

APPENDIX

Benthic Resource Characterization Reports

Prepared for



MAY 2022

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ACRONYMS AND ABBREVIATIONS

BOEM	U.S. Bureau of Ocean Energy Management
CFR	Code of Federal Regulations
COP	Construction and Operations Plan
Empire	Empire Offshore Wind LLC
ft	foot
m	meter
NEFSC	Northeast Fisheries Science Center
SPI	sediment profile imagery

This Appendix to the Construction and Operations Plan (COP) presents complete reports of benthic surveys conducted by Empire Offshore Wind LLC (Empire) and its contractors to support the characterization of benthic resources in Lease Area OCS-A 0512 and supporting submarine export cable siting corridors in the Project Area. Complete survey reports are included as attachments:

- **Attachment T-1, Site Assessment Plan (SAP) Benthic Survey Report** (Empire/Gardline 2018);
- **Attachment T-2, COP Benthic Habitat Characterization Report: Lease Area** (Empire/Gardline 2018);
- **Attachment T-3, COP Benthic Survey Report: Siting Corridors** (Empire/Inspire 2019);
- **Attachment T-4, COP Benthic Survey Report: EW 1 Submarine Export Cable Siting Corridor** (Empire/Alpine 2020);
- **Attachment T-5, COP Benthic Survey Report: EW 2 Landfall** (Empire/Alpine 2021); and
- **Attachment T-6, COP Benthic Survey Report: EW 2 Submarine Export Cable Siting Corridor** (Empire/Gardline 2021).

Benthic surveys were conducted in accordance with the following guidelines:

- The Bureau of Ocean Energy Management's (BOEM's) site characterization requirements in 30 Code of Federal Regulations (CFR) § 585.626;
- BOEM's *Guidelines for Providing Benthic Habitat Survey Information for Renewable Energy Development on the Atlantic Outer Continental Shelf Pursuant to 30 CFR Part 585* (BOEM 2019a);
- BOEM's *Guidelines for Providing Information on Fisheries for Renewable Energy Development on the Atlantic Outer Continental Shelf Pursuant to 30 CFR Part 585* (BOEM 2019b); and
- The National Oceanic and Atmospheric Administration National Marine Fisheries Service Greater Atlantic Regional Fisheries Office's *Recommendations for Mapping Fish Habitat* (NOAA Fisheries 2020).¹

The characterization of benthic resources within and surrounding the Project Area (**Figure T-1**) presented in **Section 5.5 Benthic Resources and Finfish, Invertebrates, and Essential Fish Habitat** and **Appendix U Essential Fish Habitat Assessment** incorporated data from Empire's site-specific surveys; publicly-available databases (e.g. NOAA Fisheries 2019 [EFH Mapper], Northeast Regional Ocean Council 2019, Mid-Atlantic Regional Ocean Council 2019); regional surveys; resource reports (e.g. Battista et al. 2019, NYSEDA 2017, Guida et al. 2017, NEFMC 2017, NOAA Fisheries 2017, MAFMC 2016 and 2017); and relevant peer-reviewed literature (see Section 5.5.4 References).

¹ This guidance was released in May 2020; therefore, it was referenced only for the 2020 surveys.

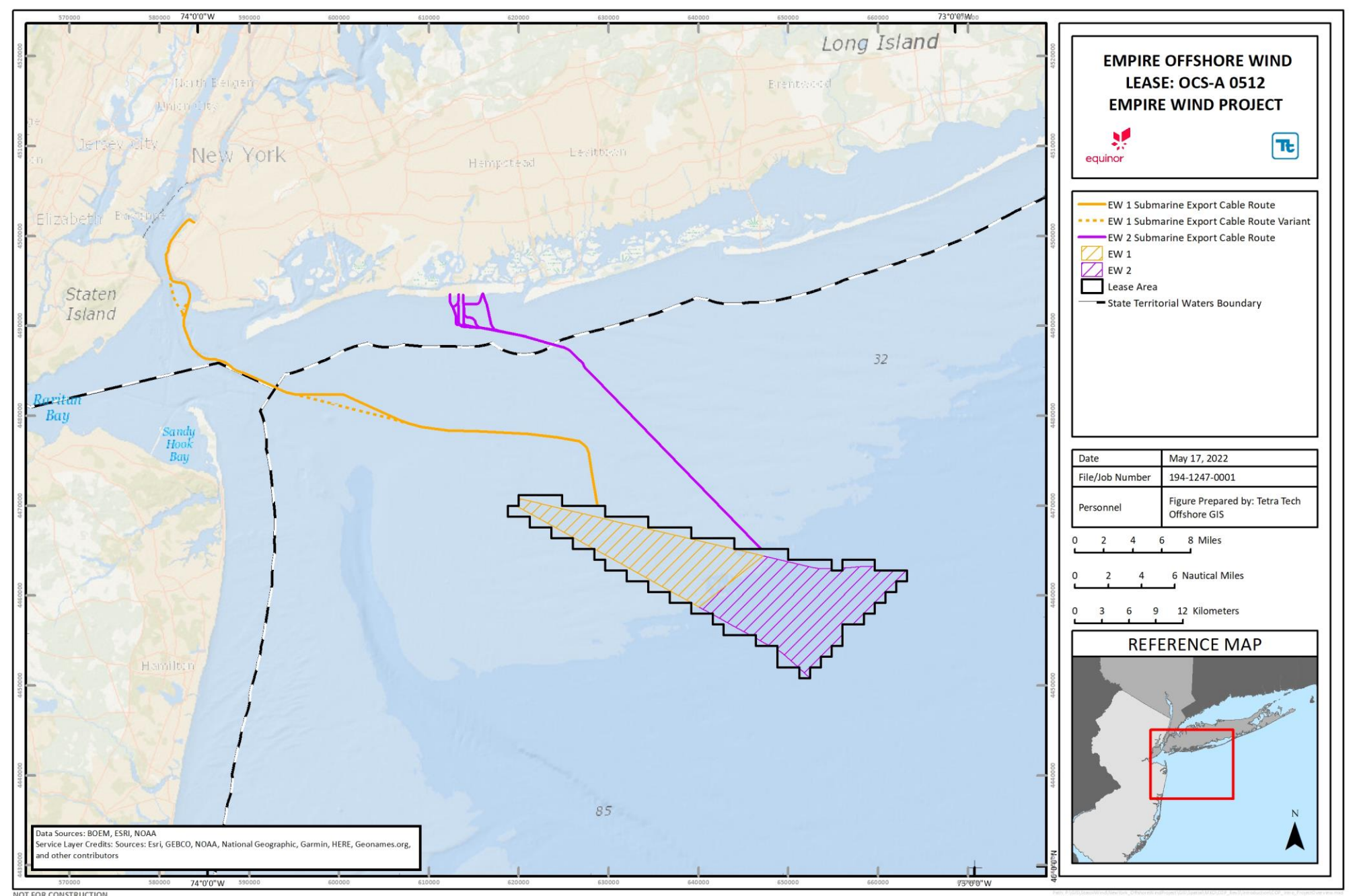


Figure T-1 Project Area

Empire conducted site-specific geophysical, geotechnical, and benthic surveys across the Lease Area and a large proportion of the submarine export cable siting corridors from March 2018 to November 2018; additional surveys in spring 2019 filled data gaps in the submarine export cable siting corridors. Empire contracted Alpine Ocean Seismic Survey Inc. (Alpine) to perform the surveys from March 18, 2018 to December 2, 2018 using survey vessels *RV Shearwater* and *RV Ocean Researcher*. The survey equipment and scope included, but was not limited to, the following:

- Gridded survey lines at a spacing of approximately 98 by 1,640 feet (ft, 30 by 500 meters [m]);
- Depth sounding (multibeam echosounder) to determine site bathymetry and elevations;
- Magnetic intensity measurements (gradiometer) for detecting local variations in the regional magnetic field from geological strata and potential ferrous objects on and below the bottom;
- Seafloor imaging (sidescan sonar survey) for seabed sediment classification purposes, to identify natural and man-made acoustic targets on the seabed, as well as any anomalous features;
- Shallow penetration sub-bottom profiler to map the near-surface stratigraphy (from seabed surface to 16.4 ft [5 m] below seabed) soils below the seabed;
- Medium penetration sub-bottom profiler to map deeper subsurface stratigraphy as needed (soils down to 246-328 ft [75-100 m] below seabed);
- Cone penetrometer tests and vibracores in the Lease Area and along the submarine export cable siting corridors; and
- Sediment grab samples and drop-down video images at 67 sampling locations (see **Table T-1**) to support the interpretation of geophysical data to characterize surficial sediment conditions and benthic habitat, including macrofaunal analysis with samples sieved at 0.5-millimeter mesh size.

Site-specific and Project-specific geophysical survey data (multibeam echo sounder and side-scan sonar) were used to support the characterization of seabed conditions. Sediment grab samples were analyzed for grain size distribution, total organic carbon, and benthic infauna (identified and classified according to the Coastal and Marine Ecological Classification Standard [Federal Geographic Data Committee 2012]). Digital imagery was reviewed to aid in identification of key habitat types, macroinvertebrates, and fish. Details of the survey campaigns are provided in **Appendix H Preliminary Marine Site Investigation Report**.

Empire contracted Inspire, LLC (Inspire) to conduct benthic sampling along the proposed submarine export cable siting corridors in Spring 2019. Sampling methods differed from the initial survey in that sediment profile imagery (SPI) rather than grab samples was used to characterize benthic habitats. The interpretation of benthic substrate indicated by backscatter was well-correlated with SPI results. Grain size distribution was analyzed in 15 sediment grab samples to ground-truth the SPI results; no infauna or epifauna were sampled (see **Table T-1**). Empire's site-specific surveys are listed in **Table T-1** and briefly described below. Survey results are summarized in **Section 5.5** and **Appendix U**, and full survey reports are included in this Appendix. Digital imagery is available upon request.

Table T-1 Empire's Site-Specific Benthic Surveys

Project Subarea	Sediment Grabs (Grain Size)	Sediment Grabs (Benthic Infauna)	Benthic Imagery		Description of Survey		
		Method a/	Sample Number	Method	Sample Number	Sample Dates	Surveyor
Lease Area							
Site Assessment Report (Attachment T-1)	15 (3 grabs at 5 stations)	0.1-m² Day grab	15 (3 grabs at 5 stations)	Drop-down still images	80	2018 Mar-Apr	Alpine/ Gardline
COP Benthic Habitat Characterization Report (Attachment T-2)	67	0.04-m² Ted Young modified van Veen sampler; 0.5 µm sieve; CMECS	67	Drop-down still images and 600-m towed video transects	3,082 images (2,469 still images and 613 video snapshots)	2018 Jun- Dec	Alpine/ Gardline
Offshore Export Cable Corridors							
Benthic Assessment Survey Report (EW 1 and EW 2) (Attachment T-3) b/	16	no organisms collected		SPI/PV	172	2019 July	Inspire
2020 Benthic Survey Report (EW 1) (Attachment T-4)	74 (3 grabs at 26 stations)	0.1-m² Modified Van Veen Sampler	26	600-m towed video transects	26 transects; 18 hours of video; 2,222 still images and 370 video snapshots	2020 Nov-Dec	Alpine/ RPS
Habitat Characterization Report (EW 2) (Attachment T-5)	37	Modified Day Grab/Van Veen	37	Drop-down still images and 600-m towed video transects	15 transects; 1,683 still images and 227 video snapshots)	2020 Nov-Dec	Gardline
2021 Benthic Survey Report (EW 2) (Attachment T-6)	36 (3 grabs at 12 stations)	0.1-m² Modified Van Veen Sampler	36 (3 grabs at 12 stations)	Drop-down still images and 600-m towed video transects	12 transects (5 with useable images); ~3 hours of video; 712 still images	2021 Apr-May	Alpine/ RPS

Project Subarea	Sediment Grabs (Grain Size)	Sediment Grabs (Benthic Infauna)		Benthic Imagery		Description of Survey	
		Method a/	Sample Number	Method	Sample Number	Sample Dates	Surveyor

Notes:

a/ All surveys except the Site Assessment Report Survey (**Attachment T-1**) used a 0.5-m sieve to separate benthic infauna from sediment in the grab sample; samples in **Attachment T-1** were sieved using a 1.0 mm sieve

b/ The survey described in **Attachment T-3** includes sample locations along submarine export cable routes previously considered, which are no longer included in the PDE.

SPI/PV = Sediment profile image/plan view image

To augment the 2019 survey data and characterize previously unsurveyed portions of the EW 2 submarine export cable siting corridor, Empire conducted additional benthic surveys from October 2020 to May 2021. Empire contracted Alpine to perform a geophysical and environmental survey along the EW 2 export cable corridor to ground truth the results of geophysical data, characterize surficial sediment conditions, and provide benthic habitat classification as per BOEM guidelines and NOAA Fisheries recommendations (**Attachment T-4**). Empire contracted Alpine to perform an additional high-resolution geophysical survey at the EW 2 landfall (**Attachment T-5**). The survey spanned April to May 2021 and employed multi-beam echo sounder; ultra-short baseline; sound velocity profiler; modified Van Veen grab; shallower water camera system; and water quality profiler data. The surveys corroborated characterizations of softbottom habitat in previously surveyed portions of the EW 2 submarine export cable siting corridor and detected novel hardbottom (e.g., cobbles, boulders) in previously unsurveyed portions of the corridor. Empire contracted Gardline Limited (Gardline) to characterize surficial sediment and provide benthic habitat classifications in the offshore portion of the EW 2 submarine export cable siting corridor (**Attachment T-6**). The survey spanned October 2020 to April 2021 and employed multi-beam echo sounder; side scan sonar; magnetometer; shallow- and medium-penetration sub-bottom profiler; shallow water camera system; modified Van Veen grab and Day grab; and water quality profiler data.

Empire augmented their site-specific high resolution geophysical and benthic surveys with the following data sources to characterize the distribution and relative abundance of fishes and invertebrates in the Project Area:

- Beam trawls and grab samples collected in 2016 by BOEM for preliminary characterization of the Lease Area (Guida et al. 2017);
- Northeast Fisheries Science Center (NEFSC) seasonal trawls and beam trawls (NEFSC 2007, 2009);
- Video and still images collected by National Ocean Service, National Centers for Coastal Ocean Science for BOEM at almost 400 locations in the Lease Area (Battista et al. 2019);
- NEFSC Sea Scallop Dredge and Habitat Camera Surveys, NEFSC Clam Survey (NEFSC 2018a), NEFSC Ecosystem Monitoring Cruises (ichthyoplankton and zooplankton), New Jersey Department of Environmental Protection Division of Fish and Wildlife Ocean Trawl Survey, Northeast Area monitoring and Assessment Program Nearshore Trawl Survey (summarized in NYSED 2017); NEFSC Multispecies Bottom Trawls (NEFSC 2018b, 2019); and
- Other reports and publications (e.g., NAS 2018; Walsh and Guida 2017; Hare et al. 2016; Walker et al. 2016 [scallop survey]), and others.

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ATTACHMENT T-1 SITE ASSESSMENT PLAN (SAP) BENTHIC SURVEY REPORT

Alpine/Gardline Report: *NY Empire Wind Geophysical Survey ST18507*



Survey Report for
**Alpine Ocean Seismic Survey Inc. On behalf of
Statoil US Wind LLC**

Project:
**NY Empire Wind Geophysical Survey
ST18507**

Description:
Habitat Characterization Report

Survey Date:
**Survey: 15-Mar-2018 to 01-Apr-2018
Environmental: 31-Mar-2018 to 31-Mar-2018**

Project Number:
11179

Client Reference:
ST18904

Report Status:
Final

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EXECUTIVE SUMMARY

During March and April 2018, Alpine Ocean Seismic Survey, Inc. (Alpine) was contracted by Statoil US Wind LLC (now known as Equinor US Wind LLC) to acquire high resolution geophysical (HRG), environmental and geotechnical survey data in sections of the Commercial Lease of Submerged Lands and Renewable Energy Development on the Outer Continental Shelf (OCS-A 0512). The survey data was required to inform the Site Assessment Plan (SAP) for the deployment of Floating Light Detection and Ranging Buoys and metocean moorings for site resource characterization. The SAP Survey Campaign area is located 22 to 39 kilometers south of Long Island, New York and covered an area of approximately 1380km².

The objective of the survey as defined by the scope of work (Statoil, 2017) was to obtain data for:

- Identification of historic properties on or within the seabed
- Identification of seafloor sediment and seafloor morphology
- Identifications of seabed obstructions
- Identification of mobile sand deposits
- Quantify and describe the characteristics of seabed sediments
- Describe the biological nature of the seabed
- Mapping of sand thickness and identification of the unconformity related to the last sea level lowstand
- Identification of shallow paleolandforms that could represent high probability locations (e.g. former river bank areas) where humans would have inhabited when the continental shelf was emergent during the last sea level lowstand
- Identify geological or manmade hazards (e.g. buried objects, shallow gas, lithological heterogeneities, etc.) beneath the seafloor that could affect the mooring systems
- Image the shallow subsurface conditions to support the interpretation and mapping of stratigraphic layering and geologic structure
- Map shallow and deep channel infill
- Map presence of gravel lag
- Describe Unit formation and Stratigraphy

A full geophysical suite consisting of multi-beam bathymetry, side scan sonar, magnetometer, and shallow and medium penetration sub-bottom profiler (high-frequency CHIRP, and single channel sparker) was acquired. The original survey objective was to target up to three Flidar survey locations (Flidar 1 to Flidar 3), however a decision was made by the client to only survey two Flidar sites (Flidar 1 and Flidar 2). Subsequently the current report and the site assessment plan (SAP) will refer to and apply to the two discrete Flidar deployment areas. Four environmental sampling stations (ST18904-ENV1 to ST18904-ENV4) were pre-selected by the client to cover each Flidar location and metocean buoy location. Following review of the geophysical data, one additional station (ST18904-ENV6) was chosen to investigate an area of medium reflectivity to ensure good coverage of all seabed substrate types. These locations are presented in the Location Map and Figure 1.1. The four environmental stations were investigated using a shallow water camera system to acquire seabed imagery and a modified 0.1m² Day grab to acquire sediment samples. At each station, three modified 0.1m² Day grab samples were collected and described. Two of the samples were acquired for macrofauna and sieved through a 1mm sized mesh, one of the samples (MFA) was later sent for analyses with the other (MFB) retained as a spare. The third sample (CHEM) was acquired for particle size and total organic matter analyses.

Geophysical data described the seabed as generally flat lying with a <1° gradient, and comprised medium to coarse sand with isolated patches of gravelly sand within the survey area. Water depths ranged between 33.0m and 37.8m

NAVD88 across the Flidar 1 survey area and 28.1m and 30.8m NAVD88 across the Flidar 2 survey area. The seabed was essentially flat, and shoaled slightly to the west across the Flidar 1 survey area whilst a broad, shallow depression up to 2m in depth traversed the Flidar 2 survey area from the northwest to southeast.

Environmental camera imagery across the survey area revealed the seabed predominantly comprised slightly gravelly medium sand with occasional shell fragments. Medium reflectivity at Station ST18904-ENV6 indicated areas of sandy gravel with sand ripples. Visible flora and fauna in seabed imagery included: Annelida (including Polychaeta worm tubes), Arthropoda (Amphipoda, Malacostraca, Paguroidea), Chordata (Tunicata), Cnidaria (cf *Hydractinia symbiolongicarpu*, Ceriantharia), Echinodermata (*Echinarachnius parma*, Holothuroidea), Foraminifera, Mollusca (Bivalvia, Cardiidae, Gastropoda, Naticidae, Neogastropoda), Rhodophyta and indeterminate Animalia.

Seabed sampling observations were used to ground truth initial geophysical interpretation and seabed imagery, with results supporting the preliminary findings. The sediment retained in the grab samples reflected the sediment observed in the seabed imagery revealing slightly gravelly fine to medium sand at Stations ENV1, ENV2 and ENV3, slightly gravelly silty sand at Station ENV4 and gravelly sand at Station ENV6. Occasional shells and shell fragments were observed at all stations. Visible fauna in the grab samples included Annelida (Polychaeta), Arthropoda (Paguroidea), Echinodermata (Clypeasteroidea), Mollusca (Bivalvia, Veneroidia), Platyhelminthes and Chondrichthyes. No species were identified as listed under the under Endangered Species Act (NOAA, 2018) or any sensitive benthic habitats as defined by BOEM (2013).

Particle size analysis revealed generally uniform sediments at the stations sampled across the survey area. Sediments were moderately well to poorly sorted, dominated by fine to coarse sands according to the Wentworth classification of mean grain size, with low (1.2% to 4.4%) mud and low (0.2% to 1.2%) gravel ($\geq 2\text{mm}$). The majority of stations were described as slightly gravelly sand under the modified Folk classification. The exception was Station ST1890-ENV6, which was described as gravelly sand. Concentrations of total organic matter (TOM) were generally uniform and ranged from 0.2% to 0.7% while water content ranged between 16.7% and 28.4%.

The macrofaunal community was generally homogenous, and dominated by Arthropoda, representing 49.9% of individuals and 28.3% of taxa. Three individuals were identified as 'immature'. Univariate statistics highlighted a generally homogenous moderately diverse (H' 2.38 to 3.75) and evenly distributed (J 0.61 to 0.85) community. There was no evidence of any physical disturbance to the faunal community as a result of any anthropogenic activity in the area.

A single individual of the Ocean Quahog (*Arctica islandica*) was retained within the fauna sample from Station ST18904-ENV3 and the sampled was located within an area designated as an essential fish habitat for this taxon (NOAA, 2018).

Other than the aforementioned, overall, the survey area did not fall in any final or proposed Critical Habitat as defined by the United States Fish and Wildlife Service (USFWS, 2018). Furthermore, no benthic species or protected fish species listed under Endangered Species Act (NOAA, 2018) were observed. Nor was there any evidence from the seabed imagery or sampling of any sensitive habitats within the surveyed area, as defined by BOEM (2013), such as exposed hard bottoms or those covered by ephemeral sand layers, seagrass patches, kelp or other algal beds.

SERVICE WARRANTY

USE OF THIS REPORT

This report has been prepared with due care and diligence and with the skill reasonably expected of a reputable contractor experienced in the types of work carried out under the contract and as such the findings in this report are based on an interpretation of data which is a matter of opinion on which professionals may differ and unless clearly stated is not a recommendation of any course of action.

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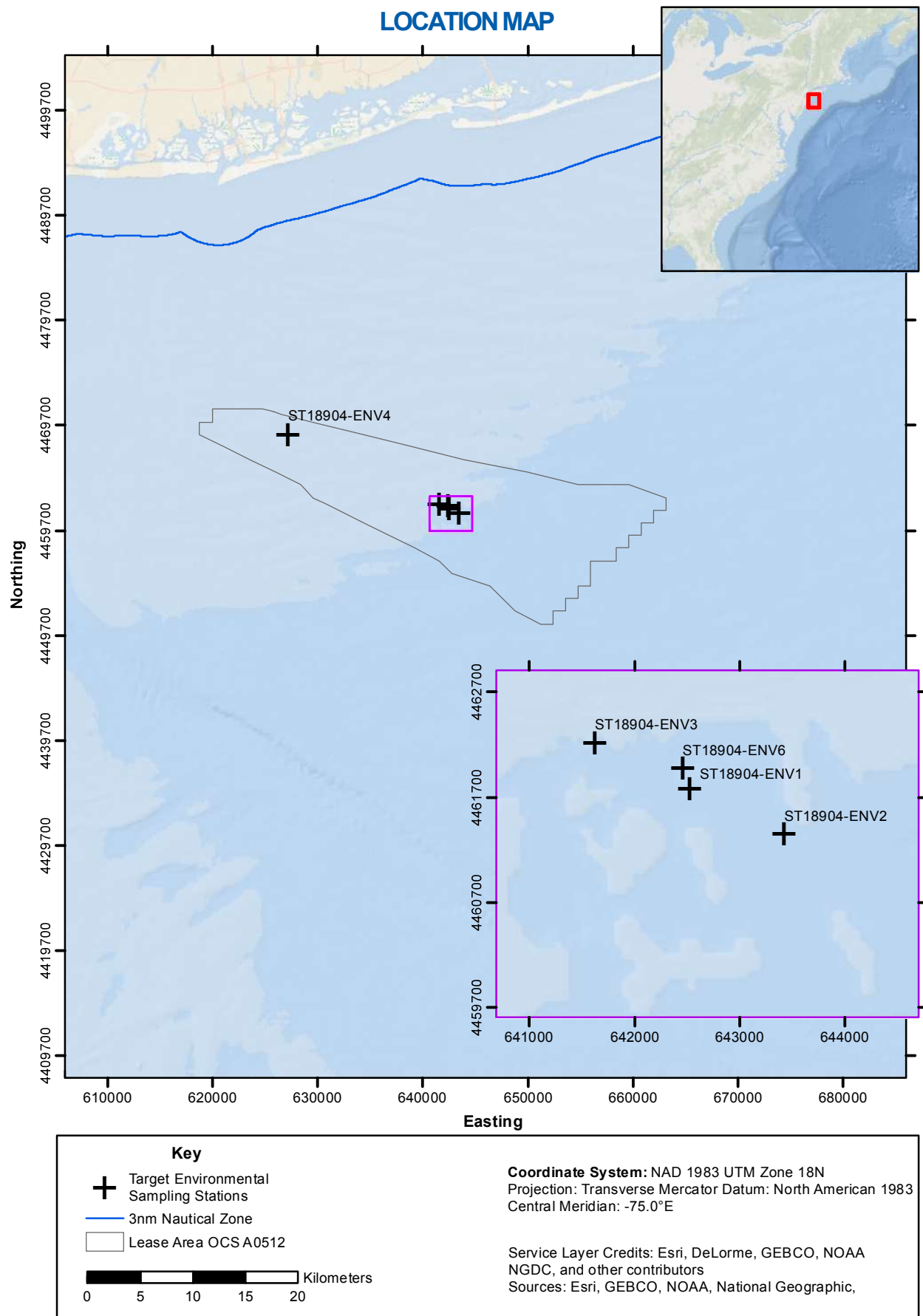


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GLOSSARY OF TERMS AND ABBREVIATIONS

Benthic	Relating to the seabed	NOAA	National Oceanic and Atmospheric Administration
Biogenic	Produced by living organisms	PRIMER	A statistical analysis program - Plymouth
BOEM	Bureau of Ocean Energy Management		Routines in Multivariate Research
Clay	Sediment grains <3.9µm in diameter	PSD	Particle Size Distribution
CM	Central Meridian	QC	Quality Control
CMECS	Coastal and Marine Ecological Classification Standard	Sand	Sediment grains ≥63µm and <2mm in diameter
Fines	Sediment grains <63µm in diameter (same as Mud)	SAP	Site Assessment Plan
FLIDAR	Floating Light Detection and Ranging Buoy	SD	Standard deviation
Gravel	Sediment grains >2mm in diameter	Silt	Sediment grains ≥3.9µm and <63µm in diameter
HRG	High Resolution Geophysical	SOW	Scope of Work
Macrofauna	Organisms that are normally larger than the mesh size of the sieve used. In this case 1mm.	SSS	Side Scan Sonar
		TOM	Total Organic Matter
MARA	Marine Archaeological Resource Assessment	UTM	Universal Transverse Mercator
MBES	Multi-beam Echo Sounder		
MDS	Multi Dimensional Scaling		
MLLW	Mean Lower Low Water		
Mud	Sediment grains <63µm (includes Silt and Clay)		
NAD	North American Datum		

1 INTRODUCTION

1.1 Scope of Work

Gardline Limited completed a geophysical and environmental habitat characterization survey on behalf of Statoil US Wind LLC (now known as Equinor US Wind LLC), across sections of the Commercial Lease of Submerged Lands and Renewable Energy Development on the Outer Continental Shelf (OCS-A 0512). The survey data was required to inform the Site Assessment Plan (SAP) for the deployment of Floating Light Detection and Ranging Buoys and metocean moorings for site resource characterization.. The SAP Survey Campaign area is located 22 to 39 kilometers south of Long Island, New York and covered an area of approximately 328km². The location of the survey is presented on the Location Map for reference. Survey operations were undertaken onboard the Gardline research vessel (RV) *Shearwater* between 15-Mar-2018 and 01-Apr-2018.

This report summarizes the results of the habitat characterization survey. The results of the geophysical survey are summarized where relevant in the current report, and reported in full separately (Gardline Limited, 2018).

The objective of the geophysical survey was to undertake a marine archaeological resource assessment (MARAs) and a high resolution geophysical (HRG) survey as defined in the scope of work (Statoil, 2017). The purpose of the habitat assessment was to support interpretation of geophysical data to characterize surficial sediment conditions and provide benthic habitat classification. As such the aim of the survey as defined in the SOW was to gather data for:

- Identification of historic properties on or within the seabed
- Identification of seafloor sediment and seafloor morphology
- Identifications of seabed obstructions
- Identification of mobile sand deposits
- Quantify and describe the characteristics of seabed sediments
- Describe the biological nature of the seabed
- Mapping of sand thickness and identification of the unconformity related to the last sea level lowstand.
- Identification of shallow paleolandforms that could represent high probability locations (e.g. former river bank areas) where humans would have inhabited when the continental shelf was emergent during the last sea level lowstand
- Identify geological or manmade hazards (e.g. buried objects, shallow gas, lithological heterogeneities, etc.) beneath the seafloor that could affect the mooring systems.
- Image the shallow subsurface conditions to support the interpretation and mapping of stratigraphic layering and geologic structure.
- Characterize and map sediment structure and bedrock stratigraphy and structure down to 80 meters below the seafloor.
- Map shallow and deep channel infill
- Map presence of gravel lag
- Describe Unit formation and Stratigraphy

The geophysical SoW requirements were achieved by using a multi-beam echo sounder (MBES), side scan sonar (SSS), magnetometer, and shallow and medium penetration sub-bottom profiler (SBP); specifically a pinger and sparker [ultra-high resolution seismic; UHRS]) spread. The environmental survey component utilized a shallow water camera system for seabed imagery acquisition and a 0.1m² Day grab to obtain sediment samples across the survey area. The survey area comprised two sites; Flidar 1 and Flidar 2. The Flidar 1 site encompassed the two Metocean mooring locations (Mooring 1 and Mooring 2) and the Flidar 1 location whilst the Flidar 2 site specifically included the Flidar 2 location.

The coordinates for the floating lidar locations are presented in Table 1.1. All positional information in this report is referenced to GRS-1980 Ellipsoid, North American Datum (NAD) 1983. All grid coordinates are projected using Universal Transverse Mercator (UTM) Projection, Grid Zone 18N, Central Meridian (CM) 75° W.

Table 1.1 Coordinates for Floating Lidar Locations

FLIDAR Coordinates	Latitude	Longitude	Easting	Northing
Flidar 1	40°17'39.88" N	73°19'23.02" W	642530	4461784
Metocean mooring 1	40°17'25.27" N	73°18'45.31" W	643430	4461350
Metocean mooring 2	40°17'54.47" N	73°20'00.90" W	641627	4462217
Flidar 2	40°21'36.58" N	73°30'06.02" W	627225	4468810

1.2 Environmental Survey Strategy

A total of four camera and grab stations (ST18904-ENV1 to ST18904-ENV4) were pre-selected by the client to cover each Flidar location and metocean buoy location. Following review of the geophysical data, one additional station (ST18904-ENV6) investigated an area of medium reflectivity to ensure good coverage of all seabed substrate types.

All stations were investigated with a digital still camera system using a 'hover and drift' technique. Seabed sampling was then attempted at the five stations using a 0.1m² modified Day Grab. This was to obtain requisite samples for the habitat assessment as well as provide ground-truthing of the geophysical data and visual assessment of seabed habitats based on the seabed imagery. Seabed sampling was successful yielding three acceptable Day grab deployments at each station. One of the samples (designated CHEM) was sub-sampled for particle size distribution (PSD) and total organic matter (TOM) along with a spare. The remaining grab samples, designated MFA and MFB samples, were screened through a 1mm mesh size sieve to provide benthic macrofauna samples and were preserved in buffered formalin. The PSD samples and one of the macrofauna (MFA) samples were sent to their respective analytical laboratories and the results reported in Sections 2.4.1 and 2.5 respectively. A summary of the camera and Day grab sampling positions together with samples acquired at each station is listed in Table 1.2.

Details of the target locations and samples collected at each station are summarized in Table 1.2. Target and actual sampling locations, the latter of which may be slightly offset from the former, are presented in Figure 1.1 and in the surveyor's log sheets in Appendix A. Detailed methods are given in Appendix B.

Table 1.2 Summary of Environmental Sampling Positions and Samples Acquired

Station	Reason for Selection	Target	Water Depth ¹	Easting ²	Northing ²	Imagery	Acceptable Day Grab	Samples Acquired			
								Fauna ³	Total Organic	Particle Size	Spare ⁴
ST18904-ENV1	Flidar 1	Pre-selected by client	35	642530	4461784	Y	3	2	1	1	1
ST18904-ENV2	Metocean buoy 1	Pre-selected by client	36	643430	4461350	Y	3	2	1	1	1
ST18904-ENV3	Metocean buoy 2	Pre-selected by client	35	641627	4462217	Y	3	2	1	1	1
ST18904-ENV4	Flidar 2	Pre-selected by client	30	627225	4468810	Y	3	2	1	1	1
ST18904-ENV6	Area of medium reflectivity	Pre-selected by client	36	642460	4461973	Y	3	2	1	1	1

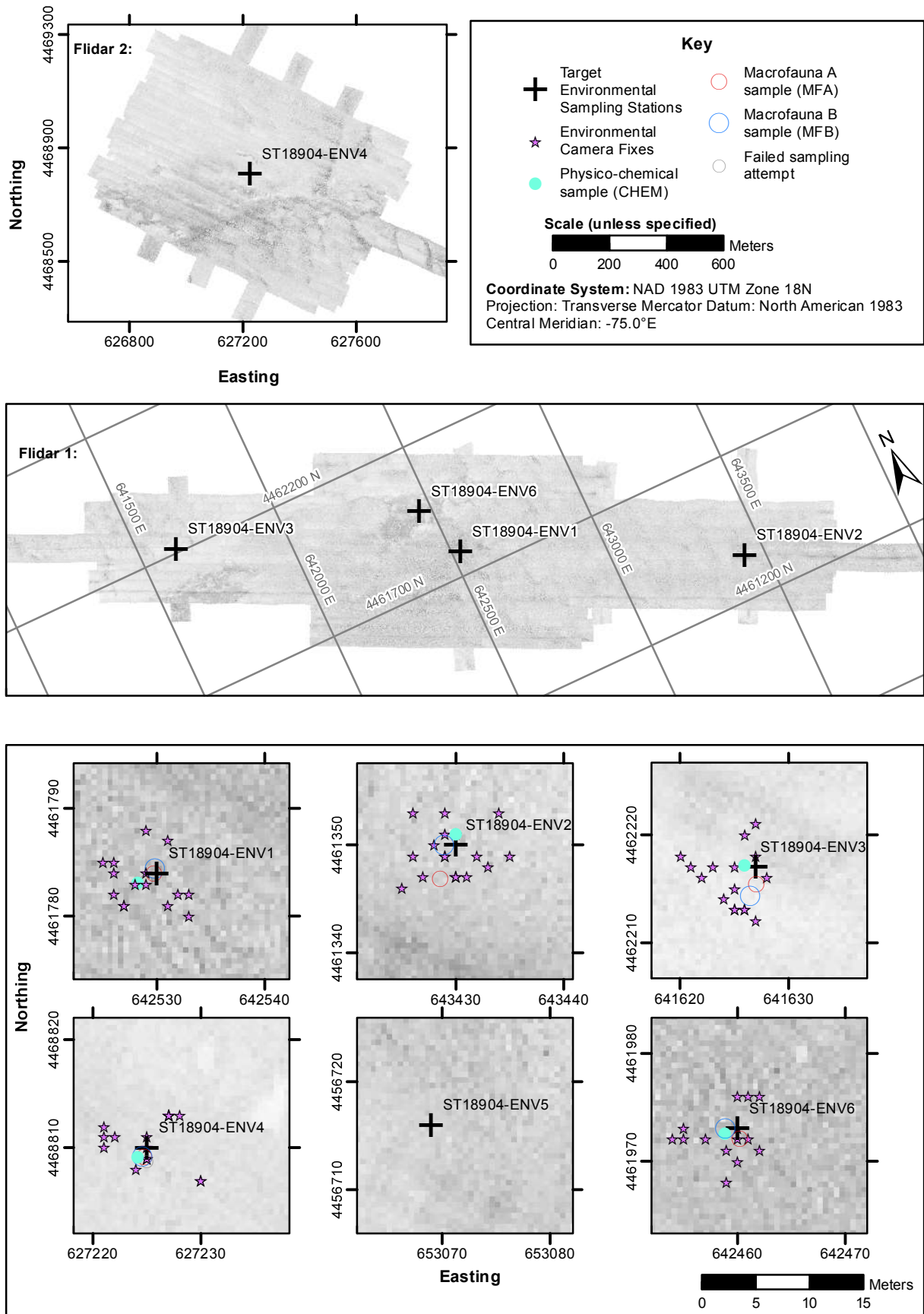
1 Observed depth at time of sampling.

2 Environmental target locations. Actual sampling positions for each individual grab sample are detailed in Appendix A.

3 One macrofauna sample was sent to be analyzed, one sample kept as a spare at room temperature. Analysis methods are as detailed in Appendix B.

4 One spare sub-sample was stored in a double-lined zip-lock bag and available for analysis of organics and particle size if required. Analysis methods are as detailed in Appendix B.

Figure 1.1 Target and Actual Sampling Locations



2 RESULTS AND DISCUSSION

2.1 Geophysical Survey Summary

2.1.1 Survey Overview

The MARA and HRG surveys for the SAP locations were conducted by the *Shearwater*. A full geophysical suite consisting of multi-beam echo sounder (MBES), side scan sonar (SSS), magnetometer, and shallow and medium penetration sub-bottom profiler (SBPs; specifically a pinger and sparker [ultra-high resolution seismic; UHRS]) was acquired. After completion of the HRG survey, the RV *Shearwater* carried out the environmental sampling. A total of five environmental sampling sites were completed during this phase of the project.

2.1.2 Bathymetry and Seabed Features

A color shaded relief of the bathymetry data and SSS mosaics overlain with interpreted seabed features are presented in Figure 2.1 and Figure 2.2. All water depth are reduced to NAVD88.

Flidar 1

Water depths across the Flidar 1 survey area ranged between 33.0m and 37.8m NAVD88. Water depth at the proposed Flidar 1 location (Station ST18904-ENV1) was 36.0m NAVD88, whilst depth at the MetOcean1 and MetOcean 2 locations (Stations ST18904-ENV2 and Stations ST18904-ENV3) were 36.3m and 35.9m NAVD88. The seabed was essentially flat, and shoaled slightly to the west and gradients did not exceed 1°. Low relief bedforms were observed across the survey area.

Seabed sediments were interpreted to comprise sand with occasional shell fragments with areas of higher reflectivity shown to contain a higher proportion of gravel. Two side scan sonar contacts were observed and interpreted as a boulder and an item of linear debris.

Flidar 2

Water depths across the Flidar 2 survey area were slightly shallower than Flidar 1 and ranged between 28.1m and 30.8m NAVD88. Water depth at the proposed Flidar 2 location (Station ST18904-ENV4) was 29.6m NAVD88. A broad, shallow depression up to 2m in depth traversed the survey area from the northwest to southeast with a seabed gradient of <1°.

Seabed sediments were comparable to the Flidar 1 survey area, and comprised sand with occasional shell fragments and isolated patches of gravelly sand. Fourteen side scan sonar contacts were present across the survey area, one of which was interpreted as an item of debris. The remaining thirteen contacts were interpreted as boulders and were situated within areas of gravelly sediments.

No infrastructures were present within both survey areas. Additionally, no seafloor, sub-surface or man-made hazards were observed.

Figure 2.1 Seabed Features with Sonar Mosaic and Color Shaded Relief of Bathymetry – Flidar 1 inclusive of Metocean 1 and Metocean 2

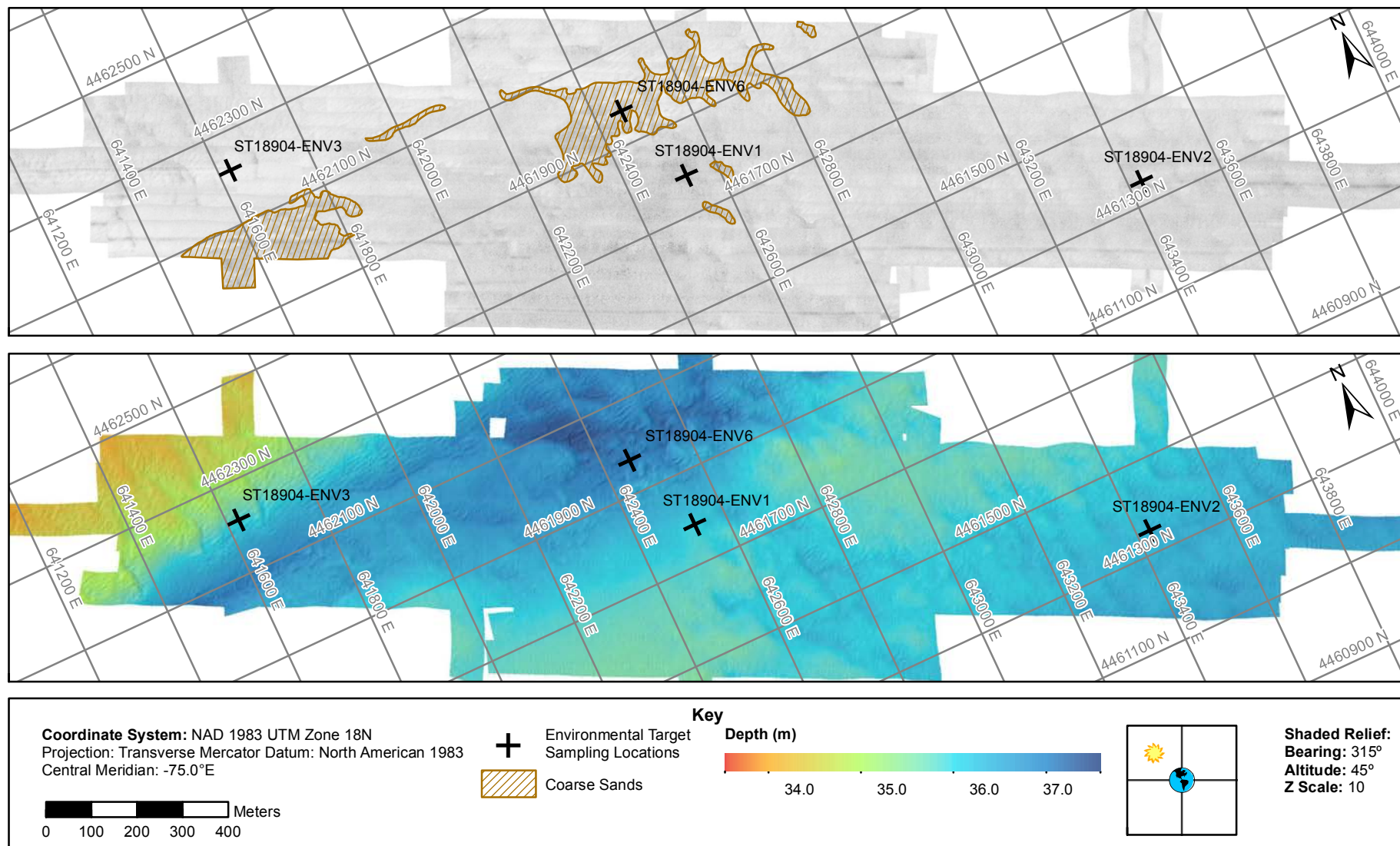
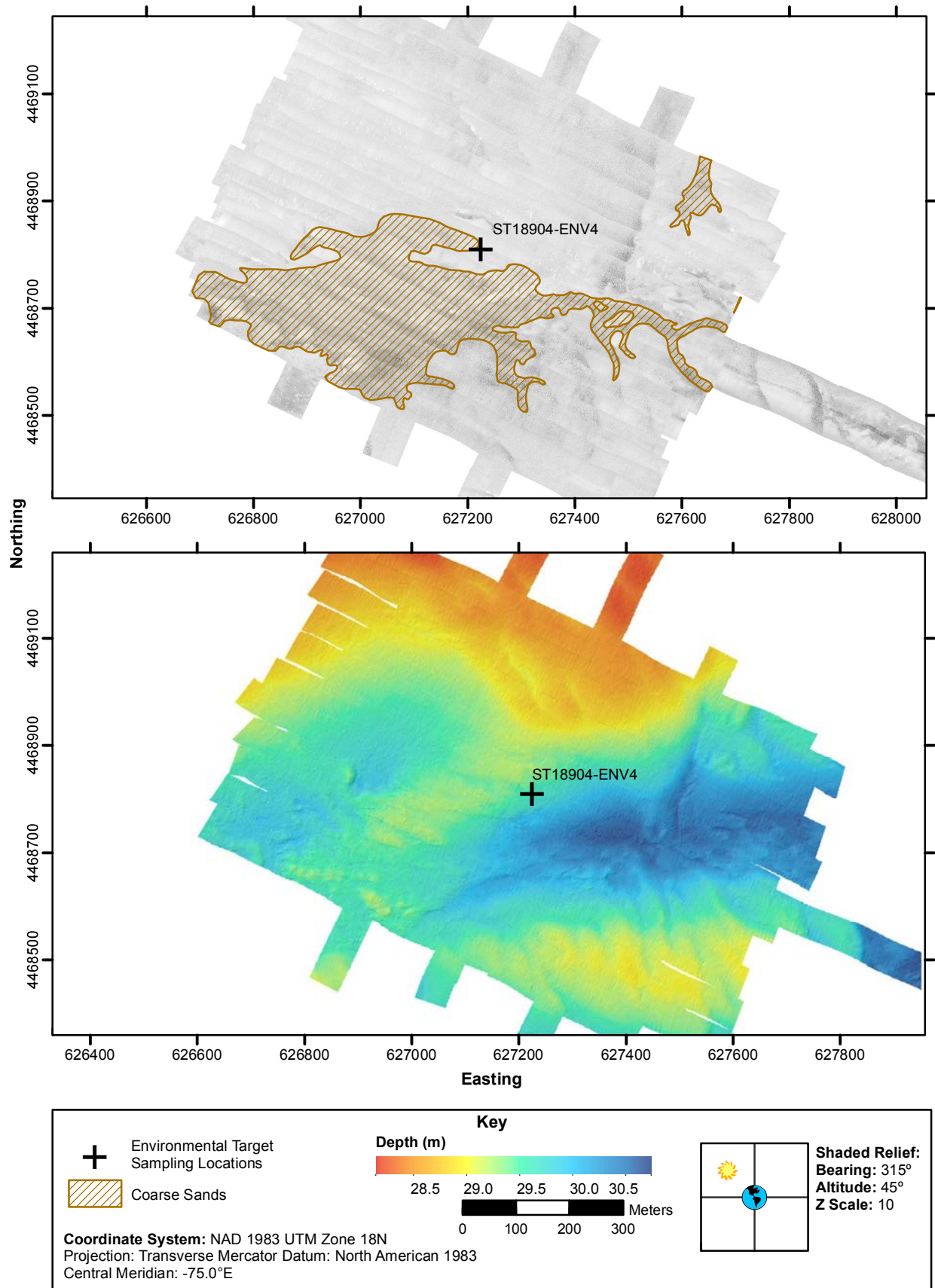


Figure 2.2 Seabed Features with Sonar Mosaic and Color Shaded Relief of Bathymetry – Flidar 2



2.2 Seabed Imagery Observations Summary

Five of the six stations selected for investigation were successfully ground truthed with the digital camera system. Environmental camera imagery across the survey area revealed the seabed predominantly comprised slightly gravelly medium sand with occasional shell fragments. Medium reflectivity at Station ST18904-ENV6 indicated areas of sandy gravel with sand ripples. In all, 80 photographs were taken across the 5 stations. All of the photographs were taken less than 10m from the target location. On average, photographs were taken 3.3m (± 1.5 SD) from their target locations. Environmental deck and positioning logs are presented in Appendix A.

The fauna observed included: Annelida (including Polychaeta worm tubes), Arthropoda (Amphipoda, Malacostraca, Paguroidea), Chordata (Tunicata), Cnidaria (cf *Hydractinia symbiolongicarpu*, Ceriantharia), Echinodermata (*Echinarachnius parma*, Holothuroidea), Foraminifera, Mollusca (Bivalvia, Cardiidae, Gastropoda, Naticidae, Neogastropoda), Rhodophyta and indeterminate Animalia.

The survey area did not fall in any final or proposed Critical Habitat as defined by the United States Fish and Wildlife Service (USFWS, 2018). Furthermore, no benthic species or protected fish species listed under the Endangered Species Act (NOAA, 2018) were observed during the current survey. However, special attention should be given to the presence of sensitive benthic habitats as defined by BOEM (2013). These include areas where information suggests the presence of exposed hard bottoms of high, moderate, or low relief; hard bottoms covered by thin, ephemeral sand layers; seagrass patches; or kelp and other algal beds, as well as the presence of Anthozoan species (BOEM, 2013). In the current survey one Anthozoa taxon (Ceriantharia) and one Hydrozoa taxon (*Hydractinia*) were observed. These are not sensitive reef-forming taxa.

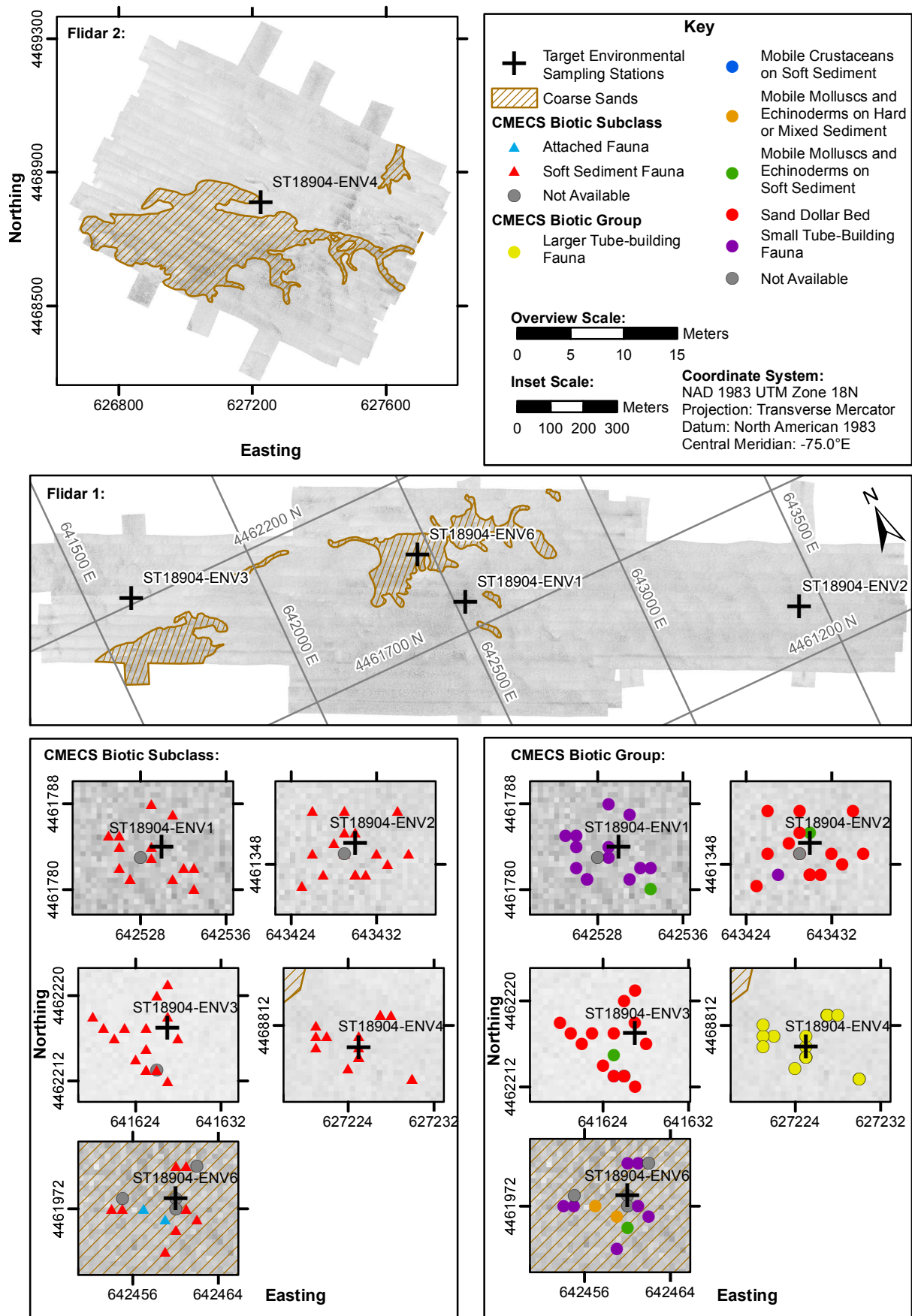
Coastal and Marine Ecological Classification Standard (CMECS) biotic classification of stations based on seabed imagery, presented in Table 2.1 was possible at a lower level at Stations ST18904-ENV2 and ST18904-ENV3, where aggregations of the common sand dollar *Echinarachnius parma* were observed. At these stations the biotic community has been categorized as '*Echinarachnius parma* Bed'.

At Stations ST18904-ENV1 and ST18904-ENV6 small faunal tubes were observed in relatively high densities and therefore these stations were categorized at the biotic group level as 'Small Tube-Building Fauna'. Station ST18904 was categorized as 'Large Tube-Building Fauna'. Figure 2.3 presents the CMECS imagery classification on a fix by fix basis.

Table 2.1 CMECS Biotic Classification From Visual Assessment

Station	Biotic Setting	Biotic Class	Biotic Subclass	Biotic Group	Biotic Community
ST18904-ENV1	Benthic Biota	Faunal Bed	Soft Sediment Fauna	Small Tube-building Fauna	
ST18904-ENV2	Benthic Biota	Faunal Bed	Soft Sediment Fauna	Sand Dollar Bed	<i>Echinarachnius parma</i> Bed
ST18904-ENV3	Benthic Biota	Faunal Bed	Soft Sediment Fauna	Sand Dollar Bed	<i>Echinarachnius parma</i> Bed
ST18904-ENV4	Benthic Biota	Faunal Bed	Soft Sediment Fauna	Larger Tube-Building Fauna	
ST18904-ENV6	Benthic Biota	Faunal Bed	Soft Sediment Fauna	Small Tube-Building Fauna	

Figure 2.3 CMECS Imagery Classification



2.3 Sediment Sampling Summary

Observations of the sediment were made by the field environmental scientist at the time of sampling. Seabed sampling observations were used to ground truth initial geophysical interpretation and seabed imagery, with results supporting the preliminary findings. A selection of photographs of the recovered samples, together with sample descriptions and positions are given in Appendix D.

Across the 5 sampling stations, 15 grab samples were retained from 17 deployments, using a modified 0.1m² steel Day grab. The two failed sampling attempts were due to low sample retention and one occasion of the grab failing to trigger. All samples were taken within 5m of their target location. On average, retained samples were acquired 1.3m (± 0.8 SD) from their target location. Environmental deck and positioning logs are presented in Appendix A.

Seabed sampling observations supported the initial geophysical interpretation and seabed imagery, with samples described as consisting of slightly gravelly fine to medium sand at Stations ENV1, ENV2 and ENV3, slightly gravelly silty sand at Station ENV4 and sandy gravel at Station ENV6. Occasional shells and shell fragments were observed at all stations.

Visible fauna within the grab samples included; Annelida (Polychaeta), Arthropoda (Paguroidea), Echinodermata (Clypeasteroidea), Mollusca (Bivalvia, Veneroidia), Platyhelminthes and Chondrichthyes (Egg cases). No benthic species or protected fish species listed under the Endangered Species Act (NOAA, 2018) were observed in the grab samples in the current survey.

2.4 Sediment Characteristics

2.4.1 Particle Size Analysis

The results of PSA, determined using wet and dry sieving, are presented in Table 2.2. Full results and histograms illustrating particle size distributions are presented in Appendix E.

The sediments across the survey area were generally homogenous and consistent with the field observations of the recovered sediment samples, seabed imagery observations and geophysical interpretation. Sediments were classified as fine sand or medium sand under the Wentworth classification of mean grain size and were described as moderately well sorted for the majority of stations. The exception was Station ST18904-ENV6 which was classified as poorly sorted coarse sand. The mean particle diameter of sediments showed a degree of variation, ranging from 133.7 μ m to 831.4 μ m at Stations ST18904-ENV4 and ST18904 ENV6.

The sand fraction ($\geq 63\mu$ m, < 2 mm) accounted for the majority of the sample at each station ranging from 75.8% at Station ST18904-ENV6 to 97.9% at Station ST18904-ENV3. The remaining sample comprised gravel (≥ 2 mm) varying between 0.2% at Station ST18904-ENV3 and 23.0% at Station ST18904-ENV6, while percentages of fines ($< 63\mu$ m) ranged between 1.2% and 4.4%. These generally homogenous results resulted in the majority of stations being described as slightly gravelly sand under the modified Folk classification. The exception was Station ST18904-ENV6, comprising gravelly sand due to higher gravel content.

The modified Folk classifications, and therefore CMECS substrate components classification Table 2.3), across all stations ranged from slightly gravelly sand at Stations ST18904-ENV1 to ST18904-ENV4 to gravelly sand at Station ST18904-ENV6.

Overall, the sediment classifications of fine sand to coarse sand (Wentworth) and slightly gravelly sand to gravelly sand (Folk and Ward) were comparable across both Flidar 1 and Flidar 2 survey areas, suggesting overall homogeneity in sediment type, with evidence of subtle natural spatial variation in composition across the survey area. Additionally, the results supported the geophysical interpretation of medium to coarse sands. No evidence of fishing activity such as trawl scars were observed in the seabed imagery. In conclusion, with no evidence of seabed disturbance within the area, the gravelly sediments were considered representative of the wider area and region.

Table 2.2 Sediment Characteristics

Station	Mean Diameter (μm) ¹	Mean Diameter (ϕ) ¹	Mud %	Sand %	Gravel %	Wentworth Classification of Mean Grain Size	Sorting ¹	Modified Folk Classification	Total Organic Matter (%)	Water Content (%) ²
ST18904-ENV1	420.4	1.25	1.2	97.6	1.2	Medium Sand	Moderately well	Slightly gravelly sand	0.2	20.8
ST18904-ENV2	337.0	1.57	1.3	97.8	0.9	Medium Sand	Moderately well	Slightly gravelly sand	0.3	23.0
ST18904-ENV3	228.2	2.13	1.9	97.9	0.2	Fine Sand	Moderately well	Slightly gravelly sand	0.4	22.2
ST18904-ENV4	133.7	2.90	4.4	94.7	0.9	Fine Sand	Moderately well	Slightly gravelly sand	0.7	28.4
ST18904-ENV6	831.4	0.27	1.2	75.8	23.0	Coarse Sand	Poor	Gravelly sand	0.2	16.7
Minimum	133.7	0.3	1.2	75.8	0.2	Fine to coarse sand	Poor and moderately well sorted	Slightly gravelly and gravelly sand	0.2	16.7
Maximum	831.4	2.9	4.4	97.9	23.0				0.7	28.4
Mean	390.1	1.6	2.0	92.8	5.2				0.4	22.2
±SD	269.5	1.0	1.4	9.6	9.9				0.2	4.2

1 Statistics calculated using Method of Moments (MoM). Sorting coefficients (MoM standard deviation) have had Folk and Ward (1957) descriptors assigned.

2 Water content as percentage of the dry sample weight.

Table 2.3 CMECS Substrate Component Classification

Station	Substrate Origin	Substrate Class	Substrate Subclass	Substrate Group	Substrate Subgroup
ST18904-ENV1	Geologic Substrate	Unconsolidated Mineral Substrate	Fine Unconsolidated Substrate	Slightly Gravelly	Slightly Gravelly Sand
ST18904-ENV2	Geologic Substrate	Unconsolidated Mineral Substrate	Fine Unconsolidated Substrate	Slightly Gravelly	Slightly Gravelly Sand
ST18904-ENV3	Geologic Substrate	Unconsolidated Mineral Substrate	Fine Unconsolidated Substrate	Slightly Gravelly	Slightly Gravelly Sand
ST18904-ENV4	Geologic Substrate	Unconsolidated Mineral Substrate	Fine Unconsolidated Substrate	Slightly Gravelly	Slightly Gravelly Sand
ST18904-ENV6	Geologic Substrate	Unconsolidated Mineral Substrate	Coarse Unconsolidated Substrate	Gravelly	Gravelly Sand

2.4.2 Organic Matter and Organic Carbon

The results of TOM analysis is presented in Table 2.2. Organic matter in marine sediments is primarily made up of detrital matter and naphthenic materials (carboxylic acids and humic substances with a small proportion of biological biomass). Total organic matter (TOM) concentrations ranged between 0.2% at Stations ST18904-ENV1 and ST18904-ENV6 to 0.7% at Station ST18904-ENV4. Water content, measured as a percentage of the dry sample weight, ranged from 16.7% at Station ST18904-ENV6 to 28.4% at Station ST18904-ENV4.

2.5 Macrofaunal Interpretation of Benthic Grab Samples

2.5.1 Overview

Two 0.1m² faunal samples (MFA and MFB) were collected from each station, one of which (MFA) was worked up and the second retained and appropriately stored as a spare. All faunal samples were screened through a 1mm sieve. Before analyzing the data set provided by the laboratory, several taxa were removed as per our stated methods; however all grab sample records, regardless of whether they were included in statistical analyses, are listed in Appendix F. Additional species were observed opportunistically in the digital imagery but were not considered quantitatively in the statistical analysis. Please see Appendix E, Section 2.2, for a discussion of digital imagery.

2.5.2 Summary and Univariate Statistics

In total, 10 faunal samples were collected from five benthic grab sampling stations. A total of 529 individuals representing 60 taxa were recorded across the five stations. Immature specimens accounted for 3 individuals from 3 taxa representing <1% of the total individuals and 5% of the total taxa.

A single individual of the Ocean Quahog (*Arctica islandica*) was retained within the fauna sample from Station ST18904-ENV3 and the sample was located within an area designated as an essential fish habitat for this taxon (NOAA, 2018).

The presence of large numbers of juveniles in the macrobenthos tends to be ephemeral due to high mortality and can temporarily disturb the normal balance of relative abundance amongst species (and consequent measures of diversity). When ranked by abundance no juveniles were within the top ten most abundant species in all sites. A 2STAGE analysis was conducted in PRIMER (v7) to determine whether the presence of 'immature' records caused significant variation between the rationalized full and adult (all 'immature' removed) data sets. The test showed that the two data sets were c.100% similar, indicating that the 'immature' records were not expected to introduce any significant variation into the multivariate analyses. For this reason, subsequent analyses were conducted on the full faunal data set, inclusive of 'immature' counts.

The full faunal data set was divided into five major taxonomic groups: Annelida (Polychaeta), Arthropoda (Crustacea), Mollusca, Echinodermata and 'Others'. The 'Other' category comprised a single taxon of Cnidaria (Anthozoa; Ceriantharia) and three taxa of Nemertea (ribbon worm) across the surveyed area. The proportional and absolute contributions of the major taxonomic groups to the total abundance of individuals and taxa in each station is summarized in Table 2.4.

Table 2.4 Contribution of Gross Taxonomic Groups

Station	Annelida	Arthropoda	Cnidaria	Echinodermata	Mollusca	Nemertea	Total
ST18904-ENV1	29	34	0	1	1	4	69
ST18904-ENV2	14	29	0	0	1	0	44
ST18904-ENV3	20	37	0	5	20	5	87
ST18904-ENV4	86	146	2	0	2	0	236
ST18904-ENV6	70	18	0	0	1	4	93
Number of Individuals	219	264	2	6	25	13	529
Number of Taxa	27	17	1	1	11	3	60
Percentage (%) of Individuals	41.4	49.9	0.4	1.1	4.7	2.5	100.0
Percentage (%) of Taxa	45.0	28.3	1.7	1.7	18.3	5.0	100.0

Arthropoda dominated the macrofaunal composition within the survey area, with 264 individuals (49.9% of all individuals) across 17 taxa (28.3% of all taxa) (Table 2.4). Arthropoda dominated the faunal composition in terms of individuals while Polychaeta dominated the faunal composition in terms of taxa at each station. In the full data set only 2 taxa (3% of those enumerated) were found at every station (*Nephtys picta*, *Byblis serrata*). There were 37 taxa that occurred in only one station (62% of all enumerated taxa), 16 of which were represented by a single individual (27% of all enumerated taxa). Furthermore, 48 taxa (80% of those enumerated) were represented by <10 individuals across all samples.

The results of the species ranking are presented in Table 2.5. The ten most dominant taxa in the full data set comprised; Polychaeta (*Nephtys picta*, *Scoletoma fragilis*, *Scoletoma verrilli*, *Ninoe nigripes*), Crustacea (*Rhepoxynius hudsoni*, *Byblis serrata*, *Unciola irrorata*, *Ampelisca verrilli*, *Edotia triloba*) and Others (*Carinomella lactea*).

Table 2.5 Species Ranking

Rank		Species/Taxon	Total Rank Score	Fidelity	Total Abundance
Score	Abundance				
1	4	<i>Nephtys picta</i>	37	0.74	38
2	2	<i>Rhepoxynius hudsoni</i>	31	0.69	52
3	3	<i>Scoletoma fragilis</i>	30	0.75	47
4	5	<i>Byblis serrata</i>	27	0.77	4727
5	7	<i>Scoletoma verrilli</i>	25	0.83	1417
5	8	<i>Unciola irrorata</i>	25	1.00	14
7	1	<i>Ampelisca verrilli</i>	23	01.15	124
8	6	<i>Ninoe nigripes</i>	22	1.47	25
8	9	<i>Edotia triloba</i>	22	2.20	11
8	13	<i>Carinomella lactea</i>	22	4.40	9

The fidelity of the species ranking can give an indication of the taxonomic distribution, with values close to or ≥ 0.8 and ≤ 1.2 indicating a generally evenly distributed community, while values outside

this range represent a patchier distribution. Three taxa were recorded between the aforementioned range; the polychaete *S. verrilli* and the crustaceans *U. irrorata*, *A. verrilli*. All remaining top 10 ranked taxa presented values outside this range which indicated a patchy distribution of taxa between stations. There was minor re-ordering of most taxa except *Rhepoxynius hudsoni*, *S. fragilis*, *E. triloba* and *C. lactea* when ranked by abundance, and their absence from one or more stations across the survey area were additional indicators of slightly more uneven distribution of these species.

The univariate statistics were indicative of a generally homogenous community structures across the stations in the full data set. All stations were generally evenly distributed and of low dominance, with mean Pielou's evenness values of 0.77 (± 0.09 SD) and mean Simpson's dominance indices of 0.19 (± 0.07 SD). Mean Shannon-Weiner diversity values for were indicative of a moderately diverse community ($H' \leq 3.75$).

Table 2.6 Faunal Univariate Statistics

Station	n Taxa	n Individuals	Margalef's Richness (d)	Simpson's Dominance (λ)	Pielou's Evenness (J)	Shannon Wiener Diversity ($H'_{\log 2}$)
ST18904-ENV1	19	69	4.25	0.12	0.85	3.60
ST18904-ENV2	8	44	1.85	0.23	0.79	2.38
ST18904-ENV3	23	87	4.93	0.13	0.83	3.75
ST18904-ENV4	24	236	4.39	0.30	0.61	2.86
ST18904-ENV6	21	93	4.41	0.18	0.76	3.33
Minimum	8	44	1.85	0.12	0.61	2.38
Maximum	25	236	4.93	0.30	0.85	3.75
Mean	19	106	3.97	0.19	0.77	3.18
$\pm$ SD	6	75	1.21	0.07	0.09	0.56

CMECS Biotic classification of stations based on seabed imagery was mostly confirmed by the dominant macrofauna taxa found at each station, which allowed the classification to the lowest level (Table 2.7). The exceptions were Stations ST18904-ENV1 and ST18904-ENV6, where their Biotic Group changed from 'Small Tube-building Fauna' to 'Diverse Soft Sediment Epifauna' and 'Small Surface-Burrowing Fauna' respectively.

Station ST18904-ENV1 faunal composition comprised sand dollars and mobile mollusk, and was therefore categorized as having a resemblance to a 'Sand Dollar/Sea Pansy/Mobile Mollusk Bed (Large Megafauna)'. At Station ST18904-ENV4 *Ampelisca* sp. dominated the macrofaunal composition and therefore the biotic community has been categorized as 'Robust *Ampelisca* Bed'. By comparison the macrofauna community at Station ST18904-ENV6 was dominated by Lumbrineridae and therefore categorized at the biotic community level as a 'Lumbrinerid Bed'. The remaining stations were categorized as '*Echinarachnius parma* Bed'.

Table 2.7 CMECS Biotic Classification from Macrofauna

Station	Biotic Setting	Biotic Class	Biotic Subclass	Biotic Group	Biotic Community
ST18904-ENV1	Benthic Biota	Faunal Bed	Soft Sediment Fauna	Diverse Soft Sediment Epifauna	Sand Dollar/ Sea Pansy/ Mobile Mollusk Bed (Large Megafauna)
ST18904-ENV2	Benthic Biota	Faunal Bed	Soft Sediment Fauna	Sand Dollar Bed	<i>Echinarachnius parma</i> Bed
ST18904-ENV3	Benthic Biota	Faunal Bed	Soft Sediment Fauna	Sand Dollar Bed	<i>Echinarachnius parma</i> Bed
ST18904-ENV4	Benthic Biota	Faunal Bed	Soft Sediment Fauna	Larger Tube-Building Fauna	Robust <i>Ampelisca</i> Bed
ST18904-ENV6	Benthic Biota	Faunal Bed	Soft Sediment Fauna	Small Surface-Burrowing Fauna	Lumbrinerid Bed

2.6 Summary of Results

Sediment Characteristics

The geophysical (MBES and SSS) data together with seabed imagery observations indicated that the seabed sediments across the survey area predominantly comprised medium to coarse sand with patches of gravelly sand. Results of the PSD analysis and seabed imagery analysis were consistent with the geophysical interpretation. The modified Folk classification, and therefore CMECS substrate components classification, across all stations ranged between slightly gravelly sand (Stations ST18904-ENV1 and ST18904-ENV4) and gravelly sand (Station ST18904-ENV6).

TOM concentrations and water content were generally homogenous.

Faunal Community

The macrofaunal (infaunal) community was found to be relatively sparse with only 2 taxa (3%) found at every station and 37 taxa (67%) present at only one station. Macrofaunal abundance was also low with 48 taxa (80%) represented by <10 individuals, 16 of which were represented by a single individual (27% of taxa). The analysis of the macrofauna stations revealed a community dominated by Arthropoda (49.9%) followed by Annelida (41.4%) with the remaining Phyla (Cnidaria, Echinodermata, Mollusca and Nemertea) representing ≤5% of the community each. Univariate analysis suggested the survey area was homogenous, with a generally evenly distributed and diverse macrofauna community of low species dominance.

All stations were categorized at the CMECS Biotic Community level as Sand Dollar/Sea Pansy/Mobile Mollusk Bed (Large Megafauna), *Echinarachnius parma* Bed, Robust *Ampelisca* Bed and Lumbrinerid Bed.

A single individual of the Ocean Quahog (*Arctica islandica*) was retained within the fauna sample from Station ST18904-ENV3, located within an essential fish habitat for this taxon according to NOAA (2018). Furthermore, two individuals of Anthozoa were observed in the fauna sample from Station ST18904-ENV4. The anthozoan (Ceriantharia) and hydrozoan (*Hydractinia*) are not reef-forming species listed by BOEM (2013) as comprising sensitive habitats.

Other than the aforementioned, overall, the survey area did not fall in any final or proposed Critical Habitat as defined by the United States Fish and Wildlife Service (USFWS, 2018) or National Marine Fisheries Service. Furthermore, no benthic species or protected fish species listed under the Endangered Species Act (NOAA, 2018) were observed in the seabed imagery or the samples acquired and analyzed. Nor was there any evidence from the seabed imagery or sampling of any sensitive habitats within the surveyed area, as defined by BOEM (2013), such as exposed hard bottoms or those covered by ephemeral sand layers, seagrass patches, kelp or other algal beds.

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APPENDICES

APPENDIX A FIELD SAMPLING LOGS

APPENDIX A FIELD SAMPLING LOGS

SEABED IMAGERY LOG SHEET (Deck)							QPRO-0753		
Job No: 11179			Area: NJ/NY Bight		Vessel: RV <i>Shearwater</i>		Operator: TSH		
Date: from: 31-Mar-2018 to: 31-Mar-2018			Page: Page 1 of 2		Client: Statoil US Wind LLC		Scale bar: 10cm interval laser lines		
Project: NY Empire Wind G&G Survey							Equipment: Kongsberg 14-208		
Sample Number	Station Number	Time on overlay	DVD/ Video No	DVD Chapter	Counter (start & end)	Sediment Description	Comments	TOT FIXES	FIXES Nos
31-Mar-18									
1	ST18904-ENV3	15:07:00	1	3	00:04:00	Sediment: Slightly gravelly fine sand with shell fragments. Sediment easily suspended. Occasional sand ripples observed. Fauna: Annelida (Polychaeta), Crustacea (Paguroidea), Echinodermata (Clypeasteroida - Sand Dollar), Mollusca (Gastropoda).	Fix number on overlay has extra zero added onto the end. VHS wasn't recording until 15:17	16	1-16
		15:20:00	1		00:17:00				
2	ST18904-ENV6	15:39:00	1	4 & 5	00:17:00	Sediment: Coarse sandy gravel, with shells and shell fragments. Sand ripples observed. Fauna: Annelida (Polychaeta), Echinodermata (Clypeasteroida - Sand Dollar), Mollusca (Bivalvia).		14	17 - 30
		15:51:00	1		00:29:00				
3	ST18904-ENV1	16:28:00	1	6 & 7	00:28:00	Sediment: Slightly gravelly coarse sand with shell fragments. Fauna: Annelida (Polychaeta), Crustacea (Paguroidea), Echinodermata (Clypeasteroida - Sand Dollar), Mollusca (Bivalvia).		15	31 - 45
		16:41:00	1		00:41:00				
4	ST18904-ENV2	17:03:00	1	8 & 9	00:41:00	Sediment: Slightly shelly medium sand. Fine veneer of sediment on surface easily suspended. Sand ripples observed. Fauna: Annelida (Polychaeta), Crustacea (Paguroidea), Echinodermata (Clypeasteroida - Sand Dollar).		18	46 - 63
		17:15:00	1		00:53:00				

APPENDIX A FIELD SAMPLING LOGS

SEABED IMAGERY LOG SHEET (Deck)							QPRO-0753		
Job No: 11179			Area: NJ/NY Bight		Vessel: RV <i>Shearwater</i>		Operator: TSH		
Date: from: 31-Mar-2018 to: 31-Mar-2018			Page: Page 2 of 2		Client: Statoil US Wind LLC		Scale bar: 10cm interval laser lines		
Project: NY Empire Wind G&G Survey							Equipment: Kongsberg 14-208		
Sample Number	Station Number	Time on overlay	DVD/ Video No	DVD Chapter	Counter (start & end)	Sediment Description	Comments	TOT FIXES	FIXES Nos
5	ST18904-ENV4	21:10:00	2	1 & 2	00:53:00	Sediment: Fine sand with occasional shell fragments. Sediment easily suspended during sampling.		17	64 - 80
		21:23:00	1		01:06:00	Fauna: Annelida (Polychaeta tubes).			

APPENDIX A FIELD SAMPLING LOGS

Seafloor Sampling Positioning Summary																			
Job No		11179						Vessel		R.V. <i>Shearwater</i>									
Client		Statoil US Wind LLC						Vessel Reference Point (VRP)		CoG									
Project Name		NY Empire Wind G&G Survey						Deployment Location		A-frame, starboard side				x	6.946	y	-12.634	z	5.806
Primary Positioning System		QPS QINSy						Actual Coordinates derived from		Deployment Location									
Geodetic Reference System		Datum		North American Datum (NAD) 1983			Ellipsoid	GRS-1980			Projection		UTM ZONE 18 (75W)			Vertical / Tidal Datum		LAT	
Date	Time (UTC/GMT)	Fix number	Stn No	Penetration	Sample Retention	Retention	Observed Seafloor Depth (m)	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks		
								Easting	Northing	Easting	Northing	dE	dN	Range	Bearing				
31-Mar-2018	15:09:13	1	ST18904-ENV3			Camera	36	641628	4462216	641627	4462217	-1	1	1	321	TSH			
31-Mar-2018	15:09:41	2	ST18904-ENV3			Camera	36	641625	4462217	641627	4462217	2	0	2	81	TSH			
31-Mar-2018	15:10:39	3	ST18904-ENV3			Camera	36	641625	4462215	641627	4462217	2	2	2	46	TSH			
31-Mar-2018	15:12:13	4	ST18904-ENV3			Camera	36	641625	4462213	641627	4462217	2	4	5	24	TSH			
31-Mar-2018	15:12:56	5	ST18904-ENV3			Camera	36	641626	4462213	641627	4462217	1	4	4	15	TSH			
31-Mar-2018	15:13:10	6	ST18904-ENV3			Camera	36	641625	4462213	641627	4462217	2	4	4	24	TSH			
31-Mar-2018	15:13:48	7	ST18904-ENV3			Camera	36	641626	4462213	641627	4462217	1	4	4	9	TSH			
31-Mar-2018	15:14:23	8	ST18904-ENV3			Camera	36	641624	4462214	641627	4462217	3	3	4	46	TSH			
31-Mar-2018	15:14:37	9	ST18904-ENV3			Camera	36	641627	4462212	641627	4462217	0	5	5	1	TSH			
31-Mar-2018	15:15:56	10	ST18904-ENV3			Camera	36	641622	4462216	641627	4462217	5	1	5	77	TSH			
31-Mar-2018	15:16:04	11	ST18904-ENV3			Camera	36	641621	4462217	641627	4462217	6	0	6	87	TSH			
31-Mar-2018	15:16:49	12	ST18904-ENV3			Camera	36	641623	4462217	641627	4462217	4	0	4	88	TSH			
31-Mar-2018	15:18:10	13	ST18904-ENV3			Camera	36	641620	4462218	641627	4462217	7	-1	7	101	TSH			
31-Mar-2018	15:19:18	14	ST18904-ENV3			Camera	36	641627	4462218	641627	4462217	0	-1	1	190	TSH			
31-Mar-2018	15:20:04	15	ST18904-ENV3			Camera	36	641627	4462221	641627	4462217	0	-4	4	185	TSH			
31-Mar-2018	15:20:48	16	ST18904-ENV3			Camera	36	641626	4462220	641627	4462217	1	-3	3	155	TSH			
31-Mar-2018	15:40:14	17	ST18904-ENV6			Camera	37	642459	4461971	642460	4461973	1	2	2	29	TSH			
31-Mar-2018	15:40:44	18	ST18904-ENV6			Camera	37	642457	4461972	642460	4461973	3	1	3	75	TSH			
31-Mar-2018	15:41:28	19	ST18904-ENV6			Camera	37	642460	4461973	642460	4461973	0	0	0	149	TSH			
31-Mar-2018	15:42:37	20	ST18904-ENV6			Camera	37	642454	4461972	642460	4461973	6	1	6	77	TSH			
31-Mar-2018	15:42:45	21	ST18904-ENV6			Camera	37	642455	4461972	642460	4461973	5	1	5	76	TSH			
31-Mar-2018	15:43:32	22	ST18904-ENV6			Camera	37	642455	4461973	642460	4461973	5	0	5	92	TSH			
31-Mar-2018	15:44:38	23	ST18904-ENV6			Camera	37	642461	4461976	642460	4461973	-1	-3	4	196	TSH			
31-Mar-2018	15:45:17	24	ST18904-ENV6			Camera	37	642460	4461972	642460	4461973	0	1	1	342	TSH			
31-Mar-2018	15:45:44	25	ST18904-ENV6			Camera	37	642462	4461976	642460	4461973	-2	-3	4	221	TSH			
31-Mar-2018	15:46:27	26	ST18904-ENV6			Camera	37	642460	4461976	642460	4461973	0	-3	3	172	TSH			
31-Mar-2018	15:48:09	27	ST18904-ENV6			Camera	37	642459	4461968	642460	4461973	1	5	5	8	TSH			
31-Mar-2018	15:49:07	28	ST18904-ENV6			Camera	37	642460	4461970	642460	4461973	0	3	3	9	TSH			
31-Mar-2018	15:50:03	29	ST18904-ENV6			Camera	37	642461	4461972	642460	4461973	-1	1	1	304	TSH			
31-Mar-2018	15:50:52	30	ST18904-ENV6			Camera	37	642462	4461971	642460	4461973	-2	2	2	320	TSH			
31-Mar-2018	16:28:45	31	ST18904-ENV1			Camera	36	642529	4461784	642530	4461784	1	0	1	71	TSH			
31-Mar-2018	16:29:36	32	ST18904-ENV1			Camera	36	642529	4461783	642530	4461784	1	1	2	54	TSH			
31-Mar-2018	16:30:49	33	ST18904-ENV1			Camera	36	642526	4461784	642530	4461784	4	0	4	83	TSH			
31-Mar-2018	16:31:46	34	ST18904-ENV1			Camera	36	642525	4461785	642530	4461784	5	-1	5	100	TSH			

APPENDIX A FIELD SAMPLING LOGS

Gardline																	Seafloor Sampling Positioning Summary						
Job No		11179						Vessel		R.V. <i>Shearwater</i>													
Client		Statoil US Wind LLC						Vessel Reference Point (VRP)		CoG													
Project Name		NY Empire Wind G&G Survey						Deployment Location		A-frame, starboard side				x	6.946	y	-12.634	z	5.806				
Primary Positioning System		QPS QINSy						Actual Coordinates derived from		Deployment Location													
Geodetic Reference System		Datum		North American Datum (NAD) 1983				Ellipsoid		GRS-1980		Projection		UTM ZONE 18 (75W)				Vertical / Tidal Datum		LAT			
Date	Time (UTC/GMT)	Fix number	Stn No	Penetration	Sample Retention	Retention	Observed Seafloor Depth (m)	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks						
								Easting	Northing	Easting	Northing	dE	dN	Range	Bearing								
31-Mar-2018	16:32:30	35	ST18904-ENV1			Camera	36	642526	4461785	642530	4461784	4	-1	4	103	TSH							
31-Mar-2018	16:33:39	36	ST18904-ENV1			Camera	36	642531	4461787	642530	4461784	-1	-3	3	196	TSH							
31-Mar-2018	16:34:26	37	ST18904-ENV1			Camera	36	642529	4461788	642530	4461784	1	-4	5	168	TSH							
31-Mar-2018	16:35:34	38	ST18904-ENV1			Camera	36	642533	4461782	642530	4461784	-3	2	3	300	TSH							
31-Mar-2018	16:36:16	39	ST18904-ENV1			Camera	35	642533	4461780	642530	4461784	-3	4	5	326	TSH							
31-Mar-2018	16:37:15	40	ST18904-ENV1			Camera	35	642531	4461781	642530	4461784	-1	3	3	338	TSH							
31-Mar-2018	16:37:57	41	ST18904-ENV1			Camera	35	642532	4461782	642530	4461784	-2	2	2	323	TSH							
31-Mar-2018	16:39:06	42	ST18904-ENV1			Camera	36	642527	4461781	642530	4461784	3	3	4	48	TSH							
31-Mar-2018	16:39:52	43	ST18904-ENV1			Camera	36	642526	4461782	642530	4461784	4	2	4	68	TSH							
31-Mar-2018	16:40:35	44	ST18904-ENV1			Camera	36	642527	4461781	642530	4461784	3	3	4	52	TSH							
31-Mar-2018	16:41:21	45	ST18904-ENV1			Camera	36	642528	4461783	642530	4461784	2	1	2	55	TSH							
31-Mar-2018	17:03:42	46	ST18904-ENV2			Camera	36	643428	4461350	643430	4461350	2	0	2	86	TSH							
31-Mar-2018	17:04:28	47	ST18904-ENV2			Camera	36	643429	4461349	643430	4461350	1	1	1	41	TSH							
31-Mar-2018	17:05:18	48	ST18904-ENV2			Camera	36	643430	4461351	643430	4461350	0	-1	1	163	TSH							
31-Mar-2018	17:06:43	49	ST18904-ENV2			Camera	36	643429	4461353	643430	4461350	1	-3	4	159	TSH							
31-Mar-2018	17:07:54	50	ST18904-ENV2			Camera	36	643426	4461353	643430	4461350	4	-3	5	127	TSH							
31-Mar-2018	17:08:53	51	ST18904-ENV2			Camera	35	643434	4461353	643430	4461350	-4	-3	4	234	TSH							
31-Mar-2018	17:09:35	52	ST18904-ENV2			Camera	36	643432	4461349	643430	4461350	-2	1	2	298	TSH							
31-Mar-2018	17:10:13	53	ST18904-ENV2			Camera	36	643429	4461351	643430	4461350	1	-1	1	123	TSH							
31-Mar-2018	17:10:58	54	ST18904-ENV2			Camera	35	643435	4461349	643430	4461350	-5	1	5	280	TSH							
31-Mar-2018	17:11:17	55	ST18904-ENV2			Camera	35	643433	4461348	643430	4461350	-3	2	4	305	TSH							
31-Mar-2018	17:11:49	56	ST18904-ENV2			Camera	36	643431	4461347	643430	4461350	-1	3	3	349	TSH							
31-Mar-2018	17:12:01	57	ST18904-ENV2			Camera	36	643430	4461347	643430	4461350	0	3	3	352	TSH							
31-Mar-2018	17:12:37	58	ST18904-ENV2			Camera	36	643430	4461347	643430	4461350	0	3	3	3	TSH							
31-Mar-2018	17:12:42	59	ST18904-ENV2			Camera	36	643430	4461347	643430	4461350	0	3	3	7	TSH							
31-Mar-2018	17:13:32	60	ST18904-ENV2			Camera	36	643427	4461347	643430	4461350	3	3	4	47	TSH							
31-Mar-2018	17:14:17	61	ST18904-ENV2			Camera	36	643426	4461349	643430	4461350	4	1	4	75	TSH							
31-Mar-2018	17:14:57	62	ST18904-ENV2			Camera	36	643425	4461346	643430	4461350	5	4	6	54	TSH							
31-Mar-2018	17:15:25	63	ST18904-ENV2			Camera	36	643429	4461349	643430	4461350	1	1	1	40	TSH							
31-Mar-2018	21:11:24	64	ST18904-ENV4			Camera	29	627225	4468809	627225	4468810	0	1	1	357	TSH							
31-Mar-2018	21:12:36	65	ST18904-ENV4			Camera	30	627224	4468808	627225	4468810	1	2	2	17	TSH							
31-Mar-2018	21:13:23	66	ST18904-ENV4			Camera	30	627225	4468810	627225	4468810	0	0	0	306	TSH							
31-Mar-2018	21:13:39	67	ST18904-ENV4			Camera	30	627225	4468809	627225	4468810	0	1	1	358	TSH							
31-Mar-2018	21:14:02	68	ST18904-ENV4			Camera	30	627225	4468809	627225	4468810	0	1	1	0	TSH							

APPENDIX A FIELD SAMPLING LOGS

Gardline																	Seafloor Sampling Positioning Summary						
Job No		11179						Vessel		R.V. <i>Shearwater</i>													
Client		Statoll US Wind LLC						Vessel Reference Point (VRP)		CoG													
Project Name		NY Empire Wind G&G Survey						Deployment Location		A-frame, starboard side				x	6.946	y	-12.634	z	5.806				
Primary Positioning System		QPS QINSy						Actual Coordinates derived from		Deployment Location													
Geodetic Reference System		Datum		North American Datum (NAD) 1983				Ellipsoid		GRS-1980				Projection		UTM ZONE 18 (75W)				Vertical / Tidal Datum		LAT	
Date	Time (UTC/GMT)	Fix number	Stn No	Penetration	Sample Retention	Retention	Observed Seafloor Depth (m)	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks						
								Easting	Northing	Easting	Northing	dE	dN	Range	Bearing								
31-Mar-2018	21:14:28	69	ST18904-ENV4			Camera	29	627225	4468811	627225	4468810	0	-1	1	215	TSH							
31-Mar-2018	21:15:13	70	ST18904-ENV4			Camera	30	627227	4468813	627225	4468810	-2	-3	4	211	TSH							
31-Mar-2018	21:15:38	71	ST18904-ENV4			Camera	30	627227	4468813	627225	4468810	-2	-3	3	221	TSH							
31-Mar-2018	21:16:07	72	ST18904-ENV4			Camera	30	627227	4468813	627225	4468810	-2	-3	3	213	TSH							
31-Mar-2018	21:16:33	73	ST18904-ENV4			Camera	30	627227	4468813	627225	4468810	-2	-3	3	216	TSH							
31-Mar-2018	21:16:47	74	ST18904-ENV4			Camera	29	627228	4468813	627225	4468810	-3	-3	4	226	TSH							
31-Mar-2018	21:18:04	75	ST18904-ENV4			Camera	30	627230	4468807	627225	4468810	-5	3	5	301	TSH							
31-Mar-2018	21:18:40	76	ST18904-ENV4			Camera	30	627230	4468807	627225	4468810	-5	3	6	307	TSH							
31-Mar-2018	21:20:00	77	ST18904-ENV4			Camera	30	627222	4468811	627225	4468810	3	-1	3	109	TSH							
31-Mar-2018	21:20:34	78	ST18904-ENV4			Camera	30	627221	4468811	627225	4468810	4	-1	4	100	TSH							
31-Mar-2018	21:21:34	79	ST18904-ENV4			Camera	30	627221	4468812	627225	4468810	4	-2	5	112	TSH							
31-Mar-2018	21:22:56	80	ST18904-ENV4			Camera	30	627221	4468810	627225	4468810	4	0	4	87	TSH							

APPENDIX A FIELD SAMPLING LOGS

SEABED SAMPLING LOG SHEET (Deck)							QPRO-0755
Job No: 11179		Area: NJ/NY Bight		Vessel: RV <i>Shearwater</i>		Operator: TSH	
Date: from: 31-Mar-2018 to: 31-Mar-2018		Page: Page 1 of 5		Client: Statoil US Wind LLC		Sieve Size: 1000µm	
Project: NY Empire Wind G&G Survey							Equipment: Day grab
Sample Number	Station Number	Time	Load	Retention	Sieving Comments	Sediment Description	Comments
1	ST18904-ENV2	17:27:37	70%	MFA	1 x 1L	Sediment: Light brown fine to medium sand with occasional shell fragments Fauna: Annelida (Polychaeta), Crustacea (Paguroidea), Mollusca (Bivalvia)	
2	ST18904-ENV2	17:36:31	80%	CHEM	NA	Sediment: Light brown fine to medium sand with occasional shell fragments Fauna: Annelida (Polychaeta)	
3	ST18904-ENV2	17:44:58	85%	MFB	1 x 1L	Sediment: Light brown fine to medium sand with occasional shell fragments Fauna: Annelida (Polychaeta), Crustacea (Paguroidea), Mollusca (Bivalvia)	
4	ST18904-ENV1	18:06:30	85%	MFA	2 x 1L	Sediment: Brown slightly gravelly medium sand with occasional shells and shell fragments. Worm tubes visible Fauna: Annelida (Polychaeta), Crustacea (Paguroidea), Mollusca (Bivalvia), Platyhelminthes	

APPENDIX A FIELD SAMPLING LOGS

SEABED SAMPLING LOG SHEET (Deck)							QPRO-0755
Job No: 11179		Area: NJ/NY Bight		Vessel: RV <i>Shearwater</i>		Operator: TSH	
Date: from: 31-Mar-2018 to: 31-Mar-2018		Page: Page 2 of 5		Client: Statoil US Wind LLC		Sieve Size: 1000µm	
Project: NY Empire Wind G&G Survey							Equipment: Day grab
Sample Number	Station Number	Time	Load	Retention	Sieving Comments	Sediment Description	Comments
5	ST18904-ENV1	18:11:12	0%	NS	NS	No Sample	Failed to trigger
6	ST18904-ENV1	18:13:40	80%	CHEM	NA	Sediment: Brown slightly gravelly medium sand with occasional shells and shell fragments. Fauna: Annelida (Polychaeta tubes)	
7	ST18904-ENV1	18:23:43	95%	MFB	1 x 1L	Sediment: Brown slightly gravelly medium sand with occasional shells and shell fragments. Worm tubes visible Fauna: Annelida (Polychaeta), Mollusca (Bivalvia), Echinodermata (Clypeasteroida), Platyhelminthes	
8	ST18904-ENV6	18:38:05	75%	MFA	2 x 5L	Sediment: Dark brown/grey sandy gravel with occasional shell fragments Fauna: Annelida (Polychaeta)	

APPENDIX A FIELD SAMPLING LOGS

SEABED SAMPLING LOG SHEET (Deck)							QPRO-0755
Job No: 11179		Area: NJ/NY Bight		Vessel: RV <i>Shearwater</i>		Operator: TSH	
Date: from: 31-Mar-2018 to: 31-Mar-2018		Page: Page 3 of 5		Client: Statoil US Wind LLC		Sieve Size: 1000µm	
Project: NY Empire Wind G&G Survey							Equipment: Day grab
Sample Number	Station Number	Time	Load	Retention	Sieving Comments	Sediment Description	Comments
9	ST18904-ENV6	18:42:33	70%	CHEM	NA	Sediment: Dark brown/grey sandy gravel with occasional shell fragments Fauna: Annelida (Polychaeta)	
10	ST18904-ENV6	18:50:25	70%	MFB	1 x 5L	Sediment: Dark brown/grey sandy gravel with occasional shell fragments Fauna: Annelida (Polychaeta)	
11	ST18904-ENV3	19:12:03	70%	MFA	1 x 1L	Sediment: Brown fine to medium sand with occasional shell fragments. Fauna: Polychaeta, Echinodermata (Clypeasteroida), Crustacea (Paguroidea), Mollusca (Bivalvia), Platyhelminthes.	
12	ST18904-ENV3	19:17:42	70%	CHEM	NA	Sediment: Brown fine to medium sand with occasional shell fragments. Fauna: No visible fauna.	

APPENDIX A FIELD SAMPLING LOGS

SEABED SAMPLING LOG SHEET (Deck)							QPRO-0755
Job No: 11179		Area: NJ/NY Bight		Vessel: RV <i>Shearwater</i>		Operator: TSH	
Date: from: 31-Mar-2018 to: 31-Mar-2018		Page: Page 4 of 5		Client: Statoil US Wind LLC		Sieve Size: 1000µm	
Project: NY Empire Wind G&G Survey							Equipment: Day grab
Sample Number	Station Number	Time	Load	Retention	Sieving Comments	Sediment Description	Comments
13	ST18904-ENV3	19:25:42	60%	MFB	1 x 1L	Sediment: Brown fine to medium sand with occasional shell fragments. Fauna: Annelida (Polychaeta), Echinodermata (Clypeasteroidea), Crustacea (Paguroidea), Mollusca (Bivalvia, Veneroidea), Platyhelminthes, Egg cases - Chondrichthyes.	
14	ST18904-ENV4	21:31:59	90%	MFA	1 x 1L	Sediment: Dark brown/grey slightly gravelly, silty sand with occasional shell fragments. Very slight anoxic smell. Fauna: Annelida (Polychaeta), Crustacea (Caridea), Mollusca (Bivalvia),	
15	ST18904-ENV4	21:35:42	55%	MFB	1 x 1L	Sediment: Dark brown/grey slightly gravelly, silty sand with occasional shell fragments. Very slight anoxic smell. Fauna: Annelida, Polychaeta, Crustacea (Caridea), Mollusca (Bivalvia),	
16	ST18904-ENV4	21:39:55	40%	-	-	No Sample	Insufficient load

APPENDIX A FIELD SAMPLING LOGS

SEABED SAMPLING LOG SHEET (Deck)							QPRO-0755
Job No: 11179		Area: NJ/NY Bight		Vessel: RV <i>Shearwater</i>		Operator: TSH	
Date: from: 31-Mar-2018 to: 31-Mar-2018		Page: Page 5 of 5		Client: Statoil US Wind LLC		Sieve Size: 1000µm	
Project: NY Empire Wind G&G Survey							Equipment: Day grab
Sample Number	Station Number	Time	Load	Retention	Sieving Comments	Sediment Description	Comments
17	ST18904-ENV4	21:43:20	70%	CHEM	NA	Sediment: Dark brown/grey slightly gravelly, silty fine sand with occasional shell fragments. Very slight anoxic smell. Fauna: Worm tubes visible	

APPENDIX A FIELD SAMPLING LOGS

Gardline																	Seafloor Sampling Positioning Summary									
Job No		11179						Vessel		R.V. <i>Shearwater</i>																
Client		Statoil US Wind LLC						Vessel Reference Point (VRP)		CoG																
Project Name		NY Empire Wind G&G Survey						Deployment Location		A-frame, starboard side				x		6.946		y		-12.634		z		5.806		
Primary Positioning System								QPS QINSy		Actual Coordinates derived from										Deployment Location						
Geodetic Reference System		Datum		North American Datum (NAD) 1983				Ellipsoid		GRS-1980				Projection		UTM ZONE 18 (75W)				Vertical / Tidal Datum		LAT				
Date	Time (UTC/GMT)	Fix number	Stn No	Penetration	Sample Retention	Retention	Observed Seafloor Depth (m)	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks									
								Easting	Northing	Easting	Northing	dE	dN	Range	Bearing											
31-Mar-2018	17:27:37	1	ST18904-ENV2	70%	MFA	Day Grab	36	643429	4461347	643430	4461350	1	3	3	24	TSH										
31-Mar-2018	17:36:31	2	ST18904-ENV2	80%	CHEM	Day Grab	36	643430	4461351	643430	4461350	0	-1	1	180	TSH										
31-Mar-2018	17:44:58	3	ST18904-ENV2	85%	MFB	Day Grab	35	643429	4461350	643430	4461350	1	0	1	88	TSH										
31-Mar-2018	18:06:30	4	ST18904-ENV1	85%	MFA	Day Grab	35	642530	4461784	642530	4461784	0	0	0	77	TSH										
31-Mar-2018	18:11:12	5	ST18904-ENV1	0%	NS	Day Grab	35	642529	4461783	642530	4461784	1	1	1	52	TSH	No Sample									
31-Mar-2018	18:13:40	6	ST18904-ENV1	80%	CHEM	Day Grab	35	642528	4461783	642530	4461784	2	1	2	64	TSH										
31-Mar-2018	18:23:43	7	ST18904-ENV1	95%	MFB	Day Grab	35	642530	4461784	642530	4461784	0	0	0	156	TSH										
31-Mar-2018	18:38:05	8	ST18904-ENV6	75%	MFA	Day Grab	318	642460	4461972	642460	4461973	0	1	1	346	TSH										
31-Mar-2018	18:42:33	9	ST18904-ENV6	70%	CHEM	Day Grab	36	642459	4461973	642460	4461973	1	1	1	66	TSH										
31-Mar-2018	18:50:25	10	ST18904-ENV6	70%	MFB	Day Grab	36	642459	4461973	642460	4461973	1	0	1	91	TSH										
31-Mar-2018	19:12:03	11	ST18904-ENV3	70%	MFA	Day Grab	35	641627	4462215	641627	4462217	0	2	2	357	TSH										
31-Mar-2018	19:17:42	12	ST18904-ENV3	70%	CHEM	Day Grab	35	641626	4462217	641627	4462217	1	0	1	99	TSH										
31-Mar-2018	19:25:42	13	ST18904-ENV3	60%	MFB	Day Grab	35	641626	4462214	641627	4462217	1	3	3	12	TSH										
31-Mar-2018	21:31:59	14	ST18904-ENV4	90%	MFA	Day Grab	30	627225	4468809	627225	4468810	0	1	1	19	TSH										
31-Mar-2018	21:35:42	15	ST18904-ENV4	55%	MFB	Day Grab	30	627225	4468809	627225	4468810	0	1	1	28	TSH										
31-Mar-2018	21:39:55	16	ST18904-ENV4	40%	NS	Day Grab	30	627225	4468809	627225	4468810	0	1	1	0	TSH	No Sample									
31-Mar-2018	21:43:23	17	ST18904-ENV4	70%	CHEM	Day Grab	30	627224	4468809	627225	4468810	1	1	1	46	TSH										

APPENDIX B METHODS

B.1 Seabed Sampling

Benthic samples were recovered using a stainless-steel, 0.1m² Day grab which had been modified in-house. The modification, shown in Figure B.1 incorporated guides for the cables to prevent them becoming trapped during triggering. The grab carried extra weights to aid penetration on impact and an extended bucket lip to reduce sediment washout. Storm feet and elastic straps were used to reduce the likelihood of the instrument pre-triggering in the water column during deployment.

Figure B.1 Modified Day Grab



Left: The modified 0.1m² Day grab.

Above (inset): The modification to the grab incorporated guides for the cables to prevent them from becoming trapped as the grab triggers.

Prior to deployment the vessel's sampling area was pre-cleaned using a powerful deck fire-hose and seawater. The grab was washed thoroughly prior to every station to prevent hydrocarbon cross contamination. A dyneema rope was used to lower the Day grab to the seabed.

Once directly over the target location the grab was lowered to the seabed and then quickly recovered so that the sample could be obtained and the apparatus returned to the pre-deployment position. Positional fixes were captured immediately for each grab sample when the grab reached the sea floor. The precise time that the grab reached the seabed was determined by observations of the tension on the winch cable.

On recovery of a sample, the grab would first be examined for acceptability following strict quality assurance (QA) criteria. In the following cases, a grab sample would be rejected and the instrument returned to the pre-deployment position:

- 1 Jammed jaws due to a large stone or shell allowing sediment washout;
- 2 One or both of the bucket doors open on recovery, causing possible surface washout;
- 3 Half sample obtained where the grab had not struck a flat area of bottom, or not hit true, causing a side or half bite of sediment;
- 4 Disruption of the sample by obvious shaking or contamination (these can occur when a sample is badly handled or if the grab strikes the side of the vessel during operations);
- 5 The grab was less than 50% full or totally filled the grab. The latter potentially allowing the sample to overflow the grab or for the surface sediments to come into contact with the lids.
- 6 Sample was acquired more than 5m from the desired position (as determined by the onboard surveyors, environmentalist and client representative, with consideration of survey objectives);
- 7 The presence of a hag fish (*Myxine glutinosa*) and/or mucus coagulants.

Brief descriptions of the collected sediments were made at the time of sampling. These were recorded in the environmentalist's log sheets and are presented in Appendix A. A selection of photographs, taken of the sediment samples whilst still in the Day grab, is presented in Appendix D.

Sediment samples collected for physico-chemical analysis (CHEM) were sub-sampled into the relevant containers. All containers were thoroughly washed with the appropriate solvents and labeled externally prior to use. A plastic scoop was used to obtain two sub-samples: one for particle size analysis (PSA) and one as a spare sample. These were placed in double-lined zip-lock bags. All physico-chemical samples were transferred to an onboard freezer for storage at <-18°C.

Sediment samples collected for faunal analyses (MFA and MFB) were thoroughly washed from the grab into a plastic tray. Once all of the equipment was washed free of sediment, the sediment sample was transferred to a sieving machine where it was broken down using a low powered seawater spray. All materials retained by the 1mm sieve were transferred to a squat jar or bucket by means of a scoop and funnel, making sure that none of the sample was lost or trapped in the mesh. The sample was fixed with a pre-buffered <20% formalin solution of known concentration, then subsequently diluted to a final concentration of approximately 4% formalin. Biological samples were placed in 1 liter polypropylene screw-top squat jars or 5 liter buckets, depending on sample size, and provided with an additional internal waterproof label.

At the end of the survey all of the retained samples were delivered to the relevant laboratories for analysis. All physico-chemical sub-samples were kept frozen, and biological samples stored at room temperature. One physico-chemical sub-sample from each station was then sent frozen, in cool boxes kept cool with ice packs, along with two biological samples, to their respective analytical sub-contractors (see Section B.2). Spares of the physico-chemical sub-sample from each station was stored frozen, and one biological sample from each station stored at room temperature. Spare samples are retained at Alpine's head office for at least six months after which time the client is contacted to advise on appropriate disposal, continued storage or dispatch to a destination of the client's choice.

B.2 Sample Analysis

Sediment and faunal samples were analyzed by the following laboratories / persons:

- PSA, Sediment total organic matter (TOM) were carried out by TerraSence, LLC, Totowa, NJ, USA.
- Benthic macrofaunal identification was undertaken by EcoAnalysts, Inc., Moscow, ID, USA.

The laboratories detailed above meet quality control requirements exacted by Gardline's internal procedures (BS/EN/ISO 9001:2008; BSI, 2008).

B.3 Particle Size Analysis

Sediments from each sample were analyzed by a combination of sieving and laser diffraction.

The results, given in full in Appendix D, and summarized in Section 2.4.1, present the following sample statistics calculated using method of moments (MoM) based on logarithmic grain size (i.e., using the phi scale); mean grain size, sorting (standard deviation), skewness and kurtosis (Krumbein & Pettijohn, 1938). These indices are described below. Mean grain size is also given geometrically (in μm). Size classes, including the mean and mode(s) are named (such as medium sand), according to sediment descriptors given in Table B.1, which are modified from Udden (1914) and Wentworth (1922). Sediment samples are also classified using the Folk triangle classification (presented in Appendix D), which uses the ratio of sand to mud ($<63\mu\text{m}$, silt and clay) and the percentage of gravel sized-material ($>2\text{mm}$) (Folk, 1954).

- 1 Mean ($\bar{x}_\phi$) (First moment) =

$$\sum_{i=1}^n f_i M_{i\phi}$$

Where f_i = fraction of total weight in each class interval
 $M_{i\phi}$ = midpoint of each class interval in phi units

- 2 Standard deviation (S_ϕ) (Second moment) =

$$\left[\sum_{i=1}^n f_i (M_{i\phi} - \bar{x}_\phi)^2 \right]^{1/2}$$

The second moment has been used as a measure of the degree of sorting. Sorting statistics are then ascribed physical descriptions (such as moderately sorted), derived from Folk and Ward (1957). Sorting classifications are presented in Table B.2.

- 3 Skewness (Sk_ϕ) (Third moment) =

$$\sum_{i=1}^n \frac{f_i (M_{i\phi} - \bar{x}_\phi)^3}{S_\phi^3}$$

The third moment, has been used as a measure of the degree of asymmetry of a frequency or cumulative curve. Positive numbers indicate a fine skewed sediment, while negative numbers indicate a coarse skewed sediment. Skewness classifications are given in Table B.3.

- 4 Kurtosis (K_ϕ) (Fourth moment) =

$$\sum_{i=1}^n \frac{f_i(M_{i\phi} - \bar{x}_\phi)^4}{S_\phi^4}$$

The forth moment, has been used as a measure of the ‘peakness’ of the distribution. When ascribed to statistics calculated by logarithmic MoM, values of <1.7 are considered very platykurtik or flat ‘peaked’, while values >7.4 are considered very leptokurtic or excessively ‘peaked’ (Blott, 2010). Kurtosis classifications according to Blott (2010) are given in Table B.4.

Table B.1 Phi and Sieve Aperture with Sediment Descriptions

Aperture in microns	Aperture in Phi Unit	Sediment Description	
<63500 to 50800	<-6 to -5.7	Very Coarse Gravel	GRAVEL
<50800 to 38100	<-5.7 to -5.3		
<38100 to 31800	<-5.3 to -5		
<31800 to 15900	<-5 to -4	Coarse Gravel	
<15900 to 12700	<-4 to -3.7	Medium Gravel	
<12700 to 7900	<-3.7 to -3		
<7900 to 6400	<-3 to -2.7	Fine Gravel	
<6400 to 4000	<-2.7 to -2		
<4000 to 2800	>-2 to -1.5	Very Fine Gravel	
<2800 to 2000	>-1.5 to -1		
<2000 to 1400	>-1 to -0.5	Very Coarse Sand	SAND
<1400 to 1000	>-0.5 to 0		
<1000 to 710	>0 to 0.5	Coarse Sand	
<710 to 500	>0.5 to 1		
<500 to 355	>1 to 1.5	Medium Sand	
<355 to 250	>1.5 to 2		
<250 to 180	>2 to 2.5	Fine Sand	
<180 to 125	>2.5 to 3		
<125 to 90	>3 to 3.5	Very Fine Sand	
<90 to 63	>3.5 to 4		
<63 to 44	>4 to 4.5	Very Coarse Silt	FINES
<44 to 31.5	>4.5 to 5		
<31.5 to 22	>5 to 5.5	Coarse Silt	
<22 to 15.6	>5.5 to 6		
<15.6 to 11	>6 to 6.5	Medium Silt	
<11 to 7.8	>6.5 to 7		
<7.8 to 5.5	>7 to 7.5	Fine Silt	
<5.5 to 3.9	>7.5 to 8		
<3.9 to 2.8	>8 to 8.5	Very Fine Silt	
<2.8 to 2	>8.5 to 9		
<2 to 1.4	>9 to 9.5	Clay	
<1.4 to 1	>9.5 to 10		
<1	>10		

Table B.2 Sorting Classifications for use with Logarithmic Method of Moments

Sorting Coefficient (Graphical Standard Deviation)	Sorting Classifications
0 < 0.35	Very well sorted
0.35 < 0.50	Well sorted
0.50 < 0.71	Moderately well sorted
0.71 < 1.00	Moderately sorted
1.00 < 2.00	Poorly sorted
2.00 < 4.00	Very poorly sorted
4.00	Extremely poorly sorted

Table B.3 Skewness Classification for use with Logarithmic Method of Moments

Skewness Coefficient	Mathematical Skewness	Graphical Skewness
> 1.30	Strongly Positive	Very fine skewed
>0.43 to 1.30	Positive	Fine skewed
>-0.43 to 0.43	Near Symmetrical	Symmetrical
>-1.30 to -0.43	Negative	Coarse skewed
≤ -1.30	Strongly Negative	Very coarse skewed

Table B.4 Kurtosis Classification for use with Logarithmic Method of Moments

Kurtosis Coefficient	Kurtosis Classification	Graphical meaning
< 1.70	Very Platykurtic	Flat-peaked; the ends are better sorted than the centre
1.70 to <2.55	Platykurtic	
2.55 to <3.70	Mesokurtic	Normal; bell shaped curve
3.70 to <7.40	Leptokurtic	Curves are excessively peaked; the centre is better sorted than the ends.
≥7.40	Very Leptokurtic	

B.4 Macrofaunal Analysis

B.4.1 Sorting and Identification

In the laboratory, samples were gently washed across a 1mm sieve to remove any sediment fines and preservative. The retained material was sorted by hand to extract all macrofauna. The organisms were identified and counted to produce a species list for each grab sample. The whole sample was processed without sub-sampling.

B.4.2 Data Set Rationalization

The faunal data set was rationalized according to the standard (GGL, 2017) procedure, which is largely based on British Standard ISO16665:2005 (BSI, 2005) and OSPAR (2017) guidelines.

Damaged Specimens

Destructive sampling techniques and sieving may damage delicate benthic organisms. It is, therefore, commonplace for fragmented organisms to be found in faunal samples. The following conditions were applied to the recording of damaged specimens and fragments:

- Fragments that constituted a major component of an individual, that unequivocally represented the presence of an entire organism, and that could be identified to species level, were recorded and included with other counts of that species. Examples include: the heads of polychaetes and crustaceans; the complete mouth structure or central disk of brittle stars; the oral area/feeding tentacles of holothurians.
- Fragments that constituted a significant component of an individual, that unequivocally represented the presence of an entire organism, but that could not be identified to species by virtue of their incompleteness, were recorded to the lowest possible taxonomic level.
- Fragments that did not unequivocally represent the presence of an entire organism were ignored, e.g. *Aphiura* arms, *Echinocardium* shell fragments, etc.

Recorded fragments, therefore, represent discrete observations of individuals that were present at the time of sampling and were included in the analyzed data set.

Treatment of Specific Groups of Organisms

GGL defines macrofauna as organisms that are normally larger than the mesh size of the sieve used to separate them from the sediment (GGL, 2017). Meiofaunal organisms, such as the Ostracoda and Copepoda, which would not be consistently sampled, were not recorded. Due to their generally small size (in fully marine environments), species from the Oligochaeta, Tardigrada and Gnathostomulida were only enumerated when a sieve with a mesh size of 0.5mm or less was used to separate organisms from sediments; otherwise, these organisms were noted to be present, but not enumerated.

Colonial, stoloniferous and encrusting epibenthic species were identified but not enumerated.

With the exception of discrete sea pen (Pennatulacea) colonies, only solitary tunicates and cnidarians were enumerated and included in statistical analyses. Colonial tunicates and cnidarians were identified but not enumerated.

The testate amoeba *Astrorhiza* sp. was the only foram routinely enumerated.

When found, the presence of Porifera (sponges) was recorded, but not identified to lower taxonomic levels, enumerated, or included in statistical analyses.

In accordance with our in-house guidelines the following organisms were not identified to species, but were enumerated and included in the data set for analyses at a higher taxonomic level:

- Nemertea – identified to phylum,
- Platyhelminthes – identified to phylum,
- Phoronida – identified to genus,
- Cephalochordata – identified to subphylum

B.5 Statistical Analyses

B.5.1 Univariate Macrofauna Indices

Univariate community analyses were undertaken using the PRIMER (version 7) software package. Univariate indices seek, by means of a single number, to summarize information about some aspect

of community structure. The two aspects of community structure contributing to the concept of diversity are species richness (a measure related to the total number of species present) and evenness (a measure relating to the pattern of distribution of individuals among the species present).

Diversity indices, as typified by the Shannon-Wiener index, are considered to be a relatively insensitive measure of anthropogenic disturbance. However, benthic ecologists have been able to demonstrate a clear inverse relationship between diversity and total oil concentrations in sediments (e.g. Davies *et al.*, 1984). They are therefore of some practical use for making comparisons between stations and sites.

The following indices were calculated and are presented in the report:

Shannon-Wiener Diversity Index

This is a widely used measure of diversity providing an integrated index of species richness and relative abundance (Clarke & Warwick, 2006). It is basically a measure of the difficulty of predicting the identity of an individual based on overall community composition. The Shannon-Wiener diversity index is expressed as:

$$H' = - \sum_{i=1}^s p_i \log_n p_i$$

where H' = Shannon-Wiener Diversity Index

p_i = proportion of the total number of individuals from the i^{th} species.

n = log base value (log base 2 is used during this report; Shannon & Weaver, 1949)

H' integrates the number of species and individual abundance to provide a summary value reflecting the diversity of fauna at a station. This index of diversity is influenced by both species richness (*i.e.* the number of species) and evenness (or equitability) of distribution of individuals between species.

Pielou's Evenness

Evenness (or equitability) is a representation of how uniformly individuals are spread between species in a sample. It is a component of, and calculated using, a theoretical diversity measure (in this instance Shannon-Wiener). Values range from 0 to 1 with high values indicating low dominance and high evenness (*N.B.* the log base that was used to calculate H' must also be used to calculate evenness).

$$J = \frac{H'}{\log_n S}$$

where J = Pielou's Evenness

H' = Shannon-Wiener Diversity index

S = total number of species in a sample

Species Ranking

A measure of the overall dominance pattern in the sampling area may be achieved by ranking the top species per station according to abundance, giving a rank score of ten to the most abundant species, decreasing to one for the tenth most abundant species, and summing these scores for all stations to provide an overall dominance score for each species (Eleftheriou & Basford, 1989). For those species ranked in the top ten, the fidelity of the species ranking can be assessed by comparing the actual rank score with the maximum possible score (thus ten multiplied by number of stations for the top rank,

etc.) for that rank as a proportion; perfect fidelity is equal to one; values lower than 0.8 or higher than 1.2 represent erratic ranking, as in a species with a patchy distribution.

APPENDIX C BACKGROUND INFORMATION

C.1 Sediment Characteristics

Particle size distributions of sediments in the marine environment are to a large extent determined by hydrodynamic energy at the sediment water interface. Strong currents tend to scour the seabed thereby resuspending fine particles and any material associated with them, whilst the finest sediments predominate in areas with the least hydrodynamic energy.

The role of sediment in the transport and retention of chemical pollutants is tied to both particle size and to the amount of particulate organic carbon associated with the sediment. The chemically active fraction of sediment is usually cited as the organic component and the finest size fractions (smaller than 63µm, silt, clay). The sediment, in particular the organic carbon and finer fractions, acts as a sink for many of the persistent compounds, including metals, hydrocarbons and chlorinated compounds. Many of these persistent substances are also inherently bioaccumulative and toxic. The concentrations of many parameters are typically positively correlated with the proportion of fines found in the sediment as a result of fine particles possessing a relatively large surface area. Fine sediment particles are relatively easily resuspended by waves and currents, and may be transported, along with the materials sorbed to them, over large distances, finally being deposited in areas of lower hydrodynamic energy.

Generally speaking, sands and coarser grained materials are often organically deficient. Strong currents have a tendency to resuspend fine materials and their associated organic matter. Therefore, in an environment that is not nutrient enriched due to anthropogenic discharges, both total organic matter and total organic carbon will normally be lowest at sites with coarse-grained sediment, where currents are often strongest.

Sediment particle size and organic content are also critical measurements for the categorization of habitat type since to a large extent they control which organisms are capable of living within sediments. Most benthic infaunal organisms exhibit preferences for sediment with particular grain size characteristics. Many organisms live in tubes or burrows constructed from sediment particles; each organism's ability to do this may be limited by the range of different sized particles available. The distribution and abundance of free-living mobile organisms, i.e. those that do not construct tubes or burrows, are also affected by particle sizes, which influence their ability to move within the sediment. Sand grains of inappropriate sizes may be too big to move or, conversely, too small to be stable.

Feeding guilds are groupings of organisms based upon the feeding strategies they employ (United States Environmental Protection Agency or US EPA, 2008) and, as such, sediment particle size and organic content can greatly affect which species guilds may dominate in any given area. Many deposit feeding organisms, which process sediment through the alimentary tract to obtain nutrition (Gage & Tyler, 1992), are highly selective of the grain sizes that they will ingest, often preferring finer sediments that possess relatively high organic content. Conversely, resuspension of fine particulate matter may clog delicate filtering apparatus used by suspension feeders to obtain their suspended food particles from seawater (Gibson *et al.*, 2005), resulting in their exclusion from muddy sediments. Additionally, the mixtures of particle sizes determine the ease with which water and oxygen move through the sediment. An abundance of fine particles in a stable environment may lead to the formation of substrata with small interstitial spaces through which oxygen diffusion can be restricted. This may lead

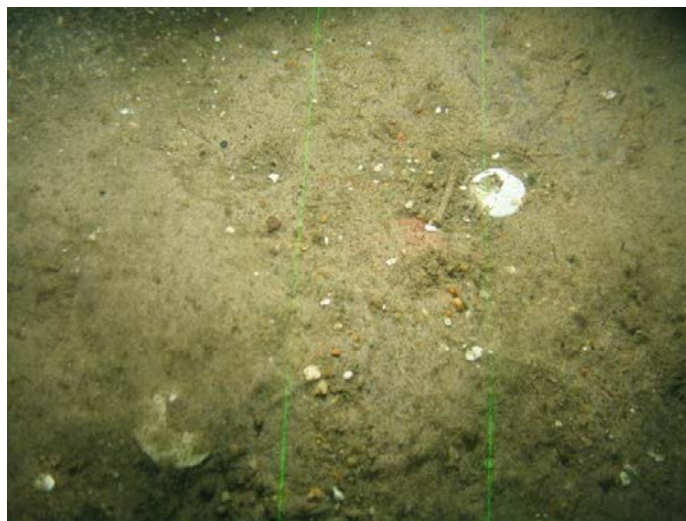
to anoxic conditions within the sediment, which further affects the range of species that may be present. Determination of sediment particle sizes and organic content is therefore of critical importance to the interpretation of benthic environmental survey data.

C.2 Macrofaunal Analyses

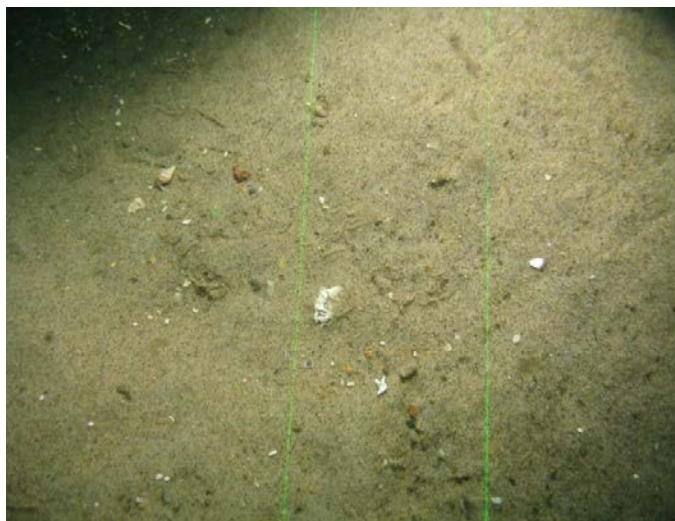
The macrofaunal investigation in this survey is designed to provide a description of the benthic infauna and how it varies across the survey area. Marine benthic invertebrate communities have been shown to be sensitive to environmental change, particularly environmental degradation as a result of anthropogenic contamination (Davies *et al.*, 1984; Warwick & Clarke, 1991). Analysis of faunal data sets may therefore provide insight into any changes resulting from point source pollutants and disturbance.

APPENDIX D SAMPLING AND SEABED PHOTOGRAPHS

APPENDIX D SAMPLING AND SEABED PHOTOGRAPHS



Fix: 31 E: 642529 N: 4461784 Depth: 36m



Fix: 45 E: 642528 N: 4461783 Depth: 36m

Station: ST18904-ENV1

Sediment Description:

Fix31: Slightly gravelly fine sand with occasional shell fragments

Fix45: Slightly gravelly fine sand with occasional shell fragments

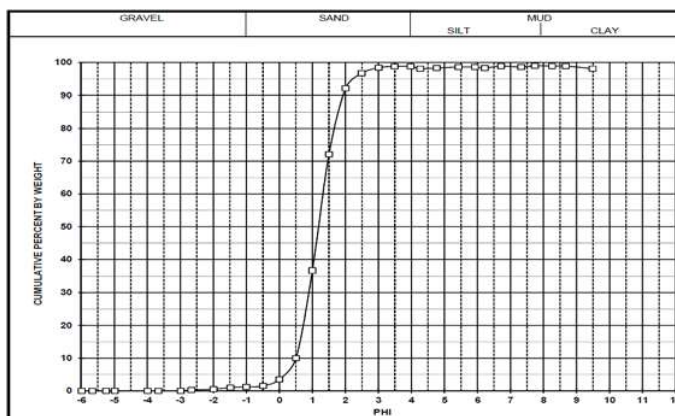
Fauna Description:

Fix31: Annelida (Polychaeta worm tubes) and Echinodermata (*Echinarachnius parma*)

Fix45: Annelida (Polychaeta worm tubes), Arthropoda (Paguroidea) and Mollusca (Neogastropoda)



Fix: 6 E: 642528 N: 4461783 Depth: 35m



TerraSense, LLC	Gardline Geosurvey Ltd	TEST SUMMARY	
8153-18001	11179	DESCRIPTION: Slightly gravelly medium sand	
Empire Wind		GRAVEL (>2mm)	1.2%
		SAND (2mm to .0625mm)	97.6%
		SILT (>0.0625mm to 0.004mm)	0.2%
		CLAY (< 0.004mm)	1.0%

Fix: 6 E: 642528 N: 4461783 Retention: PSA

Station: ST18904-ENV1

Sediment Description:

Grab: Slightly gravelly sand with occasional shells and shell fragments

CMECS Substrate Component Subgroup: Slightly gravelly sand

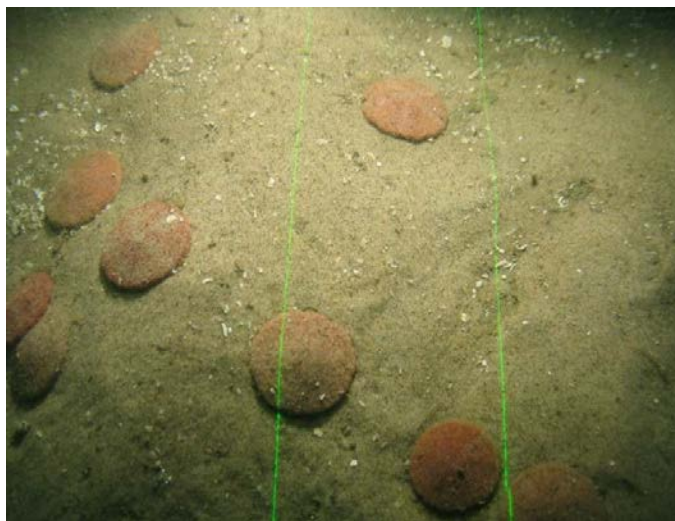
Fauna Description:

Grab: Annelida (Polychaeta worm tubes)

APPENDIX D SAMPLING AND SEABED PHOTOGRAPHS



Fix: 49 E: 643429 N: 4461353 Depth: 36m



Fix: 56 E: 643431 N: 4461347 Depth: 36m

Station: ST18904-ENV2

Sediment Description:

Fix49: Find sand with frequent shell fragments

Fix56: Fine sand with occasional shell fragments

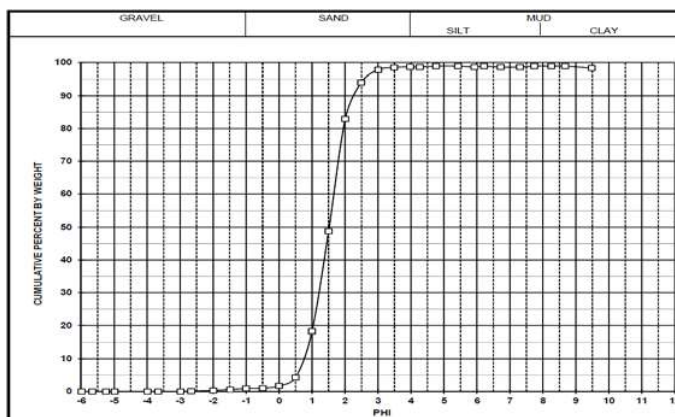
Fauna Description:

Fix49: Echinodermata (*Echinarachnius parma*) and Mollusca (Bivalvia). Faunal burrows present

Fix56: Echinodermata (*Echinarachnius parma*)



Fix: 2 E: 643430 N: 4461351 Depth: 36m



TerraSense, LLC	Gardline Geosurvey Ltd	TEST SUMMARY
8153-18001	11179	DESCRIPTION: Slightly gravelly medium sand
Empire Wind		GRAVEL (>2mm) 0.9%
		SAND (2mm to .0625mm) 97.8%
		SILT (>0.0625mm to 0.004mm) 0.2%
		CLAY (<0.004mm) 1.1%

Fix: 2 E: 643430 N: 4461351 Retention: PSA

Station: ST18904-ENV2

Sediment Description:

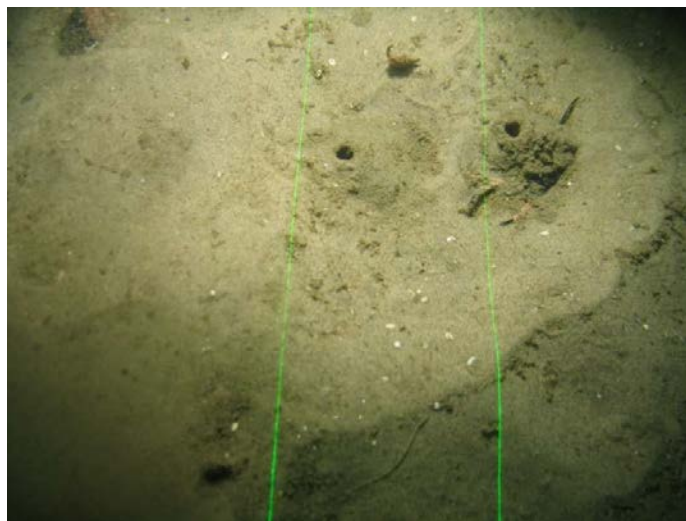
Grab: Fine to medium sand with occasional shell fragments

CMECS Substrate Component Subgroup: Slightly gravelly sand

Fauna Description:

Grab: No visible fauna

APPENDIX D SAMPLING AND SEABED PHOTOGRAPHS



Fix: 4 E: 641625 N: 4462213 Depth: 36m



Fix: 9 E: 641627 N: 4462212 Depth: 36m

Station: ST18904-ENV3

Sediment Description:

Fix4: Fine sand with occasional shell fragments

Fix9: Fine sand with occasional shell fragments

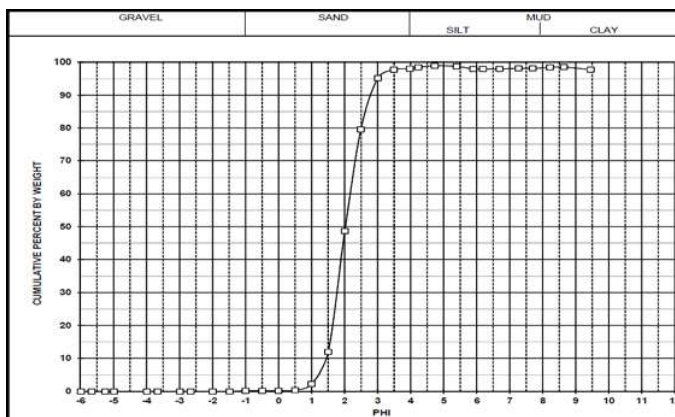
Fauna Description:

Fix4: Arthropoda (Malacostraca), Mollusca (Gastropoda, Neogastropoda), Echinodermata (*Echinarachnius parma*). Faunal burrows present

Fix9: Arthropoda (Paguroidea), Echinodermata (*Echinarachnius parma*) and Mollusca (Neogastropoda)



Fix: 12 E: 641627 N: 4462217 Depth: 35m



TerraSense, LLC	Gardline Geosurvey Ltd	TEST SUMMARY	
8153-18001	11179	DESCRIPTION: Slightly gravelly fine sand	
Empire Wind		GRAVEL (>2mm)	0.2%
		SAND (2mm to .0625mm)	97.9%
		SILT (>0.0625mm to 0.004mm)	0.9%
		CLAY (< 0.004mm)	1.0%

Fix: 12 E: 641626 N: 4462217 Retention: PSA

Station: ST18904-ENV3

Sediment Description:

Grab: Fine to medium sand with occasional shell fragments

CMECS Substrate Component Subgroup: Slightly gravelly sand

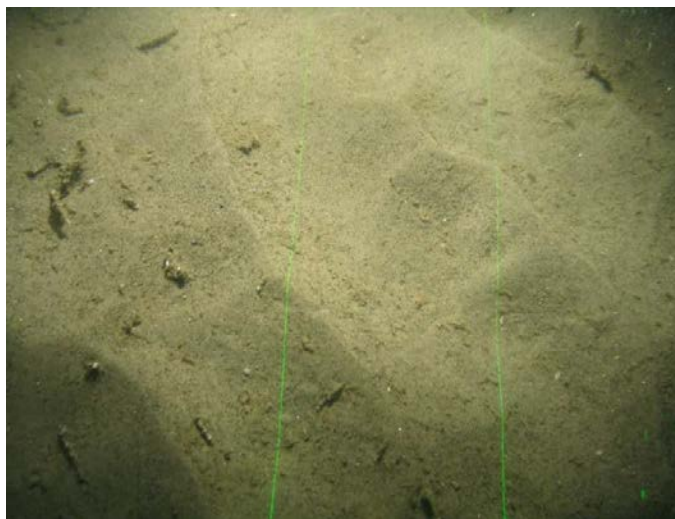
Fauna Description:

Grab: Annelida (Polychaeta worm tubes), Echinodermata (*Echinarachnius parma*)

APPENDIX D SAMPLING AND SEABED PHOTOGRAPHS



Fix: 67 E: 627225 N: 4468809 Depth: 30m



Fix: 76 E: 627230 N: 4468807 Depth: 30m

Station: ST18904-ENV4

Sediment Description:

Fix67: Fine sand with rare shell fragments

Fix76: Fine sand with rare shell fragments

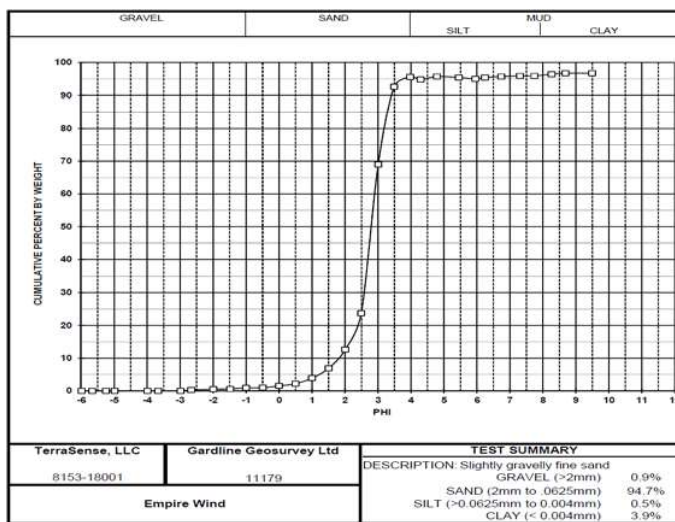
Fauna Description:

Fix67: Annelida (Polychaeta worm tubes.) and Mollusca (Neogastropoda)

Fix76: Annelida (Polychaeta worm tubes)



Fix: 17 E: 627224 N: 4468809 Depth: 30m



Fix: 17 E: 627224 N: 4468809 Retention: PSA

Station: ST18904-ENV4

Sediment Description:

Grab: Slightly gravelly, silty sand with occasional shell fragments. Very slight anoxic smell

CMECS Substrate Component Subgroup: Slightly gravelly sand

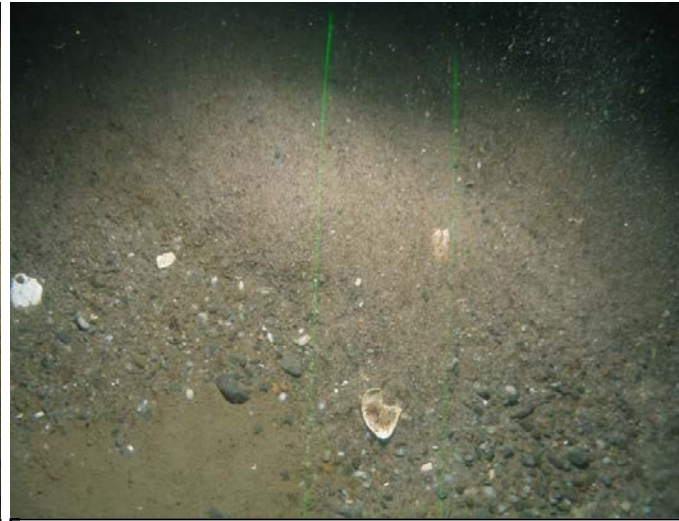
Fauna Description:

Grab: Annelida (Polychaeta worm tubes)

APPENDIX D SAMPLING AND SEABED PHOTOGRAPHS



Fix: 18 E: 642460 N: 4461973 Depth: 37m



Fix: 23 E: 642460 N: 4461973 Depth: 37m

Station: ST18904-ENV6

Sediment Description:

Fix18: Coarse sandy gravel

Fix23: Coarse gravelly sand

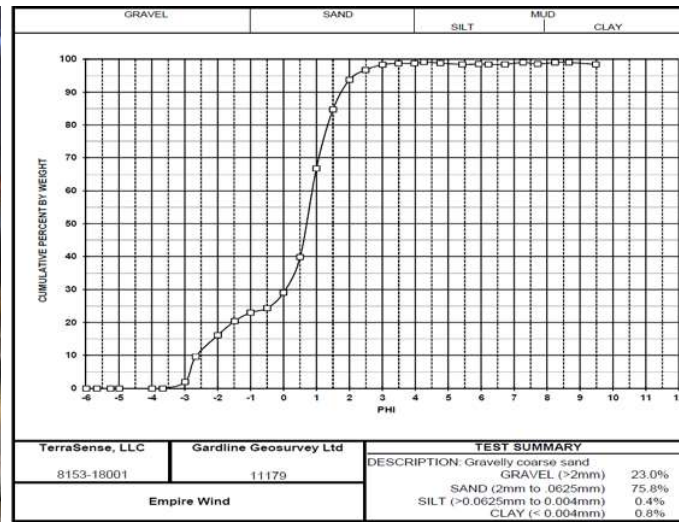
Fauna Description:

Fix18: Annelida (Polychaeta worm tubes) and
 Arthropoda (Paguroidea)

Fix23: Annelida (Polychaeta worm tubes)



Fix: 9 E: 642460 N: 4461973 Depth: 36m



Fix: 9 E: 642459 N: 4461973 Retention: PSA

Station: ST18904-ENV6

Sediment Description:

Grab: Sandy gravel with occasional shell fragments

CMECS Substrate Component Subgroup: Gravelly sand

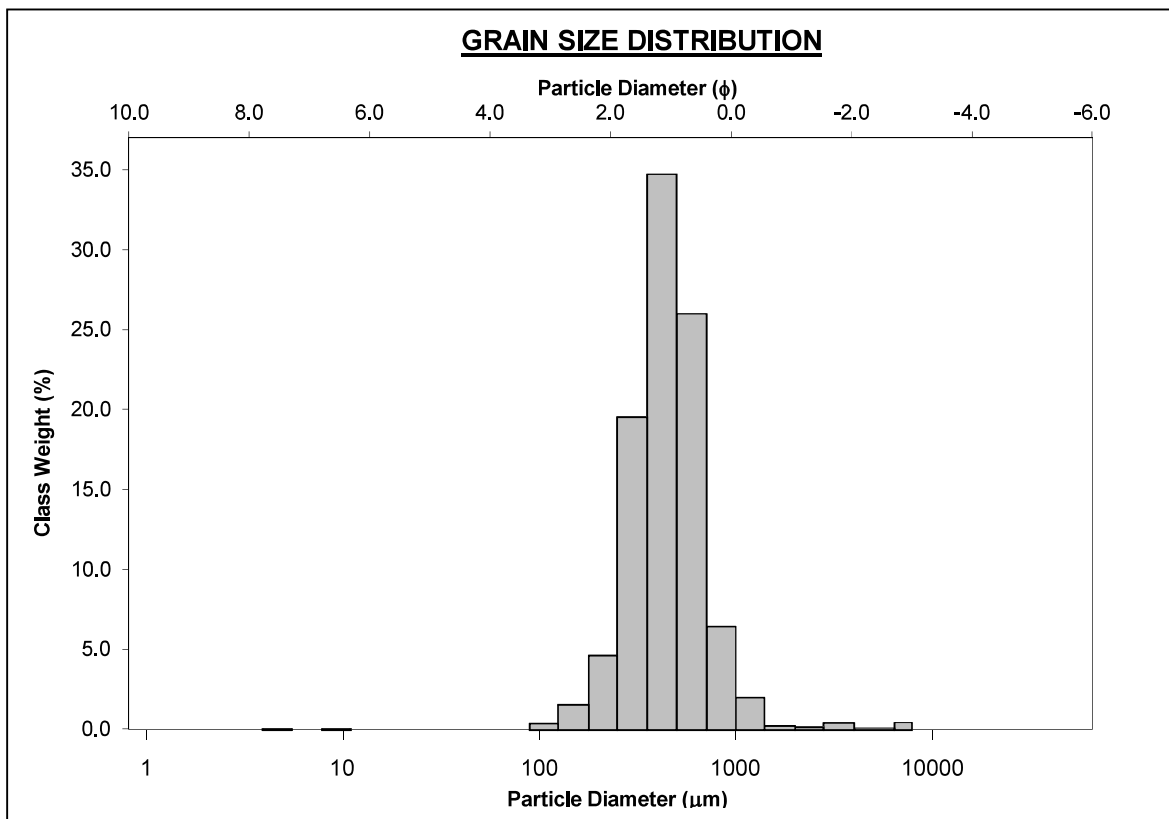
Fauna Description:

Grab: No visible fauna

APPENDIX E PARTICLE SIZE ANALYSIS

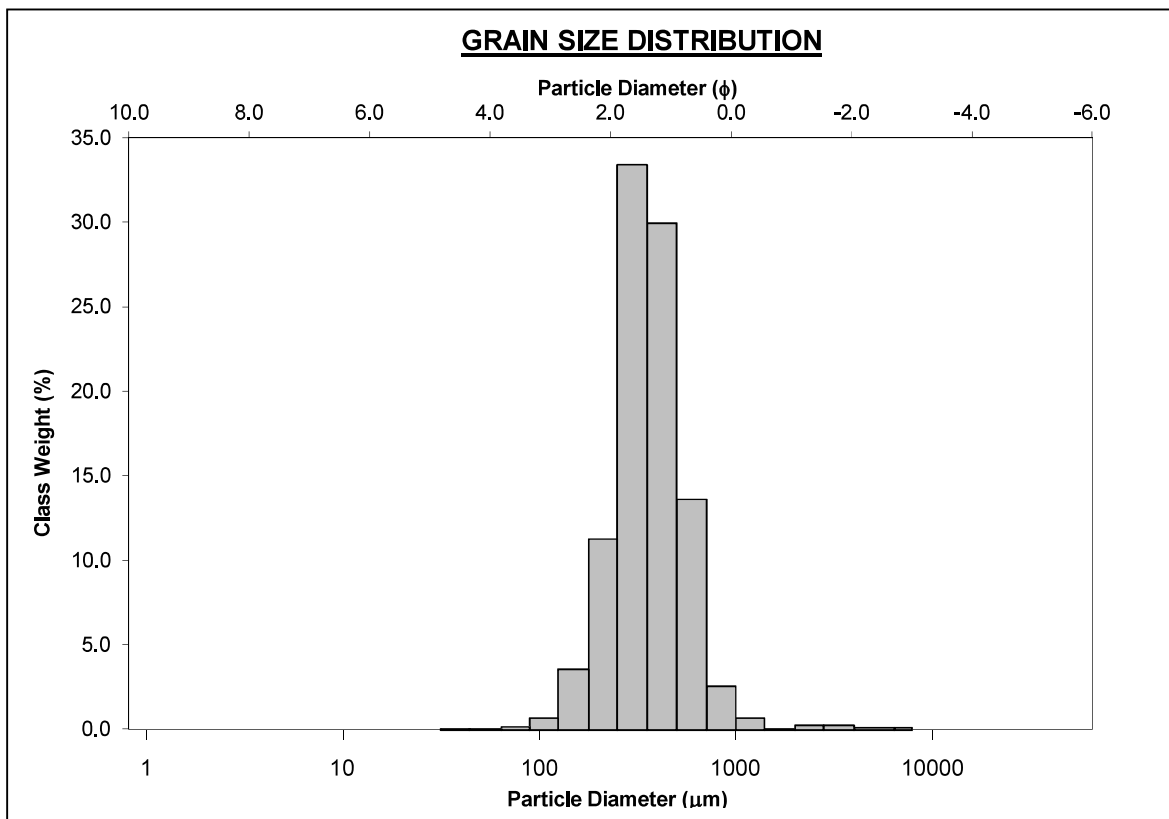
APPENDIX E PARTICLE SIZE ANALYSIS

<u>SAMPLE STATISTICS</u>						
SAMPLE IDENTITY: ENV-1			ANALYST & DATE: , 3/31/2018			
SAMPLE TYPE: Unimodal, Moderately Well Sorted			TEXTURAL GROUP: Slightly Gravelly Sand			
SEDIMENT NAME: Slightly Very Fine Gravelly Medium Sand						
	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	426.5	1.251	GRAVEL: 1.2%		COARSE SAND: 33.2%	
MODE 2:			SAND: 97.6%		MEDIUM SAND: 55.2%	
MODE 3:			MUD: 1.2%		FINE SAND: 6.5%	
D ₁₀ :	258.3	0.494			V FINE SAND: 0.4%	
MEDIAN or D ₅₀ :	438.7	1.189	V COARSE GRAVEL: 0.0%		V COARSE SILT: 0.0%	
D ₉₀ :	710.0	1.953	COARSE GRAVEL: 0.0%		COARSE SILT: 0.0%	
(D ₉₀ / D ₁₀):	2.749	3.952	MEDIUM GRAVEL: 0.0%		MEDIUM SILT: 0.1%	
(D ₉₀ - D ₁₀):	451.7	1.459	FINE GRAVEL: 0.5%		FINE SILT: 0.1%	
(D ₇₅ / D ₂₅):	1.737	2.024	V FINE GRAVEL: 0.7%		V FINE SILT: 0.0%	
(D ₇₅ - D ₂₅):	247.5	0.797	V COARSE SAND: 2.3%		CLAY: 1.0%	
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic	Geometric	Logarithmic	Geometric	Logarithmic	Description
	μm	μm	ϕ	μm	ϕ	
MEAN ($\bar{x}$):	523.9	420.4	1.250	435.4	1.199	Medium Sand
SORTING (σ):	519.7	2.153	1.106	1.549	0.631	Moderately Well Sorted
SKEWNESS (Sk):	8.665	-4.086	4.086	-0.024	0.024	Symmetrical
KURTOSIS (K):	97.61	33.88	33.88	1.130	1.130	Leptokurtic



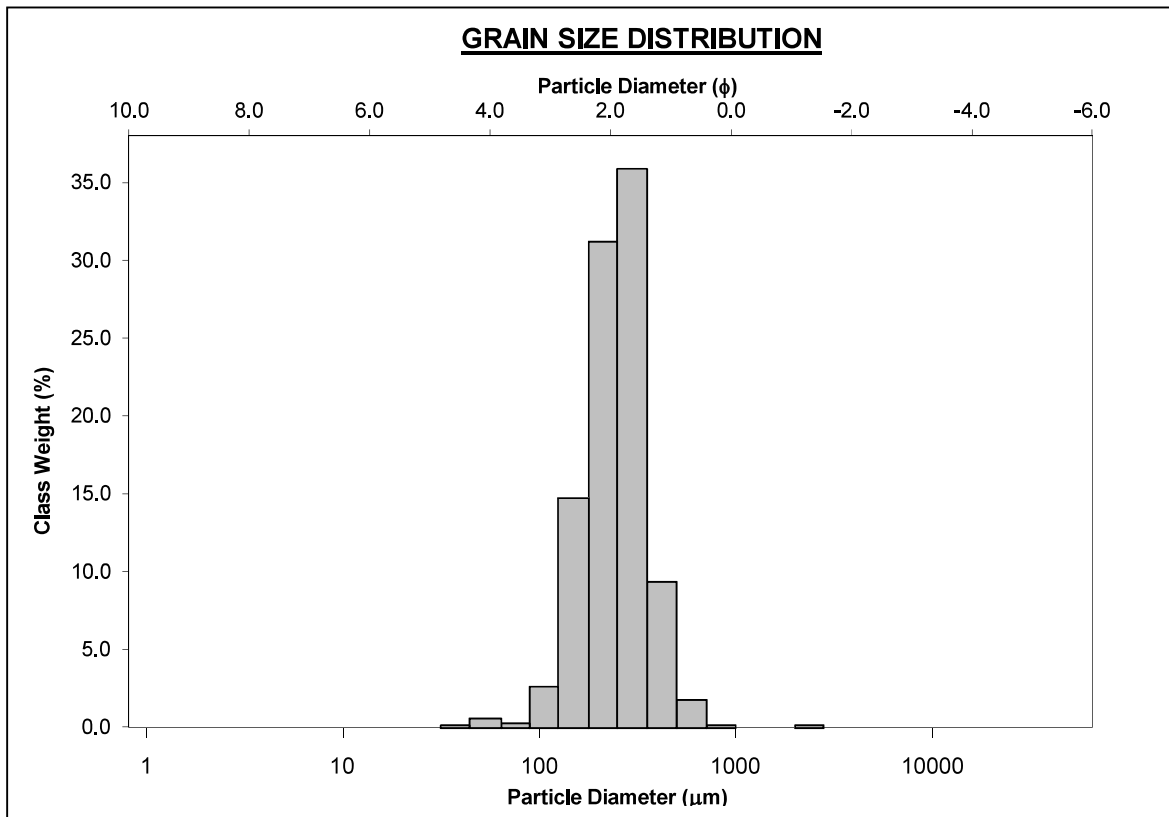
APPENDIX E PARTICLE SIZE ANALYSIS

<u>SAMPLE STATISTICS</u>						
SAMPLE IDENTITY: ENV-2			ANALYST & DATE: , 3/31/2018			
SAMPLE TYPE: Unimodal, Moderately Well Sorted			TEXTURAL GROUP: Slightly Gravelly Sand			
SEDIMENT NAME: Slightly Very Fine Gravelly Medium Sand						
	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	301.0	1.754	GRAVEL: 0.9%		COARSE SAND: 16.6%	
MODE 2:			SAND: 97.8%		MEDIUM SAND: 64.2%	
MODE 3:			MUD: 1.3%		FINE SAND: 15.2%	
D ₁₀ :	200.9	0.700			V FINE SAND: 1.0%	
MEDIAN or D ₅₀ :	348.7	1.520	V COARSE GRAVEL: 0.0%		V COARSE SILT: 0.2%	
D ₉₀ :	615.5	2.316	COARSE GRAVEL: 0.0%		COARSE SILT: 0.0%	
(D ₉₀ / D ₁₀):	3.064	3.308	MEDIUM GRAVEL: 0.0%		MEDIUM SILT: 0.0%	
(D ₉₀ - D ₁₀):	414.7	1.615	FINE GRAVEL: 0.3%		FINE SILT: 0.0%	
(D ₇₅ / D ₂₅):	1.716	1.701	V FINE GRAVEL: 0.6%		V FINE SILT: 0.0%	
(D ₇₅ - D ₂₅):	193.2	0.779	V COARSE SAND: 0.8%		CLAY: 1.1%	
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic	Geometric	Logarithmic	Geometric	Logarithmic	Description
	μm	μm	ϕ	μm	ϕ	
MEAN ($\bar{x}$):	415.1	337.0	1.569	354.3	1.497	Medium Sand
SORTING (σ):	400.5	2.108	1.076	1.520	0.604	Moderately Well Sorted
SKEWNESS (Sk):	9.854	-4.077	4.077	0.005	-0.005	Symmetrical
KURTOSIS (K):	132.0	33.72	33.72	1.109	1.109	Mesokurtic



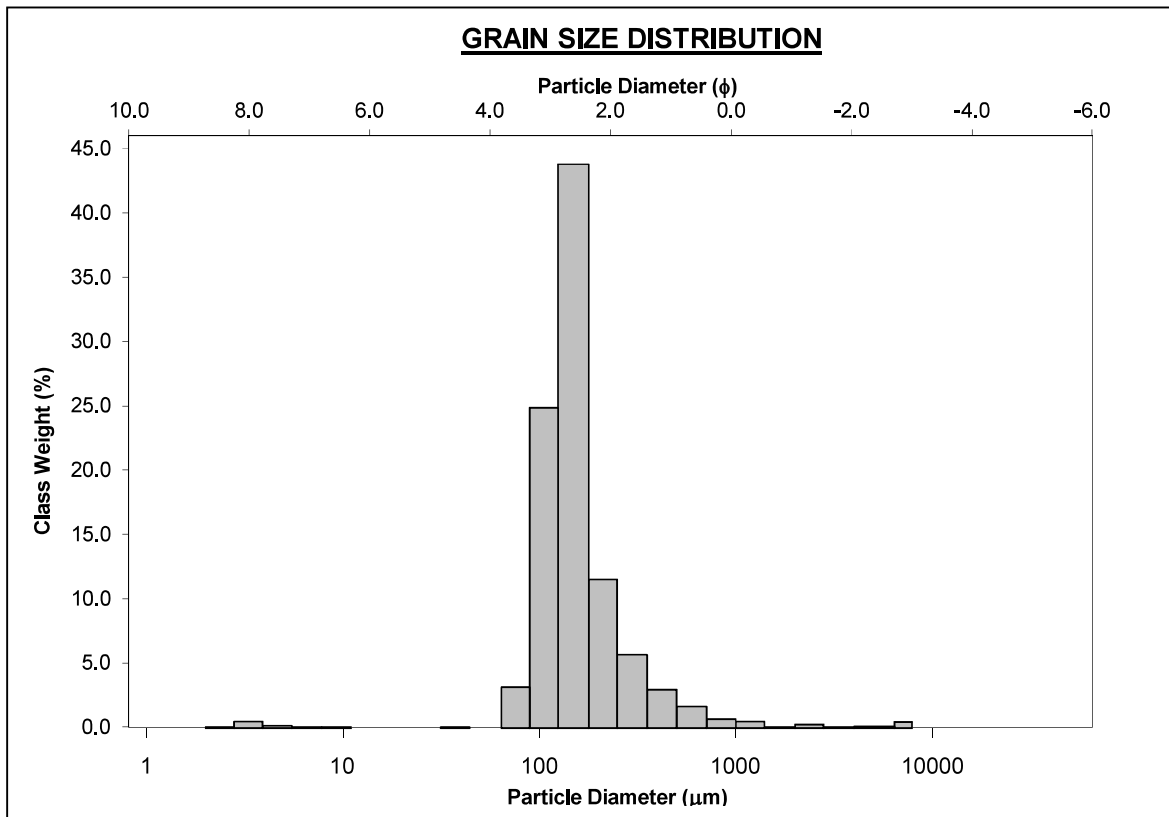
APPENDIX E PARTICLE SIZE ANALYSIS

<u>SAMPLE STATISTICS</u>						
SAMPLE IDENTITY: ENV-3			ANALYST & DATE: , 3/31/2018			
SAMPLE TYPE: Unimodal, Moderately Well Sorted			TEXTURAL GROUP: Slightly Gravelly Sand			
SEDIMENT NAME: Slightly Very Fine Gravelly Fine Sand						
	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	301.0	1.754	GRAVEL: 0.2%		COARSE SAND: 2.1%	
MODE 2:			SAND: 97.9%		MEDIUM SAND: 46.0%	
MODE 3:			MUD: 1.9%		FINE SAND: 46.6%	
D ₁₀ :	139.8	1.403			V FINE SAND: 3.3%	
MEDIAN or D ₅₀ :	245.5	2.026	V COARSE GRAVEL: 0.0%		V COARSE SILT: 0.9%	
D ₉₀ :	378.2	2.839	COARSE GRAVEL: 0.0%		COARSE SILT: 0.0%	
(D ₉₀ / D ₁₀):	2.706	2.024	MEDIUM GRAVEL: 0.0%		MEDIUM SILT: 0.0%	
(D ₉₀ - D ₁₀):	238.4	1.436	FINE GRAVEL: 0.0%		FINE SILT: 0.0%	
(D ₇₅ / D ₂₅):	1.668	1.439	V FINE GRAVEL: 0.2%		V FINE SILT: 0.0%	
(D ₇₅ - D ₂₅):	124.8	0.738	V COARSE SAND: 0.0%		CLAY: 1.0%	
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic	Geometric	Logarithmic	Geometric	Logarithmic	Description
	μm	μm	ϕ	μm	ϕ	
MEAN ($\bar{x}$):	262.6	228.2	2.132	237.4	2.075	Fine Sand
SORTING (σ):	140.4	1.918	0.940	1.467	0.553	Moderately Well Sorted
SKEWNESS (Sk):	7.412	-4.742	4.742	-0.092	0.092	Symmetrical
KURTOSIS (K):	109.2	38.41	38.41	1.035	1.035	Mesokurtic



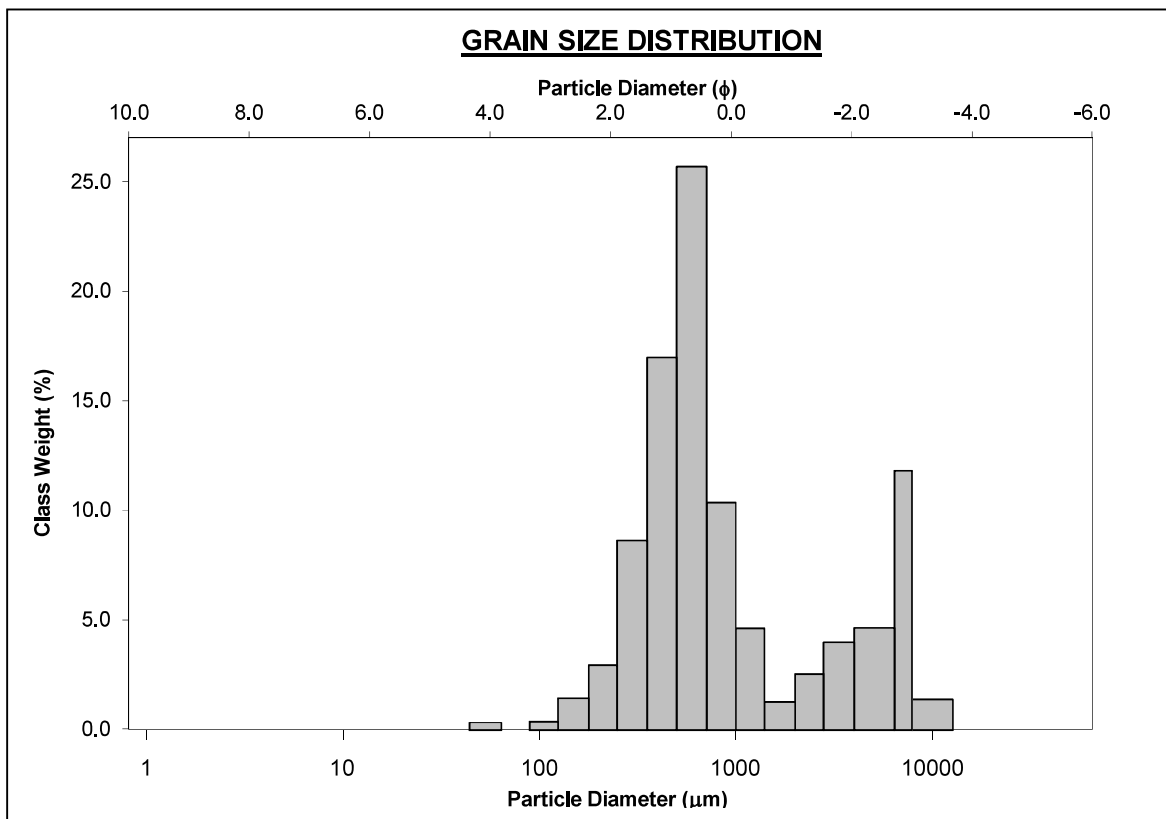
APPENDIX E PARTICLE SIZE ANALYSIS

SAMPLE STATISTICS						
SAMPLE IDENTITY: ENV-4			ANALYST & DATE: , 3/31/2018			
SAMPLE TYPE: Unimodal, Moderately Well Sorted			TEXTURAL GROUP: Slightly Gravelly Sand			
SEDIMENT NAME: Slightly Fine Gravelly Fine Sand						
	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	151.0	2.751	GRAVEL: 0.9%		COARSE SAND: 2.4%	
MODE 2:			SAND: 94.7%		MEDIUM SAND: 8.6%	
MODE 3:			MUD: 4.4%		FINE SAND: 55.5%	
D ₁₀ :	92.31	1.776			V FINE SAND: 27.6%	
MEDIAN or D ₅₀ :	144.3	2.793	V COARSE GRAVEL: 0.0%		V COARSE SILT: 0.1%	
D ₉₀ :	292.0	3.437	COARSE GRAVEL: 0.0%		COARSE SILT: 0.0%	
(D ₉₀ / D ₁₀):	3.163	1.935	MEDIUM GRAVEL: 0.0%		MEDIUM SILT: 0.1%	
(D ₉₀ - D ₁₀):	199.7	1.661	FINE GRAVEL: 0.5%		FINE SILT: 0.3%	
(D ₇₅ / D ₂₅):	1.546	1.251	V FINE GRAVEL: 0.4%		V FINE SILT: 0.6%	
(D ₇₅ - D ₂₅):	62.19	0.628	V COARSE SAND: 0.6%		CLAY: 3.3%	
			METHOD OF MOMENTS		FOLK & WARD METHOD	
			Arithmetic	Geometric	Logarithmic	Description
			μm	μm	ϕ	
MEAN ($\bar{x}$):	216.0	133.7	2.903	148.2	2.754	Fine Sand
SORTING (σ):	489.8	2.908	1.540	1.622	0.697	Moderately Well Sorted
SKEWNESS (Sk):	11.25	-2.418	2.418	0.149	-0.149	Coarse Skewed
KURTOSIS (K):	145.1	13.62	13.62	1.753	1.753	Very Leptokurtic



APPENDIX E PARTICLE SIZE ANALYSIS

<u>SAMPLE STATISTICS</u>						
SAMPLE IDENTITY: ENV-6			ANALYST & DATE: , 3/31/2018			
SAMPLE TYPE: Bimodal, Poorly Sorted			TEXTURAL GROUP: Gravelly Sand			
SEDIMENT NAME: Fine Gravelly Coarse Sand						
	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	605.0	0.747	GRAVEL: 23.0%		COARSE SAND: 37.8%	
MODE 2:	7150.0	-2.830	SAND: 75.8%		MEDIUM SAND: 26.8%	
MODE 3:			MUD: 1.2%		FINE SAND: 4.7%	
D ₁₀ :	288.1	-2.627			V FINE SAND: 0.5%	
MEDIAN or D ₅₀ :	622.2	0.685	V COARSE GRAVEL: 0.0%		V COARSE SILT: 0.4%	
D ₉₀ :	6176.1	1.796	COARSE GRAVEL: 0.0%		COARSE SILT: 0.0%	
(D ₉₀ / D ₁₀):	21.44	-0.684	MEDIUM GRAVEL: 1.9%		MEDIUM SILT: 0.0%	
(D ₉₀ - D ₁₀):	5888.1	4.422	FINE GRAVEL: 14.2%		FINE SILT: 0.0%	
(D ₇₅ / D ₂₅):	3.143	-2.901	V FINE GRAVEL: 6.9%		V FINE SILT: 0.0%	
(D ₇₅ - D ₂₅):	914.4	1.652	V COARSE SAND: 6.1%		CLAY: 0.8%	
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic	Geometric	Logarithmic	Geometric	Logarithmic	Description
	μm	μm	ϕ	μm	ϕ	
MEAN ($\bar{x}$):	1742.5	831.4	0.266	964.4	0.052	Coarse Sand
SORTING (σ):	2383.1	3.399	1.765	3.116	1.640	Poorly Sorted
SKEWNESS (Sk):	1.915	-0.513	0.513	0.472	-0.472	Very Coarse Skewed
KURTOSIS (K):	5.674	7.711	7.711	1.255	1.255	Leptokurtic



APPENDIX F MACROFAUNA ANALYSIS OF BENTHIC GRAB SAMPLES

APPENDIX F BENTHIC GRAB MACROFAUNA ANALYSIS

AphiaID	Phylum	Class	Family	Genus	Species	Taxon	ST18904-ENV1	ST18904-ENV2	ST18904-ENV3	ST18904-ENV4	ST18904-ENV6	Total Individuals	% of Individuals	Number of Stations
129778	Annelida	Polychaeta	Ampharetidae	Ampharete	finmarchica	<i>Ampharete finmarchica</i>				3		3	0.6%	1
129155	Annelida	Polychaeta	Ampharetidae	Ampharete		<i>Ampharete</i> sp.	2			6		8	1.5%	2
326605	Annelida	Polychaeta	Paraonidae	Aricidea	wassi	<i>Aricidea (Aricidea) wassi</i>			3			3	0.6%	1
129430	Animalia	Polychaeta	Paraonidae	Aricidea		<i>Aricidea</i> sp.					1	1	0.2%	1
157221	Annelida	Polychaeta	Ampharetidae	Asabellides	oculata	<i>Asabellides oculata</i>		1	4			5	1.0%	2
919	Annelida	Polychaeta	Cirratulidae			Cirratulidae					4	4	0.8%	1
157357	Annelida	Polychaeta	Oeononidae	Drilonereis	longa	<i>Drilonereis longa</i>				7	1	8	1.5%	2
157358	Annelida	Polychaeta	Oeononidae	Drilonereis	magna	<i>Drilonereis magna</i>			1			1	0.2%	1
152232	Annelida	Polychaeta	Maldanidae			<i>Euclymeninae</i>					3	3	0.6%	1
157388	Annelida	Polychaeta	Glyceridae	Glycera	americana	<i>Glycera americana</i>			2	2	3	7	1.3%	3
129296	Annelida	Polychaeta	Glyceridae	Glycera		<i>Glycera</i> sp.	1				1	2	0.4%	2
157407	Annelida	Polychaeta	Goniadidae	Goniadides	carolinae	<i>Goniadides carolinae</i>	3				8	11	2.1%	2
129418	Annelida	Polychaeta	Orbinidae	Leitoscoloplos		<i>Leitoscoloplos</i> sp.				4		4	0.8%	1
130578	Annelida	Polychaeta	Paraonidae	Levinsonia	gracilis	<i>Levinsonia gracilis</i>				2		2	0.4%	1
130228	Annelida	Polychaeta	Lumbrineridae	Lumbrinerides	acuta	<i>Lumbrinerides acuta</i>	1					1	0.2%	1
157501	Annelida	Polychaeta	Nephtysidae	Nephtys	picta	<i>Nephtys picta</i>	5	13	2	10	8	38	7.1%	5
130255	Annelida	Polychaeta	Lumbrineridae	Ninoe	nigripes	<i>Ninoe nigripes</i>				25		25	4.7%	1
334234	Annelida	Polychaeta	Oeononidae	Notocirrus	spinifera	<i>Notocirrus spinifera</i>				6		6	1.1%	1
129898	Annelida	Polychaeta	Capitellidae	Notomastus	latericeus	<i>Notomastus latericeus</i>				1	1	2	0.4%	2
334506	Annelida	Polychaeta	Phyllodoceidae	Phyllodoce	groenlandica	<i>Phyllodoce groenlandica</i>	1					1	0.2%	1
334512	Annelida	Polychaeta	Phyllodoceidae	Phyllodoce	mucosa	<i>Phyllodoce mucosa</i>			1			1	0.2%	1
129710	Annelida	Polychaeta	Terebellidae	Polycirrus		<i>Polycirrus</i> sp.					1	1	0.2%	1
130261	Annelida	Polychaeta	Lumbrineridae	Scoletoma	fragilis	<i>Scoletoma fragilis</i>	2		5	5	35	47	8.9%	4
421066	Annelida	Polychaeta	Lumbrineridae	Scoletoma	verrilli	<i>Scoletoma verrilli</i>				13	4	17	3.2%	2
331978	Annelida	Polychaeta	Sphaerodoridae	Sphaerodoropsis	corrugata	<i>Sphaerodoropsis corrugata</i>	3					3	0.6%	1
913	Annelida	Polychaeta	Spionidae			Spionidae	10			1		11	2.1%	2
129595	Annelida	Polychaeta	Sigalionidae	Sthenelais		<i>Sthenelais</i> sp.	1		2	1		4	0.8%	3
391588	Arthropoda	Malacostraca	Oedicerotidae	Ameroculodes		<i>Ameroculodes</i> sp.					2	2	0.4%	1
158022	Arthropoda	Malacostraca	Ampeliscidae	Ampelisca	vadorum	<i>Ampelisca vadorum</i>				4		4	0.8%	1
158023	Arthropoda	Malacostraca	Ampeliscidae	Ampelisca	verrilli	<i>Ampelisca verrilli</i>				124		124	23.4%	1
101946	Arthropoda	Malacostraca	Ampeliscidae	Byblis	serrata	<i>Byblis serrata</i>	10	14	1	1	1	27	5.1%	5
157815	Arthropoda	Malacostraca	Diastylidae	Diastylis	polita	<i>Diastylis polita</i>				2		2	0.4%	1
157817	Arthropoda	Malacostraca	Diastylidae	Diastylis	sculpta	<i>Diastylis sculpta</i>			1		1	2	0.4%	2
489646	Arthropoda	Malacostraca	Podoceridae	Dyopodos	monacanthus	<i>Dyopodos monacanthus</i>				1		1	0.2%	1
157885	Arthropoda	Malacostraca	Idoteidae	Edotia	triloba	<i>Edotia triloba</i>	3		3	5		11	2.1%	3
102409	Arthropoda	Malacostraca	Ischyroceridae	Erichthonius	rubricornis	<i>Erichthonius rubricornis</i>				1		1	0.2%	1
106854	Arthropoda	Malacostraca	Paguridae	Pagurus		<i>Pagurus</i> sp.			2		1	3	0.6%	2
102385	Arthropoda	Malacostraca	Isaeidae	Photis	pollex	<i>Photis pollex</i>			2			2	0.4%	1
102989	Arthropoda	Malacostraca	Phoxocephalidae	Phoxocephalus	holbolli	<i>Phoxocephalus holbolli</i>					10	10	1.9%	1
158137	Arthropoda	Malacostraca	Haustoriidae	Protohaustorius	wigleyi	<i>Protohaustorius wigleyi</i>		2				2	0.4%	1
157836	Arthropoda	Malacostraca	Bodotriidae	Pseudoleptocuma	minus	<i>Pseudoleptocuma minus</i>		1			1	2	0.4%	2

AphtID	Phylum	Class	Family	Genus	Species	Taxon	ST18904-ENV1	ST18904-ENV2	ST18904-ENV3	ST18904-ENV4	ST18904-ENV6	Total Individuals	% of Individuals	Number of Stations
549011	Arthropoda	Malacostraca	Phoxocephalidae	Rhepoxynius	hudsoni	<i>Rhepoxynius hudsoni</i>	16	8	28			52	9.8%	3
157839	Arthropoda	Malacostraca	Tanaissuidae	Tanaissus	psammophilus	<i>Tanaissus psammophilus</i>	1	4				5	1.0%	2
158156	Arthropoda	Malacostraca	Aoridae	Unciola	irrorata	<i>Unciola irrorata</i>	4			8	2	14	2.7%	3
158062	Echinodermata	Echinoidea	Echinarachniidae	Echinarachnius	parma	<i>Echinarachnius parma</i>	1		5			6	1.1%	2
420863	Mollusca	Bivalvia	Tellinidae	Angulus	versicolor	<i>Angulus versicolor</i>			3			3	0.57%	1
138802	Mollusca	Bivalvia	Arcticidae	Arctica	islandica	<i>Arctica islandica</i>			1			1	0.2%	1
140584	Mollusca	Bivalvia	Nuculidae	Ennucula	tenuis	<i>Ennucula tenuis</i>			6			6	1.1%	1
933783	Mollusca	Bivalvia	Pharidae	Ensis	directus	<i>Ensis directus</i>	1					1	0.2%	1
138154	Mollusca	Bivalvia	Lyonsiidae	Lyonsia		<i>Lyonsia</i> sp.			1			1	0.2%	1
156916	Mollusca	Bivalvia	Nuculidae	Nucula	proxima	<i>Nucula proxima</i>			6			6	1.1%	1
156963	Mollusca	Bivalvia	Veneridae	Pitar	morrhuanus	<i>Pitar morrhuanus</i>				1		1	0.2%	1
156996	Mollusca	Bivalvia	Macridae	Spisula	solidissima	<i>Spisula solidissima</i>					1	1	0.2%	1
737284	Mollusca	Gastropoda	Nassariidae	Tritia	trivittata	<i>Tritia trivittata</i>		1	2			3	0.6%	2
243	Mollusca	Bivalvia	Veneridae			<i>Veneridae</i>			1			1	0.2%	1
138672	Mollusca	Bivalvia	Yoldiidae	Yoldia		<i>Yoldia</i> sp.				1		1	0.2%	1
1361	Cnidaria	Anthozoa				Ceriantharia				2		2	0.4%	1
146927	Nemertea	Anopla	Carinomidae	Carinomella	lactea	<i>Carinomella lactea</i>			5		4	9	1.7%	2
122348	Nemertea	Anopla	Lineidae	Cerebratulus		<i>Cerebratulus</i> sp.	3					3	0.6%	1
122360	Nemertea	Anopla	Lineidae	Micrura		<i>Micrura</i> sp.	1					1	0.2%	1
individuals							69	44	87	236	93	529	100.0%	
taxa							19	8	23	25	21	60	60	

ATTACHMENT T-2

COP BENTHIC HABITAT CHARACTERIZATION REPORT: LEASE AREA

Gardline Report: *Equinor Wind OCS-A0512 Geophysical & Benthic Survey*



Survey Report for
Equinor Wind US LLC

Project:
**Equinor Wind OCS-A 0512 Geophysical & Benthic
Survey**

Description:
Habitat Characterization Report Lease Area

Survey Date:
Survey: 01-Jun-2018 to 02-Dec-2018
Environmental: 5-Aug-2018 to 01-Dec-2018

Project Number:
11179

Client Reference:
ST18904

Report Status:
Rev1

REPORT AUTHORIZATION AND DISTRIBUTION

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Checked	 A Chambers
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Distribution

1 pdf

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For attention of
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For attention of
Justin Bailey

EXECUTIVE SUMMARY

Gardline Limited completed a geophysical and habitat characterization survey on behalf of Equinor US Wind LLC (previously known as Statoil Wind US LLC), across the Commercial Lease of Submerged Lands and Renewable Energy Development on the Outer Continental Shelf (OCS-A 0512). The survey was to support characterization of benthic resources for the Construction and Operations Plan. The survey and report cover the offshore Lease Area only. Habitat characterization of the export cable corridors is reported separately. The survey area was located 14 miles (22km) to 24 miles (39km) south of Long Island, New York and covered an area of approximately 124 miles² (321km²). Environmental surveys were combined using the Gardline research vessel (RV) *Ocean Researcher* between 01-Jun-2018 and 02-Dec-2018.

The objective of the environmental survey as defined by the scope of work (Equinor Wind US, 2017) was to obtain data for:

- Identification of seafloor sediment and seafloor morphology
- Identifications of seabed obstructions
- Identification of mobile sand deposits
- Quantification and description the characteristics of seabed sediments
- Description of the biological nature of the seabed
- Identification of geological or manmade hazards (e.g. buried objects, shallow gas, lithological heterogeneities, etc.) beneath the seafloor that could affect the mooring systems

A full geophysical suite consisting of multi-beam echo sounder (MBES), side scan sonar (SSS), magnetometer and shallow and medium penetration sub-bottom profiler (SBP); specifically, ultra-high resolution seismic (UHRS) pinger and sparker spread. The preliminary results of the geophysical survey are summarized where relevant in the current report and reported in full separately, see Table 1.1. A total of 65 co-located camera and grab stations were pre-selected by the client to cover three transects through the Lease Area. In addition to these stations, Station ST18904-ENV5 was outstanding from the previous Site Assessment Plan survey, conducted onboard the RV *Shearwater* at the Lease Area and reported by Gardline (2018). Therefore, this station was investigated in the current survey. Furthermore, one additional station (ST18904-ENV72) was added to investigate an area of higher reflectivity observed from the geophysical data and to ensure good coverage of all potential seabed substrate types. All 67 stations were investigated using a shallow water camera system to acquire seabed imagery and a modified 0.1m² Day grab to acquire sediment samples. Seabed sampling was successful and yielded three acceptable Day grab deployments at each station, with the exception of Stations ST18904-ENV22 and ST18904-ENV37. However, samples with less than 50% retention were obtained at both stations and upon Equinor Wind request, these samples were sieved and fixed in formalin and labeled as 'MFA'; denoting macrofaunal sample A. Of the three acquired samples at the remaining stations, two were sieved through a 0.5mm mesh sieve, with one labeled 'MFA' and sent for macrofaunal analyses and the second labeled 'MFB' retained as a spare. The third sample (CHEM) was acquired for particle size and total organic matter analyses.

Preliminary interpretation of the geophysical data revealed the seabed sediments to predominantly comprise coarse sand with areas of higher reflectivity on the SSS data interpreted to comprise accumulations of shell, gravel and cobbles. Linear debris were interpreted throughout the survey area. Water depths across the survey area gradually deepened from the west of the site to the east and ranged between 82' (25m) North American Vertical Datum 88 (NAVD88) at Station ST18904-ENV11 to 138' (42m) NAVD88 at Station ST18904-ENV69.

Environmental camera imagery across the survey revealed the seabed predominantly comprised slightly gravelly sand with occasional shell fragments. The sand dollar *Echinarachinus parma* dominated the imagery and 52 stations

were categorized as '*Echinarachinus parma* Bed', according to the Coastal and Marine Ecological Classification Standard classification (CMECS: FGDC, 2012). Small faunal tubes were observed at seven stations in relatively high densities, therefore these stations were categorized at the biotic group level as 'Small Tube-Building Fauna'. three stations were categorized at the biotic group level as 'Burrowing Anemones' while four stations were categorized as 'Mobile Crustaceans on Soft Sediments'. Lastly, Station ST18904-ENV11 was categorized as 'Large Tube-Building Fauna'.

A total of 35 live individuals of potential *Arctica islandica* were recorded at 25 stations across the survey area and 47 pairs of siphons, which have the potential to be live *A. islandica*, were recorded at 27 stations. A further 58 dead *A. islandica* shells were recorded at 20 stations. The survey was located within an area designated as an essential fish habitat for this taxon (NOAA, 2018b).

Thirty individuals of the winter skate; *Leucoraja ocellate*, were observed at twenty stations across the survey area. These stations are located within an area designated as an essential fish habitat for this taxon (NOAA, 2018a). Furthermore, a total of 426 Rajidae egg cases were also observed across the survey area and were present in all but five stations.

Particle size analysis confirmed the initial interpretation of the geophysical data and seabed imagery, returning a modified Folk classification, and therefore a CMECS substrate components classification (FGDC, 2012), ranging between slightly gravelly muddy sand to sandy gravel across all stations. Sand ($\geq 63\mu\text{m}$, $< 2\text{mm}$) accounted for the majority of the sediment, ranging from 40.0% to 98.9%, whilst fines ($< 63\mu\text{m}$) accounted for less than 10% of the sediment at all stations, with the exception of Station ST18904-ENV72. Fines comprise clay ($< 3.8\mu\text{m}$), which accounted for a maximum of 6.3% of the sediment, and silt, which accounted for a maximum 2.6% of the sediment at all other stations. Clay accounted for 20.3% of the sediment at Station ST18904-ENV72, while silt accounted for 18.0%. The remaining sediment at all stations comprised granules (2mm to 4mm) and pebbles ($> 4\text{mm}$). Granules accounted for between 0.1% to 20.4% of the sediment across the entire survey area, whilst pebbles accounted for between 0.0% and 41.1% of the sediment. The Wentworth (1922) threshold between pebble and cobble is 64mm, which is greater than the uppermost sieve used to carry out analysis. Therefore, no differentiation could be made between pebbles and cobbles. Concentrations of total organic matter were relatively homogenous across the survey area, whilst water content ranged from 9.5% to 80.4%, correlating to the varying percentages of fines and gravels at stations.

The sieved infaunal (hereafter referred to as macrofauna) community was dominated by Polygordiidae, accounting for 39% of the overall total abundance. Despite this, the macrofaunal community was found to be relatively diverse, with 186 taxa recorded across 67 stations. 38 (20%) taxa were found at only one station and of these 25 (13%) taxa were represented by a single individual. Multivariate analysis of the faunal data revealed that stations were more dissimilar to one another than similar and that differences largely corresponded with absences and higher abundances of various taxa.

A single live individual of the ocean quahog (*A. islandica*) was recorded from the fauna sample collected at Station ST18904-ENV25 and was located within an area designated as an essential fish habitat for this taxon (NOAA, 2018b). Potential *A. islandica* (live individuals, empty shells and siphons) were also observed in the seabed imagery. Eight individuals of Anthozoa (Actiniaria, Edwardsiidae, Ceriantharia) were recorded throughout the survey area. BOEM (2013) guidelines suggest that the presence of Anthozoans within a survey area should be noted. However, these guidelines refer to Anthozoans in the context of sensitive benthic habitats, none of which are formed by the anthozoan species mentioned above.

The majority of stations (n=35) were categorized at the biotic group level as 'Small Surface-Burrowing Fauna'. Of these, the fauna community at three stations allowed further classification to the biotic community classification of 'Oligochaete Bed' and one station to the biotic community of 'Capitellid Bed'. Seventeen stations were categorized at the biotic group level of 'Large Deep-Burrowing Fauna' due to the dominance of the polychaete families Nephtyidae and Cirratulidae at individual stations

Eleven stations were categorized at the biotic group level of 'Mobile Crustaceans on Soft Sediments'. Of these, two stations were recorded as having a resemblance to the biotic community 'Robust *Ampelisca* Bed'. Whilst, one station was recorded as having a resemblance to a 'Haustoriid Bed'. Within the macrofauna data, three stations were dominated by the sand dollar *Echinarachnius parma* and were given the biotic community classification of '*Echinarachnius parma* Bed'. One station was categorized to the biotic community level as a '*Nucula* Bed'.

Station ST18904-ENV39 was dominated by the tube-dwelling polychaete Spionidae. The family Spionidae has a minimum size range of between 0.5mm and 9mm (Hayward & Ryland, 1995). This size range spans two categories on the CMECS Invertebrate Community organism size values table (FGDC, 2012); 'Small Macrofauna' and 'Large Macrofauna'. Station ST18904-ENV39 was therefore categorized within two possible biotic groups of 'Small Tube-Building Fauna' and 'Larger Tube-Building fauna'.

The survey area did not fall in any final or proposed Critical Habitat as defined by United States Fish and Wildlife Service (2018). Furthermore, no benthic species or protected fish species listed under the Endangered Species Act (NOAA, 2018a) were observed in the seabed imagery or the samples acquired and analyzed. Nor was there any further evidence from imagery or sampling of any sensitive habitats within the surveyed area, as defined by BOEM (2013), such as exposed hard bottoms or those covered by ephemeral sand layers, seagrass patches, kelp or other algal beds.

SERVICE WARRANTY

USE OF THIS REPORT

This report has been prepared with due care and diligence and with the skill reasonably expected of a reputable contractor experienced in the types of work carried out under the contract and as such the findings in this report are based on an interpretation of data which is a matter of opinion on which professionals may differ and unless clearly stated is not a recommendation of any course of action.

Gardline has prepared this report for the client(s) identified on the front cover in fulfillment of its contractual obligations under the referenced contract and the only liabilities Gardline accept are those contained therein.

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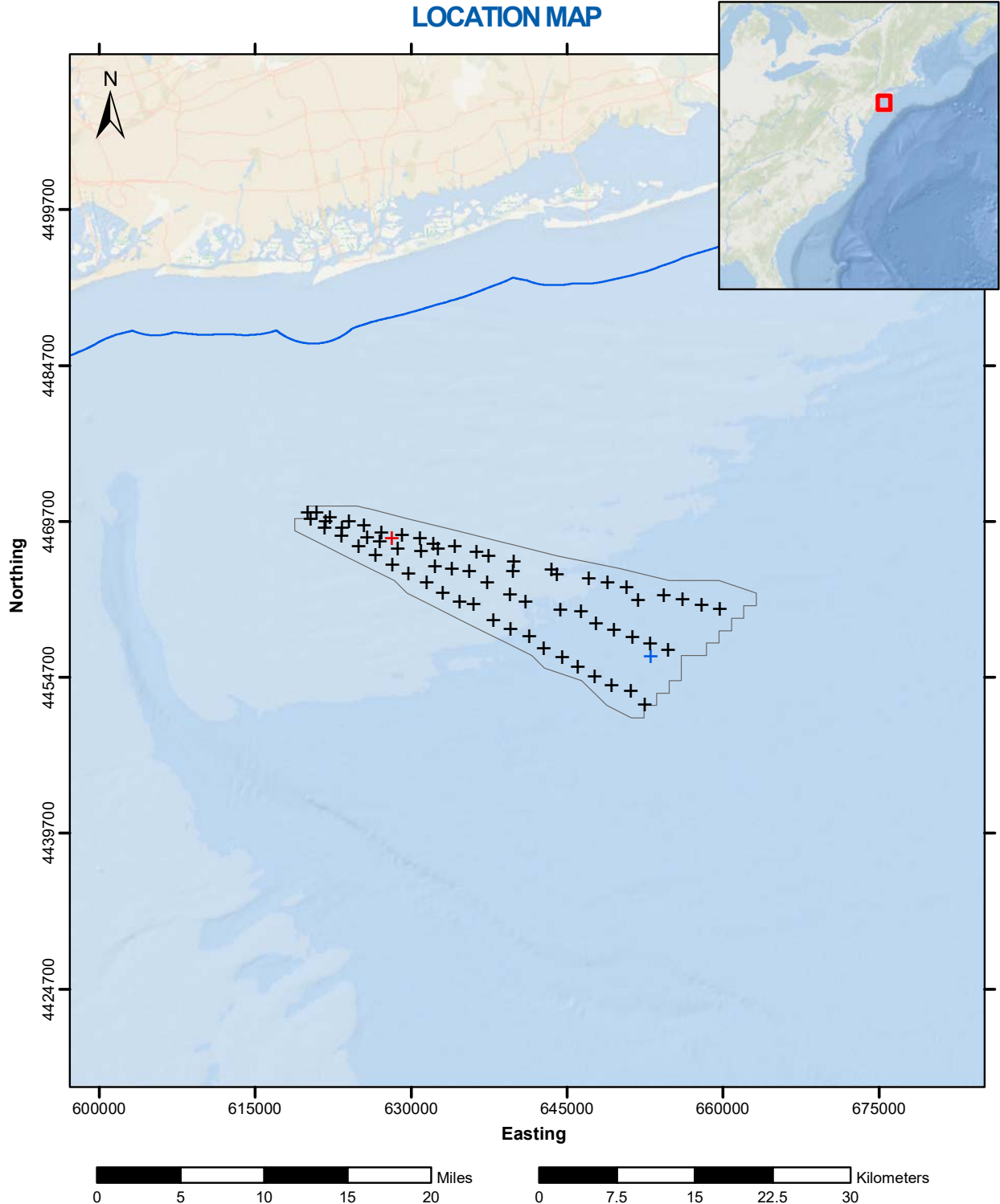


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GLOSSARY OF TERMS AND ABBREVIATIONS

Benthic	Relating to the seabed	NOAA	National Oceanic and Atmospheric Administration
Biogenic	Produced by living organisms	PRIMER	A statistical analysis program - Plymouth Routines in Multivariate Research
BOEM	Bureau of Ocean Energy Management	PSA	Particle Size Analysis
Clay	Sediment grains <3.9µm in diameter (Wentworth, 1922)	RV	Research Vessel
CM	Central Meridian	Sand	Sediment grains ≥63µm and <2mm in diameter
CMECS	Coastal and Marine Ecological Classification Standard	SAP	Site Assessment Plan
COP	Construction and Operations Plan	SBP	Sub-Bottom Profiler
Fines	Sediment grains <63µm in diameter (same as Mud)	SD	Standard deviation
FLiDAR	Floating Light Detection and Ranging Buoy	Silt	Sediment grains ≥3.9µm and <63µm in diameter (Wentworth, 1922)
Gravel	Sediment grains >2mm in diameter	Sobs	A species accumulation curve with samples added in label order
HRG	High Resolution Geophysical	SOW	Scope of Work
Macrofauna	Organisms that are normally larger than the mesh size of the sieve used, in this case 0.5mm	SSS	Side Scan Sonar
MARA	Marine Archaeological Resource Assessment	TOM	Total Organic Matter
MBES	Multi-beam Echo Sounder	UGE	A smoothed species accumulation curve based on samples being added randomly and averaged over several runs
MDS	Multi Dimensional Scaling	UHRS	Ultra-High Resolution Seismic
MoM	Method of Moments	UTM	Universal Transverse Mercator
Mud	Sediment grains <63µm (includes Silt and Clay)		
NAD	North American Datum		
NAVD	North American Vertical Datum		

1 INTRODUCTION

1.1 Scope of Work

Gardline Limited completed a geophysical and habitat characterization survey on behalf of Equinor US Wind LLC (previously known as Statoil Wind US LLC), across the Commercial Lease of Submerged Lands and Renewable Energy Development on the Outer Continental Shelf (OCS-A 0512). The survey was to support characterization of benthic resources for the Construction and Operations Plan (COP). The survey and report cover the offshore Lease Area only. Habitat characterization of the export cable corridors is reported separately. The survey area was located 14 miles (22km) to 24 miles (39km) south of Long Island, New York and covered an area of approximately 124 miles² (321km²). The extent of Lease area OCS-A 0512 is presented on the Location Map for reference. Environmental survey were combined using the Gardline research vessel (RV) *Ocean Researcher* between 01-Jun-2018 and 02-Dec-2018.

This report summarizes the results of the habitat characterization survey. The preliminary results of the geophysical survey are summarized where relevant in the current report and reported in full separately, for the full list of geophysical reports see Table 1.1.

The objective of the geophysical survey was to undertake a marine archaeological resource assessment (MARA) and a high resolution geophysical (HRG) survey as defined in the scope of work (SOW; Equinor Wind US, 2017). The purpose of the habitat assessment was to support interpretation of geophysical data to characterize surficial sediment conditions and provide benthic habitat classification. As such the aim of the environmental survey as defined in the SOW (Equinor Wind US, 2017) was to gather data for:

- Identification of seafloor sediment and seafloor morphology
- Identifications of seabed obstructions
- Identification of mobile sand deposits
- Quantification and description of the characteristics of seabed sediments
- Description of the biological nature of the seabed
- Identification of geological or manmade hazards (e.g. buried objects, shallow gas, lithological heterogeneities, etc.) beneath the seafloor that could affect the mooring systems

The geophysical SOW requirements were achieved by using a multi-beam echo sounder (MBES), side scan sonar (SSS), magnetometer and shallow and medium penetration sub-bottom profiler (SBP); specifically, ultra-high resolution seismic (UHRS) pinger and sparker spread. The preliminary results of the geophysical survey are summarized where relevant in the current report and reported in full separately, see Table 1.1. The environmental survey component utilized a shallow water camera system for seabed imagery acquisition and a 0.1m² Day grab to obtain sediment samples across the survey area. The survey area comprised the Lease Area OCS-A 0512 and export cable corridors.

All positional information in this report is referenced to GRS-1980 Ellipsoid, North American Datum (NAD) 1983. All grid coordinates are projected using Universal Transverse Mercator (UTM) Projection, Grid Zone 18N, Central Meridian (CM) 75° W.

Table 1.1 List of Geophysical Reports

Report	Report No.
ST18507 – NY Wind 2018 Survey Campaign – FLiDAR 1 SCR	11179.1
ST18507 – NY Wind 2018 Survey Campaign – FLiDAR 2 SCR	11179.2
ST18507 – NY Wind 2018 Survey Campaign – Export Cable Route	11179.3
ST18507 – NY Wind 2018 Survey Campaign – Main Lease Area Geophysical Report	11179.4
ST18507 – NY Wind 2018 Survey Campaign – Ocean View Cable Route Geophysical Report	11179.5
ST18507 – NY Wind 2018 Survey Campaign – Gowanus (Deviation) Cable Route Geophysical Report	11179.6.1
ST18507 – NY Wind 2018 Survey Campaign – Gowanus (Alternate) Cable Route Geophysical Report	11179.6.2
ST18507 – NY Wind 2018 Survey Campaign – Jones Beach East Cable Route Geophysical Report	11179.7
ST18507 – NY Wind 2018 Survey Campaign – Geophysical Acquisition Report	11179.8
ST18453 – NY Empire Wind 2018 Survey Campaign – Main Lease Area Geotechnical Report	11179.9
	11179.10
	11179.11
ST18453 – NY Empire Wind 2018 Survey Campaign – Gowanus Cable Route Geotechnical Report	11179.12
	11179.13
	11179.14
ST18453 – NY Empire Wind 2018 Survey Campaign – Gowanus Alt Cable Route Geotechnical Report	11179.15
	11179.16
	11179.17
ST18453 – NY Empire Wind 2018 Survey Campaign – Jones Beach East Cable Route Geotechnical Report	11179.18
	11179.19
	11179.20
ST18453 – NY Empire Wind 2018 Survey Campaign – Ocean View Cable Route Geotechnical Report	11179.21
	11179.22
	11179.23

1.2 Environmental Survey Strategy

A total of 65 co-located grab stations and camera stations were pre-selected by the client and were spread along three transects running through the Lease Area. In addition to the 65 pre-selected stations, Station ST18904-ENV5 was outstanding from the previous Site Assessment Plan survey conducted onboard the RV *Shearwater* at the Lease Area and reported by Gardline (2018). Therefore, this station was investigated in the current survey. Furthermore, following review of the geophysical data, one additional station (ST18904-ENV72) was added to investigate an area of higher reflectivity and to ensure good coverage of all seabed substrate types.

All stations were investigated with a digital stills camera system. Seabed sampling was attempted at all 67 stations using a 0.1m² modified Day grab. This was in order to obtain requisite samples for the habitat assessment as well as provide ground-truthing of the geophysical data and visual assessment of seabed habitats based on the seabed imagery. Seabed sampling was successful and yielded three acceptable Day grab deployments at each station, with the exception of Stations ST18904-ENV22 and ST18904-ENV37. However, samples with less than 50% retention were obtained at both stations and upon Equinor Wind request, these samples were sieved and fixed in formalin and labelled as 'MFA'; denoting macrofaunal sample A.

Of the three successful deployments at each station, one sample (designated CHEM) was sub-sampled for particle size analysis (PSA) and total organic matter (TOM) along with a spare. The remaining grab samples, labeled 'MFA' and 'MFB', were screened through a 0.5mm mesh size sieve to provide benthic sieved infauna (hereafter referred to as macrofauna) samples and were preserved in buffered formalin. The PSA samples and one of the macrofaunal samples; Sample MFA, were sent to their respective analytical laboratories and the results reported in Sections 2.4 and 2.5 respectively.

Details of the target locations and samples collected at each station are summarized in Table 1.2. Target and actual sampling locations, the latter of which may be slightly offset from the former, are presented in Figure 1.1 to Figure 1.8 and in the surveyor's log sheets in Appendix A. Detailed methods are given in Appendix B.

Table 1.2 Summary of Environmental Sampling Positions and Samples Acquired

Station	Reason for Selection	Target	Water Depth (')	Water Depth (m) ¹	Easting ²	Northing ²	Imagery	Acceptable Day Grab Samples	Samples Acquired			
									Fauna ³	Sub-samples		
										Total Organic Matter	Particle Size	Spare ⁴
ST18904-ENV1	Flidar 1	Pre-selected by client	115	35	642530	4461784	Y	3	2	1	1	1
ST18904-ENV2	Metocean buoy 1	Pre-selected by client	118	36	643430	4461350	Y	3	2	1	1	1
ST18904-ENV3	Metocean buoy 2	Pre-selected by client	115	35	641627	4462217	Y	3	2	1	1	1
ST18904-ENV4	Flidar 2	Pre-selected by client	98	30	627225	4468810	Y	3	2	1	1	1
ST18904-ENV5	FLiDAR 3 Region (remaining station from previous survey)	Pre-selected by client	131	40	653069	4456716	Y	3	2	1	1	1
ST18904-ENV6	Area of medium reflectivity	Pre-selected by client	118	36	642460	4461973	Y	3	2	1	1	1
ST18904-ENV7	Mottled/medium reflectivity	Pre-selected by client	85	25	620052	4470591	Y	3	2	1	1	1
ST18904-ENV8	Adjusted for higher reflectivity	Pre-selected by client	88	26	620908	4470528	Y	3	2	1	1	1
ST18904-ENV9	Adjusted away from debris, low reflectivity - representative main sediment type	Pre-selected by client	83	25	620340	4469992	Y	3	2	1	1	1
ST18904-ENV10	Adjusted for higher reflectivity/sediment boundary	Pre-selected by client	88	26	622179	4470124	Y	3	2	1	1	1
ST18904-ENV11	Low reflectivity - representative main sediment type	Pre-selected by client	82	25	621786	4469680	Y	3	2	1	1	1
ST18904-ENV12	Low reflectivity - representative main sediment type	Pre-selected by client	82	25	621697	4469135	Y	3	2	1	1	1
ST18904-ENV13	Adjusted for high reflectivity	Pre-selected by client	90	27	624010	4469720	Y	3	2	1	1	1
ST18904-ENV14	Adjusted for ribbons/waves and away from cable/pipeline	Pre-selected by client	85	25	623373	4469151	Y	3	2	1	1	1
ST18904-ENV15	Adjusted for cable/pipeline, low reflectivity - representative main sediment type	Pre-selected by client	84	26	623319	4468364	Y	3	2	1	1	1
ST18904-ENV16	Low reflectivity - representative main sediment type	Pre-selected by client	85	27	625461	4469323	Y	3	2	1	1	1
ST18904-ENV17	Adjusted for higher reflectivity	Pre-selected by client	91	28	625768	4468193	Y	3	2	1	1	1
ST18904-ENV18	Low reflectivity - representative main sediment type	Pre-selected by client	87	27	624939	4467345	Y	3	2	1	1	1
ST18904-ENV19	Adjusted for high reflectivity and away from debris	Pre-selected by client	99	31	627142	4468639	Y	3	2	1	1	1
ST18904-ENV20	Adjusted for low reflectivity - representative main sediment type	Pre-selected by client	98	30	626977	4467778	Y	3	2	1	1	1
ST18904-ENV21	Area of mottled/varying reflectivity	Pre-selected by client	92	28	626561	4466450	Y	3	2	1	1	1
ST18904-ENV22	Adjusted for widespread reflectivity change	Pre-selected by client	103	32	629104	4468384	Y	1	1			
ST18904-ENV23	Low reflectivity - representative main sediment type	Pre-selected by client	104	31	628720	4467073	Y	3	2	1	1	1
ST18904-ENV24	Low reflectivity - slight ribbons	Pre-selected by client	94	29	628182	4465555	Y	3	2	1	1	1
ST18904-ENV25	Low and slightly mottled reflectivity	Pre-selected by client	105	32	630870	4468054	Y	3	2	1	1	1
ST18904-ENV26	Adjusted for widespread high reflectivity	Pre-selected by client	101	31	630949	4466852	Y	3	2	1	1	1
ST18904-ENV27	Adjusted for higher reflectivity and away from cable	Pre-selected by client	103	32	629734	4464721	Y	3	2	1	1	1
ST18904-ENV28	Adjusted for low reflectivity patch within high reflectivity area	Pre-selected by client	103	32	632160	4467571	Y	3	2	1	1	1
ST18904-ENV29	Adjusted for low reflectivity - representative main sediment type	Pre-selected by client	103	31	632298	4465382	Y	3	2	1	1	1
ST18904-ENV30	Adjusted away from cable crossing, medium reflectivity	Pre-selected by client	106	33	631519	4463859	Y	3	2	1	1	1
ST18904-ENV31	Adjusted for high reflectivity	Pre-selected by client	99	30	634200	4467328	Y	3	2	1	1	1
ST18904-ENV32	Area of widespread high reflectivity	Pre-selected by client	107	33	633921	4465118	Y	3	2	1	1	1
ST18904-ENV33	Low reflectivity - representative main sediment type	Pre-selected by client	105	32	633046	4462870	Y	3	2	1	1	1
ST18904-ENV34	Low reflectivity - representative main sediment type	Pre-selected by client	104	31	636279	4466785	Y	3	2	1	1	1
ST18904-ENV35	Adjusted for area of ribbons	Pre-selected by client	105	33	635597	4464927	Y	3	2	1	1	1
ST18904-ENV36	Adjusted to be within SSS coverage, low reflectivity - representative main sediment type	Pre-selected by client	107	33	634678	4462024	Y	3	2	1	1	1
ST18904-ENV37	Adjusted for discrete constrained high ref area	Pre-selected by client	108	33	637462	4466382	Y	1	1			
ST18904-ENV38	Adjusted for high reflectivity	Pre-selected by client	11	34	637300	4463868	Y	3	2	1	1	1
ST18904-ENV39	Adjusted for area of mottled variable reflectivity	Pre-selected by client	115	34	636023	4461760	Y	3	2	1	1	1
ST18904-ENV40	Adjusted to be within SSS coverage, low reflectivity - representative main sediment type	Pre-selected by client	108	34	639872	4465877	Y	3	2	1	1	1
ST18904-ENV41	Adjusted away from several cables/pipelines, low reflectivity	Pre-selected by client	107	33	639495	4462739	Y	3	2	1	1	1
ST18904-ENV42	Low reflectivity - representative main sediment type	Pre-selected by client	112	34	637910	4460185	Y	3	2	1	1	1
ST18904-ENV43	Adjusted for widespread high reflectivity	Pre-selected by client	116	35	639781	4464941	Y	3	2	1	1	1
ST18904-ENV44	Adjusted for high reflectivity	Pre-selected by client	119	36	640990	4461982	Y	3	2	1	1	1
ST18904-ENV45	Adjusted to be within SSS coverage, low reflectivity - representative main sediment type	Pre-selected by client	116	36	639559	4459380	Y	3	2	1	1	1
ST18904-ENV46	Low reflectivity - representative main sediment type	Pre-selected by client	116	35	643492	4465093	Y	3	2	1	1	1
ST18904-ENV47	Additional station to replace former ST18904-ENV47 (close to already sampled Shearwater stations), ribbons	Pre-selected by client	103	31	632549	4467089	Y	3	2	1	1	1
ST18904-ENV48	Adjusted away from cable, low reflectivity	Pre-selected by client	123	38	641355	4458666	Y	3	2	1	1	1
ST18904-ENV49	Adjusted for high reflectivity	Pre-selected by client	118	37	644001	4464610	Y	3	2	1	1	1
ST18904-ENV50	Low reflectivity - representative main sediment type	Pre-selected by client	121	38	644322	4461209	Y	3	2	1	1	1
ST18904-ENV51	Low reflectivity - representative main sediment type	Pre-selected by client	120	36	642774	4457500	Y	3	2	1	1	1

Station	Reason for Selection	Target	Water Depth (')	Water Depth (m) ¹	Easting ²	Northing ²	Imagery	Acceptable Day Grab Samples	Samples Acquired			
									Fauna ³	Sub-samples		
										Total Organic Matter	Particle Size	Spare ⁴
ST18904-ENV52	Low reflectivity - representative main sediment type	Pre-selected by client	117	36	647098	4464248	Y	3	2	1	1	1
ST18904-ENV53	Adjusted for subtle reflectivity change	Pre-selected by client	122	37	646327	4461095	Y	3	2	1	1	1
ST18904-ENV54	Adjusted to be within SSS coverage, low reflectivity - representative main sediment type	Pre-selected by client	130	40	644532	4456638	Y	3	2	1	1	1
ST18904-ENV55	Low reflectivity - representative main sediment type	Pre-selected by client	120	37	648901	4463825	Y	3	2	1	1	1
ST18904-ENV56	Low reflectivity - representative main sediment type	Pre-selected by client	122	38	647790	4459905	Y	3	2	1	1	1
ST18904-ENV57	Low reflectivity - representative main sediment type	Pre-selected by client	129	39	646017	4455709	Y	3	2	1	1	1
ST18904-ENV58	Low reflectivity - representative main sediment type	Pre-selected by client	123	38	650704	4463402	Y	3	2	1	1	1
ST18904-ENV59	Low reflectivity - representative main sediment type	Pre-selected by client	127	39	649523	4459254	Y	3	2	1	1	1
ST18904-ENV60	Low reflectivity - representative main sediment type	Pre-selected by client	130	40	647638	4454814	Y	3	2	1	1	1
ST18904-ENV61	Adjusted away from cable and towards slightly higher reflectivity	Pre-selected by client	128	39	651843	4462100	Y	3	2	1	1	1
ST18904-ENV62	Low reflectivity - representative main sediment type	Pre-selected by client	127	39	651257	4458602	Y	3	2	1	1	1
ST18904-ENV63	Low reflectivity - representative main sediment type	Pre-selected by client	134	41	649260	4453919	Y	3	2	1	1	1
ST18904-ENV64	Low reflectivity - representative main sediment type	Pre-selected by client	126	39	654310	4462556	Y	3	2	1	1	1
ST18904-ENV65	Low reflectivity/close to shearwater Station ST18904-ENV5 that is still pending	Pre-selected by client	131	41	652990	4457951	Y	3	2	1	1	1
ST18904-ENV66	Adjusted away from cable/low reflectivity	Pre-selected by client	133	41	651140	4453402	Y	3	2	1	1	1
ST18904-ENV67	Adjusted to be within SSS coverage available at this point, low reflectivity - representative main sediment type	Pre-selected by client	129	39	656114	4462233	Y	3	2	1	1	1
ST18904-ENV68	Low reflectivity - representative main sediment type	Pre-selected by client	132	41	654724	4457299	Y	3	2	1	1	1
ST18904-ENV69	Low reflectivity - representative main sediment type	Pre-selected by client	137	41	652502	4452129	Y	3	2	1	1	1
ST18904-ENV70	Low reflectivity - representative main sediment type	Pre-selected by client	131	39	657916	4461710	Y	3	2	1	1	1
ST18904-ENV71	Low reflectivity - representative main sediment type	Pre-selected by client	134	40	659719	4461287	Y	3	2	1	1	1
ST18904-ENV72	Higher reflectivity – replicate of ST18904-ENV22	New area of high reflectivity	100	31	628134	4468137	Y	3	2	1	1	1

1 Depths have been taken from the observed depth of the chemistry grab and corrected to NADV88.

2 Environmental target locations. Actual sampling positions for each individual grab sample are detailed in Appendix A.

3 One macrofauna sample was sent to be analyzed, one sample kept as a spare at room temperature. Analysis methods are as detailed in Appendix B.

4 One spare sub-sample was stored in a double-lined zip-lock bag and available for analysis of organics and particle size if required. Analysis methods are as detailed in Appendix B.

Grey cells indicate where no samples were acquired.

Blue cells indicate stations investigated and reported by Gardline (2018) previously.

Figure 1.1 Target and Actual Sampling Locations: Stations ST18904-ENV7 to ST18904-ENV15

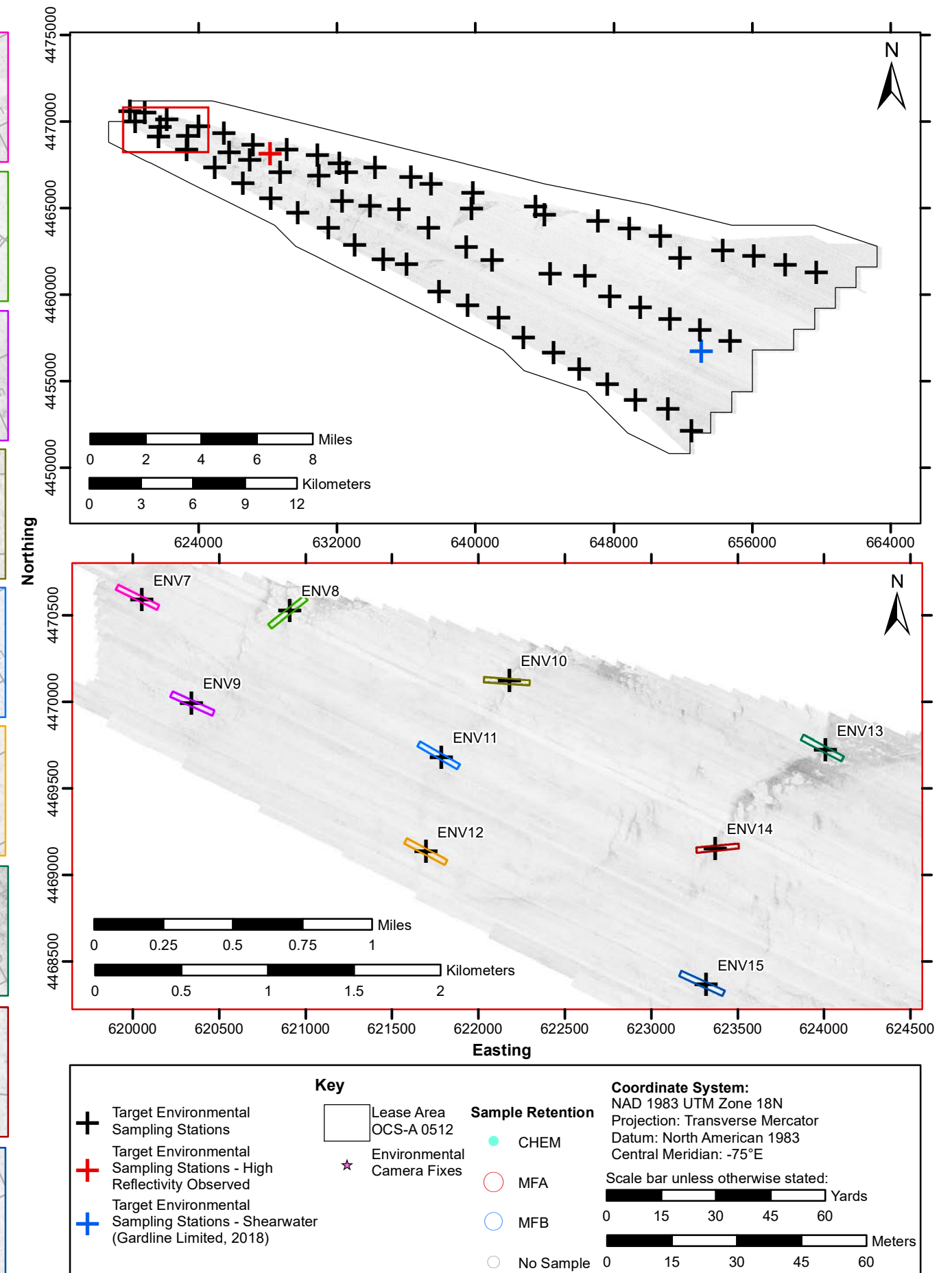
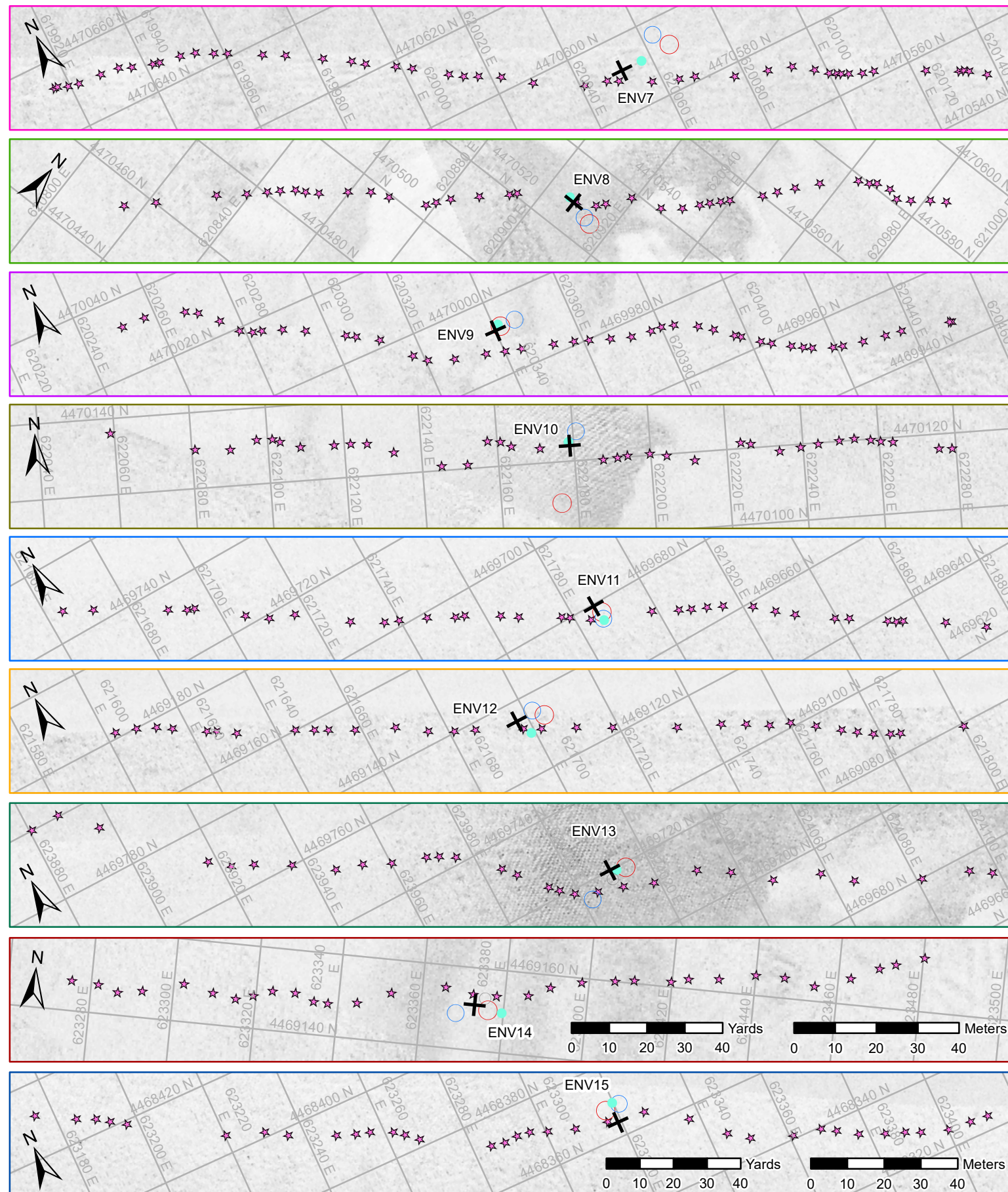


Figure 1.2 Target and Actual Sampling Locations: Stations ST18904-ENV16 to ST18904-ENV23 and ST18904-ENV72

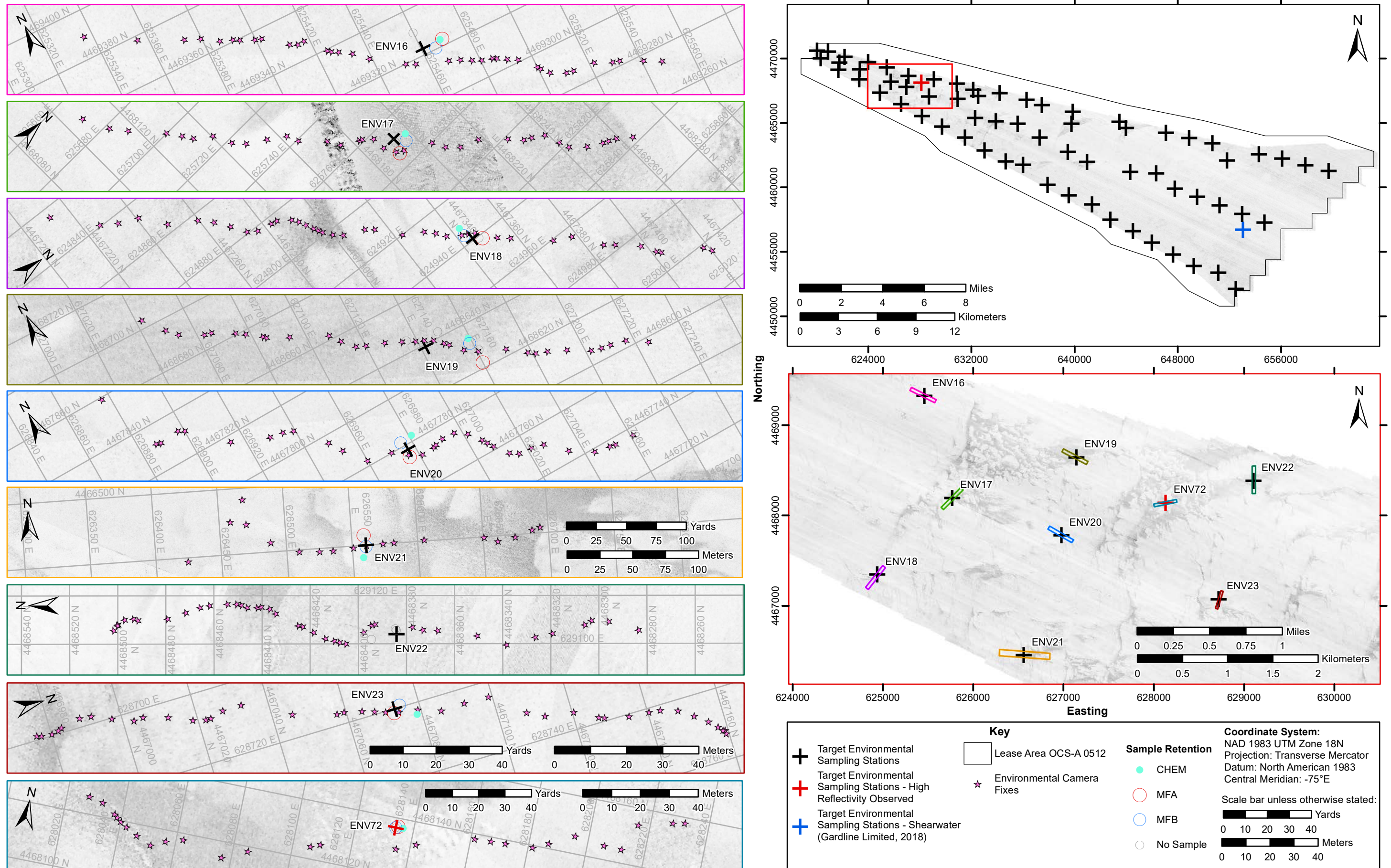


Figure 1.3 Target and Actual Sampling Locations: Stations ST18904-ENV24 to ST18904-ENV29, ST18904-ENV31, ST18904-ENV32 and ST18904-ENV47

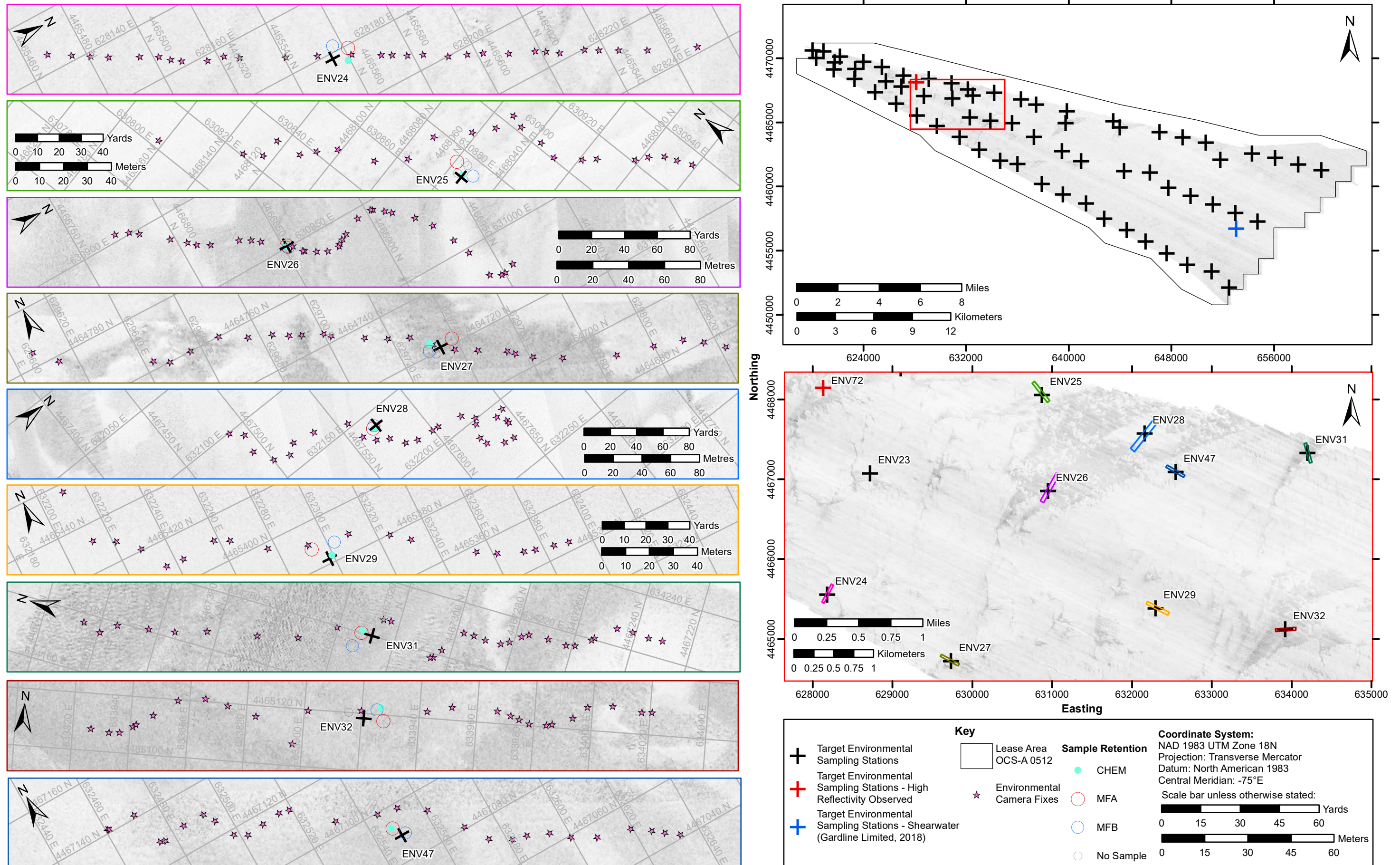


Figure 1.4 Target and Actual Sampling Locations: Stations ST18904-ENV30 and ST18904-ENV33 to ST18094-ENV40

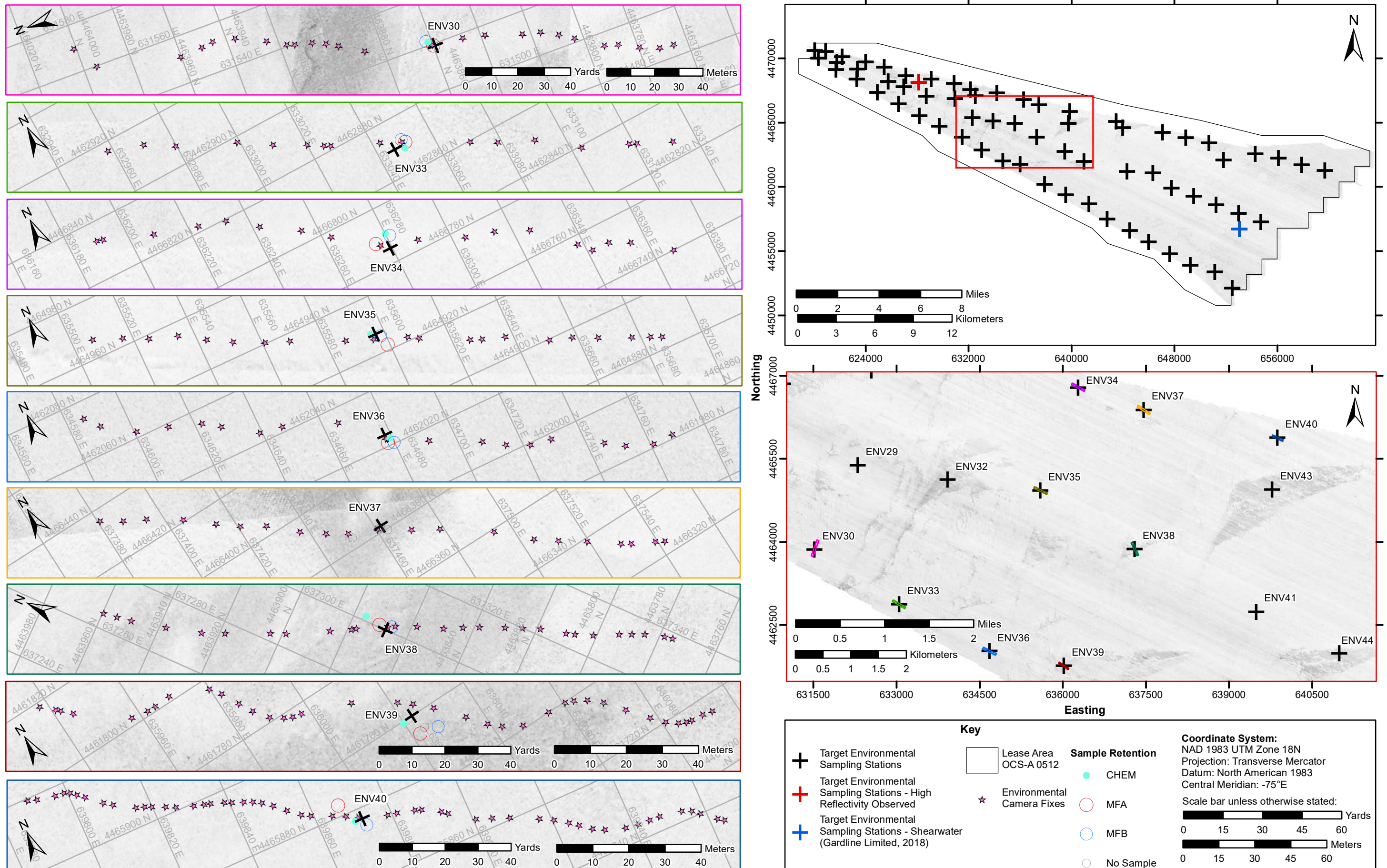


Figure 1.5 Target and Actual Sampling Locations: Stations ST18904-ENV41, ST18904-ENV43, ST18904-ENV46, ST18904-ENV49, ST18904-ENV50, ST18904-ENV52, ST18904-ENV53, ST18904-ENV55 and ST18904-ENV58

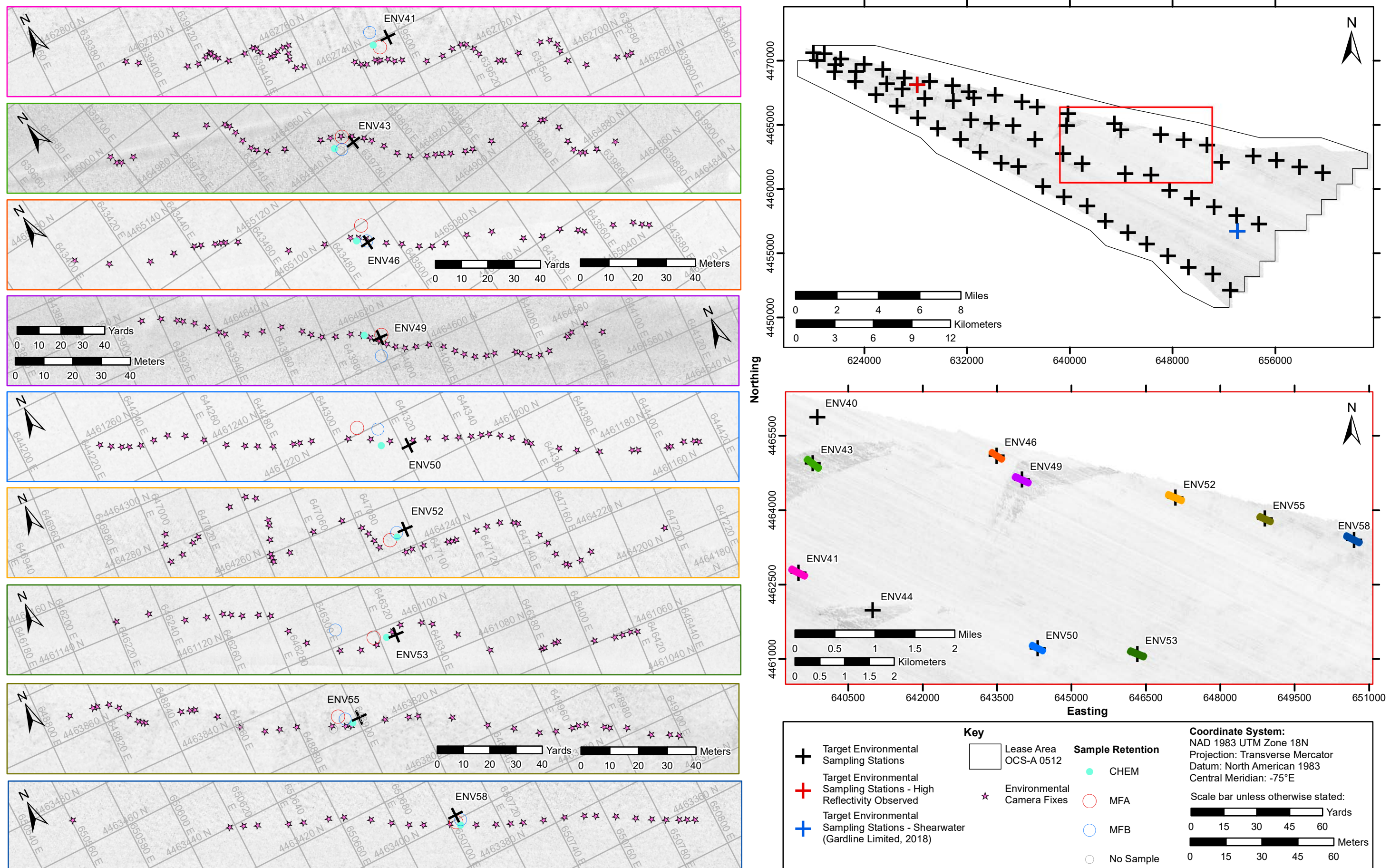


Figure 1.6 Target and Actual Sampling Locations: Stations ST18904-ENV42, ST18904-ENV44, ST18904-ENV45, ST18904-ENV48, ST18904-ENV51, ST18904-ENV54 and ST18904-ENV56 to ST18904-ENV59

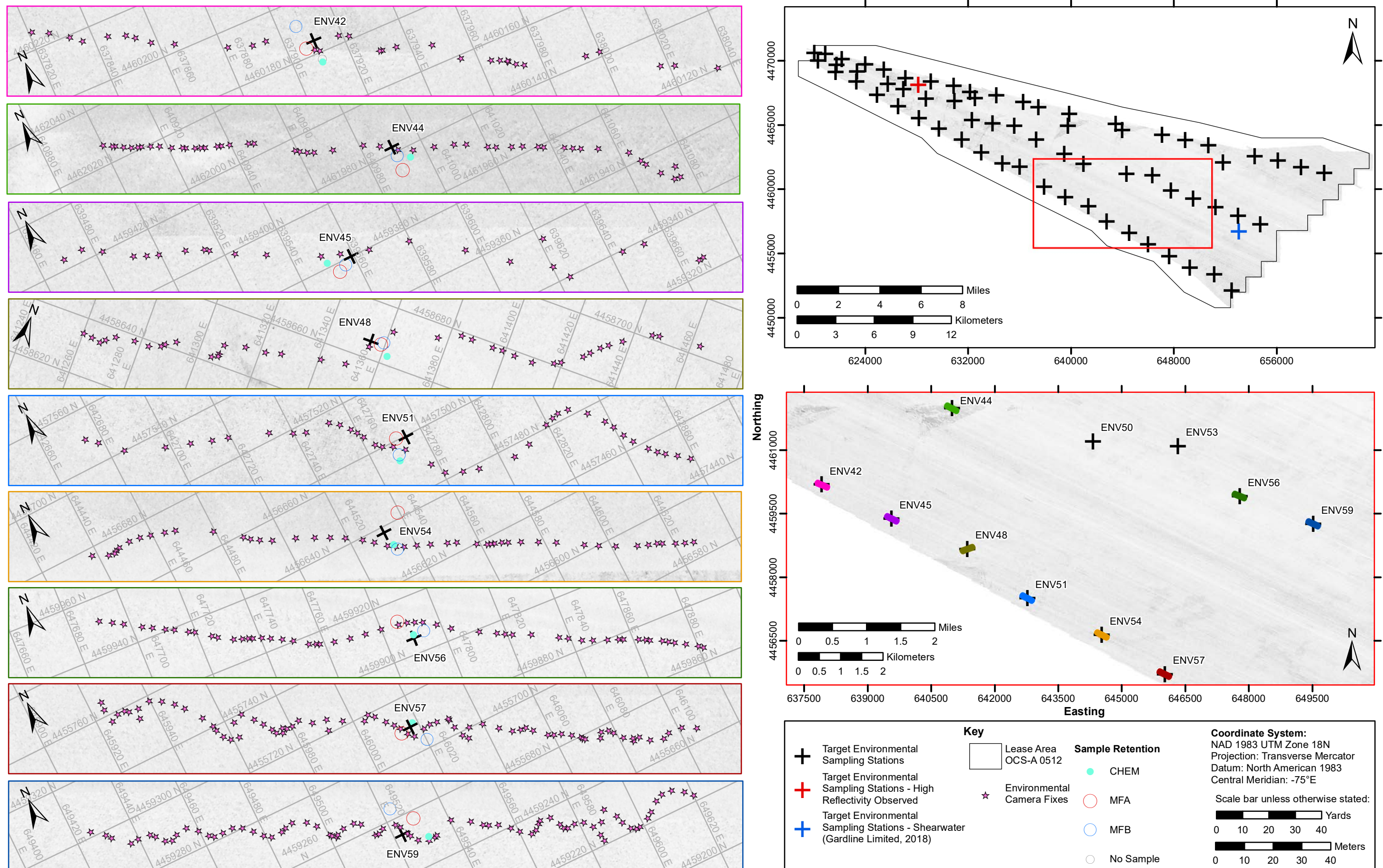


Figure 1.7 Target and Actual Sampling Locations: Stations ST18904-ENV5, ST18904-ENV60, ST18904-ENV63, ST18904-ENV65, ST18904-ENV66, ST18904-ENV68 and ST18904-ENV69

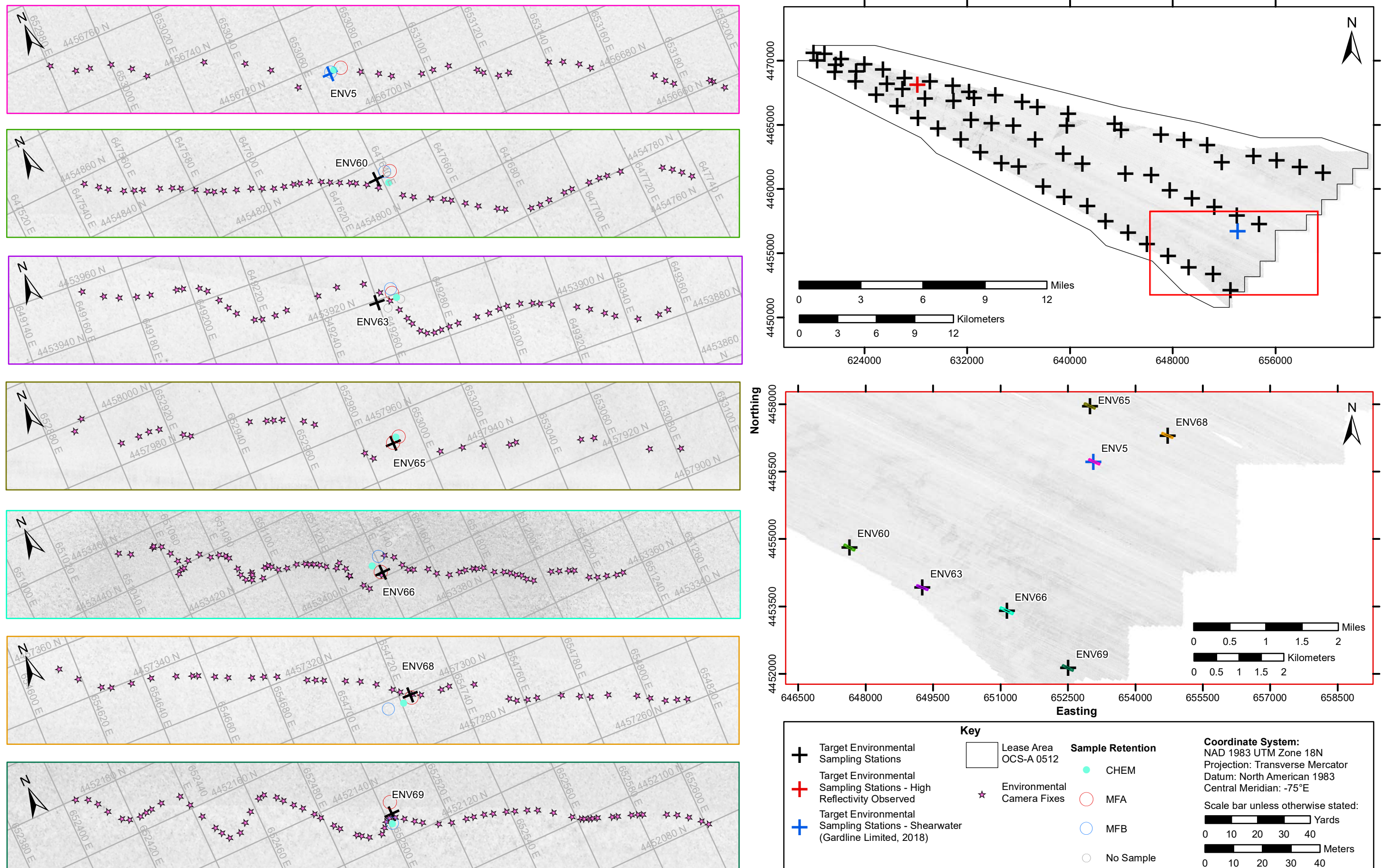
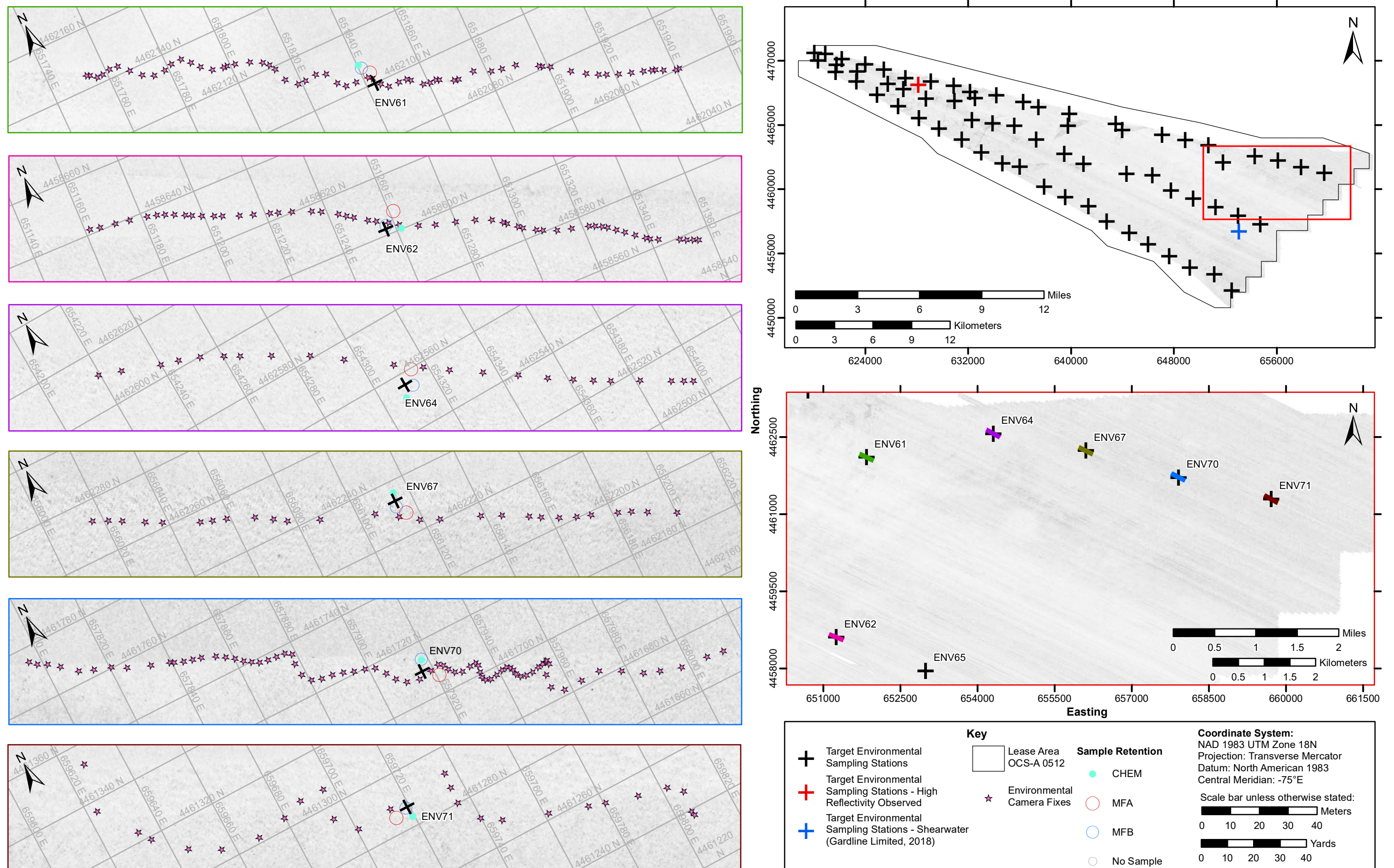


Figure 1.8 Target and Actual Sampling Locations: Stations ST18904-ENV61, ST18904-ENV62, ST18904-ENV64, ST18904-ENV67, ST18904-ENV70 and ST18904-ENV71



2 RESULTS AND DISCUSSION

2.1 Geophysical Survey Summary

2.1.1 Survey Overview

Gardline conducted a geophysical survey, for which MBES, SSS, magnetometer, SBP, UHRS pinger and sparker spread equipment were used to undertake a MARA and HRG survey. The preliminary results of the geophysical survey that inform the benthic habitat parameters are summarized below and reported in full separately, see Table 1.1. After completion of the HRG survey, the RV *Ocean Researcher* carried out the environmental sampling. A total of 67 environmental sampling sites were completed during this phase of the project.

2.1.2 Bathymetry

A color shaded relief of the bathymetry data gridded at 2m is presented in Figure 2.1. All water depths are reduced to North American Vertical Datum 88 (NAVD88). Water depths across the survey area gradually deepened from the west of the survey area to the east. Observed water depths ranged from 82' (25m) NAVD88 at Station ST18904-ENV11 in the west of the survey area to 138' (42m) NAVD88 at Station ST18904-ENV69 in the east of the survey area.

2.1.3 Seabed Features

Initial interpretation of SSS data together with environmental samples and photographs revealed predominant seabed sediments to comprise sand. Regions of higher reflectivity predominantly towards the west of the survey site were interpreted from the sonar data to comprise sand with gravel and areas of shell fragments. Linear debris items were interpreted throughout the survey area.

There were seven known wrecks and obstructions, identified from NOAA (2019) charts, within the Lease Area, however they were not observed from the seabed imagery. Seabed features are illustrated in Figure 2.2.

Figure 2.1 Color Shaded Relief of Bathymetry

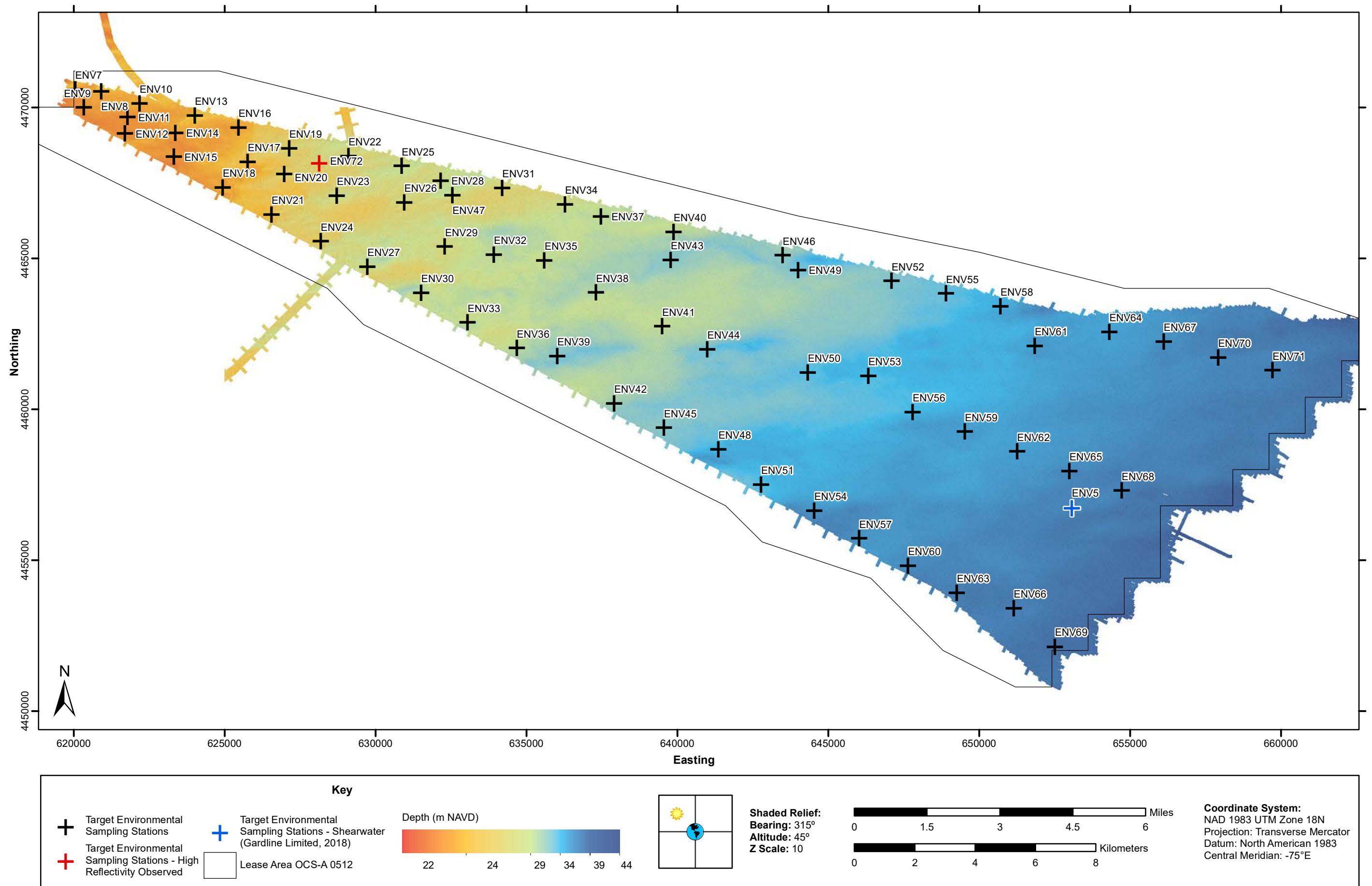
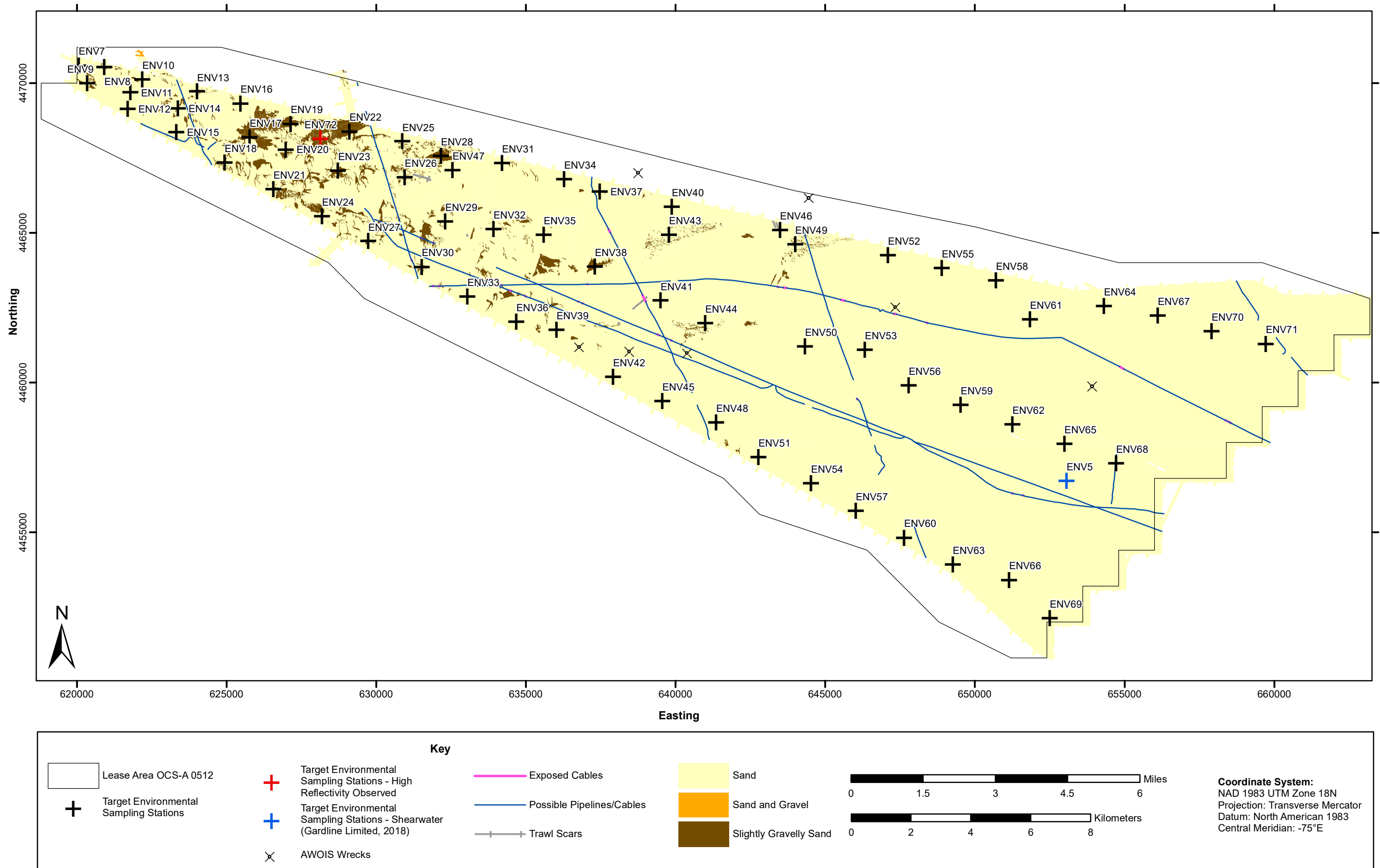


Figure 2.2 Seabed Features



2.2 Seabed Imagery Observations Summary

All stations selected for investigation were successfully ground-truthed with a digital camera system. Environmental camera imagery across the survey area revealed the seabed predominantly comprised slightly gravelly sand with occasional shell fragments. A total of 2474 photographs were obtained across 67 stations. However, image analysis was undertaken on 2469 photographs as 5 images were considered unusable due to poor visibility. A further 613 video snapshots were captured for analysis as the footage was analyzed to ensure all species of conservation interest were enumerated. Therefore, 3082 images in total were analyzed. Environmental deck and positioning logs are presented in Appendix A. A table of faunal presence and absence of all taxa recorded per image is presented in Appendix C and per station in Appendix D, with species of interest enumerated and highlighted in red.

Fauna observed included: Annelida (*Arenicola* sp. castings, cf. Aphroditidae, Terebellidae, Sabellidae), Arthropoda (Amphipoda, Brachyura, Caridea, Cirripedia, Paguroidea), Mollusca (cf. *Arctica islandica* shell, Bivalvia, cf. Cardiidae, Cephalopoda, Gastropoda, *Modiolus modiolus*, Naticidae, Neogastropoda, Nudibranchia, Pectinidae), Echinodermata (*Asterias rubens*, Asteroidea, *Echinarachinus parma*, cf. Echinarachniidae, Echinoidea, Echinidae, cf. Holothuroidea, Ophiuroidea), Chordata (Actinopterygii, Ascidiacea, *Carcharhinus falciformis*, cf. *Leucoraja ocellata*, cf. Phycidae, Pleuronectiformes, cf. *Prionotus carolinus*, Rajidae egg cases, Rhinobatidae, Triglidae), Bryozoa (*Alcyonidium diaphanum*), Cnidaria (Actiniaria, Alcyoniidae, Ceriantharia, cf. *Ectopleura larynx*, cf. *Halcampoides abyssorum*, Hydrozoa, cf. *Hydractinia symbiolongicarpu*, Pennatulacea), faunal turf, Foraminifera, Plantae (Chlorophyta, Phaeophyceae), Porifera (cf. *Polymastia* sp.) and possible bacterial mats. Bioturbation in the form of faunal burrows and tracks were also observed.

A total of 35 live individuals of potential *A. islandica* were recorded at 25 stations across the survey area and 47 pairs of siphons, which have the potential to be live *A. islandica* were recorded at 27 stations. A further 58 dead *A. islandica* shells were recorded at 20 stations. The survey area was located within an area designated as an essential fish habitat for this taxon (NOAA, 2018b).

The survey area did not fall in any final or proposed Critical Habitat as defined by the United States Fish and Wildlife Service (2018). Special attention was given to the presence of sensitive benthic habitats as defined by BOEM (2013). These include areas where information suggests the presence of exposed hard bottoms of high, moderate, or low relief; hard bottoms covered by thin, ephemeral sand layers; seagrass patches; or kelp and other algal beds, as well as the presence of Anthozoan species (BOEM, 2013). In the current survey two small Anthozoa (Alcyoniidae) colonies were observed at Station ST18904-ENV19. Furthermore, there were an additional eight Anthozoa taxa and five Hydrozoa taxa recorded. However, none of the Anthozoa or Hydrozoa taxa are sensitive reef-forming taxa.

Thirty individuals of the winter skate, *L. ocellate*, were observed at 20 stations across the survey area. These stations were located within an area designated as an essential fish habitat for this taxon (NOAA, 2018a). Furthermore, 426 Rajidae egg cases were also observed across the survey area in all but five stations.

Coastal and Marine Ecological Classification Standard (CMECS) biotic classification of stations based on seabed imagery (FGDC, 2012) is presented in Table 2.1. CMECS classification was possible to a

community level at 52 stations, where aggregations of the common sand dollar *E. parma* were observed. At these stations the biotic community was categorized as '*Echinarachnius parma* Bed'.

Small faunal tubes were observed at Stations ST18904-ENV19, ST18904-ENV20, ST18904-ENV23, ST18904-ENV26, ST18904-ENV32, ST18904-ENV38 and ST18904-ENV44 in relatively high densities, therefore these stations were categorized at the biotic group level as 'Small Tube-Building Fauna'. Stations ST18904-ENV22, ST18904-ENV31 and ST18904-ENV72 were categorized at the biotic group level as 'Burrowing Anemones' while Stations ST18904-ENV7, ST18904-ENV9, ST18904-ENV14 and ST18904-ENV15 were categorized as 'Mobile Crustaceans on Soft Sediments'. Lastly, Station ST18904-ENV11 was categorized as 'Large Tube-Building Fauna'. The proportion of CMECS biotic classifications per station based on imagery is displayed in Figure 2.3, with stations ordered west to east and tabulated in Table 2.2.

Table 2.1 CMECS Biotic Classification From Visual Assessment

[illegible]

Grey cells indicate where biotic community categories could not be classified

Figure 2.3 CMECS Biotic Group Classification From Visual Assessment with Stations Displayed West to East

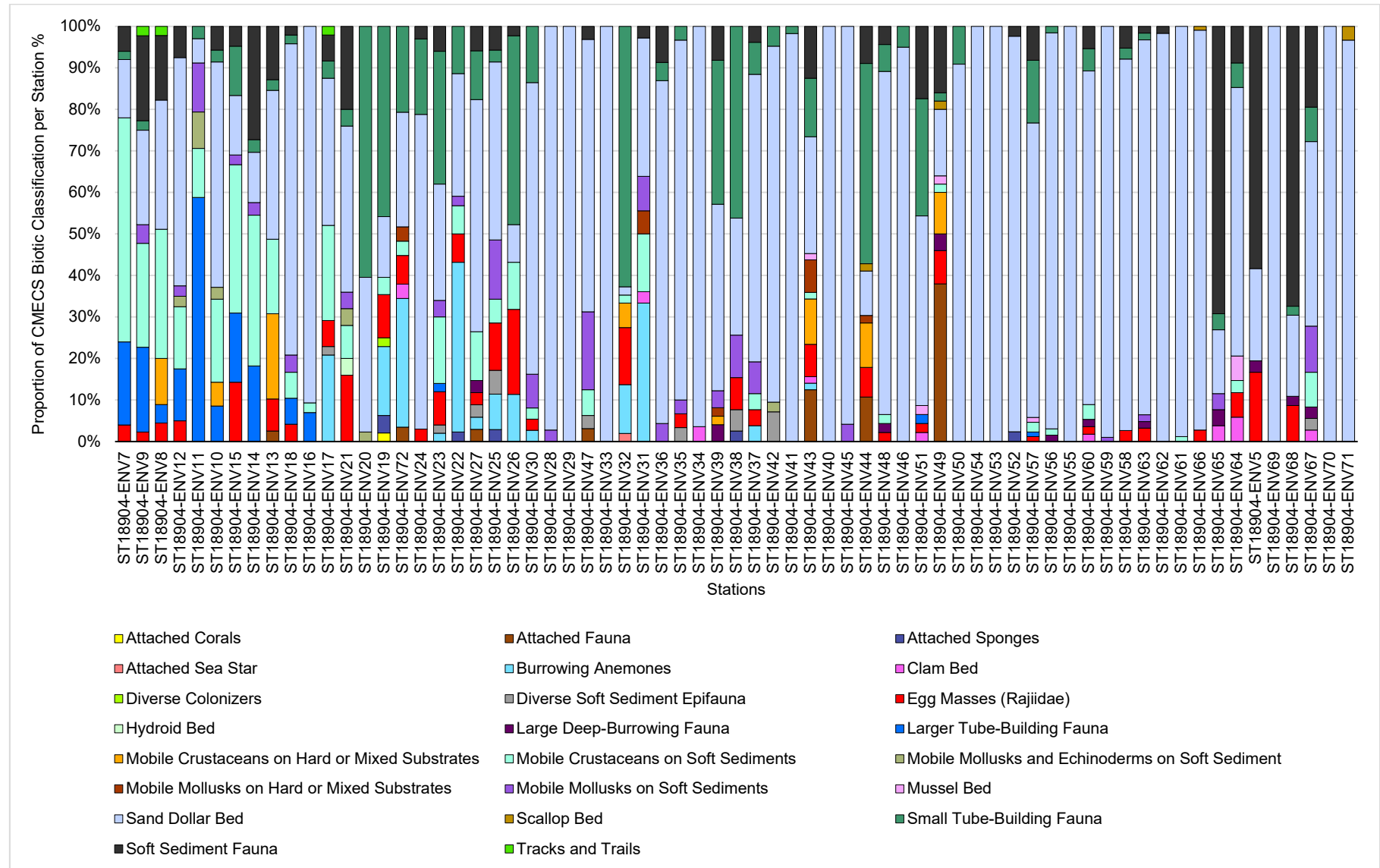


Table 2.2 CMECS Biotic Group Classification per Image From Visual Assessment

Station	Attached Corals	Attached Fauna	Attached Sponges	Attached Sea Star	Burrowing Anemones	Clam Bed	Diverse Colonizers	Diverse Soft Sediment Epifauna	Egg Masses (Rajidae)	Hydroid Bed	Large Deep-Burrowing Fauna	Larger Tube-Building Fauna	Mobile Crustaceans on Hard or Mixed Substrates	Mobile Crustaceans on Soft Sediments	Mobile Mollusks and Echinoderms on Soft Sediment	Mobile Mollusks on Hard or Mixed Substrates	Mobile Mollusks on Soft Sediments	Mussel Bed	Sand Dollar Bed	Scallop Bed	Small Tube-Building Fauna	Soft Sediment Fauna	Tracks and Trails
ST18904-ENV5									6		1								8			21	
ST18904-ENV7									2			10		27					7		1	3	
ST18904-ENV8									2			2	5	14					14			7	1
ST18904-ENV9									1			9		11			2		10		1	9	1
ST18904-ENV10												3	2	7	1				19		1	2	
ST18904-ENV11												20		4	3		4		2		1		
ST18904-ENV12									2			5		6	1		1		22			3	
ST18904-ENV13		1							3				8	7					14		1	5	
ST18904-ENV14												6		12			1		4		1	9	
ST18904-ENV15									6			7		15			1		6		5	2	
ST18904-ENV16												3		1					39				
ST18904-ENV17					10			1	3					11					17		2	3	1
ST18904-ENV18									2			3		3			2		36		1	1	
ST18904-ENV19	1		2		8		1		5					2					7		22		
ST18904-ENV20															1				16		26		
ST18904-ENV21									4	1				2	1		1		10		1	5	
ST18904-ENV22			1		18				3					3			1		13		5		
ST18904-ENV23					1			1	4			1		8			2		14		16	3	
ST18904-ENV24									1										25		6	1	
ST18904-ENV25			1		3			2	4					2			5		15		1	2	
ST18904-ENV26					5				9					5					4		20	1	
ST18904-ENV27		1			1			1	1		1			4					19		4	2	
ST18904-ENV28																	1		35				
ST18904-ENV29																			20				
ST18904-ENV30					1				1					1			3		26		5		
ST18904-ENV31					12	1								5		2	3		12			1	
ST18904-ENV32				1	6				7				3	1					1		32		
ST18904-ENV33																			20				
ST18904-ENV34						1													27				
ST18904-ENV35								1	1								1		26		1		
ST18904-ENV36																	1		19		1	2	
ST18904-ENV37					1				1					1			2		18		2	1	
ST18904-ENV38			1					2	3								4		11		18		
ST18904-ENV39											2		1			1	2		22		17	4	
ST18904-ENV40																			61				
ST18904-ENV41																			57		1		
ST18904-ENV42								3							1				36		2		
ST18904-ENV43		8			1	1			5				7	1		5		1	18		9	8	
ST18904-ENV44		6							4				6			1			6	1	27	5	
ST18904-ENV45																	1		23				
ST18904-ENV46																			38		2		
ST18904-ENV47		1						1						2			6		21			1	
ST18904-ENV48									1		1			1					38		3	2	
ST18904-ENV49		19							4		2		5	1				1	8	1	1	8	
ST18904-ENV50																			40		4		
ST18904-ENV51						1			1			1					1		21		13	8	
ST18904-ENV52			1																40			1	
ST18904-ENV53																			46				
ST18904-ENV54																			71				
ST18904-ENV55																			36				
ST18904-ENV56											1			1					62		1		
ST18904-ENV57									1			1		2			1		61		13	7	
ST18904-ENV58									1										34		1	2	
ST18904-ENV59																	1		95				
ST18904-ENV60						1			1		1			2					45		3	3	
ST18904-ENV61														1					82				
ST18904-ENV62																			58			1	
ST18904-ENV63									2		1						1		56		1	1	
ST18904-ENV64						2			2					1			2		22		2	3	
ST18904-ENV65						1					1						1		4		1	18	
ST18904-ENV66									3										104	1			
ST18904-ENV67						1		1			1			3			4		16		3	7	
ST18904-ENV68									4		1								9		1	31	
ST18904-ENV69																			86				
ST18904-ENV70																			96				
ST18904-ENV71																			29	1			
ST18904-ENV72		1			9	1			2					1		1			8		6		
Total	1	37	6	1	76	10	1	13	102	1	13	71	37	168	8	10	51	6	1985	4	285	193	3

2.3 Sediment Sampling Summary of Benthic Grab Samples

Observations of the sediment were made by the field environmental scientist at the time of sampling. Seabed sampling observations were used to ground truth initial geophysical interpretation and seabed imagery, with results supporting the preliminary findings. A selection of photographs of the recovered samples, together with sample descriptions and positions are given in Appendix E.

Across the 67 stations investigated, 195 acceptable samples were recovered using a modified 0.1m² steel Day grab. There were 31 failed sampling attempts and of these, 23 were due to pebbles or shells trapped in the grab's jaw leading to sample washout. The remaining failed sampling attempts were due to low retention in the grab or pre-triggering of the grab's jaws prior to the collection of a sample.

Of the 195 acceptable samples, 189 samples were acquired within 10m of the target location and all deployments were acquired within 82' (25m) of their respective target locations. Upon agreement with the onboard client representative, during the survey, the acceptable distance from the target location was increased from 33' (10m) to 82' (25m) due to adverse weather conditions. On average, retained samples were acquired 17' (± 10 SD; 5m (± 3 SD)) from their target location. Environmental deck and positioning logs are presented in Appendix A.

Seabed sampling observations supported the initial geophysical interpretation and seabed imagery, with samples described as medium to coarse sand with occasional gravel. Shell fragments were observed at the majority of stations.

Visible fauna within the grab samples included; Annelida (Polychaeta), Arthropoda (Caridea, Decapoda, Paguroidea), Mollusca (Bivalvia, *cf. Arctica islandica*, Gastropoda), Echinodermata (Clypeasteroidea), Chordata (Rajidae egg cases). No benthic species or protected fish species listed under the Endangered Species Act (NOAA, 2018a) were observed in the grab samples in the current survey.

2.4 Sediment Characteristics of Benthic Grab Samples

2.4.1 Particle Size Analysis of Benthic Grab Samples

The results of PSA, determined using wet and dry sieving, are presented in Table 2.3. Full results and histograms illustrating particle size distributions are presented in Appendix F, with the particle size scale adopted in the GRADISTAT program and modified from Udden (1914) and Wentworth (1922).

Mean particle diameter ranged from 135.4 μ m to 1633.3 μ m, with the exception of Station ST18904-ENV72 which recorded a mean grain size of 42.0 μ m. This difference was due to the relatively high fines content (<63 μ m, as defined by Wentworth (1922); 38.1%) in the sample. Fines accounted for less than 10% of sediment at all other stations. Fines comprise clay (<3.8 μ m), which accounted for a maximum of 6.3% of the sediment, and silt, which accounted for a maximum 2.6% of the sediment at all other stations. The sand fraction ($\geq 63\mu$ m, <2mm) accounted for the majority of sediment at all other stations, ranging from 40.0% to 98.9% across the survey area. The remaining sediment comprised granules (2mm to 4mm) and pebbles and cobbles (>4mm). Granules accounted for between 0.1% to 20.4% of the sediment across the entire survey area, whilst pebbles and cobbles accounted for between 0.0% and 41.1% of the sediment. The Wentworth (1922) threshold between pebble and cobble is 64mm, which is greater than

the uppermost sieve used to carry out analysis. Therefore, no differentiation could be made between pebbles and cobbles. The proportional breakdown of the Wentworth size classes per station is displayed in Figure 2.4, with stations ordered west to east.

Sediments were described as very poor to moderately well sorted (Folk & Ward, 1957) and as such the Wentworth classification based on mean grain size is presented. The majority of stations; $n=44$, were classified as medium sand, while the remaining stations varied from very coarse silt to very coarse sand. The variation of sorting between stations was reflected in the histograms; presented in Appendix F. Generally, stations displayed a unimodal distribution with a peak between 0.7phi (coarse sand) and 1.7phi (medium sand), however ten stations displayed a bimodal distribution and five stations displayed a trimodal distribution. Furthermore, Stations ST18904-ENV26, ST18904-ENV38 and ST18904-ENV39 displayed a polymodal distribution. Sediment at these stations were described as very poorly sorted and classified as sandy gravel or gravelly sand under the modified Folk classification (Folk & Ward, 1957). Furthermore, these stations were located in areas of higher SSS reflectivity within the geophysical data, see Figure 2.2.

The modified Folk classifications and therefore CMECS substrate components classification (FGDC, 2012) are presented in Table 2.4. Stations throughout the survey area ranged from slightly gravelly muddy sand to sandy gravel.

Overall, the sediment classifications of very coarse silt to very coarse sand (Wentworth, 1922) and slightly gravelly muddy sand to sandy gravel (Folk & Ward, 1957) were recorded, suggesting natural spatial variation in composition across the survey area. Additionally, the results supported the preliminary geophysical interpretation of coarse sand with accumulations of shell, gravel and cobbles. No evidence of fishing activity such as trawl scars were observed in the seabed imagery but were identified in the geophysical data, as shown in Figure 2.2. In conclusion, with no evidence of seabed disturbance within the area, the gravelly sediments were considered representative of the wider area and region.

Table 2.3 Sediment Characteristics

Station	Mean Diameter (µm) ¹	Mean Diameter (phi) ¹	Clay %	Silt %	Sand %	Granules %	Pebbles and Cobbles %	Wentworth Classification of Mean Grain Size	Sorting ¹	Modified Folk Classification	Total Organic Matter (%)	Water Content (%) ²
ST18904-ENV5	432.5	1.2	1.0	0.9	97.8	0.3	0.0	Medium sand	Moderately well sorted	Slightly gravelly sand	0.2	22.2
ST18904-ENV7	518.2	0.95	0.6	0.9	93.8	2.8	1.9	Medium sand	Moderately well sorted	Slightly gravelly sand	0.4	20.1
ST18904-ENV8	664.9	0.59	0.4	1.1	87.2	6.6	4.8	Coarse sand	Poorly sorted	Gravelly sand	0.3	17.7
ST18904-ENV9	448.4	1.16	0.2	1.2	96.8	1.0	0.9	Medium sand	Moderately sorted	Slightly gravelly sand	0.3	22.3
ST18904-ENV10	726.5	0.46	0.6	1.5	94.0	3.0	1.0	Coarse sand	Moderately sorted	Slightly gravelly sand	0.3	14.2
ST18904-ENV11	406.4	1.30	0.2	1.2	98.4	0.3	0.0	Medium sand	Moderately well sorted	Slightly gravelly sand	0.4	22.5
ST18904-ENV12	393.6	1.35	0.2	1.6	98.2	0.1	0.0	Medium sand	Moderately well sorted	Slightly gravelly sand	0.4	23.8
ST18904-ENV13	1177.2	-0.24	1.8	1.1	58.4	17.3	21.4	Very coarse sand	Poorly sorted	Sandy gravel	0.5	14.3
ST18904-ENV14	566.8	0.82	1.7	0.7	84.2	9.9	3.5	Coarse sand	Poorly sorted	Gravelly sand	0.3	19.7
ST18904-ENV15	332.3	1.59	1.0	1.3	95.9	0.6	1.3	Medium sand	Moderately well sorted	Slightly gravelly sand	0.3	21.5
ST18904-ENV16	309.1	1.69	2.6	0.9	94.1	1.2	1.3	Medium sand	Moderately sorted	Slightly gravelly sand	0.3	21.7
ST18904-ENV17	967.4	0.05	1.8	1.0	60.1	20.2	16.9	Very coarse sand	Poorly sorted	Sandy gravel	0.3	13.4
ST18904-ENV18	275.0	1.86	0.5	1.1	97.8	0.3	0.3	Medium sand	Moderately well sorted	Slightly gravelly sand	0.5	22.8
ST18904-ENV19	739.0	0.44	2.3	1.7	78.7	9.0	8.4	Coarse sand	Poorly sorted	Gravelly sand	0.4	13.6
ST18904-ENV20	322.7	1.63	0.1	1.3	98.3	0.3	0.1	Medium sand	Moderately well sorted	Slightly gravelly sand	0.4	23.1
ST18904-ENV21	389.0	1.36	0.1	0.4	98.8	0.4	0.3	Medium sand	Moderately well sorted	Slightly gravelly sand	0.2	20.5
ST18904-ENV23	135.4	2.9	4.4	2.6	92.1	0.5	0.5	Fine sand	Poorly sorted	Slightly gravelly sand	0.8	35.5
ST18904-ENV24	300.1	1.7	0.1	0.7	98.9	0.3	0.0	Medium sand	Moderately well sorted	Slightly gravelly sand	0.3	21.7
ST18904-ENV25	207.1	2.3	2.0	0.6	96.4	0.2	0.8	Fine sand	Moderately sorted	Slightly gravelly sand	0.5	26.9
ST18904-ENV26	1429.6	-0.5	2.9	1.5	40.0	20.2	35.4	Very coarse sand	Very poorly sorted	Sandy gravel	0.9	20.2
ST18904-ENV27	889.7	0.2	0.7	0.4	74.8	18.6	5.5	Coarse sand	Poorly sorted	Gravelly sand	0.3	14.4
ST18904-ENV28	366.0	1.5	2.0	0.2	97.5	0.2	0.1	Medium sand	Moderately well sorted	Slightly gravelly sand	0.4	24.3
ST18904-ENV29	310.2	1.7	2.0	0.0	97.9	0.1	0.0	Medium sand	Moderately well sorted	Slightly gravelly sand	0.6	24.2
ST18904-ENV30	460.7	1.1	1.9	0.0	94.6	2.1	1.4	Medium sand	Moderately sorted	Slightly gravelly sand	0.5	22.1
ST18904-ENV31	1633.3	-0.7	0.8	0.4	45.1	20.4	33.3	Very coarse sand	Poorly sorted	Sandy gravel	0.3	9.5
ST18904-ENV32	425.3	1.2	6.3	2.6	67.5	11.5	12.1	Coarse sand	Very poorly sorted	Gravelly muddy sand	0.9	27
ST18904-ENV33	343.4	1.5	1.5	0.6	97.2	0.3	0.4	Medium sand	Moderately well sorted	Slightly gravelly sand	0.6	23.7
ST18904-ENV34	339.6	1.6	2.0	0.9	96.9	0.3	0.0	Medium sand	Moderately well sorted	Slightly gravelly sand	0.6	24.3
ST18904-ENV35	493.1	1.0	0.6	0.1	95.6	2.6	1.1	Medium sand	Moderately sorted	Slightly gravelly sand	0.6	21.7
ST18904-ENV36	413.6	1.3	1.7	1.1	96.3	0.8	0.2	Medium sand	Moderately sorted	Slightly gravelly sand	0.6	23
ST18904-ENV38	582.3	0.8	4.9	1.6	62.1	7.2	24.2	Coarse sand	Very poorly sorted	Sandy gravel	0.8	22.2
ST18904-ENV39	361.7	1.5	5.0	2.1	78.4	1.8	12.7	Medium sand	Very poorly sorted	Gravelly sand	0.5	24
ST18904-ENV40	391.7	1.4	1.6	0.4	97.7	0.3	0.0	Medium sand	Moderately well sorted	Slightly gravelly sand	0.3	23.6
ST18904-ENV41	457.1	1.1	1.5	0.3	95.7	2.4	0.1	Medium sand	Moderately sorted	Slightly gravelly sand	0.3	20.3
ST18904-ENV42	400.9	1.3	1.9	0.7	95.8	1.0	0.6	Medium sand	Moderately well sorted	Slightly gravelly sand	0.3	20.3
ST18904-ENV43	1541.1	-0.6	1.1	0.2	52.6	13.7	32.4	Very coarse sand	Poorly sorted	Sandy gravel	0.2	14.6
ST18904-ENV44	1322.1	-0.4	2.3	1.6	45.3	9.7	41.1	Very coarse sand	Very poorly sorted	Sandy gravel	0.7	23
ST18904-ENV45	476.5	1.1	1.8	0.4	92.4	4.7	0.7	Coarse sand	Moderately sorted	Gravelly sand	0.3	22.7
ST18904-ENV46	260.8	1.9	2.0	0.1	96.9	0.9	0.1	Medium sand	Moderately well sorted	Slightly gravelly sand	0.4	25.1
ST18904-ENV47	924.8	0.1	1.1	0.4	72.6	18.1	7.8	Very coarse sand	Poorly sorted	Gravelly sand	0.4	16.3
ST18904-ENV48	279.8	1.8	1.9	0.1	97.7	0.3	0.0	Medium sand	Moderately well sorted	Slightly gravelly sand	0.3	22.9
ST18904-ENV49	634.2	0.7	1.5	1.1	85.9	7.3	4.2	Coarse sand	Poorly sorted	Gravelly sand	0.2	19.2

Station	Mean Diameter (µm) ¹	Mean Diameter (phi) ¹	Clay %	Silt %	Sand %	Granules %	Pebbles and Cobbles %	Wentworth Classification of Mean Grain Size	Sorting ¹	Modified Folk Classification	Total Organic Matter (%)	Water Content (%) ²
ST18904-ENV50	336.9	1.6	1.6	0.4	97.8	0.2	0.0	Medium sand	Moderately well sorted	Slightly gravelly sand	0.3	22.7
ST18904-ENV51	370.8	1.4	1.9	0.8	91.3	4.2	1.8	Medium sand	Moderately sorted	Gravelly sand	0.5	21.4
ST18904-ENV52	380.5	1.4	1.8	0.0	97.6	0.3	0.3	Medium sand	Moderately sorted	Slightly gravelly sand	0.3	21.3
ST18904-ENV53	340.9	1.6	2.0	0.1	97.4	0.5	0.0	Medium sand	Moderately well sorted	Slightly gravelly sand	0.2	21.9
ST18904-ENV54	268.5	1.9	2.5	0.0	97.2	0.3	0.0	Medium sand	Moderately well sorted	Slightly gravelly sand	0.3	24
ST18904-ENV55	339.0	1.6	1.5	0.0	96.1	1.0	1.4	Medium sand	Moderately sorted	Slightly gravelly sand	0.5	23.5
ST18904-ENV56	337.7	1.6	1.6	0.2	97.7	0.4	0.1	Medium sand	Moderately well sorted	Slightly gravelly sand	0.3	20
ST18904-ENV57	350.4	1.5	1.5	0.0	98.2	0.3	0.0	Medium sand	Moderately well sorted	Slightly gravelly sand	0.3	21.5
ST18904-ENV58	353.1	1.5	1.1	0.3	98.5	0.1	0.0	Medium sand	Moderately well sorted	Slightly gravelly sand	0.3	21.7
ST18904-ENV59	400.3	1.3	1.8	0.2	95.0	2.8	0.2	Medium sand	Moderately sorted	Slightly gravelly sand	0.5	22.6
ST18904-ENV60	327.4	1.6	1.2	0.0	97.6	1.1	0.1	Medium sand	Moderately well sorted	Slightly gravelly sand	0.4	24
ST18904-ENV61	219.1	2.2	2.2	0.9	96.7	0.2	0.0	Fine sand	Moderately well sorted	Slightly gravelly sand	0.5	25.5
ST18904-ENV62	381.5	1.4	2.1	0.2	97.3	0.4	0.0	Medium sand	Moderately well sorted	Slightly gravelly sand	0.2	20.7
ST18904-ENV63	280.2	1.8	2.1	0.6	97.2	0.1	0.0	Medium sand	Moderately well sorted	Slightly gravelly sand	0.3	23
ST18904-ENV64	339.9	1.6	1.9	0.0	97.8	0.3	0.0	Medium sand	Moderately well sorted	Slightly gravelly sand	0.1	21.6
ST18904-ENV65	346.7	1.5	1.5	0.0	97.5	0.3	0.7	Medium sand	Moderately well sorted	Slightly gravelly sand	0.2	23.7
ST18904-ENV66	565.7	0.8	0.1	2.4	88.7	7.4	1.5	Coarse sand	Poorly sorted	Gravelly sand	0.3	21.4
ST18904-ENV67	418.3	1.3	1.7	0.0	97.8	0.5	0.0	Medium sand	Moderately well sorted	Slightly gravelly sand	0.2	20.8
ST18904-ENV68	398.3	1.3	1.7	0.0	95.8	0.6	1.9	Medium sand	Moderately well sorted	Slightly gravelly sand	0.3	21.3
ST18904-ENV69	347.5	1.5	2.2	0.0	97.0	0.5	0.3	Medium sand	Moderately well sorted	Slightly gravelly sand	0.3	23.4
ST18904-ENV70	378.4	1.4	1.9	0.1	96.8	1.1	0.1	Medium sand	Moderately well sorted	Slightly gravelly sand	0.3	22.3
ST18904-ENV71	349.8	1.5	2.3	0.0	97.2	0.5	0.0	Medium sand	Moderately sorted	Slightly gravelly sand	0.3	21.6
ST18904-ENV72	42.0	4.6	20.3	18.0	59.5	2.4	0.0	Very coarse silt	Very poorly sorted	Slightly gravelly muddy sand	2.8	80.4
Minimum	42.0	-0.7	0.1	0.0	40.0	0.1	0.0	Very coarse silt to very coarse sand	Very poor to moderately well sorted	Slightly gravelly muddy sand to sandy gravel	0.1	9.5
Maximum	1633.3	4.6	20.3	18.0	98.9	20.4	41.1				2.8	80.4
Mean	491.1	1.3	2.0	1.0	88.9	3.8	4.4				0.4	22.4
± SD	317.3	0.8	2.6	2.2	15.2	5.8	9.4				0.3	8.2

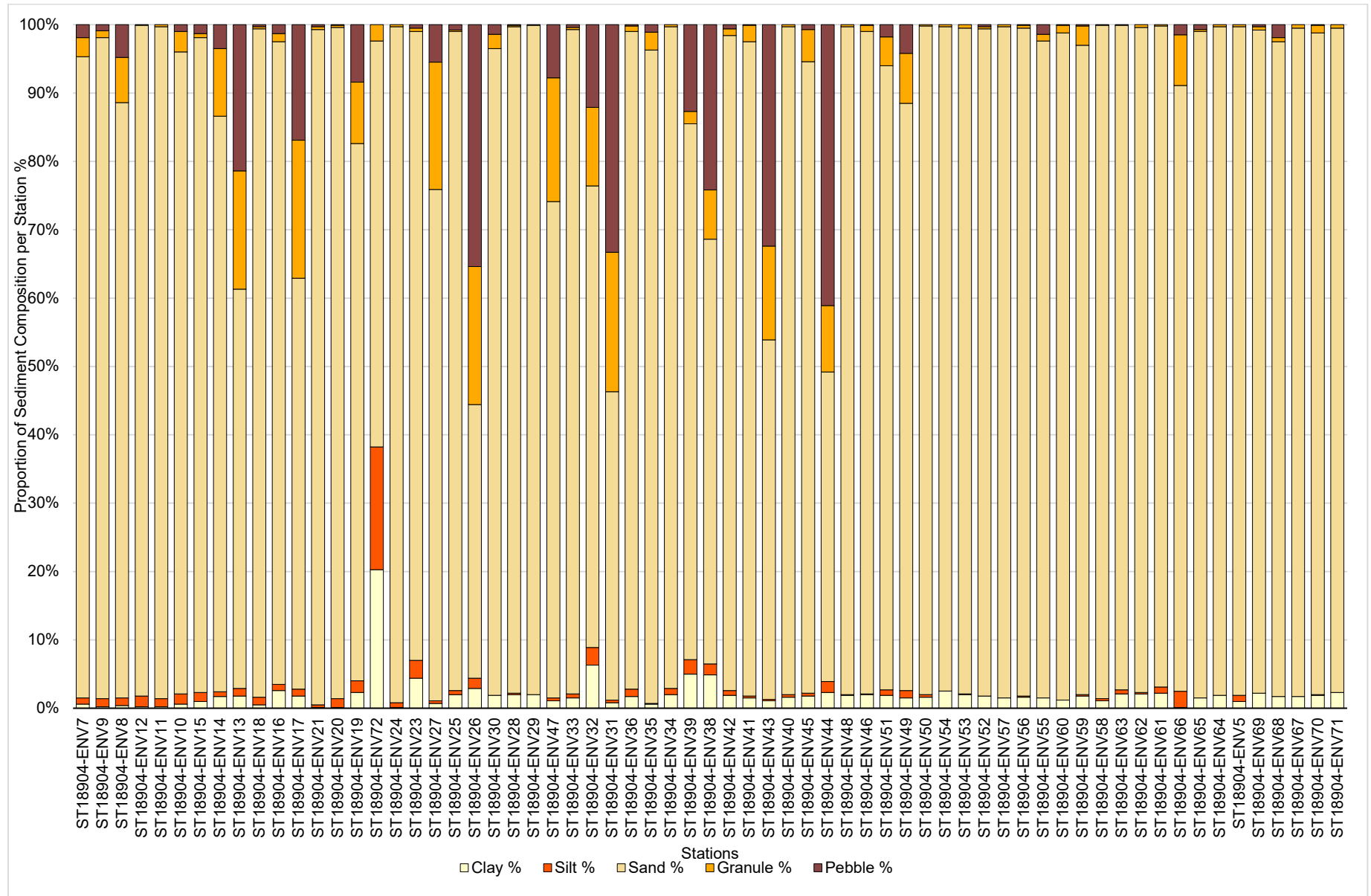
1 Statistics calculated using Method of Moments (MoM). Sorting coefficients (MoM standard deviation) have had Folk and Ward (1957) descriptors assigned.

2 Water content as percentage of the dry sample weight.

Table 2.4 CMECS Substrate Component Classification

[illegible]

Figure 2.4 Sediment Composition with Stations Displayed West to East



2.4.2 Total Organic Matter and Water Content of Benthic Grab Samples

The results of TOM analysis are presented in Table 2.3. Organic matter in marine sediments is primarily made up of detrital matter and naphthenic materials (carboxylic acids and humic substances with a small proportion of biological biomass). Concentrations of TOM ranged between 0.1% and 2.8%. Water content, measured as a percentage of the dry sample weight, ranged from 9.5% at Station ST18904-ENV31 to 80.4% at Station ST18904-ENV72, correlating to the varying percentages of fines and gravel at stations.

2.5 Macrofaunal Interpretation of Benthic Grab Samples

2.5.1 Overview of Benthic Grab Samples

Two 0.1m² faunal samples (MFA and MFB) were collected at each station, one of which; MFA, was worked up and the second retained and appropriately stored as a spare. All faunal samples were screened through a 0.5mm mesh sieve. Before analyzing the data set provided by the laboratory, several taxa were removed as per our stated methods in Section B.5.2; however all faunal records, regardless of whether they were included in statistical analyses, are listed in Appendix G.

2.5.2 Summary and Univariate Statistics of Benthic Grab Samples

A total of 66941 individuals representing 186 taxa were recorded across 67 stations. Of these, immature taxa accounted for 2019 individuals from 28 taxa, representing 3% of the total individuals and 15% of the total taxa. Immature individuals, although a valid part of the community, are ephemeral in their nature due to high levels of mortality and usually have little impact on faunal communities. A RELATE test was conducted in PRIMER v7 (Plymouth Marine Laboratories) to determine whether the presence of immature individuals caused significant variation between the rationalized full and adult (all immature individuals removed) data sets. The test showed that the two data sets were 99% similar, indicating no significant difference between the full and adult only data sets. Therefore, immature individual records were not expected to introduce any significant variation into the multivariate analyses and subsequent analyses were carried out on the full data set, inclusive of immature individuals. Furthermore, when ranked by abundance no immature individuals were within the top ten most abundant species at all stations.

A single live individual of the ocean quahog (*A. islandica*) was recorded from the fauna sample at Station ST18904-ENV25 and this was located within an area designated as an essential fish habitat for this taxon (NOAA, 2018b). Potential *A. islandica* were also observed in the seabed imagery, for further information see Section 2.2. Eight individuals of the class Anthozoa (Actiniaria, Edwardsiidae, Ceriantharia) were recorded throughout the survey area. BOEM (2013) guidelines suggest that the presence of Anthozoans within a survey area should be noted. However, these guidelines refer to Anthozoans in the context of sensitive benthic habitats, none of which are formed by the anthozoan species mentioned above.

The full fauna data set was divided into five major taxonomic groups; Annelida (Polychaeta), Arthropoda (Crustacea), Mollusca, Echinodermata and 'Others'. The 'Others' category consisted of Annelida (Oligochaeta), Chordata, Cnidaria (Anthozoa), Foraminifera, Hemichordata, Nemertea (Palaeonemertea, Pilidiophora, Hoplonemertea), Phoronida, Platyhelminthes (Turbellaria, Polycladida) and Sipuncula. The absolute and proportional contribution of these five taxonomic groups to the overall community structure is summarized in Table 2.5. Furthermore, the contribution of the five taxonomic groups are illustrated as stacked bar charts by individuals in Figure 2.5 and by taxa in Figure 2.6.

Annelida (Polychaeta; n=45539) dominated the macrofaunal composition within the survey area, accounting for 68.0% of the total individuals and 22.6% of the total taxa. A single taxon; Polygordiidae, accounted for 57.4% of the total Annelida abundance and 39.0% of the overall total abundance. Furthermore, the family Cirratulidae; a sedentary polychaete, was also abundant throughout the survey area with a total of 6645 adult individuals identified, accounting for 14.6% of total Annelida and 9.9% of the total faunal abundance.

The taxonomic groups Arthropoda (Crustacea; n=13993) and Mollusca (n=2871) were both less abundant in individuals than Annelida, accounting for 20.9% and 4.3% of the total individuals observed across the survey area, respectively. However, Arthropoda (Crustacea) contributed 29.6% of the total taxa, whilst Mollusca contributed 30.1% of the total taxa observed across the survey area, indicating that both these groups were relatively diverse.

Table 2.5 Contribution of Gross Taxonomic Groups in Sieved Grab Samples

Taxonomic Group	Individuals		Taxa	
	Abundance	Proportional Contribution %	Abundance	Proportional Contribution %
Annelida (Polychaeta)	45539	68.0	42	22.6
Arthropoda (Crustacea)	13993	20.9	55	29.6
Mollusca	2871	4.3	56	30.1
Echinodermata	1542	2.3	6	3.2
Others	2996	4.5	27	14.5
Total	66941	100.0	186	100.0

Of the 186 taxa observed across the survey area, none were recorded at every station, however, three Polychaeta taxa; Cirratulidae, Nephtyidae, Spionidae, were recorded in all but one station. A total of 38 (20.4%) taxa were found at only one station, of which 25 (13.4%) were represented by a single individual. The relatively high numbers of single and low abundance species recorded in this survey suggest a reasonably diverse community. For complete macrofaunal records see Appendix G.

Figure 2.5 Contribution of Individuals in Taxonomic Groups per Station in Sieved Grab Samples

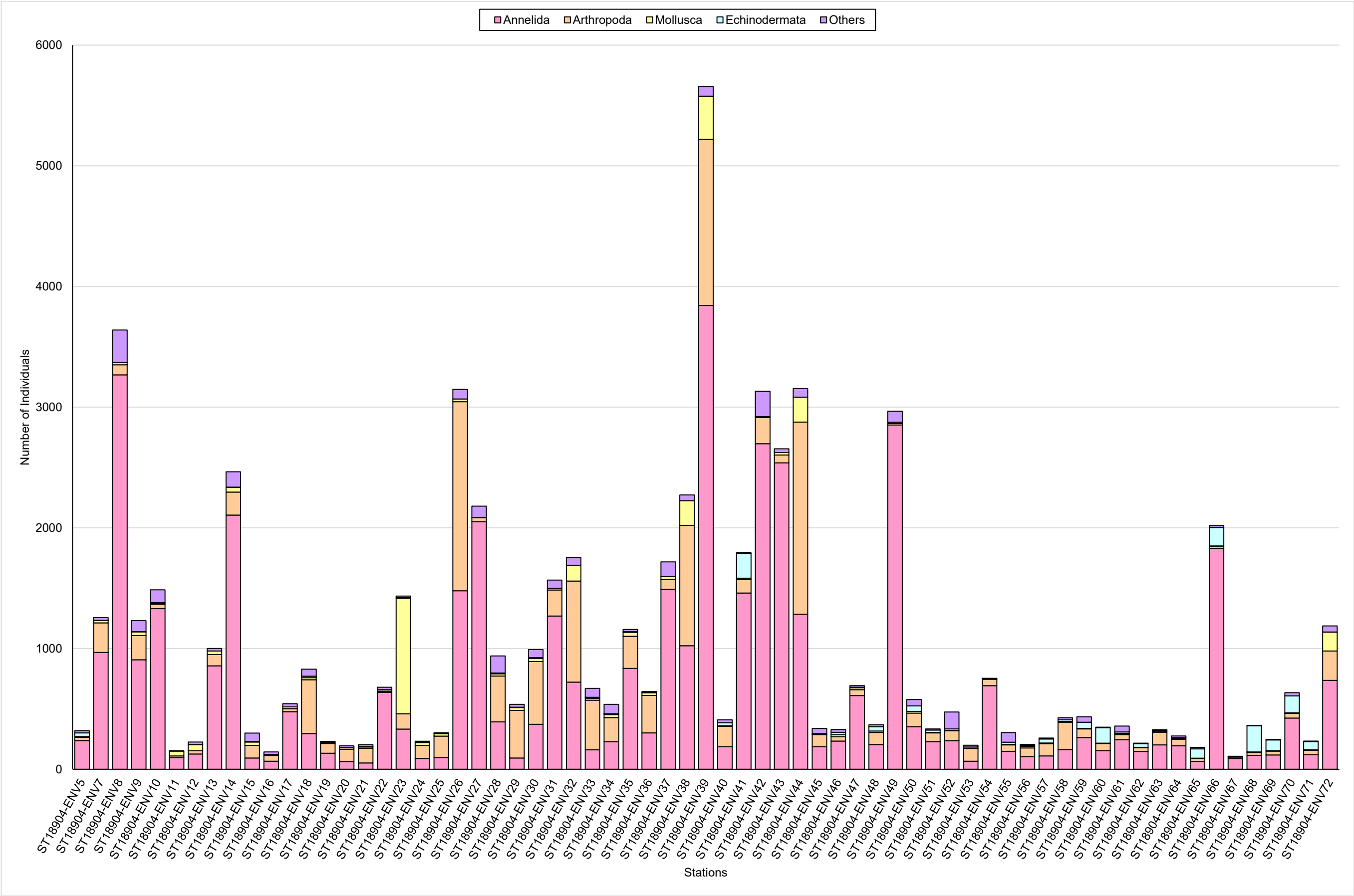
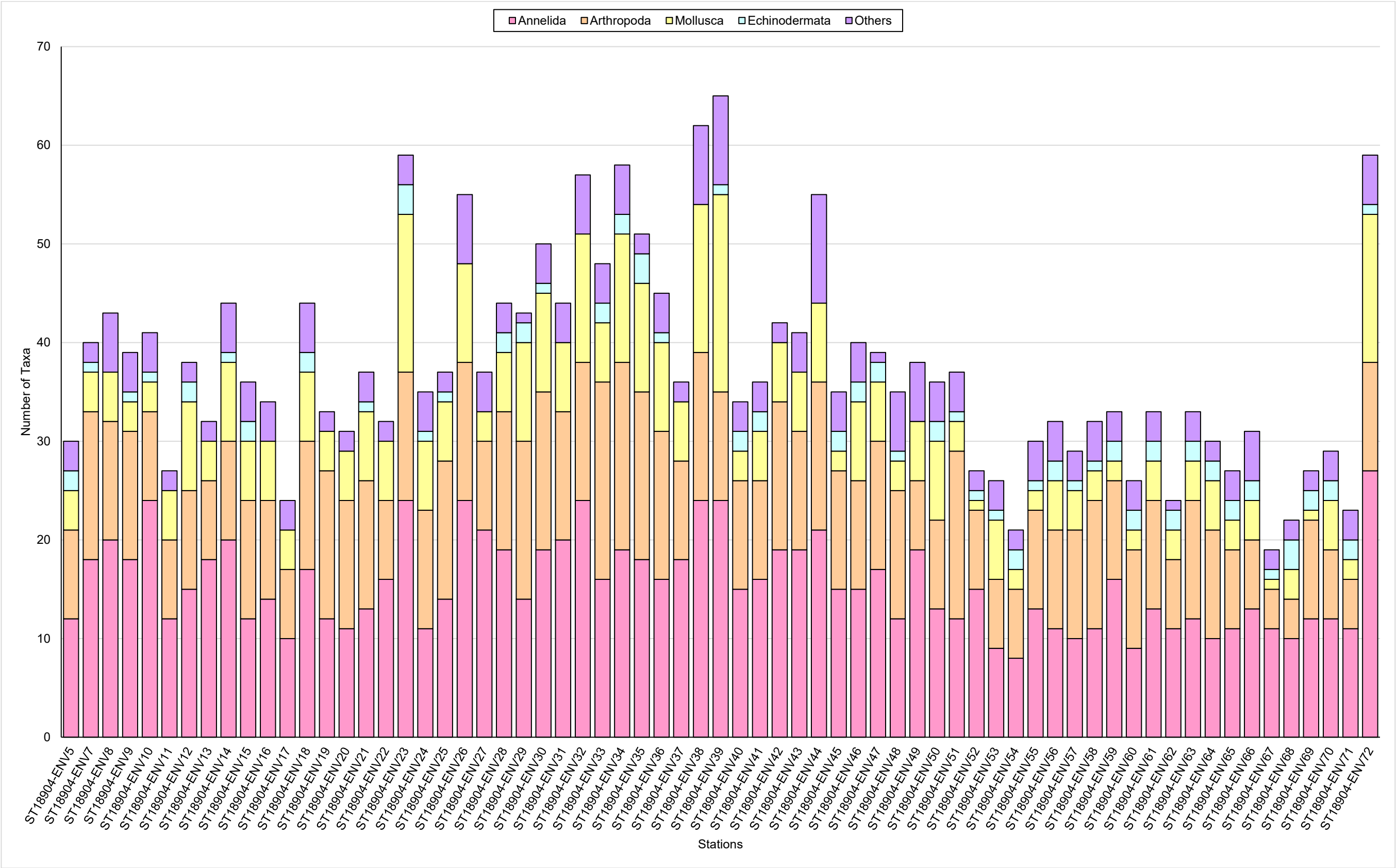


Figure 2.6 Contribution of Taxa in Taxonomic Groups per Station in Sieved Grab Samples



Species ranking provides additional information on the dominance structure of the faunal community in the survey area and is presented in Table 2.6. Of the ten most dominant taxa in the data set; five were Annelida (Polygordiidae, Cirratulidae, Nephtyidae, Spionidae, Lumbrineridae), four were Arthropoda (*Byblis serrata*, *Tanaissus psammophilus*, *Rhepoxynius hudsoni*, *Unicola irrorata*) and one was Annelida (Oligochaeta). None of the highest ranked taxa were present at all stations and only 3 of the 10 highest ranked taxa were present at 66 of the 67 stations surveyed, indicating that there is a lack of a consistent dominance structure across the stations.

The fidelity of the species ranking can give an indication of the taxonomic distribution, with values equal to or between 0.8 and 1.2 indicating a generally evenly distributed community, while values outside this range represent a patchier distribution. Only two taxa; *R. hudsoni* and Lumbrineridae, were within the range. All remaining top ten ranked taxa presented values outside this range which indicated a patchy distribution of taxa between stations. When ranked by abundance, rather than score, there was re-ordering of all taxa, with the exception of Polygordiidae and Cirratulidae. Additionally, the absence of all top ten ranked taxa from one or more stations across the survey area further indicates the slightly uneven distribution of these species.

A species accumulation plot is presented in Figure 2.7. This plot shows the increasing total number of different taxa observed as samples are successfully pooled. Two lines are plotted; the first (plotted in blue and often referred to as a Sobs curve) adds the new taxa to those already recorded in sample order. The second (plotted in red and often referred to as a UGE curve) is smooth, as it is an average output based on the sample being added in random order 999 times (Ugland *et al.*, 2003).

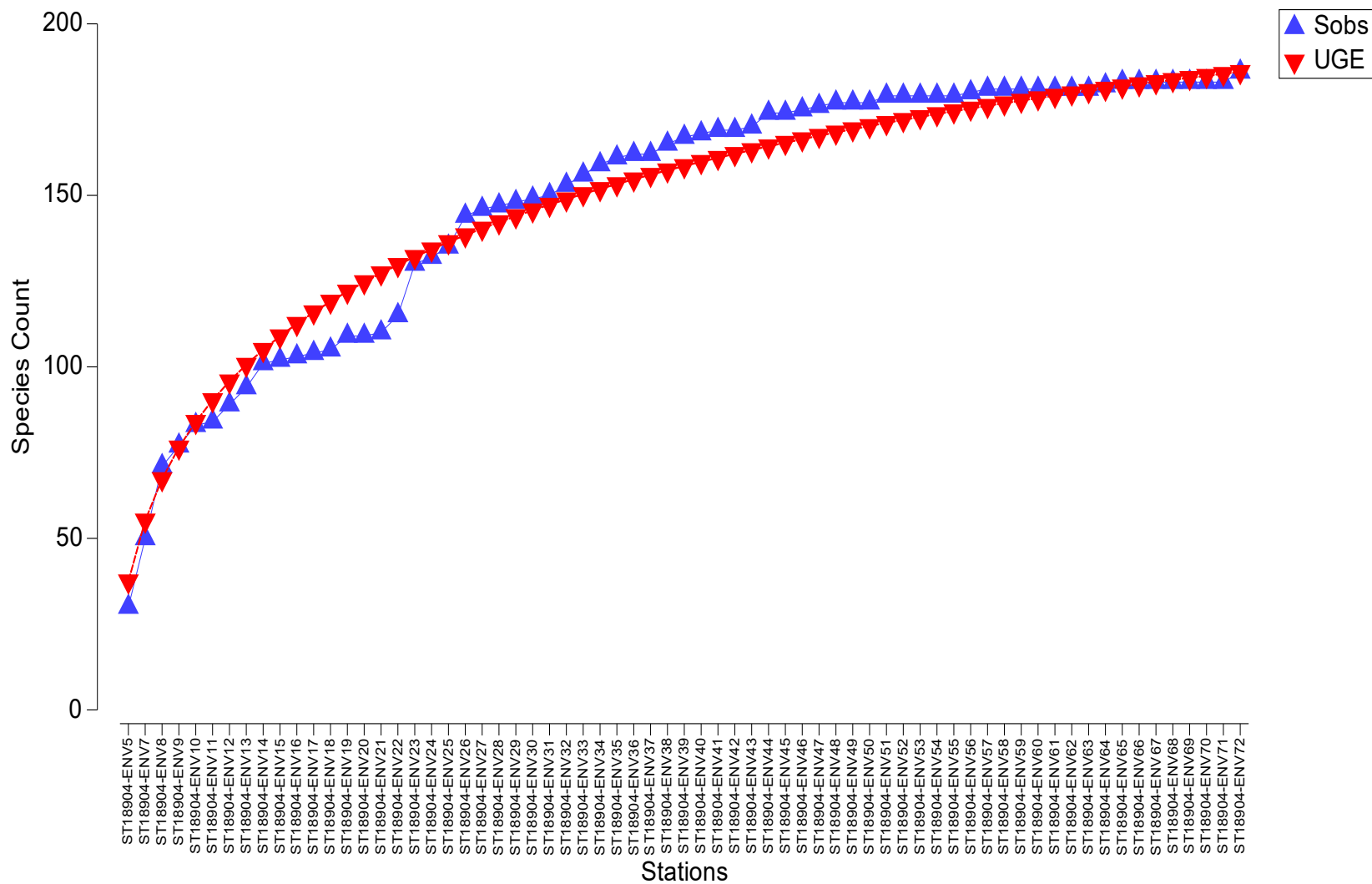
The Sobs curve starts slightly below the UGE curve, however, with the addition of ST18904-ENV26 it rises above the UGE curve. Towards the end of the plot, the Sobs curve gradually levels off. This indicates that the fauna throughout the survey area were well represented by the samples acquired. At the majority of stations, the Sobs curve was above the UGE curve, indicating that more species were elicited at these stations than the average for the survey area. Significant changes in the slope of the Sobs curve compared to the UGE curve can be an indication of change within the community composition. At Station ST18904-ENV23 fifteen new taxa were added to the Sobs curve, making it six times as steep as the UGE curve. This corresponds to a change in the sediment type, with a higher percentage of fines recorded at this station.

Table 2.6 Species Ranking in Sieved Grab Samples

Score	Rank		Taxon	Total Rank Score	Fidelity	Total Abundance
	Score	Abundance				
1	1	1	Polygordiidae	517	0.77	26126
2	2	2	Cirratulidae	453	0.75	6645
3	7	7	Nephtyidae	297	0.55	1676
4	5	5	Oligochaeta	281	0.60	2359
5	8	8	<i>Byblis serrata</i>	246	0.61	1667
6	6	6	<i>Tanaissus psammophilus</i>	223	0.67	1917
7	4	4	Spionidae	201	0.75	3852
8	15	15	<i>Rhepoxynius hudsoni</i>	187	0.93	715
9	11	11	Lumbrineridae	143	1.07	958
10	9	9	<i>Unicola irrorata</i>	141	2.10	1467

Cells are colored to indicate the taxonomic division: Annelida, Arthropoda and Others

Figure 2.7 Species Accumulation Plot in Sieved Grab Samples



The data set was analyzed to provide the total number of individuals and taxa, the Shannon Wiener diversity index (H'); calculated using logarithm base 2 (Shannon & Weaver, 1949), Pielou's evenness (J), Simpson's dominance (λ) and Margalef's index (d). Increasing values of the Shannon Wiener diversity index corresponds to increasing diversity of the community. Values for the Simpson's dominance index and Pielou's evenness both range from 0 to 1, with 1 indicating a dominated community for the former and an even community for the latter. Margalef's index takes account of the number of species present for a given number of individuals. Detailed information on methods for univariate statistics is presented in Appendix B.6.1.

The station univariate statistics are presented in Table 2.7. Overall, Shannon Wiener diversity values indicated varying diversity across the site, with values ranging from 1.33 to 4.49. Pielou's evenness values ranged from 0.27 to 0.88 across the survey area with a mean value of 0.62 (± 0.17 SD), suggesting the community was overall relatively even with occasional instances of patchiness. This was supported by Simpson's values suggesting relatively low species dominance ranging between 0.06 and 0.66. Overall, the range of univariate values recorded across the survey area indicated a relatively even distributed community with instances of patchiness and a lack of consistent dominance.

Table 2.7 Faunal Univariate Statistics in Sieved Grab Samples

Station	n Taxa	n Individuals	Margalef's Richness (d)	Simpson's Diversity (λ)	Pielou's Evenness (J')	Shannon Wiener Diversity ($H'_{\log 2}$)
ST-18904-ENV5	30	319	5.03	0.26	0.62	3.02
ST-18904-ENV7	40	1256	5.47	0.49	0.37	1.97
ST-18904-ENV8	43	3639	5.12	0.51	0.35	1.91
ST-18904-ENV9	39	1231	5.34	0.30	0.53	2.79
ST-18904-ENV10	41	1487	5.48	0.54	0.37	2.00
ST-18904-ENV11	27	153	5.17	0.21	0.68	3.24
ST-18904-ENV12	38	225	6.83	0.11	0.77	4.03
ST-18904-ENV13	32	1001	4.49	0.28	0.53	2.65
ST-18904-ENV14	44	2464	5.51	0.55	0.35	1.92
ST-18904-ENV15	36	300	6.14	0.09	0.80	4.12
ST-18904-ENV16	34	144	6.64	0.06	0.88	4.49
ST-18904-ENV17	24	543	3.65	0.28	0.56	2.55
ST-18904-ENV18	44	829	6.40	0.22	0.58	3.15
ST-18904-ENV19	33	231	5.88	0.08	0.81	4.09
ST-18904-ENV20	31	193	5.70	0.07	0.86	4.26
ST-18904-ENV21	37	203	6.78	0.09	0.81	4.24
ST-18904-ENV22	32	679	4.75	0.49	0.39	1.96
ST-18904-ENV23	59	1435	7.98	0.37	0.48	2.84
ST-18904-ENV24	35	232	6.24	0.06	0.86	4.42
ST-18904-ENV25	37	302	6.30	0.08	0.82	4.25
ST-18904-ENV26	55	3148	6.70	0.19	0.54	3.10
ST-18904-ENV27	37	2180	4.68	0.37	0.40	2.10
ST-18904-ENV28	44	939	6.28	0.14	0.66	3.61
ST-18904-ENV29	43	538	6.68	0.16	0.70	3.81
ST-18904-ENV30	50	991	7.10	0.11	0.69	3.88
ST-18904-ENV31	44	1567	5.84	0.18	0.61	3.31
ST-18904-ENV32	57	1752	7.50	0.10	0.70	4.05
ST-18904-ENV33	48	670	7.22	0.09	0.73	4.07

Station	n Taxa	n Individuals	Margalef's Richness (d)	Simpson's Diversity (λ)	Pielou's Evenness (J')	Shannon Wiener Diversity (H'_{log2})
ST-18904-ENV34	58	538	9.07	0.10	0.72	4.21
ST-18904-ENV35	51	1159	7.09	0.35	0.50	2.85
ST-18904-ENV36	45	643	6.80	0.15	0.68	3.74
ST-18904-ENV37	36	1718	4.70	0.52	0.36	1.88
ST-18904-ENV38	62	2272	7.89	0.10	0.66	3.91
ST-18904-ENV39	65	5658	7.41	0.26	0.47	2.82
ST-18904-ENV40	34	409	5.49	0.13	0.73	3.69
ST-18904-ENV41	36	1793	4.67	0.55	0.32	1.66
ST-18904-ENV42	42	3132	5.09	0.64	0.28	1.52
ST-18904-ENV43	41	2655	5.07	0.63	0.28	1.51
ST-18904-ENV44	55	3154	6.70	0.25	0.53	3.09
ST-18904-ENV45	35	338	5.84	0.13	0.73	3.73
ST-18904-ENV46	40	329	6.73	0.16	0.67	3.58
ST-18904-ENV47	39	693	5.81	0.26	0.54	2.88
ST-18904-ENV48	35	368	5.75	0.10	0.76	3.88
ST-18904-ENV49	38	2966	4.63	0.47	0.32	1.67
ST-18904-ENV50	36	577	5.51	0.11	0.72	3.71
ST-18904-ENV51	37	334	6.19	0.14	0.72	3.75
ST-18904-ENV52	27	474	4.22	0.14	0.73	3.46
ST-18904-ENV53	26	199	4.72	0.11	0.81	3.80
ST-18904-ENV54	21	754	3.02	0.52	0.39	1.69
ST-18904-ENV55	30	304	5.07	0.12	0.75	3.70
ST-18904-ENV56	32	206	5.82	0.09	0.82	4.09
ST-18904-ENV57	29	259	5.04	0.11	0.78	3.81
ST-18904-ENV58	32	426	5.12	0.16	0.69	3.45
ST-18904-ENV59	33	435	5.27	0.12	0.72	3.61
ST-18904-ENV60	26	349	4.27	0.19	0.66	3.11
ST-18904-ENV61	33	358	5.44	0.13	0.74	3.71
ST-18904-ENV62	24	216	4.28	0.15	0.75	3.43
ST-18904-ENV63	33	327	5.53	0.12	0.73	3.70
ST-18904-ENV64	30	276	5.16	0.13	0.74	3.65
ST-18904-ENV65	27	181	5.00	0.20	0.70	3.33
ST-18904-ENV66	31	2019	3.94	0.66	0.27	1.33
ST-18904-ENV67	19	107	3.85	0.15	0.79	3.35
ST-18904-ENV68	22	363	3.56	0.38	0.51	2.29
ST-18904-ENV69	27	246	4.72	0.14	0.74	3.51
ST-18904-ENV70	29	634	4.34	0.20	0.62	3.03
ST-18904-ENV71	23	234	4.03	0.14	0.73	3.30
ST-18904-ENV72	59	1187	8.19	0.11	0.70	4.13
Minimum	19	107	3.02	0.06	0.27	1.33
Maximum	65	5658	9.07	0.66	0.88	4.49
Mean	37	999	5.64	0.23	0.62	3.22
± SD	11	1074	1.21	0.17	0.17	0.85

2.5.3 Multivariate Analyses of Benthic Grab Samples

In comparison to univariate statistics, multivariate analyses enable subtle trends within the data set to be identified. Multivariate analyses were performed on the rationalized data using PRIMER v7 (Plymouth Marine Laboratories). Bray-Curtis similarity matrices were produced based on a fourth root transformed data set. The transformation was chosen in order to down-weight the influence of the numerically dominant species and to ensure that the intermediately abundant and sparse taxa contributed to the multivariate pattern.

A SIMPROF permutation test was conducted in conjunction with CLUSTER analysis and the results were visualized on a dendrogram. Red lines join stations that are statistically indistinguishable, whilst black lines join stations which are statistically different from one another. Due to the permutative nature of the SIMPROF test, only three or more stations joined together by red lines may be considered as a cluster while two stations joined together by red lines may be considered as a closely associated pair. The Bray-Curtis similarity dendrogram for stations is presented in Figure 2.8 and non-metric multidimensional scaling (nMDS) plot is presented in Figure 2.9.

The CLUSTER analysis and resulting dendrogram, formed twenty distinct groups; SIMPROF groups a to t. All stations were grouped together at 41% similarity, indicating that overall the macrofaunal community across all stations was more dissimilar than similar.

Two broad groups were identified from the CLUSTER analysis and dendrogram. Broad Group A contained 49 stations; SIMPROF groups a to k. This group further subdivided into four broad sub-groups (A1 to A4), with SIMPROF groups a (Station ST18904-ENV25) and b (Station ST18904-ENV11), identified as outliers. All stations within Broad Group A were joined together at 46% similarity. Broad Group B contained the remaining 18 stations and was further subdivided into two broad sub-groups (B1 and B2). All stations within Broad Group B joined together at 45% similarity.

Examination of the raw full data in conjunction with SIMPER analyses, presented in Table 2.8, showed that a range of species contributed to the observed (dis)similarity between Broad Groups A and B. Broad Group A's dissimilarity was attributed to higher group average abundances of the arthropods *B. serrata* and *T. psammophilus*. Group B's dissimilarity was attributed to the absence of the arthropod *R. hudsoni*, with the exception of a single individual at Station ST18904-ENV43 and higher group average abundances of the polychaetes Polygordiidae and Cirratulidae. Further information on species contribution towards the separations observed between broad groups of stations identified within the data set can be seen in Table 2.8.

This pattern was corroborated by the nMDS ordination and with a stress value of 0.17, this ordination can be considered as a useful representation of rank (dis)similarities and the overall pattern observed in the data.

Figure 2.8 Bray-Curtis Similarity Dendrogram in Sieved Grab Samples

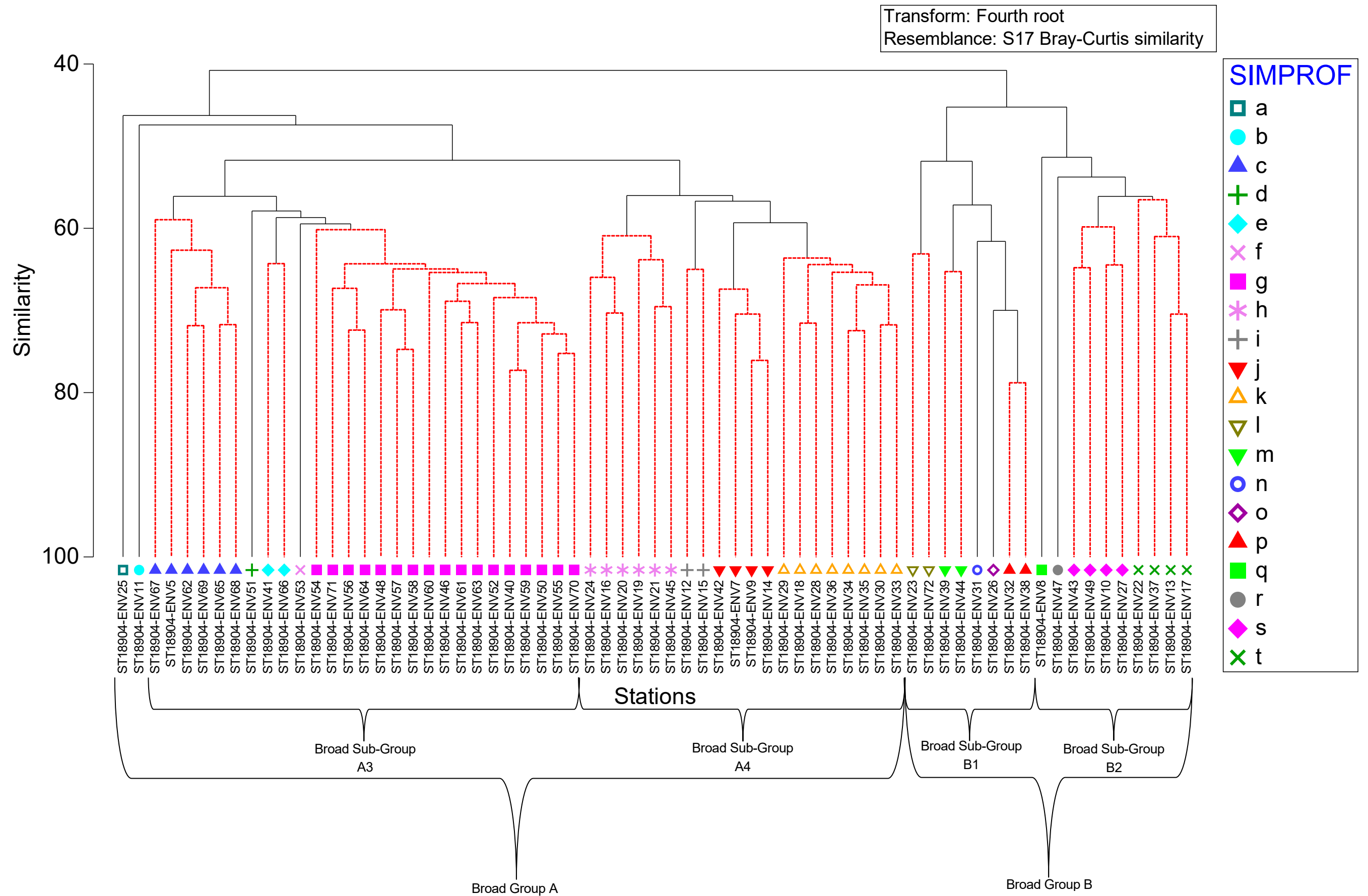


Figure 2.9 Non-Metric Multi-Dimensional Scaling Ordination in Sieved Grab Samples

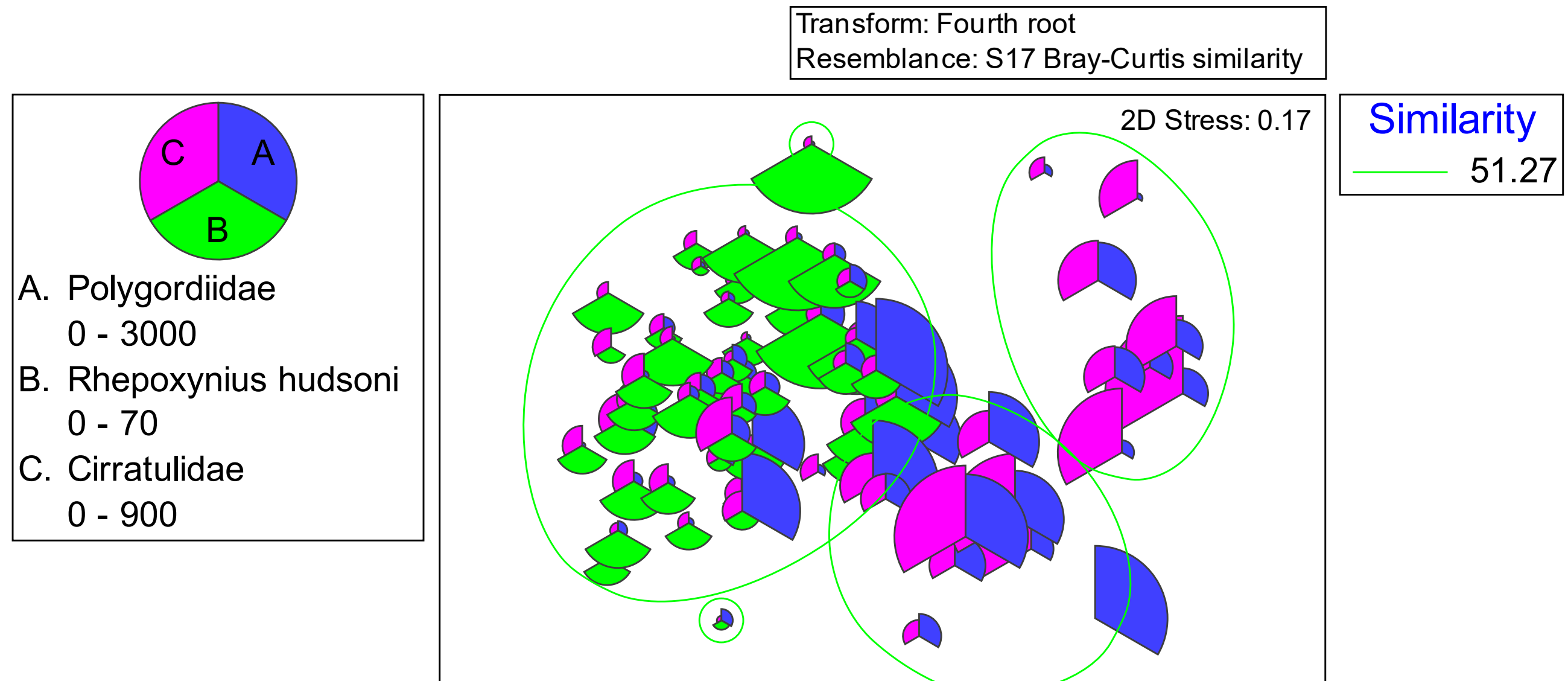


Table 2.8 SIMPROF Broad Groups in Sieved Grab Samples

Broad Group	Stations	SIMPROF Group	Bray-Curtis Similarity (%)	Distinct Macrofauna
A		<i>a to k</i>	46	Higher group abundances of <i>B. serrata</i> and <i>T. psammophilus</i>
A1	ST18904-ENV25	<i>a</i>	46	Absence of <i>T. psammophilus</i> and Spionidae, higher group abundances of Bivalvia, <i>Dyopodos monacanthus</i> , relatively lower group abundance of Polygordiidae
A2	ST18904-ENV11	<i>b</i>	47	Absence of <i>B. serrata</i> , Oligochaeta, Paraonidae, Echinoidea (imm.), higher group abundance of <i>Spisula solidissima</i>
A3	ST18904-ENV5, ST18904-ENV40, ST18904-ENV41, ST18904-ENV46 ST18904-ENV48, ST18904-ENV50 to ST18904-ENV71	<i>c to g</i>	56	Higher group abundances of Polygordiidae and <i>Pseudunciola obliqua</i> , absence of Bivalvia with the exception of a single individual at Station ST18904-ENV46
A4	ST18904-ENV7, ST18904-ENV9 ST18904-ENV12, ST18904-ENV14 ST18904-ENV15, ST18904-ENV16 ST18904-ENV18, ST18904-ENV19 ST18904-ENV20, ST18904-ENV21 ST18904-ENV24, ST18904-ENV28 ST18904-ENV29, ST18904-ENV30 ST18904-ENV33, ST18904-ENV34 ST18904-ENV35, ST18904-ENV36 ST18904-ENV42, ST18904-ENV45	<i>h to k</i>	57	Higher group abundance of Echinoidea
B		<i>l to t</i>	45	Absence of <i>R. hudsoni</i> , with the exception of a single individual at Station ST18904-ENV43, higher group abundances of Polygordiidae and Cirratulidae
B1	ST18904-ENV23, ST18904-ENV26 ST18904-ENV31, ST18904-ENV32 ST18904-ENV38, ST18904-ENV39 ST18904-ENV44, ST18904-ENV72	<i>l to p</i>	52	Higher group abundances of <i>Ampelisca vadorum</i> and <i>Nucula proxima</i> ,
B2	ST18904-ENV8, ST18904-ENV10 ST18904-ENV13, ST18904-ENV17 ST18904-ENV22, ST18904-ENV27 ST18904-ENV37, ST18904-ENV43 ST18904-ENV47, ST18904-ENV49	<i>q to t</i>	51	Absence of <i>Leptocheirus pinguis</i> , higher group abundance of Polygordiidae

2.5.4 CMECS Biotic Classification of Benthic Grab Samples

CMECS biotic classification (FGDC, 2012) of stations based on macrofaunal grab analysis results was mostly confirmed by the dominant taxon found at each station which allowed classification to the lowest level. The results are tabulated in Table 2.9 and illustrated in Figure 2.10. The exception was at Station ST18904-ENV60, where the Echinoidea (imm.) was identified as the most abundant taxa. Due to the ephemeral nature of immature individuals the second most abundant taxon; Polygordiidae, was used for the CMECS classification of this station, therefore the biotic group at this station was categorized as 'Small Surface-Burrowing Fauna'.

The majority of stations (n=35) were categorized at the biotic group level as 'Small Surface-Burrowing Fauna'. Of these, Stations ST18904-ENV15, ST18904-ENV52 and ST18904-ENV55 were dominated by Oligochaeta, hence they were assigned the biotic community classification of 'Oligochaete Bed'. Furthermore, Station ST18904-ENV72 was dominated by the polychaete Capitellidae and was classified as resembling a 'Capitellid Bed'.

Eleven stations were categorized at the biotic group level of 'Mobile Crustaceans on Soft Sediments'. Of these, Stations ST18904-ENV32 and ST18904-ENV44 were recorded as having a resemblance to the biotic community 'Robust *Ampelisca* Bed' due to the dominance of *Ampelisca vadorum* at these stations. Whilst, Station ST18904-ENV25 was recorded as having a resemblance to a 'Haustoriid Bed' due to the dominance of *R. hudsoni*. Three stations; Stations ST18904-ENV65, ST18904-ENV68 and ST18904-ENV69, were dominated by the sand dollar *E. parma* and were given the biotic community classification of '*Echinarachnius parma* Bed'. Furthermore, the bivalve *Nucula proxima* accounted for 60% (n=860) of the individuals at Station ST18904-ENV23, therefore it was categorized at the biotic community level as a '*Nucula* Bed'.

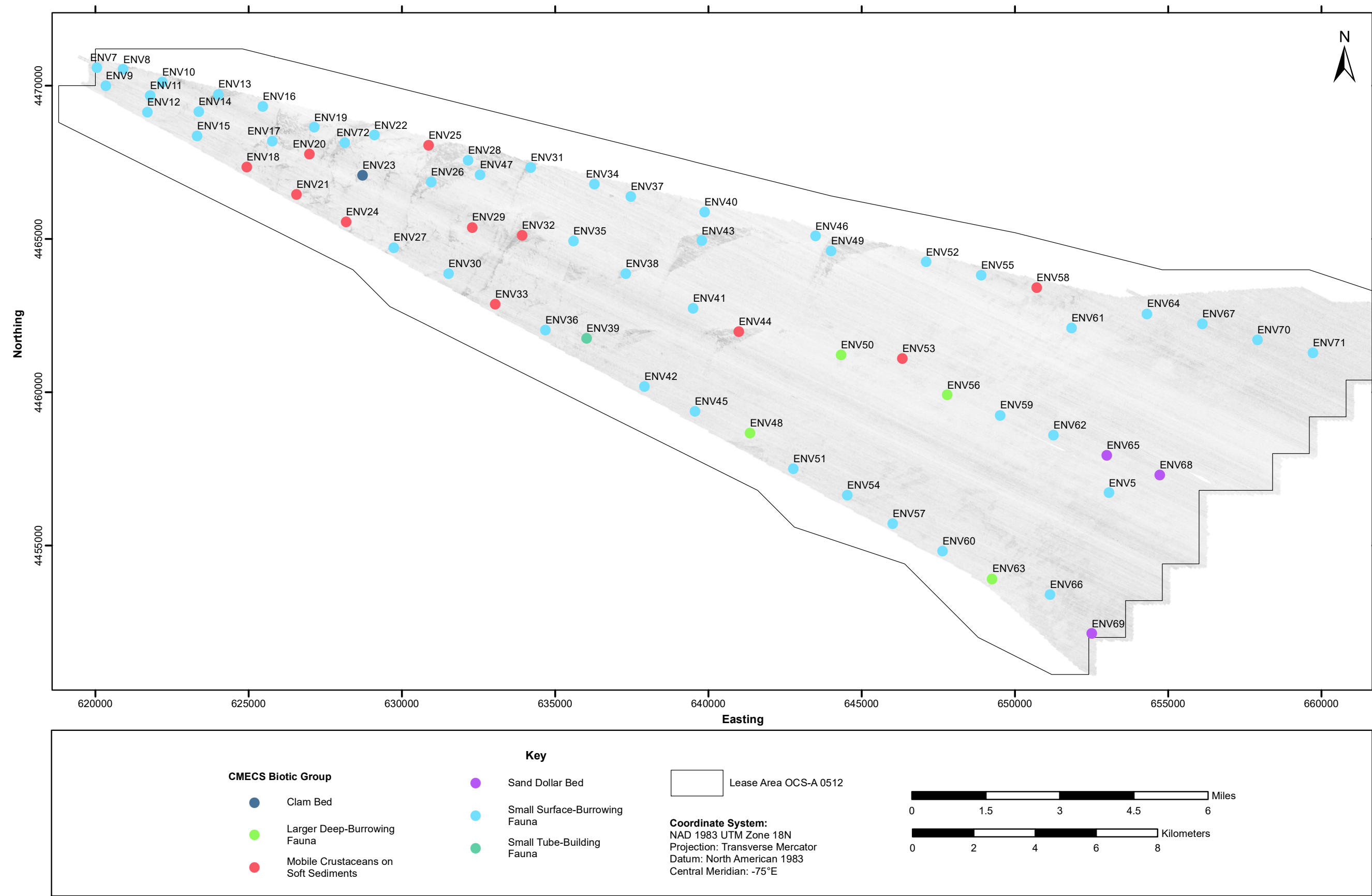
Seventeen stations were categorized at the biotic group level of 'Large Deep-Burrowing Fauna' due to the dominance of the polychaete families Nephtyidae and Cirratulidae at individual stations. Station ST18904-ENV39 recorded 2468 individuals (43% of total individuals at this station) of the tube-dwelling polychaete Spionidae. The family Spionidae has a minimum size range of between 0.5mm and 9mm (Hayward & Ryland, 1995). This size range spans two categories on the CMECS Invertebrate Community organism size values table (FGDC, 2012); 'Small Macrofauna' and 'Large Macrofauna'. Station ST18904-ENV39 was therefore categorized within two possible biotic groups of 'Small Tube-Building Fauna' and 'Larger Tube-Building fauna'.

Table 2.9 CMECS Biotic Classification from Sieved Grab Samples

Station	Biotic Setting	Biotic Class	Biotic Subclass	Biotic Group	Biotic Community
ST18904-ENV5	Benthic Biota	Faunal Bed	Soft Sediment Fauna	Small Surface-Burrowing Fauna	
ST18904-ENV7	Benthic Biota	Faunal Bed	Soft Sediment Fauna	Small Surface-Burrowing Fauna	
ST18904-ENV8	Benthic Biota	Faunal Bed	Soft Sediment Fauna	Small Surface-Burrowing Fauna	
ST18904-ENV9	Benthic Biota	Faunal Bed	Soft Sediment Fauna	Small Surface-Burrowing Fauna	
ST18904-ENV10	Benthic Biota	Faunal Bed	Soft Sediment Fauna	Small Surface-Burrowing Fauna	
ST18904-ENV11	Benthic Biota	Faunal Bed	Soft Sediment Fauna	Small Surface-Burrowing Fauna	
ST18904-ENV12	Benthic Biota	Faunal Bed	Soft Sediment Fauna	Small Surface-Burrowing Fauna	
ST18904-ENV13	Benthic Biota	Faunal Bed	Soft Sediment Fauna	Larger Deep-Burrowing Fauna	
ST18904-ENV14	Benthic Biota	Faunal Bed	Soft Sediment Fauna	Small Surface-Burrowing Fauna	Oligochaete Bed
ST18904-ENV15	Benthic Biota	Faunal Bed	Soft Sediment Fauna	Small Surface-Burrowing Fauna	
ST18904-ENV16	Benthic Biota	Faunal Bed	Soft Sediment Fauna	Small Surface-Burrowing Fauna	
ST18904-ENV17	Benthic Biota	Faunal Bed	Soft Sediment Fauna	Small Surface-Burrowing Fauna	
ST18904-ENV18	Benthic Biota	Faunal Bed	Soft Sediment Fauna	Mobile Crustaceans on Soft Sediments	
ST18904-ENV19	Benthic Biota	Faunal Bed	Soft Sediment Fauna	Larger Deep-Burrowing Fauna	
ST18904-ENV20	Benthic Biota	Faunal Bed	Soft Sediment Fauna	Mobile Crustaceans on Soft Sediments	
ST18904-ENV21	Benthic Biota	Faunal Bed	Soft Sediment Fauna	Mobile Crustaceans on Soft Sediments	Nucula Bed
ST18904-ENV22	Benthic Biota	Faunal Bed	Soft Sediment Fauna	Small Surface-Burrowing Fauna	
ST18904-ENV23	Benthic Biota	Faunal Bed	Soft Sediment Fauna	Clam Bed	Haustoriid Bed
ST18904-ENV24	Benthic Biota	Faunal Bed	Soft Sediment Fauna	Mobile Crustaceans on Soft Sediments	
ST18904-ENV25	Benthic Biota	Faunal Bed	Soft Sediment Fauna	Mobile Crustaceans on Soft Sediments	
ST18904-ENV26	Benthic Biota	Faunal Bed	Soft Sediment Fauna	Larger Deep-Burrowing Fauna	
ST18904-ENV27	Benthic Biota	Faunal Bed	Soft Sediment Fauna	Small Surface-Burrowing Fauna	
ST18904-ENV28	Benthic Biota	Faunal Bed	Soft Sediment Fauna	Small Surface-Burrowing Fauna	
ST18904-ENV29	Benthic Biota	Faunal Bed	Soft Sediment Fauna	Mobile Crustaceans on Soft Sediments	
ST18904-ENV30	Benthic Biota	Faunal Bed	Soft Sediment Fauna	Small Surface-Burrowing Fauna	Robust <i>Ampelisca</i> Bed
ST18904-ENV31	Benthic Biota	Faunal Bed	Soft Sediment Fauna	Larger Deep-Burrowing Fauna	
ST18904-ENV32	Benthic Biota	Faunal Bed	Soft Sediment Fauna	Mobile Crustaceans on Soft Sediments	
ST18904-ENV33	Benthic Biota	Faunal Bed	Soft Sediment Fauna	Mobile Crustaceans on Soft Sediments	
ST18904-ENV34	Benthic Biota	Faunal Bed	Soft Sediment Fauna	Small Surface-Burrowing Fauna	
ST18904-ENV35	Benthic Biota	Faunal Bed	Soft Sediment Fauna	Small Surface-Burrowing Fauna	
ST18904-ENV36	Benthic Biota	Faunal Bed	Soft Sediment Fauna	Small Surface-Burrowing Fauna	
ST18904-ENV37	Benthic Biota	Faunal Bed	Soft Sediment Fauna	Small Surface-Burrowing Fauna	
ST18904-ENV38	Benthic Biota	Faunal Bed	Soft Sediment Fauna	Larger Deep-Burrowing Fauna	
ST18904-ENV39	Benthic Biota	Faunal Bed	Soft Sediment Fauna	Larger Deep-Burrowing Fauna	
				Small Tube-Building Fauna	
ST18904-ENV40	Benthic Biota	Faunal Bed	Soft Sediment Fauna	Small Surface-Burrowing Fauna	Robust <i>Ampelisca</i> Bed
ST18904-ENV41	Benthic Biota	Faunal Bed	Soft Sediment Fauna	Small Surface-Burrowing Fauna	
ST18904-ENV42	Benthic Biota	Faunal Bed	Soft Sediment Fauna	Small Surface-Burrowing Fauna	
ST18904-ENV43	Benthic Biota	Faunal Bed	Soft Sediment Fauna	Small Surface-Burrowing Fauna	
ST18904-ENV44	Benthic Biota	Faunal Bed	Soft Sediment Fauna	Mobile Crustaceans on Soft Sediments	
ST18904-ENV45	Benthic Biota	Faunal Bed	Soft Sediment Fauna	Small Surface-Burrowing Fauna	
ST18904-ENV46	Benthic Biota	Faunal Bed	Soft Sediment Fauna	Small Surface-Burrowing Fauna	
ST18904-ENV47	Benthic Biota	Faunal Bed	Soft Sediment Fauna	Small Surface-Burrowing Fauna	
ST18904-ENV48	Benthic Biota	Faunal Bed	Soft Sediment Fauna	Larger Deep-Burrowing Fauna	
ST18904-ENV49	Benthic Biota	Faunal Bed	Soft Sediment Fauna	Small Surface-Burrowing Fauna	
ST18904-ENV50	Benthic Biota	Faunal Bed	Soft Sediment Fauna	Larger Deep-Burrowing Fauna	Oligochaete Bed
ST18904-ENV51	Benthic Biota	Faunal Bed	Soft Sediment Fauna	Small Surface-Burrowing Fauna	
ST18904-ENV52	Benthic Biota	Faunal Bed	Soft Sediment Fauna	Larger Deep-Burrowing Fauna	Oligochaete Bed
ST18904-ENV53	Benthic Biota	Faunal Bed	Soft Sediment Fauna	Mobile Crustaceans on Soft Sediments	
ST18904-ENV54	Benthic Biota	Faunal Bed	Soft Sediment Fauna	Small Surface-Burrowing Fauna	Oligochaete Bed
ST18904-ENV55	Benthic Biota	Faunal Bed	Soft Sediment Fauna	Larger Deep-Burrowing Fauna	
ST18904-ENV56	Benthic Biota	Faunal Bed	Soft Sediment Fauna	Larger Deep-Burrowing Fauna	
ST18904-ENV57	Benthic Biota	Faunal Bed	Soft Sediment Fauna	Larger Deep-Burrowing Fauna	
ST18904-ENV58	Benthic Biota	Faunal Bed	Soft Sediment Fauna	Mobile Crustaceans on Soft Sediments	
ST18904-ENV59	Benthic Biota	Faunal Bed	Soft Sediment Fauna	Small Surface-Burrowing Fauna	Echinarachnius parma Bed
ST18904-ENV60	Benthic Biota	Faunal Bed	Soft Sediment Fauna	Small Surface-Burrowing Fauna	
ST18904-ENV61	Benthic Biota	Faunal Bed	Soft Sediment Fauna	Small Surface-Burrowing Fauna	
ST18904-ENV62	Benthic Biota	Faunal Bed	Soft Sediment Fauna	Larger Deep-Burrowing Fauna	
ST18904-ENV63	Benthic Biota	Faunal Bed	Soft Sediment Fauna	Larger Deep-Burrowing Fauna	
ST18904-ENV64	Benthic Biota	Faunal Bed	Soft Sediment Fauna	Larger Deep-Burrowing Fauna	Echinarachnius parma Bed
ST18904-ENV65	Benthic Biota	Faunal Bed	Soft Sediment Fauna	Sand Dollar Bed	
ST18904-ENV66	Benthic Biota	Faunal Bed	Soft Sediment Fauna	Small Surface-Burrowing Fauna	Echinarachnius parma Bed
ST18904-ENV67	Benthic Biota	Faunal Bed	Soft Sediment Fauna	Small Surface-Burrowing Fauna	
ST18904-ENV68	Benthic Biota	Faunal Bed	Soft Sediment Fauna	Sand Dollar Bed	Echinarachnius parma Bed
ST18904-ENV69	Benthic Biota	Faunal Bed	Soft Sediment Fauna	Sand Dollar Bed	
ST18904-ENV70	Benthic Biota	Faunal Bed	Soft Sediment Fauna	Larger Deep-Burrowing Fauna	Capitellid Bed
ST18904-ENV71	Benthic Biota	Faunal Bed	Soft Sediment Fauna	Larger Deep-Burrowing Fauna	
ST18904-ENV72	Benthic Biota	Faunal Bed	Soft Sediment Fauna	Small Surface-Burrowing Fauna	Capitellid Bed

Grey cells indicate where classification could not be taken any further

Figure 2.10 CMECS Biotic Classification from Sieved Grab Samples



2.6 Summary of Results

Preliminary geophysical data suggested sediments comprised coarse sand with accumulations of shell, gravel and cobbles. Results of PSA and seabed imagery analyses were consistent with the initial geophysical interpretation.

The modified Folk classification and therefore CMECS substrate components classification (FGDC, 2012) ranged between slightly gravelly muddy sand to sandy gravel across all stations. TOM concentrations were relatively homogenous across the survey area, whilst water content varied from 9.5% to 80.4%, correlating to the varying percentages of fines and gravel across stations.

Analysis of the macrofaunal data revealed a relatively even distributed community with instances of patchiness and a lack of consistent dominance. The macrofaunal community was dominated by Polygordiidae, accounting for 39% of the overall total abundance. Despite this, the macrofaunal community was found to be relatively diverse, with 186 taxa recorded across 67 stations. No taxa were recorded at all stations, while 38 (20%) taxa were found at only one station and of these 25 (13%) taxa were represented by a single individual. Multivariate analysis of the faunal data revealed that stations were more dissimilar to one another than similar and that differences largely corresponded with absences and higher abundances of various taxa.

A single live individual of the ocean quahog (*A. islandica*) was recorded from the fauna sample at Station ST18904-ENV25 and this was located within an area designated as an essential fish habitat for this taxon (NOAA, 2018b). Furthermore, a total of 35 live potential *A. islandica* were recorded at 25 stations across the survey area and 47 pairs of siphons, which have the potential to be live *A. islandica*, were also recorded at 27 stations. A further 58 dead *A. islandica* shells were recorded at 20 stations across the survey area. The survey was located within an area designated as an essential fish habitat for this taxon (NOAA, 2018b). Eight individuals of Anthozoa (Actiniaria, Edwardsiidae, Ceriantharia) were recorded throughout the survey area, however these are not listed by BOEM (2013) as comprising sensitive habitats.

The survey area did not fall in any final or proposed Critical Habitat as defined by USFWS (2018). Furthermore, no benthic species or protected fish species listed under the Endangered Species Act (NOAA, 2018a) were observed in the seabed imagery or the samples acquired and analyzed. Nor was there any further evidence from imagery or sampling of any sensitive habitats within the surveyed area, as defined by BOEM (2013), such as exposed hard bottoms or those covered by ephemeral sand layers, seagrass patches, kelp or other algal beds.

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APPENDICES

APPENDIX A FIELD SAMPLING LOGS

Table A.1 Field Sampling Logs Cover Sheet

Table	Contents
Table A.1 Seabed Imagery Deck Log	Summarizes the preliminary results of the acquisition of seabed imagery across the 67 stations investigated. Details include: • Date and time of operations • Number of photographs obtained • Sediment and fauna description • Details of sampling difficulties and/or operational issues
Table A.2 Seabed Imagery Surveyors Log	Lists the positional information of all photographs acquired at the 67 stations investigated. Details include: • Date and time photographs were obtained • Target and actual sampling positions for each individual seabed image • Observed depth • Equipment used
Table A.3 Seabed Sampling Deck Log	Summarizes the preliminary results of the acquisition of grab samples across the 67 stations investigated. Details include: • Date and time of operations • Sample retention e.g. CHEM, MFA • Sample types derived from the Day grab e.g. 5 liter bucket • Sediment and fauna description • Details of sampling difficulties and/or operational issues
Table A.4 Seabed Sampling Surveyors Log	Lists the positional information of all grab samples acquired at the 67 stations. Details include: • Date and time samples were obtained • Equipment used • Observed depth • Target and actual sampling positions for each sample type • Proportion of sediment collected in the Day grab

APPENDIX A FIELD SAMPLING LOGS

Table A.2 Seabed Imagery Deck Logs

SEABED IMAGERY LOG SHEET (Deck)												QPRO-0753	
Job No: 11179				Area: New York, USA				Scale: 9.4cm laser lines					
Project: Equinor Wind OCS-A 0512								Equipment: Shallow Water Camera System					
Client: Equinor US Wind LLC								Vessel: RV <i>Ocean Researcher</i>					
Station Number	Date	Time on Overlay Start	Time on Overlay Finish	Media Location			Sediment Description	Fauna Description	Operator(s)	No. of Photos	First Fix No.	Last Fix No.	Comments
				VHS No.	DVD No. & Chapter	HDD File Name(s)							
ST18904-ENV12	05-Aug-18	11:17:25	11:40:00	1	1 1,2		Sand with shell fragments	Annelida (Polychaeta), Echinodermata (Asteroidea, Clypeasteroidea), Mollusca (Bivalvia, Gastropoda), Chordata (cf. Triglidae, Rajidae egg case)	JE, OH	31	1	31	First photo/fix taken before video started recording 00:00:00 - 00:22:35
ST18904-ENV9	05-Aug-18	13:09:37	13:28:58	1	1 3,4,5		Sand with shell fragments and occasional pebbles	Annelida (Polychaeta), Echinodermata (Asteroidea, Clypeasteroidea), Mollusca (Gastropoda), Chordata (cf. Triglidae, Rajidae egg case)	JE, OH	43	32	74	00:22:35 - 00:41:56
ST18904-ENV8	05-Aug-18	14:02:38	14:26:53	1	1,2 6,7,1		Sand with shell fragments and gravel patches	Echinodermata (Clypeasteroidea), Mollusca (Gastropoda, egg cast), Chordata (cf. Triglidae, Rajidae egg case), Cnidaria (Anthozoa)	JE, OH	40	75	114	14:12:22 DVD change mid station 00:41:56 - 01:06:11
ST18904-ENV7	05-Aug-18	15:03:07	15:31:18	1	2 2,3		Sand with shell fragments, occasional gravel patches	Annelida (Polychaeta), Arthropoda (Cirripedia, Paguroidea), Echinodermata (Asteroidea, Clypeasteroidea, possible Holothuroidea), Mollusca (Gastropoda, Bivalvia), Chordata (Pleuronectidae, Rajidae egg case), Porifera	JE, OH	46	115	159	01:06:11 - 01:34:22
ST18904-ENV11	05-Aug-18	16:17:51	16:59:45	1	3 1,2		Sand with shell fragments and occasional pebbles	Annelida (Polychaeta), Arthropoda (Paguroidea), Echinodermata (Asteroidea, Clypeasteroidea), Mollusca (Gastropoda, egg cast), Chordata (Rajidae egg case)	GD	34	160	193	01:34:22 - 02:16:16
ST18904-ENV10	05-Aug-18	17:27:22	17:53:05	1	3 3,4		Sand with shell fragments and occasional pebbles, greater density of shells towards the end of the transect	Annelida (Polychaeta), Arthropoda (Paguroidea), Echinodermata (Asteroidea, Clypeasteroidea), Mollusca (Gastropoda), Chordata (Rajidae egg case)	GD	35	194	228	17:51 DVD was full, but transect ended at 17:53 so no new DVD started 02:16:16 - 02:41:59
ST18904-ENV13	05-Aug-18	18:26:52	18:57:50	2	4 1,2		Sand with shell fragments and occasional pebbles and gravel, greater density of shells in the middle of transect. Bioturbation present	Annelida (Polychaeta), Arthropoda (Paguroidea, Brachyura), Echinodermata (Asteroidea, Clypeasteroidea), Mollusca (Gastropoda), Chordata (Rajidae egg case)	GD, SD	29	229	257	00:00:00 - 00:30:58
ST18904-ENV14	05-Aug-18	19:28:20	19:51:00	2	4 3,4		Sand with shell fragments	Annelida (Polychaeta), Arthropoda (Paguroidea, Brachyura), Echinodermata (Clypeasteroidea), Mollusca (Gastropoda), Chordata (cf. Triglidae)	GD, EH	31	258	289	00:30:58 - 00:53:38
ST18904-ENV15	06-Aug-18	14:01:22	14:27:15	2	5 1,2		Sand with shell fragments, shell fragments primarily in rippled orientation	Annelida (Polychaeta), Arthropoda (Paguroidea), Echinodermata (Clypeasteroidea), Mollusca (Gastropoda, egg cast), Chordata (Rajidae egg case)		35	290	324	00:53:38 - 01:19:31
ST18904-ENV18	06-Aug-18	15:22:00	15:55:01	2	6 1,2		Sand with shell fragments often seen in rippled formation over sand, bioturbation present	Annelida (Polychaeta), Arthropoda (Paguroidea), Echinodermata (Clypeasteroidea), Mollusca (Gastropoda), Chordata (Actinopterygii, Rajidae egg case)		40	325	364	01:19:31 - 01:52:32

Grey column denotes where no information is required.

APPENDIX A FIELD SAMPLING LOGS

Table A.2 Seabed Imagery Deck Logs

SEABED IMAGERY LOG SHEET (Deck)												QPRO-075
Job No: 11179				Area: New York, USA				Scale: 9.4cm laser lines				
Project: Equinor Wind OCS-A 0512								Equipment: Shallow Water Camera System				
Client: Equinor US Wind LLC								Vessel: RV Ocean Researcher				
Station Number	Date	Time on Overlay Start	Time on Overlay Finish	Media Location		Sediment Description	Fauna Description	Operator(s)	No. of Photos	First Fix No.	Last Fix No.	Comments
				VHS No.	DVD No. & Chapter HDD File Name(s)							
ST18904-ENV17	06-Aug-18	16:27:00	16:53:53	2	6 3,4	Sand with occasional shell fragments and gravel patches, bioturbation present	Annelida (Polychaeta), Arthropoda (Paguroidea), Echinodermata (Asteroidea, Clypeasteroidea), Mollusca (Gastropoda), Chordata (cf. Triglidae, Rajidae egg case), Cnidaria (Ceriantharia)	GD	35	365	399	Picture of plastic bag. End of DVD 2 minutes from the end 01:52:32 - 02:19:25
ST18904-ENV16	06-Aug-18	17:36:26	18:08:17	2	7 1,2	Sand with shell fragments, bioturbation present	Annelida (Polychaeta), Arthropoda (Brachyura), Echinodermata (Asteroidea, Clypeasteroidea), Cnidaria (Ceriantharia)	GD, SD	37	400	436	02:19:25 - 02:51:16
ST18904-ENV19	06-Aug-18	18:40:20	19:03:50	3	7 3,4	Sand and gravel, bioturbation present	Annelida, Arthropoda (Paguroidea), Echinodermata (Echinoidea, Clypeasteroidea), Mollusca (Gastropoda, egg case), Bryozoa, Chordata (Actinopterygii, Rajidae egg cases), Cnidaria (Ceriantharia, Hydrozoa), Faunal turf, Porifera	GD, SD	33	437	469	00:00:00 - 00:23:30
ST18904-ENV20	06-Aug-18	19:48:40	20:02:10	3	8 1,2	Sand with shell fragments, possible anthropogenic debris fix(475)	Annelida (Polychaeta), Arthropoda (Paguroidea), Echinodermata (Clypeasteroidea), Mollusca (Gastropoda), Chordata (Rajidae egg case), Cnidaria (Ceriantharia)	GD, SD	32	470	501	00:23:30 - 00:37:00
ST18904-ENV21	06-Aug-18	20:44:58	21:03:00	3	8 3,4	Sand with shell fragments, greater density of shells towards end of transect, bioturbation present	Annelida (Polychaeta), Arthropoda (Paguroidea), Echinodermata (Asteroidea, Clypeasteroidea), Mollusca (Gastropoda), Chordata (Rajidae egg cases), Cnidaria (Hydrozoa)	GD	18	502	519	20:47 Bridge informed that they couldn't run transect slow enough in set direction, but left camera down and moved 0.5 to 1kt up transect and got enough footage for characterisation 00:37:00 - 00:55:07
ST18904-ENV24	10-Aug-18	20:13:55	20:40:50	3	9 1,2	Brown sand with grey patches, shell fragments, bioturbation present	Annelida (Polychaeta), Arthropoda (Paguroidea), Echinodermata (Asteroidea, Clypeasteroidea), Mollusca (Gastropoda), Bryozoa, Chordata (Rajidae egg cases), Cnidaria (Hydrozoa)	GD	30	520	549	00:55:07 - 01:21:57
ST18904-ENV27	10-Aug-18	22:05:33	22:31:55	3	9 3,4	Brown sand with grey patches, shell fragments, patches of gravel and possible cobbles, bioturbation present	Annelida (Polychaeta), Arthropoda (Decapoda), Echinodermata (Asteroidea, Clypeasteroidea), Mollusca (Gastropoda), Chordata (cf. Triglidae), Faunal turf	GD	27	First three fixes formerly: 57, 58, 550 Renamed: 550a, 550b, 550c	574	The first two fixes were erroneously named as the next intended grab fix numbers (57 and 58). These fixes were renamed '550a' and '550b' respectively and the first 'camera' fix (500) was then labelled 550c 01:21:57 - 01:48:19
ST18904-ENV42	11-Aug-18	02:19:20	02:44:25	3	10 1,2	Sand with shell fragments, bioturbation present	Annelida (Polychaeta), Arthropoda (Paguroidea, Decapoda), Echinodermata (Clypeasteroidea), possible Cnidaria, Mollusca (Gastropoda, egg cases, Bivalvia cf. <i>Arctica islandica</i>), Chordata (Rajidae), Faunal turf	GD, SD	32	575	606	01:48:19 - 02:13:24

Grey column denotes where no information is required.

APPENDIX A FIELD SAMPLING LOGS

Table A.2 Seabed Imagery Deck Logs

SEABED IMAGERY LOG SHEET (Deck)												QPRO-0753
Job No: 11179				Area: New York, USA				Scale: 9.4cm laser lines				
Project: Equinor Wind OCS-A 0512				Equipment: Shallow Water Camera System								
Client: Equinor US Wind LLC				Vessel: RV Ocean Researcher								
Station Number	Date	Time on Overlay Start	Time on Overlay Finish	Media Location		Sediment Description	Fauna Description	Operator(s)	No. of Photos	First Fix No.	Last Fix No.	Comments
				VHS No.	DVD No. & Chapter HDD File Name(s)							
ST18904-ENV23	28-Aug-18	16:15:00	16:37:00	4	11 1,2	Sand with shell fragments, gravelly sand with shell fragments towards end of transect, bioturbation present	Annelida (Polychaeta), Arthropoda (Paguroidea), Echinodermata (Asteroidea, Clypeasteroidea), Mollusca (Gastropoda), Chordata (Actinopterygii, egg cases, Triglidae), Cnidaria (Ceriantharia), Porifera	AMR	42	607	648	00:00:00 - 00:22:00
ST18904-ENV22	28-Aug-18	18:19:00	18:47:00	4	11 3,4	Gravelly sand with shell fragments	Annelida (Polychaeta), Arthropoda (Paguroidea), Echinodermata (Asteroidea, Clypeasteroidea), Mollusca (Bivalvia), Cnidaria (Ceriantharia), Chordata (Triglidae, egg cases), Porifera	AMR	39	649	687	00:23:00 - 00:50:00
ST18904-ENV26	28-Aug-18	20:21:00	20:47:00	4	12 2,3	Gravelly sand with shell fragments and gravel patches	Annelida (Polychaeta), Arthropoda (Paguroidea), Echinodermata (Asteroidea, Clypeasteroidea), Chordata (Triglidae, egg cases), Cnidaria (Actinaria, Ceriantharia), Porifera	AMR	32	688	719	00:50:00 - 01:17:00
ST18904-ENV28	28-Aug-18	22:24:00	22:58:00	4	12 4,5	Sand with shell fragments	Annelida (Polychaeta), Arthropoda (Paguroidea), Echinodermata (Asteroidea, Clypeasteroidea), Chordata (Triglidae, Actinopterygii)	AMR	26	720	745	Vessel struggling to get on station Changed initially planned transect direction for better vessel manoeuvring 01:17:00 - 01:51:00
ST18904-ENV45	30-Aug-18	22:22:00	22:49:00	4	13 1,2	Sand with shell fragments	Annelida (Polychaeta), Arthropoda (Paguroidea, Caridea), Echinodermata (Clypeasteroidea), Mollusca (Gastropoda, Bivalvia), Chordata (Actinopterygii)	AMR	24	746	769	Fix 761 Poss. fishing net (on video) 01:51:00 - 02:18:00
ST18904-ENV72	03-Sep-18	15:44:00	16:08:00	4	13 3,4	Gravelly sand with shell fragments	Annelida (Polychaeta), Arthropoda (Paguroidea), Echinodermata (Clypeasteroidea), Chordata (Rajidae), Cnidaria (Ceriantharia)	AS/AMR	27	770	796	02:18:00 - 02:43:00
ST18904-ENV25	03-Sep-18	22:15:00	22:37:00	5	14 1,2	Sand with shell fragments and occasional gravel patches, bioturbation present	Annelida (Polychaeta), Arthropoda (Paguroidea), Echinodermata (Clypeasteroidea), Mollusca (Gastropoda), Chordata (Rajidae egg case, Triglidae), Cnidaria (Ceriantharia)	AMR	23	797	819	Vessel moving >0.6knots and occasional drifting off transect due to currents 00:00:00 - 00:24:00
ST18904-ENV47	04-Sep-18	00:44:00	01:03:00	5	14 3,4	Sand with shell fragments and gravel patches	Annelida (Polychaeta), Arthropoda (Paguroidea), Echinodermata (Asteroidea, Clypeasteroidea), Mollusca (Gastropoda, Bivalvia), Chordata (Actinopterygii)	AMR	28	820	847	Vessel moving >0.6knots and occasional drifting off transect due to currents 00:24:00 - 00:44:00
ST18904-ENV29	04-Sep-18	02:45:00	02:58:00	5	15 1,2	Sand with shell fragments, bioturbation present	Annelida (Polychaeta), Arthropoda (Paguroidea), Echinodermata (Asteroidea, Clypeasteroidea), Mollusca (Gastropoda, Bivalvia)	AMR	19	848	866	Vessel moving up to 0.8 knots 00:44:00 - 00:58:00

Grey column denotes where no information is required.

APPENDIX A FIELD SAMPLING LOGS

Table A.2 Seabed Imagery Deck Logs

SEABED IMAGERY LOG SHEET (Deck)												QPRO-075
Job No: 11179				Area: New York, USA				Scale: 9.4cm laser lines				
Project: Equinor Wind OCS-A 0512								Equipment: Shallow Water Camera System				
Client: Equinor US Wind LLC								Vessel: RV Ocean Researcher				
Station Number	Date	Time on Overlay Start	Time on Overlay Finish	Media Location		Sediment Description	Fauna Description	Operator(s)	No. of Photos	First Fix No.	Last Fix No.	Comments
				VHS No.	DVD No. & Chapter HDD File Name(s)							
ST18904-ENV30	04-Sep-18	04:34:00	04:55:00	5	15 3,4	Sand with shell fragments, bioturbation present	Annelida (Polychaeta), Arthropoda (Decapoda), Echinodermata (Clypeasteroidea), Mollusca (Bivalvia), Chordata (Actinopterygii, Rajidae)	AS	25	867	891	00:58:00 - 01:19:00
ST18904-ENV33	04-Sep-18	06:47:00	07:02:00	5	16 1,2	Sand with shell fragments, bioturbation present	Echinodermata (Clypeasteroidea), Mollusca (Bivalvia), Chordata (Rajidae)	AS	17	892	908	01:19:00 - 01:34:00
ST18904-ENV36	04-Sep-18	08:32:00	08:49:00	5	16 3,4	Sand with shell fragments, bioturbation present	Arthropoda (Paguroidea), Echinodermata (Clypeasteroidea), Chordata (Triglidae)	AS	19	909	927	01:34:00 - 01:51:00
ST18904-ENV32	05-Sep-18	22:39:00	23:00:00	6	17 1,2	Gravelly sand with shell fragments, anthropogenic debris fix(945, 947)	Annelida (Polychaeta), Arthropoda (Paguroidea, Decapoda), Echinodermata (Asteroidea, Echinoidea, Clypeasteroidea), Mollusca (Gastropoda, Pectinidae), Chordata (Triglidae, Rajidae egg cases, Actinopterygii), Cnidaria (Ceriantharia), Plantae, Porifera	AMR	26	928	953	Changed initially planned transect direction for better vessel manoeuvring 00:00:00 - 00:22:00
ST18904-ENV31	06-Sep-18	00:39:00	01:05:00	6	17 3,4	Sand and gravel with shells and shell fragments	Annelida (Polychaeta), Arthropoda (Paguroidea), Echinodermata (Clypeasteroidea), Mollusca (Gastropoda, Bivalvia), Chordata (Rajidae egg cases, Triglidae), Cnidaria (Ceriantharia), Porifera	AMR	30	954	983	00:22:00 - 00:59:00
ST18904-ENV34	06-Sep-18	02:41:00	03:01:00	6	18 1,2	Sand with shell fragments	Annelida (Polychaeta), Arthropoda (Decapoda), Echinodermata (Clypeasteroidea), Mollusca (Gastropoda, Bivalvia), Chordata (Triglidae)	AMR	18	984	1001	00:59:00 - 01:19:00
ST18904-ENV37	06-Sep-18	04:29:00	04:47:00	6	18 3,4	Sand and gravel with shell fragments	Annelida (Polychaeta), Echinodermata (Clypeasteroidea), Chordata (Triglidae)	AS	21	1002	1022	01:19:00 - 01:37:00
ST18904-ENV35	06-Sep-18	06:14:00	06:29:00	6	19 1,2	Sand with shell fragments, bioturbation present, anthropogenic debris fix(1034)	Annelida (Polychaeta), Echinodermata (Clypeasteroidea), Mollusca (Gastropoda), Chordata (Triglidae, Actinopterygii)	AS	21	1023	1043	01:37:00 - 1:52:00
ST18904-ENV38	06-Sep-18	07:43:00	07:59:00	7	19 3,4	Sandy clay with gravel and shell fragments	Annelida (Polychaeta), Arthropoda (Paguroidea), Echinodermata (Clypeasteroidea), Chordata (Actinopterygii, Rajidae egg cases, Triglidae)	AS	28	1044	1070	00:00:00 - 00:16:00
ST18904-ENV5	07-Oct-18	17:33:24	17:53:27	7	20 1,2	Sand with dense aggregations of shell fragments	Echinodermata (Clypeasteroidea), Chordata (Rajidae, Rajidae egg cases)	JE, SD	29	1071	1100	00:16:00 - 00:47:00
ST18904-ENV68	07-Oct-18	19:39:45	19:57:30	7	20 2,3	Occasionally rippled sand with dense aggregations of shell fragments	Echinodermata (Clypeasteroidea), Chordata (Actinopterygii, Rajidae egg cases)	JE, SD	41	1101	1140	00:47:00 - 1:04:00
ST18904-ENV65	07-Oct-18	22:07:17	22:32:00	7	20 4,5 21	Rippled sand with shell fragments	Echinodermata (Clypeasteroidea), Mollusca (Pectinidae)	JE, SD	25	1141	1165	1:04:00 - 1:29:00

Grey column denotes where no information is required.

APPENDIX A FIELD SAMPLING LOGS

Table A.2 Seabed Imagery Deck Logs

SEABED IMAGERY LOG SHEET (Deck)												QPRO-075	
Job No: 11179				Area: New York, USA				Scale: 9.4cm laser lines					
Project: Equinor Wind OCS-A 0512				Equipment: Shallow Water Camera System									
Client: Equinor US Wind LLC				Vessel: RV Ocean Researcher									
Station Number	Date	Time on Overlay Start	Time on Overlay Finish	Media Location			Sediment Description	Fauna Description	Operator(s)	No. of Photos	First Fix No.	Last Fix No.	Comments
				VHS No.	DVD No. & Chapter	HDD File Name(s)							
ST18904-ENV70	24-Nov-18	05:27:00	06:11:00	7	22		Rippled sand with shell fragments	Arthropoda (Caridea, Paguroidea), Echinodermata (Clypeasteroidea, Holothuridae), Mollusca (Bivalvia), Chordata (<i>Prionotus</i> sp., <i>Carcharhinus falciformis</i> , Pleuronectiformes)	KS	89	1166	1244	1:29:00 - 2:12:00
ST18904-ENV61	24-Nov-18	08:17:00	08:47:00	7	23		Slightly rippled sand with shell fragments	Arthropoda (Caridea, Paguroidea), Echinodermata (Clypeasteroidea), Mollusca (Cephalopoda, Bivalvia, Gastropoda), Chordata (<i>Prionotus</i> sp., Pleuronectiformes, Rajidae egg cases), Cnidaria (Actiniaria)	KS	77	1307	1383	2:12:00 - 2:42:00
ST18904-ENV59	24-Nov-18	10:30:22	11:07:51	8	23 24		Slightly rippled sand with shell fragments and silty deposits	Arthropoda (Caridea, Paguroidea), Echinodermata (Clypeasteroidea), Mollusca (Bivalva, Gastropoda), Chordata (<i>Carcharhinus falciformis</i> , Pleuronectiformes, <i>Prionotus</i> sp., Rajidae)	KS	77	1307	1383	00:00:00 - 00:37:00
ST18904-ENV66	24-Nov-18	12:47:02	13:31:17	8	24		Sand with shell fragments, bioturbation present	Annelida (Polychaeta), Arthropoda (Caridea, Paguroidea), Echinodermata (Clypeasteroidea), Mollusca (Bivalvia), Chordata (Actinopterygii, <i>Carcharhinus falciformis</i> , Pleuronectiformes)	KS	37	1384	1454	00:37:00 - 01:21:00
ST18904-ENV57	24-Nov-18	15:32:47	16:09:32	8	25		Rippled sand with shell fragments, bioturbation present	Arthropoda (Caridea, Paguroidea), Echinodermata (Clypeasteroidea), Mollusca (Bivalva), Chordata (<i>Carcharhinus falciformis</i> , Pleuronectiformes), Cnidaria (Actiniaria)	KS	77	1455	1531	01:21:00 - 01:58:00
ST18904-ENV51	24-Nov-18	17:56:00	18:20:00	8	26		Sand with shell fragments	Arthropoda (Paguroidea), Echinodermata (Clypeasteroidea), Mollusca (Bivalvia),Chordata (Rajidae egg case)	AS	39	1531	1569	01:58:00 - 02:22:00
ST18904-ENV53	24-Nov-18	20:04:00	20:29:00	9	27 1,2		Sand with shell fragments	Arthropoda (Caridea, Paguroidea), Echinodermata (Asteroidea, Clypeasteroidea), Chordata (Pleuronectiformes)	AS	29	1570	1598	00:00:00 - 00:25:00
ST18904-ENV55	25-Nov-18	22:06:00	22:27:00	9	27 3,4		Sand with shell fragments	Echinodermata (Clypeasteroidea), Mollusca (Gastropoda), Chordata (Actinopterygii)	AS	37	1599	1635	00:25:00 - 00:46:00 Large swell (3.5m) and high turbidity, poor data accepted by onboard client. Scale bar detached and in view, also signed off by client
ST18904-ENV52	26-Nov-18	00:05:00	00:25:00	9	28 1,2,3		Sand with shell fragments	Arthropoda (Paguridae), Echinodermata (Clypeasteroidea), Chordata (<i>Prionotus</i> sp.)	AS	41	1636	1676	00:46:00 - 01:06:00 Large swell and high turbidity, poor data accepted by onboard client
ST18904-ENV49	26-Nov-18	01:40:00	01:57:00	9	28 4,5,6		Sandy gravel with shell fragments	Arthropoda (Paguroidea), Echinodermata (Clypeasteroidea), Mollusca (Bivalvia, Gastropoda), Chordata (Rajidae egg cases, Pleuronectiformes), Cnidaria (Actiniaria)	AS	39	1677	1715	01:06:00 - 01:23:00 Large swell and high turbidity, poor data accepted by onboard client

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APPENDIX A FIELD SAMPLING LOGS

Table A.2 Seabed Imagery Deck Logs

SEABED IMAGERY LOG SHEET (Deck)													QPRO-075
Job No: 11179				Area: New York, USA				Scale: 9.4cm laser lines					
Project: Equinor Wind OCS-A 0512								Equipment: Shallow Water Camera System					
Client: Equinor US Wind LLC								Vessel: RV Ocean Researcher					
Station Number	Date	Time on Overlay Start	Time on Overlay Finish	Media Location			Sediment Description	Fauna Description	Operator(s)	No. of Photos	First Fix No.	Last Fix No.	Comments
				VHS No.	DVD No. & Chapter	HDD File Name(s)							
ST18904-ENV46	26-Nov-18	03:25:00	03:47:00	9	29		Sand with shell fragments	Arthropoda (Paguroidea), Echinodermata (Clypeasteroidea), Mollusca (Bivalvia, Gastropoda), Chordata (<i>Carcharhinus falciformis</i> , Rajidae egg cases, Pleuronectiformes)	AS	31	1716	1746	01:23:00 - 01:45:00 High turbidity, poor data accepted by onboard client
ST18904-ENV44	26-Nov-18	05:23:00	05:44:00	9	29		Sand with ripples towards the end of transect	Arthropoda (Paguroidea, Caridea), Echinodermata (Clypeasteroidea), Mollusca (Bivalvia, Gastropoda), Chordata (<i>Carcharhinus falciformis</i> , Rajidae egg cases, Rajidae), Cnidaria (Actiniaria)	KS	48	1747	1794	01:45:00 - 02:06:00 High turbidity, poor data accepted by onboard client
ST18904-ENV39	26-Nov-18	07:20:00	07:39:00	9	30		Sand with possible clay outcrops	Arthropoda (Paguroidae), Echinodermata (Asteroidea, Clypeasteroidea), Mollusca (Gastropoda), Chordata (Actinopterygii), Cnidaria (Actiniaria)	KS	39	1795	1833	02:06:00 - 02:25:00
ST18904-ENV41	26-Nov-18	09:21:20	09:44:46	9	30		Slightly rippled sand with shell fragments	Arthropoda (Paguroidea), Echinodermata (Clypeasteroidea), Mollusca (Gastropoda), Chordata (<i>Carcharhinus falciformis</i> , Rajidae, Pleuronectiformes)	KS	53	1834	1886	02:25:00 - 2:47:00 Strong tide, blue line interference on recording
ST18904-ENV43	26-Nov-18	11:29:10	11:46:21	9 10	31 1		Rippled sand with gravel and shell fragments	Arthropoda (Paguroidea, Caridea), Echinodermata (Clypeasteroidea), Mollusca (Bivalvia), Chordata (<i>Carcharhinus falciformis</i> , Rajidae egg cases), Cnidaria (Actiniaria)	KS	40	1887	1926	2:47:00 - 3:00:00 00:00:00 - 00:04:00 Strong tide
ST18904-ENV40	26-Nov-18	13:27:50	13:47:16	10	31 2		Rippled sand	Annelida (Sabellidae), Arthropoda (Paguroidea), Echinodermata (Clypeasteroidea), Mollusca (Gastropoda), Chordata (<i>Carcharhinus falciformis</i> , Rajidae egg cases, Pleuronectiformes), Cnidaria (Actiniaria)	KS	54	1927	1980	00:04:00 - 00:24:00 1.5m swell, strong tide
ST18904-ENV50	26-Nov-18	15:42:40	16:00:38	10	31 3		Rippled sand	Arthropoda (Paguroidea, Caridea), Echinodermata (Clypeasteroidea), Chordata (<i>Carcharhinus falciformis</i>)	KS	40	1981	2020	00:24:00 - 00:32:00
ST18904-ENV48	30-Nov-18	04:32:55	04:53:00	10	32 1		Sand with shell fragments	Arthropoda (Caridea), Echinodermata (Clypeasteroidea), Mollusca (Bivalvia), Chordata (Actinopterygii, Rajidae egg cases, <i>Carcharhinus falciformis</i>), possible Porifera	AS	38	2021	2058	00:32:00 - 00:53:00

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APPENDIX A FIELD SAMPLING LOGS

Table A.2 Seabed Imagery Deck Logs

SEABED IMAGERY LOG SHEET (Deck)													QPRO-075
Job No: 11179				Area: New York, USA				Scale: 9.4cm laser lines					
Project: Equinor Wind OCS-A 0512								Equipment: Shallow Water Camera System					
Client: Equinor US Wind LLC								Vessel: RV Ocean Researcher					
Station Number	Date	Time on Overlay Start	Time on Overlay Finish	Media Location			Sediment Description	Fauna Description	Operator(s)	No. of Photos	First Fix No.	Last Fix No.	Comments
				VHS No.	DVD No. & Chapter	HDD File Name(s)							
ST18904-ENV54	30-Nov-18	06:38:03	06:58:10	10	32 2		Rippled sand with shell fragments	Arthropoda (Caridea, Paguroidea), Echinodermata (Clypeasteroidea), Mollusca (Pectinidae, Gastropoda), Chordata (Actinopterygii, <i>Carcharhinus falciformis</i> , Triglidae, Rajidae egg cases)	KS	47	2059	2105	00:53:00 - 01:13:00
ST18904-ENV60	30-Nov-18	08:36:00	08:52:56	10	33 1		Rippled sand with shell fragments	Arthropoda (Caridea, Paguroidea), Echinodermata (Clypeasteroidea), Mollusca (Pectinidae, Gastropoda), Chordata (Triglidae, Pleuronectiformes, Rajidae egg cases)	KS	48	2106	2153	01:13:00 - 01:29:00
ST18904-ENV63	30-Nov-18	10:27:52	10:40:56	10	33 2		Rippled sand with shell fragments	Echinodermata (Clypeasteroidea), Mollusca (Gastropoda), Chordata (<i>Carcharhinus falciformis</i> , Pleuronectiformes)	KS	45	2156	2200	01:29:00 - 01:42:00
ST18904-ENV69	30-Nov-18	12:40:30	13:04:30	10	34 1		Rippled sand with shell fragments	Chordata (Rajidae egg cases), Arthropoda (Caridea), Echinodermata (Asteroidea, Clypeasteroidea), Mollusca (Pectinidae), possible Porifera	KS	67	2201	2267	01:42:00 - 02:06:00
ST18904-ENV62	30-Nov-18	14:39:40	14:57:10	10	34 2		Rippled sand with shell fragments, bioturbation present	Arthropoda (Paguroidea), Echinodermata (Asteroidea, Clypeasteroidea)	KS	54	2268	2321	02:06:00 - 02:22:00
ST18904-ENV56	30-Nov-18	16:31:47	16:49:42	10	35 1		Rippled sand with shell fragments, bioturbation present	Chordata (Triglidae, Melanogrammus sp.), Crustacea (Paguridae), Echinodermata (Clypeasteroidea), Mollusca (Pectinidae)	KS	53	2322	2374	02:22:00 - 02:40:00
ST18904-ENV58	30-Nov-18	18:32:00	18:48:00	11	35 2		Sand with shell fragments	Echinodermata (Clypeasteroidea), Mollusca (<i>cf. Arctica islandica</i>), Chordata (Rajidae, Rajidae egg cases)	AS	28	2375	2402	00:00:00 - 00:16:00
ST18904-ENV64	30-Nov-18	20:16:00	20:32:00	11	36 1		Sand with shell fragments	Arthropoda (Paguroidea), Echinodermata (Clypeasteroidea), Mollusca (Pectinidae), Chordata (Rajidae egg cases)	AS		2403	2425	00:16:00 - 00:32:00
ST18904-ENV67	30-Nov-18	21:48:00	22:05:00	11	36 2		Sand with shell fragments	Arthropoda (Paguroidea), Echinodermata (Clypeasteroidea), Mollusca (<i>cf. Arctica islandica</i>), Chordata (Rajidae egg cases, Actinopterygii)	AS	27	2426	2452	00:32:00 - 00:49:00
ST18904-ENV71	30-Nov-18	23:50:00	00:08:00	11	37		Sand with shell fragments	Arthropoda (Paguroidea), Echinodermata (Asteroidea, Clypeasteroidea), Mollusca (<i>cf. Arctica islandica</i>), Chordata (Rajidae, Rajidae egg cases, Actinopterygii)	AS	25	2453	2477	00:49:00 - 01:07:00

Grey column denotes where no information is required.

APPENDIX A FIELD SAMPLING LOGS

Table A.3 Seabed Imagery Surveyors Logs

Gardline												Seafloor Sampling Positioning Summary															
Job No		11179								Vessel		MV Ocean Researcher															
Client		Equinor US Wind LLC								Vessel Reference Point (VRP)		CoG															
Project Name		Equinor Wind OCS-A 0512								Deployment Location		Starboard A-frame				x		8.96		y		-3.08		z		6.05	
Primary Positioning System		Starpack 1								Actual Coordinates derived from		Deployment Location															
Geodetic Reference System		Datum				NAD83				Ellipsoid		GRS 80				Projection		UTM ZONE 18 N (75 W)				Vertical / Tidal Datum		NAVD88			
Date	Time (UTC/GMT)	Fix number	Stn No	Penetration	Sample Retention	Retention	Observed Seafloor Depth (feet)	Observed Seafloor Depth (m)	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks									
									Easting	Northing	Easting	Northing	dE	dN	Range	Bearing											
05-Aug-2018	11:16:51	1	ST18904-ENV12			Camera	82	25	621800	4469079	621785	4469088	15	-9	18	300		(Corr'd Nav, Kongsberg 14208, img#1) (V)									
05-Aug-2018	11:18:41	2	ST18904-ENV12			Camera	82	25	621785	4469085	621785	4469088	0	-3	3	3		(Corr'd Nav, Kongsberg 14208, img#2) (V)									
05-Aug-2018	11:18:57	3	ST18904-ENV12			Camera	82	25	621782	4469086	621785	4469088	-2	-1	3	59		(Corr'd Nav, Kongsberg 14208, img#3) (V)									
05-Aug-2018	11:19:26	4	ST18904-ENV12			Camera	82	25	621778	4469089	621785	4469088	-7	1	7	96		(Corr'd Nav, Kongsberg 14208, img#4) (V)									
05-Aug-2018	11:19:52	5	ST18904-ENV12			Camera	82	25	621775	4469091	621785	4469088	-10	3	10	107		(Corr'd Nav, Kongsberg 14208, img#5) (V)									
05-Aug-2018	11:20:19	6	ST18904-ENV12			Camera	82	25	621771	4469093	621785	4469088	-13	6	15	113		(Corr'd Nav, Kongsberg 14208, img#6) (V)									
05-Aug-2018	11:21:03	7	ST18904-ENV12			Camera	83	25	621766	4469097	621785	4469088	-19	9	21	116		(Corr'd Nav, Kongsberg 14208, img#7) (V)									
05-Aug-2018	11:21:52	8	ST18904-ENV12			Camera	83	25	621760	4469101	621785	4469088	-24	13	28	119		(Corr'd Nav, Kongsberg 14208, img#8) (V)									
05-Aug-2018	11:22:28	9	ST18904-ENV12			Camera	83	25	621755	4469103	621785	4469088	-30	15	33	117		(Corr'd Nav, Kongsberg 14208, img#9) (V)									
05-Aug-2018	11:23:06	10	ST18904-ENV12			Camera	83	25	621750	4469106	621785	4469088	-35	18	39	118		(Corr'd Nav, Kongsberg 14208, img#10) (V)									
05-Aug-2018	11:23:45	11	ST18904-ENV12			Camera	83	25	621744	4469109	621785	4469088	-41	21	46	118		(Corr'd Nav, Kongsberg 14208, img#11) (V)									
05-Aug-2018	11:25:02	12	ST18904-ENV12			Camera	82	25	621733	4469114	621785	4469088	-51	26	58	117		(Corr'd Nav, Kongsberg 14208, img#12) (V)									
05-Aug-2018	11:26:48	13	ST18904-ENV12			Camera	82	25	621718	4469122	621785	4469088	-66	34	74	117		(Corr'd Nav, Kongsberg 14208, img#13) (V)									
05-Aug-2018	11:27:46	14	ST18904-ENV12			Camera	82	25	621710	4469126	621785	4469088	-75	39	84	117		(Corr'd Nav, Kongsberg 14208, img#14) (V)									
05-Aug-2018	11:28:43	15	ST18904-ENV12			Camera	82	25	621702	4469130	621785	4469088	-83	43	93	117		(Corr'd Nav, Kongsberg 14208, img#15) (V)									
05-Aug-2018	11:29:12	16	ST18904-ENV12			Camera	82	25	621698	4469133	621785	4469088	-87	45	98	117		(Corr'd Nav, Kongsberg 14208, img#16) (V)									
05-Aug-2018	11:30:29	17	ST18904-ENV12			Camera	82	25	621686	4469138	621785	4469088	-98	50	111	117		(Corr'd Nav, Kongsberg 14208, img#17) (V)									
05-Aug-2018	11:31:06	18	ST18904-ENV12			Camera	82	25	621681	4469140	621785	4469088	-103	53	116	117		(Corr'd Nav, Kongsberg 14208, img#18) (V)									
05-Aug-2018	11:31:52	19	ST18904-ENV12			Camera	82	25	621675	4469144	621785	4469088	-109	56	123	117		(Corr'd Nav, Kongsberg 14208, img#19) (V)									
05-Aug-2018	11:32:48	20	ST18904-ENV12			Camera	82	25	621668	4469149	621785	4469088	-117	61	131	117		(Corr'd Nav, Kongsberg 14208, img#20) (V)									
05-Aug-2018	11:33:49	21	ST18904-ENV12			Camera	83	25	621658	4469153	621785	4469088	-126	65	142	117		(Corr'd Nav, Kongsberg 14208, img#21) (V)									
05-Aug-2018	11:34:29	22	ST18904-ENV12			Camera	83	25	621652	4469156	621785	4469088	-133	68	149	117		(Corr'd Nav, Kongsberg 14208, img#22) (V)									
05-Aug-2018	11:34:50	23	ST18904-ENV12			Camera	83	25	621649	4469158	621785	4469088	-136	70	153	117		(Corr'd Nav, Kongsberg 14208, img#23) (V)									
05-Aug-2018	11:35:19	24	ST18904-ENV12			Camera	83	25	621644	4469160	621785	4469088	-140	72	158	117		(Corr'd Nav, Kongsberg 14208, img#24) (V)									
05-Aug-2018	11:36:49	25	ST18904-ENV12			Camera	83	25	621631	4469167	621785	4469088	-154	79	173	117		(Corr'd Nav, Kongsberg 14208, img#25) (V)									
05-Aug-2018	11:37:21	26	ST18904-ENV12			Camera	83	25	621626	4469169	621785	4469088	-159	82	178	117		(Corr'd Nav, Kongsberg 14208, img#26) (V)									
05-Aug-2018	11:37:37	27	ST18904-ENV12			Camera	83	25	621624	4469171	621785	4469088	-161	83	181	117		(Corr'd Nav, Kongsberg 14208, img#27) (V)									
05-Aug-2018	11:38:40	28	ST18904-ENV12			Camera	83	25	621616	4469176	621785	4469088	-169	88	190	117		(Corr'd Nav, Kongsberg 14208, img#28) (V)									
05-Aug-2018	11:39:10	29	ST18904-ENV12			Camera	83	25	621613	4469178	621785	4469088	-172	90	194	118		(Corr'd Nav, Kongsberg 14208, img#29) (V)									
05-Aug-2018	11:39:41	30	ST18904-ENV12			Camera	83	25	621608	4469180	621785	4469088	-177	92	199	118		(Corr'd Nav, Kongsberg 14208, img#30) (V)									
05-Aug-2018	11:40:18	31	ST18904-ENV12			Camera	83	25	621602	4469182	621785	4469088	-182	94	205	117		(Corr'd Nav, Kongsberg 14208, img#31) (V)									
05-Aug-2018	13:10:27	32	ST18904-ENV9			Camera	84	26	620450	4469946	620431	4469950	20	-4	20	281		(Corr'd Nav, Kongsberg 14208, img#32) (V)									
05-Aug-2018	13:10:36	33	ST18904-ENV9			Camera	84	26	620450	4469946	620431	4469950	19	-4	20	281		(Corr'd Nav, Kongsberg 14208, img#33) (V)									
05-Aug-2018	13:11:46	34	ST18904-ENV9			Camera	84	26	620437	4469949	620431	4469950	7	-1	7	276		(Corr'd Nav, Kongsberg 14208, img#34) (V)									
05-Aug-2018	13:12:05	35	ST18904-ENV9			Camera	84	26	620433	4469949	620431	4469950	2	0	2	272		(Corr'd Nav, Kongsberg 14208, img#35) (V)									
05-Aug-2018	13:12:32	36	ST18904-ENV9			Camera	84	26	620427	4469950	620431	4469950	-4	1	4	103		(Corr'd Nav, Kongsberg 14208, img#36) (V)									
05-Aug-2018	13:12:59	37	ST18904-ENV9			Camera	84	25	620421	4469951	620431	4469950	-9	2	9	102		(Corr'd Nav, Kongsberg 14208, img#37) (V)									
05-Aug-2018	13:13:11	38	ST18904-ENV9			Camera	83	25	620419	4469952	620431	4469950	-11	3	12	103		(Corr'd Nav, Kongsberg 14208, img#38) (V)									

Grey columns denote where no information is required

APPENDIX A FIELD SAMPLING LOGS

Table A.3 Seabed Imagery Surveyors Logs

Gardline																	Seafloor Sampling Positioning Summary									
Job No		11179								Vessel		MV Ocean Researcher														
Client		Equinor US Wind LLC								Vessel Reference Point (VRP)		CoG														
Project Name		Equinor Wind OCS-A 0512								Deployment Location		Starboard A-frame			x		8.96		y		-3.08		z		6.05	
Primary Positioning System		Starpack 1								Actual Coordinates derived from		Deployment Location														
Geodetic Reference System		Datum		NAD83		Ellipsoid		GRS 80		Projection		UTM ZONE 18 N (75 W)					Vertical / Tidal Datum		NAVD88							
Date	Time (UTC/GMT)	Fix number	Stn No	Penetration	Sample Retention	Retention	Observed Seafloor Depth (feet)	Observed Seafloor Depth (m)	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks								
									Easting	Northing	Easting	Northing	dE	dN	Range	Bearing										
05-Aug-2018	13:13:37	39	ST18904-ENV9			Camera	83	25	620414	4469954	620431	4469950	-17	5	17	106		(Corr'd Nav, Kongsberg 14208, img#39) (V)								
05-Aug-2018	13:13:47	40	ST18904-ENV9			Camera	83	25	620412	4469955	620431	4469950	-19	6	19	107		(Corr'd Nav, Kongsberg 14208, img#40) (V)								
05-Aug-2018	13:14:01	41	ST18904-ENV9			Camera	83	25	620409	4469957	620431	4469950	-21	7	22	109		(Corr'd Nav, Kongsberg 14208, img#41) (V)								
05-Aug-2018	13:14:28	42	ST18904-ENV9			Camera	83	25	620405	4469960	620431	4469950	-26	10	28	112		(Corr'd Nav, Kongsberg 14208, img#42) (V)								
05-Aug-2018	13:14:44	43	ST18904-ENV9			Camera	83	25	620402	4469961	620431	4469950	-28	12	30	113		(Corr'd Nav, Kongsberg 14208, img#43) (V)								
05-Aug-2018	13:15:15	44	ST18904-ENV9			Camera	84	25	620398	4469964	620431	4469950	-32	15	36	115		(Corr'd Nav, Kongsberg 14208, img#44) (V)								
05-Aug-2018	13:15:24	45	ST18904-ENV9			Camera	83	25	620397	4469966	620431	4469950	-34	16	37	115		(Corr'd Nav, Kongsberg 14208, img#45) (V)								
05-Aug-2018	13:15:52	46	ST18904-ENV9			Camera	83	25	620392	4469969	620431	4469950	-38	20	43	117		(Corr'd Nav, Kongsberg 14208, img#46) (V)								
05-Aug-2018	13:16:12	47	ST18904-ENV9			Camera	83	25	620389	4469972	620431	4469950	-42	22	47	118		(Corr'd Nav, Kongsberg 14208, img#47) (V)								
05-Aug-2018	13:16:48	48	ST18904-ENV9			Camera	83	25	620383	4469975	620431	4469950	-47	25	53	118		(Corr'd Nav, Kongsberg 14208, img#48) (V)								
05-Aug-2018	13:17:07	49	ST18904-ENV9			Camera	83	25	620380	4469975	620431	4469950	-50	26	57	117		(Corr'd Nav, Kongsberg 14208, img#49) (V)								
05-Aug-2018	13:17:25	50	ST18904-ENV9			Camera	83	25	620377	4469975	620431	4469950	-53	26	59	116		(Corr'd Nav, Kongsberg 14208, img#50) (V)								
05-Aug-2018	13:17:52	51	ST18904-ENV9			Camera	83	25	620372	4469976	620431	4469950	-59	27	64	114		(Corr'd Nav, Kongsberg 14208, img#51) (V)								
05-Aug-2018	13:18:11	52	ST18904-ENV9			Camera	83	25	620367	4469978	620431	4469950	-64	28	70	114		(Corr'd Nav, Kongsberg 14208, img#52) (V)								
05-Aug-2018	13:18:27	53	ST18904-ENV9			Camera	83	25	620361	4469980	620431	4469950	-69	30	75	114		(Corr'd Nav, Kongsberg 14208, img#53) (V)								
05-Aug-2018	13:18:39	54	ST18904-ENV9			Camera	83	25	620358	4469981	620431	4469950	-73	32	79	113		(Corr'd Nav, Kongsberg 14208, img#54) (V)								
05-Aug-2018	13:18:54	55	ST18904-ENV9			Camera	83	25	620353	4469983	620431	4469950	-78	33	85	113		(Cor'd Nav, Kongsberg 14208, img#55) (V)								
05-Aug-2018	13:19:20	56	ST18904-ENV9			Camera	83	25	620344	4469985	620431	4469950	-86	35	93	112		(Corr'd Nav, Kongsberg 14208, img#56) (V)								
05-Aug-2018	13:19:34	57	ST18904-ENV9			Camera	83	25	620340	4469986	620431	4469950	-90	37	98	112		(Corr'd Nav, Kongsberg 14208, img#57) (V)								
05-Aug-2018	13:19:50	58	ST18904-ENV9			Camera	83	25	620335	4469987	620431	4469950	-95	38	103	112		(Corr'd Nav, Kongsberg 14208, img#58) (V)								
05-Aug-2018	13:20:21	59	ST18904-ENV9			Camera	83	25	620327	4469990	620431	4469950	-103	40	111	111		(Corr'd Nav, Kongsberg 14208, img#59) (V)								
05-Aug-2018	13:20:59	60	ST18904-ENV9			Camera	83	25	620321	4469992	620431	4469950	-110	43	118	111		(Corr'd Nav, Kongsberg 14208, img#60) (V)								
05-Aug-2018	13:21:23	61	ST18904-ENV9			Camera	83	25	620318	4469995	620431	4469950	-113	45	122	112		(Corr'd Nav, Kongsberg 14208, img#61) (V)								
05-Aug-2018	13:22:24	62	ST18904-ENV9			Camera	83	25	620311	4470002	620431	4469950	-119	53	130	114		(Corr'd Nav, Kongsberg 14208, img#62) (V)								
05-Aug-2018	13:23:00	63	ST18904-ENV9			Camera	83	25	620306	4470006	620431	4469950	-125	56	137	114		(Corr'd Nav, Kongsberg 14208, img#63) (V)								
05-Aug-2018	13:23:13	64	ST18904-ENV9			Camera	83	25	620304	4470007	620431	4469950	-127	57	139	114		(Corr'd Nav, Kongsberg 14208, img#64) (V)								
05-Aug-2018	13:23:54	65	ST18904-ENV9			Camera	83	25	620294	4470012	620431	4469950	-136	63	150	115		(Corr'd Nav, Kongsberg 14208, img#65) (V)								
05-Aug-2018	13:24:18	66	ST18904-ENV9			Camera	83	25	620289	4470015	620431	4469950	-142	65	156	115		(Corr'd Nav, Kongsberg 14208, img#66) (V)								
05-Aug-2018	13:24:46	67	ST18904-ENV9			Camera	83	25	620284	4470017	620431	4469950	-147	67	161	115		(Corr'd Nav, Kongsberg 14208, img#67) (V)								
05-Aug-2018	13:25:03	68	ST18904-ENV9			Camera	83	25	620282	4470018	620431	4469950	-149	68	164	115		(Corr'd Nav, Kongsberg 14208, img#68) (V)								
05-Aug-2018	13:25:32	69	ST18904-ENV9			Camera	83	25	620279	4470019	620431	4469950	-152	70	167	115		(Corr'd Nav, Kongsberg 14208, img#69) (V)								
05-Aug-2018	13:26:20	70	ST18904-ENV9			Camera	83	25	620275	4470024	620431	4469950	-156	74	172	115		(Corr'd Nav, Kongsberg 14208, img#70) (V)								
05-Aug-2018	13:27:00	71	ST18904-ENV9			Camera	83	25	620271	4470028	620431	4469950	-160	78	178	116		(Corr'd Nav, Kongsberg 14208, img#71) (V)								
05-Aug-2018	13:27:24	72	ST18904-ENV9			Camera	83	25	620268	4470030	620431	4469950	-163	80	182	116		(Corr'd Nav, Kongsberg 14208, img#72) (V)								
05-Aug-2018	13:28:30	73	ST18904-ENV9			Camera	83	25	620257	4470033	620431	4469950	-173	83	192	116		(Corr'd Nav, Kongsberg 14208, img#73) (V)								
05-Aug-2018	13:28:58	74	ST18904-ENV9			Camera	83	25	620251	4470033	620431	4469950	-180	83	198	115		(Corr'd Nav, Kongsberg 14208, img#74) (V)								
05-Aug-2018	14:02:16	75	ST18904-ENV8			Camera	86	26	620816	4470455	620829	4470466	-13	-12	18	48		(Corr'd Nav, Kongsberg 14208, img#75) (V)								
05-Aug-2018	14:02:54	76	ST18904-ENV8			Camera	86	26	620822	4470460	620829	4470466	-7	-6	9	50		(Corr'd Nav, Kongsberg 14208, img#76) (V)								

Grey columns denote where no information is required

APPENDIX A FIELD SAMPLING LOGS

Table A.3 Seabed Imagery Surveyors Logs

Gardline												Seafloor Sampling Positioning Summary							
Job No		11179							Vessel		MV Ocean Researcher								
Client		Equinor US Wind LLC							Vessel Reference Point (VRP)		CoG								
Project Name		Equinor Wind OCS-A 0512							Deployment Location		Starboard A-frame			x	8.96	y	-3.08	z	6.05
Primary Positioning System		Starpack 1							Actual Coordinates derived from		Deployment Location								
Geodetic Reference System		Datum			NAD83		Ellipsoid	GRS 80		Projection		UTM ZONE 18 N (75 W)				Vertical / Tidal Datum		NAVD88	
Date	Time (UTC/GMT)	Fix number	Stn No	Penetration	Sample Retention	Retention	Observed Seafloor Depth (feet)	Observed Seafloor Depth (m)	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks	
									Easting	Northing	Easting	Northing	dE	dN	Range	Bearing			
05-Aug-2018	14:04:08	77	ST18904-ENV8			Camera	87	26	620833	4470472	620829	4470466	4	5	7	217		(Cor'd Nav, Kongsberg 14208, img#77) (V)	
05-Aug-2018	14:04:40	78	ST18904-ENV8			Camera	86	26	620839	4470477	620829	4470466	10	11	15	224		(Cor'd Nav, Kongsberg 14208, img#78) (V)	
05-Aug-2018	14:05:02	79	ST18904-ENV8			Camera	86	26	620843	4470481	620829	4470466	14	14	20	224		(Cor'd Nav, Kongsberg 14208, img#79) (V)	
05-Aug-2018	14:05:19	80	ST18904-ENV8			Camera	87	26	620846	4470483	620829	4470466	16	17	23	225		(Cor'd Nav, Kongsberg 14208, img#80) (V)	
05-Aug-2018	14:05:45	81	ST18904-ENV8			Camera	87	26	620849	4470486	620829	4470466	19	19	27	225		(Cor'd Nav, Kongsberg 14208, img#81) (V)	
05-Aug-2018	14:06:09	82	ST18904-ENV8			Camera	87	26	620851	4470487	620829	4470466	22	20	30	227		(Cor'd Nav, Kongsberg 14208, img#82) (V)	
05-Aug-2018	14:06:35	83	ST18904-ENV8			Camera	87	27	620854	4470489	620829	4470466	25	22	33	228		(Cor'd Nav, Kongsberg 14208, img#83) (V)	
05-Aug-2018	14:07:14	84	ST18904-ENV8			Camera	87	27	620860	4470494	620829	4470466	31	27	41	228		(Cor'd Nav, Kongsberg 14208, img#84) (V)	
05-Aug-2018	14:07:41	85	ST18904-ENV8			Camera	88	27	620865	4470497	620829	4470466	35	31	47	229		(Cor'd Nav, Kongsberg 14208, img#85) (V)	
05-Aug-2018	14:08:08	86	ST18904-ENV8			Camera	87	27	620869	4470499	620829	4470466	40	33	52	230		(Cor'd Nav, Kongsberg 14208, img#86) (V)	
05-Aug-2018	14:09:18	87	ST18904-ENV8			Camera	87	27	620878	4470504	620829	4470466	49	37	61	233		(Cor'd Nav, Kongsberg 14208, img#87) (V)	
05-Aug-2018	14:09:34	88	ST18904-ENV8			Camera	87	27	620880	4470506	620829	4470466	50	39	64	232		(Cor'd Nav, Kongsberg 14208, img#88) (V)	
05-Aug-2018	14:09:56	89	ST18904-ENV8			Camera	87	27	620882	4470509	620829	4470466	53	43	68	231		(Cor'd Nav, Kongsberg 14208, img#89) (V)	
05-Aug-2018	14:10:34	90	ST18904-ENV8			Camera	87	27	620888	4470514	620829	4470466	58	48	75	231		(Cor'd Nav, Kongsberg 14208, img#90) (V)	
05-Aug-2018	14:11:10	91	ST18904-ENV8			Camera	87	27	620894	4470519	620829	4470466	64	53	83	230		(Cor'd Nav, Kongsberg 14208, img#91) (V)	
05-Aug-2018	14:11:20	92	ST18904-ENV8			Camera	88	27	620895	4470521	620829	4470466	66	54	85	230		(Cor'd Nav, Kongsberg 14208, img#92) (V)	
05-Aug-2018	14:13:14	93	ST18904-ENV8			Camera	88	27	620909	4470529	620829	4470466	79	62	101	232		(Cor'd Nav, Kongsberg 14208, img#93) (V)	
05-Aug-2018	14:13:59	94	ST18904-ENV8			Camera	88	27	620913	4470531	620829	4470466	84	65	106	232		(Cor'd Nav, Kongsberg 14208, img#94) (V)	
05-Aug-2018	14:14:17	95	ST18904-ENV8			Camera	88	27	620915	4470533	620829	4470466	86	67	109	232		(Cor'd Nav, Kongsberg 14208, img#95) (V)	
05-Aug-2018	14:15:09	96	ST18904-ENV8			Camera	88	27	620919	4470539	620829	4470466	90	72	115	231		(Cor'd Nav, Kongsberg 14208, img#96) (V)	
05-Aug-2018	14:16:06	97	ST18904-ENV8			Camera	88	27	620927	4470541	620829	4470466	98	75	123	233		(Cor'd Nav, Kongsberg 14208, img#97) (V)	
05-Aug-2018	14:16:43	98	ST18904-ENV8			Camera	88	27	620931	4470545	620829	4470466	102	78	129	233		(Cor'd Nav, Kongsberg 14208, img#98) (V)	
05-Aug-2018	14:17:09	99	ST18904-ENV8			Camera	88	27	620934	4470548	620829	4470466	105	82	133	232		(Cor'd Nav, Kongsberg 14208, img#99) (V)	
05-Aug-2018	14:17:23	100	ST18904-ENV8			Camera	88	27	620936	4470550	620829	4470466	107	84	136	232		(Cor'd Nav, Kongsberg 14208, img#100) (V)	
05-Aug-2018	14:17:40	101	ST18904-ENV8			Camera	88	27	620938	4470552	620829	4470466	109	86	139	232		(Cor'd Nav, Kongsberg 14208, img#101) (V)	
05-Aug-2018	14:17:54	102	ST18904-ENV8			Camera	88	27	620940	4470554	620829	4470466	111	88	141	232		(Cor'd Nav, Kongsberg 14208, img#102) (V)	
05-Aug-2018	14:18:47	103	ST18904-ENV8			Camera	88	27	620946	4470560	620829	4470466	117	94	150	231		(Cor'd Nav, Kongsberg 14208, img#103) (V)	
05-Aug-2018	14:19:11	104	ST18904-ENV8			Camera	88	27	620948	4470563	620829	4470466	119	97	154	231		(Cor'd Nav, Kongsberg 14208, img#104) (V)	
05-Aug-2018	14:19:41	105	ST18904-ENV8			Camera	89	27	620951	4470567	620829	4470466	122	101	158	230		(Cor'd Nav, Kongsberg 14208, img#105) (V)	
05-Aug-2018	14:20:29	106	ST18904-ENV8			Camera	89	27	620956	4470572	620829	4470466	126	106	165	230		(Cor'd Nav, Kongsberg 14208, img#106) (V)	
05-Aug-2018	14:21:49	107	ST18904-ENV8			Camera	89	27	620963	4470579	620829	4470466	134	113	175	230		(Cor'd Nav, Kongsberg 14208, img#107) (V)	
05-Aug-2018	14:22:29	108	ST18904-ENV8			Camera	89	27	620966	4470580	620829	4470466	137	114	178	230		(Cor'd Nav, Kongsberg 14208, img#108) (V)	
05-Aug-2018	14:22:55	109	ST18904-ENV8			Camera	89	27	620967	4470581	620829	4470466	138	115	180	230		(Cor'd Nav, Kongsberg 14208, img#109) (V)	
05-Aug-2018	14:23:47	110	ST18904-ENV8			Camera	89	27	620971	4470582	620829	4470466	142	116	183	231		(Cor'd Nav, Kongsberg 14208, img#110) (V)	
05-Aug-2018	14:24:26	111	ST18904-ENV8			Camera	89	27	620974	4470581	620829	4470466	145	115	185	232		(Cor'd Nav, Kongsberg 14208, img#111) (V)	
05-Aug-2018	14:25:06	112	ST18904-ENV8			Camera	89	27	620977	4470583	620829	4470466	148	117	189	232		(Cor'd Nav, Kongsberg 14208, img#112) (V)	
05-Aug-2018	14:25:47	113	ST18904-ENV8			Camera	89	27	620981	4470587	620829	4470466	152	120	194	232		(Cor'd Nav, Kongsberg 14208, img#113) (V)	
05-Aug-2018	14:26:21	114	ST18904-ENV8			Camera	89	27	620985	4470589	620829	4470466	156	122	198	232		(Cor'd Nav, Kongsberg 14208, img#114) (V)	

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APPENDIX A FIELD SAMPLING LOGS

Table A.3 Seabed Imagery Surveyors Logs

Gardline										Seafloor Sampling Positioning Summary									
Job No		11179								Vessel		MV Ocean Researcher							
Client		Equinor US Wind LLC								Vessel Reference Point (VRP)		CoG							
Project Name		Equinor Wind OCS-A 0512								Deployment Location		Starboard A-frame		x	8.96	y	-3.08	z	6.05
Primary Positioning System		Starpack 1								Actual Coordinates derived from		Deployment Location							
Geodetic Reference System		Datum		NAD83		Ellipsoid		GRS 80		Projection		UTM ZONE 18 N (75 W)				Vertical / Tidal Datum		NAVD88	
Date	Time (UTC/GMT)	Fix number	Stn No	Penetration	Sample Retention	Retention	Observed Seafloor Depth (feet)	Observed Seafloor Depth (m)	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks	
									Easting	Northing	Easting	Northing	dE	dN	Range	Bearing			
05-Aug-2018	15:03:24	115	ST18904-ENV7			Camera	88	27	619916	4470653	619964	4470638	-48	15	50	107		(Corr'd Nav, Kongsberg 14208, img#115) (V)	
05-Aug-2018	15:03:39	116	ST18904-ENV7			Camera	88	27	619917	4470653	619964	4470638	-47	15	49	107		(Corr'd Nav, Kongsberg 14208, img#116) (V)	
05-Aug-2018	15:04:17	117	ST18904-ENV7			Camera	88	27	619919	4470652	619964	4470638	-44	14	46	107		(Corr'd Nav, Kongsberg 14208, img#117) (V)	
05-Aug-2018	15:04:40	118	ST18904-ENV7			Camera	88	27	619922	4470651	619964	4470638	-41	13	43	107		(Corr'd Nav, Kongsberg 14208, img#118) (V)	
05-Aug-2018	15:05:25	119	ST18904-ENV7			Camera	87	27	619929	4470651	619964	4470638	-35	13	37	110		(Corr'd Nav, Kongsberg 14208, img#119) (V)	
05-Aug-2018	15:06:11	120	ST18904-ENV7			Camera	87	27	619933	4470650	619964	4470638	-30	12	32	112		(Corr'd Nav, Kongsberg 14208, img#120) (V)	
05-Aug-2018	15:06:49	121	ST18904-ENV7			Camera	87	27	619937	4470649	619964	4470638	-27	11	29	112		(Corr'd Nav, Kongsberg 14208, img#121) (V)	
05-Aug-2018	15:07:24	122	ST18904-ENV7			Camera	87	27	619942	4470647	619964	4470638	-22	9	23	113		(Corr'd Nav, Kongsberg 14208, img#122) (V)	
05-Aug-2018	15:07:34	123	ST18904-ENV7			Camera	87	27	619944	4470647	619964	4470638	-20	9	22	113		(Corr'd Nav, Kongsberg 14208, img#123) (V)	
05-Aug-2018	15:08:03	124	ST18904-ENV7			Camera	87	27	619949	4470646	619964	4470638	-14	8	16	118		(Corr'd Nav, Kongsberg 14208, img#124) (V)	
05-Aug-2018	15:08:30	125	ST18904-ENV7			Camera	87	27	619953	4470645	619964	4470638	-10	7	12	123		(Corr'd Nav, Kongsberg 14208, img#125) (V)	
05-Aug-2018	15:09:13	126	ST18904-ENV7			Camera	87	26	619958	4470643	619964	4470638	-6	4	7	126		(Corr'd Nav, Kongsberg 14208, img#126) (V)	
05-Aug-2018	15:09:49	127	ST18904-ENV7			Camera	87	26	619961	4470641	619964	4470638	-3	3	4	134		(Corr'd Nav, Kongsberg 14208, img#127) (V)	
05-Aug-2018	15:10:44	128	ST18904-ENV7			Camera	87	26	619969	4470637	619964	4470638	5	-2	6	287		(Corr'd Nav, Kongsberg 14208, img#128) (V)	
05-Aug-2018	15:11:19	129	ST18904-ENV7			Camera	86	26	619974	4470634	619964	4470638	11	-4	12	293		(Corr'd Nav, Kongsberg 14208, img#129) (V)	
05-Aug-2018	15:12:21	130	ST18904-ENV7			Camera	86	26	619983	4470629	619964	4470638	19	-10	21	297		(Corr'd Nav, Kongsberg 14208, img#130) (V)	
05-Aug-2018	15:13:06	131	ST18904-ENV7			Camera	86	26	619989	4470625	619964	4470638	26	-13	29	298		(Corr'd Nav, Kongsberg 14208, img#131) (V)	
05-Aug-2018	15:13:30	132	ST18904-ENV7			Camera	86	26	619992	4470623	619964	4470638	29	-16	33	299		(Corr'd Nav, Kongsberg 14208, img#132) (V)	
05-Aug-2018	15:14:26	133	ST18904-ENV7			Camera	86	26	619999	4470618	619964	4470638	35	-20	41	299		(Corr'd Nav, Kongsberg 14208, img#133) (V)	
05-Aug-2018	15:14:57	134	ST18904-ENV7			Camera	86	26	620003	4470616	619964	4470638	39	-22	45	300		(Corr'd Nav, Kongsberg 14208, img#134) (V)	
05-Aug-2018	15:15:54	135	ST18904-ENV7			Camera	85	26	620010	4470611	619964	4470638	47	-28	55	301		(Corr'd Nav, Kongsberg 14208, img#135) (V)	
05-Aug-2018	15:16:20	136	ST18904-ENV7			Camera	85	26	620014	4470608	619964	4470638	50	-30	58	301		(Corr'd Nav, Kongsberg 14208, img#136) (V)	
05-Aug-2018	15:16:48	137	ST18904-ENV7			Camera	85	26	620017	4470607	619964	4470638	54	-32	62	301		(Corr'd Nav, Kongsberg 14208, img#137) (V)	
05-Aug-2018	15:17:34	138	ST18904-ENV7			Camera	85	26	620023	4470604	619964	4470638	59	-35	68	300		(Corr'd Nav, Kongsberg 14208, img#138) (V)	
05-Aug-2018	15:18:23	139	ST18904-ENV7			Camera	85	26	620029	4470599	619964	4470638	66	-40	77	301		(Corr'd Nav, Kongsberg 14208, img#139) (V)	
05-Aug-2018	15:19:36	140	ST18904-ENV7			Camera	85	26	620041	4470592	619964	4470638	78	-46	90	301		(Corr'd Nav, Kongsberg 14208, img#140) (V)	
05-Aug-2018	15:20:21	141	ST18904-ENV7			Camera	85	26	620047	4470591	619964	4470638	83	-48	96	300		(Corr'd Nav, Kongsberg 14208, img#141) (V)	
05-Aug-2018	15:20:42	142	ST18904-ENV7			Camera	85	26	620050	4470589	619964	4470638	86	-49	99	300		(Corr'd Nav, Kongsberg 14208, img#142) (V)	
05-Aug-2018	15:21:30	143	ST18904-ENV7			Camera	84	26	620057	4470585	619964	4470638	94	-53	108	299		(Corr'd Nav, Kongsberg 14208, img#143) (V)	
05-Aug-2018	15:22:06	144	ST18904-ENV7			Camera	84	26	620064	4470583	619964	4470638	101	-55	115	299		(Corr'd Nav, Kongsberg 14208, img#144) (V)	
05-Aug-2018	15:22:32	145	ST18904-ENV7			Camera	84	26	620068	4470582	619964	4470638	105	-57	119	298		(Corr'd Nav, Kongsberg 14208, img#145) (V)	
05-Aug-2018	15:23:41	146	ST18904-ENV7			Camera	84	26	620078	4470577	619964	4470638	114	-61	129	298		(Corr'd Nav, Kongsberg 14208, img#146) (V)	
05-Aug-2018	15:24:25	147	ST18904-ENV7			Camera	84	26	620086	4470574	619964	4470638	122	-64	138	298		(Corr'd Nav, Kongsberg 14208, img#147) (V)	
05-Aug-2018	15:25:03	148	ST18904-ENV7			Camera	84	26	620092	4470573	619964	4470638	129	-66	144	297		(Corr'd Nav, Kongsberg 14208, img#148) (V)	
05-Aug-2018	15:25:47	149	ST18904-ENV7			Camera	84	26	620097	4470569	619964	4470638	134	-69	150	297		(Corr'd Nav, Kongsberg 14208, img#149) (V)	
05-Aug-2018	15:26:14	150	ST18904-ENV7			Camera	84	26	620100	4470567	619964	4470638	137	-72	154	298		(Corr'd Nav, Kongsberg 14208, img#150) (V)	
05-Aug-2018	15:26:27	151	ST18904-ENV7			Camera	84	26	620102	4470566	619964	4470638	138	-73	156	298		(Corr'd Nav, Kongsberg 14208, img#151) (V)	
05-Aug-2018	15:26:36	152	ST18904-ENV7			Camera	84	26	620103	4470565	619964	4470638	139	-73	157	298		(Corr'd Nav, Kongsberg 14208, img#152) (V)	

Grey columns denote where no information is required

APPENDIX A FIELD SAMPLING LOGS

Table A.3 Seabed Imagery Surveyors Logs

Gardline										Seafloor Sampling Positioning Summary									
Job No		11179								Vessel		MV Ocean Researcher							
Client		Equinor US Wind LLC								Vessel Reference Point (VRP)		CoG							
Project Name		Equinor Wind OCS-A 0512								Deployment Location		Starboard A-frame		x	8.96	y	-3.08	z	6.05
Primary Positioning System		Starpack 1								Actual Coordinates derived from		Deployment Location							
Geodetic Reference System		Datum		NAD83		Ellipsoid		GRS 80		Projection		UTM ZONE 18 N (75 W)				Vertical / Tidal Datum		NAVD88	
Date	Time (UTC/GMT)	Fix number	Stn No	Penetration	Sample Retention	Retention	Observed Seafloor Depth (feet)	Observed Seafloor Depth (m)	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks	
									Easting	Northing	Easting	Northing	dE	dN	Range	Bearing			
05-Aug-2018	15:26:50	153	ST18904-ENV7			Camera	84	26	620105	4470564	619964	4470638	141	-74	159	298		(Cor'd Nav, Kongsberg 14208, img#153) (V)	
05-Aug-2018	15:27:11	154	ST18904-ENV7			Camera	84	26	620108	4470563	619964	4470638	144	-75	0	163		(Raw Nav, Kongsberg 14208, img#154) (V)	
05-Aug-2018	15:27:31	154	ST18904-ENV7			Camera	84	26	620111	4470562	619964	4470638	147	-76	166	297		(Cor'd Nav, Kongsberg 14208, img#155) (V)	
05-Aug-2018	15:28:55	155	ST18904-ENV7			Camera	84	26	620123	4470556	619964	4470638	160	-82	180	297		(Cor'd Nav, Kongsberg 14208, img#156) (V)	
05-Aug-2018	15:29:47	156	ST18904-ENV7			Camera	84	26	620131	4470552	619964	4470638	167	-86	188	297		(Cor'd Nav, Kongsberg 14208, img#157) (V)	
05-Aug-2018	15:30:01	157	ST18904-ENV7			Camera	84	26	620132	4470552	619964	4470638	169	-87	190	297		(Cor'd Nav, Kongsberg 14208, img#158) (V)	
05-Aug-2018	15:30:21	158	ST18904-ENV7			Camera	84	26	620133	4470551	619964	4470638	170	-87	191	297		(Cor'd Nav, Kongsberg 14208, img#159) (V)	
05-Aug-2018	15:30:56	159	ST18904-ENV7			Camera	84	26	620137	4470548	619964	4470638	174	-90	196	297		(Cor'd Nav, Kongsberg 14208, img#160) (V)	
05-Aug-2018	16:18:51	160	ST18904-ENV11			Camera	83	25	621664	4469748	621699	4469730	-35	18	39	117		(Cor'd Nav, Kongsberg 14208, img#161) (V)	
05-Aug-2018	16:20:05	161	ST18904-ENV11			Camera	83	25	621672	4469744	621699	4469730	-28	14	31	117		(Cor'd Nav, Kongsberg 14208, img#162) (V)	
05-Aug-2018	16:22:55	162	ST18904-ENV11			Camera	83	25	621689	4469734	621699	4469730	-11	4	12	112		(Cor'd Nav, Kongsberg 14208, img#163) (V)	
05-Aug-2018	16:23:57	163	ST18904-ENV11			Camera	83	25	621693	4469732	621699	4469730	-6	2	7	107		(Cor'd Nav, Kongsberg 14208, img#164) (V)	
05-Aug-2018	16:24:26	164	ST18904-ENV11			Camera	83	25	621695	4469731	621699	4469730	-5	1	5	105		(Cor'd Nav, Kongsberg 14208, img#165) (V)	
05-Aug-2018	16:26:51	165	ST18904-ENV11			Camera	83	25	621705	4469723	621699	4469730	6	-7	9	319		(Cor'd Nav, Kongsberg 14208, img#166) (V)	
05-Aug-2018	16:28:40	166	ST18904-ENV11			Camera	83	25	621711	4469719	621699	4469730	11	-11	15	314		(Cor'd Nav, Kongsberg 14208, img#167) (V)	
05-Aug-2018	16:30:35	167	ST18904-ENV11			Camera	83	25	621717	4469717	621699	4469730	17	-13	22	307		(Cor'd Nav, Kongsberg 14208, img#168) (V)	
05-Aug-2018	16:32:08	168	ST18904-ENV11			Camera	83	25	621728	4469708	621699	4469730	29	-22	37	307		(Cor'd Nav, Kongsberg 14208, img#169) (V)	
05-Aug-2018	16:33:11	169	ST18904-ENV11			Camera	83	25	621736	4469703	621699	4469730	37	-27	45	306		(Cor'd Nav, Kongsberg 14208, img#170) (V)	
05-Aug-2018	16:33:42	170	ST18904-ENV11			Camera	83	25	621740	4469702	621699	4469730	40	-28	49	305		(Cor'd Nav, Kongsberg 14208, img#171) (V)	
05-Aug-2018	16:34:43	171	ST18904-ENV11			Camera	82	25	621747	4469699	621699	4469730	47	-31	57	303		(Cor'd Nav, Kongsberg 14208, img#172) (V)	
05-Aug-2018	16:35:34	172	ST18904-ENV11			Camera	82	25	621753	4469695	621699	4469730	54	-35	64	303		(Cor'd Nav, Kongsberg 14208, img#173) (V)	
05-Aug-2018	16:36:00	173	ST18904-ENV11			Camera	82	25	621755	4469694	621699	4469730	56	-35	66	302		(Cor'd Nav, Kongsberg 14208, img#174) (V)	
05-Aug-2018	16:37:12	174	ST18904-ENV11			Camera	82	25	621764	4469690	621699	4469730	64	-40	76	302		(Cor'd Nav, Kongsberg 14208, img#175) (V)	
05-Aug-2018	16:37:38	175	ST18904-ENV11			Camera	82	25	621768	4469687	621699	4469730	68	-43	81	302		(Cor'd Nav, Kongsberg 14208, img#176) (V)	
05-Aug-2018	16:39:04	176	ST18904-ENV11			Camera	82	25	621777	4469681	621699	4469730	78	-48	92	302		(Cor'd Nav, Kongsberg 14208, img#177) (V)	
05-Aug-2018	16:39:23	177	ST18904-ENV11			Camera	82	25	621779	4469680	621699	4469730	80	-50	94	302		(Cor'd Nav, Kongsberg 14208, img#178) (V)	
05-Aug-2018	16:39:58	178	ST18904-ENV11			Camera	82	25	621784	4469677	621699	4469730	84	-53	99	302		(Cor'd Nav, Kongsberg 14208, img#179) (V)	
05-Aug-2018	16:41:36	179	ST18904-ENV11			Camera	82	25	621799	4469671	621699	4469730	99	-59	115	301		(Cor'd Nav, Kongsberg 14208, img#180) (V)	
05-Aug-2018	16:42:40	180	ST18904-ENV11			Camera	82	25	621805	4469668	621699	4469730	106	-62	122	300		(Cor'd Nav, Kongsberg 14208, img#181) (V)	
05-Aug-2018	16:43:18	181	ST18904-ENV11			Camera	82	25	621808	4469666	621699	4469730	108	-63	126	300		(Cor'd Nav, Kongsberg 14208, img#182) (V)	
05-Aug-2018	16:44:04	182	ST18904-ENV11			Camera	82	25	621812	4469665	621699	4469730	112	-65	130	300		(Cor'd Nav, Kongsberg 14208, img#183) (V)	
05-Aug-2018	16:44:41	183	ST18904-ENV11			Camera	82	25	621815	4469663	621699	4469730	116	-67	134	300		(Cor'd Nav, Kongsberg 14208, img#184) (V)	
05-Aug-2018	16:45:38	184	ST18904-ENV11			Camera	82	25	621822	4469659	621699	4469730	123	-71	142	300		(Cor'd Nav, Kongsberg 14208, img#185) (V)	
05-Aug-2018	16:46:33	185	ST18904-ENV11			Camera	82	25	621827	4469655	621699	4469730	127	-75	148	300		(Cor'd Nav, Kongsberg 14208, img#186) (V)	
05-Aug-2018	16:47:03	186	ST18904-ENV11			Camera	82	25	621831	4469651	621699	4469730	131	-78	153	301		(Cor'd Nav, Kongsberg 14208, img#187) (V)	
05-Aug-2018	16:48:02	187	ST18904-ENV11			Camera	82	25	621839	4469645	621699	4469730	140	-84	163	301		(Cor'd Nav, Kongsberg 14208, img#188) (V)	
05-Aug-2018	16:48:32	188	ST18904-ENV11			Camera	82	25	621843	4469644	621699	4469730	143	-86	167	301		(Cor'd Nav, Kongsberg 14208, img#189) (V)	
05-Aug-2018	16:49:50	189	ST18904-ENV11			Camera	82	25	621851	4469638	621699	4469730	152	-92	177	301		(Cor'd Nav, Kongsberg 14208, img#190) (V)	

Grey columns denote where no information is required

APPENDIX A FIELD SAMPLING LOGS

Table A.3 Seabed Imagery Surveyors Logs

Gardline																	Seafloor Sampling Positioning Summary						
Job No		11179							Vessel		MV Ocean Researcher												
Client		Equinor US Wind LLC							Vessel Reference Point (VRP)		CoG												
Project Name		Equinor Wind OCS-A 0512							Deployment Location		Starboard A-frame			x	8.96	y	-3.08	z	6.05				
Primary Positioning System		Starpack 1							Actual Coordinates derived from		Deployment Location												
Geodetic Reference System		Datum		NAD83			Ellipsoid		GRS 80		Projection		UTM ZONE 18 N (75 W)			Vertical / Tidal Datum		NAVD88					
Date	Time (UTC/GMT)	Fix number	Stn No	Penetration	Sample Retention	Retention	Observed Seafloor Depth (feet)	Observed Seafloor Depth (m)	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks					
									Easting	Northing	Easting	Northing	dE	dN	Range	Bearing							
05-Aug-2018	16:50:06	190	ST18904-ENV11			Camera	82	25	621853	4469637	621699	4469730	154	-93	179	301		(Corr'd Nav, Kongsberg 14208, img#191) (V)					
05-Aug-2018	16:50:21	191	ST18904-ENV11			Camera	82	25	621854	4469636	621699	4469730	155	-94	181	301		(Corr'd Nav, Kongsberg 14208, img#192) (V)					
05-Aug-2018	16:51:30	192	ST18904-ENV11			Camera	82	25	621864	4469630	621699	4469730	165	-100	193	301		(Corr'd Nav, Kongsberg 14208, img#193) (V)					
05-Aug-2018	16:52:15	193	ST18904-ENV11			Camera	82	25	621873	4469624	621699	4469730	173	-106	203	301		(Corr'd Nav, Kongsberg 14208, img#194) (V)					
05-Aug-2018	17:27:16	194	ST18904-ENV10			Camera	87	27	622059	4470136	622080	4470133	-21	3	21	98		(Corr'd Nav, Kongsberg 14208, img#195) (V)					
05-Aug-2018	17:29:23	195	ST18904-ENV10			Camera	87	27	622081	4470130	622080	4470133	1	-3	3	339		(Corr'd Nav, Kongsberg 14208, img#196) (V)					
05-Aug-2018	17:30:20	196	ST18904-ENV10			Camera	87	27	622090	4470130	622080	4470133	10	-4	11	289		(Corr'd Nav, Kongsberg 14208, img#197) (V)					
05-Aug-2018	17:31:13	197	ST18904-ENV10			Camera	87	27	622097	4470132	622080	4470133	18	-2	18	276		(Corr'd Nav, Kongsberg 14208, img#198) (V)					
05-Aug-2018	17:31:52	198	ST18904-ENV10			Camera	87	27	622101	4470132	622080	4470133	22	-2	22	275		(Corr'd Nav, Kongsberg 14208, img#199) (V)					
05-Aug-2018	17:32:06	199	ST18904-ENV10			Camera	87	27	622103	4470131	622080	4470133	24	-3	24	277		(Corr'd Nav, Kongsberg 14208, img#200) (V)					
05-Aug-2018	17:32:38	200	ST18904-ENV10			Camera	88	27	622109	4470129	622080	4470133	29	-4	29	279		(Corr'd Nav, Kongsberg 14208, img#201) (V)					
05-Aug-2018	17:33:32	201	ST18904-ENV10			Camera	87	27	622117	4470129	622080	4470133	38	-5	38	277		(Corr'd Nav, Kongsberg 14208, img#202) (V)					
05-Aug-2018	17:34:11	202	ST18904-ENV10			Camera	87	27	622122	4470129	622080	4470133	42	-5	42	276		(Corr'd Nav, Kongsberg 14208, img#203) (V)					
05-Aug-2018	17:34:57	203	ST18904-ENV10			Camera	87	27	622126	4470129	622080	4470133	46	-5	47	276		(Corr'd Nav, Kongsberg 14208, img#204) (V)					
05-Aug-2018	17:35:46	204	ST18904-ENV10			Camera	87	27	622133	4470126	622080	4470133	53	-8	54	278		(Corr'd Nav, Kongsberg 14208, img#205) (V)					
05-Aug-2018	17:36:39	205	ST18904-ENV10			Camera	88	27	622145	4470121	622080	4470133	65	-12	67	281		(Corr'd Nav, Kongsberg 14208, img#206) (V)					
05-Aug-2018	17:37:10	206	ST18904-ENV10			Camera	88	27	622152	4470121	622080	4470133	72	-12	73	280		(Corr'd Nav, Kongsberg 14208, img#207) (V)					
05-Aug-2018	17:38:13	207	ST18904-ENV10			Camera	88	27	622158	4470127	622080	4470133	78	-7	78	275		(Corr'd Nav, Kongsberg 14208, img#208) (V)					
05-Aug-2018	17:38:59	208	ST18904-ENV10			Camera	88	27	622161	4470127	622080	4470133	81	-7	82	275		(Corr'd Nav, Kongsberg 14208, img#209) (V)					
05-Aug-2018	17:39:22	209	ST18904-ENV10			Camera	88	27	622164	4470125	622080	4470133	84	-8	85	276		(Corr'd Nav, Kongsberg 14208, img#210) (V)					
05-Aug-2018	17:40:30	210	ST18904-ENV10			Camera	88	27	622171	4470124	622080	4470133	91	-10	92	276		(Corr'd Nav, Kongsberg 14208, img#211) (V)					
05-Aug-2018	17:42:07	211	ST18904-ENV10			Camera	88	27	622188	4470120	622080	4470133	108	-14	109	277		(Corr'd Nav, Kongsberg 14208, img#212) (V)					
05-Aug-2018	17:42:31	212	ST18904-ENV10			Camera	88	27	622191	4470120	622080	4470133	112	-13	112	277		(Corr'd Nav, Kongsberg 14208, img#213) (V)					
05-Aug-2018	17:42:49	213	ST18904-ENV10			Camera	88	27	622194	4470120	622080	4470133	114	-13	115	277		(Corr'd Nav, Kongsberg 14208, img#214) (V)					
05-Aug-2018	17:43:24	214	ST18904-ENV10			Camera	88	27	622200	4470121	622080	4470133	120	-13	121	276		(Corr'd Nav, Kongsberg 14208, img#215) (V)					
05-Aug-2018	17:43:48	215	ST18904-ENV10			Camera	88	27	622204	4470120	622080	4470133	125	-14	125	276		(Corr'd Nav, Kongsberg 14208, img#216) (V)					
05-Aug-2018	17:44:22	216	ST18904-ENV10			Camera	88	27	622211	4470118	622080	4470133	132	-16	133	277		(Corr'd Nav, Kongsberg 14208, img#217) (V)					
05-Aug-2018	17:45:57	217	ST18904-ENV10			Camera	88	27	622224	4470122	622080	4470133	144	-12	145	275		(Corr'd Nav, Kongsberg 14208, img#218) (V)					
05-Aug-2018	17:46:33	218	ST18904-ENV10			Camera	88	27	622226	4470121	622080	4470133	147	-12	147	275		(Corr'd Nav, Kongsberg 14208, img#219) (V)					
05-Aug-2018	17:47:25	219	ST18904-ENV10			Camera	87	27	622234	4470119	622080	4470133	154	-15	155	275		(Corr'd Nav, Kongsberg 14208, img#220) (V)					
05-Aug-2018	17:48:02	220	ST18904-ENV10			Camera	87	27	622239	4470119	622080	4470133	160	-14	160	275		(Corr'd Nav, Kongsberg 14208, img#221) (V)					
05-Aug-2018	17:48:31	221	ST18904-ENV10			Camera	87	27	622244	4470120	622080	4470133	164	-14	165	275		(Corr'd Nav, Kongsberg 14208, img#222) (V)					
05-Aug-2018	17:49:06	222	ST18904-ENV10			Camera	87	26	622250	4470120	622080	4470133	170	-13	170	274		(Corr'd Nav, Kongsberg 14208, img#223) (V)					
05-Aug-2018	17:49:37	223	ST18904-ENV10			Camera	87	26	622254	4470121	622080	4470133	174	-13	174	274		(Corr'd Nav, Kongsberg 14208, img#224) (V)					
05-Aug-2018	17:50:17	224	ST18904-ENV10			Camera	87	26	622258	4470120	622080	4470133	178	-14	179	274		(Corr'd Nav, Kongsberg 14208, img#225) (V)					
05-Aug-2018	17:50:44	225	ST18904-ENV10			Camera	87	26	622261	4470119	622080	4470133	181	-14	181	274		(Corr'd Nav, Kongsberg 14208, img#226) (V)					
05-Aug-2018	17:51:12	226	ST18904-ENV10			Camera	87	26	622264	4470119	622080	4470133	184	-15	185	275		(Corr'd Nav, Kongsberg 14208, img#227) (V)					
05-Aug-2018	17:52:29	227	ST18904-ENV10			Camera	87	26	622276	4470116	622080	4470133	196	-17	197	275		(Corr'd Nav, Kongsberg 14208, img#228) (V)					

Grey columns denote where no information is required

APPENDIX A FIELD SAMPLING LOGS

Table A.3 Seabed Imagery Surveyors Logs

Gardline										Seafloor Sampling Positioning Summary									
Job No		11179								Vessel		MV Ocean Researcher							
Client		Equinor Wind US LLC								Vessel Reference Point (VRP)		CoG							
Project Name		Equinor Wind OCS-A 0512								Deployment Location		Starboard A-frame		x	8.96	y	-3.08	z	6.05
Primary Positioning System		Starpack 1								Actual Coordinates derived from		Deployment Location							
Geodetic Reference System		Datum		NAD83		Ellipsoid		GRS 80		Projection		UTM ZONE 18 N (75 W)				Vertical / Tidal Datum		NAVD88	
Date	Time (UTC/GMT)	Fix number	Stn No	Penetration	Sample Retention	Retention	Observed Seafloor Depth (feet)	Observed Seafloor Depth (m)	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks	
									Easting	Northing	Easting	Northing	dE	dN	Range	Bearing			
05-Aug-2018	17:52:50	228	ST18904-ENV10			Camera	87	26	622279	4470116	622080	4470133	199	-17	200	275		(Cor'd Nav, Kongsberg 14208, img#229) (V)	
05-Aug-2018	18:27:12	229	ST18904-ENV13			Camera	87	27	623881	4469800	623922	4469767	-41	33	53	129		(Cor'd Nav, Kongsberg 14208, img#230) (V)	
05-Aug-2018	18:28:58	230	ST18904-ENV13			Camera	87	27	623888	4469800	623922	4469767	-33	33	47	135		(Cor'd Nav, Kongsberg 14208, img#231) (V)	
05-Aug-2018	18:30:26	231	ST18904-ENV13			Camera	87	27	623897	4469793	623922	4469767	-25	25	36	135		(Cor'd Nav, Kongsberg 14208, img#232) (V)	
05-Aug-2018	18:34:28	232	ST18904-ENV13			Camera	88	27	623918	4469771	623922	4469767	-4	4	6	135		(Cor'd Nav, Kongsberg 14208, img#233) (V)	
05-Aug-2018	18:35:12	233	ST18904-ENV13			Camera	88	27	623923	4469767	623922	4469767	1	0	1	245		(Cor'd Nav, Kongsberg 14208, img#234) (V)	
05-Aug-2018	18:35:56	234	ST18904-ENV13			Camera	89	27	623928	4469765	623922	4469767	6	-2	6	289		(Cor'd Nav, Kongsberg 14208, img#235) (V)	
05-Aug-2018	18:36:53	235	ST18904-ENV13			Camera	89	27	623937	4469760	623922	4469767	15	-7	16	295		(Cor'd Nav, Kongsberg 14208, img#236) (V)	
05-Aug-2018	18:38:01	236	ST18904-ENV13			Camera	89	27	623946	4469754	623922	4469767	24	-13	28	299		(Cor'd Nav, Kongsberg 14208, img#237) (V)	
05-Aug-2018	18:39:01	237	ST18904-ENV13			Camera	89	27	623953	4469752	623922	4469767	31	-15	35	296		(Cor'd Nav, Kongsberg 14208, img#238) (V)	
05-Aug-2018	18:39:56	238	ST18904-ENV13			Camera	90	27	623960	4469748	623922	4469767	38	-19	43	296		(Cor'd Nav, Kongsberg 14208, img#239) (V)	
05-Aug-2018	18:41:11	239	ST18904-ENV13			Camera	90	27	623969	4469746	623922	4469767	47	-22	52	295		(Cor'd Nav, Kongsberg 14208, img#240) (V)	
05-Aug-2018	18:41:37	240	ST18904-ENV13			Camera	90	27	623972	4469744	623922	4469767	50	-23	55	295		(Cor'd Nav, Kongsberg 14208, img#241) (V)	
05-Aug-2018	18:42:18	241	ST18904-ENV13			Camera	90	28	623976	4469742	623922	4469767	54	-25	60	295		(Cor'd Nav, Kongsberg 14208, img#242) (V)	
05-Aug-2018	18:43:45	242	ST18904-ENV13			Camera	90	28	623985	4469734	623922	4469767	63	-33	71	298		(Cor'd Nav, Kongsberg 14208, img#243) (V)	
05-Aug-2018	18:44:10	243	ST18904-ENV13			Camera	90	27	623988	4469730	623922	4469767	66	-37	76	299		(Cor'd Nav, Kongsberg 14208, img#244) (V)	
05-Aug-2018	18:45:02	244	ST18904-ENV13			Camera	90	27	623994	4469724	623922	4469767	72	-43	84	301		(Cor'd Nav, Kongsberg 14208, img#245) (V)	
05-Aug-2018	18:45:24	245	ST18904-ENV13			Camera	90	28	623996	4469722	623922	4469767	74	-46	87	302		(Cor'd Nav, Kongsberg 14208, img#246) (V)	
05-Aug-2018	18:45:51	246	ST18904-ENV13			Camera	90	28	623999	4469719	623922	4469767	77	-48	91	302		(Cor'd Nav, Kongsberg 14208, img#247) (V)	
05-Aug-2018	18:46:41	247	ST18904-ENV13			Camera	90	27	624004	4469717	623922	4469767	83	-51	97	301		(Cor'd Nav, Kongsberg 14208, img#248) (V)	
05-Aug-2018	18:47:28	248	ST18904-ENV13			Camera	90	27	624011	4469715	623922	4469767	89	-52	104	300		(Cor'd Nav, Kongsberg 14208, img#249) (V)	
05-Aug-2018	18:48:12	249	ST18904-ENV13			Camera	90	27	624019	4469712	623922	4469767	97	-55	111	300		(Cor'd Nav, Kongsberg 14208, img#250) (V)	
05-Aug-2018	18:49:42	250	ST18904-ENV13			Camera	90	27	624030	4469710	623922	4469767	108	-58	123	298		(Cor'd Nav, Kongsberg 14208, img#251) (V)	
05-Aug-2018	18:50:43	251	ST18904-ENV13			Camera	90	28	624038	4469705	623922	4469767	116	-62	132	298		(Cor'd Nav, Kongsberg 14208, img#252) (V)	
05-Aug-2018	18:51:39	252	ST18904-ENV13			Camera	90	28	624046	4469698	623922	4469767	125	-69	143	299		(Cor'd Nav, Kongsberg 14208, img#253) (V)	
05-Aug-2018	18:53:07	253	ST18904-ENV13			Camera	91	28	624058	4469694	623922	4469767	137	-74	155	298		(Cor'd Nav, Kongsberg 14208, img#254) (V)	
05-Aug-2018	18:54:00	254	ST18904-ENV13			Camera	91	28	624065	4469688	623922	4469767	144	-79	164	299		(Cor'd Nav, Kongsberg 14208, img#255) (V)	
05-Aug-2018	18:55:49	255	ST18904-ENV13			Camera	91	28	624081	4469680	623922	4469767	159	-87	182	299		(Cor'd Nav, Kongsberg 14208, img#256) (V)	
05-Aug-2018	18:57:12	256	ST18904-ENV13			Camera	91	28	624093	4469676	623922	4469767	171	-91	194	298		(Cor'd Nav, Kongsberg 14208, img#257) (V)	
05-Aug-2018	18:57:45	257	ST18904-ENV13			Camera	91	28	624098	4469673	623922	4469767	176	-95	200	298		(Cor'd Nav, Kongsberg 14208, img#258) (V)	
05-Aug-2018	19:28:39	258	ST18904-ENV14			Camera	85	26	623480	4469173	623473	4469160	8	13	15	210		(Cor'd Nav, Kongsberg 14208, img#259) (V)	
05-Aug-2018	19:29:38	259	ST18904-ENV14			Camera	85	26	623474	4469171	623473	4469160	1	11	11	185		(Cor'd Nav, Kongsberg 14208, img#260) (V)	
05-Aug-2018	19:29:57	260	ST18904-ENV14			Camera	85	26	623470	4469169	623473	4469160	-3	10	10	163		(Cor'd Nav, Kongsberg 14208, img#261) (V)	
05-Aug-2018	19:30:31	261	ST18904-ENV14			Camera	85	26	623463	4469166	623473	4469160	-10	7	12	125		(Cor'd Nav, Kongsberg 14208, img#262) (V)	
05-Aug-2018	19:31:15	262	ST18904-ENV14			Camera	85	26	623454	4469164	623473	4469160	-18	4	19	103		(Cor'd Nav, Kongsberg 14208, img#263) (V)	
05-Aug-2018	19:32:06	263	ST18904-ENV14			Camera	85	26	623447	4469165	623473	4469160	-26	5	26	102		(Cor'd Nav, Kongsberg 14208, img#264) (V)	
05-Aug-2018	19:33:04	264	ST18904-ENV14			Camera	85	26	623440	4469165	623473	4469160	-33	5	33	99		(Cor'd Nav, Kongsberg 14208, img#265) (V)	
05-Aug-2018	19:33:57	265	ST18904-ENV14			Camera	85	26	623431	4469163	623473	4469160	-41	3	42	95		(Cor'd Nav, Kongsberg 14208, img#266) (V)	

Grey columns denote where no information is required

APPENDIX A FIELD SAMPLING LOGS

Table A.3 Seabed Imagery Surveyors Logs

Gardline										Seafloor Sampling Positioning Summary									
Job No		11179								Vessel		MV Ocean Researcher							
Client		Equinor US Wind LLC								Vessel Reference Point (VRP)		CoG							
Project Name		Equinor Wind OCS-A 0512								Deployment Location		Starboard A-frame		x	8.96	y	-3.08	z	6.05
Primary Positioning System		Starpack 1								Actual Coordinates derived from		Deployment Location							
Geodetic Reference System		Datum		NAD83		Ellipsoid		GRS 80		Projection		UTM ZONE 18 N (75 W)				Vertical / Tidal Datum		NAVD88	
Date	Time (UTC/GMT)	Fix number	Stn No	Penetration	Sample Retention	Retention	Observed Seafloor Depth (feet)	Observed Seafloor Depth (m)	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks	
									Easting	Northing	Easting	Northing	dE	dN	Range	Bearing			
05-Aug-2018	19:34:43	266	ST18904-ENV14			Camera	85	26	623424	4469162	623473	4469160	-49	3	49	93		(Corr'd Nav, Kongsberg 14208, img#267) (V)	
05-Aug-2018	19:35:07	267	ST18904-ENV14			Camera	85	26	623420	4469161	623473	4469160	-53	2	53	92		(Corr'd Nav, Kongsberg 14208, img#268) (V)	
05-Aug-2018	19:36:04	268	ST18904-ENV14			Camera	85	26	623411	4469161	623473	4469160	-62	1	62	91		(Corr'd Nav, Kongsberg 14208, img#269) (V)	
05-Aug-2018	19:36:31	269	ST18904-ENV14			Camera	85	26	623406	4469160	623473	4469160	-66	1	66	90		(Corr'd Nav, Kongsberg 14208, img#270) (V)	
05-Aug-2018	19:37:22	270	ST18904-ENV14			Camera	85	26	623398	4469159	623473	4469160	-74	-1	74	90		(Corr'd Nav, Kongsberg 14208, img#271) (V)	
05-Aug-2018	19:38:12	271	ST18904-ENV14			Camera	85	26	623391	4469157	623473	4469160	-82	-3	82	88		(Corr'd Nav, Kongsberg 14208, img#272) (V)	
05-Aug-2018	19:38:45	272	ST18904-ENV14			Camera	85	26	623386	4469155	623473	4469160	-87	-5	87	87		(Corr'd Nav, Kongsberg 14208, img#273) (V)	
05-Aug-2018	19:39:39	273	ST18904-ENV14			Camera	85	26	623378	4469154	623473	4469160	-95	-6	95	86		(Corr'd Nav, Kongsberg 14208, img#274) (V)	
05-Aug-2018	19:40:22	274	ST18904-ENV14			Camera	85	26	623372	4469154	623473	4469160	-100	-6	100	87		(Corr'd Nav, Kongsberg 14208, img#275) (V)	
05-Aug-2018	19:41:11	275	ST18904-ENV14			Camera	85	26	623366	4469155	623473	4469160	-107	-5	107	87		(Corr'd Nav, Kongsberg 14208, img#276) (V)	
05-Aug-2018	19:42:31	276	ST18904-ENV14			Camera	85	26	623353	4469152	623473	4469160	-120	-8	120	86		(Corr'd Nav, Kongsberg 14208, img#277) (V)	
05-Aug-2018	19:43:09	277	ST18904-ENV14			Camera	84	26	623344	4469149	623473	4469160	-128	-11	129	85		(Corr'd Nav, Kongsberg 14208, img#278) (V)	
05-Aug-2018	19:43:53	278	ST18904-ENV14			Camera	84	26	623337	4469148	623473	4469160	-135	-12	136	85		(Corr'd Nav, Kongsberg 14208, img#279) (V)	
05-Aug-2018	19:44:20	279	ST18904-ENV14			Camera	85	26	623334	4469148	623473	4469160	-139	-11	139	85		(Corr'd Nav, Kongsberg 14208, img#280) (V)	
05-Aug-2018	19:44:58	280	ST18904-ENV14			Camera	85	26	623329	4469150	623473	4469160	-143	-10	144	86		(Corr'd Nav, Kongsberg 14208, img#281) (V)	
05-Aug-2018	19:45:37	281	ST18904-ENV14			Camera	85	26	623324	4469150	623473	4469160	-149	-10	149	86		(Corr'd Nav, Kongsberg 14208, img#282) (V)	
05-Aug-2018	19:46:02	282	ST18904-ENV14			Camera	85	26	623319	4469148	623473	4469160	-153	-12	154	86		(Corr'd Nav, Kongsberg 14208, img#283) (V)	
05-Aug-2018	19:46:27	283	ST18904-ENV14			Camera	85	26	623315	4469147	623473	4469160	-157	-13	158	85		(Corr'd Nav, Kongsberg 14208, img#284) (V)	
05-Aug-2018	19:47:04	284	ST18904-ENV14			Camera	84	26	623310	4469148	623473	4469160	-163	-12	163	86		(Corr'd Nav, Kongsberg 14208, img#285) (V)	
05-Aug-2018	19:47:59	285	ST18904-ENV14			Camera	85	26	623302	4469149	623473	4469160	-170	-10	171	87		(Corr'd Nav, Kongsberg 14208, img#286) (V)	
05-Aug-2018	19:48:54	286	ST18904-ENV14			Camera	85	26	623293	4469147	623473	4469160	-180	-13	181	86		(Corr'd Nav, Kongsberg 14208, img#287) (V)	
05-Aug-2018	19:49:31	287	ST18904-ENV14			Camera	85	26	623287	4469146	623473	4469160	-186	-14	187	86		(Corr'd Nav, Kongsberg 14208, img#288) (V)	
05-Aug-2018	19:50:11	288	ST18904-ENV14			Camera	85	26	623282	4469147	623473	4469160	-191	-13	191	86		(Corr'd Nav, Kongsberg 14208, img#289) (V)	
05-Aug-2018	19:50:57	289	ST18904-ENV14			Camera	85	26	623275	4469147	623473	4469160	-197	-12	198	86		(Corr'd Nav, Kongsberg 14208, img#290) (V)	
06-Aug-2018	14:01:58	290	ST18904-ENV15			Camera	83	25	623175	4468432	623228	4468405	-53	27	59	117		(Corr'd Nav, Kongsberg 14208, img#1) (V)	
06-Aug-2018	14:03:27	291	ST18904-ENV15			Camera	83	25	623185	4468426	623228	4468405	-43	21	48	116		(Corr'd Nav, Kongsberg 14208, img#2) (V)	
06-Aug-2018	14:04:07	292	ST18904-ENV15			Camera	83	25	623190	4468424	623228	4468405	-38	19	42	117		(Corr'd Nav, Kongsberg 14208, img#3) (V)	
06-Aug-2018	14:04:30	293	ST18904-ENV15			Camera	83	25	623193	4468422	623228	4468405	-35	17	38	116		(Corr'd Nav, Kongsberg 14208, img#4) (V)	
06-Aug-2018	14:04:56	294	ST18904-ENV15			Camera	83	25	623197	4468419	623228	4468405	-31	14	34	115		(Corr'd Nav, Kongsberg 14208, img#5) (V)	
06-Aug-2018	14:06:48	295	ST18904-ENV15			Camera	83	25	623220	4468405	623228	4468405	-7	0	7	92		(Corr'd Nav, Kongsberg 14208, img#6) (V)	
06-Aug-2018	14:07:53	296	ST18904-ENV15			Camera	83	25	623230	4468402	623228	4468405	3	-3	4	322		(Corr'd Nav, Kongsberg 14208, img#7) (V)	
06-Aug-2018	14:08:42	297	ST18904-ENV15			Camera	83	25	623236	4468398	623228	4468405	8	-7	10	310		(Corr'd Nav, Kongsberg 14208, img#8) (V)	
06-Aug-2018	14:09:39	298	ST18904-ENV15			Camera	83	25	623248	4468393	623228	4468405	20	-12	23	302		(Corr'd Nav, Kongsberg 14208, img#9) (V)	
06-Aug-2018	14:10:05	299	ST18904-ENV15			Camera	83	25	623253	4468391	623228	4468405	25	-14	29	299		(Corr'd Nav, Kongsberg 14208, img#10) (V)	
06-Aug-2018	14:10:26	300	ST18904-ENV15			Camera	83	25	623256	4468390	623228	4468405	29	-15	32	298		(Corr'd Nav, Kongsberg 14208, img#11) (V)	
06-Aug-2018	14:11:08	301	ST18904-ENV15			Camera	83	25	623262	4468387	623228	4468405	34	-18	39	297		(Corr'd Nav, Kongsberg 14208, img#12) (V)	
06-Aug-2018	14:11:30	302	ST18904-ENV15			Camera	83	25	623265	4468385	623228	4468405	37	-20	42	298		(Corr'd Nav, Kongsberg 14208, img#13) (V)	
06-Aug-2018	14:11:52	303	ST18904-ENV15			Camera	83	25	623268	4468382	623228	4468405	40	-23	46	299		(Corr'd Nav, Kongsberg 14208, img#14) (V)	

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APPENDIX A FIELD SAMPLING LOGS

Table A.3 Seabed Imagery Surveyors Logs

Gardline												Seafloor Sampling Positioning Summary														
Job No		11179							Vessel		MV Ocean Researcher															
Client		Equinor US Wind LLC							Vessel Reference Point (VRP)		CoG															
Project Name		Equinor Wind OCS-A 0512							Deployment Location		Starboard A-frame				x		8.96		y		-3.08		z		6.05	
Primary Positioning System		Starpack 1							Actual Coordinates derived from		Deployment Location															
Geodetic Reference System		Datum		NAD83			Ellipsoid		GRS 80			Projection		UTM ZONE 18 N (75 W)				Vertical / Tidal Datum		NAVD88						
Date	Time (UTC/GMT)	Fix number	Stn No	Penetration	Sample Retention	Retention	Observed Seafloor Depth (feet)	Observed Seafloor Depth (m)	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks								
									Easting	Northing	Easting	Northing	dE	dN	Range	Bearing										
06-Aug-2018	14:13:14	304	ST18904-ENV15			Camera	83	25	623285	4468373	623228	4468405	57	-32	66	299		(Corr'd Nav, Kongsberg 14208, img#15) (V)								
06-Aug-2018	14:13:35	305	ST18904-ENV15			Camera	83	25	623289	4468372	623228	4468405	61	-33	69	298		(Corr'd Nav, Kongsberg 14208, img#16) (V)								
06-Aug-2018	14:14:05	306	ST18904-ENV15			Camera	83	25	623292	4468372	623228	4468405	65	-33	73	297		(Corr'd Nav, Kongsberg 14208, img#17) (V)								
06-Aug-2018	14:14:31	307	ST18904-ENV15			Camera	83	25	623296	4468372	623228	4468405	68	-33	76	296		(Corr'd Nav, Kongsberg 14208, img#18) (V)								
06-Aug-2018	14:15:03	308	ST18904-ENV15			Camera	83	25	623301	4468370	623228	4468405	73	-35	81	296		(Corr'd Nav, Kongsberg 14208, img#19) (V)								
06-Aug-2018	14:15:41	309	ST18904-ENV15			Camera	83	25	623308	4468367	623228	4468405	80	-38	88	295		(Corr'd Nav, Kongsberg 14208, img#20) (V)								
06-Aug-2018	14:16:21	310	ST18904-ENV15			Camera	83	25	623316	4468365	623228	4468405	89	-39	97	294		(Corr'd Nav, Kongsberg 14208, img#21) (V)								
06-Aug-2018	14:17:26	311	ST18904-ENV15			Camera	84	25	623327	4468364	623228	4468405	99	-41	107	293		(Corr'd Nav, Kongsberg 14208, img#22) (V)								
06-Aug-2018	14:18:31	312	ST18904-ENV15			Camera	83	25	623337	4468357	623228	4468405	109	-48	119	294		(Corr'd Nav, Kongsberg 14208, img#23) (V)								
06-Aug-2018	14:20:08	313	ST18904-ENV15			Camera	83	25	623345	4468349	623228	4468405	117	-56	130	296		(Corr'd Nav, Kongsberg 14208, img#24) (V)								
06-Aug-2018	14:20:43	314	ST18904-ENV15			Camera	83	25	623350	4468345	623228	4468405	122	-59	136	296		(Corr'd Nav, Kongsberg 14208, img#25) (V)								
06-Aug-2018	14:21:48	315	ST18904-ENV15			Camera	83	25	623361	4468341	623228	4468405	133	-64	148	296		(Corr'd Nav, Kongsberg 14208, img#26) (V)								
06-Aug-2018	14:22:41	316	ST18904-ENV15			Camera	83	25	623369	4468340	623228	4468405	141	-65	155	295		(Corr'd Nav, Kongsberg 14208, img#27) (V)								
06-Aug-2018	14:23:13	317	ST18904-ENV15			Camera	83	25	623372	4468337	623228	4468405	145	-68	160	295		(Corr'd Nav, Kongsberg 14208, img#28) (V)								
06-Aug-2018	14:23:47	318	ST18904-ENV15			Camera	83	25	623377	4468334	623228	4468405	150	-71	166	295		(Corr'd Nav, Kongsberg 14208, img#29) (V)								
06-Aug-2018	14:24:23	319	ST18904-ENV15			Camera	83	25	623384	4468331	623228	4468405	156	-74	173	295		(Corr'd Nav, Kongsberg 14208, img#30) (V)								
06-Aug-2018	14:24:53	320	ST18904-ENV15			Camera	83	25	623389	4468329	623228	4468405	161	-76	178	295		(Corr'd Nav, Kongsberg 14208, img#31) (V)								
06-Aug-2018	14:25:18	321	ST18904-ENV15			Camera	83	25	623393	4468328	623228	4468405	165	-77	182	295		(Corr'd Nav, Kongsberg 14208, img#32) (V)								
06-Aug-2018	14:26:01	322	ST18904-ENV15			Camera	83	25	623400	4468325	623228	4468405	172	-80	190	295		(Corr'd Nav, Kongsberg 14208, img#33) (V)								
06-Aug-2018	14:26:39	323	ST18904-ENV15			Camera	83	25	623407	4468324	623228	4468405	179	-80	196	294		(Corr'd Nav, Kongsberg 14208, img#34) (V)								
06-Aug-2018	14:27:12	324	ST18904-ENV15			Camera	83	25	623411	4468324	623228	4468405	184	-81	201	294		(Corr'd Nav, Kongsberg 14208, img#35) (V)								
06-Aug-2018	15:27:20	325	ST18904-ENV18			Camera	85	26	624824	4467212	624874	4467269	-50	-57	76	41		(Corr'd Nav, Kongsberg 14208, img#36) (V)								
06-Aug-2018	15:29:50	326	ST18904-ENV18			Camera	85	26	624839	4467227	624874	4467269	-35	-43	55	39		(Corr'd Nav, Kongsberg 14208, img#37) (V)								
06-Aug-2018	15:30:38	327	ST18904-ENV18			Camera	85	26	624843	4467233	624874	4467269	-31	-36	48	41		(Corr'd Nav, Kongsberg 14208, img#38) (V)								
06-Aug-2018	15:31:34	328	ST18904-ENV18			Camera	86	26	624847	4467241	624874	4467269	-27	-28	39	44		(Corr'd Nav, Kongsberg 14208, img#39) (V)								
06-Aug-2018	15:32:47	329	ST18904-ENV18			Camera	86	26	624856	4467249	624874	4467269	-18	-20	27	42		(Corr'd Nav, Kongsberg 14208, img#40) (V)								
06-Aug-2018	15:34:02	330	ST18904-ENV18			Camera	86	26	624863	4467260	624874	4467269	-11	-9	15	51		(Corr'd Nav, Kongsberg 14208, img#41) (V)								
06-Aug-2018	15:34:44	331	ST18904-ENV18			Camera	87	26	624868	4467265	624874	4467269	-7	-4	8	56		(Corr'd Nav, Kongsberg 14208, img#42) (V)								
06-Aug-2018	15:35:23	332	ST18904-ENV18			Camera	87	26	624873	4467269	624874	4467269	-1	0	1	80		(Corr'd Nav, Kongsberg 14208, img#43) (V)								
06-Aug-2018	15:36:03	333	ST18904-ENV18			Camera	87	26	624879	4467273	624874	4467269	5	4	6	231		(Corr'd Nav, Kongsberg 14208, img#44) (V)								
06-Aug-2018	15:36:34	334	ST18904-ENV18			Camera	87	27	624882	4467277	624874	4467269	7	8	11	224		(Corr'd Nav, Kongsberg 14208, img#45) (V)								
06-Aug-2018	15:37:18	335	ST18904-ENV18			Camera	87	27	624883	4467283	624874	4467269	8	14	16	211		(Corr'd Nav, Kongsberg 14208, img#46) (V)								
06-Aug-2018	15:37:36	336	ST18904-ENV18			Camera	88	27	624883	4467286	624874	4467269	9	16	19	208		(Corr'd Nav, Kongsberg 14208, img#47) (V)								
06-Aug-2018	15:38:23	337	ST18904-ENV18			Camera	87	27	624887	4467291	624874	4467269	13	22	25	210		(Corr'd Nav, Kongsberg 14208, img#48) (V)								
06-Aug-2018	15:38:42	338	ST18904-ENV18			Camera	87	27	624889	4467292	624874	4467269	15	23	28	213		(Corr'd Nav, Kongsberg 14208, img#49) (V)								
06-Aug-2018	15:39:01	339	ST18904-ENV18			Camera	87	27	624892	4467294	624874	4467269	18	25	31	215		(Corr'd Nav, Kongsberg 14208, img#50) (V)								
06-Aug-2018	15:39:19	340	ST18904-ENV18			Camera	88	27	624895	4467296	624874	4467269	21	26	34	218		(Corr'd Nav, Kongsberg 14208, img#51) (V)								
06-Aug-2018	15:39:31	341	ST18904-ENV18			Camera	88	27	624897	4467297	624874	4467269	23	27	36	220		(Corr'd Nav, Kongsberg 14208, img#52) (V)								

Grey columns denote where no information is required

APPENDIX A FIELD SAMPLING LOGS

Table A.3 Seabed Imagery Surveyors Logs

Gardline										Seafloor Sampling Positioning Summary									
Job No		11179								Vessel		MV Ocean Researcher							
Client		Equinor US Wind LLC								Vessel Reference Point (VRP)		CoG							
Project Name		Equinor Wind OCS-A 0512								Deployment Location		Starboard A-frame		x	8.96	y	-3.08	z	6.05
Primary Positioning System		Starpack 1								Actual Coordinates derived from		Deployment Location							
Geodetic Reference System		Datum		NAD83		Ellipsoid		GRS 80		Projection		UTM ZONE 18 N (75 W)				Vertical / Tidal Datum		NAVD88	
Date	Time (UTC/GMT)	Fix number	Stn No	Penetration	Sample Retention	Retention	Observed Seafloor Depth (feet)	Observed Seafloor Depth (m)	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks	
									Easting	Northing	Easting	Northing	dE	dN	Range	Bearing			
06-Aug-2018	15:39:42	342	ST18904-ENV18			Camera	88	27	624899	4467298	624874	4467269	24	28	37	221		(Cor'd Nav, Kongsberg 14208, img#53) (V)	
06-Aug-2018	15:40:07	343	ST18904-ENV18			Camera	88	27	624902	4467300	624874	4467269	28	31	42	222		(Cor'd Nav, Kongsberg 14208, img#54) (V)	
06-Aug-2018	15:40:36	344	ST18904-ENV18			Camera	88	27	624905	4467304	624874	4467269	31	34	46	222		(Cor'd Nav, Kongsberg 14208, img#55) (V)	
06-Aug-2018	15:41:35	345	ST18904-ENV18			Camera	87	27	624909	4467312	624874	4467269	34	43	55	219		(Cor'd Nav, Kongsberg 14208, img#56) (V)	
06-Aug-2018	15:41:59	346	ST18904-ENV18			Camera	87	27	624911	4467315	624874	4467269	37	46	59	218		(Cor'd Nav, Kongsberg 14208, img#57) (V)	
06-Aug-2018	15:43:01	347	ST18904-ENV18			Camera	87	27	624920	4467323	624874	4467269	46	54	71	220		(Cor'd Nav, Kongsberg 14208, img#58) (V)	
06-Aug-2018	15:43:56	348	ST18904-ENV18			Camera	87	27	624925	4467331	624874	4467269	50	62	80	219		(Cor'd Nav, Kongsberg 14208, img#59) (V)	
06-Aug-2018	15:44:26	349	ST18904-ENV18			Camera	87	27	624928	4467334	624874	4467269	54	65	85	219		(Cor'd Nav, Kongsberg 14208, img#60) (V)	
06-Aug-2018	15:44:52	350	ST18904-ENV18			Camera	87	27	624932	4467337	624874	4467269	57	68	89	220		(Cor'd Nav, Kongsberg 14208, img#61) (V)	
06-Aug-2018	15:45:29	351	ST18904-ENV18			Camera	87	27	624936	4467342	624874	4467269	61	73	95	220		(Cor'd Nav, Kongsberg 14208, img#62) (V)	
06-Aug-2018	15:45:44	352	ST18904-ENV18			Camera	87	27	624937	4467345	624874	4467269	62	76	98	219		(Cor'd Nav, Kongsberg 14208, img#63) (V)	
06-Aug-2018	15:46:03	353	ST18904-ENV18			Camera	87	26	624938	4467347	624874	4467269	64	78	101	219		(Cor'd Nav, Kongsberg 14208, img#64) (V)	
06-Aug-2018	15:46:57	354	ST18904-ENV18			Camera	86	26	624945	4467353	624874	4467269	71	84	110	220		(Cor'd Nav, Kongsberg 14208, img#65) (V)	
06-Aug-2018	15:47:29	355	ST18904-ENV18			Camera	86	26	624949	4467358	624874	4467269	74	88	116	220		(Cor'd Nav, Kongsberg 14208, img#66) (V)	
06-Aug-2018	15:49:15	356	ST18904-ENV18			Camera	86	26	624961	4467371	624874	4467269	86	102	133	220		(Cor'd Nav, Kongsberg 14208, img#67) (V)	
06-Aug-2018	15:50:06	357	ST18904-ENV18			Camera	85	26	624964	4467378	624874	4467269	90	109	141	219		(Cor'd Nav, Kongsberg 14208, img#68) (V)	
06-Aug-2018	15:51:16	358	ST18904-ENV18			Camera	86	26	624975	4467386	624874	4467269	100	117	154	221		(Cor'd Nav, Kongsberg 14208, img#69) (V)	
06-Aug-2018	15:51:41	359	ST18904-ENV18			Camera	86	26	624978	4467390	624874	4467269	103	121	159	220		(Cor'd Nav, Kongsberg 14208, img#70) (V)	
06-Aug-2018	15:52:45	360	ST18904-ENV18			Camera	85	26	624985	4467398	624874	4467269	110	129	170	221		(Cor'd Nav, Kongsberg 14208, img#71) (V)	
06-Aug-2018	15:53:20	361	ST18904-ENV18			Camera	85	26	624991	4467402	624874	4467269	116	133	176	221		(Cor'd Nav, Kongsberg 14208, img#72) (V)	
06-Aug-2018	15:53:31	362	ST18904-ENV18			Camera	85	26	624992	4467403	624874	4467269	118	134	178	221		(Cor'd Nav, Kongsberg 14208, img#73) (V)	
06-Aug-2018	15:55:22	363	ST18904-ENV18			Camera	85	26	625001	4467418	624874	4467269	127	149	196	220		(Cor'd Nav, Kongsberg 14208, img#74) (V)	
06-Aug-2018	15:55:41	364	ST18904-ENV18			Camera	85	26	625005	4467420	624874	4467269	130	151	200	221		(Cor'd Nav, Kongsberg 14208, img#75) (V)	
06-Aug-2018	16:27:14	365	ST18904-ENV17			Camera	90	27	625671	4468107	625699	4468121	-27	-14	31	63		(Cor'd Nav, Kongsberg 14208, img#76) (V)	
06-Aug-2018	16:28:31	366	ST18904-ENV17			Camera	90	27	625682	4468112	625699	4468121	-17	-9	19	63		(Cor'd Nav, Kongsberg 14208, img#77) (V)	
06-Aug-2018	16:29:15	367	ST18904-ENV17			Camera	90	27	625688	4468117	625699	4468121	-11	-4	11	71		(Cor'd Nav, Kongsberg 14208, img#78) (V)	
06-Aug-2018	16:30:45	368	ST18904-ENV17			Camera	89	27	625700	4468128	625699	4468121	1	7	7	190		(Cor'd Nav, Kongsberg 14208, img#79) (V)	
06-Aug-2018	16:31:22	369	ST18904-ENV17			Camera	89	27	625705	4468132	625699	4468121	7	11	13	213		(Cor'd Nav, Kongsberg 14208, img#80) (V)	
06-Aug-2018	16:31:45	370	ST18904-ENV17			Camera	89	27	625709	4468134	625699	4468121	11	13	17	219		(Cor'd Nav, Kongsberg 14208, img#81) (V)	
06-Aug-2018	16:32:35	371	ST18904-ENV17			Camera	89	27	625714	4468141	625699	4468121	16	20	25	219		(Cor'd Nav, Kongsberg 14208, img#82) (V)	
06-Aug-2018	16:33:39	372	ST18904-ENV17			Camera	89	27	625722	4468144	625699	4468121	23	23	33	225		(Cor'd Nav, Kongsberg 14208, img#83) (V)	
06-Aug-2018	16:34:16	373	ST18904-ENV17			Camera	89	27	625726	4468148	625699	4468121	28	27	39	225		(Cor'd Nav, Kongsberg 14208, img#84) (V)	
06-Aug-2018	16:35:16	374	ST18904-ENV17			Camera	89	27	625731	4468156	625699	4468121	32	35	48	223		(Cor'd Nav, Kongsberg 14208, img#85) (V)	
06-Aug-2018	16:36:35	375	ST18904-ENV17			Camera	90	27	625736	4468162	625699	4468121	37	42	56	222		(Cor'd Nav, Kongsberg 14208, img#86) (V)	
06-Aug-2018	16:37:18	376	ST18904-ENV17			Camera	90	27	625741	4468165	625699	4468121	42	44	61	224		(Cor'd Nav, Kongsberg 14208, img#87) (V)	
06-Aug-2018	16:38:57	377	ST18904-ENV17			Camera	90	27	625749	4468173	625699	4468121	51	52	73	224		(Cor'd Nav, Kongsberg 14208, img#88) (V)	
06-Aug-2018	16:39:47	378	ST18904-ENV17			Camera	90	28	625754	4468176	625699	4468121	56	55	78	225		(Cor'd Nav, Kongsberg 14208, img#89) (V)	
06-Aug-2018	16:40:41	379	ST18904-ENV17			Camera	91	28	625758	4468183	625699	4468121	60	62	86	224		(Cor'd Nav, Kongsberg 14208, img#90) (V)	

Grey columns denote where no information is required

APPENDIX A FIELD SAMPLING LOGS

Table A.3 Seabed Imagery Surveyors Logs

Gardline														Seafloor Sampling Positioning Summary						
Job No		11179							Vessel		MV Ocean Researcher									
Client		Equinor US Wind LLC							Vessel Reference Point (VRP)		CoG									
Project Name		Equinor Wind OCS-A 0512							Deployment Location		Starboard A-frame			x	8.96	y	-3.08	z	6.05	
Primary Positioning System		Starpack 1							Actual Coordinates derived from		Deployment Location									
Geodetic Reference System		Datum			NAD83		Ellipsoid		GRS 80		Projection		UTM ZONE 18 N (75 W)			Vertical / Tidal Datum		NAVD88		
Date	Time (UTC/GMT)	Fix number	Stn No	Penetration	Sample Retention	Retention	Observed Seafloor Depth (feet)	Observed Seafloor Depth (m)	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks		
									Easting	Northing	Easting	Northing	dE	dN	Range	Bearing				
06-Aug-2018	16:40:48	380	ST18904-ENV17			Camera	91	28	625759	4468184	625699	4468121	60	63	87	224		(Corr'd Nav, Kongsberg 14208, img#91) (V)		
06-Aug-2018	16:41:25	381	ST18904-ENV17			Camera	91	28	625762	4468187	625699	4468121	64	66	92	224		(Corr'd Nav, Kongsberg 14208, img#92) (V)		
06-Aug-2018	16:42:10	382	ST18904-ENV17			Camera	91	28	625768	4468188	625699	4468121	69	67	96	226		(Corr'd Nav, Kongsberg 14208, img#93) (V)		
06-Aug-2018	16:42:52	383	ST18904-ENV17			Camera	91	28	625773	4468190	625699	4468121	74	69	101	227		(Corr'd Nav, Kongsberg 14208, img#94) (V)		
06-Aug-2018	16:43:15	384	ST18904-ENV17			Camera	91	28	625774	4468193	625699	4468121	76	72	105	226		(Corr'd Nav, Kongsberg 14208, img#95) (V)		
06-Aug-2018	16:44:44	385	ST18904-ENV17			Camera	91	28	625780	4468203	625699	4468121	82	82	116	225		(Corr'd Nav, Kongsberg 14208, img#96) (V)		
06-Aug-2018	16:45:24	386	ST18904-ENV17			Camera	91	28	625786	4468206	625699	4468121	87	85	122	226		(Corr'd Nav, Kongsberg 14208, img#97) (V)		
06-Aug-2018	16:46:04	387	ST18904-ENV17			Camera	91	28	625790	4468211	625699	4468121	91	90	128	226		(Corr'd Nav, Kongsberg 14208, img#98) (V)		
06-Aug-2018	16:46:46	388	ST18904-ENV17			Camera	91	28	625793	4468218	625699	4468121	94	97	135	224		(Corr'd Nav, Kongsberg 14208, img#99) (V)		
06-Aug-2018	16:48:07	389	ST18904-ENV17			Camera	92	28	625801	4468227	625699	4468121	103	106	148	224		(Corr'd Nav, Kongsberg 14208, img#100) (V)		
06-Aug-2018	16:48:57	390	ST18904-ENV17			Camera	92	28	625806	4468231	625699	4468121	108	110	154	224		(Corr'd Nav, Kongsberg 14208, img#101) (V)		
06-Aug-2018	16:49:21	391	ST18904-ENV17			Camera	92	28	625808	4468234	625699	4468121	109	113	157	224		(Corr'd Nav, Kongsberg 14208, img#102) (V)		
06-Aug-2018	16:50:03	392	ST18904-ENV17			Camera	92	28	625811	4468239	625699	4468121	113	118	163	224		(Corr'd Nav, Kongsberg 14208, img#103) (V)		
06-Aug-2018	16:50:43	393	ST18904-ENV17			Camera	92	28	625817	4468241	625699	4468121	119	120	169	225		(Corr'd Nav, Kongsberg 14208, img#104) (V)		
06-Aug-2018	16:51:10	394	ST18904-ENV17			Camera	92	28	625822	4468243	625699	4468121	123	122	173	225		(Corr'd Nav, Kongsberg 14208, img#105) (V)		
06-Aug-2018	16:51:54	395	ST18904-ENV17			Camera	92	28	625827	4468248	625699	4468121	128	127	181	225		(Corr'd Nav, Kongsberg 14208, img#106) (V)		
06-Aug-2018	16:52:32	396	ST18904-ENV17			Camera	92	28	625830	4468254	625699	4468121	132	133	187	225		(Corr'd Nav, Kongsberg 14208, img#107) (V)		
06-Aug-2018	16:52:47	397	ST18904-ENV17			Camera	93	28	625831	4468256	625699	4468121	133	135	190	225		(Corr'd Nav, Kongsberg 14208, img#108) (V)		
06-Aug-2018	16:53:06	398	ST18904-ENV17			Camera	93	28	625833	4468259	625699	4468121	134	138	193	224		(Corr'd Nav, Kongsberg 14208, img#109) (V)		
06-Aug-2018	16:53:51	399	ST18904-ENV17			Camera	93	28	625837	4468265	625699	4468121	139	144	200	224		(Corr'd Nav, Kongsberg 14208, img#110) (V)		
06-Aug-2018	17:36:47	400	ST18904-ENV16			Camera	85	26	625336	4469389	625373	4469370	-36	20	41	119		(Corr'd Nav, Kongsberg 14208, img#111) (V)		
06-Aug-2018	17:39:29	401	ST18904-ENV16			Camera	85	26	625356	4469378	625373	4469370	-17	9	19	117		(Corr'd Nav, Kongsberg 14208, img#112) (V)		
06-Aug-2018	17:41:36	402	ST18904-ENV16			Camera	85	26	625373	4469370	625373	4469370	1	0	1	250		(Corr'd Nav, Kongsberg 14208, img#113) (V)		
06-Aug-2018	17:42:27	403	ST18904-ENV16			Camera	85	26	625380	4469367	625373	4469370	7	-3	7	290		(Corr'd Nav, Kongsberg 14208, img#114) (V)		
06-Aug-2018	17:43:21	404	ST18904-ENV16			Camera	85	26	625386	4469363	625373	4469370	14	-7	15	297		(Corr'd Nav, Kongsberg 14208, img#115) (V)		
06-Aug-2018	17:44:10	405	ST18904-ENV16			Camera	85	26	625391	4469361	625373	4469370	19	-9	21	295		(Corr'd Nav, Kongsberg 14208, img#116) (V)		
06-Aug-2018	17:44:32	406	ST18904-ENV16			Camera	85	26	625394	4469359	625373	4469370	21	-10	24	295		(Corr'd Nav, Kongsberg 14208, img#117) (V)		
06-Aug-2018	17:45:28	407	ST18904-ENV16			Camera	85	26	625400	4469357	625373	4469370	27	-13	30	295		(Corr'd Nav, Kongsberg 14208, img#118) (V)		
06-Aug-2018	17:45:54	408	ST18904-ENV16			Camera	85	26	625402	4469356	625373	4469370	30	-14	33	295		(Corr'd Nav, Kongsberg 14208, img#119) (V)		
06-Aug-2018	17:47:20	409	ST18904-ENV16			Camera	85	26	625412	4469349	625373	4469370	39	-21	44	298		(Corr'd Nav, Kongsberg 14208, img#120) (V)		
06-Aug-2018	17:48:20	410	ST18904-ENV16			Camera	85	26	625415	4469347	625373	4469370	42	-22	48	298		(Corr'd Nav, Kongsberg 14208, img#121) (V)		
06-Aug-2018	17:49:19	411	ST18904-ENV16			Camera	85	26	625418	4469347	625373	4469370	45	-22	50	296		(Corr'd Nav, Kongsberg 14208, img#122) (V)		
06-Aug-2018	17:50:41	412	ST18904-ENV16			Camera	85	26	625425	4469339	625373	4469370	52	-30	60	300		(Corr'd Nav, Kongsberg 14208, img#123) (V)		
06-Aug-2018	17:50:55	413	ST18904-ENV16			Camera	85	26	625426	4469338	625373	4469370	53	-31	62	300		(Corr'd Nav, Kongsberg 14208, img#124) (V)		
06-Aug-2018	17:51:23	414	ST18904-ENV16			Camera	85	26	625429	4469337	625373	4469370	56	-33	65	300		(Corr'd Nav, Kongsberg 14208, img#125) (V)		
06-Aug-2018	17:52:01	415	ST18904-ENV16			Camera	85	26	625434	4469334	625373	4469370	61	-36	71	300		(Corr'd Nav, Kongsberg 14208, img#126) (V)		
06-Aug-2018	17:52:43	416	ST18904-ENV16			Camera	85	26	625439	4469329	625373	4469370	66	-41	78	302		(Corr'd Nav, Kongsberg 14208, img#127) (V)		
06-Aug-2018	17:54:17	417	ST18904-ENV16			Camera	85	26	625452	4469320	625373	4469370	79	-50	93	302		(Corr'd Nav, Kongsberg 14208, img#128) (V)		

Grey columns denote where no information is required

APPENDIX A FIELD SAMPLING LOGS

Table A.3 Seabed Imagery Surveyors Logs

Gardline												Seafloor Sampling Positioning Summary														
Job No		11179							Vessel		MV Ocean Researcher															
Client		Equinor US Wind LLC							Vessel Reference Point (VRP)		CoG															
Project Name		Equinor Wind OCS-A 0512							Deployment Location		Starboard A-frame				x		8.96		y		-3.08		z		6.05	
Primary Positioning System		Starpack 1							Actual Coordinates derived from		Deployment Location															
Geodetic Reference System		Datum			NAD83		Ellipsoid		GRS 80		Projection		UTM ZONE 18 N (75 W)						Vertical / Tidal Datum		NAVD88					
Date	Time (UTC/GMT)	Fix number	Stn No	Penetration	Sample Retention	Retention	Observed Seafloor Depth (feet)	Observed Seafloor Depth (m)	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks								
									Easting	Northing	Easting	Northing	dE	dN	Range	Bearing										
06-Aug-2018	17:54:45	418	ST18904-ENV16			Camera	85	26	625455	4469318	625373	4469370	83	-51	97	302		(Cor'd Nav, Kongsberg 14208, img#129) (V)								
06-Aug-2018	17:56:14	419	ST18904-ENV16			Camera	85	26	625468	4469313	625373	4469370	95	-56	111	300		(Cor'd Nav, Kongsberg 14208, img#130) (V)								
06-Aug-2018	17:56:47	420	ST18904-ENV16			Camera	85	26	625473	4469312	625373	4469370	100	-58	115	300		(Cor'd Nav, Kongsberg 14208, img#131) (V)								
06-Aug-2018	17:57:21	421	ST18904-ENV16			Camera	85	26	625477	4469309	625373	4469370	104	-60	120	300		(Cor'd Nav, Kongsberg 14208, img#132) (V)								
06-Aug-2018	17:57:59	422	ST18904-ENV16			Camera	85	26	625481	4469308	625373	4469370	108	-62	124	300		(Cor'd Nav, Kongsberg 14208, img#133) (V)								
06-Aug-2018	17:58:44	423	ST18904-ENV16			Camera	85	26	625485	4469306	625373	4469370	112	-63	129	299		(Cor'd Nav, Kongsberg 14208, img#134) (V)								
06-Aug-2018	17:58:58	424	ST18904-ENV16			Camera	85	26	625486	4469306	625373	4469370	114	-64	131	299		(Cor'd Nav, Kongsberg 14208, img#135) (V)								
06-Aug-2018	17:59:34	425	ST18904-ENV16			Camera	85	26	625490	4469303	625373	4469370	118	-66	135	299		(Cor'd Nav, Kongsberg 14208, img#136) (V)								
06-Aug-2018	18:00:25	426	ST18904-ENV16			Camera	85	26	625494	4469301	625373	4469370	121	-69	140	299		(Cor'd Nav, Kongsberg 14208, img#137) (V)								
06-Aug-2018	18:01:32	427	ST18904-ENV16			Camera	85	26	625500	4469295	625373	4469370	127	-75	148	300		(Cor'd Nav, Kongsberg 14208, img#138) (V)								
06-Aug-2018	18:01:43	428	ST18904-ENV16			Camera	85	26	625501	4469294	625373	4469370	128	-76	149	301		(Cor'd Nav, Kongsberg 14208, img#139) (V)								
06-Aug-2018	18:02:16	429	ST18904-ENV16			Camera	85	26	625504	4469290	625373	4469370	131	-79	153	301		(Cor'd Nav, Kongsberg 14208, img#140) (V)								
06-Aug-2018	18:03:09	430	ST18904-ENV16			Camera	85	26	625510	4469287	625373	4469370	137	-82	160	301		(Cor'd Nav, Kongsberg 14208, img#141) (V)								
06-Aug-2018	18:03:33	431	ST18904-ENV16			Camera	85	26	625513	4469287	625373	4469370	140	-83	163	301		(Cor'd Nav, Kongsberg 14208, img#142) (V)								
06-Aug-2018	18:04:44	432	ST18904-ENV16			Camera	85	26	625522	4469286	625373	4469370	149	-84	171	299		(Cor'd Nav, Kongsberg 14208, img#143) (V)								
06-Aug-2018	18:05:33	433	ST18904-ENV16			Camera	86	26	625529	4469283	625373	4469370	156	-87	179	299		(Cor'd Nav, Kongsberg 14208, img#144) (V)								
06-Aug-2018	18:05:55	434	ST18904-ENV16			Camera	86	26	625532	4469282	625373	4469370	159	-88	182	299		(Cor'd Nav, Kongsberg 14208, img#145) (V)								
06-Aug-2018	18:07:01	435	ST18904-ENV16			Camera	86	26	625541	4469278	625373	4469370	168	-92	192	299		(Cor'd Nav, Kongsberg 14208, img#146) (V)								
06-Aug-2018	18:08:08	436	ST18904-ENV16			Camera	86	26	625548	4469274	625373	4469370	175	-96	199	299		(Cor'd Nav, Kongsberg 14208, img#147) (V)								
06-Aug-2018	18:41:40	437	ST18904-ENV19			Camera	97	30	627042	4468703	627054	4468686	-11	17	21	146		(Cor'd Nav, Kongsberg 14208, img#148) (V)								
06-Aug-2018	18:42:25	438	ST18904-ENV19			Camera	98	30	627049	4468695	627054	4468686	-5	9	10	153		(Cor'd Nav, Kongsberg 14208, img#149) (V)								
06-Aug-2018	18:42:52	439	ST18904-ENV19			Camera	98	30	627053	4468691	627054	4468686	-1	5	5	173		(Cor'd Nav, Kongsberg 14208, img#150) (V)								
06-Aug-2018	18:44:00	440	ST18904-ENV19			Camera	98	30	627063	4468686	627054	4468686	9	0	9	269		(Cor'd Nav, Kongsberg 14208, img#151) (V)								
06-Aug-2018	18:44:23	441	ST18904-ENV19			Camera	98	30	627066	4468685	627054	4468686	12	-1	12	273		(Cor'd Nav, Kongsberg 14208, img#152) (V)								
06-Aug-2018	18:45:41	442	ST18904-ENV19			Camera	98	30	627074	4468681	627054	4468686	21	-6	21	285		(Cor'd Nav, Kongsberg 14208, img#153) (V)								
06-Aug-2018	18:46:09	443	ST18904-ENV19			Camera	98	30	627078	4468678	627054	4468686	24	-8	25	288		(Cor'd Nav, Kongsberg 14208, img#154) (V)								
06-Aug-2018	18:46:55	444	ST18904-ENV19			Camera	98	30	627084	4468674	627054	4468686	30	-12	33	292		(Cor'd Nav, Kongsberg 14208, img#155) (V)								
06-Aug-2018	18:47:03	445	ST18904-ENV19			Camera	98	30	627085	4468673	627054	4468686	31	-13	34	293		(Cor'd Nav, Kongsberg 14208, img#156) (V)								
06-Aug-2018	18:48:10	446	ST18904-ENV19			Camera	98	30	627094	4468669	627054	4468686	40	-17	43	293		(Cor'd Nav, Kongsberg 14208, img#157) (V)								
06-Aug-2018	18:49:39	447	ST18904-ENV19			Camera	98	30	627109	4468662	627054	4468686	55	-24	60	294		(Cor'd Nav, Kongsberg 14208, img#158) (V)								
06-Aug-2018	18:50:04	448	ST18904-ENV19			Camera	98	30	627112	4468657	627054	4468686	58	-29	65	296		(Cor'd Nav, Kongsberg 14208, img#159) (V)								
06-Aug-2018	18:50:43	449	ST18904-ENV19			Camera	98	30	627116	4468653	627054	4468686	63	-34	71	298		(Cor'd Nav, Kongsberg 14208, img#160) (V)								
06-Aug-2018	18:51:09	450	ST18904-ENV19			Camera	98	30	627120	4468651	627054	4468686	66	-35	75	298		(Cor'd Nav, Kongsberg 14208, img#161) (V)								
06-Aug-2018	18:51:49	451	ST18904-ENV19			Camera	98	30	627128	4468648	627054	4468686	74	-38	83	297		(Cor'd Nav, Kongsberg 14208, img#162) (V)								
06-Aug-2018	18:52:26	452	ST18904-ENV19			Camera	99	30	627134	4468645	627054	4468686	80	-41	90	297		(Cor'd Nav, Kongsberg 14208, img#163) (V)								
06-Aug-2018	18:52:55	453	ST18904-ENV19			Camera	99	30	627139	4468643	627054	4468686	85	-43	96	297		(Cor'd Nav, Kongsberg 14208, img#164) (V)								
06-Aug-2018	18:53:22	454	ST18904-ENV19			Camera	99	30	627143	4468642	627054	4468686	89	-44	99	297		(Cor'd Nav, Kongsberg 14208, img#165) (V)								
06-Aug-2018	18:54:00	455	ST18904-ENV19			Camera	99	30	627146	4468640	627054	4468686	92	-46	103	297		(Cor'd Nav, Kongsberg 14208, img#166) (V)								

Grey columns denote where no information is required

APPENDIX A FIELD SAMPLING LOGS

Table A.3 Seabed Imagery Surveyors Logs

Gardline																	Seafloor Sampling Positioning Summary						
Job No		11179								Vessel		MV Ocean Researcher											
Client		Equinor US Wind LLC								Vessel Reference Point (VRP)		CoG											
Project Name		Equinor Wind OCS-A 0512								Deployment Location		Starboard A-frame			x	8.96	y	-3.08	z	6.05			
Primary Positioning System		Starpack 1								Actual Coordinates derived from		Deployment Location											
Geodetic Reference System		Datum		NAD83		Ellipsoid		GRS 80		Projection		UTM ZONE 18 N (75 W)					Vertical / Tidal Datum		NAVD88				
Date	Time (UTC/GMT)	Fix number	Stn No	Penetration	Sample Retention	Retention	Observed Seafloor Depth (feet)	Observed Seafloor Depth (m)	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks					
									Easting	Northing	Easting	Northing	dE	dN	Range	Bearing							
06-Aug-2018	18:54:36	456	ST18904-ENV19			Camera	99	30	627149	4468637	627054	4468686	96	-49	108	297		(Cor'd Nav, Kongsberg 14208, img#167) (V)					
06-Aug-2018	18:54:50	457	ST18904-ENV19			Camera	99	30	627151	4468635	627054	4468686	97	-51	110	298		(Cor'd Nav, Kongsberg 14208, img#168) (V)					
06-Aug-2018	18:55:25	458	ST18904-ENV19			Camera	99	30	627155	4468631	627054	4468686	102	-56	116	299		(Cor'd Nav, Kongsberg 14208, img#169) (V)					
06-Aug-2018	18:56:02	459	ST18904-ENV19			Camera	99	30	627160	4468627	627054	4468686	107	-59	122	299		(Cor'd Nav, Kongsberg 14208, img#170) (V)					
06-Aug-2018	18:57:12	460	ST18904-ENV19			Camera	99	30	627171	4468623	627054	4468686	117	-63	133	298		(Cor'd Nav, Kongsberg 14208, img#171) (V)					
06-Aug-2018	18:57:59	461	ST18904-ENV19			Camera	98	30	627178	4468617	627054	4468686	125	-69	142	299		(Cor'd Nav, Kongsberg 14208, img#172) (V)					
06-Aug-2018	18:58:19	462	ST18904-ENV19			Camera	98	30	627181	4468616	627054	4468686	127	-71	146	299		(Cor'd Nav, Kongsberg 14208, img#173) (V)					
06-Aug-2018	18:58:54	463	ST18904-ENV19			Camera	98	30	627186	4468614	627054	4468686	132	-72	151	299		(Cor'd Nav, Kongsberg 14208, img#174) (V)					
06-Aug-2018	18:59:39	464	ST18904-ENV19			Camera	98	30	627193	4468611	627054	4468686	140	-75	159	298		(Cor'd Nav, Kongsberg 14208, img#175) (V)					
06-Aug-2018	19:00:25	465	ST18904-ENV19			Camera	98	30	627202	4468606	627054	4468686	148	-80	169	298		(Cor'd Nav, Kongsberg 14208, img#176) (V)					
06-Aug-2018	19:00:48	466	ST18904-ENV19			Camera	98	30	627206	4468605	627054	4468686	153	-81	173	298		(Cor'd Nav, Kongsberg 14208, img#177) (V)					
06-Aug-2018	19:01:12	467	ST18904-ENV19			Camera	98	30	627210	4468604	627054	4468686	157	-82	177	298		(Cor'd Nav, Kongsberg 14208, img#178) (V)					
06-Aug-2018	19:01:53	468	ST18904-ENV19			Camera	98	30	627217	4468603	627054	4468686	163	-83	183	297		(Cor'd Nav, Kongsberg 14208, img#179) (V)					
06-Aug-2018	19:02:45	469	ST18904-ENV19			Camera	98	30	627225	4468598	627054	4468686	171	-88	193	297		(Cor'd Nav, Kongsberg 14208, img#180) (V)					
06-Aug-2018	19:39:22	470	ST18904-ENV20			Camera	96	29	626877	4467859	626889	4467825	-12	34	36	160		(Cor'd Nav, Kongsberg 14208, img#181) (V)					
06-Aug-2018	19:41:01	471	ST18904-ENV20			Camera	97	30	626887	4467832	626889	4467825	-2	7	7	166		(Cor'd Nav, Kongsberg 14208, img#182) (V)					
06-Aug-2018	19:41:16	472	ST18904-ENV20			Camera	97	30	626889	4467831	626889	4467825	0	6	6	181		(Cor'd Nav, Kongsberg 14208, img#183) (V)					
06-Aug-2018	19:42:11	473	ST18904-ENV20			Camera	97	30	626898	4467832	626889	4467825	9	7	11	232		(Cor'd Nav, Kongsberg 14208, img#184) (V)					
06-Aug-2018	19:42:25	474	ST18904-ENV20			Camera	97	30	626900	4467831	626889	4467825	11	6	13	244		(Cor'd Nav, Kongsberg 14208, img#185) (V)					
06-Aug-2018	19:43:49	475	ST18904-ENV20			Camera	97	30	626914	4467817	626889	4467825	26	-8	27	287		(Cor'd Nav, Kongsberg 14208, img#186) (V)					
06-Aug-2018	19:45:32	476	ST18904-ENV20			Camera	97	30	626930	4467811	626889	4467825	41	-14	43	289		(Cor'd Nav, Kongsberg 14208, img#187) (V)					
06-Aug-2018	19:46:12	477	ST18904-ENV20			Camera	97	30	626935	4467810	626889	4467825	46	-15	49	288		(Cor'd Nav, Kongsberg 14208, img#188) (V)					
06-Aug-2018	19:46:48	478	ST18904-ENV20			Camera	97	30	626939	4467808	626889	4467825	51	-17	53	288		(Cor'd Nav, Kongsberg 14208, img#189) (V)					
06-Aug-2018	19:48:14	479	ST18904-ENV20			Camera	98	30	626950	4467797	626889	4467825	61	-28	67	295		(Cor'd Nav, Kongsberg 14208, img#190) (V)					
06-Aug-2018	19:48:48	480	ST18904-ENV20			Camera	98	30	626953	4467791	626889	4467825	64	-34	73	298		(Cor'd Nav, Kongsberg 14208, img#191) (V)					
06-Aug-2018	19:49:59	481	ST18904-ENV20			Camera	98	30	626960	4467782	626889	4467825	71	-43	83	301		(Cor'd Nav, Kongsberg 14208, img#192) (V)					
06-Aug-2018	19:51:06	482	ST18904-ENV20			Camera	98	30	626970	4467780	626889	4467825	82	-45	93	299		(Cor'd Nav, Kongsberg 14208, img#193) (V)					
06-Aug-2018	19:51:50	483	ST18904-ENV20			Camera	98	30	626976	4467776	626889	4467825	87	-49	100	299		(Cor'd Nav, Kongsberg 14208, img#194) (V)					
06-Aug-2018	19:52:26	484	ST18904-ENV20			Camera	98	30	626981	4467773	626889	4467825	92	-52	106	299		(Cor'd Nav, Kongsberg 14208, img#195) (V)					
06-Aug-2018	19:52:59	485	ST18904-ENV20			Camera	98	30	626986	4467773	626889	4467825	98	-52	110	298		(Cor'd Nav, Kongsberg 14208, img#196) (V)					
06-Aug-2018	19:53:08	486	ST18904-ENV20			Camera	98	30	626988	4467774	626889	4467825	99	-51	112	297		(Cor'd Nav, Kongsberg 14208, img#197) (V)					
06-Aug-2018	19:53:31	487	ST18904-ENV20			Camera	98	30	626991	4467775	626889	4467825	103	-50	114	296		(Cor'd Nav, Kongsberg 14208, img#198) (V)					
06-Aug-2018	19:54:08	488	ST18904-ENV20			Camera	98	30	626997	4467774	626889	4467825	108	-51	119	295		(Cor'd Nav, Kongsberg 14208, img#199) (V)					
06-Aug-2018	19:54:44	489	ST18904-ENV20			Camera	98	30	627002	4467771	626889	4467825	113	-54	125	296		(Cor'd Nav, Kongsberg 14208, img#200) (V)					
06-Aug-2018	19:55:16	490	ST18904-ENV20			Camera	98	30	627006	4467766	626889	4467825	117	-59	131	297		(Cor'd Nav, Kongsberg 14208, img#201) (V)					
06-Aug-2018	19:55:27	491	ST18904-ENV20			Camera	98	30	627007	4467764	626889	4467825	118	-61	133	297		(Cor'd Nav, Kongsberg 14208, img#202) (V)					
06-Aug-2018	19:55:42	492	ST18904-ENV20			Camera	98	30	627008	4467761	626889	4467825	120	-64	135	298		(Cor'd Nav, Kongsberg 14208, img#203) (V)					
06-Aug-2018	19:56:22	493	ST18904-ENV20			Camera	98	30	627013	4467756	626889	4467825	124	-69	142	299		(Cor'd Nav, Kongsberg 14208, img#204) (V)					

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APPENDIX A FIELD SAMPLING LOGS

Table A.3 Seabed Imagery Surveyors Logs

Gardline												Seafloor Sampling Positioning Summary									
Job No		11179								Vessel		MV Ocean Researcher									
Client		Equinor US Wind LLC								Vessel Reference Point (VRP)		CoG									
Project Name		Equinor Wind OCS-A 0512								Deployment Location		Starboard A-frame				x	8.96	y	-3.08	z	6.05
Primary Positioning System		Starpack 1								Actual Coordinates derived from		Deployment Location									
Geodetic Reference System		Datum		NAD83		Ellipsoid		GRS 80		Projection		UTM ZONE 18 N (75 W)				Vertical / Tidal Datum		NAVD88			
Date	Time (UTC/GMT)	Fix number	Stn No	Penetration	Sample Retention	Retention	Observed Seafloor Depth (feet)	Observed Seafloor Depth (m)	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks			
									Easting	Northing	Easting	Northing	dE	dN	Range	Bearing					
06-Aug-2018	19:56:51	494	ST18904-ENV20			Camera	99	30	627016	4467754	626889	4467825	127	-71	146	299		(Corr'd Nav, Kongsberg 14208, img#205) (V)			
06-Aug-2018	19:57:32	495	ST18904-ENV20			Camera	98	30	627022	4467753	626889	4467825	133	-72	151	299		(Corr'd Nav, Kongsberg 14208, img#206) (V)			
06-Aug-2018	19:58:09	496	ST18904-ENV20			Camera	98	30	627027	4467752	626889	4467825	138	-73	156	298		(Corr'd Nav, Kongsberg 14208, img#207) (V)			
06-Aug-2018	19:59:02	497	ST18904-ENV20			Camera	98	30	627035	4467744	626889	4467825	146	-81	167	299		(Corr'd Nav, Kongsberg 14208, img#208) (V)			
06-Aug-2018	20:00:04	498	ST18904-ENV20			Camera	98	30	627044	4467739	626889	4467825	155	-86	177	299		(Corr'd Nav, Kongsberg 14208, img#209) (V)			
06-Aug-2018	20:00:38	499	ST18904-ENV20			Camera	98	30	627050	4467737	626889	4467825	161	-88	184	298		(Corr'd Nav, Kongsberg 14208, img#210) (V)			
06-Aug-2018	20:00:51	500	ST18904-ENV20			Camera	98	30	627053	4467737	626889	4467825	164	-88	186	298		(Corr'd Nav, Kongsberg 14208, img#211) (V)			
06-Aug-2018	20:01:44	501	ST18904-ENV20			Camera	98	30	627061	4467737	626889	4467825	172	-88	194	297		(Corr'd Nav, Kongsberg 14208, img#212) (V)			
06-Aug-2018	20:45:00	502	ST18904-ENV21			Camera	91	28	626425	4466447	626461	4466457	-36	-10	38	75		(Corr'd Nav, Kongsberg 14208, img#213) (V)			
06-Aug-2018	20:47:33	503	ST18904-ENV21			Camera	91	28	626459	4466475	626461	4466457	-2	18	18	173		(Corr'd Nav, Kongsberg 14208, img#214) (V)			
06-Aug-2018	20:48:46	504	ST18904-ENV21			Camera	90	28	626469	4466492	626461	4466457	8	35	35	193		(Corr'd Nav, Kongsberg 14208, img#215) (V)			
06-Aug-2018	20:51:24	505	ST18904-ENV21			Camera	91	28	626471	4466472	626461	4466457	10	15	18	212		(Corr'd Nav, Kongsberg 14208, img#216) (V)			
06-Aug-2018	20:52:23	506	ST18904-ENV21			Camera	91	28	626488	4466457	626461	4466457	27	0	27	270		(Corr'd Nav, Kongsberg 14208, img#217) (V)			
06-Aug-2018	20:53:17	507	ST18904-ENV21			Camera	91	28	626510	4466449	626461	4466457	49	-8	49	280		(Corr'd Nav, Kongsberg 14208, img#218) (V)			
06-Aug-2018	20:53:52	508	ST18904-ENV21			Camera	92	28	626525	4466447	626461	4466457	64	-10	65	278		(Corr'd Nav, Kongsberg 14208, img#219) (V)			
06-Aug-2018	20:54:14	509	ST18904-ENV21			Camera	92	28	626535	4466448	626461	4466457	74	-9	75	277		(Corr'd Nav, Kongsberg 14208, img#220) (V)			
06-Aug-2018	20:54:46	510	ST18904-ENV21			Camera	92	28	626551	4466449	626461	4466457	90	-8	90	275		(Corr'd Nav, Kongsberg 14208, img#221) (V)			
06-Aug-2018	20:55:06	511	ST18904-ENV21			Camera	92	28	626561	4466450	626461	4466457	100	-7	100	274		(Corr'd Nav, Kongsberg 14208, img#222) (V)			
06-Aug-2018	20:55:32	512	ST18904-ENV21			Camera	92	28	626573	4466450	626461	4466457	112	-7	113	273		(Corr'd Nav, Kongsberg 14208, img#223) (V)			
06-Aug-2018	20:55:50	513	ST18904-ENV21			Camera	92	28	626582	4466450	626461	4466457	121	-7	121	273		(Corr'd Nav, Kongsberg 14208, img#224) (V)			
06-Aug-2018	20:56:42	514	ST18904-ENV21			Camera	93	28	626605	4466451	626461	4466457	144	-6	144	272		(Corr'd Nav, Kongsberg 14208, img#225) (V)			
06-Aug-2018	20:59:04	515	ST18904-ENV21			Camera	94	29	626651	4466450	626461	4466457	190	-7	190	272		(Corr'd Nav, Kongsberg 14208, img#226) (V)			
06-Aug-2018	20:59:53	516	ST18904-ENV21			Camera	94	29	626661	4466446	626461	4466457	200	-11	200	273		(Corr'd Nav, Kongsberg 14208, img#227) (V)			
06-Aug-2018	21:01:15	517	ST18904-ENV21			Camera	94	29	626674	4466448	626461	4466457	214	-9	214	272		(Corr'd Nav, Kongsberg 14208, img#228) (V)			
06-Aug-2018	21:01:59	518	ST18904-ENV21			Camera	94	29	626688	4466453	626461	4466457	227	-4	227	271		(Corr'd Nav, Kongsberg 14208, img#229) (V)			
06-Aug-2018	21:02:19	519	ST18904-ENV21			Camera	94	29	626694	4466455	626461	4466457	233	-2	233	271		(Corr'd Nav, Kongsberg 14208, img#230) (V)			
10-Aug-2018	20:14:23	520	ST18904-ENV24			Camera	97	30	628238	4465669	628230	4465643	8	26	28	197		(Corr'd Nav, Kongsberg 14208, img#1) (V)			
10-Aug-2018	20:16:25	521	ST18904-ENV24			Camera	97	30	628231	4465653	628230	4465643	1	11	11	185		(Corr'd Nav, Kongsberg 14208, img#2) (V)			
10-Aug-2018	20:17:46	522	ST18904-ENV24			Camera	98	30	628226	4465644	628230	4465643	-4	2	4	114		(Corr'd Nav, Kongsberg 14208, img#3) (V)			
10-Aug-2018	20:18:35	523	ST18904-ENV24			Camera	97	30	628223	4465638	628230	4465643	-7	-4	8	58		(Corr'd Nav, Kongsberg 14208, img#4) (V)			
10-Aug-2018	20:19:14	524	ST18904-ENV24			Camera	97	29	628220	4465634	628230	4465643	-10	-9	13	48		(Corr'd Nav, Kongsberg 14208, img#5) (V)			
10-Aug-2018	20:20:13	525	ST18904-ENV24			Camera	97	29	628217	4465626	628230	4465643	-13	-17	21	37		(Corr'd Nav, Kongsberg 14208, img#6) (V)			
10-Aug-2018	20:20:44	526	ST18904-ENV24			Camera	97	29	628215	4465622	628230	4465643	-15	-21	26	36		(Corr'd Nav, Kongsberg 14208, img#7) (V)			
10-Aug-2018	20:21:11	527	ST18904-ENV24			Camera	96	29	628213	4465618	628230	4465643	-17	-24	30	35		(Corr'd Nav, Kongsberg 14208, img#8) (V)			
10-Aug-2018	20:22:09	528	ST18904-ENV24			Camera	95	29	628209	4465610	628230	4465643	-21	-33	39	33		(Corr'd Nav, Kongsberg 14208, img#9) (V)			
10-Aug-2018	20:23:06	529	ST18904-ENV24			Camera	95	29	628205	4465602	628230	4465643	-25	-40	48	32		(Corr'd Nav, Kongsberg 14208, img#10) (V)			
10-Aug-2018	20:23:41	530	ST18904-ENV24			Camera	95	29	628203	4465597	628230	4465643	-27	-46	53	31		(Corr'd Nav, Kongsberg 14208, img#11) (V)			
10-Aug-2018	20:24:20	531	ST18904-ENV24			Camera	94	29	628200	4465591	628230	4465643	-30	-52	60	30		(Corr'd Nav, Kongsberg 14208, img#12) (V)			

Grey columns denote where no information is required

APPENDIX A FIELD SAMPLING LOGS

Table A.3 Seabed Imagery Surveyors Logs

Gardline										Seafloor Sampling Positioning Summary									
Job No		11179							Vessel		MV Ocean Researcher								
Client		Equinor US Wind LLC							Vessel Reference Point (VRP)		CoG								
Project Name		Equinor Wind OCS-A 0512							Deployment Location		Starboard A-frame			x	8.96	y	-3.08	z	6.05
Primary Positioning System		Starpack 1							Actual Coordinates derived from		Deployment Location								
Geodetic Reference System		Datum		NAD83		Ellipsoid		GRS 80		Projection		UTM ZONE 18 N (75 W)				Vertical / Tidal Datum		NAVD88	
Date	Time (UTC/GMT)	Fix number	Stn No	Penetration	Sample Retention	Retention	Observed Seafloor Depth (feet)	Observed Seafloor Depth (m)	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks	
									Easting	Northing	Easting	Northing	dE	dN	Range	Bearing			
10-Aug-2018	20:25:24	532	ST18904-ENV24			Camera	94	29	628195	4465583	628230	4465643	-35	-59	68	30		(Corr'd Nav, Kongsberg 14208, img#13) (V)	
10-Aug-2018	20:25:59	533	ST18904-ENV24			Camera	94	29	628193	4465578	628230	4465643	-37	-64	74	30		(Corr'd Nav, Kongsberg 14208, img#14) (V)	
10-Aug-2018	20:26:33	534	ST18904-ENV24			Camera	94	29	628191	4465574	628230	4465643	-40	-69	79	30		(Corr'd Nav, Kongsberg 14208, img#15) (V)	
10-Aug-2018	20:26:59	535	ST18904-ENV24			Camera	93	28	628189	4465570	628230	4465643	-41	-72	83	30		(Corr'd Nav, Kongsberg 14208, img#16) (V)	
10-Aug-2018	20:28:14	536	ST18904-ENV24			Camera	94	29	628184	4465561	628230	4465643	-46	-81	93	30		(Corr'd Nav, Kongsberg 14208, img#17) (V)	
10-Aug-2018	20:29:35	537	ST18904-ENV24			Camera	94	29	628179	4465551	628230	4465643	-51	-92	105	29		(Corr'd Nav, Kongsberg 14208, img#18) (V)	
10-Aug-2018	20:30:54	538	ST18904-ENV24			Camera	94	29	628174	4465541	628230	4465643	-56	-102	116	29		(Corr'd Nav, Kongsberg 14208, img#19) (V)	
10-Aug-2018	20:32:40	539	ST18904-ENV24			Camera	94	29	628166	4465526	628230	4465643	-64	-116	132	29		(Corr'd Nav, Kongsberg 14208, img#20) (V)	
10-Aug-2018	20:33:31	540	ST18904-ENV24			Camera	94	29	628163	4465522	628230	4465643	-67	-121	138	29		(Corr'd Nav, Kongsberg 14208, img#21) (V)	
10-Aug-2018	20:34:14	541	ST18904-ENV24			Camera	93	28	628162	4465516	628230	4465643	-68	-126	144	28		(Corr'd Nav, Kongsberg 14208, img#22) (V)	
10-Aug-2018	20:35:07	542	ST18904-ENV24			Camera	93	28	628158	4465508	628230	4465643	-72	-134	153	28		(Corr'd Nav, Kongsberg 14208, img#23) (V)	
10-Aug-2018	20:35:34	543	ST18904-ENV24			Camera	93	28	628156	4465505	628230	4465643	-74	-138	156	28		(Corr'd Nav, Kongsberg 14208, img#24) (V)	
10-Aug-2018	20:36:11	544	ST18904-ENV24			Camera	93	28	628153	4465502	628230	4465643	-77	-141	161	29		(Corr'd Nav, Kongsberg 14208, img#25) (V)	
10-Aug-2018	20:37:03	545	ST18904-ENV24			Camera	93	28	628150	4465496	628230	4465643	-80	-147	167	29		(Corr'd Nav, Kongsberg 14208, img#26) (V)	
10-Aug-2018	20:38:17	546	ST18904-ENV24			Camera	93	28	628145	4465486	628230	4465643	-85	-156	178	29		(Corr'd Nav, Kongsberg 14208, img#27) (V)	
10-Aug-2018	20:38:56	547	ST18904-ENV24			Camera	93	28	628141	4465481	628230	4465643	-89	-162	184	29		(Corr'd Nav, Kongsberg 14208, img#28) (V)	
10-Aug-2018	20:39:38	548	ST18904-ENV24			Camera	93	28	628138	4465475	628230	4465643	-92	-167	191	29		(Corr'd Nav, Kongsberg 14208, img#29) (V)	
10-Aug-2018	20:40:30	549	ST18904-ENV24			Camera	93	28	628134	4465468	628230	4465643	-96	-175	199	29		(Corr'd Nav, Kongsberg 14208, img#30) (V)	
10-Aug-2018	22:06:04	57	ST18904-ENV27			Camera	103	31	629607	4464785	629646	4464768	-39	17	42	114		(Corr'd Nav, Kongsberg 14208, img#1) (V)	
10-Aug-2018	22:07:57	58	ST18904-ENV27			Camera	104	32	629614	4464778	629646	4464768	-32	10	33	108		(Corr'd Nav, Kongsberg 14208, img#2) (V)	
10-Aug-2018	22:11:19	550	ST18904-ENV27			Camera	104	32	629643	4464763	629646	4464768	-3	-5	6	0		(Raw Nav, Kongsberg 14208, img#3) (V)	
10-Aug-2018	22:11:51	551	ST18904-ENV27			Camera	104	32	629648	4464760	629646	4464768	2	-8	6	6		(Raw Nav, Kongsberg 14208, img#4) (V)	
10-Aug-2018	22:12:50	552	ST18904-ENV27			Camera	104	32	629656	4464760	629646	4464768	10	-8	2	13		(Raw Nav, Kongsberg 14208, img#5) (V)	
10-Aug-2018	22:13:59	553	ST18904-ENV27			Camera	105	32	629667	4464760	629646	4464768	21	-8	-3	22		(Raw Nav, Kongsberg 14208, img#6) (V)	
10-Aug-2018	22:15:01	554	ST18904-ENV27			Camera	105	32	629676	4464755	629646	4464768	30	-13	-3	33		(Raw Nav, Kongsberg 14208, img#7) (V)	
10-Aug-2018	22:16:05	555	ST18904-ENV27			Camera	104	32	629684	4464752	629646	4464768	38	-16	-4	41		(Raw Nav, Kongsberg 14208, img#8) (V)	
10-Aug-2018	22:16:49	556	ST18904-ENV27			Camera	104	32	629689	4464749	629646	4464768	43	-19	-4	47		(Raw Nav, Kongsberg 14208, img#9) (V)	
10-Aug-2018	22:17:14	557	ST18904-ENV27			Camera	105	32	629693	4464747	629646	4464768	47	-21	-4	52		(Raw Nav, Kongsberg 14208, img#10) (V)	
10-Aug-2018	22:18:09	558	ST18904-ENV27			Camera	104	32	629700	4464744	629646	4464768	54	-24	-5	59		(Raw Nav, Kongsberg 14208, img#11) (V)	
10-Aug-2018	22:18:33	559	ST18904-ENV27			Camera	103	32	629702	4464742	629646	4464768	56	-26	-4	62		(Raw Nav, Kongsberg 14208, img#12) (V)	
10-Aug-2018	22:19:40	560	ST18904-ENV27			Camera	103	31	629712	4464736	629646	4464768	66	-32	-3	73		(Raw Nav, Kongsberg 14208, img#13) (V)	
10-Aug-2018	22:20:37	561	ST18904-ENV27			Camera	103	31	629719	4464732	629646	4464768	73	-36	-3	82		(Raw Nav, Kongsberg 14208, img#14) (V)	
10-Aug-2018	22:21:30	562	ST18904-ENV27			Camera	103	32	629726	4464729	629646	4464768	80	-39	-4	89		(Raw Nav, Kongsberg 14208, img#15) (V)	
10-Aug-2018	22:22:16	563	ST18904-ENV27			Camera	103	31	629732	4464723	629646	4464768	86	-45	-2	97		(Raw Nav, Kongsberg 14208, img#16) (V)	
10-Aug-2018	22:22:50	564	ST18904-ENV27			Camera	103	31	629738	4464718	629646	4464768	92	-50	0	105		(Raw Nav, Kongsberg 14208, img#17) (V)	
10-Aug-2018	22:23:33	565	ST18904-ENV27			Camera	103	31	629745	4464714	629646	4464768	99	-54	0	113		(Raw Nav, Kongsberg 14208, img#18) (V)	
10-Aug-2018	22:24:42	566	ST18904-ENV27			Camera	103	31	629754	4464709	629646	4464768	108	-59	0	123		(Raw Nav, Kongsberg 14208, img#19) (V)	
10-Aug-2018	22:25:04	567	ST18904-ENV27			Camera	103	31	629756	4464707	629646	4464768	110	-61	1	126		(Raw Nav, Kongsberg 14208, img#20) (V)	

Grey columns denote where no information is required

APPENDIX A FIELD SAMPLING LOGS

Table A.3 Seabed Imagery Surveyors Logs

Gardline										Seafloor Sampling Positioning Summary									
Job No		11179								Vessel		MV Ocean Researcher							
Client		Equinor US Wind LLC								Vessel Reference Point (VRP)		CoG							
Project Name		Equinor Wind OCS-A 0512								Deployment Location		Starboard A-frame		x	8.96	y	-3.08	z	6.05
Primary Positioning System		Starpack 1								Actual Coordinates derived from		Deployment Location							
Geodetic Reference System		Datum		NAD83		Ellipsoid		GRS 80		Projection		UTM ZONE 18 N (75 W)				Vertical / Tidal Datum		NAVD88	
Date	Time (UTC/GMT)	Fix number	Stn No	Penetration	Sample Retention	Retention	Observed Seafloor Depth (feet)	Observed Seafloor Depth (m)	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks	
									Easting	Northing	Easting	Northing	dE	dN	Range	Bearing			
10-Aug-2018	22:25:43	568	ST18904-ENV27			Camera	103	31	629761	4464703	629646	4464768	115	-65	2	132		(Raw Nav, Kongsberg 14208, img#21) (V)	
10-Aug-2018	22:26:52	569	ST18904-ENV27			Camera	103	31	629770	4464698	629646	4464768	124	-70	2	143		(Raw Nav, Kongsberg 14208, img#22) (V)	
10-Aug-2018	22:28:19	570	ST18904-ENV27			Camera	103	31	629787	4464690	629646	4464768	141	-78	1	161		(Raw Nav, Kongsberg 14208, img#23) (V)	
10-Aug-2018	22:29:16	571	ST18904-ENV27			Camera	103	31	629800	4464687	629646	4464768	154	-81	-2	173		(Raw Nav, Kongsberg 14208, img#24) (V)	
10-Aug-2018	22:30:20	572	ST18904-ENV27			Camera	103	31	629810	4464684	629646	4464768	164	-84	-5	184		(Raw Nav, Kongsberg 14208, img#25) (V)	
10-Aug-2018	22:31:10	573	ST18904-ENV27			Camera	103	31	629816	4464680	629646	4464768	170	-88	-4	192		(Raw Nav, Kongsberg 14208, img#26) (V)	
10-Aug-2018	22:31:52	574	ST18904-ENV27			Camera	104	32	629822	4464675	629646	4464768	176	-93	-3	198		(Raw Nav, Kongsberg 14208, img#27) (V)	
11-Aug-2018	02:19:35	575	ST18904-ENV42			Camera	114	35	638035	4460121	638000	4460140	36	-19	41	299		(Corr'd Nav, Kongsberg 14208, img#1) (V)	
11-Aug-2018	02:20:54	576	ST18904-ENV42			Camera	114	35	638022	4460127	638000	4460140	22	-13	26	300		(Corr'd Nav, Kongsberg 14208, img#2) (V)	
11-Aug-2018	02:21:25	577	ST18904-ENV42			Camera	113	34	638017	4460129	638000	4460140	18	-11	21	302		(Corr'd Nav, Kongsberg 14208, img#3) (V)	
11-Aug-2018	02:23:31	578	ST18904-ENV42			Camera	112	34	638000	4460142	638000	4460140	0	2	2	182		(Corr'd Nav, Kongsberg 14208, img#4) (V)	
11-Aug-2018	02:24:13	579	ST18904-ENV42			Camera	113	34	637995	4460142	638000	4460140	-5	3	5	118		(Corr'd Nav, Kongsberg 14208, img#5) (V)	
11-Aug-2018	02:25:54	580	ST18904-ENV42			Camera	113	34	637974	4460148	638000	4460140	-26	8	27	108		(Corr'd Nav, Kongsberg 14208, img#6) (V)	
11-Aug-2018	02:26:14	581	ST18904-ENV42			Camera	113	34	637971	4460149	638000	4460140	-28	9	30	108		(Corr'd Nav, Kongsberg 14208, img#7) (V)	
11-Aug-2018	02:26:52	582	ST18904-ENV42			Camera	113	34	637969	4460151	638000	4460140	-30	11	32	110		(Corr'd Nav, Kongsberg 14208, img#8) (V)	
11-Aug-2018	02:27:05	583	ST18904-ENV42			Camera	113	34	637969	4460152	638000	4460140	-31	12	33	111		(Corr'd Nav, Kongsberg 14208, img#9) (V)	
11-Aug-2018	02:27:42	584	ST18904-ENV42			Camera	113	34	637967	4460153	638000	4460140	-33	13	35	112		(Corr'd Nav, Kongsberg 14208, img#10) (V)	
11-Aug-2018	02:27:59	585	ST18904-ENV42			Camera	113	34	637964	4460154	638000	4460140	-36	14	38	112		(Corr'd Nav, Kongsberg 14208, img#11) (V)	
11-Aug-2018	02:28:52	586	ST18904-ENV42			Camera	113	34	637955	4460159	638000	4460140	-45	19	49	113		(Corr'd Nav, Kongsberg 14208, img#12) (V)	
11-Aug-2018	02:30:19	587	ST18904-ENV42			Camera	113	34	637947	4460167	638000	4460140	-52	27	59	117		(Corr'd Nav, Kongsberg 14208, img#13) (V)	
11-Aug-2018	02:31:17	588	ST18904-ENV42			Camera	113	34	637935	4460171	638000	4460140	-64	31	71	116		(Corr'd Nav, Kongsberg 14208, img#14) (V)	
11-Aug-2018	02:31:46	589	ST18904-ENV42			Camera	113	34	637930	4460172	638000	4460140	-69	32	76	115		(Corr'd Nav, Kongsberg 14208, img#15) (V)	
11-Aug-2018	02:31:57	590	ST18904-ENV42			Camera	113	34	637930	4460172	638000	4460140	-70	32	77	115		(Corr'd Nav, Kongsberg 14208, img#16) (V)	
11-Aug-2018	02:33:15	591	ST18904-ENV42			Camera	113	34	637922	4460181	638000	4460140	-78	41	88	118		(Corr'd Nav, Kongsberg 14208, img#17) (V)	
11-Aug-2018	02:33:30	592	ST18904-ENV42			Camera	113	34	637919	4460183	638000	4460140	-81	43	92	118		(Corr'd Nav, Kongsberg 14208, img#18) (V)	
11-Aug-2018	02:34:26	593	ST18904-ENV42			Camera	112	34	637910	4460181	638000	4460140	-89	41	98	115		(Corr'd Nav, Kongsberg 14208, img#19) (V)	
11-Aug-2018	02:35:16	594	ST18904-ENV42			Camera	112	34	637909	4460182	638000	4460140	-91	42	100	115		(Corr'd Nav, Kongsberg 14208, img#20) (V)	
11-Aug-2018	02:36:35	595	ST18904-ENV42			Camera	112	34	637895	4460191	638000	4460140	-105	51	117	116		(Corr'd Nav, Kongsberg 14208, img#21) (V)	
11-Aug-2018	02:36:58	596	ST18904-ENV42			Camera	112	34	637890	4460192	638000	4460140	-110	52	121	115		(Corr'd Nav, Kongsberg 14208, img#22) (V)	
11-Aug-2018	02:37:45	597	ST18904-ENV42			Camera	112	34	637882	4460194	638000	4460140	-118	54	130	115		(Corr'd Nav, Kongsberg 14208, img#23) (V)	
11-Aug-2018	02:39:30	598	ST18904-ENV42			Camera	112	34	637865	4460203	638000	4460140	-134	63	148	115		(Corr'd Nav, Kongsberg 14208, img#24) (V)	
11-Aug-2018	02:40:06	599	ST18904-ENV42			Camera	112	34	637858	4460206	638000	4460140	-142	66	157	115		(Corr'd Nav, Kongsberg 14208, img#25) (V)	
11-Aug-2018	02:40:44	600	ST18904-ENV42			Camera	112	34	637853	4460210	638000	4460140	-146	70	162	116		(Corr'd Nav, Kongsberg 14208, img#26) (V)	
11-Aug-2018	02:41:09	601	ST18904-ENV42			Camera	112	34	637851	4460212	638000	4460140	-149	72	165	116		(Corr'd Nav, Kongsberg 14208, img#27) (V)	
11-Aug-2018	02:41:41	602	ST18904-ENV42			Camera	112	34	637845	4460214	638000	4460140	-155	74	172	116		(Corr'd Nav, Kongsberg 14208, img#28) (V)	
11-Aug-2018	02:42:38	603	ST18904-ENV42			Camera	112	34	637836	4460216	638000	4460140	-163	76	180	115		(Corr'd Nav, Kongsberg 14208, img#29) (V)	
11-Aug-2018	02:43:12	604	ST18904-ENV42			Camera	112	34	637832	4460219	638000	4460140	-167	79	185	115		(Corr'd Nav, Kongsberg 14208, img#30) (V)	
11-Aug-2018	02:43:46	605	ST18904-ENV42			Camera	112	34	637827	4460224	638000	4460140	-173	84	192	116		(Corr'd Nav, Kongsberg 14208, img#31) (V)	

Grey columns denote where no information is required

APPENDIX A FIELD SAMPLING LOGS

Table A.3 Seabed Imagery Surveyors Logs

Gardline										Seafloor Sampling Positioning Summary									
Job No		11179							Vessel		MV Ocean Researcher								
Client		Equinor US Wind LLC							Vessel Reference Point (VRP)		CoG								
Project Name		Equinor Wind OCS-A 0512							Deployment Location		Starboard A-frame			x	8.96	y	-3.08	z	6.05
Primary Positioning System		Starpack 1							Actual Coordinates derived from		Deployment Location								
Geodetic Reference System		Datum		NAD83		Ellipsoid		GRS 80		Projection		UTM ZONE 18 N (75 W)				Vertical / Tidal Datum		NAVD88	
Date	Time (UTC/GMT)	Fix number	Stn No	Penetration	Sample Retention	Retention	Observed Seafloor Depth (feet)	Observed Seafloor Depth (m)	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks	
									Easting	Northing	Easting	Northing	dE	dN	Range	Bearing			
11-Aug-2018	02:44:19	606	ST18904-ENV42			Camera	111	34	637821	4460226	638000	4460140	-178	86	198	116		(Corr'd Nav, Kongsberg 14208, img#32) (V)	
28-Aug-2018	16:15:40	607	ST18904-ENV23			Camera	103	31	628752	4467159	628746	4467170	6	-10	12	329		(Corr'd Nav, Kongsberg 14208, img#607) (V)	
28-Aug-2018	16:16:32	608	ST18904-ENV23			Camera	103	31	628753	4467159	628746	4467170	7	-10	13	325		(Corr'd Nav, Kongsberg 14208, img#608) (V)	
28-Aug-2018	16:17:02	609	ST18904-ENV23			Camera	103	31	628752	4467159	628746	4467170	6	-11	12	331		(Corr'd Nav, Kongsberg 14208, img#609) (V)	
28-Aug-2018	16:17:14	610	ST18904-ENV23			Camera	103	31	628751	4467158	628746	4467170	5	-12	13	338		(Corr'd Nav, Kongsberg 14208, img#610) (V)	
28-Aug-2018	16:17:31	611	ST18904-ENV23			Camera	103	31	628748	4467156	628746	4467170	3	-14	14	349		(Corr'd Nav, Kongsberg 14208, img#611) (V)	
28-Aug-2018	16:17:52	612	ST18904-ENV23			Camera	103	31	628746	4467152	628746	4467170	0	-17	17	0		(Corr'd Nav, Kongsberg 14208, img#612) (V)	
28-Aug-2018	16:18:14	613	ST18904-ENV23			Camera	103	31	628743	4467148	628746	4467170	-3	-21	21	7		(Corr'd Nav, Kongsberg 14208, img#613) (V)	
28-Aug-2018	16:18:40	614	ST18904-ENV23			Camera	103	31	628742	4467144	628746	4467170	-4	-26	26	9		(Corr'd Nav, Kongsberg 14208, img#614) (V)	
28-Aug-2018	16:19:01	615	ST18904-ENV23			Camera	103	31	628741	4467140	628746	4467170	-5	-29	29	9		(Corr'd Nav, Kongsberg 14208, img#615) (V)	
28-Aug-2018	16:19:46	616	ST18904-ENV23			Camera	103	31	628741	4467135	628746	4467170	-5	-35	35	8		(Corr'd Nav, Kongsberg 14208, img#616) (V)	
28-Aug-2018	16:20:35	617	ST18904-ENV23			Camera	103	31	628739	4467128	628746	4467170	-7	-41	42	9		(Corr'd Nav, Kongsberg 14208, img#617) (V)	
28-Aug-2018	16:20:46	618	ST18904-ENV23			Camera	103	31	628739	4467127	628746	4467170	-7	-43	43	10		(Corr'd Nav, Kongsberg 14208, img#618) (V)	
28-Aug-2018	16:21:30	619	ST18904-ENV23			Camera	103	31	628735	4467120	628746	4467170	-11	-49	50	12		(Corr'd Nav, Kongsberg 14208, img#619) (V)	
28-Aug-2018	16:22:26	620	ST18904-ENV23			Camera	103	32	628734	4467113	628746	4467170	-12	-57	58	12		(Corr'd Nav, Kongsberg 14208, img#620) (V)	
28-Aug-2018	16:23:09	621	ST18904-ENV23			Camera	103	32	628732	4467108	628746	4467170	-14	-62	63	13		(Corr'd Nav, Kongsberg 14208, img#621) (V)	
28-Aug-2018	16:24:08	622	ST18904-ENV23			Camera	104	32	628724	4467099	628746	4467170	-22	-70	74	17		(Corr'd Nav, Kongsberg 14208, img#622) (V)	
28-Aug-2018	16:24:44	623	ST18904-ENV23			Camera	104	32	628724	4467092	628746	4467170	-22	-77	80	16		(Corr'd Nav, Kongsberg 14208, img#623) (V)	
28-Aug-2018	16:25:38	624	ST18904-ENV23			Camera	104	32	628724	4467085	628746	4467170	-22	-84	87	14		(Corr'd Nav, Kongsberg 14208, img#624) (V)	
28-Aug-2018	16:26:19	625	ST18904-ENV23			Camera	104	32	628722	4467079	628746	4467170	-24	-90	93	15		(Corr'd Nav, Kongsberg 14208, img#625) (V)	
28-Aug-2018	16:26:50	626	ST18904-ENV23			Camera	104	32	628721	4467074	628746	4467170	-25	-95	99	14		(Corr'd Nav, Kongsberg 14208, img#626) (V)	
28-Aug-2018	16:27:11	627	ST18904-ENV23			Camera	104	32	628720	4467071	628746	4467170	-26	-99	102	14		(Corr'd Nav, Kongsberg 14208, img#627) (V)	
28-Aug-2018	16:27:27	628	ST18904-ENV23			Camera	104	32	628719	4467068	628746	4467170	-27	-102	105	15		(Corr'd Nav, Kongsberg 14208, img#628) (V)	
28-Aug-2018	16:27:45	629	ST18904-ENV23			Camera	104	32	628718	4467064	628746	4467170	-28	-105	109	15		(Corr'd Nav, Kongsberg 14208, img#629) (V)	
28-Aug-2018	16:28:13	630	ST18904-ENV23			Camera	104	32	628717	4467059	628746	4467170	-29	-110	114	15		(Corr'd Nav, Kongsberg 14208, img#630) (V)	
28-Aug-2018	16:28:25	631	ST18904-ENV23			Camera	104	32	628717	4467057	628746	4467170	-29	-112	116	14		(Corr'd Nav, Kongsberg 14208, img#631) (V)	
28-Aug-2018	16:29:39	632	ST18904-ENV23			Camera	104	32	628714	4467046	628746	4467170	-32	-124	128	15		(Corr'd Nav, Kongsberg 14208, img#632) (V)	
28-Aug-2018	16:30:34	633	ST18904-ENV23			Camera	104	32	628707	4467033	628746	4467170	-39	-137	142	16		(Corr'd Nav, Kongsberg 14208, img#633) (V)	
28-Aug-2018	16:31:01	634	ST18904-ENV23			Camera	104	32	628707	4467027	628746	4467170	-39	-142	147	15		(Corr'd Nav, Kongsberg 14208, img#634) (V)	
28-Aug-2018	16:31:31	635	ST18904-ENV23			Camera	104	32	628708	4467024	628746	4467170	-38	-146	151	15		(Corr'd Nav, Kongsberg 14208, img#635) (V)	
28-Aug-2018	16:31:42	636	ST18904-ENV23			Camera	104	32	628708	4467022	628746	4467170	-38	-147	152	14		(Corr'd Nav, Kongsberg 14208, img#636) (V)	
28-Aug-2018	16:32:07	637	ST18904-ENV23			Camera	104	32	628707	4467019	628746	4467170	-39	-151	156	14		(Corr'd Nav, Kongsberg 14208, img#637) (V)	
28-Aug-2018	16:32:47	638	ST18904-ENV23			Camera	104	32	628704	4467012	628746	4467170	-41	-157	162	15		(Corr'd Nav, Kongsberg 14208, img#638) (V)	
28-Aug-2018	16:33:34	639	ST18904-ENV23			Camera	104	32	628702	4467006	628746	4467170	-43	-164	169	15		(Corr'd Nav, Kongsberg 14208, img#639) (V)	
28-Aug-2018	16:33:59	640	ST18904-ENV23			Camera	104	32	628703	4467003	628746	4467170	-43	-166	172	15		(Corr'd Nav, Kongsberg 14208, img#640) (V)	
28-Aug-2018	16:34:43	641	ST18904-ENV23			Camera	105	32	628700	4466997	628746	4467170	-46	-172	178	15		(Corr'd Nav, Kongsberg 14208, img#641) (V)	
28-Aug-2018	16:35:11	642	ST18904-ENV23			Camera	105	32	628698	4466992	628746	4467170	-48	-178	184	15		(Corr'd Nav, Kongsberg 14208, img#642) (V)	
28-Aug-2018	16:35:27	643	ST18904-ENV23			Camera	105	32	628698	4466989	628746	4467170	-48	-181	187	15		(Corr'd Nav, Kongsberg 14208, img#643) (V)	

Grey columns denote where no information is required

APPENDIX A FIELD SAMPLING LOGS

Table A.3 Seabed Imagery Surveyors Logs

Gardline														Seafloor Sampling Positioning Summary												
Job No		11179							Vessel		MV Ocean Researcher															
Client		Equinor US Wind LLC							Vessel Reference Point (VRP)		CoG															
Project Name		Equinor Wind OCS-A 0512							Deployment Location		Starboard A-frame				x		8.96		y		-3.08		z		6.05	
Primary Positioning System		Starpack 1							Actual Coordinates derived from		Deployment Location															
Geodetic Reference System		Datum		NAD83			Ellipsoid		GRS 80			Projection		UTM ZONE 18 N (75 W)				Vertical / Tidal Datum		NAVD88						
Date	Time (UTC/GMT)	Fix number	Stn No	Penetration	Sample Retention	Retention	Observed Seafloor Depth (feet)	Observed Seafloor Depth (m)	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks								
									Easting	Northing	Easting	Northing	dE	dN	Range	Bearing										
28-Aug-2018	16:36:14	644	ST18904-ENV23			Camera	105	32	628699	4466983	628746	4467170	-47	-186	192	14		(Cor'd Nav, Kongsberg 14208, img#644) (V)								
28-Aug-2018	16:36:28	645	ST18904-ENV23			Camera	105	32	628699	4466982	628746	4467170	-47	-187	193	14		(Cor'd Nav, Kongsberg 14208, img#645) (V)								
28-Aug-2018	16:36:49	646	ST18904-ENV23			Camera	105	32	628700	4466980	628746	4467170	-46	-189	195	14		(Cor'd Nav, Kongsberg 14208, img#646) (V)								
28-Aug-2018	16:37:16	647	ST18904-ENV23			Camera	105	32	628699	4466977	628746	4467170	-46	-192	198	14		(Cor'd Nav, Kongsberg 14208, img#647) (V)								
28-Aug-2018	16:37:27	648	ST18904-ENV23			Camera	105	32	628699	4466976	628746	4467170	-47	-194	199	14		(Cor'd Nav, Kongsberg 14208, img#648) (V)								
28-Aug-2018	18:19:34	649	ST18904-ENV22			Camera	104	32	629110	4468494	629104	4468483	6	11	12	211		(Cor'd Nav, Kongsberg 14208, img#649) (V)								
28-Aug-2018	18:20:16	650	ST18904-ENV22			Camera	103	31	629110	4468497	629104	4468483	6	14	15	203		(Cor'd Nav, Kongsberg 14208, img#650) (V)								
28-Aug-2018	18:20:48	651	ST18904-ENV22			Camera	103	31	629108	4468500	629104	4468483	4	17	17	193		(Cor'd Nav, Kongsberg 14208, img#651) (V)								
28-Aug-2018	18:21:48	652	ST18904-ENV22			Camera	103	31	629106	4468502	629104	4468483	2	19	19	185		(Cor'd Nav, Kongsberg 14208, img#652) (V)								
28-Aug-2018	18:23:05	653	ST18904-ENV22			Camera	103	31	629108	4468500	629104	4468483	4	17	18	192		(Cor'd Nav, Kongsberg 14208, img#653) (V)								
28-Aug-2018	18:24:13	654	ST18904-ENV22			Camera	104	32	629110	4468492	629104	4468483	6	9	10	213		(Cor'd Nav, Kongsberg 14208, img#654) (V)								
28-Aug-2018	18:25:05	655	ST18904-ENV22			Camera	104	32	629110	4468479	629104	4468483	6	-4	7	299		(Cor'd Nav, Kongsberg 14208, img#655) (V)								
28-Aug-2018	18:25:43	656	ST18904-ENV22			Camera	104	32	629113	4468472	629104	4468483	9	-11	14	321		(Cor'd Nav, Kongsberg 14208, img#656) (V)								
28-Aug-2018	18:26:14	657	ST18904-ENV22			Camera	104	32	629115	4468466	629104	4468483	11	-17	20	327		(Cor'd Nav, Kongsberg 14208, img#657) (V)								
28-Aug-2018	18:26:33	658	ST18904-ENV22			Camera	104	32	629116	4468462	629104	4468483	12	-21	24	330		(Cor'd Nav, Kongsberg 14208, img#658) (V)								
28-Aug-2018	18:27:05	659	ST18904-ENV22			Camera	104	32	629116	4468455	629104	4468483	12	-28	31	337		(Cor'd Nav, Kongsberg 14208, img#659) (V)								
28-Aug-2018	18:27:28	660	ST18904-ENV22			Camera	104	32	629116	4468451	629104	4468483	12	-32	35	339		(Cor'd Nav, Kongsberg 14208, img#660) (V)								
28-Aug-2018	18:27:45	661	ST18904-ENV22			Camera	104	32	629116	4468449	629104	4468483	12	-34	36	341		(Cor'd Nav, Kongsberg 14208, img#661) (V)								
28-Aug-2018	18:28:07	662	ST18904-ENV22			Camera	104	32	629115	4468446	629104	4468483	11	-37	38	343		(Cor'd Nav, Kongsberg 14208, img#662) (V)								
28-Aug-2018	18:28:39	663	ST18904-ENV22			Camera	104	32	629115	4468442	629104	4468483	11	-41	42	345		(Cor'd Nav, Kongsberg 14208, img#663) (V)								
28-Aug-2018	18:28:51	664	ST18904-ENV22			Camera	104	32	629115	4468440	629104	4468483	11	-43	44	345		(Cor'd Nav, Kongsberg 14208, img#664) (V)								
28-Aug-2018	18:29:19	665	ST18904-ENV22			Camera	104	32	629114	4468437	629104	4468483	10	-46	47	347		(Cor'd Nav, Kongsberg 14208, img#665) (V)								
28-Aug-2018	18:29:39	666	ST18904-ENV22			Camera	104	32	629113	4468434	629104	4468483	9	-49	49	350		(Cor'd Nav, Kongsberg 14208, img#666) (V)								
28-Aug-2018	18:30:34	667	ST18904-ENV22			Camera	104	32	629107	4468425	629104	4468483	3	-58	58	357		(Cor'd Nav, Kongsberg 14208, img#667) (V)								
28-Aug-2018	18:30:46	668	ST18904-ENV22			Camera	104	32	629107	4468423	629104	4468483	3	-60	60	357		(Cor'd Nav, Kongsberg 14208, img#668) (V)								
28-Aug-2018	18:31:20	669	ST18904-ENV22			Camera	104	32	629105	4468419	629104	4468483	1	-64	64	359		(Cor'd Nav, Kongsberg 14208, img#669) (V)								
28-Aug-2018	18:31:52	670	ST18904-ENV22			Camera	104	32	629102	4468414	629104	4468483	-2	-69	69	2		(Cor'd Nav, Kongsberg 14208, img#670) (V)								
28-Aug-2018	18:32:16	671	ST18904-ENV22			Camera	104	32	629101	4468410	629104	4468483	-3	-73	73	2		(Cor'd Nav, Kongsberg 14208, img#671) (V)								
28-Aug-2018	18:32:28	672	ST18904-ENV22			Camera	104	32	629100	4468408	629104	4468483	-4	-75	75	3		(Cor'd Nav, Kongsberg 14208, img#672) (V)								
28-Aug-2018	18:32:44	673	ST18904-ENV22			Camera	104	32	629100	4468405	629104	4468483	-4	-78	78	3		(Cor'd Nav, Kongsberg 14208, img#673) (V)								
28-Aug-2018	18:33:46	674	ST18904-ENV22			Camera	104	32	629105	4468398	629104	4468483	1	-85	85	360		(Cor'd Nav, Kongsberg 14208, img#674) (V)								
28-Aug-2018	18:34:29	675	ST18904-ENV22			Camera	104	32	629108	4468395	629104	4468483	4	-88	88	358		(Cor'd Nav, Kongsberg 14208, img#675) (V)								
28-Aug-2018	18:34:41	676	ST18904-ENV22			Camera	104	32	629108	4468393	629104	4468483	4	-90	90	357		(Cor'd Nav, Kongsberg 14208, img#676) (V)								
28-Aug-2018	18:36:19	677	ST18904-ENV22			Camera	103	31	629107	4468378	629104	4468483	3	-105	105	358		(Cor'd Nav, Kongsberg 14208, img#677) (V)								
28-Aug-2018	18:36:44	678	ST18904-ENV22			Camera	103	31	629106	4468373	629104	4468483	2	-110	110	359		(Cor'd Nav, Kongsberg 14208, img#678) (V)								
28-Aug-2018	18:37:40	679	ST18904-ENV22			Camera	103	31	629105	4468367	629104	4468483	1	-116	116	359		(Cor'd Nav, Kongsberg 14208, img#679) (V)								
28-Aug-2018	18:40:37	680	ST18904-ENV22			Camera	103	31	629103	4468351	629104	4468483	-1	-132	132	0		(Cor'd Nav, Kongsberg 14208, img#680) (V)								
28-Aug-2018	18:41:52	681	ST18904-ENV22			Camera	102	31	629099	4468339	629104	4468483	-5	-144	144	2		(Cor'd Nav, Kongsberg 14208, img#681) (V)								

Grey columns denote where no information is required

APPENDIX A FIELD SAMPLING LOGS

Table A.3 Seabed Imagery Surveyors Logs

Gardline										Seafloor Sampling Positioning Summary										
Job No		11179								Vessel		MV Ocean Researcher								
Client		Equinor US Wind LLC								Vessel Reference Point (VRP)		CoG								
Project Name		Equinor Wind OCS-A 0512								Deployment Location		Starboard A-frame			x	8.96	y	-3.08	z	6.05
Primary Positioning System		Starpack 1								Actual Coordinates derived from		Deployment Location								
Geodetic Reference System		Datum		NAD83		Ellipsoid		GRS 80		Projection		UTM ZONE 18 N (75 W)				Vertical / Tidal Datum		NAVD88		
Date	Time (UTC/GMT)	Fix number	Stn No	Penetration	Sample Retention	Retention	Observed Seafloor Depth (feet)	Observed Seafloor Depth (m)	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks		
									Easting	Northing	Easting	Northing	dE	dN	Range	Bearing				
28-Aug-2018	18:43:06	682	ST18904-ENV22			Camera	102	31	629103	4468327	629104	4468483	-1	-156	156	1		(Cor'd Nav, Kongsberg 14208, img#682) (V)		
28-Aug-2018	18:43:45	683	ST18904-ENV22			Camera	102	31	629104	4468319	629104	4468483	0	-164	164	360		(Cor'd Nav, Kongsberg 14208, img#683) (V)		
28-Aug-2018	18:45:01	684	ST18904-ENV22			Camera	101	31	629108	4468306	629104	4468483	4	-177	177	359		(Cor'd Nav, Kongsberg 14208, img#684) (V)		
28-Aug-2018	18:45:23	685	ST18904-ENV22			Camera	101	31	629109	4468303	629104	4468483	5	-180	180	358		(Cor'd Nav, Kongsberg 14208, img#685) (V)		
28-Aug-2018	18:46:06	686	ST18904-ENV22			Camera	101	31	629109	4468296	629104	4468483	5	-187	187	358		(Cor'd Nav, Kongsberg 14208, img#686) (V)		
28-Aug-2018	18:47:39	687	ST18904-ENV22			Camera	100	31	629106	4468284	629104	4468483	2	-199	199	360		(Cor'd Nav, Kongsberg 14208, img#687) (V)		
28-Aug-2018	20:21:31	688	ST18904-ENV26			Camera	101	31	631020	4466957	631000	4466938	20	19	28	228		(Cor'd Nav, Kongsberg 14208, img#688) (V)		
28-Aug-2018	20:22:14	689	ST18904-ENV26			Camera	101	31	631022	4466951	631000	4466938	22	13	26	240		(Cor'd Nav, Kongsberg 14208, img#689) (V)		
28-Aug-2018	20:22:33	690	ST18904-ENV26			Camera	101	31	631022	4466948	631000	4466938	22	10	25	245		(Cor'd Nav, Kongsberg 14208, img#690) (V)		
28-Aug-2018	20:23:36	691	ST18904-ENV26			Camera	101	31	631019	4466942	631000	4466938	19	4	20	257		(Cor'd Nav, Kongsberg 14208, img#691) (V)		
28-Aug-2018	20:26:02	692	ST18904-ENV26			Camera	101	31	631003	4466938	631000	4466938	3	0	3	263		(Cor'd Nav, Kongsberg 14208, img#692) (V)		
28-Aug-2018	20:26:56	693	ST18904-ENV26			Camera	101	31	630992	4466935	631000	4466938	-8	-3	8	66		(Cor'd Nav, Kongsberg 14208, img#693) (V)		
28-Aug-2018	20:27:55	694	ST18904-ENV26			Camera	101	31	630980	4466928	631000	4466938	-20	-10	23	65		(Cor'd Nav, Kongsberg 14208, img#694) (V)		
28-Aug-2018	20:28:33	695	ST18904-ENV26			Camera	101	31	630971	4466922	631000	4466938	-29	-16	33	61		(Cor'd Nav, Kongsberg 14208, img#695) (V)		
28-Aug-2018	20:29:20	696	ST18904-ENV26			Camera	101	31	630962	4466912	631000	4466938	-38	-26	46	56		(Cor'd Nav, Kongsberg 14208, img#696) (V)		
28-Aug-2018	20:29:38	697	ST18904-ENV26			Camera	101	31	630959	4466909	631000	4466938	-41	-29	50	55		(Cor'd Nav, Kongsberg 14208, img#697) (V)		
28-Aug-2018	20:30:12	698	ST18904-ENV26			Camera	101	31	630955	4466904	631000	4466938	-45	-34	56	53		(Cor'd Nav, Kongsberg 14208, img#698) (V)		
28-Aug-2018	20:30:19	699	ST18904-ENV26			Camera	101	31	630955	4466903	631000	4466938	-45	-35	57	52		(Cor'd Nav, Kongsberg 14208, img#699) (V)		
28-Aug-2018	20:31:15	700	ST18904-ENV26			Camera	101	31	630955	4466894	631000	4466938	-45	-44	63	45		(Cor'd Nav, Kongsberg 14208, img#700) (V)		
28-Aug-2018	20:32:14	701	ST18904-ENV26			Camera	101	31	630960	4466884	631000	4466938	-40	-54	67	37		(Cor'd Nav, Kongsberg 14208, img#701) (V)		
28-Aug-2018	20:32:33	702	ST18904-ENV26			Camera	101	31	630961	4466881	631000	4466938	-39	-57	69	34		(Cor'd Nav, Kongsberg 14208, img#702) (V)		
28-Aug-2018	20:32:55	703	ST18904-ENV26			Camera	101	31	630963	4466878	631000	4466938	-37	-60	70	32		(Cor'd Nav, Kongsberg 14208, img#703) (V)		
28-Aug-2018	20:33:09	704	ST18904-ENV26			Camera	101	31	630964	4466877	631000	4466938	-36	-61	71	31		(Cor'd Nav, Kongsberg 14208, img#704) (V)		
28-Aug-2018	20:34:24	705	ST18904-ENV26			Camera	101	31	630963	4466871	631000	4466938	-37	-67	77	29		(Cor'd Nav, Kongsberg 14208, img#705) (V)		
28-Aug-2018	20:34:59	706	ST18904-ENV26			Camera	101	31	630960	4466865	631000	4466938	-40	-73	83	29		(Cor'd Nav, Kongsberg 14208, img#706) (V)		
28-Aug-2018	20:35:54	707	ST18904-ENV26			Camera	101	31	630957	4466859	631000	4466938	-43	-79	90	29		(Cor'd Nav, Kongsberg 14208, img#707) (V)		
28-Aug-2018	20:36:05	708	ST18904-ENV26			Camera	101	31	630956	4466859	631000	4466938	-44	-79	91	29		(Cor'd Nav, Kongsberg 14208, img#708) (V)		
28-Aug-2018	20:36:49	709	ST18904-ENV26			Camera	101	31	630951	4466855	631000	4466938	-49	-83	96	31		(Cor'd Nav, Kongsberg 14208, img#709) (V)		
28-Aug-2018	20:38:14	710	ST18904-ENV26			Camera	101	31	630940	4466841	631000	4466938	-60	-97	114	32		(Cor'd Nav, Kongsberg 14208, img#710) (V)		
28-Aug-2018	20:38:55	711	ST18904-ENV26			Camera	101	31	630937	4466837	631000	4466938	-63	-101	120	32		(Cor'd Nav, Kongsberg 14208, img#711) (V)		
28-Aug-2018	20:39:44	712	ST18904-ENV26			Camera	101	31	630933	4466831	631000	4466938	-67	-107	127	32		(Cor'd Nav, Kongsberg 14208, img#712) (V)		
28-Aug-2018	20:41:31	713	ST18904-ENV26			Camera	101	31	630928	4466815	631000	4466938	-72	-123	142	31		(Cor'd Nav, Kongsberg 14208, img#713) (V)		
28-Aug-2018	20:42:16	714	ST18904-ENV26			Camera	101	31	630924	4466809	631000	4466938	-76	-129	150	31		(Cor'd Nav, Kongsberg 14208, img#714) (V)		
28-Aug-2018	20:42:56	715	ST18904-ENV26			Camera	100	31	630920	4466805	631000	4466938	-80	-133	155	31		(Cor'd Nav, Kongsberg 14208, img#715) (V)		
28-Aug-2018	20:44:14	716	ST18904-ENV26			Camera	100	31	630914	4466797	631000	4466938	-86	-141	165	32		(Cor'd Nav, Kongsberg 14208, img#716) (V)		
28-Aug-2018	20:45:53	717	ST18904-ENV26			Camera	100	31	630903	4466784	631000	4466938	-97	-154	182	32		(Cor'd Nav, Kongsberg 14208, img#717) (V)		
28-Aug-2018	20:46:38	718	ST18904-ENV26			Camera	100	31	630899	4466779	631000	4466938	-101	-159	188	33		(Cor'd Nav, Kongsberg 14208, img#718) (V)		
28-Aug-2018	20:47:21	719	ST18904-ENV26			Camera	100	30	630896	4466772	631000	4466938	-104	-166	196	32		(Cor'd Nav, Kongsberg 14208, img#719) (V)		

Grey columns denote where no information is required

APPENDIX A FIELD SAMPLING LOGS

Table A.3 Seabed Imagery Surveyors Logs

Gardline										Seafloor Sampling Positioning Summary									
Job No		11179							Vessel		MV Ocean Researcher								
Client		Equinor US Wind LLC							Vessel Reference Point (VRP)		CoG								
Project Name		Equinor Wind OCS-A 0512							Deployment Location		Starboard A-frame			x	8.96	y	-3.08	z	6.05
Primary Positioning System		Starpack 1							Actual Coordinates derived from		Deployment Location								
Geodetic Reference System		Datum		NAD83		Ellipsoid		GRS 80		Projection		UTM ZONE 18 N (75 W)				Vertical / Tidal Datum		NAVD88	
Date	Time (UTC/GMT)	Fix number	Stn No	Penetration	Sample Retention	Retention	Observed Seafloor Depth (feet)	Observed Seafloor Depth (m)	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks	
									Easting	Northing	Easting	Northing	dE	dN	Range	Bearing			
28-Aug-2018	22:25:04	720	ST18904-ENV28			Camera	103	31	632206	4467647	632211	4467656	-5	-9	10	31		(Cor'd Nav, Kongsberg 14208, img#720) (V)	
28-Aug-2018	22:25:52	721	ST18904-ENV28			Camera	103	31	632215	4467644	632211	4467656	3	-11	12	344		(Cor'd Nav, Kongsberg 14208, img#721) (V)	
28-Aug-2018	22:26:04	722	ST18904-ENV28			Camera	103	31	632216	4467645	632211	4467656	5	-11	12	335		(Cor'd Nav, Kongsberg 14208, img#722) (V)	
28-Aug-2018	22:27:36	723	ST18904-ENV28			Camera	103	31	632227	4467641	632211	4467656	16	-15	21	314		(Cor'd Nav, Kongsberg 14208, img#723) (V)	
28-Aug-2018	22:28:22	724	ST18904-ENV28			Camera	103	31	632225	4467634	632211	4467656	14	-22	26	327		(Cor'd Nav, Kongsberg 14208, img#724) (V)	
28-Aug-2018	22:29:23	725	ST18904-ENV28			Camera	103	31	632218	4467624	632211	4467656	7	-32	33	348		(Cor'd Nav, Kongsberg 14208, img#725) (V)	
28-Aug-2018	22:30:19	726	ST18904-ENV28			Camera	103	31	632212	4467622	632211	4467656	1	-33	33	358		(Cor'd Nav, Kongsberg 14208, img#726) (V)	
28-Aug-2018	22:31:30	727	ST18904-ENV28			Camera	103	31	632203	4467626	632211	4467656	-8	-30	31	16		(Cor'd Nav, Kongsberg 14208, img#727) (V)	
28-Aug-2018	22:32:01	728	ST18904-ENV28			Camera	103	31	632200	4467628	632211	4467656	-12	-27	30	24		(Cor'd Nav, Kongsberg 14208, img#728) (V)	
28-Aug-2018	22:34:31	729	ST18904-ENV28			Camera	103	31	632208	4467641	632211	4467656	-3	-15	15	12		(Cor'd Nav, Kongsberg 14208, img#729) (V)	
28-Aug-2018	22:37:10	730	ST18904-ENV28			Camera	102	31	632192	4467622	632211	4467656	-19	-34	39	30		(Cor'd Nav, Kongsberg 14208, img#730) (V)	
28-Aug-2018	22:38:22	731	ST18904-ENV28			Camera	103	31	632188	4467605	632211	4467656	-24	-51	56	25		(Cor'd Nav, Kongsberg 14208, img#731) (V)	
28-Aug-2018	22:38:49	732	ST18904-ENV28			Camera	102	31	632187	4467600	632211	4467656	-24	-56	61	23		(Cor'd Nav, Kongsberg 14208, img#732) (V)	
28-Aug-2018	22:40:10	733	ST18904-ENV28			Camera	103	31	632186	4467588	632211	4467656	-25	-68	73	20		(Cor'd Nav, Kongsberg 14208, img#733) (V)	
28-Aug-2018	22:41:13	734	ST18904-ENV28			Camera	103	31	632183	4467580	632211	4467656	-29	-76	81	21		(Cor'd Nav, Kongsberg 14208, img#734) (V)	
28-Aug-2018	22:42:45	735	ST18904-ENV28			Camera	102	31	632173	4467573	632211	4467656	-38	-83	91	25		(Cor'd Nav, Kongsberg 14208, img#735) (V)	
28-Aug-2018	22:43:38	736	ST18904-ENV28			Camera	103	31	632168	4467565	632211	4467656	-43	-91	100	25		(Cor'd Nav, Kongsberg 14208, img#736) (V)	
28-Aug-2018	22:44:53	737	ST18904-ENV28			Camera	103	31	632161	4467559	632211	4467656	-51	-96	109	28		(Cor'd Nav, Kongsberg 14208, img#737) (V)	
28-Aug-2018	22:46:40	738	ST18904-ENV28			Camera	103	31	632147	4467557	632211	4467656	-64	-99	118	33		(Cor'd Nav, Kongsberg 14208, img#738) (V)	
28-Aug-2018	22:48:44	739	ST18904-ENV28			Camera	103	31	632137	4467534	632211	4467656	-74	-121	142	32		(Cor'd Nav, Kongsberg 14208, img#739) (V)	
28-Aug-2018	22:50:06	740	ST18904-ENV28			Camera	103	31	632133	4467519	632211	4467656	-78	-137	157	30		(Cor'd Nav, Kongsberg 14208, img#740) (V)	
28-Aug-2018	22:51:21	741	ST18904-ENV28			Camera	103	31	632139	4467512	632211	4467656	-73	-144	161	27		(Cor'd Nav, Kongsberg 14208, img#741) (V)	
28-Aug-2018	22:53:29	742	ST18904-ENV28			Camera	103	32	632134	4467501	632211	4467656	-77	-155	173	26		(Cor'd Nav, Kongsberg 14208, img#742) (V)	
28-Aug-2018	22:54:20	743	ST18904-ENV28			Camera	104	32	632121	4467493	632211	4467656	-90	-163	186	29		(Cor'd Nav, Kongsberg 14208, img#743) (V)	
28-Aug-2018	22:57:17	744	ST18904-ENV28			Camera	103	31	632108	4467496	632211	4467656	-103	-160	191	33		(Cor'd Nav, Kongsberg 14208, img#744) (V)	
28-Aug-2018	22:58:09	745	ST18904-ENV28			Camera	104	32	632101	4467488	632211	4467656	-111	-168	201	33		(Cor'd Nav, Kongsberg 14208, img#745) (V)	
30-Aug-2018	22:23:04	746	ST18904-ENV45			Camera	116	35	639667	4459325	639649	4459336	18	-11	21	302		(Cor'd Nav, Kongsberg 14208, img#746) (V)	
30-Aug-2018	22:23:41	747	ST18904-ENV45			Camera	116	35	639669	4459325	639649	4459336	20	-11	22	299		(Cor'd Nav, Kongsberg 14208, img#747) (V)	
30-Aug-2018	22:26:35	748	ST18904-ENV45			Camera	116	35	639652	4459339	639649	4459336	3	2	4	234		(Cor'd Nav, Kongsberg 14208, img#748) (V)	
30-Aug-2018	22:27:06	749	ST18904-ENV45			Camera	116	35	639644	4459340	639649	4459336	-5	3	6	126		(Cor'd Nav, Kongsberg 14208, img#749) (V)	
30-Aug-2018	22:28:21	750	ST18904-ENV45			Camera	116	35	639624	4459340	639649	4459336	-25	4	25	98		(Cor'd Nav, Kongsberg 14208, img#750) (V)	
30-Aug-2018	22:30:08	751	ST18904-ENV45			Camera	116	35	639620	4459346	639649	4459336	-29	9	30	108		(Cor'd Nav, Kongsberg 14208, img#751) (V)	
30-Aug-2018	22:31:12	752	ST18904-ENV45			Camera	116	35	639621	4459356	639649	4459336	-27	20	34	125		(Cor'd Nav, Kongsberg 14208, img#752) (V)	
30-Aug-2018	22:32:38	753	ST18904-ENV45			Camera	116	35	639608	4459354	639649	4459336	-41	18	45	113		(Cor'd Nav, Kongsberg 14208, img#753) (V)	
30-Aug-2018	22:35:39	754	ST18904-ENV45			Camera	116	35	639596	4459364	639649	4459336	-53	28	60	118		(Cor'd Nav, Kongsberg 14208, img#754) (V)	
30-Aug-2018	22:37:57	755	ST18904-ENV45			Camera	116	35	639579	4459376	639649	4459336	-70	40	80	120		(Cor'd Nav, Kongsberg 14208, img#755) (V)	
30-Aug-2018	22:39:09	756	ST18904-ENV45			Camera	116	35	639566	4459379	639649	4459336	-83	43	94	117		(Cor'd Nav, Kongsberg 14208, img#756) (V)	
30-Aug-2018	22:39:57	757	ST18904-ENV45			Camera	116	35	639556	4459383	639649	4459336	-93	46	104	116		(Cor'd Nav, Kongsberg 14208, img#757) (V)	

Grey columns denote where no information is required

APPENDIX A FIELD SAMPLING LOGS

Table A.3 Seabed Imagery Surveyors Logs

Gardline										Seafloor Sampling Positioning Summary									
Job No		11179							Vessel		MV Ocean Researcher								
Client		Equinor US Wind LLC							Vessel Reference Point (VRP)		CoG								
Project Name		Equinor Wind OCS-A 0512							Deployment Location		Starboard A-frame			x	8.96	y	-3.08	z	6.05
Primary Positioning System		Starpack 1							Actual Coordinates derived from		Deployment Location								
Geodetic Reference System		Datum		NAD83		Ellipsoid	GRS 80		Projection		UTM ZONE 18 N (75 W)				Vertical / Tidal Datum		NAVD88		
Date	Time (UTC/GMT)	Fix number	Stn No	Penetration	Sample Retention	Retention	Observed Seafloor Depth (feet)	Observed Seafloor Depth (m)	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks	
									Easting	Northing	Easting	Northing	dE	dN	Range	Bearing			
30-Aug-2018	22:40:33	758	ST18904-ENV45			Camera	116	35	639550	4459385	639649	4459336	-99	49	110	116		(Corr'd Nav, Kongsberg 14208, img#758) (V)	
30-Aug-2018	22:42:10	759	ST18904-ENV45			Camera	116	35	639533	4459394	639649	4459336	-116	57	129	116		(Corr'd Nav, Kongsberg 14208, img#759) (V)	
30-Aug-2018	22:43:16	760	ST18904-ENV45			Camera	116	35	639523	4459399	639649	4459336	-126	63	140	116		(Corr'd Nav, Kongsberg 14208, img#760) (V)	
30-Aug-2018	22:44:04	761	ST18904-ENV45			Camera	116	35	639516	4459404	639649	4459336	-133	68	149	117		(Corr'd Nav, Kongsberg 14208, img#761) (V)	
30-Aug-2018	22:44:15	762	ST18904-ENV45			Camera	116	35	639514	4459405	639649	4459336	-135	69	151	117		(Corr'd Nav, Kongsberg 14208, img#762) (V)	
30-Aug-2018	22:44:55	763	ST18904-ENV45			Camera	116	35	639508	4459408	639649	4459336	-141	71	158	117		(Corr'd Nav, Kongsberg 14208, img#763) (V)	
30-Aug-2018	22:45:48	764	ST18904-ENV45			Camera	116	35	639500	4459410	639649	4459336	-149	74	167	116		(Corr'd Nav, Kongsberg 14208, img#764) (V)	
30-Aug-2018	22:46:13	765	ST18904-ENV45			Camera	116	35	639496	4459412	639649	4459336	-153	76	171	116		(Corr'd Nav, Kongsberg 14208, img#765) (V)	
30-Aug-2018	22:46:41	766	ST18904-ENV45			Camera	116	35	639491	4459414	639649	4459336	-157	78	176	116		(Corr'd Nav, Kongsberg 14208, img#766) (V)	
30-Aug-2018	22:47:44	767	ST18904-ENV45			Camera	115	35	639483	4459420	639649	4459336	-166	84	186	117		(Corr'd Nav, Kongsberg 14208, img#767) (V)	
30-Aug-2018	22:48:39	768	ST18904-ENV45			Camera	116	35	639476	4459424	639649	4459336	-173	88	194	117		(Corr'd Nav, Kongsberg 14208, img#768) (V)	
30-Aug-2018	22:49:20	769	ST18904-ENV45			Camera	116	35	639469	4459424	639649	4459336	-180	87	200	116		(Corr'd Nav, Kongsberg 14208, img#769) (V)	
03-Sep-2018	15:47:16	770	ST18904-ENV72			Camera	100	31	628028	4468126	628134	4468137	-8	10	13	142		(Corr'd Nav, Kongsberg 14208, img#1) (V)	
03-Sep-2018	15:47:57	771	ST18904-ENV72			Camera	100	31	628033	4468125	628134	4468137	-3	9	10	161		(Corr'd Nav, Kongsberg 14208, img#2) (V)	
03-Sep-2018	15:48:31	772	ST18904-ENV72			Camera	100	31	628037	4468122	628134	4468137	2	6	6	194		(Corr'd Nav, Kongsberg 14208, img#3) (V)	
03-Sep-2018	15:48:41	773	ST18904-ENV72			Camera	100	31	628039	4468121	628134	4468137	3	5	6	207		(Corr'd Nav, Kongsberg 14208, img#4) (V)	
03-Sep-2018	15:48:54	774	ST18904-ENV72			Camera	100	31	628040	4468120	628134	4468137	4	4	6	226		(Corr'd Nav, Kongsberg 14208, img#5) (V)	
03-Sep-2018	15:49:10	775	ST18904-ENV72			Camera	100	31	628042	4468118	628134	4468137	6	3	7	248		(Corr'd Nav, Kongsberg 14208, img#6) (V)	
03-Sep-2018	15:49:40	776	ST18904-ENV72			Camera	100	31	628047	4468116	628134	4468137	11	0	11	268		(Corr'd Nav, Kongsberg 14208, img#7) (V)	
03-Sep-2018	15:50:21	777	ST18904-ENV72			Camera	100	31	628052	4468114	628134	4468137	16	-2	16	277		(Corr'd Nav, Kongsberg 14208, img#8) (V)	
03-Sep-2018	15:51:56	778	ST18904-ENV72			Camera	100	31	628057	4468116	628134	4468137	21	0	21	269		(Corr'd Nav, Kongsberg 14208, img#9) (V)	
03-Sep-2018	15:53:21	779	ST18904-ENV72			Camera	100	31	628063	4468118	628134	4468137	27	2	27	265		(Corr'd Nav, Kongsberg 14208, img#10) (V)	
03-Sep-2018	15:54:22	780	ST18904-ENV72			Camera	100	31	628077	4468115	628134	4468137	41	-1	41	272		(Corr'd Nav, Kongsberg 14208, img#11) (V)	
03-Sep-2018	15:55:27	781	ST18904-ENV72			Camera	100	31	628085	4468118	628134	4468137	49	3	49	267		(Corr'd Nav, Kongsberg 14208, img#12) (V)	
03-Sep-2018	15:56:58	782	ST18904-ENV72			Camera	101	31	628106	4468124	628134	4468137	70	9	71	263		(Corr'd Nav, Kongsberg 14208, img#782) (V)	
03-Sep-2018	15:57:12	783	ST18904-ENV72			Camera	101	31	628109	4468126	628134	4468137	74	10	74	262		(Corr'd Nav, Kongsberg 14208, img#783) (V)	
03-Sep-2018	15:58:58	784	ST18904-ENV72			Camera	101	31	628135	4468129	628134	4468137	99	14	100	262		(Corr'd Nav, Kongsberg 14208, img#784) (V)	
03-Sep-2018	15:59:28	785	ST18904-ENV72			Camera	101	31	628142	4468132	628134	4468137	106	16	107	261		(Corr'd Nav, Kongsberg 14208, img#785) (V)	
03-Sep-2018	16:00:48	786	ST18904-ENV72			Camera	101	31	628161	4468138	628134	4468137	126	23	128	260		(Corr'd Nav, Kongsberg 14208, img#786) (V)	
03-Sep-2018	16:01:08	787	ST18904-ENV72			Camera	101	31	628167	4468139	628134	4468137	131	23	133	260		(Corr'd Nav, Kongsberg 14208, img#787) (V)	
03-Sep-2018	16:01:27	788	ST18904-ENV72			Camera	101	31	628172	4468139	628134	4468137	136	23	138	260		(Corr'd Nav, Kongsberg 14208, img#788) (V)	
03-Sep-2018	16:02:08	789	ST18904-ENV72			Camera	100	31	628182	4468139	628134	4468137	146	24	148	261		(Corr'd Nav, Kongsberg 14208, img#789) (V)	
03-Sep-2018	16:02:38	790	ST18904-ENV72			Camera	100	30	628187	4468142	628134	4468137	151	26	153	260		(Corr'd Nav, Kongsberg 14208, img#790) (V)	
03-Sep-2018	16:03:36	791	ST18904-ENV72			Camera	100	31	628195	4468146	628134	4468137	159	30	162	259		(Corr'd Nav, Kongsberg 14208, img#791) (V)	
03-Sep-2018	16:04:28	792	ST18904-ENV72			Camera	101	31	628206	4468145	628134	4468137	170	29	172	260		(Corr'd Nav, Kongsberg 14208, img#792) (V)	
03-Sep-2018	16:05:09	793	ST18904-ENV72			Camera	101	31	628212	4468145	628134	4468137	176	29	178	261		(Corr'd Nav, Kongsberg 14208, img#793) (V)	
03-Sep-2018	16:06:53	794	ST18904-ENV72			Camera	101	31	628216	4468154	628134	4468137	180	38	184	258		(Corr'd Nav, Kongsberg 14208, img#794) (V)	
03-Sep-2018	16:08:03	795	ST18904-ENV72			Camera	101	31	628228	4468157	628134	4468137	192	42	196	258		(Corr'd Nav, Kongsberg 14208, img#795) (V)	

Grey columns denote where no information is required

APPENDIX A FIELD SAMPLING LOGS

Table A.3 Seabed Imagery Surveyors Logs

Seafloor Sampling Positioning Summary																			
Job No		11179							Vessel		MV Ocean Researcher								
Client		Equinor US Wind LLC							Vessel Reference Point (VRP)		CoG								
Project Name		Equinor Wind OCS-A 0512							Deployment Location		Starboard A-frame			x	8.96	y	-3.08	z	6.05
Primary Positioning System		Starpack 1							Actual Coordinates derived from		Deployment Location								
Geodetic Reference System		Datum		NAD83		Ellipsoid		GRS 80		Projection		UTM ZONE 18 N (75 W)			Vertical / Tidal Datum		NAVD88		
Date	Time (UTC/GMT)	Fix number	Stn No	Penetration	Sample Retention	Retention	Observed Seafloor Depth (feet)	Observed Seafloor Depth (m)	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks	
									Easting	Northing	Easting	Northing	dE	dN	Range	Bearing			
03-Sep-2018	16:08:23	796	ST18904-ENV72			Camera	101	31	628232	4468158	628134	4468137	196	42	200	258		(Cor'd Nav, Kongsberg 14208, img#796) (V)	
03-Sep-2018	22:15:26	797	ST18904-ENV25			Camera	104	32	630803	4468162	630813	4468136	-10	27	28	160		(Cor'd Nav, Kongsberg 14208, img#797) (V)	
03-Sep-2018	22:20:22	798	ST18904-ENV25			Camera	104	32	630821	4468131	630813	4468136	8	-4	9	299		(Cor'd Nav, Kongsberg 14208, img#798) (V)	
03-Sep-2018	22:21:15	799	ST18904-ENV25			Camera	104	32	630825	4468124	630813	4468136	13	-11	17	312		(Cor'd Nav, Kongsberg 14208, img#799) (V)	
03-Sep-2018	22:22:28	800	ST18904-ENV25			Camera	104	32	630834	4468123	630813	4468136	21	-12	24	300		(Cor'd Nav, Kongsberg 14208, img#800) (V)	
03-Sep-2018	22:23:34	801	ST18904-ENV25			Camera	105	32	630835	4468112	630813	4468136	23	-23	32	316		(Cor'd Nav, Kongsberg 14208, img#801) (V)	
03-Sep-2018	22:24:04	802	ST18904-ENV25			Camera	105	32	630841	4468108	630813	4468136	28	-28	39	315		(Cor'd Nav, Kongsberg 14208, img#802) (V)	
03-Sep-2018	22:24:41	803	ST18904-ENV25			Camera	105	32	630847	4468101	630813	4468136	34	-34	48	315		(Cor'd Nav, Kongsberg 14208, img#803) (V)	
03-Sep-2018	22:25:31	804	ST18904-ENV25			Camera	105	32	630853	4468087	630813	4468136	40	-49	63	321		(Cor'd Nav, Kongsberg 14208, img#804) (V)	
03-Sep-2018	22:26:16	805	ST18904-ENV25			Camera	105	32	630862	4468076	630813	4468136	49	-59	77	320		(Cor'd Nav, Kongsberg 14208, img#805) (V)	
03-Sep-2018	22:27:01	806	ST18904-ENV25			Camera	105	32	630876	4468073	630813	4468136	63	-62	89	315		(Cor'd Nav, Kongsberg 14208, img#806) (V)	
03-Sep-2018	22:27:55	807	ST18904-ENV25			Camera	105	32	630888	4468062	630813	4468136	75	-74	105	315		(Cor'd Nav, Kongsberg 14208, img#807) (V)	
03-Sep-2018	22:28:43	808	ST18904-ENV25			Camera	105	32	630895	4468055	630813	4468136	82	-80	115	314		(Cor'd Nav, Kongsberg 14208, img#808) (V)	
03-Sep-2018	22:29:53	809	ST18904-ENV25			Camera	105	32	630904	4468053	630813	4468136	91	-83	123	312		(Cor'd Nav, Kongsberg 14208, img#809) (V)	
03-Sep-2018	22:30:24	810	ST18904-ENV25			Camera	105	32	630902	4468047	630813	4468136	89	-88	126	315		(Cor'd Nav, Kongsberg 14208, img#810) (V)	
03-Sep-2018	22:31:18	811	ST18904-ENV25			Camera	105	32	630902	4468037	630813	4468136	89	-99	133	318		(Cor'd Nav, Kongsberg 14208, img#811) (V)	
03-Sep-2018	22:32:01	812	ST18904-ENV25			Camera	105	32	630901	4468029	630813	4468136	88	-107	138	321		(Cor'd Nav, Kongsberg 14208, img#812) (V)	
03-Sep-2018	22:33:09	813	ST18904-ENV25			Camera	105	32	630907	4468019	630813	4468136	94	-117	150	321		(Cor'd Nav, Kongsberg 14208, img#813) (V)	
03-Sep-2018	22:33:52	814	ST18904-ENV25			Camera	105	32	630911	4468014	630813	4468136	99	-121	156	321		(Cor'd Nav, Kongsberg 14208, img#814) (V)	
03-Sep-2018	22:35:18	815	ST18904-ENV25			Camera	105	32	630921	4468002	630813	4468136	108	-134	172	321		(Cor'd Nav, Kongsberg 14208, img#815) (V)	
03-Sep-2018	22:35:47	816	ST18904-ENV25			Camera	105	32	630926	4467998	630813	4468136	113	-137	178	321		(Cor'd Nav, Kongsberg 14208, img#816) (V)	
03-Sep-2018	22:36:23	817	ST18904-ENV25			Camera	105	32	630930	4467993	630813	4468136	117	-143	185	321		(Cor'd Nav, Kongsberg 14208, img#817) (V)	
03-Sep-2018	22:36:49	818	ST18904-ENV25			Camera	105	32	630932	4467988	630813	4468136	119	-148	190	321		(Cor'd Nav, Kongsberg 14208, img#818) (V)	
03-Sep-2018	22:37:17	819	ST18904-ENV25			Camera	104	32	630935	4467982	630813	4468136	122	-154	196	322		(Cor'd Nav, Kongsberg 14208, img#819) (V)	
04-Sep-2018	00:44:39	820	ST18904-ENV47			Camera	105	32	632461	4467141	632462	4467139	-2	2	3	144		(Cor'd Nav, Kongsberg 14208, img#820) (V)	
04-Sep-2018	00:44:57	821	ST18904-ENV47			Camera	105	32	632461	4467141	632462	4467139	-1	2	2	148		(Cor'd Nav, Kongsberg 14208, img#821) (V)	
04-Sep-2018	00:46:15	822	ST18904-ENV47			Camera	105	32	632471	4467141	632462	4467139	9	2	9	256		(Cor'd Nav, Kongsberg 14208, img#822) (V)	
04-Sep-2018	00:47:44	823	ST18904-ENV47			Camera	104	32	632475	4467129	632462	4467139	12	-10	16	311		(Cor'd Nav, Kongsberg 14208, img#823) (V)	
04-Sep-2018	00:47:55	824	ST18904-ENV47			Camera	104	32	632476	4467128	632462	4467139	14	-11	18	309		(Cor'd Nav, Kongsberg 14208, img#824) (V)	
04-Sep-2018	00:48:30	825	ST18904-ENV47			Camera	104	32	632484	4467130	632462	4467139	22	-9	24	293		(Cor'd Nav, Kongsberg 14208, img#825) (V)	
04-Sep-2018	00:49:13	826	ST18904-ENV47			Camera	104	32	632492	4467129	632462	4467139	30	-10	31	288		(Cor'd Nav, Kongsberg 14208, img#826) (V)	
04-Sep-2018	00:49:35	827	ST18904-ENV47			Camera	104	32	632495	4467126	632462	4467139	32	-14	35	293		(Cor'd Nav, Kongsberg 14208, img#827) (V)	
04-Sep-2018	00:50:06	828	ST18904-ENV47			Camera	104	32	632498	4467118	632462	4467139	36	-21	41	300		(Cor'd Nav, Kongsberg 14208, img#828) (V)	
04-Sep-2018	00:50:30	829	ST18904-ENV47			Camera	104	32	632502	4467115	632462	4467139	40	-24	46	301		(Cor'd Nav, Kongsberg 14208, img#829) (V)	
04-Sep-2018	00:50:59	830	ST18904-ENV47			Camera	104	32	632509	4467116	632462	4467139	46	-23	52	296		(Cor'd Nav, Kongsberg 14208, img#830) (V)	
04-Sep-2018	00:51:26	831	ST18904-ENV47			Camera	104	32	632515	4467117	632462	4467139	53	-22	57	293		(Cor'd Nav, Kongsberg 14208, img#831) (V)	
04-Sep-2018	00:51:40	832	ST18904-ENV47			Camera	104	32	632519	4467116	632462	4467139	56	-23	61	292		(Cor'd Nav, Kongsberg 14208, img#832) (V)	
04-Sep-2018	00:52:36	833	ST18904-ENV47			Camera	103	31	632531	4467105	632462	4467139	69	-34	77	297		(Cor'd Nav, Kongsberg 14208, img#833) (V)	

Grey columns denote where no information is required

APPENDIX A FIELD SAMPLING LOGS

Table A.3 Seabed Imagery Surveyors Logs

Gardline										Seafloor Sampling Positioning Summary									
Job No		11179								Vessel		MV Ocean Researcher							
Client		Equinor US Wind LLC								Vessel Reference Point (VRP)		CoG							
Project Name		Equinor Wind OCS-A 0512								Deployment Location		Starboard A-frame		x	8.96	y	-3.08	z	6.05
Primary Positioning System		Starpack 1								Actual Coordinates derived from		Deployment Location							
Geodetic Reference System		Datum		NAD83		Ellipsoid		GRS 80		Projection		UTM ZONE 18 N (75 W)				Vertical / Tidal Datum		NAVD88	
Date	Time (UTC/GMT)	Fix number	Stn No	Penetration	Sample Retention	Retention	Observed Seafloor Depth (feet)	Observed Seafloor Depth (m)	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks	
									Easting	Northing	Easting	Northing	dE	dN	Range	Bearing			
04-Sep-2018	00:53:47	834	ST18904-ENV47			Camera	103	31	632545	4467099	632462	4467139	82	-40	91	296		(Cor'd Nav, Kongsberg 14208, img#834) (V)	
04-Sep-2018	00:54:13	835	ST18904-ENV47			Camera	103	31	632552	4467098	632462	4467139	90	-41	99	294		(Cor'd Nav, Kongsberg 14208, img#835) (V)	
04-Sep-2018	00:54:47	836	ST18904-ENV47			Camera	103	31	632561	4467092	632462	4467139	98	-47	109	295		(Cor'd Nav, Kongsberg 14208, img#836) (V)	
04-Sep-2018	00:55:38	837	ST18904-ENV47			Camera	102	31	632569	4467081	632462	4467139	107	-58	122	299		(Cor'd Nav, Kongsberg 14208, img#837) (V)	
04-Sep-2018	00:56:12	838	ST18904-ENV47			Camera	102	31	632575	4467073	632462	4467139	112	-66	130	301		(Cor'd Nav, Kongsberg 14208, img#838) (V)	
04-Sep-2018	00:56:53	839	ST18904-ENV47			Camera	102	31	632581	4467069	632462	4467139	119	-70	138	301		(Cor'd Nav, Kongsberg 14208, img#839) (V)	
04-Sep-2018	00:57:23	840	ST18904-ENV47			Camera	102	31	632587	4467067	632462	4467139	124	-72	143	300		(Cor'd Nav, Kongsberg 14208, img#840) (V)	
04-Sep-2018	00:58:03	841	ST18904-ENV47			Camera	102	31	632594	4467064	632462	4467139	131	-75	151	300		(Cor'd Nav, Kongsberg 14208, img#841) (V)	
04-Sep-2018	00:58:40	842	ST18904-ENV47			Camera	102	31	632600	4467059	632462	4467139	137	-80	159	300		(Cor'd Nav, Kongsberg 14208, img#842) (V)	
04-Sep-2018	00:59:31	843	ST18904-ENV47			Camera	102	31	632608	4467055	632462	4467139	145	-84	168	300		(Cor'd Nav, Kongsberg 14208, img#843) (V)	
04-Sep-2018	01:00:41	844	ST18904-ENV47			Camera	102	31	632619	4467052	632462	4467139	157	-87	180	299		(Cor'd Nav, Kongsberg 14208, img#844) (V)	
04-Sep-2018	01:01:24	845	ST18904-ENV47			Camera	101	31	632625	4467047	632462	4467139	163	-92	187	299		(Cor'd Nav, Kongsberg 14208, img#845) (V)	
04-Sep-2018	01:01:50	846	ST18904-ENV47			Camera	101	31	632629	4467045	632462	4467139	166	-94	191	300		(Cor'd Nav, Kongsberg 14208, img#846) (V)	
04-Sep-2018	01:02:22	847	ST18904-ENV47			Camera	101	31	632633	4467041	632462	4467139	171	-98	197	300		(Cor'd Nav, Kongsberg 14208, img#847) (V)	
04-Sep-2018	02:45:46	848	ST18904-ENV29			Camera	103	31	632211	4465457	632208	4465426	2	31	31	185		(Cor'd Nav, Kongsberg 14208, img#848) (V)	
04-Sep-2018	02:47:13	849	ST18904-ENV29			Camera	103	31	632213	4465433	632208	4465426	4	7	8	213		(Cor'd Nav, Kongsberg 14208, img#849) (V)	
04-Sep-2018	02:48:09	850	ST18904-ENV29			Camera	103	31	632221	4465428	632208	4465426	13	2	13	259		(Cor'd Nav, Kongsberg 14208, img#850) (V)	
04-Sep-2018	02:48:55	851	ST18904-ENV29			Camera	103	31	632229	4465421	632208	4465426	21	-5	22	283		(Cor'd Nav, Kongsberg 14208, img#851) (V)	
04-Sep-2018	02:49:40	852	ST18904-ENV29			Camera	103	31	632236	4465410	632208	4465426	28	-16	32	300		(Cor'd Nav, Kongsberg 14208, img#852) (V)	
04-Sep-2018	02:50:20	853	ST18904-ENV29			Camera	103	31	632243	4465409	632208	4465426	35	-17	39	296		(Cor'd Nav, Kongsberg 14208, img#853) (V)	
04-Sep-2018	02:51:14	854	ST18904-ENV29			Camera	103	31	632258	4465411	632208	4465426	50	-15	52	287		(Cor'd Nav, Kongsberg 14208, img#854) (V)	
04-Sep-2018	02:51:34	855	ST18904-ENV29			Camera	103	31	632264	4465407	632208	4465426	56	-19	59	288		(Cor'd Nav, Kongsberg 14208, img#855) (V)	
04-Sep-2018	02:52:18	856	ST18904-ENV29			Camera	103	31	632277	4465397	632208	4465426	69	-29	74	293		(Cor'd Nav, Kongsberg 14208, img#856) (V)	
04-Sep-2018	02:53:11	857	ST18904-ENV29			Camera	103	31	632293	4465391	632208	4465426	84	-35	91	292		(Cor'd Nav, Kongsberg 14208, img#857) (V)	
04-Sep-2018	02:54:01	858	ST18904-ENV29			Camera	103	31	632310	4465388	632208	4465426	101	-38	108	291		(Cor'd Nav, Kongsberg 14208, img#858) (V)	
04-Sep-2018	02:54:49	859	ST18904-ENV29			Camera	103	31	632325	4465380	632208	4465426	117	-46	126	291		(Cor'd Nav, Kongsberg 14208, img#859) (V)	
04-Sep-2018	02:55:11	860	ST18904-ENV29			Camera	103	31	632332	4465374	632208	4465426	124	-52	134	293		(Cor'd Nav, Kongsberg 14208, img#860) (V)	
04-Sep-2018	02:56:16	861	ST18904-ENV29			Camera	103	31	632354	4465357	632208	4465426	146	-69	161	295		(Cor'd Nav, Kongsberg 14208, img#861) (V)	
04-Sep-2018	02:56:38	862	ST18904-ENV29			Camera	103	31	632362	4465353	632208	4465426	153	-73	170	295		(Cor'd Nav, Kongsberg 14208, img#862) (V)	
04-Sep-2018	02:57:08	863	ST18904-ENV29			Camera	103	31	632372	4465349	632208	4465426	164	-77	181	295		(Cor'd Nav, Kongsberg 14208, img#863) (V)	
04-Sep-2018	02:57:22	864	ST18904-ENV29			Camera	103	31	632377	4465347	632208	4465426	169	-79	186	295		(Cor'd Nav, Kongsberg 14208, img#864) (V)	
04-Sep-2018	02:57:45	865	ST18904-ENV29			Camera	103	31	632384	4465345	632208	4465426	176	-80	194	295		(Cor'd Nav, Kongsberg 14208, img#865) (V)	
04-Sep-2018	02:58:03	866	ST18904-ENV29			Camera	103	31	632391	4465344	632208	4465426	182	-82	200	294		(Cor'd Nav, Kongsberg 14208, img#866) (V)	
04-Sep-2018	04:34:30	867	ST18904-ENV30			Camera	109	33	631570	4464001	631551	4463954	19	47	51	202		(Cor'd Nav, Kongsberg 14208, img#867) (V)	
04-Sep-2018	04:36:07	868	ST18904-ENV30			Camera	110	33	631560	4463995	631551	4463954	9	41	42	192		(Cor'd Nav, Kongsberg 14208, img#868) (V)	
04-Sep-2018	04:38:46	869	ST18904-ENV30			Camera	110	33	631551	4463960	631551	4463954	0	7	7	182		(Cor'd Nav, Kongsberg 14208, img#869) (V)	
04-Sep-2018	04:39:46	870	ST18904-ENV30			Camera	110	34	631552	4463951	631551	4463954	1	-3	3	341		(Cor'd Nav, Kongsberg 14208, img#870) (V)	
04-Sep-2018	04:40:26	871	ST18904-ENV30			Camera	110	34	631552	4463946	631551	4463954	2	-8	8	349		(Cor'd Nav, Kongsberg 14208, img#871) (V)	

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APPENDIX A FIELD SAMPLING LOGS

Table A.3 Seabed Imagery Surveyors Logs

Gardline										Seafloor Sampling Positioning Summary									
Job No		11179								Vessel		MV Ocean Researcher							
Client		Equinor US Wind LLC								Vessel Reference Point (VRP)		CoG							
Project Name		Equinor Wind OCS-A 0512								Deployment Location		Starboard A-frame		x	8.96	y	-3.08	z	6.05
Primary Positioning System		Starpack 1								Actual Coordinates derived from		Deployment Location							
Geodetic Reference System		Datum		NAD83		Ellipsoid		GRS 80		Projection		UTM ZONE 18 N (75 W)				Vertical / Tidal Datum		NAVD88	
Date	Time (UTC/GMT)	Fix number	Stn No	Penetration	Sample Retention	Retention	Observed Seafloor Depth (feet)	Observed Seafloor Depth (m)	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks	
									Easting	Northing	Easting	Northing	dE	dN	Range	Bearing			
04-Sep-2018	04:41:13	872	ST18904-ENV30			Camera	110	34	631551	4463937	631551	4463954	0	-17	17	1		(Corr'd Nav, Kongsberg 14208, img#872) (V)	
04-Sep-2018	04:42:17	873	ST18904-ENV30			Camera	110	34	631545	4463925	631551	4463954	-6	-29	30	12		(Corr'd Nav, Kongsberg 14208, img#873) (V)	
04-Sep-2018	04:42:51	874	ST18904-ENV30			Camera	110	34	631541	4463917	631551	4463954	-10	-37	38	16		(Corr'd Nav, Kongsberg 14208, img#874) (V)	
04-Sep-2018	04:43:03	875	ST18904-ENV30			Camera	110	34	631540	4463914	631551	4463954	-11	-40	41	16		(Corr'd Nav, Kongsberg 14208, img#875) (V)	
04-Sep-2018	04:43:38	876	ST18904-ENV30			Camera	110	34	631538	4463907	631551	4463954	-13	-47	49	16		(Corr'd Nav, Kongsberg 14208, img#876) (V)	
04-Sep-2018	04:44:08	877	ST18904-ENV30			Camera	109	33	631535	4463902	631551	4463954	-15	-52	54	17		(Corr'd Nav, Kongsberg 14208, img#877) (V)	
04-Sep-2018	04:44:34	878	ST18904-ENV30			Camera	109	33	631533	4463897	631551	4463954	-18	-56	59	18		(Corr'd Nav, Kongsberg 14208, img#878) (V)	
04-Sep-2018	04:45:21	879	ST18904-ENV30			Camera	108	33	631527	4463888	631551	4463954	-24	-66	70	20		(Corr'd Nav, Kongsberg 14208, img#879) (V)	
04-Sep-2018	04:47:24	880	ST18904-ENV30			Camera	106	32	631520	4463861	631551	4463954	-31	-93	98	19		(Corr'd Nav, Kongsberg 14208, img#880) (V)	
04-Sep-2018	04:48:36	881	ST18904-ENV30			Camera	105	32	631518	4463848	631551	4463954	-33	-106	111	17		(Corr'd Nav, Kongsberg 14208, img#881) (V)	
04-Sep-2018	04:49:21	882	ST18904-ENV30			Camera	104	32	631516	4463839	631551	4463954	-35	-115	121	17		(Corr'd Nav, Kongsberg 14208, img#882) (V)	
04-Sep-2018	04:50:27	883	ST18904-ENV30			Camera	104	32	631511	4463824	631551	4463954	-40	-130	136	17		(Corr'd Nav, Kongsberg 14208, img#883) (V)	
04-Sep-2018	04:51:08	884	ST18904-ENV30			Camera	104	32	631509	4463816	631551	4463954	-42	-137	144	17		(Corr'd Nav, Kongsberg 14208, img#884) (V)	
04-Sep-2018	04:51:52	885	ST18904-ENV30			Camera	104	32	631505	4463809	631551	4463954	-46	-144	151	18		(Corr'd Nav, Kongsberg 14208, img#885) (V)	
04-Sep-2018	04:52:17	886	ST18904-ENV30			Camera	104	32	631501	4463804	631551	4463954	-49	-150	158	18		(Corr'd Nav, Kongsberg 14208, img#886) (V)	
04-Sep-2018	04:53:13	887	ST18904-ENV30			Camera	104	32	631494	4463793	631551	4463954	-56	-161	170	19		(Corr'd Nav, Kongsberg 14208, img#887) (V)	
04-Sep-2018	04:53:55	888	ST18904-ENV30			Camera	104	32	631493	4463788	631551	4463954	-58	-166	176	19		(Corr'd Nav, Kongsberg 14208, img#888) (V)	
04-Sep-2018	04:54:41	889	ST18904-ENV30			Camera	103	31	631489	4463780	631551	4463954	-62	-174	185	20		(Corr'd Nav, Kongsberg 14208, img#889) (V)	
04-Sep-2018	04:55:12	890	ST18904-ENV30			Camera	103	31	631485	4463772	631551	4463954	-66	-182	193	20		(Corr'd Nav, Kongsberg 14208, img#890) (V)	
04-Sep-2018	04:55:36	891	ST18904-ENV30			Camera	103	31	631485	4463766	631551	4463954	-66	-188	199	19		(Corr'd Nav, Kongsberg 14208, img#891) (V)	
04-Sep-2018	06:48:02	892	ST18904-ENV33			Camera	105	32	632958	4462917	632958	4462917	0	0	0	238		(Corr'd Nav, Kongsberg 14208, img#892) (V)	
04-Sep-2018	06:48:56	893	ST18904-ENV33			Camera	105	32	632970	4462913	632958	4462917	12	-4	13	288		(Corr'd Nav, Kongsberg 14208, img#893) (V)	
04-Sep-2018	06:49:42	894	ST18904-ENV33			Camera	105	32	632980	4462907	632958	4462917	22	-10	24	294		(Corr'd Nav, Kongsberg 14208, img#894) (V)	
04-Sep-2018	06:51:08	895	ST18904-ENV33			Camera	105	32	632999	4462898	632958	4462917	41	-19	45	295		(Corr'd Nav, Kongsberg 14208, img#895) (V)	
04-Sep-2018	06:52:10	896	ST18904-ENV33			Camera	105	32	633010	4462891	632958	4462917	52	-25	58	296		(Corr'd Nav, Kongsberg 14208, img#896) (V)	
04-Sep-2018	06:53:00	897	ST18904-ENV33			Camera	105	32	633020	4462886	632958	4462917	62	-31	69	297		(Corr'd Nav, Kongsberg 14208, img#897) (V)	
04-Sep-2018	06:53:25	898	ST18904-ENV33			Camera	105	32	633025	4462883	632958	4462917	67	-34	75	297		(Corr'd Nav, Kongsberg 14208, img#898) (V)	
04-Sep-2018	06:53:36	899	ST18904-ENV33			Camera	105	32	633027	4462882	632958	4462917	69	-35	78	297		(Corr'd Nav, Kongsberg 14208, img#899) (V)	
04-Sep-2018	06:54:46	900	ST18904-ENV33			Camera	105	32	633043	4462874	632958	4462917	85	-42	95	297		(Corr'd Nav, Kongsberg 14208, img#900) (V)	
04-Sep-2018	06:55:21	901	ST18904-ENV33			Camera	105	32	633049	4462871	632958	4462917	92	-46	102	297		(Corr'd Nav, Kongsberg 14208, img#901) (V)	
04-Sep-2018	06:57:04	902	ST18904-ENV33			Camera	105	32	633070	4462860	632958	4462917	112	-57	126	297		(Corr'd Nav, Kongsberg 14208, img#902) (V)	
04-Sep-2018	06:57:43	903	ST18904-ENV33			Camera	106	32	633079	4462855	632958	4462917	121	-62	136	297		(Corr'd Nav, Kongsberg 14208, img#903) (V)	
04-Sep-2018	06:58:38	904	ST18904-ENV33			Camera	106	32	633090	4462849	632958	4462917	132	-67	149	297		(Corr'd Nav, Kongsberg 14208, img#904) (V)	
04-Sep-2018	06:59:48	905	ST18904-ENV33			Camera	106	32	633103	4462839	632958	4462917	145	-77	165	298		(Corr'd Nav, Kongsberg 14208, img#905) (V)	
04-Sep-2018	07:00:58	906	ST18904-ENV33			Camera	106	32	633118	4462833	632958	4462917	161	-84	181	298		(Corr'd Nav, Kongsberg 14208, img#906) (V)	
04-Sep-2018	07:01:09	907	ST18904-ENV33			Camera	106	32	633121	4462832	632958	4462917	163	-85	184	298		(Corr'd Nav, Kongsberg 14208, img#907) (V)	
04-Sep-2018	07:02:03	908	ST18904-ENV33			Camera	106	32	633132	4462826	632958	4462917	174	-90	196	297		(Corr'd Nav, Kongsberg 14208, img#908) (V)	
04-Sep-2018	08:34:11	909	ST18904-ENV36			Camera	106	32	634586	4462074	634590	4462071	-4	3	5	130		(Corr'd Nav, Kongsberg 14208, img#909) (V)	

Grey columns denote where no information is required

APPENDIX A FIELD SAMPLING LOGS

Table A.3 Seabed Imagery Surveyors Logs

Gardline												Seafloor Sampling Positioning Summary							
Job No		11179								Vessel		MV Ocean Researcher							
Client		Equinor US Wind LLC								Vessel Reference Point (VRP)		CoG							
Project Name		Equinor Wind OCS-A 0512								Deployment Location		Starboard A-frame		x	8.96	y	-3.08	z	6.05
Primary Positioning System		Starpack 1								Actual Coordinates derived from		Deployment Location							
Geodetic Reference System		Datum		NAD83		Ellipsoid		GRS 80		Projection		UTM ZONE 18 N (75 W)				Vertical / Tidal Datum		NAVD88	
Date	Time (UTC/GMT)	Fix number	Stn No	Penetration	Sample Retention	Retention	Observed Seafloor Depth (feet)	Observed Seafloor Depth (m)	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks	
									Easting	Northing	Easting	Northing	dE	dN	Range	Bearing			
04-Sep-2018	08:34:34	910	ST18904-ENV36			Camera	107	32	634590	4462069	634590	4462071	0	-2	2	346		(Corr'd Nav, Kongsberg 14208, img#910) (V)	
04-Sep-2018	08:35:26	911	ST18904-ENV36			Camera	107	32	634601	4462062	634590	4462071	11	-9	14	309		(Corr'd Nav, Kongsberg 14208, img#911) (V)	
04-Sep-2018	08:36:15	912	ST18904-ENV36			Camera	107	33	634611	4462059	634590	4462071	22	-12	25	299		(Corr'd Nav, Kongsberg 14208, img#912) (V)	
04-Sep-2018	08:37:07	913	ST18904-ENV36			Camera	107	33	634622	4462055	634590	4462071	33	-16	36	296		(Corr'd Nav, Kongsberg 14208, img#913) (V)	
04-Sep-2018	08:37:33	914	ST18904-ENV36			Camera	107	33	634628	4462051	634590	4462071	38	-20	43	298		(Corr'd Nav, Kongsberg 14208, img#914) (V)	
04-Sep-2018	08:38:26	915	ST18904-ENV36			Camera	107	33	634639	4462044	634590	4462071	49	-27	57	299		(Corr'd Nav, Kongsberg 14208, img#915) (V)	
04-Sep-2018	08:39:06	916	ST18904-ENV36			Camera	107	33	634647	4462042	634590	4462071	57	-29	64	297		(Corr'd Nav, Kongsberg 14208, img#916) (V)	
04-Sep-2018	08:40:26	917	ST18904-ENV36			Camera	107	33	634665	4462035	634590	4462071	75	-36	84	296		(Corr'd Nav, Kongsberg 14208, img#917) (V)	
04-Sep-2018	08:41:23	918	ST18904-ENV36			Camera	107	33	634678	4462023	634590	4462071	88	-48	100	299		(Corr'd Nav, Kongsberg 14208, img#918) (V)	
04-Sep-2018	08:42:38	919	ST18904-ENV36			Camera	108	33	634691	4462016	634590	4462071	101	-55	115	299		(Corr'd Nav, Kongsberg 14208, img#919) (V)	
04-Sep-2018	08:43:51	920	ST18904-ENV36			Camera	108	33	634708	4462008	634590	4462071	118	-63	134	298		(Corr'd Nav, Kongsberg 14208, img#920) (V)	
04-Sep-2018	08:44:21	921	ST18904-ENV36			Camera	108	33	634715	4462003	634590	4462071	125	-68	142	299		(Corr'd Nav, Kongsberg 14208, img#921) (V)	
04-Sep-2018	08:45:01	922	ST18904-ENV36			Camera	108	33	634722	4461999	634590	4462071	133	-72	151	298		(Corr'd Nav, Kongsberg 14208, img#922) (V)	
04-Sep-2018	08:45:43	923	ST18904-ENV36			Camera	108	33	634730	4461998	634590	4462071	140	-73	158	298		(Corr'd Nav, Kongsberg 14208, img#923) (V)	
04-Sep-2018	08:46:51	924	ST18904-ENV36			Camera	108	33	634746	4461989	634590	4462071	156	-82	176	298		(Corr'd Nav, Kongsberg 14208, img#924) (V)	
04-Sep-2018	08:47:16	925	ST18904-ENV36			Camera	108	33	634752	4461985	634590	4462071	162	-86	184	298		(Corr'd Nav, Kongsberg 14208, img#925) (V)	
04-Sep-2018	08:47:56	926	ST18904-ENV36			Camera	108	33	634761	4461981	634590	4462071	171	-90	193	298		(Corr'd Nav, Kongsberg 14208, img#926) (V)	
04-Sep-2018	08:48:32	927	ST18904-ENV36			Camera	109	33	634768	4461982	634590	4462071	179	-89	200	297		(Corr'd Nav, Kongsberg 14208, img#927) (V)	
05-Sep-2018	22:39:59	928	ST18904-ENV32			Camera	106	32	633826	4465108	633821	4465111	6	-4	7	302		(Corr'd Nav, Kongsberg 14208, img#928) (V)	
05-Sep-2018	22:40:24	929	ST18904-ENV32			Camera	106	32	633833	4465107	633821	4465111	12	-5	13	291		(Corr'd Nav, Kongsberg 14208, img#929) (V)	
05-Sep-2018	22:40:41	930	ST18904-ENV32			Camera	106	32	633836	4465107	633821	4465111	16	-4	16	285		(Corr'd Nav, Kongsberg 14208, img#930) (V)	
05-Sep-2018	22:41:16	931	ST18904-ENV32			Camera	106	32	633841	4465109	633821	4465111	20	-2	20	276		(Corr'd Nav, Kongsberg 14208, img#931) (V)	
05-Sep-2018	22:41:31	932	ST18904-ENV32			Camera	106	32	633842	4465110	633821	4465111	21	-1	21	273		(Corr'd Nav, Kongsberg 14208, img#932) (V)	
05-Sep-2018	22:42:39	933	ST18904-ENV32			Camera	106	32	633848	4465114	633821	4465111	27	3	27	265		(Corr'd Nav, Kongsberg 14208, img#933) (V)	
05-Sep-2018	22:43:44	934	ST18904-ENV32			Camera	106	32	633856	4465120	633821	4465111	35	8	36	257		(Corr'd Nav, Kongsberg 14208, img#934) (V)	
05-Sep-2018	22:44:36	935	ST18904-ENV32			Camera	106	32	633865	4465121	633821	4465111	45	10	46	258		(Corr'd Nav, Kongsberg 14208, img#935) (V)	
05-Sep-2018	22:45:14	936	ST18904-ENV32			Camera	106	32	633873	4465119	633821	4465111	53	8	53	262		(Corr'd Nav, Kongsberg 14208, img#936) (V)	
05-Sep-2018	22:46:14	937	ST18904-ENV32			Camera	106	32	633883	4465116	633821	4465111	63	5	63	266		(Corr'd Nav, Kongsberg 14208, img#937) (V)	
05-Sep-2018	22:47:38	938	ST18904-ENV32			Camera	107	32	633897	4465108	633821	4465111	76	-4	76	273		(Corr'd Nav, Kongsberg 14208, img#938) (V)	
05-Sep-2018	22:48:49	939	ST18904-ENV32			Camera	106	32	633901	4465120	633821	4465111	81	8	81	264		(Corr'd Nav, Kongsberg 14208, img#939) (V)	
05-Sep-2018	22:50:43	940	ST18904-ENV32			Camera	107	33	633920	4465121	633821	4465111	99	10	100	265		(Corr'd Nav, Kongsberg 14208, img#940) (V)	
05-Sep-2018	22:52:39	941	ST18904-ENV32			Camera	107	33	633943	4465122	633821	4465111	122	11	123	265		(Corr'd Nav, Kongsberg 14208, img#941) (V)	
05-Sep-2018	22:53:20	942	ST18904-ENV32			Camera	107	33	633951	4465125	633821	4465111	131	13	131	264		(Corr'd Nav, Kongsberg 14208, img#942) (V)	
05-Sep-2018	22:54:23	943	ST18904-ENV32			Camera	108	33	633967	4465124	633821	4465111	146	13	147	265		(Corr'd Nav, Kongsberg 14208, img#943) (V)	
05-Sep-2018	22:54:50	944	ST18904-ENV32			Camera	108	33	633972	4465123	633821	4465111	151	12	152	266		(Corr'd Nav, Kongsberg 14208, img#944) (V)	
05-Sep-2018	22:55:14	945	ST18904-ENV32			Camera	108	33	633975	4465122	633821	4465111	154	11	155	266		(Corr'd Nav, Kongsberg 14208, img#945) (V)	
05-Sep-2018	22:55:43	946	ST18904-ENV32			Camera	108	33	633978	4465121	633821	4465111	158	9	158	267		(Corr'd Nav, Kongsberg 14208, img#946) (V)	
05-Sep-2018	22:56:26	947	ST18904-ENV32			Camera	108	33	633984	4465121	633821	4465111	164	9	164	267		(Corr'd Nav, Kongsberg 14208, img#947) (V)	

Grey columns denote where no information is required

APPENDIX A FIELD SAMPLING LOGS

Table A.3 Seabed Imagery Surveyors Logs

Gardline										Seafloor Sampling Positioning Summary									
Job No		11179							Vessel		MV Ocean Researcher								
Client		Equinor US Wind LLC							Vessel Reference Point (VRP)		CoG								
Project Name		Equinor Wind OCS-A 0512							Deployment Location		Starboard A-frame			x	8.96	y	-3.08	z	6.05
Primary Positioning System		Starpack 1							Actual Coordinates derived from		Deployment Location								
Geodetic Reference System		Datum		NAD83		Ellipsoid	GRS 80		Projection		UTM ZONE 18 N (75 W)				Vertical / Tidal Datum		NAVD88		
Date	Time (UTC/GMT)	Fix number	Stn No	Penetration	Sample Retention	Retention	Observed Seafloor Depth (feet)	Observed Seafloor Depth (m)	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks	
									Easting	Northing	Easting	Northing	dE	dN	Range	Bearing			
05-Sep-2018	22:56:39	948	ST18904-ENV32			Camera	108	33	633986	4465121	633821	4465111	166	10	166	267		(Corr'd Nav, Kongsberg 14208, img#948) (V)	
05-Sep-2018	22:57:28	949	ST18904-ENV32			Camera	108	33	633993	4465124	633821	4465111	173	13	173	266		(Corr'd Nav, Kongsberg 14208, img#949) (V)	
05-Sep-2018	22:58:13	950	ST18904-ENV32			Camera	109	33	633998	4465128	633821	4465111	178	17	178	265		(Corr'd Nav, Kongsberg 14208, img#950) (V)	
05-Sep-2018	22:59:11	951	ST18904-ENV32			Camera	108	33	634007	4465129	633821	4465111	186	18	187	265		(Corr'd Nav, Kongsberg 14208, img#951) (V)	
05-Sep-2018	22:59:56	952	ST18904-ENV32			Camera	109	33	634017	4465128	633821	4465111	196	16	197	265		(Corr'd Nav, Kongsberg 14208, img#952) (V)	
05-Sep-2018	23:00:13	953	ST18904-ENV32			Camera	109	33	634021	4465128	633821	4465111	200	17	201	265		(Corr'd Nav, Kongsberg 14208, img#953) (V)	
06-Sep-2018	00:39:57	954	ST18904-ENV31			Camera	98	30	634226	4467230	634229	4467232	-3	-2	3	55		(Corr'd Nav, Kongsberg 14208, img#954) (V)	
06-Sep-2018	00:40:24	955	ST18904-ENV31			Camera	98	30	634226	4467235	634229	4467232	-3	3	4	136		(Corr'd Nav, Kongsberg 14208, img#955) (V)	
06-Sep-2018	00:40:51	956	ST18904-ENV31			Camera	98	30	634226	4467241	634229	4467232	-2	9	9	164		(Corr'd Nav, Kongsberg 14208, img#956) (V)	
06-Sep-2018	00:41:18	957	ST18904-ENV31			Camera	98	30	634226	4467247	634229	4467232	-3	15	15	169		(Corr'd Nav, Kongsberg 14208, img#957) (V)	
06-Sep-2018	00:42:04	958	ST18904-ENV31			Camera	98	30	634221	4467253	634229	4467232	-8	21	23	159		(Corr'd Nav, Kongsberg 14208, img#958) (V)	
06-Sep-2018	00:42:12	959	ST18904-ENV31			Camera	98	30	634220	4467254	634229	4467232	-9	22	24	158		(Corr'd Nav, Kongsberg 14208, img#959) (V)	
06-Sep-2018	00:42:55	960	ST18904-ENV31			Camera	99	30	634216	4467259	634229	4467232	-13	27	30	155		(Corr'd Nav, Kongsberg 14208, img#960) (V)	
06-Sep-2018	00:43:16	961	ST18904-ENV31			Camera	99	30	634215	4467262	634229	4467232	-13	30	33	156		(Corr'd Nav, Kongsberg 14208, img#961) (V)	
06-Sep-2018	00:43:53	962	ST18904-ENV31			Camera	99	30	634216	4467269	634229	4467232	-13	37	39	161		(Corr'd Nav, Kongsberg 14208, img#962) (V)	
06-Sep-2018	00:44:32	963	ST18904-ENV31			Camera	99	30	634215	4467276	634229	4467232	-13	43	45	163		(Corr'd Nav, Kongsberg 14208, img#963) (V)	
06-Sep-2018	00:44:48	964	ST18904-ENV31			Camera	99	30	634214	4467278	634229	4467232	-15	46	48	162		(Corr'd Nav, Kongsberg 14208, img#964) (V)	
06-Sep-2018	00:45:21	965	ST18904-ENV31			Camera	99	30	634211	4467282	634229	4467232	-18	49	52	160		(Corr'd Nav, Kongsberg 14208, img#965) (V)	
06-Sep-2018	00:45:48	966	ST18904-ENV31			Camera	99	30	634210	4467284	634229	4467232	-19	52	55	160		(Corr'd Nav, Kongsberg 14208, img#966) (V)	
06-Sep-2018	00:46:28	967	ST18904-ENV31			Camera	99	30	634209	4467290	634229	4467232	-19	57	61	161		(Corr'd Nav, Kongsberg 14208, img#967) (V)	
06-Sep-2018	00:46:55	968	ST18904-ENV31			Camera	99	30	634210	4467294	634229	4467232	-19	62	65	163		(Corr'd Nav, Kongsberg 14208, img#968) (V)	
06-Sep-2018	00:47:18	969	ST18904-ENV31			Camera	99	30	634210	4467298	634229	4467232	-19	66	68	164		(Corr'd Nav, Kongsberg 14208, img#969) (V)	
06-Sep-2018	00:48:29	970	ST18904-ENV31			Camera	99	30	634202	4467303	634229	4467232	-27	71	76	159		(Corr'd Nav, Kongsberg 14208, img#970) (V)	
06-Sep-2018	00:49:05	971	ST18904-ENV31			Camera	99	30	634199	4467306	634229	4467232	-30	73	79	158		(Corr'd Nav, Kongsberg 14208, img#971) (V)	
06-Sep-2018	00:49:17	972	ST18904-ENV31			Camera	99	30	634198	4467307	634229	4467232	-30	74	80	158		(Corr'd Nav, Kongsberg 14208, img#972) (V)	
06-Sep-2018	00:51:07	973	ST18904-ENV31			Camera	99	30	634207	4467323	634229	4467232	-22	91	94	166		(Corr'd Nav, Kongsberg 14208, img#973) (V)	
06-Sep-2018	00:51:35	974	ST18904-ENV31			Camera	99	30	634206	4467326	634229	4467232	-22	94	96	167		(Corr'd Nav, Kongsberg 14208, img#974) (V)	
06-Sep-2018	00:54:07	975	ST18904-ENV31			Camera	99	30	634199	4467341	634229	4467232	-29	108	112	165		(Corr'd Nav, Kongsberg 14208, img#975) (V)	
06-Sep-2018	00:55:58	976	ST18904-ENV31			Camera	99	30	634192	4467353	634229	4467232	-36	120	126	163		(Corr'd Nav, Kongsberg 14208, img#976) (V)	
06-Sep-2018	00:57:56	977	ST18904-ENV31			Camera	99	30	634189	4467367	634229	4467232	-40	134	140	164		(Corr'd Nav, Kongsberg 14208, img#977) (V)	
06-Sep-2018	01:00:00	978	ST18904-ENV31			Camera	99	30	634186	4467384	634229	4467232	-43	151	158	164		(Corr'd Nav, Kongsberg 14208, img#978) (V)	
06-Sep-2018	01:01:24	979	ST18904-ENV31			Camera	100	30	634182	4467394	634229	4467232	-46	162	169	164		(Corr'd Nav, Kongsberg 14208, img#979) (V)	
06-Sep-2018	01:02:35	980	ST18904-ENV31			Camera	100	30	634181	4467404	634229	4467232	-48	171	178	164		(Corr'd Nav, Kongsberg 14208, img#980) (V)	
06-Sep-2018	01:03:38	981	ST18904-ENV31			Camera	100	31	634179	4467414	634229	4467232	-50	182	189	165		(Corr'd Nav, Kongsberg 14208, img#981) (V)	
06-Sep-2018	01:04:39	982	ST18904-ENV31			Camera	100	31	634175	4467420	634229	4467232	-54	187	195	164		(Corr'd Nav, Kongsberg 14208, img#982) (V)	
06-Sep-2018	01:05:18	983	ST18904-ENV31			Camera	101	31	634177	4467426	634229	4467232	-52	194	201	165		(Corr'd Nav, Kongsberg 14208, img#983) (V)	
06-Sep-2018	02:41:51	984	ST18904-ENV34			Camera	103	31	636190	4466833	636191	4466832	-2	1	2	133		(Corr'd Nav, Kongsberg 14208, img#984) (V)	
06-Sep-2018	02:42:07	985	ST18904-ENV34			Camera	103	31	636192	4466833	636191	4466832	1	1	1	209		(Corr'd Nav, Kongsberg 14208, img#985) (V)	

Grey columns denote where no information is required

APPENDIX A FIELD SAMPLING LOGS

Table A.3 Seabed Imagery Surveyors Logs

Seafloor Sampling Positioning Summary																			
Job No		11179							Vessel		MV Ocean Researcher								
Client		Equinor US Wind LLC							Vessel Reference Point (VRP)		CoG								
Project Name		Equinor Wind OCS-A 0512							Deployment Location		Starboard A-frame			x	8.96	y	-3.08	z	6.05
Primary Positioning System		Starpack 1							Actual Coordinates derived from		Deployment Location								
Geodetic Reference System		Datum		NAD83			Ellipsoid		GRS 80		Projection		UTM ZONE 18 N (75 W)			Vertical / Tidal Datum		NAVD88	
Date	Time (UTC/GMT)	Fix number	Stn No	Penetration	Sample Retention	Retention	Observed Seafloor Depth (feet)	Observed Seafloor Depth (m)	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks	
									Easting	Northing	Easting	Northing	dE	dN	Range	Bearing			
06-Sep-2018	02:43:45	986	ST18904-ENV34			Camera	103	31	636208	4466826	636191	4466832	17	-6	18	288		(Corr'd Nav, Kongsberg 14208, img#986) (V)	
06-Sep-2018	02:45:01	987	ST18904-ENV34			Camera	103	31	636223	4466822	636191	4466832	32	-10	34	287		(Corr'd Nav, Kongsberg 14208, img#987) (V)	
06-Sep-2018	02:45:54	988	ST18904-ENV34			Camera	103	31	636233	4466819	636191	4466832	42	-13	44	287		(Corr'd Nav, Kongsberg 14208, img#988) (V)	
06-Sep-2018	02:46:43	989	ST18904-ENV34			Camera	103	32	636242	4466812	636191	4466832	51	-20	55	291		(Corr'd Nav, Kongsberg 14208, img#989) (V)	
06-Sep-2018	02:48:09	990	ST18904-ENV34			Camera	104	32	636255	4466805	636191	4466832	63	-27	69	293		(Corr'd Nav, Kongsberg 14208, img#990) (V)	
06-Sep-2018	02:49:03	991	ST18904-ENV34			Camera	104	32	636263	4466798	636191	4466832	72	-34	79	296		(Corr'd Nav, Kongsberg 14208, img#991) (V)	
06-Sep-2018	02:50:20	992	ST18904-ENV34			Camera	104	32	636277	4466788	636191	4466832	86	-44	96	297		(Corr'd Nav, Kongsberg 14208, img#992) (V)	
06-Sep-2018	02:51:47	993	ST18904-ENV34			Camera	104	32	636289	4466783	636191	4466832	98	-49	110	296		(Corr'd Nav, Kongsberg 14208, img#993) (V)	
06-Sep-2018	02:53:22	994	ST18904-ENV34			Camera	104	32	636304	4466777	636191	4466832	113	-55	126	296		(Corr'd Nav, Kongsberg 14208, img#994) (V)	
06-Sep-2018	02:54:28	995	ST18904-ENV34			Camera	104	32	636314	4466774	636191	4466832	123	-58	136	295		(Corr'd Nav, Kongsberg 14208, img#995) (V)	
06-Sep-2018	02:55:36	996	ST18904-ENV34			Camera	104	32	636325	4466769	636191	4466832	134	-63	148	295		(Corr'd Nav, Kongsberg 14208, img#996) (V)	
06-Sep-2018	02:56:54	997	ST18904-ENV34			Camera	105	32	636338	4466757	636191	4466832	147	-75	165	297		(Corr'd Nav, Kongsberg 14208, img#997) (V)	
06-Sep-2018	02:57:31	998	ST18904-ENV34			Camera	105	32	636342	4466753	636191	4466832	151	-79	170	298		(Corr'd Nav, Kongsberg 14208, img#998) (V)	
06-Sep-2018	02:58:21	999	ST18904-ENV34			Camera	105	32	636348	4466753	636191	4466832	157	-79	176	297		(Corr'd Nav, Kongsberg 14208, img#999) (V)	
06-Sep-2018	02:59:04	1000	ST18904-ENV34			Camera	105	32	636355	4466749	636191	4466832	164	-83	183	297		(Corr'd Nav, Kongsberg 14208, img#1000) (V)	
06-Sep-2018	03:00:42	1001	ST18904-ENV34			Camera	105	32	636367	4466740	636191	4466832	176	-92	198	298		(Corr'd Nav, Kongsberg 14208, img#1001) (V)	
06-Sep-2018	04:29:32	1002	ST18904-ENV37			Camera	106	32	637381	4466436	637379	4466438	2	-2	3	322		(Corr'd Nav, Kongsberg 14208, img#1002) (V)	
06-Sep-2018	04:30:06	1003	ST18904-ENV37			Camera	106	32	637388	4466432	637379	4466438	8	-6	10	307		(Corr'd Nav, Kongsberg 14208, img#1003) (V)	
06-Sep-2018	04:30:37	1004	ST18904-ENV37			Camera	106	32	637395	4466428	637379	4466438	15	-10	19	303		(Corr'd Nav, Kongsberg 14208, img#1004) (V)	
06-Sep-2018	04:31:34	1005	ST18904-ENV37			Camera	106	32	637405	4466421	637379	4466438	26	-17	31	303		(Corr'd Nav, Kongsberg 14208, img#1005) (V)	
06-Sep-2018	04:32:29	1006	ST18904-ENV37			Camera	107	33	637414	4466413	637379	4466438	35	-25	43	305		(Corr'd Nav, Kongsberg 14208, img#1006) (V)	
06-Sep-2018	04:33:03	1007	ST18904-ENV37			Camera	107	33	637421	4466408	637379	4466438	42	-30	51	306		(Corr'd Nav, Kongsberg 14208, img#1007) (V)	
06-Sep-2018	04:33:51	1008	ST18904-ENV37			Camera	107	33	637428	4466403	637379	4466438	49	-35	60	305		(Corr'd Nav, Kongsberg 14208, img#1008) (V)	
06-Sep-2018	04:34:41	1009	ST18904-ENV37			Camera	108	33	637437	4466396	637379	4466438	58	-42	72	306		(Corr'd Nav, Kongsberg 14208, img#1009) (V)	
06-Sep-2018	04:35:16	1010	ST18904-ENV37			Camera	108	33	637444	4466390	637379	4466438	65	-48	81	306		(Corr'd Nav, Kongsberg 14208, img#1010) (V)	
06-Sep-2018	04:35:46	1011	ST18904-ENV37			Camera	108	33	637451	4466386	637379	4466438	72	-52	89	306		(Corr'd Nav, Kongsberg 14208, img#1011) (V)	
06-Sep-2018	04:36:41	1012	ST18904-ENV37			Camera	108	33	637460	4466382	637379	4466438	81	-56	99	305		(Corr'd Nav, Kongsberg 14208, img#1012) (V)	
06-Sep-2018	04:37:43	1013	ST18904-ENV37			Camera	108	33	637470	4466375	637379	4466438	91	-63	111	305		(Corr'd Nav, Kongsberg 14208, img#1013) (V)	
06-Sep-2018	04:38:29	1014	ST18904-ENV37			Camera	108	33	637479	4466370	637379	4466438	100	-68	121	304		(Corr'd Nav, Kongsberg 14208, img#1014) (V)	
06-Sep-2018	04:39:53	1015	ST18904-ENV37			Camera	108	33	637494	4466359	637379	4466438	115	-79	139	304		(Corr'd Nav, Kongsberg 14208, img#1015) (V)	
06-Sep-2018	04:41:02	1016	ST18904-ENV37			Camera	108	33	637504	4466350	637379	4466438	125	-88	153	305		(Corr'd Nav, Kongsberg 14208, img#1016) (V)	
06-Sep-2018	04:41:39	1017	ST18904-ENV37			Camera	108	33	637511	4466344	637379	4466438	132	-93	162	305		(Corr'd Nav, Kongsberg 14208, img#1017) (V)	
06-Sep-2018	04:42:19	1018	ST18904-ENV37			Camera	108	33	637519	4466339	637379	4466438	140	-99	172	305		(Corr'd Nav, Kongsberg 14208, img#1018) (V)	
06-Sep-2018	04:43:05	1019	ST18904-ENV37			Camera	108	33	637529	4466332	637379	4466438	150	-106	183	305		(Corr'd Nav, Kongsberg 14208, img#1019) (V)	
06-Sep-2018	04:43:21	1020	ST18904-ENV37			Camera	108	33	637532	4466330	637379	4466438	153	-108	187	305		(Corr'd Nav, Kongsberg 14208, img#1020) (V)	
06-Sep-2018	04:44:06	1021	ST18904-ENV37			Camera	108	33	637539	4466326	637379	4466438	160	-112	195	305		(Corr'd Nav, Kongsberg 14208, img#1021) (V)	
06-Sep-2018	04:44:25	1022	ST18904-ENV37			Camera	108	33	637542	4466325	637379	4466438	163	-113	199	305		(Corr'd Nav, Kongsberg 14208, img#1022) (V)	
06-Sep-2018	06:14:26	1023	ST18904-ENV35			Camera	104	32	635507	4464967	635507	4464971	0	-4	4	1		(Corr'd Nav, Kongsberg 14208, img#1023) (V)	

Grey columns denote where no information is required

APPENDIX A FIELD SAMPLING LOGS

Table A.3 Seabed Imagery Surveyors Logs

Gardline										Seafloor Sampling Positioning Summary									
Job No		11179							Vessel		MV Ocean Researcher								
Client		Equinor US Wind LLC							Vessel Reference Point (VRP)		CoG								
Project Name		Equinor Wind OCS-A 0512							Deployment Location		Starboard A-frame			x	8.96	y	-3.08	z	6.05
Primary Positioning System		Starpack 1							Actual Coordinates derived from		Deployment Location								
Geodetic Reference System		Datum		NAD83		Ellipsoid		GRS 80		Projection		UTM ZONE 18 N (75 W)				Vertical / Tidal Datum		NAVD88	
Date	Time (UTC/GMT)	Fix number	Stn No	Penetration	Sample Retention	Retention	Observed Seafloor Depth (feet)	Observed Seafloor Depth (m)	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks	
									Easting	Northing	Easting	Northing	dE	dN	Range	Bearing			
06-Sep-2018	06:15:14	1024	ST18904-ENV35			Camera	104	32	635517	4464963	635507	4464971	10	-8	13	311		(Cor'd Nav, Kongsberg 14208, img#1024) (V)	
06-Sep-2018	06:15:55	1025	ST18904-ENV35			Camera	104	32	635525	4464959	635507	4464971	18	-12	22	304		(Cor'd Nav, Kongsberg 14208, img#1025) (V)	
06-Sep-2018	06:16:41	1026	ST18904-ENV35			Camera	104	32	635534	4464955	635507	4464971	27	-16	31	300		(Cor'd Nav, Kongsberg 14208, img#1026) (V)	
06-Sep-2018	06:17:27	1027	ST18904-ENV35			Camera	104	32	635543	4464950	635507	4464971	36	-21	41	300		(Cor'd Nav, Kongsberg 14208, img#1027) (V)	
06-Sep-2018	06:18:11	1028	ST18904-ENV35			Camera	104	32	635551	4464945	635507	4464971	44	-25	51	300		(Cor'd Nav, Kongsberg 14208, img#1028) (V)	
06-Sep-2018	06:18:53	1029	ST18904-ENV35			Camera	105	32	635561	4464941	635507	4464971	54	-30	62	299		(Cor'd Nav, Kongsberg 14208, img#1029) (V)	
06-Sep-2018	06:19:29	1030	ST18904-ENV35			Camera	105	32	635569	4464937	635507	4464971	62	-33	70	298		(Cor'd Nav, Kongsberg 14208, img#1030) (V)	
06-Sep-2018	06:20:53	1031	ST18904-ENV35			Camera	105	32	635587	4464929	635507	4464971	79	-42	90	298		(Cor'd Nav, Kongsberg 14208, img#1031) (V)	
06-Sep-2018	06:21:31	1032	ST18904-ENV35			Camera	105	32	635596	4464926	635507	4464971	88	-45	99	297		(Cor'd Nav, Kongsberg 14208, img#1032) (V)	
06-Sep-2018	06:22:34	1033	ST18904-ENV35			Camera	105	32	635607	4464921	635507	4464971	99	-49	111	296		(Cor'd Nav, Kongsberg 14208, img#1033) (V)	
06-Sep-2018	06:22:55	1034	ST18904-ENV35			Camera	105	32	635610	4464919	635507	4464971	103	-52	115	297		(Cor'd Nav, Kongsberg 14208, img#1034) (V)	
06-Sep-2018	06:24:00	1035	ST18904-ENV35			Camera	105	32	635626	4464911	635507	4464971	119	-59	133	297		(Cor'd Nav, Kongsberg 14208, img#1035) (V)	
06-Sep-2018	06:24:16	1036	ST18904-ENV35			Camera	105	32	635630	4464910	635507	4464971	123	-61	137	296		(Cor'd Nav, Kongsberg 14208, img#1036) (V)	
06-Sep-2018	06:24:57	1037	ST18904-ENV35			Camera	106	32	635637	4464907	635507	4464971	130	-64	145	296		(Cor'd Nav, Kongsberg 14208, img#1037) (V)	
06-Sep-2018	06:25:57	1038	ST18904-ENV35			Camera	106	32	635651	4464900	635507	4464971	144	-71	160	296		(Cor'd Nav, Kongsberg 14208, img#1038) (V)	
06-Sep-2018	06:26:33	1039	ST18904-ENV35			Camera	106	32	635658	4464897	635507	4464971	151	-74	168	296		(Cor'd Nav, Kongsberg 14208, img#1039) (V)	
06-Sep-2018	06:27:08	1040	ST18904-ENV35			Camera	106	32	635666	4464893	635507	4464971	159	-78	177	296		(Cor'd Nav, Kongsberg 14208, img#1040) (V)	
06-Sep-2018	06:28:01	1041	ST18904-ENV35			Camera	106	32	635677	4464889	635507	4464971	170	-82	189	296		(Cor'd Nav, Kongsberg 14208, img#1041) (V)	
06-Sep-2018	06:28:33	1042	ST18904-ENV35			Camera	107	32	635683	4464886	635507	4464971	176	-85	195	296		(Cor'd Nav, Kongsberg 14208, img#1042) (V)	
06-Sep-2018	06:28:50	1043	ST18904-ENV35			Camera	107	32	635687	4464884	635507	4464971	180	-87	199	296		(Cor'd Nav, Kongsberg 14208, img#1043) (V)	
06-Sep-2018	07:44:28	1044	ST18904-ENV38			Camera	110	33	637265	4463960	637260	4463960	6	0	6	268		(Cor'd Nav, Kongsberg 14208, img#1044) (V)	
06-Sep-2018	07:44:50	1045	ST18904-ENV38			Camera	110	33	637266	4463955	637260	4463960	6	-5	-4	7		(Raw Nav, Kongsberg 14208, img#1045) (V)	
06-Sep-2018	07:45:21	1045	ST18904-ENV38			Camera	110	34	637267	4463950	637260	4463960	7	-10	12	324		(Cor'd Nav, Kongsberg 14208, img#1046) (V)	
06-Sep-2018	07:46:15	1046	ST18904-ENV38			Camera	110	34	637270	4463938	637260	4463960	10	-22	24	335		(Cor'd Nav, Kongsberg 14208, img#1047) (V)	
06-Sep-2018	07:47:04	1047	ST18904-ENV38			Camera	110	34	637273	4463926	637260	4463960	13	-34	36	338		(Cor'd Nav, Kongsberg 14208, img#1048) (V)	
06-Sep-2018	07:47:37	1048	ST18904-ENV38			Camera	110	34	637276	4463918	637260	4463960	17	-41	44	338		(Cor'd Nav, Kongsberg 14208, img#1049) (V)	
06-Sep-2018	07:48:38	1049	ST18904-ENV38			Camera	110	34	637283	4463904	637260	4463960	23	-55	60	338		(Cor'd Nav, Kongsberg 14208, img#1050) (V)	
06-Sep-2018	07:48:59	1050	ST18904-ENV38			Camera	110	33	637285	4463899	637260	4463960	25	-61	65	338		(Cor'd Nav, Kongsberg 14208, img#1051) (V)	
06-Sep-2018	07:49:56	1051	ST18904-ENV38			Camera	110	33	637292	4463885	637260	4463960	32	-74	81	337		(Cor'd Nav, Kongsberg 14208, img#1052) (V)	
06-Sep-2018	07:50:27	1052	ST18904-ENV38			Camera	110	33	637295	4463879	637260	4463960	36	-81	88	336		(Cor'd Nav, Kongsberg 14208, img#1053) (V)	
06-Sep-2018	07:50:36	1053	ST18904-ENV38			Camera	110	33	637296	4463877	637260	4463960	37	-82	90	336		(Cor'd Nav, Kongsberg 14208, img#1054) (V)	
06-Sep-2018	07:51:21	1054	ST18904-ENV38			Camera	110	33	637301	4463868	637260	4463960	42	-92	101	336		(Cor'd Nav, Kongsberg 14208, img#1055) (V)	
06-Sep-2018	07:51:31	1055	ST18904-ENV38			Camera	110	33	637303	4463865	637260	4463960	43	-94	103	336		(Cor'd Nav, Kongsberg 14208, img#1056) (V)	
06-Sep-2018	07:52:03	1056	ST18904-ENV38			Camera	110	33	637306	4463858	637260	4463960	46	-101	111	336		(Cor'd Nav, Kongsberg 14208, img#1057) (V)	
06-Sep-2018	07:52:47	1057	ST18904-ENV38			Camera	109	33	637309	4463850	637260	4463960	49	-110	120	336		(Cor'd Nav, Kongsberg 14208, img#1058) (V)	
06-Sep-2018	07:53:19	1058	ST18904-ENV38			Camera	109	33	637312	4463844	637260	4463960	52	-116	127	336		(Cor'd Nav, Kongsberg 14208, img#1059) (V)	
06-Sep-2018	07:53:46	1059	ST18904-ENV38			Camera	109	33	637314	4463839	637260	4463960	54	-121	133	336		(Cor'd Nav, Kongsberg 14208, img#1060) (V)	
06-Sep-2018	07:54:29	1060	ST18904-ENV38			Camera	109	33	637318	4463830	637260	4463960	58	-129	142	336		(Cor'd Nav, Kongsberg 14208, img#1061) (V)	

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APPENDIX A FIELD SAMPLING LOGS

Table A.3 Seabed Imagery Surveyors Logs

Gardline											Seafloor Sampling Positioning Summary															
Job No		11179							Vessel		MV Ocean Researcher															
Client		Equinor US Wind LLC							Vessel Reference Point (VRP)		CoG															
Project Name		Equinor Wind OCS-A 0512							Deployment Location		Starboard A-frame				x		8.96		y		-3.08		z		6.05	
Primary Positioning System		Starpack 1							Actual Coordinates derived from		Deployment Location															
Geodetic Reference System		Datum		NAD83		Ellipsoid		GRS 80		Projection		UTM ZONE 18 N (75 W)						Vertical / Tidal Datum		NAVD88						
Date	Time (UTC/GMT)	Fix number	Stn No	Penetration	Sample Retention	Retention	Observed Seafloor Depth (feet)	Observed Seafloor Depth (m)	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks								
									Easting	Northing	Easting	Northing	dE	dN	Range	Bearing										
06-Sep-2018	07:54:58	1061	ST18904-ENV38			Camera	109	33	637320	4463825	637260	4463960	60	-135	148	336		(Corr'd Nav, Kongsberg 14208, img#1062) (V)								
06-Sep-2018	07:55:29	1062	ST18904-ENV38			Camera	109	33	637322	4463819	637260	4463960	62	-141	154	336		(Corr'd Nav, Kongsberg 14208, img#1063) (V)								
06-Sep-2018	07:56:14	1063	ST18904-ENV38			Camera	109	33	637325	4463810	637260	4463960	65	-149	163	337		(Corr'd Nav, Kongsberg 14208, img#1064) (V)								
06-Sep-2018	07:56:29	1064	ST18904-ENV38			Camera	109	33	637325	4463807	637260	4463960	66	-152	166	337		(Corr'd Nav, Kongsberg 14208, img#1065) (V)								
06-Sep-2018	07:57:01	1065	ST18904-ENV38			Camera	109	33	637328	4463801	637260	4463960	68	-158	172	337		(Corr'd Nav, Kongsberg 14208, img#1066) (V)								
06-Sep-2018	07:57:39	1066	ST18904-ENV38			Camera	109	33	637332	4463793	637260	4463960	72	-166	181	337		(Corr'd Nav, Kongsberg 14208, img#1067) (V)								
06-Sep-2018	07:57:55	1067	ST18904-ENV38			Camera	109	33	637333	4463789	637260	4463960	74	-170	186	337		(Corr'd Nav, Kongsberg 14208, img#1068) (V)								
06-Sep-2018	07:58:14	1068	ST18904-ENV38			Camera	109	33	637335	4463785	637260	4463960	76	-174	190	337		(Corr'd Nav, Kongsberg 14208, img#1069) (V)								
06-Sep-2018	07:58:48	1069	ST18904-ENV38			Camera	108	33	637337	4463778	637260	4463960	78	-181	197	337		(Corr'd Nav, Kongsberg 14208, img#1070) (V)								
06-Sep-2018	07:59:05	1070	ST18904-ENV38			Camera	108	33	637338	4463776	637260	4463960	78	-184	200	337		(Corr'd Nav, Kongsberg 14208, img#1071) (V)								
07-Oct-2018	17:34:11	1071	ST18904-ENV5			Camera	132	40	653193	4456658	653160	4456674	33	-16	37	296		(Corr'd Nav, Kongsberg 14208, img#1) (V)								
07-Oct-2018	17:34:58	1072	ST18904-ENV5			Camera	132	40	653190	4456661	653160	4456674	31	-13	33	293		(Corr'd Nav, Kongsberg 14208, img#2) (V)								
07-Oct-2018	17:35:09	1073	ST18904-ENV5			Camera	132	40	653189	4456662	653160	4456674	30	-12	32	292		(Corr'd Nav, Kongsberg 14208, img#3) (V)								
07-Oct-2018	17:36:28	1074	ST18904-ENV5			Camera	132	40	653177	4456666	653160	4456674	18	-8	20	295		(Corr'd Nav, Kongsberg 14208, img#4) (V)								
07-Oct-2018	17:36:50	1075	ST18904-ENV5			Camera	132	40	653175	4456668	653160	4456674	15	-6	16	291		(Corr'd Nav, Kongsberg 14208, img#5) (V)								
07-Oct-2018	17:37:14	1076	ST18904-ENV5			Camera	132	40	653172	4456671	653160	4456674	13	-3	13	282		(Corr'd Nav, Kongsberg 14208, img#6) (V)								
07-Oct-2018	17:38:46	1077	ST18904-ENV5			Camera	132	40	653153	4456682	653160	4456674	-7	8	11	141		(Corr'd Nav, Kongsberg 14208, img#7) (V)								
07-Oct-2018	17:39:04	1078	ST18904-ENV5			Camera	132	40	653150	4456685	653160	4456674	-10	11	15	138		(Corr'd Nav, Kongsberg 14208, img#8) (V)								
07-Oct-2018	17:39:30	1079	ST18904-ENV5			Camera	132	40	653145	4456688	653160	4456674	-15	14	20	134		(Corr'd Nav, Kongsberg 14208, img#9) (V)								
07-Oct-2018	17:39:51	1080	ST18904-ENV5			Camera	132	40	653140	4456690	653160	4456674	-19	16	25	130		(Corr'd Nav, Kongsberg 14208, img#10) (V)								
07-Oct-2018	17:40:43	1081	ST18904-ENV5			Camera	132	40	653126	4456692	653160	4456674	-33	18	38	118		(Corr'd Nav, Kongsberg 14208, img#11) (V)								
07-Oct-2018	17:41:02	1082	ST18904-ENV5			Camera	132	40	653123	4456692	653160	4456674	-37	19	42	117		(Corr'd Nav, Kongsberg 14208, img#12) (V)								
07-Oct-2018	17:41:36	1083	ST18904-ENV5			Camera	132	40	653118	4456696	653160	4456674	-42	22	47	117		(Corr'd Nav, Kongsberg 14208, img#13) (V)								
07-Oct-2018	17:41:48	1084	ST18904-ENV5			Camera	132	40	653116	4456697	653160	4456674	-43	23	49	118		(Corr'd Nav, Kongsberg 14208, img#14) (V)								
07-Oct-2018	17:42:26	1085	ST18904-ENV5			Camera	132	40	653108	4456702	653160	4456674	-52	28	59	119		(Corr'd Nav, Kongsberg 14208, img#15) (V)								
07-Oct-2018	17:42:48	1086	ST18904-ENV5			Camera	132	40	653102	4456703	653160	4456674	-57	29	64	117		(Corr'd Nav, Kongsberg 14208, img#16) (V)								
07-Oct-2018	17:43:06	1087	ST18904-ENV5			Camera	132	40	653098	4456704	653160	4456674	-61	30	68	116		(Corr'd Nav, Kongsberg 14208, img#17) (V)								
07-Oct-2018	17:43:53	1088	ST18904-ENV5			Camera	132	40	653088	4456707	653160	4456674	-71	33	79	115		(Corr'd Nav, Kongsberg 14208, img#18) (V)								
07-Oct-2018	17:44:13	1089	ST18904-ENV5			Camera	132	40	653084	4456710	653160	4456674	-75	36	83	115		(Corr'd Nav, Kongsberg 14208, img#19) (V)								
07-Oct-2018	17:44:40	1090	ST18904-ENV5			Camera	132	40	653079	4456713	653160	4456674	-81	39	90	116		(Corr'd Nav, Kongsberg 14208, img#20) (V)								
07-Oct-2018	17:46:00	1091	ST18904-ENV5			Camera	132	40	653057	4456716	653160	4456674	-103	42	111	112		(Corr'd Nav, Kongsberg 14208, img#21) (V)								
07-Oct-2018	17:46:57	1092	ST18904-ENV5			Camera	132	40	653051	4456725	653160	4456674	-109	52	121	115		(Corr'd Nav, Kongsberg 14208, img#22) (V)								
07-Oct-2018	17:47:40	1093	ST18904-ENV5			Camera	132	40	653043	4456731	653160	4456674	-117	57	130	116		(Corr'd Nav, Kongsberg 14208, img#23) (V)								
07-Oct-2018	17:48:44	1094	ST18904-ENV5			Camera	132	40	653030	4456737	653160	4456674	-130	63	144	116		(Corr'd Nav, Kongsberg 14208, img#24) (V)								
07-Oct-2018	17:50:18	1095	ST18904-ENV5			Camera	132	40	653010	4456741	653160	4456674	-150	67	164	114		(Corr'd Nav, Kongsberg 14208, img#25) (V)								
07-Oct-2018	17:51:02	1096	ST18904-ENV5			Camera	132	40	653006	4456745	653160	4456674	-154	71	169	115		(Corr'd Nav, Kongsberg 14208, img#26) (V)								
07-Oct-2018	17:51:38	1097	ST18904-ENV5			Camera	132	40	653000	4456749	653160	4456674	-160	75	176	115		(Corr'd Nav, Kongsberg 14208, img#27) (V)								
07-Oct-2018	17:52:11	1098	ST18904-ENV5			Camera	132	40	652993	4456751	653160	4456674	-167	77	184	115		(Corr'd Nav, Kongsberg 14208, img#28) (V)								

Grey columns denote where no information is required

APPENDIX A FIELD SAMPLING LOGS

Table A.3 Seabed Imagery Surveyors Logs

Gardline										Seafloor Sampling Positioning Summary									
Job No		11179							Vessel		MV Ocean Researcher								
Client		Equinor US Wind LLC							Vessel Reference Point (VRP)		CoG								
Project Name		Equinor Wind OCS-A 0512							Deployment Location		Starboard A-frame			x	8.96	y	-3.08	z	6.05
Primary Positioning System		Starpack 1							Actual Coordinates derived from		Deployment Location								
Geodetic Reference System		Datum		NAD83		Ellipsoid	GRS 80		Projection		UTM ZONE 18 N (75 W)				Vertical / Tidal Datum		NAVD88		
Date	Time (UTC/GMT)	Fix number	Stn No	Penetration	Sample Retention	Retention	Observed Seafloor Depth (feet)	Observed Seafloor Depth (m)	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks	
									Easting	Northing	Easting	Northing	dE	dN	Range	Bearing			
07-Oct-2018	17:52:31	1099	ST18904-ENV5			Camera	132	40	652988	4456752	653160	4456674	-172	78	189	115		(Corr'd Nav, Kongsberg 14208, img#29) (V)	
07-Oct-2018	17:53:12	1100	ST18904-ENV5			Camera	132	40	652981	4456757	653160	4456674	-179	83	198	115		(Corr'd Nav, Kongsberg 14208, img#30) (V)	
07-Oct-2018	19:40:35	1101	ST18904-ENV68			Camera	132	40	654614	4457353	654724	4457299	-110	54	122	116		(Corr'd Nav, Kongsberg 14208, img#1) (V)	
07-Oct-2018	19:41:17	1102	ST18904-ENV68			Camera	132	40	654619	4457347	654724	4457299	-105	48	116	115		(Corr'd Nav, Kongsberg 14208, img#2) (V)	
07-Oct-2018	19:41:58	1103	ST18904-ENV68			Camera	132	40	654625	4457342	654724	4457299	-98	43	107	113		(Corr'd Nav, Kongsberg 14208, img#3) (V)	
07-Oct-2018	19:42:14	1104	ST18904-ENV68			Camera	132	40	654628	4457340	654724	4457299	-95	41	104	113		(Corr'd Nav, Kongsberg 14208, img#4) (V)	
07-Oct-2018	19:42:46	1105	ST18904-ENV68			Camera	132	40	654635	4457339	654724	4457299	-88	40	97	114		(Corr'd Nav, Kongsberg 14208, img#5) (V)	
07-Oct-2018	19:43:16	1106	ST18904-ENV68			Camera	132	40	654642	4457338	654724	4457299	-81	39	90	116		(Corr'd Nav, Kongsberg 14208, img#6) (V)	
07-Oct-2018	19:43:54	1107	ST18904-ENV68			Camera	132	40	654651	4457335	654724	4457299	-73	37	82	117		(Corr'd Nav, Kongsberg 14208, img#7) (V)	
07-Oct-2018	19:44:22	1108	ST18904-ENV68			Camera	132	40	654656	4457333	654724	4457299	-68	35	76	117		(Corr'd Nav, Kongsberg 14208, img#8) (V)	
07-Oct-2018	19:44:32	1109	ST18904-ENV68			Camera	132	40	654658	4457333	654724	4457299	-66	34	74	117		(Corr'd Nav, Kongsberg 14208, img#9) (V)	
07-Oct-2018	19:44:56	1110	ST18904-ENV68			Camera	132	40	654663	4457330	654724	4457299	-61	31	68	117		(Corr'd Nav, Kongsberg 14208, img#10) (V)	
07-Oct-2018	19:45:14	1111	ST18904-ENV68			Camera	132	40	654667	4457328	654724	4457299	-56	29	64	118		(Corr'd Nav, Kongsberg 14208, img#11) (V)	
07-Oct-2018	19:45:48	1112	ST18904-ENV68			Camera	132	40	654675	4457325	654724	4457299	-49	26	55	118		(Corr'd Nav, Kongsberg 14208, img#12) (V)	
07-Oct-2018	19:46:08	1113	ST18904-ENV68			Camera	132	40	654679	4457324	654724	4457299	-45	25	51	119		(Corr'd Nav, Kongsberg 14208, img#13) (V)	
07-Oct-2018	19:46:28	1114	ST18904-ENV68			Camera	132	40	654683	4457322	654724	4457299	-40	23	47	120		(Corr'd Nav, Kongsberg 14208, img#14) (V)	
07-Oct-2018	19:47:15	1115	ST18904-ENV68			Camera	132	40	654693	4457317	654724	4457299	-31	18	36	120		(Cor'd Nav, Kongsberg 14208, img#15) (V)	
07-Oct-2018	19:47:31	1116	ST18904-ENV68			Camera	132	40	654695	4457316	654724	4457299	-29	17	33	121		(Corr'd Nav, Kongsberg 14208, img#16) (V)	
07-Oct-2018	19:47:44	1117	ST18904-ENV68			Camera	132	40	654698	4457315	654724	4457299	-26	16	30	122		(Corr'd Nav, Kongsberg 14208, img#17) (V)	
07-Oct-2018	19:48:15	1118	ST18904-ENV68			Camera	132	40	654705	4457312	654724	4457299	-19	13	23	124		(Corr'd Nav, Kongsberg 14208, img#18) (V)	
07-Oct-2018	19:48:35	1119	ST18904-ENV68			Camera	132	40	654710	4457310	654724	4457299	-14	11	18	127		(Corr'd Nav, Kongsberg 14208, img#19) (V)	
07-Oct-2018	19:48:58	1120	ST18904-ENV68			Camera	132	40	654714	4457307	654724	4457299	-9	8	12	130		(Corr'd Nav, Kongsberg 14208, img#20) (V)	
07-Oct-2018	19:49:27	1121	ST18904-ENV68			Camera	132	40	654719	4457303	654724	4457299	-5	4	6	131		(Corr'd Nav, Kongsberg 14208, img#21) (V)	
07-Oct-2018	19:49:41	1122	ST18904-ENV68			Camera	132	40	654721	4457301	654724	4457299	-3	2	4	131		(Corr'd Nav, Kongsberg 14208, img#22) (V)	
07-Oct-2018	19:50:02	1123	ST18904-ENV68			Camera	132	40	654725	4457299	654724	4457299	1	0	1	276		(Corr'd Nav, Kongsberg 14208, img#23) (V)	
07-Oct-2018	19:50:14	1124	ST18904-ENV68			Camera	132	40	654727	4457298	654724	4457299	4	-1	4	290		(Corr'd Nav, Kongsberg 14208, img#24) (V)	
07-Oct-2018	19:50:45	1125	ST18904-ENV68			Camera	133	40	654735	4457297	654724	4457299	11	-2	11	282		(Corr'd Nav, Kongsberg 14208, img#25) (V)	
07-Oct-2018	19:50:57	1126	ST18904-ENV68			Camera	133	40	654738	4457297	654724	4457299	14	-2	14	279		(Corr'd Nav, Kongsberg 14208, img#26) (V)	
07-Oct-2018	19:51:32	1127	ST18904-ENV68			Camera	133	40	654746	4457294	654724	4457299	22	-5	23	282		(Corr'd Nav, Kongsberg 14208, img#27) (V)	
07-Oct-2018	19:52:25	1128	ST18904-ENV68			Camera	132	40	654755	4457285	654724	4457299	32	-14	35	294		(Corr'd Nav, Kongsberg 14208, img#28) (V)	
07-Oct-2018	19:52:40	1129	ST18904-ENV68			Camera	133	40	654758	4457283	654724	4457299	34	-16	37	295		(Corr'd Nav, Kongsberg 14208, img#29) (V)	
07-Oct-2018	19:53:01	1130	ST18904-ENV68			Camera	132	40	654761	4457282	654724	4457299	37	-17	41	294		(Corr'd Nav, Kongsberg 14208, img#30) (V)	
07-Oct-2018	19:53:19	1131	ST18904-ENV68			Camera	133	40	654764	4457282	654724	4457299	41	-17	44	293		(Corr'd Nav, Kongsberg 14208, img#31) (V)	
07-Oct-2018	19:53:54	1132	ST18904-ENV68			Camera	133	40	654773	4457279	654724	4457299	49	-20	53	292		(Corr'd Nav, Kongsberg 14208, img#32) (V)	
07-Oct-2018	19:54:17	1133	ST18904-ENV68			Camera	133	40	654778	4457277	654724	4457299	55	-22	59	292		(Corr'd Nav, Kongsberg 14208, img#33) (V)	
07-Oct-2018	19:54:31	1134	ST18904-ENV68			Camera	132	40	654782	4457275	654724	4457299	58	-24	63	292		(Corr'd Nav, Kongsberg 14208, img#34) (V)	
07-Oct-2018	19:54:58	1135	ST18904-ENV68			Camera	132	40	654788	4457273	654724	4457299	64	-26	69	292		(Corr'd Nav, Kongsberg 14208, img#35) (V)	
07-Oct-2018	19:55:41	1136	ST18904-ENV68			Camera	132	40	654797	4457269	654724	4457299	73	-30	79	292		(Corr'd Nav, Kongsberg 14208, img#36) (V)	

Grey columns denote where no information is required

APPENDIX A FIELD SAMPLING LOGS

Table A.3 Seabed Imagery Surveyors Logs

Gardline										Seafloor Sampling Positioning Summary																	
Job No		11179								Vessel		MV Ocean Researcher															
Client		Equinor US Wind LLC								Vessel Reference Point (VRP)		CoG															
Project Name		Equinor Wind OCS-A 0512								Deployment Location		Starboard A-frame				x		8.96		y		-3.08		z		6.05	
Primary Positioning System		Starpack 1								Actual Coordinates derived from		Deployment Location															
Geodetic Reference System		Datum				NAD83		Ellipsoid		GRS 80		Projection		UTM ZONE 18 N (75 W)				Vertical / Tidal Datum		NAVD88							
Date	Time (UTC/GMT)	Fix number	Stn No	Penetration	Sample Retention	Retention	Observed Seafloor Depth (feet)	Observed Seafloor Depth (m)	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks									
									Easting	Northing	Easting	Northing	dE	dN	Range	Bearing											
07-Oct-2018	19:56:00	1137	ST18904-ENV68			Camera	132	40	654801	4457267	654724	4457299	77	-32	84	293		(Corr'd Nav, Kongsberg 14208, img#37) (V)									
07-Oct-2018	19:56:27	1138	ST18904-ENV68			Camera	132	40	654806	4457264	654724	4457299	82	-35	89	293		(Corr'd Nav, Kongsberg 14208, img#38) (V)									
07-Oct-2018	19:56:52	1139	ST18904-ENV68			Camera	132	40	654809	4457263	654724	4457299	86	-36	93	293		(Corr'd Nav, Kongsberg 14208, img#39) (V)									
07-Oct-2018	19:57:15	1140	ST18904-ENV68			Camera	132	40	654813	4457262	654724	4457299	89	-37	96	293		(Corr'd Nav, Kongsberg 14208, img#40) (V)									
07-Oct-2018	22:09:15	1141	ST18904-ENV65			Camera	131	40	652890	4457997	652899	4457991	-9	6	11	126		(Corr'd Nav, Kongsberg 14208, img#1) (V)									
07-Oct-2018	22:09:45	1142	ST18904-ENV65			Camera	131	40	652893	4458001	652899	4457991	-5	10	11	151		(Corr'd Nav, Kongsberg 14208, img#2) (V)									
07-Oct-2018	22:13:23	1143	ST18904-ENV65			Camera	131	40	652903	4457987	652899	4457991	4	-4	6	311		(Corr'd Nav, Kongsberg 14208, img#3) (V)									
07-Oct-2018	22:14:11	1144	ST18904-ENV65			Camera	131	40	652910	4457987	652899	4457991	11	-4	11	290		(Corr'd Nav, Kongsberg 14208, img#4) (V)									
07-Oct-2018	22:14:36	1145	ST18904-ENV65			Camera	131	40	652913	4457987	652899	4457991	15	-4	15	285		(Corr'd Nav, Kongsberg 14208, img#5) (V)									
07-Oct-2018	22:15:01	1146	ST18904-ENV65			Camera	131	40	652917	4457987	652899	4457991	18	-4	19	283		(Corr'd Nav, Kongsberg 14208, img#6) (V)									
07-Oct-2018	22:15:50	1147	ST18904-ENV65			Camera	131	40	652924	4457982	652899	4457991	25	-9	27	290		(Corr'd Nav, Kongsberg 14208, img#7) (V)									
07-Oct-2018	22:16:05	1148	ST18904-ENV65			Camera	131	40	652926	4457980	652899	4457991	27	-11	29	292		(Corr'd Nav, Kongsberg 14208, img#8) (V)									
07-Oct-2018	22:18:03	1149	ST18904-ENV65			Camera	131	40	652947	4457977	652899	4457991	48	-14	50	286		(Corr'd Nav, Kongsberg 14208, img#9) (V)									
07-Oct-2018	22:18:35	1150	ST18904-ENV65			Camera	131	40	652953	4457975	652899	4457991	54	-16	56	287		(Corr'd Nav, Kongsberg 14208, img#10) (V)									
07-Oct-2018	22:18:52	1151	ST18904-ENV65			Camera	131	40	652955	4457974	652899	4457991	56	-17	59	287		(Corr'd Nav, Kongsberg 14208, img#11) (V)									
07-Oct-2018	22:19:18	1152	ST18904-ENV65			Camera	131	40	652958	4457973	652899	4457991	59	-18	62	287		(Corr'd Nav, Kongsberg 14208, img#12) (V)									
07-Oct-2018	22:20:00	1153	ST18904-ENV65			Camera	131	40	652964	4457970	652899	4457991	66	-21	69	288		(Cor'd Nav, Kongsberg 14208, img#13) (V)									
07-Oct-2018	22:20:17	1154	ST18904-ENV65			Camera	131	40	652968	4457967	652899	4457991	69	-24	73	289		(Corr'd Nav, Kongsberg 14208, img#14) (V)									
07-Oct-2018	22:22:05	1155	ST18904-ENV65			Camera	131	40	652980	4457951	652899	4457991	81	-40	90	296		(Corr'd Nav, Kongsberg 14208, img#15) (V)									
07-Oct-2018	22:22:27	1156	ST18904-ENV65			Camera	131	40	652982	4457949	652899	4457991	83	-42	93	297		(Corr'd Nav, Kongsberg 14208, img#16) (V)									
07-Oct-2018	22:24:45	1157	ST18904-ENV65			Camera	131	40	653004	4457942	652899	4457991	105	-49	116	295		(Corr'd Nav, Kongsberg 14208, img#17) (V)									
07-Oct-2018	22:25:27	1158	ST18904-ENV65			Camera	132	40	653012	4457940	652899	4457991	113	-51	124	294		(Corr'd Nav, Kongsberg 14208, img#18) (V)									
07-Oct-2018	22:26:10	1159	ST18904-ENV65			Camera	132	40	653019	4457938	652899	4457991	120	-53	131	294		(Corr'd Nav, Kongsberg 14208, img#19) (V)									
07-Oct-2018	22:27:01	1160	ST18904-ENV65			Camera	132	40	653027	4457934	652899	4457991	129	-57	141	294		(Corr'd Nav, Kongsberg 14208, img#20) (V)									
07-Oct-2018	22:27:13	1161	ST18904-ENV65			Camera	132	40	653030	4457934	652899	4457991	131	-57	143	293		(Corr'd Nav, Kongsberg 14208, img#21) (V)									
07-Oct-2018	22:29:14	1162	ST18904-ENV65			Camera	132	40	653051	4457927	652899	4457991	152	-64	165	293		(Corr'd Nav, Kongsberg 14208, img#22) (V)									
07-Oct-2018	22:29:38	1163	ST18904-ENV65			Camera	132	40	653055	4457925	652899	4457991	157	-66	170	293		(Corr'd Nav, Kongsberg 14208, img#23) (V)									
07-Oct-2018	22:31:08	1164	ST18904-ENV65			Camera	132	40	653072	4457914	652899	4457991	173	-77	189	294		(Corr'd Nav, Kongsberg 14208, img#24) (V)									
07-Oct-2018	22:32:01	1165	ST18904-ENV65			Camera	131	40	653082	4457910	652899	4457991	183	-81	200	294		(Corr'd Nav, Kongsberg 14208, img#25) (V)									
21-Nov-2018	12:08:22	1166	ST18904-ENV71			Camera	133	41	659627	4461353	659629	4461331	-2	22	-19	-12		(Raw Nav, Kongsberg 14208, img#1) (V)									
24-Nov-2018	05:28:04	1166	ST18904-ENV70			Camera	132	40	657721	4461811	657916	4461710	-196	101	220	117		(Corr'd Nav, Kongsberg 14208, img#1) (V)									
24-Nov-2018	05:28:52	1167	ST18904-ENV70			Camera	132	40	657728	4461808	657916	4461710	-188	98	212	117		(Corr'd Nav, Kongsberg 14208, img#2) (V)									
24-Nov-2018	05:29:43	1168	ST18904-ENV70			Camera	132	40	657738	4461805	657916	4461710	-178	95	202	118		(Corr'd Nav, Kongsberg 14208, img#3) (V)									
24-Nov-2018	05:29:59	1169	ST18904-ENV70			Camera	132	40	657742	4461805	657916	4461710	-174	95	198	118		(Corr'd Nav, Kongsberg 14208, img#4) (V)									
24-Nov-2018	05:38:37	1170	ST18904-ENV70			Camera	132	40	657796	4461775	657916	4461710	-120	65	137	118		(Corr'd Nav, Kongsberg 14208, img#5) (V)									
24-Nov-2018	05:39:05	1171	ST18904-ENV70			Camera	132	40	657798	4461773	657916	4461710	-118	63	134	118		(Corr'd Nav, Kongsberg 14208, img#6) (V)									
24-Nov-2018	05:39:32	1172	ST18904-ENV70			Camera	132	40	657801	4461771	657916	4461710	-115	61	130	118		(Corr'd Nav, Kongsberg 14208, img#7) (V)									
24-Nov-2018	05:40:09	1173	ST18904-ENV70			Camera	132	40	657805	4461769	657916	4461710	-111	58	126	118		(Corr'd Nav, Kongsberg 14208, img#8) (V)									

Grey columns denote where no information is required

APPENDIX A FIELD SAMPLING LOGS

Table A.3 Seabed Imagery Surveyors Logs

Gardline																	Seafloor Sampling Positioning Summary									
Job No		11179								Vessel		MV Ocean Researcher														
Client		Equinor US Wind LLC								Vessel Reference Point (VRP)		CoG														
Project Name		Equinor Wind OCS-A 0512								Deployment Location		Starboard A-frame			x		8.96		y		-3.08		z		6.05	
Primary Positioning System		Starpack 1								Actual Coordinates derived from		Deployment Location														
Geodetic Reference System		Datum		NAD83		Ellipsoid		GRS 80		Projection		UTM ZONE 18 N (75 W)					Vertical / Tidal Datum		NAVD88							
Date	Time (UTC/GMT)	Fix number	Stn No	Penetration	Sample Retention	Retention	Observed Seafloor Depth (feet)	Observed Seafloor Depth (m)	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks								
									Easting	Northing	Easting	Northing	dE	dN	Range	Bearing										
24-Nov-2018	05:40:53	1174	ST18904-ENV70			Camera	132	40	657810	4461764	657916	4461710	-106	54	119	117		(Corr'd Nav, Kongsberg 14208, img#9) (V)								
24-Nov-2018	05:41:21	1175	ST18904-ENV70			Camera	132	40	657815	4461762	657916	4461710	-101	52	114	117		(Corr'd Nav, Kongsberg 14208, img#10) (V)								
24-Nov-2018	05:41:51	1176	ST18904-ENV70			Camera	132	40	657821	4461760	657916	4461710	-96	50	108	118		(Corr'd Nav, Kongsberg 14208, img#11) (V)								
24-Nov-2018	05:42:19	1177	ST18904-ENV70			Camera	132	40	657825	4461758	657916	4461710	-91	48	103	118		(Corr'd Nav, Kongsberg 14208, img#12) (V)								
24-Nov-2018	05:42:58	1178	ST18904-ENV70			Camera	132	40	657833	4461755	657916	4461710	-83	45	94	118		(Corr'd Nav, Kongsberg 14208, img#13) (V)								
24-Nov-2018	05:43:31	1179	ST18904-ENV70			Camera	132	40	657839	4461753	657916	4461710	-77	43	88	119		(Corr'd Nav, Kongsberg 14208, img#14) (V)								
24-Nov-2018	05:43:38	1180	ST18904-ENV70			Camera	132	40	657841	4461752	657916	4461710	-75	42	86	119		(Corr'd Nav, Kongsberg 14208, img#15) (V)								
24-Nov-2018	05:43:53	1181	ST18904-ENV70			Camera	132	40	657844	4461751	657916	4461710	-72	41	83	119		(Corr'd Nav, Kongsberg 14208, img#16) (V)								
24-Nov-2018	05:44:08	1182	ST18904-ENV70			Camera	132	40	657847	4461750	657916	4461710	-69	40	80	120		(Corr'd Nav, Kongsberg 14208, img#17) (V)								
24-Nov-2018	05:44:23	1183	ST18904-ENV70			Camera	132	40	657850	4461749	657916	4461710	-66	39	77	121		(Corr'd Nav, Kongsberg 14208, img#18) (V)								
24-Nov-2018	05:44:51	1184	ST18904-ENV70			Camera	132	40	657855	4461747	657916	4461710	-62	37	72	121		(Corr'd Nav, Kongsberg 14208, img#19) (V)								
24-Nov-2018	05:45:11	1185	ST18904-ENV70			Camera	132	40	657858	4461746	657916	4461710	-59	35	68	121		(Corr'd Nav, Kongsberg 14208, img#20) (V)								
24-Nov-2018	05:45:31	1186	ST18904-ENV70			Camera	132	40	657860	4461743	657916	4461710	-56	33	65	121		(Corr'd Nav, Kongsberg 14208, img#21) (V)								
24-Nov-2018	05:45:51	1187	ST18904-ENV70			Camera	132	40	657863	4461742	657916	4461710	-54	31	62	120		(Corr'd Nav, Kongsberg 14208, img#22) (V)								
24-Nov-2018	05:46:11	1188	ST18904-ENV70			Camera	132	40	657865	4461740	657916	4461710	-51	30	59	120		(Corr'd Nav, Kongsberg 14208, img#23) (V)								
24-Nov-2018	05:46:31	1189	ST18904-ENV70			Camera	132	40	657867	4461739	657916	4461710	-49	28	57	120		(Corr'd Nav, Kongsberg 14208, img#24) (V)								
24-Nov-2018	05:46:51	1190	ST18904-ENV70			Camera	132	40	657870	4461738	657916	4461710	-46	28	54	121		(Corr'd Nav, Kongsberg 14208, img#25) (V)								
24-Nov-2018	05:47:11	1191	ST18904-ENV70			Camera	132	40	657873	4461738	657916	4461710	-43	27	51	123		(Corr'd Nav, Kongsberg 14208, img#26) (V)								
24-Nov-2018	05:47:31	1192	ST18904-ENV70			Camera	132	40	657876	4461737	657916	4461710	-40	27	48	124		(Corr'd Nav, Kongsberg 14208, img#27) (V)								
24-Nov-2018	05:48:03	1193	ST18904-ENV70			Camera	132	40	657879	4461736	657916	4461710	-38	26	46	124		(Corr'd Nav, Kongsberg 14208, img#28) (V)								
24-Nov-2018	05:48:28	1194	ST18904-ENV70			Camera	132	40	657878	4461732	657916	4461710	-38	22	44	120		(Corr'd Nav, Kongsberg 14208, img#29) (V)								
24-Nov-2018	05:48:53	1195	ST18904-ENV70			Camera	132	40	657878	4461728	657916	4461710	-38	18	42	115		(Corr'd Nav, Kongsberg 14208, img#30) (V)								
24-Nov-2018	05:49:18	1196	ST18904-ENV70			Camera	132	40	657881	4461725	657916	4461710	-36	15	39	112		(Corr'd Nav, Kongsberg 14208, img#31) (V)								
24-Nov-2018	05:49:43	1197	ST18904-ENV70			Camera	131	40	657884	4461724	657916	4461710	-32	14	35	113		(Corr'd Nav, Kongsberg 14208, img#32) (V)								
24-Nov-2018	05:50:08	1198	ST18904-ENV70			Camera	131	40	657888	4461723	657916	4461710	-28	13	31	115		(Corr'd Nav, Kongsberg 14208, img#33) (V)								
24-Nov-2018	05:50:33	1199	ST18904-ENV70			Camera	131	40	657892	4461722	657916	4461710	-25	12	27	116		(Corr'd Nav, Kongsberg 14208, img#34) (V)								
24-Nov-2018	05:50:58	1200	ST18904-ENV70			Camera	131	40	657895	4461721	657916	4461710	-21	11	24	117		(Corr'd Nav, Kongsberg 14208, img#35) (V)								
24-Nov-2018	05:51:22	1201	ST18904-ENV70			Camera	131	40	657899	4461720	657916	4461710	-17	10	20	119		(Corr'd Nav, Kongsberg 14208, img#36) (V)								
24-Nov-2018	05:51:48	1202	ST18904-ENV70			Camera	131	40	657902	4461718	657916	4461710	-14	8	16	121		(Corr'd Nav, Kongsberg 14208, img#37) (V)								
24-Nov-2018	05:52:17	1203	ST18904-ENV70			Camera	131	40	657905	4461715	657916	4461710	-11	5	13	114		(Corr'd Nav, Kongsberg 14208, img#38) (V)								
24-Nov-2018	05:52:42	1204	ST18904-ENV70			Camera	131	40	657907	4461712	657916	4461710	-9	2	9	100		(Corr'd Nav, Kongsberg 14208, img#39) (V)								
24-Nov-2018	05:53:06	1205	ST18904-ENV70			Camera	131	40	657910	4461709	657916	4461710	-6	-1	6	83		(Corr'd Nav, Kongsberg 14208, img#40) (V)								
24-Nov-2018	05:53:31	1206	ST18904-ENV70			Camera	131	40	657914	4461708	657916	4461710	-2	-2	3	45		(Corr'd Nav, Kongsberg 14208, img#41) (V)								
24-Nov-2018	05:53:56	1207	ST18904-ENV70			Camera	131	40	657919	4461709	657916	4461710	3	-1	3	289		(Corr'd Nav, Kongsberg 14208, img#42) (V)								
24-Nov-2018	05:54:21	1208	ST18904-ENV70			Camera	131	40	657922	4461710	657916	4461710	6	0	6	273		(Corr'd Nav, Kongsberg 14208, img#43) (V)								
24-Nov-2018	05:54:46	1209	ST18904-ENV70			Camera	131	40	657924	4461709	657916	4461710	8	-1	8	280		(Corr'd Nav, Kongsberg 14208, img#44) (V)								
24-Nov-2018	05:55:11	1210	ST18904-ENV70			Camera	131	40	657925	4461707	657916	4461710	8	-3	9	292		(Corr'd Nav, Kongsberg 14208, img#45) (V)								
24-Nov-2018	05:55:36	1211	ST18904-ENV70			Camera	131	40	657926	4461705	657916	4461710	10	-5	11	298		(Corr'd Nav, Kongsberg 14208, img#46) (V)								

Grey columns denote where no information is required

APPENDIX A FIELD SAMPLING LOGS

Table A.3 Seabed Imagery Surveyors Logs

Gardline																	Seafloor Sampling Positioning Summary										
Job No		11179								Vessel		MV Ocean Researcher															
Client		Equinor US Wind LLC								Vessel Reference Point (VRP)		CoG															
Project Name		Equinor Wind OCS-A 0512								Deployment Location		Starboard A-frame				x		8.96		y		-3.08		z		6.05	
Primary Positioning System		Starpack 1								Actual Coordinates derived from		Deployment Location															
Geodetic Reference System		Datum		NAD83		Ellipsoid		GRS 80		Projection		UTM ZONE 18 N (75 W)				Vertical / Tidal Datum		NAVD88									
Date	Time (UTC/GMT)	Fix number	Stn No	Penetration	Sample Retention	Retention	Observed Seafloor Depth (feet)	Observed Seafloor Depth (m)	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks									
									Easting	Northing	Easting	Northing	dE	dN	Range	Bearing											
24-Nov-2018	05:56:01	1212	ST18904-ENV70			Camera	131	40	657929	4461704	657916	4461710	13	-6	14	297		(Corr'd Nav, Kongsberg 14208, img#47) (V)									
24-Nov-2018	05:56:26	1213	ST18904-ENV70			Camera	131	40	657932	4461704	657916	4461710	16	-6	17	291		(Corr'd Nav, Kongsberg 14208, img#48) (V)									
24-Nov-2018	05:56:51	1214	ST18904-ENV70			Camera	131	40	657934	4461704	657916	4461710	18	-6	19	288		(Corr'd Nav, Kongsberg 14208, img#49) (V)									
24-Nov-2018	05:57:16	1215	ST18904-ENV70			Camera	131	40	657935	4461703	657916	4461710	18	-7	20	291		(Corr'd Nav, Kongsberg 14208, img#50) (V)									
24-Nov-2018	05:57:41	1216	ST18904-ENV70			Camera	131	40	657934	4461701	657916	4461710	18	-9	20	298		(Corr'd Nav, Kongsberg 14208, img#51) (V)									
24-Nov-2018	05:58:06	1217	ST18904-ENV70			Camera	131	40	657934	4461699	657916	4461710	18	-11	21	302		(Corr'd Nav, Kongsberg 14208, img#52) (V)									
24-Nov-2018	05:58:31	1218	ST18904-ENV70			Camera	131	40	657935	4461698	657916	4461710	18	-13	22	304		(Corr'd Nav, Kongsberg 14208, img#53) (V)									
24-Nov-2018	05:58:56	1219	ST18904-ENV70			Camera	131	40	657936	4461697	657916	4461710	20	-13	24	303		(Corr'd Nav, Kongsberg 14208, img#54) (V)									
24-Nov-2018	05:59:21	1220	ST18904-ENV70			Camera	131	40	657939	4461697	657916	4461710	23	-13	26	300		(Corr'd Nav, Kongsberg 14208, img#55) (V)									
24-Nov-2018	05:59:46	1221	ST18904-ENV70			Camera	131	40	657941	4461698	657916	4461710	25	-12	28	296		(Corr'd Nav, Kongsberg 14208, img#56) (V)									
24-Nov-2018	06:00:11	1222	ST18904-ENV70			Camera	131	40	657943	4461698	657916	4461710	27	-12	29	294		(Corr'd Nav, Kongsberg 14208, img#57) (V)									
24-Nov-2018	06:00:36	1223	ST18904-ENV70			Camera	131	40	657944	4461697	657916	4461710	28	-13	31	295		(Corr'd Nav, Kongsberg 14208, img#58) (V)									
24-Nov-2018	06:01:01	1224	ST18904-ENV70			Camera	131	40	657945	4461696	657916	4461710	28	-14	32	296		(Corr'd Nav, Kongsberg 14208, img#59) (V)									
24-Nov-2018	06:01:26	1225	ST18904-ENV70			Camera	131	40	657945	4461695	657916	4461710	29	-16	33	298		(Corr'd Nav, Kongsberg 14208, img#60) (V)									
24-Nov-2018	06:01:51	1226	ST18904-ENV70			Camera	131	40	657946	4461693	657916	4461710	30	-17	34	300		(Corr'd Nav, Kongsberg 14208, img#61) (V)									
24-Nov-2018	06:02:16	1227	ST18904-ENV70			Camera	131	40	657948	4461692	657916	4461710	32	-18	36	299		(Corr'd Nav, Kongsberg 14208, img#62) (V)									
24-Nov-2018	06:02:41	1228	ST18904-ENV70			Camera	131	40	657950	4461693	657916	4461710	34	-18	38	297		(Corr'd Nav, Kongsberg 14208, img#63) (V)									
24-Nov-2018	06:03:06	1229	ST18904-ENV70			Camera	131	40	657953	4461693	657916	4461710	37	-17	40	295		(Corr'd Nav, Kongsberg 14208, img#64) (V)									
24-Nov-2018	06:03:31	1230	ST18904-ENV70			Camera	131	40	657955	4461694	657916	4461710	38	-17	42	293		(Corr'd Nav, Kongsberg 14208, img#65) (V)									
24-Nov-2018	06:03:56	1231	ST18904-ENV70			Camera	131	40	657956	4461694	657916	4461710	40	-16	43	292		(Corr'd Nav, Kongsberg 14208, img#66) (V)									
24-Nov-2018	06:04:07	1232	ST18904-ENV70			Camera	131	40	657957	4461694	657916	4461710	40	-16	43	292		(Corr'd Nav, Kongsberg 14208, img#67) (V)									
24-Nov-2018	06:04:47	1233	ST18904-ENV70			Camera	131	40	657957	4461692	657916	4461710	41	-18	44	294		(Corr'd Nav, Kongsberg 14208, img#68) (V)									
24-Nov-2018	06:05:27	1234	ST18904-ENV70			Camera	131	40	657954	4461689	657916	4461710	38	-21	43	299		(Corr'd Nav, Kongsberg 14208, img#69) (V)									
24-Nov-2018	06:06:07	1235	ST18904-ENV70			Camera	131	40	657954	4461685	657916	4461710	37	-25	45	304		(Corr'd Nav, Kongsberg 14208, img#70) (V)									
24-Nov-2018	06:06:47	1236	ST18904-ENV70			Camera	131	40	657957	4461682	657916	4461710	41	-28	50	304		(Corr'd Nav, Kongsberg 14208, img#71) (V)									
24-Nov-2018	06:07:27	1237	ST18904-ENV70			Camera	131	40	657964	4461682	657916	4461710	48	-28	56	300		(Corr'd Nav, Kongsberg 14208, img#72) (V)									
24-Nov-2018	06:08:07	1238	ST18904-ENV70			Camera	131	40	657971	4461682	657916	4461710	55	-28	61	297		(Corr'd Nav, Kongsberg 14208, img#73) (V)									
24-Nov-2018	06:08:47	1239	ST18904-ENV70			Camera	131	40	657978	4461679	657916	4461710	62	-31	69	297		(Corr'd Nav, Kongsberg 14208, img#74) (V)									
24-Nov-2018	06:09:27	1240	ST18904-ENV70			Camera	131	40	657985	4461675	657916	4461710	68	-35	77	297		(Corr'd Nav, Kongsberg 14208, img#75) (V)									
24-Nov-2018	06:10:07	1241	ST18904-ENV70			Camera	131	40	657990	4461673	657916	4461710	74	-37	83	297		(Corr'd Nav, Kongsberg 14208, img#76) (V)									
24-Nov-2018	06:10:47	1242	ST18904-ENV70			Camera	131	40	657997	4461671	657916	4461710	81	-40	90	296		(Corr'd Nav, Kongsberg 14208, img#77) (V)									
24-Nov-2018	06:11:27	1243	ST18904-ENV70			Camera	131	40	658007	4461670	657916	4461710	91	-40	99	294		(Corr'd Nav, Kongsberg 14208, img#78) (V)									
24-Nov-2018	06:12:00	1244	ST18904-ENV70			Camera	131	40	658013	4461669	657916	4461710	97	-41	105	293		(Corr'd Nav, Kongsberg 14208, img#79) (V)									
24-Nov-2018	08:16:59	1245	ST18904-ENV61			Camera	129	39	651941	4462060	651933	4462056	8	4	9	242		(Corr'd Nav, Kongsberg 14208, img#80) (V)									
24-Nov-2018	08:17:37	1246	ST18904-ENV61			Camera	129	39	651940	4462060	651933	4462056	7	4	8	239		(Corr'd Nav, Kongsberg 14208, img#81) (V)									
24-Nov-2018	08:18:17	1247	ST18904-ENV61			Camera	128	39	651936	4462062	651933	4462056	3	6	7	207		(Corr'd Nav, Kongsberg 14208, img#82) (V)									
24-Nov-2018	08:18:51	1248	ST18904-ENV61			Camera	128	39	651933	4462063	651933	4462056	1	7	7	185		(Corr'd Nav, Kongsberg 14208, img#83) (V)									
24-Nov-2018	08:19:05	1249	ST18904-ENV61			Camera	128	39	651932	4462064	651933	4462056	-1	8	8	175		(Corr'd Nav, Kongsberg 14208, img#84) (V)									

Grey columns denote where no information is required

APPENDIX A FIELD SAMPLING LOGS

Table A.3 Seabed Imagery Surveyors Logs

Gardline																	Seafloor Sampling Positioning Summary						
Job No		11179										Vessel		MV Ocean Researcher									
Client		Equinor US Wind LLC										Vessel Reference Point (VRP)		CoG									
Project Name		Equinor Wind OCS-A 0512										Deployment Location		Starboard A-frame			x	8.96	y	-3.08	z	6.05	
Primary Positioning System		Starpack 1										Actual Coordinates derived from		Deployment Location									
Geodetic Reference System		Datum		NAD83		Ellipsoid		GRS 80		Projection		UTM ZONE 18 N (75 W)				Vertical / Tidal Datum		NAVD88					
Date	Time (UTC/GMT)	Fix number	Stn No	Penetration	Sample Retention	Retention	Observed Seafloor Depth (feet)	Observed Seafloor Depth (m)	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks					
									Easting	Northing	Easting	Northing	dE	dN	Range	Bearing							
24-Nov-2018	08:19:27	1250	ST18904-ENV61			Camera	128	39	651929	4462065	651933	4462056	-3	9	9	159		(Corr'd Nav, Kongsberg 14208, img#85) (V)					
24-Nov-2018	08:19:56	1251	ST18904-ENV61			Camera	128	39	651925	4462066	651933	4462056	-7	10	12	144		(Corr'd Nav, Kongsberg 14208, img#86) (V)					
24-Nov-2018	08:20:24	1252	ST18904-ENV61			Camera	128	39	651921	4462067	651933	4462056	-12	11	16	135		(Corr'd Nav, Kongsberg 14208, img#87) (V)					
24-Nov-2018	08:20:55	1253	ST18904-ENV61			Camera	128	39	651917	4462069	651933	4462056	-15	13	20	130		(Corr'd Nav, Kongsberg 14208, img#88) (V)					
24-Nov-2018	08:21:20	1254	ST18904-ENV61			Camera	128	39	651915	4462070	651933	4462056	-18	14	23	128		(Corr'd Nav, Kongsberg 14208, img#89) (V)					
24-Nov-2018	08:21:53	1255	ST18904-ENV61			Camera	128	39	651911	4462072	651933	4462056	-22	16	27	127		(Corr'd Nav, Kongsberg 14208, img#90) (V)					
24-Nov-2018	08:22:26	1256	ST18904-ENV61			Camera	128	39	651907	4462075	651933	4462056	-26	19	33	126		(Corr'd Nav, Kongsberg 14208, img#91) (V)					
24-Nov-2018	08:23:13	1257	ST18904-ENV61			Camera	128	39	651901	4462080	651933	4462056	-32	24	40	126		(Corr'd Nav, Kongsberg 14208, img#92) (V)					
24-Nov-2018	08:23:30	1258	ST18904-ENV61			Camera	128	39	651898	4462081	651933	4462056	-35	25	43	126		(Corr'd Nav, Kongsberg 14208, img#93) (V)					
24-Nov-2018	08:23:36	1259	ST18904-ENV61			Camera	128	39	651897	4462082	651933	4462056	-36	26	44	126		(Corr'd Nav, Kongsberg 14208, img#94) (V)					
24-Nov-2018	08:24:24	1260	ST18904-ENV61			Camera	129	39	651890	4462085	651933	4462056	-43	29	52	124		(Corr'd Nav, Kongsberg 14208, img#95) (V)					
24-Nov-2018	08:24:50	1261	ST18904-ENV61			Camera	129	39	651885	4462086	651933	4462056	-48	30	56	122		(Corr'd Nav, Kongsberg 14208, img#96) (V)					
24-Nov-2018	08:25:14	1262	ST18904-ENV61			Camera	129	39	651881	4462087	651933	4462056	-51	31	60	121		(Corr'd Nav, Kongsberg 14208, img#97) (V)					
24-Nov-2018	08:26:01	1263	ST18904-ENV61			Camera	129	39	651876	4462089	651933	4462056	-57	33	66	120		(Corr'd Nav, Kongsberg 14208, img#98) (V)					
24-Nov-2018	08:26:47	1264	ST18904-ENV61			Camera	128	39	651870	4462089	651933	4462056	-63	33	71	118		(Corr'd Nav, Kongsberg 14208, img#99) (V)					
24-Nov-2018	08:26:58	1265	ST18904-ENV61			Camera	128	39	651868	4462089	651933	4462056	-64	33	73	117		(Corr'd Nav, Kongsberg 14208, img#100) (V)					
24-Nov-2018	08:27:42	1266	ST18904-ENV61			Camera	128	39	651864	4462092	651933	4462056	-69	36	78	117		(Corr'd Nav, Kongsberg 14208, img#101) (V)					
24-Nov-2018	08:27:57	1267	ST18904-ENV61			Camera	128	39	651863	4462092	651933	4462056	-70	36	79	117		(Corr'd Nav, Kongsberg 14208, img#102) (V)					
24-Nov-2018	08:28:26	1268	ST18904-ENV61			Camera	128	39	651860	4462092	651933	4462056	-72	36	81	117		(Corr'd Nav, Kongsberg 14208, img#103) (V)					
24-Nov-2018	08:28:56	1269	ST18904-ENV61			Camera	128	39	651858	4462093	651933	4462056	-75	37	83	116		(Corr'd Nav, Kongsberg 14208, img#104) (V)					
24-Nov-2018	08:29:40	1270	ST18904-ENV61			Camera	128	39	651855	4462096	651933	4462056	-78	40	88	117		(Corr'd Nav, Kongsberg 14208, img#105) (V)					
24-Nov-2018	08:30:04	1271	ST18904-ENV61			Camera	128	39	651853	4462097	651933	4462056	-79	41	89	117		(Corr'd Nav, Kongsberg 14208, img#106) (V)					
24-Nov-2018	08:30:41	1272	ST18904-ENV61			Camera	128	39	651851	4462097	651933	4462056	-82	41	92	117		(Corr'd Nav, Kongsberg 14208, img#107) (V)					
24-Nov-2018	08:31:24	1273	ST18904-ENV61			Camera	128	39	651847	4462097	651933	4462056	-86	41	95	116		(Corr'd Nav, Kongsberg 14208, img#108) (V)					
24-Nov-2018	08:32:02	1274	ST18904-ENV61			Camera	128	39	651845	4462099	651933	4462056	-88	43	98	116		(Corr'd Nav, Kongsberg 14208, img#109) (V)					
24-Nov-2018	08:32:42	1275	ST18904-ENV61			Camera	128	39	651843	4462102	651933	4462056	-90	46	101	117		(Corr'd Nav, Kongsberg 14208, img#110) (V)					
24-Nov-2018	08:33:00	1276	ST18904-ENV61			Camera	128	39	651842	4462103	651933	4462056	-91	47	103	117		(Corr'd Nav, Kongsberg 14208, img#111) (V)					
24-Nov-2018	08:33:38	1277	ST18904-ENV61			Camera	128	39	651837	4462103	651933	4462056	-96	47	107	116		(Corr'd Nav, Kongsberg 14208, img#112) (V)					
24-Nov-2018	08:34:12	1278	ST18904-ENV61			Camera	128	39	651833	4462103	651933	4462056	-99	47	110	116		(Corr'd Nav, Kongsberg 14208, img#113) (V)					
24-Nov-2018	08:34:45	1279	ST18904-ENV61			Camera	128	39	651831	4462106	651933	4462056	-102	50	113	116		(Corr'd Nav, Kongsberg 14208, img#114) (V)					
24-Nov-2018	08:35:35	1280	ST18904-ENV61			Camera	128	39	651829	4462110	651933	4462056	-104	54	117	118		(Corr'd Nav, Kongsberg 14208, img#115) (V)					
24-Nov-2018	08:36:15	1281	ST18904-ENV61			Camera	128	39	651826	4462111	651933	4462056	-107	55	121	117		(Corr'd Nav, Kongsberg 14208, img#116) (V)					
24-Nov-2018	08:36:47	1282	ST18904-ENV61			Camera	128	39	651821	4462111	651933	4462056	-111	55	124	116		(Corr'd Nav, Kongsberg 14208, img#117) (V)					
24-Nov-2018	08:37:08	1283	ST18904-ENV61			Camera	128	39	651819	4462111	651933	4462056	-114	55	127	116		(Corr'd Nav, Kongsberg 14208, img#118) (V)					
24-Nov-2018	08:37:53	1284	ST18904-ENV61			Camera	128	39	651815	4462114	651933	4462056	-118	58	131	116		(Corr'd Nav, Kongsberg 14208, img#119) (V)					
24-Nov-2018	08:38:23	1285	ST18904-ENV61			Camera	128	39	651814	4462119	651933	4462056	-119	63	135	118		(Corr'd Nav, Kongsberg 14208, img#120) (V)					
24-Nov-2018	08:38:39	1286	ST18904-ENV61			Camera	128	39	651812	4462121	651933	4462056	-120	65	137	118		(Corr'd Nav, Kongsberg 14208, img#121) (V)					
24-Nov-2018	08:38:55	1287	ST18904-ENV61			Camera	128	39	651811	4462123	651933	4462056	-122	67	139	119		(Corr'd Nav, Kongsberg 14208, img#122) (V)					

Grey columns denote where no information is required

APPENDIX A FIELD SAMPLING LOGS

Table A.3 Seabed Imagery Surveyors Logs

Gardline																	Seafloor Sampling Positioning Summary						
Job No		11179										Vessel		MV Ocean Researcher									
Client		Equinor US Wind LLC										Vessel Reference Point (VRP)		CoG									
Project Name		Equinor Wind OCS-A 0512										Deployment Location		Starboard A-frame			x	8.96	y	-3.08	z	6.05	
Primary Positioning System		Starpack 1										Actual Coordinates derived from		Deployment Location									
Geodetic Reference System		Datum		NAD83		Ellipsoid		GRS 80		Projection		UTM ZONE 18 N (75 W)				Vertical / Tidal Datum		NAVD88					
Date	Time (UTC/GMT)	Fix number	Stn No	Penetration	Sample Retention	Retention	Observed Seafloor Depth (feet)	Observed Seafloor Depth (m)	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks					
									Easting	Northing	Easting	Northing	dE	dN	Range	Bearing							
24-Nov-2018	08:39:22	1288	ST18904-ENV61			Camera	128	39	651807	4462125	651933	4462056	-126	69	144	119		(Corr'd Nav, Kongsberg 14208, img#123) (V)					
24-Nov-2018	08:39:57	1289	ST18904-ENV61			Camera	128	39	651802	4462127	651933	4462056	-131	71	149	118		(Corr'd Nav, Kongsberg 14208, img#124) (V)					
24-Nov-2018	08:40:21	1290	ST18904-ENV61			Camera	127	39	651799	4462127	651933	4462056	-134	71	152	118		(Corr'd Nav, Kongsberg 14208, img#125) (V)					
24-Nov-2018	08:40:31	1291	ST18904-ENV61			Camera	127	39	651798	4462127	651933	4462056	-135	71	153	118		(Corr'd Nav, Kongsberg 14208, img#126) (V)					
24-Nov-2018	08:41:02	1292	ST18904-ENV61			Camera	127	39	651794	4462128	651933	4462056	-139	72	157	117		(Corr'd Nav, Kongsberg 14208, img#127) (V)					
24-Nov-2018	08:41:30	1293	ST18904-ENV61			Camera	127	39	651790	4462131	651933	4462056	-142	75	161	118		(Corr'd Nav, Kongsberg 14208, img#128) (V)					
24-Nov-2018	08:41:50	1294	ST18904-ENV61			Camera	127	39	651788	4462134	651933	4462056	-145	78	164	118		(Corr'd Nav, Kongsberg 14208, img#129) (V)					
24-Nov-2018	08:42:13	1295	ST18904-ENV61			Camera	127	39	651785	4462136	651933	4462056	-147	80	168	118		(Corr'd Nav, Kongsberg 14208, img#130) (V)					
24-Nov-2018	08:42:41	1296	ST18904-ENV61			Camera	127	39	651782	4462136	651933	4462056	-151	80	171	118		(Corr'd Nav, Kongsberg 14208, img#131) (V)					
24-Nov-2018	08:43:01	1297	ST18904-ENV61			Camera	127	39	651779	4462135	651933	4462056	-154	79	173	117		(Corr'd Nav, Kongsberg 14208, img#132) (V)					
24-Nov-2018	08:43:28	1298	ST18904-ENV61			Camera	127	39	651775	4462135	651933	4462056	-158	79	177	116		(Corr'd Nav, Kongsberg 14208, img#133) (V)					
24-Nov-2018	08:43:54	1299	ST18904-ENV61			Camera	127	39	651771	4462137	651933	4462056	-162	81	181	116		(Corr'd Nav, Kongsberg 14208, img#134) (V)					
24-Nov-2018	08:44:24	1300	ST18904-ENV61			Camera	127	39	651768	4462140	651933	4462056	-165	84	185	117		(Corr'd Nav, Kongsberg 14208, img#135) (V)					
24-Nov-2018	08:44:58	1301	ST18904-ENV61			Camera	127	39	651764	4462143	651933	4462056	-169	87	190	117		(Corr'd Nav, Kongsberg 14208, img#136) (V)					
24-Nov-2018	08:45:22	1302	ST18904-ENV61			Camera	127	39	651761	4462143	651933	4462056	-172	87	192	117		(Corr'd Nav, Kongsberg 14208, img#137) (V)					
24-Nov-2018	08:45:46	1303	ST18904-ENV61			Camera	127	39	651758	4462143	651933	4462056	-174	87	195	116		(Corr'd Nav, Kongsberg 14208, img#138) (V)					
24-Nov-2018	08:46:12	1304	ST18904-ENV61			Camera	127	39	651756	4462143	651933	4462056	-176	87	197	116		(Corr'd Nav, Kongsberg 14208, img#139) (V)					
24-Nov-2018	08:46:44	1305	ST18904-ENV61			Camera	127	39	651754	4462144	651933	4462056	-179	88	199	116		(Corr'd Nav, Kongsberg 14208, img#140) (V)					
24-Nov-2018	08:47:00	1306	ST18904-ENV61			Camera	127	39	651753	4462145	651933	4462056	-180	89	200	116		(Corr'd Nav, Kongsberg 14208, img#141) (V)					
24-Nov-2018	10:30:37	1307	ST18904-ENV59			Camera	127	39	649426	4459302	649432	4459294	-6	8	10	142		(Corr'd Nav, Kongsberg 14208, img#142) (V)					
24-Nov-2018	10:31:15	1308	ST18904-ENV59			Camera	127	39	649430	4459299	649432	4459294	-2	4	5	159		(Corr'd Nav, Kongsberg 14208, img#143) (V)					
24-Nov-2018	10:31:28	1309	ST18904-ENV59			Camera	127	39	649432	4459297	649432	4459294	0	2	2	177		(Corr'd Nav, Kongsberg 14208, img#144) (V)					
24-Nov-2018	10:32:25	1310	ST18904-ENV59			Camera	127	39	649437	4459292	649432	4459294	5	-2	6	292		(Corr'd Nav, Kongsberg 14208, img#145) (V)					
24-Nov-2018	10:33:03	1311	ST18904-ENV59			Camera	127	39	649440	4459293	649432	4459294	8	-2	8	283		(Corr'd Nav, Kongsberg 14208, img#146) (V)					
24-Nov-2018	10:33:46	1312	ST18904-ENV59			Camera	127	39	649444	4459292	649432	4459294	12	-2	13	281		(Corr'd Nav, Kongsberg 14208, img#147) (V)					
24-Nov-2018	10:34:00	1313	ST18904-ENV59			Camera	127	39	649445	4459291	649432	4459294	14	-4	14	285		(Corr'd Nav, Kongsberg 14208, img#148) (V)					
24-Nov-2018	10:34:28	1314	ST18904-ENV59			Camera	127	39	649448	4459288	649432	4459294	16	-7	17	292		(Corr'd Nav, Kongsberg 14208, img#149) (V)					
24-Nov-2018	10:35:02	1315	ST18904-ENV59			Camera	127	39	649450	4459287	649432	4459294	18	-8	20	292		(Corr'd Nav, Kongsberg 14208, img#150) (V)					
24-Nov-2018	10:35:32	1316	ST18904-ENV59			Camera	127	39	649452	4459288	649432	4459294	21	-6	22	287		(Corr'd Nav, Kongsberg 14208, img#151) (V)					
24-Nov-2018	10:36:10	1317	ST18904-ENV59			Camera	127	39	649456	4459289	649432	4459294	25	-6	25	283		(Corr'd Nav, Kongsberg 14208, img#152) (V)					
24-Nov-2018	10:36:38	1318	ST18904-ENV59			Camera	127	39	649460	4459286	649432	4459294	28	-8	29	287		(Corr'd Nav, Kongsberg 14208, img#153) (V)					
24-Nov-2018	10:37:04	1319	ST18904-ENV59			Camera	127	39	649462	4459283	649432	4459294	31	-11	33	290		(Corr'd Nav, Kongsberg 14208, img#154) (V)					
24-Nov-2018	10:37:24	1320	ST18904-ENV59			Camera	127	39	649464	4459282	649432	4459294	32	-13	35	291		(Corr'd Nav, Kongsberg 14208, img#155) (V)					
24-Nov-2018	10:37:56	1321	ST18904-ENV59			Camera	127	39	649467	4459282	649432	4459294	35	-13	38	290		(Corr'd Nav, Kongsberg 14208, img#156) (V)					
24-Nov-2018	10:38:23	1322	ST18904-ENV59			Camera	127	39	649471	4459282	649432	4459294	39	-13	41	288		(Corr'd Nav, Kongsberg 14208, img#157) (V)					
24-Nov-2018	10:38:42	1323	ST18904-ENV59			Camera	127	39	649474	4459280	649432	4459294	42	-14	45	289		(Corr'd Nav, Kongsberg 14208, img#158) (V)					
24-Nov-2018	10:39:00	1324	ST18904-ENV59			Camera	127	39	649477	4459277	649432	4459294	45	-17	48	291		(Corr'd Nav, Kongsberg 14208, img#159) (V)					
24-Nov-2018	10:39:19	1325	ST18904-ENV59			Camera	127	39	649480	4459275	649432	4459294	48	-20	52	292		(Corr'd Nav, Kongsberg 14208, img#160) (V)					

Grey columns denote where no information is required

APPENDIX A FIELD SAMPLING LOGS

Table A.3 Seabed Imagery Surveyors Logs

Seafloor Sampling Positioning Summary																			
Job No		11179							Vessel		MV Ocean Researcher								
Client		Equinor US Wind LLC							Vessel Reference Point (VRP)		CoG								
Project Name		Equinor Wind OCS-A 0512							Deployment Location		Starboard A-frame			x	8.96	y	-3.08	z	6.05
Primary Positioning System		Starpack 1							Actual Coordinates derived from		Deployment Location								
Geodetic Reference System		Datum		NAD83		Ellipsoid	GRS 80		Projection		UTM ZONE 18 N (75 W)				Vertical / Tidal Datum		NAVD88		
Date	Time (UTC/GMT)	Fix number	Stn No	Penetration	Sample Retention	Retention	Observed Seafloor Depth (feet)	Observed Seafloor Depth (m)	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks	
									Easting	Northing	Easting	Northing	dE	dN	Range	Bearing			
24-Nov-2018	10:39:41	1326	ST18904-ENV59			Camera	127	39	649482	4459273	649432	4459294	50	-22	54	293		(Cor'd Nav, Kongsberg 14208, img#161) (V)	
24-Nov-2018	10:40:27	1327	ST18904-ENV59			Camera	127	39	649486	4459273	649432	4459294	54	-21	58	292		(Cor'd Nav, Kongsberg 14208, img#162) (V)	
24-Nov-2018	10:40:43	1328	ST18904-ENV59			Camera	127	39	649487	4459274	649432	4459294	56	-21	59	290		(Cor'd Nav, Kongsberg 14208, img#163) (V)	
24-Nov-2018	10:41:04	1329	ST18904-ENV59			Camera	127	39	649490	4459274	649432	4459294	59	-20	62	289		(Cor'd Nav, Kongsberg 14208, img#164) (V)	
24-Nov-2018	10:41:34	1330	ST18904-ENV59			Camera	127	39	649495	4459272	649432	4459294	63	-22	67	289		(Cor'd Nav, Kongsberg 14208, img#165) (V)	
24-Nov-2018	10:41:53	1331	ST18904-ENV59			Camera	127	39	649497	4459269	649432	4459294	66	-25	70	291		(Cor'd Nav, Kongsberg 14208, img#166) (V)	
24-Nov-2018	10:42:23	1332	ST18904-ENV59			Camera	127	39	649500	4459265	649432	4459294	69	-29	75	293		(Cor'd Nav, Kongsberg 14208, img#167) (V)	
24-Nov-2018	10:42:30	1333	ST18904-ENV59			Camera	127	39	649501	4459264	649432	4459294	69	-30	75	294		(Cor'd Nav, Kongsberg 14208, img#168) (V)	
24-Nov-2018	10:43:02	1334	ST18904-ENV59			Camera	127	39	649502	4459263	649432	4459294	70	-31	77	294		(Cor'd Nav, Kongsberg 14208, img#169) (V)	
24-Nov-2018	10:43:31	1335	ST18904-ENV59			Camera	127	39	649503	4459264	649432	4459294	71	-31	77	293		(Cor'd Nav, Kongsberg 14208, img#170) (V)	
24-Nov-2018	10:44:15	1336	ST18904-ENV59			Camera	127	39	649505	4459265	649432	4459294	74	-30	79	292		(Cor'd Nav, Kongsberg 14208, img#171) (V)	
24-Nov-2018	10:44:51	1337	ST18904-ENV59			Camera	127	39	649510	4459265	649432	4459294	78	-30	83	291		(Cor'd Nav, Kongsberg 14208, img#172) (V)	
24-Nov-2018	10:45:10	1338	ST18904-ENV59			Camera	127	39	649512	4459263	649432	4459294	80	-31	86	291		(Cor'd Nav, Kongsberg 14208, img#173) (V)	
24-Nov-2018	10:46:01	1339	ST18904-ENV59			Camera	127	39	649515	4459258	649432	4459294	83	-36	91	294		(Cor'd Nav, Kongsberg 14208, img#174) (V)	
24-Nov-2018	10:46:50	1340	ST18904-ENV59			Camera	127	39	649516	4459258	649432	4459294	84	-37	92	293		(Cor'd Nav, Kongsberg 14208, img#175) (V)	
24-Nov-2018	10:47:20	1341	ST18904-ENV59			Camera	127	39	649518	4459259	649432	4459294	86	-36	93	292		(Cor'd Nav, Kongsberg 14208, img#176) (V)	
24-Nov-2018	10:48:08	1342	ST18904-ENV59			Camera	127	39	649522	4459258	649432	4459294	91	-36	98	292		(Cor'd Nav, Kongsberg 14208, img#177) (V)	
24-Nov-2018	10:48:25	1343	ST18904-ENV59			Camera	127	39	649523	4459257	649432	4459294	92	-38	99	292		(Cor'd Nav, Kongsberg 14208, img#178) (V)	
24-Nov-2018	10:49:04	1344	ST18904-ENV59			Camera	127	39	649525	4459254	649432	4459294	93	-41	102	294		(Cor'd Nav, Kongsberg 14208, img#179) (V)	
24-Nov-2018	10:49:19	1345	ST18904-ENV59			Camera	127	39	649525	4459252	649432	4459294	94	-42	103	294		(Cor'd Nav, Kongsberg 14208, img#180) (V)	
24-Nov-2018	10:49:47	1346	ST18904-ENV59			Camera	127	39	649527	4459250	649432	4459294	96	-44	105	295		(Cor'd Nav, Kongsberg 14208, img#181) (V)	
24-Nov-2018	10:50:19	1347	ST18904-ENV59			Camera	127	39	649530	4459248	649432	4459294	99	-46	109	295		(Cor'd Nav, Kongsberg 14208, img#182) (V)	
24-Nov-2018	10:50:39	1348	ST18904-ENV59			Camera	127	39	649533	4459248	649432	4459294	101	-46	111	295		(Cor'd Nav, Kongsberg 14208, img#183) (V)	
24-Nov-2018	10:50:46	1349	ST18904-ENV59			Camera	127	39	649534	4459249	649432	4459294	102	-46	112	294		(Cor'd Nav, Kongsberg 14208, img#184) (V)	
24-Nov-2018	10:51:39	1350	ST18904-ENV59			Camera	127	39	649540	4459251	649432	4459294	109	-43	117	292		(Cor'd Nav, Kongsberg 14208, img#185) (V)	
24-Nov-2018	10:52:20	1351	ST18904-ENV59			Camera	127	39	649546	4459248	649432	4459294	115	-47	124	292		(Cor'd Nav, Kongsberg 14208, img#186) (V)	
24-Nov-2018	10:52:49	1352	ST18904-ENV59			Camera	127	39	649550	4459245	649432	4459294	118	-50	128	293		(Cor'd Nav, Kongsberg 14208, img#187) (V)	
24-Nov-2018	10:53:06	1353	ST18904-ENV59			Camera	127	39	649551	4459244	649432	4459294	120	-51	130	293		(Cor'd Nav, Kongsberg 14208, img#188) (V)	
24-Nov-2018	10:53:37	1354	ST18904-ENV59			Camera	127	39	649555	4459243	649432	4459294	123	-52	133	293		(Cor'd Nav, Kongsberg 14208, img#189) (V)	
24-Nov-2018	10:54:04	1355	ST18904-ENV59			Camera	127	39	649558	4459240	649432	4459294	126	-55	138	293		(Cor'd Nav, Kongsberg 14208, img#190) (V)	
24-Nov-2018	10:54:24	1356	ST18904-ENV59			Camera	127	39	649560	4459237	649432	4459294	129	-57	141	294		(Cor'd Nav, Kongsberg 14208, img#191) (V)	
24-Nov-2018	10:55:08	1357	ST18904-ENV59			Camera	127	39	649564	4459235	649432	4459294	132	-60	145	294		(Cor'd Nav, Kongsberg 14208, img#192) (V)	
24-Nov-2018	10:55:39	1358	ST18904-ENV59			Camera	127	39	649566	4459235	649432	4459294	134	-59	146	294		(Cor'd Nav, Kongsberg 14208, img#193) (V)	
24-Nov-2018	10:56:09	1359	ST18904-ENV59			Camera	127	39	649567	4459237	649432	4459294	136	-58	147	293		(Cor'd Nav, Kongsberg 14208, img#194) (V)	
24-Nov-2018	10:56:23	1360	ST18904-ENV59			Camera	127	39	649568	4459237	649432	4459294	137	-57	148	293		(Cor'd Nav, Kongsberg 14208, img#195) (V)	
24-Nov-2018	10:57:02	1361	ST18904-ENV59			Camera	127	39	649572	4459237	649432	4459294	140	-57	151	292		(Cor'd Nav, Kongsberg 14208, img#196) (V)	
24-Nov-2018	10:57:34	1362	ST18904-ENV59			Camera	127	39	649574	4459233	649432	4459294	142	-61	155	293		(Cor'd Nav, Kongsberg 14208, img#197) (V)	
24-Nov-2018	10:57:53	1363	ST18904-ENV59			Camera	127	39	649575	4459232	649432	4459294	143	-63	156	294		(Cor'd Nav, Kongsberg 14208, img#198) (V)	

Grey columns denote where no information is required

APPENDIX A FIELD SAMPLING LOGS

Table A.3 Seabed Imagery Surveyors Logs

Gardline										Seafloor Sampling Positioning Summary									
Job No		11179							Vessel		MV Ocean Researcher								
Client		Equinor US Wind LLC							Vessel Reference Point (VRP)		CoG								
Project Name		Equinor Wind OCS-A 0512							Deployment Location		Starboard A-frame			x	8.96	y	-3.08	z	6.05
Primary Positioning System		Starpack 1							Actual Coordinates derived from		Deployment Location								
Geodetic Reference System		Datum		NAD83		Ellipsoid	GRS 80		Projection		UTM ZONE 18 N (75 W)				Vertical / Tidal Datum		NAVD88		
Date	Time (UTC/GMT)	Fix number	Stn No	Penetration	Sample Retention	Retention	Observed Seafloor Depth (feet)	Observed Seafloor Depth (m)	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks	
									Easting	Northing	Easting	Northing	dE	dN	Range	Bearing			
24-Nov-2018	10:58:34	1364	ST18904-ENV59			Camera	127	39	649576	4459231	649432	4459294	144	-63	157	294		(Corr'd Nav, Kongsberg 14208, img#199) (V)	
24-Nov-2018	10:59:09	1365	ST18904-ENV59			Camera	127	39	649579	4459231	649432	4459294	147	-63	160	293		(Corr'd Nav, Kongsberg 14208, img#200) (V)	
24-Nov-2018	10:59:35	1366	ST18904-ENV59			Camera	127	39	649582	4459230	649432	4459294	150	-64	163	293		(Corr'd Nav, Kongsberg 14208, img#201) (V)	
24-Nov-2018	11:00:01	1367	ST18904-ENV59			Camera	127	39	649584	4459228	649432	4459294	152	-67	166	294		(Corr'd Nav, Kongsberg 14208, img#202) (V)	
24-Nov-2018	11:00:30	1368	ST18904-ENV59			Camera	127	39	649585	4459224	649432	4459294	153	-70	169	295		(Corr'd Nav, Kongsberg 14208, img#203) (V)	
24-Nov-2018	11:01:08	1369	ST18904-ENV59			Camera	127	39	649585	4459222	649432	4459294	154	-73	170	295		(Corr'd Nav, Kongsberg 14208, img#204) (V)	
24-Nov-2018	11:01:52	1370	ST18904-ENV59			Camera	127	39	649587	4459228	649432	4459294	156	-67	169	293		(Corr'd Nav, Kongsberg 14208, img#205) (V)	
24-Nov-2018	11:02:22	1371	ST18904-ENV59			Camera	127	39	649590	4459231	649432	4459294	158	-63	170	292		(Corr'd Nav, Kongsberg 14208, img#206) (V)	
24-Nov-2018	11:03:10	1372	ST18904-ENV59			Camera	127	39	649593	4459227	649432	4459294	161	-67	175	293		(Corr'd Nav, Kongsberg 14208, img#207) (V)	
24-Nov-2018	11:03:29	1373	ST18904-ENV59			Camera	127	39	649594	4459224	649432	4459294	162	-70	176	293		(Corr'd Nav, Kongsberg 14208, img#208) (V)	
24-Nov-2018	11:03:59	1374	ST18904-ENV59			Camera	127	39	649596	4459221	649432	4459294	164	-73	179	294		(Corr'd Nav, Kongsberg 14208, img#209) (V)	
24-Nov-2018	11:04:23	1375	ST18904-ENV59			Camera	127	39	649597	4459221	649432	4459294	166	-74	181	294		(Corr'd Nav, Kongsberg 14208, img#210) (V)	
24-Nov-2018	11:04:42	1376	ST18904-ENV59			Camera	127	39	649599	4459221	649432	4459294	167	-74	183	294		(Corr'd Nav, Kongsberg 14208, img#211) (V)	
24-Nov-2018	11:05:29	1377	ST18904-ENV59			Camera	127	39	649602	4459222	649432	4459294	171	-72	185	293		(Corr'd Nav, Kongsberg 14208, img#212) (V)	
24-Nov-2018	11:05:51	1378	ST18904-ENV59			Camera	127	39	649604	4459223	649432	4459294	173	-71	187	292		(Corr'd Nav, Kongsberg 14208, img#213) (V)	
24-Nov-2018	11:06:21	1379	ST18904-ENV59			Camera	127	39	649608	4459226	649432	4459294	176	-68	189	291		(Corr'd Nav, Kongsberg 14208, img#214) (V)	
24-Nov-2018	11:06:41	1380	ST18904-ENV59			Camera	127	39	649610	4459227	649432	4459294	179	-67	191	291		(Corr'd Nav, Kongsberg 14208, img#215) (V)	
24-Nov-2018	11:07:03	1381	ST18904-ENV59			Camera	127	39	649614	4459227	649432	4459294	182	-67	194	290		(Corr'd Nav, Kongsberg 14208, img#216) (V)	
24-Nov-2018	11:07:24	1382	ST18904-ENV59			Camera	127	39	649618	4459225	649432	4459294	186	-70	199	291		(Corr'd Nav, Kongsberg 14208, img#217) (V)	
24-Nov-2018	11:07:38	1383	ST18904-ENV59			Camera	127	39	649620	4459222	649432	4459294	188	-72	202	291		(Corr'd Nav, Kongsberg 14208, img#218) (V)	
24-Nov-2018	12:47:16	1384	ST18904-ENV66			Camera	133	41	651043	4453456	651050	4453446	-7	10	12	146		(Corr'd Nav, Kongsberg 14208, img#219) (V)	
24-Nov-2018	12:47:33	1385	ST18904-ENV66			Camera	134	41	651048	4453453	651050	4453446	-2	8	8	163		(Corr'd Nav, Kongsberg 14208, img#220) (V)	
24-Nov-2018	12:48:29	1386	ST18904-ENV66			Camera	134	41	651057	4453452	651050	4453446	7	6	10	229		(Corr'd Nav, Kongsberg 14208, img#221) (V)	
24-Nov-2018	12:48:36	1387	ST18904-ENV66			Camera	134	41	651058	4453452	651050	4453446	8	7	10	229		(Corr'd Nav, Kongsberg 14208, img#222) (V)	
24-Nov-2018	12:49:15	1388	ST18904-ENV66			Camera	133	41	651061	4453451	651050	4453446	11	5	12	244		(Corr'd Nav, Kongsberg 14208, img#223) (V)	
24-Nov-2018	12:49:40	1389	ST18904-ENV66			Camera	133	41	651063	4453447	651050	4453446	13	1	13	265		(Corr'd Nav, Kongsberg 14208, img#224) (V)	
24-Nov-2018	12:50:05	1390	ST18904-ENV66			Camera	133	41	651064	4453443	651050	4453446	14	-3	15	283		(Corr'd Nav, Kongsberg 14208, img#225) (V)	
24-Nov-2018	12:50:36	1391	ST18904-ENV66			Camera	133	41	651064	4453439	651050	4453446	14	-7	16	296		(Corr'd Nav, Kongsberg 14208, img#226) (V)	
24-Nov-2018	12:51:57	1392	ST18904-ENV66			Camera	133	41	651063	4453438	651050	4453446	13	-8	15	303		(Corr'd Nav, Kongsberg 14208, img#227) (V)	
24-Nov-2018	12:52:59	1393	ST18904-ENV66			Camera	134	41	651066	4453439	651050	4453446	15	-7	17	294		(Corr'd Nav, Kongsberg 14208, img#228) (V)	
24-Nov-2018	12:53:36	1394	ST18904-ENV66			Camera	133	41	651068	4453441	651050	4453446	18	-5	19	284		(Corr'd Nav, Kongsberg 14208, img#229) (V)	
24-Nov-2018	12:54:26	1395	ST18904-ENV66			Camera	133	41	651074	4453441	651050	4453446	24	-4	24	281		(Corr'd Nav, Kongsberg 14208, img#230) (V)	
24-Nov-2018	12:55:07	1396	ST18904-ENV66			Camera	133	41	651077	4453438	651050	4453446	27	-7	28	285		(Corr'd Nav, Kongsberg 14208, img#231) (V)	
24-Nov-2018	12:55:58	1397	ST18904-ENV66			Camera	133	41	651081	4453438	651050	4453446	31	-8	32	284		(Corr'd Nav, Kongsberg 14208, img#232) (V)	
24-Nov-2018	12:56:26	1398	ST18904-ENV66			Camera	133	41	651083	4453436	651050	4453446	33	-10	35	286		(Corr'd Nav, Kongsberg 14208, img#233) (V)	
24-Nov-2018	12:56:38	1399	ST18904-ENV66			Camera	133	41	651084	4453435	651050	4453446	34	-11	36	288		(Corr'd Nav, Kongsberg 14208, img#234) (V)	
24-Nov-2018	12:57:16	1400	ST18904-ENV66			Camera	133	41	651086	4453429	651050	4453446	36	-17	39	295		(Corr'd Nav, Kongsberg 14208, img#235) (V)	
24-Nov-2018	12:57:40	1401	ST18904-ENV66			Camera	133	41	651086	4453426	651050	4453446	36	-19	41	298		(Corr'd Nav, Kongsberg 14208, img#236) (V)	

Grey columns denote where no information is required

APPENDIX A FIELD SAMPLING LOGS

Table A.3 Seabed Imagery Surveyors Logs

Gardline												Seafloor Sampling Positioning Summary															
Job No		11179								Vessel		MV Ocean Researcher															
Client		Equinor US Wind LLC								Vessel Reference Point (VRP)		CoG															
Project Name		Equinor Wind OCS-A 0512								Deployment Location		Starboard A-frame				x		8.96		y		-3.08		z		6.05	
Primary Positioning System		Starpack 1								Actual Coordinates derived from		Deployment Location															
Geodetic Reference System		Datum		NAD83		Ellipsoid		GRS 80		Projection		UTM ZONE 18 N (75 W)						Vertical / Tidal Datum		NAVD88							
Date	Time (UTC/GMT)	Fix number	Stn No	Penetration	Sample Retention	Retention	Observed Seafloor Depth (feet)	Observed Seafloor Depth (m)	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks									
									Easting	Northing	Easting	Northing	dE	dN	Range	Bearing											
24-Nov-2018	12:58:13	1402	ST18904-ENV66			Camera	133	41	651087	4453423	651050	4453446	37	-22	43	301		(Cor'd Nav, Kongsberg 14208, img#237) (V)									
24-Nov-2018	12:58:58	1403	ST18904-ENV66			Camera	133	41	651089	4453422	651050	4453446	39	-23	45	301		(Cor'd Nav, Kongsberg 14208, img#238) (V)									
24-Nov-2018	12:59:55	1404	ST18904-ENV66			Camera	133	41	651090	4453425	651050	4453446	40	-20	45	297		(Cor'd Nav, Kongsberg 14208, img#239) (V)									
24-Nov-2018	13:01:05	1405	ST18904-ENV66			Camera	133	41	651090	4453424	651050	4453446	40	-21	45	298		(Cor'd Nav, Kongsberg 14208, img#240) (V)									
24-Nov-2018	13:01:58	1406	ST18904-ENV66			Camera	133	41	651094	4453421	651050	4453446	44	-25	50	299		(Cor'd Nav, Kongsberg 14208, img#241) (V)									
24-Nov-2018	13:02:46	1407	ST18904-ENV66			Camera	133	41	651096	4453425	651050	4453446	46	-21	51	294		(Cor'd Nav, Kongsberg 14208, img#242) (V)									
24-Nov-2018	13:03:26	1408	ST18904-ENV66			Camera	133	41	651098	4453425	651050	4453446	48	-21	52	293		(Cor'd Nav, Kongsberg 14208, img#243) (V)									
24-Nov-2018	13:03:48	1409	ST18904-ENV66			Camera	133	41	651099	4453424	651050	4453446	49	-22	53	294		(Cor'd Nav, Kongsberg 14208, img#244) (V)									
24-Nov-2018	13:04:22	1410	ST18904-ENV66			Camera	133	41	651101	4453422	651050	4453446	51	-24	56	295		(Cor'd Nav, Kongsberg 14208, img#245) (V)									
24-Nov-2018	13:04:56	1411	ST18904-ENV66			Camera	133	41	651104	4453421	651050	4453446	54	-25	60	295		(Cor'd Nav, Kongsberg 14208, img#246) (V)									
24-Nov-2018	13:05:35	1412	ST18904-ENV66			Camera	133	41	651109	4453420	651050	4453446	59	-25	64	293		(Cor'd Nav, Kongsberg 14208, img#247) (V)									
24-Nov-2018	13:06:06	1413	ST18904-ENV66			Camera	133	41	651112	4453419	651050	4453446	62	-27	67	293		(Cor'd Nav, Kongsberg 14208, img#248) (V)									
24-Nov-2018	13:06:24	1414	ST18904-ENV66			Camera	133	41	651114	4453418	651050	4453446	64	-28	69	293		(Cor'd Nav, Kongsberg 14208, img#249) (V)									
24-Nov-2018	13:06:45	1415	ST18904-ENV66			Camera	133	41	651115	4453417	651050	4453446	65	-28	71	293		(Cor'd Nav, Kongsberg 14208, img#250) (V)									
24-Nov-2018	13:07:09	1416	ST18904-ENV66			Camera	133	41	651117	4453416	651050	4453446	67	-30	74	294		(Cor'd Nav, Kongsberg 14208, img#251) (V)									
24-Nov-2018	13:07:33	1417	ST18904-ENV66			Camera	133	41	651119	4453414	651050	4453446	69	-32	76	294		(Cor'd Nav, Kongsberg 14208, img#252) (V)									
24-Nov-2018	13:08:26	1418	ST18904-ENV66			Camera	133	41	651123	4453412	651050	4453446	73	-34	80	295		(Cor'd Nav, Kongsberg 14208, img#253) (V)									
24-Nov-2018	13:09:09	1419	ST18904-ENV66			Camera	133	41	651125	4453413	651050	4453446	75	-32	82	293		(Cor'd Nav, Kongsberg 14208, img#254) (V)									
24-Nov-2018	13:09:50	1420	ST18904-ENV66			Camera	133	41	651127	4453410	651050	4453446	77	-36	84	295		(Cor'd Nav, Kongsberg 14208, img#255) (V)									
24-Nov-2018	13:11:02	1421	ST18904-ENV66			Camera	133	41	651127	4453407	651050	4453446	77	-39	86	297		(Cor'd Nav, Kongsberg 14208, img#256) (V)									
24-Nov-2018	13:11:37	1422	ST18904-ENV66			Camera	133	41	651127	4453407	651050	4453446	77	-39	86	297		(Cor'd Nav, Kongsberg 14208, img#257) (V)									
24-Nov-2018	13:12:24	1423	ST18904-ENV66			Camera	133	41	651130	4453401	651050	4453446	80	-45	92	299		(Cor'd Nav, Kongsberg 14208, img#258) (V)									
24-Nov-2018	13:12:42	1424	ST18904-ENV66			Camera	133	41	651132	4453398	651050	4453446	82	-47	95	300		(Cor'd Nav, Kongsberg 14208, img#259) (V)									
24-Nov-2018	13:14:06	1425	ST18904-ENV66			Camera	133	41	651139	4453401	651050	4453446	89	-44	99	296		(Cor'd Nav, Kongsberg 14208, img#260) (V)									
24-Nov-2018	13:14:58	1426	ST18904-ENV66			Camera	133	41	651144	4453408	651050	4453446	94	-37	101	292		(Cor'd Nav, Kongsberg 14208, img#261) (V)									
24-Nov-2018	13:15:35	1427	ST18904-ENV66			Camera	133	41	651147	4453406	651050	4453446	97	-40	105	292		(Cor'd Nav, Kongsberg 14208, img#262) (V)									
24-Nov-2018	13:16:07	1428	ST18904-ENV66			Camera	133	41	651149	4453402	651050	4453446	99	-44	108	294		(Cor'd Nav, Kongsberg 14208, img#263) (V)									
24-Nov-2018	13:16:35	1429	ST18904-ENV66			Camera	134	41	651150	4453399	651050	4453446	100	-47	111	295		(Cor'd Nav, Kongsberg 14208, img#264) (V)									
24-Nov-2018	13:17:01	1430	ST18904-ENV66			Camera	134	41	651152	4453398	651050	4453446	102	-48	113	295		(Cor'd Nav, Kongsberg 14208, img#265) (V)									
24-Nov-2018	13:17:59	1431	ST18904-ENV66			Camera	133	41	651158	4453395	651050	4453446	108	-50	119	295		(Cor'd Nav, Kongsberg 14208, img#266) (V)									
24-Nov-2018	13:18:24	1432	ST18904-ENV66			Camera	133	41	651160	4453392	651050	4453446	110	-53	122	296		(Cor'd Nav, Kongsberg 14208, img#267) (V)									
24-Nov-2018	13:19:02	1433	ST18904-ENV66			Camera	134	41	651165	4453389	651050	4453446	115	-56	128	296		(Cor'd Nav, Kongsberg 14208, img#268) (V)									
24-Nov-2018	13:19:33	1434	ST18904-ENV66			Camera	134	41	651169	4453389	651050	4453446	119	-57	132	296		(Cor'd Nav, Kongsberg 14208, img#269) (V)									
24-Nov-2018	13:19:51	1435	ST18904-ENV66			Camera	133	41	651172	4453388	651050	4453446	121	-57	134	295		(Cor'd Nav, Kongsberg 14208, img#270) (V)									
24-Nov-2018	13:20:12	1436	ST18904-ENV66			Camera	133	41	651175	4453388	651050	4453446	124	-58	137	295		(Cor'd Nav, Kongsberg 14208, img#271) (V)									
24-Nov-2018	13:20:26	1437	ST18904-ENV66			Camera	133	41	651176	4453387	651050	4453446	126	-59	139	295		(Cor'd Nav, Kongsberg 14208, img#272) (V)									
24-Nov-2018	13:20:56	1438	ST18904-ENV66			Camera	133	41	651179	4453386	651050	4453446	129	-60	142	295		(Cor'd Nav, Kongsberg 14208, img#273) (V)									
24-Nov-2018	13:21:55	1439	ST18904-ENV66			Camera	133	41	651182	4453383	651050	4453446	132	-63	146	296		(Cor'd Nav, Kongsberg 14208, img#274) (V)									

Grey columns denote where no information is required

APPENDIX A FIELD SAMPLING LOGS

Table A.3 Seabed Imagery Surveyors Logs

Gardline																		Seafloor Sampling Positioning Summary									
Job No		11179								Vessel		MV Ocean Researcher															
Client		Equinor US Wind LLC								Vessel Reference Point (VRP)		CoG															
Project Name		Equinor Wind OCS-A 0512								Deployment Location		Starboard A-frame				x		8.96		y		-3.08		z		6.05	
Primary Positioning System		Starpack 1								Actual Coordinates derived from		Deployment Location															
Geodetic Reference System		Datum		NAD83		Ellipsoid		GRS 80		Projection		UTM ZONE 18 N (75 W)				Vertical / Tidal Datum		NAVD88									
Date	Time (UTC/GMT)	Fix number	Stn No	Penetration	Sample Retention	Retention	Observed Seafloor Depth (feet)	Observed Seafloor Depth (m)	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks									
									Easting	Northing	Easting	Northing	dE	dN	Range	Bearing											
24-Nov-2018	13:22:46	1440	ST18904-ENV66			Camera	134	41	651186	4453381	651050	4453446	136	-65	150	296		(Corr'd Nav, Kongsberg 14208, img#275) (V)									
24-Nov-2018	13:23:14	1441	ST18904-ENV66			Camera	134	41	651188	4453380	651050	4453446	138	-66	153	296		(Corr'd Nav, Kongsberg 14208, img#276) (V)									
24-Nov-2018	13:23:48	1442	ST18904-ENV66			Camera	134	41	651190	4453378	651050	4453446	140	-68	155	296		(Corr'd Nav, Kongsberg 14208, img#277) (V)									
24-Nov-2018	13:24:36	1443	ST18904-ENV66			Camera	134	41	651192	4453376	651050	4453446	142	-69	158	296		(Corr'd Nav, Kongsberg 14208, img#278) (V)									
24-Nov-2018	13:25:05	1444	ST18904-ENV66			Camera	134	41	651193	4453374	651050	4453446	143	-72	160	297		(Corr'd Nav, Kongsberg 14208, img#279) (V)									
24-Nov-2018	13:25:30	1445	ST18904-ENV66			Camera	134	41	651195	4453372	651050	4453446	145	-73	163	297		(Corr'd Nav, Kongsberg 14208, img#280) (V)									
24-Nov-2018	13:26:28	1446	ST18904-ENV66			Camera	134	41	651204	4453373	651050	4453446	154	-73	170	295		(Corr'd Nav, Kongsberg 14208, img#281) (V)									
24-Nov-2018	13:26:55	1447	ST18904-ENV66			Camera	134	41	651207	4453372	651050	4453446	157	-74	173	295		(Corr'd Nav, Kongsberg 14208, img#282) (V)									
24-Nov-2018	13:27:42	1448	ST18904-ENV66			Camera	134	41	651211	4453370	651050	4453446	161	-76	177	295		(Corr'd Nav, Kongsberg 14208, img#283) (V)									
24-Nov-2018	13:28:06	1449	ST18904-ENV66			Camera	134	41	651213	4453369	651050	4453446	163	-77	180	295		(Corr'd Nav, Kongsberg 14208, img#284) (V)									
24-Nov-2018	13:28:56	1450	ST18904-ENV66			Camera	134	41	651217	4453364	651050	4453446	167	-82	186	296		(Corr'd Nav, Kongsberg 14208, img#285) (V)									
24-Nov-2018	13:29:36	1451	ST18904-ENV66			Camera	134	41	651220	4453362	651050	4453446	170	-83	189	296		(Corr'd Nav, Kongsberg 14208, img#286) (V)									
24-Nov-2018	13:30:05	1452	ST18904-ENV66			Camera	134	41	651224	4453361	651050	4453446	174	-84	193	296		(Corr'd Nav, Kongsberg 14208, img#287) (V)									
24-Nov-2018	13:30:33	1453	ST18904-ENV66			Camera	134	41	651228	4453360	651050	4453446	178	-86	198	296		(Corr'd Nav, Kongsberg 14208, img#288) (V)									
24-Nov-2018	13:30:57	1454	ST18904-ENV66			Camera	134	41	651231	4453360	651050	4453446	181	-86	200	295		(Corr'd Nav, Kongsberg 14208, img#289) (V)									
24-Nov-2018	15:32:17	1455	ST18904-ENV57			Camera	130	40	645928	4455759	645929	4455756	-1	3	3	166		(Corr'd Nav, Kongsberg 14208, img#1) (V)									
24-Nov-2018	15:33:10	1456	ST18904-ENV57			Camera	130	40	645925	4455765	645929	4455756	-4	9	10	156		(Corr'd Nav, Kongsberg 14208, img#2) (V)									
24-Nov-2018	15:33:44	1457	ST18904-ENV57			Camera	130	40	645924	4455762	645929	4455756	-4	6	7	146		(Corr'd Nav, Kongsberg 14208, img#3) (V)									
24-Nov-2018	15:34:09	1458	ST18904-ENV57			Camera	130	40	645925	4455758	645929	4455756	-3	1	4	111		(Corr'd Nav, Kongsberg 14208, img#4) (V)									
24-Nov-2018	15:35:46	1459	ST18904-ENV57			Camera	130	40	645931	4455759	645929	4455756	2	3	3	217		(Corr'd Nav, Kongsberg 14208, img#5) (V)									
24-Nov-2018	15:36:01	1460	ST18904-ENV57			Camera	130	40	645932	4455758	645929	4455756	3	2	4	243		(Corr'd Nav, Kongsberg 14208, img#6) (V)									
24-Nov-2018	15:36:45	1461	ST18904-ENV57			Camera	130	40	645934	4455754	645929	4455756	6	-2	6	291		(Corr'd Nav, Kongsberg 14208, img#7) (V)									
24-Nov-2018	15:37:16	1462	ST18904-ENV57			Camera	130	40	645935	4455758	645929	4455756	7	1	7	260		(Corr'd Nav, Kongsberg 14208, img#8) (V)									
24-Nov-2018	15:37:47	1463	ST18904-ENV57			Camera	130	40	645940	4455758	645929	4455756	11	2	11	261		(Corr'd Nav, Kongsberg 14208, img#9) (V)									
24-Nov-2018	15:38:04	1464	ST18904-ENV57			Camera	130	40	645944	4455756	645929	4455756	15	0	15	271		(Corr'd Nav, Kongsberg 14208, img#10) (V)									
24-Nov-2018	15:38:20	1465	ST18904-ENV57			Camera	130	40	645947	4455753	645929	4455756	19	-3	19	280		(Corr'd Nav, Kongsberg 14208, img#11) (V)									
24-Nov-2018	15:38:33	1466	ST18904-ENV57			Camera	130	40	645950	4455750	645929	4455756	21	-6	22	286		(Corr'd Nav, Kongsberg 14208, img#12) (V)									
24-Nov-2018	15:38:56	1467	ST18904-ENV57			Camera	130	40	645954	4455745	645929	4455756	25	-12	28	295		(Corr'd Nav, Kongsberg 14208, img#13) (V)									
24-Nov-2018	15:39:22	1468	ST18904-ENV57			Camera	130	40	645956	4455740	645929	4455756	27	-16	31	300		(Corr'd Nav, Kongsberg 14208, img#14) (V)									
24-Nov-2018	15:39:38	1469	ST18904-ENV57			Camera	130	40	645956	4455738	645929	4455756	28	-18	33	303		(Corr'd Nav, Kongsberg 14208, img#15) (V)									
24-Nov-2018	15:39:58	1470	ST18904-ENV57			Camera	130	40	645957	4455736	645929	4455756	29	-21	36	306		(Corr'd Nav, Kongsberg 14208, img#16) (V)									
24-Nov-2018	15:40:12	1471	ST18904-ENV57			Camera	130	40	645959	4455734	645929	4455756	31	-23	38	307		(Corr'd Nav, Kongsberg 14208, img#17) (V)									
24-Nov-2018	15:40:39	1472	ST18904-ENV57			Camera	130	40	645962	4455733	645929	4455756	34	-23	41	305		(Corr'd Nav, Kongsberg 14208, img#18) (V)									
24-Nov-2018	15:41:10	1473	ST18904-ENV57			Camera	130	40	645963	4455738	645929	4455756	34	-18	39	298		(Corr'd Nav, Kongsberg 14208, img#19) (V)									
24-Nov-2018	15:41:56	1474	ST18904-ENV57			Camera	130	40	645966	4455740	645929	4455756	38	-17	41	294		(Corr'd Nav, Kongsberg 14208, img#20) (V)									
24-Nov-2018	15:42:17	1475	ST18904-ENV57			Camera	130	40	645970	4455736	645929	4455756	41	-20	46	296		(Corr'd Nav, Kongsberg 14208, img#21) (V)									
24-Nov-2018	15:42:36	1476	ST18904-ENV57			Camera	130	40	645972	4455733	645929	4455756	43	-23	49	298		(Corr'd Nav, Kongsberg 14208, img#22) (V)									
24-Nov-2018	15:43:08	1477	ST18904-ENV57			Camera	130	40	645973	4455730	645929	4455756	45	-26	52	300		(Corr'd Nav, Kongsberg 14208, img#23) (V)									

Grey columns denote where no information is required

APPENDIX A FIELD SAMPLING LOGS

Table A.3 Seabed Imagery Surveyors Logs

Gardline												Seafloor Sampling Positioning Summary															
Job No		11179								Vessel		MV Ocean Researcher															
Client		Equinor US Wind LLC								Vessel Reference Point (VRP)		CoG															
Project Name		Equinor Wind OCS-A 0512								Deployment Location		Starboard A-frame				x		8.96		y		-3.08		z		6.05	
Primary Positioning System		Starpack 1								Actual Coordinates derived from		Deployment Location															
Geodetic Reference System		Datum		NAD83		Ellipsoid		GRS 80		Projection		UTM ZONE 18 N (75 W)				Vertical / Tidal Datum		NAVD88									
Date	Time (UTC/GMT)	Fix number	Stn No	Penetration	Sample Retention	Retention	Observed Seafloor Depth (feet)	Observed Seafloor Depth (m)	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks									
									Easting	Northing	Easting	Northing	dE	dN	Range	Bearing											
24-Nov-2018	15:43:24	1478	ST18904-ENV57			Camera	130	40	645974	4455728	645929	4455756	46	-28	54	301		(Corr'd Nav, Kongsberg 14208, img#24) (V)									
24-Nov-2018	15:44:11	1479	ST18904-ENV57			Camera	130	40	645976	4455728	645929	4455756	48	-29	56	301		(Corr'd Nav, Kongsberg 14208, img#25) (V)									
24-Nov-2018	15:44:54	1480	ST18904-ENV57			Camera	130	40	645977	4455729	645929	4455756	48	-27	55	299		(Corr'd Nav, Kongsberg 14208, img#26) (V)									
24-Nov-2018	15:45:11	1481	ST18904-ENV57			Camera	130	40	645978	4455728	645929	4455756	50	-28	57	300		(Corr'd Nav, Kongsberg 14208, img#27) (V)									
24-Nov-2018	15:45:56	1482	ST18904-ENV57			Camera	130	40	645980	4455728	645929	4455756	52	-28	59	299		(Corr'd Nav, Kongsberg 14208, img#28) (V)									
24-Nov-2018	15:46:32	1483	ST18904-ENV57			Camera	130	40	645983	4455729	645929	4455756	55	-27	61	297		(Corr'd Nav, Kongsberg 14208, img#29) (V)									
24-Nov-2018	15:47:07	1484	ST18904-ENV57			Camera	130	40	645987	4455726	645929	4455756	59	-30	66	297		(Corr'd Nav, Kongsberg 14208, img#30) (V)									
24-Nov-2018	15:47:38	1485	ST18904-ENV57			Camera	130	40	645991	4455721	645929	4455756	62	-35	72	299		(Corr'd Nav, Kongsberg 14208, img#31) (V)									
24-Nov-2018	15:48:39	1486	ST18904-ENV57			Camera	130	40	645992	4455725	645929	4455756	64	-31	71	296		(Corr'd Nav, Kongsberg 14208, img#32) (V)									
24-Nov-2018	15:49:23	1487	ST18904-ENV57			Camera	130	40	645997	4455722	645929	4455756	68	-34	76	297		(Corr'd Nav, Kongsberg 14208, img#33) (V)									
24-Nov-2018	15:50:08	1488	ST18904-ENV57			Camera	130	40	646004	4455718	645929	4455756	75	-38	84	297		(Corr'd Nav, Kongsberg 14208, img#34) (V)									
24-Nov-2018	15:50:42	1489	ST18904-ENV57			Camera	130	40	646006	4455720	645929	4455756	77	-36	85	295		(Corr'd Nav, Kongsberg 14208, img#35) (V)									
24-Nov-2018	15:51:02	1490	ST18904-ENV57			Camera	129	39	646007	4455718	645929	4455756	79	-38	88	296		(Corr'd Nav, Kongsberg 14208, img#36) (V)									
24-Nov-2018	15:51:22	1491	ST18904-ENV57			Camera	129	39	646010	4455715	645929	4455756	82	-41	91	297		(Corr'd Nav, Kongsberg 14208, img#37) (V)									
24-Nov-2018	15:51:39	1492	ST18904-ENV57			Camera	129	39	646012	4455713	645929	4455756	84	-44	94	298		(Corr'd Nav, Kongsberg 14208, img#38) (V)									
24-Nov-2018	15:52:09	1493	ST18904-ENV57			Camera	129	39	646014	4455711	645929	4455756	85	-46	97	298		(Corr'd Nav, Kongsberg 14208, img#39) (V)									
24-Nov-2018	15:52:38	1494	ST18904-ENV57			Camera	129	39	646015	4455708	645929	4455756	87	-49	99	299		(Corr'd Nav, Kongsberg 14208, img#40) (V)									
24-Nov-2018	15:52:58	1495	ST18904-ENV57			Camera	129	39	646017	4455706	645929	4455756	88	-50	102	300		(Corr'd Nav, Kongsberg 14208, img#41) (V)									
24-Nov-2018	15:53:37	1496	ST18904-ENV57			Camera	129	39	646021	4455707	645929	4455756	92	-49	105	298		(Corr'd Nav, Kongsberg 14208, img#42) (V)									
24-Nov-2018	15:53:53	1497	ST18904-ENV57			Camera	129	39	646023	4455707	645929	4455756	95	-49	107	297		(Corr'd Nav, Kongsberg 14208, img#43) (V)									
24-Nov-2018	15:54:07	1498	ST18904-ENV57			Camera	129	39	646026	4455707	645929	4455756	97	-49	109	297		(Corr'd Nav, Kongsberg 14208, img#44) (V)									
24-Nov-2018	15:54:41	1499	ST18904-ENV57			Camera	129	39	646030	4455706	645929	4455756	102	-51	114	297		(Corr'd Nav, Kongsberg 14208, img#45) (V)									
24-Nov-2018	15:55:07	1500	ST18904-ENV57			Camera	129	39	646030	4455706	645929	4455756	101	-50	113	296		(Corr'd Nav, Kongsberg 14208, img#46) (V)									
24-Nov-2018	15:55:42	1501	ST18904-ENV57			Camera	129	39	646031	4455703	645929	4455756	102	-54	115	298		(Corr'd Nav, Kongsberg 14208, img#47) (V)									
24-Nov-2018	15:56:00	1502	ST18904-ENV57			Camera	129	39	646032	4455699	645929	4455756	103	-58	118	299		(Corr'd Nav, Kongsberg 14208, img#48) (V)									
24-Nov-2018	15:56:43	1503	ST18904-ENV57			Camera	129	39	646033	4455697	645929	4455756	105	-59	120	300		(Corr'd Nav, Kongsberg 14208, img#49) (V)									
24-Nov-2018	15:57:18	1504	ST18904-ENV57			Camera	129	39	646035	4455700	645929	4455756	107	-56	120	298		(Corr'd Nav, Kongsberg 14208, img#50) (V)									
24-Nov-2018	15:57:54	1505	ST18904-ENV57			Camera	129	39	646040	4455699	645929	4455756	111	-57	125	297		(Corr'd Nav, Kongsberg 14208, img#51) (V)									
24-Nov-2018	15:58:22	1506	ST18904-ENV57			Camera	129	39	646044	4455695	645929	4455756	116	-61	131	298		(Corr'd Nav, Kongsberg 14208, img#52) (V)									
24-Nov-2018	15:58:46	1507	ST18904-ENV57			Camera	129	39	646048	4455692	645929	4455756	119	-64	135	298		(Corr'd Nav, Kongsberg 14208, img#53) (V)									
24-Nov-2018	15:59:07	1508	ST18904-ENV57			Camera	129	39	646051	4455692	645929	4455756	122	-65	138	298		(Corr'd Nav, Kongsberg 14208, img#54) (V)									
24-Nov-2018	15:59:39	1509	ST18904-ENV57			Camera	129	39	646053	4455691	645929	4455756	124	-65	140	298		(Corr'd Nav, Kongsberg 14208, img#55) (V)									
24-Nov-2018	16:00:04	1510	ST18904-ENV57			Camera	129	39	646055	4455689	645929	4455756	126	-67	143	298		(Corr'd Nav, Kongsberg 14208, img#56) (V)									
24-Nov-2018	16:00:40	1511	ST18904-ENV57			Camera	129	39	646059	4455686	645929	4455756	130	-71	148	299		(Corr'd Nav, Kongsberg 14208, img#57) (V)									
24-Nov-2018	16:00:55	1512	ST18904-ENV57			Camera	129	39	646060	4455685	645929	4455756	132	-71	150	298		(Corr'd Nav, Kongsberg 14208, img#58) (V)									
24-Nov-2018	16:01:14	1513	ST18904-ENV57			Camera	129	39	646063	4455684	645929	4455756	134	-72	153	298		(Corr'd Nav, Kongsberg 14208, img#59) (V)									
24-Nov-2018	16:01:34	1514	ST18904-ENV57			Camera	129	39	646066	4455682	645929	4455756	137	-74	156	298		(Corr'd Nav, Kongsberg 14208, img#60) (V)									
24-Nov-2018	16:02:23	1515	ST18904-ENV57			Camera	129	39	646068	4455680	645929	4455756	140	-76	159	299		(Corr'd Nav, Kongsberg 14208, img#61) (V)									

Grey columns denote where no information is required

APPENDIX A FIELD SAMPLING LOGS

Table A.3 Seabed Imagery Surveyors Logs

Gardline										Seafloor Sampling Positioning Summary									
Job No		11179							Vessel		MV Ocean Researcher								
Client		Equinor US Wind LLC							Vessel Reference Point (VRP)		CoG								
Project Name		Equinor Wind OCS-A 0512							Deployment Location		Starboard A-frame			x	8.96	y	-3.08	z	6.05
Primary Positioning System		Starpack 1							Actual Coordinates derived from		Deployment Location								
Geodetic Reference System		Datum		NAD83		Ellipsoid	GRS 80		Projection		UTM ZONE 18 N (75 W)				Vertical / Tidal Datum		NAVD88		
Date	Time (UTC/GMT)	Fix number	Stn No	Penetration	Sample Retention	Retention	Observed Seafloor Depth (feet)	Observed Seafloor Depth (m)	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks	
									Easting	Northing	Easting	Northing	dE	dN	Range	Bearing			
24-Nov-2018	16:02:45	1516	ST18904-ENV57			Camera	129	39	646069	4455679	645929	4455756	140	-77	160	299		(Corr'd Nav, Kongsberg 14208, img#62) (V)	
24-Nov-2018	16:02:57	1517	ST18904-ENV57			Camera	129	39	646069	4455679	645929	4455756	141	-78	161	299		(Corr'd Nav, Kongsberg 14208, img#63) (V)	
24-Nov-2018	16:03:47	1518	ST18904-ENV57			Camera	129	39	646074	4455676	645929	4455756	146	-80	166	299		(Corr'd Nav, Kongsberg 14208, img#64) (V)	
24-Nov-2018	16:04:13	1519	ST18904-ENV57			Camera	129	39	646075	4455678	645929	4455756	147	-78	166	298		(Corr'd Nav, Kongsberg 14208, img#65) (V)	
24-Nov-2018	16:04:48	1520	ST18904-ENV57			Camera	129	39	646078	4455678	645929	4455756	149	-79	169	298		(Corr'd Nav, Kongsberg 14208, img#66) (V)	
24-Nov-2018	16:04:59	1521	ST18904-ENV57			Camera	129	39	646079	4455676	645929	4455756	151	-80	171	298		(Corr'd Nav, Kongsberg 14208, img#67) (V)	
24-Nov-2018	16:05:14	1522	ST18904-ENV57			Camera	129	39	646081	4455673	645929	4455756	153	-83	174	299		(Corr'd Nav, Kongsberg 14208, img#68) (V)	
24-Nov-2018	16:06:06	1523	ST18904-ENV57			Camera	129	39	646084	4455670	645929	4455756	156	-86	178	299		(Corr'd Nav, Kongsberg 14208, img#69) (V)	
24-Nov-2018	16:06:31	1524	ST18904-ENV57			Camera	129	39	646084	4455671	645929	4455756	156	-85	178	299		(Corr'd Nav, Kongsberg 14208, img#70) (V)	
24-Nov-2018	16:07:00	1525	ST18904-ENV57			Camera	129	39	646087	4455671	645929	4455756	158	-86	180	298		(Corr'd Nav, Kongsberg 14208, img#71) (V)	
24-Nov-2018	16:07:24	1526	ST18904-ENV57			Camera	129	39	646089	4455668	645929	4455756	161	-88	183	299		(Corr'd Nav, Kongsberg 14208, img#72) (V)	
24-Nov-2018	16:08:03	1527	ST18904-ENV57			Camera	129	39	646094	4455667	645929	4455756	165	-90	188	299		(Corr'd Nav, Kongsberg 14208, img#73) (V)	
24-Nov-2018	16:08:25	1528	ST18904-ENV57			Camera	129	39	646096	4455667	645929	4455756	168	-89	190	298		(Corr'd Nav, Kongsberg 14208, img#74) (V)	
24-Nov-2018	16:08:54	1529	ST18904-ENV57			Camera	129	39	646101	4455667	645929	4455756	173	-89	194	297		(Corr'd Nav, Kongsberg 14208, img#75) (V)	
24-Nov-2018	16:09:16	1530	ST18904-ENV57			Camera	129	39	646106	4455665	645929	4455756	177	-92	200	297		(Corr'd Nav, Kongsberg 14208, img#76) (V)	
24-Nov-2018	17:57:12	1531	ST18904-ENV51			Camera	120	37	642675	4457550	642686	4457546	-11	3	12	106		(Corr'd Nav, Kongsberg 14208, img#77) (V)	
24-Nov-2018	17:58:17	1532	ST18904-ENV51			Camera	120	37	642678	4457547	642686	4457546	-8	0	8	92		(Corr'd Nav, Kongsberg 14208, img#78) (V)	
24-Nov-2018	17:59:19	1533	ST18904-ENV51			Camera	120	37	642685	4457540	642686	4457546	-1	-6	6	8		(Corr'd Nav, Kongsberg 14208, img#79) (V)	
24-Nov-2018	18:00:36	1534	ST18904-ENV51			Camera	120	37	642698	4457535	642686	4457546	12	-12	17	314		(Corr'd Nav, Kongsberg 14208, img#80) (V)	
24-Nov-2018	18:01:10	1535	ST18904-ENV51			Camera	120	37	642707	4457532	642686	4457546	21	-15	25	305		(Corr'd Nav, Kongsberg 14208, img#81) (V)	
24-Nov-2018	18:01:55	1536	ST18904-ENV51			Camera	120	37	642714	4457529	642686	4457546	28	-17	33	302		(Corr'd Nav, Kongsberg 14208, img#82) (V)	
24-Nov-2018	18:02:45	1537	ST18904-ENV51			Camera	120	37	642719	4457528	642686	4457546	33	-19	38	300		(Corr'd Nav, Kongsberg 14208, img#83) (V)	
24-Nov-2018	18:03:45	1538	ST18904-ENV51			Camera	120	37	642733	4457523	642686	4457546	47	-24	52	297		(Corr'd Nav, Kongsberg 14208, img#84) (V)	
24-Nov-2018	18:04:17	1539	ST18904-ENV51			Camera	120	37	642740	4457519	642686	4457546	54	-28	61	297		(Corr'd Nav, Kongsberg 14208, img#85) (V)	
24-Nov-2018	18:04:38	1540	ST18904-ENV51			Camera	120	37	642744	4457517	642686	4457546	58	-30	65	297		(Corr'd Nav, Kongsberg 14208, img#86) (V)	
24-Nov-2018	18:05:48	1541	ST18904-ENV51			Camera	121	37	642753	4457516	642686	4457546	67	-30	73	294		(Corr'd Nav, Kongsberg 14208, img#87) (V)	
24-Nov-2018	18:06:18	1542	ST18904-ENV51			Camera	121	37	642756	4457514	642686	4457546	70	-33	77	295		(Corr'd Nav, Kongsberg 14208, img#88) (V)	
24-Nov-2018	18:06:46	1543	ST18904-ENV51			Camera	120	37	642758	4457511	642686	4457546	72	-36	81	296		(Corr'd Nav, Kongsberg 14208, img#89) (V)	
24-Nov-2018	18:07:03	1544	ST18904-ENV51			Camera	120	37	642760	4457509	642686	4457546	74	-38	83	297		(Corr'd Nav, Kongsberg 14208, img#90) (V)	
24-Nov-2018	18:07:23	1545	ST18904-ENV51			Camera	120	37	642761	4457506	642686	4457546	75	-40	85	298		(Corr'd Nav, Kongsberg 14208, img#91) (V)	
24-Nov-2018	18:08:01	1546	ST18904-ENV51			Camera	120	37	642764	4457502	642686	4457546	78	-44	89	300		(Corr'd Nav, Kongsberg 14208, img#92) (V)	
24-Nov-2018	18:08:22	1547	ST18904-ENV51			Camera	120	37	642765	4457500	642686	4457546	79	-46	92	300		(Corr'd Nav, Kongsberg 14208, img#93) (V)	
24-Nov-2018	18:08:53	1548	ST18904-ENV51			Camera	120	37	642769	4457499	642686	4457546	83	-48	96	300		(Corr'd Nav, Kongsberg 14208, img#94) (V)	
24-Nov-2018	18:09:18	1549	ST18904-ENV51			Camera	120	37	642772	4457496	642686	4457546	86	-51	100	300		(Corr'd Nav, Kongsberg 14208, img#95) (V)	
24-Nov-2018	18:09:58	1550	ST18904-ENV51			Camera	120	37	642778	4457487	642686	4457546	92	-59	109	303		(Corr'd Nav, Kongsberg 14208, img#96) (V)	
24-Nov-2018	18:10:25	1551	ST18904-ENV51			Camera	120	37	642781	4457482	642686	4457546	95	-64	114	304		(Corr'd Nav, Kongsberg 14208, img#97) (V)	
24-Nov-2018	18:11:19	1552	ST18904-ENV51			Camera	120	37	642786	4457480	642686	4457546	100	-67	120	304		(Corr'd Nav, Kongsberg 14208, img#98) (V)	
24-Nov-2018	18:11:51	1553	ST18904-ENV51			Camera	120	37	642792	4457478	642686	4457546	106	-68	126	303		(Corr'd Nav, Kongsberg 14208, img#99) (V)	

Grey columns denote where no information is required

APPENDIX A FIELD SAMPLING LOGS

Table A.3 Seabed Imagery Surveyors Logs

Gardline										Seafloor Sampling Positioning Summary											
Job No		11179								Vessel		MV Ocean Researcher									
Client		Equinor US Wind LLC								Vessel Reference Point (VRP)		CoG									
Project Name		Equinor Wind OCS-A 0512								Deployment Location		Starboard A-frame				x	8.96	y	-3.08	z	6.05
Primary Positioning System		Starpack 1								Actual Coordinates derived from		Deployment Location									
Geodetic Reference System		Datum		NAD83		Ellipsoid		GRS 80		Projection		UTM ZONE 18 N (75 W)				Vertical / Tidal Datum		NAVD88			
Date	Time (UTC/GMT)	Fix number	Stn No	Penetration	Sample Retention	Retention	Observed Seafloor Depth (feet)	Observed Seafloor Depth (m)	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks			
									Easting	Northing	Easting	Northing	dE	dN	Range	Bearing					
24-Nov-2018	18:12:57	1554	ST18904-ENV51			Camera	120	37	642805	4457476	642686	4457546	119	-70	138	301		(Corr'd Nav, Kongsberg 14208, img#100) (V)			
24-Nov-2018	18:13:33	1555	ST18904-ENV51			Camera	120	37	642811	4457478	642686	4457546	125	-69	143	299		(Corr'd Nav, Kongsberg 14208, img#101) (V)			
24-Nov-2018	18:14:22	1556	ST18904-ENV51			Camera	121	37	642820	4457481	642686	4457546	134	-65	149	296		(Corr'd Nav, Kongsberg 14208, img#102) (V)			
24-Nov-2018	18:14:48	1557	ST18904-ENV51			Camera	121	37	642823	4457482	642686	4457546	137	-64	151	295		(Corr'd Nav, Kongsberg 14208, img#103) (V)			
24-Nov-2018	18:15:12	1558	ST18904-ENV51			Camera	121	37	642825	4457483	642686	4457546	139	-64	153	295		(Corr'd Nav, Kongsberg 14208, img#104) (V)			
24-Nov-2018	18:15:51	1559	ST18904-ENV51			Camera	121	37	642829	4457482	642686	4457546	143	-64	156	294		(Corr'd Nav, Kongsberg 14208, img#105) (V)			
24-Nov-2018	18:16:26	1560	ST18904-ENV51			Camera	121	37	642834	4457478	642686	4457546	148	-68	163	295		(Corr'd Nav, Kongsberg 14208, img#106) (V)			
24-Nov-2018	18:16:56	1561	ST18904-ENV51			Camera	120	37	642838	4457473	642686	4457546	152	-74	169	296		(Corr'd Nav, Kongsberg 14208, img#107) (V)			
24-Nov-2018	18:17:15	1562	ST18904-ENV51			Camera	120	37	642840	4457470	642686	4457546	154	-77	172	297		(Corr'd Nav, Kongsberg 14208, img#108) (V)			
24-Nov-2018	18:17:48	1563	ST18904-ENV51			Camera	120	37	642842	4457465	642686	4457546	156	-81	176	297		(Corr'd Nav, Kongsberg 14208, img#109) (V)			
24-Nov-2018	18:18:12	1564	ST18904-ENV51			Camera	120	37	642844	4457462	642686	4457546	158	-84	179	298		(Corr'd Nav, Kongsberg 14208, img#110) (V)			
24-Nov-2018	18:18:39	1565	ST18904-ENV51			Camera	120	37	642847	4457457	642686	4457546	161	-89	184	299		(Corr'd Nav, Kongsberg 14208, img#111) (V)			
24-Nov-2018	18:18:57	1566	ST18904-ENV51			Camera	121	37	642850	4457455	642686	4457546	164	-91	188	299		(Corr'd Nav, Kongsberg 14208, img#112) (V)			
24-Nov-2018	18:19:15	1567	ST18904-ENV51			Camera	121	37	642852	4457453	642686	4457546	166	-93	190	299		(Corr'd Nav, Kongsberg 14208, img#113) (V)			
24-Nov-2018	18:19:45	1568	ST18904-ENV51			Camera	121	37	642855	4457451	642686	4457546	169	-96	195	300		(Corr'd Nav, Kongsberg 14208, img#114) (V)			
24-Nov-2018	18:20:06	1569	ST18904-ENV51			Camera	121	37	642859	4457448	642686	4457546	173	-99	199	300		(Corr'd Nav, Kongsberg 14208, img#115) (V)			
24-Nov-2018	20:08:00	1570	ST18904-ENV53			Camera	122	37	646221	4461145	646327	4461095	-106	50	117	115		(Corr'd Nav, Kongsberg 14208, img#116) (V)			
24-Nov-2018	20:10:19	1571	ST18904-ENV53			Camera	122	37	646235	4461143	646327	4461095	-92	48	104	117		(Corr'd Nav, Kongsberg 14208, img#117) (V)			
24-Nov-2018	20:11:20	1572	ST18904-ENV53			Camera	122	37	646248	4461135	646327	4461095	-79	40	88	117		(Corr'd Nav, Kongsberg 14208, img#118) (V)			
24-Nov-2018	20:12:08	1573	ST18904-ENV53			Camera	122	37	646257	4461132	646327	4461095	-70	37	79	118		(Corr'd Nav, Kongsberg 14208, img#119) (V)			
24-Nov-2018	20:13:00	1574	ST18904-ENV53			Camera	122	37	646264	4461131	646327	4461095	-63	36	73	120		(Corr'd Nav, Kongsberg 14208, img#120) (V)			
24-Nov-2018	20:13:16	1575	ST18904-ENV53			Camera	122	37	646267	4461129	646327	4461095	-60	34	69	120		(Corr'd Nav, Kongsberg 14208, img#121) (V)			
24-Nov-2018	20:13:35	1576	ST18904-ENV53			Camera	122	37	646271	4461127	646327	4461095	-56	32	65	120		(Corr'd Nav, Kongsberg 14208, img#122) (V)			
24-Nov-2018	20:14:08	1577	ST18904-ENV53			Camera	122	37	646277	4461125	646327	4461095	-50	30	58	121		(Corr'd Nav, Kongsberg 14208, img#123) (V)			
24-Nov-2018	20:14:47	1578	ST18904-ENV53			Camera	122	37	646282	4461122	646327	4461095	-45	27	53	121		(Corr'd Nav, Kongsberg 14208, img#124) (V)			
24-Nov-2018	20:15:47	1579	ST18904-ENV53			Camera	122	37	646286	4461114	646327	4461095	-41	19	45	115		(Corr'd Nav, Kongsberg 14208, img#125) (V)			
24-Nov-2018	20:16:36	1580	ST18904-ENV53			Camera	122	37	646291	4461106	646327	4461095	-36	11	38	108		(Corr'd Nav, Kongsberg 14208, img#126) (V)			
24-Nov-2018	20:17:41	1581	ST18904-ENV53			Camera	122	37	646303	4461098	646327	4461095	-24	3	24	97		(Corr'd Nav, Kongsberg 14208, img#127) (V)			
24-Nov-2018	20:18:23	1582	ST18904-ENV53			Camera	122	37	646311	4461095	646327	4461095	-16	0	16	90		(Corr'd Nav, Kongsberg 14208, img#128) (V)			
24-Nov-2018	20:18:52	1583	ST18904-ENV53			Camera	122	37	646318	4461094	646327	4461095	-9	-1	9	86		(Corr'd Nav, Kongsberg 14208, img#129) (V)			
24-Nov-2018	20:19:41	1584	ST18904-ENV53			Camera	122	37	646326	4461097	646327	4461095	-1	2	2	151		(Corr'd Nav, Kongsberg 14208, img#130) (V)			
24-Nov-2018	20:20:13	1585	ST18904-ENV53			Camera	122	37	646330	4461098	646327	4461095	3	3	5	225		(Corr'd Nav, Kongsberg 14208, img#131) (V)			
24-Nov-2018	20:21:09	1586	ST18904-ENV53			Camera	121	37	646339	4461096	646327	4461095	12	1	12	265		(Corr'd Nav, Kongsberg 14208, img#132) (V)			
24-Nov-2018	20:21:35	1587	ST18904-ENV53			Camera	121	37	646343	4461094	646327	4461095	16	-1	16	275		(Corr'd Nav, Kongsberg 14208, img#133) (V)			
24-Nov-2018	20:22:34	1588	ST18904-ENV53			Camera	121	37	646351	4461086	646327	4461095	24	-9	26	292		(Corr'd Nav, Kongsberg 14208, img#134) (V)			
24-Nov-2018	20:23:38	1589	ST18904-ENV53			Camera	121	37	646361	4461074	646327	4461095	34	-21	40	301		(Corr'd Nav, Kongsberg 14208, img#135) (V)			
24-Nov-2018	20:25:23	1590	ST18904-ENV53			Camera	122	37	646381	4461067	646327	4461095	54	-28	61	298		(Corr'd Nav, Kongsberg 14208, img#136) (V)			
24-Nov-2018	20:25:30	1591	ST18904-ENV53			Camera	122	37	646382	4461067	646327	4461095	55	-28	62	297		(Corr'd Nav, Kongsberg 14208, img#137) (V)			

Grey columns denote where no information is required

APPENDIX A FIELD SAMPLING LOGS

Table A.3 Seabed Imagery Surveyors Logs

Gardline														Seafloor Sampling Positioning Summary						
Job No		11179							Vessel		MV Ocean Researcher									
Client		Equinor US Wind LLC							Vessel Reference Point (VRP)		CoG									
Project Name		Equinor Wind OCS-A 0512							Deployment Location		Starboard A-frame			x	8.96	y	-3.08	z	6.05	
Primary Positioning System		Starpack 1							Actual Coordinates derived from		Deployment Location									
Geodetic Reference System		Datum		NAD83		Ellipsoid	GRS 80		Projection		UTM ZONE 18 N (75 W)				Vertical / Tidal Datum		NAVD88			
Date	Time (UTC/GMT)	Fix number	Stn No	Penetration	Sample Retention	Retention	Observed Seafloor Depth (feet)	Observed Seafloor Depth (m)	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks		
									Easting	Northing	Easting	Northing	dE	dN	Range	Bearing				
24-Nov-2018	20:26:04	1592	ST18904-ENV53			Camera	122	37	646387	4461067	646327	4461095	60	-28	66	295		(Corr'd Nav, Kongsberg 14208, img#138) (V)		
24-Nov-2018	20:26:17	1593	ST18904-ENV53			Camera	122	37	646388	4461067	646327	4461095	61	-28	68	295		(Corr'd Nav, Kongsberg 14208, img#139) (V)		
24-Nov-2018	20:27:28	1594	ST18904-ENV53			Camera	122	37	646403	4461061	646327	4461095	76	-34	83	294		(Corr'd Nav, Kongsberg 14208, img#140) (V)		
24-Nov-2018	20:28:10	1595	ST18904-ENV53			Camera	121	37	646411	4461059	646327	4461095	84	-36	91	293		(Corr'd Nav, Kongsberg 14208, img#141) (V)		
24-Nov-2018	20:28:30	1596	ST18904-ENV53			Camera	121	37	646414	4461059	646327	4461095	87	-36	95	292		(Corr'd Nav, Kongsberg 14208, img#142) (V)		
24-Nov-2018	20:28:55	1597	ST18904-ENV53			Camera	121	37	646418	4461059	646327	4461095	91	-36	98	292		(Corr'd Nav, Kongsberg 14208, img#143) (V)		
24-Nov-2018	20:29:16	1598	ST18904-ENV53			Camera	121	37	646421	4461058	646327	4461095	94	-37	101	292		(Corr'd Nav, Kongsberg 14208, img#144) (V)		
25-Nov-2018	22:07:57	1599	ST18904-ENV55			Camera	121	37	648999	4463772	648901	4463825	98	-52	111	298		(Corr'd Nav, Kongsberg 14208, img#1) (V)		
25-Nov-2018	22:08:23	1600	ST18904-ENV55			Camera	120	37	648996	4463774	648901	4463825	95	-51	108	298		(Corr'd Nav, Kongsberg 14208, img#2) (V)		
25-Nov-2018	22:09:11	1601	ST18904-ENV55			Camera	120	37	648990	4463777	648901	4463825	90	-48	102	298		(Corr'd Nav, Kongsberg 14208, img#3) (V)		
25-Nov-2018	22:10:03	1602	ST18904-ENV55			Camera	120	37	648984	4463782	648901	4463825	83	-42	93	297		(Corr'd Nav, Kongsberg 14208, img#4) (V)		
25-Nov-2018	22:11:01	1603	ST18904-ENV55			Camera	120	37	648978	4463785	648901	4463825	77	-40	87	297		(Corr'd Nav, Kongsberg 14208, img#5) (V)		
25-Nov-2018	22:11:17	1604	ST18904-ENV55			Camera	120	37	648977	4463786	648901	4463825	76	-39	85	297		(Corr'd Nav, Kongsberg 14208, img#6) (V)		
25-Nov-2018	22:12:02	1605	ST18904-ENV55			Camera	120	37	648971	4463790	648901	4463825	70	-35	79	296		(Corr'd Nav, Kongsberg 14208, img#7) (V)		
25-Nov-2018	22:12:26	1606	ST18904-ENV55			Camera	120	36	648969	4463790	648901	4463825	68	-34	76	297		(Corr'd Nav, Kongsberg 14208, img#8) (V)		
25-Nov-2018	22:12:43	1607	ST18904-ENV55			Camera	120	36	648967	4463790	648901	4463825	66	-34	74	298		(Corr'd Nav, Kongsberg 14208, img#9) (V)		
25-Nov-2018	22:13:17	1608	ST18904-ENV55			Camera	120	36	648961	4463792	648901	4463825	60	-33	69	299		(Cor'd Nav, Kongsberg 14208, img#10) (V)		
25-Nov-2018	22:13:50	1609	ST18904-ENV55			Camera	120	36	648955	4463794	648901	4463825	55	-31	63	300		(Corr'd Nav, Kongsberg 14208, img#11) (V)		
25-Nov-2018	22:14:36	1610	ST18904-ENV55			Camera	120	37	648948	4463799	648901	4463825	47	-26	54	299		(Corr'd Nav, Kongsberg 14208, img#12) (V)		
25-Nov-2018	22:15:22	1611	ST18904-ENV55			Camera	120	37	648940	4463804	648901	4463825	39	-21	45	298		(Corr'd Nav, Kongsberg 14208, img#13) (V)		
25-Nov-2018	22:16:18	1612	ST18904-ENV55			Camera	120	36	648930	4463811	648901	4463825	29	-13	32	295		(Corr'd Nav, Kongsberg 14208, img#14) (V)		
25-Nov-2018	22:17:18	1613	ST18904-ENV55			Camera	120	37	648920	4463817	648901	4463825	19	-8	20	293		(Corr'd Nav, Kongsberg 14208, img#15) (V)		
25-Nov-2018	22:17:34	1614	ST18904-ENV55			Camera	120	36	648916	4463818	648901	4463825	16	-7	17	294		(Corr'd Nav, Kongsberg 14208, img#16) (V)		
25-Nov-2018	22:18:08	1615	ST18904-ENV55			Camera	120	36	648909	4463820	648901	4463825	8	-4	9	299		(Corr'd Nav, Kongsberg 14208, img#17) (V)		
25-Nov-2018	22:19:02	1616	ST18904-ENV55			Camera	120	36	648897	4463823	648901	4463825	-4	-1	4	71		(Corr'd Nav, Kongsberg 14208, img#18) (V)		
25-Nov-2018	22:19:10	1617	ST18904-ENV55			Camera	120	36	648895	4463824	648901	4463825	-6	-1	6	83		(Corr'd Nav, Kongsberg 14208, img#19) (V)		
25-Nov-2018	22:19:28	1618	ST18904-ENV55			Camera	120	36	648891	4463826	648901	4463825	-10	1	10	97		(Corr'd Nav, Kongsberg 14208, img#20) (V)		
25-Nov-2018	22:20:08	1619	ST18904-ENV55			Camera	120	37	648880	4463831	648901	4463825	-21	6	22	107		(Corr'd Nav, Kongsberg 14208, img#21) (V)		
25-Nov-2018	22:20:30	1620	ST18904-ENV55			Camera	120	37	648874	4463833	648901	4463825	-27	8	28	107		(Corr'd Nav, Kongsberg 14208, img#22) (V)		
25-Nov-2018	22:20:50	1621	ST18904-ENV55			Camera	120	36	648869	4463834	648901	4463825	-32	10	33	107		(Corr'd Nav, Kongsberg 14208, img#23) (V)		
25-Nov-2018	22:21:22	1622	ST18904-ENV55			Camera	120	36	648862	4463839	648901	4463825	-39	14	41	110		(Corr'd Nav, Kongsberg 14208, img#24) (V)		
25-Nov-2018	22:21:53	1623	ST18904-ENV55			Camera	119	36	648856	4463846	648901	4463825	-45	21	49	115		(Corr'd Nav, Kongsberg 14208, img#25) (V)		
25-Nov-2018	22:22:30	1624	ST18904-ENV55			Camera	120	36	648850	4463851	648901	4463825	-51	27	57	118		(Corr'd Nav, Kongsberg 14208, img#26) (V)		
25-Nov-2018	22:22:40	1625	ST18904-ENV55			Camera	120	36	648849	4463852	648901	4463825	-52	27	59	117		(Corr'd Nav, Kongsberg 14208, img#27) (V)		
25-Nov-2018	22:22:57	1626	ST18904-ENV55			Camera	120	36	648845	4463853	648901	4463825	-55	28	62	117		(Corr'd Nav, Kongsberg 14208, img#28) (V)		
25-Nov-2018	22:24:21	1627	ST18904-ENV55			Camera	120	37	648833	4463854	648901	4463825	-68	30	74	114		(Corr'd Nav, Kongsberg 14208, img#29) (V)		
25-Nov-2018	22:24:30	1628	ST18904-ENV55			Camera	120	37	648832	4463855	648901	4463825	-69	30	76	114		(Corr'd Nav, Kongsberg 14208, img#30) (V)		
25-Nov-2018	22:24:40	1629	ST18904-ENV55			Camera	120	37	648831	4463856	648901	4463825	-70	31	77	114		(Corr'd Nav, Kongsberg 14208, img#31) (V)		

Grey columns denote where no information is required

APPENDIX A FIELD SAMPLING LOGS

Table A.3 Seabed Imagery Surveyors Logs

Gardline																	Seafloor Sampling Positioning Summary									
Job No		11179								Vessel		MV Ocean Researcher														
Client		Equinor US Wind LLC								Vessel Reference Point (VRP)		CoG														
Project Name		Equinor Wind OCS-A 0512								Deployment Location		Starboard A-frame			x		8.96		y		-3.08		z		6.05	
Primary Positioning System		Starpack 1								Actual Coordinates derived from		Deployment Location														
Geodetic Reference System		Datum		NAD83		Ellipsoid		GRS 80		Projection		UTM ZONE 18 N (75 W)					Vertical / Tidal Datum		NAVD88							
Date	Time (UTC/GMT)	Fix number	Stn No	Penetration	Sample Retention	Retention	Observed Seafloor Depth (feet)	Observed Seafloor Depth (m)	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks								
									Easting	Northing	Easting	Northing	dE	dN	Range	Bearing										
25-Nov-2018	22:25:07	1630	ST18904-ENV55			Camera	120	37	648828	4463859	648901	4463825	-72	35	80	115		(Corr'd Nav, Kongsberg 14208, img#32) (V)								
25-Nov-2018	22:25:30	1631	ST18904-ENV55			Camera	120	37	648826	4463863	648901	4463825	-74	38	84	117		(Corr'd Nav, Kongsberg 14208, img#33) (V)								
25-Nov-2018	22:25:50	1632	ST18904-ENV55			Camera	120	36	648824	4463865	648901	4463825	-77	41	87	118		(Corr'd Nav, Kongsberg 14208, img#34) (V)								
25-Nov-2018	22:26:13	1633	ST18904-ENV55			Camera	120	36	648820	4463867	648901	4463825	-81	42	91	117		(Corr'd Nav, Kongsberg 14208, img#35) (V)								
25-Nov-2018	22:26:20	1634	ST18904-ENV55			Camera	120	36	648818	4463867	648901	4463825	-83	42	93	117		(Corr'd Nav, Kongsberg 14208, img#36) (V)								
25-Nov-2018	22:27:04	1635	ST18904-ENV55			Camera	119	36	648810	4463868	648901	4463825	-91	43	101	115		(Corr'd Nav, Kongsberg 14208, img#37) (V)								
26-Nov-2018	00:05:50	1636	ST18904-ENV52			Camera	118	36	647198	4464206	647190	4464209	8	-3	8	289		(Corr'd Nav, Kongsberg 14208, img#38) (V)								
26-Nov-2018	00:08:04	1637	ST18904-ENV52			Camera	117	36	647166	4464209	647190	4464209	-24	0	24	90		(Corr'd Nav, Kongsberg 14208, img#39) (V)								
26-Nov-2018	00:08:24	1638	ST18904-ENV52			Camera	117	36	647160	4464207	647190	4464209	-30	-1	30	87		(Corr'd Nav, Kongsberg 14208, img#40) (V)								
26-Nov-2018	00:08:53	1639	ST18904-ENV52			Camera	117	36	647155	4464207	647190	4464209	-35	-1	35	88		(Corr'd Nav, Kongsberg 14208, img#41) (V)								
26-Nov-2018	00:09:03	1640	ST18904-ENV52			Camera	117	36	647154	4464208	647190	4464209	-36	-1	36	89		(Corr'd Nav, Kongsberg 14208, img#42) (V)								
26-Nov-2018	00:09:42	1641	ST18904-ENV52			Camera	117	36	647152	4464214	647190	4464209	-38	5	38	98		(Corr'd Nav, Kongsberg 14208, img#43) (V)								
26-Nov-2018	00:10:11	1642	ST18904-ENV52			Camera	117	36	647150	4464219	647190	4464209	-40	11	41	105		(Corr'd Nav, Kongsberg 14208, img#44) (V)								
26-Nov-2018	00:10:32	1643	ST18904-ENV52			Camera	117	36	647149	4464224	647190	4464209	-41	15	44	110		(Corr'd Nav, Kongsberg 14208, img#45) (V)								
26-Nov-2018	00:11:10	1644	ST18904-ENV52			Camera	117	36	647142	4464231	647190	4464209	-48	23	53	116		(Corr'd Nav, Kongsberg 14208, img#46) (V)								
26-Nov-2018	00:11:17	1645	ST18904-ENV52			Camera	117	36	647141	4464232	647190	4464209	-49	24	55	116		(Corr'd Nav, Kongsberg 14208, img#47) (V)								
26-Nov-2018	00:11:37	1646	ST18904-ENV52			Camera	117	36	647135	4464235	647190	4464209	-55	26	60	116		(Corr'd Nav, Kongsberg 14208, img#48) (V)								
26-Nov-2018	00:11:59	1647	ST18904-ENV52			Camera	117	36	647130	4464235	647190	4464209	-60	27	66	114		(Corr'd Nav, Kongsberg 14208, img#49) (V)								
26-Nov-2018	00:12:17	1648	ST18904-ENV52			Camera	117	36	647125	4464235	647190	4464209	-65	27	70	112		(Corr'd Nav, Kongsberg 14208, img#50) (V)								
26-Nov-2018	00:12:52	1649	ST18904-ENV52			Camera	117	36	647116	4464235	647190	4464209	-74	27	79	110		(Corr'd Nav, Kongsberg 14208, img#51) (V)								
26-Nov-2018	00:13:00	1650	ST18904-ENV52			Camera	117	36	647114	4464236	647190	4464209	-76	27	81	110		(Corr'd Nav, Kongsberg 14208, img#52) (V)								
26-Nov-2018	00:13:06	1651	ST18904-ENV52			Camera	117	36	647112	4464236	647190	4464209	-78	27	82	109		(Corr'd Nav, Kongsberg 14208, img#53) (V)								
26-Nov-2018	00:13:44	1652	ST18904-ENV52			Camera	117	36	647102	4464239	647190	4464209	-88	30	93	109		(Corr'd Nav, Kongsberg 14208, img#54) (V)								
26-Nov-2018	00:14:03	1653	ST18904-ENV52			Camera	117	36	647097	4464239	647190	4464209	-93	30	97	108		(Corr'd Nav, Kongsberg 14208, img#55) (V)								
26-Nov-2018	00:14:15	1654	ST18904-ENV52			Camera	117	36	647094	4464239	647190	4464209	-95	30	100	108		(Corr'd Nav, Kongsberg 14208, img#56) (V)								
26-Nov-2018	00:15:22	1655	ST18904-ENV52			Camera	117	36	647085	4464245	647190	4464209	-105	36	111	109		(Corr'd Nav, Kongsberg 14208, img#57) (V)								
26-Nov-2018	00:15:42	1656	ST18904-ENV52			Camera	117	36	647084	4464248	647190	4464209	-106	40	113	111		(Corr'd Nav, Kongsberg 14208, img#58) (V)								
26-Nov-2018	00:16:04	1657	ST18904-ENV52			Camera	117	36	647083	4464252	647190	4464209	-107	43	115	112		(Corr'd Nav, Kongsberg 14208, img#59) (V)								
26-Nov-2018	00:16:23	1658	ST18904-ENV52			Camera	117	36	647082	4464255	647190	4464209	-108	47	118	113		(Corr'd Nav, Kongsberg 14208, img#60) (V)								
26-Nov-2018	00:17:02	1659	ST18904-ENV52			Camera	117	36	647075	4464261	647190	4464209	-115	53	126	115		(Corr'd Nav, Kongsberg 14208, img#61) (V)								
26-Nov-2018	00:17:48	1660	ST18904-ENV52			Camera	117	36	647062	4464262	647190	4464209	-128	53	138	113		(Corr'd Nav, Kongsberg 14208, img#62) (V)								
26-Nov-2018	00:18:27	1661	ST18904-ENV52			Camera	117	36	647050	4464258	647190	4464209	-140	49	149	109		(Corr'd Nav, Kongsberg 14208, img#63) (V)								
26-Nov-2018	00:19:12	1662	ST18904-ENV52			Camera	117	36	647042	4464257	647190	4464209	-148	48	155	108		(Corr'd Nav, Kongsberg 14208, img#64) (V)								
26-Nov-2018	00:19:26	1663	ST18904-ENV52			Camera	117	36	647042	4464259	647190	4464209	-148	50	156	109		(Corr'd Nav, Kongsberg 14208, img#65) (V)								
26-Nov-2018	00:19:36	1664	ST18904-ENV52			Camera	117	36	647042	4464260	647190	4464209	-148	52	156	109		(Corr'd Nav, Kongsberg 14208, img#66) (V)								
26-Nov-2018	00:20:03	1665	ST18904-ENV52			Camera	117	36	647044	4464266	647190	4464209	-146	57	156	111		(Corr'd Nav, Kongsberg 14208, img#67) (V)								
26-Nov-2018	00:20:26	1666	ST18904-ENV52			Camera	117	36	647046	4464271	647190	4464209	-144	63	157	114		(Corr'd Nav, Kongsberg 14208, img#68) (V)								
26-Nov-2018	00:20:33	1667	ST18904-ENV52			Camera	117	36	647047	4464273	647190	4464209	-143	65	157	114		(Corr'd Nav, Kongsberg 14208, img#69) (V)								

Grey columns denote where no information is required

APPENDIX A FIELD SAMPLING LOGS

Table A.3 Seabed Imagery Surveyors Logs

Gardline																	Seafloor Sampling Positioning Summary						
Job No		11179								Vessel		MV Ocean Researcher											
Client		Equinor US Wind LLC								Vessel Reference Point (VRP)		CoG											
Project Name		Equinor Wind OCS-A 0512								Deployment Location		Starboard A-frame			x	8.96	y	-3.08	z	6.05			
Primary Positioning System		Starpack 1								Actual Coordinates derived from		Deployment Location											
Geodetic Reference System		Datum		NAD83		Ellipsoid		GRS 80		Projection		UTM ZONE 18 N (75 W)				Vertical / Tidal Datum		NAVD88					
Date	Time (UTC/GMT)	Fix number	Stn No	Penetration	Sample Retention	Retention	Observed Seafloor Depth (feet)	Observed Seafloor Depth (m)	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks					
									Easting	Northing	Easting	Northing	dE	dN	Range	Bearing							
26-Nov-2018	00:21:13	1668	ST18904-ENV52			Camera	117	36	647046	4464284	647190	4464209	-144	75	163	118		(Cor'd Nav, Kongsberg 14208, img#70) (V)					
26-Nov-2018	00:21:32	1669	ST18904-ENV52			Camera	117	36	647042	4464286	647190	4464209	-148	78	167	118		(Cor'd Nav, Kongsberg 14208, img#71) (V)					
26-Nov-2018	00:21:55	1670	ST18904-ENV52			Camera	117	36	647034	4464285	647190	4464209	-156	76	173	116		(Cor'd Nav, Kongsberg 14208, img#72) (V)					
26-Nov-2018	00:22:38	1671	ST18904-ENV52			Camera	117	36	647017	4464279	647190	4464209	-173	70	186	112		(Cor'd Nav, Kongsberg 14208, img#73) (V)					
26-Nov-2018	00:22:47	1672	ST18904-ENV52			Camera	117	36	647014	4464277	647190	4464209	-176	69	189	111		(Cor'd Nav, Kongsberg 14208, img#74) (V)					
26-Nov-2018	00:23:07	1673	ST18904-ENV52			Camera	117	36	647008	4464274	647190	4464209	-182	66	193	110		(Cor'd Nav, Kongsberg 14208, img#75) (V)					
26-Nov-2018	00:23:39	1674	ST18904-ENV52			Camera	117	36	647003	4464273	647190	4464209	-187	65	198	109		(Cor'd Nav, Kongsberg 14208, img#76) (V)					
26-Nov-2018	00:24:26	1675	ST18904-ENV52			Camera	117	36	647003	4464281	647190	4464209	-187	72	200	111		(Cor'd Nav, Kongsberg 14208, img#77) (V)					
26-Nov-2018	00:24:42	1676	ST18904-ENV52			Camera	117	36	647005	4464285	647190	4464209	-185	76	200	112		(Cor'd Nav, Kongsberg 14208, img#78) (V)					
26-Nov-2018	01:41:51	1677	ST18904-ENV49			Camera	118	36	644087	4464574	644088	4464562	-2	13	13	172		(Cor'd Nav, Kongsberg 14208, img#79) (V)					
26-Nov-2018	01:42:27	1678	ST18904-ENV49			Camera	118	36	644081	4464580	644088	4464562	-7	19	20	159		(Cor'd Nav, Kongsberg 14208, img#80) (V)					
26-Nov-2018	01:42:50	1679	ST18904-ENV49			Camera	118	36	644075	4464579	644088	4464562	-14	18	22	142		(Cor'd Nav, Kongsberg 14208, img#81) (V)					
26-Nov-2018	01:42:57	1680	ST18904-ENV49			Camera	118	36	644072	4464579	644088	4464562	-16	17	23	136		(Cor'd Nav, Kongsberg 14208, img#82) (V)					
26-Nov-2018	01:43:25	1681	ST18904-ENV49			Camera	118	36	644063	4464576	644088	4464562	-25	15	29	120		(Cor'd Nav, Kongsberg 14208, img#83) (V)					
26-Nov-2018	01:43:42	1682	ST18904-ENV49			Camera	118	36	644059	4464576	644088	4464562	-30	15	33	116		(Cor'd Nav, Kongsberg 14208, img#84) (V)					
26-Nov-2018	01:44:03	1683	ST18904-ENV49			Camera	118	36	644055	4464578	644088	4464562	-34	16	37	115		(Cor'd Nav, Kongsberg 14208, img#85) (V)					
26-Nov-2018	01:44:25	1684	ST18904-ENV49			Camera	118	36	644052	4464580	644088	4464562	-37	18	41	117		(Cor'd Nav, Kongsberg 14208, img#86) (V)					
26-Nov-2018	01:44:37	1685	ST18904-ENV49			Camera	118	36	644050	4464581	644088	4464562	-38	20	43	117		(Cor'd Nav, Kongsberg 14208, img#87) (V)					
26-Nov-2018	01:45:20	1686	ST18904-ENV49			Camera	118	36	644042	4464585	644088	4464562	-47	23	52	116		(Cor'd Nav, Kongsberg 14208, img#88) (V)					
26-Nov-2018	01:45:36	1687	ST18904-ENV49			Camera	118	36	644038	4464585	644088	4464562	-50	24	55	115		(Cor'd Nav, Kongsberg 14208, img#89) (V)					
26-Nov-2018	01:45:57	1688	ST18904-ENV49			Camera	118	36	644034	4464587	644088	4464562	-55	25	60	115		(Cor'd Nav, Kongsberg 14208, img#90) (V)					
26-Nov-2018	01:46:16	1689	ST18904-ENV49			Camera	118	36	644030	4464589	644088	4464562	-58	28	65	115		(Cor'd Nav, Kongsberg 14208, img#91) (V)					
26-Nov-2018	01:46:33	1690	ST18904-ENV49			Camera	118	36	644027	4464592	644088	4464562	-61	31	68	117		(Cor'd Nav, Kongsberg 14208, img#92) (V)					
26-Nov-2018	01:46:55	1691	ST18904-ENV49			Camera	118	36	644024	4464596	644088	4464562	-65	34	73	118		(Cor'd Nav, Kongsberg 14208, img#93) (V)					
26-Nov-2018	01:47:25	1692	ST18904-ENV49			Camera	118	36	644018	4464599	644088	4464562	-70	38	79	118		(Cor'd Nav, Kongsberg 14208, img#94) (V)					
26-Nov-2018	01:47:53	1693	ST18904-ENV49			Camera	118	36	644013	4464600	644088	4464562	-75	39	85	117		(Cor'd Nav, Kongsberg 14208, img#95) (V)					
26-Nov-2018	01:48:16	1694	ST18904-ENV49			Camera	118	36	644009	4464602	644088	4464562	-80	40	89	117		(Cor'd Nav, Kongsberg 14208, img#96) (V)					
26-Nov-2018	01:48:34	1695	ST18904-ENV49			Camera	118	36	644005	4464604	644088	4464562	-83	43	93	117		(Cor'd Nav, Kongsberg 14208, img#97) (V)					
26-Nov-2018	01:48:51	1696	ST18904-ENV49			Camera	118	36	644003	4464607	644088	4464562	-86	45	97	118		(Cor'd Nav, Kongsberg 14208, img#98) (V)					
26-Nov-2018	01:49:07	1697	ST18904-ENV49			Camera	118	36	644000	4464609	644088	4464562	-88	47	100	118		(Cor'd Nav, Kongsberg 14208, img#99) (V)					
26-Nov-2018	01:49:26	1698	ST18904-ENV49			Camera	118	36	643997	4464612	644088	4464562	-91	50	104	119		(Cor'd Nav, Kongsberg 14208, img#100) (V)					
26-Nov-2018	01:49:43	1699	ST18904-ENV49			Camera	118	36	643994	4464614	644088	4464562	-94	53	108	119		(Cor'd Nav, Kongsberg 14208, img#101) (V)					
26-Nov-2018	01:50:07	1700	ST18904-ENV49			Camera	118	36	643990	4464616	644088	4464562	-98	55	113	119		(Cor'd Nav, Kongsberg 14208, img#102) (V)					
26-Nov-2018	01:50:37	1701	ST18904-ENV49			Camera	118	36	643984	4464618	644088	4464562	-104	57	119	118		(Cor'd Nav, Kongsberg 14208, img#103) (V)					
26-Nov-2018	01:51:04	1702	ST18904-ENV49			Camera	118	36	643979	4464620	644088	4464562	-110	59	124	118		(Cor'd Nav, Kongsberg 14208, img#104) (V)					
26-Nov-2018	01:51:24	1703	ST18904-ENV49			Camera	119	36	643975	4464623	644088	4464562	-113	62	129	119		(Cor'd Nav, Kongsberg 14208, img#105) (V)					
26-Nov-2018	01:51:41	1704	ST18904-ENV49			Camera	119	36	643972	4464626	644088	4464562	-116	64	133	119		(Cor'd Nav, Kongsberg 14208, img#106) (V)					
26-Nov-2018	01:52:23	1705	ST18904-ENV49			Camera	119	36	643965	4464631	644088	4464562	-123	69	142	119		(Cor'd Nav, Kongsberg 14208, img#107) (V)					

Grey columns denote where no information is required

APPENDIX A FIELD SAMPLING LOGS

Table A.3 Seabed Imagery Surveyors Logs

Gardline										Seafloor Sampling Positioning Summary									
Job No		11179							Vessel		MV Ocean Researcher								
Client		Equinor US Wind LLC							Vessel Reference Point (VRP)		CoG								
Project Name		Equinor Wind OCS-A 0512							Deployment Location		Starboard A-frame			x	8.96	y	-3.08	z	6.05
Primary Positioning System		Starpack 1							Actual Coordinates derived from		Deployment Location								
Geodetic Reference System		Datum		NAD83		Ellipsoid	GRS 80		Projection		UTM ZONE 18 N (75 W)				Vertical / Tidal Datum		NAVD88		
Date	Time (UTC/GMT)	Fix number	Stn No	Penetration	Sample Retention	Retention	Observed Seafloor Depth (feet)	Observed Seafloor Depth (m)	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks	
									Easting	Northing	Easting	Northing	dE	dN	Range	Bearing			
26-Nov-2018	01:53:03	1706	ST18904-ENV49			Camera	119	36	643957	4464633	644088	4464562	-131	71	149	118		(Corr'd Nav, Kongsberg 14208, img#108) (V)	
26-Nov-2018	01:53:40	1707	ST18904-ENV49			Camera	119	36	643951	4464634	644088	4464562	-138	73	156	118		(Corr'd Nav, Kongsberg 14208, img#109) (V)	
26-Nov-2018	01:54:27	1708	ST18904-ENV49			Camera	119	36	643943	4464638	644088	4464562	-146	76	165	118		(Corr'd Nav, Kongsberg 14208, img#110) (V)	
26-Nov-2018	01:54:39	1709	ST18904-ENV49			Camera	119	36	643941	4464640	644088	4464562	-148	78	167	118		(Corr'd Nav, Kongsberg 14208, img#111) (V)	
26-Nov-2018	01:55:04	1710	ST18904-ENV49			Camera	119	36	643937	4464644	644088	4464562	-152	82	172	118		(Corr'd Nav, Kongsberg 14208, img#112) (V)	
26-Nov-2018	01:55:31	1711	ST18904-ENV49			Camera	119	36	643933	4464647	644088	4464562	-156	86	178	119		(Corr'd Nav, Kongsberg 14208, img#113) (V)	
26-Nov-2018	01:55:55	1712	ST18904-ENV49			Camera	119	36	643929	4464650	644088	4464562	-160	89	183	119		(Corr'd Nav, Kongsberg 14208, img#114) (V)	
26-Nov-2018	01:56:08	1713	ST18904-ENV49			Camera	119	36	643927	4464651	644088	4464562	-162	90	185	119		(Corr'd Nav, Kongsberg 14208, img#115) (V)	
26-Nov-2018	01:56:44	1714	ST18904-ENV49			Camera	119	36	643921	4464655	644088	4464562	-168	93	192	119		(Corr'd Nav, Kongsberg 14208, img#116) (V)	
26-Nov-2018	01:57:25	1715	ST18904-ENV49			Camera	119	36	643913	4464657	644088	4464562	-175	96	200	119		(Corr'd Nav, Kongsberg 14208, img#117) (V)	
26-Nov-2018	03:26:42	1716	ST18904-ENV46			Camera	116	35	643576	4465044	643577	4465042	-1	2	2	146		(Corr'd Nav, Kongsberg 14208, img#118) (V)	
26-Nov-2018	03:26:59	1717	ST18904-ENV46			Camera	116	35	643574	4465045	643577	4465042	-3	3	5	137		(Corr'd Nav, Kongsberg 14208, img#119) (V)	
26-Nov-2018	03:27:20	1718	ST18904-ENV46			Camera	116	35	643572	4465048	643577	4465042	-5	6	8	136		(Corr'd Nav, Kongsberg 14208, img#120) (V)	
26-Nov-2018	03:28:15	1719	ST18904-ENV46			Camera	116	35	643566	4465051	643577	4465042	-12	9	15	127		(Corr'd Nav, Kongsberg 14208, img#121) (V)	
26-Nov-2018	03:29:37	1720	ST18904-ENV46			Camera	116	35	643556	4465055	643577	4465042	-21	13	25	121		(Corr'd Nav, Kongsberg 14208, img#122) (V)	
26-Nov-2018	03:29:51	1721	ST18904-ENV46			Camera	116	35	643555	4465056	643577	4465042	-23	14	27	122		(Corr'd Nav, Kongsberg 14208, img#123) (V)	
26-Nov-2018	03:30:39	1722	ST18904-ENV46			Camera	116	35	643550	4465060	643577	4465042	-28	18	33	123		(Corr'd Nav, Kongsberg 14208, img#124) (V)	
26-Nov-2018	03:31:37	1723	ST18904-ENV46			Camera	116	35	643543	4465061	643577	4465042	-34	19	39	120		(Corr'd Nav, Kongsberg 14208, img#125) (V)	
26-Nov-2018	03:32:25	1724	ST18904-ENV46			Camera	116	35	643537	4465064	643577	4465042	-40	22	46	119		(Corr'd Nav, Kongsberg 14208, img#126) (V)	
26-Nov-2018	03:33:23	1725	ST18904-ENV46			Camera	116	35	643529	4465073	643577	4465042	-48	31	57	123		(Corr'd Nav, Kongsberg 14208, img#127) (V)	
26-Nov-2018	03:34:24	1726	ST18904-ENV46			Camera	116	35	643522	4465076	643577	4465042	-56	34	66	122		(Corr'd Nav, Kongsberg 14208, img#128) (V)	
26-Nov-2018	03:35:20	1727	ST18904-ENV46			Camera	115	35	643514	4465078	643577	4465042	-64	36	73	120		(Corr'd Nav, Kongsberg 14208, img#129) (V)	
26-Nov-2018	03:35:56	1728	ST18904-ENV46			Camera	115	35	643509	4465080	643577	4465042	-68	38	78	119		(Corr'd Nav, Kongsberg 14208, img#130) (V)	
26-Nov-2018	03:36:27	1729	ST18904-ENV46			Camera	115	35	643506	4465082	643577	4465042	-72	40	82	119		(Corr'd Nav, Kongsberg 14208, img#131) (V)	
26-Nov-2018	03:37:00	1730	ST18904-ENV46			Camera	116	35	643501	4465086	643577	4465042	-76	44	88	120		(Corr'd Nav, Kongsberg 14208, img#132) (V)	
26-Nov-2018	03:37:34	1731	ST18904-ENV46			Camera	116	35	643497	4465090	643577	4465042	-81	48	94	121		(Corr'd Nav, Kongsberg 14208, img#133) (V)	
26-Nov-2018	03:38:26	1732	ST18904-ENV46			Camera	115	35	643492	4465095	643577	4465042	-86	53	101	122		(Corr'd Nav, Kongsberg 14208, img#134) (V)	
26-Nov-2018	03:38:45	1733	ST18904-ENV46			Camera	115	35	643490	4465097	643577	4465042	-88	55	103	122		(Corr'd Nav, Kongsberg 14208, img#135) (V)	
26-Nov-2018	03:39:03	1734	ST18904-ENV46			Camera	116	35	643487	4465098	643577	4465042	-90	56	106	122		(Corr'd Nav, Kongsberg 14208, img#136) (V)	
26-Nov-2018	03:39:52	1735	ST18904-ENV46			Camera	115	35	643479	4465101	643577	4465042	-99	59	115	121		(Corr'd Nav, Kongsberg 14208, img#137) (V)	
26-Nov-2018	03:40:49	1736	ST18904-ENV46			Camera	115	35	643467	4465107	643577	4465042	-110	65	128	120		(Corr'd Nav, Kongsberg 14208, img#138) (V)	
26-Nov-2018	03:42:27	1737	ST18904-ENV46			Camera	115	35	643454	4465119	643577	4465042	-123	77	145	122		(Corr'd Nav, Kongsberg 14208, img#139) (V)	
26-Nov-2018	03:42:56	1738	ST18904-ENV46			Camera	115	35	643450	4465121	643577	4465042	-127	79	149	122		(Corr'd Nav, Kongsberg 14208, img#140) (V)	
26-Nov-2018	03:43:08	1739	ST18904-ENV46			Camera	115	35	643449	4465122	643577	4465042	-128	80	151	122		(Corr'd Nav, Kongsberg 14208, img#141) (V)	
26-Nov-2018	03:43:23	1740	ST18904-ENV46			Camera	115	35	643447	4465123	643577	4465042	-130	81	153	122		(Corr'd Nav, Kongsberg 14208, img#142) (V)	
26-Nov-2018	03:43:55	1741	ST18904-ENV46			Camera	115	35	643443	4465125	643577	4465042	-135	83	158	122		(Corr'd Nav, Kongsberg 14208, img#143) (V)	
26-Nov-2018	03:44:12	1742	ST18904-ENV46			Camera	115	35	643441	4465126	643577	4465042	-137	84	160	122		(Corr'd Nav, Kongsberg 14208, img#144) (V)	
26-Nov-2018	03:44:59	1743	ST18904-ENV46			Camera	115	35	643433	4465128	643577	4465042	-144	86	168	121		(Corr'd Nav, Kongsberg 14208, img#145) (V)	

Grey columns denote where no information is required

APPENDIX A FIELD SAMPLING LOGS

Table A.3 Seabed Imagery Surveyors Logs

Seafloor Sampling Positioning Summary																			
Job No		11179								Vessel		MV Ocean Researcher							
Client		Equinor US Wind LLC								Vessel Reference Point (VRP)		CoG							
Project Name		Equinor Wind OCS-A 0512								Deployment Location		Starboard A-frame		x	8.96	y	-3.08	z	6.05
Primary Positioning System		Starpack 1								Actual Coordinates derived from		Deployment Location							
Geodetic Reference System		Datum		NAD83		Ellipsoid		GRS 80		Projection		UTM ZONE 18 N (75 W)				Vertical / Tidal Datum		NAVD88	
Date	Time (UTC/GMT)	Fix number	Stn No	Penetration	Sample Retention	Retention	Observed Seafloor Depth (feet)	Observed Seafloor Depth (m)	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks	
									Easting	Northing	Easting	Northing	dE	dN	Range	Bearing			
26-Nov-2018	03:45:44	1744	ST18904-ENV46			Camera	115	35	643425	4465130	643577	4465042	-152	88	176	120		(Corr'd Nav, Kongsberg 14208, img#146) (V)	
26-Nov-2018	03:46:44	1745	ST18904-ENV46			Camera	115	35	643413	4465137	643577	4465042	-165	96	190	120		(Corr'd Nav, Kongsberg 14208, img#147) (V)	
26-Nov-2018	03:47:26	1746	ST18904-ENV46			Camera	115	35	643403	4465145	643577	4465042	-174	103	202	121		(Corr'd Nav, Kongsberg 14208, img#148) (V)	
26-Nov-2018	05:23:46	1747	ST18904-ENV44			Camera	119	36	641076	4461933	641077	4461934	-2	-1	2	70		(Corr'd Nav, Kongsberg 14208, img#149) (V)	
26-Nov-2018	05:24:17	1748	ST18904-ENV44			Camera	119	36	641075	4461929	641077	4461934	-2	-5	5	23		(Corr'd Nav, Kongsberg 14208, img#150) (V)	
26-Nov-2018	05:24:44	1749	ST18904-ENV44			Camera	119	36	641073	4461929	641077	4461934	-4	-4	6	42		(Corr'd Nav, Kongsberg 14208, img#151) (V)	
26-Nov-2018	05:25:14	1750	ST18904-ENV44			Camera	119	36	641070	4461933	641077	4461934	-7	-1	-4	6		(Raw Nav, Kongsberg 14208, img#152) (V)	
26-Nov-2018	05:25:40	1750	ST18904-ENV44			Camera	119	36	641067	4461938	641077	4461934	-11	4	12	112		(Corr'd Nav, Kongsberg 14208, img#153) (V)	
26-Nov-2018	05:25:54	1751	ST18904-ENV44			Camera	119	36	641066	4461940	641077	4461934	-12	6	14	118		(Corr'd Nav, Kongsberg 14208, img#154) (V)	
26-Nov-2018	05:26:26	1752	ST18904-ENV44			Camera	119	36	641063	4461944	641077	4461934	-14	11	18	127		(Corr'd Nav, Kongsberg 14208, img#155) (V)	
26-Nov-2018	05:27:22	1753	ST18904-ENV44			Camera	119	36	641054	4461950	641077	4461934	-23	17	29	126		(Corr'd Nav, Kongsberg 14208, img#156) (V)	
26-Nov-2018	05:27:55	1754	ST18904-ENV44			Camera	118	36	641049	4461953	641077	4461934	-29	19	35	124		(Corr'd Nav, Kongsberg 14208, img#157) (V)	
26-Nov-2018	05:28:10	1755	ST18904-ENV44			Camera	118	36	641046	4461954	641077	4461934	-31	21	37	123		(Corr'd Nav, Kongsberg 14208, img#158) (V)	
26-Nov-2018	05:28:26	1756	ST18904-ENV44			Camera	118	36	641044	4461956	641077	4461934	-34	22	40	123		(Corr'd Nav, Kongsberg 14208, img#159) (V)	
26-Nov-2018	05:29:07	1757	ST18904-ENV44			Camera	119	36	641037	4461959	641077	4461934	-40	25	47	122		(Corr'd Nav, Kongsberg 14208, img#160) (V)	
26-Nov-2018	05:29:18	1758	ST18904-ENV44			Camera	119	36	641036	4461960	641077	4461934	-42	26	49	122		(Corr'd Nav, Kongsberg 14208, img#161) (V)	
26-Nov-2018	05:29:45	1759	ST18904-ENV44			Camera	119	36	641031	4461962	641077	4461934	-47	29	55	122		(Corr'd Nav, Kongsberg 14208, img#162) (V)	
26-Nov-2018	05:30:04	1760	ST18904-ENV44			Camera	119	36	641027	4461964	641077	4461934	-50	30	59	121		(Corr'd Nav, Kongsberg 14208, img#163) (V)	
26-Nov-2018	05:30:35	1761	ST18904-ENV44			Camera	119	36	641022	4461966	641077	4461934	-55	33	64	121		(Corr'd Nav, Kongsberg 14208, img#164) (V)	
26-Nov-2018	05:30:54	1762	ST18904-ENV44			Camera	119	36	641020	4461968	641077	4461934	-58	34	67	121		(Corr'd Nav, Kongsberg 14208, img#165) (V)	
26-Nov-2018	05:31:36	1763	ST18904-ENV44			Camera	119	36	641014	4461972	641077	4461934	-64	38	74	121		(Corr'd Nav, Kongsberg 14208, img#166) (V)	
26-Nov-2018	05:31:57	1764	ST18904-ENV44			Camera	119	36	641010	4461973	641077	4461934	-68	40	79	121		(Corr'd Nav, Kongsberg 14208, img#167) (V)	
26-Nov-2018	05:32:28	1765	ST18904-ENV44			Camera	119	36	641003	4461976	641077	4461934	-74	42	85	120		(Corr'd Nav, Kongsberg 14208, img#168) (V)	
26-Nov-2018	05:33:08	1766	ST18904-ENV44			Camera	119	36	640996	4461978	641077	4461934	-81	44	93	119		(Corr'd Nav, Kongsberg 14208, img#169) (V)	
26-Nov-2018	05:33:46	1767	ST18904-ENV44			Camera	119	36	640991	4461980	641077	4461934	-86	47	98	119		(Corr'd Nav, Kongsberg 14208, img#170) (V)	
26-Nov-2018	05:34:27	1768	ST18904-ENV44			Camera	119	36	640986	4461984	641077	4461934	-91	51	104	119		(Corr'd Nav, Kongsberg 14208, img#171) (V)	
26-Nov-2018	05:34:56	1769	ST18904-ENV44			Camera	119	36	640981	4461987	641077	4461934	-96	54	110	119		(Corr'd Nav, Kongsberg 14208, img#172) (V)	
26-Nov-2018	05:35:48	1770	ST18904-ENV44			Camera	119	36	640971	4461990	641077	4461934	-106	57	121	118		(Corr'd Nav, Kongsberg 14208, img#173) (V)	
26-Nov-2018	05:36:28	1771	ST18904-ENV44			Camera	118	36	640965	4461992	641077	4461934	-113	59	127	118		(Corr'd Nav, Kongsberg 14208, img#174) (V)	
26-Nov-2018	05:36:44	1772	ST18904-ENV44			Camera	118	36	640963	4461993	641077	4461934	-115	60	129	118		(Corr'd Nav, Kongsberg 14208, img#175) (V)	
26-Nov-2018	05:37:01	1773	ST18904-ENV44			Camera	118	36	640961	4461995	641077	4461934	-117	61	132	118		(Corr'd Nav, Kongsberg 14208, img#176) (V)	
26-Nov-2018	05:37:12	1774	ST18904-ENV44			Camera	118	36	640959	4461996	641077	4461934	-118	62	134	118		(Corr'd Nav, Kongsberg 14208, img#177) (V)	
26-Nov-2018	05:38:31	1775	ST18904-ENV44			Camera	119	36	640948	4462005	641077	4461934	-130	71	148	119		(Corr'd Nav, Kongsberg 14208, img#178) (V)	
26-Nov-2018	05:38:39	1776	ST18904-ENV44			Camera	119	36	640946	4462005	641077	4461934	-132	72	150	119		(Corr'd Nav, Kongsberg 14208, img#179) (V)	
26-Nov-2018	05:39:08	1777	ST18904-ENV44			Camera	119	36	640940	4462008	641077	4461934	-138	74	156	118		(Corr'd Nav, Kongsberg 14208, img#180) (V)	
26-Nov-2018	05:39:22	1778	ST18904-ENV44			Camera	119	36	640937	4462009	641077	4461934	-141	75	159	118		(Corr'd Nav, Kongsberg 14208, img#181) (V)	
26-Nov-2018	05:39:29	1779	ST18904-ENV44			Camera	119	36	640936	4462009	641077	4461934	-142	76	161	118		(Corr'd Nav, Kongsberg 14208, img#182) (V)	
26-Nov-2018	05:39:53	1780	ST18904-ENV44			Camera	119	36	640932	4462011	641077	4461934	-146	77	165	118		(Corr'd Nav, Kongsberg 14208, img#183) (V)	

Grey columns denote where no information is required

APPENDIX A FIELD SAMPLING LOGS

Table A.3 Seabed Imagery Surveyors Logs

Seafloor Sampling Positioning Summary																			
Job No		11179							Vessel		MV Ocean Researcher								
Client		Equinor US Wind LLC							Vessel Reference Point (VRP)		CoG								
Project Name		Equinor Wind OCS-A 0512							Deployment Location		Starboard A-frame			x	8.96	y	-3.08	z	6.05
Primary Positioning System		Starpack 1							Actual Coordinates derived from		Deployment Location								
Geodetic Reference System		Datum		NAD83		Ellipsoid		GRS 80		Projection		UTM ZONE 18 N (75 W)			Vertical / Tidal Datum		NAVD88		
Date	Time (UTC/GMT)	Fix number	Stn No	Penetration	Sample Retention	Retention	Observed Seafloor Depth (feet)	Observed Seafloor Depth (m)	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks	
									Easting	Northing	Easting	Northing	dE	dN	Range	Bearing			
26-Nov-2018	05:40:02	1781	ST18904-ENV44			Camera	119	36	640930	4462011	641077	4461934	-147	78	167	118		(Corr'd Nav, Kongsberg 14208, img#184) (V)	
26-Nov-2018	05:40:14	1782	ST18904-ENV44			Camera	118	36	640928	4462012	641077	4461934	-149	78	168	118		(Corr'd Nav, Kongsberg 14208, img#185) (V)	
26-Nov-2018	05:40:37	1783	ST18904-ENV44			Camera	118	36	640925	4462013	641077	4461934	-152	80	172	118		(Corr'd Nav, Kongsberg 14208, img#186) (V)	
26-Nov-2018	05:40:46	1784	ST18904-ENV44			Camera	118	36	640924	4462014	641077	4461934	-153	80	173	118		(Corr'd Nav, Kongsberg 14208, img#187) (V)	
26-Nov-2018	05:41:16	1785	ST18904-ENV44			Camera	118	36	640921	4462016	641077	4461934	-156	82	177	118		(Corr'd Nav, Kongsberg 14208, img#188) (V)	
26-Nov-2018	05:41:47	1786	ST18904-ENV44			Camera	118	36	640918	4462018	641077	4461934	-160	84	181	118		(Corr'd Nav, Kongsberg 14208, img#189) (V)	
26-Nov-2018	05:42:06	1787	ST18904-ENV44			Camera	118	36	640915	4462019	641077	4461934	-163	86	184	118		(Corr'd Nav, Kongsberg 14208, img#190) (V)	
26-Nov-2018	05:42:28	1788	ST18904-ENV44			Camera	118	36	640912	4462021	641077	4461934	-166	87	187	118		(Corr'd Nav, Kongsberg 14208, img#191) (V)	
26-Nov-2018	05:42:35	1789	ST18904-ENV44			Camera	118	36	640911	4462021	641077	4461934	-167	88	188	118		(Corr'd Nav, Kongsberg 14208, img#192) (V)	
26-Nov-2018	05:42:52	1790	ST18904-ENV44			Camera	118	36	640909	4462022	641077	4461934	-169	88	191	118		(Corr'd Nav, Kongsberg 14208, img#193) (V)	
26-Nov-2018	05:43:15	1791	ST18904-ENV44			Camera	118	36	640906	4462023	641077	4461934	-171	90	193	118		(Corr'd Nav, Kongsberg 14208, img#194) (V)	
26-Nov-2018	05:43:44	1792	ST18904-ENV44			Camera	118	36	640904	4462025	641077	4461934	-174	91	196	118		(Corr'd Nav, Kongsberg 14208, img#195) (V)	
26-Nov-2018	05:43:55	1793	ST18904-ENV44			Camera	118	36	640903	4462025	641077	4461934	-175	92	197	118		(Corr'd Nav, Kongsberg 14208, img#196) (V)	
26-Nov-2018	05:44:27	1794	ST18904-ENV44			Camera	118	36	640900	4462027	641077	4461934	-177	93	200	118		(Corr'd Nav, Kongsberg 14208, img#197) (V)	
26-Nov-2018	07:21:28	1795	ST18904-ENV39			Camera	116	35	636104	4461700	636107	4461705	-3	-6	6	27		(Corr'd Nav, Kongsberg 14208, img#198) (V)	
26-Nov-2018	07:21:50	1796	ST18904-ENV39			Camera	116	35	636102	4461704	636107	4461705	-4	-2	5	70		(Corr'd Nav, Kongsberg 14208, img#199) (V)	
26-Nov-2018	07:22:52	1797	ST18904-ENV39			Camera	117	36	636094	4461715	636107	4461705	-13	10	17	127		(Corr'd Nav, Kongsberg 14208, img#200) (V)	
26-Nov-2018	07:23:08	1798	ST18904-ENV39			Camera	116	36	636091	4461716	636107	4461705	-16	11	19	124		(Corr'd Nav, Kongsberg 14208, img#201) (V)	
26-Nov-2018	07:23:28	1799	ST18904-ENV39			Camera	116	36	636087	4461716	636107	4461705	-19	11	22	120		(Corr'd Nav, Kongsberg 14208, img#202) (V)	
26-Nov-2018	07:23:38	1800	ST18904-ENV39			Camera	116	36	636086	4461717	636107	4461705	-21	11	24	118		(Corr'd Nav, Kongsberg 14208, img#203) (V)	
26-Nov-2018	07:23:50	1801	ST18904-ENV39			Camera	116	36	636084	4461718	636107	4461705	-23	12	26	118		(Corr'd Nav, Kongsberg 14208, img#204) (V)	
26-Nov-2018	07:24:07	1802	ST18904-ENV39			Camera	117	36	636081	4461720	636107	4461705	-26	15	30	119		(Corr'd Nav, Kongsberg 14208, img#205) (V)	
26-Nov-2018	07:24:27	1803	ST18904-ENV39			Camera	116	35	636078	4461723	636107	4461705	-29	18	34	122		(Corr'd Nav, Kongsberg 14208, img#206) (V)	
26-Nov-2018	07:25:01	1804	ST18904-ENV39			Camera	116	35	636074	4461729	636107	4461705	-33	24	41	125		(Corr'd Nav, Kongsberg 14208, img#207) (V)	
26-Nov-2018	07:25:32	1805	ST18904-ENV39			Camera	116	35	636069	4461734	636107	4461705	-37	29	47	127		(Corr'd Nav, Kongsberg 14208, img#208) (V)	
26-Nov-2018	07:25:51	1806	ST18904-ENV39			Camera	116	35	636066	4461737	636107	4461705	-41	32	52	128		(Corr'd Nav, Kongsberg 14208, img#209) (V)	
26-Nov-2018	07:26:09	1807	ST18904-ENV39			Camera	116	35	636063	4461739	636107	4461705	-44	34	55	127		(Corr'd Nav, Kongsberg 14208, img#210) (V)	
26-Nov-2018	07:26:21	1808	ST18904-ENV39			Camera	116	35	636060	4461740	636107	4461705	-46	34	58	127		(Corr'd Nav, Kongsberg 14208, img#211) (V)	
26-Nov-2018	07:26:45	1809	ST18904-ENV39			Camera	116	35	636055	4461740	636107	4461705	-51	35	62	124		(Corr'd Nav, Kongsberg 14208, img#212) (V)	
26-Nov-2018	07:27:23	1810	ST18904-ENV39			Camera	116	35	636047	4461741	636107	4461705	-59	35	69	121		(Corr'd Nav, Kongsberg 14208, img#213) (V)	
26-Nov-2018	07:27:51	1811	ST18904-ENV39			Camera	116	35	636042	4461744	636107	4461705	-65	38	75	121		(Corr'd Nav, Kongsberg 14208, img#214) (V)	
26-Nov-2018	07:28:14	1812	ST18904-ENV39			Camera	116	35	636039	4461747	636107	4461705	-68	41	79	121		(Corr'd Nav, Kongsberg 14208, img#215) (V)	
26-Nov-2018	07:28:50	1813	ST18904-ENV39			Camera	115	35	636035	4461752	636107	4461705	-71	46	85	123		(Corr'd Nav, Kongsberg 14208, img#216) (V)	
26-Nov-2018	07:29:43	1814	ST18904-ENV39			Camera	115	35	636029	4461759	636107	4461705	-78	53	94	124		(Corr'd Nav, Kongsberg 14208, img#217) (V)	
26-Nov-2018	07:30:11	1815	ST18904-ENV39			Camera	115	35	636025	4461763	636107	4461705	-82	57	100	125		(Corr'd Nav, Kongsberg 14208, img#218) (V)	
26-Nov-2018	07:30:32	1816	ST18904-ENV39			Camera	115	35	636022	4461765	636107	4461705	-85	60	104	125		(Corr'd Nav, Kongsberg 14208, img#219) (V)	
26-Nov-2018	07:31:43	1817	ST18904-ENV39			Camera	115	35	636011	4461772	636107	4461705	-96	67	117	125		(Corr'd Nav, Kongsberg 14208, img#220) (V)	
26-Nov-2018	07:32:58	1818	ST18904-ENV39			Camera	115	35	635997	4461777	636107	4461705	-109	72	131	123		(Corr'd Nav, Kongsberg 14208, img#221) (V)	

Grey columns denote where no information is required

APPENDIX A FIELD SAMPLING LOGS

Table A.3 Seabed Imagery Surveyors Logs

Gardline																	Seafloor Sampling Positioning Summary										
Job No		11179								Vessel		MV Ocean Researcher															
Client		Equinor US Wind LLC								Vessel Reference Point (VRP)		CoG															
Project Name		Equinor Wind OCS-A 0512								Deployment Location		Starboard A-frame				x		8.96		y		-3.08		z		6.05	
Primary Positioning System		Starpack 1								Actual Coordinates derived from		Deployment Location															
Geodetic Reference System		Datum		NAD83		Ellipsoid		GRS 80		Projection		UTM ZONE 18 N (75 W)						Vertical / Tidal Datum		NAVD88							
Date	Time (UTC/GMT)	Fix number	Stn No	Penetration	Sample Retention	Retention	Observed Seafloor Depth (feet)	Observed Seafloor Depth (m)	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks									
									Easting	Northing	Easting	Northing	dE	dN	Range	Bearing											
26-Nov-2018	07:33:14	1819	ST18904-ENV39			Camera	115	35	635995	4461778	636107	4461705	-112	73	133	123		(Corr'd Nav, Kongsberg 14208, img#222) (V)									
26-Nov-2018	07:33:30	1820	ST18904-ENV39			Camera	115	35	635993	4461779	636107	4461705	-114	74	136	123		(Corr'd Nav, Kongsberg 14208, img#223) (V)									
26-Nov-2018	07:33:53	1821	ST18904-ENV39			Camera	115	35	635990	4461781	636107	4461705	-117	76	140	123		(Corr'd Nav, Kongsberg 14208, img#224) (V)									
26-Nov-2018	07:34:17	1822	ST18904-ENV39			Camera	115	35	635987	4461785	636107	4461705	-120	80	144	124		(Corr'd Nav, Kongsberg 14208, img#225) (V)									
26-Nov-2018	07:34:36	1823	ST18904-ENV39			Camera	114	35	635985	4461789	636107	4461705	-122	84	148	124		(Corr'd Nav, Kongsberg 14208, img#226) (V)									
26-Nov-2018	07:34:57	1824	ST18904-ENV39			Camera	114	35	635982	4461794	636107	4461705	-125	89	153	125		(Corr'd Nav, Kongsberg 14208, img#227) (V)									
26-Nov-2018	07:35:13	1825	ST18904-ENV39			Camera	114	35	635980	4461797	636107	4461705	-127	92	157	126		(Corr'd Nav, Kongsberg 14208, img#228) (V)									
26-Nov-2018	07:36:10	1826	ST18904-ENV39			Camera	115	35	635969	4461802	636107	4461705	-137	96	168	125		(Corr'd Nav, Kongsberg 14208, img#229) (V)									
26-Nov-2018	07:36:35	1827	ST18904-ENV39			Camera	115	35	635965	4461801	636107	4461705	-142	96	171	124		(Corr'd Nav, Kongsberg 14208, img#230) (V)									
26-Nov-2018	07:36:50	1828	ST18904-ENV39			Camera	115	35	635962	4461801	636107	4461705	-145	96	174	124		(Corr'd Nav, Kongsberg 14208, img#231) (V)									
26-Nov-2018	07:37:18	1829	ST18904-ENV39			Camera	115	35	635957	4461802	636107	4461705	-149	97	178	123		(Corr'd Nav, Kongsberg 14208, img#232) (V)									
26-Nov-2018	07:38:35	1830	ST18904-ENV39			Camera	115	35	635944	4461812	636107	4461705	-162	107	194	123		(Corr'd Nav, Kongsberg 14208, img#233) (V)									
26-Nov-2018	07:38:51	1831	ST18904-ENV39			Camera	115	35	635942	4461815	636107	4461705	-165	109	198	124		(Corr'd Nav, Kongsberg 14208, img#234) (V)									
26-Nov-2018	07:38:58	1832	ST18904-ENV39			Camera	115	35	635941	4461816	636107	4461705	-166	110	199	124		(Corr'd Nav, Kongsberg 14208, img#235) (V)									
26-Nov-2018	07:39:20	1833	ST18904-ENV39			Camera	115	35	635938	4461819	636107	4461705	-169	113	204	124		(Corr'd Nav, Kongsberg 14208, img#236) (V)									
26-Nov-2018	09:21:29	1834	ST18904-ENV41			Camera	106	32	639393	4462779	639405	4462783	-13	-4	13	72		(Corr'd Nav, Kongsberg 14208, img#237) (V)									
26-Nov-2018	09:21:55	1835	ST18904-ENV41			Camera	106	32	639397	4462776	639405	4462783	-8	-7	11	49		(Corr'd Nav, Kongsberg 14208, img#238) (V)									
26-Nov-2018	09:22:53	1836	ST18904-ENV41			Camera	106	32	639415	4462765	639405	4462783	10	-17	20	331		(Corr'd Nav, Kongsberg 14208, img#239) (V)									
26-Nov-2018	09:23:10	1837	ST18904-ENV41			Camera	107	32	639419	4462764	639405	4462783	14	-18	23	323		(Corr'd Nav, Kongsberg 14208, img#240) (V)									
26-Nov-2018	09:23:39	1838	ST18904-ENV41			Camera	106	32	639423	4462766	639405	4462783	18	-17	25	314		(Corr'd Nav, Kongsberg 14208, img#241) (V)									
26-Nov-2018	09:24:21	1839	ST18904-ENV41			Camera	107	32	639426	4462767	639405	4462783	20	-16	26	308		(Corr'd Nav, Kongsberg 14208, img#242) (V)									
26-Nov-2018	09:24:36	1840	ST18904-ENV41			Camera	107	32	639426	4462766	639405	4462783	21	-17	27	309		(Corr'd Nav, Kongsberg 14208, img#243) (V)									
26-Nov-2018	09:24:53	1841	ST18904-ENV41			Camera	107	32	639426	4462765	639405	4462783	21	-18	28	311		(Corr'd Nav, Kongsberg 14208, img#244) (V)									
26-Nov-2018	09:25:08	1842	ST18904-ENV41			Camera	106	32	639428	4462763	639405	4462783	23	-20	30	312		(Corr'd Nav, Kongsberg 14208, img#245) (V)									
26-Nov-2018	09:25:30	1843	ST18904-ENV41			Camera	107	32	639431	4462760	639405	4462783	26	-23	35	311		(Corr'd Nav, Kongsberg 14208, img#246) (V)									
26-Nov-2018	09:26:23	1844	ST18904-ENV41			Camera	107	32	639438	4462760	639405	4462783	33	-23	40	305		(Corr'd Nav, Kongsberg 14208, img#247) (V)									
26-Nov-2018	09:27:08	1845	ST18904-ENV41			Camera	107	32	639442	4462760	639405	4462783	37	-22	44	301		(Corr'd Nav, Kongsberg 14208, img#248) (V)									
26-Nov-2018	09:27:29	1846	ST18904-ENV41			Camera	107	32	639444	4462759	639405	4462783	39	-24	45	301		(Corr'd Nav, Kongsberg 14208, img#249) (V)									
26-Nov-2018	09:27:52	1847	ST18904-ENV41			Camera	107	33	639445	4462757	639405	4462783	39	-26	47	303		(Corr'd Nav, Kongsberg 14208, img#250) (V)									
26-Nov-2018	09:28:26	1848	ST18904-ENV41			Camera	107	32	639447	4462754	639405	4462783	42	-29	51	304		(Corr'd Nav, Kongsberg 14208, img#251) (V)									
26-Nov-2018	09:28:42	1849	ST18904-ENV41			Camera	106	32	639449	4462754	639405	4462783	44	-29	53	304		(Corr'd Nav, Kongsberg 14208, img#252) (V)									
26-Nov-2018	09:29:08	1850	ST18904-ENV41			Camera	107	32	639451	4462754	639405	4462783	46	-28	54	302		(Corr'd Nav, Kongsberg 14208, img#253) (V)									
26-Nov-2018	09:29:36	1851	ST18904-ENV41			Camera	107	32	639454	4462755	639405	4462783	49	-28	56	300		(Corr'd Nav, Kongsberg 14208, img#254) (V)									
26-Nov-2018	09:30:19	1852	ST18904-ENV41			Camera	107	32	639456	4462755	639405	4462783	51	-28	58	299		(Corr'd Nav, Kongsberg 14208, img#255) (V)									
26-Nov-2018	09:30:56	1853	ST18904-ENV41			Camera	106	32	639455	4462752	639405	4462783	50	-31	59	302		(Corr'd Nav, Kongsberg 14208, img#256) (V)									
26-Nov-2018	09:31:16	1854	ST18904-ENV41			Camera	106	32	639454	4462749	639405	4462783	49	-34	59	305		(Corr'd Nav, Kongsberg 14208, img#257) (V)									
26-Nov-2018	09:31:51	1855	ST18904-ENV41			Camera	107	32	639455	4462745	639405	4462783	50	-38	63	307		(Corr'd Nav, Kongsberg 14208, img#258) (V)									
26-Nov-2018	09:32:20	1856	ST18904-ENV41			Camera	107	32	639458	4462744	639405	4462783	53	-39	66	306		(Corr'd Nav, Kongsberg 14208, img#259) (V)									

Grey columns denote where no information is required

APPENDIX A FIELD SAMPLING LOGS

Table A.3 Seabed Imagery Surveyors Logs

Gardline										Seafloor Sampling Positioning Summary									
Job No		11179							Vessel		MV Ocean Researcher								
Client		Equinor US Wind LLC							Vessel Reference Point (VRP)		CoG								
Project Name		Equinor Wind OCS-A 0512							Deployment Location		Starboard A-frame			x	8.96	y	-3.08	z	6.05
Primary Positioning System		Starpack 1							Actual Coordinates derived from		Deployment Location								
Geodetic Reference System		Datum		NAD83		Ellipsoid	GRS 80		Projection		UTM ZONE 18 N (75 W)				Vertical / Tidal Datum		NAVD88		
Date	Time (UTC/GMT)	Fix number	Stn No	Penetration	Sample Retention	Retention	Observed Seafloor Depth (feet)	Observed Seafloor Depth (m)	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks	
									Easting	Northing	Easting	Northing	dE	dN	Range	Bearing			
26-Nov-2018	09:34:32	1859	ST18904-ENV41			Camera	107	33	639478	4462736	639405	4462783	73	-47	9	86		(Raw Nav, Kongsberg 14208, img#1) (V)	
26-Nov-2018	09:34:54	1860	ST18904-ENV41			Camera	107	32	639480	4462734	639405	4462783	75	-49	10	89		(Raw Nav, Kongsberg 14208, img#2) (V)	
26-Nov-2018	09:35:10	1861	ST18904-ENV41			Camera	107	33	639482	4462733	639405	4462783	77	-50	10	91		(Raw Nav, Kongsberg 14208, img#3) (V)	
26-Nov-2018	09:35:30	1862	ST18904-ENV41			Camera	107	33	639486	4462733	639405	4462783	81	-50	9	95		(Raw Nav, Kongsberg 14208, img#4) (V)	
26-Nov-2018	09:35:39	1863	ST18904-ENV41			Camera	107	33	639487	4462732	639405	4462783	82	-51	9	96		(Raw Nav, Kongsberg 14208, img#5) (V)	
26-Nov-2018	09:35:50	1864	ST18904-ENV41			Camera	107	33	639488	4462732	639405	4462783	83	-51	9	97		(Raw Nav, Kongsberg 14208, img#6) (V)	
26-Nov-2018	09:36:10	1865	ST18904-ENV41			Camera	107	33	639491	4462731	639405	4462783	86	-52	8	100		(Raw Nav, Kongsberg 14208, img#7) (V)	
26-Nov-2018	09:36:28	1866	ST18904-ENV41			Camera	107	33	639493	4462729	639405	4462783	88	-54	9	103		(Raw Nav, Kongsberg 14208, img#8) (V)	
26-Nov-2018	09:36:43	1867	ST18904-ENV41			Camera	107	33	639496	4462728	639405	4462783	91	-55	9	106		(Raw Nav, Kongsberg 14208, img#9) (V)	
26-Nov-2018	09:37:17	1868	ST18904-ENV41			Camera	107	33	639505	4462723	639405	4462783	100	-60	9	116		(Raw Nav, Kongsberg 14208, img#10) (V)	
26-Nov-2018	09:37:37	1869	ST18904-ENV41			Camera	107	33	639512	4462722	639405	4462783	107	-61	7	123		(Raw Nav, Kongsberg 14208, img#11) (V)	
26-Nov-2018	09:37:59	1870	ST18904-ENV41			Camera	107	33	639517	4462723	639405	4462783	112	-60	4	127		(Raw Nav, Kongsberg 14208, img#12) (V)	
26-Nov-2018	09:38:16	1871	ST18904-ENV41			Camera	107	33	639521	4462723	639405	4462783	116	-60	2	130		(Raw Nav, Kongsberg 14208, img#13) (V)	
26-Nov-2018	09:38:39	1872	ST18904-ENV41			Camera	107	33	639523	4462722	639405	4462783	118	-61	2	133		(Raw Nav, Kongsberg 14208, img#14) (V)	
26-Nov-2018	09:38:59	1873	ST18904-ENV41			Camera	107	33	639525	4462719	639405	4462783	120	-64	4	136		(Raw Nav, Kongsberg 14208, img#15) (V)	
26-Nov-2018	09:39:17	1874	ST18904-ENV41			Camera	107	33	639526	4462716	639405	4462783	121	-67	6	138		(Raw Nav, Kongsberg 14208, img#16) (V)	
26-Nov-2018	09:39:53	1875	ST18904-ENV41			Camera	107	33	639532	4462710	639405	4462783	127	-73	9	146		(Raw Nav, Kongsberg 14208, img#17) (V)	
26-Nov-2018	09:40:03	1876	ST18904-ENV41			Camera	107	33	639534	4462709	639405	4462783	129	-74	9	148		(Raw Nav, Kongsberg 14208, img#18) (V)	
26-Nov-2018	09:40:33	1877	ST18904-ENV41			Camera	107	33	639541	4462709	639405	4462783	136	-74	5	155		(Raw Nav, Kongsberg 14208, img#19) (V)	
26-Nov-2018	09:41:11	1878	ST18904-ENV41			Camera	107	33	639551	4462709	639405	4462783	146	-74	1	163		(Raw Nav, Kongsberg 14208, img#20) (V)	
26-Nov-2018	09:41:41	1879	ST18904-ENV41			Camera	107	33	639555	4462708	639405	4462783	150	-75	0	168		(Raw Nav, Kongsberg 14208, img#21) (V)	
26-Nov-2018	09:42:01	1880	ST18904-ENV41			Camera	107	33	639557	4462705	639405	4462783	152	-78	2	171		(Raw Nav, Kongsberg 14208, img#22) (V)	
26-Nov-2018	09:42:24	1881	ST18904-ENV41			Camera	107	33	639557	4462702	639405	4462783	152	-81	5	172		(Raw Nav, Kongsberg 14208, img#23) (V)	
26-Nov-2018	09:42:58	1882	ST18904-ENV41			Camera	107	33	639558	4462697	639405	4462783	153	-86	9	175		(Raw Nav, Kongsberg 14208, img#24) (V)	
26-Nov-2018	09:43:36	1883	ST18904-ENV41			Camera	107	33	639564	4462692	639405	4462783	159	-91	10	183		(Raw Nav, Kongsberg 14208, img#25) (V)	
26-Nov-2018	09:44:14	1884	ST18904-ENV41			Camera	107	33	639577	4462689	639405	4462783	172	-94	7	196		(Raw Nav, Kongsberg 14208, img#26) (V)	
26-Nov-2018	09:44:29	1885	ST18904-ENV41			Camera	107	33	639581	4462688	639405	4462783	176	-95	6	200		(Raw Nav, Kongsberg 14208, img#27) (V)	
26-Nov-2018	09:44:37	1886	ST18904-ENV41			Camera	107	33	639583	4462688	639405	4462783	178	-95	6	201		(Raw Nav, Kongsberg 14208, img#28) (V)	
26-Nov-2018	11:31:22	1887	ST18904-ENV43			Camera	116	35	639868	4464875	639862	4464882	6	-7	10	321		(Corr'd Nav, Kongsberg 14208, img#29) (V)	
26-Nov-2018	11:32:01	1888	ST18904-ENV43			Camera	116	35	639859	4464877	639862	4464882	-2	-5	6	22		(Corr'd Nav, Kongsberg 14208, img#30) (V)	
26-Nov-2018	11:32:23	1889	ST18904-ENV43			Camera	115	35	639855	4464879	639862	4464882	-7	-3	8	64		(Corr'd Nav, Kongsberg 14208, img#31) (V)	
26-Nov-2018	11:32:33	1890	ST18904-ENV43			Camera	115	35	639853	4464880	639862	4464882	-8	-2	9	76		(Corr'd Nav, Kongsberg 14208, img#32) (V)	
26-Nov-2018	11:32:51	1891	ST18904-ENV43			Camera	116	35	639852	4464882	639862	4464882	-10	0	10	92		(Corr'd Nav, Kongsberg 14208, img#33) (V)	
26-Nov-2018	11:33:16	1892	ST18904-ENV43			Camera	116	35	639852	4464887	639862	4464882	-10	5	11	116		(Corr'd Nav, Kongsberg 14208, img#34) (V)	
26-Nov-2018	11:33:47	1893	ST18904-ENV43			Camera	116	35	639853	4464894	639862	4464882	-9	12	15	142		(Corr'd Nav, Kongsberg 14208, img#35) (V)	
26-Nov-2018	11:34:19	1894	ST18904-ENV43			Camera	116	35	639850	4464900	639862	4464882	-12	18	21	146		(Corr'd Nav, Kongsberg 14208, img#36) (V)	
26-Nov-2018	11:34:25	1895	ST18904-ENV43			Camera	116	35	639848	4464901	639862	4464882	-13	19	23	144		(Corr'd Nav, Kongsberg 14208, img#37) (V)	
26-Nov-2018	11:34:48	1896	ST18904-ENV43			Camera	116	35	639842	4464903	639862	4464882	-20	21	29	137		(Corr'd Nav, Kongsberg 14208, img#38) (V)	

Grey columns denote where no information is required

APPENDIX A FIELD SAMPLING LOGS

Table A.3 Seabed Imagery Surveyors Logs

Gardline														Seafloor Sampling Positioning Summary						
Job No		11179							Vessel		MV Ocean Researcher									
Client		Equinor US Wind LLC							Vessel Reference Point (VRP)		CoG									
Project Name		Equinor Wind OCS-A 0512							Deployment Location		Starboard A-frame			x	8.96	y	-3.08	z	6.05	
Primary Positioning System		Starpack 1							Actual Coordinates derived from		Deployment Location									
Geodetic Reference System		Datum		NAD83		Ellipsoid		GRS 80		Projection		UTM ZONE 18 N (75 W)			Vertical / Tidal Datum		NAVD88			
Date	Time (UTC/GMT)	Fix number	Stn No	Penetration	Sample Retention	Retention	Observed Seafloor Depth (feet)	Observed Seafloor Depth (m)	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks		
									Easting	Northing	Easting	Northing	dE	dN	Range	Bearing				
26-Nov-2018	11:35:21	1897	ST18904-ENV43			Camera	116	35	639827	4464906	639862	4464882	-35	24	43	125		(Cor'd Nav, Kongsberg 14208, img#39) (V)		
26-Nov-2018	11:35:42	1898	ST18904-ENV43			Camera	116	35	639819	4464908	639862	4464882	-43	26	51	121		(Cor'd Nav, Kongsberg 14208, img#40) (V)		
26-Nov-2018	11:35:53	1899	ST18904-ENV43			Camera	116	35	639816	4464910	639862	4464882	-46	28	54	121		(Cor'd Nav, Kongsberg 14208, img#41) (V)		
26-Nov-2018	11:36:22	1900	ST18904-ENV43			Camera	116	35	639810	4464913	639862	4464882	-52	31	60	121		(Cor'd Nav, Kongsberg 14208, img#42) (V)		
26-Nov-2018	11:36:41	1901	ST18904-ENV43			Camera	116	35	639807	4464914	639862	4464882	-55	32	63	121		(Cor'd Nav, Kongsberg 14208, img#43) (V)		
26-Nov-2018	11:36:55	1902	ST18904-ENV43			Camera	116	35	639805	4464916	639862	4464882	-57	34	66	121		(Cor'd Nav, Kongsberg 14208, img#44) (V)		
26-Nov-2018	11:37:12	1903	ST18904-ENV43			Camera	116	35	639802	4464918	639862	4464882	-60	36	70	121		(Cor'd Nav, Kongsberg 14208, img#45) (V)		
26-Nov-2018	11:37:43	1904	ST18904-ENV43			Camera	116	35	639796	4464922	639862	4464882	-66	40	77	121		(Cor'd Nav, Kongsberg 14208, img#46) (V)		
26-Nov-2018	11:38:13	1905	ST18904-ENV43			Camera	116	35	639793	4464926	639862	4464882	-69	44	82	123		(Cor'd Nav, Kongsberg 14208, img#47) (V)		
26-Nov-2018	11:38:44	1906	ST18904-ENV43			Camera	116	35	639790	4464932	639862	4464882	-72	50	87	125		(Cor'd Nav, Kongsberg 14208, img#48) (V)		
26-Nov-2018	11:39:06	1907	ST18904-ENV43			Camera	116	35	639787	4464937	639862	4464882	-74	55	92	126		(Cor'd Nav, Kongsberg 14208, img#49) (V)		
26-Nov-2018	11:39:20	1908	ST18904-ENV43			Camera	116	35	639785	4464940	639862	4464882	-76	58	96	127		(Cor'd Nav, Kongsberg 14208, img#50) (V)		
26-Nov-2018	11:39:40	1909	ST18904-ENV43			Camera	116	35	639782	4464943	639862	4464882	-80	61	101	128		(Cor'd Nav, Kongsberg 14208, img#51) (V)		
26-Nov-2018	11:39:59	1910	ST18904-ENV43			Camera	116	35	639778	4464946	639862	4464882	-83	64	105	128		(Cor'd Nav, Kongsberg 14208, img#52) (V)		
26-Nov-2018	11:40:16	1911	ST18904-ENV43			Camera	116	35	639774	4464948	639862	4464882	-87	66	110	127		(Cor'd Nav, Kongsberg 14208, img#53) (V)		
26-Nov-2018	11:40:30	1912	ST18904-ENV43			Camera	116	35	639771	4464950	639862	4464882	-91	68	114	127		(Cor'd Nav, Kongsberg 14208, img#54) (V)		
26-Nov-2018	11:41:17	1913	ST18904-ENV43			Camera	116	35	639756	4464956	639862	4464882	-105	74	129	125		(Cor'd Nav, Kongsberg 14208, img#55) (V)		
26-Nov-2018	11:41:42	1914	ST18904-ENV43			Camera	116	35	639750	4464960	639862	4464882	-112	78	136	125		(Cor'd Nav, Kongsberg 14208, img#56) (V)		
26-Nov-2018	11:42:01	1915	ST18904-ENV43			Camera	116	35	639747	4464963	639862	4464882	-115	81	141	125		(Cor'd Nav, Kongsberg 14208, img#57) (V)		
26-Nov-2018	11:42:13	1916	ST18904-ENV43			Camera	116	35	639746	4464965	639862	4464882	-116	83	143	126		(Cor'd Nav, Kongsberg 14208, img#58) (V)		
26-Nov-2018	11:42:35	1917	ST18904-ENV43			Camera	116	35	639745	4464970	639862	4464882	-117	88	146	127		(Cor'd Nav, Kongsberg 14208, img#59) (V)		
26-Nov-2018	11:42:56	1918	ST18904-ENV43			Camera	116	35	639744	4464974	639862	4464882	-117	92	149	128		(Cor'd Nav, Kongsberg 14208, img#60) (V)		
26-Nov-2018	11:43:14	1919	ST18904-ENV43			Camera	116	35	639744	4464978	639862	4464882	-118	96	152	129		(Cor'd Nav, Kongsberg 14208, img#61) (V)		
26-Nov-2018	11:43:25	1920	ST18904-ENV43			Camera	116	35	639743	4464980	639862	4464882	-119	98	154	129		(Cor'd Nav, Kongsberg 14208, img#62) (V)		
26-Nov-2018	11:43:53	1921	ST18904-ENV43			Camera	116	35	639737	4464984	639862	4464882	-125	102	162	129		(Cor'd Nav, Kongsberg 14208, img#63) (V)		
26-Nov-2018	11:44:22	1922	ST18904-ENV43			Camera	116	35	639724	4464989	639862	4464882	-138	107	174	128		(Cor'd Nav, Kongsberg 14208, img#64) (V)		
26-Nov-2018	11:45:04	1923	ST18904-ENV43			Camera	116	35	639704	4464992	639862	4464882	-157	110	192	125		(Cor'd Nav, Kongsberg 14208, img#65) (V)		
26-Nov-2018	11:45:26	1924	ST18904-ENV43			Camera	116	35	639699	4464993	639862	4464882	-163	111	197	124		(Cor'd Nav, Kongsberg 14208, img#66) (V)		
26-Nov-2018	11:45:40	1925	ST18904-ENV43			Camera	116	35	639697	4464995	639862	4464882	-164	113	199	124		(Cor'd Nav, Kongsberg 14208, img#67) (V)		
26-Nov-2018	11:46:07	1926	ST18904-ENV43			Camera	116	35	639697	4464998	639862	4464882	-165	116	202	125		(Cor'd Nav, Kongsberg 14208, img#68) (V)		
26-Nov-2018	13:28:33	1927	ST18904-ENV40			Camera	107	33	639782	4465922	639782	4465921	0	1	1	187		(Cor'd Nav, Kongsberg 14208, img#69) (V)		
26-Nov-2018	13:28:59	1928	ST18904-ENV40			Camera	107	33	639789	4465920	639782	4465921	7	-1	7	280		(Cor'd Nav, Kongsberg 14208, img#70) (V)		
26-Nov-2018	13:29:09	1929	ST18904-ENV40			Camera	107	33	639792	4465919	639782	4465921	9	-2	10	282		(Cor'd Nav, Kongsberg 14208, img#71) (V)		
26-Nov-2018	13:29:32	1930	ST18904-ENV40			Camera	107	33	639797	4465918	639782	4465921	14	-3	15	283		(Cor'd Nav, Kongsberg 14208, img#72) (V)		
26-Nov-2018	13:29:51	1931	ST18904-ENV40			Camera	107	33	639799	4465917	639782	4465921	17	-3	17	281		(Cor'd Nav, Kongsberg 14208, img#73) (V)		
26-Nov-2018	13:30:08	1932	ST18904-ENV40			Camera	107	33	639801	4465917	639782	4465921	19	-4	19	282		(Cor'd Nav, Kongsberg 14208, img#74) (V)		
26-Nov-2018	13:30:21	1933	ST18904-ENV40			Camera	107	33	639802	4465915	639782	4465921	20	-5	21	285		(Cor'd Nav, Kongsberg 14208, img#75) (V)		
26-Nov-2018	13:30:33	1934	ST18904-ENV40			Camera	107	33	639804	4465914	639782	4465921	22	-7	23	288		(Cor'd Nav, Kongsberg 14208, img#76) (V)		

Grey columns denote where no information is required

APPENDIX A FIELD SAMPLING LOGS

Table A.3 Seabed Imagery Surveyors Logs

Gardline														Seafloor Sampling Positioning Summary													
Job No		11179								Vessel		MV Ocean Researcher															
Client		Equinor US Wind LLC								Vessel Reference Point (VRP)		CoG															
Project Name		Equinor Wind OCS-A 0512								Deployment Location		Starboard A-frame				x		8.96		y		-3.08		z		6.05	
Primary Positioning System		Starpack 1								Actual Coordinates derived from		Deployment Location															
Geodetic Reference System		Datum		NAD83		Ellipsoid		GRS 80		Projection		UTM ZONE 18 N (75 W)						Vertical / Tidal Datum		NAVD88							
Date	Time (UTC/GMT)	Fix number	Stn No	Penetration	Sample Retention	Retention	Observed Seafloor Depth (feet)	Observed Seafloor Depth (m)	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks									
									Easting	Northing	Easting	Northing	dE	dN	Range	Bearing											
26-Nov-2018	13:30:56	1935	ST18904-ENV40			Camera	108	33	639808	4465910	639782	4465921	26	-10	28	292		(Corr'd Nav, Kongsberg 14208, img#77) (V)									
26-Nov-2018	13:31:06	1936	ST18904-ENV40			Camera	107	33	639810	4465909	639782	4465921	28	-12	31	293		(Corr'd Nav, Kongsberg 14208, img#78) (V)									
26-Nov-2018	13:31:35	1937	ST18904-ENV40			Camera	107	33	639816	4465906	639782	4465921	34	-15	37	294		(Corr'd Nav, Kongsberg 14208, img#79) (V)									
26-Nov-2018	13:31:50	1938	ST18904-ENV40			Camera	107	33	639818	4465905	639782	4465921	36	-16	39	294		(Corr'd Nav, Kongsberg 14208, img#80) (V)									
26-Nov-2018	13:32:03	1939	ST18904-ENV40			Camera	107	33	639820	4465904	639782	4465921	38	-17	41	294		(Corr'd Nav, Kongsberg 14208, img#81) (V)									
26-Nov-2018	13:32:26	1940	ST18904-ENV40			Camera	108	33	639823	4465902	639782	4465921	41	-18	45	294		(Corr'd Nav, Kongsberg 14208, img#82) (V)									
26-Nov-2018	13:32:43	1941	ST18904-ENV40			Camera	108	33	639826	4465901	639782	4465921	44	-20	48	294		(Corr'd Nav, Kongsberg 14208, img#83) (V)									
26-Nov-2018	13:33:15	1942	ST18904-ENV40			Camera	107	33	639831	4465899	639782	4465921	48	-21	53	294		(Corr'd Nav, Kongsberg 14208, img#84) (V)									
26-Nov-2018	13:33:32	1943	ST18904-ENV40			Camera	108	33	639833	4465899	639782	4465921	51	-22	56	293		(Corr'd Nav, Kongsberg 14208, img#85) (V)									
26-Nov-2018	13:33:42	1944	ST18904-ENV40			Camera	108	33	639835	4465898	639782	4465921	53	-23	58	293		(Corr'd Nav, Kongsberg 14208, img#86) (V)									
26-Nov-2018	13:34:01	1945	ST18904-ENV40			Camera	108	33	639839	4465897	639782	4465921	57	-24	61	293		(Corr'd Nav, Kongsberg 14208, img#87) (V)									
26-Nov-2018	13:34:12	1946	ST18904-ENV40			Camera	108	33	639841	4465896	639782	4465921	59	-25	64	293		(Corr'd Nav, Kongsberg 14208, img#88) (V)									
26-Nov-2018	13:34:32	1947	ST18904-ENV40			Camera	107	33	639844	4465895	639782	4465921	62	-26	67	293		(Corr'd Nav, Kongsberg 14208, img#89) (V)									
26-Nov-2018	13:34:51	1948	ST18904-ENV40			Camera	107	33	639846	4465894	639782	4465921	64	-27	69	293		(Corr'd Nav, Kongsberg 14208, img#90) (V)									
26-Nov-2018	13:35:10	1949	ST18904-ENV40			Camera	108	33	639848	4465892	639782	4465921	66	-28	72	293		(Corr'd Nav, Kongsberg 14208, img#91) (V)									
26-Nov-2018	13:35:29	1950	ST18904-ENV40			Camera	108	33	639851	4465890	639782	4465921	69	-30	75	294		(Corr'd Nav, Kongsberg 14208, img#92) (V)									
26-Nov-2018	13:35:51	1951	ST18904-ENV40			Camera	108	33	639854	4465888	639782	4465921	72	-33	79	295		(Corr'd Nav, Kongsberg 14208, img#93) (V)									
26-Nov-2018	13:36:16	1952	ST18904-ENV40			Camera	108	33	639857	4465885	639782	4465921	75	-36	83	296		(Corr'd Nav, Kongsberg 14208, img#94) (V)									
26-Nov-2018	13:36:35	1953	ST18904-ENV40			Camera	108	33	639859	4465884	639782	4465921	77	-37	86	296		(Corr'd Nav, Kongsberg 14208, img#95) (V)									
26-Nov-2018	13:37:12	1954	ST18904-ENV40			Camera	108	33	639865	4465881	639782	4465921	83	-40	92	296		(Corr'd Nav, Kongsberg 14208, img#96) (V)									
26-Nov-2018	13:37:31	1955	ST18904-ENV40			Camera	108	33	639868	4465879	639782	4465921	86	-41	95	296		(Corr'd Nav, Kongsberg 14208, img#97) (V)									
26-Nov-2018	13:37:50	1956	ST18904-ENV40			Camera	108	33	639871	4465878	639782	4465921	89	-43	99	296		(Corr'd Nav, Kongsberg 14208, img#98) (V)									
26-Nov-2018	13:38:38	1957	ST18904-ENV40			Camera	108	33	639879	4465875	639782	4465921	97	-46	107	295		(Corr'd Nav, Kongsberg 14208, img#99) (V)									
26-Nov-2018	13:38:51	1958	ST18904-ENV40			Camera	108	33	639881	4465875	639782	4465921	99	-46	109	295		(Corr'd Nav, Kongsberg 14208, img#100) (V)									
26-Nov-2018	13:39:16	1959	ST18904-ENV40			Camera	108	33	639886	4465873	639782	4465921	104	-48	114	295		(Corr'd Nav, Kongsberg 14208, img#101) (V)									
26-Nov-2018	13:39:26	1960	ST18904-ENV40			Camera	108	33	639888	4465873	639782	4465921	106	-48	116	294		(Corr'd Nav, Kongsberg 14208, img#102) (V)									
26-Nov-2018	13:40:03	1961	ST18904-ENV40			Camera	108	33	639893	4465870	639782	4465921	111	-51	122	295		(Corr'd Nav, Kongsberg 14208, img#103) (V)									
26-Nov-2018	13:40:15	1962	ST18904-ENV40			Camera	108	33	639894	4465869	639782	4465921	112	-52	124	295		(Corr'd Nav, Kongsberg 14208, img#104) (V)									
26-Nov-2018	13:41:01	1963	ST18904-ENV40			Camera	108	33	639901	4465864	639782	4465921	119	-57	131	296		(Corr'd Nav, Kongsberg 14208, img#105) (V)									
26-Nov-2018	13:41:25	1964	ST18904-ENV40			Camera	108	33	639905	4465862	639782	4465921	123	-58	136	295		(Corr'd Nav, Kongsberg 14208, img#106) (V)									
26-Nov-2018	13:41:45	1965	ST18904-ENV40			Camera	108	33	639909	4465861	639782	4465921	127	-60	141	295		(Corr'd Nav, Kongsberg 14208, img#107) (V)									
26-Nov-2018	13:42:19	1966	ST18904-ENV40			Camera	108	33	639917	4465857	639782	4465921	135	-64	149	295		(Corr'd Nav, Kongsberg 14208, img#108) (V)									
26-Nov-2018	13:42:38	1967	ST18904-ENV40			Camera	108	33	639920	4465855	639782	4465921	138	-66	153	295		(Corr'd Nav, Kongsberg 14208, img#109) (V)									
26-Nov-2018	13:43:02	1968	ST18904-ENV40			Camera	108	33	639924	4465853	639782	4465921	142	-68	157	296		(Corr'd Nav, Kongsberg 14208, img#110) (V)									
26-Nov-2018	13:43:20	1969	ST18904-ENV40			Camera	108	33	639926	4465851	639782	4465921	144	-70	160	296		(Corr'd Nav, Kongsberg 14208, img#111) (V)									
26-Nov-2018	13:43:48	1970	ST18904-ENV40			Camera	108	33	639929	4465849	639782	4465921	147	-72	164	296		(Corr'd Nav, Kongsberg 14208, img#112) (V)									
26-Nov-2018	13:44:09	1971	ST18904-ENV40			Camera	109	33	639932	4465847	639782	4465921	150	-74	167	296		(Corr'd Nav, Kongsberg 14208, img#113) (V)									
26-Nov-2018	13:44:39	1972	ST18904-ENV40			Camera	109	33	639938	4465845	639782	4465921	156	-76	173	296		(Corr'd Nav, Kongsberg 14208, img#114) (V)									

Grey columns denote where no information is required

APPENDIX A FIELD SAMPLING LOGS

Table A.3 Seabed Imagery Surveyors Logs

Gardline										Seafloor Sampling Positioning Summary									
Job No		11179							Vessel		MV Ocean Researcher								
Client		Equinor US Wind LLC							Vessel Reference Point (VRP)		CoG								
Project Name		Equinor Wind OCS-A 0512							Deployment Location		Starboard A-frame			x	8.96	y	-3.08	z	6.05
Primary Positioning System		Starpack 1							Actual Coordinates derived from		Deployment Location								
Geodetic Reference System		Datum		NAD83		Ellipsoid	GRS 80		Projection		UTM ZONE 18 N (75 W)				Vertical / Tidal Datum		NAVD88		
Date	Time (UTC/GMT)	Fix number	Stn No	Penetration	Sample Retention	Retention	Observed Seafloor Depth (feet)	Observed Seafloor Depth (m)	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks	
									Easting	Northing	Easting	Northing	dE	dN	Range	Bearing			
26-Nov-2018	13:44:58	1973	ST18904-ENV40			Camera	109	33	639941	4465844	639782	4465921	159	-76	177	296		(Corr'd Nav, Kongsberg 14208, img#115) (V)	
26-Nov-2018	13:45:16	1974	ST18904-ENV40			Camera	109	33	639945	4465844	639782	4465921	163	-77	180	295		(Corr'd Nav, Kongsberg 14208, img#116) (V)	
26-Nov-2018	13:45:32	1975	ST18904-ENV40			Camera	109	33	639948	4465844	639782	4465921	166	-77	183	295		(Corr'd Nav, Kongsberg 14208, img#117) (V)	
26-Nov-2018	13:46:14	1976	ST18904-ENV40			Camera	109	33	639954	4465843	639782	4465921	172	-78	189	294		(Corr'd Nav, Kongsberg 14208, img#118) (V)	
26-Nov-2018	13:46:45	1977	ST18904-ENV40			Camera	109	33	639956	4465842	639782	4465921	174	-79	191	294		(Corr'd Nav, Kongsberg 14208, img#119) (V)	
26-Nov-2018	13:47:06	1978	ST18904-ENV40			Camera	109	33	639958	4465840	639782	4465921	176	-81	194	295		(Corr'd Nav, Kongsberg 14208, img#120) (V)	
26-Nov-2018	13:47:36	1979	ST18904-ENV40			Camera	110	33	639962	4465837	639782	4465921	180	-84	199	295		(Corr'd Nav, Kongsberg 14208, img#121) (V)	
26-Nov-2018	13:47:48	1980	ST18904-ENV40			Camera	110	33	639964	4465836	639782	4465921	182	-85	201	295		(Corr'd Nav, Kongsberg 14208, img#122) (V)	
26-Nov-2018	15:42:49	1981	ST18904-ENV50			Camera	121	37	644226	4461257	644232	4461252	-6	4	8	126		(Corr'd Nav, Kongsberg 14208, img#123) (V)	
26-Nov-2018	15:43:23	1982	ST18904-ENV50			Camera	121	37	644229	4461255	644232	4461252	-3	2	4	128		(Corr'd Nav, Kongsberg 14208, img#124) (V)	
26-Nov-2018	15:43:48	1983	ST18904-ENV50			Camera	121	37	644233	4461253	644232	4461252	0	1	1	207		(Corr'd Nav, Kongsberg 14208, img#125) (V)	
26-Nov-2018	15:44:02	1984	ST18904-ENV50			Camera	121	37	644235	4461252	644232	4461252	3	-1	3	284		(Corr'd Nav, Kongsberg 14208, img#126) (V)	
26-Nov-2018	15:44:24	1985	ST18904-ENV50			Camera	121	37	644239	4461250	644232	4461252	6	-2	7	288		(Corr'd Nav, Kongsberg 14208, img#127) (V)	
26-Nov-2018	15:45:06	1986	ST18904-ENV50			Camera	121	37	644244	4461250	644232	4461252	11	-2	12	282		(Corr'd Nav, Kongsberg 14208, img#128) (V)	
26-Nov-2018	15:45:48	1987	ST18904-ENV50			Camera	121	37	644249	4461249	644232	4461252	16	-3	17	281		(Corr'd Nav, Kongsberg 14208, img#129) (V)	
26-Nov-2018	15:46:19	1988	ST18904-ENV50			Camera	121	37	644254	4461246	644232	4461252	22	-6	23	286		(Corr'd Nav, Kongsberg 14208, img#130) (V)	
26-Nov-2018	15:46:50	1989	ST18904-ENV50			Camera	121	37	644259	4461242	644232	4461252	27	-10	29	291		(Corr'd Nav, Kongsberg 14208, img#131) (V)	
26-Nov-2018	15:47:27	1990	ST18904-ENV50			Camera	121	37	644265	4461237	644232	4461252	33	-15	36	295		(Corr'd Nav, Kongsberg 14208, img#132) (V)	
26-Nov-2018	15:48:01	1991	ST18904-ENV50			Camera	121	37	644271	4461234	644232	4461252	39	-18	43	295		(Corr'd Nav, Kongsberg 14208, img#133) (V)	
26-Nov-2018	15:48:23	1992	ST18904-ENV50			Camera	121	37	644275	4461232	644232	4461252	43	-21	47	296		(Corr'd Nav, Kongsberg 14208, img#134) (V)	
26-Nov-2018	15:48:47	1993	ST18904-ENV50			Camera	121	37	644280	4461229	644232	4461252	48	-23	53	296		(Corr'd Nav, Kongsberg 14208, img#135) (V)	
26-Nov-2018	15:49:16	1994	ST18904-ENV50			Camera	121	37	644287	4461227	644232	4461252	54	-25	60	295		(Corr'd Nav, Kongsberg 14208, img#136) (V)	
26-Nov-2018	15:49:25	1995	ST18904-ENV50			Camera	121	37	644289	4461226	644232	4461252	56	-26	62	295		(Corr'd Nav, Kongsberg 14208, img#137) (V)	
26-Nov-2018	15:49:44	1996	ST18904-ENV50			Camera	121	37	644293	4461225	644232	4461252	60	-27	66	294		(Corr'd Nav, Kongsberg 14208, img#138) (V)	
26-Nov-2018	15:50:42	1997	ST18904-ENV50			Camera	121	37	644304	4461220	644232	4461252	72	-32	79	294		(Corr'd Nav, Kongsberg 14208, img#139) (V)	
26-Nov-2018	15:51:16	1998	ST18904-ENV50			Camera	121	37	644311	4461217	644232	4461252	79	-36	87	294		(Corr'd Nav, Kongsberg 14208, img#140) (V)	
26-Nov-2018	15:51:41	1999	ST18904-ENV50			Camera	121	37	644317	4461213	644232	4461252	85	-39	93	295		(Corr'd Nav, Kongsberg 14208, img#141) (V)	
26-Nov-2018	15:52:12	2000	ST18904-ENV50			Camera	121	37	644324	4461210	644232	4461252	92	-43	101	295		(Corr'd Nav, Kongsberg 14208, img#142) (V)	
26-Nov-2018	15:52:38	2001	ST18904-ENV50			Camera	121	37	644329	4461208	644232	4461252	97	-44	107	295		(Corr'd Nav, Kongsberg 14208, img#143) (V)	
26-Nov-2018	15:53:06	2002	ST18904-ENV50			Camera	121	37	644335	4461205	644232	4461252	102	-47	113	295		(Corr'd Nav, Kongsberg 14208, img#144) (V)	
26-Nov-2018	15:53:24	2003	ST18904-ENV50			Camera	121	37	644339	4461203	644232	4461252	107	-49	117	295		(Corr'd Nav, Kongsberg 14208, img#145) (V)	
26-Nov-2018	15:53:43	2004	ST18904-ENV50			Camera	121	37	644343	4461202	644232	4461252	111	-50	122	295		(Corr'd Nav, Kongsberg 14208, img#146) (V)	
26-Nov-2018	15:54:00	2005	ST18904-ENV50			Camera	121	37	644347	4461201	644232	4461252	114	-51	125	294		(Corr'd Nav, Kongsberg 14208, img#147) (V)	
26-Nov-2018	15:54:16	2006	ST18904-ENV50			Camera	121	37	644349	4461200	644232	4461252	117	-52	128	294		(Corr'd Nav, Kongsberg 14208, img#148) (V)	
26-Nov-2018	15:54:40	2007	ST18904-ENV50			Camera	121	37	644352	4461198	644232	4461252	120	-55	132	294		(Corr'd Nav, Kongsberg 14208, img#149) (V)	
26-Nov-2018	15:55:05	2008	ST18904-ENV50			Camera	121	37	644355	4461195	644232	4461252	123	-57	136	295		(Corr'd Nav, Kongsberg 14208, img#150) (V)	
26-Nov-2018	15:55:36	2009	ST18904-ENV50			Camera	121	37	644359	4461192	644232	4461252	127	-61	141	296		(Corr'd Nav, Kongsberg 14208, img#151) (V)	
26-Nov-2018	15:55:48	2010	ST18904-ENV50			Camera	121	37	644361	4461190	644232	4461252	128	-62	143	296		(Corr'd Nav, Kongsberg 14208, img#152) (V)	

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APPENDIX A FIELD SAMPLING LOGS

Table A.3 Seabed Imagery Surveyors Logs

Gardline										Seafloor Sampling Positioning Summary									
Job No		11179							Vessel		MV Ocean Researcher								
Client		Equinor US Wind LLC							Vessel Reference Point (VRP)		CoG								
Project Name		Equinor Wind OCS-A 0512							Deployment Location		Starboard A-frame			x	8.96	y	-3.08	z	6.05
Primary Positioning System		Starpack 1							Actual Coordinates derived from		Deployment Location								
Geodetic Reference System		Datum		NAD83		Ellipsoid	GRS 80		Projection		UTM ZONE 18 N (75 W)				Vertical / Tidal Datum		NAVD88		
Date	Time (UTC/GMT)	Fix number	Stn No	Penetration	Sample Retention	Retention	Observed Seafloor Depth (feet)	Observed Seafloor Depth (m)	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks	
									Easting	Northing	Easting	Northing	dE	dN	Range	Bearing			
26-Nov-2018	15:56:32	2011	ST18904-ENV50			Camera	121	37	644369	4461185	644232	4461252	136	-68	152	296		(Corr'd Nav, Kongsberg 14208, img#153) (V)	
26-Nov-2018	15:56:54	2012	ST18904-ENV50			Camera	121	37	644374	4461181	644232	4461252	142	-71	158	297		(Corr'd Nav, Kongsberg 14208, img#154) (V)	
26-Nov-2018	15:57:22	2013	ST18904-ENV50			Camera	121	37	644381	4461177	644232	4461252	148	-75	166	297		(Corr'd Nav, Kongsberg 14208, img#155) (V)	
26-Nov-2018	15:58:12	2014	ST18904-ENV50			Camera	121	37	644391	4461173	644232	4461252	159	-80	178	297		(Corr'd Nav, Kongsberg 14208, img#156) (V)	
26-Nov-2018	15:58:23	2015	ST18904-ENV50			Camera	121	37	644393	4461172	644232	4461252	161	-81	180	297		(Corr'd Nav, Kongsberg 14208, img#157) (V)	
26-Nov-2018	15:59:20	2016	ST18904-ENV50			Camera	121	37	644403	4461168	644232	4461252	170	-84	190	296		(Corr'd Nav, Kongsberg 14208, img#158) (V)	
26-Nov-2018	15:59:29	2017	ST18904-ENV50			Camera	121	37	644404	4461168	644232	4461252	171	-84	191	296		(Corr'd Nav, Kongsberg 14208, img#159) (V)	
26-Nov-2018	16:00:02	2018	ST18904-ENV50			Camera	121	37	644408	4461167	644232	4461252	176	-85	196	296		(Corr'd Nav, Kongsberg 14208, img#160) (V)	
26-Nov-2018	16:00:22	2019	ST18904-ENV50			Camera	121	37	644412	4461166	644232	4461252	179	-86	199	296		(Corr'd Nav, Kongsberg 14208, img#161) (V)	
26-Nov-2018	16:00:29	2020	ST18904-ENV50			Camera	121	37	644413	4461165	644232	4461252	181	-87	201	296		(Corr'd Nav, Kongsberg 14208, img#162) (V)	
30-Nov-2018	04:33:08	2021	ST18904-ENV48			Camera	123	37	641463	4458704	641449	4458700	14	3	15	256		(Corr'd Nav, Kongsberg 14208, img#1) (V)	
30-Nov-2018	04:34:41	2022	ST18904-ENV48			Camera	123	37	641449	4458702	641449	4458700	0	2	2	172		(Corr'd Nav, Kongsberg 14208, img#2) (V)	
30-Nov-2018	04:34:56	2023	ST18904-ENV48			Camera	122	37	641446	4458701	641449	4458700	-3	1	3	115		(Corr'd Nav, Kongsberg 14208, img#3) (V)	
30-Nov-2018	04:35:48	2024	ST18904-ENV48			Camera	123	37	641437	4458696	641449	4458700	-12	-4	12	70		(Corr'd Nav, Kongsberg 14208, img#4) (V)	
30-Nov-2018	04:36:08	2025	ST18904-ENV48			Camera	123	37	641433	4458693	641449	4458700	-16	-7	17	66		(Corr'd Nav, Kongsberg 14208, img#5) (V)	
30-Nov-2018	04:36:20	2026	ST18904-ENV48			Camera	123	37	641431	4458691	641449	4458700	-18	-9	20	64		(Corr'd Nav, Kongsberg 14208, img#6) (V)	
30-Nov-2018	04:36:39	2027	ST18904-ENV48			Camera	123	37	641428	4458688	641449	4458700	-21	-12	24	60		(Corr'd Nav, Kongsberg 14208, img#7) (V)	
30-Nov-2018	04:36:54	2028	ST18904-ENV48			Camera	123	37	641426	4458686	641449	4458700	-23	-14	27	58		(Corr'd Nav, Kongsberg 14208, img#8) (V)	
30-Nov-2018	04:37:31	2029	ST18904-ENV48			Camera	123	37	641420	4458682	641449	4458700	-29	-18	35	58		(Corr'd Nav, Kongsberg 14208, img#9) (V)	
30-Nov-2018	04:37:41	2030	ST18904-ENV48			Camera	123	37	641417	4458681	641449	4458700	-31	-20	37	58		(Corr'd Nav, Kongsberg 14208, img#10) (V)	
30-Nov-2018	04:38:13	2031	ST18904-ENV48			Camera	123	37	641410	4458678	641449	4458700	-39	-22	44	60		(Corr'd Nav, Kongsberg 14208, img#11) (V)	
30-Nov-2018	04:38:38	2032	ST18904-ENV48			Camera	123	37	641404	4458678	641449	4458700	-45	-22	50	64		(Corr'd Nav, Kongsberg 14208, img#12) (V)	
30-Nov-2018	04:39:03	2033	ST18904-ENV48			Camera	123	37	641399	4458679	641449	4458700	-50	-21	54	67		(Corr'd Nav, Kongsberg 14208, img#13) (V)	
30-Nov-2018	04:39:39	2034	ST18904-ENV48			Camera	123	37	641396	4458679	641449	4458700	-53	-22	58	68		(Corr'd Nav, Kongsberg 14208, img#14) (V)	
30-Nov-2018	04:40:18	2035	ST18904-ENV48			Camera	123	37	641388	4458679	641449	4458700	-61	-21	65	71		(Corr'd Nav, Kongsberg 14208, img#15) (V)	
30-Nov-2018	04:40:33	2036	ST18904-ENV48			Camera	123	37	641384	4458679	641449	4458700	-65	-22	68	72		(Corr'd Nav, Kongsberg 14208, img#16) (V)	
30-Nov-2018	04:41:28	2037	ST18904-ENV48			Camera	123	37	641377	4458675	641449	4458700	-72	-25	77	71		(Corr'd Nav, Kongsberg 14208, img#17) (V)	
30-Nov-2018	04:42:33	2038	ST18904-ENV48			Camera	123	37	641361	4458672	641449	4458700	-88	-28	92	72		(Corr'd Nav, Kongsberg 14208, img#18) (V)	
30-Nov-2018	04:43:15	2039	ST18904-ENV48			Camera	123	37	641355	4458664	641449	4458700	-94	-36	101	69		(Corr'd Nav, Kongsberg 14208, img#19) (V)	
30-Nov-2018	04:44:13	2040	ST18904-ENV48			Camera	123	38	641349	4458656	641449	4458700	-99	-45	109	66		(Corr'd Nav, Kongsberg 14208, img#20) (V)	
30-Nov-2018	04:44:46	2041	ST18904-ENV48			Camera	124	38	641341	4458654	641449	4458700	-108	-46	117	67		(Corr'd Nav, Kongsberg 14208, img#21) (V)	
30-Nov-2018	04:45:38	2042	ST18904-ENV48			Camera	124	38	641327	4458652	641449	4458700	-122	-49	131	68		(Corr'd Nav, Kongsberg 14208, img#22) (V)	
30-Nov-2018	04:46:12	2043	ST18904-ENV48			Camera	124	38	641322	4458650	641449	4458700	-127	-50	137	68		(Corr'd Nav, Kongsberg 14208, img#23) (V)	
30-Nov-2018	04:46:42	2044	ST18904-ENV48			Camera	124	38	641315	4458649	641449	4458700	-134	-51	143	69		(Corr'd Nav, Kongsberg 14208, img#24) (V)	
30-Nov-2018	04:47:14	2045	ST18904-ENV48			Camera	124	38	641308	4458647	641449	4458700	-141	-53	151	70		(Corr'd Nav, Kongsberg 14208, img#25) (V)	
30-Nov-2018	04:47:38	2046	ST18904-ENV48			Camera	123	38	641307	4458644	641449	4458700	-142	-56	153	68		(Corr'd Nav, Kongsberg 14208, img#26) (V)	
30-Nov-2018	04:47:47	2047	ST18904-ENV48			Camera	123	38	641307	4458643	641449	4458700	-142	-57	153	68		(Corr'd Nav, Kongsberg 14208, img#27) (V)	
30-Nov-2018	04:48:13	2048	ST18904-ENV48			Camera	123	38	641305	4458642	641449	4458700	-144	-58	155	68		(Corr'd Nav, Kongsberg 14208, img#28) (V)	

Grey columns denote where no information is required

APPENDIX A FIELD SAMPLING LOGS

Table A.3 Seabed Imagery Surveyors Logs

Gardline																	Seafloor Sampling Positioning Summary										
Job No		11179								Vessel		MV Ocean Researcher															
Client		Equinor US Wind LLC								Vessel Reference Point (VRP)		CoG															
Project Name		Equinor Wind OCS-A 0512								Deployment Location		Starboard A-frame				x		8.96		y		-3.08		z		6.05	
Primary Positioning System		Starpack 1								Actual Coordinates derived from		Deployment Location															
Geodetic Reference System		Datum		NAD83		Ellipsoid		GRS 80		Projection		UTM ZONE 18 N (75 W)						Vertical / Tidal Datum		NAVD88							
Date	Time (UTC/GMT)	Fix number	Stn No	Penetration	Sample Retention	Retention	Observed Seafloor Depth (feet)	Observed Seafloor Depth (m)	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks									
									Easting	Northing	Easting	Northing	dE	dN	Range	Bearing											
30-Nov-2018	04:49:09	2049	ST18904-ENV48			Camera	123	38	641292	4458643	641449	4458700	-157	-57	168	70		(Corr'd Nav, Kongsberg 14208, img#29) (V)									
30-Nov-2018	04:49:28	2050	ST18904-ENV48			Camera	124	38	641288	4458641	641449	4458700	-161	-60	171	70		(Corr'd Nav, Kongsberg 14208, img#30) (V)									
30-Nov-2018	04:49:37	2051	ST18904-ENV48			Camera	124	38	641287	4458640	641449	4458700	-162	-61	173	70		(Corr'd Nav, Kongsberg 14208, img#31) (V)									
30-Nov-2018	04:50:07	2052	ST18904-ENV48			Camera	124	38	641283	4458638	641449	4458700	-166	-62	177	69		(Corr'd Nav, Kongsberg 14208, img#32) (V)									
30-Nov-2018	04:50:30	2053	ST18904-ENV48			Camera	124	38	641278	4458638	641449	4458700	-171	-62	182	70		(Corr'd Nav, Kongsberg 14208, img#33) (V)									
30-Nov-2018	04:50:57	2054	ST18904-ENV48			Camera	124	38	641271	4458637	641449	4458700	-178	-63	189	70		(Corr'd Nav, Kongsberg 14208, img#34) (V)									
30-Nov-2018	04:51:20	2055	ST18904-ENV48			Camera	124	38	641268	4458635	641449	4458700	-181	-65	192	70		(Corr'd Nav, Kongsberg 14208, img#35) (V)									
30-Nov-2018	04:51:44	2056	ST18904-ENV48			Camera	123	38	641267	4458634	641449	4458700	-182	-67	194	70		(Corr'd Nav, Kongsberg 14208, img#36) (V)									
30-Nov-2018	04:52:09	2057	ST18904-ENV48			Camera	123	38	641264	4458634	641449	4458700	-185	-66	197	70		(Corr'd Nav, Kongsberg 14208, img#37) (V)									
30-Nov-2018	04:52:28	2058	ST18904-ENV48			Camera	123	38	641260	4458635	641449	4458700	-189	-66	200	71		(Corr'd Nav, Kongsberg 14208, img#38) (V)									
30-Nov-2018	06:38:21	2059	ST18904-ENV54			Camera	130	40	644626	4456586	644621	4456593	5	-7	8	323		(Corr'd Nav, Kongsberg 14208, img#39) (V)									
30-Nov-2018	06:38:43	2060	ST18904-ENV54			Camera	130	40	644623	4456587	644621	4456593	2	-6	6	339		(Corr'd Nav, Kongsberg 14208, img#40) (V)									
30-Nov-2018	06:39:05	2061	ST18904-ENV54			Camera	130	40	644620	4456588	644621	4456593	-1	-4	4	10		(Corr'd Nav, Kongsberg 14208, img#41) (V)									
30-Nov-2018	06:39:30	2062	ST18904-ENV54			Camera	130	40	644616	4456591	644621	4456593	-5	-2	5	66		(Corr'd Nav, Kongsberg 14208, img#42) (V)									
30-Nov-2018	06:39:41	2063	ST18904-ENV54			Camera	130	40	644615	4456591	644621	4456593	-7	-1	7	78		(Corr'd Nav, Kongsberg 14208, img#43) (V)									
30-Nov-2018	06:40:00	2064	ST18904-ENV54			Camera	130	40	644612	4456592	644621	4456593	-9	0	9	88		(Corr'd Nav, Kongsberg 14208, img#44) (V)									
30-Nov-2018	06:40:22	2065	ST18904-ENV54			Camera	130	40	644608	4456594	644621	4456593	-13	1	13	95		(Corr'd Nav, Kongsberg 14208, img#45) (V)									
30-Nov-2018	06:40:59	2066	ST18904-ENV54			Camera	130	40	644601	4456597	644621	4456593	-20	4	20	102		(Corr'd Nav, Kongsberg 14208, img#46) (V)									
30-Nov-2018	06:41:26	2067	ST18904-ENV54			Camera	130	40	644596	4456600	644621	4456593	-25	7	26	106		(Corr'd Nav, Kongsberg 14208, img#47) (V)									
30-Nov-2018	06:41:47	2068	ST18904-ENV54			Camera	130	39	644592	4456602	644621	4456593	-29	10	31	109		(Corr'd Nav, Kongsberg 14208, img#48) (V)									
30-Nov-2018	06:42:26	2069	ST18904-ENV54			Camera	129	39	644584	4456608	644621	4456593	-37	15	40	112		(Corr'd Nav, Kongsberg 14208, img#49) (V)									
30-Nov-2018	06:42:49	2070	ST18904-ENV54			Camera	130	39	644578	4456611	644621	4456593	-43	18	46	113		(Corr'd Nav, Kongsberg 14208, img#50) (V)									
30-Nov-2018	06:43:13	2071	ST18904-ENV54			Camera	130	39	644573	4456613	644621	4456593	-48	21	53	113		(Corr'd Nav, Kongsberg 14208, img#51) (V)									
30-Nov-2018	06:43:34	2072	ST18904-ENV54			Camera	130	40	644569	4456615	644621	4456593	-52	23	57	113		(Corr'd Nav, Kongsberg 14208, img#52) (V)									
30-Nov-2018	06:43:46	2073	ST18904-ENV54			Camera	130	40	644567	4456616	644621	4456593	-54	24	59	114		(Corr'd Nav, Kongsberg 14208, img#53) (V)									
30-Nov-2018	06:44:05	2074	ST18904-ENV54			Camera	130	40	644564	4456617	644621	4456593	-57	25	62	113		(Corr'd Nav, Kongsberg 14208, img#54) (V)									
30-Nov-2018	06:44:21	2075	ST18904-ENV54			Camera	130	40	644563	4456618	644621	4456593	-58	25	63	113		(Corr'd Nav, Kongsberg 14208, img#55) (V)									
30-Nov-2018	06:44:35	2076	ST18904-ENV54			Camera	130	40	644562	4456618	644621	4456593	-59	25	64	113		(Corr'd Nav, Kongsberg 14208, img#56) (V)									
30-Nov-2018	06:45:04	2077	ST18904-ENV54			Camera	130	40	644559	4456620	644621	4456593	-62	27	68	114		(Corr'd Nav, Kongsberg 14208, img#57) (V)									
30-Nov-2018	06:45:46	2078	ST18904-ENV54			Camera	130	40	644553	4456624	644621	4456593	-68	31	75	114		(Corr'd Nav, Kongsberg 14208, img#58) (V)									
30-Nov-2018	06:46:09	2079	ST18904-ENV54			Camera	130	40	644550	4456625	644621	4456593	-71	32	78	114		(Corr'd Nav, Kongsberg 14208, img#59) (V)									
30-Nov-2018	06:46:54	2080	ST18904-ENV54			Camera	130	40	644544	4456627	644621	4456593	-77	34	84	114		(Corr'd Nav, Kongsberg 14208, img#60) (V)									
30-Nov-2018	06:47:27	2081	ST18904-ENV54			Camera	130	40	644540	4456629	644621	4456593	-81	36	89	114		(Corr'd Nav, Kongsberg 14208, img#61) (V)									
30-Nov-2018	06:47:58	2082	ST18904-ENV54			Camera	130	40	644536	4456630	644621	4456593	-85	38	93	114		(Corr'd Nav, Kongsberg 14208, img#62) (V)									
30-Nov-2018	06:48:19	2083	ST18904-ENV54			Camera	130	40	644533	4456632	644621	4456593	-88	39	96	114		(Corr'd Nav, Kongsberg 14208, img#63) (V)									
30-Nov-2018	06:48:38	2084	ST18904-ENV54			Camera	130	40	644531	4456634	644621	4456593	-90	41	99	114		(Corr'd Nav, Kongsberg 14208, img#64) (V)									
30-Nov-2018	06:49:03	2085	ST18904-ENV54			Camera	130	40	644527	4456636	644621	4456593	-94	44	103	115		(Corr'd Nav, Kongsberg 14208, img#65) (V)									
30-Nov-2018	06:49:23	2086	ST18904-ENV54			Camera	130	40	644524	4456639	644621	4456593	-97	46	107	116		(Corr'd Nav, Kongsberg 14208, img#66) (V)									

Grey columns denote where no information is required

APPENDIX A FIELD SAMPLING LOGS

Table A.3 Seabed Imagery Surveyors Logs

Gardline																	Seafloor Sampling Positioning Summary									
Job No		11179								Vessel		MV Ocean Researcher														
Client		Equinor US Wind LLC								Vessel Reference Point (VRP)		CoG														
Project Name		Equinor Wind OCS-A 0512								Deployment Location		Starboard A-frame			x		8.96		y		-3.08		z		6.05	
Primary Positioning System		Starpack 1								Actual Coordinates derived from		Deployment Location														
Geodetic Reference System		Datum		NAD83		Ellipsoid		GRS 80		Projection		UTM ZONE 18 N (75 W)					Vertical / Tidal Datum		NAVD88							
Date	Time (UTC/GMT)	Fix number	Stn No	Penetration	Sample Retention	Retention	Observed Seafloor Depth (feet)	Observed Seafloor Depth (m)	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks								
									Easting	Northing	Easting	Northing	dE	dN	Range	Bearing										
30-Nov-2018	06:49:50	2087	ST18904-ENV54			Camera	130	40	644519	4456642	644621	4456593	-102	50	113	116		(Cor'd Nav, Kongsberg 14208, img#67) (V)								
30-Nov-2018	06:50:12	2088	ST18904-ENV54			Camera	130	40	644515	4456645	644621	4456593	-107	52	119	116		(Cor'd Nav, Kongsberg 14208, img#68) (V)								
30-Nov-2018	06:50:33	2089	ST18904-ENV54			Camera	130	40	644510	4456648	644621	4456593	-111	55	124	116		(Cor'd Nav, Kongsberg 14208, img#69) (V)								
30-Nov-2018	06:50:58	2090	ST18904-ENV54			Camera	130	40	644504	4456650	644621	4456593	-117	58	131	116		(Cor'd Nav, Kongsberg 14208, img#70) (V)								
30-Nov-2018	06:51:38	2091	ST18904-ENV54			Camera	130	40	644496	4456653	644621	4456593	-125	61	139	116		(Cor'd Nav, Kongsberg 14208, img#71) (V)								
30-Nov-2018	06:52:03	2092	ST18904-ENV54			Camera	130	40	644492	4456655	644621	4456593	-129	63	143	116		(Cor'd Nav, Kongsberg 14208, img#72) (V)								
30-Nov-2018	06:52:20	2093	ST18904-ENV54			Camera	130	40	644490	4456657	644621	4456593	-131	65	146	116		(Cor'd Nav, Kongsberg 14208, img#73) (V)								
30-Nov-2018	06:52:35	2094	ST18904-ENV54			Camera	130	40	644488	4456659	644621	4456593	-133	66	149	116		(Cor'd Nav, Kongsberg 14208, img#74) (V)								
30-Nov-2018	06:53:33	2095	ST18904-ENV54			Camera	130	39	644479	4456666	644621	4456593	-142	73	159	117		(Cor'd Nav, Kongsberg 14208, img#75) (V)								
30-Nov-2018	06:54:29	2096	ST18904-ENV54			Camera	130	39	644468	4456672	644621	4456593	-153	79	173	117		(Cor'd Nav, Kongsberg 14208, img#76) (V)								
30-Nov-2018	06:54:45	2097	ST18904-ENV54			Camera	129	39	644464	4456673	644621	4456593	-157	80	176	117		(Cor'd Nav, Kongsberg 14208, img#77) (V)								
30-Nov-2018	06:55:06	2098	ST18904-ENV54			Camera	129	39	644459	4456674	644621	4456593	-162	82	181	117		(Cor'd Nav, Kongsberg 14208, img#78) (V)								
30-Nov-2018	06:55:22	2099	ST18904-ENV54			Camera	129	39	644456	4456675	644621	4456593	-165	83	185	117		(Cor'd Nav, Kongsberg 14208, img#79) (V)								
30-Nov-2018	06:55:41	2100	ST18904-ENV54			Camera	129	39	644452	4456676	644621	4456593	-169	83	189	116		(Cor'd Nav, Kongsberg 14208, img#80) (V)								
30-Nov-2018	06:56:13	2101	ST18904-ENV54			Camera	129	39	644448	4456676	644621	4456593	-173	83	192	116		(Cor'd Nav, Kongsberg 14208, img#81) (V)								
30-Nov-2018	06:56:35	2102	ST18904-ENV54			Camera	129	39	644446	4456675	644621	4456593	-175	82	193	115		(Cor'd Nav, Kongsberg 14208, img#82) (V)								
30-Nov-2018	06:56:57	2103	ST18904-ENV54			Camera	129	39	644445	4456674	644621	4456593	-176	82	194	115		(Cor'd Nav, Kongsberg 14208, img#83) (V)								
30-Nov-2018	06:57:25	2104	ST18904-ENV54			Camera	129	39	644443	4456675	644621	4456593	-178	82	196	115		(Cor'd Nav, Kongsberg 14208, img#84) (V)								
30-Nov-2018	06:58:02	2105	ST18904-ENV54			Camera	129	39	644438	4456677	644621	4456593	-183	85	202	115		(Cor'd Nav, Kongsberg 14208, img#85) (V)								
30-Nov-2018	08:36:33	2106	ST18904-ENV60			Camera	130	40	647737	4454767	647727	4454769	10	-2	10	280		(Cor'd Nav, Kongsberg 14208, img#86) (V)								
30-Nov-2018	08:36:54	2107	ST18904-ENV60			Camera	130	40	647735	4454770	647727	4454769	7	1	7	263		(Cor'd Nav, Kongsberg 14208, img#87) (V)								
30-Nov-2018	08:37:10	2108	ST18904-ENV60			Camera	130	40	647732	4454772	647727	4454769	5	3	6	236		(Cor'd Nav, Kongsberg 14208, img#88) (V)								
30-Nov-2018	08:37:25	2109	ST18904-ENV60			Camera	130	40	647729	4454774	647727	4454769	2	5	6	200		(Cor'd Nav, Kongsberg 14208, img#89) (V)								
30-Nov-2018	08:38:22	2110	ST18904-ENV60			Camera	131	40	647716	4454780	647727	4454769	-12	11	16	132		(Cor'd Nav, Kongsberg 14208, img#90) (V)								
30-Nov-2018	08:38:39	2111	ST18904-ENV60			Camera	131	40	647711	4454780	647727	4454769	-17	11	20	125		(Cor'd Nav, Kongsberg 14208, img#91) (V)								
30-Nov-2018	08:38:50	2112	ST18904-ENV60			Camera	131	40	647708	4454781	647727	4454769	-19	12	23	121		(Cor'd Nav, Kongsberg 14208, img#92) (V)								
30-Nov-2018	08:39:05	2113	ST18904-ENV60			Camera	131	40	647704	4454781	647727	4454769	-23	12	26	118		(Cor'd Nav, Kongsberg 14208, img#93) (V)								
30-Nov-2018	08:39:31	2114	ST18904-ENV60			Camera	131	40	647698	4454782	647727	4454769	-30	13	32	113		(Cor'd Nav, Kongsberg 14208, img#94) (V)								
30-Nov-2018	08:39:42	2115	ST18904-ENV60			Camera	131	40	647695	4454782	647727	4454769	-32	13	35	111		(Cor'd Nav, Kongsberg 14208, img#95) (V)								
30-Nov-2018	08:40:07	2116	ST18904-ENV60			Camera	130	40	647689	4454782	647727	4454769	-38	13	40	108		(Cor'd Nav, Kongsberg 14208, img#96) (V)								
30-Nov-2018	08:40:25	2117	ST18904-ENV60			Camera	130	40	647686	4454782	647727	4454769	-42	13	44	107		(Cor'd Nav, Kongsberg 14208, img#97) (V)								
30-Nov-2018	08:40:44	2118	ST18904-ENV60			Camera	130	40	647682	4454782	647727	4454769	-45	13	47	106		(Cor'd Nav, Kongsberg 14208, img#98) (V)								
30-Nov-2018	08:41:28	2119	ST18904-ENV60			Camera	130	40	647674	4454786	647727	4454769	-54	16	56	107		(Cor'd Nav, Kongsberg 14208, img#99) (V)								
30-Nov-2018	08:41:41	2120	ST18904-ENV60			Camera	130	40	647672	4454787	647727	4454769	-56	18	59	108		(Cor'd Nav, Kongsberg 14208, img#100) (V)								
30-Nov-2018	08:42:14	2121	ST18904-ENV60			Camera	130	40	647666	4454791	647727	4454769	-61	22	65	109		(Cor'd Nav, Kongsberg 14208, img#101) (V)								
30-Nov-2018	08:42:34	2122	ST18904-ENV60			Camera	130	40	647662	4454793	647727	4454769	-65	24	69	111		(Cor'd Nav, Kongsberg 14208, img#102) (V)								
30-Nov-2018	08:42:53	2123	ST18904-ENV60			Camera	130	40	647658	4454797	647727	4454769	-69	27	74	112		(Cor'd Nav, Kongsberg 14208, img#103) (V)								
30-Nov-2018	08:43:03	2124	ST18904-ENV60			Camera	130	40	647656	4454798	647727	4454769	-71	29	77	112		(Cor'd Nav, Kongsberg 14208, img#104) (V)								

Grey columns denote where no information is required

APPENDIX A FIELD SAMPLING LOGS

Table A.3 Seabed Imagery Surveyors Logs

Gardline																	Seafloor Sampling Positioning Summary						
Job No		11179								Vessel		MV Ocean Researcher											
Client		Equinor US Wind LLC								Vessel Reference Point (VRP)		CoG											
Project Name		Equinor Wind OCS-A 0512								Deployment Location		Starboard A-frame			x	8.96	y	-3.08	z	6.05			
Primary Positioning System		Starpack 1								Actual Coordinates derived from		Deployment Location											
Geodetic Reference System		Datum		NAD83		Ellipsoid		GRS 80		Projection		UTM ZONE 18 N (75 W)				Vertical / Tidal Datum		NAVD88					
Date	Time (UTC/GMT)	Fix number	Stn No	Penetration	Sample Retention	Retention	Observed Seafloor Depth (feet)	Observed Seafloor Depth (m)	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks					
									Easting	Northing	Easting	Northing	dE	dN	Range	Bearing							
30-Nov-2018	08:43:20	2125	ST18904-ENV60			Camera	130	40	647652	4454800	647727	4454769	-75	31	81	113		(Corr'd Nav, Kongsberg 14208, img#105) (V)					
30-Nov-2018	08:43:44	2126	ST18904-ENV60			Camera	130	40	647647	4454803	647727	4454769	-80	34	87	113		(Corr'd Nav, Kongsberg 14208, img#106) (V)					
30-Nov-2018	08:44:00	2127	ST18904-ENV60			Camera	130	40	647644	4454806	647727	4454769	-83	36	91	114		(Corr'd Nav, Kongsberg 14208, img#107) (V)					
30-Nov-2018	08:44:35	2128	ST18904-ENV60			Camera	130	40	647638	4454812	647727	4454769	-90	42	99	115		(Corr'd Nav, Kongsberg 14208, img#108) (V)					
30-Nov-2018	08:44:50	2129	ST18904-ENV60			Camera	130	40	647634	4454814	647727	4454769	-93	45	103	116		(Corr'd Nav, Kongsberg 14208, img#109) (V)					
30-Nov-2018	08:45:04	2130	ST18904-ENV60			Camera	130	40	647631	4454816	647727	4454769	-96	47	107	116		(Corr'd Nav, Kongsberg 14208, img#110) (V)					
30-Nov-2018	08:45:12	2131	ST18904-ENV60			Camera	130	40	647629	4454817	647727	4454769	-98	48	109	116		(Corr'd Nav, Kongsberg 14208, img#111) (V)					
30-Nov-2018	08:45:27	2132	ST18904-ENV60			Camera	130	40	647626	4454819	647727	4454769	-101	50	113	116		(Corr'd Nav, Kongsberg 14208, img#112) (V)					
30-Nov-2018	08:45:43	2133	ST18904-ENV60			Camera	130	40	647623	4454821	647727	4454769	-104	52	116	116		(Corr'd Nav, Kongsberg 14208, img#113) (V)					
30-Nov-2018	08:45:58	2134	ST18904-ENV60			Camera	130	40	647621	4454822	647727	4454769	-107	53	119	116		(Corr'd Nav, Kongsberg 14208, img#114) (V)					
30-Nov-2018	08:46:17	2135	ST18904-ENV60			Camera	130	40	647617	4454824	647727	4454769	-110	55	123	116		(Corr'd Nav, Kongsberg 14208, img#115) (V)					
30-Nov-2018	08:46:33	2136	ST18904-ENV60			Camera	130	40	647614	4454825	647727	4454769	-114	56	127	116		(Corr'd Nav, Kongsberg 14208, img#116) (V)					
30-Nov-2018	08:46:45	2137	ST18904-ENV60			Camera	130	40	647612	4454826	647727	4454769	-116	57	129	116		(Corr'd Nav, Kongsberg 14208, img#117) (V)					
30-Nov-2018	08:47:05	2138	ST18904-ENV60			Camera	130	40	647608	4454826	647727	4454769	-119	57	132	116		(Corr'd Nav, Kongsberg 14208, img#118) (V)					
30-Nov-2018	08:47:28	2139	ST18904-ENV60			Camera	130	40	647605	4454827	647727	4454769	-123	58	136	115		(Corr'd Nav, Kongsberg 14208, img#119) (V)					
30-Nov-2018	08:47:55	2140	ST18904-ENV60			Camera	130	40	647601	4454829	647727	4454769	-126	60	140	115		(Corr'd Nav, Kongsberg 14208, img#120) (V)					
30-Nov-2018	08:48:17	2141	ST18904-ENV60			Camera	130	40	647598	4454831	647727	4454769	-130	62	144	115		(Corr'd Nav, Kongsberg 14208, img#121) (V)					
30-Nov-2018	08:48:42	2142	ST18904-ENV60			Camera	130	40	647593	4454833	647727	4454769	-134	64	149	115		(Corr'd Nav, Kongsberg 14208, img#122) (V)					
30-Nov-2018	08:49:03	2143	ST18904-ENV60			Camera	130	40	647589	4454834	647727	4454769	-139	65	153	115		(Corr'd Nav, Kongsberg 14208, img#123) (V)					
30-Nov-2018	08:49:22	2144	ST18904-ENV60			Camera	130	40	647586	4454836	647727	4454769	-142	67	157	115		(Corr'd Nav, Kongsberg 14208, img#124) (V)					
30-Nov-2018	08:49:35	2145	ST18904-ENV60			Camera	130	40	647584	4454837	647727	4454769	-144	68	159	115		(Corr'd Nav, Kongsberg 14208, img#125) (V)					
30-Nov-2018	08:49:56	2146	ST18904-ENV60			Camera	130	40	647580	4454839	647727	4454769	-147	70	163	115		(Corr'd Nav, Kongsberg 14208, img#126) (V)					
30-Nov-2018	08:50:19	2147	ST18904-ENV60			Camera	130	40	647576	4454842	647727	4454769	-152	73	168	116		(Corr'd Nav, Kongsberg 14208, img#127) (V)					
30-Nov-2018	08:50:30	2148	ST18904-ENV60			Camera	130	40	647573	4454843	647727	4454769	-154	74	171	116		(Corr'd Nav, Kongsberg 14208, img#128) (V)					
30-Nov-2018	08:50:47	2149	ST18904-ENV60			Camera	130	40	647569	4454845	647727	4454769	-158	76	175	116		(Corr'd Nav, Kongsberg 14208, img#129) (V)					
30-Nov-2018	08:51:09	2150	ST18904-ENV60			Camera	130	40	647564	4454847	647727	4454769	-164	78	181	115		(Corr'd Nav, Kongsberg 14208, img#130) (V)					
30-Nov-2018	08:51:21	2151	ST18904-ENV60			Camera	130	40	647561	4454848	647727	4454769	-167	79	184	115		(Corr'd Nav, Kongsberg 14208, img#131) (V)					
30-Nov-2018	08:51:36	2152	ST18904-ENV60			Camera	130	40	647558	4454850	647727	4454769	-170	81	188	115		(Corr'd Nav, Kongsberg 14208, img#132) (V)					
30-Nov-2018	08:52:01	2153	ST18904-ENV60			Camera	130	40	647553	4454853	647727	4454769	-174	83	193	116		(Corr'd Nav, Kongsberg 14208, img#133) (V)					
30-Nov-2018	08:52:17	2154	ST18904-ENV60			Camera	130	40	647550	4454855	647727	4454769	-177	86	197	116		(Corr'd Nav, Kongsberg 14208, img#134) (V)					
30-Nov-2018	08:52:38	2155	ST18904-ENV60			Camera	130	40	647546	4454858	647727	4454769	-181	89	202	116		(Corr'd Nav, Kongsberg 14208, img#135) (V)					
30-Nov-2018	10:28:10	2156	ST18904-ENV63			Camera	133	41	649164	4453957	649170	4453963	-6	-6	8	43		(Corr'd Nav, Kongsberg 14208, img#136) (V)					
30-Nov-2018	10:28:45	2157	ST18904-ENV63			Camera	133	41	649171	4453953	649170	4453963	1	-10	10	354		(Corr'd Nav, Kongsberg 14208, img#137) (V)					
30-Nov-2018	10:29:04	2158	ST18904-ENV63			Camera	133	41	649176	4453951	649170	4453963	6	-12	14	334		(Corr'd Nav, Kongsberg 14208, img#138) (V)					
30-Nov-2018	10:29:22	2159	ST18904-ENV63			Camera	133	41	649182	4453949	649170	4453963	12	-14	18	320		(Corr'd Nav, Kongsberg 14208, img#139) (V)					
30-Nov-2018	10:29:34	2160	ST18904-ENV63			Camera	133	41	649186	4453948	649170	4453963	16	-15	22	312		(Corr'd Nav, Kongsberg 14208, img#140) (V)					
30-Nov-2018	10:29:57	2161	ST18904-ENV63			Camera	133	41	649195	4453947	649170	4453963	26	-16	30	302		(Corr'd Nav, Kongsberg 14208, img#141) (V)					
30-Nov-2018	10:30:04	2162	ST18904-ENV63			Camera	133	41	649198	4453946	649170	4453963	28	-17	32	301		(Corr'd Nav, Kongsberg 14208, img#142) (V)					

Grey columns denote where no information is required

APPENDIX A FIELD SAMPLING LOGS

Table A.3 Seabed Imagery Surveyors Logs

Gardline												Seafloor Sampling Positioning Summary									
Job No		11179								Vessel		MV Ocean Researcher									
Client		Equinor US Wind LLC								Vessel Reference Point (VRP)		CoG									
Project Name		Equinor Wind OCS-A 0512								Deployment Location		Starboard A-frame				x	8.96	y	-3.08	z	6.05
Primary Positioning System		Starpack 1								Actual Coordinates derived from		Deployment Location									
Geodetic Reference System		Datum		NAD83		Ellipsoid		GRS 80		Projection		UTM ZONE 18 N (75 W)				Vertical / Tidal Datum		NAVD88			
Date	Time (UTC/GMT)	Fix number	Stn No	Penetration	Sample Retention	Retention	Observed Seafloor Depth (feet)	Observed Seafloor Depth (m)	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks			
									Easting	Northing	Easting	Northing	dE	dN	Range	Bearing					
30-Nov-2018	10:30:25	2163	ST18904-ENV63			Camera	133	41	649203	4453945	649170	4453963	33	-18	38	299		(Corr'd Nav, Kongsberg 14208, img#143) (V)			
30-Nov-2018	10:30:36	2164	ST18904-ENV63			Camera	133	41	649205	4453943	649170	4453963	36	-20	41	300		(Corr'd Nav, Kongsberg 14208, img#144) (V)			
30-Nov-2018	10:30:55	2165	ST18904-ENV63			Camera	133	41	649208	4453938	649170	4453963	38	-25	46	303		(Corr'd Nav, Kongsberg 14208, img#145) (V)			
30-Nov-2018	10:31:08	2166	ST18904-ENV63			Camera	133	41	649210	4453935	649170	4453963	41	-28	49	305		(Corr'd Nav, Kongsberg 14208, img#146) (V)			
30-Nov-2018	10:31:19	2167	ST18904-ENV63			Camera	133	41	649212	4453932	649170	4453963	43	-31	53	306		(Corr'd Nav, Kongsberg 14208, img#147) (V)			
30-Nov-2018	10:31:42	2168	ST18904-ENV63			Camera	133	41	649218	4453928	649170	4453963	48	-35	59	306		(Corr'd Nav, Kongsberg 14208, img#148) (V)			
30-Nov-2018	10:31:51	2169	ST18904-ENV63			Camera	133	41	649220	4453927	649170	4453963	50	-36	62	305		(Corr'd Nav, Kongsberg 14208, img#149) (V)			
30-Nov-2018	10:32:07	2170	ST18904-ENV63			Camera	133	41	649225	4453927	649170	4453963	55	-36	66	303		(Corr'd Nav, Kongsberg 14208, img#150) (V)			
30-Nov-2018	10:32:20	2171	ST18904-ENV63			Camera	133	41	649229	4453927	649170	4453963	59	-36	69	301		(Corr'd Nav, Kongsberg 14208, img#151) (V)			
30-Nov-2018	10:32:54	2172	ST18904-ENV63			Camera	134	41	649241	4453928	649170	4453963	71	-35	79	296		(Corr'd Nav, Kongsberg 14208, img#152) (V)			
30-Nov-2018	10:33:16	2173	ST18904-ENV63			Camera	134	41	649248	4453929	649170	4453963	79	-34	86	293		(Corr'd Nav, Kongsberg 14208, img#153) (V)			
30-Nov-2018	10:33:53	2174	ST18904-ENV63			Camera	134	41	649257	4453927	649170	4453963	88	-36	95	292		(Corr'd Nav, Kongsberg 14208, img#154) (V)			
30-Nov-2018	10:34:15	2175	ST18904-ENV63			Camera	134	41	649262	4453922	649170	4453963	92	-41	101	294		(Corr'd Nav, Kongsberg 14208, img#155) (V)			
30-Nov-2018	10:34:29	2176	ST18904-ENV63			Camera	134	41	649264	4453918	649170	4453963	94	-45	104	295		(Corr'd Nav, Kongsberg 14208, img#156) (V)			
30-Nov-2018	10:34:43	2177	ST18904-ENV63			Camera	134	41	649266	4453914	649170	4453963	96	-49	108	297		(Corr'd Nav, Kongsberg 14208, img#157) (V)			
30-Nov-2018	10:34:57	2178	ST18904-ENV63			Camera	134	41	649268	4453911	649170	4453963	98	-52	111	298		(Corr'd Nav, Kongsberg 14208, img#158) (V)			
30-Nov-2018	10:35:07	2179	ST18904-ENV63			Camera	134	41	649269	4453908	649170	4453963	99	-55	113	299		(Corr'd Nav, Kongsberg 14208, img#159) (V)			
30-Nov-2018	10:35:25	2180	ST18904-ENV63			Camera	134	41	649271	4453905	649170	4453963	101	-58	116	300		(Corr'd Nav, Kongsberg 14208, img#160) (V)			
30-Nov-2018	10:35:40	2181	ST18904-ENV63			Camera	134	41	649273	4453904	649170	4453963	103	-59	119	300		(Corr'd Nav, Kongsberg 14208, img#161) (V)			
30-Nov-2018	10:35:55	2182	ST18904-ENV63			Camera	134	41	649275	4453903	649170	4453963	105	-60	121	300		(Corr'd Nav, Kongsberg 14208, img#162) (V)			
30-Nov-2018	10:36:08	2183	ST18904-ENV63			Camera	133	41	649278	4453903	649170	4453963	108	-60	123	299		(Corr'd Nav, Kongsberg 14208, img#163) (V)			
30-Nov-2018	10:36:21	2184	ST18904-ENV63			Camera	133	41	649281	4453903	649170	4453963	111	-60	126	298		(Corr'd Nav, Kongsberg 14208, img#164) (V)			
30-Nov-2018	10:36:33	2185	ST18904-ENV63			Camera	133	41	649284	4453903	649170	4453963	114	-60	129	298		(Corr'd Nav, Kongsberg 14208, img#165) (V)			
30-Nov-2018	10:36:56	2186	ST18904-ENV63			Camera	133	41	649291	4453903	649170	4453963	121	-60	135	296		(Corr'd Nav, Kongsberg 14208, img#166) (V)			
30-Nov-2018	10:37:11	2187	ST18904-ENV63			Camera	133	41	649295	4453903	649170	4453963	125	-60	139	296		(Corr'd Nav, Kongsberg 14208, img#167) (V)			
30-Nov-2018	10:37:25	2188	ST18904-ENV63			Camera	133	41	649299	4453903	649170	4453963	129	-60	142	295		(Corr'd Nav, Kongsberg 14208, img#168) (V)			
30-Nov-2018	10:37:36	2189	ST18904-ENV63			Camera	133	41	649302	4453903	649170	4453963	132	-60	145	294		(Corr'd Nav, Kongsberg 14208, img#169) (V)			
30-Nov-2018	10:37:55	2190	ST18904-ENV63			Camera	133	41	649307	4453903	649170	4453963	137	-60	150	294		(Corr'd Nav, Kongsberg 14208, img#170) (V)			
30-Nov-2018	10:38:11	2191	ST18904-ENV63			Camera	133	41	649311	4453901	649170	4453963	141	-62	154	294		(Corr'd Nav, Kongsberg 14208, img#171) (V)			
30-Nov-2018	10:38:20	2192	ST18904-ENV63			Camera	133	41	649313	4453900	649170	4453963	143	-63	156	294		(Corr'd Nav, Kongsberg 14208, img#172) (V)			
30-Nov-2018	10:38:32	2193	ST18904-ENV63			Camera	133	41	649317	4453899	649170	4453963	147	-64	161	294		(Corr'd Nav, Kongsberg 14208, img#173) (V)			
30-Nov-2018	10:39:01	2194	ST18904-ENV63			Camera	134	41	649325	4453895	649170	4453963	155	-68	169	294		(Corr'd Nav, Kongsberg 14208, img#174) (V)			
30-Nov-2018	10:39:17	2195	ST18904-ENV63			Camera	134	41	649329	4453893	649170	4453963	159	-70	174	294		(Corr'd Nav, Kongsberg 14208, img#175) (V)			
30-Nov-2018	10:39:34	2196	ST18904-ENV63			Camera	134	41	649333	4453890	649170	4453963	163	-73	179	294		(Corr'd Nav, Kongsberg 14208, img#176) (V)			
30-Nov-2018	10:39:45	2197	ST18904-ENV63			Camera	134	41	649336	4453888	649170	4453963	166	-75	183	294		(Corr'd Nav, Kongsberg 14208, img#177) (V)			
30-Nov-2018	10:40:10	2198	ST18904-ENV63			Camera	134	41	649344	4453884	649170	4453963	174	-79	191	294		(Corr'd Nav, Kongsberg 14208, img#178) (V)			
30-Nov-2018	10:40:35	2199	ST18904-ENV63			Camera	134	41	649351	4453883	649170	4453963	181	-80	198	294		(Corr'd Nav, Kongsberg 14208, img#179) (V)			
30-Nov-2018	10:40:48	2200	ST18904-ENV63			Camera	133	41	649354	4453883	649170	4453963	185	-80	201	293		(Corr'd Nav, Kongsberg 14208, img#180) (V)			

Grey columns denote where no information is required

APPENDIX A FIELD SAMPLING LOGS

Table A.3 Seabed Imagery Surveyors Logs

Gardline																		Seafloor Sampling Positioning Summary											
Job No		11179										Vessel		MV Ocean Researcher															
Client		Equinor US Wind LLC										Vessel Reference Point (VRP)		CoG															
Project Name		Equinor Wind OCS-A 0512										Deployment Location		Starboard A-frame				x		8.96		y		-3.08		z		6.05	
Primary Positioning System		Starpack 1										Actual Coordinates derived from		Deployment Location															
Geodetic Reference System		Datum		NAD83				Ellipsoid		GRS 80				Projection		UTM ZONE 18 N (75 W)						Vertical / Tidal Datum		NAVD88					
Date	Time (UTC/GMT)	Fix number	Stn No	Penetration	Sample Retention	Retention	Observed Seafloor Depth (feet)	Observed Seafloor Depth (m)	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks											
									Easting	Northing	Easting	Northing	dE	dN	Range	Bearing													
30-Nov-2018	12:40:28	2201	ST18904-ENV69			Camera	137	42	652405	4452180	652412	4452173	-8	7	11	131		(Corr'd Nav, Kongsberg 14208, img#181) (V)											
30-Nov-2018	12:40:58	2202	ST18904-ENV69			Camera	137	42	652409	4452178	652412	4452173	-4	5	6	142		(Corr'd Nav, Kongsberg 14208, img#182) (V)											
30-Nov-2018	12:41:25	2203	ST18904-ENV69			Camera	137	42	652411	4452175	652412	4452173	-2	2	3	146		(Corr'd Nav, Kongsberg 14208, img#183) (V)											
30-Nov-2018	12:41:55	2204	ST18904-ENV69			Camera	137	42	652413	4452171	652412	4452173	1	-2	2	340		(Corr'd Nav, Kongsberg 14208, img#184) (V)											
30-Nov-2018	12:42:26	2205	ST18904-ENV69			Camera	137	42	652416	4452167	652412	4452173	4	-6	7	326		(Corr'd Nav, Kongsberg 14208, img#185) (V)											
30-Nov-2018	12:42:40	2206	ST18904-ENV69			Camera	137	42	652419	4452166	652412	4452173	6	-7	9	319		(Corr'd Nav, Kongsberg 14208, img#186) (V)											
30-Nov-2018	12:43:05	2207	ST18904-ENV69			Camera	137	42	652423	4452165	652412	4452173	10	-8	13	308		(Corr'd Nav, Kongsberg 14208, img#187) (V)											
30-Nov-2018	12:43:20	2208	ST18904-ENV69			Camera	137	42	652425	4452165	652412	4452173	12	-7	14	301		(Corr'd Nav, Kongsberg 14208, img#188) (V)											
30-Nov-2018	12:43:36	2209	ST18904-ENV69			Camera	137	42	652427	4452166	652412	4452173	15	-7	16	296		(Corr'd Nav, Kongsberg 14208, img#189) (V)											
30-Nov-2018	12:44:03	2210	ST18904-ENV69			Camera	137	42	652431	4452166	652412	4452173	19	-7	20	290		(Corr'd Nav, Kongsberg 14208, img#190) (V)											
30-Nov-2018	12:45:10	2211	ST18904-ENV69			Camera	137	42	652438	4452166	652412	4452173	26	-7	27	286		(Corr'd Nav, Kongsberg 14208, img#191) (V)											
30-Nov-2018	12:45:35	2212	ST18904-ENV69			Camera	137	42	652440	4452161	652412	4452173	27	-11	30	293		(Corr'd Nav, Kongsberg 14208, img#192) (V)											
30-Nov-2018	12:45:58	2213	ST18904-ENV69			Camera	137	42	652442	4452156	652412	4452173	30	-17	34	299		(Corr'd Nav, Kongsberg 14208, img#193) (V)											
30-Nov-2018	12:46:19	2214	ST18904-ENV69			Camera	137	42	652445	4452151	652412	4452173	32	-22	39	305		(Corr'd Nav, Kongsberg 14208, img#194) (V)											
30-Nov-2018	12:46:30	2215	ST18904-ENV69			Camera	137	42	652446	4452148	652412	4452173	34	-25	42	307		(Corr'd Nav, Kongsberg 14208, img#195) (V)											
30-Nov-2018	12:46:45	2216	ST18904-ENV69			Camera	137	42	652448	4452145	652412	4452173	35	-28	45	308		(Corr'd Nav, Kongsberg 14208, img#196) (V)											
30-Nov-2018	12:47:21	2217	ST18904-ENV69			Camera	137	42	652452	4452145	652412	4452173	39	-27	48	305		(Corr'd Nav, Kongsberg 14208, img#197) (V)											
30-Nov-2018	12:47:41	2218	ST18904-ENV69			Camera	137	42	652455	4452148	652412	4452173	42	-25	49	301		(Corr'd Nav, Kongsberg 14208, img#198) (V)											
30-Nov-2018	12:48:00	2219	ST18904-ENV69			Camera	137	42	652458	4452151	652412	4452173	46	-22	51	296		(Corr'd Nav, Kongsberg 14208, img#199) (V)											
30-Nov-2018	12:48:34	2220	ST18904-ENV69			Camera	137	42	652463	4452154	652412	4452173	50	-19	54	291		(Corr'd Nav, Kongsberg 14208, img#200) (V)											
30-Nov-2018	12:48:53	2221	ST18904-ENV69			Camera	137	42	652465	4452154	652412	4452173	52	-19	56	290		(Corr'd Nav, Kongsberg 14208, img#201) (V)											
30-Nov-2018	12:49:26	2222	ST18904-ENV69			Camera	137	42	652468	4452151	652412	4452173	56	-22	60	291		(Corr'd Nav, Kongsberg 14208, img#202) (V)											
30-Nov-2018	12:49:41	2223	ST18904-ENV69			Camera	137	42	652470	4452149	652412	4452173	58	-24	62	292		(Corr'd Nav, Kongsberg 14208, img#203) (V)											
30-Nov-2018	12:50:08	2224	ST18904-ENV69			Camera	137	42	652473	4452146	652412	4452173	60	-27	66	294		(Corr'd Nav, Kongsberg 14208, img#204) (V)											
30-Nov-2018	12:50:39	2225	ST18904-ENV69			Camera	137	42	652475	4452144	652412	4452173	63	-29	69	295		(Corr'd Nav, Kongsberg 14208, img#205) (V)											
30-Nov-2018	12:51:17	2226	ST18904-ENV69			Camera	137	42	652478	4452140	652412	4452173	65	-32	73	296		(Corr'd Nav, Kongsberg 14208, img#206) (V)											
30-Nov-2018	12:51:31	2227	ST18904-ENV69			Camera	137	42	652479	4452138	652412	4452173	67	-34	75	297		(Corr'd Nav, Kongsberg 14208, img#207) (V)											
30-Nov-2018	12:51:56	2228	ST18904-ENV69			Camera	137	42	652482	4452134	652412	4452173	70	-39	80	299		(Corr'd Nav, Kongsberg 14208, img#208) (V)											
30-Nov-2018	12:52:07	2229	ST18904-ENV69			Camera	137	42	652484	4452132	652412	4452173	71	-41	82	300		(Corr'd Nav, Kongsberg 14208, img#209) (V)											
30-Nov-2018	12:52:37	2230	ST18904-ENV69			Camera	137	42	652488	4452128	652412	4452173	76	-45	88	301		(Corr'd Nav, Kongsberg 14208, img#210) (V)											
30-Nov-2018	12:52:47	2231	ST18904-ENV69			Camera	137	42	652490	4452127	652412	4452173	77	-46	90	301		(Corr'd Nav, Kongsberg 14208, img#211) (V)											
30-Nov-2018	12:53:02	2232	ST18904-ENV69			Camera	137	42	652492	4452125	652412	4452173	79	-48	93	301		(Corr'd Nav, Kongsberg 14208, img#212) (V)											
30-Nov-2018	12:53:37	2233	ST18904-ENV69			Camera	137	42	652496	4452124	652412	4452173	84	-48	97	300		(Corr'd Nav, Kongsberg 14208, img#213) (V)											
30-Nov-2018	12:53:56	2234	ST18904-ENV69			Camera	137	42	652498	4452126	652412	4452173	86	-47	98	299		(Corr'd Nav, Kongsberg 14208, img#214) (V)											
30-Nov-2018	12:54:18	2235	ST18904-ENV69			Camera	137	42	652500	4452128	652412	4452173	87	-45	98	297		(Corr'd Nav, Kongsberg 14208, img#215) (V)											
30-Nov-2018	12:54:38	2236	ST18904-ENV69			Camera	137	42	652501	4452128	652412	4452173	89	-45	99	297		(Corr'd Nav, Kongsberg 14208, img#216) (V)											
30-Nov-2018	12:55:00	2237	ST18904-ENV69			Camera	137	42	652503	4452128	652412	4452173	91	-45	101	297		(Corr'd Nav, Kongsberg 14208, img#217) (V)											
30-Nov-2018	12:55:23	2238	ST18904-ENV69			Camera	137	42	652506	4452126	652412	4452173	93	-47	104	297		(Corr'd Nav, Kongsberg 14208, img#218) (V)											

Grey columns denote where no information is required

APPENDIX A FIELD SAMPLING LOGS

Table A.3 Seabed Imagery Surveyors Logs

Gardline																	Seafloor Sampling Positioning Summary						
Job No		11179								Vessel		MV Ocean Researcher											
Client		Equinor US Wind LLC								Vessel Reference Point (VRP)		CoG											
Project Name		Equinor Wind OCS-A 0512								Deployment Location		Starboard A-frame			x	8.96	y	-3.08	z	6.05			
Primary Positioning System		Starpack 1								Actual Coordinates derived from		Deployment Location											
Geodetic Reference System		Datum		NAD83		Ellipsoid		GRS 80		Projection		UTM ZONE 18 N (75 W)				Vertical / Tidal Datum		NAVD88					
Date	Time (UTC/GMT)	Fix number	Stn No	Penetration	Sample Retention	Retention	Observed Seafloor Depth (feet)	Observed Seafloor Depth (m)	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks					
									Easting	Northing	Easting	Northing	dE	dN	Range	Bearing							
30-Nov-2018	12:55:45	2239	ST18904-ENV69			Camera	137	42	652509	4452124	652412	4452173	96	-49	108	297		(Corr'd Nav, Kongsberg 14208, img#219) (V)					
30-Nov-2018	12:56:00	2240	ST18904-ENV69			Camera	137	42	652511	4452122	652412	4452173	98	-51	111	297		(Corr'd Nav, Kongsberg 14208, img#220) (V)					
30-Nov-2018	12:56:29	2241	ST18904-ENV69			Camera	137	42	652516	4452119	652412	4452173	103	-54	116	297		(Corr'd Nav, Kongsberg 14208, img#221) (V)					
30-Nov-2018	12:56:55	2242	ST18904-ENV69			Camera	137	42	652520	4452118	652412	4452173	108	-55	121	297		(Corr'd Nav, Kongsberg 14208, img#222) (V)					
30-Nov-2018	12:57:28	2243	ST18904-ENV69			Camera	137	42	652525	4452117	652412	4452173	113	-56	126	296		(Corr'd Nav, Kongsberg 14208, img#223) (V)					
30-Nov-2018	12:57:44	2244	ST18904-ENV69			Camera	137	42	652528	4452116	652412	4452173	115	-56	128	296		(Corr'd Nav, Kongsberg 14208, img#224) (V)					
30-Nov-2018	12:58:04	2245	ST18904-ENV69			Camera	137	42	652531	4452116	652412	4452173	119	-57	132	296		(Corr'd Nav, Kongsberg 14208, img#225) (V)					
30-Nov-2018	12:58:20	2246	ST18904-ENV69			Camera	137	42	652535	4452115	652412	4452173	122	-58	135	295		(Corr'd Nav, Kongsberg 14208, img#226) (V)					
30-Nov-2018	12:58:42	2247	ST18904-ENV69			Camera	137	42	652539	4452113	652412	4452173	126	-60	140	295		(Corr'd Nav, Kongsberg 14208, img#227) (V)					
30-Nov-2018	12:58:55	2248	ST18904-ENV69			Camera	137	42	652542	4452112	652412	4452173	129	-61	143	295		(Corr'd Nav, Kongsberg 14208, img#228) (V)					
30-Nov-2018	12:59:13	2249	ST18904-ENV69			Camera	137	42	652546	4452111	652412	4452173	133	-62	147	295		(Corr'd Nav, Kongsberg 14208, img#229) (V)					
30-Nov-2018	12:59:27	2250	ST18904-ENV69			Camera	137	42	652549	4452109	652412	4452173	137	-64	151	295		(Corr'd Nav, Kongsberg 14208, img#230) (V)					
30-Nov-2018	12:59:46	2251	ST18904-ENV69			Camera	137	42	652554	4452106	652412	4452173	141	-67	156	295		(Corr'd Nav, Kongsberg 14208, img#231) (V)					
30-Nov-2018	13:00:10	2252	ST18904-ENV69			Camera	137	42	652559	4452102	652412	4452173	146	-71	163	296		(Corr'd Nav, Kongsberg 14208, img#232) (V)					
30-Nov-2018	13:00:25	2253	ST18904-ENV69			Camera	137	42	652561	4452100	652412	4452173	149	-73	166	296		(Corr'd Nav, Kongsberg 14208, img#233) (V)					
30-Nov-2018	13:00:35	2254	ST18904-ENV69			Camera	137	42	652562	4452100	652412	4452173	150	-73	167	296		(Corr'd Nav, Kongsberg 14208, img#234) (V)					
30-Nov-2018	13:00:56	2255	ST18904-ENV69			Camera	137	42	652564	4452099	652412	4452173	152	-74	169	296		(Corr'd Nav, Kongsberg 14208, img#235) (V)					
30-Nov-2018	13:01:06	2256	ST18904-ENV69			Camera	137	42	652565	4452099	652412	4452173	153	-74	170	296		(Corr'd Nav, Kongsberg 14208, img#236) (V)					
30-Nov-2018	13:01:19	2257	ST18904-ENV69			Camera	137	42	652567	4452098	652412	4452173	154	-75	171	296		(Corr'd Nav, Kongsberg 14208, img#237) (V)					
30-Nov-2018	13:01:48	2258	ST18904-ENV69			Camera	137	42	652572	4452096	652412	4452173	159	-77	177	296		(Corr'd Nav, Kongsberg 14208, img#238) (V)					
30-Nov-2018	13:01:58	2259	ST18904-ENV69			Camera	137	42	652573	4452096	652412	4452173	161	-77	179	296		(Corr'd Nav, Kongsberg 14208, img#239) (V)					
30-Nov-2018	13:02:20	2260	ST18904-ENV69			Camera	137	42	652578	4452094	652412	4452173	165	-79	183	296		(Corr'd Nav, Kongsberg 14208, img#240) (V)					
30-Nov-2018	13:02:30	2261	ST18904-ENV69			Camera	137	42	652580	4452093	652412	4452173	168	-80	186	295		(Corr'd Nav, Kongsberg 14208, img#241) (V)					
30-Nov-2018	13:02:38	2262	ST18904-ENV69			Camera	137	42	652582	4452093	652412	4452173	169	-80	187	295		(Corr'd Nav, Kongsberg 14208, img#242) (V)					
30-Nov-2018	13:03:09	2263	ST18904-ENV69			Camera	137	42	652589	4452089	652412	4452173	177	-84	196	295		(Corr'd Nav, Kongsberg 14208, img#243) (V)					
30-Nov-2018	13:03:21	2264	ST18904-ENV69			Camera	137	42	652592	4452087	652412	4452173	180	-86	199	295		(Corr'd Nav, Kongsberg 14208, img#244) (V)					
30-Nov-2018	13:03:35	2265	ST18904-ENV69			Camera	137	42	652596	4452085	652412	4452173	183	-88	203	296		(Corr'd Nav, Kongsberg 14208, img#245) (V)					
30-Nov-2018	13:03:52	2266	ST18904-ENV69			Camera	137	42	652599	4452082	652412	4452173	187	-91	208	296		(Corr'd Nav, Kongsberg 14208, img#246) (V)					
30-Nov-2018	13:04:08	2267	ST18904-ENV69			Camera	137	42	652601	4452080	652412	4452173	189	-93	210	296		(Corr'd Nav, Kongsberg 14208, img#247) (V)					
30-Nov-2018	14:39:53	2268	ST18904-ENV62			Camera	127	39	651356	4458557	651348	4458562	7	-5	9	307		(Corr'd Nav, Kongsberg 14208, img#248) (V)					
30-Nov-2018	14:40:04	2269	ST18904-ENV62			Camera	127	39	651354	4458558	651348	4458562	5	-5	7	310		(Corr'd Nav, Kongsberg 14208, img#249) (V)					
30-Nov-2018	14:40:17	2270	ST18904-ENV62			Camera	127	39	651352	4458558	651348	4458562	3	-4	5	318		(Corr'd Nav, Kongsberg 14208, img#250) (V)					
30-Nov-2018	14:40:31	2271	ST18904-ENV62			Camera	127	39	651350	4458559	651348	4458562	1	-3	3	337		(Corr'd Nav, Kongsberg 14208, img#251) (V)					
30-Nov-2018	14:41:20	2272	ST18904-ENV62			Camera	127	39	651343	4458562	651348	4458562	-6	0	6	92		(Corr'd Nav, Kongsberg 14208, img#252) (V)					
30-Nov-2018	14:41:41	2273	ST18904-ENV62			Camera	127	39	651340	4458564	651348	4458562	-8	2	8	100		(Corr'd Nav, Kongsberg 14208, img#253) (V)					
30-Nov-2018	14:41:52	2274	ST18904-ENV62			Camera	127	39	651339	4458564	651348	4458562	-10	2	10	104		(Corr'd Nav, Kongsberg 14208, img#254) (V)					
30-Nov-2018	14:42:15	2275	ST18904-ENV62			Camera	127	39	651336	4458567	651348	4458562	-13	5	13	110		(Corr'd Nav, Kongsberg 14208, img#255) (V)					
30-Nov-2018	14:42:40	2276	ST18904-ENV62			Camera	127	39	651333	4458569	651348	4458562	-15	7	17	114		(Corr'd Nav, Kongsberg 14208, img#256) (V)					

Grey columns denote where no information is required

APPENDIX A FIELD SAMPLING LOGS

Table A.3 Seabed Imagery Surveyors Logs

Gardline										Seafloor Sampling Positioning Summary																	
Job No		11179								Vessel		MV Ocean Researcher															
Client		Equinor US Wind LLC								Vessel Reference Point (VRP)		CoG															
Project Name		Equinor Wind OCS-A 0512								Deployment Location		Starboard A-frame				x		8.96		y		-3.08		z		6.05	
Primary Positioning System		Starpack 1								Actual Coordinates derived from		Deployment Location															
Geodetic Reference System		Datum		NAD83		Ellipsoid		GRS 80		Projection		UTM ZONE 18 N (75 W)				Vertical / Tidal Datum		NAVD88									
Date	Time (UTC/GMT)	Fix number	Stn No	Penetration	Sample Retention	Retention	Observed Seafloor Depth (feet)	Observed Seafloor Depth (m)	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks									
									Easting	Northing	Easting	Northing	dE	dN	Range	Bearing											
30-Nov-2018	14:43:02	2277	ST18904-ENV62			Camera	127	39	651330	4458571	651348	4458562	-18	9	20	116		(Corr'd Nav, Kongsberg 14208, img#257) (V)									
30-Nov-2018	14:43:26	2278	ST18904-ENV62			Camera	127	39	651328	4458573	651348	4458562	-20	11	23	118		(Corr'd Nav, Kongsberg 14208, img#258) (V)									
30-Nov-2018	14:43:41	2279	ST18904-ENV62			Camera	127	39	651326	4458574	651348	4458562	-22	12	25	118		(Corr'd Nav, Kongsberg 14208, img#259) (V)									
30-Nov-2018	14:43:56	2280	ST18904-ENV62			Camera	127	39	651324	4458575	651348	4458562	-24	13	28	118		(Corr'd Nav, Kongsberg 14208, img#260) (V)									
30-Nov-2018	14:44:08	2281	ST18904-ENV62			Camera	127	39	651322	4458576	651348	4458562	-26	14	30	118		(Corr'd Nav, Kongsberg 14208, img#261) (V)									
30-Nov-2018	14:44:36	2282	ST18904-ENV62			Camera	127	39	651316	4458577	651348	4458562	-32	15	36	116		(Corr'd Nav, Kongsberg 14208, img#262) (V)									
30-Nov-2018	14:45:00	2283	ST18904-ENV62			Camera	127	39	651311	4458579	651348	4458562	-37	17	41	114		(Corr'd Nav, Kongsberg 14208, img#263) (V)									
30-Nov-2018	14:45:26	2284	ST18904-ENV62			Camera	127	39	651307	4458581	651348	4458562	-42	19	46	114		(Corr'd Nav, Kongsberg 14208, img#264) (V)									
30-Nov-2018	14:45:39	2285	ST18904-ENV62			Camera	127	39	651305	4458582	651348	4458562	-44	20	48	114		(Corr'd Nav, Kongsberg 14208, img#265) (V)									
30-Nov-2018	14:46:06	2286	ST18904-ENV62			Camera	127	39	651301	4458584	651348	4458562	-48	22	52	115		(Corr'd Nav, Kongsberg 14208, img#266) (V)									
30-Nov-2018	14:46:16	2287	ST18904-ENV62			Camera	127	39	651299	4458585	651348	4458562	-49	23	54	115		(Corr'd Nav, Kongsberg 14208, img#267) (V)									
30-Nov-2018	14:46:38	2288	ST18904-ENV62			Camera	127	39	651296	4458588	651348	4458562	-52	26	58	116		(Corr'd Nav, Kongsberg 14208, img#268) (V)									
30-Nov-2018	14:46:45	2289	ST18904-ENV62			Camera	127	39	651295	4458589	651348	4458562	-53	26	59	116		(Corr'd Nav, Kongsberg 14208, img#269) (V)									
30-Nov-2018	14:47:06	2290	ST18904-ENV62			Camera	127	39	651292	4458591	651348	4458562	-57	29	63	117		(Corr'd Nav, Kongsberg 14208, img#270) (V)									
30-Nov-2018	14:47:29	2291	ST18904-ENV62			Camera	127	39	651287	4458593	651348	4458562	-62	31	69	117		(Corr'd Nav, Kongsberg 14208, img#271) (V)									
30-Nov-2018	14:47:54	2292	ST18904-ENV62			Camera	127	39	651280	4458595	651348	4458562	-68	33	76	116		(Corr'd Nav, Kongsberg 14208, img#272) (V)									
30-Nov-2018	14:48:23	2293	ST18904-ENV62			Camera	127	39	651273	4458597	651348	4458562	-75	35	83	115		(Corr'd Nav, Kongsberg 14208, img#273) (V)									
30-Nov-2018	14:48:48	2294	ST18904-ENV62			Camera	127	39	651268	4458599	651348	4458562	-81	37	89	114		(Corr'd Nav, Kongsberg 14208, img#274) (V)									
30-Nov-2018	14:49:21	2295	ST18904-ENV62			Camera	127	39	651261	4458602	651348	4458562	-87	40	96	115		(Corr'd Nav, Kongsberg 14208, img#275) (V)									
30-Nov-2018	14:49:39	2296	ST18904-ENV62			Camera	127	39	651258	4458604	651348	4458562	-90	42	99	115		(Corr'd Nav, Kongsberg 14208, img#276) (V)									
30-Nov-2018	14:50:01	2297	ST18904-ENV62			Camera	127	39	651255	4458606	651348	4458562	-94	44	103	115		(Corr'd Nav, Kongsberg 14208, img#277) (V)									
30-Nov-2018	14:50:16	2298	ST18904-ENV62			Camera	127	39	651252	4458607	651348	4458562	-96	45	106	115		(Corr'd Nav, Kongsberg 14208, img#278) (V)									
30-Nov-2018	14:50:42	2299	ST18904-ENV62			Camera	127	39	651248	4458610	651348	4458562	-100	48	111	116		(Corr'd Nav, Kongsberg 14208, img#279) (V)									
30-Nov-2018	14:50:56	2300	ST18904-ENV62			Camera	127	39	651246	4458612	651348	4458562	-103	49	114	116		(Corr'd Nav, Kongsberg 14208, img#280) (V)									
30-Nov-2018	14:51:11	2301	ST18904-ENV62			Camera	127	39	651243	4458613	651348	4458562	-105	51	117	116		(Corr'd Nav, Kongsberg 14208, img#281) (V)									
30-Nov-2018	14:51:40	2302	ST18904-ENV62			Camera	127	39	651238	4458616	651348	4458562	-110	54	123	116		(Corr'd Nav, Kongsberg 14208, img#282) (V)									
30-Nov-2018	14:51:54	2303	ST18904-ENV62			Camera	127	39	651235	4458618	651348	4458562	-113	56	126	116		(Corr'd Nav, Kongsberg 14208, img#283) (V)									
30-Nov-2018	14:52:18	2304	ST18904-ENV62			Camera	127	39	651229	4458620	651348	4458562	-120	58	133	116		(Corr'd Nav, Kongsberg 14208, img#284) (V)									
30-Nov-2018	14:52:34	2305	ST18904-ENV62			Camera	127	39	651224	4458622	651348	4458562	-124	60	138	116		(Corr'd Nav, Kongsberg 14208, img#285) (V)									
30-Nov-2018	14:52:44	2306	ST18904-ENV62			Camera	127	39	651222	4458623	651348	4458562	-127	61	141	116		(Corr'd Nav, Kongsberg 14208, img#286) (V)									
30-Nov-2018	14:53:06	2307	ST18904-ENV62			Camera	127	39	651216	4458625	651348	4458562	-132	62	146	115		(Corr'd Nav, Kongsberg 14208, img#287) (V)									
30-Nov-2018	14:53:26	2308	ST18904-ENV62			Camera	127	39	651211	4458626	651348	4458562	-137	64	151	115		(Corr'd Nav, Kongsberg 14208, img#288) (V)									
30-Nov-2018	14:53:53	2309	ST18904-ENV62			Camera	127	39	651206	4458628	651348	4458562	-142	66	157	115		(Corr'd Nav, Kongsberg 14208, img#289) (V)									
30-Nov-2018	14:54:06	2310	ST18904-ENV62			Camera	127	39	651203	4458629	651348	4458562	-145	67	160	115		(Corr'd Nav, Kongsberg 14208, img#290) (V)									
30-Nov-2018	14:54:25	2311	ST18904-ENV62			Camera	127	39	651199	4458631	651348	4458562	-149	69	164	115		(Corr'd Nav, Kongsberg 14208, img#291) (V)									
30-Nov-2018	14:54:41	2312	ST18904-ENV62			Camera	127	39	651196	4458633	651348	4458562	-152	70	168	115		(Corr'd Nav, Kongsberg 14208, img#292) (V)									
30-Nov-2018	14:54:52	2313	ST18904-ENV62			Camera	127	39	651194	4458634	651348	4458562	-154	71	170	115		(Corr'd Nav, Kongsberg 14208, img#293) (V)									
30-Nov-2018	14:55:08	2314	ST18904-ENV62			Camera	127	39	651191	4458635	651348	4458562	-158	73	174	115		(Corr'd Nav, Kongsberg 14208, img#294) (V)									

Grey columns denote where no information is required

APPENDIX A FIELD SAMPLING LOGS

Table A.3 Seabed Imagery Surveyors Logs

Gardline																	Seafloor Sampling Positioning Summary						
Job No		11179								Vessel		MV Ocean Researcher											
Client		Equinor US Wind LLC								Vessel Reference Point (VRP)		CoG											
Project Name		Equinor Wind OCS-A 0512								Deployment Location		Starboard A-frame			x	8.96	y	-3.08	z	6.05			
Primary Positioning System		Starpack 1								Actual Coordinates derived from		Deployment Location											
Geodetic Reference System		Datum		NAD83		Ellipsoid		GRS 80		Projection		UTM ZONE 18 N (75 W)				Vertical / Tidal Datum		NAVD88					
Date	Time (UTC/GMT)	Fix number	Stn No	Penetration	Sample Retention	Retention	Observed Seafloor Depth (feet)	Observed Seafloor Depth (m)	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks					
									Easting	Northing	Easting	Northing	dE	dN	Range	Bearing							
30-Nov-2018	14:55:22	2315	ST18904-ENV62			Camera	127	39	651188	4458636	651348	4458562	-161	74	177	115		(Cor'd Nav, Kongsberg 14208, img#295) (V)					
30-Nov-2018	14:55:32	2316	ST18904-ENV62			Camera	127	39	651185	4458637	651348	4458562	-163	75	180	115		(Cor'd Nav, Kongsberg 14208, img#296) (V)					
30-Nov-2018	14:55:44	2317	ST18904-ENV62			Camera	127	39	651182	4458638	651348	4458562	-166	76	183	115		(Cor'd Nav, Kongsberg 14208, img#297) (V)					
30-Nov-2018	14:56:06	2318	ST18904-ENV62			Camera	127	39	651176	4458639	651348	4458562	-173	77	189	114		(Cor'd Nav, Kongsberg 14208, img#298) (V)					
30-Nov-2018	14:56:24	2319	ST18904-ENV62			Camera	127	39	651171	4458640	651348	4458562	-178	78	194	114		(Cor'd Nav, Kongsberg 14208, img#299) (V)					
30-Nov-2018	14:56:43	2320	ST18904-ENV62			Camera	127	39	651165	4458641	651348	4458562	-183	79	199	113		(Cor'd Nav, Kongsberg 14208, img#300) (V)					
30-Nov-2018	14:56:57	2321	ST18904-ENV62			Camera	127	39	651162	4458642	651348	4458562	-187	80	203	113		(Cor'd Nav, Kongsberg 14208, img#301) (V)					
30-Nov-2018	16:31:45	2322	ST18904-ENV56			Camera	122	37	647690	4459952	647698	4459946	-8	6	10	127		(Cor'd Nav, Kongsberg 14208, img#302) (V)					
30-Nov-2018	16:32:05	2323	ST18904-ENV56			Camera	122	37	647694	4459950	647698	4459946	-4	4	5	136		(Cor'd Nav, Kongsberg 14208, img#303) (V)					
30-Nov-2018	16:32:23	2324	ST18904-ENV56			Camera	122	37	647698	4459948	647698	4459946	0	2	2	170		(Cor'd Nav, Kongsberg 14208, img#304) (V)					
30-Nov-2018	16:32:55	2325	ST18904-ENV56			Camera	122	37	647703	4459945	647698	4459946	5	-1	5	285		(Cor'd Nav, Kongsberg 14208, img#305) (V)					
30-Nov-2018	16:33:12	2326	ST18904-ENV56			Camera	122	37	647706	4459943	647698	4459946	8	-3	9	291		(Cor'd Nav, Kongsberg 14208, img#306) (V)					
30-Nov-2018	16:33:34	2327	ST18904-ENV56			Camera	122	37	647710	4459941	647698	4459946	12	-5	13	293		(Cor'd Nav, Kongsberg 14208, img#307) (V)					
30-Nov-2018	16:33:50	2328	ST18904-ENV56			Camera	122	37	647713	4459939	647698	4459946	15	-7	17	294		(Cor'd Nav, Kongsberg 14208, img#308) (V)					
30-Nov-2018	16:34:17	2329	ST18904-ENV56			Camera	122	37	647718	4459937	647698	4459946	20	-9	22	295		(Cor'd Nav, Kongsberg 14208, img#309) (V)					
30-Nov-2018	16:34:29	2330	ST18904-ENV56			Camera	122	37	647720	4459936	647698	4459946	21	-10	24	295		(Cor'd Nav, Kongsberg 14208, img#310) (V)					
30-Nov-2018	16:35:06	2331	ST18904-ENV56			Camera	122	37	647725	4459932	647698	4459946	27	-13	30	297		(Cor'd Nav, Kongsberg 14208, img#311) (V)					
30-Nov-2018	16:35:19	2332	ST18904-ENV56			Camera	122	37	647726	4459931	647698	4459946	28	-15	32	298		(Cor'd Nav, Kongsberg 14208, img#312) (V)					
30-Nov-2018	16:35:54	2333	ST18904-ENV56			Camera	122	37	647731	4459929	647698	4459946	33	-17	37	298		(Cor'd Nav, Kongsberg 14208, img#313) (V)					
30-Nov-2018	16:36:11	2334	ST18904-ENV56			Camera	122	37	647734	4459928	647698	4459946	36	-18	40	297		(Cor'd Nav, Kongsberg 14208, img#314) (V)					
30-Nov-2018	16:36:22	2335	ST18904-ENV56			Camera	122	37	647736	4459927	647698	4459946	38	-19	42	297		(Cor'd Nav, Kongsberg 14208, img#315) (V)					
30-Nov-2018	16:36:30	2336	ST18904-ENV56			Camera	122	37	647738	4459927	647698	4459946	39	-19	44	296		(Cor'd Nav, Kongsberg 14208, img#316) (V)					
30-Nov-2018	16:36:44	2337	ST18904-ENV56			Camera	122	37	647740	4459925	647698	4459946	42	-21	47	296		(Cor'd Nav, Kongsberg 14208, img#317) (V)					
30-Nov-2018	16:36:59	2338	ST18904-ENV56			Camera	122	37	647743	4459924	647698	4459946	45	-22	50	296		(Cor'd Nav, Kongsberg 14208, img#318) (V)					
30-Nov-2018	16:37:20	2339	ST18904-ENV56			Camera	122	37	647747	4459922	647698	4459946	49	-24	54	296		(Cor'd Nav, Kongsberg 14208, img#319) (V)					
30-Nov-2018	16:37:43	2340	ST18904-ENV56			Camera	122	37	647750	4459920	647698	4459946	52	-26	58	296		(Cor'd Nav, Kongsberg 14208, img#320) (V)					
30-Nov-2018	16:38:18	2341	ST18904-ENV56			Camera	122	37	647755	4459917	647698	4459946	57	-29	64	297		(Cor'd Nav, Kongsberg 14208, img#321) (V)					
30-Nov-2018	16:38:34	2342	ST18904-ENV56			Camera	122	37	647757	4459916	647698	4459946	59	-30	66	297		(Cor'd Nav, Kongsberg 14208, img#322) (V)					
30-Nov-2018	16:38:43	2343	ST18904-ENV56			Camera	122	37	647758	4459916	647698	4459946	60	-30	67	297		(Cor'd Nav, Kongsberg 14208, img#323) (V)					
30-Nov-2018	16:39:10	2344	ST18904-ENV56			Camera	122	37	647763	4459915	647698	4459946	65	-31	72	296		(Cor'd Nav, Kongsberg 14208, img#324) (V)					
30-Nov-2018	16:39:34	2345	ST18904-ENV56			Camera	122	37	647769	4459914	647698	4459946	71	-32	78	294		(Cor'd Nav, Kongsberg 14208, img#325) (V)					
30-Nov-2018	16:39:56	2346	ST18904-ENV56			Camera	122	37	647774	4459913	647698	4459946	76	-33	83	293		(Cor'd Nav, Kongsberg 14208, img#326) (V)					
30-Nov-2018	16:40:20	2347	ST18904-ENV56			Camera	122	37	647780	4459913	647698	4459946	82	-33	88	292		(Cor'd Nav, Kongsberg 14208, img#327) (V)					
30-Nov-2018	16:40:50	2348	ST18904-ENV56			Camera	122	37	647786	4459912	647698	4459946	88	-34	95	291		(Cor'd Nav, Kongsberg 14208, img#328) (V)					
30-Nov-2018	16:41:06	2349	ST18904-ENV56			Camera	122	37	647789	4459911	647698	4459946	91	-35	97	291		(Cor'd Nav, Kongsberg 14208, img#329) (V)					
30-Nov-2018	16:41:21	2350	ST18904-ENV56			Camera	122	37	647792	4459911	647698	4459946	94	-35	100	291		(Cor'd Nav, Kongsberg 14208, img#330) (V)					
30-Nov-2018	16:41:36	2351	ST18904-ENV56			Camera	122	37	647794	4459910	647698	4459946	96	-36	103	291		(Cor'd Nav, Kongsberg 14208, img#331) (V)					
30-Nov-2018	16:42:00	2352	ST18904-ENV56			Camera	122	37	647799	4459907	647698	4459946	100	-39	108	291		(Cor'd Nav, Kongsberg 14208, img#332) (V)					

Grey columns denote where no information is required

APPENDIX A FIELD SAMPLING LOGS

Table A.3 Seabed Imagery Surveyors Logs

Gardline																	Seafloor Sampling Positioning Summary						
Job No		11179								Vessel		MV Ocean Researcher											
Client		Equinor US Wind LLC								Vessel Reference Point (VRP)		CoG											
Project Name		Equinor Wind OCS-A 0512								Deployment Location		Starboard A-frame			x	8.96	y	-3.08	z	6.05			
Primary Positioning System		Starpack 1								Actual Coordinates derived from		Deployment Location											
Geodetic Reference System		Datum		NAD83		Ellipsoid		GRS 80		Projection		UTM ZONE 18 N (75 W)			Vertical / Tidal Datum		NAVD88						
Date	Time (UTC/GMT)	Fix number	Stn No	Penetration	Sample Retention	Retention	Observed Seafloor Depth (feet)	Observed Seafloor Depth (m)	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks					
									Easting	Northing	Easting	Northing	dE	dN	Range	Bearing							
30-Nov-2018	16:42:26	2353	ST18904-ENV56			Camera	122	37	647803	4459904	647698	4459946	105	-42	113	292		(Cor'd Nav, Kongsberg 14208, img#333) (V)					
30-Nov-2018	16:43:18	2354	ST18904-ENV56			Camera	122	37	647811	4459899	647698	4459946	113	-47	123	292		(Cor'd Nav, Kongsberg 14208, img#334) (V)					
30-Nov-2018	16:43:50	2355	ST18904-ENV56			Camera	122	37	647817	4459896	647698	4459946	119	-50	129	293		(Cor'd Nav, Kongsberg 14208, img#335) (V)					
30-Nov-2018	16:44:04	2356	ST18904-ENV56			Camera	122	37	647819	4459895	647698	4459946	121	-51	132	293		(Cor'd Nav, Kongsberg 14208, img#336) (V)					
30-Nov-2018	16:44:16	2357	ST18904-ENV56			Camera	122	37	647822	4459894	647698	4459946	124	-52	134	293		(Cor'd Nav, Kongsberg 14208, img#337) (V)					
30-Nov-2018	16:44:47	2358	ST18904-ENV56			Camera	122	37	647828	4459891	647698	4459946	130	-54	141	293		(Cor'd Nav, Kongsberg 14208, img#338) (V)					
30-Nov-2018	16:45:26	2359	ST18904-ENV56			Camera	122	37	647836	4459887	647698	4459946	138	-59	150	293		(Cor'd Nav, Kongsberg 14208, img#339) (V)					
30-Nov-2018	16:45:38	2360	ST18904-ENV56			Camera	122	37	647839	4459885	647698	4459946	141	-61	154	293		(Cor'd Nav, Kongsberg 14208, img#340) (V)					
30-Nov-2018	16:45:56	2361	ST18904-ENV56			Camera	122	37	647843	4459883	647698	4459946	145	-63	158	293		(Cor'd Nav, Kongsberg 14208, img#341) (V)					
30-Nov-2018	16:46:13	2362	ST18904-ENV56			Camera	122	37	647847	4459882	647698	4459946	149	-64	162	293		(Cor'd Nav, Kongsberg 14208, img#342) (V)					
30-Nov-2018	16:46:37	2363	ST18904-ENV56			Camera	122	37	647852	4459880	647698	4459946	154	-66	167	293		(Cor'd Nav, Kongsberg 14208, img#343) (V)					
30-Nov-2018	16:46:56	2364	ST18904-ENV56			Camera	122	37	647855	4459879	647698	4459946	157	-67	171	293		(Cor'd Nav, Kongsberg 14208, img#344) (V)					
30-Nov-2018	16:47:04	2365	ST18904-ENV56			Camera	122	37	647857	4459878	647698	4459946	159	-68	173	293		(Cor'd Nav, Kongsberg 14208, img#345) (V)					
30-Nov-2018	16:47:30	2366	ST18904-ENV56			Camera	122	37	647862	4459876	647698	4459946	164	-70	178	293		(Cor'd Nav, Kongsberg 14208, img#346) (V)					
30-Nov-2018	16:47:42	2367	ST18904-ENV56			Camera	122	37	647864	4459875	647698	4459946	166	-71	180	293		(Cor'd Nav, Kongsberg 14208, img#347) (V)					
30-Nov-2018	16:47:49	2368	ST18904-ENV56			Camera	122	37	647865	4459874	647698	4459946	167	-72	182	293		(Cor'd Nav, Kongsberg 14208, img#348) (V)					
30-Nov-2018	16:48:11	2369	ST18904-ENV56			Camera	122	37	647869	4459872	647698	4459946	171	-74	186	293		(Cor'd Nav, Kongsberg 14208, img#349) (V)					
30-Nov-2018	16:48:22	2370	ST18904-ENV56			Camera	122	37	647871	4459871	647698	4459946	173	-75	188	293		(Cor'd Nav, Kongsberg 14208, img#350) (V)					
30-Nov-2018	16:48:33	2371	ST18904-ENV56			Camera	122	37	647873	4459870	647698	4459946	175	-76	191	293		(Cor'd Nav, Kongsberg 14208, img#351) (V)					
30-Nov-2018	16:48:55	2372	ST18904-ENV56			Camera	122	37	647876	4459868	647698	4459946	178	-78	194	294		(Cor'd Nav, Kongsberg 14208, img#352) (V)					
30-Nov-2018	16:49:20	2373	ST18904-ENV56			Camera	123	37	647880	4459866	647698	4459946	182	-80	199	294		(Cor'd Nav, Kongsberg 14208, img#353) (V)					
30-Nov-2018	16:49:32	2374	ST18904-ENV56			Camera	123	37	647882	4459865	647698	4459946	184	-81	201	294		(Cor'd Nav, Kongsberg 14208, img#354) (V)					
30-Nov-2018	18:29:39	2375	ST18904-ENV58			Camera	123	38	650561	4463472	650614	4463446	-53	27	60	117		(Cor'd Nav, Kongsberg 14208, img#355) (V)					
30-Nov-2018	18:34:22	2376	ST18904-ENV58			Camera	123	38	650618	4463440	650614	4463446	4	-5	7	325		(Cor'd Nav, Kongsberg 14208, img#356) (V)					
30-Nov-2018	18:34:46	2377	ST18904-ENV58			Camera	123	38	650623	4463438	650614	4463446	9	-8	12	310		(Cor'd Nav, Kongsberg 14208, img#357) (V)					
30-Nov-2018	18:35:11	2378	ST18904-ENV58			Camera	123	38	650628	4463436	650614	4463446	14	-10	18	305		(Cor'd Nav, Kongsberg 14208, img#358) (V)					
30-Nov-2018	18:36:08	2379	ST18904-ENV58			Camera	123	38	650640	4463430	650614	4463446	26	-15	30	300		(Cor'd Nav, Kongsberg 14208, img#359) (V)					
30-Nov-2018	18:36:36	2380	ST18904-ENV58			Camera	123	38	650646	4463428	650614	4463446	32	-18	37	299		(Cor'd Nav, Kongsberg 14208, img#360) (V)					
30-Nov-2018	18:37:29	2381	ST18904-ENV58			Camera	123	38	650656	4463424	650614	4463446	42	-21	47	297		(Cor'd Nav, Kongsberg 14208, img#361) (V)					
30-Nov-2018	18:38:01	2382	ST18904-ENV58			Camera	123	38	650662	4463422	650614	4463446	48	-23	53	296		(Cor'd Nav, Kongsberg 14208, img#362) (V)					
30-Nov-2018	18:38:51	2383	ST18904-ENV58			Camera	123	38	650672	4463416	650614	4463446	58	-29	65	297		(Cor'd Nav, Kongsberg 14208, img#363) (V)					
30-Nov-2018	18:39:23	2384	ST18904-ENV58			Camera	123	38	650679	4463411	650614	4463446	65	-34	73	298		(Cor'd Nav, Kongsberg 14208, img#364) (V)					
30-Nov-2018	18:39:51	2385	ST18904-ENV58			Camera	123	38	650685	4463407	650614	4463446	71	-38	81	298		(Cor'd Nav, Kongsberg 14208, img#365) (V)					
30-Nov-2018	18:40:15	2386	ST18904-ENV58			Camera	123	38	650690	4463404	650614	4463446	76	-41	87	298		(Cor'd Nav, Kongsberg 14208, img#366) (V)					
30-Nov-2018	18:41:05	2387	ST18904-ENV58			Camera	124	38	650700	4463400	650614	4463446	86	-46	98	298		(Cor'd Nav, Kongsberg 14208, img#367) (V)					
30-Nov-2018	18:41:56	2388	ST18904-ENV58			Camera	124	38	650710	4463394	650614	4463446	96	-51	109	298		(Cor'd Nav, Kongsberg 14208, img#368) (V)					
30-Nov-2018	18:42:29	2389	ST18904-ENV58			Camera	124	38	650717	4463391	650614	4463446	103	-55	117	298		(Cor'd Nav, Kongsberg 14208, img#369) (V)					
30-Nov-2018	18:42:52	2390	ST18904-ENV58			Camera	124	38	650723	4463388	650614	4463446	109	-57	123	298		(Cor'd Nav, Kongsberg 14208, img#370) (V)					

Grey columns denote where no information is required

APPENDIX A FIELD SAMPLING LOGS

Table A.3 Seabed Imagery Surveyors Logs

Gardline																	Seafloor Sampling Positioning Summary						
Job No		11179								Vessel		MV Ocean Researcher											
Client		Equinor US Wind LLC								Vessel Reference Point (VRP)		CoG											
Project Name		Equinor Wind OCS-A 0512								Deployment Location		Starboard A-frame			x	8.96	y	-3.08	z	6.05			
Primary Positioning System		Starpack 1								Actual Coordinates derived from		Deployment Location											
Geodetic Reference System		Datum		NAD83		Ellipsoid		GRS 80		Projection		UTM ZONE 18 N (75 W)					Vertical / Tidal Datum		NAVD88				
Date	Time (UTC/GMT)	Fix number	Stn No	Penetration	Sample Retention	Retention	Observed Seafloor Depth (feet)	Observed Seafloor Depth (m)	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks					
									Easting	Northing	Easting	Northing	dE	dN	Range	Bearing							
30-Nov-2018	18:43:14	2391	ST18904-ENV58			Camera	124	38	650728	4463386	650614	4463446	114	-59	128	297		(Cor'd Nav, Kongsberg 14208, img#371) (V)					
30-Nov-2018	18:43:50	2392	ST18904-ENV58			Camera	124	38	650736	4463383	650614	4463446	122	-62	137	297		(Cor'd Nav, Kongsberg 14208, img#372) (V)					
30-Nov-2018	18:44:31	2393	ST18904-ENV58			Camera	124	38	650744	4463380	650614	4463446	130	-65	146	297		(Cor'd Nav, Kongsberg 14208, img#373) (V)					
30-Nov-2018	18:45:08	2394	ST18904-ENV58			Camera	124	38	650752	4463377	650614	4463446	138	-68	154	296		(Cor'd Nav, Kongsberg 14208, img#374) (V)					
30-Nov-2018	18:45:29	2395	ST18904-ENV58			Camera	124	38	650756	4463375	650614	4463446	142	-70	159	296		(Cor'd Nav, Kongsberg 14208, img#375) (V)					
30-Nov-2018	18:46:03	2396	ST18904-ENV58			Camera	124	38	650763	4463371	650614	4463446	149	-74	167	296		(Cor'd Nav, Kongsberg 14208, img#376) (V)					
30-Nov-2018	18:46:34	2397	ST18904-ENV58			Camera	124	38	650771	4463367	650614	4463446	157	-79	175	297		(Cor'd Nav, Kongsberg 14208, img#377) (V)					
30-Nov-2018	18:47:00	2398	ST18904-ENV58			Camera	124	38	650776	4463363	650614	4463446	162	-82	182	297		(Cor'd Nav, Kongsberg 14208, img#378) (V)					
30-Nov-2018	18:47:23	2399	ST18904-ENV58			Camera	124	38	650781	4463360	650614	4463446	167	-85	188	297		(Cor'd Nav, Kongsberg 14208, img#379) (V)					
30-Nov-2018	18:47:46	2400	ST18904-ENV58			Camera	124	38	650786	4463358	650614	4463446	172	-88	193	297		(Cor'd Nav, Kongsberg 14208, img#380) (V)					
30-Nov-2018	18:48:00	2401	ST18904-ENV58			Camera	124	38	650789	4463356	650614	4463446	175	-89	197	297		(Cor'd Nav, Kongsberg 14208, img#381) (V)					
30-Nov-2018	18:48:16	2402	ST18904-ENV58			Camera	124	38	650792	4463355	650614	4463446	178	-91	200	297		(Cor'd Nav, Kongsberg 14208, img#382) (V)					
30-Nov-2018	20:17:22	2403	ST18904-ENV64			Camera	126	38	654219	4462612	654310	4462556	-91	56	107	122		(Cor'd Nav, Kongsberg 14208, img#383) (V)					
30-Nov-2018	20:17:57	2404	ST18904-ENV64			Camera	126	38	654227	4462609	654310	4462556	-83	53	99	123		(Cor'd Nav, Kongsberg 14208, img#384) (V)					
30-Nov-2018	20:18:59	2405	ST18904-ENV64			Camera	126	38	654240	4462604	654310	4462556	-70	48	85	125		(Cor'd Nav, Kongsberg 14208, img#385) (V)					
30-Nov-2018	20:19:28	2406	ST18904-ENV64			Camera	126	38	654246	4462603	654310	4462556	-64	47	79	126		(Cor'd Nav, Kongsberg 14208, img#386) (V)					
30-Nov-2018	20:20:07	2407	ST18904-ENV64			Camera	126	38	654253	4462600	654310	4462556	-57	44	72	128		(Cor'd Nav, Kongsberg 14208, img#387) (V)					
30-Nov-2018	20:20:42	2408	ST18904-ENV64			Camera	126	38	654260	4462596	654310	4462556	-50	40	64	129		(Cor'd Nav, Kongsberg 14208, img#388) (V)					
30-Nov-2018	20:21:05	2409	ST18904-ENV64			Camera	126	38	654265	4462593	654310	4462556	-45	37	58	130		(Cor'd Nav, Kongsberg 14208, img#389) (V)					
30-Nov-2018	20:21:52	2410	ST18904-ENV64			Camera	126	38	654275	4462588	654310	4462556	-35	32	48	132		(Cor'd Nav, Kongsberg 14208, img#390) (V)					
30-Nov-2018	20:22:52	2411	ST18904-ENV64			Camera	126	38	654286	4462581	654310	4462556	-24	25	35	137		(Cor'd Nav, Kongsberg 14208, img#391) (V)					
30-Nov-2018	20:23:40	2412	ST18904-ENV64			Camera	126	38	654296	4462574	654310	4462556	-14	18	23	142		(Cor'd Nav, Kongsberg 14208, img#392) (V)					
30-Nov-2018	20:24:51	2413	ST18904-ENV64			Camera	126	38	654310	4462564	654310	4462556	0	8	8	180		(Cor'd Nav, Kongsberg 14208, img#393) (V)					
30-Nov-2018	20:25:33	2414	ST18904-ENV64			Camera	126	38	654318	4462558	654310	4462556	8	2	9	256		(Cor'd Nav, Kongsberg 14208, img#394) (V)					
30-Nov-2018	20:26:08	2415	ST18904-ENV64			Camera	126	38	654326	4462553	654310	4462556	16	-3	16	281		(Cor'd Nav, Kongsberg 14208, img#395) (V)					
30-Nov-2018	20:26:51	2416	ST18904-ENV64			Camera	126	38	654335	4462546	654310	4462556	25	-10	27	291		(Cor'd Nav, Kongsberg 14208, img#396) (V)					
30-Nov-2018	20:27:38	2417	ST18904-ENV64			Camera	126	38	654346	4462539	654310	4462556	36	-17	39	295		(Cor'd Nav, Kongsberg 14208, img#397) (V)					
30-Nov-2018	20:28:14	2418	ST18904-ENV64			Camera	126	38	654354	4462533	654310	4462556	44	-23	49	297		(Cor'd Nav, Kongsberg 14208, img#398) (V)					
30-Nov-2018	20:28:45	2419	ST18904-ENV64			Camera	126	38	654361	4462528	654310	4462556	51	-28	58	298		(Cor'd Nav, Kongsberg 14208, img#399) (V)					
30-Nov-2018	20:29:11	2420	ST18904-ENV64			Camera	126	38	654367	4462525	654310	4462556	57	-31	65	299		(Cor'd Nav, Kongsberg 14208, img#400) (V)					
30-Nov-2018	20:29:36	2421	ST18904-ENV64			Camera	126	38	654372	4462522	654310	4462556	62	-34	71	299		(Cor'd Nav, Kongsberg 14208, img#401) (V)					
30-Nov-2018	20:30:15	2422	ST18904-ENV64			Camera	126	38	654381	4462517	654310	4462556	71	-39	81	299		(Cor'd Nav, Kongsberg 14208, img#402) (V)					
30-Nov-2018	20:30:58	2423	ST18904-ENV64			Camera	126	38	654391	4462511	654310	4462556	81	-45	92	299		(Cor'd Nav, Kongsberg 14208, img#403) (V)					
30-Nov-2018	20:31:17	2424	ST18904-ENV64			Camera	126	38	654394	4462509	654310	4462556	84	-47	97	299		(Cor'd Nav, Kongsberg 14208, img#404) (V)					
30-Nov-2018	20:31:34	2425	ST18904-ENV64			Camera	126	38	654397	4462507	654310	4462556	87	-49	100	299		(Cor'd Nav, Kongsberg 14208, img#405) (V)					
30-Nov-2018	21:49:56	2426	ST18904-ENV67			Camera	129	39	656016	4462273	656024	4462277	-8	-4	8	65		(Cor'd Nav, Kongsberg 14208, img#406) (V)					
30-Nov-2018	21:50:25	2427	ST18904-ENV67			Camera	129	39	656021	4462271	656024	4462277	-3	-6	6	23		(Cor'd Nav, Kongsberg 14208, img#407) (V)					
30-Nov-2018	21:50:54	2428	ST18904-ENV67			Camera	129	39	656026	4462268	656024	4462277	2	-8	8	348		(Cor'd Nav, Kongsberg 14208, img#408) (V)					

Grey columns denote where no information is required

APPENDIX A FIELD SAMPLING LOGS

Table A.3 Seabed Imagery Surveyors Logs

Gardline														Seafloor Sampling Positioning Summary												
Job No		11179							Vessel		MV Ocean Researcher															
Client		Equinor US Wind LLC							Vessel Reference Point (VRP)		CoG															
Project Name		Equinor Wind OCS-A 0512							Deployment Location		Starboard A-frame				x		8.96		y		-3.08		z		6.05	
Primary Positioning System		Starpack 1							Actual Coordinates derived from		Deployment Location															
Geodetic Reference System		Datum		NAD83		Ellipsoid		GRS 80		Projection		UTM ZONE 18 N (75 W)						Vertical / Tidal Datum		NAVD88						
Date	Time (UTC/GMT)	Fix number	Stn No	Penetration	Sample Retention	Retention	Observed Seafloor Depth (feet)	Observed Seafloor Depth (m)	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks								
									Easting	Northing	Easting	Northing	dE	dN	Range	Bearing										
30-Nov-2018	21:51:31	2429	ST18904-ENV67			Camera	129	39	656033	4462265	656024	4462277	9	-12	15	324		(Cor'd Nav, Kongsberg 14208, img#409) (V)								
30-Nov-2018	21:51:57	2430	ST18904-ENV67			Camera	129	39	656038	4462262	656024	4462277	14	-15	20	316		(Cor'd Nav, Kongsberg 14208, img#410) (V)								
30-Nov-2018	21:52:55	2431	ST18904-ENV67			Camera	129	39	656050	4462256	656024	4462277	26	-20	33	308		(Cor'd Nav, Kongsberg 14208, img#411) (V)								
30-Nov-2018	21:53:15	2432	ST18904-ENV67			Camera	129	39	656054	4462255	656024	4462277	30	-22	37	306		(Cor'd Nav, Kongsberg 14208, img#412) (V)								
30-Nov-2018	21:53:37	2433	ST18904-ENV67			Camera	129	39	656059	4462253	656024	4462277	35	-23	42	304		(Cor'd Nav, Kongsberg 14208, img#413) (V)								
30-Nov-2018	21:54:27	2434	ST18904-ENV67			Camera	129	39	656068	4462249	656024	4462277	44	-27	52	302		(Cor'd Nav, Kongsberg 14208, img#414) (V)								
30-Nov-2018	21:55:00	2435	ST18904-ENV67			Camera	129	39	656073	4462246	656024	4462277	49	-31	58	302		(Cor'd Nav, Kongsberg 14208, img#415) (V)								
30-Nov-2018	21:55:25	2436	ST18904-ENV67			Camera	129	39	656077	4462243	656024	4462277	53	-33	63	302		(Cor'd Nav, Kongsberg 14208, img#416) (V)								
30-Nov-2018	21:56:18	2437	ST18904-ENV67			Camera	129	39	656088	4462239	656024	4462277	64	-38	74	301		(Cor'd Nav, Kongsberg 14208, img#417) (V)								
30-Nov-2018	21:57:54	2438	ST18904-ENV67			Camera	129	39	656106	4462232	656024	4462277	82	-44	93	299		(Cor'd Nav, Kongsberg 14208, img#418) (V)								
30-Nov-2018	21:58:39	2439	ST18904-ENV67			Camera	129	39	656113	4462228	656024	4462277	89	-49	101	299		(Cor'd Nav, Kongsberg 14208, img#419) (V)								
30-Nov-2018	21:59:11	2440	ST18904-ENV67			Camera	129	39	656119	4462224	656024	4462277	95	-53	109	299		(Cor'd Nav, Kongsberg 14208, img#420) (V)								
30-Nov-2018	21:59:37	2441	ST18904-ENV67			Camera	129	39	656125	4462221	656024	4462277	101	-56	116	299		(Cor'd Nav, Kongsberg 14208, img#421) (V)								
30-Nov-2018	22:00:32	2442	ST18904-ENV67			Camera	129	39	656139	4462215	656024	4462277	114	-61	130	298		(Cor'd Nav, Kongsberg 14208, img#422) (V)								
30-Nov-2018	22:01:03	2443	ST18904-ENV67			Camera	129	39	656145	4462212	656024	4462277	121	-64	137	298		(Cor'd Nav, Kongsberg 14208, img#423) (V)								
30-Nov-2018	22:01:43	2444	ST18904-ENV67			Camera	130	39	656154	4462208	656024	4462277	130	-69	147	298		(Cor'd Nav, Kongsberg 14208, img#424) (V)								
30-Nov-2018	22:02:00	2445	ST18904-ENV67			Camera	130	39	656157	4462206	656024	4462277	133	-71	151	298		(Cor'd Nav, Kongsberg 14208, img#425) (V)								
30-Nov-2018	22:02:25	2446	ST18904-ENV67			Camera	129	39	656163	4462203	656024	4462277	139	-74	157	298		(Cor'd Nav, Kongsberg 14208, img#426) (V)								
30-Nov-2018	22:02:50	2447	ST18904-ENV67			Camera	130	39	656168	4462201	656024	4462277	144	-76	163	298		(Cor'd Nav, Kongsberg 14208, img#427) (V)								
30-Nov-2018	22:03:11	2448	ST18904-ENV67			Camera	130	40	656173	4462199	656024	4462277	149	-78	168	298		(Cor'd Nav, Kongsberg 14208, img#428) (V)								
30-Nov-2018	22:03:50	2449	ST18904-ENV67			Camera	130	40	656182	4462196	656024	4462277	158	-81	177	297		(Cor'd Nav, Kongsberg 14208, img#429) (V)								
30-Nov-2018	22:04:11	2450	ST18904-ENV67			Camera	130	40	656186	4462194	656024	4462277	162	-83	182	297		(Cor'd Nav, Kongsberg 14208, img#430) (V)								
30-Nov-2018	22:04:36	2451	ST18904-ENV67			Camera	130	40	656191	4462191	656024	4462277	167	-85	188	297		(Cor'd Nav, Kongsberg 14208, img#431) (V)								
30-Nov-2018	22:05:22	2452	ST18904-ENV67			Camera	130	40	656200	4462187	656024	4462277	176	-90	198	297		(Cor'd Nav, Kongsberg 14208, img#432) (V)								
30-Nov-2018	23:51:23	2453	ST18904-ENV71			Camera	133	41	659623	4461336	659629	4461331	-6	6	8	134		(Cor'd Nav, Kongsberg 14208, img#433) (V)								
30-Nov-2018	23:52:37	2454	ST18904-ENV71			Camera	133	41	659633	4461323	659629	4461331	3	-7	8	336		(Cor'd Nav, Kongsberg 14208, img#434) (V)								
30-Nov-2018	23:53:00	2455	ST18904-ENV71			Camera	133	41	659635	4461319	659629	4461331	6	-12	13	333		(Cor'd Nav, Kongsberg 14208, img#435) (V)								
30-Nov-2018	23:53:42	2456	ST18904-ENV71			Camera	133	41	659645	4461310	659629	4461331	16	-21	26	322		(Cor'd Nav, Kongsberg 14208, img#436) (V)								
30-Nov-2018	23:54:12	2457	ST18904-ENV71			Camera	133	41	659655	4461304	659629	4461331	26	-26	37	315		(Cor'd Nav, Kongsberg 14208, img#437) (V)								
30-Nov-2018	23:54:47	2458	ST18904-ENV71			Camera	133	41	659669	4461302	659629	4461331	40	-29	49	306		(Cor'd Nav, Kongsberg 14208, img#438) (V)								
30-Nov-2018	23:55:17	2459	ST18904-ENV71			Camera	133	41	659680	4461304	659629	4461331	50	-27	57	298		(Cor'd Nav, Kongsberg 14208, img#439) (V)								
30-Nov-2018	23:55:43	2460	ST18904-ENV71			Camera	133	41	659687	4461307	659629	4461331	58	-24	63	293		(Cor'd Nav, Kongsberg 14208, img#440) (V)								
30-Nov-2018	23:57:01	2461	ST18904-ENV71			Camera	133	41	659696	4461306	659629	4461331	67	-24	71	290		(Cor'd Nav, Kongsberg 14208, img#441) (V)								
30-Nov-2018	23:58:19	2462	ST18904-ENV71			Camera	133	41	659695	4461295	659629	4461331	65	-35	74	298		(Cor'd Nav, Kongsberg 14208, img#442) (V)								
30-Nov-2018	23:59:15	2463	ST18904-ENV71			Camera	133	41	659701	4461288	659629	4461331	71	-43	83	301		(Cor'd Nav, Kongsberg 14208, img#443) (V)								
01-Dec-2018	00:00:04	2464	ST18904-ENV71			Camera	133	41	659714	4461289	659629	4461331	84	-42	94	296		(Cor'd Nav, Kongsberg 14208, img#444) (V)								
01-Dec-2018	00:01:30	2465	ST18904-ENV71			Camera	134	41	659736	4461291	659629	4461331	107	-39	114	290		(Cor'd Nav, Kongsberg 14208, img#445) (V)								
01-Dec-2018	00:02:02	2466	ST18904-ENV71			Camera	134	41	659736	4461286	659629	4461331	106	-45	115	293		(Cor'd Nav, Kongsberg 14208, img#446) (V)								

Grey columns denote where no information is required

APPENDIX A FIELD SAMPLING LOGS

Table A.3 Seabed Imagery Surveyors Logs

Gardline														Seafloor Sampling Positioning Summary							
Job No		11179							Vessel		MV Ocean Researcher										
Client		Equinor US Wind LLC							Vessel Reference Point (VRP)		CoG										
Project Name		Equinor Wind OCS-A 0512							Deployment Location		Starboard A-frame		x	8.96	y	-3.08	z	6.05			
Primary Positioning System		Starpack 1							Actual Coordinates derived from		Deployment Location										
Geodetic Reference System		Datum			NAD83			Ellipsoid		GRS 80		Projection			UTM ZONE 18 N (75 W)			Vertical / Tidal Datum		NAVD88	
Date	Time (UTC/GMT)	Fix number	Stn No	Penetration	Sample Retention	Retention	Observed Seafloor Depth (feet)	Observed Seafloor Depth (m)	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks			
									Easting	Northing	Easting	Northing	dE	dN	Range	Bearing					
01-Dec-2018	00:02:24	2467	ST18904-ENV71			Camera	134	41	659735	4461280	659629	4461331	106	-51	117	295		(Corr'd Nav, Kongsberg 14208, img#447) (V)			
01-Dec-2018	00:02:58	2468	ST18904-ENV71			Camera	133	41	659740	4461272	659629	4461331	111	-59	125	298		(Corr'd Nav, Kongsberg 14208, img#448) (V)			
01-Dec-2018	00:03:24	2469	ST18904-ENV71			Camera	133	41	659746	4461268	659629	4461331	117	-63	133	298		(Corr'd Nav, Kongsberg 14208, img#449) (V)			
01-Dec-2018	00:04:12	2470	ST18904-ENV71			Camera	133	41	659761	4461262	659629	4461331	132	-69	149	297		(Corr'd Nav, Kongsberg 14208, img#450) (V)			
01-Dec-2018	00:04:46	2471	ST18904-ENV71			Camera	133	41	659775	4461258	659629	4461331	146	-73	163	297		(Corr'd Nav, Kongsberg 14208, img#451) (V)			
01-Dec-2018	00:05:00	2472	ST18904-ENV71			Camera	133	41	659781	4461256	659629	4461331	151	-75	169	296		(Corr'd Nav, Kongsberg 14208, img#452) (V)			
01-Dec-2018	00:05:26	2473	ST18904-ENV71			Camera	133	41	659792	4461253	659629	4461331	163	-78	180	296		(Corr'd Nav, Kongsberg 14208, img#453) (V)			
01-Dec-2018	00:05:58	2474	ST18904-ENV71			Camera	133	41	659802	4461251	659629	4461331	173	-80	190	295		(Corr'd Nav, Kongsberg 14208, img#454) (V)			
01-Dec-2018	00:06:45	2475	ST18904-ENV71			Camera	133	41	659806	4461247	659629	4461331	177	-84	196	295		(Corr'd Nav, Kongsberg 14208, img#455) (V)			
01-Dec-2018	00:07:36	2476	ST18904-ENV71			Camera	133	41	659805	4461239	659629	4461331	176	-91	199	297		(Corr'd Nav, Kongsberg 14208, img#456) (V)			
01-Dec-2018	00:07:46	2477	ST18904-ENV71			Camera	133	41	659806	4461238	659629	4461331	177	-93	200	298		(Corr'd Nav, Kongsberg 14208, img#457) (V)			

Grey columns denote where no information is required

APPENDIX A FIELD SAMPLING LOGS

Table A.4 Seabed Sampling Deck Logs

SEABED SAMPLING LOG SHEET (Deck)										QPRO-0755
Job No: 11179				Area: New York, USA				Sieve Size: 0.5 mm		
Project: Equinor Wind OCS-A 0512								Equipment: Day Grab / Mini Hamon Grab		
Client: Equinor US Wind LLC								Vessel: RV <i>Ocean Researcher</i>		
Sample Number	Station Number	Date	Time	Penetration (%)	Sample Retention	Sample Receptacle	Sediment Description	Fauna Description	Operator(s)	Comments
1	ST18904-ENV10	05-Aug-18	23:00	90	MFA	3 x Buckets	Coarse sand, small shell fragments	Annelida (Polychaeta), Echinodermata (Clypeasteroidea)	GD	
2	ST18904-ENV10	05-Aug-18	23:11	90	MFB	3 x Buckets	Coarse sand, small shell fragments	Annelida (Polychaeta), Arthropoda (Paguroidea), Echinodermata (Clypeasteroidea)	GD	
3	ST18904-ENV10	05-Aug-18	23:19	70	CHEM/PSA	3 x Bags	Coarse sand, small shell fragments	Arthropoda (Paguroidea)	GD	
4	ST18904-ENV8	06-Aug-18	00:10	70	MFA	2 x Buckets	Medium to coarse sand, large shell fragments, pebbles	Arthropoda (Paguroidea)	GD	
5	ST18904-ENV8	06-Aug-18	00:20	60	MFB	2 x Buckets	Medium to coarse sand, large shell fragments	Annelida (Polychaeta), Mollusca (Bivalvia)	GD	
6	ST18904-ENV8	06-Aug-18	00:30	50	CHEM/PSA	3 x Bags	Medium to coarse sand, large fragments	Arthropoda (Paguroidea), Mollusca (Bivalvia)	GD	
7	ST18904-ENV7	06-Aug-18	01:23	90	MFA	2 x Buckets	Medium to coarse sand, shell fragments	Annelida (Polychaeta), Arthropoda (Paguroidea), Echinodermata (Clypeasteroidea)	GD	
8	ST18904-ENV7	06-Aug-18	01:31	90	MFB	3 x Buckets	Medium to coarse sand, shell fragments	Arthropoda (Paguroidea)	GD	
9	ST18904-ENV7	06-Aug-18	01:50	70	CHEM/PSA	3 x Bags	Medium to coarse sand, shell fragments	Arthropoda (Caridea)	GD	
10	ST18904-ENV9	06-Aug-18	05:00	80	MFA	2 x 5L Buckets	Medium to coarse sand, shell fragments	No fauna observed	JE/ OH	Glass found in sample
11	ST18904-ENV9	06-Aug-18	05:15	80	CHEM	3 x Bags	Medium to coarse sand, shell fragments	No fauna observed	JE/ OH	
12	ST18904-ENV9	06-Aug-18	05:49	90	MFB	3 x 5L Buckets	Medium to coarse sand, shell fragments	Mollusca (Gastropoda)	JE/ OH	
13	ST18904-ENV11	06-Aug-18	06:49	85	MFA	1 x 5L Bucket	Medium to coarse sand, shell fragments	Annelida (Polychaeta)	JE/ OH	
14	ST18904-ENV11	06-Aug-18	07:13	90	CHEM	3 x Bags	Medium to coarse sand, shell fragments	No fauna observed	JE/ OH	
15	ST18904-ENV11	06-Aug-18	07:32	75	MFB	2 x 5L Buckets	Medium to coarse sand, shell fragments	Annelida	JE/ OH	
16	ST18904-ENV12	06-Aug-18	08:20	75	MFA	2 x 5L Buckets	Medium to coarse sand, shell fragments	Annelida (Polychaeta), Arthropoda (Decapoda, Caridea), Mollusca (Bivalvia)	JE/ OH	
17	ST18904-ENV12	06-Aug-18	08:33	80	CHEM	3 x Bags	Medium to coarse sand, shell fragments	No fauna observed	JE/ OH	
18	ST18904-ENV12	06-Aug-18	08:49	80	MFB	3 x 5L Buckets	Medium to coarse sand, shell fragments	No fauna observed	JE/ OH	
19	ST18904-ENV14	06-Aug-18	09:37	75	MFA	3 x 5L Buckets	Medium to coarse sand, shell fragments	Annelida (Polychaeta), Arthropoda	JE/ OH	
20	ST18904-ENV14	06-Aug-18	09:56	80	CHEM	3 x Bags	Medium to coarse sand, shell fragments	No fauna observed	JE/ OH	
21	ST18904-ENV14	06-Aug-18	10:11	30	No sample	No sample	No sample	No sample	JE/ OH	Sample washout as shell trapped in jaws
22	ST18904-ENV14	06-Aug-18	10:23	80	MFB	3 x 5L Buckets	Medium to coarse sand, shell fragments	Annelida, Mollusca	JE/ OH	
23	ST18904-ENV13	06-Aug-18	11:12	60	MFA	2 x 5L Buckets	Medium to coarse sand (sediment dark in colour, not anoxic), shell fragments	Annelida	JE/ OH	
24	ST18904-ENV13	06-Aug-18	11:32	75	CHEM	3 x Bags	Medium to coarse sand (sediment dark in colour, not anoxic), shell fragments	No fauna observed	JE/ OH	Glass found in sample

Grey rows denote failed sampling attempts.

APPENDIX A FIELD SAMPLING LOGS

Table A.4 Seabed Sampling Deck Logs

SEABED SAMPLING LOG SHEET (Deck)										QPRO-0755
Job No: 11179				Area: New York, USA				Sieve Size: 0.5 mm		
Project: Equinor Wind OCS-A 0512								Equipment: Day Grab / Mini Hamon Grab		
Client: Equinor US Wind LLC								Vessel: RV <i>Ocean Researcher</i>		
Sample Number	Station Number	Date	Time	Penetration (%)	Sample Retention	Sample Receptacle	Sediment Description	Fauna Description	Operator(s)	Comments
25	ST18904-ENV13	06-Aug-18	11:56	5	No sample	No sample	No sample	No sample	JE/ OH	Low retention, grab wire shackle caught on grab
26	ST18904-ENV13	06-Aug-18	12:13	60	MFB	2 x 5L Buckets	Medium to coarse sand (sediment dark in colour, not anoxic), shell fragments	No fauna observed	JE/ OH	
27	ST18904-ENV15	09-Aug-18	20:55	80	MFA	1 x 5L Bucket	Medium sand with few shell fragments	No fauna observed	GD	
28	ST18904-ENV15	09-Aug-18	21:03	80	MFB	1 x 5L Bucket	Medium sand with few shell fragments	No fauna observed	GD	
29	ST18904-ENV15	09-Aug-18	21:08	90	CHEM	3 x Bags	Medium sand with few shell fragments	No fauna observed	GD	
30	ST18904-ENV18	09-Aug-18	21:48	70	MFA	1 x 5L Bucket 1x 1L pot	Fine to medium sand with shell fragments	Annelida (Polychaeta), Echinodermata (Clypeasteroidea)	GD	
31	ST18904-ENV18	09-Aug-18	21:56	30	No sample	No sample	No sample	No sample	GD	Low retention, grab wire caught
32	ST18904-ENV18	09-Aug-18	22:00	70	MFB	1 x 1L Bucket	Fine to medium sand with shell fragments	Echinodermata (Clypeasteroidea)	GD	
33	ST18904-ENV18	09-Aug-18	22:06	70	CHEM	3 x Bags	Fine to medium sand with shell fragments	No fauna observed	GD	
34	ST18904-ENV17	09-Aug-18	22:40	80	MFA	2 x 5L Buckets	Coarse sand and gravel	Arthropoda (Paguroidea). Lots of small casts with holes on the surface, but no signs of worms	GD, SD	
35	ST18904-ENV17	09-Aug-18	22:46	20	No sample	No sample	No sample	No sample	GD, SD	Low retention
36	ST18904-ENV17	09-Aug-18	22:53	80	MFB	2 x 5L Buckets	Coarse sand and gravel	Arthropoda (Paguridae)	GD, SD	
37	ST18904-ENV17	09-Aug-18	23:01	70	CHEM	3 x Bags	Coarse sand and gravel	Mollusca. Lots of small casts with holes on the surface, but no signs of worms	GD, SD	
38	ST18904-ENV16	09-Aug-18	23:31	60	MFA	1 x 5L Bucket	Fine to medium sand with shell fragments, dark anoxic colour & odour 2cm deep	Echinodermata (Clypeasteroidea)	GD, SD	
39	ST18904-ENV16	09-Aug-18	23:37	60	MFB	1 x 5L Bucket	Fine to medium sand with shell fragments, dark anoxic colour & odour 2cm deep	Echinodermata (Clypeasteroidea)	GD, SD	
40	ST18904-ENV16	09-Aug-18	23:43	0	No sample	No sample	No sample	No sample	GD, SD	Grab empty, possibly triggered in water column
41	ST18904-ENV16	09-Aug-18	23:48	70	CHEM	3 x Bags	Fine to medium sand with shell fragments, dark anoxic colour & odour 2cm deep	Echinodermata (Clypeasteroidea)	GD, SD	
42	ST18904-ENV21	10-Aug-18	08:28	55	MFA	1 x 5L Bucket	Fine to medium sand with shell fragments	Mollusca (<i>cf. Arctica islandica</i>)	JE/ OH	
43	ST18904-ENV21	10-Aug-18	08:39	70	CHEM	3 x Bags	Fine to medium sand with shell fragments	Annelida (Polychaeta), Arthropoda (Paguroidea), Mollusca (Gastropoda)	JE/ OH	
44	ST18904-ENV21	10-Aug-18	09:06	75	MFB	1 x 5L Bucket	Fine to medium sand with shell fragments	Annelida (Polychaeta)	JE/ OH	
45	ST18904-ENV20	10-Aug-18	09:44	60	MFA	1 x 5L Bucket	Fine to medium sand with shell fragments	Annelida	JE/ OH	
46	ST18904-ENV20	10-Aug-18	10:02	70	CHEM	3 x Bags	Fine to medium sand with shell fragments	Annelida (Polychaeta)	JE/ OH	
47	ST18904-ENV20	10-Aug-18	10:22	85	MFB	1 x 5L Bucket	Fine to medium sand with shell fragments, dark anoxic colour & odour 2cm deep	Annelida (Polychaeta), Arthropoda (Caridea)	JE/ OH	
48	ST18904-ENV19	10-Aug-18	10:53	5	No sample	No sample	No sample	No sample	JE/ OH	Shell in jaws - washout
49	ST18904-ENV19	10-Aug-18	11:03	5	No sample	No sample	No sample	No sample	JE/ OH	Stones in jaws - washout, moved 20m SE

Grey rows denote failed sampling attempts.

APPENDIX A FIELD SAMPLING LOGS

Table A.4 Seabed Sampling Deck Logs

SEABED SAMPLING LOG SHEET (Deck)										QPRO-0755
Job No: 11179				Area: New York, USA				Sieve Size: 0.5 mm		
Project: Equinor Wind OCS-A 0512								Equipment: Day Grab / Mini Hamon Grab		
Client: Equinor US Wind LLC								Vessel: RV <i>Ocean Researcher</i>		
Sample Number	Station Number	Date	Time	Penetration (%)	Sample Retention	Sample Receptacle	Sediment Description	Fauna Description	Operator(s)	Comments
50	ST18904-ENV19	10-Aug-18	11:22	75	MFA	2 x 5L Buckets	Medium to coarse sand with shell fragments and gravel	Annelida (Polychaeta), Arthropoda (Paguroidea), Mollusca (Gastropoda)	JE/ OH	
51	ST18904-ENV19	10-Aug-18	11:33	75	CHEM	3 x Bags	Medium to coarse sand with shell fragments and gravel	Annelida, Arthropoda (Paguroidea), Mollusca (Gastropoda)	JE/ OH	
52	ST18904-ENV19	10-Aug-18	11:48	10	No sample	No sample	No sample	No sample	JE/ OH	Shell in jaws - washout
53	ST18904-ENV19	10-Aug-18	11:56	60	MFB	2 x 5L Buckets	Medium to coarse sand with shell fragments and gravel	Echinodermata (Clypeasteroidea)	JE/ OH	
54	ST18904-ENV24	10-Aug-18	21:01	80	MFA	2 x 5L Buckets	Fine to medium sand, few shell fragments	Echinodermata (Clypeasteroidea)	GD, SD	
55	ST18904-ENV24	10-Aug-18	21:07	70	CHEM	3 x Bags	Fine to medium sand, few shell fragments	No visible fauna	GD, SD	
56	ST18904-ENV24	10-Aug-18	21:16	60	MFB	1 x 5L Bucket	Fine to medium sand, few shell fragments	Echinodermata (Clypeasteroidea)	GD, SD	
57	ST18904-ENV27	10-Aug-18	22:47	70	MFA	2 x 5L Buckets	Medium to coarse sand and shell fragments	Annelida	GD, SD	
58	ST18904-ENV27	10-Aug-18	22:53	80	CHEM	3 x Bags	Medium to coarse sand and shell fragments	No fauna observed	GD, SD	
59	ST18904-ENV27	10-Aug-18	23:04	5	No sample	No sample	No sample	No sample	GD, SD	Shell caught in jaws - washout
60	ST18904-ENV27	10-Aug-18	23:09	80	MFB	2 x 5L Buckets	Medium to coarse sand and shell fragments, small patches of anoxic sand	Echinodermata (Clypeasteroidea)	GD, SD	
61	ST18904-ENV42	11-Aug-18	16:13	80	MFA	2 x 5L Buckets	Fine to medium sand, shells	Arthropoda (Decapoda), Echinodermata (Clypeasteroidea)	GD	
62	ST18904-ENV42	11-Aug-18	16:24	10	No sample	No sample	No sample	No sample	GD	Shell caught in jaws - washout
63	ST18904-ENV42	11-Aug-18	16:32	80	CHEM	3 x Bags	Fine to medium sand, dead sand dollar	Arthropoda (Paguroidea)	GD, EH	
64	ST18904-ENV42	11-Aug-18	16:40	90	MFB	2 x 5L Buckets	Fine to medium sand, shell fragments	Arthropoda (Paguroidea)	GD, EH	
65	ST18904-ENV23	28-Aug-18	17:03	95	MFA	1 x 5L Bucket	Silty fine to medium sand with rare shell fragments	Annelida (Polychaeta), Echinodermata (Clypeasteroidea), Mollusca (Bivalvia, cf. <i>Arctica islandica</i>)	AMR	
66	ST18904-ENV23	28-Aug-18	17:16	65	CHEM	3 x Bags	Silty fine to medium sand with rare shell fragments	Arthropoda (Paguroidea)	AMR	
67	ST18904-ENV23	28-Aug-18	17:26	60	MFB	1 x 5L Bucket	Silty fine to medium sand with rare shell fragments	Annelida (Polychaeta), Arthropoda (Paguroidea), Echinodermata (Clypeasteroidea), Mollusca (Bivalvia), Chordata (Elasmobranchia egg case)	AMR	
68	ST18904-ENV22	28-Aug-18	19:04	10%	No sample	No sample	Pebbles cobbles, shells		AMR	Pebbles caught in jaws - washout
69	ST18904-ENV22	28-Aug-18	19:10	30%	No sample	1 x 5L Bucket	Pebbles, cobbles, shells	Large bivalve shell	AMR	Pebbles caught in jaws - washout, but remaining sample sieved and retained upon client request
70	ST18904-ENV22	28-Aug-18	19:16	5%	No sample	No sample	No retention		AMR	Sample washout, abandoned station upon client request
71	ST18904-ENV45	30-Aug-18	23:21	70	MFA	2 x 5L Buckets	Fine to coarse sand, shell fragments	Annelida (Polychaeta), Echinodermata (Clypeasteroidea)	AMR	
72	ST18904-ENV45	30-Aug-18	23:32	70	CHEM	3 x Bags	Fine to coarse sand, shell fragments	Arthropoda (Paguroidea), Echinodermata (Clypeasteroidea)	AMR	

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APPENDIX A FIELD SAMPLING LOGS

Table A.4 Seabed Sampling Deck Logs

SEABED SAMPLING LOG SHEET (Deck)								QPRO-0755		
Job No: 11179				Area: New York, USA				Sieve Size: 0.5 mm		
Project: Equinor Wind OCS-A 0512								Equipment: Day Grab / Mini Hamon Grab		
Client: Equinor US Wind LLC								Vessel: RV <i>Ocean Researcher</i>		
Sample Number	Station Number	Date	Time	Penetration (%)	Sample Retention	Sample Receptacle	Sediment Description	Fauna Description	Operator(s)	Comments
73	ST18904-ENV45	30-Aug-18	23:42	80	MFB	2 x 5L Buckets	Fine to coarse sand, shell fragments	Annelida (Polychaeta), Echinodermata (Clypeasteroidea)	AMR	
74	ST18904-ENV72	03-Sep-18	16:30	95%	MFA	1 x 5L Bucket	Dark brown muddy fine sand, occasional pebbles and piece of wood	Annelida (Polychaeta), Arthropoda (Caridea), Mollusca (Gastropoda, Bivalvia)	AMR	
75	ST18904-ENV72	03-Sep-18	16:38	10%	No sample	No sample	No sample	No sample	AMR	Pebbles caught in jaws - washout
76	ST18904-ENV72	03-Sep-18	16:44	90%	CHEM	3 x Bags	Dark brown muddy fine sand with occasional shell fragments	Annelida (Polychaeta)	AMR	
77	ST18904-ENV72	03-Sep-18	16:55	95%	MFB	1 x 5L Bucket	Dark brown muddy fine sand with occasional shell fragments and pebbles	Annelida (Polychaeta), Arthropoda (Caridea), Mollusca (Gastropoda, Bivalvia), Chordata (Elasmobranchia egg case)	AMR	
78	ST18904-ENV26	03-Sep-18	17:35	50%	MFA	2 x 5L Buckets	Gravelly coarse sand with soft dark mud and rare shell fragments	Annelida (Polychaeta), Arthropoda (Caridea), Mollusca (Bivalvia)	AMR	
79	ST18904-ENV26	03-Sep-18	17:43	50%	CHEM	3 x Bags	Gravelly coarse sand with rare shell fragments	Annelida (Polychaeta)	AMR	
80	ST18904-ENV26	03-Sep-18	17:54	50%	MFB	2 x 5L Buckets	Gravelly coarse sand with rare shell fragments on soft dark mud	Annelida (Polychaeta), Arthropoda (Caridea), Mollusca (Bivalvia)	AMR	
81	ST18904-ENV28	03-Sep-18	18:29	70%	MFA	1 x 5L Bucket	Fine to coarse sand, shell fragments	Annelida (Polychaeta), Echinodermata (Clypeasteroidea), Mollusca (Gastropoda)	AMR	
82	ST18904-ENV28	03-Sep-18	18:38	70%	CHEM	3 x Bags	Fine to coarse sand, shell fragments	Annelida (Polychaeta), Arthropoda (Paguroidea), Mollusca (Gastropoda)	AMR	
83	ST18904-ENV28	03-Sep-18	18:49	70%	MFB	1 x 5L Bucket	Fine to coarse sand, shell fragments	Annelida (Polychaeta), Arthropoda (Paguroidea), Echinodermata (Clypeasteroidea), Mollusca (Gastropoda)	AMR	
84	ST18904-ENV25	03-Sep-18	23:07	30%	MFB	1 x 5L Bucket	Silty fine sand with shell fragments on top of gravel	Echinodermata (Clypeasteroidea)	AMR	Originally 'No Sample', but finally kept as MFB. Client aware of low retention.
85	ST18904-ENV25	03-Sep-18	23:15	40%	MFA	1 x 1L Bucket	Silty fine sand with shell fragments and rare gravel, piece of wood/coal	Echinodermata (Clypeasteroidea)	AMR	Originally 'MFB', but then renamed MFA. Client aware of low retention.
86	ST18904-ENV25	03-Sep-18	23:22	30%	No sample	No sample	Silty fine sand with gravel	No fauna observed	AMR	Pebbles caught in jaws - washout
87	ST18904-ENV25	03-Sep-18	23:27	50%	CHEM	3 x Bags	Silty fine sand with shell fragments	No fauna observed	AMR	
88	ST18904-ENV25	03-Sep-18	23:45	20%	No Sample	No sample	Silty fine sand with gravel	No fauna observed	AMR	Pebbles caught in jaws - washout
89	ST18904-ENV25	03-Sep-18	23:05	10%	No Sample	No sample	Silty fine sand with gravel	No fauna observed	AMR	Pebbles caught in jaws - washout
90	ST18904-ENV47	04-Sep-2018	01:36	80%	MFA	2 x 5L Buckets	Gravelly coarse sand with shell fragments	Arthropoda (Paguroidea), Echinodermata (Clypeasteroidea), Mollusca (Bivalvia, Gastropoda)	AMR	
91	ST18904-ENV47	04-Sep-2018	01:42	80%	CHEM	3 x Bags	Gravelly coarse sand with shell fragments	No fauna observed	AMR	
92	ST18904-ENV47	04-Sep-2018	01:52	80%	MFB	2 x 5L Buckets	Gravelly coarse sand with shell fragments	Arthropoda (Paguroidea), Mollusca (Bivalvia, Gastropoda)	AMR	

Grey rows denote failed sampling attempts.

APPENDIX A FIELD SAMPLING LOGS

Table A.4 Seabed Sampling Deck Logs

SEABED SAMPLING LOG SHEET (Deck)										QPRO-0755
Job No: 11179				Area: New York, USA				Sieve Size: 0.5 mm		
Project: Equinor Wind OCS-A 0512								Equipment: Day Grab / Mini Hamon Grab		
Client: Equinor US Wind LLC								Vessel: RV <i>Ocean Researcher</i>		
Sample Number	Station Number	Date	Time	Penetration (%)	Sample Retention	Sample Receptacle	Sediment Description	Fauna Description	Operator(s)	Comments
93	ST18904-ENV29	04-Sep-2018	03:36	60%	MFA	1 x 5L Bucket	Fine to coarse sand with shell fragments	Annelida (Polychaeta), Echinodermata (Clypeasteroidea), Mollusca (Gastropoda)	AMR	
94	ST18904-ENV29	04-Sep-2018	03:42	60%	CHEM	3 x Bags	Fine to coarse sand with shell fragments	Echinodermata (Clypeasteroidea), Mollusca (Gastropoda)	AMR	
95	ST18904-ENV29	04-Sep-2018	03:57	70%	MFB	1 x 5L Bucket	Fine to coarse sand with shell fragments	Annelida (Polychaeta), Echinodermata (Clypeasteroidea)	AS	
96	ST18904-ENV30	04-Sep-2018	05:19	80%	MFA	1 x 5L Bucket	Medium to coarse sand with shell fragments	Annelida (Polychaeta), Echinodermata (Clypeasteroidea)	AS	
97	ST18904-ENV30	04-Sep-2018	05:27	70%	MFB	2 x 5L Buckets	Medium to coarse sand with shell fragments	Annelida (Polychaeta), Echinodermata (Clypeasteroidea)	AS	
98	ST18904-ENV30	04-Sep-2018	05:34	70%	CHEM	3 x Bags	Medium to coarse sand with shell fragments	No fauna observed	AS	
99	ST18904-ENV33	04-Sep-2018	07:21	80%	MFA	1 x 5L Bucket	Fine to coarse sand with shell fragments	Annelida (Polychaeta), Echinodermata (Clypeasteroidea)	AS	
100	ST18904-ENV33	04-Sep-2018	07:27	70%	CHEM	3 x Bags	Fine to coarse sand with shell fragments	Echinodermata (Clypeasteroidea)	AS	
101	ST18904-ENV33	04-Sep-2018	07:38	70%	MFB	1 x 5L Bucket	Fine to coarse sand with shell fragments	Annelida (Polychaeta), Echinodermata (Clypeasteroidea), Mollusca (Bivalvia)	AS	
102	ST18904-ENV36	04-Sep-2018	09:19	80%	MFA	2 x 5L Buckets	Medium to coarse sand with shell fragments	Annelida (Polychaeta), Echinodermata (Clypeasteroidea)	AS	
103	ST18904-ENV36	04-Sep-2018	09:28	70%	CHEM	3 x Bags	Medium to coarse sand with shell fragments	No fauna observed	AS	
104	ST18904-ENV36	04-Sep-2018	09:40	70%	MFB	2 x 5L Buckets	Medium to coarse sand with shell fragments	Annelida (Polychaeta), Echinodermata (Clypeasteroidea)	AS	
105	ST18904-ENV32	05-Sep-2018	23:23	70%	MFA	2 x 5L Buckets	Sandy mud with gravel, rare shell fragments	Annelida (Polychaeta), Mollusca (Gastropoda)	AMR	
106	ST18904-ENV32	05-Sep-2018	23:34	70%	Chem	3 x Bags	Sandy mud with gravel, rare shell fragments	Annelida (Polychaeta)	AMR	
107	ST18904-ENV32	05-Sep-2018	23:44	30%	No sample	No sample	Pebbles	No fauna observed	AMR	Pebbles caught in jaws - washout
108	ST18904-ENV32	05-Sep-2018	23:50	80%	MFB	2 x 5L Buckets	Sandy mud with gravel, rare shell fragments	Annelida (Polychaeta), Mollusca (Gastropoda)	AMR	
109	ST18904-ENV31	06-Sep-2018	01:35	80%	MFA	3 x 5L Buckets	sandy gravel with shells and shell fragments	No fauna observed	AMR	
110	ST18904-ENV31	06-Sep-2018	01:40	70%	Chem	3 x Bags	sandy gravel with shells and shell fragments	No fauna observed	AMR	
111	ST18904-ENV31	06-Sep-2018	01:49	80%	MFB	3 x 5L Buckets	sandy gravel with shells and shell fragments	Annelida (Polychaeta), Mollusca (Gastropoda)	AMR	
112	ST18904-ENV34	06-Sep-2018	03:35	60%	MFA	1 x 5L Bucket	Fine to coarse sand, shell fragments	Annelida (Polychaeta), Echinodermata (Clypeasteroidea)	AMR	
113	ST18904-ENV34	06-Sep-2018	03:42	60%	Chem	3 x Bags	Fine to coarse sand, shell fragments	Mollusca (Gastropoda), Echinodermata (Clypeasteroidea)	AMR	
114	ST18904-ENV34	06-Sep-2018	03:51	70%	MFB	2 x 5L Buckets	Fine to coarse sand, shell fragments	Annelida (Polychaeta), Echinodermata (Clypeasteroidea)	AMR	

Grey rows denote failed sampling attempts.

APPENDIX A FIELD SAMPLING LOGS

Table A.4 Seabed Sampling Deck Logs

SEABED SAMPLING LOG SHEET (Deck)										QPRO-0755
Job No: 11179				Area: New York, USA				Sieve Size: 0.5 mm		
Project: Equinor Wind OCS-A 0512								Equipment: Day Grab / Mini Hamon Grab		
Client: Equinor US Wind LLC								Vessel: RV <i>Ocean Researcher</i>		
Sample Number	Station Number	Date	Time	Penetration (%)	Sample Retention	Sample Receptacle	Sediment Description	Fauna Description	Operator(s)	Comments
115	ST18904-ENV37	06-Sep-2018	05:06	20%	No sample	1 x 5L Bucket	Coarse sandy gravel with shells and shell fragments	No sample	AS	Shells caught in jaws, partial sample retained and combined with second no sample (20% +10% for geo), sample not fixed
116	ST18904-ENV37	06-Sep-2018	05:12	10%	No sample		No sample	No sample	AS	Shells caught in jaws, partial sample retained and combined with second no sample (20% +10% for geo), sample not fixed
117	ST18904-ENV37	06-Sep-2018	05:18	40%	No sample	1 x 5L Bucket	Coarse sandy gravel with shells and shell fragments	Annelida (Polychaeta, tubes), Mollusca (Gastropoda)	AS	Shells caught in jaws, partial sample washout. Sample retained and labeled as no sample/MFA
118	ST18904-ENV37	06-Sep-2018	05:30	0%	No sample	No sample	No sample	Echinodermata (Clypeasteroidea)	AS	Shells caught in jaws
119	ST18904-ENV35	06-Sep-2018	06:43	80%	MFA	2 x 5L Buckets	Medium to coarse sand with shell fragments	Annelida (Polychaeta)	AS	
120	ST18904-ENV35	06-Sep-2018	06:49	70%	Chem	3 x Bags	Medium to coarse sand with shell fragments	No fauna observed	AS	
121	ST18904-ENV35	06-Sep-2018	06:58	70%	MFB	2 x 5L Buckets	Medium to coarse sand with shell fragments	Annelida (Polychaeta)	AS	
122	ST18904-ENV38	06-Sep-2018	08:29	70%	MFA	2 x 5L Buckets	Silty clayey gravel with shells and shell fragments, black colour and strong organic smell	Annelida (Polychaeta), Mollusca (Gastropoda)	AS	
123	ST18904-ENV38	06-Sep-2018	08:42	60%	Chem	3 x Bags	Silty clayey gravel with shells and shell fragments, black colour and strong organic smell	Annelida (Polychaeta)	AS	
124	ST18904-ENV38	06-Sep-2018	09:01	70%	MFB	2 x 5L Buckets	Silty clayey gravel with shells and shell fragments, black colour and strong organic smell	Annelida (Polychaeta), Mollusca (Gastropoda), Chordata (Rajidae egg case)	AS	
125	ST18904-ENV5	07-Oct-2018	18:32	70%	MFA	2 x 5L Buckets	Sand with shell fragments	Echinodermata (Clypeasteroidea)	JE, SD	
126	ST18904-ENV5	07-Oct-2018	18:37	85%	CHEM	3 x Bags	Sand with shell fragments	Chordata (Actinopterygii)	JE, SD	
127	ST18904-ENV5	07-Oct-2018	18:53	80%	MFB	2 x 5L Buckets	Sand with shell fragments	Annelida (Polychaeta), Echinodermata (Clypeasteroidea)	JE, SD	
128	ST18904-ENV68	07-Oct-2018	20:26	80%	MFA	2 x 5L Buckets	Sand with shell fragments	Arthropoda (Paguroidea), Echinodermata (Clypeasteroidea), Mollusca (Gastropoda)	JE, SD	
129	ST18904-ENV68	07-Oct-2018	20:42	70%	CHEM	3 x Bags	Sand with shell fragments	Echinodermata (Clypeasteroidea)	JE, SD	
130	ST18904-ENV68	07-Oct-2018	21:05	70%	MFB	1 x 5L Bucket	Sand with shell fragments	Echinodermata (Clypeasteroidea)	JE, SD	
131	ST18904-ENV65	07-Oct-2018	23:03	80%	MFA	1 x 5L Bucket	Sand with shell fragments	Echinodermata (Clypeasteroidea)	JE, SD	
132	ST18904-ENV65	07-Oct-2018	23:12	80%	CHEM	3 x Bags	Sand with shell fragments	Echinodermata (Clypeasteroidea)	JE, SD	
133	ST18904-ENV65	07-Oct-2018	23:25	80%	MFA	2 x 5L Buckets	Sand with shell fragments	Annelida (Polychaeta), Echinodermata (Clypeasteroidea)	JE, SD	
134	ST18904-ENV70	24-Nov-2018	06:43	80%	MFA	2 x 5L Buckets	Medium to coarse sand, shell fragments	Echinodermata (Clypeasteroidea)	KS	
135	ST18904-ENV70	24-Nov-2018	06:52	90%	CHEM	3 x Bags	Medium to coarse sand, shell fragments	Echinodermata (Clypeasteroidea)	KS	
136	ST18904-ENV70	24-Nov-2018	07:04	60%	MFB	2 x 5L Buckets	Medium to coarse sand, shell fragments	No visible fauna	KS	
137	ST18904-ENV61	24-Nov-2018	09:09	80%	MFA	1 x 5L Bucket	Medium to coarse sand, shell fragments	Echinodermata (Clypeasteroidea), Mollusca (Gastropoda)	KS	

Grey rows denote failed sampling attempts.

APPENDIX A FIELD SAMPLING LOGS

Table A.4 Seabed Sampling Deck Logs

SEABED SAMPLING LOG SHEET (Deck)								QPRO-0755		
Job No: 11179				Area: New York, USA				Sieve Size: 0.5 mm		
Project: Equinor Wind OCS-A 0512				Equipment: Day Grab / Mini Hamon Grab						
Client: Equinor US Wind LLC								Vessel: RV Ocean Researcher		
Sample Number	Station Number	Date	Time	Penetration (%)	Sample Retention	Sample Receptacle	Sediment Description	Fauna Description	Operator(s)	Comments
138	ST18904-ENV61	24-Nov-2018	09:19	70%	MFB	1 x 5L Bucket	Fine to coarse sand, shell fragments	Echinodermata (Clypeasteroidea)	KS	
139	ST18904-ENV61	24-Nov-2018	09:31	80%	CHEM	3 x Bags	Fine to coarse sand, shell fragments	No fauna observed	KS	
140	ST18904-ENV59	24-Nov-2018	11:25	80%	MFA	1 x 5L Bucket	Medium sand, shell fragments	Annelida (Polychaeta), Echinodermata (Clypeasteroidea), Bryozoa	KS	
141	ST18904-ENV59	24-Nov-2018	11:36	70%	CHEM	3 x Bags	Medium sand, shell fragments	No fauna observed	KS	
142	ST18904-ENV59	24-Nov-2018	11:47	90%	MFB	3 x 5L Buckets	Medium sand, shell fragments	Annelida (Polychaeta), Echinodermata (Clypeasteroidea)	KS	
143	ST18904-ENV66	24-Nov-2018	13:58	70%	MFA	2 x 5L Buckets	Gravelly coarse sand, shell fragments	Echinodermata (Clypeasteroidea)	KS	
144	ST18904-ENV66	24-Nov-2018	14:06	70%	MFB	2 x 5L Buckets	Gravelly coarse sand, shell fragments	Annelida (Polychaeta), Echinodermata (Clypeasteroidea)	KS	
145	ST18904-ENV66	24-Nov-2018	14:15	70%	CHEM	3 x Bags	Gravelly coarse sand, shell fragments	Echinodermata (Clypeasteroidea), Mollusca (Gastropoda)	KS	
146	ST18904-ENV57	24-Nov-2018	16:28	60%	MFA	1 x 5L Bucket	Medium to coarse sand, shell fragments	Annelida (Polychaeta)	KS	
147	ST18904-ENV57	24-Nov-2018	16:37	80%	CHEM	3 x Bags	Medium to coarse sand, shell fragments	Annelida (Polychaeta)	KS	
148	ST18904-ENV57	24-Nov-2018	16:48	80%	MFB	1 x 5L Bucket	Medium to coarse sand, shell fragments	Annelida (Polychaeta)	KS	
149	ST18904-ENV51	24-Nov-2018	18:43	60%	MFA	1 x 5L Bucket	Medium to coarse sand, shell fragments	Annelida (Polychaeta), Chordata (Actinopterygii)	AS	
150	ST18904-ENV51	24-Nov-2018	18:53	70%	Chem	3 x Bags	Medium to coarse sand, shell fragments	No fauna observed	AS	
151	ST18904-ENV51	24-Nov-2018	19:04	70%	MFB	2 x 5L Buckets	Medium to coarse sand, shell fragments	Annelida (Polychaeta), Echinodermata (Clypeasteroidea)	AS	
152	ST18904-ENV53	24-Nov-2018	20:55	60%	MFA	1 x 5L Bucket	Medium to coarse sand, shell fragments	Annelida (Polychaeta)	AS	
153	ST18904-ENV53	24-Nov-2018	21:02	80%	Chem	3 x Bags	Medium to coarse sand, shell fragments	No fauna observed	AS	
154	ST18904-ENV53	24-Nov-2018	21:44	90%	MFB	1 x 5L Bucket	Medium to coarse sand, shell fragments	Annelida (Polychaeta)	AS	Struggle to get on station with increasing weather, client agreed to 25m tolerance
155	ST18904-ENV55	25-Nov-2018	22:49	-	No sample	No sample	No sample	No sample	AS	Stone in jaws -washout
156	ST18904-ENV55	25-Nov-2018	22:56	-	No sample	No sample	No sample	No sample	AS	Grab failed to trigger on seabed
157	ST18904-ENV55	25-Nov-2018	22:58	70%	MFA	1 x 5L Bucket	Medium to coarse sand, shell fragments	Annelida (Polychaeta), Echinodermata (Clypeasteroidea)	AS	
158	ST18904-ENV55	25-Nov-2018	23:06	70%	Chem	3 x Bags	Medium to coarse sand, shell fragments	Arthropoda (Paguroidea)	AS	
159	ST18904-ENV55	25-Nov-2018	23:17	70%	MFB	1 x 5L Bucket	Medium to coarse sand, shell fragments	Annelida (Polychaeta)	AS	
160	ST18904-ENV52	26-Nov-2018	00:43	90%	MFA	2 x 5L Buckets	Medium to coarse sand, shell fragments	Annelida (Polychaeta), Echinodermata (Clypeasteroidea)	AS	
161	ST18904-ENV52	26-Nov-2018	00:50	80%	Chem	3 x Bags	Medium to coarse sand, shell fragments	No fauna observed	AS	
162	ST18904-ENV52	26-Nov-2018	00:58	80%	MFB	2 x 5L Buckets	Medium to coarse sand, shell fragments	Annelida (Polychaeta)	AS	
163	ST18904-ENV49	26-Nov-2018	02:17	-	No sample	No sample	No sample	No sample	AS	Stone in jaws -washout
164	ST18904-ENV49	26-Nov-2018	02:22	80%	MFA	2 x 5L Buckets	Very coarse sandy gravel with brown-black silt and a strong smell	Annelida (Polychaeta), Mollusca (Bivalvia)	AS	
165	ST18904-ENV49	26-Nov-2018	02:30	90%	Chem	3 x Bags	Very coarse sandy gravel with brown-black silt and a strong smell	Annelida (Polychaeta)	AS	

Grey rows denote failed sampling attempts.

APPENDIX A FIELD SAMPLING LOGS

Table A.4 Seabed Sampling Deck Logs

SEABED SAMPLING LOG SHEET (Deck)										QPRO-0755
Job No: 11179				Area: New York, USA				Sieve Size: 0.5 mm		
Project: Equinor Wind OCS-A 0512								Equipment: Day Grab / Mini Hamon Grab		
Client: Equinor US Wind LLC								Vessel: RV Ocean Researcher		
Sample Number	Station Number	Date	Time	Penetration (%)	Sample Retention	Sample Receptacle	Sediment Description	Fauna Description	Operator(s)	Comments
166	ST18904-ENV49	26-Nov-2018	02:39	-	No sample	No sample	No sample	No sample	AS	Stone in jaws -washout
167	ST18904-ENV49	26-Nov-2018	02:46	90%	MFB	3 x 5L Buckets	Very coarse sandy gravel with brown-black silt and a strong smell	Annelida (Polychaeta), Mollusca (Bivalvia)	AS	
168	ST18904-ENV46	26-Nov-2018	04:03	80%	MFA	1 x 5L Bucket	Medium to coarse sand, shell fragments	Annelida (Polychaeta), Echinodermata (Clypeasteroidea)	AS	
169	ST18904-ENV46	26-Nov-2018	04:10	90%	Chem	3 x Bags	Medium to coarse sand, shell fragments	Annelida (Polychaeta), Echinodermata (Clypeasteroidea)	AS	
170	ST18904-ENV46	26-Nov-2018	04:21	80%	MFB	1 x 5L Bucket	Medium to coarse sand, shell fragments	Annelida (Polychaeta), Echinodermata (Clypeasteroidea)	AS	
171	ST18904-ENV44	26-Nov-2018	06:04	60%	MFA	2 x 5L Buckets	Coarse sand and fine gravel with black-brown silt	Annelida (Polychaeta), Mollusca (Bivalvia)	KS	
172	ST18904-ENV44	26-Nov-2018	06:11	50%	Chem	3 x Bags	Coarse sand and fine gravel with black-brown silt	No visible fauna	KS	
173	ST18904-ENV44	26-Nov-2018	06:22	60%	MFB	2 x 5L Buckets	Coarse sand and fine gravel with black-brown silt	Annelida (Polychaeta), Mollusca (Bivalvia, Gastropoda)	KS	
174	ST18904-ENV39	26-Nov-2018	07:57	50%	MFA	2 x 5L Buckets	Silty gravel with clay	Annelida (Polychaeta), Chordata (Rajidae egg case)	KS	
175	ST18904-ENV39	26-Nov-2018	08:07	50%	Chem	3 x Bags	Silty gravel with clay	Arthropoda (Paguroidea), Mollusca (Gastropoda)	KS	
176	ST18904-ENV39	26-Nov-2018	08:18	-	No sample	No sample	No sample	No sample	KS	Shackles caught in top of pyramid
177	ST18904-ENV39	26-Nov-2018	08:24	50%	MFB	1 x 5L Bucket	Silty gravel with clay	Annelida (Polychaeta), Arthropoda (Paguroidea)	KS	
178	ST18904-ENV41	26-Nov-2018	10:05	80%	MFA	2 x 5L Buckets	Medium sand	Echinodermata (Clypeasteroidea)	KS	
179	ST18904-ENV41	26-Nov-2018	10:12	60%	CHEM	3 x Bags	Medium sand	No visible fauna	KS	
180	ST18904-ENV41	26-Nov-2018	10:27	70%	MFB	2 x 5L Buckets	Medium sand	No visible fauna	KS	
181	ST18904-ENV43	26-Nov-2018	12:10	-	No sample	No sample	No sample	No sample	KS	Stone in jaws -washout
182	ST18904-ENV43	26-Nov-2018	12:17	50%	MFA	2 x 5L Buckets	Fine sandy gravel, black colour	Annelida (Polychaeta), Mollusca (Bivalvia)	KS	
183	ST18904-ENV43	26-Nov-2018	12:23	50%	Chem	3 x Bags	Fine sandy gravel, black colour	No visible fauna	KS	
184	ST18904-ENV43	26-Nov-2018	12:33	30%	No sample	No sample	No sample	No sample	KS	Low retention
185	ST18904-ENV43	26-Nov-2018	12:40	60%	MFB	2 x 5L Buckets	Fine sandy gravel, black colour	Arthropoda (Paguroidea), Echinodermata (Clypeasteroidea)	KS	
186	ST18904-ENV40	26-Nov-2018	14:08	70%	MFA	2 x 5L Buckets	Coarse sand	Echinodermata (Clypeasteroidea), Mollusca (Gastropoda)	KS	
187	ST18904-ENV40	26-Nov-2018	14:15	80%	Chem	3 x Bags	Coarse sand	Annelida (Polychaeta), Echinodermata (Clypeasteroidea)	KS	
188	ST18904-ENV40	26-Nov-2018	14:25	80%	MFB	2 x 5L Buckets	Coarse sand	Annelida (Polychaeta), Echinodermata (Clypeasteroidea)	KS	
189	ST18904-ENV50	26-Nov-2018	16:22	90%	MFA	2 x 5L Buckets	Fine to medium sand with shell fragments	Annelida (Polychaeta), Echinodermata (Clypeasteroidea), Mollusca (Gastropoda)	KS	
190	ST18904-ENV50	26-Nov-2018	16:30	90%	Chem	3 x Bags	Fine to medium sand with shell fragments	Echinodermata	KS	
191	ST18904-ENV50	26-Nov-2018	16:53	60%	MFB	2 x 5L Buckets	Fine to medium sand with shell fragments	Annelida (Polychaeta)	KS	
192	ST18904-ENV48	30-Nov-2018	05:09	60%	MFA	1 x 5L Bucket	Fine sand with shell fragments	Arthropoda (Amphipoda)	KS	
193	ST18904-ENV48	30-Nov-2018	05:17	80%	Chem	3 x Bags	Fine to medium sand with shell fragments	No fauna observed	KS	
194	ST18904-ENV48	30-Nov-2018	05:28	60%	MFB	1 x 5L Bucket	Fine to medium sand with shell fragments	Annelida (Polychaeta), Mollusca (Bivalvia)	KS	

Grey rows denote failed sampling attempts.

APPENDIX A FIELD SAMPLING LOGS

Table A.4 Seabed Sampling Deck Logs

SEABED SAMPLING LOG SHEET (Deck)								QPRO-0755		
Job No: 11179				Area: New York, USA				Sieve Size: 0.5 mm		
Project: Equinor Wind OCS-A 0512								Equipment: Day Grab / Mini Hamon Grab		
Client: Equinor US Wind LLC								Vessel: RV <i>Ocean Researcher</i>		
Sample Number	Station Number	Date	Time	Penetration (%)	Sample Retention	Sample Receptacle	Sediment Description	Fauna Description	Operator(s)	Comments
195	ST18904-ENV54	30-Nov-2018	07:16	60%	MFA	1 x 5L Bucket	Fine to medium sand with shell fragments, anoxic silt	Arthropoda (Amphipoda), Echinodermata (Clypeasteroidea)	KS	
196	ST18904-ENV54	30-Nov-2018	07:24	50%	Chem	3 x Bags	Fine to medium sand with shell fragments, anoxic silt below 3cm	Annelida (tubes), Echinodermata (Clypeasteroidea)	KS	
197	ST18904-ENV54	30-Nov-2018	07:35	50%	MFB	1 x 5L Bucket	Fine to medium sand with shell fragments, anoxic silt	Echinodermata (Clypeasteroidea)	KS	
198	ST18904-ENV60	30-Nov-2018	09:12	50%	MFA	1 x 5L Bucket	Fine to medium sand with shell fragments	Annelida (Polychaeta)	KS	
199	ST18904-ENV60	30-Nov-2018	09:21	80%	Chem	3 x Bags	Fine to medium sand with shell fragments	Echinodermata (Clypeasteroidea)	KS	
200	ST18904-ENV60	30-Nov-2018	09:31	70%	MFB	1 x 5L Bucket	Fine to medium sand with shell fragments	Annelida (tubes), Echinodermata (Clypeasteroidea)	KS	
201	ST18904-ENV63	30-Nov-2018	11:02	No Sample	No sample	No sample	No sample	No sample	KS	Grab triggered in water column
202	ST18904-ENV63	30-Nov-2018	11:08	50%	MFA	1 x 5L Bucket	Fine to medium sand with shell fragments	Echinodermata (Clypeasteroidea)	KS	
203	ST18904-ENV63	30-Nov-2018	11:16	No Sample	No sample	No sample	No sample	No sample	KS	Shell in jaws
204	ST18904-ENV63	30-Nov-2018	11:22	70%	Chem	3 x Bags	Fine to medium sand with shell fragments	Annelida (tubes), Arthropoda (Amphipoda), Echinodermata (Clypeasteroidea)	KS	
205	ST18904-ENV63	30-Nov-2018	11:32	70%	MFB	1 x 5L Bucket	Fine to medium sand with shell fragments	Annelida (Polychaeta), Echinodermata (Clypeasteroidea), Chordata (Rajidae egg case)	KS	
206	ST18904-ENV69	30-Nov-2018	13:20	70%	MFA	1 x 5L Bucket	Fine to medium sand with shell fragments	Annelida (Polychaeta), Echinodermata (Clypeasteroidea)	KS	
207	ST18904-ENV69	30-Nov-2018	13:28	70%	Chem	3 x Bags	Fine to medium sand with shell fragments	Echinodermata (Clypeasteroidea)	KS	
192	ST18904-ENV69	30-Nov-2018	13:37	80%	MFB	1 x 5L Bucket	Fine to medium sand with shell fragments	Echinodermata (Clypeasteroidea), Mollusca (Gastropoda)	KS	
193	ST18904-ENV62	30-Nov-2018	15:17	50%	MFA	1 x 5L Bucket	Fine to medium sand with shell fragments	Echinodermata (Clypeasteroidea)	KS	
194	ST18904-ENV62	30-Nov-2018	15:25	70%	Chem	3 x Bags	Fine to medium sand with shell fragments	Echinodermata (Clypeasteroidea)	KS	
195	ST18904-ENV62	30-Nov-2018	15:34	80%	MFB	1 x 5L Bucket	Fine to medium sand with shell fragments	Echinodermata (Clypeasteroidea), Mollusca (<i>Arctica islandica</i> - photo and returned)	KS	
196	ST18904-ENV56	30-Nov-2018	17:11	80%	MFA	1 x 5L Bucket	Fine to medium sand with shell fragments	Annelida (Polychaeta), Echinodermata (Clypeasteroidea)	AS	
197	ST18904-ENV56	30-Nov-2018	17:18	60%	Chem	3 x Bags	Fine to medium sand with shell fragments	Echinodermata (Clypeasteroidea)	AS	
198	ST18904-ENV56	30-Nov-2018	17:30	80%	MFB	1 x 5L Bucket	Fine to medium sand with shell fragments	Annelida (Polychaeta), Echinodermata (Clypeasteroidea), Mollusca (Gastropoda)	AS	
203	ST18904-ENV58	30-Nov-2018	19:11	70%	MFA	1 x 5L Bucket	Fine to medium sand with shell fragments	Annelida (Polychaeta)	AS	
204	ST18904-ENV58	30-Nov-2018	19:17	80%	CHEM	3 x Bags	Fine to medium sand with shell fragments	Mollusca (Bivalvia)	AS	
205	ST18904-ENV58	30-Nov-2018	19:24	80%	MFB	1 x 5L Bucket	Fine to medium sand with shell fragments	Annelida (Polychaeta)	AS	
206	ST18904-ENV64	30-Nov-2018	20:52	70%	MFA	1 x 5L Bucket	Fine to medium sand with shell fragments	Annelida (Polychaeta), Echinodermata (Clypeasteroidea), Mollusca (<i>Arctica islandica</i> - photo and returned)	AS	
207	ST18904-ENV64	30-Nov-2018	20:59	90%	CHEM	3 x Bags	Fine to medium sand with shell fragments	No fauna observed	AS	

Grey rows denote failed sampling attempts.

APPENDIX A FIELD SAMPLING LOGS

Table A.4 Seabed Sampling Deck Logs

SEABED SAMPLING LOG SHEET (Deck)										QPRO-0755	
Job No: 11179				Area: New York, USA				Sieve Size: 0.5 mm			
Project: Equinor Wind OCS-A 0512								Equipment: Day Grab / Mini Hamon Grab			
Client: Equinor US Wind LLC								Vessel: RV <i>Ocean Researcher</i>			
Sample Number	Station Number	Date	Time	Penetration (%)	Sample Retention	Sample Receptacle	Sediment Description	Fauna Description	Operator(s)	Comments	
192	ST18904-ENV64	30-Nov-2018	21:09	70%	MFB	1 x 5L Bucket	Fine to medium sand with shell fragments	Annelida (Polychaeta), Mollusca (<i>Arctica islandica</i> - photo and returned)	AS		
193	ST18904-ENV67	30-Nov-2018	22:23	90%	MFA	2 x 5L Buckets	Medium-coarse sand with shell fragments	Annelida (Polychaeta)	AS		
194	ST18904-ENV67	30-Nov-2018	22:30	90%	CHEM	3 x Bags	Medium-coarse sand with shell fragments	No fauna observed	AS		
195	ST18904-ENV67	30-Nov-2018	22:38	80%	MFB	2 x 5L Buckets	Medium-coarse sand with shell fragments	Annelida (Polychaeta)	AS		
196	ST18904-ENV71	01-Dec-2018	00:28	80%	MFA	1 x 5L Bucket	Medium sand with shell fragments	Annelida (Polychaeta), Echinodermata (Clypeasteroidea)	AS		
197	ST18904-ENV71	01-Dec-2018	00:34	80%	CHEM	3 x Bags	Medium sand with shell fragments	No fauna observed	AS		
198	ST18904-ENV71	01-Dec-2018	00:44	70%	MFA	1 x 5L Bucket	Medium sand with shell fragments	Annelida (Polychaeta), Echinodermata (Clypeasteroidea)	AS		

Grey rows denote failed sampling attempts.

APPENDIX A FIELD SAMPLING LOGS

Table A.5 Seabed Sampling Surveyors Logs

Gardline															Seafloor Sampling Positioning Summary									
Job No		11179							Vessel			MV Ocean Researcher												
Client		Equinor US Wind LLC							Vessel Reference Point (VRP)			CoG												
Project Name		Equinor Wind OCS-A 0512							Deployment Location			Starboard A-frame				x	8.96	y	-3.08	z	6.05			
Primary Positioning System		Starpack 1							Actual Coordinates derived from			Deployment Location												
Geodetic Reference System		Datum		NAD83			Ellipsoid		GRS 80		Projection		UTM zone 18N (75W)			Vertical / Tidal Datum			NAVD88					
Date	Time (UTC/GMT)	Fix number	Stn No	Penetration	Sample	Retention	Observed Seafloor Depth (feet)	Observed Seafloor Depth (m)	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks						
									Easting	Northing	Easting	Northing	dE	dN	Range	Bearing								
05-Aug-2018	23:00	1	ST18904-ENV10		MFA	90%	86	26	622176	4470109	622179	4470124	3	15	15	192	PJ							
05-Aug-2018	23:11	2	ST18904-ENV10		MFB	90%	86	26	622181	4470128	622179	4470124	-2	-4	4	28	PJ							
05-Aug-2018	23:19	3	ST18904-ENV10		CHEM	70%	86	26	622179	4470125	622179	4470124	0	-1	1	343	PJ							
06-Aug-2018	00:10	4	ST18904-ENV8		MFA	70%	85	26	620915	4470526	620908	4470528	-7	2	7	104	PJ							
06-Aug-2018	00:20	5	ST18904-ENV8		MFB	60%	85	26	620913	4470527	620908	4470528	-5	1	5	108	PJ							
06-Aug-2018	00:30	6	ST18904-ENV8		CHEM	50%	85	26	620906	4470529	620908	4470528	2	-1	2	290	PJ							
06-Aug-2018	01:23	7	ST18904-ENV7		MFA	90%	82	25	620066	4470592	620052	4470591	-14	-1	14	87	PJ							
06-Aug-2018	01:31	8	ST18904-ENV7		MFB	90%	82	25	620063	4470596	620052	4470591	-11	-5	12	66	PJ							
06-Aug-2018	01:50	9	ST18904-ENV7		CHEM	70%	82	25	620057	4470591	620052	4470591	-6	0	6	90	PJ							
06-Aug-2018	05:00	10	ST18904-ENV9		MFA	80%	83	25	620342	4469993	620340	4469992	-2	-1	2	72	SP							
06-Aug-2018	05:15	11	ST18904-ENV9		CHEM	80%	83	25	620341	4469993	620340	4469992	-1	-1	2	51	SP							
06-Aug-2018	05:49	12	ST18904-ENV9		MFB	90%	83	25	620346	4469992	620340	4469992	-6	0	6	85	SP							
06-Aug-2018	06:49	13	ST18904-ENV11		MFA	85%	83	25	621787	4469677	621786	4469680	-1	2	3	151	SP							
06-Aug-2018	07:13	14	ST18904-ENV11		CHEM	90%	82	25	621787	4469675	621786	4469680	-1	5	5	169	SP							
06-Aug-2018	07:32	15	ST18904-ENV11		MFB	75%	82	25	621787	4469675	621786	4469680	-1	4	4	170	SP							
06-Aug-2018	08:20	16	ST18904-ENV12		MFA	75%	83	25	621704	4469133	621697	4469135	-8	2	8	104	SP							
06-Aug-2018	08:33	17	ST18904-ENV12		CHEM	80%	82	25	621699	4469130	621697	4469135	-3	5	5	151	SP							
06-Aug-2018	08:49	18	ST18904-ENV12		MFB	80%	82	25	621702	4469136	621697	4469135	-5	-1	5	84	SP							
06-Aug-2018	09:37	19	ST18904-ENV14		MFA	75%	84	26	623376	4469150	623373	4469151	-3	1	3	106	SP							
06-Aug-2018	09:56	20	ST18904-ENV14		CHEM	80%	83	25	623380	4469150	623373	4469151	-7	1	7	102	SP							
06-Aug-2018	10:11	21	ST18904-ENV14		No Sample	30%	83	25	623375	4469153	623373	4469151	-2	-2	3	50	SP							
06-Aug-2018	10:23	22	ST18904-ENV14		MFB	80%	83	25	623369	4469149	623373	4469151	4	2	5	241	SP							
06-Aug-2018	11:12	23	ST18904-ENV13		MFA	60%	88	27	624014	4469719	624010	4469720	-4	1	4	107	SP							
06-Aug-2018	11:32	24	ST18904-ENV13		CHEM	75%	88	27	624012	4469719	624010	4469720	-2	1	2	112	SP							
06-Aug-2018	11:56	25	ST18904-ENV13		No Sample	5%	88	27	624009	4469718	624010	4469720	1	2	2	194	SP							
06-Aug-2018	12:13	26	ST18904-ENV13		MFB	60%	88	27	624002	4469715	624010	4469720	8	5	9	238	CB							
09-Aug-2018	20:55	27	ST18904-ENV15		MFA	80%	86	26	623317	4468368	623319	4468364	2	-4	5	337	PJ							
09-Aug-2018	21:03	28	ST18904-ENV15		MFB	80%	86	26	623321	4468368	623319	4468364	-2	-4	5	28	PJ							
09-Aug-2018	21:08	29	ST18904-ENV15		CHEM	90%	86	26	623320	4468369	623319	4468364	-1	-5	5	8	PJ							
09-Aug-2018	21:48	30	ST18904-ENV18		MFA	70%	90	27	624942	4467348	624939	4467345	-2	-3	4	36	GM							
09-Aug-2018	21:56	31	ST18904-ENV18		No Sample	30%	90	27	624941	4467347	624939	4467345	-1	-2	3	31	GM							
09-Aug-2018	22:00	32	ST18904-ENV18		MFB	70%	90	27	624936	4467343	624939	4467345	3	2	4	236	GM							
09-Aug-2018	22:06	33	ST18904-ENV18		CHEM	70%	90	27	624933	4467343	624939	4467345	7	2	7	255	GM							
09-Aug-2018	22:40	34	ST18904-ENV17		MFA	80%	93	28	625774	4468191	625768	4468193	-6	2	6	111	GM							
09-Aug-2018	22:46	35	ST18904-ENV17		No Sample	20%	93	28	625770	4468193	625768	4468193	-2	0	2	245	GM							
09-Aug-2018	22:53	36	ST18904-ENV17		MFB	80%	93	28	625772	4468196	625768	4468193	-4	-3	5	52	GM							
09-Aug-2018	23:01	37	ST18904-ENV17		CHEM	70%	93	28	625770	4468198	625768	4468193	-2	-5	5	20	GM							
09-Aug-2018	23:31	38	ST18904-ENV16		MFA	60%	87	27	625470	4469323	625461	4469323	-9	0	9	88	GM							
09-Aug-2018	23:37	39	ST18904-ENV16		MFB	60%	87	27	625466	4469320	625461	4469323	-5	2	5	113	GM							
09-Aug-2018	23:43	40	ST18904-ENV16		No Sample	0%	87	27	625460	4469330	625461	4469323	1	-8	8	353	GM							
09-Aug-2018	23:48	41	ST18904-ENV16		CHEM	70%	87	27	625469	4469323	625461	4469323	-8	0	8	87	GM							
10-Aug-2018	08:28	42	ST18904-ENV21		MFA	55%	92	28	626559	4466458	626561	4466450	1	-8	8	349	SP							
10-Aug-2018	08:39	43	ST18904-ENV21		CHEM	70%	93	28	626558	4466441	626561	4466450	3	9	10	195	SP							
10-Aug-2018	09:06	44	ST18904-ENV21		MFB	75%	93	28	626561	4466449	626561	4466450	0	1	1	182	SP							
10-Aug-2018	09:44	45	ST18904-ENV20		MFA	60%	100	30	626976	4467775	626977	4467778	1	3	3	198	SP							
10-Aug-2018	10:02	46	ST18904-ENV20		CHEM	70%	100	30	626981	4467782	626977	4467778	-4	-4	6	43	CB							
10-Aug-2018	10:22	47	ST18904-ENV20		MFB	85%	100	30	626975	4467782	626977	4467778	2	-4	4	338	CB							
10-Aug-2018	10:53	48	ST18904-ENV19		No Sample	5%	101	31	627149	4468642	627142	4468639	-7	-3	8	67	CB							

Grey rows denote failed sampling attempts

APPENDIX A FIELD SAMPLING LOGS

Table A.5 Seabed Sampling Surveyors Logs

Gardline															Seafloor Sampling Positioning Summary									
Job No		11179							Vessel			MV Ocean Researcher												
Client		Equinor US Wind LLC							Vessel Reference Point (VRP)			CoG												
Project Name		Equinor Wind OCS-A 0512							Deployment Location			Starboard A-frame			x	8.96	y	-3.08	z	6.05				
Primary Positioning System		Starpack 1							Actual Coordinates derived from			Deployment Location												
Geodetic Reference System		Datum		NAD83		Ellipsoid		GRS 80		Projection		UTM zone 18N (75W)			Vertical / Tidal Datum		NAVD88							
Date	Time (UTC/GMT)	Fix number	Stn No	Penetration	Sample	Retention	Observed Seafloor Depth (feet)	Observed Seafloor Depth (m)	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks						
									Easting	Northing	Easting	Northing	dE	dN	Range	Bearing								
10-Aug-2018	11:03	49	ST18904-ENV19		No Sample	5%	101	31	627136	4468645	627142	4468639	6	-6	8	315	CB							
10-Aug-2018	11:22	50	ST18904-ENV19		MFA	75%	100	31	627160	4468622	627159	4468627	-1	5	7	172	CB	Target moved 20m SE						
10-Aug-2018	11:33	51	ST18904-ENV19		CHEM	75%	101	31	627159	4468634	627159	4468627	0	-7	5	2	CB							
10-Aug-2018	11:48	52	ST18904-ENV19		No Sample	10%	100	31	627161	4468628	627159	4468627	-2	-1	2	123	CB							
10-Aug-2018	11:56	53	ST18904-ENV19		MFB	60%	100	31	627159	4468632	627159	4468627	0	-5	3	357	CB							
10-Aug-2018	21:01	54	ST18904-ENV24		MFA	80%	95	29	628181	4465561	628182	4465555	1	-7	7	108	PJ							
10-Aug-2018	21:07	55	ST18904-ENV24		CHEM	70%	95	29	628185	4465559	628182	4465555	-3	-4	5	34	PJ							
10-Aug-2018	21:16	56	ST18904-ENV24		MFB	60%	95	29	628178	4465557	628182	4465555	4	-2	7	38	PJ							
10-Aug-2018	22:47	57	ST18904-ENV27		MFA	70%	106	32	629739	4464722	629734	4464721	-5	-1	5	80	PJ							
10-Aug-2018	22:53	58	ST18904-ENV27		CHEM	80%	106	32	629731	4464724	629734	4464721	3	-3	4	315	PJ							
10-Aug-2018	23:04	59	ST18904-ENV27		No Sample	5%	106	32	629731	4464720	629734	4464721	3	1	3	240	PJ							
10-Aug-2018	23:09	60	ST18904-ENV27		MFB	80%	106	32	629730	4464722	629734	4464721	4	-1	4	277	PJ							
11-Aug-2018	16:13	61	ST18904-ENV42		MFA	80%	110	34	637907	4460183	637910	4460185	4	1	4	247	PJ							
11-Aug-2018	16:24	62	ST18904-ENV42		No Sample	10%	110	34	637910	4460178	637910	4460185	0	7	7	180	PJ							
11-Aug-2018	16:32	63	ST18904-ENV42		CHEM	80%	110	34	637910	4460177	637910	4460185	0	8	8	180	PJ							
11-Aug-2018	16:40	64	ST18904-ENV42		MFB	90%	110	34	637906	4460192	637910	4460185	4	-7	8	331	PJ							
28-Aug-2018	17:03	65	ST18904-ENV23		MFA	95%	103	31	628721	4467073	628720	4467073	-1	0	1	111	PB							
28-Aug-2018	17:16	66	ST18904-ENV23		CHEM	65%	102	31	628723	4467079	628720	4467073	-3	-6	6	30	PB							
28-Aug-2018	17:26	67	ST18904-ENV23		MFB	60%	102	31	628719	4467075	628720	4467073	1	-2	2	334	PB							
28-Aug-2018	19:04	68	ST18904-ENV22		No Sample	10%	100	31	629106	4468385	629104	4468384	-2	-1	2	75	ES	Gravel						
28-Aug-2018	19:10	69	ST18904-ENV22		No Sample	30%	101	31	629106	4468384	629104	4468384	-2	0	2	85	ES	Gravel						
28-Aug-2018	19:16	70	ST18904-ENV22		No Sample	5%	101	31	629102	4468394	629104	4468384	2	-10	11	349	ES	Gravel						
30-Aug-2018	23:21	71	ST18904-ENV45		MFA	70%	117	36	639553	4459377	639559	4459380	6	3	6	243	PB							
30-Aug-2018	23:32	72	ST18904-ENV45		CHEM	70%	117	36	639551	4459382	639559	4459380	8	-2	9	281	PB							
30-Aug-2018	23:42	73	ST18904-ENV45		MFB	80%	117	36	639556	4459378	639559	4459380	3	2	3	239	PB							
03-Sep-2018	16:30	74	ST18904-ENV72		MFA	95%	103	31	628135	4468137	628134	4468137	-1	-1	1	60	PB							
03-Sep-2018	16:38	75	ST18904-ENV72		No Sample	10%	103	31	628134	4468137	628134	4468137	0	0	0	245	PB	Gravel						
03-Sep-2018	16:44	76	ST18904-ENV72		CHEM	90%	103	31	628136	4468137	628134	4468137	-3	0	3	85	PB							
03-Sep-2018	16:55	77	ST18904-ENV72		MFB	95%	103	31	628134	4468137	628134	4468137	0	0	1	66	PB							
03-Sep-2018	17:35	78	ST18904-ENV26		MFA	50%	103	31	630949	4466852	630949	4466852	0	0	0	299	PB							
03-Sep-2018	17:43	79	ST18904-ENV26		CHEM	50%	103	31	630949	4466851	630949	4466852	0	1	1	201	PB							
03-Sep-2018	17:54	80	ST18904-ENV26		MFB	50%	103	31	630950	4466852	630949	4466852	-1	0	1	96	PB							
03-Sep-2018	18:29	81	ST18904-ENV28		MFA	70%	105	32	632161	4467568	632160	4467571	-1	3	3	169	PB							
03-Sep-2018	18:38	82	ST18904-ENV28		CHEM	70%	105	32	632161	4467569	632160	4467571	-1	2	3	151	PB							
03-Sep-2018	18:49	83	ST18904-ENV28		MFB	70%	104	32	632159	4467570	632160	4467571	1	1	1	210	PB							
03-Sep-2018	23:07	84	ST18904-ENV25		MFB	30%	104	32	630873	4468050	630870	4468054	-3	3	5	137	PB	Gravel						
03-Sep-2018	23:15	85	ST18904-ENV25		MFA	40%	104	32	630874	4468059	630870	4468054	-4	-6	7	35	PB							
03-Sep-2018	23:22	86	ST18904-ENV25		No Sample	30%	104	32	630871	4468056	630870	4468054	0	-3	3	8	PB	Gravel						
03-Sep-2018	23:27	87	ST18904-ENV25		CHEM	50%	104	32	630871	4468054	630870	4468054	-1	0	1	74	PB							
03-Sep-2018	23:45	88	ST18904-ENV25		No Sample	20%	103	31	630876	4468055	630870	4468054	-5	-1	6	80	PB	Gravel						
04-Sep-2018	23:05	89	ST18904-ENV25		No Sample	10%	103	31	630876	4468057	630870	4468054	-6	-3	7	64	PB							
04-Sep-2018	01:36	90	ST18904-ENV47		MFA	80%	101	31	632547	4467093	632549	4467089	2	-4	4	336	PB							
04-Sep-2018	01:42	91	ST18904-ENV47		CHEM	80%	102	31	632547	4467093	632549	4467089	2	-4	4	332	PB							
04-Sep-2018	01:52	92	ST18904-ENV47		MFB	80%	101	31	632550	4467089	632549	4467089	-1	0	1	88	PB							
04-Sep-2018	03:36	93	ST18904-ENV29		MFA	60%	103	31	632293	4465389	632298	4465382	5	-7	8	324	PB							
04-Sep-2018	03:42	94	ST18904-ENV29		CHEM	60%	103	31	632300	4465383	632298	4465382	-2	-1	2	60	PB							
04-Sep-2018	03:57	95	ST18904-ENV29		MFB	70%	103	31	632303	4465387	632298	4465382	-5	-5	7	42	PB							
04-Sep-2018	05:19	96	ST18904-ENV30		MFA	80%	106	32	631519	4463860	631519	4463859	0	-1	1	21	TK							

Grey rows denote failed sampling attempts

APPENDIX A FIELD SAMPLING LOGS

Table A.5 Seabed Sampling Surveyors Logs

Gardline															Seafloor Sampling Positioning Summary									
Job No		11179						Vessel				MV Ocean Researcher												
Client		Equinor US Wind LLC						Vessel Reference Point (VRP)				CoG												
Project Name		Equinor Wind OCS-A 0512						Deployment Location				Starboard A-frame				x	8.96	y	-3.08	z	6.05			
Primary Positioning System		Starpac 1						Actual Coordinates derived from				Deployment Location												
Geodetic Reference System		Datum		NAD83		Ellipsoid		GRS 80		Projection		UTM zone 18N (75W)				Vertical / Tidal Datum		NAVD88						
Date	Time (UTC/GMT)	Fix number	Stn No	Penetration	Sample	Retention	Observed Seafloor Depth (feet)	Observed Seafloor Depth (m)	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks						
									Easting	Northing	Easting	Northing	dE	dN	Range	Bearing								
04-Sep-2018	05:27	97	ST18904-ENV30		MFB	70%	106	32	631522	4463862	631519	4463859	-3	-3	4	42	TK							
04-Sep-2018	05:34	98	ST18904-ENV30		CHEM	70%	107	33	631521	4463861	631519	4463859	-2	-2	3	45	TK							
04-Sep-2018	07:21	99	ST18904-ENV33		MFA	80%	107	33	633051	4462870	633046	4462870	-4	-1	4	83	TK							
04-Sep-2018	07:27	100	ST18904-ENV33		CHEM	70%	107	32	633049	4462869	633046	4462870	-3	1	3	110	TK							
04-Sep-2018	07:38	101	ST18904-ENV33		MFB	70%	106	32	633050	4462872	633046	4462870	-3	-2	4	61	TK							
04-Sep-2018	09:19	102	ST18904-ENV36		MFA	80%	108	33	634678	4462021	634678	4462024	0	3	3	181	TK							
04-Sep-2018	09:28	103	ST18904-ENV36		CHEM	70%	107	33	634679	4462022	634678	4462024	-1	2	2	145	TK							
04-Sep-2018	09:40	104	ST18904-ENV36		MFB	70%	108	33	634680	4462020	634678	4462024	-2	4	4	153	TK							
05-Sep-2018	23:23	105	ST18904-ENV32		MFA	70%	108	33	633928	4465118	633921	4465118	-7	0	7	93	PB							
05-Sep-2018	23:34	106	ST18904-ENV32		CHEM	70%	108	33	633926	4465122	633921	4465118	-6	-4	6	120	PB							
05-Sep-2018	23:44	107	ST18904-ENV32		No Sample	30%	108	33	633916	4465120	633921	4465118	5	-2	6	288	PB	Gravel						
05-Sep-2018	23:50	108	ST18904-ENV32		MFB	80%	108	33	633925	4465122	633921	4465118	-4	-3	5	53	PB							
06-Sep-2018	01:35	109	ST18904-ENV31		MFA	80%	98	30	634200	4467332	634200	4467328	0	-4	4	359	PB							
06-Sep-2018	01:40	110	ST18904-ENV31		CHEM	70%	97	30	634201	4467332	634200	4467328	-1	-4	4	18	PB							
06-Sep-2018	01:49	111	ST18904-ENV31		MFB	80%	97	30	634195	4467334	634200	4467328	5	-6	8	317	ES							
06-Sep-2018	03:35	112	ST18904-ENV34		MFA	60%	103	31	636276	4466789	636279	4466785	4	-4	5	315	PB							
06-Sep-2018	03:42	113	ST18904-ENV34		CHEM	60%	103	31	636280	4466790	636279	4466785	-1	-5	5	8	PB							
06-Sep-2018	03:51	114	ST18904-ENV34		MFB	70%	103	31	636281	4466789	636279	4466785	-2	-4	4	23	PB							
06-Sep-2018	05:06	115	ST18904-ENV37		No Sample	20%	109	33	637463	4466380	637462	4466382	-1	2	3	151	TK							
06-Sep-2018	05:12	116	ST18904-ENV37		No Sample	10%	108	33	637462	4466381	637462	4466382	0	1	1	205	TK							
06-Sep-2018	05:18	117	ST18904-ENV37		No Sample	40%	109	33	637461	4466381	637462	4466382	1	1	1	248	TK	Moving 10m off target for retest						
06-Sep-2018	05:30	118	ST18904-ENV37		No Sample	0%	109	33	637452	4466384	637462	4466382	10	-2	11	280	TK							
06-Sep-2018	06:43	119	ST18904-ENV35		MFA	80%	107	33	635599	4464922	635597	4464927	-2	5	6	156	TK							
06-Sep-2018	06:49	120	ST18904-ENV35		CHEM	70%	107	33	635595	4464927	635597	4464927	2	0	2	287	TK							
06-Sep-2018	06:58	121	ST18904-ENV35		MFB	70%	107	33	635598	4464926	635597	4464927	-1	1	2	138	TK							
06-Sep-2018	08:29	122	ST18904-ENV38		MFA	70%	113	34	637301	4463871	637300	4463868	-1	-3	3	16	TK							
06-Sep-2018	08:42	123	ST18904-ENV38		CHEM	60%	113	34	637302	4463876	637300	4463868	-2	-8	8	12	TK							
06-Sep-2018	09:01	124	ST18904-ENV38		MFB	70%	112	34	637302	4463866	637300	4463868	-2	2	3	134	TK							
07-Oct-2018	18:32	125	ST18904-ENV5		MFA	70%	131	40	653073	4456717	653069	4456716	-4	-1	4	82	SO							
07-Oct-2018	18:37	126	ST18904-ENV5		CHEM	85%	131	40	653071	4456717	653069	4456716	-2	-1	2	72	SO							
07-Oct-2018	18:53	127	ST18904-ENV5		MFB	80%	131	40	653069	4456716	653069	4456716	0	0	1	39	SO							
07-Oct-2018	20:26	128	ST18904-ENV68		MFA	80%	134	41	654724	4457298	654724	4457299	0	1	1	176	SO							
07-Oct-2018	20:42	129	ST18904-ENV68		CHEM	70%	134	41	654721	4457297	654724	4457299	3	2	4	240	SO							
07-Oct-2018	21:05	130	ST18904-ENV68		MFB	70%	134	41	654715	4457297	654724	4457299	9	2	9	258	SO							
07-Oct-2018	23:03	131	ST18904-ENV65		MFA	80%	133	41	652990	4457951	652990	4457951	0	0	0	356	SO							
07-Oct-2018	23:12	132	ST18904-ENV65		CHEM	80%	133	41	652992	4457952	652990	4457951	-2	-2	2	49	SO							
07-Oct-2018	23:25	133	ST18904-ENV65		MFA	80%	133	41	652993	4457952	652990	4457951	-3	-1	3	61	SO							
24-Nov-2018	06:43	134	ST18904-ENV70		MFA	80%	129	39	657921	4461706	657916	4461710	-5	4	6	127	CB							
24-Nov-2018	06:52	135	ST18904-ENV70		CHEM	90%	129	39	657918	4461714	657916	4461710	-2	-4	4	24	CB							
24-Nov-2018	07:04	136	ST18904-ENV70		MFB	60%	129	39	657918	4461714	657916	4461710	-2	-4	4	23	CB							
24-Nov-2018	09:09	137	ST18904-ENV61		MFA	80%	128	39	651843	4462104	651843	4462100	0	-4	4	359	CB							
24-Nov-2018	09:19	138	ST18904-ENV61		MFB	70%	128	39	651841	4462107	651843	4462100	2	-7	7	343	CB							
24-Nov-2018	09:31	139	ST18904-ENV61		CHEM	80%	129	39	651840	4462108	651843	4462100	3	-8	8	342	CB							
24-Nov-2018	11:25	140	ST18904-ENV59		MFA	80%	129	39	649529	4459257	649523	4459254	-6	-4	7	59	CB							
24-Nov-2018	11:36	141	ST18904-ENV59		CHEM	70%	129	39	649531	4459249	649523	4459254	-8	5	9	120	CB							
24-Nov-2018	11:47	142	ST18904-ENV59		MFB	90%	129	39	649523	4459264	649523	4459254	0	-10	10	359	CB							
24-Nov-2018	13:58	143	ST18904-ENV66		MFA	70%	135	41	651139	4453403	651140	4453402	1	-1	1	304	CB							
24-Nov-2018	14:06	144	ST18904-ENV66		MFB	70%	135	41	651141	4453409	651140	4453402	-1	-7	7	10	CB							

Grey rows denote failed sampling attempts

APPENDIX A FIELD SAMPLING LOGS

Table A.5 Seabed Sampling Surveyors Logs

Gardline														Seafloor Sampling Positioning Summary									
Job No		11179							Vessel			MV Ocean Researcher											
Client		Equinor US Wind LLC							Vessel Reference Point (VRP)			CoG											
Project Name		Equinor Wind OCS-A 0512							Deployment Location			Starboard A-frame			x	8.96	y	-3.08	z	6.05			
Primary Positioning System		Starpack 1							Actual Coordinates derived from			Deployment Location											
Geodetic Reference System		Datum		NAD83			Ellipsoid		GRS 80		Projection		UTM zone 18N (75W)			Vertical / Tidal Datum		NAVD88					
Date	Time (UTC/GMT)	Fix number	Stn No	Penetration	Sample	Retention	Observed Seafloor Depth (feet)	Observed Seafloor Depth (m)	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks					
									Easting	Northing	Easting	Northing	dE	dN	Range	Bearing							
24-Nov-2018	14:15	145	ST18904-ENV66		CHEM	70%	135	41	651137	4453406	651140	4453402	3	-4	5	324	CB						
24-Nov-2018	16:28	146	ST18904-ENV57		MFA	60%	128	39	646013	4455709	646017	4455709	4	1	4	262	CB						
24-Nov-2018	16:37	147	ST18904-ENV57		CHEM	80%	128	39	646018	4455710	646017	4455709	-1	-1	2	53	CB						
24-Nov-2018	16:48	148	ST18904-ENV57		MFB	80%	127	39	646020	4455703	646017	4455709	-3	7	7	153	CB						
24-Nov-2018	18:43	149	ST18904-ENV51		MFA	60%	118	36	642771	4457501	642774	4457500	3	-1	4	289	ES						
24-Nov-2018	18:53	150	ST18904-ENV51		CHEM	70%	118	36	642769	4457493	642774	4457500	6	7	9	221	ES						
24-Nov-2018	19:04	151	ST18904-ENV51		MFB	70%	117	36	642769	4457495	642774	4457500	5	4	7	228	ES						
24-Nov-2018	20:55	152	ST18904-ENV53		MFA	60%	120	37	646318	4461098	646327	4461095	9	-3	10	286	ES						
24-Nov-2018	21:02	153	ST18904-ENV53		CHEM	80%	120	37	646323	4461095	646327	4461095	4	0	4	277	ES						
24-Nov-2018	21:44	154	ST18904-ENV53		MFB	90%	121	37	646304	4461106	646327	4461095	23	-11	24	297	ES	Target tolerance set to 25m					
25-Nov-2018	22:49	155	ST18904-ENV55		No Sample	-	120	37	648896	4463824	648901	4463825	5	1	5	256	ES	Stone in jaws					
25-Nov-2018	22:56	156	ST18904-ENV55		No Sample	-	120	36	648891	4463825	648901	4463825	10	0	10	270	ES	Grab failed to trigger					
25-Nov-2018	22:58	157	ST18904-ENV55		MFA	70%	120	37	648894	4463828	648901	4463825	7	-3	7	297	ES						
25-Nov-2018	23:06	158	ST18904-ENV55		CHEM	70%	120	37	648898	4463824	648901	4463825	3	1	3	254	ES						
25-Nov-2018	23:17	159	ST18904-ENV55		MFB	70%	120	37	648896	4463826	648901	4463825	5	-1	5	288	ES						
26-Nov-2018	00:43	160	ST18904-ENV52		MFA	90%	119	36	647090	4464246	647098	4464248	8	2	8	257	ES						
26-Nov-2018	00:50	161	ST18904-ENV52		CHEM	80%	119	36	647094	4464246	647098	4464248	4	2	7	175	ES						
26-Nov-2018	00:58	162	ST18904-ENV52		MFB	80%	119	36	647094	4464248	647098	4464248	4	0	4	271	ES						
26-Nov-2018	02:17	163	ST18904-ENV49		No Sample	-	121	37	643998	4464610	644001	4464610	3	0	3	265	ES	Stone in jaws					
26-Nov-2018	02:22	164	ST18904-ENV49		MFA	80%	121	37	644002	4464611	644001	4464610	-1	-1	1	53	ES						
26-Nov-2018	02:30	165	ST18904-ENV49		CHEM	90%	121	37	643995	4464614	644001	4464610	6	-4	7	302	ES						
26-Nov-2018	02:39	166	ST18904-ENV49		No Sample	-	121	37	644001	4464609	644001	4464610	0	1	1	174	ES	Stone in jaws					
26-Nov-2018	02:46	167	ST18904-ENV49		MFB	90%	121	37	643998	4464603	644001	4464610	3	7	8	199	ES						
26-Nov-2018	04:03	168	ST18904-ENV46		MFA	80%	116	35	643493	4465099	643492	4465093	-1	-6	6	12	ES						
26-Nov-2018	04:10	169	ST18904-ENV46		CHEM	90%	116	35	643489	4465096	643492	4465093	3	-2	4	310	ES						
26-Nov-2018	04:21	170	ST18904-ENV46		MFB	80%	116	35	643492	4465094	643492	4465093	0	0	0	2	ES						
26-Nov-2018	06:04	171	ST18904-ENV44		MFA	60%	118	36	640990	4461973	640990	4461982	0	9	9	181	CB						
26-Nov-2018	06:11	172	ST18904-ENV44		CHEM	50%	118	36	640994	4461976	640990	4461982	-4	6	7	144	CB						
26-Nov-2018	06:22	173	ST18904-ENV44		MFB	60%	118	36	640990	4461979	640990	4461982	0	3	3	176	CB						
26-Nov-2018	07:57	174	ST18904-ENV39		MFA	50%	113	35	636022	4461755	636023	4461760	1	5	5	189	CB						
26-Nov-2018	08:07	175	ST18904-ENV39		CHEM	50%	113	34	636020	4461759	636023	4461760	3	1	3	259	CB						
26-Nov-2018	08:18	176	ST18904-ENV39		No Sample	-	113	35	636024	4461755	636023	4461760	-1	5	5	166	CB						
26-Nov-2018	08:24	177	ST18904-ENV39		MFB	50%	113	35	636027	4461753	636023	4461760	-4	7	8	146	CB						
26-Nov-2018	10:05	178	ST18904-ENV41		MFA	80%	108	33	639490	4462737	639495	4462739	5	2	5	246	CB						
26-Nov-2018	10:12	179	ST18904-ENV41		CHEM	60%	107	33	639488	4462739	639495	4462739	7	0	7	269	CB						
26-Nov-2018	10:27	180	ST18904-ENV41		MFB	70%	108	33	639489	4462744	639495	4462739	6	-5	8	311	CB						
26-Nov-2018	12:10	181	ST18904-ENV43		No Sample	-	119	36	639774	4464941	639781	4464941	7	0	7	272	CB						
26-Nov-2018	12:17	182	ST18904-ENV43		MFA	50%	118	36	639779	4464946	639781	4464941	2	-5	5	332	CB						
26-Nov-2018	12:23	183	ST18904-ENV43		CHEM	50%	119	36	639773	4464944	639781	4464941	8	-3	9	288	CB						
26-Nov-2018	12:33	184	ST18904-ENV43		No Sample	30%	119	36	639777	4464947	639781	4464941	4	-6	7	323	CB						
26-Nov-2018	12:40	185	ST18904-ENV43		MFB	60%	119	36	639775	4464941	639781	4464941	6	0	6	274	CB						
26-Nov-2018	14:08	186	ST18904-ENV40		MFA	70%	112	34	639867	4465883	639872	4465877	5	-6	8	323	CB						
26-Nov-2018	14:15	187	ST18904-ENV40		CHEM	80%	112	34	639870	4465877	639872	4465877	2	0	2	272	CB						
26-Nov-2018	14:25	188	ST18904-ENV40		MFB	80%	112	34	639872	4465875	639872	4465877	0	2	2	170	CB						
26-Nov-2018	16:22	189	ST18904-ENV50		MFA	90%	123	38	644609	4461222	644322	4461209	-287	-14	19	315	CB						
26-Nov-2018	16:30	190	ST18904-ENV50		CHEM	90%	123	38	644314	4461213	644322	4461209	9	-4	10	296	CB						
26-Nov-2018	16:53	191	ST18904-ENV50		MFB	60%	123	37	644315	4461218	644322	4461209	7	-10	12	324	CB						
30-Nov-2018	05:09	192	ST18904-ENV48		MFA	60%	125	38	641359	4458666	641355	4458666	-4	0	4	87	CB						

Grey rows denote failed sampling attempts

APPENDIX A FIELD SAMPLING LOGS

Table A.5 Seabed Sampling Surveyors Logs

Gardline														Seafloor Sampling Positioning Summary									
Job No		11179							Vessel				MV Ocean Researcher										
Client		Equinor US Wind LLC							Vessel Reference Point (VRP)				CoG										
Project Name		Equinor Wind OCS-A 0512							Deployment Location				Starboard A-frame			x	8.96	y	-3.08	z	6.05		
Primary Positioning System		Starpack 1							Actual Coordinates derived from				Deployment Location										
Geodetic Reference System		Datum		NAD83			Ellipsoid		GRS 80		Projection		UTM zone 18N (75W)			Vertical / Tidal Datum			NAVD88				
Date	Time (UTC/GMT)	Fix number	Stn No	Penetration	Sample	Retention	Observed Seafloor Depth (feet)	Observed Seafloor Depth (m)	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks					
									Easting	Northing	Easting	Northing	dE	dN	Range	Bearing							
30-Nov-2018	05:17	193	ST18904-ENV48		CHEM	80%	125	38	641362	4458663	641355	4458666	-7	3	8	113	CB						
30-Nov-2018	05:28	194	ST18904-ENV48		MFB	60%	125	38	641359	4458667	641355	4458666	-4	-1	4	78	CB						
30-Nov-2018	07:16	195	ST18904-ENV54		MFA	60%	132	40	644539	4456642	644532	4456638	-7	-4	8	61	CB						
30-Nov-2018	07:24	196	ST18904-ENV54		CHEM	50%	132	40	644533	4456633	644532	4456638	-1	5	5	169	CB						
30-Nov-2018	07:35	197	ST18904-ENV54		MFB	50%	132	40	644533	4456631	644532	4456638	-1	7	7	169	CB						
30-Nov-2018	09:12	198	ST18904-ENV60		MFA	50%	130	40	647644	4454815	647638	4454814	-5	-1	5	83	CB						
30-Nov-2018	09:21	199	ST18904-ENV60		CHEM	80%	130	40	647642	4454812	647638	4454814	-3	3	4	131	CB						
30-Nov-2018	09:31	200	ST18904-ENV60		MFB	70%	130	40	647642	4454816	647638	4454814	-4	-1	4	73	CB						
30-Nov-2018	11:02	201	ST18904-ENV63		No Sample	No Sample	133	41	649268	4453918	649260	4453919	-8	2	8	101	CB						
30-Nov-2018	11:08	202	ST18904-ENV63		MFA	50%	133	41	649266	4453921	649260	4453919	-6	-1	6	76	CB						
30-Nov-2018	11:16	203	ST18904-ENV63		No Sample	No Sample	133	41	649263	4453916	649260	4453919	-3	3	4	135	CB						
30-Nov-2018	11:22	204	ST18904-ENV63		CHEM	70%	133	41	649267	4453919	649260	4453919	-7	1	7	96	CB						
30-Nov-2018	11:32	205	ST18904-ENV63		MFB	70%	133	40	649266	4453922	649260	4453919	-6	-3	7	65	CB						
30-Nov-2018	13:20	206	ST18904-ENV69		MFA	70%	136	42	652503	4452133	652502	4452129	-1	-4	4	15	CB						
30-Nov-2018	13:28	207	ST18904-ENV69		CHEM	70%	136	41	652501	4452126	652502	4452129	1	3	3	201	CB						
30-Nov-2018	13:37	208	ST18904-ENV69		MFB	80%	136	42	652501	4452126	652502	4452129	1	3	3	201	CB						
30-Nov-2018	15:17	209	ST18904-ENV62		MFA	50%	128	39	651261	4458607	651257	4458602	-5	-5	7	45	CB						
30-Nov-2018	15:25	210	ST18904-ENV62		CHEM	70%	128	39	651262	4458600	651257	4458602	-5	2	5	110	CB						
30-Nov-2018	15:34	211	ST18904-ENV62		MFB	80%	128	39	651257	4458603	651257	4458602	0	-1	1	17	CB						
30-Nov-2018	17:11	212	ST18904-ENV56		MFA	80%	125	38	647786	4459913	647790	4459905	3	-8	8	336	ES						
30-Nov-2018	17:18	213	ST18904-ENV56		CHEM	60%	125	38	647790	4459907	647790	4459905	0	-1	1	14	ES						
30-Nov-2018	17:30	214	ST18904-ENV56		MFB	80%	125	38	647794	4459907	647790	4459905	-4	-1	4	74	ES						
30-Nov-2018	19:11	215	ST18904-ENV58		MFA	70%	126	38	650703	4463399	650704	4463402	1	3	3	198	TK						
30-Nov-2018	19:17	216	ST18904-ENV58		CHEM	80%	126	38	650704	4463397	650704	4463402	0	5	5	178	TK						
30-Nov-2018	19:24	217	ST18904-ENV58		MFB	80%	126	38	650705	4463399	650704	4463402	-1	3	3	156	TK						
30-Nov-2018	20:52	218	ST18904-ENV64		MFA	70%	127	39	654315	4462560	654310	4462556	-5	-4	6	51	ES						
30-Nov-2018	20:59	219	ST18904-ENV64		CHEM	90%	128	39	654308	4462552	654310	4462556	2	4	5	202	ES						
30-Nov-2018	21:09	220	ST18904-ENV64		MFB	70%	127	39	654312	4462554	654310	4462556	-2	2	3	126	ES						
30-Nov-2018	22:23	221	ST18904-ENV67		MFA	90%	129	39	656116	4462228	656114	4462233	-2	5	5	161	TK						
30-Nov-2018	22:30	222	ST18904-ENV67		CHEM	90%	129	39	656115	4462236	656114	4462233	-1	-3	3	15	TK						
30-Nov-2018	22:38	223	ST18904-ENV67		MFB	80%	129	39	656113	4462231	656114	4462233	1	2	2	195	TK						
01-Dec-2018	00:28	224	ST18904-ENV71		MFA	80%	132	40	659714	4461286	659719	4461287	5	2	5	252	ES						
01-Dec-2018	00:34	225	ST18904-ENV71		CHEM	80%	132	40	659719	4461283	659719	4461287	0	4	4	178	ES						
01-Dec-2018	00:44	226	ST18904-ENV71		MFB	70%	132	40	659719	4461287	659719	4461287	1	0	1	253	ES						

Grey rows denote failed sampling attempts

APPENDIX B METHODS

B.1 Seabed Sampling

Benthic samples were recovered using a stainless-steel, 0.1m² Day grab which had been modified in-house. The modification, shown in

Figure B.1, incorporated guides for the cables to prevent them becoming trapped during triggering. The grab carried extra weights to aid penetration on impact and an extended bucket lip to reduce sediment washout. Storm feet and elastic straps were used to reduce the likelihood of the instrument pre-triggering in the water column during deployment.

Figure B.1 Modified Day Grab



Left: The modified 0.1m² Day grab.

Above (inset): The modification to the grab incorporated guides for the cables to prevent them from becoming trapped as the grab triggers.

Prior to deployment the vessel's sampling area was cleaned using a powerful deck fire-hose and seawater. The grab was washed thoroughly prior to every station and a dyneema rope was used to lower the Day grab to the seabed.

Once directly over the target location the grab was lowered to the seabed and then quickly recovered so that the sample could be obtained and the apparatus returned to the pre-deployment position. Positional fixes were captured immediately for each grab sample when the grab reached the sea floor. The precise time that the grab reached the seabed was determined by observations of the tension on the winch cable.

On recovery of a sample, the grab was examined for acceptability following strict quality assurance criteria. In the following cases, a grab sample was rejected and the instrument returned to the pre-deployment position:

- 1 Jammed jaws due to a large stone or shell allowing sediment washout
- 2 One or both of the bucket doors open on recovery, causing possible surface washout
- 3 Half sample obtained where the grab had not struck a flat area of bottom, or not hit true, causing a side or half bite of sediment
- 4 Disruption of the sample by obvious shaking or contamination (these can occur when a sample is badly handled or if the grab strikes the side of the vessel during operations)
- 5 The grab was less than 50% full or totally filled the grab. The latter potentially allowing the sample to overflow the grab or for the surface sediments to come into contact with the lids

Brief descriptions of the collected sediments were made at the time of sampling. These were recorded in the environmentalist's log sheets and are presented in Appendix A. A selection of photographs, taken of the sediment samples whilst still in the Day grab, is presented in Appendix E.

Sediment samples collected for physico-chemical analysis (CHEM) were sub-sampled into the relevant containers. All containers were labeled externally and hydrocarbons containers were thoroughly washed with the appropriate solvents prior to use. A plastic scoop was used to obtain two sub-samples: one for PSA and one as a spare sample. These were placed in double-lined zip-lock bags. All physico-chemical samples were transferred to an onboard freezer for storage at less than -18°C.

Sediment samples collected for faunal analyses (MFA and MFB) were thoroughly washed from the grab into a plastic tray. Once all of the equipment was washed free of sediment, the sediment sample was transferred to a sieving machine where it was broken down using a low powered seawater spray. All materials retained by the 0.5mm mesh sieve were transferred to a squat jar or bucket by means of a scoop and funnel, making sure that none of the sample was lost or trapped in the mesh. The sample was fixed with a pre-buffered <20% formalin solution of known concentration, then subsequently diluted to a final concentration of approximately 4% formalin. Biological samples were placed in 1 liter polypropylene screw-top squat jars or 5 liter buckets, depending on sample size, and provided with an additional internal waterproof label.

At the end of the survey all retained samples were delivered to the relevant laboratories for analysis. Physico-chemical sub-samples were kept frozen and biological samples stored at room temperature. One physico-chemical sub-sample from each station was then sent frozen, in cool boxes kept cool with ice packs, along with two biological samples, to their respective analytical sub-contractors (see Section B.2). Spares of the physico-chemical sub-sample from each station was stored frozen and one biological sample from each station stored at room temperature. Spare samples are retained at Alpine's head office for at least six months after which time the client is contacted to advise on appropriate disposal, continued storage or dispatch to a destination of the client's choice.

B.2 Sample Analysis

Sediment and faunal samples were analyzed by the following laboratories:

- PSA, Sediment total organic matter (TOM) were carried out by TerraSence, LLC, Totowa, NJ, USA.

- Benthic macrofaunal identification was undertaken by EcoAnalysts, Inc., Moscow, ID, USA.

The laboratories detailed above meet quality control requirements exacted by Gardline's internal procedures (BS/EN/ISO 9001:2008; BSI, 2008).

B.3 Particle Size Analysis

Sediments from each sample were analyzed by a combination of sieving and laser diffraction.

The results, given in full in Appendix F and summarized in Section 2.4.1, present the following sample statistics calculated using method of moments (MoM) based on logarithmic grain size (i.e., using the phi scale); mean grain size, sorting (standard deviation), skewness and kurtosis (Krumbein & Pettijohn, 1938). These indices are described below. Mean grain size is also given geometrically (in μm). Size classes, including the mean and mode(s) are named (such as medium sand), according to sediment descriptors given in Table B.1, which are modified from Udden (1914) and Wentworth (1922). Sediment samples are also classified using the Folk triangle classification (presented in Appendix F), which uses the ratio of sand to mud (<63 μm , silt and clay) and the percentage of gravel sized-material (>2mm) (Folk, 1954).

- 1 Mean ($\bar{x}_\phi$) (First moment) =

$$\sum_{i=1}^n f_i M_{i\phi}$$

Where f_i = fraction of total weight in each class interval

$M_{i\phi}$ = midpoint of each class interval in phi units

- 2 Standard deviation (S_ϕ) (Second moment) =

$$\left[\sum_{i=1}^n f_i (M_{i\phi} - \bar{x}_\phi)^2 \right]^{1/2}$$

The second moment has been used as a measure of the degree of sorting. Sorting statistics are then ascribed physical descriptions (such as moderately sorted), derived from Folk and Ward (1957). Sorting classifications are presented in Table B.2.

- 3 Skewness (Sk_ϕ) (Third moment) =

$$\sum_{i=1}^n \frac{f_i (M_{i\phi} - \bar{x}_\phi)^3}{S_\phi^3}$$

The third moment has been used as a measure of the degree of asymmetry of a frequency or cumulative curve. Positive numbers indicate a fine skewed sediment, while negative numbers indicate coarse skewed sediment. Skewness classifications are given in Table B.3.

- 4 Kurtosis (K_ϕ) (Fourth moment) =

$$\sum_{i=1}^n \frac{f_i (M_{i\phi} - \bar{x}_\phi)^4}{S_\phi^4}$$

The fourth moment has been used as a measure of the 'peakness' of the distribution. When ascribed to statistics calculated by logarithmic MoM, values of <1.7 are considered very platykurtic or flat 'peaked', while values >7.4 are considered very leptokurtic or excessively 'peaked' (Blott, 2010). Kurtosis classifications according to Blott (2010) are given in Table B.4.

Table B.1 Phi and Sieve Aperture with Sediment Descriptions

Aperture in microns	Aperture in Phi Unit	Sediment Description	
<63500 to 50800	<-6 to -5.7	Very Coarse Gravel	GRAVEL
<50800 to 38100	<-5.7 to -5.3		
<38100 to 31800	<-5.3 to -5		
<31800 to 15900	<-5 to -4	Coarse Gravel	
<15900 to 12700	<-4 to -3.7	Medium Gravel	
<12700 to 7900	<-3.7 to -3		
<7900 to 6400	<-3 to -2.7	Fine Gravel	
<6400 to 4000	<-2.7 to -2		
<4000 to 2800	>-2 to -1.5	Very Fine Gravel	
<2800 to 2000	>-1.5 to -1		
<2000 to 1400	>-1 to -0.5	Very Coarse Sand	SAND
<1400 to 1000	>-0.5 to 0		
<1000 to 710	>0 to 0.5	Coarse Sand	
<710 to 500	>0.5 to 1		
<500 to 355	>1 to 1.5	Medium Sand	
<355 to 250	>1.5 to 2		
<250 to 180	>2 to 2.5	Fine Sand	
<180 to 125	>2.5 to 3		
<125 to 90	>3 to 3.5	Very Fine Sand	
<90 to 63	>3.5 to 4		
<63 to 44	>4 to 4.5	Very Coarse Silt	FINES
<44 to 31.5	>4.5 to 5		
<31.5 to 22	>5 to 5.5	Coarse Silt	
<22 to 15.6	>5.5 to 6		
<15.6 to 11	>6 to 6.5	Medium Silt	
<11 to 7.8	>6.5 to 7		
<7.8 to 5.5	>7 to 7.5	Fine Silt	
<5.5 to 3.9	>7.5 to 8		
<3.9 to 2.8	>8 to 8.5	Very Fine Silt	
<2.8 to 2	>8.5 to 9		
<2 to 1.4	>9 to 9.5	Clay	
<1.4 to 1	>9.5 to 10		
<1	>10		

Table B.2 Sorting Classifications for use with Logarithmic Method of Moments

Sorting Coefficient (Graphical Standard Deviation)	Sorting Classifications
0 < 0.35	Very well sorted
0.35 < 0.50	Well sorted
0.50 < 0.71	Moderately well sorted
0.71 < 1.00	Moderately sorted
1.00 < 2.00	Poorly sorted
2.00 < 4.00	Very poorly sorted
4.00	Extremely poorly sorted

Table B.3 Skewness Classification for use with Logarithmic Method of Moments

Skewness Coefficient	Mathematical Skewness	Graphical Skewness
> 1.30	Strongly Positive	Very fine skewed
>0.43 to 1.30	Positive	Fine skewed
>-0.43 to 0.43	Near Symmetrical	Symmetrical
>-1.30 to -0.43	Negative	Coarse skewed
≤-1.30	Strongly Negative	Very coarse skewed

Table B.4 Kurtosis Classification for use with Logarithmic Method of Moments

Kurtosis Coefficient	Kurtosis Classification	Graphical meaning
< 1.70	Very Platykurtic	Flat-peaked; the ends are better sorted than the center
1.70 to <2.55	Platykurtic	
2.55 to <3.70	Mesokurtic	Normal; bell shaped curve
3.70 to <7.40	Leptokurtic	Curves are excessively peaked; the center is better sorted than the ends
≥7.40	Very Leptokurtic	

B.4 Total Organic Matter and Water Content

B.4.1 Total Organic Matter

A 1g air-dried and ground (particle size <118µm) sample was placed in a crucible and dried in an oven at 110±5°C until constant weight was achieved. The weight was recorded after drying to the nearest 0.1% and the sample placed in a desiccator to cool. The sample was then transferred to a cold muffle furnace and heated to 440°C. After four hours the crucible was removed from the furnace and allowed to cool to room temperature in a desiccator. The crucible was then reweighed and the loss on ignition (LOI) calculated and reported as a percentage of the original sample mass.

LOI was calculated as follows:

$$\text{Total Organic Matter} = \frac{b - f}{b} \times 100\%(^w/w)$$

Where b = weight of dried analysis sample (g)

f = weight of residue after ignition (g)

B.4.2 Water Content

A test specimen is dried in an oven at a temperature of 110±5°C to a constant mass. The loss of mass due to drying is considered to be water. The water content is calculated using the mass of water and the mass of the dry specimen.

Water content was calculated as follows:

$$\text{Water Content} = \frac{M_w}{M_s} \times 100$$

Where M_w = mass of water (g)

M_s = mass of oven dry specimen (g)

B.5 Macrofaunal Analysis

B.5.1 Sorting and Identification

In the laboratory, samples were gently washed across a 1mm sieve to remove any sediment fines and preservative. The retained material was sorted by hand to extract all macrofauna. The organisms were identified and counted to produce a species list for each grab sample. The whole sample was processed without sub-sampling.

B.5.2 Data Set Rationalization

The faunal data set was rationalized according to the standard (GGL, 2017) procedure, which is largely based on British Standard ISO16665:2005 (BSI, 2005) and OSPAR (2017) guidelines.

Immature Individuals

The inclusion of immature individuals in data sets is a contentious issue. Only when the following conditions were satisfied was an organism recorded as an immature individual:

- Organisms that were too small or immature to be identified to species were identified to the lowest possible taxonomic level and recorded as juveniles.
- The organism was in a pre-adult life stage e.g. megalopa, praniza, etc.
- For large-bodied (>4cm) species of echinoderm and bivalve, the organism was less than 10% of the maximum body size reported in the literature.

In accordance with ISO16665:2005 guidelines, immature individuals are recorded separately in the faunal list in Appendix G. Immature individuals were included in the analysed data set at the lowest achievable taxonomic level. In the first instance, statistical analyses were performed after counts of immature individuals of known species had been combined with adult records of that same species. If one or more of the immature taxa or species that included immature records, were among the ten most dominant, then a RELATE analysis was carried out to compare the data sets with and without immature individuals to determine if discussion of both sets separately is required. If the two data sets are found to be at least 95% similar, then the immature individuals are included in the data set for all further multivariate analyses and discussion. Alternatively, the multivariate analyses are additionally performed following exclusion of all immature records in order to illustrate their influence.

Damaged Specimens

Destructive sampling techniques and sieving may damage delicate benthic organisms. It is, therefore, commonplace for fragmented organisms to be found in faunal samples. The following conditions were applied to the recording of damaged specimens and fragments:

- Fragments that constituted a major component of an individual, that unequivocally represented the presence of an entire organism, and that could be identified to species level, were recorded and included with other counts of that species. Examples include: the heads of polychaetes and crustaceans; the complete mouth structure or central disk of brittle stars; the oral area/feeding tentacles of holothurians.
- Fragments that constituted a significant component of an individual, that unequivocally represented the presence of an entire organism, but that could not be identified to species by virtue of their incompleteness, were recorded to the lowest possible taxonomic level.
- Fragments that did not unequivocally represent the presence of an entire organism were ignored, *e.g. Aphiura* arms, *Echinocardium* shell fragments, etc.

Recorded fragments, therefore, represent discrete observations of individuals that were present at the time of sampling and were included in the analyzed data set.

Treatment of Specific Groups of Organisms

Gardline defines macrofauna as organisms that are normally larger than the mesh size of the sieve used to separate them from the sediment (GEL, 2010). Meiofaunal organisms, such as the Ostracoda and Copepoda, which would not be consistently sampled, were not enumerated.

Colonial, stoloniferous and encrusting epibenthic species were identified but not enumerated.

Colonial tunicates and cnidarians were identified but not enumerated.

The testate amoeba *Astrorhiza* sp. was the only foram routinely enumerated.

In accordance with Gardline's in-house guidelines the following organisms were not identified to species, but were enumerated and included in the data set for analyses at a higher taxonomic level:

- Oligochaeta – identified to genus
- Phoronida – identified to genus

B.6 Statistical Analyses

B.6.1 Univariate Macrofauna Indices

Univariate community analyses were undertaken using the PRIMER (version 7) software package. Univariate indices seek, by means of a single number, to summarize information about some aspect of community structure. The two aspects of community structure contributing to the concept of diversity are species richness (a measure related to the total number of species present) and evenness (a measure relating to the pattern of distribution of individuals among the species present).

Diversity indices, as typified by the Shannon-Wiener index, are considered to be a relatively insensitive measure of anthropogenic disturbance. The following indices were calculated and are presented in the report:

Margalef's Richness Index

Species richness is sometimes given simply as the number of species in a sample but this is of course very dependent upon sample size. Alternatively, Margalef's index (d) may be used as this takes account of the number of species present for a given number of individuals. Margalef's Richness index is calculated as follows:

$$d = \frac{(S - 1)}{\ln N}$$

where d = Margalef's Richness
 S = total number of species
 N = total number of individuals

Shannon-Wiener Diversity Index

This is a widely used measure of diversity providing an integrated index of species richness and relative abundance (Clarke & Warwick, 2006). It is basically a measure of the difficulty of predicting the identity of an individual based on overall community composition. The Shannon-Wiener diversity index is expressed as:

$$H' = - \sum_{i=1}^s p_i \log_n p_i$$

where H' = Shannon-Wiener Diversity Index
 p_i = proportion of the total number of individuals from the i^{th} species.
 n = log base value (log base 2 is used during this report; Shannon & Weaver, 1949)

H' integrates the number of species and individual abundance to provide a summary value reflecting the diversity of fauna at a station. This index of diversity is influenced by both species richness (*i.e.* the number of species) and species evenness (or equitability) of distribution of individuals between species.

Simpson's Dominance Index

Simpson's is a dominance index derived from the probability of picking two individuals from a community at random that are from the same species. Therefore, Simpson's dominance index values will be large when a community is dominated by one or a few species but lower when the community is diverse. Simpson's dominance index was calculated as follows:

$$\lambda = \sum p_i^2$$

where λ = Simpson's Dominance Index
 p_i = proportion of the total number of individuals from the i^{th} species

Simpson's dominance index ranges from 0 to 1 with values typically reflecting the abundances of the most common species in the samples.

Pielou's Evenness

Evenness (or equitability) is a representation of how uniformly individuals are spread between species in a sample. It is a component of, and calculated using, a theoretical diversity measure (in this instance Shannon-Wiener). Values range from 0 to 1 with high values indicating low dominance and high evenness (*N.B.* the log base that was used to calculate H' must also be used to calculate evenness).

$$J = \frac{H'}{\log_n S}$$

where J = Pielou's Evenness

H' = Shannon-Wiener Diversity index

S = total number of species in a sample

Species Ranking

A measure of the overall dominance pattern in the sampling area may be achieved by ranking the top species per station according to abundance, giving a rank score of ten to the most abundant species, decreasing to one for the tenth most abundant species, and summing these scores for all stations to provide an overall dominance score for each species (Eleftheriou & Basford, 1989). For those species ranked in the top ten, the fidelity of the species ranking can be assessed by comparing the actual rank score with the maximum possible score (thus ten multiplied by number of stations for the top rank, etc.) for that rank as a proportion; perfect fidelity is equal to one; values lower than 0.8 or higher than 1.2 represent erratic ranking, as in a species with a patchy distribution.

Species Accumulation Curves

Species accumulation curves show the increasing total number of different taxa observed as samples are successively pooled. Two versions are plotted in this report; the first (plotted in green) simply takes the samples in their label order, this is often referred to as the "species observed" (Sobs) curve. The second curve (plotted in blue) is smooth as it is an averaged output based on the samples being added in random order 999 times. This is referred to as the UGE (Ugland, Gray, Ellingsen) curve after Ugland *et al.*, (2003).

B.6.2 Multivariate Analyses

In addition to univariate analyses, the data were subjected to multivariate analysis using a number of different methods available within the PRIMER package (Clarke & Warwick, 2006). By considering the full data matrix as a whole and comparing each station with every other, multivariate analyses are able to highlight subtle trends in data sets that are commonly not identified when using univariate techniques. Multivariate techniques are not restricted to use with faunal data sets and if treated appropriately may also be used to compare complex physico-chemical data sets. Multivariate analyses were computed from resemblance or similarity matrices. In the case of faunal abundance data these were constructed using the Bray-Curtis measure of similarity following transformation of the data to down-weight the influence of highly abundant or dominant species. For the purposes of this survey, fourth-root transformation was utilised. According to Clarke and Warwick (2006), the fourth root transformation takes account of the rarer species.

Cluster Analysis and SIMPROF

Cluster analysis groups samples according to their similarity *i.e.*, samples within a group are more similar to each other than they are to samples in other groups. Clustering was by a hierarchical agglomerative method using group average sorting, and the results are presented as a dendrogram. Using PRIMER v7 it is possible to perform a SIMPROF (similarity profile) test at the same time as the cluster analysis to determine whether groups of samples are statistically indistinguishable or whether they contain identifiable structure. SIMPROF is an a priori test designed to identify groups of samples from unstructured data sets. The test employs a permutation-based analysis to determine whether groups of samples below each successive node of a dendrogram possess identifiable internal structure. If the result of a test at a particular node is not significant there is no identifiable structure within the samples below the node and they might therefore be considered to be a uniform group. A significant result indicates that samples within a group (below a particular node in the dendrogram) contain some structure and therefore may not be considered uniform. The analysis therefore identifies groups of samples that are each highly self-similar and also that are distinguishable from each other.

Ordination Analyses using non-Metric Multidimensional Scaling

Non-metric multidimensional scaling (nMDS or MDS) is a type of ordination method which creates a 2- or 3-dimensional 'map' of the samples (or stations) from the similarity matrix. The configuration of the samples on the 'map' is a reflection of their similarity, with distances between samples being representative of their dissimilarity.

It is normal for there to be some distortion (stress) between actual similarity values (in the resemblance matrix) and distance between samples on the ordination plot; perfect solutions are very rarely achieved when dealing with complex data sets. In order to achieve the lowest possible stress PRIMER adopts an iterative approach to ordination, constructing the plot by successively refining the positions of samples until the lowest stress is achieved. In reality the lowest possible stress is not always achieved since data points may become trapped in local minima. It is therefore necessary to re-run the analyses multiple times to ensure that the lowest achievable stress is found. The ordination analysis results reported were the product of a minimum of 25 restarts. In instances where the lowest achieved stress was found for <5 (20%) of the restarts the ordination was repeated with 100 restarts to ensure that a lower stress result could not be found.

The scale and orientation of MDS ordinations are arbitrary so no axes are drawn on the plots. Stress values increase with sample size, and usually also with increasingly severe transformation of the initial data set (due to the increasing influence of rarer species on the outcome of analyses). The stress value may be used as an indication of the usefulness of plots, with a general guide being as follows (Clarke & Warwick, 2006):

<0.05	Almost perfect representation of rank similarities
0.05 to <0.1	Good representation
0.1 to <0.2	Still useful
0.2 to <0.3	Should be treated with caution
>0.3	Little better than random points

SIMPER

Where differences between groups of samples are found, SIMPER may be used to interpret which species, or environmental variables, are principally responsible for the differences between the groups

and which are most responsible for the similarities within groups. The SIMPER analysis decomposes differences between all pairs of samples, one from each identified group, into their contributions from each species or variable, and ranks them in decreasing order of their contribution to overall dissimilarity.

RELATE

The RELATE test of PRIMER calculates the rank similarity of two specified data matrices, so, for instance, may be used to provide an indication of the effect of the removal of a subset of taxa (*e.g.*, immature individuals) on the structure of the data set overall.

APPENDIX C IMAGERY ANALYSIS RESULTS PER IMAGE

Table C.1 Species Presence and Absence per Image

[illegible]

P = Presence
Taxa highlighted in red indicate sensitive species

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Image	Station	Chordata - Physidae Chordata - Leioraja aculeata Chordata - cf. Phrynosoma erasmii Chordata - cf. Phrynosoma erasmii Chordata - Carinellus latifrons Chordata - Ascidacea A Chordata - Actinopterygii Indeterminate Chordata - Actinopterygii E Chordata - Actinopterygii D Chordata - Actinopterygii C Chordata - Actinopterygii B Byzoa - Alipodium diphrum Bacterial mat Artropoda - Pagioclia Artropoda - Indeterminate Artropoda - Crustacea Artropoda - Caridea Artropoda - Brachyura E Artropoda - Brachyura D Artropoda - Brachyura C Artropoda - Brachyura B Artropoda - Brachyura A Amphibia - Tenebrionidae Amphibia - Stenelasma B Amphibia - Stenelasma A Amphibia - Polychaeta tube I Amphibia - Polychaeta tube H Amphibia - Polychaeta tube G Amphibia - Polychaeta tube F Amphibia - Polychaeta tube E Amphibia - Polychaeta tube D Amphibia - Polychaeta tube C Amphibia - Polychaeta tube B Amphibia - Polychaeta tube A Amphibia - Indeterminate worm tube Amphibia - Aemidiid sp. castings Amphibia - Egg mass B Amphibia - Egg mass A																			
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Image	Station	Chordata - Physalia Chordata - Leucogea oculata Chordata - cf. Physalia physalis Chordata - cf. Physalia physalis Chordata - Carinellus latifrons Chordata - Ascidacea A Chordata - Actinopterygii Indeterminate Chordata - Actinopterygii E Chordata - Actinopterygii D Chordata - Actinopterygii C Chordata - Actinopterygii B Byzoa - Alcyonium digitatum Bacterial mat Artropoda - Paguridea Artropoda - Indeterminate Artropoda - Crustacea Artropoda - Caridea Artropoda - Brachyura E Artropoda - Brachyura D Artropoda - Brachyura C Artropoda - Brachyura B Artropoda - Brachyura A Arnelida - Stomatopoda Arnelida - Scudicidae B Arnelida - Tenebrionidae Arnelida - Polychaeta tube I Arnelida - Polychaeta tube H Arnelida - Polychaeta tube G Arnelida - Polychaeta tube F Arnelida - Polychaeta tube E Arnelida - Polychaeta tube D Arnelida - Polychaeta tube C Arnelida - Polychaeta tube B Arnelida - Polychaeta tube A Arnelida - Indeterminate worm tube Arnelida - Arnelid sp. castings Arnelida - Egg mass B Arnelida - Egg mass A																								
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11179_st18904-env56_fix(2354)_kongsberg14208	ENV56																									
11179_st18904-env56_fix(2355)_kongsberg14208	ENV56																									
11179_st18904-env56_fix(2356)_kongsberg14208	ENV56																									
11179_st18904-env56_fix(2357)_kongsberg14208	ENV56																									
11179_st18904-env56_fix(2358)_kongsberg14208	ENV56																									
11179_st18904-env56_fix(2359)_kongsberg14208	ENV56																									
11179_st18904-env56_fix(2360)_kongsberg14208	ENV56																									
11179_st18904-env56_fix(2361)_kongsberg14208	ENV56																									
11179_st18904-env56_fix(2362)_kongsberg14208	ENV56																									
11179_st18904-env56_fix(2363)_kongsberg14208	ENV56																									
11179_st18904-env56_fix(2364)_kongsberg14208	ENV56																									
11179_st18904-env56_fix(2365)_kongsberg14208	ENV56																									
11179_st18904-env56_fix(2366)_kongsberg14208	ENV56																									
11179_st18904-env56_fix(2367)_kongsberg14208	ENV56																									
11179_st18904-env56_fix(2368)_kongsberg14208	ENV56																									
11179_st18904-env56_fix(2369)_kongsberg14208	ENV56																									
11179_st18904-env56_fix(2370)_kongsberg14208	ENV56																									
11179_st18904-env56_fix(2371)_kongsberg14208	ENV56																									
11179_st18904-env56_fix(2372)_kongsberg14208	ENV56																									
11179_st18904-env56_fix(2373)_kongsberg14208	ENV56																									
11179_st18904-env56_fix(2374)_kongsberg14208	ENV56																									
11179_env57_snapshot_00001	ENV57																									

APPENDIX C IMAGERY ANALYSIS RESULTS PER IMAGE

Table C.1 Species Presence and Absence per Image

[illegible]

P = Presence
Taxa highlighted in red indicate sensitive species

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Table C.1 Species Presence and Absence per Image

Image	Station																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
		Physidae - Physidae	Chordata - Laccapoda ocellata	Chordata - cf. Prorata carolinus	Chordata - cf. Pseudocellomes	Chordata - Carinellus latifrons	Chordata - Ascidacea A	Chordata - Actinopterygii indeterminate	Chordata - Actinopterygii E	Chordata - Actinopterygii D	Chordata - Actinopterygii C	Chordata - Actinopterygii B	Byzonia - Alcyonium daphnium	Bacterial mat	Actinoptera - Physidae	Actinoptera - Indeterminate	Actinoptera - Chiroptera	Actinoptera - Caridea	Actinoptera - Brachyura E	Actinoptera - Brachyura D	Actinoptera - Brachyura C	Actinoptera - Brachyura B	Actinoptera - Brachyura A	Arthropoda - Terebellidae tube	Arthropoda - Stomatopoda B	Arthropoda - Stomatopoda A	Arthropoda - Polydora	Arthropoda - Polydora tube I	Arthropoda - Polydora tube H	Arthropoda - Polydora tube G	Arthropoda - Polydora tube F	Arthropoda - Polydora tube E	Arthropoda - Polydora tube D	Arthropoda - Polydora tube C	Arthropoda - Polydora tube B	Arthropoda - Polydora tube A	Arthropoda - Indeterminate worm tube	Arthropoda - Alcyonium sp. castings	Arthropoda - Egg mass B	Arthropoda - Egg mass A																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
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P = Presence
Taxa highlighted in red indicate sensitive species

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APPENDIX C IMAGERY ANALYSIS RESULTS PER IMAGE

Table C.1 Species Presence and Absence per Image

Image	Station																					Mollusca - <i>cf. Arctica Islandica</i> (Diss)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
		Chordata - Pluroveridiformes	Chordata - Rajidae Equiset	Chordata - Rhinobatidae A	Chordata - <i>Tigridia indermatella</i>	Chordata - Actinaria A	Chordata - Actinaria B	Chordata - Actinaria C	Chordata - Actinaria E	Chordata - <i>Actinaria</i>	Chordata - <i>Asperidina</i>	Chordata - <i>Asperidina</i>	Chordata - <i>Asperidina</i>	Chordata - <i>Asperidina</i>	Chordata - <i>Asperidina</i>	Chordata - <i>Asperidina</i>	Chordata - <i>Asperidina</i>	Chordata - <i>Asperidina</i>	Chordata - <i>Asperidina</i>	Chordata - <i>Asperidina</i>	Chordata - <i>Asperidina</i>	Mollusca - Bivalvia indermatella	Mollusca - Bivalvia E	Mollusca - Bivalvia D	Mollusca - Bivalvia C	Mollusca - Bivalvia B	Mollusca - Bivalvia A	Mollusca - Bivalvia spixus	Indermatella fauni turf	Indermatella fauni M	Indermatella fauni K	Indermatella fauni I	Echinodermata - Ophiuroidea	Echinodermata - Holothuroidea	Echinodermata - Echinoidea A	Echinodermata - <i>Echinocystis jama</i>	Echinodermata - <i>cf. Echinocystis</i>	Echinodermata - Asteroidea tridentaria	Echinodermata - Asteroidea B	Echinodermata - <i>Asterias rubens</i>	Crustacea - Hygrosoma indermatella	Crustacea - Hygrosoma indermatella	Crustacea - <i>Hygrosoma symbiotopocarpa</i>	Crustacea - <i>Hygrosoma</i>	Crustacea - <i>Hygrosoma</i> C	Crustacea - <i>Hygrosoma</i> B	Crustacea - <i>Hygrosoma</i> A	Crustacea - <i>cf. Penicillaria</i>	Crustacea - <i>Hygrosoma</i>	Crustacea - <i>Hygrosoma</i> A	Crustacea - <i>Hygrosoma</i> B	Crustacea - <i>Hygrosoma</i> C	Crustacea - <i>Hygrosoma</i> D	Crustacea - <i>Hygrosoma</i> E	Crustacea - <i>Hygrosoma</i> F	Crustacea - <i>Hygrosoma</i> G	Crustacea - <i>Hygrosoma</i> H	Crustacea - <i>Hygrosoma</i> I	Crustacea - <i>Hygrosoma</i> J	Crustacea - <i>Hygrosoma</i> K	Crustacea - <i>Hygrosoma</i> L	Crustacea - <i>Hygrosoma</i> M	Crustacea - <i>Hygrosoma</i> N	Crustacea - <i>Hygrosoma</i> O	Crustacea - <i>Hygrosoma</i> P	Crustacea - <i>Hygrosoma</i> Q	Crustacea - <i>Hygrosoma</i> R	Crustacea - <i>Hygrosoma</i> S	Crustacea - <i>Hygrosoma</i> T	Crustacea - <i>Hygrosoma</i> U	Crustacea - <i>Hygrosoma</i> V	Crustacea - <i>Hygrosoma</i> W	Crustacea - <i>Hygrosoma</i> X	Crustacea - <i>Hygrosoma</i> Y	Crustacea - <i>Hygrosoma</i> Z	Crustacea - <i>Hygrosoma</i> AA	Crustacea - <i>Hygrosoma</i> AB	Crustacea - <i>Hygrosoma</i> AC	Crustacea - <i>Hygrosoma</i> AD	Crustacea - <i>Hygrosoma</i> AE	Crustacea - <i>Hygrosoma</i> AF	Crustacea - <i>Hygrosoma</i> AG	Crustacea - <i>Hygrosoma</i> AH	Crustacea - <i>Hygrosoma</i> AI	Crustacea - <i>Hygrosoma</i> AJ	Crustacea - <i>Hygrosoma</i> AK	Crustacea - <i>Hygrosoma</i> AL	Crustacea - <i>Hygrosoma</i> AM	Crustacea - <i>Hygrosoma</i> AN	Crustacea - <i>Hygrosoma</i> AO	Crustacea - <i>Hygrosoma</i> AP	Crustacea - <i>Hygrosoma</i> AQ	Crustacea - <i>Hygrosoma</i> AR	Crustacea - <i>Hygrosoma</i> AS	Crustacea - <i>Hygrosoma</i> AT	Crustacea - <i>Hygrosoma</i> AU	Crustacea - <i>Hygrosoma</i> AV	Crustacea - <i>Hygrosoma</i> AW	Crustacea - <i>Hygrosoma</i> AX	Crustacea - <i>Hygrosoma</i> AY	Crustacea - <i>Hygrosoma</i> AZ	Crustacea - <i>Hygrosoma</i> BA	Crustacea - <i>Hygrosoma</i> BB	Crustacea - <i>Hygrosoma</i> BC	Crustacea - <i>Hygrosoma</i> BD	Crustacea - <i>Hygrosoma</i> BE	Crustacea - <i>Hygrosoma</i> BF	Crustacea - <i>Hygrosoma</i> BG	Crustacea - <i>Hygrosoma</i> BH	Crustacea - <i>Hygrosoma</i> BI	Crustacea - <i>Hygrosoma</i> BJ	Crustacea - <i>Hygrosoma</i> BK	Crustacea - <i>Hygrosoma</i> BL	Crustacea - <i>Hygrosoma</i> BM	Crustacea - <i>Hygrosoma</i> BN	Crustacea - <i>Hygrosoma</i> BO	Crustacea - <i>Hygrosoma</i> BP	Crustacea - <i>Hygrosoma</i> BQ	Crustacea - <i>Hygrosoma</i> BR	Crustacea - <i>Hygrosoma</i> BS	Crustacea - <i>Hygrosoma</i> BT	Crustacea - <i>Hygrosoma</i> BU	Crustacea - <i>Hygrosoma</i> BV	Crustacea - <i>Hygrosoma</i> BW	Crustacea - <i>Hygrosoma</i> BX	Crustacea - <i>Hygrosoma</i> BY	Crustacea - <i>Hygrosoma</i> BZ	Crustacea - <i>Hygrosoma</i> CA	Crustacea - <i>Hygrosoma</i> CB	Crustacea - <i>Hygrosoma</i> CC	Crustacea - <i>Hygrosoma</i> CD	Crustacea - <i>Hygrosoma</i> CE	Crustacea - <i>Hygrosoma</i> CF	Crustacea - <i>Hygrosoma</i> CG	Crustacea - <i>Hygrosoma</i> CH	Crustacea - <i>Hygrosoma</i> CI	Crustacea - <i>Hygrosoma</i> CJ	Crustacea - <i>Hygrosoma</i> CK	Crustacea - <i>Hygrosoma</i> CL	Crustacea - <i>Hygrosoma</i> CM	Crustacea - <i>Hygrosoma</i> CN	Crustacea - <i>Hygrosoma</i> CO	Crustacea - <i>Hygrosoma</i> CP	Crustacea - <i>Hygrosoma</i> CQ	Crustacea - <i>Hygrosoma</i> CR	Crustacea - <i>Hygrosoma</i> CS	Crustacea - <i>Hygrosoma</i> CT	Crustacea - <i>Hygrosoma</i> CU	Crustacea - <i>Hygrosoma</i> CV	Crustacea - <i>Hygrosoma</i> CW	Crustacea - <i>Hygrosoma</i> CX	Crustacea - <i>Hygrosoma</i> CY	Crustacea - <i>Hygrosoma</i> CZ	Crustacea - <i>Hygrosoma</i> DA	Crustacea - <i>Hygrosoma</i> DB	Crustacea - <i>Hygrosoma</i> DC	Crustacea - <i>Hygrosoma</i> DD	Crustacea - <i>Hygrosoma</i> DE	Crustacea - <i>Hygrosoma</i> DF	Crustacea - <i>Hygrosoma</i> DG	Crustacea - <i>Hygrosoma</i> DH	Crustacea - <i>Hygrosoma</i> DI	Crustacea - <i>Hygrosoma</i> DJ	Crustacea - <i>Hygrosoma</i> DK	Crustacea - <i>Hygrosoma</i> DL	Crustacea - <i>Hygrosoma</i> DM	Crustacea - <i>Hygrosoma</i> DN	Crustacea - <i>Hygrosoma</i> DO	Crustacea - <i>Hygrosoma</i> DP	Crustacea - <i>Hygrosoma</i> DQ	Crustacea - <i>Hygrosoma</i> DR	Crustacea - <i>Hygrosoma</i> DS	Crustacea - <i>Hygrosoma</i> DT	Crustacea - <i>Hygrosoma</i> DU	Crustacea - <i>Hygrosoma</i> DV	Crustacea - <i>Hygrosoma</i> DW	Crustacea - <i>Hygrosoma</i> DX	Crustacea - <i>Hygrosoma</i> DY	Crustacea - <i>Hygrosoma</i> DZ	Crustacea - <i>Hygrosoma</i> EA	Crustacea - <i>Hygrosoma</i> EB	Crustacea - <i>Hygrosoma</i> EC	Crustacea - <i>Hygrosoma</i> ED	Crustacea - <i>Hygrosoma</i> EE	Crustacea - <i>Hygrosoma</i> EF	Crustacea - <i>Hygrosoma</i> EG	Crustacea - <i>Hygrosoma</i> EH	Crustacea - <i>Hygrosoma</i> EI	Crustacea - <i>Hygrosoma</i> EJ	Crustacea - <i>Hygrosoma</i> EK	Crustacea - <i>Hygrosoma</i> EL	Crustacea - <i>Hygrosoma</i> EM	Crustacea - <i>Hygrosoma</i> EN	Crustacea - <i>Hygrosoma</i> EO	Crustacea - <i>Hygrosoma</i> EP	Crustacea - <i>Hygrosoma</i> EQ	Crustacea - <i>Hygrosoma</i> ER	Crustacea - <i>Hygrosoma</i> ES	Crustacea - <i>Hygrosoma</i> ET	Crustacea - <i>Hygrosoma</i> EU	Crustacea - <i>Hygrosoma</i> EV	Crustacea - <i>Hygrosoma</i> EW	Crustacea - <i>Hygrosoma</i> EX	Crustacea - <i>Hygrosoma</i> EY	Crustacea - <i>Hygrosoma</i> EZ	Crustacea - <i>Hygrosoma</i> FA	Crustacea - <i>Hygrosoma</i> FB	Crustacea - <i>Hygrosoma</i> FC	Crustacea - <i>Hygrosoma</i> FD	Crustacea - <i>Hygrosoma</i> FE	Crustacea - <i>Hygrosoma</i> FF	Crustacea - <i>Hygrosoma</i> FG	Crustacea - <i>Hygrosoma</i> FH	Crustacea - <i>Hygrosoma</i> FI	Crustacea - <i>Hygrosoma</i> FJ	Crustacea - <i>Hygrosoma</i> FK	Crustacea - <i>Hygrosoma</i> FL	Crustacea - <i>Hygrosoma</i> FM	Crustacea - <i>Hygrosoma</i> FN	Crustacea - <i>Hygrosoma</i> FO	Crustacea - <i>Hygrosoma</i> FP	Crustacea - <i>Hygrosoma</i> FQ	Crustacea - <i>Hygrosoma</i> FR	Crustacea - <i>Hygrosoma</i> FS	Crustacea - <i>Hygrosoma</i> FT	Crustacea - <i>Hygrosoma</i> FU	Crustacea - <i>Hygrosoma</i> FV	Crustacea - <i>Hygrosoma</i> FW	Crustacea - <i>Hygrosoma</i> FX	Crustacea - <i>Hygrosoma</i> FY	Crustacea - <i>Hygrosoma</i> FZ	Crustacea - <i>Hygrosoma</i> GA	Crustacea - <i>Hygrosoma</i> GB	Crustacea - <i>Hygrosoma</i> GC	Crustacea - <i>Hygrosoma</i> GD	Crustacea - <i>Hygrosoma</i> GE	Crustacea - <i>Hygrosoma</i> GF	Crustacea - <i>Hygrosoma</i> GG	Crustacea - <i>Hygrosoma</i> GH	Crustacea - <i>Hygrosoma</i> GI	Crustacea - <i>Hygrosoma</i> GJ	Crustacea - <i>Hygrosoma</i> GK	Crustacea - <i>Hygrosoma</i> GL	Crustacea - <i>Hygrosoma</i> GM	Crustacea - <i>Hygrosoma</i> GN	Crustacea - <i>Hygrosoma</i> GO	Crustacea - <i>Hygrosoma</i> GP	Crustacea - <i>Hygrosoma</i> GQ	Crustacea - <i>Hygrosoma</i> GR	Crustacea - <i>Hygrosoma</i> GS	Crustacea - <i>Hygrosoma</i> GT	Crustacea - <i>Hygrosoma</i> GU	Crustacea - <i>Hygrosoma</i> GV	Crustacea - <i>Hygrosoma</i> GW	Crustacea - <i>Hygrosoma</i> GX	Crustacea - <i>Hygrosoma</i> GY	Crustacea - <i>Hygrosoma</i> GZ	Crustacea - <i>Hygrosoma</i> HA	Crustacea - <i>Hygrosoma</i> HB	Crustacea - <i>Hygrosoma</i> HC	Crustacea - <i>Hygrosoma</i> HD	Crustacea - <i>Hygrosoma</i> HE	Crustacea - <i>Hygrosoma</i> HF	Crustacea - <i>Hygrosoma</i> HG	Crustacea - <i>Hygrosoma</i> HH	Crustacea - <i>Hygrosoma</i> HI	Crustacea - <i>Hygrosoma</i> HJ	Crustacea - <i>Hygrosoma</i> HK	Crustacea - <i>Hygrosoma</i> HL	Crustacea - <i>Hygrosoma</i> HM	Crustacea - <i>Hygrosoma</i> HN	Crustacea - <i>Hygrosoma</i> HO	Crustacea - <i>Hygrosoma</i> HP	Crustacea - <i>Hygrosoma</i> HQ	Crustacea - <i>Hygrosoma</i> HR	Crustacea - <i>Hygrosoma</i> HS	Crustacea - <i>Hygrosoma</i> HT	Crustacea - <i>Hygrosoma</i> HU	Crustacea - <i>Hygrosoma</i> HV	Crustacea - <i>Hygrosoma</i> HW	Crustacea - <i>Hygrosoma</i> HX	Crustacea - <i>Hygrosoma</i> HY	Crustacea - <i>Hygrosoma</i> HZ	Crustacea - <i>Hygrosoma</i> IA	Crustacea - <i>Hygrosoma</i> IB	Crustacea - <i>Hygrosoma</i> IC	Crustacea - <i>Hygrosoma</i> ID	Crustacea - <i>Hygrosoma</i> IE	Crustacea - <i>Hygrosoma</i> IF	Crustacea - <i>Hygrosoma</i> IG	Crustacea - <i>Hygrosoma</i> IH	Crustacea - <i>Hygrosoma</i> II	Crustacea - <i>Hygrosoma</i> IJ	Crustacea - <i>Hygrosoma</i> IK	Crustacea - <i>Hygrosoma</i> IL	Crustacea - <i>Hygrosoma</i> IM	Crustacea - <i>Hygrosoma</i> IN	Crustacea - <i>Hygrosoma</i> IO	Crustacea - <i>Hygrosoma</i> IP	Crustacea - <i>Hygrosoma</i> IQ	Crustacea - <i>Hygrosoma</i> IR	Crustacea - <i>Hygrosoma</i> IS	Crustacea - <i>Hygrosoma</i> IT	Crustacea - <i>Hygrosoma</i> IU	Crustacea - <i>Hygrosoma</i> IV	Crustacea - <i>Hygrosoma</i> IW	Crustacea - <i>Hygrosoma</i> IX	Crustacea - <i>Hygrosoma</i> IY	Crustacea - <i>Hygrosoma</i> IZ	Crustacea - <i>Hygrosoma</i> JA	Crustacea - <i>Hygrosoma</i> JB	Crustacea - <i>Hygrosoma</i> JC	Crustacea - <i>Hygrosoma</i> JD	Crustacea - <i>Hygrosoma</i> JE	Crustacea - <i>Hygrosoma</i> JF	Crustacea - <i>Hygrosoma</i> JG	Crustacea - <i>Hygrosoma</i> JH	Crustacea - <i>Hygrosoma</i> JI	Crustacea - <i>Hygrosoma</i> JJ	Crustacea - <i>Hygrosoma</i> JK	Crustacea - <i>Hygrosoma</i> JL	Crustacea - <i>Hygrosoma</i> JM	Crustacea - <i>Hygrosoma</i> JN	Crustacea - <i>Hygrosoma</i> JO	Crustacea - <i>Hygrosoma</i> JP	Crustacea - <i>Hygrosoma</i> JQ	Crustacea - <i>Hygrosoma</i> JR	Crustacea - <i>Hygrosoma</i> JS	Crustacea - <i>Hygrosoma</i> JT	Crustacea - <i>Hygrosoma</i> JU	Crustacea - <i>Hygrosoma</i> JV	Crustacea - <i>Hygrosoma</i> JW	Crustacea - <i>Hygrosoma</i> JX	Crustacea - <i>Hygrosoma</i> JY	Crustacea - <i>Hygrosoma</i> JZ	Crustacea - <i>Hygrosoma</i> KA	Crustacea - <i>Hygrosoma</i> KB	Crustacea - <i>Hygrosoma</i> KC	Crustacea - <i>Hygrosoma</i> KD	Crustacea - <i>Hygrosoma</i> KE	Crustacea - <i>Hygrosoma</i> KF	Crustacea - <i>Hygrosoma</i> KG	Crustacea - <i>Hygrosoma</i> KH	Crustacea - <i>Hygrosoma</i> KI	Crustacea - <i>Hygrosoma</i> KJ	Crustacea - <i>Hygrosoma</i> KK	Crustacea - <i>Hygrosoma</i> KL	Crustacea - <i>Hygrosoma</i> KM	Crustacea - <i>Hygrosoma</i> KN	Crustacea - <i>Hygrosoma</i> KO	Crustacea - <i>Hygrosoma</i> KP	Crustacea - <i>Hygrosoma</i> KQ	Crustacea - <i>Hygrosoma</i> KR	Crustacea - <i>Hygrosoma</i> KS	Crustacea - <i>Hygrosoma</i> KT	Crustacea - <i>Hygrosoma</i> KU	Crustacea - <i>Hygrosoma</i> KV	Crustacea - <i>Hygrosoma</i> KW	Crustacea - <i>Hygrosoma</i> KX	Crustacea - <i>Hygrosoma</i> KY	Crustacea - <i>Hygrosoma</i> KZ	Crustacea - <i>Hygrosoma</i> LA	Crustacea - <i>Hygrosoma</i> LB	Crustacea - <i>Hygrosoma</i> LC	Crustacea - <i>Hygrosoma</i> LD	Crustacea - <i>Hygrosoma</i> LE	Crustacea - <i>Hygrosoma</i> LF	Crustacea - <i>Hygrosoma</i> LG	Crustacea - <i>Hygrosoma</i> LH	Crustacea - <i>Hygrosoma</i> LI	Crustacea - <i>Hygrosoma</i> LJ	Crustacea - <i>Hygrosoma</i> LK	Crustacea - <i>Hygrosoma</i> LL	Crustacea - <i>Hygrosoma</i> LM	Crustacea - <i>Hygrosoma</i> LN	Crustacea - <i>Hygrosoma</i> LO	Crustacea - <i>Hygrosoma</i> LP	Crustacea - <i>Hygrosoma</i> LQ	Crustacea - <i>Hygrosoma</i> LR	Crustacea - <i>Hygrosoma</i> LS	Crustacea - <i>Hygrosoma</i> LT	Crustacea - <i>Hygrosoma</i> LU	Crustacea - <i>Hygrosoma</i> LV	Crustacea - <i>Hygrosoma</i> LW	Crustacea - <i>Hygrosoma</i> LX	Crustacea - <i>Hygrosoma</i> LY	Crustacea - <i>Hygrosoma</i> LZ	Crustacea - <i>Hygrosoma</i> MA	Crustacea - <i>Hygrosoma</i> MB	Crustacea - <i>Hygrosoma</i> MC	Crustacea - <i>Hygrosoma</i> MD	Crustacea - <i>Hygrosoma</i> ME	Crustacea - <i>Hygrosoma</i> MF	Crustacea - <i>Hygrosoma</i> MG	Crustacea - <i>Hygrosoma</i> MH	Crustacea - <i>Hygrosoma</i> MI	Crustacea - <i>Hygrosoma</i> MJ	Crustacea - <i>Hygrosoma</i> MK	Crustacea - <i>Hygrosoma</i> ML	Crustacea - <i>Hygrosoma</i> MM	Crustacea - <i>Hygrosoma</i> MN	Crustacea - <i>Hygrosoma</i> MO	Crustacea - <i>Hygrosoma</i> MP	Crustacea - <i>Hygrosoma</i> MQ	Crustacea - <i>Hygrosoma</i> MR	Crustacea - <i>Hygrosoma</i> MS	Crustacea - <i>Hygrosoma</i> MT	Crustacea - <i>Hygrosoma</i> MU	Crustacea - <i>Hygrosoma</i> MV	Crustacea - <i>Hygrosoma</i> MW	Crustacea - <i>Hygrosoma</i> MX	Crustacea - <i>Hygrosoma</i> MY	Crustacea - <i>Hygrosoma</i> MZ	Crustacea - <i>Hygrosoma</i> NA	Crustacea - <i>Hygrosoma</i> NB	Crustacea - <i>Hygrosoma</i> NC	Crustacea - <i>Hygrosoma</i> ND	Crustacea - <i>Hygrosoma</i> NE	Crustacea - <i>Hygrosoma</i> NF	Crustacea - <i>Hygrosoma</i> NG	Crustacea - <i>Hygrosoma</i> NH	Crustacea - <i>Hygrosoma</i> NI	Crustacea - <i>Hygrosoma</i> NJ	Crustacea - <i>Hygrosoma</i> NK	Crustacea - <i>Hygrosoma</i> NL	Crustacea - <i>Hygrosoma</i> NM	Crustacea - <i>Hygrosoma</i> NN	Crustacea - <i>Hygrosoma</i> NO	Crustacea - <i>Hygrosoma</i> NP	Crustacea - <i>Hygrosoma</i> NQ	Crustacea - <i>Hygrosoma</i> NR	Crustacea - <i>Hygrosoma</i> NS	Crustacea - <i>Hygrosoma</i> NT	Crustacea - <i>Hygrosoma</i> NU	Crustacea - <i>Hygrosoma</i> NV	Crustacea - <i>Hygrosoma</i> NW	Crustacea - <i>Hygrosoma</i> NX	Crustacea - <i>Hygrosoma</i> NY	Crustacea - <i>Hygrosoma</i> NZ	Crustacea - <i>Hygrosoma</i> OA	Crustacea - <i>Hygrosoma</i> OB	Crustacea - <i>Hygrosoma</i> OC	Crustacea - <i>Hygrosoma</i> OD	Crustacea - <i>Hygrosoma</i> OE	Crustacea - <i>Hygrosoma</i> OF	Crustacea - <i>Hygrosoma</i> OG	Crustacea - <i>Hygrosoma</i> OH	Crustacea - <i>Hygrosoma</i> OI	Crustacea - <i>Hygrosoma</i> OJ	Crustacea - <i>Hygrosoma</i> OK	Crustacea - <i>Hygrosoma</i> OL	Crustacea - <i>Hygrosoma</i> OM	Crustacea - <i>Hygrosoma</i> ON	Crustacea - <i>Hygrosoma</i> OO	Crustacea - <i>Hygrosoma</i> OP	Crustacea - <i>Hygrosoma</i> OQ	Crustacea - <i>Hygrosoma</i> OR	Crustacea - <i>Hygrosoma</i> OS	Crustacea - <i>Hygrosoma</i> OT	Crustacea - <i>Hygrosoma</i> OU	Crustacea - <i>Hygrosoma</i> OV	Crustacea - <i>Hygrosoma</i> OW	Crustacea - <i>Hygrosoma</i> OX	Crustacea - <i>Hygrosoma</i> OY	Crustacea - <i>Hygrosoma</i> OZ	Crustacea - <i>Hygrosoma</i> PA	Crustacea - <i>Hygrosoma</i> PB	Crustacea - <i>Hygrosoma</i> PC	Crustacea - <i>Hygrosoma</i> PD	Crustacea - <i>Hygrosoma</i> PE	Crustacea - <i>Hygrosoma</i> PF	Crustacea - <i>Hygrosoma</i> PG	Crustacea - <i>Hygrosoma</i> PH	Crustacea - <i>Hygrosoma</i> PI	Crustacea - <i>Hygrosoma</i> PJ	Crustacea - <i>Hygrosoma</i> PK	Crustacea - <i>Hygrosoma</i> PL	Crustacea - <i>Hygrosoma</i> PM	Crustacea - <i>Hygrosoma</i> PN	Crustacea - <i>Hygrosoma</i> PO	Crustacea - <i>Hygrosoma</i> PP	Crustacea - <i>Hygrosoma</i> PQ	Crustacea - <i>Hygrosoma</i> PR	Crustacea - <i>Hygrosoma</i> PS	Crustacea - <i>Hygrosoma</i> PT	Crustacea - <i>Hygrosoma</i> PU	Crustacea - <i>Hygrosoma</i> PV



APPENDIX C IMAGERY ANALYSIS RESULTS PER IMAGE

Table C.1 Species Presence and Absence per Image

Image	Station	Mollusca - cf. Arctica islandica (Diss)																						
		Mollusca - Bivalvia indeterminate	Mollusca - Bivalvia E	Mollusca - Bivalvia D	Mollusca - Bivalvia C	Mollusca - Bivalvia B	Mollusca - Bivalvia A	Mollusca - Bivalvia siphons	Indeterminate faun1 turf	Indeterminate Fauna M	Indeterminate Fauna K	Indeterminate Fauna I	Echinodermata - Ophiuroidea	Echinodermata - Holothuroidea	Echinodermata - Echinoidea A	Echinodermata - Echinoidea B	Echinodermata - Echinodermata	Echinodermata - Echinodermata	Echinodermata - Echinodermata	Echinodermata - Echinodermata	Echinodermata - Echinodermata	Echinodermata - Echinodermata	Echinodermata - Echinodermata	
11179_st18904-env17_fix(367)	ENV17																							
11179_st18904-env17_fix(368)	ENV17																							
11179_st18904-env17_fix(369)	ENV17																							
11179_st18904-env17_fix(370)	ENV17																							
11179_st18904-env17_fix(371)	ENV17																							
11179_st18904-env17_fix(372)	ENV17																							
11179_st18904-env17_fix(373)	ENV17																							
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11179_st18904-env17_fix(397)	ENV17																							
11179_st18904-env17_fix(398)	ENV17																							
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11179_env18_snapshot_00001	ENV18																							
11179_env18_snapshot_00002	ENV18																							
11179_env18_snapshot_00003	ENV18																							
11179_env18_snapshot_00004	ENV18																							
11179_env18_snapshot_00005	ENV18																							
11179_env18_snapshot_00006	ENV18																							
11179_env18_snapshot_00007	ENV18																							
11179_env18_snapshot_00008	ENV18																							
11179_st18904-env18_fix(325)	ENV18																							
11179_st18904-env18_fix(326)	ENV18																							
11179_st18904-env18_fix(327)	ENV18																							
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11179_st18904-env18_fix(331)	ENV18																							
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11179_st18904-env18_fix(358)	ENV18																							
11179_st18904-env18_fix(359)	ENV18																							



APPENDIX C IMAGERY ANALYSIS RESULTS PER IMAGE

Table C.1 Species Presence and Absence per Image

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		Mollusca - <i>Arctica islandica</i> (Diss)	Mollusca - <i>Crepidula</i>	Mollusca - <i>Bivalvia indeterminate</i>	Mollusca - <i>Bivalvia E</i>	Mollusca - <i>Bivalvia D</i>	Mollusca - <i>Bivalvia C</i>	Mollusca - <i>Bivalvia B</i>	Mollusca - <i>Bivalvia A</i>	Mollusca - <i>Bivalvia siphon</i>	Indeterminate fauna turf	Indeterminate Fauna M	Indeterminate Fauna K	Indeterminate Fauna I	Echinodermata - <i>Ophiuridea</i>	Echinodermata - <i>Holothuridea</i>	Echinodermata - <i>Echinoidea A</i>	Echinodermata - <i>Echinoidea jama</i>	Echinodermata - <i>cf. Echinocnemidites</i>	Echinodermata - <i>Asteroida tridentata</i>	Echinodermata - <i>Asteroida B</i>	Echinodermata - <i>Asteroida robust</i>	Chordata - <i>Hydrozoa indeterminate</i>	Chordata - <i>Hydrozoa cf. Hydractinia symbiolongipinna</i>	Chordata - <i>Hydrozoa C</i>	Chordata - <i>Hydrozoa B</i>	Chordata - <i>Hydrozoa A</i>	Chordata - <i>cf. Penatulus</i>	Chordata - <i>Hydrozoa</i>	Chordata - <i>Actinia subterranea</i>	Chordata - <i>Actinia E</i>	Chordata - <i>Actinia C</i>	Chordata - <i>Actinia B</i>	Chordata - <i>Actinia A</i>	Chordata - <i>Trigloporus indeterminate</i>	Chordata - <i>Rhinodactylus A</i>	Chordata - <i>Stegastes Eggs</i>	Chordata - <i>Pluricoselasma</i>																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
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Table C.1 Species Presence and Absence per Image

[illegible]

P = Presence
Taxa highlighted in red indicate sensitive species

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APPENDIX C IMAGERY ANALYSIS RESULTS PER IMAGE

Table C.1 Species Presence and Absence per Image

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APPENDIX C IMAGERY ANALYSIS RESULTS PER IMAGE

Table C.1 Species Presence and Absence per Image

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APPENDIX C IMAGERY ANALYSIS RESULTS PER IMAGE

Table C.1 Species Presence and Absence per Image

[illegible]

P = Presence
Taxa highlighted in red indicate sensitive species



APPENDIX C IMAGERY ANALYSIS RESULTS PER IMAGE

Table C.1 Species Presence and Absence per Image

		Mollusca - cf. Arctica islandica (Diss)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														</
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APPENDIX C IMAGERY ANALYSIS RESULTS PER IMAGE

Table C.1 Species Presence and Absence per Image

[illegible]

P = Presence
Taxa highlighted in red indicate sensitive species

Taxa highlighted in red indicate sensitive species

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APPENDIX C IMAGERY ANALYSIS RESULTS PER IMAGE

Table C.1 Species Presence and Absence per Image

[illegible]

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[illegible]

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APPENDIX C IMAGERY ANALYSIS RESULTS PER IMAGE

Table C.1 Species Presence and Absence per Image

[illegible]

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Table C.1 Species Presence and Absence per Image

[illegible]

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Table C.1 Species Presence and Absence per Image

[illegible]

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APPENDIX C IMAGERY ANALYSIS RESULTS PER IMAGE

Table C.1 Species Presence and Absence per Image

[illegible]

P = Presence
Taxa highlighted in red indicate sensitive species

APPENDIX C IMAGERY ANALYSIS RESULTS PER IMAGE

Table C.1 Species Presence and Absence per Image

Image	Station																											
		Mollusca - cf. <i>Arctica islandica</i> (larva)	Mollusca - cf. <i>Cardium</i>	Mollusca - <i>Gastropoda</i> A	Mollusca - <i>Gastropoda</i> B	Mollusca - <i>Gastropoda</i> C	Mollusca - <i>Gastropoda</i> D	Mollusca - <i>Gastropoda</i> E	Mollusca - <i>Gastropoda</i> F	Mollusca - <i>Gastropoda</i> G	Mollusca - <i>Gastropoda</i> indeterminata	Mollusca - <i>Modiolus modiolus</i>	Mollusca - <i>Naticidae</i> A	Mollusca - <i>Neogastropoda</i> A	Mollusca - <i>Nudibranchia</i> A	Mollusca - <i>Nudibranchia</i> B	Mollusca - <i>Pectinidae</i>	Portifera - <i>Indeterminata</i>	Portifera A	Portifera B	Portifera C	Portifera D	Portifera E	Portifera F	Portifera G	Portifera H	Portifera I	Portifera K
11179_st18904-env25_fix(803)_kongsberg14208	ENV25																											
11179_st18904-env25_fix(804)_kongsberg14208	ENV25																											
11179_st18904-env25_fix(805)_kongsberg14208	ENV25																											
11179_st18904-env25_fix(806)_kongsberg14208	ENV25										P																	
11179_st18904-env25_fix(807)_kongsberg14208	ENV25										P																	
11179_st18904-env25_fix(808)_kongsberg14208	ENV25										P																	
11179_st18904-env25_fix(809)_kongsberg14208	ENV25																											
11179_st18904-env25_fix(810)_kongsberg14208	ENV25																											
11179_st18904-env25_fix(811)_kongsberg14208	ENV25																											
11179_st18904-env25_fix(812)_kongsberg14208	ENV25																											
11179_st18904-env25_fix(813)_kongsberg14208	ENV25																											
11179_st18904-env25_fix(814)_kongsberg14208	ENV25																											
11179_st18904-env25_fix(815)_kongsberg14208	ENV25																											
11179_st18904-env25_fix(816)_kongsberg14208	ENV25																											
11179_st18904-env25_fix(817)_kongsberg14208	ENV25										P							P										
11179_st18904-env25_fix(818)_kongsberg14208	ENV25																											
11179_st18904-env25_fix(819)_kongsberg14208	ENV25																											
11179_env26_snapshot_00001	ENV26																											
11179_env26_snapshot_00002	ENV26																											
11179_env26_snapshot_00003	ENV26																											
11179_env26_snapshot_00004	ENV26																											
11179_env26_snapshot_00005	ENV26																											
11179_env26_snapshot_00006	ENV26																											
11179_env26_snapshot_00007	ENV26																											
11179_env26_snapshot_00008	ENV26																											
11179_env26_snapshot_00009	ENV26																											
11179_env26_snapshot_00010	ENV26																											
11179_env26_snapshot_00011	ENV26																											
11179_env26_snapshot_00012	ENV26																											
11179_st18904-env26_fix(688)	ENV26																P											
11179_st18904-env26_fix(689)	ENV26																											
11179_st18904-env26_fix(690)	ENV26																											
11179_st18904-env26_fix(691)	ENV26																											
11179_st18904-env26_fix(692)	ENV26																											
11179_st18904-env26_fix(693)	ENV26																											
11179_st18904-env26_fix(694)	ENV26																											
11179_st18904-env26_fix(695)	ENV26																											
11179_st18904-env26_fix(696)	ENV26																											
11179_st18904-env26_fix(697)	ENV26																											
11179_st18904-env26_fix(698)	ENV26																											
11179_st18904-env26_fix(699)	ENV26																											
11179_st18904-env26_fix(700)	ENV26																											
11179_st18904-env26_fix(701)	ENV26																											
11179_st18904-env26_fix(702)	ENV26																											
11179_st18904-env26_fix(703)	ENV26																											
11179_st18904-env26_fix(704)	ENV26																											
11179_st18904-env26_fix(705)	ENV26																											
11179_st18904-env26_fix(706)	ENV26																											
11179_st18904-env26_fix(707)	ENV26																											
11179_st18904-env26_fix(708)	ENV26																	P										
11179_st18904-env26_fix(709)	ENV26																											
11179_st18904-env26_fix(710)	ENV26																											
11179_st18904-env26_fix(711)	ENV26																											
11179_st18904-env26_fix(712)	ENV26																											
11179_st18904-env26_fix(713)	ENV26																											
11179_st18904-env26_fix(714)	ENV26																											
11179_st18904-env26_fix(715)	ENV26																											
11179_st18904-env26_fix(716)	ENV26																											
11179_st18904-env26_fix(717)	ENV26																											
11179_st18904-env26_fix(718)	ENV26																	P										
11179_st18904-env26_fix(719)	ENV26																											
11179_env27_snapshot_00003	ENV27																											
11179_env27_snapshot_00004	ENV27																											
11179_env27_snapshot_00005	ENV27																											
11179_env27_snapshot_00006	ENV27																											
11179_env27_snapshot_00007	ENV27																	P										
11179_env27_snapshot_00008	ENV27																											
11179_env27_snapshot_00011	ENV27																											
11																												

APPENDIX C IMAGERY ANALYSIS RESULTS PER IMAGE

Table C.1 Species Presence and Absence per Image

[illegible]

P = Presence
Taxa highlighted in red indicate sensitive species

APPENDIX C IMAGERY ANALYSIS RESULTS PER IMAGE

Table C.1 Species Presence and Absence per Image

[illegible]

P = Presence
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APPENDIX C IMAGERY ANALYSIS RESULTS PER IMAGE

Table C.1 Species Presence and Absence per Image

[illegible]

P = Presence
Taxa highlighted in red indicate sensitive species



APPENDIX C IMAGERY ANALYSIS RESULTS PER IMAGE

Table C.1 Species Presence and Absence per Image

Image	Station	Mollusca - P. Arctica Islandica (live)																		
		Mollusca - P. Arctica Islandica (live)	Mollusca - P. Arctica Islandica (live)	Mollusca - P. Arctica Islandica (live)	Mollusca - P. Arctica Islandica (live)	Mollusca - P. Arctica Islandica (live)	Mollusca - P. Arctica Islandica (live)	Mollusca - P. Arctica Islandica (live)	Mollusca - P. Arctica Islandica (live)	Mollusca - P. Arctica Islandica (live)	Mollusca - P. Arctica Islandica (live)	Mollusca - P. Arctica Islandica (live)	Mollusca - P. Arctica Islandica (live)	Mollusca - P. Arctica Islandica (live)	Mollusca - P. Arctica Islandica (live)	Mollusca - P. Arctica Islandica (live)	Mollusca - P. Arctica Islandica (live)	Mollusca - P. Arctica Islandica (live)	Mollusca - P. Arctica Islandica (live)	Mollusca - P. Arctica Islandica (live)
11179_env56_snapshot_00002	ENV56	1																		
11179_env56_snapshot_00003	ENV56																			
11179_env56_snapshot_00004	ENV56																			
11179_env56_snapshot_00005	ENV56																			
11179_env56_snapshot_00006	ENV56																			
11179_env56_snapshot_00007	ENV56																			
11179_env56_snapshot_00008	ENV56																			
11179_env56_snapshot_00009	ENV56																			
11179_env56_snapshot_00010	ENV56																			
11179_env56_snapshot_00011	ENV56																			
11179_env56_snapshot_00012	ENV56																			
11179_st18904-env56_fix(2322)_kongsberg14208	ENV56																			
11179_st18904-env56_fix(2323)_kongsberg14208	ENV56																			
11179_st18904-env56_fix(2324)_kongsberg14208	ENV56																			
11179_st18904-env56_fix(2325)_kongsberg14208	ENV56																			
11179_st18904-env56_fix(2326)_kongsberg14208	ENV56																			
11179_st18904-env56_fix(2327)_kongsberg14208	ENV56																			
11179_st18904-env56_fix(2328)_kongsberg14208	ENV56																			
11179_st18904-env56_fix(2329)_kongsberg14208	ENV56																			
11179_st18904-env56_fix(2330)_kongsberg14208	ENV56																			
11179_st18904-env56_fix(2331)_kongsberg14208	ENV56																			
11179_st18904-env56_fix(2332)_kongsberg14208	ENV56																			
11179_st18904-env56_fix(2333)_kongsberg14208	ENV56																			
11179_st18904-env56_fix(2334)_kongsberg14208	ENV56																			
11179_st18904-env56_fix(2335)_kongsberg14208	ENV56																			
11179_st18904-env56_fix(2337)_kongsberg14208	ENV56																			
11179_st18904-env56_fix(2338)_kongsberg14208	ENV56																			
11179_st18904-env56_fix(2339)_kongsberg14208	ENV56																			
11179_st18904-env56_fix(2340)_kongsberg14208	ENV56																			
11179_st18904-env56_fix(2341)_kongsberg14208	ENV56																			
11179_st18904-env56_fix(2342)_kongsberg14208	ENV56																			
11179_st18904-env56_fix(2343)_kongsberg14208	ENV56																			
11179_st18904-env56_fix(2344)_kongsberg14208	ENV56																			
11179_st18904-env56_fix(2345)_kongsberg14208	ENV56																			
11179_st18904-env56_fix(2346)_kongsberg14208	ENV56																			
11179_st18904-env56_fix(2347)_kongsberg14208	ENV56																			
11179_st18904-env56_fix(2348)_kongsberg14208	ENV56																			
11179_st18904-env56_fix(2349)_kongsberg14208	ENV56																			
11179_st18904-env56_fix(2350)_kongsberg14208	ENV56																			
11179_st18904-env56_fix(2351)_kongsberg14208	ENV56																			
11179_st18904-env56_fix(2352)_kongsberg14208	ENV56																			
11179_st18904-env56_fix(2353)_kongsberg14208	ENV56																			
11179_st18904-env56_fix(2354)_kongsberg14208	ENV56																			
11179_st18904-env56_fix(2355)_kongsberg14208	ENV56																			
11179_st18904-env56_fix(2356)_kongsberg14208	ENV56																			
11179_st18904-env56_fix(2357)_kongsberg14208	ENV56																			
11179_st18904-env56_fix(2358)_kongsberg14208	ENV56																			
11179_st18904-env56_fix(2359)_kongsberg14208	ENV56																			
11179_st18904-env56_fix(2360)_kongsberg14208	ENV56																			
11179_st18904-env56_fix(2361)_kongsberg14208	ENV56																			
11179_st18904-env56_fix(2362)_kongsberg14208	ENV56																			
11179_st18904-env56_fix(2363)_kongsberg14208	ENV56																			
11179_st18904-env56_fix(2364)_kongsberg14208	ENV56																			
11179_st18904-env56_fix(2365)_kongsberg14208	ENV56																			
11179_st18904-env56_fix(2366)_kongsberg14208	ENV56																			
11179_st18904-env56_fix(2367)_kongsberg14208	ENV56																			
11179_st18904-env56_fix(2368)_kongsberg14208	ENV56																			
11179_st18904-env56_fix(2369)_kongsberg14208	ENV56																			
11179_st18904-env56_fix(2370)_kongsberg14208	ENV56																			
11179_st18904-env56_fix(2371)_kongsberg14208	ENV56																			
11179_st18904-env56_fix(2372)_kongsberg14208	ENV56																			
11179_st18904-env56_fix(2373)_kongsberg14208	ENV56																			
11179_st18904-env56_fix(2374)_kongsberg14208	ENV56																			
11179_env57_snapshot_00001	ENV57	1																		
11179_env57_snapshot_00002	ENV57																			
11179_env57_snapshot_00003	ENV57																			
11179_env57_snapshot_00004	ENV57	1																		
11179_env57_snapshot_00005	ENV57																			
11179_env57_snapshot_00006	ENV57																			
11179_env57_snapshot_00007	ENV57																			
11179_env57_snapshot_00008	ENV57																			
11179_env57_snapshot_00009	ENV57																			
11179_env57_snapshot_00010	ENV57																			
11179_st18904-env57_fix(1455)_kongsberg14208	ENV57																			
11179_st18904-env57_fix(1456)_kongsberg14208	ENV57																			
11179_st18904-env57_fix(1457)_kongsberg14208	ENV57																			
11179_st18904-env57_fix(1458)_kongsberg14208	ENV57																			
11179_st18904-env57_fix(1459)_kongsberg14208	ENV57																			
11179_st18904-env57_fix(1460)_kongsberg14208	ENV57																			
11179_st18904-env57_fix(1461)_kongsberg14208	ENV57																			
11179_st18904-env57_fix(1462)_kongsberg14208	ENV57																			
11179_st18904-env57_fix(1463)_kongsberg14208	ENV57																			
11179_st18904-env57_fix(1464)_kongsberg14208	ENV57																			
11179_st18904-env57_fix(1465)_kongsberg14208	ENV57																			



APPENDIX C IMAGERY ANALYSIS RESULTS PER IMAGE

Table C.1 Species Presence and Absence per Image

image	Station	Mollusca - cf. Arctica (larvae) (larv)	Mollusca - cf. Cardidae	Mollusca - Gastropoda A	Mollusca - Gastropoda B	Mollusca - Gastropoda C	Mollusca - Gastropoda D	Mollusca - Gastropoda E	Mollusca - Gastropoda F	Mollusca - Gastropoda G	Mollusca - Gastropoda indeterminata	Mollusca - Macrurus nodulos	Mollusca - Naticidae A	Mollusca - Neogastropoda A	Mollusca - Nudibranchia A	Mollusca - Nudibranchia B	Mollusca - Pectinidae	Portiera - indeterminata	Portiera A	Portiera B	Portiera C	Portiera D	Portiera E	Portiera F	Portiera G	Portiera H	Portiera I	Portiera K
11179_st18904-env59_fix(1328)_kongsberg14208	ENV59																											
11179_st18904-env59_fix(1329)_kongsberg14208	ENV59																											
11179_st18904-env59_fix(1330)_kongsberg14208	ENV59											P																
11179_st18904-env59_fix(1331)_kongsberg14208	ENV59																											
11179_st18904-env59_fix(1332)_kongsberg14208	ENV59																											
11179_st18904-env59_fix(1333)_kongsberg14208	ENV59																											
11179_st18904-env59_fix(1334)_kongsberg14208	ENV59																											
11179_st18904-env59_fix(1335)_kongsberg14208	ENV59																											
11179_st18904-env59_fix(1336)_kongsberg14208	ENV59										P																	
11179_st18904-env59_fix(1337)_kongsberg14208	ENV59																											
11179_st18904-env59_fix(1338)_kongsberg14208	ENV59												P															
11179_st18904-env59_fix(1339)_kongsberg14208	ENV59											P																
11179_st18904-env59_fix(1340)_kongsberg14208	ENV59																											
11179_st18904-env59_fix(1341)_kongsberg14208	ENV59																											
11179_st18904-env59_fix(1342)_kongsberg14208	ENV59																											
11179_st18904-env59_fix(1343)_kongsberg14208	ENV59																											
11179_st18904-env59_fix(1344)_kongsberg14208	ENV59																											
11179_st18904-env59_fix(1345)_kongsberg14208	ENV59										P																	
11179_st18904-env59_fix(1346)_kongsberg14208	ENV59																											
11179_st18904-env59_fix(1347)_kongsberg14208	ENV59																											
11179_st18904-env59_fix(1348)_kongsberg14208	ENV59																											
11179_st18904-env59_fix(1349)_kongsberg14208	ENV59																											
11179_st18904-env59_fix(1350)_kongsberg14208	ENV59																											
11179_st18904-env59_fix(1351)_kongsberg14208	ENV59																											
11179_st18904-env59_fix(1352)_kongsberg14208	ENV59																											
11179_st18904-env59_fix(1353)_kongsberg14208	ENV59																											
11179_st18904-env59_fix(1354)_kongsberg14208	ENV59										P																	
11179_st18904-env59_fix(1355)_kongsberg14208	ENV59																											
11179_st18904-env59_fix(1356)_kongsberg14208	ENV59																											
11179_st18904-env59_fix(1357)_kongsberg14208	ENV59											P		P														
11179_st18904-env59_fix(1358)_kongsberg14208	ENV59										P																	
11179_st18904-env59_fix(1359)_kongsberg14208	ENV59			P																								
11179_st18904-env59_fix(1360)_kongsberg14208	ENV59																											
11179_st18904-env59_fix(1361)_kongsberg14208	ENV59																											
11179_st18904-env59_fix(1362)_kongsberg14208	ENV59																											
11179_st18904-env59_fix(1363)_kongsberg14208	ENV59																											
11179_st18904-env59_fix(1364)_kongsberg14208	ENV59																											
11179_st18904-env59_fix(1365)_kongsberg14208	ENV59																											
11179_st18904-env59_fix(1366)_kongsberg14208	ENV59			P																								
11179_st18904-env59_fix(1367)_kongsberg14208	ENV59																											
11179_st18904-env59_fix(1368)_kongsberg14208	ENV59																											
11179_st18904-env59_fix(1369)_kongsberg14208	ENV59																											
11179_st18904-env59_fix(1370)_kongsberg14208	ENV59																											
11179_st18904-env59_fix(1371)_kongsberg14208	ENV59											P																
11179_st18904-env59_fix(1372)_kongsberg14208	ENV59										P																	
11179_st18904-env59_fix(1373)_kongsberg14208	ENV59																											
11179_st18904-env59_fix(1374)_kongsberg14208	ENV59																											
11179_st18904-env59_fix(1375)_kongsberg14208	ENV59				P																							
11179_st18904-env59_fix(1376)_kongsberg14208	ENV59																											
11179_st18904-env59_fix(1377)_kongsberg14208	ENV59																											
11179_st18904-env59_fix(1378)_kongsberg14208	ENV59																											
11179_st18904-env59_fix(1379)_kongsberg14208	ENV59																											
11179_st18904-env59_fix(1380)_kongsberg14208	ENV59																											
11179_st18904-env59_fix(1381)_kongsberg14208	ENV59																											
11179_st18904-env59_fix(1382)_kongsberg14208	ENV59																											
11179_st18904-env59_fix(1383)_kongsberg14208	ENV59			P																								
11179_env60_snapshot_00001	ENV60																											
11179_env60_snapshot_00002	ENV60																											
11179_env60_snapshot_00003	ENV60																											
11179_env60_snapshot_00004	ENV60																											
11179_env60_snapshot_00005	ENV60																											
11179_env60_snapshot_00006	ENV60																											
11179_st18904-env60_fix(2106)_kongsberg14208	ENV60																											
11179_st18904-env60_fix(2107)_kongsberg14208	ENV60																											
11179_st18904-env60_fix(2108)_kongsberg14208	ENV60																											
11179_st18904-env60_fix(2109)_kongsberg14208	ENV60																											
11179_st18904-env60_fix(2110)_kongsberg14208	ENV60																											
11179_st18904-env60_fix(2111)_kongsberg14208	ENV60																											
11179_st18904-env60_fix(2112)_kongsberg14208	ENV60																											
11179_st18904-env60_fix(2113)_kongsberg14208	ENV60																											
11179_st18904-env60_fix(2114)_kongsberg14208	ENV60																											
11179_st18904-env60_fix(2115)_kongsberg14208	ENV60																											
11179_st18904-env60_fix(2116)_kongsberg14208	ENV60																											
11179_st18904-env60_fix(2117)_kongsberg14208	ENV60																											
11179_st18904-env60_fix(2118)_kongsberg14208	ENV60																											
11179_st18904-env60_fix(2119)_kongsberg14208	ENV60																											
11179_st18904-env60_fix(2120)_kongsberg14208	ENV60																											
11179_st18904-env60_fix(2121)_kongsberg14208	ENV60																											
11179_st18904-env60_fix(2122)_kongsberg14208	ENV60																											
11179_st18904-env60_fix(2123)_kongsberg14208	ENV6																											



APPENDIX C IMAGERY ANALYSIS RESULTS PER IMAGE

Table C.1 Species Presence and Absence per Image

image	Station	Mollusca - cf. Arctica islandica (larvae)	Mollusca - cf. Cardidae	Mollusca - Gastropoda A	Mollusca - Gastropoda B	Mollusca - Gastropoda C	Mollusca - Gastropoda D	Mollusca - Gastropoda E	Mollusca - Gastropoda F	Mollusca - Gastropoda G	Mollusca - Gastropoda indeterminata	Mollusca - Macrurus nodulos	Mollusca - Naticidae A	Mollusca - Neogastropoda A	Mollusca - Nudibranchia A	Mollusca - Nudibranchia B	Mollusca - Pectinidae	Portifera - indeterminata	Portifera A	Portifera B	Portifera C	Portifera D	Portifera E	Portifera F	Portifera G	Portifera H	Portifera I	Portifera K
11179_env61_snapshot_00003	ENV61																											
11179_env61_snapshot_00004	ENV61																											
11179_env61_snapshot_00005	ENV61																											
11179_env61_snapshot_00006	ENV61																											
11179_env61_snapshot_00007	ENV61																											
11179_env61_snapshot_00008	ENV61																											
11179_env61_snapshot_00009	ENV61																											
11179_env61_snapshot_00010	ENV61																											
11179_env61_snapshot_00011	ENV61	1																										
11179_env61_snapshot_00012	ENV61	1																										
11179_env61_snapshot_00013	ENV61																											
11179_env61_snapshot_00014	ENV61																											
11179_env61_snapshot_00015	ENV61																											
11179_env61_snapshot_00016	ENV61		1																									
11179_env61_snapshot_00017	ENV61																											
11179_env61_snapshot_00018	ENV61																											
11179_env61_snapshot_00019	ENV61																											
11179_env61_snapshot_00020	ENV61																											
11179_env61_snapshot_00021	ENV61																											
11179_st18904-env61_fix(1245)_kongsberg14208	ENV61																											
11179_st18904-env61_fix(1246)_kongsberg14208	ENV61																											
11179_st18904-env61_fix(1247)_kongsberg14208	ENV61																											
11179_st18904-env61_fix(1248)_kongsberg14208	ENV61											P																
11179_st18904-env61_fix(1249)_kongsberg14208	ENV61																											
11179_st18904-env61_fix(1250)_kongsberg14208	ENV61																											
11179_st18904-env61_fix(1251)_kongsberg14208	ENV61																											
11179_st18904-env61_fix(1252)_kongsberg14208	ENV61									P																		
11179_st18904-env61_fix(1253)_kongsberg14208	ENV61																											
11179_st18904-env61_fix(1254)_kongsberg14208	ENV61																											
11179_st18904-env61_fix(1255)_kongsberg14208	ENV61																											
11179_st18904-env61_fix(1256)_kongsberg14208	ENV61																											
11179_st18904-env61_fix(1257)_kongsberg14208	ENV61										P																	
11179_st18904-env61_fix(1258)_kongsberg14208	ENV61																											
11179_st18904-env61_fix(1259)_kongsberg14208	ENV61										P																	
11179_st18904-env61_fix(1260)_kongsberg14208	ENV61											P																
11179_st18904-env61_fix(1261)_kongsberg14208	ENV61			P																								
11179_st18904-env61_fix(1262)_kongsberg14208	ENV61											P																
11179_st18904-env61_fix(1263)_kongsberg14208	ENV61																											
11179_st18904-env61_fix(1264)_kongsberg14208	ENV61																											
11179_st18904-env61_fix(1265)_kongsberg14208	ENV61																											
11179_st18904-env61_fix(1266)_kongsberg14208	ENV61																											
11179_st18904-env61_fix(1267)_kongsberg14208	ENV61			P								P		P														
11179_st18904-env61_fix(1268)_kongsberg14208	ENV61																											
11179_st18904-env61_fix(1269)_kongsberg14208	ENV61																											
11179_st18904-env61_fix(1270)_kongsberg14208	ENV61																											
11179_st18904-env61_fix(1271)_kongsberg14208	ENV61											P																
11179_st18904-env61_fix(1272)_kongsberg14208	ENV61																											
11179_st18904-env61_fix(1273)_kongsberg14208	ENV61																											
11179_st18904-env61_fix(1274)_kongsberg14208	ENV61																											
11179_st18904-env61_fix(1275)_kongsberg14208	ENV61																											
11179_st18904-env61_fix(1276)_kongsberg14208	ENV61																											
11179_st18904-env61_fix(1277)_kongsberg14208	ENV61																											
11179_st18904-env61_fix(1278)_kongsberg14208	ENV61																											
11179_st18904-env61_fix(1279)_kongsberg14208	ENV61																											
11179_st18904-env61_fix(1280)_kongsberg14208	ENV61		1																									
11179_st18904-env61_fix(1281)_kongsberg14208	ENV61																											
11179_st18904-env61_fix(1282)_kongsberg14208	ENV61																											
11179_st18904-env61_fix(1283)_kongsberg14208	ENV61																											
11179_st18904-env61_fix(1284)_kongsberg14208	ENV61																											
11179_st18904-env61_fix(1285)_kongsberg14208	ENV61																											
11179_st18904-env61_fix(1286)_kongsberg14208	ENV61																											
11179_st18904-env61_fix(1287)_kongsberg14208	ENV61																											
11179_st18904-env61_fix(1288)_kongsberg14208	ENV61																											
11179_st18904-env61_fix(1289)_kongsberg14208	ENV61																											
11179_st18904-env61_fix(1290)_kongsberg14208	ENV61																											
11179_st18904-env61_fix(1291)_kongsberg14208	ENV61																											
11179_st18904-env61_fix(1292)_kongsberg14208	ENV61																											
11179_st18904-env61_fix(1293)_kongsberg14208	ENV61											P																
11179_st18904-env61_fix(1294)_kongsberg14208	ENV61																											
11179_st18904-env61_fix(1295)_kongsberg14208	ENV61			P																								
11179_st18904-env61_fix(1296)_kongsberg14208	ENV61																											
11179_st18904-env61_fix(1297)_kongsberg14208	ENV61										P																	
11179_st18904-env61_fix(1298)_kongsberg14208	ENV61																											
11179_st18904-env61_fix(1299)_kongsberg14208	ENV61																											
11179_st18904-env61_fix(1300)_kongsberg14208	ENV61																											
11179_st18904-env61_fix(1301)_kongsberg14208	ENV61																											
11179_st18904-env61_fix(1302)_kongsberg14208	ENV61											P																
11179_st18904-env61_fix(1303)_kongsberg14208	ENV61																											
11179_st18904-env61_fix(1304)_kongsberg14208	ENV61																											
11179_st18904-env61_fix(1305)_kongsberg14208	ENV61																											
11179_st18904-env61_fix(1306)_kongsberg14208	ENV61																											



APPENDIX C IMAGERY ANALYSIS RESULTS PER IMAGE

Table C.1 Species Presence and Absence per Image

image	Station	Mollusca - cf. Arctica islandica (larva)	Mollusca - cf. Cardidae	Mollusca - Gastropoda A	Mollusca - Gastropoda B	Mollusca - Gastropoda C	Mollusca - Gastropoda D	Mollusca - Gastropoda E	Mollusca - Gastropoda F	Mollusca - Gastropoda G	Mollusca - Gastropoda indeterminata	Mollusca - Macrurus nodulos	Mollusca - Naticidae A	Mollusca - Neogastropoda A	Mollusca - Nudibranchia A	Mollusca - Nudibranchia B	Mollusca - Nudibranchia	Portiera - indeterminata	Portiera A	Portiera B	Portiera C	Portiera D	Portiera E	Portiera F	Portiera G	Portiera H	Portiera I	Portiera K
11179_st18904-env62_fix(2296)_kongsberg14208	ENV62																											
11179_st18904-env62_fix(2297)_kongsberg14208	ENV62																											
11179_st18904-env62_fix(2298)_kongsberg14208	ENV62																											
11179_st18904-env62_fix(2299)_kongsberg14208	ENV62																											
11179_st18904-env62_fix(2300)_kongsberg14208	ENV62																											
11179_st18904-env62_fix(2301)_kongsberg14208	ENV62																											
11179_st18904-env62_fix(2302)_kongsberg14208	ENV62																											
11179_st18904-env62_fix(2303)_kongsberg14208	ENV62																											
11179_st18904-env62_fix(2304)_kongsberg14208	ENV62																											
11179_st18904-env62_fix(2305)_kongsberg14208	ENV62																											
11179_st18904-env62_fix(2306)_kongsberg14208	ENV62																											
11179_st18904-env62_fix(2307)_kongsberg14208	ENV62																											
11179_st18904-env62_fix(2308)_kongsberg14208	ENV62																											
11179_st18904-env62_fix(2309)_kongsberg14208	ENV62																											
11179_st18904-env62_fix(2310)_kongsberg14208	ENV62																											
11179_st18904-env62_fix(2311)_kongsberg14208	ENV62															P												
11179_st18904-env62_fix(2312)_kongsberg14208	ENV62																											
11179_st18904-env62_fix(2313)_kongsberg14208	ENV62																											
11179_st18904-env62_fix(2314)_kongsberg14208	ENV62																											
11179_st18904-env62_fix(2315)_kongsberg14208	ENV62																											
11179_st18904-env62_fix(2316)_kongsberg14208	ENV62																											
11179_st18904-env62_fix(2317)_kongsberg14208	ENV62																											
11179_st18904-env62_fix(2318)_kongsberg14208	ENV62																											
11179_st18904-env62_fix(2319)_kongsberg14208	ENV62																											
11179_st18904-env62_fix(2320)_kongsberg14208	ENV62																											
11179_st18904-env62_fix(2321)_kongsberg14208	ENV62																											
11179_env63_snapshot_00001	ENV63																											
11179_env63_snapshot_00002	ENV63																											
11179_env63_snapshot_00003	ENV63																											
11179_env63_snapshot_00004	ENV63																											
11179_env63_snapshot_00005	ENV63																											
11179_env63_snapshot_00006	ENV63																											
11179_env63_snapshot_00007	ENV63																											
11179_env63_snapshot_00008	ENV63	1																									P	
11179_env63_snapshot_00009	ENV63																											
11179_env63_snapshot_00010	ENV63																											
11179_env63_snapshot_00011	ENV63																											
11179_env63_snapshot_00012	ENV63																											
11179_env63_snapshot_00013	ENV63																											
11179_env63_snapshot_00014	ENV63																											
11179_env63_snapshot_00015	ENV63																											
11179_env63_snapshot_00016	ENV63																											
11179_env63_snapshot_00017	ENV63																											
11179_st18904-env63_fix(2156)_kongsberg14208	ENV63											P																
11179_st18904-env63_fix(2157)_kongsberg14208	ENV63					P						P																
11179_st18904-env63_fix(2158)_kongsberg14208	ENV63											P																
11179_st18904-env63_fix(2159)_kongsberg14208	ENV63			P								P																
11179_st18904-env63_fix(2160)_kongsberg14208	ENV63											P																
11179_st18904-env63_fix(2161)_kongsberg14208	ENV63																											
11179_st18904-env63_fix(2162)_kongsberg14208	ENV63																											
11179_st18904-env63_fix(2163)_kongsberg14208	ENV63																											
11179_st18904-env63_fix(2164)_kongsberg14208	ENV63																											
11179_st18904-env63_fix(2165)_kongsberg14208	ENV63																											
11179_st18904-env63_fix(2166)_kongsberg14208	ENV63																											
11179_st18904-env63_fix(2167)_kongsberg14208	ENV63												P															
11179_st18904-env63_fix(2168)_kongsberg14208	ENV63																											
11179_st18904-env63_fix(2169)_kongsberg14208	ENV63																											
11179_st18904-env63_fix(2170)_kongsberg14208	ENV63																											
11179_st18904-env63_fix(2171)_kongsberg14208	ENV63																											
11179_st18904-env63_fix(2172)_kongsberg14208	ENV63																											
11179_st18904-env63_fix(2173)_kongsberg14208	ENV63																											
11179_st18904-env63_fix(2174)_kongsberg14208	ENV63																											
11179_st18904-env63_fix(2175)_kongsberg14208	ENV63																											
11179_st18904-env63_fix(2176)_kongsberg14208	ENV63																											
11179_st18904-env63_fix(2177)_kongsberg14208	ENV63																											
11179_st18904-env63_fix(2178)_kongsberg14208	ENV63																											
11179_st18904-env63_fix(2179)_kongsberg14208	ENV63																											
11179_st18904-env63_fix(2180)_kongsberg14208	ENV63																											
11179_st18904-env63_fix(2181)_kongsberg14208	ENV63																											
11179_st18904-env63_fix(2182)_kongsberg14208	ENV63																											
11179_st18904-env63_fix(2183)_kongsberg14208	ENV63																											
11179_st18904-env63_fix(2184)_kongsberg14208	ENV63			P																								
11179_st18904-env63_fix(2185)_kongsberg14208	ENV63											P																
11179_st18904-env63_fix(2186)_kongsberg14208	ENV63																											
11179_st18904-env63_fix(2187)_kongsberg14208	ENV63																											
11179_st18904-env63_fix(2188)_kongsberg14208	ENV63												P															
11179_st18904-env63_fix(2189)_kongsberg14208	ENV63																											
11179_st18904-env63_fix(2190)_kongsberg14208	ENV63																											
11179_st18904-env63_fix(2191)_kongsberg14208	ENV63																											
11179_st18904-env63_fix(2192)_kongsberg14208	ENV63																											
11179_st18904-env63_fix(2193)_kongsberg14208	ENV63																											



APPENDIX C IMAGERY ANALYSIS RESULTS PER IMAGE

Table C.1 Species Presence and Absence per Image

image	Station	Mollusca - cf. Arctica islandica (larva)	Mollusca - cf. Cardidae	Mollusca - Gastropoda A	Mollusca - Gastropoda B	Mollusca - Gastropoda C	Mollusca - Gastropoda D	Mollusca - Gastropoda E	Mollusca - Gastropoda F	Mollusca - Gastropoda G	Mollusca - Gastropoda indeterminata	Mollusca - Nacidae A	Mollusca - Neogastropoda A	Mollusca - Nudibranchia A	Mollusca - Nudibranchia B	Mollusca - Pectinidae	Portiera - indeterminata	Portiera A	Portiera B	Portiera C	Portiera D	Portiera E	Portiera F	Portiera G	Portiera H	Portiera I	Portiera K
11179_env69_snapshot_00005	ENV69																										
11179_env69_snapshot_00006	ENV69																										
11179_env69_snapshot_00007	ENV69																										
11179_env69_snapshot_00008	ENV69															P											
11179_env69_snapshot_00009	ENV69															P											
11179_env69_snapshot_00010	ENV69																										
11179_env69_snapshot_00011	ENV69																										
11179_env69_snapshot_00012	ENV69																										
11179_env69_snapshot_00013	ENV69																										
11179_env69_snapshot_00014	ENV69															P											
11179_env69_snapshot_00015	ENV69															P											
11179_env69_snapshot_00016	ENV69																										
11179_env69_snapshot_00017	ENV69																										
11179_env69_snapshot_00018	ENV69																										
11179_env69_snapshot_00019	ENV69																										
11179_st18904-env69_fix(2201)_kongsberg14208	ENV69																										
11179_st18904-env69_fix(2202)_kongsberg14208	ENV69																										
11179_st18904-env69_fix(2203)_kongsberg14208	ENV69																										
11179_st18904-env69_fix(2204)_kongsberg14208	ENV69																										
11179_st18904-env69_fix(2205)_kongsberg14208	ENV69																										
11179_st18904-env69_fix(2206)_kongsberg14208	ENV69															P											
11179_st18904-env69_fix(2207)_kongsberg14208	ENV69									P																	
11179_st18904-env69_fix(2208)_kongsberg14208	ENV69																										
11179_st18904-env69_fix(2209)_kongsberg14208	ENV69																										
11179_st18904-env69_fix(2210)_kongsberg14208	ENV69																										
11179_st18904-env69_fix(2211)_kongsberg14208	ENV69																										
11179_st18904-env69_fix(2212)_kongsberg14208	ENV69																										
11179_st18904-env69_fix(2213)_kongsberg14208	ENV69																										
11179_st18904-env69_fix(2214)_kongsberg14208	ENV69																										
11179_st18904-env69_fix(2215)_kongsberg14208	ENV69																										
11179_st18904-env69_fix(2216)_kongsberg14208	ENV69																										
11179_st18904-env69_fix(2217)_kongsberg14208	ENV69															P											
11179_st18904-env69_fix(2218)_kongsberg14208	ENV69																										
11179_st18904-env69_fix(2219)_kongsberg14208	ENV69																										
11179_st18904-env69_fix(2220)_kongsberg14208	ENV69																										
11179_st18904-env69_fix(2221)_kongsberg14208	ENV69																										
11179_st18904-env69_fix(2222)_kongsberg14208	ENV69																										
11179_st18904-env69_fix(2223)_kongsberg14208	ENV69																										
11179_st18904-env69_fix(2224)_kongsberg14208	ENV69																										
11179_st18904-env69_fix(2225)_kongsberg14208	ENV69																										
11179_st18904-env69_fix(2226)_kongsberg14208	ENV69																										
11179_st18904-env69_fix(2227)_kongsberg14208	ENV69																										
11179_st18904-env69_fix(2228)_kongsberg14208	ENV69																										
11179_st18904-env69_fix(2229)_kongsberg14208	ENV69																										
11179_st18904-env69_fix(2230)_kongsberg14208	ENV69																										
11179_st18904-env69_fix(2231)_kongsberg14208	ENV69																										
11179_st18904-env69_fix(2232)_kongsberg14208	ENV69																										
11179_st18904-env69_fix(2233)_kongsberg14208	ENV69																										
11179_st18904-env69_fix(2234)_kongsberg14208	ENV69																										
11179_st18904-env69_fix(2235)_kongsberg14208	ENV69																										
11179_st18904-env69_fix(2236)_kongsberg14208	ENV69																										
11179_st18904-env69_fix(2237)_kongsberg14208	ENV69																										
11179_st18904-env69_fix(2238)_kongsberg14208	ENV69																										
11179_st18904-env69_fix(2239)_kongsberg14208	ENV69																										
11179_st18904-env69_fix(2240)_kongsberg14208	ENV69																										
11179_st18904-env69_fix(2241)_kongsberg14208	ENV69																										
11179_st18904-env69_fix(2242)_kongsberg14208	ENV69																										
11179_st18904-env69_fix(2243)_kongsberg14208	ENV69																										
11179_st18904-env69_fix(2244)_kongsberg14208	ENV69																										
11179_st18904-env69_fix(2245)_kongsberg14208	ENV69		1																								
11179_st18904-env69_fix(2246)_kongsberg14208	ENV69																										
11179_st18904-env69_fix(2247)_kongsberg14208	ENV69																										
11179_st18904-env69_fix(2248)_kongsberg14208	ENV69																										
11179_st18904-env69_fix(2249)_kongsberg14208	ENV69																										
11179_st18904-env69_fix(2250)_kongsberg14208	ENV69											P															
11179_st18904-env69_fix(2251)_kongsberg14208	ENV69																										
11179_st18904-env69_fix(2252)_kongsberg14208	ENV69																										
11179_st18904-env69_fix(2253)_kongsberg14208	ENV69																										
11179_st18904-env69_fix(2254)_kongsberg14208	ENV69																										
11179_st18904-env69_fix(2255)_kongsberg14208	ENV69																										
11179_st18904-env69_fix(2256)_kongsberg14208	ENV69																										
11179_st18904-env69_fix(2257)_kongsberg14208	ENV69																										
11179_st18904-env69_fix(2258)_kongsberg14208	ENV69																										
11179_st18904-env69_fix(2259)_kongsberg14208	ENV69																										
11179_st18904-env69_fix(2260)_kongsberg14208	ENV69																										
11179_st18904-env69_fix(2261)_kongsberg14208	ENV69																										
11179_st18904-env69_fix(2262)_kongsberg14208	ENV69																										
11179_st18904-env69_fix(2263)_kongsberg14208	ENV69																										
11179_st18904-env69_fix(2264)_kongsberg14208	ENV69																										
11179_st18904-env69_fix(2265)_kongsberg14208	ENV69																										
11179_st18904-env69_fix(2266)_kongsberg14208																											



APPENDIX C IMAGERY ANALYSIS RESULTS PER IMAGE

Table C.1 Species Presence and Absence per Image

image	Station																		
		Mollusca - cf. Arctica islandica (live)	Mollusca - cf. Cardidae	Mollusca - Gastropoda A	Mollusca - Gastropoda B	Mollusca - Gastropoda C	Mollusca - Gastropoda D	Mollusca - Gastropoda E	Mollusca - Gastropoda F	Mollusca - Gastropoda G	Mollusca - Gastropoda indeterminate	Mollusca - Macrurus nodulos	Mollusca - Nautica A	Mollusca - Neogastropoda A	Mollusca - Nudibranchia A	Mollusca - Nudibranchia B	Mollusca - Pectinidae	Portera - indeterminate	Portera A
11179_st18904-env72_fix(788)_kongsberg14208	ENV72																P		
11179_st18904-env72_fix(789)_kongsberg14208	ENV72										P								
11179_st18904-env72_fix(790)_kongsberg14208	ENV72																		
11179_st18904-env72_fix(791)_kongsberg14208	ENV72																		
11179_st18904-env72_fix(792)_kongsberg14208	ENV72																		
11179_st18904-env72_fix(793)_kongsberg14208	ENV72																		
11179_st18904-env72_fix(794)_kongsberg14208	ENV72																		
11179_st18904-env72_fix(795)_kongsberg14208	ENV72																		
11179_st18904-env72_fix(796)_kongsberg14208	ENV72										P								

P = Presence
Taxa highlighted in red indicate sensitive species

APPENDIX D IMAGERY ANALYSIS RESULTS PER STATION

Table D.1 Species Presence and Absence per Station

[illegible]

Taxa highlighted in red indicate sensitive species

APPENDIX D IMAGERY ANALYSIS RESULTS PER STATION

Table D.1 Species Presence and Absence per Station

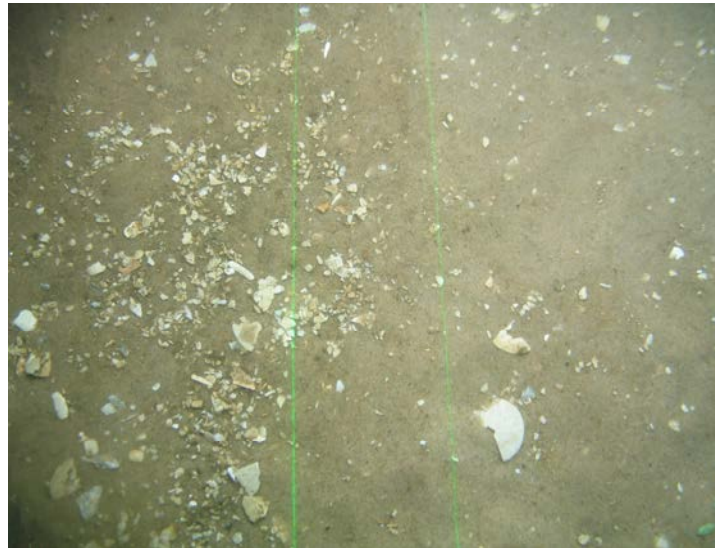
[illegible]

Taxa highlighted in red indicate sensitive species

APPENDIX E SAMPLING AND SEABED PHOTOGRAPHS



Fix: 1073 E: 653189 N: 4456662 Depth: 130' (40m)

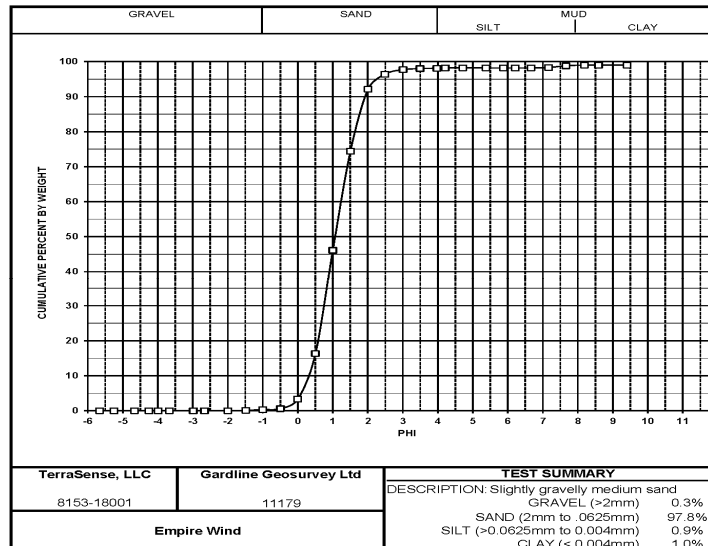


Fix: 1084 E: 653117 N: 4456697 Depth: 130' (40m)

Station: ST18904-ENV5
Sediment Description:
Fix1073: Fine sand with frequent shell fragments
Fix1084: Fine sand with frequent shell fragments
Fauna Description:
Fix1073: Echinodermata (*Echinarachnius parma*), Chordata (Rajidae egg case)
Fix1084: No visible fauna
Laser Scale: 94mm separation
CMECS Biotic Group: Sand Dollar Bed
Station ST18904-ENV5 target and actual sampling locations are illustrated in Figure 1.7



Fix: 127 E: 653069 N: 4456716 Depth: 131' (40m)



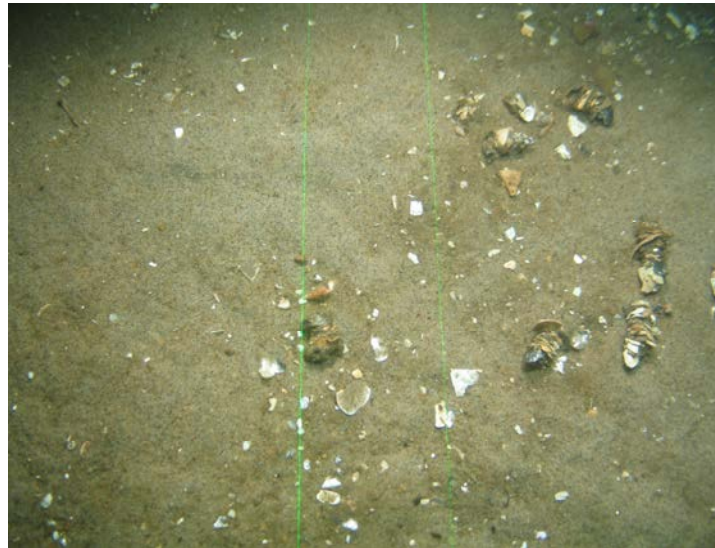
Fix: 127 E: 653071 N: 4456717 Retention: PSA

Station: ST18904-ENV5
Sediment Description:
Grab: Sand with shell fragments
CMECS Substrate Component Subgroup: Slightly gravelly sand
Fauna Description:
Grab: Annelida (Polychaeta), Echinodermata (Clypeasteroidea)

APPENDIX E SAMPLING AND SEABED PHOTOGRAPHS



Fix: 123 **E: 619944** **N: 4470647** **Depth: 86' (26m)**

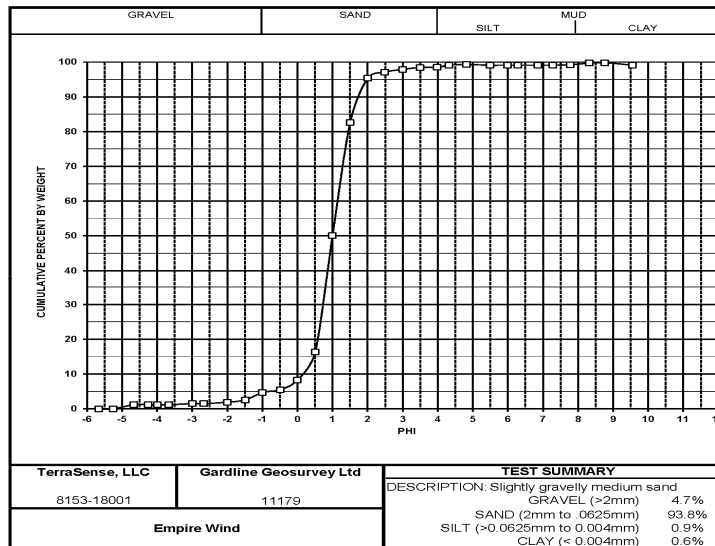


Fix: 156 **E: 620131** **N: 4470552** **Depth: 84' (26m)**

Station: ST18904-ENV7
Sediment Description:
Fix123: Fine sand with frequent shell fragments
Fix156: Fine sand with frequent shell fragments
Fauna Description:
Fix123: Echinodermata (*Echinarachnius parma*)
Fix156: Annelida (Terrebellidae), Arthropoda (Paguroidea)
Laser Scale: 94mm separation
CMECS Biotic Group: Mobile Crustaceans on Soft Sediments
 Station ST18904-ENV7 target and actual sampling locations are illustrated in Figure 1.1



Fix: 7 **E: 620066** **N: 4470592** **Depth: 82' (25m)**



Fix: 7 **E: 620057** **N: 4470591** **Retention: PSA**

Station: ST18904-ENV7
Sediment Description:
Grab: Medium to coarse sand with shell fragments
CMECS Substrate Component Subgroup: Slightly gravelly sand
Fauna Description:
Grab: Annelida (Terrebellidae), Arthropoda (Paguridae), Echinodermata (Clypeasteroidea)

APPENDIX E SAMPLING AND SEABED PHOTOGRAPHS



Fix: 101 E: 620938 N: 4470552 Depth: 87' (27m)

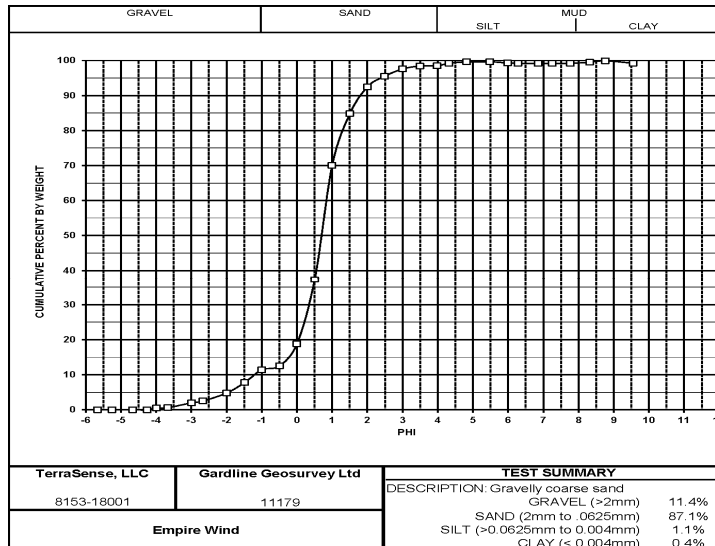


Fix: 108 E: 620966 N: 4470580 Depth: 87' (27m)

Station: ST18904-ENV8
Sediment Description:
Fix101: Gravelly sands with abundant shells and shell fragments
Fix108: Fine sand with frequent shell fragments
Fauna Description:
Fix101: Arthropoda (Paguroidea), Cnidaria (Hydrozoa)
Fix108: Arthropoda (Amphipoda), Echinodermata (*Echinarachnius parma*), Indeterminate fauna
Laser Scale: 94mm separation
CMECS Biotic Group: Sand Dollar Bed / Mobile Crustaceans on Soft Sediments
 Station ST18904-ENV8 target and actual sampling locations are illustrated in Figure 1.1



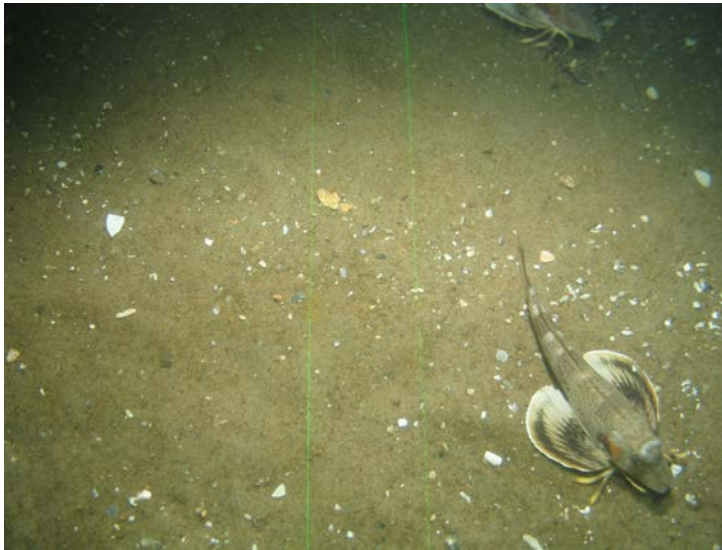
Fix: 4 E: 620915 N: 4470526 Depth: 85' (26m)



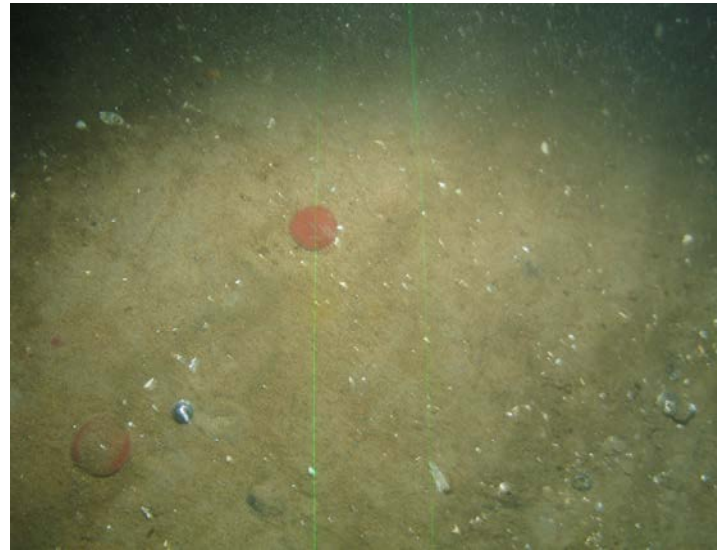
Fix: 4 E: 620906 N: 4470529 Retention: PSA

Station: ST18904-ENV8
Sediment Description:
Grab: Medium to coarse sand with shell fragments and pebbles
CMECS Substrate Component Subgroup: Gravelly sand
Fauna Description:
Grab: Arthropoda (Paguroidea)

APPENDIX E SAMPLING AND SEABED PHOTOGRAPHS



Fix: 33 E: 620450 N: 4469946 Depth: 81' (25m)



Fix: 69 E: 620279 N: 4470019 Depth: 81' (25m)

Station: ST18904-ENV9
Sediment Description:
Fix33: Fine sand with frequent shell fragments

Fix69: Fine sand with scattered shell fragments and faunal burrows

Fauna Description:
Fix33: Chordata (*cf. Prionotus carolinus*)

Fix69: Echinodermata (*Echinarachnius parma*)

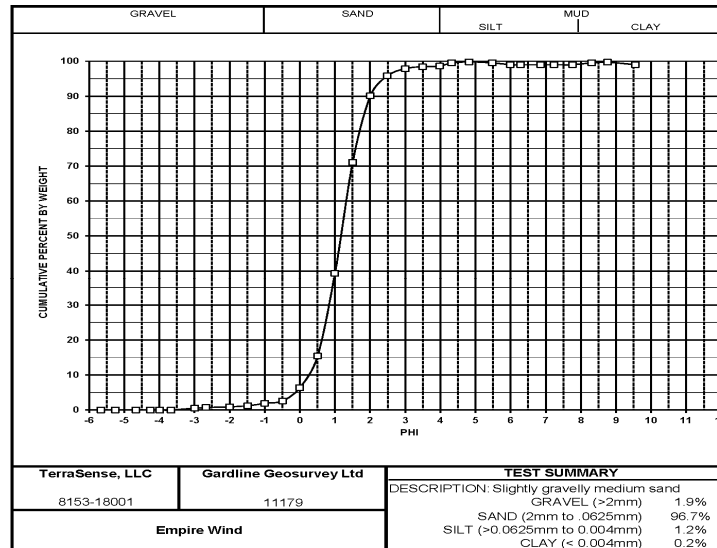
Laser Scale: 94mm separation

CMECS Biotic Group: Mobile Crustaceans on Soft Sediments

Station ST18904-ENV9 target and actual sampling locations are illustrated in Figure 1.1



Fix: 10 E: 620342 N: 4469993 Depth: 83' (25m)



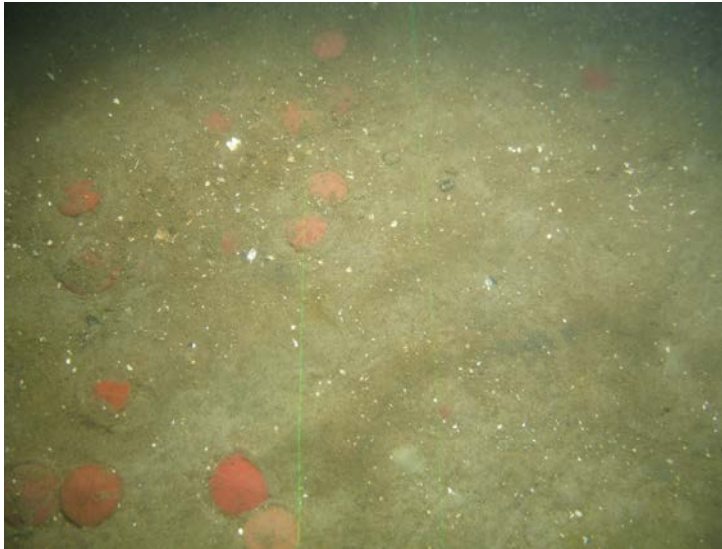
Fix: 10 E: 620341 N: 4469993 Retention: PSA

Station: ST18904-ENV9
Sediment Description:
Grab: Medium to coarse sand with shell fragments

CMECS Substrate Component Subgroup: Slightly gravelly sand

Fauna Description:
Grab: No visible fauna

APPENDIX E SAMPLING AND SEABED PHOTOGRAPHS



Fix: 201 E: 622117 N: 4470129 Depth: 88' (27m)



Fix: 213 E: 622194 N: 4470120 Depth: 89' (27m)

Station: ST18904-ENV10

Sediment Description:

Fix201: Fine sand with scattered shell fragments

Fix213: Coarse sand with abundant shells and shell fragments

Fauna Description:

Fix201: Echinodermata (*Echinarachnius parma*)

Fix213: Arthropoda (Paguroidea)

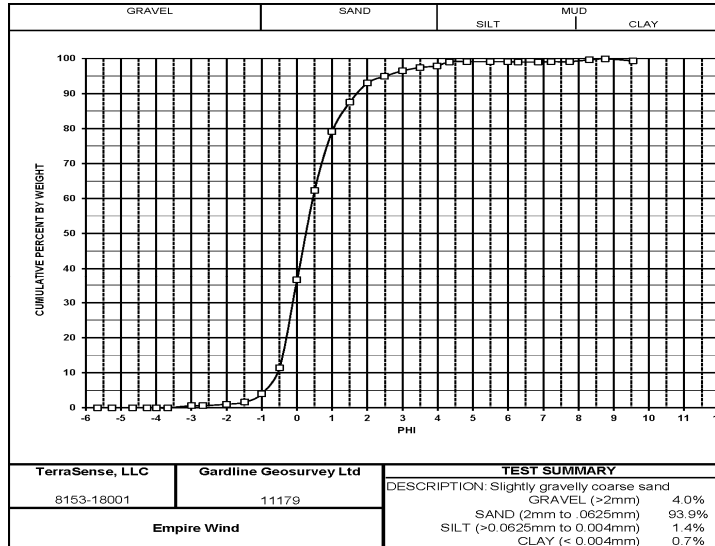
Laser Scale: 94mm separation

CMECS Biotic Group: Sand Dollar Bed

Station ST18904-ENV10 target and actual sampling locations are illustrated in Figure 1.1



Fix: 1 E: 622176 N: 4470109 Depth: 86' (26m)



Fix: 1 E: 622179 N: 4470125 Retention: PSA

Station: ST18904-ENV10

Sediment Description:

Grab: Coarse sand with shell fragments

CMECS Substrate Component Subgroup: Slightly gravelly sand

Fauna Description:

Grab: Annelida (Terrellidae), Echinodermata (Clypeasteroidea)

APPENDIX E SAMPLING AND SEABED PHOTOGRAPHS



Fix: 169 E: 621736 N: 4469703 Depth: 83' (25m)

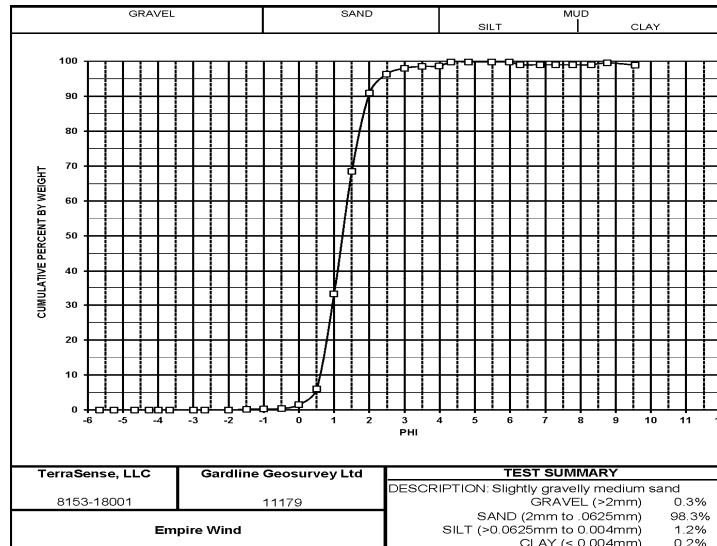


Fix: 175 E: 621768 N: 4469687 Depth: 83' (25m)

Station: ST18904-ENV11
Sediment Description:
Fix169: Fine sand with scattered shell fragments, faunal burrows present
Fix175: Fine sand with scattered shell fragments
Fauna Description:
Fix169: Mollusca (Gastropoda)
Fix175: Annelida (Terrellidae), Mollusca (Gastropoda)
Laser Scale: 94mm separation
CMECS Biotic Group: Larger Tube-building Fauna
Station ST18904-ENV11 target and actual sampling locations are illustrated in Figure 1.1



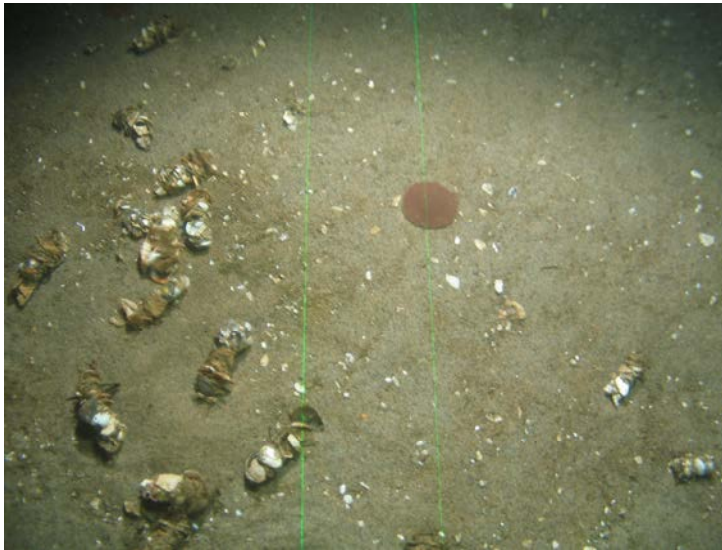
Fix: 13 E: 621787 N: 4469677 Depth: 83' (25m)



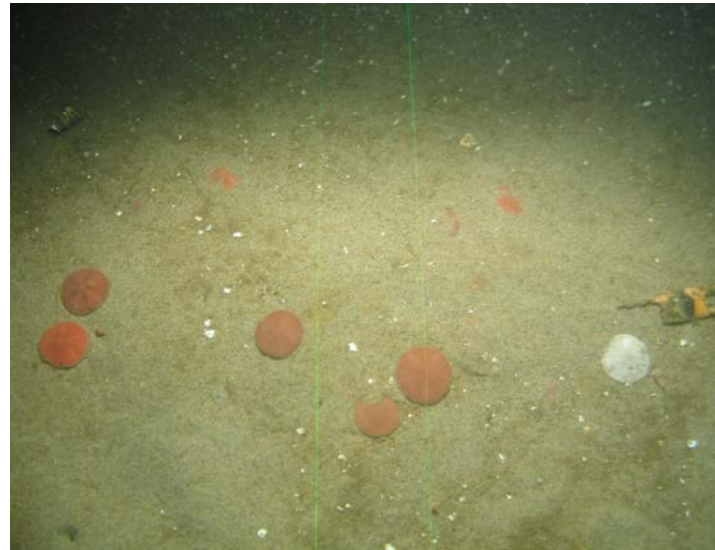
Fix: 13 E: 621787 N: 4469675 Retention: PSA

Station: ST18904-ENV11
Sediment Description:
Grab: Medium to coarse sand with shell fragments
CMECS Substrate Component Subgroup: Slightly gravelly sand
Fauna Description:
Grab: Annelida (Polychaeta)

APPENDIX E SAMPLING AND SEABED PHOTOGRAPHS



Fix: 3 E: 621782 N: 4469086 Depth: 80' (24m)



Fix: 30 E: 621608 N: 4469180 Depth: 80' (24m)

Station: ST18904-ENV12

Sediment Description:

Fix3: Fine sand with scattered shell fragments

Fix30: Fine sand with scattered shell fragments, faunal burrows present

Fauna Description:

Fix3: Annelida (Terrellidae), Arthropoda (Brachyura), Mollusca (Gastropoda), Echinodermata (*Echinarachnius parma*)

Fix30: Annelida (Terrellidae), Arthropoda (Paguroidea), Mollusca (Gastropoda), Echinodermata (*Echinarachnius parma*), Chordata (Rajidae egg case)

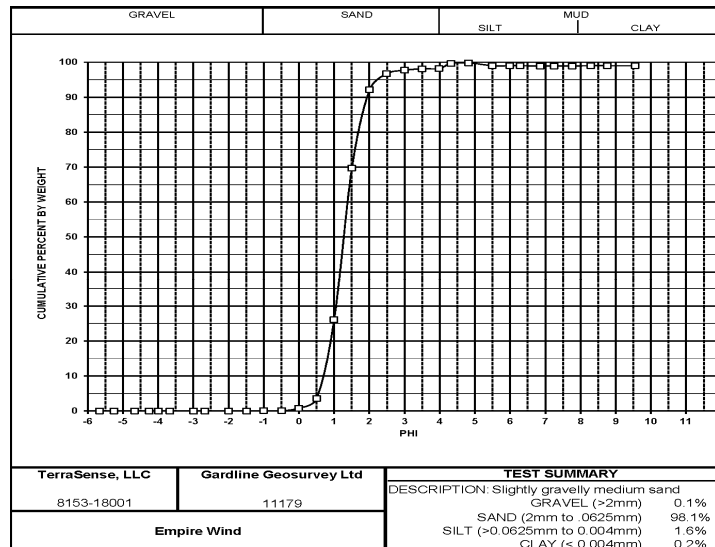
Laser Scale: 94mm separation

CMECS Biotic Group: Sand Dollar Bed

Station ST18904-ENV12 target and actual sampling locations are illustrated in Figure 1.1



Fix: 17 E: 621699 N: 4469130 Depth: 82' (25m)



Fix: 17 E: 621699 N: 4469130 Retention: PSA

Station: ST18904-ENV12

Sediment Description:

Grab: Medium to coarse sand with shell fragments

CMECS Substrate Component Subgroup: Slightly gravelly sand

Fauna Description:

Grab: No visible fauna

APPENDIX E SAMPLING AND SEABED PHOTOGRAPHS



Fix: 234 E: 623928 N: 4469765 Depth: 90' (27m)



Fix: 246 E: 623999 N: 4469719 Depth: 91' (28m)

Station: ST18904-ENV13

Sediment Description:

Fix234: Fine sand with frequent shell fragments

Fix246: Gravelly sand with abundant shells and shell fragments

Fauna Description:

Fix234: Annelida (Terrellidae), Arthropoda (Paguroidea), Mollusca (Gastropoda), Echinodermata (*Echinarachnius parma*)

Fix246: Arthropoda (Paguroidea), Mollusca (Gastropoda)

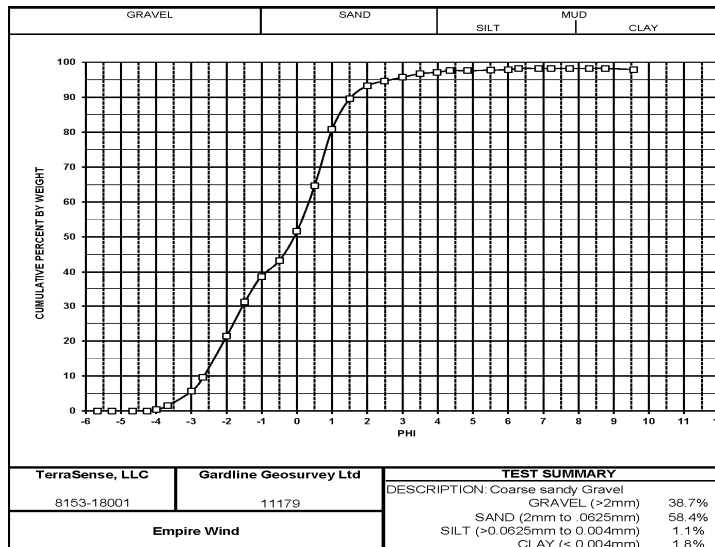
Laser Scale: 94mm separation

CMECS Biotic Group: Sand Dollar Bed

Station ST18904-ENV13 target and actual sampling locations are illustrated in Figure 1.1



Fix: 24 E: 624012 N: 4469719 Depth: 88' (27m)



Fix: 24 E: 624012 N: 4469719 Retention: PSA

Station: ST18904-ENV13

Sediment Description:

Grab: Medium to coarse sand with shell fragments, sediment dark in colour, not anoxic

CMECS Substrate Component Subgroup: Sandy gravel

Fauna Description:

Grab: No visible fauna

APPENDIX E SAMPLING AND SEABED PHOTOGRAPHS



Fix: 258 E: 623480 N: 4469173 Depth: 86' (26m)



Fix: 268 E: 623411 N: 4469161 Depth: 85' (26m)

Station: ST18904-ENV14

Sediment Description:

Fix258: Fine sand with scattered shell fragments

Fix268: Coarse sand with abundant shell fragments

Fauna Description:

Fix258: Arthropoda (Paguroidea), Mollusca (Gastropoda)

Fix268: Arthropoda (Brachyura, Paguroidea), Mollusca (Gastropoda), Porifera

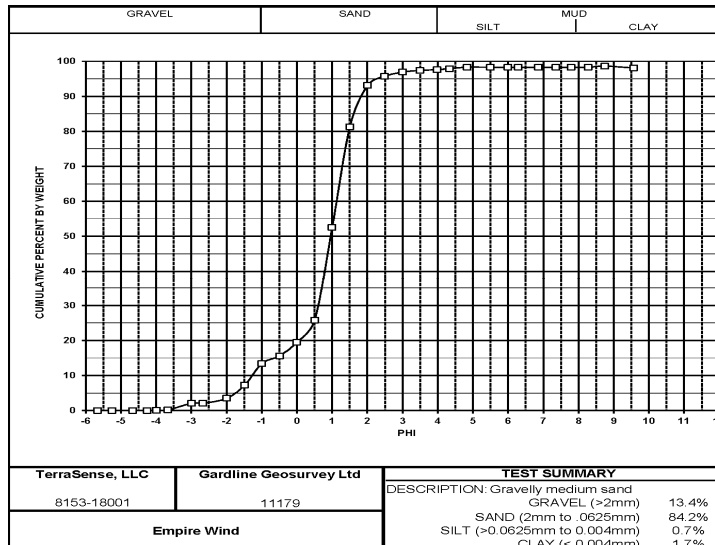
Laser Scale: 94mm separation

CMECS Biotic Group: Mobile Crustaceans on Soft Sediments

Station ST18904-ENV14 target and actual sampling locations are illustrated in Figure 1.1



Fix: 22 E: 623369 N: 4469149 Depth: 83' (25m)



Fix: 22 E: 623380 N: 4469150 Retention: PSA

Station: ST18904-ENV14

Sediment Description:

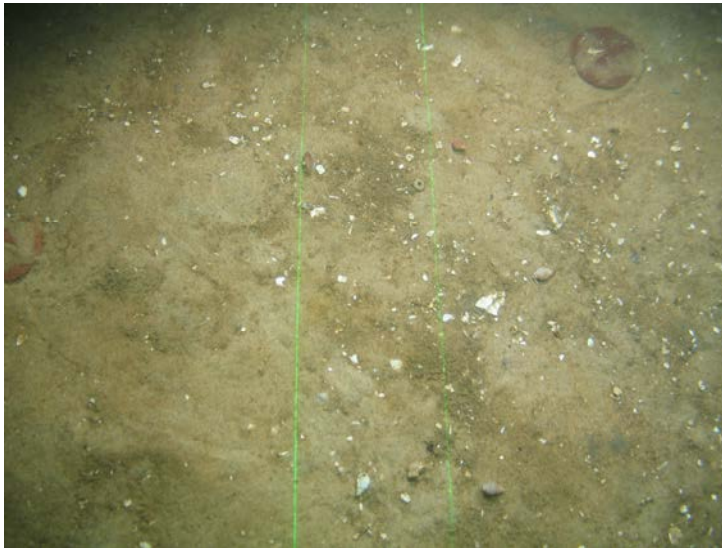
Grab: Medium to coarse sand with shell fragments

CMECS Substrate Component Subgroup: Gravelly sand

Fauna Description:

Grab: Annelida (Polychaeta), Mollusca

APPENDIX E SAMPLING AND SEABED PHOTOGRAPHS



Fix: 320 E: 623389 N: 4468329 Depth: 81' (22m)



Fix: 323 E: 623406 N: 4468324 Depth: 81' (25m)

Station: ST18904-ENV15

Sediment Description:

Fix320: Fine sand with frequent shell fragments

Fix323: Fine sand with frequent shell fragments

Fauna Description:

Fix320: Arthropoda (Paguroidea), Echinodermata (*Echinarachnius parma*)

Fix323: Annelida (Terrellidae), Arthropoda (Paguroidea), Echinodermata (*Echinarachnius parma*), Cnidaria (Hydrozoa)

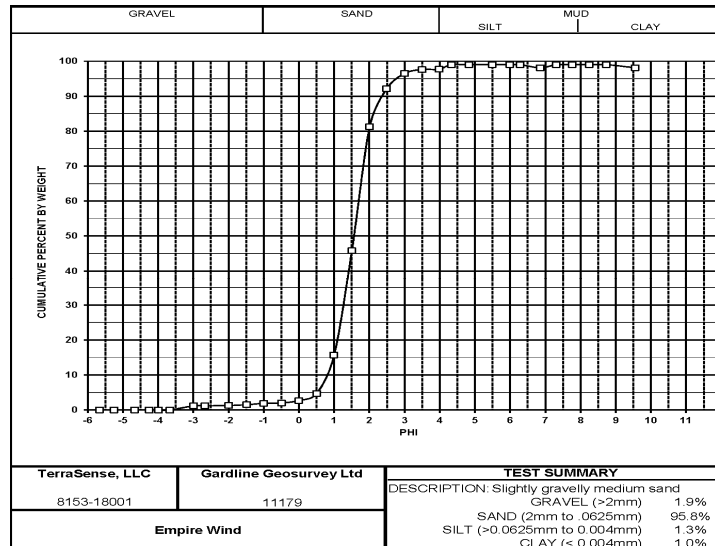
Laser Scale: 94mm separation

CMECS Biotic Group: Mobile Crustaceans on Soft Sediments

Station ST18904-ENV15 target and actual sampling locations are illustrated in Figure 1.1



Fix: 28 E: 623321 N: 4468368 Depth: 86' (26m)



Fix: 28 E: 623320 N: 4468369 Retention: PSA

Station: ST18904-ENV15

Sediment Description:

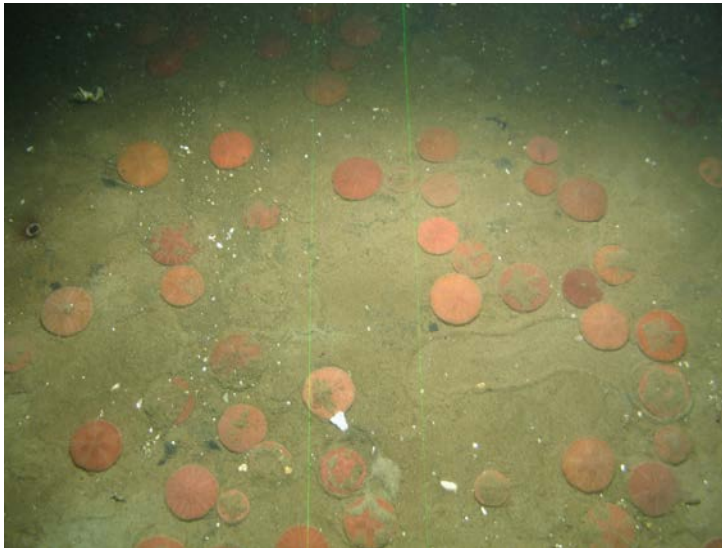
Grab: Medium sand with few shell fragments

CMECS Substrate Component Subgroup: Slightly gravelly sand

Fauna Description:

Grab: No visible fauna

APPENDIX E SAMPLING AND SEABED PHOTOGRAPHS



Fix: 424 E: 625486 N: 4469306 Depth: 87' (27m)



Fix: 428 E: 625501 N: 4469294 Depth: 87' (26m)

Station: ST18904-ENV16

Sediment Description:

Fix424: Fine sand with scattered shell fragments

Fix428: Fine sand with scattered shell fragments

Fauna Description:

Fix424: Annelida (Polychaeta tubes including Terrellidae), Echinodermata (*Echinarachnius parma*), Cnidaria (Ceriantharia)

Fix428: Annelida (Terrellidae), Arthropoda (Paguroidea), Echinodermata (*Echinarachnius parma*), Cnidaria (Ceriantharia, Hydrozoa)

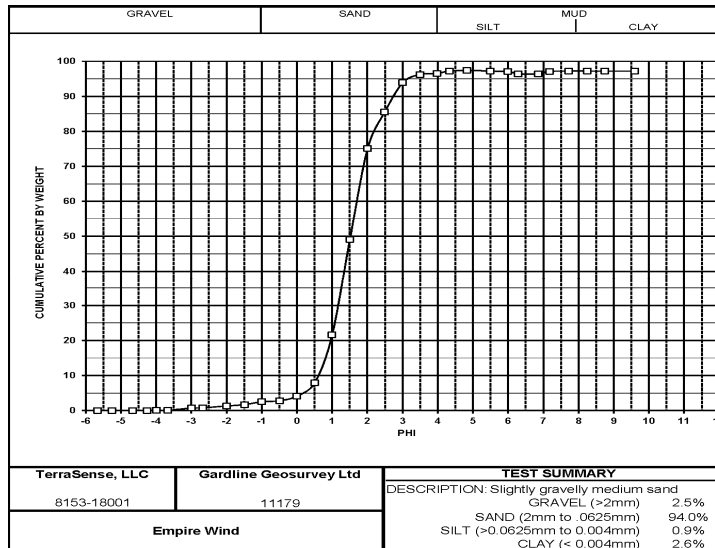
Laser Scale: 94mm separation

CMECS Biotic Group: Sand Dollar Bed

Station ST18904-ENV16 target and actual sampling locations are illustrated in Figure 1.2



Fix: 39 E: 625466 N: 4469320 Depth: 87' (27m)



Fix: 39 E: 625770 N: 4468198 Retention: PSA

Station: ST18904-ENV16

Sediment Description:

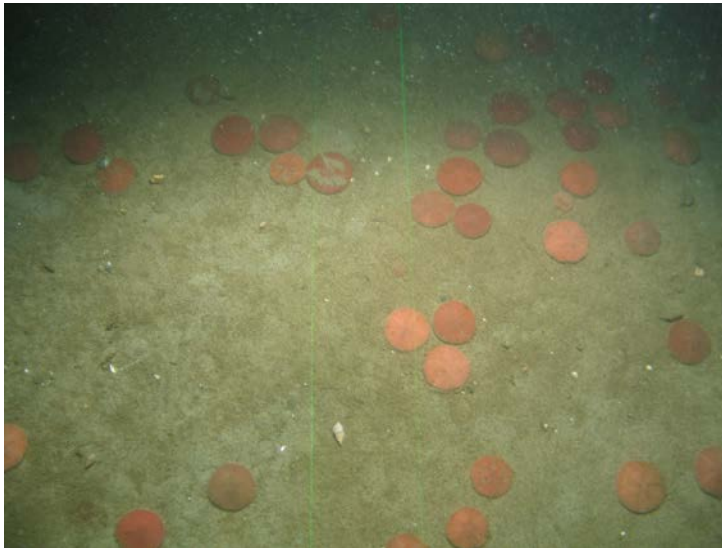
Grab: Fine to medium sand with shell fragments, dark anoxic colour and odour 2cm deep

CMECS Substrate Component Subgroup: Slightly gravelly sand

Fauna Description:

Grab: Echinodermata (*Echinarachnius parma*)

APPENDIX E SAMPLING AND SEABED PHOTOGRAPHS



Fix: 366 E: 625682 N: 4468112 Depth: 90' (27m)



Fix: 379 E: 625758 N: 4468183 Depth: 91' (28m)

Station: ST18904-ENV17

Sediment Description:

Fix366: Fine sand with scattered shell fragments

Fix379: Sandy gravel with scattered shell fragments

Fauna Description:

Fix366: Arthropoda (Paguroidea), Echinodermata (*Echinarachnius parma*), Cnidaria (Ceriantharia)

Fix379: Arthropoda (Paguroidea), Cnidaria (Ceriantharia), Anthropogenic debris (plastic)

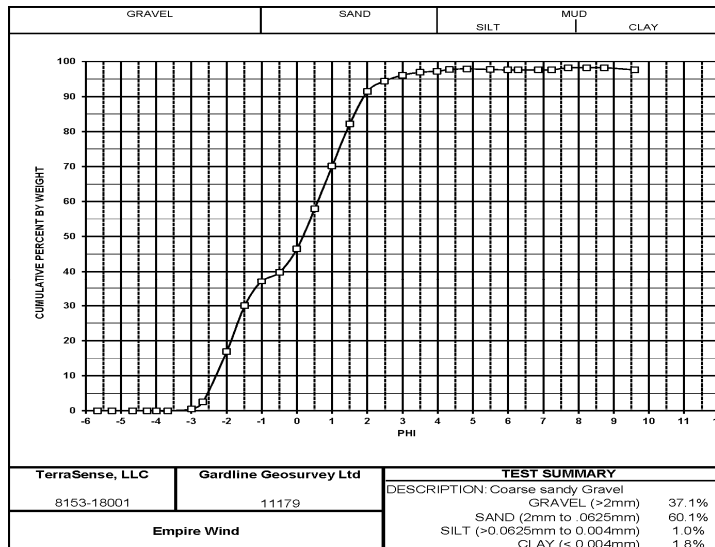
Laser Scale: 94mm separation

CMECS Biotic Group: Sand Dollar Bed

Station ST18904-ENV17 target and actual sampling locations are illustrated in Figure 1.2



Fix: 34 E: 625774 N: 4468191 Depth: 93' (28m)



Fix: 34 E: 625770 N: 4468198 Retention: PSA

Station: ST18904-ENV17

Sediment Description:

Grab: Coarse sand and gravel

CMECS Substrate Component Subgroup: Sandy gravel

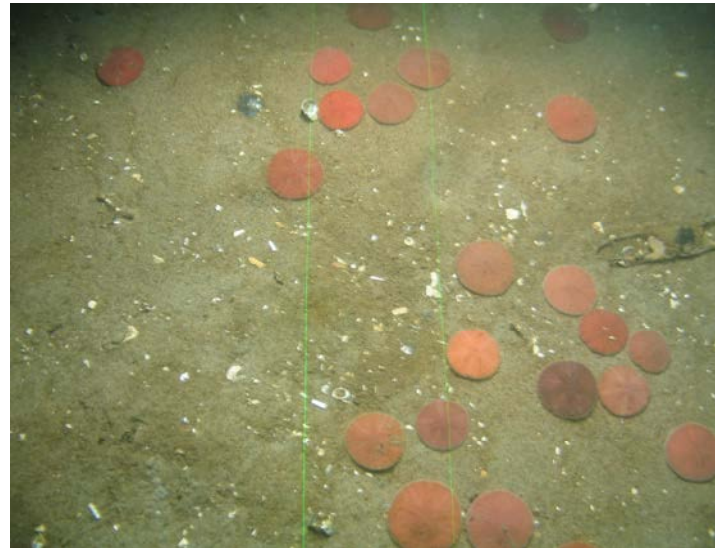
Fauna Description:

Grab: Annelida (Polychaeta), Arthropoda (Paguroidea)

APPENDIX E SAMPLING AND SEABED PHOTOGRAPHS



Fix: 340 E: 624895 N: 4467296 Depth: 87' (26m)



Fix: 353 E: 624938 N: 4467347 Depth: 86' (26m)

Station: ST18904-ENV18

Sediment Description:

Fix340: Fine sand with abundant shells and shell fragments

Fix353: Fine sand with scattered shell fragments

Fauna Description:

Fix340: Arthropoda (Paguroidea)

Fix353: Echinodermata (*Echinarachnius parma*), Chordata (Rajidae egg case), Porifera

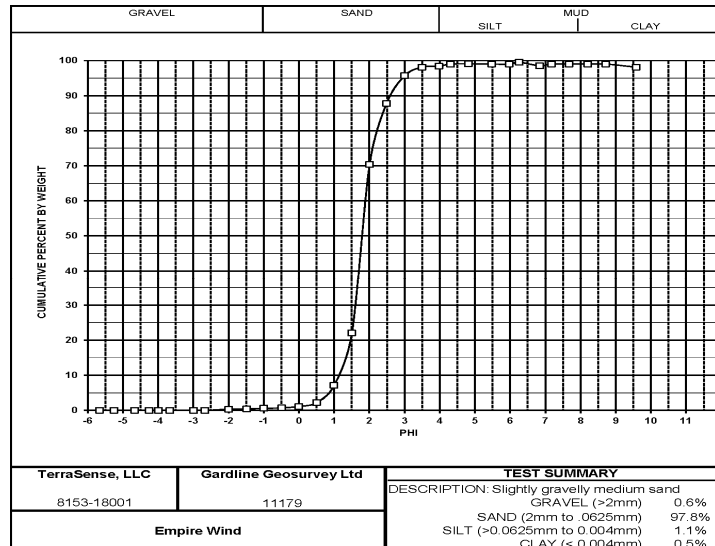
Laser Scale: 94mm separation

CMECS Biotic Group: Sand Dollar Bed

Station ST18904-ENV18 target and actual sampling locations are illustrated in Figure 1.2



Fix: 32 E: 624936 N: 4467343 Depth: 90' (27m)



Fix: 32 E: 624933 N: 4467343 Retention: PSA

Station: ST18904-ENV18

Sediment Description:

Grab: Fine to medium sand with shell fragments

CMECS Substrate Component Subgroup: Slightly gravelly sand

Fauna Description:

Grab: Echinodermata (Clypeasteroidea)

APPENDIX E SAMPLING AND SEABED PHOTOGRAPHS



Fix: 450 **E: 627120** **N: 4468651** **Depth: 100' (31m)**



Fix: 452 **E: 627134** **N: 4468645** **Depth: 101' (31m)**

Station: ST18904-ENV19

Sediment Description:

Fix450: Gravelly sand with scattered shells and shell fragments

Fix452: Gravelly sand with scattered shells, shell fragments and boulder

Fauna Description:

Fix450: Annelida (Polychaeta), Arthropoda (Paguroidea), Mollusca (Pectinidae), Chordata (Rajidae egg case), Cnidaria (Ceriantharia), Porifera

Fix452: Arthropoda (Brachyura, Paguroidea), Cnidaria (Alcyoniidae, Ceriantharia, Hydrozoa)

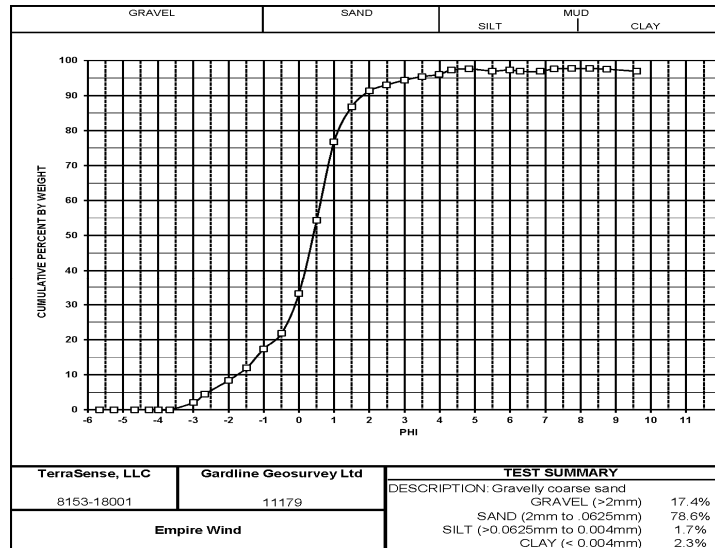
Laser Scale: 94mm separation

CMECS Biotic Group: Small Tube-building Fauna

Station ST18904-ENV19 target and actual sampling locations are illustrated in Figure 1.2



Fix: 51 **E: 627159** **N: 4468634** **Depth: 101' (31m)**



Fix: 51 **E: 627159** **N: 4468634** **Retention: PSA**

Station: ST18904-ENV19

Sediment Description:

Grab: Medium to coarse sand with shell fragments and gravel

CMECS Substrate Component Subgroup: Gravelly sand

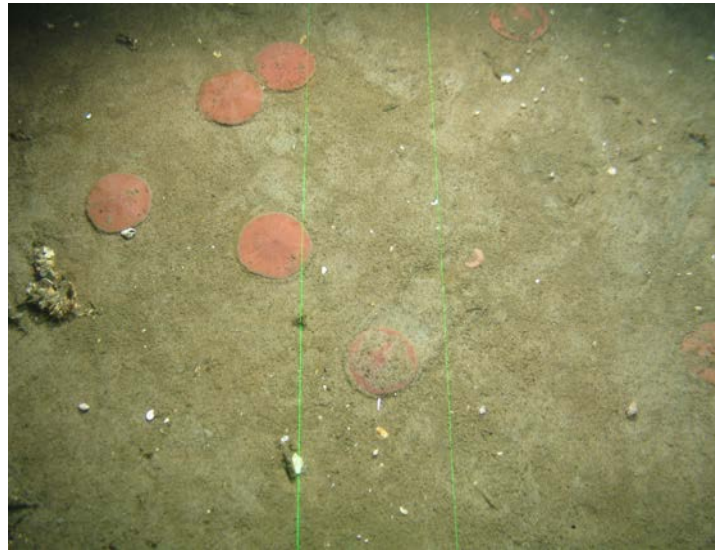
Fauna Description:

Grab: Annelida, Arthropoda (Paguridae), Mollusca (Buccinidae)

APPENDIX E SAMPLING AND SEABED PHOTOGRAPHS



Fix: 478 E: 626939 N: 4467808 Depth: 99' (30m)



Fix: 499 E: 627050 N: 4467738 Depth: 100' (30m)

Station: ST18904-ENV20

Sediment Description:

Fix478: Fine sand with scattered shell fragments

Fix499: Fine sand with scattered shell fragments

Fauna Description:

Fix478: Annelida (Polychaeta tubes including Terrellidae), Arthropoda (Paguroidea), Echinodermata (*Echinarachnius parma*), Chordata (Rajidae egg case), Cnidaria (Actiniaria)

Fix499: Annelida (Polychaeta tubes including Terrellidae), Arthropoda (Paguroidea), Cnidaria (Hydrozoa), Echinodermata (*Echinarachnius parma*)

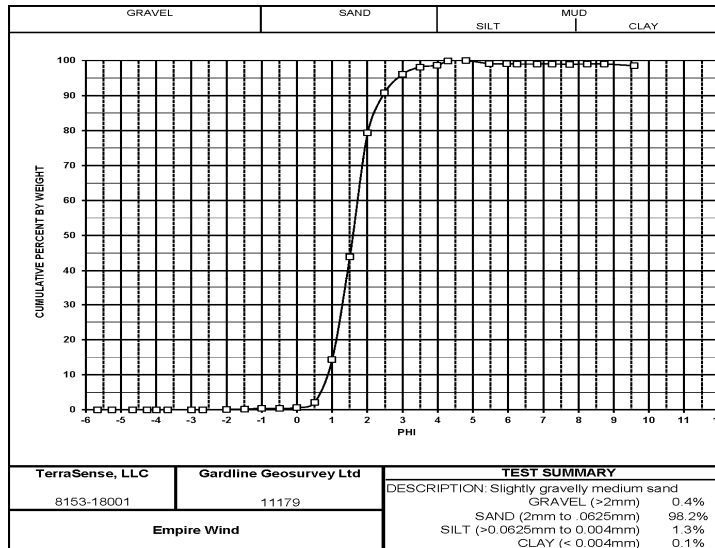
Laser Scale: 94mm separation

CMECS Biotic Group: Small Tube-building Fauna

Station ST18904-ENV20 target and actual sampling locations are illustrated in Figure 1.2



Fix: 46 E: 626981 N: 4467782 Depth: 100' (30m)



Fix: 46 E: 626981 N: 4467782 Retention: PSA

Station: ST18904-ENV20

Sediment Description:

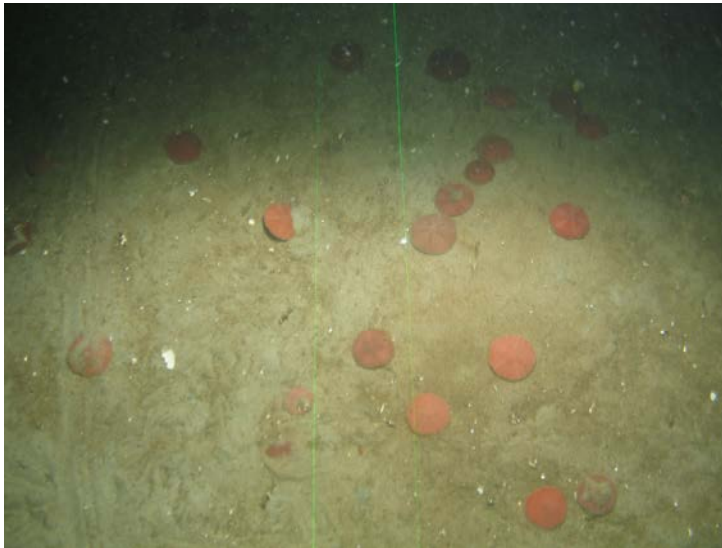
Grab: Fine to medium sand with shell fragments

CMECS Substrate Component Subgroup: Slightly gravelly sand

Fauna Description:

Grab: Annelida (Terrellidae)

APPENDIX E SAMPLING AND SEABED PHOTOGRAPHS



Fix: 503 E: 626459 N: 4466475 Depth: 92' (28m)



Fix: 518 E: 626687 N: 4466453 Depth: 95' (29m)

Station: ST18904-ENV21

Sediment Description:

Fix503: Fine sand with scattered shell fragments

Fix518: Fine sand with abundant shells and fragments

Fauna Description:

Fix503: Annelida (Polychaeta tubes), Echinodermata (*Echinarachnius parma*)

Fix518: No visible fauna

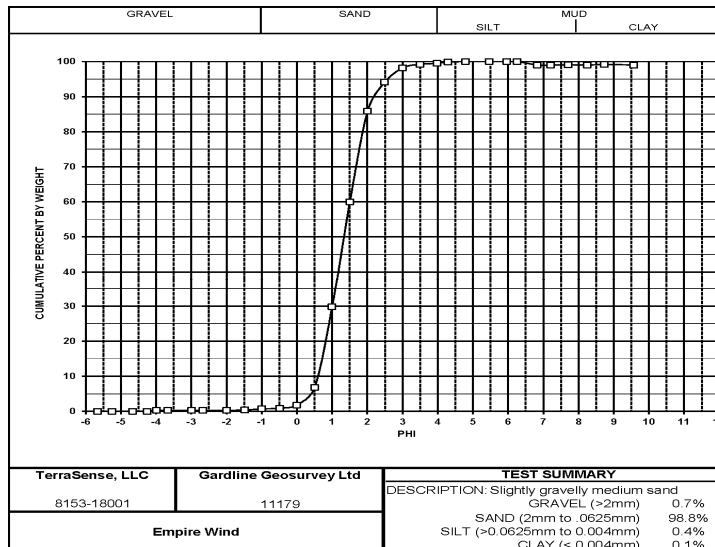
Laser Scale: 94mm separation

CMECS Biotic Group: Sand Dollar Bed

Station ST18904-ENV21 target and actual sampling locations are illustrated in Figure 1.2



Fix: 43 E: 626558 N: 4466441 Depth: 93' (28m)



Fix: 43 E: 626558 N: 4466441 Retention: PSA

Station: ST18904-ENV21

Sediment Description:

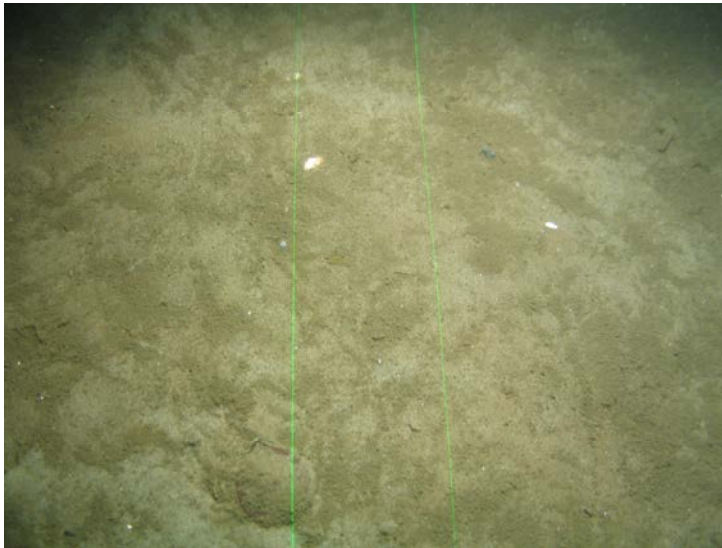
Grab: Fine to medium sand with shell fragments Dark anoxic colour & odour 2cm deep

CMECS Substrate Component Subgroup: Slightly gravelly sand

Fauna Description:

Grab: Annelida (Polychaeta), Arthropoda (Paguridae), Mollusca (Buccinidae)

APPENDIX E SAMPLING AND SEABED PHOTOGRAPHS



Fix: 650 **E:** 629110 **N:** 4468497 **Depth:** 101' (31m)



Fix: 673 **E:** 629100 **N:** 4468405 **Depth:** 101' (31m)

Station: ST18904-ENV22
Sediment Description:
Fix650: Fine sand with scattered shell fragments

Fix673: Gravelly sand with cobbles

Fauna Description:
Fix650: Echinodermata (*Echinarachnius parma*)

Fix673: Cnidaria (Actiniaria), Porifera

Laser Scale: 94mm separation

CMECS Biotic Group: Burrowing Anemones

Station ST18904-ENV22 target and actual sampling locations are illustrated in Figure 1.2



Fix: 687 **E:** 629105 **N:** 4468284 **Depth:** 97' (30m)



Fix: 69 **E:** 629106 **N:** 4468384 **Depth:** 101' (31m)

Station: ST18904-ENV22
Sediment Description:
Fix687: Fine sand with scattered shell fragments

Grab: Pebbles, cobbles and shells

Fauna Description:
Fix687: Arthropoda (Paguroidea), Mollusca (Gastropoda), Echinodermata (*Echinarachnius parma*)

Grab: Mollusca (Bivalvia shell)

APPENDIX E SAMPLING AND SEABED PHOTOGRAPHS



Fix: 640 **E: 628703** **N: 4467003** **Depth: 104' (32m)**



Fix: 646 **E: 628700** **N: 4466980** **Depth: 103' (31m)**

Station: ST18904-ENV23
Sediment Description:
Fix640: Gravelly sand with scattered shell fragments, faunal burrows present

Fix646: Sandy gravel with frequent shells and shell fragments

Fauna Description:
Fix640: Annelida (Polychaeta tubes), Arthropoda (Paguroidea)

Fix646: Arthropoda (Paguroidea)

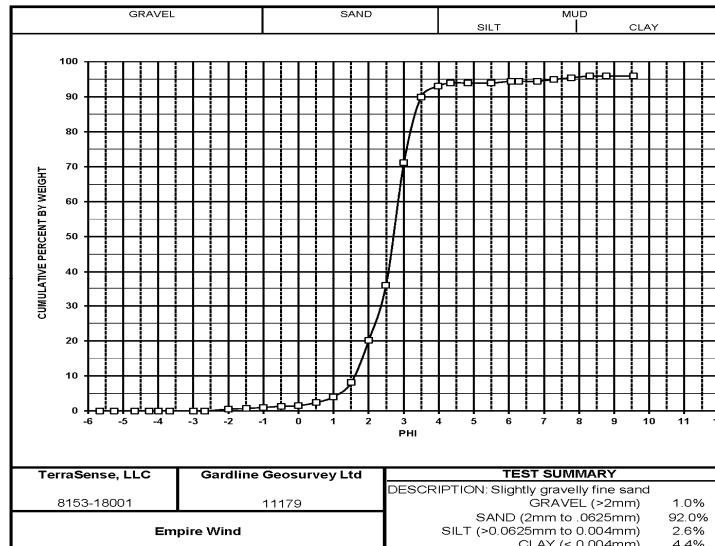
Laser Scale: 94mm separation

CMECS Biotic Group: Small Tube-building Fauna

 Station ST18904-ENV23 target and actual sampling locations are illustrated in Figure 1.2



Fix: 65 **E: 628721** **N: 4467073** **Depth: 103' (31m)**



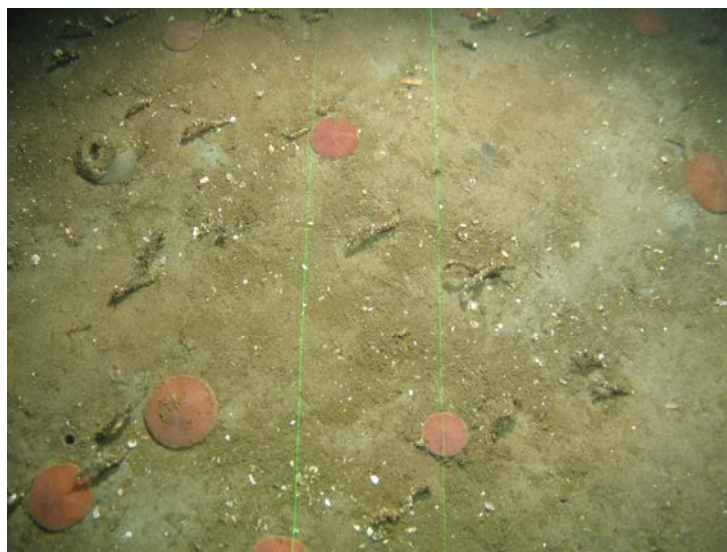
Fix: 65 **E: 628723** **N: 4467079** **Retention: PSA**

Station: ST18904-ENV23
Sediment Description:
Grab: Silty fine to medium sand with shell fragments

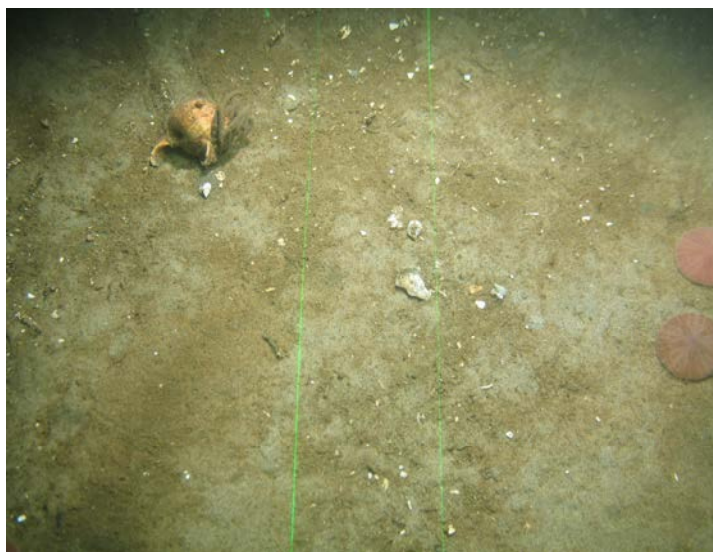
CMECS Substrate Component Subgroup: Slightly gravelly sand

Fauna Description:
Grab: Annelida (Polychaeta tubes), Echinodermata (Clypeasteroidea), Mollusca (Gastropoda, Bivalvia cf. *Arctica islandica*)

APPENDIX E SAMPLING AND SEABED PHOTOGRAPHS



Fix: 520 E: 628238 N: 4465669 Depth: 98' (30m)



Fix: 530 E: 628203 N: 4465597 Depth: 95' (30m)

Station: ST18904-ENV24

Sediment Description:

Fix520: Fine sand with scattered shell fragments, faunal burrows present

Fix530: Fine sand with scattered shell fragments

Fauna Description:

Fix520: Annelida (Polychaeta tubes), Arthropoda (Paguroidea), Echinodermata (*Echinarachnius parma*)

Fix530: Annelida (Polychaeta tubes), Arthropoda (Paguroidea), Echinodermata (*Echinarachnius parma*), Bryozoa (*Alcyonidium diaphanum*), Cnidaria (Hydrozoa), Porifera

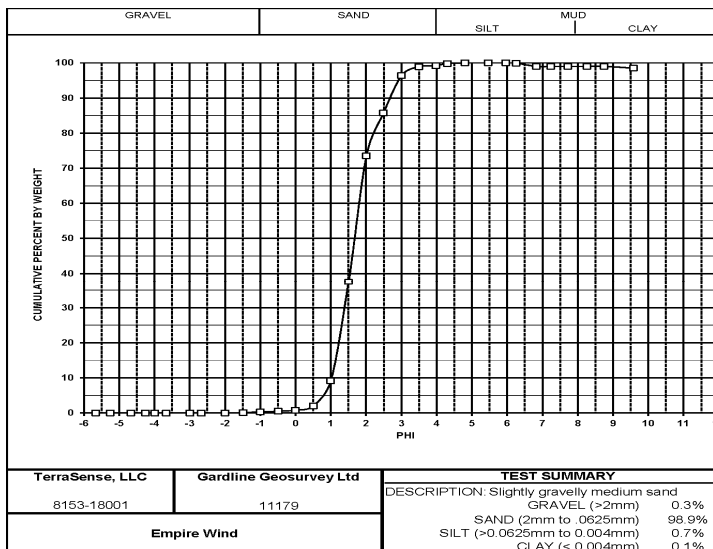
Laser Scale: 94mm separation

CMECS Biotic Group: Sand Dollar Bed

Station ST18904-ENV24 target and actual sampling locations are illustrated in Figure 1.3



Fix: 54 E: 628181 N: 4465561 Depth: 95' (29m)



Fix: 54 E: 628185 N: 4465559 Retention: PSA

Station: ST18904-ENV24

Sediment Description:

Grab: Fine to medium sand with shell fragments Dark anoxic colour & odour 2cm deep

CMECS Substrate Component Subgroup: Slightly gravelly sand

Fauna Description:

Grab: Annelida (Polychaeta), Echinodermata (Clypeasteroidea)

APPENDIX E SAMPLING AND SEABED PHOTOGRAPHS



Fix: 800 **E: 630834** **N: 4468124** **Depth: 104' (32m)**

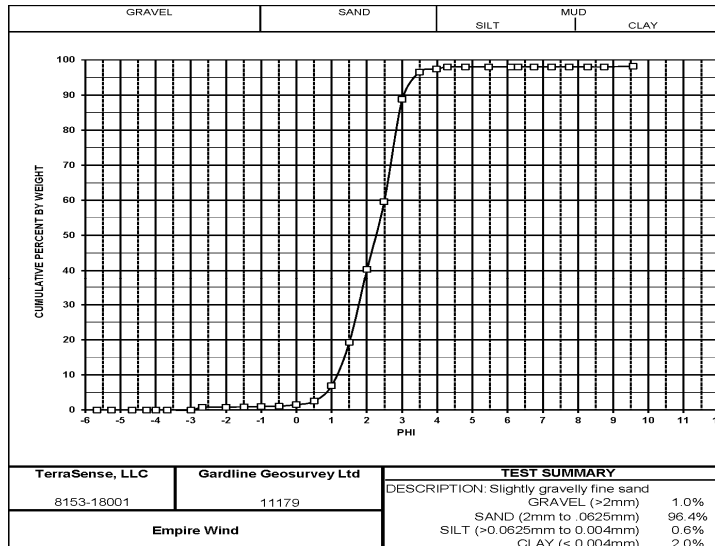


Fix: 817 **E: 630930** **N: 4467993** **Depth: 104' (32m)**

Station: ST18904-ENV25
Sediment Description:
Fix800: Fine sand with scattered shell fragments
Fix817: Gravelly sand with scattered shell fragments
Fauna Description:
Fix800: Chordata (cf. *Prionotus carolinus*), Mollusca (Gastropoda)
Fix817: Arthropoda (Paguroidea), Mollusca (Gastropoda), Cnidaria (Actiniaria), Porifera
Laser Scale: 94mm separation
CMECS Biotic Group: Sand Dollar Bed
 Station ST18904-ENV25 target and actual sampling locations are illustrated in Figure 1.3



Fix: 85 **E: 630874** **N: 4468059** **Depth: 104' (32m)**



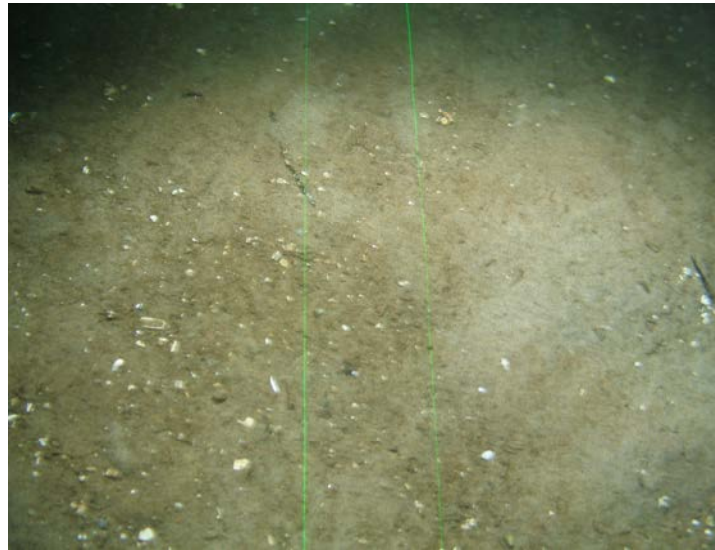
Fix: 85 **E: 630871** **N: 4468054** **Retention: PSA**

Station: ST18904-ENV25
Sediment Description:
Grab: Silty fine sand with shell fragments and gravel Wood/coal present
CMECS Substrate Component Subgroup: Slightly gravelly sand
Fauna Description:
Grab: Echinodermata (Clypeasteroidea)

APPENDIX E SAMPLING AND SEABED PHOTOGRAPHS



Fix: 711 E: 630937 N: 4466837 Depth: 99' (30m)

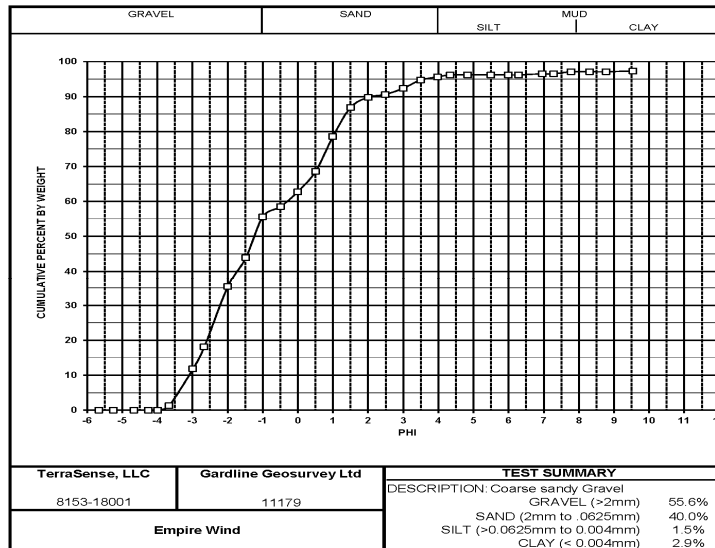


Fix: 719 E: 630896 N: 4466772 Depth: 98' (30m)

Station: ST18904-ENV26
Sediment Description:
Fix711: Sandy gravel with scattered shells and shell fragments
Fix719: Fine sand with frequent shell fragments
Fauna Description:
Fix711: Arthropoda (Paguroidea)
Fix719: Annelida (Polychaeta tubes), Plantae debris
Laser Scale: 94mm separation
CMECS Biotic Group: Small Tube-building Fauna
 Station ST18904-ENV26 target and actual sampling locations are illustrated in Figure 1.3



Fix: 78 E: 630949 N: 4466852 Depth: 103' (31m)



Fix: 78 E: 630949 N: 4466851 Retention: PSA

Station: ST18904-ENV26
Sediment Description:
Grab: Gravelly coarse sand with shell fragments on soft dark mud
CMECS Substrate Component Subgroup: Sandy gravel
Fauna Description:
Grab: Annelida (Polychaeta), Arthropoda (Caridea), Mollusca (cf. *Arctica islandica* shell)

APPENDIX E SAMPLING AND SEABED PHOTOGRAPHS



Fix: 550 **E: 629643** **N: 4464763** **Depth: 107' (32m)**

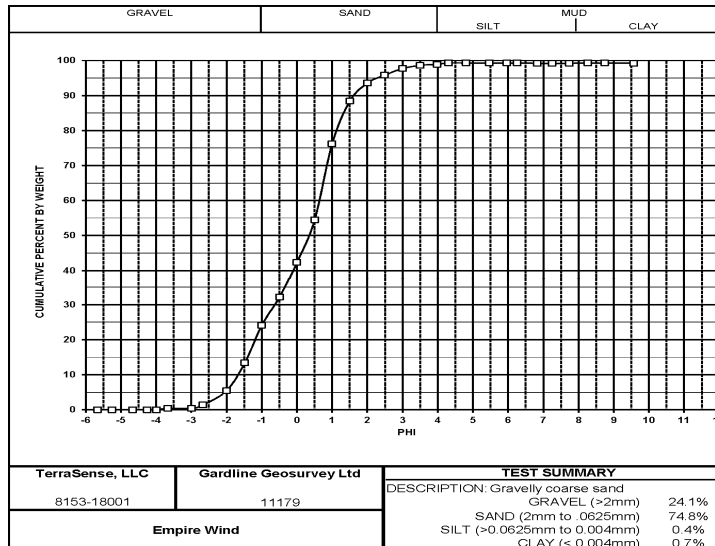


Fix: 567 **E: 629756** **N: 4464707** **Depth: 106' (32m)**

Station: ST18904-ENV27
Sediment Description:
Fix550: Gravelly sands with scattered shell fragments and cobbles, faunal burrows present
Fix567: Gravelly sand with abundant shells and shell fragments
Fauna Description:
Fix550: Annelida (Polychaeta tubes), Echinodermata (Asteroidea), Cnidaria (Hydrozoa), Indeterminate Faunal Turf
Fix567: No visible fauna
Laser Scale: 94mm separation
CMECS Biotic Group: Sand Dollar Bed
 Station ST18904-ENV27 target and actual sampling locations are illustrated in Figure 1.3



Fix: 58 **E: 629731** **N: 4464724** **Depth: 106' (32m)**



Fix: 58 **E: 629731** **N: 4464724** **Retention: PSA**

Station: ST18904-ENV27
Sediment Description:
Grab: Medium to coarse sand and shell fragments
CMECS Substrate Component Subgroup: Gravelly sand
Fauna Description:
Grab: No visible fauna

APPENDIX E SAMPLING AND SEABED PHOTOGRAPHS



Fix: 731 E: 632188 N: 4467605 Depth: 102' (31m)



Fix: 741 E: 632139 N: 4467512 Depth: 103' (31m)

Station: ST18904-ENV28

Sediment Description:

Fix731: Fine sand with scattered shell fragments

Fix741: Fine sand with scattered shell fragments

Fauna Description:

Fix731: Arthropoda (Paguroidea), Mollusca (Gastropoda), Echinodermata (*Echinarachnius parma*)

Fix741: Annelida (Terrellidae tubes), Arthropoda (Paguroidea), Echinodermata (*Echinarachnius parma*), plant debris

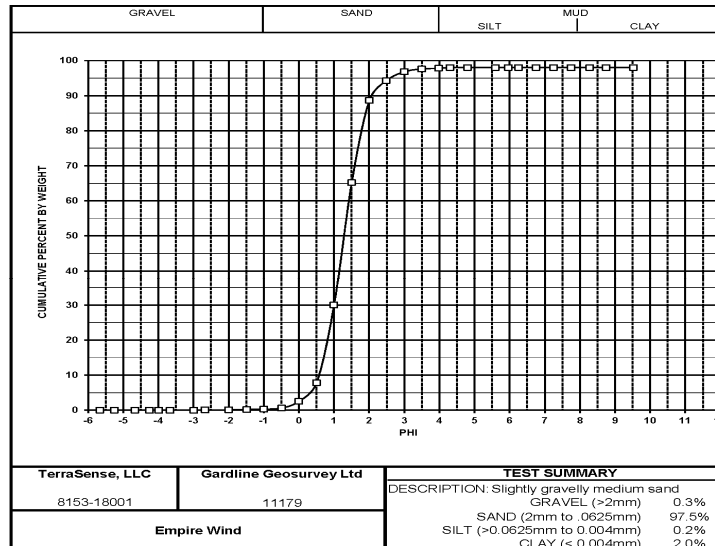
Laser Scale: 94mm separation

CMECS Biotic Group: Sand Dollar Bed

Station ST18904-ENV28 target and actual sampling locations are illustrated in Figure 1.3



Fix: 81 E: 632161 N: 4467568 Depth: 105' (32m)



Fix: 81 E: 632161 N: 4467569 Retention: PSA

Station: ST18904-ENV28

Sediment Description:

Grab: Fine to coarse sand and shell fragments

CMECS Substrate Component Subgroup: Slightly gravelly sand

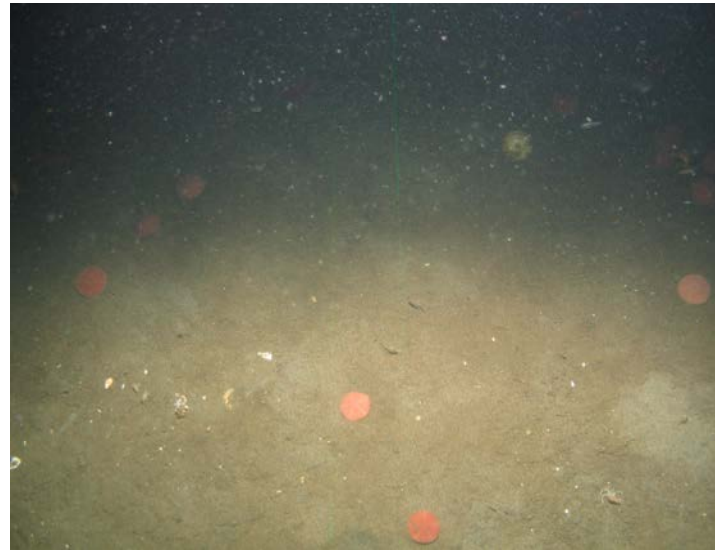
Fauna Description:

Grab: Annelida (Polychaeta), Mollusca (Gastropoda), Echinodermata (Clypeasteroidea)

APPENDIX E SAMPLING AND SEABED PHOTOGRAPHS



Fix: 852 E: 632236 N: 4465410 Depth: 102' (31m)



Fix: 859 E: 632325 N: 4465380 Depth: 102' (31m)

Station: ST18904-ENV29

Sediment Description:

Fix852: Fine sand with scattered shell fragments

Fix859: Fine sand with scattered shell fragments

Fauna Description:

Fix852: Annelida (Polychaeta tubes), Arthropoda (Paguroidea), Mollusca (Gastropoda), Echinodermata (*Echinarachnius parma*)

Fix859: Annelida (Polychaeta tubes including Terrellidae), Arthropoda (Paguroidea), Mollusca (Gastropoda), Echinodermata (Asteroidea, *Echinarachnius parma*)

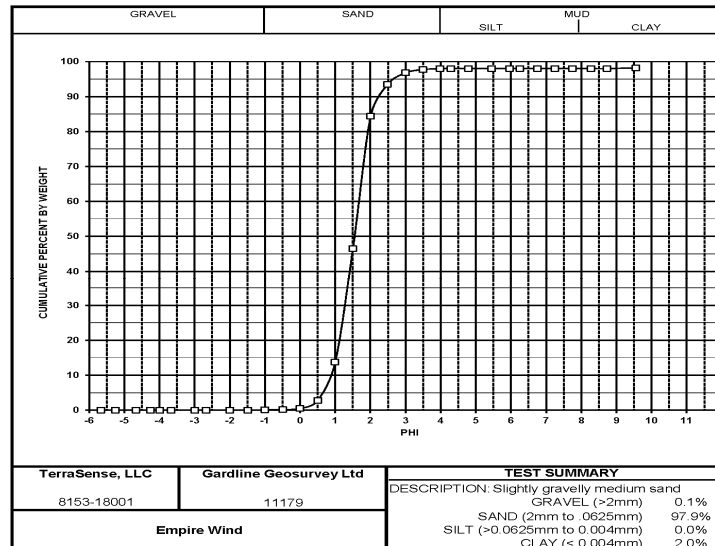
Laser Scale: 94mm separation

CMECS Biotic Group: Sand Dollar Bed

Station ST18904-ENV29 target and actual sampling locations are illustrated in Figure 1.3



Fix: 94 E: 632300 N: 4465383 Depth: 103' (31m)



Fix: 94 E: 632300 N: 4465383 Retention: PSA

Station: ST18904-ENV29

Sediment Description:

Grab: Fine to coarse sand with shell fragments

CMECS Substrate Component Subgroup: Slightly gravelly sand

Fauna Description:

Grab: Mollusca (Gastropoda), Echinodermata (Clypeasteroida)

APPENDIX E SAMPLING AND SEABED PHOTOGRAPHS



Fix: 868 **E: 631560** **N: 4463995** **Depth: 110' (34m)**



Fix: 878 **E: 631533** **N: 4463897** **Depth: 109' (33m)**

Station: ST18904-ENV30

Sediment Description:

Fix868: Fine sand with scattered shell fragments, faunal burrows present

Fix878: Gravelly sand with scattered shells and shell fragments

Fauna Description:

Fix868: Annelida (Polychaeta tubes), Arthropoda (Paguroidea), Echinodermata (*Echinarachnius parma*), Chordata (cf. *Leucoraja ocellata*)

Fix878: Mollusca (Gastropoda)

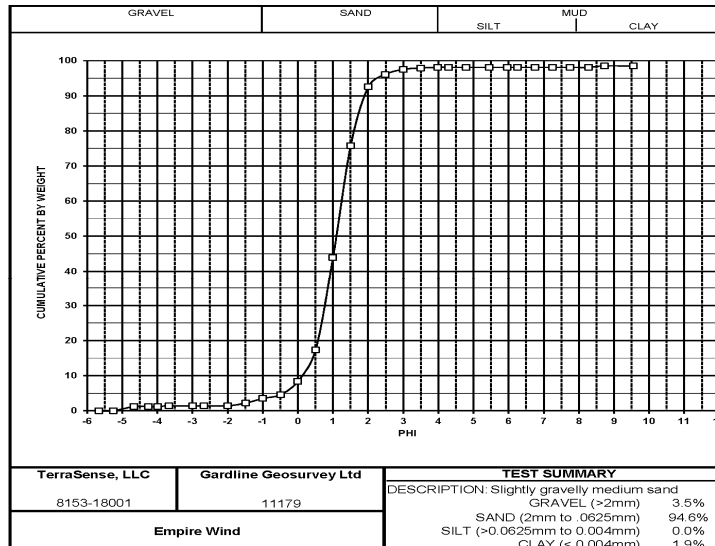
Laser Scale: 94mm separation

CMECS Biotic Group: Sand Dollar Bed

Station ST18904-ENV30 target and actual sampling locations are illustrated in Figure 1.4



Fix: 98 **E: 631521** **N: 4463861** **Depth: 107' (33m)**



Fix: 98 **E: 631521** **N: 4463861** **Retention: PSA**

Station: ST18904-ENV30

Sediment Description:

Grab: Medium to coarse sand with shell fragments

CMECS Substrate Component Subgroup: Slightly gravelly sand

Fauna Description:

Grab: No visible fauna

APPENDIX E SAMPLING AND SEABED PHOTOGRAPHS



Fix: 955 E: 634226 N: 4467235 Depth: 97' (29m)



Fix: 975 E: 634200 N: 4467341 Depth: 98' (30m)

Station: ST18904-ENV31

Sediment Description:

Fix955: Fine sand with scattered shell fragments

Fix975: Sandy gravel with scattered shell fragments

Fauna Description:

Fix955: Arthropoda (Paguroidea), Mollusca (Gastropoda), Echinodermata (*Echinarachnius parma*)

Fix975: Mollusca (Cephalopoda), Cnidaria (Actiniaria, Ceriantharia)

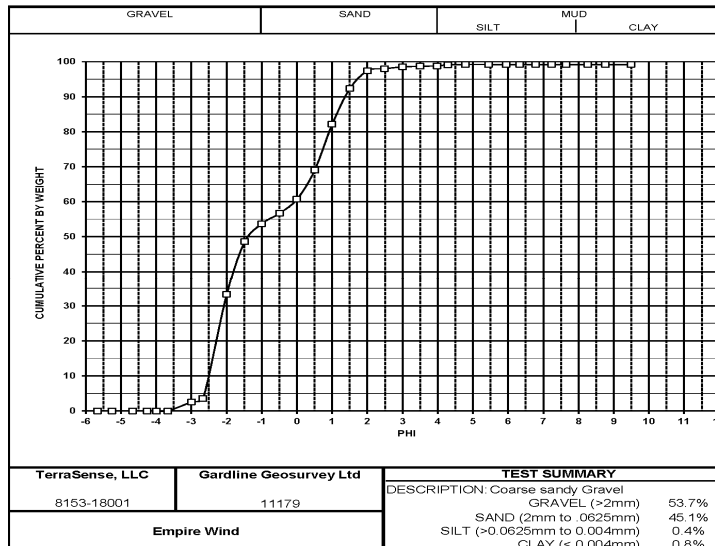
Laser Scale: 94mm separation

CMECS Biotic Group: Burrowing Anemones

Station ST18904-ENV31 target and actual sampling locations are illustrated in Figure 1.3



Fix: 110 E: 634201 N: 4467332 Depth: 97' (30m)



Fix: 110 E: 634201 N: 4467332 Retention: PSA

Station: ST18904-ENV31

Sediment Description:

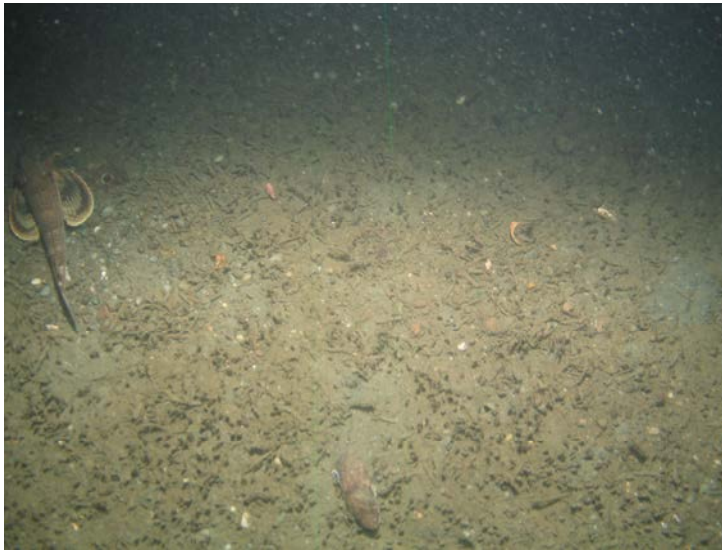
Grab: Sandy gravel with shells and shell fragments

CMECS Substrate Component Subgroup: Sandy gravel

Fauna Description:

Grab: No visible fauna

APPENDIX E SAMPLING AND SEABED PHOTOGRAPHS



Fix: 938 E: 633897 N: 4465108 Depth: 108' (33m)



Fix: 953 E: 634021 N: 4465128 Depth: 110' (33m)

Station: ST18904-ENV32

Sediment Description:

Fix938: Gravelly sand with scattered shells and shell fragments

Fix953: Fine sand with scattered shell fragments

Fauna Description:

Fix938: Annelida (Polychaeta tubes), Arthropoda (Paguroidea), Chordata (*cf. Phycidae*, *cf. Prionotus carolinus*), Cnidaria (Ceriantharia)

Fix953: Arthropoda (Paguroidea), Mollusca (Bivalvia), Echinodermata (*Echinarachnius parma*)

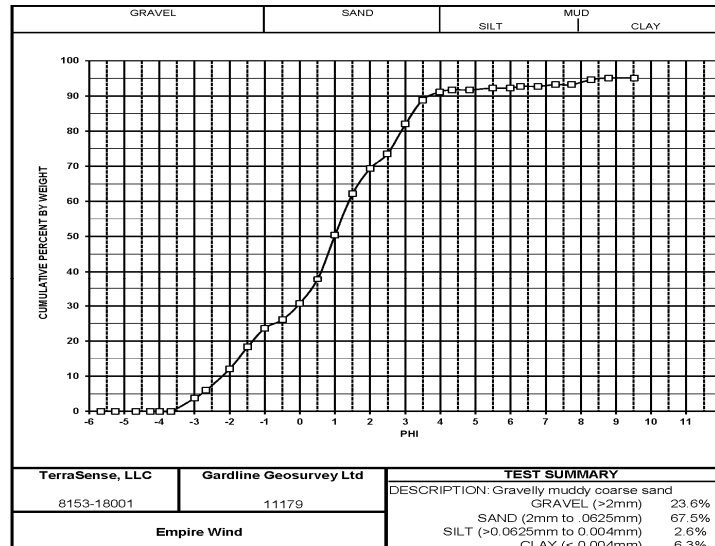
Laser Scale: 94mm separation

CMECS Biotic Group: Small Tube-building Fauna

Station ST18904-ENV32 target and actual sampling locations are illustrated in Figure 1.3



Fix: 105 E: 633928 N: 4465118 Depth: 108' (33m)



Fix: 105 E: 633926 N: 4465122 Retention: PSA

Station: ST18904-ENV32

Sediment Description:

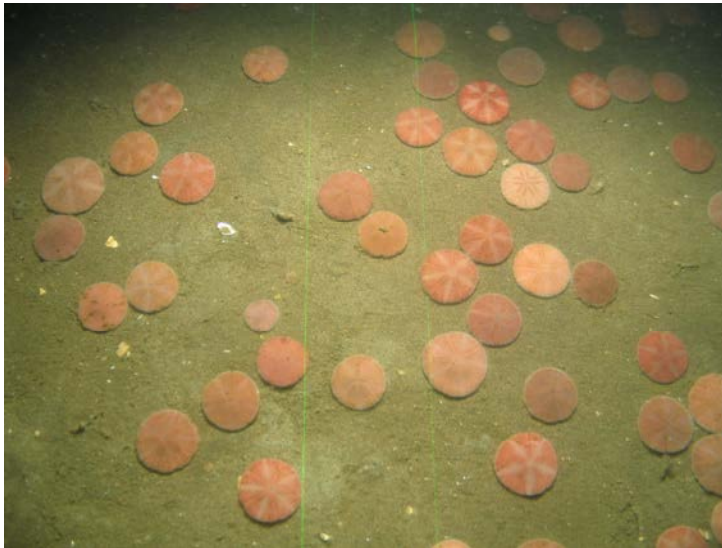
Grab: Gravelly, sandy, soft silt/clay with shell fragments and cobble

CMECS Substrate Component Subgroup: Gravelly muddy sand

Fauna Description:

Grab: Annelida (Polychaeta), Mollusca (Gastropoda)

APPENDIX E SAMPLING AND SEABED PHOTOGRAPHS



Fix: 894 E: 632979 N: 4462907 Depth: 107' (33m)



Fix: 906 E: 633118 N: 4462833 Depth: 107' (33m)

Station: ST18904-ENV33

Sediment Description:

Fix894: Fine sand with scattered shell fragments

Fix906: Fine sand with scattered shell fragments

Fauna Description:

Fix894: Annelida (Polychaeta tubes), Arthropoda (Paguroidea), Mollusca (Gastropoda), Echinodermata (*Echinarachnius parma*)

Fix906: Annelida (Polychaeta tubes), Arthropoda (Paguroidea), Mollusca (Gastropoda), Echinodermata (*Echinarachnius parma*)

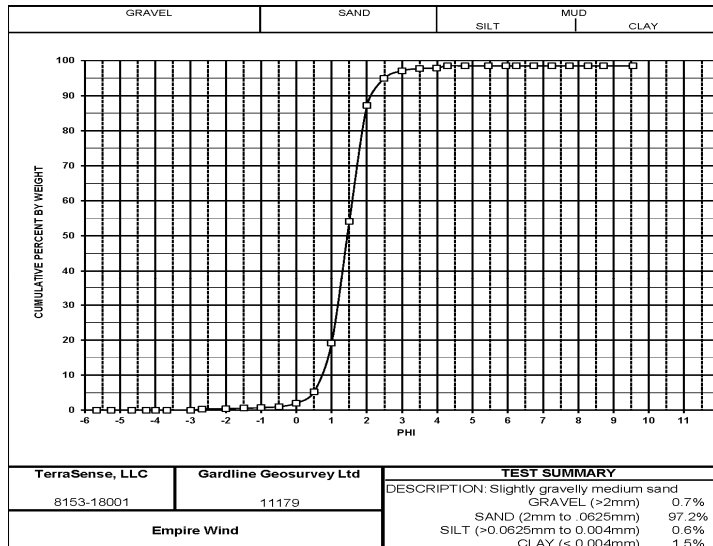
Laser Scale: 94mm separation

CMECS Biotic Group: Sand Dollar Bed

Station ST18904-ENV33 target and actual sampling locations are illustrated in Figure 1.4



Fix: 100 E: 633049 N: 4462869 Depth: 107' (32m)



Fix: 100 E: 633049 N: 4462869 Retention: PSA

Station: ST18904-ENV33

Sediment Description:

Grab: Fine to coarse sand with shell fragments

CMECS Substrate Component Subgroup: Slightly gravelly sand

Fauna Description:

Grab: Echinodermata (Clypeasteroidea)

APPENDIX E SAMPLING AND SEABED PHOTOGRAPHS



Fix: 984 E: 636189 N: 4466833 Depth: 101' (31m)



Fix: 999 E: 636348 N: 4466753 Depth: 104' (32m)

Station: ST18904-ENV34

Sediment Description:

Fix984: Fine sand with frequent shell fragments

Fix999: Fine sand with frequent shell fragments

Fauna Description:

Fix984: Arthropoda (Paguroidea), Mollusca (Bivalvia), Echinodermata (*Echinarachnius parma*)

Fix999: Arthropoda (Brachyura, Paguroidea), Mollusca (Gastropoda), Echinodermata (*Echinarachnius parma*)

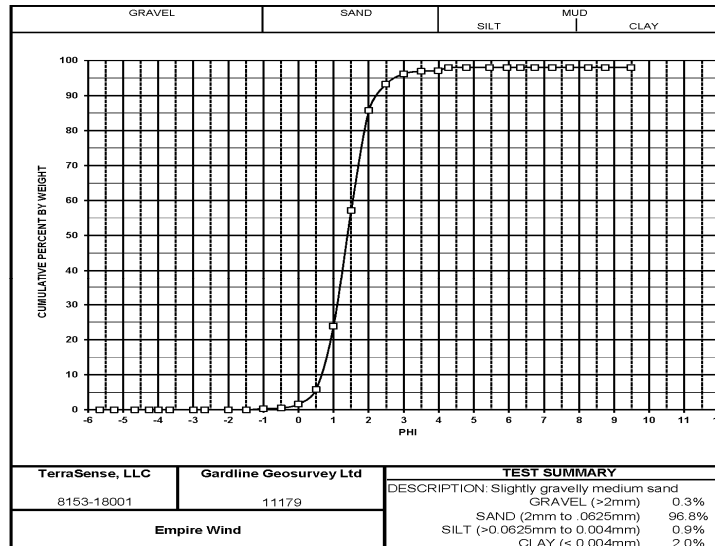
Laser Scale: 94mm separation

CMECS Biotic Group: Sand Dollar Bed

Station ST18904-ENV34 target and actual sampling locations are illustrated in Figure 1.4



Fix: 113 E: 636280 N: 4466790 Depth: 103' (32m)



Fix: 113 E: 636280 N: 4466790 Retention: PSA

Station: ST18904-ENV34

Sediment Description:

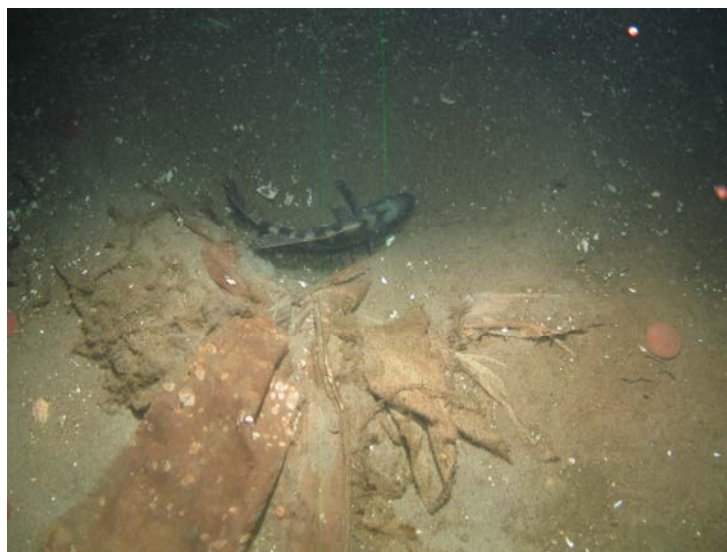
Grab: Fine to coarse sand with shell fragments

CMECS Substrate Component Subgroup: Slightly gravelly sand

Fauna Description:

Grab: Mollusca (Gastropoda), Echinodermata (Clypeasteroidea)

APPENDIX E SAMPLING AND SEABED PHOTOGRAPHS



Fix: 1034 E: 635610 N: 4464919 Depth: 107' (33m)



Fix: 1038 E: 635650 N: 4464900 Depth: 108' (33m)

Station: ST18904-ENV35

Sediment Description:

Fix1034: Fine sand with frequent shell fragments

Fix1038: Fine sand with scattered shell fragments

Fauna Description:

Fix1034: Annelida (Polychaeta tubes), Arthropoda (Paguroidea), Echinodermata (*Echinarachnius parma*), Chordata (Actinopterygii), Bryozoa (*Alcyonium diaphanum*), Anthropogenic debris (Fabric)

Fix1038: Annelida (Polychaeta tubes), Arthropoda (Paguroidea), Mollusca (Gastropoda, Naticidae), Echinodermata (*Echinarachnius parma*)

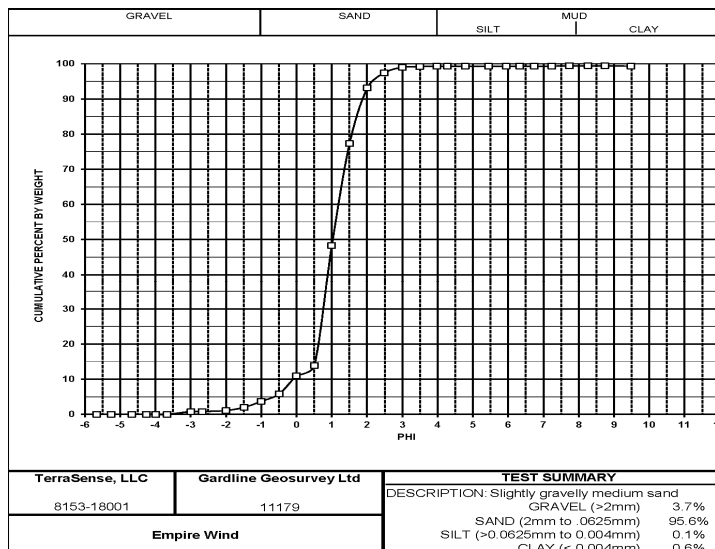
Laser Scale: 94mm separation

CMECS Biotic Group: Sand Dollar Bed

Station ST18904-ENV35 target and actual sampling locations are illustrated in Figure 1.4



Fix: 120 E: 635595 N: 4464927 Depth: 107' (33m)



Fix: 120 E: 635595 N: 4464927 Retention: PSA

Station: ST18904-ENV35

Sediment Description:

Grab: Medium to coarse sand with shell fragments

CMECS Substrate Component Subgroup: Slightly gravelly sand

Fauna Description:

Grab: No visible fauna

APPENDIX E SAMPLING AND SEABED PHOTOGRAPHS



Fix: 917 E: 634665 N: 4462035 Depth: 108' (33m)



Fix: 926 E: 634761 N: 4461981 Depth: 109' (33m)

Station: ST18904-ENV36

Sediment Description:

Fix917: Fine sand with scattered shell fragments

Fix926: Fine sand with scattered shell fragments

Fauna Description:

Fix917: Annelida (Polychaeta tubes), Echinodermata (*Echinarachnius parma*), Chordata (cf. *Prionotus carolinus*)

Fix926: Annelida (Polychaeta tubes), Mollusca (Gastropoda), Echinodermata (*Echinarachnius parma*)

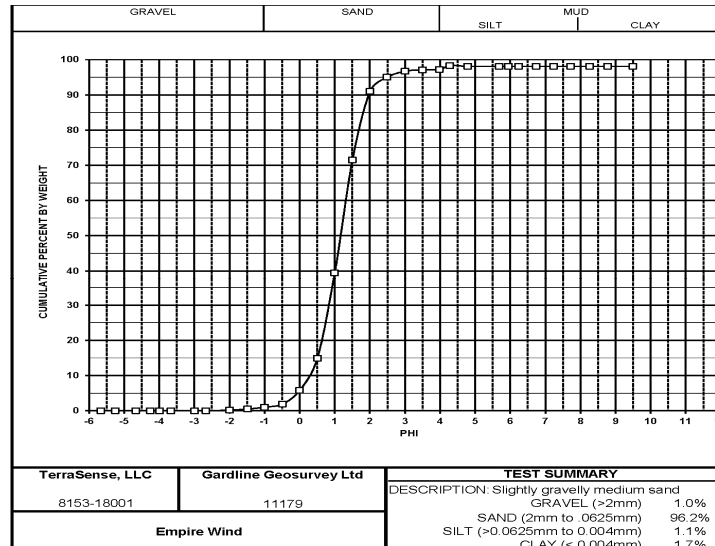
Laser Scale: 94mm separation

CMECS Biotic Group: Sand Dollar Bed

Station ST18904-ENV36 target and actual sampling locations are illustrated in Figure 1.4



Fix: 103 E: 634679 N: 4462022 Depth: 107' (33m)



Fix: 103 E: 634679 N: 4462022 Retention: PSA

Station: ST18904-ENV36

Sediment Description:

Grab: Medium to coarse sand with shell fragments

CMECS Substrate Component Subgroup: Slightly gravelly sand

Fauna Description:

Grab: No visible fauna

APPENDIX E SAMPLING AND SEABED PHOTOGRAPHS



Fix: 1008 **E:** 637428 **N:** 4466403 **Depth:** 107' (33m)



Fix: 1013 **E:** 637470 **N:** 4466375 **Depth:** 108' (33m)

Station: ST18904-ENV37

Sediment Description:

Fix1008: Fine sand with frequent shell fragments

Fix1013: Sandy gravel with abundant shells and shell fragments

Fauna Description:

Fix1008: Mollusca (Gastropoda), Echinodermata (*Echinarachnius parma*), Cnidaria (Actiniaria)

Fix1013: Arthropoda (Paguroidea)

Laser Scale: 94mm separation

CMECS Biotic Group: Sand Dollar Bed

Station ST18904-ENV37 target and actual sampling locations are illustrated in Figure 1.4



Fix: 1020 **E:** 637532 **N:** 4466330 **Depth:** 108' (33m)



Fix: 117 **E:** 637461 **N:** 4466381 **Depth:** 33m

Station: ST18904-ENV37

Sediment Description:

Fix1020: Fine sand with scattered shell fragments

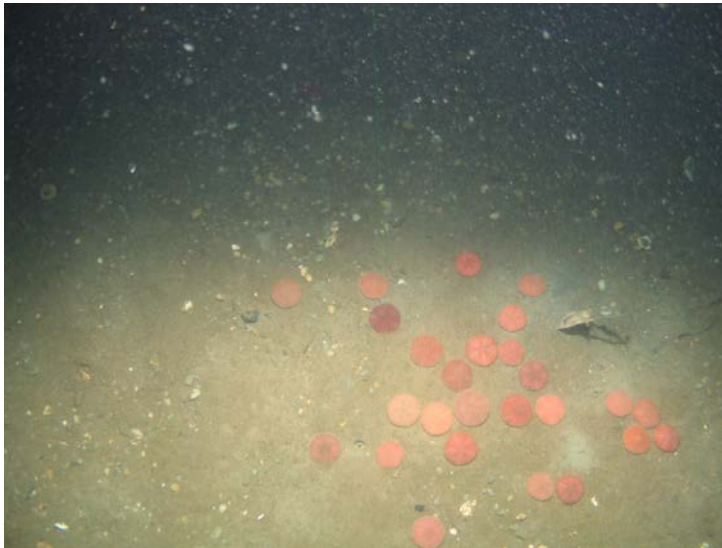
Grab: Course sandy gravel with shells and shell fragments

Fauna Description:

Fix1020: Annelida (Polychaeta tubes), Arthropoda (Paguroidea), Mollusca (Gastropoda), Echinodermata (*Echinarachnius parma*)

Grab: Annelida (Polychaeta tubes), Mollusca (Gastropoda)

APPENDIX E SAMPLING AND SEABED PHOTOGRAPHS



Fix: 1047 E: 637273 N: 4463926 Depth: 113' (34m)

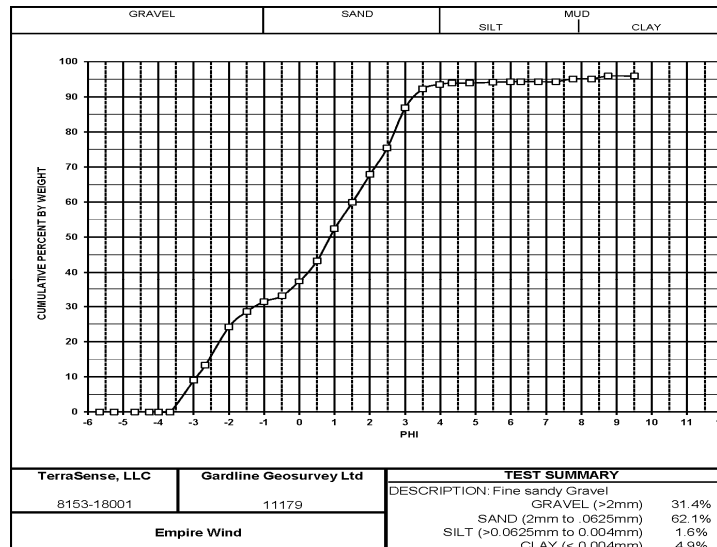


Fix: 1059 E: 637314 N: 4463839 Depth: 112' (34m)

Station: ST18904-ENV38
Sediment Description:
Fix1047: Gravelly sands with scattered shell fragments
Fix1059: Gravelly sands with frequent shells and shell fragments, faunal burrows present
Fauna Description:
Fix1047: Chordata (Rajidae egg case), Echinodermata (*Echinarachnius parma*)
Fix1059: Mollusca (Pectinidae), Chordata (*cf. Phycidae*), Porifera
Laser Scale: 94mm separation
CMECS Biotic Group: Small Tube-building Fauna
 Station ST18904-ENV38 target and actual sampling locations are illustrated in Figure 1.4



Fix: 123 E: 637302 N: 4463876 Depth: 113' (34m)



Fix: 123 E: 637302 N: 4463876 Retention: PSA

Station: ST18904-ENV38
Sediment Description:
Grab: Silty clayey gravel with shells and shell fragments
 Black colour, strong organic smell
CMECS Substrate Component Subgroup: Sandy gravel
Fauna Description:
Grab: Annelida (Polychaeta tubes)

APPENDIX E SAMPLING AND SEABED PHOTOGRAPHS



Fix: 1800 E: 636086 N: 4461717 Depth: 116' (35m)



Fix: 1825 E: 635980 N: 4461797 Depth: 114' (35m)

Station: ST18904-ENV39

Sediment Description:

Fix1800: Sand with shell fragments

Fix1825: Gravelly sand with shell fragments

Fauna Description:

Fix1800: Echinodermata (Asteroidea, *Echinarachnius parma*), Cnidaria (Actiniaria)

Fix1825: Arthropoda (Paguroidea)

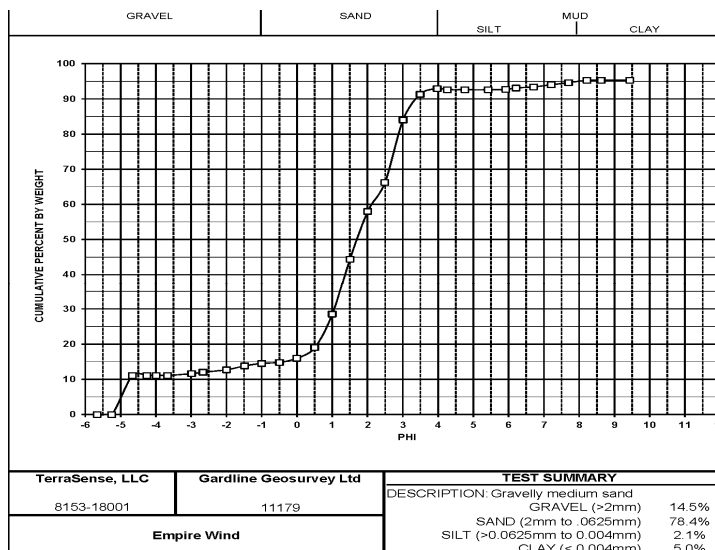
Laser Scale: 94mm separation

CMECS Biotic Group: Sand Dollar Bed

Station ST18904-ENV39 target and actual sampling locations are illustrated in Figure 1.4



Fix: 175 E: 636020 N: 4461759 Depth: 115' (35m)



Fix: 175 E: 636020 N: 4461759 Retention: PSA

Station: ST18904-ENV39

Sediment Description:

Grab: Sand with shell fragments

CMECS Substrate Component Subgroup: Gravelly sand

Fauna Description:

Grab: Arthropoda (Paguroidea)

APPENDIX E SAMPLING AND SEABED PHOTOGRAPHS



Fix: 1933 **E:** 639802 **N:** 4465915 **Depth:** 107' (33m)



Fix: 1956 **E:** 639871 **N:** 4465878 **Depth:** 108' (33m)

Station: ST18904-ENV40

Sediment Description:

Fix1933: Sand with shell fragments

Fix1956: Sand with shell fragments

Fauna Description:

Fix1933: Arthropoda (Paguroidea), Mollusca (Gastropoda, *cf. Arctica islandica* shell), Echinodermata (*Echinarachnius parma*)

Fix1956: Mollusca (Gastropoda), Echinodermata (*Echinarachnius parma*), Chordata (*cf. Carcharhinus falciformis*, Rajidae egg case)

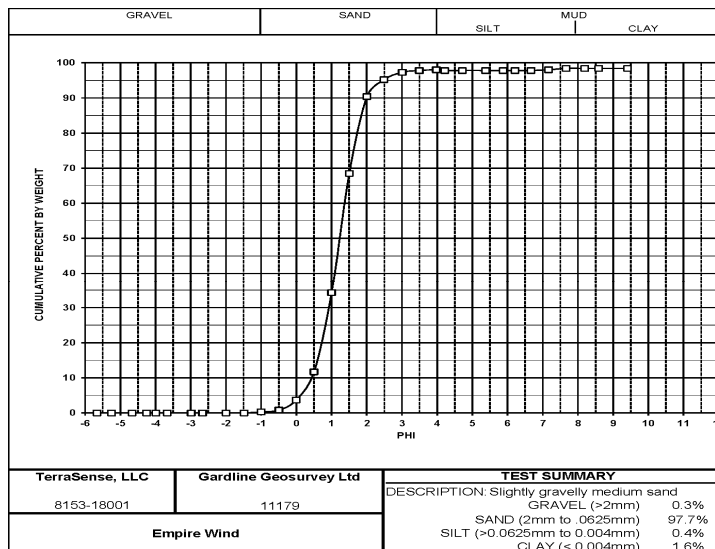
Laser Scale: 94mm separation

CMECS Biotic Group: Sand Dollar Bed

Station ST18904-ENV40 target and actual sampling locations are illustrated in Figure 1.4



Fix: 187 **E:** 639870 **N:** 4465877 **Depth:** 108' (33m)



Fix: 187 **E:** 639870 **N:** 4465877 **Retention:** PSA

Station: ST18904-ENV40

Sediment Description:

Grab: Sand with shell fragments

CMECS Substrate Component Subgroup: Slightly gravelly sand

Fauna Description:

Grab: Echinodermata (*Echinarachnius parma*)

APPENDIX E SAMPLING AND SEABED PHOTOGRAPHS



Fix: 1839 E: 639426 N: 4462767 Depth: 107' (32m)



Fix: 1877 E: 639541 N: 4462709 Depth: 107' (33m)

Station: ST18904-ENV41

Sediment Description:

Fix1839: Sand with shell fragments

Fix1877: Sand with shell fragments

Fauna Description:

Fix1839: Chordata (cf. *Leucoraja ocellata*), Mollusca (Gastropoda), Echinodermata (*Echinarachnius parma*)

Fix1877: Mollusca (Gastropoda), Echinodermata (*Echinarachnius parma*)

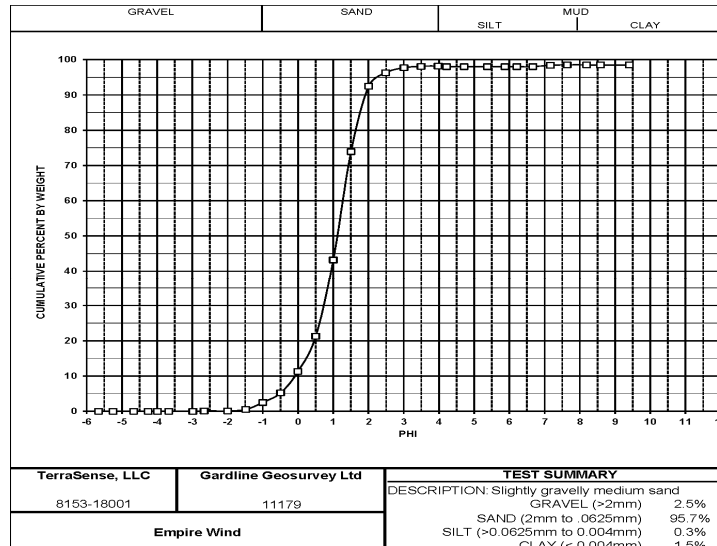
Laser Scale: 94mm separation

CMECS Biotic Group: Sand Dollar Bed

Station ST18904-ENV41 target and actual sampling locations are illustrated in Figure 1.5



Fix: 178 E: 639490 N: 4462737 Depth: 107' (32m)



Fix: 178 E: 639488 N: 4462739 Retention: PSA

Station: ST18904-ENV41

Sediment Description:

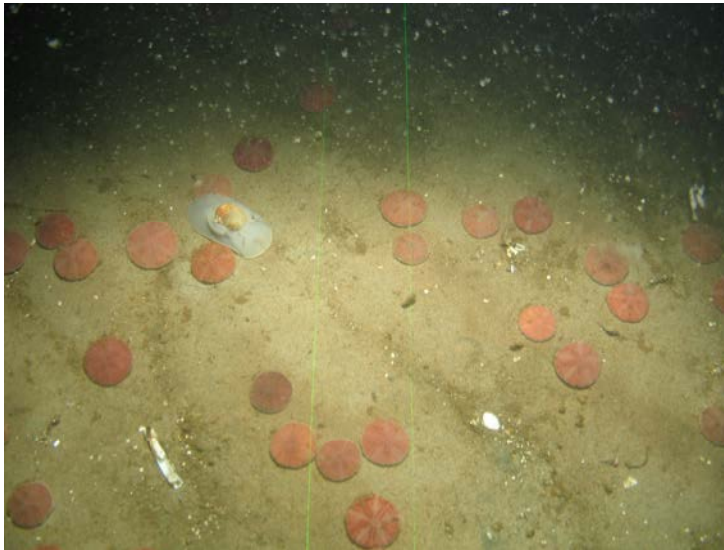
Grab: Sand with shell fragments

CMECS Substrate Component Subgroup: Slightly gravelly sand

Fauna Description:

Grab: Echinodermata (*Echinarachnius parma*)

APPENDIX E SAMPLING AND SEABED PHOTOGRAPHS



Fix: 581 E: 637971 N: 4460149 Depth: 113' (34m)



Fix: 589 E: 637931 N: 4460172 Depth: 113' (34m)

Station: ST18904-ENV42

Sediment Description:

Fix581: Fine sand with scattered shell and shell fragments

Fix589: Fine sand with frequent shells and shell fragments

Fauna Description:

Fix581: Annelida (Polychaeta tubes including Terrellidae), Mollusca (Gastropoda, Naticidae), Echinodermata (*Echinarachnius parma*)

Fix589: Annelida (Terrellidae), Echinodermata (*Echinarachnius parma*), Chordata (cf. *Leucoraja ocellata*)

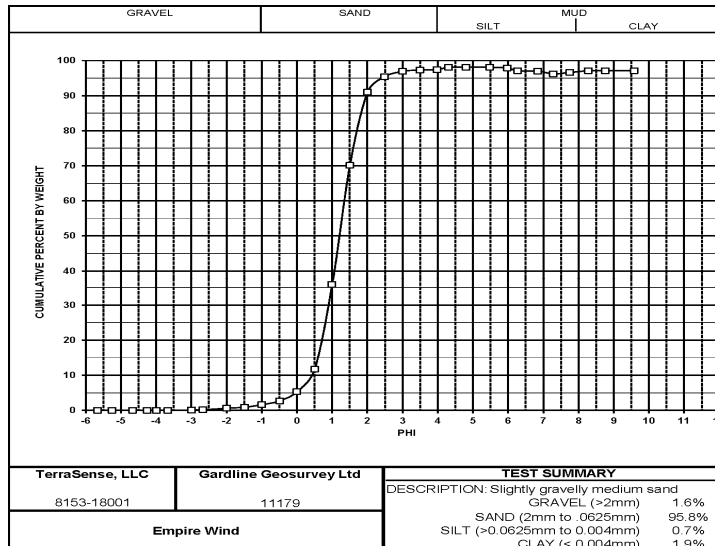
Laser Scale: 94mm separation

CMECS Biotic Group: Sand Dollar Bed

Station ST18904-ENV42 target and actual sampling locations are illustrated in Figure 1.6



Fix: 64 E: 637906 N: 4460192 Depth: 110' (34m)



Fix: 64 E: 637910 N: 4460177 Retention: PSA

Station: ST18904-ENV42

Sediment Description:

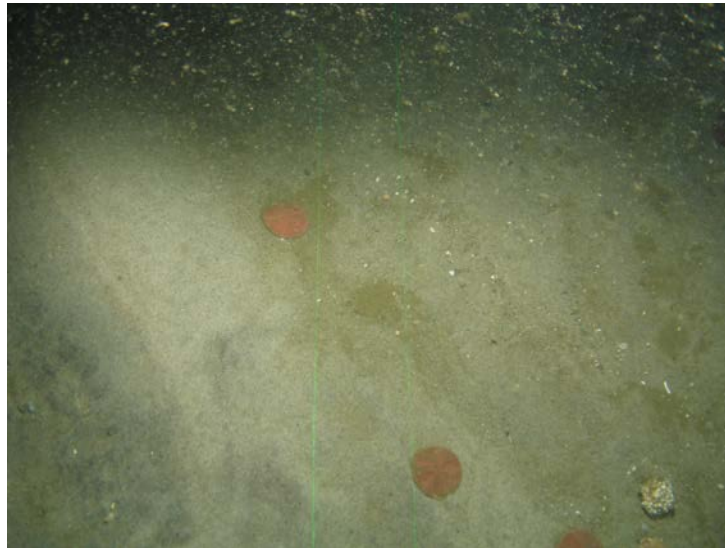
Grab: Fine to medium sand with shell fragments

CMECS Substrate Component Subgroup: Slightly gravelly sand

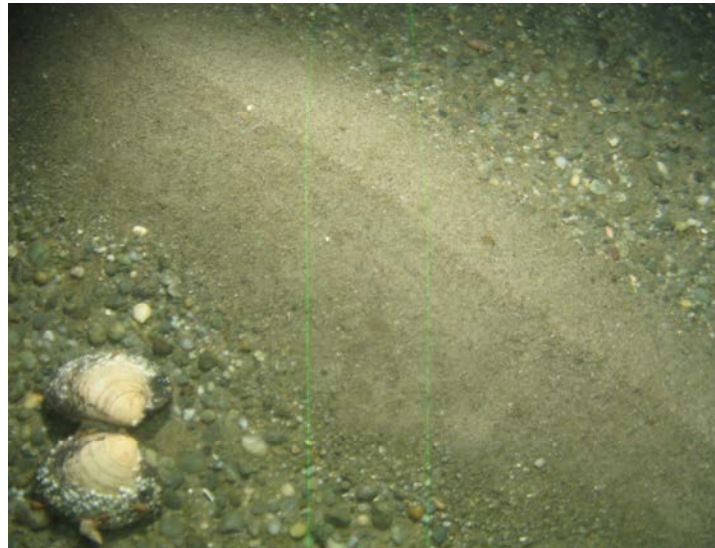
Fauna Description:

Grab: Arthropoda (Paguridae)

APPENDIX E SAMPLING AND SEABED PHOTOGRAPHS



Fix: 1890 E: 639853 N: 4464880 Depth: 115' (35m)



Fix: 1925 E: 639697 N: 4464995 Depth: 116' (35m)

Station: ST18904-ENV43

Sediment Description:

Fix1890: Sand with shell fragments

Fix1925: Gravelly sand with shell fragments

Fauna Description:

Fix1890: Arthropoda (Cirripedia, Paguroidea), Echinodermata (*Echinarachnius parma*)

Fix1925: Arthropoda (Paguroidea), Mollusca (cf. *Arctica islandica* shell)

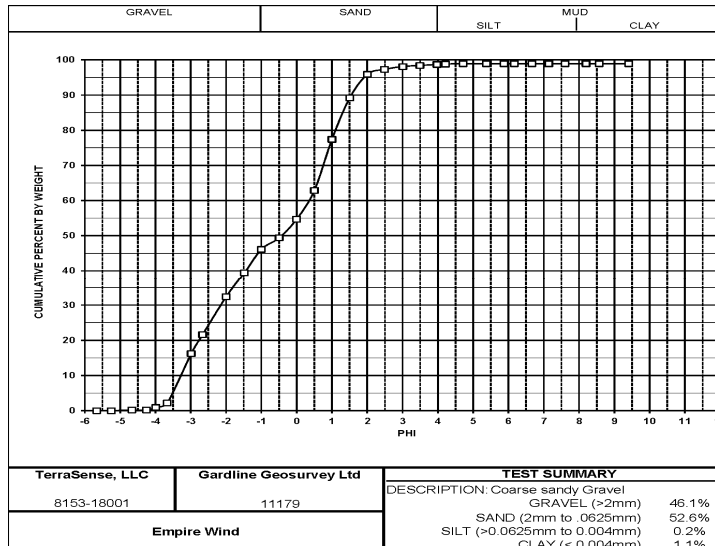
Laser Scale: 94mm separation

CMECS Biotic Group: Sand Dollar Bed

Station ST18904-ENV43 target and actual sampling locations are illustrated in Figure 1.5



Fix: 183 E: 639773 N: 4464944 Depth: 116' (35m)



Fix: 183 E: 639773 N: 4464944 Retention: PSA

Station: ST18904-ENV43

Sediment Description:

Grab: Sandy gravel

CMECS Substrate Component Subgroup: Sandy gravel

Fauna Description:

Grab: No visible fauna

APPENDIX E SAMPLING AND SEABED PHOTOGRAPHS



Fix: 1752 **E:** 641063 **N:** 4461944 **Depth:** 119' (36m)

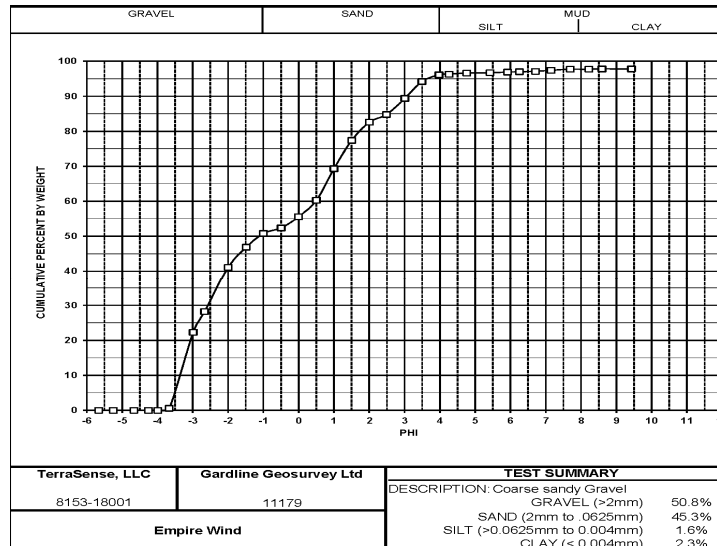


Fix: 1785 **E:** 640921 **N:** 4462016 **Depth:** 118' (36m)

Station: ST18904-ENV44
Sediment Description:
Fix1752: Gravelly sands with shell fragments
Fix1785: Gravelly sands with shell fragments
Fauna Description:
Fix1752: Annelida (Polychaeta tubes), Arthropoda (Paguroidea), Mollusca (Gastropoda), Echinodermata (*Echinarachnius parma*), Cnidaria (Actiniaria)
Fix1785: No visible fauna
Laser Scale: 94mm separation
CMECS Biotic Group: Small Tube-building Fauna
 Station ST18904-ENV44 target and actual sampling locations are illustrated in Figure 1.6



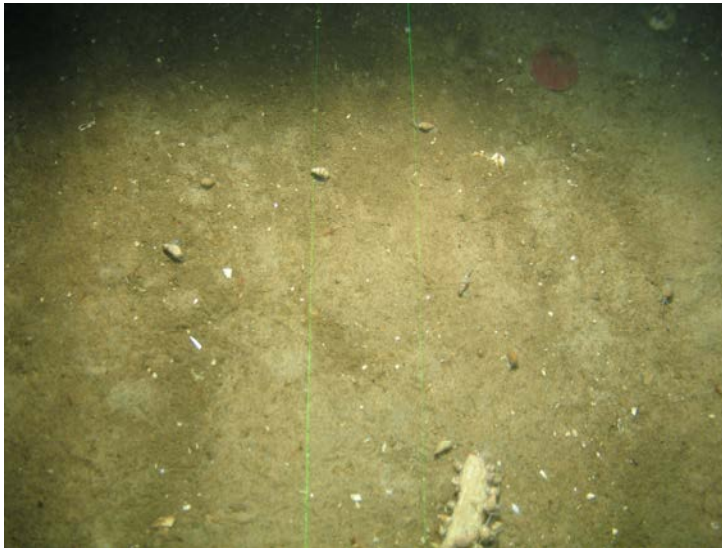
Fix: 171 **E:** 640990 **N:** 4461973 **Depth:** 119' (36m)



Fix: 171 **E:** 640994 **N:** 4461976 **Retention:** PSA

Station: ST18904-ENV44
Sediment Description:
Grab: Coarse sand with gravel and silt
CMECS Substrate Component Subgroup: Sandy gravel
Fauna Description:
Grab: Annelida (Polychaeta tubes)

APPENDIX E SAMPLING AND SEABED PHOTOGRAPHS



Fix: 752 E: 639621 N: 4459356 Depth: 116' (35m)



Fix: 767 E: 639483 N: 4459420 Depth: 116' (35m)

Station: ST18904-ENV45

Sediment Description:

Fix752: Fine sand with scattered shell fragments

Fix767: Fine sand with scattered shell fragments

Fauna Description:

Fix752: Annelida (Polychaeta tubes), Arthropoda (Caridea), Mollusca (Gastropoda), Echinodermata (*Echinarachnius parma*)

Fix767: Arthropoda (Caridea), Mollusca (Gastropoda), Echinodermata (*Echinarachnius parma*)

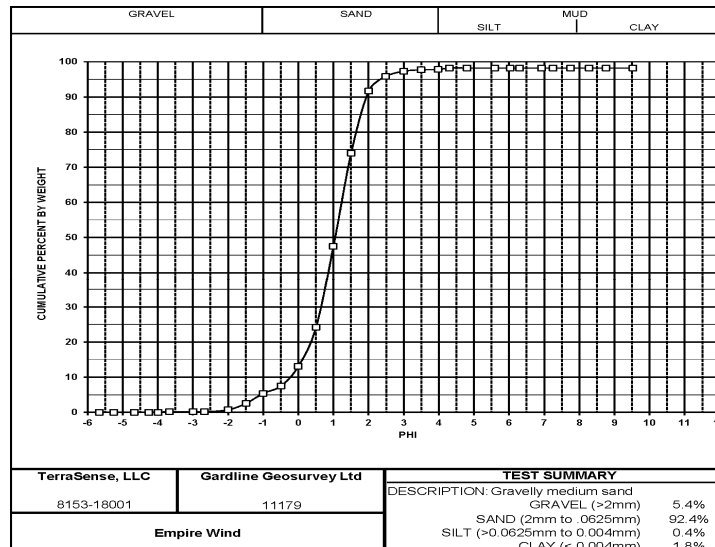
Laser Scale: 94mm separation

CMECS Biotic Group: Sand Dollar Bed

Station ST18904-ENV45 target and actual sampling locations are illustrated in Figure 1.6



Fix: 71 E: 639553 N: 4459377 Depth: 117' (36m)



Fix: 71 E: 639551 N: 4459382 Retention: PSA

Station: ST18904-ENV45

Sediment Description:

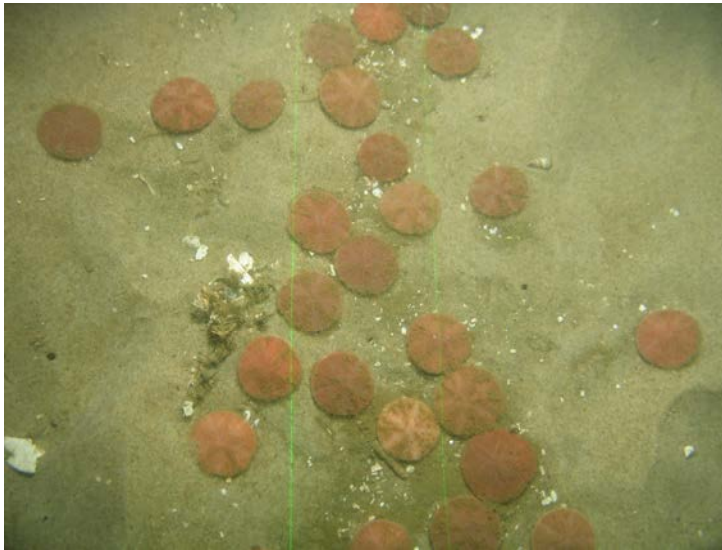
Grab: Fine to coarse sand with shell fragments

CMECS Substrate Component Subgroup: Gravelly sand

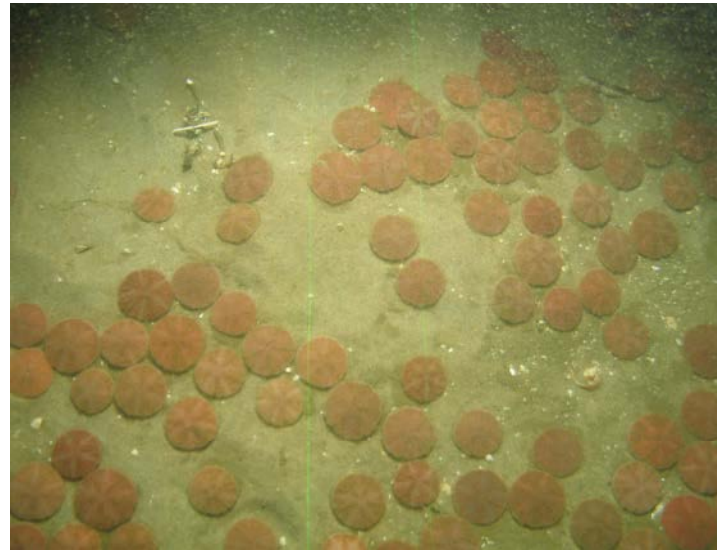
Fauna Description:

Grab: Annelida (Polychaeta), Echinodermata (Clypeasteroida)

APPENDIX E SAMPLING AND SEABED PHOTOGRAPHS



Fix: 1721 **E:** 643555 **N:** 4465056 **Depth:** 116' (35m)



Fix: 1736 **E:** 643467 **N:** 4465107 **Depth:** 115' (35m)

Station: ST18904-ENV46
Sediment Description:
Fix1721: Sand with shell fragments

Fix1736: Sand with shell fragments

Fauna Description:
Fix1721: Annelida (Polychaeta tubes including Terrebeldidae), Echinodermata (*Echinarachnius parma*)
Fix1736: Annelida (Polychaeta tubes including Terrebeldidae), Arthropoda (Amphipoda), Echinodermata (*Echinarachnius parma*)

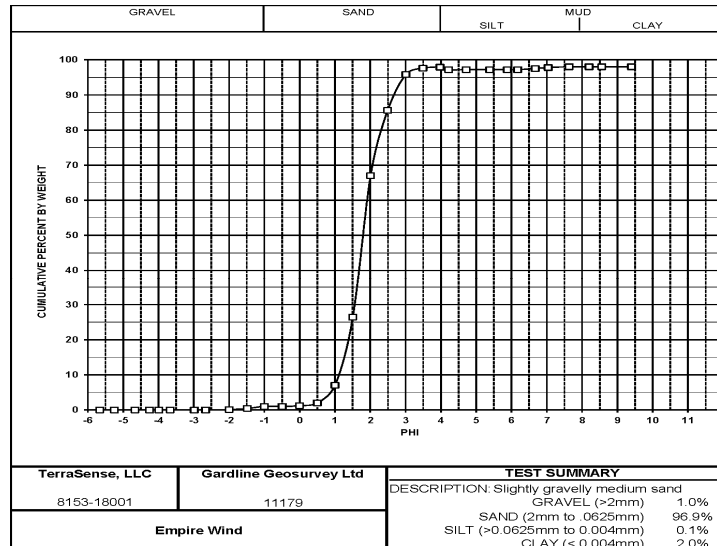
Laser Scale: 94mm separation

CMECS Biotic Group: Sand Dollar Bed

Station ST18904-ENV46 target and actual sampling locations are illustrated in Figure 1.5



Fix: 170 **E:** 643492 **N:** 4465094 **Depth:** 115' (35m)



Fix: 170 **E:** 643489 **N:** 4465096 **Retention:** PSA

Station: ST18904-ENV46
Sediment Description:
Grab: Sand with shell fragments

CMECS Substrate Component Subgroup: Slightly gravelly sand

Fauna Description:
Grab: Echinodermata (*Echinarachnius parma*)

APPENDIX E SAMPLING AND SEABED PHOTOGRAPHS



Fix: 821 E: 632461 N: 4467141 Depth: 103' (31m)



Fix: 835 E: 632552 N: 4467098 Depth: 101' (31m)

Station: ST18904-ENV47

Sediment Description:

Fix821: Fine sand with scattered shell fragments

Fix835: Gravelly sands with frequent shell fragments

Fauna Description:

Fix821: Annelida (Polychaeta tubes), Arthropoda (Paguroidea), Mollusca (Gastropoda), Echinodermata (*Echinarachnius parma*)

Fix835: No visible fauna

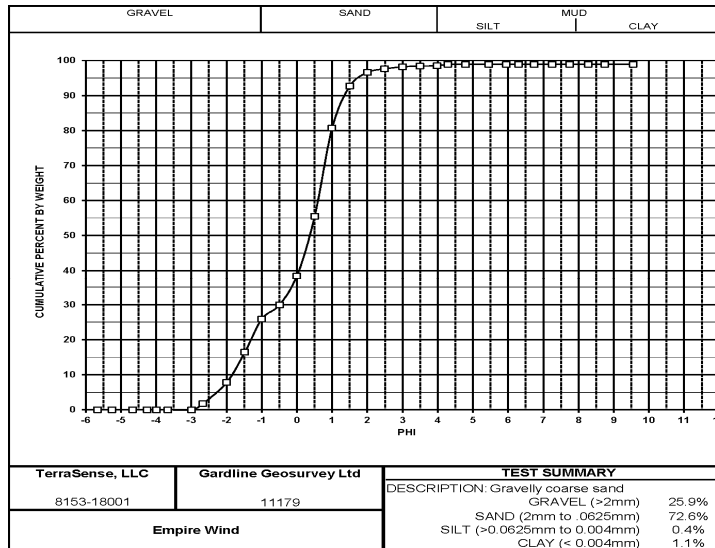
Laser Scale: 94mm separation

CMECS Biotic Group: Sand Dollar Bed

Station ST18904-ENV47 target and actual sampling locations are illustrated in Figure 1.3



Fix: 92 E: 632550 N: 4467089 Depth: 101' (31m)



Fix: 92 E: 632547 N: 4467093 Retention: PSA

Station: ST18904-ENV47

Sediment Description:

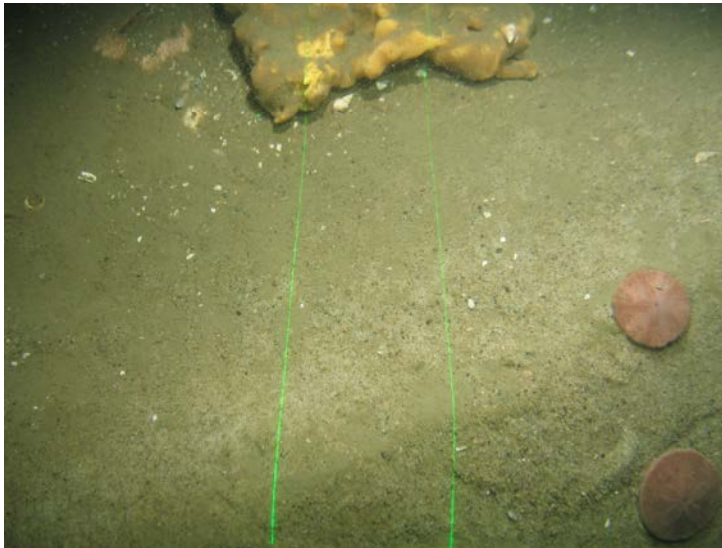
Grab: Gravelly coarse sand with shell fragments

CMECS Substrate Component Subgroup: Gravelly sand

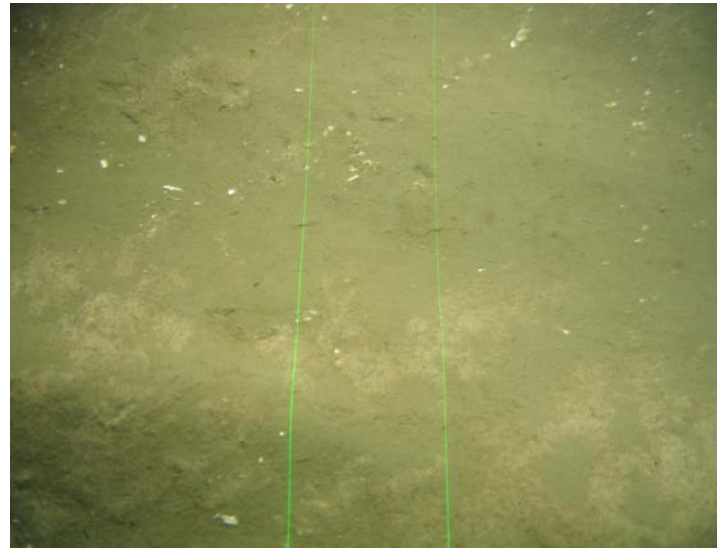
Fauna Description:

Grab: Arthropoda (Paguroidea), Mollusca (Gastropoda, Bivalvia)

APPENDIX E SAMPLING AND SEABED PHOTOGRAPHS



Fix: 2047 E: 641307 N: 4458643 Depth: 123' (38m)



Fix: 2058 E: 641260 N: 4458635 Depth: 123' (37m)

Station: ST18904-ENV48
Sediment Description:
Fix2047: Sand with shell fragments

Fix2058: Sand with shell fragments

Fauna Description:
Fix2047: Arthropoda (Paguroidea), Echinodermata (*Echinarachnius parma*) and Porifera

Fix2058: Annelida (Polychaeta tubes)

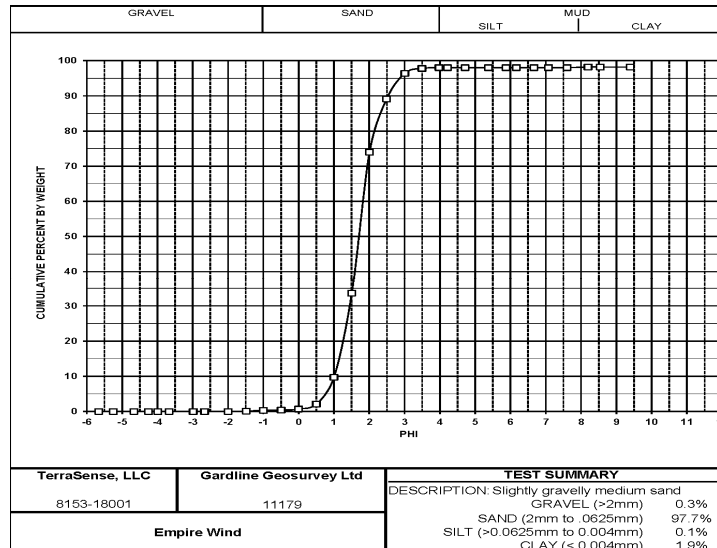
Laser Scale: 94mm separation

CMECS Biotic Group: Sand Dollar Bed

Station ST18904-ENV48 target and actual sampling locations are illustrated in Figure 1.6



Fix: 193 E: 641362 N: 4458663 Depth: 123' (37m)



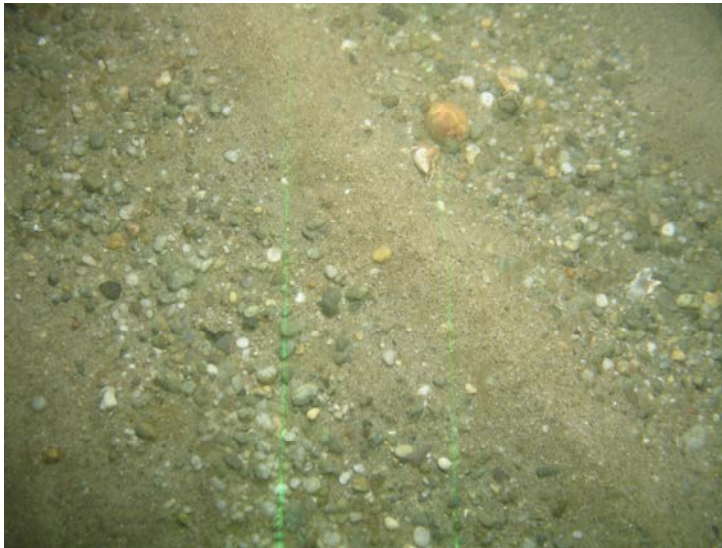
Fix: 193 E: 641362 N: 4458663 Retention: PSA

Station: ST18904-ENV48
Sediment Description:
Grab: Sand with shell fragments

CMECS Substrate Component Subgroup: Slightly gravelly sand

Fauna Description:
Grab: No visible fauna

APPENDIX E SAMPLING AND SEABED PHOTOGRAPHS



Fix: 1703 E: 643975 N: 4464623 Depth: 119' (36m)



Fix: 1715 E: 643913 N: 4464657 Depth: 119' (36m)

Station: ST18904-ENV49

Sediment Description:

Fix1703: Gravelly sand with shell fragments

Fix1715: Gravelly sand with shell fragments

Fauna Description:

Fix1703: Arthropoda (Paguroidea), Echinodermata (*Echinarachnius parma*), Cnidaria (Ceriantharia)

Fix1715: Annelida (Polychaeta tubes)

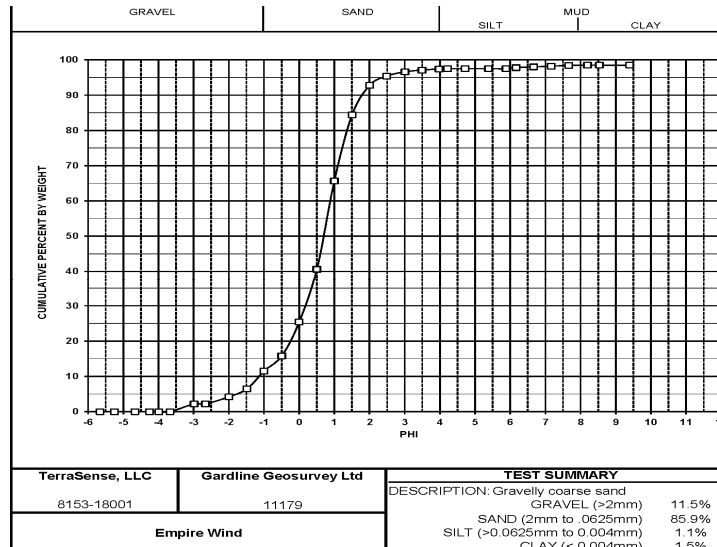
Laser Scale: 94mm separation

CMECS Biotic Group: Sand Dollar Bed

Station ST18904-ENV49 target and actual sampling locations are illustrated in Figure 1.5



Fix: 165 E: 643995 N: 4464614 Depth: 118' (36m)



Fix: 165 E: 643995 N: 4464614 Retention: PSA

Station: ST18904-ENV49

Sediment Description:

Grab: Coarse sandy gravel with silt

CMECS Substrate Component Subgroup: Gravelly sand

Fauna Description:

Grab: No visible fauna

APPENDIX E SAMPLING AND SEABED PHOTOGRAPHS



Fix: 2009 **E:** 644359 **N:** 4461192 **Depth:** 121' (37m)



Fix: 2017 **E:** 644404 **N:** 4461168 **Depth:** 121' (37m)

Station: ST18904-ENV50

Sediment Description:

Fix2009: Sand with shell fragments

Fix2017: Sand with shell fragments

Fauna Description:

Fix2009: Echinodermata (*Echinarachnius parma*)

Fix2017: Annelida (Polychaeta tubes)

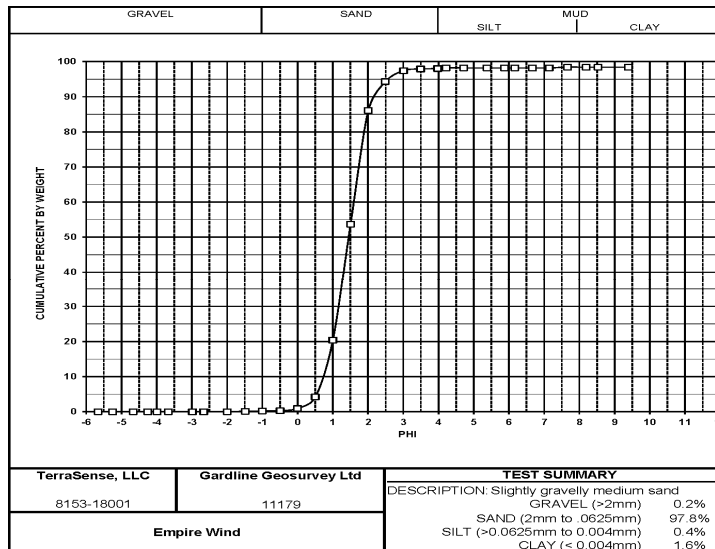
Laser Scale: 94mm separation

CMECS Biotic Group: Sand Dollar Bed

Station ST18904-ENV50 target and actual sampling locations are illustrated in Figure 1.5



Fix: 189 **E:** 644609 **N:** 4461222 **Depth:** 121' (37m)



Fix: 189 **E:** 644314 **N:** 4461213 **Retention:** PSA

Station: ST18904-ENV50

Sediment Description:

Grab: Sand with shell fragments

CMECS Substrate Component Subgroup: Slightly gravelly sand

Fauna Description:

Grab: Annelida (Polychaeta tubes), Echinodermata (*Echinarachnius parma*)

APPENDIX E SAMPLING AND SEABED PHOTOGRAPHS



Fix: 1537 E: 642719 N: 4457528 Depth: 120' (37m)



Fix: 1544 E: 642760 N: 4457509 Depth: 120' (37m)

Station: ST18904-ENV51

Sediment Description:

Fix1537: Sand with shell fragments

Fix1544: Sand with shell fragments

Fauna Description:

Fix1537: Annelida (Polychaeta tubes), Mollusca (*Arctica islandica* shell), Echinodermata (*Echinarachnius parma*)

Fix1544: Annelida (Polychaeta tubes), Arthropoda (Paguroidea), Chordata (Rajidae egg case)

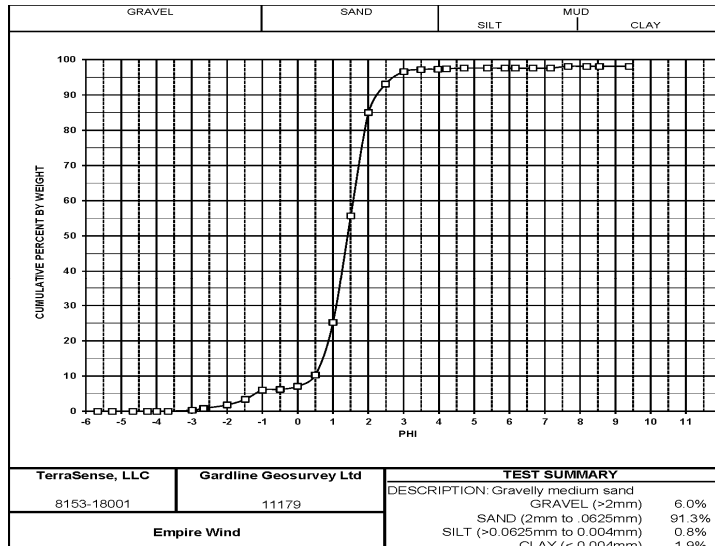
Laser Scale: 94mm separation

CMECS Biotic Group: Sand Dollar Bed

Station ST18904-ENV51 target and actual sampling locations are illustrated in Figure 1.6



Fix: 151 E: 642769 N: 4457495 Depth: 120' (37m)



Fix: 151 E: 642769 N: 4457493 Retention: PSA

Station: ST18904-ENV51

Sediment Description:

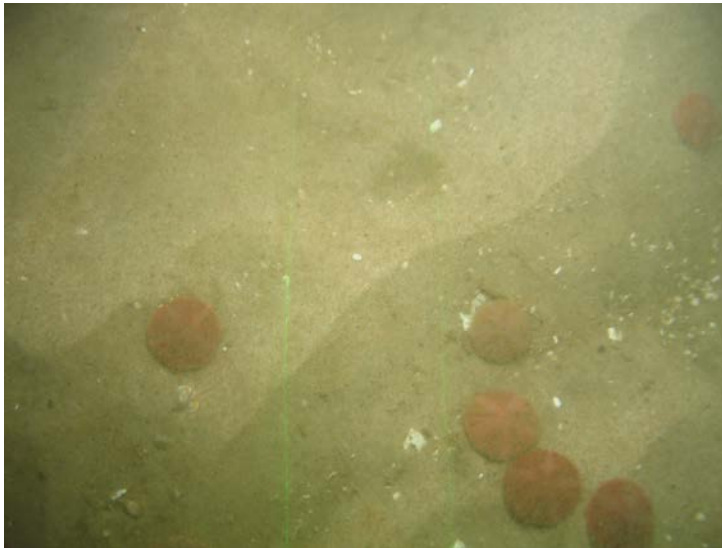
Grab: Sand with shell fragments

CMECS Substrate Component Subgroup: Gravelly sand

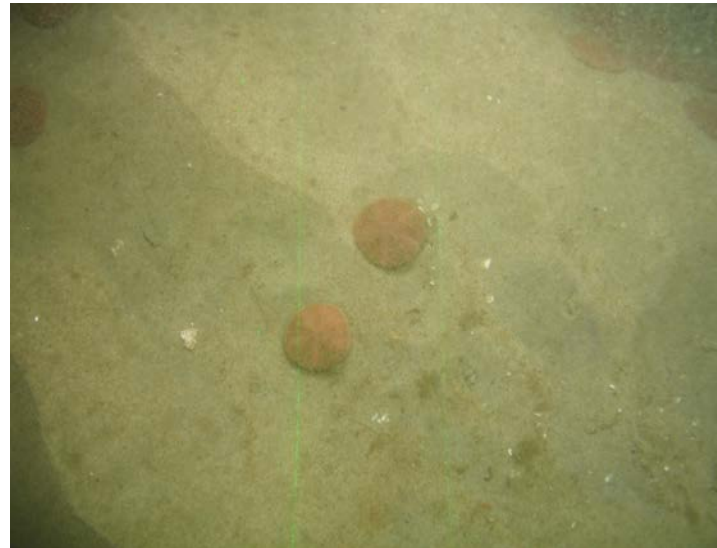
Fauna Description:

Grab: No visible fauna

APPENDIX E SAMPLING AND SEABED PHOTOGRAPHS



Fix: 1648 E: 647125 N: 4464235 Depth: 117' (36m)



Fix: 1665 E: 647044 N: 4464266 Depth: 117' (36m)

Station: ST18904-ENV52

Sediment Description:

Fix1648: Sand with shell fragments

Fix1665: Sand with shell fragments

Fauna Description:

Fix1648: Echinodermata (*Echinarachnius parma*),
Chordata (Triglidae)

Fix1665: Annelida (Polychaeta tubes), Arthropoda
(Caridea), Echinodermata (*Echinarachnius parma*)

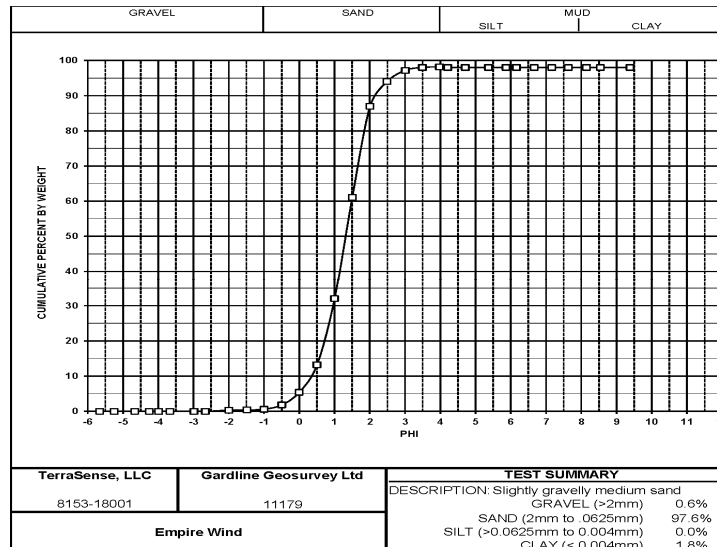
Laser Scale: 94mm separation

CMECS Biotic Group: Sand Dollar Bed

Station ST18904-ENV52 target and actual sampling locations are illustrated in Figure 1.5



Fix: 162 E: 647094 N: 4464248 Depth: 117' (36m)



Fix: 162 E: 647094 N: 4464246 Retention: PSA

Station: ST18904-ENV52

Sediment Description:

Grab: Sand with shell fragments

CMECS Substrate Component Subgroup: Slightly
gravelly sand

Fauna Description:

Grab: No visible fauna

APPENDIX E SAMPLING AND SEABED PHOTOGRAPHS



Fix: 1579 E: 646286 N: 4461114 Depth: 122' (37m)



Fix: 1593 E: 646388 N: 4461067 Depth: 122' (37m)

Station: ST18904-ENV53

Sediment Description:

Fix1579: Sand with shell fragments

Fix1593: Sand with shell fragments

Fauna Description:

Fix1579: Arthropoda (Caridea, Paguroidea), Echinodermata (*Echinarachnius parma*), Chordata (Rajidae egg case)

Fix1593: Arthropoda (Caridea), Echinodermata (Asteroidea, *Echinarachnius parma*)

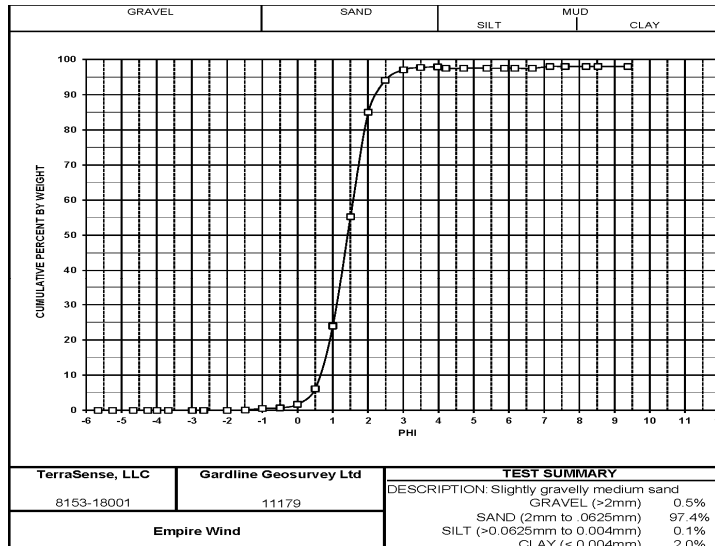
Laser Scale: 94mm separation

CMECS Biotic Group: Sand Dollar Bed

Station ST18904-ENV53 target and actual sampling locations are illustrated in Figure 1.5



Fix: 153 E: 646323 N: 4461095 Depth: 122' (37m)



Fix: 153 E: 646323 N: 4461095 Retention: PSA

Station: ST18904-ENV53

Sediment Description:

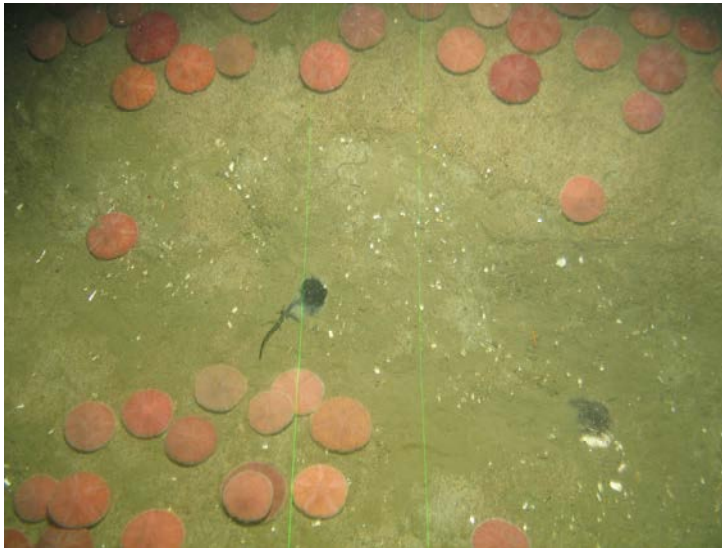
Grab: Sand with shell fragments

CMECS Substrate Component Subgroup: Slightly gravelly sand

Fauna Description:

Grab: No visible fauna

APPENDIX E SAMPLING AND SEABED PHOTOGRAPHS



Fix: 2068 E: 644592 N: 4456602 Depth: 130' (39m)



Fix: 2084 E: 644531 N: 4456634 Depth: 130' (40m)

Station: ST18904-ENV54

Sediment Description:

Fix2068: Sand with shell fragments

Fix2084: Sand with shell fragments

Fauna Description:

Fix2068: Mollusca (*Arctica islandica* shell), Echinodermata (*Echinarachnius parma*), Chordata (Rajidae egg case)

Fix2084: Echinodermata (*Echinarachnius parma*), Chordata (Actinopterygii, cf. *Leucoraja ocellata*)

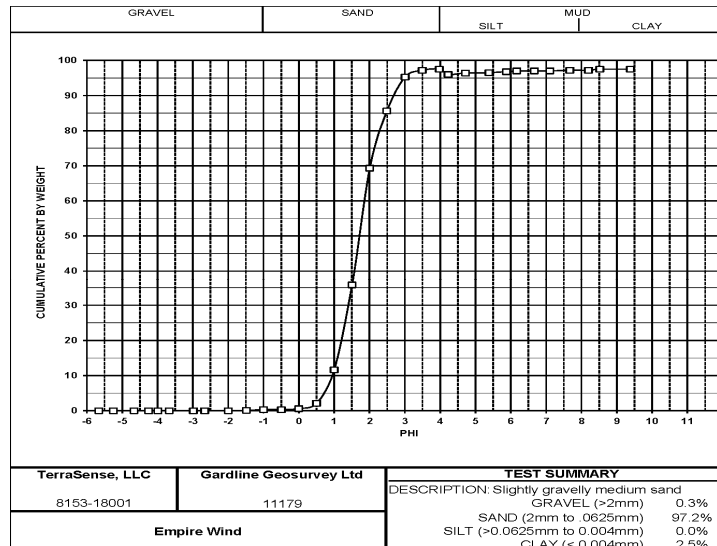
Laser Scale: 94mm separation

CMECS Biotic Group: Sand Dollar Bed

Station ST18904-ENV54 target and actual sampling locations are illustrated in Figure 1.6



Fix: 195 E: 644539 N: 4456642 Depth: 130' (39m)



Fix: 195 E: 644533 N: 4456633 Retention: PSA

Station: ST18904-ENV54

Sediment Description:

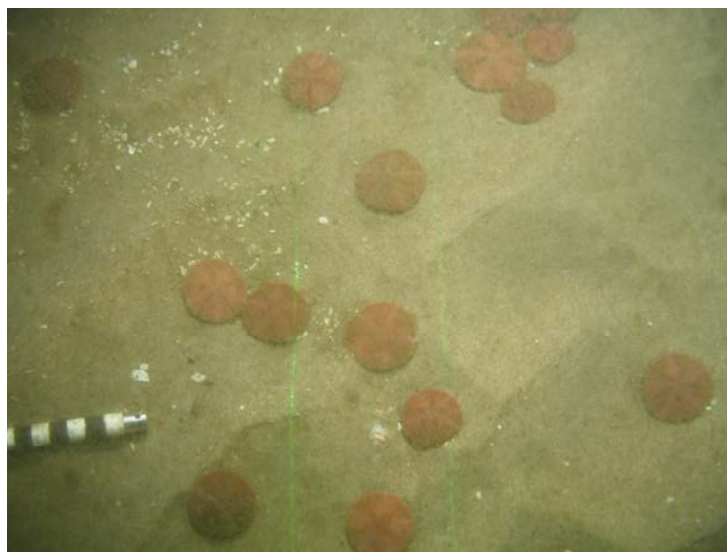
Grab: Sand with shell fragments

CMECS Substrate Component Subgroup: Slightly gravelly sand

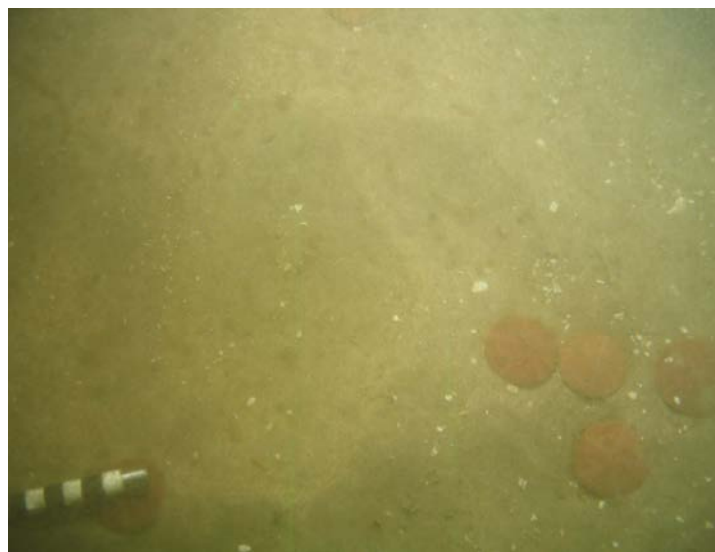
Fauna Description:

Grab: Echinodermata (*Echinarachnius parma*)

APPENDIX E SAMPLING AND SEABED PHOTOGRAPHS



Fix: 1619 E: 648880 N: 4463831 Depth: 120' (36m)



Fix: 1630 E: 648828 N: 4463859 Depth: 120' (36m)

Station: ST18904-ENV55

Sediment Description:

Fix1619: Sand with shell fragments

Fix1630: Sand with shell fragments

Fauna Description:

Fix1619: Mollusca (Naticidae), Echinodermata (*Echinarachnius parma*)

Fix1630: Echinodermata (*Echinarachnius parma*)

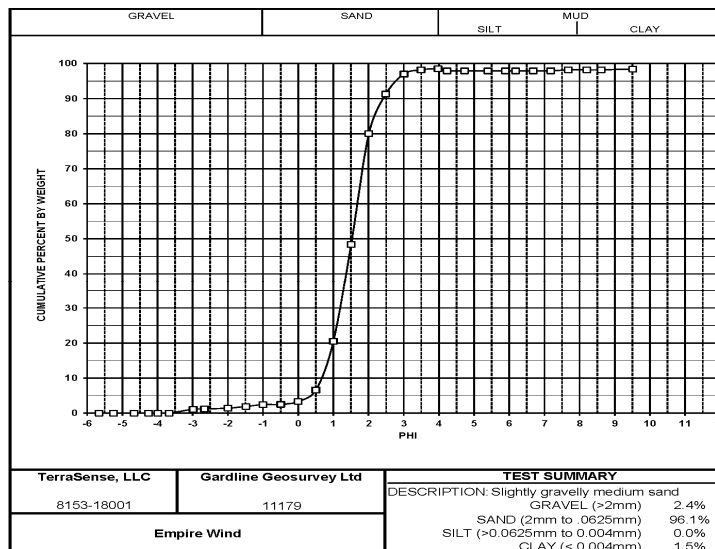
Laser Scale: 94mm separation

CMECS Biotic Group: Sand Dollar Bed

Station ST18904-ENV55 target and actual sampling locations are illustrated in Figure 1.5



Fix: 157 E: 648894 N: 4463828 Depth: 120' (36m)



Fix: 157 E: 648898 N: 4463824 Retention: PSA

Station: ST18904-ENV55

Sediment Description:

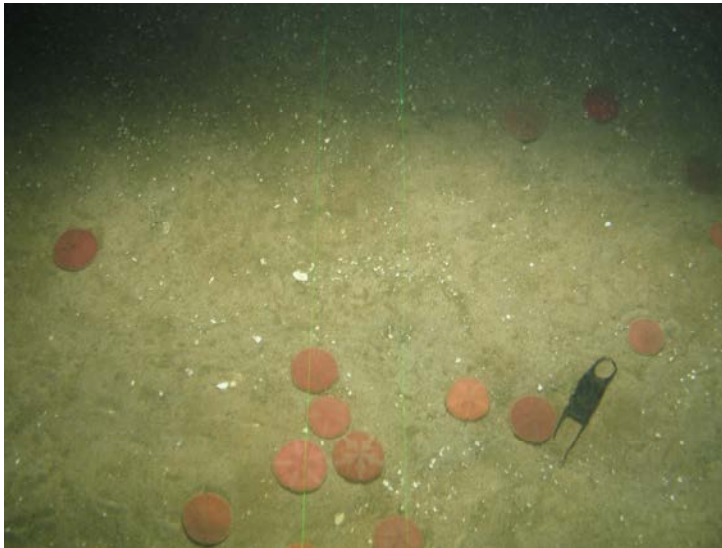
Grab: Sand with shell fragments

CMECS Substrate Component Subgroup: Slightly gravelly sand

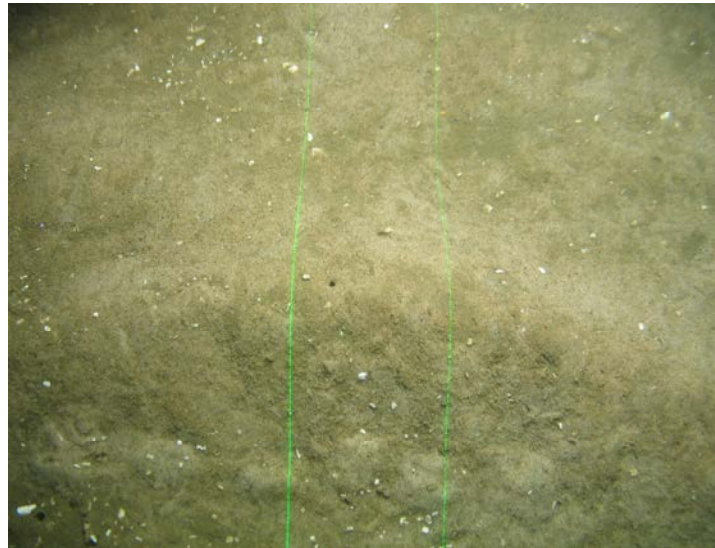
Fauna Description:

Grab: No visible fauna

APPENDIX E SAMPLING AND SEABED PHOTOGRAPHS



Fix: 2326 E: 647706 N: 4459943 Depth: 122' (37m)



Fix: 2370 E: 647871 N: 4459871 Depth: 122' (37m)

Station: ST18904-ENV56
Sediment Description:
Fix2326: Sand with shell fragments

Fix2370: Sand with shell fragments

Fauna Description:
Fix2326: Annelida (Polychaeta tubes), Echinodermata (*Echinarachnius parma*), Chordata (Rajidae egg case), Indeterminate Fauna

Fix2370: No visible fauna

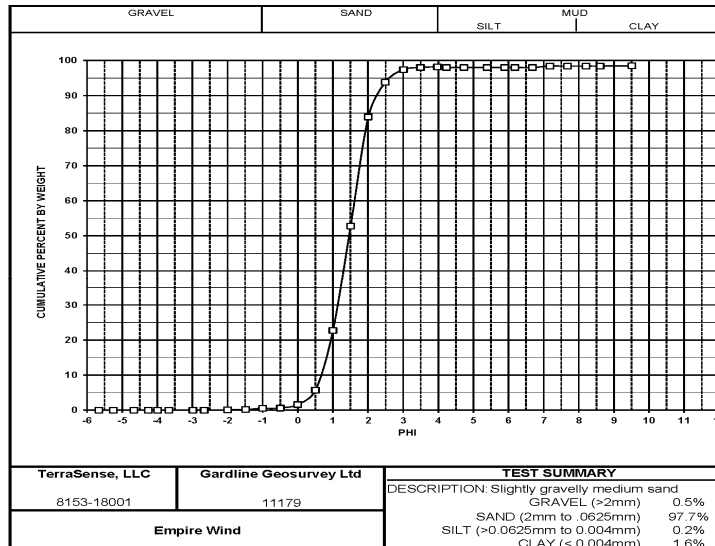
Laser Scale: 94mm separation

CMECS Biotic Group: Sand Dollar Bed

Station ST18904-ENV56 target and actual sampling locations are illustrated in Figure 1.6



Fix: 212 E: 647786 N: 4459913 Depth: 122' (37m)



Fix: 212 E: 647790 N: 4459907 Retention: PSA

Station: ST18904-ENV56
Sediment Description:
Grab: Sand with shell fragments

CMECS Substrate Component Subgroup: Slightly gravelly sand

Fauna Description:
Grab: Echinodermata (*Echinarachnius parma*)

APPENDIX E SAMPLING AND SEABED PHOTOGRAPHS



Fix: 1457 E: 645924 N: 4455762 Depth: 130' (40m)



Fix: 1468 E: 645956 N: 4455740 Depth: 130' (40m)

Station: ST18904-ENV57

Sediment Description:

Fix1457: Sand with shell fragments

Fix1468: Sand with shell fragments

Fauna Description:

Fix1457: Echinodermata (*Echinarachnius parma*),
Chordata (cf. *Carcharhinus falciformis*)

Fix1468: Echinodermata (*Echinarachnius parma*)

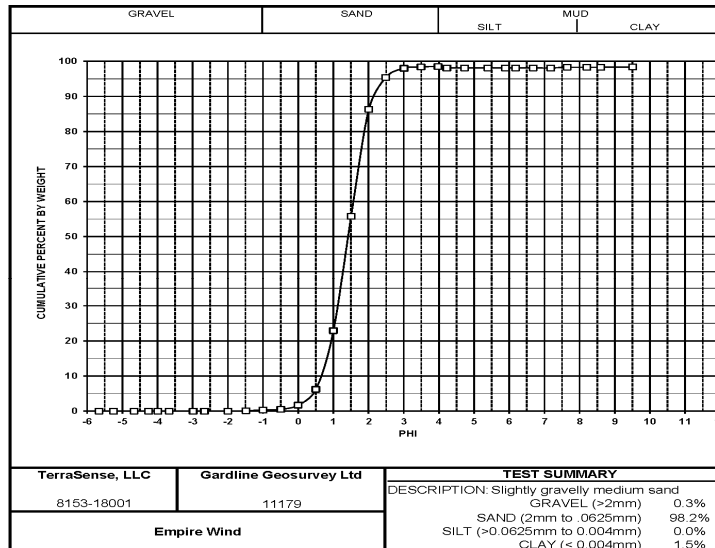
Laser Scale: 94mm separation

CMECS Biotic Group: Sand Dollar Bed

Station ST18904-ENV57 target and actual sampling locations are illustrated in Figure 1.6



Fix: 147 E: 646018 N: 4455710 Depth: 129' (39m)



Fix: 147 E: 646018 N: 4455710 Retention: PSA

Station: ST18904-ENV57

Sediment Description:

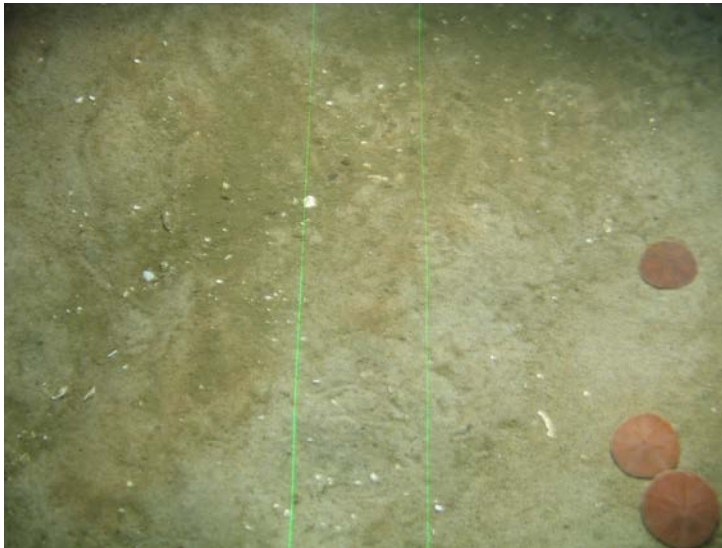
Grab: Sand with shell fragments

CMECS Substrate Component Subgroup: Slightly
gravelly sand

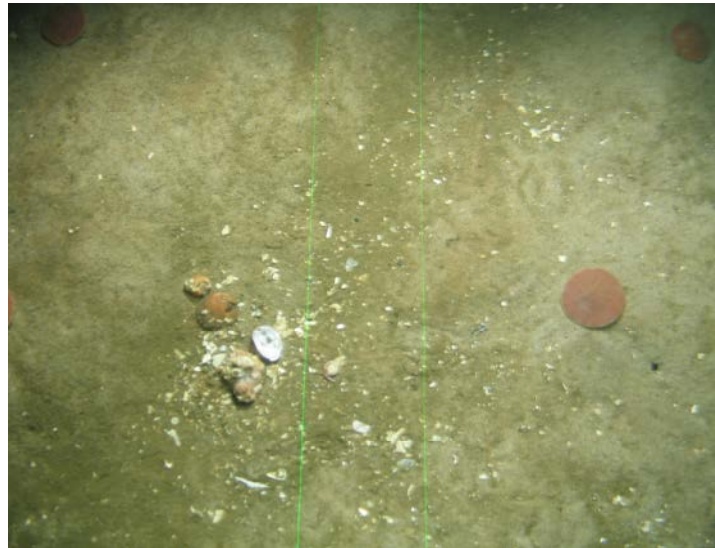
Fauna Description:

Grab: Annelida (Polychaete tubes)

APPENDIX E SAMPLING AND SEABED PHOTOGRAPHS



Fix: 2380 E: 650646 N: 4463428 Depth: 123' (38m)



Fix: 2392 E: 650736 N: 4463383 Depth: 124' (38m)

Station: ST18904-ENV58

Sediment Description:

Fix2380: Sand with shell fragments

Fix2392: Sand with shell fragments

Fauna Description:

Fix2380: Annelida (Polychaeta tubes), Echinodermata (*Echinarachnius parma*)

Fix2392: Arthropoda (Paguroidea), Echinodermata (*Echinarachnius parma*)

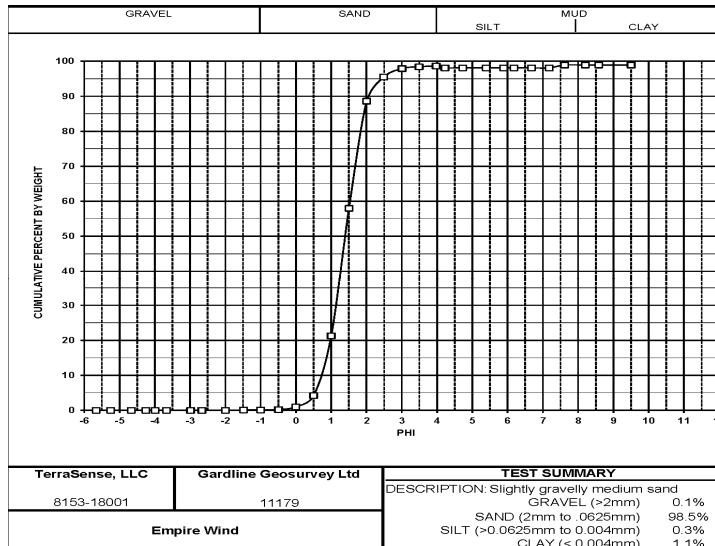
Laser Scale: 94mm separation

CMECS Biotic Group: Sand Dollar Bed

Station ST18904-ENV58 target and actual sampling locations are illustrated in Figure 1.5



Fix: 215 E: 650703 N: 4463399 Depth: 123' (38m)



Fix: 215 E: 650704 N: 4463397 Retention: PSA

Station: ST18904-ENV58

Sediment Description:

Grab: Sand with shell fragments

CMECS Substrate Component Subgroup: Slightly gravelly sand

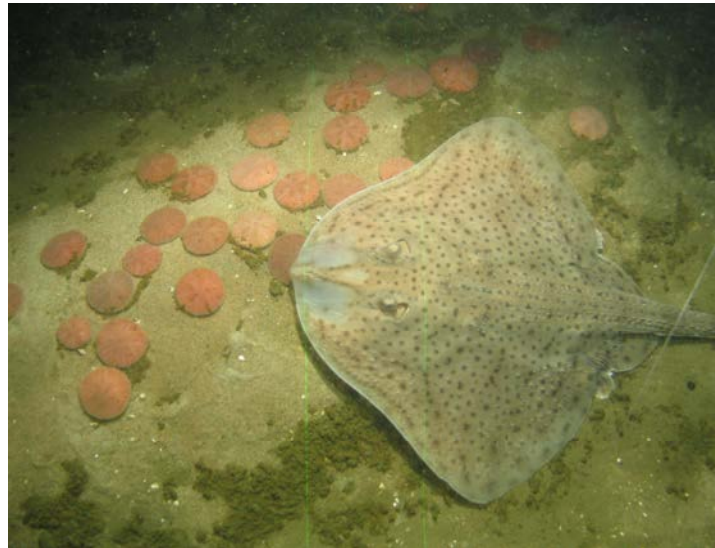
Fauna Description:

Grab: Annelida (Polychaete tubes)

APPENDIX E SAMPLING AND SEABED PHOTOGRAPHS



Fix: 1308 E: 649430 N: 4459299 Depth: 127' (39m)



Fix: 1360 E: 649568 N: 4459237 Depth: 127' (39m)

Station: ST18904-ENV59
Sediment Description:
Fix1308: Sand with shell fragments

Fix1360: Sand with shell fragments

Fauna Description:
Fix1308: Echinodermata (*Echinarachnius parma*)
Fix1360: Arthropoda (Paguroidea), Echinodermata (*Echinarachnius parma*), Chordata (cf. *Leucoraja ocellata*)

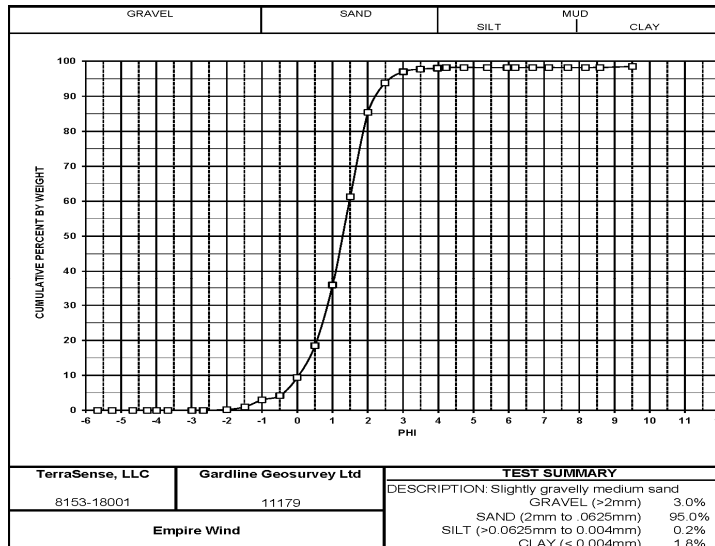
Laser Scale: 94mm separation

CMECS Biotic Group: Sand Dollar Bed

Station ST18904-ENV59 target and actual sampling locations are illustrated in Figure 1.6



Fix: 142 E: 650705 N: 4463399 Depth: 123' (38m)



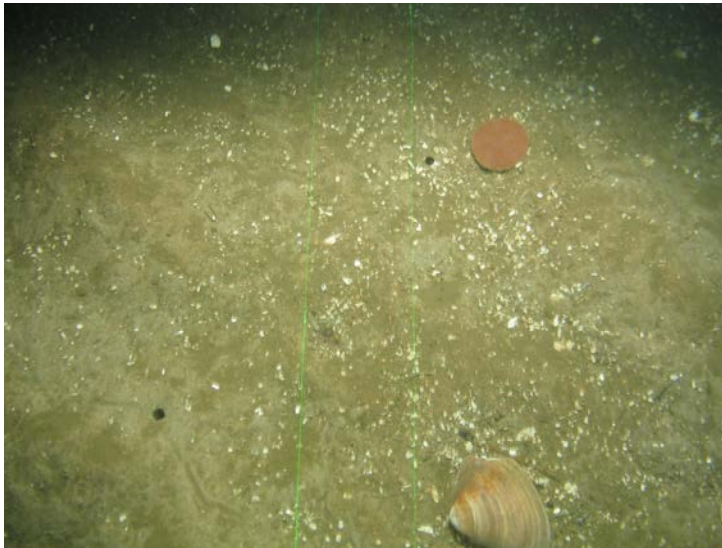
Fix: 142 E: 650704 N: 4463397 Retention: PSA

Station: ST18904-ENV59
Sediment Description:
Grab: Sand with shell fragments

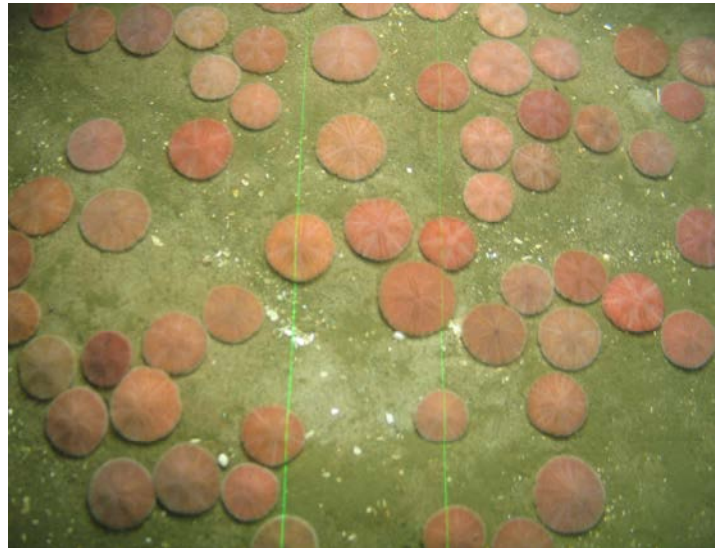
CMECS Substrate Component Subgroup: Slightly gravelly sand

Fauna Description:
Grab: Echinodermata (*Echinarachnius parma*)

APPENDIX E SAMPLING AND SEABED PHOTOGRAPHS



Fix: 2113 E: 647704 N: 4454781 Depth: 131' (40m)



Fix: 2150 E: 647564 N: 4454847 Depth: 130' (40m)

Station: ST18904-ENV60
Sediment Description:
Fix2113: Sand with shell fragments

Fix2150: Sand with shell fragments

Fauna Description:
Fix2113: Annelida (Polychaeta tube), Mollusca (Bivalvia), Echinodermata (*Echinarachnius parma*)

Fix2150: Echinodermata (*Echinarachnius parma*)

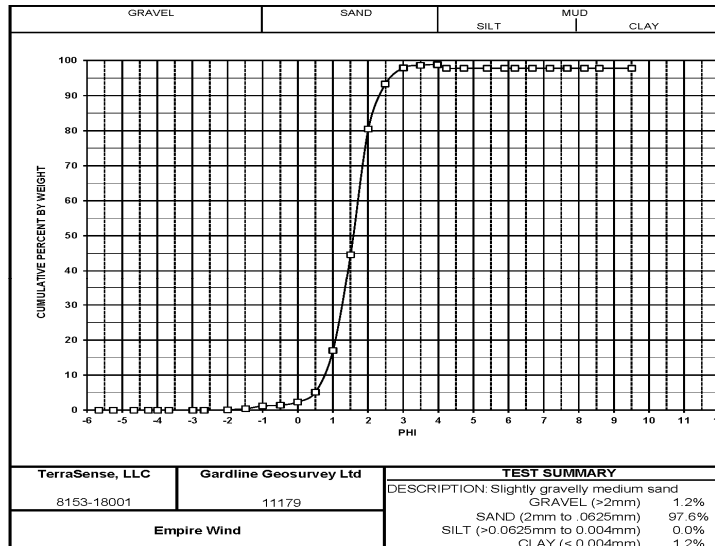
Laser Scale: 94mm separation

CMECS Biotic Group: Sand Dollar Bed

Station ST18904-ENV60 target and actual sampling locations are illustrated in Figure 1.7



Fix: 200 E: 647642 N: 4454816 Depth: 130' (40m)



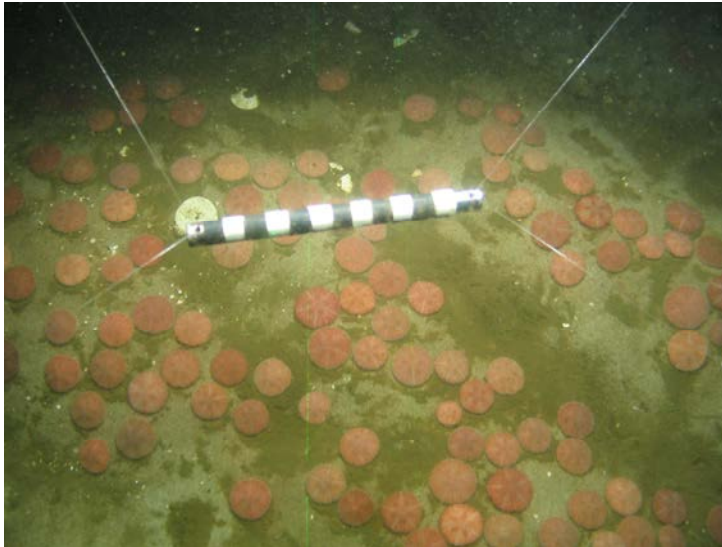
Fix: 200 E: 647642 N: 4454812 Retention: PSA

Station: ST18904-ENV60
Sediment Description:
Grab: Sand with shell fragments

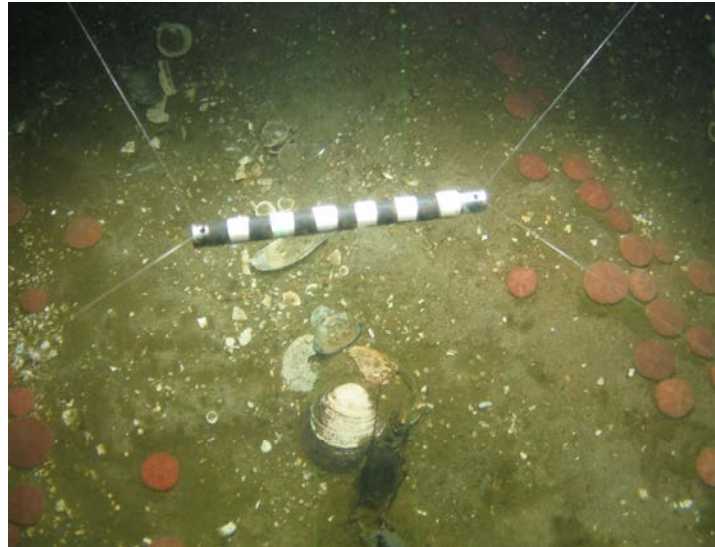
CMECS Substrate Component Subgroup: Slightly gravelly sand

Fauna Description:
Grab: Echinodermata (*Echinarachnius parma*)

APPENDIX E SAMPLING AND SEABED PHOTOGRAPHS



Fix: 1246 **E:** 651940 **N:** 4462060 **Depth:** 129' (39m)



Fix: 1286 **E:** 651812 **N:** 4462121 **Depth:** 128' (39m)

Station: ST18904-ENV61

Sediment Description:

Fix1246: Sand with shell fragments

Fix1286: Sand with shell fragments

Fauna Description:

Fix1246: Echinodermata (*Echinarachnius parma*)

Fix1286: Arthropoda (Caridea), Mollusca (*Arctica islandica* shell), Echinodermata (*Echinarachnius parma*, Holothuroidea), Chordata (Rajidae egg case)

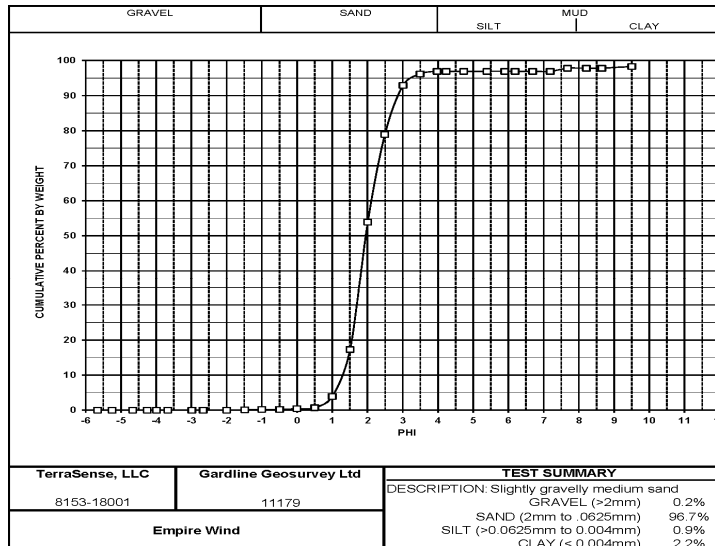
Laser Scale: 94mm separation

CMECS Biotic Group: Sand Dollar Bed

Station ST18904-ENV61 target and actual sampling locations are illustrated in Figure 1.8



Fix: 139 **E:** 651840 **N:** 4462108 **Depth:** 128' (39m)



Fix: 139 **E:** 651840 **N:** 4462108 **Retention:** PSA

Station: ST18904-ENV61

Sediment Description:

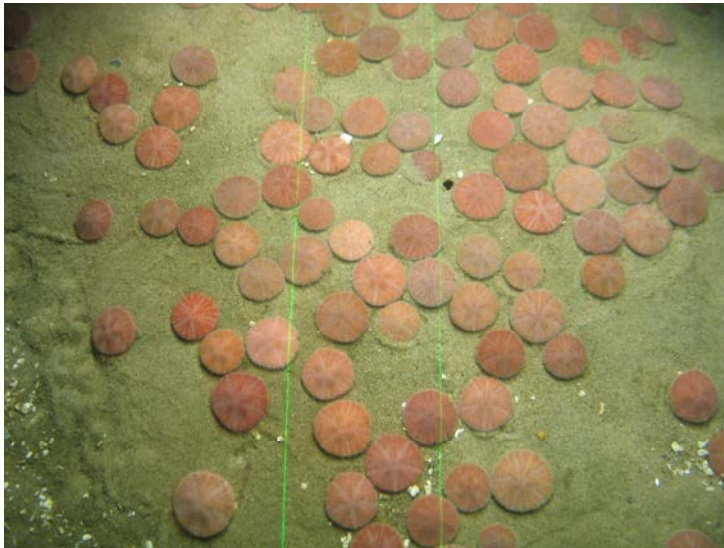
Grab: Sand with shell fragments

CMECS Substrate Component Subgroup: Slightly gravelly sand

Fauna Description:

Grab: Echinodermata (*Echinarachnius parma*)

APPENDIX E SAMPLING AND SEABED PHOTOGRAPHS



Fix: 2270 E: 651352 N: 4458558 Depth: 127' (39m)



Fix: 2311 E: 651199 N: 4458631 Depth: 127' (39m)

Station: ST18904-ENV62
Sediment Description:
Fix2270: Sand with shell fragments

Fix2311: Sand with shell fragments

Fauna Description:
Fix2270: Arthropoda (Caridea), Echinodermata (*Echinarachnius parma*)

Fix2311: Mollusca (Pectinidae), Echinodermata (*Echinarachnius parma*)

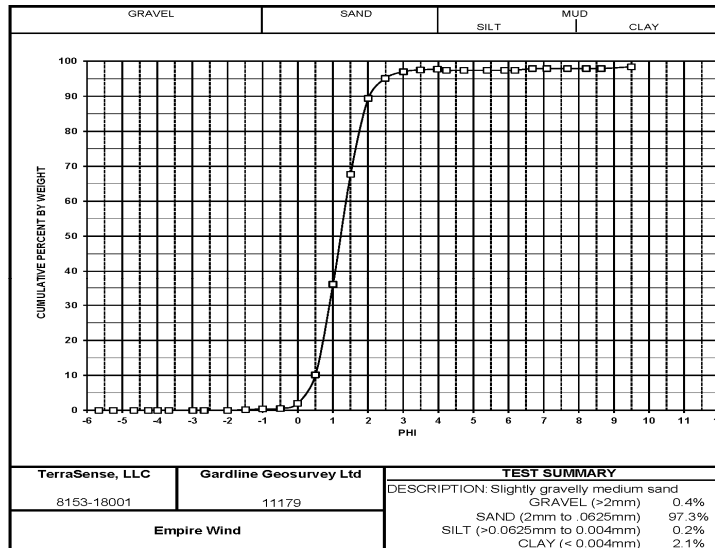
Laser Scale: 94mm separation

CMECS Biotic Group: Sand Dollar Bed

Station ST18904-ENV62 target and actual sampling locations are illustrated in Figure 1.8



Fix: 211 E: 651257 N: 4458603 Depth: 127' (39m)



Fix: 211 E: 651262 N: 4458600 Retention: PSA

Station: ST18904-ENV62
Sediment Description:
Grab: Sand with shell fragments

CMECS Substrate Component Subgroup: Slightly gravelly sand

Fauna Description:
Grab: Mollusca (*Arctica islandica*), Echinodermata (*Echinarachnius parma*)

APPENDIX E SAMPLING AND SEABED PHOTOGRAPHS



Fix: 2157 E: 649171 N: 4453953 Depth: 133' (41m)



Fix: 2188 E: 649299 N: 4453903 Depth: 133' (41m)

Station: ST18904-ENV63
Sediment Description:
Fix2157: Sand with shell fragments

Fix2188: Sand with shell fragments

Fauna Description:
Fix2157: Mollusca (Gastropoda), Echinodermata (*Echinarachnius parma*), Chordata (Rajidae egg case)
Fix2188: Mollusca (*Modiolus modiolus*), Echinodermata (*Echinarachnius parma*)

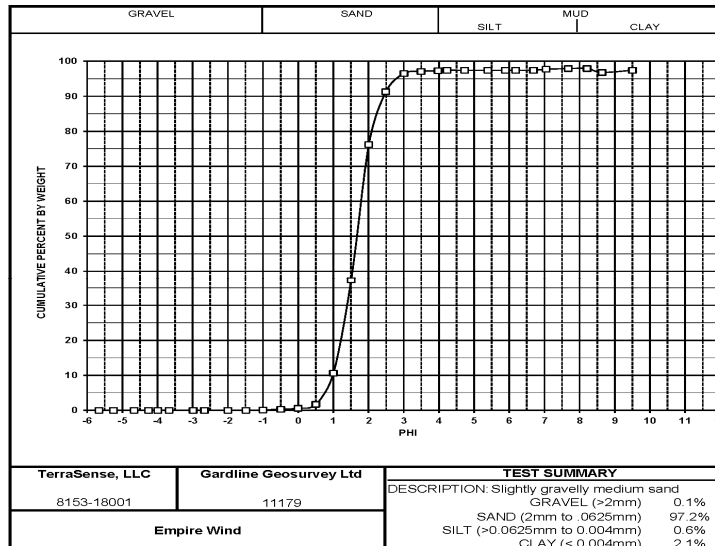
Laser Scale: 94mm separation

CMECS Biotic Group: Sand Dollar Bed

Station ST18904-ENV63 target and actual sampling locations are illustrated in Figure 1.7



Fix: 205 E: 649266 N: 4453922 Depth: 134' (41m)



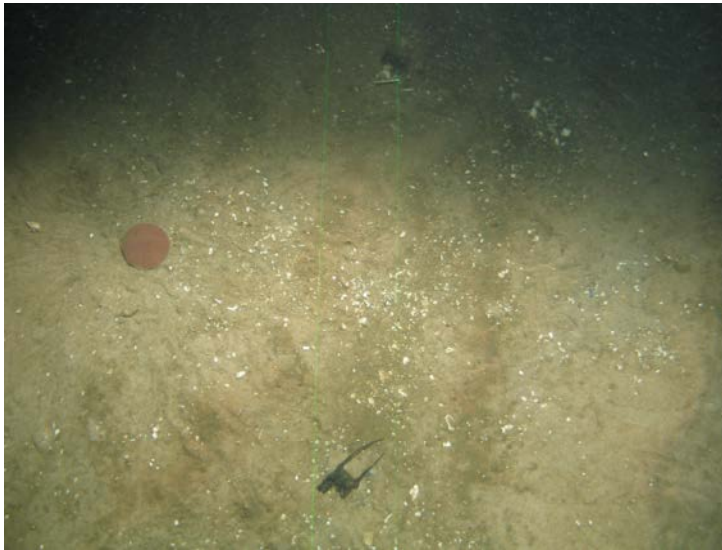
Fix: 205 E: 649267 N: 4453919 Retention: PSA

Station: ST18904-ENV63
Sediment Description:
Grab: Sand with shell fragments

CMECS Substrate Component Subgroup: Slightly gravelly sand

Fauna Description:
Grab: Annelida (Polychaeta), Echinodermata (*Echinarachnius parma*), Chordata (Rajidae egg case)

APPENDIX E SAMPLING AND SEABED PHOTOGRAPHS



Fix: 2404 E: 654227 N: 4462609 Depth: 126' (38m)



Fix: 2416 E: 654335 N: 4462546 Depth: 126' (38m)

Station: ST18904-ENV64

Sediment Description:

Fix2404: Sand with shell fragments

Fix2416: Sand with shell fragments

Fauna Description:

Fix2404: Arthropoda (Paguroidea), Echinodermata (*Echinarachnius parma*), Chordata (Rajidae egg case)

Fix2416: Arthropoda (Caridea), Echinodermata (*Echinarachnius parma*)

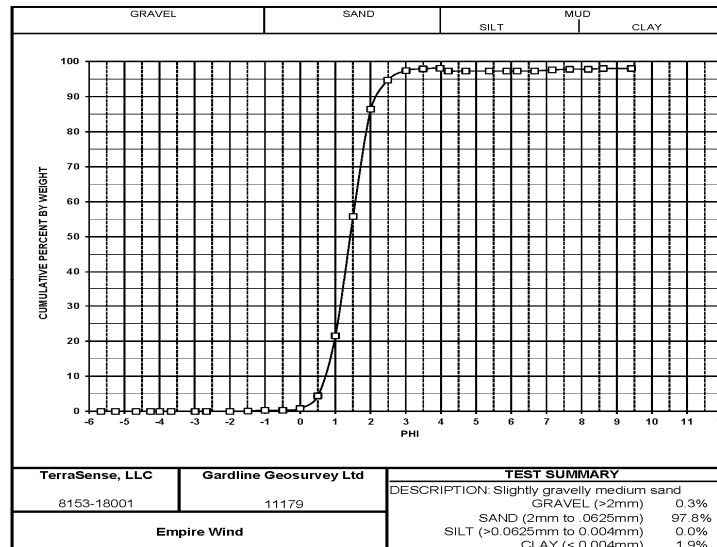
Laser Scale: 94mm separation

CMECS Biotic Group: Sand Dollar Bed

Station ST18904-ENV64 target and actual sampling locations are illustrated in Figure 1.8



Fix: 218 E: 654315 N: 4462560 Depth: 126' (38m)



Fix: 218 E: 654308 N: 4462552 Retention: PSA

Station: ST18904-ENV64

Sediment Description:

Grab: Sand with shell fragments

CMECS Substrate Component Subgroup: Slightly gravelly sand

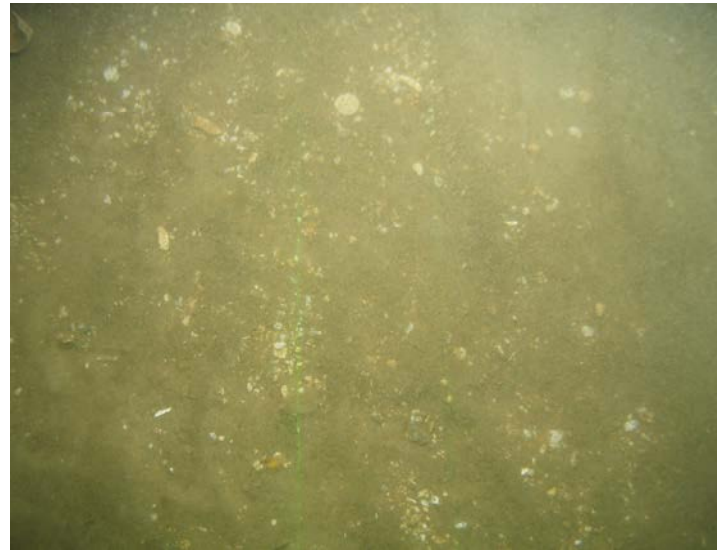
Fauna Description:

Grab: Mollusca (*Arctica islandica*)

APPENDIX E SAMPLING AND SEABED PHOTOGRAPHS



Fix: 1146 **E:** 652917 **N:** 4457987 **Depth:** 134' (41m)

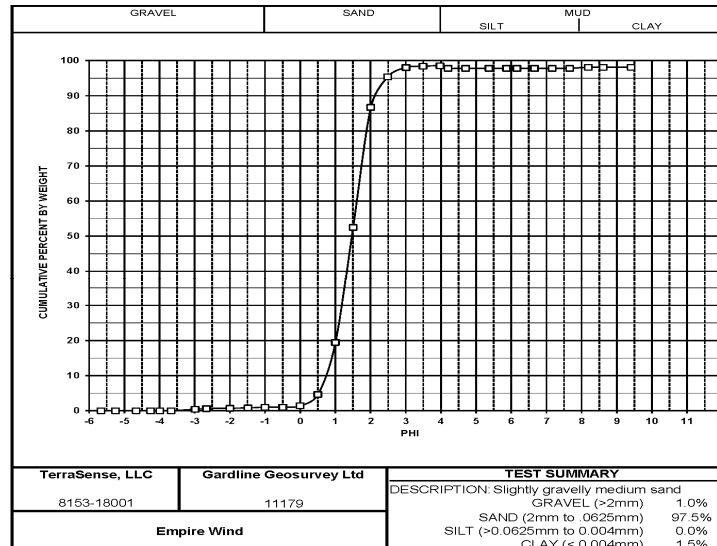


Fix: 1164 **E:** 653072 **N:** 4457914 **Depth:** 135' (41m)

Station: ST18904-ENV65
Sediment Description:
Fix1146: Sands with scattered shell fragments
Fix1164: Sands with frequent shell fragments
Fauna Description:
Fix1146: Echinodermata (*Echinarachnius parma*)
Fix1164: No visible fauna
Laser Scale: 94mm separation
CMECS Biotic Group: Sand Dollar Bed
 Station ST18904-ENV65 target and actual sampling locations are illustrated in Figure 1.7



Fix: 131 **E:** 652993 **N:** 4457952 **Depth:** 133' (41m)



Fix: 131 **E:** 652992 **N:** 4457952 **Retention:** PSA

Station: ST18904-ENV65
Sediment Description:
Grab: Sand with shell fragments
CMECS Substrate Component Subgroup: Slightly gravelly sand
Fauna Description:
Grab: Echinodermata (*Echinarachnius parma*)

APPENDIX E SAMPLING AND SEABED PHOTOGRAPHS



Fix: 1437 E: 651176 N: 4453387 Depth: 133' (41m)



Fix: 1447 E: 651207 N: 4453372 Depth: 134' (41m)

Station: ST18904-ENV66

Sediment Description:

Fix1437: Sand with shell fragments

Fix1447: Sand with shell fragments

Fauna Description:

Fix1437: Mollusca (cf. *Arctica islandica* shell), Echinodermata (*Echinarachnius parma*)

Fix1447: Annelida (Polychaeta tubes), Echinodermata (*Echinarachnius parma*)

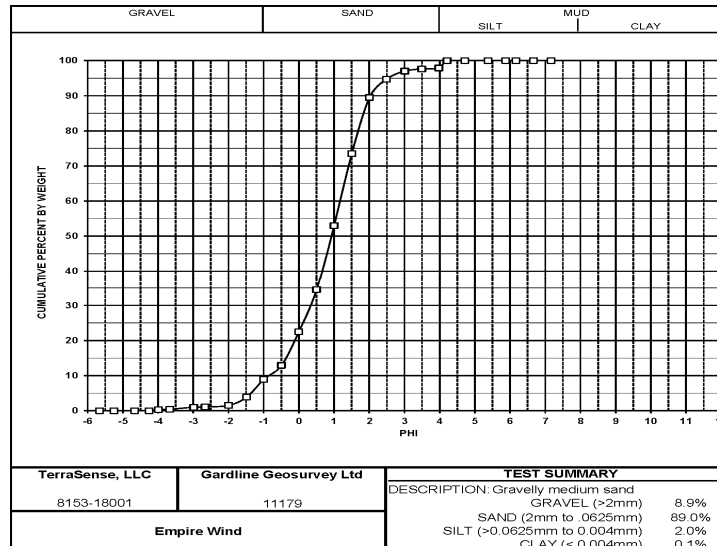
Laser Scale: 94mm separation

CMECS Biotic Group: Sand Dollar Bed

Station ST18904-ENV66 target and actual sampling locations are illustrated in Figure 1.7



Fix: 143 E: 651139 N: 4453403 Depth: 133' (41m)



Fix: 143 E: 651137 N: 4453406 Retention: PSA

Station: ST18904-ENV66

Sediment Description:

Grab: Sand with shell fragments

CMECS Substrate Component Subgroup: Gravelly sand

Fauna Description:

Grab: Echinodermata (*Echinarachnius parma*)

APPENDIX E SAMPLING AND SEABED PHOTOGRAPHS



Fix: 2426 E: 656016 N: 4462273 Depth: 129' (39m)



Fix: 2427 E: 656021 N: 4462271 Depth: 129' (39m)

Station: ST18904-ENV67

Sediment Description:

Fix2426: Sand with shell fragments

Fix2427: Sand with shell fragments

Fauna Description:

Fix2426: Mollusca (cf. *Arctica islandica* shell)

Fix2427: Echinodermata (*Echinarachnius parma*)

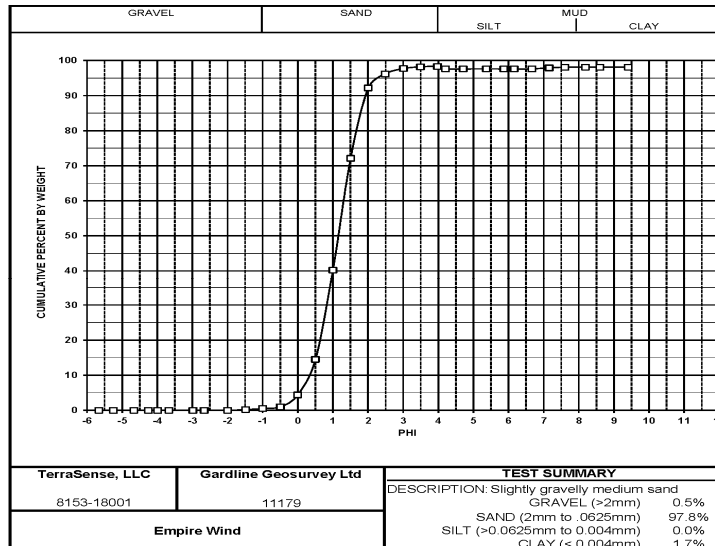
Laser Scale: 94mm separation

CMECS Biotic Group: Sand Dollar Bed

Station ST18904-ENV67 target and actual sampling locations are illustrated in Figure 1.8



Fix: 221 E: 656116 N: 4462228 Depth: 129' (39m)



Fix: 221 E: 656115 N: 4462236 Retention: PSA

Station: ST18904-ENV67

Sediment Description:

Grab: Sand with shell fragments

CMECS Substrate Component Subgroup: Slightly gravelly sand

Fauna Description:

Grab: No visible fauna

APPENDIX E SAMPLING AND SEABED PHOTOGRAPHS



Fix: 1106 E: 654642 N: 4457338 Depth: 133' (40m)



Fix: 1131 E: 654764 N: 4457282 Depth: 116' (35m)

Station: ST18904-ENV68
Sediment Description:
Fix1106: Sands with scattered shell fragments

Fix1131: Sands with frequent shell fragments

Fauna Description:
Fix1106: Chordata (Rajidae egg case)

Fix1131: Mollusca (*cf. Arctica islandica* shell)

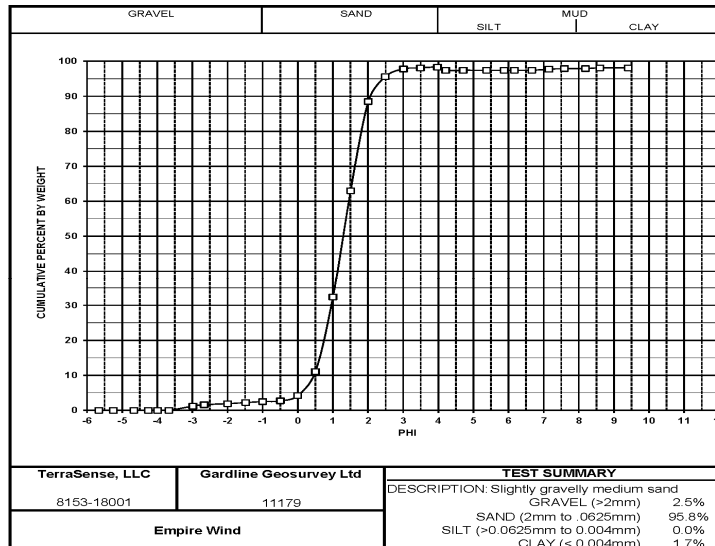
Laser Scale: 94mm separation

CMECS Biotic Group: Sand Dollar Bed

Station ST18904-ENV68 target and actual sampling locations are illustrated in Figure 1.7



Fix: 128 E: 654724 N: 4457298 Depth: 134' (41m)



Fix: 128 E: 654721 N: 4457297 Retention: PSA

Station: ST18904-ENV68
Sediment Description:
Grab: Sand with shell fragments

CMECS Substrate Component Subgroup: Slightly gravelly sand

Fauna Description:
Grab: Arthropoda (Paguroidea), Mollusca (Cardiidae), Echinodermata (*Echinarachnius parma*)

APPENDIX E SAMPLING AND SEABED PHOTOGRAPHS



Fix: 2216 **E:** 652448 **N:** 4452145 **Depth:** 137' (42m)



Fix: 2245 **E:** 652531 **N:** 4452116 **Depth:** 137' (42m)

Station: ST18904-ENV69

Sediment Description:

Fix2216: Sand with shell fragments

Fix2245: Sand with shell fragments

Fauna Description:

Fix2216: Mollusca (Pectinidae), Echinodermata (Asteroidea, *Echinarachnius parma*), Chordata (Rajidae egg case)

Fix2245: Mollusca (cf. *Arctica islandica* shell), Echinodermata (*Echinarachnius parma*)

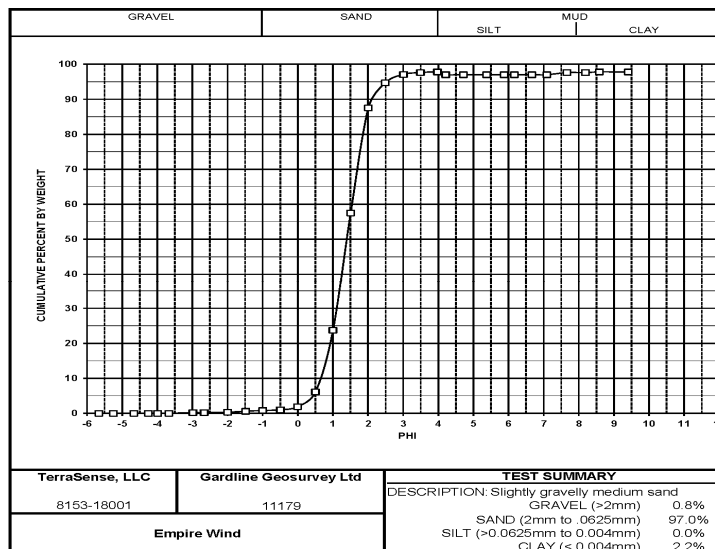
Laser Scale: 94mm separation

CMECS Biotic Group: Sand Dollar Bed

Station ST18904-ENV69 target and actual sampling locations are illustrated in Figure 1.7



Fix: 207 **E:** 652501 **N:** 4452126 **Depth:** 137' (42m)



Fix: 207 **E:** 652501 **N:** 4452126 **Retention:** PSA

Station: ST18904-ENV69

Sediment Description:

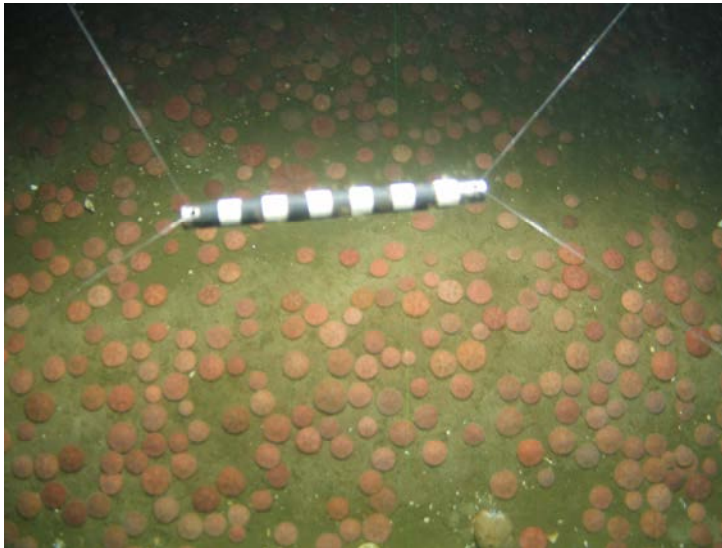
Grab: Sand with shell fragments

CMECS Substrate Component Subgroup: Slightly gravelly sand

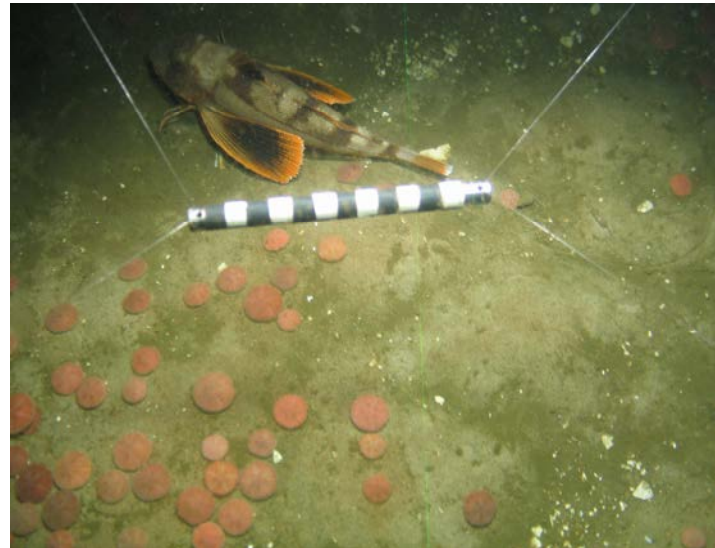
Fauna Description:

Grab: Echinodermata (*Echinarachnius parma*)

APPENDIX E SAMPLING AND SEABED PHOTOGRAPHS



Fix: 1169 E: 657742 N: 4461805 Depth: 132' (40m)



Fix: 1201 E: 657899 N: 4461720 Depth: 131' (40m)

Station: ST18904-ENV70
Sediment Description:
Fix1169: Sand with shell fragments

Fix1201: Sand with shell fragments

Fauna Description:
Fix1169: Arthropoda (Paguroidea), Echinodermata (*Echinarachnius parma*)

Fix1201: Echinodermata (*Echinarachnius parma*), Mollusca (Gastropoda), Chordata (cf. *Prionotus carolinus*)

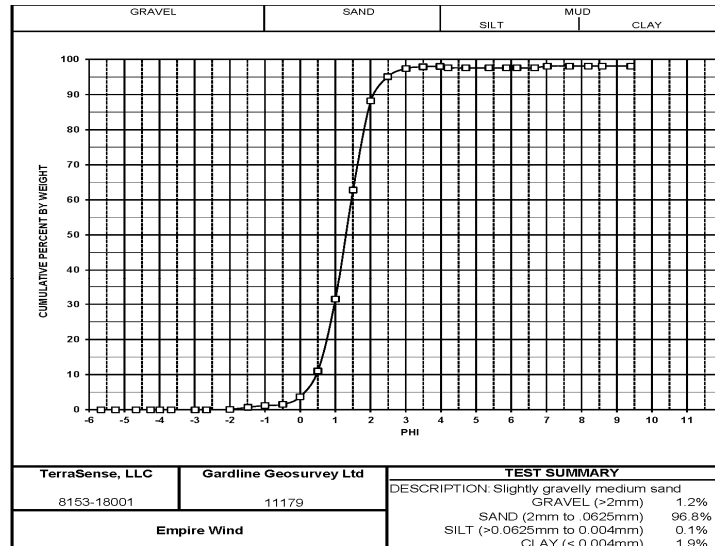
Laser Scale: 94mm separation

CMECS Biotic Group: Sand Dollar Bed

Station ST18904-ENV70 target and actual sampling locations are illustrated in Figure 1.8



Fix: 135 E: 657918 N: 4461714 Depth: 131' (40m)



Fix: 135 E: 657918 N: 4461714 Retention: PSA

Station: ST18904-ENV70
Sediment Description:
Grab: Sand with shell fragments

CMECS Substrate Component Subgroup: Slightly gravelly sand

Fauna Description:
Grab: Echinodermata (*Echinarachnius parma*)

APPENDIX E SAMPLING AND SEABED PHOTOGRAPHS



Fix: 2453 **E:** 659623 **N:** 4461336 **Depth:** 133' (41m)



Fix: 2475 **E:** 659806 **N:** 4461247 **Depth:** 133' (41m)

Station: ST18904-ENV71
Sediment Description:
Fix2453: Sand with shell fragments

Fix2475: Sand with shell fragments

Fauna Description:
Fix2453: Arthropoda (Caridea, Paguroidea), Echinodermata (*Echinarachnius parma*)

Fix2475: Arthropoda (Caridea, Paguroidea), Echinodermata (*Echinarachnius parma*)

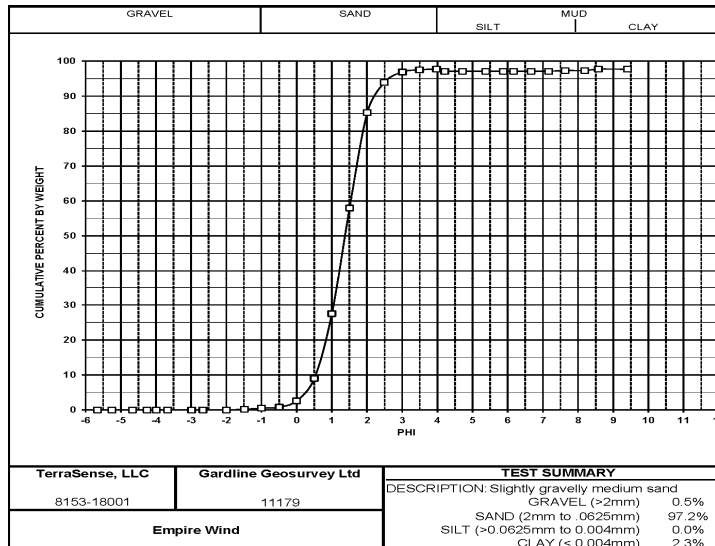
Laser Scale: 94mm separation

CMECS Biotic Group: Sand Dollar Bed

Station ST18904-ENV71 target and actual sampling locations are illustrated in Figure 1.8



Fix: 224 **E:** 659714 **N:** 4461285 **Depth:** 132' (40m)



Fix: 224 **E:** 659719 **N:** 4461283 **Retention:** PSA

Station: ST18904-ENV71
Sediment Description:
Grab: Sand with shell fragments

CMECS Substrate Component Subgroup: Slightly gravelly sand

Fauna Description:
Grab: Echinodermata (*Echinarachnius parma*)

APPENDIX E SAMPLING AND SEABED PHOTOGRAPHS



Fix: 779 E: 628062 N: 4468118 Depth: 102' (31m)



Fix: 789 E: 628181 N: 4468139 Depth: 102' (31m)

Station: ST18904-ENV72
Sediment Description:
Fix779: Gravelly sands with frequent shell fragments

Fix789: Fine sand with scattered shell fragments, faunal burrows present

Fauna Description:
Fix779: Annelida (Polychaeta tubes), Arthropoda (Paguroidea), Cnidaria (Ceriantharia)

Fix789: Arthropoda (Paguroidea), Echinodermata (*Echinarachnius parma*), Indeterminate Animalia

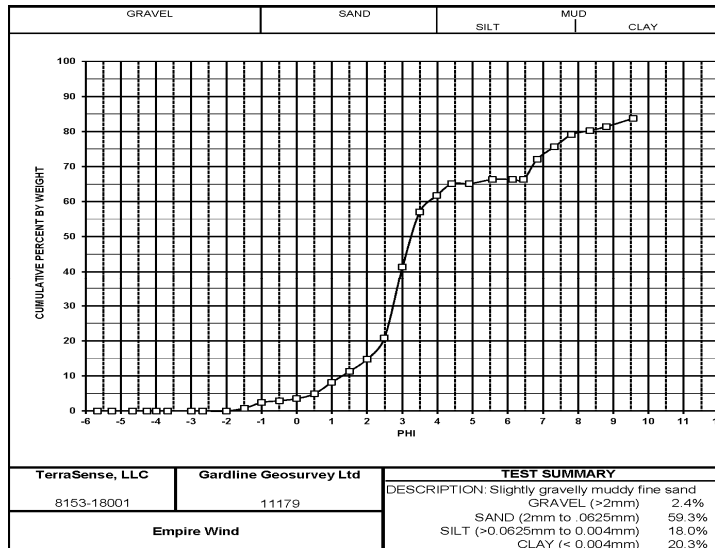
Laser Scale: 94mm separation

CMECS Biotic Group: Burrowing Anemones

 Station ST18904-ENV72 target and actual sampling locations are illustrated in Figure 1.2



Fix: 76 E: 628136 N: 4468137 Depth: 103' (31m)



Fix: 76 E: 628136 N: 4468137 Retention: PSA

Station: ST18904-ENV72
Sediment Description:
Grab: Fine sediment/mud with shell fragments

CMECS Substrate Component Subgroup: Gravelly muddy sand

Fauna Description:
Grab: Annelida (Polychaeta)

APPENDIX F PARTICLE SIZE ANALYSIS

SAMPLE STATISTICS

SAMPLE IDENTITY: **ENV-5**

ANALYST & DATE: 12/21/2018

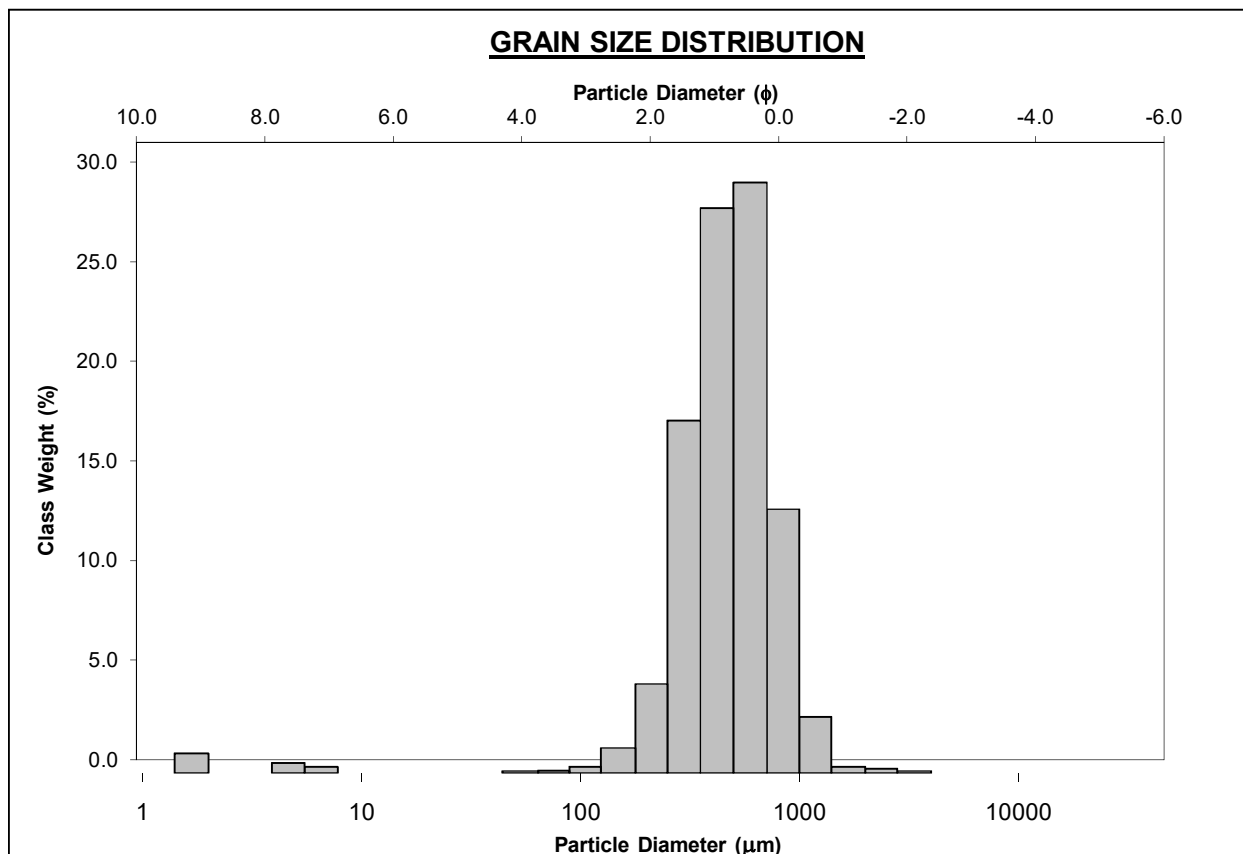
SAMPLE TYPE: Unimodal, Moderately Well Sorted

TEXTURAL GROUP: Slightly Gravelly Sand

SEDIMENT NAME: Slightly Very Fine Gravelly Medium Sand

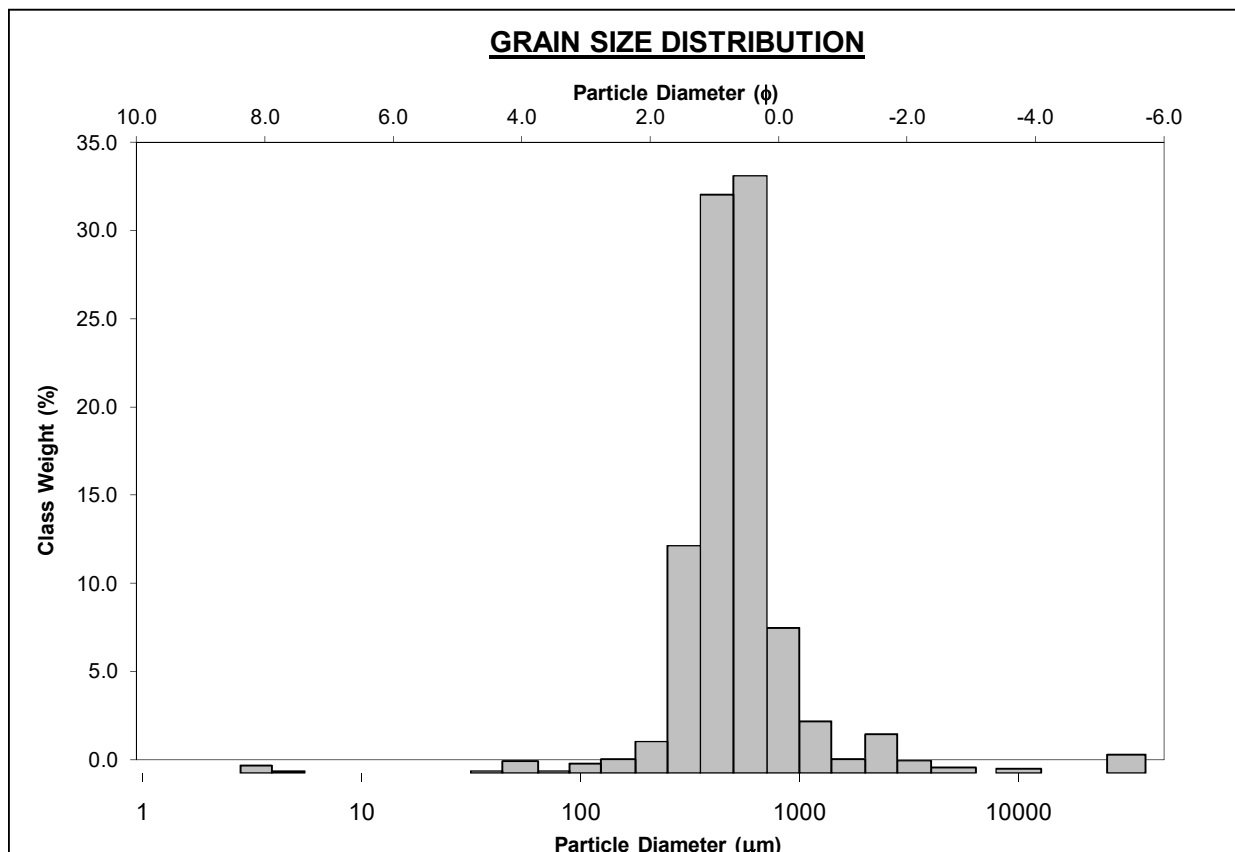
	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	605.0	0.747	GRAVEL: 0.3%	COARSE SAND: 42.8%		
MODE 2:			SAND: 97.8%	MEDIUM SAND: 45.8%		
MODE 3:			MUD: 1.9%	FINE SAND: 5.8%		
D ₁₀ :	259.5	0.255		V FINE SAND: 0.4%		
MEDIAN or D ₅₀ :	476.6	1.069	V COARSE GRAVEL: 0.0%	V COARSE SILT: 0.1%		
D ₉₀ :	838.2	1.946	COARSE GRAVEL: 0.0%	COARSE SILT: 0.0%		
(D ₉₀ / D ₁₀):	3.230	7.642	MEDIUM GRAVEL: 0.0%	MEDIUM SILT: 0.0%		
(D ₉₀ - D ₁₀):	578.7	1.691	FINE GRAVEL: 0.0%	FINE SILT: 0.8%		
(D ₇₅ / D ₂₅):	1.837	2.367	V FINE GRAVEL: 0.3%	V FINE SILT: 0.1%		
(D ₇₅ - D ₂₅):	292.1	0.878	V COARSE SAND: 3.0%	CLAY: 0.9%		
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic μm	Geometric μm	Logarithmic ϕ	Geometric μm	Logarithmic ϕ	Description
MEAN ($\bar{x}$):	522.8	432.5	1.209	463.6	1.109	Medium Sand
SORTING (σ):	267.0	2.269	1.182	1.588	0.667	Moderately Well Sorted
SKEWNESS (Sk):	2.534	-4.298	4.298	-0.103	0.103	Fine Skewed
KURTOSIS (K):	21.46	28.26	28.26	1.059	1.059	Mesokurtic

GRAIN SIZE DISTRIBUTION



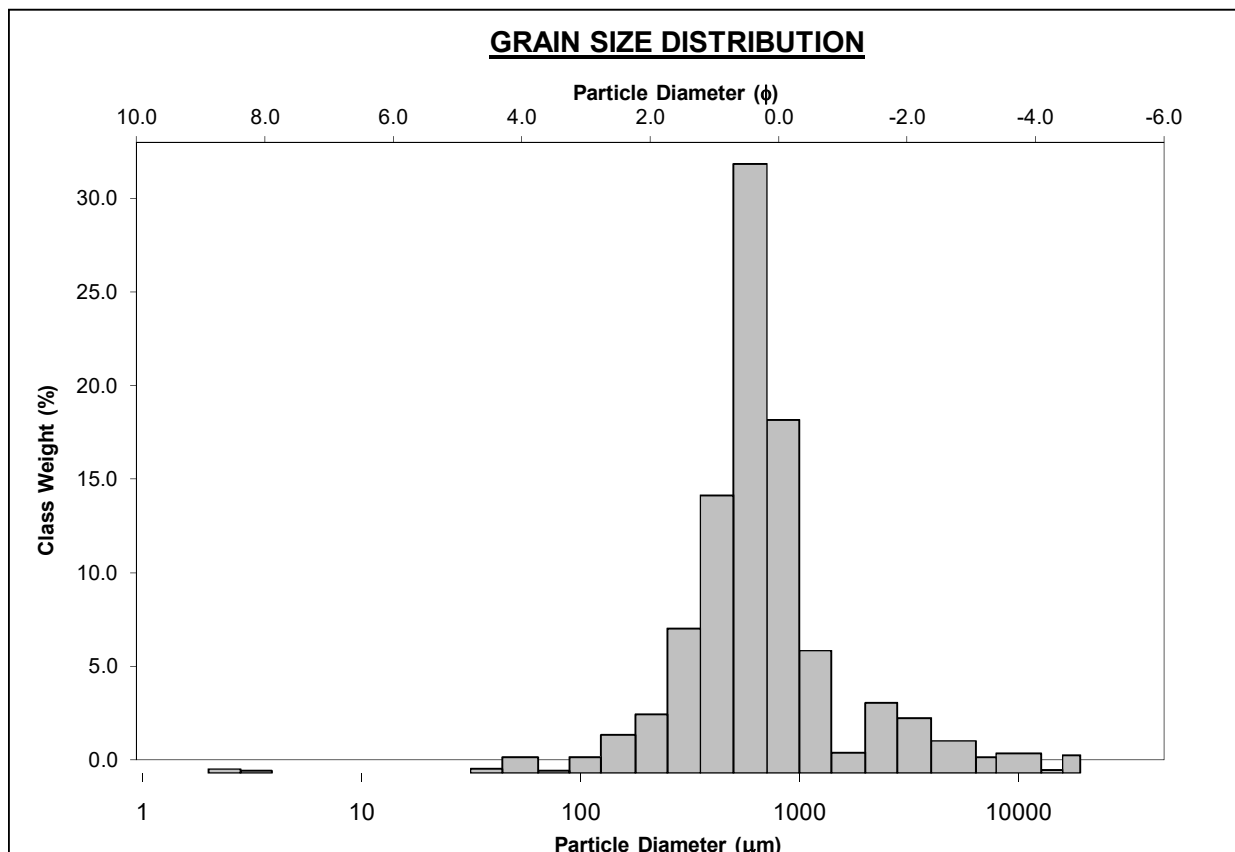
APPENDIX F PARTICLE SIZE ANALYSIS

SAMPLE STATISTICS						
SAMPLE IDENTITY: ENV-7			ANALYST & DATE: 9/14/2018			
SAMPLE TYPE: Unimodal, Moderately Well Sorted			TEXTURAL GROUP: Slightly Gravelly Sand			
SEDIMENT NAME: Slightly Very Fine Gravelly Medium Sand						
	μm	φ	GRAIN SIZE DISTRIBUTION			
MODE 1:	605.0	0.747	GRAVEL: 4.7%		COARSE SAND: 41.8%	
MODE 2:			SAND: 93.8%		MEDIUM SAND: 45.2%	
MODE 3:			MUD: 1.5%		FINE SAND: 2.6%	
D ₁₀ :	288.5	0.105			V FINE SAND: 0.7%	
MEDIAN or D ₅₀ :	500.5	0.999	V COARSE GRAVEL: 0.5%		V COARSE SILT: 0.8%	
D ₉₀ :	929.8	1.793	COARSE GRAVEL: 0.7%		COARSE SILT: 0.0%	
(D ₉₀ / D ₁₀):	3.223	17.08	MEDIUM GRAVEL: 0.3%		MEDIUM SILT: 0.0%	
(D ₉₀ - D ₁₀):	641.3	1.688	FINE GRAVEL: 0.4%		FINE SILT: 0.1%	
(D ₇₅ / D ₂₅):	1.694	2.218	V FINE GRAVEL: 2.8%		V FINE SILT: 0.4%	
(D ₇₅ - D ₂₅):		0.760	V COARSE SAND: 3.6%		CLAY: 0.2%	
	FOLK & WARD METHOD					
	Arithmetic μm	Geometric μm	Logarithmic φ	Geometric μm	Logarithmic φ	Description
MEAN ($\bar{x}$):	1010.0	518.2	0.948	496.4	1.010	Medium Sand
SORTING (σ):	3467.3	2.330	1.220	1.618	0.694	Moderately Well Sorted
SKEWNESS (Sk):	8.426	-0.247	0.247	0.129	-0.129	Coarse Skewed
KURTOSIS (K):	74.30	19.79	19.79	1.507	1.507	Very Leptokurtic



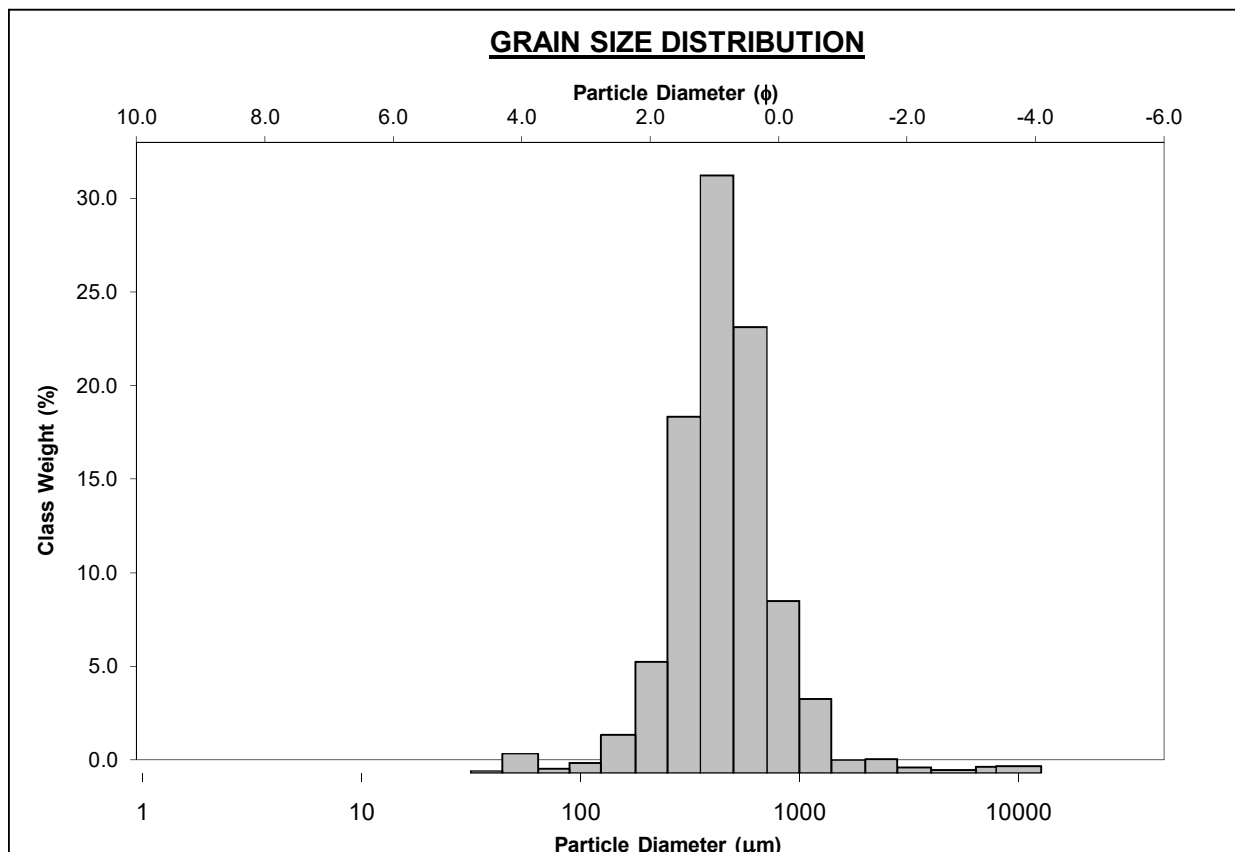
APPENDIX F PARTICLE SIZE ANALYSIS

SAMPLE STATISTICS						
SAMPLE IDENTITY: ENV-8			ANALYST & DATE: 9/14/2018			
SAMPLE TYPE: Unimodal, Poorly Sorted			TEXTURAL GROUP: Gravelly Sand			
SEDIMENT NAME: Very Fine Gravelly Coarse Sand						
	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	605.0	0.747	GRAVEL: 11.4% COARSE SAND: 51.2%			
MODE 2:			SAND: 87.2% MEDIUM SAND: 22.4%			
MODE 3:			MUD: 1.4% FINE SAND: 5.1%			
D ₁₀ :	278.9	-1.189	V FINE SAND: 1.0%			
MEDIAN or D ₅₀ :	619.6	0.691	V COARSE GRAVEL: 0.0% V COARSE SILT: 1.0%			
D ₉₀ :	2279.6	1.842	COARSE GRAVEL: 0.5% COARSE SILT: 0.0%			
(D ₉₀ / D ₁₀):	8.174	-1.550	MEDIUM GRAVEL: 1.5% MEDIUM SILT: 0.0%			
(D ₉₀ - D ₁₀):	2000.7	3.031	FINE GRAVEL: 2.8% FINE SILT: 0.0%			
(D ₇₅ / D ₂₅):	2.006	7.064	V FINE GRAVEL: 6.6% V FINE SILT: 0.3%			
(D ₇₅ - D ₂₅):	447.0	1.004	V COARSE SAND: 7.4% CLAY: 0.1%			
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic μm	Geometric μm	Logarithmic ϕ	Geometric μm	Logarithmic ϕ	Description
MEAN ($\bar{x}$):	1137.4	664.9	0.589	637.3	0.650	Coarse Sand
SORTING (σ):	1942.2	2.549	1.350	2.122	1.086	Poorly Sorted
SKEWNESS (Sk):	5.156	-0.273	0.273	0.143	-0.143	Coarse Skewed
KURTOSIS (K):	35.20	9.812	9.812	1.786	1.786	Very Leptokurtic



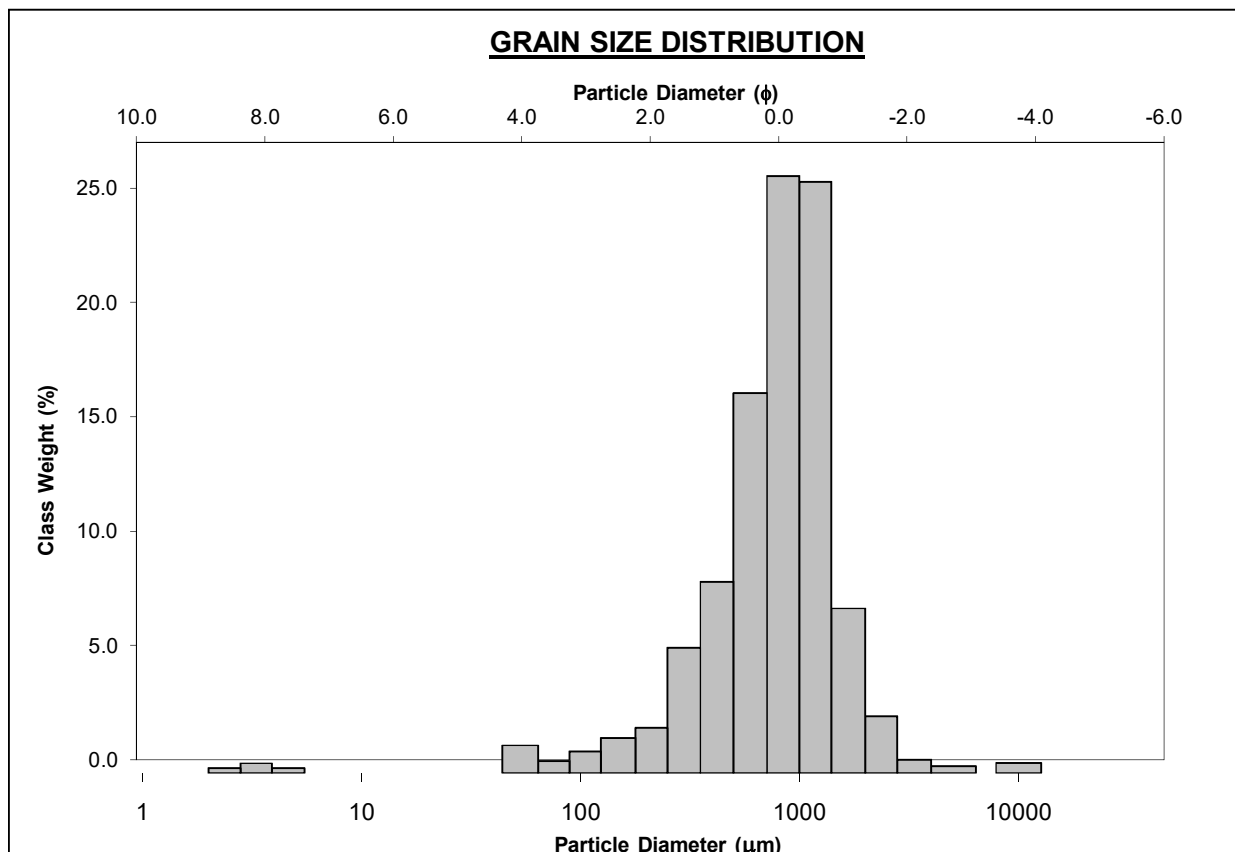
APPENDIX F PARTICLE SIZE ANALYSIS

SAMPLE STATISTICS						
SAMPLE IDENTITY: ENV-9			ANALYST & DATE: 9/14/2018			
SAMPLE TYPE: Unimodal, Moderately Sorted			TEXTURAL GROUP: Slightly Gravelly Sand			
SEDIMENT NAME: Slightly Very Fine Gravelly Medium Sand						
	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	426.5	1.251	GRAVEL: 1.9% COARSE SAND: 32.9%			
MODE 2:			SAND: 96.8% MEDIUM SAND: 50.6%			
MODE 3:			MUD: 1.3% FINE SAND: 8.0%			
D ₁₀ :	249.5	0.198	V FINE SAND: 0.8%			
MEDIAN or D ₅₀ :	444.7	1.169	V COARSE GRAVEL: 0.0% V COARSE SILT: 1.1%			
D ₉₀ :	872.0	2.003	COARSE GRAVEL: 0.0% COARSE SILT: 0.0%			
(D ₉₀ / D ₁₀):	3.495	10.14	MEDIUM GRAVEL: 0.5% MEDIUM SILT: 0.0%			
(D ₉₀ - D ₁₀):	622.5	1.805	FINE GRAVEL: 0.4% FINE SILT: 0.0%			
(D ₇₅ / D ₂₅):	1.877	2.303	V FINE GRAVEL: 1.0% V FINE SILT: 0.0%			
(D ₇₅ - D ₂₅):	288.1	0.908	V COARSE SAND: 4.5% CLAY: 0.2%			
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic μm	Geometric μm	Logarithmic ϕ	Geometric μm	Logarithmic ϕ	Description
MEAN ($\bar{x}$):	591.7	448.4	1.157	443.4	1.173	Medium Sand
SORTING (σ):	847.4	1.950	0.963	1.657	0.728	Moderately Sorted
SKEWNESS (Sk):	8.953	-0.943	0.943	0.013	-0.013	Symmetrical
KURTOSIS (K):	95.61	18.59	18.59	1.174	1.174	Leptokurtic



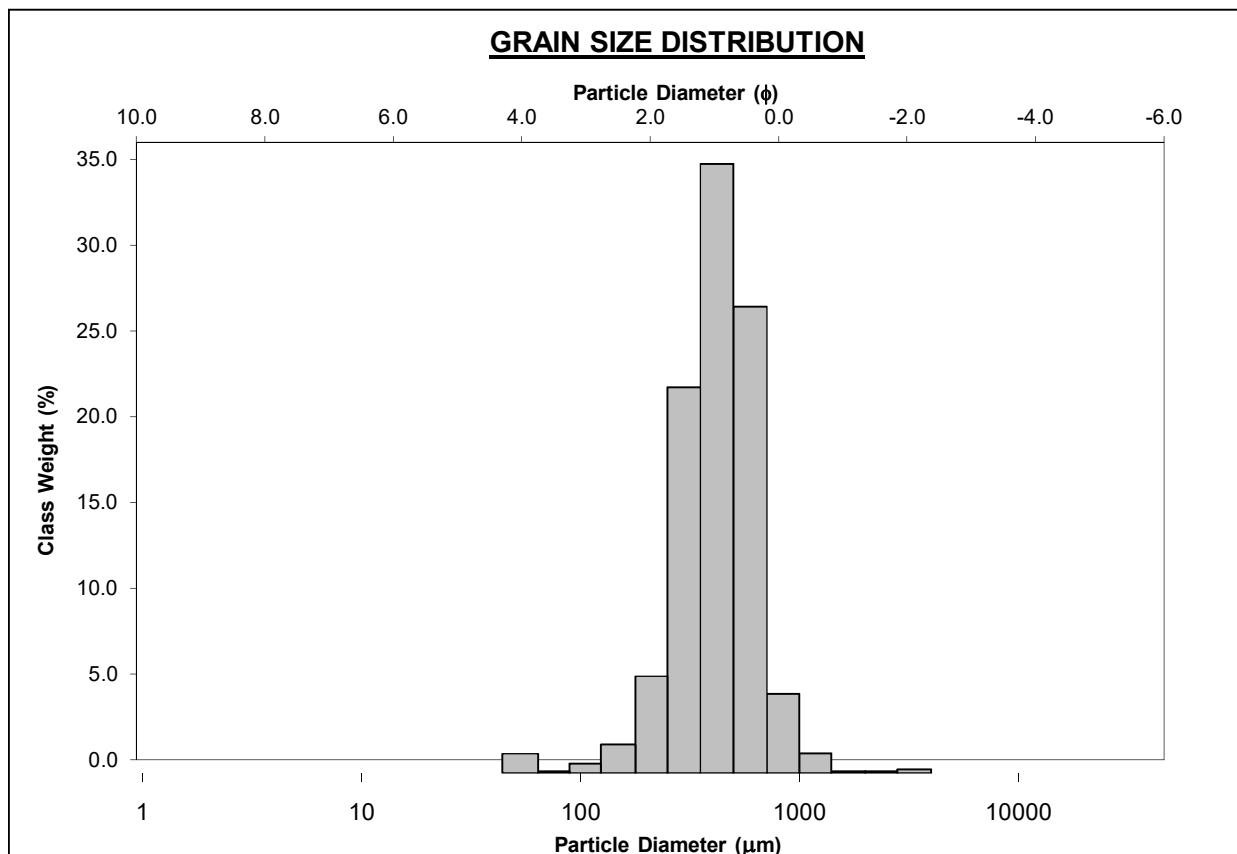
APPENDIX F PARTICLE SIZE ANALYSIS

SAMPLE STATISTICS						
SAMPLE IDENTITY: ENV-10			ANALYST & DATE: 9/14/2018			
SAMPLE TYPE: Unimodal, Moderately Sorted			TEXTURAL GROUP: Slightly Gravelly Sand			
SEDIMENT NAME: Slightly Very Fine Gravelly Coarse Sand						
	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	855.0	0.247	GRAVEL: 4.0% COARSE SAND: 42.6%			
MODE 2:			SAND: 94.0% MEDIUM SAND: 13.8%			
MODE 3:			MUD: 2.0% FINE SAND: 3.5%			
D ₁₀ :	301.2	-0.583	V FINE SAND: 1.5%			
MEDIAN or D ₅₀ :	835.9	0.259	V COARSE GRAVEL: 0.0% V COARSE SILT: 1.2%			
D ₉₀ :	1497.7	1.731	COARSE GRAVEL: 0.0% COARSE SILT: 0.0%			
(D ₉₀ / D ₁₀):	4.972	-2.970	MEDIUM GRAVEL: 0.6% MEDIUM SILT: 0.0%			
(D ₉₀ - D ₁₀):	1196.5	2.314	FINE GRAVEL: 0.4% FINE SILT: 0.2%			
(D ₇₅ / D ₂₅):	2.142	-3.941	V FINE GRAVEL: 3.0% V FINE SILT: 0.6%			
(D ₇₅ - D ₂₅):	622.0	1.099	V COARSE SAND: 32.5% CLAY: 0.0%			
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic μm	Geometric μm	Logarithmic ϕ	Geometric μm	Logarithmic ϕ	Description
MEAN ($\bar{x}$):	970.8	726.5	0.461	765.8	0.385	Coarse Sand
SORTING (σ):	925.7	2.374	1.247	1.926	0.946	Moderately Sorted
SKEWNESS (Sk):	6.655	-2.322	2.322	-0.268	0.268	Fine Skewed
KURTOSIS (K):	64.16	14.98	14.98	1.288	1.288	Leptokurtic



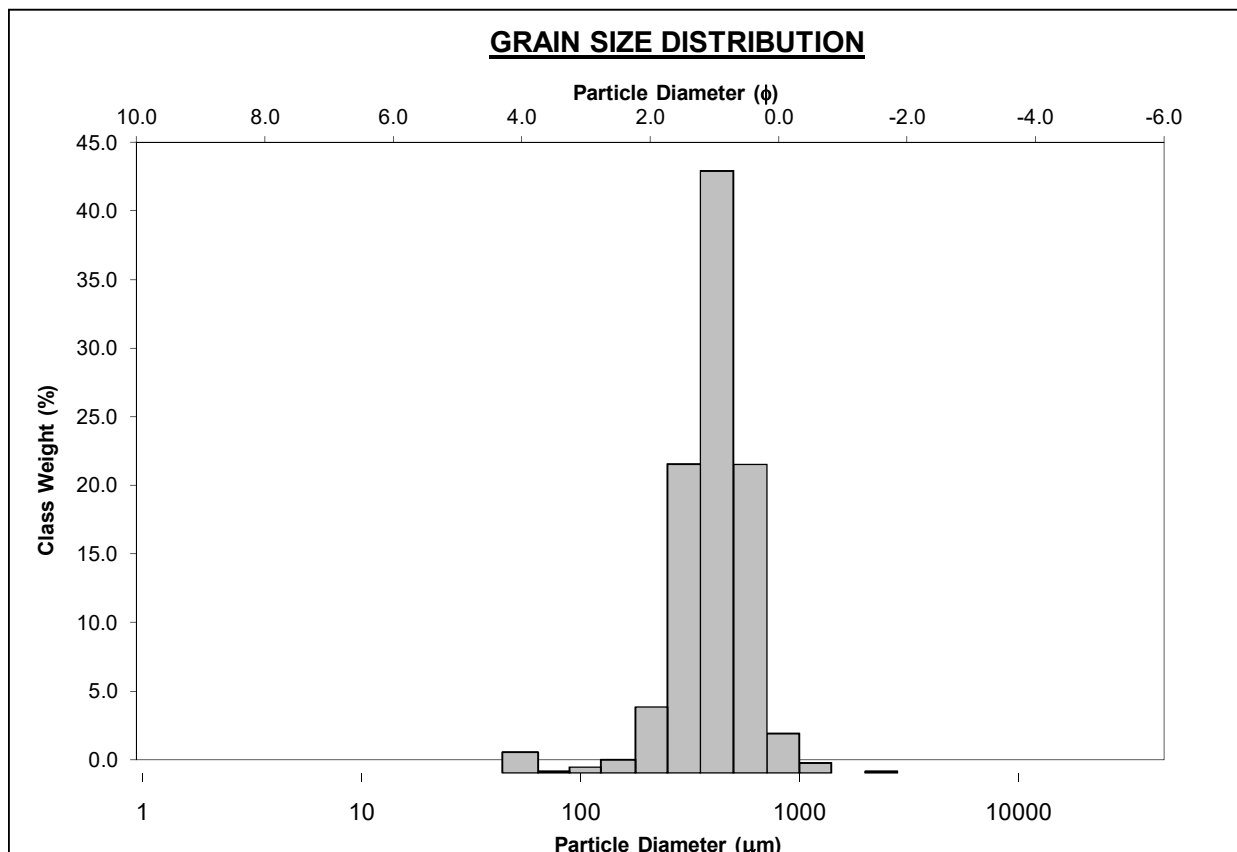
APPENDIX F PARTICLE SIZE ANALYSIS

SAMPLE STATISTICS						
SAMPLE IDENTITY: ENV-11			ANALYST & DATE: 9/14/2018			
SAMPLE TYPE: Unimodal, Moderately Well Sorted			TEXTURAL GROUP: Slightly Gravelly Sand			
SEDIMENT NAME: Slightly Very Fine Gravelly Medium Sand						
	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	426.5	1.251	GRAVEL: 0.3%		COARSE SAND: 31.7%	
MODE 2:			SAND: 98.4%		MEDIUM SAND: 57.4%	
MODE 3:			MUD: 1.3%		FINE SAND: 7.3%	
D ₁₀ :	252.5	0.569			V FINE SAND: 0.7%	
MEDIAN or D ₅₀ :	423.7	1.239	V COARSE GRAVEL: 0.0%		V COARSE SILT: 1.1%	
D ₉₀ :	674.3	1.986	COARSE GRAVEL: 0.0%		COARSE SILT: 0.0%	
(D ₉₀ / D ₁₀):	2.670	3.493	MEDIUM GRAVEL: 0.0%		MEDIUM SILT: 0.0%	
(D ₉₀ - D ₁₀):	421.8	1.417	FINE GRAVEL: 0.0%		FINE SILT: 0.0%	
(D ₇₅ / D ₂₅):	1.742	1.945	V FINE GRAVEL: 0.3%		V FINE SILT: 0.0%	
(D ₇₅ - D ₂₅):	236.8	0.801	V COARSE SAND: 1.2%		CLAY: 0.2%	
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic	Geometric	Logarithmic	Geometric	Logarithmic	Description
	μm	μm	ϕ	μm	ϕ	
MEAN ($\bar{x}$):	460.5	406.4	1.299	418.5	1.257	Medium Sand
SORTING (σ):	235.6	1.703	0.768	1.509	0.594	Moderately Well Sorted
SKEWNESS (Sk):	4.936	-3.212	3.212	-0.093	0.093	Symmetrical
KURTOSIS (K):	55.66	33.42	33.42	1.018	1.018	Mesokurtic



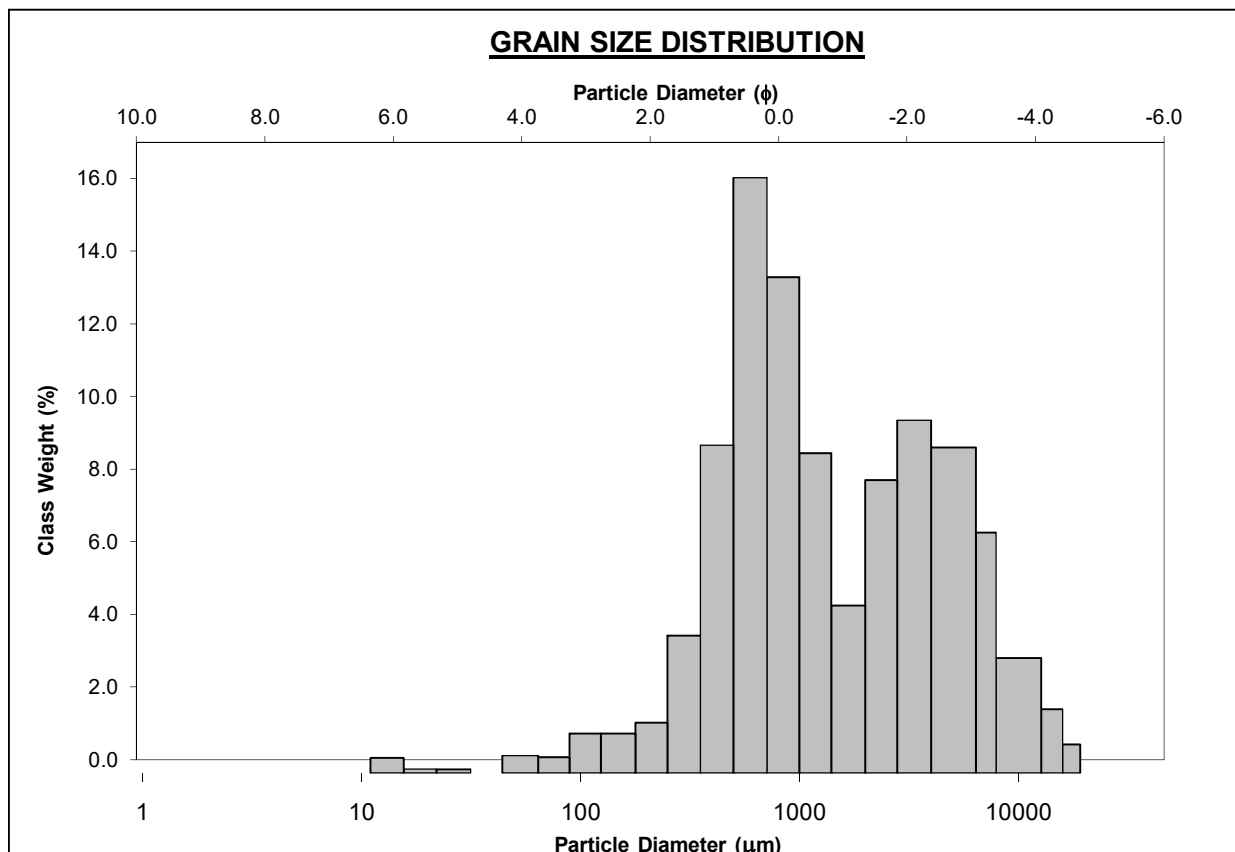
APPENDIX F PARTICLE SIZE ANALYSIS

SAMPLE STATISTICS						
SAMPLE IDENTITY: ENV-12			ANALYST & DATE: 9/14/2018			
SAMPLE TYPE: Unimodal, Moderately Well Sorted			TEXTURAL GROUP: Slightly Gravelly Sand			
SEDIMENT NAME: Slightly Very Fine Gravelly Medium Sand						
	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	426.5	1.251	GRAVEL: 0.1% COARSE SAND: 25.3%			
MODE 2:			SAND: 98.2% MEDIUM SAND: 65.7%			
MODE 3:			MUD: 1.7% FINE SAND: 5.8%			
D ₁₀ :	257.3	0.638	V FINE SAND: 0.6%			
MEDIAN or D ₅₀ :	413.1	1.275	V COARSE GRAVEL: 0.0% V COARSE SILT: 1.5%			
D ₉₀ :	642.6	1.959	COARSE GRAVEL: 0.0% COARSE SILT: 0.0%			
(D ₉₀ / D ₁₀):	2.498	3.070	MEDIUM GRAVEL: 0.0% MEDIUM SILT: 0.0%			
(D ₉₀ - D ₁₀):	385.3	1.321	FINE GRAVEL: 0.0% FINE SILT: 0.0%			
(D ₇₅ / D ₂₅):	1.565	1.663	V FINE GRAVEL: 0.1% V FINE SILT: 0.0%			
(D ₇₅ - D ₂₅):	183.6	0.646	V COARSE SAND: 0.7% CLAY: 0.2%			
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic μm	Geometric μm	Logarithmic ϕ	Geometric μm	Logarithmic ϕ	Description
MEAN ($\bar{x}$):	436.9	393.6	1.345	408.8	1.291	Medium Sand
SORTING (σ):	172.5	1.658	0.729	1.447	0.533	Moderately Well Sorted
SKEWNESS (Sk):	2.185	-4.012	4.012	-0.102	0.102	Fine Skewed
KURTOSIS (K):	21.43	40.17	40.17	1.133	1.133	Leptokurtic



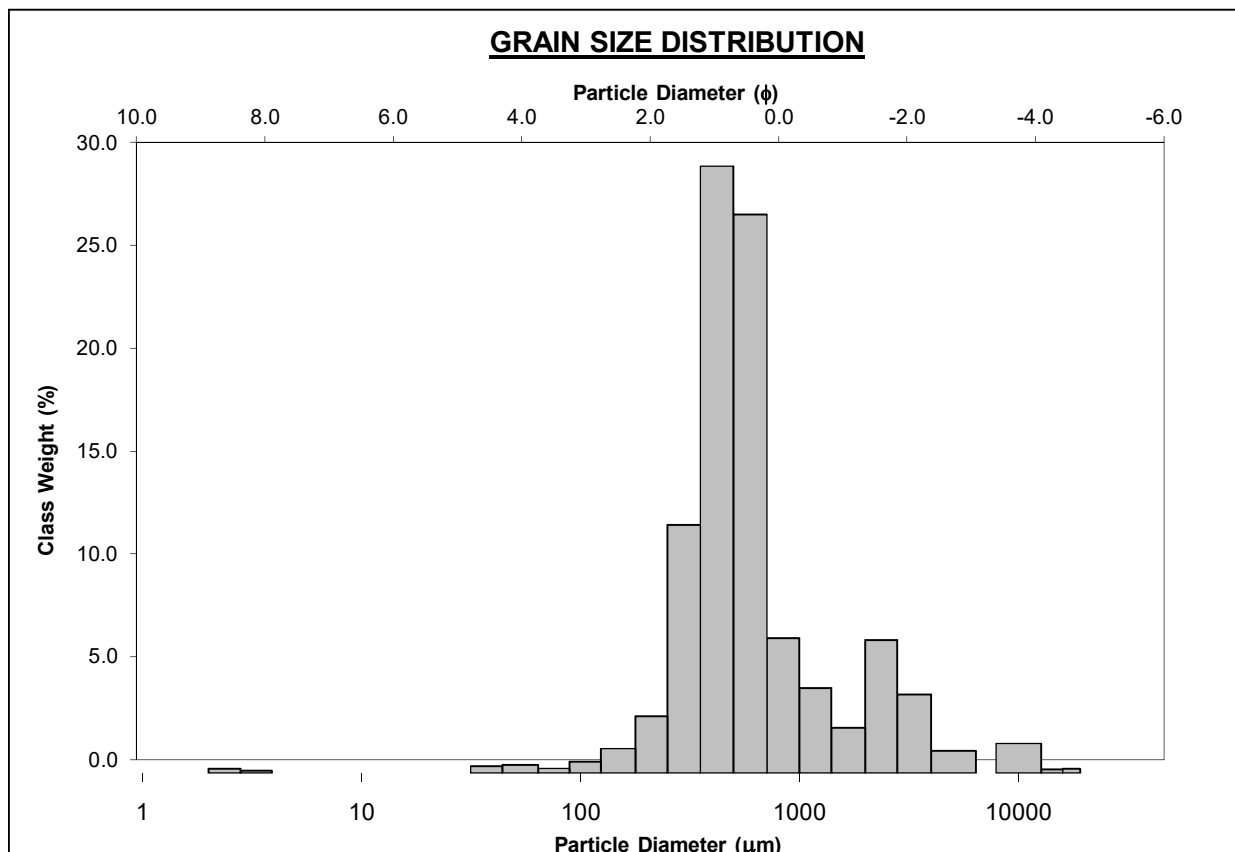
APPENDIX F PARTICLE SIZE ANALYSIS

SAMPLE STATISTICS						
SAMPLE IDENTITY: ENV-13			ANALYST & DATE: 9/14/2018			
SAMPLE TYPE: Bimodal, Poorly Sorted			TEXTURAL GROUP: Sandy Gravel			
SEDIMENT NAME: Sandy Very Fine Gravel						
	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	605.0	0.747	GRAVEL: 38.7%		COARSE SAND: 29.2%	
MODE 2:	3400.0	-1.743	SAND: 58.4%		MEDIUM SAND: 12.5%	
MODE 3:			MUD: 2.9%		FINE SAND: 2.4%	
D ₁₀ :	339.9	-2.655			V FINE SAND: 1.5%	
MEDIAN or D ₅₀ :	1067.0	-0.094	V COARSE GRAVEL: 0.0%		V COARSE SILT: 0.5%	
D ₉₀ :	6298.8	1.557	COARSE GRAVEL: 0.4%		COARSE SILT: 0.2%	
(D ₉₀ / D ₁₀):	18.53	-0.586	MEDIUM GRAVEL: 5.2%		MEDIUM SILT: 0.4%	
(D ₉₀ - D ₁₀):	5958.9	4.212	FINE GRAVEL: 15.8%		FINE SILT: 0.0%	
(D ₇₅ / D ₂₅):	6.176	-0.452	V FINE GRAVEL: 17.3%		V FINE SILT: 0.0%	
(D ₇₅ - D ₂₅):	2936.7	2.627	V COARSE SAND: 12.9%		CLAY: 1.8%	
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic	Geometric	Logarithmic	Geometric	Logarithmic	Description
	μm	μm	ϕ	μm	ϕ	
MEAN ($\bar{x}$):	2506.6	1177.2	-0.235	1326.0	-0.407	Very Coarse Sand
SORTING (σ):	2969.5	4.503	2.171	3.360	1.748	Poorly Sorted
SKEWNESS (Sk):	2.049	-1.713	1.713	0.154	-0.154	Coarse Skewed
KURTOSIS (K):	7.747	9.266	9.266	0.901	0.901	Mesokurtic



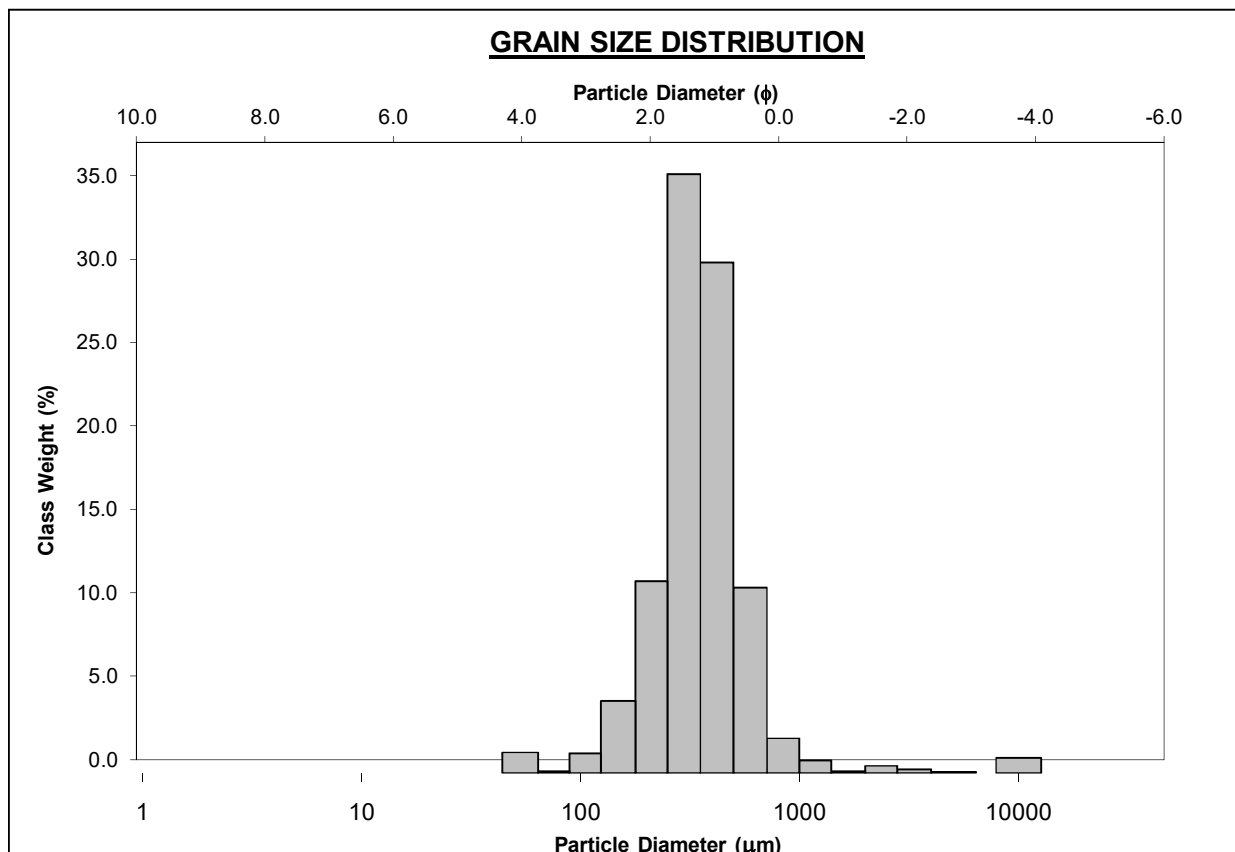
APPENDIX F PARTICLE SIZE ANALYSIS

SAMPLE STATISTICS						
SAMPLE IDENTITY: ENV-14			ANALYST & DATE: 9/14/2018			
SAMPLE TYPE: Bimodal, Poorly Sorted			TEXTURAL GROUP: Gravelly Sand			
SEDIMENT NAME: Very Fine Gravelly Medium Sand						
	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	426.5	1.251	GRAVEL: 13.4%		COARSE SAND: 33.0%	
MODE 2:	2400.0	-1.243	SAND: 84.2%		MEDIUM SAND: 40.5%	
MODE 3:			MUD: 2.4%		FINE SAND: 3.9%	
D ₁₀ :	272.9	-1.271			V FINE SAND: 0.8%	
MEDIAN or D ₅₀ :	516.7	0.953	V COARSE GRAVEL: 0.0%		V COARSE SILT: 0.7%	
D ₉₀ :	2412.6	1.874	COARSE GRAVEL: 0.1%		COARSE SILT: 0.0%	
(D ₉₀ / D ₁₀):	8.840	-1.475	MEDIUM GRAVEL: 2.0%		MEDIUM SILT: 0.0%	
(D ₉₀ - D ₁₀):	2139.7	3.144	FINE GRAVEL: 1.5%		FINE SILT: 0.0%	
(D ₇₅ / D ₂₅):	1.947	3.228	V FINE GRAVEL: 9.9%		V FINE SILT: 0.3%	
(D ₇₅ - D ₂₅):	360.6	0.961	V COARSE SAND: 6.1%		CLAY: 1.4%	
	METHOD OF MOMENTS		FOLK & WARD METHOD			
	Arithmetic	Geometric	Logarithmic	Geometric	Logarithmic	Description
	μm	μm	ϕ	μm	ϕ	
MEAN ($\bar{x}$):	1042.3	566.8	0.819	610.7	0.711	Coarse Sand
SORTING (σ):	1713.9	3.208	1.682	2.208	1.143	Poorly Sorted
SKEWNESS (Sk):	4.635	-1.840	1.840	0.338	-0.338	Very Coarse Skewed
KURTOSIS (K):	28.92	14.05	14.05	1.773	1.773	Very Leptokurtic



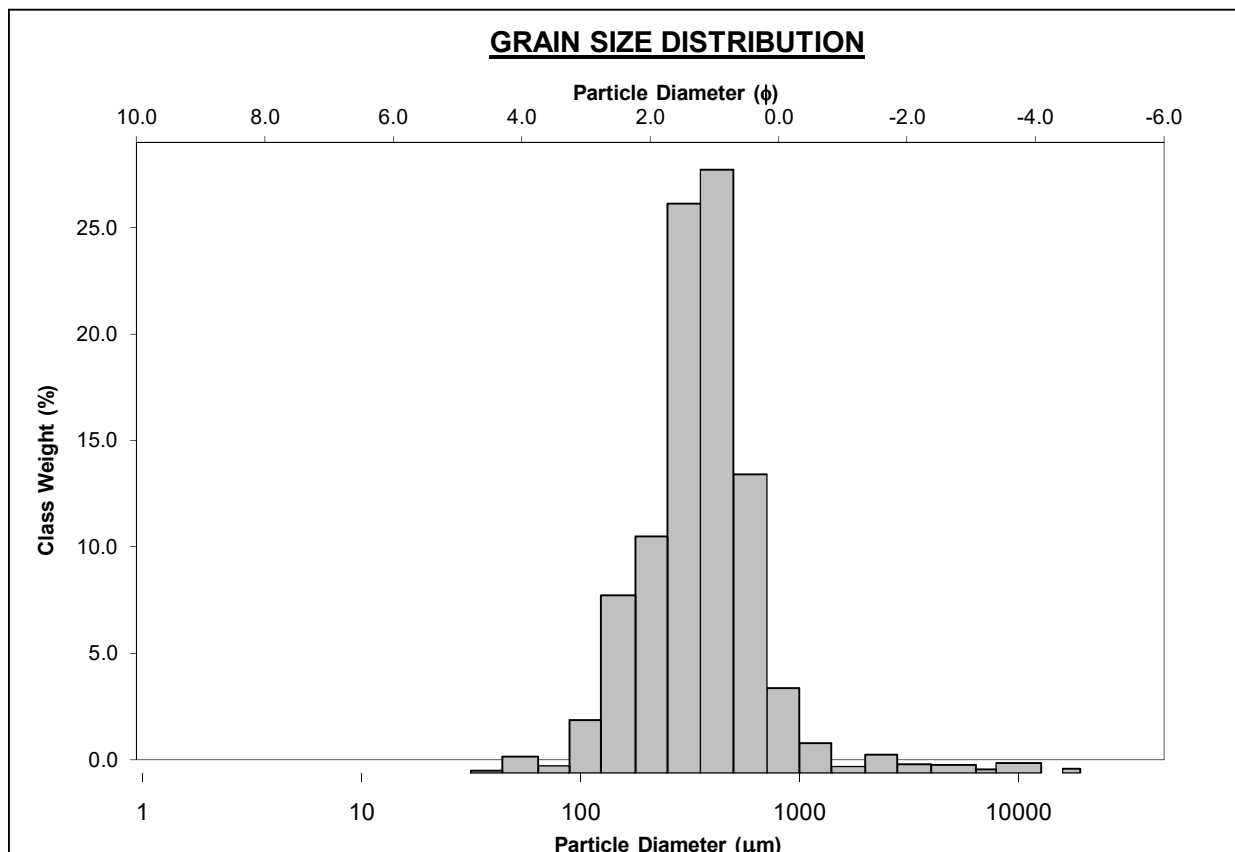
APPENDIX F PARTICLE SIZE ANALYSIS

SAMPLE STATISTICS						
SAMPLE IDENTITY: ENV-15			ANALYST & DATE: 9/14/2018			
SAMPLE TYPE: Unimodal, Moderately Well Sorted			TEXTURAL GROUP: Slightly Gravelly Sand			
SEDIMENT NAME: Slightly Medium Gravelly Medium Sand						
	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	301.0	1.754	GRAVEL: 1.9% COARSE SAND: 13.0%			
MODE 2:			SAND: 95.9% MEDIUM SAND: 65.1%			
MODE 3:			MUD: 2.2% FINE SAND: 15.6%			
D ₁₀ :	189.9	0.738	V FINE SAND: 1.4%			
MEDIAN or D ₅₀ :	338.7	1.562	V COARSE GRAVEL: 0.0% V COARSE SILT: 1.2%			
D ₉₀ :	599.6	2.397	COARSE GRAVEL: 0.0% COARSE SILT: 0.0%			
(D ₉₀ / D ₁₀):	3.158	3.248	MEDIUM GRAVEL: 1.2% MEDIUM SILT: 0.0%			
(D ₉₀ - D ₁₀):	409.7	1.659	FINE GRAVEL: 0.1% FINE SILT: 0.0%			
(D ₇₅ / D ₂₅):	1.696	1.660	V FINE GRAVEL: 0.6% V FINE SILT: 0.0%			
(D ₇₅ - D ₂₅):	184.3	0.762	V COARSE SAND: 0.8% CLAY: 1.0%			
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic μm	Geometric μm	Logarithmic ϕ	Geometric μm	Logarithmic ϕ	Description
MEAN ($\bar{x}$):	505.8	332.3	1.590	337.8	1.566	Medium Sand
SORTING (σ):	1118.6	2.300	1.201	1.552	0.634	Moderately Well Sorted
SKEWNESS (Sk):	8.178	-2.299	2.299	-0.052	0.052	Symmetrical
KURTOSIS (K):	70.96	25.41	25.41	1.250	1.250	Leptokurtic



APPENDIX F PARTICLE SIZE ANALYSIS

SAMPLE STATISTICS						
SAMPLE IDENTITY: ENV-16			ANALYST & DATE: 9/14/2018			
SAMPLE TYPE: Unimodal, Moderately Sorted			TEXTURAL GROUP: Slightly Gravelly Sand			
SEDIMENT NAME: Slightly Very Fine Gravelly Medium Sand						
	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	426.5	1.251	GRAVEL: 2.5% COARSE SAND: 17.5%			
MODE 2:			SAND: 94.1% MEDIUM SAND: 53.2%			
MODE 3:			MUD: 3.4% FINE SAND: 18.9%			
D ₁₀ :	146.7	0.572	V FINE SAND: 2.8%			
MEDIAN or D ₅₀ :	348.8	1.520	V COARSE GRAVEL: 0.0% V COARSE SILT: 0.8%			
D ₉₀ :	672.8	2.769	COARSE GRAVEL: 0.1% COARSE SILT: 0.0%			
(D ₉₀ / D ₁₀):	4.588	4.845	MEDIUM GRAVEL: 0.6% MEDIUM SILT: 0.0%			
(D ₉₀ - D ₁₀):	526.2	2.198	FINE GRAVEL: 0.6% FINE SILT: 0.0%			
(D ₇₅ / D ₂₅):	1.921	1.887	V FINE GRAVEL: 1.2% V FINE SILT: 0.0%			
(D ₇₅ - D ₂₅):	229.6	0.942	V COARSE SAND: 1.6% CLAY: 2.6%			
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic μm	Geometric μm	Logarithmic ϕ	Geometric μm	Logarithmic ϕ	Description
MEAN ($\bar{x}$):	514.9	309.1	1.694	335.0	1.578	Medium Sand
SORTING (σ):	1068.7	3.100	1.632	1.840	0.880	Moderately Sorted
SKEWNESS (Sk):	9.399	-2.713	2.713	-0.104	0.104	Fine Skewed
KURTOSIS (K):	109.6	16.63	16.63	1.359	1.359	Leptokurtic



APPENDIX F PARTICLE SIZE ANALYSIS

SAMPLE STATISTICS

SAMPLE IDENTITY: **ENV-17**

ANALYST & DATE: 9/14/2018

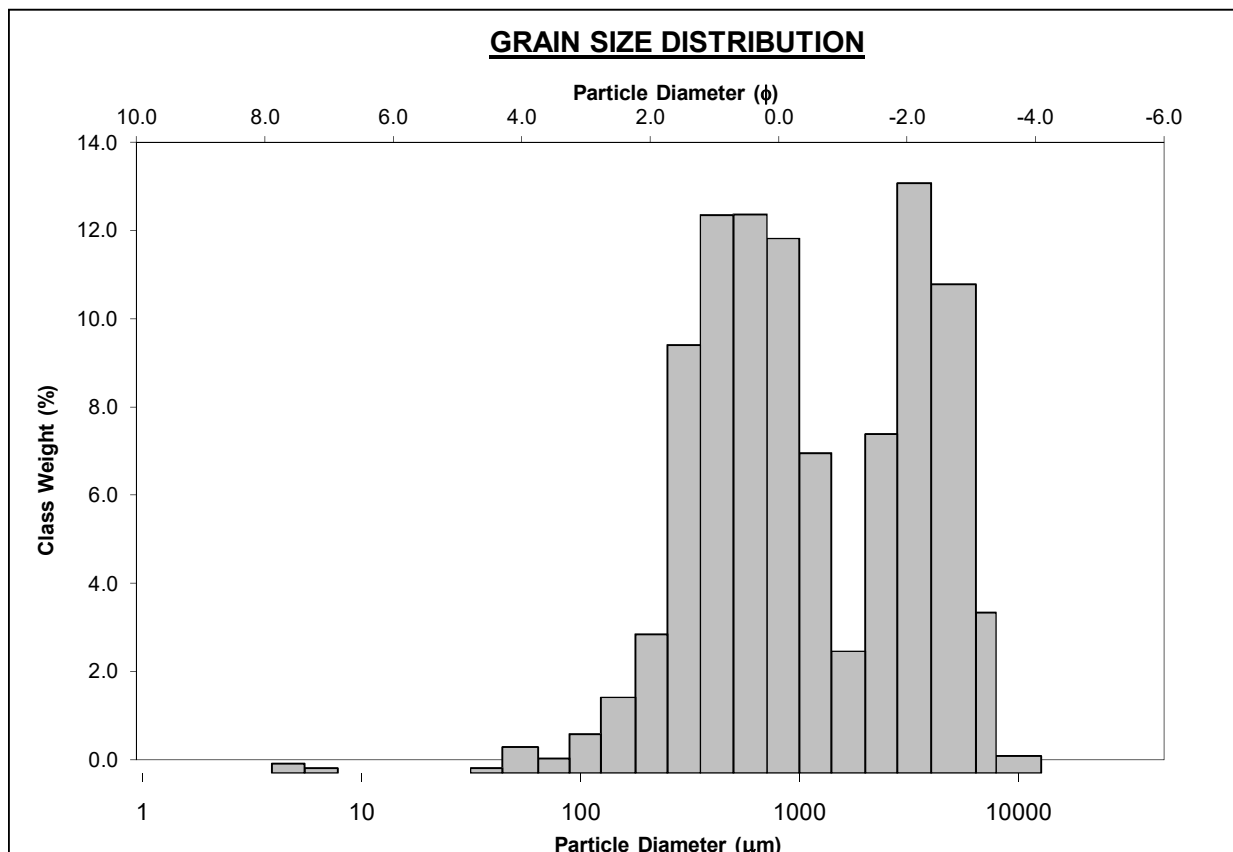
SAMPLE TYPE: Bimodal, Poorly Sorted

TEXTURAL GROUP: Sandy Gravel

SEDIMENT NAME: Sandy Very Fine Gravel

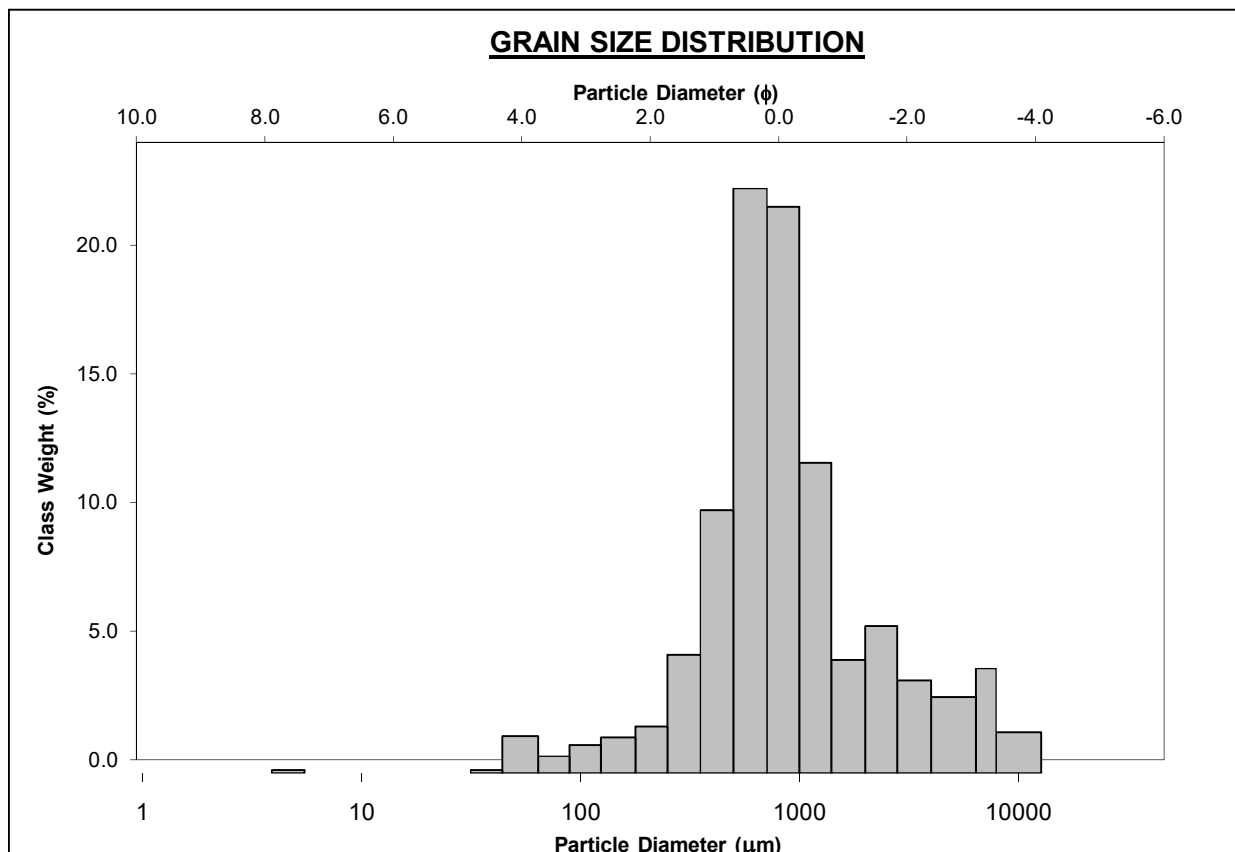
	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	3400.0	-1.743	GRAVEL: 37.1%		COARSE SAND: 23.6%	
MODE 2:	605.0	0.747	SAND: 60.1%		MEDIUM SAND: 21.3%	
MODE 3:			MUD: 2.8%		FINE SAND: 4.7%	
D ₁₀ :	263.4	-2.327			V FINE SAND: 1.2%	
MEDIAN or D ₅₀ :	900.2	0.152	V COARSE GRAVEL: 0.0%		V COARSE SILT: 0.7%	
D ₉₀ :	5018.2	1.925	COARSE GRAVEL: 0.0%		COARSE SILT: 0.0%	
(D ₉₀ / D ₁₀):	19.05	-0.827	MEDIUM GRAVEL: 0.5%		MEDIUM SILT: 0.0%	
(D ₉₀ - D ₁₀):	4754.8	4.252	FINE GRAVEL: 16.4%		FINE SILT: 0.3%	
(D ₇₅ / D ₂₅):	7.388	-0.716	V FINE GRAVEL: 20.2%		V FINE SILT: 0.0%	
(D ₇₅ - D ₂₅):	2774.1	2.885	V COARSE SAND: 9.4%		CLAY: 1.8%	
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic	Geometric	Logarithmic	Geometric	Logarithmic	Description
	μm	μm	ϕ	μm	ϕ	
MEAN ($\bar{x}$):	1948.5	967.4	0.048	1069.6	-0.097	Very Coarse Sand
SORTING (σ):	1983.0	4.346	2.120	3.259	1.704	Poorly Sorted
SKEWNESS (Sk):	1.199	-1.726	1.726	0.121	-0.121	Coarse Skewed
KURTOSIS (K):	3.825	9.080	9.080	0.744	0.744	Platykurtic

GRAIN SIZE DISTRIBUTION



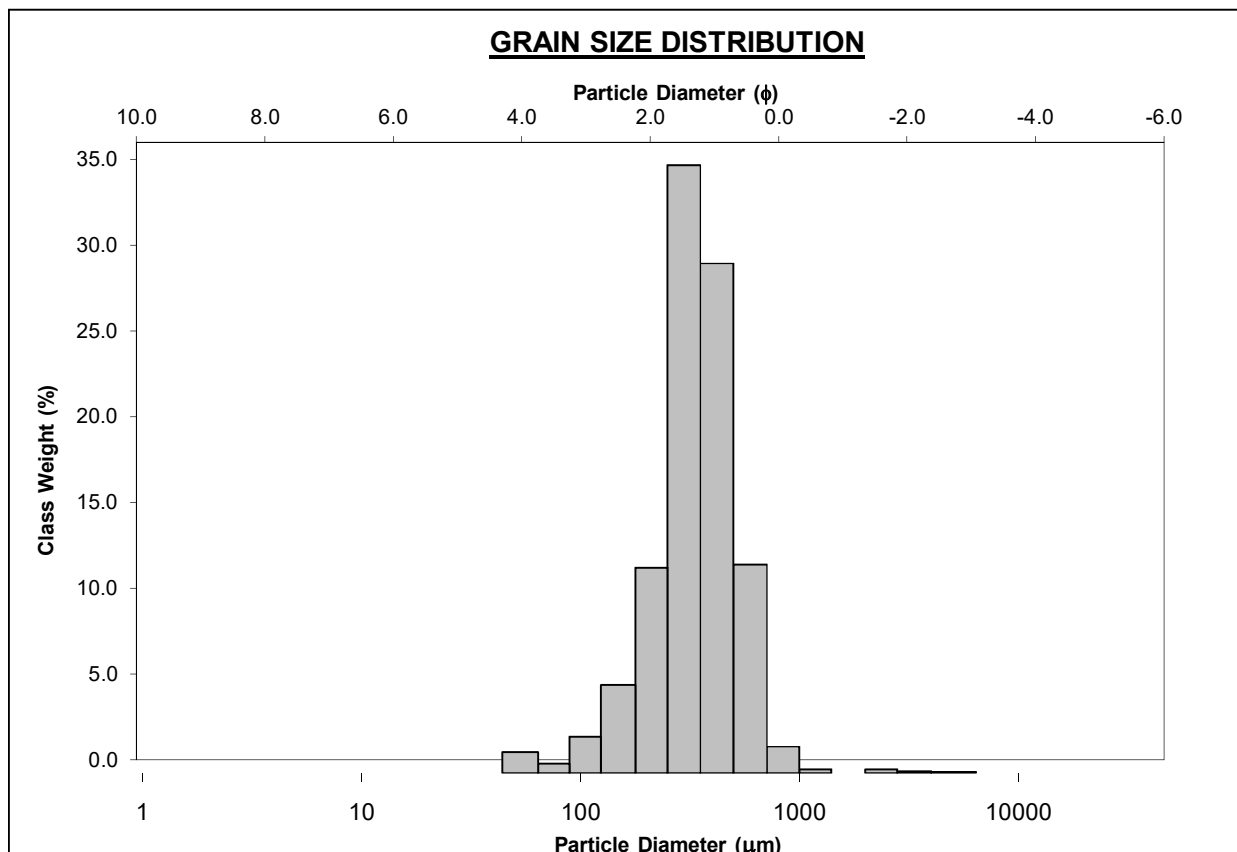
APPENDIX F PARTICLE SIZE ANALYSIS

SAMPLE STATISTICS						
SAMPLE IDENTITY: ENV-19			ANALYST & DATE: 9/14/2018			
SAMPLE TYPE: Trimodal, Poorly Sorted			TEXTURAL GROUP: Gravelly Sand			
SEDIMENT NAME: Very Fine Gravelly Coarse Sand						
	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	605.0	0.747	GRAVEL: 17.4%		COARSE SAND: 43.6%	
MODE 2:	2400.0	-1.243	SAND: 78.7%		MEDIUM SAND: 14.4%	
MODE 3:	7150.0	-2.830	MUD: 3.9%		FINE SAND: 3.1%	
D ₁₀ :	275.4	-1.771			V FINE SAND: 1.7%	
MEDIAN or D ₅₀ :	762.3	0.392	V COARSE GRAVEL: 0.0%		V COARSE SILT: 1.5%	
D ₉₀ :	3413.6	1.860	COARSE GRAVEL: 0.0%		COARSE SILT: 0.0%	
(D ₉₀ / D ₁₀):	12.39	-1.050	MEDIUM GRAVEL: 2.0%		MEDIUM SILT: 0.0%	
(D ₉₀ - D ₁₀):	3138.2	3.632	FINE GRAVEL: 6.4%		FINE SILT: 0.1%	
(D ₇₅ / D ₂₅):	2.477	-2.748	V FINE GRAVEL: 9.0%		V FINE SILT: 0.0%	
(D ₇₅ - D ₂₅):	759.5	1.309	V COARSE SAND: 15.8%		CLAY: 2.3%	
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic	Geometric	Logarithmic	Geometric	Logarithmic	Description
	μm	μm	ϕ	μm	ϕ	
MEAN ($\bar{x}$):	1435.4	739.0	0.436	865.1	0.209	Coarse Sand
SORTING (σ):	1930.8	4.013	2.005	2.857	1.514	Poorly Sorted
SKEWNESS (Sk):	2.912	-2.131	2.131	0.116	-0.116	Coarse Skewed
KURTOSIS (K):	11.82	11.85	11.85	1.845	1.845	Very Leptokurtic



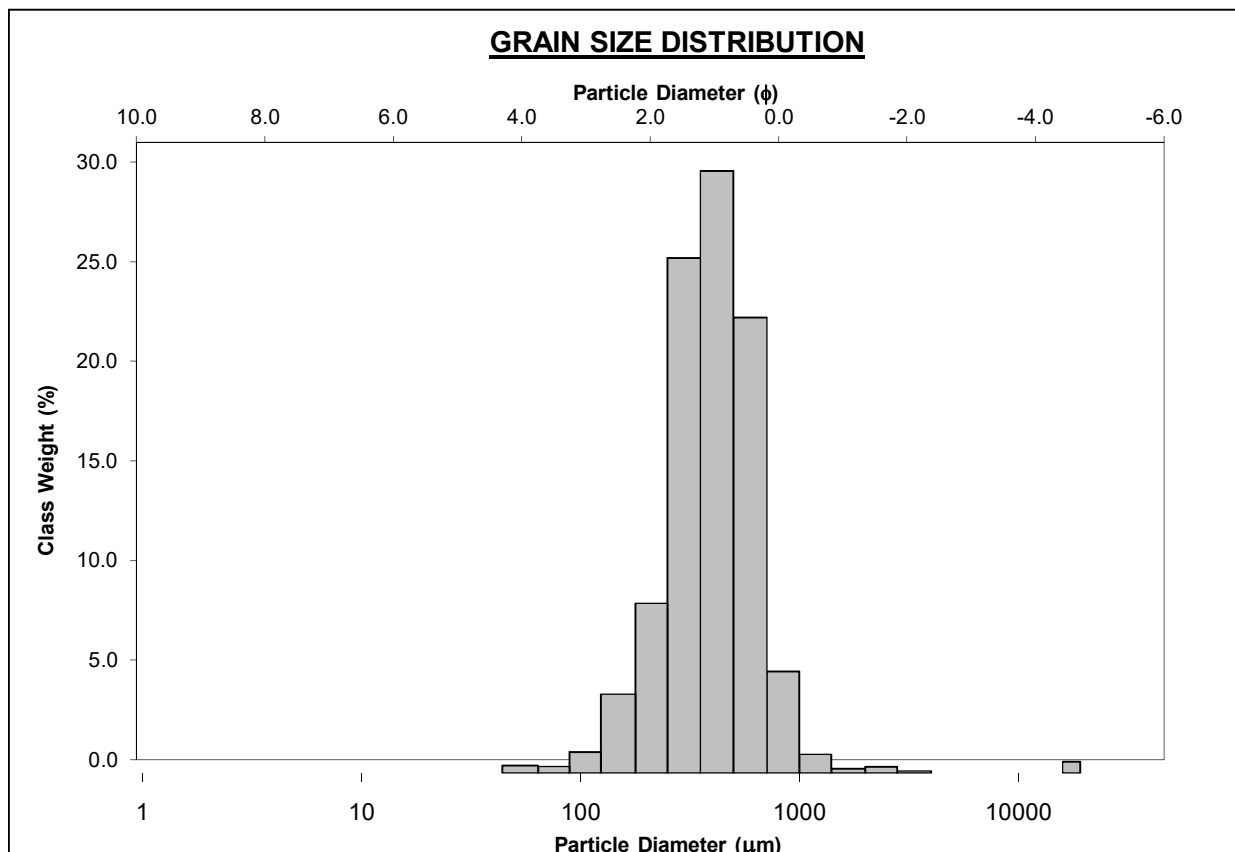
APPENDIX F PARTICLE SIZE ANALYSIS

SAMPLE STATISTICS						
SAMPLE IDENTITY: ENV-20			ANALYST & DATE: 9/14/2018			
SAMPLE TYPE: Unimodal, Moderately Well Sorted			TEXTURAL GROUP: Slightly Gravelly Sand			
SEDIMENT NAME: Slightly Very Fine Gravelly Medium Sand						
	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	301.0	1.754	GRAVEL: 0.4% COARSE SAND: 13.7%			
MODE 2:			SAND: 98.3% MEDIUM SAND: 64.6%			
MODE 3:			MUD: 1.3% FINE SAND: 17.1%			
D ₁₀ :	182.2	0.822	V FINE SAND: 2.7%			
MEDIAN or D ₅₀ :	332.4	1.589	V COARSE GRAVEL: 0.0% V COARSE SILT: 1.2%			
D ₉₀ :	565.8	2.456	COARSE GRAVEL: 0.0% COARSE SILT: 0.0%			
(D ₉₀ / D ₁₀):	3.105	2.989	MEDIUM GRAVEL: 0.0% MEDIUM SILT: 0.0%			
(D ₉₀ - D ₁₀):	383.6	1.635	FINE GRAVEL: 0.1% FINE SILT: 0.0%			
(D ₇₅ / D ₂₅):	1.697	1.646	V FINE GRAVEL: 0.3% V FINE SILT: 0.0%			
(D ₇₅ - D ₂₅):	181.1	0.763	V COARSE SAND: 0.2% CLAY: 0.1%			
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic μm	Geometric μm	Logarithmic ϕ	Geometric μm	Logarithmic ϕ	Description
MEAN ($\bar{x}$):	371.0	322.7	1.632	328.2	1.607	Medium Sand
SORTING (σ):	252.3	1.681	0.749	1.559	0.641	Moderately Well Sorted
SKEWNESS (Sk):	9.933	-1.647	1.647	-0.097	0.097	Symmetrical
KURTOSIS (K):	164.1	18.81	18.81	1.229	1.229	Leptokurtic



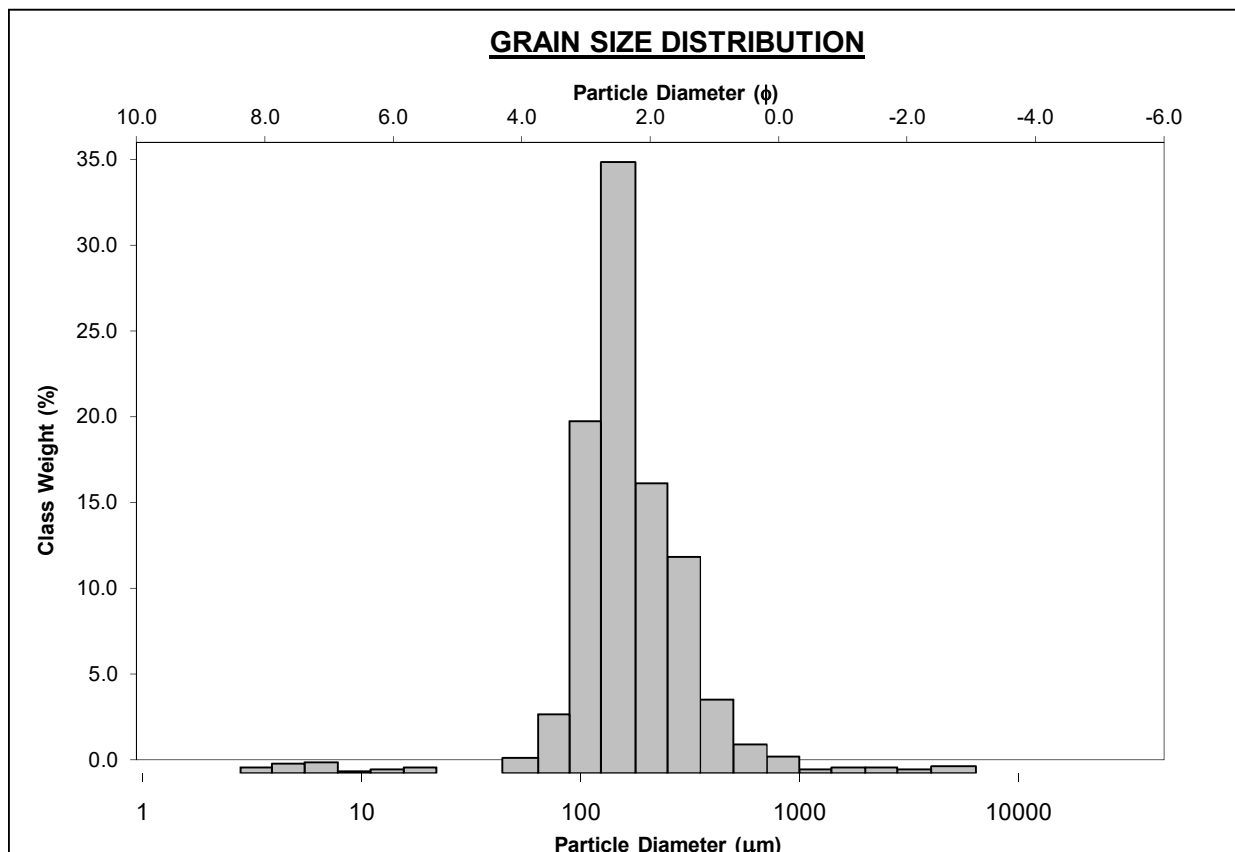
APPENDIX F PARTICLE SIZE ANALYSIS

SAMPLE STATISTICS						
SAMPLE IDENTITY: ENV-21			ANALYST & DATE: 9/14/2018			
SAMPLE TYPE: Unimodal, Moderately Well Sorted			TEXTURAL GROUP: Slightly Gravelly Sand			
SEDIMENT NAME: Slightly Very Fine Gravelly Medium Sand						
	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	426.5	1.251	GRAVEL: 0.7% COARSE SAND: 28.0%			
MODE 2:			SAND: 98.8% MEDIUM SAND: 55.8%			
MODE 3:			MUD: 0.5% FINE SAND: 12.5%			
D ₁₀ :	210.5	0.564	V FINE SAND: 1.4%			
MEDIAN or D ₅₀ :	396.1	1.336	V COARSE GRAVEL: 0.0% V COARSE SILT: 0.4%			
D ₉₀ :	676.2	2.248	COARSE GRAVEL: 0.3% COARSE SILT: 0.0%			
(D ₉₀ / D ₁₀):	3.212	3.982	MEDIUM GRAVEL: 0.0% MEDIUM SILT: 0.0%			
(D ₉₀ - D ₁₀):	465.7	1.683	FINE GRAVEL: 0.0% FINE SILT: 0.0%			
(D ₇₅ / D ₂₅):	1.865	2.006	V FINE GRAVEL: 0.4% V FINE SILT: 0.0%			
(D ₇₅ - D ₂₅):	249.6	0.899	V COARSE SAND: 1.1% CLAY: 0.1%			
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic μm	Geometric μm	Logarithmic ϕ	Geometric μm	Logarithmic ϕ	Description
MEAN ($\bar{x}$):	491.2	389.0	1.362	396.7	1.334	Medium Sand
SORTING (σ):	963.9	1.744	0.803	1.585	0.665	Moderately Well Sorted
SKEWNESS (Sk):	16.54	-0.416	0.416	-0.052	0.052	Symmetrical
KURTOSIS (K):	291.0	21.18	21.18	1.043	1.043	Mesokurtic



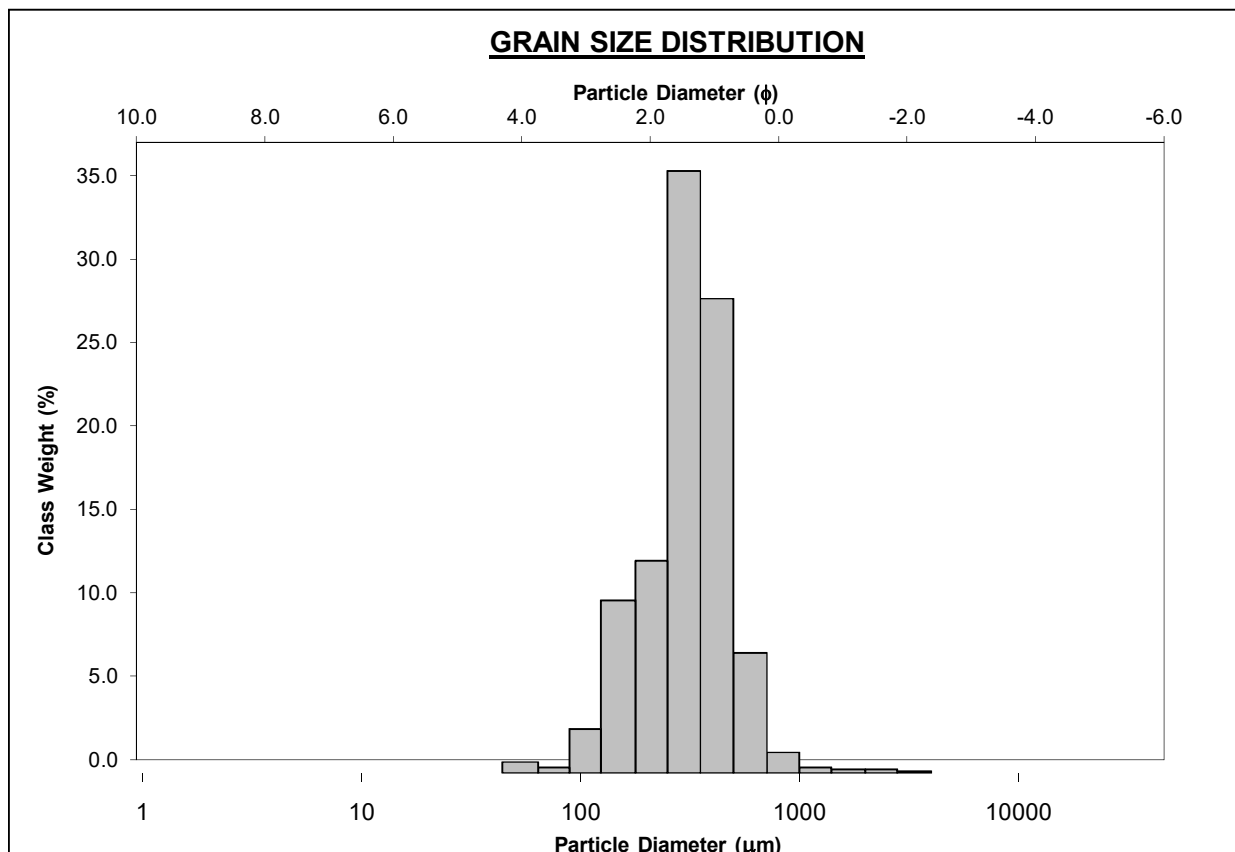
APPENDIX F PARTICLE SIZE ANALYSIS

SAMPLE STATISTICS						
SAMPLE IDENTITY: ENV-23			ANALYST & DATE: 8/10/2018			
SAMPLE TYPE: Unimodal, Poorly Sorted			TEXTURAL GROUP: Slightly Gravelly Sand			
SEDIMENT NAME: Slightly Fine Gravelly Fine Sand						
	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	151.0	2.751				
MODE 2:						
MODE 3:						
D ₁₀ :	88.06	1.581				
MEDIAN or D ₅₀ :	154.0	2.699				
D ₉₀ :	334.2	3.505				
(D ₉₀ / D ₁₀):	3.795	2.217				
(D ₉₀ - D ₁₀):	246.1	1.924				
(D ₇₅ / D ₂₅):	1.937	1.443				
(D ₇₅ - D ₂₅):	108.6	0.954				
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic μm	Geometric μm	Logarithmic ϕ	Geometric μm	Logarithmic ϕ	Description
MEAN ($\bar{x}$):	228.5	135.4	2.885	162.3	2.623	Fine Sand
SORTING (σ):	428.1	3.409	1.769	2.517	1.332	Poorly Sorted
SKEWNESS (Sk):	9.205	-2.339	2.339	-0.174	0.174	Fine Skewed
KURTOSIS (K):	99.45	10.84	10.84	2.706	2.706	Very Leptokurtic



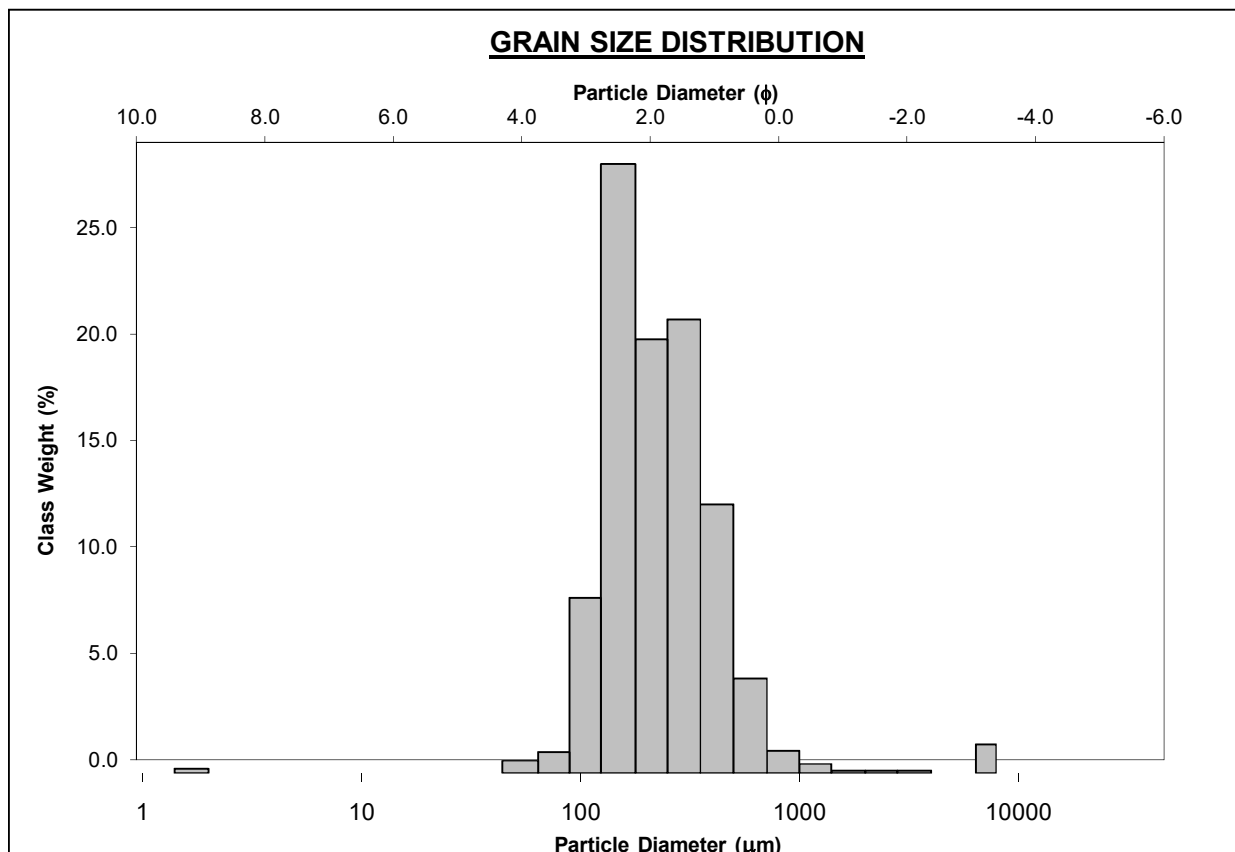
APPENDIX F PARTICLE SIZE ANALYSIS

SAMPLE STATISTICS						
SAMPLE IDENTITY: ENV-24			ANALYST & DATE: 9/14/2018			
SAMPLE TYPE: Unimodal, Moderately Well Sorted			TEXTURAL GROUP: Slightly Gravelly Sand			
SEDIMENT NAME: Slightly Very Fine Gravelly Medium Sand						
	μm	φ	GRAIN SIZE DISTRIBUTION			
MODE 1:	301.0	1.754	GRAVEL: 0.3%		COARSE SAND: 8.4%	
MODE 2:			SAND: 98.9%		MEDIUM SAND: 63.9%	
MODE 3:			MUD: 0.8%		FINE SAND: 23.1%	
D ₁₀ :	153.9	1.014			V FINE SAND: 3.1%	
MEDIAN or D ₅₀ :	312.7	1.677	V COARSE GRAVEL: 0.0%		V COARSE SILT: 0.7%	
D ₉₀ :	495.1	2.700	COARSE GRAVEL: 0.0%		COARSE SILT: 0.0%	
(D ₉₀ / D ₁₀):	3.216	2.662	MEDIUM GRAVEL: 0.0%		MEDIUM SILT: 0.0%	
(D ₉₀ - D ₁₀):	341.2	1.685	FINE GRAVEL: 0.0%		FINE SILT: 0.0%	
(D ₇₅ / D ₂₅):	1.723	1.613	V FINE GRAVEL: 0.3%		V FINE SILT: 0.0%	
(D ₇₅ - D ₂₅):	172.7	0.785	V COARSE SAND: 0.5%		CLAY: 0.1%	
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic	Geometric	Logarithmic	Geometric	Logarithmic	Description
	μm	μm	φ	μm	φ	
MEAN ($\bar{x}$):	343.6	300.1	1.736	299.3	1.740	Medium Sand
SORTING (σ):	206.6	1.662	0.733	1.585	0.665	Moderately Well Sorted
SKEWNESS (Sk):	6.146	-1.450	1.450	-0.138	0.138	Fine Skewed
KURTOSIS (K):	72.93	18.21	18.21	1.169	1.169	Leptokurtic



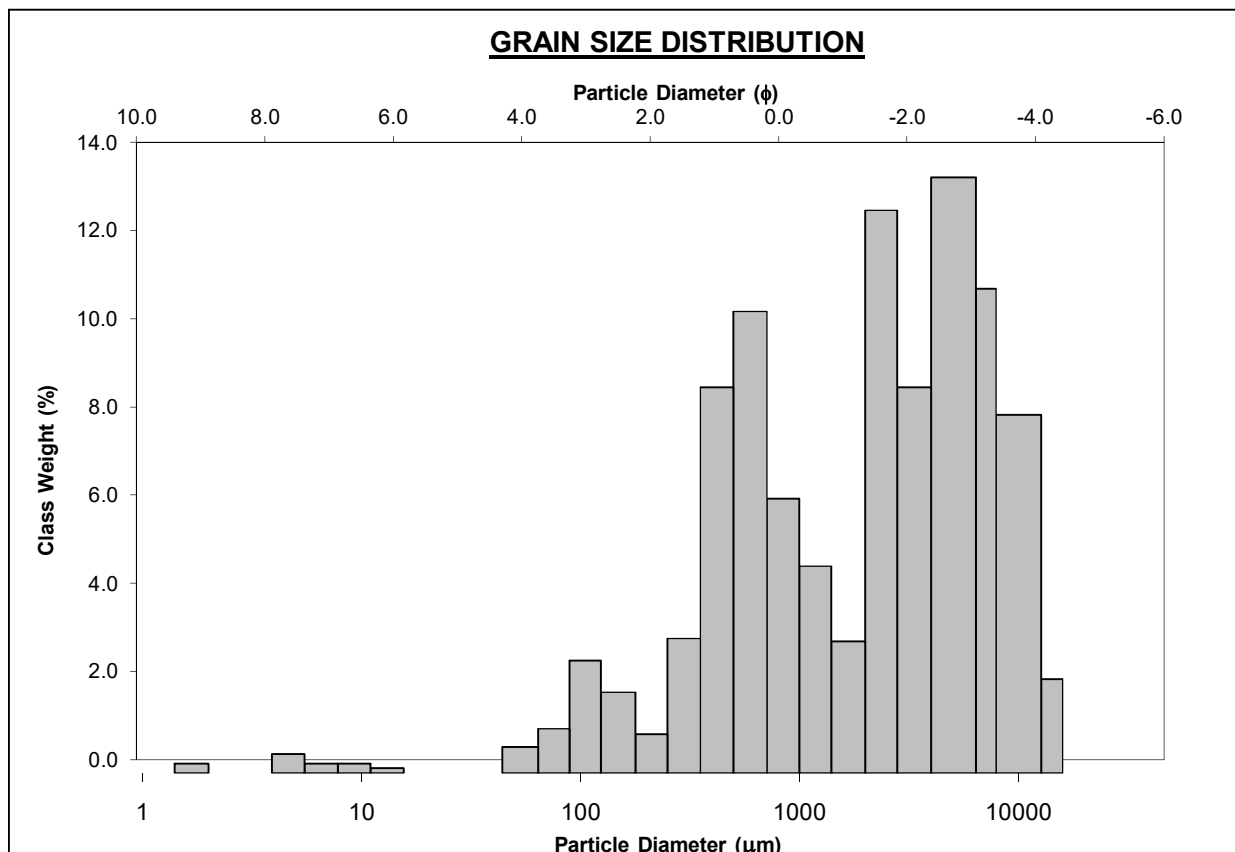
APPENDIX F PARTICLE SIZE ANALYSIS

SAMPLE STATISTICS						
SAMPLE IDENTITY: ENV-25			ANALYST & DATE: 8/10/2018			
SAMPLE TYPE: Bimodal, Moderately Sorted			TEXTURAL GROUP: Slightly Gravelly Sand			
SEDIMENT NAME: Slightly Fine Gravelly Fine Sand						
	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	151.0	2.751	GRAVEL: 1.0% COARSE SAND: 5.4%			
MODE 2:	301.0	1.754	SAND: 96.4% MEDIUM SAND: 33.2%			
MODE 3:			MUD: 2.6% FINE SAND: 48.1%			
D ₁₀ :	117.8	1.126	V FINE SAND: 9.3%			
MEDIAN or D ₅₀ :	210.3	2.249	V COARSE GRAVEL: 0.0% V COARSE SILT: 0.6%			
D ₉₀ :	458.3	3.086	COARSE GRAVEL: 0.0% COARSE SILT: 0.0%			
(D ₉₀ / D ₁₀):	3.892	2.742	MEDIUM GRAVEL: 0.0% MEDIUM SILT: 0.0%			
(D ₉₀ - D ₁₀):	340.6	1.961	FINE GRAVEL: 0.8% FINE SILT: 0.0%			
(D ₇₅ / D ₂₅):	2.183	1.687	V FINE GRAVEL: 0.2% V FINE SILT: 0.0%			
(D ₇₅ - D ₂₅):	174.0	1.126	V COARSE SAND: 0.5% CLAY: 2.0%			
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic μm	Geometric μm	Logarithmic ϕ	Geometric μm	Logarithmic ϕ	Description
MEAN ($\bar{x}$):	315.3	207.1	2.272	220.5	2.181	Fine Sand
SORTING (σ):	645.7	2.589	1.372	1.724	0.786	Moderately Sorted
SKEWNESS (Sk):	9.649	-2.587	2.587	0.127	-0.127	Coarse Skewed
KURTOSIS (K):	101.1	19.03	19.03	0.952	0.952	Mesokurtic



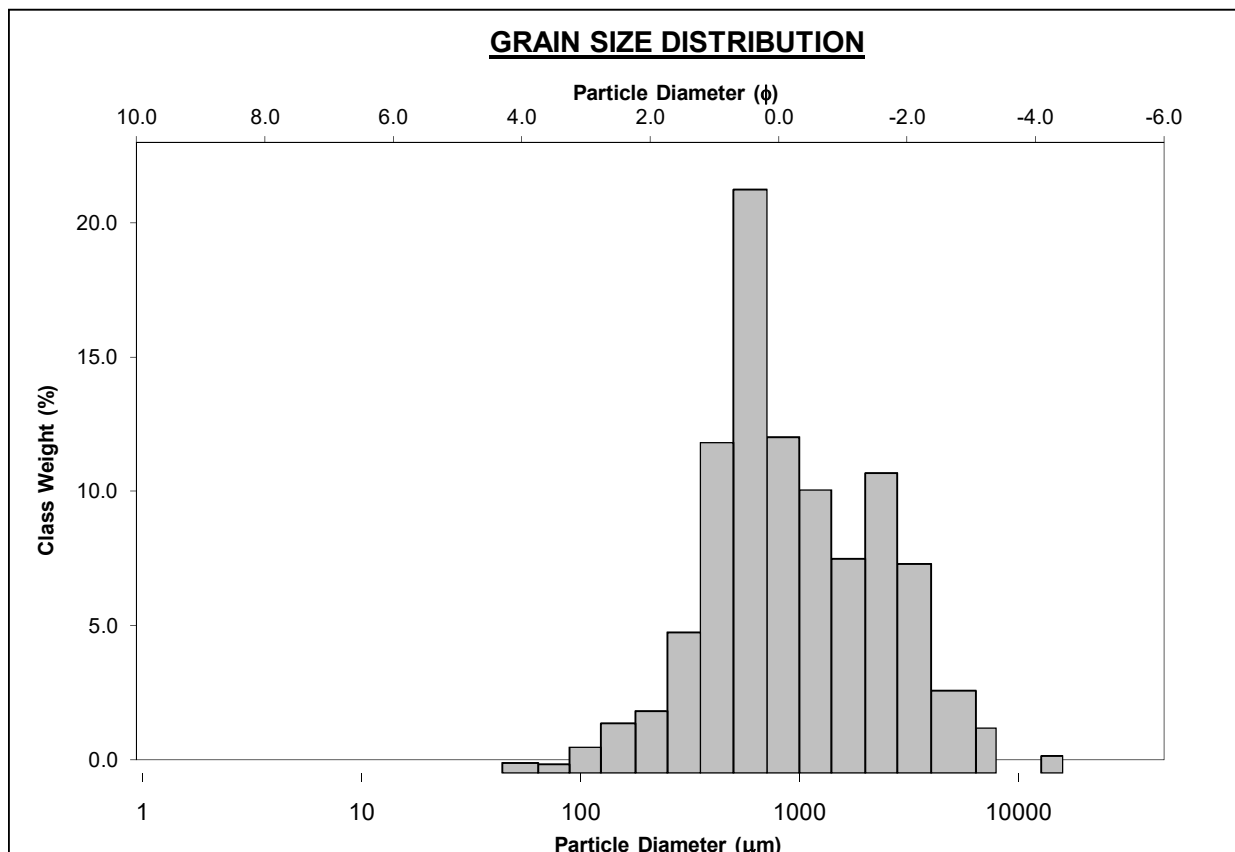
APPENDIX F PARTICLE SIZE ANALYSIS

SAMPLE STATISTICS						
SAMPLE IDENTITY: ENV-26			ANALYST & DATE: 8/10/2018			
SAMPLE TYPE: Polymodal, Very Poorly Sorted			TEXTURAL GROUP: Sandy Gravel			
SEDIMENT NAME: Sandy Fine Gravel						
	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	5200.0	-2.339	GRAVEL: 55.6%		COARSE SAND: 15.8%	
MODE 2:	2400.0	-1.243	SAND: 40.0%		MEDIUM SAND: 11.2%	
MODE 3:	605.0	0.747	MUD: 4.4%		FINE SAND: 2.6%	
D ₁₀ :	229.0	-3.099			V FINE SAND: 3.3%	
MEDIAN or D ₅₀ :	2349.5	-1.232	V COARSE GRAVEL: 0.0%		V COARSE SILT: 0.6%	
D ₉₀ :	8569.8	2.127	COARSE GRAVEL: 0.0%		COARSE SILT: 0.0%	
(D ₉₀ / D ₁₀):	37.43	-0.686	MEDIUM GRAVEL: 11.5%		MEDIUM SILT: 0.3%	
(D ₉₀ - D ₁₀):	8340.9	5.226	FINE GRAVEL: 23.9%		FINE SILT: 0.6%	
(D ₇₅ / D ₂₅):	9.353	-0.340	V FINE GRAVEL: 20.2%		V FINE SILT: 0.0%	
(D ₇₅ - D ₂₅):	4738.7	3.226	V COARSE SAND: 7.2%		CLAY: 2.9%	
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic	Geometric	Logarithmic	Geometric	Logarithmic	Description
	μm	μm	ϕ	μm	ϕ	
MEAN ($\bar{x}$):	3450.4	1429.6	-0.516	1859.6	-0.895	Very Coarse Sand
SORTING (σ):	3419.3	6.367	2.671	4.282	2.098	Very Poorly Sorted
SKEWNESS (Sk):	1.082	-1.827	1.827	-0.313	0.313	Very Fine Skewed
KURTOSIS (K):	3.354	7.419	7.419	0.899	0.899	Platykurtic



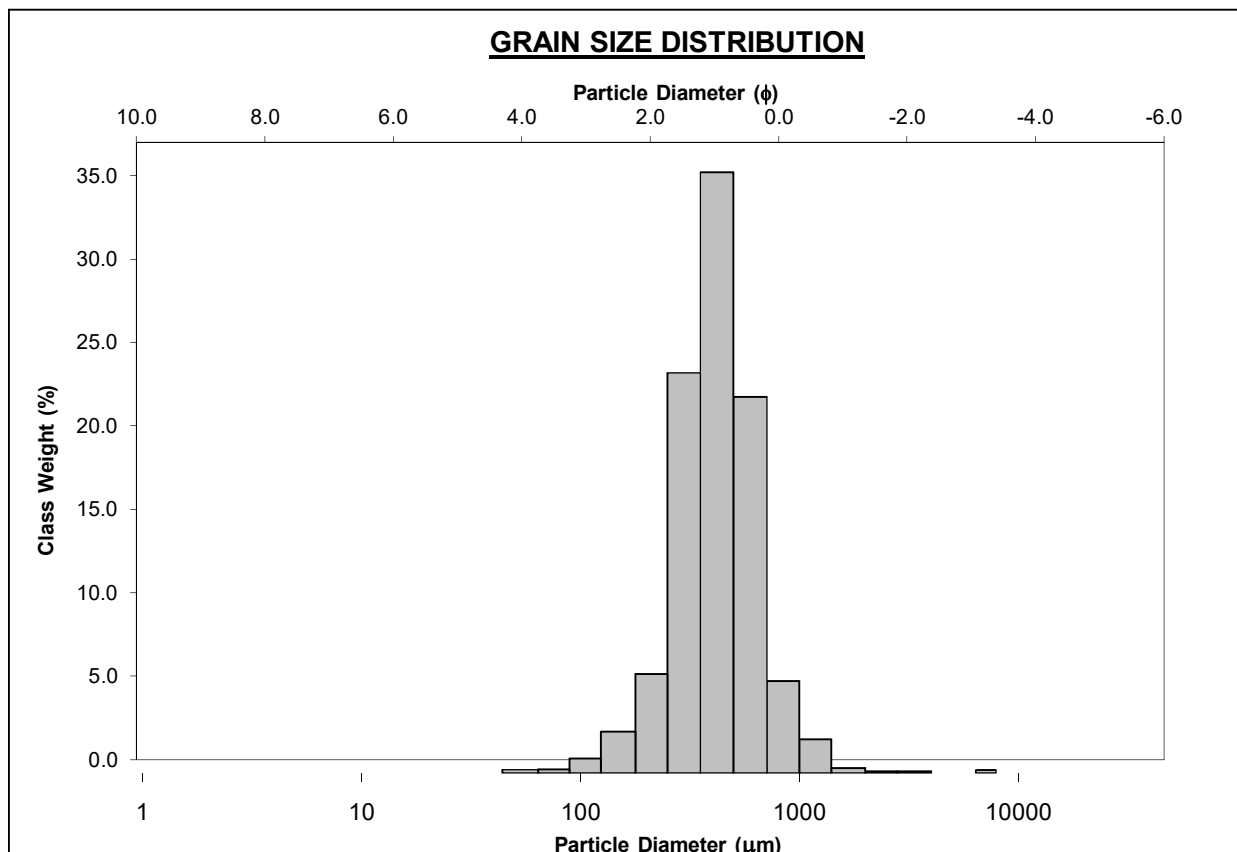
APPENDIX F PARTICLE SIZE ANALYSIS

SAMPLE STATISTICS						
SAMPLE IDENTITY: ENV-27			ANALYST & DATE: 9/14/2018			
SAMPLE TYPE: Bimodal, Poorly Sorted			TEXTURAL GROUP: Gravelly Sand			
SEDIMENT NAME: Very Fine Gravelly Coarse Sand						
	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	605.0	0.747	GRAVEL: 24.1%		COARSE SAND: 33.9%	
MODE 2:	2400.0	-1.243	SAND: 74.8%		MEDIUM SAND: 17.3%	
MODE 3:			MUD: 1.1%		FINE SAND: 4.1%	
D ₁₀ :	317.1	-1.707			V FINE SAND: 1.3%	
MEDIAN or D ₅₀ :	805.6	0.312	V COARSE GRAVEL: 0.0%		V COARSE SILT: 0.4%	
D ₉₀ :	3264.6	1.657	COARSE GRAVEL: 0.0%		COARSE SILT: 0.0%	
(D ₉₀ / D ₁₀):	10.30	-0.971	MEDIUM GRAVEL: 0.4%		MEDIUM SILT: 0.0%	
(D ₉₀ - D ₁₀):	2947.5	3.364	FINE GRAVEL: 5.1%		FINE SILT: 0.0%	
(D ₇₅ / D ₂₅):	3.771	-1.031	V FINE GRAVEL: 18.6%		V FINE SILT: 0.0%	
(D ₇₅ - D ₂₅):	1412.5	1.915	V COARSE SAND: 18.2%		CLAY: 0.7%	
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic	Geometric	Logarithmic	Geometric	Logarithmic	Description
	μm	μm	ϕ	μm	ϕ	
MEAN ($\bar{x}$):	1438.5	889.7	0.169	940.5	0.089	Coarse Sand
SORTING (σ):	1573.2	2.925	1.548	2.529	1.338	Poorly Sorted
SKEWNESS (Sk):	3.276	-1.520	1.520	0.169	-0.169	Coarse Skewed
KURTOSIS (K):	21.24	11.81	11.81	0.941	0.941	Mesokurtic



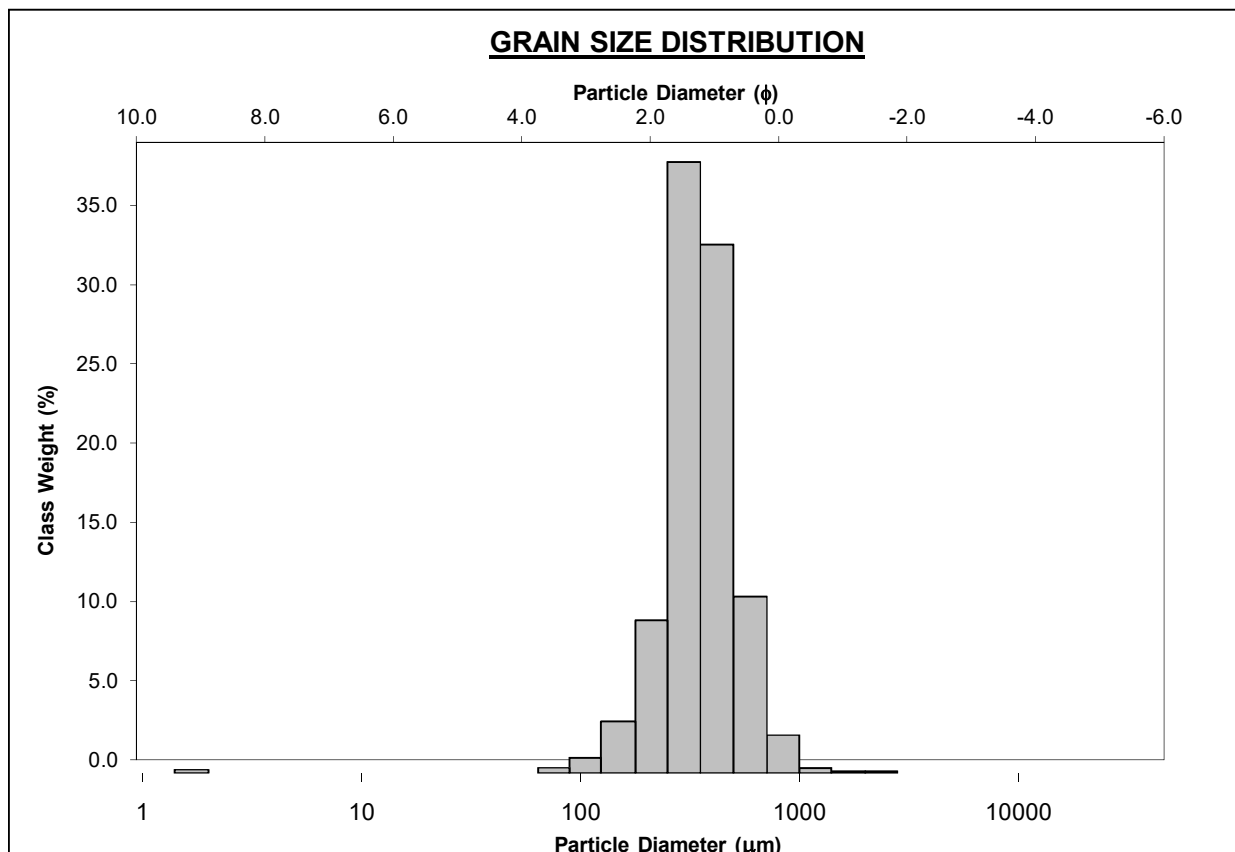
APPENDIX F PARTICLE SIZE ANALYSIS

SAMPLE STATISTICS						
SAMPLE IDENTITY: ENV-28			ANALYST & DATE: 8/10/2018			
SAMPLE TYPE: Unimodal, Moderately Well Sorted			TEXTURAL GROUP: Slightly Gravelly Sand			
SEDIMENT NAME: Slightly Very Fine Gravelly Medium Sand						
	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	426.5	1.251	GRAVEL: 0.3%		COARSE SAND: 27.5%	
MODE 2:			SAND: 97.5%		MEDIUM SAND: 58.4%	
MODE 3:			MUD: 2.2%		FINE SAND: 8.3%	
D ₁₀ :	230.3	0.544			V FINE SAND: 1.1%	
MEDIAN or D ₅₀ :	410.3	1.285	V COARSE GRAVEL: 0.0%		V COARSE SILT: 0.2%	
D ₉₀ :	685.8	2.118	COARSE GRAVEL: 0.0%		COARSE SILT: 0.0%	
(D ₉₀ / D ₁₀):	2.977	3.892	MEDIUM GRAVEL: 0.0%		MEDIUM SILT: 0.0%	
(D ₉₀ - D ₁₀):	455.4	1.574	FINE GRAVEL: 0.1%		FINE SILT: 0.0%	
(D ₇₅ / D ₂₅):	1.773	1.932	V FINE GRAVEL: 0.2%		V FINE SILT: 0.0%	
(D ₇₅ - D ₂₅):	235.9	0.826	V COARSE SAND: 2.2%		CLAY: 2.0%	
	METHOD OF MOMENTS		FOLK & WARD METHOD			
	Arithmetic	Geometric	Logarithmic	Geometric	Logarithmic	Description
	μm	μm	ϕ	μm	ϕ	
MEAN ($\bar{x}$):	458.2	366.0	1.450	408.8	1.290	Medium Sand
SORTING (σ):	321.1	2.555	1.353	1.591	0.670	Moderately Well Sorted
SKEWNESS (Sk):	10.43	-4.509	4.509	-0.068	0.068	Symmetrical
KURTOSIS (K):	198.6	28.54	28.54	1.192	1.192	Leptokurtic



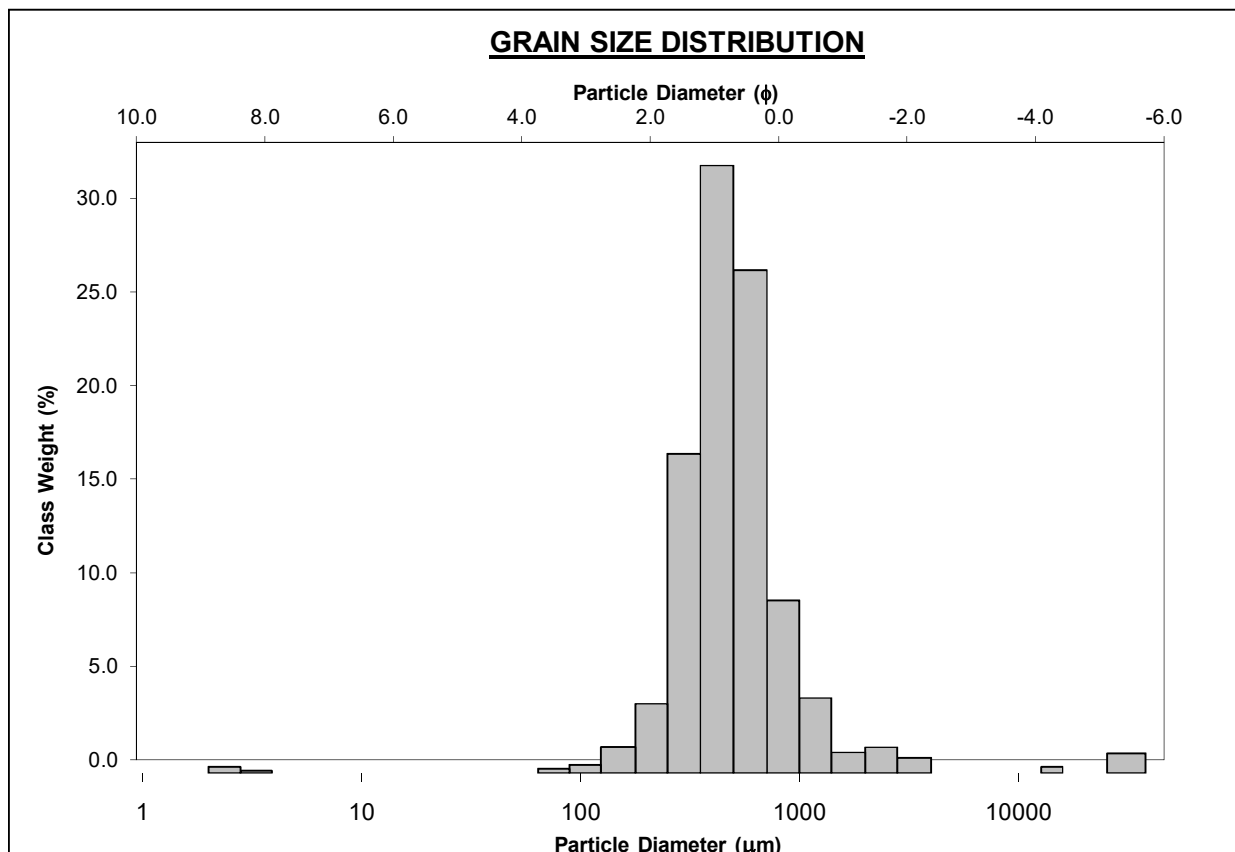
APPENDIX F PARTICLE SIZE ANALYSIS

SAMPLE STATISTICS						
SAMPLE IDENTITY: ENV-29			ANALYST & DATE: 8/10/2018			
SAMPLE TYPE: Unimodal, Moderately Well Sorted			TEXTURAL GROUP: Slightly Gravelly Sand			
SEDIMENT NAME: Slightly Very Fine Gravelly Medium Sand						
	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	301.0	1.754	GRAVEL: 0.1% COARSE SAND: 13.3%			
MODE 2:			SAND: 97.9% MEDIUM SAND: 70.2%			
MODE 3:			MUD: 2.0% FINE SAND: 12.8%			
D ₁₀ :	202.5	0.825	V FINE SAND: 1.3%			
MEDIAN or D ₅₀ :	341.8	1.549	V COARSE GRAVEL: 0.0% V COARSE SILT: 0.0%			
D ₉₀ :	564.4	2.304	COARSE GRAVEL: 0.0% COARSE SILT: 0.0%			
(D ₉₀ / D ₁₀):	2.787	2.792	MEDIUM GRAVEL: 0.0% MEDIUM SILT: 0.0%			
(D ₉₀ - D ₁₀):	361.9	1.479	FINE GRAVEL: 0.0% FINE SILT: 0.0%			
(D ₇₅ / D ₂₅):	1.635	1.605	V FINE GRAVEL: 0.1% V FINE SILT: 0.0%			
(D ₇₅ - D ₂₅):	172.3	0.709	V COARSE SAND: 0.4% CLAY: 2.0%			
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic μm	Geometric μm	Logarithmic ϕ	Geometric μm	Logarithmic ϕ	Description
MEAN ($\bar{x}$):	373.1	310.2	1.689	346.8	1.528	Medium Sand
SORTING (σ):	172.3	2.414	1.271	1.479	0.565	Moderately Well Sorted
SKEWNESS (Sk):	2.776	-4.926	4.926	-0.020	0.020	Symmetrical
KURTOSIS (K):	26.70	31.64	31.64	1.233	1.233	Leptokurtic



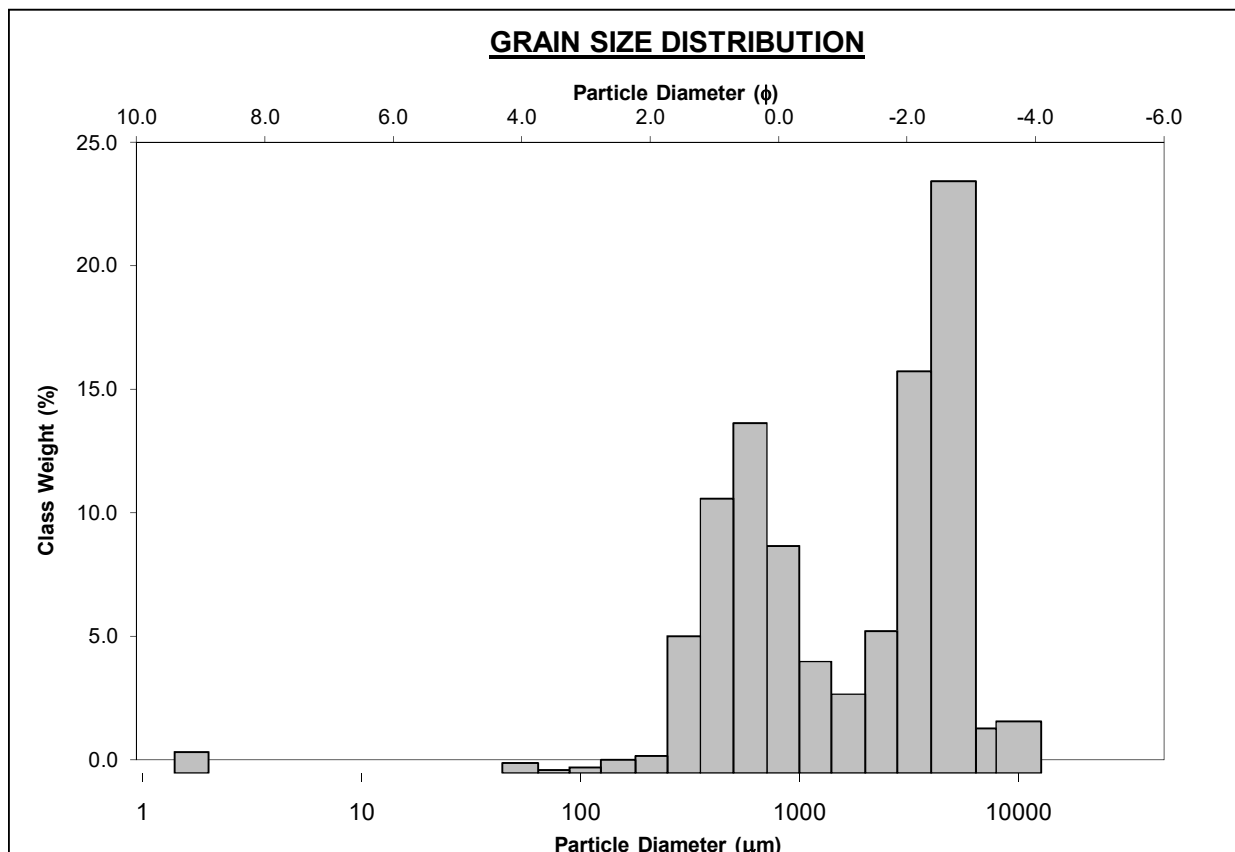
APPENDIX F PARTICLE SIZE ANALYSIS

SAMPLE STATISTICS						
SAMPLE IDENTITY: ENV-30			ANALYST & DATE: 8/10/2018			
SAMPLE TYPE: Unimodal, Moderately Sorted			TEXTURAL GROUP: Slightly Gravelly Sand			
SEDIMENT NAME: Slightly Very Fine Gravelly Medium Sand						
	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	426.5	1.251	GRAVEL: 3.5% COARSE SAND: 35.5%			
MODE 2:			SAND: 94.6% MEDIUM SAND: 48.5%			
MODE 3:			MUD: 1.9% FINE SAND: 5.1%			
D ₁₀ :	262.8	0.089	V FINE SAND: 0.6%			
MEDIAN or D ₅₀ :	467.8	1.096	V COARSE GRAVEL: 0.5% V COARSE SILT: 0.0%			
D ₉₀ :	940.3	1.928	COARSE GRAVEL: 0.7% COARSE SILT: 0.0%			
(D ₉₀ / D ₁₀):	3.578	21.70	MEDIUM GRAVEL: 0.2% MEDIUM SILT: 0.0%			
(D ₉₀ - D ₁₀):	677.5	1.839	FINE GRAVEL: 0.0% FINE SILT: 0.0%			
(D ₇₅ / D ₂₅):	1.801	2.326	V FINE GRAVEL: 2.1% V FINE SILT: 0.4%			
(D ₇₅ - D ₂₅):	285.4	0.849	V COARSE SAND: 4.9% CLAY: 1.5%			
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic μm	Geometric μm	Logarithmic ϕ	Geometric μm	Logarithmic ϕ	Description
MEAN ($\bar{x}$):	966.1	460.7	1.118	470.2	1.089	Medium Sand
SORTING (σ):	3473.3	2.907	1.539	1.684	0.752	Moderately Sorted
SKEWNESS (Sk):	8.468	-2.191	2.191	0.060	-0.060	Symmetrical
KURTOSIS (K):	74.48	20.43	20.43	1.338	1.338	Leptokurtic



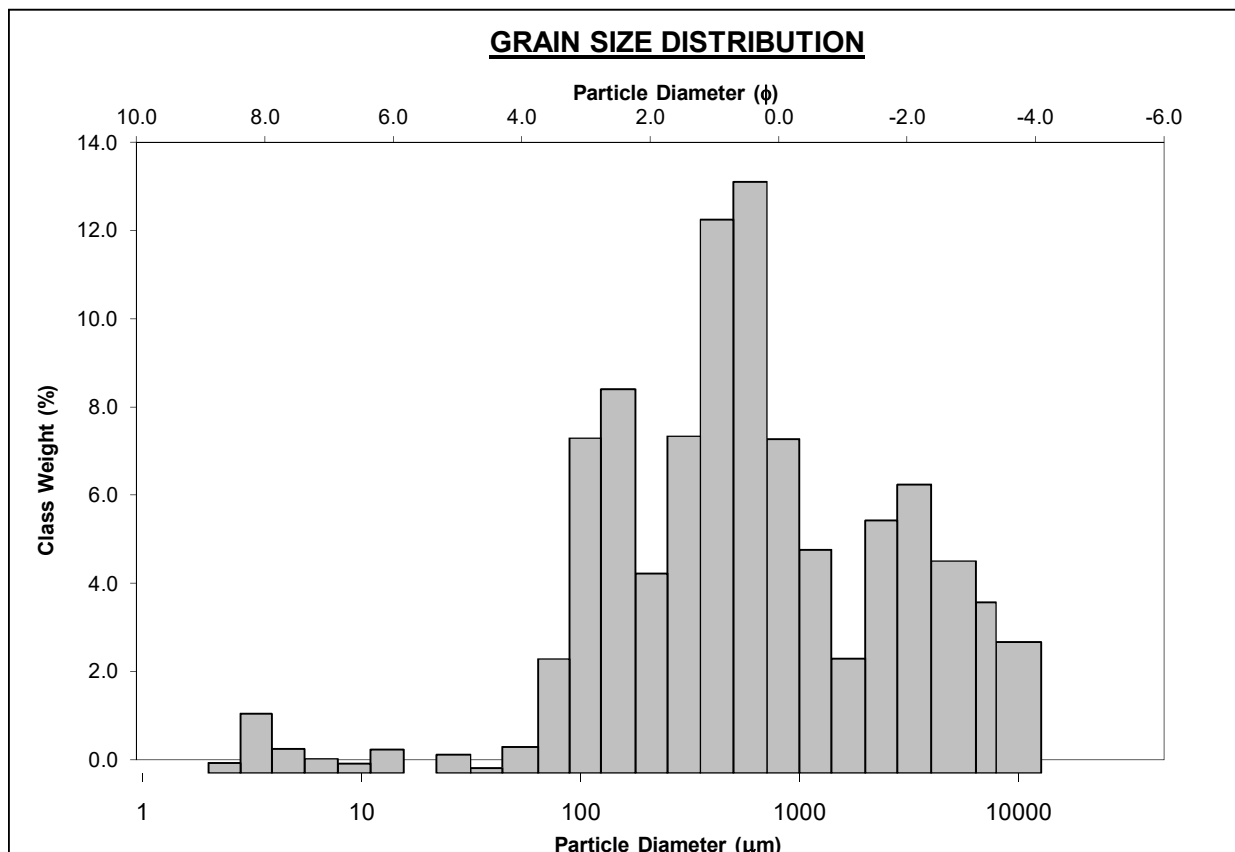
APPENDIX F PARTICLE SIZE ANALYSIS

SAMPLE STATISTICS						
SAMPLE IDENTITY: ENV-31			ANALYST & DATE: 8/10/2018			
SAMPLE TYPE: Bimodal, Poorly Sorted			TEXTURAL GROUP: Sandy Gravel			
SEDIMENT NAME: Sandy Fine Gravel						
	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	5200.0	-2.339	GRAVEL: 53.7%		COARSE SAND: 21.4%	
MODE 2:	605.0	0.747	SAND: 45.1%		MEDIUM SAND: 15.2%	
MODE 3:			MUD: 1.2%		FINE SAND: 1.1%	
D ₁₀ :	381.8	-2.532			V FINE SAND: 0.3%	
MEDIAN or D ₅₀ :	2553.0	-1.352	V COARSE GRAVEL: 0.0%		V COARSE SILT: 0.4%	
D ₉₀ :	5783.6	1.389	COARSE GRAVEL: 0.0%		COARSE SILT: 0.0%	
(D ₉₀ / D ₁₀):	15.15	-0.549	MEDIUM GRAVEL: 2.5%		MEDIUM SILT: 0.0%	
(D ₉₀ - D ₁₀):	5401.7	3.921	FINE GRAVEL: 30.8%		FINE SILT: 0.0%	
(D ₇₅ / D ₂₅):	7.544	-0.331	V FINE GRAVEL: 20.4%		V FINE SILT: 0.1%	
(D ₇₅ - D ₂₅):	3956.8	2.915	V COARSE SAND: 7.0%		CLAY: 0.7%	
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic	Geometric	Logarithmic	Geometric	Logarithmic	Description
	μm	μm	ϕ	μm	ϕ	
MEAN ($\bar{x}$):	2836.9	1633.3	-0.708	1846.2	-0.885	Very Coarse Sand
SORTING (σ):	2364.6	3.525	1.818	2.910	1.541	Poorly Sorted
SKEWNESS (Sk):	0.789	-1.477	1.477	-0.408	0.408	Very Fine Skewed
KURTOSIS (K):	3.368	8.244	8.244	0.621	0.621	Very Platykurtic



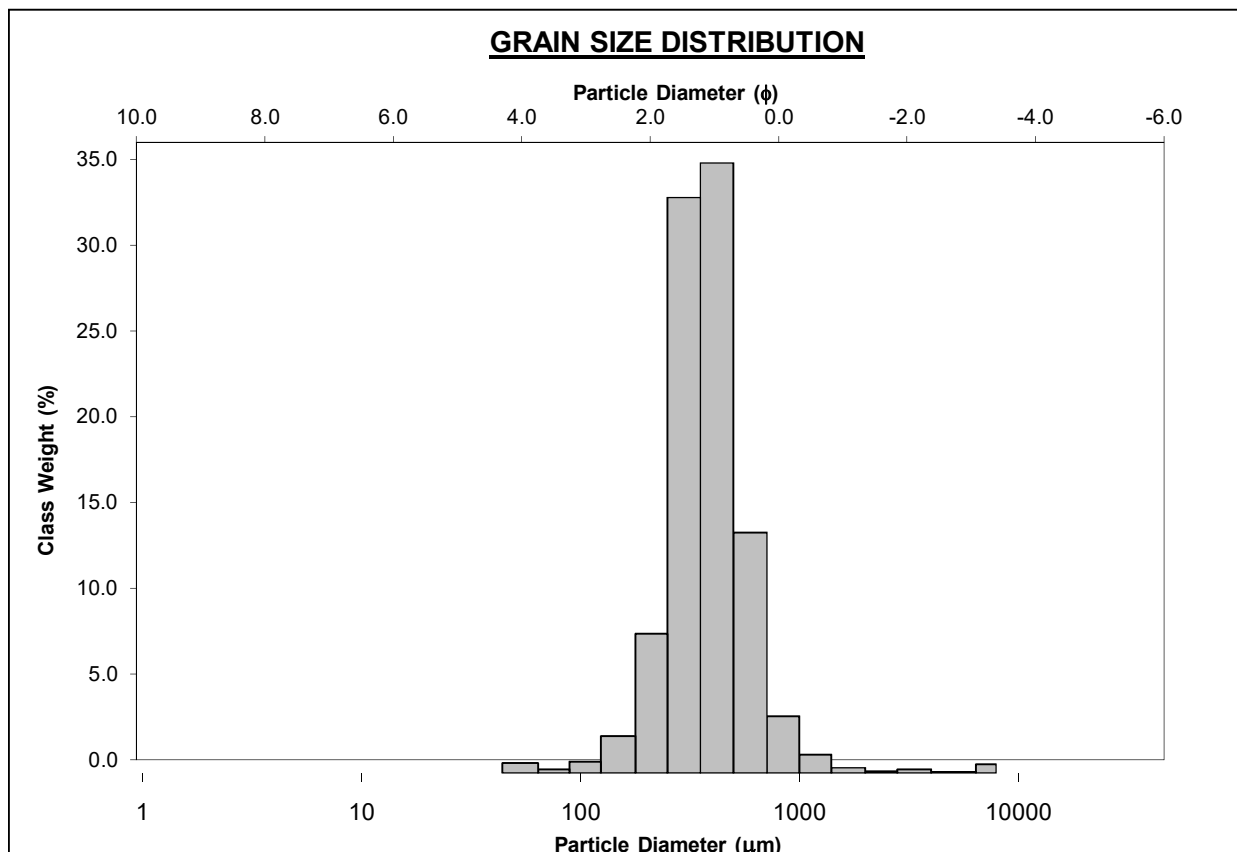
APPENDIX F PARTICLE SIZE ANALYSIS

SAMPLE STATISTICS						
SAMPLE IDENTITY: ENV-32			ANALYST & DATE: 8/10/2018			
SAMPLE TYPE: Trimodal, Very Poorly Sorted			TEXTURAL GROUP: Gravelly Muddy Sand			
SEDIMENT NAME: Very Fine Gravelly Muddy Coarse Sand						
	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	605.0	0.747	GRAVEL: 23.6%		COARSE SAND: 19.7%	
MODE 2:	151.0	2.751	SAND: 67.5%		MEDIUM SAND: 18.9%	
MODE 3:	3400.0	-1.743	MUD: 8.9%		FINE SAND: 12.5%	
D ₁₀ :	74.93	-2.233			V FINE SAND: 9.3%	
MEDIAN or D ₅₀ :	505.6	0.984	V COARSE GRAVEL: 0.0%		V COARSE SILT: 0.7%	
D ₉₀ :	4702.5	3.738	COARSE GRAVEL: 0.0%		COARSE SILT: 0.4%	
(D ₉₀ / D ₁₀):	62.76	-1.674	MEDIUM GRAVEL: 3.7%		MEDIUM SILT: 0.7%	
(D ₉₀ - D ₁₀):	4627.6	5.972	FINE GRAVEL: 8.4%		FINE SILT: 0.8%	
(D ₇₅ / D ₂₅):	9.808	-3.627	V FINE GRAVEL: 11.5%		V FINE SILT: 1.4%	
(D ₇₅ - D ₂₅):	1470.9	3.294	V COARSE SAND: 7.1%		CLAY: 4.9%	
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic	Geometric	Logarithmic	Geometric	Logarithmic	Description
	μm	μm	ϕ	μm	ϕ	
MEAN ($\bar{x}$):	1542.6	425.3	1.234	567.1	0.818	Coarse Sand
SORTING (σ):	2392.2	7.696	2.944	7.764	2.957	Very Poorly Sorted
SKEWNESS (Sk):	2.299	-1.142	1.142	-0.119	0.119	Fine Skewed
KURTOSIS (K):	7.901	4.711	4.711	1.436	1.436	Leptokurtic



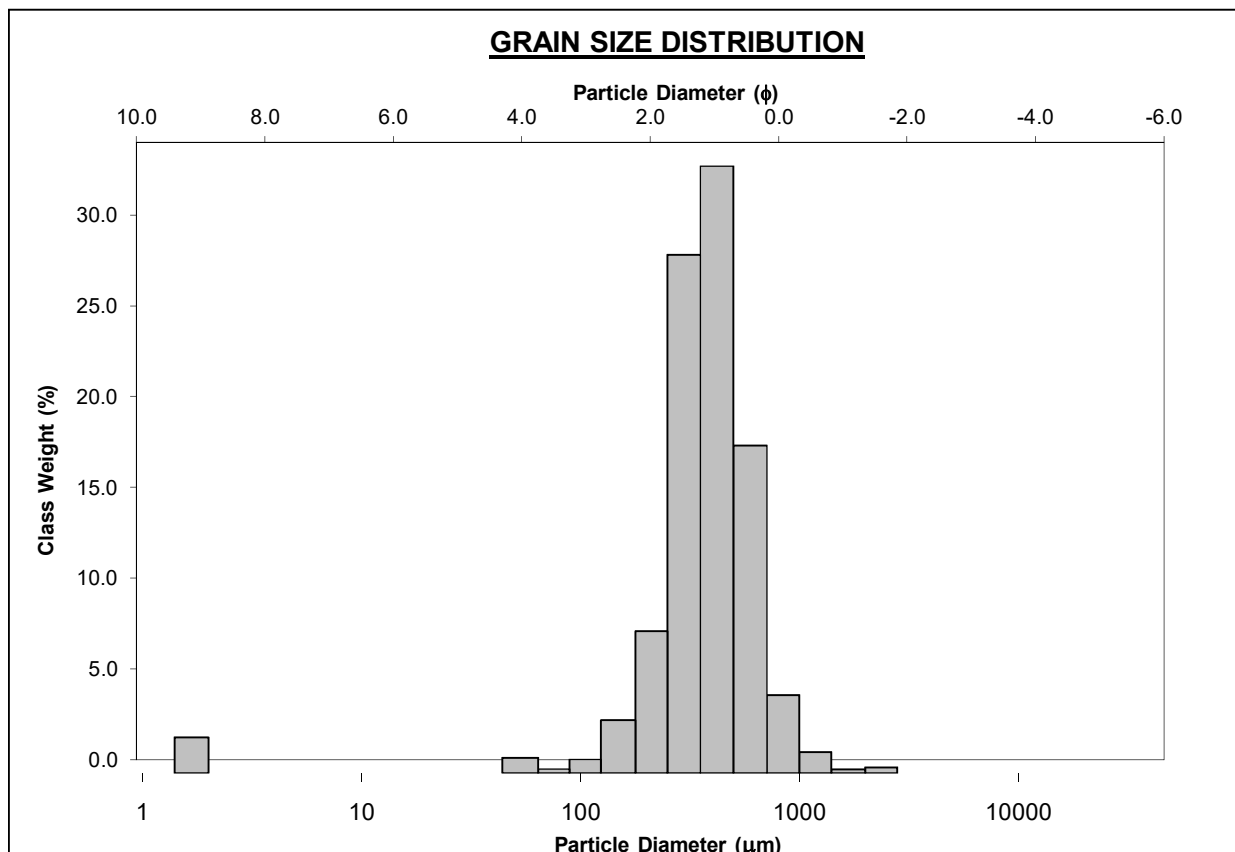
APPENDIX F PARTICLE SIZE ANALYSIS

SAMPLE STATISTICS						
SAMPLE IDENTITY: ENV-33			ANALYST & DATE: 8/10/2018			
SAMPLE TYPE: Unimodal, Moderately Well Sorted			TEXTURAL GROUP: Slightly Gravelly Sand			
SEDIMENT NAME: Slightly Fine Gravelly Medium Sand						
	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	426.5	1.251	GRAVEL: 0.7%			
MODE 2:			SAND: 97.2%			
MODE 3:			MUD: 2.1%			
D ₁₀ :	220.4	0.669	COARSE SAND: 17.1%			
MEDIAN or D ₅₀ :	367.7	1.443	MEDIUM SAND: 67.7%			
D ₉₀ :	629.0	2.182	FINE SAND: 10.2%			
(D ₉₀ / D ₁₀):	2.854	3.262	V FINE SAND: 0.9%			
(D ₉₀ - D ₁₀):	408.6	1.513	V COARSE GRAVEL: 0.0%			
(D ₇₅ / D ₂₅):	1.665	1.678	COARSE GRAVEL: 0.0%			
(D ₇₅ - D ₂₅):	188.3	0.736	MEDIUM GRAVEL: 0.0%			
			FINE GRAVEL: 0.4%			
			V FINE GRAVEL: 0.3%			
			V COARSE SAND: 1.3%			
			CLAY: 1.5%			
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic μm	Geometric μm	Logarithmic ϕ	Geometric μm	Logarithmic ϕ	Description
MEAN ($\bar{x}$):	434.2	343.4	1.542	371.3	1.429	Medium Sand
SORTING (σ):	464.6	2.327	1.218	1.493	0.578	Moderately Well Sorted
SKEWNESS (Sk):	10.83	-4.345	4.345	-0.002	0.002	Symmetrical
KURTOSIS (K):	146.0	31.85	31.85	1.143	1.143	Leptokurtic



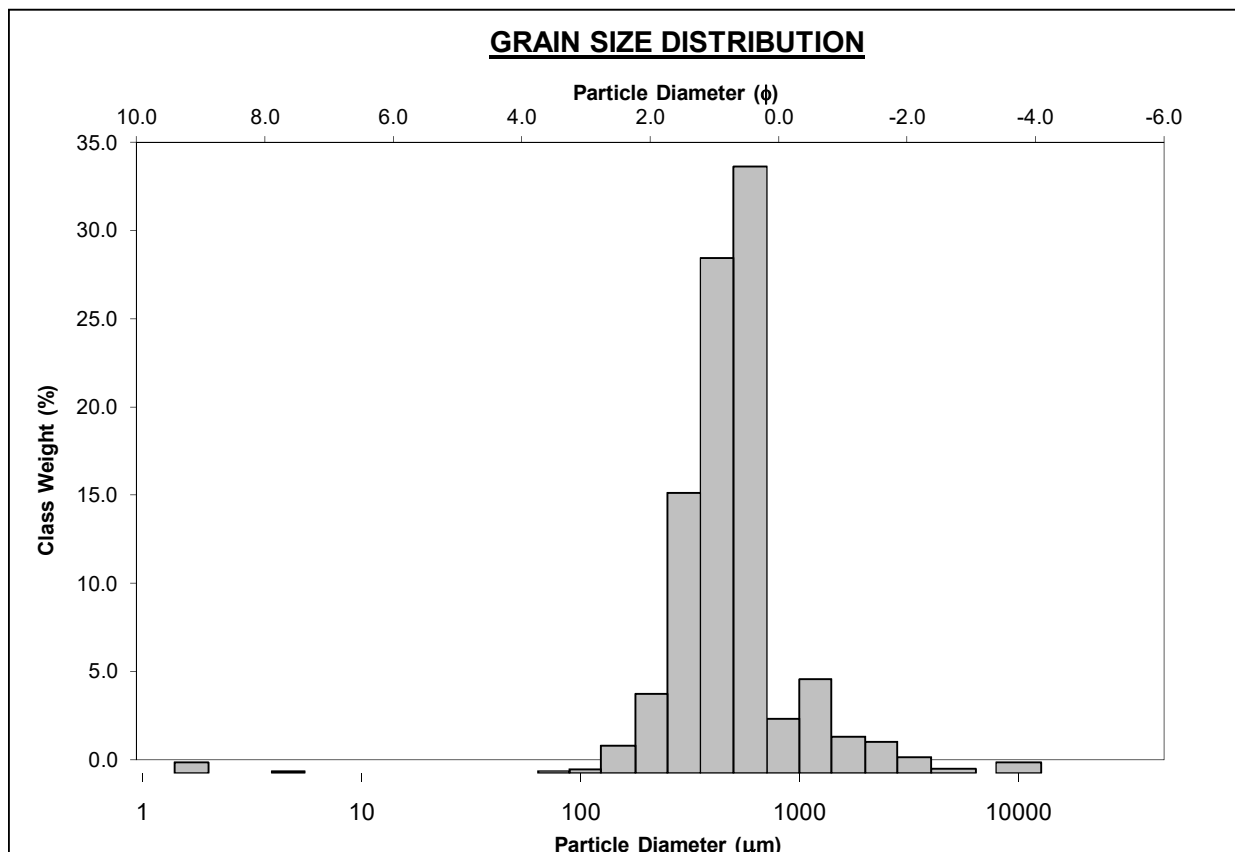
APPENDIX F PARTICLE SIZE ANALYSIS

SAMPLE STATISTICS						
SAMPLE IDENTITY: ENV-34			ANALYST & DATE: 8/10/2018			
SAMPLE TYPE: Unimodal, Moderately Well Sorted			TEXTURAL GROUP: Slightly Gravelly Sand			
SEDIMENT NAME: Slightly Very Fine Gravelly Medium Sand						
	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	426.5	1.251	GRAVEL: 0.3% COARSE SAND: 22.3%			
MODE 2:			SAND: 96.9% MEDIUM SAND: 61.5%			
MODE 3:			MUD: 2.8% FINE SAND: 10.8%			
D ₁₀ :	205.4	0.611	V FINE SAND: 1.0%			
MEDIAN or D ₅₀ :	380.6	1.394	V COARSE GRAVEL: 0.0% V COARSE SILT: 0.8%			
D ₉₀ :	654.5	2.283	COARSE GRAVEL: 0.0% COARSE SILT: 0.0%			
(D ₉₀ / D ₁₀):	3.186	3.734	MEDIUM GRAVEL: 0.0% MEDIUM SILT: 0.0%			
(D ₉₀ - D ₁₀):	449.1	1.672	FINE GRAVEL: 0.0% FINE SILT: 0.0%			
(D ₇₅ / D ₂₅):	1.741	1.787	V FINE GRAVEL: 0.3% V FINE SILT: 0.1%			
(D ₇₅ - D ₂₅):	210.4	0.800	V COARSE SAND: 1.3% CLAY: 1.9%			
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic μm	Geometric μm	Logarithmic ϕ	Geometric μm	Logarithmic ϕ	Description
MEAN ($\bar{x}$):	419.0	339.6	1.558	383.5	1.383	Medium Sand
SORTING (σ):	225.7	2.437	1.285	1.584	0.663	Moderately Well Sorted
SKEWNESS (Sk):	2.918	-4.223	4.223	-0.073	0.073	Symmetrical
KURTOSIS (K):	22.61	25.77	25.77	1.231	1.231	Leptokurtic



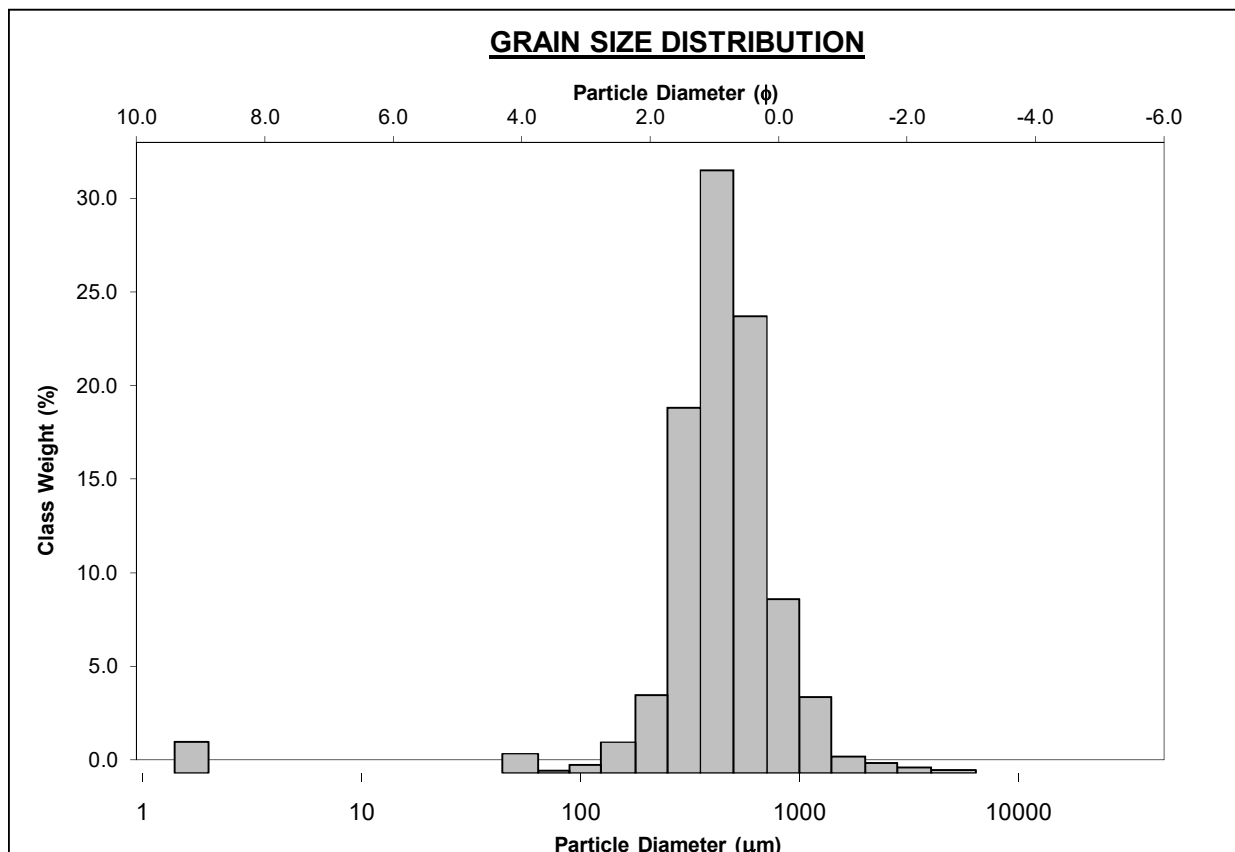
APPENDIX F PARTICLE SIZE ANALYSIS

SAMPLE STATISTICS						
SAMPLE IDENTITY: ENV-35			ANALYST & DATE: 8/10/2018			
SAMPLE TYPE: Bimodal, Moderately Sorted			TEXTURAL GROUP: Slightly Gravelly Sand			
SEDIMENT NAME: Slightly Very Fine Gravelly Medium Sand						
	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	605.0	0.747	GRAVEL: 3.7% COARSE SAND: 37.4%			
MODE 2:	1200.0	-0.243	SAND: 95.6% MEDIUM SAND: 44.6%			
MODE 3:			MUD: 0.7% FINE SAND: 6.0%			
D ₁₀ :	266.6	-0.086	V FINE SAND: 0.3%			
MEDIAN or D ₅₀ :	489.9	1.029	V COARSE GRAVEL: 0.0% V COARSE SILT: 0.0%			
D ₉₀ :	1061.2	1.907	COARSE GRAVEL: 0.0% COARSE SILT: 0.0%			
(D ₉₀ / D ₁₀):	3.980	-22.261	MEDIUM GRAVEL: 0.8% MEDIUM SILT: 0.0%			
(D ₉₀ - D ₁₀):	794.5	1.993	FINE GRAVEL: 0.3% FINE SILT: 0.1%			
(D ₇₅ / D ₂₅):	1.747	2.225	V FINE GRAVEL: 2.6% V FINE SILT: 0.0%			
(D ₇₅ - D ₂₅):	271.2	0.805	V COARSE SAND: 7.2% CLAY: 0.6%			
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic μm	Geometric μm	Logarithmic ϕ	Geometric μm	Logarithmic ϕ	Description
MEAN ($\bar{x}$):	683.2	493.1	1.020	469.7	1.090	Medium Sand
SORTING (σ):	1008.2	2.144	1.100	1.667	0.737	Moderately Sorted
SKEWNESS (Sk):	7.479	-1.872	1.872	0.013	-0.013	Symmetrical
KURTOSIS (K):	68.09	23.32	23.32	1.477	1.477	Leptokurtic



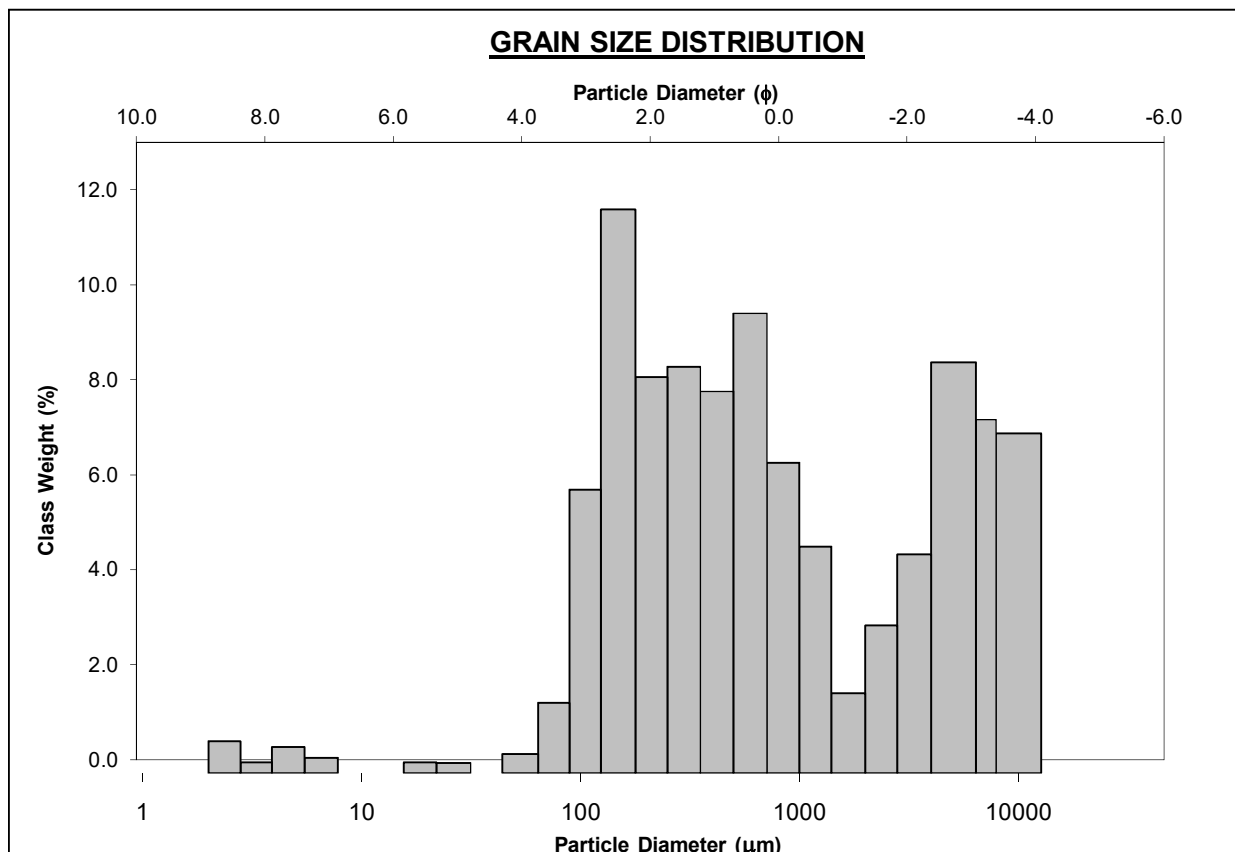
APPENDIX F PARTICLE SIZE ANALYSIS

SAMPLE STATISTICS						
SAMPLE IDENTITY: ENV-36			ANALYST & DATE: 8/10/2018			
SAMPLE TYPE: Unimodal, Moderately Sorted			TEXTURAL GROUP: Slightly Gravelly Sand			
SEDIMENT NAME: Slightly Very Fine Gravelly Medium Sand						
	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	426.5	1.251	GRAVEL: 1.0%		COARSE SAND: 33.6%	
MODE 2:			SAND: 96.3%		MEDIUM SAND: 51.4%	
MODE 3:			MUD: 2.7%		FINE SAND: 5.9%	
D ₁₀ :	253.5	0.228			V FINE SAND: 0.6%	
MEDIAN or D ₅₀ :	445.7	1.166	V COARSE GRAVEL: 0.0%		V COARSE SILT: 1.0%	
D ₉₀ :	853.8	1.980	COARSE GRAVEL: 0.0%		COARSE SILT: 0.0%	
(D ₉₀ / D ₁₀):	3.368	8.682	MEDIUM GRAVEL: 0.0%		MEDIUM SILT: 0.0%	
(D ₉₀ - D ₁₀):	600.3	1.752	FINE GRAVEL: 0.2%		FINE SILT: 0.0%	
(D ₇₅ / D ₂₅):	1.853	2.267	V FINE GRAVEL: 0.8%		V FINE SILT: 0.1%	
(D ₇₅ - D ₂₅):	282.9	0.890	V COARSE SAND: 4.8%		CLAY: 1.6%	
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic	Geometric	Logarithmic	Geometric	Logarithmic	Description
	μm	μm	ϕ	μm	ϕ	
MEAN ($\bar{x}$):	528.6	413.6	1.274	444.7	1.169	Medium Sand
SORTING (σ):	393.6	2.461	1.299	1.647	0.719	Moderately Sorted
SKEWNESS (Sk):	5.386	-3.824	3.824	-0.015	0.015	Symmetrical
KURTOSIS (K):	51.97	24.65	24.65	1.193	1.193	Leptokurtic



APPENDIX F PARTICLE SIZE ANALYSIS

SAMPLE STATISTICS						
SAMPLE IDENTITY: ENV-38			ANALYST & DATE: 8/10/2018			
SAMPLE TYPE: Polymodal, Very Poorly Sorted			TEXTURAL GROUP: Sandy Gravel			
SEDIMENT NAME: Sandy Fine Gravel						
	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	151.0	2.751	GRAVEL: 31.4%		COARSE SAND: 15.1%	
MODE 2:	605.0	0.747	SAND: 62.1%		MEDIUM SAND: 15.4%	
MODE 3:	5200.0	-2.339	MUD: 6.5%		FINE SAND: 18.8%	
D ₁₀ :	102.1	-2.917			V FINE SAND: 6.9%	
MEDIAN or D ₅₀ :	548.4	0.867	V COARSE GRAVEL: 0.0%		V COARSE SILT: 0.4%	
D ₉₀ :	7551.5	3.291	COARSE GRAVEL: 0.0%		COARSE SILT: 0.4%	
(D ₉₀ / D ₁₀):	73.94	-1.128	MEDIUM GRAVEL: 8.9%		MEDIUM SILT: 0.0%	
(D ₉₀ - D ₁₀):	7449.3	6.208	FINE GRAVEL: 15.3%		FINE SILT: 0.8%	
(D ₇₅ / D ₂₅):	20.69	-1.293	V FINE GRAVEL: 7.2%		V FINE SILT: 0.8%	
(D ₇₅ - D ₂₅):	3567.6	4.371	V COARSE SAND: 5.9%		CLAY: 4.1%	
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic	Geometric	Logarithmic	Geometric	Logarithmic	Description
	μm	μm	ϕ	μm	ϕ	
MEAN ($\bar{x}$):	2302.9	582.3	0.780	751.5	0.412	Coarse Sand
SORTING (σ):	3213.8	8.055	3.010	8.245	3.044	Very Poorly Sorted
SKEWNESS (Sk):	1.473	-0.958	0.958	-0.002	0.002	Symmetrical
KURTOSIS (K):	3.878	4.445	4.445	1.050	1.050	Mesokurtic



APPENDIX F PARTICLE SIZE ANALYSIS

SAMPLE STATISTICS

SAMPLE IDENTITY: **ENV-39**

ANALYST & DATE: 12/21/2018

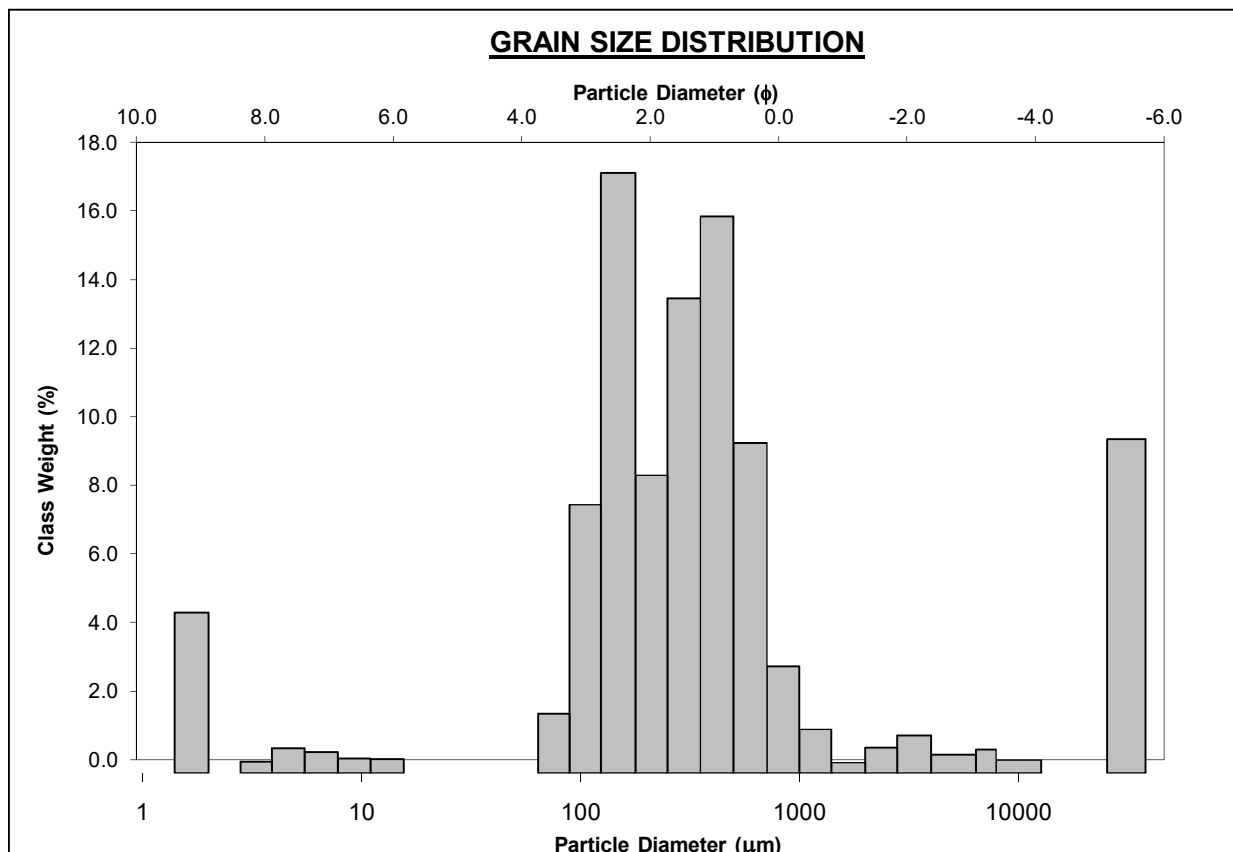
SAMPLE TYPE: Polymodal, Very Poorly Sorted

TEXTURAL GROUP: Gravelly Sand

SEDIMENT NAME: Coarse Gravelly Medium Sand

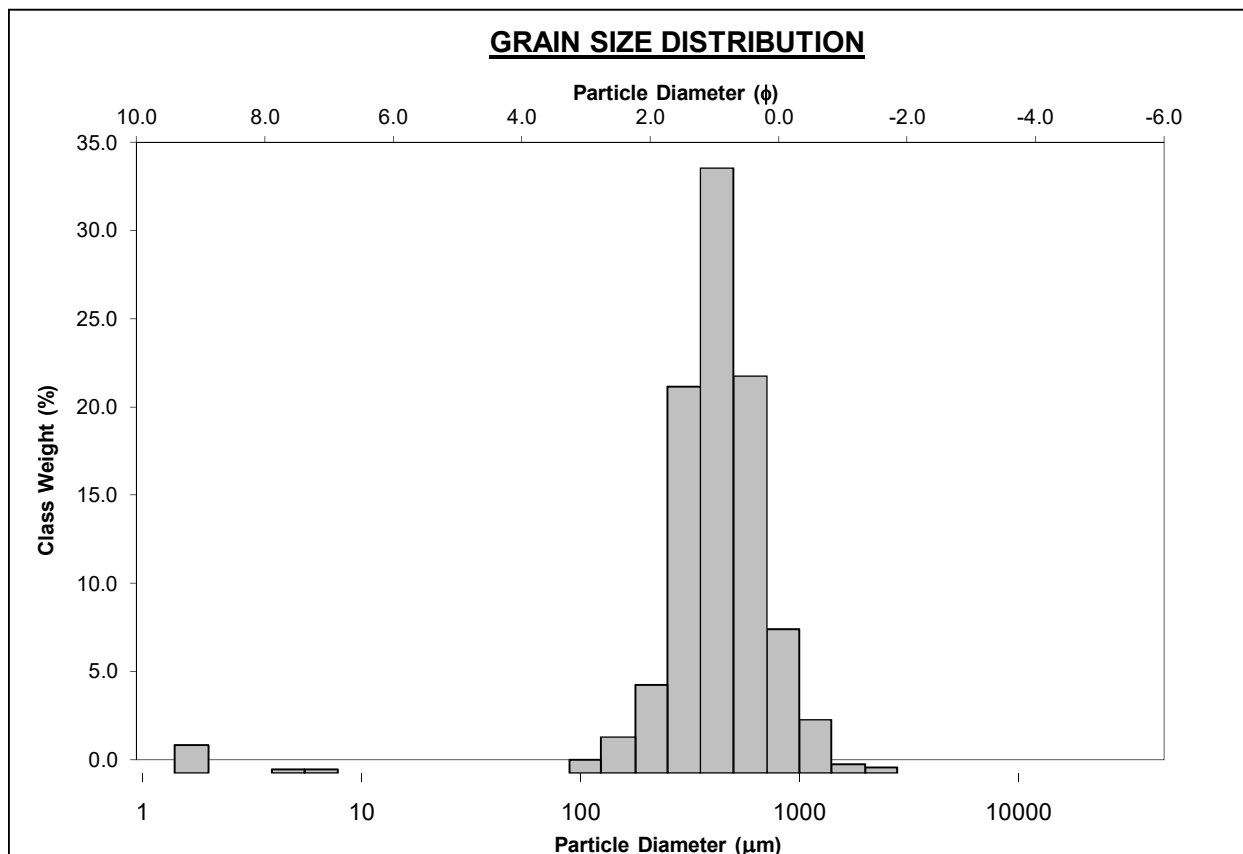
	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	151.0	2.751	GRAVEL: 14.5%	COARSE SAND: 12.5%		
MODE 2:	426.5	1.251	SAND: 78.4%	MEDIUM SAND: 29.3%		
MODE 3:	31750.0	-4.959	MUD: 7.1%	FINE SAND: 25.8%		
D ₁₀ :	94.41	-4.725		V FINE SAND: 9.3%		
MEDIAN or D ₅₀ :	305.7	1.710	V COARSE GRAVEL: 4.8%	V COARSE SILT: 0.0%		
D ₉₀ :	26441.4	3.405	COARSE GRAVEL: 6.3%	COARSE SILT: 0.0%		
(D ₉₀ / D ₁₀):	280.1	-0.721	MEDIUM GRAVEL: 0.5%	MEDIUM SILT: 0.8%		
(D ₉₀ - D ₁₀):	26347.0	8.130	FINE GRAVEL: 1.1%	FINE SILT: 1.3%		
(D ₇₅ / D ₂₅):	3.822	3.377	V FINE GRAVEL: 1.8%	V FINE SILT: 0.6%		
(D ₇₅ - D ₂₅):	420.1	1.934	V COARSE SAND: 1.5%	CLAY: 4.4%		
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic μm	Geometric μm	Logarithmic ϕ	Geometric μm	Logarithmic ϕ	Description
MEAN ($\bar{x}$):	3960.0	361.7	1.467	335.9	1.574	Medium Sand
SORTING (σ):	9871.1	8.473	3.083	6.594	2.721	Very Poorly Sorted
SKEWNESS (Sk):	2.435	0.122	-0.122	0.083	-0.083	Symmetrical
KURTOSIS (K):	6.990	4.401	4.401	2.752	2.752	Very Leptokurtic

GRAIN SIZE DISTRIBUTION



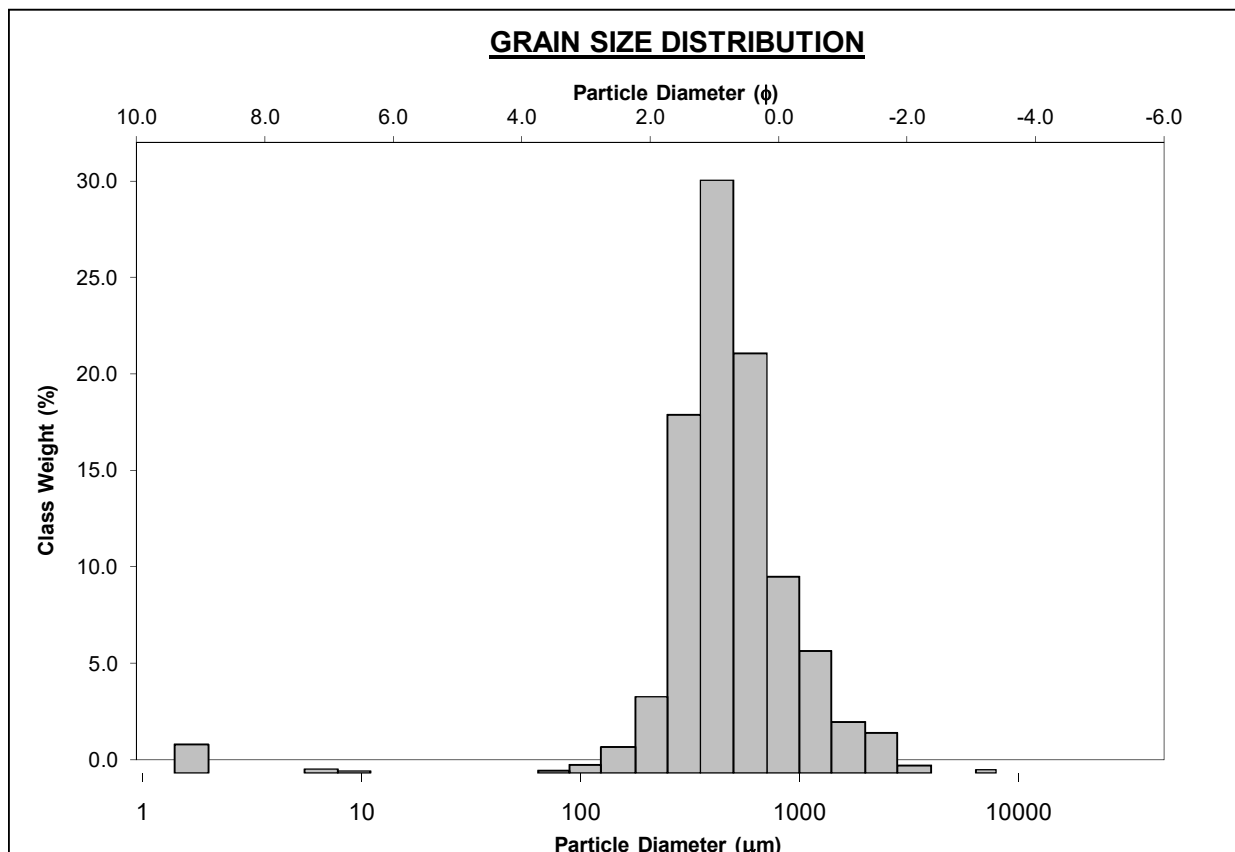
APPENDIX F PARTICLE SIZE ANALYSIS

<u>SAMPLE STATISTICS</u>						
SAMPLE IDENTITY: ENV-40			ANALYST & DATE: 12/21/2018			
SAMPLE TYPE: Unimodal, Moderately Well Sorted			TEXTURAL GROUP: Slightly Gravelly Sand			
SEDIMENT NAME: Slightly Very Fine Gravelly Medium Sand						
	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	426.5	1.251	GRAVEL: 0.3%		COARSE SAND: 30.6%	
MODE 2:			SAND: 97.7%		MEDIUM SAND: 55.8%	
MODE 3:			MUD: 2.0%		FINE SAND: 7.1%	
D ₁₀ :	250.6	0.389			V FINE SAND: 0.7%	
MEDIAN or D ₅₀ :	426.1	1.231	V COARSE GRAVEL: 0.0%		V COARSE SILT: 0.0%	
D ₉₀ :	763.6	1.997	COARSE GRAVEL: 0.0%		COARSE SILT: 0.0%	
(D ₉₀ / D ₁₀):	3.047	5.131	MEDIUM GRAVEL: 0.0%		MEDIUM SILT: 0.0%	
(D ₉₀ - D ₁₀):	513.0	1.607	FINE GRAVEL: 0.0%		FINE SILT: 0.4%	
(D ₇₅ / D ₂₅):	1.815	2.086	V FINE GRAVEL: 0.3%		V FINE SILT: 0.1%	
(D ₇₅ - D ₂₅):	259.4	0.860	V COARSE SAND: 3.4%		CLAY: 1.5%	
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic	Geometric	Logarithmic	Geometric	Logarithmic	Description
	μm	μm	ϕ	μm	ϕ	
MEAN ($\bar{x}$):	481.6	391.7	1.352	427.3	1.227	Medium Sand
SORTING (σ):	259.9	2.392	1.258	1.601	0.679	Moderately Well Sorted
SKEWNESS (Sk):	2.277	-4.277	4.277	-0.014	0.014	Symmetrical
KURTOSIS (K):	13.80	27.13	27.13	1.139	1.139	Leptokurtic



APPENDIX F PARTICLE SIZE ANALYSIS

SAMPLE STATISTICS						
SAMPLE IDENTITY: ENV-41			ANALYST & DATE: 12/21/2018			
SAMPLE TYPE: Unimodal, Moderately Sorted			TEXTURAL GROUP: Slightly Gravelly Sand			
SEDIMENT NAME: Slightly Very Fine Gravelly Medium Sand						
	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	426.5	1.251	GRAVEL: 2.5%		COARSE SAND: 31.9%	
MODE 2:			SAND: 95.7%		MEDIUM SAND: 49.1%	
MODE 3:			MUD: 1.8%		FINE SAND: 5.4%	
D ₁₀ :	261.0	-0.103			V FINE SAND: 0.5%	
MEDIAN or D ₅₀ :	462.9	1.111	V COARSE GRAVEL: 0.0%		V COARSE SILT: 0.0%	
D ₉₀ :	1074.3	1.938	COARSE GRAVEL: 0.0%		COARSE SILT: 0.0%	
(D ₉₀ / D ₁₀):	4.117	-18.734	MEDIUM GRAVEL: 0.0%		MEDIUM SILT: 0.1%	
(D ₉₀ - D ₁₀):	813.4	2.042	FINE GRAVEL: 0.1%		FINE SILT: 0.2%	
(D ₇₅ / D ₂₅):	1.935	2.643	V FINE GRAVEL: 2.4%		V FINE SILT: 0.1%	
(D ₇₅ - D ₂₅):	323.4	0.952	V COARSE SAND: 8.8%		CLAY: 1.4%	
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic	Geometric	Logarithmic	Geometric	Logarithmic	Description
	μm	μm	ϕ	μm	ϕ	
MEAN ($\bar{x}$):	603.5	457.1	1.129	486.4	1.040	Medium Sand
SORTING (σ):	492.2	2.506	1.325	1.762	0.817	Moderately Sorted
SKEWNESS (Sk):	4.355	-3.423	3.423	0.144	-0.144	Coarse Skewed
KURTOSIS (K):	39.93	22.78	22.78	1.225	1.225	Leptokurtic



APPENDIX F PARTICLE SIZE ANALYSIS

SAMPLE STATISTICS

SAMPLE IDENTITY: **ENV-42**

ANALYST & DATE: 9/14/2018

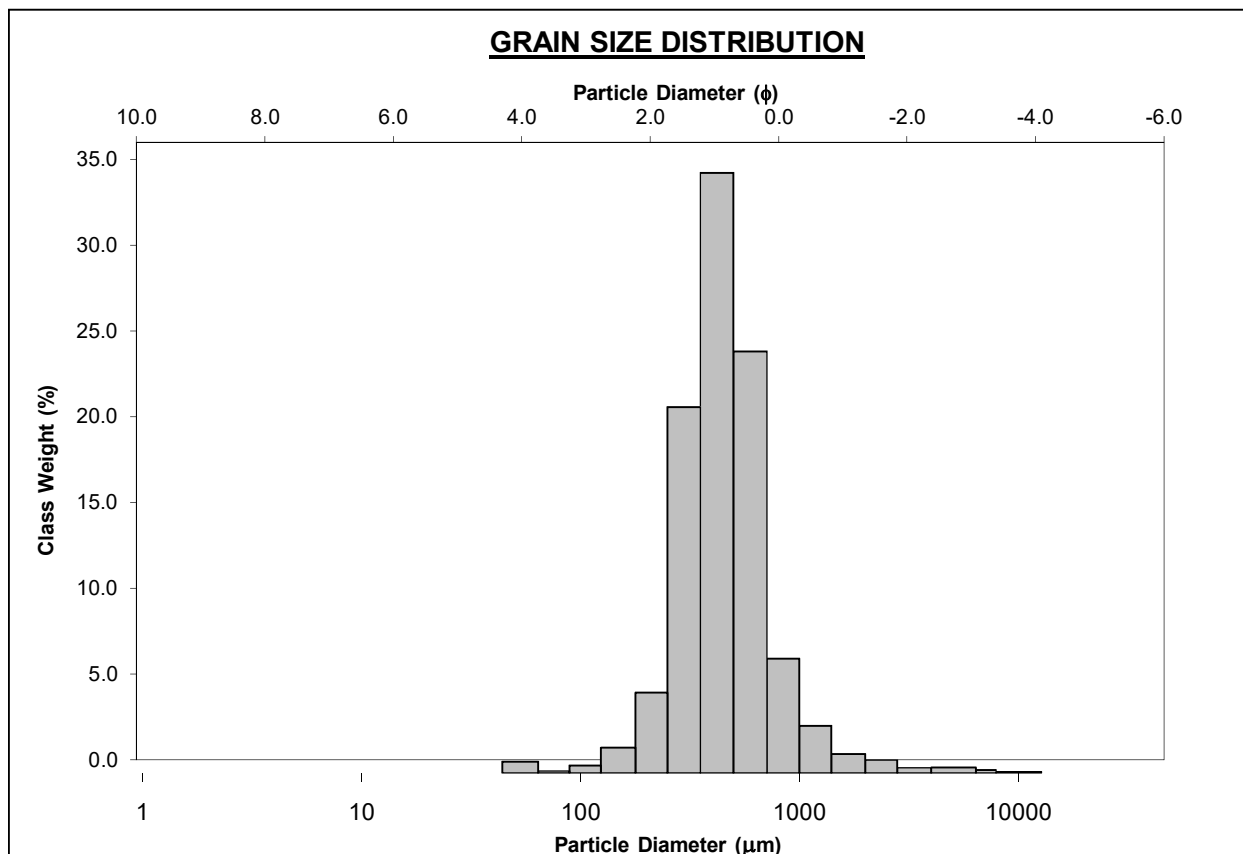
SAMPLE TYPE: Unimodal, Moderately Well Sorted

TEXTURAL GROUP: Slightly Gravelly Sand

SEDIMENT NAME: Slightly Very Fine Gravelly Medium Sand

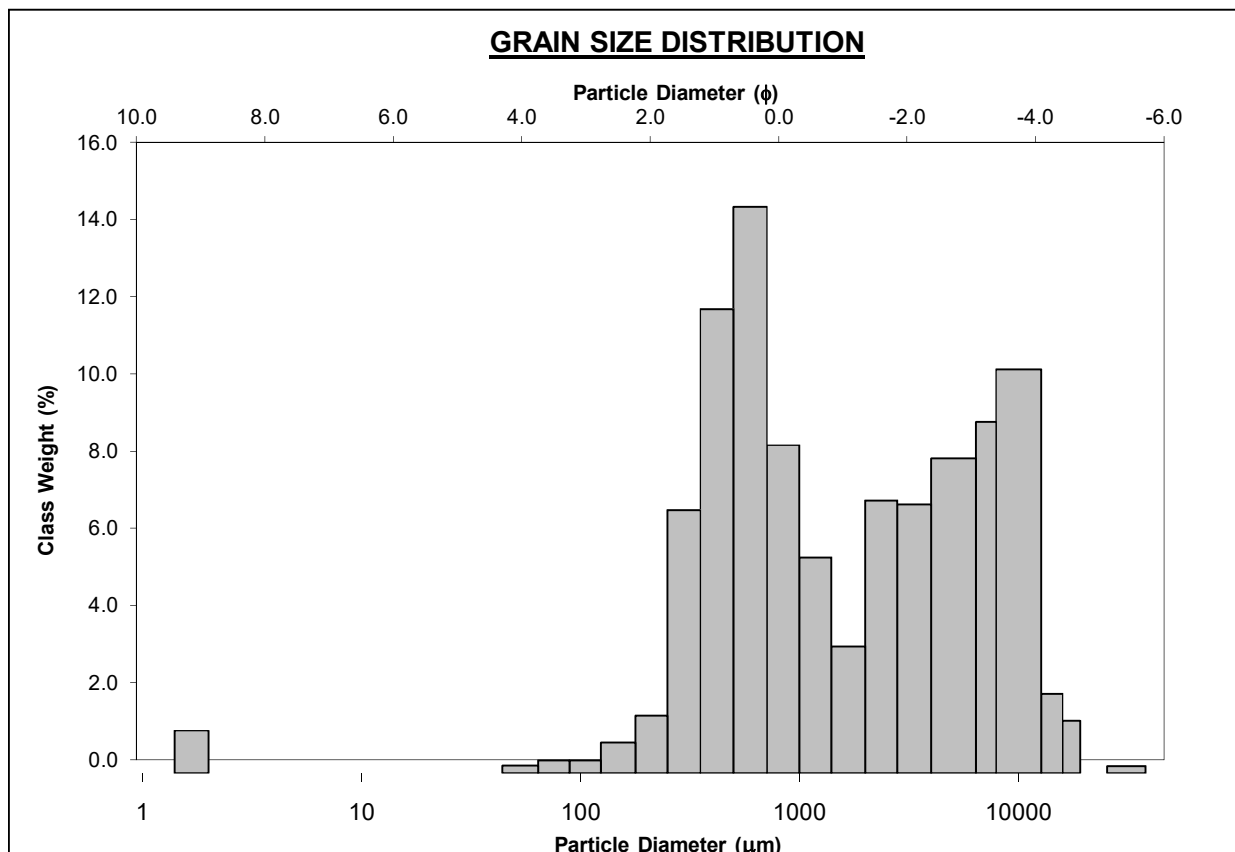
	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	426.5	1.251	GRAVEL: 1.6%	COARSE SAND: 30.6%		
MODE 2:			SAND: 95.8%	MEDIUM SAND: 54.9%		
MODE 3:			MUD: 2.6%	FINE SAND: 6.1%		
D ₁₀ :	253.2	0.363		V FINE SAND: 0.6%		
MEDIAN or D ₅₀ :	433.1	1.207	V COARSE GRAVEL: 0.0%	V COARSE SILT: 0.7%		
D ₉₀ :	777.6	1.982	COARSE GRAVEL: 0.0%	COARSE SILT: 0.0%		
(D ₉₀ / D ₁₀):	3.071	5.461	MEDIUM GRAVEL: 0.1%	MEDIUM SILT: 0.0%		
(D ₉₀ - D ₁₀):	524.4	1.619	FINE GRAVEL: 0.5%	FINE SILT: 0.0%		
(D ₇₅ / D ₂₅):	1.800	2.098	V FINE GRAVEL: 1.0%	V FINE SILT: 0.0%		
(D ₇₅ - D ₂₅):	260.3	0.848	V COARSE SAND: 3.7%	CLAY: 1.9%		
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic μm	Geometric μm	Logarithmic ϕ	Geometric μm	Logarithmic ϕ	Description
MEAN ($\bar{x}$):	537.6	400.9	1.319	432.4	1.209	Medium Sand
SORTING (σ):	582.7	2.643	1.402	1.616	0.692	Moderately Well Sorted
SKEWNESS (Sk):	8.885	-3.905	3.905	0.002	-0.002	Symmetrical
KURTOSIS (K):	114.5	25.53	25.53	1.209	1.209	Leptokurtic

GRAIN SIZE DISTRIBUTION



APPENDIX F PARTICLE SIZE ANALYSIS

SAMPLE STATISTICS						
SAMPLE IDENTITY: ENV-43			ANALYST & DATE: 12/21/2018			
SAMPLE TYPE: Trimodal, Poorly Sorted			TEXTURAL GROUP: Sandy Gravel			
SEDIMENT NAME: Sandy Fine Gravel						
	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	605.0	0.747	GRAVEL: 46.1%		COARSE SAND: 22.7%	
MODE 2:	10300.0	-3.324	SAND: 52.6%		MEDIUM SAND: 18.4%	
MODE 3:	2400.0	-1.243	MUD: 1.3%		FINE SAND: 2.3%	
D ₁₀ :	338.6	-3.285			V FINE SAND: 0.6%	
MEDIAN or D ₅₀ :	1347.7	-0.430	V COARSE GRAVEL: 0.1%		V COARSE SILT: 0.2%	
D ₉₀ :	9748.4	1.562	COARSE GRAVEL: 0.8%		COARSE SILT: 0.0%	
(D ₉₀ / D ₁₀):	28.79	-0.476	MEDIUM GRAVEL: 15.0%		MEDIUM SILT: 0.0%	
(D ₉₀ - D ₁₀):	9409.8	4.848	FINE GRAVEL: 16.6%		FINE SILT: 0.0%	
(D ₇₅ / D ₂₅):	10.42	-0.372	V FINE GRAVEL: 13.7%		V FINE SILT: 0.1%	
(D ₇₅ - D ₂₅):	4989.9	3.381	V COARSE SAND: 8.6%		CLAY: 1.0%	
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic	Geometric	Logarithmic	Geometric	Logarithmic	Description
	μm	μm	ϕ	μm	ϕ	
MEAN ($\bar{x}$):	3513.3	1541.1	-0.624	1640.0	-0.714	Very Coarse Sand
SORTING (σ):	4064.1	4.373	2.128	3.723	1.897	Poorly Sorted
SKEWNESS (Sk):	1.699	-0.935	0.935	0.166	-0.166	Coarse Skewed
KURTOSIS (K):	7.560	6.107	6.107	0.663	0.663	Very Platykurtic



APPENDIX F PARTICLE SIZE ANALYSIS

SAMPLE STATISTICS

SAMPLE IDENTITY: **ENV-44**

ANALYST & DATE: 12/21/2018

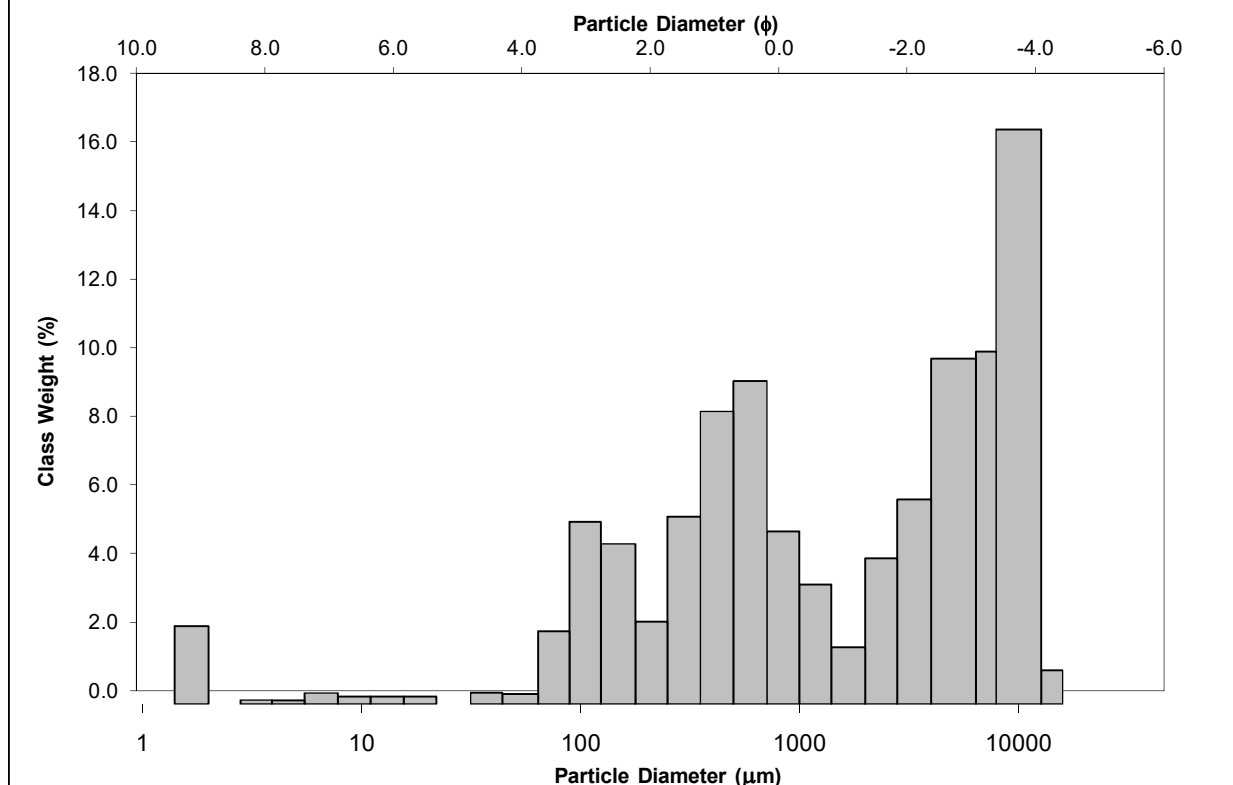
SAMPLE TYPE: Trimodal, Very Poorly Sorted

TEXTURAL GROUP: Sandy Gravel

SEDIMENT NAME: Sandy Medium Gravel

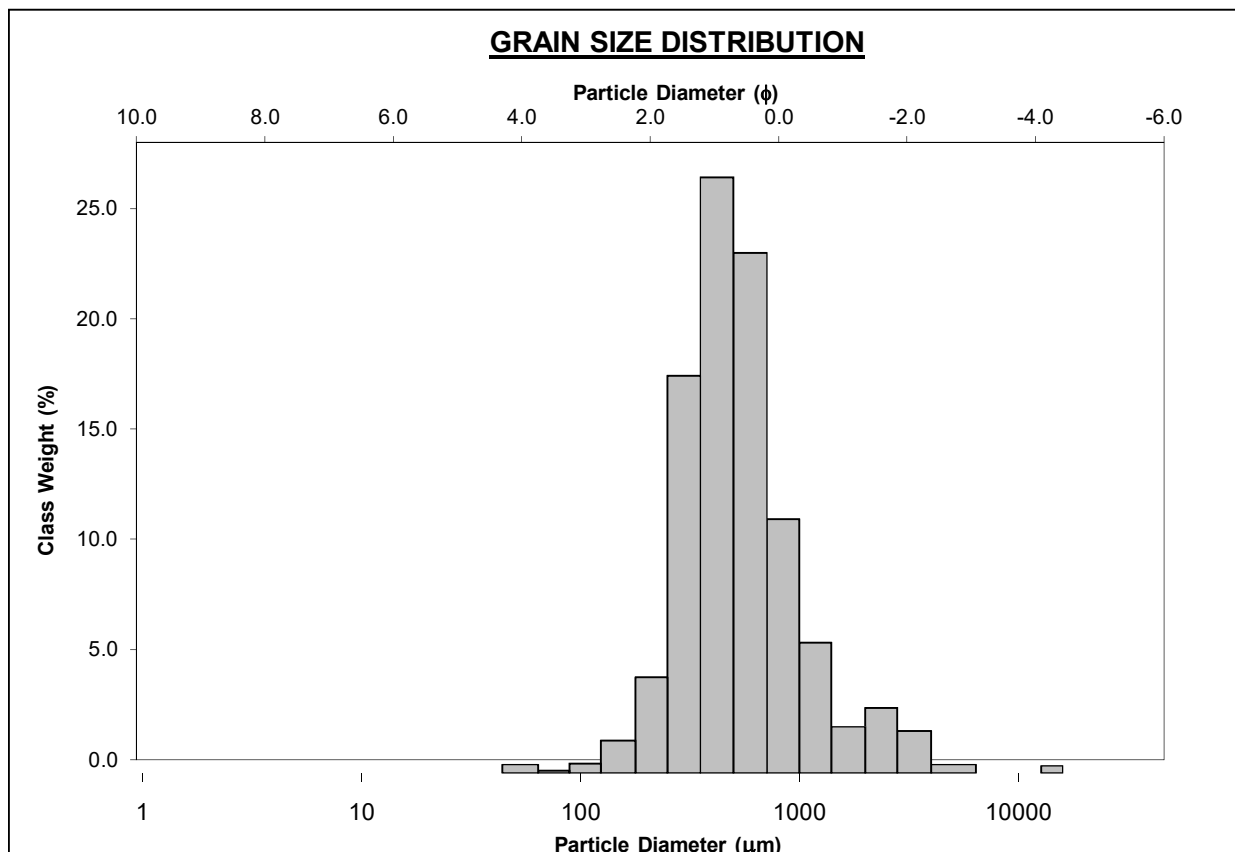
	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	10300.0	-3.324	GRAVEL: 50.8%	COARSE SAND: 13.7%		
MODE 2:	605.0	0.747	SAND: 45.3%	MEDIUM SAND: 13.2%		
MODE 3:	106.5	3.251	MUD: 3.9%	FINE SAND: 6.8%		
D ₁₀ :	119.0	-3.370		V FINE SAND: 6.8%		
MEDIAN or D ₅₀ :	2142.9	-1.100	V COARSE GRAVEL: 0.0%	V COARSE SILT: 0.6%		
D ₉₀ :	10339.3	3.071	COARSE GRAVEL: 0.0%	COARSE SILT: 0.2%		
(D ₉₀ / D ₁₀):	86.91	-0.911	MEDIUM GRAVEL: 21.7%	MEDIUM SILT: 0.4%		
(D ₉₀ - D ₁₀):	10220.4	6.441	FINE GRAVEL: 19.4%	FINE SILT: 0.4%		
(D ₇₅ / D ₂₅):	18.33	-0.476	V FINE GRAVEL: 9.7%	V FINE SILT: 0.2%		
(D ₇₅ - D ₂₅):	6782.9	4.196	V COARSE SAND: 4.8%	CLAY: 2.1%		
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic μm	Geometric μm	Logarithmic ϕ	Geometric μm	Logarithmic ϕ	Description
MEAN ($\bar{x}$):	3933.4	1322.1	-0.403	1575.1	-0.655	Very Coarse Sand
SORTING (σ):	4044.5	6.959	2.799	5.530	2.467	Very Poorly Sorted
SKEWNESS (Sk):	0.657	-1.078	1.078	-0.285	0.285	Fine Skewed
KURTOSIS (K):	1.901	4.352	4.352	0.705	0.705	Platykurtic

GRAIN SIZE DISTRIBUTION



APPENDIX F PARTICLE SIZE ANALYSIS

SAMPLE STATISTICS						
SAMPLE IDENTITY: ENV-45			ANALYST & DATE: 8/10/2018			
SAMPLE TYPE: Unimodal, Moderately Sorted			TEXTURAL GROUP: Gravelly Sand			
SEDIMENT NAME: Very Fine Gravelly Medium Sand						
	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	426.5	1.251	GRAVEL: 5.4%		COARSE SAND: 34.4%	
MODE 2:			SAND: 92.4%		MEDIUM SAND: 44.0%	
MODE 3:			MUD: 2.2%		FINE SAND: 5.8%	
D ₁₀ :	257.5	-0.269			V FINE SAND: 0.6%	
MEDIAN or D ₅₀ :	483.8	1.047	V COARSE GRAVEL: 0.0%		V COARSE SILT: 0.4%	
D ₉₀ :	1204.7	1.957	COARSE GRAVEL: 0.0%		COARSE SILT: 0.0%	
(D ₉₀ / D ₁₀):	4.679	-7.284	MEDIUM GRAVEL: 0.2%		MEDIUM SILT: 0.0%	
(D ₉₀ - D ₁₀):	947.2	2.226	FINE GRAVEL: 0.5%		FINE SILT: 0.0%	
(D ₇₅ / D ₂₅):	2.027	2.993	V FINE GRAVEL: 4.7%		V FINE SILT: 0.0%	
(D ₇₅ - D ₂₅):	355.4	1.019	V COARSE SAND: 7.7%		CLAY: 1.8%	
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic	Geometric	Logarithmic	Geometric	Logarithmic	Description
	μm	μm	ϕ	μm	ϕ	
MEAN ($\bar{x}$):	703.2	476.5	1.069	504.3	0.988	Coarse Sand
SORTING (σ):	897.1	2.849	1.510	1.918	0.939	Moderately Sorted
SKEWNESS (Sk):	8.291	-3.075	3.075	0.165	-0.165	Coarse Skewed
KURTOSIS (K):	110.7	20.52	20.52	1.393	1.393	Leptokurtic



APPENDIX F PARTICLE SIZE ANALYSIS

SAMPLE STATISTICS

SAMPLE IDENTITY: **ENV-46**

ANALYST & DATE: 2/21/2018

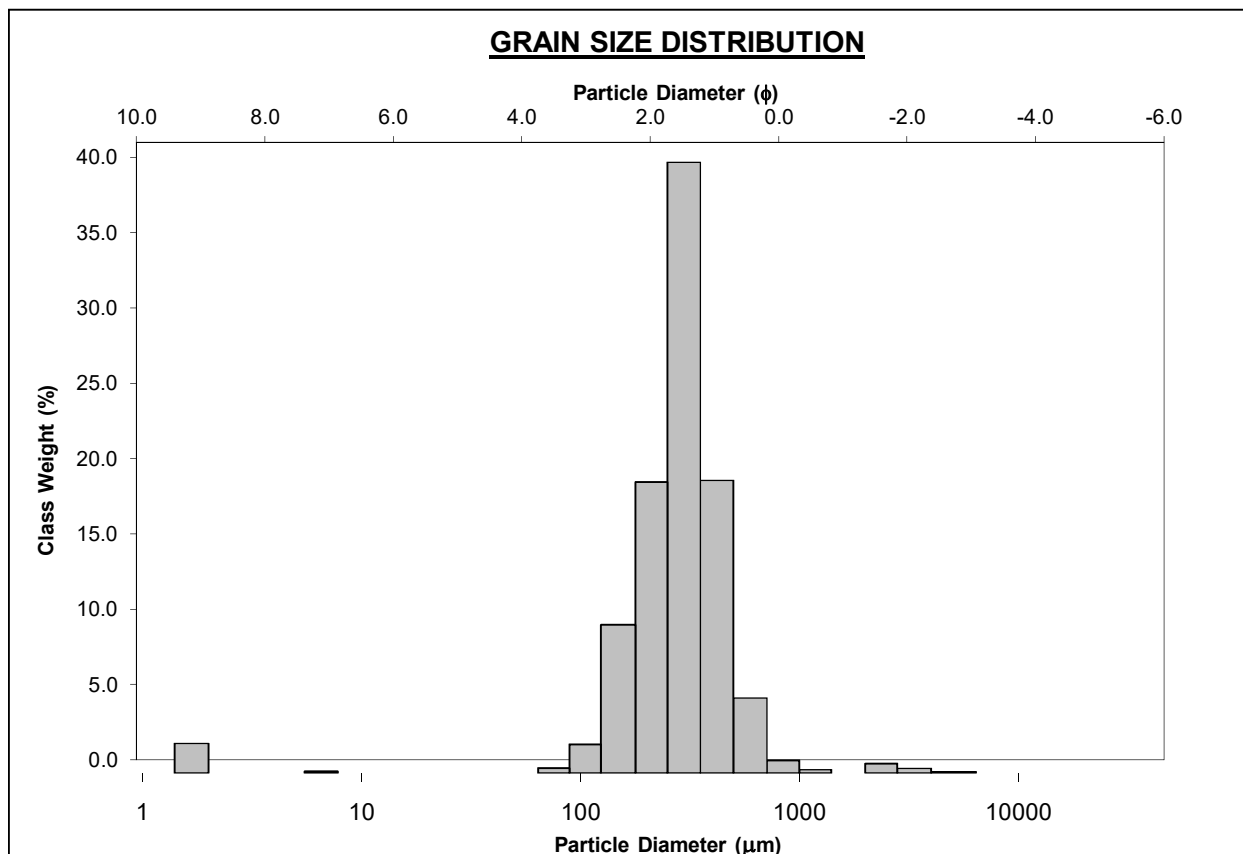
SAMPLE TYPE: Unimodal, Moderately Well Sorted

TEXTURAL GROUP: Slightly Gravelly Sand

SEDIMENT NAME: Slightly Very Fine Gravelly Medium Sand

	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	301.0	1.754	GRAVEL: 1.0%	COARSE SAND: 5.8%		
MODE 2:			SAND: 96.9%	MEDIUM SAND: 59.5%		
MODE 3:			MUD: 2.1%	FINE SAND: 29.0%		
D ₁₀ :	152.3	1.078		V FINE SAND: 2.3%		
MEDIAN or D ₅₀ :	288.2	1.795	V COARSE GRAVEL: 0.0%	V COARSE SILT: 0.0%		
D ₉₀ :	473.8	2.715	COARSE GRAVEL: 0.0%	COARSE SILT: 0.0%		
(D ₉₀ / D ₁₀):	3.111	2.519	MEDIUM GRAVEL: 0.0%	MEDIUM SILT: 0.0%		
(D ₉₀ - D ₁₀):	321.5	1.637	FINE GRAVEL: 0.1%	FINE SILT: 0.1%		
(D ₇₅ / D ₂₅):	1.680	1.510	V FINE GRAVEL: 0.9%	V FINE SILT: 0.1%		
(D ₇₅ - D ₂₅):	146.5	0.748	V COARSE SAND: 0.2%	CLAY: 1.9%		
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic μm	Geometric μm	Logarithmic ϕ	Geometric μm	Logarithmic ϕ	Description
MEAN ($\bar{x}$):	331.5	260.8	1.939	282.2	1.825	Medium Sand
SORTING (σ):	310.6	2.366	1.243	1.551	0.633	Moderately Well Sorted
SKEWNESS (Sk):	8.571	-3.841	3.841	-0.079	0.079	Symmetrical
KURTOSIS (K):	101.0	24.75	24.75	1.191	1.191	Leptokurtic

GRAIN SIZE DISTRIBUTION



APPENDIX F PARTICLE SIZE ANALYSIS

SAMPLE STATISTICS

SAMPLE IDENTITY: **ENV-47**

ANALYST & DATE: 8/10/2018

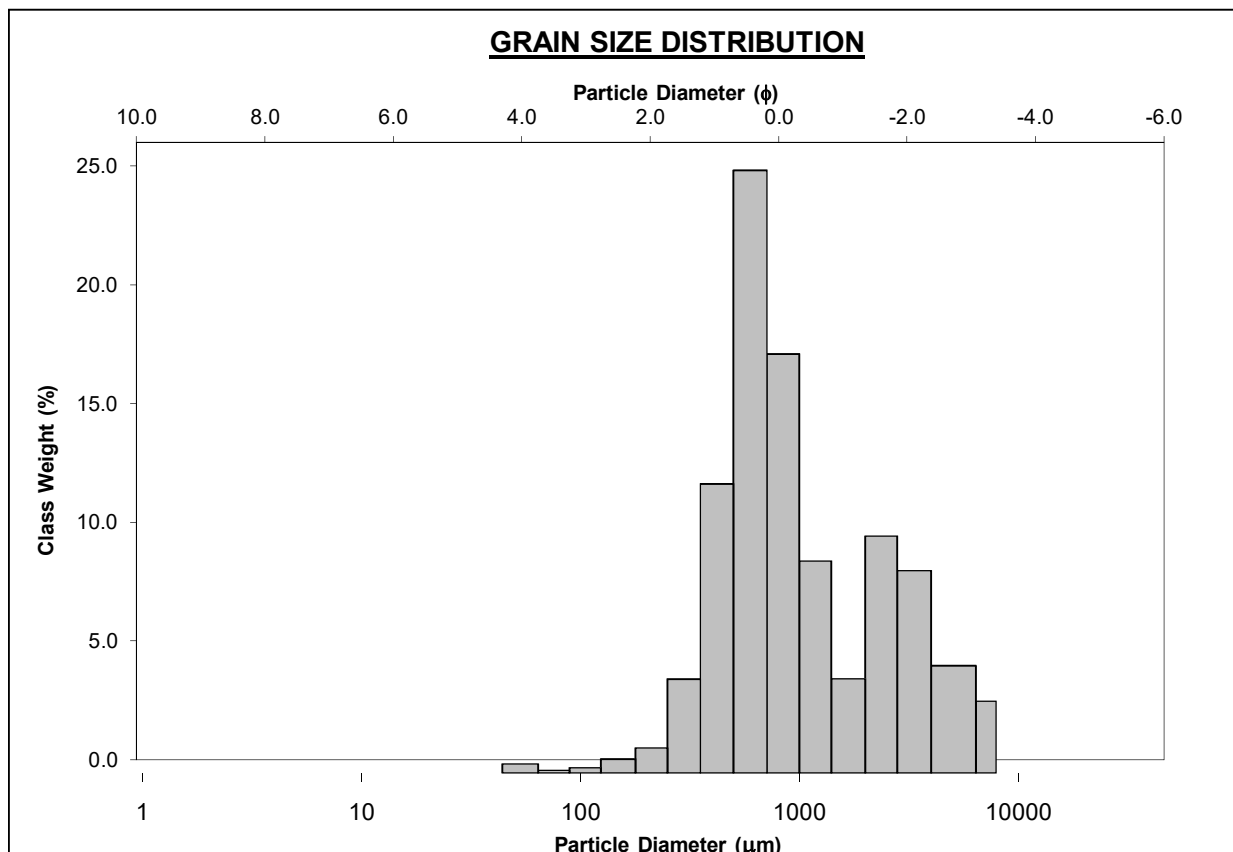
SAMPLE TYPE: Bimodal, Poorly Sorted

TEXTURAL GROUP: Gravelly Sand

SEDIMENT NAME: Very Fine Gravelly Coarse Sand

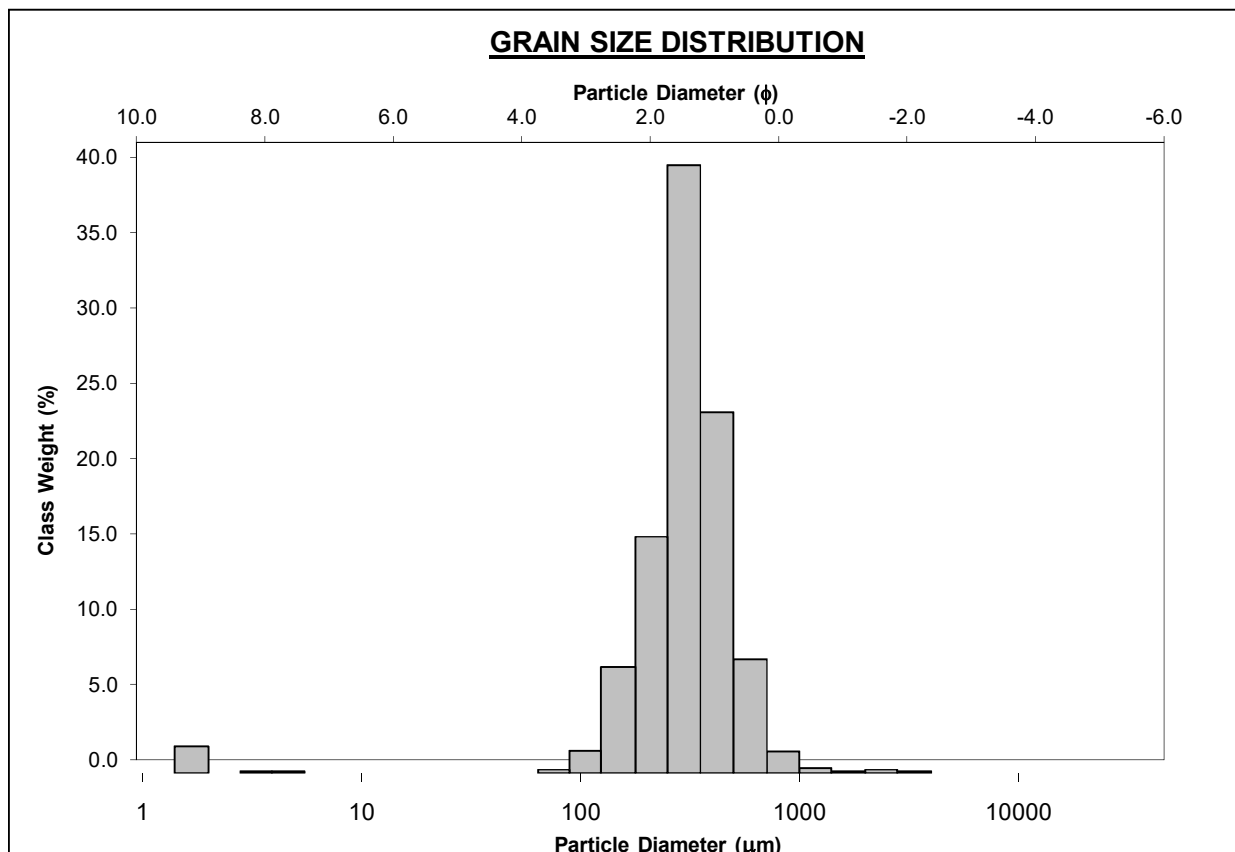
	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	605.0	0.747	GRAVEL: 25.9%	COARSE SAND: 42.3%		
MODE 2:	2400.0	-1.243	SAND: 72.6%	MEDIUM SAND: 15.9%		
MODE 3:			MUD: 1.5%	FINE SAND: 1.6%		
D ₁₀ :	381.8	-1.868		V FINE SAND: 0.3%		
MEDIAN or D ₅₀ :	792.7	0.335	V COARSE GRAVEL: 0.0%	V COARSE SILT: 0.4%		
D ₉₀ :	3651.2	1.389	COARSE GRAVEL: 0.0%	COARSE SILT: 0.0%		
(D ₉₀ / D ₁₀):	9.564	-0.744	MEDIUM GRAVEL: 0.0%	MEDIUM SILT: 0.0%		
(D ₉₀ - D ₁₀):	3269.4	3.258	FINE GRAVEL: 7.8%	FINE SILT: 0.0%		
(D ₇₅ / D ₂₅):	3.815	-0.847	V FINE GRAVEL: 18.1%	V FINE SILT: 0.0%		
(D ₇₅ - D ₂₅):	1523.5	1.932	V COARSE SAND: 12.5%	CLAY: 1.1%		
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic μm	Geometric μm	Logarithmic ϕ	Geometric μm	Logarithmic ϕ	Description
MEAN ($\bar{x}$):	1496.2	924.8	0.113	1008.4	-0.012	Very Coarse Sand
SORTING (σ):	1525.3	3.058	1.612	2.438	1.285	Poorly Sorted
SKEWNESS (Sk):	1.813	-2.068	2.068	0.341	-0.341	Very Coarse Skewed
KURTOSIS (K):	5.807	15.08	15.08	0.873	0.873	Platykurtic

GRAIN SIZE DISTRIBUTION



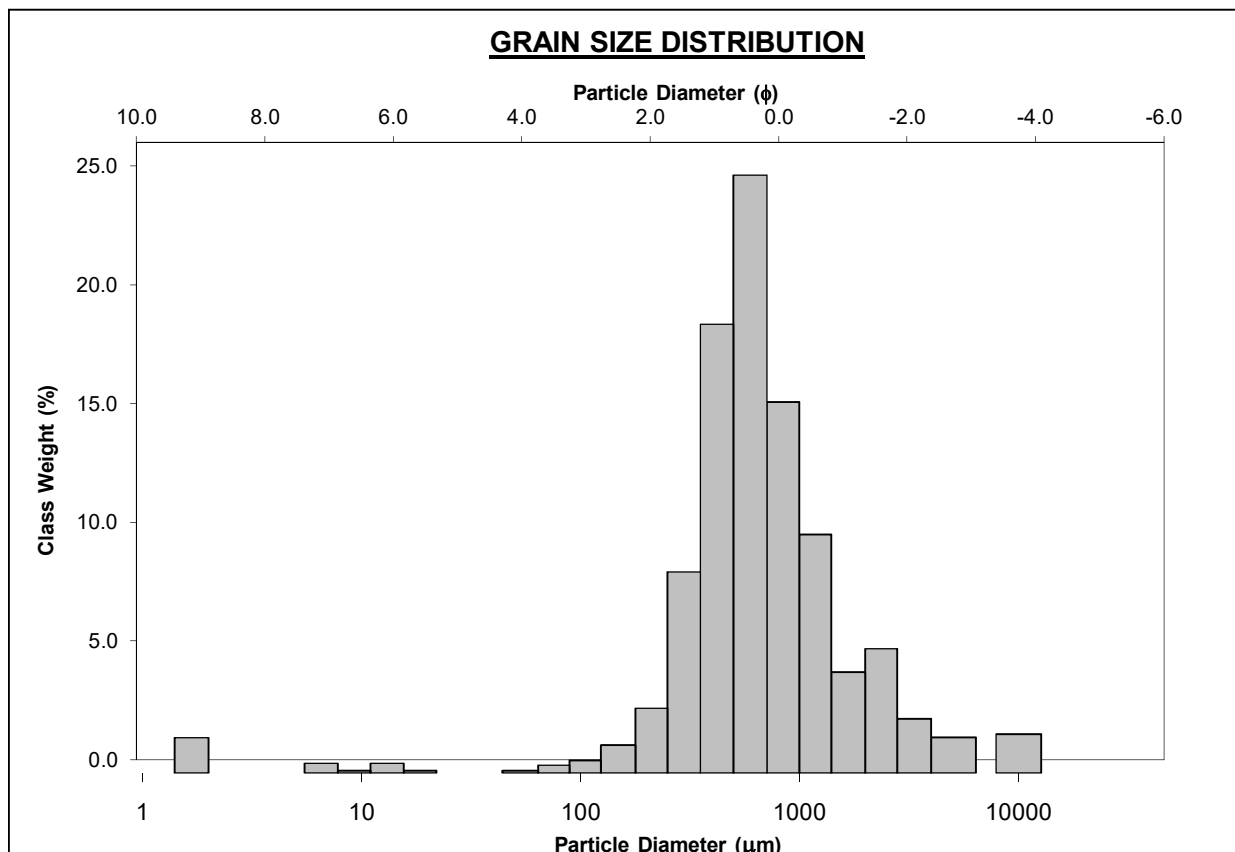
APPENDIX F PARTICLE SIZE ANALYSIS

SAMPLE STATISTICS						
SAMPLE IDENTITY: ENV-48			ANALYST & DATE: 12/21/2018			
SAMPLE TYPE: Unimodal, Moderately Well Sorted			TEXTURAL GROUP: Slightly Gravelly Sand			
SEDIMENT NAME: Slightly Very Fine Gravelly Medium Sand						
	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	301.0	1.754	GRAVEL: 0.3%		COARSE SAND: 9.0%	
MODE 2:			SAND: 97.7%		MEDIUM SAND: 63.8%	
MODE 3:			MUD: 2.0%		FINE SAND: 22.7%	
D ₁₀ :	170.2	1.006			V FINE SAND: 1.8%	
MEDIAN or D ₅₀ :	306.4	1.707	V COARSE GRAVEL: 0.0%		V COARSE SILT: 0.0%	
D ₉₀ :	497.8	2.554	COARSE GRAVEL: 0.0%		COARSE SILT: 0.0%	
(D ₉₀ / D ₁₀):	2.924	2.538	MEDIUM GRAVEL: 0.0%		MEDIUM SILT: 0.0%	
(D ₉₀ - D ₁₀):	327.6	1.548	FINE GRAVEL: 0.0%		FINE SILT: 0.1%	
(D ₇₅ / D ₂₅):	1.643	1.542	V FINE GRAVEL: 0.3%		V FINE SILT: 0.2%	
(D ₇₅ - D ₂₅):	156.6	0.716	V COARSE SAND: 0.4%		CLAY: 1.7%	
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic	Geometric	Logarithmic	Geometric	Logarithmic	Description
	μm	μm	ϕ	μm	ϕ	
MEAN ($\bar{x}$):	339.9	279.8	1.837	303.2	1.722	Medium Sand
SORTING (σ):	203.9	2.298	1.201	1.554	0.636	Moderately Well Sorted
SKEWNESS (Sk):	6.160	-4.327	4.327	-0.061	0.061	Symmetrical
KURTOSIS (K):	75.52	27.56	27.56	1.273	1.273	Leptokurtic



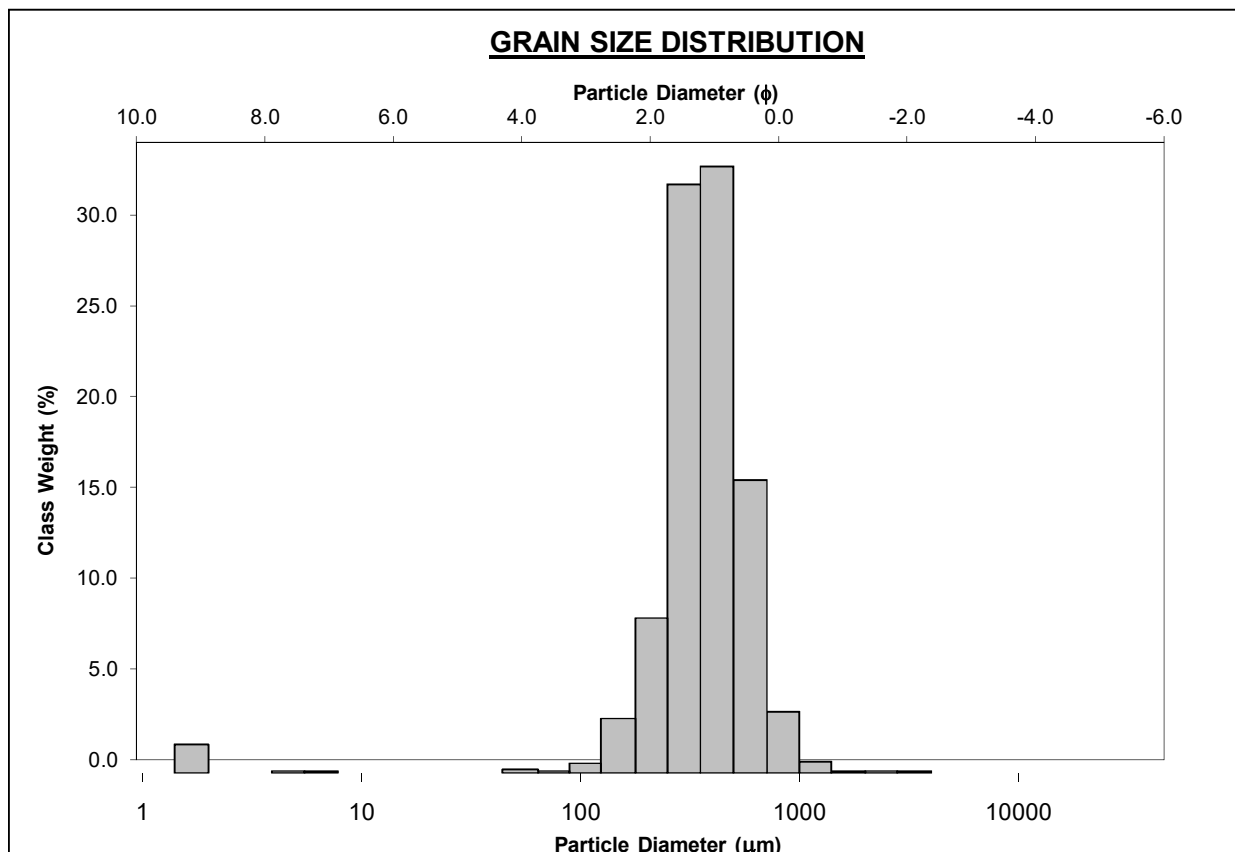
APPENDIX F PARTICLE SIZE ANALYSIS

SAMPLE STATISTICS						
SAMPLE IDENTITY: ENV-49			ANALYST & DATE: 12/21/2018			
SAMPLE TYPE: Bimodal, Poorly Sorted			TEXTURAL GROUP: Gravelly Sand			
SEDIMENT NAME: Very Fine Gravelly Coarse Sand						
	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	605.0	0.747	GRAVEL: 11.5%		COARSE SAND: 40.3%	
MODE 2:	2400.0	-1.243	SAND: 85.9%		MEDIUM SAND: 27.0%	
MODE 3:			MUD: 2.6%		FINE SAND: 3.9%	
D ₁₀ :	279.7	-1.146			V FINE SAND: 0.8%	
MEDIAN or D ₅₀ :	622.6	0.684	V COARSE GRAVEL: 0.0%		V COARSE SILT: 0.1%	
D ₉₀ :	2212.4	1.838	COARSE GRAVEL: 0.0%		COARSE SILT: 0.1%	
(D ₉₀ / D ₁₀):	7.909	-1.604	MEDIUM GRAVEL: 2.1%		MEDIUM SILT: 0.5%	
(D ₉₀ - D ₁₀):	1932.7	2.984	FINE GRAVEL: 2.1%		FINE SILT: 0.4%	
(D ₇₅ / D ₂₅):	2.412	-61.791	V FINE GRAVEL: 7.3%		V FINE SILT: 0.1%	
(D ₇₅ - D ₂₅):	593.6	1.270	V COARSE SAND: 13.9%		CLAY: 1.4%	
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic	Geometric	Logarithmic	Geometric	Logarithmic	Description
	μm	μm	ϕ	μm	ϕ	
MEAN ($\bar{x}$):	1112.3	634.2	0.657	675.2	0.567	Coarse Sand
SORTING (σ):	1643.2	3.225	1.689	2.194	1.134	Poorly Sorted
SKEWNESS (Sk):	4.193	-1.957	1.957	0.180	-0.180	Coarse Skewed
KURTOSIS (K):	22.40	12.80	12.80	1.367	1.367	Leptokurtic



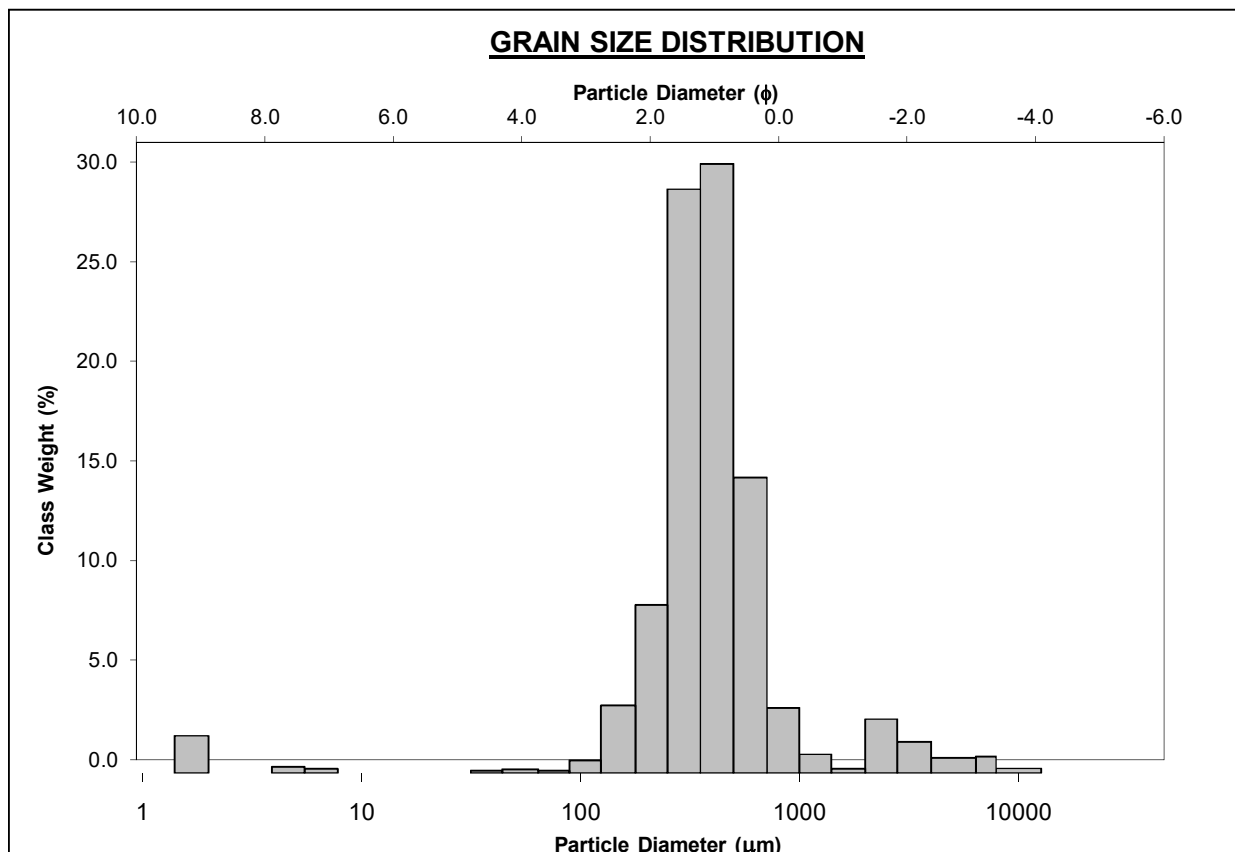
APPENDIX F PARTICLE SIZE ANALYSIS

SAMPLE STATISTICS						
SAMPLE IDENTITY: ENV-50			ANALYST & DATE: 12/21/2018			
SAMPLE TYPE: Unimodal, Moderately Well Sorted			TEXTURAL GROUP: Slightly Gravelly Sand			
SEDIMENT NAME: Slightly Very Fine Gravelly Medium Sand						
	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	426.5	1.251	GRAVEL: 0.2%		COARSE SAND: 19.5%	
MODE 2:			SAND: 97.8%		MEDIUM SAND: 65.3%	
MODE 3:			MUD: 2.0%		FINE SAND: 11.6%	
D ₁₀ :	212.3	0.675			V FINE SAND: 0.7%	
MEDIAN or D ₅₀ :	366.9	1.446	V COARSE GRAVEL: 0.0%		V COARSE SILT: 0.2%	
D ₉₀ :	626.2	2.236	COARSE GRAVEL: 0.0%		COARSE SILT: 0.0%	
(D ₉₀ / D ₁₀):	2.950	3.312	MEDIUM GRAVEL: 0.0%		MEDIUM SILT: 0.0%	
(D ₉₀ - D ₁₀):	414.0	1.561	FINE GRAVEL: 0.0%		FINE SILT: 0.2%	
(D ₇₅ / D ₂₅):	1.698	1.714	V FINE GRAVEL: 0.2%		V FINE SILT: 0.1%	
(D ₇₅ - D ₂₅):	195.9	0.764	V COARSE SAND: 0.7%		CLAY: 1.5%	
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic	Geometric	Logarithmic	Geometric	Logarithmic	Description
	μm	μm	ϕ	μm	ϕ	
MEAN ($\bar{x}$):	403.4	336.9	1.570	371.8	1.427	Medium Sand
SORTING (σ):	209.7	2.256	1.174	1.510	0.594	Moderately Well Sorted
SKEWNESS (Sk):	4.515	-4.613	4.613	-0.030	0.030	Symmetrical
KURTOSIS (K):	53.92	30.61	30.61	1.121	1.121	Leptokurtic



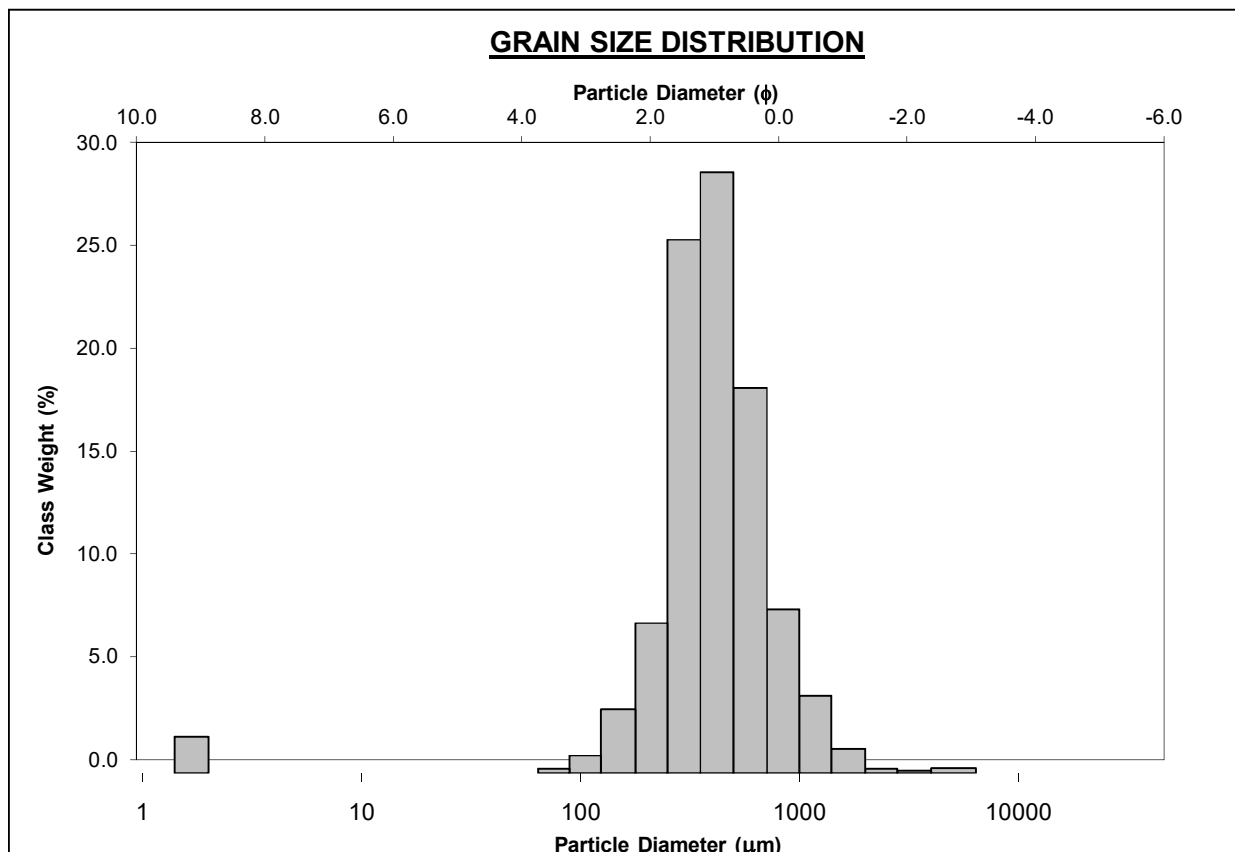
APPENDIX F PARTICLE SIZE ANALYSIS

SAMPLE STATISTICS						
SAMPLE IDENTITY: ENV-51			ANALYST & DATE: 12/21/2018			
SAMPLE TYPE: Unimodal, Moderately Sorted			TEXTURAL GROUP: Gravelly Sand			
SEDIMENT NAME: Very Fine Gravelly Medium Sand						
	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	426.5	1.251	GRAVEL: 6.0% COARSE SAND: 18.1%			
MODE 2:			SAND: 91.3% MEDIUM SAND: 59.5%			
MODE 3:			MUD: 2.7% FINE SAND: 11.9%			
D ₁₀ :	202.4	0.448	V FINE SAND: 0.8%			
MEDIAN or D ₅₀ :	376.7	1.408	V COARSE GRAVEL: 0.0% V COARSE SILT: 0.3%			
D ₉₀ :	733.2	2.305	COARSE GRAVEL: 0.0% COARSE SILT: 0.0%			
(D ₉₀ / D ₁₀):	3.622	5.147	MEDIUM GRAVEL: 0.3% MEDIUM SILT: 0.0%			
(D ₉₀ - D ₁₀):	530.8	1.857	FINE GRAVEL: 1.5% FINE SILT: 0.5%			
(D ₇₅ / D ₂₅):	1.791	1.846	V FINE GRAVEL: 4.2% V FINE SILT: 0.1%			
(D ₇₅ - D ₂₅):	221.9	0.841	V COARSE SAND: 1.1% CLAY: 1.8%			
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic μm	Geometric μm	Logarithmic ϕ	Geometric μm	Logarithmic ϕ	Description
MEAN ($\bar{x}$):	608.9	370.8	1.431	389.2	1.362	Medium Sand
SORTING (σ):	995.7	2.891	1.532	1.899	0.925	Moderately Sorted
SKEWNESS (Sk):	5.646	-2.223	2.223	0.209	-0.209	Coarse Skewed
KURTOSIS (K):	42.02	15.63	15.63	1.930	1.930	Very Leptokurtic



APPENDIX F PARTICLE SIZE ANALYSIS

SAMPLE STATISTICS						
SAMPLE IDENTITY: ENV-52			ANALYST & DATE: 12/21/2018			
SAMPLE TYPE: Unimodal, Moderately Sorted			TEXTURAL GROUP: Slightly Gravelly Sand			
SEDIMENT NAME: Slightly Fine Gravelly Medium Sand						
	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	426.5	1.251	GRAVEL: 0.6% COARSE SAND: 26.6%			
MODE 2:			SAND: 97.6% MEDIUM SAND: 54.7%			
MODE 3:			MUD: 1.8% FINE SAND: 10.4%			
D ₁₀ :	215.6	0.291	V FINE SAND: 1.1%			
MEDIAN or D ₅₀ :	403.1	1.311	V COARSE GRAVEL: 0.0% V COARSE SILT: 0.0%			
D ₉₀ :	817.1	2.213	COARSE GRAVEL: 0.0% COARSE SILT: 0.0%			
(D ₉₀ / D ₁₀):	3.789	7.596	MEDIUM GRAVEL: 0.0% MEDIUM SILT: 0.0%			
(D ₉₀ - D ₁₀):	601.5	1.922	FINE GRAVEL: 0.3% FINE SILT: 0.0%			
(D ₇₅ / D ₂₅):	1.946	2.184	V FINE GRAVEL: 0.3% V FINE SILT: 0.1%			
(D ₇₅ - D ₂₅):	277.0	0.961	V COARSE SAND: 4.8% CLAY: 1.7%			
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic μm	Geometric μm	Logarithmic ϕ	Geometric μm	Logarithmic ϕ	Description
MEAN ($\bar{x}$):	490.7	380.5	1.394	413.0	1.276	Medium Sand
SORTING (σ):	395.2	2.462	1.300	1.687	0.755	Moderately Sorted
SKEWNESS (Sk):	6.201	-3.726	3.726	0.042	-0.042	Symmetrical
KURTOSIS (K):	66.10	24.31	24.31	1.155	1.155	Leptokurtic



APPENDIX F PARTICLE SIZE ANALYSIS

SAMPLE STATISTICS

SAMPLE IDENTITY: **ENV-53**

ANALYST & DATE: 12/21/2018

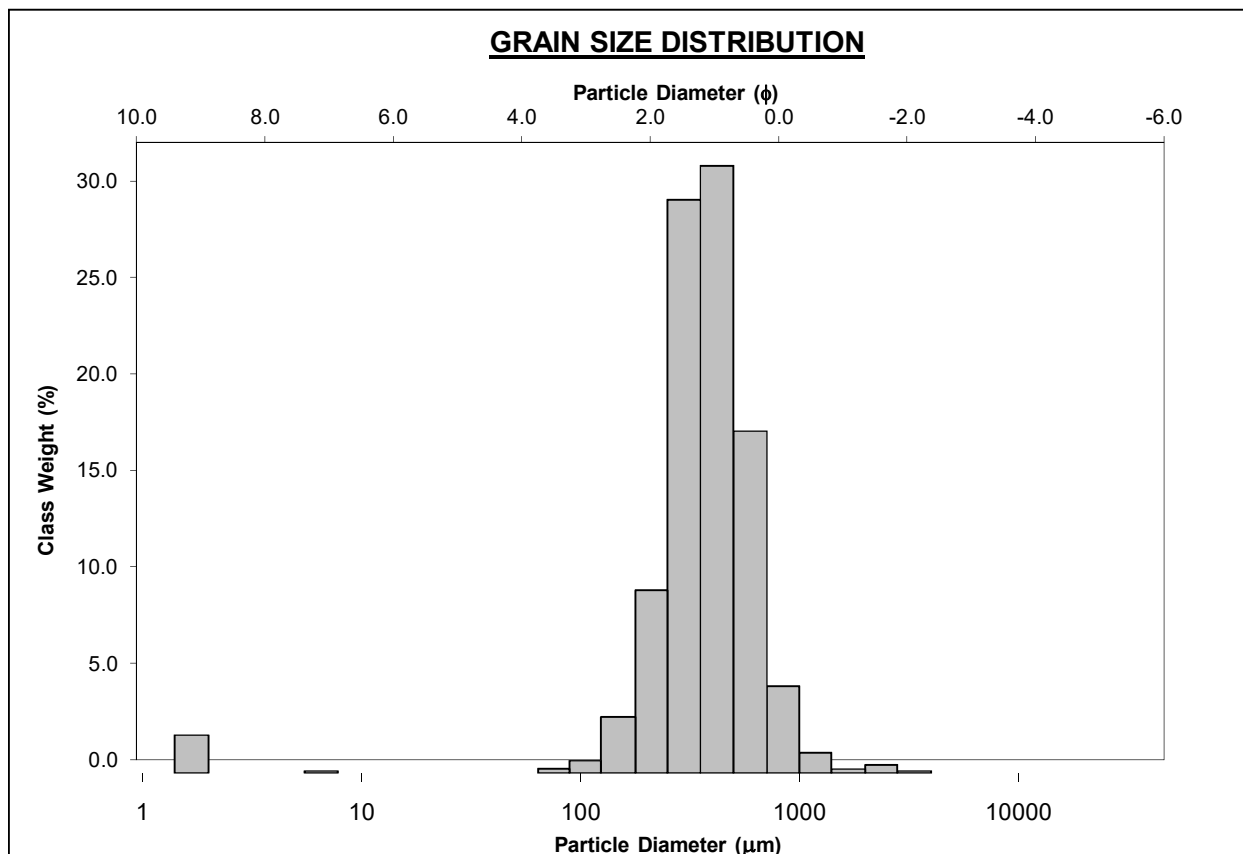
SAMPLE TYPE: Unimodal, Moderately Well Sorted

TEXTURAL GROUP: Slightly Gravelly Sand

SEDIMENT NAME: Slightly Very Fine Gravelly Medium Sand

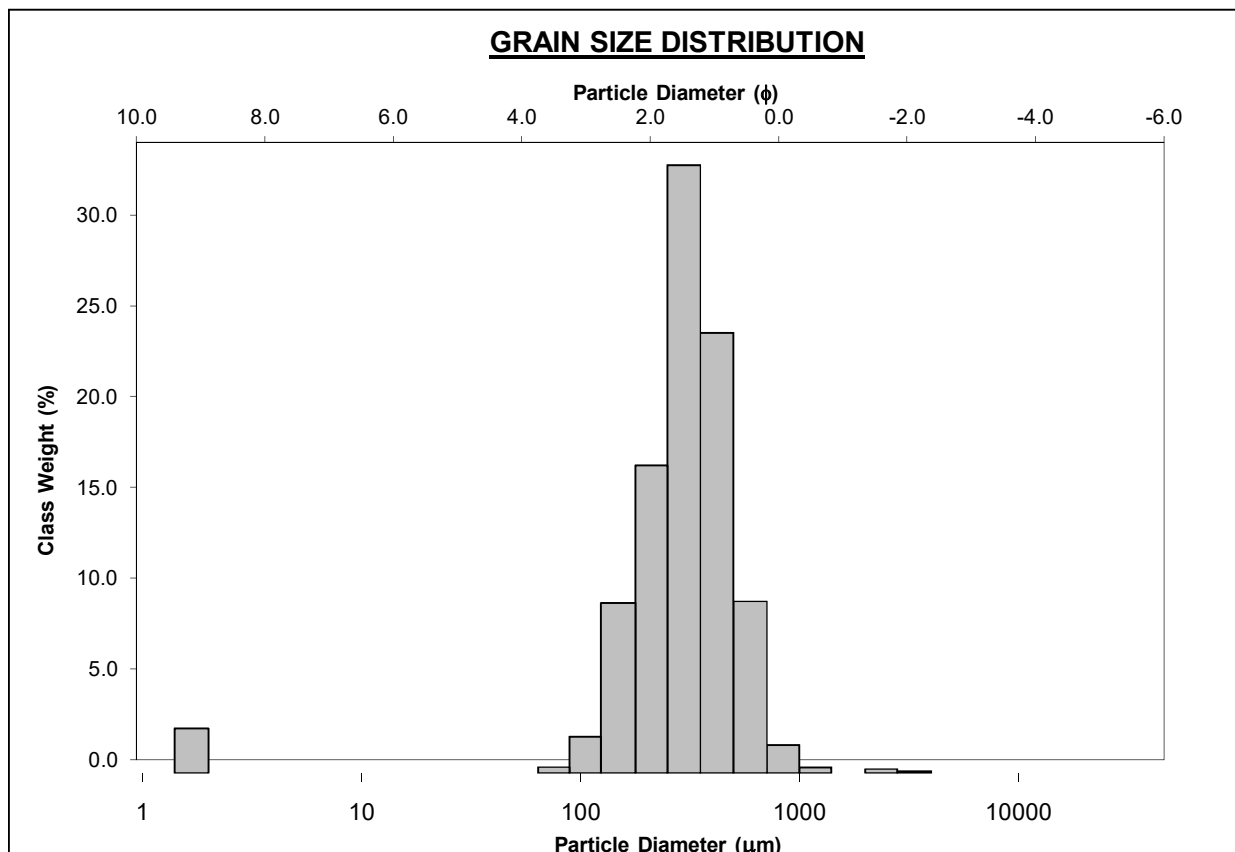
	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	426.5	1.251	GRAVEL: 0.5%	COARSE SAND: 22.2%		
MODE 2:			SAND: 97.4%	MEDIUM SAND: 60.8%		
MODE 3:			MUD: 2.1%	FINE SAND: 12.4%		
D ₁₀ :	207.1	0.605		V FINE SAND: 0.9%		
MEDIAN or D ₅₀ :	374.4	1.417	V COARSE GRAVEL: 0.0%	V COARSE SILT: 0.0%		
D ₉₀ :	657.5	2.272	COARSE GRAVEL: 0.0%	COARSE SILT: 0.0%		
(D ₉₀ / D ₁₀):	3.175	3.755	MEDIUM GRAVEL: 0.0%	MEDIUM SILT: 0.0%		
(D ₉₀ - D ₁₀):	450.4	1.667	FINE GRAVEL: 0.0%	FINE SILT: 0.1%		
(D ₇₅ / D ₂₅):	1.764	1.804	V FINE GRAVEL: 0.5%	V FINE SILT: 0.1%		
(D ₇₅ - D ₂₅):	213.9	0.819	V COARSE SAND: 1.2%	CLAY: 1.9%		
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic μm	Geometric μm	Logarithmic ϕ	Geometric μm	Logarithmic ϕ	Description
MEAN ($\bar{x}$):	421.8	340.9	1.553	380.5	1.394	Medium Sand
SORTING (σ):	251.2	2.429	1.280	1.567	0.648	Moderately Well Sorted
SKEWNESS (Sk):	4.237	-4.261	4.261	-0.011	0.011	Symmetrical
KURTOSIS (K):	38.12	26.50	26.50	1.139	1.139	Leptokurtic

GRAIN SIZE DISTRIBUTION



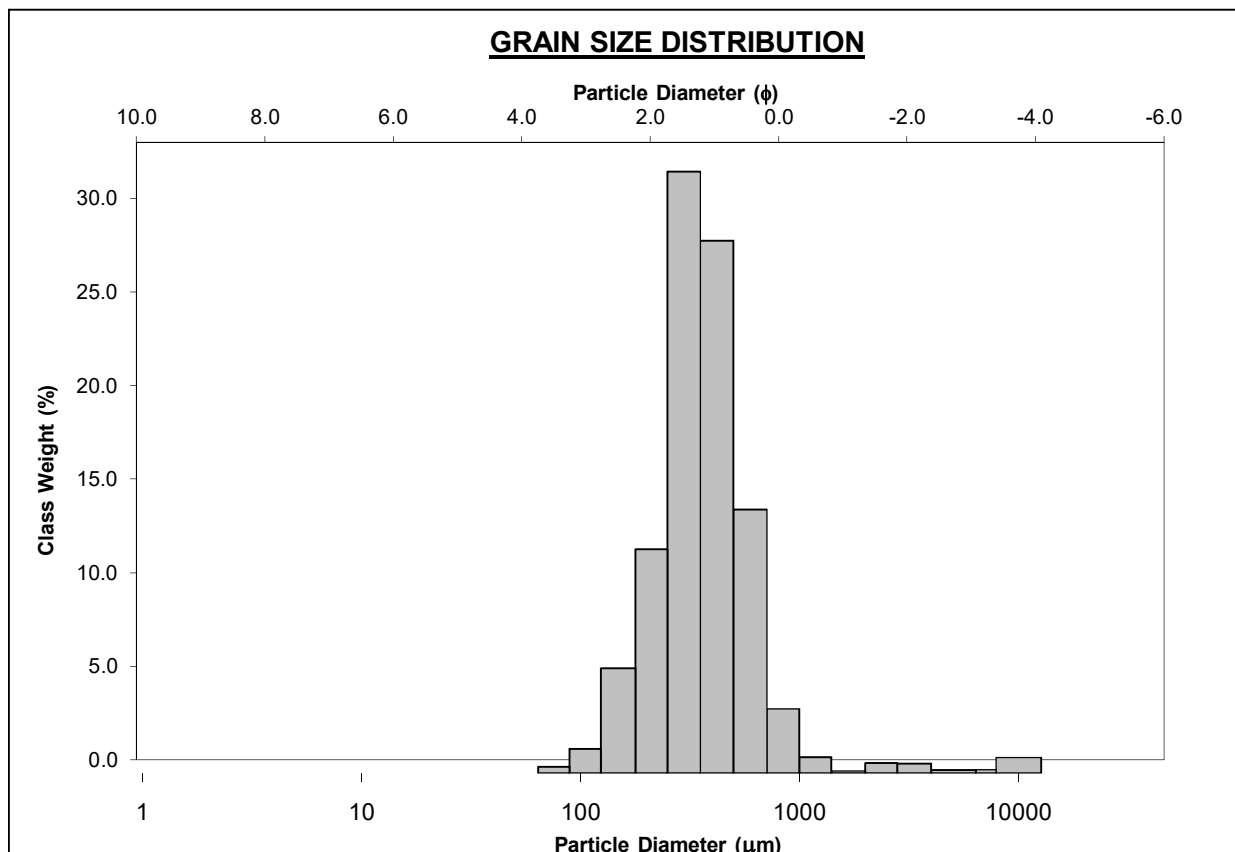
APPENDIX F PARTICLE SIZE ANALYSIS

SAMPLE STATISTICS						
SAMPLE IDENTITY: ENV-54			ANALYST & DATE: 12/21/2018			
SAMPLE TYPE: Unimodal, Moderately Well Sorted			TEXTURAL GROUP: Slightly Gravelly Sand			
SEDIMENT NAME: Slightly Very Fine Gravelly Medium Sand						
	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	301.0	1.754	GRAVEL: 0.3%		COARSE SAND: 11.0%	
MODE 2:			SAND: 97.2%		MEDIUM SAND: 57.3%	
MODE 3:			MUD: 2.5%		FINE SAND: 26.2%	
D ₁₀ :	151.1	0.915			V FINE SAND: 2.4%	
MEDIAN or D ₅₀ :	304.5	1.716	V COARSE GRAVEL: 0.0%		V COARSE SILT: 0.0%	
D ₉₀ :	530.4	2.727	COARSE GRAVEL: 0.0%		COARSE SILT: 0.0%	
(D ₉₀ / D ₁₀):	3.511	2.981	MEDIUM GRAVEL: 0.0%		MEDIUM SILT: 0.0%	
(D ₉₀ - D ₁₀):	379.3	1.812	FINE GRAVEL: 0.0%		FINE SILT: 0.0%	
(D ₇₅ / D ₂₅):	1.862	1.702	V FINE GRAVEL: 0.3%		V FINE SILT: 0.2%	
(D ₇₅ - D ₂₅):	190.9	0.897	V COARSE SAND: 0.3%		CLAY: 2.3%	
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic	Geometric	Logarithmic	Geometric	Logarithmic	Description
	μm	μm	ϕ	μm	ϕ	
MEAN ($\bar{x}$):	337.9	268.5	1.897	297.3	1.750	Medium Sand
SORTING (σ):	207.9	2.533	1.341	1.617	0.693	Moderately Well Sorted
SKEWNESS (Sk):	5.568	-3.958	3.958	-0.083	0.083	Symmetrical
KURTOSIS (K):	68.47	22.55	22.55	1.072	1.072	Mesokurtic



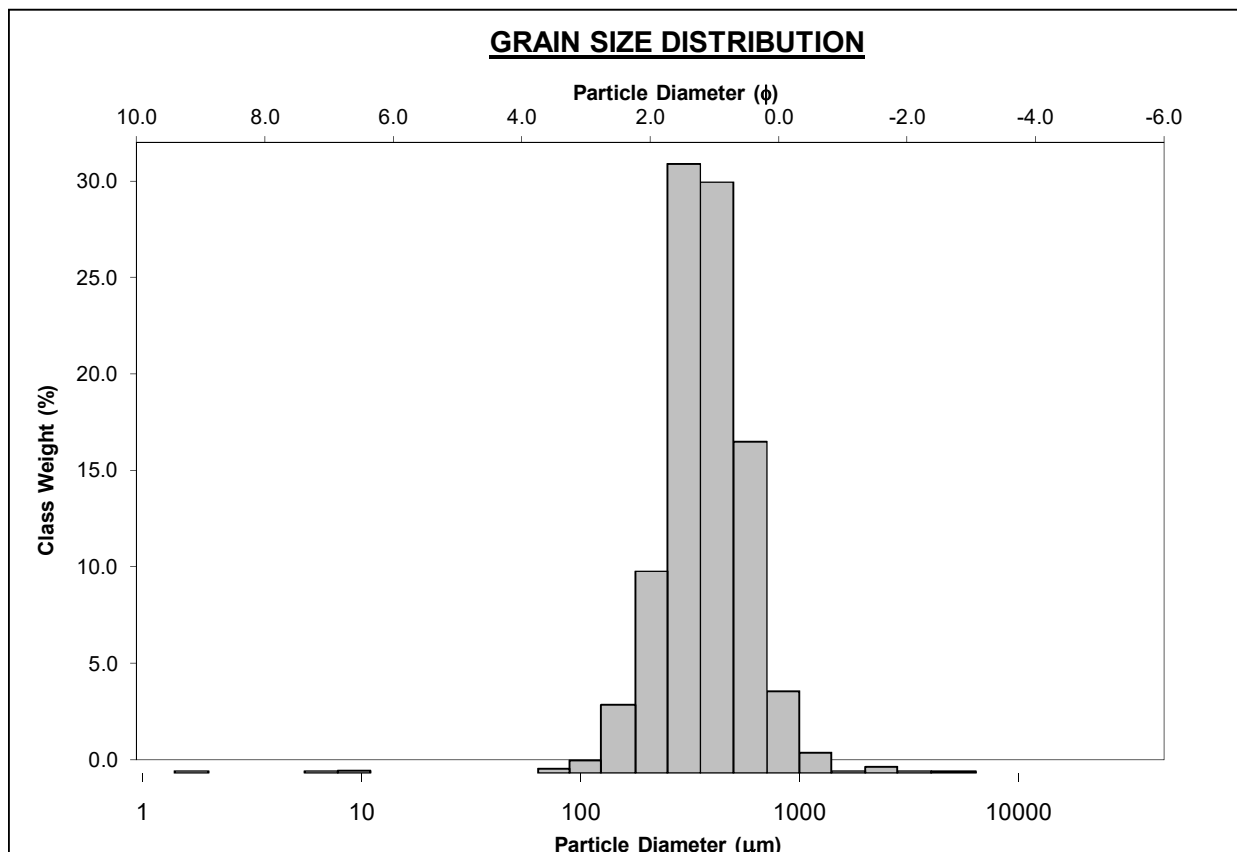
APPENDIX F PARTICLE SIZE ANALYSIS

SAMPLE STATISTICS						
SAMPLE IDENTITY: ENV-55			ANALYST & DATE: 12/21/2018			
SAMPLE TYPE: Unimodal, Moderately Sorted			TEXTURAL GROUP: Slightly Gravelly Sand			
SEDIMENT NAME: Slightly Medium Gravelly Medium Sand						
	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	301.0	1.754	GRAVEL: 2.4% COARSE SAND: 17.2%			
MODE 2:			SAND: 96.1% MEDIUM SAND: 59.1%			
MODE 3:			MUD: 1.5% FINE SAND: 17.2%			
D ₁₀ :	185.0	0.618	V FINE SAND: 1.6%			
MEDIAN or D ₅₀ :	346.8	1.528	V COARSE GRAVEL: 0.0% V COARSE SILT: 0.0%			
D ₉₀ :	651.6	2.434	COARSE GRAVEL: 0.0% COARSE SILT: 0.0%			
(D ₉₀ / D ₁₀):	3.522	3.940	MEDIUM GRAVEL: 1.1% MEDIUM SILT: 0.0%			
(D ₉₀ - D ₁₀):	466.6	1.816	FINE GRAVEL: 0.3% FINE SILT: 0.0%			
(D ₇₅ / D ₂₅):	1.796	1.782	V FINE GRAVEL: 1.0% V FINE SILT: 0.0%			
(D ₇₅ - D ₂₅):	209.6	0.845	V COARSE SAND: 0.9% CLAY: 1.5%			
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic μm	Geometric μm	Logarithmic ϕ	Geometric μm	Logarithmic ϕ	Description
MEAN ($\bar{x}$):	531.8	339.0	1.561	350.2	1.514	Medium Sand
SORTING (σ):	1118.6	2.542	1.346	1.653	0.725	Moderately Sorted
SKEWNESS (Sk):	7.778	-2.642	2.642	0.010	-0.010	Symmetrical
KURTOSIS (K):	66.05	23.09	23.09	1.248	1.248	Leptokurtic



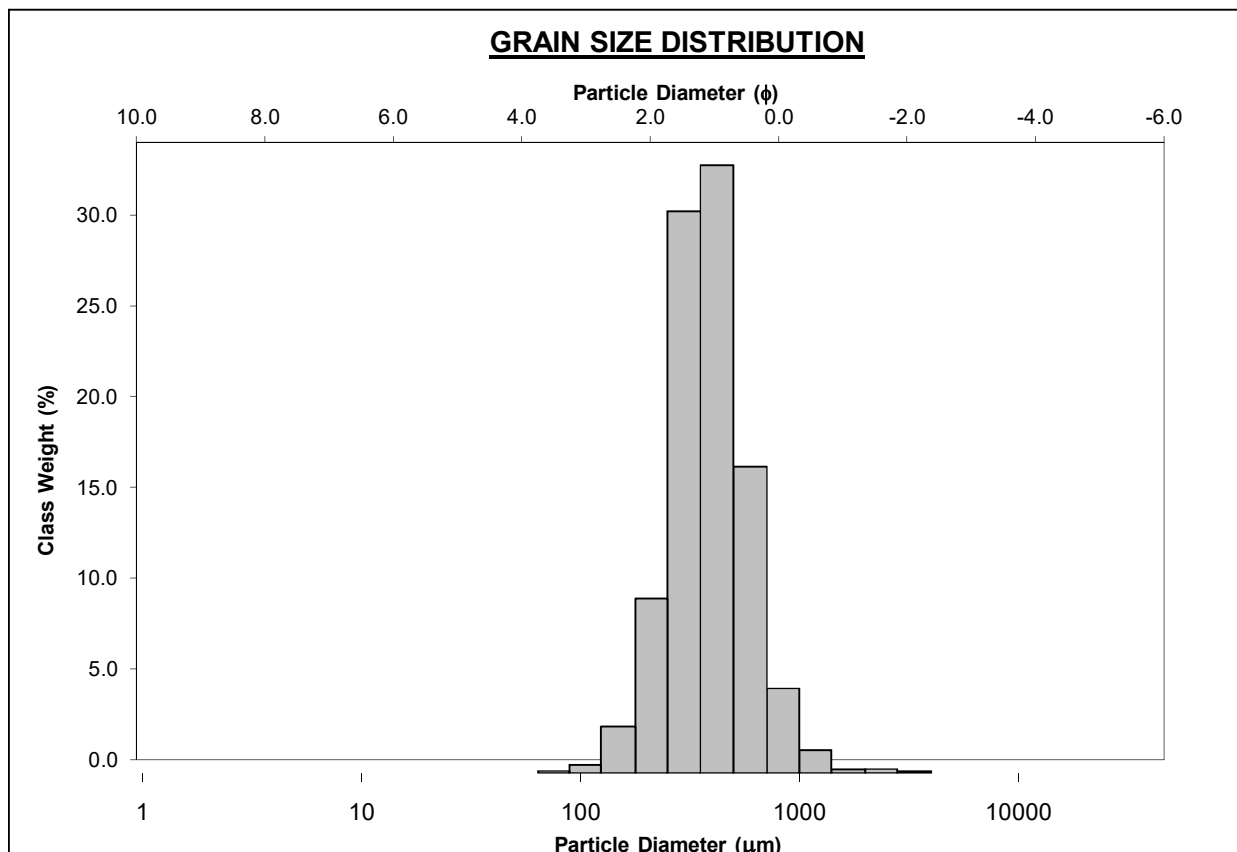
APPENDIX F PARTICLE SIZE ANALYSIS

SAMPLE STATISTICS						
SAMPLE IDENTITY: ENV-56			ANALYST & DATE: 12/21/2018			
SAMPLE TYPE: Unimodal, Moderately Well Sorted			TEXTURAL GROUP: Slightly Gravelly Sand			
SEDIMENT NAME: Slightly Very Fine Gravelly Medium Sand						
	μm	φ	GRAIN SIZE DISTRIBUTION			
MODE 1:	301.0	1.754	GRAVEL: 0.5%		COARSE SAND: 21.1%	
MODE 2:			SAND: 97.7%		MEDIUM SAND: 60.8%	
MODE 3:			MUD: 1.8%		FINE SAND: 13.8%	
D ₁₀ :	202.5	0.622			V FINE SAND: 0.9%	
MEDIAN or D ₅₀ :	364.6	1.456	V COARSE GRAVEL: 0.0%		V COARSE SILT: 0.0%	
D ₉₀ :	649.7	2.304	COARSE GRAVEL: 0.0%		COARSE SILT: 0.0%	
(D ₉₀ / D ₁₀):	3.209	3.704	MEDIUM GRAVEL: 0.0%		MEDIUM SILT: 0.1%	
(D ₉₀ - D ₁₀):	447.3	1.682	FINE GRAVEL: 0.1%		FINE SILT: 0.1%	
(D ₇₅ / D ₂₅):	1.769	1.793	V FINE GRAVEL: 0.4%		V FINE SILT: 0.0%	
(D ₇₅ - D ₂₅):	211.7	0.823	V COARSE SAND: 1.1%		CLAY: 1.6%	
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic	Geometric	Logarithmic	Geometric	Logarithmic	Description
	μm	μm	φ	μm	φ	
MEAN ($\bar{x}$):	416.8	337.7	1.566	373.1	1.422	Medium Sand
SORTING (σ):	282.8	2.375	1.248	1.563	0.644	Moderately Well Sorted
SKEWNESS (Sk):	7.397	-4.465	4.465	0.005	-0.005	Symmetrical
KURTOSIS (K):	102.9	30.20	30.20	1.122	1.122	Leptokurtic



APPENDIX F PARTICLE SIZE ANALYSIS

SAMPLE STATISTICS						
SAMPLE IDENTITY: ENV-57			ANALYST & DATE: 12/21/2018			
SAMPLE TYPE: Unimodal, Moderately Well Sorted			TEXTURAL GROUP: Slightly Gravelly Sand			
SEDIMENT NAME: Slightly Very Fine Gravelly Medium Sand						
	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	426.5	1.251	GRAVEL: 0.3% COARSE SAND: 21.2%			
MODE 2:			SAND: 98.2% MEDIUM SAND: 63.0%			
MODE 3:			MUD: 1.5% FINE SAND: 12.0%			
D ₁₀ :	217.2	0.609	V FINE SAND: 0.6%			
MEDIAN or D ₅₀ :	375.3	1.414	V COARSE GRAVEL: 0.0% V COARSE SILT: 0.0%			
D ₉₀ :	655.6	2.203	COARSE GRAVEL: 0.0% COARSE SILT: 0.0%			
(D ₉₀ / D ₁₀):	3.018	3.616	MEDIUM GRAVEL: 0.0% MEDIUM SILT: 0.0%			
(D ₉₀ - D ₁₀):	438.3	1.593	FINE GRAVEL: 0.0% FINE SILT: 0.0%			
(D ₇₅ / D ₂₅):	1.726	1.763	V FINE GRAVEL: 0.3% V FINE SILT: 0.0%			
(D ₇₅ - D ₂₅):	205.6	0.787	V COARSE SAND: 1.4% CLAY: 1.5%			
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic μm	Geometric μm	Logarithmic ϕ	Geometric μm	Logarithmic ϕ	Description
MEAN ($\bar{x}$):	421.5	350.4	1.513	381.3	1.391	Medium Sand
SORTING (σ):	234.0	2.274	1.185	1.530	0.613	Moderately Well Sorted
SKEWNESS (Sk):	4.159	-4.889	4.889	0.028	-0.028	Symmetrical
KURTOSIS (K):	40.60	35.20	35.20	1.097	1.097	Mesokurtic



APPENDIX F PARTICLE SIZE ANALYSIS

SAMPLE STATISTICS

SAMPLE IDENTITY: **ENV-58**

ANALYST & DATE: 12/21/2018

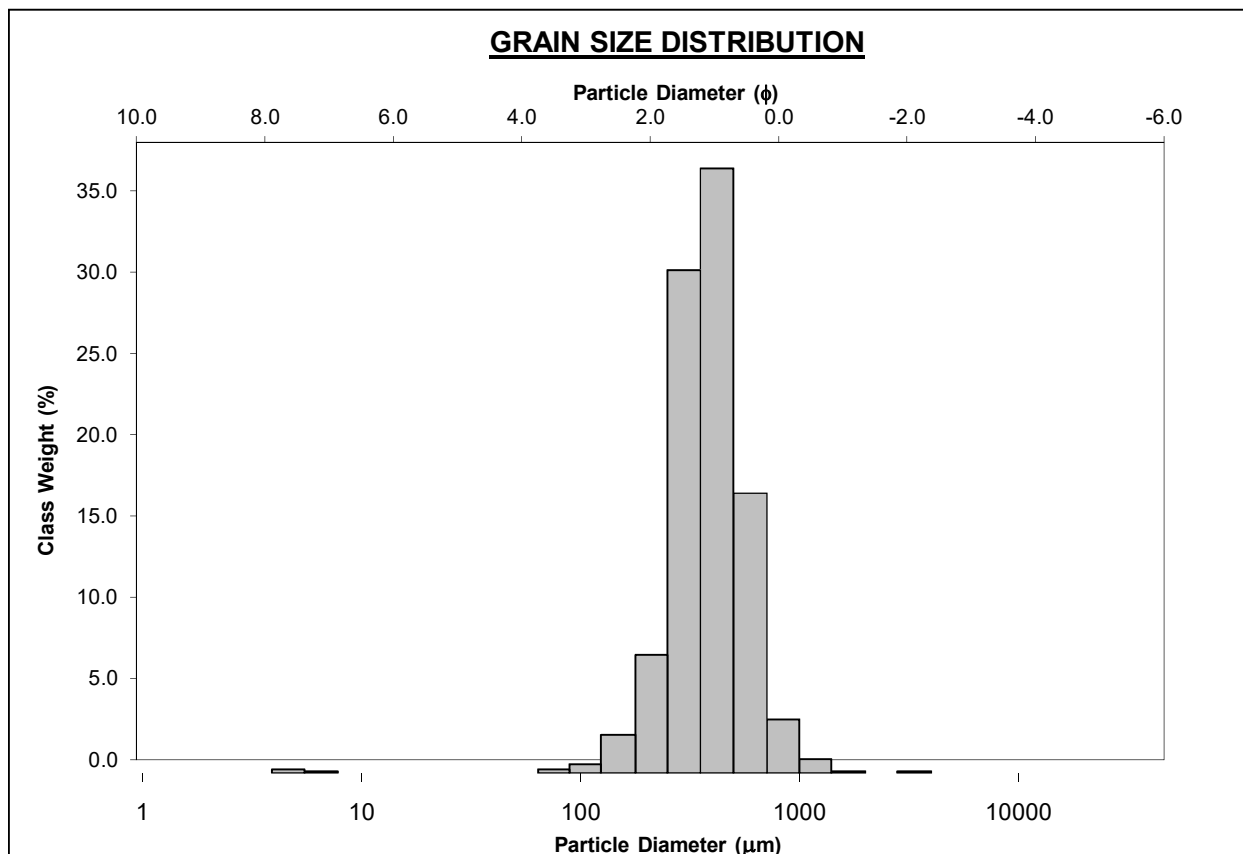
SAMPLE TYPE: Unimodal, Moderately Well Sorted

TEXTURAL GROUP: Slightly Gravelly Sand

SEDIMENT NAME: Slightly Very Fine Gravelly Medium Sand

	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	426.5	1.251	GRAVEL: 0.1%	COARSE SAND: 20.3%		
MODE 2:			SAND: 98.5%	MEDIUM SAND: 66.9%		
MODE 3:			MUD: 1.4%	FINE SAND: 9.6%		
D ₁₀ :	232.6	0.666		V FINE SAND: 0.8%		
MEDIAN or D ₅₀ :	380.8	1.393	V COARSE GRAVEL: 0.0%	V COARSE SILT: 0.0%		
D ₉₀ :	630.4	2.104	COARSE GRAVEL: 0.0%	COARSE SILT: 0.0%		
(D ₉₀ / D ₁₀):	2.710	3.161	MEDIUM GRAVEL: 0.0%	MEDIUM SILT: 0.0%		
(D ₉₀ - D ₁₀):	397.8	1.438	FINE GRAVEL: 0.0%	FINE SILT: 0.3%		
(D ₇₅ / D ₂₅):	1.660	1.696	V FINE GRAVEL: 0.1%	V FINE SILT: 0.0%		
(D ₇₅ - D ₂₅):	192.0	0.731	V COARSE SAND: 0.9%	CLAY: 1.1%		
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic μm	Geometric μm	Logarithmic ϕ	Geometric μm	Logarithmic ϕ	Description
MEAN ($\bar{x}$):	413.2	353.1	1.502	381.9	1.389	Medium Sand
SORTING (σ):	198.6	2.129	1.090	1.480	0.565	Moderately Well Sorted
SKEWNESS (Sk):	4.343	-5.189	5.189	-0.043	0.043	Symmetrical
KURTOSIS (K):	56.28	39.14	39.14	1.086	1.086	Mesokurtic

GRAIN SIZE DISTRIBUTION



APPENDIX F PARTICLE SIZE ANALYSIS

SAMPLE STATISTICS

SAMPLE IDENTITY: **ENV-59**

ANALYST & DATE: 12/21/2018

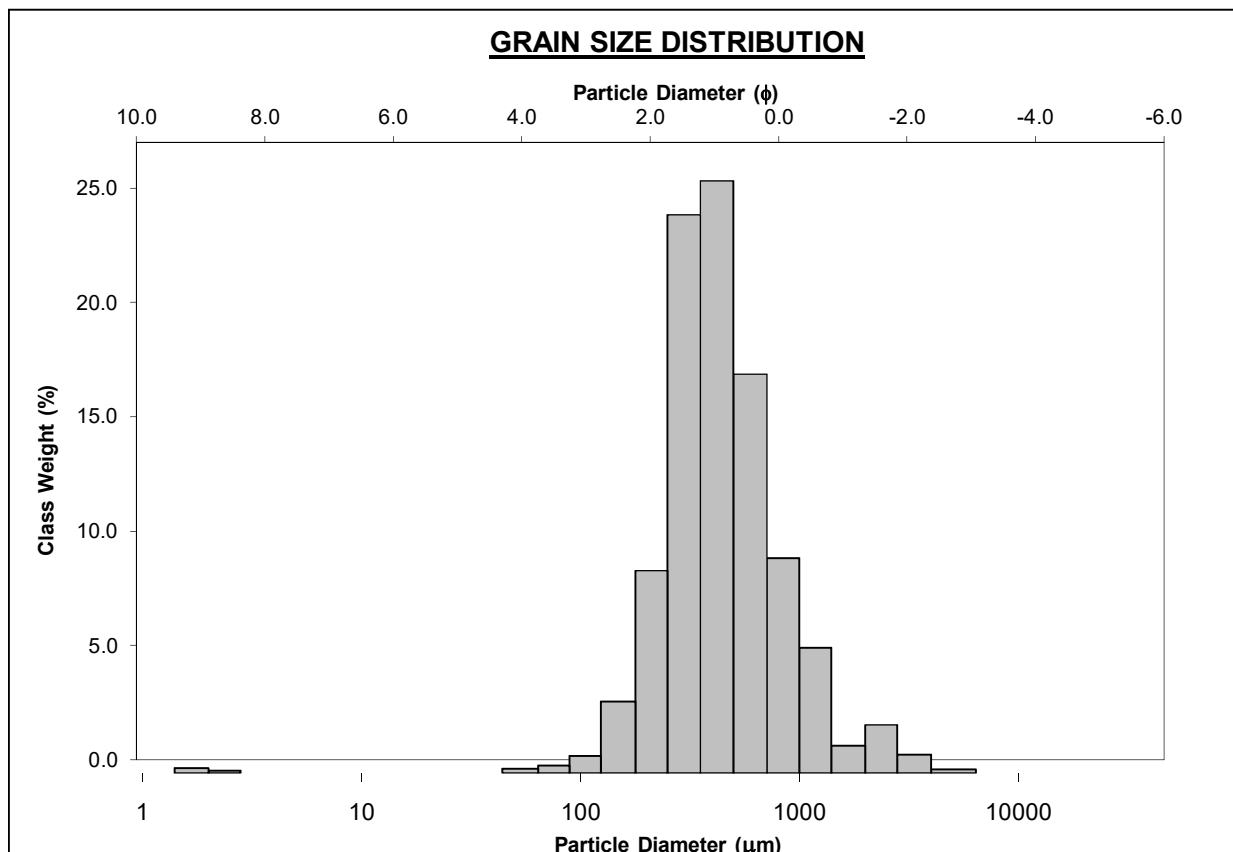
SAMPLE TYPE: Unimodal, Moderately Sorted

TEXTURAL GROUP: Slightly Gravelly Sand

SEDIMENT NAME: Slightly Very Fine Gravelly Medium Sand

	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	426.5	1.251	GRAVEL: 3.0%	COARSE SAND: 26.4%		
MODE 2:			SAND: 95.0%	MEDIUM SAND: 49.3%		
MODE 3:			MUD: 2.0%	FINE SAND: 11.8%		
D ₁₀ :	207.2	0.033		V FINE SAND: 1.1%		
MEDIAN or D ₅₀ :	411.9	1.280	V COARSE GRAVEL: 0.0%	V COARSE SILT: 0.2%		
D ₉₀ :	977.7	2.271	COARSE GRAVEL: 0.0%	COARSE SILT: 0.0%		
(D ₉₀ / D ₁₀):	4.719	69.71	MEDIUM GRAVEL: 0.0%	MEDIUM SILT: 0.0%		
(D ₉₀ - D ₁₀):	770.5	2.238	FINE GRAVEL: 0.2%	FINE SILT: 0.0%		
(D ₇₅ / D ₂₅):	2.150	2.614	V FINE GRAVEL: 2.8%	V FINE SILT: 0.1%		
(D ₇₅ - D ₂₅):	332.9	1.104	V COARSE SAND: 6.4%	CLAY: 1.7%		
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic μm	Geometric μm	Logarithmic ϕ	Geometric μm	Logarithmic ϕ	Description
MEAN ($\bar{x}$):	556.0	400.3	1.321	433.8	1.205	Medium Sand
SORTING (σ):	514.7	2.705	1.436	1.832	0.874	Moderately Sorted
SKEWNESS (Sk):	3.886	-3.228	3.228	0.115	-0.115	Coarse Skewed
KURTOSIS (K):	24.52	21.03	21.03	1.149	1.149	Leptokurtic

GRAIN SIZE DISTRIBUTION



APPENDIX F PARTICLE SIZE ANALYSIS

SAMPLE STATISTICS

SAMPLE IDENTITY: **ENV-60**

ANALYST & DATE: 12/21/2018

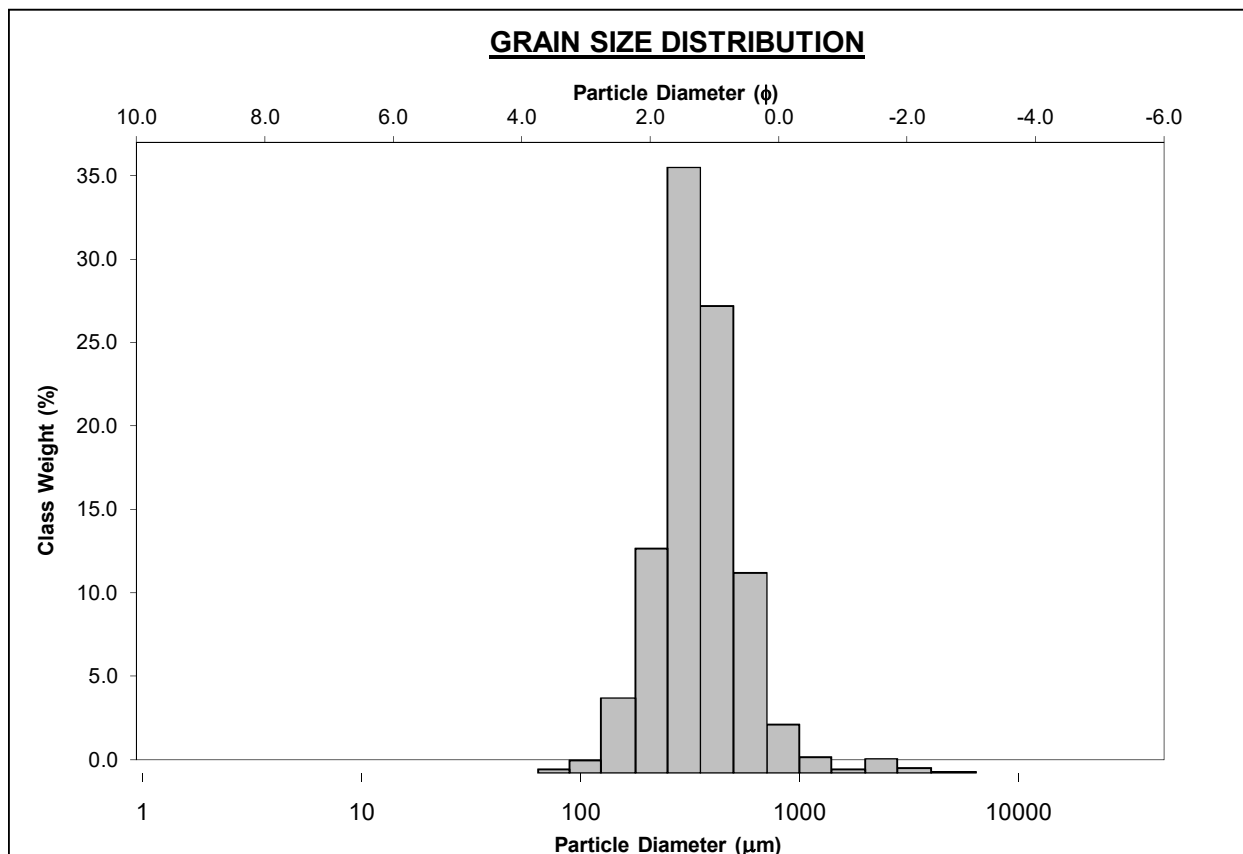
SAMPLE TYPE: Unimodal, Moderately Well Sorted

TEXTURAL GROUP: Slightly Gravelly Sand

SEDIMENT NAME: Slightly Very Fine Gravelly Medium Sand

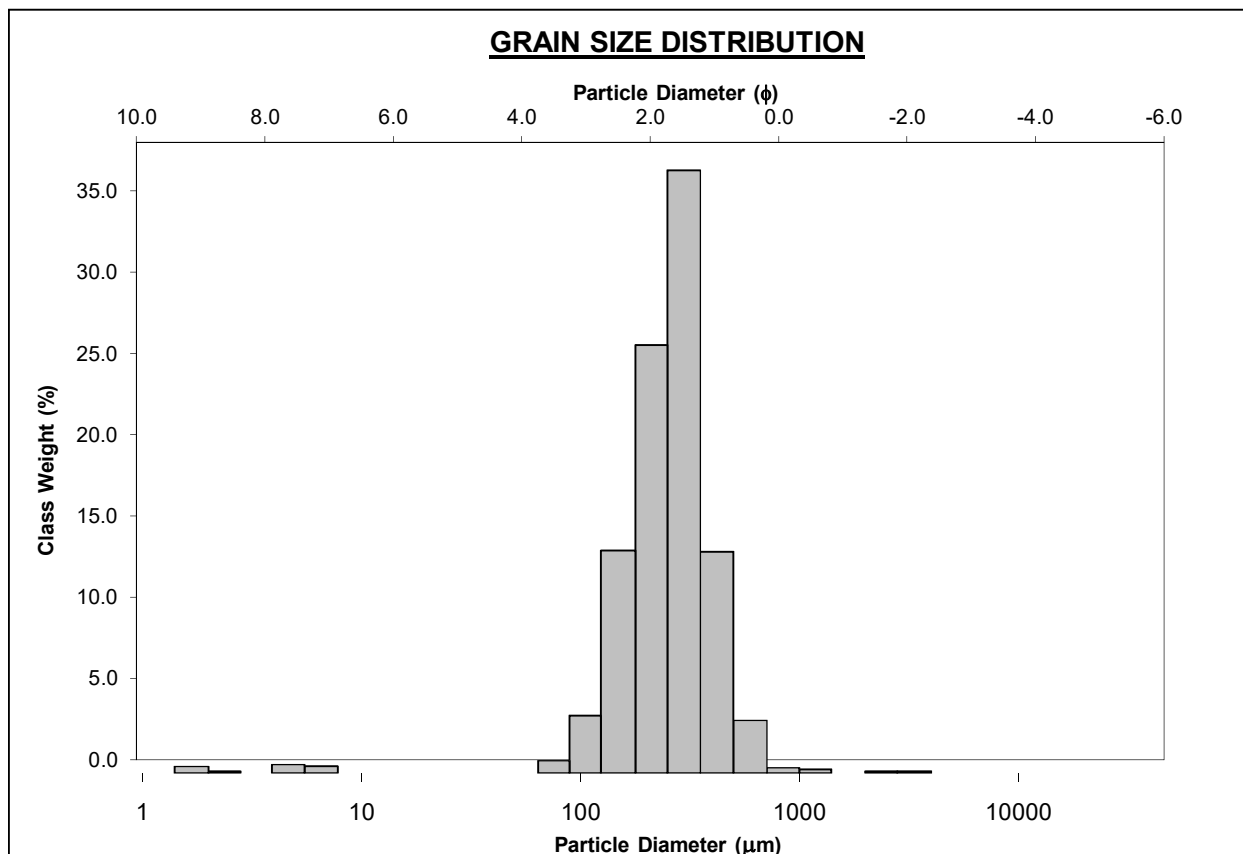
	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	301.0	1.754	GRAVEL: 1.2%	COARSE SAND: 14.7%		
MODE 2:			SAND: 97.6%	MEDIUM SAND: 63.1%		
MODE 3:			MUD: 1.2%	FINE SAND: 17.7%		
D ₁₀ :	194.1	0.702		V FINE SAND: 1.0%		
MEDIAN or D ₅₀ :	334.9	1.578	V COARSE GRAVEL: 0.0%	V COARSE SILT: 0.0%		
D ₉₀ :	614.5	2.365	COARSE GRAVEL: 0.0%	COARSE SILT: 0.0%		
(D ₉₀ / D ₁₀):	3.166	3.367	MEDIUM GRAVEL: 0.0%	MEDIUM SILT: 0.0%		
(D ₉₀ - D ₁₀):	420.5	1.663	FINE GRAVEL: 0.1%	FINE SILT: 0.0%		
(D ₇₅ / D ₂₅):	1.721	1.684	V FINE GRAVEL: 1.1%	V FINE SILT: 0.0%		
(D ₇₅ - D ₂₅):	189.3	0.783	V COARSE SAND: 1.1%	CLAY: 1.2%		
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic μm	Geometric μm	Logarithmic ϕ	Geometric μm	Logarithmic ϕ	Description
MEAN ($\bar{x}$):	405.7	327.4	1.611	339.6	1.558	Medium Sand
SORTING (σ):	340.1	2.186	1.128	1.547	0.629	Moderately Well Sorted
SKEWNESS (Sk):	6.694	-4.173	4.173	0.025	-0.025	Symmetrical
KURTOSIS (K):	67.80	33.37	33.37	1.155	1.155	Leptokurtic

GRAIN SIZE DISTRIBUTION



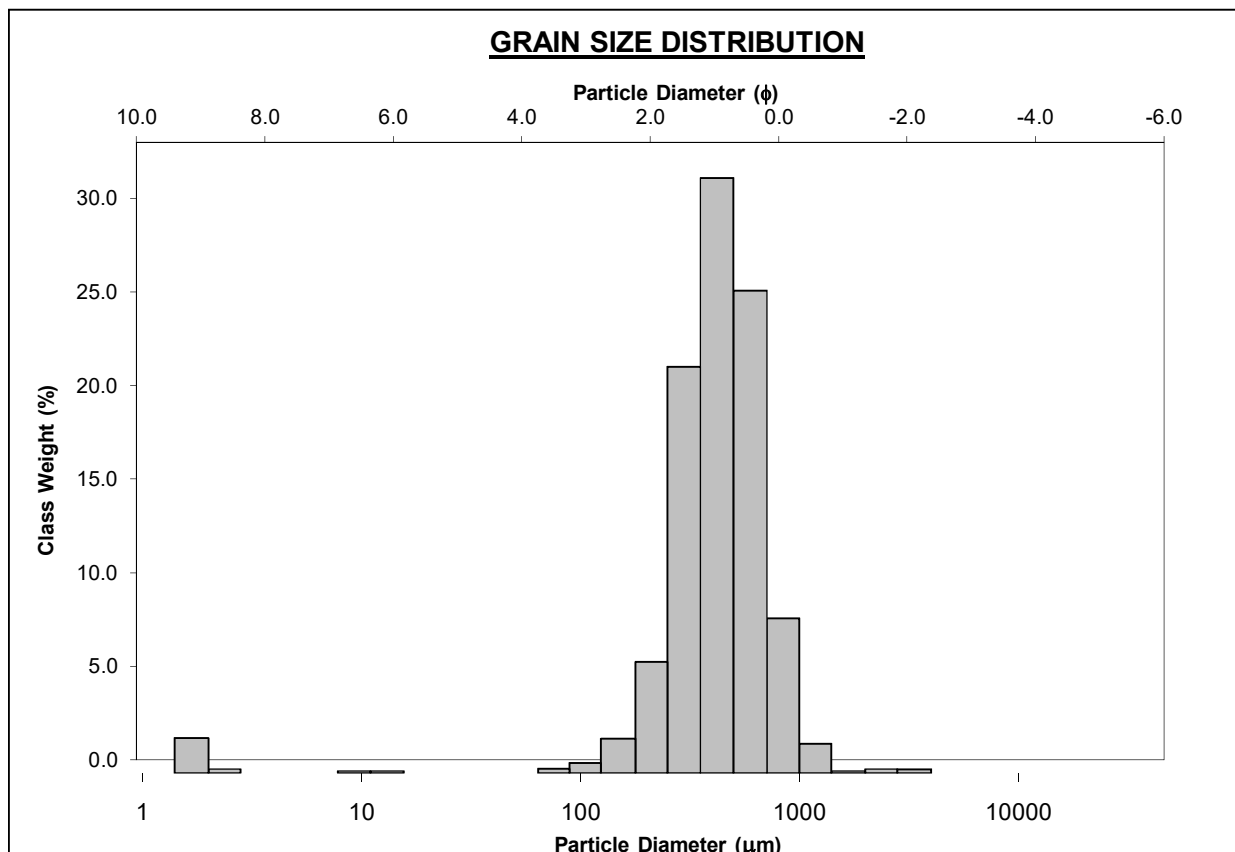
APPENDIX F PARTICLE SIZE ANALYSIS

<u>SAMPLE STATISTICS</u>						
SAMPLE IDENTITY: ENV-61			ANALYST & DATE: 12/21/2018			
SAMPLE TYPE: Unimodal, Moderately Well Sorted			TEXTURAL GROUP: Slightly Gravelly Sand			
SEDIMENT NAME: Slightly Very Fine Gravelly Medium Sand						
	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	301.0	1.754	GRAVEL: 0.2%		COARSE SAND: 3.5%	
MODE 2:			SAND: 96.7%		MEDIUM SAND: 49.6%	
MODE 3:			MUD: 3.1%		FINE SAND: 39.1%	
D ₁₀ :	133.6	1.229			V FINE SAND: 4.3%	
MEDIAN or D ₅₀ :	258.4	1.952	V COARSE GRAVEL: 0.0%		V COARSE SILT: 0.0%	
D ₉₀ :	426.7	2.904	COARSE GRAVEL: 0.0%		COARSE SILT: 0.0%	
(D ₉₀ / D ₁₀):	3.193	2.363	MEDIUM GRAVEL: 0.0%		MEDIUM SILT: 0.0%	
(D ₉₀ - D ₁₀):	293.1	1.675	FINE GRAVEL: 0.0%		FINE SILT: 0.9%	
(D ₇₅ / D ₂₅):	1.749	1.501	V FINE GRAVEL: 0.2%		V FINE SILT: 0.1%	
(D ₇₅ - D ₂₅):	140.4	0.806	V COARSE SAND: 0.2%		CLAY: 2.1%	
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic	Geometric	Logarithmic	Geometric	Logarithmic	Description
	μm	μm	ϕ	μm	ϕ	
MEAN ($\bar{x}$):	276.1	219.1	2.190	245.1	2.029	Fine Sand
SORTING (σ):	174.4	2.580	1.368	1.571	0.651	Moderately Well Sorted
SKEWNESS (Sk):	8.037	-3.936	3.936	-0.193	0.193	Fine Skewed
KURTOSIS (K):	127.6	21.47	21.47	1.156	1.156	Leptokurtic



APPENDIX F PARTICLE SIZE ANALYSIS

SAMPLE STATISTICS						
SAMPLE IDENTITY: ENV-62			ANALYST & DATE: 12/21/2018			
SAMPLE TYPE: Unimodal, Moderately Well Sorted			TEXTURAL GROUP: Slightly Gravelly Sand			
SEDIMENT NAME: Slightly Very Fine Gravelly Medium Sand						
	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	426.5	1.251	GRAVEL: 0.4%		COARSE SAND: 34.0%	
MODE 2:			SAND: 97.3%		MEDIUM SAND: 53.2%	
MODE 3:			MUD: 2.3%		FINE SAND: 7.8%	
D ₁₀ :	240.4	0.488			V FINE SAND: 0.7%	
MEDIAN or D ₅₀ :	428.7	1.222	V COARSE GRAVEL: 0.0%		V COARSE SILT: 0.0%	
D ₉₀ :	713.0	2.057	COARSE GRAVEL: 0.0%		COARSE SILT: 0.0%	
(D ₉₀ / D ₁₀):	2.966	4.215	MEDIUM GRAVEL: 0.0%		MEDIUM SILT: 0.2%	
(D ₉₀ - D ₁₀):	472.7	1.569	FINE GRAVEL: 0.0%		FINE SILT: 0.0%	
(D ₇₅ / D ₂₅):	1.849	2.129	V FINE GRAVEL: 0.4%		V FINE SILT: 0.3%	
(D ₇₅ - D ₂₅):	266.4	0.887	V COARSE SAND: 1.6%		CLAY: 1.8%	
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic	Geometric	Logarithmic	Geometric	Logarithmic	Description
	μm	μm	ϕ	μm	ϕ	
MEAN ($\bar{x}$):	473.6	381.5	1.390	424.2	1.237	Medium Sand
SORTING (σ):	263.3	2.506	1.325	1.587	0.666	Moderately Well Sorted
SKEWNESS (Sk):	3.920	-4.284	4.284	-0.066	0.066	Symmetrical
KURTOSIS (K):	38.38	25.76	25.76	1.063	1.063	Mesokurtic



APPENDIX F PARTICLE SIZE ANALYSIS

SAMPLE STATISTICS

SAMPLE IDENTITY: **ENV-63**

ANALYST & DATE: 12/21/2018

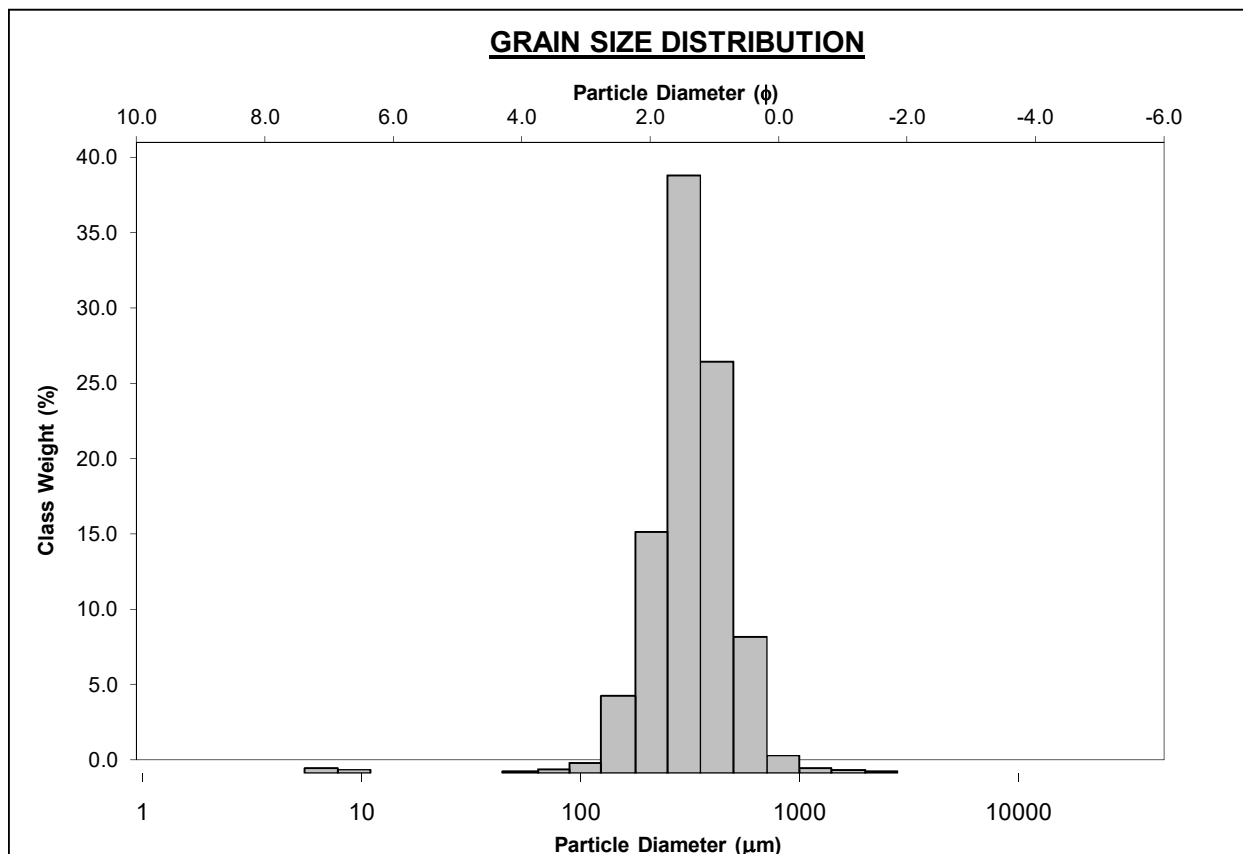
SAMPLE TYPE: Unimodal, Moderately Well Sorted

TEXTURAL GROUP: Slightly Gravelly Sand

SEDIMENT NAME: Slightly Very Fine Gravelly Medium Sand

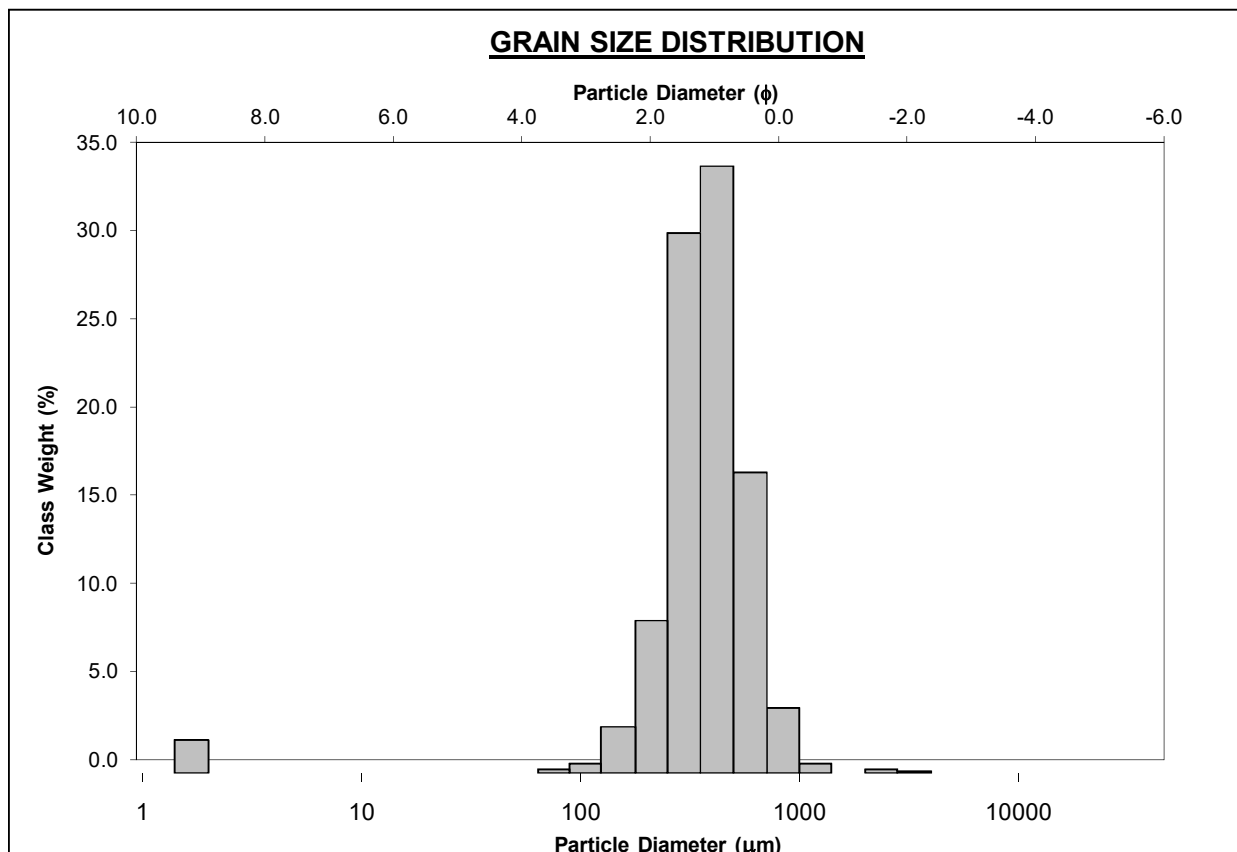
	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	301.0	1.754	GRAVEL: 0.1%	COARSE SAND: 10.0%		
MODE 2:			SAND: 97.2%	MEDIUM SAND: 65.2%		
MODE 3:			MUD: 2.7%	FINE SAND: 20.6%		
D ₁₀ :	183.2	0.966		V FINE SAND: 0.9%		
MEDIAN or D ₅₀ :	315.0	1.667	V COARSE GRAVEL: 0.0%	V COARSE SILT: 0.1%		
D ₉₀ :	512.0	2.448	COARSE GRAVEL: 0.0%	COARSE SILT: 0.0%		
(D ₉₀ / D ₁₀):	2.794	2.535	MEDIUM GRAVEL: 0.0%	MEDIUM SILT: 0.2%		
(D ₉₀ - D ₁₀):	328.7	1.482	FINE GRAVEL: 0.0%	FINE SILT: 0.3%		
(D ₇₅ / D ₂₅):	1.646	1.566	V FINE GRAVEL: 0.1%	V FINE SILT: 0.0%		
(D ₇₅ - D ₂₅):	162.7	0.719	V COARSE SAND: 0.5%	CLAY: 2.1%		
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic μm	Geometric μm	Logarithmic ϕ	Geometric μm	Logarithmic ϕ	Description
MEAN ($\bar{x}$):	344.6	280.2	1.836	313.2	1.675	Medium Sand
SORTING (σ):	172.3	2.538	1.344	1.536	0.619	Moderately Well Sorted
SKEWNESS (Sk):	3.282	-4.484	4.484	-0.059	0.059	Symmetrical
KURTOSIS (K):	31.65	26.48	26.48	1.242	1.242	Leptokurtic

GRAIN SIZE DISTRIBUTION



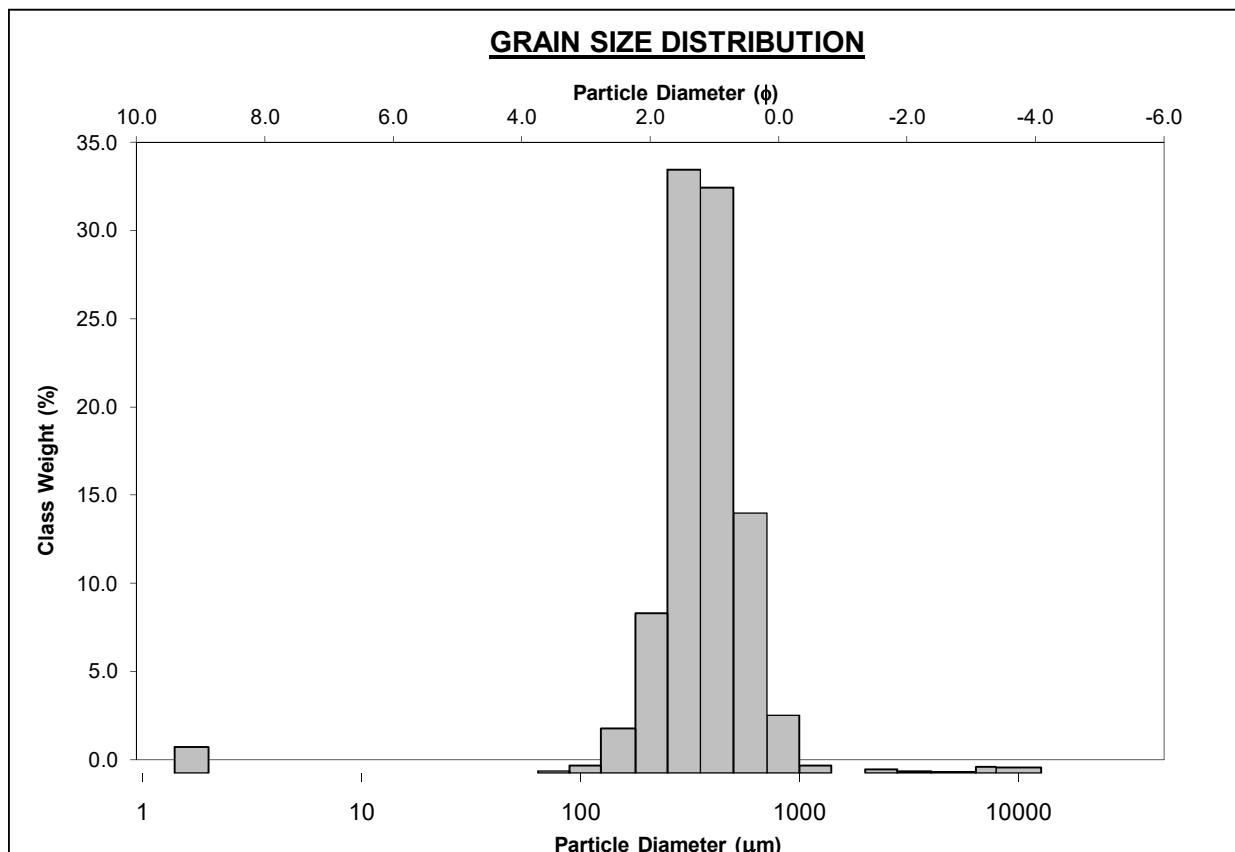
APPENDIX F PARTICLE SIZE ANALYSIS

SAMPLE STATISTICS						
SAMPLE IDENTITY: ENV-64			ANALYST & DATE: 12/21/2018			
SAMPLE TYPE: Unimodal, Moderately Well Sorted			TEXTURAL GROUP: Slightly Gravelly Sand			
SEDIMENT NAME: Slightly Very Fine Gravelly Medium Sand						
	μm	φ	GRAIN SIZE DISTRIBUTION			
MODE 1:	426.5	1.251	GRAVEL: 0.3%		COARSE SAND: 20.7%	
MODE 2:			SAND: 97.8%		MEDIUM SAND: 64.5%	
MODE 3:			MUD: 1.9%		FINE SAND: 11.3%	
D ₁₀ :	215.3	0.660			V FINE SAND: 0.8%	
MEDIAN or D ₅₀ :	374.4	1.417	V COARSE GRAVEL: 0.0%		V COARSE SILT: 0.0%	
D ₉₀ :	633.0	2.216	COARSE GRAVEL: 0.0%		COARSE SILT: 0.0%	
(D ₉₀ / D ₁₀):	2.940	3.358	MEDIUM GRAVEL: 0.0%		MEDIUM SILT: 0.0%	
(D ₉₀ - D ₁₀):	417.7	1.556	FINE GRAVEL: 0.0%		FINE SILT: 0.0%	
(D ₇₅ / D ₂₅):	1.702	1.730	V FINE GRAVEL: 0.3%		V FINE SILT: 0.1%	
(D ₇₅ - D ₂₅):	199.0	0.767	V COARSE SAND: 0.5%		CLAY: 1.8%	
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic	Geometric	Logarithmic	Geometric	Logarithmic	Description
	μm	μm	φ	μm	φ	
MEAN ($\bar{x}$):	409.3	339.9	1.557	377.1	1.407	Medium Sand
SORTING (σ):	215.0	2.323	1.216	1.506	0.591	Moderately Well Sorted
SKEWNESS (Sk):	4.680	-4.664	4.664	-0.042	0.042	Symmetrical
KURTOSIS (K):	54.28	30.29	30.29	1.088	1.088	Mesokurtic



APPENDIX F PARTICLE SIZE ANALYSIS

SAMPLE STATISTICS						
SAMPLE IDENTITY: ENV-65			ANALYST & DATE: 12/21/2018			
SAMPLE TYPE: Unimodal, Moderately Well Sorted			TEXTURAL GROUP: Slightly Gravelly Sand			
SEDIMENT NAME: Slightly Medium Gravelly Medium Sand						
	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	301.0	1.754	GRAVEL: 1.0% COARSE SAND: 18.0%			
MODE 2:			SAND: 97.5% MEDIUM SAND: 66.9%			
MODE 3:			MUD: 1.5% FINE SAND: 11.6%			
D ₁₀ :	219.2	0.679	V FINE SAND: 0.6%			
MEDIAN or D ₅₀ :	362.4	1.464	V COARSE GRAVEL: 0.0% V COARSE SILT: 0.0%			
D ₉₀ :	624.7	2.189	COARSE GRAVEL: 0.0% COARSE SILT: 0.0%			
(D ₉₀ / D ₁₀):	2.850	3.226	MEDIUM GRAVEL: 0.4% MEDIUM SILT: 0.0%			
(D ₉₀ - D ₁₀):	405.5	1.511	FINE GRAVEL: 0.3% FINE SILT: 0.0%			
(D ₇₅ / D ₂₅):	1.680	1.690	V FINE GRAVEL: 0.3% V FINE SILT: 0.1%			
(D ₇₅ - D ₂₅):	190.8	0.749	V COARSE SAND: 0.4% CLAY: 1.4%			
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic μm	Geometric μm	Logarithmic ϕ	Geometric μm	Logarithmic ϕ	Description
MEAN ($\bar{x}$):	457.7	346.7	1.528	369.1	1.438	Medium Sand
SORTING (σ):	739.1	2.244	1.166	1.482	0.568	Moderately Well Sorted
SKEWNESS (Sk):	11.29	-3.798	3.798	0.024	-0.024	Symmetrical
KURTOSIS (K):	141.3	30.43	30.43	1.073	1.073	Mesokurtic



APPENDIX F PARTICLE SIZE ANALYSIS

SAMPLE STATISTICS

SAMPLE IDENTITY: **ENV-66**

ANALYST & DATE: 12/21/2018

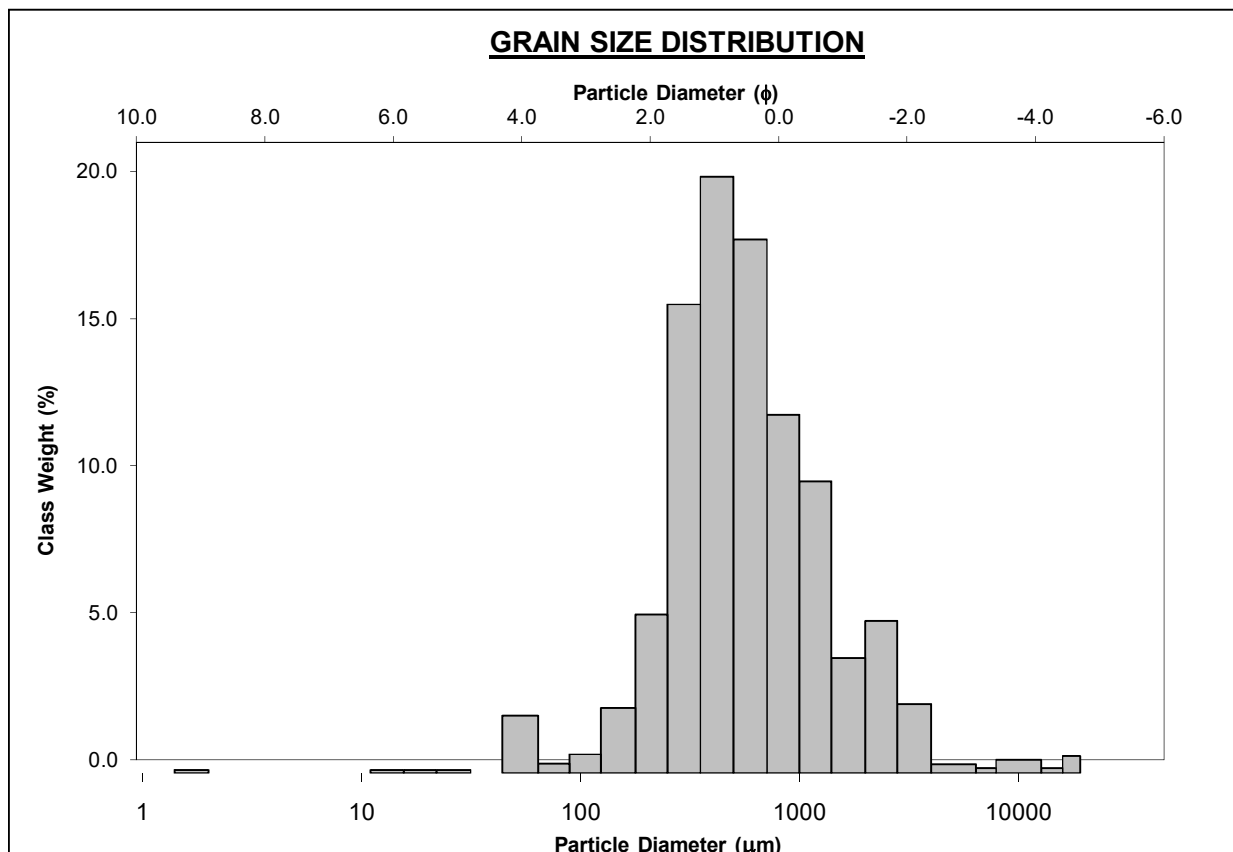
SAMPLE TYPE: Bimodal, Poorly Sorted

TEXTURAL GROUP: Gravelly Sand

SEDIMENT NAME: Very Fine Gravelly Medium Sand

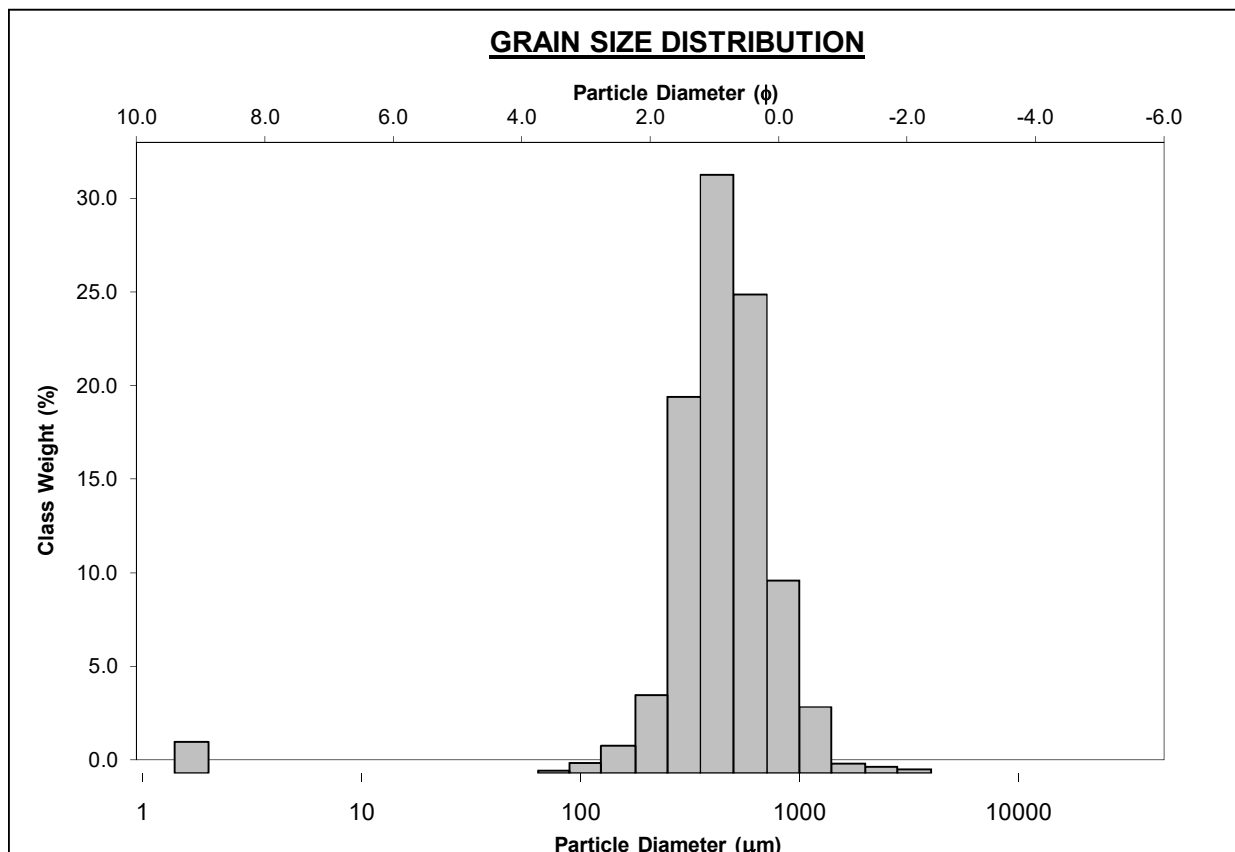
	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	426.5	1.251	GRAVEL: 8.9%	COARSE SAND: 30.3%		
MODE 2:	2400.0	-1.243	SAND: 88.7%	MEDIUM SAND: 36.1%		
MODE 3:			MUD: 2.4%	FINE SAND: 7.6%		
D ₁₀ :	234.9	-0.858		V FINE SAND: 1.1%		
MEDIAN or D ₅₀ :	527.6	0.923	V COARSE GRAVEL: 0.0%	V COARSE SILT: 2.0%		
D ₉₀ :	1813.1	2.090	COARSE GRAVEL: 0.3%	COARSE SILT: 0.2%		
(D ₉₀ / D ₁₀):	7.717	-2.434	MEDIUM GRAVEL: 0.7%	MEDIUM SILT: 0.1%		
(D ₉₀ - D ₁₀):	1578.2	2.948	FINE GRAVEL: 0.5%	FINE SILT: 0.0%		
(D ₇₅ / D ₂₅):	2.749	15.17	V FINE GRAVEL: 7.4%	V FINE SILT: 0.0%		
(D ₇₅ - D ₂₅):	592.5	1.459	V COARSE SAND: 13.6%	CLAY: 0.1%		
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic μm	Geometric μm	Logarithmic ϕ	Geometric μm	Logarithmic ϕ	Description
MEAN ($\bar{x}$):	906.0	565.7	0.822	569.2	0.813	Coarse Sand
SORTING (σ):	1458.3	2.460	1.299	2.225	1.154	Poorly Sorted
SKEWNESS (Sk):	7.125	-0.097	0.097	0.147	-0.147	Coarse Skewed
KURTOSIS (K):	68.66	6.219	6.219	1.131	1.131	Leptokurtic

GRAIN SIZE DISTRIBUTION



APPENDIX F PARTICLE SIZE ANALYSIS

SAMPLE STATISTICS						
SAMPLE IDENTITY: ENV-67			ANALYST & DATE: 12/21/2018			
SAMPLE TYPE: Unimodal, Moderately Well Sorted			TEXTURAL GROUP: Slightly Gravelly Sand			
SEDIMENT NAME: Slightly Very Fine Gravelly Medium Sand						
	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	426.5	1.251	GRAVEL: 0.5% COARSE SAND: 35.8%			
MODE 2:			SAND: 97.8% MEDIUM SAND: 51.8%			
MODE 3:			MUD: 1.7% FINE SAND: 5.7%			
D ₁₀ :	258.7	0.274	V FINE SAND: 0.6%			
MEDIAN or D ₅₀ :	449.3	1.154	V COARSE GRAVEL: 0.0% V COARSE SILT: 0.0%			
D ₉₀ :	827.0	1.951	COARSE GRAVEL: 0.0% COARSE SILT: 0.0%			
(D ₉₀ / D ₁₀):	3.197	7.120	MEDIUM GRAVEL: 0.0% MEDIUM SILT: 0.0%			
(D ₉₀ - D ₁₀):	568.3	1.677	FINE GRAVEL: 0.0% FINE SILT: 0.0%			
(D ₇₅ / D ₂₅):	1.833	2.247	V FINE GRAVEL: 0.5% V FINE SILT: 0.1%			
(D ₇₅ - D ₂₅):	279.6	0.874	V COARSE SAND: 3.9% CLAY: 1.6%			
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic μm	Geometric μm	Logarithmic ϕ	Geometric μm	Logarithmic ϕ	Description
MEAN ($\bar{x}$):	513.1	418.3	1.257	447.7	1.159	Medium Sand
SORTING (σ):	294.7	2.357	1.237	1.591	0.670	Moderately Well Sorted
SKEWNESS (Sk):	3.331	-4.420	4.420	-0.020	0.020	Symmetrical
KURTOSIS (K):	26.26	29.61	29.61	1.086	1.086	Mesokurtic



APPENDIX F PARTICLE SIZE ANALYSIS

SAMPLE STATISTICS

SAMPLE IDENTITY: **ENV-68**

ANALYST & DATE: 12/21/2018

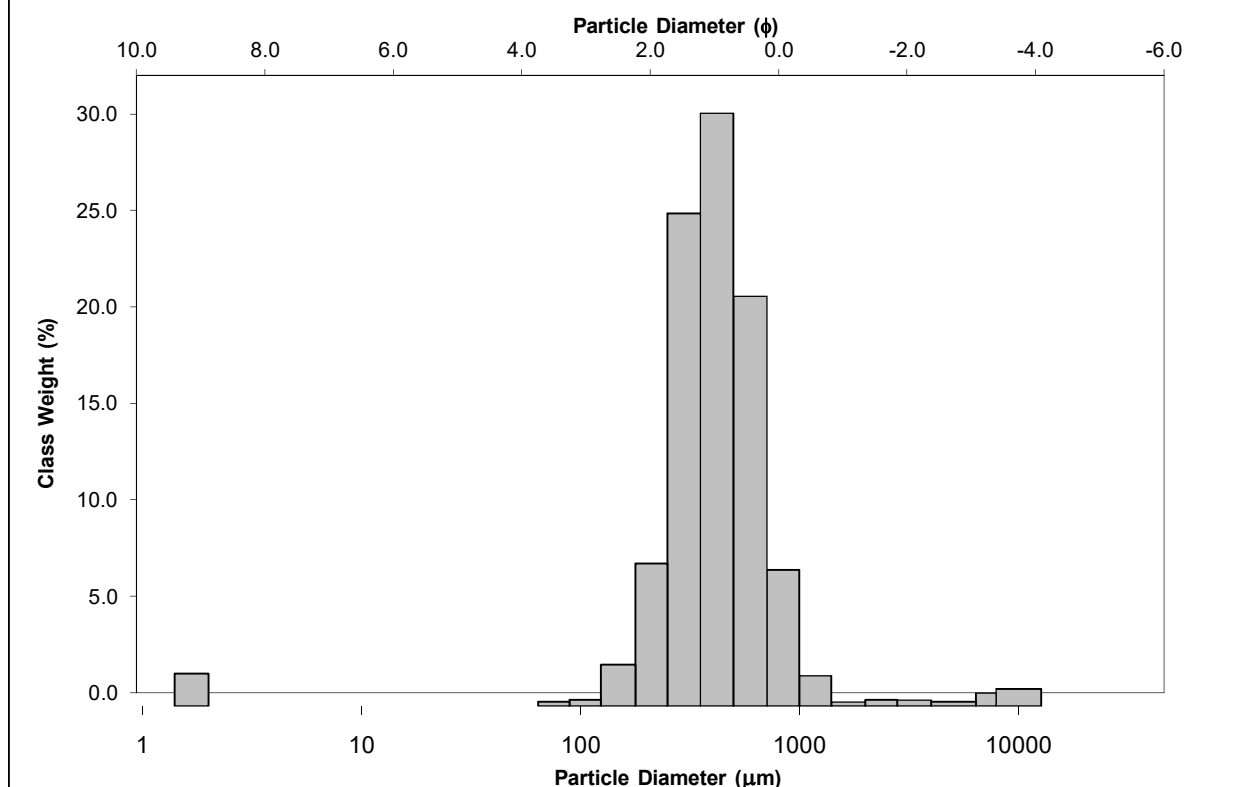
SAMPLE TYPE: Unimodal, Moderately Well Sorted

TEXTURAL GROUP: Slightly Gravelly Sand

SEDIMENT NAME: Slightly Medium Gravelly Medium Sand

	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	426.5	1.251	GRAVEL: 2.5%	COARSE SAND: 28.2%		
MODE 2:			SAND: 95.8%	MEDIUM SAND: 55.8%		
MODE 3:			MUD: 1.7%	FINE SAND: 9.5%		
D ₁₀ :	232.0	0.415		V FINE SAND: 0.5%		
MEDIAN or D ₅₀ :	409.3	1.289	V COARSE GRAVEL: 0.0%	V COARSE SILT: 0.0%		
D ₉₀ :	749.8	2.108	COARSE GRAVEL: 0.0%	COARSE SILT: 0.0%		
(D ₉₀ / D ₁₀):	3.233	5.076	MEDIUM GRAVEL: 1.2%	MEDIUM SILT: 0.0%		
(D ₉₀ - D ₁₀):	517.9	1.693	FINE GRAVEL: 0.7%	FINE SILT: 0.0%		
(D ₇₅ / D ₂₅):	1.886	2.110	V FINE GRAVEL: 0.6%	V FINE SILT: 0.1%		
(D ₇₅ - D ₂₅):	265.2	0.915	V COARSE SAND: 1.7%	CLAY: 1.6%		
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic μm	Geometric μm	Logarithmic ϕ	Geometric μm	Logarithmic ϕ	Description
MEAN ($\bar{x}$):	620.7	398.3	1.328	414.1	1.272	Medium Sand
SORTING (σ):	1209.8	2.567	1.360	1.612	0.689	Moderately Well Sorted
SKEWNESS (Sk):	6.973	-2.609	2.609	0.034	-0.034	Symmetrical
KURTOSIS (K):	53.28	21.70	21.70	1.071	1.071	Mesokurtic

GRAIN SIZE DISTRIBUTION



APPENDIX F PARTICLE SIZE ANALYSIS

SAMPLE STATISTICS

SAMPLE IDENTITY: **ENV-69**

ANALYST & DATE: 12/21/2018

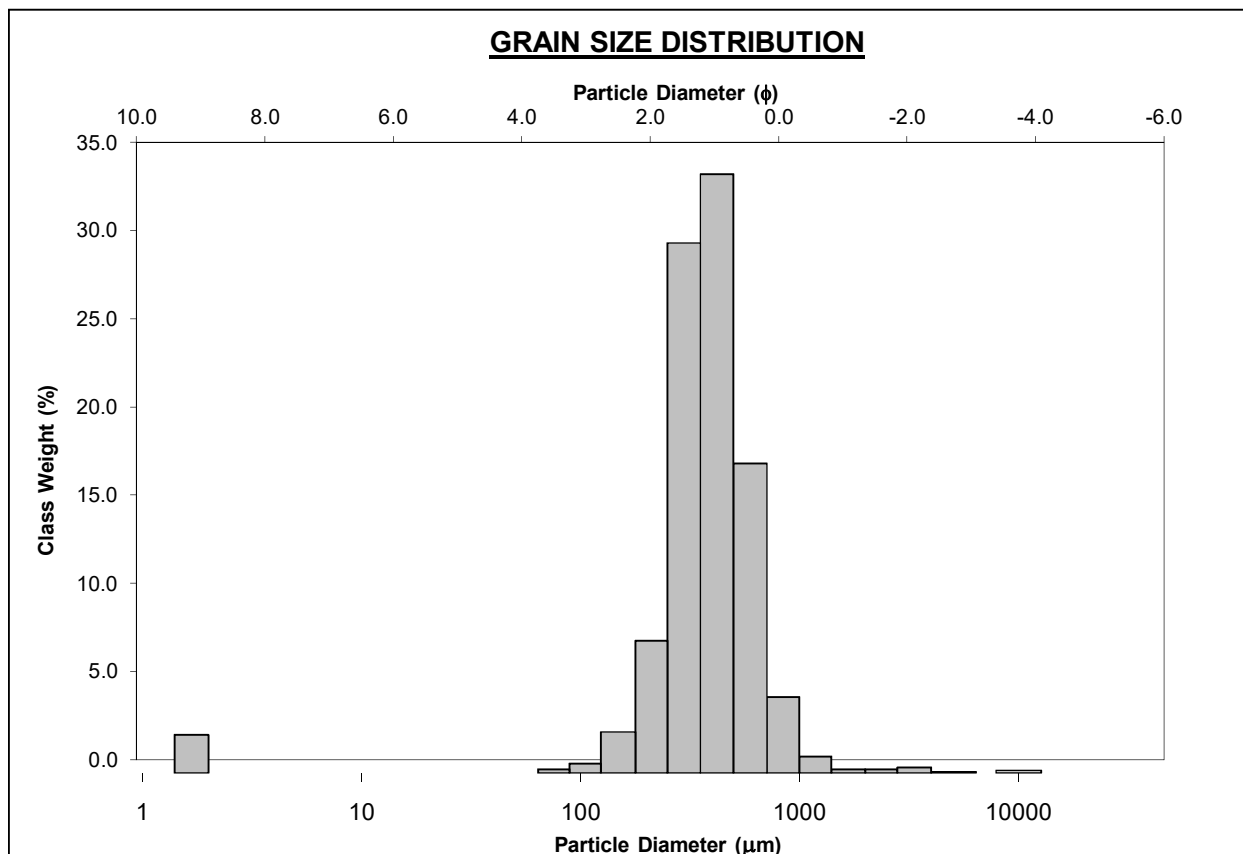
SAMPLE TYPE: Unimodal, Moderately Well Sorted

TEXTURAL GROUP: Slightly Gravelly Sand

SEDIMENT NAME: Slightly Very Fine Gravelly Medium Sand

	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	426.5	1.251	GRAVEL: 0.8%	COARSE SAND: 21.8%		
MODE 2:			SAND: 97.0%	MEDIUM SAND: 63.5%		
MODE 3:			MUD: 2.2%	FINE SAND: 9.9%		
D ₁₀ :	221.6	0.606		V FINE SAND: 0.8%		
MEDIAN or D ₅₀ :	381.4	1.391	V COARSE GRAVEL: 0.0%	V COARSE SILT: 0.0%		
D ₉₀ :	656.9	2.174	COARSE GRAVEL: 0.0%	COARSE SILT: 0.0%		
(D ₉₀ / D ₁₀):	2.964	3.586	MEDIUM GRAVEL: 0.2%	MEDIUM SILT: 0.0%		
(D ₉₀ - D ₁₀):	435.3	1.568	FINE GRAVEL: 0.1%	FINE SILT: 0.0%		
(D ₇₅ / D ₂₅):	1.713	1.762	V FINE GRAVEL: 0.5%	V FINE SILT: 0.1%		
(D ₇₅ - D ₂₅):	205.4	0.777	V COARSE SAND: 1.1%	CLAY: 2.1%		
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic μm	Geometric μm	Logarithmic ϕ	Geometric μm	Logarithmic ϕ	Description
MEAN ($\bar{x}$):	451.6	347.5	1.525	386.3	1.372	Medium Sand
SORTING (σ):	536.6	2.512	1.329	1.541	0.624	Moderately Well Sorted
SKEWNESS (Sk):	13.69	-4.037	4.037	-0.008	0.008	Symmetrical
KURTOSIS (K):	236.3	25.50	25.50	1.156	1.156	Leptokurtic

GRAIN SIZE DISTRIBUTION



APPENDIX F PARTICLE SIZE ANALYSIS

SAMPLE STATISTICS

SAMPLE IDENTITY: **ENV-70**

ANALYST & DATE: 12/21/2018

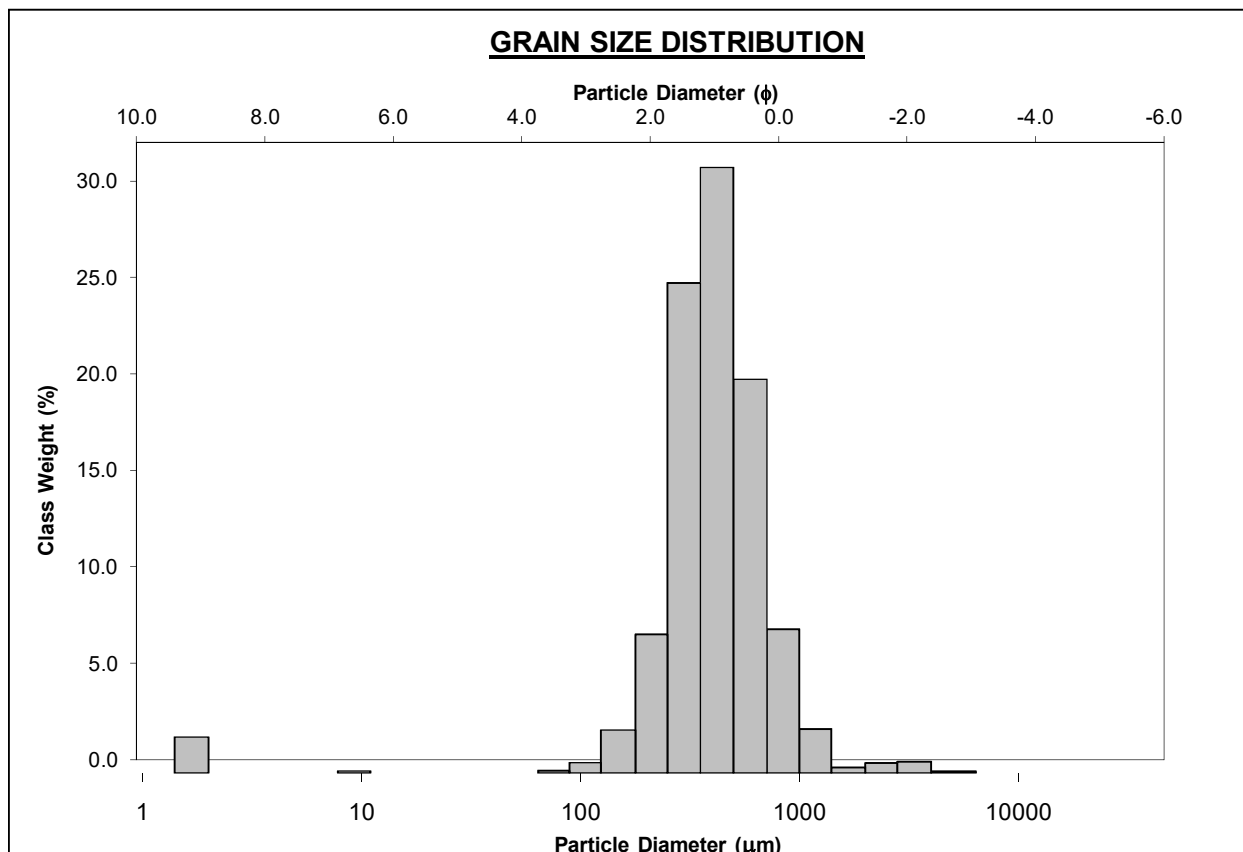
SAMPLE TYPE: Unimodal, Moderately Well Sorted

TEXTURAL GROUP: Slightly Gravelly Sand

SEDIMENT NAME: Slightly Very Fine Gravelly Medium Sand

	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	426.5	1.251	GRAVEL: 1.2%	COARSE SAND: 27.8%		
MODE 2:			SAND: 96.8%	MEDIUM SAND: 56.4%		
MODE 3:			MUD: 2.0%	FINE SAND: 9.4%		
D ₁₀ :	228.1	0.426		V FINE SAND: 0.7%		
MEDIAN or D ₅₀ :	407.0	1.297	V COARSE GRAVEL: 0.0%	V COARSE SILT: 0.0%		
D ₉₀ :	744.1	2.132	COARSE GRAVEL: 0.0%	COARSE SILT: 0.0%		
(D ₉₀ / D ₁₀):	3.262	5.000	MEDIUM GRAVEL: 0.0%	MEDIUM SILT: 0.1%		
(D ₉₀ - D ₁₀):	516.0	1.706	FINE GRAVEL: 0.1%	FINE SILT: 0.0%		
(D ₇₅ / D ₂₅):	1.872	2.077	V FINE GRAVEL: 1.1%	V FINE SILT: 0.1%		
(D ₇₅ - D ₂₅):	260.3	0.905	V COARSE SAND: 2.5%	CLAY: 1.8%		
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic μm	Geometric μm	Logarithmic ϕ	Geometric μm	Logarithmic ϕ	Description
MEAN ($\bar{x}$):	484.3	378.4	1.402	412.1	1.279	Medium Sand
SORTING (σ):	378.2	2.475	1.308	1.612	0.689	Moderately Well Sorted
SKEWNESS (Sk):	5.542	-3.920	3.920	0.025	-0.025	Symmetrical
KURTOSIS (K):	49.43	25.14	25.14	1.085	1.085	Mesokurtic

GRAIN SIZE DISTRIBUTION



APPENDIX F PARTICLE SIZE ANALYSIS

SAMPLE STATISTICS

SAMPLE IDENTITY: **ENV-71**

ANALYST & DATE: 12/21/2018

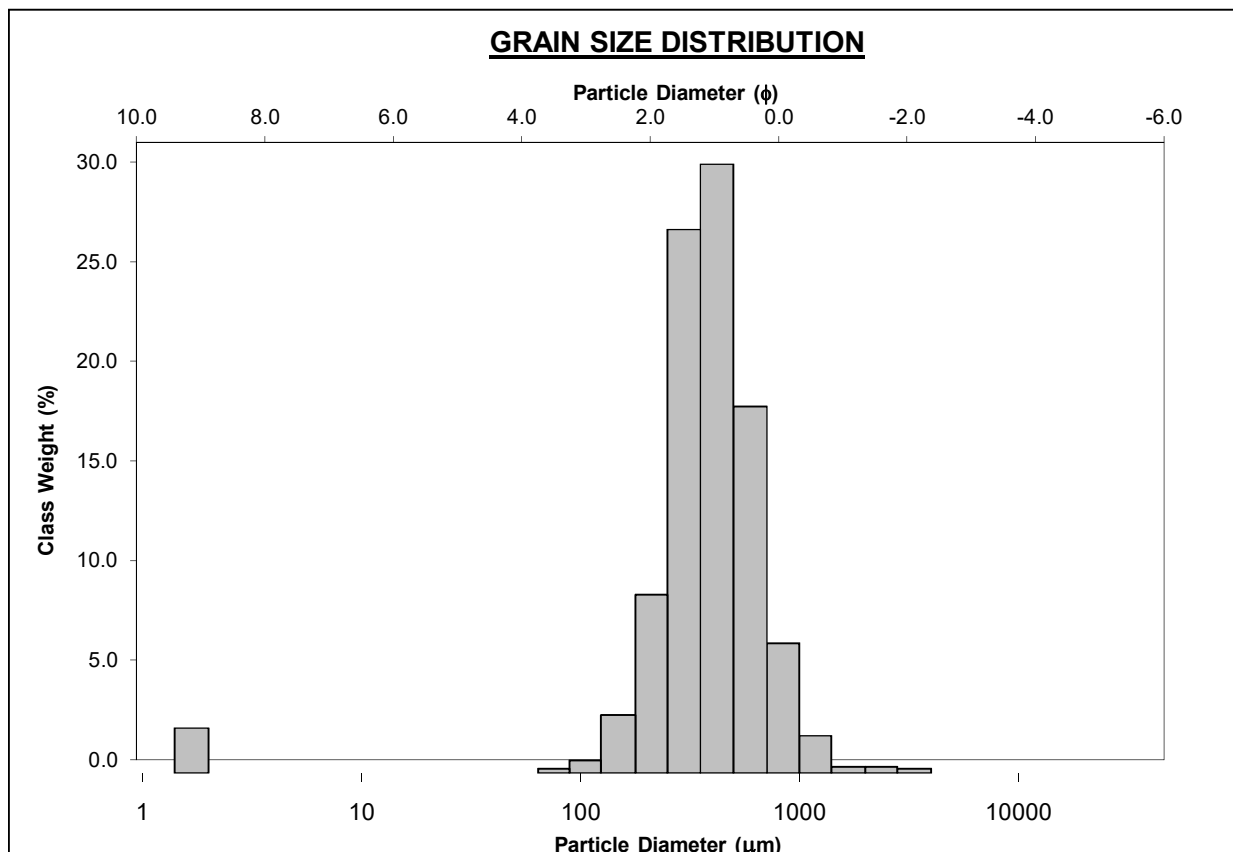
SAMPLE TYPE: Unimodal, Moderately Sorted

TEXTURAL GROUP: Slightly Gravelly Sand

SEDIMENT NAME: Slightly Very Fine Gravelly Medium Sand

	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	426.5	1.251	GRAVEL: 0.5%	COARSE SAND: 24.9%		
MODE 2:			SAND: 97.2%	MEDIUM SAND: 57.5%		
MODE 3:			MUD: 2.3%	FINE SAND: 11.8%		
D ₁₀ :	207.3	0.521		V FINE SAND: 0.9%		
MEDIAN or D ₅₀ :	386.8	1.371	V COARSE GRAVEL: 0.0%	V COARSE SILT: 0.0%		
D ₉₀ :	696.7	2.270	COARSE GRAVEL: 0.0%	COARSE SILT: 0.0%		
(D ₉₀ / D ₁₀):	3.361	4.354	MEDIUM GRAVEL: 0.0%	MEDIUM SILT: 0.0%		
(D ₉₀ - D ₁₀):	489.4	1.749	FINE GRAVEL: 0.0%	FINE SILT: 0.0%		
(D ₇₅ / D ₂₅):	1.846	1.949	V FINE GRAVEL: 0.5%	V FINE SILT: 0.2%		
(D ₇₅ - D ₂₅):	240.2	0.884	V COARSE SAND: 2.1%	CLAY: 2.1%		
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic μm	Geometric μm	Logarithmic ϕ	Geometric μm	Logarithmic ϕ	Description
MEAN ($\bar{x}$):	443.3	349.8	1.516	393.4	1.346	Medium Sand
SORTING (σ):	279.0	2.567	1.360	1.627	0.702	Moderately Sorted
SKEWNESS (Sk):	4.064	-4.050	4.050	0.003	-0.003	Symmetrical
KURTOSIS (K):	35.26	24.03	24.03	1.157	1.157	Leptokurtic

GRAIN SIZE DISTRIBUTION



APPENDIX F PARTICLE SIZE ANALYSIS

SAMPLE STATISTICS

SAMPLE IDENTITY: **ENV-72**

ANALYST & DATE: 8/10/2018

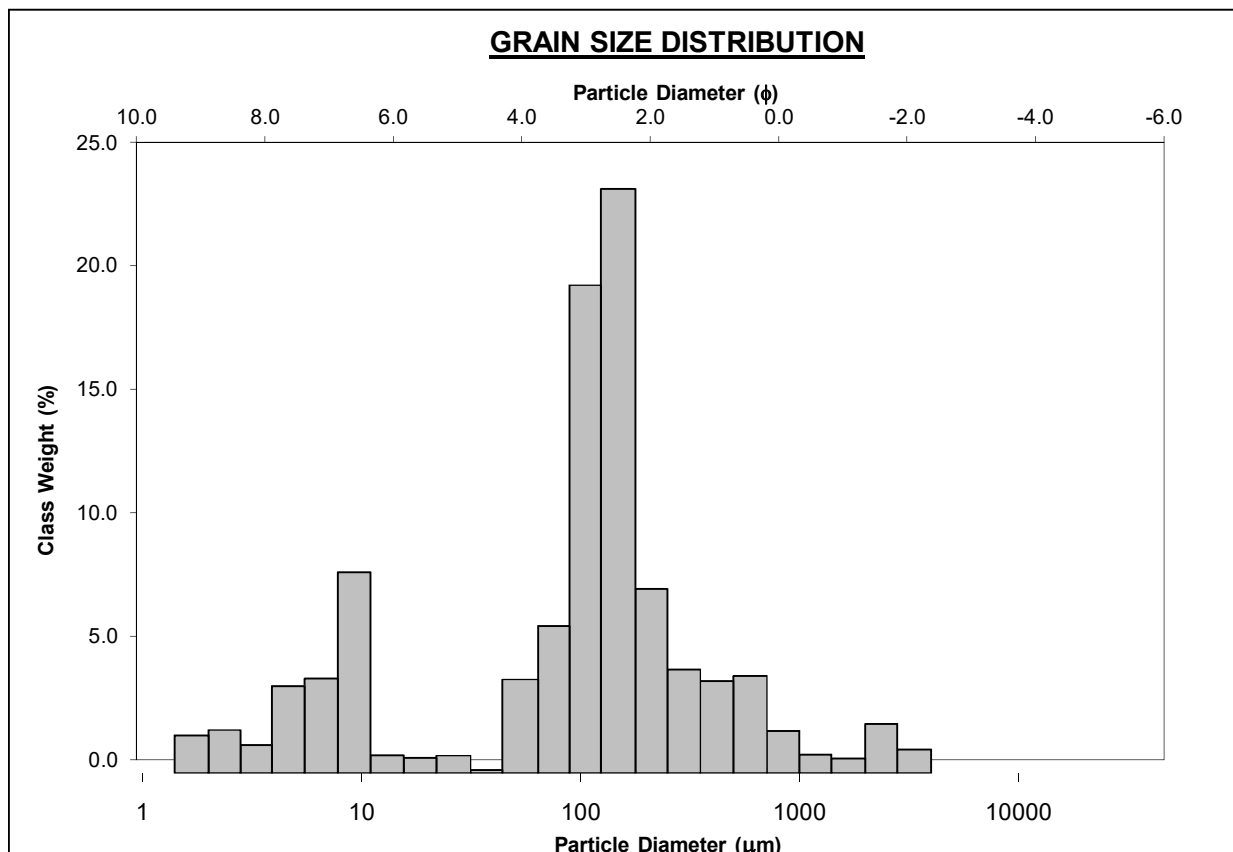
SAMPLE TYPE: Trimodal, Very Poorly Sorted

TEXTURAL GROUP: Slightly Gravelly Muddy Sand

SEDIMENT NAME: Slightly Very Fine Gravelly Muddy Fine Sand

	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	151.0	2.751	GRAVEL: 2.4%	COARSE SAND: 4.7%		
MODE 2:	9.400	6.754	SAND: 59.5%	MEDIUM SAND: 6.6%		
MODE 3:	605.0	0.747	MUD: 38.1%	FINE SAND: 26.1%		
D ₁₀ :	2.113	1.292		V FINE SAND: 21.1%		
MEDIAN or D ₅₀ :	103.2	3.277	V COARSE GRAVEL: 0.0%	V COARSE SILT: 3.3%		
D ₉₀ :	408.5	8.886	COARSE GRAVEL: 0.0%	COARSE SILT: 1.1%		
(D ₉₀ / D ₁₀):	193.3	6.880	MEDIUM GRAVEL: 0.0%	MEDIUM SILT: 7.3%		
(D ₉₀ - D ₁₀):	406.4	7.595	FINE GRAVEL: 0.0%	FINE SILT: 6.1%		
(D ₇₅ / D ₂₅):	24.69	2.781	V FINE GRAVEL: 2.4%	V FINE SILT: 2.4%		
(D ₇₅ - D ₂₅):	158.6	4.626	V COARSE SAND: 1.1%	CLAY: 17.9%		
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic μm	Geometric μm	Logarithmic ϕ	Geometric μm	Logarithmic ϕ	Description
MEAN ($\bar{x}$):	204.5	42.03	4.573	32.75	4.933	Very Coarse Silt
SORTING (σ):	454.5	8.752	3.130	8.174	3.031	Very Poorly Sorted
SKEWNESS (Sk):	4.858	-0.464	0.464	-0.491	0.491	Very Fine Skewed
KURTOSIS (K):	29.07	2.063	2.063	0.703	0.703	Platykurtic

GRAIN SIZE DISTRIBUTION



APPENDIX G MACROFAUNAL ANALYSIS OF BENTHIC GRAB SAMPLES

Table G.1 Macrofaunal Analysis of Benthic Grab Samples

Phylum

Taxon

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APPENDIX G MACROFAUNAL ANALYSIS OF BENTHIC GRAB SAMPLES

Table G.1 Macrofaunal Analysis of Benthic Grab Samples

Aphia ID	Phylum	Taxon	Authority	ST-198A-ENV5	ST-198A-ENV7	ST-198A-ENV8	ST-198A-ENV9	ST-198A-ENV10	ST-198A-ENV11	ST-198A-ENV12	ST-198A-ENV13	ST-198A-ENV14	ST-198A-ENV15	ST-198A-ENV16	ST-198A-ENV17	ST-198A-ENV18	ST-198A-ENV19	ST-198A-ENV20	ST-198A-ENV21	ST-198A-ENV22	ST-198A-ENV23	ST-198A-ENV24	ST-198A-ENV25	ST-198A-ENV26	ST-198A-ENV27	ST-198A-ENV28	ST-198A-ENV29	ST-198A-ENV30	ST-198A-ENV31	ST-198A-ENV32	ST-198A-ENV33	ST-198A-ENV34	ST-198A-ENV35	ST-198A-ENV36	ST-198A-ENV37	ST-198A-ENV38	ST-198A-ENV39	ST-198A-ENV40	ST-198A-ENV41	ST-198A-ENV42	ST-198A-ENV43	ST-198A-ENV44	ST-198A-ENV45	ST-198A-ENV46	ST-198A-ENV47	ST-198A-ENV48	ST-198A-ENV49	ST-198A-ENV50	ST-198A-ENV51	ST-198A-ENV52	ST-198A-ENV53	ST-198A-ENV54	ST-198A-ENV55	ST-198A-ENV56	ST-198A-ENV57	ST-198A-ENV58	ST-198A-ENV59	ST-198A-ENV60	ST-198A-ENV61	ST-198A-ENV62	ST-198A-ENV63	ST-198A-ENV64	ST-198A-ENV65	ST-198A-ENV66	ST-198A-ENV67	ST-198A-ENV68	ST-198A-ENV69	ST-198A-ENV70	ST-198A-ENV71	ST-198A-ENV72	ST-198A-ENV73	ST-198A-ENV74	ST-198A-ENV75	ST-198A-ENV76	ST-198A-ENV77	ST-198A-ENV78	ST-198A-ENV79	ST-198A-ENV80	ST-198A-ENV81	ST-198A-ENV82	ST-198A-ENV83	ST-198A-ENV84	ST-198A-ENV85	ST-198A-ENV86	ST-198A-ENV87	ST-198A-ENV88	ST-198A-ENV89	ST-198A-ENV90	ST-198A-ENV91	ST-198A-ENV92	ST-198A-ENV93	ST-198A-ENV94	ST-198A-ENV95	ST-198A-ENV96	ST-198A-ENV97	ST-198A-ENV98	ST-198A-ENV99	ST-198A-ENV100	ST-198A-ENV101	ST-198A-ENV102	ST-198A-ENV103	ST-198A-ENV104	ST-198A-ENV105	ST-198A-ENV106	ST-198A-ENV107	ST-198A-ENV108	ST-198A-ENV109	ST-198A-ENV110	ST-198A-ENV111	ST-198A-ENV112	ST-198A-ENV113	ST-198A-ENV114	ST-198A-ENV115	ST-198A-ENV116	ST-198A-ENV117	ST-198A-ENV118	ST-198A-ENV119	ST-198A-ENV120	ST-198A-ENV121	ST-198A-ENV122	ST-198A-ENV123	ST-198A-ENV124	ST-198A-ENV125	ST-198A-ENV126	ST-198A-ENV127	ST-198A-ENV128	ST-198A-ENV129	ST-198A-ENV130	ST-198A-ENV131	ST-198A-ENV132	ST-198A-ENV133	ST-198A-ENV134	ST-198A-ENV135	ST-198A-ENV136	ST-198A-ENV137	ST-198A-ENV138	ST-198A-ENV139	ST-198A-ENV140	ST-198A-ENV141	ST-198A-ENV142	ST-198A-ENV143	ST-198A-ENV144	ST-198A-ENV145	ST-198A-ENV146	ST-198A-ENV147	ST-198A-ENV148	ST-198A-ENV149	ST-198A-ENV150	ST-198A-ENV151	ST-198A-ENV152	ST-198A-ENV153	ST-198A-ENV154	ST-198A-ENV155	ST-198A-ENV156	ST-198A-ENV157	ST-198A-ENV158	ST-198A-ENV159	ST-198A-ENV160	ST-198A-ENV161	ST-198A-ENV162	ST-198A-ENV163	ST-198A-ENV164	ST-198A-ENV165	ST-198A-ENV166	ST-198A-ENV167	ST-198A-ENV168	ST-198A-ENV169	ST-198A-ENV170	ST-198A-ENV171	ST-198A-ENV172	ST-198A-ENV173	ST-198A-ENV174	ST-198A-ENV175	ST-198A-ENV176	ST-198A-ENV177	ST-198A-ENV178	ST-198A-ENV179	ST-198A-ENV180	ST-198A-ENV181	ST-198A-ENV182	ST-198A-ENV183	ST-198A-ENV184	ST-198A-ENV185	ST-198A-ENV186	ST-198A-ENV187	ST-198A-ENV188	ST-198A-ENV189	ST-198A-ENV190	ST-198A-ENV191	ST-198A-ENV192	ST-198A-ENV193	ST-198A-ENV194	ST-198A-ENV195	ST-198A-ENV196	ST-198A-ENV197	ST-198A-ENV198	ST-198A-ENV199	ST-198A-ENV200	ST-198A-ENV201	ST-198A-ENV202	ST-198A-ENV203	ST-198A-ENV204	ST-198A-ENV205	ST-198A-ENV206	ST-198A-ENV207	ST-198A-ENV208	ST-198A-ENV209	ST-198A-ENV210	ST-198A-ENV211	ST-198A-ENV212	ST-198A-ENV213	ST-198A-ENV214	ST-198A-ENV215	ST-198A-ENV216	ST-198A-ENV217	ST-198A-ENV218	ST-198A-ENV219	ST-198A-ENV220	ST-198A-ENV221	ST-198A-ENV222	ST-198A-ENV223	ST-198A-ENV224	ST-198A-ENV225	ST-198A-ENV226	ST-198A-ENV227	ST-198A-ENV228	ST-198A-ENV229	ST-198A-ENV230	ST-198A-ENV231	ST-198A-ENV232	ST-198A-ENV233	ST-198A-ENV234	ST-198A-ENV235	ST-198A-ENV236	ST-198A-ENV237	ST-198A-ENV238	ST-198A-ENV239	ST-198A-ENV240	ST-198A-ENV241	ST-198A-ENV242	ST-198A-ENV243	ST-198A-ENV244	ST-198A-ENV245	ST-198A-ENV246	ST-198A-ENV247	ST-198A-ENV248	ST-198A-ENV249	ST-198A-ENV250	ST-198A-ENV251	ST-198A-ENV252	ST-198A-ENV253	ST-198A-ENV254	ST-198A-ENV255	ST-198A-ENV256	ST-198A-ENV257	ST-198A-ENV258	ST-198A-ENV259	ST-198A-ENV260	ST-198A-ENV261	ST-198A-ENV262	ST-198A-ENV263	ST-198A-ENV264	ST-198A-ENV265	ST-
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ATTACHMENT T-3

COP BENTHIC SURVEY REPORT: SITING CORRIDORS

Inspire Report: *Benthic Assessment Survey of Proposed Export Cable Routes in Support of the Equinor Wind OCS-A 0512 Offshore Wind Farm Project*

Benthic Assessment Survey of Proposed Export Cable Routes in Support of the Equinor Wind OCS-A 0512 Offshore Wind Farm Project

DATA REPORT

Survey Conducted 10-15 July 2019

Prepared for:



Equinor Wind US LLC
36 Clermont Drive
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Submitted by:



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18 November 2019

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Date	Revision	Note	Prepared	Reviewed	Approved
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10/14/2019	0	Draft submitted to client	KS	DAC	KS

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LIST OF ACRONYMS

aRPD	apparent Redox Potential Discontinuity
BOEM	Bureau of Ocean Energy Management
CMECS	Coastal and Marine Ecological Classification Standard
COP	Construction and Operations Plan
DSLR	Digital single-lens reflex
Equinor	Equinor Wind US, LLC
FGDC	Federal Geographic Data Committee
G&G	Geological and Geophysical Survey
GPS	Global Positioning System
INSPIRE	INSPIRE Environmental, LLC
LIECR	Long Island Export Cable Route
NEF	Nikon Electronic Format
NJECR	New Jersey Export Cable Route
NYHECR	New York Harbor Export Cable Route
OCS	Outer Continental Shelf
PEP	Project Execution Plan
PSD	Photoshop Document
PV	Plan View
SOD	Sediment oxygen demand
SOP	Standard operating procedure
SPI	Sediment Profile Imaging

EXECUTIVE SUMMARY

INSPIRE Environmental conducted a combined Sediment Profile and Plan View Imaging (SPI/PV) survey at stations along the proposed potential Equinor Wind Export Cable Routes and at reference stations. The SPI/PV survey was conducted as part of a benthic assessment of Equinor Wind Offshore Lease Area OCS-A 0512 and provides an interpretive assessment of discrete sampling stations to characterize and delineate the benthic habitat.

The Equinor lease area OCS-A 0512 is located in the federal waters of the New York Bight. The proposed cable routes transit much of the NY Bight in federal waters, but portions also extend into NY and NJ state waters as well. To conduct a benthic assessment of the proposed area that met the Bureau of Ocean Energy Management (BOEM) guidelines, INSPIRE designed a 157-station SPI/PV survey along the cable route and 15 stations at pre-determined reference stations for a total of 172 stations surveyed. Sixteen sediment grabs were also collected to ground-truth the SPI/PV data.

Sediment type along the proposed cable routes varied at large but not small scales. Surficial sediments across the surveyed area were spatially heterogenous at the inter-station scale (i.e., sediment type varied by station) and mostly homogenous at the intra-station scale (i.e., most replicates at a station were similar in sediment type). This trend was true at the reference stations. Despite the spatial variations in sediment types, most of the sediment found along the cable routes and at the reference stations were varying sizes of mobile sand or mobile sand mixed with gravel, with a few instances of silt-clay and cobbles/boulders. The sediment types documented during the SPI/PV survey were used to ground-truth USGS backscatter data. The SPI/PV data corresponded well with the backscatter data along the cable routes and at the reference stations. Extrapolating bottom type in the area using the SPI/PV and USGS backscatter data is appropriate given the ground-truth verification. Grain-size deduced from sediment grabs was generally in agreement with the sediment types designated with SPI/PV. Disagreement between the grab and SPI/PV data can be attributed to the sediment grabs collecting only a single replicate of a relatively small area of the seafloor and not capturing the intra-station heterogeneity present at the surveyed areas.

The sediment types documented along the proposed cable routes corresponded to the designated Habitat Types. Habitat Types were defined based on the physical habitat structure and mobility, as well as the dominant CMECS Biotic Subclass and CMECS Biotic Group. Three broad habitat types were identified at the surveyed area, Sand Sheets, Sand with Mobile Gravel, and Patchy, Cobbles, Boulders on Sand. Stations were predominantly Sand Sheet habitat, and the Hudson Shelf Valley appeared to be the primary delineation of Habitat Type in the surveyed area. The transition from a seafloor habitat of Sand Sheet to one of Sand with Mobile Gravel occurred right at the Hudson Shelf Valley for both the reference stations and stations along the proposed cable routes. Stations east of the submarine valley were Sand Sheet habitat, and stations west of the submarine valley were a habitat of Sand with Mobile Gravel. Patchy, Cobbles, Boulders on Sand were documented at Station 050 situated on Cholera Bank, and along the NJECR at Station 010 in the Hudson Shelf Valley. Cobbles and

boulders tend to be predominantly stationary allowing for attached fauna to settle and grow, whereas sand and gravel are particles that are small enough that the average hydrodynamic forcing on the bottom can mobilize and transport them; mobilized grains makes the presence and subsistence of attached fauna unlikely.

Soft Sediment Fauna was the dominant Biotic Subclass observed across the surveyed area. The predominance of Soft Sediment Fauna corresponded to the predominant Sediment Types and Habitat Types observed along the proposed cable routes. There were a few instances of Attached Fauna present (12 of the 157 station samples), and Mussel Beds made-up the majority of observations (7 of the 12 stations). At the remaining stations, one station had trace coverage of barnacles (Station 133), and the other instances were sparse coverage of sponges, hydroids, and mussels at Stations 010, 046, and 068, respectively. Station 050 was an exception with dense cover of diverse attached fauna (corals, sponges, barnacles, hydroids). The reference stations were exclusively composed of Soft Sediment Fauna.

Along the proposed cable routes Biotic Group was observed to be spatial heterogenous, with a high diversity of Biotic Groups documented. Sand dollar beds and both Small and Larger Tube-Building Fauna were the predominant Biotic Groups that were observed, with much of the tube-building activity the product of the polychaete *Diopatra cuprea*. *D. cuprea* produce tubes reinforced with shell fragments and tiny pebbles which are cemented in the style of an overlapping mosaic giving these tubes a distinct appearance. The high variability in dominant Biotic Groups along the proposed cable routes highlights the diversity of benthic fauna on the seafloor in the NY Bight.

Sensitive taxa were only documented at one station, Station 050, where the Northern Star Coral *Astrangia* spp. was observed in all replicates. *Astrangia* is a stony coral that attaches to hard substrate instead of building its own structure like those corals commonly observed in tropical reefs. The polyps are translucent, and the colony has a furry appearance when they are expanded. These sensitive taxa were observed in conjunction with other non-sensitive attached fauna (sponges, hydroids, barnacles).

The results and images from this survey will allow accurate characterization and delineation of the benthic environment and establish a baseline of both large- and small-scale biological features along the potential proposed cable routes and at the three reference areas. The results will also allow Equinor to broadly communicate the results of the survey using seafloor images of predevelopment conditions. Contributions from this survey will provide valuable information to address BOEM guidelines and regulations.

1.0 INTRODUCTION

1.1 Project Background

Equinor Wind US, LLC (Equinor) and the U.S. Department of Interior's Bureau of Ocean Energy Management (BOEM) executed a commercial lease for the development of a wind energy facility on the Outer Continental Shelf (OCS) offshore New York in Lease OCS-A-512, (referred to in this report as the "Lease Area"), effective April 1, 2017. Equinor awarded INSPIRE Environmental (INSPIRE) the benthic assessment investigation of the proposed potential cable routes to support spatial planning decisions, reduce uncertainty associated with baseline conditions, and inform future approaches to quantify changes in the benthic community associated with proposed Project activities.

The Equinor lease area is in the federal waters of the New York Bight, an average of 20 miles south of Long Island, east of the Rockaways. The Equinor Wind site extends 14 to 30 miles southeast of Long Island and covers water depths between 20 to 40 meters (65 to 131 feet); the bulk of the work will take place in the shelf waters adjacent New York (NY) and New Jersey (NJ), which range in depth from approximately 5 to 63 meters (16 to 206 ft) (Figure 1-1). The proposed cable routes transit much of the NY Bight in federal waters, but portions also extend into NY and NJ state waters as well.

The continental shelf within the NY Bight region is characterized primarily by ridge and swale topography, isolated and shore-attached linear sand shoals and ridges, and localized artificial topographic highs (Figure 1-2, Byrnes et al. 2004). The most prominent sea floor feature in this area is the 170-km-long submarine Hudson River Shelf Valley which extends southeasterly across the continental shelf offshore New York City toward the shelf break until it connects with the Hudson Canyon (Rona et al. 2015 Figure 1-2). Northeast of the Hudson River Shelf Valley is a prominent northeast-southwest trending shoal. It is referred to as Cholera Banks and is characterized as an eastward extension of one or more coastal plain strata (Williams and Duane 1974). It has been suggested that this area was an emergent headland covered by coastal plain strata during the early Holocene (Schwab et al. 2000).

INSPIRE Environmental conducted a benthic assessment survey along the proposed cable routes for Equinor's lease area utilizing combined Sediment Profile and Plan View Imaging (SPI/PV). The survey was conducted at stations along the cable route and at pre-determined reference stations.

1.2 Objectives

The overall objective of this project was to conduct a benthic assessment survey along proposed export cable routes, specifically:

1. Identify and confirm dominant benthic macrofaunal and macrofloral communities and substrata in the potential Export Cable Corridors from the Lease Area to landfalls in NY and NJ associated with development of offshore wind energy within BOEM's Lease Area OCS-A-512;

- Dominant and Co-Occurring Coastal and Marine Ecological Classification Standard (CMECS) Biotic Subclasses and Groups
 - Observed flora and fauna and evidence of their presence (i.e., tracks, burrows, tubes)
 - Infaunal successional stage (functional indicator of benthic community)
2. Prepare for the design of a pre-construction baseline study that will be established later to assess whether detectable changes occurred in post-construction benthic habitat associated with proposed operations;
 - Statistically sound sampling density and arrangement that meets BOEM requirements of stations spaced at a distance of 1.9 km.
 3. Collect information aimed at supporting spatial planning decisions;
 - Statistically sound sampling density and arrangement
 - Identification of benthic habitat types and potentially sensitive habitats
 4. Collect information aimed at reducing uncertainty associated with baseline conditions and/or to inform the interpretation of survey results; and
 - Use of regional data. For example, INSPIRE contributed data collected for the New York State Energy Development Authority (NYSERDA) to NOAA to improve a regional grain size prediction model (Poti et al. 2012)
 5. Inform development of an approach to quantify substantial changes in the benthic community composition associated with proposed Project activities.
 - Collection of data at reference stations for comparison

BOEM has produced regulations and guidelines for conducting a site characterization for the proposed development of all offshore wind projects in U.S. federal waters. The SPI/PV benthic assessment was conducted to provide Equinor with data contributing to:

- Guidelines for Information Requirements for a Renewable Energy Construction and Operation Plan (COP) (BOEM 2016),
- Guidelines for Providing Geophysical, Geotechnical, and Geohazard Information Pursuant to 30 CFR Part 585 (BOEM 2015),
- Guidelines for Providing Archaeological and Historic Property Information Pursuant to 30 CFR Part 585, prepared by BOEM July 2015 and March 2017 (BOEM 2017), and;
- Guidelines for Providing Benthic Habitat Survey Information for Renewable Energy Development on the Atlantic Outer Continental Shelf Pursuant to 30 CFR Part 585 (BOEM 2019).

SPI/PV parameters collected as part of this survey were 'mapped' to corresponding BOEM Site Characterization guidelines for benthic assessment (BOEM 2019). This allows for a clear representation of how data collected as part of this survey satisfies BOEM recommended guidelines.

2.0 METHODS

2.1 Sediment Profile and Plan View Imaging

Sediment profile and plan view (SPI/PV) imaging is a monitoring technique used to provide data on the physical characteristics of the seafloor and the status of the benthic biological community (Germano et al. 2011). SPI/PV imaging has been shown to be a powerful reconnaissance tool that can efficiently map gradients in sediment type, biological communities, or disturbances from physical forces, anthropogenic input, or organic enrichment. Results and interpretations from SPI/PV data are about dynamic processes that have been deduced from imaged structures; as such, they should be considered hypotheses available for further testing/confirmation.

A 172–station SPI/PV survey was conducted by scientists from INSPIRE Environmental 10-15 July 2019 aboard the utility vessel *Northstar Commander*, along the proposed export cable routes for the Equinor Wind lease area, and at three pre-determined reference areas (Figure 2-1). The Equinor lease area is in federal waters on the continental shelf adjacent NY and NJ, and the proposed cable routes transit federal as well as NY and NJ state waters. Per BOEM guidelines stations were spaced at a distance of 1.9 km along the proposed cable routes, and reference locations were determined based on USGS backscatter data of the New York Bight (Figure 2-2).

SPI/PV station locations are provided in Appendix A. The methodology for data acquisition and analysis for these images was consistent with the sampling methods described in detail in the Project Execution Plan (PEP) for this project (INSPIRE 2019a) and INSPIRE standard operating procedures (INSPIRE 2019b).

2.1.1 Sediment Profile Imaging

The SPI technique involves deploying an underwater camera system to photograph a cross-section of the sediment–water interface. High-resolution SPI images were acquired using a Nikon® D7200 digital single-lens reflex (DSLR) camera mounted inside an Ocean Imaging® Model 3731 pressure housing. The pressure housing sat atop a wedge-shaped steel prism with a plexiglass front faceplate and a back mirror, that was mounted at a 45° angle. The camera lens looked down at the mirror, which reflected the image from the faceplate. The prism had an internal strobe mounted inside at the back of the wedge to provide illumination for the image; this chamber was filled with distilled water, so the camera always had an optically clear path. The descent of the prism into the sediment was controlled by a hydraulic piston. As the prism penetrated the seafloor, a trigger activated a time-delayed circuit that fired the internal strobe to obtain a cross-sectional image of the upper 15–20 cm of the sediment column (Figure 2-3). The camera remained on the seafloor for approximately 20 seconds to ensure that successful images were obtained.

Test exposures of a Color Calibration Target were made on deck at the beginning of the survey to verify that all internal electronic systems were working to design specifications and to provide a color standard against which final images could be checked for proper white balance. Test images were also captured to confirm proper camera settings for site conditions. For this

survey, the ISO-equivalent was set at 640, shutter speed was 1/250s, and the f-stop was f11. Images were stored in compressed raw Nikon Electronic Format (NEF) files (approximately 30 MB each). Images were checked periodically throughout the survey to confirm that the initial camera settings were still resulting in the highest quality images possible. All camera settings and any setting changes were recorded in the field log (Appendix B). Details of the camera settings for each digital image also are available in the associated parameters file embedded in each electronic image file.

Whenever the camera was brought back on board (typically after every third to fifth station), the frame counter was checked to ensure that the requisite number of replicates had been obtained. In addition, a prism penetration depth indicator on the camera frame was checked to verify that the optical prism had penetrated the bottom to a sufficient depth. If images were missed or the penetration depth was insufficient, the camera frame stop collars were adjusted and/or weights were added or removed, and additional replicate images were taken. Frame counts, time of image acquisition, water depth, frame stop-collar position, and the number of weights used were recorded in the field log for each replicate image (Appendix B). If mud doors were needed, their use was also recorded in the field log. Visual checks and hand tightening checks of all nuts and bolts on the SPI/PV camera frame were conducted periodically to make sure nothing vibrated loose during the survey.

Prior to field operations, the internal clock in the digital SPI system was synchronized with the vessel's navigation. Each image was assigned a unique time stamp in the digital file attributes by the camera's data logger and cross-checked with the time stamp in the navigational system's computer data file. Images were downloaded periodically to verify successful sample acquisition and/or to assess the type(s) of sediment and other relevant features present at a given station. Digital image files were renamed with the appropriate station names immediately after downloading as a further quality assurance step.

2.1.2 Plan View Imaging

An Ocean Imaging® Model DSC24000 plan view underwater camera system with two Ocean Imaging® Model 400-37 Deep Sea Scaling lasers was attached to the sediment profile camera frame and used to collect plan view images of the seafloor surface. Both SPI and PV images were collected during each “drop” of the system. The PV system consisted of a Nikon® D7200 DSLR camera encased in a pressure housing, a 24 VDC autonomous power pack, a 500 W strobe, and a bounce trigger. A weight was attached to the bounce trigger with a stainless-steel cable so that the weight hung below the camera frame; the scaling lasers projected two red dots that were separated by a constant distance (26 cm) regardless of the field of view of the PV system. The field of view can be varied by increasing or decreasing the length of the trigger wire and, thereby, the camera height above the bottom when the picture is taken. As the SPI/PV camera system was lowered to the seafloor, the weight attached to the bounce trigger contacted the seafloor prior to the camera frame reaching the seafloor and triggered the PV camera (Figure 2-3).

During set-up and testing of the PV camera, the positions of lasers on the PV camera were checked and calibrated to ensure separation of 26 cm. Test images were also captured to confirm proper camera settings for site conditions. For this survey, the ISO-equivalent was set at 800, shutter speed was 1/15s and the f-stop was f8. Images were stored in compressed raw Nikon Electronic Format (NEF) files (approximately 30 MB each). Images were checked periodically throughout the survey to confirm that the initial camera settings were still resulting in the highest quality images possible. The ISO setting was changed to 640 and the f-stop setting was changed to f10 after reviewing images from the first station. The f-stop was adjusted again to f16 after the first images were taken on the second day of the survey. All camera settings and any setting changes were recorded in the field log (Appendix B). Details of the camera settings for each digital image also are available in the associated parameters file embedded in each electronic image file.

Prior to field operations, the internal clock in the digital PV system was synchronized with the vessel's navigation system and the SPI camera. Each image was assigned a unique time stamp in the digital file attributes by the camera's data logger and cross-checked with the time stamp in the navigational system's computer data file. In addition, the field crew kept redundant written sample logs (Appendix B). Throughout the survey, PV images were downloaded at the same time as SPI images and were evaluated for successful image acquisition and image clarity. Digital image files were renamed with the appropriate station names immediately after downloading as a further quality assurance step.

The ability of the PV system to collect usable images is dependent on the clarity of the water column. Initially the trigger wire was set to 1.8 m and most of the stations furthest offshore were sampled at this trigger wire distance. As stations became shallower and moved more in-shore, increased turbidity resulted in adjusting the trigger wire to 1.2 m for the majority of the survey, resulting in a mean image width of 1.2 m and a mean field of view of 1.1 m².

2.1.3 SPI and PV Data Collection

The SPI/PV survey was conducted at Equinor Wind Offshore Wind Farm Project area from 10 July to 14 July aboard the utility vessel *Northstar Commander*. At each station, the vessel was positioned at the target coordinates and the camera was deployed within a defined station radius tolerance of 7.5 m. Four replicate SPI and PV images were collected at each station (Appendix B). The three replicate images with the best quality (adequate prism penetration, no or minimal sampling artifacts) at each station were selected for analysis (Appendices C and D).

Vessel positioning was carried out by INSPIRE. A Hemisphere vector V102 GPS compass was used to accurately record vessel heading and differential position accuracy to within a meter. During mobilization the navigator conducted a positional accuracy check on the system by placing the antenna on a known GPS point and ensuring the antenna's position fell within a meter of the known coordinates. During operations HYPACK Ultralite software was used to receive positional data and direct the vessel to sampling stations. When the vessel was within a 7.5-meter radius of the target location, the SPI/PV camera system was deployed to the seafloor.

As soon as the camera system made contact with the seafloor, the navigator recorded the time and position of the camera electronically in HYPACK and the written field log. This process was repeated for five SPI/PV replicate “drops” of the SPI/PV camera system at each sampling station. After all stations were surveyed the navigator exported all recorded positional data into an Excel sheet. The Excel sheet included the station name, replicate number, date, time, depth, and position of every SPI/PV replicate.

2.1.4 Image Conversion and Calibration

Following completion of field operations, quality control checks were conducted of filenames, date/time stamps, and the field log. After these procedures, the NEF raw image files were color calibrated in Adobe Camera Raw® by synchronizing the raw color profiles to the Color Calibration Target that was photographed prior to field operations with the SPI camera. The raw SPI and PV images were then converted to high-resolution Photoshop Document (PSD) format files, using a lossless conversion file process and maintaining an Adobe RGB (1998) color profile. The PSD images were then calibrated and analyzed in Adobe Photoshop®. Length and area measurements were recorded as number of pixels and converted to scientific units using the calibration information.

2.1.5 SPI and PV Data Analysis

Computer-aided analysis of SPI/PV images provided a set of standard measurements to allow for comparisons among different areas of interest. Parameters measured from SPI/PV image analysis directly correspond to BOEM Benthic Site Characterization Requirements and Guidelines (Table 2-1). Measured parameters for SPI and PV images were recorded in Microsoft Excel® spreadsheets. These data were subsequently checked by one of INSPIRE’s senior scientists as an independent quality assurance/quality control review before final interpretation was performed. Spatial distributions of SPI/PV parameters were mapped using ESRI ArcGIS 10.5.

2.1.5.1 Sediment Profile Image Analysis Parameters

The parameters discussed below were assessed and/or measured and recorded for each replicate SPI image selected for analysis (Appendix C). Descriptive comments were also recorded for each. Many variables can be seen and annotated in context in SPI images from soft bottom coastal and estuarine environments (Figure 2-4).

2.1.5.1.1 Sediment Type

The sediment grain size major mode and range were visually estimated from the color images by overlaying a grain size comparator that was at the same scale. This comparator was prepared by photographing a series of Udden-Wentworth size classes (equal to or less than coarse silt up to granule and larger sizes) with the SPI camera: silt–clay (>4 phi), very fine sand (4 to 3 phi), fine sand (3 to 2 phi), medium sand (2 to 1 phi), coarse sand (1 to 0 phi), very coarse sand (0 to -1 phi), and granule and larger (<-1 phi). The lower limit of optical resolution of the photographic system is about 62 microns, allowing recognition of grain sizes equal to, or greater than, coarse silt (≥ 4 phi). The accuracy of this method has been documented by

comparing SPI estimates with grain size statistics determined from laboratory sieve analyses (Germano et al. 2011).

The comparison of the SPI images with Udden-Wentworth sediment standards photographed through the SPI optical system was also used to map near-surface stratigraphy such as sand-over-mud and mud-over-sand, where observed. When mapped on a local scale, this stratigraphy can provide information on relative transport magnitude and frequency.

2.1.5.1.2 Prism Penetration Depth

The SPI prism penetration depth was measured from the bottom of the image to the sediment–water interface. The area of the entire cross-sectional sedimentary portion of the image was digitized; the number of pixels within this area was divided by the calibrated linear width of the image to determine the mean penetration depth. Linear maximum and minimum depths of penetration were also measured. All three measurements (maximum, minimum, and mean penetration depths) were recorded in the data file.

If the stop collar settings and the number of weights used in the camera frame are held constant throughout the survey, the camera functions as a static-load penetrometer. Comparative penetration values from sites of similar grain size give an indication of the relative water content of the sediment. Highly bioturbated sediments and rapidly accumulating sediments tend to have the highest water contents and greatest prism penetration depths.

The depth of penetration also reflects the bearing capacity and shear strength of the sediments. Over-consolidated or relic sediments and shell-bearing sands resist camera penetration. Highly bioturbated, sulfidic, or methanogenic muds are the least consolidated and deep penetration is typical. Seasonal changes in camera prism penetration have been observed at the same station in other studies and are related to the control of sediment geotechnical properties by bioturbation (Rhoads and Boyer 1982). The effect of water temperature on bioturbation rates appears to be important in controlling both biogenic surface relief and prism penetration depth (Rhoads and Germano 1982).

2.1.5.1.3 Small-Scale Surface Boundary Roughness

Surface boundary roughness was determined by measuring the vertical distance between the highest and lowest points of the sediment–water interface. The camera must be level to record accurate boundary roughness measurements. The surface boundary roughness (sediment surface relief) measured over the width of sediment profile images typically ranges from 0 to 4 cm and may be related to either physical structures (ripples, rip-up structures) or biogenic features (burrow openings, fecal mounds, foraging depressions). Biogenic roughness typically changes seasonally and is related to the interaction of bottom turbulence and bioturbation.

In sandy sediments, boundary roughness can be a measure of sand wave height. On silt–clay bottoms, boundary roughness values often reflect biogenic features such as fecal mounds or surface burrows. The size and scale of boundary roughness values can have dramatic effects

on both sediment erodibility and localized oxygen penetration into subsurface sediments (Huettel et al. 1996).

2.1.5.1.4 Apparent Redox Potential Discontinuity Depth

Aerobic near-surface marine sediments typically have higher reflectance relative to underlying hypoxic or anoxic sediments. Surface sands washed free of mud also have higher optical reflectance than underlying muddy sands. These differences in optical reflectance are apparent in SPI images; oxidized surface sediments contain particles coated with ferric hydroxide (an olive or tan color when associated with particles) and reduced and muddy sediments below this oxygenated layer are darker, generally gray to black (Fenchel 1969; Lyle 1983; Sturdivant and Shimizu 2017). The boundary between colored ferric hydroxide surface sediments and underlying gray to black sediments is called the apparent redox potential discontinuity (aRPD).

The depth of the aRPD in the sediment column is an important time integrator of dissolved oxygen conditions within sediment porewaters. In the absence of bioturbation, this high reflectance layer (in muds) will typically reach a thickness of 2 mm below the sediment–water interface (Rhoads 1974). This depth is related to the supply rate of molecular oxygen by diffusion into subsurface sediments and the consumption of that oxygen by the sediment and associated microflora. In sediments that have very high sediment oxygen demand (SOD), the sediment may lack a high reflectance layer even when the overlying water column is aerobic. In the presence of bioturbating macrofauna, the thickness of the high reflectance layer may be several centimeters.

The relationship between the thickness of the high reflectance layer and the presence or absence of free molecular oxygen in the associated porewaters must be considered with caution. The actual RPD is the boundary or horizon that separates the positive Eh region of the sediment column from the underlying negative Eh region. The exact location of this Eh = 0 boundary can be determined accurately only with microelectrodes; hence, the relationship between the change in optical reflectance, as imaged with the SPI camera, and the actual RPD can be determined only by making *in situ* Eh measurements. For this reason, the optical reflectance boundary, as imaged, is described in this study as the “apparent” RPD (aRPD) and was measured as a mean value. The mean aRPD measured in SPI has been shown to be a suitable proxy for the RPD with the depth of the actual Eh = 0 horizon generally either equal to or slightly shallower than the depth of the optical reflectance boundary (Rosenberg et al. 2001; Simone and Grant 2017). There is a lag time between when Eh reaches 0 mV and the precipitation of darker sulfidic sediments (Jorgensen and Fenchel 1974) under reducing conditions and, therefore, the related color reflectance change used to indicate the aRPD may be slightly deeper than the RPD. Additionally, bioturbating organisms can mix ferric hydroxide-coated particles downward below the Eh = 0 horizon; with active ventilation, burrows have been shown to extend below the aRPD (Sturdivant et al. 2012; Sturdivant and Shimizu 2017). Because bioturbating organisms are not uniformly distributed in the sediment matrix, the depth of the aRPD can vary across the width of a SPI image (approximately 14–15 cm). As a result,

the mean aRPD depth serves as a valuable estimate of the depth of porewater exchange, usually through porewater irrigation (bioturbation).

The rate of depression of the aRPD within the sediment is relatively slow in organic-rich muds, on the order of 200 to 300 micrometers per day; therefore, this parameter has a long time constant (Germano and Rhoads 1984). The rebound in the aRPD is also slow (Germano 1983). Measurable changes in the aRPD depth using the SPI optical technique can be detected over periods of 1 or 2 months. This parameter is used effectively to document changes (or gradients) that develop over seasonal or yearly cycles related to seasonal hypoxia, SOD, water temperature effects on bioturbation rates, and infaunal recruitment. For example, the aRPD has been shown to be a sensitive and specific indicator of hypoxic conditions experienced over the preceding 1 day to 4 weeks (Shumchenia and King 2010), and to be correlated to concurrent *in situ* dissolved oxygen concentrations (Sturdivant et al. 2012). Time-series aRPD measurements following a disturbance can be a critical diagnostic element in monitoring the degree of recolonization in an area by the ambient benthos (Rhoads and Germano 1986).

The mean aRPD depth also can be affected by local erosion. Scouring can wash away fines and shell or gravel lag deposits and can result in a very thin surface oxidized layer. During storm periods, erosion may completely remove any evidence of the aRPD (Fredette et al. 1988).

Another important characteristic of the aRPD is the contrast in reflectance at this boundary. This contrast is related to the interactions among the degree of organic loading, the bioturbation activity in the sediment, and the concentrations of bottom-water dissolved oxygen in an area. High inputs of labile organic material increase SOD and, subsequently, sulfate reduction rates and the associated abundance of sulfide end products. This results in more highly reduced, lower-reflectance sediments at depth and high contrasts between these sediments and the overlying oxidized sediments, i.e., high aRPD contrasts. In a region where there is generally more uniform reflectance across the sediment column, i.e., low aRPD contrasts, images with high aRPD contrasts indicate localized sites of relatively large inputs of organic-rich material such as phytoplankton, other naturally occurring organic detritus, dredged material, or sewage sludge.

Because the determination of the aRPD requires discrimination of optical contrast between oxidized and reduced particles, it is difficult, if not impossible, to determine the depth of the aRPD in well-sorted sands of any size that have little to no silt or organic matter in them. When using SPI technology on sand bottoms, little information other than grain size, prism penetration depth, and boundary roughness values can be measured; while oxygen has penetrated the sand beneath the sediment–water interface due to physical forcing factors acting on surface roughness elements (Ziebis et al. 1996; Huettel et al. 1998), estimates of the mean aRPD depths in these types of sediments are indeterminate with conventional white light photography.

2.1.5.1.5 Organic Enrichment, Sedimentary Methane, and Thiophilic Bacteria

Sediment oxygen demand (SOD) represents the overall rate of oxygen consumption, biologically and chemically, by the sediment column. Organic loading to a system results in increased SOD and reduced sediments. The relative amount of organic enrichment is indicated by sediment color; darker coloration indicates that sediment is more reduced and has greater organic loading (Fenchel 1969; Rhoads 1974; Lyle 1983; Bull and Williamson 2001; Sturdivant and Shimizu 2017). SOD levels (i.e., none, low, medium, and high) were assessed for all images. Images in which dark-gray or black reduced sediments were in contact with the water column across the entire length of the sediment–water interface were recorded as having low dissolved oxygen conditions. If organic loading is extremely high, porewater sulfate is depleted and methanogenesis occurs. The process of methanogenesis is indicated by the appearance of methane bubbles in the sediment column. These gas-filled voids are readily discernable in SPI images because of their irregular, generally circular aspect and glassy texture (due to the reflection of the strobe off the gas bubble). The presence of subsurface methane bubbles were noted.

A primary diagnostic feature indicating an area is suffering from hypoxic conditions due to organic enrichment is the presence of *Beggiatoa* or *Beggiatoa*-like colonies. (Note: while it cannot be determined with certainty that any bacterial colonies seen in profile images are the genus *Beggiatoa* without microscopic identification, these bacteria are known to be in the same family of sulfur-oxidizing bacteria that only appear in hypoxic or anoxic conditions). These colonies have diagnostic morphology that has been documented in numerous other sediment profile imaging surveys (Nilsson and Rosenberg 1997; Rosenberg et al. 2001; Karakassis et al. 2002; Germano et al. 2011). The presence of sulfur-oxidizing bacterial colonies indicates hypoxic dissolved oxygen concentrations in the water column at the benthic boundary layer (Rosenberg and Diaz 1993; Sturdivant et al. 2012). The presence and extent (e.g., threads, trace, patches, mat) of *Beggiatoa* or *Beggiatoa*-like colonies were noted.

2.1.5.1.6 Infaunal Successional Stage

The mapping of infaunal successional stages is readily accomplished with SPI technology. These stages are recognized in SPI images by the presence of dense assemblages of near-surface polychaetes and/or the presence of subsurface feeding voids; both may be present in the same image. Mapping of successional stages is based on the theory that organism–sediment interactions in fine-grained sediments follow a predictable sequence after a major seafloor perturbation. This theory states that primary succession results in “the predictable appearance of macrobenthic invertebrates belonging to specific functional types following a benthic disturbance. These invertebrates interact with sediment in specific ways. Because functional types are the biological units of interest, our definition does not demand a sequential appearance of particular invertebrate species or genera” (Rhoads and Boyer 1982). This theory is presented in Pearson and Rosenberg (1978) and further developed in Rhoads and Germano (1982) and Rhoads and Boyer (1982).

This continuum of change in animal communities after a disturbance (primary succession) has been divided subjectively into four stages: Stage 0, indicative of a sediment column that is largely devoid of macrofauna, occurs immediately following a physical disturbance or in close proximity to an organic enrichment source; Stage 1 is the initial community of tiny, densely populated polychaete assemblages; Stage 2 is the start of the transition to head-down deposit feeders; and Stage 3 is the mature, equilibrium community of deep-dwelling, head-down deposit feeders (Figure 2-5).

The first invertebrate assemblage (Stage 1) appears within days after an area of bottom is disturbed by natural or anthropogenic events. Stage 1 consists of assemblages of tiny tube-dwelling marine polychaetes that reach population densities of 10^4 to 10^6 individuals per m^2 . These animals feed at or near the sediment–water interface and physically stabilize or bind the sediment surface by producing a mucous “glue” that they use to build their tubes. Sometimes deposited dredged material layers contain Stage 1 tubes still attached to mud clasts from their location of origin; these transported individuals are considered as part of the *in situ* fauna in our assignment of successional stages.

If there are no repeated disturbances to the newly colonized area, then these initial tube-dwelling suspension or surface-deposit-feeding taxa are followed by burrowing, head-down deposit-feeders that rework the sediment deeper and deeper over time and mix oxygen from the overlying water into the sediment. The animals in these later-appearing communities (Stage 2 or 3) are larger, have lower overall population densities (10 to 100 individuals per m^2), and can rework the sediments to depths of 3 to 20 cm or more. These animals “loosen” the sedimentary fabric and increase the water content in the sediment, thereby lowering the sediment shear strength, and actively recycle nutrients because of the high exchange rate with the overlying waters resulting from their burrowing and feeding activities.

In dynamic environments, it is simplistic to assume that benthic communities always progress completely and sequentially through all four stages in accordance with the idealized conceptual model depicted in Figure 2-5. Various combinations of these basic successional stages are possible. For example, secondary succession can occur (Horn 1974) in response to additional labile carbon input to surface sediments, with surface-dwelling Stage 1 or 2 organisms coexisting at the same time and place with Stage 3, resulting in the assignment of a “Stage 1 on 3” or “Stage 2 on 3” designation. If both Stage 1 and Stage 2 organisms exist in an image with Stage 3 fauna, the Stage 1 on 3 designation is used because it is more important to document the presence of recruiting organisms than intermediate Stage 2 fauna.

While the successional dynamics of invertebrate communities in fine-grained sediments have been well documented, the successional dynamics of invertebrate communities in sand and coarser sediments are not well known. Consequently, the insights gained from sediment profile imaging technology regarding biological community structure and dynamics in sandy and coarse-grained bottoms can be limited highlighting the importance of combining SPI with PV.

2.1.5.2 Plan View Image Analysis

Plan view images provide a much larger field of view than SPI images and provide valuable information about the landscape ecology and sediment topography in the area where the pinpoint “optical core” of the sediment profile was taken (Figure 2-6). Unusual surface sediment layers, textures, or structures detected in any of the sediment profile images can be interpreted by considering the larger context of surface sediment features; i.e., whether a surface layer or topographic feature is a regularly occurring feature and typical of the seafloor in this general vicinity or an isolated anomaly. The scale information provided by the underwater lasers allows accurate density counts of attached epifaunal colonies, sediment burrow openings, or larger macrofauna or fish which may have been missed in the sediment profile cross-section, as well as measurements of the percent cover of *Beggiatoa* colonies and other features of interest. Information on sediment transport dynamics and bedform wavelength is also available from PV image analysis. The parameters discussed below were assessed and/or measured and recorded for each replicate PV image selected for analysis (Appendix D).

2.1.5.2.1 Field-of-View

For each replicate PV image, the field-of-view area was measured. The scale information provided by the underwater lasers allows accurate density counts of attached epifaunal colonies, sediment burrow openings, or larger macrofauna or fish which may not have been captured in the sediment profile cross-section, as well as measurements of features of interest observed in the image.

2.1.5.2.2 CMECS Biotic Subclass and CMECS Biotic Group

The Biotic Component of CMECS is a classification of the living organisms of the seabed and water column together with their physical associations at a variety of spatial scales. The Biotic Component is organized into a branched hierarchy of five nested levels: Biotic Setting, Biotic Class, Biotic Subclass, Biotic Group, and Biotic Community. The Biotic Subclass is a key CMECS classifier that presents valuable information about the surveyed area in terms of physical habitat and the potential presence of sensitive taxa; therefore, it was identified as a parameter for PV image analysis. Biotic Component classifications are defined by the dominance of life forms, taxa, or other classifiers in the observation. In the case of PV images dominance is assigned to the taxa with the greatest percent cover in the observational footprint (Federal Geographic Data Committee [FGDC] 2012).

Biotic Subclasses describe dominant biota at a coarse level. Within the Benthic/Attached Biota Biotic Component setting, there are eight classes, of which the Faunal Bed class is of most relevance to the OCS. Three subclasses fall under the Faunal Bed hierarchy: Attached Fauna, Soft Sediment Fauna, and Inferred Fauna. Inferred Fauna (e.g., tracks and trails, egg masses) are often present, but in this study, were primarily used to inform or confirm the selection of either the Attached or Soft Sediment Fauna subclass. Although the Biotic Subclass is not directly based on sediment grain size distributions, it reflects them at the scale of relevance to the dominant fauna present, thus serving as an integrator of physical and biological characteristics of the seafloor. CMECS expressly states that “substrate type is such a defining

aspect of the Faunal Bed class that CMECS Faunal Bed subclasses are assigned as physical-biological associations involving both biota and substrate (FGDC 2012)."

Plan view images were assigned one of three Biotic Subclasses (definitions from FGDC 2012):

- Attached Fauna – "Areas characterized by rock substrates, gravel substrates, other hard substrates, or mixed substrates that are dominated by fauna which maintain contact with the substrate surface, including firmly attached, crawling, resting, interstitial, or clinging fauna. Fauna may be found on, between, or under rocks or other hard substrates or substrate mixes. These fauna use pedal discs, cement, byssal threads, feet, claws, appendages, spines, suction, negative density, or other means to stay in contact with the (generally) hard substratum and may or may not be capable of slow movement over the substratum. Many attached fauna are suspension feeders and feed from the water column. Other attached fauna are benthic feeders, including herbivores, predators, detritivores, and omnivores."
- Soft Sediment Fauna – "Areas that are characterized by fine unconsolidated substrates (sand, mud) and that are dominated in percent cover or in estimated biomass by infauna, sessile epifauna, mobile epifauna, mobile fauna that create semi-permanent burrows as homes, or by structures or evidence associated with these fauna (e.g., tilefish burrows, lobster burrows). These animals may tunnel freely within the sediment or embed themselves wholly or partially in the sediment. In many cases, they will regularly leave their burrows, and may move rapidly or swim actively after doing so, but any animal that creates a semi-permanent home in the sediment can be classified as Soft Sediment Fauna. These animals may also move slowly over the sediment surface but are not capable of moving outside of the boundaries of the classification unit within one day. Most of these fauna possess specialized organs for burrowing, digging, embedding, tube-building, anchoring, or locomotory activities in soft substrates."
- IND – an indeterminate Biotic Subclass

The Biotic Component subclasses of Attached and Soft Sediment Fauna are excellent broad-brush tools for screening-level assessments of seafloor habitats for offshore wind development. Mapping proposed development areas with this CMECS classifier can highlight locations, that from a benthic habitat perspective, might be considered suitable for offshore wind development (Soft Sediment Fauna) and those that may be unsuitable or require further detailed study to determine suitability (Attached Fauna). Depending on the results and scale of reconnaissance surveys, additional studies would likely be needed as specific siting alternatives are examined.

Attached Fauna habitats are also referred to in some documents as "live bottom." These hard bottom habitats that support "live bottom" are considered potentially valuable and sensitive resources for regionally important taxa. Additionally, cobbles and boulders can provide habitat for a diverse range of taxa and serve as valuable habitat for corals and as a place for squid to lay their eggs. Soft coral habitats also may play a role in creating or enhancing habitat for black

sea bass (*Centropristis striata*), a species of concern for the SJWF and SJEC areas (Guida et al. 2017). Hard bottom habitats are limited in distribution along the Mid-Atlantic and Northeast portions of the OCS relative to sandy and soft bottom habitats (Guida et al. 2017; USGS 2018).

While Biotic Subclasses describe major biological characteristics at a fairly coarse level, Biotic Groups are descriptive terms based on finer distinctions of taxonomy, structure, position, environment, and salinity levels (FGDC 2012). CMECS provides definitions and descriptions of dozens of Biotic Groups. Only a subset of these Biotic Groups could potentially occur in the surveyed area (based on water depth, latitude, depth, etc.). The full set of defined Biotic Groups are available in the CMECS document (FGDC 2012) and a subset of Biotic Groups observed within the surveyed area are found in Table 2-2.

2.1.5.2.3 Sensitive Taxa and Species of Concern

While Geological and Geophysical (G&G) multibeam echosounder and side scan sonar data provide high quality remote imaging of the seafloor, they do not provide adequate resolution for the identification of sensitive taxa. The image resolution of the SPI/PV survey allows for the identification of sensitive taxa. Sensitive seafloor habitats include corals, submerged aquatic vegetation beds, and valuable cobble and boulder habitat (BOEM 2019). Cobble and boulder habitat can serve as structure for hard and soft corals, nursery ground for juvenile lobster, and as preferable benthic habitat for squid to deposit their eggs. Taxa considered sensitive for this survey included corals, seagrasses, squid eggs, and American lobster. Species of concern for this area included black sea bass, Atlantic cod, sea scallops, and ocean quahog (Guida et al. 2017). Presence/absence of each sensitive taxa or species of concern was noted for each replicate SPI and PV image.

2.1.5.2.4 Invasive Taxa

The introduction of invasive species to the water column and benthic habitat is an important concern related to offshore development. The utilization of vessels originating from many different ports can lead to the introduction of invasive species through fouled hulls and contaminated ballast water. The introduction of new structures, such as scour protection, turbine structure, transmission cable, and concrete mattresses, to the water column and seafloor during construction may also lead to the introduction of invasive species. The SPI/PV survey collected baseline presence/absence data for marine invasive species within the surveyed area. A list of potential invasive species was derived from the Northeastern Aquatic Nuisance Species Panel (<https://www.northeastans.org/>) and a Pennsylvania Sea Grant report (https://seagrant.psu.edu/sites/default/files/MidAtlantic%20AIS%20Field%20Guide_Web.pdf).

2.2 Sediment Grabs

2.2.1 Sediment Acquisition

A double, 0.1m² Ted Young Modified Van Veen grab sampler was used to collect surficial sediment samples following procedures outlined in the SOP for Sediment Grab Sampling

(INSPIRE 2019c). Sediments were retained from a total of 16 stations sampled along the proposed export cable routes (Figure 2-1).

Once the boat was positioned to within 25 m of the planned sampling station, the sampler was lowered vertically through the water column until it came into contact with the sediment surface. Once on the bottom, the jaws closed and the line went slack, indicating that a sample had been collected. Position data were collected, and the grab was raised to the surface and retrieved on deck.

Upon recovery of the sample, the sediment within the grab bucket was inspected to assess whether the sample was acceptable (i.e., had not been subject to partial washout during retrieval, and was of sufficient volume). If the sample was not acceptable, two additional attempts were made at the target station. If, after three attempts, a successful grab was not collected, the vessel moved off station in an attempt to find suitable bottom.

Each grab attempted was logged. Once a sample was deemed acceptable, a photograph of the undisturbed grab was obtained. The station name, latitude/longitude, and time of collection and descriptive features were recorded on the Sediment Sample Log Form (Appendix E).

2.2.2 Sediment Processing

After the grab was photographed and logged, a subsample was collected for grain size analysis. Surficial samples for grain size analyses were collected from the top 10 cm from one of the buckets. Before subsamples of the surficial sediments were taken, any overlying water was removed by slowly siphoning off the overlying water near one side of the sampler. A ruler was placed in the center of the grab (deepest section) and the top 10 cm of sediment was removed and transferred to a clean glass bowl for homogenization. Following homogenization, approximately 500 grams of sediment was placed in a zip top bag, sealed and labelled with StationID, date and time. Samples were stored at 4°C prior to analysis (samples may be held for up to 6 months before analysis). Samples were not frozen or dried prior to analysis. A Chain of custody form (Appendix F) was prepared in the field and accompanied the samples when shipped to the laboratory for analysis.

Aqua Survey, Inc. (ASI) performed the Grain Size Distribution analysis for this project. Sixteen sediment samples were delivered to ASI on July 15, 2019, under chain of custody procedures. Upon arrival, all samples were assigned unique ASI sample numbers. The samples containing mostly sand were analyzed by the sieve method (ASTM D6910-04), while the samples containing sand and silt were analyzed with the combined sieve and hydrometer method (ASTM D798-17). See Table 2-3 for sample identification and for which method was used for each sample. The appendices contain all supporting documentation including sample use forms (Appendix E) and chains of custody (Appendix F).

The particle size of the sediments was analyzed in the laboratory using ASTM Methods D6913/D7928, sieve/hydrometer methods (these methods supersede ASTM D422).

2.3 Data Quality Assurance and Quality Control

Measures were taken both during field data collection and during post-collection analysis for data quality assurance and control in alignment with the PEP for this project (INSPIRE 2019a).

Prior to survey mobilization, the camera electronics were “bench-tested” to ensure the cameras were focused and firing properly, the lasers were aligned properly, and the strobe was operational. The positions of lasers on the PV camera were checked and calibrated to ensure separation of 26 cm. Spare camera parts, fully charged battery packs, and spare cables were carried in the field to ensure uninterrupted sample acquisition. At the beginning of the survey, the times on the digital SPI and PV cameras were synchronized with the navigation system clock. Each SPI and PV station replicate is identified by the time stamp recorded as part of the digital image file and the corresponding time and position recorded by the navigation system. Redundant written sample logs were kept by the field crew (Appendix B). Test shots were fired on deck at the beginning of each field day to verify all internal electronic systems were working according to specifications. These test shots included taking pictures of standard color cards to ensure proper color balance of the digital images during collection and to verify the calibration of the image analysis system during processing.

At regular intervals during each survey day, the frame counter on the SPI camera was checked to make sure the desired number of replicates had been taken. In addition, both the SPI and PV images were downloaded at regular intervals (typically every 3 to 5 stations) using external USB ports. These images then were viewed to confirm the settings on the digital cameras were optimal for the conditions in the survey area. These settings were adjusted if necessary and changes noted in the field log (Appendix B). In addition, if images were missed or penetration depth was insufficient, proper adjustments were made (e.g., weight added to the frame) and additional replicates taken. Digital image files were renamed with the appropriate station names immediately after downloading as a further quality assurance step. Visual checks and hand tightening checks of all nuts and bolts on the SPI/PV camera frame were conducted periodically to make sure nothing vibrated loose during the survey.

A quality assurance review of all data and results presented in this report was performed in accordance with the PEP for this project (INSPIRE 2019a).

Table 2-1. SPI/PV Survey Parameters with Corresponding BOEM Site Characterization Requirements and Guidelines

	SPI/PV	BOEM Guideline (BOEM 2019)
Analysis Parameters	Sensitive Taxa (SPI/PV)	• Identification of potentially sensitive seafloor habitat
	Invasive Taxa (SPI/PV)	• Identification of invasive taxa
	Attached Flora/Fauna (PV)	• Identification of potentially sensitive seafloor habitat • Classification to CMECS Biotic Subclass • Classification to CMECS Biotic Group
	Soft Sediment Infauna Community (SPI/PV)	• Identification of potentially sensitive seafloor habitat • Characterization of macrofaunal community • Identification of taxa diversity • Classification to CMECS Biotic Subclass • Classification to CMECS Biotic Group
	Dominant and Co-occurring Biotic Subclasses & Groups	• Identification of potentially sensitive seafloor habitat • Classification to CMECS Biotic Subclass • Classification to CMECS Biotic Group
	Mobile Epifauna (SPI/PV)	• Characterization of macrofaunal community • Identification of taxa diversity
	Fish (PV)	• Characterization of macrofaunal community
	Burrows/Tubes/Tracks (PV)	• Characterization of macrofaunal community
	Flora (PV)	• Characterization of macrofloral community
	Apparent Redox Potential Discontinuity (SPI)	• Characterization of benthic habitat attributes
	Sediment Oxygen Demand (SPI)	• Characterization of benthic habitat attributes
	Successional Stage (SPI)	• Characterization of benthic habitat attributes
	Low Dissolved Oxygen Presence (SPI)	• Characterization of benthic habitat attributes
	Methane Presence (SPI)	• Characterization of benthic habitat attributes

Table 2-2. CMECS Classification Levels Used in Analysis and Classifications for the Equinor Wind Survey

CMECS Term	Scale of Classification	Classifications
<i>Geoform Component</i>		
Tectonic Setting	Site	Passive Continental Margin
Physiographic Setting	Site	Continental Shelf
Geoform Origin	Site	Geologic
<i>Substrata Component</i>		
Substrate Origin	Site	Geologic Substrate
Substrate Class	SPI/PV	Unconsolidated Mineral Substrate
*Substrata Subclass	SPI/PV	Fine Unconsolidated Substrate; Coarse Unconsolidated Substrate
*Substrata Group	PV	Sandy Mud; Muddy Sand; Sand; Slightly Gravelly; Gravelly Sand; Sandy Gravel; Boulder
*Substrata Subgroup	SPI	Silt-Clay; Very Fine Sand; Fine Sand; Medium Sand; Coarse Sand; Very Coarse Sand; Granule; Pebble; Cobble
<i>Biotic Component</i>		
Biotic Setting	SPI/PV	Benthic/Attached Biota
Biotic Class	SPI/PV	Faunal Bed
*Biotic Subclass	SPI/PV	Soft Sediment Fauna ; Attached Fauna; Inferred Fauna
*Biotic Group	SPI/PV	Larger Tube-Building Fauna ; Tracks and Trails; Sand Dollar Bed; Attached Corals; Attached Hydroids; Burrowing Anemones; Mobile Crustaceans on Hard or Mixed Substrates; Mobile Crustaceans on Soft Sediments; Diverse Soft Sediment Epifauna; Small Tube-Building Fauna; Attached Bryozoans; Larger Deep-Burrowing Fauna; Mobile Mollusks on Soft Sediments; Mobile Mollusks on Hard or Mixed Substrates; Barnacles

+ Indicates variability within the surveyed area at this level of the hierarchy

Bold text indicates an overwhelming dominant classification across the surveyed area

Table 2-3. Sediment Grab Sample Identification

Station ID	ASI ID	Grain Size Analysis Method
003	20190565	ASTM D6913-04
006	20190566	ASTM D6913-04
010	20190567	ASTM D7928-17
011	20190568	ASTM D7928-17
147	20190569	ASTM D6913-04
157	20190570	ASTM D6913-04
020	20190571	ASTM D6913-04
038	20190572	ASTM D6913-04
060	20190573	ASTM D7928-17
076	20190574	ASTM D7928-17
091	20190575	ASTM D6913-04
095	20190576	ASTM D6913-04
100	20190577	ASTM D7928-17
057	20190578	ASTM D7928-17
133	20190579	ASTM D6913-04
136	20190580	ASTM D6913-04

3.0 RESULTS

A complete set of all the data measured and assessed from each analyzed SPI image is presented in Appendix C; data measured and assessed from each PV image are in Appendix D. Station summary data was grouped by proposed cable route of interest for ease of interpretation (Long Island Cable Routes, New Jersey Cable Routes, New York Harbor Cable Routes, and reference stations; Figure 3-1) and are presented in Tables 3-1 through 3-4. Section 3.1 summarizes results for the entire surveyed area. Section 3.2 reports results from the Long Island Cable Routes, Section 3.3 reports results from the New Jersey Cable Routes, Section 3.4 reports results from the New York Harbor Cable Routes, and Section 3.5 reports results from the reference stations.

3.1 Site Overview

3.1.1 Physical Features

Surface sediment types observed in both the SPI and PV images across the surveyed areas were diverse and spatially variable (Figures 3-2, 3-3, 3-4, 3-5). Sediments ranged from: fine sediments of silt/clay and very fine sand; to larger sand sizes; to coarser material of granules and pebbles; and larger cobbles and boulders (Figures 3-2, 3-3, 3-4, and 3-6). Surficial sediments (up to 20 cm below the sediment–water interface) were assessed from SPI images and assigned phi size classes for the grain size major mode parameter (Appendix C). Many sediments imaged exhibited a surface layer of coarse sediment over a range of finer grain size classes. For interpretive purposes, these images have been aggregated into “over sand/finer sediment” groupings, such as “pebble over finer sediment”, “granule over sand”, and “very coarse sand over sand” (Tables 3-1a, 3-2a, 3-3a, 3-4a, 3-5; Figures 3-3, 3-7).

The combination of the PV images and SPI provided context on the composition of surface sediments, which were mixed in distribution (Figures 3-2, 3-3) with instances of small- and large-scale spatial heterogeneity driven by hydrodynamic forcing on the seabed. Small-scale (intra-station) heterogeneity was represented by two or three replicate images for a station being classified into two or three different sediment types (Figure 3-2,3-3). E.g., Station 51 contained three gravel sediment types (granule, pebble, pebble over fine sediment) with coarser grains oriented in the troughs of the seabed by fluid dynamics (Figure 3-8). Intra-station heterogeneity was predominantly observed at stations along the New Jersey cable route, stations in the state waters of the Long Island cable route, and stations along and adjacent Cholera Bank (Figures 3-3, 3-4, 3-5). At stations where the predominant sediment type was consistent across replicates there were still occasions where hydrodynamics influenced grain orientation, e.g., Station 40 (Figure 3-9). Larger grains were located within the trough of asymmetric sand ripples formed via bedload transport. Spatial heterogeneity in surface sediments was also observed at a larger scale (inter-station). For example, Stations 009 and 010 had different sediment types despite their close spatial proximity (Figure 3-2). Station 010 was located within a submarine valley along the edge and was composed of fine sand over silt-clay (Figure 3-10A), whereas Station 009 was situated just outside of the valley and was composed of coarse granules (Figure 3-10B); deeper valleys or basins are noted for the

reduced fluid shear force on the seabed found in these areas, compared to adjacent shallower areas. Subsequently finer material can be found in these relatively deeper locations; Station 011 located directly in the submarine valley was composed of silt-clay (Figure 3-6A). The observations of sediment types in the profile and plan view images corresponded to the USGS backscatter data (Figure 2-2), ground-truthing this information and providing a level of confidence in areas of backscatter return where SPI/PV data was not collected. There was a sharp spatial contrast in backscatter returns either side of the Hudson River Shelf Valley, and this difference in backscatter was also observed in the sediment types documented.

The prism penetration measurement provides additional information about the bearing capacity and shear strength of sediments sampled. The camera frame stops and weights were mostly held constant throughout the survey with a few notable exceptions (Appendix B). The weights are the key adjustment to hold constant in order to use prism penetration to assess relative sediment shear strength. During the survey, weights were constant at every station except Station 030. There was some adjustment to the stops, but the stops rarely had any influence on penetration as most stations contained shallow to medium penetration that rarely reached the maximum stop height. Prism penetration is therefore useful as a barometer of relative sediment shear strength and load-bearing capacity. Penetration values across the surveyed areas ranged from 2.0 cm to 19.8 cm, with a mean of 6.0 cm ($SD \pm 2.3$) (Tables 3-1a, 3-2a, 3-3a, 3-4a). Nearly two-thirds of all stations were characterized by medium to high load-bearing strength reflected in the relatively shallow prism penetration depths observed (< 6 cm) (Figures 3-11 and 3-12). Approximately one-third of all stations had low to medium bearing capacity reflected in prism penetration values between 6 and 20 cm (Figures 3-11 and 3-12 B and C). Station 128 had the lowest shear strength of any station sampled, with the prism over-penetrating and exceeding the field of view of the face plate (Figure 3-13), as a result this station was not included as part of the assessment for prism penetration values.

Small-scale surface boundary roughness measured in SPI images can indicate physical shaping activity related to bedforms and hydrodynamics as well as biological activities such as infaunal burrowing and fish foraging. Station mean boundary roughness across the surveyed area averaged 1.3 cm ($SD \pm 0.5$), with a range of 0.5 to 3.2 cm (Tables 3-1a, 3-2a, 3-3a and 3-4a; Figure 3-14). Physical forcing was the primary driver shaping small-scale boundary roughness for the majority of the SPI images analyzed (Appendix C).

3.1.2 Biological Features and Habitat

The CMECS Biotic Subclass of Soft Sediment Fauna was the dominant Biotic Subclass observed across the surveyed areas (Tables 3-1b, 3-2b, 3-3b, 3-4b; Figure 3-15). This subclass is defined as “Areas that are characterized by fine unconsolidated substrates (sand, mud) and that are dominated in percent cover or in estimated biomass by infauna, sessile epifauna, mobile epifauna, mobile fauna that create semi-permanent burrows as homes, or by structures or evidence associated with these fauna (e.g., tilefish burrows, lobster burrows)” (See Section 2.1.5.2.2 for a full definition). Observations of the Soft Sediment Fauna Subclass typically were present in the form of infaunal tubes and burrows at the sediment–water interface and sand

dollars on the sediment surface (Tables 3-1b, 3-2b, 3-3b, 3-4b; Figure 3-16). Epifaunal tracks were present across much of the surveyed areas and were created by small epifauna, such as snails and hermit crabs (Figure 3-17A) and by larger epifauna, such as cancer crabs and sea stars (Figures 3-10A, 3-17B).

The CMECS Biotic Subclass of Attached Fauna was infrequently observed as either the dominant Subclass or as the Co-occurring Biotic Subclass in the surveyed areas (Tables 3-1b, 3-2b, 3-3b, 3-4b; Figure 3-18). Attached fauna were documented: in the state waters along the planned path of the New York Export Cable where mussel beds were observed amongst shell fragments overlying silt-clay (Figure 3-19); at stations located on Cholera Bank where a diverse assemblage of attached fauna was observed (hydroids, sponges, corals; Figure 3-20); and at one station along the proposed NJ cable route (Figure 3-10A). This subclass is defined as “Areas characterized by rock substrates, gravel substrates, other hard substrates, or mixed substrates that are dominated by fauna which maintain contact with the substrate surface, including firmly attached, crawling, resting, interstitial, or clinging fauna” (See Section 2.1.5.2.2 for a full definition). When present, the percent cover of attached fauna was dense (Figure 3-21), as highlighted by the mussel beds observed along the New York Export Cable route (Figure 3-19) and the diverse attached fauna at Station 050 on Cholera Bank (Figure 3-20B); moderate, sparse and trace (Stations 095, 068, 010 respectively).

The CMECS Biotic Group of Small Tube-Building Fauna was the most common Dominant Biotic Group observed across the surveyed areas (Tables 3-1b, 3-2b, 3-3b, 3-4b; Figures 3-22 and 3-23). This group is defined as “Soft sediment areas dominated by tube-building annelids (e.g., spionids, sabellids), amphipods, small phoronids, or other small, surface-dwelling, tube-building fauna. These animals have a small tube width (< 2 millimeters), and the tubes often occur in dense mats. The animal itself may reside above or below the sediment surface within the constructed tube, which may be composed of a variety of materials (e.g., glued sediments, calcium carbonate, mucus, chitin, proteins).” Other frequently occurring Dominant CMECS Biotic Groups observed across the surveyed areas included Larger Tube Building Fauna (Figure 3-24A), Sand Dollar Beds (Figure 3-24B), Small Surface-Burrowing Fauna (Figure 3-24C), Mussel Beds (Figure 3-24D), and Burrowing Anemones (Figure 3-24E). The Dominant Co-occurring Biotic Group was variable across the surveyed area with no predominant group (Figure 3-25), highlighting the diversity of seafloor taxa in the surveyed area. Definitions of all CMECS Biotic Groups can be found in the Classification Standard (FGDC 2012).

The majority of the biological features observed at the surveyed area were driven by the seafloor habitat. The predominant habitat was Sand Sheets with numerous instances of Sand with Mobile Gravel, and a couple of stations where a habitat of Patchy Cobbles and Boulders on Sand was observed (Figures 3-2, 3-26, 3-27). Cobbles and boulders can provide habitat for a diverse range of taxa and serve as valuable habitat for corals and as a place for squid to lay their eggs (Guida et al. 2017). Sensitive taxa (Section 2.1.5.2.3) were only observed in SPI/PV imagery at one station (Tables 3-1b, 3-2b, 3-3b, 3-4b; Figure 3-28). At Station 50 the non-reef building Northern Star coral, *Astrangia* spp., was observed in all replicates (Figures 3-6E, 3-

20B, 3-29). *Astrangia* is a stony coral that attaches to hard substrate instead of building its own structure dissimilar from those corals commonly observed in tropical reefs. The polyps are translucent, and the colony has a furry appearance when they are expanded (Figure 3-29 inset). These sensitive taxa were observed in conjunction with other non-sensitive attached fauna (sponges, hydroids, barnacles) (Figure 3-20). In addition to those associated with sensitive habitats, species of concern known to occur in the area are black sea bass (warmer months), Atlantic cod (colder months), sea scallops, surf clams, and ocean quahog (Guida et al. 2017); sea scallops and the ocean quahog were the only species of concern observed during the SPI/PV survey (Figures 3-30, 3-31).

3.2 Long Island Export Cable Route (LIECR)

Fifty-six SPI/PV stations were sampled along the portion of the proposed route that was defined as the Long Island Export Cable Route (LIECR, Figure 3-1). The LIECR encompassed Stations 030-042, 79-80, 82-88, 98-106, and 116-130

3.2.1 Physical Features

Surficial sediment types varied along the LIECR with observed grain size classes ranging from silt-clay to granules and pebbles (Tables 3-1a, 3-5; Figures 3-2, 3-3, 3-6D, and 3-13). Stations located furthest offshore (Stations 030-045) were predominantly composed of medium sand (Figure 3-32) with a few instances of fine and coarse sand (Figures 3-2, 3-7C). Stations closer to shore were predominantly very fine sand or fine sand (Figures 3-3, 3-33) with a few stations composed of granules or pebbles (Figures 3-3, 3-6D). While there was inter-station spatial heterogeneity in sediment type along the LIECR, intra-station heterogeneity, i.e. two or three replicate images with different grain size categories, of primary sediments was minimal (Figures 3-2, 3-3, and 3-5). Low intra-station heterogeneity provided the ability to more accurately and finely categorize sediment types. Stations exhibiting sediment types with medium or high intra-station heterogeneity, were observed to be haphazardly distributed along the LIECR (Figure 3-5). No boulders were observed along the LIECR (Figure 3-4).

Station mean prism penetration values along the LIECR ranged from 3.6 to 13.8 cm, with a mean of 5.4 cm ($SD \pm 1.6$) (Table 3-1a). Approximately 80% of the stations along the LIECR contained medium to high load-bearing strength reflected in the relatively low prism penetration depths observed (<6 cm) while the remaining predominantly had low to medium bearing capacity reflected in prism penetration values between 6 and 15 cm (Figure 3-11). Station 128 had extremely low bearing capacity and was over-penetrated (Figures 3-11, 3-13); this station was not included in the statistical assessment of prism penetration along the LIECR. There was no discernible spatial trend in sediment load-bearing capacity along the LIECR (Figure 3-11).

Station mean boundary roughness along the LIECR averaged 1.3 cm ($SD \pm 0.5$), with a range of 0.5 to 2.8 cm (Table 3-1a; Figure 3-14). Well-formed and irregular ripples were the predominant bedform observed along the LIECR. Higher boundary roughness values (>1.5 cm) were primarily present at stations with larger more pronounced ripples which occurred at the stations closer to shore (Figures 3-14, 3-34A). Stations further from shore were generally characterized

by smaller ripples or contained no evident bedforms and generally had lower boundary roughness (<1.5 cm) (Figures 3-14, 3-34B). Physical forcing was the primary influence shaping small-scale boundary roughness for the majority of images (Appendix C). As is common in mobile sands, larger grains settled into the trough of the sand ripples (Figure 3-34).

3.2.2 Biological Features and Habitat

The dominant CMECS Biotic Subclass observed along the LIECR was Soft Sediment Fauna (Table 3-1b; Figure 3-15) with every station containing soft sediment fauna as the dominant Biotic Subclass. One station, Station 046, contained Attached Fauna as the Co-occurring Biotic Subclass (Figure 3-18); at Station 046 hydroids were observed in one replicated attached to pieces of gravel (Table 3-1b, Figure 3-20A). No other biotic subclasses were observed along the LIECR.

Biotic group was variable along the LIECR (Figure 3-22). Starting offshore and moving inshore, Stations 030-042 were determined to have Sand Dollar Beds as the dominant biotic group (Figure 3-32), with a few stations (Stations 030, 037, 040, 042) along this stretch of the proposed cable route composed of Small Surface-Burrowing or Small Tube-Building Fauna (Table 3-1b, Figures 3-24C, 3-31A). The next stretch of the LIECR (Stations 029, 043-047, 081, 078) had the dominant Biotic Group predominantly classified as Small Tube-Building Fauna (Figures 3-22, 3-35). Stations 046 and 047 were the exception, with dominant biotic groups at these stations classified as Small Surface-Burrowing Fauna and Sand Dollar Beds, respectively (Table 3-1b, Figure 3-22). The stations closest to shore, the portion of the LIECR that branches into state waters, had a variety of dominant biotic groups (Figure 3-22). Tube-Building Fauna, both small and large, were the most common Biotic Groups observed along this portion of the proposed route, while Tracks and Trails, Mobile Crustaceans on Soft Sediments, and Mobile Crustaceans on Hard or Mixed Substrates were also prevalent, amongst a few other occurring Biotic Groups not mentioned (Table 3-1b, Figure 3-22). The dominant Co-occurring Biotic Group was spatially variable along the LIECR (Figure 3-25) highlighting the diversity of taxa found on the seafloor along the LIECR.

The aRPD was often not measurable at stations along LIECR, with more than half the stations (32 out of 56) having aRPDs that were classified as IND (Figure 3-36). When determinable, mean aRPD depths ranged from 0.5 to 5.9 cm with an area mean of 3.1 cm ($SD \pm 1.2$) (Table 3-1b; Figure 3-37). In mobile sandy sediments, the aRPD depth is based more on diffusion through sand grains and sediment mixing by fluid dynamics, and less on organic inputs and bioturbation of deposit-feeding infauna. Low organic inputs make optical distinction of the aRPD difficult. Similarly, with low deposition of organic materials, the sediment oxygen demand at stations along the LIECR was predominantly low (Table 3-1b, Figures 3-37B, 3-38). Only a few stations showed evidence of elevated SOD (Figure 3-37A). No indications of low water column dissolved oxygen was observed (Table 3-1b), but the presence of methane was documented at station 128 (Table 3-1b, Figure 3-13).

The predominant state of infauna succession observed along the LIECR was Stage 2 (Table 3-1b, Figures 3-39, 3-40), an intermediate successional state. Stage 2 taxa were evidenced by the presence of polychaete tubes at the sediment–water interface (Figure 3-41), including the specialized shell tubes created by the polychaete *Diopatra cuprea* (Figure 3-41B). The presence of Stage 2 fauna along the LIECR reflects the dynamic nature of this mobile sand environment; frequent bedload transport through fluid dynamics creates an environment with regular disturbance. Due to the dynamic nature of these sandy environments and the very low organic loads found in medium and coarse sands intermediate Stage 2 taxa predominate. There were a few stations that were designated as being in transition from Stage 1 to 2 with a Stage 1 -> 2 designation (Figures 3-39, 3-40). These stations often had indications of substantial hydrodynamic forcing on the bottom, evidenced by the presence of distinct sand ripples (Figure 3-42). The small tubes present at the sediment–water interface were often located in the trough of the sand ripples (Figure 3-42B). Stage 1 -> 2 designations predominantly occurred along the LIECR between Station 116 to 123 (Figure 3-40). There were a few stations along the LIECR with advanced successional taxa indicated by Stage 2 -> 3 and Stage 3 designations (Figures 3-39, 3-40). Evidence of the presence of Stage 3 fauna included deep subsurface burrows and/or feeding voids that were both open and infilled and are the products of infaunal deposit feeder activity (Figure 3-43A). The replicates designated as being in transition from Stage 2 to 3 with a Stage 2 -> 3 designation, indicated that features (e.g., burrows in PV image pair, deep burrowing textures) were visible that indicated that Stage 3 taxa may be present but specific evidence (feeding voids) were not imaged (Figure 3-43B).

There were no sensitive taxa identified along the LIECR (Table 3-1b; Figure 3-28) and species of concern in the form of the Ocean quahog were observed at Stations 030 and 034 (Table 3-1b; Figures 3-30, 3-31A). When the Ocean quahog was observed it was in low densities as a single individual in a plan view image replicate.

The predominant habitat observed along the LIECR was Sand Sheets, with a few instances of Sand with Mobile Gravel (Figures 3-26, 3-27). Instances of habitat composed of Sand with Mobile Gravel predominantly occurred in the stations closest to shore that were in or adjacent NY state waters (Figures 3-6D, 3-26, 3-27); a couple of stations with this habitat were located further offshore (Stations 037 and 046; Figures 3-7C, 3-20A, 3-31A).

Epifauna observed with SPI and PV imagery along the LIECR was dominated by the presence of anemones, gastropods, hermit crabs, and sand dollars, among others (Table 3-1b, Figure 3-44). Epifauna were documented by PV and/or SPI at 52 of the 56 stations. Station 046 contained attached epifauna, and the percent coverage of the attached fauna at this station was sparse (1 to <30% coverage) (Table 3-1b; Figures 3-20A, 3-21).

Fish were rarely documented at stations along the LIECR; skate were documented at two stations, Stations 032 and 033 (Table 3-1b; Figure 3-45). Macroflora were not observed at any stations along the LIECR.

3.3 New Jersey Export Cable Route (NJECR)

Forty-three SPI/PV stations were sampled along the NJECR (Figure 3-1). The NJECR were the southernmost stations, and encompassed those stations extending from the Equinor lease area into NJ state waters. The NJECR included Stations 001-027 and 141-157.

3.3.1 Types of Sediment and Bedforms Observed

Similar to the LIECR surficial sediment types varied along the NJECR with observed sediment types ranging from silt-clay, to very fine sand, to sediments as large as granules (Tables 3-2a, 3-5; Figures 3-2, 3-6A, 3-6B, 3-10B). The majority of stations along the NJECR, especially those stations located east of the Hudson River Shelf Valley (Stations 012-027, 141-157), were predominantly composed of fine and medium sand (Figures 3-2, 3-23B) with a few instances of very fine sand at Stations 019 and 020 (Figures 3-2, 3-46). Station 011, located directly in the shelf valley, was composed of silt-clay (Figure 3-6A), reflecting the reduced hydrodynamics in this deeper portion of the survey area. Stations 010 and 012, located in the shelf valley but near the edge (possibly on the slopes of the valley), were composed of fine sand and very fine sand, respectively (Figure 3-10A). West of the shelf valley, moving into shallower waters and the NJ state boundaries, the sediment type was variable, with fine sand and granules the predominant sediment types (Figures 3-2, 3-7B, 3-10B, 3-12A). Intra-station sediment heterogeneity, i.e. two or three replicate images with different grain size categories, was generally low along the NJECR (Figure 3-5). A few stations had medium sediment type heterogeneity, but there was not spatial trend to the location of those stations. Boulders were present at one station along the NJECR (Table 3-2a; Figure 3-4). Station 010, located along the slope of a submarine valley, contained a boulder in one replicate (Figure 3-23A).

Station mean prism penetration values along the NJECR ranged from 2.0 to 19.8 cm, with a mean of 5.9 cm ($SD \pm 2.5$) (Table 3-2a). Approximately 70% of the stations along the NJECR contained medium to high load-bearing strength reflected in the relatively low prism penetration depths observed (< 6 cm), while the remaining predominantly had low to medium bearing capacity reflected in prism penetration values between 6 and 15 cm (Figure 3-11). Station 011 had extremely low load-bearing capacity with prism penetration > 15 cm; this station was uniquely situated in the center of the Hudson River Shelf Valley and composed of silt-clay (Figures 3-6A, 3-11). There was no discernible spatial trend in sediment load-bearing capacity along the NJECR (Figure 3-11).

Station mean boundary roughness along the NJECR averaged 1.3 cm ($SD \pm 0.6$), with a range of 0.6 to 3.2 cm (Table 3-2a; Figure 3-14). Boundary roughness was influenced by biological processes, from both infauna and epifauna activity (Table 3-2a; Figures 3-6A, 3-16B; Appendix C), and physical forcing from hydrodynamic movement of sand occasionally creating bedforms on the seafloor. When present bedforms were well-formed or uneven sand ripples (Figure 3-47). Well-formed sand ripples were oriented with larger particles in the trough of the ripple (Figure 3-47B), a common observation in mobile sands.

3.3.2 Type of Biota and Habitat Observed

The dominant CMECS Biotic Subclass along the NJECR was Soft Sediment Fauna (Table 3-2b; Figure 3-15) with every station composed of soft sediment fauna as the dominant Biotic Subclass. Most stations did not have a Co-occurring Biotic Subclass (Figure 3-18), except Stations 004 and 010 which were documented with Inferred Fauna and Attached Fauna, respectively (Table 3-2b; Figures 3-10A, 3-48).

Along the NJECR the dominant Biotic Group was variable (Table 3-2b; Figure 3-22). There was no discernible spatial trend, but Sand Dollar Beds and Small Tube-Building Fauna were the most prevalent dominant Biotic Groups observed (Figures 3-22, 3-23B, 3-46). Other biotic groups observed along the NJECR were Mobile Crustaceans on Hard or Mixed Substrates, Larger-Tube Building Fauna, Small Surface-Burrowing Fauna, and Diverse Soft Sediment Epifauna (Table 3-2b; Figure 3-22). The dominant Co-occurring Biotic Group was spatially highly variable along the NJECR with numerous Co-occurring Biotic Groups, and no particular group dominant (Figure 3-25), highlighting the diversity of taxa found on the seafloor along the NJECR.

The aRPD was often not measurable at stations along NJECR, with approximately half the stations (22 out of 43) having aRPDs that were classified as IND (Figure 3-36). When determinable, mean aRPD depths ranged from 1.5 to 4.8 cm with a mean of 3.3 cm ($SD \pm 0.8$) (Table 3-2b; Figure 3-49). In mobile sandy sediments, the aRPD depth can be influenced by diffusion through sand grains during sediment mixing, and less on organic inputs and bioturbation of deposit-feeding infauna. Though at times both processes can contribute to the depth of the aRPD (Figure 3-50). Along the NJECR, when detectable, the aRPDs were generally well-mixed deep into the sediment column by both physical forcing and biological activity (Figures 3-36, 3-49, 3-50). Low organic inputs make optical distinction of the aRPD difficult, this resulted in the high number of stations with aRPDs that were indeterminate (Figure 3-36). Similarly, with low deposition of organic materials, the sediment oxygen demand at stations along the NJECR was predominantly low (Table 3-2b, Figures, 3-49B, 3-50). Only a few stations showed evidence of elevated SOD (Figure 3-49A). No indications of low water column dissolved oxygen or methane presence was observed at any stations along the NJECR (Table 3-2b).

The predominant state of infauna succession observed along the NJECR was Stage 2 (Table 3-2b, Figure 3-39). Stage 2 taxa were evidenced by the presence of polychaetae tubes at the sediment–water interface and shallow burrowing (Figures 3-49, 3-50), including tubes created by the polychaete *Diopatra cuprea*. (Figure 3-50). *D. cuprea* often incorporate shell fragments when forming their tubes (Figure 3-16A) providing the tubes with a unique appearance. Along the NJECR we observed *D. cuprea* tubes observed without shells present due to the lack of shell hash at some stations. The presence of Stage 2 fauna along the NJECR reflects the dynamic nature of this mobile sand environment. There were a few instances where the successional stage was designated as being in transition from Stage 1 to 2 with a Stage 1 -> 2 designation (Table 3-2b; Figure 3-39). These occurrences were at Stations located offshore

(Stations 150, 153, 157) and were indicated by small tubes present at the sediment–water interface. Advanced succession was documented at Stations 010, 011, and 012; each station was located in the Hudson Shelf Valley (Figure 3-39). Stage 3 fauna were evidenced by the presence of deep subsurface burrows and/or feeding voids, the products of head-down deposit feeders (Figures 3-6A, 3-49A, 3-51). There were a few stations along the NJECR with replicates designated as being in transition from Stage 2 to 3 with a Stage 2 -> 3 designation (Figure 3-39).

There were no sensitive taxa identified along the NJECR (Table 3-2b; Figure 3-28) and species of concern in the form of the ocean quahog and sea scallop were observed at Stations 024 and Station 005, 010, respectively (Table 3-2b; Figures 3-10A, 3-30). Both the ocean quahog and sea scallop were observed in low densities of one to two individuals in a plan view image replicate.

Along the NJECR habitat type varied on either side of the Hudson Shelf Valley (Table 3-2b; Figure 3-26). Stations located east of the shelf valley were exclusive composed of Sand Sheet habitat (Figure 3-23B), and stations located west of the shelf valley were predominantly a habitat of Sand with Mobile Gravel (Figure 3-10B) with some instances of Sand Sheets (Figure 3-48) and one occurrence of Patchy Cobbles, Boulders on Sand (Figure 3-23A). The habitat types observed along the NJECR corresponded to the backscatter data collected by USGS (2-2). Stronger backscatter returns indicate coarser sediments, and weaker returns indicate finer material. Areas with stronger returns were located west of the submarine valley, which coincided with the coarser habitat of Sand with Mobile Gravel and Cobbles observed in this area (Figures 2-2, 3-26).

Epifauna observed with SPI and PV imagery along the NJECR was dominated by the presence of hermit crabs and sand dollars, among others (Table 3-2b; Figure 3-46,) though crabs, sea stars and other diverse fauna were also observed (Figures 3-10A, 3-17B). Epifauna were documented by PV and/or SPI at every station along the NJECR except Station 14 (Table 3-2b), which had a seafloor covered in polychaete tubes (Figure 3-52).

Fish were infrequently observed at stations along the NJECR, with the sea robin and skate as the only taxa documented (Table 3-2b; Figure 3-53). Macroflora were not observed at any stations along the NJECR. (Table 3-2b).

3.4 New York Harbor Export Cable Route (NYHECR)

Fifty-eight SPI/PV stations were sampled along the NYHECR (Figure 3-1). The NYHECR passes over Cholera Bank, extends into NY state waters and traverses the narrows between Staten Island and Brooklyn. The NYHECR included Stations 048-077, 089-097, 107-115 and 131-140.

3.4.1 Types of Sediment and Bedforms Observed

Surficial sediment types varied along the NYHECR with observed grain size classes ranging from silt-clay to granules and pebbles (Tables 3-3a, 3-5; Figures 3-2, 3-19, 3-8A, 3-8B), with

boulders present at one station, Station 050 (Figures 3-4, 3-20B). The majority of stations along the NYHECR were predominantly composed of very fine and fine sand (Table 3-3a; Figures 3-2, 3-16A, 3-54). All of the silt-clay sediments observed along the NYHECR were located in NY state waters and were frequently associated with overlying mussel beds (Table 3-3a, Table 3-3b; Figures 3-2, 3-19). Stations with coarser sediment types were primarily located on and adjacent to Cholera Bank (Stations 050-054, 068-071, and 131-138) where coarse and very coarse sand, pebbles and granules, and boulders were observed (Figures 3-8, 3-20B, 3-55). Cholera Bank is a known shoal, and the presence of coarse grains in this area was expected. The sediment types observed along the NYHECR corresponded to the backscatter results from the USGS (Figures 2-2, 3-2). Intra-station sediment heterogeneity, i.e. two or three replicate images with different grain size categories, was generally low along the NYHECR (Figure 3-5). A few stations had medium heterogeneity in sediment type, but there was no spatial trend to the location of these stations. One station, Station 051, had high heterogeneity with each replicate containing a different sediment type (Table 3-3a; Figure 3-8). Boulders were present at one station, Station 050, located on Cholera Bank (Table 3-3a; Figure 3-4). Every replicate at Station 050 had documented boulders (Table 3-3a; Figures 3-6E, 3-20B, 3-29).

Station mean prism penetration values along the NYHECR ranged from 2.3 to 18.9 cm, with a mean of 6.5 cm ($SD \pm 2.8$) (Table 3-3a). Approximately 50% of the stations (31 out of 58) along the NYHECR contained medium to high load-bearing strength reflected in the relatively low prism penetration depths observed (< 6 cm), while the remaining predominantly had low to medium bearing capacity reflected in prism penetration values between 6 and 15 cm (Figure 3-11). Station 115 had extremely low load-bearing capacity with prism penetration > 15 cm. Station 115 was located in NY harbor and composed of silt-clay sediments; fine sediments commonly found in harbor settings have low load-bearing capacity (Figures 3-11, 3-56). Stations with low load bearing capacity were predominantly located at the shallower stations in NY state waters and corresponded with those stations containing silt-clay or very fine sand sediment types (Figures 3-2, 3-11, 3-19, 3-56).

Station mean boundary roughness along the NYHECR averaged 1.2 cm ($SD \pm 0.5$), with a range of 0.5 to 2.8 cm (Table 3-3a; Figure 3-14). Boundary roughness was influenced by biological processes, from both infauna and epifauna activity (Table 3-3a; Figures 3-19, 3-56; Appendix C), and physical forcing from hydrodynamic movement of sand occasionally creating bedforms on the seafloor (Figure 3-55). When present bedforms were well-formed or uneven sand ripples (Table 3-3a).

3.4.2 Type of Biota and Habitat Observed

The predominant CMECS Biotic Subclass along the NYHECR was Soft Sediment Fauna (Table 3-3b; Figure 3-15) with most station designated with this Biotic Subclass. The Attached Fauna Biotic Subclass was found at: Station 050 located on Cholera Bank, which was composed of boulders (Figures 3-4, 3-6E, 3-20B, 3-29); Station 068 where Soft Sediment and Attached Fauna were both designated as the dominant Biotic Subclass due to the presence of mussels along with tube building fauna (Figure 3-57); and Stations 107-110 located in NY state waters,

the seafloor at these stations was covered in shell material with numerous mussels situated in the interstitial spaces of the shell assemblage (Figure 3-19). Co-occurring Biotic Subclass was patchily distributed along the NYHECR (Figure 3-18). When designated, Attached Fauna or Soft Sediment Fauna were the Co-occurring Biotic Subclass (Table 3-3b). The percent cover of Attached Fauna was variable along the NYHECR (Figure 3-21). Station 050 was the only location where Attached Fauna were assessed to be densely covering the bottom (Figures 3-6E, 3-20B, 3-29). Most of the stations containing Mussel Beds (Station 095, 096, 107-110) contained moderate coverage, though some stations had sparse coverage (Figures 3-19, 3-24D).

Along the NYHECR biotic group was variable (Table 3-3b; Figure 3-22). There was no specific spatial trend, but Tube-Building Fauna (both small and larger) were the most prevalent biotic groups observed (Figures 3-22, 3-17A, 3-54). Mussel Beds and Attached Mussels were prevalent at the stations in NY state waters just before the “Narrows” (Figures 3-19, 3-22, 3-24D). Other biotic groups observed along the NYHECR were Mobile Crustaceans on Hard or Mixed Substrates, Burrowing Anemones, and Sand Dollar Beds among a few others (Table 3-3b; Figure 3-22). The dominant Co-occurring Biotic Group was spatially variable along the NYHECR with numerous co-occurring groups and no particular group dominant (Figure 3-25), highlighting the diversity of taxa found on the seafloor along the NYHECR. The diversity of Co-occurring biotic groups was similarly observed at other portions of the cable route (LIECR, NJECR).

The aRPD was often not measurable at stations along NYHECR, with approximately half the stations (26 out of 58) having aRPDs that were classified as IND (Figure 3-36). When determinable, mean aRPD depths ranged from 0.1 to 5.3 cm with a mean of 2.3 cm ($SD \pm 1.1$) (Table 3-3b; Figure 3-58). Many of the NYHECR stations in federal waters were composed of mobile sands (Table 3-3a; Figure 3-2) resulting in an aRPD depth that was influenced by diffusion through sediment mixing, and less on organic inputs and bioturbation of deposit-feeding infauna (Figures 3-54, 3-57). In NY state waters the sediment became finer and the closer proximity to land increased the influence of organic input; sediment oxygen demand was much higher at NYHECR stations located in state waters (Figures 3-38, 3-57, 3-58). The aRPD at stations located in NY state waters were influenced by biological activity and organic input (Figures 3-19, 3-58). Many of the stations located on or adjacent Cholera Bank had aRPDs that were indeterminate (Figure 3-36); the aRPD can be difficult to impossible to discern in the coarse grains prevalent at stations in this location. There were no indications of low water column dissolved oxygen or methane presence was observed at any stations along the NJECR (Table 3-3b).

The infauna succession observed along the NYHECR was variable (Table 3-3b, Figure 3-39). Stations located in NY state waters had successional designations that were often either Indeterminate or advanced Stage 2->3 or Stage 3 succession; there were also a few instances of stations with Stage 2 succession. Advanced succession was evidenced by the presence of feeding voids in the sediment column (Figure 3-19). Intermediate Stage 2 succession was

evidence by shallow burrowing and tubes at the sediment–water interface (Figure 3-59A). In federal waters the predominant state of infauna succession was Stage 2, evidenced by tubes at the sediment water interface (Figure 3-59B). Stage 2 succession is a common state in mobile sand environments; mobile sands were frequently observed along the portion of the NYHECR that was situated in federal waters (Figures 3-2, 3-26). While Stage 2 taxa was the predominant state of succession of the portion of the NYHECR in federal waters, advanced succession (Stage 2->3, Stage 3) was documented between Stations 056 to 062 and 089 (Figure 3-39) evidenced by large burrowing fauna (Figure 3-59C). Replicates at a few stations were designated as being in transition from Stage 1 to 2 with a Stage 1 -> 2 designation (Table 3-3b; Figure 3-39).

Along the NYHECR sensitive taxa were identified at Station 050 (Table 3-3b; Figure 3-28). At Station 050 the non-reef building Northern Star coral, *Astrangia* spp., was observed in all replicates (Figures 3-6E, 3-20B, 3-29). Species of concern, in the form of sea scallops, were observed only at station along the NYHECR in federal waters: Stations 057, 058, and 091 (Table 3-3b; Figures 3-30, 3-60A). At each station sea scallops were observed in low densities of one individual per image replicate.

The predominant habitat observed along the NYHECR was sand sheets, and the portion of NYHECR transiting Cholera Bank was composed of Sand with Mobile Gravel habitat (Table 3-3b; Figure 3-26). One station, Station 050, was composed of Patchy, Cobbles, Boulders on Sand habitat (Figures 3-6E, 3-20B, 3-29). The habitat trends observed along the NYHECR corresponded with USGS backscatter data (Figure 2-2).

Epifauna observed with SPI and PV imagery along the NYHECR was dominated by the presence of anemones, gastropods, and hermit crabs, among others (Table 3-3b; Figure 3-60). Epifauna were documented by PV and/or SPI at every station along the NYHECR except Station 74 (Table 3-3b), which had a seafloor covered in *D. cuprea*. polychaete tubes (Figure 3-61).

Fish were only observed at Stations 131 and 132 with the sea robin identified as the taxa (Table 3-3b). Macroflora were not observed at any stations along the NYHECR. (Table 3-3b).

3.5 Reference Area Stations

Fifteen reference stations were surveyed, divided into three areas with five stations in each area. Locations for the reference areas were selected to provide a representation of the breadth of seafloor covered by the proposed export cable routes. Backscatter data from the USGS (Figure 2-2) was used to define reference locations. Reference A was selected in an area of stronger backscatter return, Reference C was selected in an area of lower backscatter return, and Reference C was selected in and around the prominent shoal Cholera Bank.

3.5.1 Types of Sediment and Bedforms Observed

Surficial sediment types varied amongst the reference areas (Table 3-4a; Figure 3-2). The predominant sediment type at Reference A was composed of granules and pebbles (Figure 3-

62A), Reference B had predominant sediment types of medium sand over fine sand, (Figure 3-62B) and Reference C had predominant sediment types of medium sand (Figure 3-62C). The sediment types observed in the reference areas corresponded to the backscatter results from the USGS (Figures 2-2, 3-2). Intra-station sediment heterogeneity was generally low with each reference area having approximately similar sediment types amongst its stations (Figure 3-2).

Station mean prism penetration values at the reference areas ranged from 4.4 to 8.0 cm, with a mean of 6.2 cm ($SD \pm 1.1$) (Table 3-4a). Approximately 50% of the reference stations (6 out of 15) contained medium to high load-bearing strength reflected in the relatively low prism penetration depths observed (< 6 cm), while the remaining stations predominantly had low to medium bearing capacity reflected in prism penetration values between 6 and 15 cm (Figure 3-11). Stations at Reference A had the highest load bearing capacity; Reference A had the largest sediment type of the three reference areas (Figure 3-2).

Station mean boundary roughness at the reference areas averaged 1.5 cm ($SD \pm 0.5$), with a range of 0.6 to 2.3 cm (Table 3-4a; Figure 3-14). Boundary roughness at the reference stations was predominantly influenced by physical processes given the prevalence of mobile sand and gravel at the three reference areas (Table 3-4a; Figures 3-60, 3-56; Appendices C and D), and physical forcing from hydrodynamic movement of sand occasionally creating bedforms on the seafloor (Figure 3-55). When present bedforms were well-formed or uneven sand ripples (Table 3-4a).

3.5.2 Type of Biota and Habitat Observed

The dominant CMECS Biotic Subclass at the reference areas was Soft Sediment Fauna (Table 3-4b; Figure 3-15) with every station in each of the three reference areas composed of soft sediment fauna as the dominant Biotic Subclass. None of the reference stations had a Co-occurring Biotic Subclass (Table 3-4b; Figure 3-18).

Biotic Group was variable between the three reference areas (Table 3-4b; Figure 3-22). The dominant Biotic Group for all stations at Reference A was Burrowing Anemones (Figures 3-63A). Reference B was a mix of dominant biotic groups, with Diverse Soft Sediment Epifauna and Larger Tube-Building Fauna the predominant groups (Figure 3-64). All of the stations at Reference C had Larger Tube-Building Fauna designated as the dominant Biotic Group (Figure 3-63B). The dominant Co-occurring Biotic Group was variable at the reference stations with numerous co-occurring groups and no particular group dominant (Figure 3-25), highlighting the diversity of taxa found on the seafloor at the reference stations. The diversity of Co-occurring biotic groups was similarly observed along the proposed cable routes (LIECR, NJECR, NYHECR).

The aRPD was often not measurable at the reference stations, with approximately half the stations (7 out of 15) having aRPDs that were classified as IND (Figure 3-36). When determinable, mean aRPD depths ranged from 2.8 to 6.8 cm with a mean of 4.4 cm ($SD \pm 1.3$) (Table 3-4b; Figure 3-65). No stations showed evidence of elevated sediment oxygen demand

(Figure 3-38), and there were no indications of low water column dissolved oxygen or methane presence any of the reference stations (Table 3-4b).

Infauna succession observed at the reference stations was predominantly Stage 2 (Table 3-4b, Figure 3-39). Stage 2 succession was primarily evidenced by tubes at the sediment–water interface (Figure 3-65A). A few stations contained advanced Stage 2->3 succession, evidenced by the presence of large burrowing fauna but no feeding voids (Figure 3-65B). Reference station REFB_05 was designated as being in transition from Stage 1 to 2 with a Stage 1 -> 2 designation (Table 3-4b; Figure 3-39).

The predominant habitat observed at the reference stations was variable (Figure 3-26). Reference A was exclusively composed of Sand with Mobile Gravel habitat (Figure 3-63A). Reference B and C were exclusively composed of Sand Sheet habitat (Figures 3-63B, 3-64B). The habitat trends observed at the reference stations corresponded with USGS backscatter data (Figure 2-2), which was used to delineate the locations of the reference areas.

There were no sensitive taxa or species of concern identified at the reference stations (Table 3-4b; Figures 3-28, 3-30). Epifauna observed with SPI and PV imagery at the reference stations was dominated by the presence of anemones at Reference A (Table 3-4b; Figure 3-63A), gastropods, hermit crabs and sand dollars at Reference B (Table 3-4b; Figure 3-64B) and a few sea stars at Reference C (Table 3-4b; Figure 3-63B).

Fish were only observed at three stations, Stations REFA_01, REFA_05, and REFB01, with sea robin, flounder and skate identified as the taxa (Table 3-4b). Macroflora were not observed at any reference stations. (Table 3-4b).

3.6 Sediment Grabs

Grain size distribution analysis were completed for sixteen sediment samples. The Grain Size Distribution results are shown in Table 3-6. Sediment grab results were approximately similar to sediment types determined by SPI/PV (Table 3-6; Figures 3-2, 3-3). Sediment grab grain size analysis determined stations to be predominantly sand, which was the predominant sediment type observed in SPI/PV imagery. At Stations 010 and 011 the grain size analysis delineated the change in sediment type from fine sand over silt-clay at Station 010 to predominantly silt-clay at Station 011 located in the center of the submarine valley. The grain-size analysis for Station 010 included approximately 40% gravel. Observations of the replicate SPI/PV images for Station 010 noted that gravel was present in small patches but was not a substantial component of the sediment type at this station. The ambiguity between the grab and SPI/PV data can be attributed to the sediment grabs collecting only a single replicate of a relatively small area of the seafloor and not capturing the intra-station heterogeneity. There was general agreement between the SPI/PV and sediment grab data, but fine scales differences in the data were attributed to the limited capability for the sediment grab approach to capture intra-station sediment heterogeneity.

Table 3-1a. Summary of Plan View Image Analysis Results at the Long Island Export Cable Route Stations

Long Island Export Cable Route Station	Water Depth (m)	SPI Replicate (n)	Mean Prism Penetration Depth (cm)	Mean Boundary Roughness (cm)	SPI Sediment Type (by replicate)			PV Replicate (n)	Gravel Mode (mm)	Dominant CMECS Substrate Group	Dominant CMECS Substrate Subgroup	Boulder Presence	Bedforms (by replicate)			Bedform Size Measurement (cm)	Debris	Habitat Type
027	30	3	4.1	0.9	Fine sand	Fine sand	Fine sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	None	Sand Sheet
028	27	3	4.7	1.2	Fine sand	Fine sand	Fine sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	Shell Hash	Sand Sheet
029	27	3	4.6	0.8	Fine sand	Medium sand	Medium sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	Shell Hash	Sand Sheet
030	37	3	5.7	1.2	Medium sand	Medium sand	Medium sand	3	IND	Sand	Sand or Finer	No	None	Uneven Ripples	Uneven Ripples	IND	Shell Hash	Sand Sheet
031	36	3	6.0	1.0	Medium sand	Medium sand	Medium sand	3	IND	Sand	Sand or Finer	No	None	Uneven Ripples	Uneven Ripples	IND	Shell Hash	Sand Sheet
032	36	3	5.9	0.8	Medium sand	Medium sand	Medium sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	Shell Hash	Sand Sheet
033	34	3	5.9	0.8	Medium sand	Medium sand	Medium sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	Shell Hash	Sand Sheet
034	33	3	5.6	0.7	Medium sand	Medium sand	Medium sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	Shell Hash	Sand Sheet
035	34	3	6.1	1.0	Medium sand	Medium sand	Medium sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	Shell Hash	Sand Sheet
036	30	3	6.3	0.7	Medium sand	Medium sand	Medium sand	3	IND	Sand	Sand or Finer	No	None	Ripples	Ripples	39.4	Shell Hash	Sand Sheet
037	32	3	6.0	0.6	Very coarse sand over sand	Very coarse sand over sand	Very coarse sand over sand	3	3.0	Gravelly	Gravelly Sand	No	None	None	IND	-	Shell Hash	Sand with Mobile Gravel
038	30	3	6.4	0.5	Medium sand	Medium sand	Medium sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	Shell Hash	Sand Sheet
039	30	3	5.4	0.9	Fine sand	Medium sand	Medium sand	3	IND	Sand	Sand or Finer	No	None	Ripples	Ripples	41.4	Shell Hash	Sand Sheet
040	30	3	6.3	1.4	Medium sand	Medium sand	Medium sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	Shell Hash	Sand Sheet
041	29	3	5.9	0.6	Fine sand	Fine sand	Fine sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	None	Sand Sheet
042	29	3	8.4	1.6	Very fine sand	Very fine sand	Very fine sand over silt/clay	3	IND	Sand	Sand or Finer	No	None	None	None	-	Shell Hash	Sand Sheet
043	27	3	4.3	1.2	Medium sand	Medium sand	Medium sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	Shell Hash	Sand Sheet

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Long Island Export Cable Route Station	Water Depth (m)	SPI Replicate (n)	Mean Prism Penetration Depth (cm)	Mean Boundary Roughness (cm)	SPI Sediment Type (by replicate)			PV Replicate (n)	Gravel Mode (mm)	Dominant CMECS Substrate Group	Dominant CMECS Substrate Subgroup	Boulder Presence	Bedforms (by replicate)			Bedform Size Measurement (cm)	Debris	Habitat Type
044	27	3	5.0	0.9	Medium sand	Medium sand	Medium sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	Shell Hash	Sand Sheet
045	25	3	4.4	1.5	Medium sand	Medium sand	Medium sand	3	IND	Sand	Sand or Finer	No	None	None	Ripples	4.5	Shell Hash	Sand Sheet
046	26	3	4.3	1.0	Medium sand	Medium sand	Pebble over finer sediment	3	12.5	Gravelly	Gravelly Sand	No	None	None	None	-	None	Sand with Mobile Gravel
047	25	3	4.4	1.0	Fine sand	Fine sand	Fine sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	None	Sand Sheet
078	23	3	4.8	1.3	Very fine sand	Very fine sand	Very fine sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	Shell Hash	Sand Sheet
079	24	3	4.1	1.5	Fine sand	Fine sand	Fine sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	Shell Hash	Sand Sheet
080	21	3	5.2	0.9	Fine sand	Fine sand	Fine sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	Shell Hash	Sand Sheet
081	25	3	6.7	1.0	Very fine sand	Very fine sand	Very fine sand	3	IND	Sand	Sand or Finer	No	None	None	Uneven Ripples	IND	None	Sand Sheet
082	23	3	5.3	1.0	Medium sand	Medium sand	Medium sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	Shell Hash	Sand Sheet
083	23	3	8.0	1.0	Very fine sand over silt/clay	Very fine sand over silt/clay	Very fine sand over silt/clay	1	IND	Sand	Sand or Finer	No	None	-	-	-	None	Sand Sheet
084	19	3	4.2	0.8	Fine sand	Fine sand	Fine sand	3	IND	Sand	Sand or Finer	No	None	None	Uneven Ripples	IND	None	Sand Sheet
085	20	3	5.7	0.8	Fine sand	Fine sand	Fine sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	Shell Hash	Sand Sheet
086	16	3	5.0	0.8	Fine sand	Fine sand	Fine sand	3	IND	Sand	Sand or Finer	No	None	Uneven Ripples	Uneven Ripples	IND	Shell Hash	Sand Sheet
087	13	3	3.8	2.5	Very fine sand	Very fine sand	Very fine sand	3	IND	Sand	Sand or Finer	No	Ripples	Ripples	Ripples	21.1	Shell Hash	Sand Sheet
088	11	3	5.8	2.8	Fine sand	Fine sand	Fine sand	3	IND	Sand	Sand or Finer	No	None	Ripples	Ripples	-	Shell Hash	Sand Sheet
098	18	3	4.2	1.0	Very fine sand	Very fine sand	Very fine sand	3	IND	Sand	Sand or Finer	No	Uneven Ripples	Uneven Ripples	Uneven Ripples	IND	Shell Hash	Sand Sheet
099	18	3	4.8	1.1	Fine sand	Medium sand over finer sediment	Medium sand over finer sediment	3	2.0	Slightly Gravelly	Slightly Gravelly Sand	No	None	None	None	-	Shell Hash	Sand with Mobile Gravel
100	15	3	4.5	1.4	Very fine sand	Very fine sand	Very fine sand	3	IND	Sand	Sand or Finer	No	Ripples	Ripples	Ripples	11.1	None	Sand Sheet

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Long Island Export Cable Route Station	Water Depth (m)	SPI Replicate (n)	Mean Prism Penetration Depth (cm)	Mean Boundary Roughness (cm)	SPI Sediment Type (by replicate)			PV Replicate (n)	Gravel Mode (mm)	Dominant CMECS Substrate Group	Dominant CMECS Substrate Subgroup	Boulder Presence	Bedforms (by replicate)			Bedform Size Measurement (cm)	Debris	Habitat Type
101	15	3	3.8	1.7	Very fine sand	Very fine sand	Very fine sand	3	IND	Sand	Sand or Finer	No	Ripples	Ripples	Ripples	16.9	Shell Hash	Sand Sheet
102	17	3	5.6	1.2	Fine sand	Fine sand	Fine sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	Shell Hash	Sand Sheet
103	17	3	3.6	1.3	Very fine sand	Very fine sand	Very fine sand	3	IND	Sand	Sand or Finer	No	Ripples	Ripples	Ripples	8.6	Shell Hash	Sand Sheet
104	14	3	4.6	2.2	Very fine sand	Very fine sand	Very fine sand	3	IND	Sand	Sand or Finer	No	Ripples	Ripples	Ripples	13.6	Shell Hash	Sand Sheet
105	11	3	3.6	1.4	Fine sand	Fine sand	Fine sand	3	IND	Sand	Sand or Finer	No	Ripples	Ripples	Ripples	29.3	Shell Hash	Sand Sheet
106	10	3	5.6	2.0	Medium sand	Medium sand	Medium sand over finer sediment	3	IND	Sand	Sand or Finer	No	Ripples	Ripples	Ripples	IND	Shell Hash	Sand Sheet
116	14	3	5.4	1.2	Medium sand	Medium sand	Medium sand	3	IND	Sand	Sand or Finer	No	Ripples	Ripples	Ripples	8.2	Shell Hash	Sand Sheet
117	14	3	4.2	1.3	Very fine sand	Very fine sand	Very fine sand	3	IND	Sand	Sand or Finer	No	Ripples	Ripples	Ripples	12.4	Shell Hash	Sand Sheet
118	14	3	4.7	1.7	Fine sand	Fine sand	Fine sand	3	IND	Sand	Sand or Finer	No	Ripples	Ripples	Ripples	9.0	None	Sand Sheet
119	14	3	4.9	1.2	Fine sand	Fine sand	Fine sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	Shell Hash	Sand Sheet
120	11	3	4.0	2.4	Very fine sand	Very fine sand	Very fine sand	3	IND	Sand	Sand or Finer	No	None	None	Ripples	-	None	Sand Sheet
121	8	3	5.6	0.7	Very fine sand	Very fine sand	Very fine sand	0	-	-	-	-	-	-	-	-	-	-
122	13	3	4.5	2.1	Fine sand	Fine sand	Fine sand	3	IND	Sand	Sand or Finer	No	Ripples	Ripples	Ripples	10.5	Shell Hash	Sand Sheet
123	14	3	5.3	1.8	Medium sand	Medium sand	Medium sand	3	2.1	Slightly Gravelly	Slightly Gravelly Sand	No	Ripples	Ripples	Uneven Ripples	12.0	Shell Hash	Sand with Mobile Gravel
124	12	3	5.6	1.6	Fine sand	Fine sand	Fine sand	3	IND	Sand	Sand or Finer	No	Ripples	Ripples	Ripples	19.9	Shell Hash	Sand Sheet
125	13	3	5.3	2.0	Fine sand over very fine sand	Fine sand over very fine sand	Fine sand over very fine sand	3	IND	Sand	Sand or Finer	No	Ripples	Ripples	Ripples	16.0	None	Sand Sheet
126	11	3	6.3	1.3	Pebble over finer sediment	Pebble over finer sediment	Pebble over finer sediment	3	IND	Gravel Mixes	Sandy Gravel	No	None	None	None	-	None	Sand with Mobile Gravel

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Long Island Export Cable Route Station	Water Depth (m)	SPI Replicate (n)	Mean Prism Penetration Depth (cm)	Mean Boundary Roughness (cm)	SPI Sediment Type (by replicate)			PV Replicate (n)	Gravel Mode (mm)	Dominant CMECS Substrate Group	Dominant CMECS Substrate Subgroup	Boulder Presence	Bedforms (by replicate)			Bedform Size Measurement (cm)	Debris	Habitat Type
127	13	3	5.9	1.1	Granule over sand	Pebble over finer sediment	Pebble over finer sediment	3	6.0	Gravelly	Gravelly Sand	No	None	None	Ripples	15.4	None	Sand with Mobile Gravel
128	13	3	IND	IND	Silt/clay	Silt/clay	Silt/clay	2	IND	Sand	Sand or Finer	No	Ripples	Ripples	-	11.5	None	Sand Sheet
129	12	3	13.8	1.3	Silt/clay over sand	Silt/clay over sand	Very fine sand over silt/clay	0	-	-	-	-	-	-	-	-	-	-
130	9	3	5.5	1.0	Pebble over finer sediment	Pebble over finer sediment	Pebble over finer sediment	3	IND	Gravel Mixes	Sandy Gravel	No	None	None	None	-	None	Sand with Mobile Gravel
n = SPI-56, PV-54																		
Max	37		13.8	2.8					12.5							41.4		
Min	8		3.6	0.5					2.0							4.5		
Mean	21		5.4	1.3					5.1							16.7		
Standard Deviation			1.6	0.5					4.4							10.3		

IND=Indeterminate

"-" Replicate image not analyzed

Table 3-1b. Summary of Sediment Profile Image Analysis Results at the Long Island Export Cable Route Stations

Long Island Export Cable Route Station	Water Depth (m)	SPI Replicate (n)	Mean aRPD Depth (cm)	Sediment Oxygen Demand Level	Methane Presence	Successional Stage (by replicate)			PV Replicate (n)	Possible Habitat of Interest	Dominant CMECS Biotic Subclass	Dominant CMECS Co-occurring Biotic Subclasses (# of reps)	Dominant CMECS Biotic Group	Dominant CMECS Co-occurring Biotic Group	Maximum Attached Fauna Percent Cover (CMECS Percent Cover Modifier)	Burrow Presence	Tracks Presence	Fish Present ¹	Presence of Tubes ¹	Epifauna Present ¹	Invasive Taxa Present ¹	Sensitive Taxa Present ¹	Sensitive Taxa ¹	Species of Concern ¹	Habitat Type
027	30	3	IND	Low	No	2	2	2	3	No	Soft Sediment Fauna	None	Small Tube-Building Fauna	Sand Dollar Bed	None	Yes	Yes	None	Yes	Anemone(s), Hermit Crab(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
028	27	3	IND	Low	No	2	2	2	3	No	Soft Sediment Fauna	None	Larger Tube-Building Fauna	Sand Dollar Bed	None	Yes	Yes	None	Yes	Gastropod(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
029	27	3	0.5	Low	No	2	2	2 -> 3	3	No	Soft Sediment Fauna	None	Larger Tube-Building Fauna	Sand Dollar Bed	None	Yes	Yes	None	Yes	Sand Dollar(s)	No	No	None	None	Sand Sheet
030	37	3	4.0	Low	No	2	2	2	3	No	Soft Sediment Fauna	None	Small Tube-Building Fauna	Sand Dollar Bed	None	Yes	Yes	None	Yes	Gastropods, Hermit Crab(s), Ocean Quahog, Sand Dollar(s)	No	No	None	Ocean Quahog	Sand Sheet
031	36	3	IND	Low	No	IND	IND	IND	3	No	Soft Sediment Fauna	None	Sand Dollar Bed	Diverse Soft Sediment Epifauna	None	No	Yes	None	Yes	Hermit Crab(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
032	36	3	3.8	Low	No	1 -> 2	2	2	3	No	Soft Sediment Fauna	None	Sand Dollar Bed	Small Tube-Building Fauna	None	No	Yes	Skate	Yes	Sand Dollar(s)	No	No	None	None	Sand Sheet
033	34	3	IND	Low	No	IND	1 -> 2	2	3	No	Soft Sediment Fauna	None	Sand Dollar Bed	Diverse Soft Sediment Epifauna; Small Tube-Building Fauna	None	No	No	Skate	Yes	Gastropod(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
034	33	3	4.0	Low	No	IND	2	2	3	No	Soft Sediment Fauna	None	Sand Dollar Bed	Small Tube-Building Fauna	None	Yes	No	None	Yes	Ocean Quahog, Sand Dollar(s)	No	No	None	Ocean Quahog	Sand Sheet
035	34	3	IND	Low	No	2	2	2	3	No	Soft Sediment Fauna	None	Sand Dollar Bed	Diverse Soft Sediment Epifauna; Small Tube-Building Fauna	None	Yes	No	None	Yes	Caprellid, Gastropod(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
036	30	3	IND	Low	No	IND	2	2	3	No	Soft Sediment Fauna	None	Sand Dollar Bed	Diverse Soft Sediment Epifauna; Sand Dollar Bed	None	No	No	None	Yes	Crab, Gastropod(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
037	32	3	3.9	Low	No	IND	2 -> 3	2 -> 3	3	No	Soft Sediment Fauna	None	Small Surface-Burrowing Fauna	Burrowing Anemones	None	Yes	Yes	None	Yes	Anemone(s), Hermit Crab(s), Sand Dollars	No	No	None	None	Sand with Mobile Gravel
038	30	3	IND	Low	No	IND	2	2	3	No	Soft Sediment Fauna	None	Sand Dollar Bed	Diverse Soft Sediment Epifauna	None	No	Yes	None	Yes	Gastropod(s), Sand Dollar(s), Sea Stars	No	No	None	None	Sand Sheet
039	30	3	IND	Low	No	2	2	2	3	No	Soft Sediment Fauna	None	Sand Dollar Bed	Larger Tube-Building Fauna; Sand Dollar Bed	None	No	No	None	Yes	Hermit Crab, Gastropod(s), Sand Dollar(s)	No	No	None	None	Sand Sheet

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Long Island Export Cable Route Station	Water Depth (m)	SPI Replicate (n)	Mean aRPD Depth (cm)	Sediment Oxygen Demand Level	Methane Presence	Successional Stage (by replicate)			PV Replicate (n)	Possible Habitat of Interest	Dominant CMECS Biotic Subclass	Dominant CMECS Co- occurring Biotic Subclasses (# of reps)	Dominant CMECS Biotic Group	Dominant CMECS Co- occurring Biotic Group	Maximum Attached Fauna Percent Cover (CMECS Percent Cover Modifier)	Burrow Presence	Tracks Presence	Fish Present ¹	Presence of Tubes ¹	Epifauna Present ¹	Invasive Taxa Present ¹	Sensitive Taxa Present ¹	Sensitive Taxa ¹	Species of Concern ¹	Habitat Type
040	30	3	IND	Low	No	2	2	2	3	No	Soft Sediment Fauna	None	Small Surface- Burrowing Fauna	Small Tube-Building Fauna	None	Yes	No	None	Yes	Sand Dollar(s)	No	No	None	None	Sand Sheet
041	29	3	IND	Low	No	2	2	2	3	No	Soft Sediment Fauna	None	Sand Dollar Bed	Sand Dollar Bed; Small Surface- Burrowing Fauna	None	No	No	None	Yes	Sand Dollar(s)	No	No	None	None	Sand Sheet
042	29	3	2.9	Medium	No	2	2 -> 3	2 on 3	3	No	Soft Sediment Fauna	None	Small Surface- Burrowing Fauna	Tracks and Trails	None	Yes	Yes	None	Yes	Anemone(s), Caprellid(s), Gastropod(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
043	27	3	IND	Low	No	2	2	2	3	No	Soft Sediment Fauna	None	Larger Tube- Building Fauna	Sand Dollar Bed; Tracks and Trails	None	Yes	Yes	None	Yes	Gastropod(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
044	27	3	IND	Low	No	IND	2	2	3	No	Soft Sediment Fauna	None	Larger Tube- Building Fauna	Varies	None	Yes	Yes	None	Yes	Anemone(s), Crab, Hermit Crab(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
045	25	3	IND	Low	No	IND	1 -> 2	2 -> 3	3	No	Soft Sediment Fauna	None	Larger Tube- Building Fauna	Small Surface- Burrowing Fauna	None	Yes	No	None	Yes	Gastropod(s), Hermit Crab(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
046	26	3	IND	Low	No	IND	2	3	3	Yes	Soft Sediment Fauna	Attached Fauna (1)	Small Surface- Burrowing Fauna	Attached Hydroids	Sparse (1 to <30%)	No	Yes	None	No	Caprellid(s), Hydroids	No	No	None	None	Sand with Mobile Gravel
047	25	3	IND	Low	No	IND	IND	2	3	No	Soft Sediment Fauna	None	Sand Dollar Bed	Larger Tube-Building Fauna; Sand Dollar Bed	None	Yes	Yes	None	Yes	Anemone, Hydroids, Sand Dollar(s)	No	No	None	None	Sand Sheet
078	23	3	IND	Low	No	2	2	2	3	No	Soft Sediment Fauna	None	Larger Tube- Building Fauna	Burrowing Anemones; Diverse Soft Sediment Epifauna	None	No	Yes	None	Yes	Anemones, Gastropod(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
079	24	3	IND	Low	No	2	2	2	3	No	Soft Sediment Fauna	None	Small Tube- Building Fauna	Diverse Soft Sediment Epifauna	None	Yes	Yes	None	Yes	Anemone(s), Gastropod(s), Hermit Crab(s), Sand Dollars, Urchin	No	No	None	None	Sand Sheet
080	21	3	IND	Low	No	2	2	2	3	No	Soft Sediment Fauna	None	Larger Tube- Building Fauna	Mobile Crustaceans on Soft Sediments	None	Yes	Yes	None	Yes	Anemone(s), Gastropod, Hermit Crab(s), Sponge	No	No	None	None	Sand Sheet
081	25	3	2.4	Low	No	2 -> 3	2 -> 3	2 -> 3	3	No	Soft Sediment Fauna	None	Larger Tube- Building Fauna	Varies	None	Yes	Yes	None	Yes	Anemone(s), Gastropod(s), Hermit Crab(s)	No	No	None	None	Sand Sheet
082	23	3	IND	Low	No	IND	IND	2	3	No	Soft Sediment Fauna	None	Sand Dollar Bed	Larger Tube-Building Fauna; Sand Dollar Bed	None	Yes	Yes	None	Yes	Anemone, Gastropod(s), Hermit Crab(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
083	23	3	1.1	Medium	No	2 -> 3	2 -> 3	2 on 3	1	No	Soft Sediment Fauna	None	Burrowing Anemones	Small Surface- Burrowing Fauna	None	Yes	No	None	Yes	Anemone(s)	No	No	None	None	Sand Sheet

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Long Island Export Cable Route Station	Water Depth (m)	SPI Replicate (n)	Mean arPD Depth (cm)	Sediment Oxygen Demand Level	Methane Presence	Successional Stage (by replicate)			PV Replicate (n)	Possible Habitat of Interest	Dominant CMECS Biotic Subclass	Dominant CMECS Co- occurring Biotic Subclasses (# of reps)	Dominant CMECS Biotic Group	Dominant CMECS Co- occurring Biotic Group	Maximum Attached Fauna Percent Cover (CMECS Percent Cover Modifier)	Burrow Presence	Tracks Presence	Fish Present ¹	Presence of Tubes ¹	Epifauna Present ¹	Invasive Taxa Present ¹	Sensitive Taxa Present ¹	Sensitive Taxa ¹	Species of Concern ¹	Habitat Type
084	19	3	IND	Low	No	IND	IND	IND	3	No	Soft Sediment Fauna	None	Sand Dollar Bed	Burrowing Anemones; Mobile Crustaceans on Soft Sediments	None	Yes	Yes	None	Yes	Anemone(s), Hermit Crab(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
085	20	3	IND	Low	No	IND	1 -> 2	1 -> 2	3	No	Soft Sediment Fauna	None	Small Tube- Building Fauna	Diverse Soft Sediment Epifauna; Small Surface- Burrowing Fauna	None	Yes	Yes	None	Yes	Hermit Crab(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
086	16	3	IND	Low	No	2	2	2 -> 3	3	No	Soft Sediment Fauna	None	Larger Tube- Building Fauna	Diverse Soft Sediment Epifauna; Mobile Crustaceans on Soft Sediments	None	Yes	No	None	Yes	Hermit Crab(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
087	13	3	3.8	Low	No	IND	2	2	3	No	Soft Sediment Fauna	None	Larger Tube- Building Fauna	Small Tube-Building Fauna	None	Yes	Yes	None	Yes	Gastropod(s), Hermit Crab(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
088	11	3	IND	Low	No	IND	IND	IND	3	No	IND	IND	Mobile Crustaceans on Soft Sediments	IND	None	IND	IND	None	No	None	No	No	None	IND	Sand Sheet
098	18	3	3.0	Low	No	IND	2	2	3	No	Soft Sediment Fauna	None	Sand Dollar Bed	Varies	None	Yes	Yes	None	Yes	Anemone(s), Hermit Crab(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
099	18	3	4.2	Low	No	2	2	2	3	No	Soft Sediment Fauna	None	Small Tube- Building Fauna	Diverse Soft Sediment Epifauna; Mobile Crustaceans on Soft Sediments	None	Yes	No	None	Yes	Gastropod(s), Hermit Crab(s), Sand Dollar(s), Sponges	No	No	None	None	Sand with Mobile Gravel
100	15	3	2.9	Low	No	2 -> 3	2 -> 3	2 -> 3	3	No	Soft Sediment Fauna	None	Small Surface- Burrowing Fauna	Mobile Crustaceans on Soft Sediments; Small Tube-Building Fauna	None	Yes	No	None	Yes	Gastropod(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
101	15	3	3.3	Low	No	IND	2 -> 3	2 -> 3	3	No	Soft Sediment Fauna	None	Diverse Soft Sediment Epifauna	Diverse Soft Sediment Epifauna; Small Surface- Burrowing Fauna	None	Yes	No	None	Yes	Anemone(s), Gastropod(s), Hermit Crab(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
102	17	3	3.1	Low	No	IND	2	2	3	No	Soft Sediment Fauna	None	Small Tube- Building Fauna	Diverse Soft Sediment Epifauna	None	Yes	Yes	None	Yes	Hermit Crab(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
103	17	3	2.2	Low	No	2	2	2	3	No	Soft Sediment Fauna	None	Small Tube- Building Fauna	Diverse Soft Sediment Epifauna; Sand Dollar Bed	None	Yes	Yes	None	Yes	Hermit Crab(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
104	14	3	IND	Low	No	IND	2	2	3	No	Soft Sediment Fauna	None	Tracks and Trails	Diverse Soft Sediment Epifauna	None	Yes	No	None	Yes	Anemone(s), Hermit Crab(s), Sand Dollars	No	No	None	None	Sand Sheet
105	11	3	IND	Low	No	IND	IND	2	3	No	Soft Sediment Fauna	None	Mobile Crustaceans on Soft Sediments	Larger Tube-Building Fauna	None	Yes	No	None	Yes	Hermit Crab(s)	No	No	None	None	Sand Sheet

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Long Island Export Cable Route Station	Water Depth (m)	SPI Replicate (n)	Mean aRPD Depth (cm)	Sediment Oxygen Demand Level	Methane Presence	Successional Stage (by replicate)			PV Replicate (n)	Possible Habitat of Interest	Dominant CMECS Biotic Subclass	Dominant CMECS Co- occurring Biotic Subclasses (# of reps)	Dominant CMECS Biotic Group	Dominant CMECS Co- occurring Biotic Group	Maximum Attached Fauna Percent Cover (CMECS Percent Cover Modifier)	Burrow Presence	Tracks Presence	Fish Present ¹	Presence of Tubes ¹	Epifauna Present ¹	Invasive Taxa Present ¹	Sensitive Taxa Present ¹	Sensitive Taxa ¹	Species of Concern ¹	Habitat Type
106	10	3	3.2	Low	No	IND	1 -> 2	2	3	No	Soft Sediment Fauna	None	Larger Tube- Building Fauna	Mobile Crustaceans on Soft Sediments	None	No	No	None	Yes	Hermit Crab	No	No	None	None	Sand Sheet
116	14	3	3.8	Low	No	IND	1 -> 2	1 -> 2	3	No	Soft Sediment Fauna	None	Larger Tube- Building Fauna	Mobile Crustaceans on Soft Sediments; Tracks and Trails	None	Yes	Yes	None	Yes	Hermit Crab(s)	No	No	None	None	Sand Sheet
117	14	3	2.6	Low	No	IND	2	2	3	No	Soft Sediment Fauna	None	Larger Tube- Building Fauna	Diverse Soft Sediment Epifauna; Small Surface- Burrowing Fauna	None	Yes	No	None	Yes	Gastropod(s), Hermit Crab(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
118	14	3	IND	Low	No	1 -> 2	2	2	3	No	Soft Sediment Fauna	None	Small Tube- Building Fauna	Mobile Crustaceans on Soft Sediments	None	Yes	No	None	Yes	Hermit Crab(s)	No	No	None	None	Sand Sheet
119	14	3	IND	Low	No	2	2	2	3	No	Soft Sediment Fauna	None	Small Tube- Building Fauna	Mobile Crustaceans on Soft Sediments	None	Yes	No	None	Yes	Hermit Crab(s)	No	No	None	None	Sand Sheet
120	11	3	3.0	Low	No	IND	IND	2	3	No	Soft Sediment Fauna	None	Larger Tube- Building Fauna	Mobile Crustaceans on Soft Sediments	None	Yes	No	None	Yes	Hermit Crab(s)	No	No	None	None	Sand Sheet
121	8	3	5.9	Low	No	IND	2	2 -> 3	0	-	-	-	-	-	-	-	-	-	Yes	IND	IND	IND	IND	IND	-
122	13	3	2.6	Low	No	1 -> 2	1 -> 2	1 -> 2	3	No	Soft Sediment Fauna	None	Small Tube- Building Fauna	Varies	None	Yes	No	None	Yes	Hermit Crab(s)	No	No	None	None	Sand Sheet
123	14	3	3.5	Low	No	1 -> 2	1 -> 2	2	3	No	Soft Sediment Fauna	None	Small Tube- Building Fauna	Larger Tube-Building Fauna; Mobile Crustaceans on Soft Sediments	None	Yes	No	None	Yes	Hermit Crab(s)	No	No	None	None	Sand with Mobile Gravel
124	12	3	3.4	Low	No	IND	1 -> 2	2	3	No	Soft Sediment Fauna	None	Mobile Crustaceans on Soft Sediments	Mobile Crustaceans on Soft Sediments; Small Surface- Burrowing Fauna	None	Yes	No	None	Yes	Gastropod(s), Hermit Crab(s), Mollusc	No	No	None	None	Sand Sheet
125	13	3	IND	Low	No	IND	1 -> 2	2	3	No	Soft Sediment Fauna	None	Small Tube- Building Fauna	Mobile Crustaceans on Soft Sediments; Small Surface- Burrowing Fauna	None	Yes	No	None	Yes	Hermit Crab(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
126	11	3	IND	Low	No	IND	2	2 -> 3	3	No	Soft Sediment Fauna	IND	Mobile Crustaceans on Hard or Mixed Substrates	IND	None	No	No	None	No	Hermit Crab(s), Hydroids	No	No	None	None	Sand with Mobile Gravel
127	13	3	IND	Low	No	IND	IND	IND	3	No	Soft Sediment Fauna	None	Mobile Crustaceans on Hard or Mixed Substrates	Larger Tube-Building Fauna	None	Yes	Yes	None	Yes	Gastropod(s), Hermit Crab(s)	No	No	None	None	Sand with Mobile Gravel
128	13	3	IND	High	Yes	IND	IND	3	2	No	Soft Sediment Fauna	None	Small Tube- Building Fauna	Mobile Crustaceans on Soft Sediments	None	Yes	No	None	Yes	Gastropod(s), Hermit Crab(s)	No	No	None	None	Sand Sheet

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Long Island Export Cable Route Station	Water Depth (m)		SPI Replicate (n)	Mean aRPD Depth (cm)	Sediment Oxygen Demand Level	Methane Presence	Successional Stage (by replicate)			PV Replicate (n)	Possible Habitat of Interest	Dominant CMECS Biotic Subclass	Dominant CMECS Co- occurring Biotic Subclasses (# of reps)	Dominant CMECS Biotic Group	Dominant CMECS Co- occurring Biotic Group	Maximum Attached Fauna Percent Cover (CMECS Percent Cover Modifier)	Burrow Presence	Tracks Presence	Fish Present¹	Presence of Tubes¹	Epifauna Present¹	Invasive Taxa Present¹	Sensitive Taxa Present¹	Sensitive Taxa¹	Species of Concern¹	Habitat Type
	129	12	3	0.5	Medium	No	2	2	2->3	0	-	-	-	-	-	-	-	-	-	Yes	IND	IND	IND	IND	IND	-
	130	9	3	IND	Low	No	IND	IND	IND	3	No	IND	IND	IND	IND	IND	None	IND	IND	None	No	None	No	No	None	None
n = SPI-56, PV-54																										
Max	37		5.9																							
Min	21		0.5																							
Mean	29		3.1																							
Standard Deviation			1.2																							

IND=Indeterminate

"-" Replicate image not analyzed

¹Variable determined from combined SPI and PV analysis

Table 3-2a. Summary of Plan View Image Analysis Results at the New Jersey Export Cable Route Stations

New Jersey Export Cable Route Station	Water Depth (m)	SPI Replicate (n)	Mean Prism Penetration Depth (cm)	Mean Boundary Roughness (cm)	SPI Sediment Type (by replicate)			PV Replicate (n)	Gravel Mode (mm)	Dominant CMECS Substrate Group	Dominant CMECS Substrate Subgroup	Boulder Presence	Bedforms (by replicate)			Bedform Size Measurement (cm)	Debris	Habitat Type
001	16	3	2.0	1.5	Fine sand	Fine sand	Fine sand	3	15.6	Gravelly	Gravelly Sand	No	None	None	None	-	Shell Hash	Sand with Mobile Gravel
002	20	3	5.6	1.2	Granule over sand	Granule over sand	Granule over sand	3	16.0	Gravel Mixes	Sandy Gravel	No	None	None	None	-	Shell Hash	Sand with Mobile Gravel
003	21	3	5.4	1.0	Fine sand	Fine sand	Fine sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	None	Sand Sheet
004	22	3	6.2	1.5	Fine sand	Fine sand	Fine sand over silt/clay	3	IND	Sand	Sand or Finer	No	None	None	None	-	Shell Hash	Sand Sheet
005	23	3	7.3	2.0	Granule over sand	Granule over sand	Medium sand	3	6.1	Gravelly	Gravelly Sand	No	None	None	None	-	Shell Hash	Sand with Mobile Gravel
006	21	3	6.6	1.0	Granule over sand	Granule over sand	Medium sand	3	2.1	Gravelly	Gravelly Sand	No	None	None	None	-	Shell Hash	Sand with Mobile Gravel
007	23	3	5.7	1.7	IND	IND	IND	3	IND	Sand	Sand or Finer	No	None	None	None	-	Shell Hash	Sand Sheet
008	26	3	6.3	1.2	Medium sand	Medium sand	Medium sand	3	2.0	Gravelly	Gravelly Sand	No	None	None	None	-	Shell Hash	Sand with Mobile Gravel
009	29	3	6.7	1.3	Granule over sand	Granule over sand	Granule over sand	3	16.1	Gravel Mixes	Sandy Gravel	No	None	None	None	-	Shell Hash	Sand with Mobile Gravel
010	35	3	6.4	1.9	Fine sand over silt/clay	Fine sand over silt/clay	Fine sand over silt/clay	3	14.1	Gravelly	Gravelly Muddy Sand	Yes	None	None	None	-	Shell Hash	Patchy Cobbles & Boulders on Sand
011	68	3	19.8	1.0	Silt/clay	Silt/clay	Silt/clay	3	IND	Sand	Sand or Finer	No	None	None	None	-	None	Sand Sheet

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New Jersey Export Cable Route Station	Water Depth (m)	SPI Replicate (n)	Mean Prism Penetration Depth (cm)	Mean Boundary Roughness (cm)	SPI Sediment Type (by replicate)			PV Replicate (n)	Gravel Mode (mm)	Dominant CMECS Substrate Group	Dominant CMECS Substrate Subgroup	Boulder Presence	Bedforms (by replicate)			Bedform Size Measurement (cm)	Debris	Habitat Type
012	39	3	9.1	2.4	Very fine sand	Very fine sand	Very fine sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	None	Sand Sheet
013	34	3	6.9	2.4	Medium sand	Medium sand	Medium sand	3	IND	Sand	Sand or Finer	No	Ripples	Ripples	Ripples	44.4	Shell Hash	Sand Sheet
014	36	3	6.5	2.3	Medium sand	Medium sand	Medium sand over finer sediment	3	IND	Sand	Sand or Finer	No	None	Ripples	Ripples	25.2	Shell Hash	Sand Sheet
015	33	3	6.4	2.4	Very fine sand	Very fine sand	Very fine sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	None	Sand Sheet
016	29	3	4.3	0.9	Very fine sand	Very fine sand	Very fine sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	None	Sand Sheet
017	28	3	5.4	0.7	Very fine sand	Very fine sand	Very fine sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	None	Sand Sheet
018	27	3	4.9	0.7	Very fine sand	Very fine sand	Very fine sand	3	IND	Sand	Sand or Finer	No	None	None	Ripples	23.2	Shell Hash	Sand Sheet
019	30	3	8.7	1.1	Very fine sand	Very fine sand	Very fine sand over finer sediment	3	IND	Sand	Sand or Finer	No	None	None	None	-	None	Sand Sheet
020	28	3	3.9	2.1	Very fine sand over finer sediment	Very fine sand over finer sediment	Very fine sand over finer sediment	3	IND	Sand	Sand or Finer	No	None	None	None	-	None	Sand Sheet
021	30	3	5.3	0.9	Medium sand	Medium sand	Medium sand	3	IND	Sand	Sand or Finer	No	Ripples	Ripples	Ripples	48.9	Shell Hash	Sand Sheet
022	29	3	4.7	3.2	Fine sand	Fine sand	Fine sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	Shell Hash	Sand Sheet
023	28	3	5.4	1.6	Medium sand	Medium sand	Medium sand	3	IND	Sand	Sand or Finer	No	Uneven Ripples	Uneven Ripples	Uneven Ripples	IND	Shell Hash	Sand Sheet
024	30	3	5.1	1.0	Medium sand	Medium sand	Medium sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	Shell Hash	Sand Sheet
025	31	3	5.3	0.9	Medium sand	Medium sand	Medium sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	Shell Hash	Sand Sheet
026	30	3	4.8	1.1	Fine sand	Fine sand	Fine sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	None	Sand Sheet
141	29	3	6.6	1.5	Very fine sand	Very fine sand	Very fine sand	1	IND	Sand	Sand or Finer	No	None	-	-	-	None	Sand Sheet
142	29	3	4.6	1.2	Very fine sand	Very fine sand	Very fine sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	None	Sand Sheet

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New Jersey Export Cable Route Station	Water Depth (m)	SPI Replicate (n)	Mean Prism Penetration Depth (cm)	Mean Boundary Roughness (cm)	SPI Sediment Type (by replicate)			PV Replicate (n)	Gravel Mode (mm)	Dominant CMECS Substrate Group	Dominant CMECS Substrate Subgroup	Boulder Presence	Bedforms (by replicate)			Bedform Size Measurement (cm)	Debris	Habitat Type
143	28	3	4.3	0.6	Very fine sand	Very fine sand	Very fine sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	None	Sand Sheet
144	29	3	4.2	0.7	Very fine sand	Very fine sand	Very fine sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	None	Sand Sheet
145	30	3	5.5	0.6	Very fine sand	Very fine sand	Very fine sand	2	IND	Sand	Sand or Finer	No	None	None	-	-	None	Sand Sheet
146	30	3	4.3	0.6	Very fine sand	Very fine sand	Very fine sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	None	Sand Sheet
147	31	3	4.6	1.3	Fine sand	Fine sand	Fine sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	Shell Hash	Sand Sheet
148	35	3	5.2	1.4	Fine sand	Fine sand	Fine sand	3	IND	Sand	Sand or Finer	No	None	Ripples	Ripples	39.1	Shell Hash	Sand Sheet
149	34	3	6.0	0.9	Fine sand	Fine sand	Fine sand	2	IND	Sand	Sand or Finer	No	None	None	-	-	Shell Hash	Sand Sheet
150	34	3	5.4	0.6	Fine sand	Fine sand	Fine sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	Shell Hash	Sand Sheet
151	34	3	4.8	0.9	Fine sand	Medium sand	Medium sand	3	IND	Sand	Sand or Finer	No	Ripples	Ripples	Ripples	31.8	Shell Hash	Sand Sheet
152	34	3	5.6	1.1	Medium sand	Medium sand	Medium sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	Shell Hash	Sand Sheet
153	36	3	5.6	1.4	Fine sand	Fine sand	Medium sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	Shell Hash	Sand Sheet
154	37	3	5.6	1.9	Fine sand	Fine sand	Fine sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	Shell Hash	Sand Sheet
155	37	3	5.8	1.1	Fine sand	Fine sand	Fine sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	Shell Hash	Sand Sheet
156	36	3	5.2	0.9	Fine sand	Fine sand	Fine sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	Shell Hash	Sand Sheet
157	37	3	6.2	1.2	Medium sand	Medium sand	Medium sand	3	IND	Sand	Sand or Finer	No	None	Ripples	Ripples	30.9	Shell Hash	Sand Sheet
n = 43																		
Max	68		19.8	3.2					16.1							48.9		
Min	16		2.0	0.6					2.0							23.2		
Mean	31		5.9	1.3					10.3							34.8		
Standard Deviation			2.5	0.6					6.6							9.7		

IND=Indeterminate

"-" Replicate image not analyzed

Table 3-2b. Summary of Sediment Profile Image Analysis Results at the New Jersey Export Cable Route Stations

New Jersey Export Cable Route Station	Water Depth (m)	SPI Replicate (n)	Mean aRPD Depth (cm)	Sediment Oxygen Demand Level	Methane Presence	Successional Stage (by replicate)			PV Replicate (n)	Possible Habitat of Interest	Dominant CMECS Biotic Subclass	Dominant CMECS Co-occurring Biotic Subclasses (# of reps)	Dominant CMECS Biotic Group	Dominant CMECS Co-occurring Biotic Group	Maximum Attached Fauna Percent Cover (CMECS Percent Cover Modifier)	Burrow Presence	Tracks Presence	Fish Present ¹	Presence of Tubes ¹	Epifauna Present ¹	Invasive Taxa Present ¹	Sensitive Taxa Present ¹	Sensitive Taxa ¹	Species of Concern ¹	Habitat Type
001	16	3	IND	Low	No	IND	IND	2	3	No	Soft Sediment Fauna	None	Larger Tube-Building Fauna	Small Tube-Building Fauna	None	No	No	None	Yes	Crab	No	No	None	None	Sand with Mobile Gravel
002	20	3	IND	Low	No	IND	2	2	3	No	Soft Sediment Fauna	None	Mobile Crustaceans on Hard or Mixed Substrates	Burrowing Anemones	None	No	No	Sea Robin	Yes	Anemone(s), Hermit Crab(s)	No	No	None	None	Sand with Mobile Gravel
003	21	3	IND	Low	No	2	2	2	3	No	Soft Sediment Fauna	IND	Small Tube-Building Fauna	Burrowing Anemones	None	No	Yes	None	Yes	Anemone(s), Gastropod(s)	No	No	None	None	Sand Sheet
004	22	3	IND	Low	No	2	2	2	3	No	Soft Sediment Fauna	Inferred Fauna (1)	Small Tube-Building Fauna	Burrowing Anemones	None	No	Yes	None	Yes	Anemone, Gastropod(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
005	23	3	IND	Low	No	IND	IND	IND	3	No	Soft Sediment Fauna	None	Mobile Crustaceans on Hard or Mixed Substrates	Sand Dollar Bed	None	No	No	Sea Robin	No	Crabs, Hermit Crab(s), Sand Dollar(s), Scallop	No	No	None	Sea Scallop	Sand with Mobile Gravel
006	21	3	IND	Low	No	IND	IND	2	3	No	Soft Sediment Fauna	None	Mobile Crustaceans on Hard or Mixed Substrates	Burrowing Anemones	None	No	No	None	Yes	Anemone(s), Gastropod(s), Hermit Crab(s)	No	No	None	None	Sand with Mobile Gravel
007	23	3	IND	IND	No	IND	IND	IND	3	No	Soft Sediment Fauna	None	Sand Dollar Bed	Sand Dollar Bed; Small Tube-Building Fauna	None	Yes	Yes	None	Yes	Gastropod(s), Hermit Crab(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
008	26	3	IND	Low	No	IND	2	2	3	No	Soft Sediment Fauna	None	Small Tube-Building Fauna	Mobile Crustaceans on Hard or Mixed Substrates; Sand Dollar Bed	None	Yes	No	None	Yes	Gastropod(s), Hermit Crab(s), Sand Dollar(s)	No	No	None	None	Sand with Mobile Gravel
009	29	3	IND	Low	No	IND	IND	IND	3	No	Soft Sediment Fauna	None	Small Surface-Burrowing Fauna	Burrowing Anemones; Egg Masses	None	No	No	None	No	Anemone(s)	No	No	None	None	Sand with Mobile Gravel
010	35	3	3.2	Low	No	2	2 on 3	2 on 3	3	Yes	Soft Sediment Fauna	Attached Fauna (2)	Small Tube-Building Fauna	Diverse Soft Sediment Epifauna	Sparse (1 to <30%)	Yes	No	None	Yes	Caprellid(s), Crab, Hermit Crab, Scallop(s), Sponge	No	No	None	Sea Scallop	Patchy Cobbles & Boulders on Sand
011	68	3	1.5	High	No	2 on 3	2 on 3	2 on 3	3	No	Soft Sediment Fauna	None	Small Tube-Building Fauna	Small Surface-Burrowing Fauna	None	Yes	Yes	None	Yes	Anemone(s)	No	No	None	None	Sand Sheet

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New Jersey Export Cable Route Station	Water Depth (m)	SPI Replicate (n)	Mean aRPD Depth (cm)	Sediment Oxygen Demand Level	Methane Presence	Successional Stage (by replicate)			PV Replicate (n)	Possible Habitat of Interest	Dominant CMECS Biotic Subclass	Dominant CMECS Co-occurring Biotic Subclasses (# of reps)	Dominant CMECS Biotic Group	Dominant CMECS Co-occurring Biotic Group	Maximum Attached Fauna Percent Cover (CMECS Percent Cover Modifier)	Burrow Presence	Tracks Presence	Fish Present ¹	Presence of Tubes ¹	Epifauna Present ¹	Invasive Taxa Present ¹	Sensitive Taxa Present ¹	Sensitive Taxa ¹	Species of Concern ¹	Habitat Type
012	39	3	3.5	Low	No	2	2 on 3	2 on 3	3	No	Soft Sediment Fauna	None	Small Tube-Building Fauna	Small Surface-Burrowing Fauna	None	Yes	No	None	Yes	Crab, Penaeid Shrimp	No	No	None	None	Sand Sheet
013	34	3	IND	Low	No	2	2	2	3	No	Soft Sediment Fauna	None	Small Tube-Building Fauna	Varies	None	No	No	None	Yes	Anemone, Caprellid(s), Gastropod, Crab, Urchin	No	No	None	None	Sand Sheet
014	36	3	3.7	Low	No	2	2	2	3	No	Soft Sediment Fauna	None	Small Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	No	None	Yes	None	No	No	None	None	Sand Sheet
015	33	3	3.5	Low	No	2	2	2	3	No	Soft Sediment Fauna	None	Small Tube-Building Fauna	Varies	None	Yes	Yes	None	Yes	Caprellid(s), Crab, Gastropod(s)	No	No	None	None	Sand Sheet
016	29	3	3.6	Low	No	2	2	2 on 3	3	No	Soft Sediment Fauna	None	Sand Dollar Bed	Small Tube-Building Fauna	None	Yes	No	None	Yes	Gastropod(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
017	28	3	4.5	Low	No	2	2	2 on 3	3	No	Soft Sediment Fauna	None	Small Tube-Building Fauna	Diverse Soft Sediment Epifauna; Sand Dollar Bed	None	Yes	Yes	None	Yes	Gastropod(s), Hermit Crab(s), Sand Dollar(s), Sea Star	No	No	None	None	Sand Sheet
018	27	3	2.5	Low	No	2	2	2	3	No	Soft Sediment Fauna	None	Small Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	Yes	Yes	Unknown	Yes	Crab, Gastropod(s), Hermit Crab(s), Sand Dollar(s), Sea Star	No	No	None	None	Sand Sheet
019	30	3	4.8	Low	No	2	2	2	3	No	Soft Sediment Fauna	None	Small Tube-Building Fauna	Small Surface-Burrowing Fauna	None	Yes	No	None	Yes	Crab, Gastropod(s)	No	No	None	None	Sand Sheet
020	28	3	3.5	Low	No	2	2	2	3	No	Soft Sediment Fauna	None	Sand Dollar Bed	Larger Tube-Building Fauna	None	Yes	Yes	None	Yes	Gastropod(s), Hermit Crab(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
021	30	3	IND	Low	No	IND	IND	IND	3	No	Soft Sediment Fauna	None	Sand Dollar Bed	Diverse Soft Sediment Epifauna	None	No	No	None	Yes	Hermit Crab(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
022	29	3	3.8	Low	No	2	2	2	3	No	Soft Sediment Fauna	None	Small Tube-Building Fauna	Diverse Soft Sediment Epifauna; Small Surface-Burrowing Fauna	None	Yes	Yes	None	Yes	Gastropod(s), Hermit Crab(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
023	28	3	IND	Low	No	IND	IND	IND	3	No	Soft Sediment Fauna	None	Diverse Soft Sediment Epifauna	Larger Tube-Building Fauna; Small Tube-Building Fauna	None	Yes	Yes	None	Yes	Gastropod(s), Hermit Crab(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
024	30	3	IND	Low	No	2	2	2	3	No	Soft Sediment Fauna	None	Sand Dollar Bed	Diverse Soft Sediment Epifauna; Sand Dollar Bed	None	No	Yes	None	Yes	Gastropod(s), Hermit Crab(s), Sand Dollar(s)	No	No	None	Ocean Quahog	Sand Sheet
025	31	3	2.2	Low	No	2	2	2	3	No	Soft Sediment Fauna	IND	Sand Dollar Bed	IND	None	No	No	None	Yes	Hermit Crab, Sand Dollar(s)	No	No	None	None	Sand Sheet

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New Jersey Export Cable Route Station	Water Depth (m)	SPI Replicate (n)	Mean aRPD Depth (cm)	Sediment Oxygen Demand Level	Methane Presence	Successional Stage (by replicate)			PV Replicate (n)	Possible Habitat of Interest	Dominant CMECS Biotic Subclass	Dominant CMECS Co-occurring Biotic Subclasses (# of reps)	Dominant CMECS Biotic Group	Dominant CMECS Co-occurring Biotic Group	Maximum Attached Fauna Percent Cover (CMECS Percent Cover Modifier)	Burrow Presence	Tracks Presence	Fish Present ¹	Presence of Tubes ¹	Epifauna Present ¹	Invasive Taxa Present ¹	Sensitive Taxa Present ¹	Sensitive Taxa ¹	Species of Concern ¹	Habitat Type
026	30	3	IND	Low	No	IND	2	2	3	No	Soft Sediment Fauna	None	Small Tube-Building Fauna	Sand Dollar Bed	None	Yes	Yes	None	Yes	Sand Dollar(s)	No	No	None	None	Sand Sheet
141	29	3	3.6	Low	No	2	2	2	1	No	Soft Sediment Fauna	None	Sand Dollar Bed	Larger Deep-Burrowing Fauna	None	Yes	No	None	Yes	Gastropod(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
142	29	3	3.3	Low	No	2	2	2	3	No	Soft Sediment Fauna	None	Small Tube-Building Fauna	Diverse Soft Sediment Epifauna; Larger Deep-Burrowing Fauna	None	Yes	Yes	None	Yes	Gastropod(s), Sand Dollar(s), Sea Stars	No	No	None	None	Sand Sheet
143	28	3	IND	Low	No	2	2	2	3	No	Soft Sediment Fauna	None	Larger Tube-Building Fauna	Diverse Soft Sediment Epifauna; Larger Deep-Burrowing Fauna	None	Yes	Yes	None	Yes	Anemones, Caprellid(s), Gastropod(s), Hermit Crab(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
144	29	3	IND	Low	No	2	2	2	3	No	Soft Sediment Fauna	None	Larger Tube-Building Fauna	Sand Dollar Bed	None	Yes	No	None	Yes	Gastropod(s), Hermit Crab, Sand Dollar(s)	No	No	None	None	Sand Sheet
145	30	3	2.4	Low	No	2	2 -> 3	2 -> 3	2	No	Soft Sediment Fauna	None	Larger Tube-Building Fauna	Sand Dollar Bed	None	Yes	Yes	Skate	Yes	Gastropod(s), Hermit Crab(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
146	30	3	2.2	Low	No	2	2	2	3	No	Soft Sediment Fauna	None	Sand Dollar Bed	Larger Deep-Burrowing Fauna; Larger Tube-Building Fauna	None	Yes	Yes	None	Yes	Gastropod(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
147	31	3	IND	Low	No	IND	IND	IND	3	No	Soft Sediment Fauna	None	Sand Dollar Bed	Mobile Mollusks on Soft Sediments; Small Tube-Building Fauna	None	Yes	Yes	None	Yes	Gastropod(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
148	35	3	IND	Low	No	2	2	2	3	No	Soft Sediment Fauna	None	Larger Tube-Building Fauna	Small Surface-Burrowing Fauna	None	Yes	Yes	None	Yes	Gastropod(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
149	34	3	IND	Low	No	2	2	2	2	No	Soft Sediment Fauna	None	Sand Dollar Bed	Mobile Mollusks on Soft Sediments	None	Yes	No	None	Yes	Gastropod(s), Hermit Crab(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
150	34	3	3.6	Low	No	IND	1 -> 2	2	3	No	Soft Sediment Fauna	None	Sand Dollar Bed	Mobile Mollusks on Soft Sediments; Small Tube-Building Fauna	None	Yes	Yes	None	Yes	Gastropod(s), Sand Dollar(s)	No	No	None	None	Sand Sheet

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New Jersey Export Cable Route Station	Water Depth (m)	SPI Replicate (n)	Mean aRPD Depth (cm)	Sediment Oxygen Demand Level	Methane Presence	Successional Stage (by replicate)			PV Replicate (n)	Possible Habitat of Interest	Dominant CMECS Biotic Subclass	Dominant CMECS Co-occurring Biotic Subclasses (# of reps)	Dominant CMECS Biotic Group	Dominant CMECS Co-occurring Biotic Group	Maximum Attached Fauna Percent Cover (CMECS Percent Cover Modifier)	Burrow Presence	Tracks Presence	Fish Present ¹	Presence of Tubes ¹	Epifauna Present ¹	Invasive Taxa Present ¹	Sensitive Taxa Present ¹	Sensitive Taxa ¹	Species of Concern ¹	Habitat Type
151	34	3	IND	Low	No	IND	2	2 -> 3	3	No	Soft Sediment Fauna	None	Sand Dollar Bed	Larger Deep-Burrowing Fauna; Small Tube-Building Fauna	None	Yes	No	None	Yes	Gastropod(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
152	34	3	IND	Low	No	2	2	2	3	No	Soft Sediment Fauna	None	Small Surface-Burrowing Fauna	Diverse Soft Sediment Epifauna	None	Yes	Yes	None	Yes	Gastropod(s), Hermit Crab(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
153	36	3	IND	Low	No	1 -> 2	2	2	3	No	Soft Sediment Fauna	None	Small Tube-Building Fauna	Diverse Soft Sediment Epifauna; Sand Dollar Bed	None	Yes	Yes	None	Yes	Gastropod(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
154	37	3	3.9	Low	No	2	2	2	3	No	Soft Sediment Fauna	None	Small Tube-Building Fauna	Varies	None	Yes	Yes	None	Yes	Hermit Crab(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
155	37	3	3.2	Low	No	2	2	2	3	No	Soft Sediment Fauna	None	Small Tube-Building Fauna	Diverse Soft Sediment Epifauna; Larger Deep-Burrowing Fauna	None	Yes	Yes	None	Yes	Hermit Crab(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
156	36	3	3.0	Low	No	IND	2	2	3	No	Soft Sediment Fauna	None	Small Tube-Building Fauna	Diverse Soft Sediment Epifauna; Sand Dollar Bed	None	Yes	Yes	None	Yes	Gastropod(s), Sand Dollar(s), Unknown Organism	No	No	None	None	Sand Sheet
157	37	3	IND	Low	No	1 -> 2	1 -> 2	1 -> 2	3	No	Soft Sediment Fauna	None	Small Tube-Building Fauna	Varies	None	Yes	Yes	None	Yes	Anemone, Gastropod(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
n = 43																									
Max	68		4.8																						
Min	16		1.5																						
Mean	31		3.3																						
Standard Deviation			0.8																						

IND=Indeterminate

"-" Replicate image not analyzed

¹Variable determined from combined SPI and PV analysis

Table 3-3a. Summary of Plan View Image Analysis Results at the New York Harbor Export Cable Route Stations

New York Harbor Export Cable Route Station	Water Depth (m)	SPI Replicate (n)	Mean Prism Penetration Depth (cm)	Mean Boundary Roughness (cm)	SPI Sediment Type (by replicate)			PV Replicate (n)	Gravel Mode (mm)	Dominant CMECS Substrate Group	Dominant CMECS Substrate Subgroup	Boulder Presence	Bedforms (by replicate)			Bedform Size Measurement (cm)	Debris	Habitat Type
048	23	3	3.9	0.9	Medium sand	Medium sand	Medium sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	Shell Hash	Sand Sheet
049	27	3	10.4	0.9	Very fine sand	Very fine sand	Very fine sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	None	Sand Sheet
050	27	3	2.3	1.0	Fine sand	IND	IND	3	195.8	Gravel Mixes	Sandy Gravel	Yes	None	None	None	-	Shell Hash	Patchy Cobbles & Boulders on Sand
051	26	3	7.9	1.1	Granule	Pebble	Pebble over finer sediment	3	4.4	Gravel Mixes	Sandy Gravel	No	None	None	None	-	None	Sand with Mobile Gravel
052	23	3	4.8	0.7	Fine sand	Fine sand	Fine sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	None	Sand Sheet
053	22	3	4.7	1.1	Fine sand	Fine sand	Fine sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	Shell Hash	Sand Sheet
054	22	3	4.5	1.1	Coarse sand	Coarse sand	Coarse sand over finer sediment	3	1.9	Slightly Gravelly	Slightly Gravelly Sand	No	None	None	None	-	None	Sand with Mobile Gravel
055	22	3	5.7	1.2	Fine sand	Fine sand	Fine sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	Shell Hash	Sand Sheet
056	25	3	5.7	1.1	Very fine sand	Very fine sand	Very fine sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	None	Sand Sheet
057	26	3	7.3	0.8	Very fine sand	Very fine sand	Very fine sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	None	Sand Sheet
058	28	3	7.2	1.7	Very fine sand	Very fine sand	Very fine sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	None	Sand Sheet
059	29	3	9.1	1.1	Very fine sand over silt/clay	Very fine sand over silt/clay	Very fine sand over silt/clay	1	IND	Sand	Sand or Finer	No	None	-	-	-	None	Sand Sheet
060	29	3	7.2	1.7	Very fine sand	Very fine sand over silt/clay	Very fine sand over silt/clay	3	IND	Sand	Sand or Finer	No	None	None	None	-	Shell Hash	Sand Sheet
061	28	3	8.5	1.4	Very fine sand over silt/clay	Very fine sand over silt/clay	Very fine sand over silt/clay	3	IND	Sand	Sand or Finer	No	None	None	None	-	None	Sand Sheet
062	27	3	6.2	2.7	Very fine sand	Very fine sand	Very fine sand	3	IND	Sand	Sand or Finer	No	None	None	IND	-	None	Sand Sheet

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New York Harbor Export Cable Route Station	Water Depth (m)	SPI Replicate (n)	Mean Prism Penetration Depth (cm)	Mean Boundary Roughness (cm)	SPI Sediment Type (by replicate)			PV Replicate (n)	Gravel Mode (mm)	Dominant CMECS Substrate Group	Dominant CMECS Substrate Subgroup	Boulder Presence	Bedforms (by replicate)			Bedform Size Measurement (cm)	Debris	Habitat Type
063	23	3	3.7	0.7	Very fine sand	Very fine sand	Very fine sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	None	Sand Sheet
064	22	3	3.4	0.6	Very fine sand	Very fine sand	Very fine sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	None	Sand Sheet
065	23	3	4.3	0.8	Very fine sand	Very fine sand	Very fine sand	3	IND	Sand	Sand or Finer	No	None	None	IND	-	None	Sand Sheet
066	25	3	3.7	0.9	Fine sand	Fine sand	Fine sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	Shell Hash	Sand Sheet
067	23	3	5.3	0.8	Fine sand	Fine sand	Fine sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	Shell Hash	Sand Sheet
068	21	3	6.6	1.2	Pebble over finer sediment	Pebble over finer sediment	Very coarse sand over sand	3	8.6	Gravel Mixes	Sandy Gravel	No	None	None	None	-	Shell Hash	Sand with Mobile Gravel
069	21	3	5.4	0.9	Coarse sand	Very coarse sand over sand	Very coarse sand over sand	3	2.5	Slightly Gravelly	Slightly Gravelly Sand	No	None	None	Ripples	54.4	Shell Hash	Sand with Mobile Gravel
070	23	3	5.3	1.2	Fine sand	Fine sand	Fine sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	None	Sand Sheet
071	22	3	6.0	1.3	Medium sand	Medium sand	Medium sand	3	IND	Sand	Sand or Finer	No	None	None	Uneven Ripples	IND	None	Sand Sheet
072	23	3	3.4	1.4	Fine sand	Fine sand	Fine sand	3	IND	Sand	Sand or Finer	No	None	None	Uneven Ripples	IND	None	Sand Sheet
073	25	3	4.6	0.9	Very fine sand	Very fine sand	Very fine sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	None	Sand Sheet
074	26	3	5.8	0.9	Fine sand	Fine sand	Fine sand	1	IND	Sand	Sand or Finer	No	None	-	-	-	None	Sand Sheet
075	28	3	10.5	0.7	Very fine sand over silt/clay	Very fine sand over silt/clay	Very fine sand over silt/clay	3	IND	Sand	Sand or Finer	No	None	None	None	-	None	Sand Sheet
076	27	3	5.4	1.3	Fine sand	Fine sand	Fine sand over silt/clay	3	IND	Sand	Sand or Finer	No	None	None	None	-	None	Sand Sheet
077	26	3	9.1	1.1	Very fine sand over silt/clay	Very fine sand over silt/clay	Very fine sand over silt/clay	3	IND	Sand	Sand or Finer	No	None	None	None	-	None	Sand Sheet
089	24	3	6.7	1.8	Very fine sand	Very fine sand	Very fine sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	None	Sand Sheet
090	21	3	5.3	1.1	Very fine sand	Very fine sand	Very fine sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	Shell Hash	Sand Sheet
091	18	3	4.4	1.3	Fine sand	Fine sand	Fine sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	Shell Hash	Sand Sheet

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New York Harbor Export Cable Route Station	Water Depth (m)	SPI Replicate (n)	Mean Prism Penetration Depth (cm)	Mean Boundary Roughness (cm)	SPI Sediment Type (by replicate)			PV Replicate (n)	Gravel Mode (mm)	Dominant CMECS Substrate Group	Dominant CMECS Substrate Subgroup	Boulder Presence	Bedforms (by replicate)			Bedform Size Measurement (cm)	Debris	Habitat Type
092	17	3	3.5	1.1	Very fine sand	Very fine sand	Very fine sand	3	IND	Sand	Sand or Finer	No	Uneven Ripples	Uneven Ripples	Uneven Ripples	IND	Shell Hash	Sand Sheet
093	13	3	3.7	1.8	Fine sand	Fine sand	Fine sand	3	IND	Sand	Sand or Finer	No	Ripples	Ripples	Ripples	15.4	Shell Hash	Sand Sheet
094	13	3	4.5	2.3	Fine sand	Fine sand	Fine sand	3	IND	Sand	Sand or Finer	No	Uneven Ripples	Uneven Ripples	Uneven Ripples	IND	None	Sand Sheet
095	9	3	6.1	1.3	Medium sand	Medium sand	Medium sand	3	IND	Sand	Sand or Finer	No	Ripples	Ripples	Ripples	14.4	None	Sand Sheet
096	7	3	5.2	2.0	Very coarse sand over sand	Very coarse sand over sand	Very coarse sand over sand	3	2.1	Gravelly	Gravelly Sand	No	None	None	Ripples	18.0	Shell Hash	Sand with Mobile Gravel
097	10	3	5.0	2.1	Fine sand	Fine sand	Fine sand	3	IND	Sand	Sand or Finer	No	Uneven Ripples	Uneven Ripples	Uneven Ripples	IND	Shell Hash	Sand Sheet
107	16	3	7.0	1.4	Fine sand	Fine sand	Fine sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	Shell Hash	Sand Sheet
108	15	3	10.0	2.8	Silt/clay	Silt/clay	Silt/clay	3	IND	IND	IND	No	None	None	None	-	Shell Hash	IND
109	11	3	10.1	1.6	Silt/clay	Silt/clay	Silt/clay	3	IND	IND	IND	No	None	None	None	-	Shell Hash	IND
110	16	3	12.4	2.6	Silt/clay	Silt/clay	Silt/clay	3	IND	Sand	Sand or Finer	No	None	None	None	-	Shell Hash	Sand Sheet
111	26	3	8.1	0.9	Very fine sand	Very fine sand	Very fine sand over silt/clay	3	IND	Sand	Sand or Finer	No	None	None	None	-	Shell Hash	Sand Sheet
112	20	3	6.1	2.3	Very fine sand	Very fine sand	Very fine sand	3	IND	IND	IND	No	None	None	None	-	Shell Hash	IND
113	14	3	6.4	1.5	Very fine sand	Very fine sand	Very fine sand	3	IND	Sand	Sand or Finer	No	Uneven Ripples	Uneven Ripples	Uneven Ripples	IND	None	Sand Sheet
114	15	3	14.3	1.1	Very fine sand over silt/clay	Very fine sand over silt/clay	Very fine sand over silt/clay	0	-	-	-	-	-	-	-	-	-	-
115	13	3	18.9	1.1	Silt/clay	Silt/clay	Silt/clay	0	-	-	-	-	-	-	-	-	-	-
131	21	3	6.1	0.9	Granule over sand	Pebble over finer sediment	Pebble over finer sediment	3	5.1	Gravelly	Gravelly Sand	No	None	None	None	-	Shell Hash	Sand with Mobile Gravel
132	23	3	6.1	0.9	Granule over sand	Pebble over finer sediment	Pebble over finer sediment	3	8.9	Gravelly	Gravelly Sand	No	None	None	None	-	Shell Hash	Sand with Mobile Gravel

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New York Harbor Export Cable Route Station	Water Depth (m)	SPI Replicate (n)	Mean Prism Penetration Depth (cm)	Mean Boundary Roughness (cm)	SPI Sediment Type (by replicate)			PV Replicate (n)	Gravel Mode (mm)	Dominant CMECS Substrate Group	Dominant CMECS Substrate Subgroup	Boulder Presence	Bedforms (by replicate)			Bedform Size Measurement (cm)	Debris	Habitat Type
133	24	3	6.7	0.7	Granule over sand	Granule over sand	Granule over sand	3	2.9	Gravelly	Gravelly Sand	No	None	None	None	-	None	Sand with Mobile Gravel
134	24	3	8.4	0.9	Very coarse sand over sand	Very coarse sand over sand	Very coarse sand over sand	3	5.6	Gravel Mixes	Sandy Gravel	No	None	None	None	-	Shell Hash	Sand with Mobile Gravel
135	23	3	5.6	0.9	Fine sand	Fine sand	Fine sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	None	Sand Sheet
136	25	3	6.5	1.1	Medium sand	Medium sand	Pebble over finer sediment	3	4.1	Gravelly	Gravelly Sand	No	None	None	None	-	Shell Hash	Sand with Mobile Gravel
137	28	3	4.6	1.2	Medium sand	Medium sand	Medium sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	None	Sand Sheet
138	27	3	4.9	0.5	Medium sand	Medium sand	Medium sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	Shell Hash	Sand Sheet
139	27	3	4.3	0.6	Very fine sand	Very fine sand	Very fine sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	Shell Hash	Sand Sheet
140	28	3	5.9	0.7	Fine sand	Fine sand	Fine sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	None	Sand Sheet
n = SPI-58, PV-56																		
Max	29		18.9	2.8					195.8								54.4	
Min	7		2.3	0.5					1.9								14.4	
Mean	22		6.5	1.2					22.0								25.5	
Standard Deviation			2.8	0.5					57.7								19.3	

IND=Indeterminate

"-" Replicate image not analyzed

Table 3-3b. Summary of Sediment Profile Image Analysis Results at the New York Harbor Export Cable Route Stations

New York Harbor Export Cable Route Station	Water Depth (m)	SPI Replicate (n)	Mean aRPD Depth (cm)	Sediment Oxygen Demand Level	Methane Presence	Successional Stage (by replicate)			PV Replicate (n)	Possible Habitat of Interest	Dominant CMECS Biotic Subclass	Dominant CMECS Co-occurring Biotic Subclasses (# of reps)	Dominant CMECS Biotic Group	Dominant CMECS Co-occurring Biotic Group	Maximum Attached Fauna Percent Cover (CMECS Percent Cover Modifier)	Burrow Presence	Tracks Presence	Fish Present ¹	Presence of Tubes ¹	Epifauna Present ¹	Invasive Taxa Present ¹	Sensitive Taxa Present ¹	Sensitive Taxa ¹	Species of Concern ¹	Habitat Type
048	23	3	IND	Low	No	IND	IND	2	3	No	Soft Sediment Fauna	None	Larger Tube-Building Fauna	Diverse Soft Sediment Epifauna; Sand Dollar Bed	None	Yes	Yes	None	Yes	Gastropod(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
049	27	3	2.7	High	No	2 -> 3	2 -> 3	2 on 3	3	No	Soft Sediment Fauna	None	Larger Tube-Building Fauna	Small Surface-Burrowing Fauna	None	Yes	No	None	Yes	Anemone(s), Caprellid(s), Hermit Crab(s)	No	No	None	None	Sand Sheet
050	27	3	IND	Low	No	IND	IND	2	3	Yes	Attached Fauna	Soft Sediment Fauna (1)	Attached Hydroids	Attached Bryozoans; Attached Sponges	Dense (70 to < 90%)	No	No	None	Yes	Corals, Hydroids, Sea Star, Sponges	No	Yes	Non-Reef Building Hard Coral	None	Patchy Cobbles & Boulders on Sand
051	26	3	IND	Low	No	IND	IND	IND	3	No	IND	IND	Mobile Crustaceans on Hard or Mixed Substrates	Burrowing Anemones	None	No	No	None	No	Anemone(s), Hermit Crab(s)	No	No	None	None	Sand with Mobile Gravel
052	23	3	IND	Low	No	2	2	2	3	No	Soft Sediment Fauna	None	Sand Dollar Bed	Mobile Crustaceans on Soft Sediments; Sand Dollar Bed	None	Yes	Yes	None	Yes	Gastropod(s), Hermit Crab(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
053	22	3	IND	Low	No	1 -> 2	1 -> 2	2	3	No	Soft Sediment Fauna	None	Sand Dollar Bed	Diverse Soft Sediment Epifauna; Mobile Crustaceans on Soft Sediments	None	Yes	Yes	None	Yes	Gastropod(s), Hermit Crab(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
054	22	3	IND	Low	No	IND	IND	2	3	No	Soft Sediment Fauna	None	Small Tube-Building Fauna	Diverse Soft Sediment Epifauna; Small Tube-Building Fauna	None	Yes	No	None	Yes	Gastropod(s), Hermit Crab(s)	No	No	None	None	Sand with Mobile Gravel
055	22	3	3.3	Low	No	IND	2	2	3	No	Soft Sediment Fauna	None	Larger Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	No	None	Yes	Gastropod(s), Hermit Crab(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
056	25	3	1.7	Low	No	2 -> 3	2 -> 3	2 -> 3	3	No	Soft Sediment Fauna	None	Larger Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	Yes	None	Yes	Crab, Gastropod(s), Hermit Crab(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
057	26	3	2.8	Low	No	2 -> 3	2 -> 3	2 -> 3	3	No	Soft Sediment Fauna	None	Larger Tube-Building Fauna	Diverse Soft Sediment Epifauna; Small Surface-Burrowing Fauna	None	Yes	Yes	None	Yes	Caprellid(s), Gastropod(s), Hermit Crab(s), Sea Scallop	No	No	None	Sea Scallop	Sand Sheet
058	28	3	2.7	Low	No	2	2 -> 3	2 -> 3	3	No	Soft Sediment Fauna	None	Larger Tube-Building Fauna	Varies	None	Yes	Yes	None	Yes	Aphrodita, Caprellid, Gastropod(s), Hermit Crab(s), Sand Dollar(s), Sea Scallop	No	No	None	Sea Scallop	Sand Sheet
059	29	3	1.9	Low	No	2 -> 3	2 -> 3	2 on 3	1	No	Soft Sediment Fauna	None	Small Tube-Building Fauna	Small Surface-Burrowing Fauna	None	Yes	Yes	None	Yes	Anemones, Gastropod(s), Hermit Crab(s)	No	No	None	None	Sand Sheet

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New York Harbor Export Cable Route Station	Water Depth (m)	SPI Replicate (n)	Mean aRPD Depth (cm)	Sediment Oxygen Demand Level	Methane Presence	Successional Stage (by replicate)			PV Replicate (n)	Possible Habitat of Interest	Dominant CMECS Biotic Subclass	Dominant CMECS Co- occurring Biotic Subclasses (# of reps)	Dominant CMECS Biotic Group	Dominant CMECS Co- occurring Biotic Group	Maximum Attached Fauna Percent Cover (CMECS Percent Cover Modifier)	Burrow Presence	Tracks Presence	Fish Present ¹	Presence of Tubes ¹	Epifauna Present ¹	Invasive Taxa Present ¹	Sensitive Taxa Present ¹	Sensitive Taxa ¹	Species of Concern ¹	Habitat Type
060	29	3	1.3	Low	No	2 -> 3	2 -> 3	2 -> 3	3	No	Soft Sediment Fauna	None	Burrowing Anemones	Burrowing Anemones; Small Surface- Burrowing Fauna	None	Yes	Yes	None	Yes	Anemone(s), Aphrodita, Clams, Gastropod(s), Hermit Crab(s)	No	No	None	None	Sand Sheet
061	28	3	1.7	Low	No	2	2 -> 3	2 -> 3	3	No	Soft Sediment Fauna	None	Small Tube- Building Fauna	Small Surface- Burrowing Fauna	None	Yes	No	None	Yes	Anemone(s), Gastropod(s)	No	No	None	None	Sand Sheet
062	27	3	2.1	Low	No	2 -> 3	2 -> 3	2 -> 3	3	No	Soft Sediment Fauna	None	Small Tube- Building Fauna	Small Surface- Burrowing Fauna	None	Yes	No	None	Yes	Anemone(s), Gastropod(s)	No	No	None	None	Sand Sheet
063	23	3	IND	Low	No	IND	2	2	3	No	Soft Sediment Fauna	None	Diverse Soft Sediment Epifauna	Small Surface- Burrowing Fauna; Small Tube-Building Fauna	None	Yes	Yes	None	Yes	Anemone, Gastropod(s), Hermit Crab, Sand Dollar(s)	No	No	None	None	Sand Sheet
064	22	3	IND	Low	No	2	2	2	3	No	Soft Sediment Fauna	None	Sand Dollar Bed	Varies	None	Yes	Yes	None	Yes	Anemone, Gastropod(s), Hermit Crab(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
065	23	3	3.0	Low	No	2	2	2	3	No	Soft Sediment Fauna	None	Small Surface- Burrowing Fauna	Small Surface- Burrowing Fauna; Tracks and Trails	None	Yes	Yes	None	Yes	Anemones, Gastropod(s), Hermit Crab, Sand Dollars	No	No	None	None	Sand Sheet
066	25	3	IND	Low	No	IND	2	2	3	No	Soft Sediment Fauna	None	Larger Tube- Building Fauna	Sand Dollar Bed	None	Yes	No	None	Yes	Gastropod(s), Hermit Crab(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
067	23	3	IND	Low	No	IND	2	2	3	No	Soft Sediment Fauna	None	Sand Dollar Bed	Larger Tube-Building Fauna	None	Yes	No	None	Yes	Sand Dollar(s)	No	No	None	None	Sand Sheet
068	21	3	3.1	Low	No	IND	IND	IND	3	No	Soft Sediment Fauna	Attached Fauna (2)	Mobile Crustaceans on Hard or Mixed Substrates	Attached Mussels; Diverse Soft Sediment Epifauna	Sparse (1 to <30%)	No	No	None	Yes	Hermit Crab(s), Mussels, Sand Dollars	No	No	None	None	Sand with Mobile Gravel
069	21	3	IND	Low	No	IND	IND	2	3	No	Soft Sediment Fauna	None	Small Tube- Building Fauna	Mobile Crustaceans on Hard or Mixed Substrates; Small Surface-Burrowing Fauna	None	Yes	Yes	None	Yes	Gastropod(s), Hermit Crab(s), Sand Dollar(s)	No	No	None	None	Sand with Mobile Gravel
070	23	3	3.4	Low	No	1 -> 2	2	2	3	No	Soft Sediment Fauna	None	Small Tube- Building Fauna	Burrowing Anemones; Small Surface- Burrowing Fauna	None	Yes	Yes	None	Yes	Anemone(s), Gastropod(s), Hermit Crab(s)	No	No	None	None	Sand Sheet
071	22	3	3.0	Low	No	IND	2	2	3	No	Soft Sediment Fauna	None	Sand Dollar Bed	Larger Tube-Building Fauna; Small Tube- Building Fauna	None	No	Yes	None	Yes	Gastropod(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
072	23	3	IND	Low	No	2	2	2	3	No	Soft Sediment Fauna	None	Small Tube- Building Fauna	Small Surface- Burrowing Fauna; Tracks and Trails	None	Yes	Yes	None	Yes	Gastropod(s), Hermit Crab(s), Sand Dollar(s)	No	No	None	None	Sand Sheet

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New York Harbor Export Cable Route Station	Water Depth (m)	SPI Replicate (n)	Mean aRPD Depth (cm)	Sediment Oxygen Demand Level	Methane Presence	Successional Stage (by replicate)			PV Replicate (n)	Possible Habitat of Interest	Dominant CMECS Biotic Subclass	Dominant CMECS Co- occurring Biotic Subclasses (# of reps)	Dominant CMECS Biotic Group	Dominant CMECS Co- occurring Biotic Group	Maximum Attached Fauna Percent Cover (CMECS Percent Cover Modifier)	Burrow Presence	Tracks Presence	Fish Present ¹	Presence of Tubes ¹	Epifauna Present ¹	Invasive Taxa Present ¹	Sensitive Taxa Present ¹	Sensitive Taxa ¹	Species of Concern ¹	Habitat Type
073	25	3	2.0	Low	No	2	2	2	3	No	Soft Sediment Fauna	None	Small Tube- Building Fauna	Diverse Soft Sediment Epifauna; Mobile Mollusks on Soft Sediments	None	Yes	Yes	Unknown	Yes	Anemones, Gastropod(s), Hermit Crab(s)	No	No	None	None	Sand Sheet
074	26	3	IND	Low	No	2	2	2 -> 3	1	No	Soft Sediment Fauna	None	Small Tube- Building Fauna	Small Surface- Burrowing Fauna	None	Yes	No	None	Yes	None	No	No	None	None	Sand Sheet
075	28	3	1.8	Medium	No	2	2	2 -> 3	3	No	Soft Sediment Fauna	None	Small Tube- Building Fauna	Burrowing Anemones	None	Yes	Yes	None	Yes	Anemone(s), Gastropod(s), Hermit Crab(s), Unknown Organism	No	No	None	None	Sand Sheet
076	27	3	1.3	Low	No	2	2	2	3	No	Soft Sediment Fauna	None	Larger Tube- Building Fauna	Diverse Soft Sediment Epifauna	None	Yes	Yes	None	Yes	Gastropod(s), Hermit Crab(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
077	26	3	1.7	Medium	No	2	2	2 on 3	3	No	Soft Sediment Fauna	None	Burrowing Anemones	Small Tube-Building Fauna	None	Yes	Yes	None	Yes	Anemone(s), Gastropod(s)	No	No	None	None	Sand Sheet
089	24	3	1.4	Medium	No	2	2 -> 3	2 -> 3	3	No	Soft Sediment Fauna	None	Larger Tube- Building Fauna	Small Surface- Burrowing Fauna; Small Tube-Building Fauna	None	Yes	No	None	Yes	Anemone(s), Hermit Crab(s)	No	No	None	None	Sand Sheet
090	21	3	2.4	Medium	No	2	2	2 -> 3	3	No	Soft Sediment Fauna	None	Larger Tube- Building Fauna	Small Surface- Burrowing Fauna	None	Yes	No	None	Yes	Anemone(s), Gastropod(s)	No	No	None	None	Sand Sheet
091	18	3	IND	Low	No	IND	2	2	3	No	Soft Sediment Fauna	None	Larger Tube- Building Fauna	Sand Dollar Bed; Small Surface-Burrowing Fauna	None	Yes	Yes	None	Yes	Moon Snail, Sand Dollar(s), Sea Scallop	No	No	None	Sea Scallop	Sand Sheet
092	17	3	3.3	Low	No	2	2	2	3	No	Soft Sediment Fauna	None	Small Tube- Building Fauna	Mobile Mollusks on Soft Sediments	None	Yes	No	None	Yes	Anemone(s), Gastropod(s), Hermit Crab(s)	No	No	None	None	Sand Sheet
093	13	3	2.9	Low	No	IND	2	2	3	No	Soft Sediment Fauna	None	Larger Tube- Building Fauna	Small Surface- Burrowing Fauna; Small Tube-Building Fauna	None	Yes	No	None	Yes	Unknown Organism	No	No	None	None	Sand Sheet
094	13	3	IND	Low	No	IND	2	2 -> 3	3	No	Soft Sediment Fauna	None	Small Tube- Building Fauna	Varies	None	Yes	No	None	Yes	Anemone(s), Gastropod(s), Hermit Crab(s), Moon Snail, Sand Dollar	No	No	None	None	Sand Sheet
095	9	3	IND	Low	No	IND	IND	IND	3	No	Soft Sediment Fauna	Attached Fauna (3)	Attached Mussels	Attached Mussels; Tracks and Trails	Moderate (30 to < 70%)	Yes	Yes	None	Yes	Hermit Crab(s), Mussels	No	No	None	None	Sand Sheet
096	7	3	IND	Low	No	IND	IND	IND	3	No	Soft Sediment Fauna	Attached Fauna (2)	Attached Mussels	None	Trace (<1%)	Yes	No	None	Yes	Mussels	No	No	None	None	Sand with Mobile Gravel
097	10	3	IND	Low	No	IND	IND	IND	3	No	Soft Sediment Fauna	None	Tracks and Trails	Mobile Crustaceans on Soft Sediments	None	Yes	No	None	Yes	None	No	No	None	None	Sand Sheet

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New York Harbor Export Cable Route Station	Water Depth (m)	SPI Replicate (n)	Mean arPD Depth (cm)	Sediment Oxygen Demand Level	Methane Presence	Successional Stage (by replicate)			PV Replicate (n)	Possible Habitat of Interest	Dominant CMECS Biotic Subclass	Dominant CMECS Co- occurring Biotic Subclasses (# of reps)	Dominant CMECS Biotic Group	Dominant CMECS Co- occurring Biotic Group	Maximum Attached Fauna Percent Cover (CMECS Percent Cover Modifier)	Burrow Presence	Tracks Presence	Fish Present ¹	Presence of Tubes ¹	Epifauna Present ¹	Invasive Taxa Present ¹	Sensitive Taxa Present ¹	Sensitive Taxa ¹	Species of Concern ¹	Habitat Type
107	16	3	5.3	Low	No	IND	IND	IND	3	No	Attached Fauna	Soft Sediment Fauna (3)	Mussel Bed	Mobile Crustaceans on Soft Sediments	Moderate (30 to < 70%)	Yes	No	None	Yes	Hermit Crab, Mussels	No	No	None	None	Sand Sheet
108	15	3	0.3	High	No	IND	2 on 3	2 on 3	3	No	Attached Fauna	None	Mussel Bed	Attached Hydroids; Attached Sea Urchins	Sparse (1 to <30%)	IND	IND	None	Yes	Hydroids, Spider Crab(s), Sea Urchin(s)	No	No	None	None	IND
109	11	3	0.1	High	No	IND	2 on 3	2 on 3	3	No	Attached Fauna	IND	Mussel Bed	Attached Hydroids	Moderate (30 to < 70%)	IND	IND	None	Yes	Hydroids, Mussels	No	No	None	None	IND
110	16	3	0.1	High	No	2 on 3	2 on 3	2 on 3	3	No	Attached Fauna	Soft Sediment Fauna (1)	Mussel Bed	Attached Hydroids	Moderate (30 to < 70%)	Yes	No	None	Yes	Hydroids	No	No	None	None	Sand Sheet
111	26	3	2.8	Medium	No	IND	IND	IND	3	No	Soft Sediment Fauna	Attached Fauna (1)	Mobile Crustaceans on Soft Sediments	Attached Hydroids	Sparse (1 to <30%)	Yes	No	None	Yes	Hermit Crabs, Hydroids	No	No	None	None	Sand Sheet
112	20	3	IND	Low	No	2	2	2	3	No	IND	IND	IND	IND	None	IND	IND	IND	Yes	Hermit Crab	IND	None	None	IND	IND
113	14	3	2.4	Low	No	IND	2	2	3	No	IND	IND	IND	IND	None	IND	IND	IND	No	IND	IND	None	None	IND	Sand Sheet
114	15	3	1.7	High	No	2 -> 3	2 on 3	2 on 3	0	-	-	-	-	-	-	-	-	-	Yes	IND	IND	IND	IND	IND	-
115	13	3	1.9	High	No	2 on 3	2 on 3	2 on 3	0	-	-	-	-	-	-	-	-	-	Yes	IND	IND	IND	IND	IND	-
131	21	3	IND	Low	No	IND	1 -> 2	1 -> 2	3	No	Soft Sediment Fauna	None	Small Surface- Burrowing Fauna	Larger Tube-Building Fauna	None	Yes	No	Sea Robin	Yes	Gastropod(s), Hermit Crab	No	No	None	None	Sand with Mobile Gravel
132	23	3	IND	Low	No	IND	2	2	3	No	Soft Sediment Fauna	None	Small Tube- Building Fauna	Varies	None	Yes	No	Sea Robin	Yes	Barnacles	No	No	None	None	Sand with Mobile Gravel
133	24	3	IND	Low	No	IND	2	2	3	No	Soft Sediment Fauna	Attached Fauna (1)	Small Tube- Building Fauna	Diverse Soft Sediment Epifauna; Mobile Crustaceans on Hard or Mixed Substrates	Trace (<1%)	Yes	Yes	None	Yes	Anemones, Barnacles, Gastropod(s), Hermit Crab(s), Sand Dollar(s)	No	No	None	None	Sand with Mobile Gravel
134	24	3	IND	Low	No	IND	IND	IND	3	No	Soft Sediment Fauna	None	Mobile Crustaceans on Hard or Mixed Substrates	Burrowing Anemones; Mobile Crustaceans on Hard or Mixed Substrates	None	Yes	No	None	Yes	Anemone(s), Hermit Crab(s)	No	No	None	None	Sand with Mobile Gravel
135	23	3	2.8	Low	No	IND	1 -> 2	2	3	No	Soft Sediment Fauna	None	Larger Tube- Building Fauna	Sand Dollar Bed	None	Yes	Yes	None	Yes	Gastropod(s), Hermit Crab(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
136	25	3	IND	Low	No	1 -> 2	2	2	3	No	Soft Sediment Fauna	None	Burrowing Anemones	Burrowing Anemones; Mobile Crustaceans on Soft Sediments	None	Yes	No	None	Yes	Anemone(s), Gastropod(s), Hermit Crab(s)	No	No	None	None	Sand with Mobile Gravel
137	28	3	2.4	Low	No	2	2	2	3	No	Soft Sediment Fauna	None	Larger Tube- Building Fauna	Larger Tube-Building Fauna; Sand Dollar Bed	None	Yes	Yes	None	Yes	Anemone(s), Gastropod(s), Hermit Crab(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
138	27	3	IND	Low	No	IND	IND	2	3	No	Soft Sediment Fauna	None	Sand Dollar Bed	Larger Tube-Building Fauna; Small Tube- Building Fauna	None	Yes	Yes	None	Yes	Sand Dollar(s)	No	No	None	None	Sand Sheet

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New York Harbor Export Cable Route Station	Water Depth (m)	SPI Replicate (n)	Mean aRPD Depth (cm)	Sediment Oxygen Demand Level	Methane Presence	Successional Stage (by replicate)			PV Replicate (n)	Possible Habitat of Interest	Dominant CMECS Biotic Subclass	Dominant CMECS Co- occurring Biotic Subclasses (# of reps)	Dominant CMECS Biotic Group	Dominant CMECS Co- occurring Biotic Group	Maximum Attached Fauna Percent Cover (CMECS Percent Cover Modifier)	Burrow Presence	Tracks Presence	Fish Present ¹	Presence of Tubes ¹	Epifauna Present ¹	Invasive Taxa Present ¹	Sensitive Taxa Present ¹	Sensitive Taxa ¹	Species of Concern ¹	Habitat Type
139	27	3	IND	Low	No	2	2	2 -> 3	3	No	Soft Sediment Fauna	None	Sand Dollar Bed	Larger Tube-Building Fauna	None	Yes	Yes	None	Yes	Anemones, Gastropod(s), Hermit Crab(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
140	28	3	3.4	Low	No	2	2	2 -> 3	3	No	Soft Sediment Fauna	None	Sand Dollar Bed	Small Tube-Building Fauna	None	Yes	Yes	None	Yes	Anemone, Hermit Crab(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
n = SPI-58, PV-56																									
Max	29	5.3																							
Min	7	0.1																							
Mean	22	2.3																							
Standard Deviation		1.1																							

IND=Indeterminate

"-" Replicate image not analyzed

¹Variable determined from combined SPI and PV analysis

Table 3-4a. Summary of Plan View Image Analysis Results at the Reference Stations

Reference Station	Water Depth (m)	SPI Replicate (n)	Mean Prism Penetration Depth (cm)	Mean Boundary Roughness (cm)	SPI Sediment Type (by replicate)			PV Replicate (n)	Gravel Mode (mm)	Dominant CMECS Substrate Group	Dominant CMECS Substrate Subgroup	Boulder Presence	Bedforms (by replicate)			Bedform Size Measurement (cm)	Debris	Habitat Type
REFA_01	29	3	6.5	1.7	Pebble over finer sediment	Pebble over finer sediment	Pebble over finer sediment	3	10.6	Gravel Mixes	Sandy Gravel	No	None	None	None	-	Shell Hash	Sand with Mobile Gravel
REFA_02	32	3	7.1	1.9	Granule over sand	Granule over sand	Granule over sand	3	6.6	Gravel Mixes	Sandy Gravel	No	None	None	None	-	Shell Hash	Sand with Mobile Gravel
REFA_03	31	3	7.2	2.1	Pebble over finer sediment	Pebble over finer sediment	Pebble over finer sediment	3	8.7	Gravel Mixes	Sandy Gravel	No	None	None	None	-	Shell Hash	Sand with Mobile Gravel
REFA_04	30	3	8.0	1.8	Granule over sand	Pebble over finer sediment	Pebble over finer sediment	3	8.9	Gravel Mixes	Sandy Gravel	No	None	None	None	-	Shell Hash	Sand with Mobile Gravel
REFA_05	33	3	7.3	2.1	Coarse sand over finer sediment	Pebble over finer sediment	Pebble over finer sediment	3	8.3	Gravel Mixes	Sandy Gravel	No	None	None	None	-	None	Sand with Mobile Gravel
REFB_01	23	3	5.6	0.9	Medium sand over finer sediment	Medium sand over finer sediment	Medium sand over finer sediment	3	IND	Sand	Sand or Finer	No	None	None	None	-	Shell Hash	Sand Sheet
REFB_02	23	3	6.2	0.6	Medium sand over finer sediment	Medium sand over finer sediment	Medium sand over finer sediment	3	IND	Sand	Sand or Finer	No	None	None	None	-	None	Sand Sheet
REFB_03	23	3	6.1	1.8	Medium sand over finer sediment	Medium sand over finer sediment	Medium sand over finer sediment	3	IND	Sand	Sand or Finer	No	None	None	None	-	None	Sand Sheet
REFB_04	23	3	4.4	0.9	Medium sand over finer sediment	Medium sand over finer sediment	Medium sand over finer sediment	3	IND	Sand	Sand or Finer	No	None	None	Uneven Ripples	IND	Shell Hash	Sand Sheet
REFB_05	24	3	4.4	0.9	Fine sand	Fine sand	Fine sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	None	Sand Sheet
REFC_01	36	3	5.3	1.1	Medium sand	Medium sand	Medium sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	Shell Hash	Sand Sheet
REFC_02	36	3	5.8	1.4	Medium sand	Medium sand	Medium sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	Shell Hash	Sand Sheet
REFC_03	36	3	5.1	1.3	Medium sand	Medium sand	Medium sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	None	Sand Sheet

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Reference Station	Water Depth (m)	SPI Replicate (n)	Mean Prism Penetration Depth (cm)	Mean Boundary Roughness (cm)	SPI Sediment Type (by replicate)			PV Replicate (n)	Gravel Mode (mm)	Dominant CMECS Substrate Group	Dominant CMECS Substrate Subgroup	Boulder Presence	Bedforms (by replicate)			Bedform Size Measurement (cm)	Debris	Habitat Type
REFC_04	35	3	7.4	1.1	Medium sand	Medium sand	Medium sand over finer sediment	3	IND	Sand	Sand or Finer	No	None	None	None	-	None	Sand Sheet
REFC_05	35	3	6.9	2.3	Medium sand	Medium sand	Medium sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	None	Sand Sheet
n = 15																		
Max	36		8.0	2.3					10.6									
Min	23		4.4	0.6					6.6									
Mean	30		6.2	1.5					8.6									
Standard Deviation			1.1	0.5					1.5									

IND=Indeterminate

"-" Replicate image not analyzed

Table 3-4b. Summary of Sediment Profile Image Analysis Results at the Reference Stations

Reference Station	Water Depth (m)	SPI Replicate (n)	Mean aRPD Depth (cm)	Sediment Oxygen Demand Level	Methane Presence	Successional Stage (by replicate)			PV Replicate (n)	Possible Habitat of Interest	Dominant CMECS Biotic Subclass	Dominant CMECS Co-occurring Biotic Subclasses (# of reps)	Dominant CMECS Biotic Group	Dominant CMECS Co-occurring Biotic Group	Maximum Attached Fauna Percent Cover (CMECS Percent)	Burrow Presence	Tracks Presence	Fish Present ¹	Presence of Tubes ¹	Epifauna Present ¹	Invasive Taxa Present ¹	Sensitive Taxa Present ¹	Sensitive Taxa ¹	Species of Concern ¹	Habitat Type
REFA_01	29	3	IND	Low	No	IND	2	2	3	No	Soft Sediment Fauna	None	Burrowing Anemones	None	None	Yes	No	Sea Robin	Yes	Anemone(s)	No	No	None	None	Sand with Mobile Gravel
REFA_02	32	3	3.9	Low	No	2	2	2	3	No	Soft Sediment Fauna	None	Burrowing Anemones	Small Tube-Building Fauna	None	Yes	No	None	Yes	Anemone(s)	No	No	None	None	Sand with Mobile Gravel
REFA_03	31	3	3.4	Low	No	2	2	2 -> 3	3	No	Soft Sediment Fauna	None	Burrowing Anemones	Mobile Crustaceans on Hard or Mixed Substrates; Small Tube-Building Fauna	None	Yes	No	None	Yes	Anemone(s), Hermit Crab(s)	No	No	None	None	Sand with Mobile Gravel
REFA_04	30	3	5.5	Low	No	IND	2	2	3	No	Soft Sediment Fauna	None	Burrowing Anemones	Mobile Crustaceans on Hard or Mixed Substrates	None	Yes	No	None	Yes	Anemone(s), Hermit Crab(s)	No	No	None	None	Sand with Mobile Gravel
REFA_05	33	3	2.8	Low	No	2	2	2	3	No	Soft Sediment Fauna	None	Burrowing Anemones	Mobile Crustaceans on Hard or Mixed Substrates; Small Tube-Building Fauna	None	Yes	No	Flounder; Skate	Yes	Anemone(s), Hermit Crab(s)	No	No	None	None	Sand with Mobile Gravel
REFB_01	23	3	4.1	Low	No	2	2	2	3	No	Soft Sediment Fauna	None	Larger Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	Yes	Yes	None	Yes	Gastropod(s), Hermit Crab(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
REFB_02	23	3	IND	Low	No	IND	2	2	3	No	Soft Sediment Fauna	None	Larger Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	Yes	Yes	Flounder	Yes	Gastropod(s), Hermit Crab(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
REFB_03	23	3	3.5	Low	No	IND	2	2	3	No	Soft Sediment Fauna	None	Diverse Soft Sediment Epifauna	Diverse Soft Sediment Epifauna; Larger Tube-Building Fauna	None	Yes	Yes	None	Yes	Gastropod(s), Hermit Crab(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
REFB_04	23	3	IND	Low	No	IND	IND	2	3	No	Soft Sediment Fauna	None	Diverse Soft Sediment Epifauna	Larger Tube-Building Fauna; Mobile Crustaceans on Soft Sediments	None	Yes	Yes	None	Yes	Gastropod(s), Hermit Crab(s), Hydroids, Sand Dollar(s)	No	No	None	None	Sand Sheet
REFB_05	24	3	IND	Low	No	1 -> 2	1 -> 2	1 -> 2	3	No	Soft Sediment Fauna	None	Sand Dollar Bed	Varies	None	Yes	Yes	None	Yes	Gastropod(s), Hermit Crab(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
REFC_01	36	3	IND	Low	No	2	2	2	3	No	Soft Sediment Fauna	None	Larger Tube-Building Fauna	Mobile Crustaceans on Soft Sediments	None	Yes	No	None	Yes	Caprellid(s), Shrimp	No	No	None	None	Sand Sheet
REFC_02	36	3	IND	Low	No	2	2	2	3	No	Soft Sediment Fauna	None	Larger Tube-Building Fauna	Mobile Crustaceans on Soft Sediments	None	Yes	No	None	Yes	Shrimp	No	No	None	None	Sand Sheet
REFC_03	36	3	IND	Low	No	2	2	2	3	No	Soft Sediment Fauna	None	Larger Tube-Building Fauna	Varies	None	Yes	No	None	Yes	Sea Star(s)	No	No	None	None	Sand Sheet
REFC_04	35	3	4.8	Low	No	2	2	2 -> 3	3	No	Soft Sediment Fauna	None	Larger Tube-Building Fauna	Diverse Soft Sediment Epifauna; Mobile Crustaceans on Soft Sediments	None	Yes	No	None	Yes	Sea Star(s), Shrimp	No	No	None	None	Sand Sheet
REFC_05	35	3	6.8	Low	No	2	2	2 -> 3	3	No	Soft Sediment Fauna	None	Larger Tube-Building Fauna	Diverse Soft Sediment Epifauna; Mobile Crustaceans on Soft Sediments	None	Yes	No	None	Yes	Clam, Gastropod, Sea Star(s), Shrimp	No	No	None	None	Sand Sheet
n = 15																									
Max	36		6.8																						
Min	23		2.8																						
Mean	30		4.4																						

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Reference Station	Water Depth (m)	SPI Replicate (n)	Mean aRPD Depth (cm)	Sediment Oxygen Demand Level	Methane Presence	Successional Stage (by replicate)	PV Replicate (n)	Possible Habitat of Interest	Dominant CMECS Biotic Subclass	Dominant CMECS Co-occurring Biotic Subclasses (# of reps)	Dominant CMECS Biotic Group	Dominant CMECS Co-occurring Biotic Group	Maximum Attached Fauna Percent Cover (CMECS Percent	Burrow Presence	Tracks Presence	Fish Present ¹	Presence of Tubes ¹	Epifauna Present ¹	Invasive Taxa Present ¹	Sensitive Taxa Present ¹	Sensitive Taxa ¹	Species of Concern ¹	Habitat Type
Standard Deviation		1.3																					

IND=Indeterminate

"-" Replicate image not analyzed

¹Variable determined from combined SPI and PV analysis

Table 3-5. SPI Sediment Type to Grain Size (phi)

SPI Sediment Type	Grain Size Major Mode (phi)
Cobble & Cobble over sand	<-8
	<-8 / 3 to 2
Pebble	-4 to -5
	-3 to -4
	-2 to -3
Pebble over finer sediment	-4 to -5 / 0 to -1
	-3 to -4 / 0 to -1
	-3 to -4 / 1 to 0
	-3 to -4 / >4
	-2 to -3 / 1 to 0
	-2 to -3 / 3 to 2
	1 to 0 / -2 to -3*
Granule	-1 to -2
Granule over sand	-1 to -2 / 1 to 0
	-1 to -2 / 2 to 1
	-1 to -2 / 3 to 2
Very coarse sand	0 to -1
Very coarse sand over sand	0 to -1 / 1 to 0
	0 to -1 / 2 to 1
Coarse sand	1 to 0
Coarse sand over finer sediment	1 to 0 / 2 to 1
	1 to 0 / 3 to 2
	1 to 0 / >4
Medium sand	2 to 1
Medium sand over silt/clay	2 to 1 / >4
Fine sand	3 to 2
Very fine sand	4 to 3
Very fine sand over silt/clay	4 to 3/>4
Silt/clay & Silt/clay over sand	>4
	>4 / -1 to -2
	>4 / 0 to -1
	>4 / 1 to 0
	>4 / 2 to 1
	>4 / 3 to 2
	>4 / 4 to 3
Indeterminate	IND

*designation used for a near even distribution of these grain size classes throughout the sediment column

Table 3-6. Sediment Grabs Grain Size Distribution (USCS Classification)

Station	ASI #	% Coarse Gravel	% Fine Gravel	Total Gravel	% Coarse Sand	% Medium Sand	% Fine Sand	Total Sand	% Silt	% Clay	Total Fines
003	20190565	0.0	0.0	0.0	0.0	2.2	97.8	100	0.0		
006	20190566	0.1	0.5	0.6	8.5	74.3	16.6	99.4	0.0	0.0	0.0
010	20190567	0.1	38.4	38.5	17.2	23.5	15.4	56.1	1.8	3.6	5.4
011	20190568	0.0	0.0	0.0	0.0	11.9	9.0	20.9	48.1	31.0	79.1
147	20190569	0.0	0.0	0.0	0.4	35.2	64.3	99.9	0.1		
157	20190570	0.0	0.3	0.3	0.5	42.0	57.2	99.7	0.0		
020	20190571	0.0	0.0	0.0	0.1	1.1	98.7	99.9	0.1		
038	20190572	0.0	0.0	0.0	1.2	53.6	45.2	100	0.0		
060	20190573	0.0	0.6	0.6	0.2	20.6	53.5	74.3	16.2	8.9	25.1
076	20190574	0.0	0.6	0.6	0.1	36.6	48.0	84.7	7.7	7.0	14.7
091	20190575	0.0	0.0	0.0	0.8	8.7	90.3	99.8	0.2		
095	20190576	0.0	0.0	0.0	0.0	51.2	48.8	100	0.0		
100	20190577	0.2	6.5	6.7	2.2	29.3	33.5	65.0	13.5	14.8	28.3
057	20190578	0.0	0.1	0.1	0.1	39.4	47.1	86.6	8.2	5.1	13.3
133	20190579	1.3	6.3	7.6	17.0	56.9	18.5	92.4	0.0		
136	20190580	1.5	7.4	8.9	13.3	39.9	37.9	91.1	0.0	0.0	0.0

4.0 SUMMARY

The purpose of the SPI/PV survey was to provide data about surficial sediments and characterize benthic habitats along the proposed export cable routes for the Equinor Wind Offshore lease area OCS-A 0512. Results from the SPI/PV survey are intended to support spatial planning decisions, reduce uncertainty associated with baseline conditions, and inform future approaches. This SPI/PV study provides a secondary line of data for the assessment of the physical, geological, and biological conditions of the surficial sediments within the surveyed area. This study also carefully considered all BOEM regulations and guideline recommendations; SPI and PV images provide important data pertaining to several of these regulations and guidelines (Table 4-1). The data from this study was collected and interpreted in consideration of these regulations and guidelines so Equinor can provide federal regulators have the best available information for review. The SPI and PV images were useful in mapping physical, geological, and biological properties of the surface sediments and helped to document and characterize processes structuring surface sediments along the proposed cable routes and at the reference stations.

Surficial sediments were heterogenous across the surveyed area at an inter-station scale; intra-station sediment heterogeneity was largely low (most replicates were similar in sediment type), but there were a few instances of high variability. These results highlight that sediment type along the export cable routes varied at large but not small scales; this trend was true at the reference stations. Despite the spatial variations in sediment types, most of the sediment found along the cable routes and at the reference stations were varying sizes of mobile sand. There were a few distinct locations where the sediment type varied from sand: silt-clay was documented in the submarine valley (the Hudson Shelf Valley) traversing the NJECR and at the stations located near the “Narrows” along the NYHECR; granules and pebbles were observed at stations located on Cholera Bank, at stations west of the submarine valley (including at Reference A), and at some of the shallow stations near Long Island; and boulders were documented at a few stations, most notably Station 050 on Cholera Bank. The sediment types documented during the SPI/PV survey were used to ground truth USGS backscatter data. The SPI/PV data corresponded well with the backscatter data, and it is appropriate to extrapolate bottom type in the area using the SPI/PV and USGS backscatter data.

The sediment type observed across the surveyed area corresponded to the Habitat Types documented. Three broad habitat types were identified at the surveyed area, Sand Sheets, Sand with Mobile Gravel, and Patchy, Cobbles, Boulders on Sand. These Habitat Types were defined based on their physical habitat structure and mobility, as well as their dominant CMECS Biotic Subclass and CMECS Biotic Group. Sand Sheets were the overwhelming habitat observed. Habitats such as Sand with Mobile Gravel and Patchy, Cobbles, Boulders on Sand were observed in distinct locations. Sand with Mobile Gravel was documented in the shallow portions of the NJECR just west of the Hudson Shelf Valley, along Cholera Bank, and in the most western portion of the LIECR in NY state waters. Patchy, Cobbles, Boulders on Sand were documented at Station 050 situated on Cholera Bank, and along the NJECR at Station 010 in

the Hudson Shelf Valley. Cobbles and boulders can provide habitat for a diverse range of taxa and serve as valuable habitat for juvenile fauna. Similar habitat observations were made at the reference stations. Sand Sheets were the predominant habitat and exclusive to Reference B (adjacent Cholera Bank) and Reference C (just east of the Hudson Shelf Valley). Sand with Mobile Gravel was exclusively observed at Reference A just west of the Hudson Shelf Valley. There did appear to be a spatial orientation to the presence of Sand with Mobile Gravel. The transition from a seafloor habitat of Sand Sheet to one of Sand with Mobile Gravel occurred right at the Hudson Shelf Valley for both the reference stations and stations along the proposed cable routes. Stations east of the submarine valley were Sand Sheet habitat, and stations west of the submarine valley were a habitat of Sand with Mobile Gravel.

The vast majority of stations (nearly two-thirds) were characterized by medium to high load-bearing strength reflected in the relatively shallow prism penetration depths (<6 cm) observed along the proposed cable routes. There was a similar trend at the reference stations where approximately half of the reference stations were characterized by medium to high load-bearing strength. Sediment load-bearing capacity, indicated by prism penetration depth, is related to grain size, and prism penetration values correlated well with sediment composition across the surveyed area. Stations with a higher prevalence of gravel, including boulders, had the highest bearing capacities (<4 cm prism penetration) or prism penetration was refused when the camera system landed directly on large boulders (e.g., Station 050). Penetration depth range is not strictly controlled by grain size but can also be influenced by compaction/porosity, as well as infaunal bioturbation. There were no discernible trends in prism penetration and bioturbation observed at the surveyed area.

Ripples indicate frequent and persistent hydrodynamic forcing at the surface of the seafloor. Ripples of varying amplitude and wavelength were the predominant bedform across the sandy and gravelly sandy portions of the surveyed area, the predominant habitat types along the proposed cable routes. Often larger particles were oriented in the trough of the sand ripples. Smaller ripples and an absence of rippling were observed at some stations haphazardly dispersed along the proposed cable routes and in a few distinct locations: the deeper stations located in the submarine valley; the stations near the Narrows where the seafloor was “armored” with bivalves; and stations where boulders were present (Stations 010 and 050). Mean small-scale surface boundary roughness measured from SPI images followed a similar spatial pattern, with higher values coincident with larger scale ripples. In addition, thin surface layers of coarse sediment over fine sediment (e.g., pebbles over finer sediment, coarse sand over fine sand) were observed throughout the surveyed area and indicated coarse sediments that were subject to frequent hydrodynamic activity over finer base sediments. The size of any larger bedforms present in the area exceeded the field-of-view of the SPI and PV images and would need to be measured in multibeam and side-scan sonar data.

The dominant Biotic Subclass across the surveyed area was Soft Sediment Fauna. The dominance of Soft Sediment Fauna corresponded with the predominant Sediment and Habitat Types observed. Attached Fauna were present as the CMECS Biotic Subclass or Co-occurring

Biotic Subclass at 12 of the 157 stations sampled across the surveyed area. Mussels in dense Mussel Beds were the Attached fauna observed in the state waters along the NYHECR; stations with Mussel Beds accounted for more than half (7 of the 12 stations) of the observations of Attached Fauna documented. At the remaining stations, one station had trace coverage of barnacles (Station 133), and the other instances were sparse coverage of sponges, hydroids, and mussels at Stations 010, 046, and 068, respectively. Station 050 was an exception with dense cover of diverse attached fauna (corals, sponges, barnacles, hydroids). The reference stations reflected what was observed along the proposed cable routes, with Soft Sediment Fauna the predominant Biotic Subclass. There were no observations of Attached Fauna at any of the reference stations.

While dominant Biotic Subclass was somewhat homogeneous across the surveyed area, Biotic Group was much more heterogeneous. Sand dollar beds and both Small and Larger Tube-Building Fauna were the predominant Biotic Groups that were observed. Tubes at the sediment–water interface were often the result of polychaetae activity, but amphipod tubes were also observed. Many tubes were formed by the polychaetae *Diopatra cuprea*, a polychaete that regularly incorporates shell particles into its tube construction giving these tubes a distinct appearance. The variability in dominant Biotic and Co-Occurring Biotic Groups along the proposed cable routes highlights the benthic diversity of the seafloor in the surveyed area. Dominant Biotic groups at the reference areas was a bit more homogeneous. The dominant Biotic Group at Reference A and Reference C was exclusively Burrowing Anemones and Larger Tube-Building Fauna, respectively. The dominant Biotic Group at Reference B was more diverse with 3 different Biotic Groups represented (Diverse Soft Sediment Epifauna, Larger Tube-Building Fauna, Sand Dollar Bed). The reference areas were generally more homogeneous with the biotic groups observed in each area because the reference areas represented a relatively small area, whereas the proposed cable routes cover vast swaths of the NY Bight.

Sensitive taxa were only documented at one station, Station 050, where the Northern Star Coral *Astrangia* spp. was observed. *Astrangia* spp. is not a reef forming coral but enhances the value of hard substratum toward attracting other fauna when it occurs (Guida et al. 2017). This taxon is found in hard bottom habitats attached to cobbles and boulders; Station 050, where *Astrangia* spp. was observed, had a habitat of cobble and boulders. *Astrangia* spp. has a broad geographical distribution, and its low relief and non-reef building life history strategy provides a population level resiliency to disturbance. *Astrangia* spp. is also not documented to provide essential fish habitat (Dimond and Carrington 2007). Any impacts to the star coral from cable construction should be minimal, localized, and recovery should be rapid (Aronson et al. 2008). No sensitive taxa were documented at the reference stations.

Throughout the surveyed area, successional taxa were overwhelmingly designated as Stage 2, with only a few stations documented to contain some other successional designation. In many cases, the Stage 2 determination was based on the presence of *D. cuprea* tubes; specialized shell tubes. Due to the dynamic nature of these sandy environments and the very low organic

loads found in medium and coarse sands, Stage 3 head-down deposit feeders would not be expected in these habitats. In instances where more advanced successional taxa were observed, the sediment grain-size was finer which can correlate with a higher organic content to support advanced successional taxa (Pearson and Rosenberg 1978). The aRPD was not determinable at many of the stations, often because it was not optically determinable. This is a common occurrence in mobile, well-washed sands with high porewater content. In coarser sandy sediments, the oxidation depth is based more on diffusion through sand grains and less on organic inputs and bioturbation of deposit-feeding infauna. The result is that the vast majority of stations also had low sediment oxygen demand, and there were no signs of bottom water hypoxia or methanogenesis.

The results and images from this survey will provide an accurate characterization and delineation of benthic habitats and establish a baseline of both large- and small-scale biological features along the proposed cable routes and at the reference areas. The results will also allow Equinor to broadly communicate the results of the survey using seafloor images of predevelopment conditions. Contributions from this survey will provide valuable information to address the BOEM guidelines and regulations, as well as stakeholder concerns.

Table 4-1. BOEM Guidelines, SPI Survey Approaches and Results

Guideline	SPI/PV Survey Approach and/or Parameter(s)	Results
Identify and confirm benthic flora and fauna	Epifauna, Infauna, Tracks, Burrows, Flora, CMECS Biotic Subclass and Group	No living flora observed Soft Sediment Fauna dominated with patchy presence of Attached Fauna
Establish a pre-construction baseline	Epifauna, Infauna, Tracks, Burrows, Flora, CMECS Biotic Subclass and Group	Sample density along the potential Equinor Wind Export Cable Routes establishes a baseline benthic characterization
Collect data to reduce uncertainty associated with baseline estimates and to inform interpretation of survey results	Epifauna, Infauna, Tracks, Burrows, Flora, CMECS Biotic Subclass and Group	Results from the SPI/PV survey may be integrated and analyzed with regional data to reduce uncertainty in existing datasets
Identify communities of sessile and slow-moving marine invertebrates	Epifauna, Infauna, CMECS Biotic Subclass and Group	Habitat Types Lists of observed species and CMECS Biotic Groups
Identify sensitive benthic habitats	Sensitive Taxa; CMECS Substrate Group; CMECS Biotic Subclass (dominant and co-occurring)	Sensitive taxa types recorded Attached Fauna presence/coverage Habitat Types *best to integrate with G&G data for full picture
Characterize seasonal and inter-annual variability of benthic community	Sampled in Summer during biologically active period (July)	Communities seen in proposed project (nearshore sands, shelf sands and cobble) not subject to substantial inter-annual variability
Identify areas to serve as baseline reference	Sampled 5 stations in three representative reference areas	Reference areas identified and baseline assessment at reference areas conducted
Characterize and delineate hard bottom gradients and rock outcroppings	Mapped presence of boulders, Sediment type assessment.	Habitat Types Spatial assessment of features completed
Characterize surficial sediments	Sediment Types mapped	Comprehensive assessment of surficial sediments completed as part of SPI/PV survey, including presence of boulders.

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Benthic Assessment Survey of Proposed Export Cable Routes in Support of the Equinor Wind OCS-A-0512 Offshore Wind Farm Project

DATA REPORT

Survey Conducted 08-15 July 2019

FIGURES

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18 November 2019

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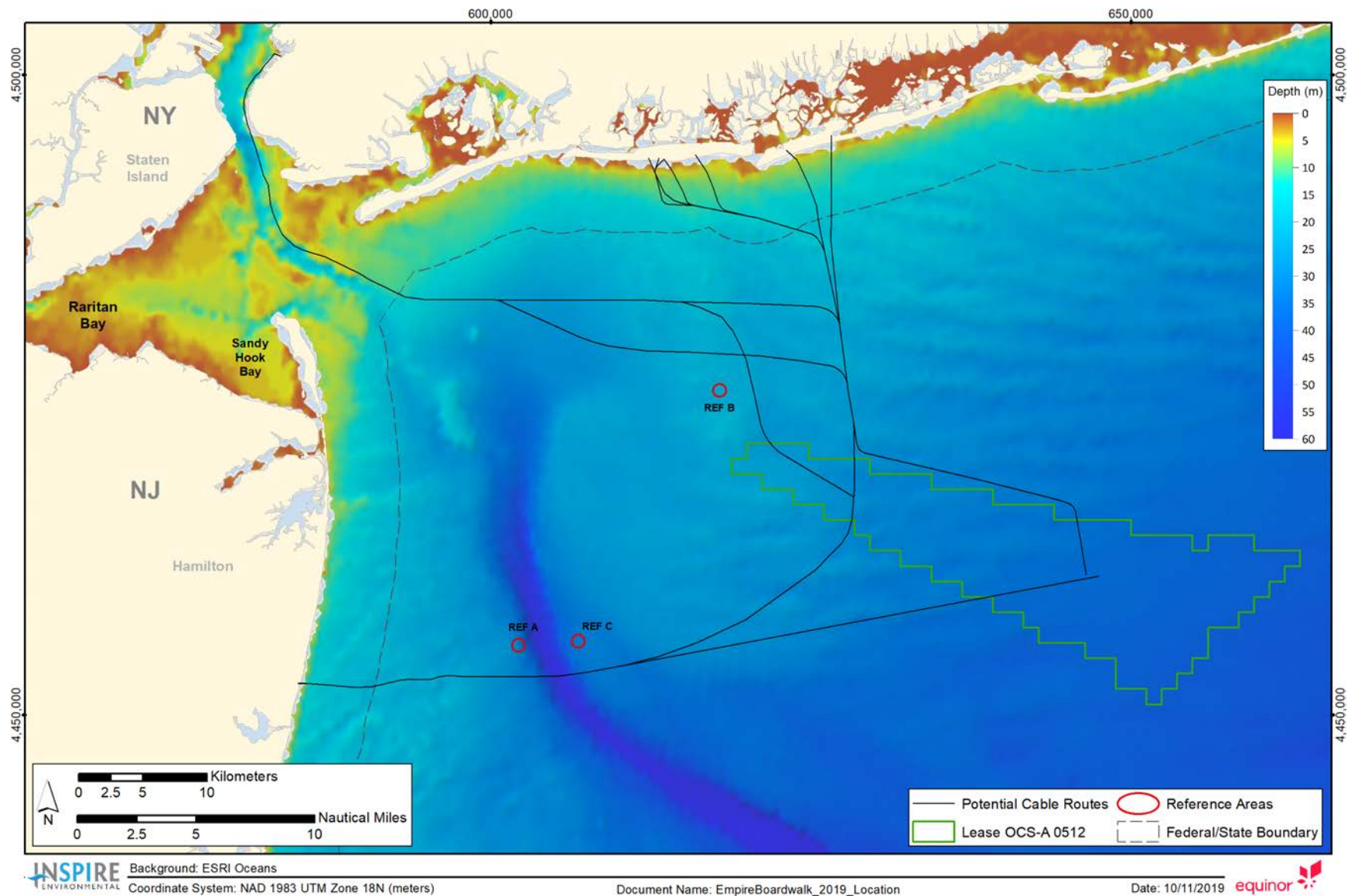


Figure 1-1. Location of the Equinor Wind export cable survey area including the lease area and proposed cable routes

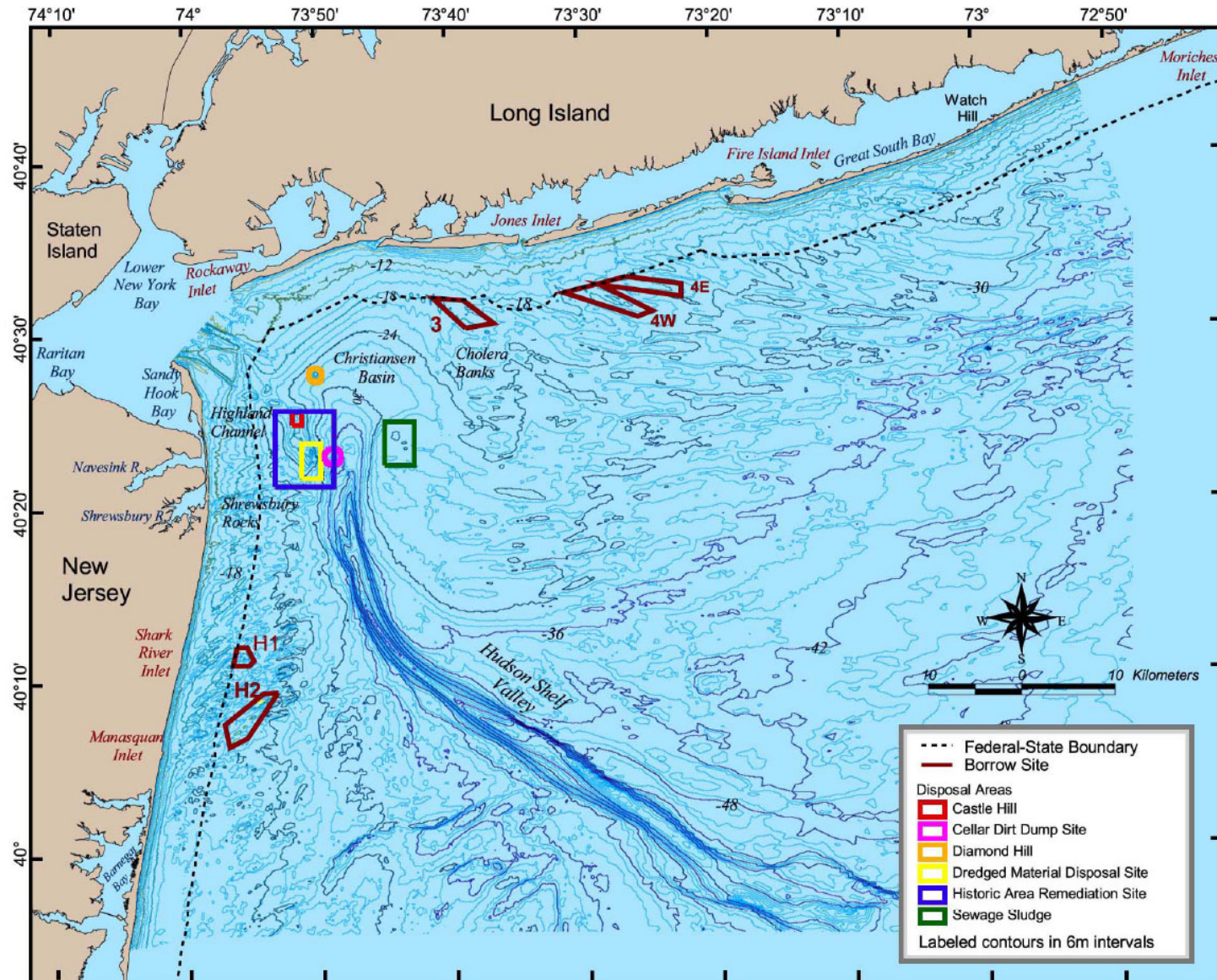


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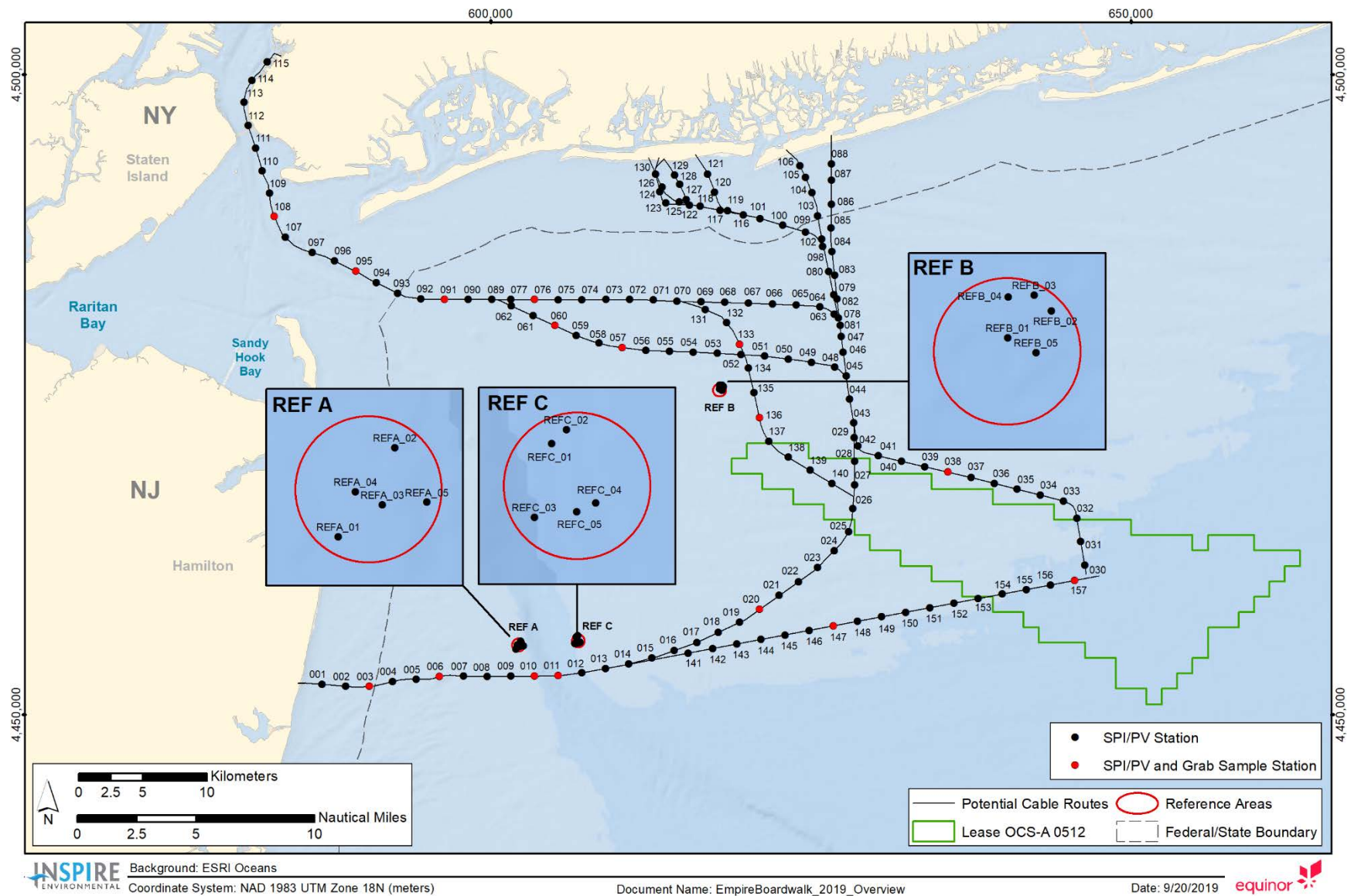


Figure 2-1. Station locations sampled for SPI, PV, and grabs along the proposed export cable routes at the Equinor Wind Offshore Wind Farm Project

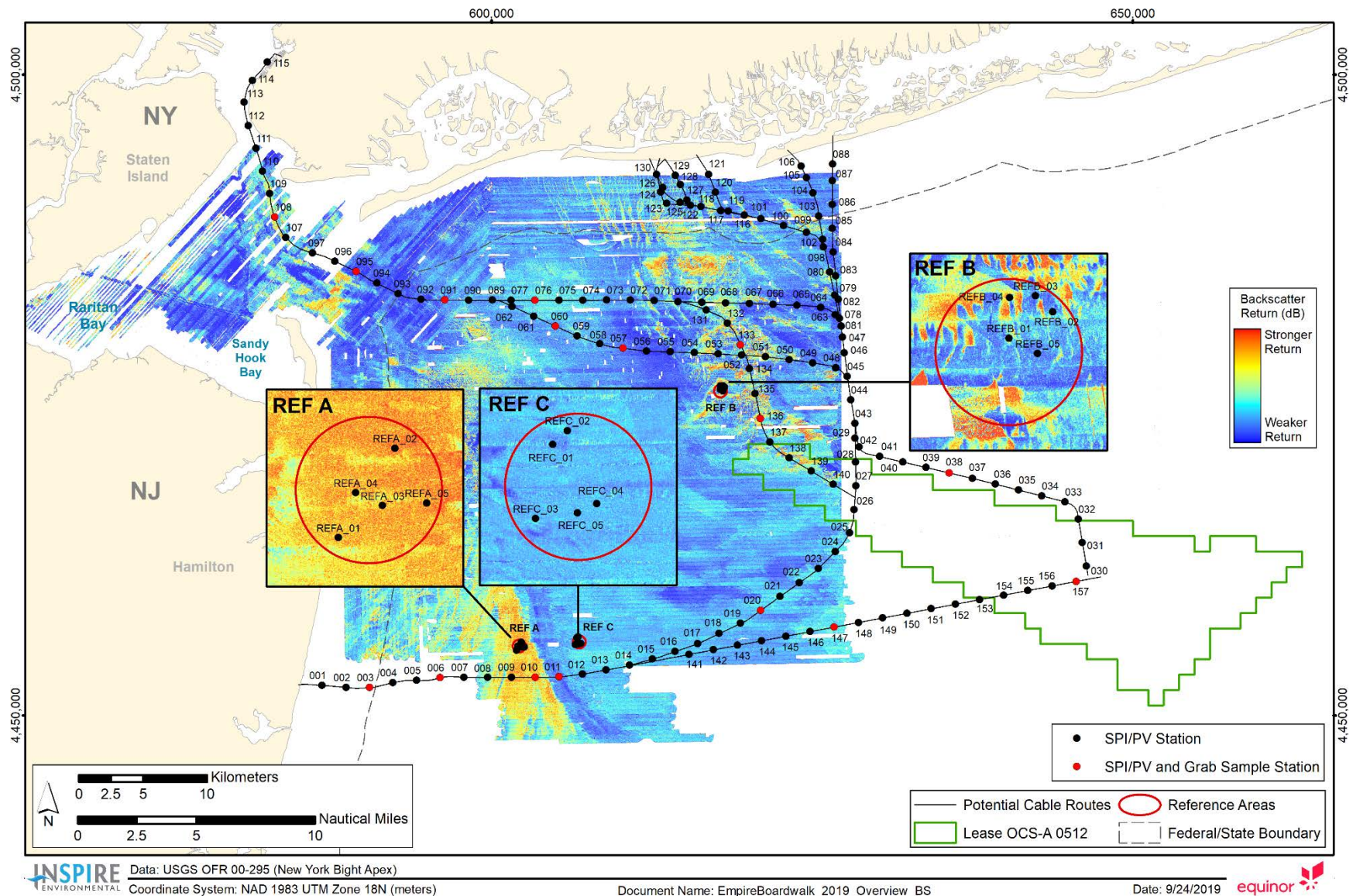


Figure 2-2. Station locations sampled for SPI, PV, and grabs over USGS Backscatter data along the proposed export cable routes at the Equinor Wind Offshore Wind Farm Project

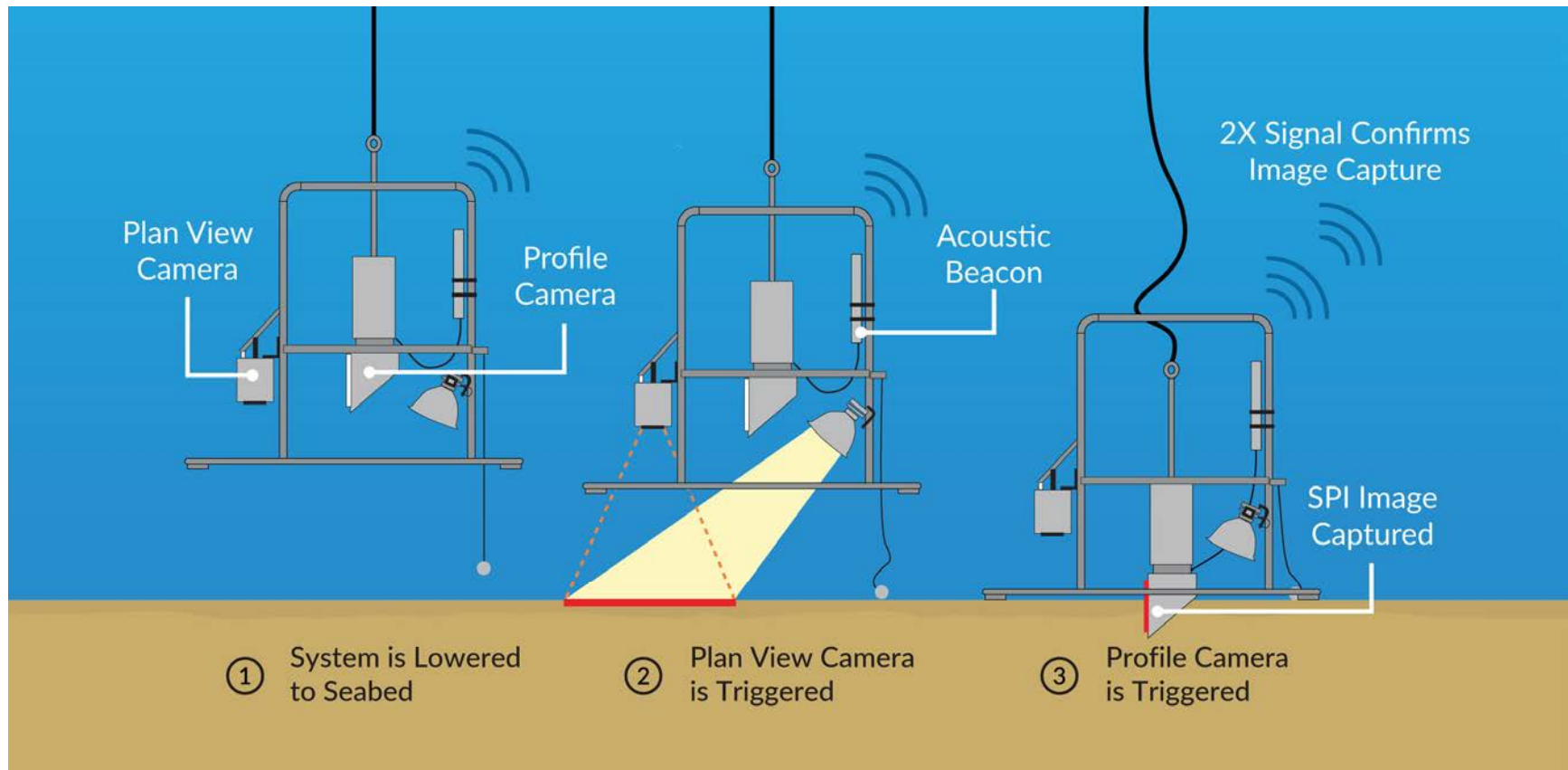


Figure 2-3. Schematic diagram of the operation of the sediment profile and plan view camera imaging system

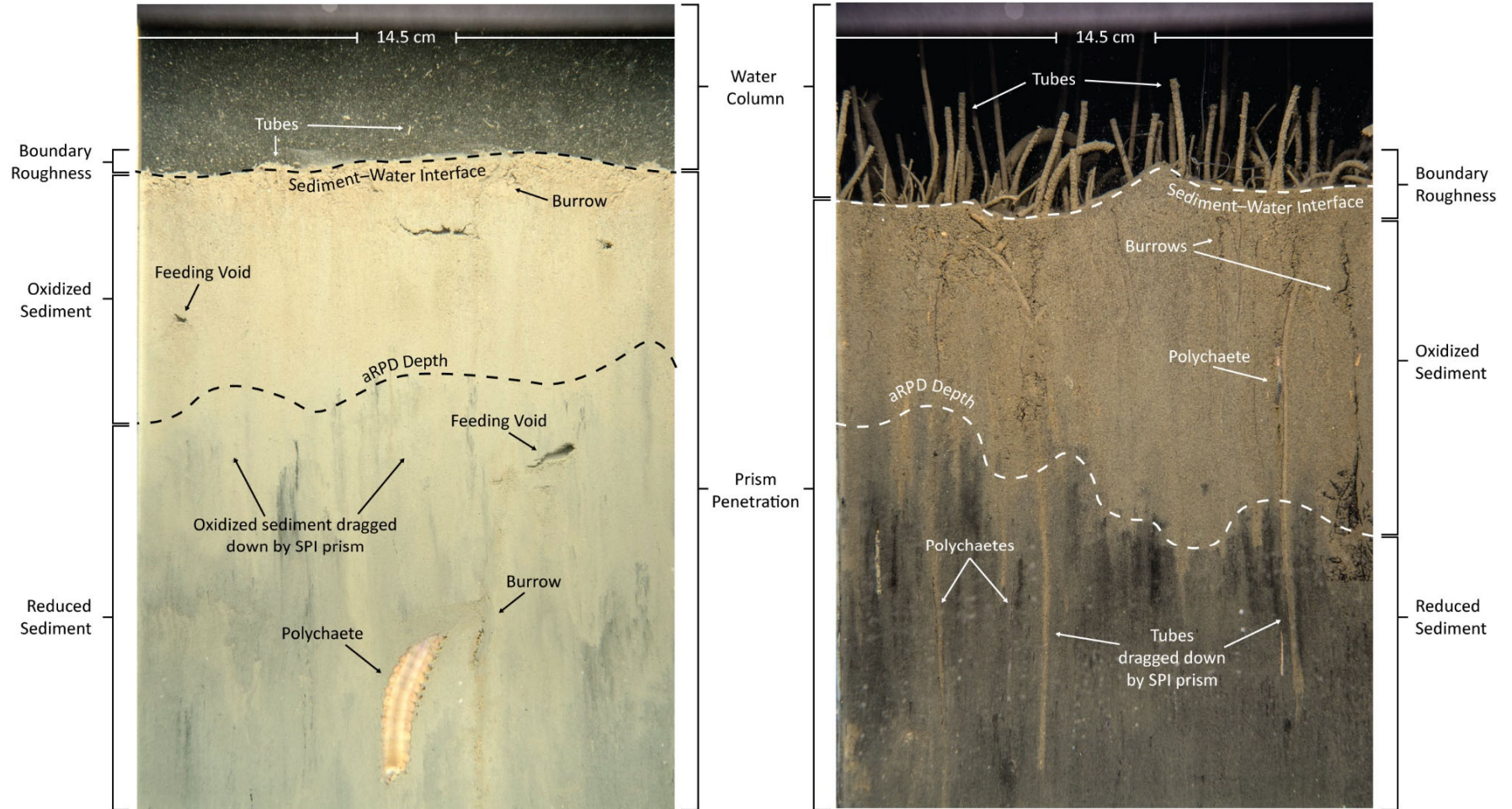


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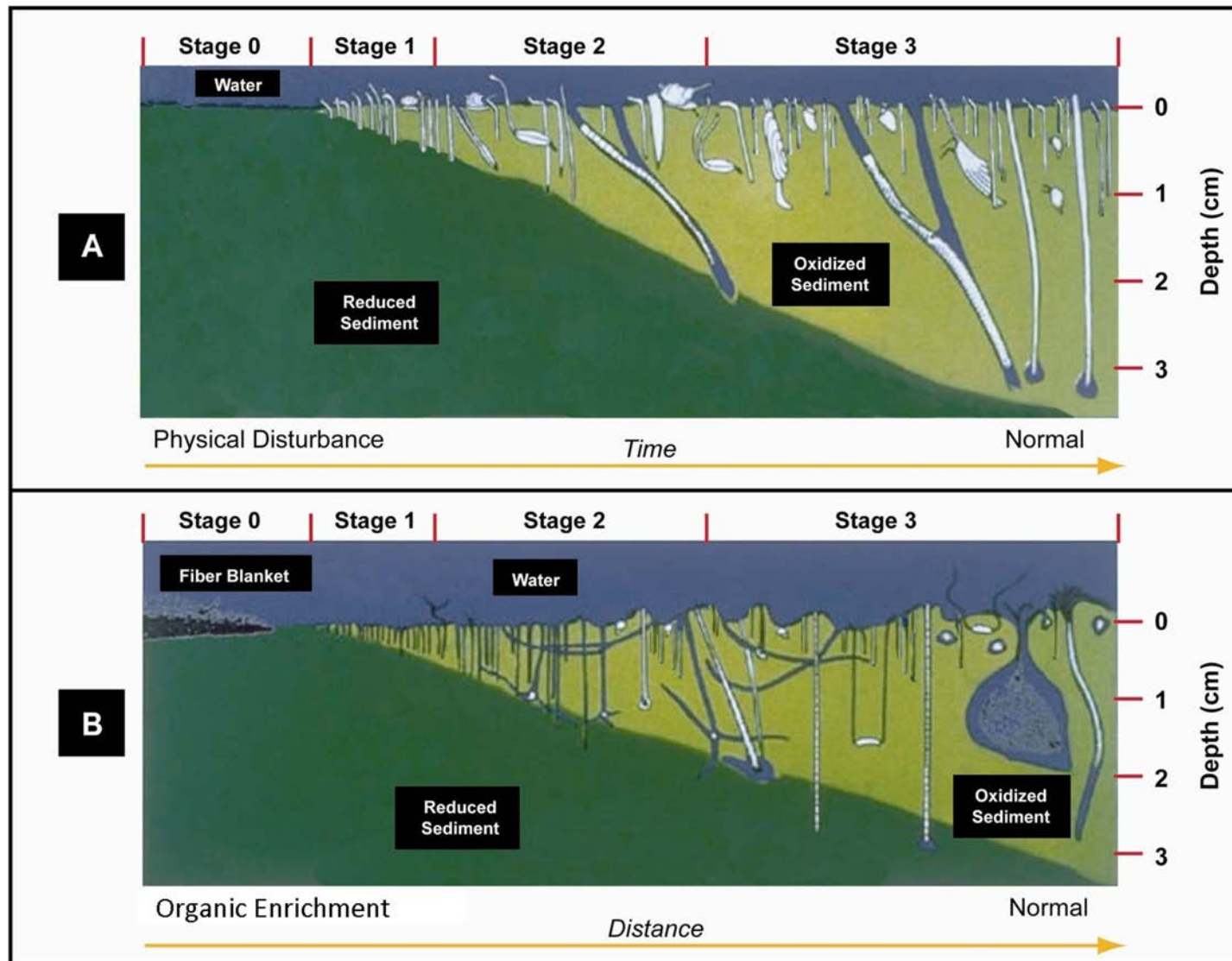


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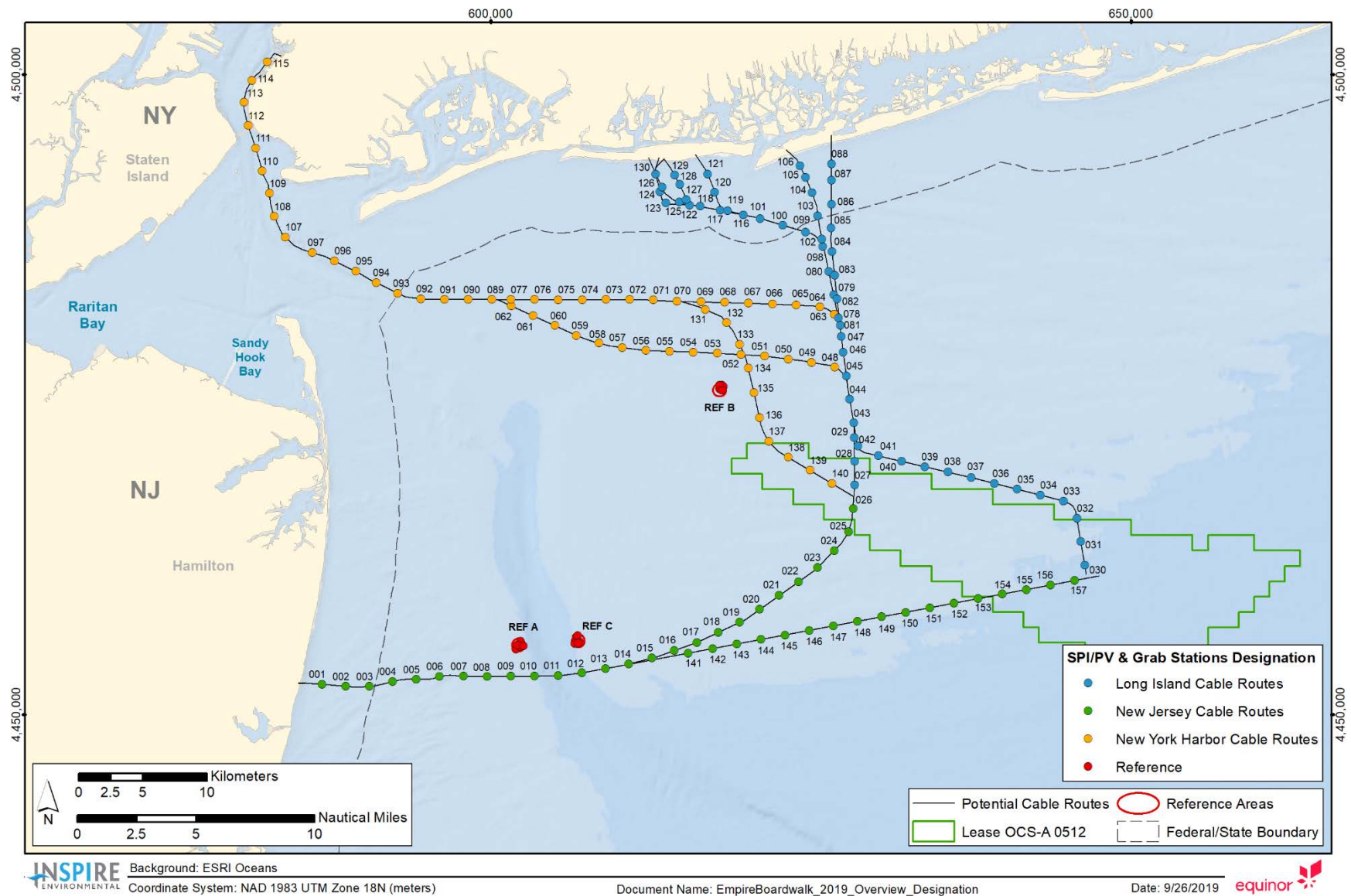


Figure 3-1. Delineation of survey area by cable route

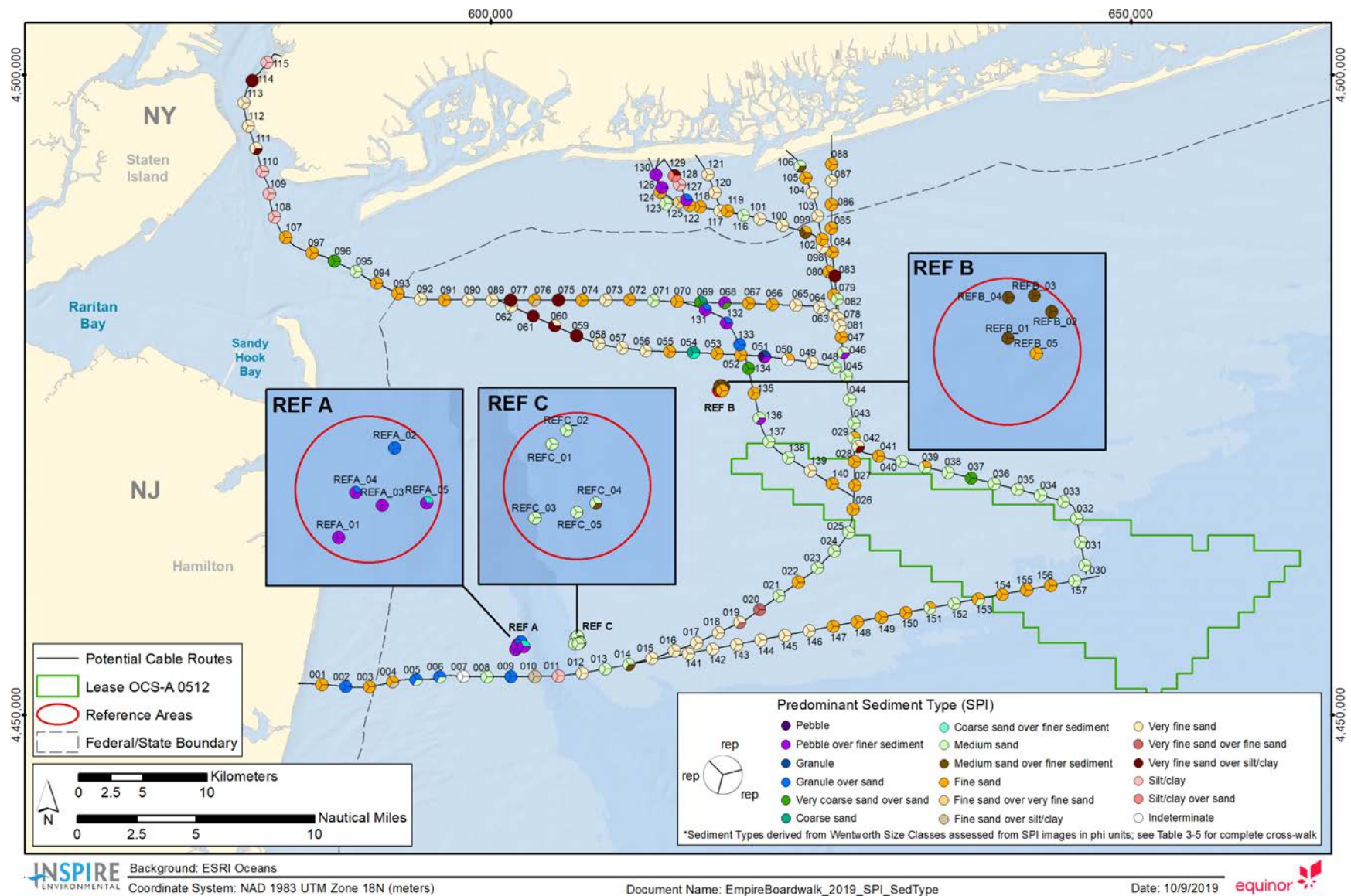


Figure 3-2. Predominant sediment types aggregated from grain size major mode (phi units) derived from SPI images across the surveyed area

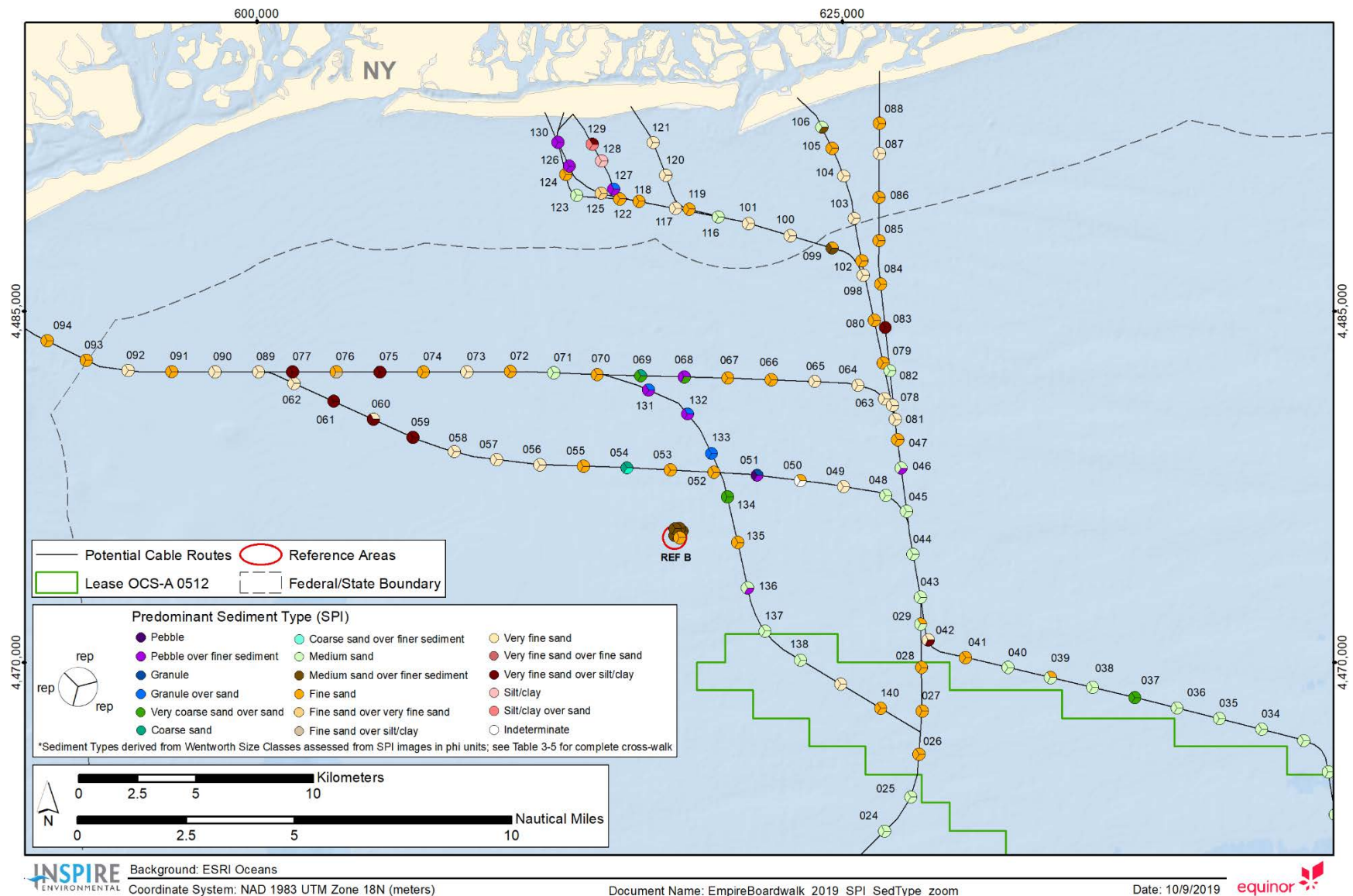


Figure 3-3. Zoom-in of the Long Island export cable route. Predominant sediment types aggregated from grain size major mode (phi units) derived from SPI images across the surveyed area.

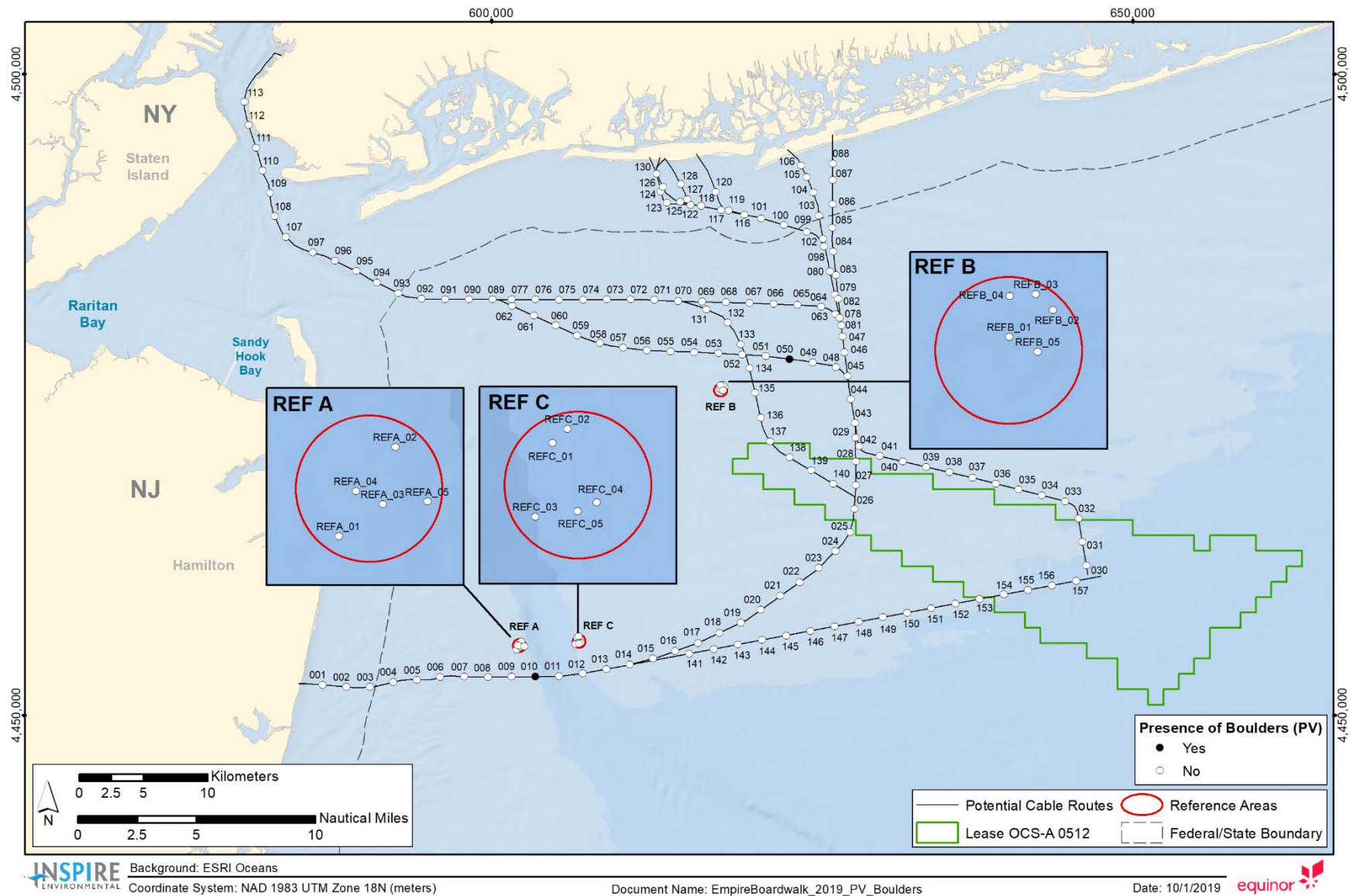


Figure 3-4. Presence/absence of boulders across the surveyed area

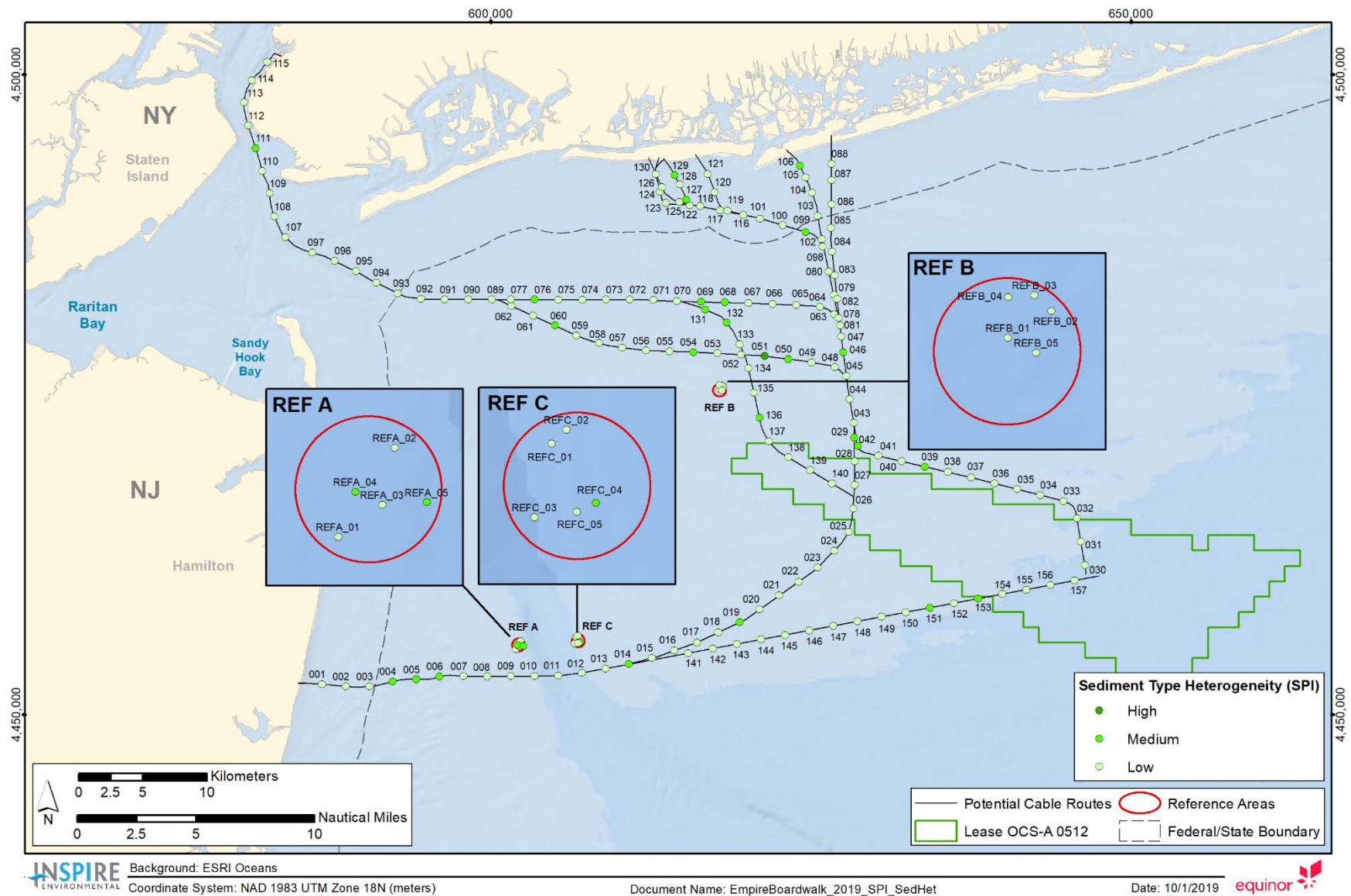


Figure 3-5. Intra-station sediment type heterogeneity determined from SPI images across the surveyed area

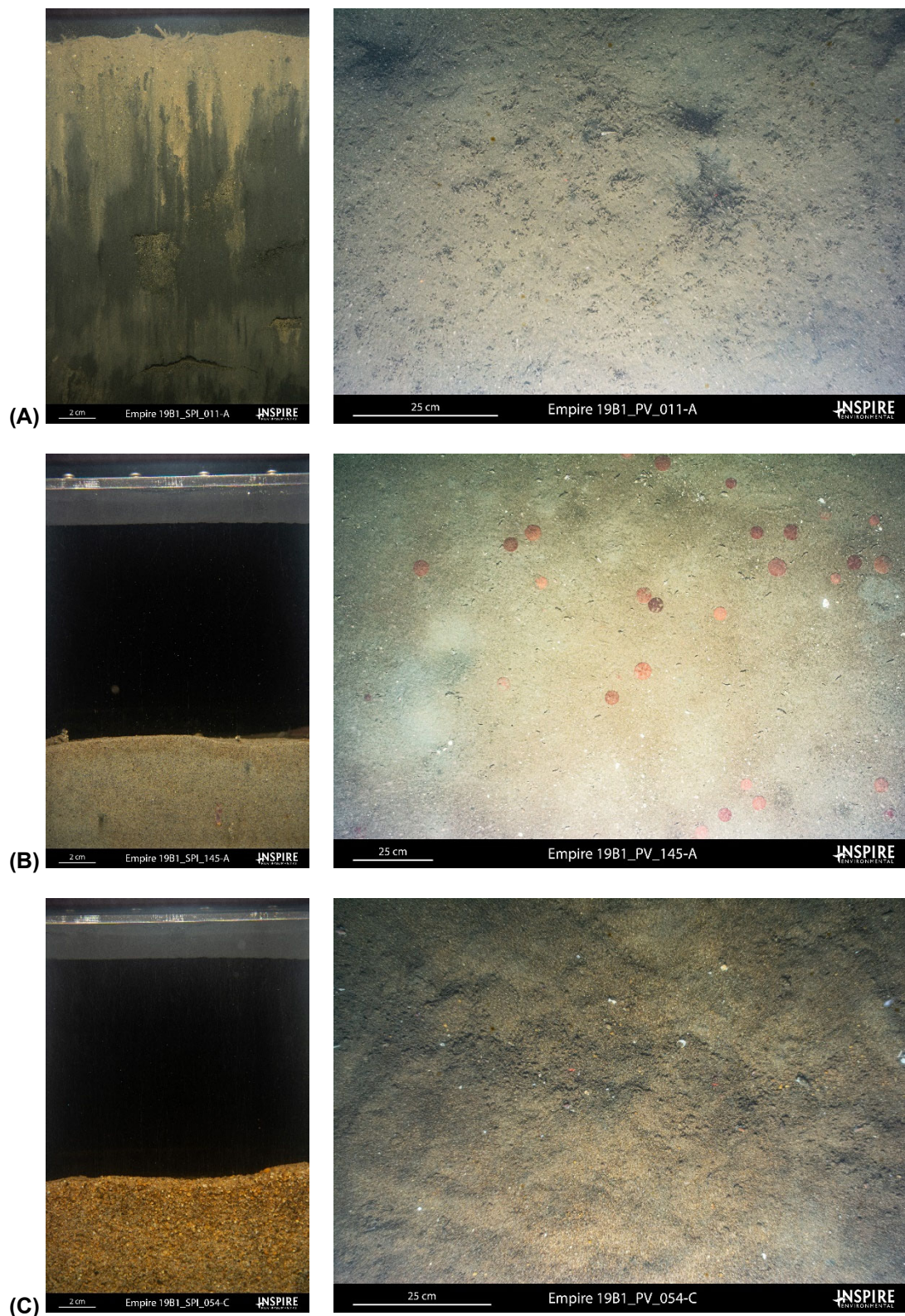


Figure 3-6. Representative SPI and PV images depicting the range of sediment types across the surveyed area; (A) silt-clay; (B) very fine sand; (C) medium to coarse sand; (D) small gravel (granule and pebble); and (E) large gravel (cobbles and small boulders)

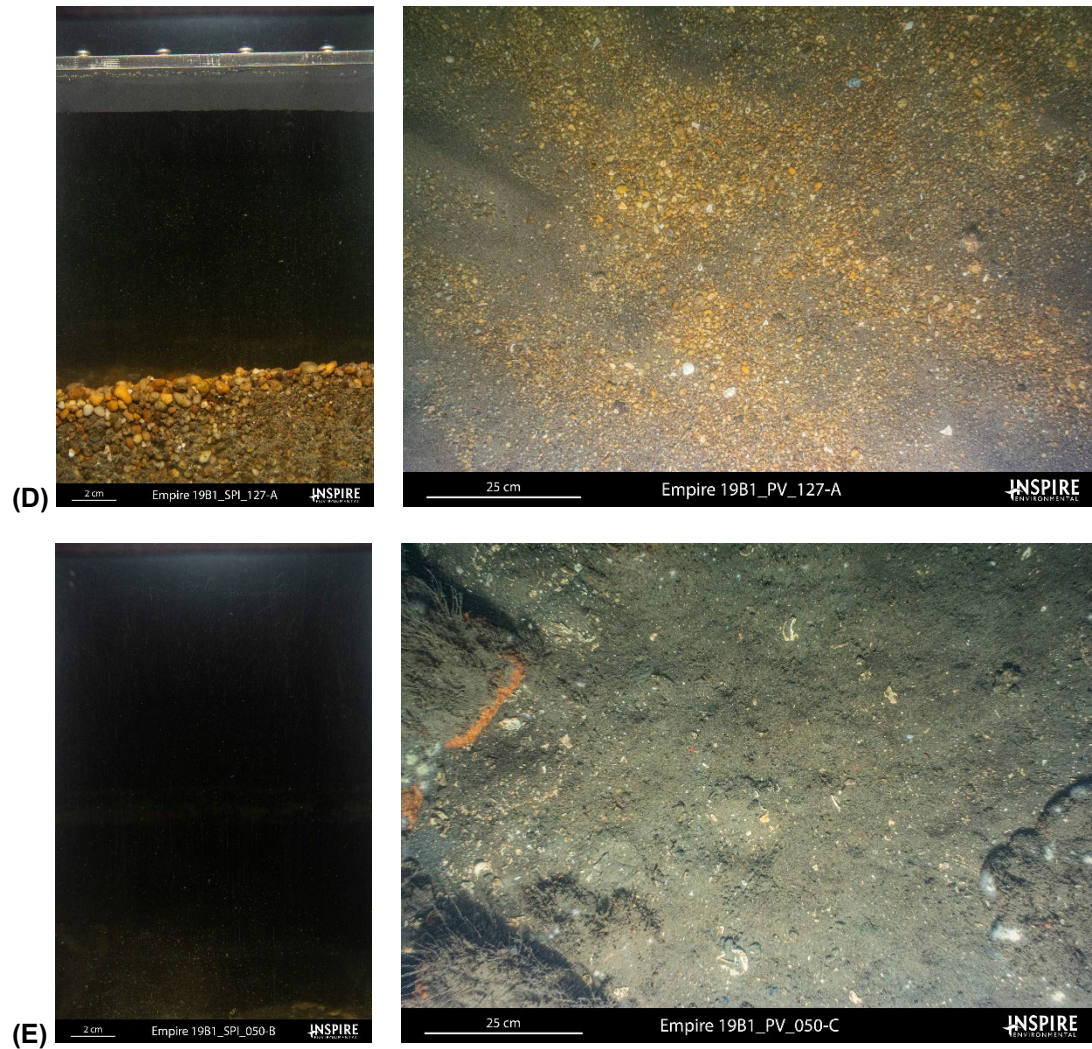


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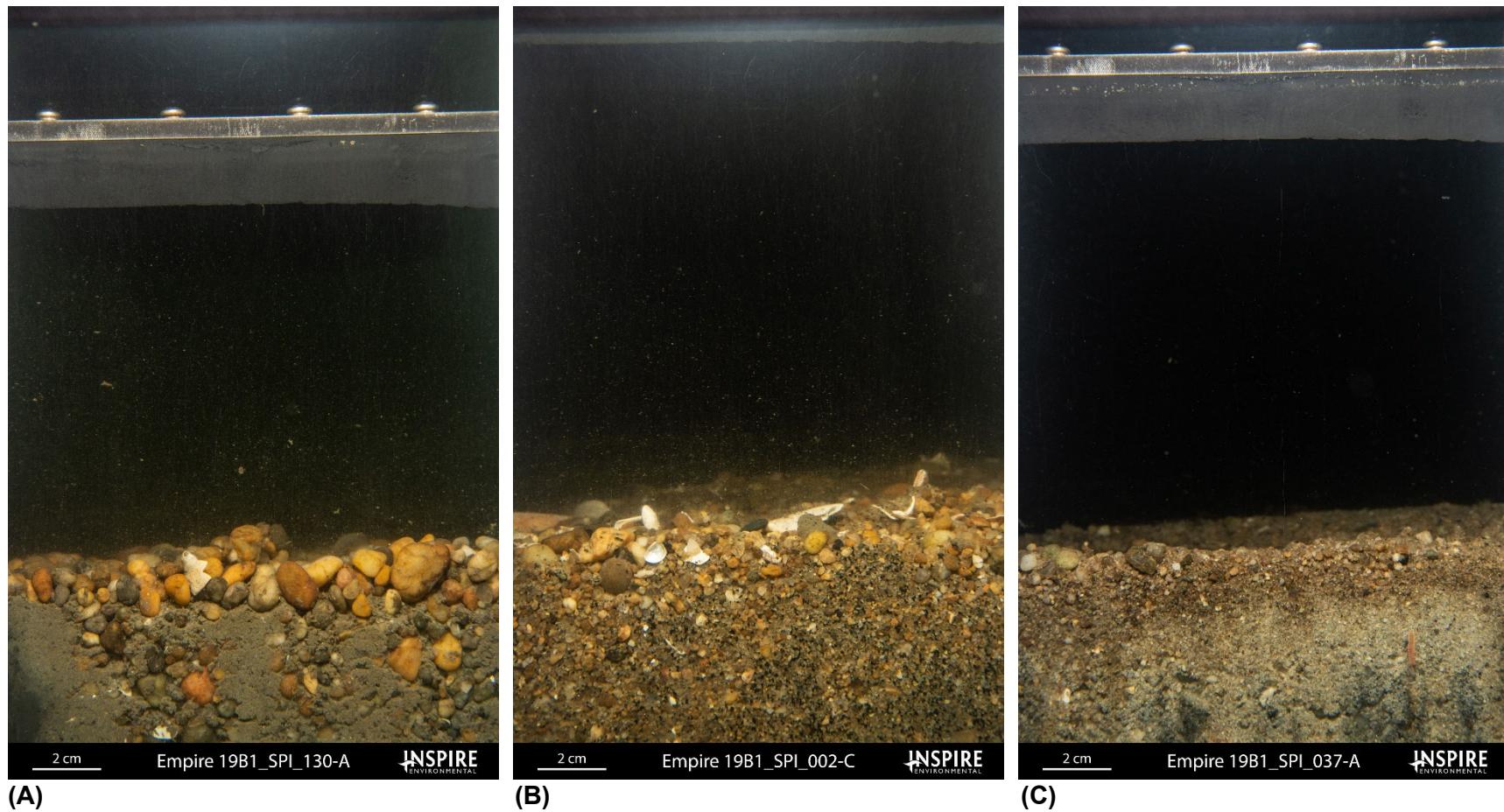


Figure 3-7. *Representative SPI images showing layering of coarse material over sand; (A) pebble over sand; (B) granule over sand; and (C) very coarse sand over sand*

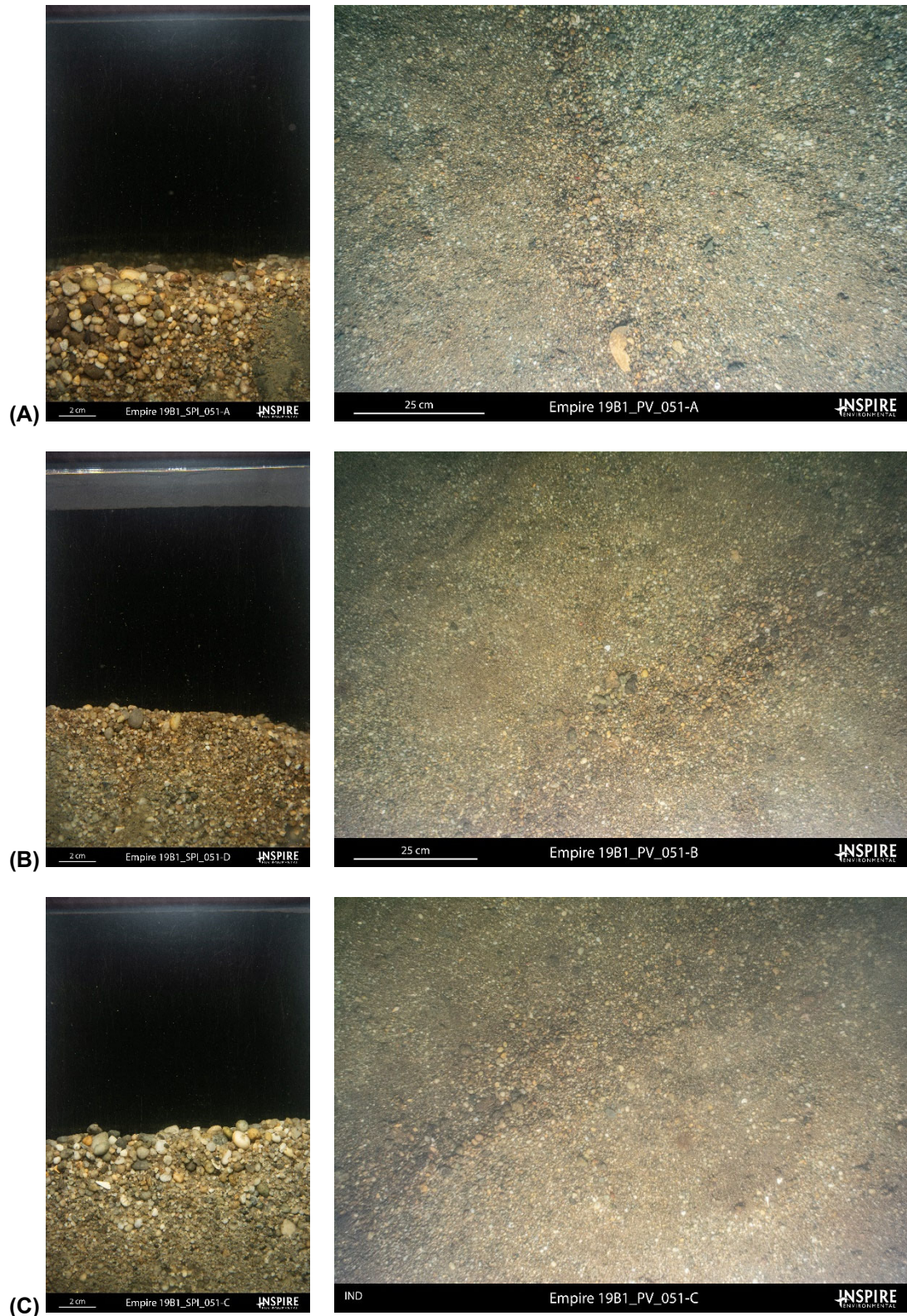


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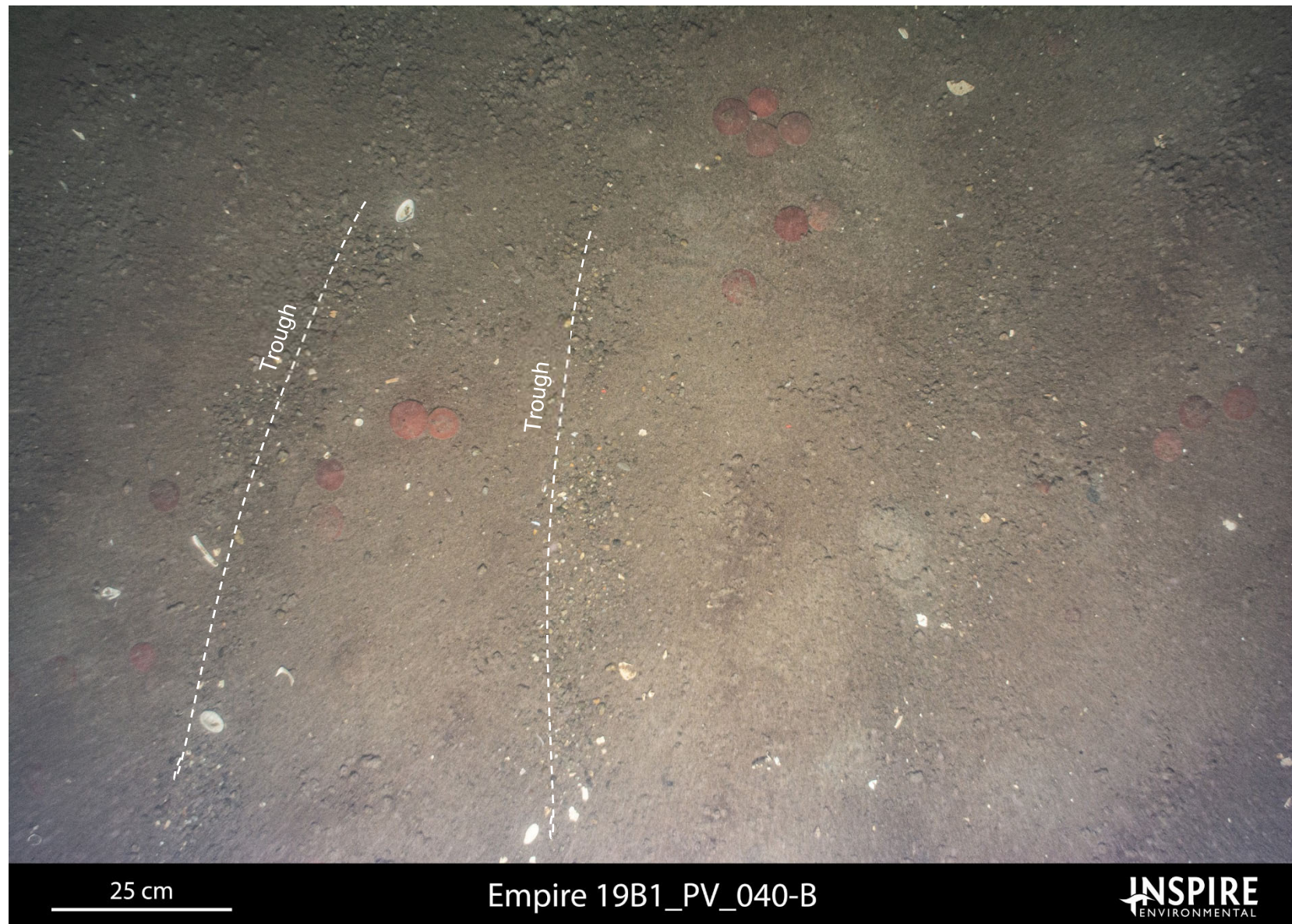


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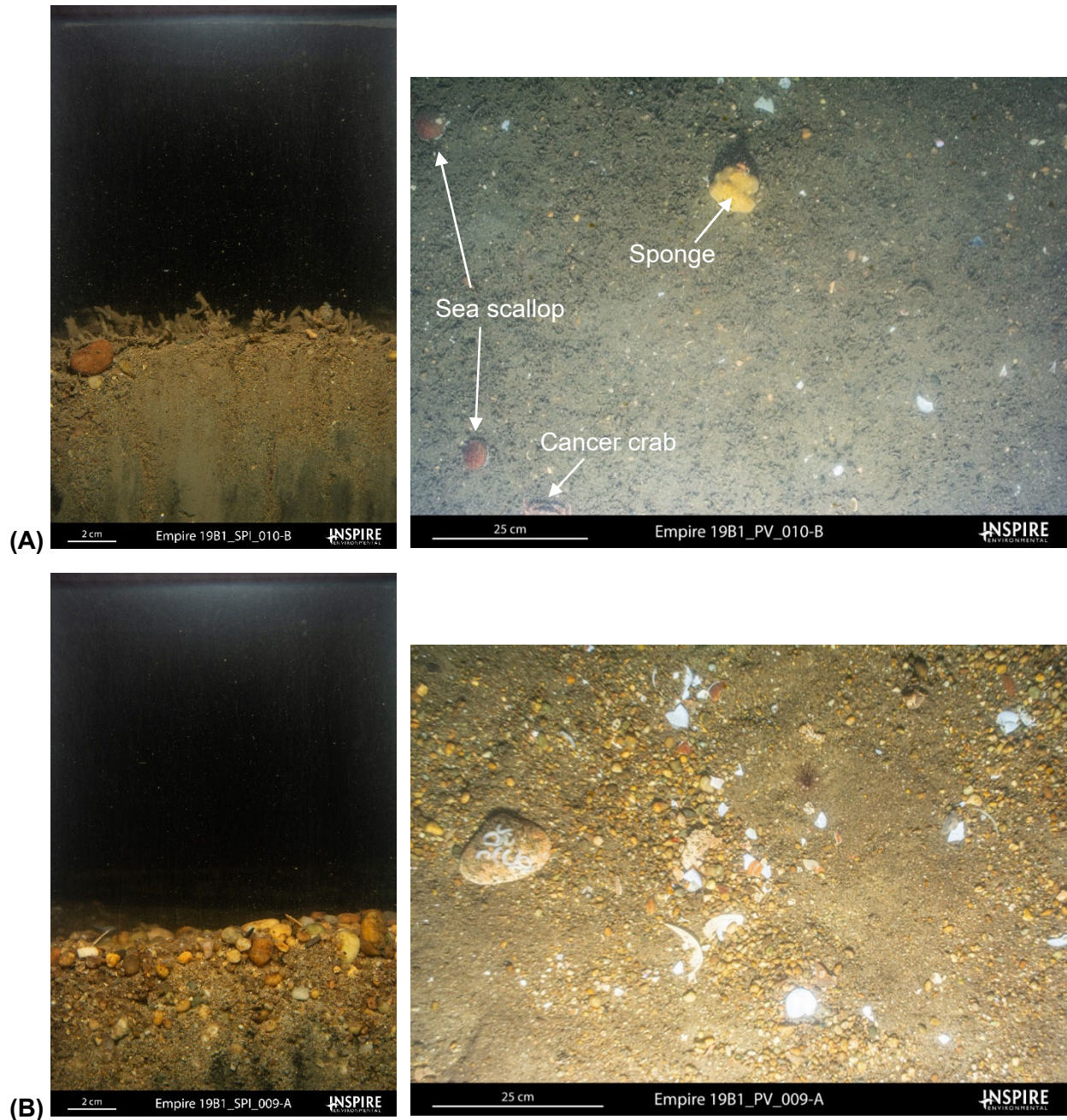


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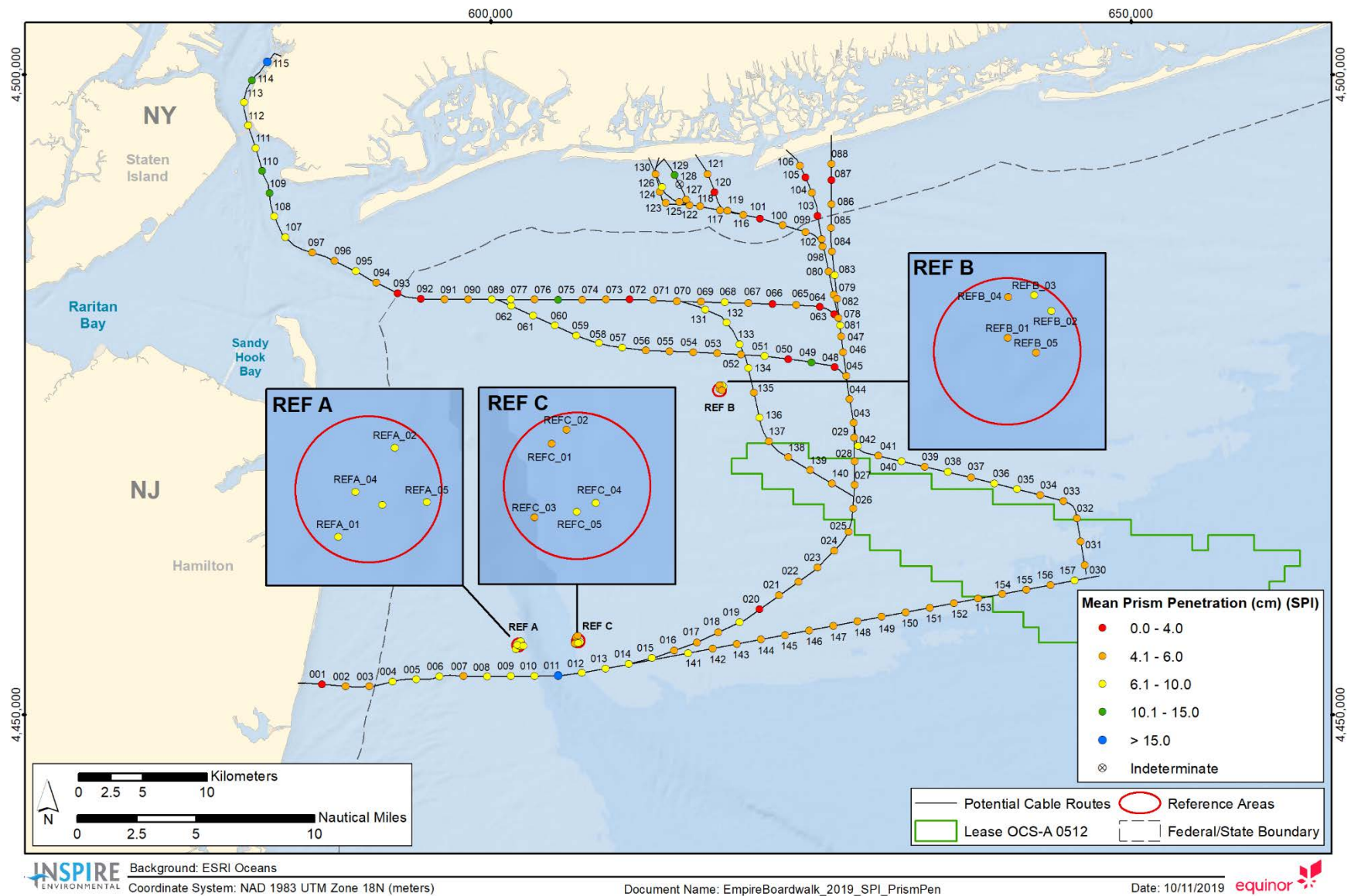


Figure 3-11. Mean station camera prism penetration depths (cm) at the Equinor Wind survey area

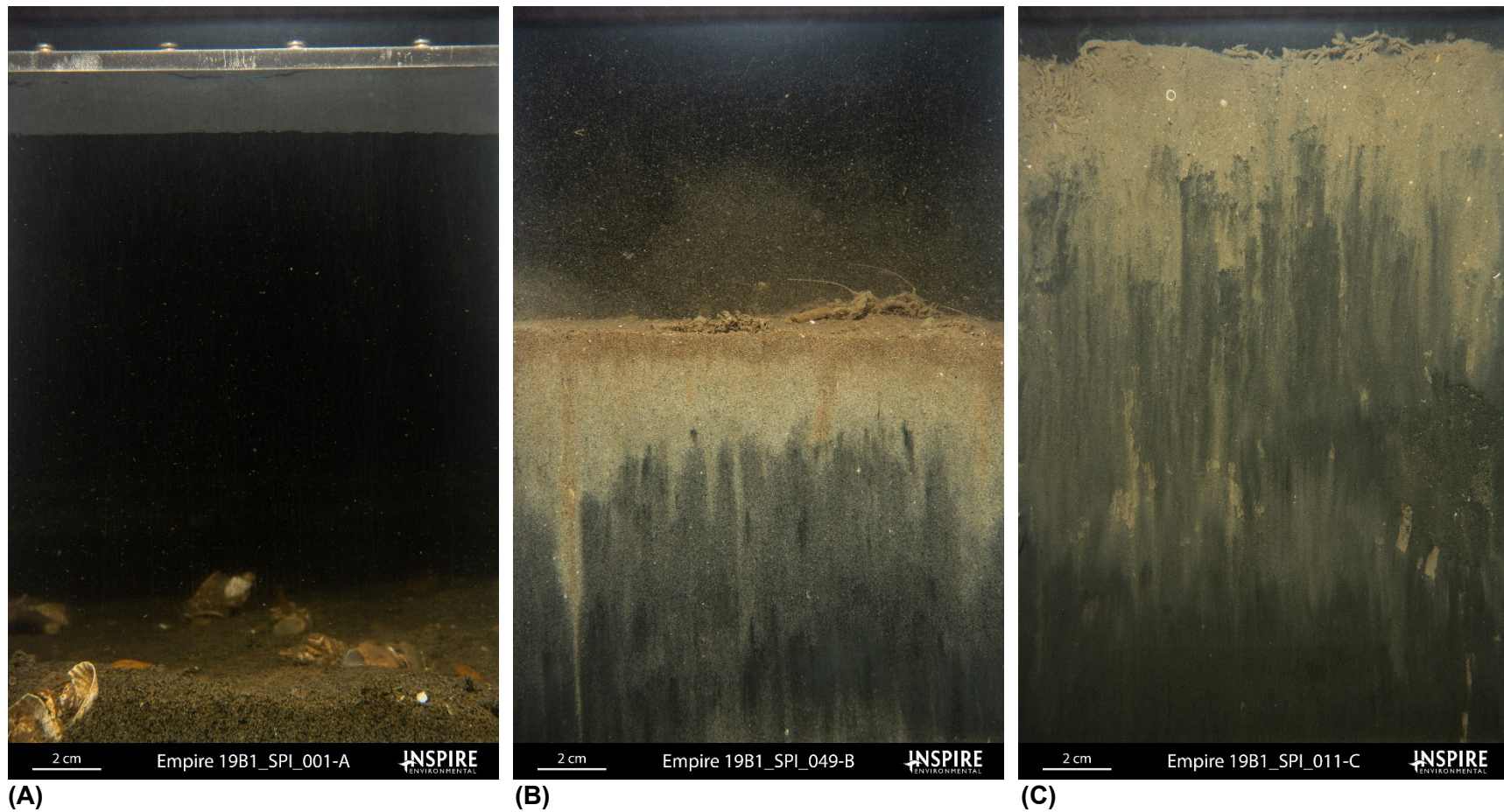


Figure 3-12. Representative SPI images showing sediments with; (A) low; (B) medium; and (C) high prism penetration values, corresponding to high, medium, and low load-bearing strength, respectively

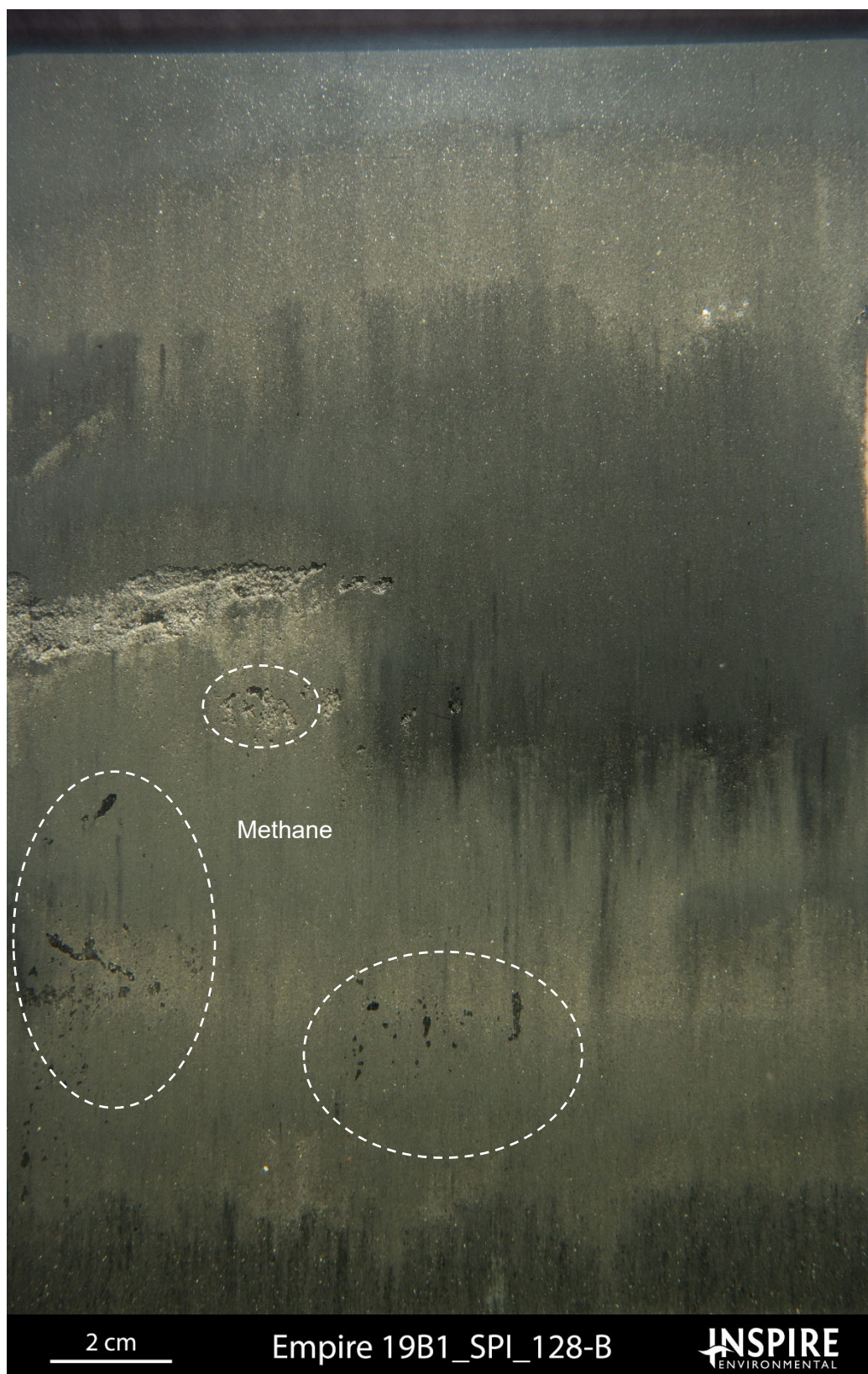


Figure 3-13. *Profile image of Station 128 depicting over penetration in silt-clay sediment with low shear strength, and the presence of methane vesicles in the sediment column*

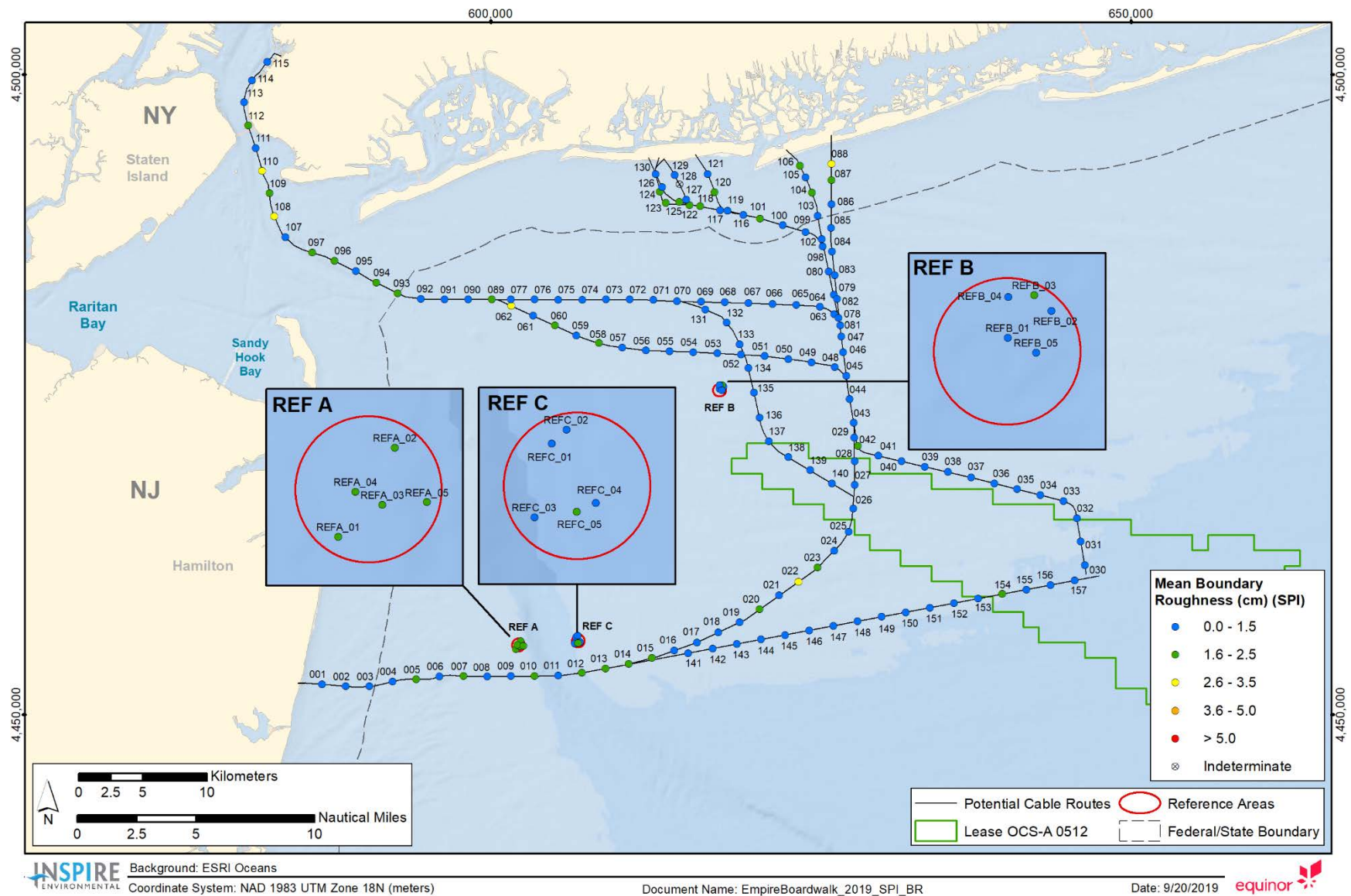


Figure 3-14. Mean station small-scale boundary roughness (cm) at the Equinor Wind survey area

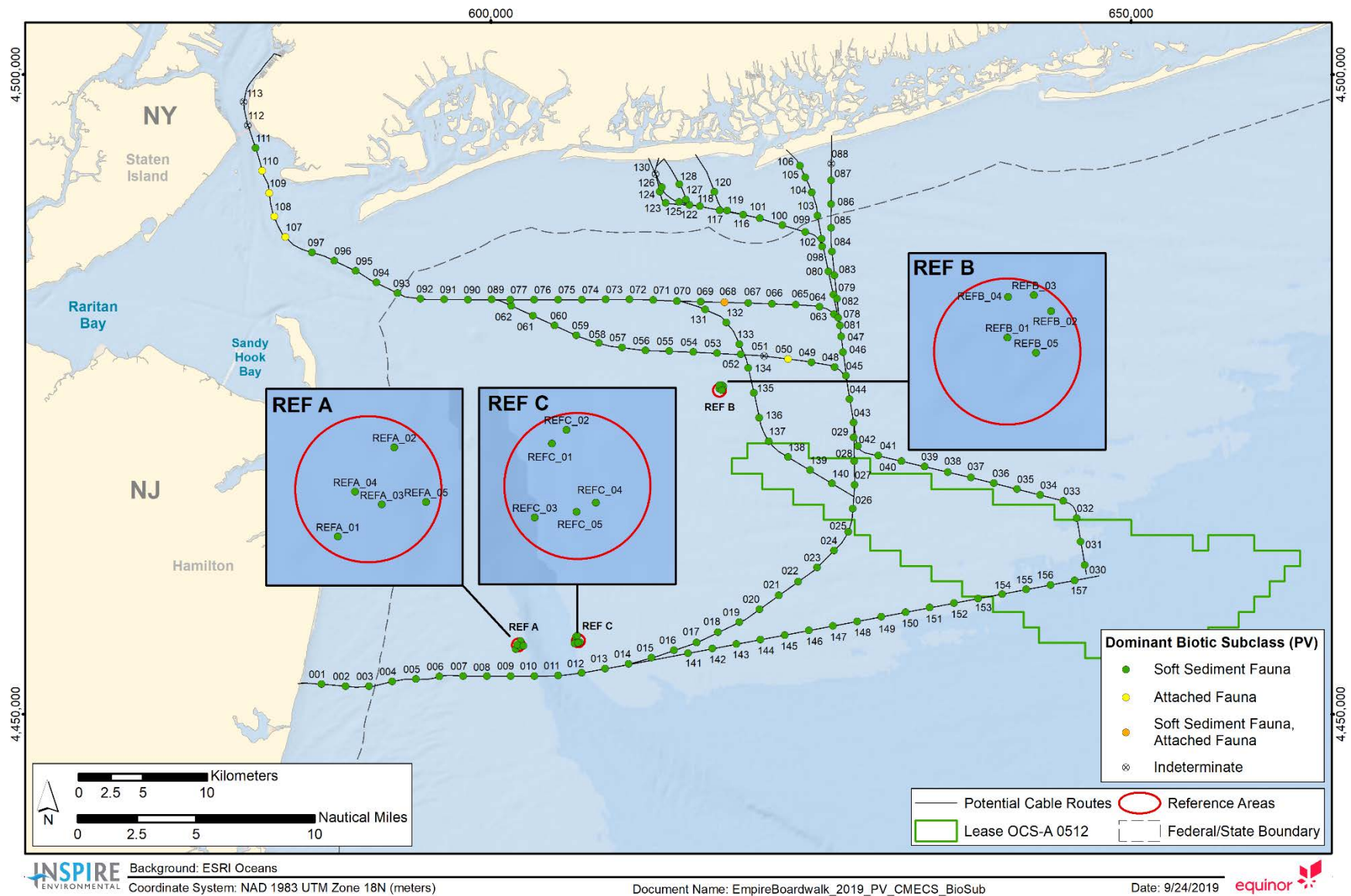


Figure 3-15. Dominant CMECS Biotic Subclass at the Equinor Wind survey area

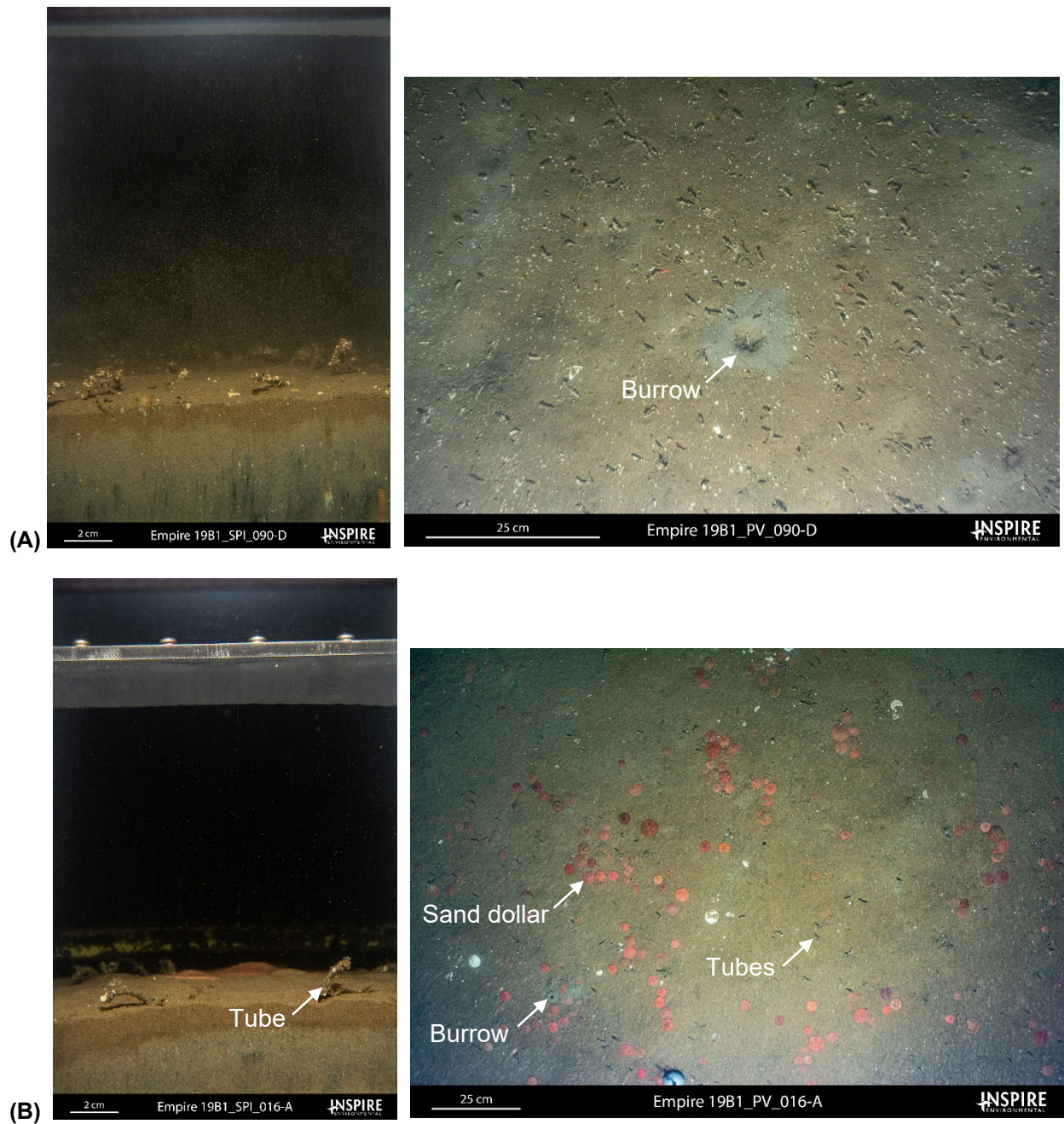


Figure 3-16. Representative SPI and PV images showing evidence of the CMECS Soft Sediment Fauna Biotic Subclass at (A) Station 090 composed of very fine sand depicting tubes and evidence of burrowing at the sediment-water interface; and (B) Station 016 depicting sand dollars, tubes and burrows on the seafloor, fauna driving seafloor boundary roughness

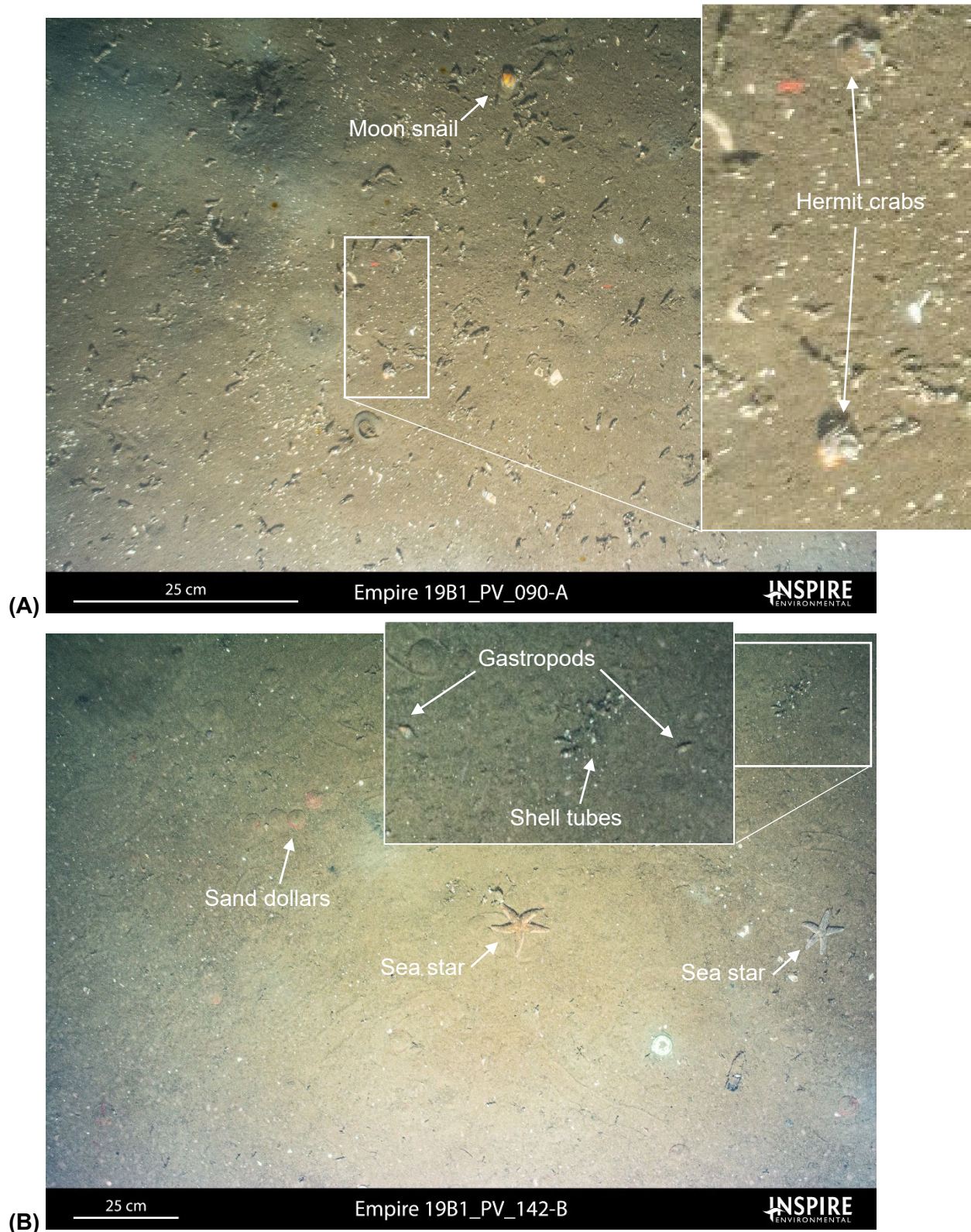


Figure 3-17. Representative PV images depicting epifauna activity on the seafloor at (A) Station 090 with hermit crabs and a moon snail present amongst numerous *Diopatra cuprea* tubes; and (B) Station 142 with sea stars, gastropods, hermit crabs, and sand dollars present amongst the distinct shell tubes formed by *Diopatra cuprea* worms.

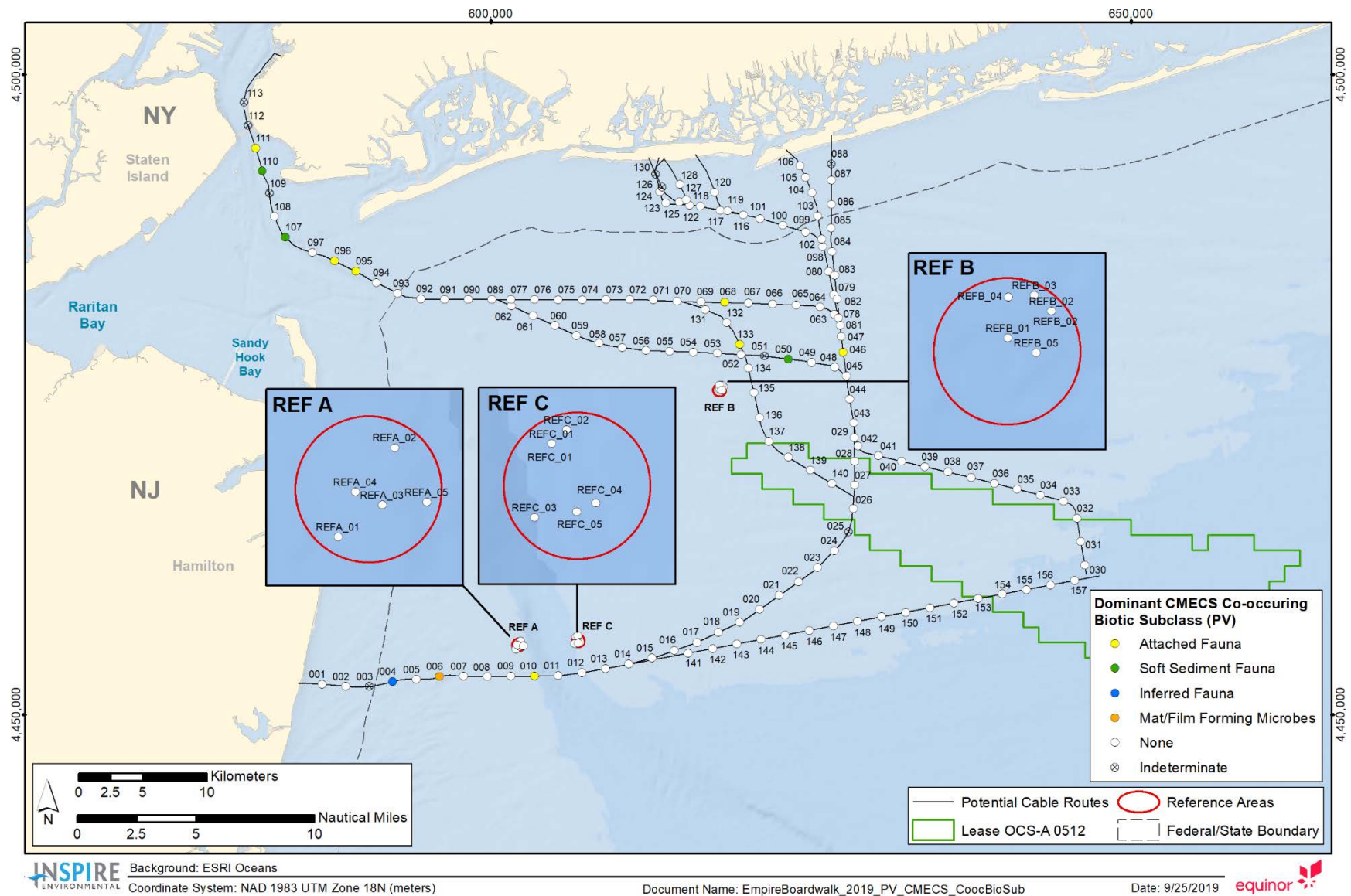


Figure 3-18. Dominant CMECS Co-occurring Biotic Subclass at the Equinor Wind survey area

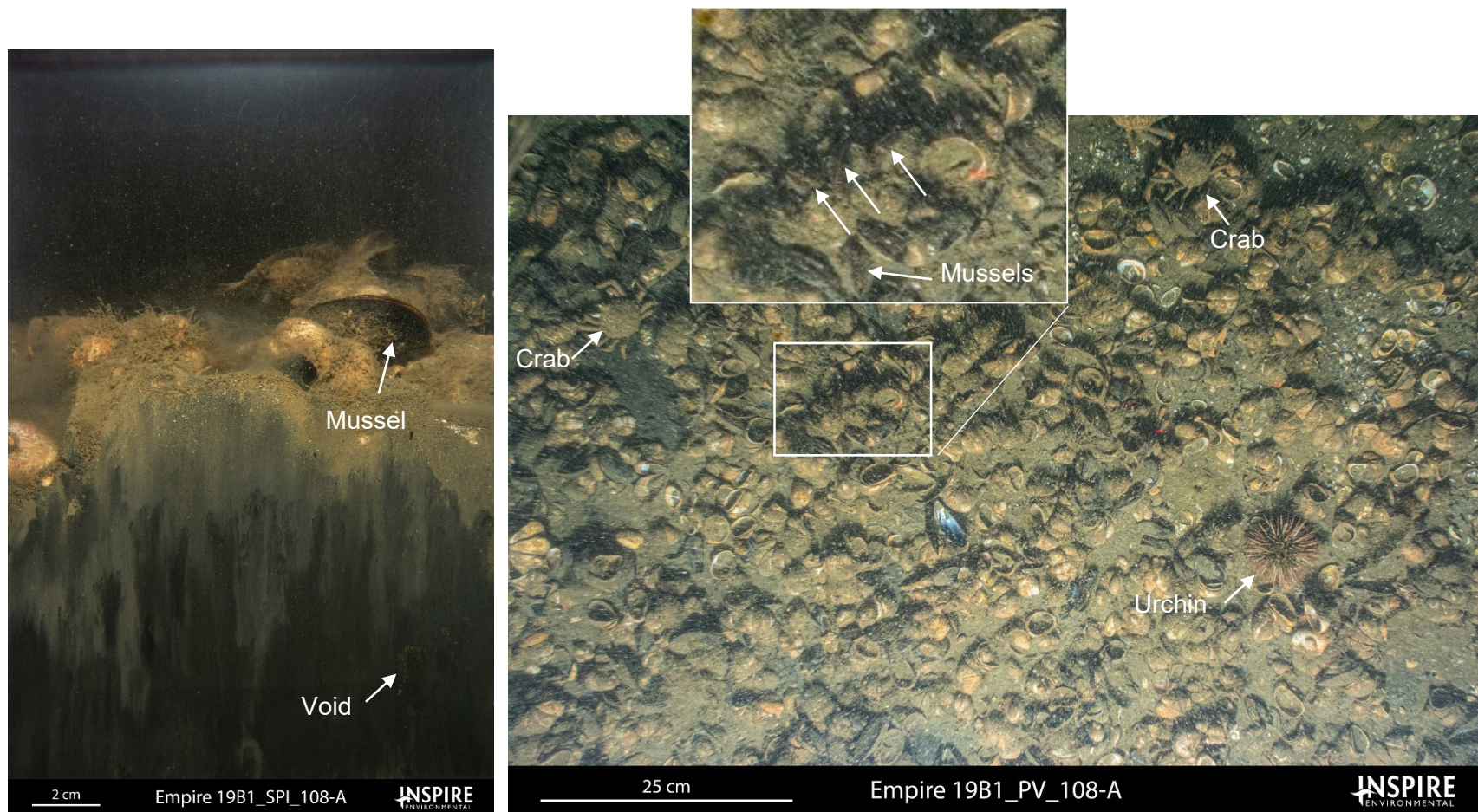


Figure 3-19. Representative SPI and PV images at Station 108 composed of silt-clay with dense mussel bed coverage on the seafloor and crabs, urchins and other interstitial fauna. Infilled feeding void from Stage 3 fauna visible in profile image.

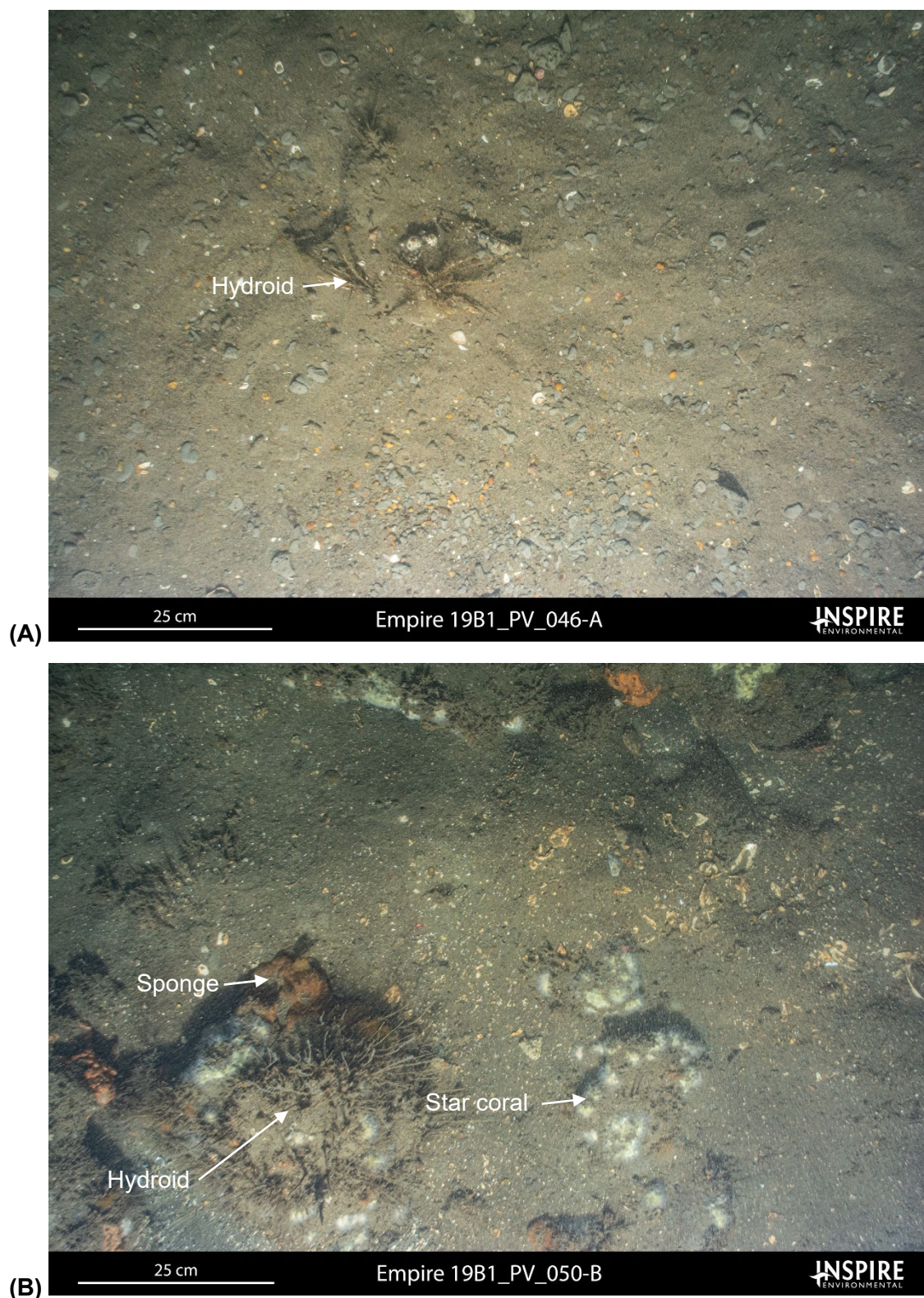


Figure 3-20. Representative PV images showing attached fauna at (A) Station 046 with the presence of hydroids; and (B) Station 050 with the presence of hydroids, sponges, and the star coral *Astrangia* spp., which is defined as sensitive taxa

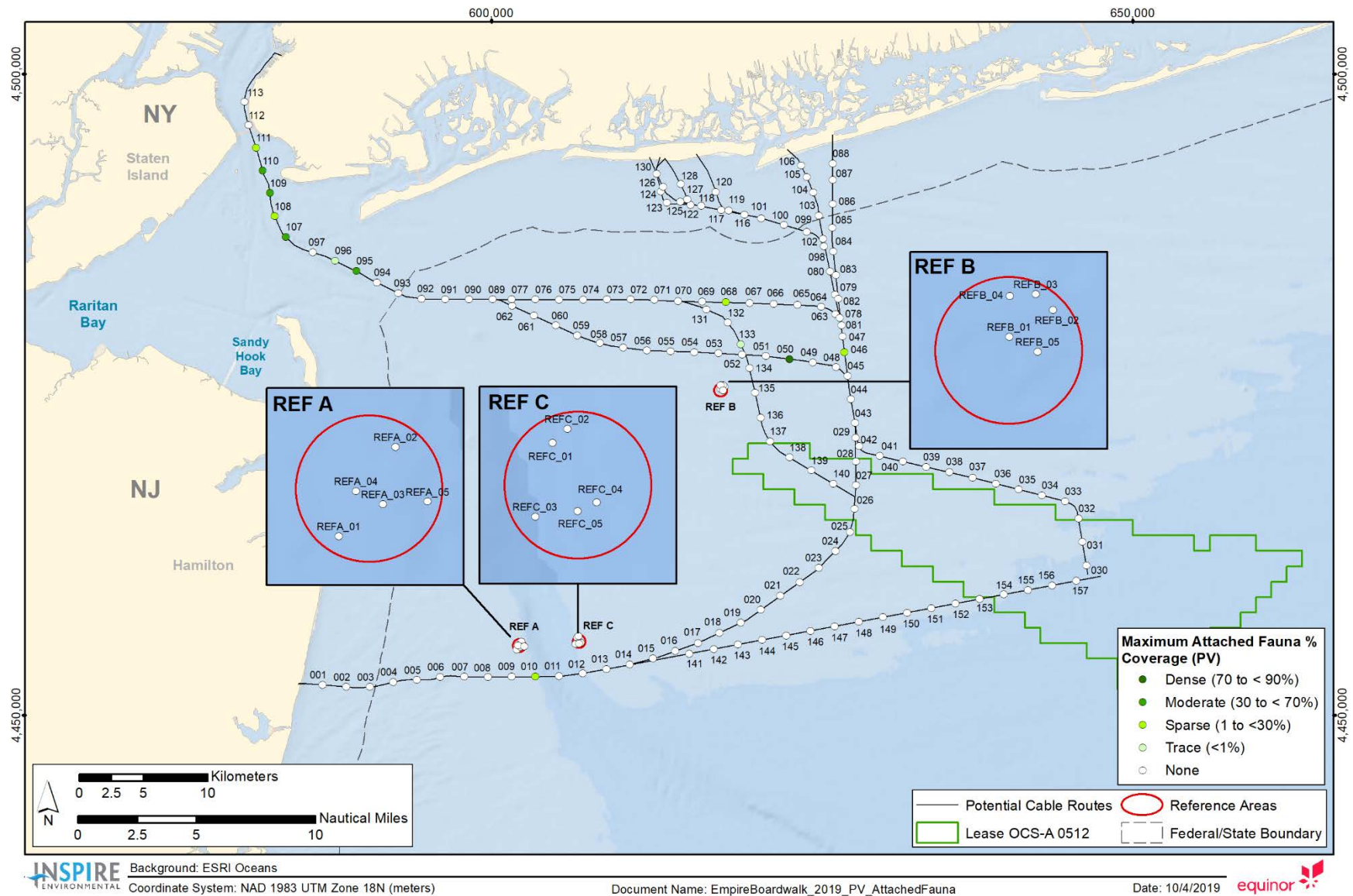


Figure 3-21. Maximum Attached Fauna Percent Cover (CMES Percent Cover Modifier) at the Equinor Wind survey area

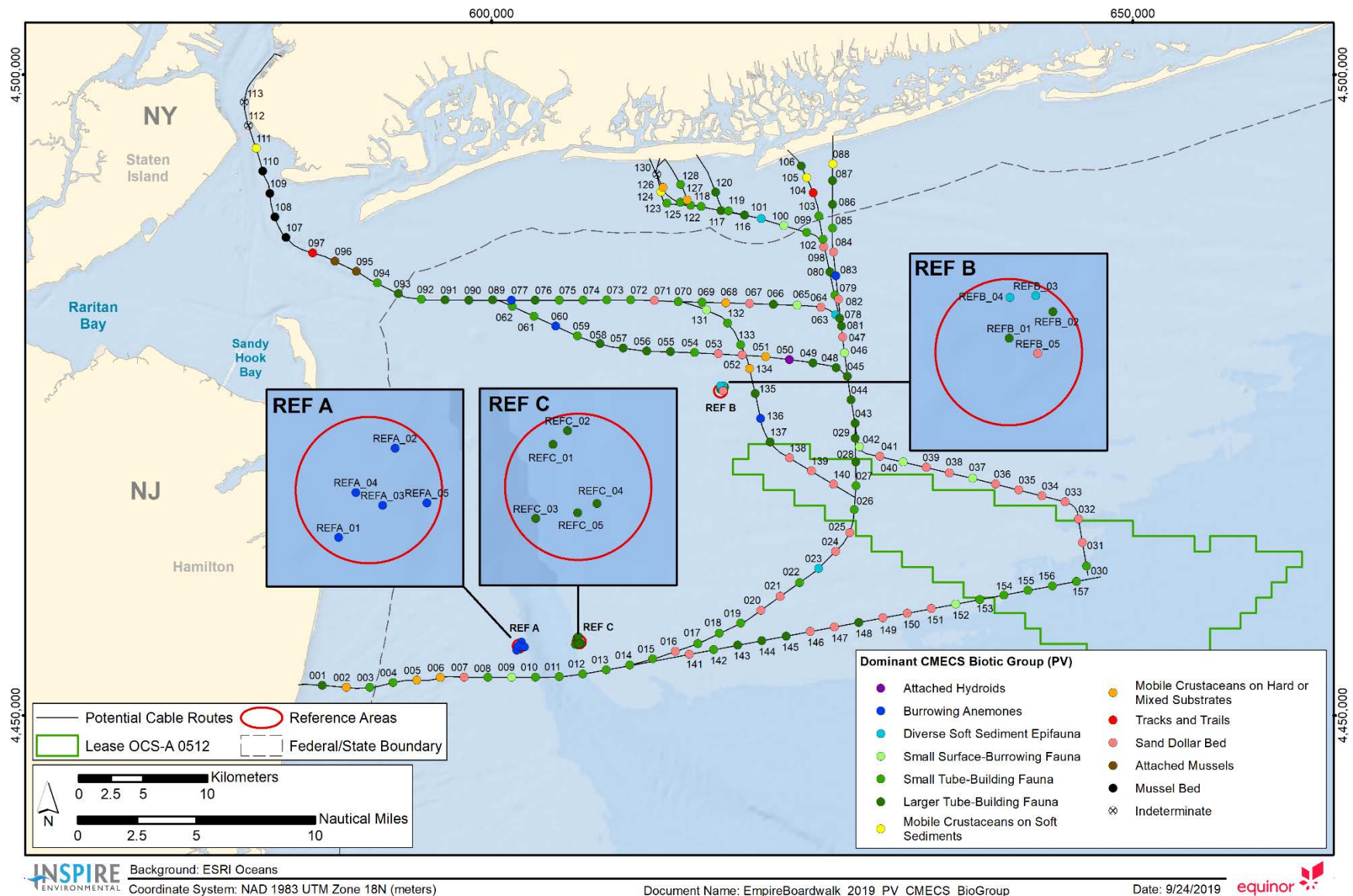


Figure 3-22. Dominant CMECS Biotic Group at the Equinor Wind survey area

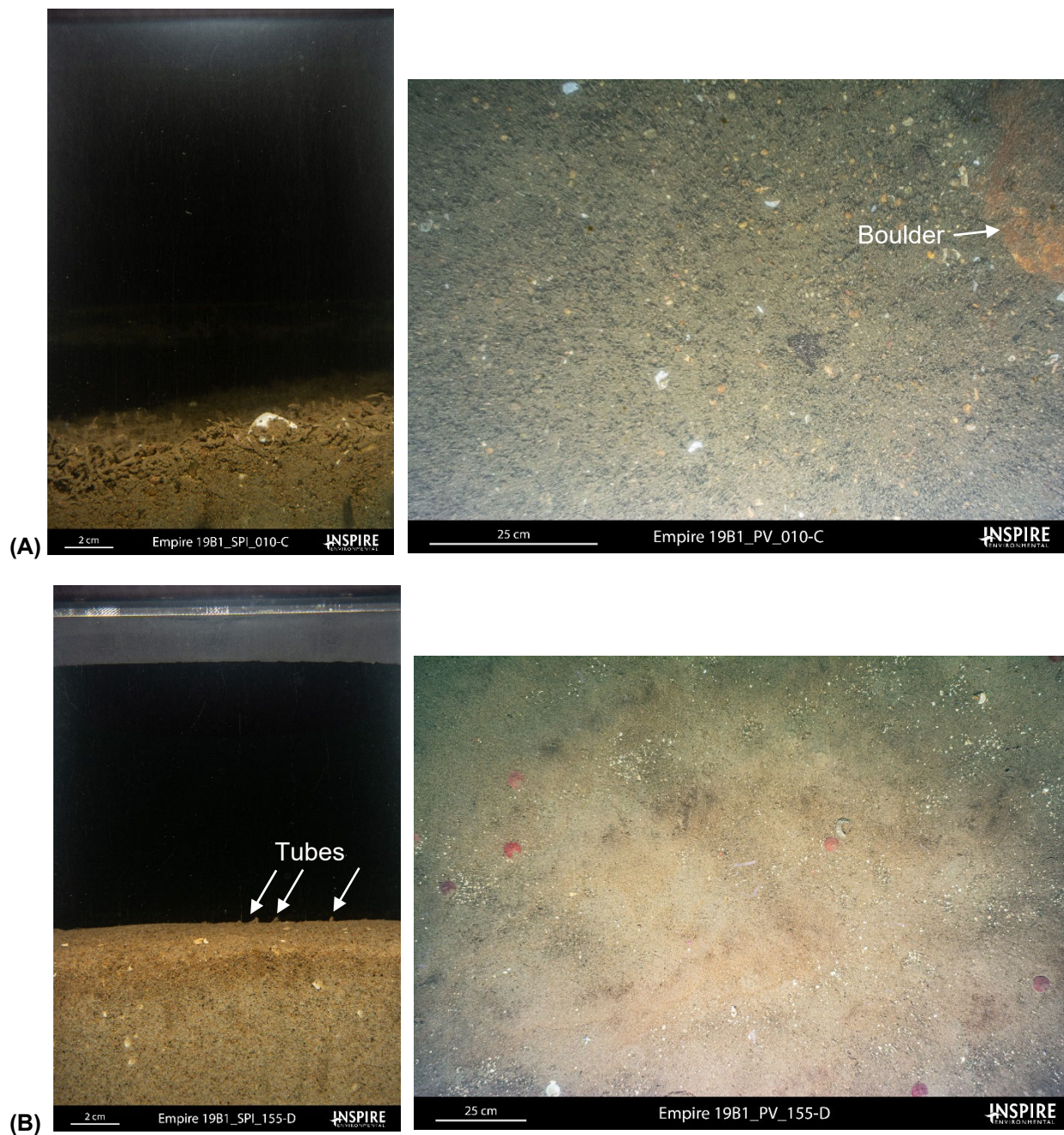


Figure 3-23. Representative SPI and PV images where the CMECS Biotic Group, Small Tube-Building Fauna, was observed at (A) Station 010 composed of fine sand over silt-clay with a boulder present; and (B) Station 155 composed of fine sand with small-tubes present at the sediment–water interface

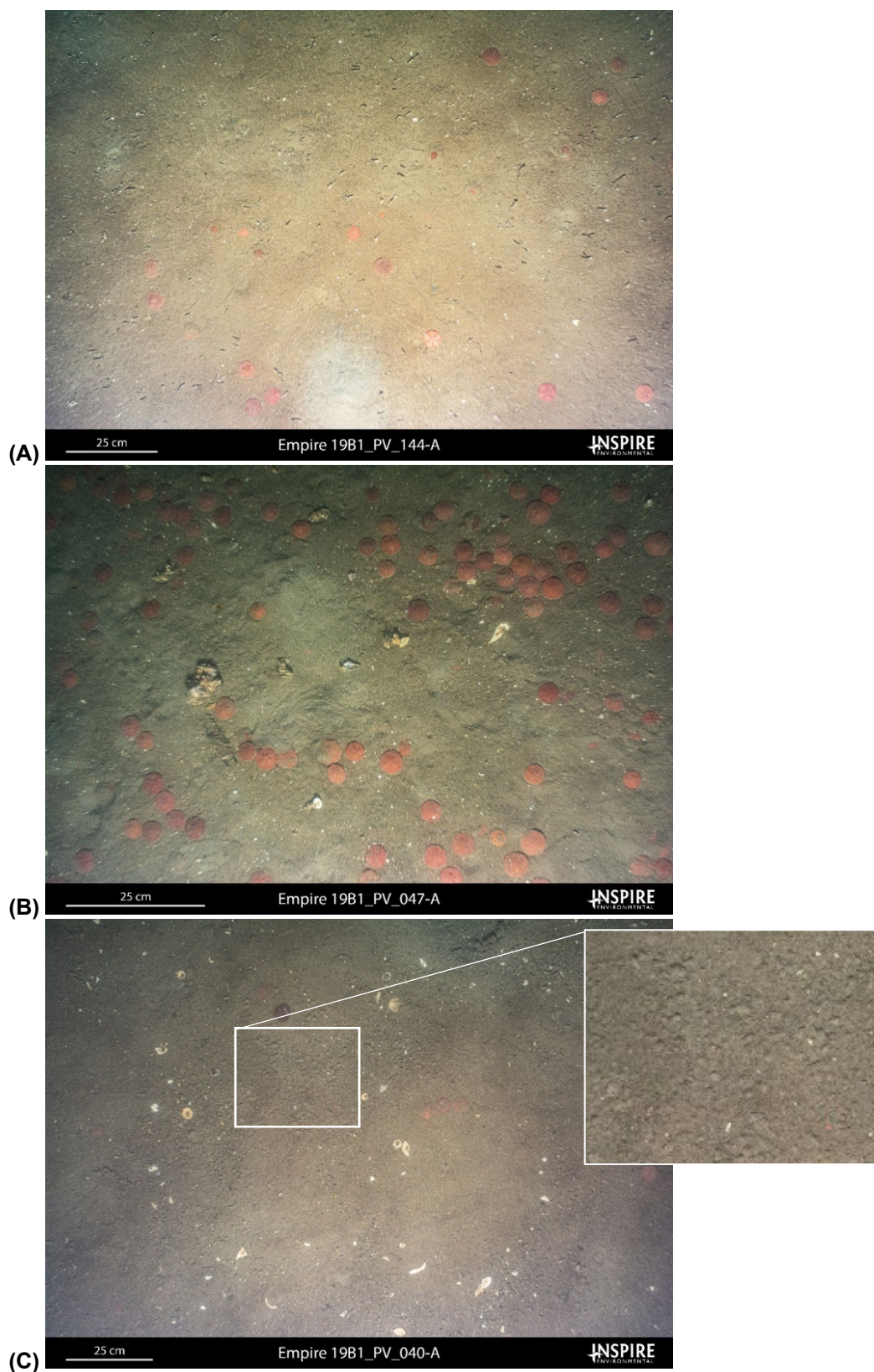


Figure 3-24. Representative PV images where the following CMECS Biotic Groups were observed: (A) Larger Tube- Building Fauna; (B) Sand Dollar Beds; (C) Small Surface-Burrowing Fauna; and (D) Mussel Beds (E) Burrowing Anemones

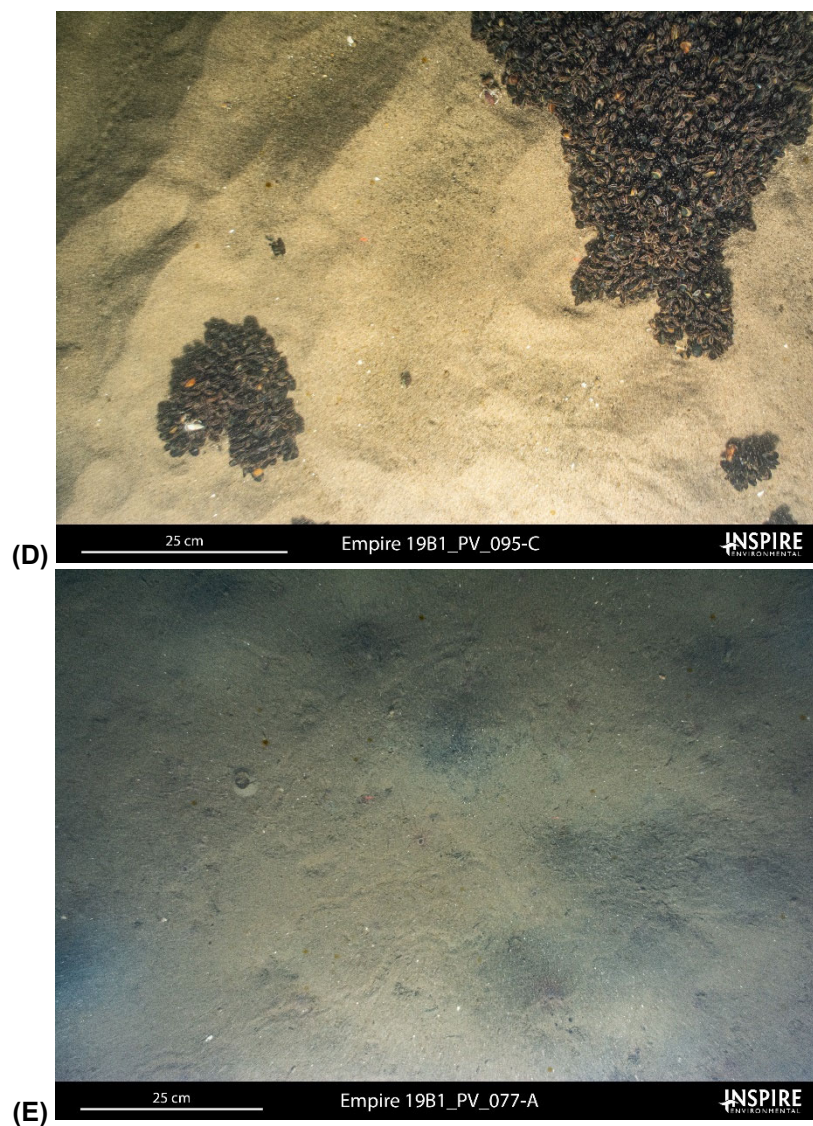


Figure 3-24. *Representative PV images where the following CMECS Biotic Groups were observed: (A) Larger Tube- Building Fauna; (B) Sand Dollar Beds; (C) Small Surface-Burrowing Fauna; and (D) Mussel Beds (E) Burrowing Anemones*

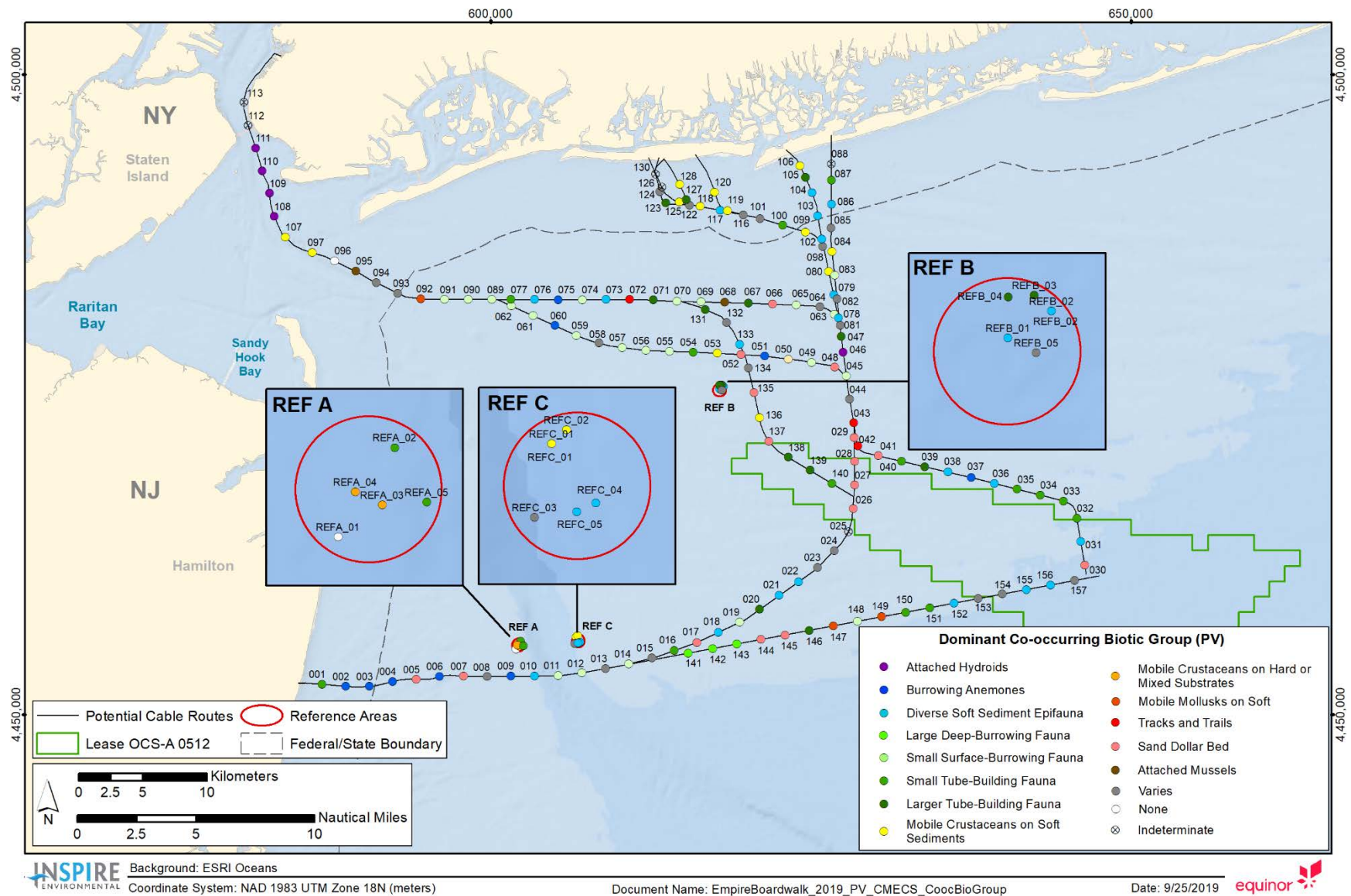


Figure 3-25. Dominant CMECS Co-occurring Biotic Group at the Equinor Wind survey area

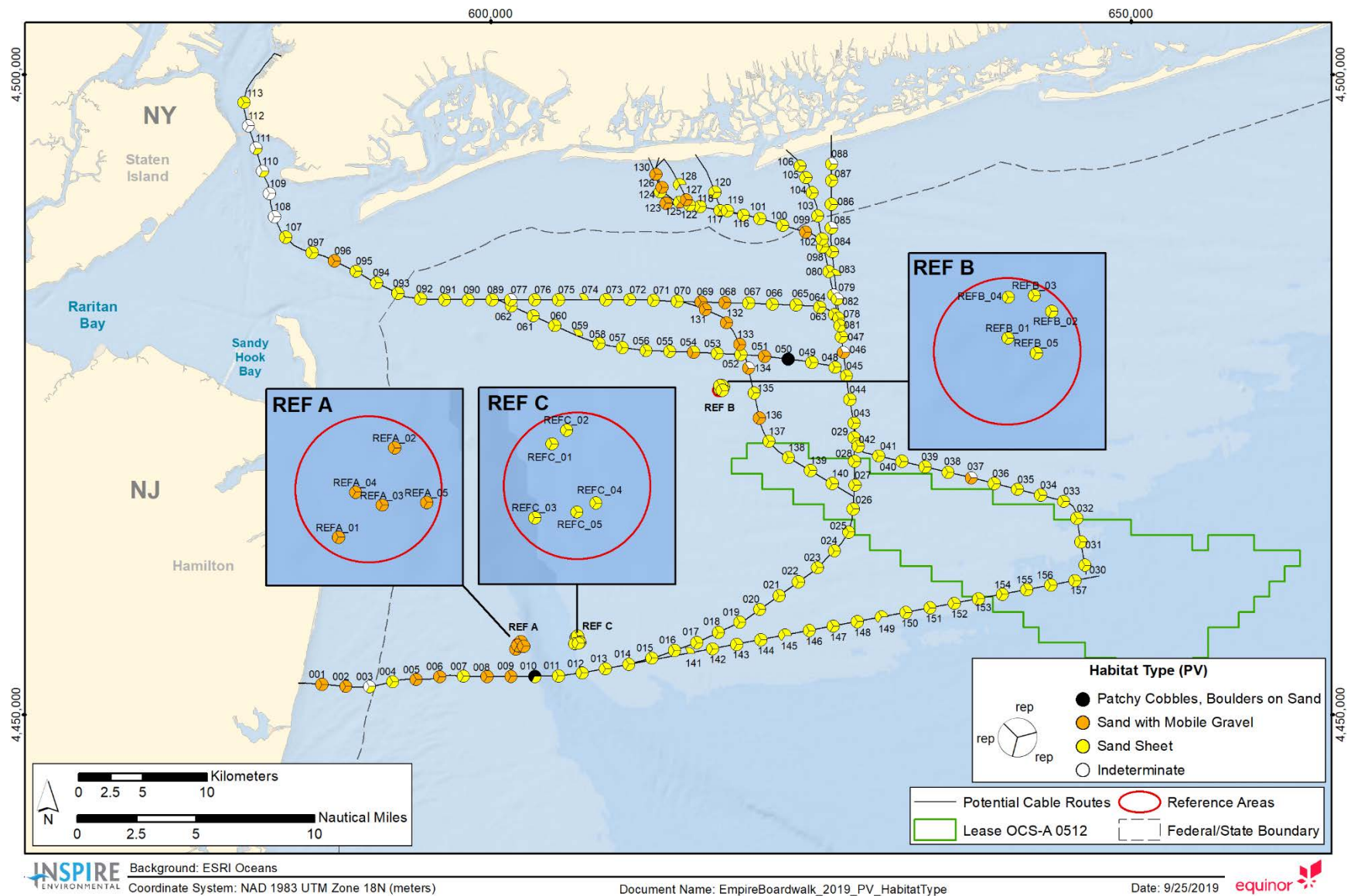


Figure 3-26. Habitat Type at the Equinor Wind survey area

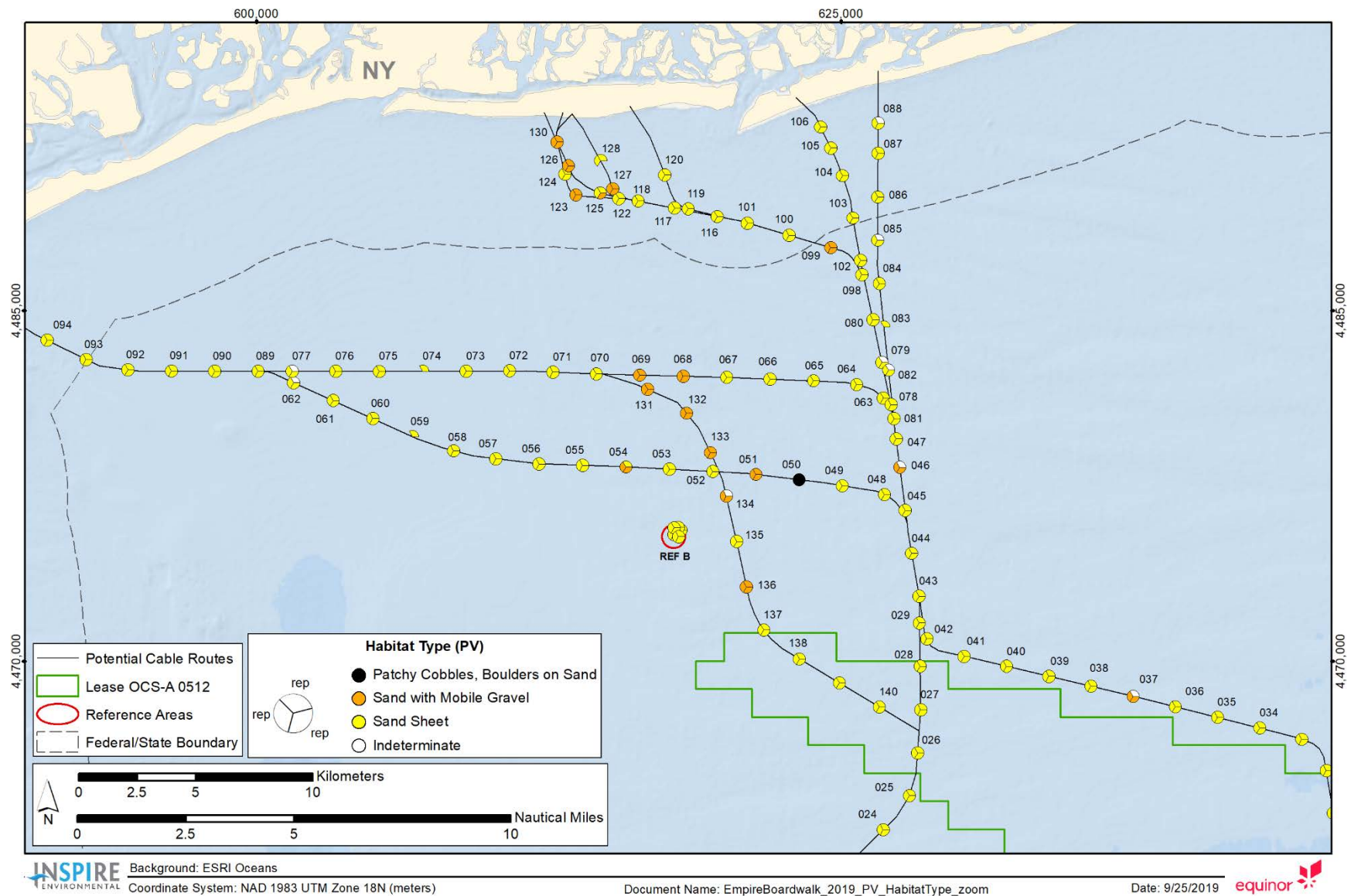


Figure 3-27. Zoom-in of the Long Island export cable route showing Habitat Type

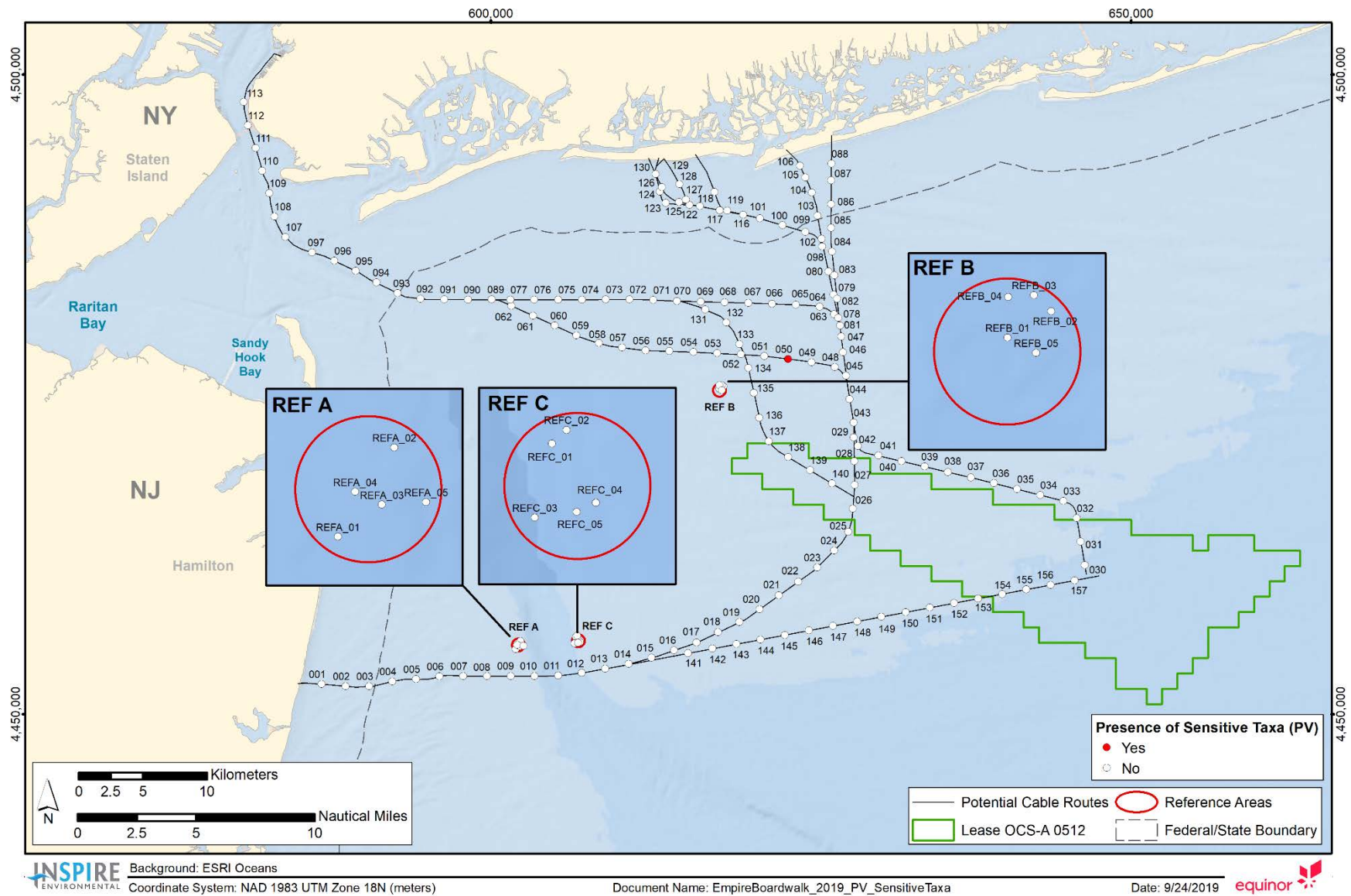


Figure 3-28. Sensitive Taxa Present at the Equinor Wind survey area

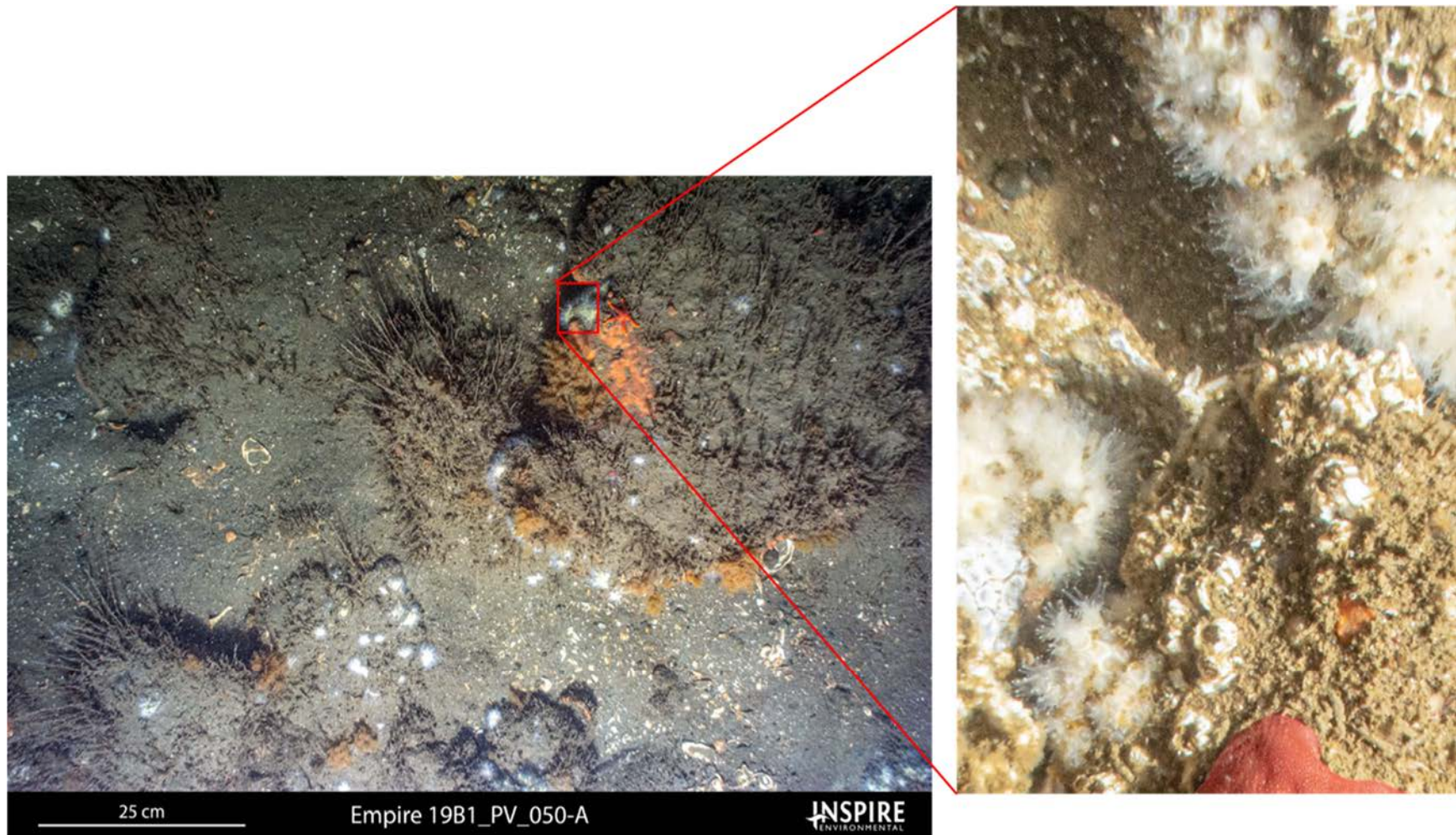


Figure 3-29. Station 050-A depicting a bottom with preferential habitat for attached fauna. The stony coral, *Astrangia* spp. (see inset), is visible as small white tufts on the cobble and boulders. This species is documented as sensitive taxa.

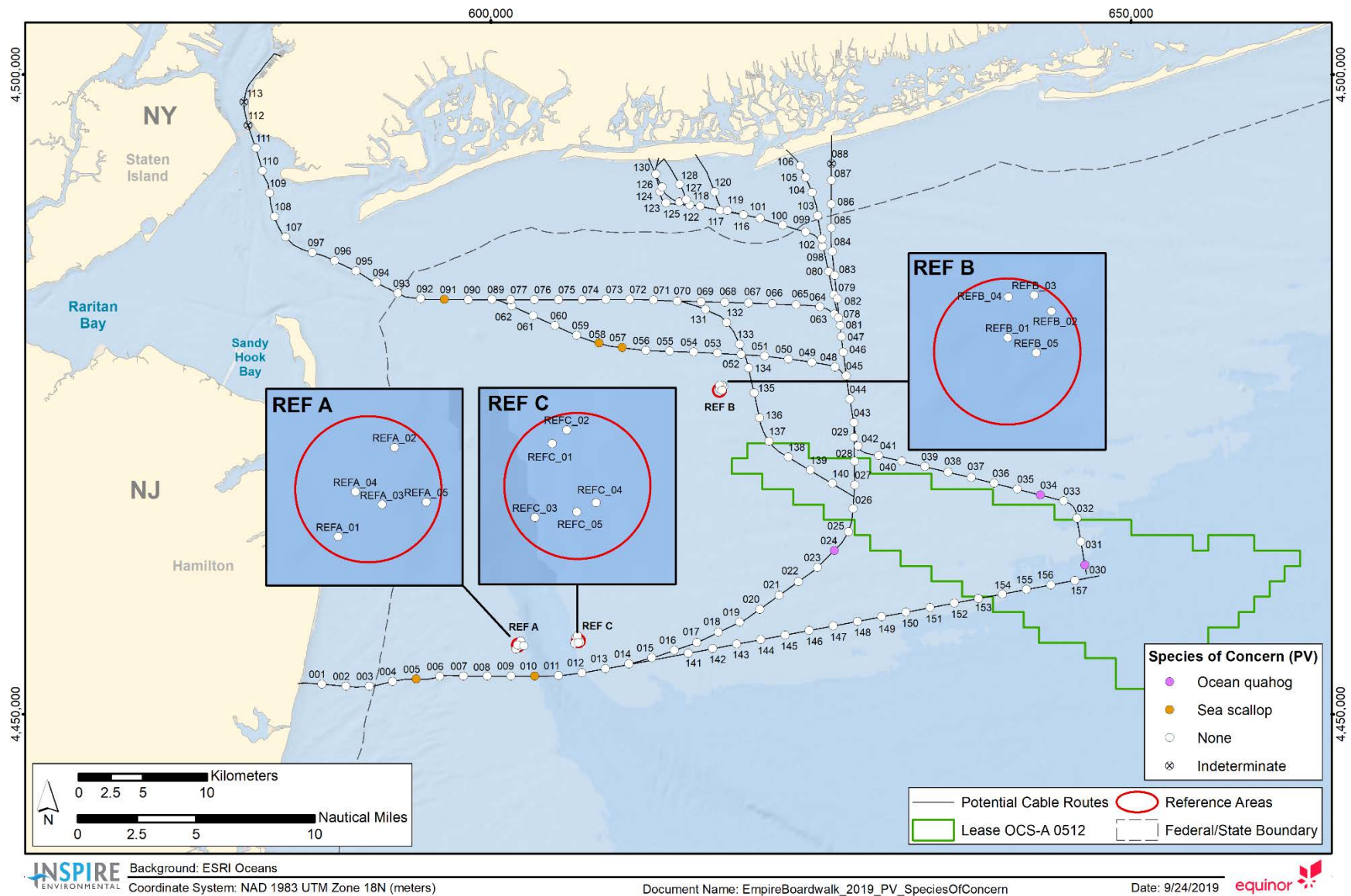


Figure 3-30. Species of Concern Type at the Equinor Wind survey area

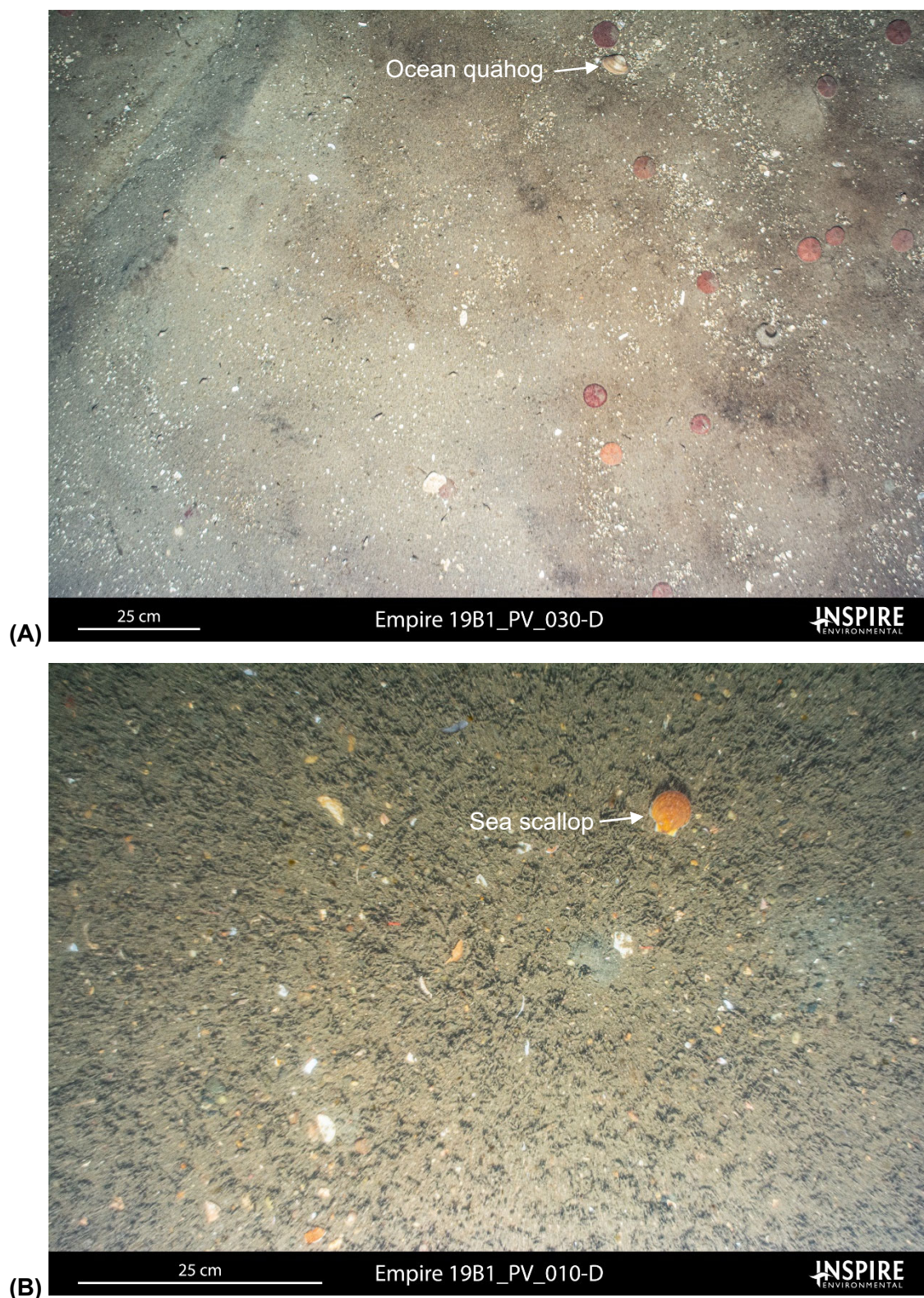


Figure 3-31. Examples of species of concern present at the Equinor Wind survey area at (A) Station 030 composed of mobile sand with an ocean quahog present surrounded by small-tube building fauna; and (B) Station 010 with a sea scallop present

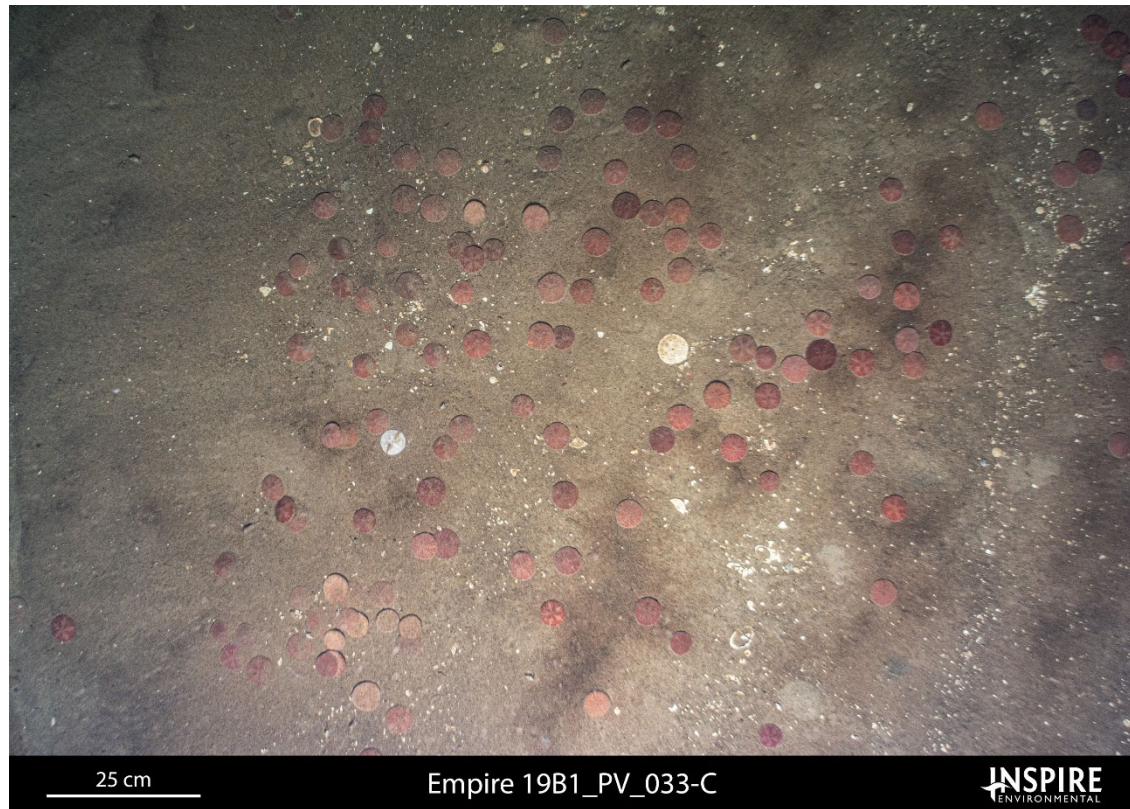


Figure 3-32. *Representative SPI and PV images showing an area composed of medium sand with a seafloor covered in sand dollars*

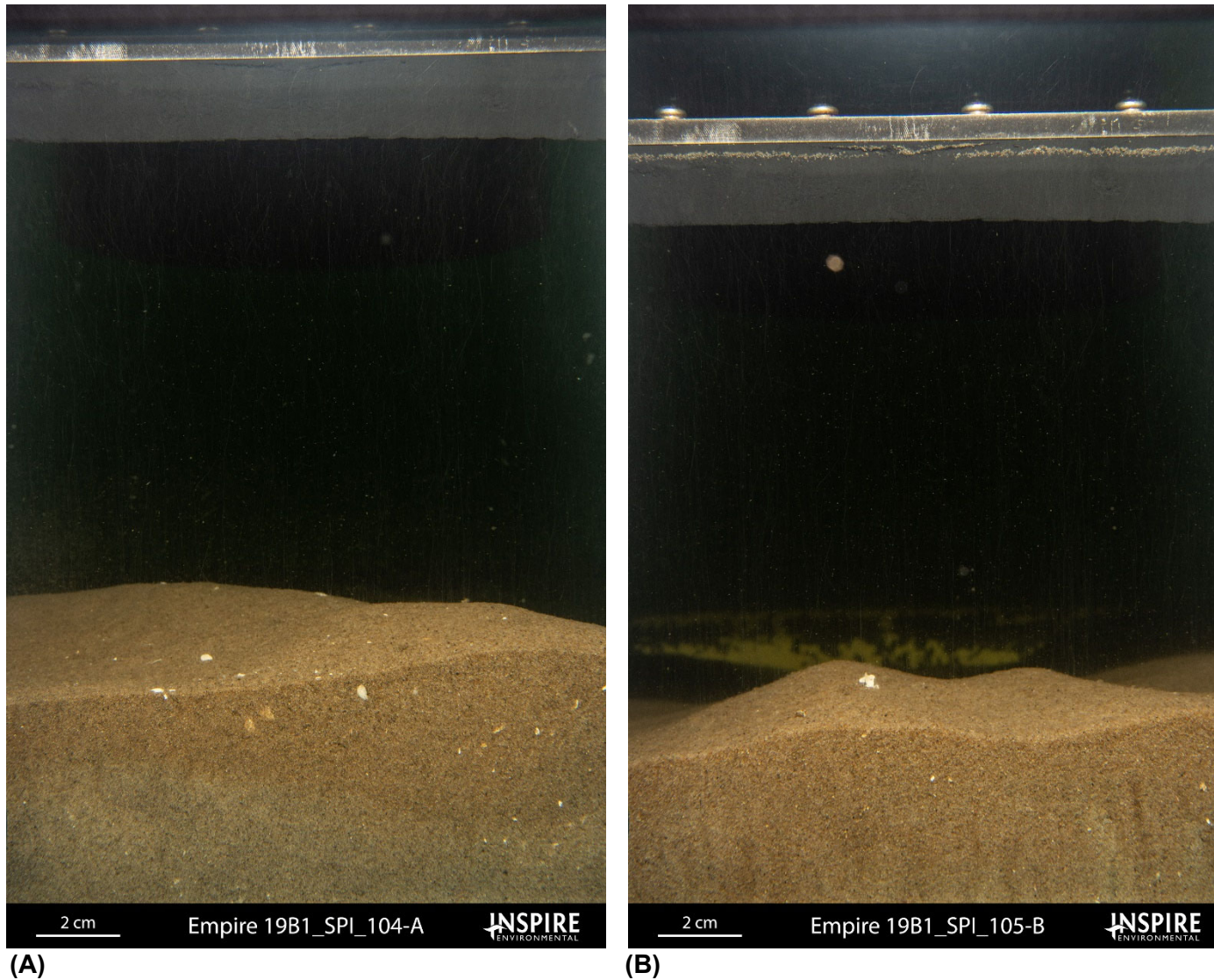


Figure 3-33. Representative SPI images from (A) Station 104 composed of very fine sand; and (B) Station 105 composed of fine sand

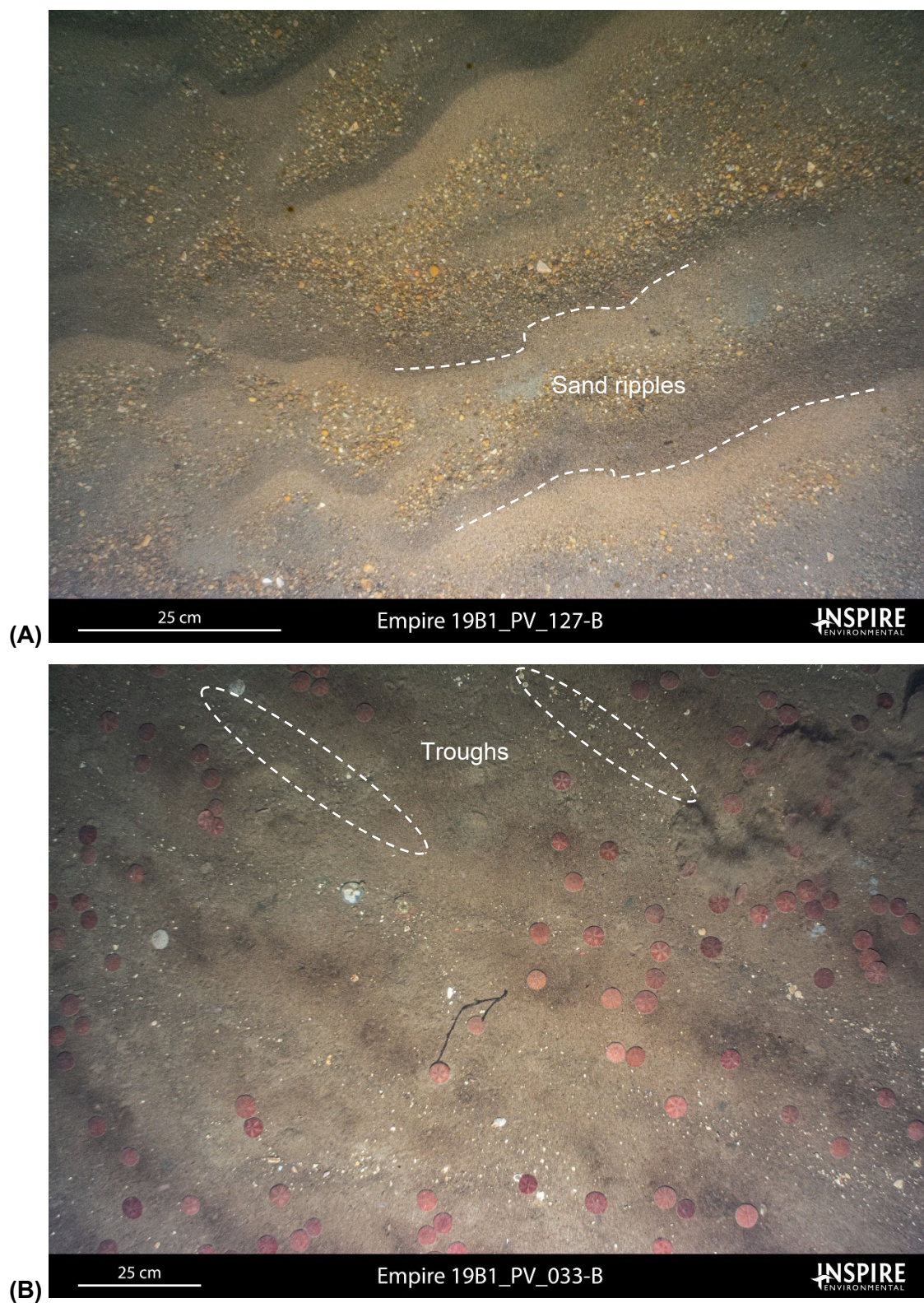


Figure 3-34. Representative PV images depicting (A) pronounced sand ripples at Station 126; and (B) less-defined sand ripples at Station 033. In each image larger grains have settled into the trough of the sand ripples.

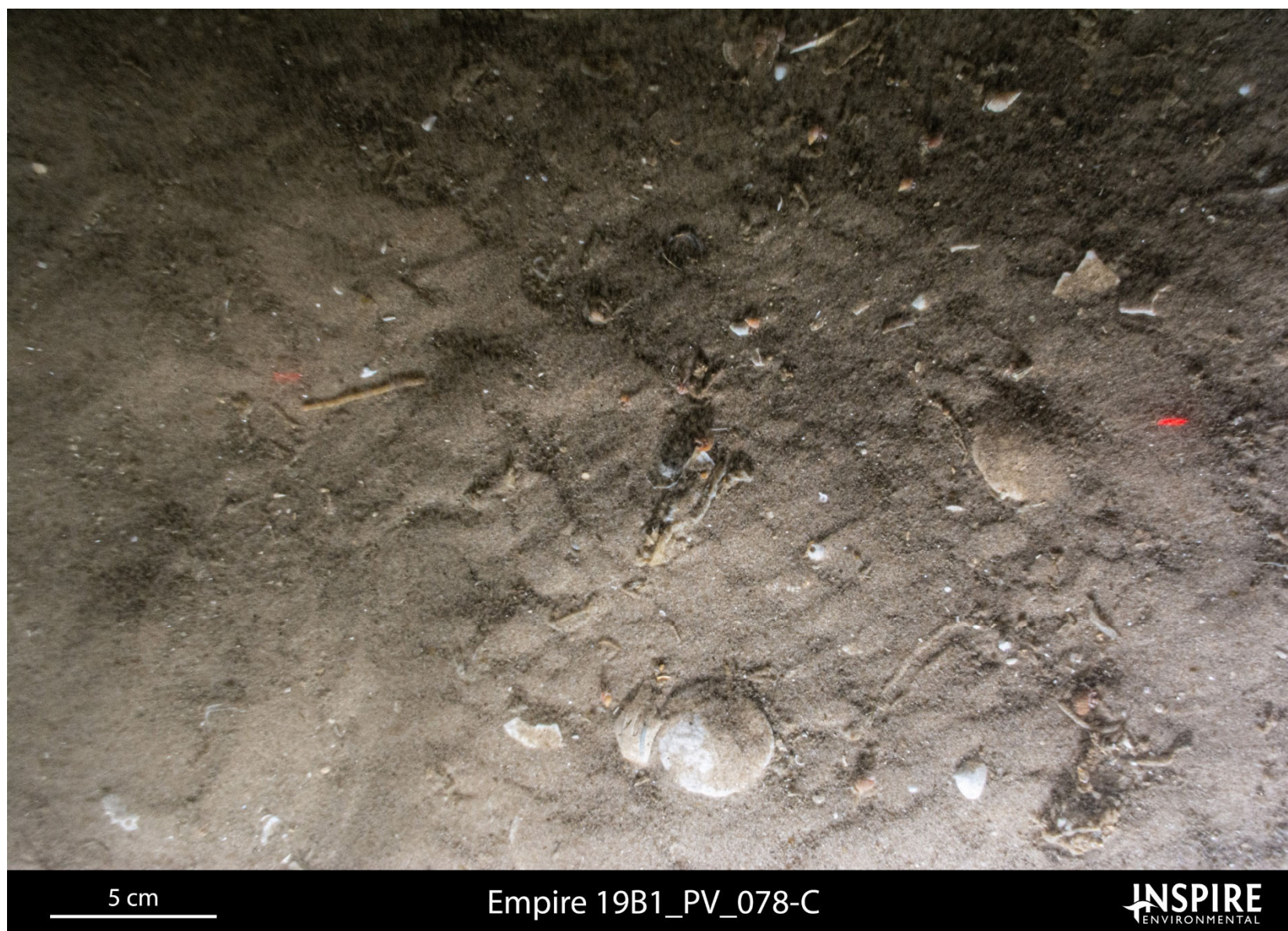


Figure 3-35. Plan view image from Station 078 with numerous small tubes on the seafloor

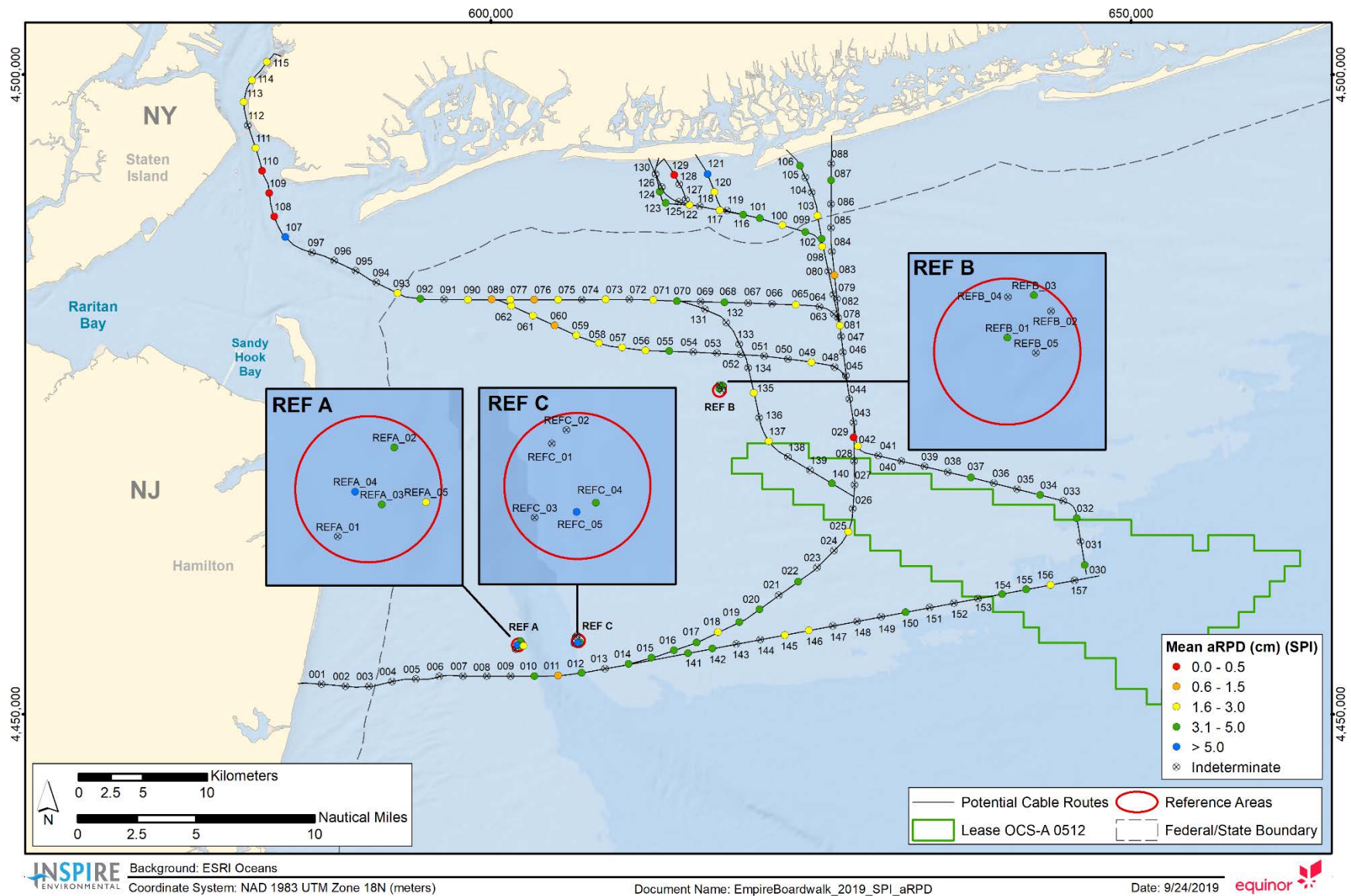


Figure 3-36. Mean station aRPD depth values (cm) at the Equinor Wind survey area

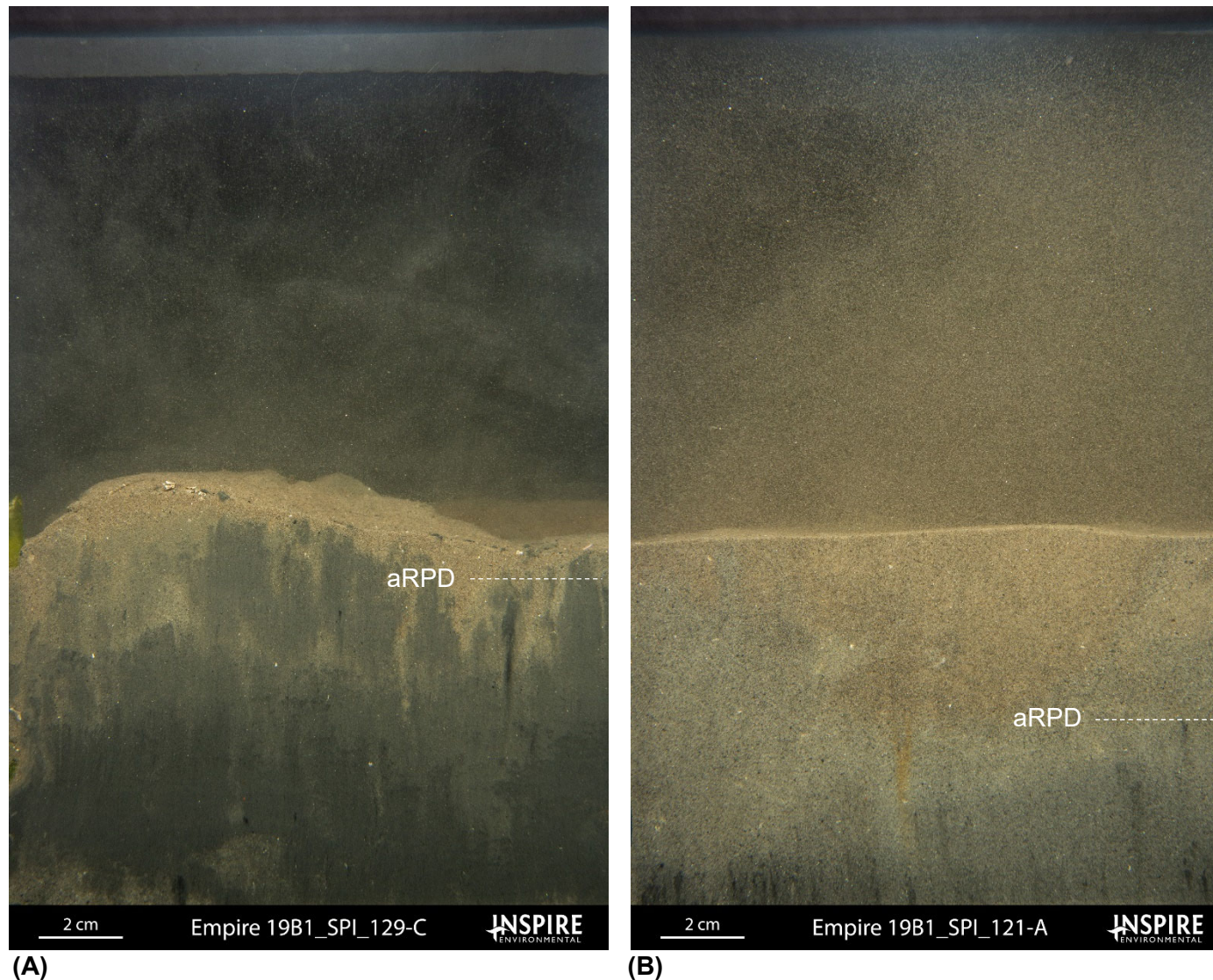


Figure 3-37. Profile images depicting (A) Station 129 with a shallow aRPD and medium sediment oxygen demand (SOD); and (B) Station 121 with a deep aRPD and low SOD. Stations 129 and 121 had the shallowest and deepest aRPDs, respectively, along the Long Island Export Cable Route

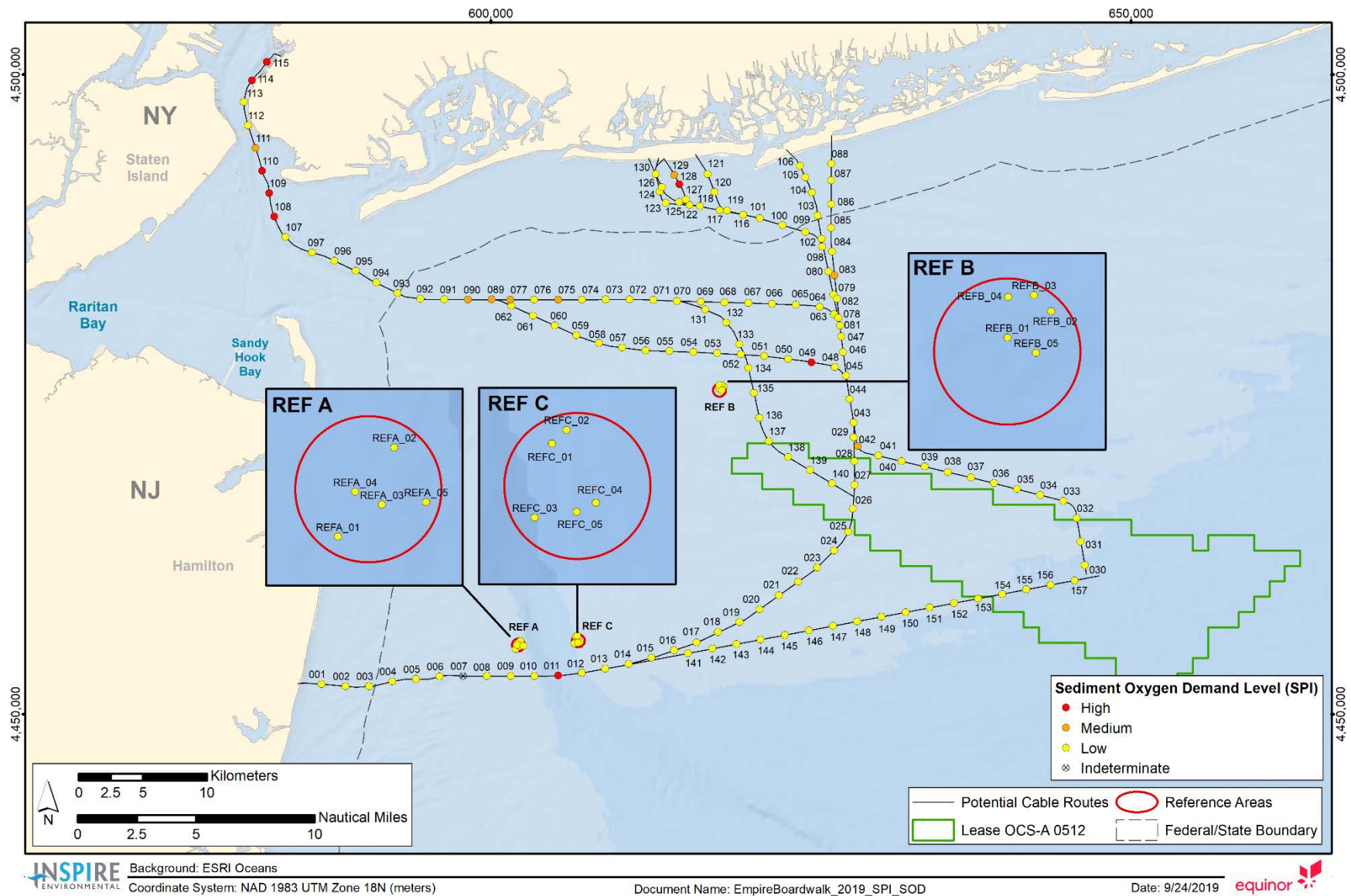


Figure 3-38. Dominant Sediment Oxygen Demand at the Equinor Wind survey area

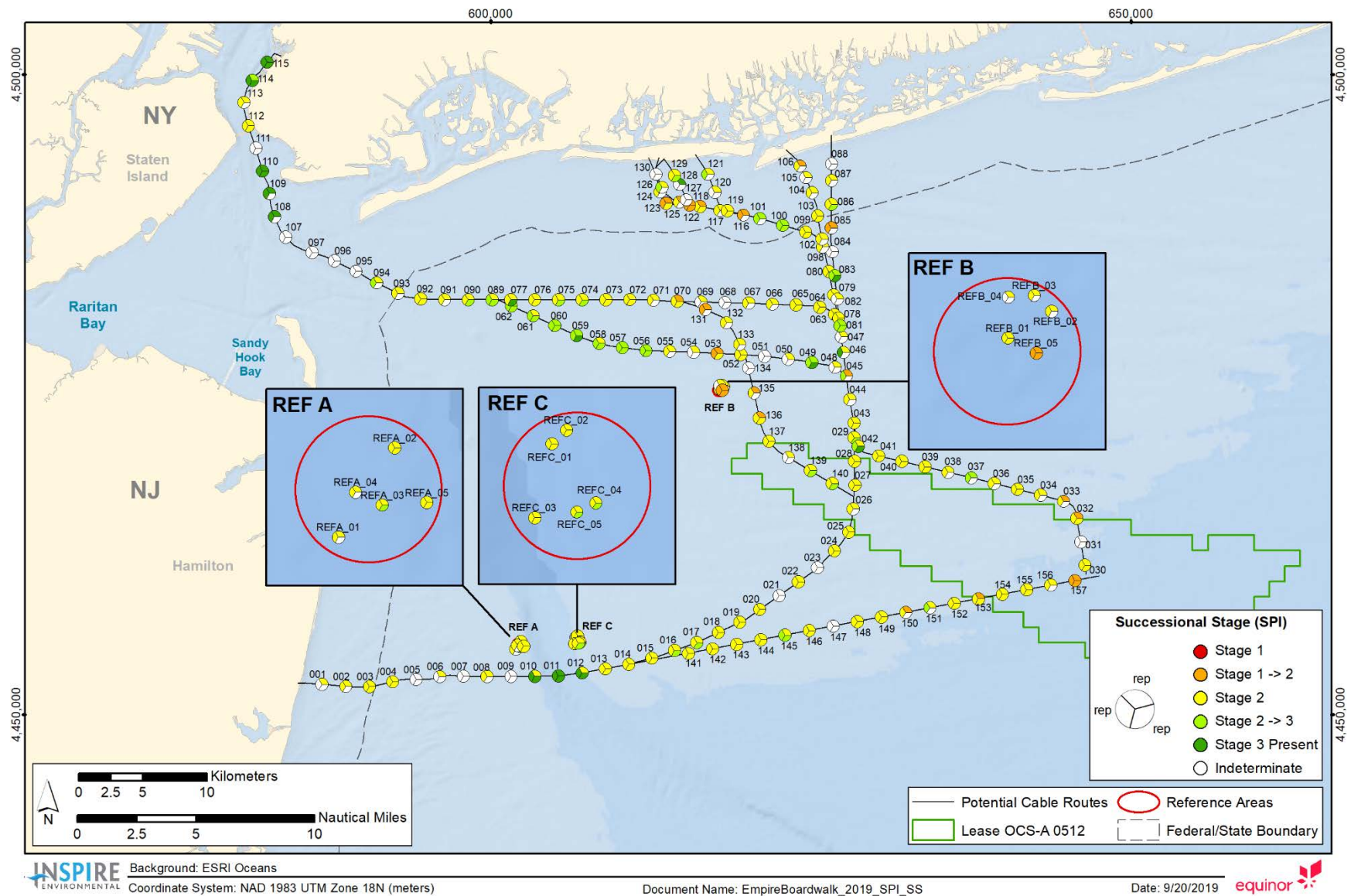


Figure 3-39. Infaunal successional stages at the Equinor Wind survey area. Results shown provide a value for each of three replicate images at each sampling station.

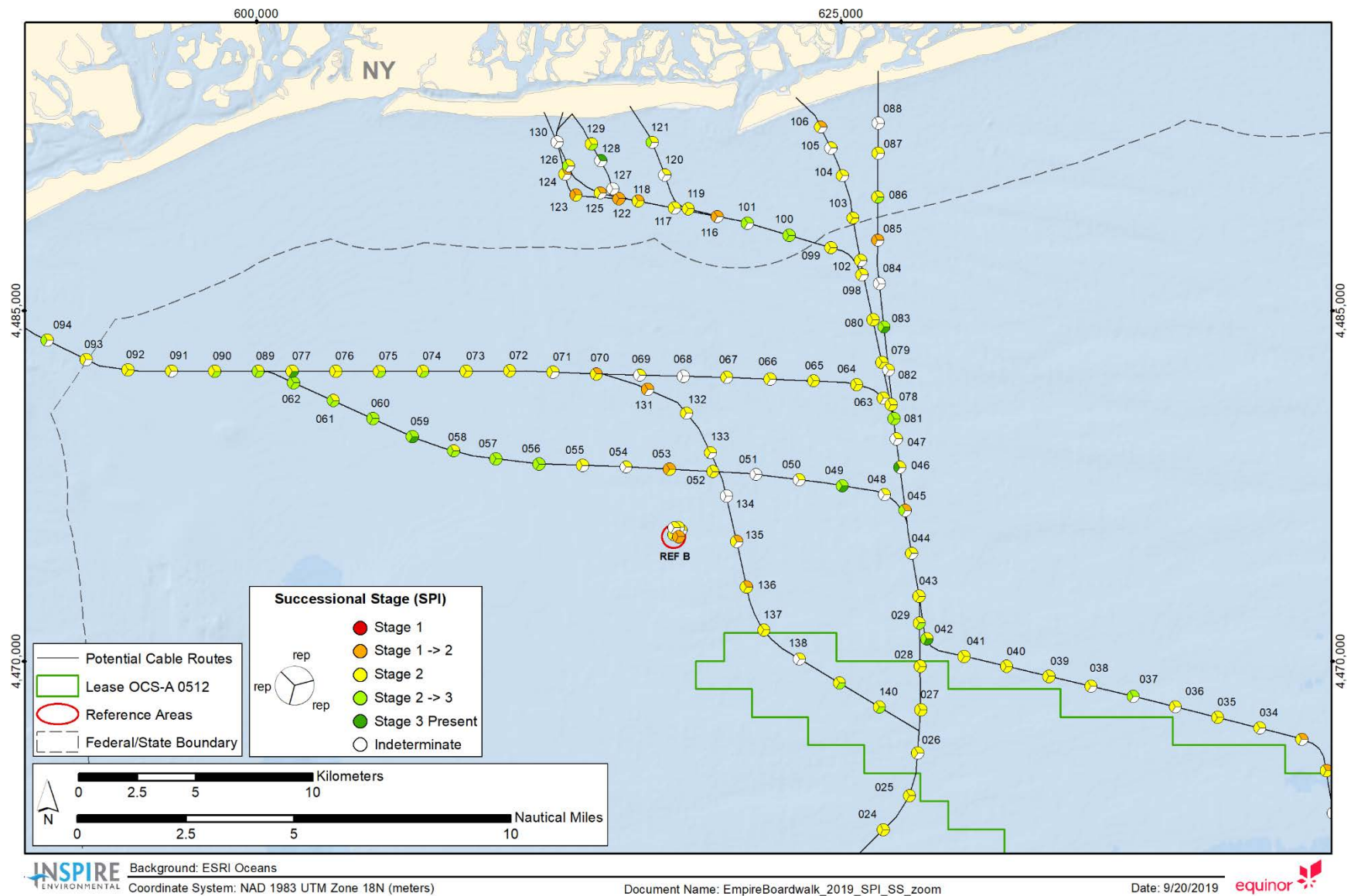


Figure 3-40. Zoom-in of the Long Island export cable route. Infaunal successional stages at the Equinor Wind survey area. Results shown provide a value for each of three replicate images at each sampling station.

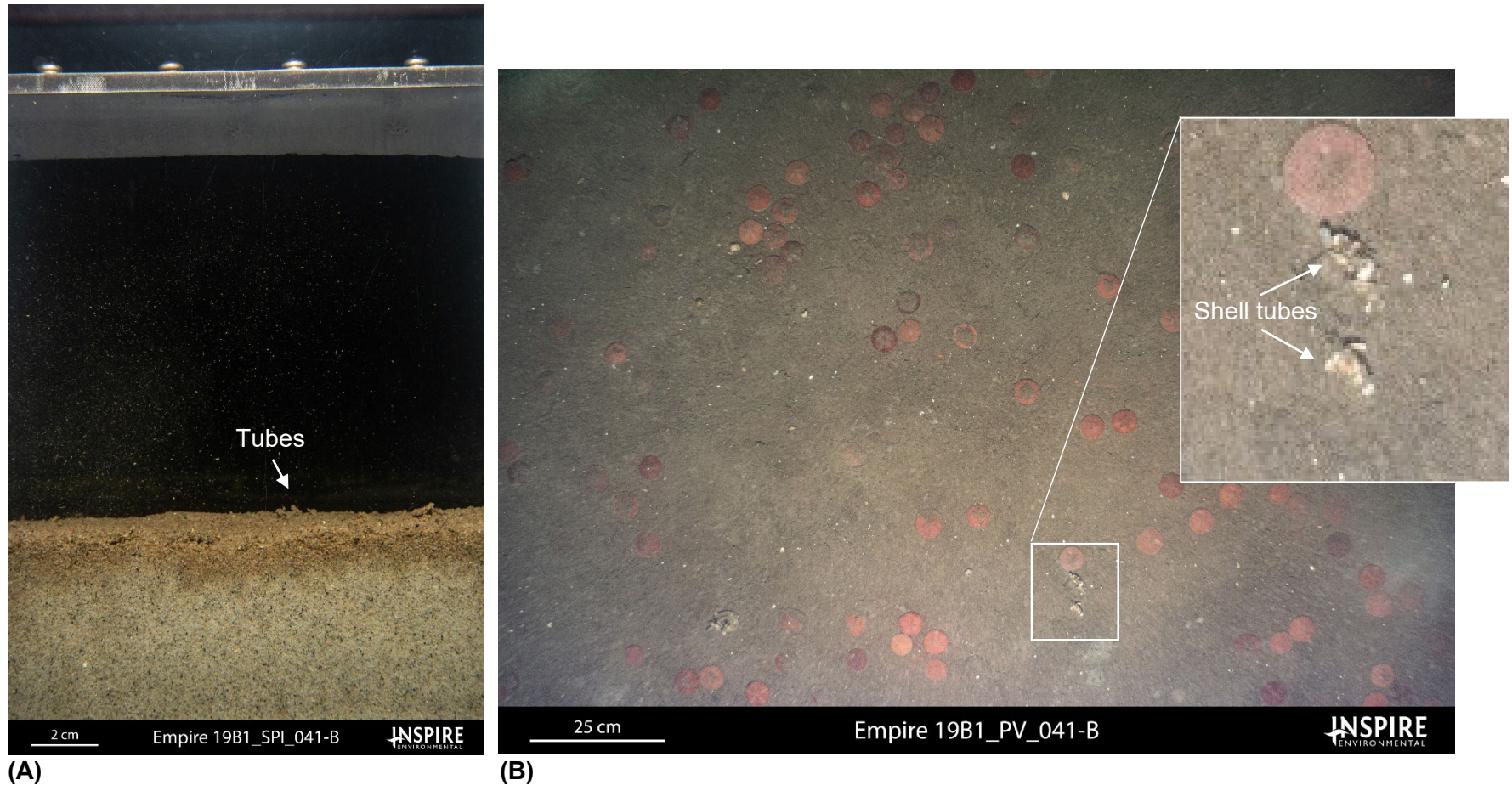


Figure 3-41. Representative profile and plan view images depicting (A) Stage 2 tubes at the sediment-water interface; and (B) Stage 2 shell tubes produced by the polychaete *Diopatra cuprea*

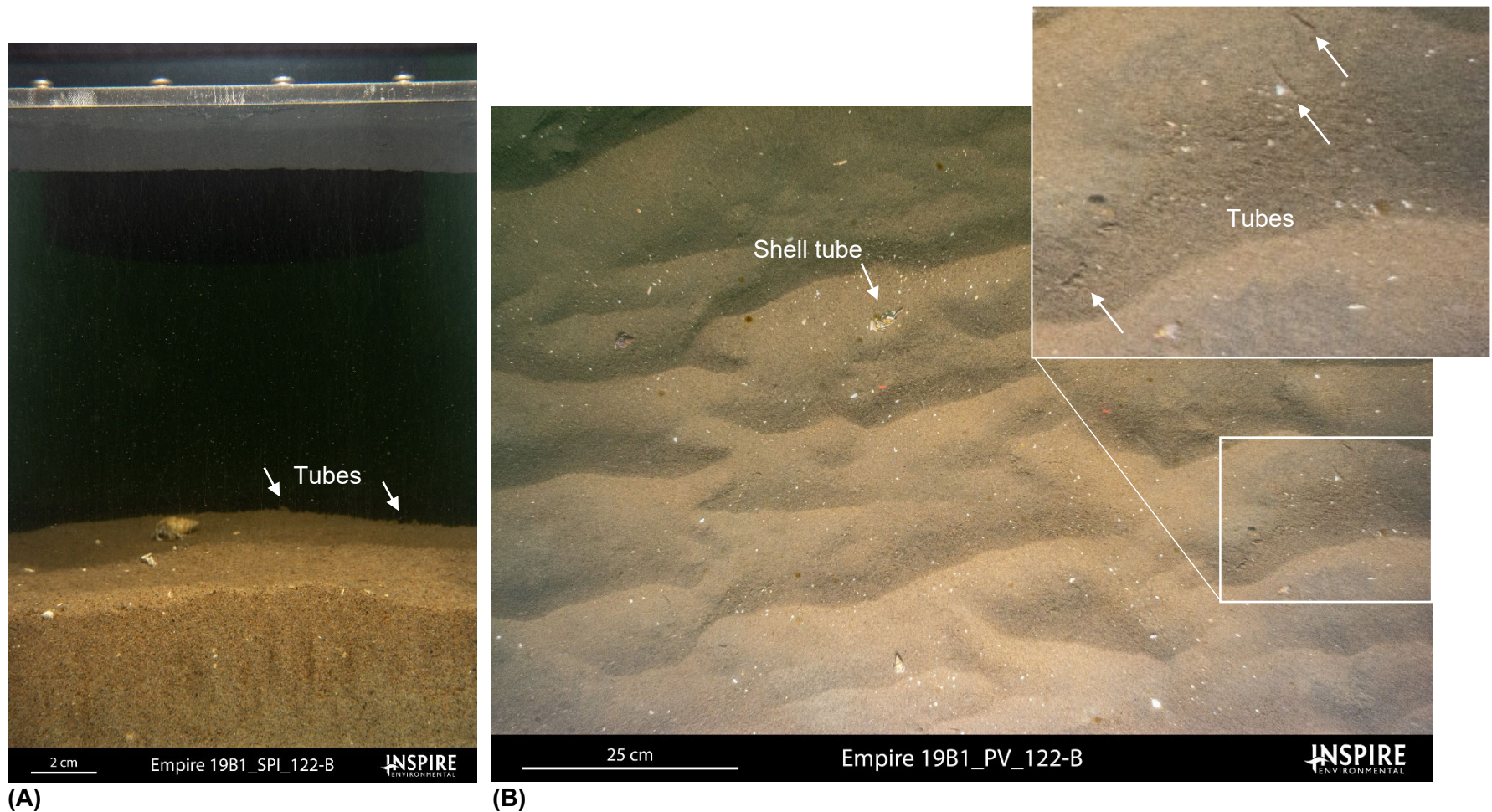


Figure 3-42. *Representative profile and plan view images of a bottom shaped by hydrodynamic forcing with Stage 1->2 succession evidenced by (A) small tubes at the sediment–water interface in the background of the profile image, and (B) tubes in the trough of sand ripples*

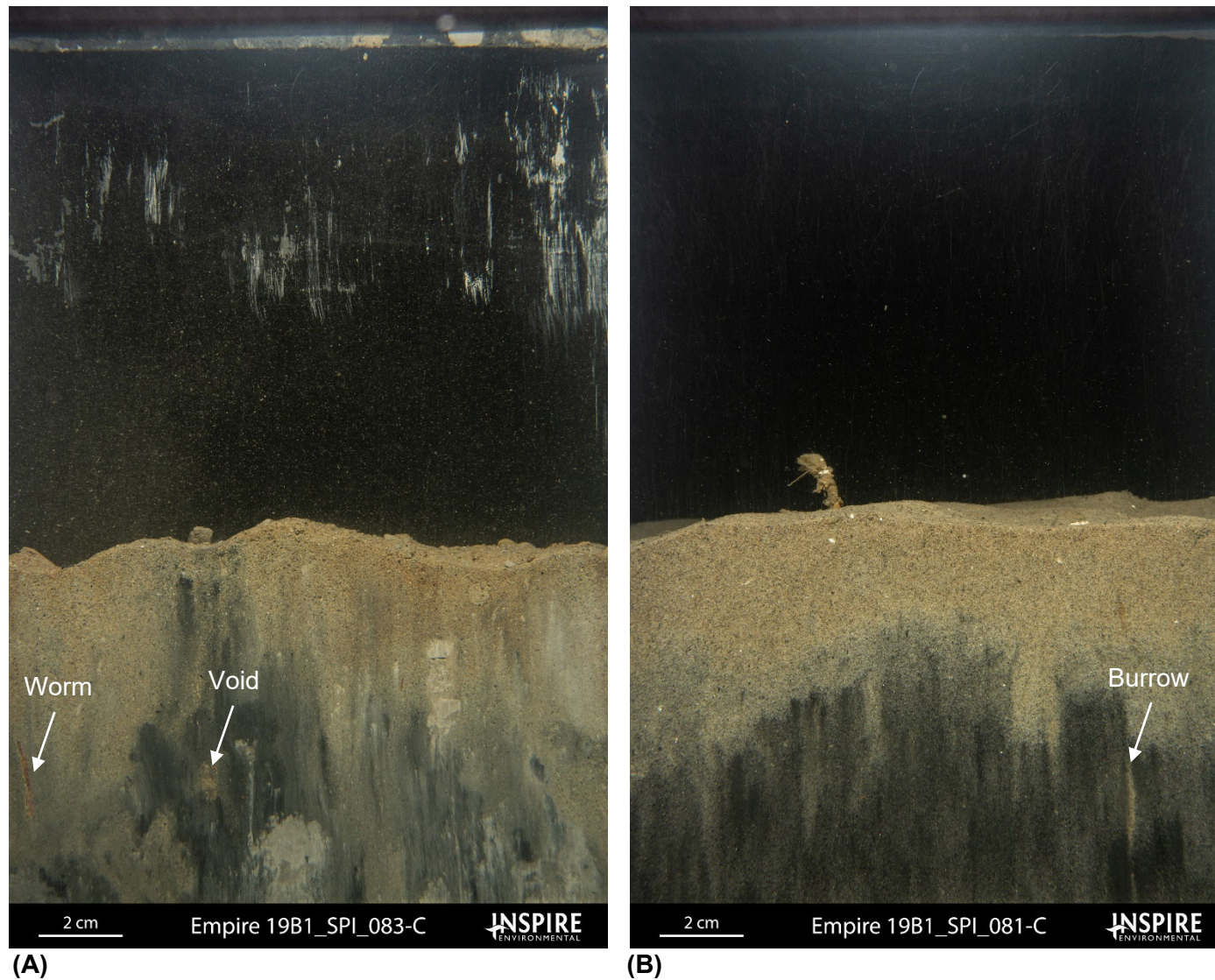


Figure 3-43. Representative profile images of advanced succession at (A) Station 083 with filled and open feeding voids and a large worm in a burrow; and (B) Station 081 with a burrow penetrating deep into the sediment column

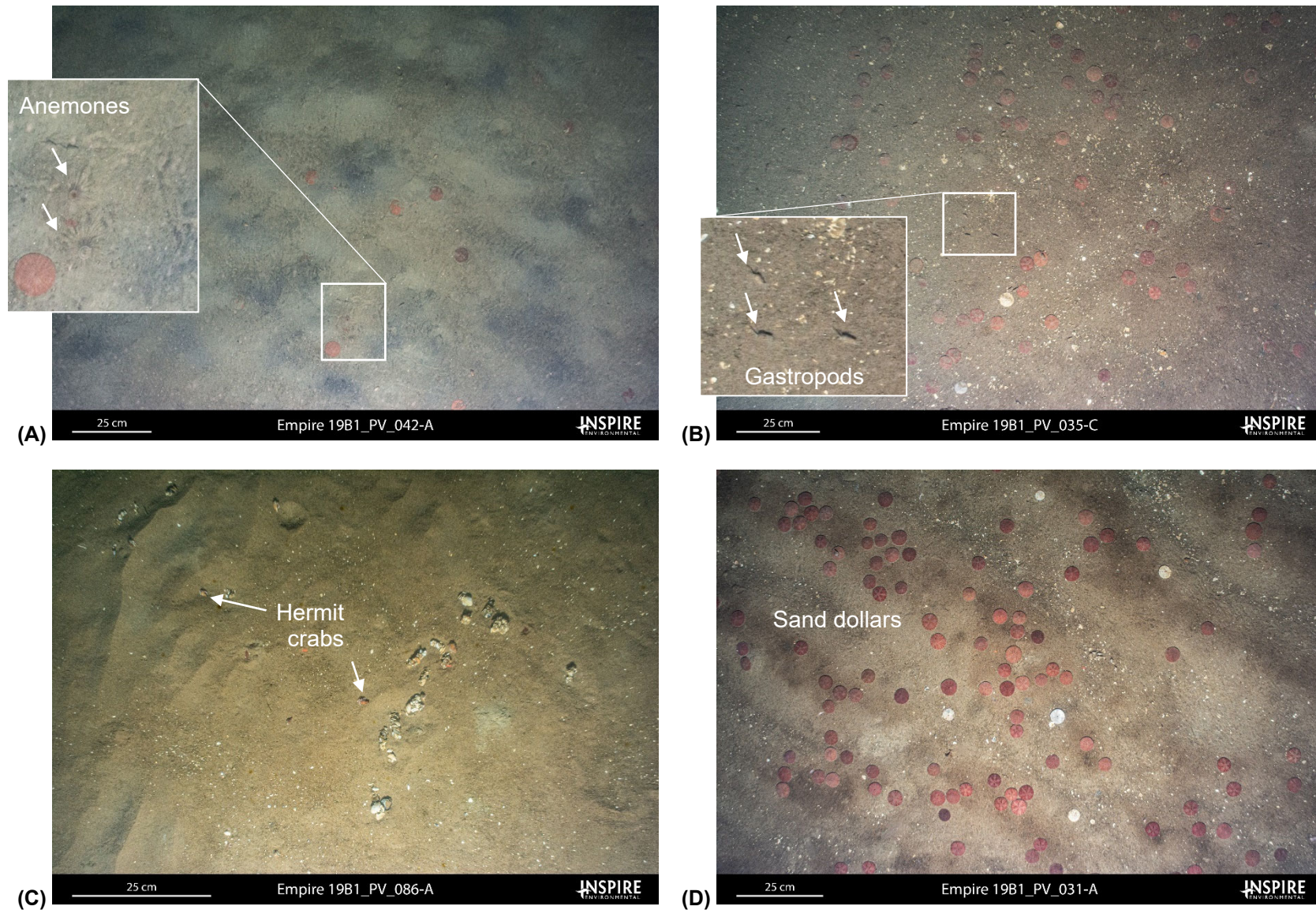


Figure 3-44. Representative plan view images indicating prevalent epifauna along the Long Island Export Cable route where (A) anemones were observed at Station 042; (B) gastropods were documented at Station 035; (C) hermit crabs were observed at Station 086; and (D) sand dollars documented at Station 031

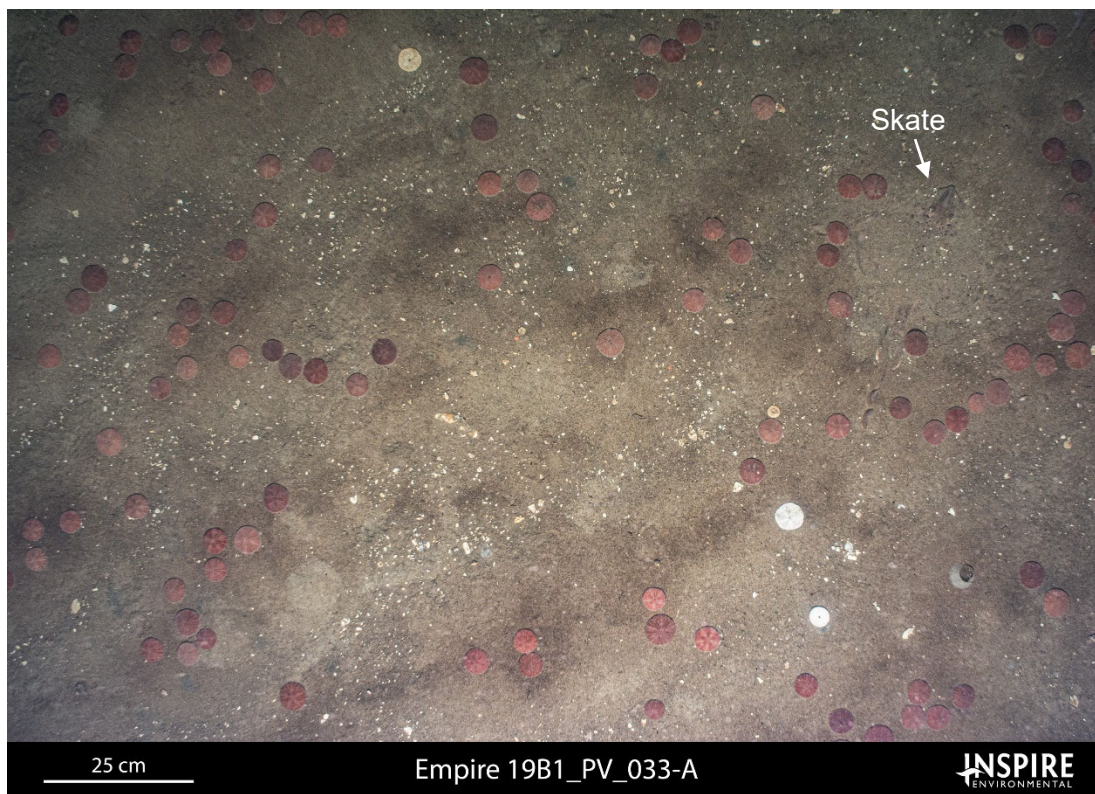
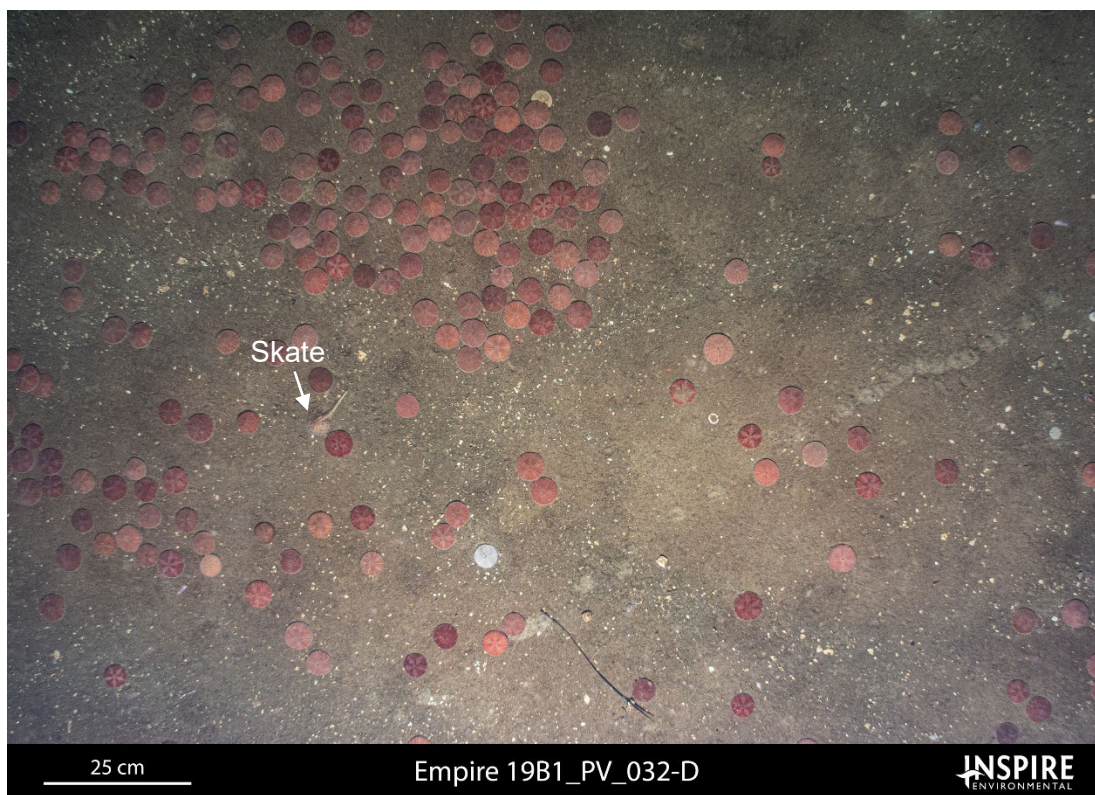


Figure 3-45. Plan view images at Stations 032 and 033 where skate were observed. At Station 033 the skate was observed partially buried in the seafloor.

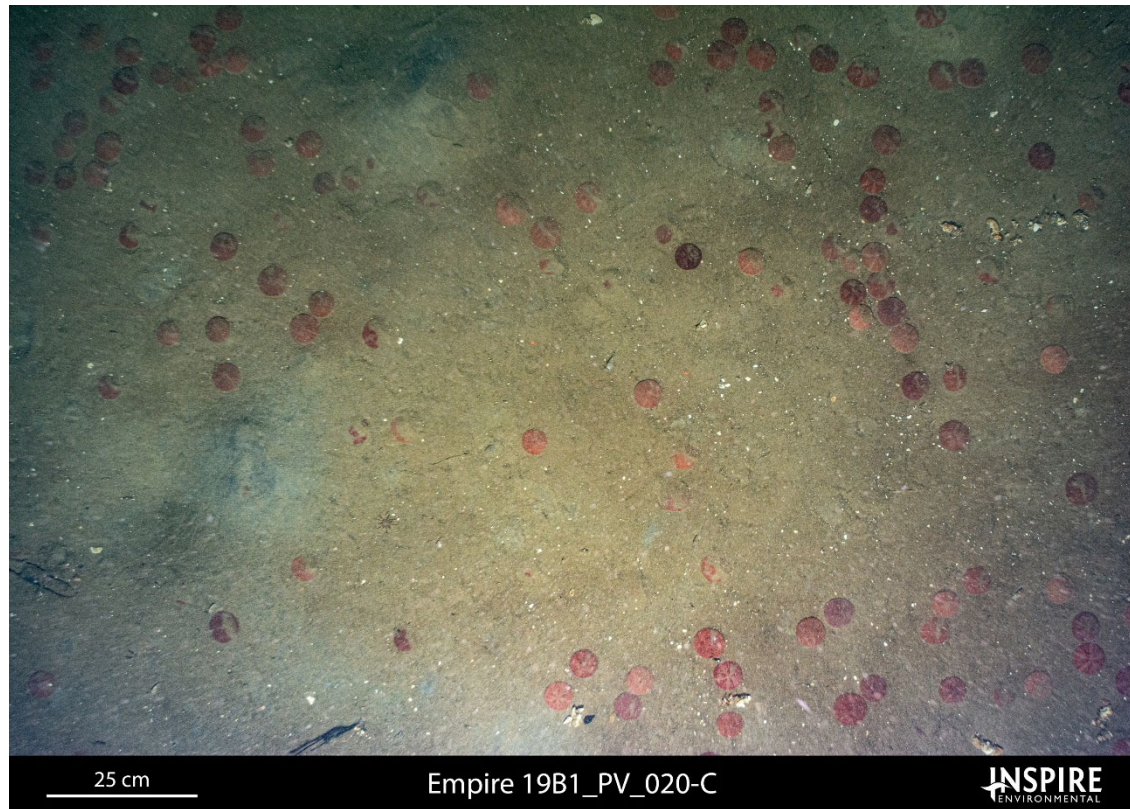


Figure 3-46. *Representative profile and plan view images composed of very fine sand with sand dollars covering the seafloor*

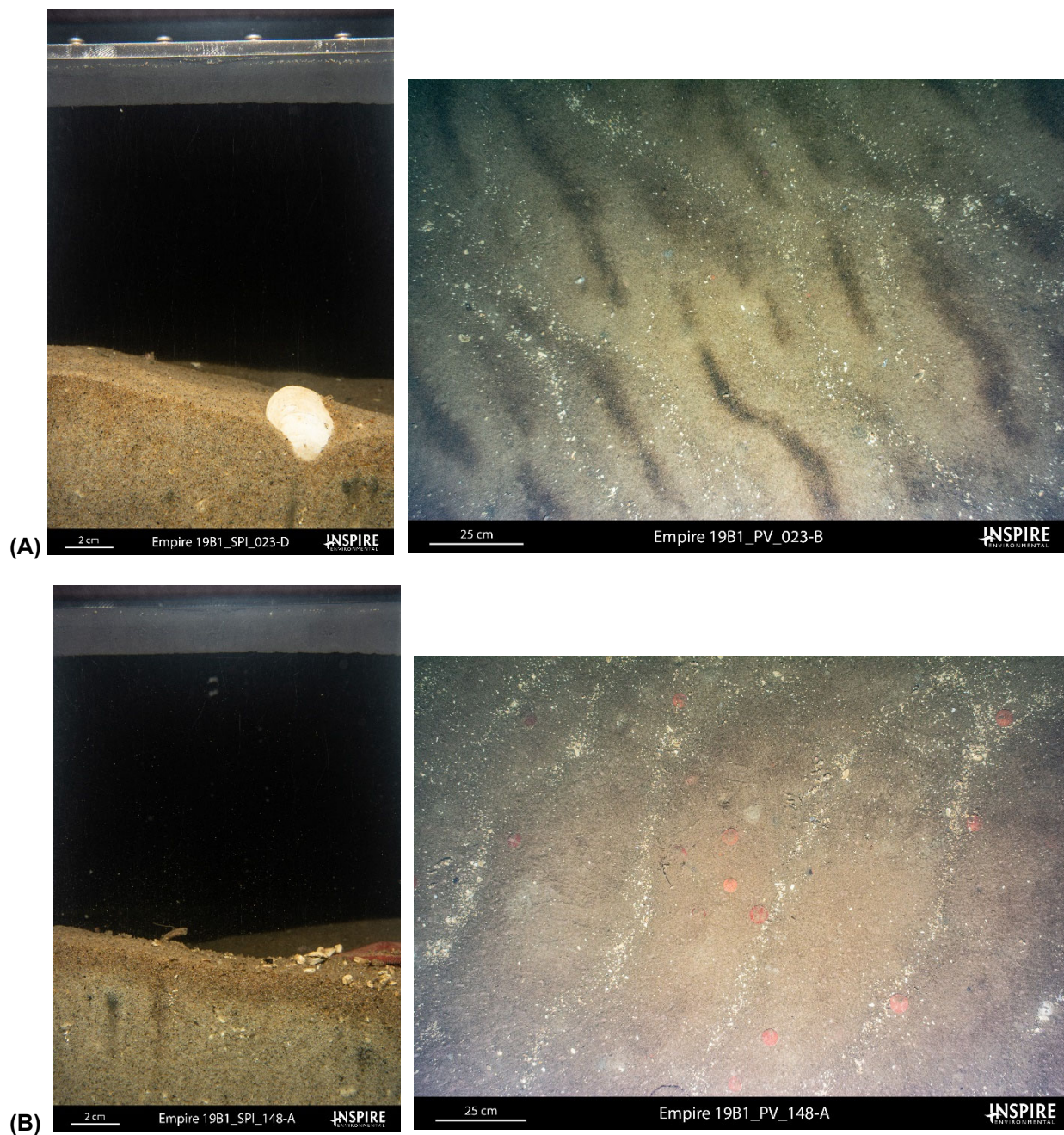


Figure 3-47. Profile images depicting bedforms at (A) Station 023 with uneven sand ripples; and (B) Station 148 with well-formed sand ripples

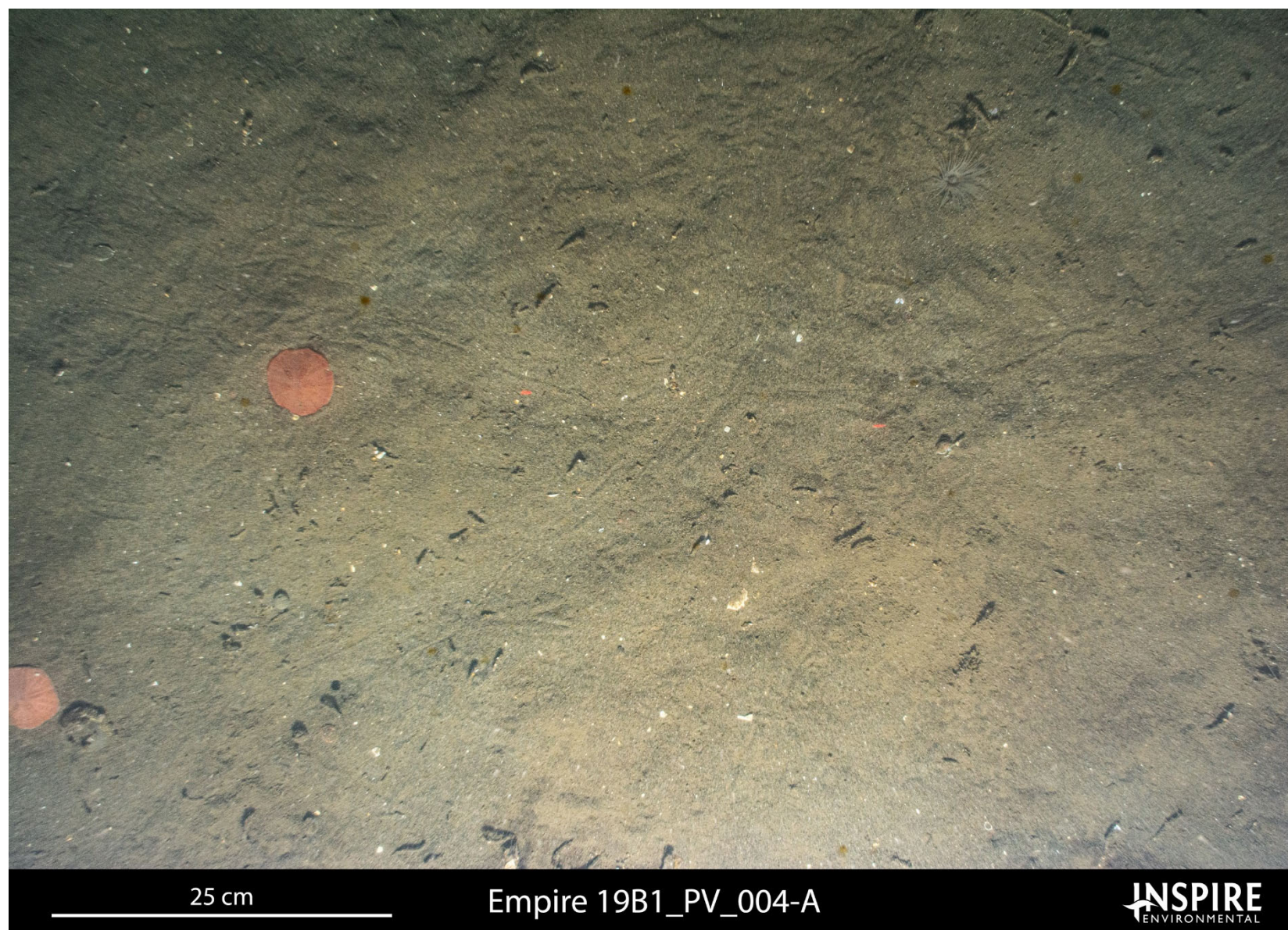


Figure 3-48. *Representative plan view image of the Inferred Fauna Co-occurring Biotic Subclass, indicated by tracks on the seafloor*

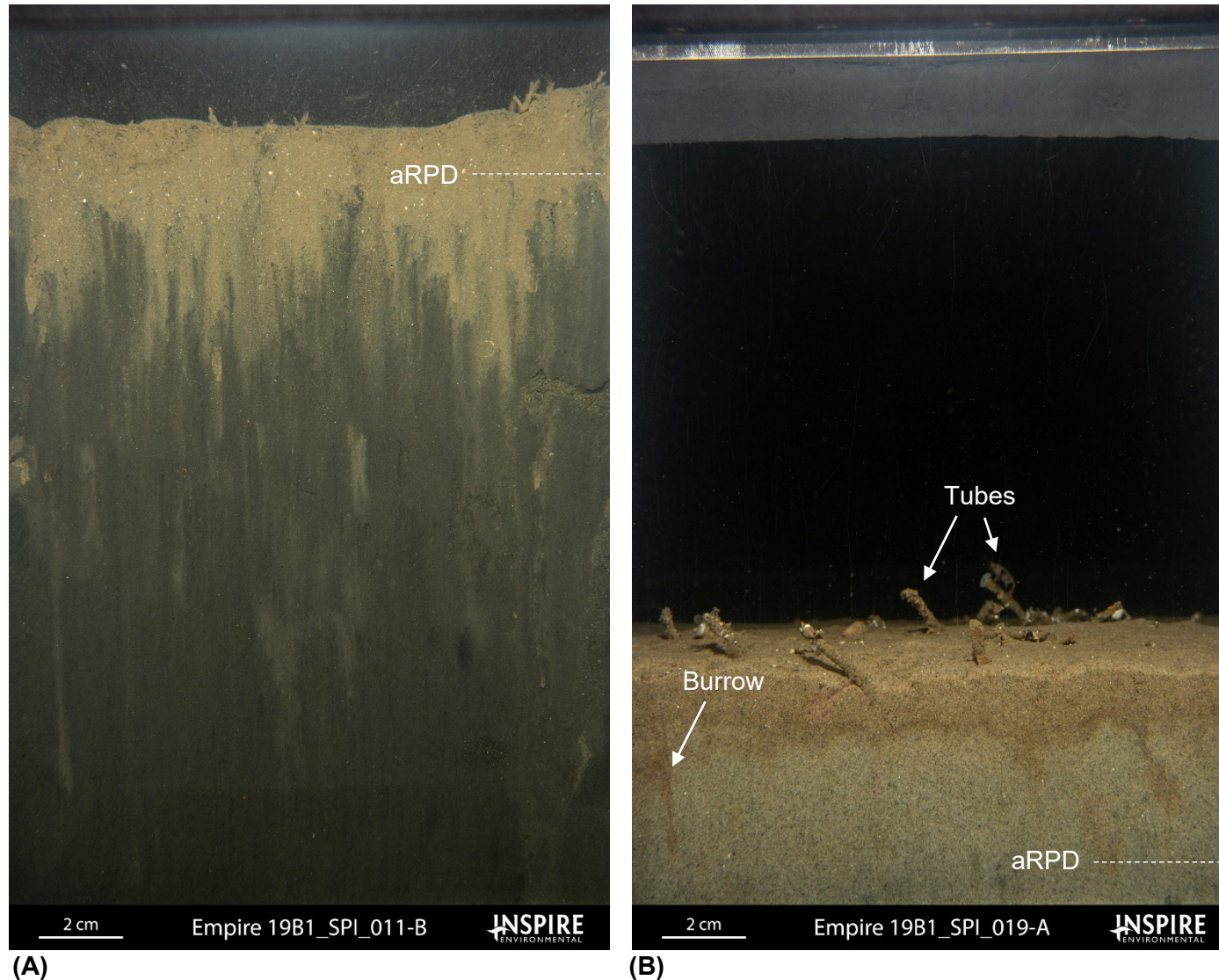


Figure 3-49. Profile images depicting (A) Station 011 with a shallow aRPD and high sediment oxygen demand (SOD); and (B) Station 019 with a deep aRPD, low SOD, and Stage 2 tubes and shallow burrowing. Stations 011 and 019 had the shallowest and deepest aRPDs, respectively, along the New Jersey Export Cable Route

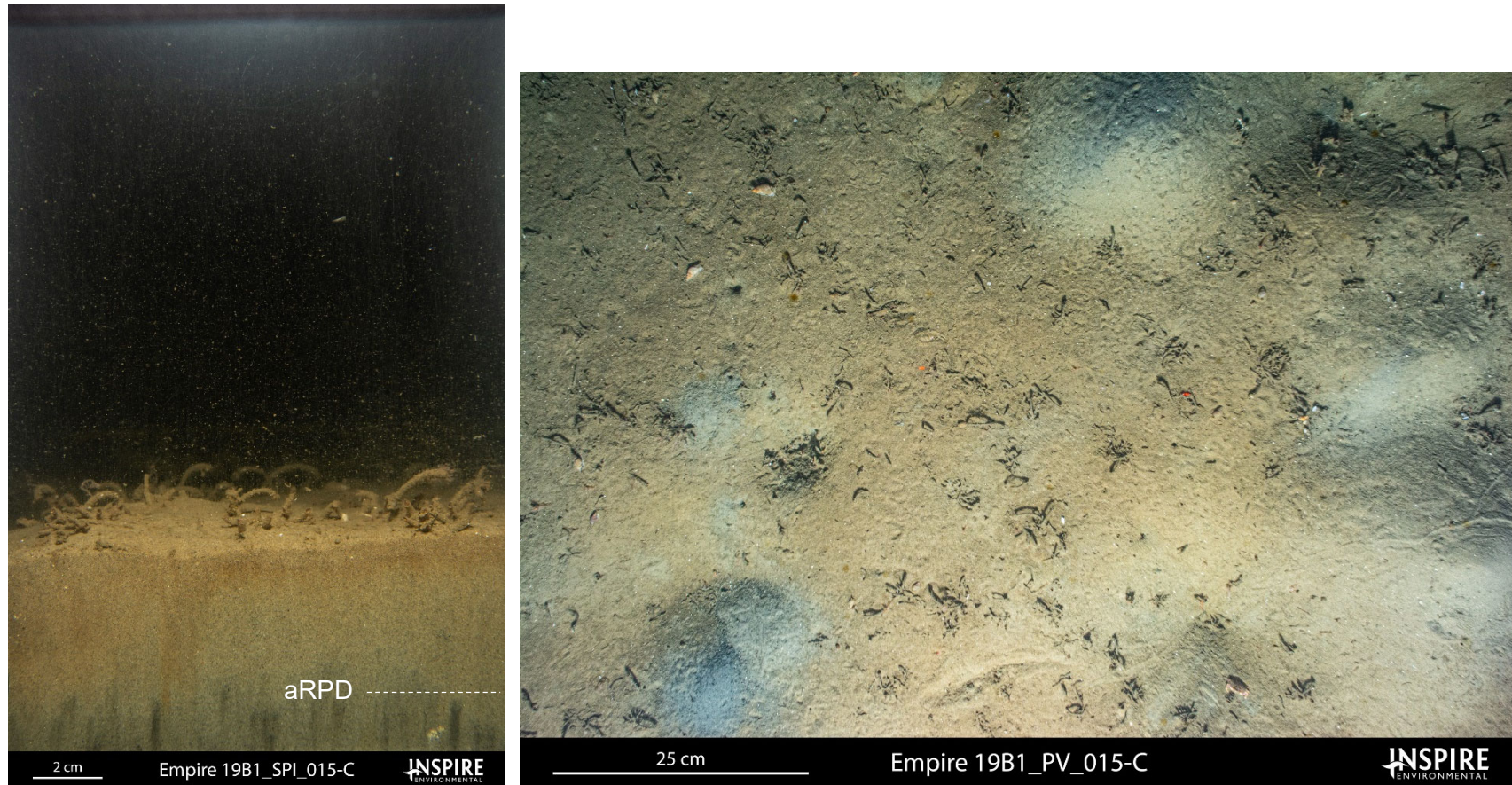


Figure 3-50. *Profile and plan view images at Station 015 depicting a seafloor composed of mobile fine sand with heavy biological reworking from tube and burrowing fauna (gray mounds). These combined processes result in a deep aRPD >3.0 cm.*

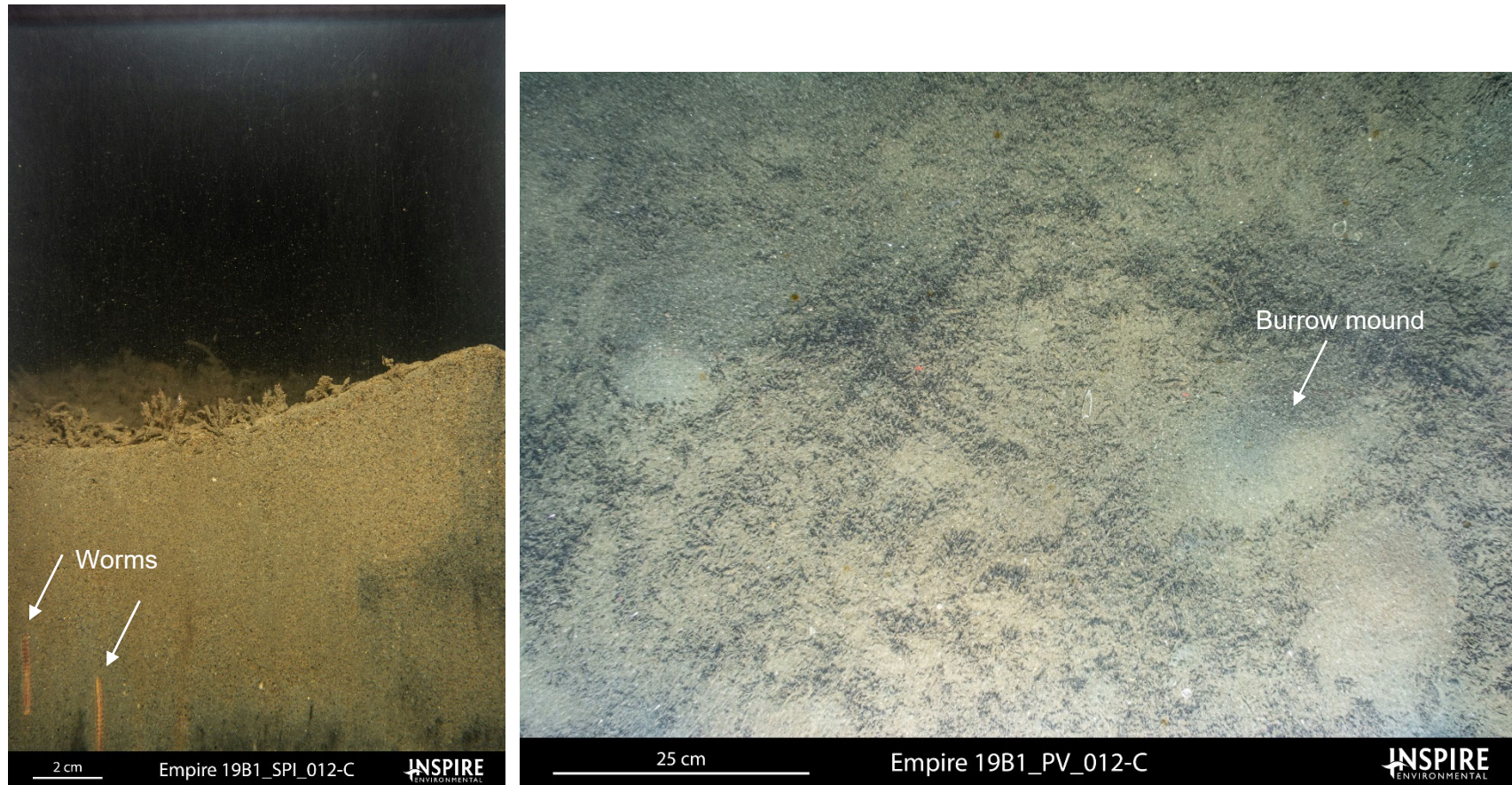


Figure 3-51. *Profile and plan view images at Station 012 depicting evidence of deep burrowing fauna in the sediment and on the seafloor*

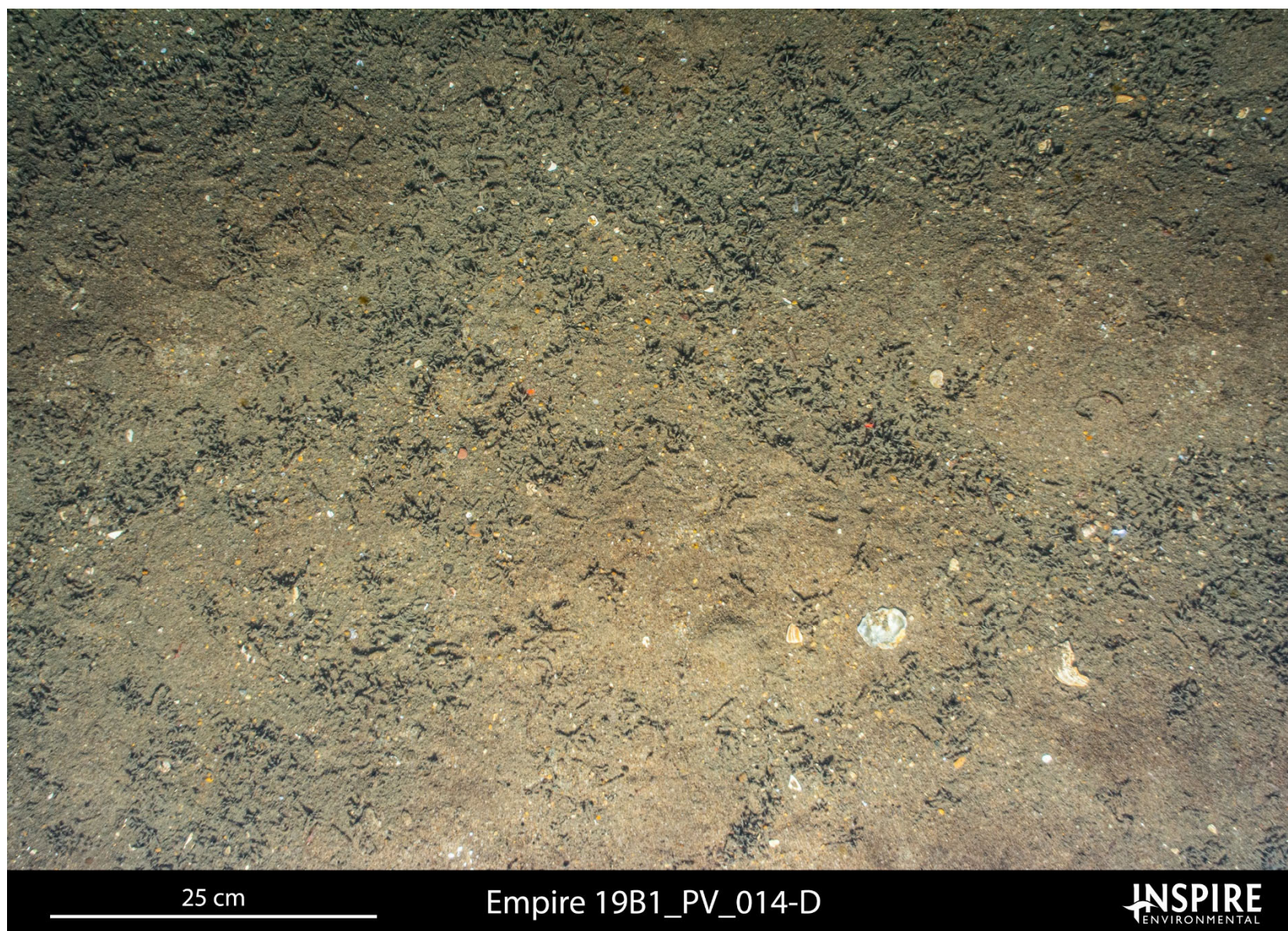


Figure 3-52. Plan view image at Station 014 depicting a seafloor covered in polychaete tubes

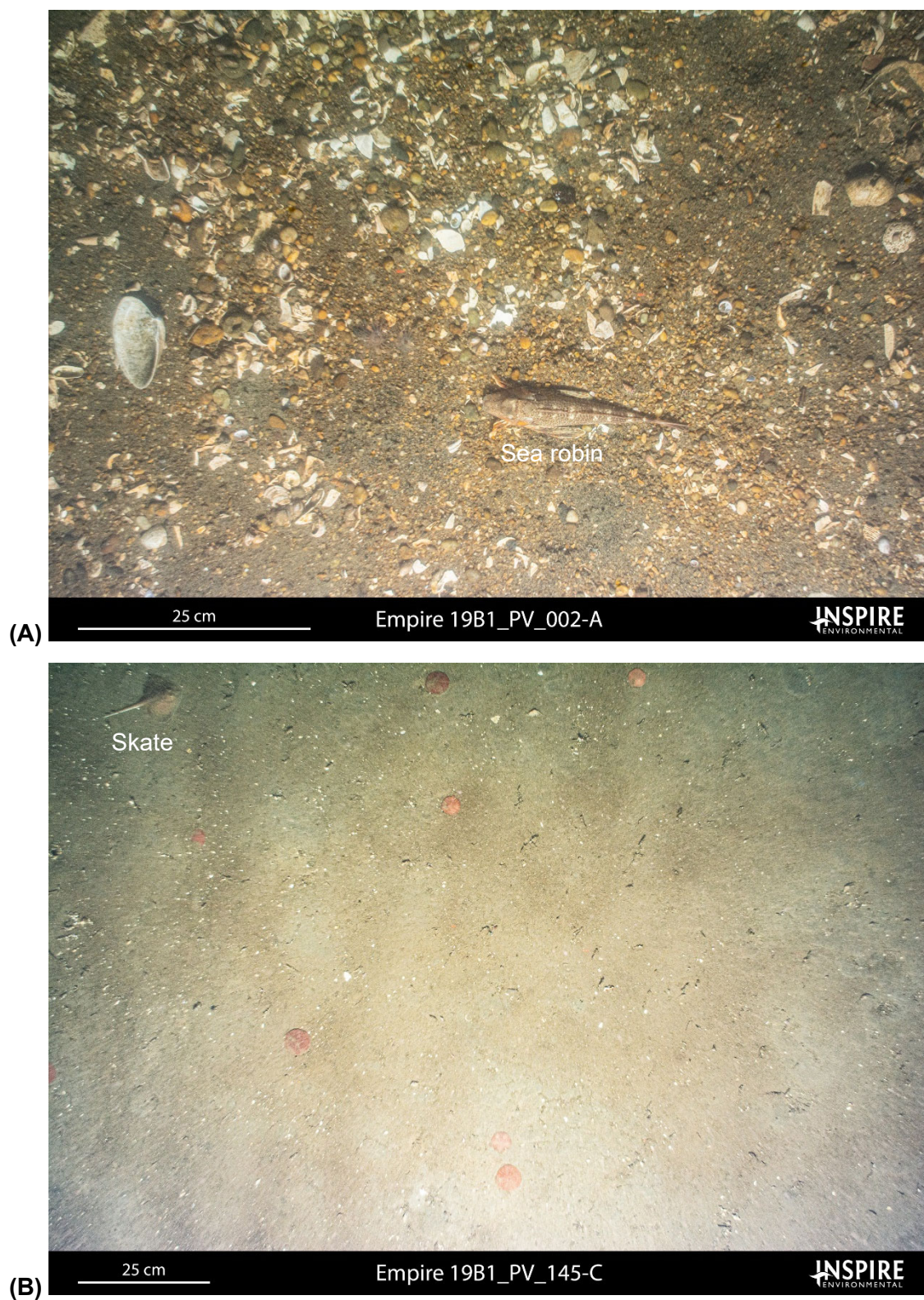


Figure 3-53. Plan view images at (A) Station 002 with a sea robin; and (B) Station 145 with a skate

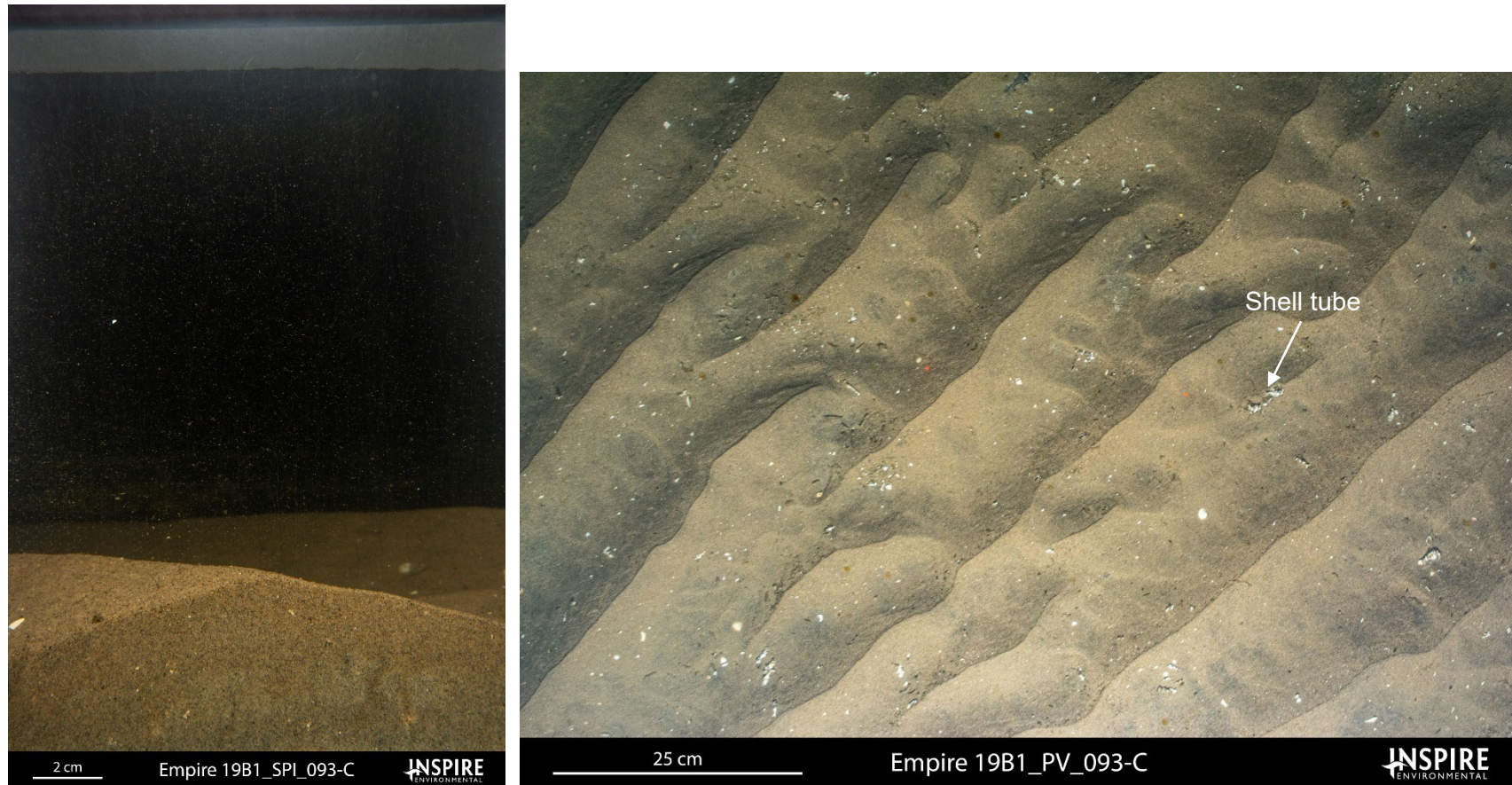


Figure 3-54. *Profile and plan view images at Station 093 composed of fine sand with *Diopatra cuprea* tubes in the trough of the sand ripples. Profile image shows an aRPD driven by sediment transport.*



Figure 3-55. *Profile and plan view image at Station 069 composed of coarse sand, with well-formed sand ripples*



Figure 3-56. Profile image of Station 115 composed of silt-clay with deep prism penetration and the presence of feeding voids, deep burrowing fauna, and tubes on the sediment surface



Figure 3-57. *Profile and plan view images at Station 068 with mussels present on the seafloor along with tube building fauna (mussels visible in the background of the profile image). The sediment oxygen demand is low and the aRPD extends beneath the prism penetration.*



Figure 3-58. Profile images depicting (A) Station 110 with a diffusional aRPD and high sediment oxygen demand (SOD), note oxic brown sediment is dragged down into sediment column; and (B) Station 107 with a deep aRPD and medium SOD. Stations 110 and 107 had the shallowest and deepest aRPDs, respectively, along the New York Harbor Export Cable Route.

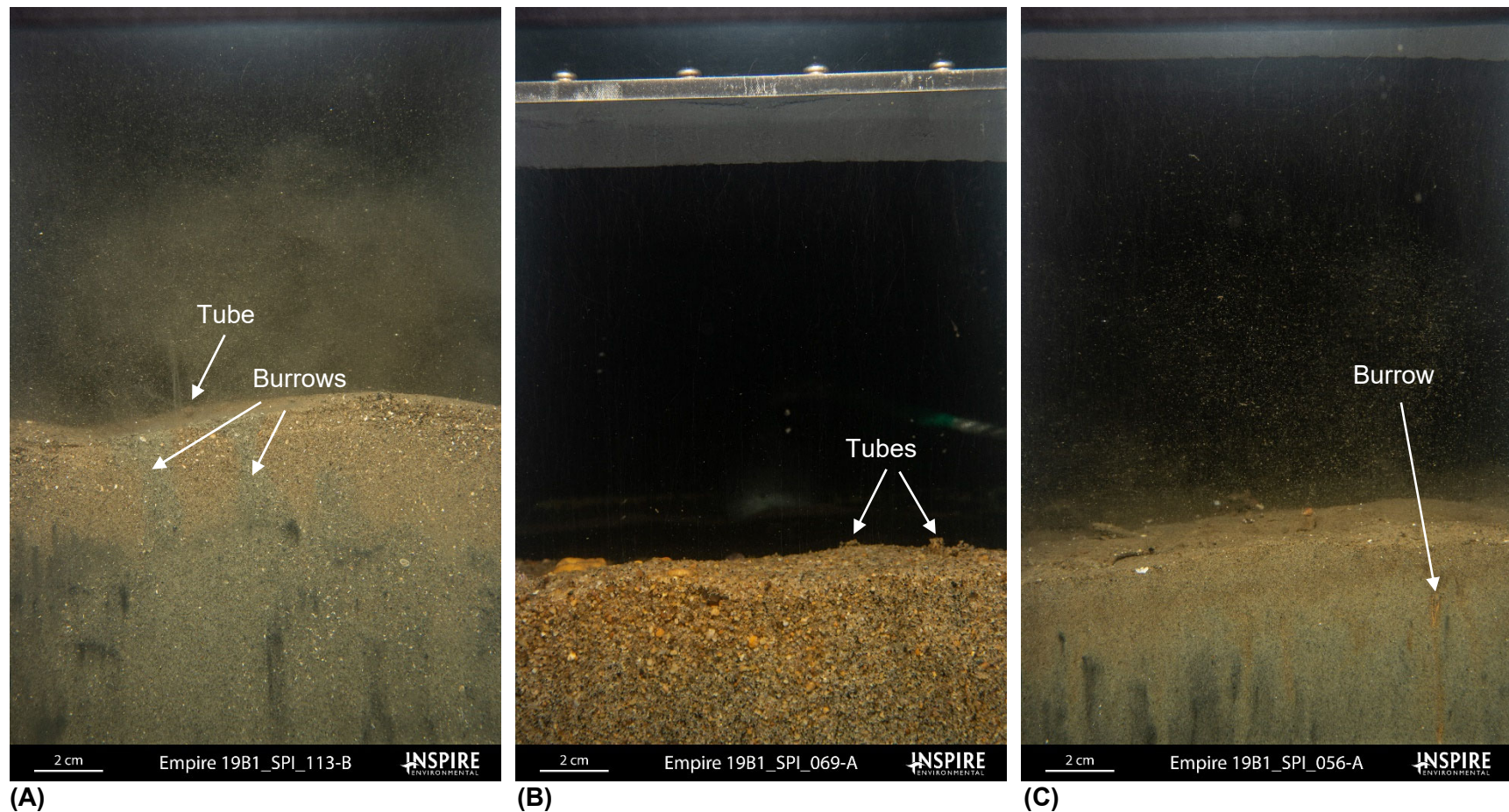


Figure 3-59. Profile images at (A) Station 113 depicting Stage 2 succession with shallow burrowing and a tube in the background; (B) Station 069 depicting Stage 2 succession evidenced by tubes at the sediment–water interface; and (C) Station 056 depicting Stage 2->3 succession evidence by large burrowing fauna

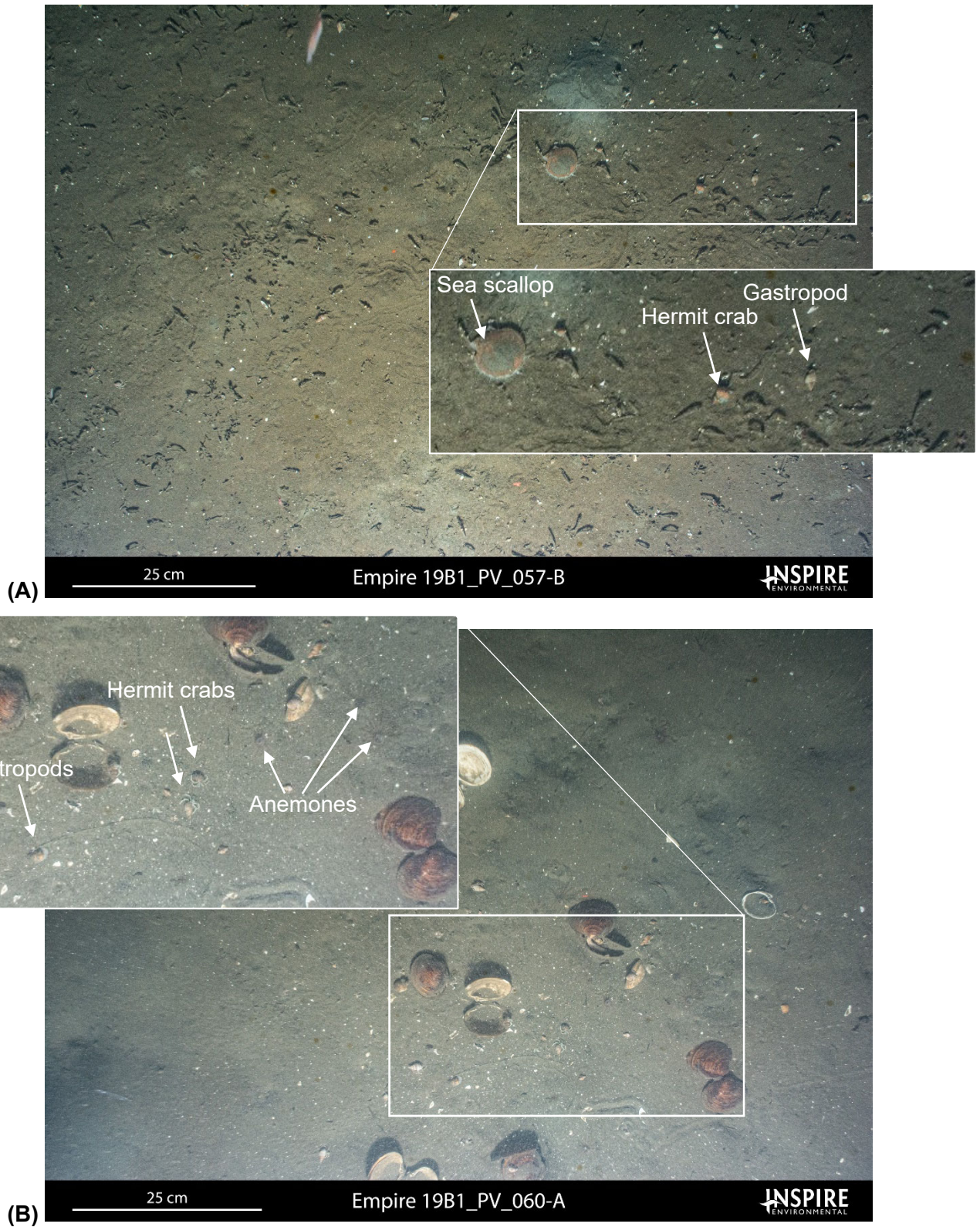


Figure 3-60. Plan view images at (A) Station 057 with a sea scallop visible amongst numerous hermit crabs and gastropods; and (B) Station 060 with numerous burrowing anemones, hermits crabs, and gastropods present



Figure 3-61. Plan view image at Station 074 with *Diopatra cuprea* tubes covering the seafloor

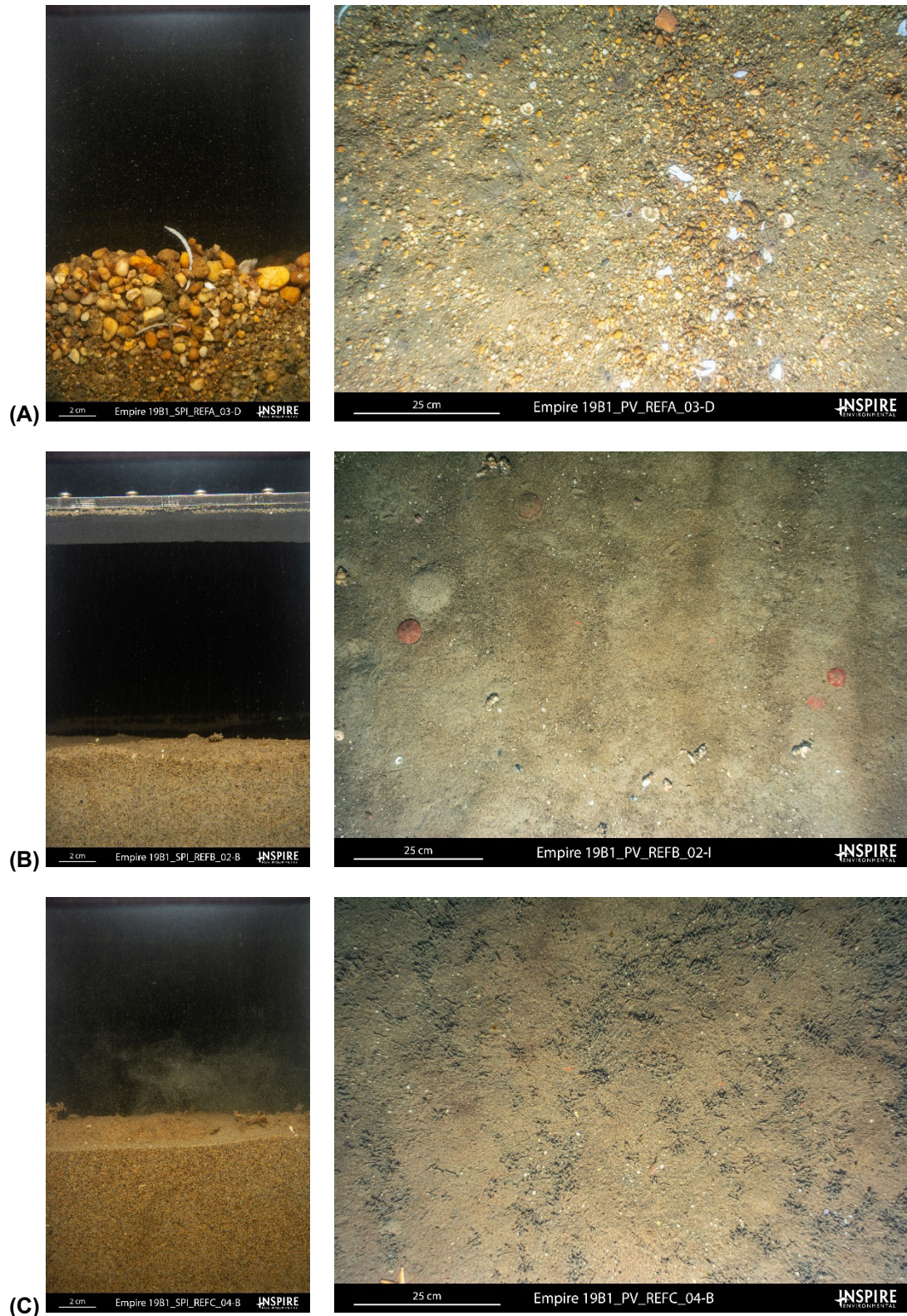


Figure 3-62. Representative profile and plan view images at (A) Station REFA_03 composed of pebbles over fine sand; (B) Station REFB_02 composed of medium sand over finer sediment, and (C) Station REFC_04 composed of medium sand

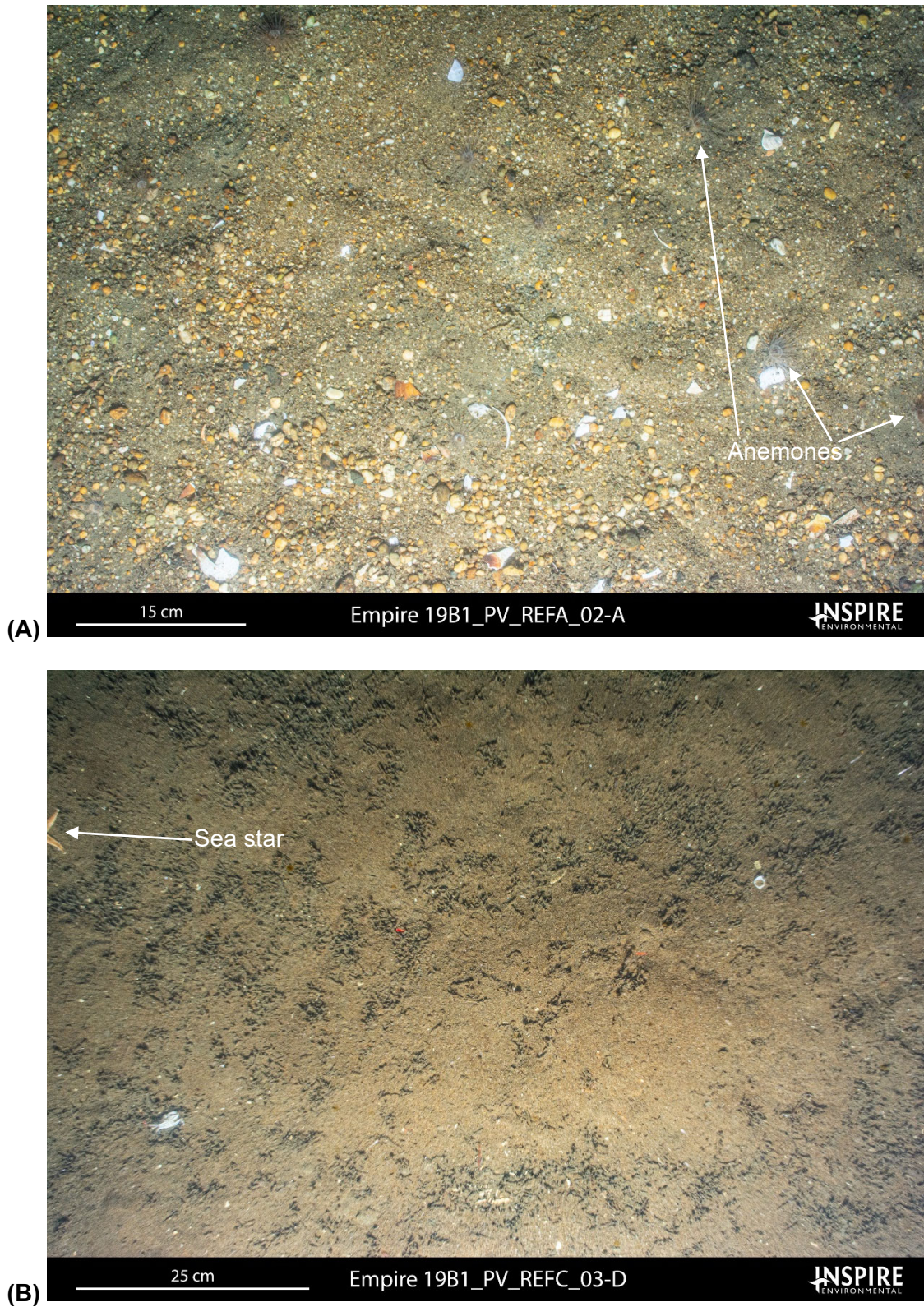


Figure 3-63. Plan view images at (A) Station REFA_02 with numerous burrowing anemones in a habitat of Sand with Mobile Gravel; and (B) Station REFC_03 with large tubes covering much of the seafloor composed of Sand Sheet habitat with a sea star present

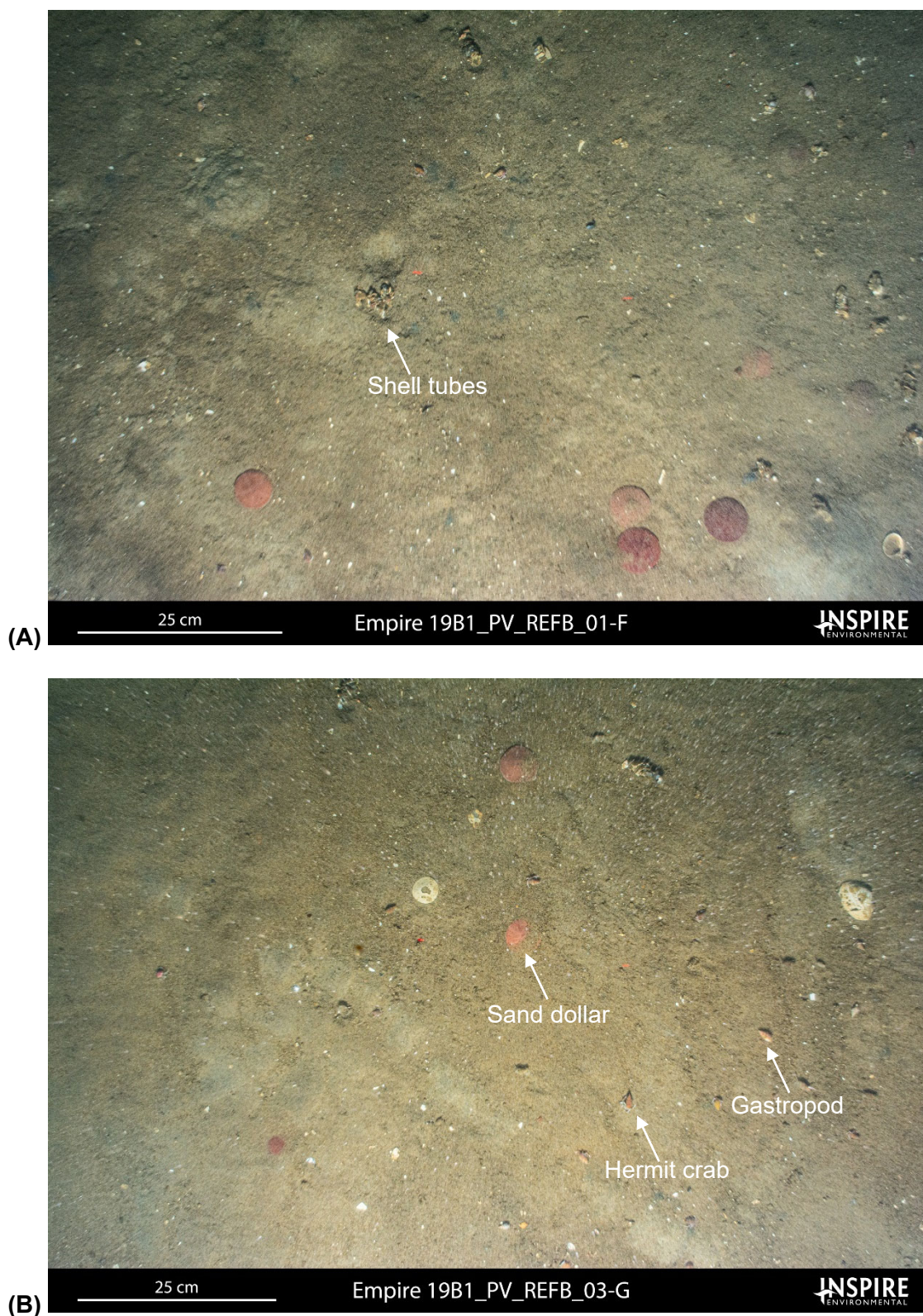


Figure 3-64. Plan view images at (A) Station REFB_01 with *Diopatra cuprea* shell tubes on the seafloor; and (B) Station REFB_03 with sand dollars, gastropods, and hermit crabs on a seafloor composed of Sand Sheet habitat

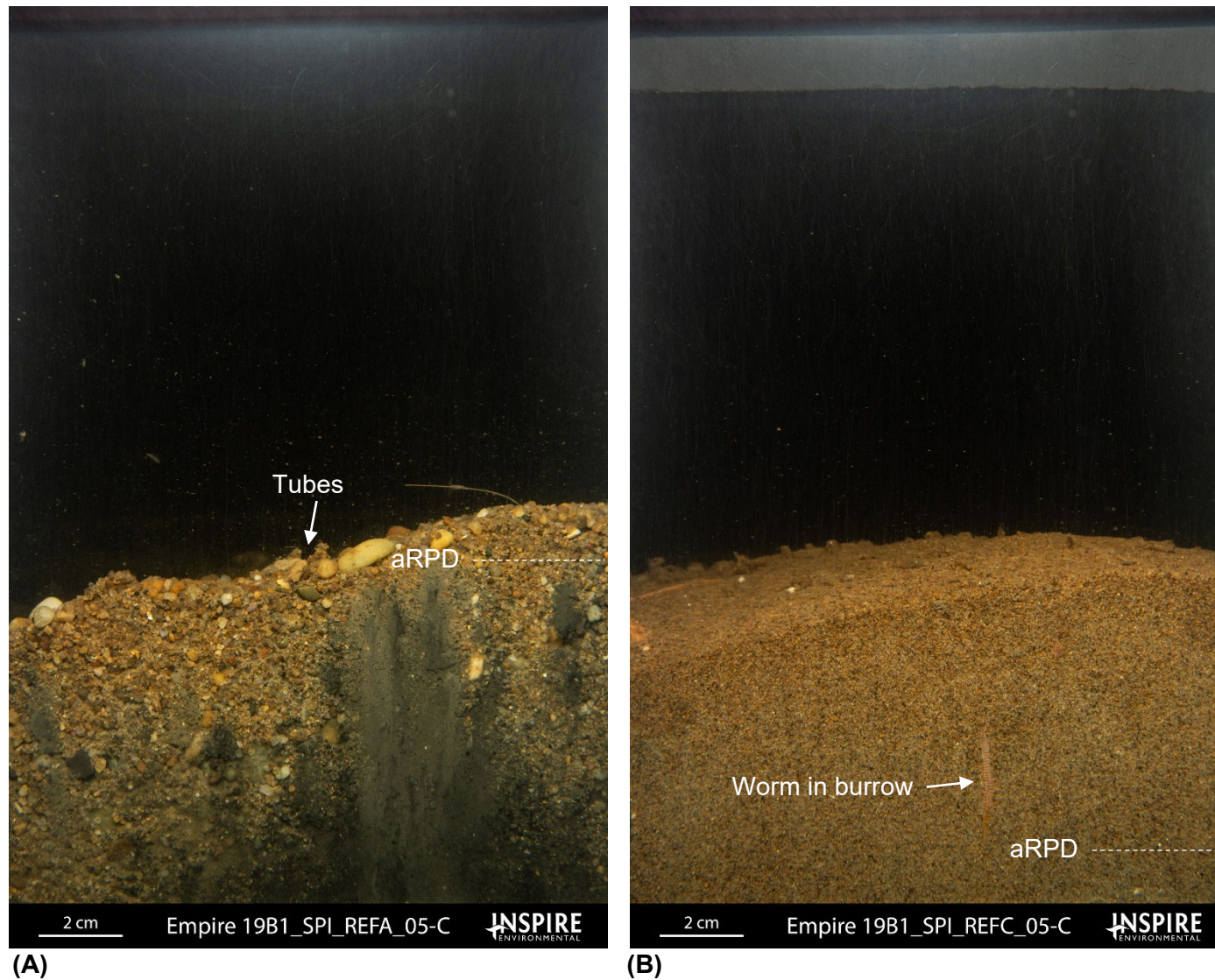


Figure 3-65. Profile images at (A) Station REFA_05 with a shallow aRPD and Stage 2 tubes at the sediment–water interface; and (B) Station REFC_05 with a deep aRPD that partially extends below the prism penetration and a large worm visible in a burrow

Benthic Assessment Survey of Proposed Export Cable Routes in Support of the Equinor Wind OCS-A 0512 Offshore Wind Farm Project

DATA REPORT

Survey Conducted 08-15 July 2019

APPENDICES

Prepared for:



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18 November 2019

APPENDIX A

SPI/PV and Sediment Grab Station Locations

2019 Benthic Assessment Survey of Proposed Export Cable Routes
in Support of the Equinor Wind OCS-A-0512 Offshore Wind Farm Project – Data Report

SampleType	StationID	Replicate	Date	Time	X_UTM_18N_m	Y_UTM_18N_m	Latitude_WGS84	Longitude_WGS84	Depth_ft
SPI_PV	001	A	7/14/2019	3:35:24	586780.31	4452349.92	40.21707794 N	73.98012949 W	53
SPI_PV	001	B	7/14/2019	3:36:09	586784.14	4452352.18	40.21709784 N	73.98008421 W	53
SPI_PV	001	C	7/14/2019	3:36:54	586780.76	4452353.76	40.21711243 N	73.98012376 W	53
SPI_PV	001	D	7/14/2019	3:37:33	586778.77	4452355.35	40.217127 N	73.98014694 W	53
SPI_PV	002	A	7/14/2019	3:13:31	588638.45	4452192.2	40.21546273 N	73.95831716 W	64
SPI_PV	002	B	7/14/2019	3:14:22	588638.89	4452194.74	40.21548556 N	73.95831173 W	64
SPI_PV	002	C	7/14/2019	3:14:55	588637.31	4452195.82	40.21549544 N	73.95833013 W	64
SPI_PV	002	D	7/14/2019	3:15:36	588634.93	4452194.74	40.21548599 N	73.95835819 W	64
SPI_PV	003	A	7/14/2019	2:50:41	590485.74	4452184.93	40.21519984 N	73.93661227 W	70
Grab	003	A	7/14/2019	4:28:52	590495.03	4452192.24	40.21526466 N	73.93650216 W	72
SPI_PV	003	B	7/14/2019	2:51:24	590486.23	4452186.38	40.21521283 N	73.9366063 W	70
SPI_PV	003	C	7/14/2019	2:52:06	590485.51	4452186.04	40.21520989 N	73.93661487 W	70
SPI_PV	003	D	7/14/2019	2:52:43	590483.83	4452185.49	40.21520513 N	73.93663463 W	70
SPI_PV	004	A	7/14/2019	2:29:02	592299.7	4452564.13	40.21841783 N	73.91524379 W	73
SPI_PV	004	B	7/14/2019	2:29:53	592299.83	4452563.73	40.21841418 N	73.91524226 W	73
SPI_PV	004	C	7/14/2019	2:30:32	592298.87	4452562	40.21839869 N	73.91525389 W	73
SPI_PV	004	D	7/14/2019	2:31:13	592297.65	4452568.76	40.2184598 N	73.91526719 W	73
SPI_PV	005	A	7/14/2019	2:07:34	594137.7	4452741.84	40.2198142 N	73.89362033 W	77
SPI_PV	005	B	7/14/2019	2:08:50	594144.74	4452737.18	40.21977136 N	73.89353832 W	77
SPI_PV	005	C	7/14/2019	2:09:31	594146.62	4452734.25	40.21974476 N	73.89351665 W	77
SPI_PV	005	D	7/14/2019	2:10:08	594145.83	4452735.22	40.21975363 N	73.89352578 W	77
SPI_PV	006	A	7/14/2019	1:47:23	595978.08	4452962.55	40.22159347 N	73.8719617 W	68
Grab	006	A	7/14/2019	5:11:20	595980.17	4452962.71	40.2215947 N	73.87193712 W	69
SPI_PV	006	B	7/14/2019	1:48:16	595974.9	4452963.88	40.22160587 N	73.87199889 W	68
Grab	006	B	7/14/2019	5:16:38	595973.86	4452961.78	40.22158705 N	73.87201141 W	69
SPI_PV	006	C	7/14/2019	1:48:53	595973.49	4452962.48	40.22159339 N	73.87201565 W	68
SPI_PV	006	D	7/14/2019	1:49:35	595973.24	4452961.19	40.22158184 N	73.8720188 W	68
SPI_PV	007	A	7/14/2019	1:24:38	597828.32	4452989.11	40.22161883 N	73.85021573 W	77
SPI_PV	007	B	7/14/2019	1:25:28	597828.69	4452987.77	40.22160672 N	73.85021157 W	77
SPI_PV	007	C	7/14/2019	1:26:02	597828.44	4452985.64	40.22158749 N	73.85021487 W	77
SPI_PV	007	D	7/14/2019	1:26:43	597825.96	4452986.06	40.2215916 N	73.85024391 W	77
SPI_PV	008	B	7/14/2019	0:19:33	599681.47	4452973.5	40.22125979 N	73.8284422 W	85
SPI_PV	008	C	7/14/2019	0:20:16	599683.01	4452976.99	40.22129105 N	73.82842353 W	85

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SampleType	StationID	Replicate	Date	Time	X_UTM_18N_m	Y_UTM_18N_m	Latitude_WGS84	Longitude_WGS84	Depth_ft
SPI_PV	008	D	7/14/2019	0:21:02	599682.71	4452977.89	40.2212992 N	73.82842691 W	85
SPI_PV	008	E	7/14/2019	0:21:49	599678.78	4452975.16	40.22127506 N	73.8284736 W	85
SPI_PV	009	A	7/13/2019	23:50:28	601538.31	4452979.81	40.2210937 N	73.80662216 W	95
SPI_PV	009	B	7/13/2019	23:51:53	601539.23	4452982.04	40.2211137 N	73.80661098 W	95
SPI_PV	009	C	7/13/2019	23:53:19	601536.03	4452979.62	40.22109226 N	73.80664897 W	95
SPI_PV	009	D	7/13/2019	23:54:36	601535.82	4452981.66	40.22111065 N	73.80665115 W	95
SPI_PV	010	A	7/13/2019	23:25:32	603400.25	4452986.11	40.22092277 N	73.78474241 W	116
Grab	010	A	7/14/2019	6:04:04	603396.6	4452994.82	40.22100171 N	73.78478392 W	120
SPI_PV	010	B	7/13/2019	23:27:07	603398.39	4452985.31	40.22091576 N	73.78476443 W	116
SPI_PV	010	C	7/13/2019	23:28:30	603394.67	4452984.98	40.2209133 N	73.78480821 W	116
SPI_PV	010	D	7/13/2019	23:30:01	603395.36	4452982.65	40.2208922 N	73.7848005 W	116
SPI_PV	011	A	7/13/2019	22:56:54	605256.07	4453018.74	40.22098562 N	73.76293045 W	224
Grab	011	A	7/14/2019	6:35:52	605251.24	4453017.47	40.22097483 N	73.76298752 W	227
SPI_PV	011	B	7/13/2019	22:58:24	605253.41	4453015.09	40.22095307 N	73.76296236 W	224
Grab	011	B	7/14/2019	6:52:18	605251.34	4453016.53	40.22096632 N	73.76298649 W	227
SPI_PV	011	C	7/13/2019	23:00:01	605250.09	4453013.85	40.22094239 N	73.76300152 W	224
SPI_PV	011	D	7/13/2019	23:01:26	605252.29	4453016.04	40.22096184 N	73.7629754 W	224
SPI_PV	012	A	7/13/2019	19:29:49	607096.72	4453248.69	40.22282366 N	73.74126404 W	127
SPI_PV	012	B	7/13/2019	19:31:23	607100.58	4453247.85	40.2228156 N	73.74121883 W	127
SPI_PV	012	C	7/13/2019	19:32:44	607099.9	4453247.35	40.22281116 N	73.74122686 W	127
SPI_PV	012	D	7/13/2019	19:34:14	607099.27	4453247.57	40.22281328 N	73.74123418 W	127
SPI_PV	013	A	7/13/2019	19:05:16	608926.09	4453569.08	40.22547371 N	73.71971365 W	111
SPI_PV	013	B	7/13/2019	19:06:58	608926.93	4453573.8	40.22551607 N	73.71970293 W	111
SPI_PV	013	C	7/13/2019	19:08:26	608928.59	4453571	40.22549068 N	73.71968391 W	111
SPI_PV	013	D	7/13/2019	19:09:58	608929.73	4453572.22	40.22550154 N	73.7196703 W	111
SPI_PV	014	A	7/13/2019	18:40:51	610749.69	4453926.67	40.22845549 N	73.69822307 W	117
SPI_PV	014	B	7/13/2019	18:42:24	610748.55	4453923.43	40.22842642 N	73.69823697 W	117
SPI_PV	014	C	7/13/2019	18:43:55	610750.81	4453920.79	40.22840235 N	73.69821096 W	117
SPI_PV	014	D	7/13/2019	18:45:19	610754.29	4453925.15	40.22844118 N	73.69816925 W	117
SPI_PV	015	A	7/13/2019	18:14:48	612542.61	4454410.55	40.2325749 N	73.67706918 W	109
SPI_PV	015	B	7/13/2019	18:16:27	612541.83	4454409.42	40.23256485 N	73.6770785 W	109
SPI_PV	015	C	7/13/2019	18:18:08	612544.1	4454413.12	40.23259785 N	73.67705121 W	109
SPI_PV	015	D	7/13/2019	18:19:33	612544	4454406.43	40.2325376 N	73.67705357 W	109

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SampleType	StationID	Replicate	Date	Time	X_UTM_18N_m	Y_UTM_18N_m	Latitude_WGS84	Longitude_WGS84	Depth_ft
SPI_PV	016	A	7/10/2019	19:07:05	614310.25	4454995.3	40.23760236 N	73.65619186 W	95
SPI_PV	016	B	7/10/2019	19:08:20	614305.2	4454999.03	40.23763665 N	73.65625057 W	95
SPI_PV	016	C	7/10/2019	19:09:35	614309.69	4454998	40.23762679 N	73.65619804 W	95
SPI_PV	016	D	7/10/2019	19:10:46	614311.37	4454993.21	40.23758339 N	73.65617907 W	95
SPI_PV	017	A	7/10/2019	18:46:54	616061.89	4455610.18	40.24289958 N	73.63549432 W	93
SPI_PV	017	B	7/10/2019	18:48:01	616062.76	4455614.48	40.24293824 N	73.63548327 W	93
SPI_PV	017	C	7/10/2019	18:49:14	616063.8	4455614.96	40.24294239 N	73.63547091 W	93
SPI_PV	017	D	7/10/2019	18:50:27	616061.09	4455615.42	40.24294695 N	73.63550266 W	93
SPI_PV	018	A	7/10/2019	18:25:27	617740.8	4456408.92	40.24985931 N	73.61561464 W	90
SPI_PV	018	B	7/10/2019	18:26:53	617738.97	4456408.43	40.24985512 N	73.61563627 W	90
SPI_PV	018	C	7/10/2019	18:28:09	617738.42	4456408.69	40.24985758 N	73.61564264 W	90
SPI_PV	018	D	7/10/2019	18:29:23	617742.57	4456410.59	40.24987406 N	73.61559354 W	90
SPI_PV	019	A	7/10/2019	18:03:21	619414.33	4457209.27	40.25683081 N	73.59579397 W	97
SPI_PV	019	B	7/10/2019	18:04:27	619418.11	4457212.29	40.25685742 N	73.59574895 W	97
SPI_PV	019	C	7/10/2019	18:05:37	619416.81	4457209.1	40.25682889 N	73.59576485 W	97
SPI_PV	019	D	7/10/2019	18:06:49	619419.59	4457208.71	40.25682496 N	73.59573228 W	97
Grab	020	A	7/10/2019	16:57:44	620970.99	4458211.39	40.26563294 N	73.57730527 W	91
SPI_PV	020	A	7/10/2019	17:43:10	620973.78	4458213.41	40.26565076 N	73.57727203 W	92
SPI_PV	020	B	7/10/2019	17:44:53	620978.22	4458213.71	40.26565279 N	73.57721983 W	92
SPI_PV	020	C	7/10/2019	17:46:13	620976.98	4458209.77	40.26561754 N	73.57723512 W	92
SPI_PV	020	D	7/10/2019	17:47:19	620975.08	4458211.83	40.26563631 N	73.5772571 W	92
SPI_PV	021	A	7/10/2019	22:18:30	622491.93	4459287.13	40.2751004 N	73.55921776 W	97
SPI_PV	021	B	7/10/2019	22:19:47	622489.02	4459282.72	40.27506103 N	73.55925278 W	97
SPI_PV	021	C	7/10/2019	22:21:03	622489.6	4459284.23	40.27507454 N	73.55924564 W	97
SPI_PV	021	D	7/10/2019	22:22:22	622488.88	4459284.53	40.27507741 N	73.55925411 W	97
SPI_PV	022	A	7/10/2019	22:37:49	624002.87	4460369.12	40.28462258 N	73.5412416 W	95
SPI_PV	022	B	7/10/2019	22:39:03	624004.34	4460364.07	40.28457691 N	73.54122536 W	95
SPI_PV	022	C	7/10/2019	22:40:18	624000.77	4460361.62	40.28455538 N	73.5412678 W	95
SPI_PV	022	D	7/10/2019	22:41:33	624000.76	4460365.09	40.28458666 N	73.54126717 W	95
SPI_PV	023	A	7/10/2019	22:57:37	625491.82	4461477.09	40.29437924 N	73.52351409 W	91
SPI_PV	023	B	7/10/2019	22:58:58	625487.13	4461475.01	40.29436119 N	73.52356967 W	91
SPI_PV	023	C	7/10/2019	23:00:16	625485.03	4461472.35	40.29433762 N	73.52359481 W	91
SPI_PV	023	D	7/10/2019	23:01:32	625488.26	4461475.93	40.29436933 N	73.52355615 W	91

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SampleType	StationID	Replicate	Date	Time	X_UTM_18N_m	Y_UTM_18N_m	Latitude_WGS84	Longitude_WGS84	Depth_ft
SPI_PV	024	A	7/10/2019	23:17:06	626799.68	4462792.17	40.30602586 N	73.50787065 W	97
SPI_PV	024	B	7/10/2019	23:18:32	626798.15	4462790.44	40.30601052 N	73.507889 W	97
SPI_PV	024	C	7/10/2019	23:19:52	626798.65	4462793.81	40.30604078 N	73.50788241 W	97
SPI_PV	024	D	7/10/2019	23:21:18	626797.6	4462791.7	40.30602196 N	73.50789517 W	97
SPI_PV	025	A	7/11/2019	0:56:59	627923.01	4464253.95	40.3190197 N	73.49436359 W	102
SPI_PV	025	B	7/11/2019	0:57:46	627919.34	4464253.07	40.31901235 N	73.494407 W	102
SPI_PV	025	C	7/11/2019	0:58:39	627920.37	4464257.33	40.31905052 N	73.49439393 W	102
SPI_PV	025	D	7/11/2019	0:59:28	627919.43	4464255.78	40.31903676 N	73.49440531 W	102
SPI_PV	025	E	7/11/2019	1:47:23	627922.18	4464254.34	40.31902338 N	73.49437331 W	102
SPI_PV	025	F	7/11/2019	1:48:03	627924.03	4464258.09	40.31905686 N	73.49435072 W	102
SPI_PV	025	G	7/11/2019	1:48:41	627921.09	4464259.32	40.3190684 N	73.49438513 W	102
SPI_PV	025	H	7/11/2019	1:49:43	627914.11	4464255.6	40.31903594 N	73.49446803 W	102
SPI_PV	026	A	7/11/2019	2:18:36	628268.34	4466065.22	40.33527934 N	73.48993681 W	98
SPI_PV	026	B	7/11/2019	2:19:24	628272.29	4466070.34	40.33532483 N	73.48988939 W	98
SPI_PV	026	C	7/11/2019	2:20:07	628272.41	4466070.34	40.33532485 N	73.48988795 W	98
SPI_PV	026	D	7/11/2019	2:20:43	628274.61	4466072.73	40.33534603 N	73.48986157 W	98
SPI_PV	026	E	7/11/2019	2:21:12	628281.88	4466077.94	40.33539183 N	73.489775 W	98
SPI_PV	026	F	7/11/2019	2:22:27	628266.84	4466064.63	40.33527424 N	73.48995458 W	98
SPI_PV	026	G	7/11/2019	2:23:21	628268.55	4466069.32	40.33531621 N	73.4899336 W	98
SPI_PV	026	H	7/11/2019	10:09:49	628269.42	4466072.46	40.33534432 N	73.48992267 W	98
SPI_PV	026	I	7/11/2019	10:10:26	628263.5	4466072.15	40.3353425 N	73.48999244 W	98
SPI_PV	026	J	7/11/2019	10:10:56	628260.64	4466068.83	40.33531305 N	73.49002675 W	98
SPI_PV	026	K	7/11/2019	10:11:31	628262.99	4466063.41	40.33526387 N	73.49000021 W	98
SPI_PV	027	A	7/11/2019	10:39:07	628408.38	4467921.56	40.35197619 N	73.48791541 W	97
SPI_PV	027	B	7/11/2019	10:39:50	628410.8	4467917.8	40.35194201 N	73.48788764 W	97
SPI_PV	027	C	7/11/2019	10:40:35	628412.26	4467917.79	40.3519417 N	73.48787052 W	97
SPI_PV	027	D	7/11/2019	10:41:20	628411.24	4467917.83	40.35194216 N	73.48788247 W	97
SPI_PV	028	A	7/11/2019	10:56:35	628382.67	4469784.97	40.36876224 N	73.48784308 W	88
SPI_PV	028	B	7/11/2019	10:57:31	628376.65	4469776.48	40.3686867 N	73.48791562 W	88
SPI_PV	028	C	7/11/2019	10:58:20	628378.97	4469773.29	40.36865756 N	73.48788896 W	88
SPI_PV	028	D	7/11/2019	10:58:54	628378.02	4469776.35	40.3686853 N	73.48789954 W	88
SPI_PV	029	A	7/11/2019	11:15:09	628344.25	4471637.71	40.38545405 N	73.48792245 W	89
SPI_PV	029	B	7/11/2019	11:15:45	628348.55	4471631.44	40.38539689 N	73.487873 W	89

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SPI_PV	029	C	7/11/2019	11:16:30	628352.83	4471633.5	40.38541483 N	73.48782221 W	89
SPI_PV	029	D	7/11/2019	11:17:09	628352.08	4471640.94	40.38548191 N	73.48782954 W	89
SPI_PV	030	A	7/10/2019	3:04:21	646372.57	4461665.55	40.29268105 N	73.27789409 W	123
SPI_PV	030	B	7/10/2019	3:06:38	646375.47	4461669.79	40.29271873 N	73.27785907 W	123
SPI_PV	030	C	7/10/2019	3:08:36	646370.35	4461655.53	40.29259125 N	73.27792244 W	123
SPI_PV	030	D	7/10/2019	3:10:21	646365.64	4461662.48	40.29265466 N	73.27797626 W	123
SPI_PV	030	E	7/10/2019	3:11:42	646368.21	4461664.19	40.29266958 N	73.27794564 W	123
SPI_PV	031	A	7/10/2019	4:08:05	646058.08	4463492.63	40.30918938 N	73.28117548 W	117
SPI_PV	031	B	7/10/2019	4:09:29	646064.09	4463491.77	40.3091806 N	73.28110502 W	117
SPI_PV	031	C	7/10/2019	4:10:17	646063.77	4463491.75	40.30918046 N	73.28110878 W	117
SPI_PV	031	D	7/10/2019	4:11:22	646056.65	4463491.04	40.30917532 N	73.28119268 W	117
SPI_PV	032	A	7/10/2019	4:43:38	645750.75	4465327.8	40.32576923 N	73.28437236 W	118
SPI_PV	032	B	7/10/2019	4:44:37	645743.89	4465321.04	40.32570959 N	73.28445461 W	118
SPI_PV	032	C	7/10/2019	4:45:54	645748.62	4465328.61	40.32577689 N	73.28439714 W	118
SPI_PV	032	D	7/10/2019	4:46:53	645743.88	4465332.86	40.32581601 N	73.28445202 W	118
SPI_PV	032	E	7/10/2019	4:52:42	645751.97	4465325.26	40.3257462 N	73.28435852 W	118
SPI_PV	033	A	7/10/2019	5:34:44	644702.6	4466659.86	40.33794716 N	73.29640318 W	110
SPI_PV	033	B	7/10/2019	5:35:41	644702.81	4466651.09	40.33786816 N	73.29640269 W	110
SPI_PV	033	C	7/10/2019	5:36:55	644702.69	4466654.17	40.33789587 N	73.29640345 W	110
SPI_PV	033	D	7/10/2019	5:38:08	644701.66	4466660.87	40.33795638 N	73.29641396 W	110
SPI_PV	033	E	7/10/2019	5:39:11	644698.1	4466663.02	40.33797637 N	73.29645544 W	110
SPI_PV	034	A	7/10/2019	6:02:24	642907.23	4467143.16	40.34260876 N	73.31742342 W	109
SPI_PV	034	B	7/10/2019	6:03:21	642905.29	4467138.33	40.34256564 N	73.31744731 W	109
SPI_PV	034	C	7/10/2019	6:06:33	642904.58	4467146.87	40.34264267 N	73.31745368 W	109
SPI_PV	034	D	7/10/2019	6:07:22	642903.42	4467148.62	40.34265865 N	73.31746702 W	109
SPI_PV	035	A	7/10/2019	6:34:51	641101.03	4467598.93	40.34702053 N	73.3385802 W	110
SPI_PV	035	B	7/10/2019	6:35:50	641090.62	4467599.2	40.34702478 N	73.33870265 W	110
SPI_PV	035	C	7/10/2019	6:37:57	641105.67	4467599.37	40.34702374 N	73.3385255 W	110
SPI_PV	035	D	7/10/2019	6:39:07	641103.4	4467602.66	40.34705377 N	73.33855143 W	110
SPI_PV	035	E	7/10/2019	6:40:53	641102.64	4467602.47	40.3470522 N	73.33856048 W	110
SPI_PV	036	A	7/10/2019	6:59:10	639294.02	4468051.88	40.35140325 N	73.35974992 W	100
SPI_PV	036	B	7/10/2019	7:00:11	639302.61	4468051.18	40.35139552 N	73.35964901 W	100
SPI_PV	036	C	7/10/2019	7:01:07	639296.64	4468053.04	40.35141329 N	73.35971884 W	100

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SampleType	StationID	Replicate	Date	Time	X_UTM_18N_m	Y_UTM_18N_m	Latitude_WGS84	Longitude_WGS84	Depth_ft
SPI_PV	036	D	7/10/2019	7:02:01	639295.21	4468047.25	40.35136135 N	73.35973701 W	100
SPI_PV	037	A	7/10/2019	7:20:30	637491.67	4468496.64	40.35570757 N	73.38086958 W	105
SPI_PV	037	B	7/10/2019	7:21:21	637490.82	4468497.74	40.35571763 N	73.38087936 W	105
SPI_PV	037	C	7/10/2019	7:22:14	637491.63	4468498.84	40.3557274 N	73.38086953 W	105
SPI_PV	037	D	7/10/2019	7:23:37	637494.69	4468506.19	40.35579312 N	73.38083189 W	105
SPI_PV	038	A	7/10/2019	7:44:31	635684.98	4468927.16	40.35988057 N	73.40204612 W	100
Grab	038	A	7/10/2019	10:38:37	635696.38	4468916.46	40.35978239 N	73.40191413 W	102
SPI_PV	038	B	7/10/2019	7:45:25	635687.5	4468925.35	40.35986392 N	73.40201682 W	100
SPI_PV	038	C	7/10/2019	7:46:17	635683.18	4468928.1	40.3598894 N	73.40206706 W	100
SPI_PV	038	D	7/10/2019	7:47:11	635687.56	4468929.79	40.35990386 N	73.40201515 W	100
SPI_PV	039	A	7/10/2019	8:08:54	633884.74	4469351.38	40.36399197 N	73.42315063 W	98
SPI_PV	039	B	7/10/2019	8:10:34	633877.12	4469354.06	40.36401735 N	73.42323989 W	98
SPI_PV	039	C	7/10/2019	8:11:28	633882.56	4469357.59	40.36404826 N	73.42317503 W	98
SPI_PV	039	D	7/10/2019	8:12:22	633880.66	4469358.71	40.36405863 N	73.42319713 W	98
SPI_PV	040	A	7/10/2019	8:32:13	632069.15	4469780.6	40.36814705 N	73.4444377 W	98
SPI_PV	040	B	7/10/2019	8:33:04	632066.05	4469776.1	40.36810699 N	73.44447507 W	98
SPI_PV	040	C	7/10/2019	8:33:53	632069.6	4469779.16	40.36813399 N	73.44443266 W	98
SPI_PV	040	D	7/10/2019	8:36:07	632066.31	4469780.45	40.36814613 N	73.44447116 W	98
SPI_PV	041	A	7/10/2019	8:54:14	630261.42	4470208.31	40.3722834 N	73.46563516 W	96
SPI_PV	041	B	7/10/2019	8:54:57	630264.29	4470203.86	40.37224284 N	73.46560235 W	96
SPI_PV	041	C	7/10/2019	8:55:45	630261.7	4470204	40.3722445 N	73.46563281 W	96
SPI_PV	041	D	7/10/2019	8:56:29	630258.55	4470204.34	40.37224808 N	73.46566979 W	96
SPI_PV	041	E	7/10/2019	8:57:33	630258.97	4470202.2	40.37222875 N	73.46566527 W	96
SPI_PV	042	A	7/10/2019	9:17:04	628667.42	4470961.01	40.37930984 N	73.4842529 W	94
SPI_PV	042	B	7/10/2019	9:18:50	628671.99	4470970.66	40.379396 N	73.48419714 W	94
SPI_PV	042	C	7/10/2019	9:19:36	628673.16	4470962.77	40.37932474 N	73.48418492 W	94
SPI_PV	042	D	7/10/2019	9:20:27	628674.24	4470968.15	40.37937309 N	73.48417112 W	94
SPI_PV	043	A	7/11/2019	11:29:44	628335.47	4472781.42	40.39575571 N	73.48779537 W	88
SPI_PV	043	B	7/11/2019	11:30:21	628332.57	4472791.47	40.3958467 N	73.48782748 W	88
SPI_PV	043	C	7/11/2019	11:31:10	628325.12	4472788.95	40.39582515 N	73.48791583 W	88
SPI_PV	043	D	7/11/2019	11:32:21	628326.25	4472782.22	40.39576436 N	73.48790381 W	88
SPI_PV	044	A	7/11/2019	11:47:18	628014.38	4474615.78	40.41232545 N	73.49120872 W	87
SPI_PV	044	B	7/11/2019	11:48:08	628011.77	4474606.76	40.41224462 N	73.49124129 W	87

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SampleType	StationID	Replicate	Date	Time	X_UTM_18N_m	Y_UTM_18N_m	Latitude_WGS84	Longitude_WGS84	Depth_ft
SPI_PV	044	C	7/11/2019	11:49:21	628018.16	4474610.6	40.41227825 N	73.49116521 W	87
SPI_PV	044	D	7/11/2019	11:50:10	628017.4	4474612.31	40.41229373 N	73.49117382 W	87
SPI_PV	044	E	7/11/2019	11:50:48	628014.11	4474614.18	40.41231105 N	73.49121219 W	87
SPI_PV	045	A	7/11/2019	12:07:35	627742.32	4476452.65	40.42891017 N	73.49404531 W	83
SPI_PV	045	B	7/11/2019	12:09:06	627742.81	4476453.14	40.42891449 N	73.49403944 W	83
SPI_PV	045	C	7/11/2019	12:10:18	627739.69	4476454.75	40.42892943 N	73.49407589 W	83
SPI_PV	045	D	7/11/2019	12:11:28	627744.68	4476446.27	40.42885232 N	73.49401872 W	83
SPI_PV	046	A	7/11/2019	19:50:59	627510.26	4478296.01	40.44554702 N	73.49641025 W	84
SPI_PV	046	B	7/11/2019	19:52:17	627514.58	4478296.01	40.4455464 N	73.4963593 W	84
SPI_PV	046	C	7/11/2019	19:53:29	627515.75	4478295.21	40.44553905 N	73.49634574 W	84
SPI_PV	046	D	7/11/2019	19:54:44	627515.75	4478294.64	40.44553392 N	73.49634586 W	84
SPI_PV	047	A	7/11/2019	19:22:56	627357.71	4479511.9	40.4565207 N	73.49796471 W	81
SPI_PV	047	D	7/11/2019	19:26:47	627352.58	4479509.92	40.45650372 N	73.49802564 W	81
SPI_PV	047	E	7/11/2019	19:31:15	627354.76	4479512.41	40.45652582 N	73.49799939 W	81
SPI_PV	047	F	7/11/2019	19:32:39	627355.46	4479510.22	40.45650598 N	73.49799162 W	81
SPI_PV	048	A	7/11/2019	12:24:30	626854.18	4477127.75	40.43512601 N	73.50437745 W	77
SPI_PV	048	B	7/11/2019	12:25:46	626855.22	4477131.49	40.43515951 N	73.50436446 W	77
SPI_PV	048	C	7/11/2019	12:27:04	626855.72	4477130.86	40.43515377 N	73.50435863 W	77
SPI_PV	048	D	7/11/2019	12:28:15	626854.05	4477130.67	40.43515231 N	73.5043784 W	77
SPI_PV	049	A	7/11/2019	12:41:59	625045.46	4477502.76	40.43877727 N	73.52562191 W	87
SPI_PV	049	B	7/11/2019	12:43:13	625041.04	4477507.61	40.43882167 N	73.52567299 W	87
SPI_PV	049	C	7/11/2019	12:44:24	625040.96	4477509.33	40.43883714 N	73.52567363 W	87
SPI_PV	049	D	7/11/2019	12:45:38	625043.3	4477507.34	40.43881886 N	73.52564648 W	87
SPI_PV	050	A	7/11/2019	12:59:47	623201.68	4477762.51	40.44139187 N	73.54730436 W	87
SPI_PV	050	B	7/11/2019	13:01:06	623200.46	4477762.73	40.44139398 N	73.54731874 W	87
SPI_PV	050	C	7/11/2019	13:02:14	623201.29	4477768.44	40.4414453 N	73.54730783 W	87
SPI_PV	050	D	7/11/2019	13:03:22	623200.25	4477760.21	40.4413713 N	73.54732163 W	87
SPI_PV	051	A	7/11/2019	13:18:27	621359.67	4477989.45	40.44370656 N	73.56897404 W	84
SPI_PV	051	B	7/11/2019	13:19:41	621356.9	4477991.09	40.44372173 N	73.56900636 W	84
SPI_PV	051	C	7/11/2019	13:20:52	621361.49	4477990.09	40.44371208 N	73.56895246 W	84
SPI_PV	051	D	7/11/2019	13:22:06	621360.71	4477995.51	40.44376106 N	73.56896064 W	84
SPI_PV	052	A	7/11/2019	14:06:29	619507.81	4478118.09	40.44513339 N	73.59077995 W	77
SPI_PV	052	B	7/11/2019	14:07:54	619509.17	4478116.07	40.44511496 N	73.59076432 W	77

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SampleType	StationID	Replicate	Date	Time	X_UTM_18N_m	Y_UTM_18N_m	Latitude_WGS84	Longitude_WGS84	Depth_ft
SPI_PV	052	C	7/11/2019	14:09:10	619506.85	4478115.57	40.44511079 N	73.5907917 W	77
SPI_PV	052	D	7/11/2019	14:10:21	619508.71	4478118.61	40.44513796 N	73.59076928 W	77
SPI_PV	053	A	7/12/2019	20:56:49	617656.01	4478213.66	40.44625823 N	73.61259226 W	72
SPI_PV	053	B	7/12/2019	20:58:36	617651.44	4478210.68	40.44623206 N	73.6126467 W	72
SPI_PV	053	C	7/12/2019	21:00:00	617655.02	4478216.37	40.44628282 N	73.61260345 W	72
SPI_PV	053	D	7/12/2019	21:01:30	617655.14	4478210.4	40.44622904 N	73.6126032 W	72
SPI_PV	054	A	7/12/2019	21:19:28	615800.44	4478306.58	40.44735561 N	73.63445039 W	72
SPI_PV	054	B	7/12/2019	21:20:38	615797.65	4478310.7	40.44739313 N	73.6344826 W	72
SPI_PV	054	C	7/12/2019	21:22:20	615799.16	4478312.35	40.44740783 N	73.63446448 W	72
SPI_PV	054	D	7/12/2019	21:24:01	615798.57	4478308.69	40.44737492 N	73.63447212 W	72
SPI_PV	055	A	7/12/2019	23:58:51	613940.25	4478376.73	40.44824449 N	73.65636798 W	73
SPI_PV	055	B	7/13/2019	0:00:20	613941.55	4478377.48	40.44825108 N	73.65635251 W	73
SPI_PV	055	C	7/13/2019	0:01:54	613940.27	4478377.61	40.44825236 N	73.65636753 W	73
SPI_PV	055	D	7/13/2019	0:03:20	613942.18	4478377.84	40.44825421 N	73.65634502 W	73
SPI_PV	056	A	7/13/2019	0:22:09	612085.78	4478435.92	40.44902965 N	73.67822063 W	81
SPI_PV	056	B	7/13/2019	0:23:14	612082.96	4478436.34	40.44903387 N	73.67825385 W	81
SPI_PV	056	C	7/13/2019	0:23:58	612081.42	4478436.14	40.44903225 N	73.67827203 W	81
SPI_PV	056	D	7/13/2019	0:24:39	612080.6	4478436.61	40.44903662 N	73.67828161 W	81
SPI_PV	057	A	7/13/2019	0:44:29	610235.03	4478662.15	40.45131476 N	73.70000111 W	86
Grab	057	A	7/13/2019	15:12:58	610242.16	4478656.35	40.45126154 N	73.69991804 W	89
SPI_PV	057	B	7/13/2019	0:45:11	610239.25	4478661.69	40.45131006 N	73.69995136 W	86
SPI_PV	057	C	7/13/2019	0:45:54	610239.47	4478664.7	40.45133709 N	73.69994833 W	86
SPI_PV	057	D	7/13/2019	0:46:32	610236.82	4478666.42	40.45135294 N	73.6999792 W	86
SPI_PV	058	A	7/13/2019	1:08:11	608423.05	4479001.49	40.45460947 N	73.72130667 W	91
SPI_PV	058	B	7/13/2019	1:09:01	608420	4479001.69	40.45461163 N	73.72134256 W	91
SPI_PV	058	C	7/13/2019	1:09:42	608418.01	4479002.91	40.4546229 N	73.72136583 W	91
SPI_PV	058	D	7/13/2019	1:10:16	608415.72	4479003.98	40.45463283 N	73.72139273 W	91
SPI_PV	059	A	7/13/2019	1:29:51	606666.21	4479607.77	40.46029742 N	73.74191938 W	95
SPI_PV	059	B	7/13/2019	1:30:41	606666.73	4479609.85	40.4603161 N	73.74191295 W	95
SPI_PV	059	C	7/13/2019	1:31:24	606668.27	4479612.47	40.46033951 N	73.7418943 W	95
SPI_PV	059	D	7/13/2019	1:31:57	606668.46	4479613.95	40.46035283 N	73.74189184 W	95
SPI_PV	060	A	7/13/2019	1:54:40	604970.57	4480387.49	40.46753631 N	73.76178532 W	95
Grab	060	A	7/13/2019	14:37:17	604972.9	4480384.29	40.46750721 N	73.76175839 W	95

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SampleType	StationID	Replicate	Date	Time	X_UTM_18N_m	Y_UTM_18N_m	Latitude_WGS84	Longitude_WGS84	Depth_ft
SPI_PV	060	B	7/13/2019	1:55:23	604976.73	4480390.18	40.46755974 N	73.76171217 W	95
SPI_PV	060	C	7/13/2019	1:56:07	604971.37	4480384.27	40.46750719 N	73.76177637 W	95
SPI_PV	060	D	7/13/2019	1:56:46	604968.26	4480379.9	40.46746823 N	73.76181385 W	95
SPI_PV	061	A	7/13/2019	2:18:49	603279.02	4481153.82	40.47465066 N	73.78160945 W	91
SPI_PV	061	B	7/13/2019	2:19:38	603281.98	4481152.87	40.4746417 N	73.78157467 W	91
SPI_PV	061	C	7/13/2019	2:20:22	603278.54	4481155.82	40.47466874 N	73.78161485 W	91
SPI_PV	061	D	7/13/2019	2:20:58	603279.33	4481156.95	40.47467877 N	73.78160527 W	91
SPI_PV	062	A	7/13/2019	2:40:28	601582.97	4481913.94	40.48170627 N	73.80149191 W	87
SPI_PV	062	B	7/13/2019	2:41:22	601583.67	4481918.68	40.48174893 N	73.80148289 W	87
SPI_PV	062	C	7/13/2019	2:42:05	601583.63	4481918.54	40.48174765 N	73.80148339 W	87
SPI_PV	062	D	7/13/2019	2:42:46	601588.75	4481919.31	40.48175391 N	73.80142292 W	87
SPI_PV	063	A	7/11/2019	18:30:59	626809.02	4481260.57	40.47235314 N	73.50408436 W	74
SPI_PV	063	B	7/11/2019	18:32:23	626807.61	4481260.32	40.47235115 N	73.50410103 W	74
SPI_PV	063	C	7/11/2019	18:33:33	626807.76	4481261.39	40.47236075 N	73.50409902 W	74
SPI_PV	063	D	7/11/2019	18:34:44	626812.67	4481262.55	40.47237047 N	73.50404091 W	74
SPI_PV	064	A	7/11/2019	17:43:57	625664.46	4481835.66	40.47770635 N	73.517468 W	72
SPI_PV	064	B	7/11/2019	17:45:36	625669.06	4481840.3	40.4777475 N	73.5174129 W	72
SPI_PV	064	C	7/11/2019	17:46:51	625668.72	4481838.6	40.4777322 N	73.51741724 W	72
SPI_PV	064	D	7/11/2019	17:48:07	625669.81	4481835.62	40.47770518 N	73.517405 W	72
SPI_PV	065	A	7/11/2019	16:59:27	623816.52	4481999.43	40.47945884 N	73.53923045 W	77
SPI_PV	065	B	7/11/2019	17:00:44	623819.82	4481990	40.47937346 N	73.53919336 W	77
SPI_PV	065	C	7/11/2019	17:01:52	623822.66	4481991.53	40.47938676 N	73.53915959 W	77
SPI_PV	065	D	7/11/2019	17:03:13	623820.46	4481989.74	40.47937101 N	73.53918581 W	77
SPI_PV	066	A	7/11/2019	16:38:29	621965.98	4482066.39	40.48033574 N	73.56104333 W	82
SPI_PV	066	B	7/11/2019	16:39:56	621965.56	4482070.94	40.48037684 N	73.56104744 W	82
SPI_PV	066	C	7/11/2019	16:41:20	621964.02	4482068.1	40.48035147 N	73.56106619 W	82
SPI_PV	066	D	7/11/2019	16:42:39	621962.13	4482072.69	40.48039306 N	73.56108762 W	82
SPI_PV	067	A	7/11/2019	16:19:03	620107.17	4482147.13	40.48133386 N	73.58295194 W	77
SPI_PV	067	B	7/11/2019	16:20:18	620110.45	4482149.52	40.48135487 N	73.58291281 W	77
SPI_PV	067	C	7/11/2019	16:21:40	620106.36	4482149.88	40.48135873 N	73.582961 W	77
SPI_PV	067	D	7/11/2019	16:22:54	620109.69	4482143.98	40.48130514 N	73.5829228 W	77
SPI_PV	068	A	7/11/2019	16:00:52	618249.54	4482191.89	40.48200359 N	73.60485402 W	70
SPI_PV	068	B	7/11/2019	16:02:08	618249.93	4482189.37	40.4819808 N	73.60484992 W	70

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SPI_PV	068	C	7/11/2019	16:03:17	618250.93	4482195.21	40.48203329 N	73.60483708 W	70
SPI_PV	068	D	7/11/2019	16:04:33	618253.07	4482195.77	40.48203799 N	73.60481165 W	70
SPI_PV	069	A	7/11/2019	15:41:27	616390.1	4482240.49	40.48270398 N	73.62677738 W	70
SPI_PV	069	B	7/11/2019	15:42:54	616392.93	4482237.32	40.48267509 N	73.62674455 W	70
SPI_PV	069	C	7/11/2019	15:44:10	616394.07	4482243.31	40.48272886 N	73.62673 W	70
SPI_PV	069	D	7/11/2019	15:45:31	616393.15	4482240.22	40.48270117 N	73.62674142 W	70
SPI_PV	070	A	7/12/2019	20:11:23	614532.91	4482288.82	40.4833975 N	73.64867474 W	76
SPI_PV	070	B	7/12/2019	20:12:52	614531.68	4482286.48	40.48337661 N	73.64868968 W	76
SPI_PV	070	C	7/12/2019	20:14:22	614531.9	4482287.6	40.48338672 N	73.64868689 W	76
SPI_PV	070	D	7/12/2019	20:16:12	614535.25	4482285.86	40.48337054 N	73.64864768 W	76
SPI_PV	071	A	7/12/2019	19:53:16	612675.05	4482369.39	40.48437736 N	73.67057496 W	71
SPI_PV	071	B	7/12/2019	19:54:46	612676.1	4482370.42	40.48438651 N	73.6705624 W	71
SPI_PV	071	C	7/12/2019	19:56:20	612677.61	4482370.77	40.48438948 N	73.67054445 W	71
SPI_PV	071	D	7/12/2019	19:57:48	612678.14	4482369.82	40.48438086 N	73.67053838 W	71
SPI_PV	072	A	7/12/2019	19:35:25	610819.15	4482421.35	40.48509515 N	73.69245763 W	74
SPI_PV	072	B	7/12/2019	19:37:01	610820.45	4482422.44	40.48510475 N	73.69244214 W	74
SPI_PV	072	C	7/12/2019	19:38:30	610821.08	4482420.09	40.48508356 N	73.6924351 W	74
SPI_PV	072	D	7/12/2019	19:40:07	610818.55	4482423.51	40.48511466 N	73.69246434 W	74
SPI_PV	073	A	7/12/2019	19:18:27	608965.16	4482409.85	40.48523693 N	73.71432939 W	81
SPI_PV	073	B	7/12/2019	19:19:53	608960.37	4482414.16	40.48527644 N	73.71438514 W	81
SPI_PV	073	C	7/12/2019	19:21:23	608962.76	4482412.64	40.48526239 N	73.71435726 W	81
SPI_PV	073	D	7/12/2019	19:22:55	608959.11	4482410.66	40.48524508 N	73.71440065 W	81
SPI_PV	074	A	7/12/2019	18:45:55	607102.78	4482404.01	40.48542671 N	73.73629932 W	86
SPI_PV	074	B	7/12/2019	18:47:31	607103.81	4482401.14	40.48540068 N	73.73628772 W	86
SPI_PV	074	C	7/12/2019	18:48:56	607103.52	4482402.67	40.48541453 N	73.73629081 W	86
SPI_PV	074	D	7/12/2019	18:50:31	607105.86	4482402.58	40.48541343 N	73.73626326 W	86
SPI_PV	074	E	7/12/2019	19:00:06	607106.98	4482401.96	40.48540768 N	73.73625008 W	86
SPI_PV	074	F	7/12/2019	19:01:43	607105.49	4482401.05	40.48539971 N	73.73626785 W	86
SPI_PV	074	G	7/12/2019	19:03:30	607105.08	4482401.51	40.48540384 N	73.7362726 W	86
SPI_PV	074	H	7/12/2019	19:05:10	607105.85	4482402.91	40.48541634 N	73.73626329 W	86
SPI_PV	075	A	7/12/2019	18:25:48	605249.42	4482397.16	40.48560196 N	73.75816326 W	91
SPI_PV	075	B	7/12/2019	18:27:19	605243.88	4482397.69	40.48560748 N	73.75822858 W	91
SPI_PV	075	C	7/12/2019	18:28:56	605244.07	4482396.27	40.48559462 N	73.75822647 W	91

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SPI_PV	075	D	7/12/2019	18:30:26	605246.58	4482396.25	40.48559417 N	73.75819696 W	91
SPI_PV	076	A	7/12/2019	17:52:56	603386.09	4482405.36	40.48590998 N	73.78014254 W	90
Grab	076	A	7/13/2019	14:16:00	603383.5	4482403.17	40.48589059 N	73.78017352 W	87
SPI_PV	076	B	7/12/2019	17:54:35	603384.31	4482401.41	40.48587465 N	73.78016416 W	90
SPI_PV	076	C	7/12/2019	17:56:10	603386.32	4482401.63	40.48587639 N	73.78014048 W	90
SPI_PV	076	D	7/12/2019	17:57:37	603385	4482403.56	40.48589388 N	73.78015571 W	90
SPI_PV	077	A	7/12/2019	17:33:02	601526.54	4482405.58	40.48614142 N	73.80207891 W	86
SPI_PV	077	B	7/12/2019	17:34:38	601529.03	4482406.98	40.48615373 N	73.80204928 W	86
SPI_PV	077	C	7/12/2019	17:36:03	601524.7	4482404.61	40.48613295 N	73.80210076 W	86
SPI_PV	077	D	7/12/2019	17:37:39	601529.12	4482403.11	40.48611884 N	73.80204885 W	86
SPI_PV	078	A	7/11/2019	18:45:49	627135.8	4480973.65	40.46971921 N	73.50028818 W	77
SPI_PV	078	B	7/11/2019	18:47:20	627133.58	4480964.79	40.4696398 N	73.50031615 W	77
SPI_PV	078	C	7/11/2019	18:48:37	627136.62	4480967.76	40.46966606 N	73.50027973 W	77
SPI_PV	078	D	7/11/2019	18:49:52	627133.11	4480968.42	40.46967256 N	73.500321 W	77
SPI_PV	079	A	7/12/2019	4:58:37	626749.45	4482789.32	40.4861301 N	73.50448128 W	80
SPI_PV	079	B	7/12/2019	4:59:36	626746.72	4482784.83	40.48609015 N	73.50451441 W	80
SPI_PV	079	C	7/12/2019	5:00:22	626744.9	4482784.98	40.48609178 N	73.5045358 W	80
SPI_PV	079	D	7/12/2019	5:01:01	626746.96	4482788.82	40.48612598 N	73.50451078 W	80
SPI_PV	080	A	7/12/2019	5:41:01	626365.78	4484604.67	40.50253761 N	73.50864475 W	69
SPI_PV	080	B	7/12/2019	5:41:58	626362.09	4484609.26	40.50257953 N	73.50868733 W	69
SPI_PV	080	C	7/12/2019	5:42:35	626364.84	4484614.71	40.50262819 N	73.50865383 W	69
SPI_PV	080	D	7/12/2019	5:43:32	626364.54	4484608.2	40.50256962 N	73.5086587 W	69
SPI_PV	081	A	7/11/2019	19:02:48	627260.95	4480382.73	40.46437826 N	73.49893087 W	83
SPI_PV	081	B	7/11/2019	19:04:23	627257.56	4480384.29	40.46439283 N	73.49897059 W	83
SPI_PV	081	C	7/11/2019	19:05:35	627258.23	4480386.51	40.46441267 N	73.49896224 W	83
SPI_PV	081	D	7/11/2019	19:06:47	627254.73	4480378.44	40.46434059 N	73.49900512 W	83
SPI_PV	082	A	7/12/2019	4:18:41	627035.34	4482455.05	40.48307603 N	73.50117616 W	76
SPI_PV	082	B	7/12/2019	4:19:45	627029.29	4482459.29	40.48311515 N	73.50124662 W	76
SPI_PV	082	C	7/12/2019	4:20:30	627031.98	4482462.43	40.48314302 N	73.50121434 W	76
SPI_PV	082	D	7/12/2019	4:21:33	627034.81	4482463.55	40.48315262 N	73.5011807 W	76
SPI_PV	083	A	7/12/2019	5:26:25	626835.52	4484300.89	40.49973011 N	73.50316354 W	76
SPI_PV	083	B	7/12/2019	5:27:10	626837.99	4484304.59	40.4997631 N	73.50313369 W	76
SPI_PV	083	C	7/12/2019	5:27:53	626838.68	4484304.13	40.49975886 N	73.50312561 W	76

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SampleType	StationID	Replicate	Date	Time	X_UTM_18N_m	Y_UTM_18N_m	Latitude_WGS84	Longitude_WGS84	Depth_ft
SPI_PV	083	D	7/12/2019	5:28:49	626835.3	4484304.02	40.49975839 N	73.50316551 W	76
SPI_PV	084	A	7/12/2019	6:00:51	626636.72	4486155.58	40.5164637 N	73.50513801 W	62
SPI_PV	084	B	7/12/2019	6:01:37	626635.06	4486155.73	40.51646534 N	73.50515759 W	62
SPI_PV	084	C	7/12/2019	6:02:25	626640.41	4486152.06	40.5164314 N	73.50509522 W	62
SPI_PV	084	D	7/12/2019	6:03:05	626643.36	4486155.97	40.51646622 N	73.50505956 W	62
SPI_PV	085	A	7/12/2019	6:43:33	626565.5	4488012.69	40.53319952 N	73.50560692 W	66
SPI_PV	085	B	7/12/2019	6:44:27	626560.85	4488012.3	40.53319678 N	73.50566198 W	66
SPI_PV	085	C	7/12/2019	6:45:10	626563.58	4488008.86	40.53316539 N	73.50563036 W	66
SPI_PV	085	D	7/12/2019	6:45:56	626565.9	4488003.16	40.5331137 N	73.50560418 W	66
SPI_PV	086	A	7/12/2019	7:18:02	626568.58	4489860.28	40.54983829 N	73.50520076 W	51
SPI_PV	086	B	7/12/2019	7:18:55	626572.88	4489857.21	40.54980992 N	73.50515051 W	51
SPI_PV	086	C	7/12/2019	7:19:49	626573.17	4489862.77	40.54985995 N	73.50514599 W	51
SPI_PV	086	D	7/12/2019	7:20:41	626575.44	4489868.64	40.54991253 N	73.50511803 W	51
SPI_PV	087	A	7/12/2019	7:36:48	626581.63	4491728.67	40.5666273 N	73.50467227 W	43
SPI_PV	087	B	7/12/2019	7:38:06	626574.72	4491719.98	40.56658554 N	73.50475554 W	43
SPI_PV	087	C	7/12/2019	7:38:50	626578.4	4491727.11	40.56664917 N	73.5047107 W	43
SPI_PV	087	D	7/12/2019	7:39:38	626584.39	4491725.13	40.56663043 N	73.50464039 W	43
SPI_PV	088	A	7/12/2019	7:57:25	626584.34	4493020.43	40.57829564 N	73.50438113 W	36
SPI_PV	088	B	7/12/2019	7:58:16	626584.51	4493017.04	40.57826517 N	73.50437985 W	36
SPI_PV	088	C	7/12/2019	7:58:59	626588.68	4493011.53	40.57821491 N	73.50433165 W	36
SPI_PV	088	D	7/12/2019	7:59:44	626588.53	4493012.42	40.57822291 N	73.50433333 W	36
SPI_PV	089	A	7/13/2019	3:52:20	600066.12	4482413.48	40.48638987 N	73.8193057 W	80
SPI_PV	089	B	7/13/2019	3:53:44	600068.59	4482408.99	40.48634911 N	73.8192773 W	80
SPI_PV	089	C	7/13/2019	3:54:35	600072.68	4482404.81	40.48631099 N	73.81922974 W	80
SPI_PV	089	D	7/13/2019	3:55:12	600070.59	4482401.28	40.48627945 N	73.81925492 W	80
SPI_PV	090	A	7/13/2019	4:14:51	598212.13	4482405.99	40.4865438 N	73.84117806 W	70
SPI_PV	090	B	7/13/2019	4:15:38	598210.14	4482409.07	40.4865718 N	73.84120105 W	70
SPI_PV	090	C	7/13/2019	4:16:20	598211.03	4482405.71	40.48654142 N	73.84119114 W	70
SPI_PV	090	D	7/13/2019	4:16:59	598215.71	4482404.67	40.48653154 N	73.84113606 W	70
SPI_PV	091	A	7/13/2019	4:37:10	596358.46	4482416.76	40.48685802 N	73.86304412 W	60
Grab	091	A	7/13/2019	13:40:36	596353.35	4482414.44	40.48683776 N	73.86310469 W	57
SPI_PV	091	B	7/13/2019	4:37:57	596353.21	4482420.71	40.48689424 N	73.86310541 W	60
SPI_PV	091	C	7/13/2019	4:38:43	596350.78	4482416.08	40.48685278 N	73.86313487 W	60

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SampleType	StationID	Replicate	Date	Time	X_UTM_18N_m	Y_UTM_18N_m	Latitude_WGS84	Longitude_WGS84	Depth_ft
SPI_PV	091	D	7/13/2019	4:39:26	596353.92	4482416.01	40.48685185 N	73.86309781 W	60
SPI_PV	092	A	7/13/2019	4:56:59	594504.36	4482470.86	40.48755849 N	73.88490899 W	55
SPI_PV	092	B	7/13/2019	4:57:46	594496.63	4482468.79	40.48754066 N	73.88500049 W	55
SPI_PV	092	C	7/13/2019	4:58:24	594497.73	4482467.3	40.48752711 N	73.88498781 W	55
SPI_PV	092	D	7/13/2019	4:59:14	594499.94	4482466.15	40.48751652 N	73.88496192 W	55
SPI_PV	093	A	7/13/2019	5:20:09	592714.83	4482911.55	40.49172968 N	73.9059562 W	44
SPI_PV	093	B	7/13/2019	5:20:53	592710.74	4482908.77	40.49170509 N	73.90600488 W	44
SPI_PV	093	C	7/13/2019	5:21:38	592712.99	4482912.89	40.49174196 N	73.9059777 W	44
SPI_PV	093	D	7/13/2019	5:22:29	592715.44	4482909.19	40.49170834 N	73.90594933 W	44
SPI_PV	094	A	7/13/2019	5:39:48	591049.78	4483733.65	40.49931904 N	73.92548243 W	44
SPI_PV	094	B	7/13/2019	5:40:40	591049.03	4483731.46	40.49929936 N	73.9254916 W	44
SPI_PV	094	C	7/13/2019	5:41:22	591042.78	4483730.6	40.49929232 N	73.92556547 W	44
SPI_PV	094	D	7/13/2019	5:42:07	591043.64	4483726.54	40.49925568 N	73.92555596 W	44
SPI_PV	094	E	7/13/2019	5:42:43	591046.21	4483720.89	40.49920445 N	73.9255264 W	44
SPI_PV	095	A	7/13/2019	6:01:21	589433.49	4484637.11	40.50763269 N	73.94442636 W	30
Grab	095	A	7/13/2019	13:00:56	589430.97	4484637.29	40.50763462 N	73.94445601 W	26
SPI_PV	095	B	7/13/2019	6:02:08	589435.66	4484635.88	40.50762138 N	73.94440096 W	30
SPI_PV	095	C	7/13/2019	6:02:46	589432.73	4484634.88	40.50761265 N	73.94443558 W	30
SPI_PV	095	D	7/13/2019	6:03:26	589429.4	4484633.46	40.50760029 N	73.94447509 W	30
SPI_PV	096	A	7/13/2019	6:17:55	587759.48	4485440.92	40.51505178 N	73.96406997 W	23
SPI_PV	096	B	7/13/2019	6:18:41	587758.21	4485439.52	40.51503934 N	73.96408519 W	23
SPI_PV	096	C	7/13/2019	6:19:23	587754.11	4485436.24	40.51501025 N	73.96413403 W	23
SPI_PV	096	D	7/13/2019	6:20:00	587751.15	4485438.22	40.51502842 N	73.96416864 W	23
SPI_PV	097	A	7/13/2019	6:37:05	586021.2	4486092.46	40.52110275 N	73.98449731 W	33
SPI_PV	097	B	7/13/2019	6:37:45	586019.55	4486092.5	40.52110323 N	73.98451677 W	33
SPI_PV	097	C	7/13/2019	6:38:23	586019.3	4486093.4	40.52111141 N	73.98451968 W	33
SPI_PV	097	E	7/13/2019	6:41:22	586019.17	4486092.93	40.52110717 N	73.98452123 W	33
SPI_PV	098	A	7/12/2019	6:15:59	625886.68	4486536.4	40.52000756 N	73.51391318 W	58
SPI_PV	098	B	7/12/2019	6:16:36	625883.29	4486540.66	40.52004643 N	73.5139523 W	58
SPI_PV	098	C	7/12/2019	6:17:27	625882.7	4486532.25	40.51997078 N	73.51396093 W	58
SPI_PV	098	D	7/12/2019	6:18:11	625883.56	4486535.35	40.51999852 N	73.5139502 W	58
SPI_PV	099	A	7/12/2019	10:08:50	624556.66	4487692.76	40.53062252 N	73.52938144 W	58
SPI_PV	099	B	7/12/2019	10:09:32	624563.68	4487691.92	40.53061395 N	73.52929876 W	58

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SampleType	StationID	Replicate	Date	Time	X_UTM_18N_m	Y_UTM_18N_m	Latitude_WGS84	Longitude_WGS84	Depth_ft
SPI_PV	099	C	7/12/2019	10:10:57	624556.61	4487696.25	40.53065404 N	73.52938131 W	58
SPI_PV	099	D	7/12/2019	10:11:43	624557.63	4487701.51	40.53070119 N	73.5293682 W	58
SPI_PV	100	A	7/12/2019	10:31:01	622774.63	4488219.03	40.53562807 N	73.55031291 W	50
SPI_PV	100	B	7/12/2019	10:31:52	622779.93	4488218.82	40.53562531 N	73.55025042 W	50
SPI_PV	100	C	7/12/2019	10:32:44	622783.11	4488221.2	40.53564633 N	73.55021235 W	50
SPI_PV	100	D	7/12/2019	10:33:27	622781.76	4488221.26	40.5356471 N	73.55022837 W	50
SPI_PV	101	A	7/12/2019	10:51:58	620994.55	4488743.59	40.54061403 N	73.571225 W	48
SPI_PV	101	B	7/12/2019	10:53:06	620993.96	4488746.86	40.54064364 N	73.5712313 W	48
SPI_PV	101	C	7/12/2019	10:53:48	620998.64	4488750.08	40.54067195 N	73.57117543 W	48
SPI_PV	101	D	7/12/2019	10:54:35	621000.56	4488748.12	40.54065395 N	73.57115309 W	48
SPI_PV	102	A	7/12/2019	6:28:22	625836.63	4487149.24	40.52553431 N	73.51438191 W	57
SPI_PV	102	B	7/12/2019	6:29:17	625836.15	4487137.6	40.52542959 N	73.5143899 W	57
SPI_PV	102	C	7/12/2019	6:30:02	625836.41	4487139.8	40.5254494 N	73.51438636 W	57
SPI_PV	102	D	7/12/2019	6:31:08	625843.32	4487140.31	40.52545289 N	73.51430472 W	57
SPI_PV	103	A	7/12/2019	7:03:49	625502.41	4488963.63	40.54192527 N	73.51796645 W	56
SPI_PV	103	B	7/12/2019	7:04:31	625504.93	4488967.52	40.54195994 N	73.51793585 W	56
SPI_PV	103	C	7/12/2019	7:05:14	625509.96	4488972.38	40.54200297 N	73.5178755 W	56
SPI_PV	103	D	7/12/2019	7:05:57	625515.38	4488974.1	40.54201765 N	73.51781125 W	56
SPI_PV	104	A	7/12/2019	9:37:22	625062.43	4490770.57	40.55826506 N	73.52280276 W	45
SPI_PV	104	B	7/12/2019	9:39:31	625061.63	4490761.95	40.55818754 N	73.52281398 W	45
SPI_PV	104	C	7/12/2019	9:40:23	625062	4490763.84	40.55820447 N	73.52280921 W	45
SPI_PV	104	D	7/12/2019	9:41:12	625064.12	4490764.9	40.55821367 N	73.52278394 W	45
SPI_PV	105	A	7/12/2019	9:18:32	624563.4	4491954.92	40.56900642 N	73.5284617 W	37
SPI_PV	105	B	7/12/2019	9:19:38	624560.44	4491947.82	40.56894297 N	73.52849806 W	37
SPI_PV	105	C	7/12/2019	9:20:27	624565.35	4491947.48	40.56893913 N	73.52844013 W	37
SPI_PV	105	D	7/12/2019	9:21:13	624566.5	4491941.92	40.5688889 N	73.52842761 W	37
SPI_PV	106	A	7/12/2019	8:48:05	624125.61	4492856.23	40.57718932 N	73.53345476 W	32
SPI_PV	106	B	7/12/2019	8:48:55	624125.92	4492857.38	40.57719968 N	73.5334508 W	32
SPI_PV	106	C	7/12/2019	8:49:45	624124.17	4492860.88	40.57723143 N	73.53347083 W	32
SPI_PV	106	D	7/12/2019	8:50:54	624127.19	4492850.69	40.57713917 N	73.53343711 W	32
SPI_PV	106	E	7/12/2019	8:51:36	624126.46	4492845.52	40.57709275 N	73.53344678 W	32
SPI_PV	107	A	7/13/2019	7:02:02	583940.97	4487286.65	40.53207275 N	74.00889304 W	52
SPI_PV	107	B	7/13/2019	7:02:45	583941.38	4487287.13	40.53207702 N	74.00888809 W	52

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SPI_PV	107	C	7/13/2019	7:03:24	583937.6	4487284.94	40.53205768 N	74.00893303 W	52
SPI_PV	107	D	7/13/2019	7:04:06	583940.94	4487289	40.53209394 N	74.00889303 W	52
SPI_PV	108	A	7/13/2019	7:36:16	583074.13	4488897.3	40.54666823 N	74.01891489 W	48
Grab	108	A	7/13/2019	12:22:52	583074.48	4488897.86	40.54667325 N	74.01891064 W	38
SPI_PV	108	B	7/13/2019	7:37:40	583070.77	4488899.45	40.5466879 N	74.01895425 W	48
SPI_PV	108	C	7/13/2019	7:38:18	583073.39	4488902.92	40.54671891 N	74.01892288 W	48
SPI_PV	108	D	7/13/2019	7:38:55	583072.56	4488905.66	40.54674371 N	74.01893228 W	48
SPI_PV	108	E	7/13/2019	7:39:19	583071.31	4488908.22	40.54676686 N	74.01894676 W	48
SPI_PV	108	F	7/13/2019	7:39:40	583071.88	4488910.52	40.54678757 N	74.01893966 W	48
SPI_PV	109	A	7/13/2019	7:58:33	582678.62	4490716.09	40.56309072 N	74.02334701 W	36
SPI_PV	109	B	7/13/2019	7:59:19	582679.55	4490713.91	40.56307106 N	74.02333638 W	36
SPI_PV	109	C	7/13/2019	7:59:59	582678.14	4490709.04	40.56302731 N	74.02335368 W	36
SPI_PV	109	D	7/13/2019	8:00:32	582678.53	4490705.64	40.56299664 N	74.02334954 W	36
SPI_PV	110	B	7/13/2019	8:19:46	582132.43	4492461.5	40.57886711 N	74.02957101 W	53
SPI_PV	110	C	7/13/2019	8:20:34	582137.09	4492458.91	40.57884332 N	74.02951634 W	53
SPI_PV	110	D	7/13/2019	8:21:12	582140.37	4492462	40.57887078 N	74.02947717 W	53
SPI_PV	110	E	7/13/2019	8:21:52	582136.16	4492464.08	40.57888998 N	74.02952664 W	53
SPI_PV	111	A	7/13/2019	8:41:44	581615.47	4494250.6	40.59503375 N	74.03544676 W	86
SPI_PV	111	B	7/13/2019	8:42:39	581615.91	4494247.67	40.59500736 N	74.03544199 W	86
SPI_PV	111	C	7/13/2019	8:43:15	581614.81	4494242.68	40.59496253 N	74.03545562 W	86
SPI_PV	111	D	7/13/2019	8:44:00	581615.25	4494240.41	40.59494202 N	74.03545069 W	86
SPI_PV	112	A	7/13/2019	9:06:19	581024.35	4496005.8	40.61090207 N	74.04220617 W	64
SPI_PV	112	B	7/13/2019	9:09:00	581020.57	4496007.49	40.61091764 N	74.0422506 W	64
SPI_PV	112	C	7/13/2019	9:11:01	581021.33	4496010.96	40.61094881 N	74.04224119 W	64
SPI_PV	112	D	7/13/2019	9:11:55	581019.57	4496006.7	40.61091058 N	74.0422625 W	64
SPI_PV	113	A	7/13/2019	9:43:00	580687.91	4497831.74	40.6273822 N	74.04594874 W	47
SPI_PV	113	B	7/13/2019	9:43:46	580682.09	4497823.89	40.62731206 N	74.04601856 W	47
SPI_PV	113	C	7/13/2019	9:44:58	580681.82	4497832.72	40.62739166 N	74.04602057 W	47
SPI_PV	113	D	7/13/2019	9:46:06	580686.27	4497827.46	40.62734381 N	74.0459687 W	47
SPI_PV	114	A	7/13/2019	10:07:32	581331	4499537.75	40.64268614 N	74.03812534 W	50
SPI_PV	114	B	7/13/2019	10:08:20	581333.64	4499538.56	40.64269317 N	74.038094 W	50
SPI_PV	114	C	7/13/2019	10:09:04	581333.58	4499537.78	40.64268616 N	74.03809486 W	50
SPI_PV	114	D	7/13/2019	10:09:44	581330.85	4499535.72	40.64266784 N	74.03812736 W	50

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SampleType	StationID	Replicate	Date	Time	X_UTM_18N_m	Y_UTM_18N_m	Latitude_WGS84	Longitude_WGS84	Depth_ft
SPI_PV	114	E	7/13/2019	10:10:35	581330.67	4499531.87	40.64263322 N	74.03813005 W	50
SPI_PV	115	A	7/13/2019	10:28:43	582503.3	4500973.51	40.65550244 N	74.02407442 W	43
SPI_PV	115	B	7/13/2019	10:29:37	582503.85	4500978.81	40.65555007 N	74.0240672 W	43
SPI_PV	115	C	7/13/2019	10:30:27	582498.57	4500975.12	40.6555174 N	74.02413014 W	43
SPI_PV	115	D	7/13/2019	10:31:39	582500.8	4500969.58	40.6554673 N	74.02410452 W	43
SPI_PV	116	A	7/12/2019	11:15:28	619703.05	4489022.09	40.54330983 N	73.58641855 W	45
SPI_PV	116	B	7/12/2019	11:17:25	619704.2	4489038.64	40.54345877 N	73.58640185 W	45
SPI_PV	116	C	7/12/2019	11:18:11	619706.46	4489040.79	40.54347783 N	73.58637482 W	45
SPI_PV	116	D	7/12/2019	11:18:53	619708.12	4489034.25	40.5434186 N	73.58635642 W	45
SPI_PV	116	E	7/12/2019	11:19:34	619707.44	4489029.39	40.54337495 N	73.5863654 W	45
SPI_PV	117	A	7/12/2019	11:47:29	617879.23	4489386.94	40.54685725 N	73.60788212 W	46
SPI_PV	117	B	7/12/2019	11:48:16	617878.75	4489387.68	40.54686405 N	73.60788758 W	46
SPI_PV	117	C	7/12/2019	11:48:53	617884.65	4489384.61	40.54683554 N	73.60781852 W	46
SPI_PV	117	D	7/12/2019	11:49:31	617885.35	4489384.28	40.54683245 N	73.60781027 W	46
SPI_PV	118	A	7/12/2019	16:06:09	616315.47	4489690.73	40.54981434 N	73.62628859 W	47
SPI_PV	118	B	7/12/2019	16:07:40	616309.24	4489691.89	40.54982562 N	73.62636191 W	47
SPI_PV	118	C	7/12/2019	16:09:11	616308.69	4489689.17	40.54980127 N	73.62636898 W	47
SPI_PV	118	D	7/12/2019	16:10:40	616309.76	4489691.48	40.54982185 N	73.62635593 W	47
SPI_PV	119	A	7/12/2019	11:35:01	618461.07	4489358.57	40.5465188 N	73.60101793 W	45
SPI_PV	119	B	7/12/2019	11:35:44	618463.32	4489357.21	40.54650619 N	73.60099169 W	45
SPI_PV	119	C	7/12/2019	11:36:33	618462.47	4489355.04	40.54648682 N	73.60100213 W	45
SPI_PV	119	D	7/12/2019	11:37:13	618459.42	4489354.89	40.54648589 N	73.60103813 W	45
SPI_PV	120	A	7/12/2019	12:59:51	617461.22	4490804.66	40.55968504 N	73.61255368 W	36
SPI_PV	120	B	7/12/2019	13:01:44	617459.48	4490800.55	40.55964828 N	73.612575 W	36
SPI_PV	120	C	7/12/2019	13:03:13	617462.62	4490802.98	40.5596697 N	73.61253743 W	36
SPI_PV	120	D	7/12/2019	13:05:03	617460.56	4490802.64	40.55966692 N	73.61256181 W	36
SPI_PV	121	A	7/12/2019	13:26:45	616916.77	4492202.38	40.57235036 N	73.61872407 W	27
SPI_PV	121	B	7/12/2019	13:28:22	616914.16	4492199.18	40.57232188 N	73.61875554 W	27
SPI_PV	121	C	7/12/2019	13:29:46	616913.49	4492203.04	40.57235682 N	73.61876269 W	27
SPI_PV	121	D	7/12/2019	13:31:25	616915.69	4492195.68	40.5722902 N	73.61873813 W	27
SPI_PV	122	A	7/12/2019	15:53:52	615497.02	4489794.96	40.55086756 N	73.63593297 W	44
SPI_PV	122	B	7/12/2019	15:55:34	615501.67	4489793.45	40.55085333 N	73.6358784 W	44
SPI_PV	122	C	7/12/2019	15:57:09	615504.83	4489792.89	40.55084783 N	73.63584121 W	44

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SPI_PV	122	D	7/12/2019	15:58:35	615500.01	4489793.56	40.55085453 N	73.63589797 W	44
SPI_PV	123	A	7/12/2019	15:17:32	613654.7	4489953.16	40.55254725 N	73.65765744 W	45
SPI_PV	123	B	7/12/2019	15:19:27	613652.42	4489950.25	40.55252136 N	73.65768483 W	45
SPI_PV	123	C	7/12/2019	15:21:05	613654.12	4489949.83	40.55251727 N	73.6576648 W	45
SPI_PV	123	D	7/12/2019	15:22:55	613654.04	4489943.98	40.55246466 N	73.65766679 W	45
SPI_PV	124	A	7/12/2019	15:03:17	613193.39	4490836.12	40.56056272 N	73.66294618 W	41
SPI_PV	124	B	7/12/2019	15:04:51	613193.74	4490832.8	40.56053281 N	73.66294257 W	41
SPI_PV	124	C	7/12/2019	15:06:18	613195.25	4490831.29	40.56051899 N	73.66292502 W	41
SPI_PV	124	D	7/12/2019	15:07:49	613195.42	4490827.57	40.56048542 N	73.66292377 W	41
SPI_PV	125	A	7/12/2019	15:31:56	614701.26	4490036.49	40.55315348 N	73.64528492 W	43
SPI_PV	125	B	7/12/2019	15:33:30	614696.59	4490037.95	40.5531673 N	73.64533979 W	43
SPI_PV	125	C	7/12/2019	15:35:06	614698.39	4490035.88	40.55314835 N	73.64531897 W	43
SPI_PV	125	D	7/12/2019	15:36:40	614700.06	4490036.01	40.55314929 N	73.64529919 W	43
SPI_PV	126	A	7/12/2019	14:51:47	613340.01	4491191.57	40.56374401 N	73.66115093 W	37
SPI_PV	126	B	7/12/2019	14:53:25	613338.1	4491188.65	40.56371799 N	73.66117406 W	37
SPI_PV	126	C	7/12/2019	14:55:06	613339.46	4491189.77	40.56372792 N	73.66115776 W	37
SPI_PV	126	D	7/12/2019	14:56:33	613339.5	4491193.92	40.56376525 N	73.66115656 W	37
SPI_PV	127	A	7/12/2019	15:42:02	615239.18	4490216.37	40.55469887 N	73.63890059 W	43
SPI_PV	127	B	7/12/2019	15:43:42	615233.76	4490217.65	40.55471119 N	73.63896426 W	43
SPI_PV	127	C	7/12/2019	15:45:21	615235.75	4490214.41	40.55468167 N	73.63894134 W	43
SPI_PV	127	D	7/12/2019	15:46:51	615232.03	4490212.89	40.55466854 N	73.63898558 W	43
SPI_PV	128	A	7/12/2019	14:32:22	614717.67	4491411.92	40.56553888 N	73.64484132 W	44
SPI_PV	128	B	7/12/2019	14:34:04	614711.52	4491411.37	40.56553478 N	73.64491404 W	44
SPI_PV	128	C	7/12/2019	14:35:37	614716.98	4491411.75	40.56553744 N	73.64484947 W	44
SPI_PV	128	D	7/12/2019	14:37:22	614715.78	4491414.74	40.56556457 N	73.64486319 W	44
SPI_PV	129	A	7/12/2019	13:50:03	614324.05	4492128.6	40.57204804 N	73.6493602 W	40
SPI_PV	129	B	7/12/2019	13:51:52	614322.82	4492130.1	40.57206174 N	73.64937446 W	40
SPI_PV	129	C	7/12/2019	13:53:33	614325.76	4492126.25	40.57202664 N	73.6493404 W	40
SPI_PV	129	D	7/12/2019	13:55:19	614328.08	4492125.87	40.57202289 N	73.64931307 W	40
SPI_PV	130	A	7/12/2019	14:12:05	612857.52	4492212.81	40.57300769 N	73.66666641 W	31
SPI_PV	130	B	7/12/2019	14:13:48	612850.3	4492214.69	40.57302567 N	73.66675132 W	31
SPI_PV	130	C	7/12/2019	14:15:10	612855.32	4492219.98	40.57307255 N	73.66669109 W	31
SPI_PV	130	D	7/12/2019	14:16:44	612857.63	4492218.27	40.57305691 N	73.66666407 W	31

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SampleType	StationID	Replicate	Date	Time	X_UTM_18N_m	Y_UTM_18N_m	Latitude_WGS84	Longitude_WGS84	Depth_ft
SPI_PV	131	A	7/11/2019	15:22:57	616727.09	4481632.25	40.47717865 N	73.62291447 W	69
SPI_PV	131	B	7/11/2019	15:24:15	616724.86	4481635.5	40.47720817 N	73.62294017 W	69
SPI_PV	131	C	7/11/2019	15:25:25	616727.81	4481636.97	40.47722104 N	73.62290513 W	69
SPI_PV	131	D	7/11/2019	15:26:40	616729.82	4481633.01	40.47718511 N	73.62288215 W	69
SPI_PV	132	A	7/11/2019	15:03:40	618383.72	4480612.96	40.46776403 N	73.60356615 W	75
SPI_PV	132	B	7/11/2019	15:04:54	618383.18	4480609.3	40.46773117 N	73.60357316 W	75
SPI_PV	132	C	7/11/2019	15:06:09	618380.33	4480611.22	40.46774883 N	73.60360637 W	75
SPI_PV	132	D	7/11/2019	15:07:37	618383.12	4480613.08	40.46776518 N	73.60357314 W	75
SPI_PV	133	A	7/11/2019	14:45:48	619412.58	4478922.93	40.45239572 N	73.5917512 W	79
Grab	133	A	7/13/2019	15:57:58	619409.76	4478925.84	40.45242238 N	73.59178398 W	79
SPI_PV	133	B	7/11/2019	14:47:05	619410.41	4478923.95	40.45240522 N	73.59177661 W	79
SPI_PV	133	C	7/11/2019	14:48:23	619411.8	4478927.41	40.45243625 N	73.5917596 W	79
SPI_PV	133	D	7/11/2019	14:49:34	619412.42	4478919.99	40.45236929 N	73.59175374 W	79
SPI_PV	134	A	7/11/2019	14:26:08	620095.61	4477065.07	40.4355648 N	73.5840497 W	80
SPI_PV	134	B	7/11/2019	14:27:29	620095.25	4477062.8	40.43554443 N	73.58405438 W	80
SPI_PV	134	C	7/11/2019	14:28:48	620097.44	4477061.73	40.43553444 N	73.58402878 W	80
SPI_PV	134	D	7/11/2019	14:30:02	620093.85	4477063.71	40.43555282 N	73.58407068 W	80
SPI_PV	135	A	7/11/2019	4:37:16	620538.91	4475120.09	40.41798353 N	73.57919335 W	76
SPI_PV	135	B	7/11/2019	4:38:08	620542.6	4475120.77	40.41798909 N	73.57914973 W	76
SPI_PV	135	C	7/11/2019	4:38:56	620547.5	4475115.87	40.41794426 N	73.57909292 W	76
SPI_PV	135	D	7/11/2019	4:40:53	620530.9	4475117.97	40.41796558 N	73.57928814 W	76
SPI_PV	135	E	7/11/2019	4:41:50	620531.26	4475126.14	40.41803913 N	73.57928241 W	76
SPI_PV	135	F	7/11/2019	8:07:25	620537.53	4475114.19	40.41793061 N	73.57921071 W	74
SPI_PV	135	G	7/11/2019	8:07:55	620538.47	4475114.82	40.41793615 N	73.57919959 W	74
SPI_PV	135	H	7/11/2019	8:08:18	620539.45	4475119.39	40.4179771 N	73.57918717 W	74
SPI_PV	135	I	7/11/2019	8:08:42	620540.33	4475120.75	40.41798922 N	73.57917647 W	74
SPI_PV	136	A	7/11/2019	4:16:19	620953.51	4473174.49	40.40040054 N	73.5746777 W	83
Grab	136	A	7/13/2019	16:32:29	620956.22	4473174.42	40.40039957 N	73.57464573 W	83
SPI_PV	136	B	7/11/2019	4:17:21	620963.02	4473174.97	40.40040353 N	73.57456556 W	83
SPI_PV	136	C	7/11/2019	4:18:51	620954.64	4473170.12	40.400361 N	73.57466522 W	83
SPI_PV	136	D	7/11/2019	4:19:45	620956.21	4473172.71	40.40038414 N	73.57464616 W	83
SPI_PV	136	E	7/11/2019	8:26:35	620954.78	4473183.18	40.4004786 N	73.57466107 W	80
SPI_PV	136	F	7/11/2019	8:27:42	620956.03	4473170.41	40.40036346 N	73.57464874 W	80

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SPI_PV	136	G	7/11/2019	8:28:16	620954.88	4473173.75	40.40039374 N	73.57466168 W	80
SPI_PV	136	H	7/11/2019	8:28:42	620955.18	4473173.92	40.40039517 N	73.57465809 W	80
SPI_PV	137	A	7/11/2019	3:56:27	621693.43	4471339.35	40.38376487 N	73.56631159 W	91
SPI_PV	137	B	7/11/2019	3:57:11	621692.42	4471338.17	40.38375439 N	73.56632371 W	91
SPI_PV	137	C	7/11/2019	3:57:56	621696.22	4471345.41	40.38381896 N	73.5662776 W	91
SPI_PV	137	D	7/11/2019	3:58:42	621692.16	4471339.48	40.38376618 N	73.56632654 W	91
SPI_PV	137	E	7/11/2019	8:46:07	621691.18	4471347.31	40.38383688 N	73.5663366 W	90
SPI_PV	137	F	7/11/2019	8:46:40	621691.85	4471347.98	40.38384279 N	73.56632861 W	90
SPI_PV	137	G	7/11/2019	8:47:02	621692.99	4471347.17	40.38383534 N	73.56631535 W	90
SPI_PV	137	H	7/11/2019	8:47:32	621693.44	4471343.07	40.38379836 N	73.56631084 W	90
SPI_PV	138	A	7/11/2019	3:35:55	623212.23	4470093.98	40.37232548 N	73.5486645 W	90
SPI_PV	138	B	7/11/2019	3:36:41	623214.7	4470096.81	40.37235052 N	73.54863489 W	90
SPI_PV	138	C	7/11/2019	3:37:27	623217.87	4470094.94	40.37233327 N	73.54859801 W	90
SPI_PV	138	D	7/11/2019	3:38:06	623220.99	4470095.66	40.37233932 N	73.54856112 W	90
SPI_PV	138	E	7/11/2019	9:07:59	623218.85	4470101.41	40.37239142 N	73.5485852 W	86
SPI_PV	138	F	7/11/2019	9:08:27	623215.54	4470097.65	40.37235798 N	73.54862486 W	86
SPI_PV	138	G	7/11/2019	9:08:52	623213.53	4470092.79	40.37231451 N	73.54864949 W	86
SPI_PV	138	H	7/11/2019	9:09:19	623213.58	4470090.47	40.37229367 N	73.54864933 W	86
SPI_PV	139	A	7/11/2019	3:14:40	624927.35	4469075.16	40.36289441 N	73.52866781 W	88
SPI_PV	139	B	7/11/2019	3:15:28	624929.91	4469074.06	40.3628841 N	73.52863784 W	88
SPI_PV	139	C	7/11/2019	3:16:14	624930.2	4469067.17	40.36282207 N	73.52863577 W	88
SPI_PV	139	D	7/11/2019	3:17:01	624929.41	4469073.78	40.36288168 N	73.52864382 W	88
SPI_PV	139	E	7/11/2019	9:29:03	624920.5	4469065.99	40.36281286 N	73.52875015 W	85
SPI_PV	139	F	7/11/2019	9:29:29	624920.43	4469070.6	40.36285435 N	73.52875017 W	85
SPI_PV	139	G	7/11/2019	9:29:55	624922.68	4469074.84	40.36289221 N	73.52872275 W	85
SPI_PV	139	H	7/11/2019	9:30:22	624925.65	4469075.53	40.36289797 N	73.52868768 W	85
SPI_PV	140	A	7/11/2019	2:52:08	626634.46	4468046.81	40.35337545 N	73.50877276 W	93
SPI_PV	140	B	7/11/2019	2:52:52	626638.44	4468052.85	40.35342917 N	73.50872467 W	93
SPI_PV	140	C	7/11/2019	2:53:40	626629.66	4468046.82	40.35337627 N	73.50882925 W	93
SPI_PV	140	D	7/11/2019	2:54:28	626629.81	4468044.83	40.3533583 N	73.50882795 W	93
SPI_PV	140	E	7/11/2019	9:49:51	626634.48	4468047.43	40.35338103 N	73.50877243 W	89
SPI_PV	140	F	7/11/2019	9:50:32	626636.23	4468049.51	40.35339943 N	73.50875146 W	89
SPI_PV	140	G	7/11/2019	9:50:54	626637.72	4468049.72	40.3534011 N	73.50873384 W	89

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SPI_PV	140	H	7/11/2019	9:51:16	626638.58	4468049.96	40.35340316 N	73.50872369 W	89
SPI_PV	141	A	7/10/2019	19:25:16	615401	4454771.33	40.23543553 N	73.6434129 W	96
SPI_PV	141	B	7/10/2019	19:26:41	615402.85	4454776.65	40.23548315 N	73.64339016 W	96
SPI_PV	141	C	7/10/2019	19:27:55	615402.87	4454774.9	40.23546745 N	73.64339024 W	96
SPI_PV	141	D	7/10/2019	19:29:09	615405.04	4454776.33	40.23547998 N	73.64336452 W	96
SPI_PV	142	A	7/10/2019	19:57:26	617292.27	4455129.91	40.23840245 N	73.62112077 W	95
SPI_PV	142	B	7/10/2019	19:58:52	617286.53	4455134.81	40.23844744 N	73.62118737 W	95
SPI_PV	142	C	7/10/2019	20:00:18	617288.86	4455132.87	40.23842962 N	73.62116029 W	95
SPI_PV	142	D	7/10/2019	20:01:38	617292.79	4455132.72	40.23842767 N	73.62111419 W	95
SPI_PV	142	E	7/10/2019	20:03:19	617304.02	4455141.35	40.23850389 N	73.62098056 W	95
SPI_PV	143	A	7/10/2019	20:40:28	619176.42	4455488.44	40.24136569 N	73.59891042 W	93
SPI_PV	143	B	7/10/2019	20:41:43	619177.25	4455489.73	40.24137716 N	73.59890053 W	93
SPI_PV	143	C	7/10/2019	20:43:24	619172.88	4455484.11	40.24132717 N	73.59895285 W	93
SPI_PV	143	D	7/10/2019	20:44:45	619182.66	4455489.59	40.24137518 N	73.59883691 W	93
SPI_PV	144	A	7/10/2019	21:01:39	621062.28	4455845.22	40.24430852 N	73.57667864 W	94
SPI_PV	144	B	7/10/2019	21:03:00	621062.37	4455842.59	40.24428488 N	73.57667801 W	94
SPI_PV	144	C	7/10/2019	21:04:27	621062.51	4455841.05	40.24427096 N	73.57667664 W	94
SPI_PV	144	D	7/10/2019	21:05:43	621063.72	4455845.47	40.2443106 N	73.57666158 W	94
SPI_PV	145	A	7/10/2019	21:23:43	622946.25	4456193.98	40.2471752 N	73.55446865 W	99
SPI_PV	145	B	7/10/2019	21:24:59	622950.88	4456195.82	40.24719104 N	73.55441389 W	99
SPI_PV	145	C	7/10/2019	21:26:30	622947.13	4456194.66	40.24718119 N	73.55445821 W	99
SPI_PV	145	D	7/10/2019	21:27:47	622946.39	4456193.67	40.24717237 N	73.55446713 W	99
SPI_PV	146	A	7/10/2019	21:43:55	624840.69	4456553.37	40.25013165 N	73.53213182 W	100
SPI_PV	146	B	7/10/2019	21:45:08	624832.86	4456550.58	40.2501077 N	73.53222442 W	100
SPI_PV	146	C	7/10/2019	21:46:19	624835.32	4456552.06	40.25012072 N	73.53219529 W	100
SPI_PV	146	D	7/10/2019	21:47:33	624839.29	4456550.22	40.25010355 N	73.53214897 W	100
SPI_PV	147	A	7/10/2019	16:01:10	626718.96	4456907.51	40.25303904 N	73.50998435 W	103
Grab	147	A	7/10/2019	16:24:04	626714.09	4456908.12	40.25304525 N	73.51004153 W	102
SPI_PV	147	B	7/10/2019	16:02:22	626720.04	4456910.43	40.25306516 N	73.50997108 W	103
SPI_PV	147	C	7/10/2019	16:03:42	626720.29	4456912.98	40.25308806 N	73.5099677 W	103
SPI_PV	147	D	7/10/2019	16:04:46	626721.31	4456913.69	40.25309433 N	73.50995553 W	103
SPI_PV	148	A	7/10/2019	15:41:20	628603.3	4457263.26	40.25595562 N	73.48776335 W	115
SPI_PV	148	B	7/10/2019	15:42:33	628604.17	4457262.77	40.25595105 N	73.48775323 W	115

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SampleType	StationID	Replicate	Date	Time	X_UTM_18N_m	Y_UTM_18N_m	Latitude_WGS84	Longitude_WGS84	Depth_ft
SPI_PV	148	C	7/10/2019	15:43:42	628605.4	4457265.89	40.25597901 N	73.48773823 W	115
SPI_PV	148	D	7/10/2019	15:44:54	628605.08	4457266.07	40.25598067 N	73.48774192 W	115
SPI_PV	149	A	7/10/2019	15:22:25	630493.89	4457620.02	40.25887609 N	73.46546693 W	111
SPI_PV	149	B	7/10/2019	15:23:33	630495.33	4457620.66	40.25888163 N	73.46544998 W	111
SPI_PV	149	C	7/10/2019	15:25:04	630495.34	4457621.48	40.25888896 N	73.46544969 W	111
SPI_PV	149	D	7/10/2019	15:26:13	630498.1	4457623.65	40.25890811 N	73.46541674 W	111
SPI_PV	150	A	7/10/2019	14:50:46	632388.23	4457975.55	40.26178044 N	73.44312491 W	111
SPI_PV	150	B	7/10/2019	14:51:55	632380.76	4457973.29	40.2617613 N	73.44321319 W	111
SPI_PV	150	C	7/10/2019	14:53:05	632378.1	4457973.12	40.26176016 N	73.44324451 W	111
SPI_PV	150	D	7/10/2019	14:54:16	632379.09	4457977.53	40.26179972 N	73.44323201 W	111
SPI_PV	151	A	7/10/2019	14:30:47	634275.3	4458331.22	40.26468295 N	73.42086661 W	112
SPI_PV	151	B	7/10/2019	14:32:11	634269.74	4458329.22	40.2646659 N	73.42093235 W	112
SPI_PV	151	C	7/10/2019	14:33:31	634269.35	4458328.96	40.26466363 N	73.42093706 W	112
SPI_PV	151	D	7/10/2019	14:34:45	634270.18	4458333.17	40.26470135 N	73.42092641 W	112
SPI_PV	152	A	7/10/2019	14:12:31	636163.37	4458686.22	40.26757499 N	73.39859486 W	113
SPI_PV	152	B	7/10/2019	14:13:46	636155.95	4458687.43	40.26758706 N	73.39868185 W	113
SPI_PV	152	C	7/10/2019	14:15:09	636158.12	4458684.63	40.26756146 N	73.39865696 W	113
SPI_PV	152	D	7/10/2019	14:16:26	636159.02	4458683.63	40.26755236 N	73.39864655 W	113
SPI_PV	153	A	7/10/2019	13:50:13	638047.21	4459037.89	40.27043334 N	73.37637178 W	117
SPI_PV	153	B	7/10/2019	13:51:24	638043	4459038.84	40.27044254 N	73.3764211 W	117
SPI_PV	153	C	7/10/2019	13:52:43	638040.54	4459037.63	40.27043206 N	73.37645031 W	117
SPI_PV	153	D	7/10/2019	13:53:58	638040.58	4459041.23	40.27046447 N	73.376449 W	117
SPI_PV	154	A	7/10/2019	13:29:08	639926.85	4459395.14	40.27333837 N	73.35419518 W	121
SPI_PV	154	B	7/10/2019	13:30:22	639930.68	4459392.45	40.27331345 N	73.35415067 W	121
SPI_PV	154	C	7/10/2019	13:31:45	639933.95	4459395.38	40.27333935 N	73.35411168 W	121
SPI_PV	154	D	7/10/2019	13:32:53	639931.74	4459398.72	40.27336974 N	73.35413689 W	121
SPI_PV	155	A	7/10/2019	13:08:33	641816.05	4459749.46	40.27621109 N	73.33190497 W	120
SPI_PV	155	B	7/10/2019	13:09:32	641817.18	4459749.87	40.27621453 N	73.33189159 W	120
SPI_PV	155	C	7/10/2019	13:10:37	641815.58	4459752.78	40.27624099 N	73.33190986 W	120
SPI_PV	155	D	7/10/2019	13:11:43	641811.96	4459752.14	40.27623584 N	73.33195247 W	120
SPI_PV	156	A	7/10/2019	12:47:31	643704.06	4460109.16	40.27912809 N	73.30962587 W	119
SPI_PV	156	B	7/10/2019	12:48:47	643707.22	4460106.14	40.27910031 N	73.3095895 W	119
SPI_PV	156	C	7/10/2019	12:49:49	643703.4	4460110.2	40.27913755 N	73.3096335 W	119

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SampleType	StationID	Replicate	Date	Time	X_UTM_18N_m	Y_UTM_18N_m	Latitude_WGS84	Longitude_WGS84	Depth_ft
SPI_PV	156	D	7/10/2019	12:50:49	643700.56	4460112.05	40.2791547 N	73.30966648 W	119
Grab	157	A	7/10/2019	11:51:11	645586.62	4460466.8	40.28202316 N	73.28740956 W	121
SPI_PV	157	A	7/10/2019	12:22:13	645588.59	4460463.65	40.28199444 N	73.28738719 W	121
SPI_PV	157	B	7/10/2019	12:23:15	645584.2	4460463.25	40.28199159 N	73.28743887 W	121
SPI_PV	157	C	7/10/2019	12:24:31	645580.18	4460468.07	40.28203573 N	73.28748499 W	121
SPI_PV	157	D	7/10/2019	12:25:54	645588.13	4460467.03	40.28202499 N	73.28739185 W	121
SPI_PV	REFA_01	A	7/13/2019	22:16:07	601934.25	4455103.99	40.24017915 N	73.80163239 W	94
SPI_PV	REFA_01	B	7/13/2019	22:17:35	601932.79	4455107.13	40.2402076 N	73.80164905 W	94
SPI_PV	REFA_01	C	7/13/2019	22:18:58	601930.84	4455107.8	40.24021384 N	73.80167195 W	94
SPI_PV	REFA_01	D	7/13/2019	22:20:23	601931.68	4455108.33	40.24021854 N	73.80166192 W	94
SPI_PV	REFA_02	A	7/13/2019	21:21:45	602319.76	4455715.38	40.24563918 N	73.79700374 W	105
SPI_PV	REFA_02	B	7/13/2019	21:23:22	602319.57	4455717.7	40.24566005 N	73.7970056 W	105
SPI_PV	REFA_02	C	7/13/2019	21:24:46	602319.71	4455713.41	40.24562142 N	73.7970046 W	105
SPI_PV	REFA_02	D	7/13/2019	21:26:20	602322.88	4455720.49	40.24568479 N	73.79696629 W	105
SPI_PV	REFA_03	A	7/13/2019	21:48:49	602233.92	4455323.91	40.24212349 N	73.79807515 W	101
SPI_PV	REFA_03	B	7/13/2019	21:50:18	602239.79	4455324.29	40.24212623 N	73.79800602 W	101
SPI_PV	REFA_03	C	7/13/2019	21:51:40	602236.86	4455318.1	40.24207085 N	73.79804145 W	101
SPI_PV	REFA_03	D	7/13/2019	21:53:04	602240.08	4455324.98	40.24213236 N	73.79800253 W	101
SPI_PV	REFA_04	A	7/13/2019	21:38:01	602050.56	4455411.69	40.24293652 N	73.80021636 W	100
SPI_PV	REFA_04	B	7/13/2019	21:40:14	602050.87	4455413.3	40.242951 N	73.80021249 W	100
SPI_PV	REFA_04	C	7/13/2019	21:41:37	602048.53	4455410.8	40.24292876 N	73.80024046 W	100
SPI_PV	REFA_04	D	7/13/2019	21:43:09	602051.84	4455413.46	40.24295229 N	73.80020105 W	100
SPI_PV	REFA_05	A	7/13/2019	22:00:35	602538.03	4455341.25	40.2422425 N	73.79449779 W	109
SPI_PV	REFA_05	B	7/13/2019	22:02:00	602540.25	4455350.27	40.24232347 N	73.79447023 W	109
SPI_PV	REFA_05	C	7/13/2019	22:03:26	602537.4	4455350.43	40.24232532 N	73.79450374 W	109
SPI_PV	REFA_05	D	7/13/2019	22:04:47	602537.79	4455348.55	40.24230834 N	73.7944995 W	109
SPI_PV	REFB_01	A	7/11/2019	5:39:25	617852.3	4475428.54	40.42114637 N	73.61079464 W	77
SPI_PV	REFB_01	B	7/11/2019	5:40:15	617851.56	4475424.44	40.4211095 N	73.61080412 W	77
SPI_PV	REFB_01	C	7/11/2019	5:41:41	617853.82	4475430.61	40.42116478 N	73.61077635 W	77
SPI_PV	REFB_01	D	7/11/2019	5:42:28	617852.02	4475431.31	40.42117132 N	73.61079745 W	77
SPI_PV	REFB_01	E	7/11/2019	7:42:14	617851.04	4475432.1	40.42117861 N	73.61080893 W	77
SPI_PV	REFB_01	F	7/11/2019	7:42:56	617848.9	4475434.02	40.42119616 N	73.61083375 W	77
SPI_PV	REFB_01	G	7/11/2019	7:43:27	617849.32	4475437.49	40.42122738 N	73.61082812 W	77

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SampleType	StationID	Replicate	Date	Time	X_UTM_18N_m	Y_UTM_18N_m	Latitude_WGS84	Longitude_WGS84	Depth_ft
SPI_PV	REFB_01	H	7/11/2019	7:43:58	617852.46	4475434.86	40.42120327 N	73.61079167 W	77
SPI_PV	REFB_02	A	7/11/2019	5:06:07	618151.12	4475611.33	40.42275024 N	73.60723935 W	75
SPI_PV	REFB_02	B	7/11/2019	5:06:47	618150.64	4475619.76	40.42282621 N	73.60724339 W	75
SPI_PV	REFB_02	C	7/11/2019	5:08:05	618150.37	4475621.5	40.42284194 N	73.60724625 W	75
SPI_PV	REFB_02	D	7/11/2019	5:09:00	618151.46	4475615.92	40.42279154 N	73.60723449 W	75
SPI_PV	REFB_02	E	7/11/2019	5:10:26	618140.2	4475620.66	40.42283588 N	73.60736627 W	75
SPI_PV	REFB_02	F	7/11/2019	5:11:12	618142.88	4475626.15	40.42288492 N	73.60733374 W	75
SPI_PV	REFB_02	G	7/11/2019	6:58:40	618138.52	4475625.83	40.42288264 N	73.60738507 W	75
SPI_PV	REFB_02	H	7/11/2019	6:59:11	618137.15	4475621.15	40.42284068 N	73.60740212 W	75
SPI_PV	REFB_02	I	7/11/2019	6:59:39	618140.82	4475619.64	40.42282654 N	73.60735922 W	75
SPI_PV	REFB_02	J	7/11/2019	7:00:15	618146.86	4475620.94	40.42283745 N	73.6072877 W	75
SPI_PV	REFB_03	A	7/11/2019	5:18:36	618032.76	4475720.05	40.42374628 N	73.60861404 W	75
SPI_PV	REFB_03	B	7/11/2019	5:19:22	618030.82	4475720.58	40.42375131 N	73.60863676 W	75
SPI_PV	REFB_03	C	7/11/2019	5:20:11	618029.43	4475721.61	40.42376078 N	73.60865295 W	75
SPI_PV	REFB_03	D	7/11/2019	5:20:55	618028.03	4475717.87	40.42372729 N	73.60867009 W	75
SPI_PV	REFB_03	E	7/11/2019	7:25:45	618021.87	4475720.13	40.42374846 N	73.6087423 W	75
SPI_PV	REFB_03	F	7/11/2019	7:26:16	618018.36	4475717.28	40.42372337 N	73.60878424 W	75
SPI_PV	REFB_03	G	7/11/2019	7:26:40	618020.59	4475717.15	40.42372186 N	73.60875799 W	75
SPI_PV	REFB_03	H	7/11/2019	7:27:08	618026.42	4475717.1	40.42372058 N	73.60868928 W	75
SPI_PV	REFB_04	A	7/11/2019	5:28:33	617855.87	4475707.25	40.42365603 N	73.61070097 W	76
SPI_PV	REFB_04	B	7/11/2019	5:29:19	617859.24	4475713.24	40.42370952 N	73.61066019 W	76
SPI_PV	REFB_04	C	7/11/2019	5:30:06	617859.83	4475707.18	40.42365481 N	73.61065436 W	76
SPI_PV	REFB_04	D	7/11/2019	5:31:21	617845.69	4475705.37	40.42364054 N	73.61082125 W	76
SPI_PV	REFB_04	E	7/11/2019	5:32:17	617850.8	4475717.06	40.42374513 N	73.6107589 W	76
SPI_PV	REFB_04	F	7/11/2019	7:34:06	617856.01	4475717.03	40.42374405 N	73.61069757 W	76
SPI_PV	REFB_04	G	7/11/2019	7:34:42	617859.02	4475714.82	40.42372375 N	73.61066251 W	76
SPI_PV	REFB_04	H	7/11/2019	7:35:14	617859.85	4475707.64	40.42365901 N	73.610654 W	76
SPI_PV	REFB_04	I	7/11/2019	7:35:56	617856.05	4475708.17	40.42366428 N	73.61069873 W	76
SPI_PV	REFB_05	A	7/11/2019	5:47:28	618046.86	4475325.74	40.42019292 N	73.60852103 W	79
SPI_PV	REFB_05	B	7/11/2019	5:48:28	618046.19	4475328.95	40.42022186 N	73.60852827 W	79
SPI_PV	REFB_05	C	7/11/2019	5:49:15	618050.75	4475329.46	40.42022587 N	73.60847445 W	79
SPI_PV	REFB_05	D	7/11/2019	5:50:10	618048.1	4475327.02	40.42020426 N	73.60850614 W	79
SPI_PV	REFB_05	E	7/11/2019	7:48:52	618037.3	4475323.92	40.42017782 N	73.60863403 W	79

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SampleType	StationID	Replicate	Date	Time	X_UTM_18N_m	Y_UTM_18N_m	Latitude_WGS84	Longitude_WGS84	Depth_ft
SPI_PV	REFB_05	F	7/11/2019	7:49:22	618033.46	4475323.96	40.4201788 N	73.60867919 W	79
SPI_PV	REFB_05	G	7/11/2019	7:49:53	618036.43	4475326.63	40.42020238 N	73.60864377 W	79
SPI_PV	REFB_05	H	7/11/2019	7:50:22	618041.21	4475328	40.42021403 N	73.60858715 W	79
SPI_PV	REFC_01	A	7/13/2019	20:24:27	606643.44	4456040.06	40.24802412 N	73.74612663 W	117
SPI_PV	REFC_01	B	7/13/2019	20:26:13	606643.55	4456037.34	40.24799957 N	73.74612579 W	117
SPI_PV	REFC_01	C	7/13/2019	20:27:36	606642.46	4456042.13	40.24804292 N	73.7461378 W	117
SPI_PV	REFC_01	D	7/13/2019	20:29:06	606642.63	4456040.73	40.24803027 N	73.74613601 W	117
SPI_PV	REFC_02	A	7/13/2019	20:32:45	606743.76	4456133.97	40.24885724 N	73.74493164 W	117
SPI_PV	REFC_02	B	7/13/2019	20:34:06	606740.41	4456135.43	40.24887075 N	73.74497084 W	117
SPI_PV	REFC_02	C	7/13/2019	20:35:35	606738.88	4456132.33	40.24884307 N	73.74498936 W	117
SPI_PV	REFC_02	D	7/13/2019	20:37:08	606739.27	4456131.51	40.24883557 N	73.74498487 W	117
SPI_PV	REFC_03	A	7/13/2019	19:54:21	606526.43	4455533.98	40.24348065 N	73.74758601 W	119
SPI_PV	REFC_03	B	7/13/2019	19:55:48	606526.66	4455536.31	40.24350157 N	73.74758291 W	119
SPI_PV	REFC_03	C	7/13/2019	19:57:11	606527.34	4455535.63	40.24349539 N	73.74757511 W	119
SPI_PV	REFC_03	D	7/13/2019	19:58:33	606529.18	4455530.15	40.24344577 N	73.74755438 W	119
SPI_PV	REFC_04	A	7/13/2019	20:12:59	606944.43	4455634.59	40.24433354 N	73.74265609 W	114
SPI_PV	REFC_04	B	7/13/2019	20:14:31	606940.24	4455630.05	40.2442932 N	73.74270606 W	114
SPI_PV	REFC_04	C	7/13/2019	20:15:52	606938.47	4455631.8	40.24430919 N	73.7427266 W	114
SPI_PV	REFC_04	D	7/13/2019	20:17:20	606940.43	4455635.33	40.24434077 N	73.74270295 W	114
SPI_PV	REFC_05	A	7/13/2019	20:04:14	606813.93	4455573.24	40.24379758 N	73.7442002 W	115
SPI_PV	REFC_05	B	7/13/2019	20:05:39	606814.63	4455573.01	40.24379541 N	73.74419204 W	115
SPI_PV	REFC_05	C	7/13/2019	20:07:15	606815.87	4455579.42	40.24385305 N	73.74417636 W	115
SPI_PV	REFC_05	D	7/13/2019	20:08:39	606810.73	4455570.74	40.24377551 N	73.74423826 W	115

APPENDIX B

SPI/PV and Sediment Grab Field Log

Notes:

FC = Frame Count

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SampleType	StationID	Replicate	Date	Time	Frame	SPI_StopC ollar_in	SPI_Weights_perSide_num	Depth_ft	Comments
SPI_PV	030	A	7/10/2019	3:03:29	13	16	4	114	02:15 arrive at station to commence sampling.
SPI_PV	030	B	7/10/2019	3:06:00	14	16	4	114	SPI: ISO 640, f/11, 1/250s; PV: ISO 800, f/8, 1/15s.
SPI_PV	030	C	7/10/2019	3:08:00	15	16	4	114	
SPI_PV	030	D	7/10/2019	3:09:45	16	16	4	114	
SPI_PV	030	E	7/10/2019	3:11:05	17	16	4	114	
SPI_PV	031	A	7/10/2019	4:07:26	20	18	5	108	Download, FC 19. PV camera settings changed to ISO-640 and f/10.
SPI_PV	031	B	7/10/2019	4:08:37	21	18	5	108	
SPI_PV	031	C	7/10/2019	4:09:40	22	18	5	108	
SPI_PV	031	D	7/10/2019	4:10:43	23	18	5	108	On deck, download FC 24.
SPI_PV	032	A	7/10/2019	4:43:02	25	18	5	111	
SPI_PV	032	B	7/10/2019	4:43:56	26	18	5	111	
SPI_PV	032	C	7/10/2019	4:45:17	27	18	5	111	
SPI_PV	032	D	7/10/2019	4:46:17	28	18	5	111	
SPI_PV	032	E	7/10/2019	4:52:09	29	18	5	111	
SPI_PV	033	A	7/10/2019	5:34:11	30	18	5	105	
SPI_PV	033	B	7/10/2019	5:35:05	31	18	5	105	
SPI_PV	033	C	7/10/2019	5:36:23	32	18	5	105	
SPI_PV	033	D	7/10/2019	5:37:30	33	18	5	105	
SPI_PV	033	E	7/10/2019	5:38:36	34	18	5	105	
SPI_PV	034	A	7/10/2019	6:01:51	35	18	5	100	
SPI_PV	034	B	7/10/2019	6:02:49	36	18	5	100	
SPI_PV	034	C	7/10/2019	6:06:00	37	18	5	100	
SPI_PV	034	D	7/10/2019	6:06:46	38	18	5	100	
SPI_PV	035	A	7/10/2019	6:34:17	39	18	5	100	
SPI_PV	035	B	7/10/2019	6:35:10	40	18	5	100	
SPI_PV	035	C	7/10/2019	6:37:26	41	18	5	100	
SPI_PV	035	D	7/10/2019	6:38:37	42	18	5	100	
SPI_PV	035	E	7/10/2019	6:40:19	43	18	5	100	
SPI_PV	036	A	7/10/2019	6:58:39	44	18	5	91	
SPI_PV	036	B	7/10/2019	6:59:39	45	18	5	91	
SPI_PV	036	C	7/10/2019	7:00:34	46	18	5	91	
SPI_PV	036	D	7/10/2019	7:01:28	47	18	5	91	
SPI_PV	037	A	7/10/2019	7:19:56	48	18	5	97	
SPI_PV	037	B	7/10/2019	7:20:43	49	18	5	97	
SPI_PV	037	C	7/10/2019	7:21:42	50	18	5	97	
SPI_PV	037	D	7/10/2019	7:23:04	51	18	5	97	
SPI_PV	038	A	7/10/2019	7:44:00	52	18	5	92	
SPI_PV	038	B	7/10/2019	7:44:50	53	18	5	92	
SPI_PV	038	C	7/10/2019	7:45:43	54	18	5	92	
SPI_PV	038	D	7/10/2019	7:46:37	55	18	5	92	
SPI_PV	039	A	7/10/2019	8:08:26	56	18	5	90	
SPI_PV	039	B	7/10/2019	8:10:00	57	18	5	90	
SPI_PV	039	C	7/10/2019	8:10:57	58	18	5	90	

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SampleType	StationID	Replicate	Date	Time	Frame	SPI_StopC ollar_in	SPI_Weights_perSide_num	Depth_ft	Comments
SPI_PV	039	D	7/10/2019	8:11:52	59	18	5	90	
SPI_PV	040	A	7/10/2019	8:31:41	60	18	5	89	
SPI_PV	040	B	7/10/2019	8:32:31	61	18	5	89	
SPI_PV	040	C	7/10/2019	8:33:19	62	18	5	89	
SPI_PV	040	D	7/10/2019	8:35:34	63	18	5	89	
SPI_PV	041	A	7/10/2019	8:53:43	64	18	5	85	
SPI_PV	041	B	7/10/2019	8:54:25	65	18	5	85	
SPI_PV	041	C	7/10/2019	8:55:12	66	18	5	85	
SPI_PV	041	D	7/10/2019	8:55:59	67	18	5	85	
SPI_PV	041	E	7/10/2019	8:56:44	68	18	5	85	
SPI_PV	042	A	7/10/2019	9:16:34	69	18	5	85	
SPI_PV	042	B	7/10/2019	9:18:18	70	18	5	85	
SPI_PV	042	C	7/10/2019	9:19:03	71	18	5	85	
SPI_PV	042	D	7/10/2019	9:19:54	72	18	5	85	Download, FC 75. Shift change. Collect grab samples at stations 38 and 157, switching back to SPI.
SPI_PV	157	A	7/10/2019	12:22:13	77	18	5	123	
SPI_PV	157	B	7/10/2019	12:23:15	78	18	5	123	
SPI_PV	157	C	7/10/2019	12:24:31	79	18	5	123	
SPI_PV	157	D	7/10/2019	12:25:54	80	18	5	123	
SPI_PV	156	A	7/10/2019	12:47:01	81	18	5	120	
SPI_PV	156	B	7/10/2019	12:48:20	82	18	5	120	
SPI_PV	156	C	7/10/2019	12:49:20	83	18	5	120	
SPI_PV	156	D	7/10/2019	12:50:21	84	18	5	120	
SPI_PV	155	A	7/10/2019	13:08:01	85	18	5	119	
SPI_PV	155	B	7/10/2019	13:09:02	86	18	5	119	
SPI_PV	155	C	7/10/2019	13:10:05	87	18	5	119	
SPI_PV	155	D	7/10/2019	13:11:12	88	18	5	119	
SPI_PV	154	A	7/10/2019	13:28:35	89	18	5	119	
SPI_PV	154	B	7/10/2019	13:29:52	90	18	5	119	
SPI_PV	154	C	7/10/2019	13:31:15	91	18	5	119	
SPI_PV	154	D	7/10/2019	13:32:21	92	18	5	119	
SPI_PV	153	A	7/10/2019	13:49:42	93	18	5	117	
SPI_PV	153	B	7/10/2019	13:50:52	94	18	5	117	
SPI_PV	153	C	7/10/2019	13:52:38	95	18	5	117	
SPI_PV	153	D	7/10/2019	13:53:26	96	18	5	117	
SPI_PV	152	A	7/10/2019	14:12:01	97	18	5	113	
SPI_PV	152	B	7/10/2019	14:13:15	98	18	5	113	
SPI_PV	152	C	7/10/2019	14:14:42	99	18	5	113	
SPI_PV	152	D	7/10/2019	14:15:56	100	18	5	113	
SPI_PV	151	A	7/10/2019	14:30:25	101	18	5	112	
SPI_PV	151	B	7/10/2019	14:31:50	102	18	5	112	
SPI_PV	151	C	7/10/2019	14:33:03	103	18	5	112	
SPI_PV	151	D	7/10/2019	14:34:16	104	18	5	112	

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SampleType	StationID	Replicate	Date	Time	Frame	SPI_StopC ollar_in	SPI_Weights_perSide_num	Depth_ft	Comments
SPI_PV	150	A	7/10/2019	14:50:15	105	18	5	111	
SPI_PV	150	B	7/10/2019	14:51:24	106	18	5	111	
SPI_PV	150	C	7/10/2019	14:52:34	107	18	5	111	
SPI_PV	150	D	7/10/2019	14:53:47	108	18	5	111	Shackle jammed, unstuck. Download.
SPI_PV	149	A	7/10/2019	15:21:54	110	18	5	111	
SPI_PV	149	B	7/10/2019	15:23:04	111	18	5	111	PV image missing.
SPI_PV	149	C	7/10/2019	15:24:31	112	18	5	111	
SPI_PV	149	D	7/10/2019	15:25:41	113	18	5	111	
SPI_PV	148	A	7/10/2019	15:40:50	114	18	5	115	
SPI_PV	148	B	7/10/2019	15:42:02	115	18	5	115	
SPI_PV	148	C	7/10/2019	15:43:13	116	18	5	115	
SPI_PV	148	D	7/10/2019	15:44:23	117	18	5	115	
SPI_PV	147	A	7/10/2019	16:00:42	118	18	5	103	
SPI_PV	147	B	7/10/2019	16:01:54	119	18	5	103	
SPI_PV	147	C	7/10/2019	16:03:07	120	18	5	103	
SPI_PV	147	D	7/10/2019	16:04:15	121	18	5	103	Grab at station 147 at 16:24:04; Grab station 20 at 16:57:44.
SPI_PV	020	A	7/10/2019	17:42:50	122	18	5	91	
SPI_PV	020	B	7/10/2019	17:44:25	123	18	5	91	
SPI_PV	020	C	7/10/2019	17:45:30	124	18	5	91	
SPI_PV	020	D	7/10/2019	17:46:46	125	18	5	91	
SPI_PV	019	A	7/10/2019	18:02:50	126	18	5	97	
SPI_PV	019	B	7/10/2019	18:03:56	127	18	5	97	
SPI_PV	019	C	7/10/2019	18:05:06	128	18	5	97	
SPI_PV	019	D	7/10/2019	18:06:17	129	18	5	97	
SPI_PV	018	A	7/10/2019	18:24:56	130	18	5	90	
SPI_PV	018	B	7/10/2019	18:26:23	131	18	5	90	
SPI_PV	018	C	7/10/2019	18:27:37	132	18	5	90	
SPI_PV	018	D	7/10/2019	18:28:51	133	18	5	90	
SPI_PV	017	A	7/10/2019	18:46:19	134	18	5	93	
SPI_PV	017	B	7/10/2019	18:47:31	135	18	5	93	
SPI_PV	017	C	7/10/2019	18:48:45	136	18	5	93	
SPI_PV	017	D	7/10/2019	18:49:58	137	18	5	93	
SPI_PV	016	A	7/10/2019	19:06:30	139	18	5	95	
SPI_PV	016	B	7/10/2019	19:07:52	140	18	5	95	
SPI_PV	016	C	7/10/2019	19:09:03	141	18	5	95	
SPI_PV	016	D	7/10/2019	19:10:14	142	18	5	95	
SPI_PV	141	A	7/10/2019	19:24:48	143	18	5	96	
SPI_PV	141	B	7/10/2019	19:26:09	144	18	5	96	
SPI_PV	141	C	7/10/2019	19:27:21	145	18	5	96	
SPI_PV	141	D	7/10/2019	19:28:39	146	18	5	96	
SPI_PV	142	A	7/10/2019	19:57:26	147	18	5	95	
SPI_PV	142	B	7/10/2019	19:58:26	148	18	5	95	
SPI_PV	142	C	7/10/2019	19:59:48	149	18	5	95	

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SampleType	StationID	Replicate	Date	Time	Frame	SPI_StopC ollar_in	SPI_Weights_perSide_num	Depth_ft	Comments
SPI_PV	142	D	7/10/2019	20:01:08	150	18	5	95	
SPI_PV	142	E	7/10/2019	20:03:19	151	18	5	95	Download, FC 155.
SPI_PV	143	A	7/10/2019	20:39:55	156	18	5	93	
SPI_PV	143	B	7/10/2019	20:41:11	157	18	5	93	
SPI_PV	143	C	7/10/2019	20:42:54	158	18	5	93	
SPI_PV	143	D	7/10/2019	20:44:14	159	18	5	93	
SPI_PV	144	A	7/10/2019	21:01:07	160	18	5	94	
SPI_PV	144	B	7/10/2019	21:02:29	161	18	5	94	
SPI_PV	144	C	7/10/2019	21:03:56	162	18	5	94	
SPI_PV	144	D	7/10/2019	21:05:12	163	18	5	94	
SPI_PV	145	A	7/10/2019	21:23:13	164	18	5	99	
SPI_PV	145	B	7/10/2019	21:24:29	165	18	5	99	
SPI_PV	145	C	7/10/2019	21:26:00	166	18	5	99	
SPI_PV	145	D	7/10/2019	21:27:17	167	18	5	99	
SPI_PV	146	A	7/10/2019	21:43:25	168	18	5	100	
SPI_PV	146	B	7/10/2019	21:44:36	169	18	5	100	
SPI_PV	146	C	7/10/2019	21:45:48	170	18	5	100	
SPI_PV	146	D	7/10/2019	21:47:03	171	18	5	100	
SPI_PV	021	A	7/10/2019	22:18:00	172	18	5	97	
SPI_PV	021	B	7/10/2019	22:19:18	173	18	5	97	
SPI_PV	021	C	7/10/2019	22:20:32	174	18	5	97	
SPI_PV	021	D	7/10/2019	22:21:51	175	18	5	97	
SPI_PV	022	A	7/10/2019	22:37:16	176	18	5	95	
SPI_PV	022	B	7/10/2019	22:38:31	177	18	5	95	
SPI_PV	022	C	7/10/2019	22:39:46	178	18	5	95	
SPI_PV	022	D	7/10/2019	22:41:02	179	18	5	95	
SPI_PV	023	A	7/10/2019	22:57:10	180	18	5	91	
SPI_PV	023	B	7/10/2019	22:58:30	181	18	5	91	
SPI_PV	023	C	7/10/2019	22:59:44	182	18	5	91	
SPI_PV	023	D	7/10/2019	23:01:00	183	18	5	91	
SPI_PV	024	A	7/10/2019	23:16:35	184	18	5	97	
SPI_PV	024	B	7/10/2019	23:18:01	185	18	5	97	
SPI_PV	024	C	7/10/2019	23:19:20	186	18	5	97	
SPI_PV	024	D	7/10/2019	23:20:47	187	18	5	97	Download images, FC 139.
SPI_PV	025	A	7/11/2019	0:56:21	190	18	5	92	Shift change, change PV battery. PV camera adjusted to 4 ft trigger due to increasing turbidity.
SPI_PV	025	B	7/11/2019	0:57:15	191	18	5	92	
SPI_PV	025	C	7/11/2019	0:58:01	192	18	5	92	
SPI_PV	025	D	7/11/2019	0:58:50	193	18	5	92	Download, FC 194. PV f-stop changed to f16. Cable shortened an inch.
SPI_PV	025	E	7/11/2019	1:46:40		18	5	92	PV Only
SPI_PV	025	F	7/11/2019	1:47:07		18	5	92	PV Only
SPI_PV	025	G	7/11/2019	1:48:05		18	5	92	PV Only

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SampleType	StationID	Replicate	Date	Time	Frame	SPI_StopC ollar_in	SPI_Weights_perSide_num	Depth_ft	Comments
SPI_PV	025	H	7/11/2019	1:49:05		18	5	92	PV Only
SPI_PV	026	A	7/11/2019	2:18:03	195	18	5	89	SPI Only
SPI_PV	026	B	7/11/2019	2:18:48	196	18	5	89	SPI Only
SPI_PV	026	C	7/11/2019	2:19:31	197	18	5	89	SPI Only
SPI_PV	026	E	7/11/2019	2:20:35	199	18	5	89	No image
SPI_PV	026	F	7/11/2019	2:21:56	200	18	5	89	SPI Only
SPI_PV	026	G	7/11/2019	2:22:46	201	18	5	89	SPI Only
SPI_PV	140	A	7/11/2019	2:51:30	202	18	5	94	SPI Only
SPI_PV	140	B	7/11/2019	2:52:13	203	18	5	94	SPI Only
SPI_PV	140	C	7/11/2019	2:53:03	204	18	5	94	SPI Only
SPI_PV	140	D	7/11/2019	2:53:55	205	18	5	94	SPI Only
SPI_PV	139	A	7/11/2019	3:14:07	206	18	5	87	SPI Only
SPI_PV	139	B	7/11/2019	3:14:52	207	18	5	87	SPI Only
SPI_PV	139	C	7/11/2019	3:15:36	208	18	5	87	SPI Only
SPI_PV	139	D	7/11/2019	3:16:24	209	18	5	87	SPI Only
SPI_PV	138	A	7/11/2019	3:35:19	210	18	5	90	SPI Only
SPI_PV	138	B	7/11/2019	3:36:05	211	18	5	90	SPI Only
SPI_PV	138	C	7/11/2019	3:36:52	212	18	5	90	SPI Only
SPI_PV	138	D	7/11/2019	3:37:32	213	18	5	90	SPI Only
SPI_PV	137	A	7/11/2019	3:55:55	214	18	5	91	SPI Only
SPI_PV	137	B	7/11/2019	3:56:35	215	18	5	91	SPI Only
SPI_PV	137	C	7/11/2019	3:57:22	216	18	5	91	SPI Only
SPI_PV	137	D	7/11/2019	3:58:09	217	18	5	91	SPI Only
SPI_PV	136	A	7/11/2019	4:15:45	218	18	5	83	SPI Only
SPI_PV	136	B	7/11/2019	4:16:46	219	18	5	83	SPI Only
SPI_PV	136	C	7/11/2019	4:18:20	220	18	5	83	SPI Only
SPI_PV	136	D	7/11/2019	4:19:05	221	18	5	83	SPI Only
SPI_PV	135	A	7/11/2019	4:36:48	222	18	5	76	SPI Only
SPI_PV	135	B	7/11/2019	4:37:35	223	18	5	76	SPI Only
SPI_PV	135	C	7/11/2019	4:38:22	224	18	5	76	SPI Only
SPI_PV	135	D	7/11/2019	4:40:22	225	18	5	76	SPI Only
SPI_PV	135	E	7/11/2019	4:41:07	226	18	5	76	SPI Only
SPI_PV	REFB_02	A	7/11/2019	5:05:29	227	18	5	75	SPI Only
SPI_PV	REFB_02	B	7/11/2019	5:06:11	228	18	5	75	SPI Only
SPI_PV	REFB_02	C	7/11/2019	5:07:31	229	18	5	75	SPI Only
SPI_PV	REFB_02	D	7/11/2019	5:08:27	230	18	5	75	SPI Only
SPI_PV	REFB_02	E	7/11/2019	5:09:55	231	18	5	75	SPI Only
SPI_PV	REFB_02	F	7/11/2019	5:10:39	232	18	5	75	SPI Only
SPI_PV	REFB_03	A	7/11/2019	5:18:04	233	18	5	74	SPI Only
SPI_PV	REFB_03	B	7/11/2019	5:18:50	234	18	5	74	SPI Only
SPI_PV	REFB_03	C	7/11/2019	5:19:36	235	18	5	74	SPI Only
SPI_PV	REFB_03	D	7/11/2019	5:20:19	236	18	5	74	SPI Only
SPI_PV	REFB_04	A	7/11/2019	5:28:00	237	18	5	76	SPI Only

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SPI_PV	REFB_04	B	7/11/2019	5:28:43	238	18	5	76	SPI Only
SPI_PV	REFB_04	C	7/11/2019	5:29:32	239	18	5	76	No image
SPI_PV	REFB_04	D	7/11/2019	5:30:47	240	18	5	76	SPI Only
SPI_PV	REFB_04	E	7/11/2019	5:31:44	241	18	5	76	SPI Only
SPI_PV	REFB_01	A	7/11/2019	5:38:55	242	18	5	76	SPI Only
SPI_PV	REFB_01	B	7/11/2019	5:39:40	243	18	5	76	SPI Only
SPI_PV	REFB_01	C	7/11/2019	5:41:09	244	18	5	76	SPI Only
SPI_PV	REFB_01	D	7/11/2019	5:41:55	245	18	5	76	SPI Only
SPI_PV	REFB_05	A	7/11/2019	5:46:57	246	18	5	79	SPI Only
SPI_PV	REFB_05	B	7/11/2019	5:47:51	247	18	5	79	SPI Only
SPI_PV	REFB_05	C	7/11/2019	5:48:40	248	18	5	79	SPI Only
SPI_PV	REFB_05	D	7/11/2019	5:49:38	249	18	5	79	SPI Only
SPI_PV	REFB_02	G	7/11/2019	6:58:08		18	5	75	PV Only
SPI_PV	REFB_02	H	7/11/2019	6:58:34		18	5	75	PV Only
SPI_PV	REFB_02	I	7/11/2019	6:59:05		18	5	75	PV Only
SPI_PV	REFB_02	J	7/11/2019	6:59:40		18	5	75	PV Only
SPI_PV	REFB_03	E	7/11/2019	7:25:13		18	5	75	PV Only
SPI_PV	REFB_03	F	7/11/2019	7:25:40		18	5	75	PV Only
SPI_PV	REFB_03	G	7/11/2019	7:26:04		18	5	75	PV Only
SPI_PV	REFB_03	H	7/11/2019	7:26:30		18	5	75	PV Only
SPI_PV	REFB_04	F	7/11/2019	7:33:33		18	5	76	PV Only
SPI_PV	REFB_04	G	7/11/2019	7:34:10		18	5	76	PV Only
SPI_PV	REFB_04	H	7/11/2019	7:34:37		18	5	76	PV Only
SPI_PV	REFB_04	I	7/11/2019	7:35:25		18	5	76	PV Only
SPI_PV	REFB_01	E	7/11/2019	7:41:43		18	5	76	PV Only
SPI_PV	REFB_01	F	7/11/2019	7:42:25		18	5	76	PV Only
SPI_PV	REFB_01	G	7/11/2019	7:42:55		18	5	76	PV Only
SPI_PV	REFB_01	H	7/11/2019	7:43:21		18	5	76	PV Only
SPI_PV	REFB_05	E	7/11/2019	7:48:23		18	5	79	PV Only
SPI_PV	REFB_05	F	7/11/2019	7:48:45		18	5	79	PV Only
SPI_PV	REFB_05	G	7/11/2019	7:49:18		18	5	79	PV Only
SPI_PV	REFB_05	H	7/11/2019	7:49:46		18	5	79	PV Only
SPI_PV	135	F	7/11/2019	8:06:54		18	5	76	PV Only
SPI_PV	135	G	7/11/2019	8:07:18		18	5	76	PV Only
SPI_PV	135	H	7/11/2019	8:07:43		18	5	76	PV Only
SPI_PV	135	I	7/11/2019	8:08:08		18	5	76	PV Only
SPI_PV	136	E	7/11/2019	8:26:00		18	5	79	PV Only
SPI_PV	136	F	7/11/2019	8:27:08		18	5	79	PV Only
SPI_PV	136	G	7/11/2019	8:27:39		18	5	79	PV Only
SPI_PV	136	H	7/11/2019	8:28:07		18	5	79	PV Only
SPI_PV	137	E	7/11/2019	8:45:37		18	5	91	PV Only
SPI_PV	137	F	7/11/2019	8:46:05		18	5	91	PV Only
SPI_PV	137	G	7/11/2019	8:46:26		18	5	91	PV Only

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SPI_PV	137	H	7/11/2019	8:46:59		18	5	91	PV Only
SPI_PV	138	E	7/11/2019	9:07:28		18	5	91	PV Only
SPI_PV	138	F	7/11/2019	9:07:53		18	5	91	PV Only
SPI_PV	138	G	7/11/2019	9:08:20		18	5	91	PV Only
SPI_PV	138	H	7/11/2019	9:08:47		18	5	91	PV Only
SPI_PV	139	E	7/11/2019	9:28:30		18	5	87	PV Only
SPI_PV	139	F	7/11/2019	9:28:58		18	5	87	PV Only
SPI_PV	139	G	7/11/2019	9:29:23		18	5	87	PV Only
SPI_PV	139	H	7/11/2019	9:29:50		18	5	87	PV Only
SPI_PV	140	E	7/11/2019	9:49:32		18	5	89	PV Only
SPI_PV	140	F	7/11/2019	9:49:54		18	5	89	PV Only
SPI_PV	140	G	7/11/2019	9:50:14		18	5	89	PV Only
SPI_PV	140	H	7/11/2019	9:50:39		18	5	89	PV Only
SPI_PV	026	H	7/11/2019	10:09:17		18	5	89	PV Only
SPI_PV	026	I	7/11/2019	10:09:55		18	5	89	PV Only
SPI_PV	026	J	7/11/2019	10:10:23		18	5	89	PV Only
SPI_PV	026	K	7/11/2019	10:10:56		18	5	89	PV Only
SPI_PV	027	A	7/11/2019	10:38:30	250	18	5	97	
SPI_PV	027	B	7/11/2019	10:39:14	251	18	5	97	
SPI_PV	027	C	7/11/2019	10:40:00	252	18	5	97	
SPI_PV	027	D	7/11/2019	10:40:45	253	18	5	97	
SPI_PV	028	A	7/11/2019	10:56:03	255	18	5	89	
SPI_PV	028	B	7/11/2019	10:56:57	256	18	5	89	
SPI_PV	028	C	7/11/2019	10:57:40	257	18	5	89	
SPI_PV	028	D	7/11/2019	10:58:22	258	18	5	89	
SPI_PV	029	A	7/11/2019	11:14:30	259	18	5	89	
SPI_PV	029	B	7/11/2019	11:15:10	260	18	5	89	
SPI_PV	029	C	7/11/2019	11:15:53	261	18	5	89	
SPI_PV	029	D	7/11/2019	11:16:32	262	18	5	89	
SPI_PV	043	A	7/11/2019	11:28:54	263	18	5	89	
SPI_PV	043	B	7/11/2019	11:29:45	264	18	5	89	
SPI_PV	043	C	7/11/2019	11:30:35	265	18	5	89	
SPI_PV	043	D	7/11/2019	11:31:43	266	18	5	89	
SPI_PV	044	A	7/11/2019	11:46:44	267	18	5	87	
SPI_PV	044	B	7/11/2019	11:47:30	268	18	5	87	
SPI_PV	044	C	7/11/2019	11:48:47	269	18	5	87	
SPI_PV	044	D	7/11/2019	11:49:32	270	18	5	87	
SPI_PV	044	E	7/11/2019	11:50:12	271	18	5	87	
SPI_PV	045	A	7/11/2019	12:07:08	272	18	5	83	Shift change
SPI_PV	045	B	7/11/2019	12:08:36	273	18	5	83	
SPI_PV	045	C	7/11/2019	12:09:46	274	18	5	83	
SPI_PV	045	D	7/11/2019	12:10:58	275	18	5	83	
SPI_PV	048	A	7/11/2019	12:24:04	276	18	5	77	

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SampleType	StationID	Replicate	Date	Time	Frame	SPI_StopC ollar_in	SPI_Weights_perSide_num	Depth_ft	Comments
SPI_PV	048	B	7/11/2019	12:25:15	277	18	5	77	
SPI_PV	048	C	7/11/2019	12:26:34	278	18	5	77	
SPI_PV	048	D	7/11/2019	12:27:46	279	18	5	77	
SPI_PV	049	A	7/11/2019	12:41:28	280	18	5	87	
SPI_PV	049	B	7/11/2019	12:42:43	281	18	5	87	
SPI_PV	049	C	7/11/2019	12:43:53	282	18	5	87	
SPI_PV	049	D	7/11/2019	12:45:07	283	18	5	87	
SPI_PV	050	A	7/11/2019	12:59:17	284	18	5	87	Hard Bottom station 50; no penetration.
SPI_PV	050	B	7/11/2019	13:00:32	285	18	5	87	No penetration
SPI_PV	050	C	7/11/2019	13:01:43	286	18	5	87	
SPI_PV	050	D	7/11/2019	13:02:51	287	18	5	87	No SPI image
SPI_PV	051	A	7/11/2019	13:17:56	288	18	5	87	Hard bottom station 51.
SPI_PV	051	B	7/11/2019	13:19:10	289	18	5	87	
SPI_PV	051	C	7/11/2019	13:20:20	290	18	5	87	
SPI_PV	051	D	7/11/2019	13:21:35	291	18	5	87	Download images, FC 291.
SPI_PV	052	A	7/11/2019	14:06:00	292	18	5	77	
SPI_PV	052	B	7/11/2019	14:07:26	293	18	5	77	
SPI_PV	052	C	7/11/2019	14:08:39	294	18	5	77	
SPI_PV	052	D	7/11/2019	14:09:50	295	18	5	77	
SPI_PV	134	A	7/11/2019	14:25:35	296	18	5	80	Gravel station 134.
SPI_PV	134	B	7/11/2019	14:26:59	297	18	5	80	
SPI_PV	134	C	7/11/2019	14:28:16	298	18	5	80	No PV image
SPI_PV	134	D	7/11/2019	14:29:30	299	18	5	80	
SPI_PV	133	A	7/11/2019	14:45:17	300	18	5	79	Gravel station 133.
SPI_PV	133	B	7/11/2019	14:46:33	301	18	5	79	
SPI_PV	133	C	7/11/2019	14:47:50	302	18	5	79	
SPI_PV	133	D	7/11/2019	14:49:02	303	18	5	79	
SPI_PV	132	A	7/11/2019	15:03:05	304	18	5	75	Hard bottom? Station 132.
SPI_PV	132	B	7/11/2019	15:04:22	305	18	5	75	
SPI_PV	132	C	7/11/2019	15:05:36	306	18	5	75	
SPI_PV	132	D	7/11/2019	15:07:07	307	18	5	75	
SPI_PV	131	A	7/11/2019	15:22:57	308	18	5	69	Hard bottom station 131.
SPI_PV	131	B	7/11/2019	15:23:43	309	18	5	69	
SPI_PV	131	C	7/11/2019	15:24:53	310	18	5	69	
SPI_PV	131	D	7/11/2019	15:26:09	311	18	5	69	
SPI_PV	069	A	7/11/2019	15:40:55	312	18	5	70	Minimal gravel station 69.
SPI_PV	069	B	7/11/2019	15:42:23	313	18	5	70	
SPI_PV	069	C	7/11/2019	15:43:39	314	18	5	70	
SPI_PV	069	D	7/11/2019	15:44:59	315	18	5	70	
SPI_PV	068	A	7/11/2019	16:00:18	316	18	5	70	Hard bottom or gravel station 68.
SPI_PV	068	B	7/11/2019	16:01:38	317	18	5	70	
SPI_PV	068	C	7/11/2019	16:02:46	318	18	5	70	
SPI_PV	068	D	7/11/2019	16:04:01	319	18	5	70	

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SampleType	StationID	Replicate	Date	Time	Frame	SPI_StopC ollar_in	SPI_Weights_perSide_num	Depth_ft	Comments
SPI_PV	067	A	7/11/2019	16:18:30	320	18	5	77	
SPI_PV	067	B	7/11/2019	16:19:47	321	18	5	77	
SPI_PV	067	C	7/11/2019	16:21:09	322	18	5	77	
SPI_PV	067	D	7/11/2019	16:22:22	323	18	5	77	
SPI_PV	066	A	7/11/2019	16:37:56	324	18	5	82	
SPI_PV	066	B	7/11/2019	16:39:27	325	18	5	82	
SPI_PV	066	C	7/11/2019	16:40:50	326	18	5	82	
SPI_PV	066	D	7/11/2019	16:42:07	327	18	5	82	
SPI_PV	065	A	7/11/2019	16:58:56	328	18	5	77	
SPI_PV	065	B	7/11/2019	17:00:13	329	18	5	77	
SPI_PV	065	C	7/11/2019	17:01:22	330	18	5	77	
SPI_PV	065	D	7/11/2019	17:02:43	331	18	5	77	Download images, FC 332.
SPI_PV	064	A	7/11/2019	17:43:30	333	18	5	72	
SPI_PV	064	B	7/11/2019	17:45:05	334	18	5	72	
SPI_PV	064	C	7/11/2019	17:46:20	335	18	5	72	
SPI_PV	064	D	7/11/2019	17:47:35	336	18	5	72	
SPI_PV	063	A	7/11/2019	18:30:30	337	18	5	74	
SPI_PV	063	B	7/11/2019	18:31:53	338	18	5	74	
SPI_PV	063	C	7/11/2019	18:33:02	339	18	5	74	
SPI_PV	063	D	7/11/2019	18:34:12	340	18	5	74	
SPI_PV	078	A	7/11/2019	18:45:18	341	18	5	77	
SPI_PV	078	B	7/11/2019	18:46:50	342	18	5	77	
SPI_PV	078	C	7/11/2019	18:48:01	343	18	5	77	
SPI_PV	078	D	7/11/2019	18:49:25	344	18	5	77	
SPI_PV	081	A	7/11/2019	19:02:16	345	18	5	83	
SPI_PV	081	B	7/11/2019	19:03:53	346	18	5	83	
SPI_PV	081	C	7/11/2019	19:05:04	347	18	5	83	
SPI_PV	081	D	7/11/2019	19:06:15	348	18	5	83	
SPI_PV	047	A	7/11/2019	19:22:28	349	18	5	81	
SPI_PV	047	B	7/11/2019	19:23:39	350	18	5	81	No nav fix for rep B.
SPI_PV	047	C	7/11/2019	19:24:55	351	18	5	81	No nav fix for rep C.
SPI_PV	047	D	7/11/2019	19:26:18	352	18	5	81	
SPI_PV	047	E	7/11/2019	19:30:55	353	18	5	81	
SPI_PV	047	F	7/11/2019	19:32:10	354	18	5	81	
SPI_PV	046	A	7/11/2019	19:50:28	355	18	5	84	
SPI_PV	046	B	7/11/2019	19:51:45	356	18	5	84	
SPI_PV	046	C	7/11/2019	19:52:58	357	18	5	84	PV images poor quality, redo. FC 362
SPI_PV	046	D	7/11/2019	19:54:11	358	18	5	84	Sampling stopped for lighting at 20:25, PV battery swap.
SPI_PV	026	D	7/11/2019		198	18	5	89	No image
SPI_PV	055	C	7/12/2019	0:01:20	559	13	5	73	
SPI_PV	055	D	7/12/2019	0:02:47	560	13	5	73	
SPI_PV	082	A	7/12/2019	4:18:11	363	18	5	76	3:00 on deck download, adjust PV wire to improve focus. 4:00 commence resampling at station 82.

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SampleType	StationID	Replicate	Date	Time	Frame	SPI_StopC ollar_in	SPI_Weights_perSide_num	Depth_ft	Comments
SPI_PV	082	B	7/12/2019	4:19:11	364	18	5	76	
SPI_PV	082	C	7/12/2019	4:19:58	365	18	5	76	
SPI_PV	082	D	7/12/2019	4:21:00	366	18	5	76	Download to check PV, FC 367. Shortened PV wire.
SPI_PV	079	A	7/12/2019	4:58:06	368	18	5	80	
SPI_PV	079	B	7/12/2019	4:59:02	369	18	5	80	
SPI_PV	079	C	7/12/2019	4:59:47	370	18	5	80	
SPI_PV	079	D	7/12/2019	5:00:25	371	18	5	80	
SPI_PV	083	A	7/12/2019	5:25:53	372	18	5	76	
SPI_PV	083	B	7/12/2019	5:26:38	373	18	5	76	
SPI_PV	083	C	7/12/2019	5:27:22	374	18	5	76	
SPI_PV	083	D	7/12/2019	5:28:14	375	18	5	76	May need PV redo.
SPI_PV	080	A	7/12/2019	5:40:35	376	18	5	69	
SPI_PV	080	B	7/12/2019	5:41:21	377	18	5	69	
SPI_PV	080	C	7/12/2019	5:42:01	378	18	5	69	
SPI_PV	080	D	7/12/2019	5:42:57	379	18	5	69	
SPI_PV	084	A	7/12/2019	6:00:19	380	18	5	62	
SPI_PV	084	B	7/12/2019	6:01:05	381	18	5	62	
SPI_PV	084	C	7/12/2019	6:01:50	382	18	5	62	
SPI_PV	084	D	7/12/2019	6:02:30	383	18	5	62	
SPI_PV	098	A	7/12/2019	6:15:27	384	18	5	58	
SPI_PV	098	B	7/12/2019	6:16:02	385	18	5	58	
SPI_PV	098	C	7/12/2019	6:16:56	386	18	5	58	
SPI_PV	098	D	7/12/2019	6:17:38	387	18	5	58	
SPI_PV	102	A	7/12/2019	6:27:48	388	18	5	57	
SPI_PV	102	B	7/12/2019	6:28:45	389	18	5	57	
SPI_PV	102	C	7/12/2019	6:29:30	390	18	5	57	
SPI_PV	102	D	7/12/2019	6:30:33	391	18	5	57	FC 392
SPI_PV	085	A	7/12/2019	6:43:03	393	18	5	66	
SPI_PV	085	B	7/12/2019	6:43:56	394	18	5	66	
SPI_PV	085	C	7/12/2019	6:44:37	395	18	5	66	
SPI_PV	085	D	7/12/2019	6:45:22	396	18	5	66	FC 398
SPI_PV	103	A	7/12/2019	7:03:18	399	18	5	56	
SPI_PV	103	B	7/12/2019	7:04:00	400	18	5	56	
SPI_PV	103	C	7/12/2019	7:04:42	401	18	5	56	
SPI_PV	103	D	7/12/2019	7:05:26	402	18	5	56	
SPI_PV	086	A	7/12/2019	7:17:30	403	18	5	51	
SPI_PV	086	B	7/12/2019	7:18:24	404	18	5	51	
SPI_PV	086	C	7/12/2019	7:19:16	405	18	5	51	
SPI_PV	086	D	7/12/2019	7:20:08	406	18	5	51	
SPI_PV	087	A	7/12/2019	7:36:16	407	18	5	44	
SPI_PV	087	B	7/12/2019	7:37:33	408	18	5	44	
SPI_PV	087	C	7/12/2019	7:38:13	409	18	5	44	
SPI_PV	087	D	7/12/2019	7:39:02	410	18	5	44	FC 411

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SampleType	StationID	Replicate	Date	Time	Frame	SPI_StopC ollar_in	SPI_Weights_perSide_num	Depth_ft	Comments
SPI_PV	088	A	7/12/2019	7:56:50	412	18	5	36	
SPI_PV	088	B	7/12/2019	7:57:41	413	18	5	36	
SPI_PV	088	C	7/12/2019	7:58:28	414	18	5	36	
SPI_PV	088	D	7/12/2019	7:59:09	415	18	5	36	Download, FC 415.
SPI_PV	106	A	7/12/2019	8:47:33	416	18	5	32	
SPI_PV	106	B	7/12/2019	8:48:23	417	18	5	32	
SPI_PV	106	C	7/12/2019	8:49:12	418	18	5	32	
SPI_PV	106	D	7/12/2019	8:50:22	419	18	5	32	
SPI_PV	106	E	7/12/2019	8:51:02	420	18	5	32	FC 421
SPI_PV	105	X	7/12/2019	9:05:17	422	18	5	37	
SPI_PV	105	Y	7/12/2019	9:07:03	423	18	5	37	
SPI_PV	105	Z	7/12/2019	9:07:55	424	18	5	37	Nav CPU crashed, redo station.
SPI_PV	105	A	7/12/2019	9:18:00	425	18	5	37	
SPI_PV	105	B	7/12/2019	9:19:06	426	18	5	37	
SPI_PV	105	C	7/12/2019	9:19:54	427	18	5	37	
SPI_PV	105	D	7/12/2019	9:20:39	428	18	5	37	
SPI_PV	104	A	7/12/2019	9:36:52	429	18	5	45	
SPI_PV	104	B	7/12/2019	9:39:00	430	18	5	45	
SPI_PV	104	C	7/12/2019	9:39:53	431	18	5	45	
SPI_PV	104	D	7/12/2019	9:40:40	432	18	5	45	
SPI_PV	099	A	7/12/2019	10:08:21	433	18	5	58	
SPI_PV	099	B	7/12/2019	10:09:00	434	18	5	58	
SPI_PV	099	C	7/12/2019	10:10:26	435	18	5	58	
SPI_PV	099	D	7/12/2019	10:11:08	436	18	5	58	
SPI_PV	100	A	7/12/2019	10:30:33	437	18	5	50	
SPI_PV	100	B	7/12/2019	10:31:20	438	18	5	50	
SPI_PV	100	C	7/12/2019	10:32:09	439	18	5	50	
SPI_PV	100	D	7/12/2019	10:32:54	440	18	5	50	FC 441
SPI_PV	101	A	7/12/2019	10:51:28	442	18	5	48	
SPI_PV	101	B	7/12/2019	10:52:35	443	18	5	48	
SPI_PV	101	C	7/12/2019	10:53:17	444	18	5	48	
SPI_PV	101	D	7/12/2019	10:54:03	445	18	5	48	
SPI_PV	116	A	7/12/2019	11:14:57	446	18	5	45	
SPI_PV	116	B	7/12/2019	11:16:55	447	18	5	45	
SPI_PV	116	C	7/12/2019	11:17:35	448	18	5	45	
SPI_PV	116	D	7/12/2019	11:18:17	449	18	5	45	
SPI_PV	116	E	7/12/2019	11:18:58	450	18	5	45	
SPI_PV	119	A	7/12/2019	11:34:30	451	18	5	45	
SPI_PV	119	B	7/12/2019	11:35:11	452	18	5	45	
SPI_PV	119	C	7/12/2019	11:36:00	453	18	5	45	
SPI_PV	119	D	7/12/2019	11:36:40	454	18	5	45	
SPI_PV	117	A	7/12/2019	11:47:00	455	18	5	46	
SPI_PV	117	B	7/12/2019	11:47:40	456	18	5	46	

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SampleType	StationID	Replicate	Date	Time	Frame	SPI_StopC ollar_in	SPI_Weights_perSide_num	Depth_ft	Comments
SPI_PV	117	C	7/12/2019	11:48:20	457	18	5	46	
SPI_PV	117	D	7/12/2019	11:48:57	458	18	5	46	Download, FC 460. Changed SPI battery.
SPI_PV	120	A	7/12/2019	12:59:51	461	18	5	36	
SPI_PV	120	B	7/12/2019	13:01:16	462	18	5	36	
SPI_PV	120	C	7/12/2019	13:02:46	463	18	5	36	
SPI_PV	120	D	7/12/2019	13:04:33	464	18	5	36	
SPI_PV	121	A	7/12/2019	13:26:25	465	18	5	27	Poor PV quality station 121.
SPI_PV	121	B	7/12/2019	13:27:50	466	18	5	27	
SPI_PV	121	C	7/12/2019	13:29:18	467	18	5	27	
SPI_PV	121	D	7/12/2019	13:30:54	468	18	5	27	
SPI_PV	129	A	7/12/2019	13:49:34	469	18	5	40	Poor PV quality station 129.
SPI_PV	129	B	7/12/2019	13:51:23	470	18	5	40	
SPI_PV	129	C	7/12/2019	13:53:05	471	18	5	40	
SPI_PV	129	D	7/12/2019	13:54:51	472	18	5	40	Over penetrated SPI.
SPI_PV	130	A	7/12/2019	14:11:36	473	18	5	31	Gravel bottom station 130.
SPI_PV	130	B	7/12/2019	14:13:18	474	18	5	31	
SPI_PV	130	C	7/12/2019	14:14:49	475	18	5	31	
SPI_PV	130	D	7/12/2019	14:16:16	476	18	5	31	
SPI_PV	128	A	7/12/2019	14:31:55	477	18	5	44	
SPI_PV	128	B	7/12/2019	14:33:35	478	18	5	44	
SPI_PV	128	C	7/12/2019	14:35:09	479	18	5	44	
SPI_PV	128	D	7/12/2019	14:36:49	480	18	5	44	2 good PV, over penetrated SPI.
SPI_PV	126	A	7/12/2019	14:51:17	481	18	5	37	Gravel bottom station 126.
SPI_PV	126	B	7/12/2019	14:52:54	482	18	5	37	
SPI_PV	126	C	7/12/2019	14:54:35	483	18	5	37	
SPI_PV	126	D	7/12/2019	14:56:02	484	18	5	37	Low PV quality station 126.
SPI_PV	124	A	7/12/2019	15:02:44	485	18	5	41	
SPI_PV	124	B	7/12/2019	15:04:19	486	18	5	41	
SPI_PV	124	C	7/12/2019	15:05:46	487	18	5	41	
SPI_PV	124	D	7/12/2019	15:07:17	488	18	5	41	
SPI_PV	123	A	7/12/2019	15:17:00	489	18	5	45	
SPI_PV	123	B	7/12/2019	15:18:55	490	18	5	45	
SPI_PV	123	C	7/12/2019	15:20:34	491	18	5	45	
SPI_PV	123	D	7/12/2019	15:22:24	492	18	5	45	
SPI_PV	125	A	7/12/2019	15:31:27	493	18	5	43	
SPI_PV	125	B	7/12/2019	15:32:59	494	18	5	43	
SPI_PV	125	C	7/12/2019	15:34:35	495	18	5	43	
SPI_PV	125	D	7/12/2019	15:36:09	496	18	5	43	
SPI_PV	127	A	7/12/2019	15:41:30	497	18	5	43	Grave/sand bottom station 127.
SPI_PV	127	B	7/12/2019	15:43:10	498	18	5	43	
SPI_PV	127	C	7/12/2019	15:44:49	499	18	5	43	
SPI_PV	127	D	7/12/2019	15:46:20	500	18	5	43	
SPI_PV	122	A	7/12/2019	15:53:19	501	18	5	44	

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SampleType	StationID	Replicate	Date	Time	Frame	SPI_StopC ollar_in	SPI_Weights_perSide_num	Depth_ft	Comments
SPI_PV	122	B	7/12/2019	15:55:04	502	18	5	44	
SPI_PV	122	C	7/12/2019	15:56:37	503	18	5	44	
SPI_PV	122	D	7/12/2019	15:58:05	504	18	5	44	
SPI_PV	118	A	7/12/2019	16:05:38	505	18	5	47	
SPI_PV	118	B	7/12/2019	16:07:10	506	18	5	47	
SPI_PV	118	C	7/12/2019	16:08:40	507	18	5	47	
SPI_PV	118	D	7/12/2019	16:10:09	508	18	5	47	Images downloaded, FC 509. Adjusted stops to 12.5"
SPI_PV	077	A	7/12/2019	17:32:32	510	13	5	86	
SPI_PV	077	B	7/12/2019	17:34:06	511	13	5	86	
SPI_PV	077	C	7/12/2019	17:35:32	512	13	5	86	
SPI_PV	077	D	7/12/2019	17:37:08	513	13	5	86	
SPI_PV	076	A	7/12/2019	17:52:26	514	13	5	90	
SPI_PV	076	B	7/12/2019	17:54:04	515	13	5	90	
SPI_PV	076	C	7/12/2019	17:55:40	516	13	5	90	
SPI_PV	076	D	7/12/2019	17:57:06	517	13	5	90	
SPI_PV	075	A	7/12/2019	18:25:18	518	13	5	91	
SPI_PV	075	B	7/12/2019	18:26:47	519	13	5	91	
SPI_PV	075	C	7/12/2019	18:28:26	520	13	5	91	
SPI_PV	075	D	7/12/2019	18:29:55	521	13	5	91	
SPI_PV	074	A	7/12/2019	18:45:25	522	13	5	86	SPI Only
SPI_PV	074	B	7/12/2019	18:47:02	523	13	5	86	SPI Only
SPI_PV	074	C	7/12/2019	18:48:26	524	13	5	86	SPI Only
SPI_PV	074	D	7/12/2019	18:49:59	525	13	5	86	SPI Only
SPI_PV	074	E	7/12/2019	18:59:58	526	13	5	86	
SPI_PV	074	F	7/12/2019	19:01:11	527	13	5	86	
SPI_PV	074	G	7/12/2019	19:03:01	528	13	5	86	
SPI_PV	074	H	7/12/2019	19:04:40	529	13	5	86	
SPI_PV	073	A	7/12/2019	19:17:56	530	13	5	81	
SPI_PV	073	B	7/12/2019	19:19:21	531	13	5	81	
SPI_PV	073	C	7/12/2019	19:20:51	532	13	5	81	
SPI_PV	073	D	7/12/2019	19:22:25	533	13	5	81	
SPI_PV	072	A	7/12/2019	19:34:54	534	13	5	74	
SPI_PV	072	B	7/12/2019	19:36:29	535	13	5	74	
SPI_PV	072	C	7/12/2019	19:38:00	536	13	5	74	
SPI_PV	072	D	7/12/2019	19:39:36	537	13	5	74	FC 538
SPI_PV	071	A	7/12/2019	19:52:46	539	13	5	71	
SPI_PV	071	B	7/12/2019	19:54:15	540	13	5	71	
SPI_PV	071	C	7/12/2019	19:55:48	541	13	5	71	
SPI_PV	071	D	7/12/2019	19:57:17	542	13	5	71	
SPI_PV	070	A	7/12/2019	20:10:52	543	13	5	76	
SPI_PV	070	B	7/12/2019	20:12:20	544	13	5	76	
SPI_PV	070	C	7/12/2019	20:13:51	545	13	5	76	
SPI_PV	070	D	7/12/2019	20:15:42	546	13	5	76	Download images, FC 546.

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SampleType	StationID	Replicate	Date	Time	Frame	SPI_StopC ollar_in	SPI_Weights_perSide_num	Depth_ft	Comments
SPI_PV	053	A	7/12/2019	20:56:17	547	13	5	72	
SPI_PV	053	B	7/12/2019	20:58:04	548	13	5	72	
SPI_PV	053	C	7/12/2019	20:59:30	549	13	5	72	
SPI_PV	053	D	7/12/2019	21:00:58	550	13	5	72	
SPI_PV	054	A	7/12/2019	21:18:56	551	13	5	72	
SPI_PV	054	B	7/12/2019	21:20:06	552	13	5	72	
SPI_PV	054	C	7/12/2019	21:22:00	553	13	5	72	
SPI_PV	054	D	7/12/2019	21:23:30	554	13	5	72	Bent frame caught on stern, winch cable off spool.
SPI_PV	055	A	7/12/2019	23:58:19	557	13	5	73	
SPI_PV	055	B	7/12/2019	23:59:49	558	13	5	73	
SPI_PV	056	A	7/13/2019	0:21:39	561	13	5	81	
SPI_PV	056	B	7/13/2019	0:22:42	562	13	5	81	
SPI_PV	056	C	7/13/2019	0:23:25	563	13	5	81	
SPI_PV	056	D	7/13/2019	0:24:03	564	13	5	81	Shift change
SPI_PV	057	A	7/13/2019	0:43:52	565	13	5	86	
SPI_PV	057	B	7/13/2019	0:44:34	566	13	5	86	
SPI_PV	057	C	7/13/2019	0:45:17	567	13	5	86	
SPI_PV	057	D	7/13/2019	0:45:56	568	13	5	86	
SPI_PV	058	A	7/13/2019	1:07:41	569	13	5	91	
SPI_PV	058	B	7/13/2019	1:08:25	570	13	5	91	
SPI_PV	058	C	7/13/2019	1:09:04	571	13	5	91	
SPI_PV	058	D	7/13/2019	1:09:43	572	13	5	91	
SPI_PV	059	A	7/13/2019	1:29:21	573	13	5	95	
SPI_PV	059	B	7/13/2019	1:30:05	574	13	5	95	
SPI_PV	059	C	7/13/2019	1:30:45	575	13	5	95	
SPI_PV	059	D	7/13/2019	1:31:21	576	13	5	95	
SPI_PV	060	A	7/13/2019	1:54:09	577	13	5	95	
SPI_PV	060	B	7/13/2019	1:54:48	578	13	5	95	
SPI_PV	060	C	7/13/2019	1:55:28	579	13	5	95	
SPI_PV	060	D	7/13/2019	1:56:10	580	13	5	95	
SPI_PV	061	A	7/13/2019	2:18:20	581	13	5	91	
SPI_PV	061	B	7/13/2019	2:19:00	582	13	5	91	
SPI_PV	061	C	7/13/2019	2:19:44	583	13	5	91	
SPI_PV	061	D	7/13/2019	2:20:25	584	13	5	91	
SPI_PV	062	A	7/13/2019	2:40:00	585	13	5	87	
SPI_PV	062	B	7/13/2019	2:40:46	586	13	5	87	
SPI_PV	062	C	7/13/2019	2:41:31	587	13	5	87	
SPI_PV	062	D	7/13/2019	2:42:11	588	13	5	87	Download, FC 590. Stops raised to 14", SPI download malfunction camera still taking photos.
SPI_PV	089	A	7/13/2019	3:51:44	591	14	5	80	
SPI_PV	089	B	7/13/2019	3:53:11	592	14	5	80	
SPI_PV	089	C	7/13/2019	3:54:02	593	14	5	80	
SPI_PV	089	D	7/13/2019	3:54:36	594	14	5	80	

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SampleType	StationID	Replicate	Date	Time	Frame	SPI_StopC ollar_in	SPI_Weights_perSide_num	Depth_ft	Comments
SPI_PV	090	A	7/13/2019	4:14:20	595	14	5	70	
SPI_PV	090	B	7/13/2019	4:15:00	596	14	5	70	
SPI_PV	090	C	7/13/2019	4:15:46	597	14	5	70	
SPI_PV	090	D	7/13/2019	4:16:25	598	14	5	70	
SPI_PV	091	A	7/13/2019	4:36:39	599	14	5	60	
SPI_PV	091	B	7/13/2019	4:37:19	600	14	5	60	
SPI_PV	091	C	7/13/2019	4:38:08	601	14	5	60	
SPI_PV	091	D	7/13/2019	4:38:49	602	14	5	60	
SPI_PV	092	A	7/13/2019	4:56:27	603	14	5	55	
SPI_PV	092	B	7/13/2019	4:57:08	604	14	5	55	
SPI_PV	092	C	7/13/2019	4:57:48	605	14	5	55	
SPI_PV	092	D	7/13/2019	4:58:37	606	14	5	55	
SPI_PV	093	A	7/13/2019	5:19:36	607	14	5	44	
SPI_PV	093	B	7/13/2019	5:20:15	608	14	5	44	
SPI_PV	093	C	7/13/2019	5:21:00	609	14	5	44	
SPI_PV	093	D	7/13/2019	5:21:52	610	14	5	44	
SPI_PV	094	A	7/13/2019	5:39:16	611	14	5	44	
SPI_PV	094	B	7/13/2019	5:40:02	612	14	5	44	
SPI_PV	094	C	7/13/2019	5:40:49	613	14	5	44	
SPI_PV	094	D	7/13/2019	5:41:30	614	14	5	44	
SPI_PV	094	E	7/13/2019	5:42:09	615	14	5	44	
SPI_PV	095	A	7/13/2019	6:00:52	616	14	5	30	
SPI_PV	095	B	7/13/2019	6:01:35	617	14	5	30	
SPI_PV	095	C	7/13/2019	6:02:14	618	14	5	30	
SPI_PV	095	D	7/13/2019	6:02:51	619	14	5	30	
SPI_PV	096	A	7/13/2019	6:17:17	620	14	5	23	
SPI_PV	096	B	7/13/2019	6:18:05	621	14	5	23	
SPI_PV	096	C	7/13/2019	6:18:45	622	14	5	23	
SPI_PV	096	D	7/13/2019	6:19:25	623	14	5	23	
SPI_PV	097	A	7/13/2019	6:36:31	624	14	5	33	
SPI_PV	097	B	7/13/2019	6:37:07	625	14	5	33	
SPI_PV	097	C	7/13/2019	6:37:45	626	14	5	33	
SPI_PV	097	D	7/13/2019	6:38:27	627	14	5	33	
SPI_PV	097	E	7/13/2019	6:40:49	628	14	5	33	
SPI_PV	107	A	7/13/2019	7:01:30	629	14	5	52	
SPI_PV	107	B	7/13/2019	7:02:07	630	14	5	52	
SPI_PV	107	C	7/13/2019	7:02:48	631	14	5	52	
SPI_PV	107	D	7/13/2019	7:03:31	632	14	5	52	Download, FC 632.
SPI_PV	108	A	7/13/2019	7:35:43	633	14	5	48	
SPI_PV	108	B	7/13/2019	7:36:23	634	14	5	48	
SPI_PV	108	C	7/13/2019	7:37:00	635	14	5	48	
SPI_PV	108	D	7/13/2019	7:37:41	636	14	5	48	
SPI_PV	108	E	7/13/2019	7:38:20	637	14	5	48	

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SampleType	StationID	Replicate	Date	Time	Frame	SPI_StopC ollar_in	SPI_Weights_perSide_num	Depth_ft	Comments
SPI_PV	108	F	7/13/2019	7:38:58	638	14	5	48	
SPI_PV	109	A	7/13/2019	7:58:01	639	14	5	36	
SPI_PV	109	B	7/13/2019	7:58:45	640	14	5	36	
SPI_PV	109	C	7/13/2019	7:59:23	641	14	5	36	
SPI_PV	109	D	7/13/2019	7:59:56	642	14	5	36	
SPI_PV	110	A	7/13/2019	8:17:27	643	14	5	53	
SPI_PV	110	B	7/13/2019	8:19:13	644	14	5	53	
SPI_PV	110	C	7/13/2019	8:19:59	645	14	5	53	
SPI_PV	110	D	7/13/2019	8:20:36	646	14	5	53	
SPI_PV	110	E	7/13/2019	8:21:19	647	14	5	53	
SPI_PV	111	A	7/13/2019	8:41:15	648	14	5	86	
SPI_PV	111	B	7/13/2019	8:42:05	649	14	5	86	
SPI_PV	111	C	7/13/2019	8:42:48	650	14	5	86	
SPI_PV	111	D	7/13/2019	8:43:28	651	14	5	86	
SPI_PV	112	A	7/13/2019	9:05:48	652	14	5	64	
SPI_PV	112	B	7/13/2019	9:08:32	653	14	5	64	
SPI_PV	112	C	7/13/2019	9:10:30	654	14	5	64	
SPI_PV	112	D	7/13/2019	9:11:19	655	14	5	64	
SPI_PV	113	A	7/13/2019	9:42:28	656	14	5	47	
SPI_PV	113	B	7/13/2019	9:43:16	657	14	5	47	
SPI_PV	113	C	7/13/2019	9:44:27	658	14	5	47	
SPI_PV	113	D	7/13/2019	9:45:27	659	14	5	47	
SPI_PV	114	A	7/13/2019	10:07:01	660	14	5	50	
SPI_PV	114	B	7/13/2019	10:07:50	661	14	5	50	
SPI_PV	114	C	7/13/2019	10:08:30	662	14	5	50	
SPI_PV	114	D	7/13/2019	10:09:10	663	14	5	50	
SPI_PV	114	E	7/13/2019	10:10:04	664	14	5	50	
SPI_PV	115	A	7/13/2019	10:28:12	665	14	5	50	
SPI_PV	115	B	7/13/2019	10:29:01	666	14	5	50	
SPI_PV	115	C	7/13/2019	10:29:56	667	14	5	50	
SPI_PV	115	D	7/13/2019	10:31:08	668	14	5	50	Download, shift change. Grabs 12:22-16:31 at stations 108, 95, 91, 76, 60, 57, 133, 136.
SPI_PV	015	D	7/13/2019	18:14:00	672	14	5	109	
SPI_PV	015	A	7/13/2019	18:14:18	669	14	5	109	
SPI_PV	015	B	7/13/2019	18:15:54	670	14	5	109	
SPI_PV	015	C	7/13/2019	18:17:40	671	14	5	109	
SPI_PV	014	A	7/13/2019	18:40:20	673	14	5	117	
SPI_PV	014	B	7/13/2019	18:41:53	674	14	5	117	
SPI_PV	014	C	7/13/2019	18:43:23	675	14	5	117	
SPI_PV	014	D	7/13/2019	18:44:46	676	14	5	117	
SPI_PV	013	A	7/13/2019	19:04:45	677	14	5	111	
SPI_PV	013	B	7/13/2019	19:06:26	678	14	5	111	
SPI_PV	013	C	7/13/2019	19:07:58	679	14	5	111	

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SampleType	StationID	Replicate	Date	Time	Frame	SPI_StopC ollar_in	SPI_Weights_perSide_num	Depth_ft	Comments
SPI_PV	013	D	7/13/2019	19:09:25	680	14	5	111	
SPI_PV	012	A	7/13/2019	19:29:17	681	14	5	127	
SPI_PV	012	B	7/13/2019	19:30:51	682	14	5	127	
SPI_PV	012	C	7/13/2019	19:32:14	683	14	5	127	
SPI_PV	012	D	7/13/2019	19:33:42	684	14	5	127	
SPI_PV	REFC_03	A	7/13/2019	19:53:50	685	14	5	119	
SPI_PV	REFC_03	B	7/13/2019	19:55:18	686	14	5	119	
SPI_PV	REFC_03	C	7/13/2019	19:56:39	687	14	5	119	
SPI_PV	REFC_03	D	7/13/2019	19:58:02	688	14	5	119	
SPI_PV	REFC_05	A	7/13/2019	20:03:43	689	14	5	115	
SPI_PV	REFC_05	B	7/13/2019	20:05:07	690	14	5	115	
SPI_PV	REFC_05	C	7/13/2019	20:06:44	691	14	5	115	
SPI_PV	REFC_05	D	7/13/2019	20:08:06	692	14	5	115	
SPI_PV	REFC_04	A	7/13/2019	20:12:27	693	14	5	114	
SPI_PV	REFC_04	B	7/13/2019	20:13:58	694	14	5	114	
SPI_PV	REFC_04	C	7/13/2019	20:15:20	695	14	5	114	
SPI_PV	REFC_04	D	7/13/2019	20:16:57	696	14	5	114	
SPI_PV	REFC_01	A	7/13/2019	20:23:55	697	14	5	117	
SPI_PV	REFC_01	B	7/13/2019	20:25:42	698	14	5	117	
SPI_PV	REFC_01	C	7/13/2019	20:27:04	699	14	5	117	
SPI_PV	REFC_01	D	7/13/2019	20:28:34	700	14	5	117	
SPI_PV	REFC_02	A	7/13/2019	20:32:12	701	14	5	117	
SPI_PV	REFC_02	B	7/13/2019	20:33:34	702	14	5	117	
SPI_PV	REFC_02	C	7/13/2019	20:35:04	703	14	5	117	
SPI_PV	REFC_02	D	7/13/2019	20:36:35	704	14	5	117	Download images, FC 705. Deck test 706.
SPI_PV	REFA_02	A	7/13/2019	21:21:16	707	14	5	105	Gravel station REFA_02.
SPI_PV	REFA_02	B	7/13/2019	21:22:50	708	14	5	105	
SPI_PV	REFA_02	C	7/13/2019	21:24:14	709	14	5	105	
SPI_PV	REFA_02	D	7/13/2019	21:25:47	710	14	5	105	
SPI_PV	REFA_04	A	7/13/2019	21:37:30	711	14	5	100	Gravel station REFA_04.
SPI_PV	REFA_04	B	7/13/2019	21:39:40	712	14	5	100	
SPI_PV	REFA_04	C	7/13/2019	21:41:05	713	14	5	100	
SPI_PV	REFA_04	D	7/13/2019	21:42:36	714	14	5	100	
SPI_PV	REFA_03	A	7/13/2019	21:48:20	715	14	5	101	Gravel station REFA_03.
SPI_PV	REFA_03	B	7/13/2019	21:49:45	716	14	5	101	
SPI_PV	REFA_03	C	7/13/2019	21:51:10	717	14	5	101	
SPI_PV	REFA_03	D	7/13/2019	21:52:32	718	14	5	101	
SPI_PV	REFA_05	A	7/13/2019	22:00:03	719	14	5	109	Gravel station REFA_05.
SPI_PV	REFA_05	B	7/13/2019	22:01:27	720	14	5	109	
SPI_PV	REFA_05	C	7/13/2019	22:02:54	721	14	5	109	
SPI_PV	REFA_05	D	7/13/2019	22:04:14	722	14	5	109	
SPI_PV	REFA_01	A	7/13/2019	22:15:36	723	14	5	94	Gravel station REFA_01.
SPI_PV	REFA_01	B	7/13/2019	22:17:03	724	14	5	94	

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SampleType	StationID	Replicate	Date	Time	Frame	SPI_StopC ollar_in	SPI_Weights_perSide_num	Depth_ft	Comments
SPI_PV	REFA_01	C	7/13/2019	22:18:26	725	14	5	94	
SPI_PV	REFA_01	D	7/13/2019	22:19:51	726	14	5	94	
SPI_PV	011	A	7/13/2019	22:56:28	727	14	5	224	
SPI_PV	011	B	7/13/2019	22:57:56	728	14	5	224	
SPI_PV	011	C	7/13/2019	22:59:28	729	14	5	224	
SPI_PV	011	D	7/13/2019	23:00:55	730	14	5	224	
SPI_PV	010	A	7/13/2019	23:25:00	731	14	5	116	Minimal gravel station 10.
SPI_PV	010	B	7/13/2019	23:26:35	732	14	5	116	
SPI_PV	010	C	7/13/2019	23:27:59	733	14	5	116	
SPI_PV	010	D	7/13/2019	23:29:30	734	14	5	116	
SPI_PV	009	A	7/13/2019	23:49:58	735	14	5	95	Gravel station 9.
SPI_PV	009	B	7/13/2019	23:51:20	736	14	5	95	
SPI_PV	009	C	7/13/2019	23:52:47	737	14	5	95	
SPI_PV	009	D	7/13/2019	23:54:04	738	14	5	95	FC 738, shift change.
SPI_PV	008	A	7/14/2019	0:17:51	739	14	5	85	
SPI_PV	008	B	7/14/2019	0:18:55	740	14	5	85	
SPI_PV	008	C	7/14/2019	0:19:39	741	14	5	85	
SPI_PV	008	D	7/14/2019	0:20:25	742	14	5	85	
SPI_PV	008	E	7/14/2019	0:21:13	743	14	5	85	Download, FC 744.
SPI_PV	007	A	7/14/2019	1:24:08	745	14	5	77	
SPI_PV	007	B	7/14/2019	1:24:48	746	14	5	77	
SPI_PV	007	C	7/14/2019	1:25:30	747	14	5	77	
SPI_PV	007	D	7/14/2019	1:26:11	748	14	5	77	
SPI_PV	006	A	7/14/2019	1:46:53	749	14	5	68	
SPI_PV	006	B	7/14/2019	1:47:37	750	14	5	68	Gravelly sand station 6.
SPI_PV	006	C	7/14/2019	1:48:21	751	14	5	68	
SPI_PV	006	D	7/14/2019	1:49:09	752	14	5	68	
SPI_PV	005	A	7/14/2019	2:07:04	753	14	5	77	Gravel station 5.
SPI_PV	005	B	7/14/2019	2:08:15	754	14	5	77	
SPI_PV	005	C	7/14/2019	2:08:54	755	14	5	77	
SPI_PV	005	D	7/14/2019	2:09:39	756	14	5	77	
SPI_PV	004	A	7/14/2019	2:28:31	757	14	5	73	
SPI_PV	004	B	7/14/2019	2:29:18	758	14	5	73	
SPI_PV	004	C	7/14/2019	2:29:57	759	14	5	73	
SPI_PV	004	D	7/14/2019	2:30:36	760	14	5	73	
SPI_PV	003	A	7/14/2019	2:50:10	761	14	5	70	
SPI_PV	003	B	7/14/2019	2:50:51	762	14	5	70	
SPI_PV	003	C	7/14/2019	2:51:27	763	14	5	70	
SPI_PV	003	D	7/14/2019	2:52:11	764	14	5	70	
SPI_PV	002	A	7/14/2019	3:13:01	765	14	5	64	Gravel station 2.
SPI_PV	002	B	7/14/2019	3:13:42	766	14	5	64	
SPI_PV	002	C	7/14/2019	3:14:21	767	14	5	64	
SPI_PV	002	D	7/14/2019	3:15:05	768	14	5	64	

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SampleType	StationID	Replicate	Date	Time	Frame	SPI_StopC ollar_in	SPI_Weights_perSide_num	Depth_ft	Comments
SPI_PV	001	A	7/14/2019	3:34:52	769	14	5	53	Minimal gravel station 1.
SPI_PV	001	B	7/14/2019	3:35:36	770	14	5	53	
SPI_PV	001	C	7/14/2019	3:36:20	771	14	5	53	
SPI_PV	001	D	7/14/2019	3:36:58	772	14	5	53	Download, FC 772. 3:40 SPI/PV sampling completed. Commence final grab sampling. Grabs 4:26-6:51 at stations 3, 6, 10, 11.

APPENDIX C

Sediment Profile Image Analysis Results

Notes:

IND=Indeterminate

Grain Size: "/" indicates layer of one phi size range over another.

Successional Stage: "on" indicates one Stage is found on top of another Stage (i.e., 1 on 3); "->" indicates one Stage is progressing to another Stage (i.e., 2 -> 3).

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StationID	Replicate	Water Depth (ft)	Date	Time	Stop Collar Setting (in)	# of Weights (per side)	Image Width (cm)	Grain Size Major Mode (phi)	Grain Size Minimum (phi)	Grain Size Maximum (phi)	Grain Size Range (phi)	Penetration Mean (cm)
001	A	53	7/14/2019	3:35:07	14	5	14.49	4-3	1	>4	1 to >4	1.31
001	B	53	7/14/2019	3:35:52	14	5	14.49	4-3	1	>4	1 to >4	2.26
001	C	53	7/14/2019	3:36:37	14	5	14.49	4-3	0	>4	0 to >4	2.53
002	A	64	7/14/2019	3:13:17	14	5	14.49	-1 to -2/4-3	-3	>4	-3 to >4	5.05
002	B	64	7/14/2019	3:13:59	14	5	14.49	-1 to -2/4-3	-5	>4	-5 to >4	5.86
002	C	64	7/14/2019	3:14:39	14	5	14.49	-1 to -2/2-1	-3	>4	-3 to >4	5.96
003	A	70	7/14/2019	2:50:26	14	5	14.49	4-3	1	>4	1 to >4	5.04
003	B	70	7/14/2019	2:51:09	14	5	14.49	4-3	1	>4	1 to >4	5.31
003	C	70	7/14/2019	2:51:44	14	5	14.49	4-3	1	>4	1 to >4	5.78
004	A	73	7/14/2019	2:28:48	14	5	14.49	4-3	1	>4	1 to >4	5.29
004	B	73	7/14/2019	2:29:34	14	5	14.49	4-3	-1	>4	-1 to >4	5.06
004	C	73	7/14/2019	2:30:15	14	5	14.49	4-3/>4	1	>4	1 to >4	8.13
005	A	77	7/14/2019	2:07:20	14	5	14.49	2-1	-2	>4	-2 to >4	8.38
005	B	77	7/14/2019	2:08:33	14	5	14.49	-1 to -2/2-1	-2	>4	-2 to >4	6.01
005	C	77	7/14/2019	2:09:11	14	5	14.49	-1 to -2/2-1	-2	>4	-2 to >4	7.40
006	A	68	7/14/2019	1:47:08	14	5	14.49	-1 to -2/2-1	-1	>4	-1 to >4	5.88
006	B	68	7/14/2019	1:47:54	14	5	14.49	-1 to -2/2-1	-1	>4	-1 to >4	6.89
006	C	68	7/14/2019	1:48:37	14	5	14.49	2-1	0	>4	0 to >4	7.12
007	A	77	7/14/2019	1:24:24	14	5	14.49	IND	IND	IND	IND to IND	4.89
007	B	77	7/14/2019	1:25:05	14	5	14.49	IND	IND	IND	IND to IND	5.98
007	C	77	7/14/2019	1:25:47	14	5	14.49	IND	IND	IND	IND to IND	6.29
008	B	85	7/14/2019	0:19:10	14	5	14.49	2-1	-1	>4	-1 to >4	7.21
008	C	85	7/14/2019	0:19:56	14	5	14.49	2-1	-2	>4	-2 to >4	5.81
008	D	85	7/14/2019	0:20:41	14	5	14.49	2-1	-1	>4	-1 to >4	5.76
009	A	95	7/13/2019	23:50:13	14	5	14.49	-1 to -2/2-1	-3	>4	-3 to >4	6.67
009	B	95	7/13/2019	23:51:37	14	5	14.49	-1 to -2/2-1	-2	>4	-2 to >4	7.07

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StationID	Replicate	Water Depth (ft)	Date	Time	Stop Collar Setting (in)	# of Weights (per side)	Image Width (cm)	Grain Size Major Mode (phi)	Grain Size Minimum (phi)	Grain Size Maximum (phi)	Grain Size Range (phi)	Penetration Mean (cm)
009	C	95	7/13/2019	23:53:04	14	5	14.49	-1 to -2/2-1	-3	>4	-3 to >4	6.45
010	B	116	7/13/2019	23:26:52	14	5	14.49	3-2/>4	-4	>4	-4 to >4	7.38
010	C	116	7/13/2019	23:28:16	14	5	14.49	>4	-1	>4	-1 to >4	3.08
010	D	116	7/13/2019	23:29:47	14	5	14.49	3-2/>4	-1	>4	-1 to >4	8.83
011	A	224	7/13/2019	22:56:37	14	5	14.49	>4	0	>4	0 to >4	20.15
011	B	224	7/13/2019	22:58:11	14	5	14.49	>4	0	>4	0 to >4	18.98
011	C	224	7/13/2019	22:59:48	14	5	14.49	>4	0	>4	0 to >4	20.28
012	A	127	7/13/2019	19:29:31	14	5	14.49	4-3	2	>4	2 to >4	7.38
012	B	127	7/13/2019	19:31:08	14	5	14.49	4-3	0	>4	0 to >4	10.02
012	C	127	7/13/2019	19:32:27	14	5	14.49	4-3	0	>4	0 to >4	9.92
013	A	111	7/13/2019	19:05:00	14	5	14.49	2-1	0	>4	0 to >4	8.92
013	B	111	7/13/2019	19:06:42	14	5	14.49	2-1	-1	>4	-1 to >4	7.16
013	C	111	7/13/2019	19:08:11	14	5	14.49	2-1	-1	>4	-1 to >4	4.77
014	A	117	7/13/2019	18:40:36	14	5	14.49	2-1	-1	>4	-1 to >4	6.07
014	B	117	7/13/2019	18:42:09	14	5	14.49	2-1	-1	>4	-1 to >4	6.41
014	D	117	7/13/2019	18:45:03	14	5	14.49	2-1/>4	0	>4	0 to >4	7.01
015	A	109	7/13/2019	18:14:33	14	5	14.49	4-3	1	>4	1 to >4	6.63
015	B	109	7/13/2019	18:16:12	14	5	14.49	4-3	1	>4	1 to >4	6.69
015	C	109	7/13/2019	18:17:53	14	5	14.49	4-3	1	>4	1 to >4	6.01
016	A	95	7/10/2019	19:06:41	18	5	14.49	4-3	1	>4	1 to >4	3.66
016	B	95	7/10/2019	19:07:59	18	5	14.49	4-3	1	>4	1 to >4	4.93
016	C	95	7/10/2019	19:09:18	18	5	14.49	4-3	0	>4	0 to >4	4.36
017	A	93	7/10/2019	18:46:29	18	5	14.49	4-3	0	>4	0 to >4	7.15
017	B	93	7/10/2019	18:47:44	18	5	14.49	4-3	1	>4	1 to >4	5.14
017	D	93	7/10/2019	18:50:11	18	5	14.49	4-3	0	>4	0 to >4	3.92
018	A	90	7/10/2019	18:25:08	18	5	14.49	4-3	0	>4	0 to >4	6.13
018	B	90	7/10/2019	18:26:34	18	5	14.49	4-3	1	>4	1 to >4	3.89
018	C	90	7/10/2019	18:27:53	18	5	14.49	4-3	0	>4	0 to >4	4.56
019	A	97	7/10/2019	18:03:03	18	5	14.49	4-3	1	>4	1 to >4	5.53

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019	B	97	7/10/2019	18:04:10	18	5	14.49	4-3	2	>4	2 to >4	4.74
019	C	97	7/10/2019	18:05:19	18	5	14.49	4-3/3-2	0	>4	0 to >4	15.69
020	A	92	7/10/2019	17:42:53	18	5	14.49	4-3	0	>4	0 to >4	3.72
020	B	92	7/10/2019	17:44:34	18	5	14.49	4-3	1	>4	1 to >4	3.66
020	C	92	7/10/2019	17:45:55	18	5	14.49	4-3	-1	>4	-1 to >4	4.34
021	A	97	7/10/2019	22:18:09	18	5	14.49	2-1	0	>4	0 to >4	5.43
021	B	97	7/10/2019	22:19:30	18	5	14.49	2-1	1	>4	1 to >4	5.27
021	D	97	7/10/2019	22:22:06	18	5	14.49	2-1	0	>4	0 to >4	5.33
022	A	95	7/10/2019	22:37:29	18	5	14.49	3-2	0	>4	0 to >4	3.93
022	B	95	7/10/2019	22:38:46	18	5	14.49	3-2	-1	>4	-1 to >4	6.59
022	C	95	7/10/2019	22:40:01	18	5	14.49	3-2	0	>4	0 to >4	3.57
023	A	91	7/10/2019	22:57:17	18	5	14.49	2-1	-2	>4	-2 to >4	4.81
023	B	91	7/10/2019	22:58:43	18	5	14.49	2-1	-1	>4	-1 to >4	6.19
023	D	91	7/10/2019	23:01:14	18	5	14.49	2-1	-1	>4	-1 to >4	5.11
024	A	97	7/10/2019	23:16:48	18	5	14.49	2-1	-1	>4	-1 to >4	4.74
024	B	97	7/10/2019	23:18:16	18	5	14.49	2-1	-1	>4	-1 to >4	5.27
024	C	97	7/10/2019	23:19:35	18	5	14.49	2-1	0	>4	0 to >4	5.16
025	A	102	7/11/2019	0:56:36	18	5	14.49	2-1	0	>4	0 to >4	5.02
025	B	102	7/11/2019	0:57:20	18	5	14.49	2-1	0	>4	0 to >4	5.13
025	D	102	7/11/2019	0:59:04	18	5	14.49	2-1	0	>4	0 to >4	5.62
026	C	98	7/11/2019	2:19:45	18	5	14.49	3-2	1	>4	1 to >4	4.34
026	F	98	7/11/2019	2:22:09	18	5	14.49	3-2	2	>4	2 to >4	4.13
026	G	98	7/11/2019	2:23:01	18	5	14.49	3-2	0	>4	0 to >4	5.82
027	A	97	7/11/2019	10:38:45	18	5	14.49	3-2	1	>4	1 to >4	4.26
027	B	97	7/11/2019	10:39:29	18	5	14.49	3-2	0	>4	0 to >4	4.20
027	C	97	7/11/2019	10:40:15	18	5	14.49	3-2	0	>4	0 to >4	3.86
028	A	88	7/11/2019	10:56:17	18	5	14.49	3-2	0	>4	0 to >4	4.83
028	B	88	7/11/2019	10:57:12	18	5	14.49	3-2	0	>4	0 to >4	4.85
028	C	88	7/11/2019	10:57:55	18	5	14.49	3-2	0	>4	0 to >4	4.35
029	A	89	7/11/2019	11:14:45	18	5	14.49	3-2	0	>4	0 to >4	4.91
029	B	89	7/11/2019	11:15:25	18	5	14.49	3-2	0	>4	0 to >4	3.86
029	C	89	7/11/2019	11:16:09	18	5	14.49	3-2	0	>4	0 to >4	4.95
030	A	123	7/10/2019	3:03:41	16	4	14.49	3-2	-1	>4	-1 to >4	5.97

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030	C	123	7/10/2019	3:08:14	16	4	14.49	3-2	-1	>4	-1 to >4	5.43
030	D	123	7/10/2019	3:10:00	16	4	14.49	3-2	-1	>4	-1 to >4	5.74
031	A	117	7/10/2019	4:07:40	18	5	14.49	3-2	0	>4	0 to >4	6.43
031	B	117	7/10/2019	4:08:49	18	5	14.49	3-2	0	>4	0 to >4	5.73
031	C	117	7/10/2019	4:09:53	18	5	14.49	3-2	1	>4	1 to >4	5.89
032	A	118	7/10/2019	4:43:15	18	5	14.49	3-2	-1	>4	-1 to >4	5.25
032	B	118	7/10/2019	4:44:10	18	5	14.49	3-2	-1	>4	-1 to >4	5.92
032	D	118	7/10/2019	4:46:32	18	5	14.49	3-2	-1	>4	-1 to >4	6.67
033	A	110	7/10/2019	5:34:24	18	5	14.49	3-2	0	>4	0 to >4	6.90
033	B	110	7/10/2019	5:35:18	18	5	14.49	3-2	-1	>4	-1 to >4	4.88
033	C	110	7/10/2019	5:36:36	18	5	14.49	3-2	-1	>4	-1 to >4	5.98
034	A	109	7/10/2019	6:02:04	18	5	14.49	3-2	0	>4	0 to >4	6.12
034	B	109	7/10/2019	6:03:02	18	5	14.49	3-2	0	>4	0 to >4	5.45
034	C	109	7/10/2019	6:06:15	18	5	14.49	3-2	0	>4	0 to >4	5.31
035	A	110	7/10/2019	6:34:32	18	5	14.49	3-2	-2	>4	-2 to >4	5.91
035	B	110	7/10/2019	6:35:21	18	5	14.49	3-2	0	>4	0 to >4	6.45
035	C	110	7/10/2019	6:37:41	18	5	14.49	3-2	-1	>4	-1 to >4	5.93
036	A	100	7/10/2019	6:58:52	18	5	14.49	2-1	-1	>4	-1 to >4	7.22
036	B	100	7/10/2019	6:59:53	18	5	14.49	2-1	0	>4	0 to >4	5.09
036	C	100	7/10/2019	7:00:48	18	5	14.49	2-1	1	>4	1 to >4	6.69
037	A	105	7/10/2019	7:20:11	18	5	14.49	-1 to 0/2-1	-3	>4	-3 to >4	5.82
037	C	105	7/10/2019	7:21:57	18	5	14.49	-1 to 0/2-1	-3	>4	-3 to >4	5.89
037	D	105	7/10/2019	7:23:19	18	5	14.49	-1 to 0/2-1	-2	>4	-2 to >4	6.25
038	A	100	7/10/2019	7:44:15	18	5	14.49	3-2	-1	>4	-1 to >4	6.23
038	B	100	7/10/2019	7:45:05	18	5	14.49	3-2	-2	>4	-2 to >4	6.12
038	C	100	7/10/2019	7:45:58	18	5	14.49	3-2	-1	>4	-1 to >4	6.74
039	A	98	7/10/2019	8:08:38	18	5	14.49	3-2	0	>4	0 to >4	4.18
039	B	98	7/10/2019	8:10:15	18	5	14.49	3-2	-1	>4	-1 to >4	5.34
039	C	98	7/10/2019	8:11:11	18	5	14.49	3-2	-1	>4	-1 to >4	6.55
040	A	98	7/10/2019	8:31:56	18	5	14.49	2-1	0	>4	0 to >4	6.87

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040	B	98	7/10/2019	8:32:46	18	5	14.49	2-1	1	>4	1 to >4	6.12
040	C	98	7/10/2019	8:33:34	18	5	14.49	2-1	0	>4	0 to >4	5.91
041	A	96	7/10/2019	8:53:58	18	5	14.49	2-1	1	>4	1 to >4	6.27
041	B	96	7/10/2019	8:54:40	18	5	14.49	2-1	0	>4	0 to >4	5.64
041	C	96	7/10/2019	8:55:27	18	5	14.49	2-1	0	>4	0 to >4	5.76
042	A	94	7/10/2019	9:16:46	18	5	14.49	3-2	0	>4	0 to >4	8.98
042	B	94	7/10/2019	9:18:32	18	5	14.49	3-2	-1	>4	-1 to >4	5.28
042	C	94	7/10/2019	9:19:18	18	5	14.49	3-2/4-3	0	>4	0 to >4	11.03
043	A	88	7/11/2019	11:29:09	18	5	14.49	2-1	-1	>4	-1 to >4	4.45
043	B	88	7/11/2019	11:30:01	18	5	14.49	2-1	-1	>4	-1 to >4	4.24
043	C	88	7/11/2019	11:30:49	18	5	14.49	2-1	0	>4	0 to >4	4.18
044	A	87	7/11/2019	11:46:59	18	5	14.49	2-1	0	>4	0 to >4	5.35
044	B	87	7/11/2019	11:47:46	18	5	14.49	2-1	-1	>4	-1 to >4	4.71
044	C	87	7/11/2019	11:49:02	18	5	14.49	2-1	-1	>4	-1 to >4	5.08
045	A	83	7/11/2019	12:07:17	18	5	14.49	2-1	0	>4	0 to >4	4.80
045	B	83	7/11/2019	12:08:50	18	5	14.49	2-1	0	>4	0 to >4	4.54
045	C	83	7/11/2019	12:10:01	18	5	14.49	2-1	1	>4	1 to >4	3.93
046	A	84	7/11/2019	19:50:44	18	5	14.49	-3 to -4/2-1	-4	>4	-4 to >4	3.48
046	B	84	7/11/2019	19:52:00	18	5	14.49	2-1	0	>4	0 to >4	4.88
046	D	84	7/11/2019	19:54:26	18	5	14.49	2-1	-3	>4	-3 to >4	4.63
047	A	81	7/11/2019	19:22:37	18	5	14.49	3-2	0	>4	0 to >4	3.60
047	D	81	7/11/2019	19:26:29	18	5	14.49	3-2	0	>4	0 to >4	4.79
047	E	81	7/11/2019	19:30:59	18	5	14.49	3-2	0	>4	0 to >4	4.71
048	A	77	7/11/2019	12:24:14	18	5	14.49	2-1	-1	>4	-1 to >4	3.82
048	B	77	7/11/2019	12:25:30	18	5	14.49	2-1	-1	>4	-1 to >4	3.79
048	C	77	7/11/2019	12:26:48	18	5	14.49	2-1	-1	>4	-1 to >4	4.18
049	A	87	7/11/2019	12:41:42	18	5	14.49	4-3	0	>4	0 to >4	6.18
049	B	87	7/11/2019	12:42:56	18	5	14.49	4-3	1	>4	1 to >4	12.08
049	D	87	7/11/2019	12:45:22	18	5	14.49	4-3	-1	>4	-1 to >4	12.85
050	A	87	7/11/2019	12:59:30	18	5	14.49	IND	IND	IND	IND to IND	0.00
050	B	87	7/11/2019	13:00:47	18	5	14.49	IND	IND	IND	IND to IND	0.00

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StationID	Replicate	Water Depth (ft)	Date	Time	Stop Collar Setting (in)	# of Weights (per side)	Image Width (cm)	Grain Size Major Mode (phi)	Grain Size Minimum (phi)	Grain Size Maximum (phi)	Grain Size Range (phi)	Penetration Mean (cm)
050	C	87	7/11/2019	13:01:55	18	5	14.49	3-2	-2	>4	-2 to >4	7.03
051	A	84	7/11/2019	13:18:11	18	5	14.49	-2 to -3	-4	>4	-4 to >4	7.23
051	C	84	7/11/2019	13:20:36	18	5	14.49	-3 to -4/-2 to -1	-4	>4	-4 to >4	9.02
051	D	84	7/11/2019	13:21:50	18	5	14.49	-2 to -1	-3	>4	-3 to >4	7.35
052	B	77	7/11/2019	14:07:38	18	5	14.49	3-2	1	>4	1 to >4	5.10
052	C	77	7/11/2019	14:08:53	18	5	14.49	3-2	1	>4	1 to >4	5.48
052	D	77	7/11/2019	14:10:04	18	5	14.49	3-2	1	>4	1 to >4	3.89
053	A	72	7/12/2019	20:56:30	12.5	5	14.49	3-2	-1	>4	-1 to >4	5.21
053	B	72	7/12/2019	20:58:18	12.5	5	14.49	3-2	0	>4	0 to >4	4.44
053	D	72	7/12/2019	21:01:13	12.5	5	14.49	3-2	0	>4	0 to >4	4.45
054	A	72	7/12/2019	21:19:09	12.5	5	14.49	1-0	0	>4	0 to >4	2.68
054	B	72	7/12/2019	21:20:18	12.5	5	14.49	1-0	-2	>4	-2 to >4	4.42
054	C	72	7/12/2019	21:22:01	12.5	5	14.49	1-0/2-1	-1	>4	-1 to >4	6.47
055	A	73	7/12/2019	23:58:30	12.5	5	14.49	3-2	1	>4	1 to >4	7.40
055	B	73	7/13/2019	0:00:04	12.5	5	14.49	3-2	-1	>4	-1 to >4	5.11
055	C	73	7/13/2019	0:01:35	12.5	5	14.49	3-2	0	>4	0 to >4	4.51
056	A	81	7/13/2019	0:21:54	12.5	5	14.49	4-3	1	>4	1 to >4	5.61
056	B	81	7/13/2019	0:22:57	12.5	5	14.49	4-3	0	>4	0 to >4	6.27
056	C	81	7/13/2019	0:23:37	12.5	5	14.49	4-3	0	>4	0 to >4	5.25
057	A	86	7/13/2019	0:44:08	12.5	5	14.49	4-3	1	>4	1 to >4	6.65
057	B	86	7/13/2019	0:44:50	12.5	5	14.49	4-3	1	>4	1 to >4	9.16
057	C	86	7/13/2019	0:45:32	12.5	5	14.49	4-3	0	>4	0 to >4	6.17
058	A	91	7/13/2019	1:07:56	12.5	5	14.49	4-3	1	>4	1 to >4	6.52
058	C	91	7/13/2019	1:09:21	12.5	5	14.49	4-3	0	>4	0 to >4	7.63
058	D	91	7/13/2019	1:09:58	12.5	5	14.49	4-3	1	>4	1 to >4	7.48
059	A	95	7/13/2019	1:29:36	12.5	5	14.49	4-3/>4	0	>4	0 to >4	8.91
059	B	95	7/13/2019	1:30:21	12.5	5	14.49	4-3/>4	1	>4	1 to >4	9.72
059	C	95	7/13/2019	1:31:00	12.5	5	14.49	4-3/>4	0	>4	0 to >4	8.61
060	A	95	7/13/2019	1:54:25	12.5	5	14.49	4-3	0	>4	0 to >4	5.32
060	B	95	7/13/2019	1:55:03	12.5	5	14.49	4-3/>4	1	>4	1 to >4	7.95

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StationID	Replicate	Water Depth (ft)	Date	Time	Stop Collar Setting (in)	# of Weights (per side)	Image Width (cm)	Grain Size Major Mode (phi)	Grain Size Minimum (phi)	Grain Size Maximum (phi)	Grain Size Range (phi)	Penetration Mean (cm)
060	C	95	7/13/2019	1:55:45	12.5	5	14.49	4-3/>4	0	>4	0 to >4	8.40
061	A	91	7/13/2019	2:18:35	12.5	5	14.49	4-3/>4	0	>4	0 to >4	9.09
061	B	91	7/13/2019	2:19:17	12.5	5	14.49	4-3/>4	0	>4	0 to >4	8.21
061	C	91	7/13/2019	2:20:00	12.5	5	14.49	4-3/>4	0	>4	0 to >4	8.16
062	A	87	7/13/2019	2:40:14	12.5	5	14.49	4-3/>4	1	>4	1 to >4	6.53
062	B	87	7/13/2019	2:41:00	12.5	5	14.49	4-3/>4	1	>4	1 to >4	5.61
062	D	87	7/13/2019	2:42:24	12.5	5	14.49	4-3/>4	1	>4	1 to >4	6.53
063	B	74	7/11/2019	18:32:06	18	5	14.49	4-3	0	>4	0 to >4	3.80
063	C	74	7/11/2019	18:33:16	18	5	14.49	4-3	0	>4	0 to >4	4.49
063	D	74	7/11/2019	18:34:28	18	5	14.49	4-3	1	>4	1 to >4	2.95
064	A	72	7/11/2019	17:43:40	18	5	14.49	4-3	0	>4	0 to >4	3.68
064	B	72	7/11/2019	17:45:19	18	5	14.49	4-3	0	>4	0 to >4	3.52
064	C	72	7/11/2019	17:46:35	18	5	14.49	4-3	1	>4	1 to >4	3.07
065	A	77	7/11/2019	16:59:10	18	5	14.49	4-3	1	>4	1 to >4	4.61
065	B	77	7/11/2019	17:00:25	18	5	14.49	4-3	1	>4	1 to >4	4.09
065	C	77	7/11/2019	17:01:35	18	5	14.49	4-3	1	>4	1 to >4	4.09
066	A	82	7/11/2019	16:38:10	18	5	14.49	3-2	-1	>4	-1 to >4	3.77
066	B	82	7/11/2019	16:39:40	18	5	14.49	3-2	0	>4	0 to >4	2.91
066	C	82	7/11/2019	16:41:02	18	5	14.49	3-2	-1	>4	-1 to >4	4.37
067	A	77	7/11/2019	16:18:44	18	5	14.49	3-2	1	>4	1 to >4	5.06
067	B	77	7/11/2019	16:20:01	18	5	14.49	3-2	0	>4	0 to >4	6.11
067	D	77	7/11/2019	16:22:36	18	5	14.49	3-2	0	>4	0 to >4	4.78
068	A	70	7/11/2019	16:00:31	18	5	14.49	-2 to -3/2-1	-6	>4	-6 to >4	7.28
068	B	70	7/11/2019	16:01:52	18	5	14.49	-2 to -3/2-1	-4	>4	-4 to >4	5.45
068	C	70	7/11/2019	16:03:01	18	5	14.49	0 to -1/2-1	-3	>4	-3 to >4	7.09
069	A	70	7/11/2019	15:41:06	18	5	14.49	0 to -1/2-1	-1	>4	-1 to >4	4.71
069	B	70	7/11/2019	15:42:37	18	5	14.49	1-0/2-1	-2	>4	-2 to >4	6.13
069	C	70	7/11/2019	15:43:54	18	5	14.49	2-1	-1	>4	-1 to >4	5.22
070	A	76	7/12/2019	20:11:06	12.5	5	14.49	3-2	0	>4	0 to >4	6.56
070	B	76	7/12/2019	20:12:35	12.5	5	14.49	3-2	1	>4	1 to >4	5.68
070	C	76	7/12/2019	20:14:05	12.5	5	14.49	3-2	1	>4	1 to >4	3.67

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StationID	Replicate	Water Depth (ft)	Date	Time	Stop Collar Setting (in)	# of Weights (per side)	Image Width (cm)	Grain Size Major Mode (phi)	Grain Size Minimum (phi)	Grain Size Maximum (phi)	Grain Size Range (phi)	Penetration Mean (cm)
071	A	71	7/12/2019	19:52:58	12.5	5	14.49	2-1	1	>4	1 to >4	5.58
071	B	71	7/12/2019	19:54:29	12.5	5	14.49	2-1	0	>4	0 to >4	6.39
071	C	71	7/12/2019	19:55:58	12.5	5	14.49	2-1	-1	>4	-1 to >4	6.12
072	A	74	7/12/2019	19:35:07	12.5	5	14.49	4-3	1	>4	1 to >4	3.49
072	C	74	7/12/2019	19:38:13	12.5	5	14.49	4-3	0	>4	0 to >4	3.47
072	D	74	7/12/2019	19:39:50	12.5	5	14.49	4-3	1	>4	1 to >4	3.12
073	A	81	7/12/2019	19:18:07	12.5	5	14.49	4-3	1	>4	1 to >4	4.71
073	B	81	7/12/2019	19:19:37	12.5	5	14.49	4-3	0	>4	0 to >4	4.23
073	C	81	7/12/2019	19:21:06	12.5	5	14.49	4-3	0	>4	0 to >4	4.75
074	E	86	7/12/2019	18:59:48	12.5	5	14.49	4-3	1	>4	1 to >4	5.84
074	F	86	7/12/2019	19:01:27	12.5	5	14.49	4-3	0	>4	0 to >4	5.95
074	G	86	7/12/2019	19:03:13	12.5	5	14.49	4-3	0	>4	0 to >4	5.51
075	A	91	7/12/2019	18:25:31	12.5	5	14.49	4-3/>4	0	>4	0 to >4	10.33
075	B	91	7/12/2019	18:27:03	12.5	5	14.49	4-3/>4	1	>4	1 to >4	11.22
075	D	91	7/12/2019	18:30:09	12.5	5	14.49	4-3/>4	1	>4	1 to >4	10.03
076	A	90	7/12/2019	17:52:40	12.5	5	14.49	4-3/>4	0	>4	0 to >4	5.42
076	B	90	7/12/2019	17:54:19	12.5	5	14.49	4-3	0	>4	0 to >4	5.58
076	C	90	7/12/2019	17:55:52	12.5	5	14.49	4-3	0	>4	0 to >4	5.22
077	A	86	7/12/2019	17:32:45	12.5	5	14.49	4-3/>4	0	>4	0 to >4	8.31
077	C	86	7/12/2019	17:35:47	12.5	5	14.49	4-3/>4	1	>4	1 to >4	9.28
077	D	86	7/12/2019	17:37:23	12.5	5	14.49	4-3/>4	0	>4	0 to >4	9.67
078	A	77	7/11/2019	18:45:32	18	5	14.49	4-3	1	>4	1 to >4	4.43
078	B	77	7/11/2019	18:47:03	18	5	14.49	4-3	0	>4	0 to >4	5.52
078	C	77	7/11/2019	18:48:15	18	5	14.49	4-3	0	>4	0 to >4	4.39
079	A	80	7/12/2019	4:58:21	18	5	14.49	3-2	0	>4	0 to >4	4.49
079	C	80	7/12/2019	5:00:02	18	5	14.49	3-2	0	>4	0 to >4	3.80
079	D	80	7/12/2019	5:00:41	18	5	14.49	3-2	0	>4	0 to >4	3.90
080	A	69	7/12/2019	5:40:46	18	5	14.49	2-1	0	>4	0 to >4	4.37
080	B	69	7/12/2019	5:41:36	18	5	14.49	2-1	-1	>4	-1 to >4	5.52
080	C	69	7/12/2019	5:42:16	18	5	14.49	2-1	-1	>4	-1 to >4	5.71
081	A	83	7/11/2019	19:02:31	18	5	14.49	4-3	1	>4	1 to >4	5.33
081	B	83	7/11/2019	19:04:06	18	5	14.49	4-3	1	>4	1 to >4	5.62
081	C	83	7/11/2019	19:05:18	18	5	14.49	4-3	0	>4	0 to >4	9.17

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StationID	Replicate	Water Depth (ft)	Date	Time	Stop Collar Setting (in)	# of Weights (per side)	Image Width (cm)	Grain Size Major Mode (phi)	Grain Size Minimum (phi)	Grain Size Maximum (phi)	Grain Size Range (phi)	Penetration Mean (cm)
082	A	76	7/12/2019	4:18:26	18	5	14.49	2-1	-1	>4	-1 to >4	6.20
082	B	76	7/12/2019	4:19:26	18	5	14.49	2-1	0	>4	0 to >4	5.14
082	C	76	7/12/2019	4:20:13	18	5	14.49	2-1	0	>4	0 to >4	4.51
083	A	76	7/12/2019	5:26:07	18	5	14.49	4-3/>4	1	>4	1 to >4	7.65
083	B	76	7/12/2019	5:26:53	18	5	14.49	4-3/>4	1	>4	1 to >4	7.74
083	C	76	7/12/2019	5:27:38	18	5	14.49	4-3/>4	1	>4	1 to >4	8.61
084	A	62	7/12/2019	6:00:34	18	5	14.49	3-2	1	>4	1 to >4	5.20
084	B	62	7/12/2019	6:01:18	18	5	14.49	3-2	0	>4	0 to >4	3.68
084	D	62	7/12/2019	6:02:46	18	5	14.49	3-2	1	>4	1 to >4	3.60
085	A	66	7/12/2019	6:43:18	18	5	14.49	3-2	1	>4	1 to >4	6.20
085	B	66	7/12/2019	6:44:11	18	5	14.49	3-2	0	>4	0 to >4	5.38
085	C	66	7/12/2019	6:44:52	18	5	14.49	3-2	0	>4	0 to >4	5.59
086	A	51	7/12/2019	7:17:44	18	5	14.49	3-2	-1	>4	-1 to >4	5.00
086	B	51	7/12/2019	7:18:40	18	5	14.49	3-2	0	>4	0 to >4	4.77
086	C	51	7/12/2019	7:19:32	18	5	14.49	3-2	0	>4	0 to >4	5.29
087	A	43	7/12/2019	7:36:28	18	5	14.49	3-2	-1	>4	-1 to >4	4.76
087	B	43	7/12/2019	7:37:49	18	5	14.49	3-2	0	>4	0 to >4	3.60
087	C	43	7/12/2019	7:38:29	18	5	14.49	3-2	1	>4	1 to >4	3.14
088	A	36	7/12/2019	7:57:05	18	5	14.49	2-1	0	>4	0 to >4	4.69
088	B	36	7/12/2019	7:57:56	18	5	14.49	2-1	-1	>4	-1 to >4	6.90
088	C	36	7/12/2019	7:58:42	18	5	14.49	2-1	-1	>4	-1 to >4	5.77
089	A	80	7/13/2019	3:52:00	14	5	14.49	4-3	0	>4	0 to >4	8.03
089	B	80	7/13/2019	3:53:27	14	5	14.49	4-3	0	>4	0 to >4	4.94
089	C	80	7/13/2019	3:54:15	14	5	14.49	4-3	0	>4	0 to >4	7.03
090	A	70	7/13/2019	4:14:36	14	5	14.49	4-3	0	>4	0 to >4	5.91
090	B	70	7/13/2019	4:15:15	14	5	14.49	4-3	0	>4	0 to >4	4.83
090	D	70	7/13/2019	4:16:41	14	5	14.49	4-3	1	>4	1 to >4	5.05
091	A	60	7/13/2019	4:36:55	14	5	14.49	3-2	0	>4	0 to >4	4.24
091	B	60	7/13/2019	4:37:35	14	5	14.49	3-2	0	>4	0 to >4	4.67
091	C	60	7/13/2019	4:38:24	14	5	14.49	3-2	0	>4	0 to >4	4.43
092	A	55	7/13/2019	4:56:43	14	5	14.49	4-3	1	>4	1 to >4	3.20
092	C	55	7/13/2019	4:58:05	14	5	14.49	4-3	-1	>4	-1 to >4	3.66
092	D	55	7/13/2019	4:58:53	14	5	14.49	4-3	0	>4	0 to >4	3.71
093	B	44	7/13/2019	5:20:32	14	5	14.49	4-3	0	>4	0 to >4	4.58
093	C	44	7/13/2019	5:21:16	14	5	14.49	4-3	0	>4	0 to >4	4.23

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StationID	Replicate	Water Depth (ft)	Date	Time	Stop Collar Setting (in)	# of Weights (per side)	Image Width (cm)	Grain Size Major Mode (phi)	Grain Size Minimum (phi)	Grain Size Maximum (phi)	Grain Size Range (phi)	Penetration Mean (cm)
093	D	44	7/13/2019	5:22:08	14	5	14.49	4-3	1	>4	1 to >4	2.36
094	B	44	7/13/2019	5:40:18	14	5	14.49	4-3	0	>4	0 to >4	4.12
094	C	44	7/13/2019	5:41:05	14	5	14.49	4-3	0	>4	0 to >4	4.91
094	D	44	7/13/2019	5:41:45	14	5	14.49	4-3	0	>4	0 to >4	4.55
095	A	30	7/13/2019	6:01:06	14	5	14.49	2-1	0	>4	0 to >4	5.98
095	B	30	7/13/2019	6:01:48	14	5	14.49	2-1	0	>4	0 to >4	6.60
095	C	30	7/13/2019	6:02:29	14	5	14.49	2-1	-1	>4	-1 to >4	5.76
096	A	23	7/13/2019	6:17:32	14	5	14.49	-1 to 0/3-2	-2	>4	-2 to >4	4.80
096	B	23	7/13/2019	6:18:21	14	5	14.49	-1 to 0/3-2	-2	>4	-2 to >4	5.33
096	D	23	7/13/2019	6:19:41	14	5	14.49	3-2	-2	>4	-2 to >4	5.48
097	A	33	7/13/2019	6:36:47	14	5	14.49	3-2	-1	>4	-1 to >4	3.09
097	B	33	7/13/2019	6:37:24	14	5	14.49	3-2	0	>4	0 to >4	6.21
097	C	33	7/13/2019	6:38:01	14	5	14.49	3-2	-1	>4	-1 to >4	5.66
098	A	58	7/12/2019	6:15:43	18	5	14.49	4-3	1	>4	1 to >4	4.54
098	B	58	7/12/2019	6:16:17	18	5	14.49	4-3	0	>4	0 to >4	3.31
098	C	58	7/12/2019	6:17:11	18	5	14.49	4-3	1	>4	1 to >4	4.84
099	A	58	7/12/2019	10:08:35	18	5	14.49	3-2	0	>4	0 to >4	4.67
099	B	58	7/12/2019	10:09:14	18	5	14.49	2-1/3-2	-1	>4	-1 to >4	4.38
099	C	58	7/12/2019	10:10:41	18	5	14.49	2-1/3-2	0	>4	0 to >4	5.36
100	A	50	7/12/2019	10:30:47	18	5	14.49	4-3	0	>4	0 to >4	5.24
100	B	50	7/12/2019	10:31:36	18	5	14.49	4-3	1	>4	1 to >4	3.60
100	C	50	7/12/2019	10:32:24	18	5	14.49	4-3	1	>4	1 to >4	4.73
101	A	48	7/12/2019	10:51:43	18	5	14.49	4-3	1	>4	1 to >4	3.41
101	B	48	7/12/2019	10:52:49	18	5	14.49	4-3	0	>4	0 to >4	4.59
101	C	48	7/12/2019	10:53:31	18	5	14.49	4-3	1	>4	1 to >4	3.44
102	A	57	7/12/2019	6:28:02	18	5	14.49	3-2	0	>4	0 to >4	6.03
102	B	57	7/12/2019	6:28:59	18	5	14.49	3-2	0	>4	0 to >4	5.14
102	C	57	7/12/2019	6:29:45	18	5	14.49	3-2	0	>4	0 to >4	5.49
103	A	56	7/12/2019	7:03:33	18	5	14.49	4-3	1	>4	1 to >4	4.24

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StationID	Replicate	Water Depth (ft)	Date	Time	Stop Collar Setting (in)	# of Weights (per side)	Image Width (cm)	Grain Size Major Mode (phi)	Grain Size Minimum (phi)	Grain Size Maximum (phi)	Grain Size Range (phi)	Penetration Mean (cm)
103	B	56	7/12/2019	7:04:15	18	5	14.49	4-3	0	>4	0 to >4	3.45
103	C	56	7/12/2019	7:04:58	18	5	14.49	4-3	0	>4	0 to >4	3.00
104	A	45	7/12/2019	9:37:06	18	5	14.49	4-3	-1	>4	-1 to >4	5.47
104	B	45	7/12/2019	9:39:14	18	5	14.49	4-3	1	>4	1 to >4	3.68
104	C	45	7/12/2019	9:40:07	18	5	14.49	4-3	0	>4	0 to >4	4.51
105	A	37	7/12/2019	9:18:13	18	5	14.49	3-2	2	>4	2 to >4	2.57
105	B	37	7/12/2019	9:19:20	18	5	14.49	3-2	1	>4	1 to >4	4.08
105	C	37	7/12/2019	9:20:09	18	5	14.49	3-2	1	>4	1 to >4	4.00
106	A	32	7/12/2019	8:47:48	18	5	14.49	2-1	0	>4	0 to >4	7.58
106	B	32	7/12/2019	8:48:38	18	5	14.49	2-1	-1	>4	-1 to >4	4.86
106	C	32	7/12/2019	8:49:27	18	5	14.49	2-1	-2	>4	-2 to >4	4.32
107	A	52	7/13/2019	7:01:44	14	5	14.49	3-2	-1	>4	-1 to >4	6.05
107	B	52	7/13/2019	7:02:23	14	5	14.49	3-2	-1	>4	-1 to >4	5.80
107	C	52	7/13/2019	7:03:04	14	5	14.49	3-2	-1	>4	-1 to >4	9.28
108	A	48	7/13/2019	7:35:59	14	5	14.49	>4	1	>4	1 to >4	11.32
108	B	48	7/13/2019	7:36:40	14	5	14.49	>4	2	>4	2 to >4	8.02
108	F	48	7/13/2019	7:39:14	14	5	14.49	>4	1	>4	1 to >4	10.52
109	A	36	7/13/2019	7:58:17	14	5	14.49	>4	-2	>4	-2 to >4	9.85
109	C	36	7/13/2019	7:59:39	14	5	14.49	4-3/>4	0	>4	0 to >4	9.89
109	D	36	7/13/2019	8:00:11	14	5	14.49	4-3/>4	-1	>4	-1 to >4	10.71
110	B	53	7/13/2019	8:19:29	14	5	14.49	>4	0	>4	0 to >4	13.16
110	C	53	7/13/2019	8:20:14	14	5	14.49	>4	0	>4	0 to >4	15.08
110	D	53	7/13/2019	8:20:52	14	5	14.49	>4	1	>4	1 to >4	8.98
111	A	86	7/13/2019	8:41:30	14	5	14.49	4-3	-1	>4	-1 to >4	7.92
111	B	86	7/13/2019	8:42:21	14	5	14.49	4-3/>4	-1	>4	-1 to >4	11.57
111	C	86	7/13/2019	8:43:00	14	5	14.49	4-3	0	>4	0 to >4	4.86
112	A	64	7/13/2019	9:06:04	14	5	14.49	4-3	-1	>4	-1 to >4	4.98

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StationID	Replicate	Water Depth (ft)	Date	Time	Stop Collar Setting (in)	# of Weights (per side)	Image Width (cm)	Grain Size Major Mode (phi)	Grain Size Minimum (phi)	Grain Size Maximum (phi)	Grain Size Range (phi)	Penetration Mean (cm)
112	B	64	7/13/2019	9:08:46	14	5	14.49	4-3	-1	>4	-1 to >4	6.70
112	C	64	7/13/2019	9:10:44	14	5	14.49	4-3	-1	>4	-1 to >4	6.65
113	A	47	7/13/2019	9:42:44	14	5	14.49	4-3	0	>4	0 to >4	4.16
113	B	47	7/13/2019	9:43:32	14	5	14.49	4-3	-1	>4	-1 to >4	9.61
113	C	47	7/13/2019	9:44:43	14	5	14.49	4-3	0	>4	0 to >4	5.54
114	A	50	7/13/2019	10:07:17	14	5	14.49	4-3/>4	-1	>4	-1 to >4	13.11
114	B	50	7/13/2019	10:08:06	14	5	14.49	4-3/>4	-1	>4	-1 to >4	16.34
114	D	50	7/13/2019	10:09:27	14	5	14.49	4-3/>4	0	>4	0 to >4	13.52
115	A	43	7/13/2019	10:28:29	14	5	14.49	>4	0	>4	0 to >4	19.13
115	B	43	7/13/2019	10:29:18	14	5	14.49	>4	0	>4	0 to >4	18.71
115	C	43	7/13/2019	10:30:12	14	5	14.49	>4	-1	>4	-1 to >4	18.91
116	A	45	7/12/2019	11:15:11	18	5	14.49	2-1	0	>4	0 to >4	5.63
116	B	45	7/12/2019	11:17:10	18	5	14.49	2-1	0	>4	0 to >4	5.04
116	D	45	7/12/2019	11:18:32	18	5	14.49	2-1	0	>4	0 to >4	5.66
117	A	46	7/12/2019	11:47:13	18	5	14.49	4-3	0	>4	0 to >4	3.84
117	C	46	7/12/2019	11:48:34	18	5	14.49	4-3	-1	>4	-1 to >4	4.64
117	D	46	7/12/2019	11:49:12	18	5	14.49	4-3	0	>4	0 to >4	4.12
118	A	47	7/12/2019	16:05:52	18	5	14.49	3-2	0	>4	0 to >4	5.15
118	B	47	7/12/2019	16:07:23	18	5	14.49	3-2	1	>4	1 to >4	4.57
118	C	47	7/12/2019	16:08:53	18	5	14.49	3-2	0	>4	0 to >4	4.35
119	A	45	7/12/2019	11:34:44	18	5	14.49	3-2	0	>4	0 to >4	5.15
119	B	45	7/12/2019	11:35:25	18	5	14.49	3-2	0	>4	0 to >4	5.00
119	C	45	7/12/2019	11:36:15	18	5	14.49	3-2	-1	>4	-1 to >4	4.41
120	A	36	7/12/2019	12:59:28	18	5	14.49	4-3	1	>4	1 to >4	4.78
120	B	36	7/12/2019	13:01:28	18	5	14.49	4-3	0	>4	0 to >4	4.18
120	C	36	7/12/2019	13:02:59	18	5	14.49	4-3	1	>4	1 to >4	2.94
121	A	27	7/12/2019	13:26:29	18	5	14.49	4-3	1	>4	1 to >4	8.95
121	B	27	7/12/2019	13:28:05	18	5	14.49	4-3	1	>4	1 to >4	3.94
121	C	27	7/12/2019	13:29:31	18	5	14.49	4-3	1	>4	1 to >4	3.91
122	A	44	7/12/2019	15:53:33	18	5	14.49	3-2	1	>4	1 to >4	3.93
122	B	44	7/12/2019	15:55:18	18	5	14.49	3-2	0	>4	0 to >4	4.55

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StationID	Replicate	Water Depth (ft)	Date	Time	Stop Collar Setting (in)	# of Weights (per side)	Image Width (cm)	Grain Size Major Mode (phi)	Grain Size Minimum (phi)	Grain Size Maximum (phi)	Grain Size Range (phi)	Penetration Mean (cm)
122	C	44	7/12/2019	15:56:52	18	5	14.49	3-2	0	>4	0 to >4	5.16
123	A	45	7/12/2019	15:17:15	18	5	14.49	2-1	0	>4	0 to >4	5.71
123	B	45	7/12/2019	15:19:07	18	5	14.49	2-1	-1	>4	-1 to >4	5.97
123	C	45	7/12/2019	15:20:45	18	5	14.49	2-1	0	>4	0 to >4	4.37
124	A	41	7/12/2019	15:02:59	18	5	14.49	3-2	0	>4	0 to >4	5.03
124	B	41	7/12/2019	15:04:34	18	5	14.49	3-2	0	>4	0 to >4	7.13
124	C	41	7/12/2019	15:06:01	18	5	14.49	3-2	0	>4	0 to >4	4.53
125	A	43	7/12/2019	15:31:40	18	5	14.49	4-3	0	>4	0 to >4	5.40
125	B	43	7/12/2019	15:33:14	18	5	14.49	4-3	1	>4	1 to >4	4.35
125	C	43	7/12/2019	15:34:50	18	5	14.49	4-3	1	>4	1 to >4	6.25
126	A	37	7/12/2019	14:51:31	18	5	14.49	-3 to -2/4-3	-4	>4	-4 to >4	5.84
126	C	37	7/12/2019	14:54:48	18	5	14.49	-4 to -3/4-3	-5	>4	-5 to >4	6.33
126	D	37	7/12/2019	14:56:17	18	5	14.49	-3 to -2/4-3	-3	>4	-3 to >4	6.81
127	A	43	7/12/2019	15:41:45	18	5	14.49	-3 to -2/3-2	-3	>4	-3 to >4	4.84
127	B	43	7/12/2019	15:43:25	18	5	14.49	3-2	-2	>4	-2 to >4	7.04
127	C	43	7/12/2019	15:45:03	18	5	14.49	-2 to -1/3-2	-2	>4	-2 to >4	5.75
128	A	44	7/12/2019	14:32:02	18	5	14.49	>4	2	>4	2 to >4	IND
128	B	44	7/12/2019	14:33:47	18	5	14.49	>4	2	>4	2 to >4	IND
128	C	44	7/12/2019	14:35:19	18	5	14.49	>4	2	>4	2 to >4	IND
129	A	40	7/12/2019	13:49:47	18	5	14.49	>4/4-3	1	>4	1 to >4	14.59
129	B	40	7/12/2019	13:51:37	18	5	14.49	>4/4-3	1	>4	1 to >4	17.69
129	C	40	7/12/2019	13:53:18	18	5	14.49	4-3/>4	1	>4	1 to >4	9.24
130	A	31	7/12/2019	14:11:48	18	5	14.49	-3 to -2/4-3	-3	>4	-3 to >4	5.42
130	B	31	7/12/2019	14:13:30	18	5	14.49	-3 to -2/4-3	-4	>4	-4 to >4	5.83
130	C	31	7/12/2019	14:14:55	18	5	14.49	-3 to -2/4-3	-3	>4	-3 to >4	5.16
131	A	69	7/11/2019	15:22:35	18	5	14.49	2-1	-3	>4	-3 to >4	7.18
131	B	69	7/11/2019	15:23:59	18	5	14.49	-2 to -1/2-1	-3	>4	-3 to >4	5.97
131	C	69	7/11/2019	15:25:09	18	5	14.49	-2 to -1/2-1	-2	>4	-2 to >4	5.15
132	A	75	7/11/2019	15:03:19	18	5	14.49	-3 to -2/2-1	-4	>4	-4 to >4	5.45
132	B	75	7/11/2019	15:04:38	18	5	14.49	2-1	-4	>4	-4 to >4	6.47

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StationID	Replicate	Water Depth (ft)	Date	Time	Stop Collar Setting (in)	# of Weights (per side)	Image Width (cm)	Grain Size Major Mode (phi)	Grain Size Minimum (phi)	Grain Size Maximum (phi)	Grain Size Range (phi)	Penetration Mean (cm)
132	C	75	7/11/2019	15:05:52	18	5	14.49	2-1	-3	>4	-3 to >4	6.42
133	A	79	7/11/2019	14:45:31	18	5	14.49	0-1	-1	>4	-1 to >4	7.21
133	B	79	7/11/2019	14:46:49	18	5	14.49	2-1	-2	>4	-2 to >4	6.44
133	C	79	7/11/2019	14:48:06	18	5	14.49	2-1	-2	>4	-2 to >4	6.43
134	A	80	7/11/2019	14:25:50	18	5	14.49	3-2	-1	>4	-1 to >4	10.65
134	B	80	7/11/2019	14:27:13	18	5	14.49	-1 to 0/3-2	-2	>4	-2 to >4	7.02
134	D	80	7/11/2019	14:29:45	18	5	14.49	-1 to 0/3-2	-1	>4	-1 to >4	7.40
135	A	76	7/11/2019	4:37:00	18	5	14.49	4-3	0	>4	0 to >4	5.08
135	B	76	7/11/2019	4:37:50	18	5	14.49	4-3	2	>4	2 to >4	5.07
135	D	76	7/11/2019	4:40:33	18	5	14.49	4-3	2	>4	2 to >4	6.73
136	A	83	7/11/2019	4:16:12	18	5	14.49	3-2	0	>4	0 to >4	6.09
136	B	83	7/11/2019	4:17:01	18	5	14.49	3-2	0	>4	0 to >4	6.75
136	C	83	7/11/2019	4:18:34	18	5	14.49	3-2	-2	>4	-2 to >4	6.57
137	A	91	7/11/2019	3:56:08	18	5	14.49	3-2	-1	>4	-1 to >4	4.79
137	B	91	7/11/2019	3:56:49	18	5	14.49	3-2	-1	>4	-1 to >4	4.85
137	C	91	7/11/2019	3:57:37	18	5	14.49	3-2	1	>4	1 to >4	4.25
138	A	90	7/11/2019	3:35:33	18	5	14.49	3-2	0	>4	0 to >4	4.94
138	B	90	7/11/2019	3:36:20	18	5	14.49	3-2	0	>4	0 to >4	4.16
138	C	90	7/11/2019	3:37:07	18	5	14.49	3-2	0	>4	0 to >4	5.74
139	A	88	7/11/2019	3:14:21	18	5	14.49	4-3	1	>4	1 to >4	4.69
139	B	88	7/11/2019	3:15:08	18	5	14.49	4-3	1	>4	1 to >4	4.15
139	C	88	7/11/2019	3:15:52	18	5	14.49	4-3	1	>4	1 to >4	4.15
140	A	93	7/11/2019	2:51:45	18	5	14.49	3-2	0	>4	0 to >4	5.77
140	B	93	7/11/2019	2:52:27	18	5	14.49	3-2	0	>4	0 to >4	6.26
140	C	93	7/11/2019	2:53:18	18	5	14.49	3-2	1	>4	1 to >4	5.75
141	A	96	7/10/2019	19:24:58	18	5	14.49	4-3	1	>4	1 to >4	4.73
141	B	96	7/10/2019	19:26:17	18	5	14.49	4-3	1	>4	1 to >4	8.93
141	C	96	7/10/2019	19:27:36	18	5	14.49	4-3	0	>4	0 to >4	6.07
142	A	95	7/10/2019	19:57:04	18	5	14.49	4-3	1	>4	1 to >4	5.07
142	B	95	7/10/2019	19:58:33	18	5	14.49	4-3	0	>4	0 to >4	4.50
142	C	95	7/10/2019	20:00:01	18	5	14.49	4-3	0	>4	0 to >4	4.36
143	A	93	7/10/2019	20:40:07	18	5	14.49	4-3	1	>4	1 to >4	4.96
143	C	93	7/10/2019	20:43:07	18	5	14.49	4-3	1	>4	1 to >4	3.77
143	D	93	7/10/2019	20:44:28	18	5	14.49	4-3	1	>4	1 to >4	4.22
144	A	94	7/10/2019	21:01:21	18	5	14.49	4-3	2	>4	2 to >4	4.68
144	B	94	7/10/2019	21:02:44	18	5	14.49	4-3	2	>4	2 to >4	4.05
144	D	94	7/10/2019	21:05:26	18	5	14.49	4-3	1	>4	1 to >4	3.83
145	A	99	7/10/2019	21:23:25	18	5	14.49	4-3	2	>4	2 to >4	5.92
145	B	99	7/10/2019	21:24:42	18	5	14.49	4-3	-1	>4	-1 to >4	5.07
145	C	99	7/10/2019	21:26:12	18	5	14.49	4-3	1	>4	1 to >4	5.41

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146	A	100	7/10/2019	21:43:36	18	5	14.49	4-3	0	>4	0 to >4	4.32
146	B	100	7/10/2019	21:44:51	18	5	14.49	4-3	0	>4	0 to >4	4.32
146	C	100	7/10/2019	21:46:03	18	5	14.49	4-3	0	>4	0 to >4	4.39
147	A	103	7/10/2019	16:00:51	18	5	14.49	3-2	0	>4	0 to >4	3.69
147	B	103	7/10/2019	16:02:02	18	5	14.49	3-2	-1	>4	-1 to >4	4.27
147	C	103	7/10/2019	16:03:17	18	5	14.49	3-2	-1	>4	-1 to >4	5.83
148	A	115	7/10/2019	15:41:02	18	5	14.49	3-2	0	>4	0 to >4	5.88
148	B	115	7/10/2019	15:42:16	18	5	14.49	3-2	-1	>4	-1 to >4	5.53
148	C	115	7/10/2019	15:43:25	18	5	14.49	3-2	-1	>4	-1 to >4	4.32
149	A	111	7/10/2019	15:22:07	18	5	14.49	3-2	0	>4	0 to >4	6.16
149	B	111	7/10/2019	15:23:16	18	5	14.49	3-2	0	>4	0 to >4	6.62
149	D	111	7/10/2019	15:25:55	18	5	14.49	3-2	0	>4	0 to >4	5.25
150	A	111	7/10/2019	14:50:28	18	5	14.49	3-2	-1	>4	-1 to >4	5.49
150	B	111	7/10/2019	14:51:38	18	5	14.49	3-2	0	>4	0 to >4	4.53
150	C	111	7/10/2019	14:52:48	18	5	14.49	3-2	-1	>4	-1 to >4	6.22
151	A	112	7/10/2019	14:30:28	18	5	14.49	2-1	1	>4	1 to >4	5.06
151	B	112	7/10/2019	14:31:55	18	5	14.49	2-1	-1	>4	-1 to >4	5.26
151	D	112	7/10/2019	14:34:25	18	5	14.49	3-2	-1	>4	-1 to >4	4.17
152	A	113	7/10/2019	14:12:10	18	5	14.49	2-1	-1	>4	-1 to >4	5.04
152	B	113	7/10/2019	14:13:28	18	5	14.49	2-1	0	>4	0 to >4	3.75
152	D	113	7/10/2019	14:16:09	18	5	14.49	2-1	-1	>4	-1 to >4	8.08
153	A	117	7/10/2019	13:49:55	18	5	14.49	2-1	0	>4	0 to >4	6.09
153	B	117	7/10/2019	13:51:04	18	5	14.49	2-1	0	>4	0 to >4	4.89
153	C	117	7/10/2019	13:52:15	18	5	14.49	2-1	0	>4	0 to >4	5.95
154	A	121	7/10/2019	13:28:49	18	5	14.49	3-2	0	>4	0 to >4	5.21
154	B	121	7/10/2019	13:30:04	18	5	14.49	3-2	0	>4	0 to >4	5.32
154	C	121	7/10/2019	13:31:28	18	5	14.49	3-2	-1	>4	-1 to >4	6.15
155	A	120	7/10/2019	13:08:12	18	5	14.49	3-2	0	>4	0 to >4	5.20
155	B	120	7/10/2019	13:09:15	18	5	14.49	3-2	0	>4	0 to >4	5.84
155	D	120	7/10/2019	13:11:26	18	5	14.49	3-2	-1	>4	-1 to >4	6.28
156	A	119	7/10/2019	12:47:15	18	5	14.49	3-2	1	>4	1 to >4	5.09
156	B	119	7/10/2019	12:48:21	18	5	14.49	3-2	0	>4	0 to >4	5.06
156	D	119	7/10/2019	12:50:32	18	5	14.49	3-2	0	>4	0 to >4	5.44
157	A	121	7/10/2019	12:21:56	18	5	14.49	2-1	1	>4	1 to >4	6.41

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StationID	Replicate	Water Depth (ft)	Date	Time	Stop Collar Setting (in)	# of Weights (per side)	Image Width (cm)	Grain Size Major Mode (phi)	Grain Size Minimum (phi)	Grain Size Maximum (phi)	Grain Size Range (phi)	Penetration Mean (cm)
157	B	121	7/10/2019	12:22:57	18	5	14.49	2-1	-2	>4	-2 to >4	6.31
157	C	121	7/10/2019	12:24:00	18	5	14.49	2-1	-1	>4	-1 to >4	5.79
REFA_01	A	94	7/13/2019	22:15:50	14	5	14.49	-3 to -2/3-2	-5	>4	-5 to >4	5.72
REFA_01	B	94	7/13/2019	22:17:20	14	5	14.49	-3 to -2/2-1	-4	>4	-4 to >4	6.65
REFA_01	C	94	7/13/2019	22:18:43	14	5	14.49	2-1	-4	>4	-4 to >4	7.26
REFA_02	A	105	7/13/2019	21:21:27	14	5	14.49	2-1/3-2	-4	>4	-4 to >4	6.34
REFA_02	B	105	7/13/2019	21:23:07	14	5	14.49	1-0/2-1	-3	>4	-3 to >4	7.99
REFA_02	D	105	7/13/2019	21:26:05	14	5	14.49	1-0/2-1	-5	>4	-5 to >4	7.01
REFA_03	A	101	7/13/2019	21:48:32	14	5	14.49	2-1	-3	>4	-3 to >4	6.36
REFA_03	B	101	7/13/2019	21:50:02	14	5	14.49	-1 to 0/2-1	-3	>4	-3 to >4	7.49
REFA_03	D	101	7/13/2019	21:52:50	14	5	14.49	-3 to -2/2-1	-5	>4	-5 to >4	7.86
REFA_04	A	100	7/13/2019	21:37:46	14	5	14.49	-3 to -2/2-1	-4	>4	-4 to >4	7.81
REFA_04	C	100	7/13/2019	21:41:22	14	5	14.49	2-1	-3	>4	-3 to >4	8.82
REFA_04	D	100	7/13/2019	21:42:54	14	5	14.49	-3 to -2/2-1	-5	>4	-5 to >4	7.51
REFA_05	A	109	7/13/2019	22:00:17	14	5	14.49	-3 to -2/2-1	-4	>4	-4 to >4	8.40
REFA_05	B	109	7/13/2019	22:01:44	14	5	14.49	-3 to -2/2-1	-4	>4	-4 to >4	5.11
REFA_05	C	109	7/13/2019	22:03:11	14	5	14.49	2-1/>4	-3	>4	-3 to >4	8.44
REFB_01	A	77	7/11/2019	5:39:10	18	5	14.49	3-2	1	>4	1 to >4	4.98
REFB_01	B	77	7/11/2019	5:39:55	18	5	14.49	3-2	0	>4	0 to >4	6.37
REFB_01	C	77	7/11/2019	5:41:23	18	5	14.49	3-2	1	>4	1 to >4	5.50
REFB_02	A	75	7/11/2019	5:05:43	18	5	14.49	3-2	0	>4	0 to >4	9.55
REFB_02	B	75	7/11/2019	5:06:26	18	5	14.49	3-2	1	>4	1 to >4	4.94
REFB_02	C	75	7/11/2019	5:07:45	18	5	14.49	3-2	1	>4	1 to >4	4.18
REFB_03	A	75	7/11/2019	5:18:19	18	5	14.49	3-2	1	>4	1 to >4	7.18
REFB_03	B	75	7/11/2019	5:19:01	18	5	14.49	3-2	1	>4	1 to >4	4.99
REFB_03	C	75	7/11/2019	5:19:51	18	5	14.49	3-2	0	>4	0 to >4	6.04
REFB_04	A	76	7/11/2019	5:28:14	18	5	14.49	2-1	0	>4	0 to >4	4.77
REFB_04	D	76	7/11/2019	5:31:01	18	5	14.49	2-1	-3	>4	-3 to >4	4.17
REFB_04	E	76	7/11/2019	5:31:59	18	5	14.49	2-1	-2	>4	-2 to >4	4.31
REFB_05	A	79	7/11/2019	5:47:11	18	5	14.49	3-2	1	>4	1 to >4	4.26
REFB_05	B	79	7/11/2019	5:48:06	18	5	14.49	3-2	0	>4	0 to >4	5.10
REFB_05	C	79	7/11/2019	5:48:55	18	5	14.49	3-2	0	>4	0 to >4	3.97
REFC_01	A	117	7/13/2019	20:24:09	14	5	14.49	3-2	1	>4	1 to >4	5.16
REFC_01	B	117	7/13/2019	20:25:59	14	5	14.49	3-2	1	>4	1 to >4	6.06
REFC_01	D	117	7/13/2019	20:28:51	14	5	14.49	3-2	1	>4	1 to >4	4.70

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StationID	Replicate	Water Depth (ft)	Date	Time	Stop Collar Setting (in)	# of Weights (per side)	Image Width (cm)	Grain Size Major Mode (phi)	Grain Size Minimum (phi)	Grain Size Maximum (phi)	Grain Size Range (phi)	Penetration Mean (cm)
REFC_02	A	117	7/13/2019	20:32:29	14	5	14.49	3-2	0	>4	0 to >4	6.13
REFC_02	B	117	7/13/2019	20:33:51	14	5	14.49	3-2	0	>4	0 to >4	6.01
REFC_02	C	117	7/13/2019	20:35:19	14	5	14.49	3-2	0	>4	0 to >4	5.34
REFC_03	A	119	7/13/2019	19:54:06	14	5	14.49	3-2	0	>4	0 to >4	5.29
REFC_03	B	119	7/13/2019	19:55:33	14	5	14.49	3-2	0	>4	0 to >4	4.41
REFC_03	D	119	7/13/2019	19:58:19	14	5	14.49	3-2	1	>4	1 to >4	5.73
REFC_04	A	114	7/13/2019	20:12:44	14	5	14.49	3-2	1	>4	1 to >4	7.13
REFC_04	B	114	7/13/2019	20:14:14	14	5	14.49	3-2	2	>4	2 to >4	8.14
REFC_04	C	114	7/13/2019	20:15:36	14	5	14.49	3-2/4-3	1	>4	1 to >4	6.83
REFC_05	A	115	7/13/2019	20:03:58	14	5	14.49	3-2	0	>4	0 to >4	7.12
REFC_05	B	115	7/13/2019	20:05:24	14	5	14.49	3-2	1	>4	1 to >4	6.47
REFC_05	C	115	7/13/2019	20:06:57	14	5	14.49	3-2	1	>4	1 to >4	7.18

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StationID	Replicate	Water Depth (ft)	Date	Time	Penetration Minimum (cm)	Penetration Maximum (cm)	Over-penetration?	Boundary Roughness (cm)	aRPD Mean (cm)	aRPD > Pen	Methane Present?	Low DO Present?	Sediment Oxygen Demand	Beggiatoa Present?
001	A	53	7/14/2019	3:35:07	1.02	1.80	No	0.78	IND	FALSE	No	No	Low	No
001	B	53	7/14/2019	3:35:52	1.44	3.06	No	1.62	IND	FALSE	No	No	Low	No
001	C	53	7/14/2019	3:36:37	1.35	3.55	No	2.21	IND	FALSE	No	No	Low	No
002	A	64	7/14/2019	3:13:17	4.53	5.57	No	1.04	IND	FALSE	No	No	Low	No
002	B	64	7/14/2019	3:13:59	4.91	6.60	No	1.70	IND	FALSE	No	No	Low	No
002	C	64	7/14/2019	3:14:39	5.35	6.28	No	0.93	IND	FALSE	No	No	Low	No
003	A	70	7/14/2019	2:50:26	4.76	5.34	No	0.58	IND	FALSE	No	No	Low	No
003	B	70	7/14/2019	2:51:09	4.98	5.62	No	0.64	IND	FALSE	No	No	Low	No
003	C	70	7/14/2019	2:51:44	4.65	6.40	No	1.75	IND	FALSE	No	No	Low	No
004	A	73	7/14/2019	2:28:48	4.74	5.97	No	1.23	IND	FALSE	No	No	Low	No
004	B	73	7/14/2019	2:29:34	4.47	5.50	No	1.02	IND	FALSE	No	No	Low	No
004	C	73	7/14/2019	2:30:15	6.54	8.79	No	2.25	1.38	FALSE	No	No	Low	No
005	A	77	7/14/2019	2:07:20	7.00	10.34	No	3.34	IND	FALSE	No	No	Low	No
005	B	77	7/14/2019	2:08:33	4.94	6.82	No	1.88	IND	FALSE	No	No	Low	No
005	C	77	7/14/2019	2:09:11	7.09	7.76	No	0.67	IND	FALSE	No	No	Low	No
006	A	68	7/14/2019	1:47:08	5.38	6.30	No	0.92	IND	FALSE	No	No	Low	No
006	B	68	7/14/2019	1:47:54	6.30	7.39	No	1.09	IND	FALSE	No	No	Low	No
006	C	68	7/14/2019	1:48:37	6.60	7.55	No	0.95	IND	FALSE	No	No	Low	No
007	A	77	7/14/2019	1:24:24	3.71	5.75	No	2.03	IND	FALSE	No	IND	IND	No
007	B	77	7/14/2019	1:25:05	5.13	6.75	No	1.62	IND	FALSE	No	IND	IND	No
007	C	77	7/14/2019	1:25:47	5.31	6.85	No	1.54	IND	FALSE	No	IND	IND	No
008	B	85	7/14/2019	0:19:10	6.68	7.76	No	1.08	IND	FALSE	No	No	Low	No
008	C	85	7/14/2019	0:19:56	5.18	6.21	No	1.03	IND	FALSE	No	No	Low	No
008	D	85	7/14/2019	0:20:41	5.14	6.66	No	1.51	IND	FALSE	No	No	Low	No
009	A	95	7/13/2019	23:50:13	5.79	7.42	No	1.63	IND	FALSE	No	No	Low	No
009	B	95	7/13/2019	23:51:37	6.20	7.46	No	1.25	IND	FALSE	No	No	Low	No

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StationID	Replicate	Water Depth (ft)	Date	Time	Penetration Minimum (cm)	Penetration Maximum (cm)	Over-penetration?	Boundary Roughness (cm)	aRPD Mean (cm)	aRPD > Pen	Methane Present?	Low DO Present?	Sediment Oxygen Demand	Beggiatoa Present?
009	C	95	7/13/2019	23:53:04	5.97	6.91	No	0.93	IND	FALSE	No	No	Low	No
010	B	116	7/13/2019	23:26:52	6.12	7.93	No	1.82	IND	FALSE	No	No	Low	No
010	C	116	7/13/2019	23:28:16	1.12	4.17	No	3.04	IND	FALSE	No	No	Low	No
010	D	116	7/13/2019	23:29:47	8.30	9.20	No	0.89	1.59	FALSE	No	No	Low	No
011	A	224	7/13/2019	22:56:37	19.74	20.53	No	0.79	1.11	FALSE	No	No	Low	No
011	B	224	7/13/2019	22:58:11	18.75	19.75	No	1.00	1.03	FALSE	No	No	Low	No
011	C	224	7/13/2019	22:59:48	19.64	20.72	No	1.09	1.10	FALSE	No	No	Low	No
012	A	127	7/13/2019	19:29:31	6.59	7.79	No	1.21	1.15	FALSE	No	No	Low	No
012	B	127	7/13/2019	19:31:08	8.28	11.17	No	2.89	1.31	FALSE	No	No	Low	No
012	C	127	7/13/2019	19:32:27	8.68	11.86	No	3.17	IND	FALSE	No	No	Low	No
013	A	111	7/13/2019	19:05:00	7.21	10.98	No	3.77	IND	FALSE	No	No	Low	No
013	B	111	7/13/2019	19:06:42	6.06	7.74	No	1.68	IND	FALSE	No	No	Low	No
013	C	111	7/13/2019	19:08:11	3.81	5.46	No	1.65	IND	FALSE	No	No	Low	No
014	A	117	7/13/2019	18:40:36	5.50	7.18	No	1.67	1.49	FALSE	No	No	Low	No
014	B	117	7/13/2019	18:42:09	4.75	7.70	No	2.95	1.42	FALSE	No	No	Low	No
014	D	117	7/13/2019	18:45:03	5.93	8.14	No	2.21	1.40	FALSE	No	No	Low	No
015	A	109	7/13/2019	18:14:33	5.03	10.15	No	5.12	0.62	FALSE	No	No	Low	No
015	B	109	7/13/2019	18:16:12	6.03	7.16	No	1.13	1.12	FALSE	No	No	Low	No
015	C	109	7/13/2019	18:17:53	5.55	6.44	No	0.89	0.65	FALSE	No	No	Low	No
016	A	95	7/10/2019	19:06:41	3.01	4.00	No	0.99	1.12	FALSE	No	No	Low	No
016	B	95	7/10/2019	19:07:59	4.28	5.41	No	1.13	1.46	FALSE	No	No	Low	No
016	C	95	7/10/2019	19:09:18	4.13	4.58	No	0.45	1.12	FALSE	No	No	Low	No
017	A	93	7/10/2019	18:46:29	6.69	7.40	No	0.71	1.22	FALSE	No	No	Low	No
017	B	93	7/10/2019	18:47:44	4.86	5.54	No	0.68	1.30	FALSE	No	No	Low	No
017	D	93	7/10/2019	18:50:11	3.66	4.24	No	0.59	1.03	FALSE	No	No	Low	No
018	A	90	7/10/2019	18:25:08	5.71	6.73	No	1.02	0.96	FALSE	No	No	Low	No
018	B	90	7/10/2019	18:26:34	3.57	4.15	No	0.58	0.95	FALSE	No	No	Low	No
018	C	90	7/10/2019	18:27:53	4.28	4.82	No	0.54	1.27	FALSE	No	No	Low	No
019	A	97	7/10/2019	18:03:03	5.30	5.72	No	0.42	1.28	FALSE	No	No	Low	No

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StationID	Replicate	Water Depth (ft)	Date	Time	Penetration Minimum (cm)	Penetration Maximum (cm)	Over-penetration?	Boundary Roughness (cm)	aRPD Mean (cm)	aRPD > Pen	Methane Present?	Low DO Present?	Sediment Oxygen Demand	Beggiatoa Present?
019	B	97	7/10/2019	18:04:10	2.96	5.54	No	2.59	0.36	FALSE	No	No	Low	No
019	C	97	7/10/2019	18:05:19	15.40	15.80	No	0.40	0.92	FALSE	No	No	Low	No
020	A	92	7/10/2019	17:42:53	1.07	6.00	No	4.93	1.92	TRUE	No	No	Low	No
020	B	92	7/10/2019	17:44:34	3.45	4.07	No	0.62	0.81	FALSE	No	No	Low	No
020	C	92	7/10/2019	17:45:55	3.93	4.60	No	0.67	0.85	FALSE	No	No	Low	No
021	A	97	7/10/2019	22:18:09	5.24	5.62	No	0.38	0.75	FALSE	No	No	Low	No
021	B	97	7/10/2019	22:19:30	4.65	5.90	No	1.25	1.01	FALSE	No	No	Low	No
021	D	97	7/10/2019	22:22:06	4.97	5.89	No	0.92	1.23	FALSE	No	No	Low	No
022	A	95	7/10/2019	22:37:29	3.33	4.75	No	1.42	0.64	FALSE	No	No	Low	No
022	B	95	7/10/2019	22:38:46	6.27	6.76	No	0.49	1.11	FALSE	No	No	Low	No
022	C	95	7/10/2019	22:40:01	0.00	7.56	No	7.56	IND	FALSE	No	No	Low	No
023	A	91	7/10/2019	22:57:17	4.39	5.24	No	0.85	0.62	FALSE	No	No	Low	No
023	B	91	7/10/2019	22:58:43	5.53	6.91	No	1.38	0.91	FALSE	No	No	Low	No
023	D	91	7/10/2019	23:01:14	3.94	6.53	No	2.59	0.94	FALSE	No	No	Low	No
024	A	97	7/10/2019	23:16:48	4.52	5.01	No	0.49	0.31	FALSE	No	No	Low	No
024	B	97	7/10/2019	23:18:16	4.45	6.48	No	2.03	0.91	FALSE	No	No	Low	No
024	C	97	7/10/2019	23:19:35	4.94	5.49	No	0.54	0.95	FALSE	No	No	Low	No
025	A	102	7/11/2019	0:56:36	4.68	5.41	No	0.73	IND	FALSE	No	No	Low	No
025	B	102	7/11/2019	0:57:20	4.88	5.41	No	0.53	0.81	FALSE	No	No	Low	No
025	D	102	7/11/2019	0:59:04	4.74	6.17	No	1.42	2.18	FALSE	No	No	Low	No
026	C	98	7/11/2019	2:19:45	4.18	4.61	No	0.42	1.04	FALSE	No	No	Low	No
026	F	98	7/11/2019	2:22:09	2.71	4.55	No	1.84	1.12	FALSE	No	No	Low	No
026	G	98	7/11/2019	2:23:01	5.46	6.36	No	0.90	1.12	FALSE	No	No	Low	No
027	A	97	7/11/2019	10:38:45	4.03	4.53	No	0.50	0.89	FALSE	No	No	Low	No
027	B	97	7/11/2019	10:39:29	3.57	5.02	No	1.46	0.44	FALSE	No	No	Low	No
027	C	97	7/11/2019	10:40:15	3.47	4.26	No	0.79	0.85	FALSE	No	No	Low	No
028	A	88	7/11/2019	10:56:17	3.62	5.96	No	2.34	0.97	FALSE	No	No	Low	No
028	B	88	7/11/2019	10:57:12	4.58	5.22	No	0.64	0.81	FALSE	No	No	Low	No
028	C	88	7/11/2019	10:57:55	4.04	4.58	No	0.53	0.77	FALSE	No	No	Low	No
029	A	89	7/11/2019	11:14:45	4.38	5.54	No	1.16	0.53	FALSE	No	No	Low	No
029	B	89	7/11/2019	11:15:25	3.67	4.03	No	0.36	1.02	FALSE	No	No	Low	No
029	C	89	7/11/2019	11:16:09	4.53	5.53	No	1.00	1.14	FALSE	No	No	Low	No
030	A	123	7/10/2019	3:03:41	5.58	6.38	No	0.80	1.15	FALSE	No	No	Low	No

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030	C	123	7/10/2019	3:08:14	4.78	6.63	No	1.85	0.70	FALSE	No	No	Low	No
030	D	123	7/10/2019	3:10:00	5.25	6.32	No	1.07	1.30	FALSE	No	No	Low	No
031	A	117	7/10/2019	4:07:40	5.96	7.28	No	1.32	0.85	FALSE	No	No	Low	No
031	B	117	7/10/2019	4:08:49	5.49	6.01	No	0.52	0.82	FALSE	No	No	Low	No
031	C	117	7/10/2019	4:09:53	5.19	6.26	No	1.07	IND	FALSE	No	No	Low	No
032	A	118	7/10/2019	4:43:15	4.94	5.47	No	0.53	0.78	FALSE	No	No	Low	No
032	B	118	7/10/2019	4:44:10	5.30	6.10	No	0.80	0.99	FALSE	No	No	Low	No
032	D	118	7/10/2019	4:46:32	6.13	7.16	No	1.02	0.63	FALSE	No	No	Low	No
033	A	110	7/10/2019	5:34:24	6.79	7.05	No	0.26	0.87	FALSE	No	No	Low	No
033	B	110	7/10/2019	5:35:18	4.46	5.14	No	0.68	0.42	FALSE	No	No	Low	No
033	C	110	7/10/2019	5:36:36	5.37	6.84	No	1.47	0.86	FALSE	No	No	Low	No
034	A	109	7/10/2019	6:02:04	5.70	6.38	No	0.68	1.40	FALSE	No	No	Low	No
034	B	109	7/10/2019	6:03:02	4.98	6.02	No	1.04	0.93	FALSE	No	No	Low	No
034	C	109	7/10/2019	6:06:15	5.10	5.50	No	0.40	0.69	FALSE	No	No	Low	No
035	A	110	7/10/2019	6:34:32	4.86	6.91	No	2.05	0.79	FALSE	No	No	Low	No
035	B	110	7/10/2019	6:35:21	6.26	6.57	No	0.32	1.05	FALSE	No	No	Low	No
035	C	110	7/10/2019	6:37:41	5.71	6.20	No	0.49	1.31	FALSE	No	No	Low	No
036	A	100	7/10/2019	6:58:52	6.52	7.51	No	0.99	IND	FALSE	No	No	Low	No
036	B	100	7/10/2019	6:59:53	4.62	5.59	No	0.97	IND	FALSE	No	No	Low	No
036	C	100	7/10/2019	7:00:48	6.53	6.79	No	0.26	IND	FALSE	No	No	Low	No
037	A	105	7/10/2019	7:20:11	5.52	6.19	No	0.67	IND	FALSE	No	No	Low	No
037	C	105	7/10/2019	7:21:57	5.71	6.21	No	0.50	IND	FALSE	No	No	Low	No
037	D	105	7/10/2019	7:23:19	6.00	6.76	No	0.76	IND	FALSE	No	No	Low	No
038	A	100	7/10/2019	7:44:15	5.88	6.41	No	0.52	0.86	FALSE	No	No	Low	No
038	B	100	7/10/2019	7:45:05	5.96	6.28	No	0.32	1.04	FALSE	No	No	Low	No
038	C	100	7/10/2019	7:45:58	6.42	7.12	No	0.70	0.68	FALSE	No	No	Low	No
039	A	98	7/10/2019	8:08:38	3.89	4.50	No	0.61	0.52	FALSE	No	No	Low	No
039	B	98	7/10/2019	8:10:15	5.04	5.99	No	0.94	1.07	FALSE	No	No	Low	No
039	C	98	7/10/2019	8:11:11	5.70	6.96	No	1.26	0.83	FALSE	No	No	Low	No
040	A	98	7/10/2019	8:31:56	6.43	7.10	No	0.66	1.37	FALSE	No	No	Low	No

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StationID	Replicate	Water Depth (ft)	Date	Time	Penetration Minimum (cm)	Penetration Maximum (cm)	Over-penetration?	Boundary Roughness (cm)	aRPD Mean (cm)	aRPD > Pen	Methane Present?	Low DO Present?	Sediment Oxygen Demand	Beggiatoa Present?
040	B	98	7/10/2019	8:32:46	4.82	7.34	No	2.52	0.41	FALSE	No	No	Low	No
040	C	98	7/10/2019	8:33:34	5.54	6.42	No	0.88	0.32	FALSE	No	No	Low	No
041	A	96	7/10/2019	8:53:58	5.92	6.50	No	0.58	0.97	FALSE	No	No	Low	No
041	B	96	7/10/2019	8:54:40	5.21	5.92	No	0.72	1.14	FALSE	No	No	Low	No
041	C	96	7/10/2019	8:55:27	5.56	5.95	No	0.39	0.75	FALSE	No	No	Low	No
042	A	94	7/10/2019	9:16:46	7.39	9.64	No	2.25	0.96	FALSE	No	No	Low	No
042	B	94	7/10/2019	9:18:32	5.01	5.63	No	0.62	1.04	FALSE	No	No	Low	No
042	C	94	7/10/2019	9:19:18	9.88	11.77	No	1.89	0.74	FALSE	No	No	Low	No
043	A	88	7/11/2019	11:29:09	4.00	5.04	No	1.04	1.24	FALSE	No	No	Low	No
043	B	88	7/11/2019	11:30:01	3.34	5.36	No	2.02	0.92	FALSE	No	No	Low	No
043	C	88	7/11/2019	11:30:49	3.97	4.60	No	0.63	0.45	FALSE	No	No	Low	No
044	A	87	7/11/2019	11:46:59	5.15	5.47	No	0.32	IND	FALSE	No	No	Low	No
044	B	87	7/11/2019	11:47:46	3.57	5.54	No	1.97	IND	FALSE	No	No	Low	No
044	C	87	7/11/2019	11:49:02	4.80	5.34	No	0.54	1.08	FALSE	No	No	Low	No
045	A	83	7/11/2019	12:07:17	4.21	5.66	No	1.46	0.93	FALSE	No	No	Low	No
045	B	83	7/11/2019	12:08:50	3.42	5.52	No	2.10	IND	FALSE	No	No	Low	No
045	C	83	7/11/2019	12:10:01	3.50	4.51	No	1.01	IND	FALSE	No	No	Low	No
046	A	84	7/11/2019	19:50:44	2.95	4.10	No	1.15	IND	FALSE	No	No	Low	No
046	B	84	7/11/2019	19:52:00	4.57	5.24	No	0.66	IND	FALSE	No	No	Low	No
046	D	84	7/11/2019	19:54:26	3.88	4.99	No	1.11	IND	FALSE	No	No	Low	No
047	A	81	7/11/2019	19:22:37	3.23	3.93	No	0.70	0.64	FALSE	No	No	Low	No
047	D	81	7/11/2019	19:26:29	4.24	5.12	No	0.88	1.27	FALSE	No	No	Low	No
047	E	81	7/11/2019	19:30:59	3.62	5.14	No	1.52	1.14	FALSE	No	No	Low	No
048	A	77	7/11/2019	12:24:14	3.69	4.02	No	0.33	IND	FALSE	No	No	Low	No
048	B	77	7/11/2019	12:25:30	3.39	4.48	No	1.09	IND	FALSE	No	No	Low	No
048	C	77	7/11/2019	12:26:48	3.77	4.97	No	1.20	0.58	FALSE	No	No	Low	No
049	A	87	7/11/2019	12:41:42	5.47	6.62	No	1.15	0.73	FALSE	No	No	Low	No
049	B	87	7/11/2019	12:42:56	11.81	12.28	No	0.47	0.76	FALSE	No	No	Low	No
049	D	87	7/11/2019	12:45:22	12.24	13.27	No	1.03	0.78	FALSE	No	No	Low	No
050	A	87	7/11/2019	12:59:30	0.00	0.00	No	IND	IND	FALSE	IND	IND	IND	IND
050	B	87	7/11/2019	13:00:47	0.00	0.00	No	IND	IND	FALSE	IND	IND	IND	IND

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StationID	Replicate	Water Depth (ft)	Date	Time	Penetration Minimum (cm)	Penetration Maximum (cm)	Over-penetration?	Boundary Roughness (cm)	aRPD Mean (cm)	aRPD > Pen	Methane Present?	Low DO Present?	Sediment Oxygen Demand	Beggiatoa Present?
050	C	87	7/11/2019	13:01:55	6.61	7.59	No	0.98	IND	FALSE	No	No	Low	No
051	A	84	7/11/2019	13:18:11	6.86	7.45	No	0.59	IND	FALSE	No	No	Low	No
051	C	84	7/11/2019	13:20:36	8.37	9.54	No	1.17	IND	FALSE	No	No	Low	No
051	D	84	7/11/2019	13:21:50	6.15	7.82	No	1.67	IND	FALSE	No	No	Low	No
052	B	77	7/11/2019	14:07:38	4.80	5.42	No	0.62	IND	FALSE	No	No	Low	No
052	C	77	7/11/2019	14:08:53	5.29	5.79	No	0.49	0.75	FALSE	No	No	Low	No
052	D	77	7/11/2019	14:10:04	3.36	4.46	No	1.11	IND	FALSE	No	No	Low	No
053	A	72	7/12/2019	20:56:30	4.36	5.55	No	1.20	1.06	FALSE	No	No	Low	No
053	B	72	7/12/2019	20:58:18	3.70	5.21	No	1.51	0.56	FALSE	No	No	Low	No
053	D	72	7/12/2019	21:01:13	4.16	4.69	No	0.53	0.80	FALSE	No	No	Low	No
054	A	72	7/12/2019	21:19:09	2.19	3.08	No	0.89	IND	FALSE	No	No	Low	No
054	B	72	7/12/2019	21:20:18	4.07	5.24	No	1.16	IND	FALSE	No	No	Low	No
054	C	72	7/12/2019	21:22:01	6.09	7.21	No	1.12	IND	FALSE	No	No	Low	No
055	A	73	7/12/2019	23:58:30	6.83	7.84	No	1.01	IND	FALSE	No	No	Low	No
055	B	73	7/13/2019	0:00:04	3.99	5.64	No	1.65	IND	FALSE	No	No	Low	No
055	C	73	7/13/2019	0:01:35	4.06	5.13	No	1.08	IND	FALSE	No	No	Low	No
056	A	81	7/13/2019	0:21:54	4.73	6.05	No	1.32	1.38	FALSE	No	No	Low	No
056	B	81	7/13/2019	0:22:57	5.76	6.62	No	0.86	0.85	FALSE	No	No	Low	No
056	C	81	7/13/2019	0:23:37	4.89	6.07	No	1.17	0.86	FALSE	No	No	Low	No
057	A	86	7/13/2019	0:44:08	6.40	7.03	No	0.63	1.05	FALSE	No	No	Low	No
057	B	86	7/13/2019	0:44:50	8.92	9.43	No	0.51	0.96	FALSE	No	No	Low	No
057	C	86	7/13/2019	0:45:32	5.64	6.84	No	1.20	1.01	FALSE	No	No	Low	No
058	A	91	7/13/2019	1:07:56	6.17	6.91	No	0.74	1.12	FALSE	No	No	Low	No
058	C	91	7/13/2019	1:09:21	7.18	8.09	No	0.90	0.93	FALSE	No	No	Low	No
058	D	91	7/13/2019	1:09:58	5.21	8.53	No	3.32	IND	FALSE	No	No	Low	No
059	A	95	7/13/2019	1:29:36	8.22	9.43	No	1.22	0.69	FALSE	No	No	Low	No
059	B	95	7/13/2019	1:30:21	9.29	10.22	No	0.92	0.97	FALSE	No	No	Low	No
059	C	95	7/13/2019	1:31:00	7.91	9.09	No	1.17	1.17	FALSE	No	No	Low	No
060	A	95	7/13/2019	1:54:25	4.99	6.62	No	1.63	0.66	FALSE	No	No	Low	No
060	B	95	7/13/2019	1:55:03	7.27	8.52	No	1.25	1.36	FALSE	No	No	Low	No

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StationID	Replicate	Water Depth (ft)	Date	Time	Penetration Minimum (cm)	Penetration Maximum (cm)	Over-penetration?	Boundary Roughness (cm)	aRPD Mean (cm)	aRPD > Pen	Methane Present?	Low DO Present?	Sediment Oxygen Demand	Beggiatoa Present?
060	C	95	7/13/2019	1:55:45	7.39	9.69	No	2.30	1.22	FALSE	No	No	Low	No
061	A	91	7/13/2019	2:18:35	7.82	10.29	No	2.48	0.92	FALSE	No	No	Low	No
061	B	91	7/13/2019	2:19:17	7.57	8.55	No	0.99	0.93	FALSE	No	No	Low	No
061	C	91	7/13/2019	2:20:00	7.81	8.52	No	0.71	0.89	FALSE	No	No	Low	No
062	A	87	7/13/2019	2:40:14	5.70	7.64	No	1.95	1.58	FALSE	No	No	Low	No
062	B	87	7/13/2019	2:41:00	2.75	7.11	No	4.36	0.98	FALSE	No	No	Low	No
062	D	87	7/13/2019	2:42:24	5.97	7.68	No	1.71	0.88	FALSE	No	No	Low	No
063	B	74	7/11/2019	18:32:06	3.61	3.95	No	0.34	0.97	FALSE	No	No	Low	No
063	C	74	7/11/2019	18:33:16	4.17	4.76	No	0.59	1.67	FALSE	No	No	Low	No
063	D	74	7/11/2019	18:34:28	2.47	3.62	No	1.15	0.44	FALSE	No	No	Low	No
064	A	72	7/11/2019	17:43:40	3.51	3.91	No	0.39	0.93	FALSE	No	No	Low	No
064	B	72	7/11/2019	17:45:19	3.15	3.86	No	0.71	0.75	FALSE	No	No	Low	No
064	C	72	7/11/2019	17:46:35	2.65	3.31	No	0.66	0.76	FALSE	No	No	Low	No
065	A	77	7/11/2019	16:59:10	4.26	4.93	No	0.67	0.92	FALSE	No	No	Low	No
065	B	77	7/11/2019	17:00:25	3.64	4.66	No	1.01	1.01	FALSE	No	No	Low	No
065	C	77	7/11/2019	17:01:35	3.58	4.41	No	0.83	1.27	FALSE	No	No	Low	No
066	A	82	7/11/2019	16:38:10	3.09	4.28	No	1.20	1.14	FALSE	No	No	Low	No
066	B	82	7/11/2019	16:39:40	2.51	3.42	No	0.91	0.83	FALSE	No	No	Low	No
066	C	82	7/11/2019	16:41:02	4.07	4.53	No	0.46	IND	FALSE	No	No	Low	No
067	A	77	7/11/2019	16:18:44	4.68	5.62	No	0.93	0.95	FALSE	No	No	Low	No
067	B	77	7/11/2019	16:20:01	5.78	6.32	No	0.53	0.97	FALSE	No	No	Low	No
067	D	77	7/11/2019	16:22:36	4.35	5.34	No	0.99	0.94	FALSE	No	No	Low	No
068	A	70	7/11/2019	16:00:31	6.42	7.96	No	1.54	IND	FALSE	No	No	Low	No
068	B	70	7/11/2019	16:01:52	4.92	6.05	No	1.13	IND	FALSE	No	No	Low	No
068	C	70	7/11/2019	16:03:01	6.42	7.47	No	1.05	IND	FALSE	No	No	Low	No
069	A	70	7/11/2019	15:41:06	4.11	5.05	No	0.93	IND	FALSE	No	No	Low	No
069	B	70	7/11/2019	15:42:37	5.33	6.55	No	1.22	IND	FALSE	No	No	Low	No
069	C	70	7/11/2019	15:43:54	4.91	5.60	No	0.70	IND	FALSE	No	No	Low	No
070	A	76	7/12/2019	20:11:06	5.84	7.12	No	1.28	IND	FALSE	No	No	Low	No
070	B	76	7/12/2019	20:12:35	4.94	6.45	No	1.51	1.01	FALSE	No	No	Low	No
070	C	76	7/12/2019	20:14:05	3.39	4.12	No	0.73	0.94	FALSE	No	No	Low	No

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StationID	Replicate	Water Depth (ft)	Date	Time	Penetration Minimum (cm)	Penetration Maximum (cm)	Over-penetration?	Boundary Roughness (cm)	aRPD Mean (cm)	aRPD > Pen	Methane Present?	Low DO Present?	Sediment Oxygen Demand	Beggiatoa Present?
071	A	71	7/12/2019	19:52:58	5.12	5.87	No	0.75	1.03	FALSE	No	No	Low	No
071	B	71	7/12/2019	19:54:29	4.96	7.46	No	2.50	1.35	FALSE	No	No	Low	No
071	C	71	7/12/2019	19:55:58	5.76	6.50	No	0.74	1.27	FALSE	No	No	Low	No
072	A	74	7/12/2019	19:35:07	3.00	3.72	No	0.72	1.35	FALSE	No	No	Low	No
072	C	74	7/12/2019	19:38:13	2.58	4.25	No	1.67	1.18	FALSE	No	No	Low	No
072	D	74	7/12/2019	19:39:50	2.17	3.99	No	1.82	0.81	FALSE	No	No	Low	No
073	A	81	7/12/2019	19:18:07	4.23	5.24	No	1.01	1.22	FALSE	No	No	Low	No
073	B	81	7/12/2019	19:19:37	3.92	4.59	No	0.67	0.54	FALSE	No	No	Low	No
073	C	81	7/12/2019	19:21:06	4.23	5.12	No	0.89	0.91	FALSE	No	No	Low	No
074	E	86	7/12/2019	18:59:48	5.01	6.32	No	1.32	0.97	FALSE	No	No	Low	No
074	F	86	7/12/2019	19:01:27	5.31	6.35	No	1.04	0.42	FALSE	No	No	Low	No
074	G	86	7/12/2019	19:03:13	5.30	5.68	No	0.38	0.56	FALSE	No	No	Low	No
075	A	91	7/12/2019	18:25:31	10.05	10.54	No	0.49	1.33	FALSE	No	No	Low	No
075	B	91	7/12/2019	18:27:03	11.00	11.57	No	0.57	0.98	FALSE	No	No	Low	No
075	D	91	7/12/2019	18:30:09	9.59	10.75	No	1.17	0.89	FALSE	No	No	Low	No
076	A	90	7/12/2019	17:52:40	5.14	5.90	No	0.76	0.69	FALSE	No	No	Low	No
076	B	90	7/12/2019	17:54:19	4.36	6.80	No	2.45	0.96	FALSE	No	No	Low	No
076	C	90	7/12/2019	17:55:52	4.89	5.54	No	0.65	1.03	FALSE	No	No	Low	No
077	A	86	7/12/2019	17:32:45	8.07	8.57	No	0.50	0.94	FALSE	No	No	Low	No
077	C	86	7/12/2019	17:35:47	8.76	9.55	No	0.79	0.92	FALSE	No	No	Low	No
077	D	86	7/12/2019	17:37:23	8.27	10.30	No	2.03	0.86	FALSE	No	No	Low	No
078	A	77	7/11/2019	18:45:32	3.89	5.08	No	1.20	IND	FALSE	No	No	Low	No
078	B	77	7/11/2019	18:47:03	4.61	6.24	No	1.63	0.88	FALSE	No	No	Low	No
078	C	77	7/11/2019	18:48:15	3.75	4.70	No	0.95	0.45	FALSE	No	No	Low	No
079	A	80	7/12/2019	4:58:21	3.70	5.53	No	1.83	IND	FALSE	No	No	Low	No
079	C	80	7/12/2019	5:00:02	3.36	4.65	No	1.29	1.45	FALSE	No	No	Low	No
079	D	80	7/12/2019	5:00:41	3.12	4.41	No	1.29	IND	FALSE	No	No	Low	No
080	A	69	7/12/2019	5:40:46	3.81	4.87	No	1.05	IND	FALSE	No	No	Low	No
080	B	69	7/12/2019	5:41:36	5.03	6.06	No	1.03	IND	FALSE	No	No	Low	No
080	C	69	7/12/2019	5:42:16	5.43	5.96	No	0.52	1.21	FALSE	No	No	Low	No
081	A	83	7/11/2019	19:02:31	4.94	5.79	No	0.85	1.70	FALSE	No	No	Low	No
081	B	83	7/11/2019	19:04:06	4.80	5.97	No	1.17	1.49	FALSE	No	No	Low	No
081	C	83	7/11/2019	19:05:18	8.59	9.49	No	0.90	2.41	FALSE	No	No	Low	No

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082	A	76	7/12/2019	4:18:26	5.23	6.87	No	1.63	1.47	FALSE	No	No	Low	No
082	B	76	7/12/2019	4:19:26	4.77	5.45	No	0.67	IND	FALSE	No	No	Low	No
082	C	76	7/12/2019	4:20:13	4.12	4.84	No	0.73	0.61	FALSE	No	No	Low	No
083	A	76	7/12/2019	5:26:07	7.26	8.22	No	0.96	1.35	FALSE	No	No	Low	No
083	B	76	7/12/2019	5:26:53	7.30	8.10	No	0.79	0.92	FALSE	No	No	Low	No
083	C	76	7/12/2019	5:27:38	8.07	9.32	No	1.25	0.54	FALSE	No	No	Low	No
084	A	62	7/12/2019	6:00:34	4.80	5.66	No	0.86	IND	FALSE	No	No	Low	No
084	B	62	7/12/2019	6:01:18	3.21	4.17	No	0.97	0.89	FALSE	No	No	Low	No
084	D	62	7/12/2019	6:02:46	3.26	3.78	No	0.52	1.03	FALSE	No	No	Low	No
085	A	66	7/12/2019	6:43:18	5.67	6.60	No	0.92	0.79	FALSE	No	No	Low	No
085	B	66	7/12/2019	6:44:11	4.98	5.79	No	0.80	1.13	FALSE	No	No	Low	No
085	C	66	7/12/2019	6:44:52	5.20	5.96	No	0.76	0.55	FALSE	No	No	Low	No
086	A	51	7/12/2019	7:17:44	4.58	5.37	No	0.79	0.91	FALSE	No	No	Low	No
086	B	51	7/12/2019	7:18:40	4.50	5.05	No	0.54	1.64	FALSE	No	No	Low	No
086	C	51	7/12/2019	7:19:32	4.88	5.87	No	0.99	1.41	FALSE	No	No	Low	No
087	A	43	7/12/2019	7:36:28	3.94	6.18	No	2.24	1.54	FALSE	No	No	Low	No
087	B	43	7/12/2019	7:37:49	1.91	5.29	No	3.38	IND	FALSE	No	No	Low	No
087	C	43	7/12/2019	7:38:29	2.64	4.63	No	1.99	0.80	FALSE	No	No	Low	No
088	A	36	7/12/2019	7:57:05	2.91	6.33	No	3.42	IND	FALSE	No	No	Low	No
088	B	36	7/12/2019	7:57:56	5.79	7.41	No	1.62	IND	FALSE	No	No	Low	No
088	C	36	7/12/2019	7:58:42	4.51	7.82	No	3.32	IND	FALSE	No	No	Low	No
089	A	80	7/13/2019	3:52:00	6.52	9.49	No	2.97	1.40	FALSE	No	No	Low	No
089	B	80	7/13/2019	3:53:27	4.14	5.64	No	1.50	0.79	FALSE	No	No	Low	No
089	C	80	7/13/2019	3:54:15	6.63	7.43	No	0.80	1.07	FALSE	No	No	Low	No
090	A	70	7/13/2019	4:14:36	5.63	6.28	No	0.66	0.77	FALSE	No	No	Low	No
090	B	70	7/13/2019	4:15:15	3.96	5.76	No	1.80	0.86	FALSE	No	No	Low	No
090	D	70	7/13/2019	4:16:41	4.57	5.53	No	0.96	0.97	FALSE	No	No	Low	No
091	A	60	7/13/2019	4:36:55	3.35	4.90	No	1.55	1.12	FALSE	No	No	Low	No
091	B	60	7/13/2019	4:37:35	4.26	5.27	No	1.01	0.94	FALSE	No	No	Low	No
091	C	60	7/13/2019	4:38:24	3.64	5.11	No	1.47	0.98	FALSE	No	No	Low	No
092	A	55	7/13/2019	4:56:43	2.50	3.71	No	1.21	0.97	FALSE	No	No	Low	No
092	C	55	7/13/2019	4:58:05	3.54	4.21	No	0.67	0.98	FALSE	No	No	Low	No
092	D	55	7/13/2019	4:58:53	3.11	4.60	No	1.49	0.94	FALSE	No	No	Low	No
093	B	44	7/13/2019	5:20:32	3.24	5.36	No	2.12	1.28	FALSE	No	No	Low	No
093	C	44	7/13/2019	5:21:16	2.78	5.02	No	2.24	2.15	FALSE	No	No	Low	No

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StationID	Replicate	Water Depth (ft)	Date	Time	Penetration Minimum (cm)	Penetration Maximum (cm)	Over-penetration?	Boundary Roughness (cm)	aRPD Mean (cm)	aRPD > Pen	Methane Present?	Low DO Present?	Sediment Oxygen Demand	Beggiatoa Present?
093	D	44	7/13/2019	5:22:08	1.83	2.99	No	1.16	1.50	FALSE	No	No	Low	No
094	B	44	7/13/2019	5:40:18	3.39	4.99	No	1.60	IND	FALSE	No	No	Low	No
094	C	44	7/13/2019	5:41:05	3.30	7.26	No	3.97	IND	FALSE	No	No	Low	No
094	D	44	7/13/2019	5:41:45	3.89	5.32	No	1.42	IND	FALSE	No	No	Low	No
095	A	30	7/13/2019	6:01:06	4.78	6.65	No	1.87	IND	FALSE	No	No	Low	No
095	B	30	7/13/2019	6:01:48	6.10	6.90	No	0.80	IND	FALSE	No	No	Low	No
095	C	30	7/13/2019	6:02:29	5.17	6.34	No	1.16	IND	FALSE	No	No	Low	No
096	A	23	7/13/2019	6:17:32	3.88	5.52	No	1.64	IND	FALSE	No	No	Low	No
096	B	23	7/13/2019	6:18:21	4.22	7.32	No	3.10	IND	FALSE	No	No	Low	No
096	D	23	7/13/2019	6:19:41	4.84	5.98	No	1.14	IND	FALSE	No	No	Low	No
097	A	33	7/13/2019	6:36:47	1.92	5.17	No	3.25	IND	FALSE	No	No	Low	No
097	B	33	7/13/2019	6:37:24	5.33	6.49	No	1.15	IND	FALSE	No	No	Low	No
097	C	33	7/13/2019	6:38:01	4.23	6.25	No	2.02	IND	FALSE	No	No	Low	No
098	A	58	7/12/2019	6:15:43	4.11	5.05	No	0.93	1.02	FALSE	No	No	Low	No
098	B	58	7/12/2019	6:16:17	2.93	3.64	No	0.72	0.99	FALSE	No	No	Low	No
098	C	58	7/12/2019	6:17:11	4.09	5.50	No	1.41	0.34	FALSE	No	No	Low	No
099	A	58	7/12/2019	10:08:35	4.43	5.17	No	0.74	IND	TRUE	No	No	Low	No
099	B	58	7/12/2019	10:09:14	3.36	5.13	No	1.77	IND	TRUE	No	No	Low	No
099	C	58	7/12/2019	10:10:41	4.69	5.53	No	0.84	4.24	FALSE	No	No	Low	No
100	A	50	7/12/2019	10:30:47	4.60	6.24	No	1.64	4.01	FALSE	No	No	Low	No
100	B	50	7/12/2019	10:31:36	3.04	4.08	No	1.03	2.05	FALSE	No	No	Low	No
100	C	50	7/12/2019	10:32:24	3.98	5.49	No	1.51	2.75	FALSE	No	No	Low	No
101	A	48	7/12/2019	10:51:43	2.22	4.66	No	2.45	2.56	FALSE	No	No	Low	No
101	B	48	7/12/2019	10:52:49	3.76	5.23	No	1.47	3.09	FALSE	No	No	Low	No
101	C	48	7/12/2019	10:53:31	3.05	4.20	No	1.15	1.99	FALSE	No	No	Low	No
102	A	57	7/12/2019	6:28:02	5.57	6.29	No	0.72	3.01	FALSE	No	No	Low	No
102	B	57	7/12/2019	6:28:59	4.42	6.20	No	1.78	2.69	FALSE	No	No	Low	No
102	C	57	7/12/2019	6:29:45	5.11	6.18	No	1.08	3.46	FALSE	No	No	Low	No
103	A	56	7/12/2019	7:03:33	3.55	5.11	No	1.57	2.17	FALSE	No	No	Low	No

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StationID	Replicate	Water Depth (ft)	Date	Time	Penetration Minimum (cm)	Penetration Maximum (cm)	Over-penetration?	Boundary Roughness (cm)	aRPD Mean (cm)	aRPD > Pen	Methane Present?	Low DO Present?	Sediment Oxygen Demand	Beggiatoa Present?
103	B	56	7/12/2019	7:04:15	2.53	4.23	No	1.71	1.91	FALSE	No	No	Low	No
103	C	56	7/12/2019	7:04:58	2.74	3.25	No	0.51	1.62	FALSE	No	No	Low	No
104	A	45	7/12/2019	9:37:06	4.76	6.20	No	1.43	2.94	FALSE	No	No	Low	No
104	B	45	7/12/2019	9:39:14	2.28	4.88	No	2.60	1.75	FALSE	No	No	Low	No
104	C	45	7/12/2019	9:40:07	3.37	5.92	No	2.55	2.12	FALSE	No	No	Low	No
105	A	37	7/12/2019	9:18:13	1.92	2.84	No	0.92	IND	TRUE	No	No	Low	No
105	B	37	7/12/2019	9:19:20	3.32	4.68	No	1.36	IND	TRUE	No	No	Low	No
105	C	37	7/12/2019	9:20:09	2.91	4.79	No	1.88	IND	TRUE	No	No	Low	No
106	A	32	7/12/2019	8:47:48	4.88	8.96	No	4.08	5.28	FALSE	No	No	Low	No
106	B	32	7/12/2019	8:48:38	4.57	5.04	No	0.47	3.69	FALSE	No	No	Low	No
106	C	32	7/12/2019	8:49:27	3.47	4.85	No	1.38	2.64	FALSE	No	No	Low	No
107	A	52	7/13/2019	7:01:44	5.38	6.54	No	1.16	IND	TRUE	No	No	Low	No
107	B	52	7/13/2019	7:02:23	4.82	6.80	No	1.98	IND	TRUE	No	No	Low	No
107	C	52	7/13/2019	7:03:04	8.53	9.73	No	1.21	5.69	FALSE	No	No	Low	No
108	A	48	7/13/2019	7:35:59	8.39	12.34	No	3.95	IND	FALSE	No	No	High	No
108	B	48	7/13/2019	7:36:40	6.92	9.14	No	2.22	IND	FALSE	No	No	High	No
108	F	48	7/13/2019	7:39:14	9.62	11.78	No	2.16	IND	FALSE	No	No	High	No
109	A	36	7/13/2019	7:58:17	9.15	10.53	No	1.38	IND	FALSE	No	No	High	No
109	C	36	7/13/2019	7:59:39	8.97	10.48	No	1.51	IND	FALSE	No	No	High	No
109	D	36	7/13/2019	8:00:11	9.82	11.63	No	1.81	IND	FALSE	No	No	High	No
110	B	53	7/13/2019	8:19:29	11.71	14.83	No	3.12	IND	FALSE	No	No	High	No
110	C	53	7/13/2019	8:20:14	13.25	15.87	No	2.62	IND	FALSE	No	No	High	No
110	D	53	7/13/2019	8:20:52	7.80	9.97	No	2.16	IND	FALSE	No	No	High	No
111	A	86	7/13/2019	8:41:30	7.51	8.34	No	0.83	3.24	FALSE	No	No	Medium	No
111	B	86	7/13/2019	8:42:21	10.94	12.21	No	1.27	3.02	FALSE	No	No	High	No
111	C	86	7/13/2019	8:43:00	4.59	5.20	No	0.61	2.10	FALSE	No	No	Medium	No
112	A	64	7/13/2019	9:06:04	3.22	6.49	No	3.27	IND	TRUE	No	No	Low	No

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StationID	Replicate	Water Depth (ft)	Date	Time	Penetration Minimum (cm)	Penetration Maximum (cm)	Over-penetration?	Boundary Roughness (cm)	aRPD Mean (cm)	aRPD > Pen	Methane Present?	Low DO Present?	Sediment Oxygen Demand	Beggiatoa Present?
112	B	64	7/13/2019	9:08:46	5.65	7.83	No	2.17	IND	FALSE	No	No	Low	No
112	C	64	7/13/2019	9:10:44	6.05	7.47	No	1.41	IND	FALSE	No	No	Low	No
113	A	47	7/13/2019	9:42:44	3.89	4.87	No	0.97	1.59	FALSE	No	No	Low	No
113	B	47	7/13/2019	9:43:32	8.87	10.30	No	1.43	3.14	FALSE	No	No	Low	No
113	C	47	7/13/2019	9:44:43	4.46	6.54	No	2.08	IND	TRUE	No	No	Low	No
114	A	50	7/13/2019	10:07:17	12.66	13.67	No	1.01	1.68	FALSE	No	No	High	No
114	B	50	7/13/2019	10:08:06	15.10	16.99	No	1.89	2.85	FALSE	No	No	High	No
114	D	50	7/13/2019	10:09:27	13.42	13.77	No	0.35	0.64	FALSE	No	No	High	No
115	A	43	7/13/2019	10:28:29	18.89	19.46	No	0.57	1.90	FALSE	No	No	High	No
115	B	43	7/13/2019	10:29:18	17.74	19.17	No	1.43	IND	FALSE	No	No	High	No
115	C	43	7/13/2019	10:30:12	18.10	19.45	No	1.35	IND	FALSE	No	No	High	No
116	A	45	7/12/2019	11:15:11	4.99	6.41	No	1.41	3.75	FALSE	No	No	Low	No
116	B	45	7/12/2019	11:17:10	4.51	5.43	No	0.92	3.47	FALSE	No	No	Low	No
116	D	45	7/12/2019	11:18:32	4.86	6.15	No	1.29	4.15	FALSE	No	No	Low	No
117	A	46	7/12/2019	11:47:13	3.02	5.21	No	2.18	2.62	FALSE	No	No	Low	No
117	C	46	7/12/2019	11:48:34	4.25	5.03	No	0.78	2.08	FALSE	No	No	Low	No
117	D	46	7/12/2019	11:49:12	3.78	4.57	No	0.79	2.22	FALSE	No	No	Low	No
118	A	47	7/12/2019	16:05:52	4.53	5.69	No	1.16	1.52	FALSE	No	No	Low	No
118	B	47	7/12/2019	16:07:23	4.29	4.85	No	0.55	1.28	FALSE	No	No	Low	No
118	C	47	7/12/2019	16:08:53	2.66	5.95	No	3.29	1.79	FALSE	No	No	Low	No
119	A	45	7/12/2019	11:34:44	4.61	5.78	No	1.17	2.51	FALSE	No	No	Low	No
119	B	45	7/12/2019	11:35:25	4.77	5.33	No	0.57	2.04	FALSE	No	No	Low	No
119	C	45	7/12/2019	11:36:15	3.67	5.57	No	1.90	2.03	FALSE	No	No	Low	No
120	A	36	7/12/2019	12:59:28	3.78	6.97	No	3.20	3.08	FALSE	No	No	Low	No
120	B	36	7/12/2019	13:01:28	2.77	6.11	No	3.34	2.91	FALSE	No	No	Low	No
120	C	36	7/12/2019	13:02:59	2.41	3.15	No	0.74	IND	TRUE	No	No	Low	No
121	A	27	7/12/2019	13:26:29	8.74	9.17	No	0.43	5.92	FALSE	No	No	Low	No
121	B	27	7/12/2019	13:28:05	3.21	4.42	No	1.21	IND	TRUE	No	No	Low	No
121	C	27	7/12/2019	13:29:31	3.73	4.24	No	0.51	IND	TRUE	No	No	Low	No
122	A	44	7/12/2019	15:53:33	2.63	4.91	No	2.28	2.64	FALSE	No	No	Low	No
122	B	44	7/12/2019	15:55:18	4.06	5.07	No	1.01	1.95	FALSE	No	No	Low	No

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StationID	Replicate	Water Depth (ft)	Date	Time	Penetration Minimum (cm)	Penetration Maximum (cm)	Over-penetration?	Boundary Roughness (cm)	aRPD Mean (cm)	aRPD > Pen	Methane Present?	Low DO Present?	Sediment Oxygen Demand	Beggiatoa Present?
122	C	44	7/12/2019	15:56:52	3.50	6.56	No	3.07	2.71	FALSE	No	No	Low	No
123	A	45	7/12/2019	15:17:15	5.22	6.41	No	1.18	3.54	FALSE	No	No	Low	No
123	B	45	7/12/2019	15:19:07	4.50	7.11	No	2.61	2.73	FALSE	No	No	Low	No
123	C	45	7/12/2019	15:20:45	3.57	5.10	No	1.53	3.03	FALSE	No	No	Low	No
124	A	41	7/12/2019	15:02:59	4.11	6.71	No	2.61	2.64	FALSE	No	No	Low	No
124	B	41	7/12/2019	15:04:34	6.62	8.18	No	1.57	4.44	FALSE	No	No	Low	No
124	C	41	7/12/2019	15:06:01	4.21	4.94	No	0.73	3.17	FALSE	No	No	Low	No
125	A	43	7/12/2019	15:31:40	4.55	6.68	No	2.13	3.89	FALSE	No	No	Low	No
125	B	43	7/12/2019	15:33:14	3.84	4.96	No	1.12	2.41	FALSE	No	No	Low	No
125	C	43	7/12/2019	15:34:50	4.95	7.73	No	2.78	2.93	FALSE	No	No	Low	No
126	A	37	7/12/2019	14:51:31	5.29	6.32	No	1.03	IND	FALSE	No	No	Low	No
126	C	37	7/12/2019	14:54:48	5.70	7.20	No	1.50	IND	FALSE	No	No	Low	No
126	D	37	7/12/2019	14:56:17	6.01	7.37	No	1.36	IND	FALSE	No	No	Low	No
127	A	43	7/12/2019	15:41:45	4.01	5.41	No	1.40	IND	FALSE	No	No	Low	No
127	B	43	7/12/2019	15:43:25	6.49	7.79	No	1.29	IND	FALSE	No	No	Low	No
127	C	43	7/12/2019	15:45:03	5.25	6.00	No	0.75	IND	FALSE	No	No	Low	No
128	A	44	7/12/2019	14:32:02	IND	IND	Yes	IND	IND	FALSE	No	No	High	No
128	B	44	7/12/2019	14:33:47	IND	IND	Yes	IND	IND	FALSE	Yes	No	High	No
128	C	44	7/12/2019	14:35:19	IND	IND	Yes	IND	IND	FALSE	No	No	High	No
129	A	40	7/12/2019	13:49:47	13.77	15.39	No	1.62	2.77	FALSE	No	No	Medium	No
129	B	40	7/12/2019	13:51:37	17.42	17.90	No	0.48	1.99	FALSE	No	No	Medium	No
129	C	40	7/12/2019	13:53:18	8.20	10.07	No	1.87	0.44	FALSE	No	No	High	No
130	A	31	7/12/2019	14:11:48	4.82	6.12	No	1.29	IND	FALSE	No	No	Low	No
130	B	31	7/12/2019	14:13:30	5.23	6.22	No	0.99	IND	FALSE	No	No	Low	No
130	C	31	7/12/2019	14:14:55	4.76	5.63	No	0.87	IND	FALSE	No	No	Low	No
131	A	69	7/11/2019	15:22:35	6.50	7.59	No	1.09	IND	FALSE	No	No	Low	No
131	B	69	7/11/2019	15:23:59	5.23	6.33	No	1.10	IND	FALSE	No	No	Low	No
131	C	69	7/11/2019	15:25:09	4.88	5.38	No	0.50	IND	FALSE	No	No	Low	No
132	A	75	7/11/2019	15:03:19	5.29	5.71	No	0.43	IND	FALSE	No	No	Low	No
132	B	75	7/11/2019	15:04:38	5.68	7.00	No	1.32	IND	FALSE	No	No	Low	No

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StationID	Replicate	Water Depth (ft)	Date	Time	Penetration Minimum (cm)	Penetration Maximum (cm)	Over-penetration?	Boundary Roughness (cm)	aRPD Mean (cm)	aRPD > Pen	Methane Present?	Low DO Present?	Sediment Oxygen Demand	Beggiatoa Present?
132	C	75	7/11/2019	15:05:52	6.02	7.09	No	1.08	2.66	FALSE	No	No	Low	No
133	A	79	7/11/2019	14:45:31	6.75	7.56	No	0.82	IND	FALSE	No	No	Low	No
133	B	79	7/11/2019	14:46:49	6.09	6.65	No	0.57	3.39	FALSE	No	No	Low	No
133	C	79	7/11/2019	14:48:06	6.16	6.82	No	0.65	4.24	FALSE	No	No	Low	No
134	A	80	7/11/2019	14:25:50	10.30	10.79	No	0.49	IND	FALSE	No	No	Low	No
134	B	80	7/11/2019	14:27:13	6.07	7.52	No	1.46	4.97	FALSE	No	No	Low	No
134	D	80	7/11/2019	14:29:45	7.12	7.97	No	0.85	4.16	FALSE	No	No	Low	No
135	A	76	7/11/2019	4:37:00	4.28	5.76	No	1.48	2.62	FALSE	No	No	Low	No
135	B	76	7/11/2019	4:37:50	4.80	5.39	No	0.59	2.06	FALSE	No	No	Low	No
135	D	76	7/11/2019	4:40:33	6.45	7.05	No	0.60	3.73	FALSE	No	No	Low	No
136	A	83	7/11/2019	4:16:12	5.37	6.35	No	0.98	3.43	FALSE	No	No	Low	No
136	B	83	7/11/2019	4:17:01	6.37	7.79	No	1.42	3.71	FALSE	No	No	Low	No
136	C	83	7/11/2019	4:18:34	6.17	6.93	No	0.76	2.74	FALSE	No	No	Low	No
137	A	91	7/11/2019	3:56:08	4.24	5.20	No	0.97	2.15	FALSE	No	No	Low	No
137	B	91	7/11/2019	3:56:49	4.04	5.92	No	1.88	2.74	FALSE	No	No	Low	No
137	C	91	7/11/2019	3:57:37	3.77	4.52	No	0.75	1.97	FALSE	No	No	Low	No
138	A	90	7/11/2019	3:35:33	4.67	5.12	No	0.45	1.27	FALSE	No	No	Low	No
138	B	90	7/11/2019	3:36:20	3.91	4.38	No	0.47	0.91	FALSE	No	No	Low	No
138	C	90	7/11/2019	3:37:07	5.50	6.07	No	0.57	1.39	FALSE	No	No	Low	No
139	A	88	7/11/2019	3:14:21	4.48	4.97	No	0.49	2.97	FALSE	No	No	Low	No
139	B	88	7/11/2019	3:15:08	3.74	4.35	No	0.61	1.90	FALSE	No	No	Low	No
139	C	88	7/11/2019	3:15:52	3.75	4.49	No	0.74	2.44	FALSE	No	No	Low	No
140	A	93	7/11/2019	2:51:45	5.37	6.07	No	0.70	3.17	FALSE	No	No	Low	No
140	B	93	7/11/2019	2:52:27	5.83	6.71	No	0.88	3.87	FALSE	No	No	Low	No
140	C	93	7/11/2019	2:53:18	5.54	6.09	No	0.55	3.07	FALSE	No	No	Low	No
141	A	96	7/10/2019	19:24:58	3.30	6.61	No	3.31	1.92	FALSE	No	No	Low	No
141	B	96	7/10/2019	19:26:17	8.58	9.21	No	0.63	4.31	FALSE	No	No	Low	No
141	C	96	7/10/2019	19:27:36	5.79	6.30	No	0.51	4.57	FALSE	No	No	Low	No
142	A	95	7/10/2019	19:57:04	3.56	5.75	No	2.18	3.71	FALSE	No	No	Low	No
142	B	95	7/10/2019	19:58:33	4.07	4.87	No	0.80	1.40	FALSE	No	No	Low	No
142	C	95	7/10/2019	20:00:01	4.08	4.80	No	0.73	2.85	FALSE	No	No	Low	No
143	A	93	7/10/2019	20:40:07	4.65	5.23	No	0.58	1.39	FALSE	No	No	Low	No
143	C	93	7/10/2019	20:43:07	3.42	3.98	No	0.55	1.80	FALSE	No	No	Low	No
143	D	93	7/10/2019	20:44:28	3.83	4.50	No	0.67	1.54	FALSE	No	No	Low	No
144	A	94	7/10/2019	21:01:21	4.42	4.85	No	0.43	IND	FALSE	No	No	Low	No
144	B	94	7/10/2019	21:02:44	3.54	4.45	No	0.91	2.21	FALSE	No	No	Low	No
144	D	94	7/10/2019	21:05:26	3.54	4.29	No	0.75	1.62	FALSE	No	No	Low	No
145	A	99	7/10/2019	21:23:25	5.70	6.18	No	0.49	2.49	FALSE	No	No	Low	No
145	B	99	7/10/2019	21:24:42	4.66	5.32	No	0.66	2.53	FALSE	No	No	Low	No
145	C	99	7/10/2019	21:26:12	5.16	5.80	No	0.64	2.29	FALSE	No	No	Low	No

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StationID	Replicate	Water Depth (ft)	Date	Time	Penetration Minimum (cm)	Penetration Maximum (cm)	Over-penetration?	Boundary Roughness (cm)	aRPD Mean (cm)	aRPD > Pen	Methane Present?	Low DO Present?	Sediment Oxygen Demand	Beggiatoa Present?
146	A	100	7/10/2019	21:43:36	3.98	4.62	No	0.64	2.15	FALSE	No	No	Low	No
146	B	100	7/10/2019	21:44:51	3.93	4.70	No	0.77	2.26	FALSE	No	No	Low	No
146	C	100	7/10/2019	21:46:03	4.08	4.56	No	0.48	2.28	FALSE	No	No	Low	No
147	A	103	7/10/2019	16:00:51	3.08	4.72	No	1.64	IND	TRUE	No	No	Low	No
147	B	103	7/10/2019	16:02:02	3.54	5.57	No	2.03	2.37	FALSE	No	No	Low	No
147	C	103	7/10/2019	16:03:17	5.67	5.98	No	0.32	3.15	FALSE	No	No	Low	No
148	A	115	7/10/2019	15:41:02	4.91	6.87	No	1.96	2.21	FALSE	No	No	Low	No
148	B	115	7/10/2019	15:42:16	5.06	6.18	No	1.12	3.47	FALSE	No	No	Low	No
148	C	115	7/10/2019	15:43:25	3.90	4.99	No	1.09	2.24	FALSE	No	No	Low	No
149	A	111	7/10/2019	15:22:07	5.88	6.38	No	0.50	2.49	FALSE	No	No	Low	No
149	B	111	7/10/2019	15:23:16	6.30	7.08	No	0.78	3.18	FALSE	No	No	Low	No
149	D	111	7/10/2019	15:25:55	4.45	5.87	No	1.42	2.77	FALSE	No	No	Low	No
150	A	111	7/10/2019	14:50:28	5.09	5.75	No	0.66	2.60	FALSE	No	No	Low	No
150	B	111	7/10/2019	14:51:38	4.30	4.71	No	0.41	2.40	FALSE	No	No	Low	No
150	C	111	7/10/2019	14:52:48	5.80	6.57	No	0.77	3.60	FALSE	No	No	Low	No
151	A	112	7/10/2019	14:30:28	4.38	5.38	No	1.00	3.36	FALSE	No	No	Low	No
151	B	112	7/10/2019	14:31:55	4.73	5.67	No	0.95	3.08	FALSE	No	No	Low	No
151	D	112	7/10/2019	14:34:25	3.90	4.60	No	0.70	2.52	FALSE	No	No	Low	No
152	A	113	7/10/2019	14:12:10	4.67	5.75	No	1.08	IND	TRUE	No	No	Low	No
152	B	113	7/10/2019	14:13:28	3.12	4.68	No	1.55	IND	TRUE	No	No	Low	No
152	D	113	7/10/2019	14:16:09	7.63	8.41	No	0.77	IND	FALSE	No	No	Low	No
153	A	117	7/10/2019	13:49:55	5.51	6.55	No	1.03	3.65	FALSE	No	No	Low	No
153	B	117	7/10/2019	13:51:04	4.68	5.17	No	0.49	2.30	FALSE	No	No	Low	No
153	C	117	7/10/2019	13:52:15	4.67	7.40	No	2.73	2.92	FALSE	No	No	Low	No
154	A	121	7/10/2019	13:28:49	4.19	6.33	No	2.14	1.54	FALSE	No	No	Low	No
154	B	121	7/10/2019	13:30:04	4.78	6.23	No	1.45	2.32	FALSE	No	No	Low	No
154	C	121	7/10/2019	13:31:28	5.12	7.14	No	2.02	3.93	FALSE	No	No	Low	No
155	A	120	7/10/2019	13:08:12	4.90	5.81	No	0.91	2.19	FALSE	No	No	Low	No
155	B	120	7/10/2019	13:09:15	4.81	6.34	No	1.53	3.39	FALSE	No	No	Low	No
155	D	120	7/10/2019	13:11:26	5.80	6.58	No	0.78	3.25	FALSE	No	No	Low	No
156	A	119	7/10/2019	12:47:15	4.66	6.00	No	1.34	2.42	FALSE	No	No	Low	No
156	B	119	7/10/2019	12:48:21	4.89	5.45	No	0.55	2.08	FALSE	No	No	Low	No
156	D	119	7/10/2019	12:50:32	5.21	6.11	No	0.90	3.56	FALSE	No	No	Low	No
157	A	121	7/10/2019	12:21:56	6.03	6.61	No	0.59	3.86	FALSE	No	No	Low	No

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StationID	Replicate	Water Depth (ft)	Date	Time	Penetration Minimum (cm)	Penetration Maximum (cm)	Over-penetration?	Boundary Roughness (cm)	aRPD Mean (cm)	aRPD > Pen	Methane Present?	Low DO Present?	Sediment Oxygen Demand	Beggiatoa Present?
157	B	121	7/10/2019	12:22:57	5.89	6.80	No	0.90	3.60	FALSE	No	No	Low	No
157	C	121	7/10/2019	12:24:00	4.56	6.56	No	2.00	3.86	FALSE	No	No	Low	No
REFA_01	A	94	7/13/2019	22:15:50	4.54	6.43	No	1.89	IND	FALSE	No	No	Low	No
REFA_01	B	94	7/13/2019	22:17:20	5.97	7.32	No	1.35	IND	FALSE	No	No	Low	No
REFA_01	C	94	7/13/2019	22:18:43	5.89	7.88	No	1.99	IND	FALSE	No	No	Low	No
REFA_02	A	105	7/13/2019	21:21:27	5.11	7.52	No	2.41	4.62	FALSE	No	No	Low	No
REFA_02	B	105	7/13/2019	21:23:07	7.09	8.46	No	1.37	2.81	FALSE	No	No	Low	No
REFA_02	D	105	7/13/2019	21:26:05	5.89	7.82	No	1.93	3.57	FALSE	No	No	Low	No
REFA_03	A	101	7/13/2019	21:48:32	4.78	7.87	No	3.10	3.35	FALSE	No	No	Low	No
REFA_03	B	101	7/13/2019	21:50:02	6.57	8.28	No	1.71	IND	FALSE	No	No	Low	No
REFA_03	D	101	7/13/2019	21:52:50	7.01	8.40	No	1.39	IND	FALSE	No	No	Low	No
REFA_04	A	100	7/13/2019	21:37:46	7.01	8.71	No	1.70	5.91	FALSE	No	No	Low	No
REFA_04	C	100	7/13/2019	21:41:22	7.36	10.30	No	2.95	5.46	FALSE	No	No	Low	No
REFA_04	D	100	7/13/2019	21:42:54	7.04	7.91	No	0.87	IND	FALSE	No	No	Low	No
REFA_05	A	109	7/13/2019	22:00:17	7.86	9.29	No	1.43	IND	FALSE	No	No	Low	No
REFA_05	B	109	7/13/2019	22:01:44	4.42	6.34	No	1.92	IND	FALSE	No	No	Low	No
REFA_05	C	109	7/13/2019	22:03:11	6.80	9.71	No	2.91	2.84	FALSE	No	No	Low	No
REFB_01	A	77	7/11/2019	5:39:10	4.24	5.50	No	1.26	2.67	FALSE	No	No	Low	No
REFB_01	B	77	7/11/2019	5:39:55	6.09	6.91	No	0.82	4.10	FALSE	No	No	Low	No
REFB_01	C	77	7/11/2019	5:41:23	5.08	5.76	No	0.68	3.36	FALSE	No	No	Low	No
REFB_02	A	75	7/11/2019	5:05:43	9.43	9.67	No	0.24	IND	TRUE	No	No	Low	No
REFB_02	B	75	7/11/2019	5:06:26	4.64	5.28	No	0.64	IND	TRUE	No	No	Low	No
REFB_02	C	75	7/11/2019	5:07:45	3.74	4.66	No	0.91	IND	TRUE	No	No	Low	No
REFB_03	A	75	7/11/2019	5:18:19	5.87	8.21	No	2.35	4.97	FALSE	No	No	Low	No
REFB_03	B	75	7/11/2019	5:19:01	4.48	6.11	No	1.63	2.98	FALSE	No	No	Low	No
REFB_03	C	75	7/11/2019	5:19:51	5.23	6.72	No	1.49	3.72	FALSE	No	No	Low	No
REFB_04	A	76	7/11/2019	5:28:14	4.18	5.19	No	1.01	IND	TRUE	No	No	Low	No
REFB_04	D	76	7/11/2019	5:31:01	3.72	4.56	No	0.84	IND	TRUE	No	No	Low	No
REFB_04	E	76	7/11/2019	5:31:59	3.84	4.83	No	0.99	IND	TRUE	No	No	Low	No
REFB_05	A	79	7/11/2019	5:47:11	3.69	4.84	No	1.15	2.71	FALSE	No	No	Low	No
REFB_05	B	79	7/11/2019	5:48:06	4.77	5.63	No	0.86	2.81	FALSE	No	No	Low	No
REFB_05	C	79	7/11/2019	5:48:55	3.61	4.26	No	0.65	1.73	FALSE	No	No	Low	No
REFC_01	A	117	7/13/2019	20:24:09	4.79	5.91	No	1.13	IND	FALSE	No	No	Low	No
REFC_01	B	117	7/13/2019	20:25:59	5.50	6.51	No	1.01	IND	FALSE	No	No	Low	No
REFC_01	D	117	7/13/2019	20:28:51	4.43	5.50	No	1.07	IND	FALSE	No	No	Low	No

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StationID	Replicate	Water Depth (ft)	Date	Time	Penetration Minimum (cm)	Penetration Maximum (cm)	Over-penetration?	Boundary Roughness (cm)	aRPD Mean (cm)	aRPD > Pen	Methane Present?	Low DO Present?	Sediment Oxygen Demand	Beggiatoa Present?
REFC_02	A	117	7/13/2019	20:32:29	5.78	6.49	No	0.72	IND	FALSE	No	No	Low	No
REFC_02	B	117	7/13/2019	20:33:51	5.61	6.53	No	0.92	IND	FALSE	No	No	Low	No
REFC_02	C	117	7/13/2019	20:35:19	4.29	6.98	No	2.69	IND	FALSE	No	No	Low	No
REFC_03	A	119	7/13/2019	19:54:06	4.90	5.84	No	0.95	IND	FALSE	No	No	Low	No
REFC_03	B	119	7/13/2019	19:55:33	3.51	5.42	No	1.91	IND	FALSE	No	No	Low	No
REFC_03	D	119	7/13/2019	19:58:19	5.22	6.39	No	1.17	IND	FALSE	No	No	Low	No
REFC_04	A	114	7/13/2019	20:12:44	6.53	7.42	No	0.89	IND	FALSE	No	No	Low	No
REFC_04	B	114	7/13/2019	20:14:14	7.73	8.65	No	0.92	IND	FALSE	No	No	Low	No
REFC_04	C	114	7/13/2019	20:15:36	6.12	7.54	No	1.42	4.79	FALSE	No	No	Low	No
REFC_05	A	115	7/13/2019	20:03:58	5.96	7.97	No	2.01	6.76	FALSE	No	No	Low	No
REFC_05	B	115	7/13/2019	20:05:24	5.04	7.54	No	2.50	IND	TRUE	No	No	Low	No
REFC_05	C	115	7/13/2019	20:06:57	5.57	8.04	No	2.47	IND	TRUE	No	No	Low	No

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StationID	Replicate	Water Depth (ft)	Date	Time	Sensitive Taxa Present?	Type of Sensitive Taxa	Type of Species of Concern	Invasive Taxa Present?	Type of Invasive Taxa	Tubes Present?	Epifauna	Voids Present?	Successional Stage
001	A	53	7/14/2019	3:35:07	No	None	None	No	None	No	None	No	IND
001	B	53	7/14/2019	3:35:52	No	None	None	No	None	No	None	No	IND
001	C	53	7/14/2019	3:36:37	No	None	None	No	None	No	None	No	IND
002	A	64	7/14/2019	3:13:17	No	None	None	No	None	Yes	None	No	2
002	B	64	7/14/2019	3:13:59	No	None	None	No	None	Yes	None	No	2
002	C	64	7/14/2019	3:14:39	No	None	None	No	None	No	None	No	IND
003	A	70	7/14/2019	2:50:26	No	None	None	No	None	Yes	None	No	2
003	B	70	7/14/2019	2:51:09	No	None	None	No	None	Yes	Gastropods	No	2
003	C	70	7/14/2019	2:51:44	No	None	None	No	None	No	None	No	IND
004	A	73	7/14/2019	2:28:48	No	None	None	No	None	Yes	None	No	2
004	B	73	7/14/2019	2:29:34	No	None	None	No	None	Yes	Gastropods	No	2
004	C	73	7/14/2019	2:30:15	No	None	None	No	None	Yes	None	No	2
005	A	77	7/14/2019	2:07:20	No	None	None	No	None	No	None	No	IND
005	B	77	7/14/2019	2:08:33	No	None	None	No	None	No	Hermit Crab	No	IND
005	C	77	7/14/2019	2:09:11	No	None	None	No	None	No	None	No	IND
006	A	68	7/14/2019	1:47:08	No	None	None	No	None	No	None	No	IND
006	B	68	7/14/2019	1:47:54	No	None	None	No	None	No	None	No	IND
006	C	68	7/14/2019	1:48:37	No	None	None	No	None	Yes	None	No	2
007	A	77	7/14/2019	1:24:24	No	None	None	No	None	No	None	No	IND
007	B	77	7/14/2019	1:25:05	No	None	None	No	None	IND	None	No	IND
007	C	77	7/14/2019	1:25:47	No	None	None	No	None	No	None	No	IND
008	B	85	7/14/2019	0:19:10	No	None	None	No	None	Yes	None	No	2
008	C	85	7/14/2019	0:19:56	No	None	None	No	None	Yes	None	No	2
008	D	85	7/14/2019	0:20:41	No	None	None	No	None	No	None	No	IND
009	A	95	7/13/2019	23:50:13	No	None	None	No	None	No	None	No	IND
009	B	95	7/13/2019	23:51:37	No	None	None	No	None	No	None	No	IND

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StationID	Replicate	Water Depth (ft)	Date	Time	Sensitive Taxa Present?	Type of Sensitive Taxa	Type of Species of Concern	Invasive Taxa Present?	Type of Invasive Taxa	Tubes Present?	Epifauna	Voids Present?	Successional Stage
009	C	95	7/13/2019	23:53:04	No	None	None	No	None	No	None	No	IND
010	B	116	7/13/2019	23:26:52	No	None	None	No	None	Yes	None	Yes	2 on 3
010	C	116	7/13/2019	23:28:16	No	None	None	No	None	Yes	None	No	2
010	D	116	7/13/2019	23:29:47	No	None	None	No	None	Yes	None	No	2 -> 3
011	A	224	7/13/2019	22:56:37	No	None	None	No	None	Yes	None	Yes	2 on 3
011	B	224	7/13/2019	22:58:11	No	None	None	No	None	Yes	None	Yes	2 on 3
011	C	224	7/13/2019	22:59:48	No	None	None	No	None	Yes	None	Yes	2 on 3
012	A	127	7/13/2019	19:29:31	No	None	None	No	None	Yes	None	No	2
012	B	127	7/13/2019	19:31:08	No	None	None	No	None	Yes	None	Yes	2 on 3
012	C	127	7/13/2019	19:32:27	No	None	None	No	None	Yes	None	No	2 on 3
013	A	111	7/13/2019	19:05:00	No	None	None	No	None	Yes	None	No	2
013	B	111	7/13/2019	19:06:42	No	None	None	No	None	Yes	None	No	2
013	C	111	7/13/2019	19:08:11	No	None	None	No	None	Yes	None	No	2
014	A	117	7/13/2019	18:40:36	No	None	None	No	None	Yes	None	No	2
014	B	117	7/13/2019	18:42:09	No	None	None	No	None	Yes	None	No	2
014	D	117	7/13/2019	18:45:03	No	None	None	No	None	Yes	None	No	2
015	A	109	7/13/2019	18:14:33	No	None	None	No	None	Yes	None	No	2
015	B	109	7/13/2019	18:16:12	No	None	None	No	None	Yes	None	No	2
015	C	109	7/13/2019	18:17:53	No	None	None	No	None	Yes	None	No	2
016	A	95	7/10/2019	19:06:41	No	None	None	No	None	Yes	Sand Dollars	No	2
016	B	95	7/10/2019	19:07:59	No	None	None	No	None	Yes	Gastropod, Sand Dollar	No	2 -> 3
016	C	95	7/10/2019	19:09:18	No	None	None	No	None	Yes	None	No	2 -> 3
017	A	93	7/10/2019	18:46:29	No	None	None	No	None	Yes	Sand Dollars	No	2
017	B	93	7/10/2019	18:47:44	No	None	None	No	None	Yes	Sand Dollars	No	2
017	D	93	7/10/2019	18:50:11	No	None	None	No	None	Yes	Sand Dollar	No	2 -> 3
018	A	90	7/10/2019	18:25:08	No	None	None	No	None	Yes	Hermit Crab	No	2
018	B	90	7/10/2019	18:26:34	No	None	None	No	None	Yes	None	No	2
018	C	90	7/10/2019	18:27:53	No	None	None	No	None	No	Fish, Hermit Crabs	No	2
019	A	97	7/10/2019	18:03:03	No	None	None	No	None	Yes	None	No	2 -> 3

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StationID	Replicate	Water Depth (ft)	Date	Time	Sensitive Taxa Present?	Type of Sensitive Taxa	Type of Species of Concern	Invasive Taxa Present?	Type of Invasive Taxa	Tubes Present?	Epifauna	Voids Present?	Successional Stage
019	B	97	7/10/2019	18:04:10	No	None	None	No	None	No	None	No	2
019	C	97	7/10/2019	18:05:19	No	None	None	No	None	Yes	None	No	2 -> 3
020	A	92	7/10/2019	17:42:53	No	None	None	No	None	No	Sand Dollars	No	2
020	B	92	7/10/2019	17:44:34	No	None	None	No	None	No	None	No	2
020	C	92	7/10/2019	17:45:55	No	None	None	No	None	Yes	Sand Dollar	No	2
021	A	97	7/10/2019	22:18:09	No	None	None	No	None	No	None	No	IND
021	B	97	7/10/2019	22:19:30	No	None	None	No	None	No	Sand Dollar	No	IND
021	D	97	7/10/2019	22:22:06	No	None	None	No	None	No	None	No	IND
022	A	95	7/10/2019	22:37:29	No	None	None	No	None	Yes	None	No	2
022	B	95	7/10/2019	22:38:46	No	None	None	No	None	Yes	Hermit Crab	No	2
022	C	95	7/10/2019	22:40:01	No	None	None	No	None	Yes	None	No	2
023	A	91	7/10/2019	22:57:17	No	None	None	No	None	No	None	No	IND
023	B	91	7/10/2019	22:58:43	No	None	None	No	None	No	None	No	IND
023	D	91	7/10/2019	23:01:14	No	None	None	No	None	No	None	No	IND
024	A	97	7/10/2019	23:16:48	No	None	None	No	None	Yes	None	No	2
024	B	97	7/10/2019	23:18:16	No	None	None	No	None	Yes	Hermit Crab, Sand Dollars	No	2
024	C	97	7/10/2019	23:19:35	No	None	None	No	None	Yes	Sand Dollar	No	2
025	A	102	7/11/2019	0:56:36	No	None	None	No	None	No	None	No	2
025	B	102	7/11/2019	0:57:20	No	None	None	No	None	Yes	Hermit Crab	No	2
025	D	102	7/11/2019	0:59:04	No	None	None	No	None	No	Hermit Crab, Sand Dollars	No	2 -> 3
026	C	98	7/11/2019	2:19:45	No	None	None	No	None	Yes	None	No	2
026	F	98	7/11/2019	2:22:09	No	None	None	No	None	Yes	Sand Dollars	No	2
026	G	98	7/11/2019	2:23:01	No	None	None	No	None	No	None	No	2
027	A	97	7/11/2019	10:38:45	No	None	None	No	None	Yes	None	No	2
027	B	97	7/11/2019	10:39:29	No	None	None	No	None	No	Sand Dollar	No	2
027	C	97	7/11/2019	10:40:15	No	None	None	No	None	Yes	None	No	2
028	A	88	7/11/2019	10:56:17	No	None	None	No	None	Yes	Gastropod, Sand Dollar	No	2
028	B	88	7/11/2019	10:57:12	No	None	None	No	None	Yes	None	No	2
028	C	88	7/11/2019	10:57:55	No	None	None	No	None	No	Sand Dollar	No	2
029	A	89	7/11/2019	11:14:45	No	None	None	No	None	Yes	None	No	2
029	B	89	7/11/2019	11:15:25	No	None	None	No	None	Yes	Sand Dollar	No	2 -> 3
029	C	89	7/11/2019	11:16:09	No	None	None	No	None	Yes	Sand Dollars	No	2
030	A	123	7/10/2019	3:03:41	No	None	None	No	None	Yes	Sand Dollar	No	2

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StationID	Replicate	Water Depth (ft)	Date	Time	Sensitive Taxa Present?	Type of Sensitive Taxa	Type of Species of Concern	Invasive Taxa Present?	Type of Invasive Taxa	Tubes Present?	Epifauna	Voids Present?	Successional Stage
030	C	123	7/10/2019	3:08:14	No	None	None	No	None	Yes	None	No	2
030	D	123	7/10/2019	3:10:00	No	None	None	No	None	Yes	None	No	2
031	A	117	7/10/2019	4:07:40	No	None	None	No	None	No	Sand Dollars	No	IND
031	B	117	7/10/2019	4:08:49	No	None	None	No	None	No	None	No	IND
031	C	117	7/10/2019	4:09:53	No	None	None	No	None	No	None	No	IND
032	A	118	7/10/2019	4:43:15	No	None	None	No	None	Yes	None	No	1 -> 2
032	B	118	7/10/2019	4:44:10	No	None	None	No	None	No	Sand Dollars	No	2 -> 3
032	D	118	7/10/2019	4:46:32	No	None	None	No	None	Yes	None	No	2
033	A	110	7/10/2019	5:34:24	No	None	None	No	None	Yes	None	No	1 -> 2
033	B	110	7/10/2019	5:35:18	No	None	None	No	None	Yes	Sand Dollar	No	1 -> 2
033	C	110	7/10/2019	5:36:36	No	None	None	No	None	Yes	Sand Dollars	No	2
034	A	109	7/10/2019	6:02:04	No	None	None	No	None	No	Sand Dollars	No	2
034	B	109	7/10/2019	6:03:02	No	None	None	No	None	Yes	None	No	2
034	C	109	7/10/2019	6:06:15	No	None	None	No	None	No	Sand Dollars	No	2
035	A	110	7/10/2019	6:34:32	No	None	None	No	None	No	Sand Dollar	No	2
035	B	110	7/10/2019	6:35:21	No	None	None	No	None	Yes	None	No	2
035	C	110	7/10/2019	6:37:41	No	None	None	No	None	Yes	Sand Dollars	No	2
036	A	100	7/10/2019	6:58:52	No	None	None	No	None	Yes	None	No	2
036	B	100	7/10/2019	6:59:53	No	None	None	No	None	Yes	Gastropods, Sand Dollar	No	2
036	C	100	7/10/2019	7:00:48	No	None	None	No	None	Yes	Sand Dollar	No	2
037	A	105	7/10/2019	7:20:11	No	None	None	No	None	Yes	None	No	2 -> 3
037	C	105	7/10/2019	7:21:57	No	None	None	No	None	No	Hermit Crab	No	IND
037	D	105	7/10/2019	7:23:19	No	None	None	No	None	No	None	No	2 -> 3
038	A	100	7/10/2019	7:44:15	No	None	None	No	None	Yes	Gastropod	No	2
038	B	100	7/10/2019	7:45:05	No	None	None	No	None	Yes	Sand Dollar	No	2
038	C	100	7/10/2019	7:45:58	No	None	None	No	None	Yes	None	No	2
039	A	98	7/10/2019	8:08:38	No	None	None	No	None	Yes	Sand Dollar	No	2
039	B	98	7/10/2019	8:10:15	No	None	None	No	None	Yes	Hermit Crab, Sand Dollar	No	2
039	C	98	7/10/2019	8:11:11	No	None	None	No	None	Yes	Sand Dollars	No	2
040	A	98	7/10/2019	8:31:56	No	None	None	No	None	No	None	No	2

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StationID	Replicate	Water Depth (ft)	Date	Time	Sensitive Taxa Present?	Type of Sensitive Taxa	Type of Species of Concern	Invasive Taxa Present?	Type of Invasive Taxa	Tubes Present?	Epifauna	Voids Present?	Successional Stage
040	B	98	7/10/2019	8:32:46	No	None	None	No	None	Yes	None	No	2
040	C	98	7/10/2019	8:33:34	No	None	None	No	None	No	Sand Dollars	No	IND
041	A	96	7/10/2019	8:53:58	No	None	None	No	None	Yes	None	No	2
041	B	96	7/10/2019	8:54:40	No	None	None	No	None	Yes	None	No	2
041	C	96	7/10/2019	8:55:27	No	None	None	No	None	Yes	Sand Dollar	No	2 -> 3
042	A	94	7/10/2019	9:16:46	No	None	None	No	None	Yes	None	No	2 -> 3
042	B	94	7/10/2019	9:18:32	No	None	None	No	None	No	None	No	2
042	C	94	7/10/2019	9:19:18	No	None	None	No	None	Yes	None	No	2
043	A	88	7/11/2019	11:29:09	No	None	None	No	None	Yes	None	No	2
043	B	88	7/11/2019	11:30:01	No	None	None	No	None	Yes	None	No	2
043	C	88	7/11/2019	11:30:49	No	None	None	No	None	Yes	Sand Dollar	No	2
044	A	87	7/11/2019	11:46:59	No	None	None	No	None	No	None	No	IND
044	B	87	7/11/2019	11:47:46	No	None	None	No	None	Yes	Sand Dollar	No	2
044	C	87	7/11/2019	11:49:02	No	None	None	No	None	Yes	None	No	2
045	A	83	7/11/2019	12:07:17	No	None	None	No	None	Yes	Gastropod	No	2
045	B	83	7/11/2019	12:08:50	No	None	None	No	None	No	None	No	IND
045	C	83	7/11/2019	12:10:01	No	None	None	No	None	Yes	None	No	1 -> 2
046	A	84	7/11/2019	19:50:44	No	None	None	No	None	No	None	No	IND
046	B	84	7/11/2019	19:52:00	No	None	None	No	None	No	None	No	2
046	D	84	7/11/2019	19:54:26	No	None	None	No	None	No	None	No	2
047	A	81	7/11/2019	19:22:37	No	None	None	No	None	No	None	No	IND
047	D	81	7/11/2019	19:26:29	No	None	None	No	None	No	Sand Dollars	No	IND
047	E	81	7/11/2019	19:30:59	No	None	None	No	None	Yes	Sand Dollar	No	2
048	A	77	7/11/2019	12:24:14	No	None	None	No	None	Yes	None	No	2
048	B	77	7/11/2019	12:25:30	No	None	None	No	None	No	None	No	IND
048	C	77	7/11/2019	12:26:48	No	None	None	No	None	Yes	None	No	2
049	A	87	7/11/2019	12:41:42	No	None	None	No	None	Yes	None	No	2
049	B	87	7/11/2019	12:42:56	No	None	None	No	None	Yes	None	No	2 -> 3
049	D	87	7/11/2019	12:45:22	No	None	None	No	None	Yes	None	No	2 on 3
050	A	87	7/11/2019	12:59:30	IND	None	None	No	None	IND	Ind	IND	IND
050	B	87	7/11/2019	13:00:47	IND	None	None	No	None	IND	Ind	IND	IND

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StationID	Replicate	Water Depth (ft)	Date	Time	Sensitive Taxa Present?	Type of Sensitive Taxa	Type of Species of Concern	Invasive Taxa Present?	Type of Invasive Taxa	Tubes Present?	Epifauna	Voids Present?	Successional Stage
050	C	87	7/11/2019	13:01:55	No	None	None	No	None	Yes	None	No	2
051	A	84	7/11/2019	13:18:11	No	None	None	No	None	No	None	No	IND
051	C	84	7/11/2019	13:20:36	No	None	None	No	None	No	None	No	IND
051	D	84	7/11/2019	13:21:50	No	None	None	No	None	No	None	No	IND
052	B	77	7/11/2019	14:07:38	No	None	None	No	None	Yes	None	No	2
052	C	77	7/11/2019	14:08:53	No	None	None	No	None	Yes	None	No	2
052	D	77	7/11/2019	14:10:04	No	None	None	No	None	Yes	None	No	2
053	A	72	7/12/2019	20:56:30	No	None	None	No	None	Yes	None	No	2
053	B	72	7/12/2019	20:58:18	No	None	None	No	None	No	None	No	1 -> 2
053	D	72	7/12/2019	21:01:13	No	None	None	No	None	No	None	No	1 -> 2
054	A	72	7/12/2019	21:19:09	No	None	None	No	None	Yes	None	No	2
054	B	72	7/12/2019	21:20:18	No	None	None	No	None	No	None	No	IND
054	C	72	7/12/2019	21:22:01	No	None	None	No	None	No	None	No	IND
055	A	73	7/12/2019	23:58:30	No	None	None	No	None	Yes	None	No	2
055	B	73	7/13/2019	0:00:04	No	None	None	No	None	Yes	None	No	2
055	C	73	7/13/2019	0:01:35	No	None	None	No	None	No	Gastropod	No	2
056	A	81	7/13/2019	0:21:54	No	None	None	No	None	Yes	Gastropod	No	2 -> 3
056	B	81	7/13/2019	0:22:57	No	None	None	No	None	Yes	None	No	2 -> 3
056	C	81	7/13/2019	0:23:37	No	None	None	No	None	Yes	Crab	No	2 -> 3
057	A	86	7/13/2019	0:44:08	No	None	None	No	None	Yes	None	No	2 -> 3
057	B	86	7/13/2019	0:44:50	No	None	None	No	None	Yes	None	No	2 -> 3
057	C	86	7/13/2019	0:45:32	No	None	None	No	None	Yes	Gastropod	No	2 -> 3
058	A	91	7/13/2019	1:07:56	No	None	None	No	None	Yes	None	No	2
058	C	91	7/13/2019	1:09:21	No	None	None	No	None	Yes	Gastropod, Sand Dollars	No	2
058	D	91	7/13/2019	1:09:58	No	None	None	No	None	No	Gastropod, Sand Dollar	No	2
059	A	95	7/13/2019	1:29:36	No	None	None	No	None	No	Gastropod	No	2
059	B	95	7/13/2019	1:30:21	No	None	None	No	None	Yes	None	No	2
059	C	95	7/13/2019	1:31:00	No	None	None	No	None	Yes	None	Yes	2 on 3
060	A	95	7/13/2019	1:54:25	No	None	None	No	None	Yes	Clams	No	2 -> 3
060	B	95	7/13/2019	1:55:03	No	None	None	No	None	Yes	None	No	2 -> 3

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060	C	95	7/13/2019	1:55:45	No	None	None	No	None	Yes	None	No	2 -> 3
061	A	91	7/13/2019	2:18:35	No	None	None	No	None	Yes	None	No	2 -> 3
061	B	91	7/13/2019	2:19:17	No	None	None	No	None	Yes	None	No	2 -> 3
061	C	91	7/13/2019	2:20:00	No	None	None	No	None	Yes	Gastropod	No	2
062	A	87	7/13/2019	2:40:14	No	None	None	No	None	Yes	None	No	2 -> 3
062	B	87	7/13/2019	2:41:00	No	None	None	No	None	Yes	Gastropods	No	2 -> 3
062	D	87	7/13/2019	2:42:24	No	None	None	No	None	Yes	None	No	2 -> 3
063	B	74	7/11/2019	18:32:06	No	None	None	No	None	Yes	None	No	2
063	C	74	7/11/2019	18:33:16	No	None	None	No	None	Yes	Gastropods	No	2
063	D	74	7/11/2019	18:34:28	No	None	None	No	None	No	Sand Dollars	No	2
064	A	72	7/11/2019	17:43:40	No	None	None	No	None	Yes	Gastropod, Sand Dollars	No	2
064	B	72	7/11/2019	17:45:19	No	None	None	No	None	No	Sand Dollars	No	2
064	C	72	7/11/2019	17:46:35	No	None	None	No	None	Yes	Sand Dollar	No	2
065	A	77	7/11/2019	16:59:10	No	None	None	No	None	Yes	Gastropod	No	2
065	B	77	7/11/2019	17:00:25	No	None	None	No	None	Yes	None	No	2
065	C	77	7/11/2019	17:01:35	No	None	None	No	None	Yes	Gastropod	No	2
066	A	82	7/11/2019	16:38:10	No	None	None	No	None	Yes	Gastropod	No	2
066	B	82	7/11/2019	16:39:40	No	None	None	No	None	No	Sand Dollar	No	IND
066	C	82	7/11/2019	16:41:02	No	None	None	No	None	Yes	None	No	2
067	A	77	7/11/2019	16:18:44	No	None	None	No	None	Yes	Sand Dollar	No	2
067	B	77	7/11/2019	16:20:01	No	None	None	No	None	No	Sand Dollars	No	2
067	D	77	7/11/2019	16:22:36	No	None	None	No	None	No	Sand Dollars	No	2
068	A	70	7/11/2019	16:00:31	No	None	None	No	None	No	None	No	IND
068	B	70	7/11/2019	16:01:52	No	None	None	No	None	No	None	No	IND
068	C	70	7/11/2019	16:03:01	No	None	None	No	None	No	None	No	IND
069	A	70	7/11/2019	15:41:06	No	None	None	No	None	Yes	None	No	2
069	B	70	7/11/2019	15:42:37	No	None	None	No	None	No	None	No	IND
069	C	70	7/11/2019	15:43:54	No	None	None	No	None	Yes	None	No	2
070	A	76	7/12/2019	20:11:06	No	None	None	No	None	Yes	None	No	2
070	B	76	7/12/2019	20:12:35	No	None	None	No	None	Yes	None	No	2
070	C	76	7/12/2019	20:14:05	No	None	None	No	None	Yes	None	No	2

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071	A	71	7/12/2019	19:52:58	No	None	None	No	None	Yes	None	No	2
071	B	71	7/12/2019	19:54:29	No	None	None	No	None	No	Gastropod, Sand Dollars	No	IND
071	C	71	7/12/2019	19:55:58	No	None	None	No	None	Yes	None	No	2
072	A	74	7/12/2019	19:35:07	No	None	None	No	None	Yes	None	No	2
072	C	74	7/12/2019	19:38:13	No	None	None	No	None	Yes	None	No	2
072	D	74	7/12/2019	19:39:50	No	None	None	No	None	Yes	Hermit Crab, Sand Dollar	No	2
073	A	81	7/12/2019	19:18:07	No	None	None	No	None	Yes	Gastropod	No	2
073	B	81	7/12/2019	19:19:37	No	None	None	No	None	Yes	None	No	2
073	C	81	7/12/2019	19:21:06	No	None	None	No	None	Yes	Gastropod	No	2 -> 3
074	E	86	7/12/2019	18:59:48	No	None	None	No	None	Yes	None	No	2 -> 3
074	F	86	7/12/2019	19:01:27	No	None	None	No	None	Yes	None	No	2
074	G	86	7/12/2019	19:03:13	No	None	None	No	None	Yes	None	No	2
075	A	91	7/12/2019	18:25:31	No	None	None	No	None	Yes	None	No	2
075	B	91	7/12/2019	18:27:03	No	None	None	No	None	Yes	Unknown Organism	No	2 -> 3
075	D	91	7/12/2019	18:30:09	No	None	None	No	None	Yes	Gastropod	No	2
076	A	90	7/12/2019	17:52:40	No	None	None	No	None	Yes	None	No	2
076	B	90	7/12/2019	17:54:19	No	None	None	No	None	Yes	None	No	2
076	C	90	7/12/2019	17:55:52	No	None	None	No	None	Yes	None	No	2
077	A	86	7/12/2019	17:32:45	No	None	None	No	None	Yes	None	No	2
077	C	86	7/12/2019	17:35:47	No	None	None	No	None	Yes	Gastropod	No	2
077	D	86	7/12/2019	17:37:23	No	None	None	No	None	Yes	None	Yes	2 on 3
078	A	77	7/11/2019	18:45:32	No	None	None	No	None	Yes	None	No	2
078	B	77	7/11/2019	18:47:03	No	None	None	No	None	Yes	None	No	2
078	C	77	7/11/2019	18:48:15	No	None	None	No	None	Yes	Sand Dollars	No	2
079	A	80	7/12/2019	4:58:21	No	None	None	No	None	Yes	None	No	2
079	C	80	7/12/2019	5:00:02	No	None	None	No	None	Yes	None	No	2
079	D	80	7/12/2019	5:00:41	No	None	None	No	None	Yes	Gastropod	No	2
080	A	69	7/12/2019	5:40:46	No	None	None	No	None	Yes	None	No	2
080	B	69	7/12/2019	5:41:36	No	None	None	No	None	Yes	Gastropod, Hermit Crabs, Sponge	No	2
080	C	69	7/12/2019	5:42:16	No	None	None	No	None	Yes	None	No	2
081	A	83	7/11/2019	19:02:31	No	None	None	No	None	Yes	None	No	2 -> 3
081	B	83	7/11/2019	19:04:06	No	None	None	No	None	Yes	Gastropods	No	2 -> 3
081	C	83	7/11/2019	19:05:18	No	None	None	No	None	Yes	None	No	2 -> 3

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082	A	76	7/12/2019	4:18:26	No	None	None	No	None	No	None	No	2
082	B	76	7/12/2019	4:19:26	No	None	None	No	None	No	None	No	IND
082	C	76	7/12/2019	4:20:13	No	None	None	No	None	Yes	None	No	2
083	A	76	7/12/2019	5:26:07	No	None	None	No	None	Yes	None	No	2 -> 3
083	B	76	7/12/2019	5:26:53	No	None	None	No	None	Yes	None	No	2 -> 3
083	C	76	7/12/2019	5:27:38	No	None	None	No	None	No	None	Yes	2 on 3
084	A	62	7/12/2019	6:00:34	No	None	None	No	None	No	Sand Dollar	No	IND
084	B	62	7/12/2019	6:01:18	No	None	None	No	None	No	Sand Dollars	No	IND
084	D	62	7/12/2019	6:02:46	No	None	None	No	None	No	Sand Dollars	No	IND
085	A	66	7/12/2019	6:43:18	No	None	None	No	None	Yes	None	No	2
085	B	66	7/12/2019	6:44:11	No	None	None	No	None	Yes	None	No	2
085	C	66	7/12/2019	6:44:52	No	None	None	No	None	No	None	No	IND
086	A	51	7/12/2019	7:17:44	No	None	None	No	None	Yes	None	No	2
086	B	51	7/12/2019	7:18:40	No	None	None	No	None	Yes	None	No	2
086	C	51	7/12/2019	7:19:32	No	None	None	No	None	Yes	None	No	2 -> 3
087	A	43	7/12/2019	7:36:28	No	None	None	No	None	No	None	No	IND
087	B	43	7/12/2019	7:37:49	No	None	None	No	None	Yes	None	No	2
087	C	43	7/12/2019	7:38:29	No	None	None	No	None	Yes	None	No	2
088	A	36	7/12/2019	7:57:05	No	None	None	No	None	No	None	No	IND
088	B	36	7/12/2019	7:57:56	No	None	None	No	None	No	None	No	IND
088	C	36	7/12/2019	7:58:42	No	None	None	No	None	No	None	No	IND
089	A	80	7/13/2019	3:52:00	No	None	None	No	None	Yes	None	No	2 -> 3
089	B	80	7/13/2019	3:53:27	No	None	None	No	None	Yes	None	No	2
089	C	80	7/13/2019	3:54:15	No	None	None	No	None	Yes	None	No	2 -> 3
090	A	70	7/13/2019	4:14:36	No	None	None	No	None	Yes	None	No	2
090	B	70	7/13/2019	4:15:15	No	None	None	No	None	Yes	None	No	2
090	D	70	7/13/2019	4:16:41	No	None	None	No	None	Yes	None	No	2 -> 3
091	A	60	7/13/2019	4:36:55	No	None	None	No	None	Yes	None	No	2
091	B	60	7/13/2019	4:37:35	No	None	None	No	None	No	None	No	IND
091	C	60	7/13/2019	4:38:24	No	None	None	No	None	Yes	None	No	2
092	A	55	7/13/2019	4:56:43	No	None	None	No	None	No	Gastropod	No	2
092	C	55	7/13/2019	4:58:05	No	None	None	No	None	Yes	None	No	2
092	D	55	7/13/2019	4:58:53	No	None	None	No	None	No	None	No	2
093	B	44	7/13/2019	5:20:32	No	None	None	No	None	No	None	No	IND
093	C	44	7/13/2019	5:21:16	No	None	None	No	None	No	None	No	IND

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StationID	Replicate	Water Depth (ft)	Date	Time	Sensitive Taxa Present?	Type of Sensitive Taxa	Type of Species of Concern	Invasive Taxa Present?	Type of Invasive Taxa	Tubes Present?	Epifauna	Voids Present?	Successional Stage
093	D	44	7/13/2019	5:22:08	No	None	None	No	None	Yes	None	No	2
094	B	44	7/13/2019	5:40:18	No	None	None	No	None	Yes	None	No	2
094	C	44	7/13/2019	5:41:05	No	None	None	No	None	No	None	No	IND
094	D	44	7/13/2019	5:41:45	No	None	None	No	None	Yes	None	No	2 -> 3
095	A	30	7/13/2019	6:01:06	No	None	None	No	None	Yes	None	No	2
095	B	30	7/13/2019	6:01:48	No	None	None	No	None	No	None	No	IND
095	C	30	7/13/2019	6:02:29	No	None	None	No	None	No	None	No	IND
096	A	23	7/13/2019	6:17:32	No	None	None	No	None	No	None	No	IND
096	B	23	7/13/2019	6:18:21	No	None	None	No	None	No	None	No	IND
096	D	23	7/13/2019	6:19:41	No	None	None	No	None	No	None	No	IND
097	A	33	7/13/2019	6:36:47	No	None	None	No	None	No	None	No	IND
097	B	33	7/13/2019	6:37:24	No	None	None	No	None	No	None	No	IND
097	C	33	7/13/2019	6:38:01	No	None	None	No	None	No	None	No	IND
098	A	58	7/12/2019	6:15:43	No	None	None	No	None	Yes	Sand Dollar	No	2
098	B	58	7/12/2019	6:16:17	No	None	None	No	None	No	Sand Dollars	No	2
098	C	58	7/12/2019	6:17:11	No	None	None	No	None	No	Sand Dollars	No	IND
099	A	58	7/12/2019	10:08:35	No	None	None	No	None	Yes	None	No	2
099	B	58	7/12/2019	10:09:14	No	None	None	No	None	Yes	None	No	2
099	C	58	7/12/2019	10:10:41	No	None	None	No	None	Yes	None	No	2
100	A	50	7/12/2019	10:30:47	No	None	None	No	None	Yes	None	No	2 -> 3
100	B	50	7/12/2019	10:31:36	No	None	None	No	None	Yes	None	No	2 -> 3
100	C	50	7/12/2019	10:32:24	No	None	None	No	None	Yes	Sand Dollar	No	2 -> 3
101	A	48	7/12/2019	10:51:43	No	None	None	No	None	No	Sand Dollar	No	IND
101	B	48	7/12/2019	10:52:49	No	None	None	No	None	Yes	Sand Dollar	No	2 -> 3
101	C	48	7/12/2019	10:53:31	No	None	None	No	None	No	None	No	2 -> 3
102	A	57	7/12/2019	6:28:02	No	None	None	No	None	Yes	None	No	2
102	B	57	7/12/2019	6:28:59	No	None	None	No	None	Yes	Sand Dollar	No	2
102	C	57	7/12/2019	6:29:45	No	None	None	No	None	Yes	None	No	2
103	A	56	7/12/2019	7:03:33	No	None	None	No	None	No	None	No	2

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StationID	Replicate	Water Depth (ft)	Date	Time	Sensitive Taxa Present?	Type of Sensitive Taxa	Type of Species of Concern	Invasive Taxa Present?	Type of Invasive Taxa	Tubes Present?	Epifauna	Voids Present?	Successional Stage
103	B	56	7/12/2019	7:04:15	No	None	None	No	None	No	None	No	2 -> 3
103	C	56	7/12/2019	7:04:58	No	None	None	No	None	No	Hermit Crab, Sand Dollars	No	2
104	A	45	7/12/2019	9:37:06	No	None	None	No	None	No	None	No	2
104	B	45	7/12/2019	9:39:14	No	None	None	No	None	No	None	No	IND
104	C	45	7/12/2019	9:40:07	No	None	None	No	None	No	None	No	2
105	A	37	7/12/2019	9:18:13	No	None	None	No	None	No	None	No	IND
105	B	37	7/12/2019	9:19:20	No	None	None	No	None	No	None	No	IND
105	C	37	7/12/2019	9:20:09	No	None	None	No	None	No	None	No	IND
106	A	32	7/12/2019	8:47:48	No	None	None	No	None	Yes	None	No	2
106	B	32	7/12/2019	8:48:38	No	None	None	No	None	Yes	Hermit Crab	No	2
106	C	32	7/12/2019	8:49:27	No	None	None	No	None	No	None	No	IND
107	A	52	7/13/2019	7:01:44	No	None	None	No	None	No	Hermit Crab	No	IND
107	B	52	7/13/2019	7:02:23	No	None	None	No	None	No	None	No	IND
107	C	52	7/13/2019	7:03:04	No	None	None	No	None	No	Hermit Crab	No	2
108	A	48	7/13/2019	7:35:59	No	None	None	No	None	Yes	Hydroids	Yes	2 on 3
108	B	48	7/13/2019	7:36:40	No	None	None	No	None	No	Hydroids	Yes	2 on 3
108	F	48	7/13/2019	7:39:14	No	None	None	No	None	No	Hydroids	No	IND
109	A	36	7/13/2019	7:58:17	No	None	None	No	None	Yes	None	Yes	2 on 3
109	C	36	7/13/2019	7:59:39	No	None	None	No	None	No	None	IND	IND
109	D	36	7/13/2019	8:00:11	No	None	None	No	None	Yes	Hydroids	Yes	2 on 3
110	B	53	7/13/2019	8:19:29	No	None	None	No	None	No	Hydroids	Yes	2 on 3
110	C	53	7/13/2019	8:20:14	No	None	None	No	None	No	Hydroids	Yes	2 on 3
110	D	53	7/13/2019	8:20:52	No	None	None	No	None	No	Hydroids	Yes	2 on 3
111	A	86	7/13/2019	8:41:30	No	None	None	No	None	Yes	None	IND	2
111	B	86	7/13/2019	8:42:21	No	None	None	No	None	No	None	No	IND
111	C	86	7/13/2019	8:43:00	No	None	None	No	None	No	None	No	IND
112	A	64	7/13/2019	9:06:04	No	None	None	No	None	No	Hermit Crab	Yes	2 on 3

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StationID	Replicate	Water Depth (ft)	Date	Time	Sensitive Taxa Present?	Type of Sensitive Taxa	Type of Species of Concern	Invasive Taxa Present?	Type of Invasive Taxa	Tubes Present?	Epifauna	Voids Present?	Successional Stage
112	B	64	7/13/2019	9:08:46	No	None	None	No	None	Yes	None	No	2
112	C	64	7/13/2019	9:10:44	No	None	None	No	None	Yes	None	No	2
113	A	47	7/13/2019	9:42:44	No	None	None	No	None	No	None	No	2
113	B	47	7/13/2019	9:43:32	No	None	None	No	None	No	None	No	2
113	C	47	7/13/2019	9:44:43	No	None	None	No	None	No	None	No	IND
114	A	50	7/13/2019	10:07:17	No	None	None	No	None	Yes	None	No	2 -> 3
114	B	50	7/13/2019	10:08:06	No	None	None	No	None	Yes	None	Yes	2 on 3
114	D	50	7/13/2019	10:09:27	No	None	None	No	None	Yes	None	Yes	2 on 3
115	A	43	7/13/2019	10:28:29	No	None	None	No	None	Yes	None	Yes	2 on 3
115	B	43	7/13/2019	10:29:18	No	None	None	No	None	Yes	None	Yes	2 on 3
115	C	43	7/13/2019	10:30:12	No	None	None	No	None	Yes	None	Yes	2 on 3
116	A	45	7/12/2019	11:15:11	No	None	None	No	None	No	None	No	IND
116	B	45	7/12/2019	11:17:10	No	None	None	No	None	No	None	No	1 -> 2
116	D	45	7/12/2019	11:18:32	No	None	None	No	None	Yes	None	No	1 -> 2
117	A	46	7/12/2019	11:47:13	No	None	None	No	None	No	None	No	IND
117	C	46	7/12/2019	11:48:34	No	None	None	No	None	Yes	Hermit Crab	No	2
117	D	46	7/12/2019	11:49:12	No	None	None	No	None	No	Sand Dollar	No	2
118	A	47	7/12/2019	16:05:52	No	None	None	No	None	Yes	None	No	2
118	B	47	7/12/2019	16:07:23	No	None	None	No	None	Yes	None	No	2
118	C	47	7/12/2019	16:08:53	No	None	None	No	None	Yes	None	No	2
119	A	45	7/12/2019	11:34:44	No	None	None	No	None	Yes	None	No	2
119	B	45	7/12/2019	11:35:25	No	None	None	No	None	Yes	None	No	2
119	C	45	7/12/2019	11:36:15	No	None	None	No	None	Yes	None	No	2
120	A	36	7/12/2019	12:59:28	No	None	None	No	None	No	None	No	2
120	B	36	7/12/2019	13:01:28	No	None	None	No	None	No	None	No	IND
120	C	36	7/12/2019	13:02:59	No	None	None	No	None	Yes	None	No	2
121	A	27	7/12/2019	13:26:29	No	None	None	No	None	No	None	No	2 -> 3
121	B	27	7/12/2019	13:28:05	No	None	None	No	None	No	None	No	IND
121	C	27	7/12/2019	13:29:31	No	None	None	No	None	Yes	None	No	2
122	A	44	7/12/2019	15:53:33	No	None	None	No	None	Yes	None	No	2
122	B	44	7/12/2019	15:55:18	No	None	None	No	None	Yes	Hermit Crab	No	2

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StationID	Replicate	Water Depth (ft)	Date	Time	Sensitive Taxa Present?	Type of Sensitive Taxa	Type of Species of Concern	Invasive Taxa Present?	Type of Invasive Taxa	Tubes Present?	Epifauna	Voids Present?	Successional Stage
122	C	44	7/12/2019	15:56:52	No	None	None	No	None	Yes	None	No	2
123	A	45	7/12/2019	15:17:15	No	None	None	No	None	No	None	No	2
123	B	45	7/12/2019	15:19:07	No	None	None	No	None	Yes	None	No	2
123	C	45	7/12/2019	15:20:45	No	None	None	No	None	Yes	None	No	2
124	A	41	7/12/2019	15:02:59	No	None	None	No	None	Yes	Mollusc	No	2
124	B	41	7/12/2019	15:04:34	No	None	None	No	None	No	None	No	2
124	C	41	7/12/2019	15:06:01	No	None	None	No	None	No	None	No	2
125	A	43	7/12/2019	15:31:40	No	None	None	No	None	Yes	None	No	2
125	B	43	7/12/2019	15:33:14	No	None	None	No	None	No	None	No	2
125	C	43	7/12/2019	15:34:50	No	None	None	No	None	Yes	Sand Dollar	No	2
126	A	37	7/12/2019	14:51:31	No	None	None	No	None	No	None	No	IND
126	C	37	7/12/2019	14:54:48	No	None	None	No	None	No	Hydroids	No	2 -> 3
126	D	37	7/12/2019	14:56:17	No	None	None	No	None	No	None	No	2
127	A	43	7/12/2019	15:41:45	No	None	None	No	None	No	None	No	IND
127	B	43	7/12/2019	15:43:25	No	None	None	No	None	No	None	No	IND
127	C	43	7/12/2019	15:45:03	No	None	None	No	None	No	None	No	IND
128	A	44	7/12/2019	14:32:02	No	None	None	No	None	IND	None	No	IND
128	B	44	7/12/2019	14:33:47	No	None	None	No	None	IND	None	No	IND
128	C	44	7/12/2019	14:35:19	No	None	None	No	None	IND	None	No	IND
129	A	40	7/12/2019	13:49:47	No	None	None	No	None	No	None	No	2
129	B	40	7/12/2019	13:51:37	No	None	None	No	None	Yes	None	No	2
129	C	40	7/12/2019	13:53:18	No	None	None	No	None	Yes	None	No	2
130	A	31	7/12/2019	14:11:48	No	None	None	No	None	No	None	No	IND
130	B	31	7/12/2019	14:13:30	No	None	None	No	None	No	None	No	IND
130	C	31	7/12/2019	14:14:55	No	None	None	No	None	No	None	No	IND
131	A	69	7/11/2019	15:22:35	No	None	None	No	None	Yes	None	No	2
131	B	69	7/11/2019	15:23:59	No	None	None	No	None	Yes	None	No	2
131	C	69	7/11/2019	15:25:09	No	None	None	No	None	No	Hermit Crab	No	IND
132	A	75	7/11/2019	15:03:19	No	None	None	No	None	Yes	None	No	2
132	B	75	7/11/2019	15:04:38	No	None	None	No	None	Yes	None	No	2

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StationID	Replicate	Water Depth (ft)	Date	Time	Sensitive Taxa Present?	Type of Sensitive Taxa	Type of Species of Concern	Invasive Taxa Present?	Type of Invasive Taxa	Tubes Present?	Epifauna	Voids Present?	Successional Stage
132	C	75	7/11/2019	15:05:52	No	None	None	No	None	No	None	No	2
133	A	79	7/11/2019	14:45:31	No	None	None	No	None	Yes	None	No	2
133	B	79	7/11/2019	14:46:49	No	None	None	No	None	No	Sand Dollars	No	IND
133	C	79	7/11/2019	14:48:06	No	None	None	No	None	Yes	None	No	2
134	A	80	7/11/2019	14:25:50	No	None	None	No	None	No	None	No	IND
134	B	80	7/11/2019	14:27:13	No	None	None	No	None	Yes	None	No	2
134	D	80	7/11/2019	14:29:45	No	None	None	No	None	No	None	No	IND
135	A	76	7/11/2019	4:37:00	No	None	None	No	None	No	None	No	IND
135	B	76	7/11/2019	4:37:50	No	None	None	No	None	Yes	None	No	2
135	D	76	7/11/2019	4:40:33	No	None	None	No	None	Yes	Sand Dollars	No	2
136	A	83	7/11/2019	4:16:12	No	None	None	No	None	Yes	None	No	2
136	B	83	7/11/2019	4:17:01	No	None	None	No	None	Yes	Gastropod	No	2
136	C	83	7/11/2019	4:18:34	No	None	None	No	None	No	None	No	IND
137	A	91	7/11/2019	3:56:08	No	None	None	No	None	Yes	None	No	2
137	B	91	7/11/2019	3:56:49	No	None	None	No	None	Yes	None	No	2
137	C	91	7/11/2019	3:57:37	No	None	None	No	None	Yes	None	No	2
138	A	90	7/11/2019	3:35:33	No	None	None	No	None	No	Sand Dollars	No	IND
138	B	90	7/11/2019	3:36:20	No	None	None	No	None	Yes	Sand Dollars	No	2
138	C	90	7/11/2019	3:37:07	No	None	None	No	None	No	Sand Dollars	No	IND
139	A	88	7/11/2019	3:14:21	No	None	None	No	None	Yes	None	No	2 -> 3
139	B	88	7/11/2019	3:15:08	No	None	None	No	None	Yes	Sand Dollars	No	2
139	C	88	7/11/2019	3:15:52	No	None	None	No	None	Yes	Sand Dollars	No	2
140	A	93	7/11/2019	2:51:45	No	None	None	No	None	Yes	None	No	2 -> 3
140	B	93	7/11/2019	2:52:27	No	None	None	No	None	Yes	Sand Dollars	No	2
140	C	93	7/11/2019	2:53:18	No	None	None	No	None	Yes	None	No	2
141	A	96	7/10/2019	19:24:58	No	None	None	No	None	Yes	None	No	2
141	B	96	7/10/2019	19:26:17	No	None	None	No	None	Yes	Sand Dollar	No	2
141	C	96	7/10/2019	19:27:36	No	None	None	No	None	Yes	Gastropod	No	2
142	A	95	7/10/2019	19:57:04	No	None	None	No	None	Yes	None	No	2
142	B	95	7/10/2019	19:58:33	No	None	None	No	None	Yes	Sand Dollar	No	2
142	C	95	7/10/2019	20:00:01	No	None	None	No	None	Yes	Sand Dollar	No	2
143	A	93	7/10/2019	20:40:07	No	None	None	No	None	Yes	Sand Dollar	No	2 -> 3
143	C	93	7/10/2019	20:43:07	No	None	None	No	None	Yes	None	No	2
143	D	93	7/10/2019	20:44:28	No	None	None	No	None	Yes	None	No	2
144	A	94	7/10/2019	21:01:21	No	None	None	No	None	Yes	Hermit Crab, Sand Dollars	No	2
144	B	94	7/10/2019	21:02:44	No	None	None	No	None	Yes	Sand Dollar	No	2
144	D	94	7/10/2019	21:05:26	No	None	None	No	None	Yes	None	No	2
145	A	99	7/10/2019	21:23:25	No	None	None	No	None	Yes	None	No	2 -> 3
145	B	99	7/10/2019	21:24:42	No	None	None	No	None	Yes	None	No	2
145	C	99	7/10/2019	21:26:12	No	None	None	No	None	Yes	Hermit Crab	No	2

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146	A	100	7/10/2019	21:43:36	No	None	None	No	None	Yes	None	No	2
146	B	100	7/10/2019	21:44:51	No	None	None	No	None	Yes	Sand Dollars	No	2
146	C	100	7/10/2019	21:46:03	No	None	None	No	None	Yes	None	No	2
147	A	103	7/10/2019	16:00:51	No	None	None	No	None	No	Sand Dollars	No	IND
147	B	103	7/10/2019	16:02:02	No	None	None	No	None	No	Gastropods	No	IND
147	C	103	7/10/2019	16:03:17	No	None	None	No	None	No	Gastropod, Sand Dollar	No	IND
148	A	115	7/10/2019	15:41:02	No	None	None	No	None	Yes	Sand Dollar	No	2 -> 3
148	B	115	7/10/2019	15:42:16	No	None	None	No	None	Yes	None	No	2
148	C	115	7/10/2019	15:43:25	No	None	None	No	None	Yes	Sand Dollar	No	2
149	A	111	7/10/2019	15:22:07	No	None	None	No	None	Yes	Sand Dollar	No	2
149	B	111	7/10/2019	15:23:16	No	None	None	No	None	No	Gastropod	No	2
149	D	111	7/10/2019	15:25:55	No	None	None	No	None	Yes	Sand Dollars	No	2
150	A	111	7/10/2019	14:50:28	No	None	None	No	None	No	Gastropod, Sand Dollars	No	2
150	B	111	7/10/2019	14:51:38	No	None	None	No	None	No	Sand Dollars	No	IND
150	C	111	7/10/2019	14:52:48	No	None	None	No	None	Yes	Sand Dollars	No	2
151	A	112	7/10/2019	14:30:28	No	None	None	No	None	Yes	None	No	2
151	B	112	7/10/2019	14:31:55	No	None	None	No	None	Yes	None	No	2 -> 3
151	D	112	7/10/2019	14:34:25	No	None	None	No	None	No	Sand Dollar	No	IND
152	A	113	7/10/2019	14:12:10	No	None	None	No	None	Yes	Sand Dollars	No	2
152	B	113	7/10/2019	14:13:28	No	None	None	No	None	Yes	None	No	2
152	D	113	7/10/2019	14:16:09	No	None	None	No	None	Yes	Gastropod	No	2
153	A	117	7/10/2019	13:49:55	No	None	None	No	None	Yes	Sand Dollar	No	2
153	B	117	7/10/2019	13:51:04	No	None	None	No	None	Yes	Sand Dollar	No	2
153	C	117	7/10/2019	13:52:15	No	None	None	No	None	Yes	None	No	2
154	A	121	7/10/2019	13:28:49	No	None	None	No	None	Yes	Sand Dollars	No	2
154	B	121	7/10/2019	13:30:04	No	None	None	No	None	Yes	None	No	2
154	C	121	7/10/2019	13:31:28	No	None	None	No	None	No	None	No	2
155	A	120	7/10/2019	13:08:12	No	None	None	No	None	Yes	None	No	2
155	B	120	7/10/2019	13:09:15	No	None	None	No	None	Yes	Sand Dollar	No	2
155	D	120	7/10/2019	13:11:26	No	None	None	No	None	Yes	None	No	2
156	A	119	7/10/2019	12:47:15	No	None	None	No	None	Yes	None	No	2
156	B	119	7/10/2019	12:48:21	No	None	None	No	None	No	None	No	IND
156	D	119	7/10/2019	12:50:32	No	None	None	No	None	Yes	Sand Dollar	No	2
157	A	121	7/10/2019	12:21:56	No	None	None	No	None	Yes	None	No	1 -> 2

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StationID	Replicate	Water Depth (ft)	Date	Time	Sensitive Taxa Present?	Type of Sensitive Taxa	Type of Species of Concern	Invasive Taxa Present?	Type of Invasive Taxa	Tubes Present?	Epifauna	Voids Present?	Successional Stage
157	B	121	7/10/2019	12:22:57	No	None	None	No	None	Yes	None	No	2
157	C	121	7/10/2019	12:24:00	No	None	None	No	None	Yes	Sand Dollar	No	2
REFA_01	A	94	7/13/2019	22:15:50	No	None	None	No	None	No	None	No	IND
REFA_01	B	94	7/13/2019	22:17:20	No	None	None	No	None	Yes	None	No	2
REFA_01	C	94	7/13/2019	22:18:43	No	None	None	No	None	Yes	None	No	2
REFA_02	A	105	7/13/2019	21:21:27	No	None	None	No	None	Yes	None	No	2
REFA_02	B	105	7/13/2019	21:23:07	No	None	None	No	None	Yes	None	No	2
REFA_02	D	105	7/13/2019	21:26:05	No	None	None	No	None	Yes	None	No	2
REFA_03	A	101	7/13/2019	21:48:32	No	None	None	No	None	No	None	No	2
REFA_03	B	101	7/13/2019	21:50:02	No	None	None	No	None	Yes	None	No	2
REFA_03	D	101	7/13/2019	21:52:50	No	None	None	No	None	No	Hermit Crab	No	IND
REFA_04	A	100	7/13/2019	21:37:46	No	None	None	No	None	No	None	No	IND
REFA_04	C	100	7/13/2019	21:41:22	No	None	None	No	None	Yes	None	No	2
REFA_04	D	100	7/13/2019	21:42:54	No	None	None	No	None	Yes	None	No	2
REFA_05	A	109	7/13/2019	22:00:17	No	None	None	No	None	Yes	None	No	2
REFA_05	B	109	7/13/2019	22:01:44	No	None	None	No	None	Yes	Hermit Crab	No	2
REFA_05	C	109	7/13/2019	22:03:11	No	None	None	No	None	Yes	None	No	2
REFB_01	A	77	7/11/2019	5:39:10	No	None	None	No	None	Yes	Sand Dollar	No	2
REFB_01	B	77	7/11/2019	5:39:55	No	None	None	No	None	Yes	None	No	2
REFB_01	C	77	7/11/2019	5:41:23	No	None	None	No	None	Yes	None	No	2
REFB_02	A	75	7/11/2019	5:05:43	No	None	None	No	None	No	None	No	IND
REFB_02	B	75	7/11/2019	5:06:26	No	None	None	No	None	Yes	None	No	2
REFB_02	C	75	7/11/2019	5:07:45	No	None	None	No	None	Yes	None	No	2
REFB_03	A	75	7/11/2019	5:18:19	No	None	None	No	None	No	None	No	IND
REFB_03	B	75	7/11/2019	5:19:01	No	None	None	No	None	Yes	None	No	2
REFB_03	C	75	7/11/2019	5:19:51	No	None	None	No	None	Yes	None	No	2
REFB_04	A	76	7/11/2019	5:28:14	No	None	None	No	None	Yes	None	No	2
REFB_04	D	76	7/11/2019	5:31:01	No	None	None	No	None	No	None	No	IND
REFB_04	E	76	7/11/2019	5:31:59	No	None	None	No	None	No	Hydroids	No	IND
REFB_05	A	79	7/11/2019	5:47:11	No	None	None	No	None	Yes	Sand Dollars	No	1 -> 2
REFB_05	B	79	7/11/2019	5:48:06	No	None	None	No	None	Yes	Sand Dollars	No	1 -> 2
REFB_05	C	79	7/11/2019	5:48:55	No	None	None	No	None	No	Gastropod, Sand Dollars	No	2
REFC_01	A	117	7/13/2019	20:24:09	No	None	None	No	None	Yes	None	No	2
REFC_01	B	117	7/13/2019	20:25:59	No	None	None	No	None	Yes	None	No	2
REFC_01	D	117	7/13/2019	20:28:51	No	None	None	No	None	Yes	Shrimp	No	2

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REFC_02	A	117	7/13/2019	20:32:29	No	None	None	No	None	Yes	None	No	2
REFC_02	B	117	7/13/2019	20:33:51	No	None	None	No	None	Yes	None	No	2
REFC_02	C	117	7/13/2019	20:35:19	No	None	None	No	None	Yes	None	No	2
REFC_03	A	119	7/13/2019	19:54:06	No	None	None	No	None	Yes	None	No	2
REFC_03	B	119	7/13/2019	19:55:33	No	None	None	No	None	Yes	None	No	2
REFC_03	D	119	7/13/2019	19:58:19	No	None	None	No	None	Yes	None	No	2
REFC_04	A	114	7/13/2019	20:12:44	No	None	None	No	None	Yes	None	No	2
REFC_04	B	114	7/13/2019	20:14:14	No	None	None	No	None	Yes	None	No	2
REFC_04	C	114	7/13/2019	20:15:36	No	None	None	No	None	Yes	None	No	2 -> 3
REFC_05	A	115	7/13/2019	20:03:58	No	None	None	No	None	Yes	None	No	2
REFC_05	B	115	7/13/2019	20:05:24	No	None	None	No	None	Yes	None	No	2
REFC_05	C	115	7/13/2019	20:06:57	No	None	None	No	None	Yes	None	No	2 -> 3

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StationID	Replicate	Water Depth (ft)	Date	Time	Comment
001	A	53	7/14/2019	3:35:07	Limited penetration. Very fine sand with some shell hash at surface in background of image. Lack of discernible aRPD or fauna makes SS determination difficult.
001	B	53	7/14/2019	3:35:52	Limited penetration. Very fine sand with a couple of clay clasts visible in upper centimeters of sediment. Some shell hash at surface in background of image. Lack of discernible aRPD or fauna makes SS determination difficult.
001	C	53	7/14/2019	3:36:37	Very fine sand with a few clasts of reduced clay at surface that are likely camera artefacts. Some shell hash in background of image. Lack of discernible aRPD or fauna makes SS determination difficult.
002	A	64	7/14/2019	3:13:17	Very fine pebbles over very fine sand. Some pebbles have been dragged down in to very fine sand by prism penetration. Stage 2 tubes visible at sediment surface in background of image.
002	B	64	7/14/2019	3:13:59	Very fine pebbles over very fine sand. Some pebbles have been dragged down in to very fine sand by prism penetration. Scattered very coarse pebbles in background of image at sediment surface. Stage 2 tubes visible at sediment surface in background of image.
002	C	64	7/14/2019	3:14:39	Very fine pebbles over medium sand. Some shell hash intermixed with very fine pebbles. No discernible aRPD or evidence of fauna makes SS difficult to determine.
003	A	70	7/14/2019	2:50:26	Very fine sand with a couple of Stage 2 tubes in the background of the image at the SWI.
003	B	70	7/14/2019	2:51:09	Very fine sand with worm and amphipod tubes at SWI. Small gastropods attached to worm tubes visible.
003	C	70	7/14/2019	2:51:44	Very fine sand with no discernible aRPD boundary or visible fauna to accurately designate SS.
004	A	73	7/14/2019	2:28:48	Very fine sand with a few Stage 2 tubes in background of image at SWI.
004	B	73	7/14/2019	2:29:34	Very fine sand with Stage 2 tubes, amphipods, and gastropods in background of image at SWI. A few scattered shell fragments also present.
004	C	73	7/14/2019	2:30:15	Very fine sand with a pocket of silt-clay ranging from approximately 1.5 cm depth to 6 cm depth. Some Stage 2 tubes and amphipod tubes visible at SWI.
005	A	77	7/14/2019	2:07:20	Medium sand with many shell fragments and a couple of very small pebbles present. Large boundary roughness but does not appear to have been caused by sediment ripples. No visible evidence of fauna or aRPD makes SS determination difficult.
005	B	77	7/14/2019	2:08:33	Very fine pebbles and large shell fragments over medium sand. A hermit crab at SWI. No evidence (aRPD or fauna) to determine SS.
005	C	77	7/14/2019	2:09:11	Very fine pebbles and large shell fragments over medium sand. No evidence (aRPD or fauna) to determine SS.
006	A	68	7/14/2019	1:47:08	Very fine pebbles and large shell fragments over medium sand. No evidence (aRPD or fauna) to determine SS.
006	B	68	7/14/2019	1:47:54	Very fine pebbles and large shell fragments over medium sand. No evidence (aRPD or fauna) to determine SS.
006	C	68	7/14/2019	1:48:37	Medium sand with some very fine pebbles intermixed. A Stage 2 tube at SWI.
007	A	77	7/14/2019	1:24:24	Poor image does not reveal much about sediment except boundary roughness.
007	B	77	7/14/2019	1:25:05	Poor image does not reveal much about sediment except boundary roughness. Something in background of image at SWI but difficult to tell what it is.
007	C	77	7/14/2019	1:25:47	Poor image does not reveal much about sediment except boundary roughness.
008	B	85	7/14/2019	0:19:10	Medium sand with very fine pebbles intermixed and at sediment surface. Amphipod structures at SWI.
008	C	85	7/14/2019	0:19:56	Medium sand with intermixed very fine pebbles, some larger. Some shell hash at sediment surface, along with Stage 2 tubes and amphipod structures.
008	D	85	7/14/2019	0:20:41	Medium sand with intermixed very fine pebbles. No evidence (aRPD or fauna) to determine SS.
009	A	95	7/13/2019	23:50:13	Very fine pebbles with a couple intermixed fine pebbles over and intermixed with medium sand. No evidence (aRPD or fauna) to determine SS.
009	B	95	7/13/2019	23:51:37	Very fine pebbles with a couple intermixed fine pebbles over and intermixed with medium sand. No evidence (aRPD or fauna) to determine SS.

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009	C	95	7/13/2019	23:53:04	Very fine pebbles over medium sand. A few fine pebbles at SWI with large shell fragments. No evidence (aRPD or fauna) to determine SS.
010	B	116	7/13/2019	23:26:52	Fine sand over silt-clay. Dense amphipod tubes at SWI with a few very fine pebbles and a coarse pebble also at SWI. Open voids and a visible worm in a burrow at depth.
010	C	116	7/13/2019	23:28:16	Silt-clay with a high density of amphipod tubes at SWI along with some shell hash. Drag-down from tubes has obscured aRPD depth.
010	D	116	7/13/2019	23:29:47	Fine sand over silt-clay. Dense amphipod tubes at SWI with a few very fine pebbles also at SWI. Evidence of deep burrowing present but no visible evidence of Stage 3 fauna.
011	A	224	7/13/2019	22:56:37	High penetration. Silt-clay with Stage 2 tubes at SWI, visible worms in burrows, and multiple open and partially filled voids.
011	B	224	7/13/2019	22:58:11	High penetration. Silt-clay with Stage 2 tubes at SWI, visible worms in burrows, and partially filled and infilled voids
011	C	224	7/13/2019	22:59:48	High penetration. Silt-clay with Stage 2 tubes at SWI, visible worms in burrows, and partially filled and infilled voids
012	A	127	7/13/2019	19:29:31	Very fine sand with dense amphipod tubes at SWI.
012	B	127	7/13/2019	19:31:08	Very fine sand with dense amphipod tubes at SWI. Infilled voids present.
012	C	127	7/13/2019	19:32:27	Very fine sand with dense amphipod tubes at SWI. Two large worms at depth against faceplate.
013	A	111	7/13/2019	19:05:00	Medium sand with possible rippling at SWI. Amphipod structures at SWI.
013	B	111	7/13/2019	19:06:42	Medium sand with possible rippling at SWI. Amphipod structures and a few Stage 2 tubes at SWI.
013	C	111	7/13/2019	19:08:11	Medium sand with some shell fragments intermixed. Amphipod tubes at SWI.
014	A	117	7/13/2019	18:40:36	Medium sand with occasional shell fragments intermixed. Amphipod tubes at SWI.
014	B	117	7/13/2019	18:42:09	Medium sand with occasional shell fragments intermixed. Amphipod tubes and structures at SWI.
014	D	117	7/13/2019	18:45:03	Medium sand with a layer of reduced fines at the maximum penetration of the prism. Occasional shell fragments intermixed in the sand layer. Amphipod tubes and structures at SWI.
015	A	109	7/13/2019	18:14:33	Very fine sand with rippling at the sediment surface. Amphipod structures and Stage 2 worm tubes at SWI.
015	B	109	7/13/2019	18:16:12	Very fine sand with rippling at the sediment surface. Amphipod and Stage 2 worm tubes at SWI.
015	C	109	7/13/2019	18:17:53	Very fine sand with many amphipod tubes at SWI and some evidence of burrowing in the sediment column.
016	A	95	7/10/2019	19:06:41	Very fine sand with Stage 2 tubes at SWI. Sand dollars present on sediment surface.
016	B	95	7/10/2019	19:07:59	Very fine sand with evidence of burrowing moving the aRPD boundary deeper in to sediment. A sand dollar against the faceplate. A few Stage 2 tubes and small gastropods at the SWI in background of image.
016	C	95	7/10/2019	19:09:18	Very fine sand with Stage 2 tubes and amphipod structures at SWI in background of image. Large worm visible in burrow beneath aRPD boundary.
017	A	93	7/10/2019	18:46:29	Very fine sand with amphipod structures and sand dollars at SWI.
017	B	93	7/10/2019	18:47:44	Very fine sand with amphipod structures, sand dollars, and Stage 2 tubes at SWI in background of image.
017	D	93	7/10/2019	18:50:11	Very fine sand with many Stage 2 tubes and amphipod structures at SWI. A sand dollar against the faceplate. A worm in a burrow beneath aRPD boundary.
018	A	90	7/10/2019	18:25:08	Very fine sand with many Stage 2 tubes and amphipod structures at SWI. Shell hash and a hermit crab on sediment surface.
018	B	90	7/10/2019	18:26:34	Very fine sand with a few Stage 2 tubes and amphipod structures at the SWI.
018	C	90	7/10/2019	18:27:53	Very fine sand with many hermit crabs in background of image along with a fish just in frame. Shell hash present on sediment surface.
019	A	97	7/10/2019	18:03:03	Very fine sediment with many Stage 2 tubes at SWI. Evidence of burrowing bringing aRPD boundary deeper in to sediment.

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019	B	97	7/10/2019	18:04:10	Very fine sediment with an amphipod structure at SWI. Apparent rippling of sediment occurring.
019	C	97	7/10/2019	18:05:19	Very fine sand over fine sand with very high penetration. Multiple layers of sediment at depth, possible relic aRPD. Stage 2 tubes at SWI. Burrowing evident throughout sediment column but no visible evidence of Stage 3 fauna.
020	A	92	7/10/2019	17:42:53	Very fine sand with multiple sand dollars and an amphipod structure at SWI. Rippling of sediment evident. Portion of image has aRPD greater than penetration because of rippling.
020	B	92	7/10/2019	17:44:34	Very fine sand with a thin aRPD. Some shell hash on sediment surface in background.
020	C	92	7/10/2019	17:45:55	Very fine sand with a few small Stage 2 tubes and a sand dollar against the faceplate. A few shell fragments present near sediment surface.
021	A	97	7/10/2019	22:18:09	Medium sand with no visible fauna to determine SS.
021	B	97	7/10/2019	22:19:30	Medium sand with no visible fauna to determine SS. A sand dollar on sediment surface in background of image.
021	D	97	7/10/2019	22:22:06	Medium sand with no visible fauna to determine SS.
022	A	95	7/10/2019	22:37:29	Fine sand with a Stage 2 tube at SWI. Shell hash at SWI and within upper sediment.
022	B	95	7/10/2019	22:38:46	Fine sand with many Stage 2 tubes and amphipod structures at SWI. A hermit crab on sediment surface. Some shell fragments intermixed with sediment.
022	C	95	7/10/2019	22:40:01	Fine sand with a large sediment ripple captured in image. Stage 2 tubes at sediment surface in background of image.
023	A	91	7/10/2019	22:57:17	Medium sand with intermixed shell fragments. No visible fauna to help determine SS.
023	B	91	7/10/2019	22:58:43	Medium sand with intermixed shell fragments. No visible fauna to help determine SS. Worm at sediment surface.
023	D	91	7/10/2019	23:01:14	Medium sand with intermixed shell fragments. No visible fauna to help determine SS. Large shell against face plate.
024	A	97	7/10/2019	23:16:48	Medium sand with a few Stage 2 tubes in background of image at SWI.
024	B	97	7/10/2019	23:18:16	Medium sand with intermixed shell fragments. Sand dollars, a hermit crab, and Stage 2 tubes at SWI in background of image.
024	C	97	7/10/2019	23:19:35	Medium sand with intermixed shell hash. Stage 2 tubes and a sand dollar at the sediment surface.
025	A	102	7/11/2019	0:56:36	Medium sand with a few amphipod structures at SWI in background of image at sediment surface.
025	B	102	7/11/2019	0:57:20	Medium sand with a few Stage 2 tubes and a hermit crab at SWI.
025	D	102	7/11/2019	0:59:04	Medium sand with intermixed shell hash at depth. Well-developed aRPD with a large burrow bringing aRPD boundary deeper. A hermit crab and multiple sand dollars at sediment surface.
026	C	98	7/11/2019	2:19:45	Fine sand with many Stage 2 tubes at SWI.
026	F	98	7/11/2019	2:22:09	Fine sand with Stage 2 tubes, amphipod structures, and sand dollars at SWI.
026	G	98	7/11/2019	2:23:01	Fine sand with some turbidity in the water column. Evidence of burrowing beneath aRPD boundary.
027	A	97	7/11/2019	10:38:45	Fine sand with a few tubes at SWI and evidence of shallow burrowing.
027	B	97	7/11/2019	10:39:29	Fine sand with a sand dollar and amphipod structures at SWI.
027	C	97	7/11/2019	10:40:15	Fine sand with many Stage 2 tubes and amphipod tubes in background of image at SWI.
028	A	88	7/11/2019	10:56:17	Fine sand with a gastropod against the faceplate. A sand dollar and Stage 2 tube in background of image.
028	B	88	7/11/2019	10:57:12	Fine sand with amphipod structures and small tubes in background of image at SWI.
028	C	88	7/11/2019	10:57:55	Fine sand with intermixed shell fragments. Sand dollars at SWI.
029	A	89	7/11/2019	11:14:45	Fine sand with Stage 2 tubes and shell hash at sediment surface in background of image.
029	B	89	7/11/2019	11:15:25	Fine sand with small Stage 1 tubes and a sand dollar at SWI. A large worm in a burrow visible beneath aRPD boundary.
029	C	89	7/11/2019	11:16:09	Fine sand with Stage 2 tubes and sand dollars at sediment surface in background of image.
030	A	123	7/10/2019	3:03:41	Fine sand with intermixed shell fragments and a sand dollar against the faceplate. Stage 2 tubes and amphipod structures in background of image.

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030	C	123	7/10/2019	3:08:14	Fine sand with intermixed shell fragments. Stage 2 tubes in background of image at sediment surface.
030	D	123	7/10/2019	3:10:00	Fine sand with intermixed shell fragments. Stage 2 tubes in background of image at sediment surface.
031	A	117	7/10/2019	4:07:40	Fine sand with many sand dollars at sediment surface. No visible evidence of fauna to aid in SS determination.
031	B	117	7/10/2019	4:08:49	Fine sand with some intermixed shell hash. No visible evidence of fauna to aid in SS determination.
031	C	117	7/10/2019	4:09:53	Fine sand with medium sand intermixed. Some rippling apparent in background of image. Unable to determine aRPD or SS.
032	A	118	7/10/2019	4:43:15	Fine sand with intermixed shell hash. Shallow aRPD with Stage 1 tubes at SWI.
032	B	118	7/10/2019	4:44:10	Fine sand with intermixed shell hash. Sand dollars at sediment surface. A worm in a burrow beneath the aRPD boundary.
032	D	118	7/10/2019	4:46:32	Fine sand with intermixed shell hash. Stage 2 and Stage 1 tubes at SWI.
033	A	110	7/10/2019	5:34:24	Fine sand with Stage 1 tubes at SWI. Evidence of burrowing moving the aRPD boundary deeper in to sediment.
033	B	110	7/10/2019	5:35:18	Fine sand with some intermixed shell hash and Stage 1 tubes at SWI. Partial aRPD and a sand dollar in background of image on sediment surface.
033	C	110	7/10/2019	5:36:36	Fine sand with intermixed shell hash. A sand dollar against face plate and another in background of image on sediment surface. Stage 2 tubes visible in background of image.
034	A	109	7/10/2019	6:02:04	Fine sand with many sand dollars both against the face plate and in background of image. Well-developed aRPD.
034	B	109	7/10/2019	6:03:02	Fine sand with intermixed shell hash. Amphipod tubes at SWI.
034	C	109	7/10/2019	6:06:15	Fine sand with shell hash and many sand dollars at SWI. A burrow moving aRPD boundary deeper in to sediment visible.
035	A	110	7/10/2019	6:34:32	Fine sand with shell hash intermixed. Sand dollar and amphipod structures at SWI. Evidence of sediment rippling.
035	B	110	7/10/2019	6:35:21	Fine sand with some intermixed shell hash. Stage 2 tubes at sediment surface in background of image.
035	C	110	7/10/2019	6:37:41	Fine sand with intermixed shell hash and surficial shell hash. Amphipod structures and Stage 2 tubes at SWI, as well as sand dollars in background of image.
036	A	100	7/10/2019	6:58:52	Medium sand with intermixed and surficial shell hash. Stage 2 tubes and amphipod structures in the background of image.
036	B	100	7/10/2019	6:59:53	Medium sand with intermixed shell hash. Stage 2 tubes, multiple gastropods, and a sand dollar on the sediment surface.
036	C	100	7/10/2019	7:00:48	Medium sand with a sand dollar against the face plate. Amphipod tubes in background of image.
037	A	105	7/10/2019	7:20:11	Very coarse sand with a variety of pebble sizes over medium sand. Stage 2 tubes in background of image. A large worm in a burrow against the faceplate at depth.
037	C	105	7/10/2019	7:21:57	Very coarse sand with a variety of pebble sizes at the surface and intermixed with a layer of medium sand beneath the very coarse sand. A hermit crab at sediment surface. No evidence (aRPD or fauna) visible to determine SS.
037	D	105	7/10/2019	7:23:19	Very coarse sand over medium sand with intermixed small pebbles. Amphipod structures in background of image at SWI and a large worm in a burrow against the face plate.
038	A	100	7/10/2019	7:44:15	Fine sand with Stage 2 tubes and a gastropod at sediment surface in the background of the image.
038	B	100	7/10/2019	7:45:05	Fine sand with Stage 2 tubes and a sand dollar in background of image. Shell hash intermixed with fine sand.
038	C	100	7/10/2019	7:45:58	Fine sand with intermixed and surficial shell hash. Stage 2 tubes and possible amphipod structures in background of image.
039	A	98	7/10/2019	8:08:38	Fine sand with amphipod structures, Stage 2 tubes, and a sand dollar at SWI.
039	B	98	7/10/2019	8:10:15	Fine sand with Stage 2 tubes, a sand dollar, and a hermit crab at sediment surface.
039	C	98	7/10/2019	8:11:11	Fine sand with a Stage 2 tube and sand dollars on sediment surface.
040	A	98	7/10/2019	8:31:56	Medium sand with a developed aRPD and evidence of burrows moving the aRPD deeper, despite no visible fauna.

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StationID	Replicate	Water Depth (ft)	Date	Time	Comment
040	B	98	7/10/2019	8:32:46	Medium sand with many amphipod and Stage 2 tubes at SWI. Possible worm in burrow at depth.
040	C	98	7/10/2019	8:33:34	Medium sand with some rippling, partial aRPD, and a couple of sand dollars at SWI.
041	A	96	7/10/2019	8:53:58	Medium sand with Stage 2 tubes, amphipod tubes, and amphipod structures at the SWI.
041	B	96	7/10/2019	8:54:40	Medium sand with Stage 2 tubes and possible amphipod tubes at SWI.
041	C	96	7/10/2019	8:55:27	Medium sand with Stage 2 tubes at SWI, a sand dollar against the faceplate, and a burrow moving the aRPD boundary deeper in to sediment.
042	A	94	7/10/2019	9:16:46	Fine sand with amphipod structures at SWI and Stage 2 tubes visible in background of image. PV trigger weight and associated line visible at sediment surface. Large worm in burrow and many other worms visible in burrows all beneath aRPD boundary. Possible rippling at sediment surface.
042	B	94	7/10/2019	9:18:32	Fine sand with an amphipod structure at SWI. Rippling of sediment surface evident in background of image.
042	C	94	7/10/2019	9:19:18	Fine sand with a reduced layer of very fine sand at depth, as well as a patch of reduced sediment near SWI. Some reduced small sediment clasts at SWI along with Stage 2 tubes. Evidence of rippling in background of image.
043	A	88	7/11/2019	11:29:09	Medium sand with shell hash at SWI and some intermixed. Stage 2 tubes in background of image at sediment surface.
043	B	88	7/11/2019	11:30:01	Medium sand with scattered shell hash intermixed in upper cms of sediment. Tubes in background of image.
043	C	88	7/11/2019	11:30:49	Medium sand with Stage 2 tubes in background of image and a sand dollar against the faceplate.
044	A	87	7/11/2019	11:46:59	Medium sand with an indistinct aRPD and shell hash at SWI.
044	B	87	7/11/2019	11:47:46	Medium sand with intermixed shell hash near sediment surface. Stage 2 tube at SWI and a sand dollar against the faceplate.
044	C	87	7/11/2019	11:49:02	Medium sand with intermixed shell hash. Tubes visible in far background of image.
045	A	83	7/11/2019	12:07:17	Medium sand with a gastropod and Stage 2 tubes at SWI.
045	B	83	7/11/2019	12:08:50	Medium sand with no visual evidence (aRPD boundary or fauna) to aid with SS determination.
045	C	83	7/11/2019	12:10:01	Medium sand with small Stage 1 tubes visible at SWI. Shell hash at SWI.
046	A	84	7/11/2019	19:50:44	Medium pebbles overlaying medium sand. Coarseness of sediment makes aRPD determination difficult and no visible fauna to aid with SS determination.
046	B	84	7/11/2019	19:52:00	Medium sand with some reduced clay clasts within sediment column. Many hydroids in background of image.
046	D	84	7/11/2019	19:54:26	Medium sand with a few fine pebbles at SWI. Some reduced clay clasts within sediment column. Many hydroids in background of image.
047	A	81	7/11/2019	19:22:37	Fine sand with no visible fauna to aid with determination of SS.
047	D	81	7/11/2019	19:26:29	Fine sand with a large number of sand dollars both against the faceplate and in the background of the image.
047	E	81	7/11/2019	19:30:59	Fine sand with Stage 2 structures at SWI, as well as a sand dollar. Shell hash on sediment surface.
048	A	77	7/11/2019	12:24:14	Medium sand with shell hash at sediment surface and intermixed in top cms of sediment. Stage 2 tubes visible in background of image.
048	B	77	7/11/2019	12:25:30	Medium sand with scattered shell fragments on surface and intermixed. No visible evidence (aRPD or fauna) to determine SS.
048	C	77	7/11/2019	12:26:48	Medium sand with multiple Stage 2 tubes at SWI. Shell hash intermixed in sediment column.
049	A	87	7/11/2019	12:41:42	Very fine sand with many amphipod structures at the SWI.
049	B	87	7/11/2019	12:42:56	Very fine sand with many Stage 2 tubes and amphipod structures at SWI. Multiple visible burrows moving aRPD boundary deeper in to sediment with a worm visible in a burrow near aRPD boundary.
049	D	87	7/11/2019	12:45:22	Very fine sand with many amphipod structures at the SWI. Burrowing bringing aRPD boundary deeper and multiple very large worm visible at depth.
050	A	87	7/11/2019	12:59:30	No penetration.
050	B	87	7/11/2019	13:00:47	No penetration.

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StationID	Replicate	Water Depth (ft)	Date	Time	Comment
050	C	87	7/11/2019	13:01:55	Fine sand with large shell hash at both the surface and intermixed in the sediment. Stage 2 tubes and a very fine pebble at SWI.
051	A	84	7/11/2019	13:18:11	Very fine to medium pebbles with a patch of silt-clay. Unable to determine aRPD or SS from coarse material.
051	C	84	7/11/2019	13:20:36	Medium pebbles overlaying very fine pebbles and very coarse sand. Unable to determine aRPD or SS from coarse material.
051	D	84	7/11/2019	13:21:50	Very fine pebbles and very coarse sand with a few fine pebbles at SWI. Unable to determine aRPD or SS from coarse material.
052	B	77	7/11/2019	14:07:38	Fine sand with sand dollars against the faceplate and in background of image along with Stage 2 tubes.
052	C	77	7/11/2019	14:08:53	Fine sand with Stage 2 tubes in background of image at sediment surface.
052	D	77	7/11/2019	14:10:04	Fine sand with Stage 2 tubes in background of image at sediment surface.
053	A	72	7/12/2019	20:56:30	Fine sand with Stage 2 tubes and shell hash at the sediment surface. Some shell hash intermixed in sediment.
053	B	72	7/12/2019	20:58:18	Fine sand with burrowing moving aRPD boundary deeper in to sediment.
053	D	72	7/12/2019	21:01:13	Fine sand with burrowing moving aRPD boundary deeper in to sediment. Shell hash at sediment surface and intermixed with sediment.
054	A	72	7/12/2019	21:19:09	Coarse sand with a Stage 2 tube in the background of image at sediment surface.
054	B	72	7/12/2019	21:20:18	Coarse sand with intermixed very fine pebbles. No fauna or discernable aRPD visible to determine SS.
054	C	72	7/12/2019	21:22:01	Coarse sand overlaying medium sand with no fauna or discernible aRPD visible to determine SS.
055	A	73	7/12/2019	23:58:30	Fine sand with shell hash at the sediment surface. A Stage 2 tube visible in background of image.
055	B	73	7/13/2019	0:00:04	Fine sand with shell hash and Stage 2 tubes at SWI and some shell hash intermixed with sediment.
055	C	73	7/13/2019	0:01:35	Fine sand with shell hash at the SWI. A gastropod visible at sediment surface in background of image.
056	A	81	7/13/2019	0:21:54	Very fine sand with Stage 2 tubes at SWI. Possible gastropod in background of image at sediment surface. Worms in burrows beneath aRPD boundary moving deeper.
056	B	81	7/13/2019	0:22:57	Very fine sand with many Stage 2 tubes at SWI. Burrows in sediment moving aRPD boundary deeper.
056	C	81	7/13/2019	0:23:37	Very fine sand with many Stage 2 tubes at SWI along with a crab. Burrows in sediment moving aRPD boundary deeper.
057	A	86	7/13/2019	0:44:08	Very fine sand with Stage 2 tubes and amphipod structures at SWI. Polychaetes visible on tubes, on sediment surface, and within burrows in sediment.
057	B	86	7/13/2019	0:44:50	Very fine sand with tubes and amphipod structures at SWI. Worms in burrows visible beneath aRPD boundary.
057	C	86	7/13/2019	0:45:32	Very fine sand with tubes and amphipod structures at SWI. A gastropod on sediment surface. Burrowing bringing aRPD boundary deeper.
058	A	91	7/13/2019	1:07:56	Very fine sand with Stage 2 tubes and amphipod structures at SWI.
058	C	91	7/13/2019	1:09:21	Very fine sand with many amphipod structures at SWI along with a few sand dollars and a gastropod on sediment surface.
058	D	91	7/13/2019	1:09:58	Very fine sand with small-scale mounding occurring, possibly due to sediment transport. Sand dollar against faceplate and gastropod at sediment surface in background of image.
059	A	95	7/13/2019	1:29:36	Very fine sand with many amphipod structures and Stage 2 tubes at SWI. A gastropod at the sediment surface in the background of the image.
059	B	95	7/13/2019	1:30:21	Very fine sand over silt-clay. Stage 2 tubes and amphipod structures at SWI. Some small reduced clasts at SWI.
059	C	95	7/13/2019	1:31:00	Very fine sand over silt-clay. Amphipod structures at SWI and a partially infilled void at depth.
060	A	95	7/13/2019	1:54:25	Very fine sand with a Stage 2 tube and many clam shells at SWI. Amphipod structures visible in background of image. Burrowing evident beneath aRPD boundary.
060	B	95	7/13/2019	1:55:03	Very fine sand over silt-clay with Stage 2 tubes and amphipod structures at SWI. Burrows visible beneath aRPD boundary.

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StationID	Replicate	Water Depth (ft)	Date	Time	Comment
060	C	95	7/13/2019	1:55:45	Very fine sand over silt-clay with a Stage 2 tube visible at SWI. Burrowing evident beneath aRPD boundary.
061	A	91	7/13/2019	2:18:35	Very fine sand over silt-clay. Stage 2 tubes and amphipod structures at SWI. Large burrows visibly moving aRPD boundary deeper.
061	B	91	7/13/2019	2:19:17	Very fine sand over silt-clay. Stage 2 tubes and amphipod structures at SWI. Large burrows visibly moving aRPD boundary deeper. Shell hash in silt-clay layer of sediment.
061	C	91	7/13/2019	2:20:00	Very fine sand over silt-clay. Stage 2 tubes and amphipod structures at SWI. A sediment mound in background of image.
062	A	87	7/13/2019	2:40:14	Very fine sand over silt-clay. Stage 2 tubes and amphipod structures at SWI. A large burrow present in image.
062	B	87	7/13/2019	2:41:00	Very fine sand over silt-clay with a transected mound or ripple creating large small-scale boundary roughness. Many gastropods in background of image along with Stage 2 tubes and amphipod structures. Visible burrows beneath aRPD boundary.
062	D	87	7/13/2019	2:42:24	Very fine sand over silt-clay. Stage 2 tubes at SWI and worms visible in burrows beneath aRPD boundary.
063	B	74	7/11/2019	18:32:06	Very fine sand with Stage 2 tubes at SWI.
063	C	74	7/11/2019	18:33:16	Very fine sand with Stage 2 tubes and a couple of gastropods at SWI. Shell hash at depth.
063	D	74	7/11/2019	18:34:28	Very fine sand with sand dollars at SWI. A moon snail egg casing has been transected by prism and partially obscures aRPD depth.
064	A	72	7/11/2019	17:43:40	Very fine sand with Stage 2 tubes, a gastropod, and multiple sand dollars at SWI in background of image. A sand dollar also against the face plate.
064	B	72	7/11/2019	17:45:19	Very fine sand with some shell hash at SWI, as well as a sand dollar. Another sand dollar against face plate.
064	C	72	7/11/2019	17:46:35	Very fine sand with a small mound a Stage 2 tube, and a sand dollar in the background of the image.
065	A	77	7/11/2019	16:59:10	Very fine sand with Stage 2 tubes, amphipod structures, and a gastropod at sediment surface.
065	B	77	7/11/2019	17:00:25	Very fine sand with Stage 2 tubes and amphipod structures at sediment surface. A small mound in background of image.
065	C	77	7/11/2019	17:01:35	Very fine sand with Stage 2 tubes, an amphipod structure, and a gastropod visible at sediment surface.
066	A	82	7/11/2019	16:38:10	Fine sand with intermixed shell hash. Tubes and a gastropod in background of image.
066	B	82	7/11/2019	16:39:40	Fine sand with intermixed and surficial shell hash. A sand dollar at sediment surface in background of image.
066	C	82	7/11/2019	16:41:02	Fine sand with intermixed shell hash. Stage 2 and Stage 1 tubes at SWI.
067	A	77	7/11/2019	16:18:44	Fine sand with a sand dollar against the face plate and Stage 2 tubes in background of image.
067	B	77	7/11/2019	16:20:01	Fine sand with sand dollars in background of image along with shell hash. Burrowing evident in upper sediment.
067	D	77	7/11/2019	16:22:36	Fine sand with some surficial shell hash and sand dollars in background of image.
068	A	70	7/11/2019	16:00:31	Fine pebbles with some coarse and very coarse pebbles overlaying medium sand. No visible fauna or aRPD in coarse material.
068	B	70	7/11/2019	16:01:52	Fine pebbles with some coarse pebbles overlaying medium sand. Pebbles also intermixed in sand matrix. No visible fauna or aRPD in coarse material.
068	C	70	7/11/2019	16:03:01	Very coarse sand with some fine pebbles at sediment surface overlaying medium sand. Shell hash and very fine pebbles intermixed in sand matrix
069	A	70	7/11/2019	15:41:06	Very coarse sand over medium sand with intermixed very fine pebbles. Stage 2 tubes at sediment surface in background of image.
069	B	70	7/11/2019	15:42:37	Coarse sand over medium sand with some scattered very fine pebbles. No visible aRPD or fauna.
069	C	70	7/11/2019	15:43:54	Medium sand with a few intermixed very fine pebbles. Stage 2 tube in background of image.
070	A	76	7/12/2019	20:11:06	Fine sand with Stage 2 tubes in background of image at sediment surface.
070	B	76	7/12/2019	20:12:35	Fine sand with Stage 2 tubes and amphipod structures at sediment surface in background of image.
070	C	76	7/12/2019	20:14:05	Fine sand with amphipod structures at SWI.

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071	A	71	7/12/2019	19:52:58	Medium sand with Stage 2 tubes at sediment surface in background of image
071	B	71	7/12/2019	19:54:29	Medium sand with sand dollars and gastropods in background of image. A sand dollar against the faceplate.
071	C	71	7/12/2019	19:55:58	Medium sand with patches of broken shell intermixed. Stage 2 tubes at SWI.
072	A	74	7/12/2019	19:35:07	Very fine sand with amphipod structures and Stage 2 tubes at SWI.
072	C	74	7/12/2019	19:38:13	Very fine sand with amphipod structures and Stage 2 tubes at SWI.
072	D	74	7/12/2019	19:39:50	Very fine sand with Stage 2 tubes at SWI as well as a sand dollar and a hermit crab at sediment surface.
073	A	81	7/12/2019	19:18:07	Very fine sand with Stage 2 tubes, amphipod structures, and a gastropod at sediment surface.
073	B	81	7/12/2019	19:19:37	Very fine sand with many Stage 2 and amphipod tubes at sediment surface.
073	C	81	7/12/2019	19:21:06	Very fine sand with many Stage 2 and amphipod tubes at sediment surface. A gastropod in background of image and visible burrows moving aRPD boundary deeper.
074	E	86	7/12/2019	18:59:48	Very fine sand with Stage 2 tubes and amphipod structures at SWI. Mound in background of image. Visible worm in burrow beneath aRPD boundary.
074	F	86	7/12/2019	19:01:27	Very fine sand with many Stage 2 tubes and amphipod structures at SWI.
074	G	86	7/12/2019	19:03:13	Very fine sand with many Stage 2 tubes and amphipod structures at SWI.
075	A	91	7/12/2019	18:25:31	Very fine sand over reduced silt-clay. Many amphipod structures at SWI.
075	B	91	7/12/2019	18:27:03	Very fine sand over reduced silt-clay. Amphipod structures and unknown organism at SWI. Worm visible in burrow at depth.
075	D	91	7/12/2019	18:30:09	Very fine sand over reduced silt-clay. Stage 2 tubes at SWI and a gastropod's proboscis just in frame at sediment surface.
076	A	90	7/12/2019	17:52:40	Very fine sand over silt-clay with many Stage 2 tubes and amphipod structures at SWI.
076	B	90	7/12/2019	17:54:19	Very fine sand with many Stage 2 tubes and amphipod structures at SWI.
076	C	90	7/12/2019	17:55:52	Very fine sand with many Stage 2 tubes and amphipod structures at SWI.
077	A	86	7/12/2019	17:32:45	Very fine sand over silt-clay. Amphipod structure at SWI and worms visible in burrows above aRPD boundary.
077	C	86	7/12/2019	17:35:47	Very fine sand over silt-clay. Amphipod structures, Stage 2 tubes, and a large gastropod visible at sediment surface. A mound in the background.
077	D	86	7/12/2019	17:37:23	Very fine sand over silt-clay. Amphipod structures at SWI along with some sediment rippling. Large worm in burrow visible moving aRPD boundary deeper. Open voids at depth.
078	A	77	7/11/2019	18:45:32	Very fine sand with Stage 2 tubes in background of image.
078	B	77	7/11/2019	18:47:03	Very fine sand with Stage 2 tubes in background of image.
078	C	77	7/11/2019	18:48:15	Very fine sand with a small tube at SWI. Sand dollars on sediment surface and against face plate.
079	A	80	7/12/2019	4:58:21	Fine sand with many Stage 1 and Stage 2 tubes at sediment surface. Large cluster of shell at background of image.
079	C	80	7/12/2019	5:00:02	Fine sand with Shell hash and Stage 2 tubes at SWI.
079	D	80	7/12/2019	5:00:41	Fine sand with Stage 2 tubes and a gastropod at sediment surface in the background of the image.
080	A	69	7/12/2019	5:40:46	Medium sand with Stage 2 tubes and a large amount of shell hash at SWI. Large shell cluster in background of image.
080	B	69	7/12/2019	5:41:36	Medium sand with shell hash at SWI and intermixed in upper sediment. Many hermit crabs and a gastropod visible at sediment surface and on shell hash. Possible orange sponge against faceplate.
080	C	69	7/12/2019	5:42:16	Medium sand with shell hash at SWI and intermixed in sediment. Stage 2 tubes at SWI.
081	A	83	7/11/2019	19:02:31	Very fine sand with Stage 2 tube and amphipod structure at SWI. Burrowing visible moving aRPD boundary deeper.
081	B	83	7/11/2019	19:04:06	Very fine sand with Stage 2 tubes, amphipod structures, and multiple gastropods at SWI. Burrowing visible moving aRPD boundary deeper.
081	C	83	7/11/2019	19:05:18	Very fine sand with reduced very fine sand at depth. A Stage 2 tube at SWI.

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082	A	76	7/12/2019	4:18:26	Medium sand with intermixed shell hash. A clam shell at sediment surface. A burrow creating small-scale boundary roughness.
082	B	76	7/12/2019	4:19:26	Medium sand with intermixed shell hash. Unable to determine aRPD boundary and no visible evidence of fauna. Possible burrow within sediment.
082	C	76	7/12/2019	4:20:13	Medium sand with surficial and intermixed shell hash. A Stage 2 tube visible in background of image.
083	A	76	7/12/2019	5:26:07	Very fine sand over silt-clay material that was likely deposited. A clast of this material at SWI. Stage 2 tubes at SWI and a visible worm in a burrow beyond aRPD boundary.
083	B	76	7/12/2019	5:26:53	Very fine sand over silt-clay material that was likely deposited. Stage 2 tubes at SWI and visible worms in burrows beyond aRPD boundary.
083	C	76	7/12/2019	5:27:38	Very fine sand over silt-clay material that was likely deposited. Visible worms in burrows beyond aRPD boundary and partially infilled voids present.
084	A	62	7/12/2019	6:00:34	Fine sand with turbidity in water column. A sand dollar visible in background of image. No discernible aRPD.
084	B	62	7/12/2019	6:01:18	Fine sand with many sand dollars at sediment surface and one against faceplate.
084	D	62	7/12/2019	6:02:46	Fine sand with many sand dollars at sediment surface and one against faceplate.
085	A	66	7/12/2019	6:43:18	Fine sand with Stage 2 tubes in background of image at sediment surface.
085	B	66	7/12/2019	6:44:11	Fine sand with surficial shell hash and Stage 2 tubes in background of image at sediment surface.
085	C	66	7/12/2019	6:44:52	Fine sand with no visible fauna to aid with SS determination.
086	A	51	7/12/2019	7:17:44	Fine sand with Stage 2 tubes and some surficial shell hash.
086	B	51	7/12/2019	7:18:40	Fine sand with Stage 2 tubes at SWI.
086	C	51	7/12/2019	7:19:32	Fine sand with Stage 2 tubes at SWI and burrows moving beyond aRPD boundary.
087	A	43	7/12/2019	7:36:28	Fine sand with evidence of rippling at sediment surface. No visible evidence of fauna to aid with SS.
087	B	43	7/12/2019	7:37:49	Fine sand with Stage 2 tubes, shell hash, and rippling at sediment surface.
087	C	43	7/12/2019	7:38:29	Fine sand with Stage 2 tubes, shell hash, and rippling at sediment surface.
088	A	36	7/12/2019	7:57:05	Medium sand with shell hash at SWI and rippling at surface.
088	B	36	7/12/2019	7:57:56	Medium sand with shell hash at SWI and intermixed in sediment. Rippling at surface.
088	C	36	7/12/2019	7:58:42	Medium sand with shell hash at SWI and intermixed in sediment. Rippling at surface.
089	A	80	7/13/2019	3:52:00	Very fine sand with Stage 2 tubes and amphipod structures at SWI. A large worm in a burrow at depth. Rippling at sediment surface.
089	B	80	7/13/2019	3:53:27	Very fine sand with Stage 2 tubes and amphipod structures at SWI. Rippling at sediment surface.
089	C	80	7/13/2019	3:54:15	Very fine sand with Stage 2 tubes and amphipod structures at SWI. A burrow moving beyond aRPD boundary. Rippling at sediment surface.
090	A	70	7/13/2019	4:14:36	Very fine sand with many Stage 2 tubes at SWI.
090	B	70	7/13/2019	4:15:15	Very fine sand with many Stage 2 tubes and amphipod structures at SWI.
090	D	70	7/13/2019	4:16:41	Very fine sand with many Stage 2 tubes and amphipod structures at SWI. Worms in burrows at depth, including a very large worm.
091	A	60	7/13/2019	4:36:55	Fine sand with Stage 2 tubes and shell hash at SWI.
091	B	60	7/13/2019	4:37:35	Fine sand with shell hash at SWI.
091	C	60	7/13/2019	4:38:24	Fine sand with Stage 2 tubes and shell hash at SWI.
092	A	55	7/13/2019	4:56:43	Very fine sand with a gastropod at sediment surface.
092	C	55	7/13/2019	4:58:05	Very fine sand with a Stage 2 tube in background of image at SWI.
092	D	55	7/13/2019	4:58:53	Very fine sand with some shell intermixed.
093	B	44	7/13/2019	5:20:32	Very fine sand with rippling at surface evident.
093	C	44	7/13/2019	5:21:16	Very fine sand with rippling at surface evident.

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093	D	44	7/13/2019	5:22:08	Very fine sand with rippling at surface evident in background of image. A Stage 2 tube present at SWI.
094	B	44	7/13/2019	5:40:18	Very fine sand with rippling at surface evident in background of image. A Stage 2 tube present at SWI.
094	C	44	7/13/2019	5:41:05	Very fine sand with rippling at surface evident.
094	D	44	7/13/2019	5:41:45	Very fine sand with rippling at surface evident in background of image. A Stage 2 tube present at SWI. A large worm in a burrow at depth.
095	A	30	7/13/2019	6:01:06	Medium sand with Stage 2 tubes in background of image and some small rippling of sediment.
095	B	30	7/13/2019	6:01:48	Medium sand with rippling of sediment at sediment surface. Coarse material makes aRPD difficult to determine and lack of faunal evidence makes SS difficult.
095	C	30	7/13/2019	6:02:29	Medium sand with rippling of sediment at sediment surface. Coarse material makes aRPD difficult to determine and lack of faunal evidence makes SS difficult. Large patch of live mussels in background of image.
096	A	23	7/13/2019	6:17:32	Very coarse sand to very fine pebbles partially overlaying and partially intermixed with fine sand. Coarse material makes SS determination difficult.
096	B	23	7/13/2019	6:18:21	Very coarse sand to very fine pebbles partially overlaying and partially intermixed with fine sand. Coarse material makes SS determination difficult. Rippling at sediment surface.
096	D	23	7/13/2019	6:19:41	Fine sand with densely intermixed very coarse sand and very fine pebbles. Minor rippling at sediment surface. Intermixed coarse material makes SS determination difficult.
097	A	33	7/13/2019	6:36:47	Fine sand with some shell hash at sediment surface and rippling evident.
097	B	33	7/13/2019	6:37:24	Fine sand with some shell hash at sediment surface and rippling evident.
097	C	33	7/13/2019	6:38:01	Fine sand with some shell hash at sediment surface and rippling evident.
098	A	58	7/12/2019	6:15:43	Very fine sand with evidence of shallow burrowing and a sand dollar against the faceplate
098	B	58	7/12/2019	6:16:17	Very fine sand with evidence of shallow burrowing and many sand dollars at sediment surface.
098	C	58	7/12/2019	6:17:11	Very fine sand with many sand dollars at sediment surface.
099	A	58	7/12/2019	10:08:35	Fine sand with surficial shell hash and Stage 2 tubes in background of image at sediment surface.
099	B	58	7/12/2019	10:09:14	Medium sand overlaying fine sand with surficial shell hash and Stage 2 tubes in background of image at sediment surface. Shell hash dragged down by prism penetration.
099	C	58	7/12/2019	10:10:41	Medium sand overlaying fine sand with surficial shell hash and Stage 2 tubes in background of image at sediment surface.
100	A	50	7/12/2019	10:30:47	Very fine sand with Stage 2 tubes, clasts of sand, and small rippling at sediment surface. Burrows visually moving beyond aRPD boundary.
100	B	50	7/12/2019	10:31:36	Very fine sand with Stage 2 tubes and small rippling at sediment surface. Burrows visually moving beyond aRPD boundary.
100	C	50	7/12/2019	10:32:24	Very fine sand with Stage 2 tubes, clasts of sand, and small rippling at sediment surface. Burrows visually moving beyond aRPD boundary. A sand dollar within sediment against face plate.
101	A	48	7/12/2019	10:51:43	Very fine sand with a sand dollar against the face plate. Shell hash and small ripples at sediment surface.
101	B	48	7/12/2019	10:52:49	Very fine sand with a sand dollar against the face plate and Stage 2 tubes in the background of the image. Surficial shell hash and some intermixed shell hash present. Small ripples at sediment surface. Visible burrow moving beyond aRPD boundary.
101	C	48	7/12/2019	10:53:31	Very fine sand with surficial shell hash and a visible worm in a burrow moving beyond the aRPD boundary.
102	A	57	7/12/2019	6:28:02	Fine sand with Stage 2 tubes in background of image at sediment surface.
102	B	57	7/12/2019	6:28:59	Fine sand with shell hash and sand clumps at SWI. Sand dollar within sediment against faceplate. Stage 2 tubes in background of image.
102	C	57	7/12/2019	6:29:45	Fine sand with Stage 2 tubes in background of image at sediment surface.
103	A	56	7/12/2019	7:03:33	Very fine sand with surficial shell hash and an amphipod structure at sediment surface.

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StationID	Replicate	Water Depth (ft)	Date	Time	Comment
103	B	56	7/12/2019	7:04:15	Very fine sand with surficial shell hash and rippling at sediment surface. Burrows affecting boundary roughness and moving beyond aRPD boundary.
103	C	56	7/12/2019	7:04:58	Very fine sand with sand dollars and a hermit crab at sediment surface. Some surficial shell hash.
104	A	45	7/12/2019	9:37:06	Very fine sand with a well-developed aRPD.
104	B	45	7/12/2019	9:39:14	Very fine sand with small-scale rippling at surface.
104	C	45	7/12/2019	9:40:07	Very fine sand with rippling at surface. Shell hash in background of image at surface and well-developed aRPD with burrowing visible.
105	A	37	7/12/2019	9:18:13	Fine sand with rippling visible in background of image.
105	B	37	7/12/2019	9:19:20	Fine sand with rippling visible in background of image.
105	C	37	7/12/2019	9:20:09	Fine sand with rippling visible in background of image. Possible Stage 2 tube structure in background of image.
106	A	32	7/12/2019	8:47:48	Medium sand with some coarse sand intermixed near SWI. A large sediment ripple transected. Stage 2 tubes present in background of image.
106	B	32	7/12/2019	8:48:38	Medium sand with some coarse sand intermixed near SWI. Stage 2 tubes present and a hermit crab at sediment surface. Shell hash at sediment surface.
106	C	32	7/12/2019	8:49:27	Medium sand with some intermixed shell hash. No visible aRPD boundary or evidence of fauna.
107	A	52	7/13/2019	7:01:44	Fine sand with many dead mussel shells and a hermit crab at sediment surface. Dense shell hash intermixed with sediment.
107	B	52	7/13/2019	7:02:23	Fine sand with many dead mussel shells at sediment surface. Dense shell hash intermixed with sediment.
107	C	52	7/13/2019	7:03:04	Fine sand with dead mussel shells, live mussels, and a hermit crab at sediment surface. Dense shell hash intermixed with sediment.
108	A	48	7/13/2019	7:35:59	Silt-clay with dense shells containing hydroids, including live mussels, at SWI. Infilled void at depth. Shells affecting aRPD and boundary roughness through drag-down
108	B	48	7/13/2019	7:36:40	Silt-clay with dense shells containing hydroids, including live mussels, at SWI. Open void near surface and infilled void at depth. Shells affecting aRPD and boundary roughness through drag-down
108	F	48	7/13/2019	7:39:14	Silt-clay with dense shells containing hydroids, including live mussels, at SWI. Open void near surface and infilled void at depth. Shells affecting aRPD and boundary roughness through drag-down
109	A	36	7/13/2019	7:58:17	Silt-clay with dense shell hash at SWI and intermixed in upper sediment. Infilled voids at depth. Stage 2 tubes within shell hash matrix.
109	C	36	7/13/2019	7:59:39	Very fine sand overlaying silt-clay. Dense shell hash at SWI dragged down in to sediment and obscured many variables.
109	D	36	7/13/2019	8:00:11	Very fine sand over silt-clay. Dense shell hash at SWI and intermixed in sediment matrix. Stage 2 tubes among shell hash at sediment surface and open voids present.
110	B	53	7/13/2019	8:19:29	Very fine sand over silt-clay. Dense shell hash at SWI and intermixed in sediment matrix. Large burrow moving to depth and a void present.
110	C	53	7/13/2019	8:20:14	Silt-clay with dense shells containing hydroids, including live mussels, at SWI. Infilled void at depth. Shells affecting aRPD and boundary roughness through drag-down
110	D	53	7/13/2019	8:20:52	Silt-clay with dense shells containing hydroids, including live mussels, at SWI. Infilled void at depth. Shells affecting aRPD and boundary roughness through drag-down
111	A	86	7/13/2019	8:41:30	Very fine sand with shell hash and Stage 2 tubes at SWI. Shell hash densely intermixed with sediment matrix
111	B	86	7/13/2019	8:42:21	Very fine sand overlaying silt-clay. Dense shell hash at SWI and intermixed in very fine sand layer.
111	C	86	7/13/2019	8:43:00	Very fine sand with shell hash at SWI. Shell hash densely intermixed with sediment matrix
112	A	64	7/13/2019	9:06:04	Very fine sand with dense shell hash and a hermit crab at SWI. Partially infilled void visible in sediment.

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StationID	Replicate	Water Depth (ft)	Date	Time	Comment
112	B	64	7/13/2019	9:08:46	Very fine sand with shell hash and Stage 2 tubes at SWI. Shell hash intermixed with sediment matrix. Burrows visible in sediment.
112	C	64	7/13/2019	9:10:44	Very fine sand with shell hash and Stage 2 tubes at SWI. Shell hash intermixed with sediment matrix. Burrows visible in sediment.
113	A	47	7/13/2019	9:42:44	Very fine sand with intermixed fine shell hash. Visible worm in burrow near aRPD boundary.
113	B	47	7/13/2019	9:43:32	Very fine sand with intermixed fine shell hash. Evidence of burrowing above and near aRPD boundary.
113	C	47	7/13/2019	9:44:43	Very fine sand with intermixed fine shell hash. Unable to distinguish aRPD or faunal evidence. Small rippling at sediment surface.
114	A	50	7/13/2019	10:07:17	Very fine sand over silt-clay. Shell hash and Stage 2 tubes at SWI. Burrows moving beyond aRPD boundary, including one with a visible worm present.
114	B	50	7/13/2019	10:08:06	Very fine sand over silt-clay. Shell hash and Stage 2 tubes at SWI. Large burrow moving from SWI down to partially infilled void.
114	D	50	7/13/2019	10:09:27	Very fine sand over silt-clay. Shell hash and Stage 2 tubes at SWI. Burrows moving beyond aRPD boundary and a partially infilled void near depth.
115	A	43	7/13/2019	10:28:29	Silt-clay with very high penetration. Stage 2 tubes at SWI and burrows well beyond aRPD boundary and infilled voids at depth.
115	B	43	7/13/2019	10:29:18	Silt-clay with very high penetration. Stage 2 tubes at SWI and burrows well beyond aRPD boundary. Large worm in a burrow and infilled voids at depth.
115	C	43	7/13/2019	10:30:12	Silt-clay with very high penetration. Stage 2 tubes at SWI and burrows well beyond aRPD boundary. Open voids near SWI and infilled voids at depth.
116	A	45	7/12/2019	11:15:11	Medium sand with rippling of sediment at SWI.
116	B	45	7/12/2019	11:17:10	Medium sand with a few small, visible burrows in the sediment.
116	D	45	7/12/2019	11:18:32	Medium sand with burrowing present. Stage 1 tubes at sediment surface.
117	A	46	7/12/2019	11:47:13	Very fine sand with shell hash and rippling at the surface.
117	C	46	7/12/2019	11:48:34	Very fine sand with rippling in background of image. Hermit crab at sediment surface with Stage 2 tube. Shallow burrowing visible.
117	D	46	7/12/2019	11:49:12	Very fine sand with sand dollar at the sediment surface. Shallow burrowing visible.
118	A	47	7/12/2019	16:05:52	Fine sand with Stage 2 tubes in background of image at sediment surface. Rippling of surficial sediment present.
118	B	47	7/12/2019	16:07:23	Fine sand with Stage 2 tubes in background of image at sediment surface. Rippling of surficial sediment present.
118	C	47	7/12/2019	16:08:53	Fine sand with Stage 2 tubes in background of image at sediment surface. Rippling of surficial sediment present.
119	A	45	7/12/2019	11:34:44	Fine sand with Stage 2 tubes in background of image at sediment surface. Shell hash at surface and intermixed with sediment.
119	B	45	7/12/2019	11:35:25	Fine sand with Stage 2 tubes in background of image at sediment surface. Shell hash at surface and intermixed with sediment.
119	C	45	7/12/2019	11:36:15	Fine sand with Stage 2 tubes in background of image at sediment surface. Rippling of surficial sediment present.
120	A	36	7/12/2019	12:59:28	Very fine sand with rippling at surface. Well-developed aRPD with shallow burrowing evident.
120	B	36	7/12/2019	13:01:28	Very fine sand with rippling at sediment surface.
120	C	36	7/12/2019	13:02:59	Very fine sand with Stage 2 tubes at sediment surface.
121	A	27	7/12/2019	13:26:29	Very fine sand with a well-developed aRPD and a burrow moving beyond aRPD boundary.
121	B	27	7/12/2019	13:28:05	Very fine sand with some rippling at sediment surface.
121	C	27	7/12/2019	13:29:31	Very fine sand with a Stage 2 tube visible at sediment surface. Rippling present in background of image.
122	A	44	7/12/2019	15:53:33	Fine sand with Stage 2 tubes in background of image and rippling at sediment surface.
122	B	44	7/12/2019	15:55:18	Fine sand with Stage 2 tubes in background of image and a hermit crab on sediment surface.

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StationID	Replicate	Water Depth (ft)	Date	Time	Comment
122	C	44	7/12/2019	15:56:52	Fine sand with small tubes at SWI and evidence of burrowing near aRPD boundary. Rippling at SWI.
123	A	45	7/12/2019	15:17:15	Medium sand with rippling at SWI and burrows present in sediment.
123	B	45	7/12/2019	15:19:07	Medium sand with a ripple at SWI and small tubes in background of image. Well-developed aRPD.
123	C	45	7/12/2019	15:20:45	Medium sand with coarse sand intermixed and Stage 2 tubes in background of image.
124	A	41	7/12/2019	15:02:59	Fine sand with rippling, a Stage 2 tube, and a mollusc at sediment surface.
124	B	41	7/12/2019	15:04:34	Fine sand with some rippling at sediment surface and a well-developed aRPD.
124	C	41	7/12/2019	15:06:01	Fine sand with a well-developed aRPD and shallow burrowing.
125	A	43	7/12/2019	15:31:40	Very fine sand with a Stage 2 tube structure laying at SWI.
125	B	43	7/12/2019	15:33:14	Very fine sand with evidence of shallow burrowing.
125	C	43	7/12/2019	15:34:50	Very fine sand with a ripple at SWI, a buried sand dollar against the faceplate, and a Stage 2 tube in background of image.
126	A	37	7/12/2019	14:51:31	Fine pebbles with intermixed coarse pebbles overlaying very fine sand. Coarse material makes aRPD and SS determination difficult
126	C	37	7/12/2019	14:54:48	Medium pebbles with intermixed coarse pebbles overlaying very fine sand. Hydroids growing on a shell fragment at SWI. Visible worms in burrows beneath pebble layer.
126	D	37	7/12/2019	14:56:17	Fine pebbles overlaying very fine sand. Burrowing, some with small worms visible in sediment beneath pebble layer.
127	A	43	7/12/2019	15:41:45	Fine pebbles overlaying and intermixed with fine sand. Coarse material makes aRPD and SS determination difficult.
127	B	43	7/12/2019	15:43:25	Fine sand with densely intermixed very coarse sand and very fine pebbles. Minor rippling at sediment surface. Intermixed coarse material makes SS determination difficult.
127	C	43	7/12/2019	15:45:03	Very fine pebbles overlaying/intermixed with fine sand. Coarse material makes SS determination difficult.
128	A	44	7/12/2019	14:32:02	Silt-clay with overpenetration. Some burrowing evident.
128	B	44	7/12/2019	14:33:47	Silt-clay with overpenetration. Methane present. Large worm in burrow visible.
128	C	44	7/12/2019	14:35:19	Silt-clay with overpenetration. Some burrowing evident.
129	A	40	7/12/2019	13:49:47	Silt-clay overlaying very fine sand. Layering within sediment evident. Burrows at SWI moving a few cms in to sediment.
129	B	40	7/12/2019	13:51:37	Silt-clay overlaying very fine sand. Layering within sediment evident. Stage 2 tube and amphipod structure at SWI and burrows at SWI moving a few cms in to sediment.
129	C	40	7/12/2019	13:53:18	Very fine sand over silt-clay. Stage 2 tubes at SWI.
130	A	31	7/12/2019	14:11:48	Fine pebbles overlaying and intermixed with very fine sand. Coarse material makes aRPD and SS determination difficult.
130	B	31	7/12/2019	14:13:30	Fine pebbles overlaying and intermixed with very fine sand. Coarse material makes aRPD and SS determination difficult.
130	C	31	7/12/2019	14:14:55	Fine pebbles overlaying and intermixed with very fine sand. Coarse material makes aRPD and SS determination difficult.
131	A	69	7/11/2019	15:22:35	Medium sand with intermixed very fine pebbles. Stage 2 tube and possible mussel shells at SWI.
131	B	69	7/11/2019	15:23:59	Thin layer of very fine pebbles overlaying and intermixed with medium sand. Stage 2 tubes at SWI.
131	C	69	7/11/2019	15:25:09	Thin layer of very fine pebbles overlaying and intermixed with medium sand. A hermit crab and unknown object/organism in background of image.
132	A	75	7/11/2019	15:03:19	Thin layer of fine pebbles with some coarse pebbles and shell hash overlaying medium sand. A Stage 2 tube at SWI.
132	B	75	7/11/2019	15:04:38	Medium sand with some intermixed and surficial very coarse sand and fine pebbles. Stage 2 structures at SWI.

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132	C	75	7/11/2019	15:05:52	Medium sand with some intermixed and surficial very coarse sand and very fine pebbles.
133	A	79	7/11/2019	14:45:31	Coarse sand with intermixed very fine pebbles. Stage 2 structures at SWI.
133	B	79	7/11/2019	14:46:49	Medium sand with intermixed and surficial very fine pebbles. Sand dollars against faceplate and SWI.
133	C	79	7/11/2019	14:48:06	Medium sand with intermixed and surficial very fine pebbles. Many Stage 2 structures at SWI.
134	A	80	7/11/2019	14:25:50	Fine sand with intermixed very fine pebbles/very coarse sand. Very high water content within sediment matrix obscures variables.
134	B	80	7/11/2019	14:27:13	Very coarse sand over fine sand with Stage 2 structures at SWI.
134	D	80	7/11/2019	14:29:45	Very coarse sand over fine sand. Coarse material makes aRPD and SS determination difficult.
135	A	76	7/11/2019	4:37:00	Very fine sand with rippling at SWI.
135	B	76	7/11/2019	4:37:50	Very fine sand with a Stage 2 tube at SWI.
135	D	76	7/11/2019	4:40:33	Very fine sand with a sand dollar against the faceplate and sand dollars and Stage 2 tubes in background of image.
136	A	83	7/11/2019	4:16:12	Fine sand with evidence of burrowing near aRPD boundary.
136	B	83	7/11/2019	4:17:01	Fine sand with Stage 2 tubes and a gastropod at sediment surface in the background of the image.
136	C	83	7/11/2019	4:18:34	Fine sand with a few very fine pebbles at SWI.
137	A	91	7/11/2019	3:56:08	Fine sand with a couple of Stage 2 structures at sediment surface.
137	B	91	7/11/2019	3:56:49	Fine sand with multiple Stage 2 tubes and amphipod structures at SWI.
137	C	91	7/11/2019	3:57:37	Fine sand with a Stage 2 tube at sediment surface.
138	A	90	7/11/2019	3:35:33	Fine sand with multiple sand dollars against faceplate.
138	B	90	7/11/2019	3:36:20	Fine sand with many sand dollars at sediment surface and a Stage 2 tube at SWI.
138	C	90	7/11/2019	3:37:07	Fine sand with multiple sand dollars visible.
139	A	88	7/11/2019	3:14:21	Very fine sand with Stage 2 tubes at sediment surface and a large worm in a burrow beyond aRPD boundary.
139	B	88	7/11/2019	3:15:08	Very fine sand with Stage 2 tubes and sand dollars at the sediment surface.
139	C	88	7/11/2019	3:15:52	Very fine sand with Stage 2 tubes and sand dollars at the sediment surface.
140	A	93	7/11/2019	2:51:45	Fine sand with Stage 2 tubes at SWI and a large worm in a burrow beyond the aRPD boundary.
140	B	93	7/11/2019	2:52:27	Fine sand with Stage 2 tubes at SWI and sand dollars at sediment surface in the background of the image.
140	C	93	7/11/2019	2:53:18	Fine sand with Stage 2 tubes and amphipod structures at the sediment surface.
141	A	96	7/10/2019	19:24:58	Very fine sand with Stage 2 tubes at SWI and large rippling occurring at sediment surface.
141	B	96	7/10/2019	19:26:17	Very fine sand with Stage 2 tubes at SWI and sand dollars at sediment surface in the background of the image.
141	C	96	7/10/2019	19:27:36	Very fine sand with Stage 2 tubes and a gastropod in background of image.
142	A	95	7/10/2019	19:57:04	Very fine sand with a Stage 2 tube in background of image at SWI.
142	B	95	7/10/2019	19:58:33	Very fine sand with a sand dollar against the faceplate and a Stage 2 tube in the background of image.
142	C	95	7/10/2019	20:00:01	Very fine sand with many Stage 2 tubes and amphipod structures at SWI.
143	A	93	7/10/2019	20:40:07	Very fine sand with an amphipod structure and sand dollar at SWI. A worm in a burrow beyond aRPD boundary visible.
143	C	93	7/10/2019	20:43:07	Very fine sand with many Stage 2 tubes and amphipod structures at SWI.
143	D	93	7/10/2019	20:44:28	Very fine sand with Stage 2 tubes at SWI.
144	A	94	7/10/2019	21:01:21	Very fine sand with Stage 2 tubes, sand dollars, and a hermit crab at SWI.
144	B	94	7/10/2019	21:02:44	Very fine sand with Stage 2 tubes at SWI and a sand dollar in background of image.
144	D	94	7/10/2019	21:05:26	Very fine sand with Stage 2 tubes at SWI.
145	A	99	7/10/2019	21:23:25	Very fine sand with Stage 2 tubes, amphipod structures, and a large worm in a burrow beneath aRPD boundary.
145	B	99	7/10/2019	21:24:42	Very fine sand with multiple Stage 2 tubes in background of image.
145	C	99	7/10/2019	21:26:12	Very fine sand with Stage 2 tubes and amphipod structures in background of image. A small hermit crab present at sediment surface.

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146	A	100	7/10/2019	21:43:36	Very fine sand with a few Stage 2 tubes at SWI.
146	B	100	7/10/2019	21:44:51	Very fine sand with a Stage 2 tube against the faceplate and many sand dollars in background of image.
146	C	100	7/10/2019	21:46:03	Very fine sand with Stage 2 tubes in background of image. Small unknown organism against faceplate. Possible gastropod in far background of image.
147	A	103	7/10/2019	16:00:51	Fine sand with a couple of sand dollars against the faceplate.
147	B	103	7/10/2019	16:02:02	Fine sand with surficial shell hash. Multiple gastropods at sediment surface.
147	C	103	7/10/2019	16:03:17	Fine sand with surficial shell hash, a gastropod, and a sand dollar at sediment surface.
148	A	115	7/10/2019	15:41:02	Fine sand with surficial shell hash. Stage 2 tube and a sand dollar at SWI. Burrow visible in sediment moving beyond aRPD boundary.
148	B	115	7/10/2019	15:42:16	Fine sand with some surficial shell hash and amphipod structures in background of the image.
148	C	115	7/10/2019	15:43:25	Fine sand with a Stage 2 tube and sand dollar on the sediment surface.
149	A	111	7/10/2019	15:22:07	Fine sand with surficial shell hash, Stage 2 tubes, and a sand dollar at SWI.
149	B	111	7/10/2019	15:23:16	Fine sand with some surficial shell hash and a gastropod at sediment surface.
149	D	111	7/10/2019	15:25:55	Fine sand with Stage 2 tube, amphipod structure, and multiple sand dollars at sediment surface, including one against the faceplate.
150	A	111	7/10/2019	14:50:28	Fine sand with some intermixed shell hash. Sand dollars and gastropod at sediment surface. Sand dollar against face plate. Shallow burrowing evident.
150	B	111	7/10/2019	14:51:38	Fine sand with surficial shell hash and many sand dollars at sediment surface.
150	C	111	7/10/2019	14:52:48	Fine sand with sand dollars and amphipod structures at SWI.
151	A	112	7/10/2019	14:30:28	Medium sand with Stage 2 tubes and amphipod structures in background of image.
151	B	112	7/10/2019	14:31:55	Medium sand with Stage 2 tubes in background of image. Intermixed shell hash and a large worm in a burrow moving beyond aRPD boundary.
151	D	112	7/10/2019	14:34:25	Fine sand with surficial shell hash, some intermixed, and a sand dollar in background of image.
152	A	113	7/10/2019	14:12:10	Medium sand with surficial and intermixed shell hash. Stage 2 tubes and sand dollars visible in background of image.
152	B	113	7/10/2019	14:13:28	Medium sand with surficial and intermixed shell hash. Stage 2 tubes visible in background of image.
152	D	113	7/10/2019	14:16:09	Medium sand with an amphipod structure and a gastropod at the SWI. Shallow burrowing evident.
153	A	117	7/10/2019	13:49:55	Medium sand with Stage 2 tubes and a sand dollar in background of image.
153	B	117	7/10/2019	13:51:04	Medium sand with some surficial shell hash. A Stage 2 tube and sand dollar in background of image.
153	C	117	7/10/2019	13:52:15	Medium sand with intermixed shell hash. Many Stage 2 tubes at SWI. Ripple or mound transected.
154	A	121	7/10/2019	13:28:49	Fine sand with some surficial shell hash. A sand dollar against faceplate, another in background, and a Stage 2 tube at SWI.
154	B	121	7/10/2019	13:30:04	Fine sand with some surficial shell hash and a Stage 2 tube in the background of the image.
154	C	121	7/10/2019	13:31:28	Fine sand with surficial shell hash. Burrows visible moving beyond aRPD boundary.
155	A	120	7/10/2019	13:08:12	Fine sand with Stage 2 structures at SWI.
155	B	120	7/10/2019	13:09:15	Fine sand with Stage 2 structures and a sand dollar at SWI. Rippling and surficial shell hash in background of image.
155	D	120	7/10/2019	13:11:26	Fine sand with Stage 2 tubes in background of image.
156	A	119	7/10/2019	12:47:15	Fine sand with Stage 2 tubes in background of image.
156	B	119	7/10/2019	12:48:21	Fine sand with surficial and intermixed shell hash.
156	D	119	7/10/2019	12:50:32	Fine sand with Stage 2 tubes and a sand dollar in background of image.
157	A	121	7/10/2019	12:21:56	Medium sand with small tubes at SWI. Some shallow burrowing visible.

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157	B	121	7/10/2019	12:22:57	Medium sand with Stage 2 tubes at SWI. A worm in a burrow beyond aRPD boundary. Large shell hash pieces within sediment column.
157	C	121	7/10/2019	12:24:00	Medium sand with some intermixed shell hash. Stage 2 structures and a sand dollar at SWI.
REFA_01	A	94	7/13/2019	22:15:50	Fine pebbles overlaying and intermixed with fine sand. Coarse material makes aRPD and SS determination difficult.
REFA_01	B	94	7/13/2019	22:17:20	Fine pebbles with a few scattered more coarse pebbles overlaying and intermixed with medium sand. A Stage 2 tube at SWI.
REFA_01	C	94	7/13/2019	22:18:43	Medium sand with a few coarse pebbles and fine pebbles at SWI and intermixed. A Stage 2 tube a SWI.
REFA_02	A	105	7/13/2019	21:21:27	Medium sand over fine sand with medium and fine pebbles scattered at surface. Stage 2 tubes visible at SWI.
REFA_02	B	105	7/13/2019	21:23:07	Coarse sand over medium sand with some scattered very fine and fine pebbles. Amphipod structures at SWI.
REFA_02	D	105	7/13/2019	21:26:05	Coarse sand over medium sand with some scattered fine and coarse pebbles. Amphipod structures at SWI.
REFA_03	A	101	7/13/2019	21:48:32	Many fine pebbles scattered at surface over medium sand. A worm in a burrow visible.
REFA_03	B	101	7/13/2019	21:50:02	Very fine pebbles and very coarse sand overlaying medium sand. Some fine pebbles at SWI. A Stage 2 tube at SWI.
REFA_03	D	101	7/13/2019	21:52:50	A thick layer of fine pebbles overlaying medium sand. A hermit crab against the faceplate.
REFA_04	A	100	7/13/2019	21:37:46	Fine pebbles overlaying and intermixed with medium sand. Coarse material makes SS and aRPD determination difficult.
REFA_04	C	100	7/13/2019	21:41:22	Medium sand with fine and very fine pebbles at SWI and intermixed. Amphipod structures present at SWI.
REFA_04	D	100	7/13/2019	21:42:54	Fine pebbles overlaying and intermixed with medium sand. Stage 2 structures at SWI.
REFA_05	A	109	7/13/2019	22:00:17	Fine pebbles overlaying and intermixed with medium sand. Stage 2 structures at SWI.
REFA_05	B	109	7/13/2019	22:01:44	Fine pebbles overlaying and intermixed with medium sand. Stage 2 tubes and a hermit crab at SWI.
REFA_05	C	109	7/13/2019	22:03:11	Medium sand with surficial and intermixed fine pebbles and coarse sand overlaying a layer of reduced silt-clay. Stage 2 tubes and amphipod structures at SWI.
REFB_01	A	77	7/11/2019	5:39:10	Fine sand with Stage 1 and Stage 2 tubes at SWI. Sand dollar buried at sediment surface.
REFB_01	B	77	7/11/2019	5:39:55	Fine sand with Stage 1 and Stage 2 tubes at SWI. Shallow burrowing visible.
REFB_01	C	77	7/11/2019	5:41:23	Fine sand with Stage 1 and Stage 2 tubes at SWI. Shallow burrowing visible.
REFB_02	A	75	7/11/2019	5:05:43	Fine sand with a few pieces of shell intermixed. Unable to determine aRPD or SS.
REFB_02	B	75	7/11/2019	5:06:26	Fine sand with Stage 2 tubes present at sediment surface.
REFB_02	C	75	7/11/2019	5:07:45	Fine sand with Stage 2 tubes present at sediment surface.
REFB_03	A	75	7/11/2019	5:18:19	Fine sand with no visual fauna.
REFB_03	B	75	7/11/2019	5:19:01	Fine sand with rippling at SWI and Stage 2 tubes in background of image.
REFB_03	C	75	7/11/2019	5:19:51	Fine sand with many Stage 2 tubes in background of image.
REFB_04	A	76	7/11/2019	5:28:14	Medium sand with a few Stage 2 tubes at sediment surface.
REFB_04	D	76	7/11/2019	5:31:01	Medium sand with shell hash and a few scattered fine pebbles at sediment surface.
REFB_04	E	76	7/11/2019	5:31:59	Medium sand with shell hash and a few scattered fine pebbles at sediment surface. Many hydroids present at sediment surface.
REFB_05	A	79	7/11/2019	5:47:11	Fine sand with Stage 1 tubes at SWI. Evidence of burrowing moving the aRPD boundary deeper in to sediment. Sand dollars in background and against faceplate.
REFB_05	B	79	7/11/2019	5:48:06	Fine sand with Stage 1 tubes at SWI. Evidence of burrowing moving the aRPD boundary deeper in to sediment. Sand dollars in background and against faceplate.
REFB_05	C	79	7/11/2019	5:48:55	Fine sand with a gastropod and multiple sand dollars in background of image. Shallow burrowing evident.
REFC_01	A	117	7/13/2019	20:24:09	Fine sand with dense amphipod tubes at SWI.
REFC_01	B	117	7/13/2019	20:25:59	Fine sand with dense amphipod tubes at SWI, as well as amphipod structures at SWI.
REFC_01	D	117	7/13/2019	20:28:51	Fine sand with dense amphipod tubes at SWI. Shrimp present on sediment surface.

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StationID	Replicate	Water Depth (ft)	Date	Time	Comment
REFC_02	A	117	7/13/2019	20:32:29	Fine sand with dense amphipod tubes at SWI.
REFC_02	B	117	7/13/2019	20:33:51	Fine sand with dense amphipod tubes at SWI.
REFC_02	C	117	7/13/2019	20:35:19	Fine sand with intermixed shell hash. Amphipod tubes and rippling at SWI.
REFC_03	A	119	7/13/2019	19:54:06	Fine sand with dense amphipod tubes at SWI.
REFC_03	B	119	7/13/2019	19:55:33	Fine sand with amphipod tubes and shell hash at SWI. A large mound in background of image.
REFC_03	D	119	7/13/2019	19:58:19	Fine sand with amphipod tubes in background of image. Rippling at sediment surface present in background of image.
REFC_04	A	114	7/13/2019	20:12:44	Fine sand with amphipod tubes at SWI.
REFC_04	B	114	7/13/2019	20:14:14	Fine sand with amphipod tubes at SWI.
REFC_04	C	114	7/13/2019	20:15:36	Fine sand over a layer of reduced very fine sand. Dense amphipod tubes at SWI and a large worm in a burrow at depth.
REFC_05	A	115	7/13/2019	20:03:58	Fine sand with amphipod tubes at SWI. Patches of reduced very fine sand near depth.
REFC_05	B	115	7/13/2019	20:05:24	Fine sand with amphipod tubes and structures at SWI.
REFC_05	C	115	7/13/2019	20:06:57	Fine sand. Dense amphipod tubes at SWI and a large worm in a burrow at depth.

APPENDIX D

Plan View Image Analysis Results

Notes:

IND=Indeterminate

Bedform Size Measurement: "-" indicates variable is not measured for the replicate

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StationID	Replicate	Date	Time	Image Width (cm)	Image Height (cm)	Field of View (m ²)	Habitat Type	Substrate Group	Substrate Subgroup	Gravel Mode (mm)	Boulders	Bedforms
001	A	7/14/2019	3:34:45	100.58	67.05	0.67	Sand with Mobile Gravel	Gravelly	Gravelly Sand	15.93	No	None
001	B	7/14/2019	3:35:30	96.77	64.52	0.62	Sand with Mobile Gravel	Gravelly	Gravelly Sand	14.52	No	None
001	C	7/14/2019	3:36:14	97.56	65.04	0.63	Sand with Mobile Gravel	Gravelly	Gravelly Sand	16.26	No	None
002	A	7/14/2019	3:12:55	94.60	63.07	0.60	Sand with Mobile Gravel	Gravel Mixes	Sandy Gravel	19.71	No	None
002	B	7/14/2019	3:13:37	92.42	61.61	0.57	Sand with Mobile Gravel	Gravel Mixes	Sandy Gravel	12.32	No	None
002	C	7/14/2019	3:14:17	IND	IND	IND	Sand with Mobile Gravel	Gravel Mixes	Sandy Gravel	IND	No	None
003	A	7/14/2019	2:50:05	99.30	66.20	0.66	Sand Sheet	Sand	Sand or Finer	IND	No	None
003	B	7/14/2019	2:50:47	IND	IND	IND	IND	IND	IND	IND	No	None
003	C	7/14/2019	2:51:22	IND	IND	IND	IND	IND	IND	IND	No	None
004	A	7/14/2019	2:28:26	94.83	63.22	0.60	Sand Sheet	Sand	Sand or Finer	IND	No	None
004	B	7/14/2019	2:29:13	94.95	63.30	0.60	Sand Sheet	Sand	Sand or Finer	IND	No	None
004	C	7/14/2019	2:29:53	98.05	65.37	0.64	Sand Sheet	Sand	Sand or Finer	IND	No	None
005	A	7/14/2019	2:06:58	99.81	66.54	0.66	Sand with Mobile Gravel	Gravelly	Gravelly Sand	8.32	No	None
005	B	7/14/2019	2:08:11	100.52	67.01	0.67	Sand with Mobile Gravel	Gravel Mixes	Sandy Gravel	4.19	No	None
005	C	7/14/2019	2:08:49	97.99	65.33	0.64	Sand with Mobile Gravel	Gravelly	Gravelly Sand	5.72	No	None
006	A	7/14/2019	1:46:47	94.03	62.69	0.59	Sand with Mobile Gravel	Gravelly	Gravelly Sand	3.13	No	None
006	B	7/14/2019	1:47:33	92.20	61.47	0.57	Sand with Mobile Gravel	Gravelly	Gravelly Sand	1.54	No	None
006	C	7/14/2019	1:48:16	95.88	63.92	0.61	Sand with Mobile Gravel	Gravelly	Gravelly Sand	1.60	No	None
007	A	7/14/2019	1:24:03	93.86	62.58	0.59	Sand Sheet	Sand	Sand or Finer	IND	No	None
007	B	7/14/2019	1:24:44	96.18	64.12	0.62	Sand Sheet	Sand	Sand or Finer	IND	No	None
007	C	7/14/2019	1:25:25	99.17	66.12	0.66	Sand Sheet	Sand	Sand or Finer	IND	No	None
008	B	7/14/2019	0:18:18	94.20	62.80	0.59	Sand with Mobile Gravel	Gravelly	Gravelly Sand	IND	No	None
008	C	7/14/2019	0:18:49	93.86	62.58	0.59	Sand with Mobile Gravel	Gravelly	Gravelly Sand	2.35	No	None
008	D	7/14/2019	0:19:34	100.58	67.05	0.67	Sand with Mobile Gravel	Gravelly	Gravelly Sand	1.68	No	None
009	A	7/13/2019	23:49:52	96.06	64.04	0.62	Sand with Mobile Gravel	Gravel Mixes	Sandy Gravel	16.01	No	None
009	B	7/13/2019	23:50:23	102.63	68.42	0.70	Sand with Mobile Gravel	Gravel Mixes	Sandy Gravel	17.11	No	None
009	C	7/13/2019	23:52:43	90.28	60.19	0.54	Sand with Mobile Gravel	Gravel Mixes	Sandy Gravel	15.05	No	None
010	B	7/13/2019	23:26:30	105.62	70.41	0.74	Patchy Cobbles & Boulders on Sand	Gravelly	Gravelly Muddy Sand	13.20	No	None
010	C	7/13/2019	23:27:53	98.55	65.70	0.65	Patchy Cobbles & Boulders on Sand	Gravelly	Gravelly Muddy Sand	14.78	Yes	None
010	D	7/13/2019	23:29:25	90.12	60.08	0.54	Sand Sheet	Gravelly	Gravelly Muddy Sand	14.27	No	None
011	A	7/13/2019	22:56:14	99.43	66.28	0.66	Sand Sheet	Sand	Sand or Finer	IND	No	None
011	B	7/13/2019	22:57:48	88.94	59.29	0.53	Sand Sheet	Sand	Sand or Finer	IND	No	None
011	C	7/13/2019	22:59:24	79.19	52.79	0.42	Sand Sheet	Sand	Sand or Finer	IND	No	None
012	A	7/13/2019	19:29:09	98.05	65.37	0.64	Sand Sheet	Sand	Sand or Finer	IND	No	None
012	B	7/13/2019	19:29:52	91.17	60.78	0.55	Sand Sheet	Sand	Sand or Finer	IND	No	None
012	C	7/13/2019	19:30:46	97.38	64.92	0.63	Sand Sheet	Sand	Sand or Finer	IND	No	None
013	A	7/13/2019	19:04:38	90.91	60.61	0.55	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples

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StationID	Replicate	Date	Time	Image Width (cm)	Image Height (cm)	Field of View (m ²)	Habitat Type	Substrate Group	Substrate Subgroup	Gravel Mode (mm)	Boulders	Bedforms
013	B	7/13/2019	19:06:21	96.59	64.40	0.62	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
013	C	7/13/2019	19:07:48	94.15	62.76	0.59	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
014	A	7/13/2019	18:40:15	93.13	62.09	0.58	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
014	B	7/13/2019	18:41:46	100.06	66.71	0.67	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
014	D	7/13/2019	18:44:41	98.92	65.95	0.65	Sand Sheet	Sand	Sand or Finer	IND	No	None
015	A	7/13/2019	18:14:11	97.56	65.04	0.63	Sand Sheet	Sand	Sand or Finer	IND	No	None
015	B	7/13/2019	18:15:50	94.20	62.80	0.59	Sand Sheet	Sand	Sand or Finer	IND	No	None
015	C	7/13/2019	18:17:31	97.62	65.08	0.64	Sand Sheet	Sand	Sand or Finer	IND	No	None
016	A	7/10/2019	19:06:20	184.62	123.08	2.27	Sand Sheet	Sand	Sand or Finer	IND	No	None
016	B	7/10/2019	19:07:38	181.40	120.93	2.19	Sand Sheet	Sand	Sand or Finer	IND	No	None
016	C	7/10/2019	19:08:58	193.55	129.03	2.50	Sand Sheet	Sand	Sand or Finer	IND	No	None
017	A	7/10/2019	18:46:07	184.83	123.22	2.28	Sand Sheet	Sand	Sand or Finer	IND	No	None
017	B	7/10/2019	18:47:24	185.94	123.96	2.30	Sand Sheet	Sand	Sand or Finer	IND	No	None
017	D	7/10/2019	18:49:51	183.75	122.50	2.25	Sand Sheet	Sand	Sand or Finer	IND	No	None
018	A	7/10/2019	18:24:47	182.67	121.78	2.22	Sand Sheet	Sand	Sand or Finer	IND	No	None
018	B	7/10/2019	18:26:13	184.83	123.22	2.28	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
018	C	7/10/2019	18:27:33	187.50	125.00	2.34	Sand Sheet	Sand	Sand or Finer	IND	No	None
019	A	7/10/2019	18:02:41	185.49	123.66	2.29	Sand Sheet	Sand	Sand or Finer	IND	No	None
019	B	7/10/2019	18:03:50	185.05	123.37	2.28	Sand Sheet	Sand	Sand or Finer	IND	No	None
019	C	7/10/2019	18:04:59	181.40	120.93	2.19	Sand Sheet	Sand	Sand or Finer	IND	No	None
020	A	7/10/2019	17:42:33	182.03	121.35	2.21	Sand Sheet	Sand	Sand or Finer	IND	No	None
020	B	7/10/2019	17:44:13	194.76	129.84	2.53	Sand Sheet	Sand	Sand or Finer	IND	No	None
020	C	7/10/2019	17:45:35	186.60	124.40	2.32	Sand Sheet	Sand	Sand or Finer	IND	No	None
021	A	7/10/2019	22:17:49	178.29	118.86	2.12	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
021	B	7/10/2019	22:19:08	177.88	118.59	2.11	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
021	D	7/10/2019	22:21:45	179.52	119.68	2.15	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
022	A	7/10/2019	22:37:07	169.20	112.80	1.91	Sand Sheet	Sand	Sand or Finer	IND	No	None
022	B	7/10/2019	22:38:25	185.27	123.52	2.29	Sand Sheet	Sand	Sand or Finer	IND	No	None
022	C	7/10/2019	22:39:40	177.07	118.05	2.09	Sand Sheet	Sand	Sand or Finer	IND	No	None
023	A	7/10/2019	22:56:56	172.00	114.66	1.97	Sand Sheet	Sand	Sand or Finer	IND	No	Uneven ripples
023	B	7/10/2019	22:58:21	176.07	117.38	2.07	Sand Sheet	Sand	Sand or Finer	IND	No	Uneven ripples
023	D	7/10/2019	23:00:53	175.68	117.12	2.06	Sand Sheet	Sand	Sand or Finer	IND	No	Uneven ripples

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StationID	Replicate	Date	Time	Image Width (cm)	Image Height (cm)	Field of View (m ²)	Habitat Type	Substrate Group	Substrate Subgroup	Gravel Mode (mm)	Boulders	Bedforms
024	A	7/10/2019	23:16:29	176.47	117.65	2.08	Sand Sheet	Sand	Sand or Finer	IND	No	None
024	B	7/10/2019	23:17:55	IND	IND	IND	Sand Sheet	Sand	Sand or Finer	IND	No	None
024	C	7/10/2019	23:19:13	172.95	115.30	1.99	Sand Sheet	Sand	Sand or Finer	IND	No	None
025	A	7/11/2019	0:56:16	135.42	90.28	1.22	Sand Sheet	Sand	Sand or Finer	IND	No	None
025	B	7/11/2019	0:57:00	133.33	88.89	1.19	Sand Sheet	Sand	Sand or Finer	IND	No	None
025	D	7/11/2019	0:58:36	139.04	92.69	1.29	Sand Sheet	Sand	Sand or Finer	IND	No	None
026	H	7/11/2019	10:09:11	113.95	75.97	0.87	Sand Sheet	Sand	Sand or Finer	IND	No	None
026	J	7/11/2019	10:10:19	112.07	74.71	0.84	Sand Sheet	Sand	Sand or Finer	IND	No	None
026	K	7/11/2019	10:10:51	111.91	74.61	0.83	Sand Sheet	Sand	Sand or Finer	IND	No	None
027	A	7/11/2019	10:38:25	115.47	76.98	0.89	Sand Sheet	Sand	Sand or Finer	IND	No	None
027	B	7/11/2019	10:39:09	112.88	75.25	0.85	Sand Sheet	Sand	Sand or Finer	IND	No	None
027	C	7/11/2019	10:39:55	118.18	78.79	0.93	Sand Sheet	Sand	Sand or Finer	IND	No	None
028	A	7/11/2019	10:55:58	108.11	72.07	0.78	Sand Sheet	Sand	Sand or Finer	IND	No	None
028	B	7/11/2019	10:56:51	107.00	71.33	0.76	Sand Sheet	Sand	Sand or Finer	IND	No	None
028	C	7/11/2019	10:57:35	111.59	74.39	0.83	Sand Sheet	Sand	Sand or Finer	IND	No	None
029	A	7/11/2019	11:14:25	104.14	69.43	0.72	Sand Sheet	Sand	Sand or Finer	IND	No	None
029	B	7/11/2019	11:15:05	114.45	76.30	0.87	Sand Sheet	Sand	Sand or Finer	IND	No	None
029	C	7/11/2019	11:15:49	108.18	72.12	0.78	Sand Sheet	Sand	Sand or Finer	IND	No	None
030	A	7/10/2019	3:03:22	178.08	118.72	2.11	Sand Sheet	Sand	Sand or Finer	IND	No	Uneven ripples
030	C	7/10/2019	3:07:54	183.31	122.21	2.24	Sand Sheet	Sand	Sand or Finer	IND	No	Uneven ripples
030	D	7/10/2019	3:09:40	180.14	120.09	2.16	Sand Sheet	Sand	Sand or Finer	IND	No	None
031	A	7/10/2019	4:07:21	175.48	116.99	2.05	Sand Sheet	Sand	Sand or Finer	IND	No	Uneven ripples
031	B	7/10/2019	4:08:30	179.72	119.82	2.15	Sand Sheet	Sand	Sand or Finer	IND	No	Uneven ripples
031	C	7/10/2019	4:09:35	IND	IND	IND	Sand Sheet	Sand	Sand or Finer	IND	No	None
032	A	7/10/2019	4:42:57	177.68	118.45	2.10	Sand Sheet	Sand	Sand or Finer	IND	No	None
032	B	7/10/2019	4:43:51	186.16	124.11	2.31	Sand Sheet	Sand	Sand or Finer	IND	No	None
032	D	7/10/2019	4:46:13	185.94	123.96	2.30	Sand Sheet	Sand	Sand or Finer	IND	No	None
033	A	7/10/2019	5:34:06	182.88	121.92	2.23	Sand Sheet	Sand	Sand or Finer	IND	No	None
033	B	7/10/2019	5:35:00	179.31	119.54	2.14	Sand Sheet	Sand	Sand or Finer	IND	No	None
033	C	7/10/2019	5:36:18	182.67	121.78	2.22	Sand Sheet	Sand	Sand or Finer	IND	No	None
034	A	7/10/2019	6:01:46	184.62	123.08	2.27	Sand Sheet	Sand	Sand or Finer	IND	No	None
034	B	7/10/2019	6:02:43	184.83	123.22	2.28	Sand Sheet	Sand	Sand or Finer	IND	No	None

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StationID	Replicate	Date	Time	Image Width (cm)	Image Height (cm)	Field of View (m ²)	Habitat Type	Substrate Group	Substrate Subgroup	Gravel Mode (mm)	Boulders	Bedforms
034	C	7/10/2019	6:05:56	187.05	124.70	2.33	Sand Sheet	Sand	Sand or Finer	IND	No	None
035	A	7/10/2019	6:34:12	192.36	128.24	2.47	Sand Sheet	Sand	Sand or Finer	IND	No	None
035	B	7/10/2019	6:35:01	189.32	126.21	2.39	Sand Sheet	Sand	Sand or Finer	IND	No	None
035	C	7/10/2019	6:37:21	181.82	121.21	2.20	Sand Sheet	Sand	Sand or Finer	IND	No	None
036	A	7/10/2019	6:58:34	181.40	120.93	2.19	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
036	B	7/10/2019	6:59:33	190.94	127.29	2.43	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
036	C	7/10/2019	7:00:29	196.47	130.98	2.57	Sand Sheet	Sand	Sand or Finer	IND	No	None
037	A	7/10/2019	7:19:52	182.67	121.78	2.22	Sand with Mobile Gravel	Gravelly	Gravelly Sand	3.04	No	None
037	C	7/10/2019	7:21:38	IND	IND	IND	IND	IND	IND	IND	No	IND
037	D	7/10/2019	7:23:00	183.31	122.21	2.24	Sand with Mobile Gravel	Gravelly	Gravelly Sand	3.06	No	None
038	A	7/10/2019	7:43:56	182.03	121.35	2.21	Sand Sheet	Sand	Sand or Finer	IND	No	None
038	B	7/10/2019	7:44:45	182.46	121.64	2.22	Sand Sheet	Sand	Sand or Finer	IND	No	None
038	C	7/10/2019	7:45:38	187.50	125.00	2.34	Sand Sheet	Sand	Sand or Finer	IND	No	None
039	A	7/10/2019	8:08:18	185.94	123.96	2.30	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
039	B	7/10/2019	8:09:56	183.10	122.07	2.24	Sand Sheet	Sand	Sand or Finer	IND	No	None
039	C	7/10/2019	8:10:53	174.11	116.07	2.02	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
040	A	7/10/2019	8:31:37	180.76	120.51	2.18	Sand Sheet	Sand	Sand or Finer	IND	No	None
040	B	7/10/2019	8:32:26	178.29	118.86	2.12	Sand Sheet	Sand	Sand or Finer	IND	No	None
040	C	7/10/2019	8:33:15	186.60	124.40	2.32	Sand Sheet	Sand	Sand or Finer	IND	No	None
041	A	7/10/2019	8:53:38	190.71	127.14	2.42	Sand Sheet	Sand	Sand or Finer	IND	No	None
041	B	7/10/2019	8:54:21	177.27	118.18	2.10	Sand Sheet	Sand	Sand or Finer	IND	No	None
041	C	7/10/2019	8:55:07	182.46	121.64	2.22	Sand Sheet	Sand	Sand or Finer	IND	No	None
042	A	7/10/2019	9:16:27	191.18	127.45	2.44	Sand Sheet	Sand	Sand or Finer	IND	No	None
042	B	7/10/2019	9:18:13	183.53	122.35	2.25	Sand Sheet	Sand	Sand or Finer	IND	No	None
042	C	7/10/2019	9:18:59	175.48	116.99	2.05	Sand Sheet	Sand	Sand or Finer	IND	No	None
043	A	7/11/2019	11:28:49	116.68	77.79	0.91	Sand Sheet	Sand	Sand or Finer	IND	No	None
043	B	7/11/2019	11:29:41	117.82	78.55	0.93	Sand Sheet	Sand	Sand or Finer	IND	No	None
043	C	7/11/2019	11:30:30	111.59	74.39	0.83	Sand Sheet	Sand	Sand or Finer	IND	No	None
044	A	7/11/2019	11:46:39	104.91	69.94	0.73	Sand Sheet	Sand	Sand or Finer	IND	No	None
044	B	7/11/2019	11:47:26	125.10	83.40	1.04	Sand Sheet	Sand	Sand or Finer	IND	No	None
044	C	7/11/2019	11:48:41	111.03	74.02	0.82	Sand Sheet	Sand	Sand or Finer	IND	No	None
045	A	7/11/2019	12:06:54	114.62	76.41	0.88	Sand Sheet	Sand	Sand or Finer	IND	No	None
045	B	7/11/2019	12:08:30	114.54	76.36	0.87	Sand Sheet	Sand	Sand or Finer	IND	No	None

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StationID	Replicate	Date	Time	Image Width (cm)	Image Height (cm)	Field of View (m ²)	Habitat Type	Substrate Group	Substrate Subgroup	Gravel Mode (mm)	Boulders	Bedforms
045	C	7/11/2019	12:09:39	116.24	77.50	0.90	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
046	A	7/11/2019	19:50:23	113.37	75.58	0.86	Sand with Mobile Gravel	Gravelly	Gravelly Sand	9.83	No	None
046	B	7/11/2019	19:51:38	103.24	68.83	0.71	Sand with Mobile Gravel	Gravelly	Gravelly Sand	15.14	No	None
046	D	7/11/2019	19:54:07	IND	IND	IND	IND	IND	IND	IND	No	None
047	A	7/11/2019	19:22:18	112.88	75.25	0.85	Sand Sheet	Sand	Sand or Finer	IND	No	None
047	D	7/11/2019	19:26:07	118.63	79.09	0.94	Sand Sheet	Sand	Sand or Finer	IND	No	None
047	E	7/11/2019	19:30:39	117.56	78.37	0.92	Sand Sheet	Sand	Sand or Finer	IND	No	None
048	A	7/11/2019	12:23:53	117.56	78.37	0.92	Sand Sheet	Sand	Sand or Finer	IND	No	None
048	B	7/11/2019	12:25:10	115.73	77.15	0.89	Sand Sheet	Sand	Sand or Finer	IND	No	None
048	C	7/11/2019	12:26:27	114.96	76.64	0.88	Sand Sheet	Sand	Sand or Finer	IND	No	None
049	A	7/11/2019	12:41:20	118.81	79.21	0.94	Sand Sheet	Sand	Sand or Finer	IND	No	None
049	B	7/11/2019	12:42:36	107.44	71.63	0.77	Sand Sheet	Sand	Sand or Finer	IND	No	None
049	D	7/11/2019	12:45:02	110.56	73.71	0.81	Sand Sheet	Sand	Sand or Finer	IND	No	None
050	A	7/11/2019	12:59:07	111.59	74.39	0.83	Patchy Cobbles & Boulders on Sand	Gravel Mixes	Sandy Gravel	225.97	Yes	None
050	B	7/11/2019	13:00:27	112.15	74.77	0.84	Patchy Cobbles & Boulders on Sand	Gravel Mixes	Sandy Gravel	162.62	Yes	None
050	C	7/11/2019	13:01:35	110.01	73.34	0.81	Patchy Cobbles & Boulders on Sand	Gravelly	Gravelly Sand	198.94	Yes	None
051	A	7/11/2019	13:17:49	110.56	73.71	0.81	Sand with Mobile Gravel	Gravel Mixes	Sandy Gravel	5.90	No	None
051	B	7/11/2019	13:19:05	116.77	77.84	0.91	Sand with Mobile Gravel	Gravel Mixes	Sandy Gravel	2.92	No	None
051	C	7/11/2019	13:21:30	IND	IND	IND	Sand with Mobile Gravel	Gravel Mixes	Sandy Gravel	IND	No	None
052	B	7/11/2019	14:07:18	111.35	74.23	0.83	Sand Sheet	Sand	Sand or Finer	IND	No	None
052	C	7/11/2019	14:08:33	110.33	73.55	0.81	Sand Sheet	Sand	Sand or Finer	IND	No	None
052	D	7/11/2019	14:09:44	110.17	73.45	0.81	Sand Sheet	Sand	Sand or Finer	IND	No	None
053	A	7/12/2019	20:56:09	105.76	70.51	0.75	Sand Sheet	Sand	Sand or Finer	IND	No	None
053	B	7/12/2019	20:57:57	110.17	73.45	0.81	Sand Sheet	Sand	Sand or Finer	IND	No	None
053	D	7/12/2019	21:00:52	112.23	74.82	0.84	Sand Sheet	Sand	Sand or Finer	IND	No	None
054	A	7/12/2019	21:18:48	112.55	75.04	0.84	Sand with Mobile Gravel	Slightly Gravelly	Slightly Gravelly Sand	1.88	No	None
054	B	7/12/2019	21:19:58	106.92	71.28	0.76	Sand with Mobile Gravel	Slightly Gravelly	Slightly Gravelly Sand	1.78	No	None
054	C	7/12/2019	21:21:41	104.42	69.61	0.73	Sand Sheet	Slightly Gravelly	Slightly Gravelly Sand	1.91	No	None
055	A	7/12/2019	23:58:10	105.83	70.56	0.75	Sand Sheet	Sand	Sand or Finer	IND	No	None
055	B	7/12/2019	23:59:43	107.07	71.38	0.76	Sand Sheet	Sand	Sand or Finer	IND	No	None
055	C	7/13/2019	0:01:14	112.47	74.98	0.84	Sand Sheet	Sand	Sand or Finer	IND	No	None
056	A	7/13/2019	0:21:34	108.56	72.37	0.79	Sand Sheet	Sand	Sand or Finer	IND	No	None
056	B	7/13/2019	0:22:35	113.21	75.47	0.85	Sand Sheet	Sand	Sand or Finer	IND	No	None

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StationID	Replicate	Date	Time	Image Width (cm)	Image Height (cm)	Field of View (m ²)	Habitat Type	Substrate Group	Substrate Subgroup	Gravel Mode (mm)	Boulders	Bedforms
056	C	7/13/2019	0:23:16	109.86	73.24	0.80	Sand Sheet	Sand	Sand or Finer	IND	No	None
057	A	7/13/2019	0:43:48	108.56	72.37	0.79	Sand Sheet	Sand	Sand or Finer	IND	No	None
057	B	7/13/2019	0:44:28	112.96	75.31	0.85	Sand Sheet	Sand	Sand or Finer	IND	No	None
057	C	7/13/2019	0:45:12	107.88	71.92	0.78	Sand Sheet	Sand	Sand or Finer	IND	No	None
058	A	7/13/2019	1:07:35	110.17	73.45	0.81	Sand Sheet	Sand	Sand or Finer	IND	No	None
058	B	7/13/2019	1:08:20	100.19	66.80	0.67	Sand Sheet	Sand	Sand or Finer	IND	No	None
058	D	7/13/2019	1:09:38	106.19	70.80	0.75	Sand Sheet	Sand	Sand or Finer	IND	No	None
059	A	7/13/2019	1:29:15	110.33	73.55	0.81	Sand Sheet	Sand	Sand or Finer	IND	No	None
060	A	7/13/2019	1:54:04	109.17	72.78	0.79	Sand Sheet	Sand	Sand or Finer	IND	No	None
060	B	7/13/2019	1:54:42	IND	IND	IND	Sand Sheet	Sand	Sand or Finer	IND	No	None
060	C	7/13/2019	1:55:24	107.22	71.48	0.77	Sand Sheet	Sand	Sand or Finer	IND	No	None
061	A	7/13/2019	2:18:14	107.44	71.63	0.77	Sand Sheet	Sand	Sand or Finer	IND	No	None
061	C	7/13/2019	2:19:38	109.40	72.93	0.80	Sand Sheet	Sand	Sand or Finer	IND	No	None
061	D	7/13/2019	2:20:20	106.78	71.18	0.76	Sand Sheet	Sand	Sand or Finer	IND	No	None
062	A	7/13/2019	2:39:53	110.80	73.86	0.82	Sand Sheet	Sand	Sand or Finer	IND	No	None
062	B	7/13/2019	2:40:39	IND	IND	IND	IND	IND	IND	IND	No	IND
062	D	7/13/2019	2:42:02	115.21	76.81	0.88	Sand Sheet	Sand	Sand or Finer	IND	No	None
063	A	7/11/2019	18:30:21	116.94	77.96	0.91	Sand Sheet	Sand	Sand or Finer	IND	No	None
063	B	7/11/2019	18:31:45	116.42	77.61	0.90	Sand Sheet	Sand	Sand or Finer	IND	No	None
063	D	7/11/2019	18:34:07	115.81	77.21	0.89	Sand Sheet	Sand	Sand or Finer	IND	No	None
064	A	7/11/2019	17:43:20	117.47	78.31	0.92	Sand Sheet	Sand	Sand or Finer	IND	No	None
064	B	7/11/2019	17:44:57	118.18	78.79	0.93	Sand Sheet	Sand	Sand or Finer	IND	No	None
064	C	7/11/2019	17:46:13	115.21	76.81	0.88	Sand Sheet	Sand	Sand or Finer	IND	No	None
065	A	7/11/2019	16:58:49	121.88	81.25	0.99	Sand Sheet	Sand	Sand or Finer	IND	No	None
065	B	7/11/2019	17:00:05	107.73	71.82	0.77	Sand Sheet	Sand	Sand or Finer	IND	No	None
065	C	7/11/2019	17:01:14	117.03	78.02	0.91	Sand Sheet	Sand	Sand or Finer	IND	No	IND
066	A	7/11/2019	16:37:46	116.94	77.96	0.91	Sand Sheet	Sand	Sand or Finer	IND	No	None
066	B	7/11/2019	16:39:20	111.19	74.13	0.82	Sand Sheet	Sand	Sand or Finer	IND	No	None
066	C	7/11/2019	16:40:42	109.94	73.29	0.81	Sand Sheet	Sand	Sand or Finer	IND	No	None
067	A	7/11/2019	16:18:21	120.00	80.00	0.96	Sand Sheet	Sand	Sand or Finer	IND	No	None
067	B	7/11/2019	16:19:40	106.78	71.18	0.76	Sand Sheet	Sand	Sand or Finer	IND	No	None
067	D	7/11/2019	16:22:16	117.21	78.14	0.92	Sand Sheet	Sand	Sand or Finer	IND	No	None
068	A	7/11/2019	16:00:10	117.47	78.31	0.92	Sand with Mobile Gravel	Gravel Mixes	Sandy Gravel	11.75	No	None

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StationID	Replicate	Date	Time	Image Width (cm)	Image Height (cm)	Field of View (m ²)	Habitat Type	Substrate Group	Substrate Subgroup	Gravel Mode (mm)	Boulders	Bedforms
068	B	7/11/2019	16:01:32	110.87	73.92	0.82	Sand with Mobile Gravel	Gravel Mixes	Sandy Gravel	7.39	No	None
068	C	7/11/2019	16:02:41	113.70	75.80	0.86	Sand with Mobile Gravel	Gravel Mixes	Sandy Gravel	6.63	No	None
069	A	7/11/2019	15:40:43	115.99	77.32	0.90	Sand with Mobile Gravel	Slightly Gravelly	Slightly Gravelly Sand	2.90	No	None
069	B	7/11/2019	15:42:16	116.85	77.90	0.91	Sand with Mobile Gravel	Slightly Gravelly	Slightly Gravelly Sand	1.95	No	None
069	C	7/11/2019	15:43:34	108.86	72.58	0.79	Sand with Mobile Gravel	Slightly Gravelly	Slightly Gravelly Sand	2.72	No	Ripples
070	A	7/12/2019	20:10:46	104.00	69.33	0.72	Sand Sheet	Sand	Sand or Finer	IND	No	None
070	B	7/12/2019	20:12:15	107.59	71.72	0.77	Sand Sheet	Sand	Sand or Finer	IND	No	None
070	C	7/12/2019	20:13:44	106.78	71.18	0.76	Sand Sheet	Sand	Sand or Finer	IND	No	None
071	A	7/12/2019	19:52:38	107.66	71.77	0.77	Sand Sheet	Sand	Sand or Finer	IND	No	None
071	B	7/12/2019	19:54:09	108.41	72.27	0.78	Sand Sheet	Sand	Sand or Finer	IND	No	None
071	C	7/12/2019	19:55:37	104.07	69.38	0.72	Sand Sheet	Sand	Sand or Finer	IND	No	Uneven ripples
072	A	7/12/2019	19:34:47	110.64	73.76	0.82	Sand Sheet	Sand	Sand or Finer	IND	No	None
072	C	7/12/2019	19:37:52	108.33	72.22	0.78	Sand Sheet	Sand	Sand or Finer	IND	No	Uneven ripples
072	D	7/12/2019	19:39:29	110.09	73.39	0.81	Sand Sheet	Sand	Sand or Finer	IND	No	None
073	A	7/12/2019	19:17:47	108.18	72.12	0.78	Sand Sheet	Sand	Sand or Finer	IND	No	None
073	B	7/12/2019	19:19:16	104.84	69.89	0.73	Sand Sheet	Sand	Sand or Finer	IND	No	None
073	C	7/12/2019	19:20:45	105.91	70.60	0.75	Sand Sheet	Sand	Sand or Finer	IND	No	None
074	E	7/12/2019	18:59:27	112.64	75.09	0.85	Sand Sheet	Sand	Sand or Finer	IND	No	None
075	A	7/12/2019	18:25:10	102.23	68.15	0.70	Sand Sheet	Sand	Sand or Finer	IND	No	None
075	B	7/12/2019	18:26:43	108.64	72.42	0.79	Sand Sheet	Sand	Sand or Finer	IND	No	None
075	D	7/12/2019	18:28:19	103.93	69.29	0.72	Sand Sheet	Sand	Sand or Finer	IND	No	None
076	A	7/12/2019	17:52:20	102.63	68.42	0.70	Sand Sheet	Sand	Sand or Finer	IND	No	None
076	B	7/12/2019	17:53:58	110.64	73.76	0.82	Sand Sheet	Sand	Sand or Finer	IND	No	None
076	C	7/12/2019	17:55:32	104.35	69.57	0.73	Sand Sheet	Sand	Sand or Finer	IND	No	None
077	A	7/12/2019	17:32:25	105.62	70.41	0.74	Sand Sheet	Sand	Sand or Finer	IND	No	None
077	C	7/12/2019	17:35:25	IND	IND	IND	IND	IND	IND	IND	No	None

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StationID	Replicate	Date	Time	Image Width (cm)	Image Height (cm)	Field of View (m ²)	Habitat Type	Substrate Group	Substrate Subgroup	Gravel Mode (mm)	Boulders	Bedforms
077	D	7/12/2019	17:37:02	105.62	70.41	0.74	Sand Sheet	Sand	Sand or Finer	IND	No	None
078	A	7/11/2019	18:45:12	115.38	76.92	0.89	Sand Sheet	Sand	Sand or Finer	IND	No	None
078	B	7/11/2019	18:47:54	103.38	68.92	0.71	Sand Sheet	Sand	Sand or Finer	IND	No	None
078	C	7/11/2019	18:48:39	38.80	25.86	0.10	Sand Sheet	Sand	Sand or Finer	IND	No	None
079	A	7/12/2019	4:58:00	107.73	71.82	0.77	Sand Sheet	Sand	Sand or Finer	IND	No	None
079	C	7/12/2019	4:59:39	105.19	70.13	0.74	Sand Sheet	Sand	Sand or Finer	IND	No	None
079	D	7/12/2019	5:00:20	IND	IND	IND	IND	IND	IND	IND	No	None
080	A	7/12/2019	5:40:25	110.01	73.34	0.81	Sand Sheet	Sand	Sand or Finer	IND	No	None
080	B	7/12/2019	5:41:16	103.72	69.15	0.72	Sand Sheet	Sand	Sand or Finer	IND	No	None
080	C	7/12/2019	5:41:56	106.12	70.75	0.75	Sand Sheet	Sand	Sand or Finer	IND	No	None
081	A	7/11/2019	19:02:09	109.40	72.93	0.80	Sand Sheet	Sand	Sand or Finer	IND	No	None
081	B	7/11/2019	19:03:44	109.47	72.98	0.80	Sand Sheet	Sand	Sand or Finer	IND	No	None
081	C	7/11/2019	19:04:57	107.88	71.92	0.78	Sand Sheet	Sand	Sand or Finer	IND	No	Uneven ripples
082	A	7/12/2019	4:18:05	117.03	78.02	0.91	Sand Sheet	Sand	Sand or Finer	IND	No	None
082	B	7/12/2019	4:19:50	IND	IND	IND	IND	IND	IND	IND	No	None
082	C	7/12/2019	4:20:54	111.99	74.66	0.84	Sand Sheet	Sand	Sand or Finer	IND	No	None
083	A	7/12/2019	5:25:46	109.09	72.73	0.79	Sand Sheet	Sand	Sand or Finer	IND	No	None
084	A	7/12/2019	6:00:13	114.71	76.47	0.88	Sand Sheet	Sand	Sand or Finer	IND	No	None
084	C	7/12/2019	6:01:44	110.80	73.86	0.82	Sand Sheet	Sand	Sand or Finer	IND	No	None
084	D	7/12/2019	6:02:25	102.97	68.65	0.71	Sand Sheet	Sand	Sand or Finer	IND	No	Uneven ripples
085	A	7/12/2019	6:42:57	117.03	78.02	0.91	Sand Sheet	Sand	Sand or Finer	IND	No	None
085	B	7/12/2019	6:43:51	IND	IND	IND	IND	IND	IND	IND	No	None
085	C	7/12/2019	6:44:32	105.76	70.51	0.75	Sand Sheet	Sand	Sand or Finer	IND	No	None
086	A	7/12/2019	7:17:24	109.32	72.88	0.80	Sand Sheet	Sand	Sand or Finer	IND	No	Uneven ripples
086	B	7/12/2019	7:18:19	103.24	68.83	0.71	Sand Sheet	Sand	Sand or Finer	IND	No	Uneven ripples
086	C	7/12/2019	7:19:11	104.70	69.80	0.73	Sand Sheet	Sand	Sand or Finer	IND	No	None
087	A	7/12/2019	7:36:08	109.63	73.09	0.80	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
087	B	7/12/2019	7:37:29	105.48	70.32	0.74	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
087	C	7/12/2019	7:38:08	108.26	72.17	0.78	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
088	A	7/12/2019	7:56:44	IND	IND	IND	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
088	B	7/12/2019	7:57:36	IND	IND	IND	IND	IND	IND	IND	No	None
088	C	7/12/2019	7:58:22	IND	IND	IND	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
089	A	7/13/2019	3:51:40	94.03	62.69	0.59	Sand Sheet	Sand	Sand or Finer	IND	No	None

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StationID	Replicate	Date	Time	Image Width (cm)	Image Height (cm)	Field of View (m ²)	Habitat Type	Substrate Group	Substrate Subgroup	Gravel Mode (mm)	Boulders	Bedforms
089	B	7/13/2019	3:53:06	97.62	65.08	0.64	Sand Sheet	Sand	Sand or Finer	IND	No	None
089	C	7/13/2019	3:53:54	101.23	67.49	0.68	Sand Sheet	Sand	Sand or Finer	IND	No	None
090	A	7/13/2019	4:14:15	92.36	61.57	0.57	Sand Sheet	Sand	Sand or Finer	IND	No	None
090	B	7/13/2019	4:14:55	97.20	64.80	0.63	Sand Sheet	Sand	Sand or Finer	IND	No	None
090	D	7/13/2019	4:16:20	94.26	62.84	0.59	Sand Sheet	Sand	Sand or Finer	IND	No	None
091	A	7/13/2019	4:36:34	95.35	63.57	0.61	Sand Sheet	Sand	Sand or Finer	IND	No	None
091	B	7/13/2019	4:37:14	98.42	65.62	0.65	Sand Sheet	Sand	Sand or Finer	IND	No	None
091	C	7/13/2019	4:38:03	95.65	63.76	0.61	Sand Sheet	Sand	Sand or Finer	IND	No	None
092	A	7/13/2019	4:56:22	93.08	62.05	0.58	Sand Sheet	Sand	Sand or Finer	IND	No	Uneven ripples
092	C	7/13/2019	4:57:44	93.30	62.20	0.58	Sand Sheet	Sand	Sand or Finer	IND	No	Uneven ripples
092	D	7/13/2019	4:58:31	98.30	65.53	0.64	Sand Sheet	Sand	Sand or Finer	IND	No	Uneven ripples
093	A	7/13/2019	5:19:31	99.36	66.24	0.66	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
093	C	7/13/2019	5:20:49	100.00	66.67	0.67	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
093	D	7/13/2019	5:21:24	99.30	66.20	0.66	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
094	B	7/13/2019	5:39:57	103.38	68.92	0.71	Sand Sheet	Sand	Sand or Finer	IND	No	Uneven ripples
094	C	7/13/2019	5:40:43	96.53	64.36	0.62	Sand Sheet	Sand	Sand or Finer	IND	No	Uneven ripples
094	D	7/13/2019	5:42:00	89.55	59.70	0.53	Sand Sheet	Sand	Sand or Finer	IND	No	Uneven ripples
095	A	7/13/2019	6:00:44	104.28	69.52	0.72	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
095	B	7/13/2019	6:01:27	100.19	66.80	0.67	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
095	C	7/13/2019	6:02:09	93.41	62.28	0.58	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
096	A	7/13/2019	6:17:10	95.35	63.57	0.61	Sand with Mobile Gravel	Gravelly	Gravelly Sand	1.59	No	None
096	B	7/13/2019	6:17:59	104.56	69.71	0.73	Sand with Mobile Gravel	Gravelly	Gravelly Sand	1.39	No	None
096	D	7/13/2019	6:19:20	99.11	66.07	0.65	Sand with Mobile Gravel	Gravelly	Gravelly Sand	3.30	No	Ripples
097	A	7/13/2019	6:36:26	100.65	67.10	0.68	Sand Sheet	Sand	Sand or Finer	IND	No	Uneven ripples
097	B	7/13/2019	6:37:03	99.68	66.45	0.66	Sand Sheet	Sand	Sand or Finer	IND	No	Uneven ripples
097	C	7/13/2019	6:38:22	99.11	66.07	0.65	Sand Sheet	Sand	Sand or Finer	IND	No	Uneven ripples
098	A	7/12/2019	6:15:22	107.66	71.77	0.77	Sand Sheet	Sand	Sand or Finer	IND	No	Uneven ripples
098	B	7/12/2019	6:15:57	111.19	74.13	0.82	Sand Sheet	Sand	Sand or Finer	IND	No	Uneven ripples

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StationID	Replicate	Date	Time	Image Width (cm)	Image Height (cm)	Field of View (m ²)	Habitat Type	Substrate Group	Substrate Subgroup	Gravel Mode (mm)	Boulders	Bedforms
098	C	7/12/2019	6:16:49	110.33	73.55	0.81	Sand Sheet	Sand	Sand or Finer	IND	No	Uneven ripples
099	A	7/12/2019	10:08:15	102.36	68.24	0.70	Sand with Mobile Gravel	Slightly Gravelly	Slightly Gravelly Sand	1.71	No	None
099	B	7/12/2019	10:08:53	105.91	70.60	0.75	Sand with Mobile Gravel	Slightly Gravelly	Slightly Gravelly Sand	1.77	No	None
099	C	7/12/2019	10:10:19	104.91	69.94	0.73	Sand with Mobile Gravel	Slightly Gravelly	Slightly Gravelly Sand	2.62	No	None
100	A	7/12/2019	10:30:26	105.41	70.27	0.74	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
100	B	7/12/2019	10:31:15	109.47	72.98	0.80	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
100	C	7/12/2019	10:32:04	111.59	74.39	0.83	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
101	A	7/12/2019	10:51:23	99.43	66.28	0.66	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
101	B	7/12/2019	10:52:28	105.55	70.37	0.74	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
101	C	7/12/2019	10:53:11	99.30	66.20	0.66	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
102	A	7/12/2019	6:27:40	105.98	70.65	0.75	Sand Sheet	Sand	Sand or Finer	IND	No	None
102	B	7/12/2019	6:28:37	103.93	69.29	0.72	Sand Sheet	Sand	Sand or Finer	IND	No	None
102	C	7/12/2019	6:29:24	109.47	72.98	0.80	Sand Sheet	Sand	Sand or Finer	IND	No	None
103	A	7/12/2019	7:03:13	104.56	69.71	0.73	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
103	B	7/12/2019	7:03:53	109.55	73.03	0.80	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
103	C	7/12/2019	7:04:37	104.14	69.43	0.72	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
104	A	7/12/2019	9:36:45	110.72	73.81	0.82	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
104	B	7/12/2019	9:38:52	105.69	70.46	0.74	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
104	C	7/12/2019	9:39:46	103.79	69.19	0.72	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
105	A	7/12/2019	9:17:52	115.81	77.21	0.89	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
105	B	7/12/2019	9:18:58	97.26	64.84	0.63	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
105	C	7/12/2019	9:19:36	103.72	69.15	0.72	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
106	A	7/12/2019	8:47:28	IND	IND	IND	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
106	B	7/12/2019	8:48:18	IND	IND	IND	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples

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StationID	Replicate	Date	Time	Image Width (cm)	Image Height (cm)	Field of View (m ²)	Habitat Type	Substrate Group	Substrate Subgroup	Gravel Mode (mm)	Boulders	Bedforms
106	C	7/12/2019	8:49:06	IND	IND	IND	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
107	A	7/13/2019	7:01:23	94.15	62.76	0.59	Sand Sheet	Sand	Sand or Finer	IND	No	None
107	B	7/13/2019	7:02:02	90.70	60.47	0.55	Sand Sheet	Sand	Sand or Finer	IND	No	None
107	C	7/13/2019	7:02:43	86.05	57.36	0.49	Sand Sheet	Sand	Sand or Finer	IND	No	None
108	A	7/13/2019	7:35:38	96.83	64.56	0.63	IND	IND	IND	IND	No	None
108	B	7/13/2019	7:36:19	IND	IND	IND	IND	IND	IND	IND	No	None
108	F	7/13/2019	7:38:53	94.72	63.15	0.60	IND	IND	IND	IND	No	None
109	A	7/13/2019	7:57:56	94.15	62.76	0.59	IND	IND	IND	IND	No	None
109	C	7/13/2019	7:59:17	IND	IND	IND	IND	IND	IND	IND	No	None
109	D	7/13/2019	7:59:50	IND	IND	IND	IND	IND	IND	IND	No	None
110	B	7/13/2019	8:19:08	88.59	59.06	0.52	IND	IND	IND	IND	No	None
110	C	7/13/2019	8:19:53	96.89	64.60	0.63	IND	IND	IND	IND	No	None
110	D	7/13/2019	8:20:31	111.59	74.39	0.83	Sand Sheet	Sand	Sand or Finer	IND	No	None
111	A	7/13/2019	8:41:09	97.14	64.76	0.63	IND	IND	IND	IND	No	None
111	B	7/13/2019	8:42:00	91.87	61.25	0.56	IND	IND	IND	IND	No	None
111	C	7/13/2019	8:42:39	85.86	57.24	0.49	Sand Sheet	Sand	Sand or Finer	IND	No	None
112	A	7/13/2019	9:05:43	IND	IND	IND	IND	IND	IND	IND	No	None
112	B	7/13/2019	9:08:25	IND	IND	IND	IND	IND	IND	IND	No	None
112	C	7/13/2019	9:10:23	IND	IND	IND	IND	IND	IND	IND	No	None
113	A	7/13/2019	9:42:23	IND	IND	IND	Sand Sheet	Sand	Sand or Finer	IND	No	Uneven ripples
113	B	7/13/2019	9:43:11	IND	IND	IND	Sand Sheet	Sand	Sand or Finer	IND	No	Uneven ripples
113	C	7/13/2019	9:44:22	IND	IND	IND	Sand Sheet	Sand	Sand or Finer	IND	No	Uneven ripples
116	A	7/12/2019	11:14:51	111.59	74.39	0.83	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
116	B	7/12/2019	11:16:50	100.39	66.92	0.67	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
116	D	7/12/2019	11:18:11	113.29	75.53	0.86	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
117	A	7/12/2019	11:46:52	104.70	69.80	0.73	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
117	C	7/12/2019	11:48:14	108.86	72.58	0.79	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
117	D	7/12/2019	11:48:50	109.94	73.29	0.81	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
118	A	7/12/2019	16:05:32	112.55	75.04	0.84	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
118	B	7/12/2019	16:07:03	100.26	66.84	0.67	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
118	C	7/12/2019	16:08:32	106.56	71.04	0.76	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
119	A	7/12/2019	11:34:24	106.56	71.04	0.76	Sand Sheet	Sand	Sand or Finer	IND	No	None
119	B	7/12/2019	11:35:04	112.64	75.09	0.85	Sand Sheet	Sand	Sand or Finer	IND	No	None
119	C	7/12/2019	11:35:54	109.86	73.24	0.80	Sand Sheet	Sand	Sand or Finer	IND	No	None
120	A	7/12/2019	12:59:13	31.73	21.16	0.07	Sand Sheet	Sand	Sand or Finer	IND	No	None

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StationID	Replicate	Date	Time	Image Width (cm)	Image Height (cm)	Field of View (m ²)	Habitat Type	Substrate Group	Substrate Subgroup	Gravel Mode (mm)	Boulders	Bedforms
120	B	7/12/2019	13:01:08	105.48	70.32	0.74	Sand Sheet	Sand	Sand or Finer	IND	No	None
120	C	7/12/2019	13:02:38	IND	IND	IND	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
122	A	7/12/2019	15:53:13	107.59	71.72	0.77	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
122	B	7/12/2019	15:54:58	109.01	72.68	0.79	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
122	C	7/12/2019	15:56:32	107.59	71.72	0.77	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
123	A	7/12/2019	15:16:55	109.24	72.83	0.80	Sand with Mobile Gravel	Slightly Gravelly	Slightly Gravelly Sand	1.82	No	Ripples
123	B	7/12/2019	15:18:47	105.98	70.65	0.75	Sand with Mobile Gravel	Slightly Gravelly	Slightly Gravelly Sand	2.65	No	Uneven ripples
123	C	7/12/2019	15:20:25	107.44	71.63	0.77	Sand with Mobile Gravel	Slightly Gravelly	Slightly Gravelly Sand	1.79	No	Ripples
124	A	7/12/2019	15:02:38	110.87	73.92	0.82	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
124	B	7/12/2019	15:04:14	109.17	72.78	0.79	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
124	C	7/12/2019	15:05:41	108.86	72.58	0.79	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
125	A	7/12/2019	15:31:20	105.12	70.08	0.74	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
125	B	7/12/2019	15:32:53	103.93	69.29	0.72	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
125	C	7/12/2019	15:34:29	110.64	73.76	0.82	Sand with Mobile Gravel	Slightly Gravelly	Slightly Gravelly Sand	IND	No	Ripples
126	A	7/12/2019	14:51:11	IND	IND	IND	Sand with Mobile Gravel	Gravel Mixes	Sandy Gravel	IND	No	None
126	C	7/12/2019	14:54:28	IND	IND	IND	Sand with Mobile Gravel	Gravel Mixes	Sandy Gravel	IND	No	None
126	D	7/12/2019	14:55:57	IND	IND	IND	Sand with Mobile Gravel	Gravel Mixes	Sandy Gravel	IND	No	None
127	A	7/12/2019	15:41:25	112.64	75.09	0.85	Sand with Mobile Gravel	Gravel Mixes	Sandy Gravel	6.57	No	None
127	B	7/12/2019	15:43:05	108.64	72.42	0.79	Sand with Mobile Gravel	Gravelly	Gravelly Sand	5.43	No	Ripples
127	C	7/12/2019	15:44:43	IND	IND	IND	Sand with Mobile Gravel	Gravelly	Gravelly Sand	IND	No	None
128	A	7/12/2019	14:31:42	IND	IND	IND	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
128	B	7/12/2019	14:33:26	106.27	70.84	0.75	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
130	A	7/12/2019	14:11:26	IND	IND	IND	Sand with Mobile Gravel	Gravel Mixes	Sandy Gravel	IND	No	None
130	B	7/12/2019	14:13:10	IND	IND	IND	Sand with Mobile Gravel	Gravel Mixes	Sandy Gravel	IND	No	None
130	C	7/12/2019	14:14:33	IND	IND	IND	Sand with Mobile Gravel	Gravel Mixes	Sandy Gravel	IND	No	None
131	A	7/11/2019	15:22:12	110.33	73.55	0.81	Sand with Mobile Gravel	Gravelly	Gravelly Sand	4.60	No	None
131	B	7/11/2019	15:23:39	115.90	77.27	0.90	Sand with Mobile Gravel	Gravelly	Gravelly Sand	6.76	No	None
131	C	7/11/2019	15:24:49	113.95	75.97	0.87	Sand with Mobile Gravel	Gravelly	Gravelly Sand	3.80	No	None
132	A	7/11/2019	15:02:57	115.56	77.04	0.89	Sand with Mobile Gravel	Gravelly	Gravelly Sand	9.63	No	None
132	B	7/11/2019	15:04:17	110.56	73.71	0.81	Sand with Mobile Gravel	Gravelly	Gravelly Sand	10.13	No	None
132	C	7/11/2019	15:05:31	119.82	79.88	0.96	Sand with Mobile Gravel	Gravelly	Gravelly Sand	6.99	No	None

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StationID	Replicate	Date	Time	Image Width (cm)	Image Height (cm)	Field of View (m ²)	Habitat Type	Substrate Group	Substrate Subgroup	Gravel Mode (mm)	Boulders	Bedforms
133	A	7/11/2019	14:45:10	116.94	77.96	0.91	Sand with Mobile Gravel	Gravelly	Gravelly Sand	2.92	No	None
133	B	7/11/2019	14:46:28	114.20	76.13	0.87	Sand with Mobile Gravel	Gravelly	Gravelly Sand	1.90	No	None
133	C	7/11/2019	14:47:46	115.38	76.92	0.89	Sand with Mobile Gravel	Gravelly	Gravelly Sand	3.85	No	None
134	A	7/11/2019	14:25:27	118.27	78.85	0.93	Sand with Mobile Gravel	Gravel Mixes	Sandy Gravel	1.97	No	None
134	B	7/11/2019	14:26:52	IND	IND	IND	IND	Gravel Mixes	Sandy Gravel	IND	No	None
134	D	7/11/2019	14:29:24	109.86	73.24	0.80	Sand with Mobile Gravel	Gravel Mixes	Sandy Gravel	9.15	No	None
135	F	7/11/2019	8:06:50	114.04	76.02	0.87	Sand Sheet	Sand	Sand or Finer	IND	No	None
135	G	7/11/2019	8:07:12	113.13	75.42	0.85	Sand Sheet	Sand	Sand or Finer	IND	No	None
135	H	7/11/2019	8:07:38	110.95	73.97	0.82	Sand Sheet	Sand	Sand or Finer	IND	No	None
136	E	7/11/2019	8:25:55	117.12	78.08	0.91	Sand with Mobile Gravel	Gravelly	Gravelly Sand	3.90	No	None
136	F	7/11/2019	8:27:03	115.90	77.27	0.90	Sand with Mobile Gravel	Gravelly	Gravelly Sand	3.86	No	None
136	H	7/11/2019	8:28:02	111.91	74.61	0.83	Sand with Mobile Gravel	Gravelly	Gravelly Sand	4.66	No	None
137	E	7/11/2019	8:45:32	112.64	75.09	0.85	Sand Sheet	Sand	Sand or Finer	IND	No	None
137	G	7/11/2019	8:46:21	112.07	74.71	0.84	Sand Sheet	Sand	Sand or Finer	IND	No	None
137	H	7/11/2019	8:46:54	119.72	79.82	0.96	Sand Sheet	Sand	Sand or Finer	IND	No	None
138	E	7/11/2019	9:07:24	107.96	71.97	0.78	Sand Sheet	Sand	Sand or Finer	IND	No	None
138	F	7/11/2019	9:07:47	105.76	70.51	0.75	Sand Sheet	Sand	Sand or Finer	IND	No	None
138	G	7/11/2019	9:08:15	109.47	72.98	0.80	Sand Sheet	Sand	Sand or Finer	IND	No	None
139	E	7/11/2019	9:28:25	113.87	75.91	0.86	Sand Sheet	Sand	Sand or Finer	IND	No	None
139	F	7/11/2019	9:28:52	108.86	72.58	0.79	Sand Sheet	Sand	Sand or Finer	IND	No	None
139	G	7/11/2019	9:29:19	113.79	75.86	0.86	Sand Sheet	Sand	Sand or Finer	IND	No	None
140	E	7/11/2019	9:49:27	108.71	72.47	0.79	Sand Sheet	Sand	Sand or Finer	IND	No	None
140	F	7/11/2019	9:49:49	107.51	71.67	0.77	Sand Sheet	Sand	Sand or Finer	IND	No	None
140	H	7/11/2019	9:50:33	116.59	77.73	0.91	Sand Sheet	Sand	Sand or Finer	IND	No	None
141	B	7/10/2019	19:25:56	192.12	128.08	2.46	Sand Sheet	Sand	Sand or Finer	IND	No	None
142	A	7/10/2019	19:56:42	190.24	126.83	2.41	Sand Sheet	Sand	Sand or Finer	IND	No	None
142	B	7/10/2019	19:57:38	197.22	131.48	2.59	Sand Sheet	Sand	Sand or Finer	IND	No	None
142	C	7/10/2019	19:58:14	187.27	124.85	2.34	Sand Sheet	Sand	Sand or Finer	IND	No	None
143	A	7/10/2019	20:39:46	183.31	122.21	2.24	Sand Sheet	Sand	Sand or Finer	IND	No	None
143	C	7/10/2019	20:42:45	182.46	121.64	2.22	Sand Sheet	Sand	Sand or Finer	IND	No	None

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StationID	Replicate	Date	Time	Image Width (cm)	Image Height (cm)	Field of View (m ²)	Habitat Type	Substrate Group	Substrate Subgroup	Gravel Mode (mm)	Boulders	Bedforms
143	D	7/10/2019	20:44:08	179.10	119.40	2.14	Sand Sheet	Sand	Sand or Finer	IND	No	None
144	A	7/10/2019	21:01:00	171.62	114.41	1.96	Sand Sheet	Sand	Sand or Finer	IND	No	None
144	B	7/10/2019	21:02:24	IND	IND	IND	Sand Sheet	Sand	Sand or Finer	IND	No	None
144	C	7/10/2019	21:03:50	177.88	118.59	2.11	Sand Sheet	Sand	Sand or Finer	IND	No	None
145	A	7/10/2019	21:23:05	179.93	119.95	2.16	Sand Sheet	Sand	Sand or Finer	IND	No	None
145	C	7/10/2019	21:25:51	166.84	111.23	1.86	Sand Sheet	Sand	Sand or Finer	IND	No	None
146	A	7/10/2019	21:43:16	180.76	120.51	2.18	Sand Sheet	Sand	Sand or Finer	IND	No	None
146	B	7/10/2019	21:44:30	177.27	118.18	2.10	Sand Sheet	Sand	Sand or Finer	IND	No	None
146	C	7/10/2019	21:45:43	182.88	121.92	2.23	Sand Sheet	Sand	Sand or Finer	IND	No	None
147	A	7/10/2019	16:00:30	182.03	121.35	2.21	Sand Sheet	Sand	Sand or Finer	IND	No	None
147	B	7/10/2019	16:01:42	179.10	119.40	2.14	Sand Sheet	Sand	Sand or Finer	IND	No	None
147	C	7/10/2019	16:02:58	177.47	118.32	2.10	Sand Sheet	Sand	Sand or Finer	IND	No	None
148	A	7/10/2019	15:40:42	182.46	121.64	2.22	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
148	B	7/10/2019	15:41:56	190.48	126.98	2.42	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
148	C	7/10/2019	15:43:06	185.05	123.37	2.28	Sand Sheet	Sand	Sand or Finer	IND	No	None
149	A	7/10/2019	15:21:48	182.46	121.64	2.22	Sand Sheet	Sand	Sand or Finer	IND	No	None
149	D	7/10/2019	15:25:36	184.40	122.93	2.27	Sand Sheet	Sand	Sand or Finer	IND	No	None
150	A	7/10/2019	14:50:09	183.96	122.64	2.26	Sand Sheet	Sand	Sand or Finer	IND	No	None
150	B	7/10/2019	14:51:18	184.83	123.22	2.28	Sand Sheet	Sand	Sand or Finer	IND	No	None
150	C	7/10/2019	14:52:27	183.31	122.21	2.24	Sand Sheet	Sand	Sand or Finer	IND	No	None
151	A	7/10/2019	14:30:06	183.75	122.50	2.25	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
151	B	7/10/2019	14:31:36	178.49	118.99	2.12	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
151	D	7/10/2019	14:34:05	189.32	126.21	2.39	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
152	A	7/10/2019	14:11:51	180.14	120.09	2.16	Sand Sheet	Sand	Sand or Finer	IND	No	None
152	B	7/10/2019	14:13:09	185.49	123.66	2.29	Sand Sheet	Sand	Sand or Finer	IND	No	None
152	D	7/10/2019	14:15:50	180.97	120.65	2.18	Sand Sheet	Sand	Sand or Finer	IND	No	None
153	A	7/10/2019	13:49:37	179.31	119.54	2.14	Sand Sheet	Sand	Sand or Finer	IND	No	None
153	B	7/10/2019	13:50:44	181.61	121.07	2.20	Sand Sheet	Sand	Sand or Finer	IND	No	None
153	C	7/10/2019	13:51:56	179.52	119.68	2.15	Sand Sheet	Sand	Sand or Finer	IND	No	None
154	A	7/10/2019	13:28:30	182.03	121.35	2.21	Sand Sheet	Sand	Sand or Finer	IND	No	None
154	B	7/10/2019	13:29:45	186.60	124.40	2.32	Sand Sheet	Sand	Sand or Finer	IND	No	None

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StationID	Replicate	Date	Time	Image Width (cm)	Image Height (cm)	Field of View (m ²)	Habitat Type	Substrate Group	Substrate Subgroup	Gravel Mode (mm)	Boulders	Bedforms
154	C	7/10/2019	13:31:08	189.32	126.21	2.39	Sand Sheet	Sand	Sand or Finer	IND	No	None
155	A	7/10/2019	13:07:53	181.82	121.21	2.20	Sand Sheet	Sand	Sand or Finer	IND	No	None
155	B	7/10/2019	13:08:55	180.14	120.09	2.16	Sand Sheet	Sand	Sand or Finer	IND	No	None
155	D	7/10/2019	13:11:06	182.67	121.78	2.22	Sand Sheet	Sand	Sand or Finer	IND	No	None
156	A	7/10/2019	12:46:55	179.31	119.54	2.14	Sand Sheet	Sand	Sand or Finer	IND	No	None
156	B	7/10/2019	12:48:02	184.62	123.08	2.27	Sand Sheet	Sand	Sand or Finer	IND	No	None
156	D	7/10/2019	12:50:13	187.27	124.85	2.34	Sand Sheet	Sand	Sand or Finer	IND	No	None
157	A	7/10/2019	12:21:37	177.27	118.18	2.10	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
157	B	7/10/2019	12:22:36	179.52	119.68	2.15	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
157	C	7/10/2019	12:23:41	181.61	121.07	2.20	Sand Sheet	Sand	Sand or Finer	IND	No	None
REFA_01	A	7/13/2019	22:15:28	99.05	66.03	0.65	Sand with Mobile Gravel	Gravel Mixes	Sandy Gravel	10.73	No	None
REFA_01	B	7/13/2019	22:16:58	95.12	63.41	0.60	Sand with Mobile Gravel	Gravel Mixes	Sandy Gravel	11.10	No	None
REFA_01	C	7/13/2019	22:18:20	92.91	61.94	0.58	Sand with Mobile Gravel	Gravel Mixes	Sandy Gravel	10.07	No	None
REFA_02	A	7/13/2019	21:21:05	78.00	52.00	0.41	Sand with Mobile Gravel	Gravel Mixes	Sandy Gravel	5.20	No	None
REFA_02	B	7/13/2019	21:22:45	89.97	59.98	0.54	Sand with Mobile Gravel	Gravel Mixes	Sandy Gravel	4.50	No	None
REFA_02	D	7/13/2019	21:25:43	85.95	57.30	0.49	Sand with Mobile Gravel	Gravel Mixes	Sandy Gravel	10.03	No	None
REFA_03	A	7/13/2019	21:48:09	100.13	66.75	0.67	Sand with Mobile Gravel	Gravel Mixes	Sandy Gravel	9.18	No	None
REFA_03	B	7/13/2019	21:49:40	104.63	69.75	0.73	Sand with Mobile Gravel	Gravel Mixes	Sandy Gravel	6.98	No	None
REFA_03	D	7/13/2019	21:52:28	98.92	65.95	0.65	Sand with Mobile Gravel	Gravel Mixes	Sandy Gravel	9.89	No	None
REFA_04	A	7/13/2019	21:37:24	105.69	70.46	0.74	Sand with Mobile Gravel	Gravel Mixes	Sandy Gravel	7.05	No	None
REFA_04	C	7/13/2019	21:41:01	94.83	63.22	0.60	Sand with Mobile Gravel	Gravel Mixes	Sandy Gravel	8.69	No	None
REFA_04	D	7/13/2019	21:42:31	94.20	62.80	0.59	Sand with Mobile Gravel	Gravel Mixes	Sandy Gravel	10.99	No	None
REFA_05	A	7/13/2019	21:59:55	90.91	60.61	0.55	Sand with Mobile Gravel	Gravel Mixes	Sandy Gravel	7.58	No	None
REFA_05	B	7/13/2019	22:01:20	99.68	66.45	0.66	Sand with Mobile Gravel	Gravel Mixes	Sandy Gravel	7.48	No	None
REFA_05	C	7/13/2019	22:02:49	97.01	64.68	0.63	Sand with Mobile Gravel	Gravel Mixes	Sandy Gravel	9.70	No	None
REFB_01	E	7/11/2019	7:41:38	115.21	76.81	0.88	Sand Sheet	Sand	Sand or Finer	IND	No	None
REFB_01	F	7/11/2019	7:42:21	108.18	72.12	0.78	Sand Sheet	Sand	Sand or Finer	IND	No	None

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StationID	Replicate	Date	Time	Image Width (cm)	Image Height (cm)	Field of View (m ²)	Habitat Type	Substrate Group	Substrate Subgroup	Gravel Mode (mm)	Boulders	Bedforms
REFB_01	G	7/11/2019	7:42:50	113.45	75.64	0.86	Sand Sheet	Sand	Sand or Finer	IND	No	None
REFB_02	H	7/11/2019	6:58:29	105.98	70.65	0.75	Sand Sheet	Sand	Sand or Finer	IND	No	None
REFB_02	I	7/11/2019	6:59:00	111.67	74.45	0.83	Sand Sheet	Sand	Sand or Finer	IND	No	None
REFB_02	J	7/11/2019	6:59:34	110.40	73.60	0.81	Sand Sheet	Sand	Sand or Finer	IND	No	None
REFB_03	E	7/11/2019	7:25:05	120.65	80.43	0.97	Sand Sheet	Sand	Sand or Finer	IND	No	None
REFB_03	F	7/11/2019	7:25:34	113.70	75.80	0.86	Sand Sheet	Sand	Sand or Finer	IND	No	None
REFB_03	G	7/11/2019	7:25:58	111.59	74.39	0.83	Sand Sheet	Sand	Sand or Finer	IND	No	None
REFB_04	F	7/11/2019	7:33:29	115.47	76.98	0.89	Sand Sheet	Sand	Sand or Finer	IND	No	None
REFB_04	G	7/11/2019	7:34:06	106.85	71.23	0.76	Sand Sheet	Sand	Sand or Finer	IND	No	Uneven ripples
REFB_04	H	7/11/2019	7:34:33	114.79	76.53	0.88	Sand Sheet	Sand	Sand or Finer	IND	No	None
REFB_05	E	7/11/2019	7:48:17	115.99	77.32	0.90	Sand Sheet	Sand	Sand or Finer	IND	No	None
REFB_05	F	7/11/2019	7:48:40	IND	IND	IND	Sand Sheet	Sand	Sand or Finer	IND	No	None
REFB_05	H	7/11/2019	7:49:38	115.13	76.75	0.88	Sand Sheet	Sand	Sand or Finer	IND	No	None
REFC_01	A	7/13/2019	20:23:47	98.98	65.99	0.65	Sand Sheet	Sand	Sand or Finer	IND	No	None
REFC_01	B	7/13/2019	20:25:36	97.50	65.00	0.63	Sand Sheet	Sand	Sand or Finer	IND	No	None
REFC_01	D	7/13/2019	20:28:30	IND	IND	IND	Sand Sheet	Sand	Sand or Finer	IND	No	None
REFC_02	A	7/13/2019	20:32:07	93.25	62.16	0.58	Sand Sheet	Sand	Sand or Finer	IND	No	None
REFC_02	B	7/13/2019	20:33:28	96.59	64.40	0.62	Sand Sheet	Sand	Sand or Finer	IND	No	None
REFC_02	C	7/13/2019	20:34:57	98.86	65.91	0.65	Sand Sheet	Sand	Sand or Finer	IND	No	None
REFC_03	A	7/13/2019	19:53:45	94.32	62.88	0.59	Sand Sheet	Sand	Sand or Finer	IND	No	None
REFC_03	B	7/13/2019	19:55:11	91.02	60.68	0.55	Sand Sheet	Sand	Sand or Finer	IND	No	None
REFC_03	D	7/13/2019	19:57:55	94.66	63.11	0.60	Sand Sheet	Sand	Sand or Finer	IND	No	None
REFC_04	A	7/13/2019	20:12:23	90.54	60.36	0.55	Sand Sheet	Sand	Sand or Finer	IND	No	None
REFC_04	B	7/13/2019	20:13:52	98.55	65.70	0.65	Sand Sheet	Sand	Sand or Finer	IND	No	None
REFC_04	D	7/13/2019	20:16:51	94.32	62.88	0.59	Sand Sheet	Sand	Sand or Finer	IND	No	None
REFC_05	A	7/13/2019	20:03:36	92.91	61.94	0.58	Sand Sheet	Sand	Sand or Finer	IND	No	None
REFC_05	B	7/13/2019	20:05:02	96.59	64.40	0.62	Sand Sheet	Sand	Sand or Finer	IND	No	None
REFC_05	C	7/13/2019	20:06:35	90.64	60.43	0.55	Sand Sheet	Sand	Sand or Finer	IND	No	None

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StationID	Replicate	Bedform Size Measurement (cm)	Debris	Biotic Subclass	Co-occurring Biotic Subclass	Sensitive Taxa Present?	Type of Sensitive Taxa	Type of Species of Concern Observed
001	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
001	B	-	Shell hash	Soft Sediment Fauna	None	No	None	None
001	C	-	Shell hash	Soft Sediment Fauna	None	No	None	None
002	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
002	B	-	Shell hash	Soft Sediment Fauna	None	No	None	None
002	C	IND	Shell hash	Soft Sediment Fauna	None	No	None	None
003	A	-	None	Soft Sediment Fauna	None	No	None	None
003	B	IND	IND	IND	IND	No	None	IND
003	C	IND	IND	IND	IND	No	None	IND
004	A	-	None	Soft Sediment Fauna	Inferred Fauna	No	None	None
004	B	-	None	Soft Sediment Fauna	None	No	None	None
004	C	-	Shell hash	Soft Sediment Fauna	None	No	None	None
005	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
005	B	-	Shell hash	Soft Sediment Fauna	None	No	None	None
005	C	-	Shell hash	Soft Sediment Fauna	None	No	None	Sea scallop
006	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
006	B	-	Shell hash	Soft Sediment Fauna	None	No	None	None
006	C	-	Shell hash	Soft Sediment Fauna	None	No	None	None
007	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
007	B	-	Shell hash	Soft Sediment Fauna	None	No	None	None
007	C	-	Shell hash	Soft Sediment Fauna	None	No	None	None
008	B	-	Shell hash	Soft Sediment Fauna	None	No	None	None
008	C	-	Shell hash	Soft Sediment Fauna	None	No	None	None
008	D	-	Shell hash	Soft Sediment Fauna	None	No	None	None
009	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
009	B	-	Shell hash	Soft Sediment Fauna	None	No	None	None
009	C	-	Shell hash	Soft Sediment Fauna	None	No	None	None
010	B	-	Shell hash	Soft Sediment Fauna	Attached Fauna	No	None	Sea scallop
010	C	-	Shell hash	Soft Sediment Fauna	Attached Fauna	No	None	None
010	D	-	Shell hash	Soft Sediment Fauna	None	No	None	Sea scallop
011	A	-	None	Soft Sediment Fauna	None	No	None	None
011	B	-	None	Soft Sediment Fauna	None	No	None	None
011	C	-	None	Soft Sediment Fauna	None	No	None	None
012	A	-	None	Soft Sediment Fauna	None	No	None	None
012	B	-	None	Soft Sediment Fauna	None	No	None	None
012	C	-	None	Soft Sediment Fauna	None	No	None	None
013	A	52.76	Shell hash	Soft Sediment Fauna	None	No	None	None

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StationID	Replicate	Bedform Size Measurement (cm)	Debris	Biotic Subclass	Co-occurring Biotic Subclass	Sensitive Taxa Present?	Type of Sensitive Taxa	Type of Species of Concern Observed
013	B	35.40	Shell hash	Soft Sediment Fauna	None	No	None	None
013	C	45.10	Shell hash	Soft Sediment Fauna	None	No	None	None
014	A	18.74	Shell hash	Soft Sediment Fauna	None	No	None	None
014	B	31.59	Shell hash	Soft Sediment Fauna	None	No	None	None
014	D	-	Shell hash	Soft Sediment Fauna	None	No	None	None
015	A	-	None	Soft Sediment Fauna	None	No	None	None
015	B	-	None	Soft Sediment Fauna	None	No	None	None
015	C	-	None	Soft Sediment Fauna	None	No	None	None
016	A	-	None	Soft Sediment Fauna	None	No	None	None
016	B	-	None	Soft Sediment Fauna	None	No	None	None
016	C	-	None	Soft Sediment Fauna	None	No	None	None
017	A	-	None	Soft Sediment Fauna	None	No	None	None
017	B	-	None	Soft Sediment Fauna	None	No	None	None
017	D	-	None	Soft Sediment Fauna	None	No	None	None
018	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
018	B	23.20	Shell hash	Soft Sediment Fauna	None	No	None	None
018	C	-	Shell hash	Soft Sediment Fauna	None	No	None	None
019	A	-	None	Soft Sediment Fauna	None	No	None	None
019	B	-	None	Soft Sediment Fauna	None	No	None	None
019	C	-	None	Soft Sediment Fauna	None	No	None	None
020	A	-	None	Soft Sediment Fauna	None	No	None	None
020	B	-	None	Soft Sediment Fauna	None	No	None	None
020	C	-	None	Soft Sediment Fauna	None	No	None	None
021	A	51.20	Shell hash	Soft Sediment Fauna	None	No	None	None
021	B	46.87	Shell hash	Soft Sediment Fauna	None	No	None	None
021	D	48.74	Shell hash	Soft Sediment Fauna	None	No	None	None
022	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
022	B	-	Shell hash	Soft Sediment Fauna	None	No	None	None
022	C	-	Shell hash	Soft Sediment Fauna	None	No	None	None
023	A	IND	Shell hash	Soft Sediment Fauna	None	No	None	None
023	B	IND	Shell hash	Soft Sediment Fauna	None	No	None	None
023	D	IND	Shell hash	Soft Sediment Fauna	None	No	None	None

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StationID	Replicate	Bedform Size Measurement (cm)	Debris	Biotic Subclass	Co-occurring Biotic Subclass	Sensitive Taxa Present?	Type of Sensitive Taxa	Type of Species of Concern Observed
024	A	-	Shell hash	Soft Sediment Fauna	None	No	None	Ocean quahog
024	B	IND	Shell hash	Soft Sediment Fauna	IND	No	None	IND
024	C	-	Shell hash	Soft Sediment Fauna	None	No	None	None
025	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
025	B	-	Shell hash	Soft Sediment Fauna	IND	No	None	IND
025	D	-	Shell hash	Soft Sediment Fauna	IND	No	None	IND
026	H	-	None	Soft Sediment Fauna	None	No	None	None
026	J	-	None	Soft Sediment Fauna	None	No	None	None
026	K	-	None	Soft Sediment Fauna	None	No	None	None
027	A	-	None	Soft Sediment Fauna	None	No	None	None
027	B	-	None	Soft Sediment Fauna	None	No	None	None
027	C	-	None	Soft Sediment Fauna	None	No	None	None
028	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
028	B	-	Shell hash	Soft Sediment Fauna	None	No	None	None
028	C	-	Shell hash	Soft Sediment Fauna	None	No	None	None
029	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
029	B	-	Shell hash	Soft Sediment Fauna	None	No	None	None
029	C	-	Shell hash	Soft Sediment Fauna	None	No	None	None
030	A	IND	Shell hash	Soft Sediment Fauna	None	No	None	None
030	C	IND	Shell hash	Soft Sediment Fauna	None	No	None	None
030	D	-	Shell hash	Soft Sediment Fauna	None	No	None	Ocean quahog
031	A	IND	Shell hash	Soft Sediment Fauna	None	No	None	None
031	B	IND	Shell hash	Soft Sediment Fauna	None	No	None	None
031	C	IND	Shell hash	Soft Sediment Fauna	None	No	None	None
032	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
032	B	-	Shell hash	Soft Sediment Fauna	None	No	None	IND
032	D	-	Shell hash	Soft Sediment Fauna	None	No	None	None
033	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
033	B	-	Shell hash	Soft Sediment Fauna	None	No	None	None
033	C	-	Shell hash	Soft Sediment Fauna	None	No	None	None
034	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
034	B	-	Shell hash	Soft Sediment Fauna	None	No	None	None

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StationID	Replicate	Bedform Size Measurement (cm)	Debris	Biotic Subclass	Co-occurring Biotic Subclass	Sensitive Taxa Present?	Type of Sensitive Taxa	Type of Species of Concern Observed
034	C	-	Shell hash	Soft Sediment Fauna	None	No	None	Ocean quahog
035	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
035	B	-	Shell hash	Soft Sediment Fauna	None	No	None	None
035	C	-	Shell hash	Soft Sediment Fauna	None	No	None	None
036	A	32.59	Shell hash	Soft Sediment Fauna	None	No	None	None
036	B	46.18	Shell hash	Soft Sediment Fauna	None	No	None	None
036	C	-	Shell hash	Soft Sediment Fauna	None	No	None	None
037	A	-	None	Soft Sediment Fauna	None	No	None	None
037	C	IND	Shell hash	IND	IND	No	None	IND
037	D	-	Shell hash	Soft Sediment Fauna	None	No	None	None
038	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
038	B	-	Shell hash	Soft Sediment Fauna	None	No	None	IND
038	C	-	Shell hash	Soft Sediment Fauna	None	No	None	None
039	A	40.60	Shell hash	Soft Sediment Fauna	None	No	None	None
039	B	-	Shell hash	Soft Sediment Fauna	None	No	None	None
039	C	42.28	Shell hash	Soft Sediment Fauna	None	No	None	None
040	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
040	B	-	Shell hash	Soft Sediment Fauna	None	No	None	None
040	C	-	Shell hash	Soft Sediment Fauna	None	No	None	None
041	A	-	None	Soft Sediment Fauna	None	No	None	None
041	B	-	None	Soft Sediment Fauna	None	No	None	None
041	C	-	None	Soft Sediment Fauna	None	No	None	None
042	A	-	None	Soft Sediment Fauna	None	No	None	None
042	B	-	Shell hash	Soft Sediment Fauna	None	No	None	None
042	C	-	None	Soft Sediment Fauna	None	No	None	None
043	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
043	B	-	Shell hash	Soft Sediment Fauna	None	No	None	None
043	C	-	Shell hash	Soft Sediment Fauna	None	No	None	None
044	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
044	B	-	Shell hash	Soft Sediment Fauna	None	No	None	None
044	C	-	Shell hash	Soft Sediment Fauna	None	No	None	None
045	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
045	B	-	Shell hash	Soft Sediment Fauna	None	No	None	None

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StationID	Replicate	Bedform Size Measurement (cm)	Debris	Biotic Subclass	Co-occurring Biotic Subclass	Sensitive Taxa Present?	Type of Sensitive Taxa	Type of Species of Concern Observed
045	C	4.49	Shell hash	Soft Sediment Fauna	None	No	None	None
046	A	-	None	Soft Sediment Fauna	Attached Fauna	No	None	None
046	B	-	None	Soft Sediment Fauna	None	No	None	None
046	D	IND	IND	IND	IND	No	None	IND
047	A	-	None	Soft Sediment Fauna	None	No	None	None
047	D	-	None	Soft Sediment Fauna	None	No	None	None
047	E	-	None	Soft Sediment Fauna	None	No	None	None
048	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
048	B	-	Shell hash	Soft Sediment Fauna	None	No	None	None
048	C	-	Shell hash	Soft Sediment Fauna	None	No	None	None
049	A	-	None	Soft Sediment Fauna	None	No	None	None
049	B	-	None	Soft Sediment Fauna	None	No	None	None
049	D	-	None	Soft Sediment Fauna	None	No	None	None
050	A	-	Shell hash	Attached Fauna	None	Yes	Non-Reef Building Hard Coral	None
050	B	-	Shell hash	Attached Fauna	None	Yes	Non-Reef Building Hard Coral	None
050	C	-	Shell hash	Attached Fauna	Soft Sediment Fauna	Yes	Non-Reef Building Hard Coral	None
051	A	-	None	IND	IND	No	None	None
051	B	-	None	IND	IND	No	None	None
051	C	IND	None	IND	IND	No	None	None
052	B	-	None	Soft Sediment Fauna	None	No	None	None
052	C	-	None	Soft Sediment Fauna	None	No	None	None
052	D	-	None	Soft Sediment Fauna	None	No	None	None
053	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
053	B	-	Shell hash	Soft Sediment Fauna	None	No	None	None
053	D	-	Shell hash	Soft Sediment Fauna	None	No	None	None
054	A	-	None	Soft Sediment Fauna	None	No	None	None
054	B	-	None	Soft Sediment Fauna	None	No	None	None
054	C	-	None	Soft Sediment Fauna	None	No	None	None
055	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
055	B	-	Shell hash	Soft Sediment Fauna	None	No	None	None
055	C	-	Shell hash	Soft Sediment Fauna	None	No	None	None
056	A	-	None	Soft Sediment Fauna	None	No	None	None
056	B	-	None	Soft Sediment Fauna	None	No	None	None

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StationID	Replicate	Bedform Size Measurement (cm)	Debris	Biotic Subclass	Co-occurring Biotic Subclass	Sensitive Taxa Present?	Type of Sensitive Taxa	Type of Species of Concern Observed
056	C	-	None	Soft Sediment Fauna	None	No	None	None
057	A	-	None	Soft Sediment Fauna	None	No	None	None
057	B	-	None	Soft Sediment Fauna	None	No	None	Sea scallop
057	C	-	None	Soft Sediment Fauna	None	No	None	None
058	A	-	None	Soft Sediment Fauna	None	No	None	None
058	B	-	None	IND	IND	No	None	IND
058	D	-	None	Soft Sediment Fauna	None	No	None	Sea scallop
059	A	-	None	Soft Sediment Fauna	None	No	None	None
060	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
060	B	IND	None	Soft Sediment Fauna	None	No	None	None
060	C	-	None	Soft Sediment Fauna	None	No	None	None
061	A	-	None	Soft Sediment Fauna	None	No	None	None
061	C	-	None	Soft Sediment Fauna	None	No	None	None
061	D	-	None	Soft Sediment Fauna	None	No	None	None
062	A	-	None	Soft Sediment Fauna	None	No	None	None
062	B	IND	IND	IND	IND	No	None	IND
062	D	-	None	Soft Sediment Fauna	None	No	None	None
063	A	-	None	Soft Sediment Fauna	None	No	None	None
063	B	-	None	Soft Sediment Fauna	None	No	None	None
063	D	-	None	Soft Sediment Fauna	None	No	None	None
064	A	-	None	Soft Sediment Fauna	None	No	None	None
064	B	-	None	Soft Sediment Fauna	None	No	None	None
064	C	-	None	Soft Sediment Fauna	None	No	None	None
065	A	-	None	Soft Sediment Fauna	None	No	None	None
065	B	-	None	Soft Sediment Fauna	None	No	None	None
065	C	-	IND	IND	IND	No	None	IND
066	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
066	B	-	Shell hash	Soft Sediment Fauna	None	No	None	None
066	C	-	Shell hash	Soft Sediment Fauna	None	No	None	None
067	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
067	B	-	Shell hash	Soft Sediment Fauna	None	No	None	None
067	D	-	Shell hash	Soft Sediment Fauna	None	No	None	None
068	A	-	Shell hash	Soft Sediment Fauna	Attached Fauna	No	None	None

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StationID	Replicate	Bedform Size Measurement (cm)	Debris	Biotic Subclass	Co-occurring Biotic Subclass	Sensitive Taxa Present?	Type of Sensitive Taxa	Type of Species of Concern Observed
068	B	-	None	Soft Sediment Fauna	Attached Fauna	No	None	None
068	C	-	Shell hash	Attached Fauna	None	No	None	None
069	A	-	None	Soft Sediment Fauna	None	No	None	None
069	B	-	Shell hash	Soft Sediment Fauna	None	No	None	None
069	C	54.43	Shell hash	Soft Sediment Fauna	None	No	None	None
070	A	-	None	Soft Sediment Fauna	None	No	None	None
070	B	-	None	Soft Sediment Fauna	None	No	None	None
070	C	-	None	Soft Sediment Fauna	None	No	None	None
071	A	-	None	Soft Sediment Fauna	None	No	None	None
071	B	-	None	Soft Sediment Fauna	None	No	None	None
071	C	IND	None	Soft Sediment Fauna	None	No	None	None
072	A	-	None	Soft Sediment Fauna	None	No	None	None
072	C	IND	None	Soft Sediment Fauna	None	No	None	None
072	D	-	None	Soft Sediment Fauna	None	No	None	None
073	A	-	None	Soft Sediment Fauna	None	No	None	None
073	B	-	None	Soft Sediment Fauna	None	No	None	None
073	C	-	None	Soft Sediment Fauna	None	No	None	None
074	E	-	None	Soft Sediment Fauna	None	No	None	None
075	A	-	None	Soft Sediment Fauna	None	No	None	None
075	B	-	None	Soft Sediment Fauna	None	No	None	None
075	D	-	None	Soft Sediment Fauna	None	No	None	None
076	A	-	None	Soft Sediment Fauna	None	No	None	None
076	B	-	None	Soft Sediment Fauna	None	No	None	None
076	C	-	None	Soft Sediment Fauna	None	No	None	None
077	A	-	None	Soft Sediment Fauna	None	No	None	None
077	C	IND	None	IND	IND	No	None	IND

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StationID	Replicate	Bedform Size Measurement (cm)	Debris	Biotic Subclass	Co-occurring Biotic Subclass	Sensitive Taxa Present?	Type of Sensitive Taxa	Type of Species of Concern Observed
077	D	-	None	Soft Sediment Fauna	None	No	None	None
078	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
078	B	-	None	Soft Sediment Fauna	None	No	None	None
078	C	-	Shell hash	Soft Sediment Fauna	None	No	None	None
079	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
079	C	-	None	Soft Sediment Fauna	None	No	None	None
079	D	IND	IND	IND	IND	No	None	IND
080	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
080	B	-	Shell hash	Soft Sediment Fauna	None	No	None	None
080	C	-	Shell hash	Soft Sediment Fauna	None	No	None	None
081	A	-	None	Soft Sediment Fauna	None	No	None	None
081	B	-	None	Soft Sediment Fauna	None	No	None	None
081	C	IND	None	Soft Sediment Fauna	None	No	None	None
082	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
082	B	IND	None	Soft Sediment Fauna	IND	No	None	IND
082	C	-	None	Soft Sediment Fauna	None	No	None	None
083	A	-	None	Soft Sediment Fauna	None	No	None	None
084	A	-	None	Soft Sediment Fauna	None	No	None	None
084	C	-	None	Soft Sediment Fauna	None	No	None	None
084	D	IND	None	Soft Sediment Fauna	None	No	None	None
085	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
085	B	IND	None	Soft Sediment Fauna	None	No	None	None
085	C	-	None	Soft Sediment Fauna	None	No	None	None
086	A	IND	Shell hash	Soft Sediment Fauna	None	No	None	None
086	B	IND	Shell hash	Soft Sediment Fauna	None	No	None	None
086	C	-	Shell hash	Soft Sediment Fauna	None	No	None	None
087	A	20.24	Shell hash	Soft Sediment Fauna	None	No	None	None
087	B	25.53	Shell hash	Soft Sediment Fauna	None	No	None	None
087	C	17.38	Shell hash	Soft Sediment Fauna	None	No	None	None
088	A	IND	Shell hash	IND	IND	No	None	IND
088	B	IND	None	IND	IND	No	None	IND
088	C	IND	Shell hash	IND	IND	No	None	IND
089	A	-	None	Soft Sediment Fauna	None	No	None	None

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StationID	Replicate	Bedform Size Measurement (cm)	Debris	Biotic Subclass	Co-occurring Biotic Subclass	Sensitive Taxa Present?	Type of Sensitive Taxa	Type of Species of Concern Observed
089	B	-	None	Soft Sediment Fauna	None	No	None	None
089	C	-	None	Soft Sediment Fauna	None	No	None	None
090	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
090	B	-	Shell hash	Soft Sediment Fauna	None	No	None	None
090	D	-	Shell hash	Soft Sediment Fauna	None	No	None	None
091	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
091	B	-	Shell hash	Soft Sediment Fauna	None	No	None	None
091	C	-	Shell hash	Soft Sediment Fauna	None	No	None	Sea scallop
092	A	IND	Shell hash	Soft Sediment Fauna	None	No	None	None
092	C	IND	Shell hash	Soft Sediment Fauna	None	No	None	None
092	D	IND	Shell hash	Soft Sediment Fauna	None	No	None	None
093	A	18.42	Shell hash	Soft Sediment Fauna	None	No	None	None
093	C	13.33	Shell hash	Soft Sediment Fauna	None	No	None	None
093	D	14.40	Shell hash	IND	IND	No	None	IND
094	B	IND	None	Soft Sediment Fauna	None	No	None	None
094	C	IND	None	Soft Sediment Fauna	None	No	None	None
094	D	IND	None	Soft Sediment Fauna	None	No	None	None
095	A	10.13	None	Soft Sediment Fauna	Attached Fauna	No	None	None
095	B	21.79	None	Soft Sediment Fauna	Attached Fauna	No	None	None
095	C	11.13	None	Soft Sediment Fauna	Attached Fauna	No	None	None
096	A	-	Shell hash	Soft Sediment Fauna	Attached Fauna	No	None	None
096	B	-	Shell hash	Soft Sediment Fauna	None	No	None	None
096	D	18.01	Shell hash	Soft Sediment Fauna	Attached Fauna	No	None	None
097	A	IND	Shell hash	Soft Sediment Fauna	None	No	None	None
097	B	IND	Shell hash	Soft Sediment Fauna	None	No	None	None
097	C	IND	Shell hash	IND	IND	No	None	IND
098	A	IND	Shell hash	Soft Sediment Fauna	None	No	None	None
098	B	IND	Shell hash	Soft Sediment Fauna	None	No	None	None

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StationID	Replicate	Bedform Size Measurement (cm)	Debris	Biotic Subclass	Co-occurring Biotic Subclass	Sensitive Taxa Present?	Type of Sensitive Taxa	Type of Species of Concern Observed
098	C	IND	Shell hash	Soft Sediment Fauna	None	No	None	None
099	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
099	B	-	Shell hash	Soft Sediment Fauna	None	No	None	None
099	C	-	Shell hash	Soft Sediment Fauna	None	No	None	None
100	A	11.24	None	Soft Sediment Fauna	None	No	None	None
100	B	11.22	None	Soft Sediment Fauna	None	No	None	None
100	C	10.79	None	Soft Sediment Fauna	None	No	None	None
101	A	21.21	Shell hash	Soft Sediment Fauna	None	No	None	None
101	B	16.57	Shell hash	Soft Sediment Fauna	None	No	None	None
101	C	12.91	Shell hash	Soft Sediment Fauna	None	No	None	None
102	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
102	B	-	Shell hash	Soft Sediment Fauna	None	No	None	None
102	C	-	Shell hash	Soft Sediment Fauna	IND	No	None	IND
103	A	10.28	Shell hash	Soft Sediment Fauna	None	No	None	None
103	B	8.03	Shell hash	Soft Sediment Fauna	None	No	None	None
103	C	7.46	Shell hash	Soft Sediment Fauna	None	No	None	None
104	A	7.66	Shell hash	Soft Sediment Fauna	None	No	None	None
104	B	19.91	Shell hash	Soft Sediment Fauna	None	No	None	None
104	C	13.15	Shell hash	Soft Sediment Fauna	None	No	None	None
105	A	26.75	None	Soft Sediment Fauna	None	No	None	None
105	B	31.61	None	Soft Sediment Fauna	None	No	None	None
105	C	29.39	Shell hash	Soft Sediment Fauna	None	No	None	None
106	A	IND	Shell hash	Soft Sediment Fauna	None	No	None	None
106	B	IND	Shell hash	Soft Sediment Fauna	None	No	None	None

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StationID	Replicate	Bedform Size Measurement (cm)	Debris	Biotic Subclass	Co-occurring Biotic Subclass	Sensitive Taxa Present?	Type of Sensitive Taxa	Type of Species of Concern Observed
106	C	IND	Shell hash	Soft Sediment Fauna	None	No	None	None
107	A	-	Shell hash	Attached Fauna	Soft Sediment Fauna	No	None	None
107	B	-	Shell hash	Attached Fauna	Soft Sediment Fauna	No	None	None
107	C	-	Shell hash	Attached Fauna	Soft Sediment Fauna	No	None	None
108	A	-	Shell hash	Attached Fauna	None	No	None	None
108	B	IND	Shell hash	Attached Fauna	None	No	None	None
108	F	-	Shell hash	Attached Fauna	None	No	None	None
109	A	-	Shell hash	Attached Fauna	None	No	None	None
109	C	IND	Shell hash	IND	IND	No	None	IND
109	D	IND	Shell hash	IND	IND	No	None	IND
110	B	-	Shell hash	Attached Fauna	None	No	None	None
110	C	-	Shell hash	Attached Fauna	None	No	None	None
110	D	-	Shell hash	Attached Fauna	Soft Sediment Fauna	No	None	None
111	A	-	Shell hash	IND	IND	No	None	None
111	B	-	Shell hash	IND	IND	No	None	None
111	C	-	Shell hash	Soft Sediment Fauna	Attached Fauna	No	None	None
112	A	IND	IND	IND	IND	No	None	IND
112	B	IND	IND	IND	IND	No	None	IND
112	C	IND	Shell hash	IND	IND	No	None	IND
113	A	IND	None	IND	IND	No	None	IND
113	B	IND	None	IND	IND	No	None	IND
113	C	IND	None	IND	IND	No	None	IND
116	A	9.30	Shell hash	Soft Sediment Fauna	None	No	None	None
116	B	5.86	Shell hash	Soft Sediment Fauna	None	No	None	None
116	D	9.55	Shell hash	Soft Sediment Fauna	None	No	None	None
117	A	7.15	Shell hash	Soft Sediment Fauna	None	No	None	None
117	C	14.52	Shell hash	Soft Sediment Fauna	None	No	None	None
117	D	15.39	Shell hash	Soft Sediment Fauna	None	No	None	None
118	A	9.66	None	Soft Sediment Fauna	None	No	None	None
118	B	7.10	None	Soft Sediment Fauna	None	No	None	None
118	C	10.21	None	Soft Sediment Fauna	None	No	None	None
119	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
119	B	-	Shell hash	Soft Sediment Fauna	None	No	None	None
119	C	-	Shell hash	Soft Sediment Fauna	None	No	None	None
120	A	-	None	Soft Sediment Fauna	IND	No	None	None

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StationID	Replicate	Bedform Size Measurement (cm)	Debris	Biotic Subclass	Co-occurring Biotic Subclass	Sensitive Taxa Present?	Type of Sensitive Taxa	Type of Species of Concern Observed
120	B	-	None	Soft Sediment Fauna	None	No	None	None
120	C	IND	None	Soft Sediment Fauna	None	No	None	None
122	A	9.77	Shell hash	Soft Sediment Fauna	None	No	None	None
122	B	10.90	Shell hash	Soft Sediment Fauna	None	No	None	None
122	C	10.94	Shell hash	Soft Sediment Fauna	None	No	None	None
123	A	12.75	Shell hash	Soft Sediment Fauna	None	No	None	None
123	B	IND	Shell hash	Soft Sediment Fauna	None	No	None	None
123	C	11.28	Shell hash	Soft Sediment Fauna	None	No	None	None
124	A	33.08	Shell hash	Soft Sediment Fauna	None	No	None	None
124	B	13.28	Shell hash	Soft Sediment Fauna	None	No	None	None
124	C	13.24	Shell hash	Soft Sediment Fauna	None	No	None	None
125	A	17.17	None	Soft Sediment Fauna	None	No	None	None
125	B	13.51	None	Soft Sediment Fauna	None	No	None	None
125	C	17.43	None	Soft Sediment Fauna	None	No	None	None
126	A	IND	None	IND	IND	No	None	None
126	C	IND	None	Soft Sediment Fauna	IND	No	None	None
126	D	IND	None	IND	IND	No	None	None
127	A	-	None	Soft Sediment Fauna	None	No	None	None
127	B	15.39	None	Soft Sediment Fauna	None	No	None	None
127	C	IND	None	Soft Sediment Fauna	None	No	None	None
128	A	IND	None	Soft Sediment Fauna	None	No	None	None
128	B	11.51	None	Soft Sediment Fauna	None	No	None	None
130	A	IND	None	IND	IND	No	None	None
130	B	IND	None	IND	IND	No	None	None
130	C	IND	None	IND	IND	No	None	None
131	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
131	B	-	Shell hash	Soft Sediment Fauna	None	No	None	None
131	C	-	Shell hash	Soft Sediment Fauna	None	No	None	None
132	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
132	B	-	Shell hash	Soft Sediment Fauna	None	No	None	None
132	C	-	Shell hash	Soft Sediment Fauna	None	No	None	None

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StationID	Replicate	Bedform Size Measurement (cm)	Debris	Biotic Subclass	Co-occurring Biotic Subclass	Sensitive Taxa Present?	Type of Sensitive Taxa	Type of Species of Concern Observed
133	A	-	None	Soft Sediment Fauna	Attached Fauna	No	None	None
133	B	-	None	Soft Sediment Fauna	None	No	None	None
133	C	-	None	Soft Sediment Fauna	None	No	None	None
134	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
134	B	IND	Shell hash	IND	IND	No	None	IND
134	D	-	Shell hash	Soft Sediment Fauna	None	No	None	None
135	F	-	None	Soft Sediment Fauna	None	No	None	None
135	G	-	None	Soft Sediment Fauna	None	No	None	None
135	H	-	None	Soft Sediment Fauna	None	No	None	None
136	E	-	Shell hash	Soft Sediment Fauna	None	No	None	None
136	F	-	Shell hash	Soft Sediment Fauna	None	No	None	None
136	H	-	Shell hash	Soft Sediment Fauna	None	No	None	None
137	E	-	None	Soft Sediment Fauna	None	No	None	None
137	G	-	None	Soft Sediment Fauna	None	No	None	None
137	H	-	None	Soft Sediment Fauna	None	No	None	None
138	E	-	Shell hash	Soft Sediment Fauna	None	No	None	None
138	F	-	Shell hash	Soft Sediment Fauna	None	No	None	None
138	G	-	Shell hash	Soft Sediment Fauna	None	No	None	None
139	E	-	Shell hash	Soft Sediment Fauna	None	No	None	None
139	F	-	None	Soft Sediment Fauna	None	No	None	None
139	G	-	None	Soft Sediment Fauna	None	No	None	None
140	E	-	None	Soft Sediment Fauna	None	No	None	None
140	F	-	None	Soft Sediment Fauna	None	No	None	None
140	H	-	None	Soft Sediment Fauna	None	No	None	None
141	B	-	None	Soft Sediment Fauna	None	No	None	None
142	A	-	None	Soft Sediment Fauna	None	No	None	None
142	B	-	None	Soft Sediment Fauna	None	No	None	None
142	C	-	None	Soft Sediment Fauna	None	No	None	None
143	A	-	None	Soft Sediment Fauna	None	No	None	None
143	C	-	None	Soft Sediment Fauna	None	No	None	None

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StationID	Replicate	Bedform Size Measurement (cm)	Debris	Biotic Subclass	Co-occurring Biotic Subclass	Sensitive Taxa Present?	Type of Sensitive Taxa	Type of Species of Concern Observed
143	D	-	None	Soft Sediment Fauna	None	No	None	None
144	A	-	None	Soft Sediment Fauna	None	No	None	None
144	B	IND	None	Soft Sediment Fauna	None	No	None	None
144	C	-	None	Soft Sediment Fauna	None	No	None	None
145	A	-	None	Soft Sediment Fauna	None	No	None	None
145	C	-	None	Soft Sediment Fauna	None	No	None	None
146	A	-	None	Soft Sediment Fauna	None	No	None	None
146	B	-	None	Soft Sediment Fauna	None	No	None	None
146	C	-	None	Soft Sediment Fauna	None	No	None	None
147	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
147	B	-	Shell hash	Soft Sediment Fauna	None	No	None	None
147	C	-	Shell hash	Soft Sediment Fauna	None	No	None	None
148	A	35.27	Shell hash	Soft Sediment Fauna	None	No	None	None
148	B	42.86	Shell hash	Soft Sediment Fauna	None	No	None	None
148	C	-	Shell hash	Soft Sediment Fauna	None	No	None	None
149	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
149	D	-	Shell hash	Soft Sediment Fauna	None	No	None	None
150	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
150	B	-	Shell hash	Soft Sediment Fauna	None	No	None	None
150	C	-	Shell hash	Soft Sediment Fauna	None	No	None	None
151	A	28.79	Shell hash	Soft Sediment Fauna	None	No	None	None
151	B	31.53	Shell hash	Soft Sediment Fauna	None	No	None	None
151	D	35.02	Shell hash	Soft Sediment Fauna	None	No	None	None
152	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
152	B	-	Shell hash	Soft Sediment Fauna	None	No	None	None
152	D	-	Shell hash	Soft Sediment Fauna	None	No	None	None
153	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
153	B	-	Shell hash	Soft Sediment Fauna	None	No	None	None
153	C	-	Shell hash	Soft Sediment Fauna	None	No	None	None
154	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
154	B	-	Shell hash	Soft Sediment Fauna	None	No	None	None

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StationID	Replicate	Bedform Size Measurement (cm)	Debris	Biotic Subclass	Co-occurring Biotic Subclass	Sensitive Taxa Present?	Type of Sensitive Taxa	Type of Species of Concern Observed
154	C	-	Shell hash	Soft Sediment Fauna	None	No	None	None
155	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
155	B	-	Shell hash	Soft Sediment Fauna	None	No	None	None
155	D	-	Shell hash	Soft Sediment Fauna	None	No	None	None
156	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
156	B	-	Shell hash	Soft Sediment Fauna	None	No	None	None
156	D	-	Shell hash	Soft Sediment Fauna	None	No	None	None
157	A	30.23	Shell hash	Soft Sediment Fauna	None	No	None	None
157	B	31.54	Shell hash	Soft Sediment Fauna	None	No	None	None
157	C	-	Shell hash	Soft Sediment Fauna	None	No	None	None
REFA_01	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
REFA_01	B	-	Shell hash	Soft Sediment Fauna	None	No	None	None
REFA_01	C	-	Shell hash	Soft Sediment Fauna	None	No	None	None
REFA_02	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
REFA_02	B	-	None	Soft Sediment Fauna	None	No	None	None
REFA_02	D	-	Shell hash	Soft Sediment Fauna	None	No	None	None
REFA_03	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
REFA_03	B	-	None	Soft Sediment Fauna	None	No	None	None
REFA_03	D	-	Shell hash	Soft Sediment Fauna	None	No	None	None
REFA_04	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
REFA_04	C	-	Shell hash	Soft Sediment Fauna	None	No	None	None
REFA_04	D	-	Shell hash	Soft Sediment Fauna	None	No	None	None
REFA_05	A	-	None	Soft Sediment Fauna	None	No	None	None
REFA_05	B	-	None	Soft Sediment Fauna	None	No	None	None
REFA_05	C	-	None	Soft Sediment Fauna	None	No	None	None
REFB_01	E	-	Shell hash	Soft Sediment Fauna	None	No	None	None
REFB_01	F	-	Shell hash	Soft Sediment Fauna	None	No	None	None

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StationID	Replicate	Bedform Size Measurement (cm)	Debris	Biotic Subclass	Co-occurring Biotic Subclass	Sensitive Taxa Present?	Type of Sensitive Taxa	Type of Species of Concern Observed
REFB_01	G	-	Shell hash	Soft Sediment Fauna	None	No	None	None
REFB_02	H	-	None	Soft Sediment Fauna	None	No	None	None
REFB_02	I	-	None	Soft Sediment Fauna	None	No	None	None
REFB_02	J	-	None	Soft Sediment Fauna	None	No	None	None
REFB_03	E	-	None	Soft Sediment Fauna	None	No	None	None
REFB_03	F	-	None	Soft Sediment Fauna	None	No	None	None
REFB_03	G	-	None	Soft Sediment Fauna	None	No	None	None
REFB_04	F	-	Shell hash	Soft Sediment Fauna	None	No	None	None
REFB_04	G	IND	Shell hash	Soft Sediment Fauna	None	No	None	None
REFB_04	H	-	Shell hash	Soft Sediment Fauna	None	No	None	None
REFB_05	E	-	None	Soft Sediment Fauna	None	No	None	None
REFB_05	F	IND	None	Soft Sediment Fauna	None	No	None	None
REFB_05	H	-	None	Soft Sediment Fauna	None	No	None	None
REFC_01	A	-	None	Soft Sediment Fauna	None	No	None	None
REFC_01	B	-	Shell hash	Soft Sediment Fauna	None	No	None	None
REFC_01	D	IND	None	Soft Sediment Fauna	IND	No	None	IND
REFC_02	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
REFC_02	B	-	Shell hash	Soft Sediment Fauna	None	No	None	None
REFC_02	C	-	Shell hash	Soft Sediment Fauna	None	No	None	None
REFC_03	A	-	None	Soft Sediment Fauna	None	No	None	None
REFC_03	B	-	None	Soft Sediment Fauna	None	No	None	None
REFC_03	D	-	None	Soft Sediment Fauna	None	No	None	None
REFC_04	A	-	None	Soft Sediment Fauna	None	No	None	None
REFC_04	B	-	None	Soft Sediment Fauna	None	No	None	None
REFC_04	D	-	None	Soft Sediment Fauna	None	No	None	None
REFC_05	A	-	None	Soft Sediment Fauna	None	No	None	None
REFC_05	B	-	None	Soft Sediment Fauna	None	No	None	None
REFC_05	C	-	None	Soft Sediment Fauna	None	No	None	None

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StationID	Replicate	Biotic Group	Co-occurring Biotic Group	Percent Cover of All Attached Fauna	Invasive Taxa Present?	Type of Invasive Taxa	Tubes	Burrows	Tracks
001	A	Larger Tube-Building Fauna	Small Tube-Building Fauna	None	No	None	Yes	No	No
001	B	Larger Tube-Building Fauna	Small Tube-Building Fauna	None	No	None	Yes	No	No
001	C	Larger Tube-Building Fauna	Small Tube-Building Fauna	None	No	None	Yes	No	No
002	A	Mobile Crustaceans on Hard or Mixed Substrates	Burrowing Anemones	None	No	None	No	No	No
002	B	IND	IND	None	No	None	No	No	No
002	C	IND	IND	None	No	None	No	No	No
003	A	Small Tube-Building Fauna	Burrowing Anemones	None	No	None	Yes	No	Yes
003	B	IND	IND	None	IND	None	IND	IND	IND
003	C	IND	IND	None	IND	None	IND	IND	IND
004	A	Small Tube-Building Fauna	Burrowing Anemones	None	No	None	Yes	No	Yes
004	B	Small Tube-Building Fauna	None	None	No	None	Yes	No	No
004	C	Small Tube-Building Fauna	Burrowing Anemones	None	No	None	Yes	No	Yes
005	A	Small Surface-Burrowing Fauna	Sand Dollar Bed	None	No	None	No	No	No
005	B	Mobile Crustaceans on Hard or Mixed Substrates	None	None	No	None	No	No	No
005	C	Mobile Crustaceans on Hard or Mixed Substrates	None	None	No	None	No	No	No
006	A	Mobile Crustaceans on Hard or Mixed Substrates	None	None	No	None	Yes	No	No
006	B	Mobile Crustaceans on Hard or Mixed Substrates	Burrowing Anemones	None	No	None	No	No	No
006	C	Mobile Crustaceans on Hard or Mixed Substrates	None	None	No	None	No	No	No
007	A	Sand Dollar Bed	Small Tube-Building Fauna	None	No	None	Yes	Yes	Yes
007	B	Small Surface-Burrowing Fauna	Sand Dollar Bed	None	No	None	Yes	No	No
007	C	Small Tube-Building Fauna	Sand Dollar Bed	None	No	None	Yes	No	Yes
008	B	IND	IND	None	No	None	Yes	No	No
008	C	Small Tube-Building Fauna	Mobile Crustaceans on Hard or Mixed Substrates	None	No	None	No	No	No
008	D	Small Surface-Burrowing Fauna	Sand Dollar Bed	None	No	None	Yes	Yes	No
009	A	Small Surface-Burrowing Fauna	Egg Masses	None	No	None	No	No	No
009	B	Small Surface-Burrowing Fauna	Burrowing Anemones	None	No	None	No	No	No
009	C	Small Surface-Burrowing Fauna	Burrowing Anemones	None	No	None	No	No	No
010	B	Small Tube-Building Fauna	Diverse Soft Sediment Epifauna	Sparse (1 to <30%)	No	None	Yes	No	No
010	C	Small Tube-Building Fauna	IND	Sparse (1 to <30%)	No	None	Yes	No	No
010	D	Small Tube-Building Fauna	None	None	No	None	Yes	Yes	No
011	A	Small Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	Yes	No
011	B	Small Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	Yes	Yes
011	C	Small Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	Yes	Yes
012	A	Small Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	Yes	No
012	B	Small Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	No	No
012	C	Small Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	Yes	No
013	A	Small Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	No	No

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StationID	Replicate	Biotic Group	Co-occurring Biotic Group	Percent Cover of All Attached Fauna	Invasive Taxa Present?	Type of Invasive Taxa	Tubes	Burrows	Tracks
013	B	Small Tube-Building Fauna	Mobile Crustaceans on Soft Sediments	None	No	None	Yes	No	No
013	C	Small Tube-Building Fauna	Burrowing Anemones	None	No	None	Yes	No	No
014	A	Small Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	No	No
014	B	Small Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	No	No
014	D	Small Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	No	No
015	A	Small Tube-Building Fauna	Mobile Crustaceans on Soft Sediments	None	No	None	Yes	Yes	Yes
015	B	Small Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	Yes	No
015	C	Small Tube-Building Fauna	Sessile Gastropods	None	No	None	Yes	Yes	Yes
016	A	Sand Dollar Bed	Small Tube-Building Fauna	None	No	None	Yes	Yes	No
016	B	Sand Dollar Bed	Small Tube-Building Fauna	None	No	None	Yes	Yes	No
016	C	Sand Dollar Bed	Small Tube-Building Fauna	None	No	None	Yes	Yes	No
017	A	Small Tube-Building Fauna	Sand Dollar Bed	None	No	None	Yes	No	No
017	B	Small Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	No	Yes
017	D	Small Tube-Building Fauna	Sand Dollar Bed	None	No	None	Yes	Yes	Yes
018	A	Small Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	No	Yes
018	B	Small Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	No	No
018	C	Small Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	Yes	Yes
019	A	Small Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	Yes	No
019	B	Small Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	Yes	No
019	C	Small Tube-Building Fauna	None	None	No	None	Yes	No	No
020	A	Sand Dollar Bed	Larger Tube-Building Fauna	None	No	None	Yes	Yes	Yes
020	B	Sand Dollar Bed	Larger Tube-Building Fauna	None	No	None	Yes	Yes	No
020	C	Sand Dollar Bed	Larger Tube-Building Fauna	None	No	None	Yes	Yes	No
021	A	Sand Dollar Bed	Diverse Soft Sediment Epifauna	None	No	None	No	No	No
021	B	Sand Dollar Bed	Diverse Soft Sediment Epifauna	None	No	None	Yes	No	No
021	D	Sand Dollar Bed	Diverse Soft Sediment Epifauna	None	No	None	Yes	No	No
022	A	Small Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	Yes	Yes
022	B	Small Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	Yes	Yes
022	C	Small Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	Yes	Yes
023	A	Diverse Soft Sediment Epifauna	Larger Tube-Building Fauna	None	No	None	Yes	No	Yes
023	B	Diverse Soft Sediment Epifauna	None	None	No	None	No	No	Yes
023	D	Diverse Soft Sediment Epifauna	Small Tube-Building Fauna	None	No	None	Yes	Yes	No

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StationID	Replicate	Biotic Group	Co-occurring Biotic Group	Percent Cover of All Attached Fauna	Invasive Taxa Present?	Type of Invasive Taxa	Tubes	Burrows	Tracks
024	A	Small Surface-Burrowing Fauna	Sand Dollar Bed	None	No	None	Yes	No	Yes
024	B	Sand Dollar Bed	IND	None	IND	None	Yes	IND	IND
024	C	Sand Dollar Bed	Diverse Soft Sediment Epifauna	None	No	None	Yes	No	No
025	A	Sand Dollar Bed	None	None	No	None	Yes	No	No
025	B	Sand Dollar Bed	IND	None	IND	None	IND	IND	IND
025	D	Sand Dollar Bed	IND	None	IND	None	IND	IND	IND
026	H	Small Tube-Building Fauna	Sand Dollar Bed	None	No	None	Yes	Yes	Yes
026	J	Small Tube-Building Fauna	Sand Dollar Bed	None	No	None	Yes	Yes	No
026	K	Small Tube-Building Fauna	Sand Dollar Bed	None	No	None	Yes	Yes	No
027	A	Small Tube-Building Fauna	Sand Dollar Bed	None	No	None	Yes	Yes	Yes
027	B	Small Tube-Building Fauna	Sand Dollar Bed	None	No	None	Yes	No	Yes
027	C	Small Tube-Building Fauna	Sand Dollar Bed	None	No	None	Yes	No	No
028	A	Larger Tube-Building Fauna	Sand Dollar Bed	None	No	None	Yes	Yes	Yes
028	B	Larger Tube-Building Fauna	Sand Dollar Bed	None	No	None	Yes	Yes	Yes
028	C	Small Tube-Building Fauna	Sand Dollar Bed	None	No	None	Yes	Yes	Yes
029	A	Larger Tube-Building Fauna	Sand Dollar Bed	None	No	None	Yes	No	Yes
029	B	Larger Tube-Building Fauna	Sand Dollar Bed	None	No	None	Yes	Yes	No
029	C	Larger Tube-Building Fauna	Sand Dollar Bed	None	No	None	Yes	Yes	Yes
030	A	Small Tube-Building Fauna	Sand Dollar Bed	None	No	None	Yes	No	No
030	C	Small Tube-Building Fauna	Sand Dollar Bed	None	No	None	Yes	Yes	No
030	D	Diverse Soft Sediment Epifauna	Sand Dollar Bed	None	No	None	Yes	No	Yes
031	A	Sand Dollar Bed	Diverse Soft Sediment Epifauna	None	No	None	Yes	No	Yes
031	B	Sand Dollar Bed	None	None	No	None	Yes	No	No
031	C	Sand Dollar Bed	Diverse Soft Sediment Epifauna	None	No	None	Yes	No	No
032	A	Sand Dollar Bed	Small Tube-Building Fauna	None	No	None	Yes	No	No
032	B	Sand Dollar Bed	Small Tube-Building Fauna	None	IND	None	IND	No	No
032	D	Sand Dollar Bed	Small Tube-Building Fauna	None	No	None	Yes	No	Yes
033	A	Sand Dollar Bed	Small Tube-Building Fauna	None	No	None	Yes	No	No
033	B	Sand Dollar Bed	Small Tube-Building Fauna	None	No	None	Yes	No	No
033	C	Sand Dollar Bed	Diverse Soft Sediment Epifauna	None	No	None	Yes	No	No
034	A	Sand Dollar Bed	Small Tube-Building Fauna	None	No	None	Yes	Yes	No
034	B	Sand Dollar Bed	Small Tube-Building Fauna	None	No	None	Yes	Yes	No

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StationID	Replicate	Biotic Group	Co-occurring Biotic Group	Percent Cover of All Attached Fauna	Invasive Taxa Present?	Type of Invasive Taxa	Tubes	Burrows	Tracks
034	C	Sand Dollar Bed	Small Tube-Building Fauna	None	No	None	Yes	No	No
035	A	Sand Dollar Bed	Small Tube-Building Fauna	None	No	None	Yes	Yes	No
035	B	Sand Dollar Bed	Small Tube-Building Fauna	None	No	None	Yes	Yes	No
035	C	Sand Dollar Bed	Diverse Soft Sediment Epifauna	None	No	None	Yes	No	No
036	A	Diverse Soft Sediment Epifauna	Sand Dollar Bed	None	No	None	Yes	No	No
036	B	Sand Dollar Bed	Diverse Soft Sediment Epifauna	None	No	None	Yes	No	No
036	C	Sand Dollar Bed	Diverse Soft Sediment Epifauna	None	No	None	Yes	No	No
037	A	Small Surface-Burrowing Fauna	Burrowing Anemones	None	No	None	Yes	No	Yes
037	C	IND	IND	None	IND	None	IND	IND	IND
037	D	Small Surface-Burrowing Fauna	Burrowing Anemones	None	No	None	No	Yes	No
038	A	Sand Dollar Bed	Diverse Soft Sediment Epifauna	None	No	None	Yes	No	Yes
038	B	Sand Dollar Bed	Diverse Soft Sediment Epifauna	None	IND	None	IND	IND	IND
038	C	Sand Dollar Bed	IND	None	No	None	Yes	No	Yes
039	A	Sand Dollar Bed	Larger Tube-Building Fauna	None	No	None	Yes	No	No
039	B	Larger Tube-Building Fauna	Sand Dollar Bed	None	No	None	Yes	No	No
039	C	Sand Dollar Bed	Larger Tube-Building Fauna	None	No	None	Yes	No	No
040	A	Small Surface-Burrowing Fauna	Small Tube-Building Fauna	None	No	None	Yes	Yes	No
040	B	Small Surface-Burrowing Fauna	Small Tube-Building Fauna	None	No	None	Yes	No	No
040	C	Small Surface-Burrowing Fauna	Small Tube-Building Fauna	None	No	None	Yes	No	No
041	A	Small Surface-Burrowing Fauna	Sand Dollar Bed	None	No	None	Yes	No	No
041	B	Small Tube-Building Fauna	Sand Dollar Bed	None	No	None	Yes	No	No
041	C	Sand Dollar Bed	Small Surface-Burrowing Fauna	None	No	None	Yes	No	No
042	A	Small Surface-Burrowing Fauna	Tracks and Trails	None	No	None	Yes	Yes	Yes
042	B	Burrowing Anemones	Tracks and Trails	None	No	None	Yes	No	Yes
042	C	Small Surface-Burrowing Fauna	Tracks and Trails	None	No	None	Yes	Yes	Yes
043	A	Larger Tube-Building Fauna	Tracks and Trails	None	No	None	Yes	Yes	Yes
043	B	Larger Tube-Building Fauna	Tracks and Trails	None	No	None	Yes	Yes	Yes
043	C	Small Tube-Building Fauna	Sand Dollar Bed	None	No	None	Yes	Yes	No
044	A	Larger Tube-Building Fauna	Burrowing Anemones	None	No	None	Yes	Yes	Yes
044	B	Larger Tube-Building Fauna	Sand Dollar Bed	None	No	None	Yes	Yes	No
044	C	Mobile Crustaceans on Soft Sediments	Tracks and Trails	None	No	None	Yes	No	Yes
045	A	Larger Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	Yes	No
045	B	Larger Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	Yes	No

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StationID	Replicate	Biotic Group	Co-occurring Biotic Group	Percent Cover of All Attached Fauna	Invasive Taxa Present?	Type of Invasive Taxa	Tubes	Burrows	Tracks
045	C	Larger Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	No	No
046	A	Small Surface-Burrowing Fauna	Attached Hydroids	Sparse (1 to <30%)	No	None	No	No	No
046	B	Small Surface-Burrowing Fauna	None	None	No	None	No	No	Yes
046	D	IND	IND	None	IND	None	IND	IND	IND
047	A	Sand Dollar Bed	Larger Tube-Building Fauna	None	No	None	Yes	No	Yes
047	D	Sand Dollar Bed	Larger Tube-Building Fauna	None	No	None	Yes	Yes	No
047	E	Larger Tube-Building Fauna	Sand Dollar Bed	None	No	None	Yes	Yes	No
048	A	Larger Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	No	Yes
048	B	Larger Tube-Building Fauna	Sand Dollar Bed	None	No	None	Yes	No	Yes
048	C	Larger Tube-Building Fauna	Sand Dollar Bed	None	No	None	Yes	Yes	No
049	A	Larger Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	Yes	No
049	B	Larger Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	Yes	No
049	D	Larger Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	Yes	No
050	A	Attached Hydroids	Attached Bryozoans	Dense (70 to < 90%)	No	None	Yes	No	No
050	B	Attached Hydroids	Attached Sponges	Moderate (30 to < 70%)	No	None	Yes	No	No
050	C	Attached Hydroids	Attached Sponges	Moderate (30 to < 70%)	No	None	Yes	No	No
051	A	Mobile Crustaceans on Hard or Mixed Substrates	Burrowing Anemones	None	No	None	No	No	No
051	B	IND	IND	None	No	None	No	No	No
051	C	Mobile Crustaceans on Hard or Mixed Substrates	IND	None	No	None	No	No	No
052	B	Sand Dollar Bed	Mobile Crustaceans on Soft Sediments	None	No	None	Yes	Yes	Yes
052	C	Small Tube-Building Fauna	Sand Dollar Bed	None	No	None	Yes	Yes	No
052	D	Small Surface-Burrowing Fauna	Sand Dollar Bed	None	No	None	Yes	Yes	No
053	A	Sand Dollar Bed	Mobile Crustaceans on Soft Sediments	None	No	None	Yes	Yes	Yes
053	B	Larger Tube-Building Fauna	Mobile Crustaceans on Soft Sediments	None	No	None	Yes	Yes	No
053	D	Small Surface-Burrowing Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	Yes	Yes
054	A	Small Tube-Building Fauna	Small Tube-Building Fauna	None	No	None	Yes	Yes	No
054	B	Small Tube-Building Fauna	Small Tube-Building Fauna	None	No	None	Yes	No	No
054	C	Small Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	No	No
055	A	Larger Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	No	No
055	B	Larger Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	No	No
055	C	Larger Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	No	No
056	A	Larger Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	No	Yes
056	B	Larger Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	No	No

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StationID	Replicate	Biotic Group	Co-occurring Biotic Group	Percent Cover of All Attached Fauna	Invasive Taxa Present?	Type of Invasive Taxa	Tubes	Burrows	Tracks
056	C	Larger Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	No	Yes
057	A	Larger Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	Yes	Yes
057	B	Larger Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	Yes	Yes
057	C	Larger Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	Yes	No
058	A	Larger Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	Yes	Yes
058	B	Larger Tube-Building Fauna	Sand Dollar Bed	None	IND	None	IND	IND	IND
058	D	Diverse Soft Sediment Epifauna	Small Tube-Building Fauna	None	No	None	Yes	Yes	No
059	A	Small Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	Yes	Yes
060	A	Diverse Soft Sediment Epifauna	Burrowing Anemones	None	No	None	Yes	Yes	Yes
060	B	Small Surface-Burrowing Fauna	Burrowing Anemones	None	No	None	Yes	Yes	No
060	C	Burrowing Anemones	Small Surface-Burrowing Fauna	None	No	None	Yes	Yes	Yes
061	A	Small Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	Yes	No
061	C	Small Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	Yes	No
061	D	Small Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	Yes	No
062	A	Small Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	Yes	No
062	B	IND	IND	None	IND	None	IND	IND	IND
062	D	Small Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	Yes	No
063	A	Sand Dollar Bed	Small Tube-Building Fauna	None	No	None	Yes	No	Yes
063	B	Small Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	No	Yes
063	D	Diverse Soft Sediment Epifauna	Small Surface-Burrowing Fauna	None	No	None	Yes	Yes	Yes
064	A	Sand Dollar Bed	Burrowing Anemones	None	No	None	No	No	Yes
064	B	Sand Dollar Bed	Small Tube-Building Fauna	None	No	None	Yes	No	Yes
064	C	Sand Dollar Bed	Small Surface-Burrowing Fauna	None	No	None	Yes	Yes	Yes
065	A	Diverse Soft Sediment Epifauna	Small Surface-Burrowing Fauna	None	No	None	Yes	No	Yes
065	B	Small Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	Yes	No
065	C	Small Surface-Burrowing Fauna	Tracks and Trails	None	IND	None	IND	Yes	Yes
066	A	Larger Tube-Building Fauna	Sand Dollar Bed	None	No	None	Yes	Yes	No
066	B	Larger Tube-Building Fauna	Sand Dollar Bed	None	No	None	Yes	Yes	No
066	C	Larger Tube-Building Fauna	Sand Dollar Bed	None	No	None	Yes	No	No
067	A	Sand Dollar Bed	Larger Tube-Building Fauna	None	No	None	Yes	No	No
067	B	Sand Dollar Bed	Larger Tube-Building Fauna	None	No	None	Yes	Yes	No
067	D	Sand Dollar Bed	IND	None	No	None	No	Yes	No
068	A	Mobile Crustaceans on Hard or Mixed Substrates	Attached Mussels	Sparse (1 to <30%)	No	None	No	No	No

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StationID	Replicate	Biotic Group	Co-occurring Biotic Group	Percent Cover of All Attached Fauna	Invasive Taxa Present?	Type of Invasive Taxa	Tubes	Burrows	Tracks
068	B	Attached Mussels	Diverse Soft Sediment Epifauna	Sparse (1 to <30%)	No	None	Yes	No	No
068	C	Mobile Crustaceans on Hard or Mixed Substrates	Attached Mussels	Sparse (1 to <30%)	No	None	No	No	No
069	A	Small Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	Yes	No
069	B	Small Tube-Building Fauna	Mobile Crustaceans on Hard or Mixed Substrates	None	No	None	Yes	No	Yes
069	C	Small Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	Yes	No
070	A	Small Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	Yes	Yes
070	B	Small Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	IND	IND
070	C	Small Tube-Building Fauna	Burrowing Anemones	None	No	None	Yes	Yes	No
071	A	Sand Dollar Bed	Larger Tube-Building Fauna	None	No	None	Yes	No	Yes
071	B	Sand Dollar Bed	Larger Tube-Building Fauna	None	No	None	Yes	No	No
071	C	Sand Dollar Bed	Small Tube-Building Fauna	None	No	None	Yes	No	No
072	A	Small Tube-Building Fauna	Tracks and Trails	None	No	None	Yes	Yes	Yes
072	C	Small Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	No	No
072	D	Small Tube-Building Fauna	Tracks and Trails	None	No	None	Yes	Yes	Yes
073	A	Small Tube-Building Fauna	Mobile Mollusks on Soft Sediments	None	No	None	Yes	Yes	Yes
073	B	Small Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	Yes	Yes
073	C	Small Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	Yes	No
074	E	Small Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	Yes	No
075	A	Small Tube-Building Fauna	Burrowing Anemones	None	No	None	Yes	Yes	Yes
075	B	Small Tube-Building Fauna	Burrowing Anemones	None	No	None	Yes	Yes	Yes
075	D	Small Tube-Building Fauna	Burrowing Anemones	None	No	None	Yes	Yes	No
076	A	Larger Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	Yes	Yes
076	B	Larger Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	Yes	No
076	C	Larger Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	No	No
077	A	Burrowing Anemones	Small Tube-Building Fauna	None	No	None	Yes	Yes	Yes
077	C	IND	IND	None	IND	None	IND	IND	IND

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StationID	Replicate	Biotic Group	Co-occurring Biotic Group	Percent Cover of All Attached Fauna	Invasive Taxa Present?	Type of Invasive Taxa	Tubes	Burrows	Tracks
077	D	Burrowing Anemones	Small Tube-Building Fauna	None	No	None	Yes	Yes	No
078	A	Larger Tube-Building Fauna	Burrowing Anemones	None	No	None	Yes	No	Yes
078	B	Larger Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	No	Yes
078	C	Larger Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	No	Yes
079	A	Small Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	Yes	Yes
079	C	Small Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	Yes	No
079	D	IND	IND	None	IND	None	IND	IND	IND
080	A	Larger Tube-Building Fauna	IND	None	No	None	Yes	Yes	No
080	B	Larger Tube-Building Fauna	IND	None	No	None	Yes	Yes	No
080	C	Larger Tube-Building Fauna	Mobile Crustaceans on Soft Sediments	None	No	None	Yes	Yes	Yes
081	A	Larger Tube-Building Fauna	Burrowing Anemones	None	No	None	Yes	Yes	Yes
081	B	Larger Tube-Building Fauna	Tracks and Trails	None	No	None	Yes	Yes	Yes
081	C	Larger Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	Yes	No
082	A	Small Tube-Building Fauna	Sand Dollar Bed	None	No	None	Yes	Yes	Yes
082	B	IND	IND	None	IND	None	IND	IND	IND
082	C	Sand Dollar Bed	Larger Tube-Building Fauna	None	No	None	Yes	Yes	No
083	A	Burrowing Anemones	Small Surface-Burrowing Fauna	None	No	None	Yes	Yes	No
084	A	Sand Dollar Bed	Burrowing Anemones	None	No	None	Yes	Yes	Yes
084	C	Sand Dollar Bed	Mobile Crustaceans on Soft Sediments	None	No	None	Yes	Yes	Yes
084	D	Sand Dollar Bed	Mobile Crustaceans on Soft Sediments	None	No	None	Yes	Yes	No
085	A	Small Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	Yes	Yes
085	B	Larger Tube-Building Fauna	IND	None	No	None	Yes	IND	IND
085	C	Small Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	Yes	No
086	A	Larger Tube-Building Fauna	Mobile Crustaceans on Soft Sediments	None	No	None	Yes	Yes	No
086	B	Larger Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	Yes	No
086	C	Larger Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	Yes	IND
087	A	Larger Tube-Building Fauna	Small Tube-Building Fauna	None	No	None	Yes	No	No
087	B	Larger Tube-Building Fauna	Small Tube-Building Fauna	None	No	None	Yes	Yes	Yes
087	C	Larger Tube-Building Fauna	Small Tube-Building Fauna	None	No	None	Yes	Yes	No
088	A	Mobile Crustaceans on Soft Sediments	IND	None	No	None	IND	IND	IND
088	B	IND	IND	None	IND	None	IND	IND	IND
088	C	IND	IND	None	IND	None	IND	IND	IND
089	A	Larger Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	Yes	No

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StationID	Replicate	Biotic Group	Co-occurring Biotic Group	Percent Cover of All Attached Fauna	Invasive Taxa Present?	Type of Invasive Taxa	Tubes	Burrows	Tracks
089	B	Larger Tube-Building Fauna	Small Tube-Building Fauna	None	No	None	Yes	Yes	No
089	C	Larger Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	Yes	No
090	A	Larger Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	Yes	No
090	B	Larger Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	Yes	No
090	D	Larger Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	Yes	No
091	A	Larger Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	Yes	No
091	B	Larger Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	Yes	Yes
091	C	Larger Tube-Building Fauna	Sand Dollar Bed	None	No	None	Yes	Yes	Yes
092	A	Small Tube-Building Fauna	Mobile Mollusks on Soft Sediments	None	No	None	Yes	Yes	No
092	C	Small Tube-Building Fauna	Mobile Mollusks on Soft Sediments	None	No	None	Yes	Yes	No
092	D	Small Tube-Building Fauna	Mobile Mollusks on Soft Sediments	None	No	None	Yes	Yes	No
093	A	Larger Tube-Building Fauna	Small Tube-Building Fauna	None	No	None	Yes	Yes	No
093	C	Larger Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	Yes	No
093	D	IND	IND	None	IND	None	IND	IND	IND
094	B	Small Tube-Building Fauna	Mobile Mollusks on Soft Sediments	None	No	None	Yes	Yes	No
094	C	Small Tube-Building Fauna	Larger Tube-Building Fauna	None	No	None	Yes	Yes	No
094	D	Small Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	Yes	No
095	A	Tracks and Trails	Attached Mussels	Sparse (1 to <30%)	No	None	Yes	Yes	Yes
095	B	Attached Mussels	Tracks and Trails	Sparse (1 to <30%)	No	None	Yes	Yes	Yes
095	C	Attached Mussels	Attached Mussels	Moderate (30 to < 70%)	No	None	Yes	Yes	Yes
096	A	Attached Mussels	None	Trace (<1%)	No	None	No	Yes	No
096	B	Small Tube-Building Fauna	None	None	No	None	No	Yes	No
096	D	Attached Mussels	None	Trace (<1%)	No	None	Yes	Yes	No
097	A	Small Surface-Burrowing Fauna	Mobile Crustaceans on Soft Sediments	None	No	None	Yes	Yes	No
097	B	Tracks and Trails	None	None	No	None	No	No	No
097	C	IND	IND	None	IND	None	IND	IND	IND
098	A	Sand Dollar Bed	Mobile Crustaceans on Soft Sediments	None	No	None	Yes	Yes	Yes
098	B	Sand Dollar Bed	Larger Tube-Building Fauna	None	No	None	Yes	Yes	Yes

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StationID	Replicate	Biotic Group	Co-occurring Biotic Group	Percent Cover of All Attached Fauna	Invasive Taxa Present?	Type of Invasive Taxa	Tubes	Burrows	Tracks
098	C	Sand Dollar Bed	Burrowing Anemones	None	No	None	Yes	Yes	Yes
099	A	Larger Tube-Building Fauna	Mobile Crustaceans on Soft Sediments	None	No	None	Yes	Yes	No
099	B	Small Tube-Building Fauna	Mobile Crustaceans on Soft Sediments	None	No	None	Yes	Yes	No
099	C	Small Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	Yes	No
100	A	Small Surface-Burrowing Fauna	Mobile Crustaceans on Soft Sediments	None	No	None	Yes	Yes	No
100	B	Small Surface-Burrowing Fauna	Small Tube-Building Fauna	None	No	None	Yes	Yes	No
100	C	Small Surface-Burrowing Fauna	Small Tube-Building Fauna	None	No	None	Yes	Yes	No
101	A	Diverse Soft Sediment Epifauna	Small Surface-Burrowing Fauna	None	No	None	Yes	Yes	No
101	B	Diverse Soft Sediment Epifauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	Yes	No
101	C	Diverse Soft Sediment Epifauna	None	None	No	None	Yes	Yes	No
102	A	Small Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	Yes	Yes
102	B	Small Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	Yes	Yes
102	C	Sand Dollar Bed	IND	None	IND	None	IND	IND	IND
103	A	Small Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	Yes	Yes
103	B	Small Tube-Building Fauna	Sand Dollar Bed	None	No	None	Yes	Yes	No
103	C	Small Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	Yes	Yes
104	A	Small Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	Yes	No
104	B	Small Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	Yes	No
104	C	Small Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	Yes	No
105	A	Mobile Crustaceans on Soft Sediments	Larger Tube-Building Fauna	None	No	None	Yes	Yes	No
105	B	Mobile Crustaceans on Soft Sediments	None	None	No	None	Yes	Yes	No
105	C	Mobile Crustaceans on Soft Sediments	Larger Tube-Building Fauna	None	No	None	Yes	Yes	No
106	A	Larger Tube-Building Fauna	IND	None	No	None	Yes	IND	IND
106	B	Larger Tube-Building Fauna	Mobile Crustaceans on Soft Sediments	None	No	None	Yes	No	No

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106	C	Larger Tube-Building Fauna	None	None	No	None	Yes	No	No
107	A	Mussel Bed	Mobile Crustaceans on Soft Sediments	Sparse (1 to <30%)	No	None	Yes	Yes	No
107	B	Mussel Bed	Mobile Crustaceans on Soft Sediments	Moderate (30 to < 70%)	No	None	Yes	Yes	No
107	C	Mussel Bed	None	Moderate (30 to < 70%)	No	None	Yes	Yes	No
108	A	Mussel Bed	Attached Hydroids	Sparse (1 to <30%)	No	None	IND	IND	IND
108	B	Mussel Bed	Attached Sea Urchins	Sparse (1 to <30%)	No	None	IND	IND	IND
108	F	Mussel Bed	Attached Hydroids	Sparse (1 to <30%)	No	None	IND	IND	IND
109	A	Mussel Bed	Attached Hydroids	Moderate (30 to < 70%)	No	None	IND	IND	IND
109	C	Mussel Bed	IND	None	IND	None	IND	IND	IND
109	D	Mussel Bed	IND	None	IND	None	IND	IND	IND
110	B	Mussel Bed	Attached Hydroids	Moderate (30 to < 70%)	No	None	IND	IND	IND
110	C	Mussel Bed	Attached Hydroids	Moderate (30 to < 70%)	No	None	IND	IND	IND
110	D	Mussel Bed	Attached Hydroids	Moderate (30 to < 70%)	No	None	Yes	Yes	No
111	A	IND	IND	None	No	None	IND	IND	IND
111	B	IND	IND	None	No	None	IND	IND	IND
111	C	Mobile Crustaceans on Soft Sediments	Attached Hydroids	Sparse (1 to <30%)	No	None	Yes	Yes	No
112	A	IND	IND	None	IND	None	IND	IND	IND
112	B	IND	IND	None	IND	None	IND	IND	IND
112	C	IND	IND	None	IND	None	IND	IND	IND
113	A	IND	IND	None	IND	None	IND	IND	IND
113	B	IND	IND	None	IND	None	IND	IND	IND
113	C	IND	IND	None	IND	None	IND	IND	IND
116	A	Larger Tube-Building Fauna	Tracks and Trails	None	No	None	Yes	Yes	Yes
116	B	Larger Tube-Building Fauna	Mobile Crustaceans on Soft Sediments	None	No	None	Yes	Yes	No
116	D	Mobile Crustaceans on Soft Sediments	None	None	No	None	No	No	No
117	A	Larger Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	Yes	No
117	C	Larger Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	Yes	No
117	D	Small Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	Yes	No
118	A	Small Tube-Building Fauna	Mobile Crustaceans on Soft Sediments	None	No	None	Yes	Yes	No
118	B	Small Tube-Building Fauna	Mobile Crustaceans on Soft Sediments	None	No	None	Yes	Yes	No
118	C	Small Tube-Building Fauna	None	None	No	None	Yes	Yes	No
119	A	Larger Tube-Building Fauna	Mobile Crustaceans on Soft Sediments	None	No	None	Yes	Yes	No
119	B	Small Tube-Building Fauna	Mobile Crustaceans on Soft Sediments	None	No	None	Yes	Yes	No
119	C	Small Tube-Building Fauna	Mobile Crustaceans on Soft Sediments	None	No	None	Yes	Yes	No
120	A	Larger Tube-Building Fauna	IND	None	IND	None	Yes	IND	IND

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StationID	Replicate	Biotic Group	Co-occurring Biotic Group	Percent Cover of All Attached Fauna	Invasive Taxa Present?	Type of Invasive Taxa	Tubes	Burrows	Tracks
120	B	Larger Tube-Building Fauna	Mobile Crustaceans on Soft Sediments	None	No	None	Yes	Yes	No
120	C	Larger Tube-Building Fauna	IND	None	No	None	Yes	IND	No
122	A	Small Tube-Building Fauna	Mobile Crustaceans on Soft Sediments	None	No	None	Yes	Yes	No
122	B	Small Tube-Building Fauna	Larger Tube-Building Fauna	None	No	None	Yes	Yes	No
122	C	Small Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	Yes	No
123	A	Small Tube-Building Fauna	Larger Tube-Building Fauna	None	No	None	Yes	Yes	No
123	B	Small Tube-Building Fauna	Mobile Crustaceans on Soft Sediments	None	No	None	Yes	Yes	No
123	C	Small Tube-Building Fauna	Larger Tube-Building Fauna	None	No	None	Yes	Yes	No
124	A	Mobile Crustaceans on Soft Sediments	Small Surface-Burrowing Fauna	None	No	None	Yes	Yes	No
124	B	Mobile Crustaceans on Soft Sediments	None	None	No	None	Yes	Yes	No
124	C	Small Tube-Building Fauna	Mobile Crustaceans on Soft Sediments	None	No	None	Yes	Yes	No
125	A	Small Tube-Building Fauna	Mobile Crustaceans on Soft Sediments	None	No	None	Yes	Yes	No
125	B	Small Tube-Building Fauna	Mobile Crustaceans on Soft Sediments	None	No	None	Yes	IND	IND
125	C	Small Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	Yes	No
126	A	IND	IND	None	No	None	No	No	No
126	C	Mobile Crustaceans on Hard or Mixed Substrates	IND	None	No	None	No	No	No
126	D	IND	IND	None	No	None	No	No	No
127	A	Mobile Crustaceans on Hard or Mixed Substrates	Larger Tube-Building Fauna	None	No	None	Yes	No	No
127	B	None	None	None	No	None	Yes	Yes	Yes
127	C	Larger Tube-Building Fauna	None	None	No	None	Yes	Yes	No
128	A	Small Tube-Building Fauna	Mobile Crustaceans on Soft Sediments	None	No	None	Yes	Yes	No
128	B	Small Tube-Building Fauna	Mobile Crustaceans on Soft Sediments	None	No	None	Yes	Yes	No
130	A	IND	IND	None	No	None	IND	IND	IND
130	B	IND	IND	None	No	None	IND	IND	IND
130	C	IND	IND	None	No	None	IND	IND	IND
131	A	Small Surface-Burrowing Fauna	None	None	No	None	Yes	Yes	No
131	B	Small Surface-Burrowing Fauna	None	None	No	None	Yes	Yes	No
131	C	Small Surface-Burrowing Fauna	Larger Tube-Building Fauna	None	No	None	Yes	Yes	No
132	A	Small Tube-Building Fauna	Barnacles	None	No	None	Yes	Yes	No
132	B	Small Tube-Building Fauna	Larger Tube-Building Fauna	None	No	None	Yes	Yes	No
132	C	Small Tube-Building Fauna	Mobile Crustaceans on Hard or Mixed Substrates	None	No	None	Yes	Yes	No

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StationID	Replicate	Biotic Group	Co-occurring Biotic Group	Percent Cover of All Attached Fauna	Invasive Taxa Present?	Type of Invasive Taxa	Tubes	Burrows	Tracks
133	A	Small Tube-Building Fauna	Diverse Soft Sediment Epifauna	Trace (<1%)	No	None	Yes	Yes	Yes
133	B	Sand Dollar Bed	Mobile Crustaceans on Hard or Mixed Substrates	None	No	None	Yes	Yes	No
133	C	Small Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	Yes	No
134	A	Mobile Crustaceans on Hard or Mixed Substrates	Burrowing Anemones	None	No	None	Yes	Yes	No
134	B	IND	IND	None	IND	None	IND	IND	IND
134	D	Small Tube-Building Fauna	Mobile Crustaceans on Hard or Mixed Substrates	None	No	None	Yes	Yes	No
135	F	Larger Tube-Building Fauna	Sand Dollar Bed	None	No	None	Yes	Yes	Yes
135	G	Larger Tube-Building Fauna	Sand Dollar Bed	None	No	None	Yes	Yes	No
135	H	Larger Tube-Building Fauna	Sand Dollar Bed	None	No	None	Yes	Yes	Yes
136	E	Burrowing Anemones	Mobile Crustaceans on Soft Sediments	None	No	None	Yes	Yes	No
136	F	Burrowing Anemones	Mobile Crustaceans on Soft Sediments	None	No	None	Yes	Yes	No
136	H	Mobile Crustaceans on Soft Sediments	Burrowing Anemones	None	No	None	Yes	Yes	No
137	E	Larger Tube-Building Fauna	Sand Dollar Bed	None	No	None	Yes	Yes	Yes
137	G	Sand Dollar Bed	Larger Tube-Building Fauna	None	No	None	Yes	Yes	No
137	H	Larger Tube-Building Fauna	Sand Dollar Bed	None	No	None	Yes	Yes	No
138	E	Sand Dollar Bed	Small Tube-Building Fauna	None	No	None	Yes	Yes	Yes
138	F	Sand Dollar Bed	Larger Tube-Building Fauna	None	No	None	Yes	Yes	Yes
138	G	Sand Dollar Bed	Larger Tube-Building Fauna	None	No	None	Yes	Yes	Yes
139	E	Sand Dollar Bed	Larger Tube-Building Fauna	None	No	None	Yes	Yes	Yes
139	F	Sand Dollar Bed	Larger Tube-Building Fauna	None	No	None	Yes	Yes	Yes
139	G	Sand Dollar Bed	Larger Tube-Building Fauna	None	No	None	Yes	Yes	Yes
140	E	Sand Dollar Bed	Small Tube-Building Fauna	None	No	None	Yes	Yes	Yes
140	F	Sand Dollar Bed	Small Tube-Building Fauna	None	No	None	Yes	Yes	No
140	H	Sand Dollar Bed	Small Tube-Building Fauna	None	No	None	Yes	Yes	No
141	B	Sand Dollar Bed	Larger Deep-Burrowing Fauna	None	No	None	Yes	Yes	No
142	A	Small Tube-Building Fauna	Larger Deep-Burrowing Fauna	None	No	None	Yes	Yes	Yes
142	B	Small Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	Yes	Yes
142	C	Small Tube-Building Fauna	Larger Deep-Burrowing Fauna	None	No	None	Yes	Yes	Yes
143	A	Larger Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	Yes	Yes
143	C	Larger Tube-Building Fauna	Larger Deep-Burrowing Fauna	None	No	None	Yes	Yes	Yes

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StationID	Replicate	Biotic Group	Co-occurring Biotic Group	Percent Cover of All Attached Fauna	Invasive Taxa Present?	Type of Invasive Taxa	Tubes	Burrows	Tracks
143	D	Larger Tube-Building Fauna	Larger Deep-Burrowing Fauna	None	No	None	Yes	Yes	Yes
144	A	Larger Tube-Building Fauna	Sand Dollar Bed	None	No	None	Yes	Yes	No
144	B	Larger Tube-Building Fauna	Sand Dollar Bed	None	No	None	Yes	Yes	No
144	C	Larger Tube-Building Fauna	Sand Dollar Bed	None	No	None	Yes	Yes	No
145	A	Larger Tube-Building Fauna	Sand Dollar Bed	None	No	None	Yes	Yes	Yes
145	C	Larger Tube-Building Fauna	Sand Dollar Bed	None	No	None	Yes	Yes	No
146	A	Sand Dollar Bed	Larger Deep-Burrowing Fauna	None	No	None	Yes	Yes	Yes
146	B	Sand Dollar Bed	Larger Tube-Building Fauna	None	No	None	Yes	Yes	No
146	C	Sand Dollar Bed	Larger Tube-Building Fauna	None	No	None	Yes	Yes	Yes
147	A	Sand Dollar Bed	Small Tube-Building Fauna	None	No	None	Yes	Yes	Yes
147	B	Sand Dollar Bed	Mobile Mollusks on Soft Sediments	None	No	None	Yes	Yes	Yes
147	C	Sand Dollar Bed	Mobile Mollusks on Soft Sediments	None	No	None	Yes	Yes	Yes
148	A	Larger Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	Yes	Yes
148	B	Larger Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	Yes	Yes
148	C	Larger Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	Yes	No
149	A	Sand Dollar Bed	Mobile Mollusks on Soft Sediments	None	No	None	Yes	Yes	No
149	D	Sand Dollar Bed	Mobile Mollusks on Soft Sediments	None	No	None	Yes	Yes	No
150	A	Sand Dollar Bed	Small Tube-Building Fauna	None	No	None	Yes	Yes	No
150	B	Sand Dollar Bed	Small Tube-Building Fauna	None	No	None	Yes	Yes	No
150	C	Sand Dollar Bed	Mobile Mollusks on Soft Sediments	None	No	None	Yes	Yes	Yes
151	A	Sand Dollar Bed	Larger Deep-Burrowing Fauna	None	No	None	Yes	Yes	No
151	B	Sand Dollar Bed	Small Tube-Building Fauna	None	No	None	Yes	Yes	No
151	D	Sand Dollar Bed	Small Tube-Building Fauna	None	No	None	Yes	Yes	No
152	A	Small Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	Yes	Yes
152	B	Small Surface-Burrowing Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	Yes	Yes
152	D	Small Surface-Burrowing Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	Yes	Yes
153	A	Small Tube-Building Fauna	Sand Dollar Bed	None	No	None	Yes	Yes	Yes
153	B	Sand Dollar Bed	IND	None	No	None	IND	IND	IND
153	C	Small Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	Yes	No
154	A	Sand Dollar Bed	Small Tube-Building Fauna	None	No	None	Yes	Yes	Yes
154	B	Small Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	Yes	Yes

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StationID	Replicate	Biotic Group	Co-occurring Biotic Group	Percent Cover of All Attached Fauna	Invasive Taxa Present?	Type of Invasive Taxa	Tubes	Burrows	Tracks
154	C	Small Tube-Building Fauna	Sand Dollar Bed	None	No	None	Yes	Yes	Yes
155	A	Small Tube-Building Fauna	Larger Deep-Burrowing Fauna	None	No	None	Yes	Yes	Yes
155	B	Small Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	Yes	No
155	D	Small Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	Yes	No
156	A	Small Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	Yes	Yes
156	B	Small Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	Yes	Yes
156	D	Small Tube-Building Fauna	Sand Dollar Bed	None	No	None	Yes	Yes	Yes
157	A	Small Tube-Building Fauna	Sand Dollar Bed	None	No	None	Yes	Yes	No
157	B	Sand Dollar Bed	Small Surface-Burrowing Fauna	None	No	None	Yes	Yes	No
157	C	Small Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	Yes	Yes
REFA_01	A	Burrowing Anemones	None	None	No	None	Yes	Yes	No
REFA_01	B	Burrowing Anemones	None	None	No	None	Yes	Yes	No
REFA_01	C	Burrowing Anemones	None	None	No	None	Yes	Yes	No
REFA_02	A	Burrowing Anemones	Small Tube-Building Fauna	None	No	None	Yes	Yes	No
REFA_02	B	Burrowing Anemones	IND	None	No	None	IND	IND	IND
REFA_02	D	Burrowing Anemones	Small Tube-Building Fauna	None	No	None	Yes	Yes	No
REFA_03	A	Burrowing Anemones	Mobile Crustaceans on Hard or Mixed Substrates	None	No	None	Yes	Yes	No
REFA_03	B	Burrowing Anemones	Small Tube-Building Fauna	None	No	None	Yes	Yes	No
REFA_03	D	Burrowing Anemones	Mobile Crustaceans on Hard or Mixed Substrates	None	No	None	Yes	Yes	No
REFA_04	A	Burrowing Anemones	Mobile Crustaceans on Hard or Mixed Substrates	None	No	None	Yes	Yes	No
REFA_04	C	Burrowing Anemones	Mobile Crustaceans on Hard or Mixed Substrates	None	No	None	Yes	Yes	No
REFA_04	D	Burrowing Anemones	Mobile Crustaceans on Hard or Mixed Substrates	None	No	None	Yes	Yes	No
REFA_05	A	Burrowing Anemones	Small Tube-Building Fauna	None	No	None	Yes	Yes	No
REFA_05	B	Burrowing Anemones	Small Tube-Building Fauna	None	No	None	Yes	Yes	No
REFA_05	C	Small Tube-Building Fauna	Mobile Crustaceans on Hard or Mixed Substrates	None	No	None	Yes	Yes	No
REFB_01	E	Larger Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	Yes	Yes
REFB_01	F	Larger Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	Yes	Yes

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REFB_01	G	Larger Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	Yes	Yes
REFB_02	H	Larger Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	Yes	Yes
REFB_02	I	Larger Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	Yes	Yes
REFB_02	J	Larger Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	Yes	Yes
REFB_03	E	Larger Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	Yes	Yes
REFB_03	F	Diverse Soft Sediment Epifauna	Larger Tube-Building Fauna	None	No	None	Yes	Yes	Yes
REFB_03	G	Diverse Soft Sediment Epifauna	Larger Tube-Building Fauna	None	No	None	Yes	Yes	Yes
REFB_04	F	Diverse Soft Sediment Epifauna	Larger Tube-Building Fauna	None	No	None	Yes	Yes	Yes
REFB_04	G	Sand Dollar Bed	Mobile Crustaceans on Soft Sediments	None	No	None	IND	IND	IND
REFB_04	H	Diverse Soft Sediment Epifauna	Larger Tube-Building Fauna	None	No	None	Yes	Yes	Yes
REFB_05	E	Sand Dollar Bed	Larger Deep-Burrowing Fauna	None	No	None	Yes	Yes	Yes
REFB_05	F	Sand Dollar Bed	Mobile Crustaceans on Soft Sediments	None	No	None	Yes	Yes	No
REFB_05	H	Sand Dollar Bed	Larger Tube-Building Fauna	None	No	None	Yes	Yes	Yes
REFC_01	A	Larger Tube-Building Fauna	None	None	No	None	Yes	Yes	No
REFC_01	B	Larger Tube-Building Fauna	Mobile Crustaceans on Soft Sediments	None	No	None	Yes	Yes	No
REFC_01	D	Larger Tube-Building Fauna	IND	None	IND	None	Yes	Yes	IND
REFC_02	A	Larger Tube-Building Fauna	None	None	No	None	Yes	Yes	No
REFC_02	B	Larger Tube-Building Fauna	Mobile Crustaceans on Soft Sediments	None	No	None	Yes	Yes	No
REFC_02	C	Larger Tube-Building Fauna	None	None	No	None	Yes	Yes	No
REFC_03	A	Larger Tube-Building Fauna	Starfish Bed	None	No	None	Yes	Yes	No
REFC_03	B	Larger Tube-Building Fauna	Larger Deep-Burrowing Fauna	None	No	None	Yes	Yes	No
REFC_03	D	Larger Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	Yes	No
REFC_04	A	Larger Tube-Building Fauna	Mobile Crustaceans on Soft Sediments	None	No	None	Yes	Yes	No
REFC_04	B	Larger Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	Yes	No
REFC_04	D	Larger Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	Yes	No
REFC_05	A	Larger Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	Yes	No
REFC_05	B	Larger Tube-Building Fauna	Mobile Crustaceans on Soft Sediments	None	No	None	Yes	Yes	No
REFC_05	C	Larger Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	Yes	No

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StationID	Replicate	Infauna	Epifauna	Flora	Fish Type
001	A	None	Crab	None	None
001	B	None	None	None	None
001	C	None	Crab	None	None
002	A	None	Hermit Crabs, Anemones	None	Sea Robin
002	B	None	None	None	None
002	C	None	None	None	None
003	A	None	Anemone	None	None
003	B	IND	Ind	IND	IND
003	C	IND	Ind	IND	IND
004	A	None	Anemone, Sand Dollars	None	None
004	B	None	Sand Dollars	None	None
004	C	None	Anemone, Sand Dollars	None	None
005	A	None	Sand Dollars	None	None
005	B	None	Hermit Crabs, Crabs	None	Sea Robin
005	C	None	Hermit Crabs, Scallop	None	None
006	A	None	Hermit Crab	None	None
006	B	None	Anemone, Hermit Crabs	None	None
006	C	None	Hermit Crab, Gastropod	None	None
007	A	None	Hermit Crabs, Sand Dollars	None	None
007	B	None	Sand Dollars	None	None
007	C	None	Gastropod, Hermit Crab, Sand Dollars	None	None
008	B	None	Hermit Crabs, Sand Dollars	None	None
008	C	None	Gastropod, Hermit Crabs, Sand Dollar	None	None
008	D	None	Sand Dollars	None	None
009	A	None	Anemone	None	None
009	B	None	Anemone	None	None
009	C	None	Anemones	None	None
010	B	None	Crab, Hermit Crab, Scallops, Sponge	None	None
010	C	None	Sponge	None	None
010	D	None	Scallop	None	None
011	A	None	None	None	None
011	B	None	None	None	None
011	C	None	Anemone	None	None
012	A	None	Crab, Penaeid Shrimp	None	None
012	B	None	None	None	None
012	C	None	None	None	None
013	A	None	None	None	None

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StationID	Replicate	Infauna	Epifauna	Flora	Fish Type
013	B	None	None	None	None
013	C	None	Anemone, Gastropod, Crab, Urchin	None	None
014	A	None	None	None	None
014	B	None	None	None	None
014	D	None	None	None	None
015	A	None	Gastropods	None	None
015	B	None	Gastropod	None	None
015	C	None	Crab, Gastropods	None	None
016	A	None	Sand Dollars	None	None
016	B	None	Sand Dollars	None	None
016	C	None	Sand Dollars	None	None
017	A	None	Sand Dollars	None	None
017	B	None	Hermit Crabs, Sand Dollars, Sea Star	None	None
017	D	None	Gastropods, Hermit Crabs, Sand Dollars	None	None
018	A	None	Crab, Sea Star	None	None
018	B	None	Gastropods, Sand Dollar	None	None
018	C	None	Sand Dollars	None	None
019	A	None	None	None	None
019	B	None	Crab, Gastropod	None	None
019	C	None	None	None	None
020	A	None	Hermit Crab, Sand Dollars	None	None
020	B	None	Sand Dollars	None	None
020	C	None	Gastropods, Sand Dollars	None	None
021	A	None	Hermit Crab, Sand Dollars	None	None
021	B	None	Hermit Crabs, Sand Dollars	None	None
021	D	None	Hermit Crabs, Sand Dollars	None	None
022	A	None	Gastropods, Sand Dollars	None	None
022	B	None	Gastropods, Hermit Crab, Sand Dollars	None	None
022	C	None	Sand Dollars	None	None
023	A	None	Gastropod, Hermit Crabs, Sand Dollars	None	None
023	B	None	Gastropods, Hermit Crabs	None	None
023	D	None	Gastropods, Hermit Crabs, Sand Dollar	None	None

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StationID	Replicate	Infauna	Epifauna	Flora	Fish Type
024	A	None	Gastropods, Sand Dollars	None	None
024	B	None	Sand Dollars	None	None
024	C	None	Gastropod, Hermit Crabs, Sand Dollars	None	None
025	A	None	Sand Dollars	None	None
025	B	None	Sand Dollars	None	None
025	D	None	Sand Dollars	None	None
026	H	None	Sand Dollars	None	None
026	J	None	Sand Dollars	None	None
026	K	None	Sand Dollars	None	None
027	A	None	Sand Dollars	None	None
027	B	None	Hermit Crab, Sand Dollars	None	None
027	C	None	Anemone, Hermit Crab, Sand Dollars	None	None
028	A	None	Hermit Crab, Sand Dollars	None	None
028	B	None	Sand Dollars	None	None
028	C	None	Sand Dollars	None	None
029	A	None	Sand Dollars	None	None
029	B	None	Sand Dollars	None	None
029	C	None	Sand Dollars	None	None
030	A	None	Sand Dollars	None	None
030	C	None	Hermit Crab, Sand Dollars	None	None
030	D	None	Gastropods, Ocean Quahog, Sand Dollars	None	None
031	A	None	Hermit Crab, Sand Dollars	None	None
031	B	None	Sand Dollars	None	None
031	C	None	Sand Dollars	None	None
032	A	None	Sand Dollars	None	None
032	B	None	Sand Dollars	None	None
032	D	None	Sand Dollars	None	Skate
033	A	None	Sand Dollars	None	Skate
033	B	None	Sand Dollars	None	Skate
033	C	None	Gastropods, Sand Dollars	None	None
034	A	None	Sand Dollars	None	None
034	B	None	Sand Dollars	None	None

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StationID	Replicate	Infauna	Epifauna	Flora	Fish Type
034	C	None	Ocean Quahog, Sand Dollars	None	None
035	A	None	Sand Dollars	None	None
035	B	None	Sand Dollars	None	None
035	C	None	Gastropods, Sand Dollars	None	None
036	A	None	Crab, Sand Dollars	None	None
036	B	None	Gastropods, Sand Dollars	None	None
036	C	None	Sand Dollars	None	None
037	A	None	Anemones	None	None
037	C	IND	Ind	IND	IND
037	D	None	Anemones, Hermit Crab, Sand Dollars	None	None
038	A	None	Sand Dollars	None	None
038	B	IND	Sand Dollars, Sea Stars	IND	IND
038	C	None	Sand Dollars	None	None
039	A	None	Sand Dollars	None	None
039	B	None	Gastropod, Sand Dollars	None	None
039	C	None	Sand Dollars	None	None
040	A	None	Sand Dollars	None	None
040	B	None	Sand Dollars	None	None
040	C	None	Sand Dollars	None	None
041	A	None	Sand Dollars	None	None
041	B	None	Sand Dollars	None	None
041	C	None	Sand Dollars	None	None
042	A	None	Anemones, Gastropods, Sand Dollars	None	None
042	B	None	Gastropods, Sand Dollars	None	None
042	C	None	Anemones, Gastropods	None	None
043	A	None	Sand Dollars	None	None
043	B	None	Sand Dollars	None	None
043	C	None	Gastropod, Sand Dollars	None	None
044	A	None	Anemone, Hermit Crabs, Sand Dollars	None	None
044	B	None	Sand Dollars	None	None
044	C	None	Anemone, Crab, Hermit Crabs, Sand Dollars	None	None
045	A	None	Hermit Crab, Sand Dollars	None	None
045	B	None	Sand Dollars	None	None

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StationID	Replicate	Infauna	Epifauna	Flora	Fish Type
045	C	None	Sand Dollars	None	None
046	A	None	Hydroids	None	None
046	B	None	None	None	None
046	D	IND	Ind	IND	IND
047	A	None	Hydroids, Sand Dollars	None	None
047	D	None	Anemone, Sand Dollars	None	None
047	E	None	Anemone, Sand Dollars	None	None
048	A	None	Gastropod, Sand Dollars	None	None
048	B	None	Sand Dollars	None	None
048	C	None	Sand Dollars	None	None
049	A	None	Anemones, Hermit Crab	None	None
049	B	None	Anemone, Hermit Crabs	None	None
049	D	None	Anemones	None	None
050	A	None	Corals, Hydroids, Sea Star, Sponges	None	None
050	B	None	Corals, Hydroids, Sponges	None	None
050	C	None	Corals, Hydroids, Sponges	None	None
051	A	None	None	None	None
051	B	None	Hermit Crabs, Anemone	None	None
051	C	None	Hermit Crab	None	None
052	B	None	Hermit Crabs, Sand Dollars	None	None
052	C	None	Sand Dollars	None	None
052	D	None	Gastropod, Hermit Crab, Sand Dollars	None	None
053	A	None	Hermit Crab, Sand Dollars	None	None
053	B	None	Hermit Crabs, Sand Dollars	None	None
053	D	None	Gastropod, Hermit Crabs, Sand Dollars	None	None
054	A	None	Hermit Crabs, Sand Dollar	None	None
054	B	None	Gastropods, Hermit Crabs	None	None
054	C	None	Gastropods, Hermit Crabs	None	None
055	A	None	Hermit Crab, Sand Dollar	None	None
055	B	None	Hermit Crab	None	None
055	C	None	Gastropods	None	None
056	A	None	Gastropod, Hermit Crabs, Sand Dollar	None	None
056	B	None	None	None	None

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StationID	Replicate	Infauna	Epifauna	Flora	Fish Type
056	C	None	Sand Dollar	None	None
057	A	None	Gastropod, Hermit Crab	None	None
057	B	None	Gastropod, Hermit Crabs, Sea Scallop	None	None
057	C	None	None	None	None
058	A	None	Hermit Crabs, Sand Dollars	None	None
058	B	IND	Sand Dollars	IND	IND
058	D	None	Aphrodita, Sand Dollars, Sea Scallop	None	None
059	A	None	Anemones, Gastropods, Hermit Crab	None	None
060	A	None	Anemones, Gastropod, Hermit Crabs	None	None
060	B	None	Anemones	None	None
060	C	None	Anemones, Aphrodita, Gastropods, Hermit Crab	None	None
061	A	None	Anemones, Gastropod	None	None
061	C	None	Gastropods	None	None
061	D	None	None	None	None
062	A	None	Anemones	None	None
062	B	IND	Ind	IND	IND
062	D	None	Anemones	None	None
063	A	None	Anemone, Sand Dollars	None	None
063	B	None	Anemone, Gastropod, Sand Dollars	None	None
063	D	None	Anemone, Gastropod, Hermit Crab, Sand Dollars	None	None
064	A	None	Anemone, Gastropod, Hermit Crab, Sand Dollars	None	None
064	B	None	Sand Dollars	None	None
064	C	None	Hermit Crabs, Sand Dollars	None	None
065	A	None	Anemones, Gastropods, Hermit Crab, Sand Dollars	None	None
065	B	None	Anemones, Gastropods, Hermit Crab, Sand Dollars	None	None
065	C	IND	Anemone, Sand Dollars	IND	IND
066	A	None	Sand Dollars	None	None
066	B	None	Sand Dollars	None	None
066	C	None	Hermit Crabs, Sand Dollars	None	None
067	A	None	Sand Dollars	None	None
067	B	None	Sand Dollars	None	None
067	D	None	Sand Dollars	None	None
068	A	None	Hermit Crab, Mussels	None	None

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StationID	Replicate	Infauna	Epifauna	Flora	Fish Type
068	B	None	Hermit Crabs, Mussels, Sand Dollars	None	None
068	C	None	Hermit Crab, Mussels	None	None
069	A	None	Gastropod	None	None
069	B	None	Gastropods, Hermit Crab	None	None
069	C	None	Gastropod, Sand Dollars	None	None
070	A	None	Anemones, Gastropod, Hermit Crab	None	None
070	B	None	Anemone	None	None
070	C	None	Anemones	None	None
071	A	None	Gastropod, Sand Dollars	None	None
071	B	None	Gastropod, Sand Dollars	None	None
071	C	None	Sand Dollars	None	None
072	A	None	Hermit Crab, Sand Dollars	None	None
072	C	None	Sand Dollars	None	None
072	D	None	Gastropods, Hermit Crab, Sand Dollar	None	None
073	A	None	Gastropods, Hermit Crab	None	Unknown
073	B	None	Anemones, Gastropods, Hermit Crabs	None	None
073	C	None	Anemones, Gastropods, Hermit Crabs	None	None
074	E	None	None	None	None
075	A	None	Anemones, Gastropod	None	None
075	B	None	Anemones, Gastropods, Hermit Crabs	None	None
075	D	None	Anemones, Gastropod	None	None
076	A	None	Gastropods, Hermit Crabs, Sand Dollars	None	None
076	B	None	Gastropods, Hermit Crabs, Sand Dollars	None	None
076	C	None	Gastropods, Hermit Crabs, Sand Dollars	None	None
077	A	None	Anemones, Gastropods	None	None
077	C	IND	Ind	IND	IND

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StationID	Replicate	Infauna	Epifauna	Flora	Fish Type
077	D	None	Gastropods	None	None
078	A	None	Anemones, Sand Dollars	None	None
078	B	None	Gastropods, Sand Dollars	None	None
078	C	None	Gastropods	None	None
079	A	None	Anemones, Hermit Crab, Sand Dollars	None	None
079	C	None	Anemones, Hermit Crabs, Urchin	None	None
079	D	IND	Ind	IND	IND
080	A	None	Anemone, Hermit Crab	None	None
080	B	None	Sponge	None	None
080	C	None	Hermit Crabs	None	None
081	A	None	Anemone	None	None
081	B	None	Gastropods, Hermit Crabs	None	None
081	C	None	None	None	None
082	A	None	Hermit Crab, Sand Dollars	None	None
082	B	IND	Sand Dollars	IND	IND
082	C	None	Anemone, Gastropods, Sand Dollars	None	None
083	A	None	Anemones	None	None
084	A	None	Anemones, Hermit Crabs, Sand Dollars	None	None
084	C	None	Anemones, Hermit Crabs, Sand Dollars	None	None
084	D	None	Hermit Crabs, Sand Dollars	None	None
085	A	None	Hermit Crab, Sand Dollars	None	None
085	B	IND	Sand Dollars	IND	IND
085	C	None	Hermit Crabs, Sand Dollars	None	None
086	A	None	Hermit Crabs	None	None
086	B	None	Hermit Crabs, Sand Dollars	None	None
086	C	None	Hermit Crab, Sand Dollars	None	None
087	A	None	Hermit Crab	None	None
087	B	None	Hermit Crab, Sand Dollar	None	None
087	C	None	Gastropod, Hermit Crab, Sand Dollar	None	None
088	A	None	None	None	None
088	B	IND	Ind	IND	IND
088	C	None	None	None	None
089	A	None	Hermit Crab	None	None

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StationID	Replicate	Infauna	Epifauna	Flora	Fish Type
089	B	None	Anemone	None	None
089	C	None	Anemone, Hermit Crab	None	None
090	A	None	Gastropod	None	None
090	B	None	None	None	None
090	D	None	Anemone	None	None
091	A	None	None	None	None
091	B	None	Sand Dollars	None	None
091	C	None	Moon Snail, Sand Dollars, Sea Scallop	None	None
092	A	None	Hermit Crab	None	None
092	C	None	None	None	None
092	D	None	Anemone, Gastropods	None	None
093	A	None	Unknown Organism	None	None
093	C	None	None	None	None
093	D	IND	Ind	IND	IND
094	B	None	Moon Snail, Sand Dollar	None	None
094	C	None	Hermit Crab	None	None
094	D	None	None	None	None
095	A	None	Mussels	None	None
095	B	None	Mussels	None	None
095	C	None	Hermit Crabs, Mussels	None	None
096	A	None	Mussels	None	None
096	B	None	None	None	None
096	D	None	Mussels	None	None
097	A	None	None	None	None
097	B	None	None	None	None
097	C	IND	Ind	IND	IND
098	A	None	Hermit Crabs, Sand Dollars	None	None
098	B	None	Sand Dollars	None	None

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StationID	Replicate	Infauna	Epifauna	Flora	Fish Type
098	C	None	Anemones, Hermit Crabs, Sand Dollars	None	None
099	A	None	Hermit Crabs, Sponges	None	None
099	B	None	Gastropods	None	None
099	C	None	Gastropods, Hermit Crabs, Sand Dollars	None	None
100	A	None	None	None	None
100	B	None	Gastropod	None	None
100	C	None	None	None	None
101	A	None	Anemone, Hermit Crabs, Sand Dollars	None	None
101	B	None	Gastropod, Sand Dollars	None	None
101	C	None	Hermit Crab, Sand Dollars	None	None
102	A	None	Hermit Crabs, Sand Dollars	None	None
102	B	None	Hermit Crabs, Sand Dollars	None	None
102	C	IND	Sand Dollars	IND	IND
103	A	None	Hermit Crabs, Sand Dollars	None	None
103	B	None	Hermit Crabs, Sand Dollars	None	None
103	C	None	Hermit Crabs, Sand Dollars	None	None
104	A	None	Anemones, Hermit Crabs, Sand Dollars	None	None
104	B	None	Sand Dollar	None	None
104	C	None	Anemone, Hermit Crab, Sand Dollars	None	None
105	A	None	Hermit Crabs	None	None
105	B	None	Hermit Crabs	None	None
105	C	None	Hermit Crabs	None	None
106	A	None	None	None	None
106	B	None	None	None	None

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StationID	Replicate	Infauna	Epifauna	Flora	Fish Type
106	C	None	None	None	None
107	A	None	Mussels	None	None
107	B	None	Mussels	None	None
107	C	None	Mussels	None	None
108	A	None	Hydroids, Spider Crabs, Sea Urchin	None	None
108	B	None	Hydroids, Spider Crab, Sea Urchins	None	None
108	F	None	Hydroids, Sea Urchins	None	None
109	A	None	Hydroids, Mussels	None	None
109	C	IND	Mussels	IND	IND
109	D	IND	Mussels	IND	IND
110	B	None	Hydroids	None	None
110	C	None	Hydroids	None	None
110	D	None	Hydroids	None	None
111	A	None	None	None	None
111	B	None	None	None	None
111	C	None	Hermit Crabs, Hydroids	None	None
112	A	IND	Ind	IND	IND
112	B	IND	Ind	IND	IND
112	C	IND	Ind	IND	IND
113	A	IND	Ind	IND	IND
113	B	IND	Ind	IND	IND
113	C	IND	Ind	IND	IND
116	A	None	None	None	None
116	B	None	Hermit Crabs	None	None
116	D	None	None	None	None
117	A	None	Gastropods, Sand Dollars	None	None
117	C	None	Gastropods, Hermit Crabs, Sand Dollars	None	None
117	D	None	Sand Dollars	None	None
118	A	None	Hermit Crabs	None	None
118	B	None	Hermit Crabs	None	None
118	C	None	None	None	None
119	A	None	Hermit Crab	None	None
119	B	None	Hermit Crabs	None	None
119	C	None	Hermit Crabs	None	None
120	A	None	None	None	None

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StationID	Replicate	Infauna	Epifauna	Flora	Fish Type
120	B	None	Hermit Crab	None	None
120	C	None	None	None	None
122	A	None	Hermit Crab	None	None
122	B	None	Hermit Crabs	None	None
122	C	None	Hermit Crabs	None	None
123	A	None	Hermit Crab	None	None
123	B	None	Hermit Crabs	None	None
123	C	None	None	None	None
124	A	None	Gastropods, Hermit Crabs	None	None
124	B	None	Gastropods, Hermit Crabs	None	None
124	C	None	Hermit Crab	None	None
125	A	None	Hermit Crab	None	None
125	B	None	Hermit Crab	None	None
125	C	None	Sand Dollar	None	None
126	A	None	None	None	None
126	C	None	Hermit Crabs	None	None
126	D	None	None	None	None
127	A	None	Hermit Crabs	None	None
127	B	None	Gastropod	None	None
127	C	None	None	None	None
128	A	None	Gastropod, Hermit Crabs	None	None
128	B	None	Hermit Crab	None	None
130	A	None	None	None	None
130	B	None	None	None	None
130	C	None	None	None	None
131	A	None	Gastropods	None	None
131	B	None	Gastropods	None	Sea Robin
131	C	None	None	None	None
132	A	None	Barnacles	None	None
132	B	None	None	None	None
132	C	None	None	None	Sea Robin

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StationID	Replicate	Infauna	Epifauna	Flora	Fish Type
133	A	None	Anemones, Barnacles, Hermit Crabs, Sand Dollars	None	None
133	B	None	Hermit Crabs, Sand Dollars	None	None
133	C	None	Gastropods, Hermit Crabs, Sand Dollars	None	None
134	A	None	Anemone, Hermit Crabs	None	None
134	B	IND	Ind	IND	IND
134	D	None	Hermit Crabs	None	None
135	F	None	Hermit Crab, Sand Dollars	None	None
135	G	None	Hermit Crab, Sand Dollars	None	None
135	H	None	Gastropods	None	None
136	E	None	Anemones, Hermit Crabs	None	None
136	F	None	Anemones, Hermit Crabs	None	None
136	H	None	Anemones, Hermit Crab	None	None
137	E	None	Anemones, Hermit Crabs, Sand Dollars	None	None
137	G	None	Sand Dollars	None	None
137	H	None	Gastropod, Hermit Crab, Sand Dollars	None	None
138	E	None	Sand Dollars	None	None
138	F	None	Sand Dollars	None	None
138	G	None	Sand Dollars	None	None
139	E	None	Anemones, Sand Dollars	None	None
139	F	None	Gastropod, Sand Dollars	None	None
139	G	None	Gastropods, Hermit Crabs, Sand Dollars	None	None
140	E	None	Anemone, Sand Dollars	None	None
140	F	None	Sand Dollars	None	None
140	H	None	Hermit Crab, Sand Dollars	None	None
141	B	None	Sand Dollars	None	None
142	A	None	Sand Dollars	None	None
142	B	None	Gastropods, Sand Dollars, Sea Stars	None	None
142	C	None	Sand Dollars	None	None
143	A	None	Gastropod, Hermit Crab, Sand Dollars	None	None
143	C	None	Gastropods, Sand Dollars	None	None

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StationID	Replicate	Infauna	Epifauna	Flora	Fish Type
143	D	None	Anemones, Sand Dollars	None	None
144	A	None	Gastropods, Sand Dollars	None	None
144	B	None	Sand Dollars	None	None
144	C	None	Gastropods, Sand Dollars	None	None
145	A	None	Gastropods, Hermit Crab, Sand Dollars	None	None
145	C	None	Gastropods, Sand Dollars	None	Skate
146	A	None	Sand Dollars	None	None
146	B	None	Sand Dollars	None	None
146	C	None	Gastropods, Sand Dollars	None	None
147	A	None	Gastropods, Sand Dollars	None	None
147	B	None	Gastropods, Sand Dollars	None	None
147	C	None	Gastropods, Sand Dollars	None	None
148	A	None	Gastropods, Sand Dollars	None	None
148	B	None	Gastropods, Sand Dollars	None	None
148	C	None	Gastropods, Sand Dollars	None	None
149	A	None	Gastropods, Hermit Crab, Sand Dollars	None	None
149	D	None	Gastropods, Sand Dollars	None	None
150	A	None	Gastropods, Sand Dollars	None	None
150	B	None	Gastropods, Sand Dollars	None	None
150	C	None	Gastropods, Sand Dollars	None	None
151	A	None	Sand Dollars	None	None
151	B	None	Gastropods, Sand Dollars	None	None
151	D	None	Gastropods, Sand Dollars	None	None
152	A	None	Gastropods, Hermit Crab, Sand Dollars	None	None
152	B	None	Gastropods, Sand Dollars	None	None
152	D	None	Gastropods, Sand Dollars	None	None
153	A	None	Sand Dollars	None	None
153	B	None	Sand Dollars	None	None
153	C	None	Gastropods, Sand Dollars	None	None
154	A	None	Sand Dollars	None	None
154	B	None	Hermit Crabs, Sand Dollars	None	None

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StationID	Replicate	Infauna	Epifauna	Flora	Fish Type
154	C	None	Sand Dollars	None	None
155	A	None	Hermit Crabs, Sand Dollars	None	None
155	B	None	Hermit Crabs, Sand Dollars	None	None
155	D	None	Hermit Crabs, Sand Dollars	None	None
156	A	None	Gastropods, Sand Dollars	None	None
156	B	None	Gastropods, Sand Dollars, Unknown Organism	None	None
156	D	None	Gastropods, Sand Dollars	None	None
157	A	None	Gastropods, Sand Dollars	None	None
157	B	None	Sand Dollars	None	None
157	C	None	Anemone, Gastropods, Sand Dollars	None	None
REFA_01	A	None	Anemones	None	Sea Robin
REFA_01	B	None	Anemones	None	None
REFA_01	C	None	Anemones	None	None
REFA_02	A	None	Anemones	None	None
REFA_02	B	None	Anemones	None	None
REFA_02	D	None	None	None	None
REFA_03	A	None	Anemones, Hermit Crabs	None	None
REFA_03	B	None	Anemones, Hermit Crabs	None	None
REFA_03	D	None	Anemones, Hermit Crabs	None	None
REFA_04	A	None	Anemones, Hermit Crabs	None	None
REFA_04	C	None	Anemones, Hermit Crabs	None	None
REFA_04	D	None	Anemones, Hermit Crabs	None	None
REFA_05	A	None	Anemones, Hermit Crabs	None	Skate
REFA_05	B	None	Anemones, Hermit Crabs	None	None
REFA_05	C	None	Anemones, Hermit Crabs	None	Flounder
REFB_01	E	None	Gastropods, Hermit Crabs, Sand Dollars	None	None
REFB_01	F	None	Gastropods, Hermit Crabs, Sand Dollars	None	None

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REFB_01	G	None	Gastropods, Hermit Crabs, Sand Dollars	None	None
REFB_02	H	None	Gastropods, Hermit Crabs, Sand Dollar	None	None
REFB_02	I	None	Gastropods, Hermit Crabs, Sand Dollars	None	None
REFB_02	J	None	Gastropod, Hermit Crabs, Sand Dollars	None	Flounder
REFB_03	E	None	Gastropods, Hermit Crabs, Sand Dollars	None	None
REFB_03	F	None	Gastropods, Hermit Crabs, Sand Dollars	None	None
REFB_03	G	None	Gastropods, Hermit Crabs, Sand Dollars	None	None
REFB_04	F	None	Hermit Crabs, Sand Dollars	None	None
REFB_04	G	None	Hermit Crabs, Sand Dollars	None	None
REFB_04	H	None	Gastropods, Hermit Crab, Sand Dollars	None	None
REFB_05	E	None	Hermit Crab, Sand Dollars	None	None
REFB_05	F	None	Hermit Crab, Sand Dollars	None	None
REFB_05	H	None	Hermit Crabs, Sand Dollars	None	None
REFC_01	A	None	None	None	None
REFC_01	B	None	Shrimp	None	None
REFC_01	D	IND	Ind	IND	IND
REFC_02	A	None	None	None	None
REFC_02	B	None	Shrimp	None	None
REFC_02	C	None	None	None	None
REFC_03	A	None	Sea Stars	None	None
REFC_03	B	None	None	None	None
REFC_03	D	None	Sea Star	None	None
REFC_04	A	None	Shrimp	None	None
REFC_04	B	None	Sea Star, Shrimp	None	None
REFC_04	D	None	Sea Stars	None	None
REFC_05	A	None	Clam, Gastropod, Sea Star, Shrimp	None	None
REFC_05	B	None	Shrimp	None	None
REFC_05	C	None	Sea Star	None	None

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StationID	Replicate	Comments
001	A	Sand with surficial small pebbles, Stage 2 tubes, shell hash, and a crab
001	B	Sand with surficial small pebbles, Stage 2 tubes, and shell hash.
001	C	Sand with surficial small pebbles, Stage 2 tubes, shell hash, and a crab in upper left corner
002	A	Sand with surficial small pebbles and dense shell hash coverage. A sea robin and two anemones at sediment surface
002	B	Sand with very small pebbles and shell hash at surface.
002	C	Sand with very small pebbles and shell hash at surface.
003	A	Sand with an anemone in upper right, a few tubes, and multiple gastropod tracks in image
003	B	Turbid water column shot.
003	C	Turbid water column shot.
004	A	Sand with a couple of sand dollars and an anemone at sediment surface. Tubes and gastropod tracks visible
004	B	Sand with a slightly turbid water column. Tubes and sand dollars visible at sediment surface
004	C	Sand with shell hash, a couple of sand dollars, and an anemone at sediment surface. Tubes and gastropod tracks visible
005	A	Sand with very fine pebbles, shell hash, and a couple of sand dollars at sediment surface
005	B	Very fine pebbles to very coarse sand and intermixed shell hash at sediment surface. A sea robin present
005	C	Sand with a high amount of very fine pebbles and intermixed shell hash. A very small scallop visible in upper right quadrant of image.
006	A	Sand and very coarse sand with some very fine pebbles and shell hash also present
006	B	Sand and very coarse sand with some very fine pebbles and shell hash also present
006	C	Sand and very coarse sand with some very fine pebbles and shell hash also present. A very small gastropod shell in upper right quadrant of image.
007	A	Sand with intermixed shell hash. Many sand dollars and gastropod tracks at sediment surface. A few visible tubes and burrows
007	B	Sand with high turbidity in water column. Visible portion of sediment surface contains tubes and many sand dollars
007	C	Sand with many sand dollars and shell hash at surface. A small gastropod (upper left center with proboscis extended) and a very small hermit crab visible (lower left center).
008	B	Sand, coarse sand, and very fine pebbles with shell hash, a few very fine pebbles, and multiple sand dollars at the sediment surface.
008	C	Sand with very fine pebbles, shell hash, a sand dollar, and a gastropod (upper left corner) at sediment surface
008	D	Sand with very fine pebbles, shell hash, and many sand dollars at sediment surface. A burrow present in center of image
009	A	Dense fine pebbles and sand with intermixed shell hash. An anemone in upper center of image
009	B	Dense fine pebbles and sand with intermixed shell hash. An anemone in right of image
009	C	Dense fine pebbles and sand with intermixed shell hash. A pair of anemones in left center and left bottom of image
010	B	Sand with dense tubes, some shell hash, and a sponge. A small hermit crab on sponge, a pair of scallops in upper left and lower left of image. A crab just visible in left bottom.
010	C	Sand with dense tubes, scattered shell hash, and some very fine pebbles at sediment surface. A possible large sponge in upper right of image.
010	D	Sand with dense tubes, some shell hash and very fine pebbles. A scallop on sediment surface. A few small burrows with associated reduced sediment.
011	A	Sand with dense tubes and a few large burrows at sediment surface
011	B	Sand with dense tubes, some tracks, and a few large burrows at sediment surface
011	C	Sand with dense tubes, some tracks, and a few large burrows at sediment surface. An anemone present in dead center of image
012	A	Sand with dense tubes, a few reduced mounds from burrowing, and a crab at sediment surface
012	B	Sand with dense tubes. Turbidity obscures bottom half of image
012	C	Sand with dense tubes and a few reduced mounds from burrowing
013	A	Sand with some rippling evident. Shell hash has gathered in trough between waveforms. Many small tubes at surface

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StationID	Replicate	Comments
013	B	Sand with some rippling evident. Shell hash has gathered in trough between waveforms. Many small tubes at surface
013	C	Sand with apparent rippling as evidenced by shell hash collected in troughs. A crab in lower right quadrant, a gastropod in lower left, and an urchin in upper left.
014	A	Sand with dense tubes and shell hash within very minor ripples
014	B	Sand with dense tubes and shell hash within very minor ripples
014	D	Sand with dense tubes and some shell hash that seems scattered rather than organized in troughs
015	A	Sand with a high density of tubes. A large burrow and associated reduced mound. A couple of gastropods in upper left corner
015	B	Sand with a high density of tubes. Artefact track straight through image. A gastropod in upper left quadrant on tubes. A few burrows with associated reduced sediment.
015	C	Sand with at least 3 gastropods in upper left quadrant, high density of tubes, and a crab in lower right quadrant. A few mounds/burrows and gastropod tracks at sediment surface.
016	A	Sand with a large number of tubes and sand dollars at sediment surface. A few very small burrows
016	B	Sand with a large number of tubes and sand dollars at sediment surface. A few very small burrows
016	C	Sand with a large number of tubes and sand dollars at sediment surface. A few very small burrows
017	A	Sand with many tubes and sand dollars at sediment surface.
017	B	Sand with small tubes and sand dollars at sediment surface. A sea star surrounded by hermit crabs near center of image
017	D	Sand with tubes and sand dollars at sediment surface. A few gastropods and hermit crabs present. A few burrows with associated reduced mounds.
018	A	Sand with greenish hue visible in majority of coverage. Fine shell hash, a crab, a sea star, and some tubes present
018	B	Sand with very small wave height ripples. Fine shell hash throughout. Many small tubes. A partially buried sand dollar and many very small gastropods at sediment surface.
018	C	Sand with greenish hue visible in majority of coverage. Fine shell hash, multiple sand dollars, some burrowing and associated reduced sediments present.
019	A	Sand with greenish hue visible in majority of coverage. Many small tubes and burrows at surface. A burrow with associated reduced sediment at top of image.
019	B	Sand with greenish hue visible in majority of coverage. Many small tubes and burrows at surface. Burrows with associated reduced sediment in image.
019	C	Sand with many small tubes at sediment surface.
020	A	Sand with many tubes and sand dollars at sediment surface. A hermit crab and associated track in upper right corner of image
020	B	Sand with many tubes and sand dollars at sediment surface. A couple of burrows with associated reduced sediment mounds
020	C	Sand with tubes and many sand dollars at sediment surface. A couple of very small gastropods in upper center of image. A skate egg casing in lower right of image. Burrows with associated reduced sediment mounds present.
021	A	Sand with rippling at surface. Sand dollars on peaks of waveforms and shell hash in troughs. A hermit crab in upper left of image
021	B	Sand with rippling at surface. Sand dollars and hermit crabs prevalent across image. Shell hash in troughs of waveforms
021	D	Sand with rippling at surface. Sand dollars and hermit crabs prevalent across image. Shell hash in troughs of waveforms
022	A	Sand with many small tubes and a group of sand dollars at sediment surface. Burrows and some associated reduced sediment mounds present. A few small gastropods present.
022	B	Sand with sand dollars, a hermit crab in the center of image, and a pair of small gastropods in upper center of image. A burrow with associated reduced sediment mound.
022	C	Sand with sand dollars, small tubes, and many burrows at sediment surface
023	A	Sand with rippling that is not in a waveform distribution. Shell hash in troughs. A few sand dollars present and a gastropod near top center of image.
023	B	Sand with rippling that is not in a waveform distribution. Shell hash in troughs. Many gastropods present
023	D	Sand with rippling that is not in a waveform distribution. Shell hash in troughs. Many gastropods and a sand dollar present

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StationID	Replicate	Comments
024	A	Sand with very fine shell hash throughout image. Many sand dollars, tubes, and small gastropods present at surface. Possible ocean quahog in lower portion of image.
024	B	Sand with high turbidity in water column. Visible portion of sediment surface contains tubes, fine shell hash, and many sand dollars.
024	C	Sand with very fine shell hash throughout image. Many sand dollars, tubes, and a small gastropod present
025	A	Sand with shell hash and sand dollars across entire image.
025	B	Sand with high turbidity in the water column. Shell hash and sand dollars visible
025	D	Sand with high turbidity in the water column. Shell hash and sand dollars visible
026	H	Sand with many sand dollars and small tubes present. Tracks and a few burrows present
026	J	Sand with many sand dollars and small tubes present. A few burrows with associated reduced sediment at surface
026	K	Sand with many sand dollars and small tubes present. A few burrows with associated reduced sediment at surface
027	A	Sand with sand dollars at sediment surface and buried across most of image. Tubes, tracks, and burrows with reduced sediment also present.
027	B	Sand with sand dollars at sediment surface and buried across most of image. Tubes, tracks, and a hermit crab in upper left of image present.
027	C	Sand with some minor turbidity in upper portion of image. Many sand dollars, a hermit crab, and an anemone at sediment surface.
028	A	Sand with many sand dollars, tubes, and burrows present. A hermit crab in lower right of image
028	B	Sand with many sand dollars, tubes, and burrows present among fine shell hash
028	C	Sand with many sand dollars, tubes, and burrows present among fine shell hash
029	A	Sand with many sand dollars and tubes at sediment surface among fine shell hash
029	B	Sand with many sand dollars and tubes at sediment surface among fine shell hash
029	C	Sand with many tubes at sediment surface among fine shell hash. Sand dollars present in large numbers as well
030	A	Sand with unevenly distributed ripples. Fine shell hash has gathered in troughs. Sand dollars appear on peaks
030	C	Sand with a few unevenly distributed ripples. Fine shell hash and sand dollars at sediment surface. A few small burrows, some with reduced sediment associated. Possible hermit crab in upper center of image.
030	D	Sand with many sand dollars and very small gastropods at sediment surface. Possible ocean quahog in upper center of image. Small tubes also present.
031	A	Sand with unevenly distributed ripples with fine shell hash collected in the troughs. Dense sand dollars in image. A hermit crab on a sand dollar in upper left of image.
031	B	Sand with unevenly distributed ripples with fine shell hash collected in the troughs. Sand dollars throughout image. A skate egg casing visible beneath a sand dollar in upper center of image.
031	C	Sand with some turbidity in center of image and fine shell hash at surface. Sand dollars throughout image. A skate egg casing visible in upper right of image.
032	A	Sand with fine shell hash and dense sand dollars present. A skate egg casing in center of image
032	B	Turbid water column with fine shell hash and sand dollars visible on soft bottom
032	D	Sand with fine shell hash and dense sand dollars present. A skate present at sediment surface in center left of image
033	A	Sand with dense sand dollars at surface. A mostly buried large skate in the right of image. Fine shell hash at surface
033	B	Sand with many sand dollars at sediment surface. Fine shell hash present at surface. A skate swimming out of frame. Some possible reduced sediment clasts at surface near where skate is imaged.
033	C	Sand with dense sand dollars at surface. Fine shell hash and a few very small gastropods also at surface
034	A	Sand with very dense sand dollars at sediment surface. Burrows with associated reduced sediment mounds present. Fine shell hash at surface.
034	B	Sand with a dense covering of fine shell hash and many sand dollars at surface. Tubes also visible

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StationID	Replicate	Comments
034	C	Sand with fine shell hash and very dense sand dollars at surface. An ocean quahog in upper central of image
035	A	Sand with dense coverage of fine shell hash and sand dollars. A few mounds related to burrowing present
035	B	Sand with dense coverage of fine shell hash and sand dollars. A few mounds related to burrowing present
035	C	Sand with many sand dollars and a large number of very small gastropods scattered across entire image.
036	A	Sand with ripples containing shell hash within their troughs. A crab in upper right of image. Sand dollars at sediment surface throughout.
036	B	Sand with ripples containing shell hash within their troughs. Sand dollars at sediment surface throughout. Multiple small gastropods at sediment surface. Trigger weight imaged at bottom center.
036	C	Sand with shell hash and sand dollars across entire image. A skate egg casing in bottom left of image
037	A	Very fine pebbles to very coarse sand overlaying finer sands. Some tubes visible. Two anemones present in lower center of image.
037	C	Turbid water shot. Some larger shell fragments visible through turbidity
037	D	Very fine pebbles to very coarse sand overlaying finer sands. Anemones present across center of image. A hermit crab present in left center of image. A skate egg casing in lower portion of image. Small burrows present in upper left of image.
038	A	Sand with fine shell hash and dense sand dollars at SWI. Some tracks and tubes present at sediment surface
038	B	Turbid water shows a sandy bottom with shell hash, dense sand dollars, and a pair of large sea stars.
038	C	Sand with fine shell hash and dense sand dollars at SWI. Some tracks and tubes present at sediment surface
039	A	Sand with rippling at surface. Fine shell hash gathered in troughs. Sand dollars and tubes across entire image
039	B	Sand with fine shell hash at surface. Sand dollars and tubes across entire image. A small gastropod in lower right of image
039	C	Sand with rippling at surface. Fine shell hash gathered in troughs. Sand dollars and tubes across entire image. Left side of image partially obscured by turbidity
040	A	Sand with scattered shell hash, many small tubes, and a few sand dollars at sediment surface. A burrow with reduced sediment at top of image.
040	B	Sand with scattered shell hash, many small tubes, and a few sand dollars at sediment surface
040	C	Sand with scattered shell hash, many small tubes, and a few sand dollars at sediment surface. Water column turbidity does not obscure most variables.
041	A	Sand with many sand dollars and small tubes at sediment surface
041	B	Sand with many sand dollars and small tubes at sediment surface
041	C	Sand with many sand dollars and small tubes at sediment surface. Minor turbidity in water column
042	A	Sand with many pock-marked burrows. A few tubes, at least 3 anemones visible. A few sand dollars and very small gastropods and their associated tracks at surface.
042	B	Sand with some shell hash at surface. A few sand dollars and very small gastropods and their associated tracks at surface.
042	C	Sand with pock-marked burrows. A few tubes. At least six anemones visible. Small gastropods and their tracks at surface
043	A	Sand with shell hash and tubes at surface. A track running diagonally through image. A few sand dollars partially buried in sediment and a few burrows visible.
043	B	Sand with shell hash and tubes at surface. A few sand dollars partially buried in sediment and a few burrows visible
043	C	Sand with shell hash and tubes at surface. A few sand dollars partially buried in sediment and a few burrows visible. A small gastropod in upper left of image.
044	A	Sand with shell hash at surface. Tubes, anemones, sand dollars, and a few small hermit crabs in image
044	B	Sand with right side of image affected by turbidity in water column. Shell hash and a few sand dollars in visible portion of image
044	C	Sand with partially buried sand dollars, shell hash, multiple hermit crabs, and an anemone at surface. A crab partially under a sand dollar husk.
045	A	Sand with fine shell hash. A few tubes, sand dollars, and a hermit crab at surface
045	B	Sand with fine shell hash. A few tubes and sand dollars at surface. Artefact of previous camera drop in frame

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StationID	Replicate	Comments
045	C	Sand with very short period rippling at surface and some turbidity in water column. Fine shell hash and a few partially buried sand dollars at surface.
046	A	Sand with fine and very fine pebbles at sediment surface. Attached hydroids present in center of image
046	B	Sand with fine and very fine pebbles at sediment surface. Larger pebble partially in frame in upper portion of image
046	D	High water column turbidity has obscured view of sediment surface
047	A	Sand with dense sand dollar coverage. Tubes and a very small patch of hydroids in the center of image. A partially buried skate egg casing in center left of image.
047	D	Sand with tubes and dense coverage of sand dollars at sediment surface. An anemone in upper right of image
047	E	Sand with tubes and dense coverage of sand dollars at sediment surface. An anemone in lower left of image
048	A	Sand with fine shell hash, a few sand dollars, tubes, and a gastropod at sediment surface
048	B	Sand with fine shell hash, a few sand dollars, and tubes at the sediment surface
048	C	Sand with fine shell hash, a few sand dollars, and tubes at the sediment surface.
049	A	Sand with many tubes at sediment surface. A few small burrows, a hermit crab, and a pair of anemones also present
049	B	Sand with many tubes and small burrows. A pair of hermit crabs and an anemone at sediment surface
049	D	Sand with many tubes at sediment surface. A few small burrows and three anemones also present
050	A	Large cobbles with sand and shell hash coverage. Cobble structures full of attached fauna including hydroids, sponges, and non-reef building hard corals.
050	B	Large cobbles with sand and shell hash coverage. Cobble structures full of attached fauna including hydroids, sponges, and non-reef building hard corals.
050	C	Large cobbles with sand and shell hash coverage. Cobble structures full of attached fauna including hydroids, sponges, and non-reef building hard corals. Area between cobbles full of small tubes.
051	A	Very fine and fine pebbles covering majority of sediment surface. No visible fauna
051	B	Very fine and fine pebbles covering majority of sediment surface. No visible fauna
051	C	Very fine and fine pebbles covering majority of sediment surface. No visible fauna
052	B	Sand with many small tubes, small burrows, sand dollars, and hermit crabs present
052	C	Sand with many small tubes, small burrows and sand dollars present. Minor turbidity in water column
052	D	Sand with many sand dollars and tubes present. A few hermit crabs and a small gastropod also visible. Imprint of camera frame from a previous drop in majority of image.
053	A	Sand with fine shell hash throughout. Many burrows and associated reduced sediments. Tubes, sand dollars, and a hermit crab all present.
053	B	Sand with fine shell hash throughout. Sand dollars and hermit crabs scattered across entire image. Small tubes and burrows with reduced sediment also present.
053	D	Sand with fine shell hash throughout. Sand dollars, hermit crabs, and a gastropod present at sediment surface. Tubes and burrows scattered throughout.
054	A	Sand with coarse sand and very fine pebbles at sediment surface. A couple of hermit crabs and a sand dollar also present
054	B	Sand with coarse sand and very fine pebbles at sediment surface. A couple of hermit crabs and tubes also present
054	C	Sand and coarse sand with a pair of hermit crabs at sediment surface
055	A	Sand with fine shell hash intermixed. A sand dollar and hermit crab in upper left of image. Tubes prevalent in upper portion of image.
055	B	Sand with fine shell hash intermixed. Tubes present in right portion of image and a hermit crab in upper left
055	C	Sand with some evidence of sediment transport at surface. A few tubes in image. A pair of gastropods in center of image
056	A	Sand with patches of reduced sediment at surface. Many small tubes and tracks at sediment surface. Upper left of image contains hermit crabs and a small gastropod.
056	B	Sand with turbidity obscuring left half of image. Many tubes present at visible portion of sediment

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StationID	Replicate	Comments
056	C	Sand with turbidity obscuring left portion of image. Many tubes and small tracks present at visible portion of sediment
057	A	Sand with large burrows and associated reduced sediment. Small tubes throughout image. A gastropod and associated track in the upper left of image. A hermit crab in upper right.
057	B	Sand with many small tubes throughout image. Multiple hermit crabs, a small gastropod, and a sea scallop on sediment surface
057	C	Sand with some turbidity across entire image. Tubes and burrows visible through turbidity
058	A	Sand with many small tubes throughout image. Multiple hermit crabs and sand dollars at sediment surface
058	B	Major turbidity obscured entire bottom. Pink color of sand dollars only thing visible through turbidity
058	D	Sand with small tubes present throughout. A few sand dollars and a sea scallop at sediment surface
059	A	Sand with small tubes and small burrows throughout. A couple of larger burrows with reduced sediment also present. Many gastropods and a couple of anemones in lower half of image.
060	A	Sand with many anemones. Clam shell hash prevalent in image. A gastropod with associated trail in bottom of image.
060	B	Sand with turbidity affecting visibility of half of the image. Visible portion of sediment contains multiple anemones and a few large burrows.
060	C	Sand with numerous anemones. A few gastropods and their associated tracks as well as a hermit crab present. Small tubes and burrows present.
061	A	Sand with a few anemones and a small gastropod present. Many larger burrows with reduced sediment associated and small tubes throughout image.
061	C	Sand with some large burrows. Small tubes throughout image.
061	D	Sand with some large burrows and small tubes throughout image. Minor turbidity in water column
062	A	Sand with burrows and small tubes throughout image. A few anemones in the center of the image
062	B	High water column turbidity has obscured view of sediment surface
062	D	Sand with many burrows, multiple anemones, and small tubes throughout image.
063	A	Sand with many sand dollars, tracks, and small tubes. An anemone also present at sediment surface
063	B	Sand with some sand dollars and an anemone. A small gastropod with associated track also present
063	D	Sand with sand dollars and gastropods creating tracks. An anemone and some tubes also at sediment surface
064	A	Sand with a large number of sand dollars. A gastropod, hermit crab, and anemone amongst the sand dollars
064	B	Sand with a large number of sand dollars and a few tubes intermixed
064	C	Sand with a large number of sand dollars and a few tubes intermixed. A pair of hermit crabs present
065	A	Sand with multiple anemones and sand dollars at sediment surface. A few gastropods and their associated tracks also present. Small tubes scattered across surface.
065	B	Sand with a few large burrows and associated reduced sediment mounds. An anemone, small gastropods, a hermit crab, and a few sand dollars present.
065	C	Sand with high amount of turbidity. Only a few large tracks visible through turbidity
066	A	Sand with fine shell hash scattered throughout. Many tubes and sand dollars at sediment surface. A few small burrows also visible.
066	B	Sand with fine shell hash scattered throughout. Many tubes and sand dollars at sediment surface. A few small burrows also visible.
066	C	Sand with fine shell hash across sediment surface. Many sand dollars and tubes present. A hermit crab in both the upper left and upper right quadrants of image.
067	A	Sand with some shell hash at surface. Many sand dollars and some tubes in image
067	B	Sand with some shell hash at surface. Many sand dollars and some tubes in image
067	D	Some turbidity in water column. Visible sediment shows many sand dollars and scattered shell hash
068	A	Medium and fine pebbles overlaying sand. Coarse material with no visible fauna. A skate egg casing in center of image laying on top of a mussel.

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068	B	Fine and very fine pebbles with a few medium pebbles overlaying sand. Small tubes visible in sandy spots in image. A cluster of mussels in upper center of image. Burrowing sand dollar in lower right of image. A couple hermit crabs scattered amongst the gravel.
068	C	Fine and very fine pebbles overlaying sand. Attached mussels in upper left of image. Some large shell hash scattered amongst pebbles.
069	A	Sand with very fine pebbles scattered about. Some burrows and associated reduced sediments present. A small gastropod in center of image.
069	B	Sand with very fine pebbles scattered about. Tubes scattered throughout. Hermit crabs and small gastropods on sediment surface.
069	C	Sand with very fine pebbles gathered in the troughs of some surficial waveforms. A small gastropod in center of image, burrowed sand dollars in upper left of image.
070	A	Sand with clusters of tubes, multiple anemones, and small gastropod tracks across sediment surface. A hermit crab central
070	B	Water column turbidity obscures many variables. Visible through turbidity is an anemone at top of image and a few tube clusters scattered about.
070	C	Sand with multiple anemones across center of image. Many tubes at sediment surface
071	A	Sand with many sand dollars and tubes scattered across surface. A very small gastropod in center of image
071	B	Sand with many sand dollars and tubes scattered across surface. A gastropod in center right of image
071	C	Sand with very small, uneven rippling evident of minor hydrodynamic forcing at sediment surface. Scattered sand dollars and a few tubes also present.
072	A	Sand with many different types of tracks running through image. A few tubes present, a large burrow and associated mound in upper right of image, a hermit crab in left of image, and a few sand dollars at top of image.
072	C	Sand with very small, uneven rippling evident of minor hydrodynamic forcing at sediment surface. Scattered tubes and a few sand dollars at surface.
072	D	Sand with multiple gastropods and their associated tracks. A small hermit crab near a sand dollar. Many small tubes across imaged surface.
073	A	Sand with dense patches of tube clusters. Area of reduced sediment diagonally through image. The tail of a fish in frame in lower left of image. Numerous gastropods throughout image.
073	B	Sand with dense coverage of tube clusters. Multiple gastropods and hermit crabs at sediment surface. Small sand dollars in upper right of image, some partially burrowed. A couple burrowing anemones.
073	C	Sand with dense coverage of tube clusters. Minor turbidity in the water column. Multiple gastropods and hermit crabs at sediment surface. Small sand dollars.
074	E	Sand with many tubes at sediment surface. Surface is pocked with burrows
075	A	Sand with at least 10 anemones at surface along with many tubes. A few burrows and a large trail cutting diagonally across image.
075	B	Sand with many anemones and tubes at sediment surface. A few burrows, multiple gastropods with associated tracks, and multiple hermit crabs at sediment surface.
075	D	Turbidity in water obscures left side of image. Multiple anemones, burrows, tubes, and a gastropod visible in right portion of image.
076	A	Sand with dense tubes across entire image. A pair of sand dollars also visible
076	B	Turbidity in water column affects visibility of portions of image. Visible portions contain sand with dense tubes and multiple sand dollars.
076	C	Turbidity in water column affects visibility of portions of image. Visible portions contain sand with dense tubes
077	A	Sand with many gastropod tracks running throughout. A few anemones and some burrows. Tubes scattered across entire image
077	C	High water column turbidity has obscured view of sediment surface

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077	D	Turbidity obscures bottom right of image. Visible sediment is sand with many tubes, small burrows, and gastropods
078	A	Sand with some anemones and sand dollars at sediment surface. Some tubes and tracks in image
078	B	Sand with tubes, sand dollars, and gastropods with associated tracks visible
078	C	Image captured very close to sediment surface. Tubes, gastropods and associated tracks, on sandy bottom
079	A	Sand with small tubes and burrows throughout. A few anemones and sand dollars at sediment surface.
079	C	Sand with a few scattered very fine pebbles at surface. Small tubes and burrows throughout. A few anemones and small hermit crab in lower left of image.
079	D	High water column turbidity has obscured view of sediment surface
080	A	Sand with dense shell hash. Much shell hash has been used in fortifying tube structures present throughout image
080	B	Sand with dense shell hash. Much shell hash has been used in fortifying tube structures present throughout image
080	C	Sand with dense shell hash. Much shell hash has been used in fortifying tube structures present throughout image. Multiple large tracks moving across the image.
081	A	Sand with small tubes and tracks throughout. An anemone central in image
081	B	Sand with small tubes and many tracks across imaged surface. A few small gastropods and hermit crabs at sediment surface
081	C	Sand with very short period rippling at the surface. Small tubes across imaged surface
082	A	Sand with fine shell hash throughout. Many sand dollars and a small hermit crab at sediment surface
082	B	Turbidity has obscured image surface. Multiple sand dollars visible through turbidity
082	C	Sand with many shell-fortified tubes and sand dollars at surface. An anemone and a few small gastropods also at sediment surface.
083	A	Sand with what appears to be clastic clay material at the surface. A large number of anemones present throughout image.
084	A	Sand with a dense covering of sand dollars. Multiple anemones and a couple small hermit crabs also at sediment surface
084	C	Sand with a dense covering of sand dollars. Multiple anemones and a couple small hermit crabs also at sediment surface
084	D	Sand with very short period ripples at surface. Many sand dollars and a few scattered hermit crabs present
085	A	Sand with a few sand dollar and a hermit crab at sediment surface. Unknown object/fauna in upper right of image
085	B	Turbid water with a large, shell-fortified tube and a pair of sand dollars visible through turbidity
085	C	Sand with a few large, shell-fortified tubes at surface. A grouping of small hermit crabs in the center of image.
086	A	Sand with many large, shell-fortified tubes at surface. Small burrows also present. A few small hermit crabs scattered across imaged surface.
086	B	Sand with many large, shell-fortified tubes at surface. Small burrows also present. A few small hermit crabs scattered across imaged surface.
086	C	Turbid conditions allow for only a portion of sediment surface to be visible. Visible sediment contains large, shell-fortified tubes, a hermit crab, and a few sand dollars.
087	A	Ripples apparent at sediment surface. Shell hash present within troughs of ripples. Large and small tubes present
087	B	Ripples at sandy surface. Shell hash within the troughs of ripples. Many small tubes present. A hermit crab and sand dollar in the trough of ripple in far left of image.
087	C	Ripples at sandy surface. Shell hash within the troughs of ripples. Many small tubes present. A hermit crab, a small gastropod, and a sand dollar at sediment surface.
088	A	Minor water column turbidity makes some variables difficult to determine. Ripples at sandy surface with shell hash in the troughs.
088	B	High water column turbidity has obscured view of sediment surface
088	C	Minor water column turbidity makes some variables difficult to determine. Ripples at sandy surface with shell hash in the troughs.
089	A	Sand with many small tubes and very small burrows across entire imaged surface. A few larger burrows with associated reduced sediment. A hermit crab in upper left corner of image.

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089	B	Sand with many small tubes and burrows, some larger burrows with associated reduced sediment, at sediment surface. An anemone in the center of image.
089	C	Sand with many small tubes and very small burrows across entire imaged surface. A few larger burrows with associated reduced sediment. A hermit crab in upper right corner of image and an anemone in the upper left.
090	A	Sand with fine shell hash at surface. Dense coverage of shell-fortified tubes. Small burrows, some with reduced sediment associated. A gastropod in top center of image.
090	B	Sand with fine shell hash at surface. Dense coverage of shell-fortified tubes. Small burrows, some with reduced sediment associated.
090	D	Sand with fine shell hash at surface. Dense coverage of shell-fortified tubes. Small burrows, some with reduced sediment associated. An anemone in bottom right of image.
091	A	Sand with fine shell hash at sediment surface. Large, shell-fortified tubes present
091	B	Sand with fine shell hash at sediment surface. Large, shell-fortified tubes present. A pair of sand dollars also at surface
091	C	Sand with fine shell hash at sediment surface. Large, shell-fortified tubes present. Many sand dollars also at surface. A scallop on top of a large shell in upper right of image.
092	A	Sand with short period uneven rippling. Some small tubes and burrows scattered about surface
092	C	Sand with short period uneven rippling. Some small tubes and burrows scattered about surface
092	D	Sand with minor short period uneven rippling. Some small tubes and burrows scattered about surface. An anemone in left of image and many small gastropods at surface.
093	A	Sand with ripples at surface. Shell hash that doesn't seem to be distributed only in ripple troughs. Some tubes with shell-fortification. Unknown organism/object in upper left corner.
093	C	Sand with ripples at surface. Shell hash distributed mostly in ripple troughs. Small tubes and a few small burrows present in image.
093	D	Water column turbidity obscures many variables. Visible through turbidity are ripples and shell hash at sandy surface
094	B	Sand with uneven short-period rippling at sediment surface. Small tubes, burrows, and a sand-covered sand dollar present in image.
094	C	Sand with uneven short-period rippling at sediment surface. Small tubes and burrows visible through minor water turbidity
094	D	Sand with uneven short-period rippling at sediment surface. Small tubes and burrows, some with associated reduced sediment, visible at sediment surface.
095	A	Sand with short-period ripples at surface. A grouping of mussels and many tracks and small burrows at sediment surface
095	B	Sand with ripples at surface. A grouping of mussels and many tracks and small burrows at sediment surface
095	C	Sand with short-period ripples at surface. A large grouping of mussels and smaller groupings nearby. Tracks and small burrows at sediment surface. A few hermit crabs on mussels.
096	A	Sand with very fine pebbles and very coarse sand at sediment surface. A small patch of juvenile mussels in lower right corner
096	B	Sand with very fine pebbles and very coarse sand at sediment surface.
096	D	Sand with some rippling evident. Shell hash and very fine pebbles have gathered in the ripple troughs. A small patch of mussels present in upper left of image.
097	A	Sand with uneven rippling at surface. Finer shell hash distributed within the troughs of ripples. Small tubes and burrows visible
097	B	Sand with uneven rippling at surface. Finer shell hash distributed within the troughs of ripples. Small tubes and burrows visible. A few mussels shells in upper right corner of image that do not appear to be living.
097	C	Turbidity in water has obscured many variables. Visible through turbidity is a sandy bottom with uneven rippling and shell hash
098	A	Sand with fine shell hash. Many sand dollars and their associated tracks. Uneven rippling of sediment also present. A few hermit crabs in left side of image.
098	B	Sand with fine shell hash. Many sand dollars and their associated tracks. Uneven rippling of sediment also present. Shell-fortified tubes present amongst sand dollars.

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098	C	Sand with fine shell hash. Many sand dollars and their associated tracks. Uneven rippling of sediment also present. Many anemones and sand dollars at sediment surface.
099	A	Sand with some scattered very fine pebbles and very coarse sand at surface. Possible orange sponges or just debris in bottom half of image. A large hermit crab and many shell-fortified tubes present.
099	B	Sand with some scattered very fine pebbles and very coarse sand at surface. Shell-fortified tubes and many small gastropods present in image.
099	C	Sand with a lot of shell hash and some very fine pebbles and very coarse sand. Small tubes and multiple small gastropods and hermit crabs at surface. A pair of sand dollars also imaged.
100	A	Sand with rippling at surface. Many clasts of material at sediment surface. Possibly clay. Small burrows and very small tubes at surface.
100	B	Sand with rippling at surface. Many clasts of material at sediment surface. Possibly clay. Small burrows and very small tubes at surface. A gastropod in top center of image.
100	C	Sand with rippling at surface. Many clasts of material at sediment surface. Possibly clay. Small burrows and very small tubes at surface.
101	A	Sand with rippling at surface. Shell hash gathered in ripple troughs. An anemone in lower right corner. A few hermit crabs and a pair of sand dollars also imaged.
101	B	Minor turbidity in water has obscured finer details of sediment surface. Sand with rippling at surface. Shell hash gathered in ripple troughs. A few tubes and small burrows visible. A few sand dollars and a gastropod in lower portion of image.
101	C	Sand with rippling at surface. Shell hash gathered in ripple troughs. A hermit crab in lower right of image. Many sand dollars also imaged in right side of image.
102	A	Sandy bottom with fine shell hash scattered throughout. A few shell-fortified tubes present in lower portion of image. Many sand dollars and hermit crabs in right portion of image.
102	B	Sandy bottom with fine shell hash scattered throughout. A shell-fortified tubes present. A few sand dollars and hermit crabs imaged.
102	C	Water column turbidity obscures most variables. Visible through turbidity is many sand dollars and a sandy bottom with scattered shell hash.
103	A	Sandy bottom with rippling at surface. A few burrows with associated reduced sediment. Sand dollars and a few hermit crabs present at sediment surface.
103	B	Sandy bottom with rippling at surface. Right portion of image obscured by turbidity. Sand dollars and a few hermit crabs present at visible sediment surface.
103	C	Sandy bottom with rippling at surface. A few burrows with associated reduced sediment. Sand dollars and a few hermit crabs present at sediment surface.
104	A	Sandy bottom with rippling at surface. A few anemones and hermit crabs present. Shell hash within ripple troughs.
104	B	Sandy bottom with rippling at surface. A couple of shell-fortified tubes present. Shell hash gathered in ripple troughs
104	C	Sandy bottom with rippling at surface. Shell hash gathered in ripple troughs. Many tubes present across image. An anemone in lower right corner.
105	A	Sand with rippling at surface. Many hermit crabs in upper half of image
105	B	Sand with rippling at surface. Many hermit crabs scattered across imaged sediment surface
105	C	Sand with rippling at surface. Many hermit crabs scattered across imaged sediment surface. A shell-fortified tube present in lower right corner.
106	A	Sand with rippling at surface and shell hash within ripple troughs. Water column turbidity makes finer details difficult to determine. A large, shell-fortified tube visible.
106	B	Sand with rippling at surface and shell hash within ripple troughs. Water column turbidity makes finer details difficult to determine. A few large, shell-fortified tube visible.

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106	C	Sand with rippling at surface and shell hash within ripple troughs. Water column turbidity makes finer details difficult to determine. A few large, shell-fortified tube visible.
107	A	Sand with shell hash, much being dead mussel shells. Patches of live mussels scattered about sediment
107	B	Sand with shell hash, much being dead mussel shells. Patches of live mussels scattered about sediment
107	C	Sand with shell hash. Patches of live mussels scattered about sediment
108	A	Dense shells covering nearly entire sediment surface. A few spider crabs and an urchin on shells. Many shells have attached hydroids.
108	B	Dense shells covering nearly entire sediment surface. A spider crab and a few urchin on shells. Many shells have attached hydroids.
108	F	Dense shells covering nearly entire sediment surface. Multiples urchins on shells. Many shells have attached hydroids
109	A	Dense shells covering nearly entire sediment surface. A few patches of live mussels. Many shells have attached hydroids
109	C	Turbidity in water has obscured many variables. Visible through turbidity is dense bivalves
109	D	Turbidity in water has obscured many variables. Visible through turbidity is dense bivalves
110	B	Dense shells covering nearly entire sediment surface. Most shells have attached hydroids
110	C	Dense shells covering nearly entire sediment surface. Most shells have attached hydroids
110	D	Dense shells covering nearly entire sediment surface. Most shells have attached hydroids. Small patches of sand in upper right corner of image have small tubes and burrows.
111	A	Dense shells and shell hash covering seabed. No visual evidence of fauna
111	B	Dense shells and shell hash covering seabed. No visual evidence of fauna
111	C	Shells covering large portion of imaged sediment. Many shells have attached hydroids. Sediment not covered in shells is sand and has multiple hermit crabs imaged.
112	A	High water column turbidity has obscured view of sediment surface
112	B	High water column turbidity has obscured view of sediment surface
112	C	High water column turbidity has obscured view of sediment surface. Dense shell hash partially visible through turbidity
113	A	High water column turbidity has obscured view of sediment surface. Uneven rippling just visible through turbidity
113	B	High water column turbidity has obscured view of sediment surface. Uneven rippling just visible through turbidity
113	C	High water column turbidity has obscured view of sediment surface. Uneven rippling just visible through turbidity
116	A	Sandy bottom with shell hash and rippling at surface. A large, shell-fortified tube in center of image. Small burrows and some tracks in image.
116	B	Sandy bottom with shell hash and rippling at surface. A shell-fortified tube in bottom of image. Small burrows in image
116	D	Sandy bottom with shell hash and rippling at surface. A shell-fortified tube in top left of image. Small burrows in image
117	A	Sand with minor short period ripples. Shell hash and larger tubes scattered throughout imaged surface. A few sand dollars and small gastropods also present.
117	C	Sand with minor short period ripples. Shell hash and larger tubes scattered throughout imaged surface. A few sand dollars, hermit crabs, and small gastropods also present.
117	D	Sand with ripples at surface. Scattered shell hash and a number of sand dollar at surface
118	A	Sand with ripples at surface. A pair of hermit crabs at sediment surface and small tubes and burrows throughout
118	B	Sand with ripples at surface. A pair of hermit crabs at sediment surface and small tubes and burrows throughout
118	C	Sand with ripples at surface. Small tubes and burrows throughout
119	A	Sand with shell hash at sediment surface. A few shell-fortified tubes and a hermit crab imaged
119	B	Sand with shell hash at sediment surface. A pair of hermit crabs imaged. Small tubes and burrows present
119	C	Sand with shell hash at sediment surface. A few hermit crabs imaged. Small tubes and burrows present
120	A	Image captured very close to sediment surface. A few shell-fortified tubes on a sandy bottom visible

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120	B	Turbidity in water makes some finer detail difficult to distinguish. Shell-fortified tubes throughout sandy bottom with a hermit crab also visible.
120	C	Shell-fortified tubes throughout sandy bottom with rippling at surface
122	A	Sand with rippling at sediment surface. Small burrows and tubes imaged. A hermit crab in left of image
122	B	Sand with rippling at surface. A shell fortified tube and many small tubes present. A pair of hermit crabs imaged
122	C	Sand with rippling at surface. Many small burrows present throughout image. A pair of hermit crabs imaged
123	A	Sand with scattered very fine pebbles and very coarse sand at surface. Shell hash and pebbles have gathered in ripple troughs. Many shell fortified tubes imaged. A hermit crab center of image.
123	B	Sand with shell hash and very fine pebbles at surface. Multiple hermit crabs at sediment surface
123	C	Sand with scattered very fine pebbles and very coarse sand at surface. Shell hash and pebbles have gathered in ripple troughs. Many shell fortified tubes imaged in a cluster.
124	A	Sand with ripples at surface. Shell hash gathered in ripple troughs. Multiple hermit crabs and gastropods at sediment surface
124	B	Sand with ripples at surface. Shell hash gathered in ripple troughs. Multiple hermit crabs and gastropods at sediment surface
124	C	Sand with ripples at surface. Shell hash gathered in ripple troughs. A hermit crab at top of image
125	A	Sand with ripples. Small tubes and burrow present. A hermit crab in upper left
125	B	Turbidity obscures finer details of image. Sandy bottom with ripples and a hermit crab visible through turbidity
125	C	Sand with ripples at surface. A patch of very fine pebbles in center of image. Small tubes and burrows throughout. A sand dollar in upper left.
126	A	Very fine and fine pebbles covering majority of sediment surface. No visible fauna
126	C	Very fine and fine pebbles covering majority of sediment surface. Hermit crabs visible on pebble surface
126	D	Very fine and fine pebbles covering majority of sediment surface. No visible fauna
127	A	Very fine and fine pebbles on large portions of sediment surface with sandy patches scattered about. Hermit crabs visible on pebble surface.
127	B	Very fine and fine pebbles gathered in the troughs of sand ripples. Small burrows and a gastropod and associated trail imaged
127	C	Very fine and fine pebbles on large portions of sediment surface with sandy patches scattered about. Large, shell-fortified tubes in upper right corner of image.
128	A	Sandy bottom with ripples at surface. Many small tubes and burrows present throughout image. A gastropod and a pair of hermit crabs at surface.
128	B	Sandy bottom with ripples at surface. Many small tubes and burrows present throughout image. A hermit crab in top of image
130	A	Sediment surface covered in fine and very fine pebbles. No visible fauna
130	B	Sediment surface covered in fine and very fine pebbles. Some coarse and very coarse pebbles also visible. No visible fauna
130	C	Sediment surface covered in fine and very fine pebbles. No visible fauna
131	A	Sandy bottom with high proportion of sediment surface covered by fine and very fine pebbles. A few large shell-fortified tubes and a large gastropod in image. Many skate egg casings in lower right corner.
131	B	Sandy bottom with high proportion of sediment surface covered by fine and very fine pebbles. A large shell-fortified tube few small gastropods imaged. A sea robin in upper center of image.
131	C	Sandy bottom with high proportion of sediment surface covered by fine and very fine pebbles. A couple of large shell-fortified tubes in upper center of image. Large shell hash present.
132	A	Sandy bottom with high proportion of sediment surface covered by fine and very fine pebbles. A couple of large shell-fortified tubes imaged. Large shell hash present. A few pebbles in the coarse to very coarse size range. Barnacles attached to large gravel piece in upper right.
132	B	Sandy bottom with high proportion of sediment surface covered by fine and very fine pebbles. Large shell hash present
132	C	Sandy bottom with high proportion of sediment surface covered by fine and very fine pebbles. Large shell hash present. A sea robin in center of image.

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133	A	Sandy bottom with very fine pebbles and coarse sand present at surface. Many small tubes and sand dollars throughout imaged surface. A coarse pebble with attached barnacles in upper left corner. Multiple hermit crabs at sediment surface.
133	B	Sandy bottom with very fine pebbles and coarse sand present at surface. A few shell-fortified tubes and sand dollars throughout imaged surface. Multiple hermit crabs at sediment surface. A few large burrows in upper portion of image.
133	C	Sandy bottom with very fine pebbles and coarse sand present at surface. A small tubes throughout imaged surface. A few sand dollars and hermit crabs at sediment surface. A couple of small gastropods in upper right of image.
134	A	Sandy bottom with very fine pebbles and coarse sand present at surface. Small tubes throughout image. A few sand dollars in lower left of image.
134	B	Turbidity in water obscures most variables. Visible through turbidity are large chunks of shell hash
134	D	Sandy bottom with some fine pebbles scattered about surface. A few hermit crabs imaged. A large burrow in upper left of image
135	F	Sand with many hermit crabs, shell-fortified tubes, and sand dollars at sediment surface
135	G	Some turbidity in water. Visible are sand with many hermit crabs, shell-fortified tubes, and sand dollars at sediment surface
135	H	Sand with many shell-fortified tubes and sand dollars at sediment surface. A few small gastropods scattered about sediment surface.
136	E	Sand with very fine pebbles scattered across sediment surface. Small burrows and many burrowing anemones present in image
136	F	Sand with very fine pebbles scattered across sediment surface. Small burrows and many burrowing anemones present in image
136	H	Sand with very fine pebbles scattered across sediment surface. Small burrows and many burrowing anemones present in image
137	E	Sand with sand dollars throughout imaged surface. Many shell-fortified tubes and a few hermit crabs at surface
137	G	Turbidity obscures finer variables. Sand with sand dollars and shell-fortified tubes imaged at surface
137	H	Sand with sand dollars throughout imaged surface. Many shell-fortified tubes and a hermit crab at surface. Burrows visible throughout.
138	E	Sand with sand dollars and shell hash throughout imaged surface. Burrows visible throughout. A shell-fortified tube at bottom of image.
138	F	Sand with sand dollars and shell hash throughout imaged surface. Burrows visible throughout. A shell-fortified tube at top right of image. Possible fecal pellets near top center of image.
138	G	Sand with sand dollars, shell-fortified tubes, and shell hash throughout imaged surface
139	E	Sand with many sand dollars and shell-fortified tubes at surface. A few anemones also present. Many burrows and trails as well
139	F	Sand with sand dollars and shell-fortified tubes imaged surface. A small gastropod in center of image
139	G	Sand with sand dollars and many small burrows with associated sediments at surface. Small tubes also throughout. Many small gastropods and hermit crabs imaged.
140	E	Sand with many small tubes and burrows. Sand dollars throughout image. An anemone present. A shell-fortified tube in both the top and bottom of image.
140	F	Sand with many small tubes and burrows. Sand dollars throughout image.
140	H	Turbidity obscuring the edges of image. Visible seabed is sand with many small tubes and burrows. Sand dollars throughout image. Hermit crab in upper right portion of image.
141	B	Sand with large burrows and associated reduced sediment. Small tubes throughout image. Sand dollars throughout seabed
142	A	Sand with small tubes throughout. A few large burrows and associated reduced sediment. A few sand dollars also visible
142	B	Sand with many sand dollars and small tubes throughout image. A cluster of small gastropods in upper right corner of image. A pair of sea stars also at sediment surface.
142	C	Sand with small tubes throughout. A few large burrows and associated reduced sediment. A few sand dollars also visible
143	A	Sand with small tubes and burrows throughout. A few sand dollars also visible
143	C	Sand with small tubes throughout. A few large burrows and associated reduced sediment. A few sand dollars also visible. A couple small gastropods in upper left of image.

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143	D	Sand with small tubes throughout. A few large burrows and associated reduced sediment. A few sand dollars also visible. A few small anemones present in upper portion of image.
144	A	Sand with small tubes throughout. Many sand dollars throughout and a few small gastropods in center of image. Larger burrows with associated reduced sediment present.
144	B	Right half of image obscured by turbidity. Visible sediment surface contains a large burrow, many small tubes, and a few sand dollars.
144	C	Bottom half of image obscured by turbidity. Visible sediment surface contains large burrows, many small tubes, and a few small gastropods and sand dollars.
145	A	Sand surface contains large burrows, many small tubes, and a few small gastropods and sand dollars. A hermit crab also visible in top center of image.
145	C	Sand with many small tubes throughout. A few sand dollars and small gastropods present. A skate in upper left of image
146	A	Sand with high coverage of sand dollars and burrows/mounds. Small tubes also present throughout
146	B	Minor turbidity in the water. Dense sand dollars with small tubes also visible
146	C	Sand with dense sand dollar and small tube coverage. A few small gastropods also present
147	A	Sand with fine shell hash and sand dollars throughout imaged surface. A few small gastropods also present
147	B	Sand with fine shell hash and sand dollars throughout imaged surface. Many small gastropods also present
147	C	Sand with fine shell hash and sand dollars throughout imaged surface. Many small gastropods also present. A few shell-fortified tubes present.
148	A	Sand with fine shell hash gathered in the troughs of ripples. Shell-fortified tubes and sand dollars scattered about. A few small gastropods imaged.
148	B	Sand with fine shell hash gathered in the troughs of ripples. Shell-fortified tubes and sand dollars scattered about. A few small gastropods imaged.
148	C	Sand with fine shell hash at surface. Shell-fortified tubes and sand dollars at sediment surface. A skate egg casing in center of image.
149	A	Sand with fine shell hash and dense sand dollars at sediment surface. A few small tubes and burrows also visible
149	D	Sand with fine shell hash and dense sand dollars at sediment surface. A few small tubes and burrows also visible
150	A	Sand with fine shell hash and dense sand dollars at sediment surface. A few small tubes and burrows also visible
150	B	Sand with fine shell hash and dense sand dollars at sediment surface. A few small tubes and burrows also visible
150	C	Sand with fine shell hash and dense sand dollars at sediment surface. A few small tubes, gastropods, and burrows also visible
151	A	Sand with fine shell hash in ripple troughs. Dense sand dollar coverage. A large burrow with reduced sediment in center of image.
151	B	Sand with fine shell hash in ripple troughs. Dense sand dollar coverage. A few large burrows and many small gastropods present
151	D	Sand with fine shell hash in ripple troughs. Dense sand dollar coverage. Many small tubes and small gastropods present
152	A	Sand with fine shell hash. Scattered sand dollars. A large number of small gastropods throughout. A small hermit crab also present.
152	B	Sand with fine shell hash. Scattered sand dollars. A large number of small gastropods throughout.
152	D	Sand with fine shell hash. A few scattered sand dollars. A large number of small gastropods throughout.
153	A	Sand with fine shell hash, many small burrows, and sand dollars throughout.
153	B	Turbidity in water has obscured many variables. Sand with fine shell hash and sand dollars throughout visible through turbidity
153	C	Sand with fine shell hash, many small burrows, and sand dollars throughout. A few small gastropods also present
154	A	Sand with fine shell hash distributed in low portions of sediment surface. Suggests some transport occurring. Sand dollars throughout image. Small burrows and tubes also present.
154	B	Sand with fine shell hash distributed in low portions of sediment surface. Suggests some transport occurring. Sand dollars throughout image. Small burrows and tubes also present. A large hermit crab present in center of image.

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in Support of the Equinor Wind OCS-A-0512 Offshore Wind Farm Project – Data Report

StationID	Replicate	Comments
154	C	Sand with fine shell hash distributed throughout sediment surface. Sand dollars throughout image. Small burrows and tubes also present. A shell-fortified tube at top of image.
155	A	Sand with fine shell hash throughout. A few sand dollars and hermit crabs present. Many larger burrows with associated reduced sediment and small tubes present throughout.
155	B	Sand with fine shell hash throughout. A few sand dollars and hermit crabs present. Many larger burrows with associated reduced sediment and small tubes present throughout.
155	D	Sand with fine shell hash throughout. Sediment surface contains many small tubes and burrows throughout. A scattering of sand dollars and the occasional hermit crab visible.
156	A	Sand with fine shell hash throughout. Multiple sand dollars and small gastropods at sediment surface. Many small tubes and burrows throughout.
156	B	Sand with sand dollars, burrows, and small tubes throughout. A few small gastropods and shell hash also present. An unknown organism visible in center bottom of image.
156	D	Sand with sand dollars, burrows, and small tubes throughout. A few small gastropods and shell hash also present.
157	A	Sand with sand dollars, burrows, and small tubes throughout. A few small gastropods also present. Shell hash has gathered in ripple troughs.
157	B	Sand with minor rippling. Sand dollars and fine shell hash throughout image. Small tubes and burrows also throughout.
157	C	Sand with fine shell hash throughout. A high density of both sand dollars and very small gastropods at sediment surface. Burrows and tubes also present throughout.
REFA_01	A	Medium and fine pebbles overlaying sand. Multiple anemones and a sea robin just within frame visible.
REFA_01	B	Medium and fine pebbles overlaying sand. Multiple anemones visible.
REFA_01	C	Medium and fine pebbles overlaying sand. Large shell hash present in upper portion of image. Multiple anemones visible.
REFA_02	A	Fine pebbles with medium and very fine pebbles intermixed overlaying sand. Many burrowing anemones present throughout image. Shell hash also present.
REFA_02	B	Turbidity in water column has obscured fine variables. Fine pebbles with medium and very fine pebbles intermixed overlaying sand. A few burrowing anemones visible.
REFA_02	D	Some turbidity. Fine, medium, and very fine pebbles overlaying sand. Small tubes and burrows visible. No obvious fauna present.
REFA_03	A	Fine, medium, and very fine pebbles overlaying sand. Shell hash throughout. Anemones and hermit crabs also present throughout.
REFA_03	B	Fine, medium, and very fine pebbles overlaying sand. Anemones and hermit crabs also present throughout.
REFA_03	D	Fine, medium, and very fine pebbles overlaying sand. Shell hash throughout. Anemones and hermit crabs also present throughout.
REFA_04	A	Fine, medium, and very fine pebbles overlaying sand. Shell hash throughout. Anemones and hermit crabs also present throughout.
REFA_04	C	Fine, medium, and very fine pebbles overlaying sand. Shell hash throughout. Anemones and hermit crabs also present throughout.
REFA_04	D	Fine, medium, and very fine pebbles overlaying sand. Shell hash throughout. Anemones and hermit crabs also present throughout. A scallop shell present but appears dead.
REFA_05	A	Fine, medium, and very fine pebbles overlaying sand. Hermit crabs present throughout. An anemone also visible. Large skate in image.
REFA_05	B	Fine, medium, and very fine pebbles overlaying sand. Anemones and hermit crabs present throughout.
REFA_05	C	Fine, medium, and very fine pebbles overlaying sand. Hermit crabs present throughout. An anemone also visible. A flatfish present in lower right of image. A scallop shell that appears dead in upper left of image.
REFB_01	E	Sand with many hermit crabs, shell-fortified tubes, small gastropods, and sand dollars at sediment surface.
REFB_01	F	Sand with many hermit crabs, shell-fortified tubes, small gastropods, and sand dollars at sediment surface.

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in Support of the Equinor Wind OCS-A-0512 Offshore Wind Farm Project – Data Report

StationID	Replicate	Comments
REFB_01	G	Some turbidity around edges of image. Sand with sand dollars, hermit crabs, small gastropods, and shell-fortified tubes
REFB_02	H	Sand with many shell-fortified tubes in a cluster. Small burrows throughout. A sand dollar, a few small gastropods, and a pair of hermit crabs also present.
REFB_02	I	Sand with many hermit crabs, shell-fortified tubes, small gastropods, and sand dollars at sediment surface. Small burrows and tubes throughout.
REFB_02	J	Sand with many hermit crabs and shell-fortified tubes. Small burrows and tubes also throughout. A small flounder and associated trail in sediment in upper left quadrant of image.
REFB_03	E	Sand with many hermit crabs, gastropods, and shell-fortified tubes. Larger burrows with associated reduced sediment also present.
REFB_03	F	Sand with many hermit crabs, gastropods, and shell-fortified tubes. Larger burrows with associated reduced sediment also present.
REFB_03	G	Sand with many hermit crabs across entire imaged surface. A few sand dollars, gastropods, and shell-fortified tubes also visible
REFB_04	F	Sand with shell-fortified tubes and shell hash. A few sand dollars and hermit crabs also present
REFB_04	G	Sand with short period uneven rippling. Sand dollars and hermit crabs at surface. Minor turbidity obscures fine variables
REFB_04	H	Sand with many shell-fortified tubes, small burrows, and tracks at sediment surface. A few small gastropods, hermit crabs, and sand dollars also present.
REFB_05	E	Sand with dense sand dollar coverage. Larger burrows and associated reduced sediment also present. A shell-fortified tube and hermit crab also present.
REFB_05	F	Turbidity obscures right portion of image. Sand with dense sand dollar coverage. Larger burrows and associated reduced sediment also present. A hermit crab also present.
REFB_05	H	Sand with dense sand dollar coverage. Shell-fortified tubes present throughout. Burrows and hermit crabs also present,
REFC_01	A	Sand with almost complete surficial coverage of small tubes.
REFC_01	B	Sand with dense small tubes in clusters. Small burrows and fine shell hash also present
REFC_01	D	Most of image obscured by turbidity. Visible sediment surface has dense coverage of tube clusters and small burrows
REFC_02	A	Sand with dense small tubes in clusters. Small burrows and fine shell hash also present
REFC_02	B	Sand with dense small tubes in clusters. Small burrows and fine shell hash also present
REFC_02	C	Sand with dense small tubes in clusters. Small burrows and fine shell hash also present
REFC_03	A	Sand with almost complete surficial coverage of small tubes. A pair of sea stars present
REFC_03	B	Sand with dense small tubes and a few large burrows present.
REFC_03	D	Sand with dense small tubes and many small burrows present. A sea star partially in image in left side. A dead crab in lower left of image.
REFC_04	A	Sand with dense small tubes and small burrows throughout.
REFC_04	B	Sand with dense small tubes and small burrows throughout. A sea star partially in image in lower left corner. A shrimp barely visible in center lower portion of image.
REFC_04	D	Sand with dense small tubes and small burrows throughout. A pair of sea stars in right of image
REFC_05	A	Sand with dense small tubes and small burrows throughout. A sea star also imaged
REFC_05	B	Sand with dense small tubes in the left portion and more spread out tubes and small burrows in the right.
REFC_05	C	Sand with dense small tubes and small burrows throughout. A sea star partially buried in upper portion of image

APPENDIX E

Sediment Grab Log Forms

Sediment Log Form –Sampling for Particle Size

INSPIRE Project Number:	Project Name: <u>Empire Wind Benthic Survey</u>	Vessel: <u>R/V Northstar Comm</u>	Date: <u>10 Jul 2019</u>
Station ID: <u>038</u>	Water depth (m): <u>28</u>	Time On Station (local): <u>10:28</u>	Time Off Station (local): <u>10:58</u>
Latitude (N; NAD83):	Longitude (W; NAD83):	Photograph (Y/N – file) <u>Yes</u>	
Sampling Staff: <u>Kelsey Sturdivant + Chuck Holloway</u>			
Sampling Gear: <u>Double van Veen</u> Single van Veen (circle one and size):		Penetration (cm): <u>11.5</u>	Sample Time: (local) <u>N: 38</u>

Sample Description

 Color: Light Brown Tannish Orange Greenish Gray Olive Gray Light Gray Dark Gray Black

Other:

 Type: Cobble Gravel Sand (coarse med fine) Silt Clay Wood chips Shells or Shell Hash

Other:

 Odor: None Slight Strong Petroleum H₂S Other:

 Density: Hard Solid Firm Soft Loose Other:

 Debris Present: Yes No Type:

 Overlying Water Present: Yes No

 Misc: Biota Sand dollar, Neritic worm Detritus None
Sediment Sample – Particle Size (500 gram sample, 250 grams minimum)
Sample Interval Range (i.e. 0-5 cm or 0-10 cm):

Sample ID:
Grab Number (A= Accepted; R = Rejected)

Codes: DB = Debris Interference; DS = Disturbed Surface; NS = No Sediment in sampler; OP = Over Penetration; OT = Other

1	2	3	4	Notes
<u>A</u>				

Field Activities / Comments / Observations:

 Field Team Leader Signature and Approval [Signature]

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Sediment Log Form –Sampling for Particle Size

INSPIRE Project Number:	Project Name: <i>Empire Wind Benthic Survey</i>	Vessel: <i>N-Star Commander</i>	Date: <i>10 Jul 2017</i>
Station ID: <i>157</i>	Water depth (m):	Time On Station (local): <i>11:47</i>	Time Off Station (local): <i>11:56</i>
Latitude (N; NAD83):	Longitude (W; NAD83):	Photograph (Y/N – file) <i>Yes</i>	
Sampling Staff:			
Sampling Gear <u>Double van Veen</u> Single van Veen (circle one and size):		Penetration (cm): <i>12 1/2</i>	Sample Time: (local) <i>11:51</i>

Sample Description

 Color: Light Brown Tannish Orange Greenish Gray Olive Gray Light Gray Dark Gray Black

Other:

 Type: Cobble Gravel Sand (coarse med fine) Silt Clay Wood chips Shells or Shell Hash

Other:

 Odor: None Slight Strong Petroleum H₂S Other:

 Density: Hard Solid Firm Soft Loose Other:

Debris Present: Yes No Type:

 Overlying Water Present: Yes No

 Misc: Biota Amphipod, worm, hermit crab, sand dollar Detritus

Sediment Sample – Particle Size (500 gram sample, 250 grams minimum)
Sample Interval Range (i.e. 0-5 cm or 0-10 cm):

Sample ID:
Grab Number (A= Accepted; R = Rejected)
Codes: DB = Debris Interference; DS = Disturbed Surface; NS = No Sediment in sampler; OP = Over Penetration; OT = Other

1	2	3	4	Notes
<u>A</u>				

Field Activities / Comments / Observations:

Field Team Leader Signature and Approval

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Sediment Log Form –Sampling for Particle Size

INSPIRE Project Number:	Project Name: <u>Empire Wind Benthic</u>	Vessel: <u>Northstar Commander</u>	Date: <u>7/10/19</u>
Station ID: <u>147</u>	Water depth (m):	Time On Station (local):	Time Off Station (local):
Latitude (N; NAD83):	Longitude (W; NAD83):	Photograph (Y/N – file) <u>yes</u>	
Sampling Staff: <u>John Harding, Brian Gervelis, Dan Jackson</u>			
Sampling Gear <u>Double van Veen</u> Single van Veen		Penetration (cm): <u>10</u>	Sample Time: (local) <u>16:24</u>
(circle one and size):			

Sample Description

 Color: Light Brown Tannish Orange Greenish Gray Olive Gray Light Gray Dark Gray Black

Other:

 Type: Cobble Gravel Sand (coarse med fine) Silt Clay Wood chips Shells or Shell Hash

Other:

 Odor: None Slight Strong Petroleum H₂S Other:

 Density: Hard Solid Firm Soft Loose Other:

Debris Present: Yes No Type:

 Overlying Water Present: Yes No

 Misc: Biota Sand Dollar, worm Detritus None
Sediment Sample – Particle Size (500 gram sample, 250 grams minimum)
Sample Interval Range (i.e. 0-5 cm or 0-10 cm):

Sample ID:
Grab Number (A= Accepted; R = Rejected)

Codes: DB = Debris Interference; DS = Disturbed Surface; NS = No Sediment in sampler; OP = Over Penetration; OT = Other

1	2	3	4	Notes
<u>A</u>				

Field Activities / Comments / Observations:

 Field Team Leader Signature and Approval [Signature]

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Sediment Log Form –Sampling for Particle Size

INSPIRE Project Number:	Project Name: <u>Empire Wind Benthic Survey</u>	Vessel: <u>North Star Commander</u>	Date: <u>7/10/19</u>
Station ID: <u>020</u>	Water depth (m):	Time On Station (local):	Time Off Station (local):
Latitude (N; NAD83):	Longitude (W; NAD83):	Photograph (Y/N – file) <u>YES</u>	
Sampling Staff: <u>John Hardin, Brian Gervelis, Dan Jackson</u>			
Sampling Gear <u>Double van Veen</u> Single van Veen (circle one and size):		Penetration (cm): <u>10</u>	Sample Time: (local) <u>16:57</u>

Sample Description

 Color: Light Brown Tannish Orange Greenish Gray Olive Gray Light Gray Dark Gray Black

Other:

 Type: Cobble Gravel Sand (coarse med fine) Silt Clay Wood chips Shells or Shell Hash

Other:

 Odor: None Slight Strong Petroleum H₂S Other:

 Density: Hard Solid Firm Soft Loose Other:

 Debris Present: Yes No Type:

 Overlying Water Present: Yes No

 Misc: Biota Amphipod, Sand Dollar, Worm Detritus

Sediment Sample – Particle Size (500 gram sample, 250 grams minimum)
Sample Interval Range (i.e. 0-5 cm or 0-10 cm):

Sample ID:
Grab Number (A= Accepted; R = Rejected)

Codes: DB = Debris Interference; DS = Disturbed Surface; NS = No Sediment in sampler; OP = Over Penetration; OT = Other

1	2	3	4	Notes
<u>A</u>				

Field Activities / Comments / Observations:

Aflac 2cm, anoxic

 Field Team Leader Signature and Approval [Signature]

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Sediment Log Form – Sampling for Particle Size

INSPIRE Project Number:	Project Name: <u>Empire Wind Bathic Survey</u>	Vessel: <u>North Star Commander</u>	Date: <u>7-13-19</u>
Station ID: <u>108</u>	Water depth (m):	Time On Station (local):	Time Off Station (local):
Latitude (N; NAD83):	Longitude (W; NAD83):	Photograph (Y/N – file) <u>Yes</u>	
Sampling Staff: <u>John Hardin, Brian Gervelis, Dan Jackson</u>			
Sampling Gear: <u>Double van Veen</u> Single van Veen (circle one and size):		Penetration (cm): <u>12.5</u>	Sample Time: (local) <u>12:22:52</u>

Sample Description

Color: Light Brown Tannish Orange Greenish Gray Olive Gray Light Gray Dark Gray Black
 Other:

Type: Cobble Gravel Sand (coarse med fine) Silt Clay Wood chips Shells or Shell Hash
 Other:

Odor: None Slight Strong Petroleum H₂S Other:
Sulfur

Density: Hard Solid Firm Soft Loose Other:

Debris Present: Yes No Type:

Overlying Water Present: Yes No

Misc: Biota Muscles, Hermit Crab, Gastropod Detritus _____

Sediment Sample – Particle Size (500 gram sample, 250 grams minimum)

Sample Interval Range (i.e. 0-5 cm or 0-10 cm):

Sample ID:

Grab Number (A= Accepted; R = Rejected)				
Codes: DB = Debris Interference; DS = Disturbed Surface; NS = No Sediment in sampler; OP = Over Penetration; OT = Other				
1	2	3	4	Notes
<u>A</u>				

Field Activities / Comments / Observations:
After 2cm - anoxic silt/fine sand, stronger odor of sulfur

Field Team Leader Signature and Approval



Page ____ of ____

INSPIRE Project Number:	Project Name: <u>Empire Wind Benthic 2019</u>	Vessel: <u>Northstar Commander</u>	Date: <u>7-13-19</u>
Station ID: <u>095</u>	Water depth (m):	Time On Station (local):	Time Off Station (local):
Latitude (N; NAD83):		Longitude (W; NAD83):	Photograph (Y/N – file) <u>Yes</u>
Sampling Staff: <u>Den Jackson, Brian Gervelis, John Hardin</u>			
Sampling Gear: <u>Double van Veen</u> Single van Veen (circle one and size):		Penetration (cm): <u>11.5</u>	Sample Time: (local) <u>13:00:56</u>

Sample Description
 Color: Light Brown Tannish Orange Greenish Gray Olive Gray Light Gray Dark Gray Black
 Other:
 Type: Cobble Gravel Sand (coarse med fine) Silt Clay Wood chips Shells or Shell Hash
 Other:
 Odor: None Slight Strong Petroleum H₂S Other:
 Density: Hard Solid Firm Soft Loose Other:
 Debris Present: Yes No Type:
 Overlying Water Present: Yes No
 Misc: Biota Hermit Crab Detritus

Sediment Sample – Particle Size (500 gram sample, 250 grams minimum)
Sample Interval Range (i.e. 0-5 cm or 0-10 cm):
Sample ID:

Grab Number (A= Accepted; R = Rejected)				
Codes: DB = Debris Interference; DS = Disturbed Surface; NS = No Sediment in sampler; OP = Over Penetration; OT = Other				
1	2	3	4	Notes
<u>A</u>				

Field Activities / Comments / Observations:

 Field Team Leader Signature and Approval [Signature]

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Sediment Log Form – Sampling for Particle Size

INSPIRE Project Number:	Project Name: <u>Empire Wind Benthic 2018</u>	Vessel: <u>Northstar Commander</u>	Date: <u>7-13-19</u>
Station ID: <u>091</u>	Water depth (m):	Time On Station (local):	Time Off Station (local):
Latitude (N; NAD83):		Longitude (W; NAD83):	Photograph (Y/N – file) <u>YES</u>
Sampling Staff: <u>John Hardin, Brian Gervelis, Dan Jackson</u>			
Sampling Gear: <u>Double van Veen</u> Single van Veen (circle one and size):		Penetration (cm): <u>11</u>	Sample Time: (local) <u>13:40:36</u>

Sample Description

Color: Light Brown Tannish Orange Greenish Gray Olive Gray Light Gray Dark Gray Black

Other:

Type: Cobble Gravel Sand (coarse med fine) Silt Clay Wood chips Shells or Shell Hash

Other:

Odor: None Slight Strong Petroleum H₂S Other:

Density: Hard Solid Firm Soft Loose Other:

Debris Present: Yes No Type:

Overlying Water Present: Yes No

Misc: Biota Polychaete, Sand Dollar, Clam Detritus _____

Sediment Sample – Particle Size (500 gram sample, 250 grams minimum)

Sample Interval Range (i.e. 0-5 cm or 0-10 cm):

Sample ID:

Grab Number (A= Accepted; R = Rejected)				
Codes: DB = Debris Interference; DS = Disturbed Surface; NS = No Sediment in sampler; OP = Over Penetration; OT = Other				
1	2	3	4	Notes
<u>A</u>				

Field Activities / Comments / Observations:
Mix of med/fine sand + Silt

 Field Team Leader Signature and Approval [Signature]

Page ____ of ____

Sediment Log Form – Sampling for Particle Size

INSPIRE Project Number:		Project Name: <u>Empire Wind Berth 209</u>		Vessel: <u>N. Star Commander</u>	Date: <u>7-13-19</u>
Station ID: <u>076</u>		Water depth (m):		Time On Station (local):	Time Off Station (local):
Latitude (N; NAD83):		Longitude (W; NAD83):		Photograph (Y/N – file) <u>YES</u>	
Sampling Staff: <u>John Hardin, Brian Gervelis, Dan Jackson</u>					
Sampling Gear: <u>Double van Veen</u> Single van Veen (circle one and size):				Penetration (cm): <u>10</u>	Sample Time: (local) <u>14:16:00</u>

Sample Description

Color: Light Brown Tannish Orange Greenish Gray Olive Gray Light Gray Dark-Gray Black
 Other:

Type: Cobble Gravel Sand (coarse med fine) Silt Clay Wood chips Shells or Shell Hash
 Other:

Odor: None Slight Strong Petroleum H₂S Other:

Density: Hard Solid Firm Soft Loose Other:

Debris Present: Yes No Type:

Overlying Water Present: Yes No

Misc: Biota Sand Dollar, Polychaetes, Snail Detritus _____

Sediment Sample – Particle Size (500 gram sample, 250 grams minimum)

Sample Interval Range (i.e. 0-5 cm or 0-10 cm):

Sample ID:

Grab Number (A= Accepted; R = Rejected)				
Codes: DB = Debris Interference; DS = Disturbed Surface; NS = No Sediment in sampler; OP = Over Penetration; OT = Other				
1	2	3	4	Notes
<u>A</u>				

Field Activities / Comments / Observations:

Field Team Leader Signature and Approval



Page ____ of ____

INSPIRE Project Number:	Project Name: <u>Empire Wind Benthic 2019</u>	Vessel: <u>N. Star Commander</u>	Date: <u>7-13-19</u>
Station ID: <u>060</u>	Water depth (m):	Time On Station (local):	Time Off Station (local):
Latitude (N; NAD83):	Longitude (W; NAD83):	Photograph (Y/N – file) <u>YES</u>	
Sampling Staff: <u>John Hardin, Brian Gervelt, Dan Jackson</u>			
Sampling Gear: <u>Double van Veen</u> Single van Veen (circle one and size):		Penetration (cm): <u>13.5</u>	Sample Time: (local) <u>14:37:17</u>

Sample Description

 Color: Light Brown Tannish Orange Greenish Gray Olive Gray Light Gray Dark Gray Black

Other:

 Type: Cobble Gravel Sand (coarse med fine) Silt Clay Wood chips Shells or Shell Hash

Other:

 Odor: None Slight Strong Petroleum H₂S Other:

 Density: Hard Solid Firm Soft Loose Other:

Debris Present: Yes No Type:

 Overlying Water Present: Yes No

 Misc: Biota Worms, Quabag Detritus

Sediment Sample – Particle Size (500 gram sample, 250 grams minimum)

Sample Interval Range (i.e. 0-5 cm or 0-10 cm):

Sample ID:

Grab Number (A= Accepted; R = Rejected)

Codes: DB = Debris Interference; DS = Disturbed Surface; NS = No Sediment in sampler; OP = Over Penetration; OT = Other

1	2	3	4	Notes
<u>A</u>				

Field Activities / Comments / Observations:
Mainly Silty Clay, some fine sand
After 4/5 cm → anoxic silty clay (black)

Field Team Leader Signature and Approval



Page ____ of ____

INSPIRE Project Number:	Project Name: <u>Empire Wind Benthic 2019 N. Star Commander</u>	Vessel:	Date: <u>7-13-19</u>
Station ID: <u>057</u>	Water depth (m):	Time On Station (local):	Time Off Station (local):
Latitude (N; NAD83):	Longitude (W; NAD83):	Photograph (Y/N – file) <u>YES</u>	
Sampling Staff: <u>John Harding, Brian Genetis, Dan Jackson</u>			
Sampling Gear <u>Double van Veen</u> Single van Veen (circle one and size):		Penetration (cm): <u>12.5</u>	Sample Time: (local) <u>15:12:58</u>

Sample Description

 Color: Light Brown Tannish Orange Greenish Gray Olive Gray Light Gray Dark Gray Black

Other:

 Type: Cobble Gravel Sand (coarse med fine) Silt Clay Wood chips Shells or Shell Hash

Other:

 Odor: None Slight Strong Petroleum H₂S Other:

 Density: Hard Solid Firm Soft Loose Other:

 Debris Present: Yes No Type:

 Overlying Water Present: Yes No

 Misc: Biota Polychaetes, Worm, crustacean, Amphipod, Smail Detritus

Sediment Sample – Particle Size (500 gram sample, 250 grams minimum)
Sample Interval Range (i.e. 0-5 cm or 0-10 cm):

Sample ID:
Grab Number (A= Accepted; R = Rejected)
Codes: DB = Debris Interference; DS = Disturbed Surface; NS = No Sediment in sampler; OP = Over Penetration; OT = Other

1	2	3	4	Notes
<u>A</u>				

Field Activities / Comments / Observations:
Mostly silt/fine sand w/ some clay
Anoxic → 6cm down

 Field Team Leader Signature and Approval [Signature]

Page ____ of ____

INSPIRE Project Number:	Project Name: <i>Empire Wind Benthic 2019</i>	Vessel: <i>N. Star Commander</i>	Date: <i>7-13-19</i>
Station ID: <i>133</i>	Water depth (m):	Time On Station (local):	Time Off Station (local):
Latitude (N; NAD83):	Longitude (W; NAD83):	Photograph (Y/N – file) <i>YES</i>	
Sampling Staff: <i>John Hardin, Brian Gerveliz, Dan Jackson</i>			
Sampling Gear: <u>Double van Veen</u> Single van Veen (circle one and size):		Penetration (cm): <i>11</i>	Sample Time: (local) <i>15:57:58</i>

Sample Description

 Color: Light Brown Tannish Orange Greenish Gray Olive Gray Light Gray Dark Gray Black

Other:

 Type: Cobble Gravel Sand (coarse med fine) Silt Clay Wood chips Shells or Shell Hash

Other:

 Odor: None Slight Strong Petroleum H₂S Other:

 Density: Hard Solid Firm Soft Loose Other:

 Debris Present: Yes No Type:

 Overlying Water Present: Yes No

 Misc: Biota Sand Dollar, Snail, worm, clam Detritus

Sediment Sample – Particle Size (500 gram sample, 250 grams minimum)
Sample Interval Range (i.e. 0-5 cm or 0-10 cm):

Sample ID:
Grab Number (A= Accepted; R = Rejected)

Codes: DB = Debris Interference; DS = Disturbed Surface; NS = No Sediment in sampler; OP = Over Penetration; OT = Other

1	2	3	4	Notes
<i>A</i>				

Field Activities / Comments / Observations:

Mainly medium/coarse sand
Pebbles present

 Field Team Leader Signature and Approval *[Signature]*

Page ____ of ____

INSPIRE Project Number:	Project Name: <i>Empire Wind Benthic 2019</i>	Vessel: <i>N. Star Commander</i>	Date: <i>7-13-19</i>
Station ID: <i>136</i>	Water depth (m):	Time On Station (local):	Time Off Station (local):
Latitude (N; NAD83):	Longitude (W; NAD83):	Photograph (Y/N – file) <i>YES</i>	
Sampling Staff: <i>John Hardin, Brian Gervelis, Dan Jackson</i>			
Sampling Gear: <u>Double van Veen</u> Single van Veen (circle one and size):		Penetration (cm): <i>11.5</i>	Sample Time: (local) <i>16:32:29</i>

Sample Description

 Color: Light Brown Tannish Orange Greenish Gray Olive Gray Light Gray Dark Gray Black

Other:

 Type: Cobble Gravel Sand (coarse med fine) Silt Clay Wood chips Shells or Shell Hash

Other:

 Odor: None Slight Strong Petroleum H₂S Other:

 Density: Hard Solid Firm Soft Loose Other:

 Debris Present: Yes No Type:

 Overlying Water Present: Yes No

 Misc: Biota Worm Detritus

Sediment Sample – Particle Size (500 gram sample, 250 grams minimum)
Sample Interval Range (i.e. 0-5 cm or 0-10 cm):

Sample ID:
Grab Number (A= Accepted; R= Rejected)

Codes: DB = Debris Interference; DS = Disturbed Surface; NS = No Sediment in sampler; OP = Over Penetration; OT = Other

1	2	3	4	Notes
<i>A</i>				

Field Activities / Comments / Observations:

Medium Sand w/ Pebbles

 Field Team Leader Signature and Approval 

Page ____ of ____

Sediment Log Form – Sampling for Particle Size

INSPIRE Project Number:	Project Name: <u>Empire Wind Benthic Survey</u>	Vessel: <u>N-Star Commander</u>	Date: <u>14 Jul 2019</u>
Station ID: <u>003</u>	Water depth (m): <u>21.2 m</u>	Time On Station (local): <u>04:24:04</u>	Time Off Station (local): <u>04:40:11</u>
Latitude (N; NAD83):		Longitude (W; NAD83):	Photograph (Y/N – file) <u>Yes</u>
Sampling Staff: <u>K. Sturdivant, C. Holloway</u>			
Sampling Gear: <u>Double van Veen</u> Single van Veen (circle one and size):		Penetration (cm): <u>11.5</u>	Sample Time: (local) <u>04:26:53</u>
Sample Description Color: Light Brown Tannish Orange Greenish Gray <u>Olive Gray</u> Light Gray Dark Gray Black Other: Type: Cobble Gravel <u>Sand</u> (coarse med fine) Silt Clay Wood chips Shells or Shell Hash Other: Odor: <u>None</u> Slight Strong Petroleum H ₂ S Other: Density: Hard Solid <u>Firm</u> Soft Loose Other: Debris Present: Yes <u>No</u> Type: Overlying Water Present: <u>Yes</u> No Misc: Biota <u>Worms</u> Detritus			
Sediment Sample – Particle Size (500 gram sample, 250 grams minimum) Sample Interval Range (i.e. 0-5 cm or 0-10 cm): Sample ID:			
Grab Number (A= Accepted; R = Rejected) Codes: DB = Debris Interference; DS = Disturbed Surface; NS = No Sediment in sampler; OP = Over Penetration; OT = Other			
1	2	3	4
<u>A</u>			Notes
Field Activities / Comments / Observations:			

Field Team Leader Signature and Approval



Page ____ of ____

INSPIRE Project Number:	Project Name: <i>Empire Wild Benthic Survey</i>	Vessel: <i>N-Star Commander</i>	Date: <i>14 July 2019</i>
Station ID: <i>006</i>	Water depth (m): <i>20.6m</i>	Time On Station (local): <i>05:06:24</i>	Time Off Station (local): <i>05:28:52</i>
Latitude (N; NAD83):		Longitude (W; NAD83):	Photograph (Y/N – file) <i>Yes</i>
Sampling Staff: <i>K. Sturtevant, Chuck Holloway</i>			
Sampling Gear ☒ Double van Veen ☐ Single van Veen (circle one and size):		Penetration (cm): <i>11.5</i>	Sample Time: (local) <i>05:16:30</i>

Sample Description

 Color: ☒ Light Brown ☐ Tannish Orange ☐ Greenish Gray ☐ Olive Gray ☐ Light Gray ☐ Dark Gray ☐ Black

 Other: *TAN LT BRN*

 Type: Cobble Gravel ☒ Sand ☒ (coarse med fine) Silt Clay Wood chips Shells or Shell Hash

Other:

 Odor: ☒ None ☐ Slight ☐ Strong Petroleum H₂S Other:

 Density: Hard Solid ☒ Firm ☐ Soft Loose Other:

 Debris Present: Yes ☒ No ☐ Type:

 Overlying Water Present: ☒ Yes ☐ No

Misc: Biota _____ Detritus _____

Sediment Sample – Particle Size (500 gram sample, 250 grams minimum)
Sample Interval Range (i.e. 0-5 cm or 0-10 cm):

Sample ID:
Grab Number (A= Accepted; R = Rejected)

Codes: DB = Debris Interference; DS = Disturbed Surface; NS = No Sediment in sampler; OP = Over Penetration; OT = Other

1	2	3	4	Notes
<i>DB</i>	<i>A</i>			

Field Activities / Comments / Observations:

Field Team Leader Signature and Approval



Page ____ of ____

Sediment Log Form – Sampling for Particle Size

INSPIRE Project Number:		Project Name: <u>Empire Wind Benthic Survey</u>		Vessel: <u>N. Star Command</u>	Date: <u>14 July 2019</u>
Station ID: <u>010</u>		Water depth (m): <u>35.2 m</u>		Time On Station (local): <u>06:01:52</u>	Time Off Station (local): <u>06:14:03</u>
Latitude (N; NAD83):		Longitude (W; NAD83):		Photograph (Y/N – file) <u>Yes</u>	
Sampling Staff: <u>K. Sturdivant, C. Hollaway</u>					
Sampling Gear ☒ Double van Veen ☐ Single van Veen (circle one and size):				Penetration (cm): <u>10.0</u>	Sample Time: (local) <u>06:04:10</u>

Sample Description

Color: Light Brown Tannish Orange Greenish Gray Olive Gray Light Gray Dark Gray Black
 Other: DARK BROWN

Type: ☒ Cobble ☒ Gravel ☒ Sand (coarse med fine) ☐ Silt ☐ Clay ☐ Wood chips ☐ Shells or ☒ Shell Hash
 Other:

Odor: None ☒ Slight ☐ Strong Petroleum H₂S Other:

Density: Hard Solid ☒ Firm ☐ Soft Loose Other:

Debris Present: ☒ Yes ☐ No Type: Cobbles

Overlying Water Present: ☒ Yes ☐ No

Misc: Biota Amphipods, clams, worms Detritus tunicate, scallop

Sediment Sample – Particle Size (500 gram sample, 250 grams minimum)

Sample Interval Range (i.e. 0-5 cm or 0-10 cm):

Sample ID:

Grab Number (A= Accepted; R = Rejected)				
Codes: DB = Debris Interference; DS = Disturbed Surface; NS = No Sediment in sampler; OP = Over Penetration; OT = Other				
1	2	3	4	Notes
<u>X</u>				

Field Activities / Comments / Observations:

 Field Team Leader Signature and Approval: [Signature]

Page ____ of ____

Sediment Log Form – Sampling for Particle Size

INSPIRE Project Number:	Project Name: <u>Empire Wind Benthic Survey</u>	Vessel: <u>N-Star Commander</u>	Date: <u>14 Jul 2019</u>
Station ID: <u>011</u>	Water depth (m): <u>67.9 m</u>	Time On Station (local):	Time Off Station (local):
Latitude (N; NAD83):	Longitude (W; NAD83):	Photograph (Y/N – file)	
Sampling Staff: <u>K. Sturdivant, Chuck Hollaway</u>			
Sampling Gear: <u>Double van Veen</u> Single van Veen		Penetration (cm): <u>15</u>	Sample Time: (local)

Sample Description

 Color: Light Brown Tannish Orange Greenish Gray Olive Gray Light Gray Dark Gray Black

Other:

 Type: Cobble Gravel Sand (coarse med fine) Silt Clay Wood chips Shells or Shell Hash

Other:

 Odor: None Slight Strong Petroleum H₂S Other:

 Density: Hard Solid Firm Soft Loose Other:

 Debris Present: Yes No Type:

 Overlying Water Present: Yes No

 Misc: Biota Worms amphipods isopods caprellids Detritus

Sediment Sample – Particle Size (500 gram sample, 250 grams minimum)
Sample Interval Range (i.e. 0-5 cm or 0-10 cm):

Sample ID:
Grab Number (A= Accepted; R = Rejected)

Codes: DB = Debris Interference; DS = Disturbed Surface; NS = No Sediment in sampler; OP = Over Penetration; OT = Other

1	2	3	4	Notes
<u>OP</u>	<u>A</u>			

Field Activities / Comments / Observations:

Field Team Leader Signature and Approval _____

Page ____ of ____

APPENDIX F

Sediment Grab Chain of Custody Form

Chain of Custody Record & Laboratory Analysis Request

INSPIRE Environmental
513 Broadway, Suite 314
Newport, RI 02840
401-849-9236

Lab Name *Aqua Survey*
Lab Address *469 Point Breeze Rd.*
Lab Address *Flemington, NJ 08822*
Lab Phone Number *908-788-8700*



Lab Assigned Number:		Turn-around Requested: Normal			Date: <i>15 Jul 2019</i>					
Client Company: INSPIRE Environmental		Phone: 401-849-9236			Page: <i>1</i> of <i>1</i>					
Purchase Order Number:		PO-0019								
Client Contact: <i>Eguro</i>					No. of Coolers: <i>1</i>		Cooler Temps: <i>2°C</i>			
Client Project Name: <i>Empire Wind Benthic Survey</i>					Analysis Requested				Notes/Comments	
Client Project #: 08C04-1815		Samplers:			Grain Size Sieve (ASTM D6913)	Grain Size Hydrometer (ASTM D7928)				
Sample ID	Date	Time	Matrix	No. Containers						
<i>003</i>	<i>14 Jul 2019</i>	<i>04:28:52</i>	<i>SED</i>							
<i>006</i>	<i>14 Jul 2019</i>	<i>05:16:38</i>								
<i>010</i>	<i>14 Jul 2019</i>	<i>06:04:04</i>								
<i>011</i>	<i>14 Jul 2019</i>	<i>06:58:58</i>								
<i>147</i>	<i>14 Jul 2019</i>	<i>16:24:04</i>								
<i>157</i>	<i>14 Jul 2019</i>	<i>11:51:11</i>								
<i>020</i>	<i>14 Jul 2019</i>	<i>16:57:44</i>								
<i>038</i>	<i>14 Jul 2019</i>	<i>10:38:32</i>								
<i>060</i>	<i>13 Jul 2019</i>	<i>14:37:17</i>								
<i>076</i>	<i>13 Jul 2019</i>	<i>14:16:00</i>								
<i>091</i>	<i>13 Jul 2019</i>	<i>13:40:36</i>								
<i>095</i>	<i>13 Jul 2019</i>	<i>13:00:56</i>								
<i>108</i>	<i>13 Jul 2019</i>	<i>12:27:52</i>								
<i>136 057</i>	<i>13 Jul 2019</i>	<i>15:12:58</i>								
<i>133</i>	<i>13 Jul 2019</i>	<i>15:57:58</i>								
<i>136</i>	<i>13 Jul 2019</i>	<i>16:32:21</i>								
Comments/Special Instructions		Relinquished by: (Signature)			Received by: (Signature)		Relinquished by: (Signature)		Received by: (Signature)	
		<i>[Signature]</i>			<i>[Signature]</i>					
		Printed Name: <i>Kersey Sturdivant</i>			Printed Name: <i>Michelle Thomas</i>		Printed Name:		Printed Name:	
		INSPIRE Environmental			Company: <i>RSI</i>		Company:		Company:	
Date & Time: <i>7/15/19 1308</i>		Date & Time: <i>7/15/19 1308</i>			Date & Time:		Date & Time:		Date & Time:	

ATTACHMENT T-4
COP BENTHIC SURVEY REPORT: EW 1 SUBMARINE EXPORT CABLE SITING
CORRIDOR

Alpine Report: *Empire Wind 2020 Surveys Environmental Campaign* – RV Shearwater



Client: **Equinor Wind US LLC**



Project Title: **Empire Wind 2020 Surveys
Environmental Campaign
RV Shearwater**

Project Date: **2020 Nov. to December**

Project No.: **1894 / EQ20540**

Doc. Type: **Operations Report**

Doc. Date: **2021.05.14**

Doc. No: **AOSS-1894-OPS-02-00**

Rev.: **Rev. 0**



DOCUMENT SUMMARY

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Verification	Checked	K Rikson
	Approved	J Bailey

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Project Number	Doc. Type	Doc. Date	Revision
1894	Operations Report	2021.05.14	Rev. 0

Distribution

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New Jersey	Texas	

Executive Summary

Alpine Ocean Seismic Survey, Inc. (Alpine) performed a high-resolution geophysical survey for Equinor US Wind LLC (Equinor) for the Empire Wind Offshore Wind Project Export Cable Route offshore New York. The project consisted of a geophysical and an environmental scope of work completed on Alpine's survey vessel, RV Shearwater, and a bathymetric scope of work completed on Alpine's survey vessel, MV William M.

The surveys were performed to support development of an export cable extending from the site of a proposed wind farm, infilling and adding to coverage of previous years' surveys. The infill areas were all designed to meet relevant BOEM specifications.

Surveys on the RV Shearwater which were utilized for this geophysical report took place from 25-Nov-2020 to 10-Dec-2020.

Ref.	Name
AOSS-1894-OPS-01	RV Shearwater HRG Operations Report, 2020
AOSS-1894-OPS-02	RV Shearwater Environmental Operations Report, 2020
AOSS-1894-OPS-03	MV William M Operations Report, 2020
AOSS-1894-INT-04	Interpretation Report, Gowanus ECR
AOSS-1894-INT-05	Seabed Mobility Report, Gowanus ECR
AOSS-1894-OPS-06	RV Shearwater HRG Operations Report, 2021
AOSS-1894-OPS-07	RV Shearwater Environmental Operations Report, 2021
AOSS-1894-OPS-08	MV William M Operations Report, 2021
AOSS-1894-INT-09	Interpretation Report, Barret ECR
AOSS-1894-INT-10	Seabed Mobility Report, Barret ECR

This report is the **RV Shearwater Environmental Operations Report, 2020**, comprising operational information and results for the environmental surveys on the Gowanus Route, i.e., Task 4.

Service Warranty & Report Use Notice

This report has been prepared with due care and diligence and with the skill reasonably expected of a reputable contractor experienced in the types of work carried out under the contract. As such the findings in this report are based on an interpretation of data which is a matter of opinion on which professionals may differ and unless clearly stated is not a recommendation of any course of action.

Alpine Ocean Seismic Survey, Inc. (Alpine) has prepared this report for the client(s) identified on the front cover in fulfillment of its contractual obligations under the contract, and the only liabilities Alpine accept are those contained therein.

Please be aware that further distribution of this report, in whole or part, or the use of the data for a purpose not expressly stated within the contractual work scope is at the client's sole risk and Alpine recommends that this disclaimer be included in any such distribution.

ALPINE OCEAN SEISMIC SURVEY, INC.
155 Hudson Avenue, Norwood, NJ 07648 USA
Telephone 1 201 768 8000 Fax 1 201 768 5750
www.alpineocean.com

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GLOSSARY OF ABBREVIATIONS

Abbreviation	Meaning
BOEM	Bureau of Ocean Energy Management
cfm	Cubic feet per minute
CHIRP	Compressed High Intensity Radar Pulse
COP	Construction and Operations Plan
CORS	Continuously Operating Reference Station
DGPS	Differential Global Positioning System
DPR	Daily Progress Report
DTM	Digital Terrain Model
ECR	Export Cable Route
ECRC	Export Cable Route Corridor
ft	Feet
GAMS	GPS Azimuth Measurement System
GIS	Geographic Information System
GNSS	Global Navigation Satellite System
HRG	High Resolution Geophysical
Hz	Hertz
IMU	Inertial Measurement Unit
IVO	...in the vicinity of...
kHz	Kilohertz
KPI	Key Performance Indicator
kn	Knots
Lat	Latitude
LNM	Local Notice to Mariners
Long	Longitude
m	Meter
MARA	Marine Archaeological Assessment
MBES	Multi-Beam Echo Sounder
MLLW	Mean Lower Low Water
MV	Motor Vessel
MVP	Moving Vessel Profiler
nT	Nanotesla
N/A	Not Applicable
NAD83	North American Datum of 1983
NAVD88	North American Vertical Datum of 1988
NGS	National Geodetic Survey
NMFS	National Marine Fisheries Service

Abbreviation	Meaning
NOAA	National Oceanographic and Atmospheric Administration
PDOP	Position Dilution of Precision
PPK	Post Processing Kinematic
PPS	Pulse Per Second
psi	Pounds per square inch
PSO	Protected Species Observer
QA	Quality Assurance
QC	Quality Control
QMA	Qualified Marine Archaeologist
RTK	Real-Time Kinematic
RTN	Real-Time Network
RV	Research Vessel
S-UHRS	Single-Channel Ultra High Resolution Seismic
SBES	Single-Beam Echo Sounder
SBP	Sub-Bottom Profiler
SEG	Society of Exploration Geophysicists
SEG-Y	SEG storage format
SOW	Scope of Work
SSS	Side Scan Sonar
SVP	Sound Velocity Profile
TVG	Transverse Gradiometer
USCG	United States Coast Guard
USGS	United States Geological Survey
UTC	Coordinated Universal Time
UTM	Universal Transverse Mercator Projection
VDatum	Vertical Datum Transformation
WGS84	World Geodetic System 1984
XTF	eXtended Triton Format

Technical Terminology

Geodetic datum	A set of constants used for calculating the coordinates of points on the Earth.
GRS80	Geodetic Reference System 1980 refers to the global reference ellipsoid that was originally used for the definition of the World Geodetic System 1984 (WGS 84), and is defined by its semi-major axis and flattening.
NAVD88	A fixed reference for elevations determined by geodetic leveling which was derived from a general adjustment of the first-order terrestrial leveling nets of the United States, Canada, and Mexico. In the adjustment, only the height of the primary tidal bench mark at Father Point, Rimouski, Quebec, Canada was held fixed, thus providing minimum constraint. NAVD88 benchmark values are given in Helmert orthometric height units.
National Tidal Datum Epoch	The specific 19-year period adopted by the National Ocean Service as the official time segment over which tide observations are taken and reduced to obtain mean values for tidal datums. It is necessary for standardization because of periodic and apparent secular trends in sea level. The present NTDE is 1983 through 2001 and is actively considered for revision every 20-25 years. Tidal datums in certain regions with anomalous sea level changes (Alaska, Gulf of Mexico) are calculated on a Modified 5-Year Epoch.

Technical terminology is referenced with respect to the organization that defines the specific concept (e.g., NOAA for “MLLW”).

1. INTRODUCTION

Alpine Ocean Seismic Survey, Inc. (Alpine) performed a high-resolution geophysical survey for Equinor US Wind LLC (Equinor) for the Empire Wind Offshore Wind Project Export Cable Route offshore New York. The project consisted of a geophysical and an environmental scope of work completed on Alpine's survey vessel, RV Shearwater, and a bathymetric scope of work completed on Alpine's survey vessel, MV William M.

The survey scope was subdivided into separate tasks:

Task 1: Bathymetric survey of the SBMT and 39th St Pier quay walls (not described in this report);

Task 2: HRG and MARA surveys at the ECR alternatives and Homeport Pier site (not described in this report);

Task 3: Submarine asset crossing surveys (not described in this report);

Task 4: Environmental survey scope.

However, during the course of the survey, the geophysical scope was expanded with the following items:

Extra 1: Gravesend Bay HRG survey extension (not described in this report);

Extra 2: The Narrows HRG survey extension (not described in this report);

Extra 3: Coney Island HRG and MARA survey extension (not described in this report);

Extra 4: SBP & UHRS survey across the original route centerline (not described in this report);

Extra 5: Seabed Mobility Assessment (not described in this report);

The survey areas were located from the most inshore location at SBMT to the furthest offshore extent of approximately 15km along the Route Straightening area.

The surveys were performed to support development of an export cable extending from the site of a proposed wind farm, infilling and adding to coverage of previous years' surveys.

Operations were carried out on a 12 h basis, utilizing a surficial sediment grab sampler, water quality profiler, and underwater camera video. The purpose of the environmental

dataset was to help benthic enumeration, document the habitats present across the survey area, and to analyze water quality.

RV Shearwater mobilized at Liberty Landing Marina, Jersey City, NJ, on 25-Nov-2020, and demobilized in the same port after the successful completion of the environmental survey scope on 10-Dec-2020.

The surveys were in line with lease requirements and according to specifications described in BOEM's "BOEM's Guidelines for Providing Benthic Habitat Survey Information for Renewable Energy Development on the Atlantic Outer Continental Shelf Pursuant to 30 CFR Part 585", dated June 2020.

Reporting for this project has been subdivided per project phases as noted in Table 1.1.

Table 1.1 Project Reporting

Ref.	Name
AOSS-1894-OPS-01	RV Shearwater HRG Operations Report, 2020
AOSS-1894-OPS-02	RV Shearwater Environmental Operations Report, 2020
AOSS-1894-OPS-03	MV William M Operations Report, 2020
AOSS-1894-INT-04	Interpretation Report, Gowanus ECR
AOSS-1894-INT-05	Seabed Mobility Report, Gowanus ECR
AOSS-1894-OPS-06	RV Shearwater HRG Operations Report, 2021
AOSS-1894-OPS-07	RV Shearwater Environmental Operations Report, 2021
AOSS-1894-OPS-08	MV William M Operations Report, 2021
AOSS-1894-INT-09	Interpretation Report, Barret ECR
AOSS-1894-INT-10	Seabed Mobility Report, Barret ECR

This report is the **RV Shearwater Environmental Operations Report, 2020**, comprising operational descriptions and results for the environmental surveys on the Gowanus Route, i.e., Task 4.

1.1. Survey Acquisition Plan

The RV Shearwater conducted environmental operations in the Gowanus Export Cable Route (ECR) extending from the offshore lease site OCS-A-0512 connecting to the mainland at the South Brooklyn Marine Terminal (SBMT). The supplemental environmental work was conducted as an add-on to the geophysical survey previously completed. The scope of work included surficial sediment grab samples (78), water quality profiles (26), and 600-meter underwater video transects (26). Up to three attempts were authorized at each site, if needed. At three of the sampling sites, a successful sample could not be collected after the third attempt. This resulted in a total of 75 out of a total 78 proposed locations being successful.

The survey acquisition plan for the project was based on requirements articulated by Equinor and Tetrattech, including sample locations and underwater video transects provided by Equinor.

1.2. Fieldwork Summary

The mobilization for this portion of the project took place on 25-Nov-2020 alongside the dock at Liberty Landing Marina in Jersey City, NJ. This consisted of routine checks of equipment as well as a positional check, in addition to the calibrations and testing performed during the geophysical mobilization.

Once all mobilization checks were complete, R/V Shearwater departed the dock and headed for Gravesend Bay where the vessel anchored for the night. Survey work began the following morning, 26-Nov-2020, starting with the sites in Gravesend Bay. The entire survey consisted of 78 grab sample locations, 26 water quality profiles, and 26 underwater video transects. The environmental survey continued until 09-Dec-2020, when the vessel returned to the dock for demobilization. Demobilization was completed for the environmental survey on 10-Dec-2020.

The fieldwork breakdown is shown in Table 1.2.

Table 1.2 Fieldwork Summary

Description	Detail
Survey Vessel	R/V <i>Shearwater</i>
Mobilization & Sea Trials	25-Nov-2020
Survey Operations	26-Nov-2020 to 09-Dec-2020
Demobilization	09-Dec-2020 to 10-Dec-2020

1.3. Time Breakdown

A breakdown of the time expenditures for the project is presented in Table 4 and Figure 3.

Table 1.3 Time Breakdown by Percentage

Activity	Project Hours	Percentage
Mob / Demob	58:00	15.10
Operational	100:05	26.06
Weather Standby	118:47	30.93
Contractor Time	2:30	0.65
Non-Operational (On-hire)	104:38	27.25

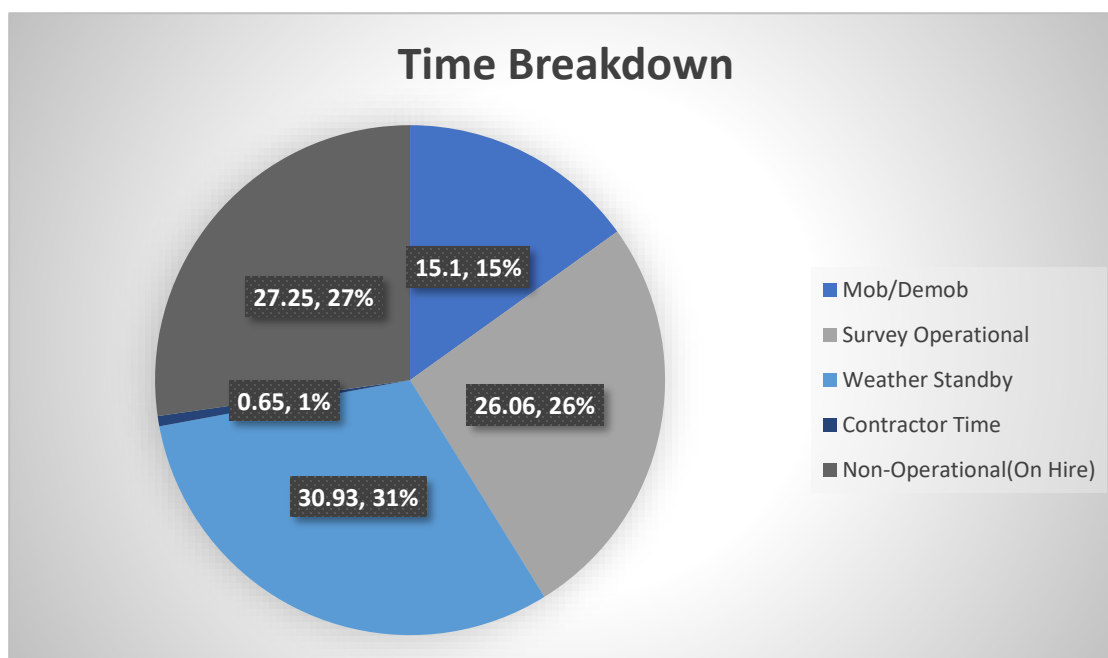


Figure 1.1 Time Breakdown by Percentage

1.4. Project Field Personnel

Table 1.4 details the key personnel who were present onboard the R/V *Shearwater* during Equinor's Empire Wind 2020 Gowanus ECR Survey, and who participated in and contributed to day-to-day survey operations and data processing.

Table 1.4 Key Field Personnel

Personnel	Name
Party Chief	C Keane
Surveyor	C Miro S Childers M Shand I Wachino
Benthic Biologist (RPS)	J Diaz y Gonzales S Berkman
Equinor Representative	S Budge T Nguyen
Captain	M Porter W Porter M Afify D Tameriano

2. VESSEL & EQUIPMENT SUMMARY

RV *Shearwater* (Figure 2.1) is a multi-purpose survey vessel with capabilities to perform bathymetric, geophysical, geotechnical, and environmental surveys. In addition to moon pool mounted and towed sensor capability the RV *Shearwater* has two fast-action hydraulic winches and a heavy-duty crane (S.W.L. 8,000 lbs) for overhead operations. Vessel specifications are outlined in Table 2.1.

Table 2.1 RV Shearwater Specifications

Vessel Specifications	
Flag	United States of America
Class	Multi-Role Survey
Built	1981 (Reconfigured 2011)
Overall Length / Breadth	33.53m / 11.89m
Draft	2.74m
Gross Tonnage	198t
Main Engine	2 x 526 HP John Deere Model 6125AFM
Bow Thrust / Stern Thrust	Thrustmaster 100 HP / Hydraulically Driven “Z” Drives
Accommodation	22 berths
Nominal Endurance	14 days



Figure 2.1 RV Shearwater

3. HSE SUMMARY

The safety standards and procedures onboard the R/V *Shearwater* adhere to company policy which is set forth in, and informed by, Alpine's Health and Safety Manual for Marine Geophysical Operations, which is, in turn, administered, maintained, and developed by the company's Health and Safety Officer. During the Gowanus ECR Environmental Survey, Equinor's safety policies were incorporated into the project's overall HSE framework. To maintain these standards every crew member was given a safety induction upon joining the vessel and regular safety drills were carried out during the cruise. Toolbox meetings were conducted prior to all equipment deployments and recoveries and before any deck operations were commenced.

3.1. HSE Events

Over the course of the survey, a total of 5 vessel safety inductions were given and 2 vessel safety drills were conducted. The main focus of the inductions and drills, along with frequent informal crew and staff discussions, was deck operations and the implementation of Alpine's COVID-19 protocols. In addition to the preceding, discussions were also held to address significant safety observation cards that had been submitted and received, particularly if the content of the observation card was directly related to operations.

A total of 11 toolbox meetings were held, and a total of 7 safety observation cards were submitted by the onboard personnel during operations. Additionally, there were no first aid cases, lost time incidents or hazardous occurrences during the project. Table 3.1 below presents a summary of the HSE events that occurred during Equinor's Empire Wind 2020 Gowanus ECR Survey.

Table 3.1 HSE Event Summary

Item	Total Events
Vessel Safety Inductions	5
Safety Drills	2
Toolbox Talks	11
Safety Observation Cards	7

The survey and marine crew averaged 17 persons for the survey operations. The total

number of man-hours worked during the project was 1,776 hours.

3.2. Protected Species Observations

During the project, there were 2 PSOs from RPS onboard RV *Shearwater*. They carried out protected species observations during pre-watch and operational hours. Table 3.2 presents a summary of the PSOs observations and the mitigating actions taken by the R/V Shearwater during the survey.

Table 3.2 PSO Observations

Description	Detection Events	# of Animals	Mitigations
Sea Turtles Visual Sightings	0	0	0
Delphinid Visual Sightings	2	12	0
Whales	8	16	0
Total Sightings	10	28	0

4. SURVEY PARAMETERS

4.1. Project Geodetics

The geodetic and datum parameters for the survey were provided in Equinor's "RE-PM710-00002_01 EW Geodetic Note" and are summarized below in Tables 4.1 to 4.3.

Table 4.1 Project Survey Datums

Datums	
Geodetic Datum	NAD83 (2011) Epoch 2018.0
Projection	UTM Zone 18 North
Measurement Units	Meters (m)
Vertical Datum	NAVD88 (North American Vertical Datum of 1988); as determined using the USA – VDatum.

Table 4.2 Project Ellipsoid Parameters

Ellipsoid	
Ellipsoid	GRS 1980
Semi-Major Axis	a = 6378137.000 m
Semi-Minor Axis	b = 6356752.314 m
Eccentricity	e = 0.081819191043
Inverse Flattening	1/f = 298.257222101
Vertical Datum	NAVD88
EPSG Code	NAD83 (2011) UTM Zone 18 North Projected (6347) / NAD83 (2011) Geographic (6318)

Table 4.3 Survey Projection Parameters

Projection	
Projection	UTM Zone 18N
Projection Type	Transverse Mercator
EPSG Code	6347
Origin Latitude	00° 00' 00.000" North

Origin Longitude	075° 00' 00.000" West
Origin False Easting	500 000.000
Origin False Northing	0.000
Scale Factor	0.9996
Grid Unit	Meters

A datum transformation was performed real-time during survey operations within the QINSy navigation software used onboard the R/V *Shearwater*, which converted positioning data from ITRF 2014 to NAD83 epoch 2018 via a seven-parameter transformative shift. (Table 4.4).

Table 4.4 Transformation Parameters – ITRF to NAD83 (2011) Epoch 2018.0

<i>ITRF2014 to NAD83(2011), epoch 2018.0 (Position Vector transformation)</i>		
X-axis translation (dx)	1.01162	Meter
Y-axis translation (dy)	-1.91401	Meter
Z-axis translation (dz)	-0.55309	Meter
X-axis rotation (rX)	- 0.02731474	arc-second
Y-axis rotation (rY)	0.00647979	arc-second
Z-axis rotation (rZ)	- 0.01052142	arc-second
Scale difference	- 0.00020717	Parts per million

5. SURVEY EQUIPMENT & VESSEL CONFIGURATIONS

The Gowanus ECR survey was conducted using a pole-mounted MBES and USBL system, which was mobilized and used for the Geophysical work.

Table 5.1 lists all survey equipment that was mobilized and employed on the R/V *Shearwater* during Equinor's Empire Wind 2020 Gowanus ECR Survey.

Table 5.1 Project Survey Equipment

System	Equipment Model
Primary Horizontal Control	Applanix POS MV OceanMaster GPS Aided Motion Compensation System with C-Nav DGPS Corrections
Secondary Horizontal Control	Applanix POS MV OceanMaster GPS Aided Motion Compensation System with C-Nav DGPS Corrections
Integrated Navigation System	QPS QINSy Navigational and Data-logging Software
Heading Reference	Applanix POS MV OceanMaster
Multi-Beam Echo Sounder (MBES)	R2 Sonic 2024 Multi-Beam Echo Sounder
Ultra-Short Baseline (USBL)	Sonardyne Scout Pro USBL Acoustic Positioning System
Sound Velocity Profiler (MVP/SVP)	AML Moving Vessel Profiler (MVP) Sontek Castaway CTD (SVP)
Grab Sampler	Ocean Instruments Salish Grab Standard SG-20 (Modified Van Veen Sampler)
Water Quality Profiler	Sea-Bird SBE 19 plus V2
Underwater Camera	Deeptrekker Digital Colour 4k Camera GoPro Black 7 TLS-500 underwater camera sled
PSO Equipment	Reticule Binoculars

5.1. Survey Equipment

5.1.1. GNSS Navigation, Motion & Heading

Primary navigation for this project was supplied by an Applanix POS MV OceanMaster system receiving CNAV differential corrections. Secondary navigation for this project was supplied by another independent Applanix POS MV OceanMaster system receiving CNAV differential corrections. Dual independent receivers were used in order to give full redundancy on the navigation systems.

Heave, pitch and roll data for the vessel was provided using the inertial measurement unit (IMU) integrated with the POS MV OceanMaster. The IMU data was input with respect to the vessel's common reference point (CRP) to provide accurate motion to all necessary sensors. An additional IMU was setup for redundancy.

Additionally, each POS MV OceanMaster provided heading information by integrating data from both inertial and GNSS sensors. The systems comprised a gyro-contained, inertial measurement unit and two Trimble GNSS receivers mounted on an antenna platform with a specified separation across the centerline of the vessel. A combination of gyro calculations and a GPS azimuth measurement solution (GAMS) from the antennas provided a highly accurate heading value to the POS MV.

5.1.2. Sound Velocity Profiler

An AML Moving Velocity Profiler (MVP) was used to generate a profile of the speed of sound through the water column, which was applied in QINSy and the USBL software to correct for sound velocity temporal changes and to verify the quality and accuracy of the MBES data in real-time. The SVP was deployed approximately every 30 minutes, or as needed depending on environmental conditions, and could be acquired while the vessel was surveying online.

The MVP was mounted on the port stern corner of the vessel and was deployed through a sheave block where it could be launched from a locked position from a topside unit inside the survey lab. The operating parameters of the MVP system can be seen in Table 5.2.

Table 5.2 AML MVP Operating Parameters

Instrumentation	
Sound Velocity Probe	AML Moving Vessel Profiler
Operating Parameters	
Range	1375–1625m/s
Resolution	0.001m/s
Accuracy	±0.025m/s
Method	Chen-Millero
Temperature	
Range	-5°C to +45°C
Resolution	0.001°C
Accuracy	±0.005°C
Pressure	
Range	0–500dBar
Resolution	0.02%FS
Accuracy	±0.05%FS

5.1.3. Multi-Beam Echo Sounder

An R2 Sonic 2024 multi-beam echo sounder (MBES) was pole-mounted through a center-hull moonpool on the R/V *Shearwater* and was used to provide water depths at sampling locations. The MBES settings were established during the geophysical campaign sea trials to obtain the most ideal data while meeting the project specifications.

Table 5.3 R2 Sonic MBES Operating Parameters

Instrumentation	
Multi-Beam Echo Sounder	R2 Sonic 2024
Transducer Mount	Pole mounted through moonpool
Motion Reference Unit	POS MV OceanMaster
Sound Velocity Probe	AML SVS
Operating Parameters	
Port Transducer Frequency	350 kHz
Acquisition Software	QPS - QINSy
Velocity Sensor At Td	On
General Water Depths	5–35m
Angular Coverage	120°
No. of Beams	256

5.1.4. Ultra-Short Baseline Positioning System

The underwater camera was positioned using a pole mounted Sonardyne Scout Pro USBL transceiver and separate acoustic beacons to provide accurate target location. Discrete target location testing and USBL calibration parameters established during sea trials met or exceeded all of Alpine's equipment requirements.

During the geophysical mobilization, the USBL system was calibrated for pitch, roll and yaw using the QPS QINSy USBL calibration software.

Specifications of the USBL positioning system can be seen in Table 5.4.

Table 5.4 Sonardyne USBL Operating Parameters

Instrumentation	
Transceiver	Sonardyne Scout Pro
Transponder Beacons	Applied Acoustics 1019 Mini transponder
Operating Parameters	
Ping Rate	1s
Depth Rating	1,000m
Depth Aided	No
Beam Shape	Omni-directional

5.1.5. Grab Sampler

Conducted using a Salish Modified Van Veen Grab.

Three samples taken at each station resulting in 78 grab samples. 75 samples successful.

Onsite description of geology as well as benthic habitat can be found in the daily log. Samples were further analyzed at a laboratory for grain size, Total Organic Carbon (Terrasense) and benthic enumeration (ESS). All benthic samples were treated with a 10% Formalin solution as well as Rose Bengal. Grain size samples were all refrigerated.

5.1.6. Water Quality Profiler

Water quality profiles were conducted using the Sea-Bird SBE 19 plus V2 system. The Sea-Bird collected Conductivity, Temperature, Salinity, DO, and pH.

One profile was taken at the center site of each station prior to any other sampling taking place in order to be sure the sample was acquired without any bottom disturbance from sediment sampling.

5.1.7. Underwater Camera

Underwater video was collected using the TLS-500 towed underwater camera sled. Twenty-six 600 m long transects were investigated, each oriented to cross the primary grab sample location and offset locations.

General benthic habitat descriptions can be found in the daily log. Final analysis for macrofaunal count and benthic habitat were performed by ESS and provided to RPS for the final Benthic Report (Appendix E).

6. PROCESSING METHODOLOGY

This section describes the processing sequences used for continuous data quality control as well as quality assurance.

6.1. Navigation

No processing of navigation data for the purposes of smoothing the track of the camera on transects was undertaken.

6.2. Grab Sampling

Grab sampling procedures are described in the Benthic Analysis Report included as Appendix E.

6.3. Water Quality Profiling

Water quality profiles were taken into SeaProc software, part of the SeaSoft software suite in order to produce ASCII format processed data files with all required data columns, including depth, pressure, density, oxygen saturation, acidity, conductivity and sound velocity.

6.4. Underwater Camera Video

Underwater camera procedures are described in the Benthic Analysis Report included as Appendix E.

7. OPERATIONAL SUMMARY

7.1. Limiting Factors

Throughout the survey, several limiting factors impacted project and operations efficiency.

Strong currents within New York Harbor were a factor which occasionally impeded survey progress. This was particularly true in the vicinity of the Verrazano Narrows Bridge where the Harbor is very narrow and tidal exchange is characterized by extremely strong tidal currents often in excess of 2–3 kn. Survey areas that suffered from the influence of these currents included the nearshore sections of the Gravesend Bay and the Narrows Extension. The strong currents often posed a risk to safe navigation due to the limitations of RV *Shearwater* and the proximity in these areas to the shore, rocks, bridge pilings, and anchored or moored vessels. Consequently, survey operations in these areas needed to be timed to coincide with neap tides or periods of slack tide, thereby impacting survey efficiency and acquisition flexibility.

7.2. Technical Issues

The Environmental work had originally planned to utilize a single beam echo sounder to provide real-time water depths during Benthic survey operations. However, since these Benthic operations began immediately after demobilizing the geophysical equipment on the Shearwater, the multi-beam echo sounder was left onboard to provide water depths.

Appendices

APPENDIX A DAILY PROGRESS REPORTS



DAILY REPORT

Vessel: **RV Shearwater**
Client: **Equinor**
Location: **New York Harbor and Approach, NY**
Project: **Empire Wind 2020 Survey Campaign 1 ECR**

Project No: **1894**
Todays Date: **25 November 2020**
Report No: **1**
Start Date: **25 November 2020**

All times are **EST** (GMT - **05:00** hrs)

AA. VESSEL LOCATION AT 24:00 HRS:

Description: **New York Harbor and Approach, NY** Latitude: **40 42 39.3667** Longitude: **74 02 38.7350**

BB. WEATHER:

Time (Local)	BAROM	WIND		WAVE	VISIB.	SKY	REMARKS
	mb	Speed mph	Dir	HEIGHT m	nmi	CONDS	
00:00							
08:00	1016.3	0-5	var	0.0-0.5	10	Clear	Sunny
16:00	1016.1	10-15	SSW	0.0-0.5	10	Clear	Sunny
24:00							

CC. PERSONNEL & EQUIPMENT:**C1. Alpine OSS Personnel:**

Party Chief: C. Keane	Surveyor: M. Shand	Cook: S. Hamilton
Navigator: C. Miro	1st Captain: M. Porter	PSO: A. Jackson
Surveyor: S. Childers	2nd Captain: M. Afify	PSO: B. Roberts
Surveyor: I. Wacchino	3rd Captain: D. Tameriano	
Benthic Biologist(RPS): S. Berkman	Deckhand: S. Kelleher	
Benthic Biologist(RPS): J. Diaz y Gonzalez	Deckhand: M. Budzinsky	

C2. Additional Personnel**C3. Client Personnel:**

Client Rep. **S. Budge**

C4. Personnel On Board:

ALPINE: **5** CLIENT: **1** VESSEL: **6** OTHERS: **4** TOTAL **16**

C5. ALPINE'S Equipment:

R2 Sonic 2024 MBES	Sontek Castaway CTD	SBE 19plus V2 SeaCat CTD	
Sonardyne Scout Pro USBL	C-Nav 3050 DGPS	Reticule Binoculars	
Applanix POS MV Oceanmaster	QPS QINSy and QIMERA software		
AML Moving Vessel Profiler (MVP) SVP	Alpine Video Software		

C6. Additional Equipment

Salish Grab Sampler (RPS)
TS-500 Towed Camera Imaging System (RPS)

C7. Project Variations (include notices of changes of personnel / equipment)

Off Vessel		On Vessel	
Personnel:	T. Kane	Personnel:	I. Wacchino, S. Childers
Equipment:		Equipment:	

DD. DIARY OF EVENTS TODAY:

INSERT A ROW

From	To	hrs	Code	
00:00	6:00	6:00	M	Non-operational time
6:00	18:00	12:00	M	Mobilization activities; equipment installation and checks/testing, vessel refueled.
18:00	24:00	6:00	M	Non-operational time

EE.	PROJECT DATA:						
E1.	Time Summary:						
Rate	Code		Previous Hours	Today Hours	Total Hours		Percent of Total
Mob / Demob	M			24:00	24:00		100.00
Infill Lines	OI						
Weather Standby (Sea)	WS						
Operational	O						
Weather Standby (Port)	W						
Standby HSE	SHSE						
Contractor Time	CT						
Port Call	PC						
Survey Downtime	SD						
Maintenance time	MT						
Disputed Time	DT						
Non-operational(On-hire)	NoH						
To Be Determined	TBD						
MMO Standby	MMO						
TOTAL				24:00	24:00		100.00%
Hrs. of Daily Operations 24			Cumulative Hours Check Value= 24.00				
E2.	Survey Progress:						INSERT A ROW
Description	Cores Left	Area	Total Cores	Cores Prev	Today Cores	Cores To Date	% Completed
Grab Samples	78.00	Gowanus ECR	78.00				
Video Transects	26.00		26.00				
CTD Casts	26.00		26.00				
Reruns on Contractor							
Reruns on Client							
TOTALS:	130.00		130.00				
FF.	SAFETY (Details & Figures for Vessel and Survey Crews and Client Representatives)						
Incidents & Drills				Previous Events	Today's Events	Events To Date	
Safety Meeting							
Vessel Safety Induction					4	4	
Vessel Safety Drill (MOB, Fire & Abandon Ship)					1	1	
Tool Box Talks							
Permit to Work							
Safety Observation Card							
Hazardous Occurrence Report							
First Aid Case (FAC)							
Medical Treatment Case (MTC)							
Lost Time Incident (LTI)							
No. of survey Man-Hours worked since start of project or LTI.					384:00	384:00	
GG.	VESSEL ROB's at 24:00hrs						
	Fuel (T)	Lube Oil (L)	Water (T)				
Start of Project							
ROB at 00:00 hrs	TBD	TBD	TBD				
Consumed Today							
Received today							
ROB at 24:00 hrs	1.00	1.00	1.00				
HH.	EXPECTED WEATHER NEXT 24 HRS:						
Winds: 10-15kts S, becoming SW in the afternoon. Seas: 0.5-1.0m. Rain/cloudy							
II.	ANTICIPATED PROGRAM NEXT 24 HRS:						
Begin surveying at nearshore stations.							
JJ.	PARTY CHIEF'S COMMENTS: (Optional)						
All equipment assembled and tested. Vessel anchored near survey area. MOB drill conducted.							
KK.	REPRESENTATIVE'S COMMENTS: (Optional)						
For ALPINE				For Equinor			
							
C.Keane (Survey Party Chief)				S. Budge (Client Representative)			
Vessel:	RV Shearwater	Project No:	1894	Date:	25 November 2020		
Client:	Equinor	Location:	York Harbor and Approach	Report No.	001		



DAILY REPORT

Vessel: **RV Shearwater**
Client: **Equinor**
Location: **New York Harbor and Approach, NY**
Project: **Empire Wind 2020 Survey Campaign 1 ECR**

Project No: **1894**
Todays Date: **26 November 2020**
Report No: **2**
Start Date: **25 November 2020**

All times are **EST** (GMT - **5:00** hrs)

AA. VESSEL LOCATION AT 24:00 HRS:

Description: **New York Harbor and Approach** Latitude: **40 35 50.128** Longitude: **74 01 17.900**

BB. WEATHER:

Time (Local)	BAROM	WIND		WAVE	VISIB.	SKY	REMARKS
	mb	Speed mph	Dir	HEIGHT m	nmi	CONDS	
00:00							
08:00	1016.0	10-15	S	0.5-1.0	10	Clear	Generally fair conditions
16:00	1014.0	5-10	SW	0.5-1.0	10	Clear	Generally fair conditions
24:00							

CC. PERSONNEL & EQUIPMENT:**C1. Alpine OSS Personnel:**

Party Chief: C. Keane	Surveyor M. Shand	Cook: S. Hamilton
Navigator: C. Miro	1st Captain: M. Porter	PSO: A. Jackson
Surveyor S. Childers	2nd Captain: M. Affy	PSO: B. Roberts
Surveyor I. Wacchino	3rd Captain: D. Tameriano	
Benthic Biologist(RPS) S. Berkman	Deckhand: S. Kelleher	
Benthic Biologist(RPS) J. Diaz y Gonzalez	Deckhand: M. Budzinsky	

C2. Additional Personnel**C3. Client Personnel:**

Client Rep.	S. Budge	
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C4. Personnel On Board:

ALPINE:	5	CLIENT:	1	VESSEL:	6	OTHERS:	4	TOTAL 16
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C5. ALPINE'S Equipment:

R2 Sonic 2024 MBES	Sontek Castaway CTD	SBE 19plus V2 SeaCat CTD		
Sonardyne Scout Pro USBL	C-Nav 3050 DGPS	Reticule Binoculars		
Applanix POS MV Oceanmaster	QPS QINSy and QIMERA software			
AML Moving Vessel Profiler (MVP) SVP	Alpine Video Software			

C6. Additional Equipment

Salish Grab Sampler (RPS)	
TS-500 Towed Camera Imaging System (RPS)	

C7. Project Variations (include notices of changes of personnel / equipment)

Off Vessel		On Vessel	
Personnel:		Personnel:	
Equipment:		Equipment:	

DD. DIARY OF EVENTS TODAY:

From	To	hrs	Code	
00:00	6:54	6:54	NoH	Non-operational time
6:54	7:54	1:00	O	PSO Pre watch, survey crew prep deck
7:54	8:02	0:08	O	WQ-EW1-8A complete
8:02	9:27	1:25	CT	Navigation issues and improper grab done from failed beacon positioning.
9:27	15:59	6:32	O	9 grab samples, 3 water quality tests, and 1 UWV completed.
15:59	16:30	0:31	CT	Video cable snagged under boat and was recovered, connections cleaned and video tested.
16:30	17:00	0:30	O	PSO Post watch, survey crew continue to process samples.
17:00	24:00	7:00	NoH	Anchored

EE.	PROJECT DATA:							
E1.	Time Summary:							
Rate	Code		Previous Hours	Today Hours	Total Hours		Percent of Total	
Mob / Demob	M		24:00		24:00		50.00	
Infill Lines	OI							
Weather Standby (Sea)	WS			8:10	8:10		17.01	
Operational	O							
Weather Standby (Port)	W							
Standby HSE	SHSE							
Contractor Time	CT			1:56	1:56		4.03	
Port Call	PC							
Survey Downtime	SD							
Maintenance time	MT							
Disputed Time	DT							
Non-operational(On-hire)	NoH			13:54	13:54		28.96	
To Be Determined	TBD							
MMO Standby	MMO							
TOTAL			24:00	24:00	48:00		100.00%	
<i>Hrs. of Daily Operations 24</i>			Cumulative Hours Check Value= 48.00					
E2.	Survey Progress:							
G		Cores Left	Area	Total Cores	Cores Prev	Today Cores	Cores To Date	% Completed
Grab Samples		69.00	Gowanus ECR	78.00		9.00	9.00	11.54%
Video Transects		25.00		26.00		1.00	1.00	3.85%
CTD Casts		23.00		26.00		3.00	3.00	11.54%
Reruns on Contractor								
Reruns on Client								
TOTALS:		117.00	TOTAL	130.00		13.00	13.00	10.00%
FF.	SAFETY (Details & Figures for Vessel and Survey Crews and Client Representatives)							
Incidents & Drills				Previous Events	Today's Events	Events To Date		
Safety Meeting								
Vessel Safety Induction				4		4		
Vessel Safety Drill (MOB, Fire & Abandon Ship)				1		1		
Tool Box Talks					2	2		
Permit to Work								
Safety Observation Card								
Hazardous Occurrence Report								
First Aid Case (FAC)								
Medical Treatment Case (MTC)								
Lost Time Incident (LTI)								
No. of survey Man-Hours worked since start of project or LTI.				384:00	384:00	768:00		
GG.	VESSEL ROB's at 24:00hrs							
			Fuel (T)	Lube Oil (L)	Water (T)			
ROB at 00:00 hrs			TBD	TBD	TBD			
Consumed Today								
Received today								
ROB at 24:00 hrs								
HH.	EXPECTED WEATHER NEXT 24 HRS:							
Winds: 5-10 kts W. Seas: 0.5-1.0m. Mostly clear skies.								
II.	ANTICIPATED PROGRAM NEXT 24 HRS:							
Continue survey in nearshore areas and work our way offshore.								
JJ.	PARTY CHIEF'S COMMENTS: (Optional)							
Sites Completed: Grab-EW1-8-R3, Grab-EW1-8-A3, Grab-EW1-8-L1, Grab-EW1-7-A1, Grab-EW1-7-R1, Grab-EW1-7-L1, Grab-EW1-6-A1, Grab-EW1-6-R1, Grab-EW1-6-L1, WQ-EW1-8A, WQ-EW1-7A, WQ-EW1-6A.								
KK.	REPRESENTATIVE'S COMMENTS: (Optional)							
Grab EW1-7-L1 was relocated, 55m SSE along the proposed video transect, into shallower water to allow safe access for Shearwater. A further 2 grab attempts may be required at EW1-7-R1 and EW1-6-A1, where it was agreed on-board that first attempts be accepted even though they over penetrated. Grain size samples are being refrigerated on-board								
Confirmation of PSO procedures for environmental survey has been sent from Equinor onshore								
For ALPINE					For Equinor			
								
C. Keane					S. Budge			
(Survey Party Chief)					(Client Representative)			
Vessel:	RV Shearwater	Project No:	1894	Date:	26 November 2020			
Client:	Equinor	Location: / York Harbor and Approach	Report No.	002				

Vessel: **RV Shearwater**
 Client: **Equinor**
 Location: **New York Harbor and Approach, NY**
 Project: **Empire Wind 2020 Survey Campaign 1 ECR**

Project No: **1894**
 Today's Date: **27 November 2020**
 Report No: **3**
 Start Date: **25 November 2020**

All times are **EST** (GMT - **5:00** hrs)

AA. VESSEL LOCATION AT 24:00 HRS:

Description: **New York Harbor and Approach** Latitude: **40 31.888** Longitude: **73 47.626**

BB. WEATHER:

Time (Local)	BAROM mb	WIND Speed mph	Dir	WAVE HEIGHT m	VISIB. nmi	SKY CONDS	REMARKS
00:00							
08:00	1019.0	5-10	W	0.5-1.0	10	Cloudy	
16:00	1015.0	5-10	W	0.5-1.0	10	Cloudy	
24:00							

CC. PERSONNEL & EQUIPMENT:
C1. Alpine OSS Personnel:

Party Chief: C. Keane	Surveyor M. Shand	Cook: S. Hamilton
Navigator: C. Miro	1st Captain: M. Porter	PSO: A. Jackson
Surveyor S. Childers	2nd Captain: M. Affy	PSO: B. Roberts
Surveyor I. Wacchino	3rd Captain: D. Tameriano	
Benthic Biologist(RPS) S. Berkman	Deckhand: S. Kelleher	
Benthic Biologist(RPS) J. Diaz y Gonzalez	Deckhand: M. Budzinsky	

C2. Additional Personnel
C3. Client Personnel:

Client Rep. **S. Budge**

C4. Personnel On Board:

ALPINE:	5	CLIENT:	1	VESSEL:	6	OTHERS:	4	TOTAL 16
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C5. ALPINE'S Equipment:

R2 Sonic 2024 MBES	Sontek Castaway CTD	SBE 19plus V2 SeaCat CTD		
Sonardyne Scout Pro USBL	C-Nav 3050 DGPS	Reticule Binoculars		
Applanix POS MV Oceanmaster	QPS QINSy and QIMERA software			
AML Moving Vessel Profiler (MVP) SVP	Alpine Video Software			

C6. Additional Equipment

Salish Grab Sampler (RPS)
 TS-500 Towed Camera Imaging System (RPS)

C7. Project Variations (include notices of changes of personnel / equipment)

Off Vessel	On Vessel
Personnel:	Personnel:
Equipment:	Equipment:

DD. DIARY OF EVENTS TODAY:

From	To	hrs	Code	
00:00	6:37	6:37	NoH	Non-operational time; survey team on standby for daylight
6:37	7:37	1:00	O	PSO pre watch, survey crew prep deck.
7:37	16:20	8:43	O	21 grabs and 7 water quality samples complete
16:20	16:50	0:30	O	PSO post watch, survey team continues with water quality samples.
16:50	17:09	0:19	O	Survey crew finished taking water quality samples. 3 more collected.
17:09	24:00	6:51	NoH	Non-operational time; survey team on standby for daylight

EE.	PROJECT DATA:							
E1.	Time Summary:							
Rate	Code		Previous Hours	Today Hours	Total Hours		Percent of Total	
Mob / Demob	M		24:00		24:00		33.33	
Infill Lines	OI							
Weather Standby (Sea)	WS							
Operational	O		8:10	10:32	18:42		25.97	
Weather Standby (Port)	W							
Standby HSE	SHSE							
Contractor Time	CT		1:56		1:56		2.69	
Port Call	PC							
Survey Downtime	SD							
Maintenance time	MT							
Disputed Time	DT							
Non-operational(On-hire)	NoH		13:54	13:28	27:22		38.01	
To Be Determined	TBD							
MMO Standby	MMO							
TOTAL			48:00	24:00	72:00		100.00%	
<i>Hrs. of Daily Operations 24</i>			Cumulative Hours Check Value= 72.00					
E2.	Survey Progress:							
Description		Cores Left	Area	Total Cores	Cores Prev	Today Cores	Cores To Date	% Completed
Grab Samples		48.00	Gowanus ECR	78.00	9.00	21.00	30.00	38.46%
Video Transects		25.00		26.00	1.00		1.00	3.85%
CTD Casts		13.00		26.00	3.00	10.00	13.00	50.00%
Reruns on Contractor								
Reruns on Client								
TOTALS:		86.00	TOTAL	130.00	13.00	31.00	44.00	33.85%
FF.	SAFETY (Details & Figures for Vessel and Survey Crews and Client Representatives)							
Incidents & Drills				Previous Events	Today's Events	Events To Date		
Safety Meeting								
Vessel Safety Induction				4		4		
Vessel Safety Drill (MOB, Fire & Abandon Ship)				1		1		
Tool Box Talks				2	1	3		
Permit to Work								
Safety Observation Card					1	1		
Hazardous Occurrence Report								
First Aid Case (FAC)								
Medical Treatment Case (MTC)								
Lost Time Incident (LTI)								
No. of survey Man-Hours worked since start of project or LTI.				768:00	384:00	1152:00		
GG.	VESSEL ROB's at 24:00hrs							
			Fuel (T)	Lube Oil (L)	Water (T)			
ROB at 00:00 hrs								
Consumed Today			TBD	TBD	TBD			
Received today								
ROB at 24:00 hrs								
HH.	EXPECTED WEATHER NEXT 24 HRS:							
Winds: 5-10 kts NW. Seas: 0.5-1.0m.								
II.	ANTICIPATED PROGRAM NEXT 24 HRS:							
Start furthest offshore work and work our way back inshore.								
JJ.	PARTY CHIEF'S COMMENTS: (Optional)							
Sites completed today: Grab-EW1-14-A, Grab-EW1-14-R, Grab-EW1-14-L, Grab-EW1-15-A, Grab-EW1-15-R, Grab-EW1-15-L, Grab-EW1-16-A, Grab-EW1-16-R, Grab-EW1-16-L, Grab-EW1-17-A, Grab-EW1-17-R, Grab-EW1-17-L, Grab-EW1-18-A, Grab-EW1-18-R, Grab-EW1-18-L, Grab-EW1-19-A, Grab-EW1-19-R, Grab-EW1-19-L, Grab-EW1-21-A, Grab-EW1-21-R, Grab-EW1-21-L, Grab-EW1-22-A, Grab-EW1-22-R, Grab-EW1-22-L, WQ-EW1-14, WQ-EW1-15, WQ-EW1-16, WQ-EW1-17, WQ-EW1-18, WQ-EW1-19, WQ-EW1-20, WQ-EW1-21, WQ-EW1-22, WQ-EW1-23								
KK.	REPRESENTATIVE'S COMMENTS: (Optional)							
During the static positioning comparison between Hemisphere and C-Nav systems (carried out on Tuesday 24 November at Liberty Landing Marina) no time stamp was logged for Hemisphere positions. I have requested a dynamic positioning system comparison, including time stamps for both systems, between the primary and secondary C-Nav systems on-board.								
For ALPINE					For Equinor			
								
C.Keane					S. Budge			
(Survey Party Chief)					(Client Representative)			
Vessel:	RV Shearwater	Project No:	1894	Date:	27 November 2020			
Client:	Equinor	Location:	York Harbor and Approach	Report No.	003			
Project: Empire Wind 2020 Survey Campaign 1 ECR								



DAILY REPORT

Vessel: **RV Shearwater**
Client: **Equinor**
Location: **New York Harbor and Approach, NY**
Project: **Empire Wind 2020 Survey Campaign 1 ECR**

Project No: **1894**
Todays Date: **28 November 2020**
Report No: **4**
Start Date: **25 November 2020**

All times are **EST** (GMT - **5:00** hrs)

AA. VESSEL LOCATION AT 24:00 HRS:

Description: **NY Harbor and Approach** Latitude: **40 32.373** Longitude: **74 45.526**

BB. WEATHER:

Time (Local)	BAROM	WIND		WAVE	VISIB.	SKY	REMARKS
	mb	Speed mph	Dir	HEIGHT m	nmi	CONDS	
00:00							
08:00	1023.4	5-10	NW	0.5-1.0	10	Clear	Sunny/fair
16:00	1025.7	5-10	WNW	0.5	10	Clear	Sunny/fair
24:00							

CC. PERSONNEL & EQUIPMENT:**C1. Alpine OSS Personnel:**

Party Chief: C. Keane	Surveyor M. Shand	Cook: S. Hamilton
Navigator: C. Miro	1st Captain: M. Porter	PSO: A. Jackson
Surveyor S. Childers	2nd Captain: M. Affy	PSO: B. Roberts
Surveyor I. Wacchino	3rd Captain: D. Tameriano	
Benthic Biologist(RPS) S. Berkman	Deckhand: S. Kelleher	
Benthic Biologist(RPS) J. Diaz y Gonzalez	Deckhand: M. Budzinsky	

C2. Additional Personnel**C3. Client Personnel:**

Client Rep. **S. Budge**

C4. Personnel On Board:

ALPINE:	5	CLIENT:	1	VESSEL:	6	OTHERS:	4	TOTAL 16
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C5. ALPINE'S Equipment:

R2 Sonic 2024 MBES	Sontek Castaway CTD	SBE 19plus V2 SeaCat CTD		
Sonardyne Scout Pro USBL	C-Nav 3050 DGPS	Reticule Binoculars		
Applanix POS MV Oceanmaster	QPS QINSy and QIMERA software			
AML Moving Vessel Profiler (MVP) SVP	Alpine Video Software			

C6. Additional Equipment

Salish Grab Sampler (RPS)
TS-500 Towed Camera Imaging System (RPS)

C7. Project Variations (include notices of changes of personnel / equipment)

Off Vessel		On Vessel	
Personnel:		Personnel:	
Equipment:		Equipment:	

DD. DIARY OF EVENTS TODAY:

From	To	hrs	Code	
00:00	6:04	6:04	NoH	Non-operational time; survey team on standby for daylight
6:04	6:37	0:33	O	Survey crew starts deploying water quality samples while waiting for PSO
6:37	7:37	1:00	O	PSO pre watch, survey team continues with water quality samples, 3 collected.
7:37	16:20	8:43	O	9 grab samples, 3 videos collected
16:20	16:50	0:30	O	PSO post watch
16:50	24:00	7:10	NoH	Non-operational time; survey team on standby for daylight

EE.	PROJECT DATA:						
E1.	Time Summary:						
Rate	Code		Previous Hours	Today Hours	Total Hours		Percent of Total
Mob / Demob	M		24:00		24:00		25.00
Infill Lines	OI						
Weather Standby (Sea)	WS						
Operational	O		18:42	10:46	29:28		30.69
Weather Standby (Port)	W						
Standby HSE	SHSE						
Contractor Time	CT		1:56		1:56		2.01
Port Call	PC						
Survey Downtime	SD						
Maintenance time	MT						
Disputed Time	DT						
Non-operational(On-hire)	NoH		27:22	13:14	40:36		42.29
To Be Determined	TBD						
MMO Standby	MMO						
TOTAL			72:00	24:00	96:00		100.00%
<i>Hrs. of Daily Operations 24</i>			Cumulative Hours Check Value= 96.00				
E2.	Survey Progress:						
Description	Cores Left	Area	Total Cores	Cores Prev	Today Cores	Cores To Date	% Completed
Grab Samples	39.00	Gowanus ECR	78.00	30.00	9.00	39.00	50.00%
Video Transects	22.00		26.00	1.00	3.00	4.00	15.38%
CTD Casts	10.00		26.00	13.00	3.00	16.00	61.54%
Reruns on Contractor							
Reruns on Client							
TOTALS:		71.00	TOTAL	130.00	44.00	59.00	45.38%
FF.	SAFETY (Details & Figures for Vessel and Survey Crews and Client Representatives)						
Incidents & Drills				Previous Events	Today's Events	Events To Date	
Safety Meeting							
Vessel Safety Induction				4		4	
Vessel Safety Drill (MOB, Fire & Abandon Ship)				1		1	
Tool Box Talks				3	1	4	
Permit to Work							
Safety Observation Card				1		1	
Hazardous Occurrence Report							
First Aid Case (FAC)							
Medical Treatment Case (MTC)							
Lost Time Incident (LTI)							
No. of survey Man-Hours worked since start of project or LTI.				1152:00	384:00	1536:00	
GG.	VESSEL ROB's at 24:00hrs						
			Fuel (T)	Lube Oil (L)	Water (T)		
ROB at 00:00 hrs							
Consumed Today			TBD	TBD	TBD		
Received today							
ROB at 24:00 hrs							
HH.	EXPECTED WEATHER NEXT 24 HRS:						
Winds: 5-15 kts SE, becoming 10-15 kts SE midday. Seas: 0.5-1.0m							
II.	ANTICIPATED PROGRAM NEXT 24 HRS:						
Continue working our way inshore starting with grab samples and then moving on to videos.							
JJ.	PARTY CHIEF'S COMMENTS: (Optional)						
Sites completed: Grab-EW1-24-A, Grab-EW1-24-R, Grab-EW1-24-L, Grab-EW1-25-A, Grab-EW1-25-R, Grab-EW1-25-L, Grab-EW1-26-A, Grab-EW1-26-R, Grab-EW1-26-L, UWV-EW1-24, UWV-EW1-25, UWV-EW1-26, WQ-EW1-24, WQ-EW1-25, WQ-EW1-26. Things to Note: Grab-EW1-26-R was attempted a total of 4 times. One failed attempt was caused by a malfunction with the grab sampler. The other three attempts were failed attempts due to sediment type. Also, Grab-EW1-25-L3 was given three attempts and all three were failed due to sediment type. While running UWV-EW1-24, the video feed cut out for one minute causing about 30 meters of lost coverage. 30 meters of coverage was extended on the end of the transect.							
KK.	REPRESENTATIVE'S COMMENTS: (Optional)						
For ALPINE  C.Keane (Survey Party Chief) For Equinor  S. Budge (Client Representative)							
Vessel: RV Shearwater		Project No: 1894		Date: 28 November 2020			
Client: Equinor		Location: York Harbor and Approach		Report No. 004			
Project: Empire Wind 2020 Survey Campaign 1 ECR							

Vessel: **RV Shearwater**
 Client: **Equinor**
 Location: **New York Harbor and Approach, NY**
 Project: **Empire Wind 2020 Survey Campaign 1 ECR**

Project No: **1894**
 Today's Date: **29 November 2020**
 Report No: **5**
 Start Date: **25 November 2020**

All times are **EST** (GMT - **5:00** hrs)

AA. VESSEL LOCATION AT 24:00 HRS:

Description: **Liberty Landing Marina** Latitude: **40 42 39.367** Longitude: **74 02 38.735**

BB. WEATHER:

Time (Local)	BAROM mb	WIND Speed mph	Dir	WAVE HEIGHT m	VISIB. nmi	SKY CONDS	REMARKS
00:00							
08:00	1022.0	5-10	W	0-0.5	10	Clear	Sunny/fair
16:00	1020.0	5-10	SW	0-0.5	10	Clear	Sunny/fair
24:00							

CC. PERSONNEL & EQUIPMENT:
C1. Alpine OSS Personnel:

Party Chief: C. Keane	Surveyor M. Shand	Cook: S. Hamilton
Navigator: C. Miro	1st Captain: M. Porter	PSO: A. Jackson
Surveyor S. Childers	2nd Captain: M. Affy	PSO: B. Roberts
Surveyor I. Wacchino	3rd Captain: D. Tameriano	
Benthic Biologist(RPS) S. Berkman	Deckhand: S. Kelleher	
Benthic Biologist(RPS) J. Diaz y Gonzalez	Deckhand: M. Budzinsky	

C2. Additional Personnel
C3. Client Personnel:

Client Rep. **S. Budge**

C4. Personnel On Board:

ALPINE:	5	CLIENT:	1	VESSEL:	6	OTHERS:	4	TOTAL 16
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C5. ALPINE'S Equipment:

R2 Sonic 2024 MBES	Sontek Castaway CTD	SBE 19plus V2 SeaCat CTD		
Sonardyne Scout Pro USBL	C-Nav 3050 DGPS	Reticule Binoculars		
Applanix POS MV Oceanmaster	QPS QINSy and QIMERA software			
AML Moving Vessel Profiler (MVP) SVP	Alpine Video Software			

C6. Additional Equipment

Salish Grab Sampler (RPS)
 TS-500 Towed Camera Imaging System (RPS)

C7. Project Variations (include notices of changes of personnel / equipment)

Off Vessel	On Vessel
Personnel:	Personnel:
Equipment:	Equipment:

DD. DIARY OF EVENTS TODAY:

From	To	hrs	Code	
00:00	6:37	6:37	NoH	Non-operational time; survey team on standby for daylight and PSO pre-watch completion
6:37	7:37	1:00	O	PSO pre watch, survey team prep deck.
7:37	11:11	3:34	O	9 Grab samples complete and 1 video complete
11:11	11:45	0:34	CT	Stripped screw on camera casing had to be removed and replaced.
11:45	16:32	4:47	O	5 more videos completed
16:32	17:02	0:30	O	PSO post watch, survey crew secure deck for transit back to dock.
17:02	19:30	2:28	NoH	Transit back to dock to wait out weather.
19:30	24:00	4:30	W	Weather standby at Liberty Landing Marina

EE.		PROJECT DATA:						
E1.		Time Summary:						
Rate	Code		Previous Hours	Today Hours	Total Hours		Percent of Total	
Mob / Demob	M		24:00		24:00		20.00	
Infill Lines	OI							
Weather Standby (Sea)	WS							
Operational	O		29:28	9:51	39:19		32.76	
Weather Standby (Port)	W			4:30	4:30		3.75	
Standby HSE	SHSE							
Contractor Time	CT		1:56	0:34	2:30		2.08	
Port Call	PC							
Survey Downtime	SD							
Maintenance time	MT							
Disputed Time	DT							
Non-operational(On-hire)	NoH		40:36	9:05	49:41		41.40	
To Be Determined	TBD							
MMO Standby	MMO							
TOTAL			96:00	24:00	120:00		100.00%	
Hrs. of Daily Operations 24			Cumulative Hours Check Value= 120.00					
E2.		Survey Progress:						
Description		Cores Left	Area	Total Cores	Cores Prev	Today Cores	Cores To Date	% Completed
Grab Samples		30.00	Gowanus ECR	78.00	39.00	9.00	48.00	61.54%
Video Transects		16.00		26.00	4.00	6.00	10.00	38.46%
CTD Casts		10.00		26.00	16.00		16.00	61.54%
Reruns on Contractor								
Reruns on Client								
TOTALS:		56.00	TOTAL	130.00	59.00	15.00	74.00	56.92%
FF.		SAFETY (Details & Figures for Vessel and Survey Crews and Client Representatives)						
Incidents & Drills				Previous Events	Today's Events	Events To Date		
Safety Meeting								
Vessel Safety Induction				4		4		
Vessel Safety Drill (MOB, Fire & Abandon Ship)				1		1		
Tool Box Talks				4	1	5		
Permit to Work								
Safety Observation Card				1	2	3		
Hazardous Occurrence Report								
First Aid Case (FAC)								
Medical Treatment Case (MTC)								
Lost Time Incident (LTI)								
No. of survey Man-Hours worked since start of project or LTI.				1536:00	384:00	1920:00		
GG.		VESSEL ROB's at 24:00hrs						
		Fuel (T)	Lube Oil (L)	Water (T)				
ROB at 00:00 hrs		TBD	TBD	TBD				
Consumed Today								
Received today								
ROB at 24:00 hrs								
HH.		EXPECTED WEATHER NEXT 24 HRS:						
Winds: S 25-35kts Gusts upto 60 kts Seas: 2-3m								
II.		ANTICIPATED PROGRAM NEXT 24 HRS:						
Weather standby at dock.								
JJ.		PARTY CHIEF'S COMMENTS: (Optional)						
Sites Completed: Grab-EW1-20-A, Grab-EW1-20-R, Grab-EW1-20-L, Grab-EW1-22-A, Grab-EW1-22-R, Grab-EW1-22-L, Grab-EW1-23-A, Grab-EW1-23-R, Grab-EW1-23-L, UWV-EW1-23, UWV-EW1-22, UWV-EW1-21, UWV-EW1-20, UWV-EW1-19, UWV-EW1-18. Things to note: One positive observation card commending the survey crew on the back deck for working as a team and wearing correct PPE from the 27th-28th. One other observation card for a crew member wearing improper gloves on deck. The vessel is heading back to the dock for weather. There is a gale force wind warning in effect Monday and Tuesday for the NY Harbor area.								
KK.		REPRESENTATIVE'S COMMENTS: (Optional)						
For ALPINE					For Equinor			
								
C.Keane					S. Budge			
(Survey Party Chief)					(Client Representative)			
Vessel:	RV Shearwater	Project No:	1894	Date:	29 November 2020			
Client:	Equinor	Location:	York Harbor and Approach	Report No.	005			
		Project:	Empire Wind 2020 Survey Campaign 1 ECR					

Vessel: **RV Shearwater**
 Client: **Equinor**
 Location: **New York Harbor and Approach, NY**
 Project: **Empire Wind 2020 Survey Campaign 1 ECR**

Project No: **1894**
 Today's Date: **30 November 2020**
 Report No: **6**
 Start Date: **25 November 2020**

All times are **EST** (GMT - **5:00** hrs)

AA. VESSEL LOCATION AT 24:00 HRS:

Description: **Liberty Landing Marina** Latitude: **40 42 39.367** Longitude: **74 02 38.735**

BB. WEATHER:

Time (Local)	BAROM mb	WIND Speed mph	Dir	WAVE HEIGHT m	VISIB. nmi	SKY CONDS	REMARKS
00:00							
08:00	1010.0	20-25	SE	1.0-2.0	5	Cloudy	Rain/High Winds
16:00	1010.0	20-25	SE	1.0-2.0	5	Cloudy	Rain/High Winds
24:00							

CC. PERSONNEL & EQUIPMENT:
C1. Alpine OSS Personnel:

Party Chief: C. Keane	Surveyor M. Shand	Cook: S. Hamilton
Navigator: C. Miro	1st Captain: M. Porter	PSO: A. Jackson
Surveyor S. Childers	2nd Captain: M. Affy	PSO: B. Roberts
Surveyor I. Wacchino	3rd Captain: D. Tameriano	
Benthic Biologist(RPS) S. Berkman	Deckhand: S. Kelleher	
Benthic Biologist(RPS) J. Diaz y Gonzalez	Deckhand: M. Budzinsky	

C2. Additional Personnel
C3. Client Personnel:

Client Rep. **S. Budge**

C4. Personnel On Board:

ALPINE:	5	CLIENT:	1	VESSEL:	6	OTHERS:	4	TOTAL 16
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C5. ALPINE'S Equipment:

R2 Sonic 2024 MBES	Sontek Castaway CTD	SBE 19plus V2 SeaCat CTD		
Sonardyne Scout Pro USBL	C-Nav 3050 DGPS	Reticule Binoculars		
Applanix POS MV Oceanmaster	QPS QINSy and QIMERA software			
AML Moving Vessel Profiler (MVP) SVP	Alpine Video Software			

C6. Additional Equipment

Salish Grab Sampler (RPS)
 TS-500 Towed Camera Imaging System (RPS)

C7. Project Variations (include notices of changes of personnel / equipment)

Off Vessel	On Vessel
Personnel:	Personnel:
Equipment:	Equipment:

DD. DIARY OF EVENTS TODAY:

From	To	hrs	Code	
00:00	6:00	6:00	W	Non-operational time; weather standby
6:00	18:00	12:00	W	Weather standby at Liberty Landing Marina
18:00	24:00	6:00	W	Non-operational time; weather standby

EE.	PROJECT DATA:						
E1.	Time Summary:						
Rate	Code		Previous Hours	Today Hours	Total Hours		Percent of Total
Mob / Demob	M		24:00		24:00		16.67
Infill Lines	OI						
Weather Standby (Sea)	WS						
Operational	O		39:19		39:19		27.30
Weather Standby (Port)	W		4:30	24:00	28:30		19.79
Standby HSE	SHSE						
Contractor Time	CT		2:30		2:30		1.74
Port Call	PC						
Survey Downtime	SD						
Maintenance time	MT						
Disputed Time	DT						
Non-operational(On-hire)	NoH		49:41		49:41		34.50
To Be Determined	TBD						
MMO Standby	MMO						
TOTAL			120:00	24:00	144:00		100.00%
Hrs. of Daily Operations 24			Cumulative Hours Check Value= 144.00				
E2.	Survey Progress:						
Description	Cores Left	Area	Total Cores	Cores Prev	Today Cores	Cores To Date	% Completed
Grab Samples	30.00	Gowanus ECR	78.00	48.00		48.00	61.54%
Video Transects	16.00		26.00	10.00		10.00	38.46%
CTD Casts	10.00		26.00	16.00		16.00	61.54%
Reruns on Contractor							
Reruns on Client							
TOTALS:		56.00	TOTAL	130.00	74.00	74.00	56.92%
FF.	SAFETY (Details & Figures for Vessel and Survey Crews and Client Representatives)						
Incidents & Drills				Previous Events	Today's Events	Events To Date	
Safety Meeting							
Vessel Safety Induction				4		4	
Vessel Safety Drill (MOB, Fire & Abandon Ship)				1		1	
Tool Box Talks				5		5	
Permit to Work							
Safety Observation Card				3		3	
Hazardous Occurrence Report							
First Aid Case (FAC)							
Medical Treatment Case (MTC)							
Lost Time Incident (LTI)							
No. of survey Man-Hours worked since start of project or LTI.				1920:00	384:00	2304:00	
GG.	VESSEL ROB's at 24:00hrs						
			Fuel (T)	Lube Oil (L)	Water (T)		
ROB at 00:00 hrs			TBD	TBD	TBD		
Consumed Today							
Received today							
ROB at 24:00 hrs							
HH.	EXPECTED WEATHER NEXT 24 HRS:						
Winds: 15-20 kts SW, gusting 25-30 kts. Seas: waves, 1.0-1.5m.							
II.	ANTICIPATED PROGRAM NEXT 24 HRS:						
Standby for weather.							
JJ.	PARTY CHIEF'S COMMENTS: (Optional)						
Survey team offloaded samples to send to labs for processing.							
KK.	REPRESENTATIVE'S COMMENTS: (Optional)						
For ALPINE				For Equinor			
							
C.Keane				S. Budge			
(Survey Party Chief)				(Client Representative)			
Vessel: RV Shearwater		Project No: 1894		Date: 30 November 2020			
Client: Equinor		Location: / York Harbor and Approach		Report No.		006	

Vessel: **RV Shearwater**
 Client: **Equinor**
 Location: **New York Harbor and Approach, NY**
 Project: **Empire Wind 2020 Survey Campaign 1 ECR**

Project No: **1894**
 Today's Date: **01 December 2020**
 Report No: **7**
 Start Date: **25 November 2020**

All times are **EST** (GMT - **5:00** hrs)

AA. VESSEL LOCATION AT 24:00 HRS:

Description: **Liberty Landing Marina** Latitude: **40 42 39.367** Longitude: **74 02 38.735**

BB. WEATHER:

Time (Local)	BAROM mb	WIND Speed mph	Dir	WAVE HEIGHT m	VISIB. nmi	SKY CONDS	REMARKS
00:00							
08:00	1001.0	15-20 gusts 25-30	SW	1.0-2.0	10	Clear	Gale force winds
16:00	1003.0	15-20 gusts 25-30	ESE	10.-2.0	10	Clear	Gale force winds
24:00							

CC. PERSONNEL & EQUIPMENT:
C1. Alpine OSS Personnel:

Party Chief: C. Keane	Surveyor M. Shand	Cook: S. Hamilton
Navigator: C. Miro	1st Captain: M. Porter	PSO: A. Jackson
Surveyor S. Childers	2nd Captain: M. Afify	PSO: B. Roberts
Surveyor I. Wacchino	3rd Captain: D. Tameriano	
Benthic Biologist(RPS) S. Berkman	Deckhand: S. Kelleher	
Benthic Biologist(RPS) J. Diaz y Gonzalez	Deckhand: M. Budzinsky	

C2. Additional Personnel
C3. Client Personnel:

Client Rep. **S. Budge**

C4. Personnel On Board:

ALPINE: **5** CLIENT: **1** VESSEL: **6** OTHERS: **4** TOTAL **16**

C5. ALPINE'S Equipment:

R2 Sonic 2024 MBES	Sontek Castaway CTD	SBE 19plus V2 SeaCat CTD	
Sonardyne Scout Pro USBL	C-Nav 3050 DGPS	Reticule Binoculars	
Applanix POS MV Oceanmaster	QPS QINSy and QIMERA software		
AML Moving Vessel Profiler (MVP) SVP	Alpine Video Software		

C6. Additional Equipment

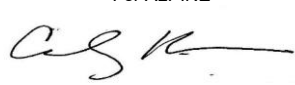
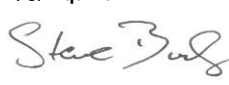
Salish Grab Sampler (RPS)
 TS-500 Towed Camera Imaging System (RPS)

C7. Project Variations (include notices of changes of personnel / equipment)

Off Vessel	On Vessel
Personnel:	Personnel:
Equipment:	Equipment:

DD. DIARY OF EVENTS TODAY:

From	To	hrs	Code	
00:00	6:00	6:00	W	Non-operational time; standby for weather
6:00	18:00	12:00	W	Standby for weather at dock.
18:00	24:00	6:00	W	Non-operational time; standby for weather

EE.		PROJECT DATA:						
E1.		Time Summary:						
Rate	Code		Previous Hours	Today Hours	Total Hours		Percent of Total	
Mob / Demob	M		24:00		24:00		14.29	
Infill Lines	OI							
Weather Standby (Sea)	WS							
Operational	O		39:19		39:19		23.40	
Weather Standby (Port)	W		28:30	24:00	52:30		31.25	
Standby HSE	SHSE							
Contractor Time	CT		2:30		2:30		1.49	
Port Call	PC							
Survey Downtime	SD							
Maintenance time	MT							
Disputed Time	DT							
Non-operational(On-hire)	NoH		49:41		49:41		29.57	
To Be Determined	TBD							
MMO Standby	MMO							
TOTAL			144:00	24:00	168:00		100.00%	
Hrs. of Daily Operations 24			Cumulative Hours Check Value= 168.00					
E2.		Survey Progress:						
Description		Cores Left	Area	Total Cores	Cores Prev	Today Cores	Cores To Date	% Completed
Grab Samples		30.00	Gowanus ECR	78.00	48.00		48.00	61.54%
Video Transects		16.00		26.00	10.00		10.00	38.46%
CTD Casts		10.00		26.00	16.00		16.00	61.54%
Reruns on Contractor								
Reruns on Client								
TOTALS:		56.00	TOTAL	130.00	74.00		74.00	56.92%
FF.		SAFETY (Details & Figures for Vessel and Survey Crews and Client Representatives)						
Incidents & Drills				Previous Events	Today's Events	Events To Date		
Safety Meeting								
Vessel Safety Induction				4		4		
Vessel Safety Drill (MOB, Fire & Abandon Ship)				1		1		
Tool Box Talks				5		5		
Permit to Work								
Safety Observation Card				3		3		
Hazardous Occurrence Report								
First Aid Case (FAC)								
Medical Treatment Case (MTC)								
Lost Time Incident (LTI)								
No. of survey Man-Hours worked since start of project or LTI.				2304:00	384:00	2688:00		
GG.		VESSEL ROB's at 24:00hrs						
		Fuel (T)	Lube Oil (L)	Water (T)				
ROB at 00:00 hrs		TBD	TBD	TBD				
Consumed Today								
Received today								
ROB at 24:00 hrs								
HH.		EXPECTED WEATHER NEXT 24 HRS:						
Winds: 15-20 kts W, gusting 25-30 kts. Seas: waves, 1.0-2.0m								
II.		ANTICIPATED PROGRAM NEXT 24 HRS:						
Get off the dock in the morning to check to see if weather is workable.								
JJ.		PARTY CHIEF'S COMMENTS: (Optional)						
KK.		REPRESENTATIVE'S COMMENTS: (Optional)						
For ALPINE					For Equinor			
 C.Keane (Survey Party Chief)					 S. Budge (Client Representative)			
Vessel:	RV Shearwater	Project No:	1894	Date:	01 December 2020			
Client:	Equinor	Location:	York Harbor and Approach	Report No.	007			
		Project:	Empire Wind 2020 Survey Campaign 1 ECR					



DAILY REPORT

Vessel: **RV Shearwater**
Client: **Equinor**
Location: **New York Harbor and Approach, NY**
Project: **Empire Wind 2020 Survey Campaign 1 ECR**

Project No: **1894**
Todays Date: **02 December 2002**
Report No: **8**
Start Date: **25 November 2020**

All times are **EST** (GMT - **5:00** hrs)

AA. VESSEL LOCATION AT 24:00 HRS:

Description: **Liberty Landing Marina** Latitude: **40 42 39.367** Longitude: **74 02 38.735**

BB. WEATHER:

Time (Local)	BAROM	WIND		WAVE	VISIB.	SKY	REMARKS
	mb	Speed mph	Dir	HEIGHT m	nmi	CONDS	
00:00							
08:00	1014.0	15-20	W	1.0-1.5	10	Clear	
16:00	1017.0	15-20	W	1.0-1.5	10	Clear	
24:00							

CC. PERSONNEL & EQUIPMENT:**C1. Alpine OSS Personnel:**

Party Chief: C.Keane	Surveyor M. Shand	Cook: S. Hamilton
Navigator: C. Miro	1st Captain: M. Porter	PSO: A. Jackson
Surveyor S. Childers	2nd Captain: M. Afify	PSO: B. Roberts
Surveyor I. Wacchino	3rd Captain: D. Tameriano	
Benthic Biologist(RPS) S. Berkman	Deckhand: S. Kelleher	
Benthic Biologist(RPS) J. Diaz y Gonzalez	Deckhand: M. Budzinsky	

C2. Additional Personnel**C3. Client Personnel:**

Client Rep.	S. Budge	
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C4. Personnel On Board:

ALPINE:	5	CLIENT:	1	VESSEL:	6	OTHERS:	4	TOTAL	16
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C5. ALPINE'S Equipment:

R2 Sonic 2024 MBES	Sontek Castaway CTD	SBE 19plus V2 SeaCat CTD		
Sonardyne Scout Pro USBL	C-Nav 3050 DGPS	Reticule Binoculars		
Applanix POS MV Oceanmaster	QPS QINSy and QIMERA software			
AML Moving Vessel Profiler (MVP) SVP	Alpine Video Software			

C6. Additional Equipment

Salish Grab Sampler (RPS)	
TS-500 Towed Camera Imaging System (RPS)	

C7. Project Variations (include notices of changes of personnel / equipment)

Off Vessel		On Vessel	
Personnel:		Personnel:	
Equipment:		Equipment:	

DD. DIARY OF EVENTS TODAY:

From	To	hrs	Code	
00:00	6:30	6:30	W	Non-operational time; survey team on standby for daylight
6:30	7:01	0:31	O	R/V Shearwater departs Liberty Landing Marina and begins transit to site
7:01	8:01	1:00	O	PSO Pre watch, survey crew prep deck
8:01	8:36	0:35	O	Vessel continues to transit to first site
8:36	16:20	7:44	O	12 Grab samples completed, 5 water quality samples
16:20	16:50	0:30	O	PSO post watch, survey crew continue processing samples/ securing back deck
16:50	24:00	7:10	NoH	Non-operational time; survey team on standby for daylight

EE.	PROJECT DATA:						
E1.	Time Summary:						
Rate	Code		Previous Hours	Today Hours	Total Hours		Percent of Total
Mob / Demob	M		24:00		24:00		12.50
Infill Lines	OI						
Weather Standby (Sea)	WS						
Operational	O		39:19	10:20	49:39		25.86
Weather Standby (Port)	W		52:30	6:30	59:00		30.73
Standby HSE	SHSE						
Contractor Time	CT		2:30		2:30		1.30
Port Call	PC						
Survey Downtime	SD						
Maintenance time	MT						
Disputed Time	DT						
Non-operational(On-hire)	NoH		49:41	7:10	56:51		29.61
To Be Determined	TBD						
MMO Standby	MMO						
TOTAL			168:00	24:00	192:00		100.00%
Hrs. of Daily Operations 24			Cumulative Hours Check Value= 192.00				
E2.	Survey Progress:						
Description	Cores Left	Area	Total Cores	Cores Prev	Today Cores	Cores To Date	% Completed
Grab Samples	18.00	Gowanus ECR	78.00	48.00	12.00	60.00	76.92%
Video Transects	16.00		26.00	10.00		10.00	38.46%
CTD Casts	5.00		26.00	16.00	5.00	21.00	80.77%
Reruns on Contractor							
Reruns on Client							
TOTALS:	39.00	TOTAL	130.00	74.00	17.00	91.00	70.00%
FF.	SAFETY (Details & Figures for Vessel and Survey Crews and Client Representatives)						
Incidents & Drills			Previous Events	Today's Events	Events To Date		
Safety Meeting							
Vessel Safety Induction			4		4		
Vessel Safety Drill (MOB, Fire & Abandon Ship)			1		1		
Tool Box Talks			5	1	6		
Permit to Work							
Safety Observation Card			3	2	5		
Hazardous Occurrence Report							
First Aid Case (FAC)							
Medical Treatment Case (MTC)							
Lost Time Incident (LTI)							
No. of survey Man-Hours worked since start of project or LTI.			2688:00	384:00	3072:00		
GG.	VESSEL ROB's at 24:00hrs						
		Fuel (T)	Lube Oil (L)		Water (T)		
ROB at 00:00 hrs		TBD	TBD		TBD		
Consumed Today							
Received today							
ROB at 24:00 hrs							
HH.	EXPECTED WEATHER NEXT 24 HRS:						
Winds: 10-15 kts SW. Seas: waves, 0.5-1.0m							
II.	ANTICIPATED PROGRAM NEXT 24 HRS:						
Continue with grabs left offshore and move on to offshore videos.							
JJ.	PARTY CHIEF'S COMMENTS: (Optional)						
Sites Completed: Grab-EW1-9A, Grab-EW1-9R, Grab-EW1-9L, Grab-EW1-5A, Grab-EW1-5R, Grab-EW1-5L, Grab-EW1-4A, Grab-EW1-4R, Grab-EW1-4L, Grab-EW1-10A, Grab-EW1-10R, Grab-EW1-10L. Things to Note: Grab-EW1-8L was attempted two more times and was still over penetrated both times. The sample was kept from the first attempt. Two observation cards were submitted from November 30th. One card was for water in the lab from rain causing a potential slipping hazard. The water was immediately mopped up. The other was from clutter in the lab from extra gear. Survey crew took the time to organize the lab during weather downtime to correct this issue.							
KK.	REPRESENTATIVE'S COMMENTS: (Optional)						
Weather conditions on site were considered unsafe for operations very close to shore at stations 1, 2 and 3 north of the Verrazano Narrows Bridge so Shearwater continued transit south to Gravesend Bay at the start of the day. After acquiring data at stations 9, 5 and 4 the weather prevented any further work close to shore in the north of Gravesend Bay. Shearwater transited south and acquired grabs and a water quality sample at Station 10 and a water sample at Station 11 before poor weather prevented further work in the area. Shearwater then transited back to Gravesend Bay, where weather conditions had improved, and acquired grab samples at Stations 8 and 9 before PSO post-watch began.							
For ALPINE					For Equinor		
							
C.Keane					S. Budge		
(Survey Party Chief)					(Client Representative)		
Vessel:	RV Shearwater	Project No:	1894	Date:	02 December 2002		
Client:	Equinor	Location:	York Harbor and Approach	Report No.	008		
Project: Empire Wind 2020 Survey Campaign 1 ECR							



DAILY REPORT

Vessel: **RV Shearwater**
Client: **Equinor**
Location: **New York Harbor and Approach, NY**
Project: **Empire Wind 2020 Survey Campaign 1 ECR**

Project No: **1894**
Today's Date: **03 December 2020**
Report No: **9**
Start Date: **25 November 2020**

All times are **EST** (GMT - **5:00** hrs)

AA. VESSEL LOCATION AT 24:00 HRS:

Description: **At anchor** Latitude: **40;35;07.531** Longitude: **40;35;07.531**

BB. WEATHER:

Time (Local)	BAROM mb	WIND Speed mph	Dir	WAVE HEIGHT m	VISIB. nmi	SKY CONDS	REMARKS
00:00							
08:00	1023.71	10-15	SW	0.5-1.0	10	Clear	
16:00	1022.69	10-15	SW	0.5-1.0	10	Clear	
24:00							

CC. PERSONNEL & EQUIPMENT:**C1. Alpine OSS Personnel:**

Party Chief: C. Keane	Surveyor M. Shand	Cook: S. Hamilton
Navigator: C. Miro	1st Captain: W. Porter	PSO: A. Jackson
Surveyor S. Childers	2nd Captain: M. Afify	PSO: B. Roberts
Surveyor I. Wacchino	3rd Captain: D. Tameriano	
Benthic Biologist(RPS) S. Berkman	Deckhand: S. Kelleher	
Benthic Biologist(RPS) J. Diaz y Gonzalez	Deckhand: M. Budzinsky	

C2. Additional Personnel**C3. Client Personnel:**

Client Rep. **S. Budge**

C4. Personnel On Board:

ALPINE:	5	CLIENT:	1	VESSEL:	6	OTHERS:	4	TOTAL 16
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C5. ALPINE'S Equipment:

R2 Sonic 2024 MBES	Sontek Castaway CTD	SBE 19plus V2 SeaCat CTD		
Sonardyne Scout Pro USBL	C-Nav 3050 DGPS	Reticule Binoculars		
Applanix POS MV Oceanmaster	QPS QINSy and QIMERA software			
AML Moving Vessel Profiler (MVP) SVP	Alpine Video Software			

C6. Additional Equipment

Salish Grab Sampler (RPS)
TS-500 Towed Camera Imaging System (RPS)

C7. Project Variations (include notices of changes of personnel / equipment)

Off Vessel	On Vessel
Personnel:	Personnel:
Equipment:	Equipment:

DD. DIARY OF EVENTS TODAY:

From	To	hrs	Code	
00:00	6:15	6:15	NoH	Non-operational time; survey team on standby for daylight
6:15	6:40	0:25	O	Anchor up. R/V Shearwater begins transit to first survey site.
6:40	7:40	1:00	O	PSO pre watch, survey crew preps deck and starts water quality samples.
7:40	9:48	2:08	O	9 Grab samples and 2 water qualities completed, switch out to videos.
9:48	12:38	2:50	O	3 video sites attempted, poor vis due to high turbidity. Abandon videos-go back to grabs.
12:38	16:00	3:22	O	transit back to Gravesend Bay to complete grabs.
16:00	16:25	0:25	O	Grab- EW1-7R and Grab-EW1-6A re-shoots completed.
16:25	16:55	0:30	O	PSO post watch, survey crew secures back deck, vessel anchored in Gravesend Bay.
16:55	24:00	7:05	NoH	Non-Operational time; R/V Shearwater at anchor, survey crew on standby for daylight.

EE.		PROJECT DATA:						
E1.		Time Summary:						
Rate	Code		Previous Hours	Today Hours	Total Hours		Percent of Total	
Mob / Demob	M		24:00		24:00		11.11	
Infill Lines	OI							
Weather Standby (Sea)	WS							
Operational	O		49:39	10:40	60:19		27.92	
Weather Standby (Port)	W		59:00		59:00		27.31	
Standby HSE	SHSE							
Contractor Time	CT		2:30		2:30		1.16	
Port Call	PC							
Survey Downtime	SD							
Maintenance time	MT							
Disputed Time	DT							
Non-operational(On-hire)	NoH		56:51	13:20	70:11		32.49	
To Be Determined	TBD							
MMO Standby	MMO							
TOTAL			192:00	24:00	216:00		100.00%	
Hrs. of Daily Operations 24			Cumulative Hours Check Value= 216.00					
E2.		Survey Progress:						
Description		Cores Left	Area	Total Cores	Cores Prev	Today Cores	Cores To Date	% Completed
Grab Samples		9.00	Gowanus ECR	78.00	60.00	9.00	69.00	88.46%
Video Transects		16.00		26.00	10.00		10.00	38.46%
CTD Casts		3.00		26.00	21.00	2.00	23.00	88.46%
Reruns on Contractor								
Reruns on Client								
TOTALS:		28.00	TOTAL	130.00	91.00	11.00	102.00	78.46%
FF.		SAFETY (Details & Figures for Vessel and Survey Crews and Client Representatives)						
Incidents & Drills				Previous Events	Today's Events	Events To Date		
Safety Meeting								
Vessel Safety Induction				4		4		
Vessel Safety Drill (MOB, Fire & Abandon Ship)				1	1	2		
Tool Box Talks				6	1	7		
Permit to Work								
Safety Observation Card				5	1	6		
Hazardous Occurrence Report								
First Aid Case (FAC)								
Medical Treatment Case (MTC)								
Lost Time Incident (LTI)								
No. of survey Man-Hours worked since start of project or LTI.				3072:00	384:00	3456:00		
GG.		VESSEL ROB's at 24:00hrs						
			Fuel (T)	Lube Oil (L)	Water (T)			
ROB at 00:00 hrs			TBD	TBD	TBD			
Consumed Today								
Received today								
ROB at 24:00 hrs								
HH.		EXPECTED WEATHER NEXT 24 HRS:						
Winds: 10-15 kts SW. Seas: waves, 0.0-0.5m.								
II.		ANTICIPATED PROGRAM NEXT 24 HRS:						
Start with video work and our way offshore. If turbidity is still too high we will start with the grabs/water qualities at stations EW1-1, EW1-2, and EW1-3.								
JJ.		PARTY CHIEF'S COMMENTS: (Optional)						
Sites Completed: WQ-EW1-12, WQ-EW1-13, Grab-EW1-13A, Grab-EW1-13R, Grab-EW1-13L, Grab-EW1-12A, Grab-EW1-12R, Grab-EW1-12L, Grab-EW1-11A, Grab-EW1-11R, Grab-EW1-11L Things to Note: Grab-EW1-7R was attempted two more times, but still showed over penetration. Sample was kept from first attempt. Grab-EW1-6A was attempted a second time and produced a good sample. This sample was kept in addition to the first attempt that showed over penetration. High turbidity in the water column did not allow for acceptable video footage. Video was attempted at UWV-EW1-10, UWV-EW1-12, and UWV-EW1-17. No videos were recorded and video work was abandoned for the day. One Observation card submitted for the day. An example of safe practice allowing a team member to switch positions on deck to avoid further aggravating a sore muscle. Drill done this morning for running aground/flooding.								
KK.		REPRESENTATIVE'S COMMENTS: (Optional)						
For ALPINE					For Equinor			
								
C.Keane					S. Budge			
(Survey Party Chief)					(Client Representative)			
Vessel: RV Shearwater		Project No: 1894		Date: 03 December 2020				
Client: Equinor		Location: York Harbor and Approach		Report No. 009				
Project: Empire Wind 2020 Survey Campaign 1 ECR								



DAILY REPORT

Vessel: **RV Shearwater**
Client: **Equinor**
Location: **New York Harbor and Approach, NY**
Project: **Empire Wind 2020 Survey Campaign 1 ECR**

Project No: **1894**
Today's Date: **04 December 2020**
Report No: **10**
Start Date: **25 November 2020**

All times are **EST** (GMT - **5:00** hrs)

AA. VESSEL LOCATION AT 24:00 HRS:

Description: **Liberty Landing Marina** Latitude: **40 42 39.367** Longitude: **74 02 38.735**

BB. WEATHER:

Time (Local)	BAROM	WIND		WAVE	VISIB.	SKY	REMARKS
	mb	Speed mph	Dir	HEIGHT m	nmi	CONDS	
00:00							
08:00	1016.0	10-15	S	0.5-1.0	10	Cloudy	
16:00	1015.0	10-15	S	0.5-1.0	10	Cloudy	Light rain
24:00							

CC. PERSONNEL & EQUIPMENT:**C1. Alpine OSS Personnel:**

Party Chief: C. Keane	Surveyor M. Shand	Cook: S. Hamilton
Navigator: C. Miro	1st Captain: W. Porter	PSO: A. Jackson
Surveyor S. Childers	2nd Captain: M. Afify	PSO: B. Roberts
Surveyor I. Wacchino	3rd Captain: D. Tameriano	
Benthic Biologist(RPS) S. Berkman	Deckhand: S. Kelleher	
Benthic Biologist(RPS) J. Diaz y Gonzalez	Deckhand: M. Budzinsky	

C2. Additional Personnel**C3. Client Personnel:**

Client Rep.	S. Budge
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C4. Personnel On Board:

ALPINE:	5	CLIENT:	1	VESSEL:	6	OTHERS:	4	TOTAL	16
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C5. ALPINE'S Equipment:

R2 Sonic 2024 MBES	Sontek Castaway CTD	SBE 19plus V2 SeaCat CTD		
Sonardyne Scout Pro USBL	C-Nav 3050 DGPS	Reticule Binoculars		
Applanix POS MV Oceanmaster	QPS QINSy and QIMERA software			
AML Moving Vessel Profiler (MVP) SVP	Alpine Video Software			

C6. Additional Equipment

Salish Grab Sampler (RPS)
TS-500 Towed Camera Imaging System (RPS)

C7. Project Variations (include notices of changes of personnel / equipment)

Off Vessel		On Vessel	
Personnel:		Personnel:	
Equipment:		Equipment:	

DD. DIARY OF EVENTS TODAY:

From	To	hrs	Code	
00:00	6:40	6:40	NoH	Non-operational time; survey team on standby for daylight
6:40	7:40	1:00	O	PSO Pre-watch, R/V Shearwater transits to first video site.
7:40	12:45	5:05	O	3 Videos completed, 2 more attempted but aborted due to poor visibility.
12:45	13:57	1:12	O	Transit to Gravesend Bay
13:57	16:20	2:23	O	2 videos completed in Gravesend Bay.
16:20	16:50	0:30	O	PSO post watch, survey crew secures back deck, vessel begins transit back to dock.
16:50	18:30	1:40	O	Continue transit to Liberty Landing Marina to wait out weather.
18:30	24:00	5:30	W	Vessel/crew on weather standby at dock

EE.	PROJECT DATA:							
E1.	Time Summary:							
Rate	Code		Previous Hours	Today Hours	Total Hours		Percent of Total	
Mob / Demob	M		24:00		24:00		10.00	
Infill Lines	OI							
Weather Standby (Sea)	WS							
Operational	O		60:19	11:50	72:09		30.06	
Weather Standby (Port)	W		59:00	5:30	64:30		26.88	
Standby HSE	SHSE							
Contractor Time	CT		2:30		2:30		1.04	
Port Call	PC							
Survey Downtime	SD							
Maintenance time	MT							
Disputed Time	DT							
Non-operational(On-hire)	NoH		70:11	6:40	76:51		32.02	
To Be Determined	TBD							
MMO Standby	MMO							
TOTAL			216:00	24:00	240:00		100.00%	
Hrs. of Daily Operations 24			Cumulative Hours Check Value= 240.00					
E2.	Survey Progress:							
Description		Cores Left	Area	Total Cores	Cores Prev	Today Cores	Cores To Date	% Completed
Grab Samples		9.00	Gowanus ECR	78.00	69.00		69.00	88.46%
Video Transects		11.00		26.00	10.00	5.00	15.00	57.69%
CTD Casts		3.00		26.00	23.00		23.00	88.46%
Reruns on Contractor								
Reruns on Client								
TOTALS:		23.00	TOTAL	130.00	102.00	5.00	107.00	82.31%
FF.	SAFETY (Details & Figures for Vessel and Survey Crews and Client Representatives)							
Incidents & Drills				Previous Events	Today's Events	Events To Date		
Safety Meeting								
Vessel Safety Induction				4		4		
Vessel Safety Drill (MOB, Fire & Abandon Ship)				2		2		
Tool Box Talks				7	1	8		
Permit to Work								
Safety Observation Card				6		6		
Hazardous Occurrence Report								
First Aid Case (FAC)								
Medical Treatment Case (MTC)								
Lost Time Incident (LTI)								
No. of survey Man-Hours worked since start of project or LTI.				3456:00	384:00	3840:00		
GG.	VESSEL ROB's at 24:00hrs							
			Fuel (T)	Lube Oil (L)	Water (T)			
ROB at 00:00 hrs			TBD	TBD	TBD			
Consumed Today								
Received today								
ROB at 24:00 hrs								
HH.	EXPECTED WEATHER NEXT 24 HRS:							
Winds: 15-20 kts N with gusts 30-35kts. Seas: 0.5-1.5m								
II.	ANTICIPATED PROGRAM NEXT 24 HRS:							
Weather standby at Liberty Landing Marina								
JJ.	PARTY CHIEF'S COMMENTS: (Optional)							
Sites completed: UWV-EW1-10, UWV-EW1-11, UWV-EW1-12, UWV-EW1-9, UWV-EW1-8. Things to Note: High turbidity is causing poor visability in still images taken by the go-pro camera attached to the camera sled. Stills can be taken from the video footage by a program used by RPS. UWV-EW1-9 shows a deviation due to fishing gear in the proposed transect.								
KK.	REPRESENTATIVE'S COMMENTS: (Optional)							
My personal assessment is that video imagery along UWV-EW1-10 is poor. The status of this video is still under review by Alpine/RPS. Images from the stills camera mounted on the video sled were poor (unacceptable) along all video transects today. Alpine has proposed substituting screen grabs from video footage in place of still images, thus allowing 5 video transects to be deemed completed today.								
Shearwater deviated 30m from line UWV-EW1-9 due to a fishing buoy at E 583374.41 N 4493207.42; Lat 40;35;07.663 N Long 74;00;53.280 W in Gravesend Bay. No decision has yet been made about the need to re-run for this deviation.								
For ALPINE					For Equinor			
								
C.Keane (Survey Party Chief)					S. Budge (Client Representative)			
Vessel:	RV Shearwater	Project No:	1894	Date:	04 December 2020			
Client:	Equinor	Location:	York Harbor and Approach	Report No.	010			
Project: Empire Wind 2020 Survey Campaign 1 ECR								



DAILY REPORT

Vessel: **RV Shearwater**
Client: **Equinor**
Location: **New York Harbor and Approach, NY**
Project: **Empire Wind 2020 Survey Campaign 1 ECR**

Project No: **1894**
Today's Date: **05 December 2020**
Report No: **11**
Start Date: **25 November 2020**

All times are **EST** (GMT - **5:00** hrs)

AA. VESSEL LOCATION AT 24:00 HRS:

Description: **Liberty Landing Marina** Latitude: **40 42 39.367** Longitude: **74 02 38.735**

BB. WEATHER:

Time (Local)	BAROM	WIND		WAVE	VISIB.	SKY	REMARKS
	mb	Speed mph	Dir	HEIGHT m	nmi	CONDS	
00:00							
08:00	1005.0	15-20	NW	1.0-1.5	10	Cloudy/rainy	30-35 kt gusts
16:00	1005.0	15-20	NW	1.0-1.6	10	Cloudy	30-35 kt gusts
24:00							

CC. PERSONNEL & EQUIPMENT:**C1. Alpine OSS Personnel:**

Party Chief: C. Keane	Surveyor M. Shand	Cook: S. Hamilton
Navigator: C. Miro	1st Captain: W. Porter	PSO: A. Jackson
Surveyor S. Childers	2nd Captain: M. Afify	PSO: B. Roberts
Surveyor I. Wacchino	3rd Captain: D. Tameriano	
Benthic Biologist(RPS) S. Berkman	Deckhand: S. Kelleher	
Benthic Biologist(RPS) J. Diaz y Gonzalez	Deckhand: M. Budzinsky	

C2. Additional Personnel**C3. Client Personnel:**

Client Rep. **T. Nguyen**

C4. Personnel On Board:

ALPINE:	5	CLIENT:	1	VESSEL:	6	OTHERS:	4	TOTAL 16
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C5. ALPINE'S Equipment:

R2 Sonic 2024 MBES	Sontek Castaway CTD	SBE 19plus V2 SeaCat CTD		
Sonardyne Scout Pro USBL	C-Nav 3050 DGPS	Reticule Binoculars		
Applanix POS MV Oceanmaster	QPS QINSy and QIMERA software			
AML Moving Vessel Profiler (MVP) SVP	Alpine Video Software			

C6. Additional Equipment

Salish Grab Sampler (RPS)
TS-500 Towed Camera Imaging System (RPS)

C7. Project Variations (include notices of changes of personnel / equipment)

Off Vessel		On Vessel	
Personnel:	S. Budge	Personnel:	T. Nguyen
Equipment:		Equipment:	

DD. DIARY OF EVENTS TODAY:

From	To	hrs	Code	
00:00	6:00	6:00	W	Non-Operational, Standby at dock for weather
6:00	18:00	12:00	W	Standby at dock for weather
18:00	24:00	6:00	W	Non-Operational, Standby at dock for weather

EE.	PROJECT DATA:							
E1.	Time Summary:							
Rate	Code		Previous Hours	Today Hours	Total Hours		Percent of Total	
Mob / Demob	M		24:00		24:00		9.09	
Infill Lines	OI							
Weather Standby (Sea)	WS							
Operational	O		72:09		72:09		27.33	
Weather Standby (Port)	W		64:30	24:00	88:30		33.52	
Standby HSE	SHSE							
Contractor Time	CT		2:30		2:30		0.95	
Port Call	PC							
Survey Downtime	SD							
Maintenance time	MT							
Disputed Time	DT							
Non-operational(On-hire)	NoH		76:51		76:51		29.11	
To Be Determined	TBD							
MMO Standby	MMO							
TOTAL			240:00	24:00	264:00		100.00%	
Hrs. of Daily Operations 24			Cumulative Hours Check Value= 264.00					
E2.	Survey Progress:							
Description		Cores Left	Area	Total Cores	Cores Prev	Today Cores	Cores To Date	% Completed
Grab Samples		9.00	Gowanus ECR	78.00	69.00		69.00	88.46%
Video Transects		11.00		26.00	15.00		15.00	57.69%
CTD Casts		3.00		26.00	23.00		23.00	88.46%
Reruns on Contractor								
Reruns on Client								
TOTALS:		23.00	TOTAL	130.00	107.00		107.00	82.31%
FF.	SAFETY (Details & Figures for Vessel and Survey Crews and Client Representatives)							
Incidents & Drills				Previous Events	Today's Events	Events To Date		
Safety Meeting								
Vessel Safety Induction				4		4		
Vessel Safety Drill (MOB, Fire & Abandon Ship)				2		2		
Tool Box Talks				8		8		
Permit to Work								
Safety Observation Card				6		6		
Hazardous Occurrence Report								
First Aid Case (FAC)								
Medical Treatment Case (MTC)								
Lost Time Incident (LTI)								
No. of survey Man-Hours worked since start of project or LTI.				3840:00	384:00	4224:00		
GG.	VESSEL ROB's at 24:00hrs							
		Fuel (T)	Lube Oil (L)	Water (T)				
ROB at 00:00 hrs		TBD	TBD	TBD				
Consumed Today								
Received today								
ROB at 24:00 hrs								
HH.	EXPECTED WEATHER NEXT 24 HRS:							
Winds: 15-20 kts NW, gusts 25-30 kts. Seas: waves, 0.5-1.0m								
II.	ANTICIPATED PROGRAM NEXT 24 HRS:							
Weather standby at dock.								
JJ.	PARTY CHIEF'S COMMENTS: (Optional)							
KK.	REPRESENTATIVE'S COMMENTS: (Optional)							
For ALPINE					For Equinor			
								
C.Keane (Survey Party Chief)					T. Nguyen (Client Representative)			
Vessel:	RV Shearwater	Project No:	1894	Date:	05 December 2020			
Client:	Equinor	Location:	York Harbor and Approach	Report No.	011			
Project: Empire Wind 2020 Survey Campaign 1 ECR								



DAILY REPORT

Vessel: **RV Shearwater**
Client: **Equinor**
Location: **New York Harbor and Approach, NY**
Project: **Empire Wind 2020 Survey Campaign 1 ECR**

Project No: **1894**
Today's Date: **06 December 2020**
Report No: **12**
Start Date: **25 November 2020**

All times are **EST** (GMT - **5:00** hrs)

AA. VESSEL LOCATION AT 24:00 HRS:

Description: **Liberty Landing Marina** Latitude: **40 42 39.367** Longitude: **74 02 38.735**

BB. WEATHER:

Time (Local)	BAROM	WIND		WAVE	VISIB.	SKY	REMARKS
	mb	Speed mph	Dir	HEIGHT m	nmi	CONDS	
00:00							
08:00	1010.0	15-20	NE	1.0-1.5	10	Partly cloudy	Gusts in low 30s
16:00	1010.0	15-20	NE	1.0-1.5	10	Partly cloudy	Gusts in low 30s
24:00							

CC. PERSONNEL & EQUIPMENT:**C1. Alpine OSS Personnel:**

Party Chief: C. Keane	Surveyor M. Shand	Cook: S. Hamilton
Navigator: C. Miro	1st Captain: W. Porter	PSO: A. Jackson
Surveyor S. Childers	2nd Captain: M. Afify	PSO: B. Roberts
Surveyor I. Wacchino	3rd Captain: D. Tameriano	
Benthic Biologist(RPS) S. Berkman	Deckhand: S. Kelleher	
Benthic Biologist(RPS) J. Diaz y Gonzalez	Deckhand: M. Budzinsky	

C2. Additional Personnel**C3. Client Personnel:**

Client Rep.	T. Nguyen	
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C4. Personnel On Board:

ALPINE:	5	CLIENT:	1	VESSEL:	6	OTHERS:	4	TOTAL	16
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C5. ALPINE'S Equipment:

R2 Sonic 2024 MBES	Sontek Castaway CTD	SBE 19plus V2 SeaCat CTD		
Sonardyne Scout Pro USBL	C-Nav 3050 DGPS	Reticule Binoculars		
Applanix POS MV Oceanmaster	QPS QINSy and QIMERA software			
AML Moving Vessel Profiler (MVP) SVP	Alpine Video Software			

C6. Additional Equipment

Salish Grab Sampler (RPS)	
TS-500 Towed Camera Imaging System (RPS)	

C7. Project Variations (include notices of changes of personnel / equipment)

Off Vessel		On Vessel	
Personnel:		Personnel:	
Equipment:		Equipment:	

DD. DIARY OF EVENTS TODAY:

From	To	hrs	Code	
00:00	6:00	6:00	W	Non-Operational, Standby at dock for weather
6:00	18:00	12:00	W	Standby at dock for weather
18:00	24:00	6:00	W	Non-Operational, Standby at dock for weather

EE.	PROJECT DATA:							
E1.	Time Summary:							
Rate	Code		Previous Hours	Today Hours	Total Hours		Percent of Total	
Mob / Demob	M		24:00		24:00		8.33	
Infill Lines	OI							
Weather Standby (Sea)	WS							
Operational	O		72:09		72:09		25.05	
Weather Standby (Port)	W		88:30	24:00	112:30		39.06	
Standby HSE	SHSE							
Contractor Time	CT		2:30		2:30		0.87	
Port Call	PC							
Survey Downtime	SD							
Maintenance time	MT							
Disputed Time	DT							
Non-operational(On-hire)	NoH		76:51		76:51		26.68	
To Be Determined	TBD							
MMO Standby	MMO							
TOTAL			264:00	24:00	288:00		100.00%	
Hrs. of Daily Operations 24			Cumulative Hours Check Value= 288.00					
E2.	Survey Progress:							
Description		Cores Left	Area	Total Cores	Cores Prev	Today Cores	Cores To Date	% Completed
Grab Samples		9.00	Gowanus ECR	78.00	69.00		69.00	88.46%
Video Transects		11.00		26.00	15.00		15.00	57.69%
CTD Casts		3.00		26.00	23.00		23.00	88.46%
Reruns on Contractor								
Reruns on Client								
TOTALS:		23.00	TOTAL	130.00	107.00		107.00	82.31%
FF.	SAFETY (Details & Figures for Vessel and Survey Crews and Client Representatives)							
Incidents & Drills				Previous Events	Today's Events	Events To Date		
Safety Meeting								
Vessel Safety Induction				4	1	5		
Vessel Safety Drill (MOB, Fire & Abandon Ship)				2		2		
Tool Box Talks				8		8		
Permit to Work								
Safety Observation Card				6		6		
Hazardous Occurrence Report								
First Aid Case (FAC)								
Medical Treatment Case (MTC)								
Lost Time Incident (LTI)								
No. of survey Man-Hours worked since start of project or LTI.				4224:00	384:00	4608:00		
GG.	VESSEL ROB's at 24:00hrs							
			Fuel (T)	Lube Oil (L)	Water (T)			
ROB at 00:00 hrs			TBD	TBD	TBD			
Consumed Today								
Received today								
ROB at 24:00 hrs								
HH.	EXPECTED WEATHER NEXT 24 HRS:							
Winds: 10-15 kts NE. Seas: waves, 0.5-1.0m								
II.	ANTICIPATED PROGRAM NEXT 24 HRS:							
Finish grab samples in area north of the bridge and continue with video transects.								
JJ.	PARTY CHIEF'S COMMENTS: (Optional)							
KK.	REPRESENTATIVE'S COMMENTS: (Optional)							
For ALPINE					For Equinor			
								
C.Keane (Survey Party Chief)					T. Nguyen (Client Representative)			
Vessel:	RV Shearwater	Project No:	1894	Date:	06 December 2020			
Client:	Equinor	Location:	York Harbor and Approach	Report No.	012			
Project: Empire Wind 2020 Survey Campaign 1 ECR								



DAILY REPORT

Vessel: **RV Shearwater**
Client: **Equinor**
Location: **New York Harbor and Approach, NY**
Project: **Empire Wind 2020 Survey Campaign 1 ECR**

Project No: **1894**
Today's Date: **07 December 2020**
Report No: **13**
Start Date: **25 November 2020**

All times are **EST** (GMT - **5:00** hrs)

AA. VESSEL LOCATION AT 24:00 HRS:

Description: **At anchor, Gravesend Bay, NY, NY** Latitude: **40 35 25.205** Longitude: **74 01 10.114**

BB. WEATHER:

Time (Local)	BAROM	WIND		WAVE	VISIB.	SKY	REMARKS
	mb	Speed mph	Dir	HEIGHT m	nmi	CONDS	
00:00							
08:00	1010.0	5-10	NW	0-0.5	10	clear	
16:00	1007.0	5-10	NW	0-0.5	10	clear	
24:00							

CC. PERSONNEL & EQUIPMENT:**C1. Alpine OSS Personnel:**

Party Chief: C.Keane	Surveyor M. Shand	Cook: S. Hamilton
Navigator: C. Miro	1st Captain: W.Porter	PSO: A. Jackson
Surveyor S. Childers	2nd Captain: M. Afify	PSO: B. Roberts
Surveyor I. Wacchino	3rd Captain: D. Tameriano	
Benthic Biologist(RPS) S. Berkman	Deckhand: S. Kelleher	
Benthic Biologist(RPS) J. Diaz y Gonzalez	Deckhand: M. Budzinsky	

C2. Additional Personnel**C3. Client Personnel:**

Client Rep.	T. Nguyen	
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C4. Personnel On Board:

ALPINE:	5	CLIENT:	1	VESSEL:	6	OTHERS:	4	TOTAL 16
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C5. ALPINE'S Equipment:

R2 Sonic 2024 MBES	Sontek Castaway CTD	SBE 19plus V2 SeaCat CTD		
Sonardyne Scout Pro USBL	C-Nav 3050 DGPS	Reticule Binoculars		
Applanix POS MV Oceanmaster	QPS QINSy and QIMERA software			
AML Moving Vessel Profiler (MVP) SVP	Alpine Video Software			

C6. Additional Equipment

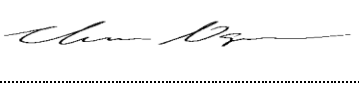
Salish Grab Sampler (RPS)	
TS-500 Towed Camera Imaging System (RPS)	

C7. Project Variations (include notices of changes of personnel / equipment)

Off Vessel		On Vessel	
Personnel:		Personnel:	
Equipment:		Equipment:	

DD. DIARY OF EVENTS TODAY:

From	To	hrs	Code	
00:00	6:17	6:17	W	Non-operational time; Standby for weather
6:17	6:47	0:30	O	Depart Liberty Landing Marina, begin transit to first station
6:47	7:47	1:00	O	PSO Pre-watch, 2 water quality samples complete.
7:47	11:30	3:43	O	9 Grab samples and 1 water quality complete.
11:30	11:49	0:19	O	Switch to video transects
11:49	16:30	4:41	O	4 video transects complete
16:30	17:00	0:30	O	PSO Post-watch, survey crew secure deck, R/V Shearwater anchors in Gravesend Bay.
17:00	24:00	7:00	NoH	Non-operational time; standby for daylight.

EE.	PROJECT DATA:						
E1.	Time Summary:						
Rate	Code		Previous Hours	Today Hours	Total Hours		Percent of Total
Mob / Demob	M		24:00		24:00		7.69
Infill Lines	OI						
Weather Standby (Sea)	WS						
Operational	O		72:09	10:43	82:52		26.56
Weather Standby (Port)	W		112:30	6:17	118:47		38.07
Standby HSE	SHSE						
Contractor Time	CT		2:30		2:30		0.80
Port Call	PC						
Survey Downtime	SD						
Maintenance time	MT						
Disputed Time	DT						
Non-operational(On-hire)	NoH		76:51	7:00	83:51		26.88
To Be Determined	TBD						
MMO Standby	MMO						
TOTAL			288:00	24:00	312:00		100.00%
Hrs. of Daily Operations 24			Cumulative Hours Check Value= 312.00				
E2.	Survey Progress:						
Description	Cores Left	Area	Total Cores	Cores Prev	Today Cores	Cores To Date	% Completed
Grab Samples		Gowanus ECR	78.00	69.00	9.00	78.00	100.00%
Video Transects	7.00		26.00	15.00	4.00	19.00	73.08%
CTD Casts			26.00	23.00	3.00	26.00	100.00%
Reruns on Contractor							
Reruns on Client							
TOTALS:	7.00	TOTAL	130.00	107.00	16.00	123.00	94.62%
FF.	SAFETY (Details & Figures for Vessel and Survey Crews and Client Representatives)						
Incidents & Drills			Previous Events	Today's Events	Events To Date		
Safety Meeting							
Vessel Safety Induction			5		5		
Vessel Safety Drill (MOB, Fire & Abandon Ship)			2		2		
Tool Box Talks			8	1	9		
Permit to Work							
Safety Observation Card			6		6		
Hazardous Occurrence Report							
First Aid Case (FAC)							
Medical Treatment Case (MTC)							
Lost Time Incident (LTI)							
No. of survey Man-Hours worked since start of project or LTI.			4608:00	384:00	4992:00		
GG.	VESSEL ROB's at 24:00hrs						
		Fuel (T)	Lube Oil (L)		Water (T)		
ROB at 00:00 hrs		TBD	TBD		TBD		
Consumed Today							
Received today							
ROB at 24:00 hrs							
HH.	EXPECTED WEATHER NEXT 24 HRS:						
Winds: 10-15 kts N Gusts in the 20s. Seas: 0.5-1.0m							
II.	ANTICIPATED PROGRAM NEXT 24 HRS:						
Continue with video transects							
JJ.	PARTY CHIEF'S COMMENTS: (Optional)						
Sites Completed: Grab-EW1-1A, Grab-EW1-1R, Grab-EW1-1L, Grab-EW1-2A, Grab-EW1-2R, Grab-EW1-2L, Grab-EW1-3A, Grab-EW1-3R, Grab-EW1-3L, UWV-EW1-2, UWV-EW1-3, UWV-EW1-4, UWV-EW1-5. Things to Note: UWV-EW1-1 was attempted, but aborted due to low visibility.							
KK.	REPRESENTATIVE'S COMMENTS: (Optional)						
For ALPINE					For Equinor		
							
C.Keane (Survey Party Chief)					T. Nguyen (Client Representative)		
Vessel:	RV Shearwater	Project No:	1894	Date:	07 December 2020		
Client:	Equinor	Location:	York Harbor and Approach	Report No.	013		
Project: Empire Wind 2020 Survey Campaign 1 ECR							

Vessel:	RV Shearwater	Project No:	1894
Client:	Equinor	Today's Date:	08 December 2020
Location:	New York Harbor and Approach, NY	Report No:	14
Project:	Empire Wind 2020 Survey Campaign 1 ECR	Start Date:	25 November 2020

All times are EST (GMT - 5:00 hrs)

AA. VESSEL LOCATION AT 24:00 HRS:

Description: Offshore New York Harbor, NY Latitude: 40 31.426 Longitude: 73 52.120

BB. WEATHER:

Time (Local)	BAROM	WIND	WAVE	VISIB.	SKY	REMARKS
	mb	Speed mph Dir	HEIGHT m	nmi	CONDS	
00:00						
08:00	1009.0	10-15 NW	0-0.5	10	Clear	
16:00	1009.0	10-15 NW	0-0.5	10	Clear	
24:00						

CC. PERSONNEL & EQUIPMENT:
C1. Alpine OSS Personnel:

Party Chief: C.Keane	Surveyor M. Shand	Cook: S. Hamilton
Navigator: C. Miro	1st Captain: W.Porter	PSO: A. Jackson
Surveyor S. Childers	2nd Captain: M. Afify	PSO: B. Roberts
Surveyor I. Wacchino	3rd Captain: D. Tameriano	
Benthic Biologist(RPS) S. Berkman	Deckhand: S. Kelleher	
Benthic Biologist(RPS) J. Diaz y Gonzalez	Deckhand: M. Budzinsky	

C2. Additional Personnel
C3. Client Personnel:

Client Rep. T. Nguyen

C4. Personnel On Board:

ALPINE:	5	CLIENT:	1	VESSEL:	6	OTHERS:	4	TOTAL 16
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C5. ALPINE'S Equipment:

R2 Sonic 2024 MBES	Sontek Castaway CTD	SBE 19plus V2 SeaCat CTD	
Sonardyne Scout Pro USBL	C-Nav 3050 DGPS	Reticule Binoculars	
Applanix POS MV Oceanmaster	QPS QINSy and QIMERA software		
AML Moving Vessel Profiler (MVP) SVP	Alpine Video Software		

C6. Additional Equipment

Salish Grab Sampler (RPS)
TS-500 Towed Camera Imaging System (RPS)

C7. Project Variations (include notices of changes of personnel / equipment)

Off Vessel	On Vessel
Personnel:	Personnel:
Equipment:	Equipment:

DD. DIARY OF EVENTS TODAY:

From	To	hrs	Code	
00:00	6:50	6:50	NoH	Non-operational time; survey team on standby for daylight
6:50	7:50	1:00	O	PSO Pre-watch, survey crew prep deck, R/V Shearwater lifts anchor and heads to first station.
7:50	16:20	8:30	O	6 Video transects complete including one re-run.
16:20	16:50	0:30	O	PSO Post-watch, R/V Shearwater begins running weather patterns for the night.
16:50	24:00	7:10	NoH	Non-operational time; survey team on standby for daylight

EE.	PROJECT DATA:						
E1.	Time Summary:						
Rate	Code		Previous Hours	Today Hours	Total Hours		Percent of Total
Mob / Demob	M		24:00		24:00		7.14
Infill Lines	OI						
Weather Standby (Sea)	WS						
Operational	O		82:52	10:00	92:52		27.64
Weather Standby (Port)	W		118:47		118:47		35.35
Standby HSE	SHSE						
Contractor Time	CT		2:30		2:30		0.74
Port Call	PC						
Survey Downtime	SD						
Maintenance time	MT						
Disputed Time	DT						
Non-operational(On-hire)	NoH		83:51	14:00	97:51		29.12
To Be Determined	TBD						
MMO Standby	MMO						
TOTAL			312:00	24:00	336:00		100.00%
Hrs. of Daily Operations 24			Cumulative Hours Check Value= 336.00				
E2.	Survey Progress:						
Description	Cores Left	Area	Total Cores	Cores Prev	Today Cores	Cores To Date	% Completed
Grab Samples		Gowanus ECR	78.00	78.00		78.00	100.00%
Video Transects	2.00		26.00	19.00	5.00	24.00	92.31%
CTD Casts			26.00	26.00		26.00	100.00%
Reruns on Contractor							
Reruns on Client	-1.00				1.00	1.00	
TOTALS:	1.00	TOTAL	130.00	123.00	6.00	129.00	99.23%
FF.	SAFETY (Details & Figures for Vessel and Survey Crews and Client Representatives)						
Incidents & Drills			Previous Events	Today's Events	Events To Date		
Safety Meeting							
Vessel Safety Induction			5		5		
Vessel Safety Drill (MOB, Fire & Abandon Ship)			2		2		
Tool Box Talks			9	1	10		
Permit to Work							
Safety Observation Card			6	1	7		
Hazardous Occurrence Report							
First Aid Case (FAC)							
Medical Treatment Case (MTC)							
Lost Time Incident (LTI)							
No. of survey Man-Hours worked since start of project or LTI.			4992:00	384:00	5376:00		
GG.	VESSEL ROB's at 24:00hrs						
	Fuel (T)	Lube Oil (L)	Water (T)				
ROB at 00:00 hrs	TBD	TBD	TBD				
Consumed Today							
Received today							
ROB at 24:00 hrs							
HH.	EXPECTED WEATHER NEXT 24 HRS:						
Winds: 10-15 kts NW. Seas: waves,0.5-1.0m.							
II.	ANTICIPATED PROGRAM NEXT 24 HRS:						
Finish video transects. Head back to dock fro demobilization.							
JJ.	PARTY CHIEF'S COMMENTS: (Optional)						
Sites Completed: UWV-EW1-7, UWV-EW1-10B (re-run due to poor visibility on first run), UWV-EW1-13B, UWV-EW1-14C , UWV-EW1-15, UWV-EW1-16 Things to Note: Sites UWV-EW1-13B is labeled as a second attempt because recording had begun on the first attempt and then immediately aborted due to low visibility. UWV-EW1-14C is labelled as a third attempt due to one attempt being low visibility and the other poor USBL positioning due to shallow water. This was corrected by taking another sound velocity profile. Two more sites to complete tomorrow: UWV-EW1-17 and UWV-EW1-1							
KK.	REPRESENTATIVE'S COMMENTS: (Optional)						
For ALPINE					For Equinor		
							
C.Keane (Survey Party Chief)					T. Nguyen (Client Representative)		
Vessel:	RV Shearwater	Project No:	1894	Date:	08 December 2020		
Client:	Equinor	Location:	York Harbor and Approach	Report No.	014		
Project: Empire Wind 2020 Survey Campaign 1 ECR							

Vessel:	RV Shearwater	Project No:	1894
Client:	Equinor	Today's Date:	10 December 2020
Location:	New York Harbor and Approach, NY	Report No:	16
Project:	Empire Wind 2020 Survey Campaign 1 ECR	Start Date:	25 November 2020

All times are EST (GMT - 5:00 hrs)

AA. VESSEL LOCATION AT 24:00 HRS:

Description: Liberty Landing Marina, NJ Latitude: 40 42 39.367 Longitude: 74 02 38.735

BB. WEATHER:

Time (Local)	BAROM mb	WIND Speed mph Dir	WAVE HEIGHT m	VISIB. nmi	SKY CONDS	REMARKS
00:00						
08:00	1020.0	5-10 NE	0-0.5	10	Clear	
16:00	1019.0	5-10 NE	0-0.5	10	Clear	
24:00						

CC. PERSONNEL & EQUIPMENT:
C1. Alpine OSS Personnel:

Party Chief: C. Keane	Surveyor M. Shand	Cook: S. Hamilton
Navigator: C. Miro	1st Captain: W. Porter	PSO: A. Jackson
Surveyor S. Childers	2nd Captain: M. Affy	PSO: B. Roberts
Surveyor I. Wacchino	3rd Captain: D. Tameriano	
Benthic Biologist(RPS) S. Berkman	Deckhand: S. Kelleher	
Benthic Biologist(RPS) J. Diaz y Gonzalez	Deckhand: M. Budzinsky	

C2. Additional Personnel
C3. Client Personnel:

Client Rep. T. Nguyen

C4. Personnel On Board:

ALPINE:	5	CLIENT:	1	VESSEL:	6	OTHERS:	4	TOTAL 16
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C5. ALPINE'S Equipment:

R2 Sonic 2024 MBES	Sontek Castaway CTD	SBE 19plus V2 SeaCat CTD	
Sonardyne Scout Pro USBL	C-Nav 3050 DGPS	Reticule Binoculars	
Applanix POS MV Oceanmaster	QPS QINSy and QIMERA software		
AML Moving Vessel Profiler (MVP) SVP	Alpine Video Software		

C6. Additional Equipment

Salish Grab Sampler (RPS)
TS-500 Towed Camera Imaging System (RPS)

C7. Project Variations (include notices of changes of personnel / equipment)

Off Vessel	On Vessel
Personnel:	Personnel:
Equipment:	Equipment:

DD. DIARY OF EVENTS TODAY:

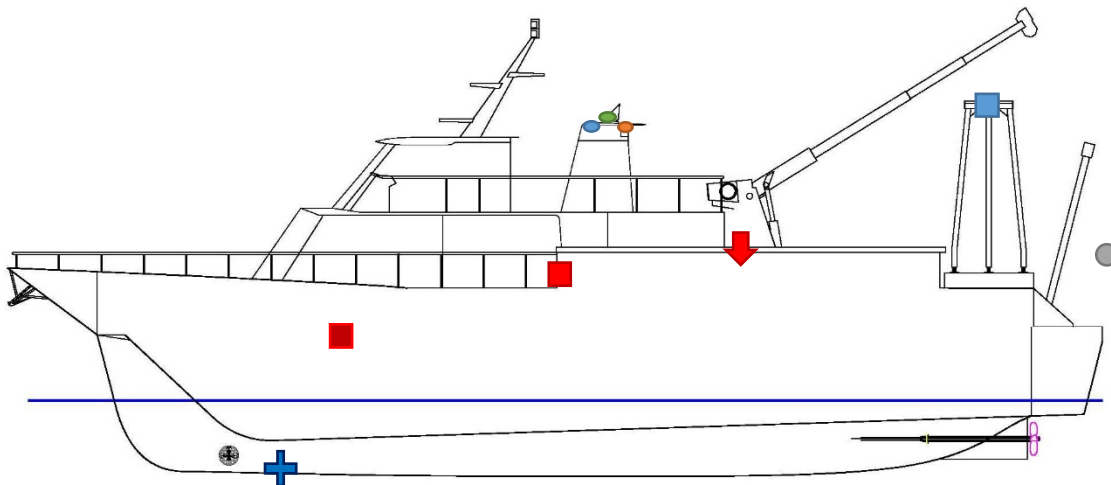
From	To	hrs	Code	
00:00	6:00	6:00	M	Standby for daylight at dock
6:00	18:00	12:00	M	Complete mobilization and head back to office
18:00	24:00	6:00	M	Project complete.

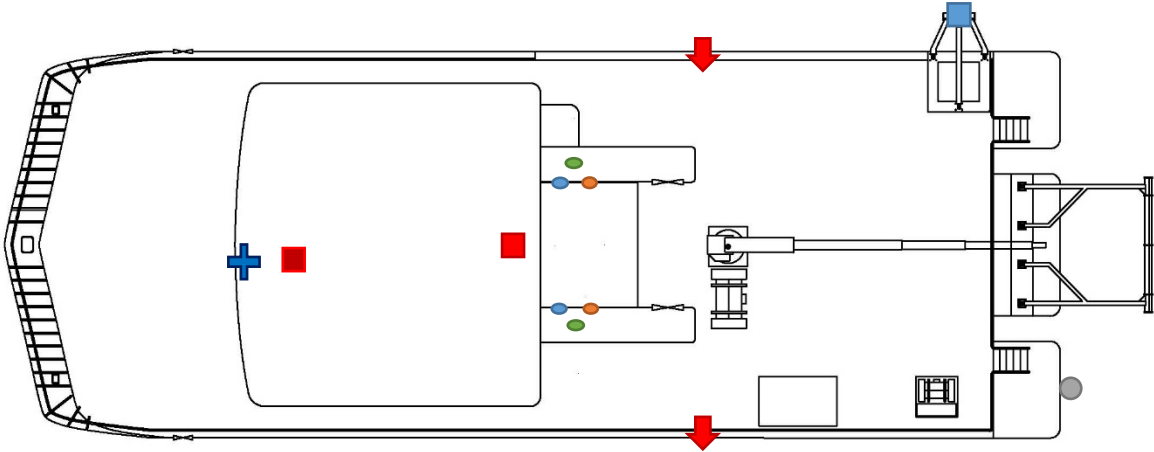
EE.	PROJECT DATA:							
E1.	Time Summary:							
Rate	Code		Previous Hours	Today Hours	Total Hours		Percent of Total	
Mob / Demob	M		34:00	24:00	58:00		15.10	
Infill Lines	OI							
Weather Standby (Sea)	WS							
Operational	O		100:05		100:05		26.06	
Weather Standby (Port)	W		118:47		118:47		30.93	
Standby HSE	SHSE							
Contractor Time	CT		2:30		2:30		0.65	
Port Call	PC							
Survey Downtime	SD							
Maintenance time	MT							
Disputed Time	DT							
Non-operational(On-hire)	NoH		104:38		104:38		27.25	
To Be Determined	TBD							
MMO Standby	MMO							
TOTAL			360:00	24:00	384:00		100.00%	
Hrs. of Daily Operations 24			Cumulative Hours Check Value= 384.00					
E2.	Survey Progress:							
Description		Cores Left	Area	Total Cores	Cores Prev	Today Cores	Cores To Date	% Completed
Mainlines			Gowanus ECR	78.00	78.00		78.00	100.00%
Infill				26.00	26.00		26.00	100.00%
Reruns on Contractor				26.00	26.00		26.00	100.00%
Reruns on Contractor								
Reruns on Client		-1.00			1.00		1.00	
TOTALS:		-1.00	TOTAL	130.00	131.00		131.00	100.77%
FF.	SAFETY (Details & Figures for Vessel and Survey Crews and Client Representatives)							
Incidents & Drills				Previous Events	Today's Events	Events To Date		
Safety Meeting								
Vessel Safety Induction				5		5		
Vessel Safety Drill (MOB, Fire & Abandon Ship)				2		2		
Tool Box Talks				11		11		
Permit to Work								
Safety Observation Card				7		7		
Hazardous Occurrence Report								
First Aid Case (FAC)								
Medical Treatment Case (MTC)								
Lost Time Incident (LTI)								
No. of survey Man-Hours worked since start of project or LTI.				5760:00	384:00	6144:00		
GG.	VESSEL ROB's at 24:00hrs							
			Fuel (T)	Lube Oil (L)	Water (T)			
ROB at 00:00 hrs			TBD	TBD	TBD			
Consumed Today								
Received today								
ROB at 24:00 hrs								
HH.	EXPECTED WEATHER NEXT 24 HRS:							
II.	ANTICIPATED PROGRAM NEXT 24 HRS:							
JJ.	PARTY CHIEF'S COMMENTS: (Optional)							
KK.	REPRESENTATIVE'S COMMENTS: (Optional)							
For ALPINE					For Equinor			
 C.Keane (Survey Party Chief)					T. Nguyen (Client Representative)			
Vessel: RV Shearwater		Project No: 1894		Date: 10 December 2020				
Client: Equinor		Location: York Harbor and Approach		Report No. 016				
Project: Empire Wind 2020 Survey Campaign 1 ECR								

APPENDIX B VESSEL SPECIFICATIONS & EQUIPMENT SPECIFICATIONS

APPENDIX C VESSEL OFFSET DIAGRAM

VESSEL : <i>R/V Shearwater</i>						
OFFSET from IMU	☒ Meter ☐ Feet		+ forward/ - backward	+ right/ - left	+ up/ - down	Notes
POS 1 Primary GPS Antenna			-0.729	-1.661	5.246	Phase center
POS 1 Secondary GPS Antenna			-0.691	1.744	5.251	Phase center
IMU 1 (Inertial Measurement Unit)			0.000	0.000	0.115	
CNAV 1			-0.513	-1.277	4.966	Phase center
POS 2 Primary GPS Antenna			1.263	-1.277	5.081	Phase center
POS 2 Secondary GPS Antenna			-1.246	1.331	5.077	Phase center
IMU 2 (Inertial Measurement Unit)			2.639	-0.642	-3.771	
CNAV 2			-0.513	1.331	5.077	Phase center
MBES			2.665	-0.620	-6.032	Phase center
Port Measure Down			-4.164	-5.874	-0.217	
Starboard Measure Down			-4.109	5.864	0.987	
MVP Towpoint			-16.271	-4.419	0.831	
Camera Towpoint / Water Profiler Drop Point			6.946	-12.634	5.806	STBD A-Frame





Y

Rev. Date :	Project	Page :
05/11/2021	1894 Equinor Empire Wind 2020 Environmental	Page 2 of 2

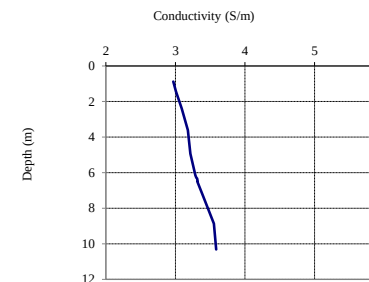
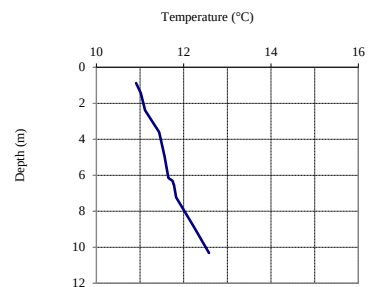
APPENDIX D WATER QUALITY PROFILES

Depth (m)	Temperature (°C)	Conductivity (S/m)	Salinity (PSU)	DO (mg/L)	pH
0.879	10.9099	2.969441	25.9027	8.4079	7.733
1.437	11.0173	3.006954	26.1872	8.4014	7.733
2.39	11.1141	3.089694	26.9126	8.3956	7.731
3.611	11.4383	3.17844	27.525	8.3513	7.733
4.929	11.5591	3.213565	27.7704	8.2806	7.741
6.15	11.6513	3.286719	28.3996	8.1355	7.749
6.279	11.7286	3.301127	28.4781	8.0921	7.762
6.322	11.7488	3.311623	28.5628	8.0971	7.766
6.504	11.7691	3.319627	28.6236	8.1005	7.769
6.515	11.7752	3.316344	28.5876	8.1089	7.77
7.222	11.8246	3.38745	29.2282	8.0716	7.773
8.861	12.2319	3.551693	30.4694	8.0202	7.787
10.317	12.5795	3.585969	30.5119	8.0254	7.799

1894 Equinor Water Quality

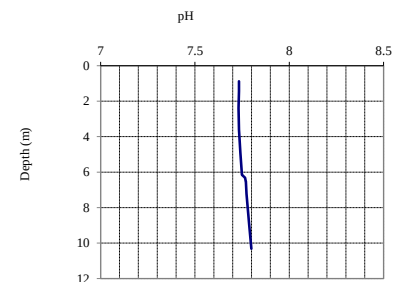
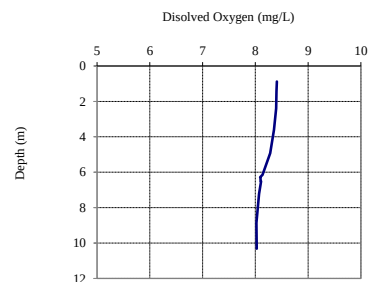
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Date, Time: 12/2/2020 17:21 UTC
Station: WQ-EW1-10A

Coordinates
NAD83 (2011) UTM Zone 18 North (m)
X: 582927.2
Y: 4489342.01
Lat: 40;33;02.479 N
Lon: 74;01;14.129 W



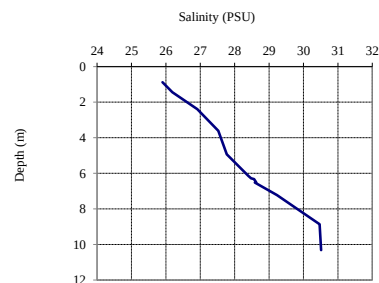
Temperature (°C)	
Mean	11.64
Min	10.91
Max	12.58

Conductivity (S/m)	
Mean	3.271
Min	2.969
Max	3.586



DO (mg/L)	
Mean	8.1914
Min	8.0202
Max	8.4079

pH	
Mean	7.7574
Min	7.7310
Max	7.7990



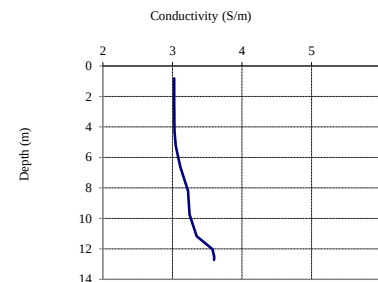
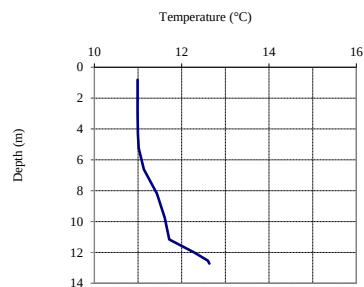
Salinity (PSU)	
Mean	28.2
Min	25.9
Max	30.5

Depth (m)	Temperature (°C)	Conductivity (S/m)	Salinity (PSU)	DO (mg/L)	pH
0.813	10.9901	3.026023	26.3902	8.3055	7.739
0.931	10.991	3.025554	26.385	8.293	7.738
1.252	10.99	3.026223	26.3921	8.3021	7.738
1.948	10.9893	3.026434	26.3944	8.2945	7.738
2.548	10.9883	3.026006	26.3908	8.3093	7.739
3.127	10.9906	3.027168	26.4001	8.3396	7.74
3.62	10.9916	3.027333	26.4007	8.3613	7.74
4.305	10.9957	3.030169	26.4248	8.3818	7.742
5.248	11.0156	3.048063	26.5825	8.3791	7.743
6.619	11.1333	3.112715	27.1185	8.3359	7.743
8.183	11.4321	3.22377	27.9623	8.3004	7.749
9.747	11.6121	3.245343	28.0324	8.2649	7.759
11.161	11.7146	3.347717	28.9325	8.1123	7.765
12.018	12.2948	3.574826	30.6371	7.9223	7.775
12.532	12.5973	3.60124	30.6408	7.8977	7.796
12.725	12.6338	3.598824	30.5884	7.7937	7.807

1894 Equinor Water Quality

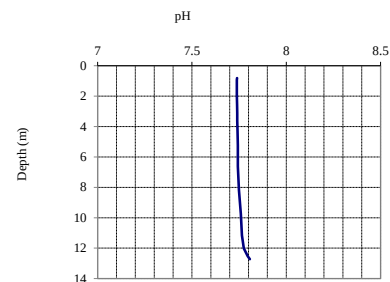
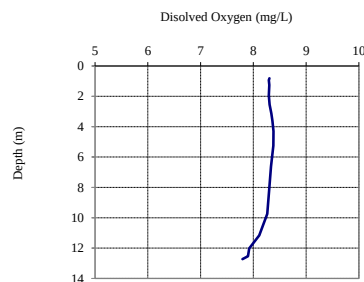
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Station: WQ-EW1-11A

Coordinates
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Y: 4487937.41
Lat: 40;32;16.738 N
Lon: 74;00;51.997 W



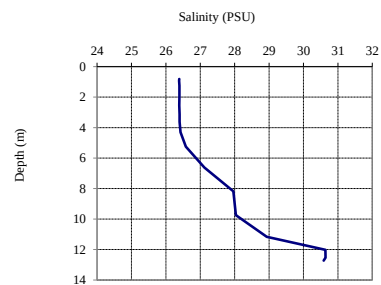
Temperature (°C)	
Mean	11.40
Min	10.99
Max	12.63

Conductivity (S/m)	
Mean	3.185
Min	3.026
Max	3.601



DO (mg/L)	
Mean	8.2246
Min	7.7937
Max	8.3818

pH	
Mean	7.7532
Min	7.7380
Max	7.8070



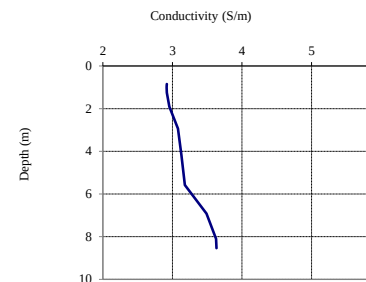
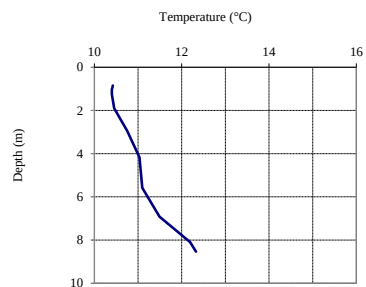
Salinity (PSU)	
Mean	27.6
Min	26.4
Max	30.6

Depth (m)	Temperature (°C)	Conductivity (S/m)	Salinity (PSU)	DO (mg/L)	pH
0.846	10.4228	2.92057	25.7738	8.4806	7.689
0.932	10.4163	2.917224	25.7458	8.477	7.686
1.017	10.4011	2.916518	25.7496	8.4669	7.69
1.253	10.4004	2.919685	25.7809	8.4526	7.691
1.906	10.4525	2.956141	26.0985	8.4377	7.691
2.935	10.7482	3.078744	27.0754	8.4097	7.695
4.167	11.0321	3.128427	27.3457	8.4201	7.708
5.581	11.0985	3.179126	27.7853	8.3457	7.715
6.92	11.4918	3.490714	30.49	8.1338	7.718
8.098	12.1936	3.62656	31.2159	8.1269	7.736
8.537	12.3276	3.633232	31.1679	8.0815	7.761

1894 Equinor Water Quality

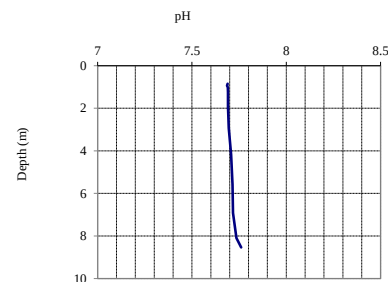
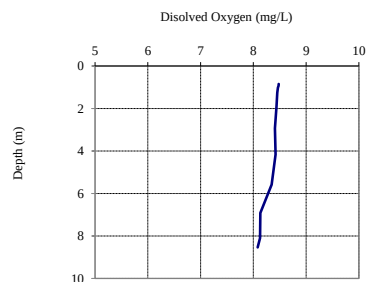
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Date, Time: 12/3/2020 12:14 UTC
Station: WQ-EW1-12A

Coordinates
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Y: 4487076.53
Lat: 40;31;48.573 N
Lon: 74;00;23.369 W



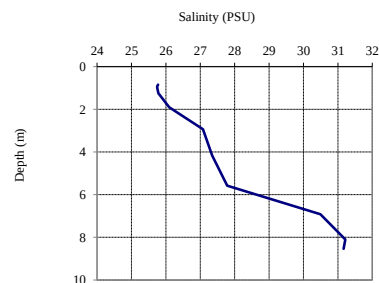
Temperature (°C)	
Mean	11.00
Min	10.40
Max	12.33

Conductivity (S/m)	
Mean	3.161
Min	2.917
Max	3.633



DO (mg/L)	
Mean	8.3484
Min	8.0815
Max	8.4806

pH	
Mean	7.7073
Min	7.6860
Max	7.7610



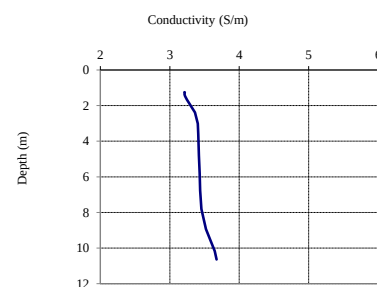
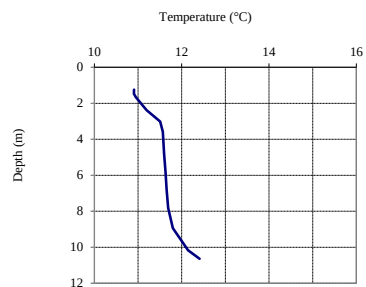
Salinity (PSU)	
Mean	27.7
Min	25.7
Max	31.2

Depth (m)	Temperature (°C)	Conductivity (S/m)	Salinity (PSU)	DO (mg/L)	pH
1.245	10.9106	3.2121	28.2497	8.3474	7.79
1.256	10.9068	3.215691	28.2876	8.3498	7.792
1.374	10.9064	3.211836	28.2504	8.351	7.792
1.47	10.9055	3.219223	28.3229	8.308	7.793
1.674	10.9531	3.246909	28.5554	8.2859	7.792
2.381	11.1926	3.361383	29.4795	8.2306	7.797
3.013	11.506	3.404013	29.6414	8.2401	7.808
3.581	11.5689	3.410523	29.6536	8.2462	7.812
4.791	11.5947	3.419228	29.7164	8.1882	7.813
5.798	11.6297	3.430551	29.7971	8.1553	7.814
6.773	11.654	3.437778	29.8467	8.1413	7.815
7.812	11.6891	3.454181	29.976	8.1341	7.817
8.937	11.7965	3.519377	30.5157	8.1179	7.818
10.169	12.1458	3.64596	31.4408	8.0856	7.822
10.64	12.4095	3.67327	31.4803	8.0769	7.832

1894 Equinor Water Quality

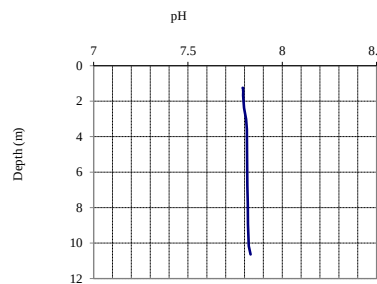
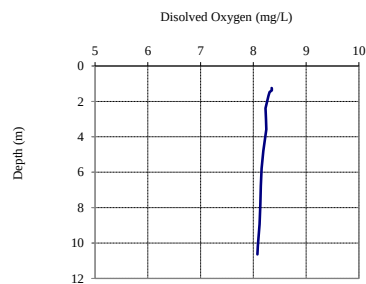
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Lon: 73;59;21.356 W



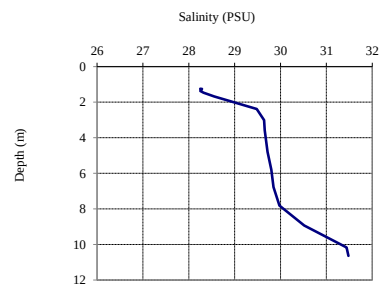
Temperature (°C)	
Mean	11.45
Min	10.91
Max	12.41

Conductivity (S/m)	
Mean	3.391
Min	3.212
Max	3.673



DO (mg/L)	
Mean	8.2172
Min	8.0769
Max	8.3510

pH	
Mean	7.8071
Min	7.7900
Max	7.8320



Salinity (PSU)	
Mean	29.5
Min	28.2
Max	31.5

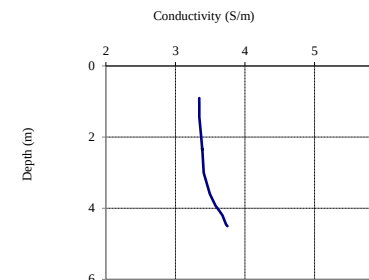
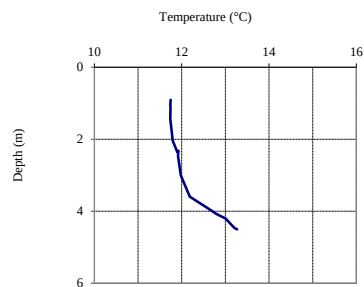
Depth (m)	Temperature (°C)	Conductivity (S/m)	Salinity (PSU)	DO (mg/L)	pH
0.904	11.7462	3.342822	28.8651	8.2104	7.603
0.958	11.7434	3.342182	28.861	8.1989	7.607
1.044	11.7411	3.342682	28.8676	8.2012	7.611
1.129	11.7425	3.342566	28.8653	8.2001	7.611
1.429	11.7377	3.343987	28.8826	8.1919	7.614
2.04	11.7928	3.371334	29.101	8.1562	7.617
2.361	11.9023	3.386105	29.1563	8.1374	7.62
2.318	11.9225	3.383949	29.12	8.1617	7.623
2.468	11.9146	3.389476	29.1789	8.164	7.626
3.004	11.9806	3.406716	29.2913	8.1019	7.627
3.593	12.1841	3.4946	29.9666	7.9982	7.627
3.925	12.6102	3.574206	30.3785	7.9401	7.624
4.075	12.7924	3.631815	30.7738	7.9177	7.621
4.204	13.0082	3.677329	31.0252	7.8008	7.619
4.364	13.1304	3.708161	31.2138	7.6666	7.621
4.46	13.2048	3.728138	31.3394	7.5404	7.621
4.503	13.2693	3.747277	31.4649	7.4428	7.621

1894 Equinor Water Quality

Location: NY Harbor and Approaches
Date, Time: 11/27/2020 12:38 EDT
Station: WQ-EW1-14A

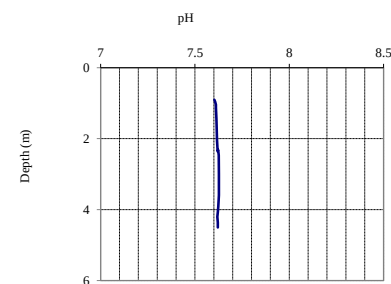
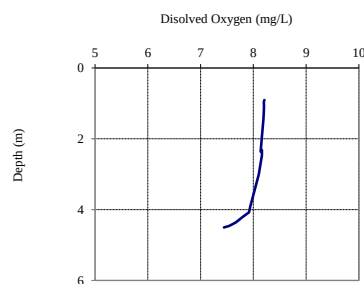
Coordinates
NAD83 (2011) UTM Zone 18 North (m)
X: 587260.37
Y: 4485970.94

Lat/Lon
Lat: 40;31;11.563 N
Lon: 73;58;11.595 W



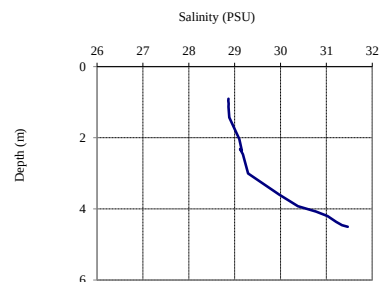
Temperature (°C)	
Mean	12.26
Min	11.74
Max	13.27

Conductivity (S/m)	
Mean	3.483
Min	3.342
Max	3.747



DO (mg/L)	
Mean	8.0018
Min	7.4428
Max	8.2104

pH	
Mean	7.6184
Min	7.6030
Max	7.6270



Salinity (PSU)	
Mean	29.8
Min	28.9
Max	31.5

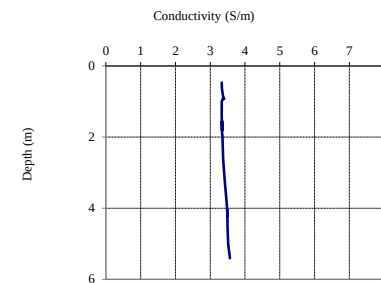
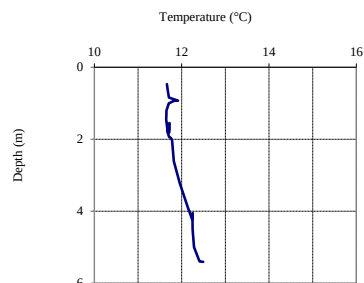
Depth (m)	Temperature (°C)	Conductivity (S/m)	Salinity (PSU)	DO (mg/L)	pH
0.467	11.6602	3.332276	28.831	8.3428	7.656
0.628	11.6799	3.335571	28.8472	8.3273	7.66
0.842	11.7091	3.366382	29.1195	8.348	7.661
0.928	11.9152	3.400982	29.2887	8.3253	7.663
0.928	11.8351	3.356018	28.9221	8.3468	7.669
1.003	11.7058	3.332355	28.7962	8.339	7.673
1.206	11.651	3.330268	28.8186	8.312	7.678
1.271	11.6496	3.330816	28.8249	8.3347	7.681
1.303	11.6506	3.330055	28.8168	8.3793	7.683
1.453	11.6444	3.330207	28.823	8.8026	7.685
1.688	11.6674	3.338758	28.887	8.6971	7.688
1.817	11.713	3.343817	28.9	8.2273	7.69
1.721	11.7209	3.343524	28.8911	8.2603	7.692
1.549	11.7205	3.342311	28.8799	8.3437	7.695
1.571	11.6923	3.334518	28.8271	8.3118	7.699
1.774	11.6692	3.335657	28.8559	8.3274	7.701
1.935	11.7112	3.346329	28.9254	8.3616	7.703
1.967	11.7561	3.352516	28.9496	8.3694	7.705
2.031	11.7803	3.35525	28.9569	8.3346	7.708
2.61	11.8173	3.37093	29.0777	8.2762	7.708
3.22	11.9559	3.418251	29.4206	8.2311	7.709
3.874	12.1365	3.47694	29.8364	8.2221	7.707
4.227	12.2402	3.49901	29.9634	8.2154	7.71
4.045	12.2542	3.495616	29.92	8.2161	7.714
4.088	12.2451	3.492583	29.8985	8.2367	7.715
4.506	12.2503	3.498812	29.9533	8.2544	7.716
4.999	12.2814	3.516976	30.1007	8.2781	7.718
5.395	12.4093	3.563996	30.4437	8.2609	7.719
5.406	12.4923	3.565508	30.3908	8.2546	7.72

1894 Equinor Water Quality

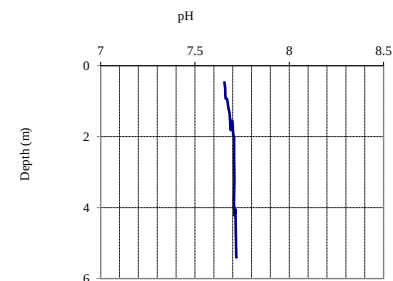
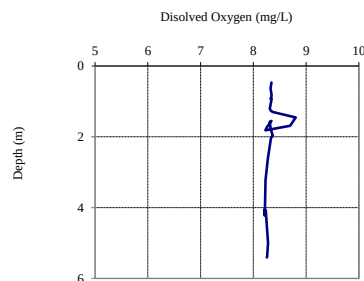
Location: NY Harbor and Approaches
Date, Time: 11/27/2020 14:00 EDT
Station: WQ-EW1-15A

Coordinates
NAD83 (2011) UTM Zone 18 North (m)
X: 592012.7
Y: 4483588.39

Lat/Lon
Lat: 40;29;52.456 N
Lon: 73;54;50.910 W



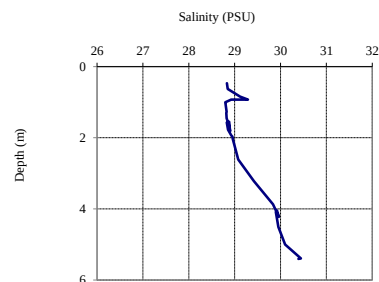
Temperature (°C)	
Mean	11.86
Min	11.64
Max	12.41



Conductivity (S/m)	
Mean	3.388
Min	3.330
Max	3.564

DO (mg/L)	
Mean	8.3315
Min	8.2154
Max	8.8026

pH	
Mean	7.6931
Min	7.6560
Max	7.7190



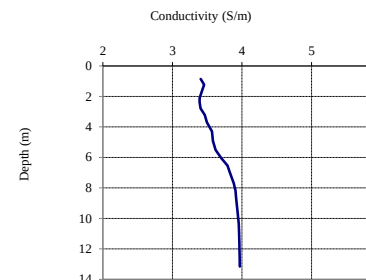
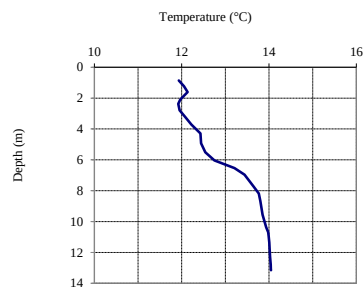
Salinity (PSU)	
Mean	29.2
Min	28.8
Max	30.4

Depth (m)	Temperature (°C)	Conductivity (S/m)	Salinity (PSU)	DO (mg/L)	pH
0.856	11.9336	3.406304	29.3251	8.4137	7.784
1.231	12.0516	3.456195	29.7075	9.0079	7.786
1.606	12.1368	3.427127	29.3635	8.6079	7.788
2.099	11.9668	3.390891	29.1517	8.2359	7.79
2.367	11.9212	3.391118	29.1894	8.347	7.792
2.785	11.9503	3.40437	29.2928	8.3585	7.794
3.213	12.0792	3.464852	29.7672	8.3191	7.794
3.706	12.2201	3.497043	29.961	8.3144	7.793
4.295	12.4278	3.569072	30.4773	8.2754	7.794
4.927	12.4453	3.581039	30.5763	8.2854	7.798
5.506	12.5425	3.619515	30.8612	8.3263	7.799
6.042	12.7507	3.700442	31.4547	8.3909	7.798
6.534	13.2095	3.791005	31.9231	8.3356	7.792
6.963	13.4389	3.823894	32.0377	8.1264	7.79
7.702	13.6396	3.882285	32.412	7.7621	7.787
8.184	13.7669	3.905696	32.5214	7.5061	7.788
8.666	13.8	3.916041	32.5891	7.3938	7.792
9.555	13.8502	3.935021	32.7219	7.3673	7.793
10.369	13.9355	3.953002	32.8153	7.4068	7.796
10.691	13.9813	3.95678	32.8111	7.4149	7.798
10.948	13.9924	3.959087	32.8228	7.3773	7.8
11.366	14.0062	3.961688	32.8349	7.3477	7.802
11.751	14.0138	3.962666	32.8373	7.37	7.805
11.933	14.0179	3.963442	32.8409	7.3862	7.808
12.298	14.0256	3.966266	32.8603	7.3595	7.811
12.79	14.038	3.967701	32.8627	7.3586	7.814
13.08	14.0429	3.968327	32.8642	7.3609	7.817
13.155	14.0447	3.968902	32.8679	7.3436	7.819

1894 Equinor Water Quality

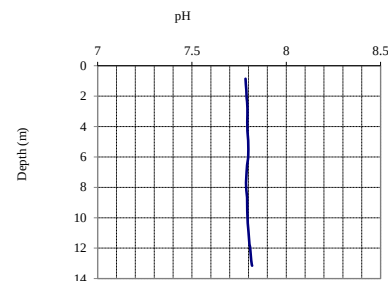
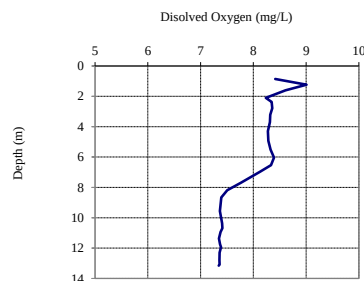
Location: NY Harbor and Approaches
Date, Time: 11/27/2020 15:13 UTC
Station: WQ-EW1-16A

Coordinates
NAD83 (2011) UTM Zone 18 North (m)
X: 594981.24
Y: 4482450.64
Lat: 40;29;14.359 N
Lon: 73;52;45.430 W



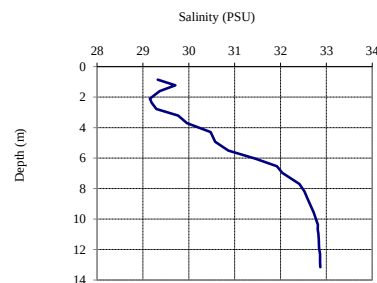
Temperature (°C)	
Mean	13.15
Min	11.92
Max	14.04

Conductivity (S/m)	
Mean	3.742
Min	3.391
Max	3.969



DO (mg/L)	
Mean	7.8964
Min	7.3436
Max	9.0079

pH	
Mean	7.7972
Min	7.7840
Max	7.8190



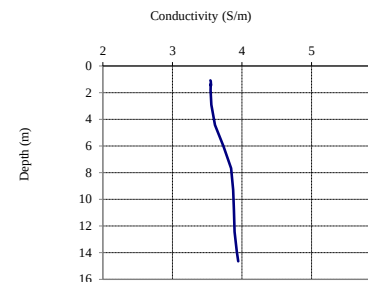
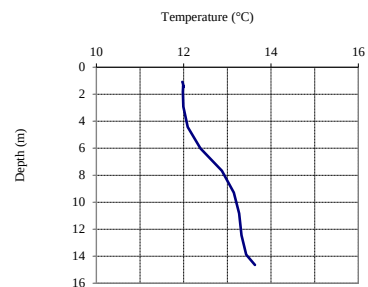
Salinity (PSU)	
Mean	31.5
Min	29.2
Max	32.9

Depth (m)	Temperature (°C)	Conductivity (S/m)	Salinity (PSU)	DO (mg/L)	pH
1.082	11.9684	3.54604	30.6338	8.2376	7.937
1.136	11.9767	3.551238	30.6769	8.226	7.938
1.457	11.9974	3.554322	30.6892	8.251	7.937
1.446	11.9904	3.550445	30.6579	8.2758	7.938
1.361	11.9866	3.550857	30.665	8.2332	7.939
1.811	11.9815	3.54881	30.6494	8.1973	7.94
2.914	11.9925	3.560256	30.7496	8.2211	7.939
4.425	12.0909	3.611611	31.1599	8.2613	7.94
6.01	12.3828	3.732355	32.0686	8.2387	7.944
7.67	12.8753	3.843417	32.7015	8.2304	7.95
9.288	13.1481	3.873223	32.7468	8.1701	7.952
10.831	13.2688	3.885078	32.7536	7.9883	7.951
12.437	13.3253	3.893181	32.7804	7.8423	7.954
13.884	13.4298	3.923987	32.9784	7.7623	7.953
14.644	13.6318	3.945551	33.0052	7.7439	7.952

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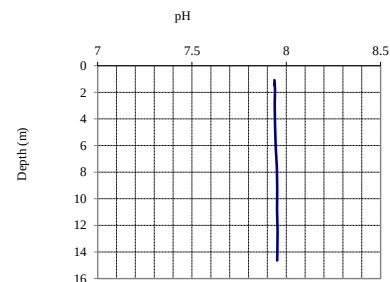
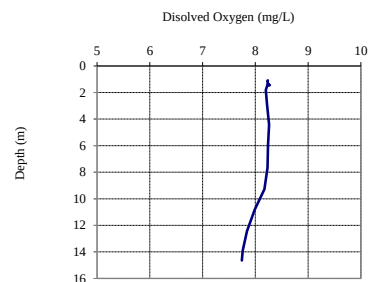
Location: NY Harbor and Approaches
Date, Time: 12/3/2020 17:36 UTC
Station: WQ-EW1-17B

Coordinates
NAD83 (2011) UTM Zone 18 North (m)
X: 595808.93
Y: 4482398.55
Lat: 40;29;12.328 N
Lon: 73;52;10.307 W



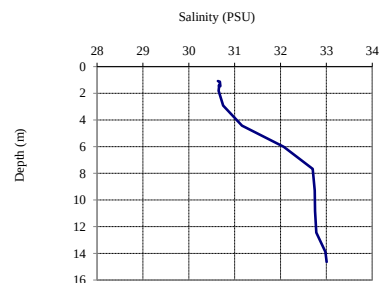
Temperature (°C)	
Mean	12.54
Min	11.97
Max	13.63

Conductivity (S/m)	
Mean	3.705
Min	3.546
Max	3.946



DO (mg/L)	
Mean	8.1253
Min	7.7439
Max	8.2758

pH	
Mean	7.9443
Min	7.9370
Max	7.9540



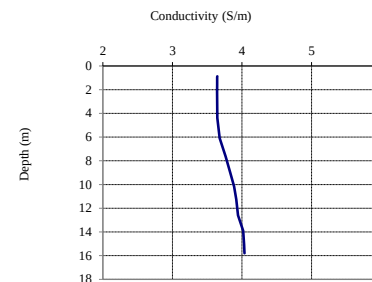
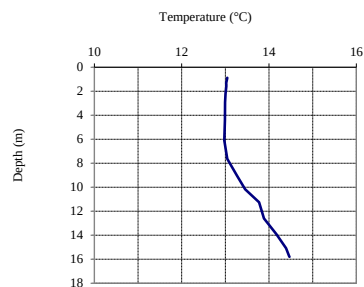
Salinity (PSU)	
Mean	31.7
Min	30.6
Max	33.0

Depth (m)	Temperature (°C)	Conductivity (S/m)	Salinity (PSU)	DO (mg/L)	pH
0.875	13.045	3.644969	30.6934	8.0378	7.852
0.95	13.0415	3.643203	30.6797	8.0421	7.854
1.314	13.0186	3.642731	30.6937	8.0484	7.856
1.41	13.0237	3.642895	30.6911	8.0479	7.857
1.592	13.0223	3.642201	30.6856	8.0407	7.857
2.192	13.0039	3.641855	30.697	8.0314	7.859
2.91	12.9945	3.643211	30.717	8.0361	7.86
4.389	12.9889	3.645747	30.7447	8.0467	7.862
6.092	12.9756	3.679811	31.0744	8.0409	7.864
7.635	13.0453	3.763676	31.8039	8.0071	7.863
9.027	13.2655	3.831884	32.258	7.9921	7.863
10.163	13.4544	3.885671	32.6002	7.9557	7.865
11.255	13.7727	3.918035	32.6298	7.885	7.863
12.594	13.8849	3.942183	32.7575	7.739	7.862
13.912	14.1686	4.016035	33.1964	7.5494	7.859
15.079	14.3898	4.030229	33.1365	7.4392	7.858
15.722	14.4582	4.035114	33.1224	7.2601	7.858
15.797	14.4683	4.035672	33.1189	7.0784	7.857

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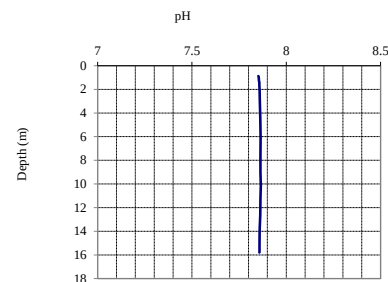
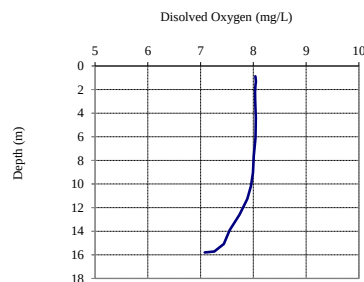
Location: NY Harbor and Approaches
Date, Time: 11/27/2020 17:37 UTC
Station: WQ-EW1-18A

Coordinates
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X: 596990.27
Y: 4481945.79
Lat: 40;28;57.152 N
Lon: 73;51;20.386 W



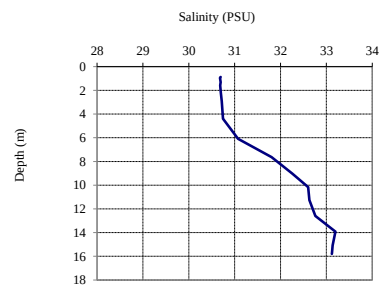
Temperature (°C)	
Mean	13.45
Min	12.98
Max	14.47

Conductivity (S/m)	
Mean	3.794
Min	3.642
Max	4.036



DO (mg/L)	
Mean	7.8488
Min	7.0784
Max	8.0484

pH	
Mean	7.8594
Min	7.8520
Max	7.8650



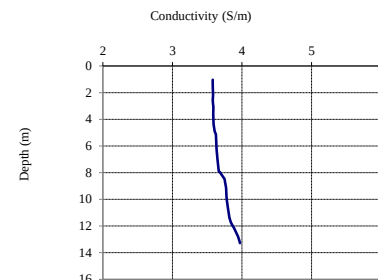
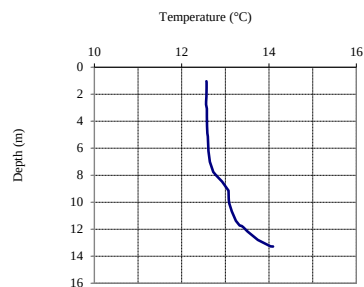
Salinity (PSU)	
Mean	31.7
Min	30.7
Max	33.2

Depth (m)	Temperature (°C)	Conductivity (S/m)	Salinity (PSU)	DO (mg/L)	pH
1.035	12.5649	3.579038	30.4618	8.4273	7.848
1.132	12.5687	3.578763	30.4561	8.4115	7.849
1.55	12.568	3.578938	30.4581	8.3949	7.852
2.171	12.5664	3.583197	30.4994	8.3846	7.854
2.546	12.5602	3.579127	30.4659	8.3808	7.855
2.771	12.5581	3.582233	30.4968	8.3979	7.856
3.071	12.5778	3.587746	30.5328	8.431	7.857
3.639	12.5781	3.586242	30.5182	8.4569	7.86
4.357	12.5791	3.591307	30.565	8.4709	7.863
4.892	12.5882	3.607064	30.7063	8.4719	7.864
5.128	12.5975	3.624018	30.859	8.4549	7.866
5.417	12.6021	3.627788	30.8908	8.4679	7.867
5.631	12.6056	3.630344	30.912	8.5015	7.869
6.199	12.6129	3.633008	30.931	8.5078	7.872
7.003	12.6445	3.64818	31.0482	8.5025	7.873
7.763	12.7227	3.662619	31.1199	8.5525	7.873
7.924	12.7666	3.666865	31.1237	8.5887	7.874
7.945	12.7717	3.678181	31.2263	8.4963	7.875
8.47	12.9264	3.748341	31.759	8.3495	7.873
9.145	13.0718	3.77066	31.8468	8.3036	7.871
9.67	13.0767	3.775378	31.8867	8.1825	7.872
9.874	13.0789	3.778084	31.9102	8.0673	7.874
10.099	13.092	3.782332	31.9391	8.0642	7.876
10.677	13.1473	3.799274	32.0514	8.0691	7.877
11.373	13.2403	3.818533	32.1533	8.0582	7.878
11.716	13.3271	3.838589	32.2676	7.997	7.877
11.759	13.3757	3.842401	32.262	7.8989	7.878
11.855	13.4106	3.851898	32.3212	7.839	7.878
12.166	13.5083	3.886654	32.5626	7.8246	7.879
12.787	13.7449	3.943044	32.8852	7.8128	7.879
13.269	14.0333	3.971682	32.9033	7.7911	7.875
13.28	14.0926	3.968751	32.8257	7.6538	7.875

1894 Equinor Water Quality

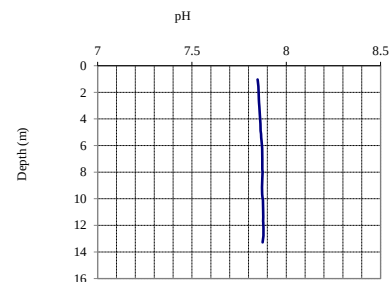
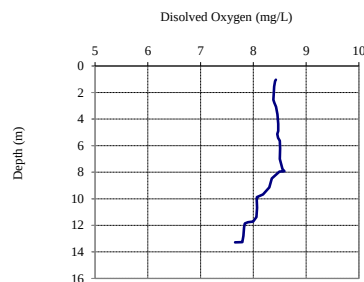
Location: NY Harbor and Approaches
Date, Time: 11/27/2020 18:37 UTC
Station: WQ-EW1-19A

Coordinates
NAD83 (2011) UTM Zone 18 North (m)
X: 598142.7
Y: 4481648.08
Lat: 40;28;47.011 N
Lon: 74;00;53.288 W



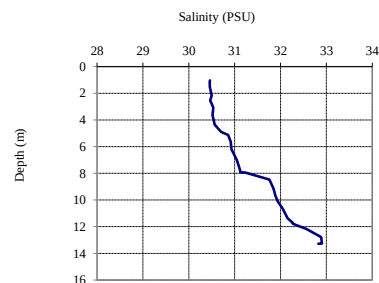
Temperature (°C)	
Mean	12.81
Min	12.56
Max	13.41

Conductivity (S/m)	
Mean	3.680
Min	3.579
Max	3.852



DO (mg/L)	
Mean	8.3260
Min	7.8390
Max	8.5887

pH	
Mean	7.8672
Min	7.8480
Max	7.8780



Salinity (PSU)	
Mean	31.2
Min	30.5
Max	32.3

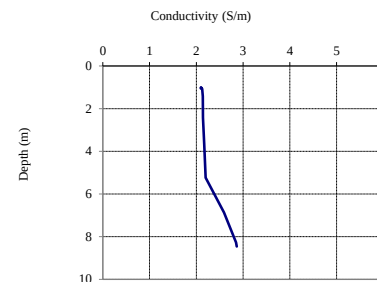
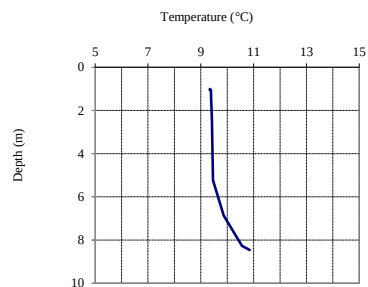
Depth (m)	Temperature (°C)	Conductivity (S/m)	Salinity (PSU)	DO (mg/L)	pH
1.014	9.3575	2.105888	18.5416	8.6716	7.596
1.003	9.3538	2.103759	18.5231	8.652	7.598
1.046	9.3416	2.093543	18.4311	8.6702	7.6
1.035	9.3371	2.100271	18.4982	8.6842	7.602
1.046	9.3482	2.112268	18.6079	8.6901	7.602
1.068	9.3873	2.127008	18.7293	8.6772	7.605
1.421	9.3915	2.139419	18.8464	8.6664	7.605
2.428	9.418	2.143966	18.876	8.6669	7.605
3.671	9.4351	2.169823	19.1155	8.6429	7.607
5.235	9.4633	2.198766	19.3788	8.6045	7.609
6.863	9.8629	2.591626	22.9477	8.4262	7.594
8.267	10.5578	2.849069	24.9842	8.3657	7.596
8.459	10.85	2.865185	24.9402	8.2678	7.616

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Location: NY Harbor and Approaches
Date, Time: 12/7/2020 15:13 UTC
Station: WQ-EW1-1A

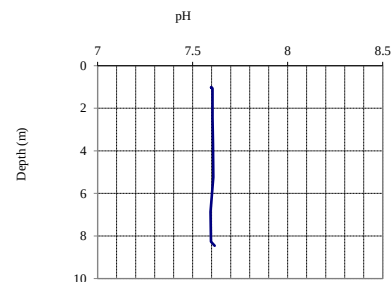
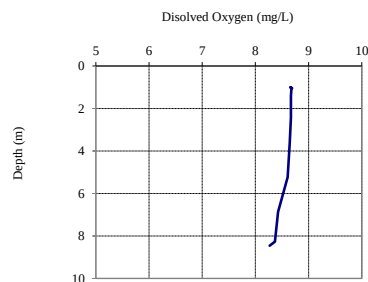
Coordinates
NAD83 (2011) UTM Zone 18 North (m)
X: 582997.03
Y: 4501584.28

Lat/Lon
Lat: 40;39;39.436 N
Lon: 74;01;05.355 W



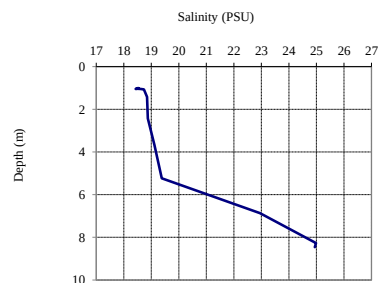
Temperature (°C)	
Mean	9.62
Min	9.34
Max	10.85

Conductivity (S/m)	
Mean	2.277
Min	2.094
Max	2.865



DO (mg/L)	
Mean	8.5912
Min	8.2678
Max	8.6901

pH	
Mean	7.6027
Min	7.5940
Max	7.6160



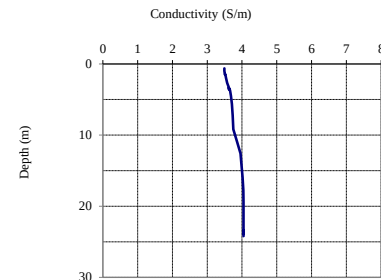
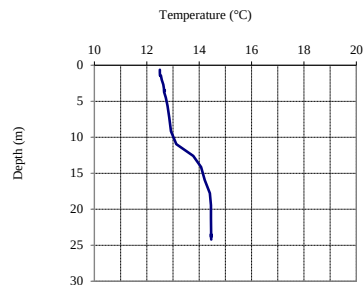
Salinity (PSU)	
Mean	20.0
Min	18.4
Max	25.0

Depth (m)	Temperature (°C)	Conductivity (S/m)	Salinity (PSU)	DO (mg/L)	pH
0.625	12.4991	3.493311	29.7051	8.6755	7.946
0.957	12.4994	3.494086	29.712	8.6698	7.946
1.428	12.5039	3.504594	29.8075	8.6943	7.947
1.503	12.5296	3.512744	29.864	8.6853	7.945
1.428	12.5407	3.514553	29.8722	8.674	7.945
1.568	12.5477	3.524026	29.956	8.6671	7.945
2.007	12.5687	3.542241	30.1109	8.636	7.946
2.671	12.6285	3.572936	30.3522	8.6597	7.944
3.507	12.6636	3.636433	30.9228	8.6559	7.946
3.571	12.6911	3.623733	30.7804	8.7115	7.952
3.41	12.6668	3.613703	30.7056	8.803	7.953
3.421	12.6613	3.624375	30.8108	8.8187	7.953
3.7	12.6586	3.653334	31.0866	8.8142	7.952
4.492	12.7262	3.682333	31.3046	8.8437	7.953
5.628	12.792	3.708286	31.4946	8.8414	7.954
7.246	12.8596	3.731408	31.6557	8.7634	7.952
9.174	12.9257	3.750593	31.7805	8.663	7.948
10.952	13.1252	3.86013	32.6425	8.4613	7.945
12.591	13.7752	3.95853	33.0032	8.3059	7.934
14.144	14.0722	3.983207	32.9761	7.8152	7.929
15.933	14.2105	4.015937	33.1586	7.3981	7.927
17.765	14.4094	4.040108	33.2092	7.2786	7.927
19.457	14.4486	4.04091	33.1823	7.1855	7.928
21.31	14.452	4.041923	33.1879	7.2121	7.927
23.206	14.4585	4.042627	33.188	7.2151	7.931
23.88	14.4592	4.042082	33.1822	7.1986	7.93
23.441	14.4499	4.041812	33.1878	7.1641	7.929
23.473	14.4541	4.042594	33.1914	7.1682	7.932
23.945	14.4588	4.042936	33.1903	7.172	7.932
24.202	14.4612	4.042857	33.1874	7.1871	7.935

1894 Equinor Water Quality

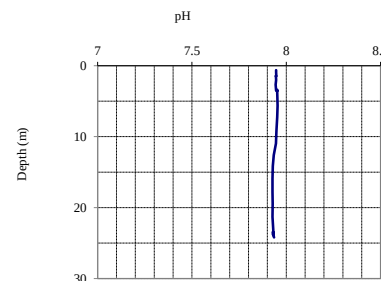
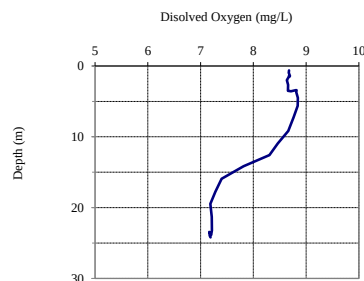
Location: NY Harbor and Approaches
Date, Time: 11/27/2020, 22:09 UTC
Station: WQ-EW1-20A

Coordinates
NAD83 (2011) UTM Zone 18 North (m)
X: 600081.65
Y: 4481146.47
Lat: 40;28;29.913 N
Lon: 73;49;09.561 W



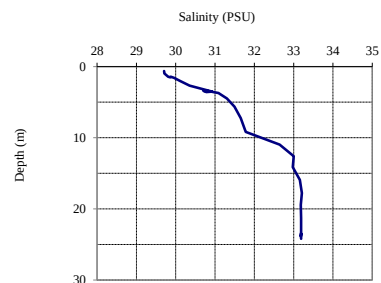
Temperature (°C)	
Mean	13.34
Min	12.50
Max	14.46

Conductivity (S/m)	
Mean	3.779
Min	3.493
Max	4.043



DO (mg/L)	
Mean	8.1679
Min	7.1641
Max	8.8437

pH	
Mean	7.9411
Min	7.9270
Max	7.9540



Salinity (PSU)	
Mean	31.7
Min	29.7
Max	33.2

Depth (m)	Temperature (°C)	Conductivity (S/m)	Salinity (PSU)	DO (mg/L)	pH
0.82	12.5866	3.502984	29.7271	8.5072	7.826
1.056	12.6057	3.530008	29.9664	8.5561	7.828
1.645	12.6155	3.547262	30.121	8.5442	7.831
2.18	12.6239	3.545315	30.0957	8.5545	7.834
2.62	12.6231	3.576359	30.3889	8.5857	7.837
3.562	12.6637	3.640826	30.9642	8.5855	7.84
4.473	12.7106	3.669387	31.1951	8.667	7.846
5.169	12.7518	3.684645	31.3049	8.649	7.848
5.93	12.7732	3.694029	31.3754	8.6716	7.85
6.241	12.8063	3.703322	31.4356	8.6688	7.85
6.605	12.8205	3.710362	31.49	8.5476	7.85
7.548	12.8648	3.73051	31.6428	8.4363	7.851
8.63	12.9028	3.744854	31.7459	8.3572	7.851
9.594	13.0243	3.779581	31.9705	8.2822	7.852
10.301	13.1095	3.786345	31.962	8.2124	7.852
10.601	13.0868	3.791655	32.0309	8.1148	7.856
11.136	13.1238	3.809923	32.1712	8.0477	7.857
11.757	13.1781	3.837034	32.3795	8.0642	7.861
12.679	13.39	3.913536	32.9154	8.0674	7.862
13.514	14.0007	4.002247	33.2139	8.1436	7.856
14.007	14.2219	4.008616	33.0822	7.8588	7.855
14.103	14.2377	4.00895	33.0716	7.5238	7.857
14.596	14.2581	4.014919	33.1089	7.4539	7.858
15.303	14.2794	4.018401	33.1224	7.4705	7.861
15.999	14.3099	4.024067	33.148	7.4763	7.862
16.781	14.3394	4.02834	33.1617	7.4286	7.865
17.156	14.3673	4.030978	33.1618	7.392	7.863
17.392	14.3737	4.032534	33.1705	7.3724	7.868
17.831	14.3902	4.035398	33.1824	7.3537	7.868
18.506	14.4094	4.040647	33.2139	7.3479	7.87
19.266	14.4708	4.050299	33.2493	7.2824	7.87
19.855	14.4953	4.049838	33.2239	7.2344	7.872
20.23	14.4919	4.049385	33.2225	7.1561	7.873
20.605	14.492	4.050109	33.2289	7.165	7.874
21.323	14.4999	4.051707	33.2364	7.1753	7.877
22.158	14.5041	4.051787	33.2332	7.1765	7.878
22.276	14.5031	4.051346	33.23	7.1466	7.879
22.072	14.497	4.050997	33.2321	7.1173	7.881
21.987	14.4952	4.051096	33.2346	7.108	7.881
22.372	14.5007	4.051912	33.2372	7.1357	7.883
22.908	14.5047	4.051991	33.2343	7.148	7.885
23.058	14.5044	4.05182	33.2329	7.1368	7.887

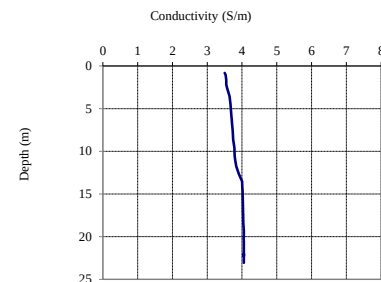
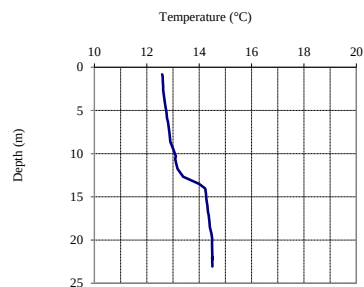
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Location:
Date, Time:
Station:

NY Harbor and Approaches
11/27/2020, 20:05 UTC
WQ-EW1-21A

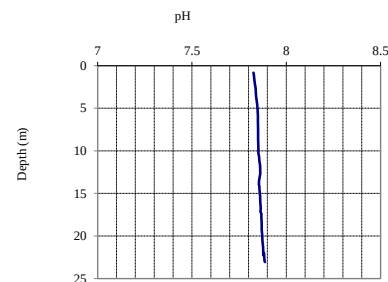
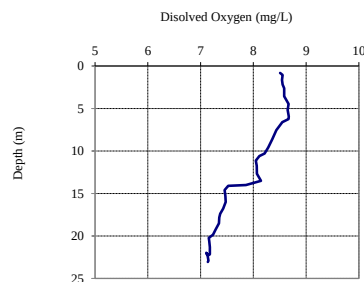
Coordinates
NAD83 (2011) UTM Zone 18 North (m)
X: 602034.87
Y: 4480639.84

Lat/Lon
Lat: 40;28;12.630 N
Lon: 73;47;46.919 W



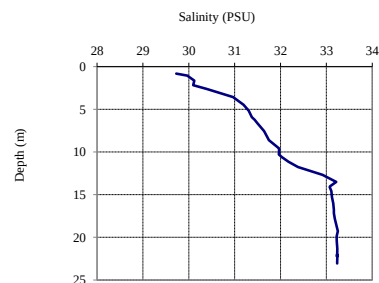
Temperature (°C)	
Mean	13.70
Min	12.59
Max	14.50

Conductivity (S/m)	
Mean	3.882
Min	3.503
Max	4.052



DO (mg/L)	
Mean	7.8315
Min	7.1080
Max	8.6716

pH	
Mean	7.8596
Min	7.8260
Max	7.8870



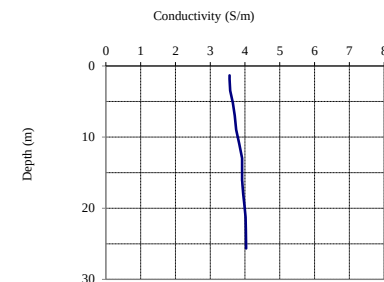
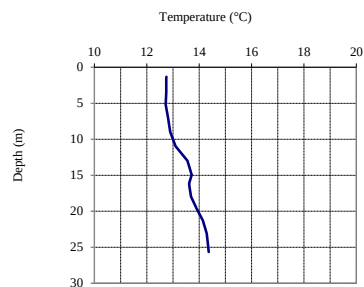
Salinity (PSU)	
Mean	32.3
Min	29.7
Max	33.2

Depth (m)	Temperature (°C)	Conductivity (S/m)	Salinity (PSU)	DO (mg/L)	pH
1.325	12.7494	3.557723	30.1126	8.9692	7.935
1.55	12.7468	3.556143	30.0998	8.9894	7.935
1.818	12.7446	3.555806	30.0982	9.0037	7.936
2.321	12.7436	3.561478	30.1522	9.0252	7.937
3.478	12.7462	3.575388	30.2804	9.0123	7.938
5.182	12.7212	3.65187	31.0206	8.9758	7.938
6.971	12.8125	3.704102	31.4375	9.0049	7.933
8.953	12.8936	3.74641	31.7681	8.8327	7.933
10.956	13.0987	3.83502	32.4287	8.6242	7.928
12.98	13.5509	3.918726	32.8252	8.4679	7.921
14.951	13.7147	3.917751	32.6751	8.0289	7.926
16.13	13.619	3.918947	32.7675	7.8427	7.932
16.237	13.6169	3.920629	32.785	8.0597	7.935
16.622	13.6306	3.924103	32.8055	8.1467	7.937
17.972	13.6928	3.948013	32.9742	8.1433	7.938
19.6	13.9005	3.984218	33.1309	8.1454	7.934
21.25	14.1407	4.014563	33.2039	7.9923	7.929
23.081	14.2907	4.027063	33.1892	7.7248	7.925
24.655	14.3387	4.03062	33.1801	7.4658	7.924
25.652	14.3648	4.032544	33.1749	7.3357	7.923

1894 Equinor Water Quality

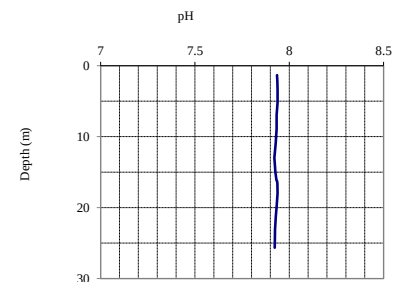
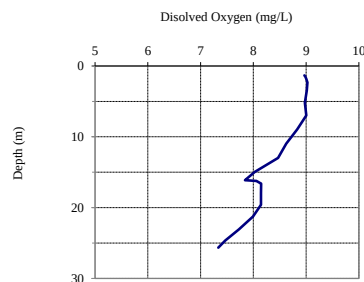
Location: NY Harbor and Approaches
Date, Time: 11/27/2020, 21:18 UTC
Station: WQ-EW1-22B

Coordinates
NAD83 (2011) UTM Zone 18 North (m)
X: 603905.98
Y: 4480157.79
Lat: 40;27;56.164 N
Lon: 73;46;27.760 W



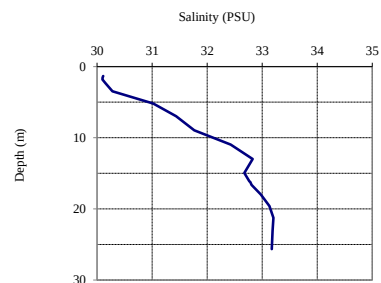
Temperature (°C)	
Mean	13.41
Min	12.72
Max	14.36

Conductivity (S/m)	
Mean	3.819
Min	3.556
Max	4.033



DO (mg/L)	
Mean	8.3895
Min	7.3357
Max	9.0252

pH	
Mean	7.9319
Min	7.9210
Max	7.9380



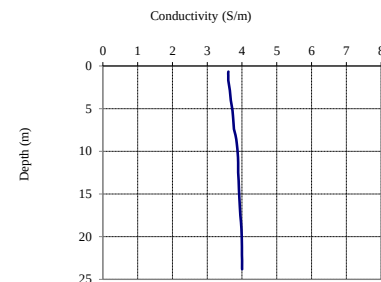
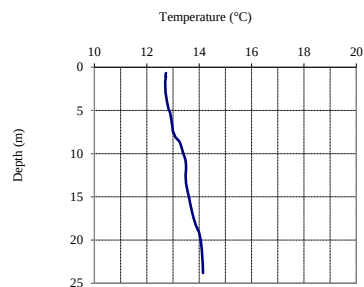
Salinity (PSU)	
Mean	32.0
Min	30.1
Max	33.2

Depth (m)	Temperature (°C)	Conductivity (S/m)	Salinity (PSU)	DO (mg/L)	pH
0.667	12.733	3.610252	30.6203	9.1215	8.001
0.731	12.7272	3.605912	30.5841	9.1318	8.001
0.967	12.7157	3.603074	30.5665	9.1843	8.002
1.031	12.7153	3.604851	30.5836	9.2013	8.001
1.052	12.7317	3.605365	30.5752	9.3056	8.002
1.674	12.7026	3.604939	30.5945	9.7607	8.002
2.863	12.7149	3.651673	31.0249	8.9198	8
4.03	12.774	3.679958	31.2427	9.1891	7.996
4.791	12.8301	3.708317	31.4635	8.9699	7.994
5.241	12.8901	3.725908	31.5792	8.8307	7.991
5.895	12.9307	3.742386	31.7003	8.7486	7.99
6.634	12.9664	3.753858	31.7781	8.7051	7.99
7.394	12.9975	3.7668	31.8736	8.6728	7.992
8.112	13.099	3.81249	32.2175	8.6801	7.988
8.583	13.2499	3.836716	32.3168	8.6015	7.983
9.055	13.3098	3.847728	32.3689	8.3214	7.981
9.74	13.3743	3.868279	32.5061	8.1735	7.981
10.694	13.4768	3.887482	32.5978	8.122	7.98
11.315	13.4983	3.889352	32.5967	8.058	7.984
11.883	13.4964	3.889068	32.5954	8.1288	7.985
12.483	13.4804	3.888732	32.6057	8.1628	7.986
13.436	13.4962	3.901132	32.7076	8.1941	7.988
14.443	13.5649	3.913522	32.764	8.2404	7.987
15.246	13.6219	3.921212	32.7865	8.2049	7.988
15.91	13.6677	3.930261	32.8313	8.1365	7.986
16.639	13.7182	3.939805	32.8764	8.0655	7.986
17.506	13.7936	3.950994	32.9154	8.0038	7.985
18.31	13.8742	3.970387	33.0258	7.983	7.983
19.102	13.9933	3.984706	33.0558	7.955	7.981
20.141	14.0672	3.992623	33.065	7.867	7.98
21.202	14.1002	3.99573	33.0649	7.761	7.978
22.133	14.1181	3.999015	33.0795	7.71	7.979
22.755	14.1385	4.000991	33.0799	7.6703	7.978
23.033	14.1414	4.0009	33.0765	7.6339	7.979
23.579	14.143	4.001659	33.0819	7.6315	7.98
23.815	14.1463	4.001555	33.078	7.612	7.979

1894 Equinor Water Quality

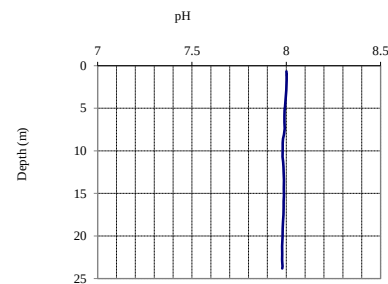
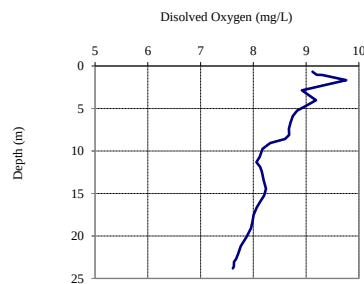
Location: Ny Harbor and Approaches
Date, Time: 11/27/2020, 21:22 UTC
Station: WQ-EW1-23A

Coordinates
NAD83 (2011) UTM Zone 18 North (m)
X: 605033.86
Y: 4479865.48
Lat: 40;27;46.176 N
Lon: 73;45;40.051 W



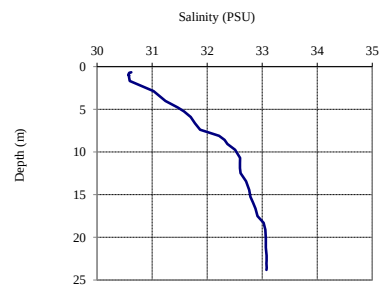
Temperature (°C)	
Mean	13.39
Min	12.70
Max	14.15

Conductivity (S/m)	
Mean	3.836
Min	3.603
Max	4.002



DO (mg/L)	
Mean	8.4072
Min	7.6120
Max	9.7607

pH	
Mean	7.9880
Min	7.9780
Max	8.0020



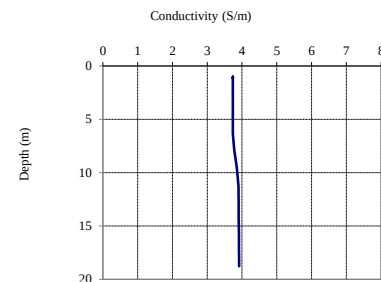
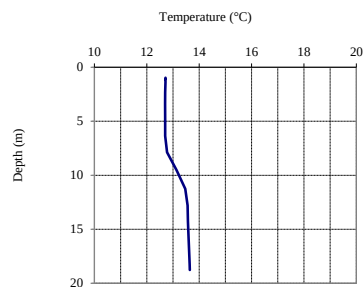
Salinity (PSU)	
Mean	32.2
Min	30.6
Max	33.1

Depth (m)	Temperature (°C)	Conductivity (S/m)	Salinity (PSU)	DO (mg/L)	pH
0.967	12.7163	3.737335	12.7163	8.5145	7.757
1.063	12.7199	3.736456	12.7199	8.511	7.761
1.117	12.7087	3.736227	12.7087	8.4983	7.764
1.106	12.711	3.73638	12.711	8.5132	7.763
1.342	12.7145	3.73601	12.7145	8.5261	7.765
2.306	12.7008	3.735425	12.7008	8.5254	7.772
3.388	12.6992	3.735954	12.6992	8.5208	7.777
4.856	12.7029	3.736152	12.7029	8.537	7.78
6.355	12.703	3.737745	12.703	8.5399	7.785
7.876	12.7729	3.775758	12.7729	8.5218	7.785
9.505	13.1359	3.850804	13.1359	8.5478	7.787
11.251	13.4693	3.897634	13.4693	8.4327	7.789
12.793	13.5564	3.901267	13.5564	8.1467	7.792
14.229	13.5714	3.904164	13.5714	7.9801	7.792
15.685	13.5922	3.910499	13.5922	7.9439	7.796
17.131	13.6189	3.914489	13.6189	7.9528	7.798
18.245	13.6348	3.917468	13.6348	7.9324	7.802
18.77	13.6432	3.917805	13.6432	7.9137	7.801

1894 Equinor Water Quality

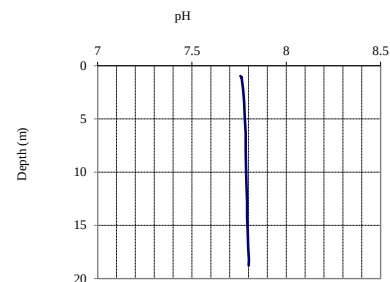
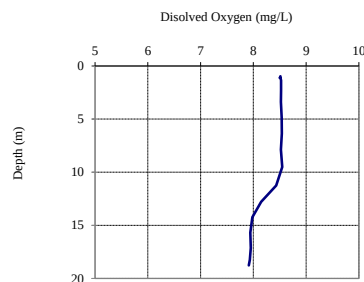
Location: NY Harbor and Approaches
Date, Time: 11/28/2020, 11:04 UTC
Station: WQ-EW1-24A

Coordinates
NAD83 (2011) UTM Zone 18 North (m)
X: 616328.16
Y: 4478263.27
Lat: 40;26;48.811 N
Lon: 73;37;41.653 W



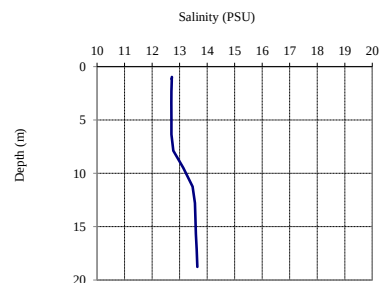
Temperature (°C)	
Mean	13.08
Min	12.70
Max	13.64

Conductivity (S/m)	
Mean	3.812
Min	3.735
Max	3.918



DO (mg/L)	
Mean	8.3366
Min	7.9137
Max	8.5478

pH	
Mean	7.7814
Min	7.7570
Max	7.8020



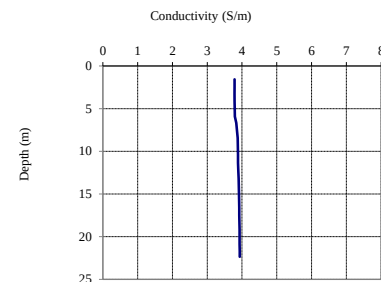
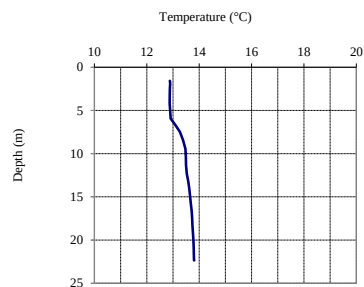
Salinity (PSU)	
Mean	13.1
Min	12.7
Max	13.6

Depth (m)	Temperature (°C)	Conductivity (S/m)	Salinity (PSU)	DO (mg/L)	pH
1.57	12.8842	3.787299	32.1652	8.2716	7.894
1.913	12.8914	3.787382	32.1597	8.2634	7.896
2.416	12.8849	3.786717	32.1588	8.3396	7.897
3.262	12.8787	3.784515	32.1429	8.3288	7.899
4.194	12.873	3.787281	32.1735	8.3247	7.9
5.051	12.8936	3.789381	32.1754	8.313	7.902
5.93	12.9113	3.794891	32.2121	8.3241	7.903
6.669	13.0829	3.83785	32.4706	8.3496	7.902
7.483	13.2628	3.853536	32.464	8.3717	7.899
8.447	13.3838	3.87764	32.5861	8.2029	7.9
9.444	13.4721	3.882934	32.5598	8.0652	7.898
10.408	13.4915	3.884817	32.5605	7.9408	7.898
11.34	13.5011	3.886907	32.5714	7.9175	7.899
12.347	13.5293	3.894997	32.6225	7.9131	7.899
13.193	13.5844	3.902479	32.6449	7.8939	7.9
13.953	13.6154	3.906964	32.6598	7.8549	7.9
14.757	13.6505	3.912159	32.6779	7.8268	7.901
15.699	13.6804	3.917194	32.6989	7.7748	7.899
16.642	13.7158	3.922069	32.7136	7.7536	7.899
17.499	13.7336	3.923485	32.7112	7.7201	7.9
18.345	13.7467	3.926564	32.7283	7.7127	7.899
19.159	13.7642	3.928461	32.7306	7.6892	7.9
20.027	13.7778	3.931203	32.7441	7.6725	7.901
20.873	13.7907	3.932321	32.7432	7.6528	7.902
21.687	13.798	3.933888	32.7511	7.6336	7.902
22.351	13.8064	3.934994	32.754	7.631	7.901
22.351	13.808	3.934415	32.7472	7.6276	7.901

1894 Equinor Water Quality

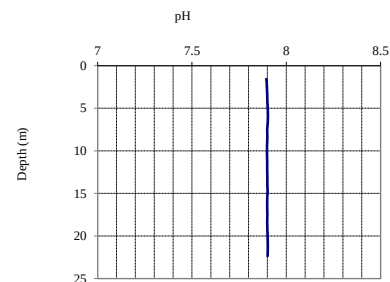
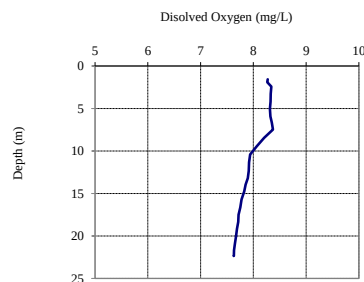
Location: NY Harbor and Approaches
Date, Time: 11/28/2020, 11:43 UTC
Station: WQ-EW1-25A

Coordinates
NAD83 (2011) UTM Zone 18 North (m)
X: 621874.76
Y: 4477912.77
Lat: 40;26;34.586 N
Lon: 73;33;46.501 W



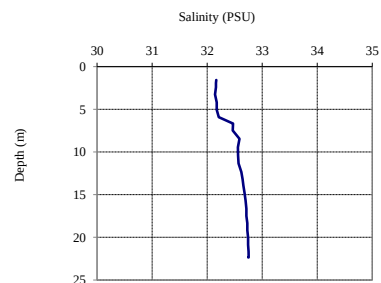
Temperature (°C)	
Mean	13.42
Min	12.87
Max	13.81

Conductivity (S/m)	
Mean	3.876
Min	3.785
Max	3.935



DO (mg/L)	
Mean	7.9766
Min	7.6276
Max	8.3717

pH	
Mean	7.8997
Min	7.8940
Max	7.9030



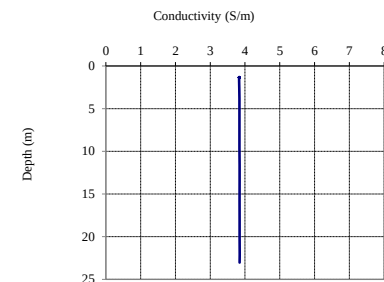
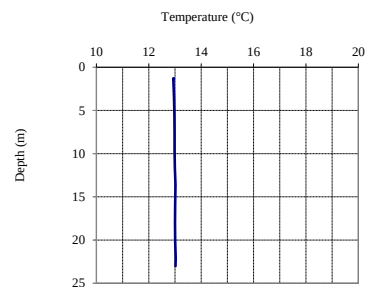
Salinity (PSU)	
Mean	32.5
Min	32.1
Max	32.8

Depth (m)	Temperature (°C)	Conductivity (S/m)	Salinity (PSU)	DO (mg/L)	pH
1.295	12.9553	3.833802	32.5441	8.3279	7.897
1.348	12.9524	3.833448	32.5432	8.3243	7.898
1.38	12.9499	3.832888	32.5401	8.3184	7.9
1.359	12.9482	3.83285	32.5411	8.3396	7.9
1.337	12.9479	3.832296	32.5362	8.3407	7.903
1.359	12.9435	3.831447	32.5319	8.3406	7.904
1.348	12.9391	3.830592	32.5276	8.3224	7.906
1.305	12.937	3.83083	32.5317	8.3231	7.907
1.305	12.94	3.831312	32.5337	8.3478	7.909
1.348	12.9421	3.831737	32.5359	8.3554	7.911
1.391	12.942	3.831145	32.5304	8.3365	7.911
1.359	12.9381	3.830811	32.5305	8.3462	7.912
1.337	12.9387	3.831229	32.534	8.3528	7.913
1.498	12.9412	3.831756	32.5368	8.3469	7.915
1.573	12.9429	3.831808	32.5358	8.3379	7.916
1.745	12.9433	3.832187	32.539	8.3461	7.916
2.612	12.9521	3.835141	32.559	8.3373	7.918
3.834	12.9656	3.83814	32.5752	8.3192	7.919
5.494	12.9761	3.839396	32.5773	8.2793	7.918
7.519	12.9866	3.840363	32.5767	8.2843	7.92
9.586	12.9863	3.839378	32.5668	8.3074	7.92
11.6	12.9938	3.844827	32.611	8.2994	7.922
13.635	13.0217	3.845633	32.5937	8.3415	7.921
15.799	13.0064	3.843405	32.585	8.2698	7.921
17.984	13.0024	3.84414	32.5945	8.3009	7.923
20.105	13.0086	3.845854	32.6045	8.3021	7.923
22.108	13.0274	3.84791	32.6069	8.3	7.924
23.029	13.0207	3.84505	32.5853	8.2729	7.924

1894 Equinor Water Quality

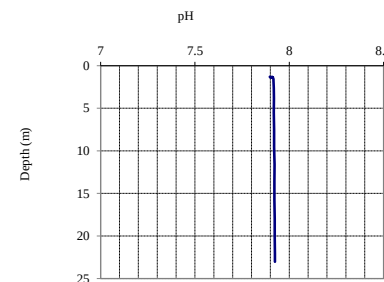
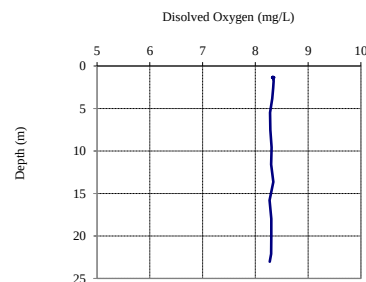
Location: NY Harbor and Approaches
Date, Time: 11/28/2020, 12:29 UTC
Station: WQ-EW1-26A

Coordinates
NAD83 (2011) UTM Zone 18 North (m)
X: 628105.19
Y: 4474033.66
Lat: 40;24;25.448 N
Lon: 74;00;53.288 W



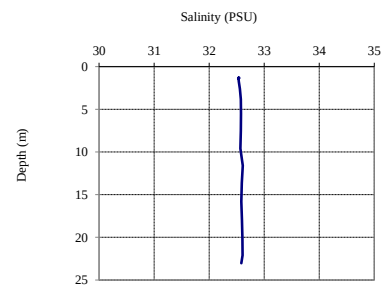
Temperature (°C)	
Mean	12.97
Min	12.94
Max	13.03

Conductivity (S/m)	
Mean	3.836
Min	3.831
Max	3.848



DO (mg/L)	
Mean	8.3222
Min	8.2698
Max	8.3554

pH	
Mean	7.9133
Min	7.8970
Max	7.9240



Salinity (PSU)	
Mean	32.6
Min	32.5
Max	32.6

Depth (m)	Temperature (°C)	Conductivity (S/m)	Salinity (PSU)	DO (mg/L)	pH
1.574	9.5597	2.227723	19.6065	8.5173	7.567
1.724	9.5401	2.235037	19.6876	8.5175	7.567
1.928	9.5709	2.250122	19.816	8.5207	7.568
2.528	9.6149	2.278596	20.0659	8.5008	7.568
4.156	9.7396	2.342617	20.6121	8.4586	7.569
6.117	9.9012	2.424674	21.3084	8.4197	7.573
7.874	10.1034	2.549919	22.393	8.3638	7.577
9.706	10.5968	2.913885	25.5834	8.1929	7.576
10.884	11.1524	3.039158	26.3965	8.1324	7.594
11.013	11.2132	3.038117	26.3431	7.9923	7.605
11.066	11.2482	3.042386	26.3589	7.8022	7.608

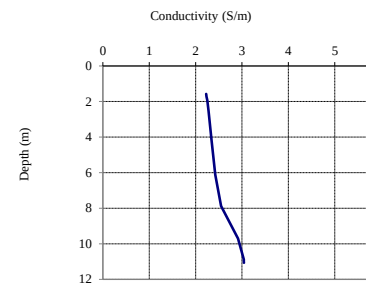
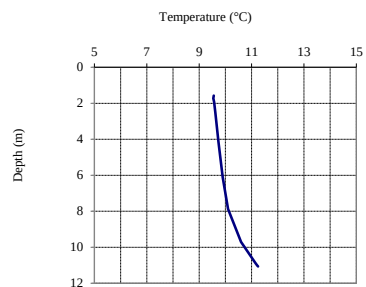
1894 Equinor Water Quality

Location:
Date, Time:
Station:

NY Harbor and Approaches
12/7/2020 12:37 UTC
WQ-EW1-2A

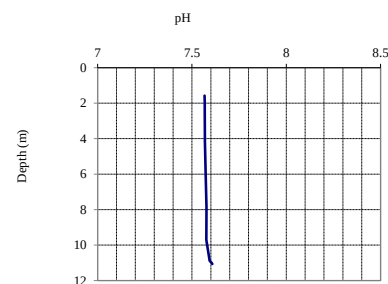
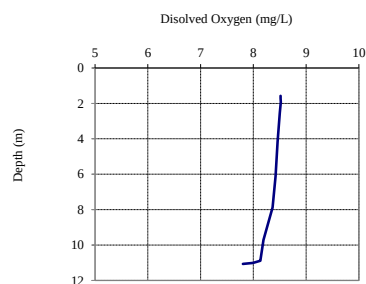
Coordinates
NAD83 (2011) UTM Zone 18 North (m)
X: 581459.56
Y: 4499723.51

Lat/Lon
Lat: 40;38;39.648 N
Lon: 74;02;11.692 W



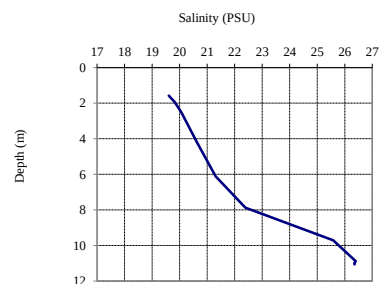
Temperature (°C)	
Mean	10.20
Min	9.54
Max	11.25

Conductivity (S/m)	
Mean	2.577
Min	2.228
Max	3.042



DO (mg/L)	
Mean	8.3107
Min	7.8022
Max	8.5207

pH	
Mean	7.5793
Min	7.5670
Max	7.6080



Salinity (PSU)	
Mean	22.6
Min	19.6
Max	26.4

Depth (m)	Temperature (°C)	Conductivity (S/m)	Salinity (PSU)	DO (mg/L)	pH
1.329	9.0593	2.030064	17.9629	8.8743	7.453
1.394	9.0467	2.026627	17.936	8.8737	7.456
1.447	9.0398	2.027895	17.9517	8.8871	7.456
1.501	9.0471	2.028984	17.9586	8.9077	7.457
1.511	9.0478	2.028618	17.9547	8.9181	7.459
2.39	9.0604	2.040558	18.0634	8.9084	7.459
3.911	9.219	2.148524	19.0248	8.8565	7.456
5.507	9.6056	2.387199	21.1201	8.7339	7.447
7.136	10.3703	2.871039	25.3268	8.4677	7.434
8.85	11.091	3.058864	26.6306	8.3063	7.452
9.61	11.3681	3.153569	27.3366	8.0072	7.478
9.771	11.4414	3.177521	27.5116	7.7365	7.489

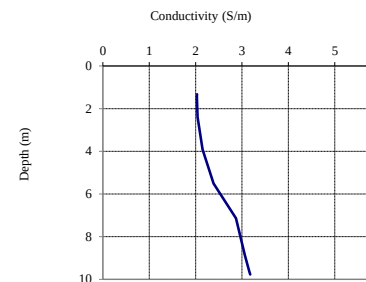
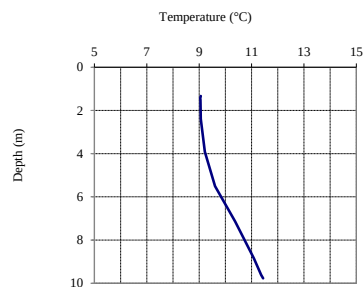
1894 Equinor Water Quality

Location:
Date, Time:
Station:

NY Harbor and Approaches
12/7/2020 12:17 UTC
WQ-EW1-3A

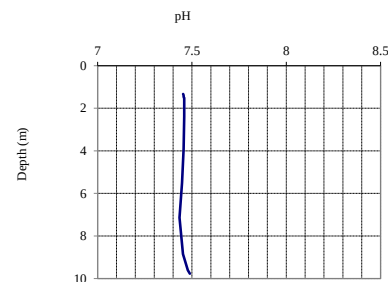
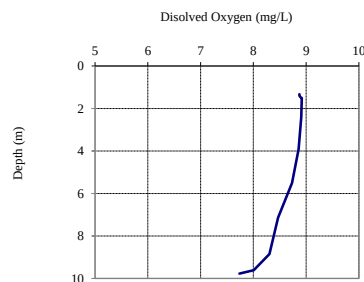
Coordinates
NAD83 (2011) UTM Zone 18 North (m)
X: 581023.31
Y: 4498650.04

Lat/Lon
Lat: 40;38;04.993 N
Lon: 74;02;30.761 W



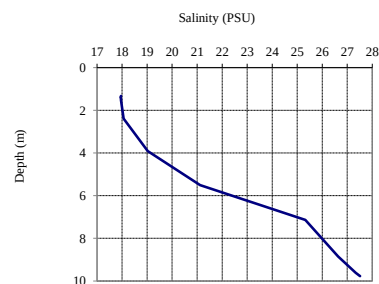
Temperature (°C)	
Mean	9.78
Min	9.04
Max	11.44

Conductivity (S/m)	
Mean	2.415
Min	2.027
Max	3.178



DO (mg/L)	
Mean	8.6231
Min	7.7365
Max	8.9181

pH	
Mean	7.4580
Min	7.4340
Max	7.4890



Salinity (PSU)	
Mean	21.2
Min	17.9
Max	27.5

Depth (m)	Temperature (°C)	Conductivity (S/m)	Salinity (PSU)	DO (mg/L)	pH
1.525	11.3401	3.070672	26.5669	8.0111	7.686
1.653	11.3379	3.07092	26.5708	8.0078	7.687
1.782	11.3404	3.065734	26.5194	8.013	7.687
2.35	11.3482	3.065363	26.51	8.0122	7.687
3.196	11.352	3.06538	26.5072	8.0279	7.688
4.289	11.353	3.062651	26.4801	8.0539	7.688
5.789	11.3569	3.06813	26.529	8.0535	7.689
7.503	11.3494	3.074623	26.5958	8.0476	7.691
9.377	11.3393	3.083237	26.6847	8.0485	7.693
11.316	11.2905	3.09508	26.8326	8.0504	7.695
13.223	11.291	3.123068	27.0997	8.0539	7.697
15.108	11.3969	3.165586	27.4284	8.0694	7.703
16.886	11.447	3.192119	27.6446	8.0962	7.71
18.439	11.4357	3.198261	27.7113	8.112	7.715
19.853	11.5117	3.266391	28.3064	8.104	7.717
21.235	11.8627	3.382828	29.1489	8.0975	7.724
21.985	12.1847	3.432848	29.3724	8.0782	7.737

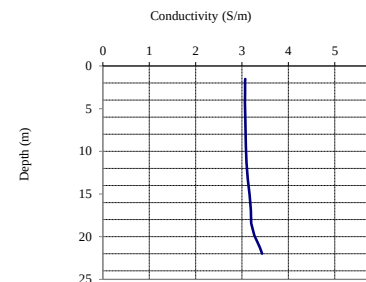
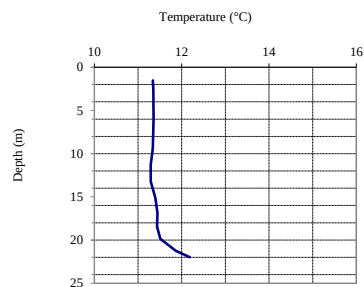
1894 Equinor Water Quality

Location:
Date, Time:
Station:

NY Harbor and Approaches
12/2/2020 15:32 UTC
WQ-EW1-4A

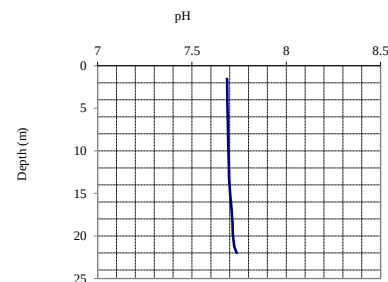
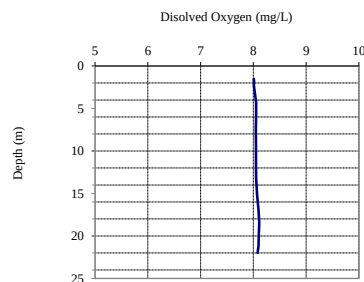
Coordinates
NAD83 (2011) UTM Zone 18 North (m)
X: 581248.99
Y: 4494637.24

Lat/Lon
Lat: 40;35;54.789 N
Lon: 74;02;23.019 W



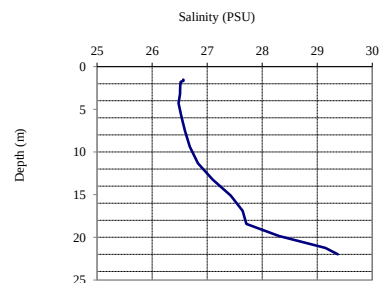
Temperature (°C)	
Mean	11.44
Min	11.29
Max	12.18

Conductivity (S/m)	
Mean	3.146
Min	3.063
Max	3.433



DO (mg/L)	
Mean	8.0551
Min	8.0078
Max	8.1120

pH	
Mean	7.6996
Min	7.6860
Max	7.7370



Salinity (PSU)	
Mean	27.2
Min	26.5
Max	29.4

Depth (m)	Temperature (°C)	Conductivity (S/m)	Salinity (PSU)	DO (mg/L)	pH
0.931	11.4433	3.07534	26.5375	7.9106	7.637
1.188	11.451	3.07941	26.5708	7.9059	7.64
1.434	11.4517	3.075453	26.5324	7.9205	7.642
2.109	11.4525	3.075465	26.5318	7.9126	7.642
3.62	11.4642	3.093602	26.6956	7.8951	7.643
5.398	11.481	3.119774	26.9324	7.8885	7.647
7.273	11.5169	3.18511	27.5291	7.8832	7.656
9.105	11.5692	3.224015	27.8611	7.9347	7.67
10.936	11.595	3.225218	27.8526	8.026	7.68
12.725	11.6035	3.227317	27.8656	8.0822	7.683
14.482	11.6271	3.257915	28.1395	8.0853	7.685
16.238	11.9223	3.36386	28.9234	8.0434	7.689
17.92	12.0979	3.397389	29.1052	8.0073	7.696
19.537	12.3106	3.48233	29.7432	7.8863	7.706
20.984	12.4704	3.500745	29.7902	7.8206	7.717
21.926	12.4998	3.500863	29.7677	7.7707	7.72
22.579	12.5039	3.503216	29.7864	7.7254	7.722

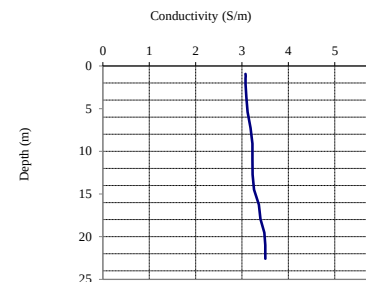
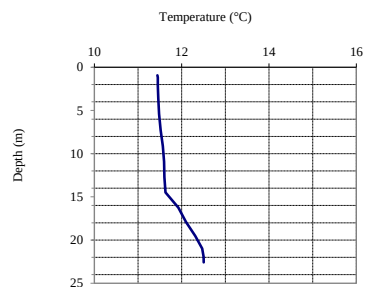
1894 Equinor Water Quality

Location:
Date, Time:
Station:

NY Harbor and Approaches
12/2/2020 14:40 UTC
WQ-EW1-5A

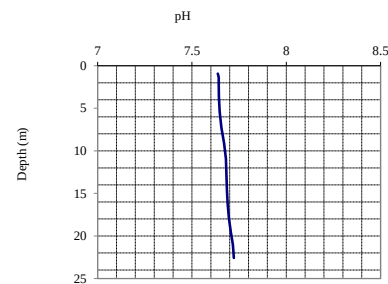
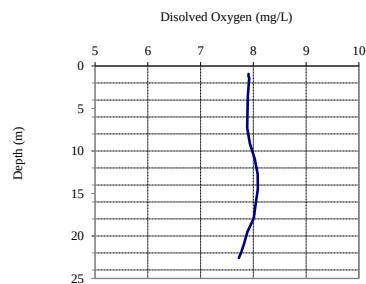
Coordinates
NAD83 (2011) UTM Zone 18 North (m)
X: 581547.39
Y: 4493540.41

Lat/Lon
Lat: 40;35;19.116 N
Lon: 74;02;10.835 W



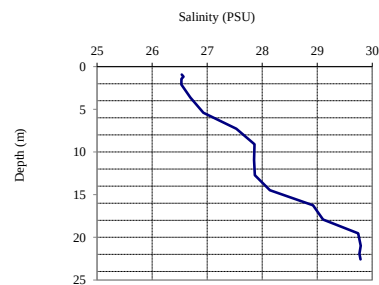
Temperature (°C)	
Mean	11.79
Min	11.44
Max	12.50

Conductivity (S/m)	
Mean	3.258
Min	3.075
Max	3.503



DO (mg/L)	
Mean	7.9234
Min	7.7254
Max	8.0853

pH	
Mean	7.6750
Min	7.6370
Max	7.7220



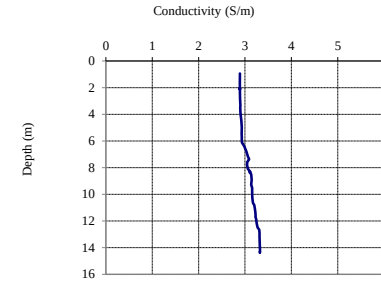
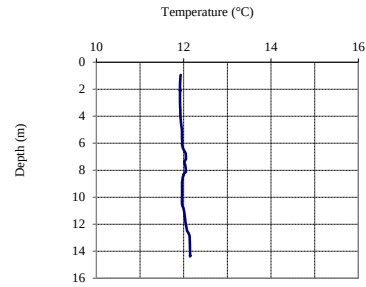
Salinity (PSU)	
Mean	28.0
Min	26.5
Max	29.8

Depth (m)	Temperature (°C)	Conductivity (S/m)	Salinity (PSU)	DO (mg/L)	pH
0.94	11.9286	2.890423	24.462	7.7299	7.652
1.165	11.9216	2.888889	24.4523	7.7262	7.654
1.679	11.9149	2.888768	24.4553	8.0278	7.654
2.14	11.9154	2.890089	24.4671	7.8088	7.654
2.033	11.9166	2.88957	24.4616	7.6422	7.655
2.044	11.9189	2.889466	24.4591	7.7547	7.654
2.269	11.9159	2.890014	24.4661	7.7559	7.653
2.858	11.9149	2.894515	24.5086	7.7386	7.653
3.361	11.9202	2.901503	24.5701	7.7307	7.654
3.49	11.9238	2.898326	24.5381	7.7522	7.654
3.822	11.9218	2.899978	24.5547	7.7588	7.654
4.068	11.9279	2.908763	24.6325	7.7529	7.655
4.465	11.9369	2.91948	24.7265	7.743	7.653
4.979	11.9577	2.93136	24.8234	7.744	7.653
5.44	11.964	2.929139	24.7984	7.7658	7.654
5.525	11.9605	2.928345	24.7932	7.7765	7.654
5.665	11.961	2.929359	24.8023	7.7887	7.653
5.911	11.9663	2.93129	24.8167	7.7937	7.654
6.114	11.9636	2.932938	24.8339	7.7745	7.655
6.382	11.9836	2.982532	25.2836	7.7647	7.654
6.747	12.0436	3.024483	25.6349	7.7603	7.653
7.164	12.0523	3.061978	25.9797	7.7817	7.65
7.368	12.0089	3.089876	26.2715	7.8318	7.644
7.604	12.0347	3.045577	25.8381	7.9026	7.649
7.839	12.0445	3.046083	25.836	7.9224	7.652
8.096	12.0512	3.063346	25.993	7.9004	7.651
8.321	11.9922	3.117514	26.5427	7.8683	7.648
8.343	11.997	3.096694	26.3436	7.8574	7.648
8.493	11.9813	3.1322	26.6886	7.8363	7.65
8.9	11.9611	3.145209	26.8254	7.8322	7.649
9.264	11.9611	3.135364	26.7325	7.848	7.649
9.36	11.9621	3.140499	26.7802	7.8564	7.651
9.521	11.9614	3.152454	26.8933	7.8502	7.653
9.864	11.9613	3.154124	26.909	7.8525	7.653
10.249	11.9598	3.157028	26.9373	7.85	7.653
10.539	11.9644	3.16734	27.0312	7.8468	7.655
10.667	11.9746	3.174599	27.0922	7.8466	7.655
10.785	11.9897	3.197623	27.2984	7.8006	7.655
11.031	12.011	3.210459	27.4039	7.7583	7.657
11.396	12.0252	3.224739	27.5281	7.7297	7.656
11.631	12.0358	3.228395	27.5548	7.6904	7.657
11.674	12.0338	3.224642	27.5208	7.6577	7.658
11.878	12.0401	3.240368	27.6645	7.6583	7.659
12.188	12.0609	3.252612	27.7646	7.672	7.661
12.488	12.0759	3.27163	27.933	7.6412	7.661
12.649	12.1103	3.306684	28.2384	7.5918	7.661
12.863	12.134	3.312806	28.2783	7.5715	7.658
13.184	12.1384	3.314313	28.2891	7.5533	7.661
13.559	12.1407	3.317443	28.3168	7.5625	7.663
14.18	12.1442	3.32176	28.3547	7.5426	7.664
14.33	12.1476	3.322891	28.3628	7.5114	7.666
14.32	12.1485	3.321584	28.3497	7.5219	7.666
14.309	12.1464	3.318562	28.3228	7.524	7.67
14.384	12.145	3.31962	28.3338	7.5274	7.671

1894 Equinor Water Quality

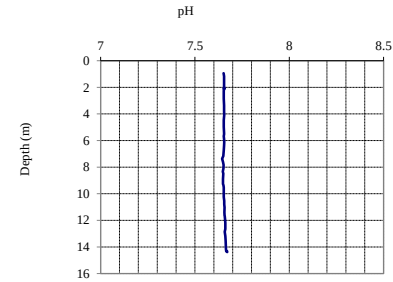
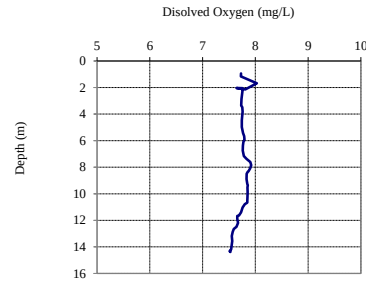
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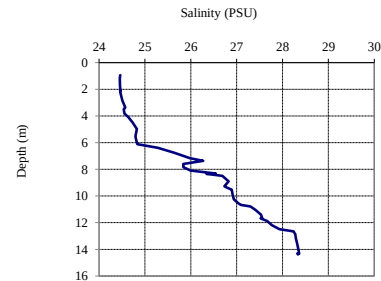
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Mean	11.96
Min	11.91
Max	12.05

Conductivity (S/m)	
Mean	2.956
Min	2.889
Max	3.118



DO (mg/L)	
Mean	7.7912
Min	7.6422
Max	8.0278

pH	
Mean	7.6525
Min	7.6440
Max	7.6550



Salinity (PSU)	
Mean	25.0
Min	24.5
Max	26.5

Depth (m)	Temperature (°C)	Conductivity (S/m)	Salinity (PSU)	DO (mg/L)	pH
0.854	12.2529	3.014082	25.3975	7.2197	7.582
0.897	12.2554	3.009688	25.3549	7.2068	7.584
0.95	12.2566	3.010426	25.3609	7.2231	7.585
0.972	12.2494	3.014568	25.4043	7.222	7.585
0.918	12.2532	3.013601	25.3928	7.2273	7.586
0.993	12.2531	3.017323	25.4274	7.2313	7.587
1.229	12.2439	3.017669	25.4367	7.2192	7.588
1.497	12.2479	3.008692	25.3505	7.2175	7.589
2.172	12.2366	3.043167	25.6787	7.209	7.59
3.329	12.182	3.118786	26.4221	7.2177	7.584
4.786	12.137	3.137253	26.6264	7.2907	7.581
5.932	12.0889	3.154807	26.8252	7.3658	7.582
6.178	12.0508	3.163672	26.9358	7.4384	7.583
7.046	11.9847	3.209437	27.4149	7.4883	7.582
7.571	11.958	3.272953	28.0356	7.5288	7.581

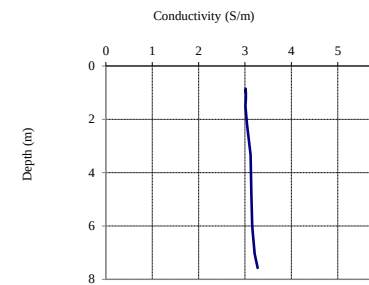
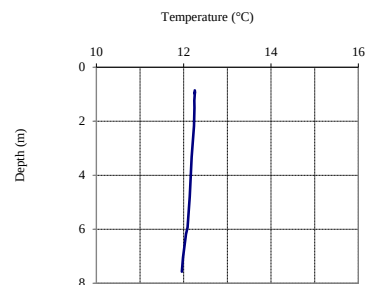
1894 Equinor Water Quality

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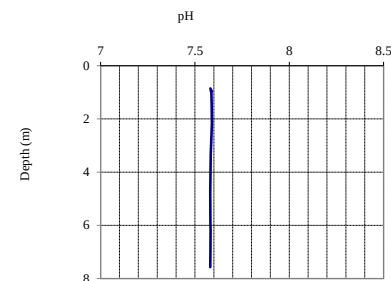
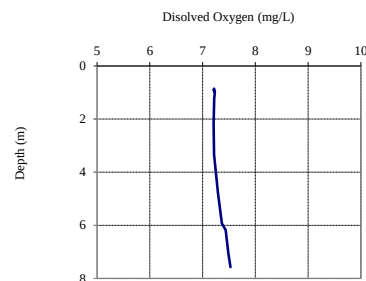
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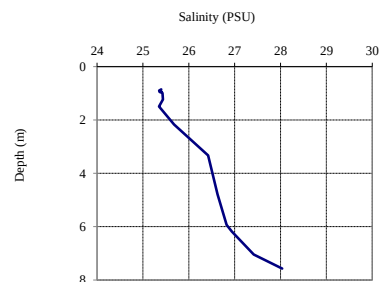
Temperature (°C)	
Mean	12.18
Min	11.96
Max	12.26

Conductivity (S/m)	
Mean	3.080
Min	3.009
Max	3.273



DO (mg/L)	
Mean	7.2870
Min	7.2068
Max	7.5288

pH	
Mean	7.5846
Min	7.5810
Max	7.5900



Salinity (PSU)	
Mean	26.1
Min	25.4
Max	28.0

Depth (m)	Temperature (°C)	Conductivity (S/m)	Salinity (PSU)	DO (mg/L)	pH
0.986	11.8005	3.131141	26.8109	7.8662	7.592
1.04	11.798	3.13123	26.8135	7.8756	7.592
1.051	11.798	3.128276	26.7855	7.8819	7.595
1.383	11.7912	3.127034	26.7786	7.8716	7.596
2.025	11.7792	3.145048	26.9575	7.8576	7.597
2.679	11.7836	3.157355	27.0707	7.845	7.596
3.643	11.7885	3.182713	27.3072	7.859	7.598
4.542	11.7942	3.207758	27.5403	7.871	7.597
4.917	11.7909	3.223056	27.6879	7.8597	7.597
5.41	11.7946	3.233492	27.7841	7.8694	7.599
5.839	11.811	3.25715	27.9966	7.8994	7.6
6.203	11.8243	3.26175	28.0302	7.9525	7.599
6.181	11.8277	3.262046	28.0305	7.9756	7.601
6.427	11.8283	3.262566	28.0349	7.9461	7.603
7.027	11.8322	3.274739	28.1475	7.9092	7.605
7.488	11.8634	3.300507	28.3688	7.8756	7.606
7.616	11.8815	3.303407	28.3826	7.8814	7.606
8.066	11.8866	3.309642	28.4378	7.894	7.608
8.173	11.8913	3.310754	28.4448	7.8942	7.611
8.184	11.8922	3.310881	28.4453	7.896	7.612
8.205	11.8945	3.311021	28.4449	7.8923	7.614
8.248	11.8937	3.311307	28.4482	7.9037	7.616
8.408	11.8939	3.311404	28.4489	7.921	7.619
8.419	11.8967	3.312163	28.454	7.9141	7.621

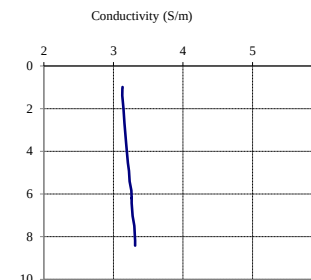
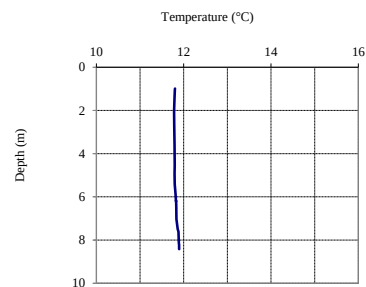
1894 Equinor Water Quality

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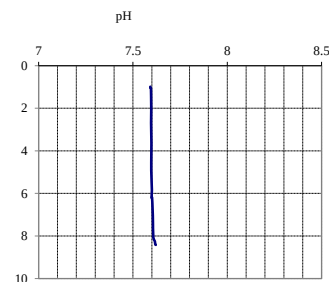
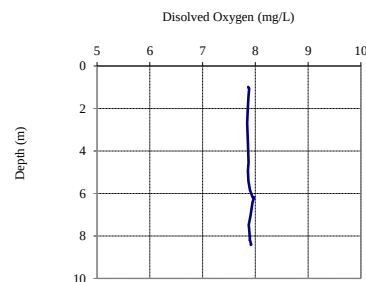
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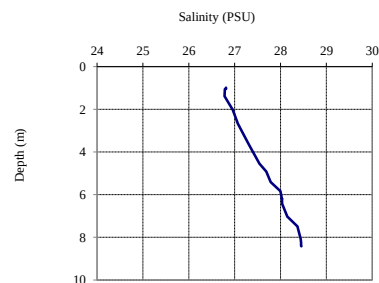
Temperature (°C)	
Mean	11.83
Min	11.78
Max	11.90

Conductivity (S/m)	
Mean	3.240
Min	3.127
Max	3.312



DO (mg/L)	
Mean	7.8922
Min	7.8450
Max	7.9756

pH	
Mean	7.6033
Min	7.5920
Max	7.6210



Salinity (PSU)	
Mean	27.8
Min	26.8
Max	28.5

Depth (m)	Temperature (°C)	Conductivity (S/m)	Salinity (PSU)	DO (mg/L)	pH
0.981	10.9171	2.88236	25.0617	8.1181	7.611
1.024	10.9185	2.878978	25.0283	8.1332	7.613
1.645	10.9181	2.855488	24.8035	8.1739	7.614
2.374	10.9098	2.809788	24.372	8.204	7.616
2.941	10.908	2.813358	24.4071	8.1844	7.612
3.338	10.909	2.820615	24.4756	8.1563	7.613
3.755	10.9084	2.814689	24.4193	8.1425	7.612
4.313	10.9082	2.84646	24.7229	8.1257	7.612
5.223	10.9082	2.923266	25.4586	8.0946	7.612
5.887	10.9288	2.954166	25.7408	8.1118	7.615
6.08	10.9532	2.960857	25.7879	8.153	7.619
6.594	10.9543	2.960438	25.783	8.1598	7.62
7.109	10.9493	2.959065	25.7731	8.162	7.621
7.269	10.9481	2.960712	25.7897	8.1641	7.62
7.387	10.9541	2.964147	25.8184	8.1613	7.62
8.351	10.9705	2.968353	25.847	8.1753	7.624
8.887	10.988	2.972905	25.8783	8.171	7.625

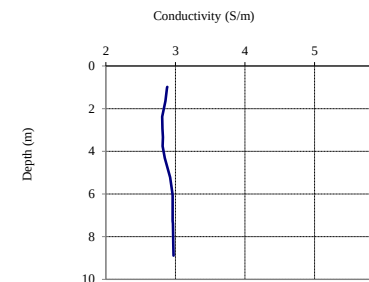
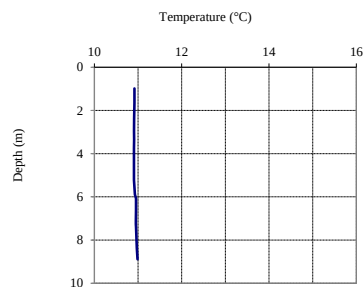
1894 Equinor Water Quality

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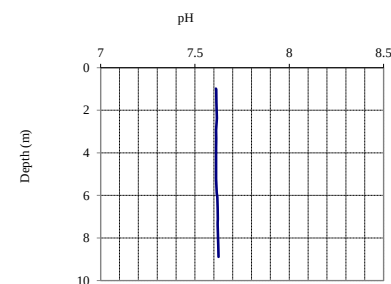
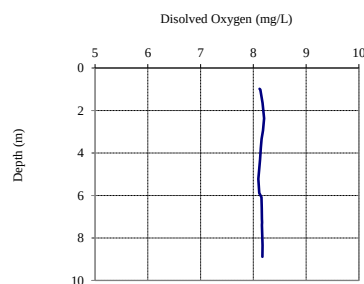
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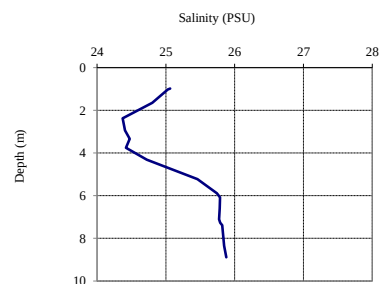
Temperature (°C)	
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Min	10.91
Max	10.99

Conductivity (S/m)	
Mean	2.903
Min	2.810
Max	2.973



DO (mg/L)	
Mean	8.1524
Min	8.0946
Max	8.2040

pH	
Mean	7.6164
Min	7.6110
Max	7.6250



Salinity (PSU)	
Mean	25.2
Min	24.4
Max	25.9

APPENDIX E BENTHIC ANALYSIS REPORT

EQUINOR EMPIRE OCS A-0512

2020 Benthic Survey Report

Prepared by:

RPS Ocean Science

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Prepared for:

Alpine - Equinor

20-P-210446 Alpine Equinor
Empire

Lease Area OCS A-0512
2020 Benthic Survey Report

May 07, 2021

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1 INTRODUCTION

RPS was contracted by Alpine to collect, process, analyze, and compile benthic data collected with a towed video sled and grab sampler in the export cable corridors associated with Equinor's Lease Area OCS-A 0512, offshore of New York/New Jersey. The survey area was defined as the previously uncharacterized portions of the Empire Wind 1 (EW1) export cable route (ECR) that connects the offshore lease area to the mainland at the South Brooklyn Marine Terminal, New York. Sample locations were chosen by Equinor to ground-truth acoustic data, fill spatial gaps from prior surveys, and investigate known or expected complex habitat (Figure 1-1). The grab samples and video imagery data conclusions presented in this document will support interpretation of geophysical data to characterize surficial sediment conditions and classify the benthic habitat according to the Coastal and Marine Ecological Classifications Standards (CMECS; FGDC, 2012) and recent guidance for mapping fish habitat from National Marine Fisheries Service (NMFS, 2021) for inclusion in permitting documentation required by Bureau of Ocean Energy Management (BOEM). This report provides:

- A description of the benthic grab sampling methods, results, and analysis;
- The analysis of benthic grab sampling results using key statistical analyses such as taxa diversity, richness, and density;
- A description and analysis of abundance of benthic organisms observed in the video data collected; and
- CMECS classifications of each grab sample site and survey transect based on the video, grain size, and benthic community lab results.

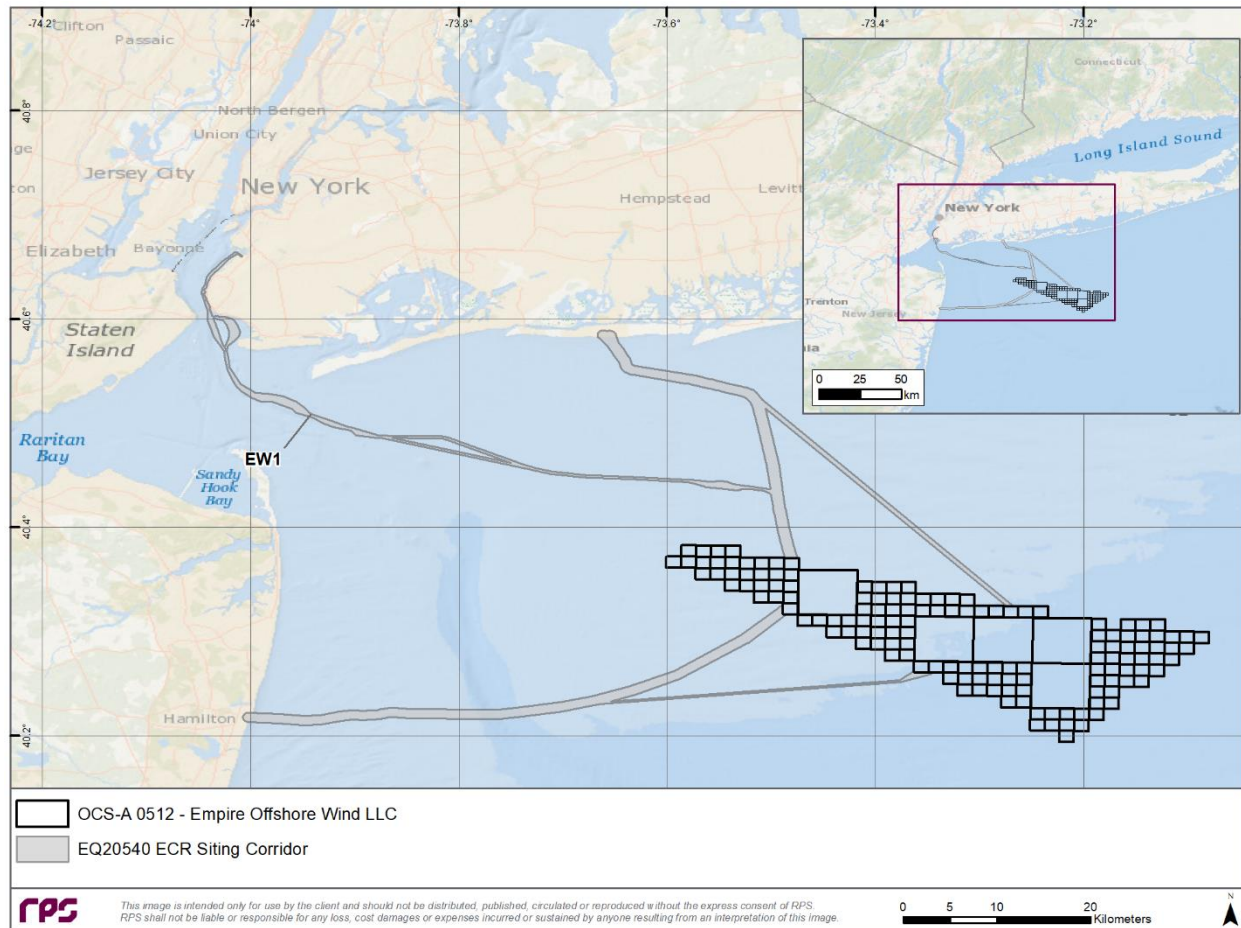


Figure 1-1. Location of the 2020 benthic survey area.

2 METHODS

2.1 Field Survey

2.1.1 Towed Camera Sled

Underwater video transects were taken in conjunction with grab samples for visual classification of the seafloor in December of 2020. The survey was completed on the Research Vessel (RV) Shearwater. The camera sled was equipped with parallel-mounted lasers 2.5 centimeters (cm) apart and a cable that transmitted real-time viewing of images to the vessel. An ultra-short baseline (USBL) beacon was fixed to the camera sled to obtain GPS coordinates in conjunction with a pole-mounted USBL system. A Deep Trekker digital color 4K high resolution camera recorded video along 600-m transects. A GoPro Black 7 was also used to collect time-lapse still images of the bottom, however, winter storm surges and high turbidity limited the visibility and effectiveness of the stills for some transects. The video sled was deployed from an A-frame located on the starboard quarter by the Alpine crew and lowered until positioned 0.5 to

1 meters (m) above the seafloor. Distance of camera to the seafloor varied along each transect due to differences in sediment type, vessel speed, swells, and low visibility/high turbidity.

Video transects were recorded in accordance with procedures following BOEM's Guidelines for Providing Benthic Habitat Survey Information for Renewable Energy Development on the Atlantic Outer Continental Shelf Pursuant to 30 CFR Part 585 (BOEM, 2019). While recording, field notes were taken containing sample information (date, time, global positioning satellite [GPS] coordinates, station ID, depth, and video file name) and observations of sediment/seafloor characteristics of note to aid in post-processing of video data. Notes were made for the beginning and end of the transect as well as any changes in weather or visibility conditions, sediment, or species. During video recording, potentially sensitive benthic habitats (e.g., exposed hard bottom, seagrass/kelp/algal beds, coral species) were noted if present, as per BOEM's guidelines (BOEM, 2019). There were 26 transects completed along the EW1 ECR.

2.1.2 Grab Sampling

Benthic grab samples were acquired using an Ocean Instruments Salish Grab Standard SG-20 sampler. This grab is a modified version of a standard Van Veen sampler with a stainless-steel weighted frame and release system ideal for collection of sediments in soft to hard substrates with a penetration depth up to 20 cm and sampling area of 0.10 square meters (m²). A USBL beacon was fixed to the grab sampler to obtain GPS coordinates in conjunction with a pole-mounted USBL transceiver. An attached video camera equipped with parallel-mounted scale lasers and lights provided real-time viewing of the bottom from the vessel. This video was recorded and used to collect additional information concerning the area surrounding the grab sample site.

Upon retrieval, the grab sampler was examined for sample acceptability. A sample was initially deemed acceptable if the bucket was more than 50% full, the sample was not over penetrated (i.e., not full to the top), and sample surface structures were undisturbed and even (i.e., not slumped). If a sample did not fulfil these requirements, the entire contents were returned to the water and another sample attempt was made. A photograph and/or results from each attempt were collected as the grab was brought on board. If more than three failed sample attempts occurred at one station, sampling moved on to the next station, and no sediment samples were sent for further analyses. Failed attempts due to grab sampler malfunction (not habitat/sediment related), were not included in the total count of attempts or the decision to move on from a station. The results of each attempted grab were recorded in field notes. There were a total of 74 grab samples collected from 26 stations along the EW1 ECR. Four sample sites had insufficient recovery after multiple attempts were made to collect a sediment sample.

Once an acceptable sample was obtained, the following steps were taken:

1. Overlying water was drained using a siphon.

2. A photograph was taken of the sample next to an identification label containing sample identification number and date.
3. Field notes were taken, including descriptions of physical features (depth of penetration, sediment color, texture, surface features) and surface megafauna; large surface fauna were returned to the water immediately.
4. The grab sample was then divided into two sections representing 40% and 60% of the sample surface area based on the bucket design which was accessed via two hinged doors divided by a central support bar.
5. The 40% sample was removed and placed into 500- μ m sieving buckets to be further processed for taxonomic identification of organisms within the sediment.
6. A 200-mL subsample of the sediment was taken from the center of one side of the grab sampler bucket using a 3-inch diameter core tube. The samples were stored in double-layered plastic bags for grain size and TOC analyses.

After collection, sediment for macroinvertebrate analysis was loaded onto a processing table and material washed through a 500- μ m sieve using seawater under gentle pressure.

Organisms, shell fragments, and other remaining material were placed into a plastic container using stainless steel forceps, as needed. The container was filled no more than two-thirds full of sample and seawater. If the quantity of sample exceeded this volume, it was placed in additional separate containers. The sample was fixed/preserved with 10% buffered formalin solution by filling the remaining space within the bottle with solution. Containers were tightly sealed with electrical tape and stored in a cooler at ambient temperature (not frozen or refrigerated). Prior to sieving the next sample, the sieve was cleaned by backwashing with pressurized water.

2.2 Grab Sample Analysis

2.2.1 Sediment Grain Size and Total Organic Carbon Analysis

Grain size samples were sent by Alpine to TerraSense LLC (Totowa, NJ). Samples were analyzed using the American Society for Testing and Materials (ASTM) soil classification system standards D6913/D7928 (sieve and hydrometer, equivalent to the Unified Soils Classification System [USCS]) to obtain particle size distributions by weight (ASTM, 2017a;b). Grain size boundaries differ slightly from the Wentworth System referenced by CMECS. For the sake of applying NMFS (2021) modified CMECS, differences in the threshold for silt or clay (0.0625 mm for Wentworth vs. 0.075 mm for USCS) is the only factor that changed the classification of muddy sand vs. sand and sandy mud vs. muddy sand in rare instances. The cutoff for gravel for CMECS (Wentworth 2 mm sieve size) is captured in the grain size analysis. To achieve alignment between the sieves used for the ASTM standards and the Wentworth (1922) grain size scale, the TerraSense lab interpolated the original data to Wentworth thresholds for particle size to aid in CMECS classification of the substrate. A total of 74 sediment samples were sent for grain size analysis.

Total Organic Carbon (TOC) samples were analyzed by TerraSense LLC (Totowa, NJ). TOC content of sediment samples was determined using ASTM D2974 with results reported as percent (%) organic content by burn-off.

2.2.1 Grab Image Analysis

The sediment grain size lab results do not discern between substrates of biogenic or geologic origin (i.e., sieves do not discern between shells vs. gravels), thus all underwater video and associated bottom images were reviewed to determine the origin of substrate. If the sample was reported by the lab as a gravel mix ($\geq 30\%$ gravel) and the grab sample images (Appendix C) appeared to have $\sim 50\%$ or more shell, a point count analysis of was done on associated imagery in photoQuad (Trygonis and Sini, 2012). The grab sampler image was overlain with 50 points as it best represents the sediment that is sent to the lab. If over 50% of the points were confirmed as shell, then the grab sample was classified under CEMCS as biogenic shell, instead of the gravel/gravel mix as reported by the lab.

2.2.2 Benthic Macroinvertebrate Lab Analysis

The macroinvertebrate benthic samples for the survey were sent by Alpine to ESS Group (ESS; East Providence, RI). Prior to sorting, ESS emptied sample material from each sample in its entirety into a 500- μm mesh sieve. Tap water was gently run over the sieve to rinse any additional fine sediment that was not removed during the field sieving process as well as to remove the formalin solution prior to the microscope work. Rinsed samples were preserved in 70% ethanol for sorting, enumeration, and identification. Rose bengal was added to bulky samples to improve sorting efficiency.

Each benthic sample was sorted to remove organisms from residual debris. Sorted benthic organisms were subsequently identified and enumerated by a qualified taxonomist using a dissecting microscope with magnification up to 90X and readily available taxonomic keys. Some smaller organisms were temporarily slide-mounted and identified under a compound microscope with magnification to 1,000X. The target taxonomic identification level was family. If this could not be achieved, taxonomic identification was taken to the lowest practicable taxonomic level.

Enumerations of macroinvertebrates identified from each sample were recorded directly in an electronic bench sheet. Taxonomic nomenclature was checked for consistency with the World Register of Marine Species (www.marinespecies.org).

2.3 Video Data Post-Processing

2.3.1 Objectives

Post-processing and analysis of video transect data were conducted by RPS to provide:

- General characterization of substrate including bottom type, texture, micro-topography;

- Evidence of benthic activity by organisms (burrows, trails, biogenic reefs);
- Identification of epibenthic macroinvertebrates (decapod crustaceans, mollusks [including squid mops], echinoderms) and benthic habitat;
- Presence/evidence and general characterization of submerged aquatic vegetation (macroalgae, sea grass);
- Identification of organisms to the lowest practical taxonomic level (generally to Order to Family) using standard taxonomic keys for the geographic area;
- Evidence of fishing activity, such as trawl scars, pots, and working nets; and
- Presence of derelict fishing gear, military expended materials, shipwrecks, cultural artifacts, or other anthropogenic marine debris.

All still images from videos were classified according to NMFS-modified CMECS substrate component categories (FGDC, 2012; NMFS, 2021), which focuses closely on details of grain size and composition to describe benthic habitats and is being used to define complex and potentially valuable fish habitats. The BOEM Benthic Habitat Survey guidelines (BOEM, 2019) also require that the developer characterize the benthic community composition which includes documentation of abundance, diversity, percent cover, and community structure. The following were recorded when present and identifiable:

- Characterization and delineation of any submerged aquatic vegetation (seagrass or macroalgae) that occurs within the area of potential adverse effect;
- Characterization and delineation of any hard-bottom gradients of low to high relief such as coral (heads/reefs), rock or clay outcroppings, or other shelter-forming features; and
- Identification of communities of sessile and slow-moving marine invertebrates (clams, mussels, polychaete worms, anemones, sponges, echinoderms) that may be within the area of potential adverse effect.

2.3.2 Methods

Transect videos were reviewed and analyzed in two separate steps. First, each video was reviewed in its entirety and any notable seafloor features or epifaunal/benthic/demersal species greater than 4 cm in size (roughly equal to 1.5 times the distance between the laser points) were recorded. When a feature or species was identified, the reviewer recorded the time, rated video visibility at that time, categorized the bottom, and recorded the lowest practical taxonomic level (LPTL) of the feature. Some features were enumerated whereas others were marked as present or absent and further quantified in the second separate step of video review (see next paragraph below). The abundances of enumerable megafauna were recorded along with presence/absence of benthic biotic activity, submerged aquatic vegetation (macroalgae, sea grass), fishing activity, derelict gear, military expended materials, shipwrecks, coral heads/reefs, rock outcroppings, other shelter features, and other marine debris. Specifically, submerged aquatic vegetation, bushy plant-like organisms (i.e., presumably hydrozoa or bryozoa but potentially macroalgae), eelgrass, blue mussels,

oysters, sponges, slipper shells (i.e., *Crepidula fornicata*), encrusting organisms, northern star coral (*Astrangia poculata*), and sand dollars (*Echinarachnius parma*) were marked as present or absent while other qualifying features were enumerated. Most portions of the videos were reviewed multiple times using slower playback speeds and replay functions.

Second, each video was subsampled to create still images taken at increments equivalent to one image every 5 m distance by accounting for the duration of the video. Metadata were recorded for each still image including latitude and longitude, time, transect, and ID number. The quality of each image was assessed with a categorical scale of visibility from 0 to 4. Still images with quality scores of “moderate” (2 or greater) were considered passing and analyzed with seabed image processing software photoQuad (Trygonis and Sini, 2012). Each image was calibrated for scale using the reference laser points and the area (cm²) of the visible portion was recorded, with poorly lit or blurry edges of passing images excluded from the area of analysis.

To inform CMECS classification of bottom habitat, 50 points were distributed uniformly across the entire visible portion of each passing still image using photoQuad. Percent cover data were recorded as the number of points under which different substrate types were visible: boulder, cobble, pebble/granule, sand/mud, or biogenic-origin shells or large worm tube structures (see size definitions in Table 2-1). In addition, other “biological elements” were recorded if present and visible in each image, including infaunal structures (e.g., small worm or amphipod tubes), larger tube structure made by decorator worms (*Diopatra cuprea*), burrows (e.g., crab depressions or clam siphon holes), mobile megafauna (e.g., Cancer crabs, hermit crabs, benthic or demersal fish), Codium or other algae, encrusting organisms (e.g., sponges), sand dollars, mussel beds, eelgrass, and bushy plant-like organisms that were grouped together for identification purposes (e.g., hydrozoa, bryozoa, branching algae).

These point counts approximated percent cover of each substrate type in the still image, which was used to assign the appropriate substrate classifications of the habitat to the furthest extent possible under a NMFS-modified (NMFS, 2021) version of CMECS (FGDC, 2012). This system discerns substrate components by origin (e.g., geologic mineral, biogenic material, or anthropogenic material) and size groups, based primarily on the percent cover of coarse, gravel-sized particles (pebble/granule, cobble, and boulder) versus fine sand/mud, or the size category of shells (reef, rubble, and hash). Some images had a substantial amount of biological element cover (also referred to as flora/fauna throughout this report) that was removed from the percent cover calculations in order to accurately determine the percent of visible substrate composing gravel, sand, shells, etc. After the main CMECS classification for the substrate component in each image was defined, a secondary or co-occurring substrate type was defined to provide further detail and delineate between habitats. For example, if the main CMECS classification defined the dominant substrate type as geologic origin, then the secondary CMECS classification would contain information about

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substrates of biogenic or anthropogenic origin if they were also present. These classifications were assigned for the visible surface area of each image and then summarized at the transect level.

Table 2-1. CMECS geologic sediment size, biogenic or anthropogenic size, and percent cover categories (*from FGDC, 2012).

Geologic Sediment Category	Definition	Biogenic or Anthro Size Category	Definition	Biogenic Cover Density	Adapted Definition*
Bedrock	> 4,096 mm	Reef	> 4,096 mm	Trace	≤ 2%
Boulder	256 – 4,096 mm	Rubble	64 – 4,096 mm	Sparse	> 2 – 30%
Cobble	64 – 256 mm			Moderate	30 – 70%
Pebble / Granule	2 – 64 mm	Hash	2 – 64 mm	Dense	70 – 90%
Sand / Mud	< 2 mm	Sand or Bits	< 2 mm	Complete	> 90%

The CMECS biotic component was determined using a combination of the still image biological element percent cover data and video review enumeration data. The percent cover data were considered first to determine the appropriate CMECS biotic classifications with enumeration data used to determine which megafauna species were most dominant when megafauna covered the first or second largest area within the transect. Large megafauna were excluded as were dominate enumerated species with fewer than three individuals per transect.

2.4 Benthic Macroinvertebrate Data Post-Processing

Benthic macroinvertebrate community statistics were calculated using family or next-lowest practical taxonomic level (NLPTL) abundance estimates in each sample, which were reported as count per 0.04 m² (area of benthic macroinvertebrate sample). Community composition parameters included: total abundance, number of phyla, number of taxa, Margalef's Richness Index, Shannon Diversity Index, and Pielou's Index of Evenness for each station in the sampling area.

2.4.1 Taxonomic Composition

Benthic macroinvertebrate taxonomic composition was assessed to characterize the high-level trends in taxa data. Community composition includes the relative proportions of taxonomic groups by number of identifiable taxa and number of individuals and was used to evaluate dominance of common phyla across all samples. Taxonomic composition was summarized for each station across the sampling area, aggregated at both phylum-level and family or NLPTL.

2.4.2 Richness, Diversity, and Evenness

Taxonomic richness, evenness, and diversity are common ecological parameters used to measure the overall biodiversity of a community or discrete unit. Taxonomic richness is the number of unique species or taxonomic groups represented in an area of interest. In this assessment, taxonomic richness was calculated using Margalef's Richness Index (Formula 1) for each station.

Formula 1. Margalef's Richness Index (RI).

$$RI = \frac{(S - 1)}{\ln(N)}$$

Where:

S= the number of unique taxa

N= the total number of individuals in the sample

Interpretation: The higher the index, the greater the richness.

The diversity index for a community considers taxonomic richness and the proportion of each unique taxa. The Shannon Diversity Index (H'; Formula 2) was calculated using the number of each taxa (family or NLPTL), the proportional abundance of each taxa relative to the total number of individuals, and the sum of the proportions. This index was used to assess diversity of each station. The diversity index (H') increases with increasing taxonomic richness and evenness.

Formula 2. H'- Shannon Diversity Index.

$$H' = - \sum_{i=1}^R p_i \ln(p_i)$$

Where:

p_i = the proportion of individuals belonging to the taxa i in the dataset of interest

Interpretation: The greater the H' , the greater the richness and evenness.

Evenness of a community refers to the similarity in abundances of different taxa comprising a population or sample. Pielou's Index of Evenness (J' ; Formula 3) includes H' (Shannon-Weiner Diversity Index) in its calculation.

Formula 3. J' - Pielou's Index of Evenness.

$$J' = \frac{H'}{H_{\text{Max}}}$$

Where:

H' = the Shannon- Weiner Diversity Index

H_{Max} = the maximum possible value of H' , where each taxon occurs in equal abundances.

$$H_{\text{Max}} = \ln(s)$$

Where: s = Number of taxa

Interpretation: J' is constrained between 0 and 1. The greater the value of J' , the more evenness in the sample.

The Shannon-Weiner Diversity index was also applied to the enumerated species from the video review on a per-transect basis with observations recorded to the level of phylum or NLPTL.

2.4.3 Biotic Component

Data acquired from the grab samples collected across the survey area were used to inform the CMECS biotic component, which is the classification of living flora and fauna on or within the seabed with their physical associations (FGDC, 2012). Taxonomic lab data were evaluated to determine the CMECS classification hierarchy for the biotic component, which includes the biotic setting, class, subclass, co-occurring subclass, group, and co-occurring group. Biotic community and co-occurring communities were defined for some samples where possible. Unique taxa from each grab sample were sorted into broad functional groups (i.e., burrowing, tube-building, small clam, etc.), based on the biotic groups listed in CMECS and the sizes of certain organisms. The assigned classifications were based on the first and

second most dominant functional group for each station, with field photos consulted in a secondary assessment to determine sizes.

3 RESULTS

3.1 Video Analysis

3.1.1 Transect Locations

The characteristics and locations of the 26 underwater video transects within the sampling area are described in Table 3-1 and shown in Figure 3-1.

Table 3-1. Underwater video transect locations in the sampling area.

Transect	Date	Recorded Duration (min:sec)	Start Latitude (°N)	Start Longitude (°W)	End Latitude (°N)	End Longitude (°W)	Total # Stills	# Analyzed Stills
EW1-01	12/9/2021	57:04	40.66343	-74.0167	40.6584	-74.0196	138	55
EW1-02	12/7/2021	48:38	40.64553	-74.0334	40.64314	-74.0399	134	79
EW1-03	12/7/2021	48:58	40.63655	-74.0392	40.63289	-74.0446	145	84
EW1-04	12/7/2021	45:12	40.60118	-74.0407	40.59586	-74.0389	134	88
EW1-05	12/7/2021	41:52	40.5911	-74.0372	40.5859	-74.0355	136	91
EW1-06	11/26/2021	35:00	40.60237	-74.0392	40.60109	-74.0317	141	81
EW1-07	12/8/2021	52:02	40.5987	-74.0288	40.60386	-74.0312	137	86
EW1-08	12/4/2021	42:43	40.59427	-74.0218	40.5993	-74.0248	139	51
EW1-09	12/4/2021	47:44	40.5812	-74.0158	40.58665	-74.0145	140	65
EW1-10	12/8/2021	52:23	40.54811	-74.0194	40.55332	-74.0219	146	112
EW1-11	12/4/2021	47:22	40.5404	-74.0161	40.53546	-74.0128	134	78
EW1-12	12/4/2021	39:26	40.53161	-74.0095	40.52865	-74.0033	133	64
EW1-13	12/8/2021	56:05	40.524	-73.9925	40.52192	-73.9858	143	85
EW1-14	12/8/2021	49:31	40.51735	-73.9715	40.52245	-73.9684	134	108
EW1-15	12/8/2021	40:48	40.49554	-73.9159	40.50034	-73.9124	132	74
EW1-16	12/8/2021	36:10	40.4877	-73.8828	40.4869	-73.8757	134	85
EW1-17	12/9/2021	32:14	40.48597	-73.873	40.48756	-73.866	134	69
EW1-18	11/29/2021	34:26	40.48184	-73.8523	40.48329	-73.8592	134	107
EW1-19	11/29/2021	32:43	40.47728	-73.8406	40.48225	-73.8437	135	99
EW1-20	11/29/2021	37:04	40.47427	-73.8159	40.47573	-73.8228	136	98
EW1-21	11/29/2021	33:16	40.46946	-73.7929	40.47093	-73.7999	136	100
EW1-22	11/29/2021	48:05	40.46486	-73.771	40.46636	-73.778	134	106
EW1-23	11/29/2021	38:02	40.46205	-73.7575	40.46357	-73.7647	135	120
EW1-24	11/28/2021	42:43	40.44673	-73.6246	40.44719	-73.6322	122	81
EW1-25	11/28/2021	33:48	40.44254	-73.5593	40.44334	-73.5667	138	95
EW1-26	11/28/2021	26:02	40.40456	-73.4898	40.41004	-73.4909	95	61

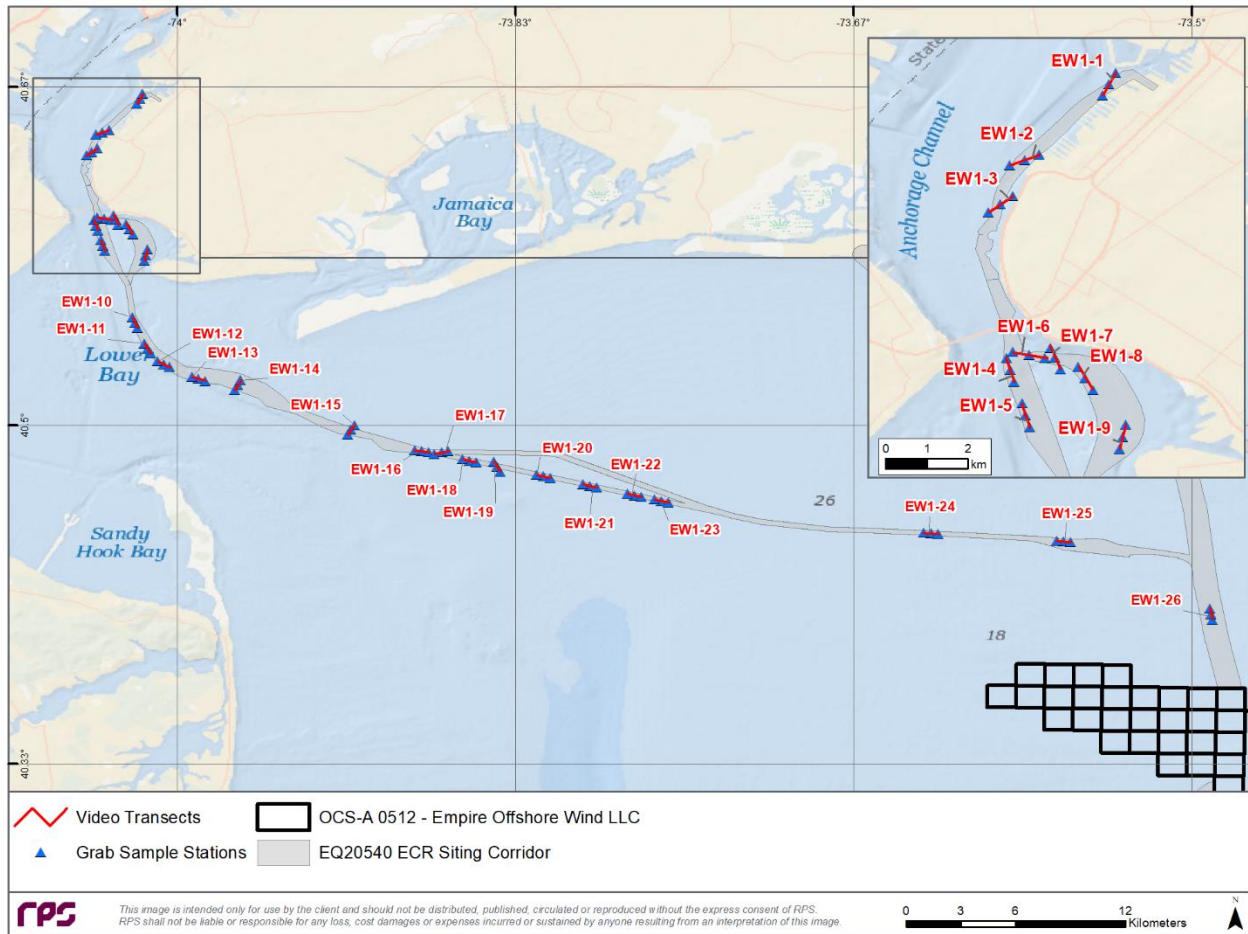


Figure 3-1. Map of video transects (red) and grab sample sites (blue) in the sampling area. Individual grab samples at each station are designated in the data with an “L” representing the left-most sample, “A” representing the center sample, and “R” representing the right-most sample.

3.1.2 Organisms and Features

The abundance of enumerable features greater than four cm were recorded during the video review process. Organisms were identified to the LPTL, usually to order or family. A total of 2,763 features, including 2,683 organisms from 6 phyla (Table 3-2, Figure 3-2, Figure 3-3, Figure 3-4, and Figure 3-5), were identified and recorded within the 26 transects. The most numerous organisms were burrowing anemones, spider crabs, and cancer (rock or Jonah) crabs composing 40%, 23% and 9% of all organisms, respectively. Despite their high overall abundance, burrowing anemone observations were limited to 7 transects with 1,020 of the 1,079 individuals within transect EW1-23. Spider crabs were more evenly distributed between 14 transects. In general, many organisms tended to be present in transects EW1-01 through EW1-14 or EW1-14 through EW1-26, but not both; indicating two fairly distinct communities were sampled. Diversity ranged from 0.13 (EW1-23) to 2.07 (EW1-2, EW1-16, EW1-22; Table 3-3).

The total observed organisms comprised 381 vertebrates from 19 unique LPTLs in 9 orders (Figure 3-6) and 2,473 invertebrates from 18 unique LPTLs in 9 classes (Figure 3-7). An additional 80 other observations were recorded: 56 instances of anthropogenic debris including two instances of derelict fishing gear (EW1-25 and EW1-13), 1 instance of drag marks that could be signs of fishing activity (EW1-07), 16 unidentified organisms, and 7 unidentified objects (unclear if living). Unidentified organisms and objects were the result of high turbidity. Notably, 28 dead bony fish were observed, 15 of which could be identified as Atlantic menhaden.

The presence or absence of other qualifying features (i.e., habitat features of note or species that were quantified by their percent cover of the seafloor rather than through enumeration [see Section 2.3.2 for full list]) ranged from absent in all transects (i.e., eelgrass) to present in all but 6 transects (i.e., bushy plant-like organisms; Figure 3-8). In addition, Northern star coral, a cold-water coral species associated with hard substrate, was present in 4 of the 26 video transects and occurred in transects both nearest and farther from shore. The only observations of potential invasive species were the presence of a few isolated patches of a colorful encrusting organism that could be an invasive tunicate, such as *Didemnum*.

For representative images of some observed species see Table 3-4 and for complete reviewer notes see Appendix B.

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Table 3-2. Megafauna and other enumerated features observed during review of the video transects (continued next page).

Common Name	Lowest Taxonomic Level	Transect EW1-																										Total
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	
Invertebrate																												
Anemone, burrowing	Anthozoa	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	15	17	-	12	-	6	1,020	-	-	7	1,079
Crab, blue	Callinectes sapidus	-	2	1	1	-	1	-	1	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8
Crab, cancer	Cancer	-	4	3	56	62	9	16	3	5	22	40	3	2	-	-	-	1	1	-	25	-	-	-	1	-	1	254
Crab, hermit	Pagurus	-	9	11	9	24	2	2	-	-	28	15	1	-	-	1	12	2	15	2	-	-	3	-	2	-	2	140
Crab, horseshoe	Limulus polyphemus	-	-	1	4	3	-	-	-	1	-	-	-	-	-	-	2	-	-	1	-	4	1	5	1	-	-	23
Crab, spider	Libinia	-	6	38	152	109	15	38	6	41	137	58	3	3	14	14	-	-	-	-	-	-	-	-	-	-	-	622
Crab, unidentified	Decapoda	-	1	-	3	-	1	1	-	1	7	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	19
Moon snail	Naticidae	-	1	1	-	1	1	10	-	3	1	1	3	-	-	1	-	-	11	-	4	17	3	2	6	1	1	68
Moon snail, egg case	Naticidae	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	2	-	-	-	-	-	-	-	-	4
Scallop, sea	Placopecten magellanicus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	-	-	-	-	6
Sea pen	Pennatulacea	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	6	1	-	-	3	-	6	-	-	-	-	17
Sea star	Asterias	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	1
Sea urchin	Echinoidea	-	-	-	19	1	-	-	-	4	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	25
Shrimp	Decapoda	-	1	2	4	-	-	-	-	-	-	3	-	-	-	-	-	-	8	2	-	-	-	-	-	-	-	20
Shrimp, mantis	Squilla empusa	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Squid	Cephalopoda	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Whelk eggs	Melongenidae	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
Whelk, channeled or knobbed	Melongenidae	-	-	-	3	4	1	1	-	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11
Worm, Aphroditid	Aphrodita aculeata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1
Vertebrate																												
Dogfish, spiny	Squalus acanthias	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	2
Eel, unidentified	Anguilliformes	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Fish, unidentified (bony)	Teleostei	-	-	16	-	2	-	-	9	-	-	-	6	-	-	-	-	-	1	-	3	-	-	-	-	-	-	37
Fish, unidentified dead bony	Teleostei	2	1	-	3	-	-	6	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	13
Flatfish, unidentified	Teleostei	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Flounder	Pleuronectiformes	-	-	-	-	-	-	3	1	1	1	-	-	-	-	1	1	-	-	2	1	4	6	4	-	-	-	25
Flounder, fourspot	Hippoglossina oblongus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1
Flounder, summer	Paralichthys dentatus	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
Flounder, windowpane	Scopthalmus aquosus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	2
Flounder, winter	Pseudopleuronectes americanus	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
Goby	Gobiidae	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1

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Common Name	Lowest Taxonomic Level	Transect EW1-																										Total
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	
Hake, red, white, or spotted	Urophycis	-	6	6	2	4	-	4	-	1	4	1	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	31
Hake, spotted	<i>Urophycis regia</i>	1	1	-	11	8	1	-	-	1	-	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	26
Hake, unidentified	Gadidae	2	5	1	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	12
Menhaden, Atlantic	<i>Brevoortia tryannus</i>	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
Menhaden, Atlantic (dead)	<i>Brevoortia tryannus</i>	1	5	-	3	-	-	5	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	15
Roundfish, unidentified	Teleostei	8	27	-	1	-	3	2	-	1	9	2	-	1	-	2	15	9	-	1	-	-	-	1	-	-	-	82
Sea bass, black	<i>Centropristis striata</i>	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Sea robin, northern	<i>Prionotus carolinus</i>	-	1	-	2	-	1	1	-	-	5	-	-	-	-	-	2	-	-	-	-	-	-	-	1	-	-	13
Sea robin, unidentified	Prionotus	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
Skate	Rajidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1	1	1	4
Skate, egg case	Rajidae	-	-	-	2	-	-	-	-	-	-	1	1	-	1	-	6	15	13	4	9	2	10	5	2	3	27	101
Skate, little	<i>Leucoraja erinacea</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	2
Skate, little or winter	Leucoraja	-	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	2
Striped bass	<i>Morone saxatilis</i>	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Unidentified or Non-Living																												
Debris, anthropogenic	Debris, anthropogenic	2	18	8	8	4	3	7	-	-	1	1	-	1	-	-	-	-	-	-	-	-	-	-	-	1	-	54
Debris, anthropogenic (fishing gear)	Debris, anthropogenic (fishing gear)	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	1	-	2
Possible fishing activity (drag marks)	Possible fishing activity (drag marks)	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Object, unidentified	Object, unidentified	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	2	-	2	-	1	-	-	-	-	-	-	7
Organism, unidentified	Organism, unidentified	2	3	1	1	-	1	-	-	-	-	-	1	-	-	-	2	-	-	-	-	-	1	1	-	-	3	16
Total Organisms (Confirmed)		15	71	82	278	220	36	91	21	62	221	132	20	8	16	8	49	43	68	14	57	27	42	1,039	17	7	39	2,683
Total Observations		20	92	92	287	224	40	99	21	62	222	133	21	10	16	8	53	43	70	14	58	27	43	1,040	17	9	42	2,763

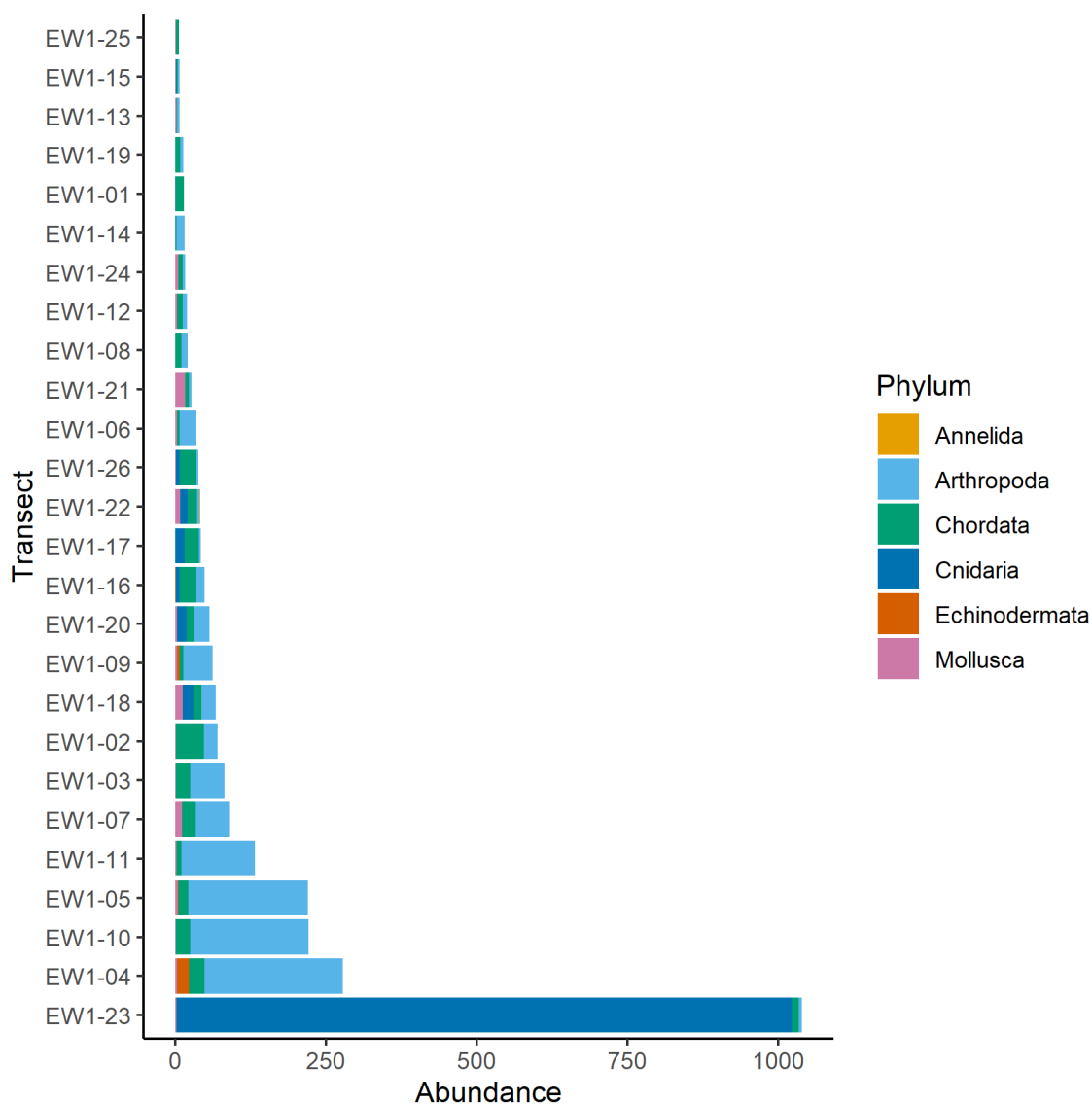


Figure 3-2. Distribution of enumerated organisms larger than 4 cm aggregated by Phylum in each video transect. Organisms not identified to the level of Phylum were excluded. These data include only enumerated species larger than 4 cm. See text for complete explanation of which species were quantified by enumeration versus by percent of bottom cover.

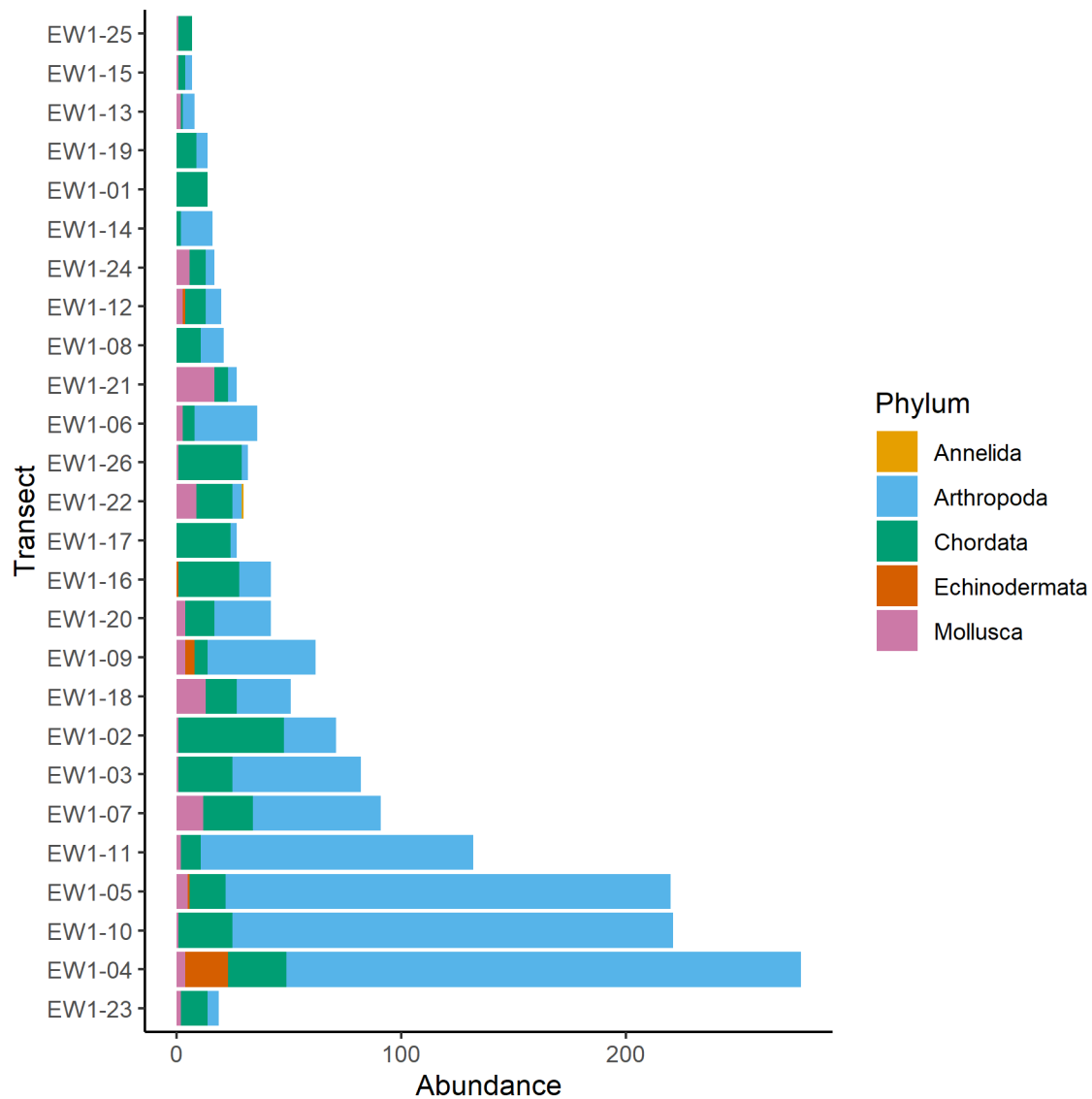


Figure 3-3. Distribution of enumerated organisms larger than 4 cm aggregated by Phyla in each video transect. Organisms not identified to the level of Phylum were excluded. Cnidaria were excluded to enlarge details. See Figure 3-2 for similar figure with Cnidaria included.

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Table 3-3 Shannon-Weiner diversity index values for each Video transect based on observations to the level of family (or NLTPL).

Transect	Shannon-Weiner Diversity
EW1-01	1.54
EW1-02	2.07
EW1-03	1.87
EW1-04	1.66
EW1-05	1.44
EW1-06	1.94
EW1-07	2.01
EW1-08	1.43
EW1-09	1.38
EW1-10	1.39
EW1-11	1.49
EW1-12	1.93
EW1-13	1.7
EW1-14	0.38
EW1-15	1.73
EW1-16	2.07
EW1-17	1.38
EW1-18	1.77
EW1-19	1.77
EW1-20	1.61
EW1-21	1.05
EW1-22	2.07
EW1-23	0.13
EW1-24	1.71
EW1-25	1.3
EW1-26	1.08

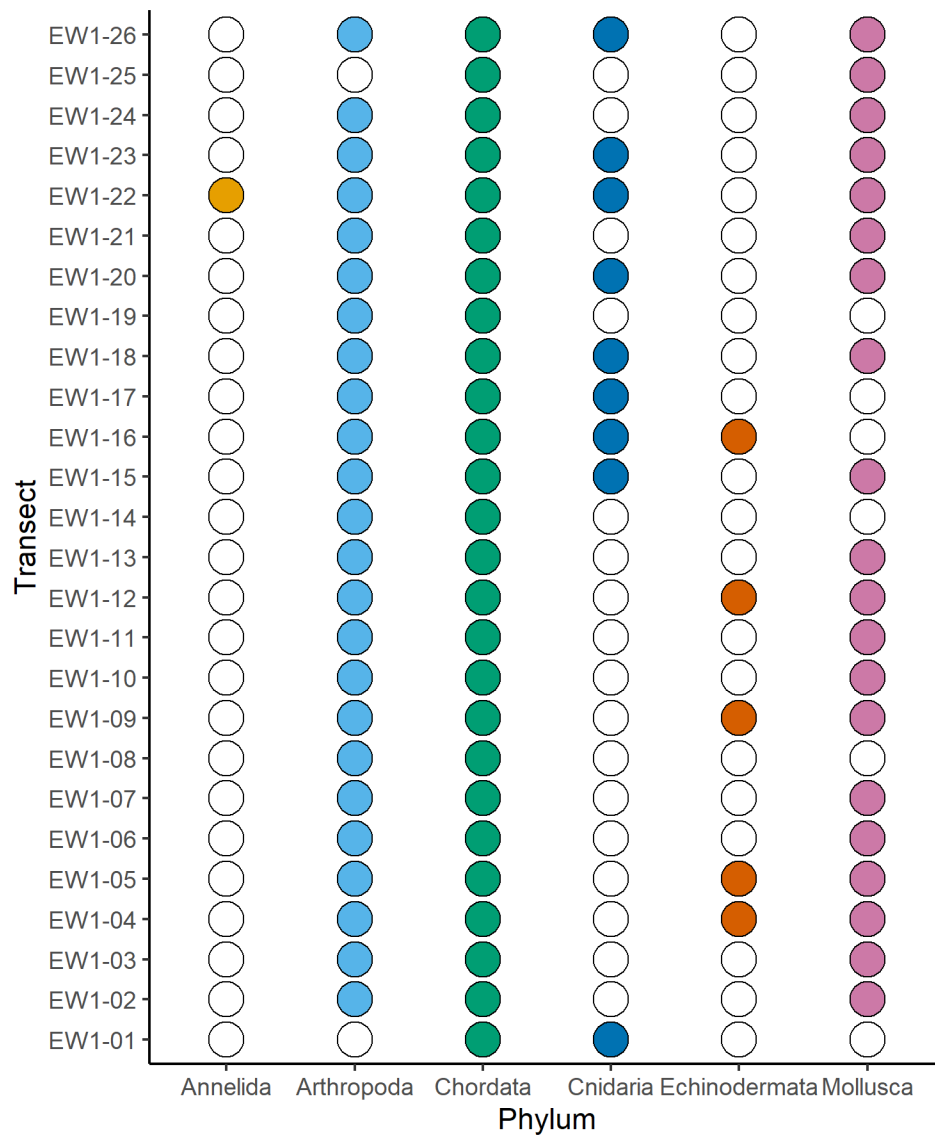


Figure 3-4. Presence (colored) or absence (white) of Phyla in each video transect. These data include only enumerated species larger than 4 cm. See text for complete explanation of which species were quantified by enumeration versus by percent of bottom cover.

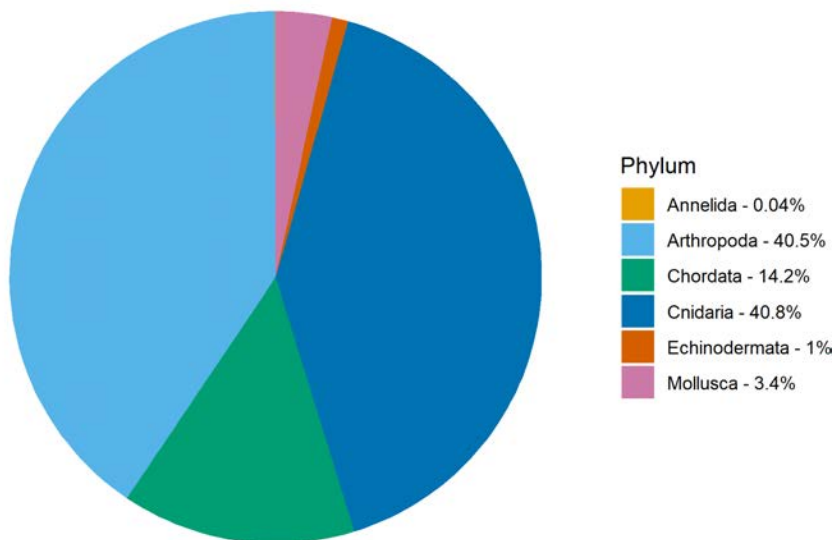


Figure 3-5. Percent composition of enumerated organisms larger than 4 cm aggregated by Phyla in all video transects. Organisms not identified to the level of Phylum were excluded.

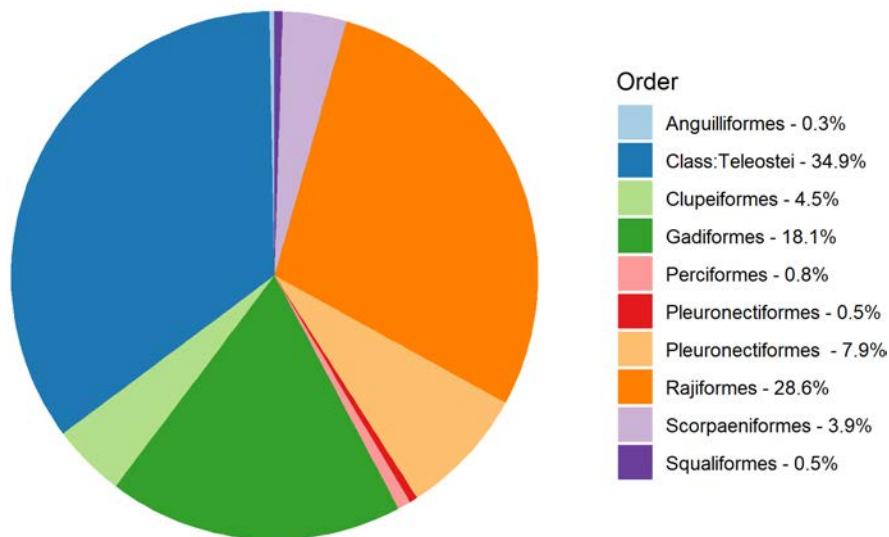


Figure 3-6. Percent composition of enumerated vertebrates (phylum Chordata) larger than 4 cm aggregated by taxonomic level "order" in all video transects. Fishes not identified to the level of order are depicted as Class:Teleostei.

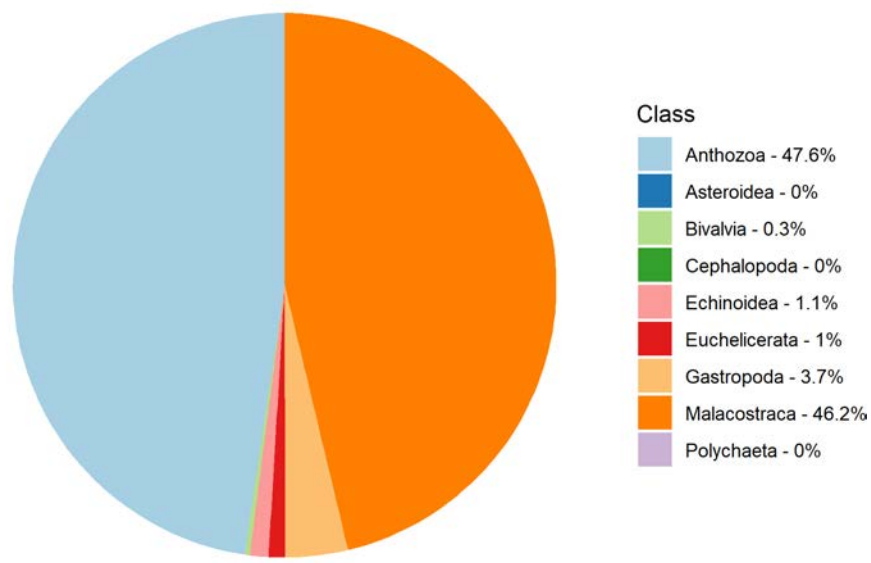
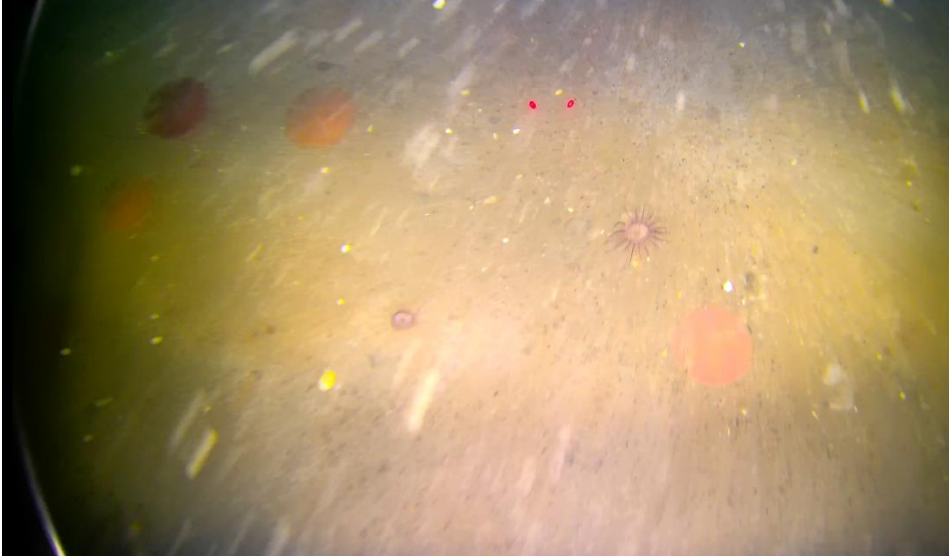
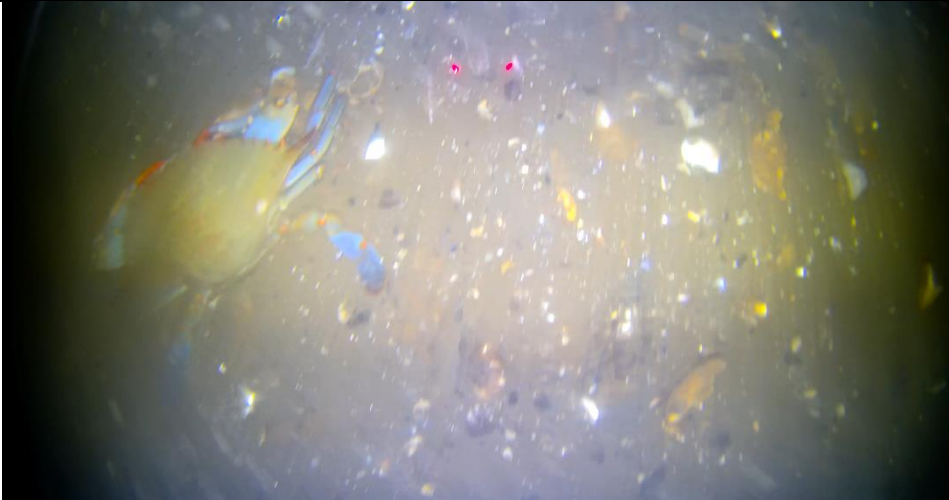


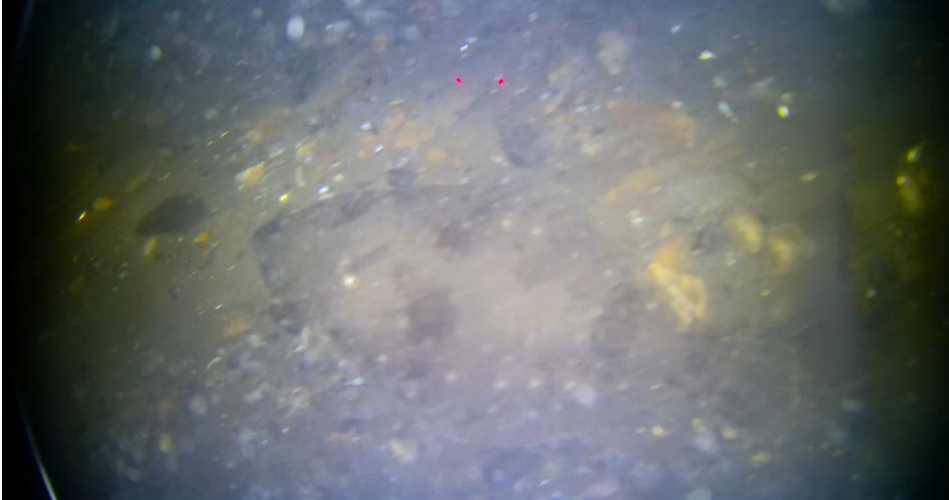
Figure 3-7. Percent composition of enumerated invertebrates larger than 4 cm aggregated by taxonomic level “class” in all video transects. Echinoidea, Bivalvia, Polychaeta, Cephalopoda, and Asteroida compose 1.5% of the total.



Figure 3-8. Presence (colored) or absence (white) of important features in each video transect. These data only include features that were marked as present or absent and not enumerated. See text for complete explanation of which species were quantified by enumeration versus by percent of bottom cover.

Table 3-4. Representative images of megafauna and debris observed and identified in the videos (continued on next pages).

Sand Dollars (<i>Echinarachnius parma</i>) Burrowing Anenomes (<i>Anthozoa</i>) EW1-26	
Skate Egg Case (<i>Rajidae</i>) EW1-18	
Blue Crab (female) (<i>Callinectes sapidus</i>) EW1-10	

Summer Flounder (<i>Paralichthys dentatus</i>) EW1-10	 An underwater photograph showing a Summer Flounder resting on a sandy seabed. The fish is positioned horizontally, with its head to the left and tail to the right. The sand is light-colored with some darker patches and small debris. The water is slightly turbid, and the lighting is from above, casting a soft shadow.
Winter Flounder (<i>Pseudopleuronectes americanus</i>) EW1-10	 An underwater photograph of a Winter Flounder on a sandy seabed. The fish is seen from the side, with its head pointing towards the left. The sand is light-colored and textured. The water is clear, and the lighting is bright, highlighting the fish's features.
Northern Star Coral (<i>Astrangia poculata</i>) EW1-18	 An underwater photograph showing Northern Star Coral on a sandy seabed. The coral appears as a cluster of small, white, star-shaped structures. The sand is light-colored, and there is some darker material and debris around the coral. The lighting is bright, creating some glare on the coral's surface.

Anthropogenic Debris (derelict fishing pot) EW1-25	
Moon Snail (<i>Naticidae</i>) EW1-18	
Spiny Dogfish (<i>Squalus acanthias</i>) EW1-26	



3.1.3 Percent Cover

The following section summarizes the results of the percent cover analysis of still images derived from underwater video transects in the ECC project area. Percent cover of various bottom substrates and features within a measured surface area of each image were recorded and used to define the NMFS-modified (NMFS, 2021) CMECS substrate classification that was most suitable for the sampled area. In addition to percent cover of different sediment grain sizes (boulder, cobble, pebble/granule, or sand/mud), the presence of biogenic shell substrate, biogenic worm tube substrate (formed by Sabellarid or Serpulid species), anthropogenic materials, and other biological elements were also recorded. Examples of biological elements include flora (e.g., algae or seagrass), fauna (e.g., mobile megafauna, encrusting species, sand dollars, mussel beds), and evidence of biological activity (e.g., burrows, infaunal structures, decorator worm tubes). Thus, in addition to CMECS classification of the main substrate, the density of co-occurring shell and flora/fauna cover were calculated to illustrate these aspects of habitat complexity. Visual examples of habitat types defined using the still images are presented in the CMECS Classifications section (Section 3.2.2). Differences in the total area classified for each transect were a result of varying total transect lengths and visibility throughout the video.

A total of 277 m² of seafloor was analyzed. The substrate group with the highest percent cover across all transects was fine sand/mud, composing 81% (223 m²) of the surface area analyzed through still images for the transects. Only two of the transects were less than 50% sand/mud: EW1-4 and EW1-24 with 33% (2 m²) and 26% (9 m²), respectively. The average sand/mud coverage across all transects was 82%. Gravels (boulder, cobble, and pebble/granule sizes combined) occurred in 16 out of the 26 transects. Transect EW1-24 had the least sand/mud cover (33% or 2 m²) and the highest gravel cover (72% or 25 m²; Table 3-5), all from the pebble/granule size range. Of the total seafloor area analyzed, 10% (29 m²)

comprised gravel substrate. Over 99% of the gravel analyzed was pebble/granule sized (2 – 64 mm), with cobbles (64 – 256 mm) in two transects (EW1-12 and EW1-13) and boulders (> 256 mm) in one (EW1-03).

Biogenic shell cover accounted for 8% (22 m²) of the substrate within all transects. Of the 26 transects, 5 had biogenic shell cover above 30% (moderate cover), with the highest at EW1-04 with 58% (4 m²). Oak and maple leaves, which made up the majority of points categorized as organic-origin woody debris, were found in 6 transects, with 50% of the recorded cover occurring in transect EW1-07. Anthropogenic debris was found in 4 transects: EW1-02, EW1-04, EW1-13, and EW1-25 for a total of 0.15 m², or 0.6%. Closer to shore this debris was plastic bits like drink bottles, while further out, the debris was commercial fishing gear (EW1-25; Figure 3-1).

The total area of biological elements (i.e., flora or fauna) sampled was 2 m² and accounts for less than 1% of the bottom cover (Table 3-6). Sand dollars, bushy plant-like organisms, and megafauna were the most common biological elements, accounting for 35% (0.8 m²), 28% (0.7 m²), and 25% (0.6 m²) of the flora/fauna cover, respectively. The megafauna category contains various crab species, slipper shells (*Crepidula*), anemones, sea urchins, and fish species etc. detected in the still images. The eelgrass noted in transect EW1-22 was floating and no attached eelgrass was found in the survey. There was no biogenic worm tube substrate cover from reef-building Sabellarid or Serpulid species; however, singular sand/shell tubes created by decorator worms (*Diopatra cuprea*) were found in five transects and were counted as a biological element (Table 3-6). Only one transect had no flora or fauna observed, EW1-15. Mussel beds were found in transects EW1-04 and EW1-11 covering a total of 0.01 m² (Table 3-6).

Table 3-5. Area and percent coverage of different substrates summarized from still images taken from each of the 26 video transects in the sampling area.

Transect	Total Area Analyzed (m ²)	Percent of Area – Gravel Substrates				Sand/Mud (%)	Shell Cover (%)	Organic Debris - Wood (%)	Anthropogenic Debris (%)	Flora/Fauna Cover (%)
		Boulder (%)	Cobble (%)	Pebble/ Granule (%)	All Gravel Combined (%)					
EW1-01	1.74	0	0	0	0	98.10	0.06	0	0	1.13
EW1-02	2.72	0	0	0	0	97.70	0.87	0.14	0.03	1.27
EW1-03	3.58	0.24	0	0	0.24	94.60	3.46	0.21	0	1.38
EW1-04	6.09	0	0	5.25	5.25	32.38	57.92	0.10	0.04	4.31
EW1-05	6.42	0	0	0.91	0.91	79.78	17.08	0	0	2.22
EW1-06	9.03	0	0	5.89	5.89	54.56	38.62	0	0	0.93
EW1-07	4.96	0	0	0.38	0.38	85.17	12.12	0.68	0	1.65
EW1-08	2.64	0	0	0	0	98.84	0.15	0	0	0.77
EW1-09	3.09	0	0	5.90	5.90	56.08	37.57	0	0	0.45
EW1-10	9.06	0	0	2.11	2.11	67.85	26.50	0.10	0	3.40
EW1-11	5.67	0	0	3.52	3.52	58.61	36.22	0	0	1.65
EW1-12	5.53	0	0.07	0.54	0.61	86.11	12.97	0	0	0.37
EW1-13	7.73	0	0.22	9.74	9.96	55.95	33	0	0.03	1.07
EW1-14	24.64	0	0	0.10	0.10	97.86	1.98	0	0	0.07
EW1-15	9.84	0	0	0	0	98.37	1.63	0	0	0.00
EW1-16	8.68	0	0	0	0	98.06	1.83	0	0	0.16

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Transect	Total Area Analyzed (m ²)	Percent of Area – Gravel Substrates				Sand/Mud (%)	Shell Cover (%)	Organic Debris - Wood (%)	Anthropogenic Debris (%)	Flora/ Fauna Cover (%)
		Boulder (%)	Cobble (%)	Pebble/ Granule (%)	All Gravel Combined (%)					
EW1-17	7.9	0	0	0.29	0.29	96.73	2.83	0	0	0.18
EW1-18	12.63	0	0	0.01	0.01	93.03	6.64	0	0	0.32
EW1-19	12.55	0	0	0	0	96.31	3.64	0	0	0.03
EW1-20	10.53	0	0	0	0	99.40	0.18	0	0	0.38
EW1-21	11.69	0	0	0	0	99.55	0.41	0	0	0.03
EW1-22	13.47	0	0	0	0	99.50	0.19	0	0	0.26
EW1-23	17.34	0	0	0	0	98.94	0.15	0	0	0.83
EW1-24	34.16	0	0	72.20	72.20	25.95	1.83	0	0	0.01
EW1-25	27.07	0	0	6.64	6.64	89.11	3.11	0.02	0.55	0.61
EW1-26	18.04	0	0	0.81	0.81	92.40	2.86	0	0	4.05
Total Area (m²)	276.79	0.01	0.02	28.94	28.97	223	22.18	0.06	0.15	2.42

Table 3-6. Area and percent coverage of different biological elements (i.e., flora/fauna) observed within still images taken from each of the 26 video transects in the sampling area.

Transect	Flora/ Fauna Area (m²)	Burrows (%)	Infaunal Structures (%)	Megafauna (%)	Encrusting Orgs. (%)	Sand Dollars (%)	Mussel Beds (%)	Eelgrass (%)	Algae – Codium (%)	Bushy Plant-like Orgs. (%)	Decorator Worms (%)
EW1-01	0.02	0.31	0.71	0	0	0	0	0	0	0.10	0
EW1-02	0.03	0	0	0.08	0	0	0	0	0	1.18	0
EW1-03	0.05	0.06	0.11	0.14	0	0	0	0	0	1.07	0
EW1-04	0.26	0	0	2.02	0.45	0	0.02	0	0	1.82	0
EW1-05	0.14	0	0	2.22	0	0	0	0	0	0	0
EW1-06	0.08	0	0	0.65	0.06	0	0	0	0	0.22	0
EW1-07	0.08	0	0	0.18	0	0	0	0	0.03	1.43	0
EW1-08	0.02	0.17	0.25	0.10	0	0	0	0	0.07	0.18	0
EW1-09	0.01	0	0	0.16	0	0	0	0	0	0.29	0
EW1-10	0.31	0	0.03	0.47	0.04	0	0	0	0.15	2.71	0
EW1-11	0.09	0	0	0.17	0.34	0	0.12	0	0	1.02	0
EW1-12	0.02	0	0	0.13	0	0	0	0	0.06	0.12	0.05
EW1-13	0.08	0	0	0.22	0	0	0	0	0.43	0.41	0
EW1-14	0.02	0.02	0	0.05	0	0	0	0	0	0	0
EW1-15	0	0	0	0	0	0	0	0	0	0	0
EW1-16	0.01	0.05	0	0.06	0	0	0	0	0	0	0.04
EW1-17	0.01	0	0	0	0	0.16	0	0	0	0	0.02
EW1-18	0.04	0	0	0.29	0	0.02	0	0	0	0	0
EW1-19	< 0.01	0.01	0.02	0	0	0	0	0	0	0	0
EW1-20	0.04	0.28	0.03	0.07	0	0	0	0	0	0	0
EW1-21	< 0.01	0.01	0	0.02	0	0	0	0	0	0	0
EW1-22	0.04	0.15	0.04	0.04	0	0	0	0.03	0	0	0
EW1-23	0.14	0.20	0.07	0.55	0	0	0	0	0	0	0
EW1-24	< 0.01	0	0	0.01	0	0	0	0	0	0	0
EW1-25	0.16	0	0.01	0	0	0.40	0	0	0	0.16	0.04
EW1-26	0.73	0	0	0.06	0	3.87	0	0	0	0	0.12
Total Flora/Fauna Area (m²)	2.42	0.11	0.05	0.61	0.06	0.82	0.01	0	0.05	0.67	0.04

3.2 Grab Samples

3.2.1 Station Locations

The characteristics and locations of the 78 grab sample stations are described in Table 3-7 and shown in Figure 3-1. Four stations retrieved insufficient sediment after at least three attempts, and therefore show N/A for sample penetration in the tables below and were not further analyzed. Hard bottom substrates (gravel, shell, and cobble) and anthropogenic debris (garbage and asphalt material) blocked the complete

closing of the sampler jaws and caused the retrieval of insufficient sediment levels in grabs EW1-09-A, EW1-13-A, EW1-25-L, and EW1-26-R.

Table 3-7. Location and characteristics of grab samples collected in the sampling area (continued on next page).

Sample	Date (UTC)	Time (UTC)	Latitude (°N)	Longitude (°W)	Water Depth (m)	Sample Penetration Depth (mm)
EW1-01-A3	12/7/20	15:57	40.660938	-74.018171	9.31	180
EW1-01-L3	12/7/20	16:18	40.658475	-74.019603	10.75	180
EW1-01-R3	12/7/20	15:34	40.663404	-74.016742	7.65	190
EW1-02-A3	12/7/20	14:16	40.644364	-74.036591	11.33	165
EW1-02-L3	12/7/20	13:51	40.643192	-74.039818	12.8	165
EW1-02-R3	12/7/20	14:55	40.645525	-74.033397	7.76	165
EW1-03-A1	12/7/20	13:06	40.634740	-74.041877	9.64	145
EW1-03-L2	12/7/20	12:58	40.632949	-74.044522	11.34	80
EW1-03-R3	12/7/20	13:27	40.636483	-74.039216	2.68	165
EW1-04-A1	12/2/20	16:17	40.598565	-74.039777	22.76	76
EW1-04-L1	12/2/20	16:29	40.601171	-74.040633	26.69	130
EW1-04-R3	12/2/20	16:07	40.595929	-74.038968	21.28	90
EW1-05-A1	12/2/20	14:51	40.588687	-74.036392	24.76	75
EW1-05-L1	12/2/20	15:20	40.591293	-74.037178	25.79	70
EW1-05-R1	12/2/20	15:05	40.586040	-74.035509	23.57	75
EW1-06-A2	12/3/20	21:24	40.601763	-74.035612	18.92	130
EW1-06-L1	11/26/20	18:52	40.602471	-74.039222	28.60	75
EW1-06-R1	11/26/20	19:17	40.601103	-74.032189	11.60	155
EW1-07-A1	11/26/20	17:02	40.601216	-74.029965	6.22	160
EW1-07-L1	11/26/20	18:07	40.603333	-74.030962	4.20	100
EW1-07-R1	11/26/20	17:33	40.598685	-74.028851	14.00	175
EW1-08-A3	11/26/20	16:02	40.596738	-74.023396	6.90	170
EW1-08-L1	11/26/20	16:16	40.599162	-74.024951	7.40	170
EW1-08-R3	11/26/20	14:58	40.594138	-74.021651	6.30	180
EW1-09-A3	12/2/20	19:51	40.583888	-74.015203	6.63	NA
EW1-09-L1	12/2/20	19:39	40.581236	-74.015855	3.88	82
EW1-09-R5	12/2/20	20:37	40.586561	-74.014568	6.56	160
EW1-10-A2	12/2/20	17:56	40.550676	-74.020630	8.40	75
EW1-10-L1	12/2/20	17:35	40.553234	-74.021817	8.05	80
EW1-10-R2	12/2/20	18:14	40.548154	-74.019401	12.76	145
EW1-11-A1	12/3/20	14:32	40.537997	-74.014491	15.59	77
EW1-11-L1	12/3/20	14:42	40.540393	-74.016096	13.06	85
EW1-11-R1	12/3/20	14:21	40.535603	-74.012883	18.68	80
EW1-12-A1	12/3/20	13:45	40.530130	-74.006480	10.19	85
EW1-12-L2	12/3/20	14:08	40.531532	-74.009501	8.68	85
EW1-12-R1	12/3/20	13:33	40.528736	-74.003450	19.78	100
EW1-13-A3	12/3/20	12:57	40.522945	-73.989259	11.76	NA
EW1-13-L1	12/3/20	13:18	40.523972	-73.992528	17.19	130
EW1-13-R1	12/3/20	13:07	40.521904	-73.985990	8.07	100
EW1-14-A1	11/27/20	13:14	40.519875	-73.969965	4.09	105
EW1-14-L1	11/27/20	13:29	40.517425	-73.971387	5.43	90
EW1-14-R1	11/27/20	12:59	40.522334	-73.968496	10.33	100
EW1-15-A1	11/27/20	14:14	40.497942	-73.914216	9.23	75

Sample	Date (UTC)	Time (UTC)	Latitude (°N)	Longitude (°W)	Water Depth (m)	Sample Penetration Depth (mm)
EW1-15-L1	11/27/20	14:52	40.495569	-73.915899	9.90	70
EW1-15-R2	11/27/20	14:37	40.500266	-73.912499	8.39	75
EW1-16-A1	11/27/20	15:59	40.487295	-73.879270	13.55	100
EW1-16-L3	11/27/20	15:45	40.487674	-73.882789	13.05	85
EW1-16-R2	11/27/20	16:18	40.486931	-73.875879	13.66	87
EW1-17-A3	11/27/20	16:50	40.486784	-73.869529	14.28	97
EW1-17-L2	11/27/20	17:11	40.486001	-73.872958	14.08	87
EW1-17-R1	11/27/20	17:23	40.487547	-73.866162	14.09	82
EW1-18-A1	11/27/20	18:13	40.482590	-73.855734	16.77	80
EW1-18-L1	11/27/20	17:49	40.483291	-73.859163	16.18	75
EW1-18-R1	11/27/20	18:25	40.481886	-73.852273	17.61	88
EW1-19-A1	11/27/20	19:05	40.479720	-73.842231	19.84	118
EW1-19-L1	11/27/20	18:52	40.482201	-73.843607	18.87	110
EW1-19-R3	11/27/20	19:34	40.477284	-73.840612	20.58	75
EW1-20-A1	11/29/20	12:55	40.474991	-73.819339	24.49	145
EW1-20-L1	11/29/20	12:44	40.475697	-73.822744	24.03	118
EW1-20-R1	11/29/20	13:09	40.474272	-73.815933	24.7	120
EW1-21-A1	11/27/20	20:40	40.470192	-73.796331	26.31	143
EW1-21-L2	11/27/20	20:25	40.470905	-73.799780	25.32	140
EW1-21-R1	11/27/20	20:56	40.469477	-73.792927	26	115
EW1-22-A1	11/29/20	13:54	40.465598	-73.774430	26.63	125
EW1-22-L1	11/29/20	13:42	40.466315	-73.777817	26.34	96
EW1-22-R1	11/29/20	14:09	40.464866	-73.771004	26.69	108
EW1-23-A1	11/29/20	14:38	40.462825	-73.761147	26.92	137
EW1-23-L1	11/29/20	14:27	40.463524	-73.764542	26.72	122
EW1-23-R1	11/29/20	14:51	40.462106	-73.757729	24.54	107
EW1-24-A1	11/28/20	19:27	40.446943	-73.628277	18.71	125
EW1-24-L1	11/28/20	19:41	40.447131	-73.631814	19.03	108
EW1-24-R1	11/28/20	19:15	40.446757	-73.624751	18.73	135
EW1-25-A1	11/28/20	17:57	40.442957	-73.562944	23.04	107
EW1-25-L3	11/28/20	18:27	40.443334	-73.566431	22.58	NA
EW1-25-R3	11/28/20	17:42	40.442592	-73.559449	22.59	70
EW1-26-A2	11/28/20	13:09	40.407116	-73.490395	25.2	87
EW1-26-L1	11/28/20	12:46	40.409765	-73.490928	25.55	100
EW1-26-R4	11/28/20	13:54	40.404397	-73.489775	25.3	NA

3.2.2 Sediment Analysis

The following section presents grab sample grain size composition results from the TerraSense, LLC lab analysis. There were 74 grabs across the EW1 sampling area analyzed. The majority of sites were sandy/muddy with 58% of samples sandy or finer (Table 3-8). There were 31 samples which contained $\geq 5\%$ gravel (> 2 mm), which designates them as complex habitat under the NMFS (2021) modified CMECS guidelines. Of the samples designated as complex, 5 had $\geq 30\%$ gravel (EW1-11-L1, EW1-24-A1, EW1-24-L1, EW1-24-R1, and EW1-25-R3). There was likely no cobble (> 64 mm); however the closest sieve that the TerraSense lab used to this size was 76 mm. Only two samples (EW1-11-R1 and EW1-13-R1) had

the possibility of cobble present with 2% and 6% of the sample falling within the 38 – 76 mm range. Fine silt and clay particles (< 0.075 mm) composed 0 – 99% of each sample (mean of 21.1%), with 17 samples containing ≥ 30% silt and clay (Table 3-8). The fines component may be a slight overestimate because CMECS classifies silt/clay at a smaller scale (< 0.0625 mm) than the lab results (< 0.075 mm).

Total organic carbon (TOC) percentages ranged from 0.2 – 7.7%, with an average of 1.64%. Only 12 samples were above 3% TOC, and all these samples contained over 30% silt/clay. The majority of samples had less than 1% TOC, with 41 of the 74 total grab samples in the lower end of the range.

Table 3-8. Grain size composition from grab samples collected along the EW1 (continued on next page).

Station	Boulder % (256- 4096 mm)	Cobble % (76-256 mm)	Pebble/ Granule % (2-76 mm)	Very Coarse Sand % (1-2 mm)	Coarse Sand % (0.5-1 mm)	Medium Sand % (0.25-0.5 mm)	Fine Sand % (0.125-0.25 mm)	Very Fine Sand % (0.075- 0.125 mm)	Silt/Clay % (< 0.075 mm)	d50 (mm)	Total Organic Carbon (%)
EW1-01-A3	0	0	0	0.1	0	0	0.1	0.4	99.4	0	6.9
EW1-01-L3	0	0	0	0	0	0	1.1	1.5	97.4	0	6.5
EW1-01-R3	0	0	0	0.1	0	0	0.1	0.3	99.5	0	7.7
EW1-02-A3	0	0	9	1.8	0.4	0	3.6	22.2	63	0	4.1
EW1-02-L3	0	0	1	0.9	0.2	0	6.1	31.9	59.9	0	3.7
EW1-02-R3	0	0	0	0	0	0	1.4	3.5	95.1	0	6.7
EW1-03-A1	0	0	2	0.1	0.7	0.2	11.1	53.1	32.8	0.08	2.8
EW1-03-L2	0	0	0.1	0.1	0.2	0.9	70.5	19.6	8.6	0.15	0.6
EW1-03-R3	0	0	3.5	0.9	1.1	5	15.9	16.2	57.4	0	4.1
EW1-04-A1	0	0	10	4.4	11.8	21.8	38.8	6.6	6.6	0.24	1.3
EW1-04-L1	0	0	10	2.2	3.3	7.6	50.9	14.4	11.6	0.17	1.7
EW1-04-R3	0	0	9	2.3	2.6	9.2	59.7	11.3	5.9	0.19	1.0
EW1-05-A1	0	0	6.04	1.7	2.6	16.5	57.56	10.6	5	0.2	0.8
EW1-05-L1	0	0	7	1.5	1.7	10.8	68.6	5.9	4.5	0.19	0.9
EW1-05-R1	0	0	8.85	1.6	2.1	11.3	51.45	17.1	7.6	0.18	1.2
EW1-06-A2	0	0	16	6.6	4.5	2.9	34.1	15.8	20.1	0.15	2.2
EW1-06-L1	0	0	12	6.6	9.7	16.7	36.4	10.8	7.8	0.23	1.2
EW1-06-R1	0	0	8	1.8	0.4	0.8	12.3	21	55.7	0	2.4
EW1-07-A1	0	0	24	0.1	0.7	0.2	7.9	14.2	52.9	0	5.6
EW1-07-L1	0	0	12	5.7	8.8	23.5	34.2	8.6	7.2	0.25	0.9
EW1-07-R1	0	0	1.4	0.5	0.4	0.7	18.6	43.4	35	0.08	2.3
EW1-08-A3	0	0	3	1.7	1.1	2.3	3.6	15.9	72.4	0	5.6
EW1-08-L1	0	0	5	1.7	1.1	2.3	4.3	30.8	54.8	0	3.3
EW1-08-R3	0	0	0	0	0.8	0.2	2.5	22.1	74.4	0	4.6
EW1-09-L1	0	0	22.41	9.1	7.7	5.2	26.29	15.2	14.1	0.2	1.6
EW1-09-R5	0	0	4	0	0	0	17.4	55.3	23.3	0.09	1.4
EW1-10-A2	0	0	5	3.9	3.6	18.4	53.3	10.9	4.9	0.2	0.8
EW1-10-L1	0	0	5	3.2	2.8	19.1	52.7	10.4	6.8	0.2	0.7
EW1-10-R2	0	0	10	0.2	0.5	1.3	19.5	28.7	39.8	0.08	3.9
EW1-11-A1	0	0	6.7	4.5	12.3	44.8	24.8	3.4	3.5	0.32	0.6
EW1-11-L1	0	0	34.6	1.9	1.2	7.9	34.4	11.1	8.9	0.23	1.9
EW1-11-R1	0	0	8.32	1	1.1	13.9	62.18	8.1	5.4	0.2	0.9
EW1-12-A1	0	0	10.37	4.1	8.4	48.83	24.5	1.2	2.6	0.32	0.5
EW1-12-L2	0	0	4.07	2.5	16	66.43	10	0.2	0.8	0.36	0.3
EW1-12-R1	0	0	0.15	0.1	2.8	56.45	36.2	2.7	1.6	0.27	0.4
EW1-13-L1	0	0	8.68	11.8	38.32	27.8	10.6	1	1.8	0.57	0.3
EW1-13-R1	0	0	16.29	4	20.5	52.81	5.2	0.2	1	0.44	0.2

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Station	Boulder % (256-4096 mm)	Cobble % (76-256 mm)	Pebble/Granule % (2-76 mm)	Very Coarse Sand % (1-2 mm)	Coarse Sand % (0.5-1 mm)	Medium Sand % (0.25-0.5 mm)	Fine Sand % (0.125-0.25 mm)	Very Fine Sand % (0.075-0.125 mm)	Silt/Clay % (< 0.075 mm)	d50 (mm)	Total Organic Carbon (%)
EW1-14-A1	0	0	0.41	3.1	18.2	58.39	18	0.9	1	0.35	0.3
EW1-14-L1	0	0	1.27	1.5	5.4	35.3	54.53	1.1	0.9	0.23	0.3
EW1-14-R1	0	0	3.11	8.2	16.9	54.49	16.3	0.3	0.7	0.36	0.3
EW1-15-A1	0	0	0.44	0.3	1.2	10.5	72.26	14.6	0.7	0.18	0.4
EW1-15-L1	0	0	0.78	0.1	0.4	4.8	79.82	13.4	0.7	0.17	0.5
EW1-15-R2	0	0	6.02	4.4	24	41.88	20.1	3.1	0.5	0.38	0.4
EW1-16-A1	0	0	5.86	16.7	34.64	32.4	7.7	1.7	1	0.57	0.6
EW1-16-L3	0	0	0.12	0.2	2	20.6	52.68	22.5	1.9	0.17	0.5
EW1-16-R2	0	0	0.17	0.1	1	13.3	57.43	26.3	1.7	0.15	0.6
EW1-17-A3	0	0	2.36	6.1	37.3	40.24	8.1	3.3	2.6	0.47	0.7
EW1-17-L2	0	0	0.15	0.1	1.1	15.4	59.25	21	3	0.16	0.6
EW1-17-R1	0	0	0.63	0.4	2.9	33.3	48.87	13.8	0.1	0.21	0.5
EW1-18-A1	0	0	3.22	0.6	1.9	13.5	50.38	27.9	2.5	0.16	0.8
EW1-18-L1	0	0	0.44	0.4	1.9	30.1	51.26	14.6	1.3	0.2	0.5
EW1-18-R1	0	0	2.98	0.8	1.9	8.6	49.42	31.6	4.7	0.14	0.8
EW1-19-A1	0	0	0.92	0.6	1.6	7.2	28.6	48.98	12.1	0.11	0.8
EW1-19-L1	0	0	0.33	0.3	1.2	6	32.9	52.87	6.4	0.11	0.7
EW1-19-R3	0	0	0.37	0.1	0.6	2.3	4.6	8.9	83.13	0	0.9
EW1-20-A1	0	0	0.04	0.2	0.7	2.5	12	64.26	20.3	0.09	1.5
EW1-20-L1	0	0	0.02	0.2	0.9	5.1	14.9	64.78	14.1	0.09	0.9
EW1-20-R1	0	0	0.03	0.1	0.1	0.2	1.7	11.5	86.37	0	1.1
EW1-21-A1	0	0	1.58	0.8	0.8	1	23.5	60.82	11.5	0.1	1.2
EW1-21-L2	0	0	0.02	0.1	0.4	0.9	19.5	61.18	17.9	0.1	1.8
EW1-21-R1	0	0	0.4	0.1	0.2	0.9	20.6	60.9	16.9	0.1	2.0
EW1-22-A1	0	0	0.37	0	0.1	1.2	20.6	59.23	18.5	0.1	1.9
EW1-22-L1	0	0	0.12	0.1	0.2	2.6	24.3	60.08	12.6	0.1	1.2
EW1-22-R1	0	0	0	0.1	0.2	1.8	24	63.3	10.6	0.1	0.9
EW1-23-A1	0	0	0.58	0	0.2	0.9	13.4	59.62	25.3	0.09	1.8
EW1-23-L1	0	0	0.21	0.1	0.1	0.6	15.1	58.19	25.7	0.09	1.9
EW1-23-R1	0	0	0.85	0.1	0.1	0.7	16.5	64.05	17.7	0.09	0.9
EW1-24-A1	0	0	38.6	21.3	24.2	13.7	1.4	0.3	0.5	1.4	0.5
EW1-24-L1	0	0	53.5	17.4	14.9	12.1	1.1	0.2	0.8	2.1	0.2
EW1-24-R1	0	0	63.7	3.6	15.3	14.3	2.3	0.3	0.5	3.2	0.2
EW1-25-A1	0	0	9.11	6.6	11.6	17.4	35.49	16.4	3.4	0.22	0.7
EW1-25-R3	0	0	48.7	8.2	16.2	22	3.9	0.4	0.6	1.8	0.3
EW1-26-A2	0	0	12.73	1.8	6.5	17.6	45.67	15	0.7	0.21	0.4
EW1-26-L1	0	0	0.12	1.8	19.9	63.58	12.6	1.3	0.7	0.36	0.4

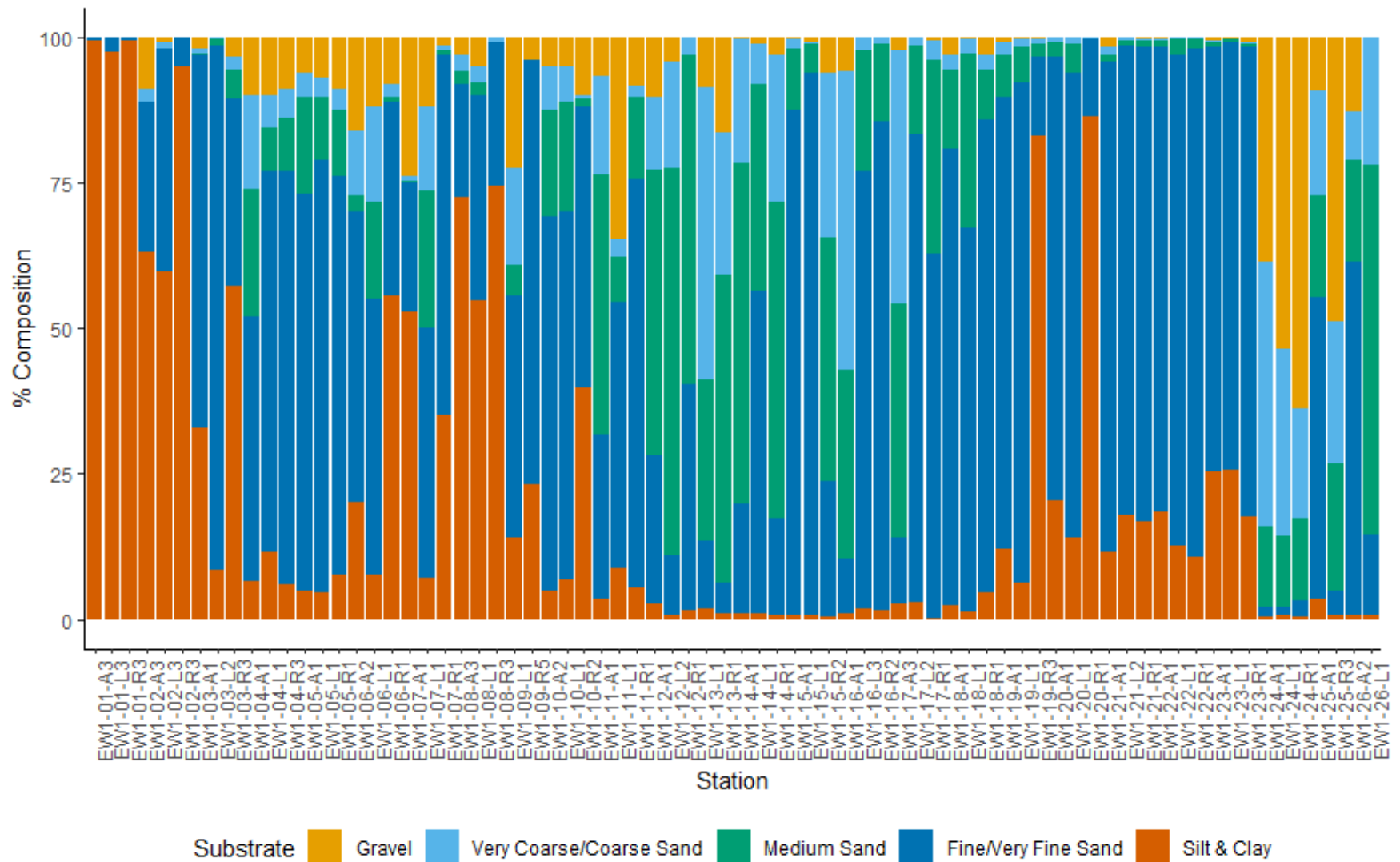


Figure 3-9. Grain size composition at each grab sample station collected along the EW1.

3.2.3 Benthic Community Analysis

3.2.3.1 Taxonomic Composition

Grab samples were attempted at 26 stations, with 3 replicate grabs taken at each station for a total of 78 samples for infaunal macroinvertebrate analysis. Of the 78 sample sites, 74 had successful benthic grab samples collected. All four grab sample sites where insufficient amounts of sediment were obtained were a result of coarse/hard bottom sediments preventing full closure of grab sampler bucket. The 74 successful grab samples yielded a total of 8,381 individual organisms (i.e., per all 74 0.04 m² samples). Organisms collected in this survey area were from seven unique phyla comprising 101 families or NLPTL (Table 3-9). The Phyla Mollusca, Annelida, and Arthropoda dominated both the abundance and unique taxa in samples, representing 94% of all organisms and 91% of the taxa identified (Figure 3-10). In addition, sand lance (*Ammodytes spp.*) were observed in two grab samples (EW1-14-A1 and EW1-14-R1); however, they were excluded from the subsequent analyses as they are vertebrates.

Density across the 74 benthic grab samples ranged from four organisms in EW1-12-L2 to 560 in EW1-20-A1 (Table 3-10). Nut clams from the family Nuculidae had the highest abundance of any organism identified, with 3,097 identified in 30 of the 74 samples. Amphipods from the families Corophiidae, Aoridae, and Ampeliscidae were also numerous with a total of 925 identified in nine, 39, 16 samples, respectively. Polychaete worms from the families Glyceridae and Spionidae occurred most frequently in samples, identified in 44 and 42 of the 74 samples, respectively. The percent composition of each sample by phyla is shown in Figure 3-11 and abundance of unique taxa is presented in Table 3-11

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Table 3-9. Phyla present in the 74 benthic grab samples collected in the sampling area. The density values represent abundance summed across all 0.04 m² samples.

Phylum	Abundant Taxonomic Groups (common names)	Density	Number of Families (or NLPTL)
Annelida	Polychaete worms	2,654	32
Arthropoda	Amphipods, isopods, hermit crabs	1,618	31
Cnidaria	Sea anemone	12	3
Echinodermata	Sand dollars, sea urchins, sea cucumbers	5	3
Mollusca	Nut clams, pyramid shells, slipper snails, tellins	4,009	29
Nemertea	Ribbon worms	65	2
Sipuncula	Peanut worms	18	1
Totals		8,381	101

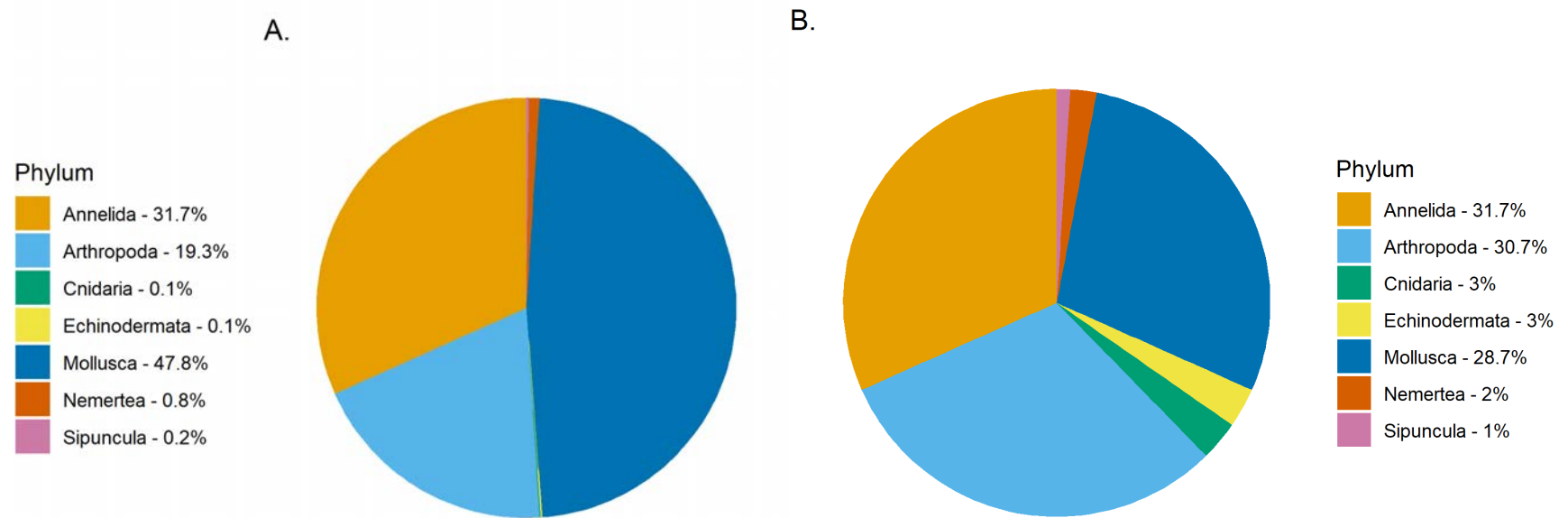


Figure 3-10. Proportional abundance (A) and proportion of unique taxa (family or NLPTL) (B) for each phylum collected in all benthic grab samples in the sampling area. Results presented as percentage of total.

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Table 3-10. Abundance of each Phylum counted within each grab sample collected in the sampling area (continued on next page).

Station	Annelida	Arthropoda	Cnidaria	Echinodermata	Mollusca	Nemertea	Sipuncula	Density (Abundance per 0.04 m ²)
EW1-01-A3	92	3	0	0	49	12	2	158
EW1-01-L3	57	12	0	0	94	1	3	167
EW1-01-R3	29	1	0	0	65	1	2	98
EW1-02-A3	7	5	0	0	25	0	0	37
EW1-02-L3	22	6	0	0	166	0	0	194
EW1-02-R3	21	21	0	0	1	0	0	43
EW1-03-A1	5	12	1	0	2	0	0	20
EW1-03-L2	7	1	0	0	4	0	0	12
EW1-03-R3	27	2	0	0	2	2	0	33
EW1-04-A1	34	17	0	0	21	1	0	73
EW1-04-L1	8	6	0	0	5	3	0	22
EW1-04-R3	34	10	0	0	3	0	0	47
EW1-05-A1	24	0	0	0	0	0	0	24
EW1-05-L1	65	10	0	0	10	1	0	86
EW1-05-R1	7	5	0	0	2	0	0	14
EW1-06-A2	17	14	0	0	3	1	0	35
EW1-06-L1	11	9	0	0	5	1	0	26
EW1-06-R1	43	3	0	0	51	3	0	100
EW1-07-A1	18	68	0	0	12	3	0	101
EW1-07-L1	5	4	0	0	8	0	0	17
EW1-07-R1	17	4	0	0	95	7	1	124
EW1-08-A3	3	0	0	0	17	0	0	20
EW1-08-L1	36	2	0	0	122	0	0	160
EW1-08-R3	6	1	0	0	42	0	4	53
EW1-09-L1	98	21	0	2	7	2	0	130
EW1-09-R5	36	11	0	0	22	6	5	80
EW1-10-A2	13	14	0	0	8	0	0	35
EW1-10-L1	16	6	0	0	9	0	0	31
EW1-10-R2	75	40	0	0	28	0	0	143
EW1-11-A1	32	8	0	0	6	0	0	46
EW1-11-L1	30	36	0	0	44	0	0	110
EW1-11-R1	41	65	0	0	36	0	0	142
EW1-12-A1	4	0	0	0	7	0	0	11
EW1-12-L2	0	3	0	0	1	0	0	4
EW1-12-R1	10	17	0	0	12	0	0	39
EW1-13-L1	3	0	0	0	2	0	0	5
EW1-13-R1	19	0	0	0	5	0	0	24
EW1-14-A1	0	7	0	0	4	0	0	11

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Station	Annelida	Arthropoda	Cnidaria	Echinodermata	Mollusca	Nemertea	Sipuncula	Density (Abundance per 0.04 m ²)
EW1-14-L1	3	39	0	0	6	0	0	48
EW1-14-R1	11	8	0	0	0	0	0	19
EW1-15-A1	8	73	0	0	3	0	0	84
EW1-15-L1	4	68	0	0	1	0	0	73
EW1-15-R2	4	4	0	0	0	0	0	8
EW1-16-A1	77	20	0	0	6	0	0	103
EW1-16-L3	9	4	0	0	0	0	0	13
EW1-16-R2	16	12	0	0	0	0	0	28
EW1-17-A3	8	5	0	0	0	0	0	13
EW1-17-L2	11	10	0	1	1	0	0	23
EW1-17-R1	9	16	0	0	4	0	0	29
EW1-18-A1	36	9	0	0	6	2	0	53
EW1-18-L1	10	13	0	0	6	0	0	29
EW1-18-R1	44	6	0	0	2	0	0	52
EW1-19-A1	39	79	0	0	28	0	0	146
EW1-19-L1	10	48	0	0	14	4	0	76
EW1-19-R3	33	5	0	0	14	0	0	52
EW1-20-A1	104	6	0	0	450	0	0	560
EW1-20-L1	190	11	0	0	66	0	0	267
EW1-20-R1	53	22	3	0	91	0	1	170
EW1-21-A1	92	31	0	0	277	7	0	407
EW1-21-L2	55	1	3	0	102	1	0	162
EW1-21-R1	22	9	2	0	393	3	0	429
EW1-22-A1	11	3	0	0	320	0	0	334
EW1-22-L1	80	30	1	0	272	0	0	383
EW1-22-R1	26	12	0	0	88	3	0	129
EW1-23-A1	12	3	0	0	302	0	0	317
EW1-23-L1	40	3	0	0	428	0	0	471
EW1-23-R1	65	19	1	0	104	1	0	190
EW1-24-A1	144	54	0	0	10	0	0	208
EW1-24-L1	109	399	0	1	0	0	0	509
EW1-24-R1	282	93	0	0	0	0	0	375
EW1-25-A1	42	25	0	0	14	0	0	81
EW1-25-R3	11	7	0	0	4	0	0	22
EW1-26-A2	11	9	1	0	2	0	0	23
EW1-26-L1	1	18	0	1	0	0	0	20
Totals	2,654	1,618	12	5	4,009	65	18	8,381

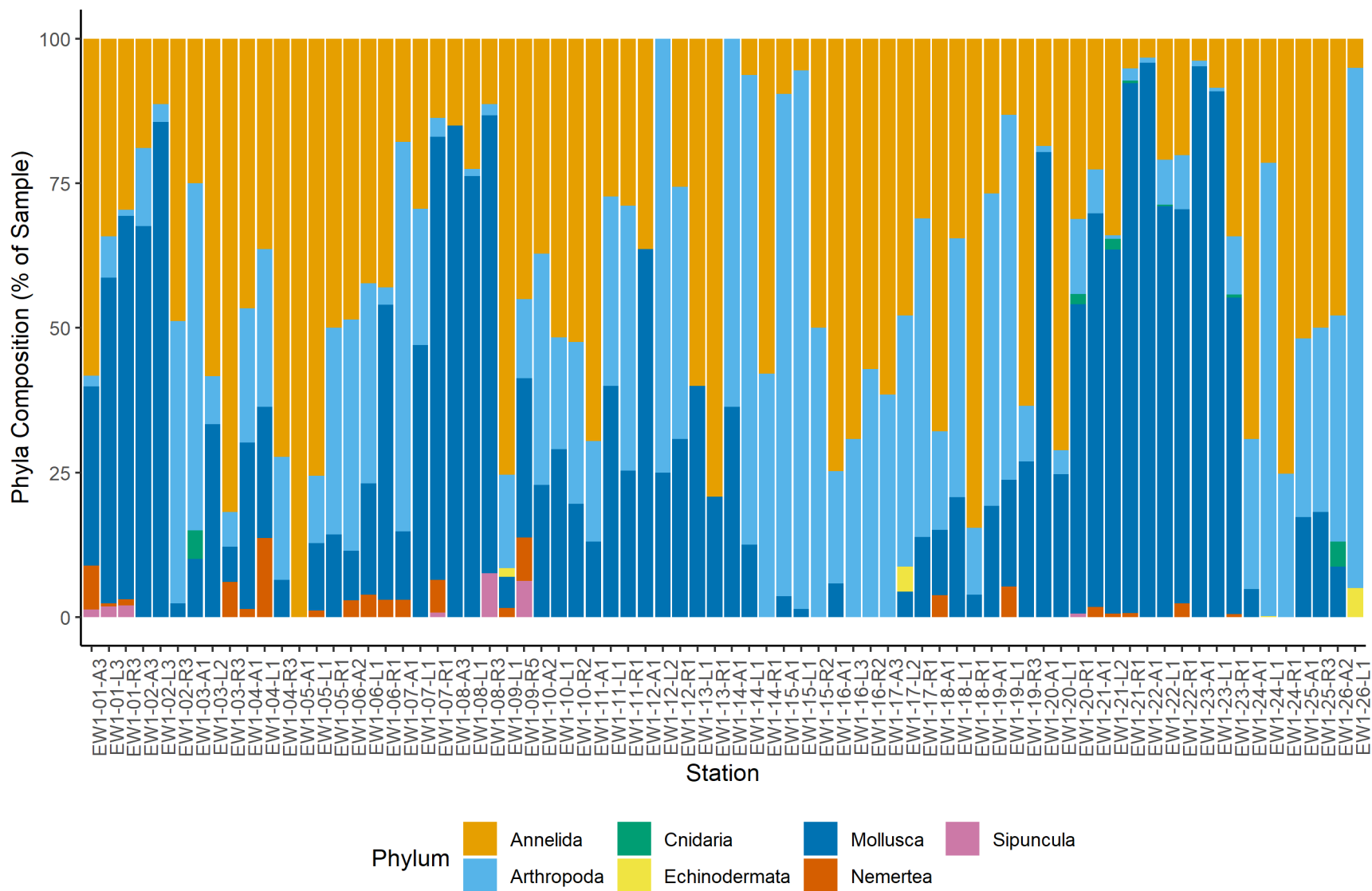


Figure 3-11. Percent composition of organisms in each represented phylum for the 74 benthic grab samples collected in the sampling area.

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Table 3-11. Abundance of each phylum and taxon (family or NLPTL) across all grab samples (continued on next page).

Phylum	Family or NLPTL	Abundance Across All Samples	Mean Abundance per 0.04 m ²	Median Abundance per 0.04 m ²	Frequency of Occurrence
Annelida	Ampharetidae	31	0.4	0	17
	Capitellidae	113	1.5	0	22
	Chaetopteridae	19	0.3	0	9
	Cirratulidae	229	3.1	0	29
	Enchytraeidae	174	2.4	0	5
	Flabelligeridae	34	0.5	0	7
	Glyceridae	239	3.2	1	44
	Goniadidae	17	0.2	0	3
	Hesionidae	14	0.2	0	2
	Lumbrineridae	37	0.5	0	18
	Magelonidae	7	0.1	0	5
	Maldanidae	104	1.4	0	21
	Naididae	63	0.9	0	16
	Nephtyidae	171	2.3	0	36
	Nereididae	20	0.3	0	9
	Oeonidae	69	0.9	0	12
	Onuphidae	34	0.5	0	15
	Opheliidae	17	0.2	0	1
	Orbiniidae	19	0.3	0	13
	Paraonidae	385	5.2	0	20
	Pectinariidae	110	1.5	0	11
	Phyllodocidae	41	0.6	0	17
	Polygordiidae	198	2.7	0	19
	Polynoidae	17	0.2	0	7
	Sabellariidae	106	1.4	0	12
	Sabellidae	3	0	0	2
	Scalibregmatidae	7	0.1	0	2
	Sigalionidae	36	0.5	0	14
	Spionidae	271	3.7	1	42
	Syllidae	40	0.5	0	8
	Terebellidae	23	0.3	0	4
	Travisiidae	6	0.1	0	6
Arthropoda	Ampeliscidae	190	2.6	0	16
	Amphipoda	3	0	0	3
	Ancinidae	18	0.2	0	8
	Anthuridae	46	0.6	0	18
	Aoridae	294	4	1	39
	Argissidae	1	0	0	1
	Bateidae	1	0	0	1
	Bodotriidae	7	0.1	0	5
	Brachyura	1	0	0	1
	Cancridae	10	0.1	0	6
	Caprellidae	29	0.4	0	6
	Chaetiliidae	7	0.1	0	4
	Corophiidae	441	6	0	9
	Crangonidae	1	0	0	1
	Diastylidae	24	0.3	0	7
	Epialtidae	9	0.1	0	4
	Haustoriidae	144	1.9	0	12
	Idoteidae	19	0.3	0	11
	Ischyroceridae	10	0.1	0	1
	Liljeborgiidae	46	0.6	0	4
	Lysianassidae	25	0.3	0	10
	Maeridae	18	0.2	0	3

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Phylum	Family or NLPTL	Abundance Across All Samples	Mean Abundance per 0.04 m ²	Median Abundance per 0.04 m ²	Frequency of Occurrence
	Melitidae	37	0.5	0	10
	Oedicerotidae	7	0.1	0	6
	Paguridae	36	0.5	0	14
	Panopeidae	22	0.3	0	9
	Phoxichilidiidae	1	0	0	1
	Phoxocephalidae	118	1.6	0	18
	Pontogeneiidae	1	0	0	1
	Squillidae	1	0	0	1
	Stenothoidae	51	0.7	0	5
Cnidaria	Actiniaria	3	0	0	3
	Cerianthidae	5	0.1	0	2
	Sagartiidae	4	0.1	0	2
Echinodermata	Echinarachniidae	1	0	0	1
	Echinoidea	1	0	0	1
	Synaptidae	3	0	0	2
Mollusca	Acteonidae	25	0.3	0	7
	Anomiidae	2	0	0	1
	Arcidae	8	0.1	0	2
	Arctidae	21	0.3	0	8
	Bivalvia	21	0.3	0	6
	Buccinidae	1	0	0	1
	Calyptraeidae	93	1.3	0	13
	Columbellidae	7	0.1	0	3
	Corambidae	2	0	0	1
	Doridoidei	1	0	0	1
	Epitoniidae	3	0	0	1
	Lucinidae	18	0.2	0	5
	Lyonsiidae	11	0.1	0	8
	Mactridae	38	0.5	0	14
	Muricidae	3	0	0	2
	Mytilidae	43	0.6	0	5
	Nassariidae	18	0.2	0	7
	Naticidae	6	0.1	0	3
	Nuculidae	3,097	41.9	0	30
	Pandoridae	13	0.2	0	8
	Periplomatidae	41	0.6	0	10
	Pyramidellidae	149	2	0	10
	Solecurtidae	6	0.1	0	4
	Solenidae	16	0.2	0	8
	Tellinidae	90	1.2	0	34
	Thyasiridae	47	0.6	0	5
	Tornatinidae	50	0.7	0	6
	Veneridae	29	0.4	0	11
	Yoldiidae	150	2	0	19
Nemertea	Lineidae	9	0.1	0	5
Nemertea	Nemertea	56	0.8	0	16
Sipuncula	Sipuncula	18	0.2	0	7

3.2.3.2 Richness, Diversity, and Evenness

Mean density was 113 organisms per sample, averaged across 74 sample sites in the sampling area (Table 3-12). Taxonomic richness was 2.88, on average, with individual samples ranging from 0.63 at EW1-05-A1 to 5.63 at EW1-07-A1 (Figure 3-12). Average diversity across the individual grab samples was 1.81 with a range from 0.65 at EW1-23-A1 to 2.94 at EW1-11-L1. Evenness ranged from 0.29 at EW1-21-R1 and EW1-22-A1 to 1.0 at EW1-12-L2, which consisted of four organisms from four families (or NLPTL). Mean evenness across the 74 samples was 0.75. Richness, diversity, and evenness are unitless indices; however, higher values indicate greater amounts of richness, diversity, or evenness in each sample.

Table 3-12. Community composition parameters calculated for each grab sample station (continued on next page).

Station	Density (Abundance per 0.04 m ²)	Number of Families (or NLPTL)	Ecological Indices		
			Richness	Diversity	Evenness
EW1-01-A3	158	23	4.35	2.57	0.82
EW1-01-L3	167	21	3.91	2.43	0.80
EW1-01-R3	98	13	2.62	2.02	0.79
EW1-02-A3	37	8	1.94	1.45	0.70
EW1-02-L3	194	17	3.04	1.54	0.54
EW1-02-R3	43	15	3.72	2.39	0.88
EW1-03-A1	20	9	2.67	2.02	0.92
EW1-03-L2	12	7	2.41	1.79	0.92
EW1-03-R3	33	13	3.43	2.25	0.88
EW1-04-A1	73	21	4.66	2.55	0.84
EW1-04-L1	22	12	3.56	2.37	0.95
EW1-04-R3	47	19	4.68	2.54	0.86
EW1-05-A1	24	3	0.63	0.97	0.88
EW1-05-L1	86	10	2.02	1.18	0.51
EW1-05-R1	14	9	3.03	2.04	0.93
EW1-06-A2	35	16	4.22	2.55	0.92
EW1-06-L1	26	16	4.60	2.58	0.93
EW1-06-R1	100	16	3.26	2.03	0.73
EW1-07-A1	101	27	5.63	2.83	0.86
EW1-07-L1	17	13	4.24	2.51	0.98
EW1-07-R1	124	14	2.70	1.32	0.50
EW1-08-A3	20	6	1.67	1.27	0.71
EW1-08-L1	160	11	1.97	1.46	0.61
EW1-08-R3	53	12	2.77	1.68	0.68
EW1-09-L1	130	19	3.70	2.00	0.68
EW1-09-R5	80	18	3.88	2.54	0.88
EW1-10-A2	35	20	5.34	2.85	0.95
EW1-10-L1	31	16	4.37	2.56	0.92
EW1-10-R2	143	18	3.43	2.41	0.83
EW1-11-A1	46	12	2.87	1.63	0.66
EW1-11-L1	110	26	5.32	2.94	0.90
EW1-11-R1	142	22	4.24	2.87	0.93
EW1-12-A1	11	3	0.83	0.91	0.83
EW1-12-L2	4	4	2.16	1.39	1.00
EW1-12-R1	39	12	3.00	2.04	0.82
EW1-13-L1	5	3	1.24	1.05	0.96
EW1-13-R1	24	5	1.26	0.94	0.58
EW1-14-A1	11	3	0.83	0.91	0.83
EW1-14-L1	48	7	1.55	1.56	0.80

Station	Density (Abundance per 0.04 m ²)	Number of Families (or NLPTL)	Ecological Indices		
			Richness	Diversity	Evenness
EW1-14-R1	19	4	1.02	1.35	0.98
EW1-15-A1	84	10	2.03	1.28	0.55
EW1-15-L1	73	8	1.63	1.04	0.50
EW1-15-R2	8	6	2.40	1.73	0.97
EW1-16-A1	103	14	2.80	1.84	0.70
EW1-16-L3	13	6	1.95	1.52	0.85
EW1-16-R2	28	12	3.30	2.29	0.92
EW1-17-A3	13	3	0.78	1.09	0.99
EW1-17-L2	23	12	3.51	2.11	0.85
EW1-17-R1	29	15	4.16	2.38	0.88
EW1-18-A1	53	23	5.54	2.79	0.89
EW1-18-L1	29	15	4.16	2.46	0.91
EW1-18-R1	52	13	3.04	1.51	0.59
EW1-19-A1	146	16	3.01	1.63	0.59
EW1-19-L1	76	9	1.85	1.42	0.65
EW1-19-R3	52	16	3.80	2.36	0.85
EW1-20-A1	560	9	1.26	0.98	0.45
EW1-20-L1	267	15	2.51	1.90	0.70
EW1-20-R1	170	16	2.92	1.89	0.68
EW1-21-A1	407	18	2.83	1.52	0.53
EW1-21-L2	162	15	2.75	1.72	0.63
EW1-21-R1	429	14	2.14	0.76	0.29
EW1-22-A1	334	10	1.55	0.67	0.29
EW1-22-L1	383	12	1.85	1.13	0.45
EW1-22-R1	129	14	2.68	1.46	0.55
EW1-23-A1	317	9	1.39	0.65	0.30
EW1-23-L1	471	12	1.79	0.76	0.31
EW1-23-R1	190	27	4.96	2.07	0.63
EW1-24-A1	208	14	2.44	2.02	0.77
EW1-24-L1	509	10	1.44	1.09	0.47
EW1-24-R1	375	12	1.86	1.96	0.79
EW1-25-A1	81	19	4.10	2.74	0.93
EW1-25-R3	22	11	3.24	2.22	0.93
EW1-26-A2	23	12	3.51	2.22	0.89
EW1-26-L1	20	5	1.34	0.78	0.48
Average	113	13	2.88	1.81	0.75

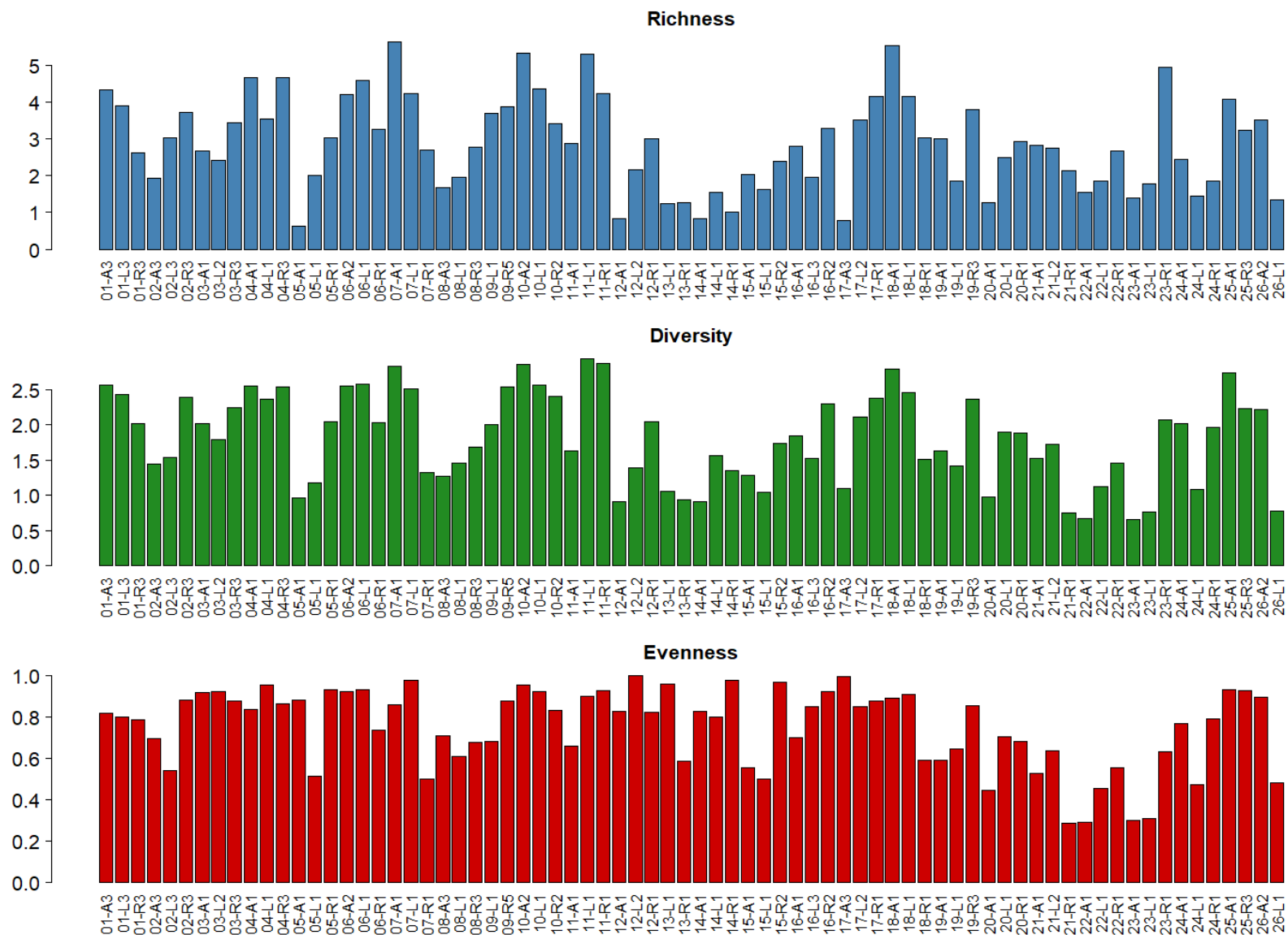


Figure 3-12. Ecological index values calculated for each sample station in the sampling area.

4 CMECS CLASSIFICATIONS

4.1 Video Transects

4.1.1 Substrate Component

For underwater video transects, each still image taken along the transect during the percent cover analysis was assigned a CMECS substrate classification following NMFS modifications (NMFS, 2021). In addition to substrate classes, the density of shell and flora/fauna cover were calculated for each still image and summarized at the transect level. Representative images of different CMECS classifications are presented in Table 4-3. Maps displaying the location and CMECS classification of each still image analyzed from the video transects are provided in Appendix D.

Across the 26 video transects, a total of 2,222 still images were assigned a CMECS classification, covering an area of 277 m². The number of still images classified as geologic origin, unconsolidated, fine substrate of sand/mud size (1,780) was far greater than any other CMECS group, composing 203 m² of the analyzed area (Table 4-1, Table 4-2, Figure 4-1). Of the 26 transects, 12 were composed only of stills classified as sand/mud, indicating substrate homogeneity within those transect lines. The transects located farther offshore contained more sand/mud stills than those closer to shore, except for EW1-14 which had the highest area classified as sand/mud (24.64 m² or 12% of the total sand/mud) and was moderately close to shore. Transect EW1-24 was the only transect with no stills classified as sand/mud. The sand/mud CMECS group is not considered complex under the NMFS guidelines (NMFS, 2021); therefore 73% of the area analyzed along the EW1 ECR is not classified as complex.

Complex habitat includes those with $\geq 5\%$ of gravel-sized particles (> 2 mm), those dominated by biogenic origin shell substrates, or those with a substantial amount of biological activity or presence. Substrates classified as gravel occurred in 45 stills within 2 transects with $\geq 80\%$ sediment particles of cobble (EW1-13) or pebble/granule (EW1-24) size and composed 16 m² of the project area (Table 4-1, Table 4-2, Figure 4-1). Gravel mixes of pebble/granule and sand/mud ($< 80\%$ and $\geq 30\%$ gravel) were classified in 57 still images for a total of 21 m² from 8 transects, with EW1-24 containing the most by area (18 m²). Gravelly sand/mud ($< 30\%$ and $\geq 5\%$ gravel) was classified in 160 images across 13 transects, with a dominant gravel type of pebble/granule. Transects EW1-3 and EW1-12 both contained 0.05 m² cover from boulder and cobble, respectively.

Biogenic origin substrates present in the project area include shell hash, with pieces of shell between 2 and 64 mm size, shell rubble, with pieces or whole shells larger than 64 mm, and organic woody debris. Shell hash was classified as the main CMECS substrate group in 177 images across 8 transects and composed 13 m² of the area. Shell rubble was classified as the main CMECS substrate group in only 3 images (1 each

form EW1-09, EW1-10, and EW1-11) and composed 0.2 m² of the area. These areas where shells dominate were found only in transects located closer to shore and are considered complex habitat.

In addition to the main CMECS substrate component, which is the substrate comprising the majority of the surface area in each still, secondary or co-occurring substrate classifications were assigned for other substrate origin types present in each image (e.g., geologic, biogenic, or anthropogenic). Biogenic shell substrate was the most frequent co-occurring substrate type, classified as a secondary CMECS group in 1,095 (49%) of still images at various levels of cover density (Table 4-1, Table 4-2, Figure 4-2). Organic woody debris did not comprise the majority of percent cover for any stills, but it was classified as a co-occurring substrate type in 16 still images, for a total area of 0.7 m² of the analyzed area composed of oak and maple leaves or peat debris. The only other co-occurring substrate type was anthropogenic origin classified in five images, which included a chunk of brick (EW1-13) and a derelict lobster pot (EW1-25) among plastic trash bits.

The area of the biological elements recorded in the percent cover analysis was summarized to approximate the density of flora/fauna cover for each still image along the transect. Higher densities of flora/fauna suggest the presence of potentially greater complex habitat due to greater biological activity (e.g., burrows, megafauna) or the occurrence of additional structure in the environment (e.g., infaunal structures, encrusting organisms, algae). Nearly all of the still images analyzed across all 26 transects contained zero to sparse (< 30%) flora/fauna cover (Figure 4-3). Three transects (EW1-02, EW1-04, EW1-05) each contained one still image with moderate flora/fauna cover (> 30% and < 70 %).

Representative images of CMECS substrate types are in Table 4-3.

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Table 4-1. The number of stills and total area (m²) classified to each combination of main CMECS substrate component and secondary/co-occurring substrate groups for each of the 26 video transects in the sampling area. Abbreviations are as follows: S/M = Sand/Mud, B = Boulder, C = Cobble, and P/G = Pebble/Granule. All substrate component groups except sand/mud/shell mix and sand/mud are considered 'complex' habitat by NMFS (2020).

Main and Co-Occurring CMECS Substrate Group Combinations	Number of Stills per Group	Percent of Stills per Group (%)	Area of Stills Classified to Group (m ²)	Percent of Area Classified to Group (%)
Biogenic Shell Hash with Moderate Gravel Mixes	96	4.32	7.88	2.85
Biogenic Shell Hash with Moderate Gravel Mixes and Trash Bits	1	0.05	0.05	0.02
Biogenic Shell Hash with Moderate Sand/Mud	38	1.71	2.63	0.95
Biogenic Shell Hash with Moderate Sand/Mud and Trash Rubble	1	0.05	0.06	0.02
Biogenic Shell Hash with Sparse Gravel	12	0.54	0.89	0.32
Biogenic Shell Hash with Sparse Gravel Mixes	15	0.68	1.03	0.37
Biogenic Shell Hash with Sparse Sand/Mud	14	0.63	0.80	0.29
Biogenic Shell Rubble	1	0.05	0.04	0.01
Biogenic Shell Rubble with Moderate Sand/Mud	1	0.05	0.10	0.04
Biogenic Shell Rubble with Sparse Sand/Mud	1	0.05	0.03	0.01
Gravel - Cobble with Moderate Shell Hash	1	0.05	0.05	0.02
Gravel - Pebble/Granule	25	1.13	9.52	3.44
Gravel - Pebble/Granule with Sparse Shell Hash	15	0.68	4.92	1.78
Gravel - Pebble/Granule with Trace Shell Hash	4	0.18	1.37	0.50
Gravel Mixes - Pebble/Granule with S/M	23	1.04	10.56	3.82
Gravel Mixes - Pebble/Granule with S/M and Moderate Shell Hash	14	0.63	1.35	0.49
Gravel Mixes - Pebble/Granule with S/M and Sparse Shell Hash	14	0.63	5.47	1.98
Gravel Mixes - Pebble/Granule with S/M and Trace Shell Hash	6	0.27	3.50	1.27
Gravelly Sand/Mud with B	1	0.05	0.05	0.02
Gravelly Sand/Mud with C and Sparse Shell Hash	1	0.05	0.05	0.02
Gravelly Sand/Mud with P/G	10	0.45	3.01	1.09
Gravelly Sand/Mud with P/G and Moderate Shell Hash	89	4.01	7.81	2.82
Gravelly Sand/Mud with P/G and Moderate Shell Hash and Peat Debris	1	0.05	0.06	0.02
Gravelly Sand/Mud with P/G and Sparse Shell and Construction Hash	1	0.05	0.05	0.02
Gravelly Sand/Mud with P/G and Sparse Shell Hash	52	2.34	10.39	3.75
Gravelly Sand/Mud with P/G and Sparse Woody Debris	1	0.05	0.11	0.04
Gravelly Sand/Mud with P/G and Trace Shell Hash	4	0.18	1.60	0.58
Sand/Mud	903	40.64	101.69	36.74
Sand/Mud with Moderate Shell Hash	66	2.97	5.58	2.02
Sand/Mud with Moderate Shell Rubble	1	0.05	0.03	0.01
Sand/Mud with Moderate Metal Rubble and Shell Hash	1	0.05	0.43	0.16
Sand/Mud with Sparse Shell Hash	559	25.16	64.75	23.39
Sand/Mud with Sparse Shell Rubble	4	0.18	0.35	0.13
Sand/Mud with Sparse Shell Hash and Woody Debris	4	0.18	0.28	0.10
Sand/Mud with Sparse Woody Debris	6	0.27	0.34	0.12
Sand/Mud with Sparse Woody Debris and Shell Hash	2	0.09	0.11	0.04
Sand/Mud with Sparse Woody Debris and Trash Bits	1	0.05	0.04	0.01
Sand/Mud with Trace Shell Hash	231	10.40	29.71	10.73
Sand/Mud with Trace Woody Debris	2	0.09	0.08	0.03
Totals	2,222	100	276.79	100

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Table 4-2. Area (m²) classified to main CMECS substrate component groups for each of the 26 video transects in the sampling area. Abbreviations are as follows: S/M = Sand/Mud, B = Boulder, C = Cobble, and P/G = Pebble/Granule. All substrate component groups except sand/mud/shell mix and sand/mud are considered 'complex' habitat by NMFS (2020).

Transect	Biogenic Shell Rubble	Biogenic Shell Hash	Gravel		Gravel Mixes with P/G	Gravelly Sand/Mud			Sand/ Mud
			C	P/G		with B	with C	with P/G	
EW1-01									1.75
EW1-02									2.72
EW1-03						0.05			3.53
EW1-04		4.75			0.12			0.72	0.50
EW1-05		0.11						0.75	5.56
EW1-06		2.08			0.63			2.18	4.14
EW1-07								0.25	4.71
EW1-08									2.64
EW1-09	0.03	0.83			0.09			1.32	0.82
EW1-10	0.04	1.63			0.10			1.34	5.97
EW1-11	0.10	1.97						1.09	2.50
EW1-12		0.04					0.05	0.30	5.13
EW1-13		1.94	0.05		0.44			3.41	1.89
EW1-14									24.64
EW1-15									9.84
EW1-16									8.67
EW1-17								0.19	7.71
EW1-18									12.63
EW1-19									12.55
EW1-20									10.53
EW1-21									11.69
EW1-22									13.47
EW1-23									17.35
EW1-24				15.81	18.35				
EW1-25					0.82			10.95	15.30
EW1-26					0.35			0.52	17.15
Total Area per Main CMECS (m²)	0.17	13.35	0.05	15.81	20.89	0.05	0.05	23.03	203.40

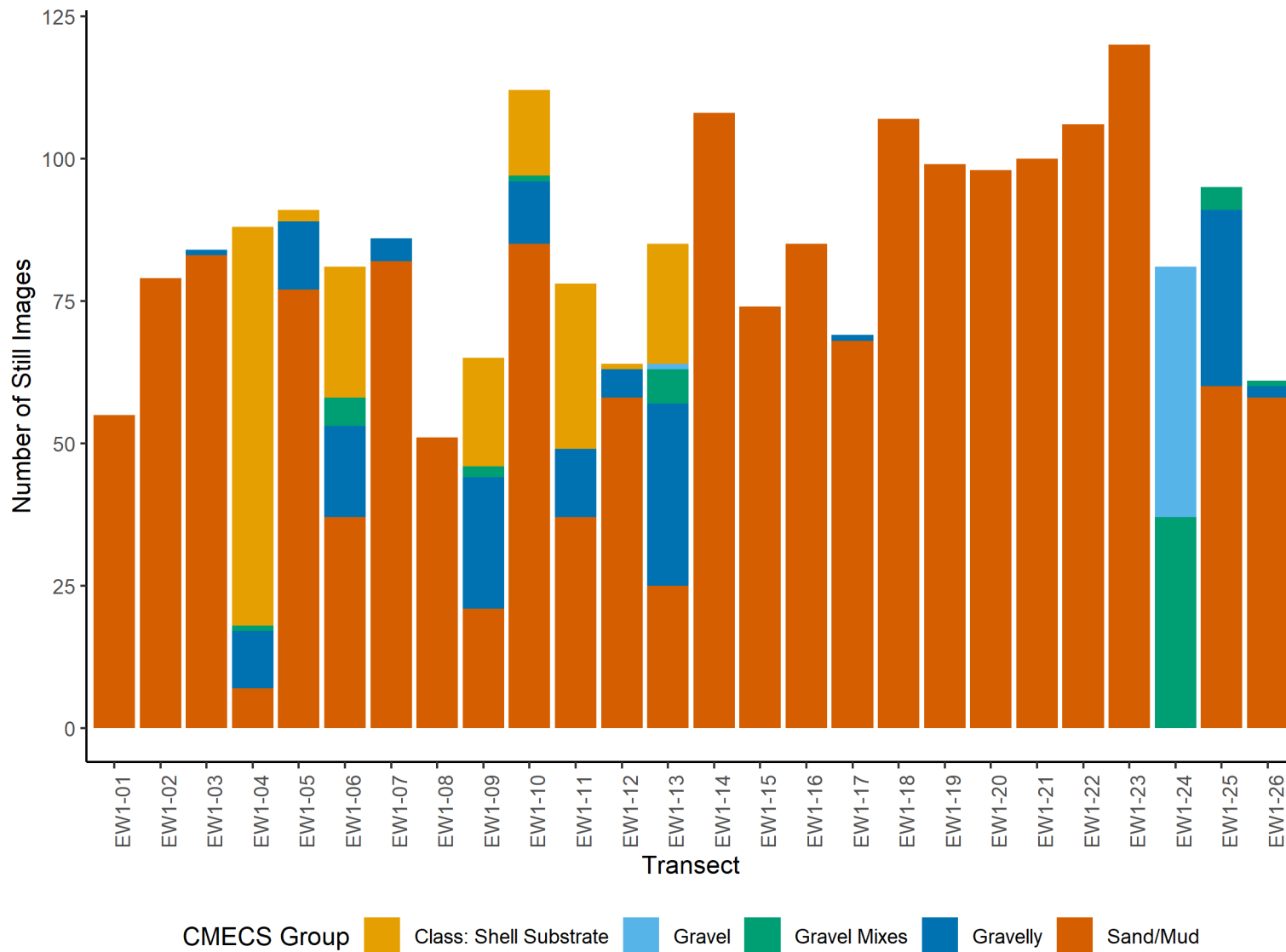


Figure 4-1. The number of still images classified to CMECS substrate component groups/classes within each video transect.

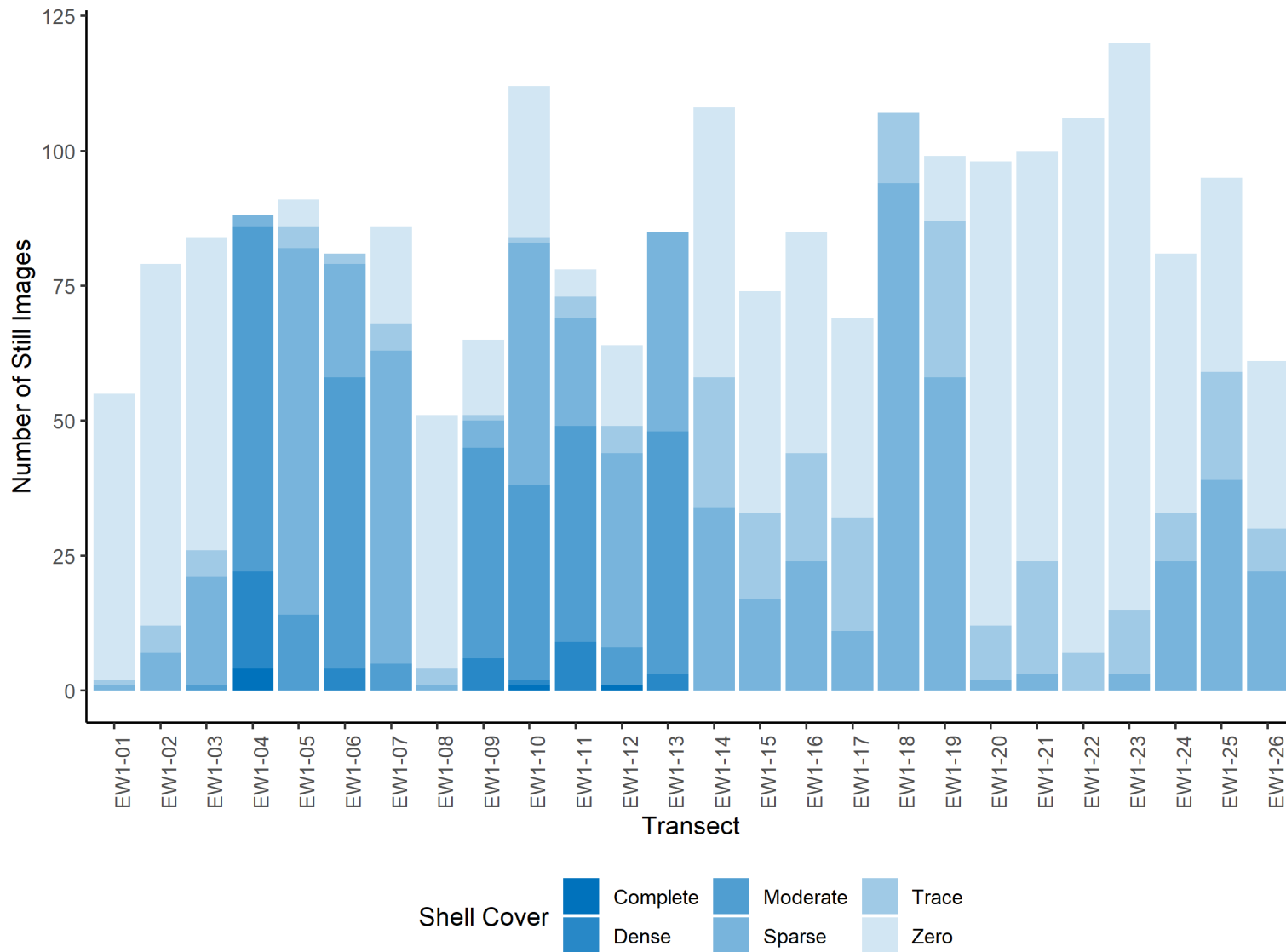


Figure 4-2. The number of still images classified to each biogenic cover density category within each video transect. Trace is < 2%, Sparse is 2 to < 30%, Moderate is 30 to < 70%, Dense is 70 to < 90%, and Complete is 90 to 100% cover.

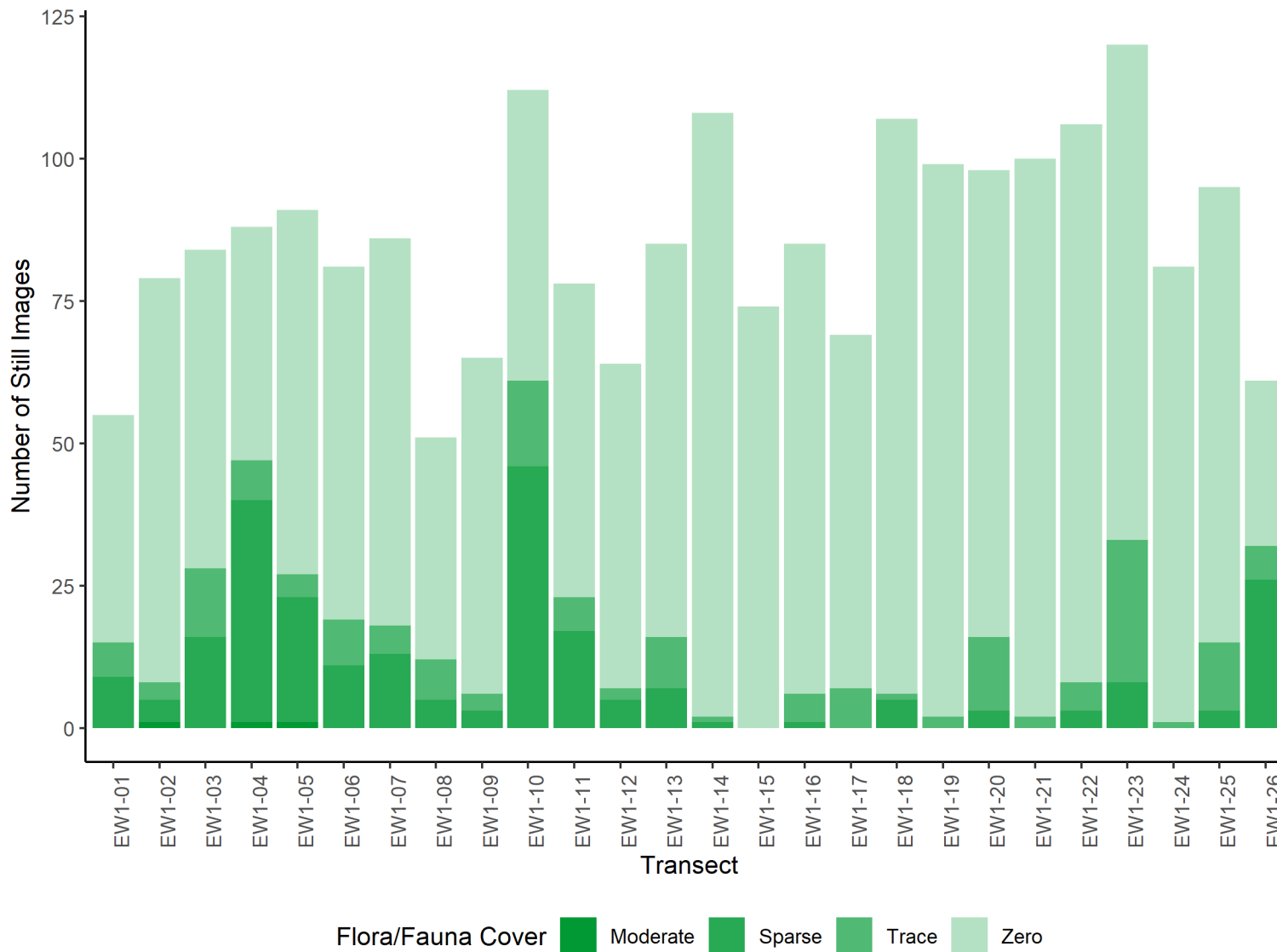
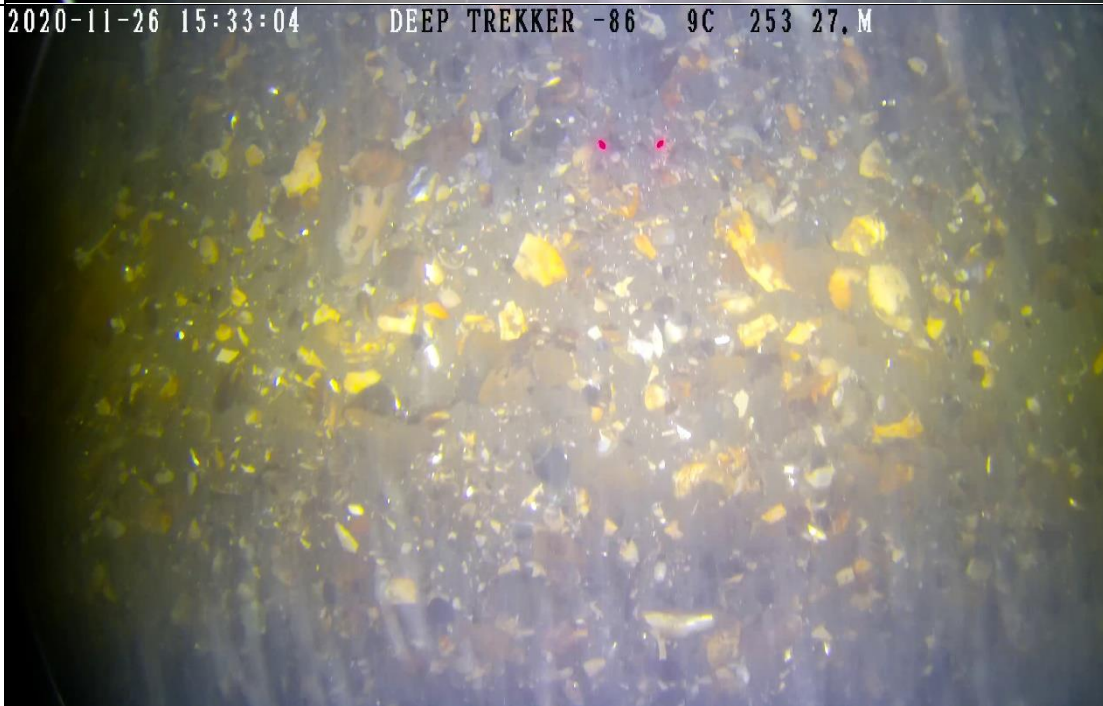


Figure 4-3. The number of still images classified to each flora/fauna density category within each video transect. Trace is < 2%, Sparse is 2 to < 30%, Moderate is 30 to < 70%, Dense is 70 to < 90%, and Complete is 90 to 100% cover.

Table 4-3. Representative still images of various habitat types observed in the sampling area. Still number in parenthesis. Abbreviations are as follows: S/M = Sand/Mud, B = Boulder, C = Cobble, and P/G = Pebble/Granule.

Geologic Unconsolidat ed Fine Sand/Mud EW1-22 (still 22)	2020-11-29 12:24:08 DEEP TREKKER -65 11C 183 28.M 
Biogenic Shell Hash Moderate Gravel EW1-06 (still 40)	2020-11-26 15:33:04 DEEP TREKKER -86 9C 253 27.M 

Geologic Unconsolidat ed Coarse Gravelly Sand/Mud with P/G Sparse Shell Hash EW1-25 (still 02)	2020-11-28 11:33:18 DEEP TREKKER 74 10C 326 25.M 
Geologic Unconsolidat ed Fine Sand/Mud Sparse Woody Debris EW1-07 (still 136)	2020-12-08 08:52:03 DEEP TREKKER -80 7C 350 6.3M 



4.1.2 Biotic Component

The CMECS biotic component classifications all fell under the faunal bed class which was split between 12 transects with subclass soft sediment fauna and 14 transects with subclass attached fauna (Table 4-4). Many of the nearshore (i.e., lower ID number) transects contained diverse colonizers/filamentous algae as the main or co-occurring biotic group. This group was a combination of algae and bushy plant-like organisms (e.g., hydrozoa and bryozoa) that were often indistinguishable in the video when small. The offshore transects contained a variety of dominant groups including sand dollar beds, burrowing anemone beds, mobile mollusks, mobile crustaceans, and diverse epifauna. Three transects did not contain communities with great enough densities to classify a biotic group so the subclass soft sediment fauna was the lowest level of classification assigned (EW1-14, EW1-15, and EW1-19).

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Table 4-4. CMECS hierarchical biotic classifications based on percent cover analysis of still images and enumeration of flora/fauna summarized at the transect level.

Transect	Biotic Setting	Biotic Class	Biotic Subclass	Co-occurring Biotic Subclass	Biotic Group	Co-occurring Biotic Group
EW1-01	Benthic biota	Faunal bed	Attached fauna	Soft sediment fauna	Diverse Colonizers/Filamentous Algae	
EW1-02	Benthic biota	Faunal bed	Attached fauna	Soft sediment fauna	Diverse Colonizers/Filamentous Algae	Mobile Crustaceans
EW1-03	Benthic biota	Faunal bed	Attached fauna	Soft sediment fauna	Diverse Colonizers/Filamentous Algae	Mobile Crustaceans
EW1-04	Benthic biota	Faunal bed	Attached fauna	Soft sediment fauna	Diverse Colonizers/Filamentous Algae	Sessile Gastropods
EW1-05	Benthic biota	Faunal bed	Attached fauna	Soft sediment fauna	Sessile Gastropods	Mobile Crustaceans
EW1-06	Benthic biota	Faunal bed	Attached fauna	Soft sediment fauna	Sessile Gastropods	Diverse Colonizers/Filamentous Algae
EW1-07	Benthic biota	Faunal bed	Attached fauna	Soft sediment fauna	Mobile Mollusks	
EW1-08	Benthic biota	Faunal bed	Attached fauna	Soft sediment fauna	Small Surface-Burrowing Fauna	Diverse Colonizers/Filamentous Algae
EW1-09	Benthic biota	Faunal bed	Attached fauna	Soft sediment fauna	Diverse Colonizers/Filamentous Algae	
EW1-10	Benthic biota	Faunal bed	Attached fauna	Soft sediment fauna	Diverse Colonizers/Filamentous Algae	Mobile Crustaceans
EW1-11	Benthic biota	Faunal bed	Attached fauna	Soft sediment fauna	Diverse Colonizers/Filamentous Algae	Mobile Crustaceans
EW1-12	Benthic biota	Faunal bed	Attached fauna	Soft sediment fauna	Diverse Colonizers/Filamentous Algae	
EW1-13	Benthic biota	Faunal bed	Attached fauna	Soft sediment fauna	Leafy/Leathery Algae	Diverse Colonizers/Filamentous Algae
EW1-14	Benthic biota	Faunal bed	Soft sediment fauna			
EW1-15	Benthic biota	Faunal bed	Soft sediment fauna			
EW1-16	Benthic biota	Faunal bed	Soft sediment fauna		Mobile Crustaceans	
EW1-17	Benthic biota	Faunal bed	Soft sediment fauna		Sand Dollar Bed	Burrowing Anemones
EW1-18	Benthic biota	Faunal bed	Soft sediment fauna		Sand Dollar Bed	Diverse Epifauna
EW1-19	Benthic biota	Faunal bed	Soft sediment fauna			
EW1-20	Benthic biota	Faunal bed	Soft sediment fauna		Burrowing Anemones	
EW1-21	Benthic biota	Faunal bed	Soft sediment fauna		Mobile Mollusks	
EW1-22	Benthic biota	Faunal bed	Soft sediment fauna		Diverse Epifauna	
EW1-23	Benthic biota	Faunal bed	Soft sediment fauna		Burrowing Anemone Bed	
EW1-24	Benthic biota	Faunal bed	Attached fauna		Mobile Mollusks	
EW1-25	Benthic biota	Faunal bed	Soft sediment fauna	Attached fauna	Sand Dollar Bed	Diverse Colonizers/Filamentous Algae
EW1-26	Benthic biota	Faunal bed	Soft sediment fauna		Sand Dollar Bed	Burrowing Anemones

4.2 Grab Sample Stations

We assigned NMFS (2020) modified CMECS classifications to each benthic grab sample station based on visual inspection of the sample once on board the survey vessel, laboratory analysis of grain size, and still image point count analysis for grabs with insufficient sediment recovery and those with substantial amounts of shell cover based on the imagery collected prior to grab deployment. Substrate classification results are presented in geographic context in Figure 4-4 and as a hierarchy in Table 4-5. Biotic component classification results are presented in Table 4-6.

4.2.1 Substrate Component

Sediment grab samples were dominated by fine unconsolidated substrate of geologic origin, with 58% of samples classified as sand or finer (Figure 4-4 and Table 4-5). The most abundant classification was gravelly sand for 18 of the 74 total samples, and the average d50 was 0.2709 mm. There were no failed grab stations that required image analysis and all CMECS classifications were made based on the GeoTesting lab data.

There were 31 samples which contained $\geq 5\%$ gravel that designates them as complex habitat according to the NMFS (2021) modified CMECS classifications, and no cobbles or boulders were present in any samples. These samples equate to 42% of the grab samples, with only 5 samples containing $\geq 30\%$ gravel (EW1-11-L1, EW1-24-A1, EW1-24-L1, EW1-24-R1, and EW1-25-R3). One of these samples (EW1-11-L1) was reclassified as biogenic shell hash, as over 50% of the substrate was determined to be shell hash of biogenic origin upon further review of the sample and seabed imagery. There were 25 samples which were classified as mud or muddy unconsolidated fine substrate, and 8 coarse samples were gravelly mud or gravelly muddy sand.

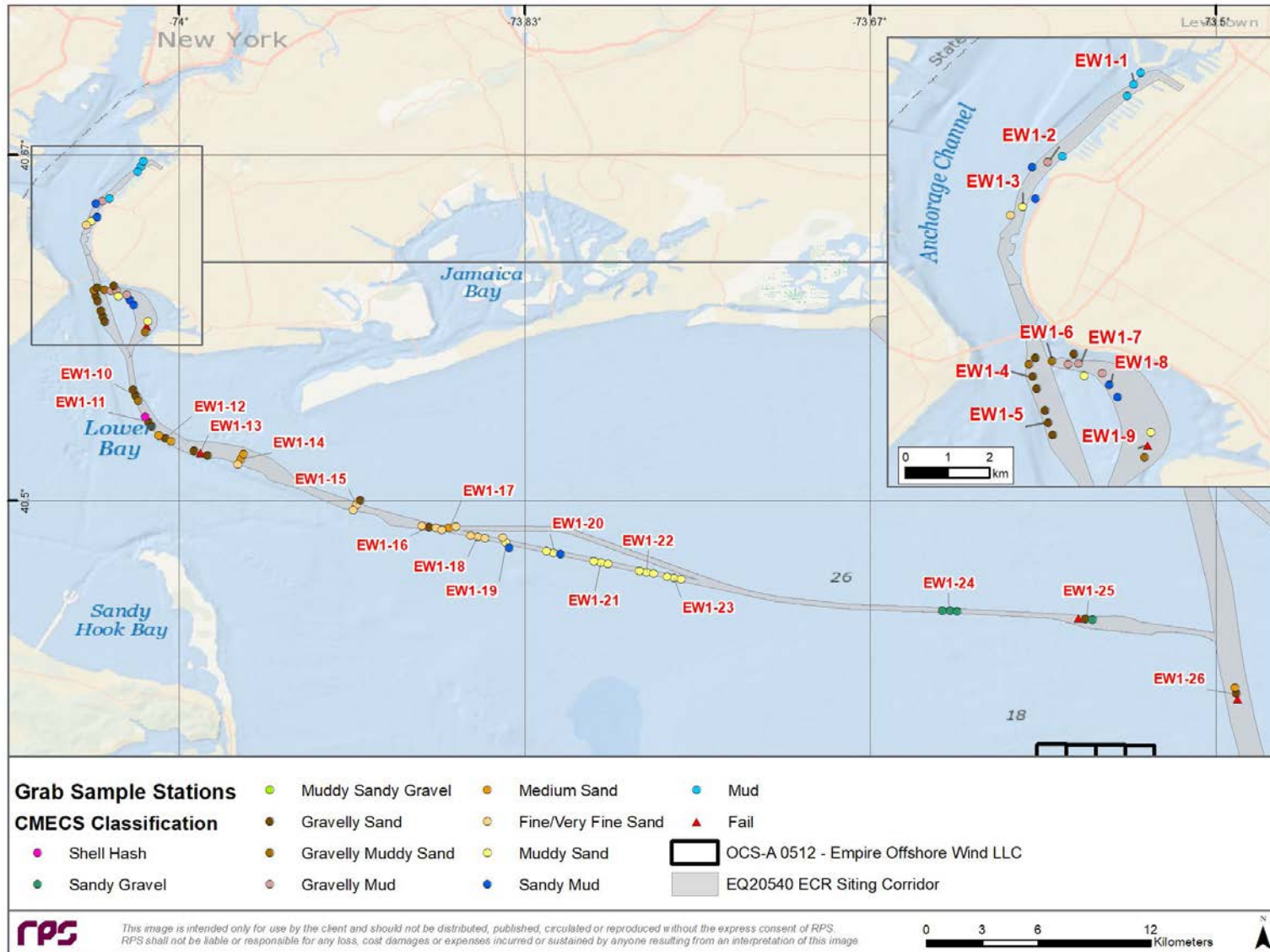
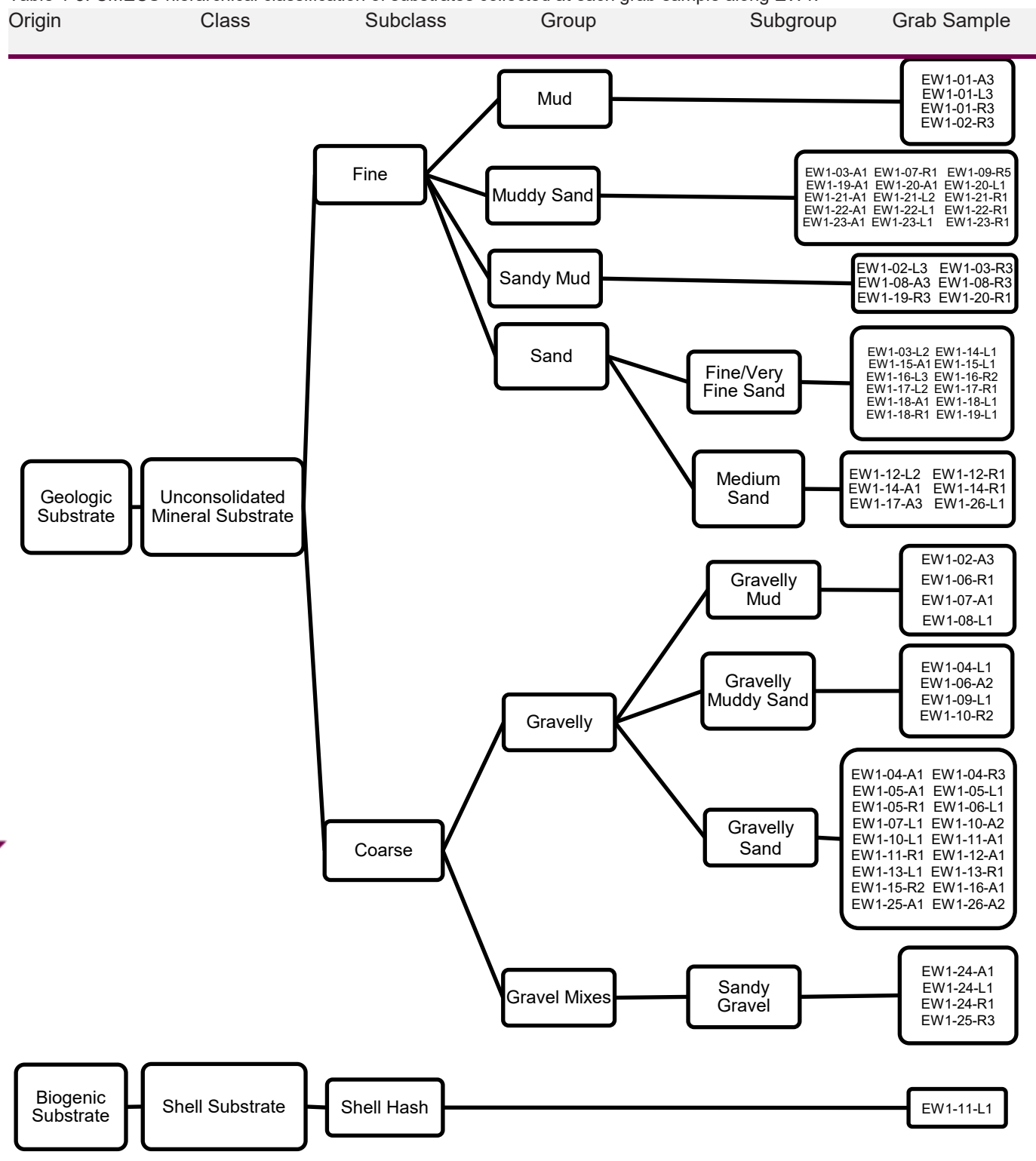


Figure 4-4. CMECS classification designated for each benthic grab sample collected in the WEA. Point colors indicate different CMECS classifications.

Table 4-5. CMECS hierarchical classification of substrates collected at each grab sample along EW1.



4.2.2 Biotic Component

The CMECS biotic component classification for each successful grab sample collected in the survey area is presented in the table below (Table 4-6). The subclass was soft sediment fauna for all but 2 of the 74 successful benthic grab stations. The subclass for grab stations EW1-05-L1 and EW1-06-R1 was attached fauna due to the dominant abundance of attached tube-building fauna (attached *Sabellaria* structures) and sessile gastropods (*Crepidula* spp.) in the samples, respectively. The biotic group or co-occurring group of most samples (74%) was small surface-burrowing fauna, which included a diverse number of annelid worm, amphipod, and isopod taxa. Clam beds with high abundances of nut clams (Nuculidae) were also common, occurring at 16 stations, many of which were located in offshore waters (EW1-20-23).

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Table 4-6. CMECS classification of the biotic component of the seabed and the dominant taxa as derived from the lab analysis at each benthic grab sample.

Sample Site	Biotic Setting	Biotic Class	Biotic Subclass	Co-Occurring Biotic Subclass	Biotic Group	Co-Occurring Biotic Group	Biotic Community
EW1-05-L1	Benthic Biota	Faunal Bed	Attached Fauna	Soft Sediment Fauna	Attached Tube-Building Fauna	Diverse Soft Sediment Epifauna	Attached Sabellaria
EW1-06-R1	Benthic Biota	Faunal Bed	Attached Fauna	Soft Sediment Fauna	Sessile Gastropods	Small Surface-Burrowing Fauna	
EW1-08-L1	Benthic Biota	Faunal Bed	Soft Sediment Fauna		Clam Bed	Larger Tube-Building Fauna	Nucula Bed
EW1-02-L3	Benthic Biota	Faunal Bed	Soft Sediment Fauna		Clam Bed	Mobile Mollusks on Soft Sediments	Nucula Bed
EW1-07-R1	Benthic Biota	Faunal Bed	Soft Sediment Fauna		Clam Bed	Small Surface-Burrowing Fauna	Nucula Bed
EW1-08-R3	Benthic Biota	Faunal Bed	Soft Sediment Fauna		Clam Bed	Small Surface-Burrowing Fauna	Nucula Bed
EW1-20-A1	Benthic Biota	Faunal Bed	Soft Sediment Fauna		Clam Bed	Small Surface-Burrowing Fauna	Nucula Bed
EW1-20-R1	Benthic Biota	Faunal Bed	Soft Sediment Fauna		Clam Bed	Small Surface-Burrowing Fauna	Nucula Bed
EW1-21-A1	Benthic Biota	Faunal Bed	Soft Sediment Fauna		Clam Bed	Small Surface-Burrowing Fauna	Nucula Bed
EW1-21-L2	Benthic Biota	Faunal Bed	Soft Sediment Fauna		Clam Bed	Small Surface-Burrowing Fauna	Nucula Bed
EW1-21-R1	Benthic Biota	Faunal Bed	Soft Sediment Fauna		Clam Bed	Small Surface-Burrowing Fauna	Nucula Bed
EW1-22-L1	Benthic Biota	Faunal Bed	Soft Sediment Fauna		Clam Bed	Small Surface-Burrowing Fauna	Nucula Bed
EW1-22-R1	Benthic Biota	Faunal Bed	Soft Sediment Fauna		Clam Bed	Small Surface-Burrowing Fauna	Nucula Bed
EW1-23-L1	Benthic Biota	Faunal Bed	Soft Sediment Fauna		Clam Bed	Small Surface-Burrowing Fauna	Nucula Bed
EW1-23-R1	Benthic Biota	Faunal Bed	Soft Sediment Fauna		Clam Bed	Small Surface-Burrowing Fauna	
EW1-02-A3	Benthic Biota	Faunal Bed	Soft Sediment Fauna		Clam Bed		Nucula Bed
EW1-08-A3	Benthic Biota	Faunal Bed	Soft Sediment Fauna		Clam Bed		Nucula Bed
EW1-22-A1	Benthic Biota	Faunal Bed	Soft Sediment Fauna		Clam Bed		Nucula Bed
EW1-23-A1	Benthic Biota	Faunal Bed	Soft Sediment Fauna		Clam Bed		Nucula Bed
EW1-19-A1	Benthic Biota	Faunal Bed	Soft Sediment Fauna		Larger Tube-Building Fauna	Diverse Soft Sediment Epifauna	Robust Ampelisca Bed
EW1-19-L1	Benthic Biota	Faunal Bed	Soft Sediment Fauna		Larger Tube-Building Fauna	Diverse Soft Sediment Epifauna	Robust Ampelisca Bed
EW1-09-L1	Benthic Biota	Faunal Bed	Soft Sediment Fauna		Larger Tube-Building Fauna	Small Surface-Burrowing Fauna	
EW1-01-L3	Benthic Biota	Faunal Bed	Soft Sediment Fauna		Mobile Mollusks on Soft Sediments	Small Surface-Burrowing Fauna	
EW1-01-R3	Benthic Biota	Faunal Bed	Soft Sediment Fauna		Mobile Mollusks on Soft Sediments	Small Surface-Burrowing Fauna	
EW1-04-R3	Benthic Biota	Faunal Bed	Soft Sediment Fauna	Attached Fauna	Small Surface-Burrowing Fauna	Attached Tube-Building Fauna	
EW1-12-R1	Benthic Biota	Faunal Bed	Soft Sediment Fauna		Small Surface-Burrowing Fauna	Clam Bed	
EW1-20-L1	Benthic Biota	Faunal Bed	Soft Sediment Fauna		Small Surface-Burrowing Fauna	Clam Bed	
EW1-01-A3	Benthic Biota	Faunal Bed	Soft Sediment Fauna		Small Surface-Burrowing Fauna	Diverse Soft Sediment Epifauna	
EW1-04-A1	Benthic Biota	Faunal Bed	Soft Sediment Fauna	Attached Fauna	Small Surface-Burrowing Fauna	Diverse Soft Sediment Epifauna	
EW1-11-R1	Benthic Biota	Faunal Bed	Soft Sediment Fauna	Attached Fauna	Small Surface-Burrowing Fauna	Diverse Soft Sediment Epifauna	

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Sample Site	Biotic Setting	Biotic Class	Biotic Subclass	Co-Occurring Biotic Subclass	Biotic Group	Co-Occurring Biotic Group	Biotic Community
EW1-19-R3	Benthic Biota	Faunal Bed	Soft Sediment Fauna		Small Surface-Burrowing Fauna	Diverse Soft Sediment Epifauna	
EW1-07-A1	Benthic Biota	Faunal Bed	Soft Sediment Fauna		Small Surface-Burrowing Fauna	Mobile Crustaceans on Soft Sediments	
EW1-11-L1	Benthic Biota	Faunal Bed	Soft Sediment Fauna		Small Surface-Burrowing Fauna	Mussel Bed	
EW1-09-R5	Benthic Biota	Faunal Bed	Soft Sediment Fauna		Small Surface-Burrowing Fauna	Small Tube-Building Fauna	
EW1-10-R2	Benthic Biota	Faunal Bed	Soft Sediment Fauna		Small Surface-Burrowing Fauna	Small Tube-Building Fauna	
EW1-24-R1	Benthic Biota	Faunal Bed	Soft Sediment Fauna		Small Surface-Burrowing Fauna	Small Tube-Building Fauna	
EW1-25-A1	Benthic Biota	Faunal Bed	Soft Sediment Fauna		Small Surface-Burrowing Fauna	Small Tube-Building Fauna	
EW1-02-R3	Benthic Biota	Faunal Bed	Soft Sediment Fauna		Small Surface-Burrowing Fauna		
EW1-03-A1	Benthic Biota	Faunal Bed	Soft Sediment Fauna		Small Surface-Burrowing Fauna		
EW1-03-L2	Benthic Biota	Faunal Bed	Soft Sediment Fauna		Small Surface-Burrowing Fauna		
EW1-03-R3	Benthic Biota	Faunal Bed	Soft Sediment Fauna		Small Surface-Burrowing Fauna		
EW1-04-L1	Benthic Biota	Faunal Bed	Soft Sediment Fauna		Small Surface-Burrowing Fauna		
EW1-05-A1	Benthic Biota	Faunal Bed	Soft Sediment Fauna		Small Surface-Burrowing Fauna		
EW1-06-A2	Benthic Biota	Faunal Bed	Soft Sediment Fauna		Small Surface-Burrowing Fauna		
EW1-06-L1	Benthic Biota	Faunal Bed	Soft Sediment Fauna		Small Surface-Burrowing Fauna		
EW1-07-L1	Benthic Biota	Faunal Bed	Soft Sediment Fauna		Small Surface-Burrowing Fauna		
EW1-10-A2	Benthic Biota	Faunal Bed	Soft Sediment Fauna		Small Surface-Burrowing Fauna		
EW1-10-L1	Benthic Biota	Faunal Bed	Soft Sediment Fauna		Small Surface-Burrowing Fauna		
EW1-11-A1	Benthic Biota	Faunal Bed	Soft Sediment Fauna		Small Surface-Burrowing Fauna		
EW1-13-R1	Benthic Biota	Faunal Bed	Soft Sediment Fauna		Small Surface-Burrowing Fauna		
EW1-14-L1	Benthic Biota	Faunal Bed	Soft Sediment Fauna		Small Surface-Burrowing Fauna		
EW1-14-R1	Benthic Biota	Faunal Bed	Soft Sediment Fauna		Small Surface-Burrowing Fauna		
EW1-15-A1	Benthic Biota	Faunal Bed	Soft Sediment Fauna		Small Surface-Burrowing Fauna		

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Sample Site	Biotic Setting	Biotic Class	Biotic Subclass	Co-Occurring Biotic Subclass	Biotic Group	Co-Occurring Biotic Group	Biotic Community
EW1-15-L1	Benthic Biota	Faunal Bed	Soft Sediment Fauna		Small Surface-Burrowing Fauna		
EW1-16-A1	Benthic Biota	Faunal Bed	Soft Sediment Fauna		Small Surface-Burrowing Fauna		
EW1-16-L3	Benthic Biota	Faunal Bed	Soft Sediment Fauna		Small Surface-Burrowing Fauna		
EW1-16-R2	Benthic Biota	Faunal Bed	Soft Sediment Fauna		Small Surface-Burrowing Fauna		
EW1-17-A3	Benthic Biota	Faunal Bed	Soft Sediment Fauna		Small Surface-Burrowing Fauna		
EW1-17-L2	Benthic Biota	Faunal Bed	Soft Sediment Fauna		Small Surface-Burrowing Fauna		
EW1-17-R1	Benthic Biota	Faunal Bed	Soft Sediment Fauna		Small Surface-Burrowing Fauna		
EW1-18-A1	Benthic Biota	Faunal Bed	Soft Sediment Fauna		Small Surface-Burrowing Fauna		
EW1-18-L1	Benthic Biota	Faunal Bed	Soft Sediment Fauna		Small Surface-Burrowing Fauna		
EW1-18-R1	Benthic Biota	Faunal Bed	Soft Sediment Fauna		Small Surface-Burrowing Fauna		
EW1-24-A1	Benthic Biota	Faunal Bed	Soft Sediment Fauna		Small Surface-Burrowing Fauna		
EW1-24-L1	Benthic Biota	Faunal Bed	Soft Sediment Fauna		Small Surface-Burrowing Fauna		
EW1-25-R3	Benthic Biota	Faunal Bed	Soft Sediment Fauna		Small Surface-Burrowing Fauna		
EW1-26-A2	Benthic Biota	Faunal Bed	Soft Sediment Fauna		Small Surface-Burrowing Fauna		
EW1-26-L1	Benthic Biota	Faunal Bed	Soft Sediment Fauna		Small Surface-Burrowing Fauna		
EW1-05-R1	Benthic Biota	Faunal Bed	Soft Sediment Fauna				
EW1-12-A1	Benthic Biota	Faunal Bed	Soft Sediment Fauna				
EW1-12-L2	Benthic Biota	Faunal Bed	Soft Sediment Fauna				
EW1-13-L1	Benthic Biota	Faunal Bed	Soft Sediment Fauna				
EW1-14-A1	Benthic Biota	Faunal Bed	Soft Sediment Fauna				
EW1-15-R2	Benthic Biota	Faunal Bed	Soft Sediment Fauna				

5 SUMMARY

RPS was contracted by Alpine to collect, process, analyze, and compile benthic data collected with a towed video sled and grab sampler in the export cable corridors associated with Equinor's Lease Area OCS-A 0512, offshore of New York/New Jersey. The survey area was defined as the previously uncharacterized portions of the Empire Wind 1 (EW1) export cable route (ECR) that connects the offshore lease area to the mainland at the South Brooklyn Marine Terminal, New York. In total, 26 transects were surveyed and 74 grab samples collected to classify seafloor habitats and document species abundance in the project area. The CMECS hierarchical system has classification thresholds based primarily on the percent and composition of gravel particles (> 2 mm) to identify substrates that may be considered "complex" by NMFS for the purposes of essential fish habitat mapping. CMECS classifications were generated using both visual analysis of stills taken from video transects and analysis of sediment grain size lab results.

Organism Abundances

The 18 hours of video from 26 transects were reviewed and a total of 2,763 features, including 2,683 organisms from 6 phyla were identified. Most organisms observed were invertebrates which totaled 2,473 or 92% but 381 vertebrates were also observed. The most numerous organisms were burrowing anemones, spider crabs, and *Cancer spp.* (rock or Jonah) crabs composing 40%, 23% and 9% of all organisms, respectively. However, burrowing anemones were only present in 7 transects and 90% were found in a single transect (EW1-23). In contrast, spider crabs were observed in 14 transects and rock/Jonah crabs in 17. Amongst vertebrates, the most numerous observations were 101 instances of skate egg cases followed by another 119 observation which were not identified beyond the class Teleostei. Varieties of hake were observed 57 times making them the most common taxa identified beyond Teleostei.

The 74 successful grab samples yielded a total of 8,381 individual organisms per all 0.04 m² samples. Organisms collected in this survey area were from 7 unique phyla comprising 101 families or NLPTL. The Phyla Mollusca, Annelida, and Arthropoda dominated both the abundance and unique taxa in samples, representing 94% of all organisms and 91% of the taxa identified respectively. The phylum Mollusca was most abundant comprising 47% of all organisms identified followed by Annelids with 32%. However, unique taxa were spread fairly evenly across annelids, arthropods, and mollusks which together contain 91% of unique families or NLPTL. By far the most abundant organisms were the nut clams (Nuculidae) with 3,097 identified in 30 of the 74 samples. Polychaete worms from the families Glyceridae and Spionidae occurred most frequently in samples and were identified in 44 and 42 of the 74 samples, respectively. On average, 113 organisms were identified, and 13 families were identified per sample. Average taxonomic richness was 2.88, average diversity was 1.81, and average evenness was 0.75.

CMECS Classifications

A total of 2,222 still images with a combined area of 277 m² were analyzed for CMECS substrate component classification using point count methods. Geologic origin, unconsolidated, fine sand/mud was by far the most common classification with 80% of stills and 73% of total area analyzed. Additionally, 12 of the 26 transects contained only sand/mud indicating a high degree of substrate homogeneity in these transects. The sand/mud CMECS group is not considered complex under the NMFS guidelines (NMFS, 2021), therefore 73% of the area analyzed is not complex. Complex substrate in the form of gravel, shell hash, and shell rubble was identified as the main CMECS classification in 73 m² or 26% of the analyzed area. Gravel was only classified as the main substrate component in two transects with most from EW1-24. Gravel mixes were classified in 57 images and 21 m² from 8 transects, with EW1-24 containing 86% by area. Gravelly sand/mud was classified in 160 images across 13 transects. Pebble/granule was the dominant gravel size throughout. Biogenic shell substrates (also considered complex) were identified as the main substrate component mostly in transects closer to shore in 8% of the stills.

The CMECS biotic component along the video transects was consistently classified as faunal beds across all transects. However, these faunal beds were split between two subclasses: soft sediment fauna and attached fauna. The 12 soft sediment fauna subclass transects were distinguished by the presence of sand dollars, anemones, and other small, often burrowing fauna and the 14 attached fauna subclass transects contained a diverse assemblage of algae's, seaweeds, bryozoans, and other surface colonizers.

Sediment analysis of grab samples showed a predominance of fine unconsolidated substrate of geologic origin, with 58% of the 74 total samples classified as sand or finer. Thirty-one of the 74 total grab samples, contained ≥ 5% gravel and would be designated as complex habitat according to the NMFS (2021) modified CMECS classifications (the rest being classified as varieties of sand, silt, and mud). However, no cobbles or boulders were present in any samples. Of these 31, only 4 samples contained ≥ 30% gravel (classified as gravel mixes – sandy gravel) and 1 (EW1-11-L1) was reclassified as biogenic shell hash due to high shell content. The remaining complex samples were comprised of gravelly sand (18), gravelly mud (4), or gravelly muddy sand (4).

CMECS classification of the biotic component of grab samples classified all but two of the samples as "soft-sediment fauna"; the exceptions due to high abundances of tube-dwelling organisms and sessile gastropods leading to an "attached fauna" classification (EW1-05-L1, and EW1-06-R1). In 74% of samples the co-occurring biotic group was classified as small-surface dwelling fauna, which included a diverse assemblage of annelid worms, amphipods, and isopods. Clam beds composed of Nuculidae nut clams were also common and occurred in 16 stations.

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APPENDIX A: BENTHIC GRAB FIELD NOTES

Table A - 1. Field notes and biologic information for each grab station.

Station	Grab Pass/Fail	Grab Failure Note	Sediment Characteristics	Field Description of Grab	Plant-like organisms	Anthropogenic or Terrestrial Debris/Fishing Activity
EW1-01-A1	Fail	Failed due to overpenetration of sample	Brown mud	Soft brown mud with foul scent	Not Present	Not Present
EW1-01-A2	Fail	Failed due to overpenetration of sample	Brown mud	Soft brown mud with foul scent	Not Present	Not Present
EW1-01-A3	Pass		Brown mud	Soft brown mud with foul scent	Not Present	Not Present
EW1-01-L1	Fail	Failed due to overpenetration of sample	Brown mud	Soft brown mud with foul scent	Not Present	Not Present
EW1-01-L2	Fail	Failed due to overpenetration of sample	Brown mud	Brown mud with dead fish covered in small snails on surface	Not Present	Not Present
EW1-01-L3	Pass		Brown mud	Soft brown mud with foul scent	Not Present	Not Present
EW1-01-R1	Fail	Failed due to overpenetration of sample	Brown mud	Soft brown mud with foul scent	Not Present	Not Present
EW1-01-R2	Fail	Failed due to overpenetration of sample	Brown mud	Soft brown mud with foul scent	Not Present	Not Present
EW1-01-R3	Pass		Brown mud	Soft brown mud with foul scent	Not Present	Not Present
EW1-02-A1	Fail	Failed due to overpenetration of sample	Brown mud	Brown mud with shell hash (small clams). Anoxic / waste scent from sample	Not Present	Not Present
EW1-02-A2	Fail	Failed due to overpenetration of sample	Brown mud	Brown mud	Not Present	Not Present
EW1-02-A3	Pass		Brown mud	Brown mud with shell hash (small clams)	Not Present	Not Present
EW1-02-L1	Fail	Failed due to overpenetration of sample	Brown mud	Brown mud with anoxic scent	Not Present	Not Present
EW1-02-L2	Fail	Failed due to overpenetration of sample	Brown mud	Brown mud	Not Present	Not Present
EW1-02-L3	Pass		Brown mud	Brown mud with shell hash, full clam shell on surface. 1/2 of sample bucket overpenetrated, infaunal side undisturbed	Not Present	Not Present
EW1-02-R1	Fail	Failed due to overpenetration of sample	Brown mud	Brown mud	Not Present	Not Present
EW1-02-R2	Fail	Failed due to overpenetration of sample	Brown mud	Brown mud	Not Present	Not Present
EW1-02-R3	Pass		Brown mud	Brown mud with terrestrial debris and trash	Not Present	Anthropogenic/ Terrestrial Debris

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Station	Grab Pass/Fail	Grab Failure Note	Sediment Characteristics	Field Description of Grab	Plant-like organisms	Anthropogenic or Terrestrial Debris/Fishing Activity
EW1-03-A1	Pass		Brown silty sand	Brown silty sand with dark gray clay underneath. Anoxic/sulfur scent	Not Present	Not Present
EW1-03-L1	Fail	Fail due to trash stuck in jaw preventing full closure	Brown silty mud	Brown silty mud with debris	Not Present	Anthropogenetic Debris
EW1-03-L2	Pass		Brown silty sand	Brown silty sand	Not Present	Not Present
EW1-03-R1	Fail	Failed due to overpenetration of sample	Brown silt	Brown silt with shell hash	Not Present	Not Present
EW1-03-R2	Fail	Failed due to overpenetration of sample	Brown silt	Brown silt with shell hash. Bottle/trash on surface	Not Present	Anthropogenetic Debris
EW1-03-R3	Pass		Brown silty mud	Brown silty mud with shell hash. 1/2 of sample bucket overpenetrated, infaunal side undisturbed	Not Present	Not Present
EW1-04-A1	Pass		Gray silt with shell rubble	Gray silt with dense shell rubble and hash. Living Crepidula and hermit crab on surface.	Not Present	Not Present
EW1-04-L1	Pass		Gray silt with shell rubble	Gray silt with dense shell rubble and hash	Not Present	Not Present
EW1-04-R1	Fail	Failed due to shallow sample	Gray silt with shell rubble	Gray silt with dense shell rubble and hash	Not Present	Not Present
EW1-04-R2	Fail	Failed due to shallow sample	Gray silt with shell rubble	Gray silt with dense shell rubble and hash	Not Present	Not Present
EW1-04-R3	Pass		Gray silt with shell rubble	Gray silt with dense shell rubble and hash	Not Present	Not Present
EW1-05-A1	Pass		Olive fine sand with shell rubble	Olive fine sand with shell hash and shell rubble	Not Present	Not Present
EW1-05-L1	Pass		Gray silt with shell rubble	Gray silt with shell hash and rubble (Crepidula, mussel, snail). Large spier crab in grab- returned to water	Not Present	Not Present
EW1-05-R1	Pass		Gray silt with shell rubble	Gray silt with shell hash and rubble	Not Present	Not Present
EW1-06-A1	Fail		Brown silty mud	Brown to gray silty mud with trace shell hash and worm tubes on the surface. Dark gray mud under lighter surface layer	Not Present	Not Present
EW1-06-A2	Pass		Brown muddy silt	Brown muddy silt with shell hash and rubble	Not Present	Not Present
EW1-06-L1	Pass		Brown fine silty sand	Brown fine silty sand with shell hash and rubble	Not Present	Not Present
EW1-06-R1	Pass		Brown fine silty mud	Brown fine silty mud with dense Crepidula shell rubble. Crepidula and mussel shells common through sample.	Not Present	Not Present

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Station	Grab Pass/Fail	Grab Failure Note	Sediment Characteristics	Field Description of Grab	Plant-like organisms	Anthropogenic or Terrestrial Debris/Fishing Activity
EW1-07-A1	Pass		Crepidula shell rubble over brown mud	Crepidula shell rubble with attached plant-like organism over brown mud. Hermit crab on surface	Present	Not Present
EW1-07-L1	Pass		Brown silty sand	Brown to gray silty sand with shell hash and rubble and worm tubes on the surface. Grab retrieved anthropogenic debris in jaws. Foul odor in sample	Not Present	Not Present
EW1-07-R1	Pass		Gray silty mud	Gray silty mud with trace shell hash	Not Present	Not Present
EW1-07-R2	Fail	Failed due to overpenetration of sample	Brown mud	Brown mud	Not Present	Not Present
EW1-07-R3	Fail	Failed due to overpenetration of sample	Brown mud	Brown mud	Not Present	Not Present
EW1-08-A1	Fail	Failed due to overpenetration of sample	Dark brown anoxic mud	Dark brown mud with anoxic scent	Not Present	Not Present
EW1-08-A2	Fail	Grab door opened on return disturbing sample. Overpenetrated.	Dark brown anoxic mud	Dark brown mud	Not Present	Not Present
EW1-08-A3	Pass		Dark brown silty sand	Dark brown-gray silty sand over gray mud with trace shell hash. Anoxic scent	Not Present	Not Present
EW1-08-L1	Pass		Dark brown mud	Dark brown-gray silty sand over dark gray mud with shell hash and worm tubes present on surface	Not Present	Not Present
EW1-08-L2	Fail	Failed due to overpenetration of sample	Brown silty mud	Brown silty mud	Not Present	Not Present
EW1-08-L3	Fail	Failed due to overpenetration of sample	Brown silty mud	Brown silty mud	Not Present	Not Present
EW1-08-R1	Fail	Failed due to overpenetration of sample	Dark brown anoxic mud	Dark anoxic mud with trace shell hash visible at the surface	Not Present	Not Present
EW1-08-R2	Fail	Failed due to overpenetration of sample	Dark brown anoxic mud	Dark brown anoxic mud with shell hash	Not Present	Not Present
EW1-08-R3	Pass		Dark brown anoxic mud	Dark brown anoxic mud with a dark gray mud layer under brown mud. Strong sulfur scent	Not Present	Not Present
EW1-09-A1	Fail	Failed due to shallow sample	Silt with shell hash and rubble	Silt with shell hash and rubble. Shallow sample with only partial closure of bucket due to shell. No/bad USBL position	Not Present	Not Present
EW1-09-A2	Fail	No grab closure due to hard bottom (shell rubble)	Shell rubble	Shell rubble with silty sand. Only partial closure of grab due to shell in jaw	Not Present	Not Present
EW1-09-A3	Fail	3x fail due to shell in grab jaw, preventing full closure	Gray silt with shell rubble	Gray silt with dense shell rubble	Not Present	Not Present

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Station	Grab Pass/Fail	Grab Failure Note	Sediment Characteristics	Field Description of Grab	Plant-like organisms	Anthropogenic or Terrestrial Debris/Fishing Activity
EW1-09-L1	Pass		Gray silt with shell rubble	Gray silt with shell rubble and hash. Hermit crab on surface	Not Present	Not Present
EW1-09-R1	Fail	Failed due to overpenetration of sample	Brown silty mud	Brown silty mud with worm tubes	Not Present	Not Present
EW1-09-R2	Fail	Failed due to lid opening on return/loss of sample	Brown silty mud	Brown silty mud	Present	Not Present
EW1-09-R3	Fail	Failed due to lid opening on return/loss of sample	Brown silty mud	Brown silty mud	Not Present	Not Present
EW1-09-R4	Fail	Failed due to overpenetration of sample	Brown silty mud	Brown silty mud	Not Present	Not Present
EW1-09-R5	Pass		Brown silty mud	Brown silty mud with worm tubes. Slightly overpenetrated in one part of sample. Kept as third attempt	Not Present	Not Present
EW1-10-A1	Fail	Failed due to shallow sample	Brown-gray silt	Brown-gray silt with shell rubble/hash	Present	Not Present
EW1-10-A2	Pass		Gray silty sand with shell rubble	Gray silty sand with dense shell hash and trace worm tube structures	Not Present	Not Present
EW1-10-L1	Pass		Brown silty sand	Brown silty sand with shell hash and rubble	Not Present	Not Present
EW1-10-R1	Fail	Failed due to overpenetration of sample	Brown mud	Brown mud with dark silt and dense shell hash/rubble (Crepidula). Foul sulfuric scent to sample	Not Present	Not Present
EW1-10-R2	Pass		Brown mud and gray silt	Brown mud and gray silt with Crepidula. Dark gray layer under surface sediment with anoxic scent.	Present	Not Present
EW1-11-A1	Pass		Brown fine silty sand	Brown fine silty sand with shell hash and rubble. Dark gray silt with anoxic scent under brown surface layer	Present	Not Present
EW1-11-L1	Pass		Shell rubble	Shell rubble/hash over gray silt. Small spider crab on surface	Present	Not Present
EW1-11-R1	Pass		Gray silt with shell rubble	Gray silt with shell rubble and hash (Crepidula and mussel). Hermit crab on surface	Not Present	Not Present
EW1-12-A1	Pass		Brown fine sand	Brown fine sand with shell hash and rubble	Not Present	Not Present
EW1-12-L1	Fail	Shell stuck in jaw, prevented full closure of grab.	Brown fine sand	Brown fine sand with large rock and shell rubble	Not Present	Not Present
EW1-12-L2	Pass		Brown fine sand	Brown fine sand with shell hash. Live clam on surface	Not Present	Not Present
EW1-12-R1	Pass		Brown fine sand	Brown fine sand with shell hash	Not Present	Not Present
EW1-13-A1	Fail	Rock in grab, no sample			Not Present	Not Present

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Station	Grab Pass/Fail	Grab Failure Note	Sediment Characteristics	Field Description of Grab	Plant-like organisms	Anthropogenic or Terrestrial Debris/Fishing Activity
EW1-13-A2	Fail	Large rock in jaw, no sample. Rock looks like it is asphalt or tar with encrusting organisms growing over it			Not Present	Not Present
EW1-13-A3	Fail	Large rock (similar to above) in jaw, no sample			Not Present	Not Present
EW1-13-L1	Pass		Medium brown sand	Medium brown sand with shell hash and gravel	Not Present	Not Present
EW1-13-R1	Pass		Medium brown sand	Medium brown sand with shell hash	Not Present	Not Present
EW1-14-A1	Pass		Brown medium sand	Brown medium sand with shell hash. Sand lance in sediment	Not Present	Not Present
EW1-14-L1	Pass		Brown medium sand	Brown Medium	Not Present	Not Present
EW1-14-R1	Pass		Brown medium sand	Brown medium sand with trace shell hash. Sand lance in sediment. Hermit crab on surface	Not Present	Not Present
EW1-15-A1	Pass		Fine brown sand	Fine brown sand with shell hash	Not Present	Not Present
EW1-15-L1	Pass		Fine brown sand	Brown fine sand with shell hash	Not Present	Not Present
EW1-15-R1	Fail	Lid on bucket opened on return			Not Present	Not Present
EW1-15-R2	Pass		Fine brown sand	Fine brown sand with shell hash and large clam rubble	Not Present	Not Present
EW1-16-A1	Pass		Medium brown sand	Medium brown sand with shell hash. Small crab and sand dollar on surface. Large cobble in sediment	Not Present	Not Present
EW1-16-L1	Fail	Grab malfunction- bucket hit seafloor sideways and did not collect sample			Not Present	Not Present
EW1-16-L2	Fail	Failed due to shallow sample	Fine brown sand	Fine brown sand with shell hash	Not Present	Not Present
EW1-16-L3	Pass		Fine brown sand	Fine brown sand with trace shell hash	Not Present	Not Present
EW1-16-R1	Fail	Failed due to shallow sample	Fine brown sand	Fine brown sand with hermit crab and snail on surface	Not Present	Not Present
EW1-16-R2	Pass		Fine brown sand	Fine brown sand with trace shell hash. Hermit crab on surface	Not Present	Not Present
EW1-17-A1	Fail	No grab closure			Not Present	Not Present
EW1-17-A2	Fail	No grab closure			Not Present	Not Present
EW1-17-A3	Pass		Fine brown sand	Fine brown sand with shell hash. Large worm tube on surface	Not Present	Not Present

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Station	Grab Pass/Fail	Grab Failure Note	Sediment Characteristics	Field Description of Grab	Plant-like organisms	Anthropogenic or Terrestrial Debris/Fishing Activity
EW1-17-L1	Fail	Draining of sediment on sides of sample due to slightly open bucket	Fine brown sand	Fine brown sand.	Not Present	Not Present
EW1-17-L2	Pass		Fine brown sand	Fine brown sand with trace shell hash	Not Present	Not Present
EW1-17-R1	Pass		Fine brown sand	Fine brown sand with trace shell hash	Not Present	Not Present
EW1-18-A1	Pass		Fine brown sand	Fine brown sand with trace shell hash. Hermit crab on surface	Not Present	Not Present
EW1-18-L1	Pass		Fine brown sand	Fine brown sand with trace shell hash. Sand dollar and worm tube on surface	Not Present	Not Present
EW1-18-R1	Pass		Fine brown sand	Fine brown sand with shell hash. Small hermit crab on surface	Not Present	Not Present
EW1-19-A1	Pass		Gray silty sand	Gray silty sand with dense amphipod bed and trace shell hash	Not Present	Not Present
EW1-19-L1	Pass		Fine brown sand	Fine brown sand with dense amphipod bed presence and shell hash. Dark silt under surface layer	Not Present	Not Present
EW1-19-R1	Fail	Failed due to loss of sediment on either side of the closure	Brownish gray silty sand	Brownish gray silty sand with trace shell hash	Not Present	Not Present
EW1-19-R2	Fail	Failed due to rock and glass bottle stuck in jaw preventing full closure	Brownish gray silty sand	Brownish gray silty sand with cobble and glass debris	Not Present	Anthropogenetic Debris
EW1-19-R3	Pass		Brownish gray fine silty sand	Brownish gray fine silty sand with shell hash and small stones	Not Present	Not Present
EW1-20-A1	Pass		Brown silty mud	Brown silty mud with trace worm tubes	Not Present	Not Present
EW1-20-L1	Pass		Brown silty mud		Not Present	Not Present
EW1-20-R1	Pass		Brown silty mud	Brown silty mud with trace worm tubes	Not Present	Not Present
EW1-21-A1	Pass		Brown silty mud	Brown silty mud with worm tube and amphipod beds at the surface. Uneven surface layer. Dark clay under surface layer	Not Present	Not Present
EW1-21-L1	Fail	No grab closure			Not Present	Not Present
EW1-21-L2	Pass		Brown silty mud	Brown silty mud with trace worm tube presence at surface with dark, dense clay subsurface layer	Not Present	Not Present
EW1-21R1	Pass		Brown silty mud	Brown mud over dark clay. Worm tubes on surface.	Not Present	Not Present
EW1-22-A1	Pass		Brown silty mud	Brown silty mud with worm tubes. Dark gray, dense clay under softer brown mud	Not Present	Not Present
EW1-22-L1	Pass		Brown silty mud	Brown silty mud with worm tubes	Not Present	Not Present

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Station	Grab Pass/Fail	Grab Failure Note	Sediment Characteristics	Field Description of Grab	Plant-like organisms	Anthropogenic or Terrestrial Debris/Fishing Activity
EW1-22-R1	Pass		Brown silty mud	Brown silty mud. 5 small sand dollars on surface	Not Present	Not Present
EW1-23-A1	Pass		Brown silty mud	Brown silty mud with worm tubes and trace shell hash	Not Present	Not Present
EW1-23-L1	Pass		Brown silty mud	Brown silty mud with worm tubes, trace shell hash, and snail on surface	Not Present	Not Present
EW1-23-R1	Pass		Brown silty mud	Brown silty mud with worm tubes	Not Present	Not Present
EW1-24-A1	Pass		Gravelly coarse sand	Gravelly coarse sand	Not Present	Not Present
EW1-24-L1	Pass		Gravel	Gravel with trace shell hash	Not Present	Not Present
EW1-24-R1	Pass		Gravel with sand	Gravel with sand and trace shell hash	Not Present	Not Present
EW1-25-A1	Pass		Fine brown sand	Fine brown sand with trace shell hash and hermit crabs and snail on surface	Not Present	Not Present
EW1-25-L1	Fail	No sample, large rock in bucket			Not Present	Not Present
EW1-25-L2	Fail	No sample, large rock in bucket			Not Present	Not Present
EW1-25-L3	Fail	Fail x3 no sample, rocks in grab			Not Present	Not Present
EW1-25-R1	Fail	No full closure, caught on pebble/gravel			Not Present	Not Present
EW1-25-R2	Fail	No sample, grab closed on rock			Not Present	Not Present
EW1-25-R3	Pass		Medium to fine brown sand	Medium to fine brown sand with shell hash, gravel, and large rocks. Worm tube and hermit crabs on surface	Not Present	Not Present
EW1-26-A1	Fail	Grab only partially closed with large rock caught in jaw	Brown sand	Brown sand with pebbles and cobble. Grab only partially closed with large rock caught in jaw	Not Present	Not Present
EW1-26-A2	Pass		Fine brown sand	Fine brown sand with trace shell hash. Hermit crabs and snail on surface. Deep dark layer of dense packed sand with gravel/pebbles at base of sample	Not Present	Not Present
EW1-26-L1	Pass		Medium brown sand	Medium brown sand with multiple (6) sand dollars on surface	Not Present	Not Present
EW1-26-R1	Fail	Failed due to partial closure of grab bucket as rock caught in jaw	Gravel with sand		Not Present	Not Present
EW1-26-R2	Fail	Grab caught on rock, only partial closure	Gravel with sand	Gravel with sand, possible worm tube holes on surface	Not Present	Not Present

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Station	Grab Pass/Fail	Grab Failure Note	Sediment Characteristics	Field Description of Grab	Plant-like organisms	Anthropogenic or Terrestrial Debris/Fishing Activity
EW1-26-R3	Fail	Failed due to grab malfunction- top door on sampler open upon retrieval	Gravel with sand	Gravel with sand, many hermit crabs on surface and worm tubes in sediment	Not Present	Not Present
EW1-26-R4	Fail	Fail x3. grab caught on gravel caused partial closure	Gravel with sand		Not Present	Not Present

APPENDIX B: VIDEO TRANSECT REVIEWER NOTES

Table B - 2. Video reviewer notes while analyzing transects.

Transect	Videography	Encrusting Organisms/Macroflora	Ground Cover	Substrate	Organisms	Other
EW1-01	High turbidity leading to poor visibility	There were instances of a few apparent sponge or tunicate species mixed into clumps or living and dead algae	A relatively thick fine sediment layer blanketed most visible organisms and structure. There were some clumps of likely algae and encrusting organisms. Trace shell hash occasionally visible	fine sand/mud	Mostly fish species visible. A few crangon shrimp below the threshold	
EW1-02	High turbidity leading to poor visibility	There were instances of a few apparent sponge species, one bright orange, with some patches of algae as well. All of which was mostly covered in recent deposition of sediment	A relatively thick fine sediment layer blanketed most visible organisms and structure. There were some large clumps of likely algae and encrusting organisms presumably all attached to hard substrate especially near the beginning. A few patches of shell hash and some quahog rubble were visible in some places especially in the middle of the transect.	fine sand/mud	Small elongated fish that often appeared to be spotted hake or a similar species were fairly common throughout with most being hard to confirm due to visibility. Crabs and dead menhaden were also common as were many hermit crabs below the size threshold.	Garbage, especially plastic bags, were common especially near the beginning of the transect.
EW1-03	moderate visibility	A few boulders with bushy plant-like organisms (plogs) and encrusting organisms	Sand/mud with plogs and frequent crepidula clusters. One large patch of shell rubble and crepidula towards end of video. some larger shell aggregate worm tubes	sand/mud	hermit crabs, spider crabs, cancer crabs, spotted hake	
EW1-04		A variety of encrusting organisms of various shapes and colors from bushy plant like orgs to colorful encrusting orgs including some instances of what appeared to be colonial tunicates that looked similar to didemnum but were not carpeting or extremely abundant. At least one cobble and one boulder in the middle and a few boulders later on had patches of what was likely northern star coral one very small piece of green algae that likely drifted there	Dense shell hash in most places with likely gravel and some patches with cobbles, small boulders, and bricks near the middle and end	sand or mud with varying degrees of shell and gravel and areas of cobble	Many crabs with notable amounts of spotted hake and sea urchins. A few crabs and quite a few shrimp were below the cutoff. There were enough single oyster shells to reason that a few were alive.	

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Transect	Videography	Encrusting Organisms/Macroflora	Ground Cover	Substrate	Organisms	Other
EW1-05	Moderate visibility	Few patches of boulders with encrusting organisms and areas of shells with flora	Sand/mud with plorg and many terrestrial leaves entangled. Boulder/mounded debris with encrusting organisms common throughout.		Hermit crabs, spider crabs	lots of anthropogenic debris
EW1-06	High turbidity leading to poor visibility	Some smaller encrusting patches of tunicates or sponges were present in a few instances throughout the transect	Abundant crepidula shells over sand	sand and or mud	Abundant living crepidula and a variety of crab species were the most dominant organism	
EW1-07		A few patches of bushy plant-like organisms and red colored branching algae adhered to shells with some rather large 6+ inch tall patches in the middle of the transect onward	Flat mud/sand early on transitioning to increasingly dense shell patches (hash and some rubble) of mostly crepidula then varying densities of shells the remainder of the transect. Overall sand/mud is more dominant than shells		Crabs, snails, and dead fish were most common. Some hermit crabs and other organisms below the size threshold	
EW1-08	Low visibility throughout, flat sand and high turbidity makes it hard for camera to focus		Sand with dispersed algae/plorgs throughout	sand	Dead fish, spider cancer and blue crabs, hermit crabs too small to count	
EW1-09	High turbidity leading to poor visibility	Orange, yellow, and white colored encrusting organisms that appear to be sponges and tunicates as well as busy plant -like organisms fixed to shells and possibly gravel. At least two species of algae present in small amounts	Dense shell hash/rubble throughout the first 2/3 of the transect giving way to sparse hell hash	sand or gravelly sand (with many shells)	Some crabs, hakes, sea urchins scattered throughout the transect with many small hermit crabs below the size threshold	
EW1-10	Moderate turbidity with moderate to low visibility	Frequent bushy plant-like organisms and some macroalgae growing on shells. Smaller orange and white encrusting patches here and there.	Mostly dense shell hash and rubble with alternating patches of sand/mud	sand/mud	Abundant crabs. Many hermit crabs and some other crabs below the threshold. There were enough isolated blue mussel shells to reason that a few were alive.	
EW1-11	Moderate turbidity with fairly low visibility	Periodic attached bushy plant like organisms on shells. Some are as long as 6-8 inches	a variety of shells of hash and rubble size that were dense at the beginning but declined in density to sparse by the middle with a dense patch again at the very end	sand/mud	Abundant cancer, spider, and hermit crabs with some shrimp and hermit crabs below threshold. The crabs seem to be drawn to the shellfish, that appeared to include living blue mussels and a few possibly living oysters. Near the end of the video apparent clam (possibly razor clam) siphon holes were visible when the camera neared the bottom.	

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Transect	Videography	Encrusting Organisms/Macroflora	Ground Cover	Substrate	Organisms	Other
EW1-12	Clarity is between low to moderate with the up and down of the swell	Encrusting orgs over cobbles	Sand with moderate to dense shell rubble and hash. Much of the shell is from mussel.		moon snail, small UID fish	
EW1-13		Small clumps of green algae appear periodically at first then more frequently after about 1/3 through. A few clumps of likely northern star coral observed	Flat sand and mud or sand waves with trace to sparse shell hash at first transitioning to patches of heavy sparse or dense shell hash then continuous shells hash and rubble for the middle 1/3 then back to patches between sand waves	Sand at first transitioning to gravel with heavy shell content about half way with a stretch of cobbles and boulders and possibly another substance creating complex habitat then steadily transitioning back to sand for the last 1/3	Despite many blue mussel shells only a few appear to be possibly living	
EW1-15		No sizable encrusting organisms due to lack of suitable structure	Mostly trace shell hash with some shell rubble	sand	Relatively few organisms above the threshold with some crabs and likely hake visible	
EW1-16		A few encrusting species on larger shells with one or two apparent bushy plant-like organisms. Some crepidula stuck to large hermit crab shells	Trace shell hash	flat sand or sand waves	A mix of fish and inverts. Abundant hermit crabs below the size threshold. Shell conglomerate worm tubes from apparently dead polychaetas were fairly common	
EW1-17	Moderate turbidity with fairly low visibility	A few encrusting species on larger shells, no easily apparent bushy plant-like organisms.	Mostly trace to sparse shell hash with aggregated shelled worm tubes scattered throughout. Some more dense patches of shell hash in the middle where they are aggregated in sand wave troughs	sand	Sand dollars were the most abundant macrofauna. There were enough clean mussel shells of various sizes in wave troughs to assume that some are alive (present). Many hermit crabs and some anemones below the threshold. Most skate egg cases appeared spent. A few crepidula attached to larger shells.	
EW1-18	Clarity is moderate throughout. Flat low relief mud/sand makes it difficult for the camera to focus	A few small patches of hard bottom that appeared to be rocks with encrusting orgs	Sand ripples with moderate shell hash. some larger shell aggregate worm tubes	flat sand/mud	sand dollars, moon snails, northern cerianthids or other burrowing anemones	

EQUINOR EMPIRE 2020 BENTHIC SURVEY REPORT

Transect	Videography	Encrusting Organisms/Macroflora	Ground Cover	Substrate	Organisms	Other
	when not very close to the bottom.					
EW1-19		A few clusters of possibly star coral, large barnacles, or anemones were observed on a lone rock about 20 cm in diameter. There were some bushy plant like organisms on the few scattered rocks as well.	Shell hash with occasional burrows and a few whole shells that fall under the rubble classification	sand/mud	Relatively few large organisms with many hermit crabs and a few other species just below the size threshold	
EW1-20	Clarity is moderate throughout. Flat low relief mud/sand makes it difficult for the camera to focus when not very close to the bottom.	Some sea pens throughout	Flat sand with trace shell hash and abundant burrows, some larger shell aggregate worm tubes	sand	cancer crabs, northern cerianthids or other burrowing anemones	
EW1-21			Trace shell and occasional burrows and bioturbation in sand bottom	sand	Moon snails were the dominant megafauna with a few small demersal fish and many cancer-crab like individuals below the threshold	
EW1-22	Clarity is moderate throughout. Flat low relief mud/sand makes it difficult for the camera to focus when not very close to the bottom.	sea pens throughout the transect	Some larger shell aggregate worm tubes	sand	Sand dollars, hermit crabs, scallops, many small tubes from worms and burrows throughout	Sand dollars common in the early portion of the transect, only a few after
EW1-23		Minimal encrusting organisms other than a few shells with apparently hydrozoa/bryozoa	Sparse shell hash	sand/mud	Abundant anemones including many that were below the size threshold. Flounders were the most common mobile organism	
EW1-24	Good visibility and speed	A handful of small individual macroalgae and bushy plant-like organisms growing on shells	Small sand waves with trace to sparse shell hash and occasional single shell rubble pieces	sand	Remarkably low abundance of megafauna likely attributable to the apparently high dynamics of the area except for some spider crabs near the end of the transect	
EW1-24	Clarity of video is moderate to good.	Shell rubble was often covered in hydroids and	ebble/gravel with shell hash and rubble	gravel	hermit crabs, moon snails dominated	

EQUINOR EMPIRE 2020 BENTHIC SURVEY REPORT

Transect	Videography	Encrusting Organisms/Macroflora	Ground Cover	Substrate	Organisms	Other
EW1-25		brown in color, blending in with the sea floor. There were a few small patches of pale brown to orange organism on shells and a derelict fish trap. There were also bushy plant like organisms (likely hydrozoa) present on large shells throughout the transect	sand with patches of sparse to dense shell covers.	sand (with shell)	Relatively low abundance of mobile organisms and other megafauna besides abundant sand dollars and some crepidula	
EW1-26	Clarity is moderate throughout	Bushy plant like organisms and algae present	flat sand with shell hash and rubble. Transitions from flat sand to more dense shell/gravel patches. Shell aggregate worm tubes become very abundant in last 1/3 of video	sand	sand dollars, skate gg cases, anemones, worm tubes	

APPENDIX C: GRAB SAMPLE IMAGES

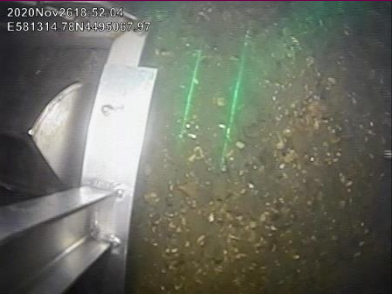
Table C-1. Images of both sides of the grab sample bucket (A and B) immediately after recovery/draining and of the bottom just prior to sampling (C). NMFS Modified CMECS (2021) and d50 (median grain size) reported below images.

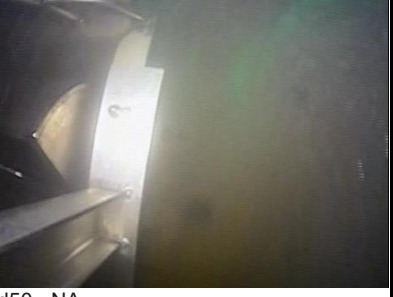
Station	A.	B.	C.
EW1-01-A3	 NMFS (modified) CMECS: Mud	 NMFS Complex Habitat: No	 d50 = NA
EW1-01-L3	 NMFS (modified) CMECS: Mud	 NMFS Complex Habitat: No	 d50 = NA
EW1-01-R3	 NMFS (modified) CMECS: Mud	 NMFS Complex Habitat: No	 d50 = NA
EW1-02-A3	 NMFS (modified) CMECS: Gravelly Mud	 NMFS Complex Habitat: Yes	 d50 = NA

Station	A.	B.	C.
EW1-02-L3			
	NMFS (modified) CMECS: Sandy Mud	NMFS Complex Habitat: No	d50 = NA
EW1-02-R3			
	NMFS (modified) CMECS: Mud	NMFS Complex Habitat: No	d50 = NA
EW1-03-A1			
	NMFS (modified) CMECS: Muddy Sand	NMFS Complex Habitat: No	d50 = 0.08
EW1-03-L2			
	NMFS (modified) CMECS: Fine/Very Fine Sand	NMFS Complex Habitat: No	d50 = 0.15

Station	A.	B.	C.
EW1-03-R3			
	NMFS (modified) CMECS: Sandy Mud	NMFS Complex Habitat: No	d50 = NA
EW1-04-A1			
	NMFS (modified) CMECS: Gravelly Sand	NMFS Complex Habitat: Yes	d50 = 0.24
EW1-04-L1			
	NMFS (modified) CMECS: Gravelly Muddy Sand	NMFS Complex Habitat: Yes	d50 = 0.17
EW1-04-R3			
	NMFS (modified) CMECS: Gravelly Sand	NMFS Complex Habitat: Yes	d50 = 0.19

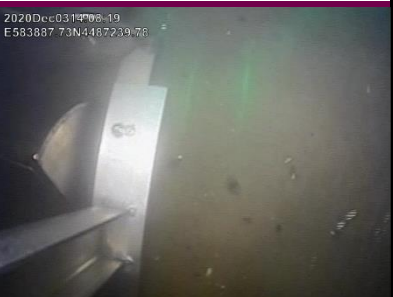
Station	A.	B.	C.
EW1-05-A1			 2020Dec02 13:51:20 E581551.97N443601.4
	NMFS (modified) CMECS: Gravelly Sand	NMFS Complex Habitat: Yes	d50 = 0.2
EW1-05-L1			 2020Dec02 17:20:12 E581481.54N443620.03
	NMFS (modified) CMECS: Gravelly Sand	NMFS Complex Habitat: Yes	d50 = 0.19
EW1-05-R1			 2020Dec02 17:04:37 E581630.01N443624.98
	NMFS (modified) CMECS: Gravelly Sand	NMFS Complex Habitat: Yes	d50 = 0.18
EW1-06-A2			 2020Dec02 21:34:08 E581604.51N443430.0
	NMFS (modified) CMECS: Gravelly Muddy Sand	NMFS Complex Habitat: Yes	d50 = 0.15

Station	A.	B.	C.
EW1-06-L1			
	NMFS (modified) CMECS: Gravelly Sand	NMFS Complex Habitat: Yes	d50 = 0.23
EW1-06-R1			
	NMFS (modified) CMECS: Gravelly Sand	NMFS Complex Habitat: Yes	d50 = NA
EW1-07-A1			
	NMFS (modified) CMECS: Gravelly Mud	NMFS Complex Habitat: Yes	d50 = NA
EW1-07-L1			
	NMFS (modified) CMECS: Gravelly Sand	NMFS Complex Habitat: Yes	d50 = 0.25

Station	A.	B.	C.
EW1-07-R1			
	NMFS (modified) CMECS: Muddy Sand	NMFS Complex Habitat: No	d50 = 0.08
EW1-08-A3			
	NMFS (modified) CMECS: Sandy Mud	NMFS Complex Habitat: No	d50 = NA
EW1-08-L1			
	NMFS (modified) CMECS: Gravelly Mud	NMFS Complex Habitat: No	d50 = NA
EW1-08-R3			
	NMFS (modified) CMECS: Sandy Mud	NMFS Complex Habitat: No	d50 = NA

Station	A.	B.	C.
EW1-09-A3			
	NMFS (modified) CMECS: Insufficient sediment amount	NMFS Complex Habitat: Insufficient sediment amount	d50 = Insufficient sediment amount
EW1-09-L1			
	NMFS (modified) CMECS: Gravely Muddy Sand	NMFS Complex Habitat: Yes	d50 = 0.2
EW1-09-R5			
	NMFS (modified) CMECS: Muddy Sand	NMFS Complex Habitat: No	d50 = 0.09
EW1-10-A2			
	NMFS (modified) CMECS: Gravely Sand	NMFS Complex Habitat: Yes	d50 = 0.2

Station	A.	B.	C.
EW1-10-L1			
	NMFS (modified) CMECS: Gravelly Sand	NMFS Complex Habitat: Yes	d50 = 0.2
EW1-10-R2			
	NMFS (modified) CMECS: Gravelly Muddy Sand	NMFS Complex Habitat: Yes	d50 = 0.08
EW1-11-A1			
	NMFS (modified) CMECS: Gravelly Sand	NMFS Complex Habitat: Yes	d50 = 0.32
EW1-11-L1			
	NMFS (modified) CMECS: Shell Hash	NMFS Complex Habitat: Yes	d50 = 0.23

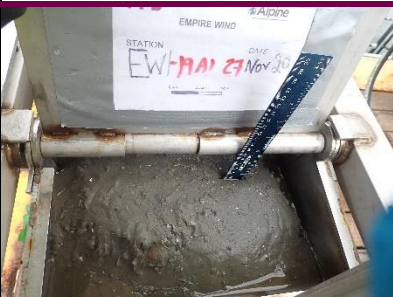
Station	A.	B.	C.
EW1-11-R1			 2020Dec01 13:20:38 E584601.11N4447682.68
	NMFS (modified) CMECS: Gravelly Sand	NMFS Complex Habitat: Yes	d50 = 0.2
EW1-12-A1			 2020Dec03 15:45:30 E584141.07N4447082.98
	NMFS (modified) CMECS: Gravelly Sand	NMFS Complex Habitat: Yes	d50 = 0.32
EW1-12-L2			 2020Dec03 14:09:19 E583887.73N4447239.78
	NMFS (modified) CMECS: Medium Sand	NMFS Complex Habitat: No	d50 = 0.36
EW1-12-R1			 2020Dec03 14:08:32 E584402.51N4447334.68
	NMFS (modified) CMECS: Medium Sand	NMFS Complex Habitat: No	d50 = 0.27

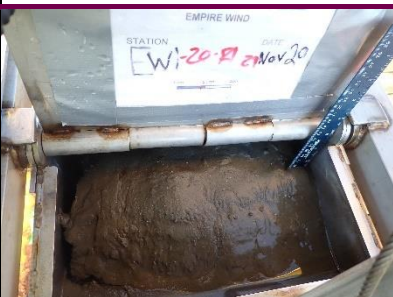
Station	A.	B.	C.
EW1-13-A3			
	NMFS (modified) CMECS: Insufficient sediment amount	NMFS Complex Habitat: Insufficient sediment amount	d50 = Insufficient sediment amount
EW1-13-L1			
	NMFS (modified) CMECS: Gravelly Sand	NMFS Complex Habitat: Yes	d50 = 0.57
EW1-13-R1			
	NMFS (modified) CMECS: Gravelly Sand	NMFS Complex Habitat: Yes	d50 = 0.44
EW1-14-A1			
	NMFS (modified) CMECS: Medium Sand	NMFS Complex Habitat: No	d50 = 0.35

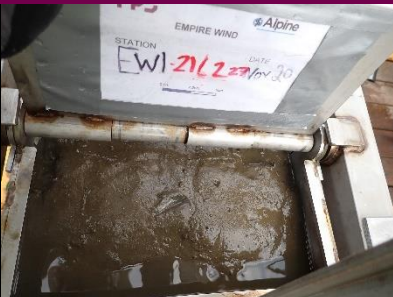
Station	A.	B.	C.
EW1-14-L1			
	NMFS (modified) CMECS: Fine/Very Find Sand	NMFS Complex Habitat: No	d50 = 0.23
EW1-14-R1			
	NMFS (modified) CMECS: Medium Sand	NMFS Complex Habitat: No	d50 = 0.36
EW1-15-A1			
	NMFS (modified) CMECS: Fine/Very Find Sand	NMFS Complex Habitat: No	d50 = 0.18
EW1-15-L1			
	NMFS (modified) CMECS: Fine/Very Fine Sand	NMFS Complex Habitat: No	d50 = 0.17

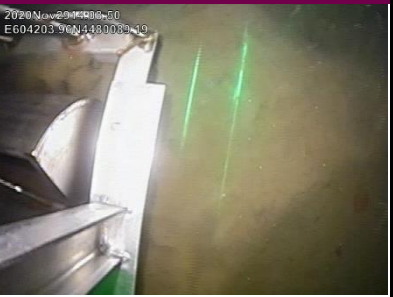
Station	A.	B.	C.
EW1-15-R2			 2020Nov27 15:35:27 E592161 27N033350.01
	NMFS (modified) CMECS: Gravelly Sand	NMFS Complex Habitat: Yes	d50 = 0.38
EW1-16-A1			 2020Nov27 15:59:40 E594992 7N0332471.39
	NMFS (modified) CMECS: Gravelly Sand	NMFS Complex Habitat: Yes	d50 = 0.57
EW1-16-L3			 2020Nov27 15:45:38 E594697 94N0432388.91
	NMFS (modified) CMECS: Fine/Very Fine Sand	NMFS Complex Habitat: No	d50 = 0.17
EW1-16-R2			 2020Nov27 16:18:43 E595288 89N0432410.98
	NMFS (modified) CMECS: Fine/Very Fine Sand	NMFS Complex Habitat: No	d50 = 0.15

Station	A.	B.	C.
EW1-17-A3			
	NMFS (modified) CMECS: Medium Sand	NMFS Complex Habitat: No	d50 = 0.47
EW1-17-L2			
	NMFS (modified) CMECS: Fine/Very Fine Sand	NMFS Complex Habitat: No	d50 = 0.16
EW1-17-R1			
	NMFS (modified) CMECS: Fine/Very Fine Sand	NMFS Complex Habitat: No	d50 = 0.21
EW1-18-A1			
	NMFS (modified) CMECS: Fine/Very Fine Sand	NMFS Complex Habitat: No	d50 = 0.16

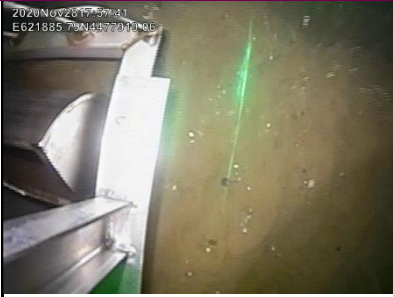
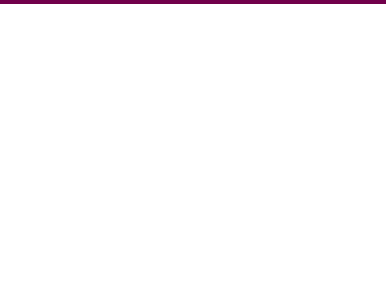
Station	A.	B.	C.
EW1-18-L1			
	NMFS (modified) CMECS: Fine/Very Fine Sand	NMFS Complex Habitat: No	d50 = 0.2
EW1-18-R1			
	NMFS (modified) CMECS: Fine/Very Fine Sand	NMFS Complex Habitat: No	d50 = 0.14
EW1-19-A1			
	NMFS (modified) CMECS: Muddy Sand	NMFS Complex Habitat: No	d50 = 0.11
EW1-19-L1			
	NMFS (modified) CMECS: Fine/Very Fine Sand	NMFS Complex Habitat: No	d50 = 0.11

Station	A.	B.	C.
EW1-19-R3			
	NMFS (modified) CMECS: Sandy Mud	NMFS Complex Habitat: No	d50 = NA
EW1-20-A1			
	NMFS (modified) CMECS: Muddy Sand	NMFS Complex Habitat: No	d50 = 0.9
EW1-20-L1			
	NMFS (modified) CMECS: Muddy Sand	NMFS Complex Habitat: No	d50 = 0.9
EW1-20-R1			
	NMFS (modified) CMECS: Sandy Mud	NMFS Complex Habitat: No	d50 = NA

Station	A.	B.	C.
EW1-21-A1			
	NMFS (modified) CMECS: Muddy Sand	NMFS Complex Habitat: No	d50 = 0.1
EW1-21-L2			
	NMFS (modified) CMECS: Muddy Sand	NMFS Complex Habitat: No	d50 = 0.1
EW1-21-R1			
	NMFS (modified) CMECS: Muddy Sand	NMFS Complex Habitat: No	d50 = 0.1
EW1-22-A1			
	NMFS (modified) CMECS: Muddy Sand	NMFS Complex Habitat: No	d50 = 0.1

Station	A.	B.	C.
EW1-22-L1			
	NMFS (modified) CMECS: Muddy Sand	NMFS Complex Habitat: No	d50 = 0.1
EW1-22-R1			
	NMFS (modified) CMECS: Muddy Sand	NMFS Complex Habitat: No	d50 = 0.1
EW1-23-A1			
	NMFS (modified) CMECS: Muddy Sand	NMFS Complex Habitat: No	d50 = 0.09
EW1-23-L1			
	NMFS (modified) CMECS: Muddy Sand	NMFS Complex Habitat: No	d50 = 0.09

Station	A.	B.	C.
EW1-23-R1			
	NMFS (modified) CMECS: Muddy Sand	NMFS Complex Habitat: No	d50 = 0.09
EW1-24-A1			
	NMFS (modified) CMECS: Sandy Gravel	NMFS Complex Habitat: Yes	d50 = 1.4
EW1-24-L1			
	NMFS (modified) CMECS: Sandy Gravel	NMFS Complex Habitat: Yes	d50 = 2.1
EW1-24-R1			
	NMFS (modified) CMECS: Sandy Gravel	NMFS Complex Habitat: Yes	d50 = 3.2

Station	A.	B.	C.
EW1-25-A1			
	NMFS (modified) CMECS: Gravelly Sand	NMFS Complex Habitat: Yes	d50 = 0.22
EW1-25-L3			
	NMFS (modified) CMECS: Insufficient sediment amount	NMFS Complex Habitat: Insufficient sediment amount	d50 = Insufficient sediment amount
EW1-25-R3			
	NMFS (modified) CMECS: Sandy Gravel	NMFS Complex Habitat: Yes	d50 = 1.8
EW1-26-A2			
	NMFS (modified) CMECS: Gravelly Sand	NMFS Complex Habitat: Yes	d50 = 0.21

Station	A.	B.	C.
EW1-26-L1	 NMFS (modified) CMECS: Medium Sand	 NMFS Complex Habitat: No	 d50 = 0.36
EW1-26-R4	 NMFS (modified) CMECS: Gravelly Sand	 NMFS Complex Habitat: Yes	 d50 = NA

CMECS Classifications for Still Images Derived from Video Analysis

Empire Offshore Wind

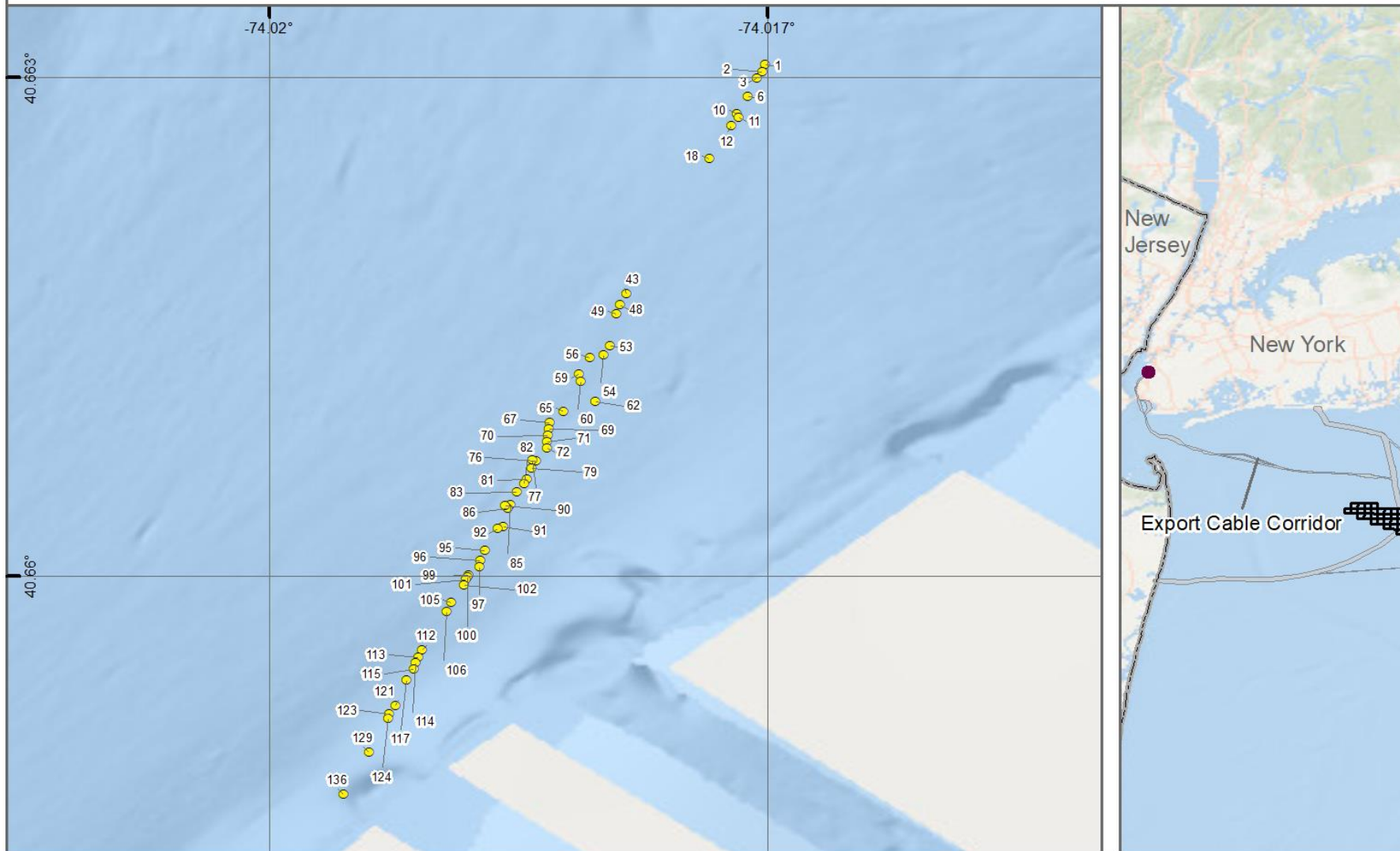
RPS, Delivered 05/07/2021

Slides 2 - 27 = CMECS classifications along video transects in the EW1

Legend abbreviations: B = boulder, C = cobble, PG = pebble/granule, and SM = sand/mud

Zone: EW1

Transect: EW1-01



CMECS Classification

● Sand/Mud



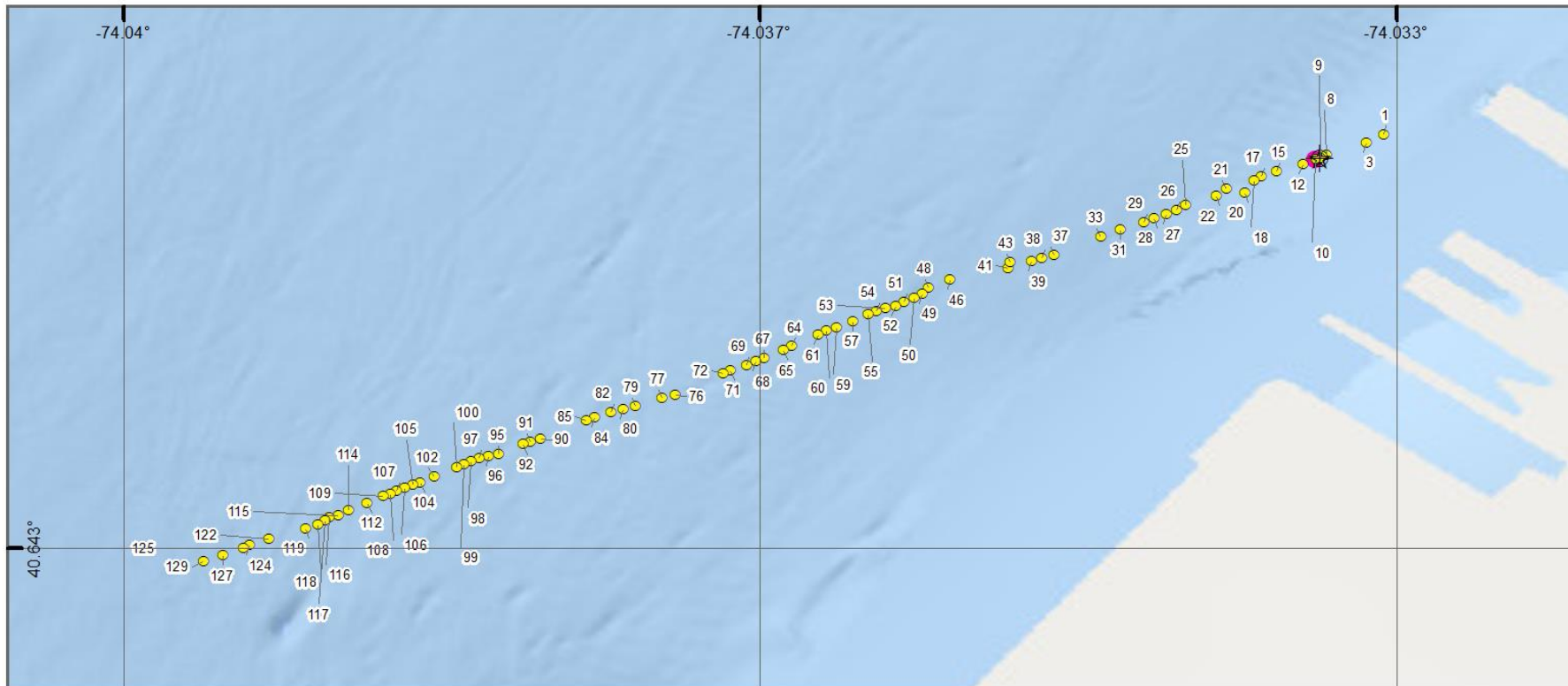
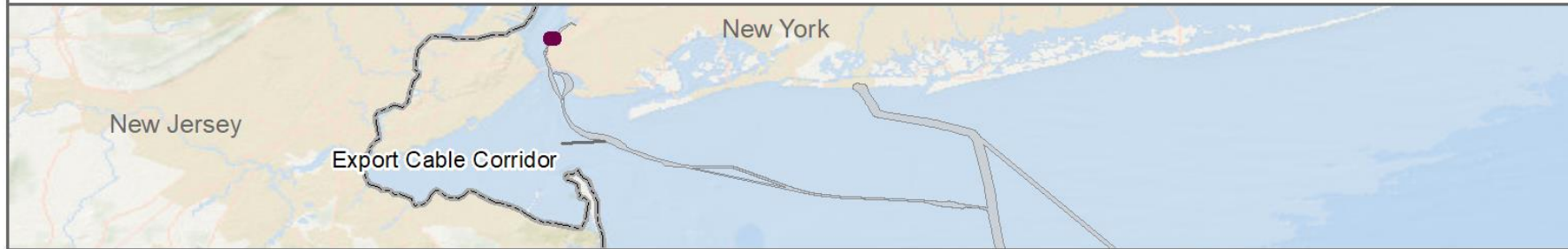
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0 105 210
Meters



Zone: EW1

Transect: EW1-02



CMECS Classification

● Sand/Mud

Other Cover

☆ Woody Debris

⊕ Anthropogenic Debris

Flora/Fauna Cover

● Moderate



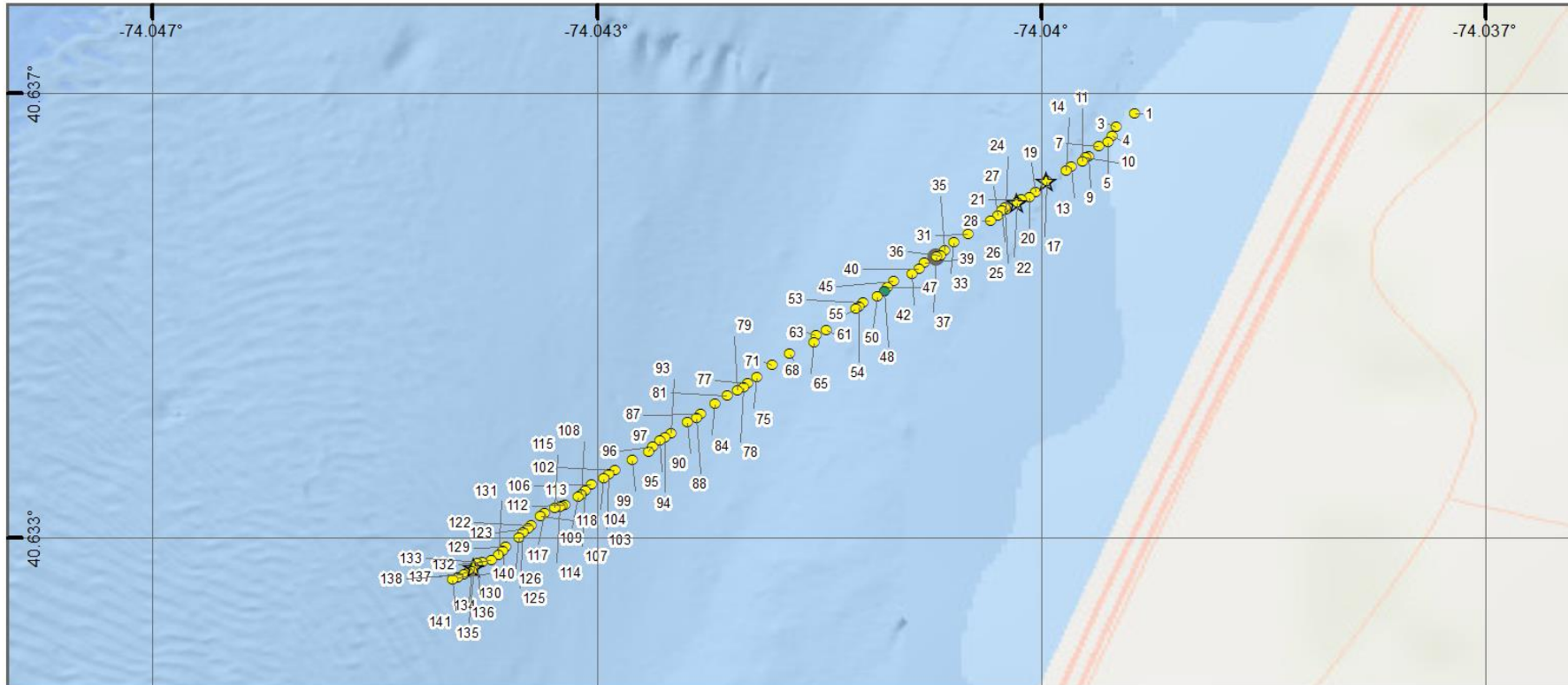
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0 90 180
Meters



Zone: EW1

Transect: EW1-03



CMECS Classification

- Gravelly Sand/Mud with B
- Sand/Mud

Other Cover

- ☆ Woody Debris

Shell Cover

- Moderate



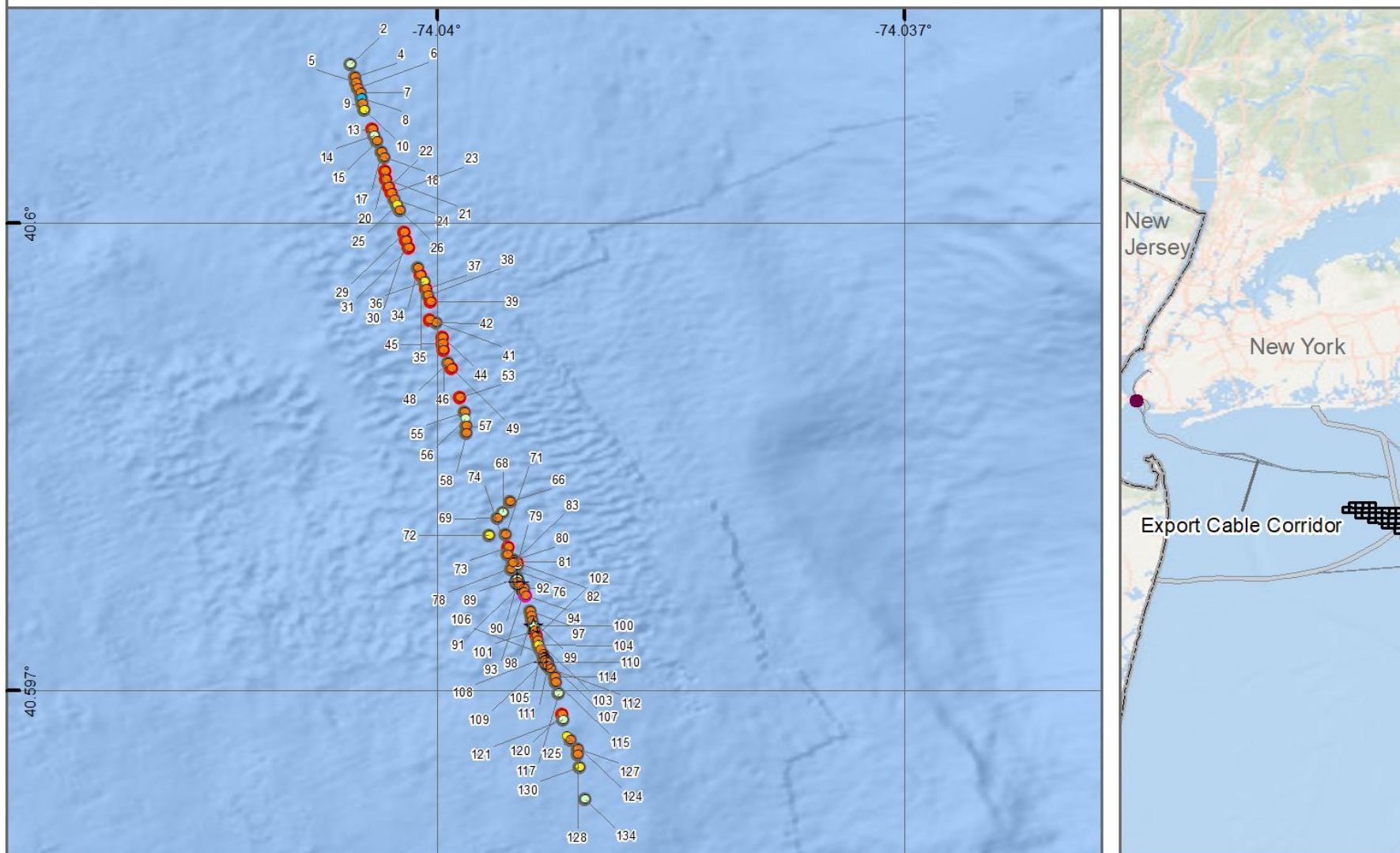
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0 130 260
Meters



Zone: EW1

Transect: EW1-04



CMECS Classification

- Biogenic Shell Hash
- Gravel Mixes - Pebble/Granule with S/M
- Gravelly Sand/Mud with P/G
- Sand/Mud

Other Cover

- ☆ Woody Debris
- ⊕ Anthropogenic Debris

Flora/Fauna Cover

- Moderate

Shell Cover

- Dense or Complete
- Moderate



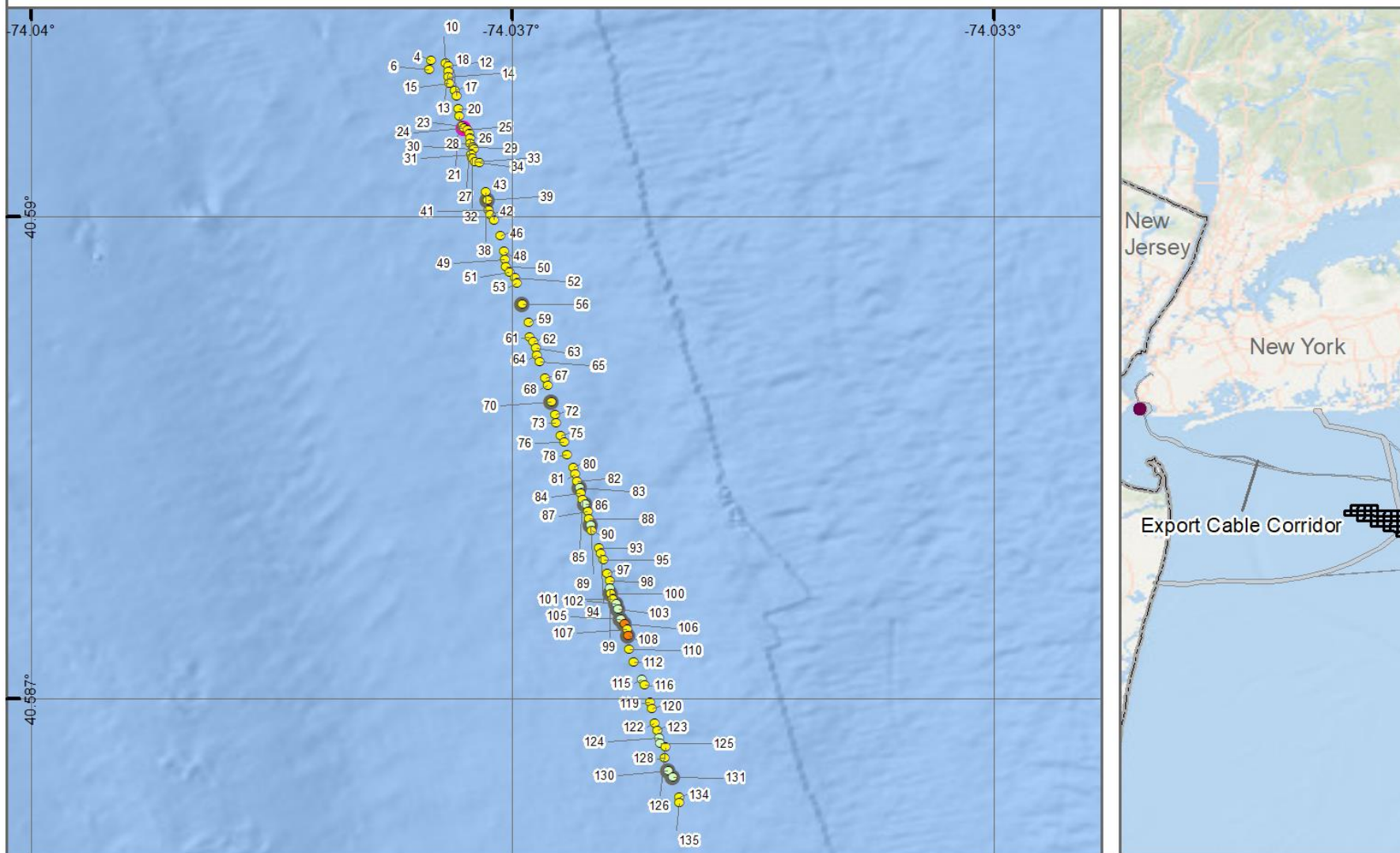
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0 112.5 225 Meters



Zone: EW1

Transect: EW1-05



CMECS Classification

- Biogenic Shell Hash
- Sand/Mud
- Gravelly Sand/Mud with P/G

Flora/Fauna Cover

- Moderate

Shell Cover

- Moderate



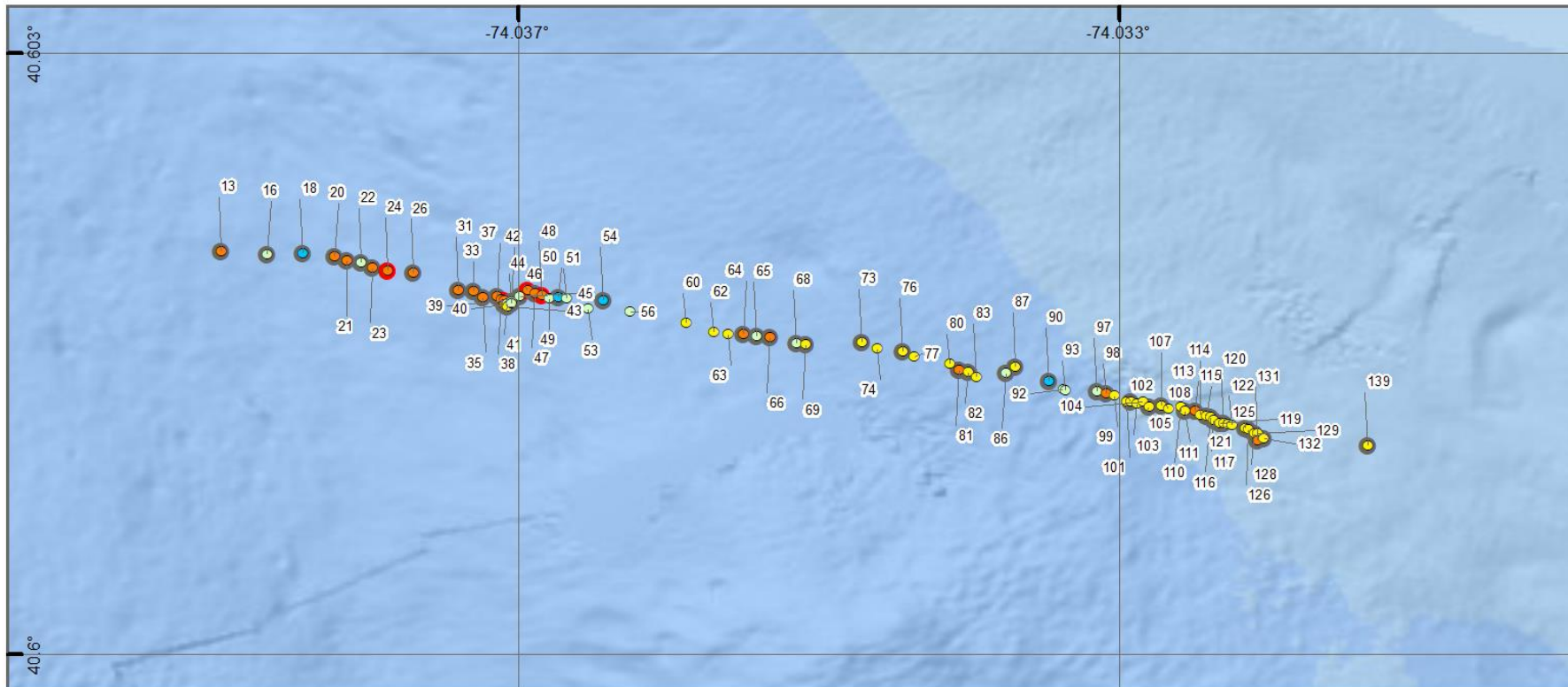
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0 110 220 Meters



Zone: EW1

Transect: EW1-06



CMECS Classification

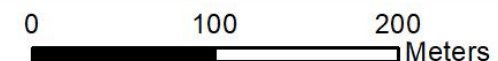
- Biogenic Shell Hash
- Gravel Mixes - Pebble/Granule with S/M
- Gravelly Sand/Mud with P/G
- Sand/Mud

Shell Cover

- Dense or Complete
- Moderate

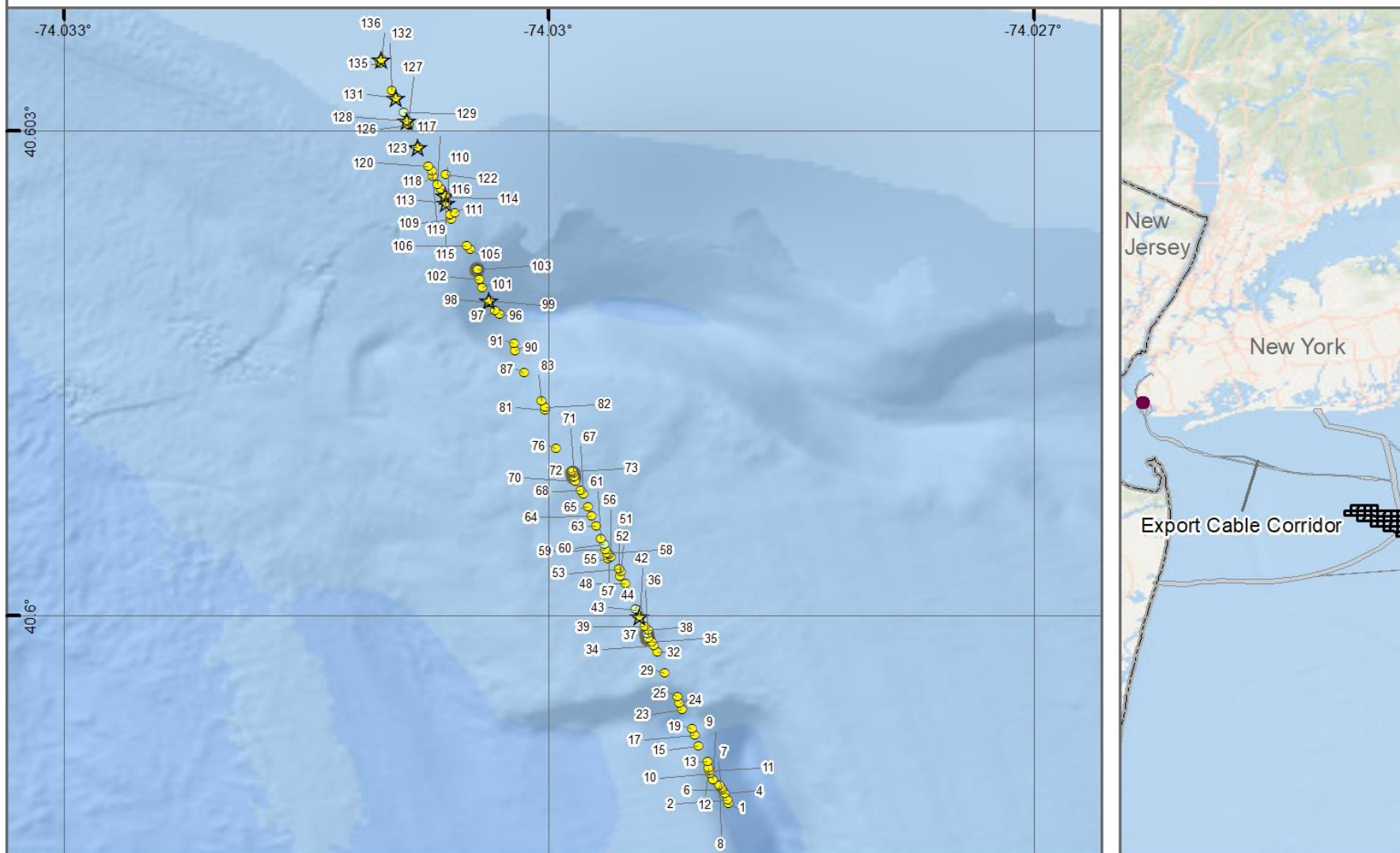


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Zone: EW1

Transect: EW1-07



CMECS Classification

- Gravelly Sand/Mud with P/G
- Sand/Mud

Other Cover

- ☆ Woody Debris

Shell Cover

- Moderate



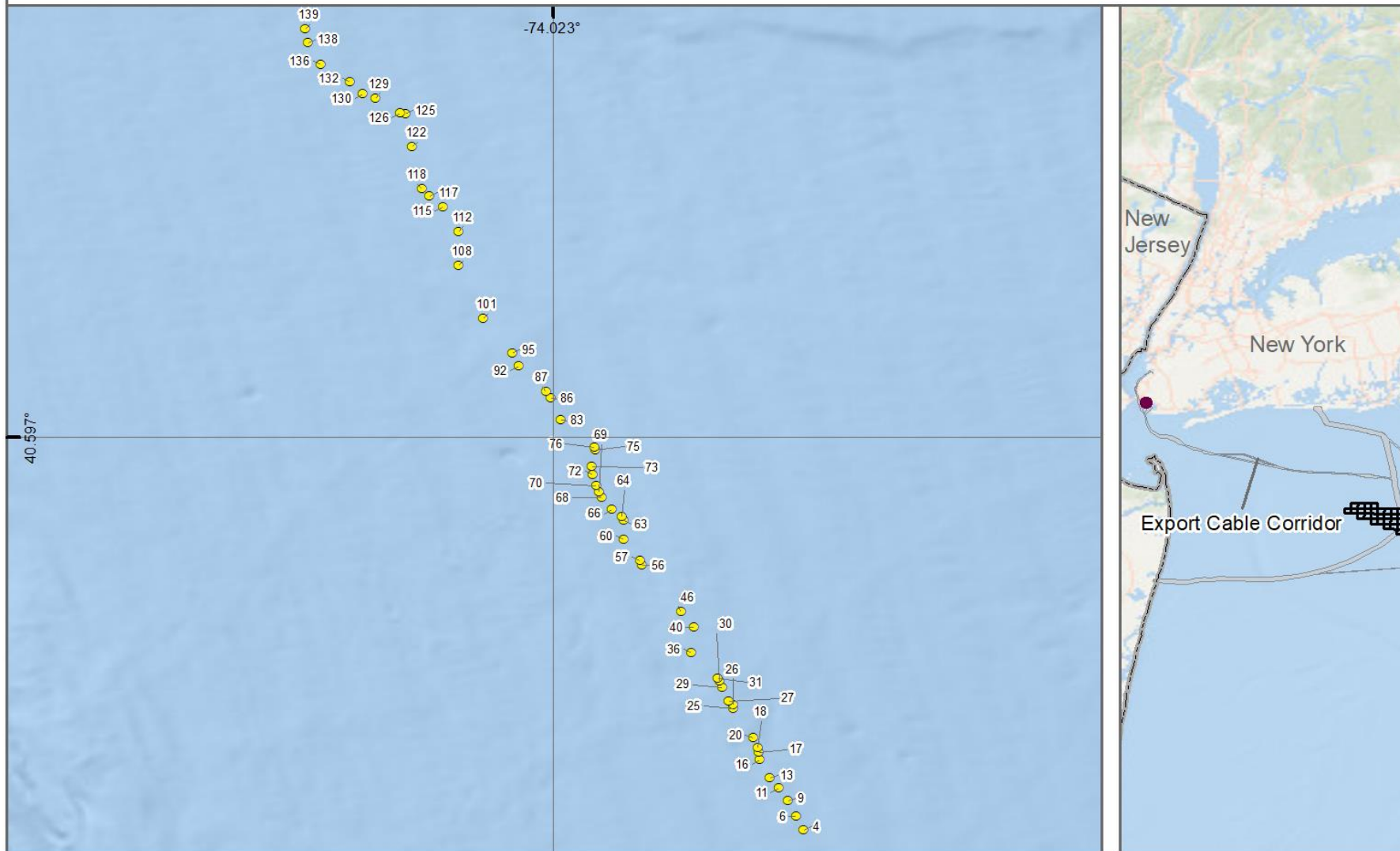
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0 110 220 Meters



Zone: EW1

Transect: EW1-08



CMECS Classification

● Sand/Mud



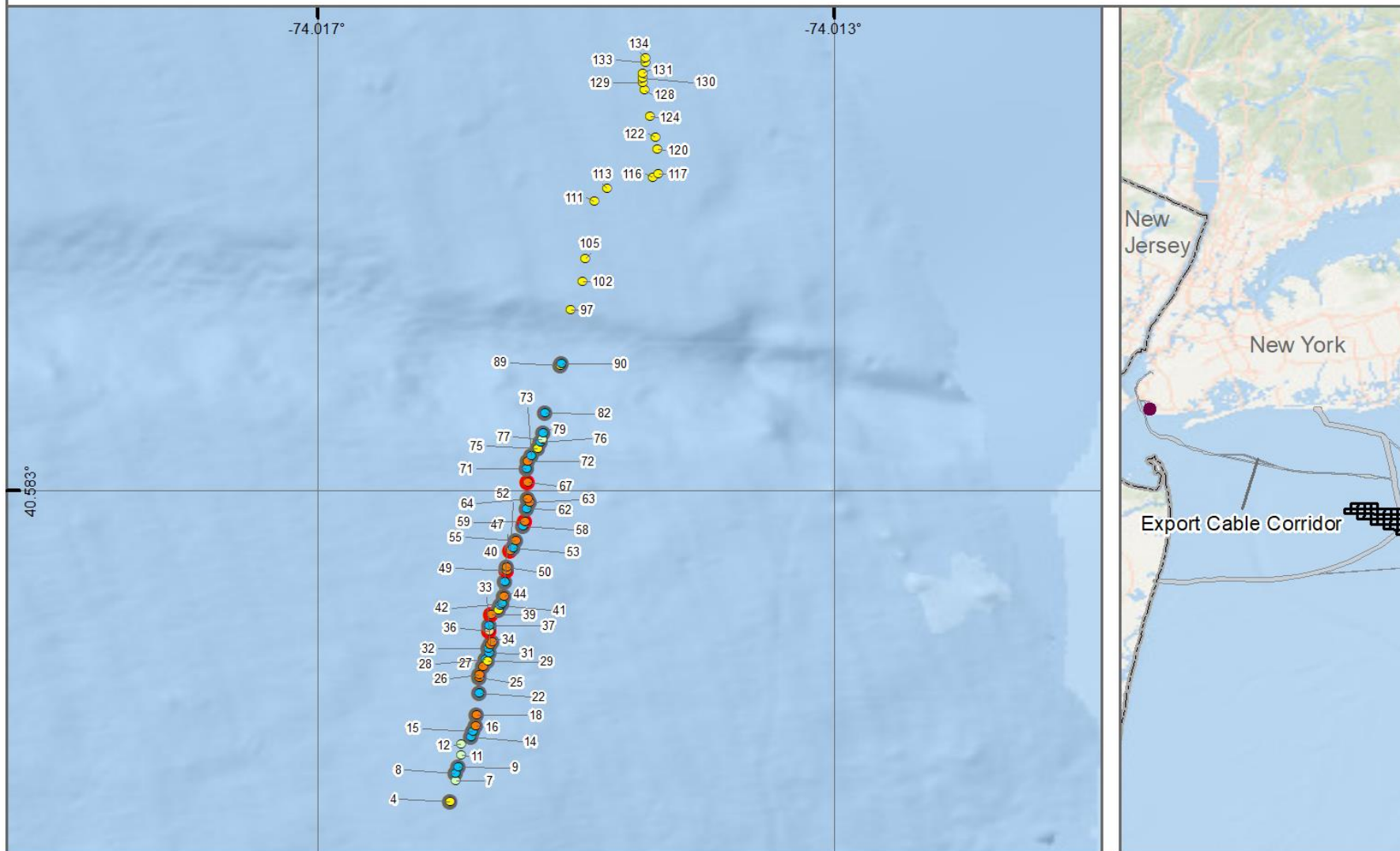
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0 90 180 Meters



Zone: EW1

Transect: EW1-09



CMECS Classification

- Biogenic Shell Hash
- Biogenic Shell Rubble
- Gravel Mixes - Pebble/Granule with S/M
- Gravelly Sand/Mud with P/G
- Sand/Mud

Shell Cover

- Dense or Complete
- Moderate



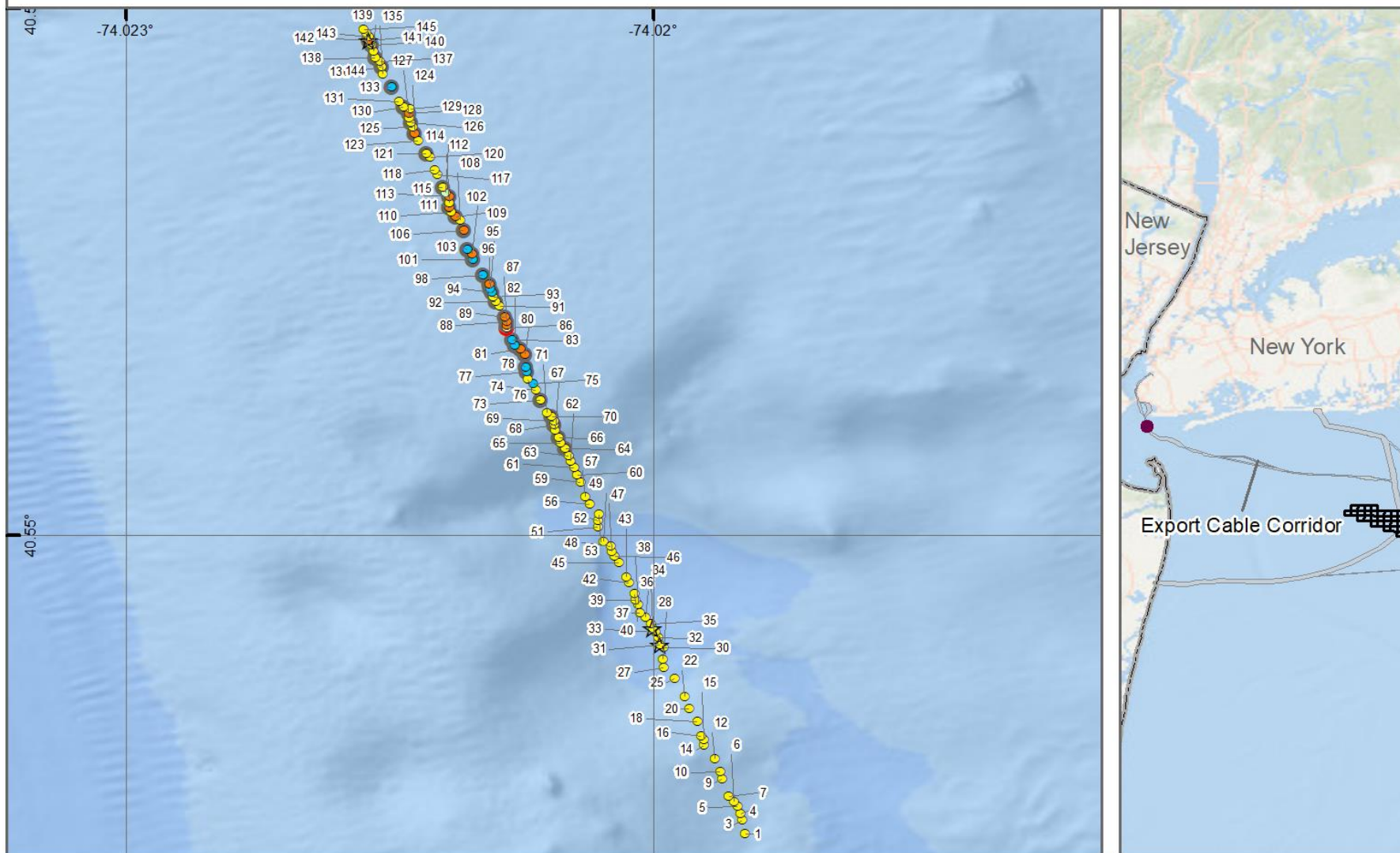
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0 100 200
Meters



Zone: EW1

Transect: EW1-10



CMECS Classification

- Biogenic Shell Hash
- Biogenic Shell Rubble
- Gravel Mixes - Pebble/Granule with S/M

- Gravelly Sand/Mud with P/G
- Sand/Mud

Other Cover

- ☆ Woody Debris

Shell Cover

- Dense or Complete
- Moderate



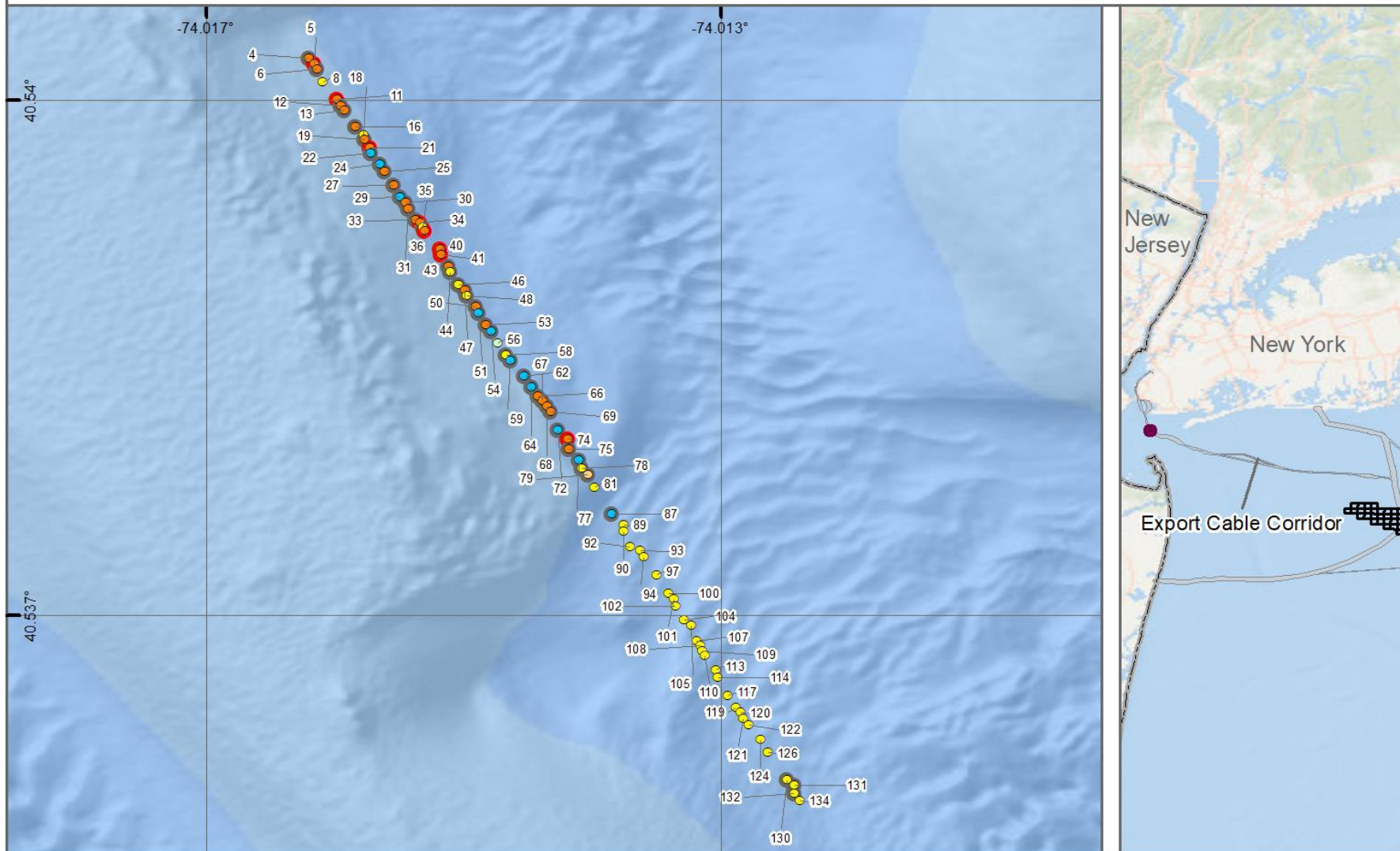
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0 100 200
Meters



Zone: EW1

Transect: EW1-11



CMECS Classification

- Biogenic Shell Hash
- Biogenic Shell Rubble
- Gravel Mixes - Pebble/Granule with S/M
- Gravelly Sand/Mud with P/G
- Sand/Mud

Shell Cover

- Dense or Complete
- Moderate



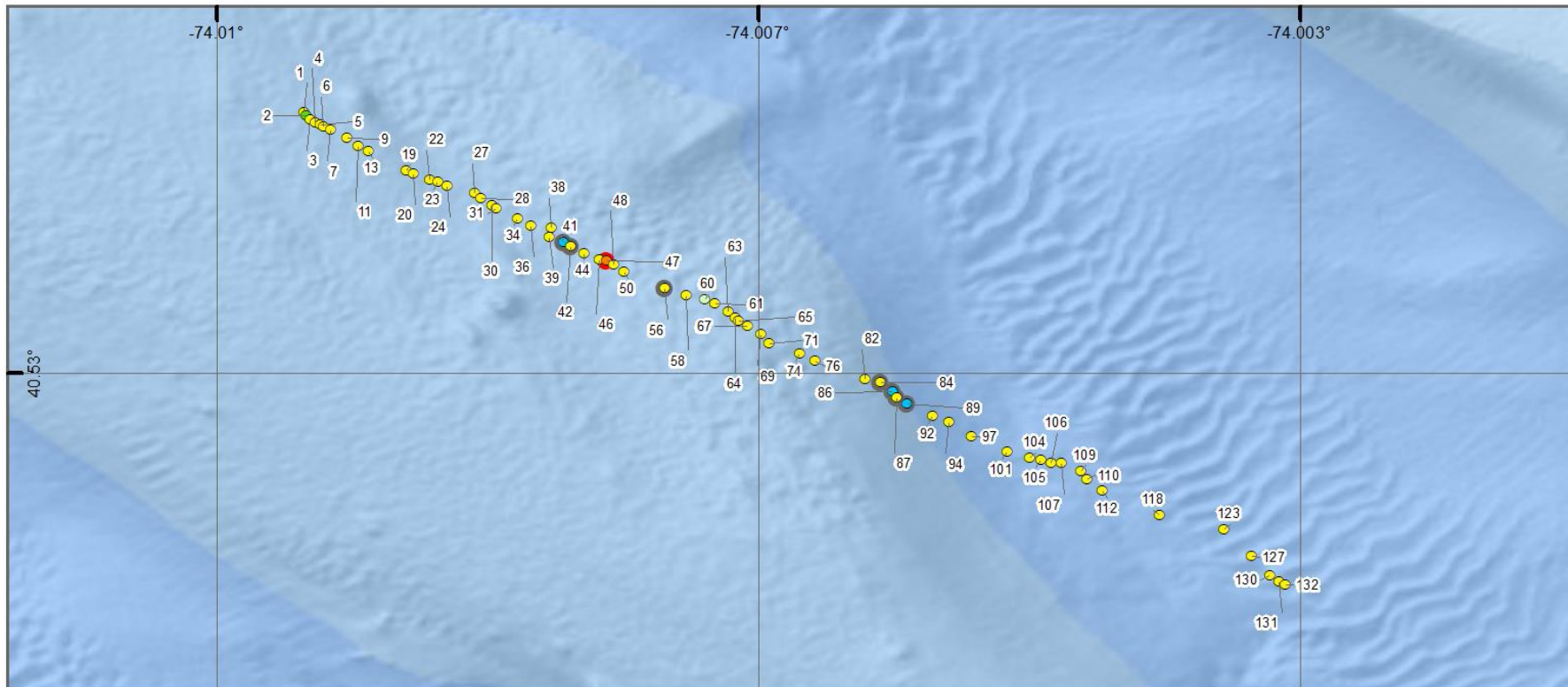
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0 100 200
Meters



Zone: EW1

Transect: EW1-12



CMECS Classification

- | | |
|--|------------------------------|
| ● Biogenic Shell Hash | ● Gravelly Sand/Mud with P/G |
| ● Gravel Mixes - Pebble/Granule with S/M | ● Sand/Mud |
| ● Gravelly Sand/Mud with C | |

Shell Cover

- | |
|---------------------|
| ● Dense or Complete |
| ● Moderate |



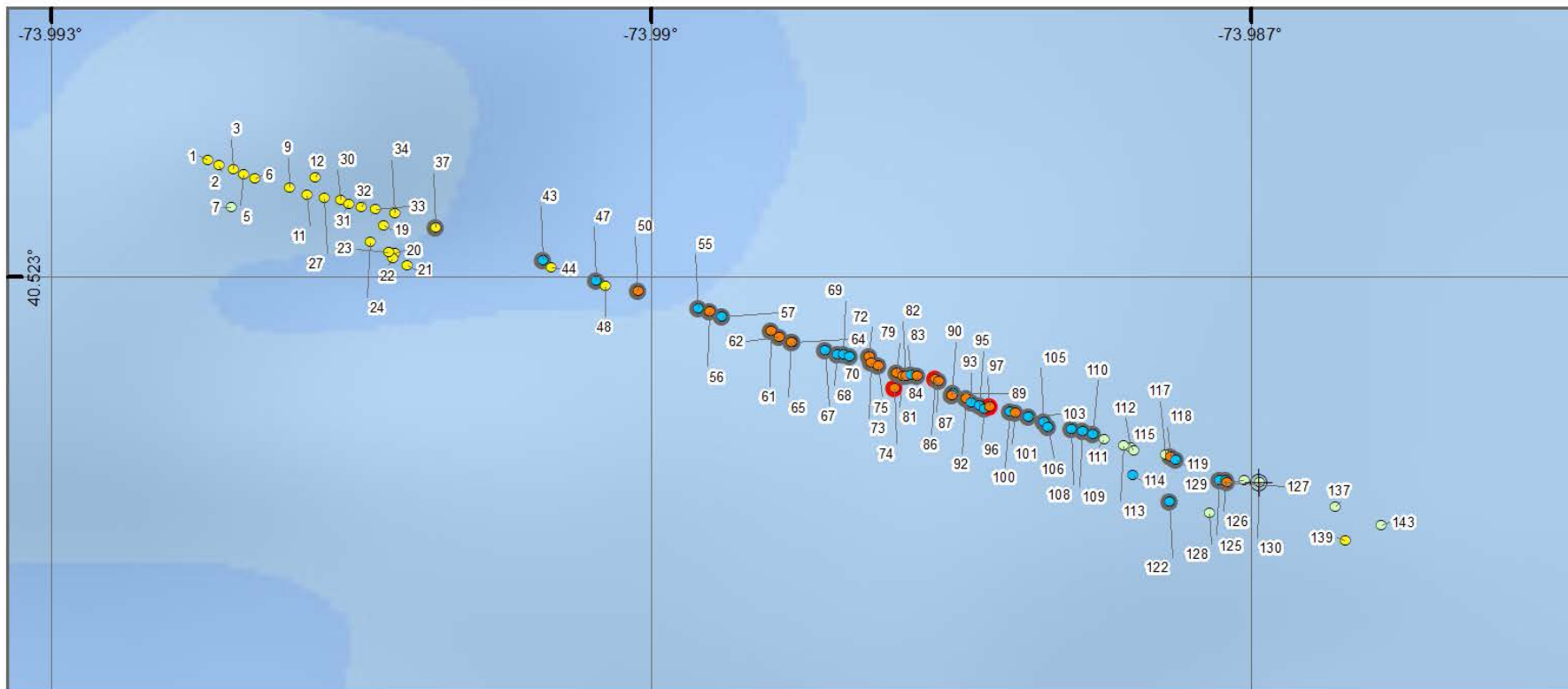
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0 110 220
Meters



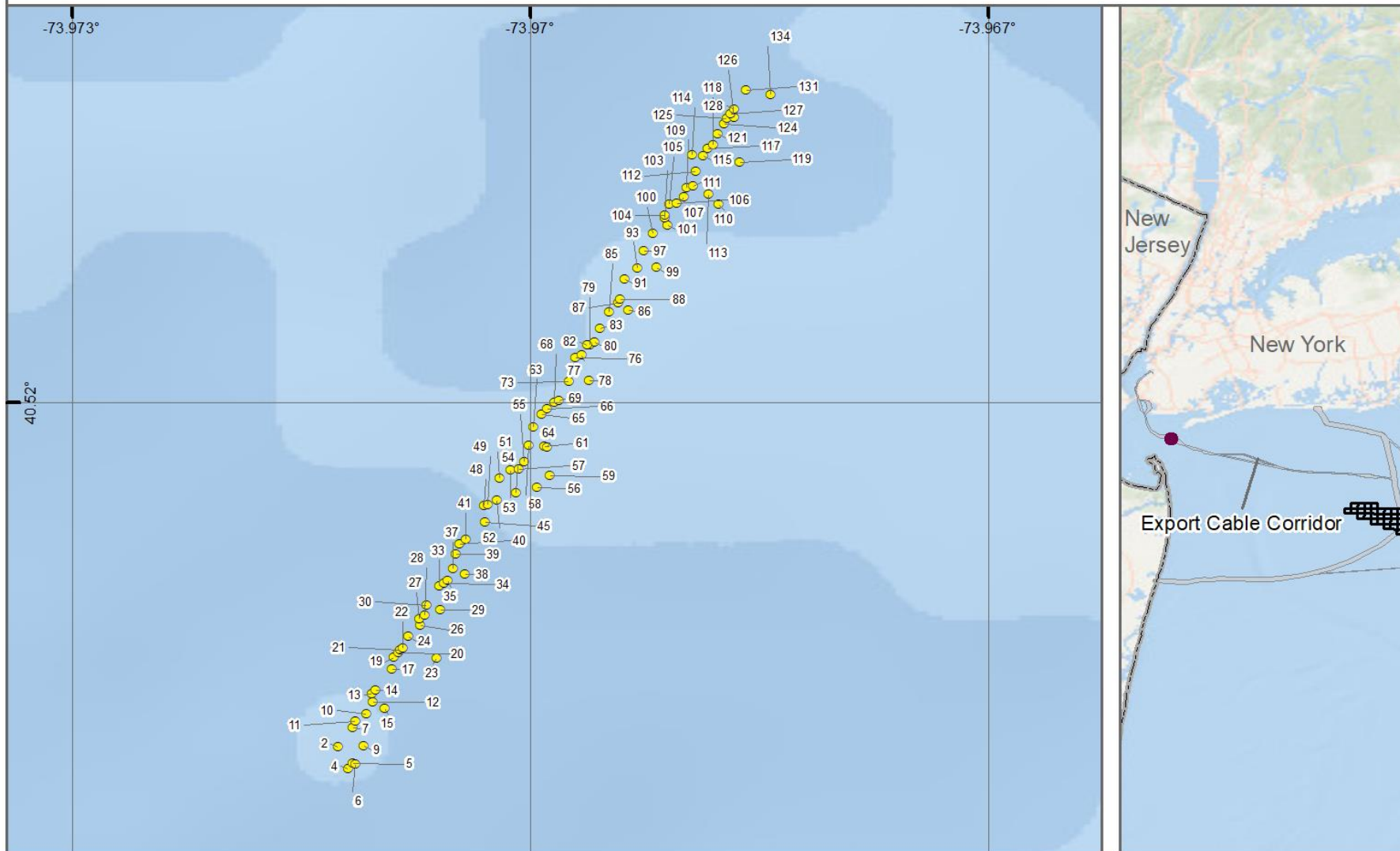
Zone: EW1

Transect: EW1-13



Zone: EW1

Transect: EW1-14



CMECS Classification

● Sand/Mud



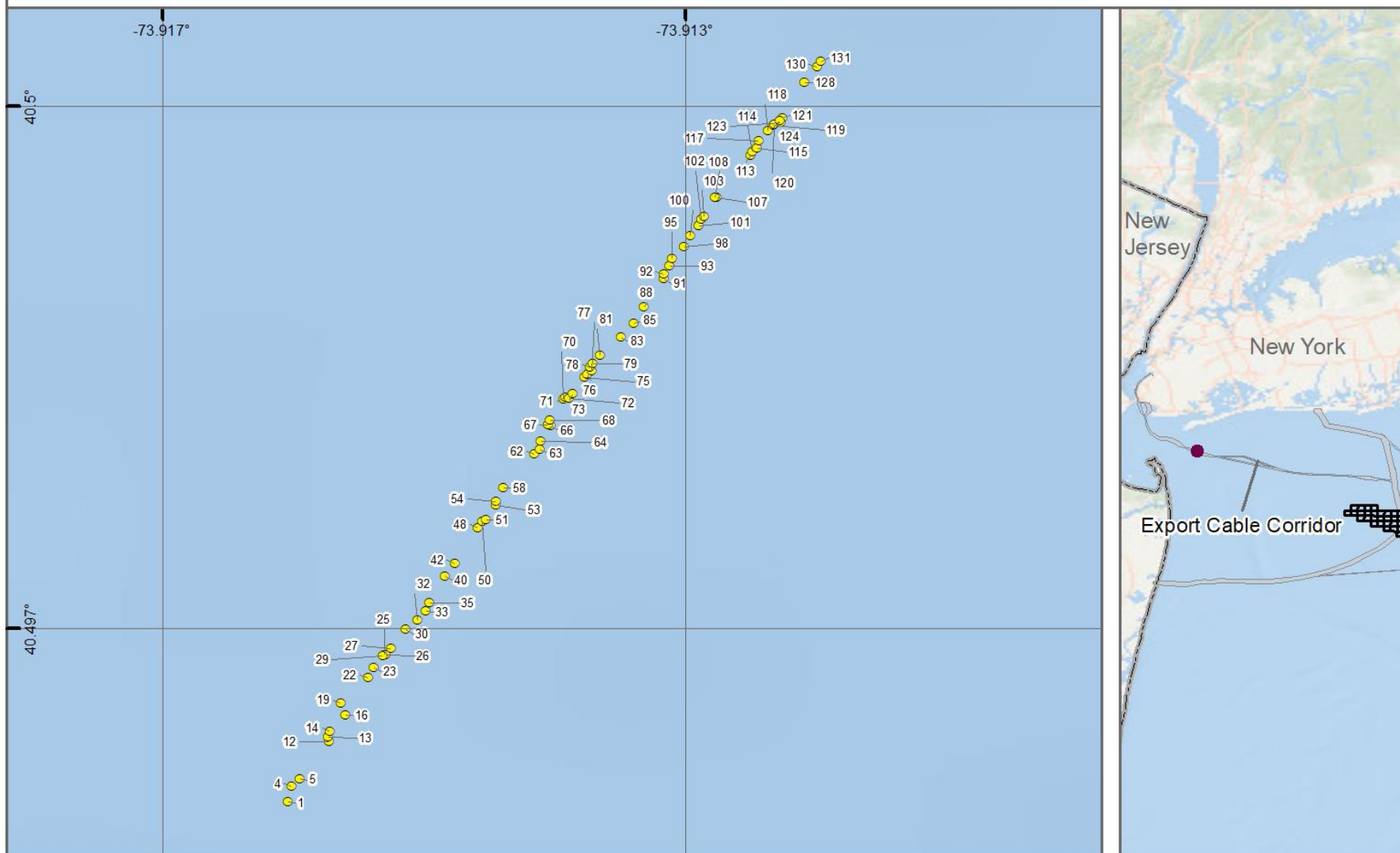
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0 115 230
Meters



Zone: EW1

Transect: EW1-15



CMECS Classification

● Sand/Mud



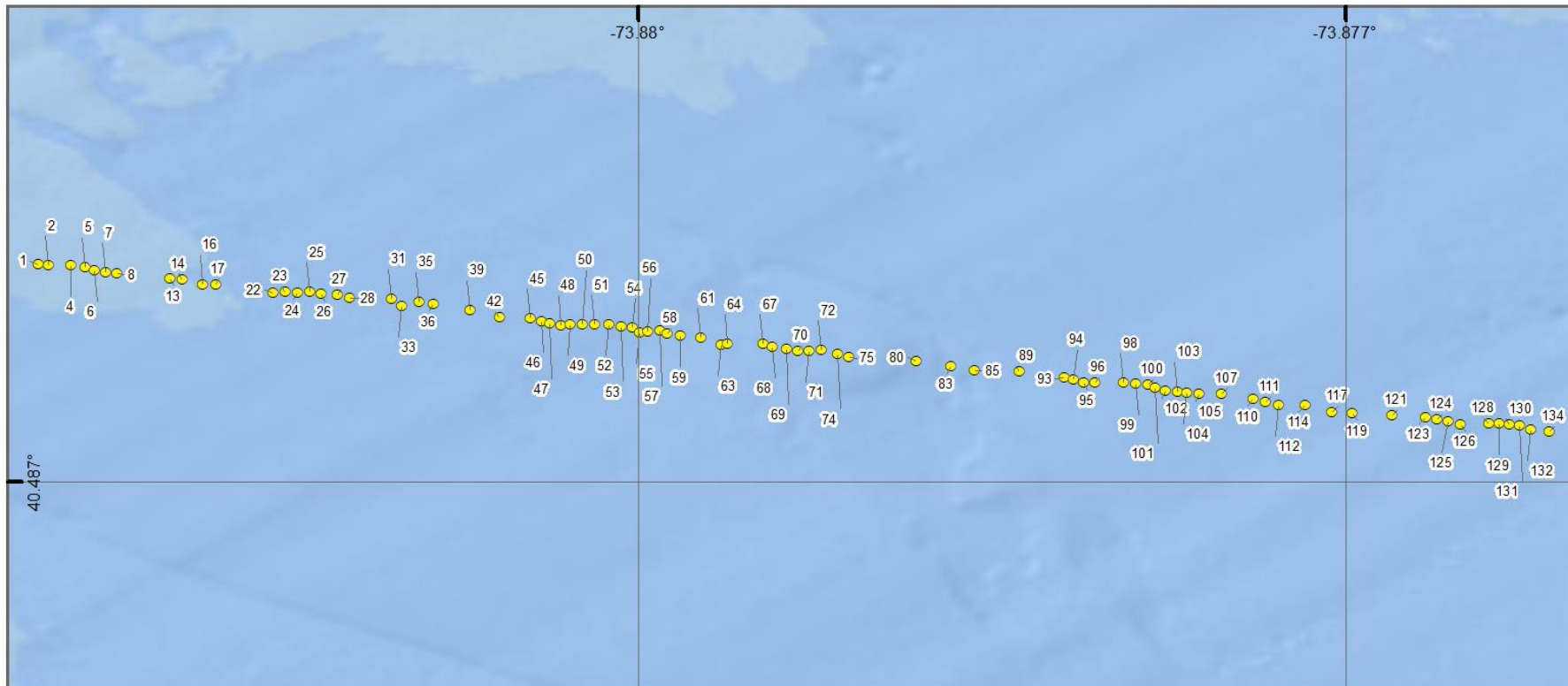
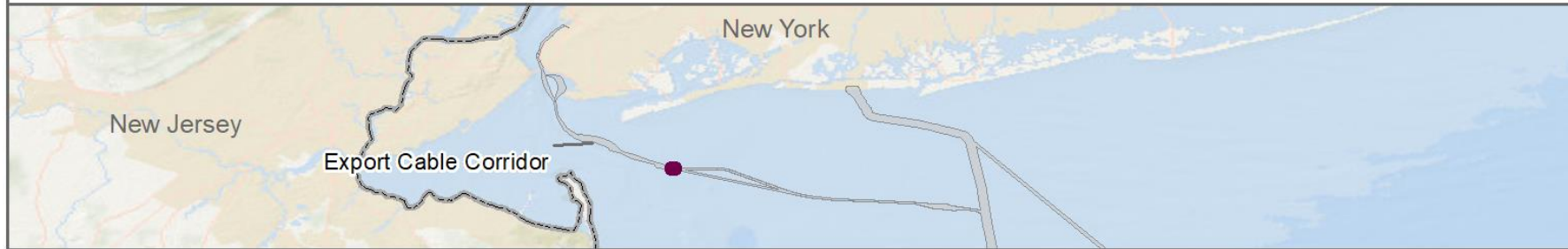
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0 100 200
Meters



Zone: EW1

Transect: EW1-16



CMECS Classification

● Sand/Mud



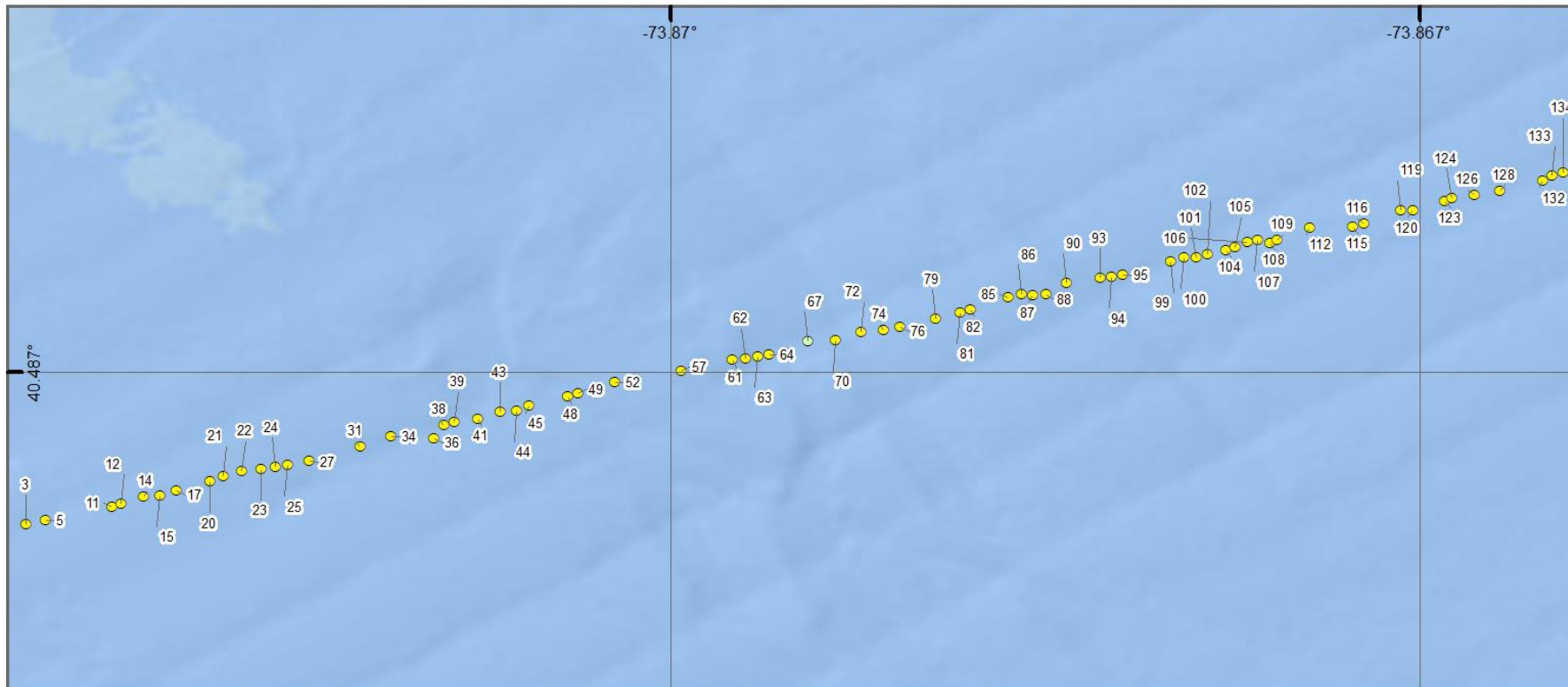
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0 80 160
Meters



Zone: EW1

Transect: EW1-17



CMECS Classification

- Gravelly Sand/Mud with P/G
- Sand/Mud



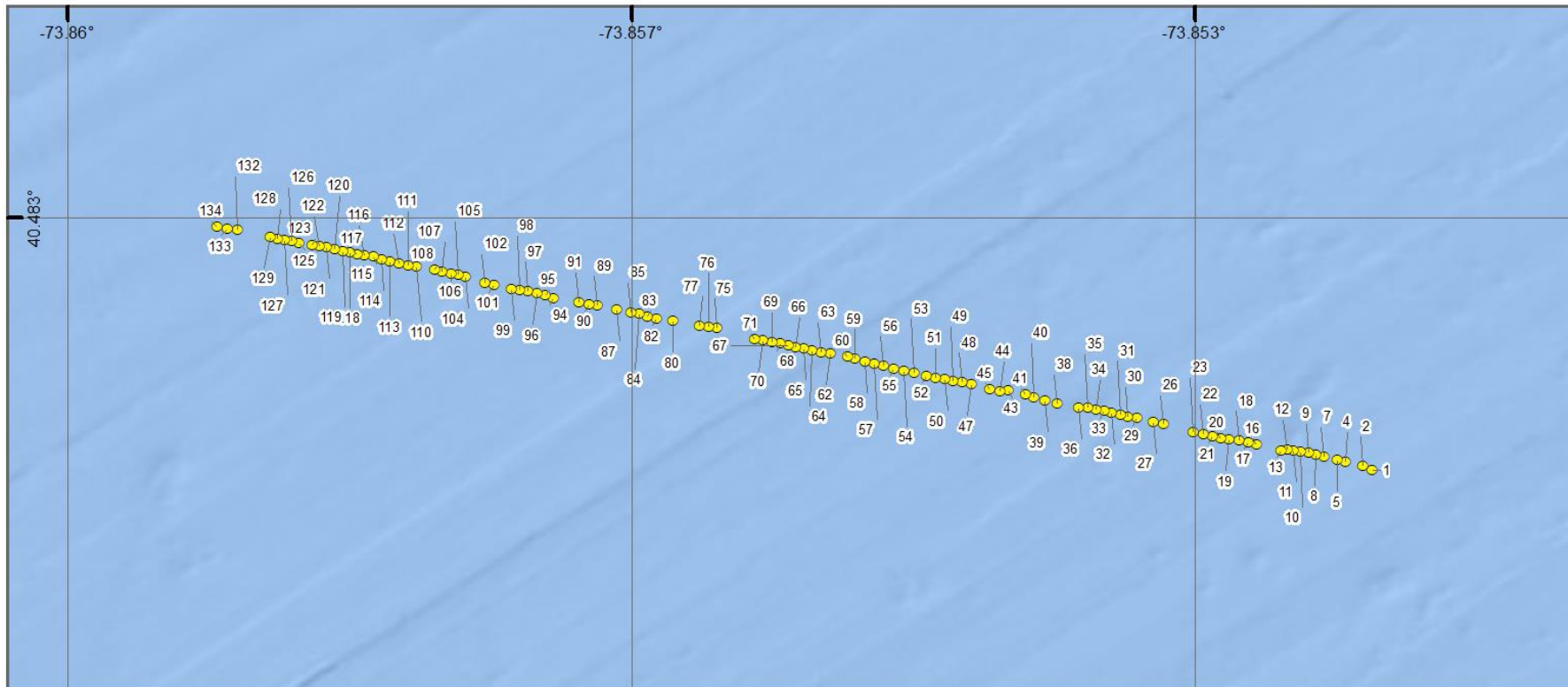
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0 80 160 Meters



Zone: EW1

Transect: EW1-18

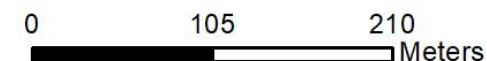


CMECS Classification

● Sand/Mud

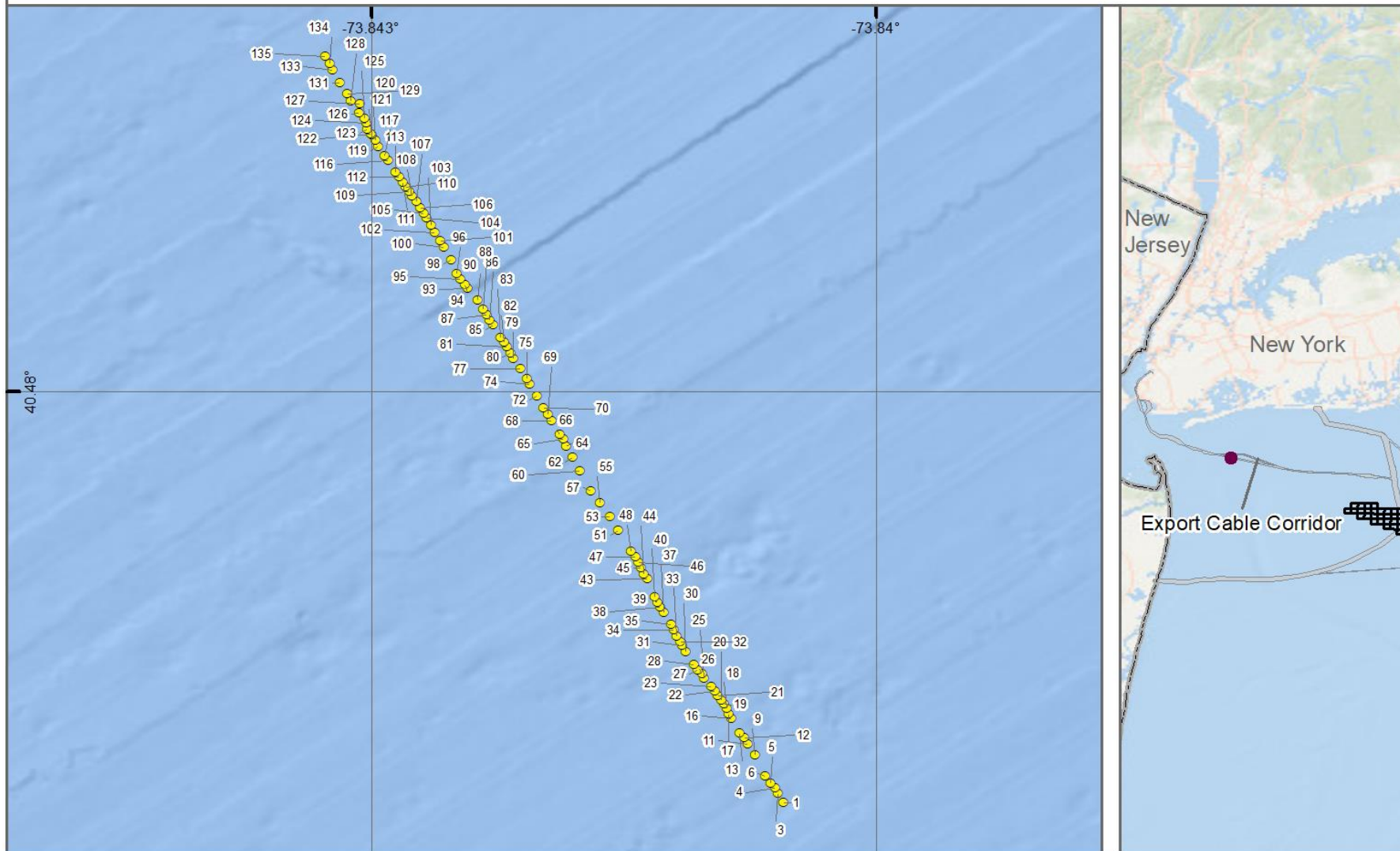


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Zone: EW1

Transect: EW1-19



CMECS Classification

● Sand/Mud



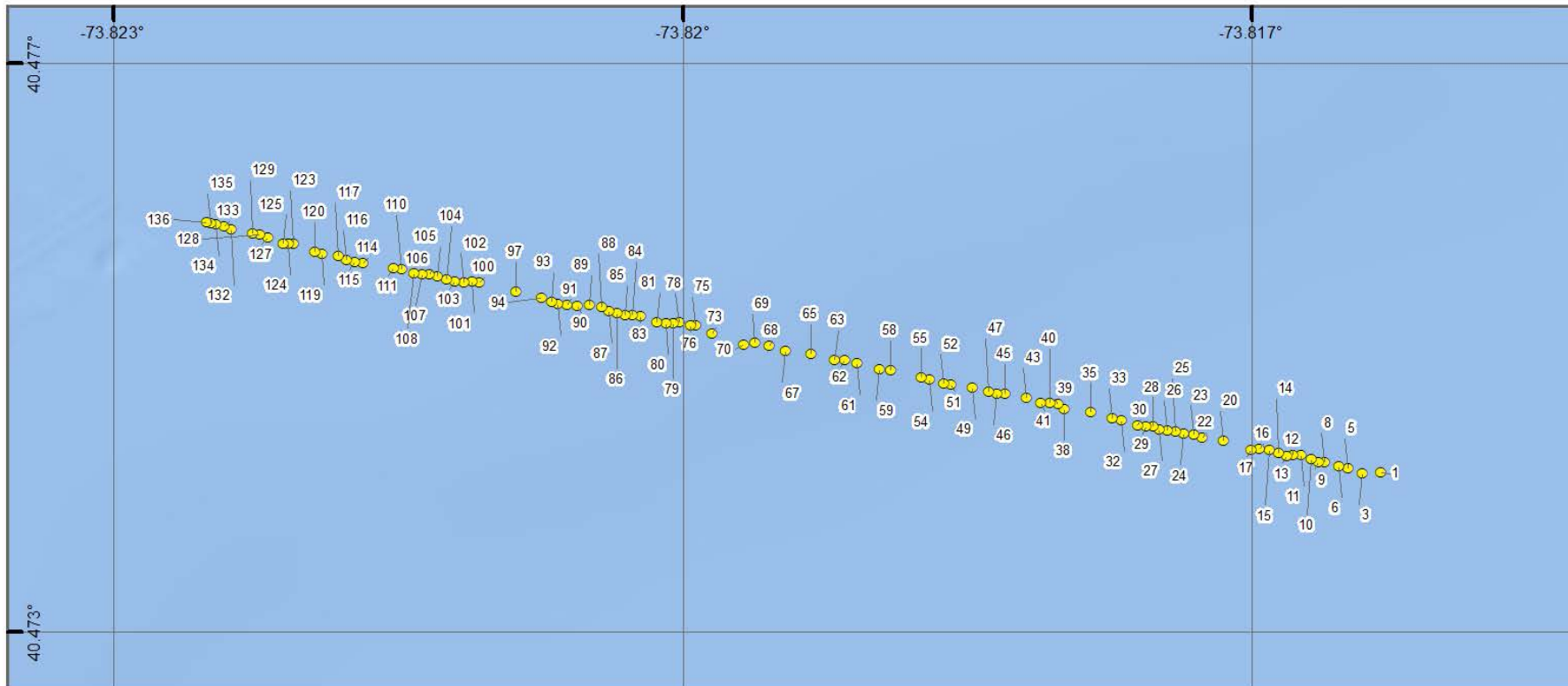
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0 105 210 Meters



Zone: EW1

Transect: EW1-20



CMECS Classification

● Sand/Mud



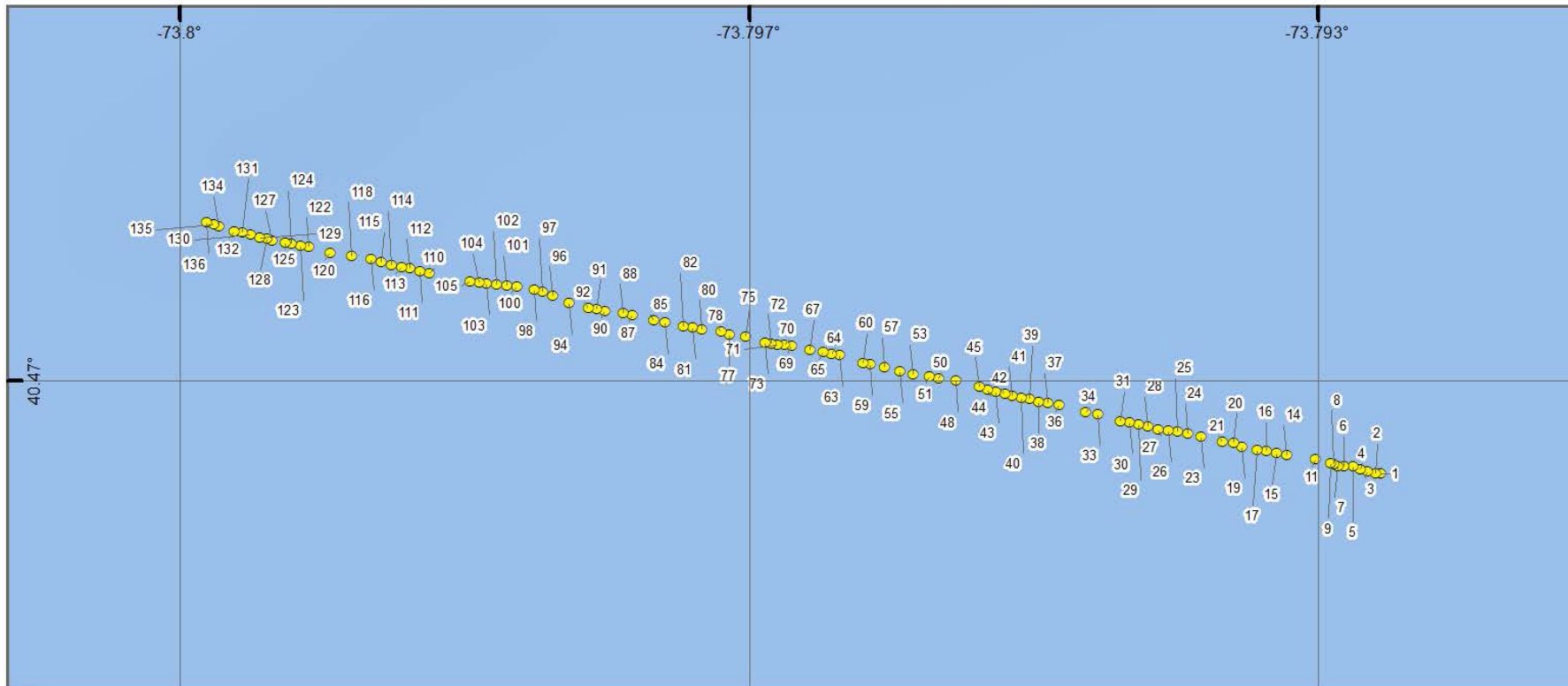
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0 105 210 Meters



Zone: EW1

Transect: EW1-21



CMECS Classification

● Sand/Mud



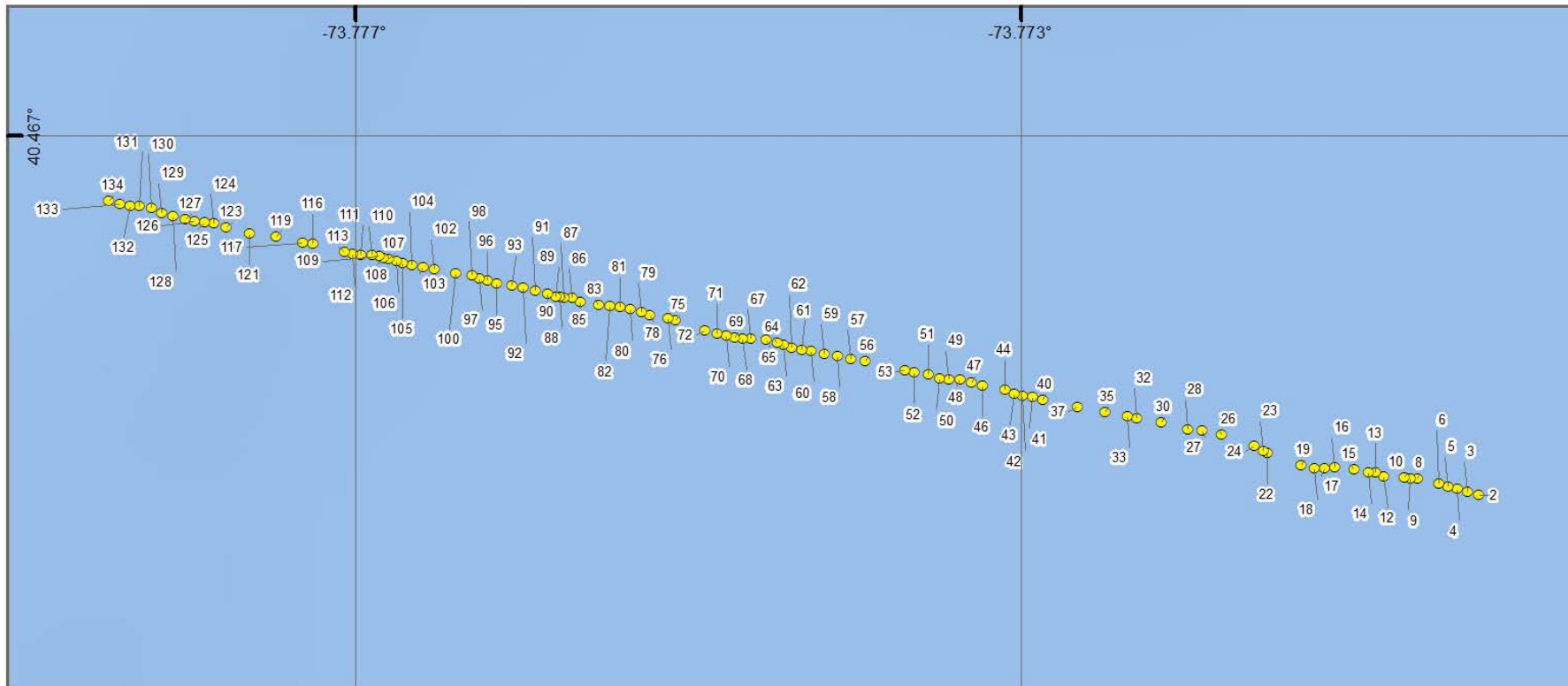
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0 105 210 Meters



Zone: EW1

Transect: EW1-22



CMECS Classification

● Sand/Mud



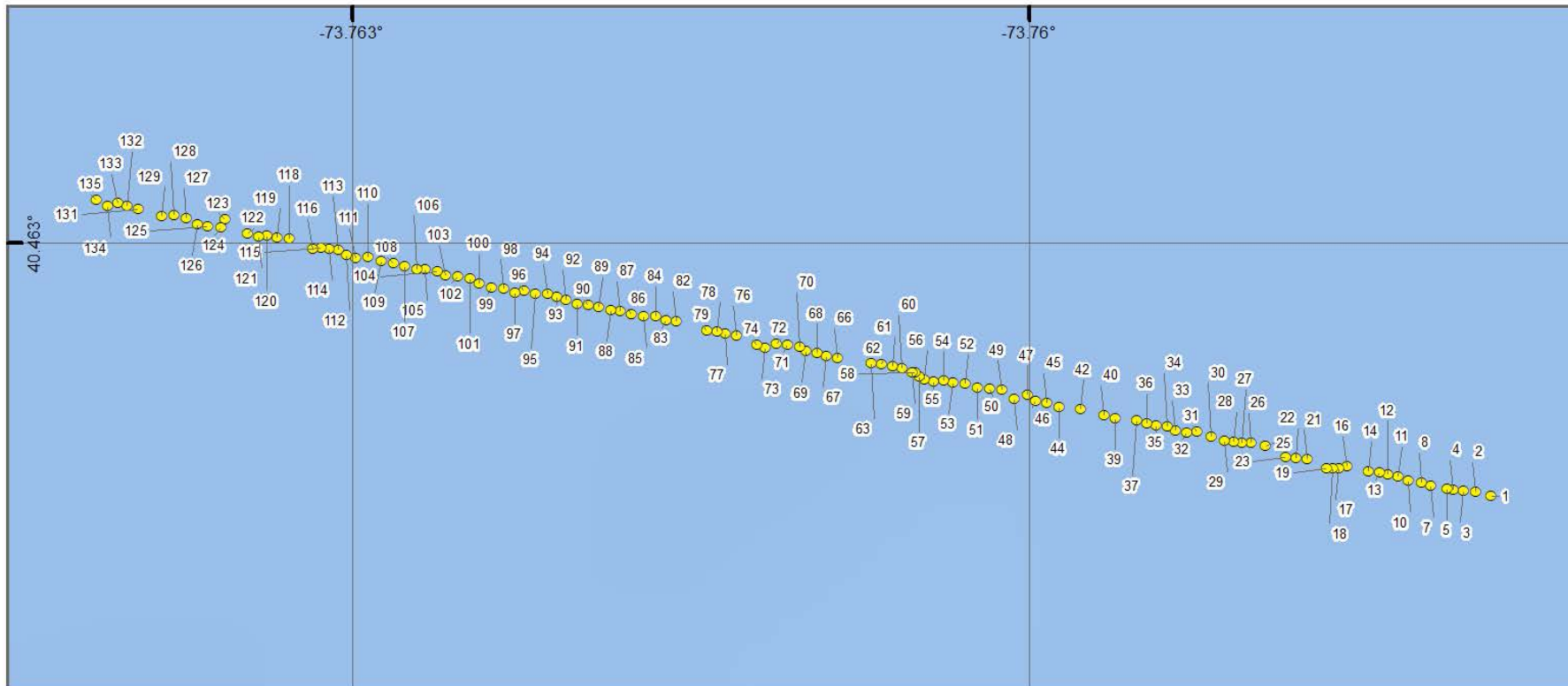
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0 87.5 175
Meters



Zone: EW1

Transect: EW1-23



CMECS Classification

● Sand/Mud



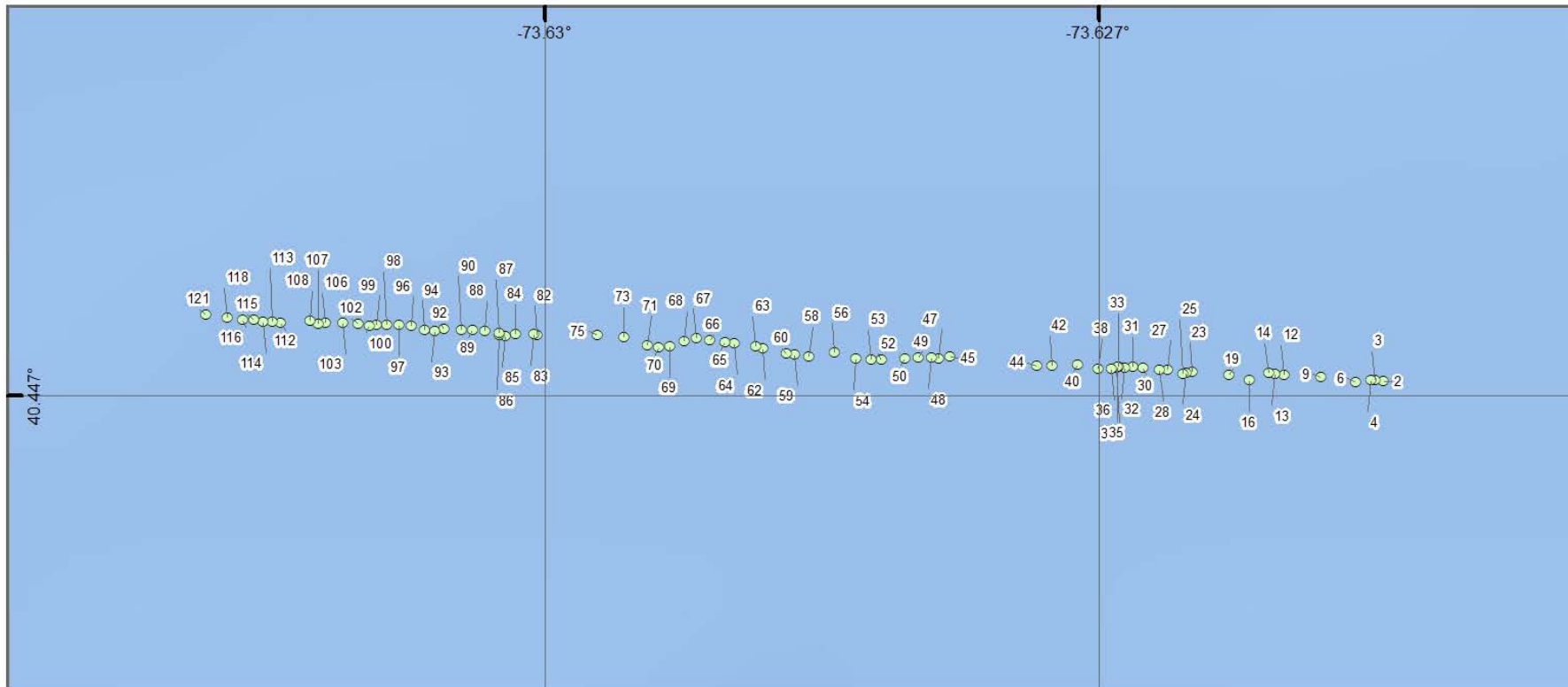
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0 87.5 175
Meters



Zone: EW1

Transect: EW1-24



CMECS Classification

- Gravelly Sand/Mud with P/G



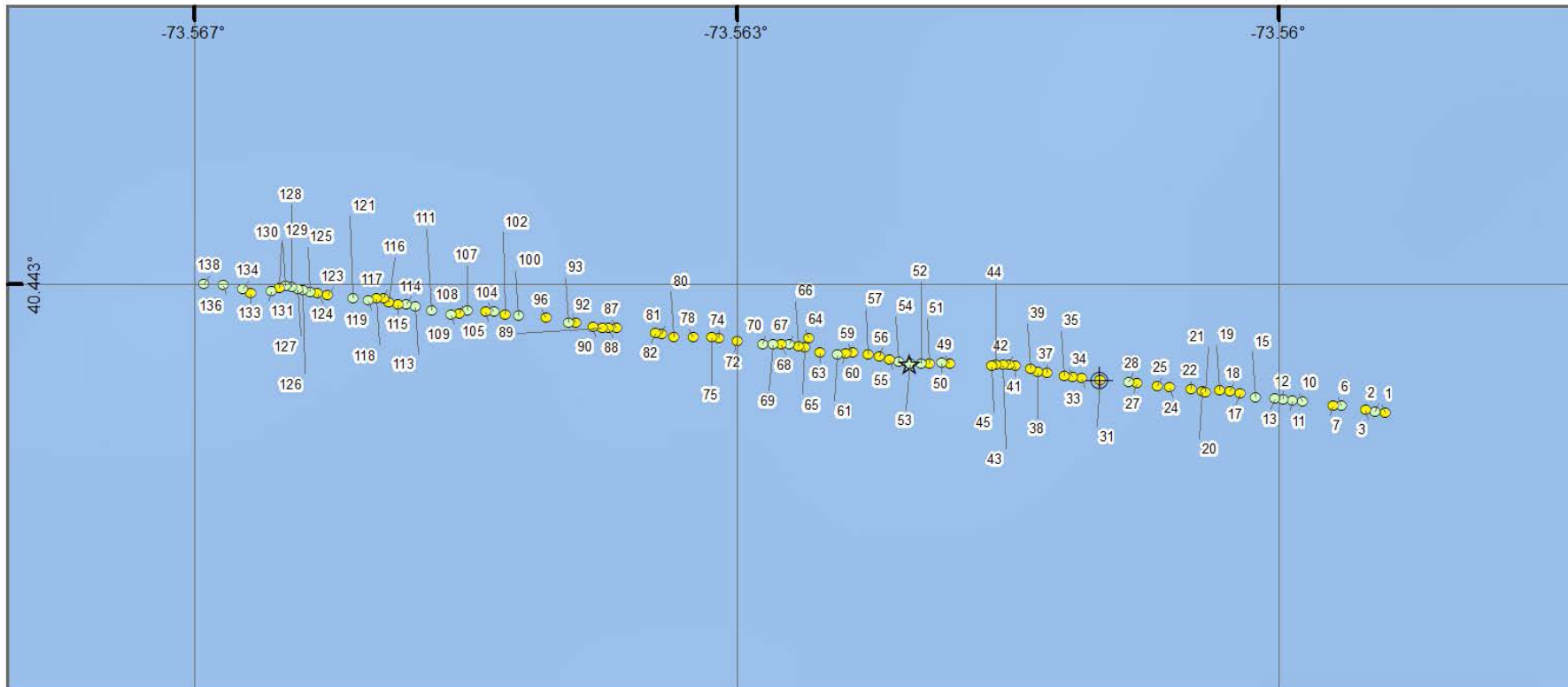
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0 105 210
Meters



Zone: EW1

Transect: EW1-25



CMECS Classification

- Gravelly Sand/Mud with P/G
- Sand/Mud

Other Cover

- ☆ Woody Debris
- ⊕ Anthropogenic Debris



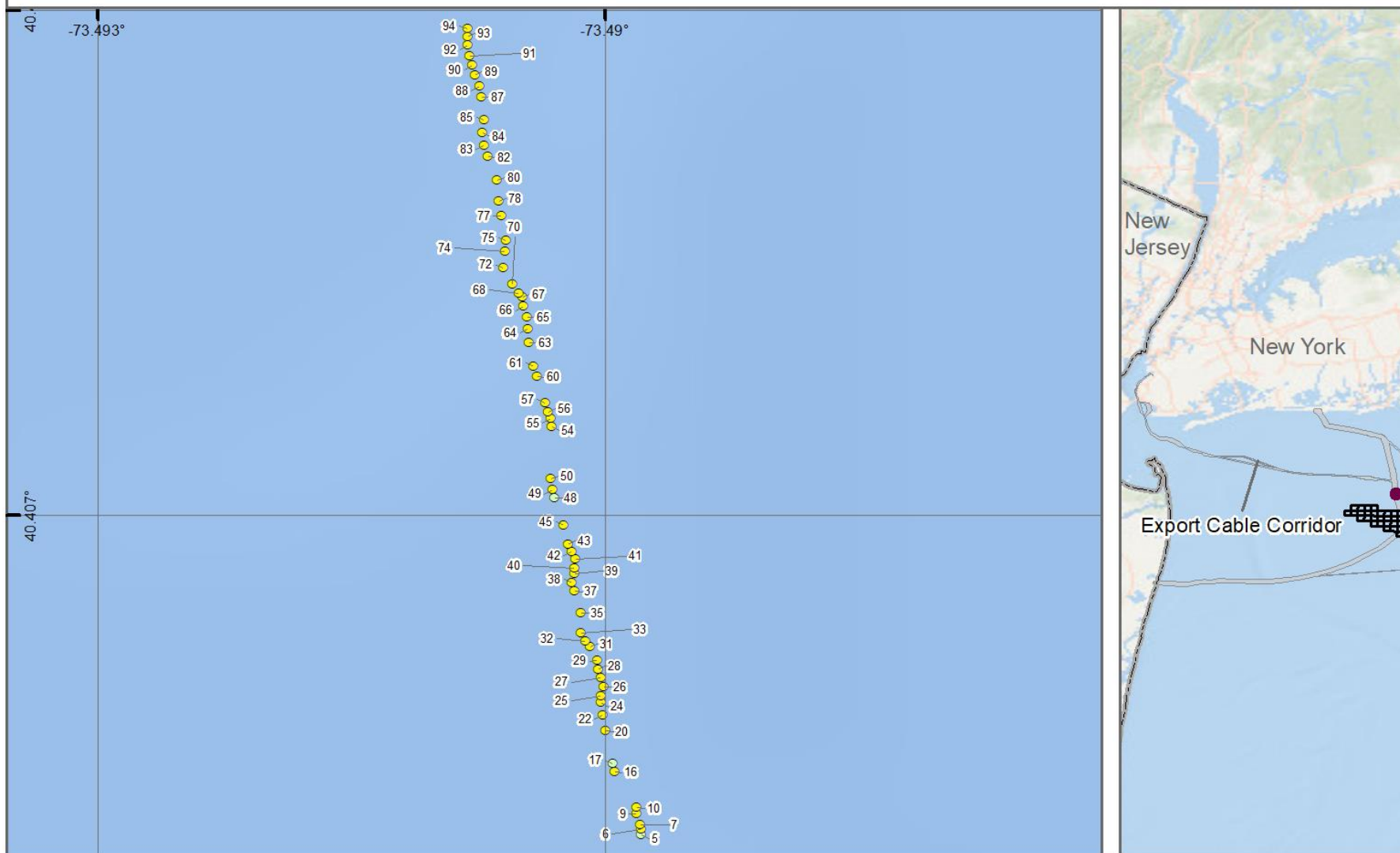
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0 110 220 Meters



Zone: EW1

Transect: EW1-26



CMECS Classification

- Gravelly Sand/Mud with P/G ● Sand/Mud



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0 105 210 Meters



APPENDIX F TERRASENSE ANALYSIS REPORT

Alpine #1894
Equinor Empire Wind
LABORATORY TESTING DATA SUMMARY

BORING NO.	IDENTIFICATION TESTS														
	WATER CONTENT	ORGANIC CONTENT (burnoff)	USCS SYMB. (1)	GRAVEL	VERY COARSE SAND	COARSE SAND	MEDIUM SAND	FINE SAND	VERY FINE SAND	MUD	D ₁₀₀	D ₆₀	D ₅₀	D ₃₀	D ₁₀
	(%)	(%)		(%)	(%)	(%)	(%)	(%)	(%)	(%)	(mm)	(mm)	(mm)	(mm)	(mm)
EW1-1-A3	124.5	6.9	OH	0	0	0	0	0	0	99	2	<0.075	<0.075	<0.075	<0.075
EW1-1-L3	137.5	6.5	OH	0	0	0	0	1	2	97	4.75	<0.075	<0.075	<0.075	<0.075
EW1-1-R3	187.0	7.7	OH	0	0	0	0	0	0	100	2	<0.075	<0.075	<0.075	<0.075
EW1-2-A3	109.3	4.1	OH	9	2	0	0	4	22	63	9.53	<0.075	<0.075	<0.075	<0.075
EW1-2-L3	101.2	3.7	OH	1	1	0	0	6	32	60	4.75	<0.075	<0.075	<0.075	<0.075
EW1-2-R3	165.3	6.7	OH	0	0	0	0	1	4	95	2	<0.075	<0.075	<0.075	<0.075
EW1-3-A1	52.2	2.8	OH	2	0	1	0	11	53	33	19.1	0.088	0.078	<0.075	<0.075
EW1-3-L2	37.0	0.6	SP-SM	0	0	0	1	70	20	9	4.75	0.162	0.150	0.120	0.078
EW1-3-R3	82.8	4.1	OH	4	1	1	5	16	16	58	19.1	<0.075	<0.075	<0.075	<0.075
EW1-4-A1	32.9	1.3	SP-SM	10	4	12	22	39	7	7	19.1	0.318	0.240	0.170	0.110
EW1-4-L1	43.0	1.7	SM	10	2	3	8	51	14	12	38.1	0.197	0.170	0.130	<0.075
EW1-4-R3	29.6	1.0	SP-SM	9	2	3	9	60	11	6	25.4	0.209	0.190	0.150	0.096
EW1-5-A1	34.0	0.8	SP-SM	6	2	3	17	58	11	5	25.4	0.217	0.200	0.160	0.100
EW1-5-L1	28.6	0.9	SP-SM	7	2	2	11	69	6	5	25.4	0.211	0.190	0.160	0.110
EW1-5-R1	36.7	1.2	SP-SM	9	2	2	11	52	17	8	19.1	0.202	0.180	0.130	<0.075
EW1-6-A1	59.0	1.5	OH	1	0	0	1	32	33	34	9.53	0.112	0.096	<0.075	<0.075
EW1-6-A2	51.3	2.2	SM	16	7	5	3	34	16	20	25.4	0.195	0.150	0.110	<0.075
EW1-6-L1	28.0	1.2	SP-SM	12	7	10	17	36	11	8	12.7	0.304	0.230	0.160	0.081
EW1-6-R1	83.7	2.4	OH	8	2	0	1	12	21	56	25.4	0.075	<0.075	<0.075	<0.075
EW1-7-A1	116.5	5.6	OH	24	0	1	0	8	14	53	25.4	0.091	<0.075	<0.075	<0.075
EW1-7-L1	28.9	0.9	SP-SM	12	6	9	24	34	9	7	25.4	0.327	0.250	0.170	0.093
EW1-7-R1	65.5	2.3	SC	1	1	0	1	19	43	35	9.53	0.096	0.082	<0.075	<0.075
EW1-8-A3	102.3	5.6	OH	3	2	1	2	4	16	73	9.53	<0.075	<0.075	<0.075	<0.075
EW1-8-L1	88.1	3.3	OH	5	2	1	2	4	31	55	25.4	<0.075	<0.075	<0.075	<0.075
EW1-8-R3	89.1	4.6	OH	0	0	1	0	3	22	74	4.75	<0.075	<0.075	<0.075	<0.075
EW1-9-L1	41.4	1.6	SM	22	9	8	5	26	15	14	38.1	0.463	0.200	0.120	<0.075
EW1-9-R5	42.7	1.4	SM	4	0	0	0	17	55	23	25.4	0.099	0.088	<0.075	<0.075

Prepared by: NG
Reviewed by: GET
Date: 4/21/2021

TerraSense, LLC
45H Commerce Way
Totowa, NJ 07512

Project No.: 7901-20002
File: Indx2b.xlsx
Page 1 of 3

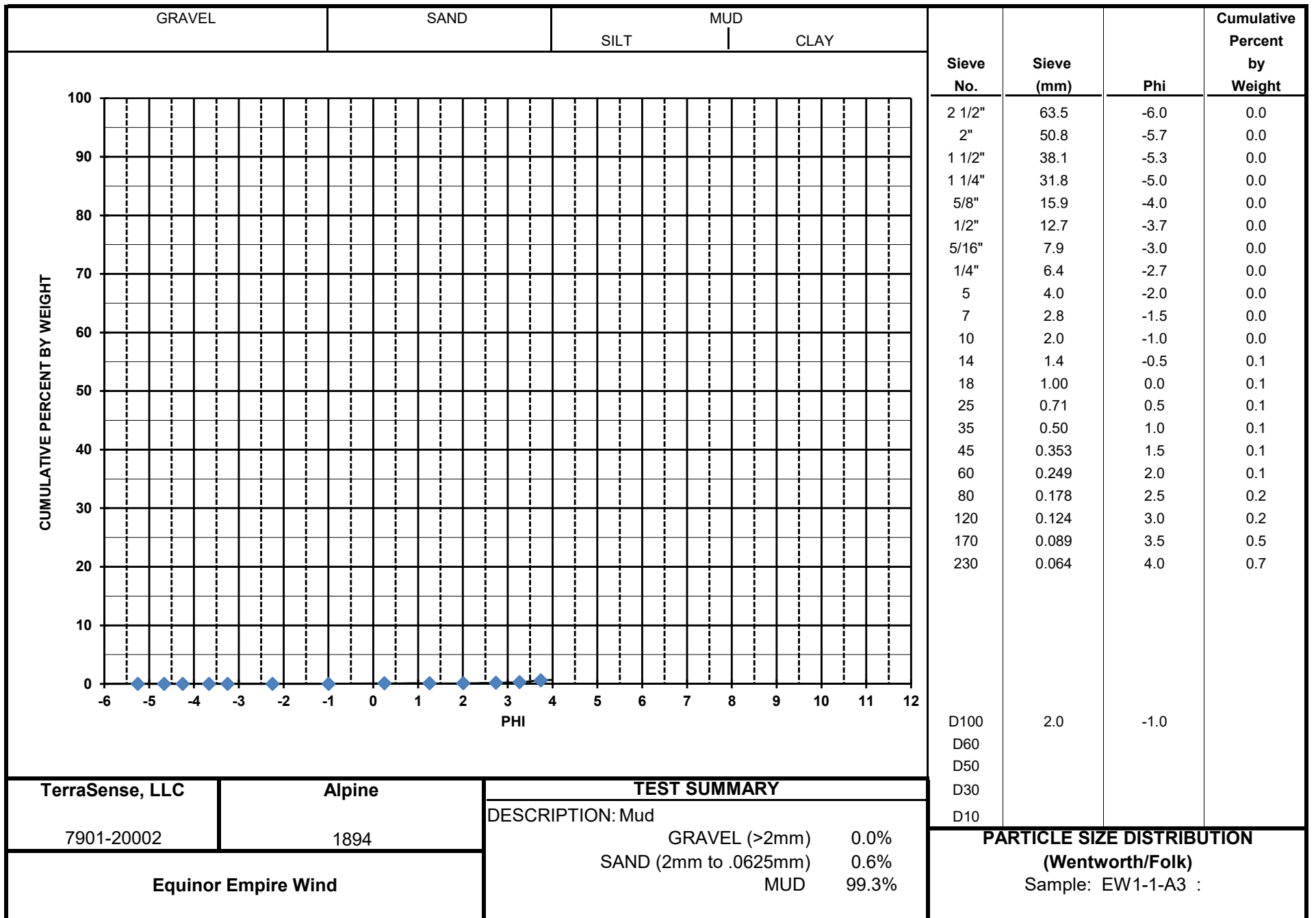
Alpine #1894
Equinor Empire Wind
LABORATORY TESTING DATA SUMMARY

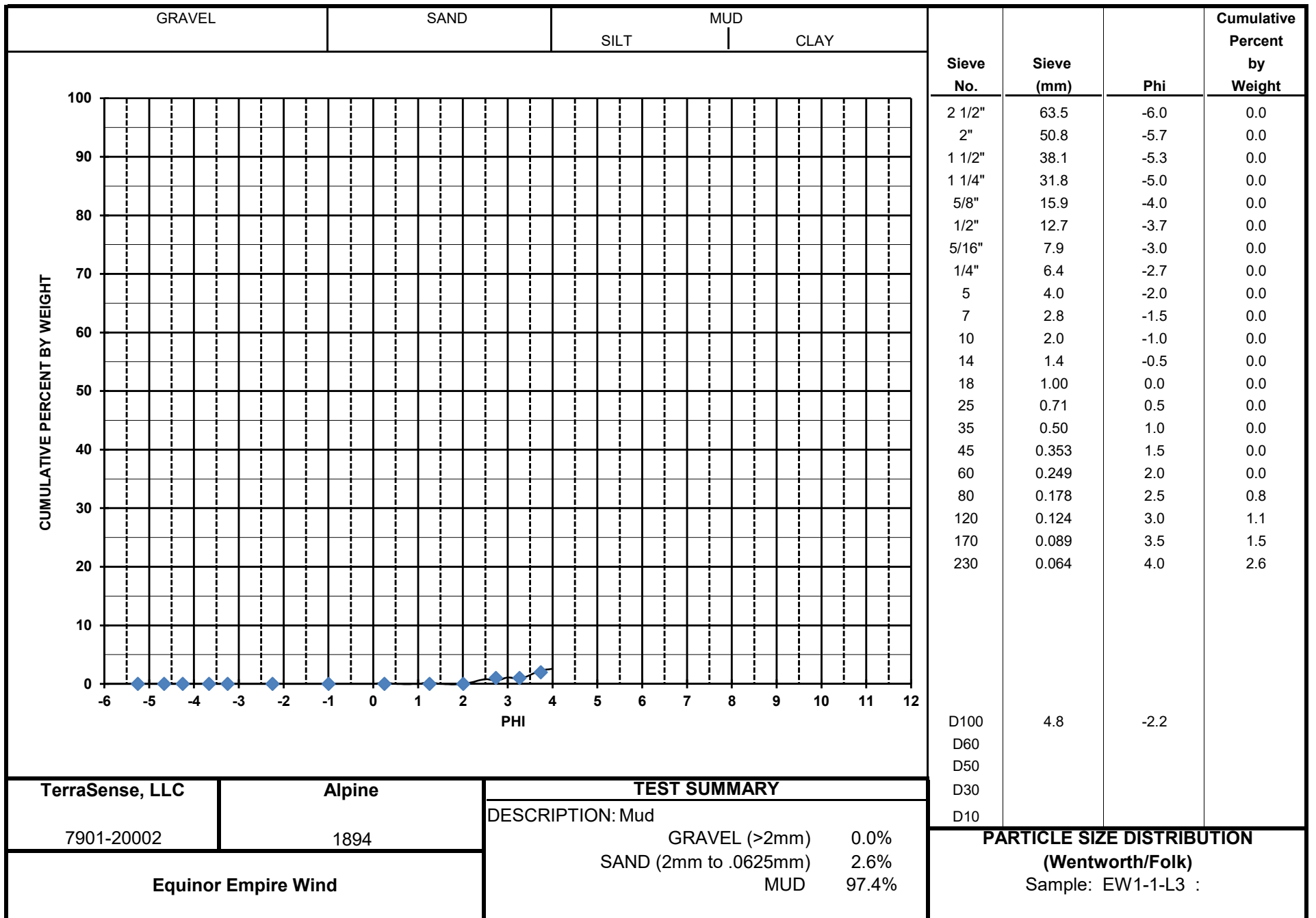
BORING NO.	IDENTIFICATION TESTS														
	WATER CONTENT	ORGANIC CONTENT (burnoff)	USCS SYMB. (1)	GRAVEL	VERY COARSE SAND	COARSE SAND	MEDIUM SAND	FINE SAND	VERY FINE SAND	MUD	D ₁₀₀	D ₆₀	D ₅₀	D ₃₀	D ₁₀
	(%)	(%)		(%)	(%)	(%)	(%)	(%)	(%)	(%)	(mm)	(mm)	(mm)	(mm)	(mm)
EW1-10-A2	31.1	0.8	SP-SM	5	4	4	18	53	11	5	12.7	0.225	0.200	0.160	0.091
EW1-10-L1	27.2	0.7	SP-SM	5	3	3	19	53	10	7	12.7	0.222	0.200	0.160	0.080
EW1-10-R2	89.1	3.9	SM	10	0	1	1	20	29	40	25.4	0.104	0.082	<0.075	<0.075
EW1-11-A1	25.4	0.6	SP	7	5	12	45	25	3	4	25.4	0.369	0.320	0.240	0.150
EW1-11-L1	43.3	1.9	SP-SM	35	2	1	8	34	11	9	25.4	0.368	0.230	0.160	0.075
EW1-11-R1	36.6	0.9	SP-SM	8	1	1	14	62	8	5	76.2	0.216	0.200	0.170	0.110
EW1-12-A1	28.8	0.5	SP	10	4	8	49	25	1	3	25.4	0.364	0.320	0.250	0.170
EW1-12-L2	24.7	0.3	SP	4	3	16	66	10	0	1	25.4	0.399	0.360	0.300	0.240
EW1-12-R1	27.4	0.4	SP	0	0	3	56	36	3	2	4.75	0.301	0.270	0.210	0.160
EW1-13-L1	21.0	0.3	SP	9	12	38	28	11	1	2	19.1	0.682	0.570	0.400	0.200
EW1-13-R1	21.9	0.2	SP	16	4	21	53	5	0	1	76.2	0.559	0.440	0.340	0.260
EW1-14-A1	23.0	0.3	SP	0	3	18	58	18	1	1	9.53	0.389	0.350	0.280	0.190
EW1-14-L1	23.5	0.3	SP	1	2	5	35	55	1	1	9.53	0.264	0.230	0.190	0.160
EW1-14-R1	21.4	0.3	SP	3	8	17	55	16	0	1	19.1	0.410	0.360	0.290	0.200
EW1-15-A1	23.4	0.4	SP	0	0	1	11	72	15	1	9.53	0.192	0.180	0.140	0.110
EW1-15-L1	26.5	0.5	SP	1	0	0	5	80	13	1	9.53	0.190	0.170	0.150	0.110
EW1-15-R2	21.6	0.4	SP	6	4	24	42	20	3	1	38.1	0.458	0.380	0.270	0.160
EW1-16-A1	20.1	0.6	SP	6	17	35	32	8	2	1	25.4	0.693	0.570	0.380	0.250
EW1-16-L3	23.3	0.5	SP	0	0	2	21	53	23	2	4.75	0.194	0.170	0.130	0.095
EW1-16-R2	25.4	0.6	SP-SM	0	0	1	13	57	26	2	4.75	0.174	0.150	0.120	0.087
EW1-17-A3	17.9	0.7	SP	2	6	37	40	8	3	3	9.53	0.549	0.470	0.330	0.180
EW1-17-L2	24.9	0.6	SP	0	0	1	15	59	21	3	4.75	0.182	0.160	0.130	0.098
EW1-17-R1	24.5	0.5	SP	1	0	3	33	49	14	0	9.53	0.240	0.210	0.160	0.110
EW1-18-A1	26.5	0.8	SP	3	1	2	14	50	28	3	25.4	0.182	0.160	0.120	0.086
EW1-18-L1	21.7	0.5	SP	0	0	2	30	51	15	1	4.75	0.227	0.200	0.160	0.110
EW1-18-R1	31.1	0.8	SP-SM	3	1	2	9	50	32	5	19.1	0.160	0.140	0.110	0.080

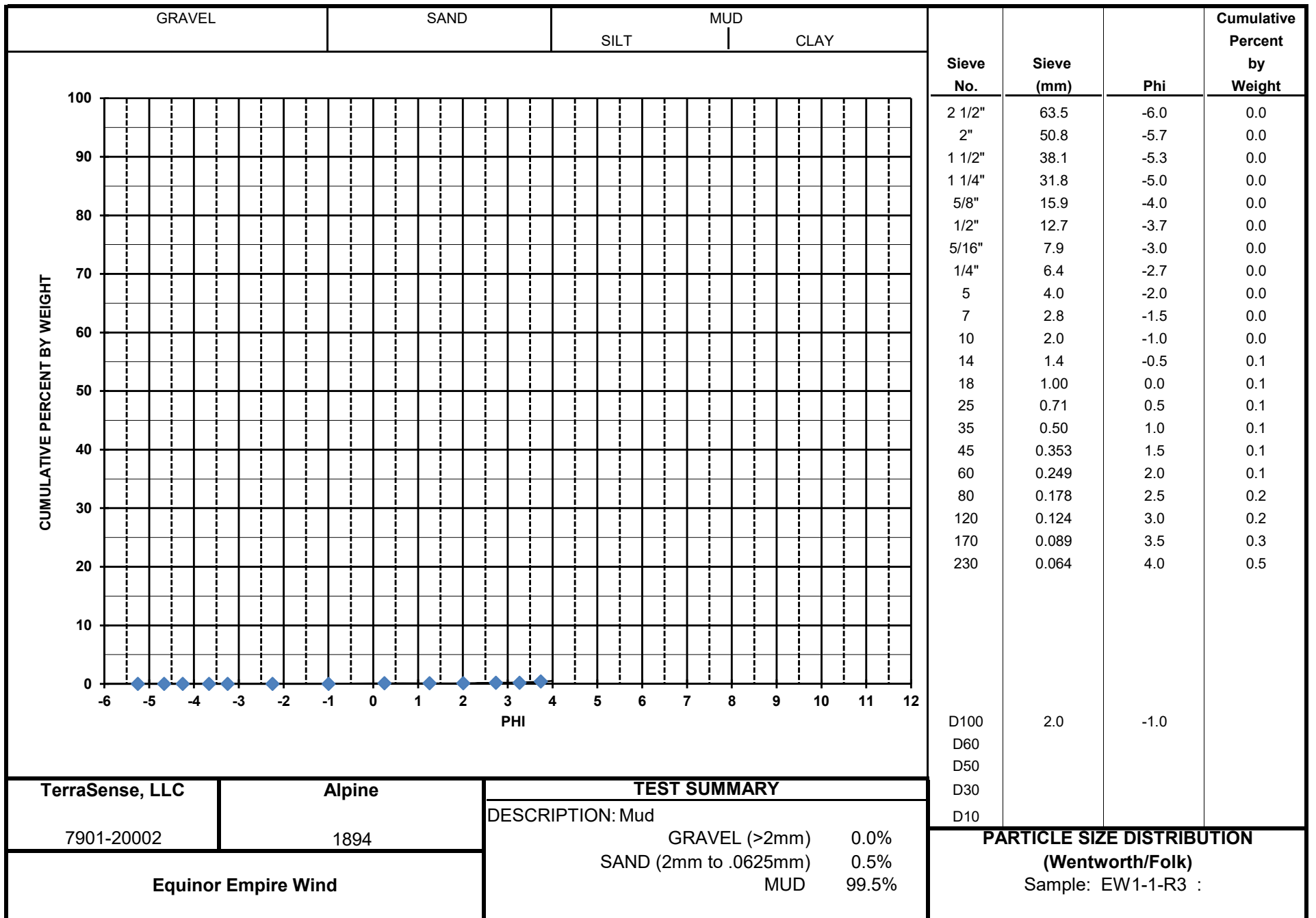
Alpine #1894
Equinor Empire Wind
LABORATORY TESTING DATA SUMMARY

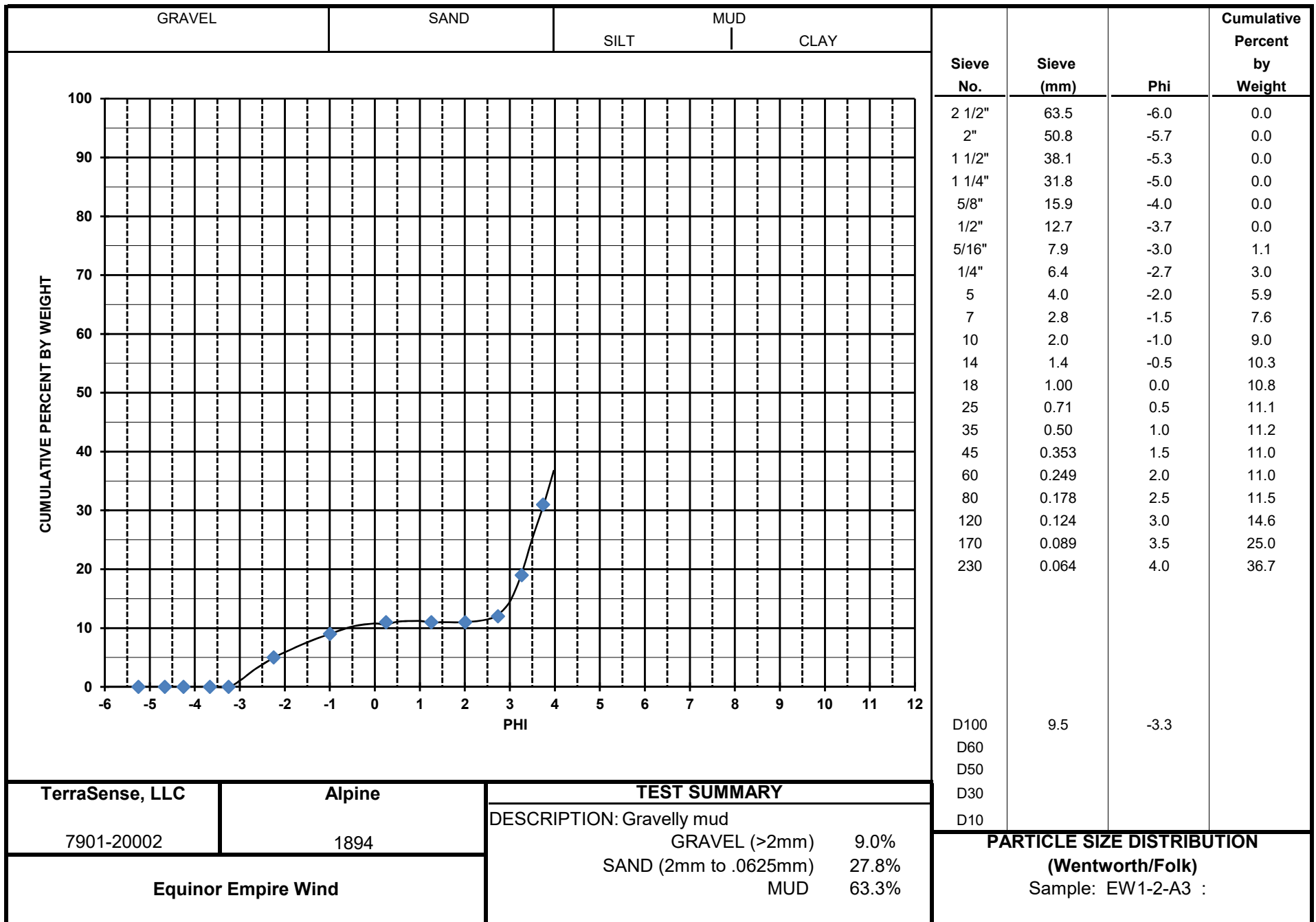
BORING NO.	IDENTIFICATION TESTS														
	WATER CONTENT	ORGANIC CONTENT (burnoff)	USCS SYMB. (1)	GRAVEL	VERY COARSE SAND	COARSE SAND	MEDIUM SAND	FINE SAND	VERY FINE SAND	MUD	D ₁₀₀	D ₆₀	D ₅₀	D ₃₀	D ₁₀
	(%)	(%)	(1)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(mm)	(mm)	(mm)	(mm)	(mm)
EW1-19-A1	26.0	0.8	SM	1	1	2	7	29	49	12	9.53	0.124	0.110	0.088	<0.075
EW1-19-L1	27.0	0.7	SP-SM	0	0	1	6	33	53	6	9.53	0.125	0.110	0.093	0.075
EW1-19-R3	25.8	0.9	ML	0	0	1	2	5	9	83	19.1	<0.075	<0.075	<0.075	<0.075
EW1-20-A1	36.3	1.5	SM	0	0	1	3	12	65	20	4.75	0.097	0.089	0.077	<0.075
EW1-20-L1	28.1	0.9	SM	0	0	1	5	15	65	14	4.75	0.101	0.094	0.081	<0.075
EW1-20-R1	36.2	1.1	ML	0	0	0	0	2	12	86	25.4	<0.075	<0.075	<0.075	<0.075
EW1-21-A1	33.9	1.2	SM	2	1	1	1	24	61	12	9.53	0.112	0.100	0.085	<0.075
EW1-21-L2	40.1	1.8	SM	0	0	0	1	20	61	18	4.75	0.104	0.095	0.079	<0.075
EW1-21-R1	41.0	2.0	SM	0	0	0	1	21	61	17	9.53	0.105	0.096	0.080	<0.075
EW1-22-A1	39.9	1.9	SM	0	0	0	1	21	59	19	9.53	0.105	0.095	0.079	<0.075
EW1-22-L1	32.7	1.2	SM	0	0	0	3	24	60	13	4.75	0.111	0.100	0.084	<0.075
EW1-22-R1	28.3	0.9	SM	0	0	0	2	24	63	11	2	0.111	0.100	0.085	<0.075
EW1-23-A1	44.2	1.8	SM	1	0	0	1	13	60	25	9.53	0.097	0.088	<0.075	<0.075
EW1-23-L1	43.4	1.9	SM	0	0	0	1	15	58	26	4.75	0.097	0.088	<0.075	<0.075
EW1-23-R1	32.5	0.9	SM	1	0	0	1	17	64	18	25.4	0.102	0.093	0.079	<0.075
EW1-24-A1	10.8	0.5	SP	39	21	24	14	1	0	1	19.1	1.940	1.400	0.740	0.400
EW1-24-L1	10.8	0.2	SW	54	17	15	12	1	0	1	9.53	2.560	2.100	1.000	0.400
EW1-24-R1	8.1	0.2	SP	64	4	15	14	2	0	1	19.1	4.590	3.200	0.810	0.360
EW1-25-A1	26.0	0.7	SP-SM	9	7	12	17	36	16	3	9.53	0.299	0.220	0.140	0.093
EW1-25-R3	12.7	0.3	SP	49	8	16	22	4	0	1	25.4	3.160	1.800	0.570	0.290
EW1-26-A2	24.1	0.4	SP	13	2	7	18	46	15	1	25.4	0.245	0.210	0.150	0.110
EW1-26-L1	17.1	0.4	SP	0	2	20	64	13	1	1	4.75	0.397	0.360	0.290	0.200

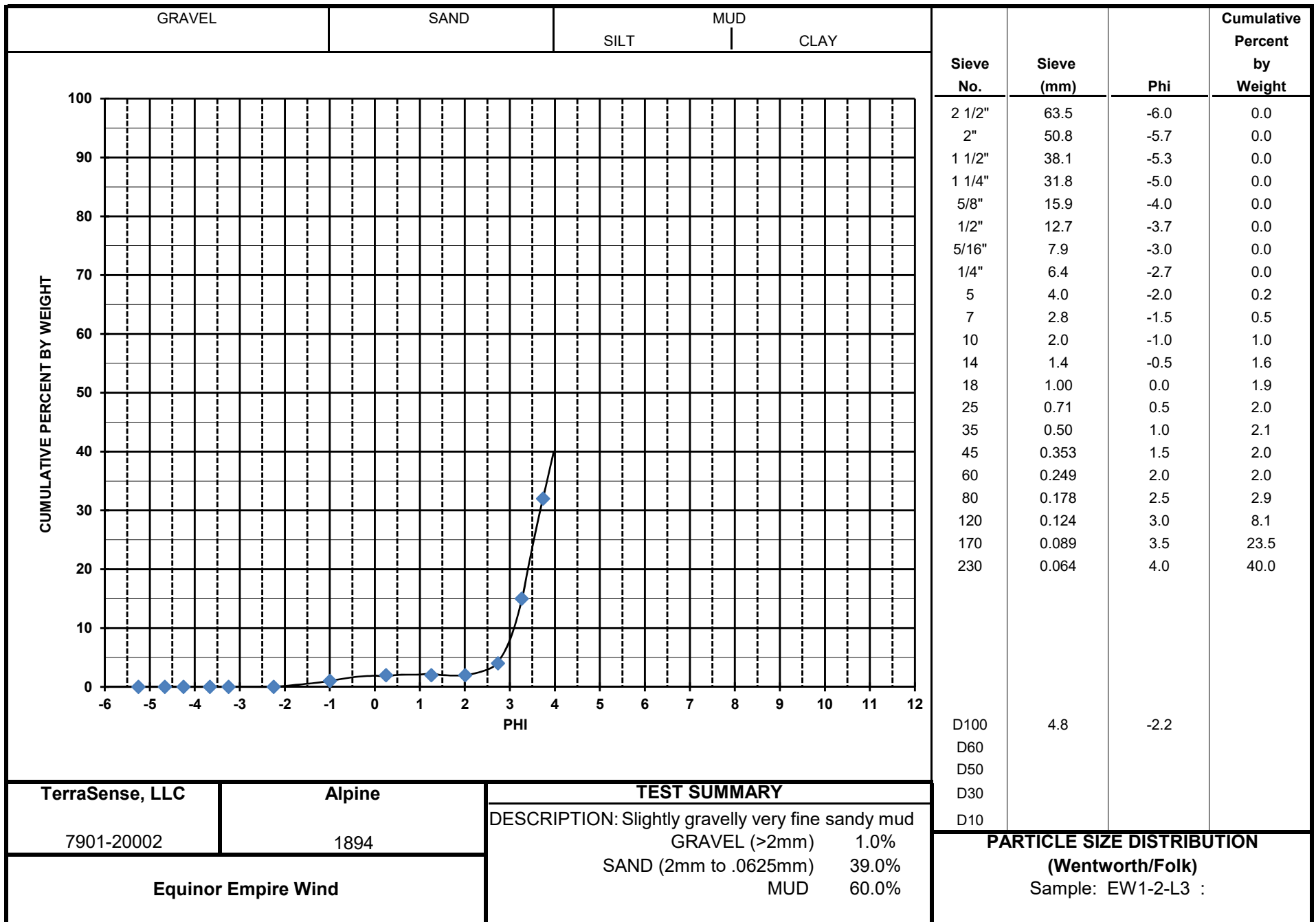
Note: (1) USCS symbol based on visual observation and Sieve reported.

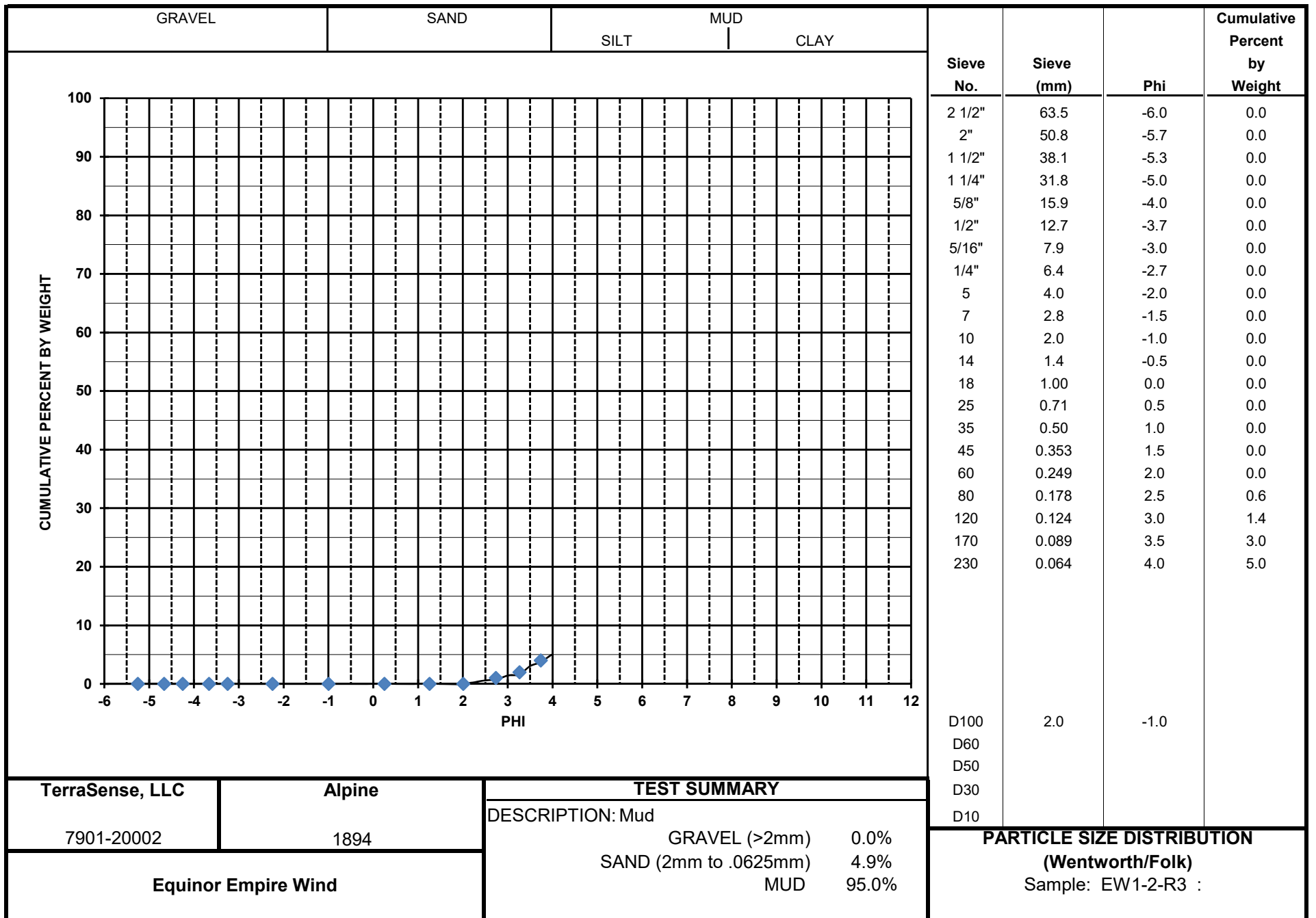


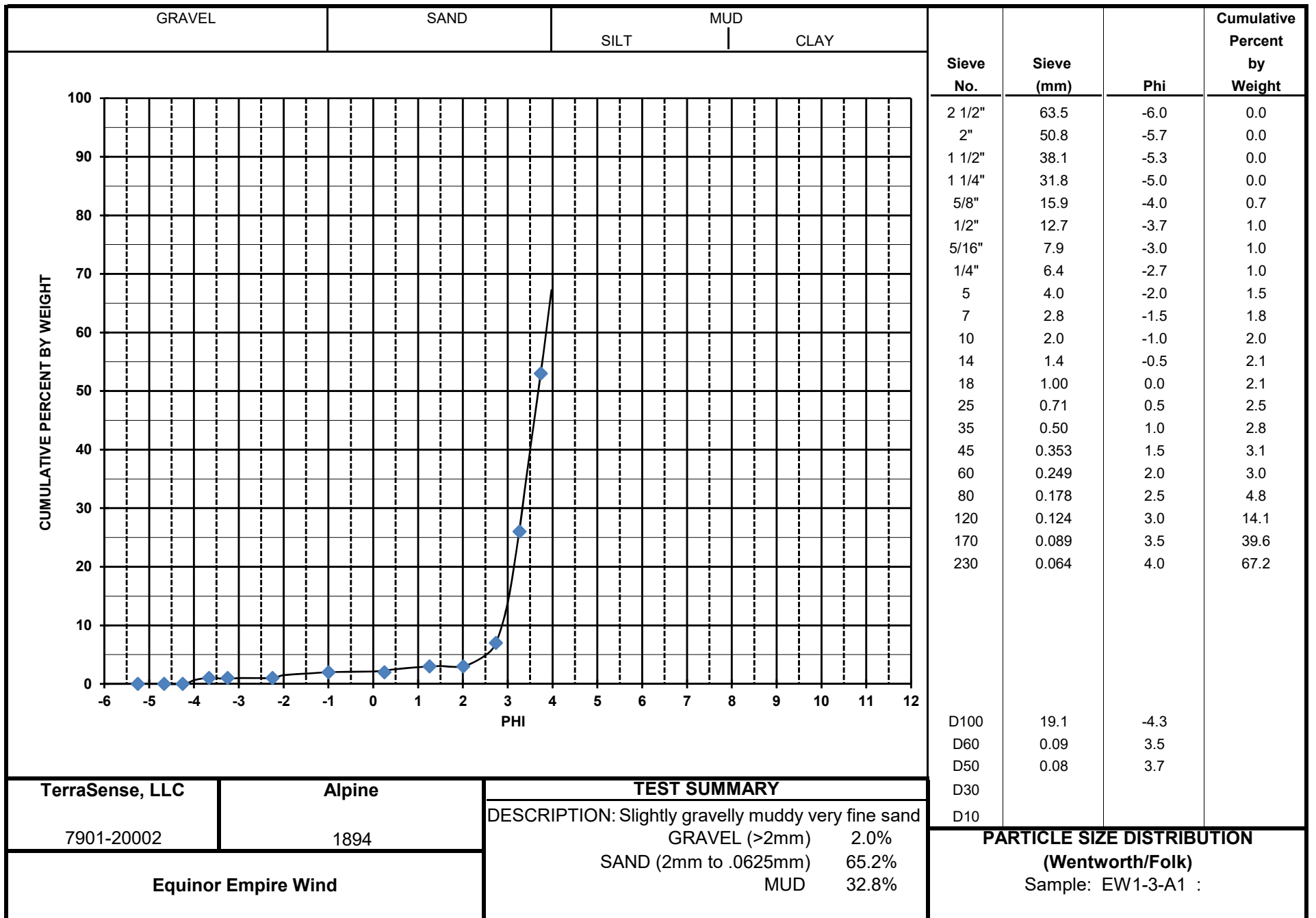


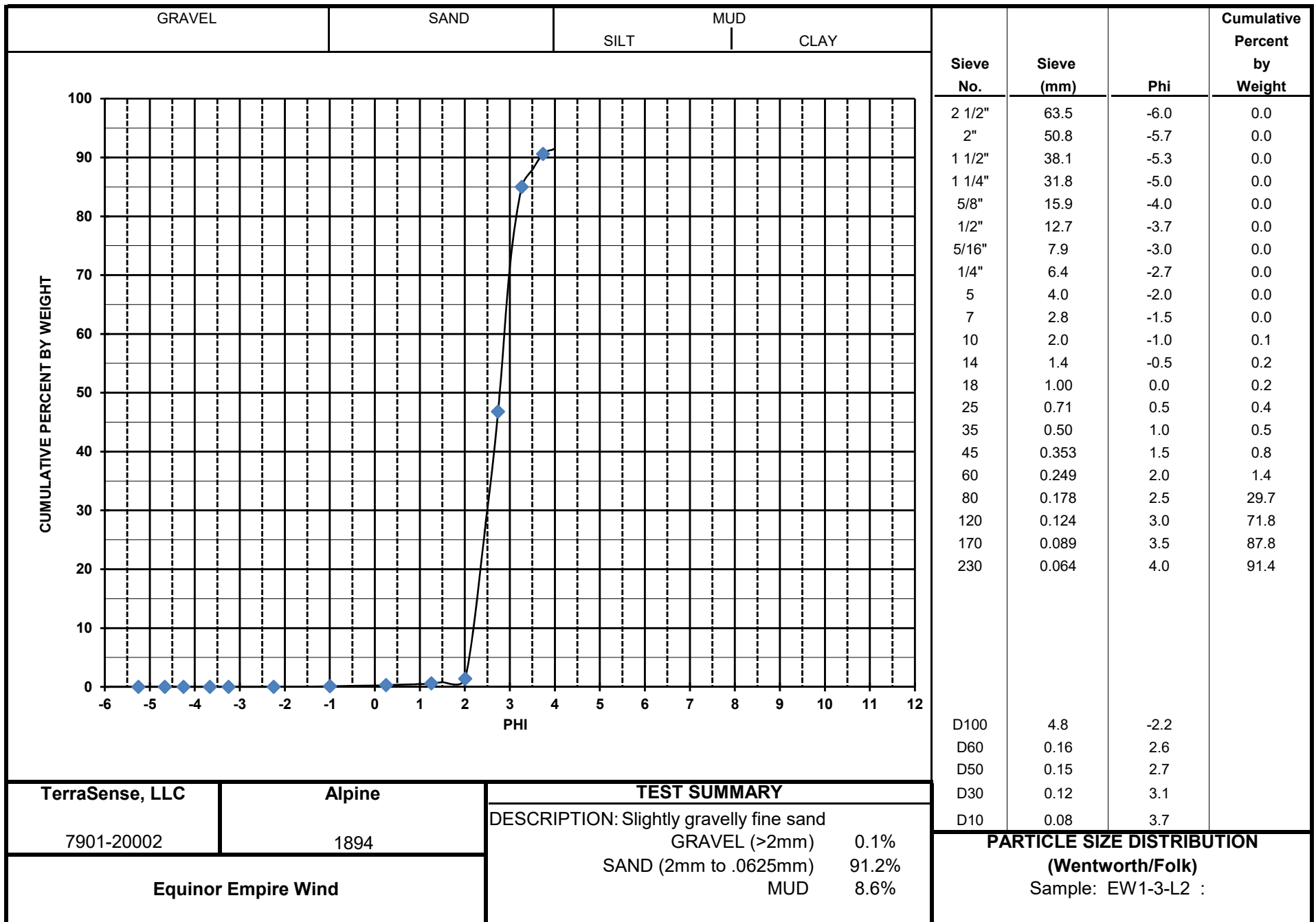


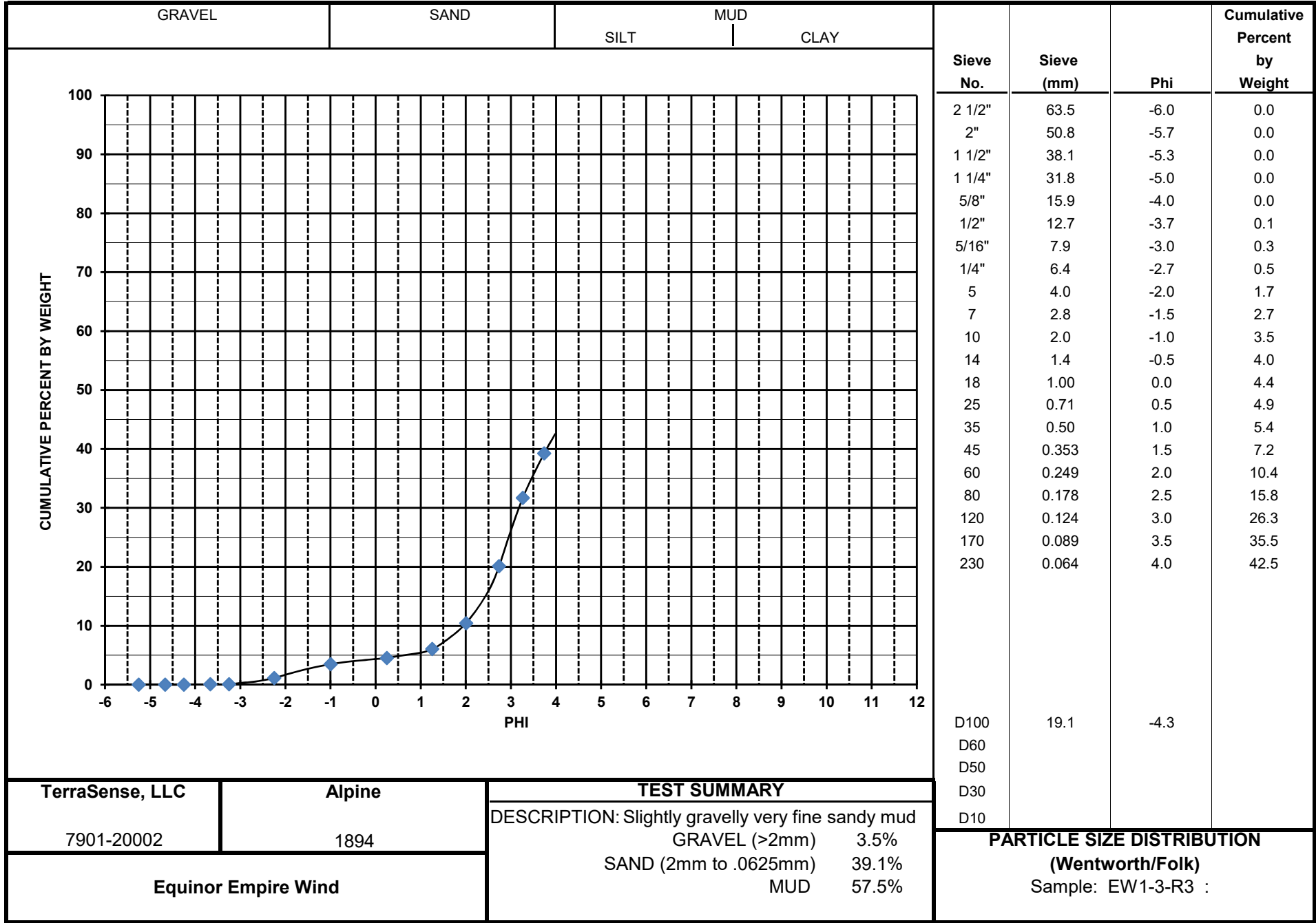


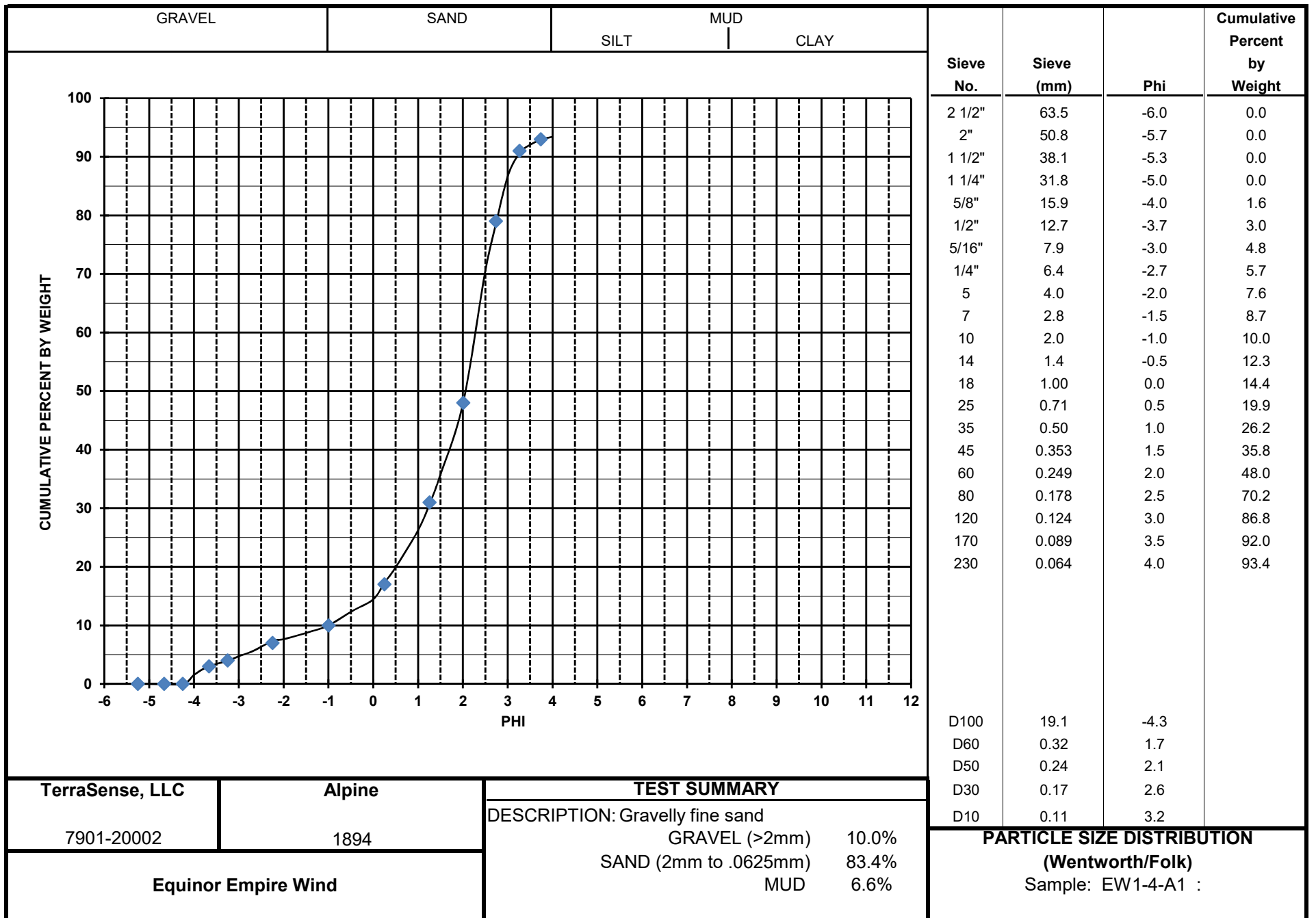


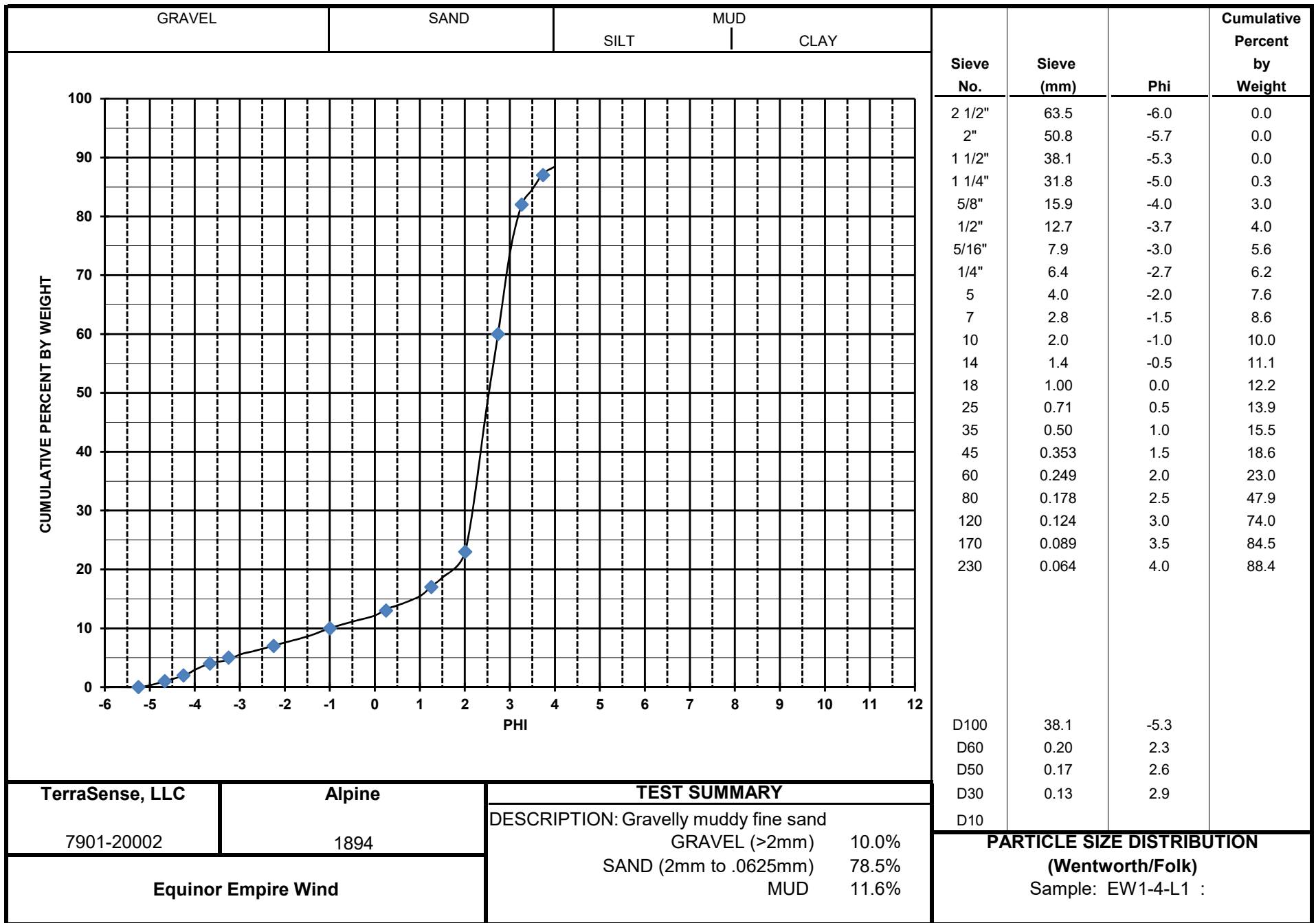


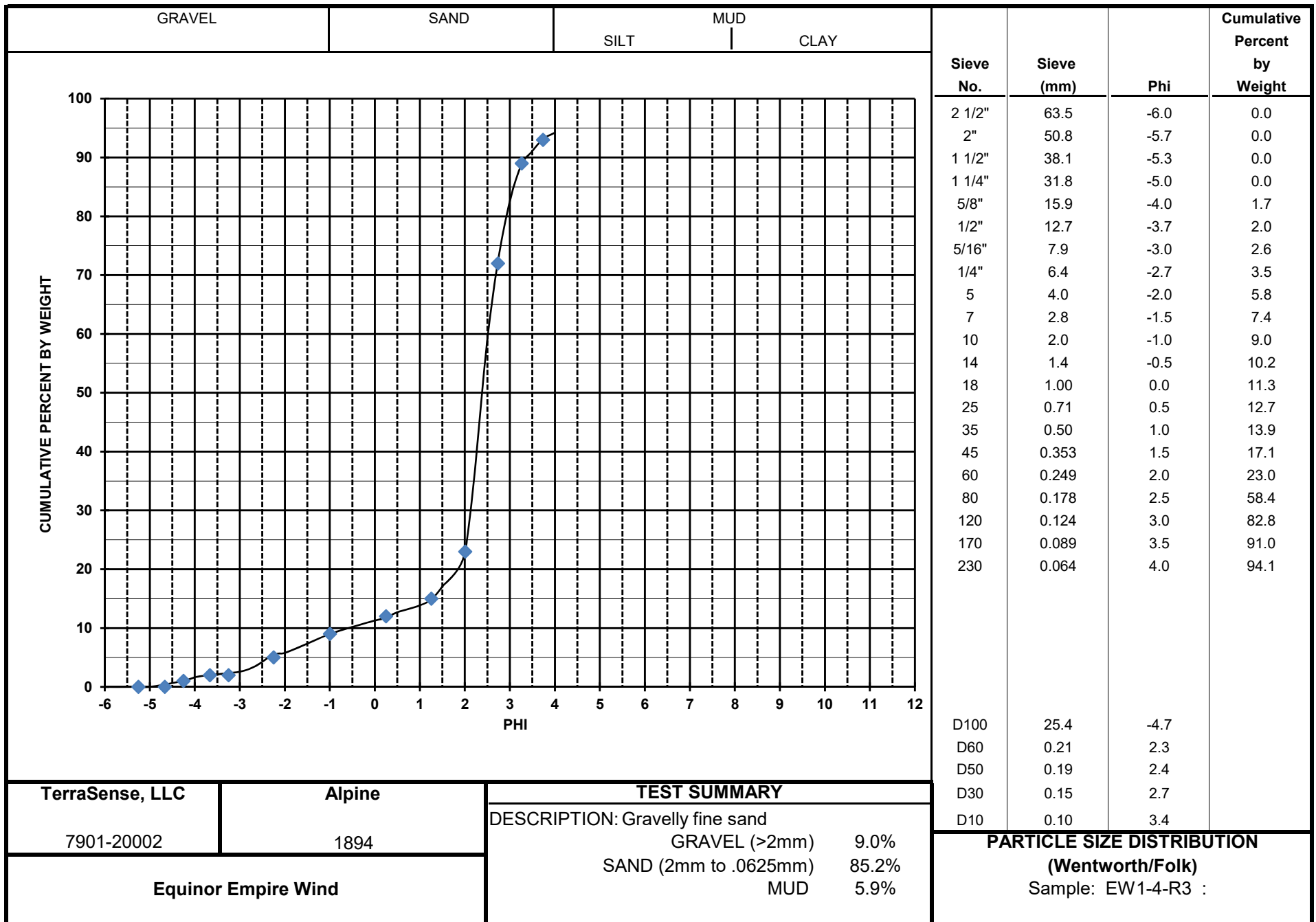


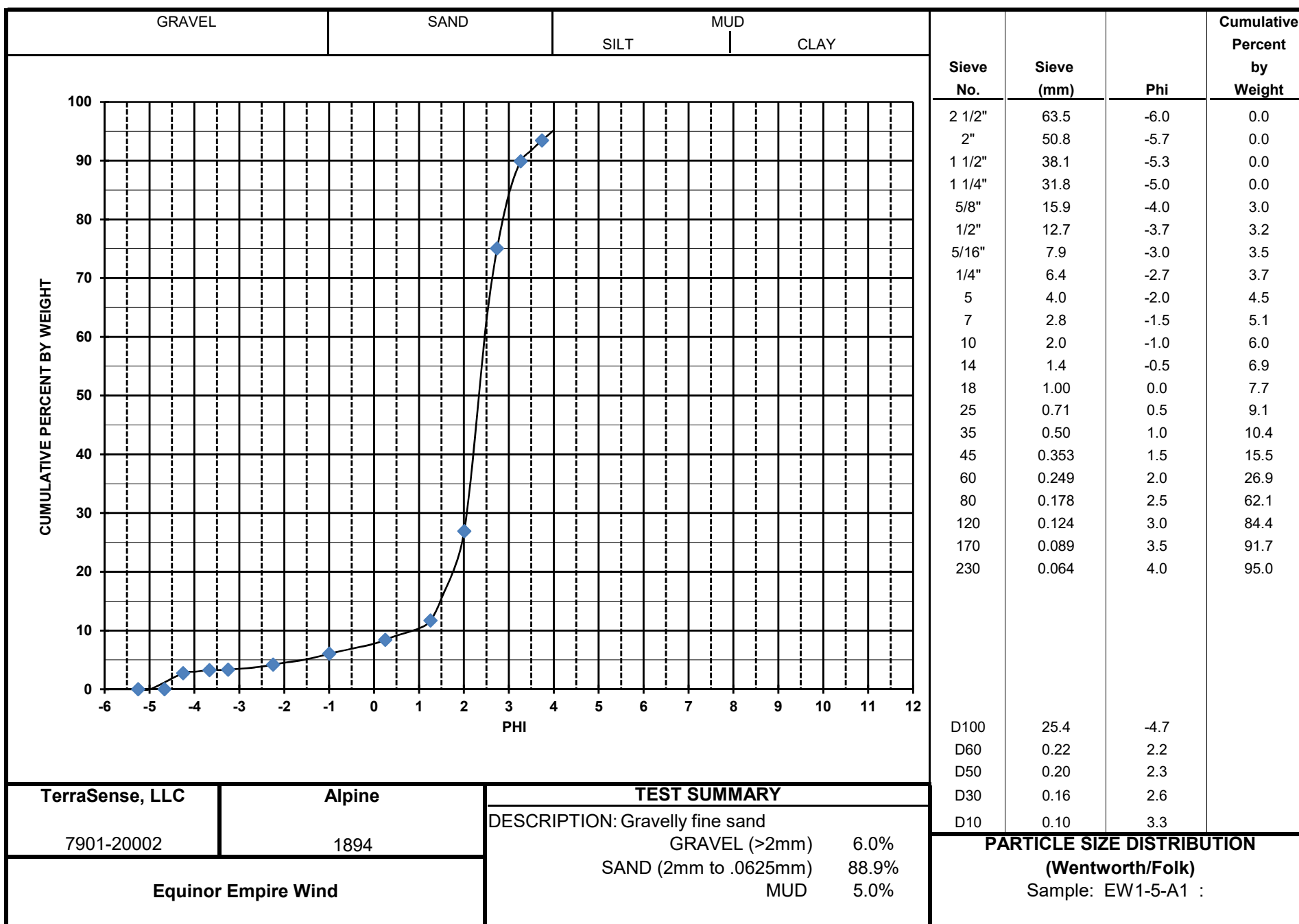


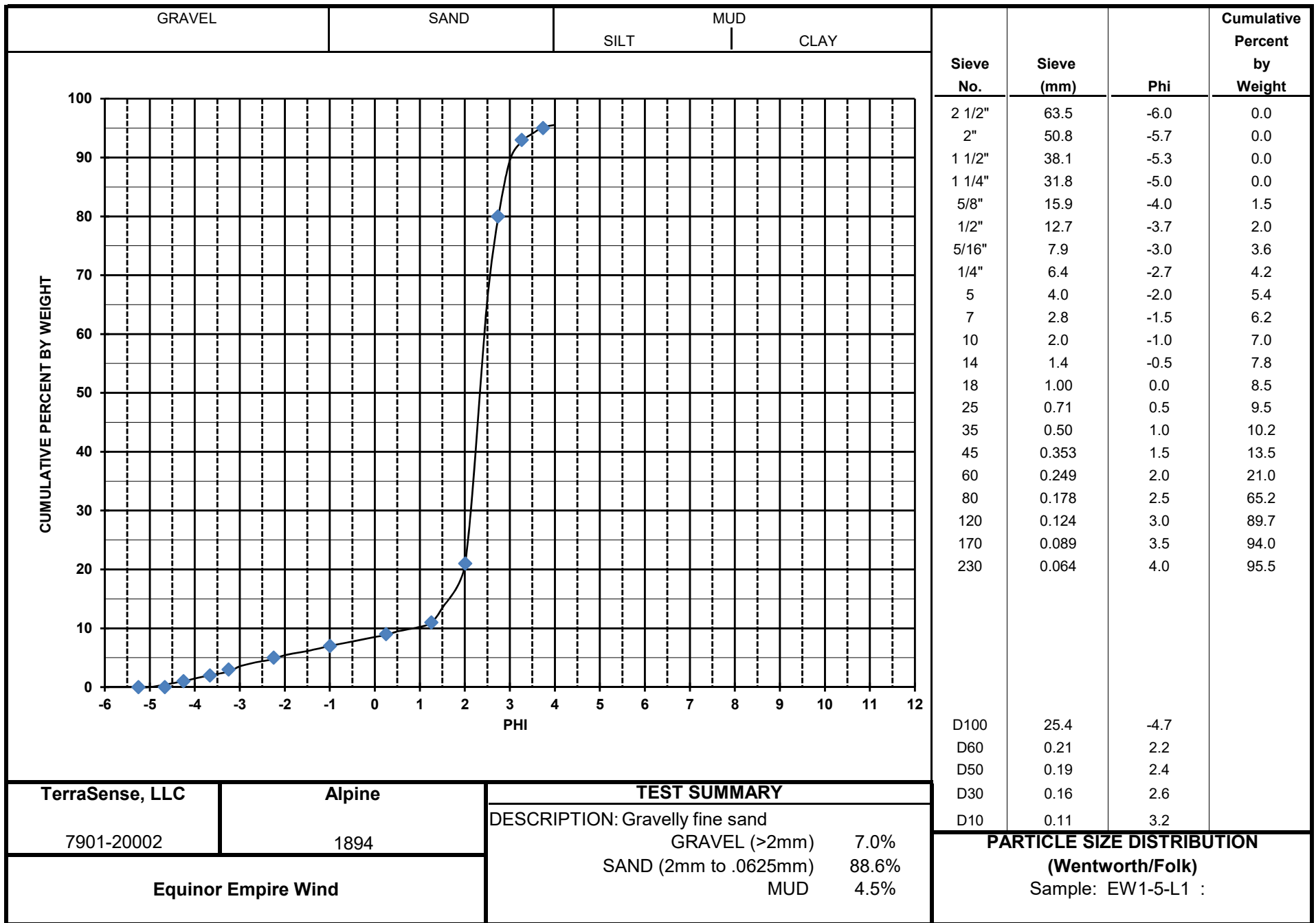


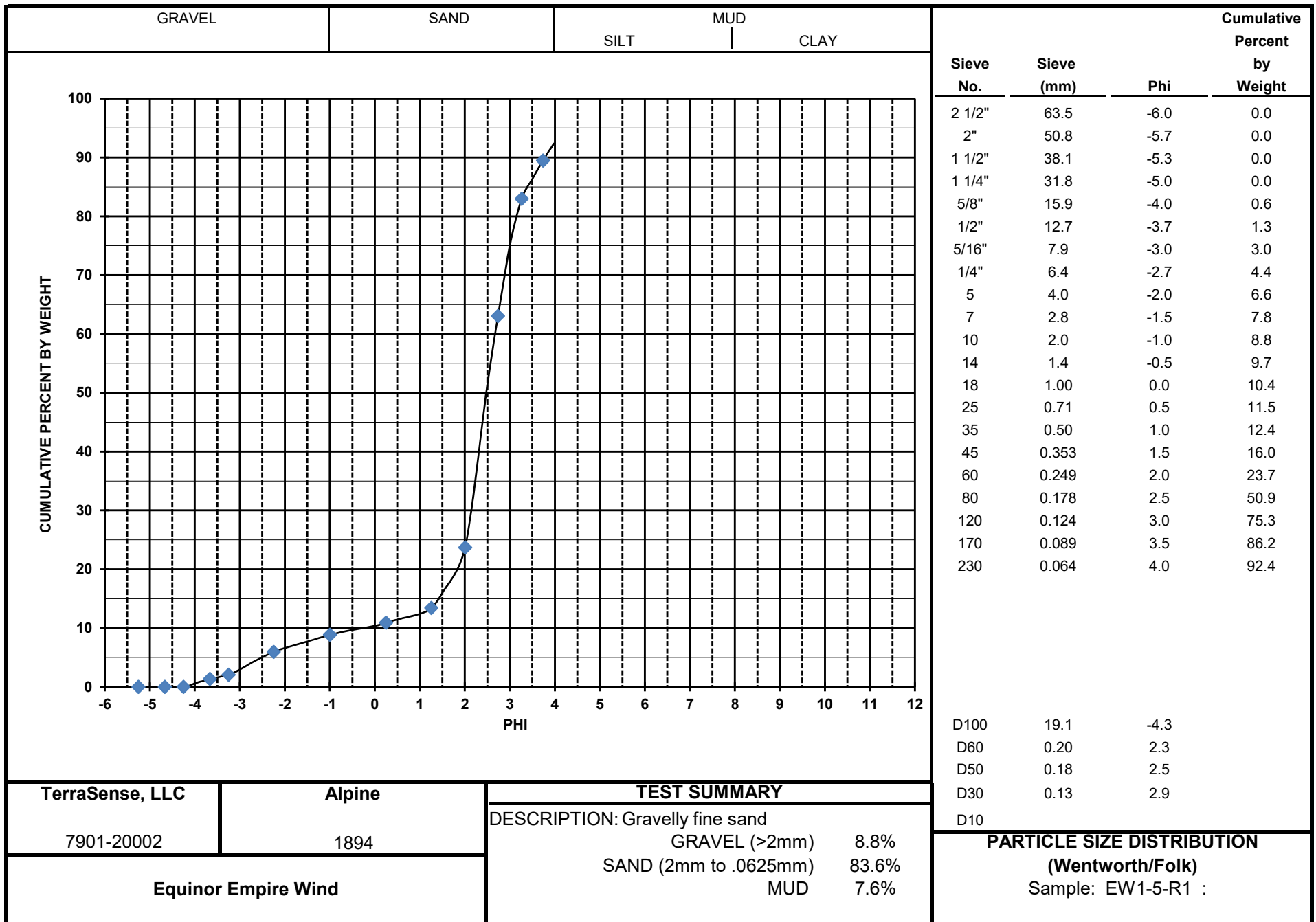


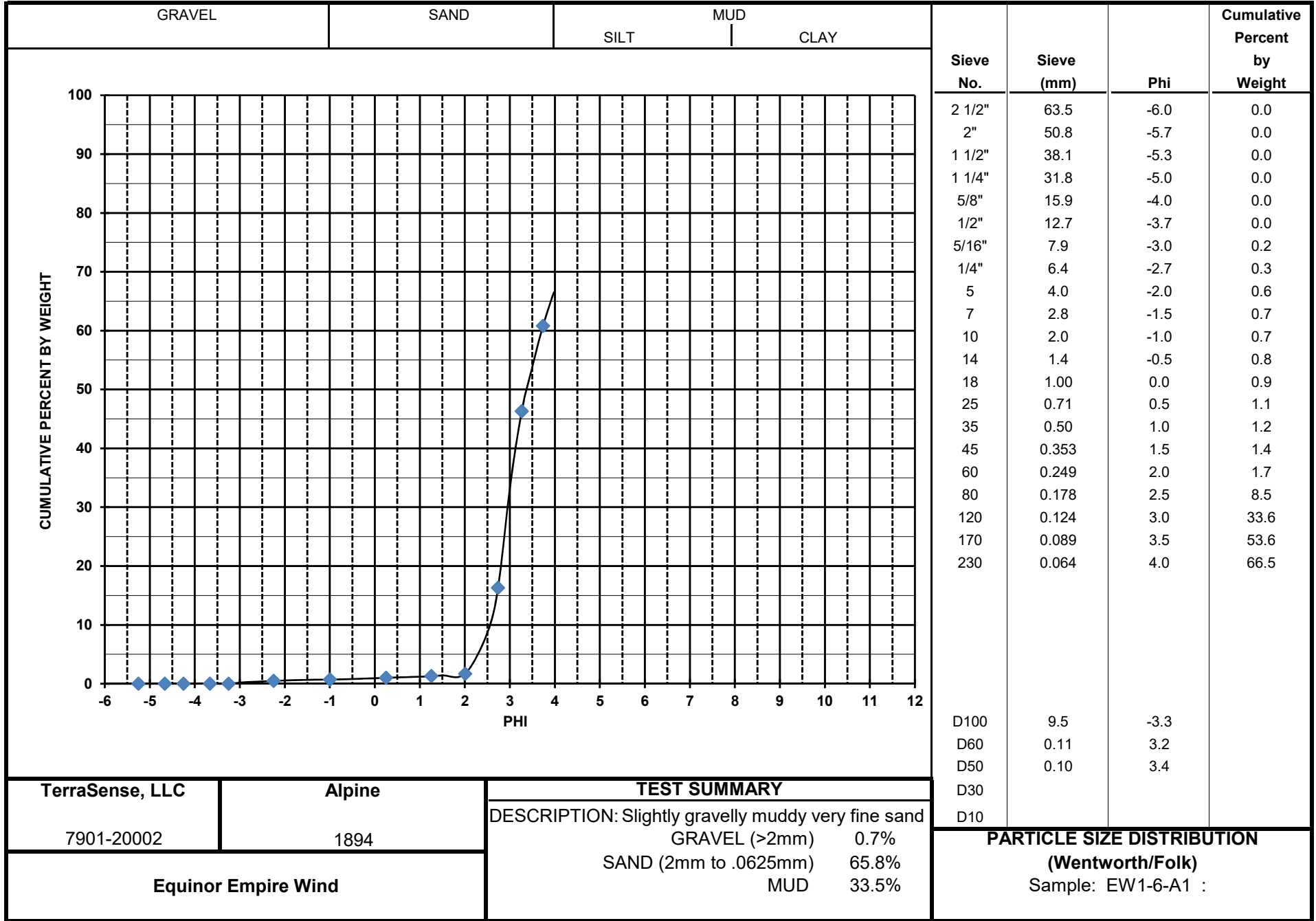


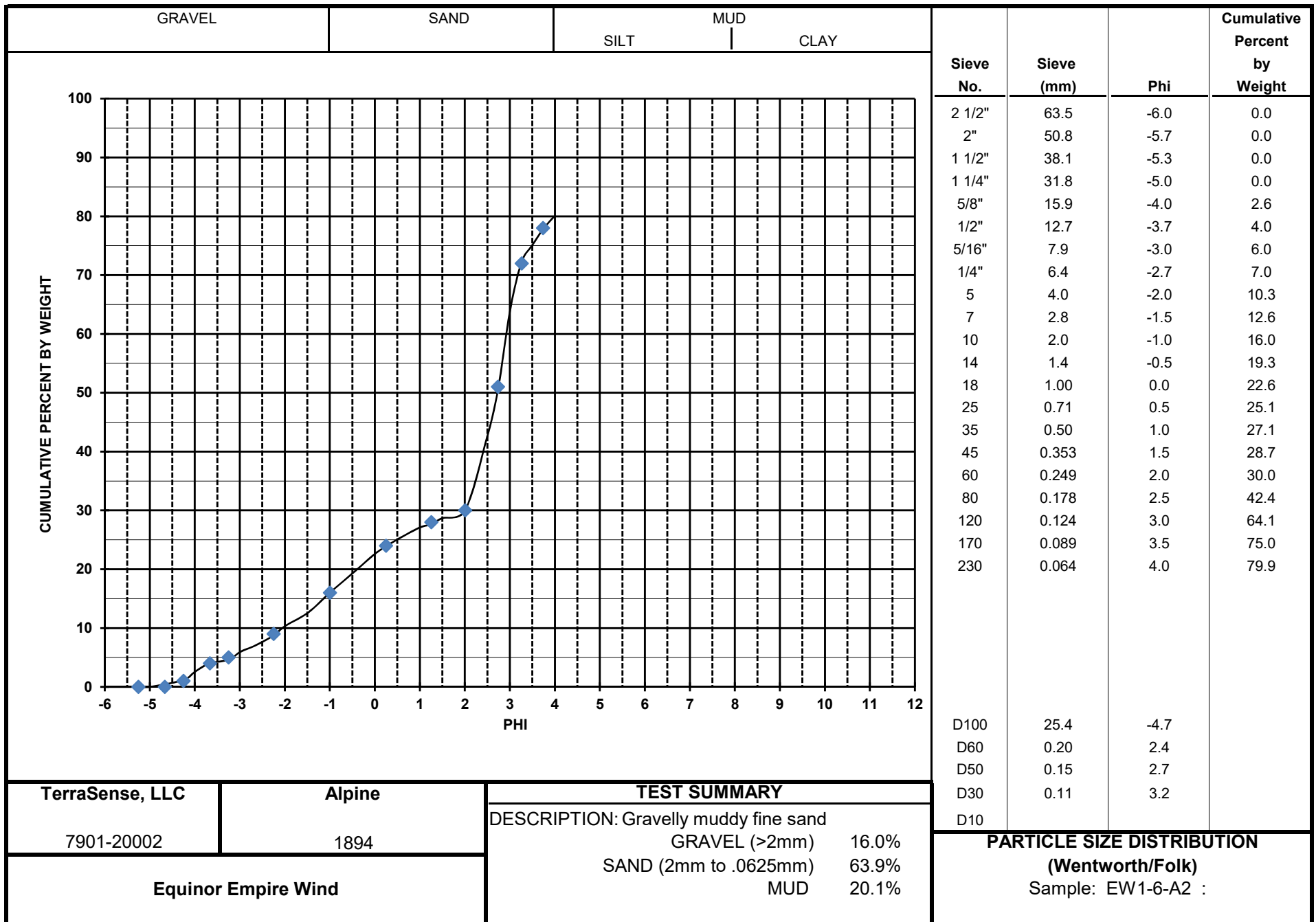


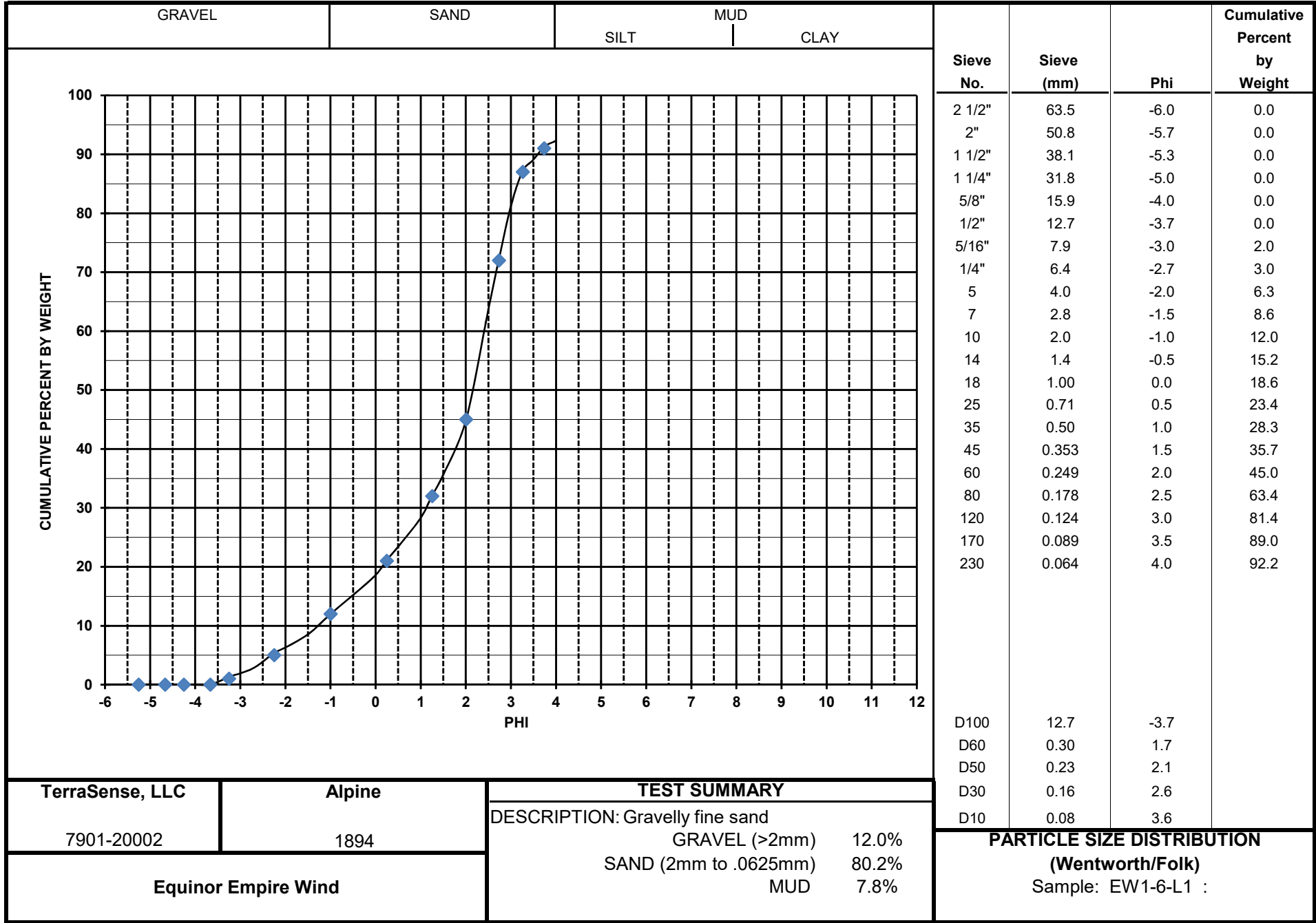


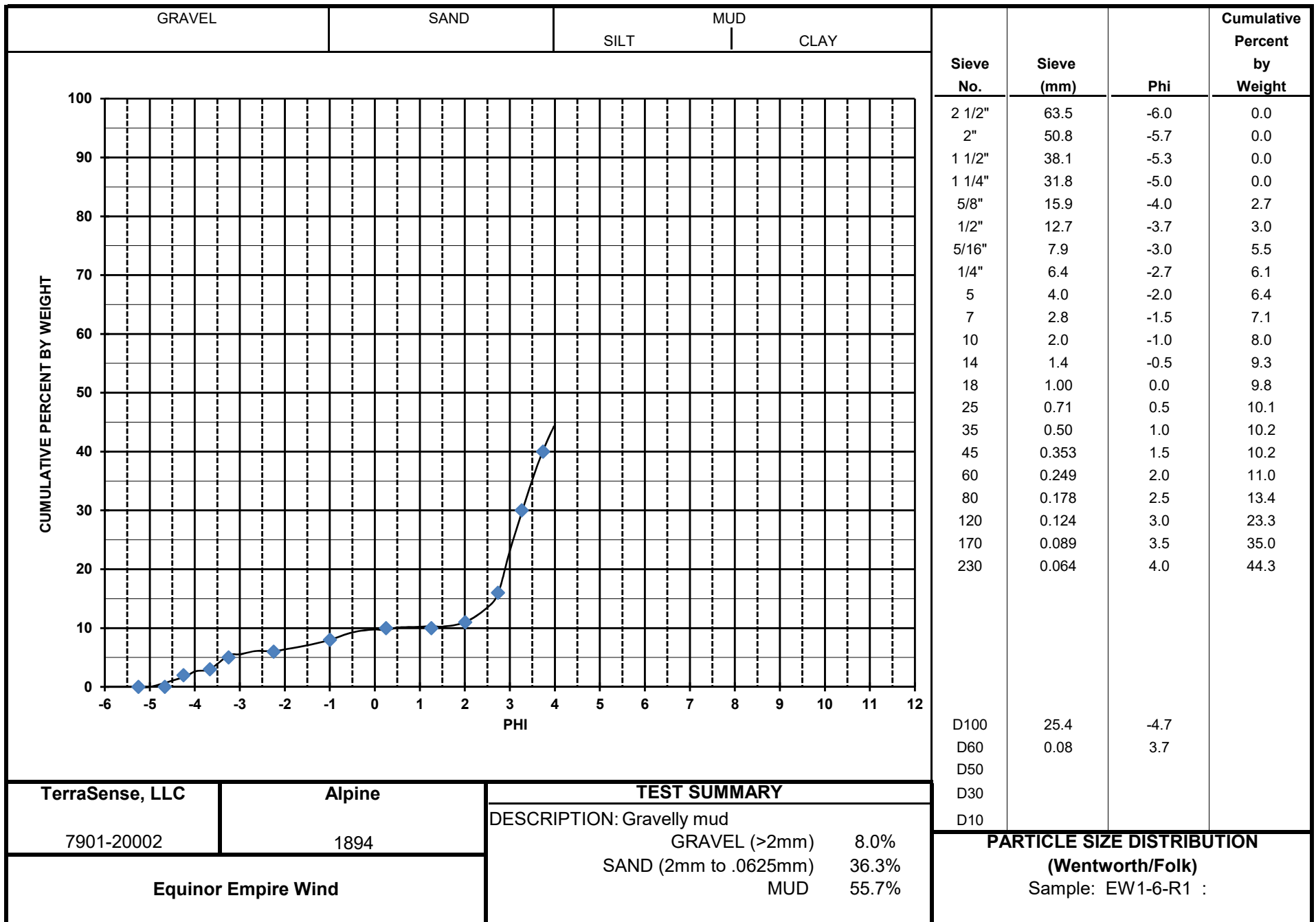


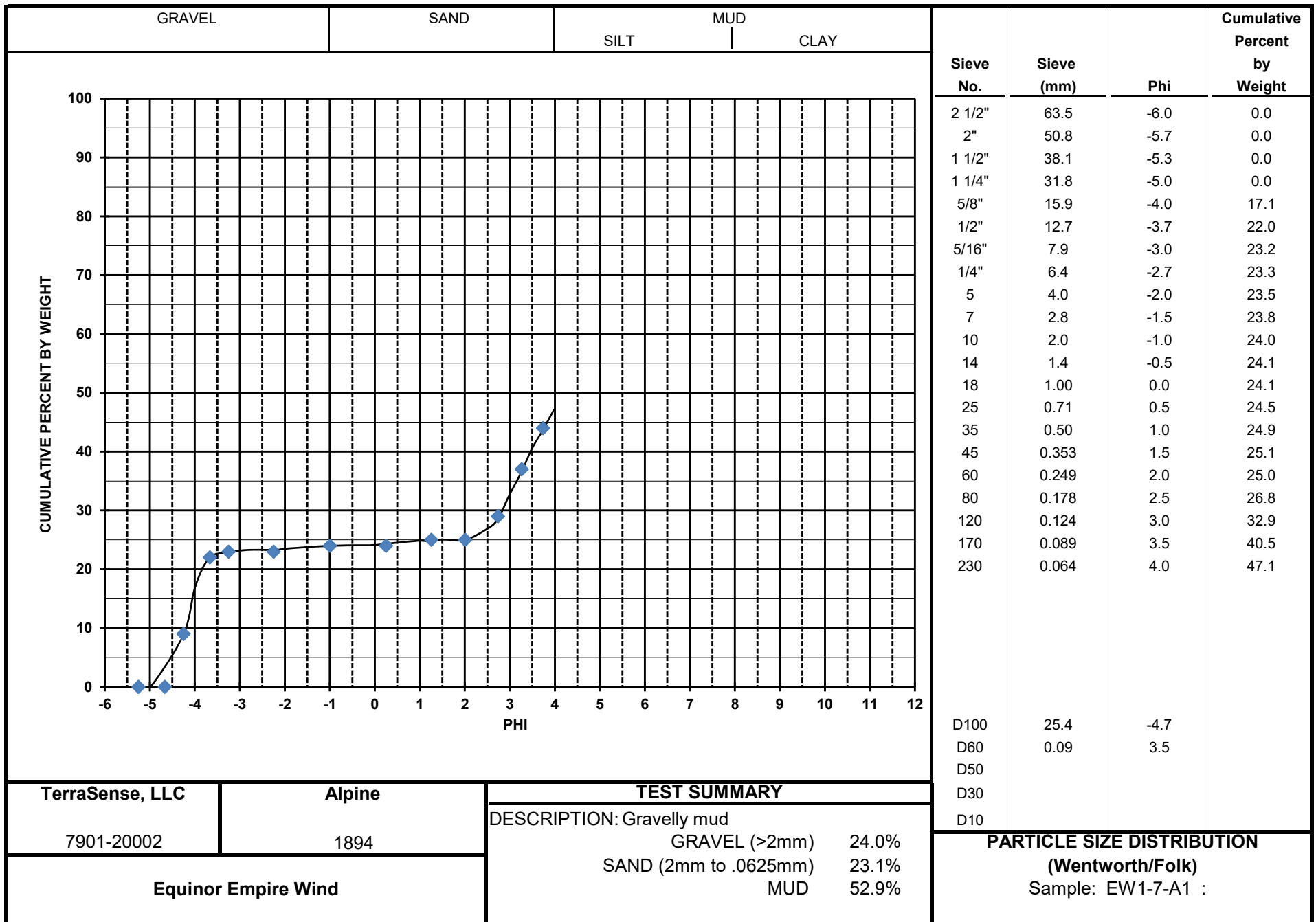


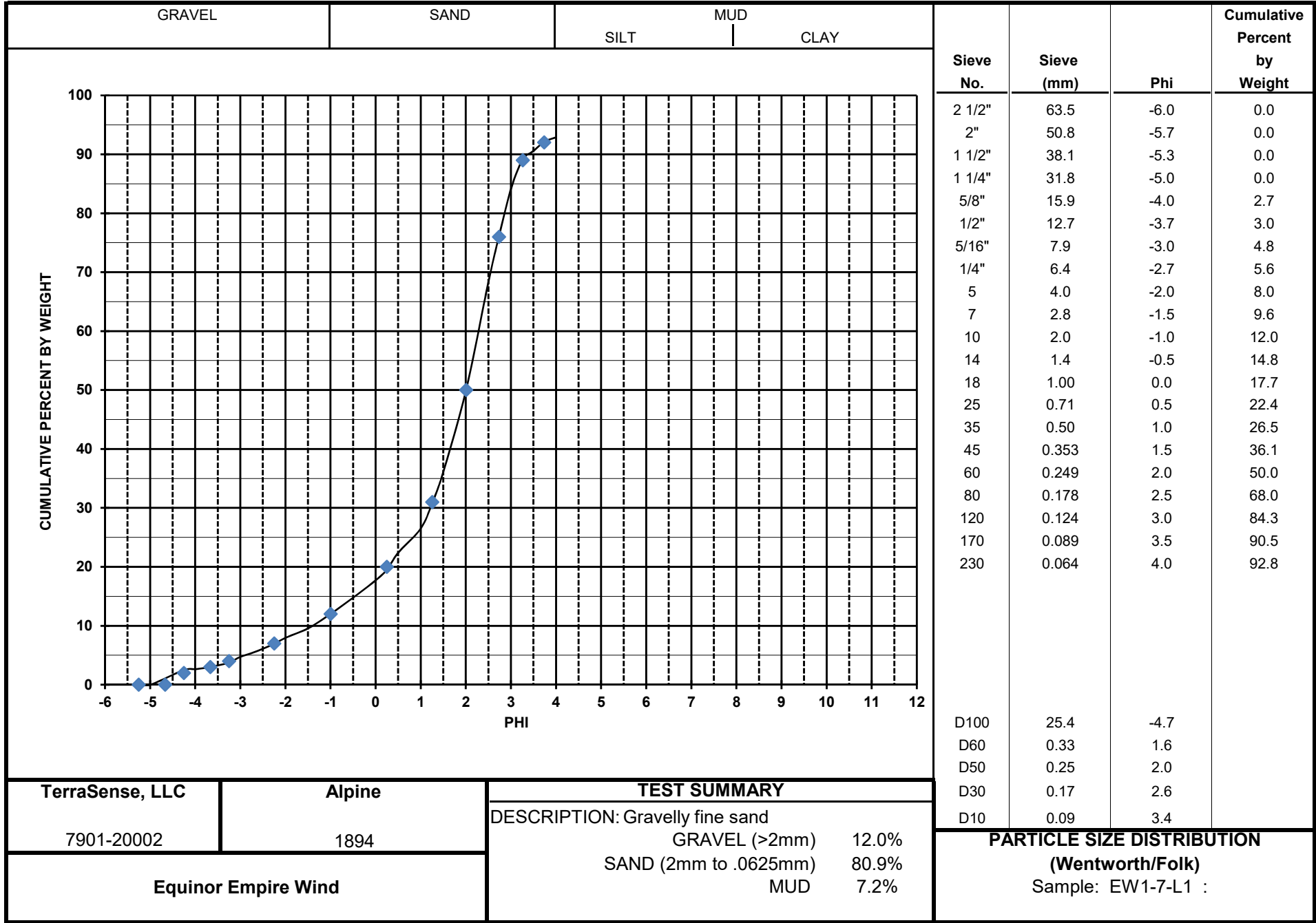


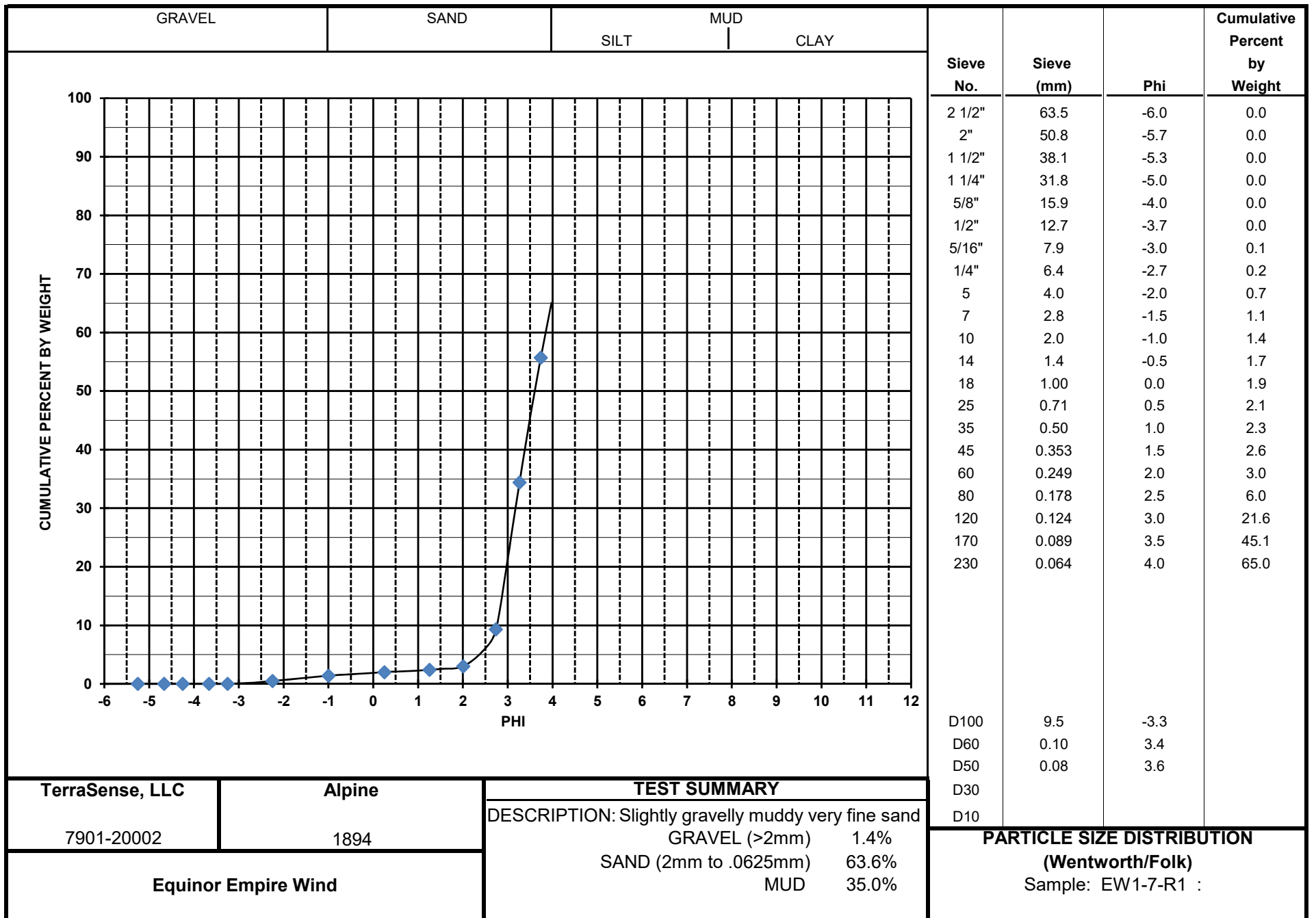


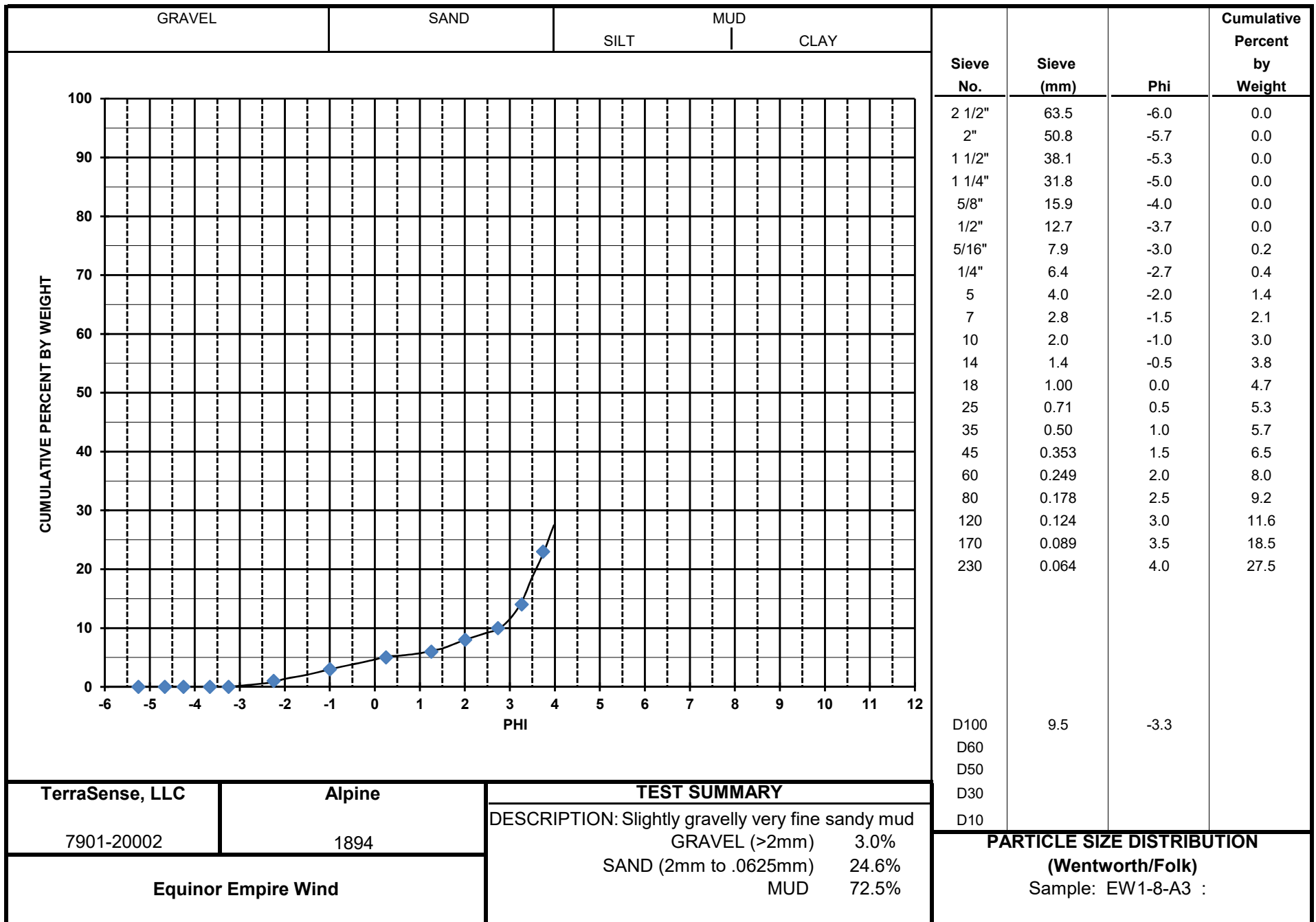


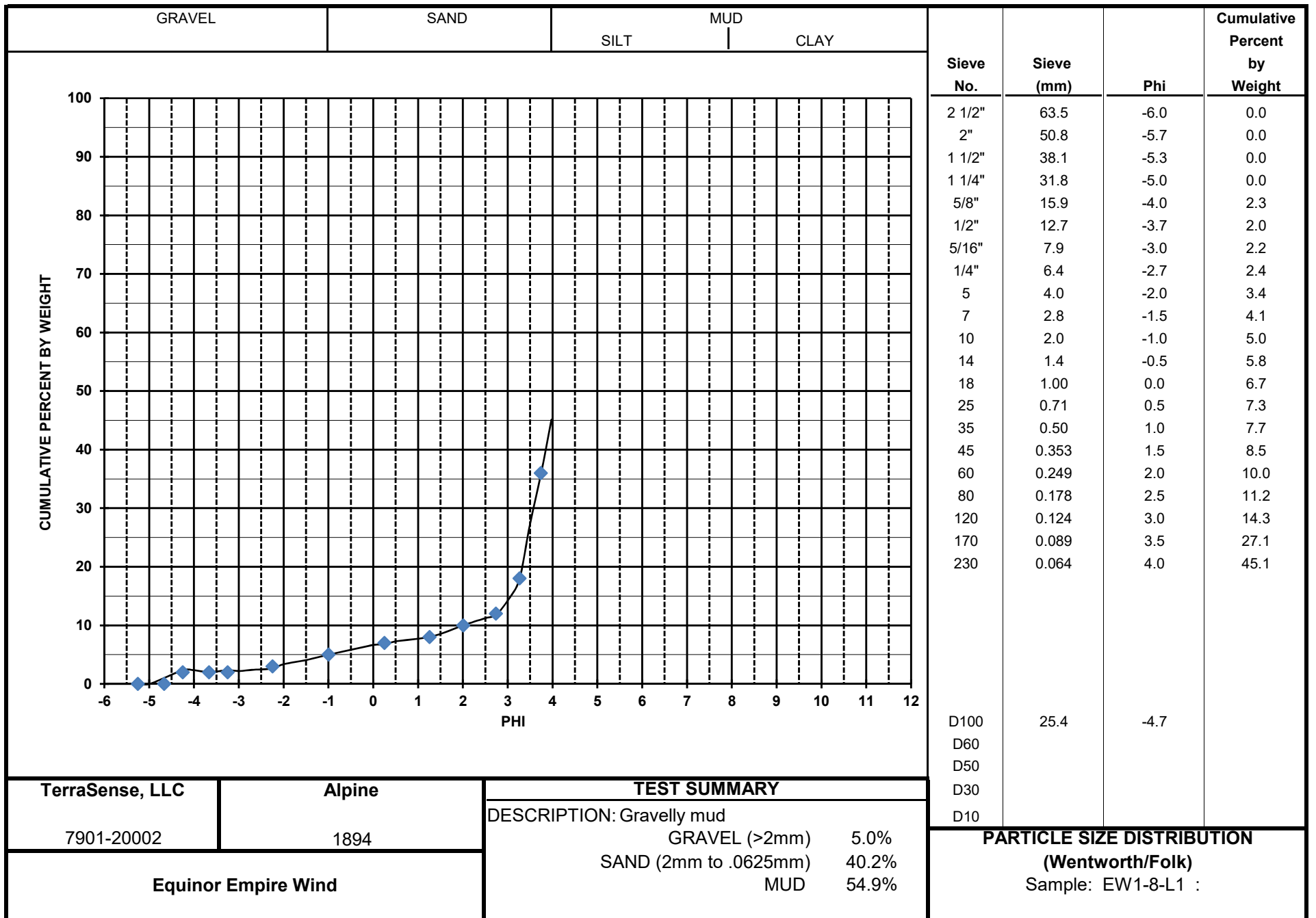


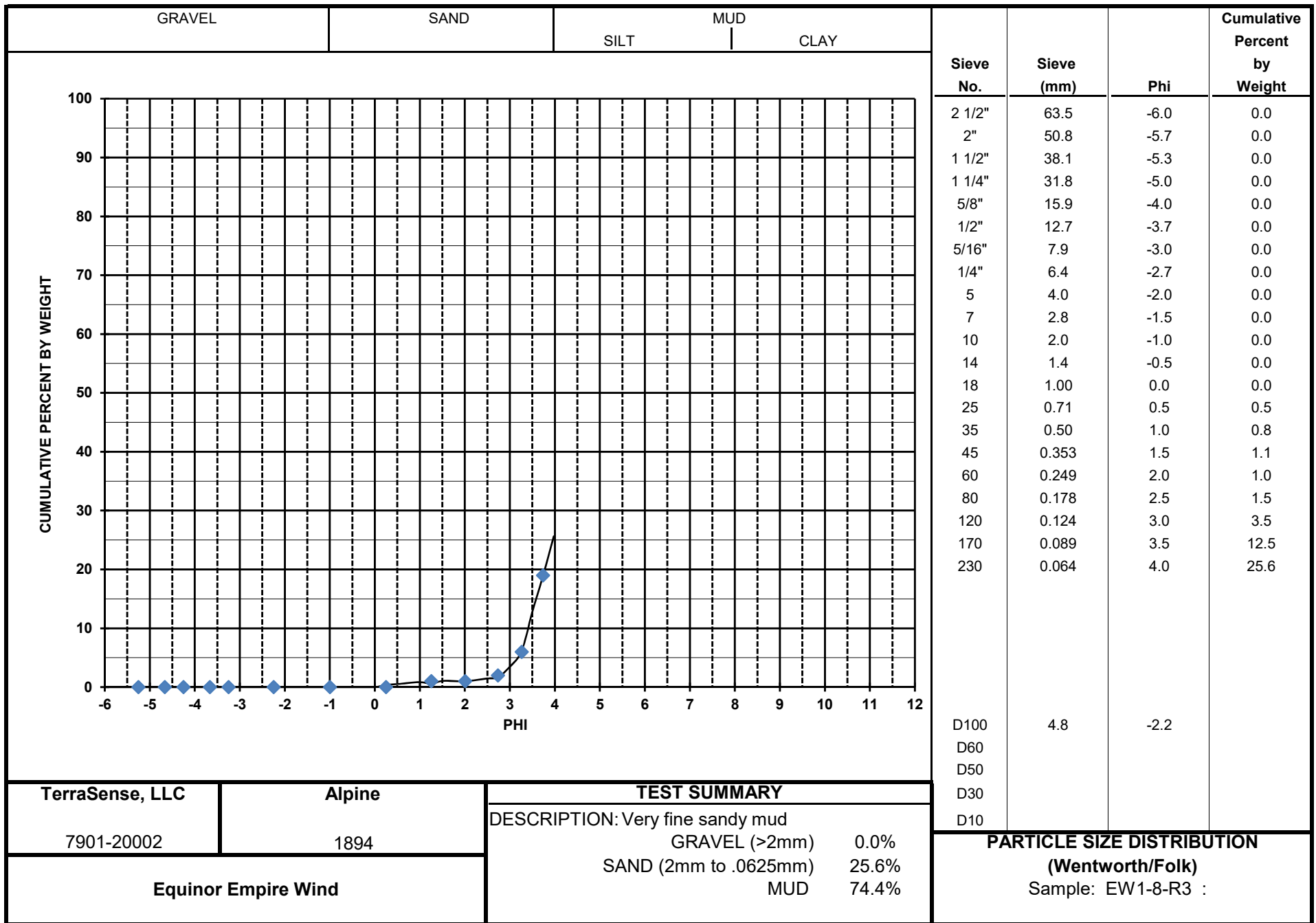


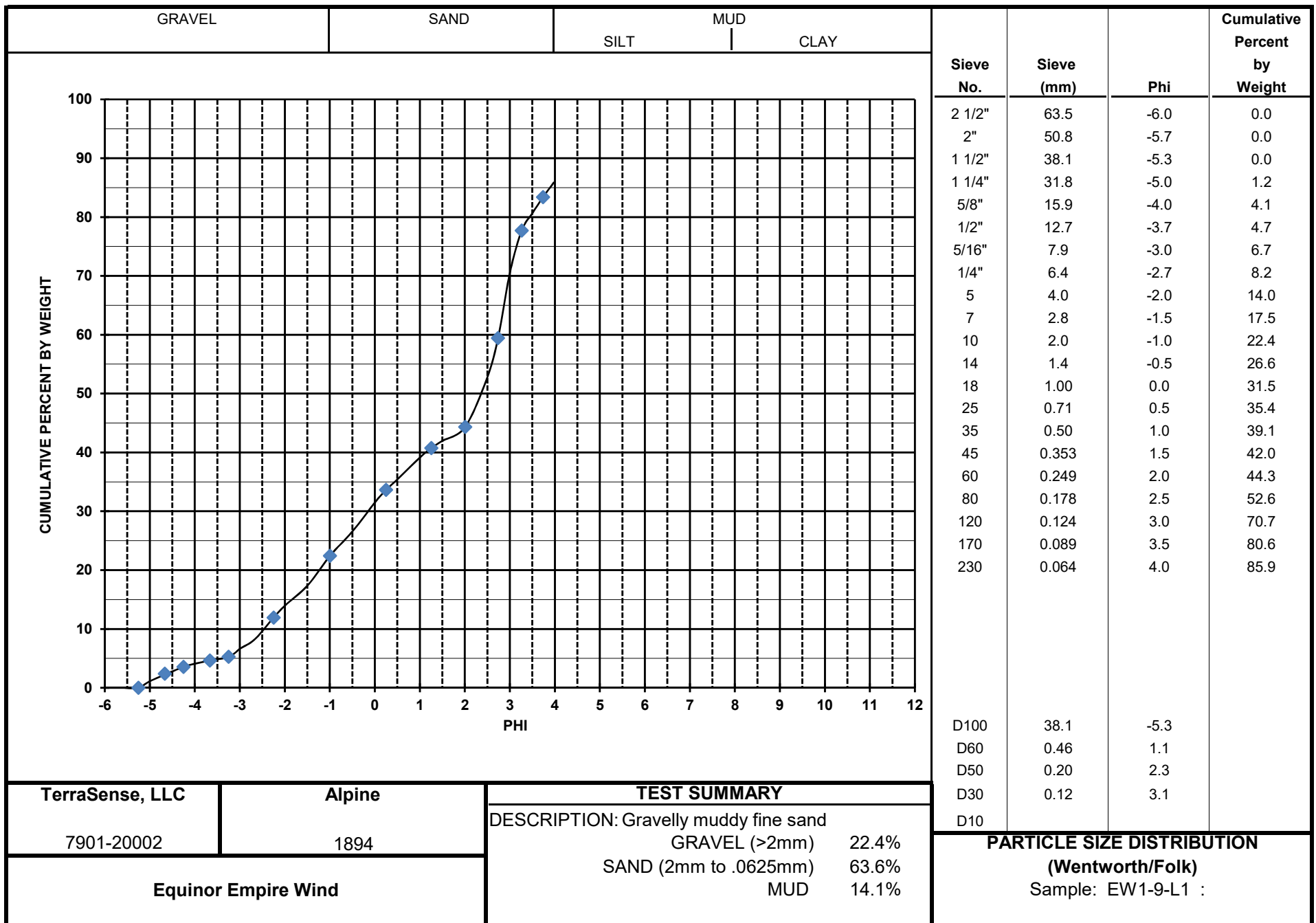


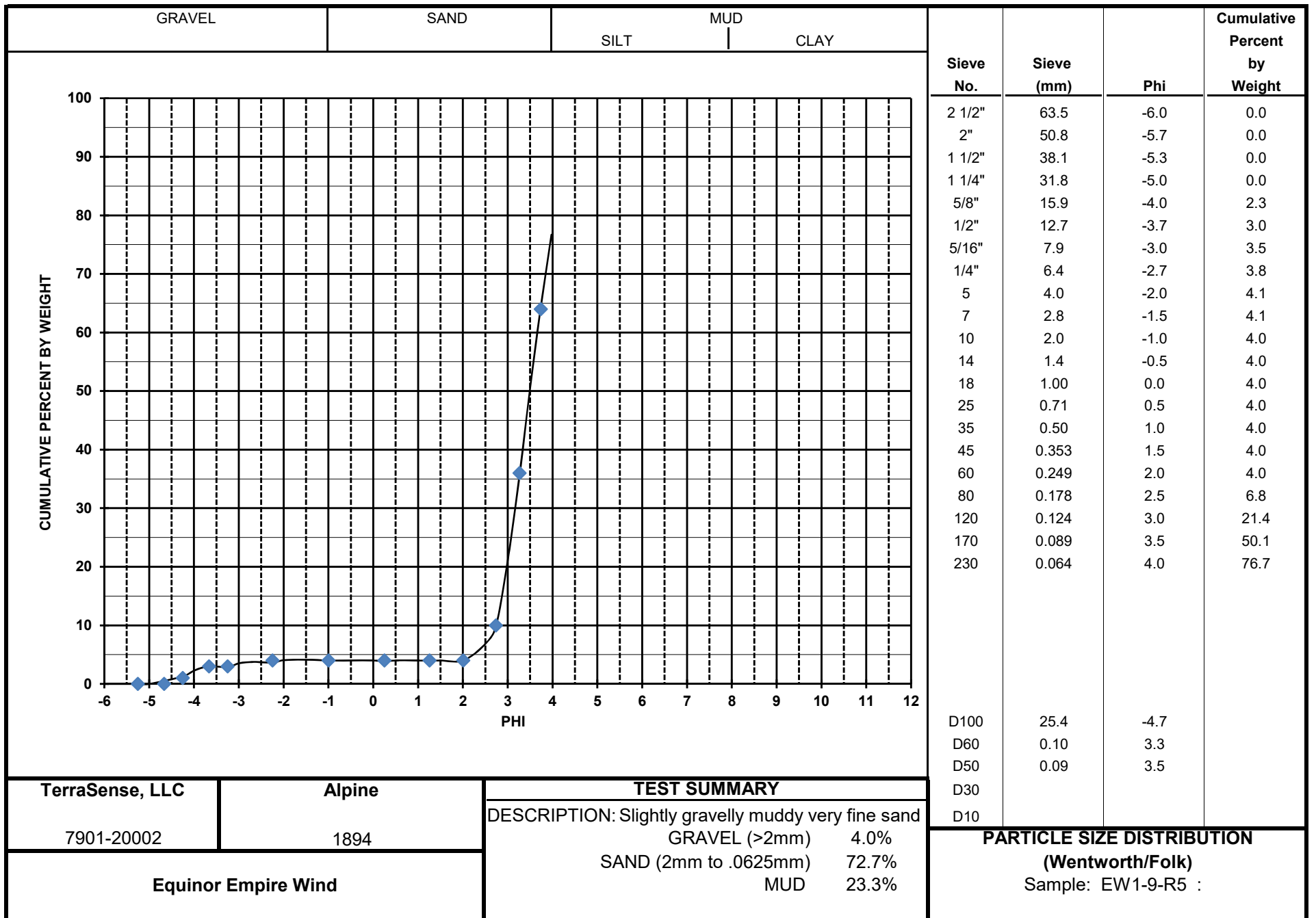


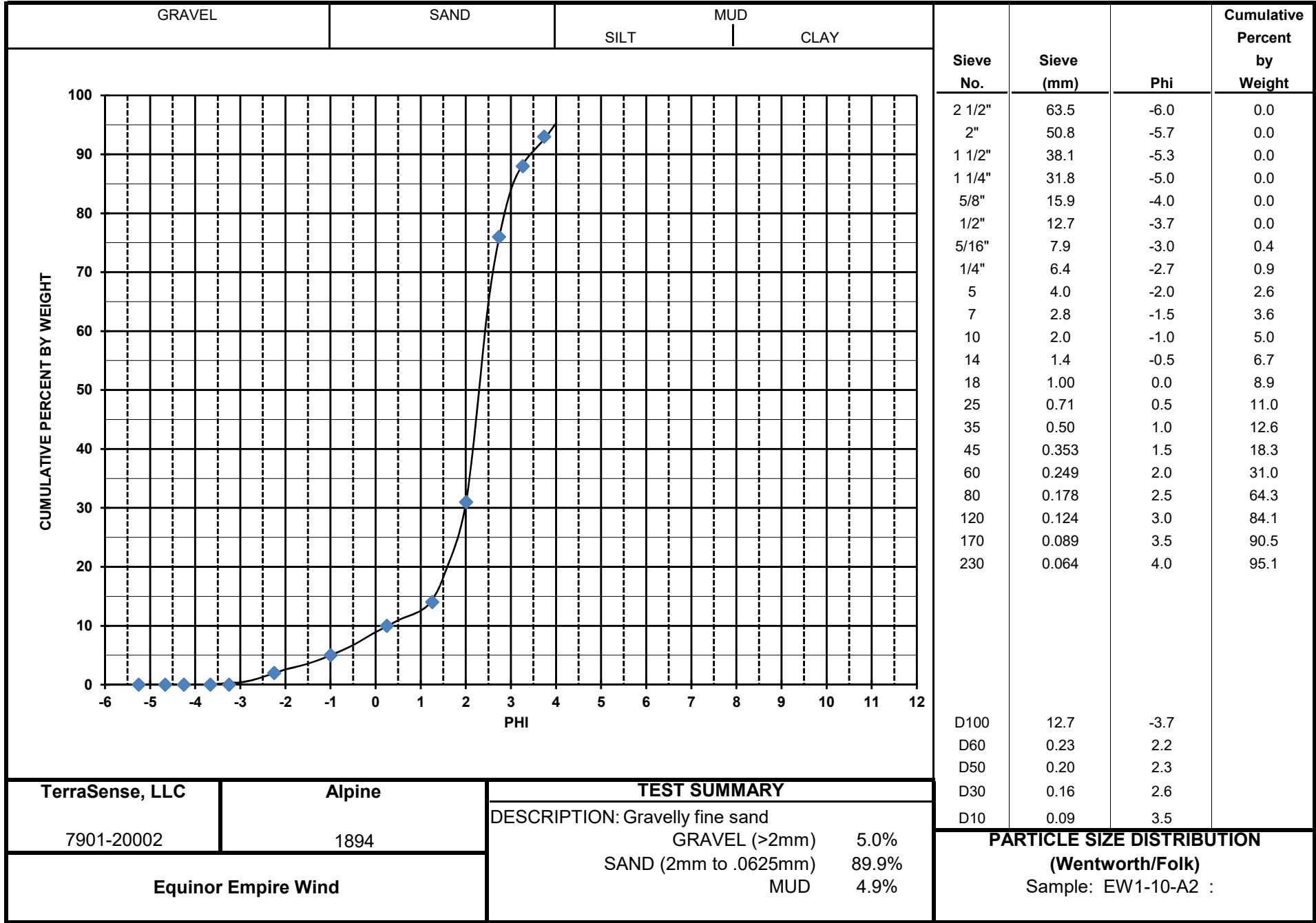


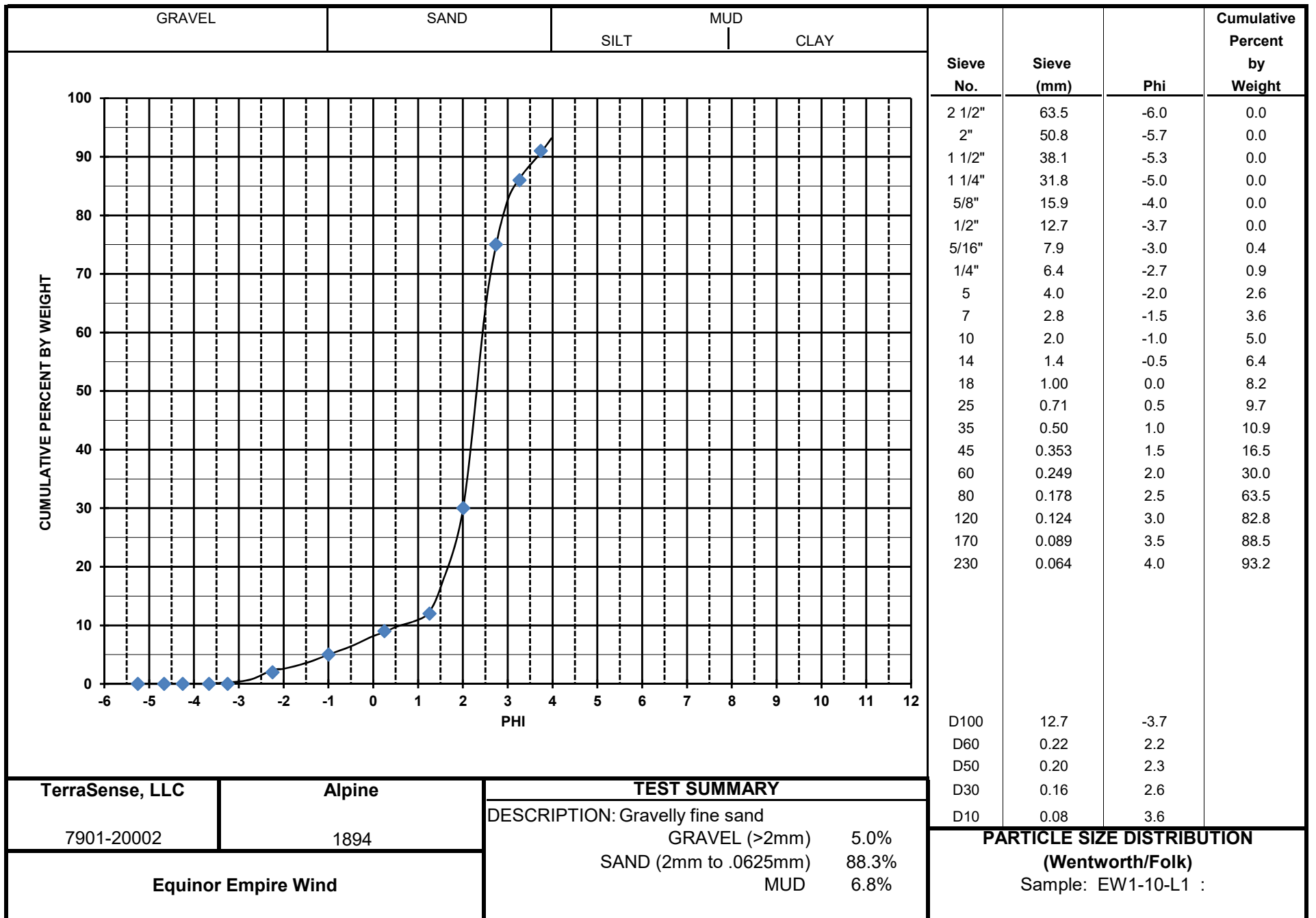


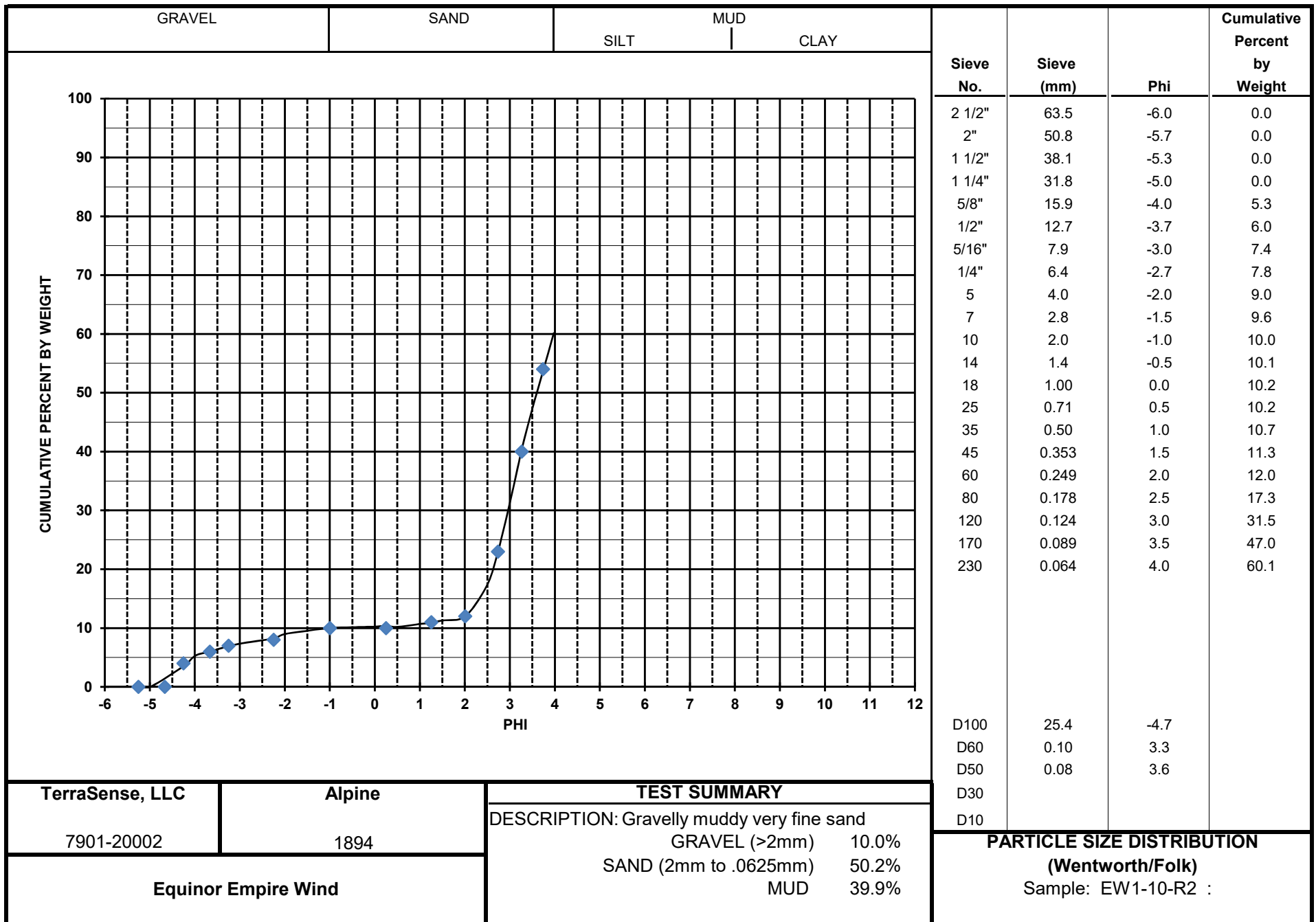


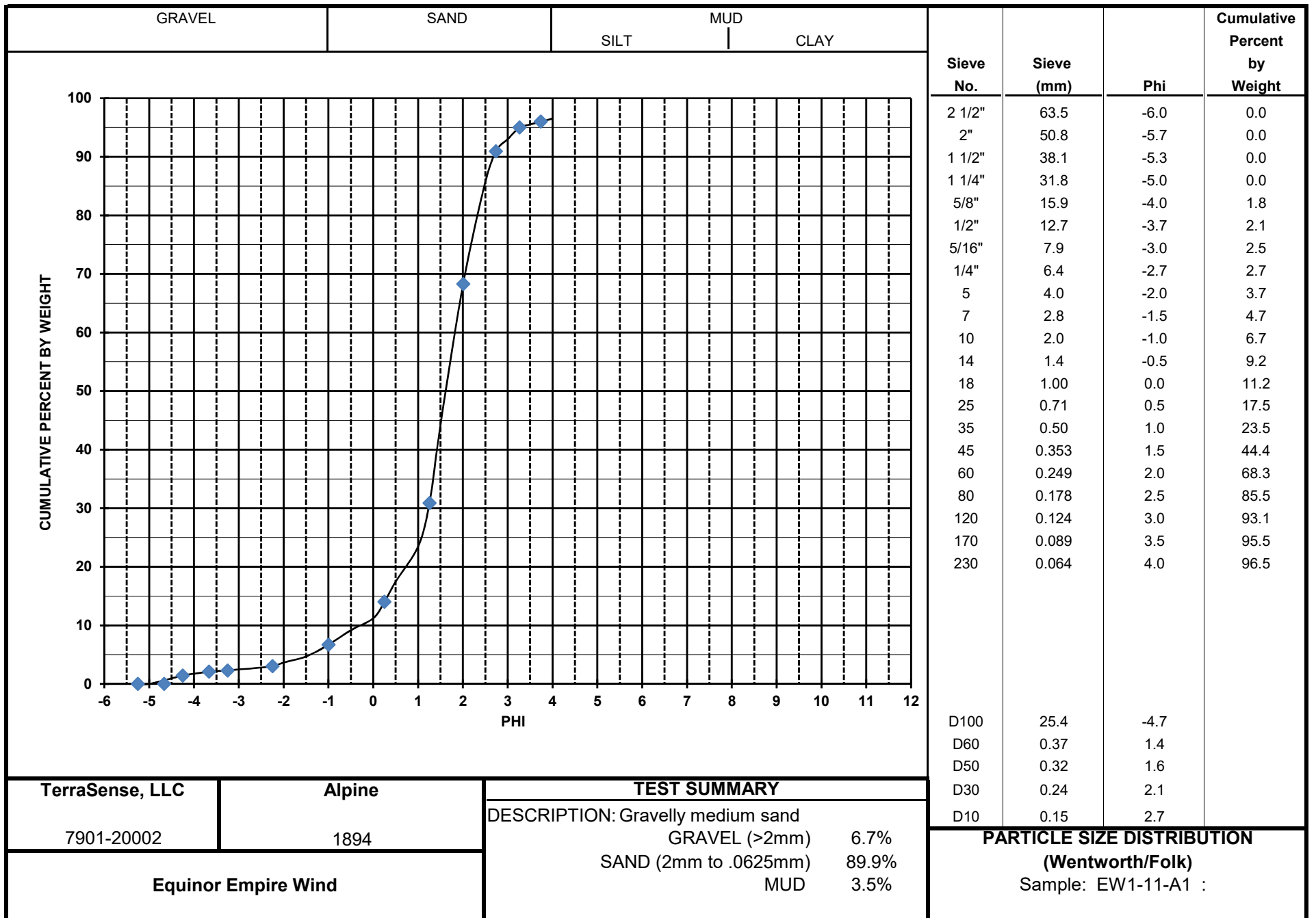


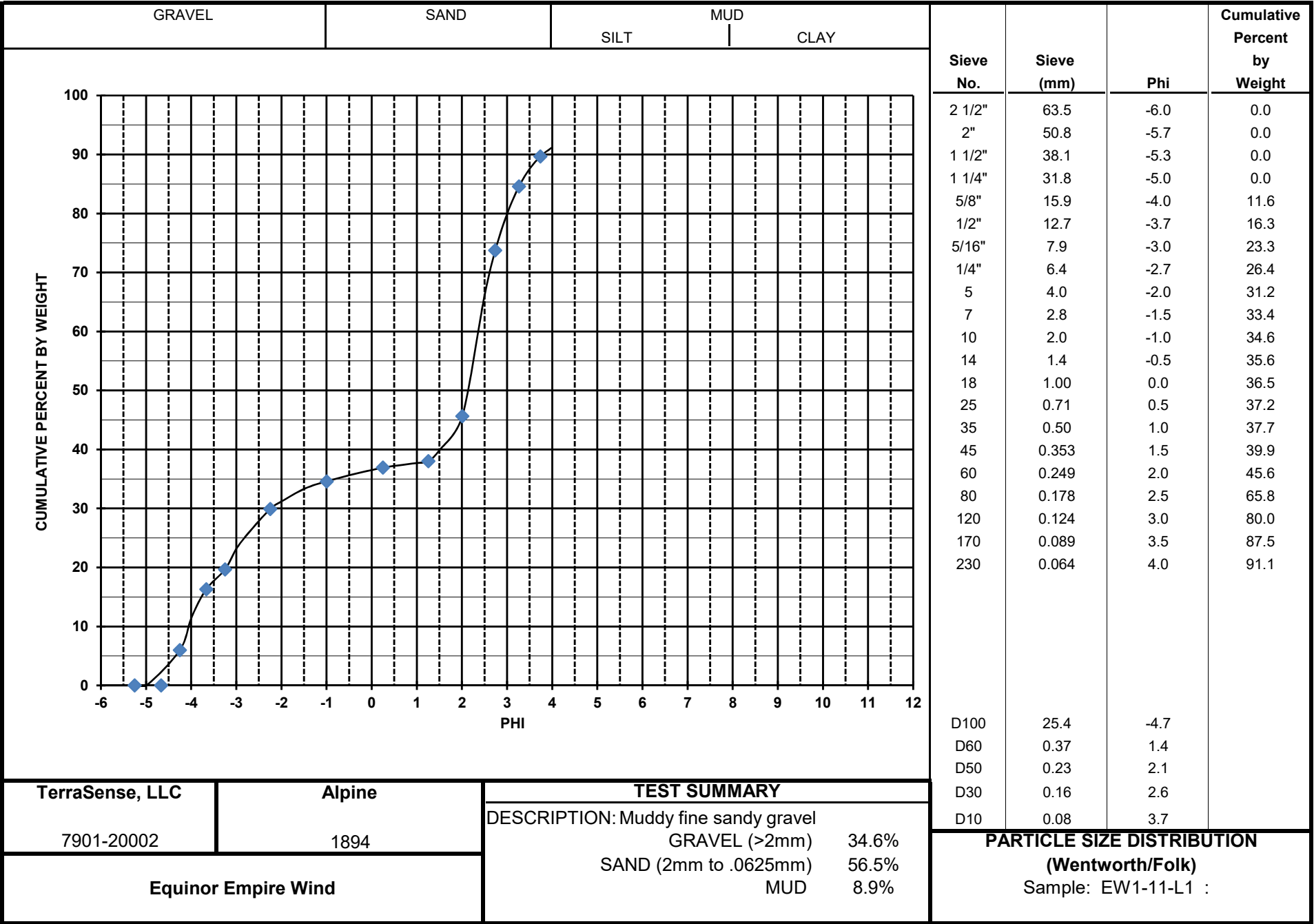


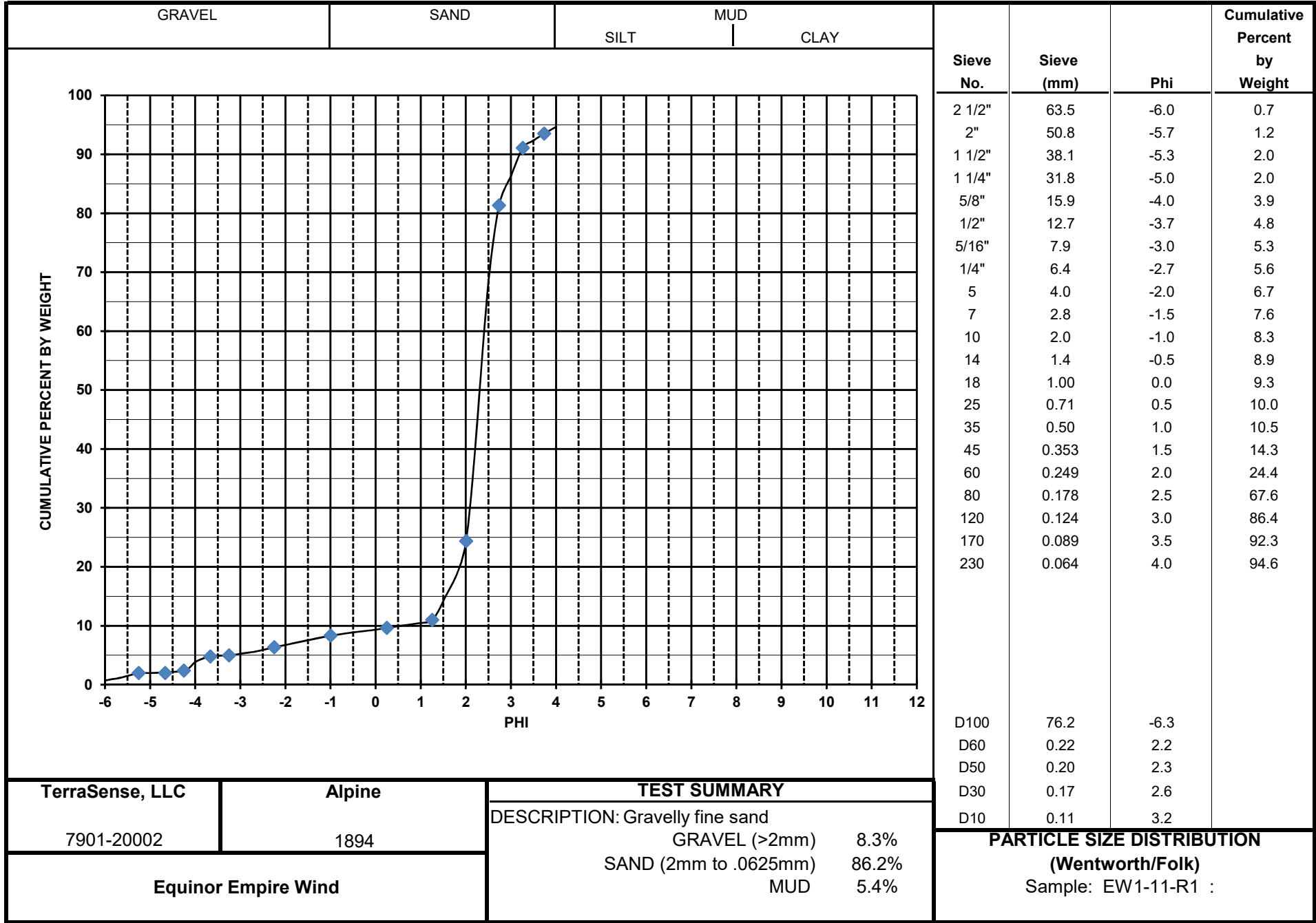


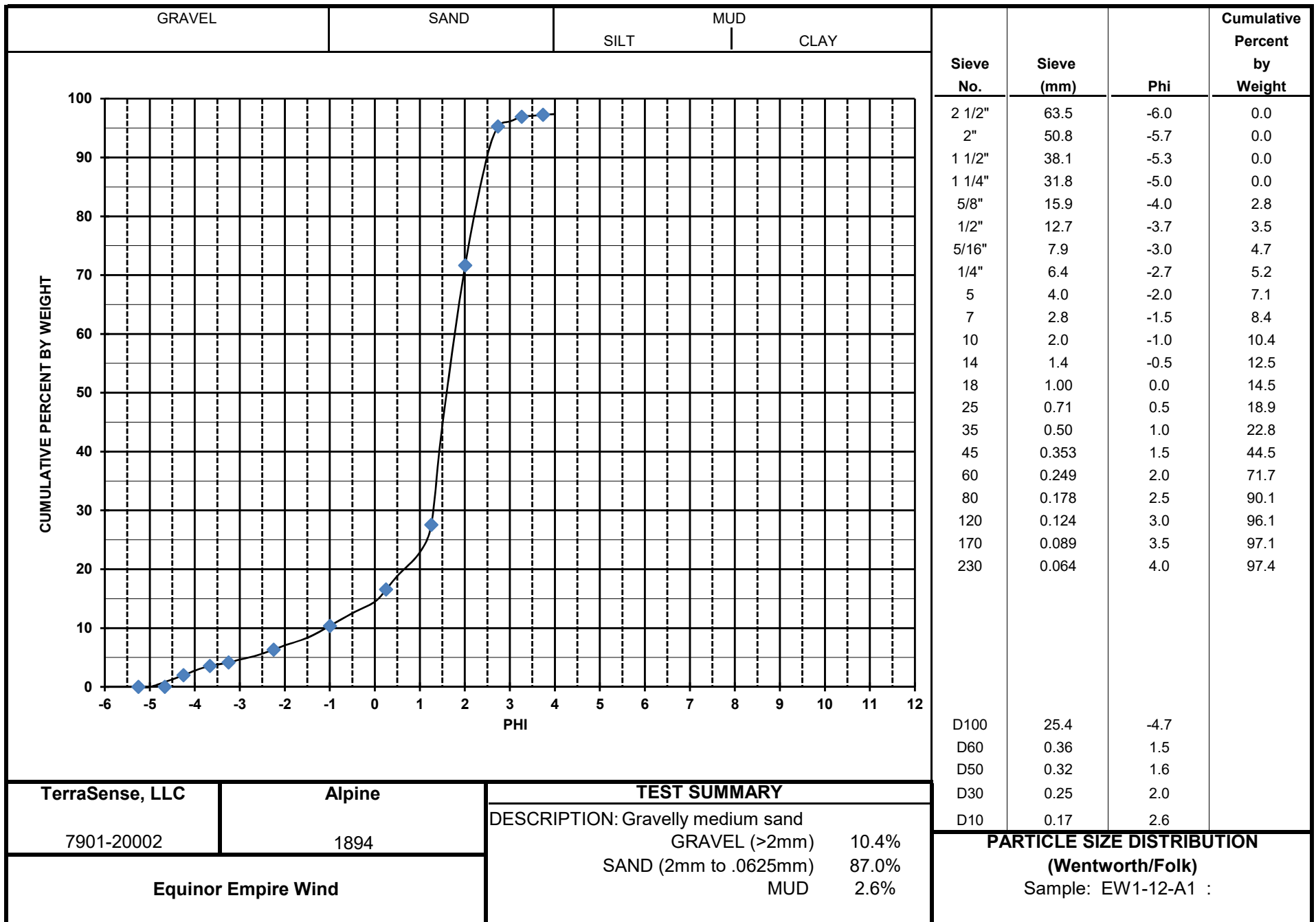


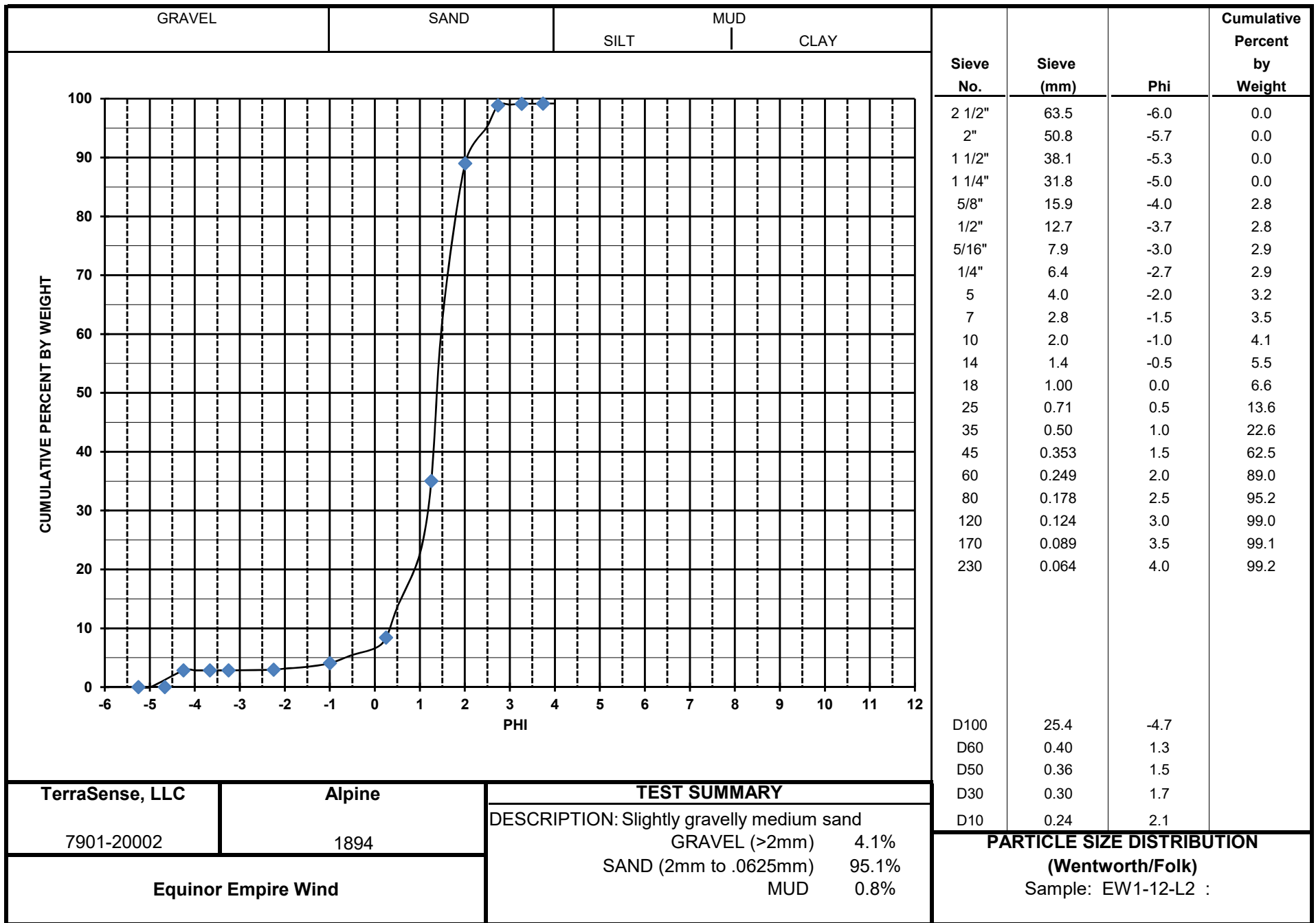


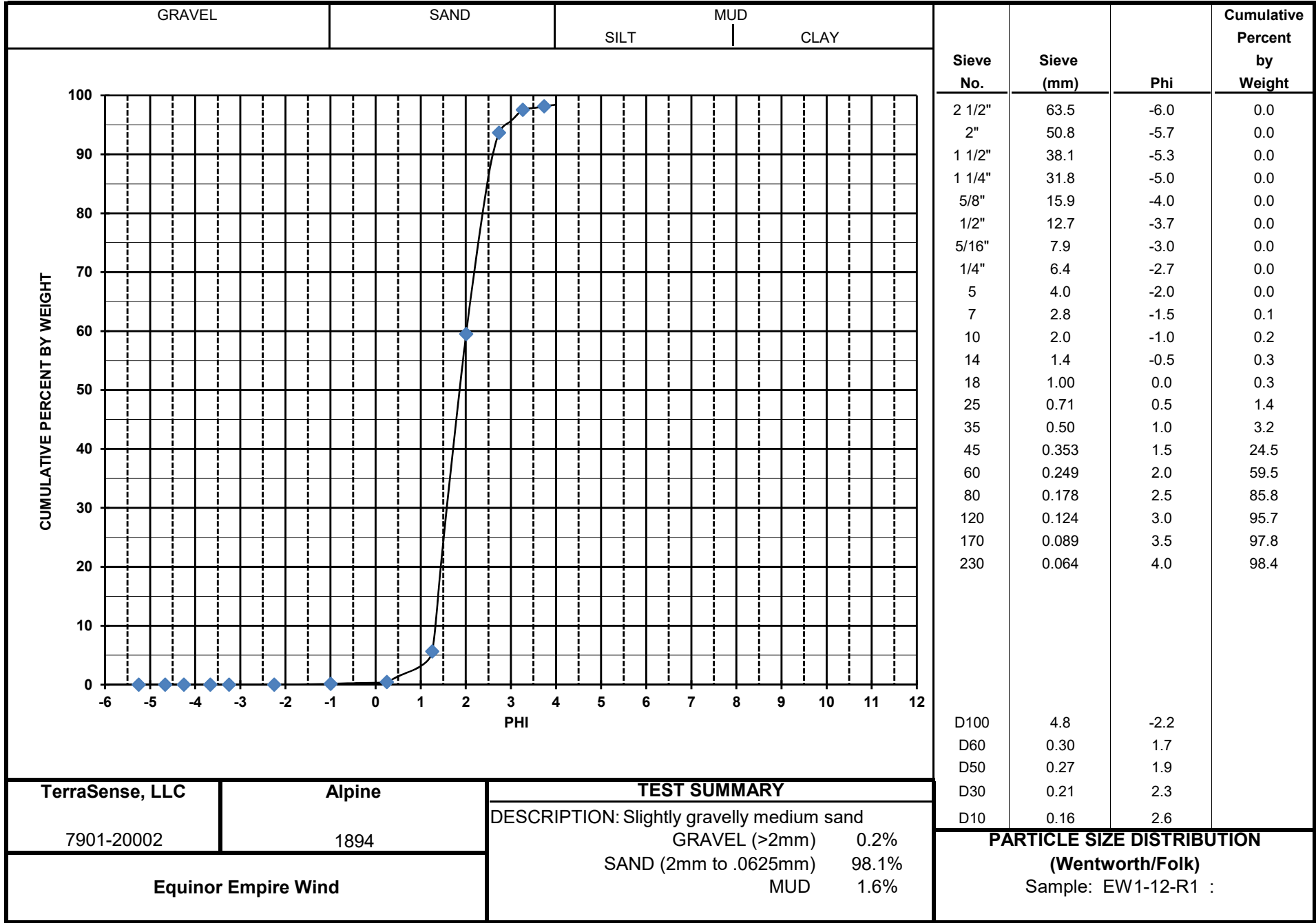


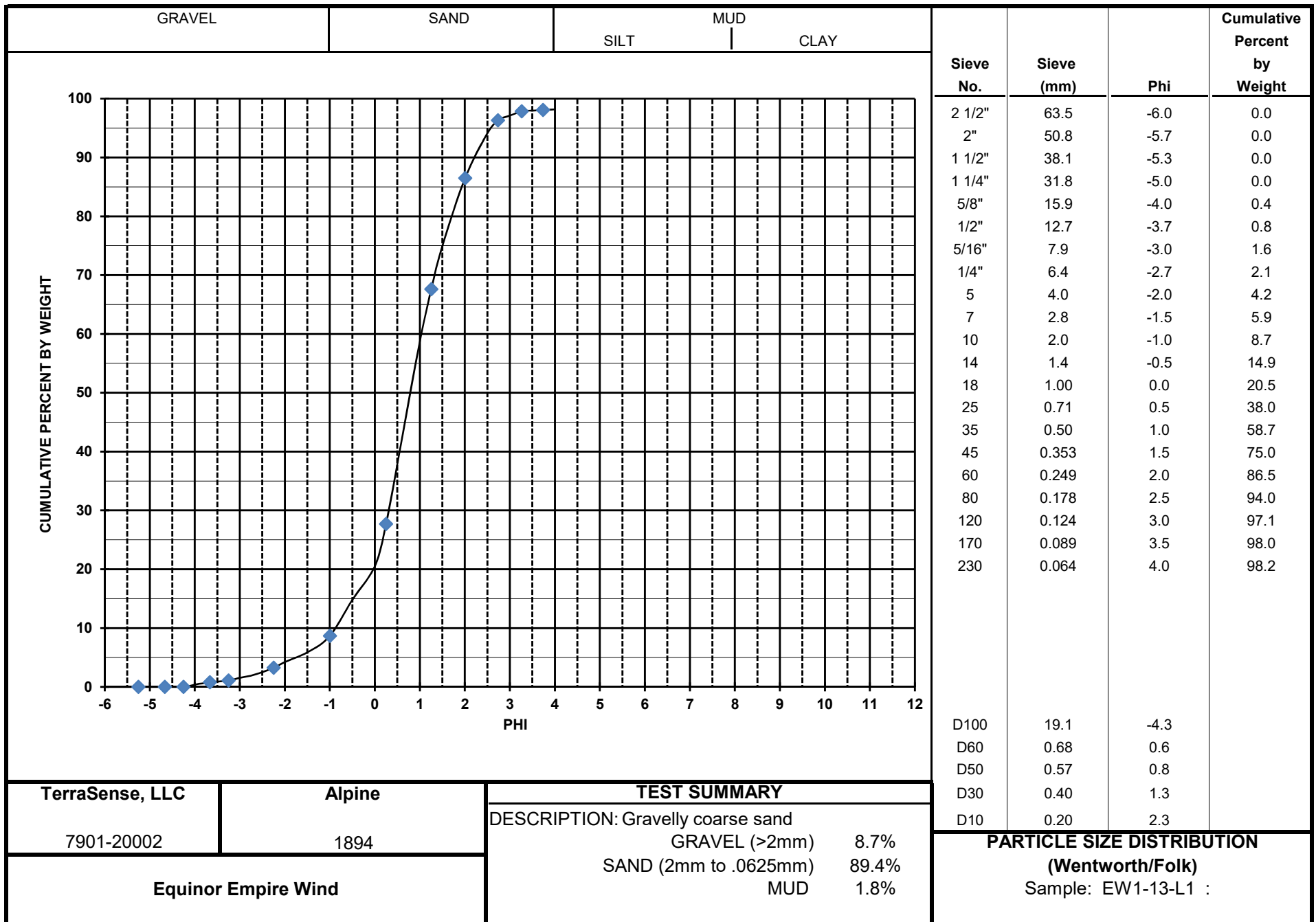


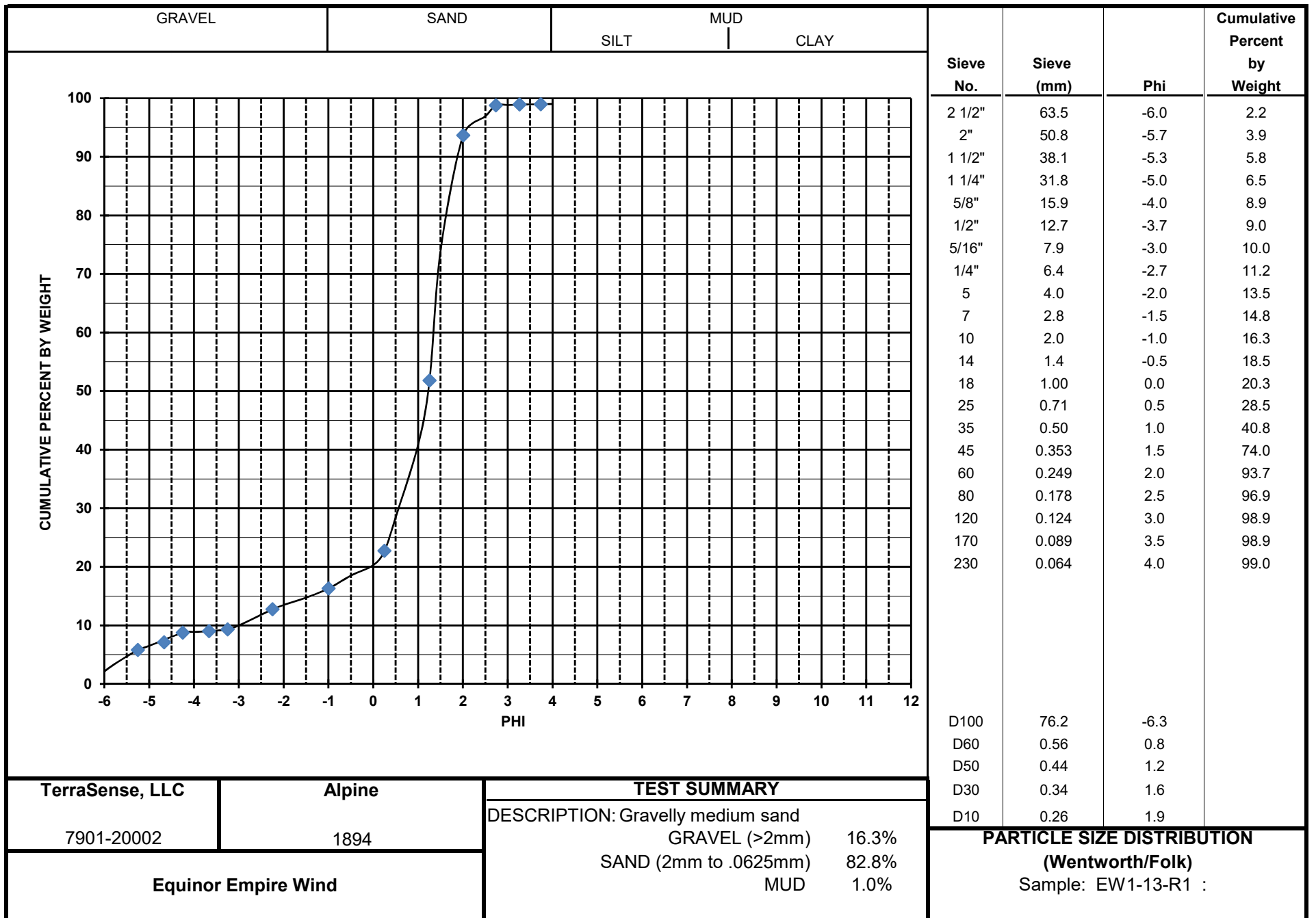


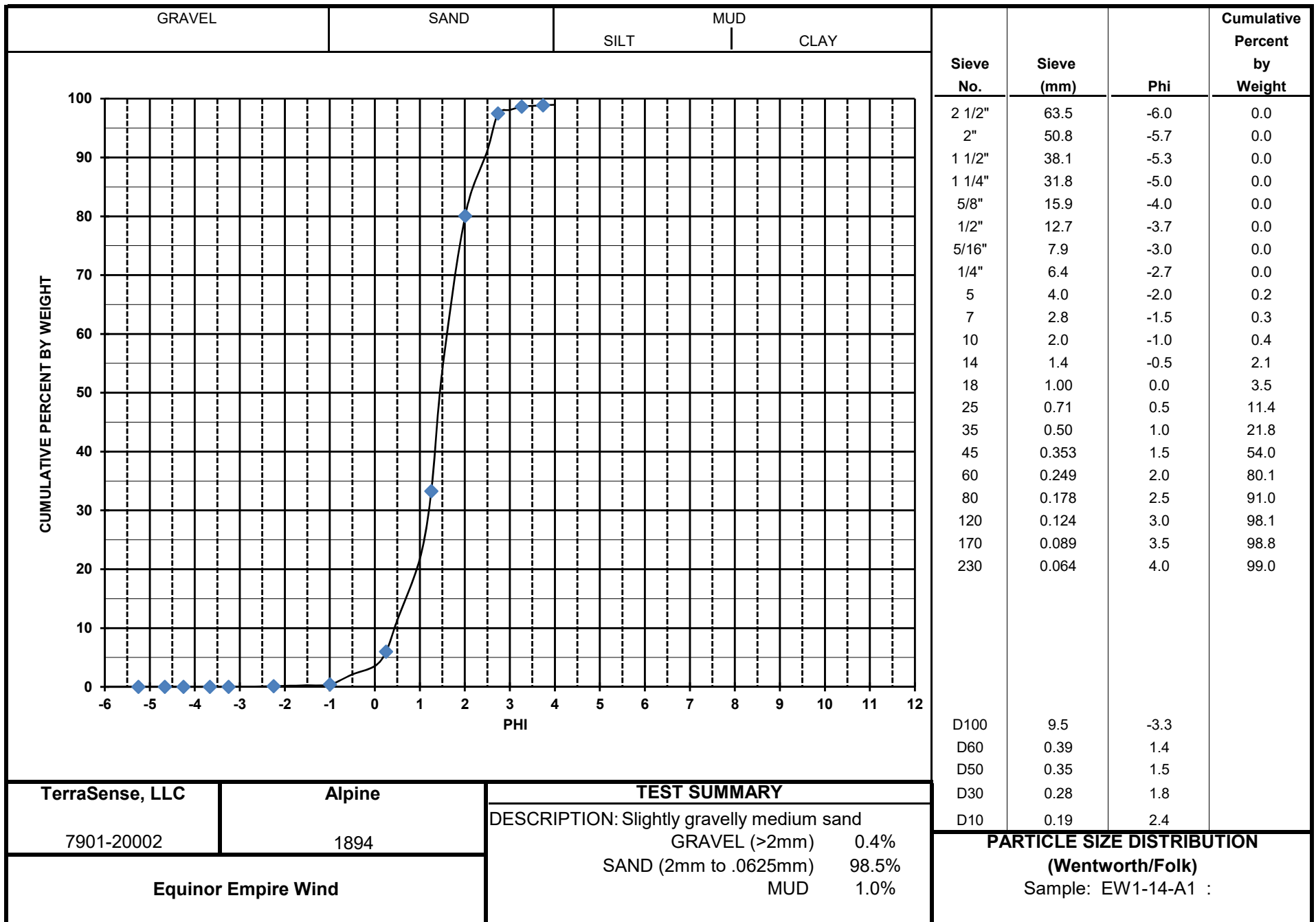


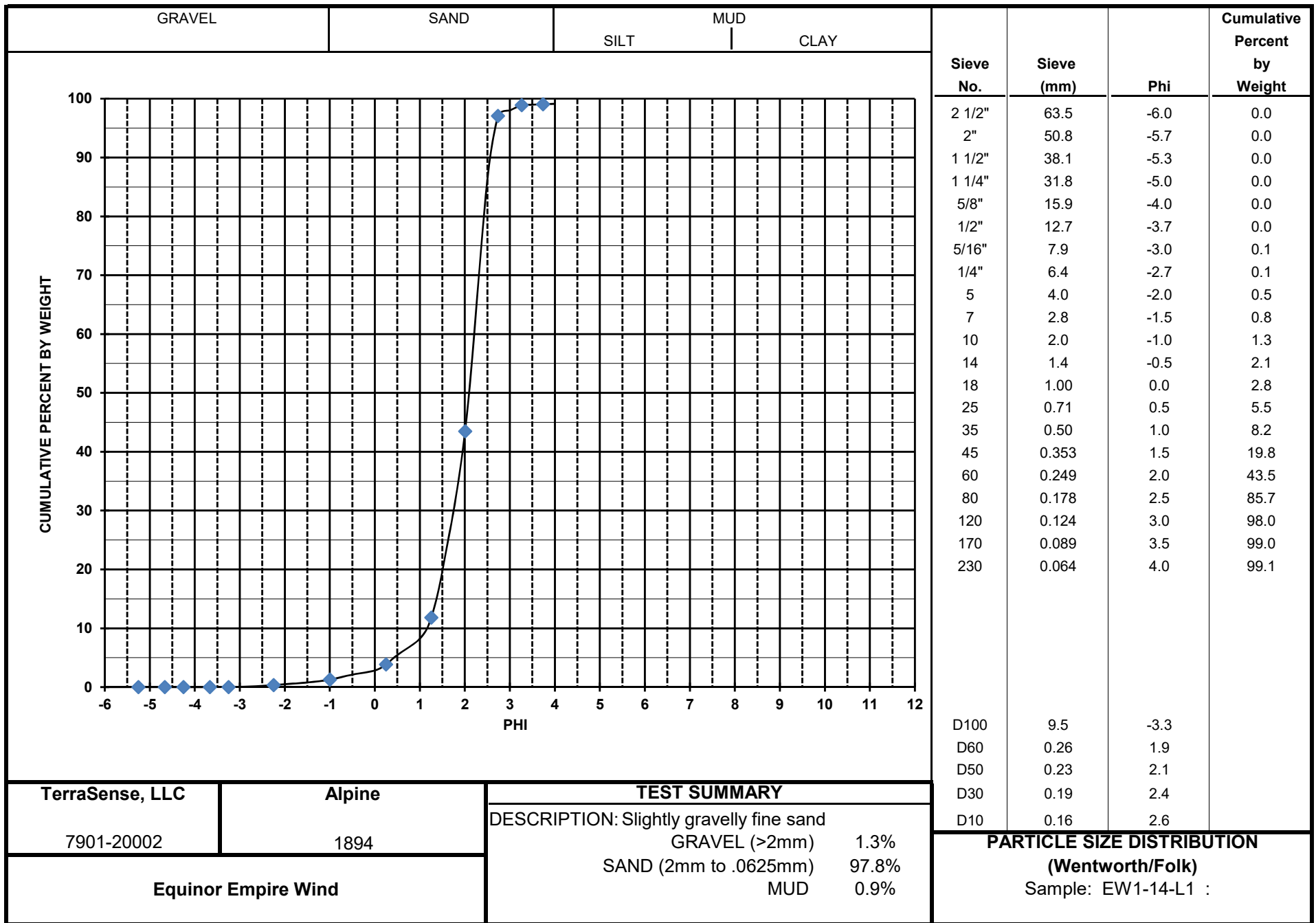


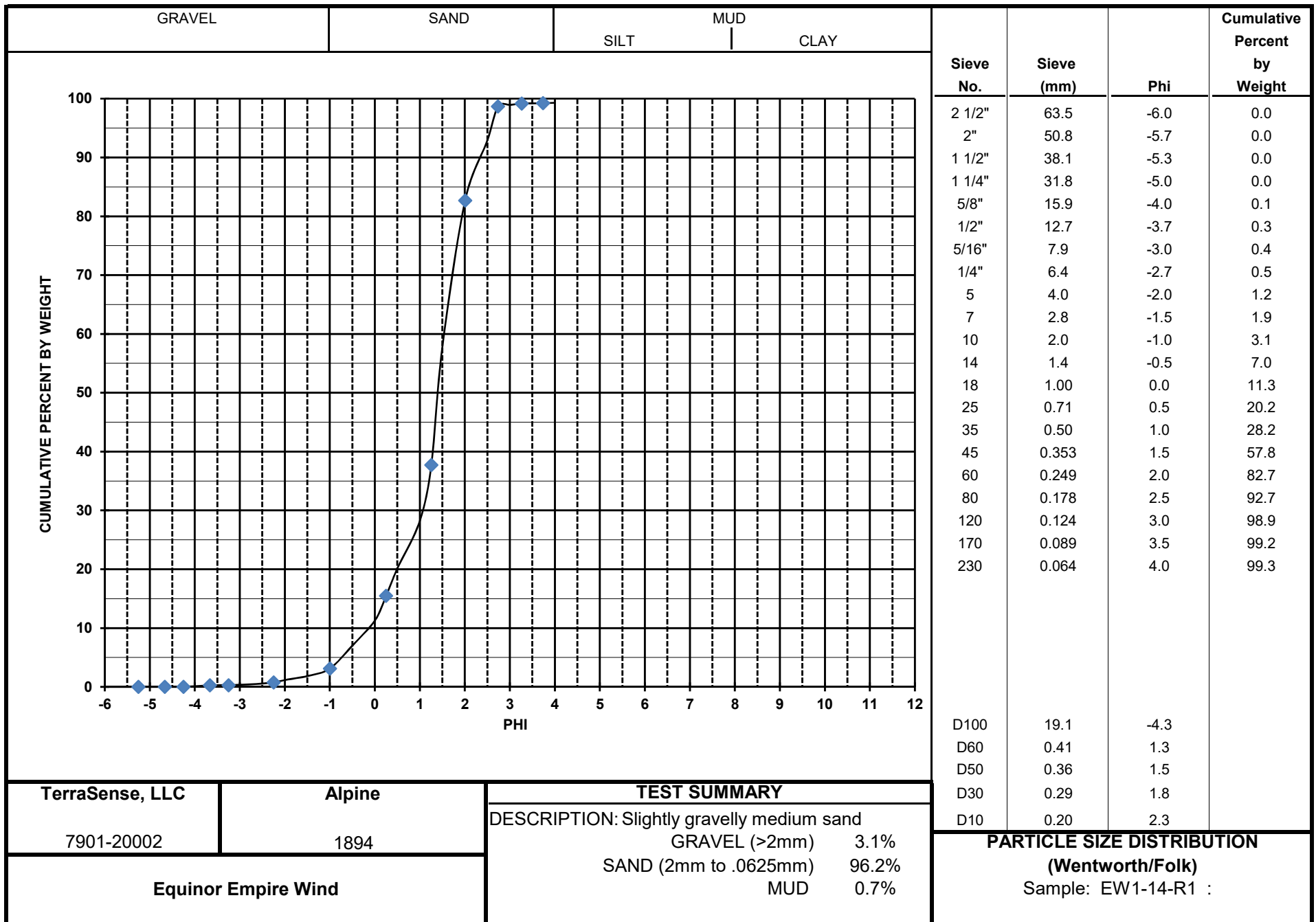


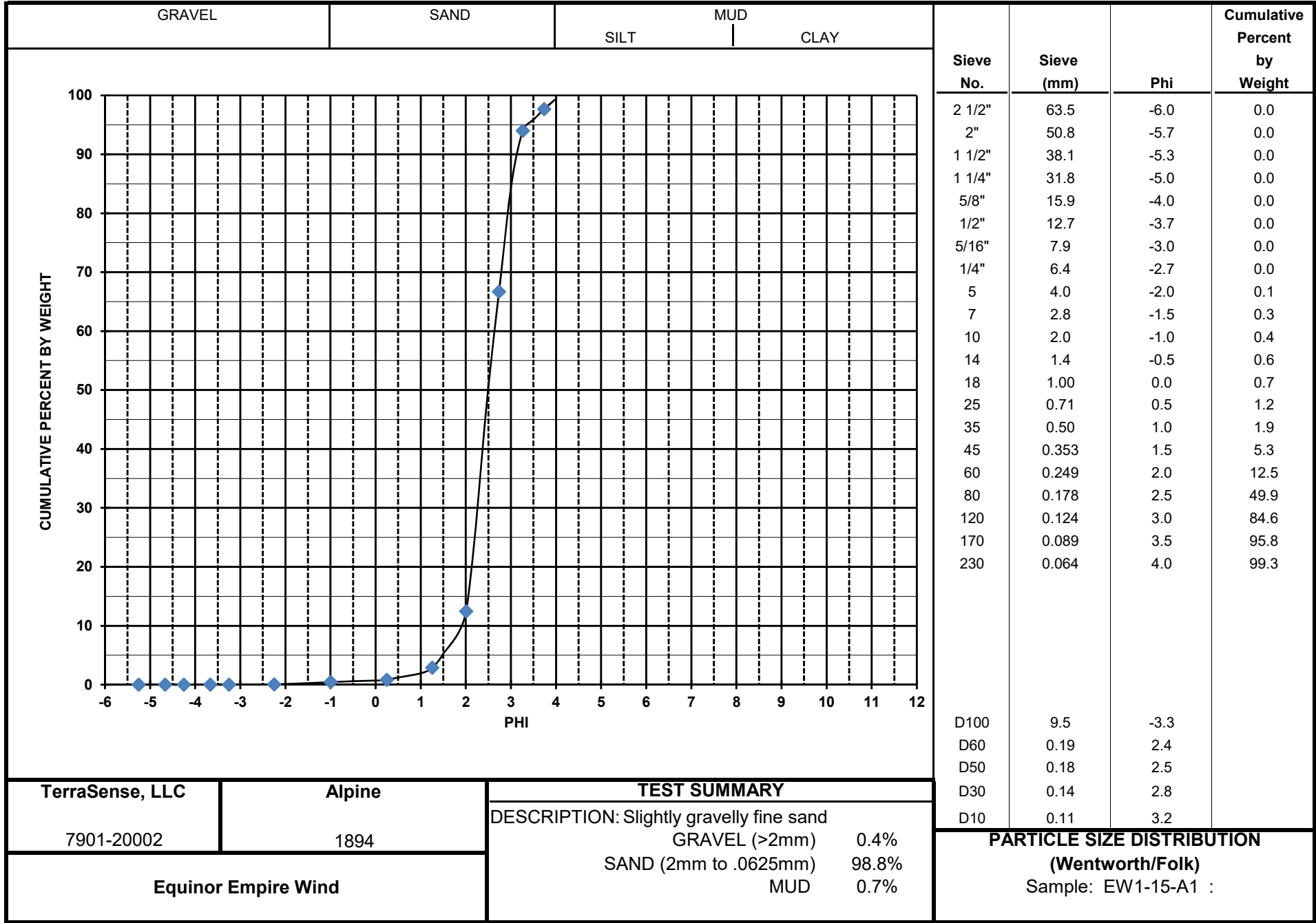


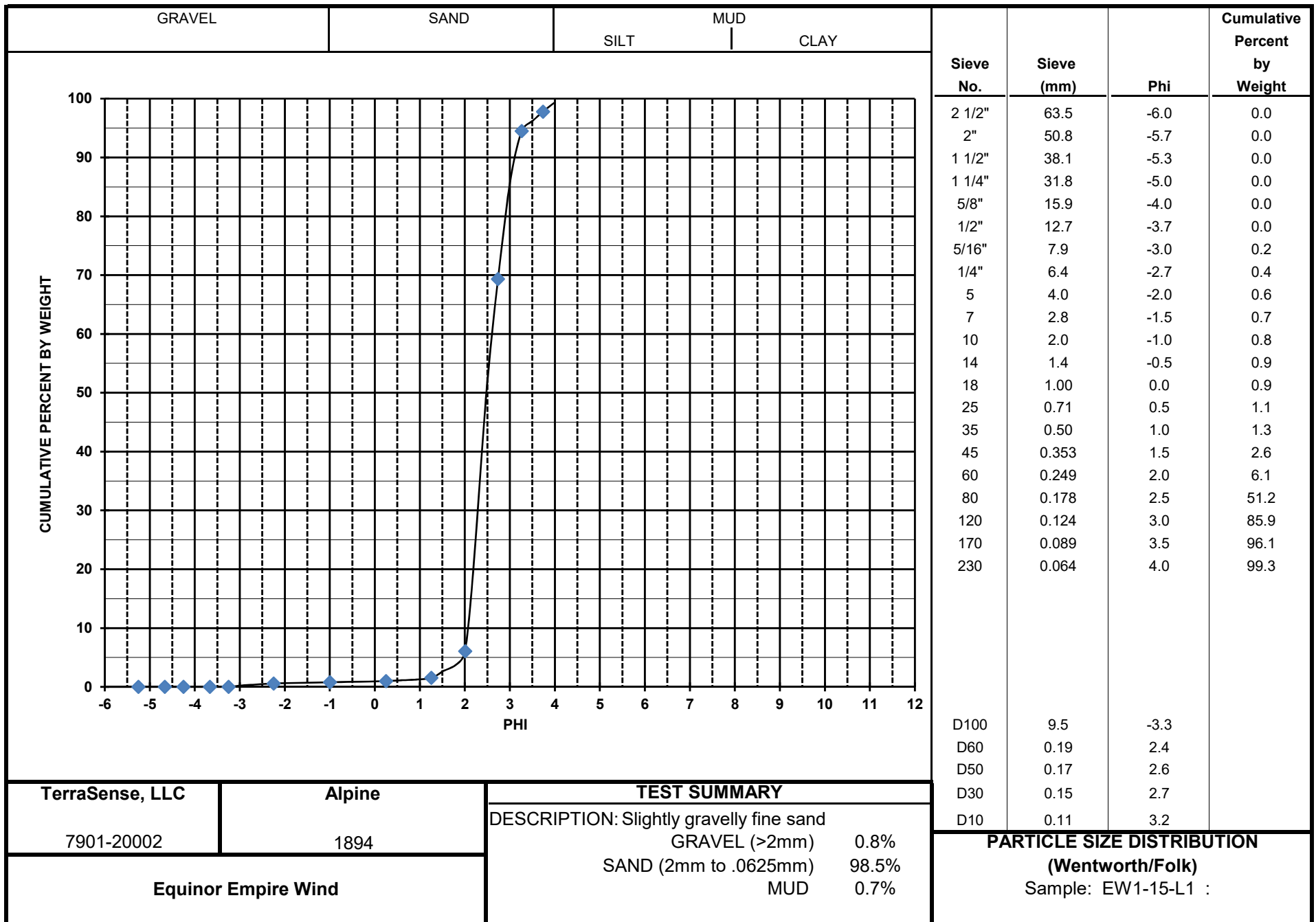


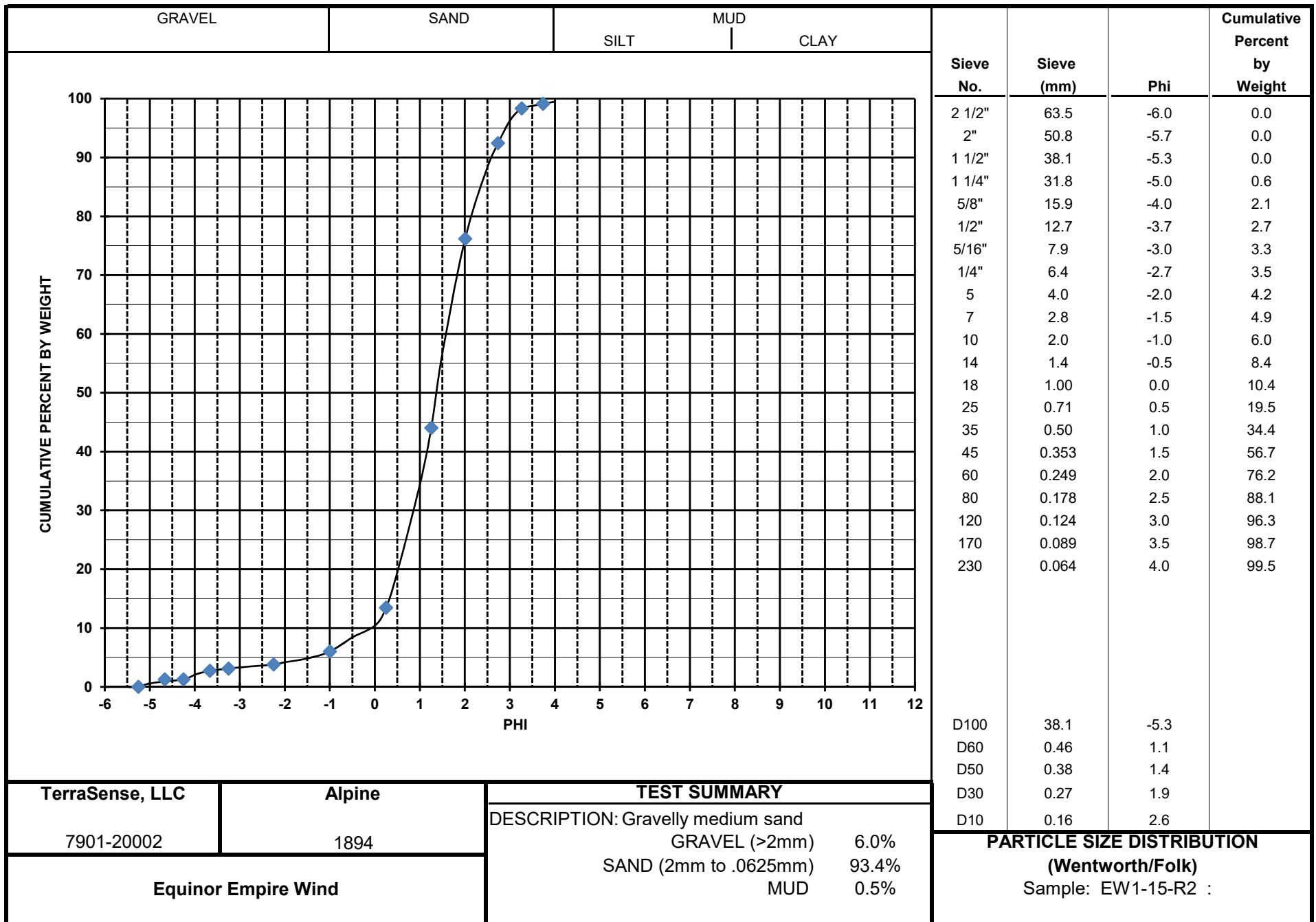


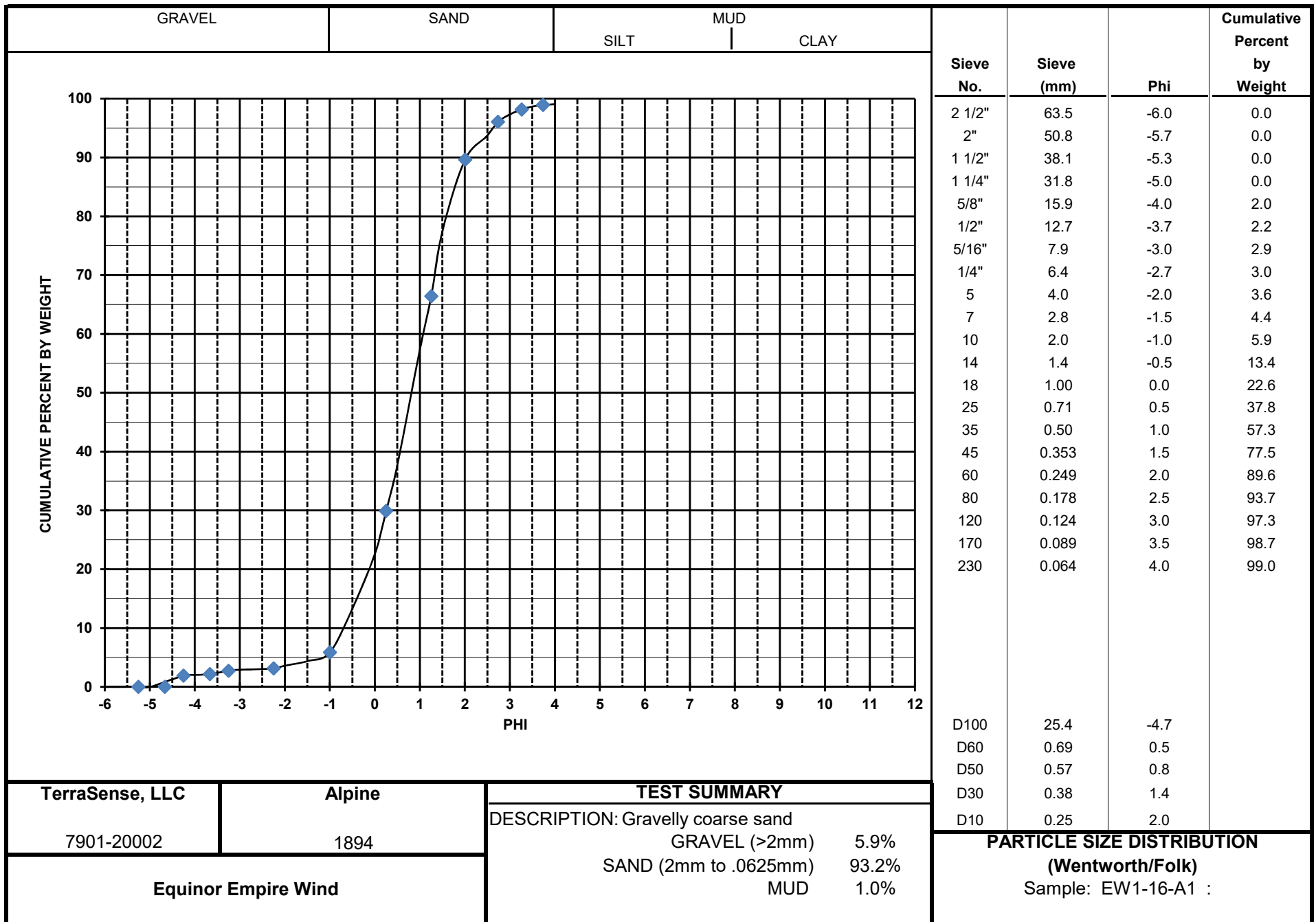


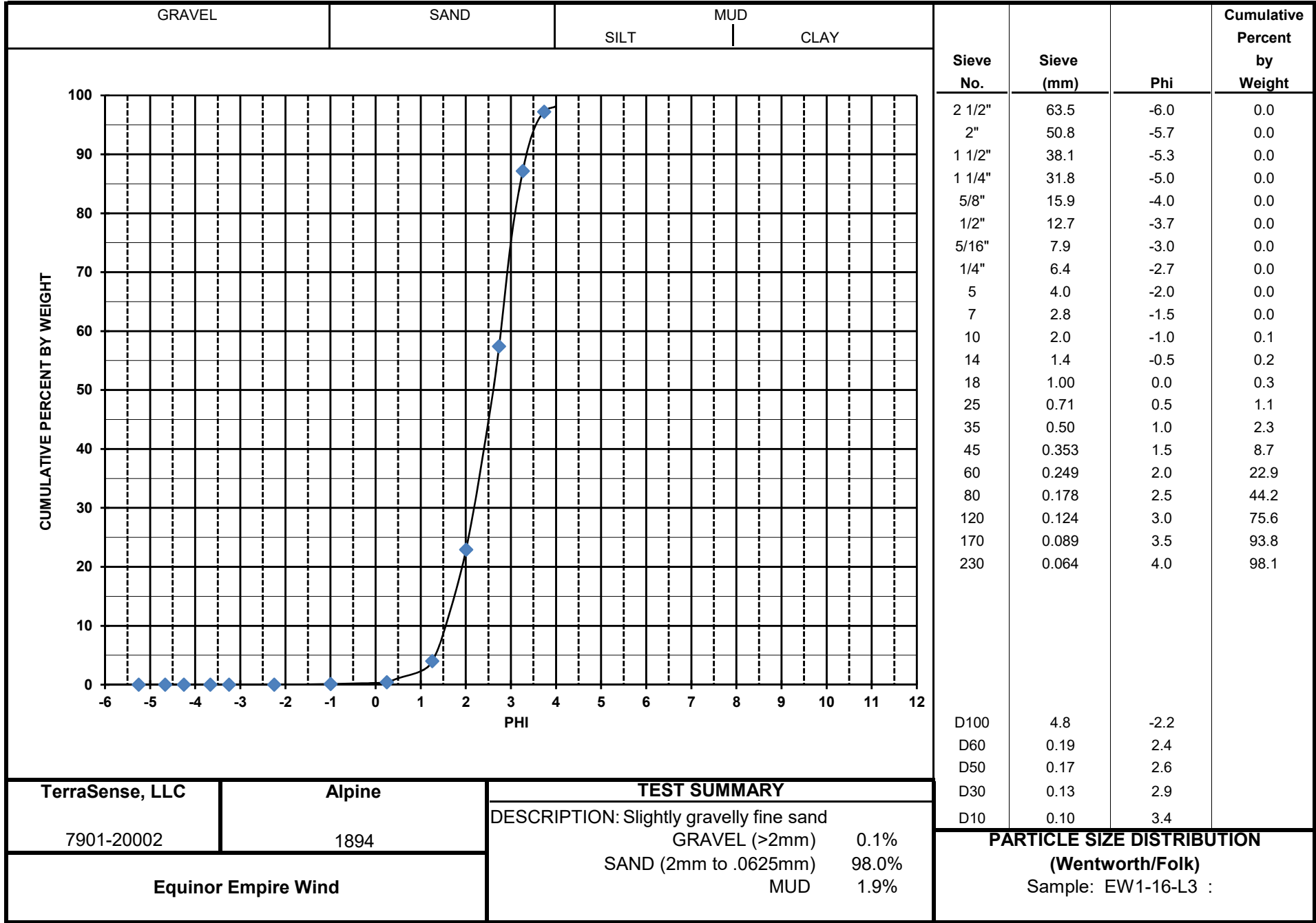


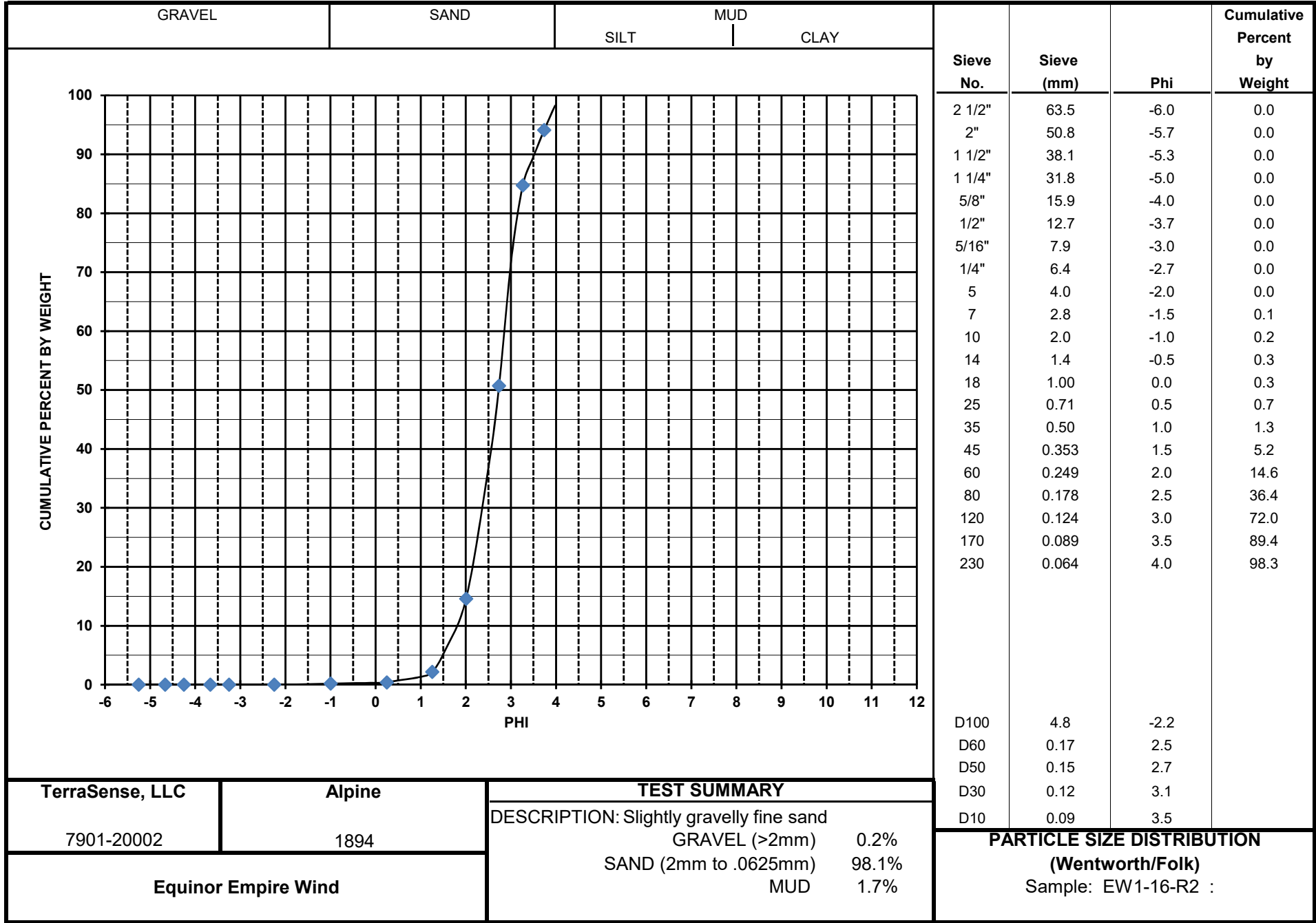


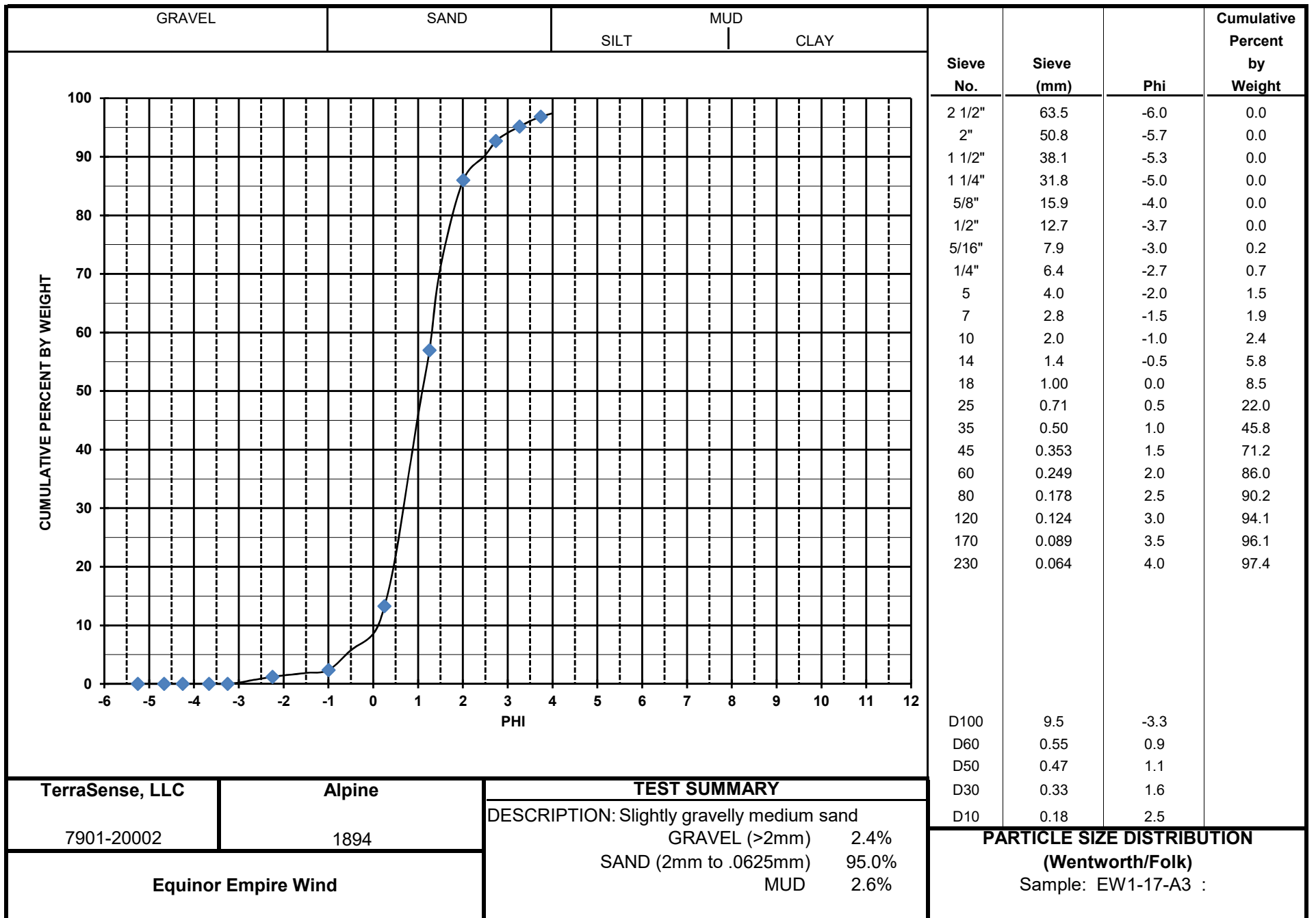


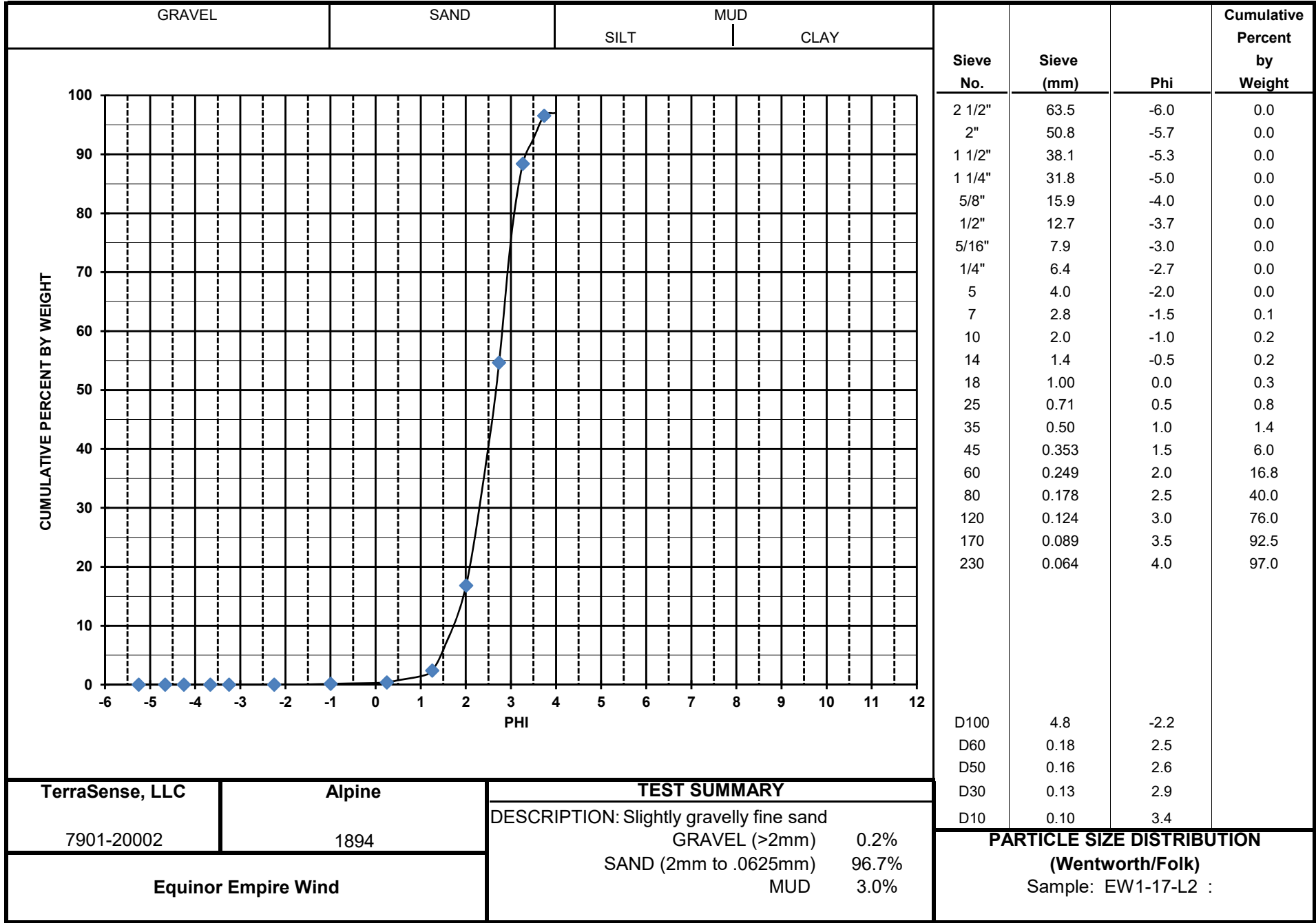


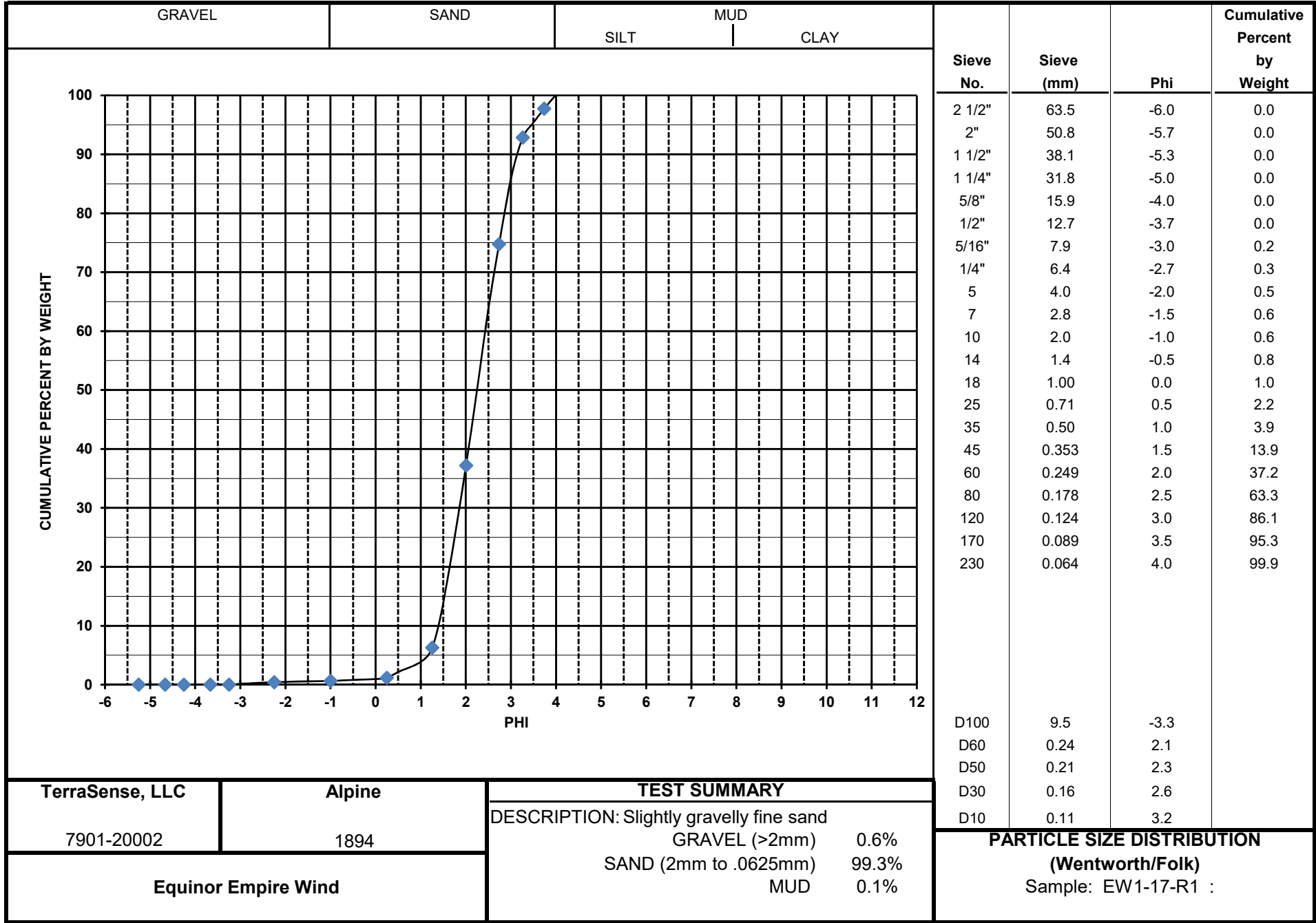


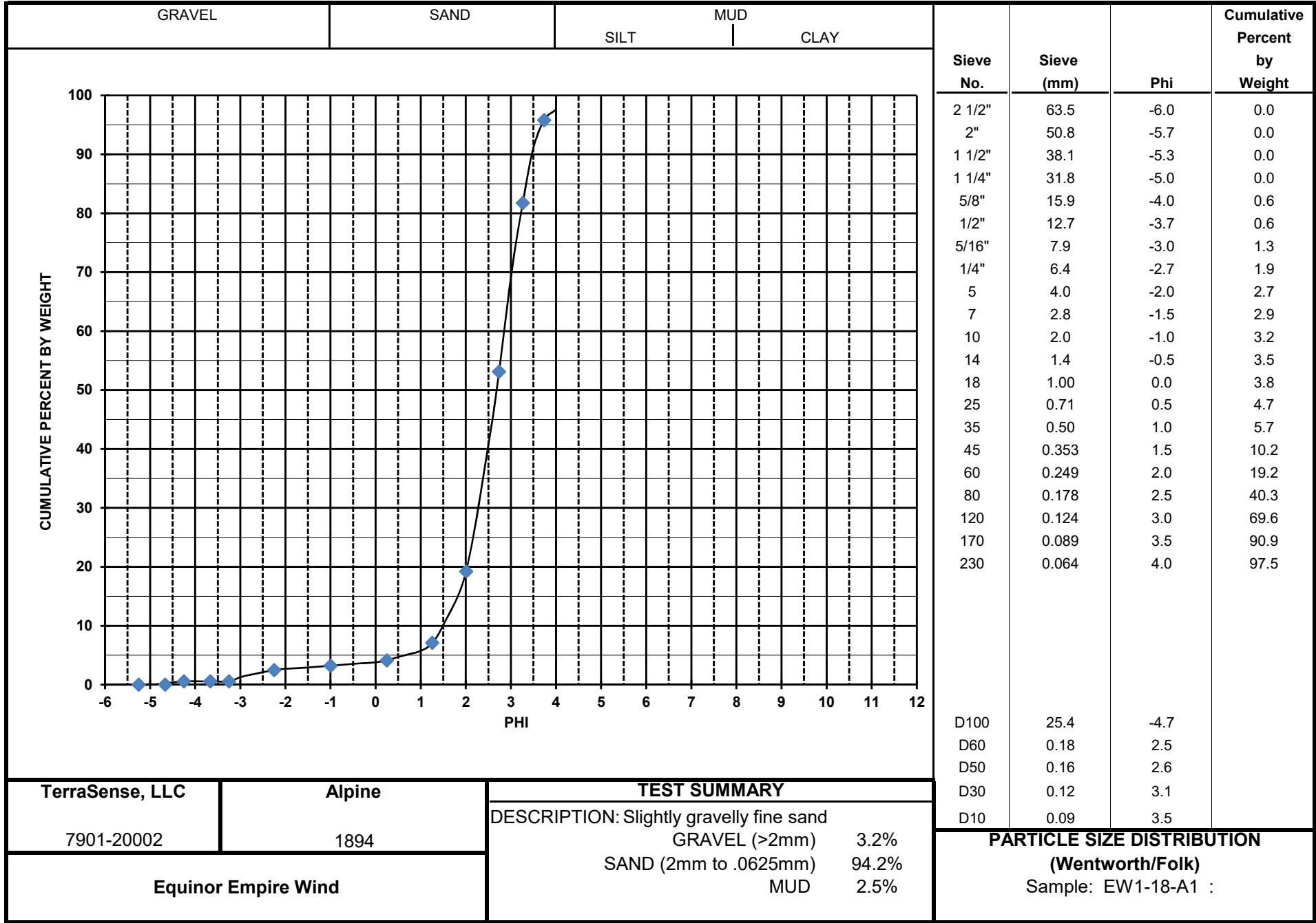


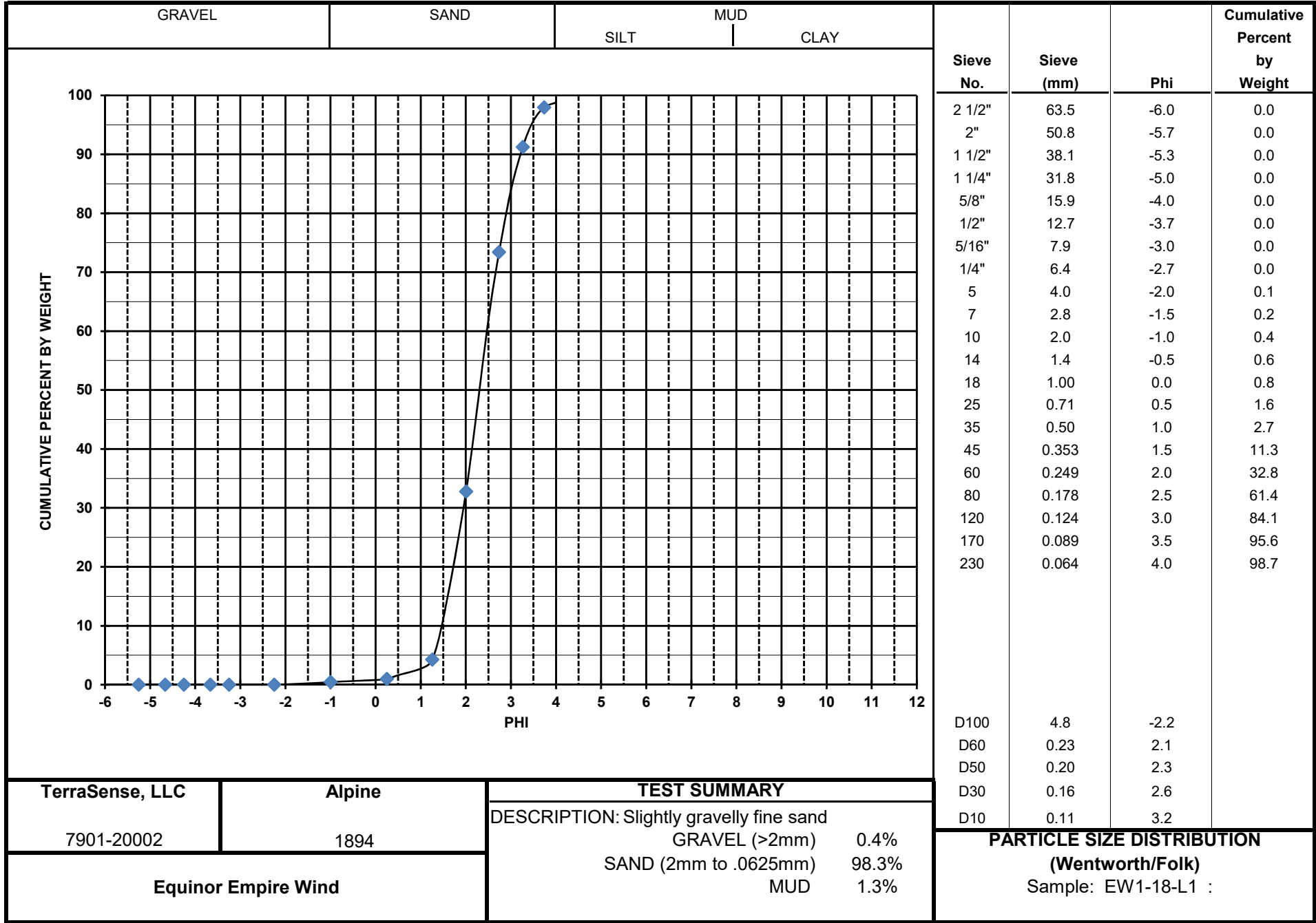


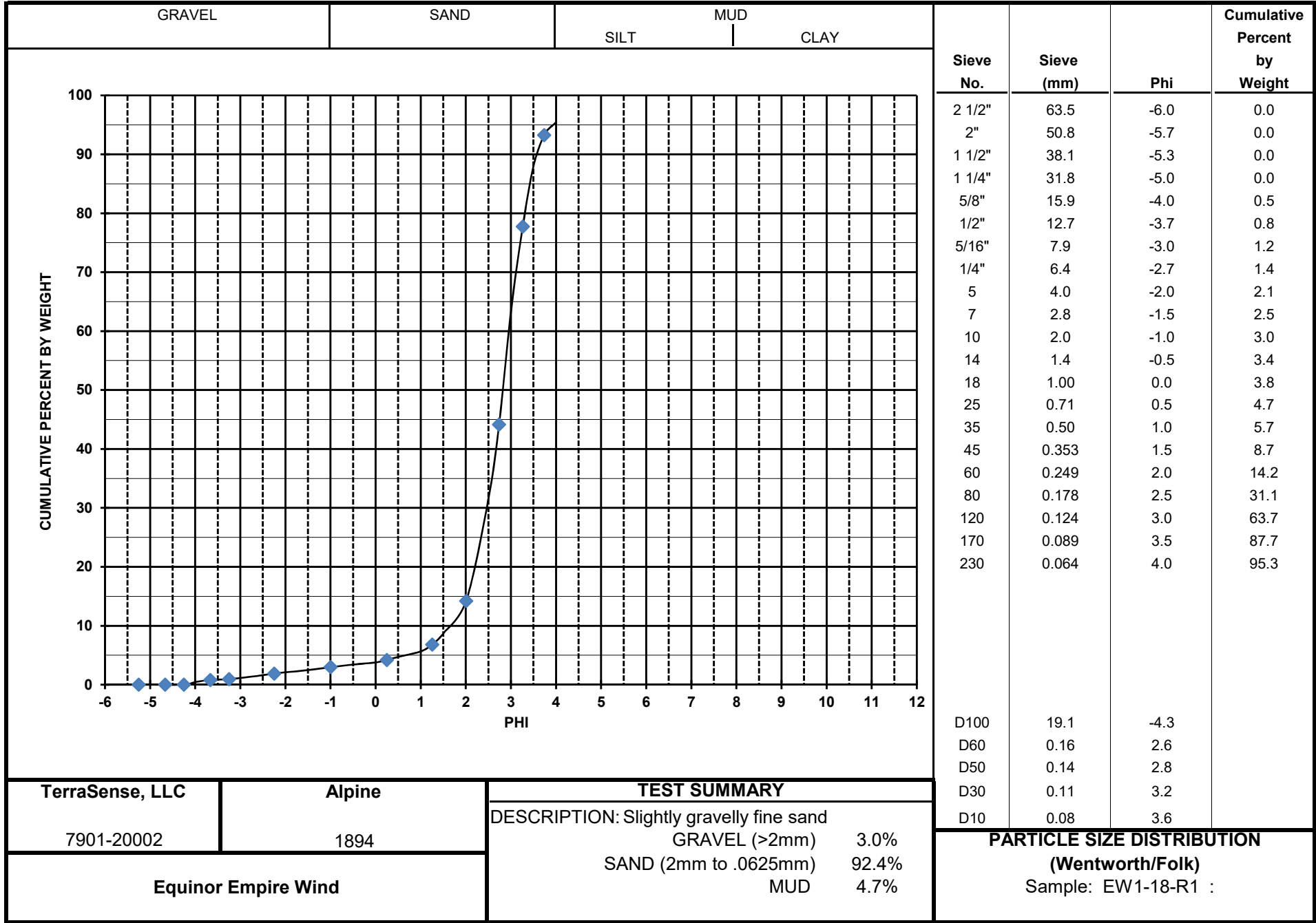


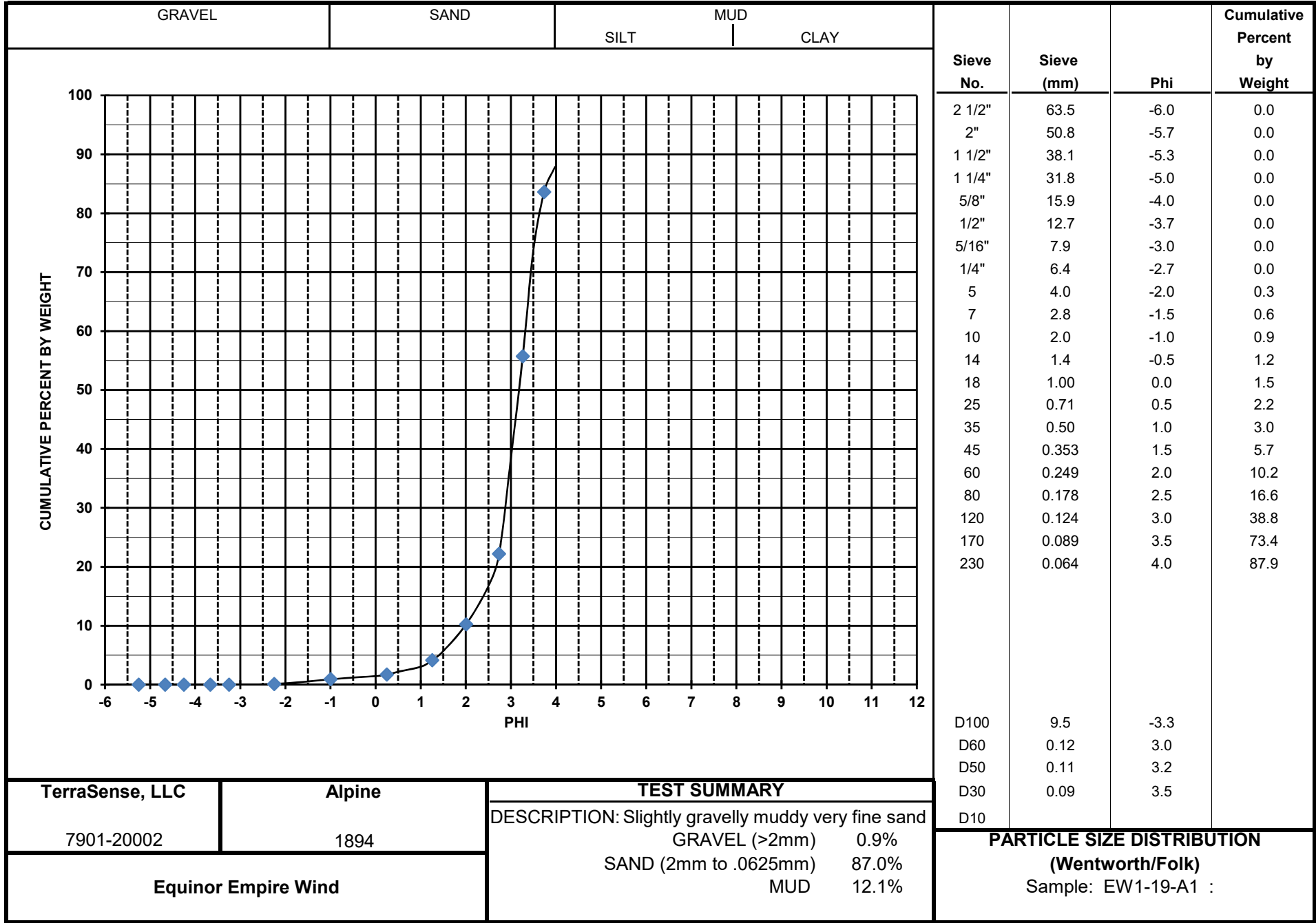


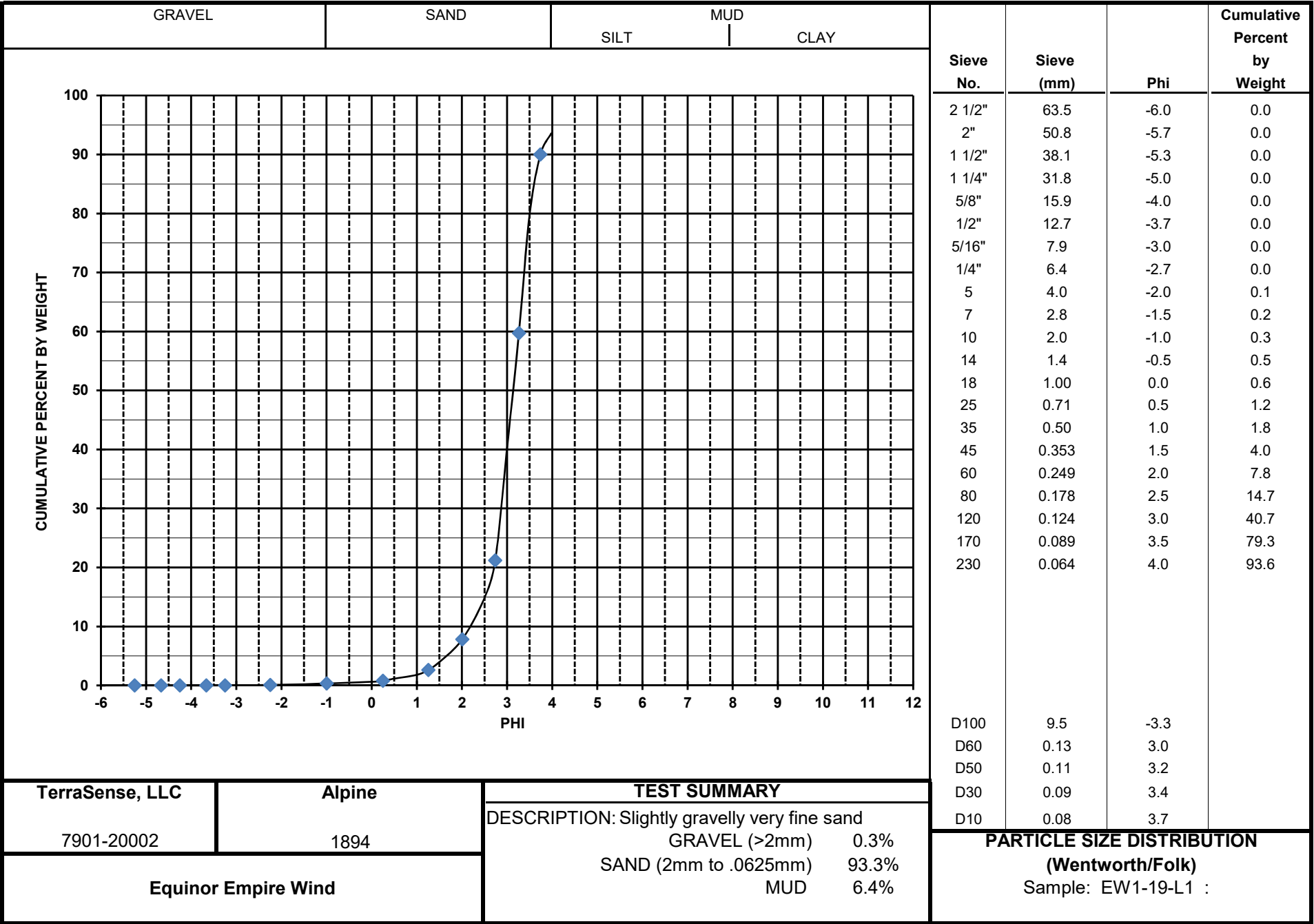


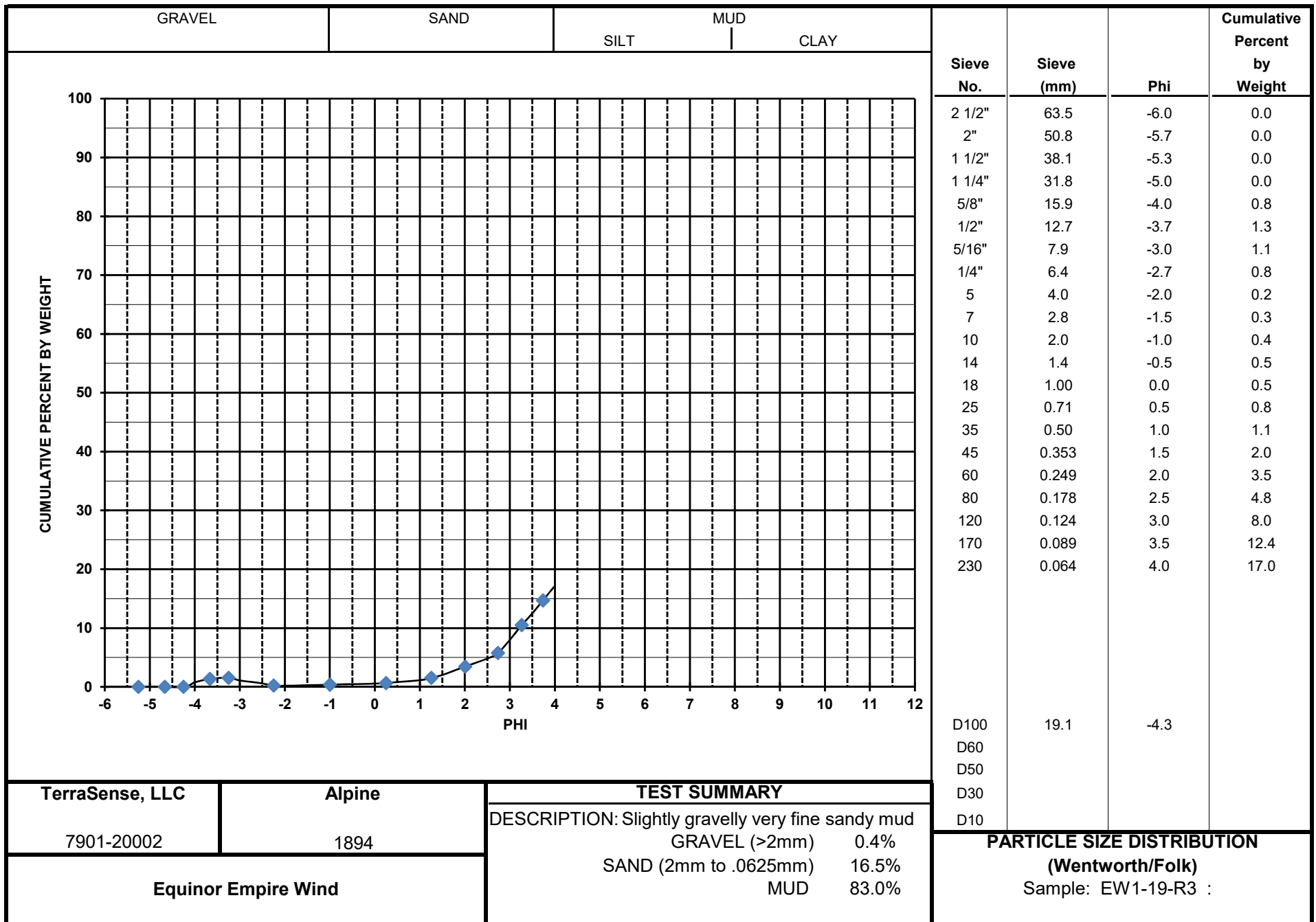


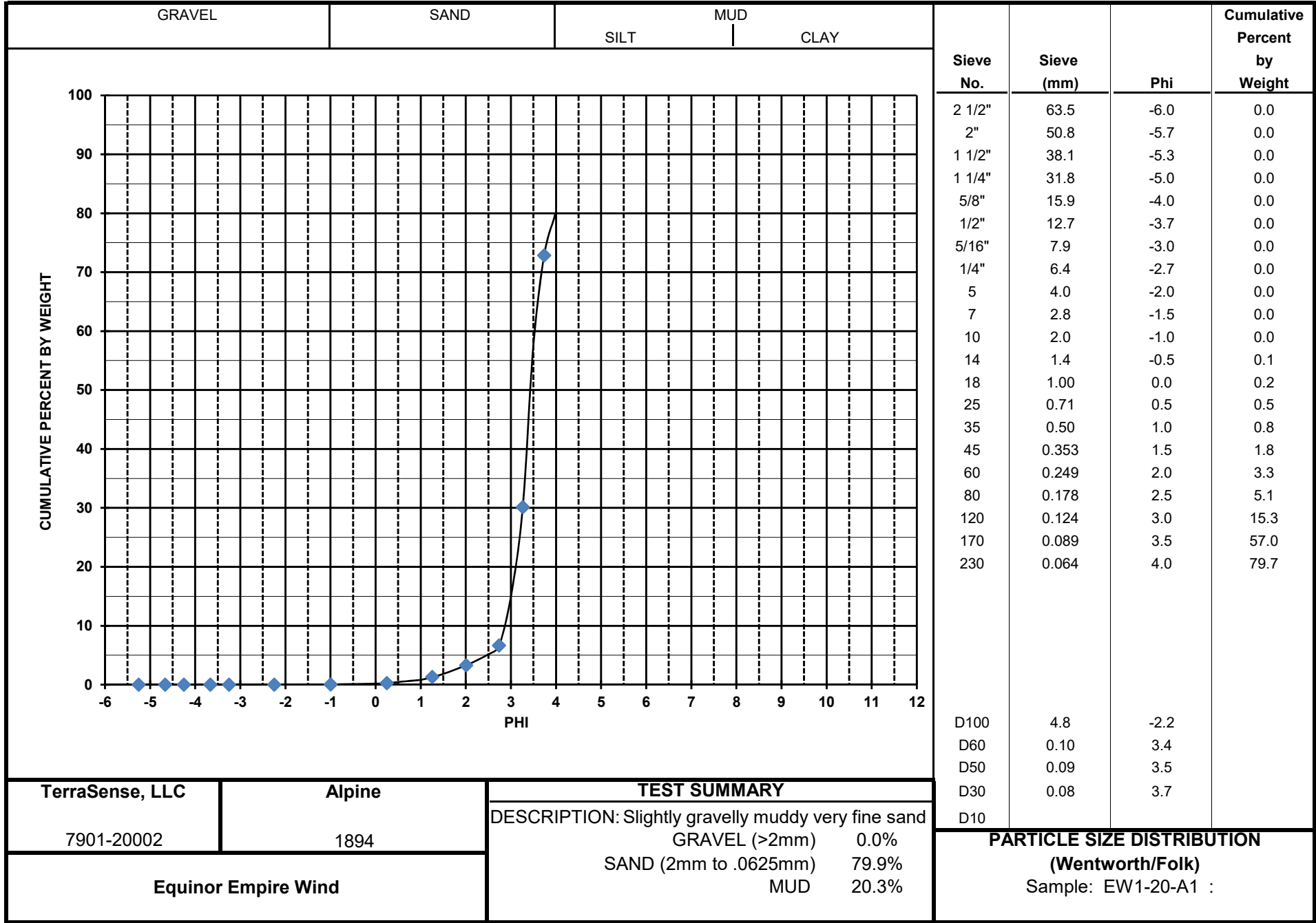


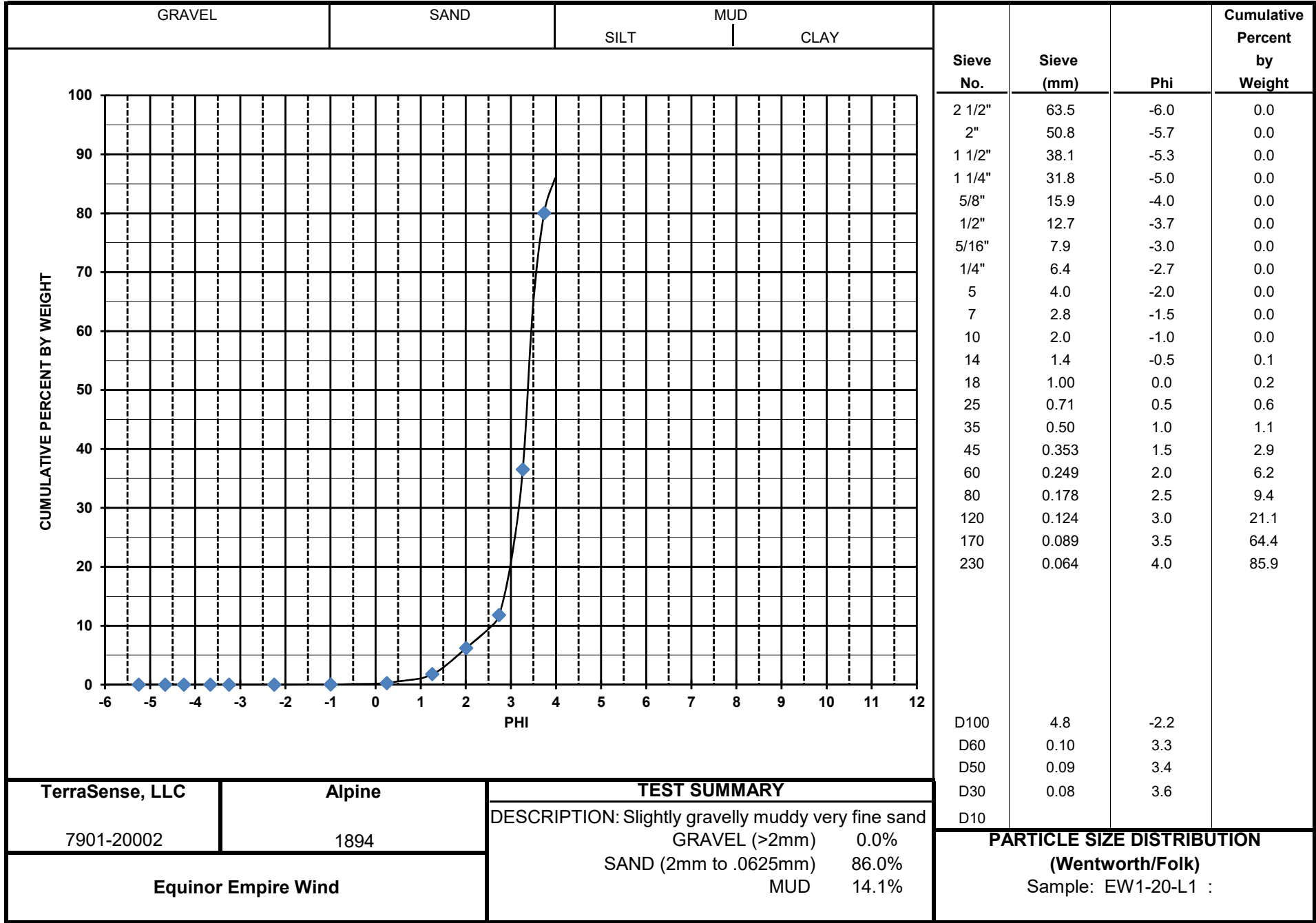


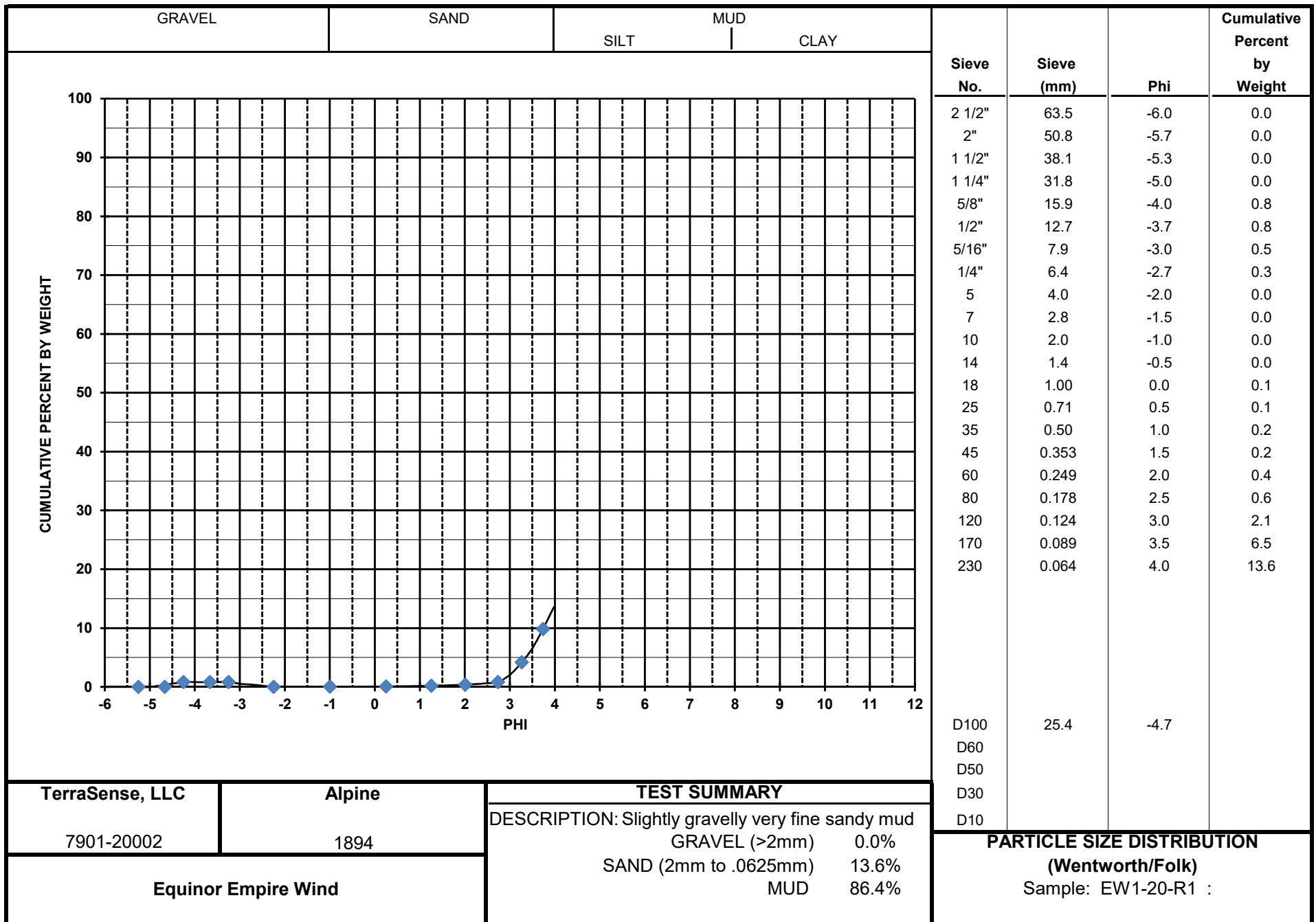


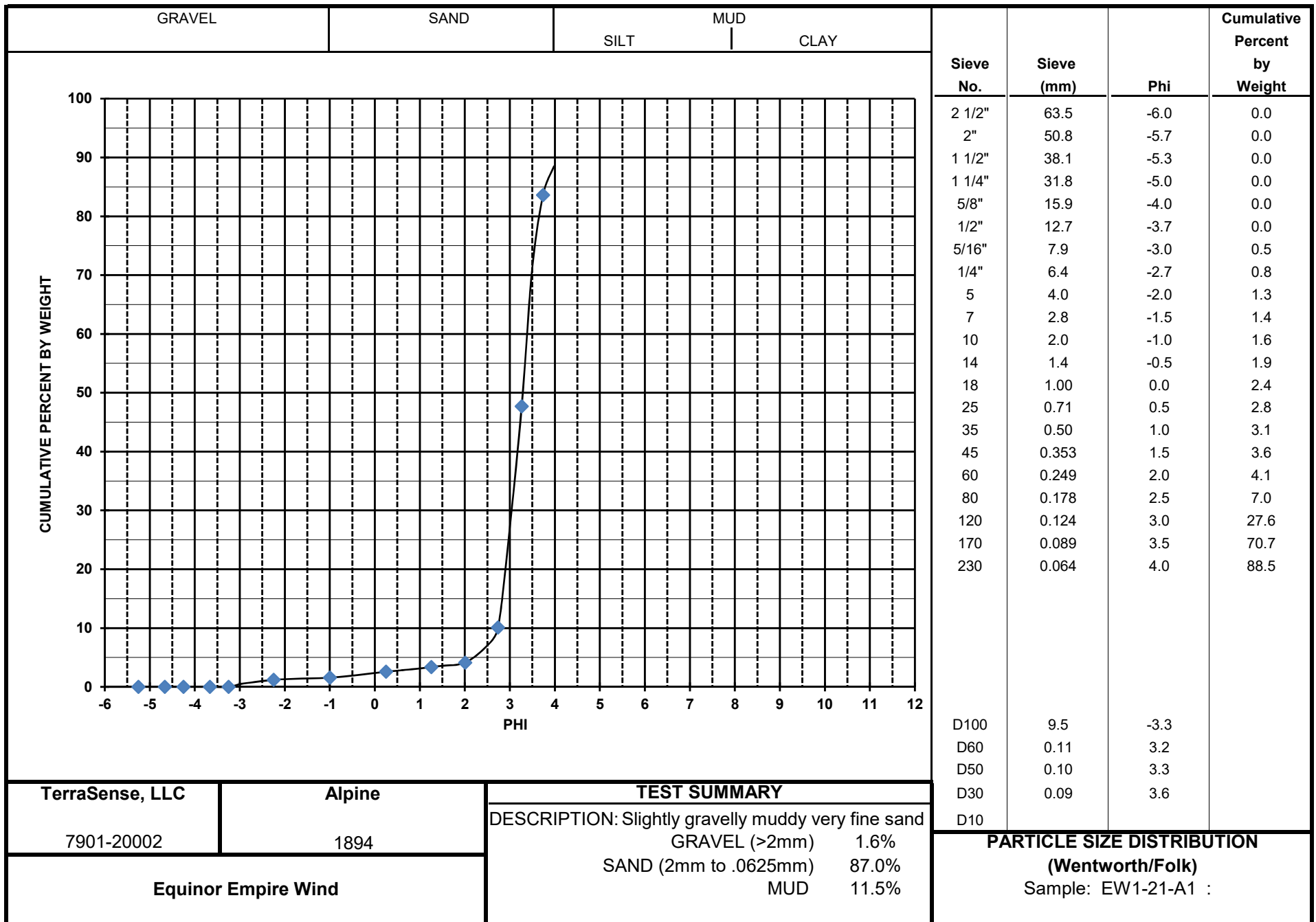


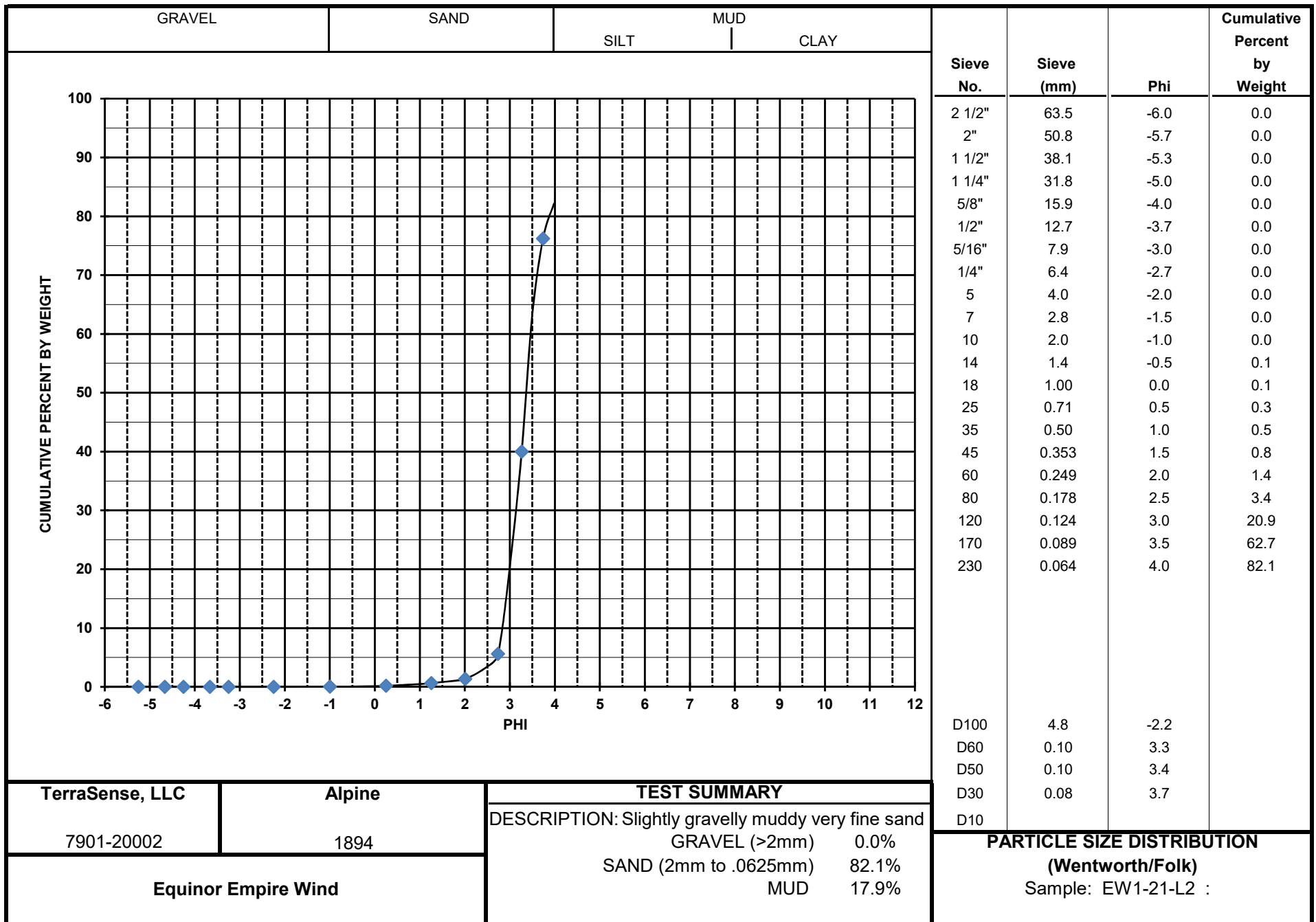


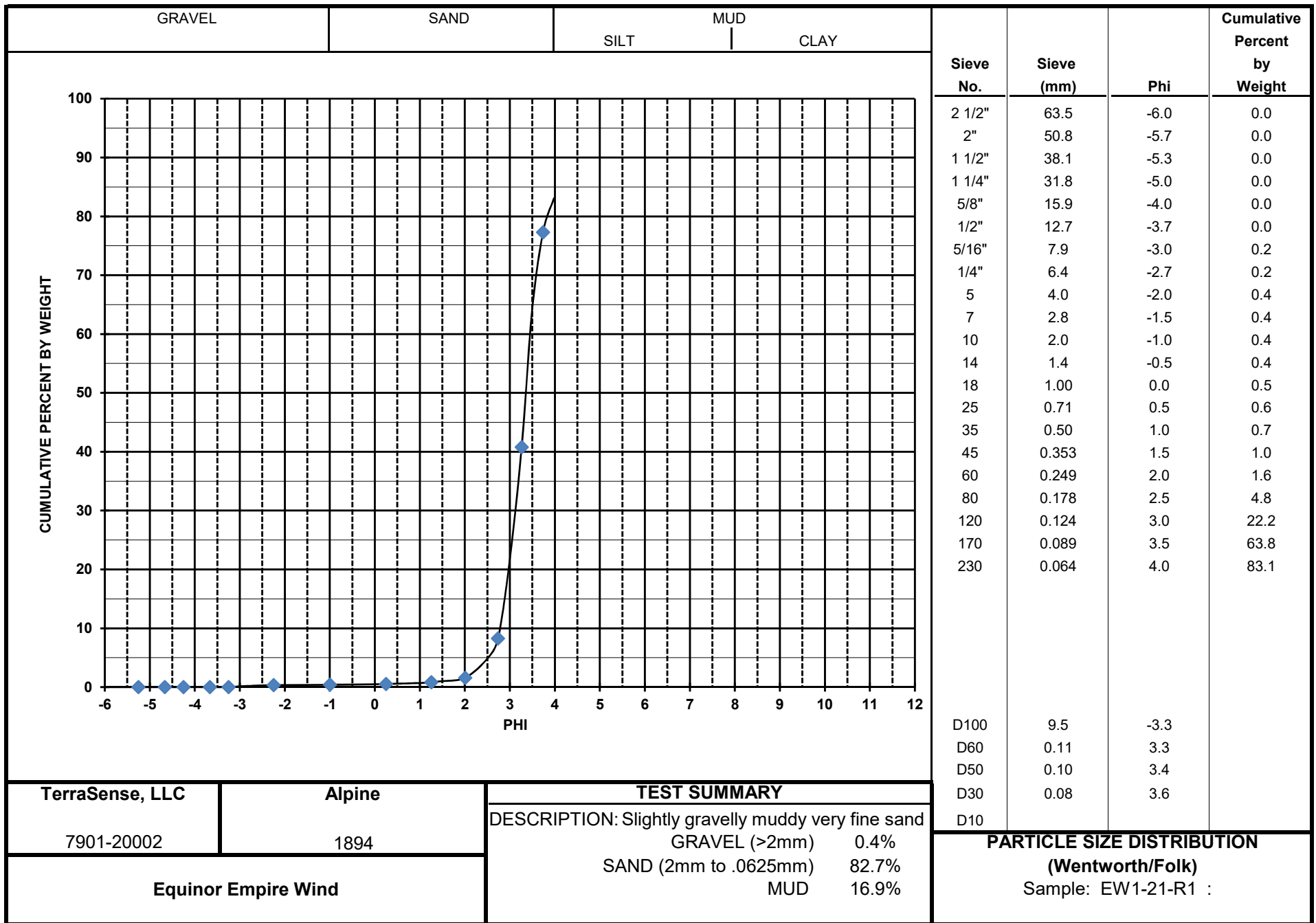


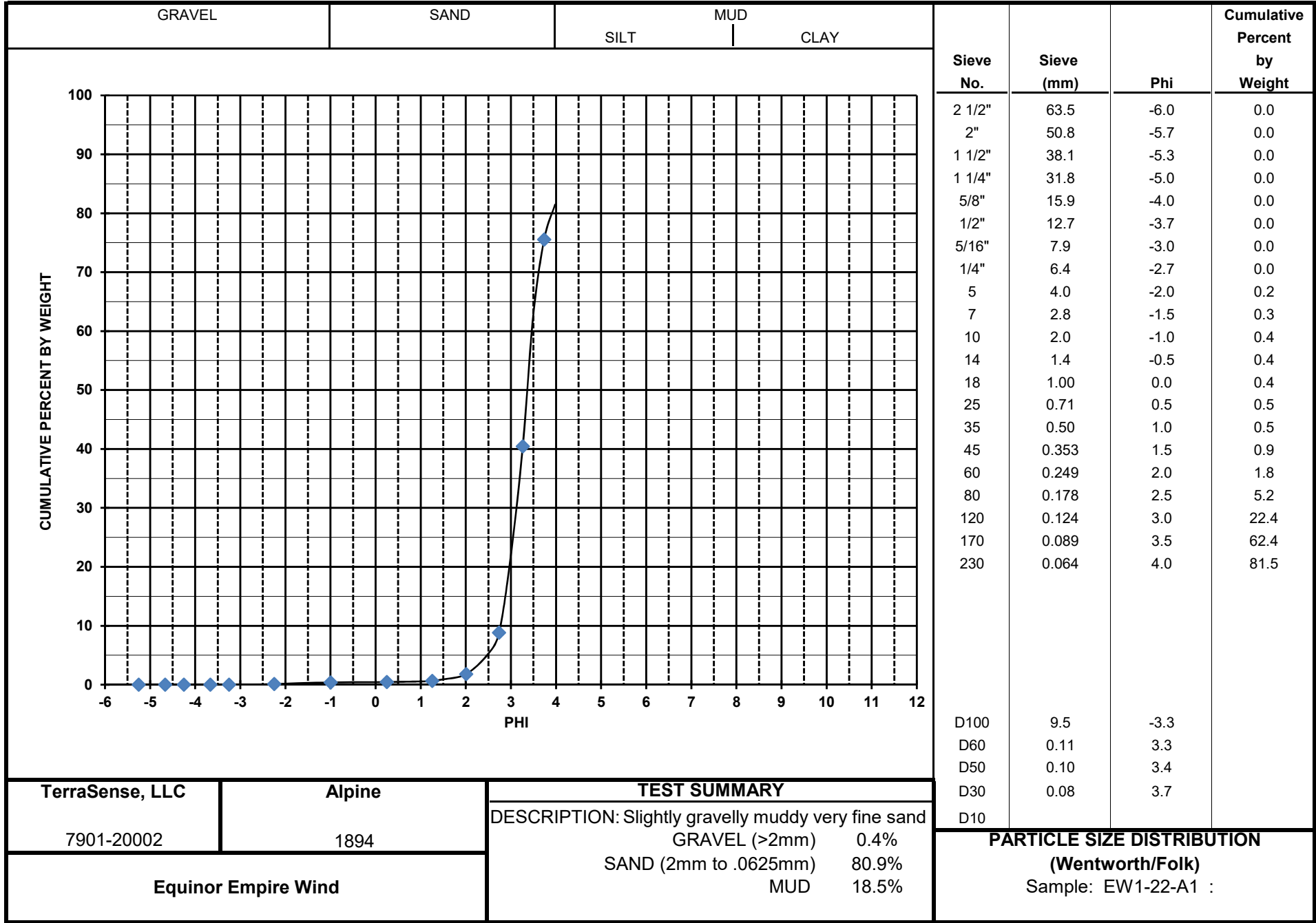


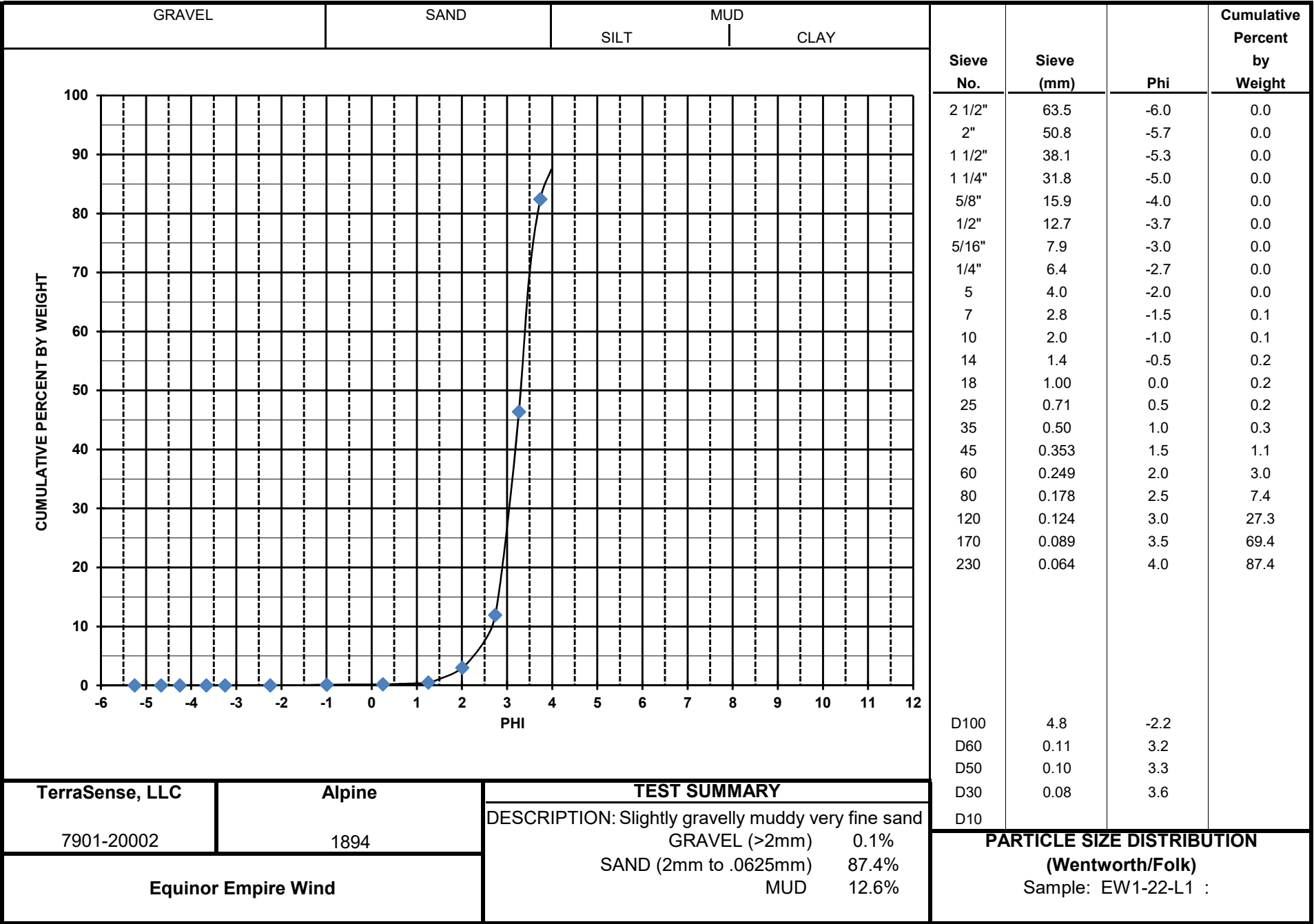


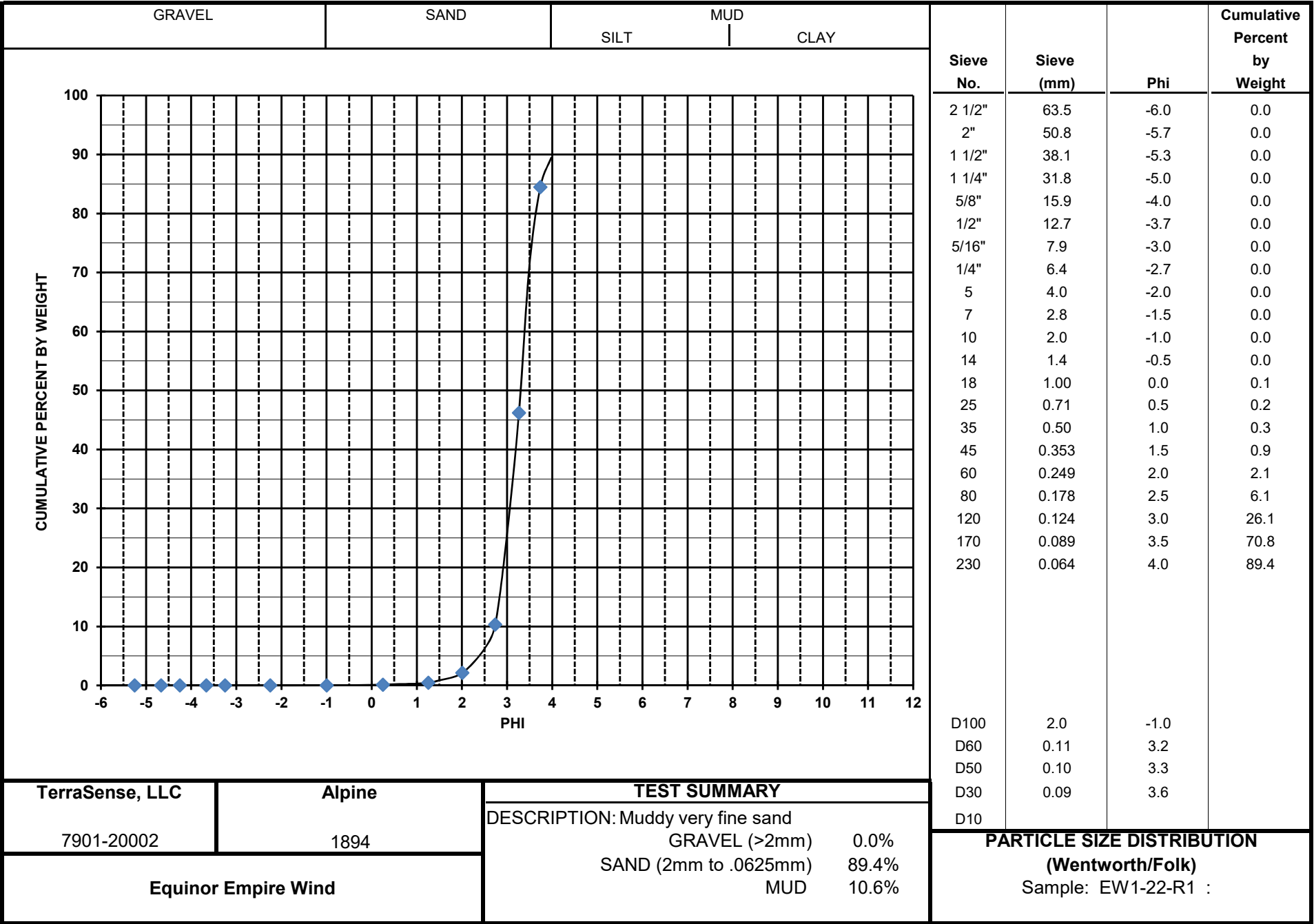


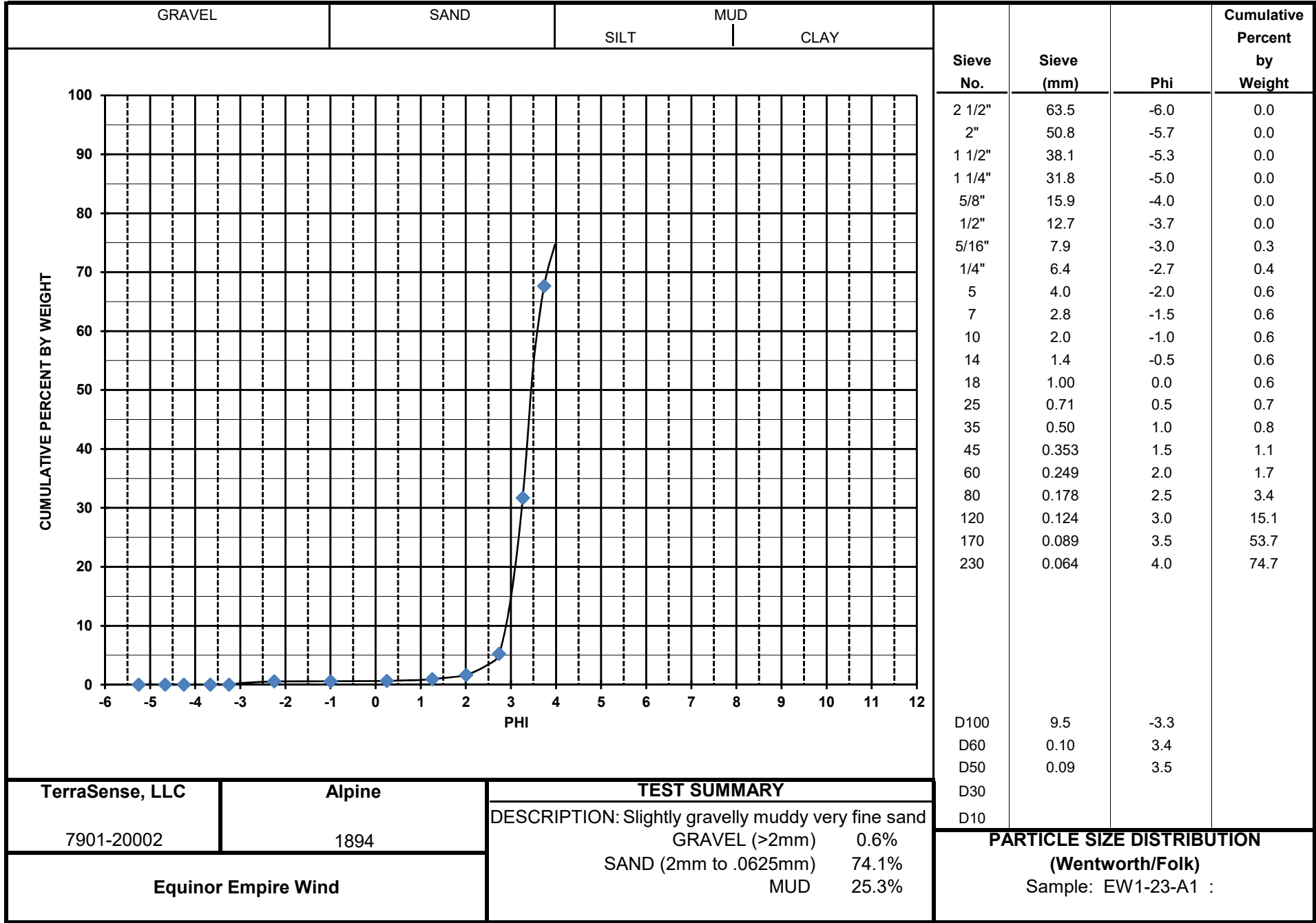


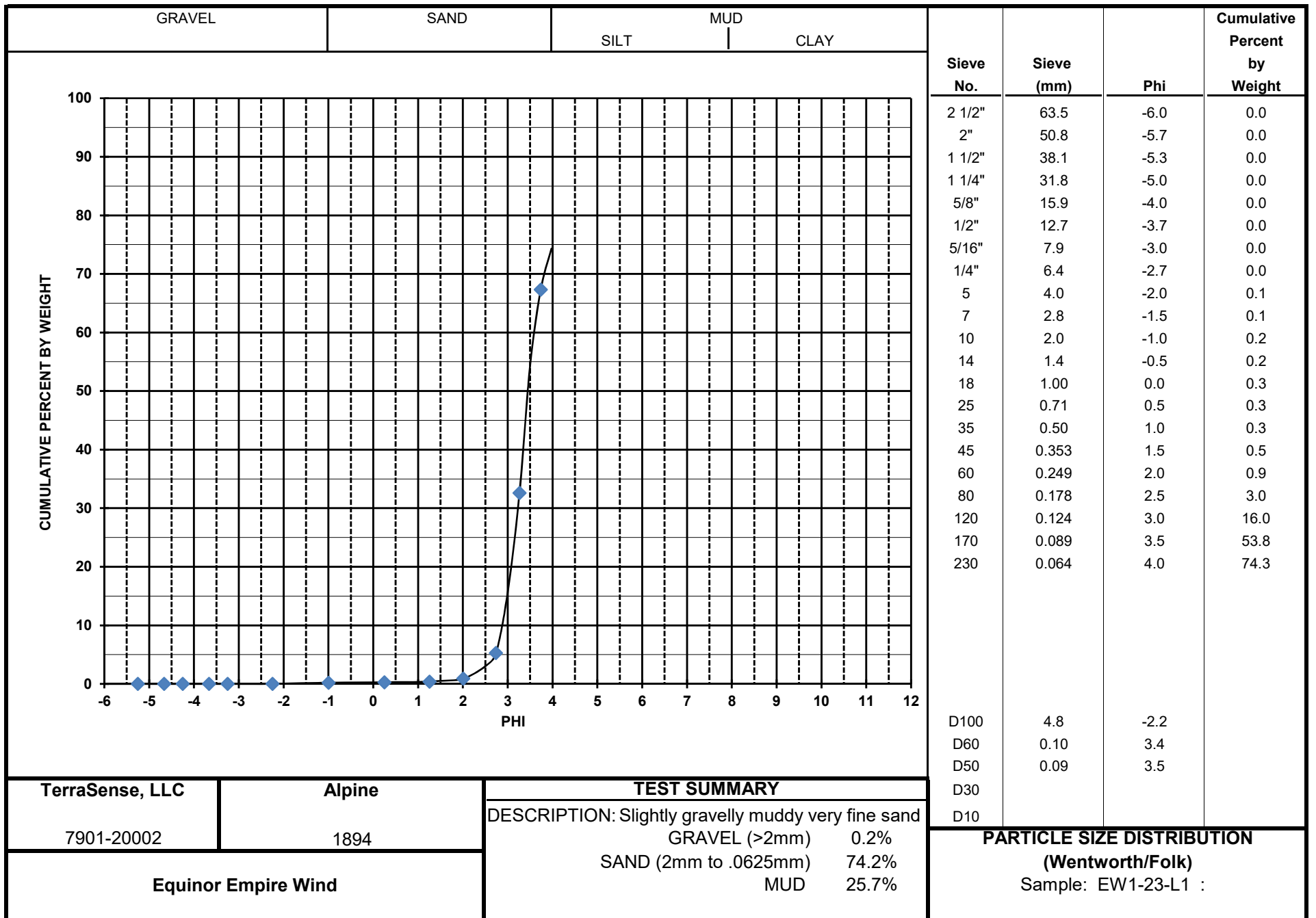


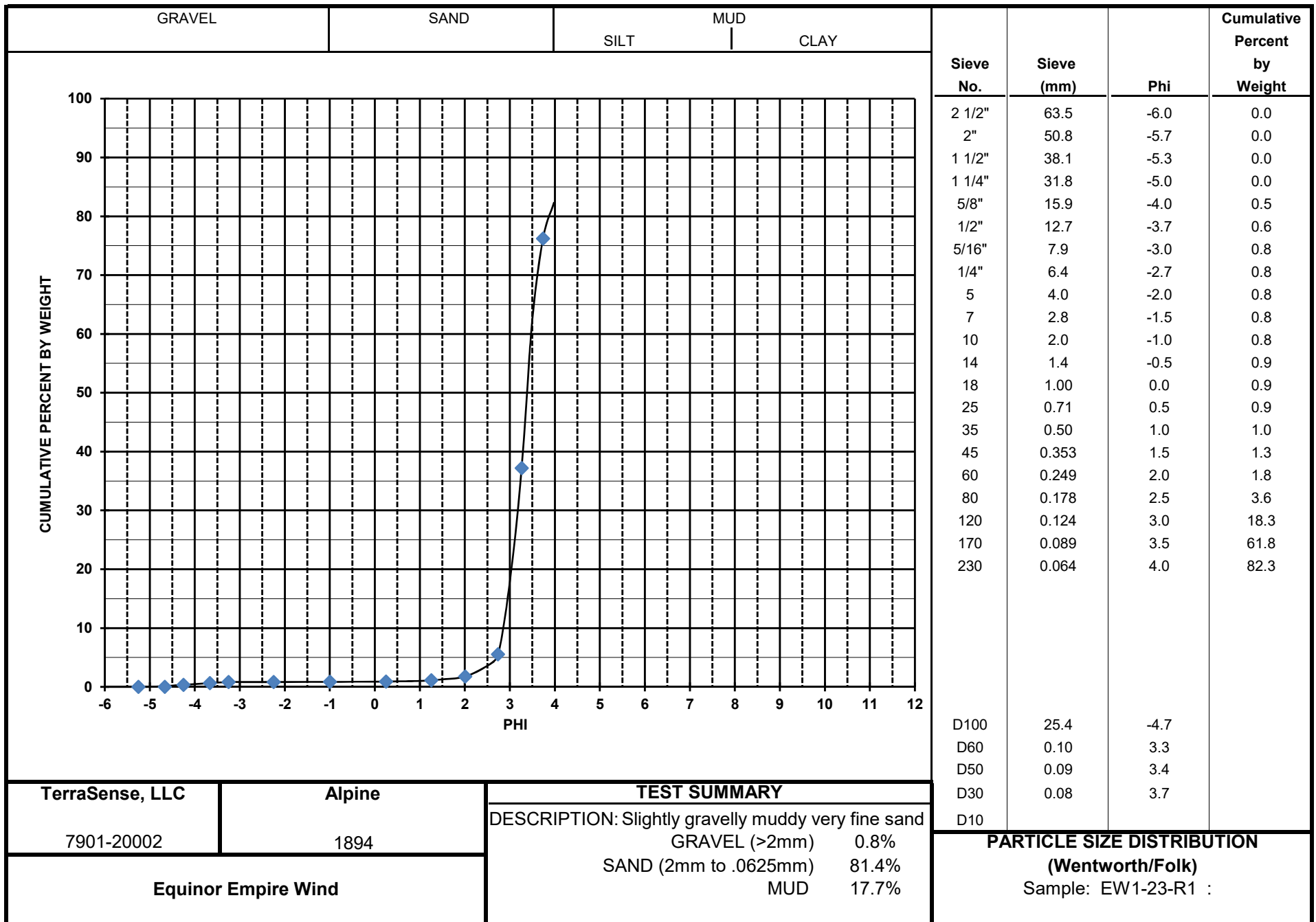


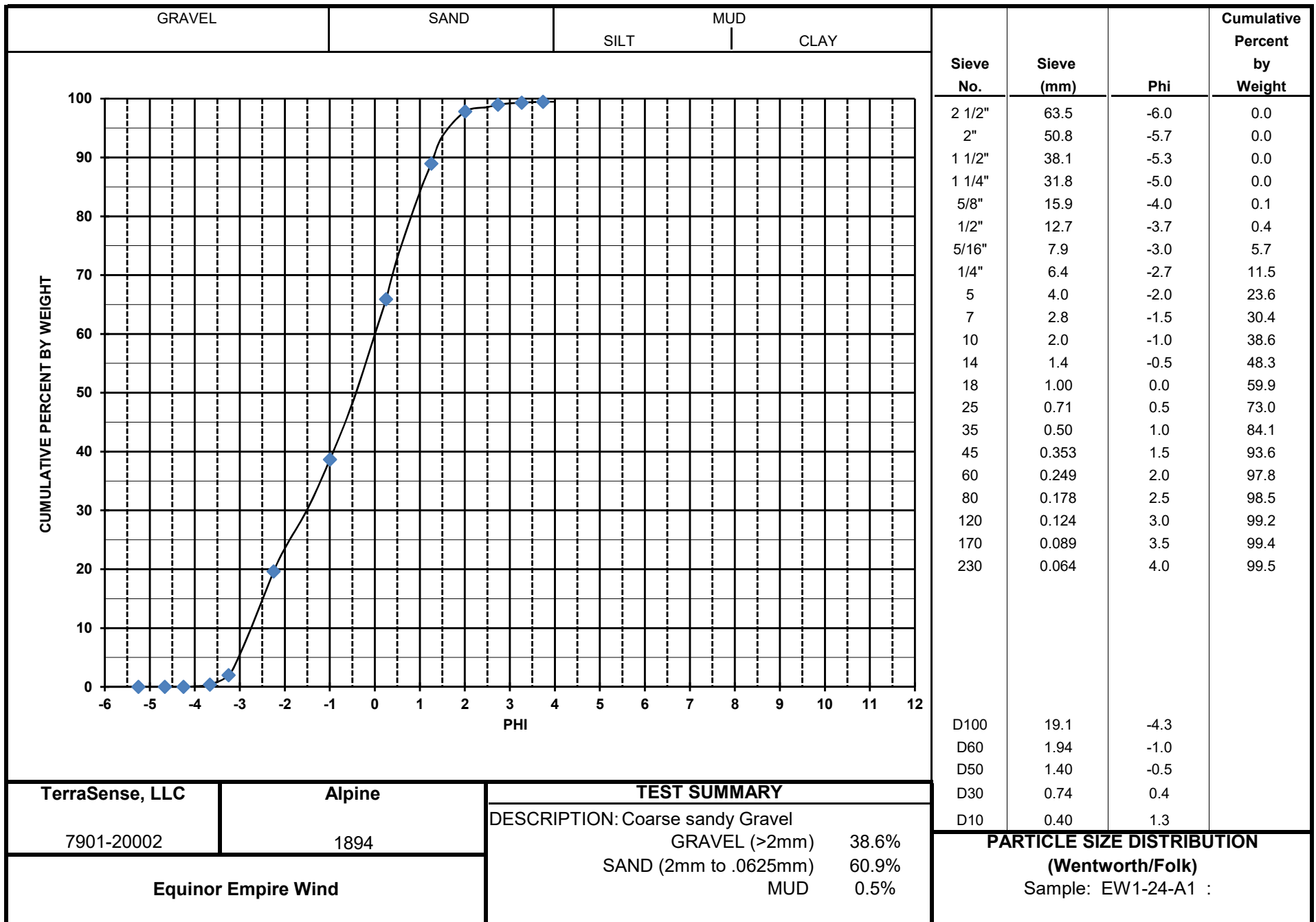


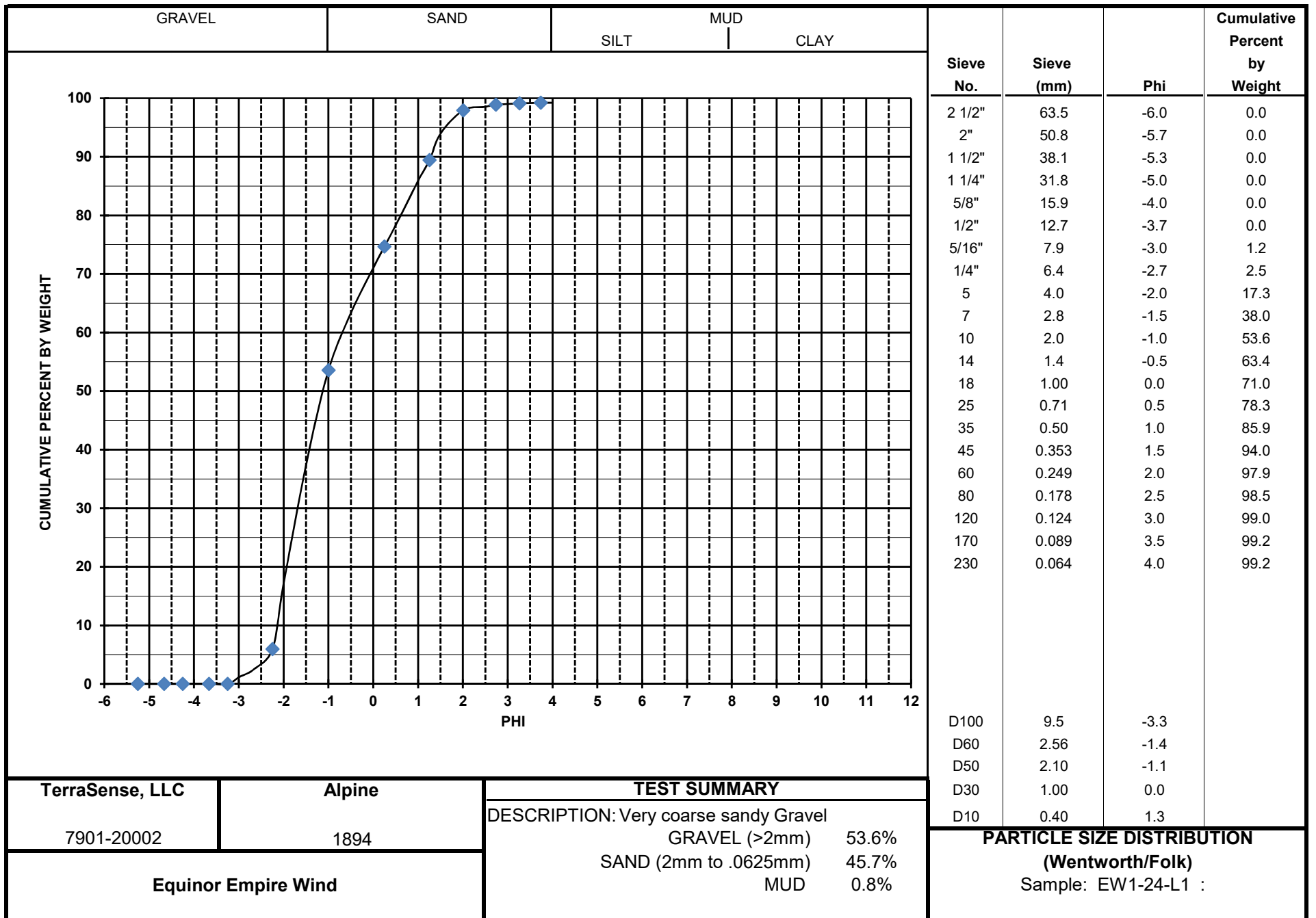


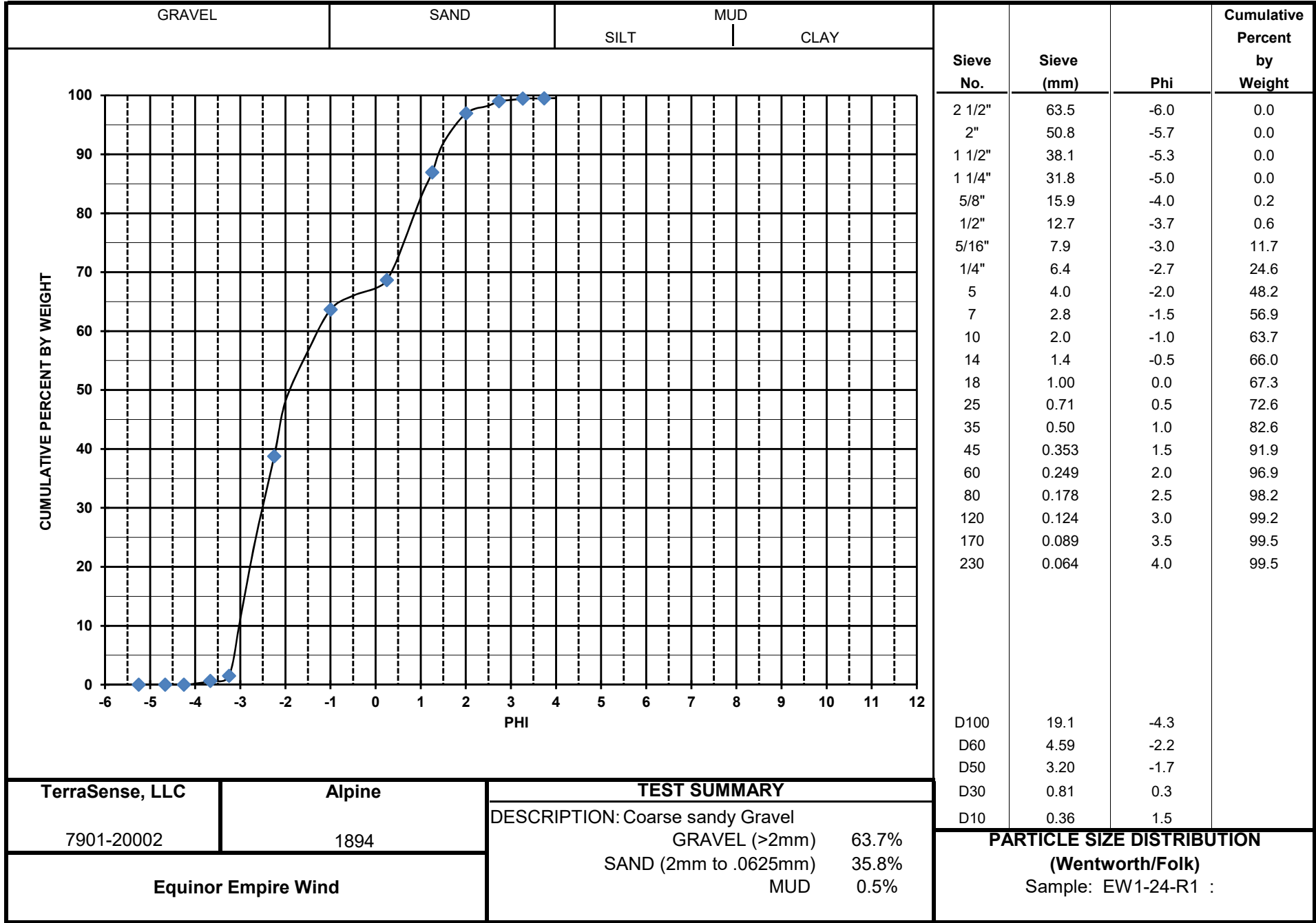


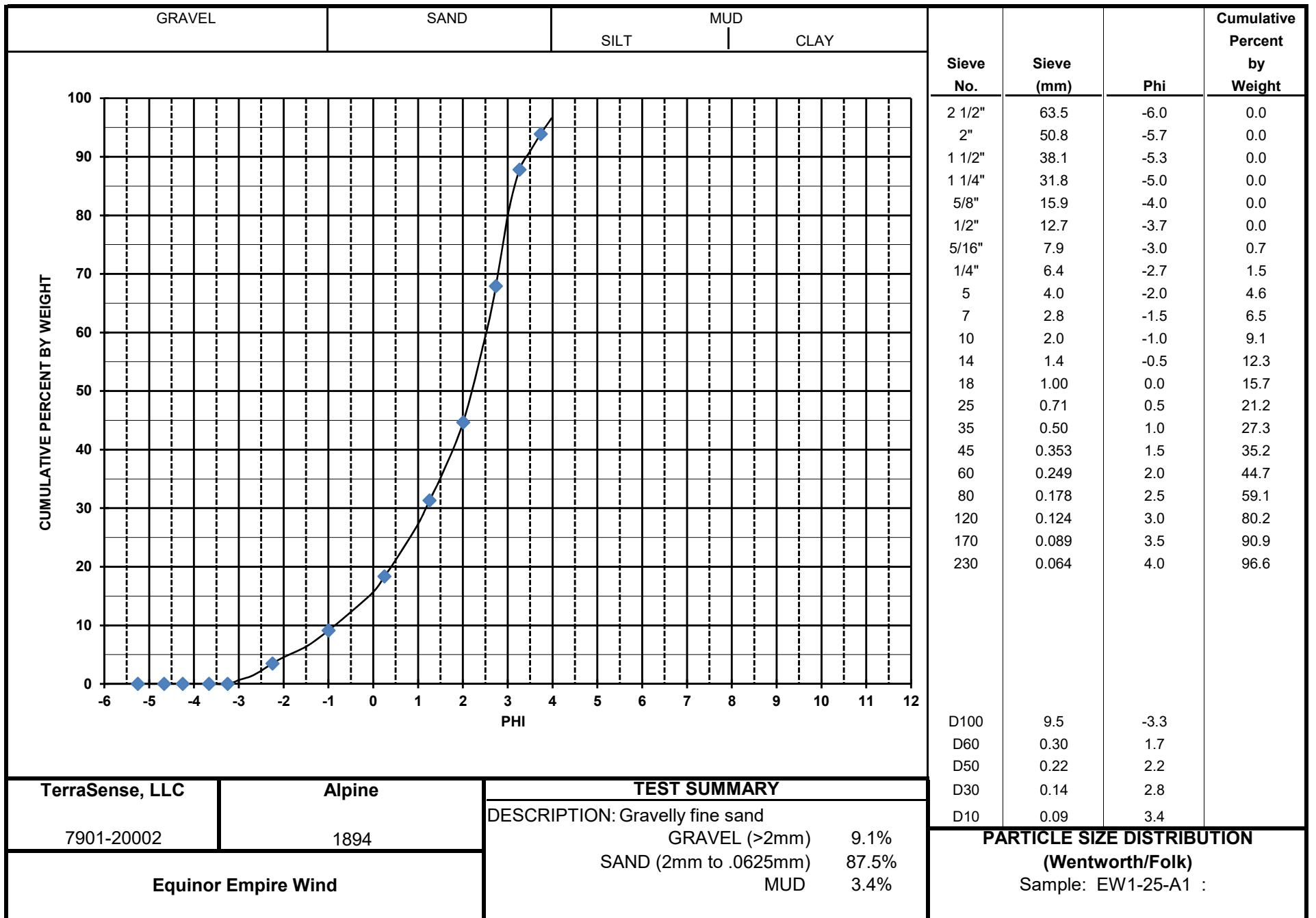


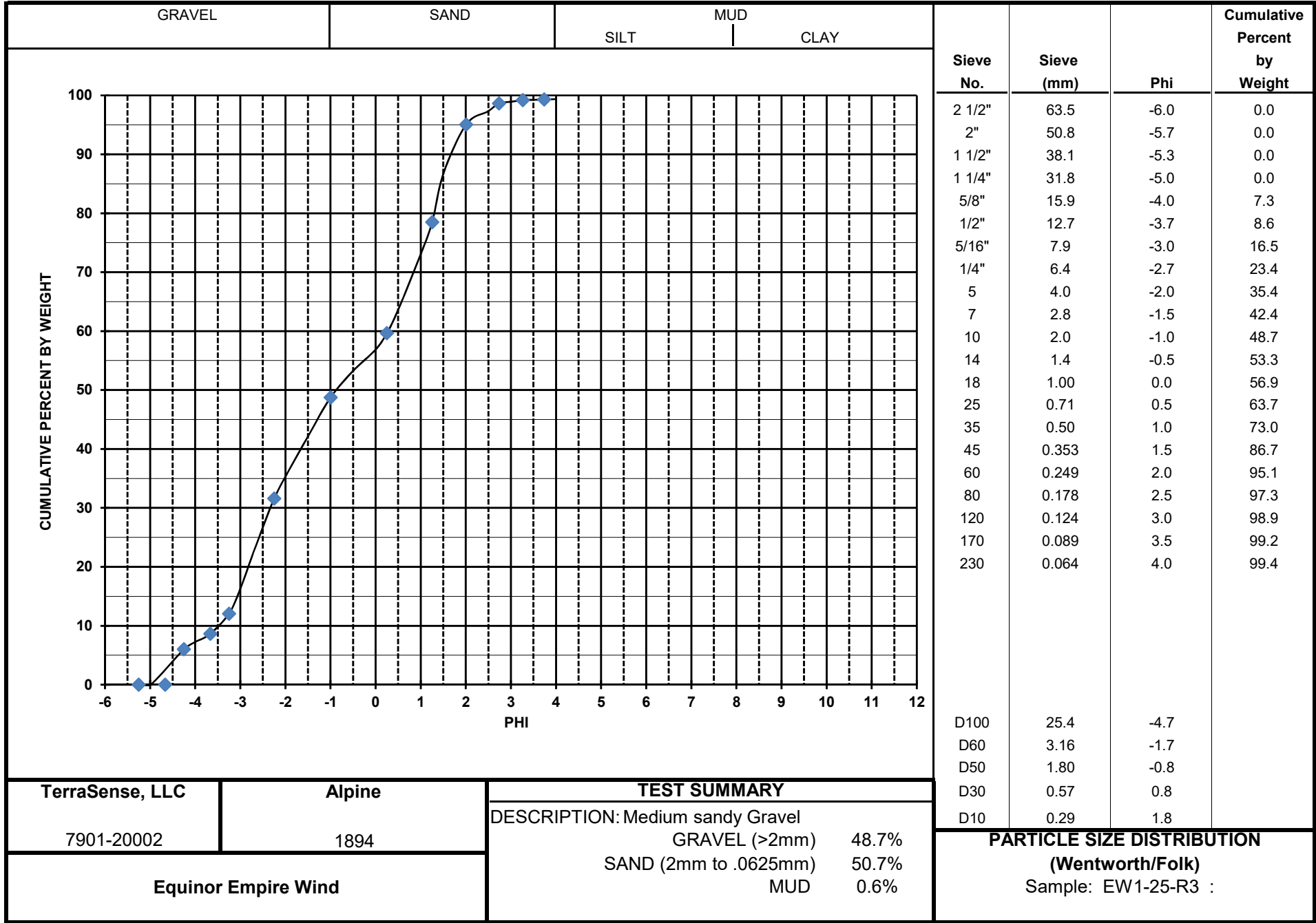


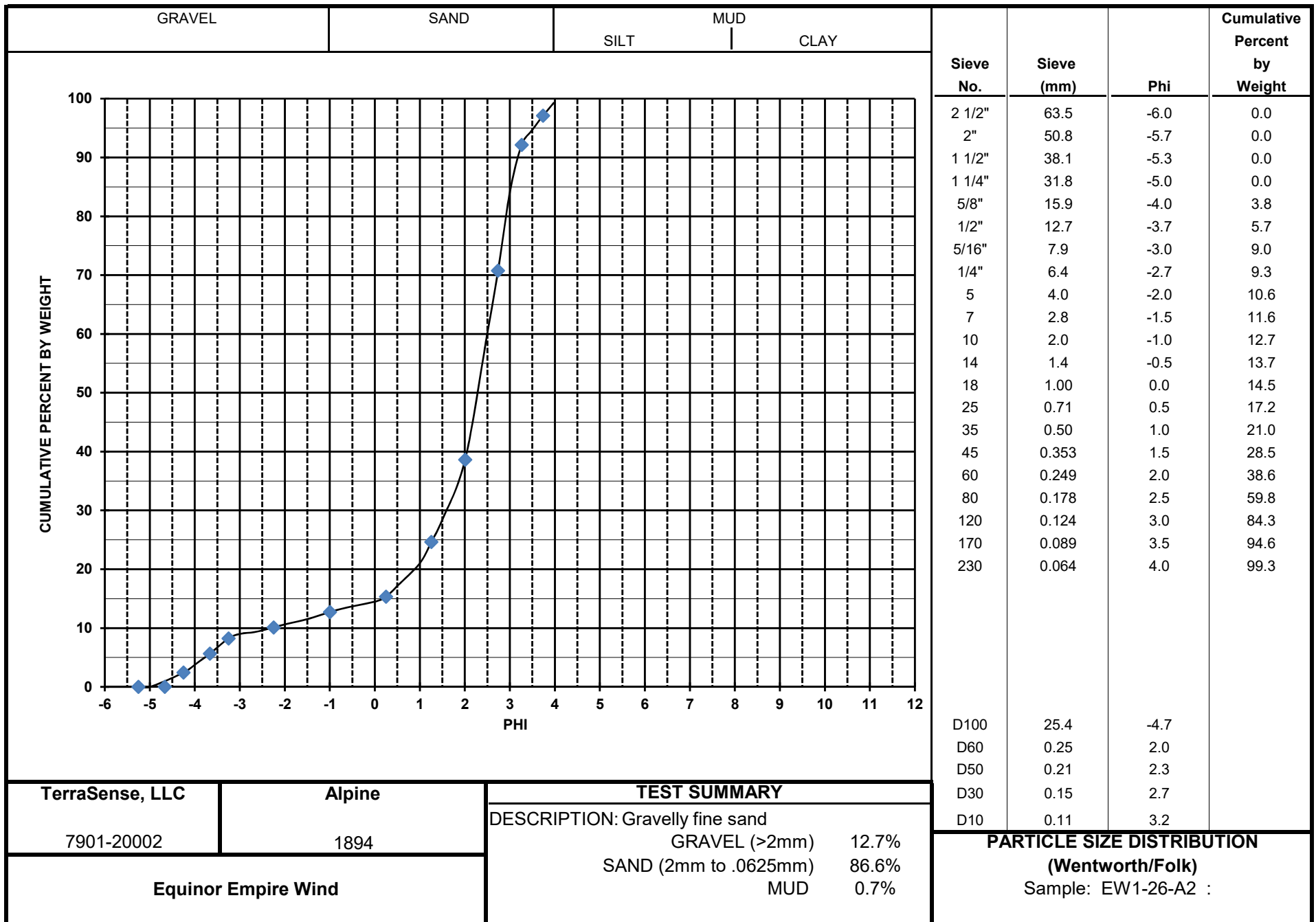


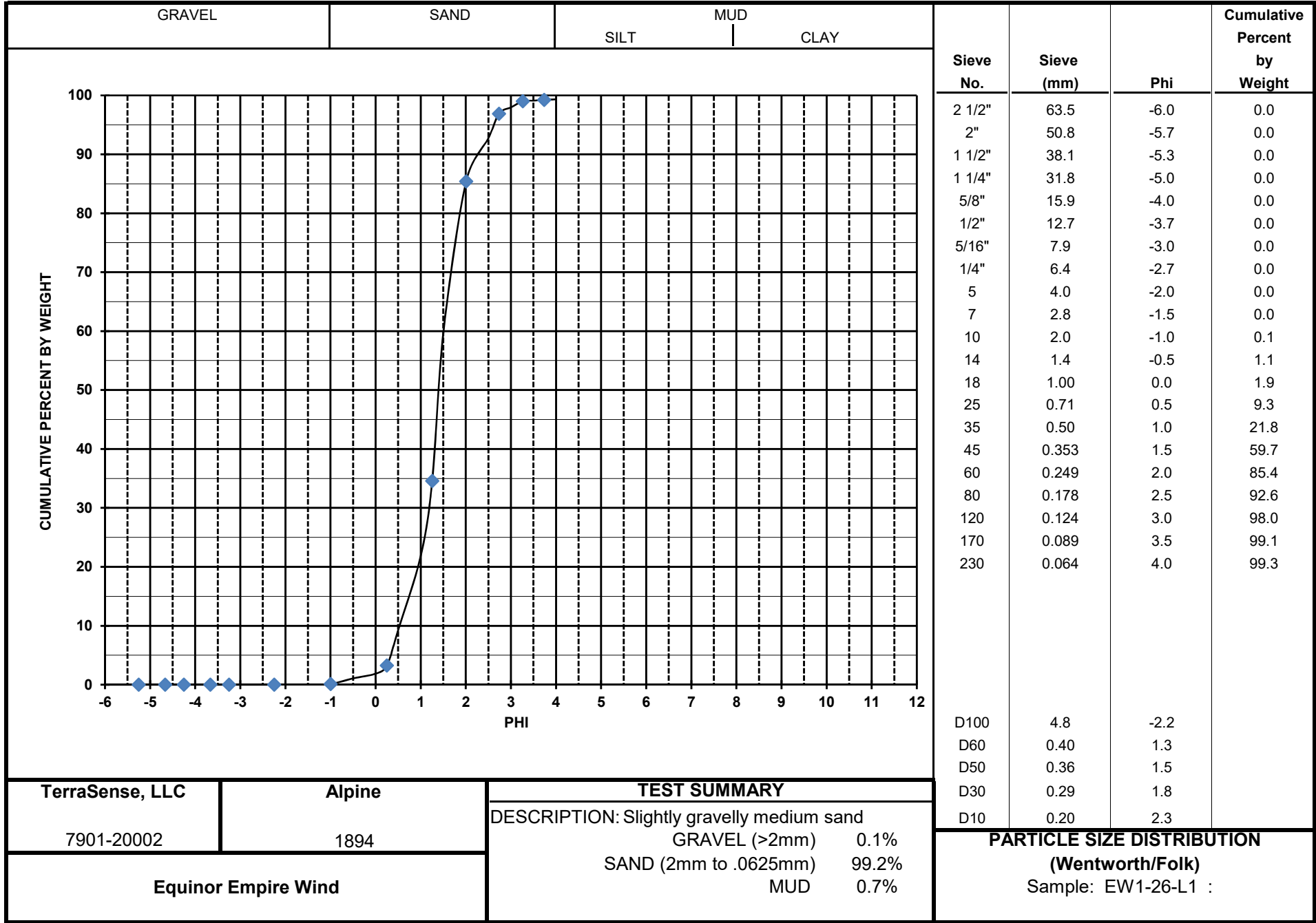












ATTACHMENT T-5
COP BENTHIC SURVEY REPORT: EW 2 LANDFALL

Alpine Report: *Empire Wind 2021 Surveys Environmental Campaign – EW2 RV Shearwater*



Client:

Equinor Wind US LLC



Project Title:

**Empire Wind 2021 Surveys
Environmental Campaign – EW2
RV *Shearwater***

Project Date:

2021 April to May

Project No.:

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Rev. 0



DOCUMENT SUMMARY

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Checked	K Rikson
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Approved	J Bailey
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Distribution

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Executive Summary

Alpine Ocean Seismic Survey, Inc. (Alpine) performed a high-resolution geophysical survey for Equinor US Wind LLC (Equinor) for the Empire Wind Offshore Wind Project Export Cable Route offshore New York. The project consisted of geophysical and environmental scopes of work completed on Alpine's survey vessel, RV *Shearwater*, and geophysical scopes of work completed on Alpine's survey vessel, MV William M.

The surveys were performed to support development of an export cable extending from the site of a proposed wind farm, infilling and adding to coverage of previous years' surveys. The infill areas were all designed to meet relevant BOEM specifications.

Surveys on the RV *Shearwater* which were utilized for this report took place from 30-Apr-2021 to 05-May-2021.

Ref.	Name
AOSS-1894-OPS-01	RV <i>Shearwater</i> HRG Operations Report, 2020
AOSS-1894-OPS-02	RV <i>Shearwater</i> Environmental Operations Report, 2020
AOSS-1894-OPS-03	MV William M Operations Report, 2020
AOSS-1894-INT-04	Interpretation Report, Gowanus ECR
AOSS-1894-INT-05	Seabed Mobility Report, Gowanus ECR
AOSS-1894-OPS-06	RV <i>Shearwater</i> HRG Operations Report, 2021
AOSS-1894-OPS-07	RV <i>Shearwater</i> Environmental Operations Report, 2021
AOSS-1894-OPS-08	MV William M Operations Report, 2021
AOSS-1894-INT-09	Interpretation Report, Barret ECR
AOSS-1894-INT-10	Seabed Mobility Report, Barret ECR

This report is the **RV *Shearwater* Environmental Operations Report, 2021**, comprising operational information and results for the environmental surveys on the Barret Route.

Service Warranty & Report Use Notice

This report has been prepared with due care and diligence and with the skill reasonably expected of a reputable contractor experienced in the types of work carried out under the contract. As such the findings in this report are based on an interpretation of data which is a matter of opinion on which professionals may differ and unless clearly stated is not a recommendation of any course of action.

Alpine Ocean Seismic Survey, Inc. (Alpine) has prepared this report for the client(s) identified on the front cover in fulfillment of its contractual obligations under the contract, and the only liabilities Alpine accept are those contained therein.

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GLOSSARY OF ABBREVIATIONS

Abbreviation	Meaning
BOEM	Bureau of Ocean Energy Management
COP	Construction and Operations Plan
CORS	Continuously Operating Reference Station
DGPS	Differential Global Positioning System
DPR	Daily Progress Report
DTM	Digital Terrain Model
ECR	Export Cable Route
ECRC	Export Cable Route Corridor
ft	Feet
GAMS	GPS Azimuth Measurement System
GIS	Geographic Information System
GNSS	Global Navigation Satellite System
HRG	High Resolution Geophysical
Hz	Hertz
IMU	Inertial Measurement Unit
IVO	...in the vicinity of...
kHz	Kilohertz
KPI	Key Performance Indicator
kn	Knots
Lat	Latitude
LNМ	Local Notice to Mariners
Long	Longitude
m	Meter
MARA	Marine Archaeological Assessment
MBES	Multi-Beam Echo Sounder
MV	Motor Vessel
MVP	Moving Vessel Profiler
nT	Nanotesla
N/A	Not Applicable
NAD83	North American Datum of 1983
NAVD88	North American Vertical Datum of 1988
NGS	National Geodetic Survey
NMFS	National Marine Fisheries Service
NOAA	National Oceanographic and Atmospheric Administration
PDOP	Position Dilution of Precision
PPK	Post Processing Kinematic

Abbreviation	Meaning
PPS	Pulse Per Second
PSO	Protected Species Observer
QA	Quality Assurance
QC	Quality Control
QMA	Qualified Marine Archaeologist
RTK	Real-Time Kinematic
RTN	Real-Time Network
RV	Research Vessel
S-UHRS	Single-Channel Ultra High Resolution Seismic
SBES	Single-Beam Echo Sounder
SBP	Sub-Bottom Profiler
SEG	Society of Exploration Geophysicists
SEG-Y	SEG storage format
SOW	Scope of Work
SSS	Side Scan Sonar
SVP	Sound Velocity Profile
TVG	Transverse Gradiometer
USCG	United States Coast Guard
USGS	United States Geological Survey
UTC	Coordinated Universal Time
UTM	Universal Transverse Mercator Projection
VDatum	Vertical Datum Transformation
WGS84	World Geodetic System 1984
XTF	eXtended Triton Format

Technical Terminology

Terminology	Definition
Geodetic datum	A set of constants used for calculating the coordinates of points on the Earth.
GRS80	Geodetic Reference System 1980 refers to the global reference ellipsoid that was originally used for the definition of the World Geodetic System 1984 (WGS 84), and is defined by its semi-major axis and flattening.
NAVD88	A fixed reference for elevations determined by geodetic leveling which was derived from a general adjustment of the first-order terrestrial leveling nets of the United States, Canada, and Mexico. In the adjustment, only the height of the primary tidal bench mark at Father Point, Rimouski, Quebec, Canada was held fixed, thus providing minimum constraint. NAVD88 benchmark values are given in Helmert orthometric height units.
National Tidal Datum Epoch	The specific 19-year period adopted by the National Ocean Service as the official time segment over which tide observations are taken and reduced to obtain mean values for tidal datums. It is necessary for standardization because of periodic and apparent secular trends in sea level. The present NTDE is 1983 through 2001 and is actively considered for revision every 20-25 years. Tidal datums in certain regions with anomalous sea level changes (Alaska, Gulf of Mexico) are calculated on a Modified 5-Year Epoch.
Technical terminology is referenced with respect to the organization that defines the specific concept (e.g., NOAA for “MLLW”).	

1. INTRODUCTION

Alpine Ocean Seismic Survey, Inc. (Alpine) performed a high-resolution geophysical survey for Equinor US Wind LLC (Equinor) for the Empire Wind Offshore Wind Project Export Cable Route offshore New York. The project consisted of geophysical and environmental scopes of work completed on Alpine's survey vessel, RV *Shearwater*, and geophysical scopes of work completed on Alpine's survey vessel, MV William M.

This report contains environmental data acquired in 2021 under Equinor project designation EQ21526.

The surveys were performed to support development of an export cable extending from the site of a proposed wind farm, infilling and adding to coverage of previous years' surveys. The infill areas were all designed to meet relevant BOEM specifications.

Operations were carried out on a 12 h basis, utilizing a surficial sediment grab sampler, water quality profiler, and underwater video camera. The purpose of the environmental dataset was to help benthic enumeration, document the habitats present across the survey area, and to analyze water quality.

RV *Shearwater* mobilized at Liberty Landing Marina, Jersey City, NJ, on 30-Apr-2021, and demobilized in the same port after the successful completion of the environmental survey scope on 05-May-2021.

The surveys were in line with lease requirements and according to specifications described in BOEM's "BOEM's Guidelines for Providing Benthic Habitat Survey Information for Renewable Energy Development on the Atlantic Outer Continental Shelf Pursuant to 30 CFR Part 585", dated June 2020.

Reporting for this project has been subdivided per project phases as noted in Table 1.1.

Table 1.1 Project Reporting

Ref.	Name
AOSS-1894-OPS-01	RV <i>Shearwater</i> HRG Operations Report, 2020
AOSS-1894-OPS-02	RV <i>Shearwater</i> Environmental Operations Report, 2020
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This report is the **RV *Shearwater* Environmental Operations Report, 2021**, comprising operational information and results for the environmental surveys on the Barret Route (BAR, or Empire Wind 2, or EW-2).

The environmental survey area is illustrated as Figure 1.1.

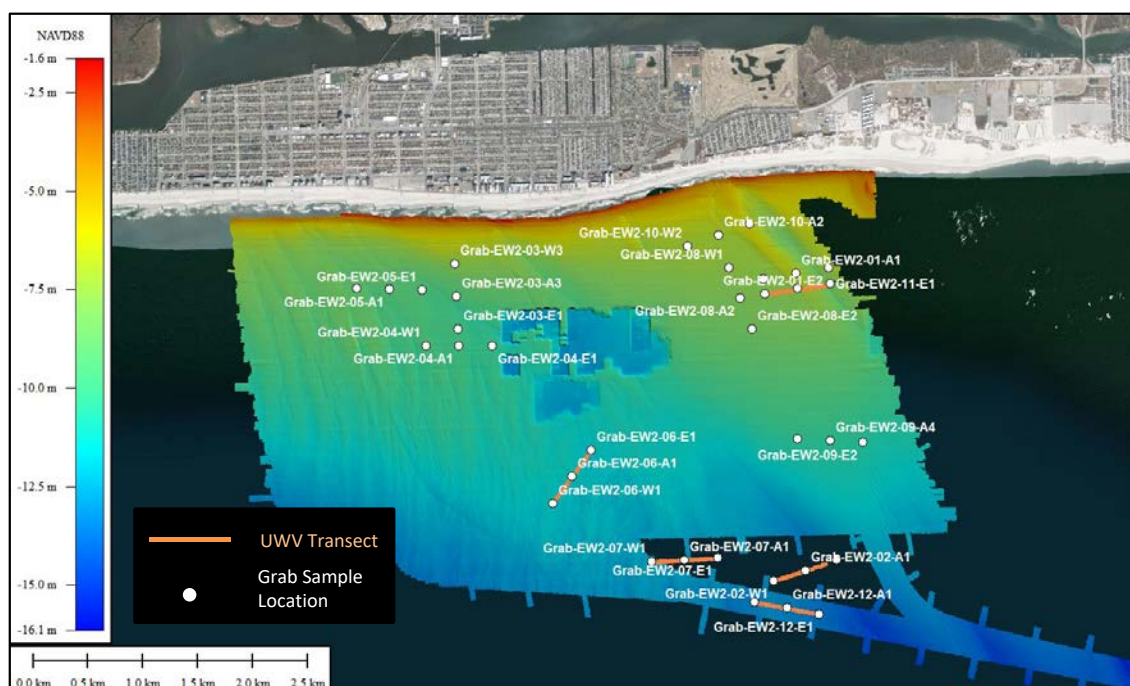


Figure 1.1 Environmental Survey Area - EW-2 Barret Landing

1.1. Survey Acquisition Plan

The RV *Shearwater* conducted environmental operations in the Barret Export Cable Route (ECR) extending from the offshore lease site OCS-A-0512 connecting to the mainland at the Jones Beach. The supplemental environmental work was conducted as an add-on to the geophysical survey previously completed. The scope of work included surficial sediment grab samples (36), water quality profiles (12), and 600-meter underwater video transects (12). Up to three attempts were authorized at each site, if needed. At 7 of the Underwater Video Transect locations, a successful image of the seabed could not be attained for benthic assessment. This resulted in a total of 5 out of a total 12 proposed transects being successful.

The survey acquisition plan for the project was based on requirements articulated by Equinor and TetraTech, including sample locations and underwater video transects provided by Equinor.

1.2. Fieldwork Summary

The mobilization for this portion of the project took place on 28 Apr-2021 alongside the dock at Liberty Landing Marina in Jersey City, NJ. This consisted of routine checks of equipment as well as a positional check, in addition to the calibrations and testing performed during the geotechnical mobilization.

Once mobilization was complete, and weather conditions were suitable, the RV *Shearwater* departed the dock and transited to Barret Landing on the morning of 02-May-2021. The entire survey consisted of 36 grab sample locations, 12 water quality profiles, and 12 underwater video transects. The environmental survey continued until 05-May-2021, when the vessel returned to the dock to start demobilization. Demobilization was completed for the environmental survey on 06-May-2021.

The fieldwork breakdown is shown in Table 1.2.

Table 1.2 Fieldwork Summary

Description	Detail
Survey Vessel	RV <i>Shearwater</i>
Mobilization	28-Apr-2021 to 30-April-2021
Survey Operations	02-May-2021 to 05-May-2021
Demobilization	05-May-2021to 06-May-2021

1.3. Time Breakdown

A breakdown of the time expenditures for the project is presented in Table 1.3 and Figure 1.2.

Table 1.3 Time Breakdown by Percentage

Activity	Project Hours	Percentage
Mob / Demob	26:15	14.34%
Operational	44:57	24.56%
Weather Standby (Port)	20:30	11.20%
Weather Standby (Offshore)	0:20	0.18%
Non-Operational (On-hire)	90:58	49.71%

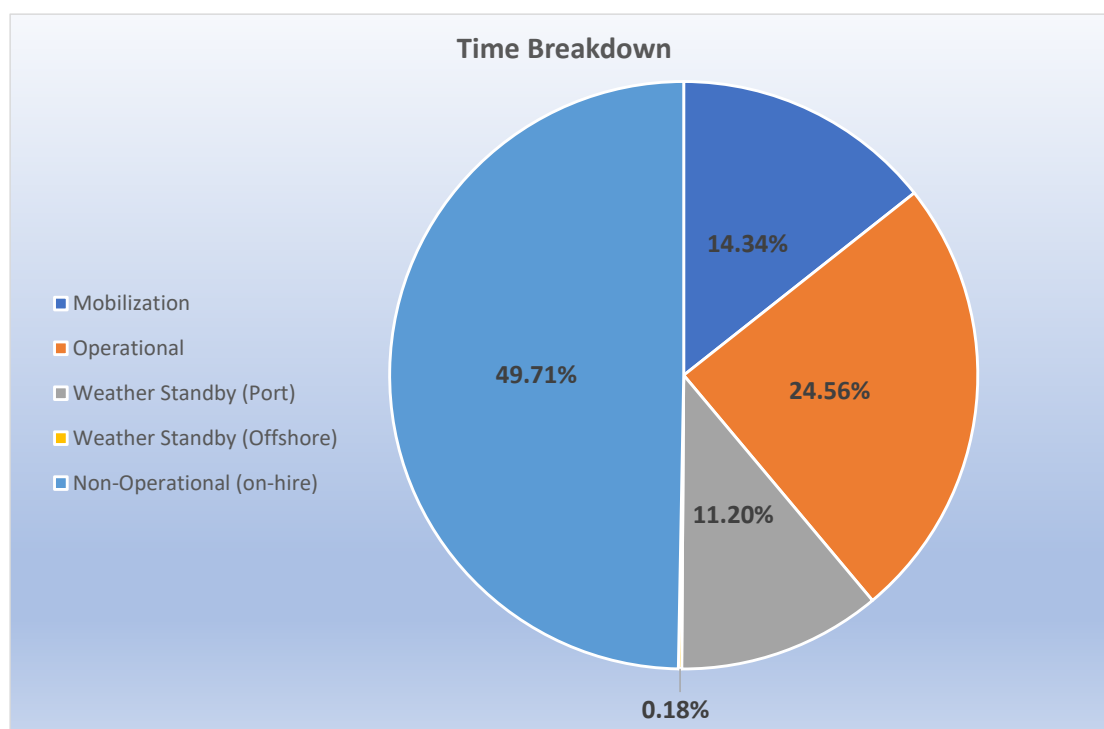


Figure 1.2 Time Breakdown by Percentage

1.4. Project Field Personnel

Table 1.4 details the key personnel who were present onboard the RV *Shearwater* during Equinor's Empire Wind 2021 Barret ECR Benthic Survey, and who participated in and contributed to day-to-day survey operations and data processing.

Table 1.4 Key Field Personnel

Personnel	Name
Party Chief	V Reale
Surveyor	S Childers J Juarez J Cunha F Zarzour
Benthic Biologist (RPS)	C Smith S Davies
Equinor Representative	Len Wang
Captain	M Porter R Worley M Afify

2. VESSEL & EQUIPMENT SUMMARY

RV *Shearwater* (Figure 2.1) is a multi-purpose survey vessel with capabilities to perform bathymetric, geophysical, geotechnical, and environmental surveys. In addition to moon pool mounted and towed sensor capability the RV *Shearwater* has two fast-action hydraulic winches and a heavy-duty crane (S.W.L. 8,000 lbs) for overhead operations. Vessel specifications are outlined in Table 2.1.

Table 2.1 RV *Shearwater* Specifications

Vessel Specifications	
Flag	United States of America
Class	Multi-Role Survey
Built	1981 (Reconfigured 2011)
Overall Length / Breadth	33.53m / 11.89m
Draft	2.74m
Gross Tonnage	198t
Main Engine	2 x 526 HP John Deere Model 6125AFM
Bow Thrust / Stern Thrust	Thrustmaster 100 HP / Hydraulically Driven “Z” Drives
Accommodation	22 berths
Nominal Endurance	14 days



Figure 2.1 RV *Shearwater*

3. HSE SUMMARY

The safety standards and procedures onboard the RV *Shearwater* adhere to company policy which is set forth in, and informed by, Alpine's Health and Safety Manual for Marine Geophysical Operations, which is, in turn, administered, maintained, and developed by the company's Health and Safety Officer. During the Barret ECR Environmental Survey, Equinor's safety policies were incorporated into the project's overall HSE framework. To maintain these standards every crew member was given a safety induction upon joining the vessel and regular safety drills were carried out during the cruise. Toolbox meetings were conducted prior to all equipment deployments and recoveries and before any deck operations were commenced.

3.1. HSE Events

Over the course of the environmental survey, a total of 5 vessel safety inductions were given and 5 vessel safety drills were conducted. The main focus of the inductions and drills, along with frequent informal crew and staff discussions, was deck operations and the implementation of Alpine's COVID-19 protocols. In addition to the preceding, discussions were also held to address significant safety observation cards that had been submitted and received, particularly if the content of the observation card was directly related to operations.

During the course of the environmental survey phase, a total of 14 toolbox meetings were held, and a total of 2 safety observation cards were submitted by the onboard personnel during operations. Additionally, there were no first aid cases, lost time incidents or hazardous occurrences during the project. Table 3.1 below presents a summary of the HSE events that occurred during Equinor's Empire Wind 2021 Barrett ECR Survey.

Table 3.1 HSE Event Summary

Item	Total Events
Vessel Safety Inductions	5
Safety Drills	5
Toolbox Talks	102
Safety Observation Cards	33

The survey and marine crew averaged 16 persons for the survey operations. The total number of man-hours worked during the environmental survey was 2904:00 hours.

4. SURVEY PARAMETERS

4.1. Project Geodetics

The geodetic and datum parameters for the survey were provided in Equinor’s “RE-PM710-00002_01 EW Geodetic Note” and are summarized below in Tables 4.1 to 4.3.

Table 4.1 Project Survey Datums

Datums	
Geodetic Datum	NAD83 (2011) Epoch 2018.0
Projection	UTM Zone 18 North
Measurement Units	Meters (m)
Vertical Datum	NAVD88 (North American Vertical Datum of 1988); as determined using the USA – VDatum.

Table 4.2 Project Ellipsoid Parameters

Ellipsoid	
Ellipsoid	GRS 1980
Semi-Major Axis	a = 6378137.000 m
Semi-Minor Axis	b = 6356752.314 m
Eccentricity	e = 0.081819191043
Inverse Flattening	1/f = 298.257222101
Vertical Datum	NAVD88
EPSG Code	NAD83 (2011) UTM Zone 18 North Projected (6347) / NAD83 (2011) Geographic (6318)

Table 4.3 Survey Projection Parameters

Projection	
Projection	UTM Zone 18N
Projection Type	Transverse Mercator
EPSG Code	6347
Origin Latitude	00° 00' 00.000" North

Origin Longitude	075° 00' 00.000" West
Origin False Easting	500 000.000
Origin False Northing	0.000
Scale Factor	0.9996
Grid Unit	Meters

A datum transformation was performed real-time during survey operations within the QINSy navigation software used onboard the RV *Shearwater*, which converted positioning data from ITRF 2014 to NAD83 epoch 2018 via a seven-parameter transformative shift. (Table 4.4).

Table 4.4 Transformation Parameters – ITRF to NAD83 (2011) Epoch 2018.0

<i>ITRF2014 to NAD83(2011), epoch 2018.0 (Position Vector transformation)</i>		
X-axis translation (dx)	1.01162	Meter
Y-axis translation (dy)	-1.91401	Meter
Z-axis translation (dz)	-0.55309	Meter
X-axis rotation (rX)	- 0.02731474	arc-second
Y-axis rotation (rY)	0.00647979	arc-second
Z-axis rotation (rZ)	- 0.01052142	arc-second
Scale difference	- 0.00020717	Parts per million

5. SURVEY EQUIPMENT & VESSEL CONFIGURATIONS

The Barret ECR survey was conducted using a pole-mounted MBES and USBL system, which was previously mobilized and used for the geophysical scope of work.

Table 5.1 lists all survey equipment that was mobilized and employed on RV *Shearwater* during Equinor's Empire Wind 2021 Barret ECR Survey.

Table 5.1 Project Survey Equipment

System	Equipment Model
Primary Horizontal Control	Applanix POS MV OceanMaster GPS Aided Motion Compensation System with C-Nav DGPS Corrections
Secondary Horizontal Control	Applanix POS MV OceanMaster GPS Aided Motion Compensation System with C-Nav DGPS Corrections
Integrated Navigation System	QPS QINSy Navigational and Data-logging Software
Heading Reference	Applanix POS MV OceanMaster
Multi-Beam Echo Sounder (MBES)	R2 Sonic 2024 Multi-Beam Echo Sounder
Ultra-Short Baseline (USBL)	Sonardyne Scout Pro USBL Acoustic Positioning System
Sound Velocity Profiler (MVP/SVP)	AML Moving Vessel Profiler (MVP) Sontek Castaway CTD (SVP)
Grab Sampler	Ocean Instruments Salish Grab Standard SG-20 (Modified Van Veen Sampler)
Water Quality Profiler	Sea-Bird SBE 911 plus
Underwater Camera	Deeptrekker Digital Colour 4k Camera GoPro Black 9 TLS-500 underwater camera sled
PSO Equipment	Reticule Binoculars

5.1. Survey Equipment

5.1.1. GNSS Navigation, Motion & Heading

Primary navigation for this project was supplied by an Applanix POS MV OceanMaster system receiving CNAV differential corrections. Secondary navigation for this project was supplied by another independent Applanix POS MV OceanMaster system receiving CNAV differential corrections. Dual independent receivers were used in order to give full redundancy on the navigation systems.

Heave, pitch and roll data for the vessel was provided using the inertial measurement unit (IMU) integrated with the POS MV OceanMaster. The IMU data was input with respect to the vessel's common reference point (CRP) to provide accurate motion to all necessary sensors. An additional IMU was setup for redundancy.

Additionally, each POS MV OceanMaster provided heading information by integrating data from both inertial and GNSS sensors. The systems comprised a gyro-contained, inertial measurement unit and two Trimble GNSS receivers mounted on an antenna platform with a specified separation across the centerline of the vessel. A combination of gyro calculations and a GPS azimuth measurement solution (GAMS) from the antennas provided a highly accurate heading value to the POS MV.

5.1.2. Sound Velocity Profiler

An AML Moving Velocity Profiler (MVP) was used to generate a profile of the speed of sound through the water column, which was applied in QINSy and the USBL software to correct for sound velocity temporal changes and to verify the quality and accuracy of the MBES data in real-time. The MVP was deployed approximately every 30 minutes, or as needed depending on environmental conditions, and could be acquired while the vessel was surveying online.

The MVP was mounted on the port stern corner of the vessel and was deployed through a sheave block where it could be launched from a locked position from a topside unit inside the survey lab. The operating parameters of the MVP system can be seen in Table 5.2.

Table 5.2 AML MVP Operating Parameters

Instrumentation	
Sound Velocity Probe	AML Moving Vessel Profiler
Operating Parameters	
Range	1375–1625m/s
Resolution	0.001m/s
Accuracy	±0.025m/s
Method	Chen-Millero
Temperature	
Range	-5°C to +45°C
Resolution	0.001°C
Accuracy	±0.005°C
Pressure	
Range	0–500dBar
Resolution	0.02%FS
Accuracy	±0.05%FS

5.1.3. Multi-Beam Echo Sounder

An R2 Sonic 2024 Multi-Beam Echo Sounder (MBES) was pole-mounted through a center-hull moonpool on the RV *Shearwater* and was used to provide water depths at sampling locations. The MBES settings were established during the geophysical campaign sea trials to obtain the most ideal data while meeting the project specifications.

Table 5.3 R2 Sonic MBES Operating Parameters

Instrumentation	
Multi-Beam Echo Sounder	R2 Sonic 2024
Transducer Mount	Pole mounted through moonpool
Motion Reference Unit	POS MV OceanMaster
Sound Velocity Probe	AML SVS
Operating Parameters	
Port Transducer Frequency	350kHz
Acquisition Software	QPS - QINSy
Velocity Sensor At Td	On
General Water Depths	5–35m
Angular Coverage	120°
No. of Beams	256

5.1.4. Ultra-Short Baseline Positioning System

The underwater camera was positioned using a pole mounted Sonardyne Scout Pro USBL transceiver and separate acoustic beacons to provide accurate target location. Discrete target location testing and USBL calibration parameters established during sea trials met or exceeded all of Alpine's equipment requirements.

During the geophysical mobilization, the USBL system was calibrated for pitch, roll and yaw using the QPS QINSy USBL calibration software.

Specifications of the USBL positioning system can be seen in Table 5.4.

Table 5.4 Sonardyne USBL Operating Parameters

Instrumentation	
Transceiver	Sonardyne Scout Pro
Transponder Beacons	Applied Acoustics 8190 Mini transponder
Operating Parameters	
Ping Rate	1s
Depth Rating	1,000m
Depth Aided	No
Beam Shape	Omni-directional

5.1.5. Grab Sampler

Conducted using a Salish Modified Van Veen Grab.

Three samples taken at each station resulting in 36 grab samples. 36 samples successful. Onsite description of geology as well as benthic habitat can be found in the daily log. Samples were further analyzed at a laboratory for grain size, Total Organic Carbon (Terrasense) and benthic enumeration (ESS). All benthic samples were treated with a 10% Formalin solution as well as Rose Bengal. Grain size samples were all refrigerated.

5.1.6. Water Quality Profiler

Water quality profiles were conducted using the Sea-Bird SBE 911 plus system. The Sea-Bird collected Conductivity, Temperature, Salinity, DO, and pH.

One profile was taken at the center site of each station prior to any other sampling taking place in order to be sure the sample was acquired without any bottom disturbance from sediment sampling.

5.1.7. Underwater Camera

Underwater video was collected using the TLS-500 towed underwater camera sled. 12 600 m long transects were investigated, each oriented to cross the primary grab sample location and offset locations. Five of these transects were imaged successfully. Despite multiple attempts, 7 of the transects could not provide sufficient detail of the seabed for sediment and benthic assessment. This was likely due to the area being in shallow water conditions with strong currents and seas, influences from the nearby Jones inlet or possible turbid waters following the winter season.

General benthic habitat descriptions can be found in the daily log. Final analysis for macrofaunal count and benthic habitat were performed by ESS and provided to RPS for the final Benthic Report (Appendix E).

6. PROCESSING METHODOLOGY

This section describes the processing sequences used for continuous data quality control as well as quality assurance.

6.1. Navigation

No processing of navigation data for the purposes of smoothing the track of the camera on transects was undertaken.

6.2. Grab Sampling

Grab sampling procedures are described in the Benthic Analysis Report included as Appendix E.

6.3. Water Quality Profiling

Water quality profiles were taken into SeaProc software, part of the SeaSoft software suite in order to produce ASCII format processed data files with all required data columns, including depth, pressure, density, oxygen saturation, acidity, conductivity and sound velocity.

6.4. Underwater Camera Video

Underwater camera procedures are described in the Benthic Analysis Report included as Appendix E.

7. OPERATIONAL SUMMARY

7.1. Limiting Factors

Turbid conditions in the water lead to sediment occlusion in a majority of video footage taken. After multiple attempts only 5 video transects were deemed visible. Despite multiple attempts, 7 of the transects could not provide sufficient detail of the seabed for sediment and benthic assessment. This was likely due to the area being in shallow water conditions with strong currents and seas, influences from the nearby Jones inlet or possible turbid waters following the winter season.

Appendices

APPENDIX A DAILY PROGRESS REPORTS

Vessel: **Shearwater**
 Client: **Equinor Wind US LLC**
 Location: **New York City, U.S.A.**
 Project: **Empire Wind Gowanus ECR-NY**

Project No: **1894**
 Today's Date: **29 April 2021**
 Report No: **58**
 Start Date: **03 March 2021**

All times are **EST** (GMT - **4:00** hrs)

AA. VESSEL LOCATION AT 24:00 HRS:

Description: **Liberty Landing Marina, NJ** Latitude: **40° 42.65** Longitude: **74° 02.64**

BB. WEATHER:

Time (Local)	BAROM	WIND		WAVE	VISIB.	SKY	REMARKS
	mb	Speed mph	Dir	HEIGHT m	nmi	CONDS	
00:00		10	W	0.5	10	Cloudy	
08:00		8	S	0.9	10	Cloudy	
16:00		15	S	1	7	Rain	
24:00		17	SW	1	5	Rain	

CC. PERSONNEL & EQUIPMENT:
C1. Alpine OSS Personnel:

Party Chief: **V Reale** Surveyor: **J Juarez** Surveyor: **C Smith** Captain: **M Porter** AB: **D Davison**
 Surveyor: **S Childers** Surveyor: **F Zarzour** Surveyor: **S Davies** 2nd Captain: **R Worley** AB: **M Budzinsky**
 Surveyor: **J Cunha** Mate: **M Afify** Chef: **S Hamilton**

C2. Additional Personnel

PSO: **K Villegas**

PSO: **A Vest**

C3. Client Personnel:

Client Rep. **Len Wang**

C4. Personnel On Board:

ALPINE: **5** CLIENT: **1** VESSEL: **6** OTHERS: **4** TOTAL **16**

C5. ALPINE'S Equipment:

Environmental Camera Sled	Grab Sampler	AML MVP30		
R2 Sonic MBES 2024	2 Applanix POS MV Ocean Master	CTD caster		
USBL Sonardyne Ranger	2 x C-Nav 3050			

C6. Additional Equipment
C7. Project Variations (include notices of changes of personnel / equipment)

Off Vessel		On Vessel	
Personnel:		Personnel:	
Equipment:		Equipment:	

DD. DIARY OF EVENTS TODAY:

From	To	hrs	Code	
00:00	7:00	7:00	NoH	Vessel at dock in Liberty Landing Marina.
7:00	19:00	12:00	M	Mobilization of equipment for environmental activities in port.
19:00	24:00	5:00	NoH	Vessel at dock in Liberty Landing Marina.

EE.		PROJECT DATA:					
E1.		Time Summary:					
Rate	Code		Previous Hours	Today Hours	Total Hours		Percent of Total
Mobilization	M		255:55	12:00	267:55		22.69
Operational	O		215:20		215:20		18.23
Infill Lines	OI		68:23		68:23		5.79
Additional Lines	OAL						
WXR Stby Port	W		72:00		72:00		6.10
WXR Stby Offshore	WO		12:04		12:04		1.02
Contractor Time	CT		19:36		19:36		1.66
Port Call	PC		40:00		40:00		3.39
Survey Downtime	SD						
Non-Operational (on-hire)	NoH		460:00	12:00	472:00		39.97
Disputed Time	DT						
PSO Downtime	PSO		13:42		13:42		1.16
TOTAL			1157:00	24:00	1181:00		100.00%
Hrs. of Daily Operations 12			Cumulative Hours Check Value= 696.00				
E2.		Survey Progress:					
Description	Km Left	Area	Total Km	Km Prev	Today Km	Km To Date	% Completed
Barret Extension			414.97	414.97		414.97	100.00%
Wreck Reroute Extension			85.97	85.97		85.97	100.00%
Gravesend Bay Extension			41.64	41.64		41.64	100.00%
Coney Island Extension			132.22	132.22		132.22	100.00%
Narrows Extension			41.21	41.21		41.21	100.00%
Seabed Mobility Investigations			34.90	34.90		34.90	100.00%
Anchor Plan Survey			23.88	23.88		23.88	100.00%
TOTALS:		TOTAL	774.79	774.79		774.79	100.00%
FF.		SAFETY (Details & Figures for Vessel and Survey Crews and Client Representatives)					
Incidents & Drills			Previous Events	Today's Events	Events To Date		
Safety Meeting			1		1		
Vessel Safety Induction			5		5		
Vessel Safety Drill (MOB, Fire & Abandon Ship)			5		5		
Tool Box Talks			88	2	90		
Permit to Work							
Safety Observation Card			31		31		
Hazardous Occurrence Report							
First Aid Case (FAC)							
Medical Treatment Case (MTC)							
Lost Time Incident (LTI)							
No. of survey Man-Hours worked since start of project or LTI.			10068:00	384:00	10452:00		
GG.		VESSEL ROB's at 24:00hrs					
		Fuel (gal)	Lube Oil (gal)	Water (gal)			
ROB at 00:00 hrs							
Consumed Today							
Received today							
ROB at 24:00 hrs							
HH.		EXPECTED WEATHER NEXT 24 HRS:					
Increasing wind from W (20-25 knots),							
II.		ANTICIPATED PROGRAM NEXT 24 HRS:					
Completing Mob activities							
JJ.		PARTY CHIEF'S COMMENTS: (Optional)					
Starboard side thruster repaired, vessel fully operational since midday							
KK.		REPRESENTATIVE'S COMMENTS: (Optional)					
For ALPINE				For Equinor Wind US LLC			
							
V Reale (Survey Party Chief)				Len Wang (Client Representative)			
Vessel: Shearwater		Project No: 1894		Date: 29 April 2021			
Client: Equinor Wind US LLC		Location: New York City, U.S.A.		Report No. 058			
Project: Empire Wind Gowanus ECR-NY							

Vessel: **Shearwater**
 Client: **Equinor Wind US LLC**
 Location: **New York City, U.S.A.**
 Project: **Empire Wind Gowanus ECR-NY**

Project No: **1894**
 Today's Date: **30 April 2021**
 Report No: **59**
 Start Date: **03 March 2021**

All times are **EST** (GMT - **4:00** hrs)

AA. VESSEL LOCATION AT 24:00 HRS:

Description: **Liberty Landing Marina, NJ** Latitude: **40° 42.65** Longitude: **74° 02.64**

BB. WEATHER:

Time (Local)	BAROM	WIND		WAVE	VISIB.	SKY	REMARKS
	mb	Speed mph	Dir	HEIGHT m	nmi	CONDS	
00:00		17	SW	1	5	Rain	
08:00		20	W	1.3	5	Cloudy	
16:00		20	W	1.6	10	Partly Cloudy	
24:00		27	NW	1.5	10	Partly Cloudy	

CC. PERSONNEL & EQUIPMENT:
C1. Alpine OSS Personnel:

Party Chief: **V Reale** Surveyor: **J Juarez** Surveyor: **C Smith** Captain: **M Porter** AB: **D Davison**
 Surveyor: **S Childers** Surveyor: **F Zarzour** Surveyor: **S Davies** 2nd Captain: **R Worley** AB: **M Budzinsky**
 Surveyor: **J Cunha** Mate: **M Afify** Chef: **S Hamilton**

C2. Additional Personnel

PSO: **K Villegas**

PSO: **A Vest**

C3. Client Personnel:

Client Rep. **Len Wang**

C4. Personnel On Board:

ALPINE: **5** CLIENT: **1** VESSEL: **6** OTHERS: **4** TOTAL **16**

C5. ALPINE'S Equipment:

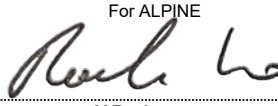
Environmental Camera Sled	Grab Sampler	AML MVP30		
R2 Sonic MBES 2024	2 Applanix POS MV Ocean Master	CTD caster		
USBL Sonardyne Ranger	2 x C-Nav 3050			

C6. Additional Equipment
C7. Project Variations (include notices of changes of personnel / equipment)

Off Vessel		On Vessel	
Personnel:		Personnel:	Steve Budge
Equipment:		Equipment:	

DD. DIARY OF EVENTS TODAY:

From	To	hrs	Code	
00:00	7:00	7:00	NoH	Vessel at dock in Liberty Landing Marina.
7:00	10:30	3:30	M	Mobilization of equipment for environmental activities in port.
10:30	19:00	8:30	W	Mob completed. Weather standby at Liberty Landing Marina.
19:00	24:00	5:00	NoH	Vessel at dock in Liberty Landing Marina.

EE.		PROJECT DATA:					
E1.		Time Summary:					
Rate	Code		Previous Hours	Today Hours	Total Hours		Percent of Total
Mobilization	M		267:55	3:30	271:25		22.52
Operational	O		215:20		215:20		17.87
Infill Lines	OI		68:23		68:23		5.67
Additional Lines	OAL						
WXR Stby Port	W		72:00	8:30	80:30		6.68
WXR Stby Offshore	WO		12:04		12:04		1.00
Contractor Time	CT		19:36		19:36		1.63
Port Call	PC		40:00		40:00		3.32
Survey Downtime	SD						
Non-Operational (on-hire)	NoH		472:00	12:00	484:00		40.17
Disputed Time	DT						
PSO Downtime	PSO		13:42		13:42		1.14
TOTAL			1181:00	24:00	1205:00		100.00%
Hrs. of Daily Operations 12			Cumulative Hours Check Value= 708.00				
E2.		Survey Progress:					
Description		Cores Left	Area	Total Cores	Cores Prev	Today Cores	Cores To Date
Water Quality Profiles		12.00		12.00			
Grab Samples		36.00		36.00			
Underwater Video Transect		12.00		12.00			
TOTALS:		60.00	TOTAL	60.00			
FF.		SAFETY (Details & Figures for Vessel and Survey Crews and Client Representatives)					
Incidents & Drills				Previous Events	Today's Events	Events To Date	
Safety Meeting				1		1	
Vessel Safety Induction				5		5	
Vessel Safety Drill (MOB, Fire & Abandon Ship)				5		5	
Tool Box Talks				90	1	91	
Permit to Work							
Safety Observation Card				31		31	
Hazardous Occurrence Report							
First Aid Case (FAC)							
Medical Treatment Case (MTC)							
Lost Time Incident (LTI)							
No. of survey Man-Hours worked since start of project or LTI.				10452:00	384:00	10836:00	
GG.		VESSEL ROB's at 24:00hrs					
		Fuel (gal)	Lube Oil (gal)	Water (gal)			
ROB at 00:00 hrs							
Consumed Today							
Received today							
ROB at 24:00 hrs							
HH.		EXPECTED WEATHER NEXT 24 HRS:					
Weather conditions improving in the afternoon.							
II.		ANTICIPATED PROGRAM NEXT 24 HRS:					
Weather permitting, moving to survey area and start survey activities.							
JJ.		PARTY CHIEF'S COMMENTS: (Optional)					
KK.		REPRESENTATIVE'S COMMENTS: (Optional)					
For ALPINE  V Reale (Survey Party Chief)				For Equinor Wind US LLC  Len Wang (Client Representative)			
Vessel: Shearwater		Project No: 1894		Date: 30 April 2021			
Client: Equinor Wind US LLC		Location: New York City, U.S.A.		Report No. 059			
Project: Empire Wind Gowanus ECR-NY							

Vessel: **Shearwater**
 Client: **Equinor Wind US LLC**
 Location: **New York City, U.S.A.**
 Project: **Empire Wind Gowanus ECR-NY**

Project No: **1894**
 Today's Date: **01 May 2021**
 Report No: **60**
 Start Date: **03 March 2021**

All times are **EST** (GMT - **4:00** hrs)

AA. VESSEL LOCATION AT 24:00 HRS:

Description: Latitude: **40° 33' 00** Longitude: **74° 00' 00**

BB. WEATHER:

Time (Local)	BAROM	WIND		WAVE	VISIB.	SKY	REMARKS
	mb	Speed mph	Dir	HEIGHT m	nmi	CONDS	
00:00		27	NW	1.5	10	Partly Cloudy	
08:00		20	NW	1.3	10	Partly Cloudy	
16:00		10	W	0.5	10	Clear	
24:00		10	SW	0.3	10	Clear	

CC. PERSONNEL & EQUIPMENT:
C1. Alpine OSS Personnel:

Party Chief: **V Reale** Surveyor: **J Juarez** Surveyor: **C Smith** Captain: **M Porter** AB: **D Davison**
 Surveyor: **S Childers** Surveyor: **F Zarzour** Surveyor: **S Davies** 2nd Captain: **R Worley** AB: **M Budzinsky**
 Surveyor: **J Cunha** Mate: **M Afify** Chef: **S Hamilton**

C2. Additional Personnel

PSO: **K Villegas**

PSO: **A Vest**

C3. Client Personnel:

Client Rep. **Len Wang**

C4. Personnel On Board:

ALPINE: **5** CLIENT: **1** VESSEL: **6** OTHERS: **4** TOTAL **16**

C5. ALPINE'S Equipment:

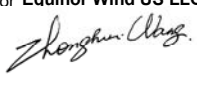
Environmental Camera Sled	Grab Sampler	AML MVP30		
R2 Sonic MBES 2024	2 Applanix POS MV Ocean Master	CTD caster		
USBL Sonardyne Ranger	2 x C-Nav 3050			

C6. Additional Equipment
C7. Project Variations (include notices of changes of personnel / equipment)

Off Vessel		On Vessel	
Personnel:		Personnel:	
Equipment:		Equipment:	

DD. DIARY OF EVENTS TODAY:

From	To	hrs	Code	
00:00	7:00	7:00	NoH	Vessel at dock in Liberty Landing Marina.
7:00	19:00	12:00	W	Weather standby at Liberty Landing Marina.
19:00	24:00	5:00	NoH	Vessel leaves dock at 21:00 and transits to survey area.

EE.		PROJECT DATA:					
E1.		Time Summary:					
Rate	Code		Previous Hours	Today Hours	Total Hours		Percent of Total
Mobilization	M		271:25		271:25		22.08
Operational	O		215:20		215:20		17.52
Infill Lines	OI		68:23		68:23		5.56
Additional Lines	OAL						
WXR Stby Port	W		80:30	12:00	92:30		7.53
WXR Stby Offshore	WO		12:04		12:04		0.98
Contractor Time	CT		19:36		19:36		1.59
Port Call	PC		40:00		40:00		3.25
Survey Downtime	SD						
Non-Operational (on-hire)	NoH		484:00	12:00	496:00		40.36
Disputed Time	DT						
PSO Downtime	PSO		13:42		13:42		1.11
TOTAL			1205:00	24:00	1229:00		100.00%
Hrs. of Daily Operations 12			Cumulative Hours Check Value= 720.00				
E2.		Survey Progress:					
Description		Cores Left	Area	Total Cores	Cores Prev	Today Cores	Cores To Date
Water Quality Profiles		12.00		12.00			
Grab Samples		36.00		36.00			
Underwater Video Transect		12.00		12.00			
TOTALS:		60.00	TOTAL	60.00			
FF.		SAFETY (Details & Figures for Vessel and Survey Crews and Client Representatives)					
Incidents & Drills				Previous Events	Today's Events	Events To Date	
Safety Meeting				1		1	
Vessel Safety Induction				5		5	
Vessel Safety Drill (MOB, Fire & Abandon Ship)				5		5	
Tool Box Talks				91	1	92	
Permit to Work							
Safety Observation Card				31		31	
Hazardous Occurrence Report							
First Aid Case (FAC)							
Medical Treatment Case (MTC)							
Lost Time Incident (LTI)							
No. of survey Man-Hours worked since start of project or LTI.				10836:00	384:00	11220:00	
GG.		VESSEL ROB's at 24:00hrs					
		Fuel (gal)	Lube Oil (gal)	Water (gal)			
ROB at 00:00 hrs							
Consumed Today							
Received today							
ROB at 24:00 hrs							
HH.		EXPECTED WEATHER NEXT 24 HRS:					
Partly cloudy, wind 6 to 15 knts SW to S							
II.		ANTICIPATED PROGRAM NEXT 24 HRS:					
Grab sampling activities at Barrett landing area.							
JJ.		PARTY CHIEF'S COMMENTS: (Optional)					
KK.		REPRESENTATIVE'S COMMENTS: (Optional)					
For ALPINE					For Equinor Wind US LLC		
							
V Reale					Len Wang		
(Survey Party Chief)					(Client Representative)		
Vessel: Shearwater		Project No: 1894		Date: 01 May 2021			
Client: Equinor Wind US LLC		Location: New York City, U.S.A.		Report No. 060			
Project: Empire Wind Gowanus ECR-NY							

Vessel: **Shearwater**
 Client: **Equinor Wind US LLC**
 Location: **New York City, U.S.A.**
 Project: **Empire Wind Gowanus ECR-NY**

Project No: **1894**
 Today's Date: **02 May 2021**
 Report No: **61**
 Start Date: **03 March 2021**

All times are **EST** (GMT - **4:00** hrs)

AA. VESSEL LOCATION AT 24:00 HRS:

Description: **Barrett survey area** Latitude: **40° 30' 00** Longitude: **73° 40' 00**

BB. WEATHER:

Time (Local)	BAROM mb	WIND Speed mph Dir	WAVE HEIGHT m	VISIB. nmi	SKY CONDS	REMARKS
00:00		10 SW	0.3	>5	clear	
08:00		10 S	0.6	>5	cloudy	rain showers
16:00		7 SSW	0.8	>5	partly cloudy	
24:00		15 S	1	>5	clear	

CC. PERSONNEL & EQUIPMENT:
C1. Alpine OSS Personnel:

Party Chief: **V Reale** Surveyor: **J Juarez** Surveyor: **C Smith** Captain: **M Porter** AB: **D Davison**
 Surveyor: **S Childers** Surveyor: **F Zarzour** Surveyor: **S Davies** 2nd Captain: **R Worley** AB: **M Budzinsky**
 Surveyor: **J Cunha** Mate: **M Afify** Chef: **S Hamilton**

C2. Additional Personnel

PSO: **K Villegas**

PSO: **A Vest**

C3. Client Personnel:

Client Rep. **Len Wang**

C4. Personnel On Board:

ALPINE: **5** CLIENT: **1** VESSEL: **6** OTHERS: **4** TOTAL **16**

C5. ALPINE'S Equipment:

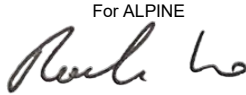
Environmental Camera Sled	Grab Sampler	AML MVP30		
R2 Sonic MBES 2024	2 Applanix POS MV Ocean Master	CTD caster		
USBL Sonardyne Ranger	2 x C-Nav 3050			

C6. Additional Equipment
C7. Project Variations (include notices of changes of personnel / equipment)

Off Vessel	On Vessel
Personnel:	Personnel:
Equipment:	Equipment:

DD. DIARY OF EVENTS TODAY:

From	To	hrs	Code	
00:00	6:47	6:47	NoH	Transiting to survey area.
6:47	10:40	3:53	O	Grab sampling at stations 03-04-05
10:40	11:00	0:20	WO	Waiting on weather, storm approaching with strong winds gusts
11:00	18:49	7:49	O	Grab sampling at stations 02-06-07-08-09-12
18:49	24:00	5:11	NoH	Loitering at survey area.

EE.		PROJECT DATA:						
E1.		Time Summary:						
Rate	Code		Previous Hours	Today Hours	Total Hours		Percent of Total	
Mobilization	M		271:25		271:25		21.66	
Operational	O		215:20	11:42	227:02		18.12	
Infill Lines	OI		68:23		68:23		5.46	
Additional Lines	OAL							
WXR Stby Port	W		92:30		92:30		7.38	
WXR Stby Offshore	WO		12:04	0:20	12:24		0.99	
Contractor Time	CT		19:36		19:36		1.56	
Port Call	PC		40:00		40:00		3.19	
Survey Downtime	SD							
Non-Operational (on-hire)	NoH		496:00	11:58	507:58		40.54	
Disputed Time	DT							
PSO Downtime	PSO		13:42		13:42		1.09	
TOTAL			1229:00	24:00	1253:00		100.00%	
Hrs. of Daily Operations 12			Cumulative Hours Check Value= 732.00					
E2.		Survey Progress:						
Description		Cores Left	Area	Total Cores	Cores Prev	Today Cores	Cores To Date	% Completed
Water Quality Profiles		12.00		12.00				
Grab Samples		9.00		36.00		27.00	27.00	75.00%
Underwater Video Transect		12.00		12.00				
TOTALS:		33.00	TOTAL	60.00		27.00	27.00	45.00%
FF.		SAFETY (Details & Figures for Vessel and Survey Crews and Client Representatives)						
				Previous Events	Today's Events	Events To Date		
Incidents & Drills								
Safety Meeting				1		1		
Vessel Safety Induction				5		5		
Vessel Safety Drill (MOB, Fire & Abandon Ship)				5		5		
Tool Box Talks				92	2	94		
Permit to Work								
Safety Observation Card				31		31		
Hazardous Occurrence Report								
First Aid Case (FAC)								
Medical Treatment Case (MTC)								
Lost Time Incident (LTI)								
No. of survey Man-Hours worked since start of project or LTI.				11220:00	384:00	11604:00		
GG.		VESSEL ROB's at 24:00hrs						
		Fuel (gal)	Lube Oil (gal)	Water (gal)				
ROB at 00:00 hrs								
Consumed Today								
Received today								
ROB at 24:00 hrs								
HH.		EXPECTED WEATHER NEXT 24 HRS:						
Cloudy, possible rain showers, wind E up to 15 knots								
II.		ANTICIPATED PROGRAM NEXT 24 HRS:						
Completing sediments sampling and start Water Quality profiling.								
JJ.		PARTY CHIEF'S COMMENTS: (Optional)						
KK.		REPRESENTATIVE'S COMMENTS: (Optional)						
For ALPINE					For Equinor Wind US LLC			
								
V Reale (Survey Party Chief)					Len Wang (Client Representative)			
Vessel: Shearwater		Project No: 1894		Date: 02 May 2021				
Client: Equinor Wind US LLC		Location: New York City, U.S.A.		Report No. 061				
		Project: Empire Wind Gowanus ECR-NY						

Vessel: **Shearwater**
 Client: **Equinor Wind US LLC**
 Location: **New York City, U.S.A.**
 Project: **Empire Wind Gowanus ECR-NY**

Project No: **1894**
 Today's Date: **03 May 2021**
 Report No: **62**
 Start Date: **03 March 2021**

All times are **EST** (GMT - **4:00** hrs)

AA. VESSEL LOCATION AT 24:00 HRS:

Description: Latitude: **40° 40' 00 N** Longitude: **74° 00' 00**

BB. WEATHER:

Time (Local)	BAROM	WIND		WAVE	VISIB.	SKY	REMARKS
	mb	Speed mph	Dir	HEIGHT m	nmi	CONDS	
00:00		15	S	1	>5	clear	
08:00		10	NE	1	>5	partly cloudy	
16:00		14	ENE	0.9	>5	partly cloudy	
24:00		15	E	1	>5	cloudy	rain showers

CC. PERSONNEL & EQUIPMENT:
C1. Alpine OSS Personnel:

Party Chief: **V Reale** Surveyor: **J Juarez** Surveyor: **C Smith** Captain: **M Porter** AB: **D Davison**
 Surveyor: **S Childers** Surveyor: **F Zarzour** Surveyor: **S Davies** 2nd Captain: **R Worley** AB: **M Budzinsky**
 Surveyor: **J Cunha** Mate: **M Afify** Chef: **S Hamilton**

C2. Additional Personnel

PSO: **K Villegas**

PSO: **A Vest**

C3. Client Personnel:

Client Rep. **Len Wang**

C4. Personnel On Board:

ALPINE: **5** CLIENT: **1** VESSEL: **6** OTHERS: **4** TOTAL **16**

C5. ALPINE'S Equipment:

Environmental Camera Sled	Grab Sampler	AML MVP30		
R2 Sonic MBES 2024	2 Applanix POS MV Ocean Master	CTD caster		
USBL Sonardyne Ranger	2 x C-Nav 3050			

C6. Additional Equipment
C7. Project Variations (include notices of changes of personnel / equipment)

Off Vessel		On Vessel	
Personnel:		Personnel:	
Equipment:		Equipment:	

DD. DIARY OF EVENTS TODAY:

From	To	hrs	Code	
00:00	6:45	6:45	NoH	Loitering at survey area.
6:45	11:54	5:09	O	Water Quality profiles at all stations.
11:54	16:55	5:01	O	Grab sampling at stations 01-10-11.
16:55	18:45	1:50	O	Preparation of equipment for Video transects, storage of collected grab samples.
18:45	24:00	5:15	NoH	Transiting to Liberty Landing Marina for maritime crew change.

EE.		PROJECT DATA:						
E1.		Time Summary:						
Rate	Code		Previous Hours	Today Hours	Total Hours		Percent of Total	
Mobilization	M		271:25		271:25		21.25	
Operational	O		227:02	12:00	239:02		18.72	
Infill Lines	OI		68:23		68:23		5.35	
Additional Lines	OAL							
WXR Stby Port	W		92:30		92:30		7.24	
WXR Stby Offshore	WO		12:24		12:24		0.97	
Contractor Time	CT		19:36		19:36		1.53	
Port Call	PC		40:00		40:00		3.13	
Survey Downtime	SD							
Non-Operational (on-hire)	NoH		507:58	12:00	519:58		40.72	
Disputed Time	DT							
PSO Downtime	PSO		13:42		13:42		1.07	
TOTAL			1253:00	24:00	1277:00		100.00%	
Hrs. of Daily Operations 12			Cumulative Hours Check Value= 744.00					
E2.		Survey Progress:						
Description		Cores Left	Area	Total Cores	Cores Prev	Today Cores	Cores To Date	% Completed
Water Quality Profiles				12.00		12.00	12.00	100.00%
Grab Samples				36.00	27.00	9.00	36.00	100.00%
Underwater Video Transect		12.00		12.00				
TOTALS:		12.00	TOTAL	60.00	27.00	21.00	48.00	80.00%
FF.		SAFETY (Details & Figures for Vessel and Survey Crews and Client Representatives)						
Incidents & Drills				Previous Events	Today's Events	Events To Date		
Safety Meeting				1		1		
Vessel Safety Induction				5		5		
Vessel Safety Drill (MOB, Fire & Abandon Ship)				5		5		
Tool Box Talks				94	3	97		
Permit to Work								
Safety Observation Card				31		31		
Hazardous Occurrence Report								
First Aid Case (FAC)								
Medical Treatment Case (MTC)								
Lost Time Incident (LTI)								
No. of survey Man-Hours worked since start of project or LTI.				11604:00	384:00	11988:00		
GG.		VESSEL ROB's at 24:00hrs						
		Fuel (gal)	Lube Oil (gal)	Water (gal)				
ROB at 00:00 hrs								
Consumed Today								
Received today								
ROB at 24:00 hrs								
HH.		EXPECTED WEATHER NEXT 24 HRS:						
Partly cloudy with rain showers, wind variable direction up to 15 knots								
II.		ANTICIPATED PROGRAM NEXT 24 HRS:						
Weather permitting, running underwater video transects.								
JJ.		PARTY CHIEF'S COMMENTS: (Optional)						
KK.		REPRESENTATIVE'S COMMENTS: (Optional)						
For ALPINE					For Equinor Wind US LLC			
								
V Reale (Survey Party Chief)					Len Wang (Client Representative)			
Vessel: Shearwater		Project No: 1894		Date: 03 May 2021				
Client: Equinor Wind US LLC		Location: New York City, U.S.A.		Report No. 062				
Project: Empire Wind Gowanus ECR-NY								

Vessel: **Shearwater**
 Client: **Equinor Wind US LLC**
 Location: **New York City, U.S.A.**
 Project: **Empire Wind Gowanus ECR-NY**

Project No: **1894**
 Today's Date: **04 May 2021**
 Report No: **63**
 Start Date: **03 March 2021**

All times are **EST** (GMT - **4:00** hrs)

AA. VESSEL LOCATION AT 24:00 HRS:

Description: **Barret area** Latitude: **40° 34' 00** Longitude: **73° 39' 00**

BB. WEATHER:

Time (Local)	BAROM	WIND		WAVE	VISIB.	SKY	REMARKS
	mb	Speed mph	Dir	HEIGHT m	nmi	CONDS	
00:00		15	E	1	>5	cloudy	rain showers
08:00		10	NNW	0.8	>5	partly cloudy	
16:00		8	SE	0.9	>5	partly cloudy	
24:00		15	ESE	1	>5	cloudy	rain showers

CC. PERSONNEL & EQUIPMENT:
C1. Alpine OSS Personnel:

Party Chief: **V Reale** Surveyor: **J Juarez** Surveyor: **C Smith** Captain: **M Porter** AB: **D Davison**
 Surveyor: **S Childers** Surveyor: **F Zarzour** Surveyor: **S Davies** 2nd Captain: **R Worley** AB: **M Budzinsky**
 Surveyor: **J Cunha** Mate: **M Afify** Chef: **S Hamilton**

C2. Additional Personnel

PSO: **K Villegas**

PSO: **A Vest**

C3. Client Personnel:

Client Rep. **Len Wang**

C4. Personnel On Board:

ALPINE: **5** CLIENT: **1** VESSEL: **6** OTHERS: **4** TOTAL **16**

C5. ALPINE'S Equipment:

Environmental Camera Sled	Grab Sampler	AML MVP30		
R2 Sonic MBES 2024	2 Applanix POS MV Ocean Master	CTD caster		
USBL Sonardyne Ranger	2 x C-Nav 3050			

C6. Additional Equipment
C7. Project Variations (include notices of changes of personnel / equipment)

Off Vessel		On Vessel	
Personnel:		Personnel:	
Equipment:		Equipment:	

DD. DIARY OF EVENTS TODAY:

From	To	hrs	Code	
00:00	6:40	6:40	NoH	Transiting to survey area.
6:40	18:00	11:20	O	Underwater Video transects on EW-01-02-03-05-06-07-08-09-10-11-12
18:00	18:40	0:40	O	Reporting and preparation for next day activities
18:40	24:00	5:20	NoH	Loitering at survey area.

EE.		PROJECT DATA:						
E1.		Time Summary:						
Rate	Code		Previous Hours	Today Hours	Total Hours		Percent of Total	
Mobilization	M		271:25		271:25		20.86	
Operational	O		239:02	12:00	251:02		19.30	
Infill Lines	OI		68:23		68:23		5.26	
Additional Lines	OAL							
WXR Stby Port	W		92:30		92:30		7.11	
WXR Stby Offshore	WO		12:24		12:24		0.95	
Contractor Time	CT		19:36		19:36		1.51	
Port Call	PC		40:00		40:00		3.07	
Survey Downtime	SD							
Non-Operational (on-hire)	NoH		519:58	12:00	531:58		40.89	
Disputed Time	DT							
PSO Downtime	PSO		13:42		13:42		1.05	
TOTAL			1277:00	24:00	1301:00		100.00%	
Hrs. of Daily Operations 12			Cumulative Hours Check Value= 756.00					
E2.		Survey Progress:						
Description		Cores Left	Area	Total Cores	Cores Prev	Today Cores	Cores To Date	% Completed
Water Quality Profiles				12.00	12.00		12.00	100.00%
Grab Samples				36.00	36.00		36.00	100.00%
Underwater Video Transect		7.00		12.00		5.00	5.00	41.67%
TOTALS:		7.00	TOTAL	60.00	48.00	5.00	53.00	88.33%
FF.		SAFETY (Details & Figures for Vessel and Survey Crews and Client Representatives)						
				Previous Events	Today's Events	Events To Date		
Incidents & Drills								
Safety Meeting				1		1		
Vessel Safety Induction				5		5		
Vessel Safety Drill (MOB, Fire & Abandon Ship)				5		5		
Tool Box Talks				97	2	99		
Permit to Work								
Safety Observation Card				31	2	33		
Hazardous Occurrence Report								
First Aid Case (FAC)								
Medical Treatment Case (MTC)								
Lost Time Incident (LTI)								
No. of survey Man-Hours worked since start of project or LTI.				11988:00	384:00	12372:00		
GG.		VESSEL ROB's at 24:00hrs						
		Fuel (gal)		Lube Oil (gal)		Water (gal)		
ROB at 00:00 hrs								
Consumed Today								
Received today								
ROB at 24:00 hrs								
HH.		EXPECTED WEATHER NEXT 24 HRS:						
Partly cloudy with rain showers, wind variable direction up to 15 knots								
II.		ANTICIPATED PROGRAM NEXT 24 HRS:						
Weather permitting, complete underwater video transects.								
JJ.		PARTY CHIEF'S COMMENTS: (Optional)						
Of the 11 transects surveyed today, 5 transects (EW-02, 06, 07, 11, 12) have been accepted, while the others (EW-01, 03, 05, 08, 09, 10) have been rejected due to low visibility close to the seabed.								
KK.		REPRESENTATIVE'S COMMENTS: (Optional)						
For ALPINE					For Equinor Wind US LLC			
								
V Reale					Len Wang			
(Survey Party Chief)					(Client Representative)			
Vessel: Shearwater		Project No: 1894		Date: 04 May 2021				
Client: Equinor Wind US LLC		Location: New York City, U.S.A.		Report No. 063				
		Project: Empire Wind Gowanus ECR-NY						

Vessel: **Shearwater**
 Client: **Equinor Wind US LLC**
 Location: **New York City, U.S.A.**
 Project: **Empire Wind Gowanus ECR-NY**

Project No: **1894**
 Today's Date: **05 May 2021**
 Report No: **64**
 Start Date: **03 March 2021**

All times are **EST** (GMT - **4:00** hrs)

AA. VESSEL LOCATION AT 24:00 HRS:

Description: **Liberty Landing Marina, NJ** Latitude: **40° 42.65** Longitude: **74° 02.64**

BB. WEATHER:

Time (Local)	BAROM	WIND		WAVE	VISIB.	SKY	REMARKS
	mb	Speed mph	Dir	HEIGHT m	nmi	CONDS	
00:00		15	ESE	1	<5	cloudy	rain showers
08:00		12	ENE	1.1	<5	cloudy	
16:00		8	ENE	0.9	<5	cloudy	rain
24:00		14	ESE	1	<5	cloudy	rain showers

CC. PERSONNEL & EQUIPMENT:
C1. Alpine OSS Personnel:

Party Chief: **V Reale** Surveyor: **J Juarez** Surveyor: **C Smith** Captain: **M Porter** AB: **D Davison**
 Surveyor: **S Childers** Surveyor: **F Zarzour** Surveyor: **S Davies** 2nd Captain: **R Worley** AB: **M Budzinsky**
 Surveyor: **J Cunha** Mate: **M Afify** Chef: **S Hamilton**

C2. Additional Personnel

PSO: **K Villegas**

PSO: **A Vest**

C3. Client Personnel:

Client Rep. **Len Wang**

C4. Personnel On Board:

ALPINE: **5** CLIENT: **1** VESSEL: **6** OTHERS: **4** TOTAL **16**

C5. ALPINE'S Equipment:

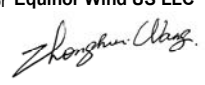
Environmental Camera Sled	Grab Sampler	AML MVP30		
R2 Sonic MBES 2024	2 Applanix POS MV Ocean Master	CTD caster		
USBL Sonardyne Ranger	2 x C-Nav 3050			

C6. Additional Equipment
C7. Project Variations (include notices of changes of personnel / equipment)

Off Vessel		On Vessel	
Personnel:		Personnel:	
Equipment:		Equipment:	

DD. DIARY OF EVENTS TODAY:

From	To	hrs	Code	
00:00	6:45	6:45	NoH	Loitering at survey area.
6:45	10:30	3:45	O	Underwater Video transects on EW-04-06-08-09-10.
10:30	16:00	5:30	O	Survey completed, check of data and backups, transiting to port.
16:00	18:45	2:45	M	Vessel at dock in Liberty Landing Marina, demobilization of survey equipment.
18:45	24:00	5:15	NoH	Vessel at dock in Liberty Landing Marina.

EE.		PROJECT DATA:						
E1.		Time Summary:						
Rate	Code		Previous Hours	Today Hours	Total Hours		Percent of Total	
Mobilization	M		271:25	2:45	274:10		20.69	
Operational	O		251:02	9:15	260:17		19.64	
Infill Lines	OI		68:23		68:23		5.16	
Additional Lines	OAL							
WXR Stby Port	W		92:30		92:30		6.98	
WXR Stby Offshore	WO		12:24		12:24		0.94	
Contractor Time	CT		19:36		19:36		1.48	
Port Call	PC		40:00		40:00		3.02	
Survey Downtime	SD							
Non-Operational (on-hire)	NoH		531:58	12:00	543:58		41.05	
Disputed Time	DT							
PSO Downtime	PSO		13:42		13:42		1.03	
TOTAL			1301:00	24:00	1325:00		100.00%	
Hrs. of Daily Operations 12			Cumulative Hours Check Value= 768.00					
E2.		Survey Progress:						
Description		Cores Left	Area	Total Cores	Cores Prev	Today Cores	Cores To Date	% Completed
Water Quality Profiles				12.00	12.00		12.00	100.00%
Grab Samples				36.00	36.00		36.00	100.00%
Underwater Video Transect		7.00		12.00	5.00		5.00	41.67%
TOTALS:		7.00	TOTAL	60.00	53.00		53.00	88.33%
FF.		SAFETY (Details & Figures for Vessel and Survey Crews and Client Representatives)						
Incidents & Drills				Previous Events	Today's Events	Events To Date		
Safety Meeting				1		1		
Vessel Safety Induction				5		5		
Vessel Safety Drill (MOB, Fire & Abandon Ship)				5		5		
Tool Box Talks				99	2	101		
Permit to Work								
Safety Observation Card				33		33		
Hazardous Occurrence Report								
First Aid Case (FAC)								
Medical Treatment Case (MTC)								
Lost Time Incident (LTI)								
No. of survey Man-Hours worked since start of project or LTI.				12372:00	384:00	12756:00		
GG.		VESSEL ROB's at 24:00hrs						
		Fuel (gal)	Lube Oil (gal)	Water (gal)				
ROB at 00:00 hrs								
Consumed Today								
Received today								
ROB at 24:00 hrs								
HH.		EXPECTED WEATHER NEXT 24 HRS:						
Sunny, variable winds from W - NW								
II.		ANTICIPATED PROGRAM NEXT 24 HRS:						
Demobilization at dock								
JJ.		PARTY CHIEF'S COMMENTS: (Optional)						
Of the 5 transects surveyed today, only 1 transect (EW-06) has been accepted, while the others (EW-04, 08, 09, 10) have been rejected due to low visibility close to the seabed. The EW-06 transect has been rerun due to poor visibility on the second half of previous recorded video.								
KK.		REPRESENTATIVE'S COMMENTS: (Optional)						
For ALPINE					For Equinor Wind US LLC			
								
V Reale (Survey Party Chief)					Len Wang (Client Representative)			
Vessel: Shearwater		Project No: 1894		Date: 05 May 2021				
Client: Equinor Wind US LLC		Location: New York City, U.S.A.		Report No. 064				
		Project: Empire Wind Gowanus ECR-NY						



Project No:	1894
Todays Date:	06 May 2021
Report No:	65
Start Date:	03 March 2021

All times are **EST** (GMT - **4:00** hrs)

AA.	VESSEL LOCATION AT 24:00 HRS:
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Description: Liberty Landing Marina, NJ	Latitude: 40° 42.65	Longitude: 74° 02.64
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BB.	WEATHER:
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Time	BAROM	WIND		WAVE	VISIB.	SKY	REMARKS
(Local)	mb	Speed mph	Dir	HEIGHT m	nmi	CONDS	
00:00		15	WNW	1	<5	cloudy	
08:00		15	WNW	0.9	>5	clear	
16:00							
24:00							

CC.	PERSONNEL & EQUIPMENT:
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C1.	Alpine OSS Personnel:
-----	-----------------------

Party Chief: V Reale	Surveyor: J Juarez	Surveyor: C Smith	Captain: M Porter	AB: D Davison
Surveyor: S Childers	Surveyor: F Zazour	Surveyor: S Davies	2nd Captain: R Worley	AB: M Budzinsky
Surveyor: J Cunha			Mate: M Affy	Chef: S Hamilton

C2.	Additional Personnel
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PSO: K Villegas

PSO: A Vest

C3.	Client Personnel:
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Client Rep.	Len Wang
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C4.	Personnel On Board:
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ALPINE:	5	CLIENT:	1	VESSEL:	6	OTHERS:	4	TOTAL 16
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C5.	ALPINE'S Equipment:
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Environmental Camera Sled	Grab Sampler	AML MVP30		
R2 Sonic MBES 2024	2 Applanix POS MV Ocean Master	CTD caster		
USBL Sonardyne Ranger	2 x C-Nav 3050			

C6.	Additional Equipment
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C7.	Project Variations (include notices of changes of personnel / equipment)
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	Off Vessel	On Vessel
Personnel:		Personnel:
Equipment:		Equipment:

DD.	DIARY OF EVENTS TODAY:
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[illegible]

EE.		PROJECT DATA:						
E1.		Time Summary:						
Rate	Code		Previous Hours	Today Hours	Total Hours		Percent of Total	
Mobilization	M		274:10	8:00	282:10		21.06	
Operational	O		260:17		260:17		19.42	
Infill Lines	OI		68:23		68:23		5.10	
Additional Lines	OAL							
WXR Stby Port	W		92:30		92:30		6.90	
WXR Stby Offshore	WO		12:24		12:24		0.93	
Contractor Time	CT		19:36		19:36		1.46	
Port Call	PC		40:00		40:00		2.99	
Survey Downtime	SD							
Non-Operational (on-hire)	NoH		543:58	7:00	550:58		41.12	
Disputed Time	DT							
PSO Downtime	PSO		13:42		13:42		1.02	
TOTAL			1325:00	15:00	1340:00		100.00%	
Hrs. of Daily Operations 12			Cumulative Hours Check Value= 780.00					
E2.		Survey Progress:						
Description		Cores Left	Area	Total Cores	Cores Prev	Today Cores	Cores To Date	% Completed
Water Quality Profiles				12.00	12.00		12.00	100.00%
Grab Samples				36.00	36.00		36.00	100.00%
Underwater Video Transect		7.00		12.00	5.00		5.00	41.67%
TOTALS:		7.00	TOTAL	60.00	53.00		53.00	88.33%
FF.		SAFETY (Details & Figures for Vessel and Survey Crews and Client Representatives)						
Incidents & Drills				Previous Events	Today's Events	Events To Date		
Safety Meeting				1		1		
Vessel Safety Induction				5		5		
Vessel Safety Drill (MOB, Fire & Abandon Ship)				5		5		
Tool Box Talks				101	1	102		
Permit to Work								
Safety Observation Card				33		33		
Hazardous Occurrence Report								
First Aid Case (FAC)								
Medical Treatment Case (MTC)								
Lost Time Incident (LTI)								
No. of survey Man-Hours worked since start of project or LTI.				12756:00	240:00	12996:00		
GG.		VESSEL ROB's at 24:00hrs						
		Fuel (gal)	Lube Oil (gal)	Water (gal)				
ROB at 00:00 hrs								
Consumed Today								
Received today								
ROB at 24:00 hrs								
HH.		EXPECTED WEATHER NEXT 24 HRS:						
II.		ANTICIPATED PROGRAM NEXT 24 HRS:						
JJ.		PARTY CHIEF'S COMMENTS: (Optional)						
KK.		REPRESENTATIVE'S COMMENTS: (Optional)						
Survey activities completed and demobilization authorized.								
For ALPINE					For Equinor Wind US LLC			
								
V Reale (Survey Party Chief)					Len Wang (Client Representative)			
Vessel: Shearwater		Project No: 1894		Date: 06 May 2021				
Client: Equinor Wind US LLC		Location: New York City, U.S.A.		Report No. 065				
		Project: Empire Wind Gowanus ECR-NY						

APPENDIX B VESSEL & EQUIPMENT SPECIFICATIONS



R/V Shearwater

Multi-role Survey Vessel



R/V Shearwater – Multi-role Survey Vessel



R/V Shearwater combines superior stability and maneuverability with state-of-the-art research facilities to provide a flexible, multipurpose platform for marine surveying. The vessel fills the gap between small coastal and large offshore survey platforms providing a cost effective solution for many applications. In addition, the Shearwater allows for a single vessel to complete different tasks, such as geophysical, environmental, and geotechnical surveys, thereby affording our clients the opportunity to save both time and money.

The Shearwater is designed to be flexible enabling it to provide efficient and effective configurations for the completion of its missions. The 110' x 39' aluminium trimaran boasts a hydraulic azimuth drive propulsion system which is fuel efficient while providing superior positioning and line-keeping performance (handling is further enhanced by a 100 HP Bow Thruster). In most instances, this allows the vessel to hold station without resorting to anchoring. The Shearwater also features a large back deck, two equipment moon-

pools, a crane, hydraulic stern A-frame, fixed starboard A-frame, dedicated equipment winches, laboratory and office space with onboard data processing capabilities, and accommodation for up to 20 people on a 24-hour basis.

A professional crew, with extensive experience in offshore survey and construction operations, allows clients to take advantage of the full list of impressive capabilities the Shearwater can bring to a project.

R/V SHEARWATER HAS BEEN DESIGNED TO SUPPORT THE FOLLOWING KEY AREAS:

- / Offshore Structure Surveys (Wind, Oil & Gas, Hydrokinetic)
- / Cable and Pipeline Route Surveys
- / Marine Aggregate and Mineral Surveys
- / Environmental Surveys
- / Oceanographic Instrument Deployment and Recovery
- / Port and Breakwater Development Surveys
- / ROV, AUV and Diver Support
- / Offshore Construction Support and Monitoring Surveys



Vessel Details

Name:	Shearwater
Type:	Multi-Role Survey
Year of Build:	1981
Reconfigured, Refit and Repowered:	2011

Dimensions

Length:	110'
Beam:	39'
Draft:	9'
GRT:	198
NRT:	175
Aft Deck:	1175 sq. ft with separate stern rescue deck

Accommodation

Berths:	20 including crew
Survey Lab:	127 sq ft
Processing Office:	72 sq ft

Propulsion and Machinery

Main Engines:	2 x 526 HP John Deere Model 6125AFM
Propulsion:	2 x Hydraulically driven "Z" Drives (raise/lower/tilt with 360 degree steering)
Bow Thruster:	Thrustmaster 100 HP
Generators:	2 x John Deere Model 6081AFM/Marathon (Magna Plus) 135 Kw

Capacities

Desalination System:	Up to 900 gallons/day
Fresh Water Storage:	5000 gallons
Fuel Storage:	13800 gallons
Septic:	Zero discharge with 2000 gallon holding tank
Endurance:	21 days

Fuel Consumption

Survey 24hrs:	300 gallons/day
Steaming:	500-600 gallons/day
Standby at Sea:	70-100 gallons/day

Navigation

Radar:	Furuno 1944C/NT Furuno 1935
Charting System:	Garmin 5208 GPS with Chart Plot
Auto Pilot:	COMNAV
Echosounders:	Furuno FCV 620 - color in each hull
AIS:	Furuno FA 150
Navtex:	Furuno NX700
Survey GPS, Heading and IMU:	Applanix POS MV
Acoustic Positioning:	Moon Pool mounted USBL

Communication

VHF:	2 x Icom IC-M504
SSB:	SEA 245 HF/SSB
SART:	Sevenstar Electronics S.701
Satellite (Phone/Data):	Intellian v80G VSAT

Equipment Handling

Equipment Moon Pools:	Port and Starboard 3 foot diameter moon pools
Hydraulic Stern A-Frame:	2 Ton Capacity Can operate as two separate davits
Fixed Starboard A-Frame:	5 Ton Capacity
Crane:	14 Ton Maximum Capacity 5 Ton w/ single part line 2 Ton at 40' Extension.
Geotechnical Winch:	5 Ton Capacity
Survey Equipment Winch:	2500m (11mm diam.) Capacity

Survey Capabilities

Hydrography and Geophysics

Multibeam and Single Beam Echosounders
Side Scan Sonars
Subbottom Profilers
Boomers
Sparkers
Mini Air Gun
Multi-Channel Streamers
Magnetometers and Gradiometers

Benthic and Oceanographic

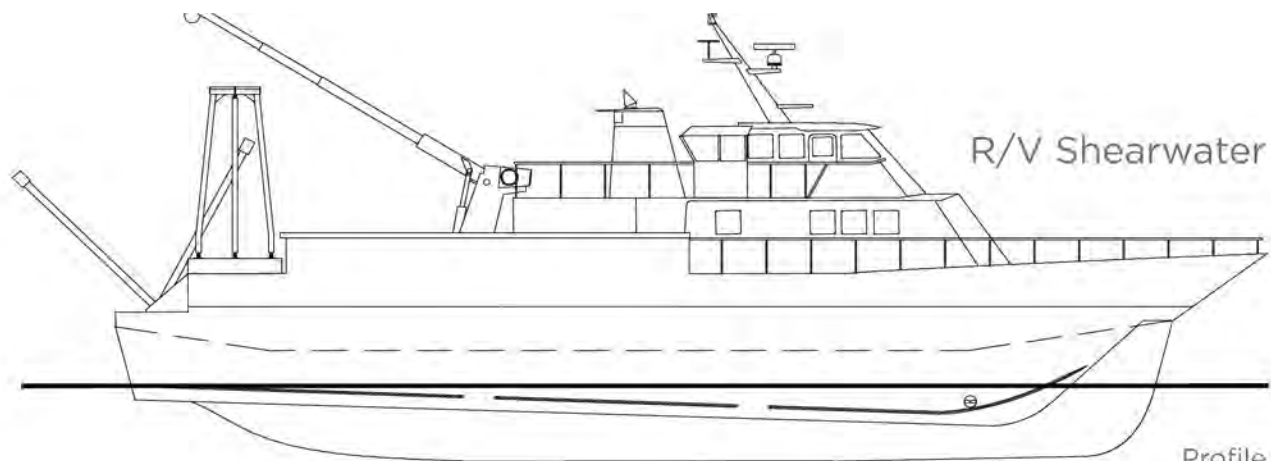
CTD and SVPs
Water Sampling Systems
Turbidity Monitoring Systems
Benthic Grabs
Box Corers
Drop Down Cameras

Geotechnical

10 to 30' Pneumatic and Electric Vibracores
Mini-CPTs
Piston Corers
Drop Corers
Grab Samplers

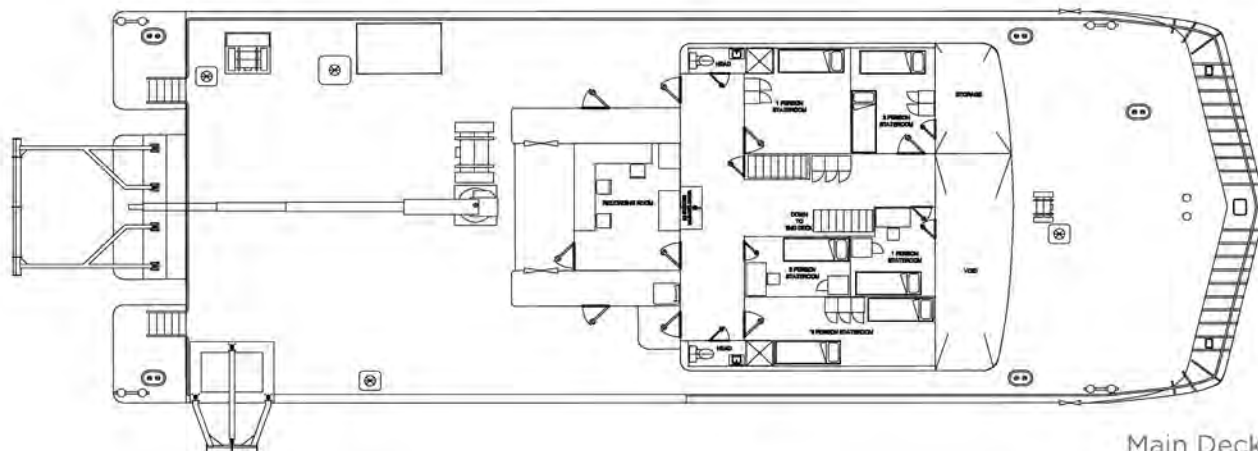
Other

Deployment and Retrieval of Inspection Class ROVs and Compact AUVs
Dive Platform Capable
Permanently Installed Networked Server

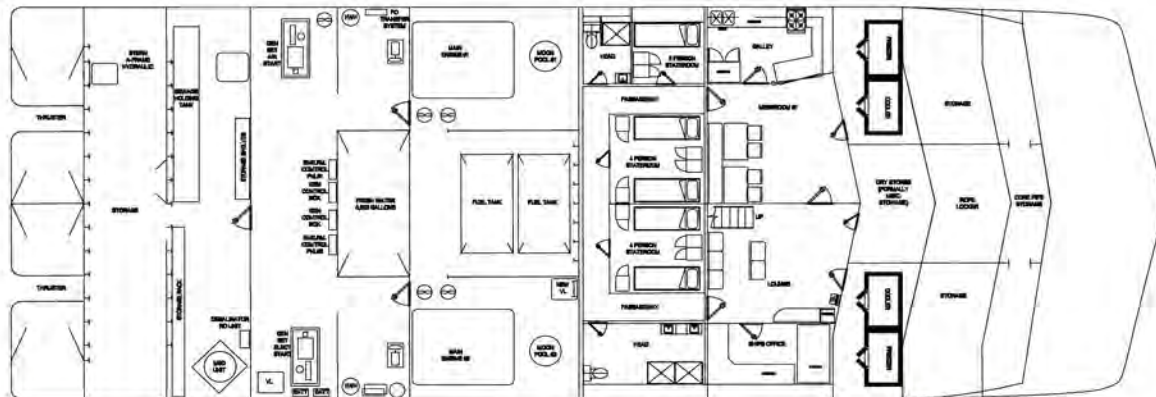


R/V Shearwater

Profile



Main Deck



Below Main Deck



Alpine Ocean Seismic Survey, Inc.
 135 Hudson Avenue, Norwood, New Jersey 07648 USA
 Tel: 1-201-768-8000
 Email: Info@alpineocean.com

www.alpineocean.com

POS MV™

OCEANMASTER SPECIFICATIONS

MAXIMIZE YOUR ROI WITH POS MV OCEANMASTER

POS MV OceanMaster is a user-friendly, turnkey system designed and built to provide accurate attitude, heading, heave, position, and velocity data of your marine vessel and onboard sensors. POS MV is proven in all conditions, and is the georeferencing and motion compensation solution of choice for the hydrographic professional.

POS MV blends GNSS data with angular rate and acceleration data from an IMU and heading from the GPS Azimuth Measurement System (GAMS) to produce a robust and accurate full six degrees-of-freedom position and orientation solution.



PERFORMANCE SUMMARY - POS MV OCEANMASTER ACCURACY¹

	DGPS	Fugro Marinestar®	IARTK	POSPac MMS PPP	POSPac MMS IAPPK	Accuracy During GNSS Outage (60 s total)
Position	0.5 - 2 m ²	Horizontal: 10 cm 95% Vertical: 15 cm 95%	Horizontal: +/- (8 mm + 1 ppm x baseline length) ³ Vertical: +/- (15 mm + 1 ppm x baseline length) ³	Horizontal: < 0.1 m Vertical: < 0.2 m	Horizontal: +/- (8 mm + 1 ppm x baseline length) ³ Vertical: +/- (15 mm + 1 ppm x baseline length) ³	~ 6 m (DGPS) ~ 3 m (RTK) ~ 2 m (PPDGNSS) ~ 1 m (IAPPK)
Roll & Pitch ⁴	0.02°	0.01°	0.01°	<0.01°	0.008°	0.03°
Heading ⁴	0.01° (4 m baseline) 0.02° (2 m baseline)	0.01° (4 m baseline) 0.02° (2 m baseline)	0.01° (4 m baseline) 0.02° (2 m baseline)	0.01° (4 m base- line) 0.02° (2 m base- line)	0.01° (4 m baseline) 0.02° (2 m baseline)	1° per hour degrada- tion (negligible for outages <60 s)
Heave TrueHeave™	5 cm or 5% ⁵ 2 cm or 2% ⁶	5 cm or 5% ⁵ 2 cm or 2% ⁶	5 cm or 5% ⁵ 2 cm or 2% ⁶	-	-	5 cm or 5% ⁵ 2 cm or 2% ⁶

PCS OPTIONS

COMPONENT	DIMENSIONS	WEIGHT	TEMPERATURE	HUMIDITY	POWER
Rack Mount PCS	L = 442mm, W = 356mm, H = 46mm	3.9 kg	-20 °C to +70 °C	10 - 80% RH	AC 120/230 V, 50/60 Hz, auto-switching
Small Form Factor PCS	L = 167mm, W = 185mm, H = 68mm	2.5 kg	-20 °C to +60 °C	0- 100% RH	DC 10-34 V, 35 W (peak)

INERTIAL MEASUREMENT UNIT (IMU)

ENCLOSURE	DIMENSIONS	WEIGHT	TEMPERATURE	IP RATING
Between Decks	L = 158 mm, W = 158 mm, H = 124 mm	2.5 kg	-40 °C to +60 °C	IP65
Submersible	Ø100 mm X 104 mm ⁷ (base plate Ø132 mm)	2.7 kg	-40 °C to +60 °C	IP68

GLOBAL NAVIGATION SATELLITE SYSTEM (GNSS)

COMPONENT	DIMENSIONS	WEIGHT	TEMPERATURE	HUMIDITY
GNSS Antenna	Ø178 mm, W = 73 mm	0.45 kg	-50 °C to +70 °C	0-100% RH

¹ 1 sigma unless otherwise stated

² Depending on quality of differential corrections

³ Assumes 1 m IMU-GNSS antenna offset

⁴ No range limit

⁵ Whichever is greater, for periods of 20 seconds or less

⁶ Whichever is greater, for periods of 35 seconds or less

⁷ Height excludes connector

1. ETHERNET INPUT OUTPUT

Ethernet	(10/100 base-T)
Parameters	Time tag, status, position, attitude, heave, velocity, track and speed, dynamics, performance metrics, raw IMU data, raw GNSS data
Display Port	Low rate (1 Hz) UDP protocol output
Control Port	TCP/IP input for system commands
Primary Port	Real-time (up to 200 Hz) UDP protocol output
Secondary Port	Buffered TCP/IP protocol output for data logging to external device

2. SERIAL RS232 INPUT OUTPUT

5 COM Ports	User assignable to: NMEA output (0-5), Binary output (0-5), Auxiliary GNSS input (0-2), Base GNSS correction input (0-2)
-------------	--

3. NMEA ASCII OUTPUT

Parameters	NMEA Standard ASCII messages: Position (\$INGGA), Heading (\$INHDT), Track and Speed (\$INVTG), Statistics (\$INGST), Attitude (\$PASHR, \$PRDID), Time and Date (\$INZDA, \$UTC)
Rate	Up to 50 Hz (user selectable)
Configuration	Output selections and rate individually configurable on each assigned com port

4. HIGH RATE ATTITUDE OUTPUT

Parameters	User selectable binary messages: attitude, heading, speed
Rate	Up to 200 Hz (user selectable)
Configuration	Output selections and rate individually configurable on each assigned com port

5. AUXILIARY GNSS INPUTS

Parameters	NMEA Standard ASCII messages: \$GPGGA, \$GPGST, \$GPGSA, \$GPGSV Uses Aux input with best quality
Rate	1 Hz

6. BASE GNSS CORRECTION INPUTS

Parameters	RTCM V2.x, RTCM V3.x, CMR and CMR+, CMRx input formats accepted. Combined with raw GNSS observables in navigation solution
Rate	1 Hz

7. DIGITAL I/O

1PPS	1 pulse-per-second Time Sync output, normally high, active low pulse
Event Input (2)	Time mark of external events. TTL pulses > 1 msec width, rising or falling edge, max rate 200 Hz

8. USER SUPPLIED EQUIPMENT

PC for POS Controller and Operator Client Software

- Atom 1.6 GHz or equivalent (minimum)
- Intel Graphics media accelerator 500 or equivalent (minimum)
- 2 GB RAM, 32 GB HDD (minimum)
- Ethernet adapter (RJ45 100 base T), USB Port
- Windows 7

PC for Mission Planning and optional POSpac Post-processing

- Pentium 4 (32 bits) at 2 GHz or equivalent (recommended min)
- 1 GB RAM, 100 GB Free disk space (recommended minimum)
- 2 X USB 2.0 ports for security keys
- Internet Access (for installation, DEM download, optional SmartBase processing)
- Windows 7

Scan the QR Code on your mobile device to access information on POS MV.



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applanix
A TRIMBLE COMPANY

capture everything. precisely.

C-Nav3050[®]

GNSS Receiver



FEATURES

Integrated GNSS/L-Band receiver

Patented multipath rejection

Software configurable to user requirements

C-Nav3050®

Technical Specifications

Features

- » All-in-view parallel tracking with 66-channels
- » Satellite-based augmentation system (SBAS) tracking (WAAS / EGNOS / MSAS / GAGAN)
- » Built-in C-NavC1® and C-NavC2® L-Band receiver
- » C-NavC2® operating mode with automatic fail-safe to C-NavC1®
- » C/A, P1, P2, L2C, L5, G1, and G2 code tracking
- » L1, L2, L5, G1 and G2 full wavelength carrier phase tracking
- » C-Nav corrections over Internet
- » High-sensitivity / low-signal level tracking
- » Fast signal acquisition / re-acquisition
- » Superior interference suppression (both in- and out-of-band) using custom tuned antennas
- » Patented multipath rejection
- » RTK Extend™
- » C-Nav over-the-air activation capabilities
- » Configurable as real time kinematic (RTK) base or rover
- » Programmable output rates
- » Event marker input / 1 pulse-per-second (PPS) output
- » 2GB internal data storage
- » C-Setup PC control software included



■ For more information: oceanengineering.com/cnav

Dimensions/weight	
Length	6.47 in / 164 mm
Width	4.60 in / 117 mm
Height	2.37 in / 60 mm
Weight	1.1 lb / 0.5 kg

Front status indication	
Power/GNSS Status, correction service status, interface status, and Bluetooth status	

External power	
Input	AC / DC Adapter 110 / 220 VAC 12 VDC Nominal 0.5A (9.0 V to 32 VDC)

Connectors	
I/O ports	2 x 9 pin Positronic
DC ports	1 x 9 pin Positronic
RF connector	TNC (with 5VDC bias for antenna / LNA)

Temperature (ambient)	
Operating	-40°F to 158°F / -40°C to 70°C
Humidity	95% non-condensing

Accuracy (RMS) horizontal/vertical	
RTK (<40km)	1 cm + 0.5ppm / 2cm + 1ppm
C-Nav services (95%)	8 cm / 15 cm
Code DGNS (≤200 km)	40 cm + 3 ppm / 90 cm + 3 ppm
Velocity	0.01 ms
RTK extend (<15 mins)	3 cm + 1 ppm / 6 cm + 2 ppm

User programmable output rate	
Position/velocity/time	1, 5, 10, 25, 50, or 100 Hz
Raw data	1, 5, 10, 25, 50, or 100 Hz

Data latency	
Position/velocity/time	10 ms at all rates
Raw data	10 ms at all rates

Time-to-first-fix	
Cold/warm/hot	< 60 s / < 50 s / < 20 s (Typical values measured per ION-STD 101)

I/O connector assignments	
Data interfaces	2 x RS232 (1-changeable to RS422, 4800 - 115200 baud rates) 1 x USB 2.0 (host or device) Bluetooth Ethernet (10T / 100T)

Input/output data messages	
NMEA-0183	ALM, GBS, GGA, GLL, GRS, GSA, GST, GSV, RMC, RRE, VTG, ZDA, GFA, DTM, GNS, MLA
Differential correction	RTCM 2.3 and 3.0, SBAS and C-Nav (proprietary)
RTK connection	CMR / CMR+, RTCM, NavCom Ultra RTK
Receiver control	NavCom proprietary commands (ASCII)

Compliance/Approvals	
IMO performance standard for GPS: IEC 60529	
IMO performance standard for GNSS: IEC 61108-1:2003	
NMEA-0183 compatibility up to V4.1	
FCC Part 15 Class B, CE	
QC message strings comply with the recommendations in OGP 373-19 and IMCA S015 (July 2011)	

MBRTK - Range and Bearing Option	
High-accuracy range and bearing data between vessels	
Multiple rovers can use a common base	
RTK levels of accuracy for range, irrespective of differential correctors	
Converter available to emulate a fanbeam output	
Heading accuracy (degrees at 1 sigma) + 0.6 / baseline length in meters	
Baseline horizontal accuracy + 1 cm + 1 ppm	
MBRTK NMEA-0183 Outputs: HDT, TTM, ROT	



The **Moving Vessel Profiler™ (MVP)** is a multi-purpose instrument for aiding in the collection of both shallow and deep water data sets. The MVP's primary function is to allow accurate data collection **without the need to stop the vessel**.

The system includes a computer-controlled *smart winch and deployment system* that allows the free fall fish to be deployed while the vessel is underway. The system is completely autonomous and can be controlled by computer without the requirement for personnel on deck. This serves the purpose of extending operations by not relying on deck crew after normal working hours and also through the expanded *environmental* operating envelope.

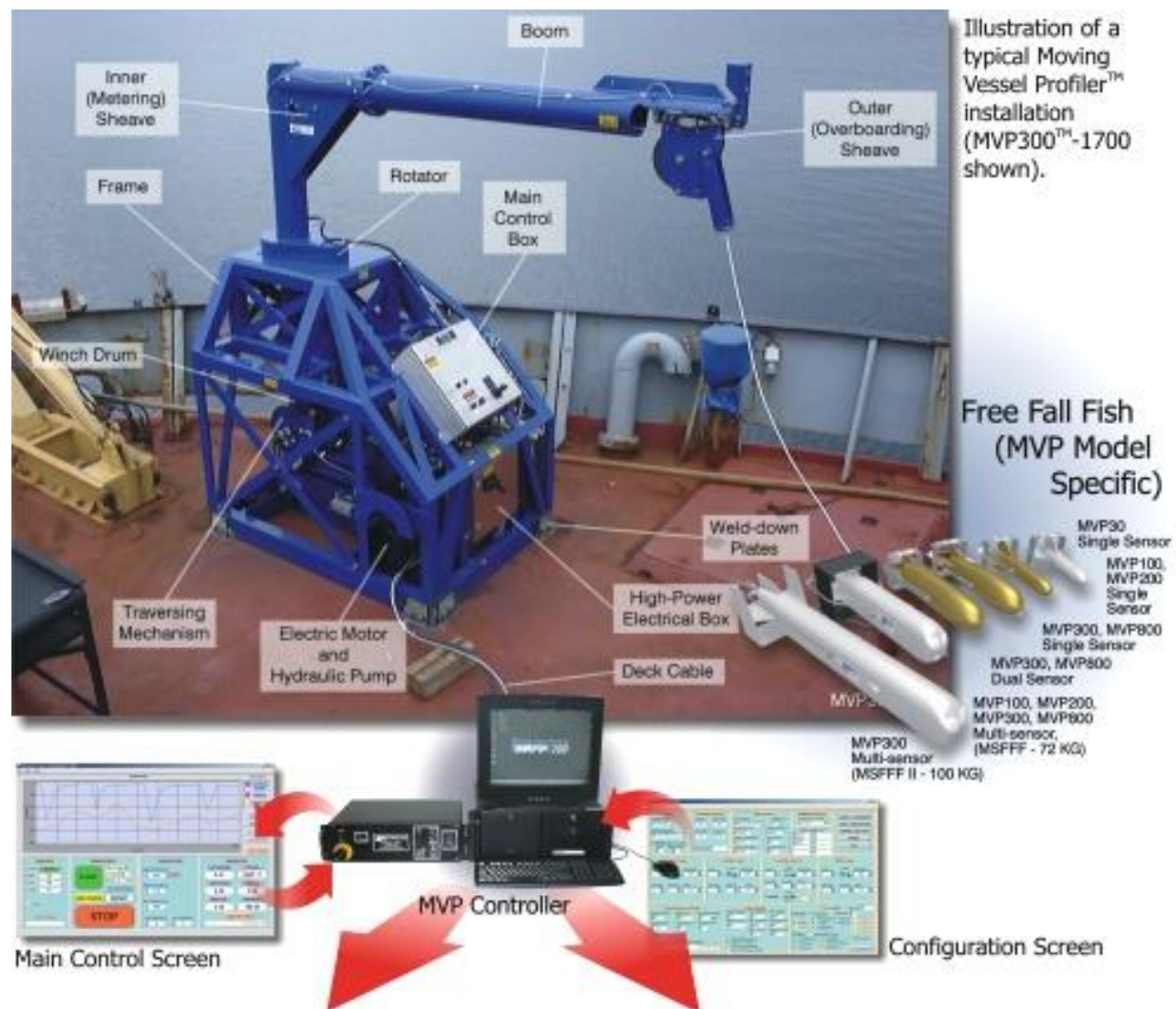
The system was originally adapted to collect Sound Velocity (SV) data for shallow water (100m) hydrographic operations. The data was used to calibrate **multibeam sonar data** for the Canadian Hydrographic Service.

The Free Fall Fish designed for use with the MVP system can carry a variety of sensor packages. Each fish is specifically designed to work with an MVP system to obtain that system's maximum operating depth. The Free Fall Fish come in single- and multi-sensor models. Sensors that have been used with the MVP system to date include Sound Velocity, CTD, [Laser Optical Particle Counter \(LOPC\)](#) and fluorometer. Please note that not all models of free fall fish are compatible with all models of the Moving Vessel Profiler.

There are currently five configurations of the Moving Vessel Profiler in use: the [MVP200™](#), the [MVP300™](#), the smallest system, the [MVP30™](#), the [MVP30-350](#) (a variant of the MVP30) and the [MVP800™](#). Each system is designed to collect data to a certain depth and ship speed. The largest model in the MVP line, the [MVP800™](#), is capable of deploying the sensor-equipped towfish to a depth of

800 metres at a ship speed of 12 knots. [See the chart below for detailed specifications on each of these systems.](#)

The following shows the major components of the MVP system. The computer controls the winch using parameters set by the operator, the depth signals sent back by the free fall fish and (if the vessel is equipped with one) readings sent to the MVP controller by the ship's depth sounder. The data is collected in real time from the fish and recorded by the computer in a format that can be presented graphically. *Click on the various parts of the graphic to view larger images.*



Scout USBL

Subsea Positioning System

ROV and Towfish Installation

Coastal transponders are compact and rugged and can be installed directly onto ROVs or small towfish attached to the umbilical



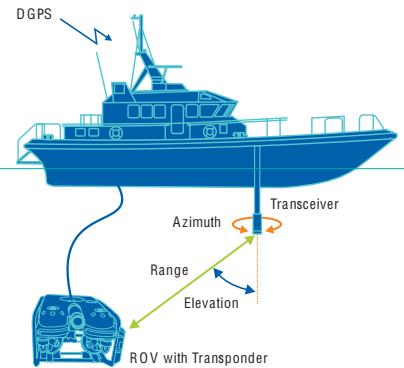
Lightweight Release Transponder

The LRT is a versatile acoustic release transponder with a Safe Working Load (SWL) of 125kg



USBL Positioning

The Scout USBL system calculates the position of a target by measuring the range and bearing of a transponder from the vessel



Introduction

Scout USBL is a complete vessel based subsea positioning system for divers, ROVs and towfish.

Scout calculates the position of a subsea target by measuring the range and bearing from a vessel mounted transceiver to a small acoustic transponder fitted to the target; a technique known as Ultra-Short BaseLine (USBL) positioning. USBL positioning is widely used by the offshore and oceanographic industries as it offers high accuracy performance combined with ease of operation.

One of the main advantages of the technique is that no other in-water acoustic equipment has to be deployed before underwater operations can commence. Only the targets being tracked need to be equipped with a transponder. With Scout, a support boat can arrive on location and begin tracking straight away. This has particular benefits for search and salvage applications when search times are critical.

Key Features

- Easy to install and use
- Affordable and high accuracy
- All sensors, software and hardware provided
- 1,000 metre design slant range
- Upgrade path to deep water USBL systems

Scout, Scout Plus and Scout Pro

Three versions of Scout are available: Scout, Scout Plus and Scout Pro.

Scout and Scout Plus are entry level systems designed for general target tracking applications at ranges up to 500 metres. Scout can track one surface vessel and four subsea targets whilst Scout Plus can track six targets and incorporates a responder mode for fast position updates of ROVs and towfish. With both systems, all sensors and hardware are provided whilst the software is simple to learn and intuitive to use. These features make Scout and Scout Plus the ideal

solution for users with little or no prior experience of acoustic systems.

Scout Pro is designed to support complex construction survey applications through its fully featured software. It provides greater accuracy, tracking for up to 10 subsea targets and a 1,000 metre design slant range.

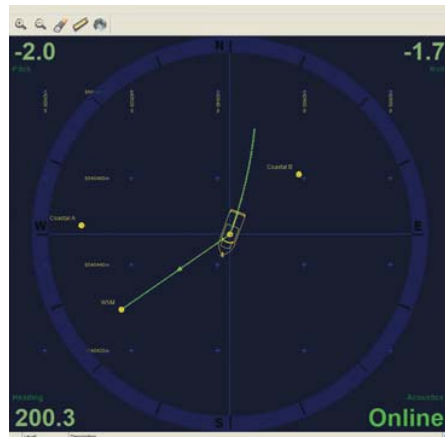
The advanced topside control hardware supplied with Scout Pro systems enables experienced users to operate using Sonardyne's latest Wideband signalling technology and its associated benefits that include greater immunity to noise and a ten fold improvement in measurement repeatability.

This same topside unit can also be used with Sonardyne Ranger USBL, Fusion USBL and Fusion Long BaseLine (LBL) equipment therefore providing a cost effective and versatile upgrade solution for full ocean depth subsea operations.

Scout USBL System Overview

Scout Software Display

Scout's 'Simple' UI software is easy and intuitive to use and requires minimal user training



Scout Transceiver

Scout transceivers are small, easy to deploy and incorporate an internal heading, pitch and roll sensor



Surface Interface Unit

The SIU provides power and communications to the transceiver

Surface Command Unit

The SCU is a self contained PC, display and interface unit for operating Scout and Scout Plus from any type of vessel



Transceiver Deployment

For temporary vessel installations, a dedicated lightweight deployment pole is available from Sonardyne



System Overview

A Scout USBL system is comprised of four main components: control software, vessel based interface unit, acoustic transceiver and transponders.

Software

Scout and Scout Plus software is easy to use and intuitive to operate. It is designed to appeal to users who wish to arrive on location and begin tracking a target immediately.

Scout Pro software shares a common look and feel with Sonardyne's Fusion and Ranger systems and offers users a complete range of survey tools. These include: chart backdrops, industry standard output telegrams and configurable sensor displays.

Interface Unit

As standard, Scout and Scout Plus systems are supplied with a rack-mountable Surface Interface Unit (SIU) that supplies power and communications to the transceiver and is connected to the user's own computer via a serial or USB link.

For complete portability, the optional Surface Command Unit (SCU) enables Scout and Scout Plus to be operated from almost any size of boat. It comprises a PC, high brightness TFT display, sensor interface and rechargeable battery incorporated in an splashproof case.

Scout Pro systems are supplied with a Navigation Controller Unit (NCU). In addition to accurately time stamping incoming data from external devices such as GPS, Gyro and VRU's, the NCU also provides power and communications for the vessel's USBL transceiver.

Transceiver

The Scout transceiver provides a hemispherical pattern of acoustic coverage enabling tracking of targets from far below through to near surface. For this reason, it is suitable for a wide variety of tasks such as towfish tracking.

The compact design of the transceiver makes it easy to install on a simple over-the-side mount or through a gate valve. Sonardyne

can supply an easy-to-assemble pole, complete with fittings and advice on installation, if required. Options include a water block protection device and tilted transducer array.

To simplify set-up, an integrated motion sensor automatically compensates for the dynamic motion of the vessel. For higher accuracy applications, external reference sensors can be used with Scout Plus and Scout Pro.

Transponders

Scout USBL is compatible with the Sonardyne's family of low cost HF frequency transponders. Scout Plus and Scout Pro both offer additional compability with the advanced Wideband Sub-Mini (WSM) transponder.

All transponders have been designed for applications where size and weight are important operational factors, such as installation on the back of a diver or ROV. For more information on transponders, turn to Pages 14 and 15.

Scout USBL

System Specifications

System Performance

General

Design slant Range	500 metres (Scout, Scout Plus) 1,000 metres (Scout Pro)
Acoustic Coverage	±90° below transceiver
Accuracy	±2.75% of Slant Range (With internal Heading and Attitude sensor) ±0.5% of Slant Range (With external VRU and Gyro)
Tracking	Supports tracking of one surface vessel and multiple subsea targets

Transceiver

Type Number	8024
Operating Frequency	Sonardyne HF (35-55kHz)
Sensors	Heading and Attitude
Options	Tilted Array
Deployment Method	Through-hull or Over-the-Side
Mechanical Construction	Aluminium Bronze, Powder Coated
Dimensions – Without Guard (LxDia)	489mm (19.25") x 160mm (6.3")
Weight in Air	18.9kg
Weight in Water	8.9kg

Surface Command Unit (SCU)

Type Number	8039
Processor	Pentium M
Operating System	Windows XP Professional
RAM	512Mb
Hard Disk	40Gb
Ports (Front Panel)	4 x Serial Ports, 1 x USB 2.0
External Inputs	Transceiver, Responder Trigger, GPS Antenna (Optional)
Battery	Internal Li-Ion (UN Transport Approved)
Typical Battery Life	1-2 hours
Power Supply	12-16V DC
Display Panel	12.1" TFT, 1024 x 768
IP Rating	IP65
Dimensions (LxWxH)	444.5mm (17.5") x 305mm (12") x 178mm (7")
Weight	10kg

Surface Interface Unit (SIU)

Type Number	8038
Ports	4 x Serial Ports, 1 x USB 2.0
External Inputs	Transceiver, Power, Responder Trigger
Power Supply	110 / 230V AC
Dimensions (LxWxH)	432mm (17") x 305mm (12") x 51mm (2")
Weight	3kg

Navigation Controller Unit (NCU)

See separate datasheet for full specifications

Datasheet

Wideband Sub-Mini Transponder/Responder (WSM)



Description

Sonardyne's family of Wideband Sub-Minis (WSM) are a versatile range of USBL transponder/responders designed for positioning ROVs, towfish and other mobile targets in water depths up to 4,000 metres.

Compact and rugged, WSMs incorporate the latest Sonardyne Wideband® signal technology which offers superior ranging accuracy, operation in a multi-user, multi-vessel environment and fast USBL position updates.

In addition to supporting new Sonardyne Wideband® signals, WSMs also support traditional Sonardyne tone and HPR 300 and HiPAP® channels. A link allows the WSM to be configured for use with all of the popular MF frequency acoustic navigation systems.

The Type 8071 WSM is equipped with an omni-directional transducer and is depth rated to 1,000 metres making it suitable for a wide range of general USBL tracking application.

The Type 8070 WSM is a 4,000 metre rated unit and features a high-power directional transducer with an acoustic output comparable to Sonardyne's most powerful full size seabed transponders.

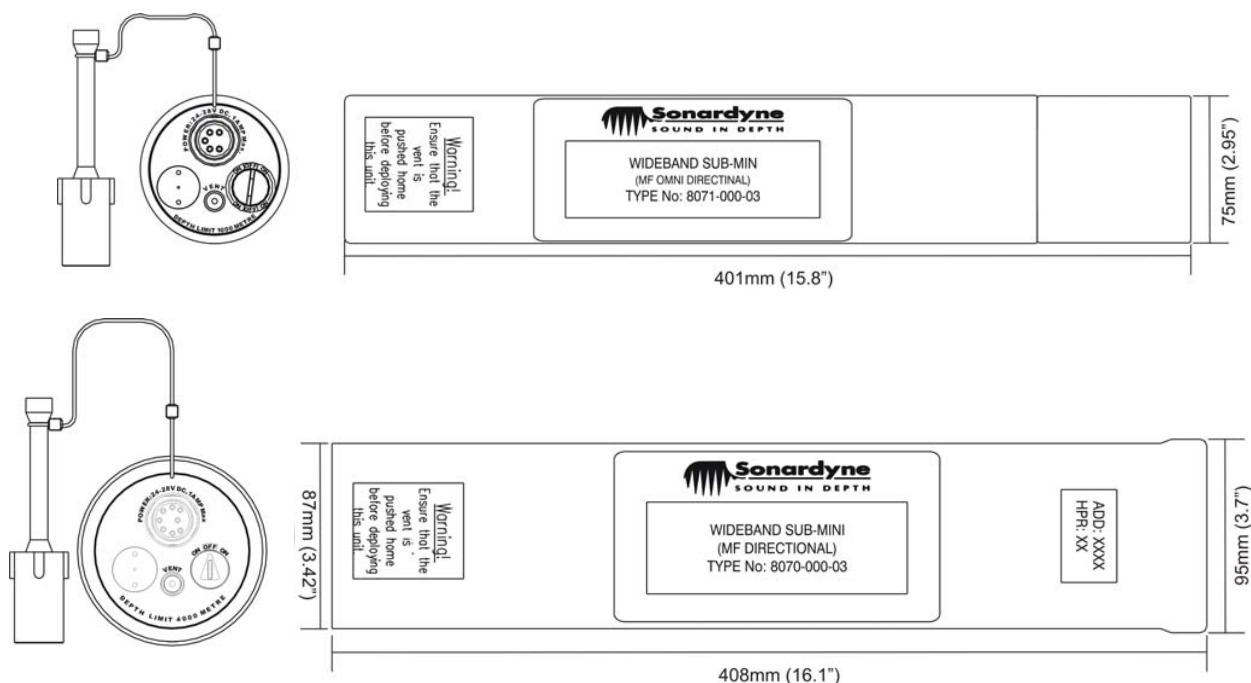
Both types of WSM have a depth sensor fitted as standard to aid USBL positioning accuracy and an external On/Off switch for ease of use and storage when not in use.

Key Features

- Choice of 1,000 Metre or 4,000 Metre depth rating
- Choice of Omni-Directional or Directional beamshape with class leading acoustic power output
- Channel selection via serial data port by PC
- Transponder or Responder operating modes
- Depth sensor for improved USBL positioning performance
- Long-life NiMH battery
- Compact and rugged design
- Windows based software for test and setup
- External On/Off switch for ease of use and storage

Specifications

Wideband Sub-Mini Transponder/Responder (WSM)



Feature	Type 8071	Type 8070
Depth Rating	1,000 Metres	4,000 Metres
Operating Frequency	MF (19-36kHz)	MF (19-36kHz)
Operating Channels	All Sonardyne Wideband/Tone HPR 300 & 400 Channels	All Sonardyne Wideband/Tone HPR 300 & 400 Channels
Transducer Beamshape	Omni-Directional	Directional
Transmit Source Level (dB re 1µPa @ 1m)(26-32kHz)	(External Power) 190dB (Battery – High Power) 188dB (Battery – Low Power) 185dB	202dB 199dB 196dB
Receive Sensitivity (dB re 1µPa)	High Gain <100dB Low Gain <110dB	<100dB <110dB
Power Supply	Long-Life Ni MH battery or ext. 24V via ROV's umbilical	Long-Life Ni MH battery or ext. 24V via ROV's umbilical
Number of Replies (Responder)	Unlimited with External Power	Unlimited with External Power
Depth Sensor	Standard	Standard
Maximum Update Period	750ms	750ms
Quiescent Life	60 Days	60 Days
Mating Connector	Subconn MCIL5F	Subconn MCIL5F
Mechanical Construction	Aluminium Alloy, Anodised	Aluminium Alloy, Anodised
Dimensions (LxDia)	401mm (15.8\") x 75mm (2.95\")	408mm (16.1\") x 95mm (3.7\")
Weight in Air	2.7kg	5.0kg
Weight in Water	1.4kg	2.6kg
Battery Charger	7972-000-04	7972-000-04

SBE 19plus V2 SeaCAT Profiler CTD

The SBE 19plus V2 SeaCAT measures conductivity, temperature, and pressure at 4 scans/sec (4 Hz) and provides high accuracy and resolution, reliability, and ease-of-use for a wide range of research, monitoring, and engineering applications. Pump-controlled, T-C ducted flow minimizes salinity spiking caused by ship heave and allows for slow descent rates without slowing sensor responses, improving dynamic accuracy and resolving small scale structure in the water column. The 19plus V2 supports numerous auxiliary sensors (dissolved oxygen, pH, turbidity, fluorescence, oil, PAR, nitrates, altimeter, etc.) with six A/D channels and one RS-232 data channel. Data is recorded in memory and can also be output in real-time in engineering units or raw HEX. Nine alkaline D-cells provide power for up to 60 hours of profiling.

The 19plus V2 is commonly used autonomously, recording data internally. It can also provide real-time acquisition and display over short cables via the RS-232 interface; a load-bearing cable for hand-hauled, real-time profiling is available. External power and communication over 10,000 m of single-core, armored cable can be provided with the SBE 36 Deck Unit and PDIM. The 19plus V2 is easily integrated with a Sea-Bird Water Sampler; both real-time and autonomous auto-fire operations are possible.

In moored mode, the 19plus V2 records data at user-programmable intervals. This is easily configured with setup commands and by removing the profiling T-C Duct and installing optional anti-foulant devices.



Shown with optional cage,
SBE 5P pump, &
SBE 43 DO sensor

Features

- Conductivity, Temperature, Pressure, and up to seven auxiliary sensors.
- User-programmable mode: profiling at 4 Hz, or moored sampling at user-programmable intervals.
- RS-232 interface, internal memory, and internal alkaline batteries (can be powered externally).
- Pump-controlled, T-C ducted flow to minimize salinity spiking.
- Depths to 600, 7000, or 10,500 m.
- Seasoft® V2 Windows software package (setup, data upload, real-time data acquisition, and data processing).
- Next generation of the SeaCAT family, field-proven since 1987.
- Five-year limited warranty.

Components

- Unique internal-field conductivity cell permits use of T-C Duct, minimizing salinity spiking.
- Aged and pressure-protected thermistor has a long history of exceptional accuracy and stability.
- Pressure sensor with temperature compensation is available in eight strain-gauge ranges (to 7000 m) and eleven Digiquartz® ranges (to 10,500 m). *Note: Sampling rate 2 Hz when Digiquartz installed.*
- Pump runs continuously (profiling mode), providing correlation of CTD and plumbed auxiliary sensor measurements.

Options

- Plastic (600 m) or titanium (7000 or 10,500 m) housing; XSG/AG or wet-pluggable MCBH connectors.
- SBE 5M pump for pumped conductivity; or SBE 5P or 5T pump for pumped conductivity and auxiliary sensor(s).
- Sea-Bird Scientific auxiliary sensors — dissolved oxygen, pH, fluorescence, oil, radiance (PAR), light transmission, turbidity, nitrates (profiling only), etc.
- Auxiliary sensors from other manufacturers.
- Stainless steel protection cage.
- Rechargeable Nickel Metal Hydride (NiMH) batteries and charger.
- Moored mode conversion kit with anti-foulant device fittings.
- Load-bearing underwater cable for hand-hauled, real-time profiling.
- SBE 36 CTD Deck Unit & PDIM or SBE 33 Deck Unit & Sea-Bird water sampler (real-time operation on single-core armored cable to 10,000 m).
- Plastic shipping case.

Measurement Range

Conductivity	0 to 9 S/m
Temperature	-5 to +35 °C
Pressure	Strain-gauge 0 to 20/100/350/600/1000/2000/3500/7000 m; Quartz 20/60/130/200/270/680/1400/2000/4200/7000/10,500 m

Initial Accuracy

Conductivity	± 0.0005 S/m
Temperature	± 0.005 °C
Pressure	Strain-gauge ± 0.1% of full scale range; Quartz ± 0.02% of full scale range

Typical Stability

Conductivity	0.0003 S/m per month
Temperature	0.0002 °C per month
Pressure	Strain-gauge ± 0.1% of full scale range per year; Quartz ± 0.02% of full scale range per year

Resolution

Conductivity	0.00005 S/m typical
Temperature	0.0001 °C
Pressure	Strain-gauge 0.002% of full scale range; Quartz 0.0025% of full scale range

Sampling Speed

Memory & Data Storage

Power Supply & Consumption

Optional External Power

Auxiliary Sensors

Housing, Depth Rating, & Weight

(add 0.3 to 0.7 kg [in air] for pump, depending on model)

Optional Cage (weight in air)

Profiling: 4 Hz (strain-gauge pressure) or 2 Hz (Quartz pressure)

64 Mbyte non-volatile FLASH
Bytes/sample: 6 T&C; 5 pressure; 2 each external voltage;
4 date & time (RS-232 sensor is sensor dependent)

9 alkaline D-cell batteries, 60 hours CTD profiling (see manual)

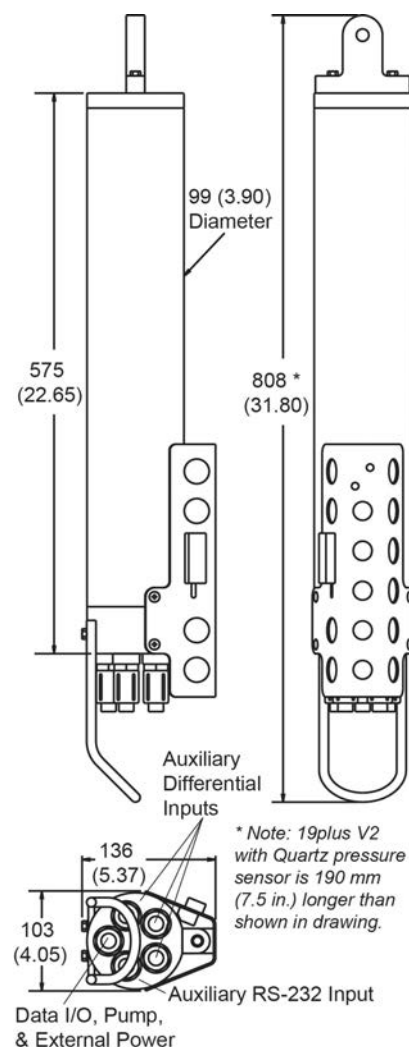
9 - 28 VDC; consult factory for required current

Power out up to 500 mA at 10.5 - 11 VDC;
Voltage sensor A/D resolution 14 bits & input range 0-5 VDC

Acetal Copolymer Plastic, 600 m, in air 7.3 kg, in water 2.3 kg
3AL-2.5V Titanium, 7000 m, in air 13.7 kg, in water 8.6 kg
6AL-4V Titanium, 10,500 m

(strain-gauge pressure version) 1016 x 241 x 279 mm, 6.3 kg

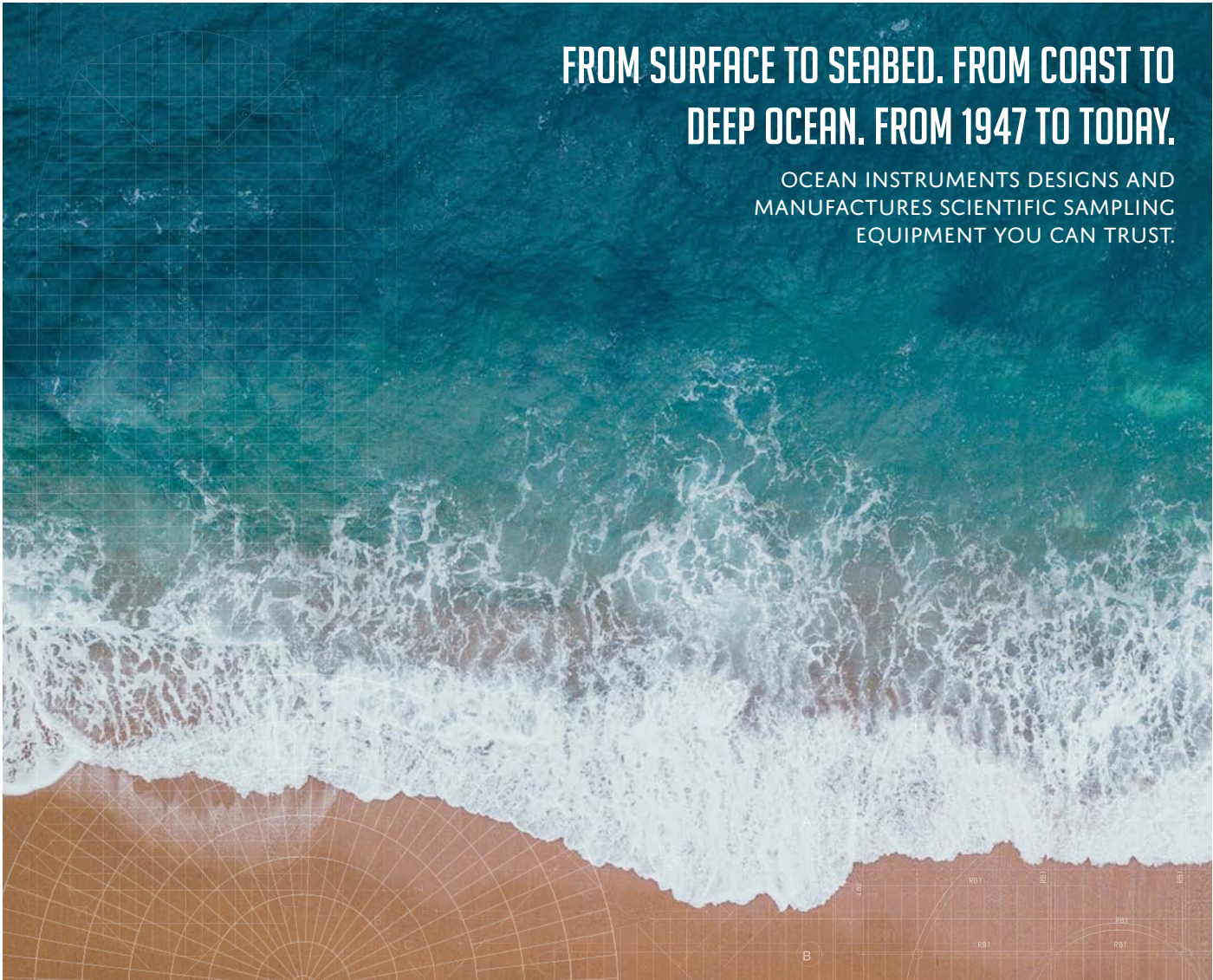
Dimensions in
millimeters (inches)



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FROM SURFACE TO SEABED. FROM COAST TO
DEEP OCEAN. FROM 1947 TO TODAY.

OCEAN INSTRUMENTS DESIGNS AND
MANUFACTURES SCIENTIFIC SAMPLING
EQUIPMENT YOU CAN TRUST.

GRAB SAMPLERS ARE THE INDUSTRY STANDARD TOOL FOR THE COLLECTION OF SURFACE SEDIMENT SAMPLES. GRAB SAMPLERS ARE IDEAL FOR USE ON SEAFLOORS IN HARD OR MIXED SUBSTRATES. THE VAN VEEN GRAB SAMPLER IS A CLAMSHELL STYLE GRAB DESIGNED TO SAMPLE SEDIMENT IN WATER

ENVIRONMENTS. THE SAMPLER WAS INVENTED BY JOHAN VAN VEEN (A DUTCH ENGINEER) IN 1933. THE USE OF THE VAN VEEN'S GRAB IS VERY SIMPLE WHICH HAS MADE IT INDUSTRY STANDARD FOR SURFACE SEDIMENT SAMPLING.

GRAB SAMPLERS

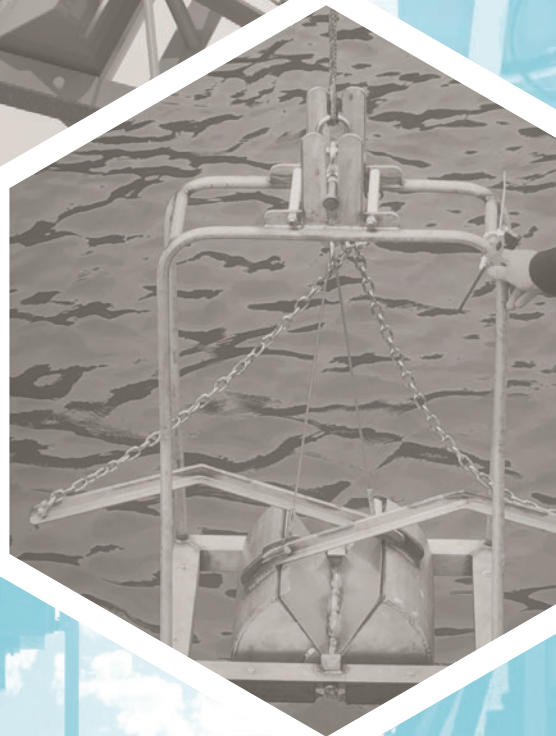
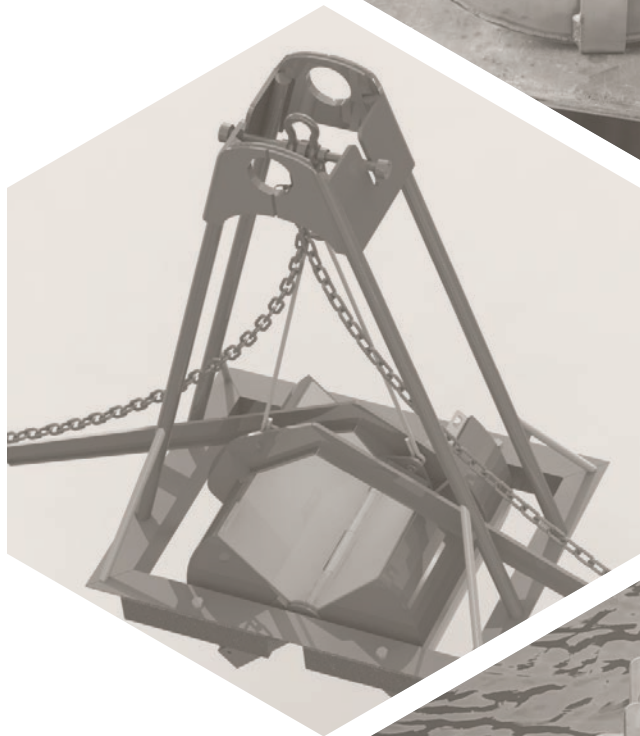
THE SALISH GRAB IS A MODIFIED VERSION OF THE STANDARD VAN VEEN WITH WEIGHTED FRAME AND RELEASE SYSTEM IDEAL FOR COLLECTION OF SEDIMENTS IN SOFT TO HARD SUBSTRATES. THIS DESIGN WAS OPTIMIZED FOR THE CHALLENGING CONDITIONS OF THE SALISH SEAS WHERE BOTTOM SUBSTRATES ARE OFTEN A COMBINATION OF CLAYS AND ROCK MIXED WITH SILTS AND SANDS. THE STANDARD MODEL IS IDEAL FOR CHEMISTRY SAMPLING WITH A PENETRATION DEPTH TO 20 CM AND AMPLE VOLUME FOR MOST SEDIMENT TESTING PROGRAMS.

SPECIFICATIONS

BUCKET DEPTH: 20 CM PENETRATION

MATERIAL: 316 STAINLESS STEEL
WITH LEAD BLOCKS

SAMPLING AREA: 0.10 M²



GRAB SAMPLERS



Top Features

20MP	4K60 5K30	33ft (10m)
------	--------------	------------

CAMERAS ACCESSORIES LIFESTYLE GEAR LIGHTING

Overview **Tech Specs** Reviews

Scheduled Capture Superphoto + HDR RAW

Specifications

Camera Features

Key Features

Built-In Mounting with Folding Fingers | HERO9 Black Mods Compatibility

Audio Features

3.5mm Audio Mic Input with Media Mod for HERO9 Black or Pro 3.5 Mic Adapter (Sold Separately) | RAW Audio Capture (.wav Format)

Connected Features

Wi-Fi + Bluetooth® | GPS Enabled | Connects to GoPro App | Auto Offload to Phone

Camera Modes + Settings

Photo

20MP

Video

Video 5K30 + 4K60, Wide FOV

HERO9 Black

Buy

Buckle | USB-C Cable | Thumb Screw | Camera Case

Compatibility

Compatible with Over 30 Accessories

Camera Accessories

Shop Now

A GoPro HERO9 Black camera is shown mounted on a black tripod. To the right of the camera, there is a GoPro battery, a GoPro USB-C cable, and a GoPro SD card. The background is a solid blue color.A GoPro lighting accessory is shown. It consists of a black rectangular light unit with a grid of small white LEDs, mounted on a black GoPro mount. The background is a solid purple color.

Lighting

Shop Now



TOWED CAMERA TS-500 | IMAGING SYSTEMS

FROM SURFACE TO SEABED. FROM COAST TO
DEEP OCEAN. FROM 1947 TO TODAY.

OCEAN INSTRUMENTS DESIGNS AND
MANUFACTURES SCIENTIFIC SAMPLING
EQUIPMENT YOU CAN TRUST.



TS-500 TETHERED TOW SLED

Hydrodynamic Imaging Tow Sled for up to 200-meter applications. Designed for benthic habitat mapping and sediment bed mapping. System comes standard with Machine Series DSLR cameras for wide swath imaging, laser scales, LED lights, Motion Reference system and Altimeter. Optional accessories include sonar and CTD systems for seabed mapping. Can come optional with thrusters and neutrally buoyant setup with depressor wing.

Featured in the OI Tether system series is live top-side view, telemetry and overlay of meta-data on imagery for critical analysis of seabed images. DSLR still images are captured in in optical flat plane for accurate sizing with the aid of scale lasers

SPECIFICATIONS

Size	4ft long, 2ft wide
Weight	45 kg-80 kg
Data Integrity	RAID HDD
Lights	1000 lumens (2 total)
Depth	200 meters
Camera Quality	12mp
Video Quality	4K
Time Lapse Camera	8K GP at 14mp
Positioning	Integrated USBL compatible
Swath Width	2 meters
Altimeter	Tritech Micron
MRU	Ixblue Fins compatible
Auxiliary Camera -	GoPro8

MISSIONS

- Benthic Habitat mapping
- Seabed Mapping
- Hazard Assessment
- Artefact Surveys
- Pipeline Surveys

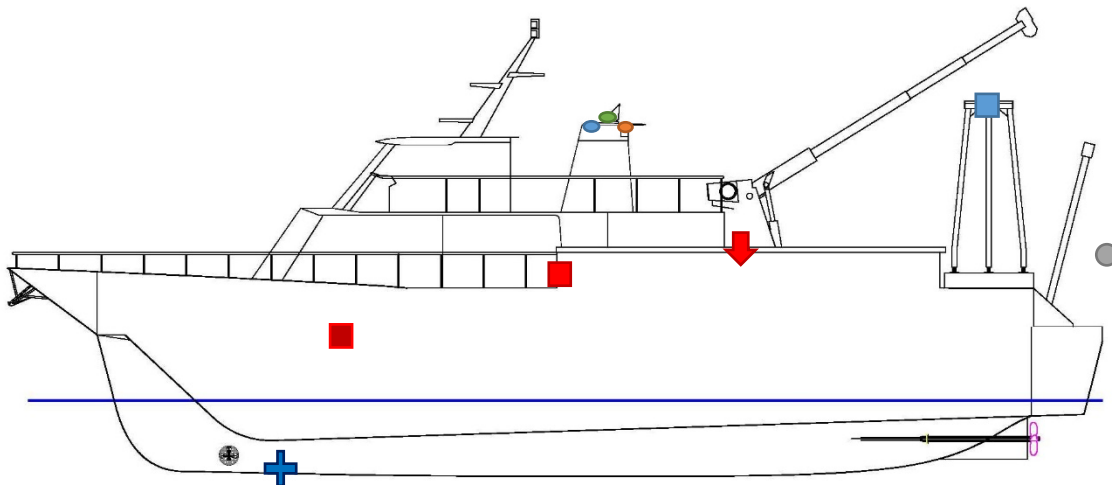
DEPLOYMENT

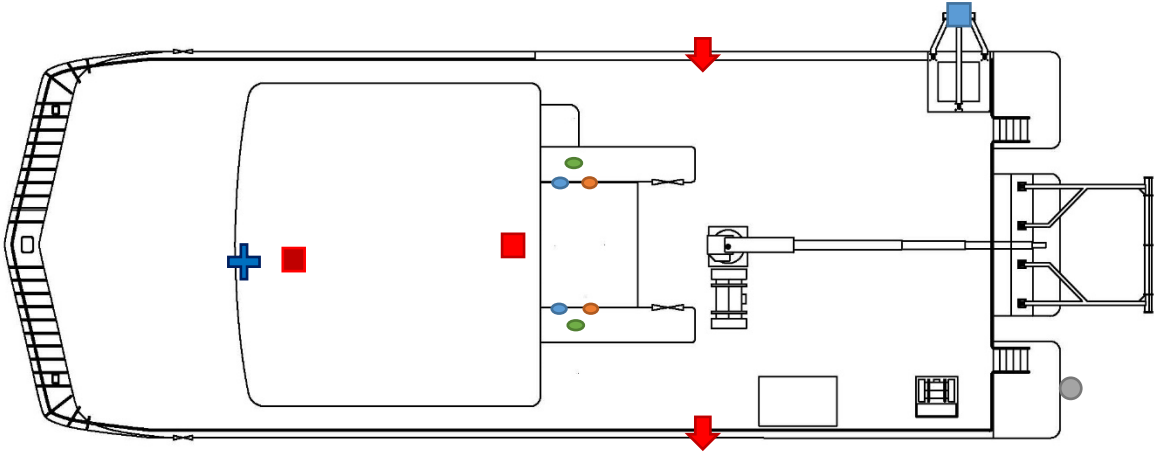
- Tethered cable
- 0.5 to 2.5 knots Speed
- Survey Height – 1-3 meters off seabed
- Control real-time from cabin
- Optional Flotation package
- Optional Acoustic Safety Release
- Optional Daughter Sled – low flight



APPENDIX C VESSEL OFFSET DIAGRAM

VESSEL : R/V Shearwater						
OFFSET from IMU	☒ Meter	☐ Feet	+ forward/ - backward	+ right/ - left	+ up/ - down	Notes
POS 1 Primary GPS Antenna		●	-0.729	-1.661	5.246	Phase center
POS 1 Secondary GPS Antenna		●	-0.691	1.744	5.251	Phase center
IMU 1 (Inertial Measurement Unit)		■	0.000	0.000	0.115	
CNAV 1		●	-0.513	-1.277	4.966	Phase center
POS 2 Primary GPS Antenna		●	1.263	-1.277	5.081	Phase center
POS 2 Secondary GPS Antenna		●	-1.246	1.331	5.077	Phase center
IMU 2 (Inertial Measurement Unit)		■	2.639	-0.642	-3.771	
CNAV 2		●	-0.513	1.331	5.077	Phase center
MBES		+	2.665	-0.620	-6.032	Phase center
Port Measure Down		↓	-4.164	-5.874	-0.217	
Starboard Measure Down		↓	-4.109	5.864	0.987	
MVP Towpoint		●	-16.271	-4.419	0.831	
Camera Towpoint / Water Profiler Drop Point		■	6.946	-12.634	5.806	STBD A-Frame



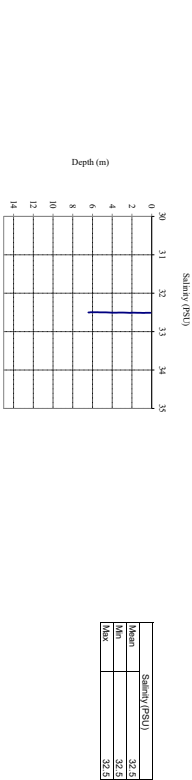
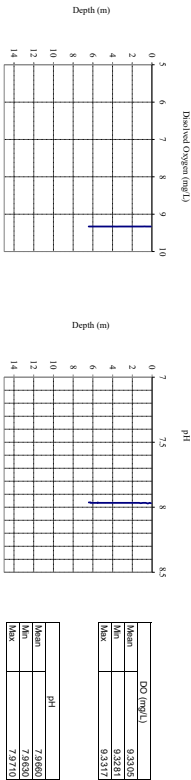
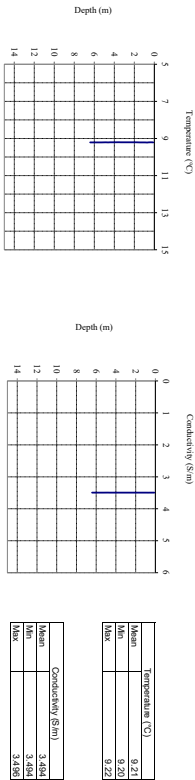


APPENDIX D WATER QUALITY PROFILES

Depth (m)	Temperature (°C)		Salinity (PSU)	DO (mg/L)	pH
	15°C	20°C			
0.25	9.297	3.466(3)	32.208	9.33(5)	7.86
0.45	9.262	3.452(4)	32.208	9.33(5)	7.87
0.60	9.277	3.466(7)	32.170	9.325(7)	7.87
0.70	9.298	3.469(7)	32.51	9.326(5)	7.86
0.825	9.259	3.465(5)	32.516	9.326(6)	7.86
0.95	9.263	3.465(5)	32.516	9.326(6)	7.86
1.10	9.263	3.465(5)	32.516	9.326(6)	7.86
1.30	9.212	3.460(8)	32.516	9.326(6)	7.86
1.48	9.202	3.447(2)	32.516	9.317(7)	7.86
1.70	9.261	3.464(8)	32.506	9.331(7)	7.86
1.90	9.267	3.441(7)	32.670	9.331(8)	7.86
2.10	9.268	3.456(8)	32.670	9.331(8)	7.86
2.30	9.268	3.441(4)	32.670	9.331(8)	7.86
2.55	9.249	3.456(8)	32.515	9.334(4)	7.86
2.80	9.261	3.464(8)	32.515	9.334(4)	7.86
3.00	9.264	3.463(2)	32.504	9.316	7.86
3.170	9.244	3.467(3)	32.504	9.316	7.86
3.340	9.244	3.467(3)	32.504	9.316	7.86
3.46	9.243	3.468(2)	32.505	9.3174	7.86
3.68	9.267	3.468(2)	32.505	9.3174	7.86
4.08	9.205	3.460(1)	32.504	9.316	7.86
4.63	9.205	3.463(9)	32.504	9.316	7.86
5.07	9.205	3.463(9)	32.504	9.316	7.86
5.270	9.205	3.463(9)	32.504	9.316	7.86
5.46	9.251	3.468(8)	32.444	9.33(5)	7.86
5.67	9.251	3.468(8)	32.444	9.33(5)	7.86
5.75	9.252	3.467(4)	32.444	9.33(5)	7.86
5.93	9.219	3.466(3)	32.444	9.33(5)	7.86
6.08	9.219	3.466(3)	32.444	9.33(5)	7.86
6.22	9.214	3.466(8)	32.444	9.33(5)	7.86
6.36	9.202	3.460(7)	32.498	9.33(5)	7.86
6.47	9.202	3.460(7)	32.498	9.33(5)	7.86

1894 Equinor Water Quality

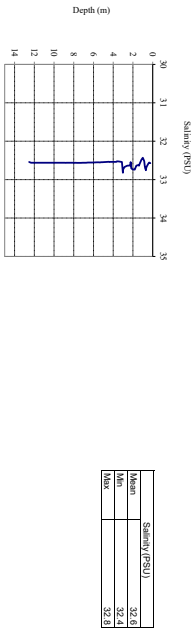
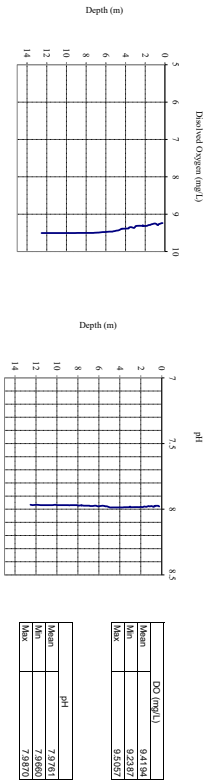
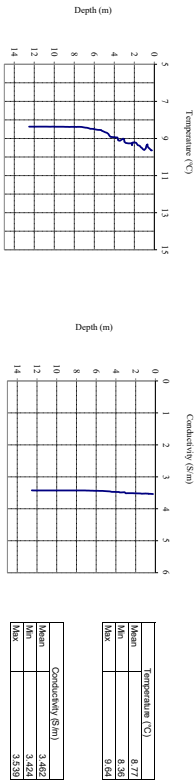
Location:	Barnett Landing	Coordinates
Date/Time:	May 03 2021 15:31:28 UTC	
Station:	EQ21526-EW201-A1	
		NAD83 (2011) UTM Zone 18 North (m)
		X: 616928.48 Lat: 40.3434473N
		Y: 4482934.47 Lon: 073.3706674W



[illegible]

1894 Equinor Water Quality

Location:	Barnett Landing	Coordinates
Date/Time:	May 03 2011 14:33:07 UTC	NAD83 (2011) UTM Zone 18 North (m)
Station:	EC21526-EW242-A2	X: 617008.81 Lat: 40:33:06.735N



Salinity (PSU)	
Mean	32.6
Min	32.4
Max	32.8

pH	
Mean	7.9761
Min	7.9660
Max	7.9870

DO (mg/L)	
Mean	9.4194
Min	9.2387
Max	9.5057

Conductivity (S/m)	
Mean	3.462
Min	3.424
Max	3.539

1894 Equino Water Quality

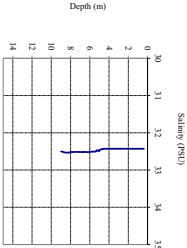
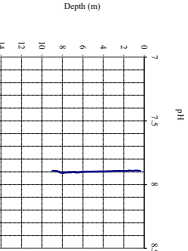
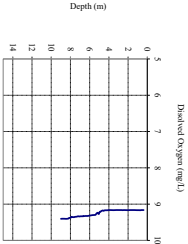
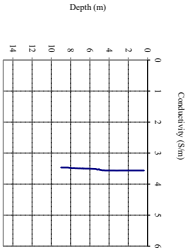
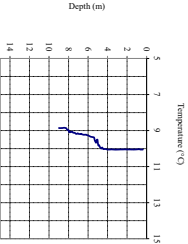
Location: Bayou Landry
Date, Time: May 03 2021 12:18:48 UTC
Station: EQZ1028-EV2-03-A1
Coordinates: NAD83 (2011) UTM Zone 18 North (m)
X: 613832.75
Y: 4492424.17
Lat: 07°39'18.3460N
Long: 073°39'18.3460W

Temperature (°C)	
Mean	9.34
Min	7.89
Max	10.06

Conductivity (S/m)	
Mean	3.550
Min	3.463
Max	3.595

DO (mg/L)	
Mean	9.343
Min	9.1032
Max	9.4048

pH	
Mean	7.8684
Min	7.8905
Max	7.9100



Salinity (PSU)	
Mean	32.4
Min	32.4
Max	32.4

Depth (m)	Temperature (°C)	Conductivity (S/m)	Salinity (PSU)	DO (mg/L)	pH
0.043	10.0520	3.561344	32.4243	9.18386	7.899
0.043	10.0547	3.561352	32.4275	9.18355	7.899
0.085	10.0431	3.560286	32.4272	9.16589	7.899
0.751	10.0308	3.559541	32.4307	9.16814	7.899
0.808	10.0365	3.559519	32.4293	9.16709	7.899
0.849	10.0404	3.560009	32.4305	9.16744	7.899
1.086	10.0462	3.560709	32.4315	9.1652	7.893
1.349	10.051	3.561133	32.433	9.16425	7.899
1.516	10.0507	3.561103	32.4333	9.16431	7.899
1.573	10.0529	3.561306	32.4333	9.16387	7.899
1.704	10.0555	3.561107	32.433	9.16344	7.893
1.945	10.0548	3.560683	32.432	9.163	7.893
2.111	10.0457	3.5607	32.4324	9.16351	7.893
2.188	10.0448	3.560539	32.4324	9.16348	7.893
2.296	10.046	3.560937	32.4318	9.16342	7.893
2.657	10.047	3.560651	32.4324	9.16503	7.893
2.905	10.0549	3.561579	32.4337	9.16344	7.893
3.182	10.0585	3.561806	32.4329	9.16277	7.895
3.335	10.0628	3.56205	32.4324	9.16504	7.895
3.535	10.0626	3.562026	32.4324	9.16504	7.895
3.825	10.0534	3.561501	32.4331	9.16373	7.897
4.028	10.0517	3.561301	32.4333	9.16412	7.897
4.133	10.0526	3.56102	32.4323	9.16365	7.897
4.277	10.0507	3.560634	32.4319	9.16347	7.897
4.377	10.0578	3.560954	32.432	9.16389	7.897
4.449	10.0172	3.558332	32.429	9.17096	7.897
4.483	9.9818	3.560583	32.4288	9.17055	7.898
4.489	9.9535	3.552283	32.4374	9.16853	7.898
4.61	9.9848	3.566538	32.4387	9.17527	7.898
4.674	9.9818	3.555259	32.4387	9.17594	7.898
4.773	9.9529	3.551542	32.44	9.16861	7.898
4.843	9.9528	3.544223	32.4354	9.2027	7.898
4.889	9.7128	3.53447	32.4603	9.2041	7.899
5.004	9.5008	3.519152	32.4852	9.27136	7.899
5.088	9.6023	3.519515	32.4875	9.2729	7.899
5.131	9.5954	3.521215	32.4875	9.2735	7.899
5.289	9.5903	3.522146	32.4719	9.29083	7.899
5.307	9.4644	3.511578	32.5048	9.29049	7.899
5.405	9.3731	3.505738	32.5104	9.29896	7.899
5.72	9.343	3.500089	32.5104	9.30314	7.899
6.15	9.3447	3.488709	32.5171	9.32256	7.9
6.177	9.2258	3.487428	32.5211	9.32622	7.902
6.468	9.2329	3.487517	32.5163	9.32608	7.905
6.648	9.2523	3.484801	32.5162	9.33135	7.905
6.703	9.2502	3.484855	32.516	9.3318	7.905
6.868	9.1903	3.483808	32.5167	9.3385	7.902
6.968	9.164	3.483312	32.5163	9.33513	7.902
7.002	9.1718	3.482529	32.5141	9.3377	7.902
7.03	9.1503	3.480035	32.5136	9.34225	7.902
7.093	9.1575	3.480041	32.516	9.34064	7.902
7.146	9.1629	3.483158	32.5167	9.3354	7.905
7.23	9.164	3.482999	32.513	9.3353	7.905
7.31	9.1623	3.482538	32.5151	9.3347	7.905
7.367	9.1238	3.487111	32.5141	9.3477	7.905
7.412	9.1212	3.487589	32.5142	9.34824	7.905
7.435	9.1207	3.487515	32.5159	9.34836	7.905
7.47	9.1205	3.487462	32.5154	9.34842	7.905
7.53	9.1205	3.487462	32.5154	9.34847	7.905
7.64	9.0536	3.481636	32.5142	9.36227	7.905
7.761	9.07786	3.484258	32.5183	9.3568	7.905
7.863	9.0964	3.485292	32.5179	9.3546	7.91
7.883	9.0544	3.48502	32.516	9.36428	7.905
7.944	9.0641	3.485531	32.517	9.3647	7.905
8.023	8.9573	3.47448	32.5322	9.38122	7.908
8.125	8.9729	3.474881	32.519	9.37885	7.908
8.175	8.9281	3.471898	32.5286	9.38753	7.906
8.216	8.89743	3.46777	32.5339	9.39844	7.906
8.299	8.8723	3.465733	32.533	9.3973	7.906
8.345	8.86591	3.465091	32.5328	9.4045	7.909
8.462	8.8441	3.464681	32.5324	9.40484	7.906
8.463	8.8453	3.465283	32.532	9.40405	7.904
8.68	8.8654	3.466543	32.5259	9.40982	7.904
8.74	8.8653	3.466543	32.5259	9.40982	7.904
8.879	8.8655	3.464334	32.5055	9.4018	7.892
8.985	8.8575	3.463345	32.5028	9.40384	7.892

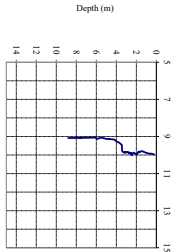
Depth (m)	Temperature	Conductivity	Salinity (PSU)	DO (mg/L)	pH
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0.308	9.5954	3.55542	32.4301	9.18428	7.54
0.508	9.5951	3.55549	32.4327	9.189	7.54
0.772	9.5926	3.555072	32.4327	9.1899	7.54
1.107	9.5818	3.545326	32.431	9.20161	7.545
1.448	9.5697	3.540555	32.4332	9.2154	7.545
1.728	9.5555	3.535326	32.4347	9.23114	7.54
1.783	9.5113	3.541928	32.4448	9.21045	7.54
1.908	9.5795	3.554609	32.4262	9.17897	7.544
2.278	9.5707	3.54664	32.4428	9.18353	7.545
2.37	9.5732	3.54702	32.443	9.18353	7.54
2.5	9.5821	3.547082	32.4438	9.18378	7.544
2.529	9.5918	3.550255	32.4338	9.18379	7.544
2.639	9.5739	3.546564	32.4391	9.19911	7.545
2.719	9.5662	3.546073	32.4411	9.20055	7.54
2.779	9.5718	3.546728	32.4432	9.19889	7.54
2.84	9.5739	3.54702	32.4433	9.20541	7.545
2.861	9.584	3.548868	32.4433	9.20541	7.545
2.955	9.5331	3.54339	32.4455	9.20584	7.54
3.051	9.5558	3.545522	32.4448	9.205242	7.54
3.082	9.5749	3.54657	32.4382	9.19689	7.54
3.128	9.5623	3.54572	32.4438	9.20527	7.545
3.138	9.5633	3.545333	32.4443	9.20527	7.545
3.167	9.5835	3.547019	32.4438	9.19742	7.54
3.295	9.586	3.544949	32.4386	9.20274	7.543
3.369	9.5226	3.541797	32.4365	9.20599	7.543
3.423	9.5718	3.539007	32.4338	9.21881	7.545
3.438	9.5739	3.540555	32.4338	9.21881	7.545
3.478	9.5327	3.535046	32.4385	9.20559	7.537
3.728	9.5327	3.535046	32.4385	9.20559	7.537
3.992	9.5338	3.499464	32.4294	9.31913	7.537
4.149	9.2024	3.46948	32.5128	9.33152	7.535
4.167	9.1814	3.469222	32.5128	9.33152	7.535
4.276	9.183	3.469227	32.5128	9.33152	7.535
4.278	9.183	3.469227	32.5128	9.33152	7.535
4.35	9.1416	3.469313	32.5156	9.34391	7.533
4.691	9.1416	3.469313	32.5156	9.34391	7.533
4.7	9.137	3.46899	32.5111	9.34479	7.528
4.944	9.1388	3.468737	32.5111	9.34479	7.528
5.202	9.0973	3.468748	32.5197	9.35513	7.531
5.202	9.0973	3.468748	32.5197	9.35513	7.531
5.32	9.0964	3.46843	32.5204	9.35881	7.531
5.504	9.0965	3.468751	32.5179	9.3534	7.531
5.859	9.1182	3.468729	32.5087	9.34819	7.528
5.942	9.1445	3.468501	32.5113	9.3436	7.533
6.083	9.1024	3.481722	32.5197	9.35809	7.529
6.083	9.1024	3.481722	32.5197	9.35809	7.529
6.251	9.0679	3.462722	32.5128	9.35938	7.524
6.659	9.0679	3.462722	32.5128	9.35938	7.524
6.668	9.0665	3.462827	32.5131	9.35944	7.527
6.987	9.0728	3.463027	32.5113	9.35844	7.527
7.383	9.0709	3.462871	32.5113	9.35844	7.524
7.383	9.0709	3.462871	32.5113	9.35844	7.524
7.463	9.0724	3.463385	32.5098	9.35742	7.524
7.569	9.0753	3.463225	32.51	9.35781	7.524
7.922	9.0757	3.463239	32.5105	9.3579	7.524
8.251	9.0816	3.463553	32.5094	9.35679	7.524
8.334	9.0817	3.463878	32.5078	9.35842	7.524
8.334	9.0817	3.463878	32.5078	9.35842	7.524
8.509	9.0833	3.463843	32.5095	9.35682	7.524
8.605	9.0844	3.463846	32.5095	9.35635	7.524
8.701	9.0843	3.463865	32.5097	9.35635	7.524
8.811	9.0838	3.463852	32.5098	9.35643	7.519

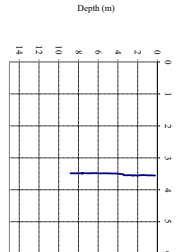
1894 Equinor Water Quality

Location: Ramat Lutfah
Data Time: May 03 2021 12:55:11 UTC
Station: ECU 1526-EW2-04-A1
Coordinates: NAD83 (2011) UTM Zone 18 North (m)
X: 613855.66
Y: 4481977.14
Lat: 073.39 17.621W
Lati on: 40-34-14.698N

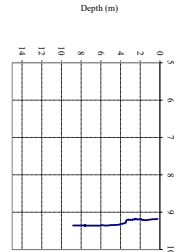
Temperature (°C)



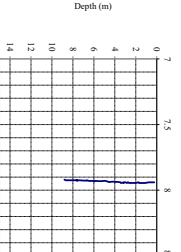
Conductivity (S/m)



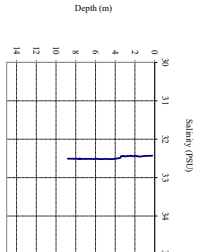
pH



DO (mg/L)



Salinity (PSU)



Temperature (°C)	
Mean	9.47
Min	9.05
Max	10.31

Conductivity (S/m)	
Mean	3.515
Min	3.455
Max	3.557

DO (mg/L)	
Mean	9.2797
Min	9.1719
Max	9.3671

pH	
Mean	7.5352
Min	7.5190
Max	7.5593

Salinity (PSU)	
Mean	32.5
Min	32.4
Max	32.5

1894 Equinoir Water Quality

Location: Bureau Landing
Data Time: May 03 2021 12:38:50 UTC
Station: E02 1894-EW2-05-A1
Coordinates
NAD83 (2011) UTM Zone 18 North (m)
X: 613222.89
Y: 4462482.13
Lat: 40°34'31.72"N
Long: 073°39'44.20"W

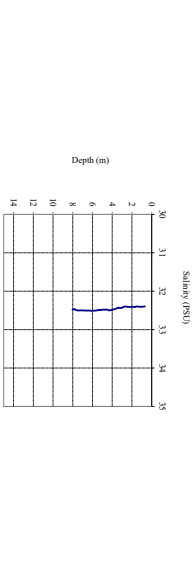
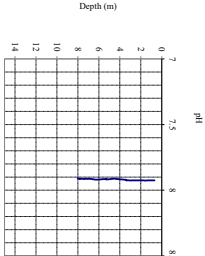
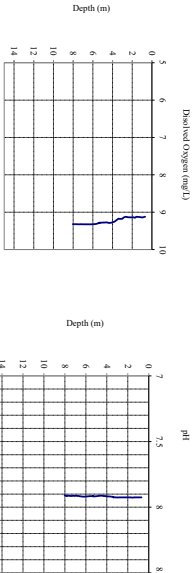
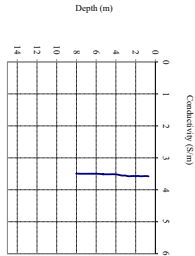
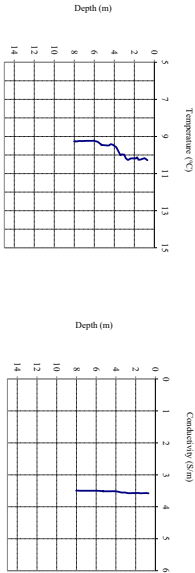
Temperature (°C)	
Mean	9.64
Min	9.23
Max	10.28

Conductivity (S/m)	
Mean	3.526
Min	3.508
Max	3.578

DO (mg/L)	
Mean	9.2452
Min	9.1213
Max	9.3296

pH	
Mean	7.9184
Min	7.8590
Max	7.9793

Salinity (PSU)	
Mean	32.5
Min	32.4
Max	32.5



Depth (m)	Temperature (°C)	Conductivity (S/m)	DO (mg/L)	pH
0.254	9.6342	3.52546	9.2452	7.925
0.746	10.2615	3.516741	9.13427	7.925
0.923	10.2276	3.517141	9.13088	7.925
0.974	10.1672	3.56824	9.24064	9.14238
1.385	10.2472	3.517579	9.24026	9.12672
1.574	10.2689	3.517108	9.23972	9.12534
1.722	10.3284	3.56844	9.24167	9.15046
1.722	10.1234	3.517098	9.24046	9.13827
1.945	10.1884	3.517226	9.24037	9.13931
2.297	10.1817	3.517266	9.24036	9.13866
2.434	10.1826	3.517266	9.24036	9.13866
2.465	10.2848	3.517246	9.24036	9.13866
2.789	10.2048	3.517362	9.24036	9.13866
2.857	10.1783	3.517044	9.24055	9.14003
3.006	9.9835	3.555764	9.2444	9.17741
3.231	9.8627	3.555833	9.2435	9.18151
3.389	9.8964	3.555838	9.2444	9.17483
3.805	9.5842	3.523902	9.24889	9.25853
4.074	9.4786	3.518197	9.24854	9.27647
4.114	9.4589	3.518084	9.24837	9.28041
4.256	9.4113	3.518048	9.24893	9.28064
4.308	9.4001	3.516246	9.24787	9.27632
4.602	9.4803	3.516246	9.24787	9.27632
5.167	9.4641	3.516246	9.24842	9.27952
5.319	9.4491	3.515116	9.24886	9.28305
5.353	9.4389	3.515116	9.24886	9.28305
5.675	9.3855	3.505954	9.25035	9.31488
6.037	9.2376	3.469707	9.25091	9.32448
6.12	9.2324	3.468816	9.25088	9.32559
6.312	9.2336	3.468513	9.25045	9.3256
6.51	9.2328	3.468525	9.25035	9.32665
6.587	9.2323	3.468525	9.25035	9.32665
6.817	9.2389	3.468706	9.25014	9.32689
6.906	9.2426	3.468888	9.25014	9.32689
7.055	9.2444	3.469152	9.2501	9.3268
7.241	9.2541	3.4691546	9.24881	9.32689
7.243	9.2426	3.468706	9.25005	9.32688
7.514	9.2446	3.469076	9.24888	9.3267
7.673	9.2577	3.468976	9.24888	9.3267
7.779	9.265	3.468916	9.24771	9.32614
7.817	9.2651	3.468944	9.24888	9.32614
7.818	9.2653	3.468944	9.24888	9.32614
7.853	9.265	3.468974	9.24707	9.32117
7.972	9.2641	3.46837	9.24746	9.32111
7.992	9.2641	3.468445	9.24753	9.32108
8.027	9.2635	3.468605	9.24774	9.32107

1894 Equinor Water Quality

Location:

Bayou La Batre

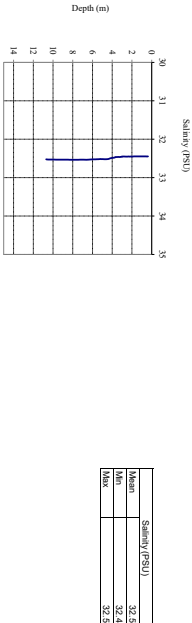
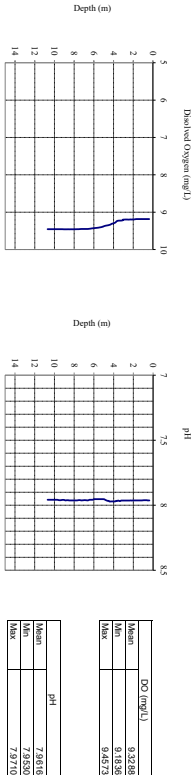
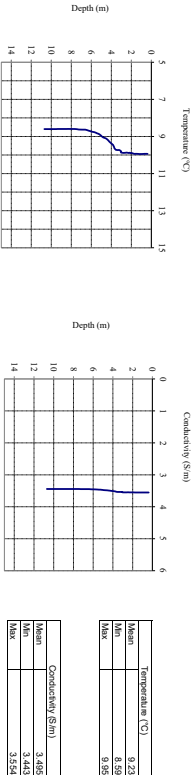
Data Time: May 03 2021 13:17:55 UTC

Station: E02-152P-EW2-06-A1

Coordinates

Latitude: 30°33'55.525"N

Longitude: 87°33'34.855"W



Depth (m)	Temperature (°C)	Conductivity (S/m)	Salinity (PSU)	DO (mg/L)	pH
0.488	8.3528	3.553434	32.4483	9.18887	7.963
0.582	9.9383	3.552889	32.4474	9.18587	7.963
0.767	9.9371	3.552868	32.4481	9.18587	7.961
0.945	9.9431	3.553461	32.448	9.18587	7.961
1.16	9.9449	3.553722	32.4472	9.18403	7.961
1.206	9.9434	3.553475	32.4467	9.18308	7.963
1.316	9.9432	3.553491	32.4477	9.18468	7.963
1.546	9.9373	3.553268	32.4472	9.1859	7.963
1.705	9.9307	3.553291	32.4466	9.18728	7.963
1.901	9.9052	3.55022	32.4483	9.18228	7.963
2.067	9.8973	3.549276	32.4521	9.19001	7.963
2.123	9.8847	3.548671	32.451	9.18823	7.964
2.252	9.8819	3.548382	32.4515	9.18476	7.963
2.301	9.8805	3.548097	32.4501	9.18512	7.963
2.354	9.8804	3.548235	32.4505	9.19714	7.964
2.461	9.8885	3.54716	32.4521	9.19842	7.964
2.595	9.8872	3.548133	32.4518	9.19266	7.964
2.669	9.8977	3.547912	32.4502	9.1981	7.964
3.042	9.8647	3.547042	32.4522	9.20019	7.964
3.039	9.7889	3.541004	32.459	9.21504	7.964
3.093	9.7645	3.538868	32.459	9.21897	7.964
3.357	9.7355	3.536832	32.4619	9.22566	7.965
3.546	9.726	3.53592	32.4626	9.22754	7.964
3.689	9.6442	3.528753	32.4643	9.24404	7.965
3.728	9.572	3.523401	32.4749	9.25807	7.965
3.831	9.4629	3.518143	32.4855	9.2833	7.97
4.19	9.2022	3.500887	32.4835	9.31409	7.97
4.322	9.1888	3.493741	32.5094	9.33254	7.971
4.433	9.1469	3.480039	32.5175	9.34273	7.971
4.488	9.1231	3.481884	32.5178	9.34786	7.966
4.591	9.0951	3.482776	32.5207	9.35187	7.96
4.803	8.9951	3.48276	32.5207	9.35187	7.964
5.072	8.9321	3.477247	32.5168	9.37729	7.953
5.121	8.8207	3.470207	32.5182	9.3897	7.953
5.175	8.8007	3.467372	32.5161	9.3861	7.953
5.259	8.7813	3.465835	32.5181	9.40087	7.953
5.425	8.8317	3.465054	32.5203	9.40817	7.953
5.531	8.8039	3.465084	32.5194	9.41408	7.953
5.708	8.7599	3.457145	32.5232	9.42098	7.953
5.85	8.7458	3.455248	32.5242	9.42598	7.953
6.073	8.7323	3.455335	32.5237	9.42873	7.958
6.282	8.6982	3.449705	32.5235	9.4382	7.958
6.389	8.662	3.448768	32.5313	9.44319	7.958
6.438	8.6577	3.448434	32.5318	9.44407	7.958
6.606	8.6304	3.446199	32.5333	9.44873	7.963
6.915	8.6332	3.446338	32.5324	9.44877	7.96
7.230	8.6044	3.444525	32.5347	9.45408	7.96
7.429	8.5959	3.443265	32.5344	9.45822	7.963
7.501	8.6042	3.444029	32.5338	9.45989	7.963
8.026	8.5954	3.444226	32.5337	9.45711	7.963
8.258	8.5854	3.443118	32.5331	9.45714	7.963
8.454	8.5964	3.443193	32.5333	9.45715	7.963
8.526	8.5952	3.443139	32.5328	9.45721	7.963
8.594	8.5948	3.443039	32.5327	9.45731	7.961
8.726	8.5955	3.443116	32.5322	9.45718	7.961
8.838	8.5952	3.443138	32.5318	9.45706	7.959
9.039	8.5962	3.443158	32.5318	9.45706	7.959
9.197	8.597	3.443198	32.5313	9.45681	7.961
9.372	8.5984	3.443314	32.5307	9.45681	7.961
9.619	8.6013	3.443492	32.5305	9.45686	7.958
9.712	8.6013	3.443437	32.5305	9.45681	7.958
9.915	8.6013	3.443436	32.5302	9.45692	7.958
10.108	8.6032	3.443661	32.5301	9.45686	7.958
10.245	8.6032	3.443667	32.5301	9.45686	7.958
10.365	8.6033	3.443667	32.5301	9.45686	7.958
10.512	8.6024	3.443525	32.5293	9.45688	7.958
10.683	8.6023	3.443502	32.5249	9.45622	7.958

Depth (m)

Depth (m)

Temperature (°C)

Conductivity (S/m)

pH

Depth (m)

Depth (m)

Salinity (PSU)

DO (mg/L)	
Mean	9.3208
Min	9.1836
Max	9.4573

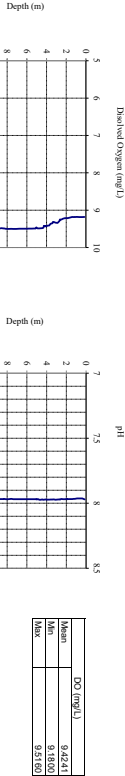
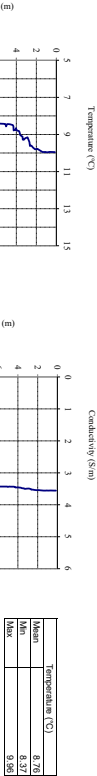
pH	
Mean	7.8916
Min	7.855
Max	7.9735

Conductivity (S/m)	
Mean	3.495
Min	3.475
Max	3.554

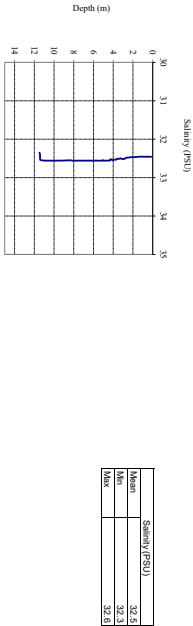
Temperature (°C)	
Mean	8.23
Min	8.09
Max	8.35

1894 Equinoir Water Quality

Location: Bureau Landing
Date Time: May 03 2021 13:41:13 UTC
Station: E02 1526-EW02-07-A1
Coordinates: NAD83 (0311) UTM Zone 18 North (m)
Lat: 40.5310428N
Long: 073.3751548W
Elev: 61590.24
Y: 4480026.85



DO (mg/L)	
Mean	0.4241
Min	0.1850
Max	0.5160

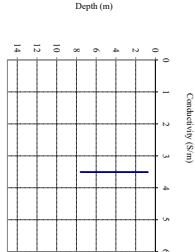
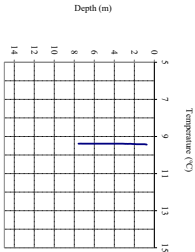


Depth (m)	Temperature (°C)	Conductivity (S/m)	Salinity (PSU)	DO (mg/L)	pH
0.376	8.652	3.55533	32.454	0.18373	7.963
0.672	9.9404	3.55397	32.4553	0.18478	7.963
0.921	9.9403	3.55502	32.4549	0.18203	7.963
1.132	9.9432	3.55068	32.4552	0.18433	7.966
1.389	9.9527	3.55082	32.4532	0.18366	7.966
1.646	9.9527	3.55082	32.4532	0.18366	7.966
1.904	9.9527	3.55082	32.4532	0.18366	7.966
2.161	9.9527	3.55082	32.4532	0.18366	7.966
2.418	9.9527	3.55082	32.4532	0.18366	7.966
2.675	9.9527	3.55082	32.4532	0.18366	7.966
2.932	9.9527	3.55082	32.4532	0.18366	7.966
3.189	9.9527	3.55082	32.4532	0.18366	7.966
3.446	9.9527	3.55082	32.4532	0.18366	7.966
3.703	9.9527	3.55082	32.4532	0.18366	7.966
3.960	9.9527	3.55082	32.4532	0.18366	7.966
4.217	9.9527	3.55082	32.4532	0.18366	7.966
4.474	9.9527	3.55082	32.4532	0.18366	7.966
4.731	9.9527	3.55082	32.4532	0.18366	7.966
4.988	9.9527	3.55082	32.4532	0.18366	7.966
5.245	9.9527	3.55082	32.4532	0.18366	7.966
5.502	9.9527	3.55082	32.4532	0.18366	7.966
5.759	9.9527	3.55082	32.4532	0.18366	7.966
6.016	9.9527	3.55082	32.4532	0.18366	7.966
6.273	9.9527	3.55082	32.4532	0.18366	7.966
6.530	9.9527	3.55082	32.4532	0.18366	7.966
6.787	9.9527	3.55082	32.4532	0.18366	7.966
7.044	9.9527	3.55082	32.4532	0.18366	7.966
7.301	9.9527	3.55082	32.4532	0.18366	7.966
7.558	9.9527	3.55082	32.4532	0.18366	7.966
7.815	9.9527	3.55082	32.4532	0.18366	7.966
8.072	9.9527	3.55082	32.4532	0.18366	7.966
8.329	9.9527	3.55082	32.4532	0.18366	7.966
8.586	9.9527	3.55082	32.4532	0.18366	7.966
8.843	9.9527	3.55082	32.4532	0.18366	7.966
9.100	9.9527	3.55082	32.4532	0.18366	7.966
9.357	9.9527	3.55082	32.4532	0.18366	7.966
9.614	9.9527	3.55082	32.4532	0.18366	7.966
9.871	9.9527	3.55082	32.4532	0.18366	7.966
10.128	9.9527	3.55082	32.4532	0.18366	7.966
10.385	9.9527	3.55082	32.4532	0.18366	7.966
10.642	9.9527	3.55082	32.4532	0.18366	7.966
10.899	9.9527	3.55082	32.4532	0.18366	7.966
11.156	9.9527	3.55082	32.4532	0.18366	7.966
11.413	9.9527	3.55082	32.4532	0.18366	7.966
11.670	9.9527	3.55082	32.4532	0.18366	7.966
11.927	9.9527	3.55082	32.4532	0.18366	7.966
12.184	9.9527	3.55082	32.4532	0.18366	7.966
12.441	9.9527	3.55082	32.4532	0.18366	7.966
12.698	9.9527	3.55082	32.4532	0.18366	7.966
12.955	9.9527	3.55082	32.4532	0.18366	7.966
13.212	9.9527	3.55082	32.4532	0.18366	7.966
13.469	9.9527	3.55082	32.4532	0.18366	7.966
13.726	9.9527	3.55082	32.4532	0.18366	7.966
13.983	9.9527	3.55082	32.4532	0.18366	7.966
14.240	9.9527	3.55082	32.4532	0.18366	7.966
14.497	9.9527	3.55082	32.4532	0.18366	7.966
14.754	9.9527	3.55082	32.4532	0.18366	7.966
15.011	9.9527	3.55082	32.4532	0.18366	7.966
15.268	9.9527	3.55082	32.4532	0.18366	7.966
15.525	9.9527	3.55082	32.4532	0.18366	7.966
15.782	9.9527	3.55082	32.4532	0.18366	7.966
16.039	9.9527	3.55082	32.4532	0.18366	7.966
16.296	9.9527	3.55082	32.4532	0.18366	7.966
16.553	9.9527	3.55082	32.4532	0.18366	7.966
16.810	9.9527	3.55082	32.4532	0.18366	7.966
17.067	9.9527	3.55082	32.4532	0.18366	7.966
17.324	9.9527	3.55082	32.4532	0.18366	7.966
17.581	9.9527	3.55082	32.4532	0.18366	7.966
17.838	9.9527	3.55082	32.4532	0.18366	7.966
18.095	9.9527	3.55082	32.4532	0.18366	7.966
18.352	9.9527	3.55082	32.4532	0.18366	7.966
18.609	9.9527	3.55082	32.4532	0.18366	7.966
18.866	9.9527	3.55082	32.4532	0.18366	7.966
19.123	9.9527	3.55082	32.4532	0.18366	7.966
19.380	9.9527	3.55082	32.4532	0.18366	7.966
19.637	9.9527	3.55082	32.4532	0.18366	7.966
19.894	9.9527	3.55082	32.4532	0.18366	7.966
20.151	9.9527	3.55082	32.4532	0.18366	7.966
20.408	9.9527	3.55082	32.4532	0.18366	7.966
20.665	9.9527	3.55082	32.4532	0.18366	7.966
20.922	9.9527	3.55082	32.4532	0.18366	7.966
21.179	9.9527	3.55082	32.4532	0.18366	7.966
21.436	9.9527	3.55082	32.4532	0.18366	7.966
21.693	9.9527	3.55082	32.4532	0.18366	7.966
21.950	9.9527	3.55082	32.4532	0.18366	7.966
22.207	9.9527	3.55082	32.4532	0.18366	7.966
22.464	9.9527	3.55082	32.4532	0.18366	7.966
22.721	9.9527	3.55082	32.4532	0.18366	7.966
22.978	9.9527	3.55082	32.4532	0.18366	7.966
23.235	9.9527	3.55082	32.4532	0.18366	7.966
23.492	9.9527	3.55082	32.4532	0.18366	7.966
23.749	9.9527	3.55082	32.4532	0.18366	7.966
24.006	9.9527	3.55082	32.4532	0.18366	7.966
24.263	9.9527	3.55082	32.4532	0.18366	7.966
24.520	9.9527	3.55082	32.4532	0.18366	7.966
24.777	9.9527	3.55082	32.4532	0.18366	7.966
25.034	9.9527	3.55082	32.4532	0.18366	7.966
25.291	9.9527	3.55082	32.4532	0.18366	7.966
25.548	9.9527	3.55082	32.4532	0.18366	7.966
25.805	9.9527	3.55082	32.4532	0.18366	7.966
26.062	9.9527	3.55082	32.4532	0.18366	7.966
26.319	9.9527	3.55082	32.4532	0.18366	7.966
26.576	9.9527	3.55082	32.4532	0.18366	7.966
26.833	9.9527	3.55082	32.4532	0.18366	7.966
27.090	9.9527	3.55082	32.4532	0.18366	7.966
27.347	9.9527	3.55082	32.4532	0.18366	7.966
27.604	9.9527	3.55082	32.4532	0.18366	7.966
27.861	9.9527	3.55082	32.4532	0.18366	7.966
28.118	9.9527	3.55082	32.4532	0.18366	7.966
28.375	9.9527	3.55082	32.4532	0.18366	7.966
28.632	9.9527	3.55082	32.4532	0.18366	7.966
28.889	9.9527	3.55082	32.4532	0.18366	7.966
29.146	9.9527	3.55082	32.4532	0.18366	7.966
29.403	9.9527	3.55082	32.4532	0.18366	7.966
29.660	9.9527	3.55082	32.4532	0.18366	7.966
29.917	9.9527	3.55082	32.4532	0.18366	7.966
30.174	9.9527	3.55082	32.4532	0.18366	7.966
30.431	9.9527	3.55082	32.4532	0.18366	7.966
30.688	9.9527	3.55082	32.4532	0.18366	7.966
30.945	9.9527	3.55082	32.4532	0.18366	7.966
31.202	9.9527	3.55082	32.4532	0.18366	7.966
31.459	9.9527	3.55082	32.4532	0.18366	7.966
31.716	9.9527	3.55082	32.4532	0.18366	7.966
31.973	9.9527	3.55082	32.4532	0.18366	7.966
32.230	9.9527	3.55082	32.4532	0.18366	7.966
32.487	9.9527	3.55082	32.4532	0.18366	7.966
32.744	9.9527	3.55082	32.4532	0.18366	7.966
33.001	9.9527	3.55082	32.4532	0.18366	7.966
33.258	9.9527	3.55082	32.4532	0.18366	7.966
33.515	9.9527	3.55082	32.4532	0.18366	7.966
33.772	9.9527	3.55082	32.4532	0.18366	7.966
34.029	9.9527	3.55082	32.4532	0.18366	7.966
34.286	9.9527	3.55082	32.4532	0.18366	7.966
34.543	9.9527	3.55082	32.4532	0.18366	7.966
34.800	9.9527	3.55082	32.4532	0.18366	7.966
35.057	9.9527	3.55082	32.4532	0.18366	7.966
35.314	9.9527	3.55082	32.4532	0.18366	7.966
35.571	9.9527	3.55082	32.4532	0.18366	7.966
35.828	9.9527	3.55082	32.4532	0.18366	7.966
36.085	9.9527	3.55082	32.4532	0.18366	7.966
36.342	9.9527	3.55082	32.4532	0.18366	7.966
36.599	9.9527	3.55082	32.4532	0.18366	7.966
36.856	9.9527	3.55082	32.4532	0.18366	7.966
37.113	9.9527	3.55082	32.4532	0.18366	7.966
37.370	9.9527	3.55082	32.4532	0.18366	7.966
37.627	9.9527	3.55082	32.4532	0.18366	7.966
37.884	9.9527	3.55082	32.4532	0.18366	7.966
38.141	9.9527	3.55082	32.4532	0.18366	7.966
38.398	9.9527	3.55082	32.4532	0.18366	7.966
38.655	9.9527	3.55082	32.4532	0.18366	7.966
38.912	9.9527	3.55082	32.4532	0.18366	7.966
39.169	9.9527	3.55082	32.4532	0.18366	7.966
39.426	9.9527	3.55082	32.4532	0.18366	7.966
39.683	9.9527	3.55082	32.4532	0.18366	7.966
39.940	9.9527	3.55082	32.4532	0.18366	7.966
40.197	9.9527	3.55082	32.4532	0.18366	7.966
40.454	9.9527	3.55082	32.4532	0.18366	7.966
40.711	9.9527	3.55082	32.4532	0.18366	7.966
40.968	9.9527	3.55082	32.4532	0.18366	7.966
41.225	9.9527	3.55082	32.4532	0.18366	7.966
41.482	9.9527	3.55082	32.4532	0.18366	7.966
41.739	9.9527	3.55082	32.4532	0.18366	7.966
41.996	9.9527	3.55082	32.4532	0.18366	7.966
42.253	9.9527	3.55082	32.4532	0.18366	7.966
42.510	9.9527	3.55082	32.4532	0.18366	7.966
42.767	9.9527	3.55082	32.4532	0.18366	7.966
43.024	9.9527	3.55082	32.4532	0.18366	7.966
43.281	9.9527	3.55082	32.4532	0.18366	7.966
43.538	9.9527	3.55082	32.4532	0.18366	7.966
43.795	9.9527	3.55082	32.4532	0.18366	7.966
44.052	9.9527	3.55082	32.4532	0.18366	7.966
44.309	9.9527	3.55082	32.4532	0.1	

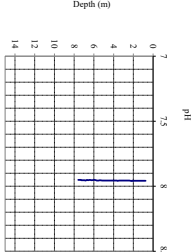
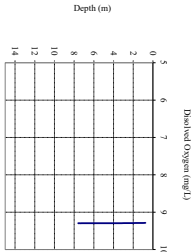
1894 Equinor Water Quality

Location: 15°28'22.00"N 40°34'27.36"E
Data Time: May 03 2021 15:09:50 UTC
Station: ECU 1526-EW2-08-A1
Coordinates: Lat: 15.472500 Lon: 40.574250
Name: 1894 Equinor Water Quality
Y: 4482408.88
Lat: 073.9728445W

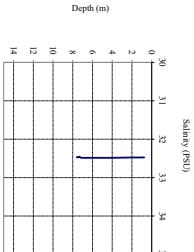
Depth (m)	Temperature (°C)	Conductivity (S/m)	Salinity (PSU)	DO (mg/L)	pH
0.926	9.4475	3.509708	32.4765	9.28565	7.968
1.327	9.4208	3.510016	32.4757	9.28565	7.968
1.625	9.4183	3.509825	32.4758	9.28583	7.968
1.776	9.4169	3.509724	32.476	9.28565	7.968
2.031	9.4053	3.508762	32.4768	9.286	7.968
2.163	9.4054	3.509785	32.4766	9.28197	7.96
2.394	9.396	3.50823	32.4778	9.28932	7.966
2.696	9.3971	3.508253	32.4778	9.2857	7.966
2.950	9.3971	3.508253	32.4778	9.2857	7.966
3.065	9.3964	3.509185	32.4768	9.28382	7.966
3.189	9.3917	3.509064	32.4812	9.28451	7.966
3.449	9.3907	3.509038	32.4817	9.28467	7.966
3.596	9.391	3.509081	32.4817	9.2846	7.966
3.688	9.3909	3.508133	32.4823	9.28469	7.966
3.785	9.3904	3.509079	32.4823	9.28472	7.966
4.065	9.3903	3.5081	32.4824	9.28472	7.966
4.43	9.3906	3.509124	32.4823	9.28467	7.966
4.723	9.3903	3.509163	32.4827	9.28469	7.966
4.827	9.3903	3.509173	32.4826	9.28469	7.966
5.146	9.3906	3.509037	32.4836	9.28467	7.966
5.388	9.3906	3.509032	32.4836	9.2846	7.964
5.546	9.3909	3.509332	32.4836	9.28462	7.966
5.705	9.3907	3.509306	32.4834	9.28467	7.966
5.827	9.3907	3.509306	32.4834	9.28467	7.966
6.035	9.3906	3.509416	32.4844	9.2846	7.964
6.21	9.3905	3.509382	32.4841	9.2846	7.964
6.414	9.3905	3.509412	32.4843	9.28464	7.961
6.587	9.3904	3.509366	32.4839	9.28461	7.964
6.704	9.3902	3.509323	32.4836	9.28462	7.961
6.856	9.389	3.509443	32.4849	9.28462	7.966
6.943	9.389	3.509386	32.4853	9.28483	7.964
7.059	9.3888	3.509386	32.4778	9.2863	7.964
7.271	9.3888	3.509466	32.4778	9.2863	7.964
7.408	9.3888	3.509076	32.4773	9.28616	7.961
7.543	9.3862	3.509746	32.4809	9.2866	7.961
7.573	9.3867	3.509746	32.4773	9.28699	7.961
7.585	9.3868	3.507152	32.4742	9.28682	7.961



Temperature (°C)	
Mean	9.40
Min	9.38
Max	9.44



DO (mg/L)	
Mean	9.2939
Min	9.2854
Max	9.2975



Salinity (PSU)	
Mean	32.5
Min	32.5
Max	32.5

pH	
Mean	7.9592
Min	7.9592
Max	7.9593

1894 Equino Water Quality

Location:
Date/Time:
Station:

Bay of Islands
May 03 2017 14:53:32 UTC
EC21DB-SW-209-A1

Barcode Labeling
X:
Y:
449117201

Coordinates
Latitude
Longitude
40°33'44.68"N
075°28'43.15"W

Depth (m)	Temperature (°C)	Conductivity (µmS/cm)	Salinity (PSU)	DO (mg/L)	pH
0.552	9.3408	3.503414	32.4877	9.29883	7.565
0.944	9.3351	3.503655	32.4863	9.30055	7.565
1.381	9.2904	3.503058	32.26<+01	9.331E+00	7.563
1.769	9.2504	3.492499	32.26<+01	9.331E+00	7.563
1.803	9.2494	3.493004	32.26<+01	9.331E+00	7.563
2.011	9.2055	3.486893	32.26<+01	9.331E+00	7.564
2.381	9.1602	3.480728	32.26<+01	9.331E+00	7.561
2.604	9.1286	3.481759	32.26<+01	9.331E+00	7.563
2.981	9.1483	3.481154	32.26<+01	9.331E+00	7.561
3.011	9.1132	3.484644	32.26<+01	9.331E+00	7.561
3.109	9.1072	3.481139	32.26<+01	9.331E+00	7.561
3.164	9.1044	3.480795	32.26<+01	9.331E+00	7.563
3.881	9.0891	3.480235	32.26<+01	9.331E+00	7.562
4.073	9.0877	3.483155	32.26<+01	9.331E+00	7.562
4.11	9.0878	3.483135	32.26<+01	9.331E+00	7.562
4.337	9.0868	3.483031	32.26<+01	9.331E+00	7.562
4.432	9.0864	3.483018	32.26<+01	9.331E+00	7.56
5.033	9.0841	3.484939	32.26<+01	9.331E+00	7.562
5.076	9.0822	3.484861	32.26<+01	9.331E+00	7.567
5.311	9.0797	3.484725	32.26<+01	9.331E+00	7.562
5.476	9.0779	3.484668	32.26<+01	9.331E+00	7.56
5.602	9.0762	3.484656	32.26<+01	9.331E+00	7.56
5.833	9.0745	3.484471	32.26<+01	9.331E+00	7.56
5.944	9.0711	3.48434	32.26<+01	9.331E+00	7.562
6.039	9.0723	3.484342	32.26<+01	9.331E+00	7.567
6.144	9.0697	3.48384	32.26<+01	9.331E+00	7.567
6.343	9.0612	3.48335	32.26<+01	9.331E+00	7.56
6.493	9.0576	3.48335	32.26<+01	9.331E+00	7.567
6.759	9.0508	3.482842	32.26<+01	9.331E+00	7.56
6.914	9.0442	3.482208	32.26<+01	9.331E+00	7.56
7.219	9.0382	3.481935	32.26<+01	9.331E+00	7.567
7.319	9.0361	3.480934	32.26<+01	9.331E+00	7.567
7.73	9.0181	3.480478	32.26<+01	9.331E+00	7.56
8.033	9.0113	3.480114	32.26<+01	9.331E+00	7.56
8.23	9.0045	3.479615	32.26<+01	9.331E+00	7.567
8.443	8.9967	3.479161	32.26<+01	9.331E+00	7.567
8.613	8.9923	3.479086	32.487	9.331E+00	7.565
8.692	8.9913	3.479035	32.481	9.331E+00	7.565
8.732	8.9978	3.479115	32.486	9.331E+00	7.567
8.749	8.9963	3.479049	32.484	9.331E+00	7.567
8.922	8.9986	3.479462	32.481	9.331E+00	7.567
9.081	8.9394	3.473503	32.468	9.331E+00	7.567
9.168	8.933	3.474249	32.438	9.331E+00	7.567
9.169	8.9347	3.473503	32.468	9.331E+00	7.567
9.616	8.898	3.471145	32.4577	9.331E+00	7.563
9.651	8.882	3.468212	32.481	9.331E+00	7.563
9.681	8.8341	3.466241	32.458	9.331E+00	7.563
9.711	8.8347	3.466241	32.458	9.331E+00	7.563
9.881	8.801	3.463443	32.4003	9.331E+00	7.56
10.129	8.8304	3.460303	32.4812	9.41E+00	7.56
10.102	8.861	3.461511	32.4882	9.41E+00	7.56
10.333	8.8757	3.463647	32.4863	9.401E+00	7.563

Temperature (°C)

Temperature (°C)	
Mean	9.046
Min	8.816
Max	9.37

Conductivity (µmS/cm)

Conductivity (µmS/cm)	
Mean	3.4861
Min	3.4601
Max	3.507

Salinity (PSU)

Salinity (PSU)	
Mean	32.4
Min	32.3
Max	32.6

Depth (m)	Temperature (°C)	Conductivity (µmS/cm)	Salinity (PSU)	DO (mg/L)	pH
0.552	9.3408	3.503414	32.4877	9.29883	7.565
0.944	9.3351	3.503655	32.4863	9.30055	7.565
1.381	9.2904	3.503058	32.26<+01	9.331E+00	7.563
1.769	9.2504	3.492499	32.26<+01	9.331E+00	7.563
1.803	9.2494	3.493004	32.26<+01	9.331E+00	7.563
2.011	9.2055	3.486893	32.26<+01	9.331E+00	7.564
2.381	9.1602	3.480728	32.26<+01	9.331E+00	7.561
2.604	9.1286	3.481759	32.26<+01	9.331E+00	7.563
2.981	9.1483	3.481154	32.26<+01	9.331E+00	7.561
3.011	9.1132	3.484644	32.26<+01	9.331E+00	7.561
3.109	9.1072	3.481139	32.26<+01	9.331E+00	7.561
3.164	9.1044	3.480795	32.26<+01	9.331E+00	7.563
3.881	9.0891	3.480235	32.26<+01	9.331E+00	7.562
4.073	9.0877	3.483155	32.26<+01	9.331E+00	7.562
4.11	9.0878	3.483135	32.26<+01	9.331E+00	7.562
4.337	9.0868	3.483031	32.26<+01	9.331E+00	7.562
4.432	9.0864	3.483018	32.26<+01	9.331E+00	7.56
5.033	9.0841	3.484939	32.26<+01	9.331E+00	7.562
5.076	9.0822	3.484861	32.26<+01	9.331E+00	7.567
5.311	9.0797	3.484725	32.26<+01	9.331E+00	7.562
5.476	9.0779	3.484668	32.26<+01	9.331E+00	7.56
5.602	9.0762	3.484656	32.26<+01	9.331E+00	7.56
5.833	9.0745	3.484471	32.26<+01	9.331E+00	7.56
5.944	9.0711	3.48434	32.26<+01	9.331E+00	7.562
6.039	9.0723	3.484342	32.26<+01	9.331E+00	7.567
6.144	9.0697	3.48384	32.26<+01	9.331E+00	7.567
6.343	9.0612	3.48335	32.26<+01	9.331E+00	7.56
6.493	9.0576	3.48335	32.26<+01	9.331E+00	7.567
6.759	9.0508	3.482842	32.26<+01	9.331E+00	7.56
6.914	9.0442	3.482208	32.26<+01	9.331E+00	7.56
7.219	9.0382	3.481935	32.26<+01	9.331E+00	7.567
7.319	9.0361	3.480934	32.26<+01	9.331E+00	7.567
7.73	9.0181	3.480478	32.26<+01	9.331E+00	7.56
8.033	9.0113	3.480114	32.26<+01	9.331E+00	7.56
8.23	9.0045	3.479615	32.26<+01	9.331E+00	7.567
8.443	8.9967	3.479161	32.26<+01	9.331E+00	7.567
8.613	8.9923	3.479086	32.487	9.331E+00	7.565
8.692	8.9913	3.479035	32.481	9.331E+00	7.565
8.732	8.9978	3.479115	32.486	9.331E+00	7.567
8.749	8.9963	3.479049	32.484	9.331E+00	7.567
8.922	8.9986	3.479462	32.481	9.331E+00	7.567
9.081	8.9394	3.473503	32.468	9.331E+00	7.567
9.168	8.933	3.474249	32.438	9.331E+00	7.567
9.169	8.9347	3.473503	32.468	9.331E+00	7.567
9.616	8.898	3.471145	32.4577	9.331E+00	7.563
9.651	8.882	3.468212	32.481	9.331E+00	7.563
9.681	8.8341	3.466241	32.458	9.331E+00	7.563
9.711	8.8347	3.466241	32.458	9.331E+00	7.563
9.881	8.801	3.463443	32.4003	9.331E+00	7.56
10.129	8.8304	3.460303	32.4812	9.41E+00	7.56
10.102	8.861	3.461511	32.4882	9.41E+00	7.56
10.333	8.8757	3.463647	32.4863	9.401E+00	7.563

1904 Equinor Water Quality

Location:
 Date: May 01 2022
 Name: E201550-EW2-10-A1
 Station:

Barnet Landing
 Coordinates
 NAD83 (2011) UTM Zone 18 North (m)
 X: 618218.86
 Y: 4492881.8
 Lat: 46.3446071°N
 Lon: 073.3736482°W

Temperature (°C)

Depth (m)	Temperature (°C)
Mean	9.92
Min	8.87
Max	10.46

Conductivity (S/m)

Depth (m)	Conductivity (S/m)
Mean	3.450
Min	3.333
Max	3.555

Dissolved Oxygen (mg/L)

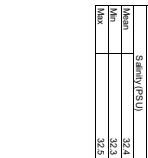
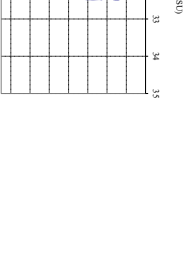
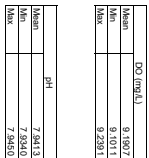
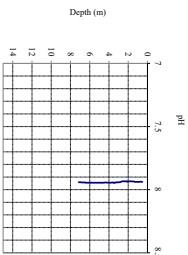
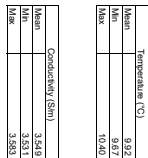
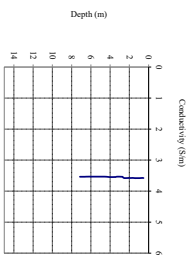
Depth (m)	Dissolved Oxygen (mg/L)
Mean	8.1007
Min	7.891
Max	8.2931

pH

Depth (m)	pH
Mean	7.5413
Min	7.3940
Max	7.5950

Salinity (PSU)

Depth (m)	Salinity (PSU)
Mean	32.4
Min	32.3
Max	32.5



1894 Equino[®] Water Quality

Depth (m)	Temperature (C)	Conductivity (S/m)	Salinity (PSU)	DO (mg/L)	pH
0.332	9.1796	3.462906	32.516	9.34E+00	7.869
0.665	9.1786	3.462912	32.5169	9.34E+00	7.866
0.968	9.1778	3.462978	32.5161	9.34E+00	7.866
1.04	9.1786	3.462659	32.5168	9.34E+00	7.866
1.467	9.1791	3.462657	32.517	9.34E+00	7.866
1.687	9.1791	3.462657	32.5177	9.34E+00	7.866
2.034	9.1764	3.462661	32.5167	9.34E+00	7.866
2.24	9.1761	3.462619	32.5175	9.34E+00	7.866
2.387	9.1761	3.462619	32.5175	9.34E+00	7.866
2.629	9.1768	3.462946	32.5169	9.34E+00	7.866
2.779	9.1728	3.462151	32.5164	9.34E+00	7.866
3.016	9.1719	3.462138	32.517	9.34E+00	7.863
3.25	9.1728	3.462112	32.5161	9.34E+00	7.863
3.446	9.1777	3.462077	32.5163	9.34E+00	7.861
3.468	9.1717	3.462119	32.5167	9.34E+00	7.866
3.765	9.1742	3.462083	32.514	9.34E+00	7.866
4.034	9.1786	3.462171	32.5166	9.34E+00	7.866
4.24	9.1773	3.462191	32.5162	9.34E+00	7.866
4.44	9.1773	3.462194	32.5161	9.34E+00	7.861
4.712	9.1769	3.462262	32.5164	9.34E+00	7.863
5.12	9.1808	3.462657	32.5101	9.34E+00	7.866
5.422	9.1808	3.462657	32.5102	9.34E+00	7.863
5.622	9.1808	3.462274	32.5102	9.34E+00	7.863
5.815	9.1803	3.462279	32.5095	9.34E+00	7.866
6.039	9.1788	3.462283	32.5109	9.34E+00	7.866
6.085	9.1788	3.462283	32.5108	9.34E+00	7.863
6.284	9.1794	3.46223	32.5096	9.34E+00	7.866
6.568	9.1743	3.46195	32.5113	9.34E+00	7.861
6.811	9.1789	3.462127	32.5098	9.34E+00	7.863
6.814	9.184	3.462191	32.5071	9.34E+00	7.863
6.86	9.1789	3.462191	32.5096	9.34E+00	7.863
7.045	9.1777	3.462107	32.5096	9.34E+00	7.863
7.075	9.1711	3.461794	32.5118	9.34E+00	7.863
7.162	9.1711	3.46167	32.5151	9.34E+00	7.863

Location:
Date, Time
Station

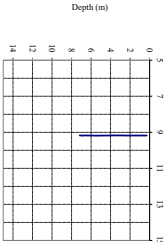
Event1 ending
May 03 2021 15:24:41 UTC
EQ2 1526-EV02-11-A1

Coordinates
Lat: 40.3425 888N
Lon: 073.3706 0361W

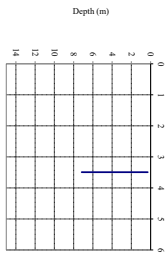
Latitude
40.3425 888N

Longitude
073.3706 0361W

Temperature (C)



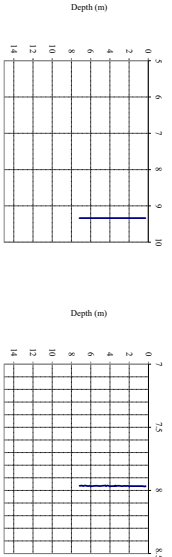
Conductivity (S/m)



Temperature (C)	
Mean	9.18
Min	9.16
Max	9.18

Conductivity (S/m)	
Mean	3.462
Min	3.462
Max	3.463

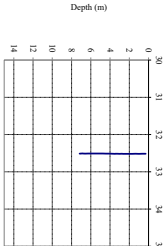
pH



DO (mg/L)	
Mean	9.3368
Min	9.3360
Max	9.3380

pH	
Mean	7.8644
Min	7.8610
Max	7.8650

Salinity (PSU)



Salinity (PSU)	
Mean	32.5
Min	32.5
Max	32.5

1894 Equine Water Quality

Location: Bureau Landing
Date Time: May 03 2021 13:58:29 UTC
Station: EQ21028-EV2-12-A1
Coordinates: NAD83 (2011) UTM Zone 18 North (m)
X: 616845.54
Y: 448956.51
Lat: 40.325588N
Long: 073.3712255W

Depth (m)	Temperature (C)	Conductivity (S/m)	Salinity (PSU)	DO (mg/L)	pH
0.568	9.5561	3.522978	32.5370	9.2578	7.879
0.868	9.4449	3.515458	32.5009	9.25243	7.979
1.247	9.3527	3.525348	32.4892	9.25521	7.98E+00
1.627	9.3318	3.505689	32.512	9.25486	7.98E+00
2.007	9.3259	3.505689	32.512	9.25486	7.98E+00
2.387	9.3076	3.501657	32.5111	9.25142	7.98E+00
2.767	9.0999	3.466905	32.5209	9.25176	7.98E+00
3.147	9.13	3.4689713	32.5300	9.25444	7.98E+00
3.527	9.0723	3.446472	32.5310	9.25734	7.98E+00
3.907	9.0447	3.440132	32.5298	9.26317	7.98E+00
4.287	8.9244	3.471235	32.547	9.24708	7.98E+00
4.667	8.8493	3.474445	32.5372	9.24257	7.98E+00
5.047	8.4558	3.433866	32.5672	9.24456	7.98E+00
5.427	8.4548	3.433866	32.5644	9.24502	7.98E+00
5.807	8.5001	3.438877	32.557	9.27586	7.98E+00
6.187	8.4516	3.432592	32.5602	9.24597	7.98E+00
6.567	8.4046	3.424757	32.5592	9.24818	7.98E+00
6.947	8.4212	3.426561	32.5644	9.24402	7.98E+00
7.327	8.4003	3.429254	32.563	9.24544	7.97E+00
7.707	8.4003	3.429167	32.5622	9.24551	7.97E+00
8.087	8.3996	3.428804	32.5628	9.24701	7.97E+00
8.467	8.4001	3.429048	32.562	9.24584	7.97E+00
8.847	8.4001	3.428842	32.5614	9.24982	7.97E+00
9.227	8.3994	3.427929	32.5635	9.24982	7.97E+00
9.607	8.3982	3.427778	32.564	9.24904	7.97E+00
9.987	8.3982	3.427778	32.564	9.24904	7.97E+00
10.367	8.3986	3.427837	32.5642	9.24956	7.97E+00
10.747	8.3955	3.427535	32.5641	9.24993	7.97E+00
11.127	8.395	3.427535	32.5641	9.24993	7.97E+00
11.507	8.3948	3.427531	32.5641	9.24995	7.97E+00
11.887	8.3978	3.427202	32.5661	9.25015	7.97E+00
12.267	8.3978	3.427202	32.5661	9.25015	7.97E+00
12.647	8.3814	3.427241	32.565	9.25004	7.97E+00
13.027	8.3752	3.42685	32.5653	9.250182	7.97E+00
13.407	8.3756	3.42683	32.565	9.25017	7.97E+00
13.787	8.3711	3.42683	32.5653	9.250275	7.97E+00
14.167	8.3718	3.426875	32.5654	9.25027	7.97E+00
14.547	8.3721	3.426814	32.5653	9.250259	7.97E+00
14.927	8.3728	3.426869	32.5654	9.250249	7.97E+00
15.307	8.3725	3.426869	32.5654	9.25023	7.97E+00
15.687	8.3725	3.426869	32.5654	9.25023	7.97E+00
16.067	8.3722	3.426866	32.5652	9.250249	7.969
16.447	8.3731	3.426702	32.5651	9.25024	7.969
16.827	8.3728	3.426709	32.5657	9.250231	7.969
17.207	8.3728	3.426709	32.5654	9.250249	7.969
17.587	8.3728	3.426709	32.5654	9.250249	7.969
17.967	8.3728	3.426709	32.5654	9.250249	7.969
18.347	8.3728	3.426709	32.5654	9.250249	7.969
18.727	8.3728	3.426709	32.5654	9.250249	7.969
19.107	8.3728	3.426709	32.5654	9.250249	7.969
19.487	8.3728	3.426709	32.5654	9.250249	7.969
19.867	8.3728	3.426709	32.5654	9.250249	7.969
20.247	8.3728	3.426709	32.5654	9.250249	7.969
20.627	8.3728	3.426709	32.5654	9.250249	7.969
21.007	8.3728	3.426709	32.5654	9.250249	7.969
21.387	8.3728	3.426709	32.5654	9.250249	7.969
21.767	8.3728	3.426709	32.5654	9.250249	7.969
22.147	8.3728	3.426709	32.5654	9.250249	7.969
22.527	8.3728	3.426709	32.5654	9.250249	7.969
22.907	8.3728	3.426709	32.5654	9.250249	7.969
23.287	8.3728	3.426709	32.5654	9.250249	7.969
23.667	8.3728	3.426709	32.5654	9.250249	7.969
24.047	8.3728	3.426709	32.5654	9.250249	7.969
24.427	8.3728	3.426709	32.5654	9.250249	7.969
24.807	8.3728	3.426709	32.5654	9.250249	7.969
25.187	8.3728	3.426709	32.5654	9.250249	7.969
25.567	8.3728	3.426709	32.5654	9.250249	7.969
25.947	8.3728	3.426709	32.5654	9.250249	7.969
26.327	8.3728	3.426709	32.5654	9.250249	7.969
26.707	8.3728	3.426709	32.5654	9.250249	7.969
27.087	8.3728	3.426709	32.5654	9.250249	7.969
27.467	8.3728	3.426709	32.5654	9.250249	7.969
27.847	8.3728	3.426709	32.5654	9.250249	7.969
28.227	8.3728	3.426709	32.5654	9.250249	7.969
28.607	8.3728	3.426709	32.5654	9.250249	7.969
28.987	8.3728	3.426709	32.5654	9.250249	7.969
29.367	8.3728	3.426709	32.5654	9.250249	7.969
29.747	8.3728	3.426709	32.5654	9.250249	7.969
30.127	8.3728	3.426709	32.5654	9.250249	7.969
30.507	8.3728	3.426709	32.5654	9.250249	7.969
30.887	8.3728	3.426709	32.5654	9.250249	7.969
31.267	8.3728	3.426709	32.5654	9.250249	7.969
31.647	8.3728	3.426709	32.5654	9.250249	7.969
32.027	8.3728	3.426709	32.5654	9.250249	7.969
32.407	8.3728	3.426709	32.5654	9.250249	7.969
32.787	8.3728	3.426709	32.5654	9.250249	7.969
33.167	8.3728	3.426709	32.5654	9.250249	7.969
33.547	8.3728	3.426709	32.5654	9.250249	7.969
33.927	8.3728	3.426709	32.5654	9.250249	7.969
34.307	8.3728	3.426709	32.5654	9.250249	7.969
34.687	8.3728	3.426709	32.5654	9.250249	7.969
35.067	8.3728	3.426709	32.5654	9.250249	7.969
35.447	8.3728	3.426709	32.5654	9.250249	7.969
35.827	8.3728	3.426709	32.5654	9.250249	7.969
36.207	8.3728	3.426709	32.5654	9.250249	7.969
36.587	8.3728	3.426709	32.5654	9.250249	7.969
36.967	8.3728	3.426709	32.5654	9.250249	7.969
37.347	8.3728	3.426709	32.5654	9.250249	7.969
37.727	8.3728	3.426709	32.5654	9.250249	7.969
38.107	8.3728	3.426709	32.5654	9.250249	7.969
38.487	8.3728	3.426709	32.5654	9.250249	7.969
38.867	8.3728	3.426709	32.5654	9.250249	7.969
39.247	8.3728	3.426709	32.5654	9.250249	7.969
39.627	8.3728	3.426709	32.5654	9.250249	7.969
40.007	8.3728	3.426709	32.5654	9.250249	7.969
40.387	8.3728	3.426709	32.5654	9.250249	7.969
40.767	8.3728	3.426709	32.5654	9.250249	7.969
41.147	8.3728	3.426709	32.5654	9.250249	7.969
41.527	8.3728	3.426709	32.5654	9.250249	7.969
41.907	8.3728	3.426709	32.5654	9.250249	7.969
42.287	8.3728	3.426709	32.5654	9.250249	7.969
42.667	8.3728	3.426709	32.5654	9.250249	7.969
43.047	8.3728	3.426709	32.5654	9.250249	7.969
43.427	8.3728	3.426709	32.5654	9.250249	7.969
43.807	8.3728	3.426709	32.5654	9.250249	7.969
44.187	8.3728	3.426709	32.5654	9.250249	7.969
44.567	8.3728	3.426709	32.5654	9.250249	7.969
44.947	8.3728	3.426709	32.5654	9.250249	7.969
45.327	8.3728	3.426709	32.5654	9.250249	7.969
45.707	8.3728	3.426709	32.5654	9.250249	7.969
46.087	8.3728	3.426709	32.5654	9.250249	7.969
46.467	8.3728	3.426709	32.5654	9.250249	7.969
46.847	8.3728	3.426709	32.5654	9.250249	7.969
47.227	8.3728	3.426709	32.5654	9.250249	7.969
47.607	8.3728	3.426709	32.5654	9.250249	7.969
47.987	8.3728	3.426709	32.5654	9.250249	7.969
48.367	8.3728	3.426709	32.5654	9.250249	7.969
48.747	8.3728	3.426709	32.5654	9.250249	7.969
49.127	8.3728	3.426709	32.5654	9.250249	7.969
49.507	8.3728	3.426709	32.5654	9.250249	7.969
49.887	8.3728	3.426709	32.5654	9.250249	7.969
50.267	8.3728	3.426709	32.5654	9.250249	7.969
50.647	8.3728	3.426709	32.5654	9.250249	7.969
51.027	8.3728	3.426709	32.5654	9.250249	7.969
51.407	8.3728	3.426709	32.5654	9.250249	7.969
51.787	8.3728	3.426709	32.5654	9.250249	7.969
52.167	8.3728	3.426709	32.5654	9.250249	7.969
52.547	8.3728	3.426709	32.5654	9.250249	7.969
52.927	8.3728	3.426709	32.5654	9.250249	7.969
53.307	8.3728	3.426709	32.5654	9.250249	7.969
53.687	8.3728	3.426709	32.5654	9.250249	7.969
54.067	8.3728	3.426709	32.5654	9.250249	7.969
54.447	8.3728	3.426709	32.5654	9.250249	7.969
54.827	8.3728	3.426709	32.5654	9.250249	7.969
55.207	8.3728	3.426709	32.5654	9.250249	7.969
55.587	8.3728	3.426709	32.5654	9.250249	7.969
55.967	8.3728	3.426709	32.5654	9.250249	7.969
56.347	8.3728	3.426709	32.5654	9.250249	7.969
56.727	8.3728	3.426709	32.5654	9.250249	7.969
57.107	8.3728	3.426709	32.5654	9.250249	7.969
57.487	8.3728	3.426709	32.5654	9.250249	7.969
57.867	8.3728	3.426709	32.5654	9.250249	7.969
58.247	8.3728	3.426709	32.5654	9.250249	7.969
58.627	8.3728	3.426709	32.5654	9.250249	7.969
59.007	8.3728	3.426709	32.5654	9.250249	7.969
59.387	8.3728	3.426709	32.5654	9.250249	7.969
59.767	8.3728	3.426709	32.5654	9.250249	7.969
60.147	8.3728	3.426709	32.5654	9.250249	7.969
60.527	8.3728	3.426709	32.5654	9.250249	7.969
60.907	8.3728	3.426709	32.5654	9.250249	7.969
61.287	8.3728	3.426709	32.5654	9.250249	7.969
61.667	8.3728	3.426709	32.5654	9.250249	7.969
62.047	8.3728	3.426709	32.5654	9.250249	7.969</

APPENDIX E BENTHIC ANALYSIS REPORT

EQUINOR EMPIRE OCS A-0512

2021 Benthic Survey Report

Prepared by:

RPS Ocean Science

Stephen Davies, Alexander Sousa, Gabrielle DiPreta,
Stephanie Berkman, Joseph Zottoli, Alicia Morandi, and
Matthew Bernardo

Prepared for:

Alpine - Equinor

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E Alicia.Morandi@rpsgroup.com

21-P-212908 Alpine Equinor
Empire 2 Benthic Addendum
Lease Area OCS A-0512
2021 Benthic Survey Report

July 16, 2021

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1 INTRODUCTION

RPS was contracted by Alpine to collect, process, analyze, and compile additional benthic data collected with a towed video sled and grab sampler along the Barret Export Cable Route (ECR) associated with Equinor's Lease Area OCS-A 0512, offshore of New York/New Jersey. The survey area was defined as the previously uncharacterized portions of the Empire Wind 2 (EW2) ECR that connects the offshore lease area to Long Island, New York. Sample locations were chosen by Equinor to ground-truth acoustic data, fill spatial gaps from prior surveys, and investigate known or expected complex habitat (Figure 1-1). The grab samples and video imagery data conclusions presented in this document will support interpretation of geophysical data to characterize surficial sediment conditions and classify the benthic habitat according to the Coastal and Marine Ecological Classifications Standards (CMECS; FGDC, 2012) and recent guidance for mapping fish habitat from National Marine Fisheries Service (NMFS, 2021) for inclusion in permitting documentation required by Bureau of Ocean Energy Management (BOEM). This report provides:

- A description of the benthic grab sampling methods, results, and analysis;
- The analysis of benthic grab sampling results using key statistical analyses such as taxa diversity, richness, and density;
- A description and analysis of abundance of benthic organisms observed in the video data collected; and
- CMECS classifications of each grab sample site and survey transect based on the video, grain size, and benthic community lab results.

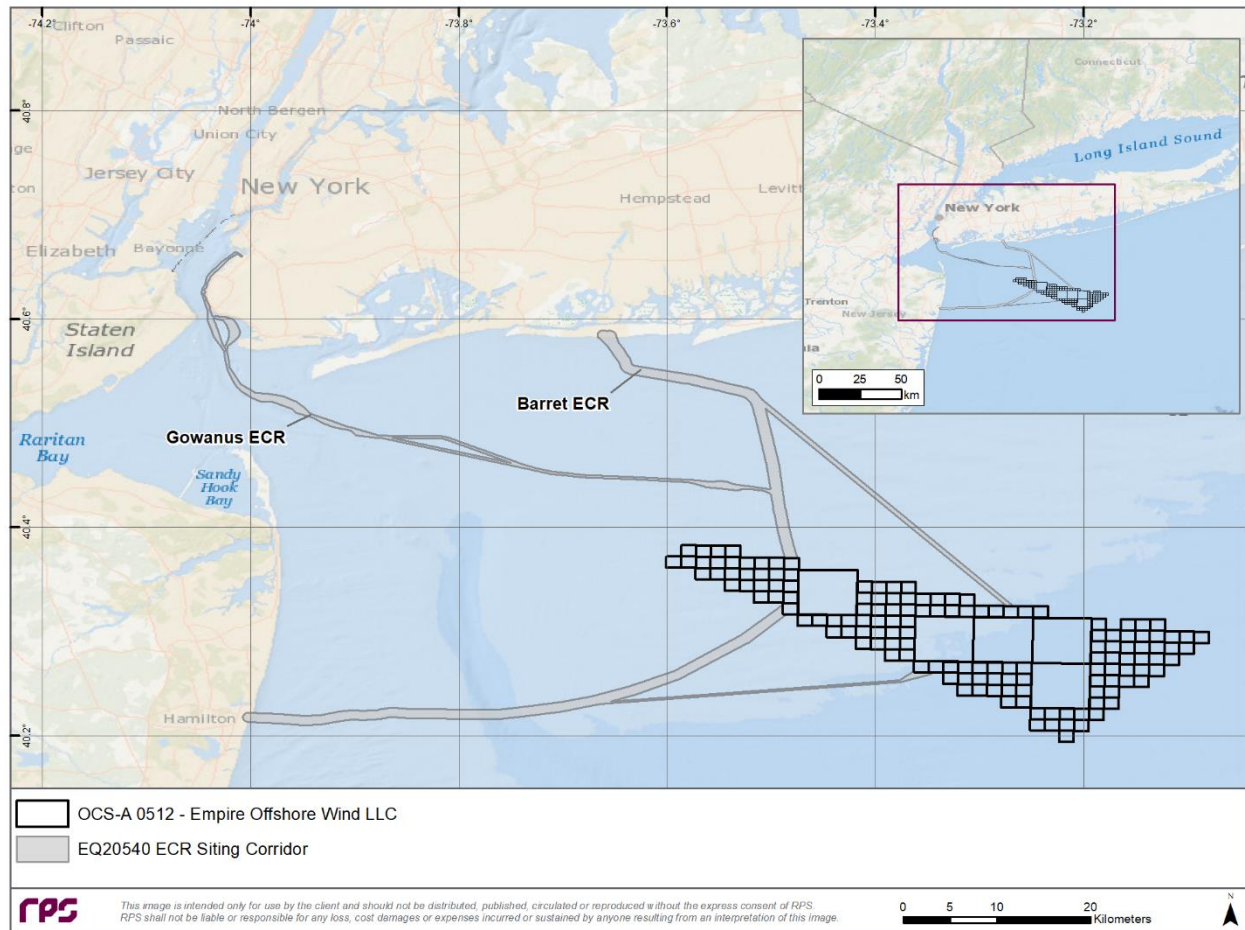


Figure 1-1. Location of the 2021 benthic survey area.

2 METHODS

2.1 Field Survey

2.1.1 Towed Camera Sled

Underwater video transects were taken in conjunction with grab samples for visual classification of the seafloor in May of 2021. The survey was completed on the Research Vessel (RV) Shearwater. The camera sled was equipped with parallel-mounted lasers 2.5 centimeters (cm) apart and a cable that transmitted real-time viewing of images to the vessel. An ultra-short baseline (USBL) beacon was fixed to the camera sled to obtain GPS coordinates in conjunction with a pole-mounted USBL system. A Deep Trekker digital color 4K high resolution camera recorded video along 600-m transects. A GoPro Hero 9 Black was also used to collect time-lapsed still images of the bottom. High turbidity limited the visibility and effectiveness of the video and stills for the majority of transects with seven of the 12 video transects failing after multiple attempts. The video sled was deployed from an A-frame located on the starboard quarter by the Alpine

crew and lowered until positioned 0.5 to 1 meters (m) above the seafloor. Distance of camera to the seafloor varied along each transect due to differences in sediment type, vessel speed, swells, and low visibility/high turbidity.

Video transects were recorded in accordance with procedures following BOEM's Guidelines for Providing Benthic Habitat Survey Information for Renewable Energy Development on the Atlantic Outer Continental Shelf Pursuant to 30 CFR Part 585 (BOEM, 2019). While recording, field notes were taken containing sample information (date, time, global positioning satellite [GPS] coordinates, station ID, depth, and video file name) and observations of sediment/seafloor characteristics of note to aid in post-processing of video data. Notes were made for the beginning and end of the transect as well as any changes in weather or visibility conditions, sediment, or species. During video recording, potentially sensitive benthic habitats (e.g., exposed hard bottom, seagrass/kelp/algal beds, coral species) were noted if present, as per BOEM's guidelines (BOEM, 2019). There were five transects successfully completed along the EW2 ECR. Failed transects were due to very high turbidity.

2.1.2 Grab Sampling

Benthic grab samples were acquired using an Ocean Instruments Salish Grab Standard SG-20 sampler. This grab is a modified version of a standard Van Veen sampler with a stainless-steel weighted frame and release system ideal for collection of sediments in soft to hard substrates with a penetration depth up to 20 cm and sampling area of 0.10 square meters (m²). A USBL beacon was fixed to the grab sampler to obtain GPS coordinates in conjunction with a pole-mounted USBL transceiver. An attached video camera equipped with parallel-mounted scale lasers and lights provided real-time viewing of the bottom from the vessel. This video was recorded and used to collect additional information concerning the area surrounding the grab sample site.

Upon retrieval, the grab sampler was examined for sample acceptability. A sample was initially deemed acceptable if the bucket was more than 50% full or had a penetration depth > 7 cm, the sample was not over penetrated (i.e., not full to the top), and sample surface structures were undisturbed and even (i.e., not slumped). If a sample did not fulfil these requirements, the entire contents were returned to the water and another sample attempt was made. A photograph and/or results from each attempt were collected as the grab was brought on board. If more than three failed sample attempts occurred at one station, sampling moved on to the next station, and no sediment samples were sent for further analyses. 15 sites, however, consisted of a sand/clay matrix that made penetrating to >7 cm depth difficult. 12 of the 15 sites, after repeated attempts, with 4.5 to 6.5 cm penetration depth, were accepted and collected for further analyses. Failed attempts due to grab sampler malfunction (not habitat/sediment related), were not included in the total count of attempts or the decision to move on from a station. The results of each attempted grab were recorded in field notes. There was a total of 36 grab samples collected from 12 stations along the EW2 ECR.

Once an acceptable sample was obtained, the following steps were taken:

1. Overlying water was drained using a siphon.
2. A photograph was taken of the sample next to an identification label containing sample identification number and date.
3. Field notes were taken, including descriptions of physical features (depth of penetration, sediment color, texture, surface features) and surface megafauna; large surface fauna were returned to the water immediately.
4. The grab sample was then divided into two sections representing 40% and 60% of the sample surface area based on the bucket design which was accessed via two hinged doors divided by a central support bar.
5. The 40% sample was removed and placed into 500- μ m sieving buckets to be further processed for taxonomic identification of organisms within the sediment.
6. A 200-mL subsample of the sediment was taken from the center of one side of the grab sampler bucket using a 3-inch diameter core tube. The samples were stored in double-layered plastic bags for grain size and TOC analyses.

After collection, sediment for macroinvertebrate analysis was loaded onto a processing table and material washed through a 500- μ m sieve using seawater under gentle pressure.

Organisms, shell fragments, and other remaining material were placed into a plastic container using stainless steel forceps, as needed. The container was filled no more than two-thirds full of sample and seawater. If the quantity of sample exceeded this volume, it was placed in additional separate containers. The sample was fixed/preserved with 10% buffered formalin solution by filling the remaining space within the bottle with solution. Containers were tightly sealed with electrical tape and stored in a cooler at ambient temperature (not frozen or refrigerated). Prior to sieving the next sample, the sieve was cleaned by backwashing with pressurized water.

2.2 Grab Sample Analysis

2.2.1 Sediment Grain Size and Total Organic Carbon Analysis

Grain size samples were sent by Alpine to TerraSense LLC (Totowa, NJ). Particle size distribution of samples were analyzed using Wentworth/Folk.

Total Organic Carbon (TOC) samples were analyzed by TerraSense LLC (Totowa, NJ). TOC content of sediment samples was determined using ASTM D2974 with results reported as percent (%) organic content by burn-off.

2.2.1 Grab Image Analysis

The sediment grain size lab results do not discern between substrates of biogenic or geologic origin (i.e., sieves do not discern between shells vs. gravels), thus all underwater video and associated bottom images were reviewed to determine the origin of substrate. If the sample was reported by the lab as a gravel mix ($\geq 30\%$ gravel) and the grab sample images (Appendix C) appeared to have $\sim 50\%$ or more shell, a point count analysis was done on associated imagery in photoQuad (Trygonis and Sini, 2012). The grab sampler image was overlain with 50 points as it best represents the sediment that is sent to the lab. If over 50% of the points were confirmed as shell, then the grab sample was classified under CEMCS as biogenic shell, instead of the gravel/gravel mix as reported by the lab.

2.2.2 Benthic Macroinvertebrate Lab Analysis

The macroinvertebrate benthic samples for the survey were sent by Alpine to ESS Group (ESS; East Providence, RI). Prior to sorting, ESS emptied sample material from each sample in its entirety into a 500- μm mesh sieve. Tap water was gently run over the sieve to rinse any additional fine sediment that was not removed during the field sieving process as well as to remove the formalin solution prior to the microscope work. Rinsed samples were preserved in 70% ethanol for sorting, enumeration, and identification. Rose bengal was added to bulky samples to improve sorting efficiency.

Each benthic sample was sorted to remove organisms from residual debris. Sorted benthic organisms were subsequently identified and enumerated by a qualified taxonomist using a dissecting microscope with magnification up to 90X and readily available taxonomic keys. Some smaller organisms were temporarily slide-mounted and identified under a compound microscope with magnification to 1,000X. The target taxonomic identification level was family. If this could not be achieved, taxonomic identification was taken to the lowest practicable taxonomic level.

Enumerations of macroinvertebrates identified from each sample were recorded directly in an electronic bench sheet. Taxonomic nomenclature was checked for consistency with the World Register of Marine Species (www.marinespecies.org).

2.3 Video Data Post-Processing

2.3.1 Objectives

Post-processing and analysis of video transect data were conducted by RPS to provide:

- General characterization of substrate including bottom type, texture, micro-topography;
- Evidence of benthic activity by organisms (burrows, trails, biogenic reefs);
- Identification of epibenthic macroinvertebrates (decapod crustaceans, mollusks [including squid mops], echinoderms) and benthic habitat;

- Presence/evidence and general characterization of submerged aquatic vegetation (macroalgae, sea grass);
- Identification of organisms to the lowest practical taxonomic level (generally to Order to Family) using standard taxonomic keys for the geographic area;
- Evidence of fishing activity, such as trawl scars, pots, and working nets; and
- Presence of derelict fishing gear, military expended materials, shipwrecks, cultural artifacts, or other anthropogenic marine debris.

All still images from videos were classified according to NMFS-modified CMECS substrate component categories (FGDC, 2012; NMFS, 2021), which focuses closely on details of grain size and composition to describe benthic habitats and is being used to define complex and potentially valuable fish habitats. The BOEM Benthic Habitat Survey guidelines (BOEM, 2019) also require that the developer characterize the benthic community composition which includes documentation of abundance, diversity, percent cover, and community structure. The following were recorded when present and identifiable:

- Characterization and delineation of any submerged aquatic vegetation (seagrass or macroalgae) that occurs within the area of potential adverse effect;
- Characterization and delineation of any hard-bottom gradients of low to high relief such as coral (heads/reefs), rock or clay outcroppings, or other shelter-forming features; and
- Identification of communities of sessile and slow-moving marine invertebrates (clams, mussels, polychaete worms, anemones, sponges, echinoderms) that may be within the area of potential adverse effect.

2.3.2 Methods

Transect videos were reviewed in their entirety and any notable seafloor features or epifaunal/benthic/demersal species greater than 4 cm in size (roughly equal to 1.5 times the distance between the laser points) were recorded. When a feature or species was identified, the reviewer recorded the time, rated video visibility at that time, categorized the bottom, and recorded the lowest practical taxonomic level (LPTL) of the feature. Some features were enumerated whereas others were marked as present or absent and further quantified in the second separate step of video review (see next paragraph below). The abundances of enumerable megafauna were recorded along with presence/absence of benthic biotic activity, submerged aquatic vegetation (macroalgae, sea grass), fishing activity, derelict gear, military expended materials, shipwrecks, coral heads/reefs, rock outcroppings, other shelter features, and other marine debris. Specifically, submerged aquatic vegetation, bushy plant-like organisms (i.e., presumably hydrozoa or bryozoa but potentially macroalgae), eelgrass, blue mussels, oysters, sponges, slipper shells (i.e., *Crepidula fornicata*), encrusting organisms, northern star coral (*Astrangia poculata*), and sand dollars (*Echinarachnius parma*) were marked as present or absent while other qualifying features were enumerated. Most portions of the videos were reviewed multiple times using slower playback speeds and replay functions.

For the first two transects completed, EW2-12 and EW2-2, The time lapse was set on the GoPro to take an image every 2 seconds, after review of the number of useable images from these transects, the time lapse was set to take an image every second. Still images were then subset by the start and end time of the transect and at an interval of every tenth image. Metadata were recorded for each still image including latitude and longitude, time, transect, and ID number. The quality of each image was assessed with a categorical scale of visibility from 0 to 4. Still images with quality scores of “moderate” (2 or greater) were considered passing and analyzed with seabed image processing software photoQuad (Trygonis and Sini, 2012). Each image was calibrated for scale using the reference laser points and the area (cm²) of the visible portion was recorded, with poorly lit or blurry edges of passing images excluded from the area of analysis.

To inform CMECS classification of bottom habitat, 50 points were distributed uniformly across the entire visible portion of each passing still image using photoQuad. Percent cover data were recorded as the number of points under which different substrate types were visible: boulder, cobble, pebble/granule, sand/mud, or biogenic-origin shells or large worm tube structures (see size definitions in Table 2-1). In addition, other “biological elements” were recorded if present and visible in each image, including infaunal structures (e.g., small worm or amphipod tubes), larger tube structure made by decorator worms (*Diopatra cuprea*), burrows (e.g., crab depressions or clam siphon holes), mobile megafauna (e.g., Cancer crabs, hermit crabs, benthic or demersal fish), Codium or other algae, encrusting organisms (e.g., sponges), sand dollars, mussel beds, eelgrass, and bushy plant-like organisms that were grouped together for identification purposes (e.g., hydrozoa, bryozoa, branching algae).

These point counts approximated percent cover of each substrate type in the still image, which was used to assign the appropriate substrate classifications of the habitat to the furthest extent possible under a NMFS-modified (NMFS, 2021) version of CMECS (FGDC, 2012). This system discerns substrate components by origin (e.g., geologic mineral, biogenic material, or anthropogenic material) and size groups, based primarily on the percent cover of coarse, gravel-sized particles (pebble/granule, cobble, and boulder) versus fine sand/mud, or the size category of shells (reef, rubble, and hash). Some images had a substantial amount of biological element cover (also referred to as flora/fauna throughout this report) that was removed from the percent cover calculations in order to accurately determine the percent of visible substrate composing gravel, sand, shells, etc. After the main CMECS classification for the substrate component in each image was defined, a secondary or co-occurring substrate type was defined to provide further detail and delineate between habitats. For example, if the main CMECS classification defined the dominant substrate type as geologic origin, then the secondary CMECS classification would contain information about substrates of biogenic or anthropogenic origin if they were also present. These classifications were assigned for the visible surface area of each image and then summarized at the transect level.

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Table 2-1. CMECS geologic sediment size, biogenic or anthropogenic size, and percent cover categories (*from FGDC, 2012).

Geologic Sediment Category	Definition	Biogenic or Anthro Size Category	Definition	Biogenic Cover Density	Adapted Definition*
Bedrock	> 4,096 mm	Reef	> 4,096 mm	Trace	≤ 2%
Boulder	256 – 4,096 mm	Rubble	64 – 4,096 mm	Sparse	> 2 – 30%
Cobble	64 – 256 mm			Moderate	30 – 70%
Pebble / Granule	2 – 64 mm	Hash	2 – 64 mm	Dense	70 – 90%
Sand / Mud	< 2 mm	Sand or Bits	< 2 mm	Complete	> 90%

The CMECS biotic component based on towed video data was determined using a combination of the still image biological element percent cover data and video review enumeration data. The percent cover data were considered first to determine the appropriate CMECS biotic classifications with enumeration data used to determine which megafauna species were most dominant when megafauna covered the first or second largest area within the transect. Large megafauna were excluded as were dominate enumerated species with fewer than three individuals per transect.

2.4 Benthic Macroinvertebrate Data Post-Processing

Benthic macroinvertebrate community statistics were calculated using family or next-lowest practical taxonomic level (NLPTL) abundance estimates in each sample, which were reported as count per 0.04 m² (area of benthic macroinvertebrate sample). Community composition parameters included: total abundance, number of phyla, number of taxa, Margalef's Richness Index, Shannon Diversity Index, and Pielou's Index of Evenness for each station in the sampling area.

2.4.1 Taxonomic Composition

Benthic macroinvertebrate taxonomic composition was assessed to characterize the high-level trends in taxa data. Community composition includes the relative proportions of taxonomic groups by number of identifiable taxa and number of individuals and was used to evaluate dominance of common phyla across all samples. Taxonomic composition was summarized for each station across the sampling area, aggregated at both phylum-level and family or NLPTL.

2.4.2 Richness, Diversity, and Evenness

Taxonomic richness, evenness, and diversity are common ecological parameters used to measure the overall biodiversity of a community or discrete unit. Taxonomic richness is the number of unique species or taxonomic groups represented in an area of interest. In this assessment, taxonomic richness was calculated using Margalef's Richness Index (Formula 1) for each station.

Formula 1. Margalef's Richness Index (RI).

$$RI = \frac{(S - 1)}{\ln(N)}$$

Where:

S= the number of unique taxa

N= the total number of individuals in the sample

Interpretation: The higher the index, the greater the richness.

The diversity index for a community considers taxonomic richness and the proportion of each unique taxa. The Shannon Diversity Index (H'; Formula 2) was calculated using the number of each taxa (family or NLPTL), the proportional abundance of each taxa relative to the total number of individuals, and the sum of the proportions. This index was used to assess diversity of each station. The diversity index (H') increases with increasing taxonomic richness and evenness.

Formula 2. H'- Shannon Diversity Index.

$$H' = - \sum_{i=1}^R p_i \ln(p_i)$$

Where:

p_i = the proportion of individuals belonging to the taxa i in the dataset of interest

Interpretation: The greater the H' , the greater the richness and evenness.

Evenness of a community refers to the similarity in abundances of different taxa comprising a population or sample. Pielou's Index of Evenness (J' ; Formula 3) includes H' (Shannon-Weiner Diversity Index) in its calculation.

Formula 3. J' - Pielou's Index of Evenness.

$$J' = \frac{H'}{H_{\text{Max}}}$$

Where:

H' = the Shannon- Weiner Diversity Index

H_{Max} = the maximum possible value of H' , where each taxon occurs in equal abundances.

$$H_{\text{Max}} = \ln(s)$$

Where: s = Number of taxa

Interpretation: J' is constrained between 0 and 1. The greater the value of J' , the more evenness in the sample.

The Shannon-Weiner Diversity index was also applied to the enumerated species from the video review on a per-transect basis with observations recorded to the level of phylum or NLPTL.

2.4.3 Biotic Component

Data acquired from the grab samples were used to inform the CMECS biotic component, which is the classification of living flora and fauna on or within the seabed with their physical environment associations (FGDC, 2012). Taxonomic lab data were evaluated to determine the CMECS classification hierarchy for the biotic component, which includes the biotic setting, class, subclass, co-occurring subclass, group, and co-occurring group. The finer detailed biotic community and co-occurring communities were defined for some samples where possible. Unique taxa from each grab sample were sorted into broad functional groups (i.e., burrowing, tube-building, small clam, etc.), based on the biotic groups listed in CMECS and the sizes of certain organisms. The assigned classifications were based on the first and second most dominant functional group for each station, with field photos consulted in a secondary assessment to determine sizes.

3 RESULTS

3.1 Video Analysis

3.1.1 Transect Locations

The characteristics and locations of the five completed underwater video transects within the sampling area are described in Table 3-1 and shown in Figure 3-1. Due to very turbid conditions, 7 of the proposed 12 transects failed after repeat attempts to obtain passing video and still image quality.

Table 3-1. Underwater video transect locations in the sampling area.

Transect	Date	Recorded Duration (min:sec)	Start Latitude (DD)	Start Longitude (DD)	End Latitude (DD)	End Longitude (DD)	Total # Stills	# Analyzed Stills
EW2-02-UWV-1	05/04/2021	32:01	40.5511	-73.6215	40.55266	-73.6147	97	65
EW2-06-UWV-2	05/05/2021	24:13	40.55771	-73.6452	40.56206	-73.6409	146	47
EW2-07-UWV-1	05/04/2021	40:10	40.55275	-73.6345	40.55303	-73.6274	242	128
EW2-11-UWV-2	05/05/2021	22:40	40.57466	-73.6218	40.57531	-73.6148	137	65
EW2-12-UWV-1	05/04/2021	29:45	40.54934	-73.6235	40.54827	-73.6166	90	65

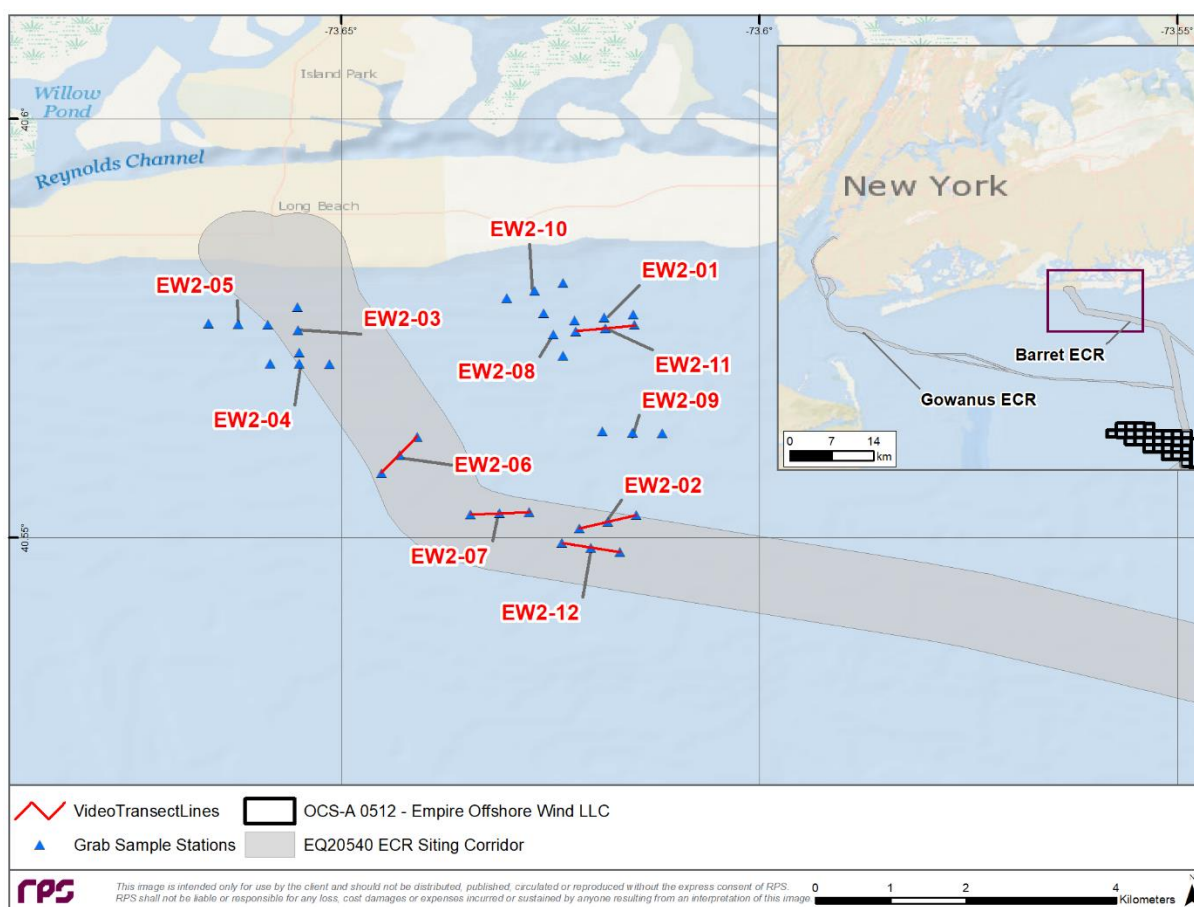


Figure 3-1. Map of video transects (red) and grab sample sites (blue) in the sampling area, labeled by transect/station number.

3.1.2 Organisms and Features

The abundance of enumerable features greater than four cm were recorded during the video review process. Organisms were identified to the LPTL, usually to order or family. A total of 142 features, including 126 organisms from 5 phyla (Table 3-2, Figure 3-2, Figure 3-3), were identified and recorded within the five transects. The most numerous organisms observed were moon snails, composing ~70% of all organism.

The total observed organisms comprised 14 vertebrates from 7 unique LPTLs in 2 orders (Figure 3-5) and 112 invertebrates from 8 unique LPTLs in five classes (Figure 3-6). An additional 16 other observations were recorded: 13 unidentified organisms, and 3 unidentified objects (unclear if living). Unidentified organisms and objects were the result of high turbidity obscuring visibility.

The presence or absence of other qualifying features (i.e., habitat features of note or species that were quantified by their percent cover of the seafloor rather than through enumeration [see Section 2.3.2 for full list]) ranged from absent in all transects (i.e., eelgrass, corals, fish) to present in all 5 transects (i.e., polychaete worms; Figure 3-7).

For representative images of some observed species see Table 3-4 and for complete reviewer notes see Appendix B.

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Table 3-2. Megafauna and other enumerated features observed during review of the video transects (continued next page).

Common Name	Lowest Taxonomic Level	EW2-					Total
		2	6	7	11	12	
Invertebrate							
Anemone, burrowing	Anthozoa	1	2	3	-	-	6
Clam, surf	Spisula solidissima	-	-	1	1	-	2
Crab, cancer	Cancer	-	2	1	-	1	4
Crab, hermit	Pagurus		3	-	-		3
Crab, spider	Libnia	3	-	1	1	2	7
Crab, unidentified	Decapoda	-	-	-	1	-	1
Moon snail	Naticidae	15	14	27	1	31	88
Worm, unidentified	Polychaeta	-	-	1	-	-	1
Vertebrate							
fish, unidentified	Chordata	-	-	1	-	-	1
fish, unidentified (bony)	Teleostei	-	3	-	-	-	3
sea bass, black	Centropristis striata	1	-		-	-	1
skate	Rajidae	2	-	-	1	1	4
skate, egg case	Rajidae	-	-	-	1	-	1
skate, little or winter	Leucoraja	-	1	-	-	-	1
skate, winter	Leucoraja ocellata	-	-	-	-	3	3
Unidentified or Non-Living							
object, unidentified	object, unidentified	2	-	-	1	-	3
organism, unidentified	organism, unidentified	-	5	8	-	-	13
Total Organisms (Confirmed)		22	26	35	6	38	126
Total Observations		24	31	43	7	38	142

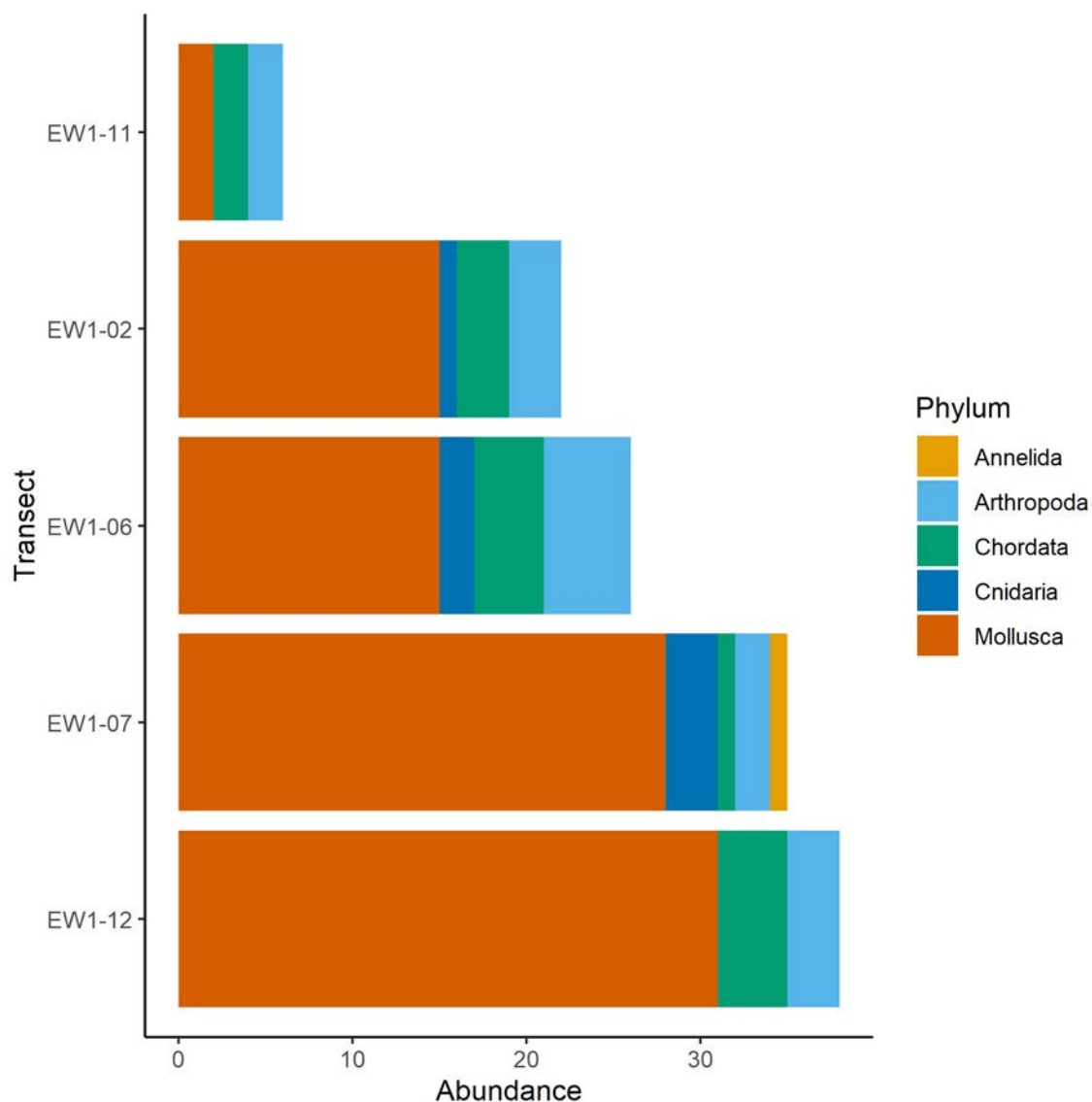


Figure 3-2. Distribution of enumerated organisms larger than 4 cm aggregated by Phylum in each video transect. Organisms not identified to the level of Phylum were excluded. These data include only enumerated species larger than 4 cm. See text for complete explanation of which species were quantified by enumeration versus by percent of bottom cover.

Table 3-3 Shannon-Weiner diversity index values for each Video transect based on observations to the level of family (or NLTP).)

Transect	Diversity
EW2-06-UWV-1	1.68
EW2-07-UWV-1	1.23
EW2-11-UWV-2	1.75
EW2-12-UWV-1	0.65

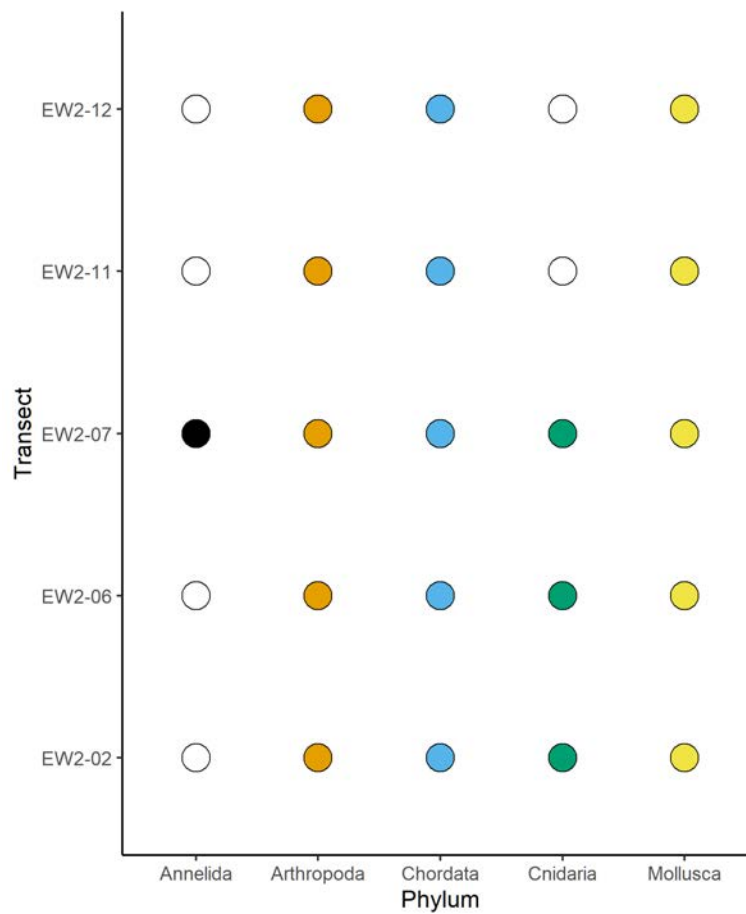


Figure 3-3. Presence (colored) or absence (white) of Phyla in each video transect. These data include only enumerated species larger than 4 cm. See text for complete explanation of which species were quantified by enumeration versus by percent of bottom cover.

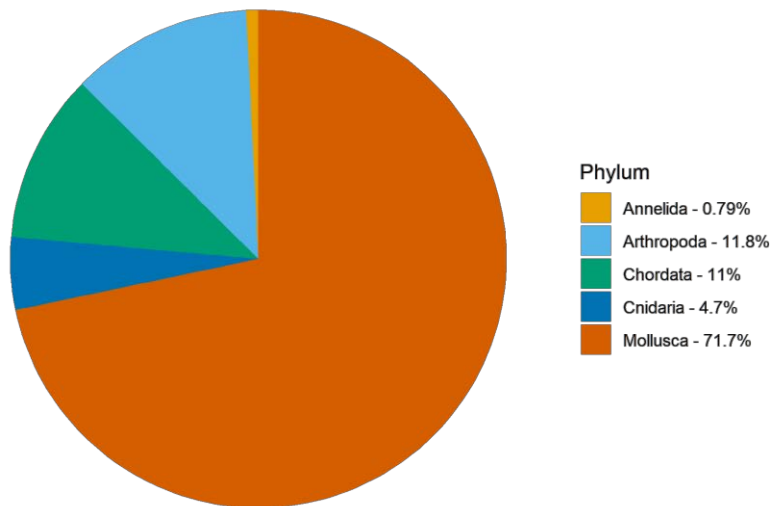


Figure 3-4. Percent composition of enumerated organisms larger than 4 cm aggregated by Phyla in all video transects. Organisms not identified to the level of Phylum were excluded.

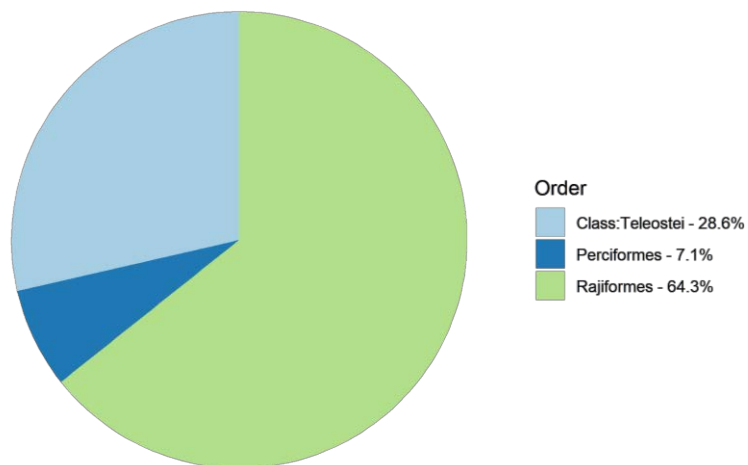


Figure 3-5. Percent composition of enumerated vertebrates (phylum Chordata) larger than 4 cm aggregated by taxonomic level "order" in all video transects. Fishes not identified to the level of order are depicted as Class: Teleostei.

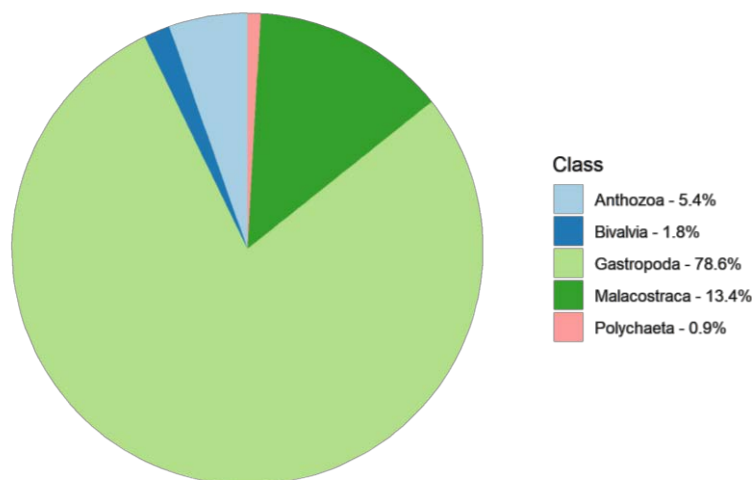


Figure 3-6. Percent composition of enumerated invertebrates larger than 4 cm aggregated by taxonomic level "class" in all video transects.

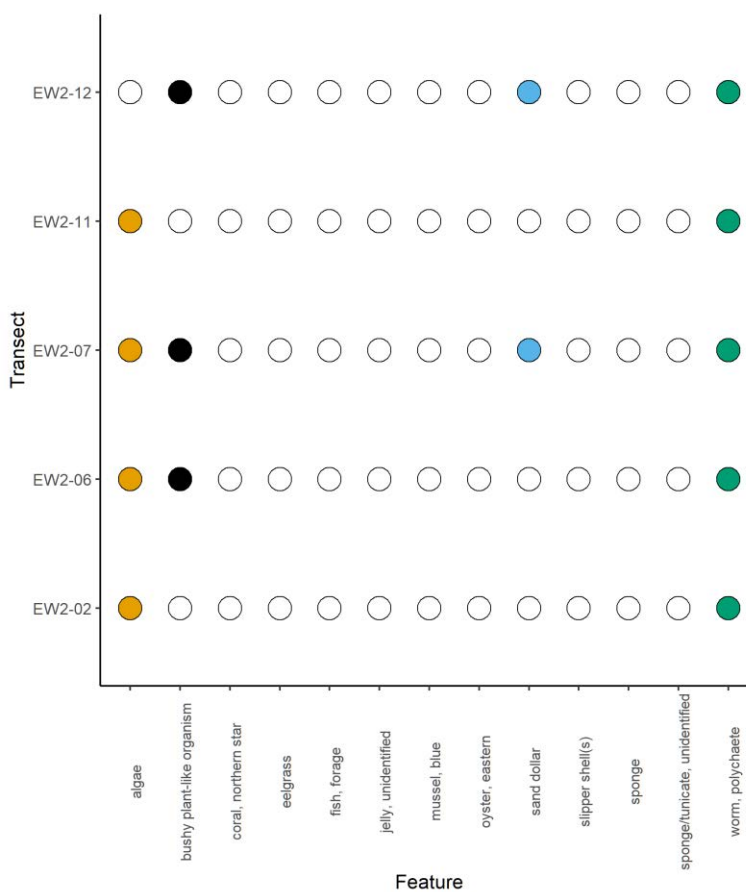


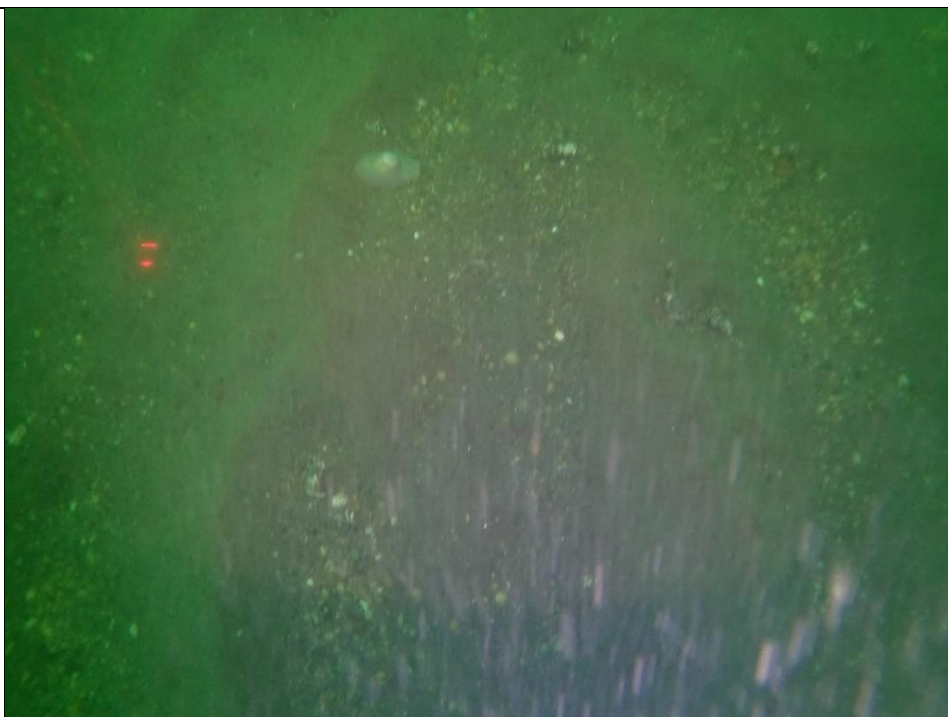
Figure 3-7. Presence (colored) or absence (white) of important features in each video transect. These data only include features that were marked as present or absent and not enumerated. See text for complete explanation of which species were quantified by enumeration versus by percent of bottom cover.

Table 3-4. Representative GoPro still images of megafauna and debris observed and identified along the video transects (continued on next pages).

Black Sea Bass (<i>Centropristus striata</i>) EW2-UWV-02-1	
Burrowing Anenomes (<i>Anthozoa</i>) EW2-UWV-07-1	

Moon Snail (*Naticidae*)

EW2-UWV-02-1



Spider crab (*Libinia spp.*)

EW2-UWV-07-1



Little or Winter Skate (<i>Leucoraja</i>) EW2-UWV-07-1	
Decorator Worm Tubes Smaller worm tubes, with smaller shell fragments, many individuals (<i>Diopatra spp</i>) EW2-UWV-07-1	



3.1.3 Percent Cover

The following section summarizes the results of the percent cover analysis of still images derived from underwater video transects in the ECR project area. Percent cover of various bottom substrates and features within a measured surface area of each image were recorded and used to define the NMFS-modified (NMFS, 2021) CMECS substrate classification that was most suitable for the sampled area. In addition to percent cover of different sediment grain sizes (boulder, cobble, pebble/granule, or sand/mud), the presence of biogenic shell substrate, biogenic worm tube substrate (formed by Sabellarid or Serpulid species), anthropogenic materials, and other biological elements were also recorded. Examples of biological elements include flora (e.g., algae or seagrass), fauna (e.g., mobile megafauna, encrusting species, sand dollars, mussel beds), and evidence of biological activity (e.g., burrows, infaunal structures, decorator worm tubes). Thus, in addition to CMECS classification of the main substrate, the density of co-occurring shell and flora/fauna cover were calculated to illustrate these aspects of habitat complexity. Visual examples of habitat types defined using the still images are presented in the CMECS Classifications section (Section 3.2.2). Differences in the total area classified for each transect were a result of varying total transect lengths and visibility throughout the video.

A total of ~210 m² of seafloor was analyzed. The substrate group with the highest percent cover across all transects was fine sand/mud, composing 83% (~174 m²) of the surface area analyzed through still images for the transects. No transects were less than 50% sand/mud: The average sand/mud coverage across all transects was ~85%. Gravel density >5% (boulder, cobble, and pebble/granule sizes combined) occurred

in two out of the five transects. Transect EW2-02-UWV-1 had the least sad/mud cover (~67% or 31 m²) and the highest gravel cover (31% or 14 m²; Table 3-5), all from the pebble/granule size range. Of the total seafloor area analyzed, 14% (30 m²) comprised gravel substrate. All the gravel analyzed was pebble/granule sized (2 – 64 mm).

Biogenic shell cover accounted for .02% (4 m²) of the substrate within all transects. None of the transects, had biogenic shell cover above 30% (moderate cover), with the highest at EW2-12-UWV-1 with ~3% (1.5 m²).

The total area of biological elements (i.e., flora or fauna) sampled was 2 m² and accounts for less than 0.1% of the bottom cover (Table 3-6). Floating macroalgae, decorator worm tubes, and megafauna were the most common biological elements, accounting for 53% (1.05 m²), 25% (0.49 m²), and 17% (0.34 m²) of the flora/fauna cover, respectively. The megafauna category contains various crab species, anemones, and fish species etc. detected in the still images. The eelgrass noted in transect EW2-11 was floating and no attached eelgrass was found in the survey. There was no biogenic worm tube substrate cover from reef-building Sabellarid or Serpulid species; however, singular sand/shell tubes created by decorator worms (*Diopatra spp.*) were found in all transects and were counted as a biological element (Table 3-6).

Table 3-5. Area and percent coverage of different substrates summarized from still images taken from each of the five video transects in the sampling area.

Transect	Total Area Analyzed (m ²)	Percent of Area – Gravel Substrates				Sand/Mud (%)	Shell Cover (%)	Organic Debris - Wood (%)	Anthropogenic Debris (%)	Flora/Fauna Cover (%)
		Boulder (%)	Cobble (%)	Pebble/Granule (%)	All Gravel Combined (%)					
EW2-02	45.7	0	0	30.79	30.79	67.70	1.06	0	0	0.46
EW2-06	21.75	0	0	0.93	0.93	97.21	1.61	0	0	0.25
EW2-07	65.91	0	0	2.44	2.44	94.70	2.02	0	0	0.84
EW2-11	26.05	0	0	0	0	94.70	1.15	0	0	4.16
EW2-12	50.51	0	0	27.29	27.29	69.57	2.94	0	0	0.21
Total Area (m²)	209.92	0	0	0	29.66	174.31	3.95	0	0	2

Table 3-6. Area and percent coverage of different biological elements (i.e., flora/fauna) observed within still images taken from each of the five video transects in the sampling area.

Transect	Flora/ Fauna Area (m²)	Burrows (%)	Infaunal Structures (%)	Algae (%)	Eel- grass (%)	Bushy Plant- like Orgs. (%)	Encrusting Orgs. (%)	Mega- fauna (%)	Sand Dollars (%)	Mussel Bed (%)	Decorator Worms (%)
EW2-02	0.21	0	0	0	0	0	0	0.38	0	0	0.08
EW2-06	0.05	0	0	0.02	0	0	0	0.23	0	0	0
EW2-07	0.55	0	0	0	0	0	0	0.12	0.08	0	0.64
EW2-11	1.08	0	0	3.88	0.04	0.24	0	0	0	0	0
EW2-12	0.11	0	0	0.07	0	0	0	0.07	0	0	0.07
Total Flora/Fauna Area (m²)	2	0	0	1.05	0.01	0.06	0	0.34	0.05	0	0.49

3.2 Grab Samples

3.2.1 Station Locations

The characteristics and locations of the 36 grab sample stations are described in Table 3-7 and shown in Figure 3-1. Sediment samples were collected for each station; however, some samples had penetration depths below the 7 cm cutoff (as stated in the project execution plan) but were accepted on the final grab attempt with confirmation from the Client Representative.

Table 3-7. Location and characteristics of grab samples collected in the sampling area (continued on next page).

Sample	Date (UTC)	Time (UTC)	Latitude (DD)	Longitude (DD)	Water Depth (m)	Sample Penetration Depth (mm)
EW2-01-A1	5/3/2021	19:06:09	40.576252	-73.618505	8	97
EW2-01-E2	5/3/2021	19:41:24	40.576648	-73.614992	8	50
EW2-01-W2	5/3/2021	18:41:01	40.575878	-73.622015	9	60
EW2-02-A1	5/2/2021	18:57:08	40.551858	-73.618050	13	89
EW2-02-E1	5/2/2021	18:36:06	40.552670	-73.614665	14	70
EW2-02-W1	5/2/2021	19:17:31	40.551087	-73.621450	14	78
EW2-03-A3	5/2/2021	13:28:07	40.574778	-73.655098	9	45
EW2-03-E1	5/2/2021	13:44:56	40.572097	-73.654995	10	74
EW2-03-W3	5/2/2021	12:46:29	40.577490	-73.655217	8	55
EW2-04-A1	5/2/2021	14:22:30	40.570737	-73.654955	10	80
EW2-04-E1	5/2/2021	15:10:54	40.570722	-73.651337	11	90
EW2-04-W1	5/2/2021	14:03:28	40.570803	-73.658445	10	74
EW2-05-A1	5/2/2021	11:25:03	40.575460	-73.662262	9	91
EW2-05-E1*	5/2/2021	12:05:40	40.575372	-73.658735	9	127
EW2-05-W1	5/2/2021	11:00:53	40.575573	-73.665823	8	95
EW2-06-A1	5/2/2021	15:50:06	40.559877	-73.642975	12	99
EW2-06-E1	5/2/2021	15:29:09	40.562022	-73.640865	12	95

Sample	Date (UTC)	Time (UTC)	Latitude (DD)	Longitude (DD)	Water Depth (m)	Sample Penetration Depth (mm)
EW2-06-W1	5/2/2021	16:14:48	40.557682	-73.645103	13	86
EW2-07-A1	5/2/2021	16:54:13	40.552882	-73.630998	14	70
EW2-07-E1	5/2/2021	17:13:01	40.553033	-73.627443	13	70
EW2-07-W1	5/2/2021	16:36:00	40.552772	-73.634520	13	78
EW2-08-A2	5/2/2021	21:56:35	40.574278	-73.624557	8	70
EW2-08-E2	5/2/2021	21:30:54	40.571712	-73.623383	8	45
EW2-08-W1	5/2/2021	22:16:16	40.576802	-73.625745	7	70
EW2-09-A4	5/2/2021	20:35:31	40.562487	-73.615128	11	50
EW2-09-E2	5/2/2021	21:03:12	40.562428	-73.611550	11	65
EW2-09-W3	5/2/2021	19:54:00	40.562680	-73.618677	10	60
EW2-10-A2	5/3/2021	17:31:19	40.579482	-73.626782	8	60
EW2-10-E2	5/3/2021	18:03:18	40.580382	-73.623432	7	103
EW2-10-W2	5/3/2021	17:00:12	40.578613	-73.630137	8	70
EW2-11-A1	5/3/2021	20:25:29	40.574982	-73.618342	8	75
EW2-11-E1	5/3/2021	20:00:10	40.575368	-73.614848	9	60
EW2-11-W3	5/3/2021	20:46:44	40.574618	-73.621863	8	60
EW2-12-A1	5/2/2021	17:54:08	40.548805	-73.620062	14	98
EW2-12-E1	5/2/2021	18:16:35	40.548287	-73.616592	14	70
EW2-12-W1	5/2/2021	17:31:34	40.549322	-73.623563	14	85

*Navigation log says E3 due to two mechanical fails

3.2.2 Sediment Analysis

The following section presents grab sample grain size composition results from the TerraSense, LLC lab analysis. There were 36 grabs across the EW2 sampling area analyzed. The majority of sites were sandy with 58% of samples medium sand or finer (Table 3-8). There were 12 samples which contained $\geq 5\%$ gravel (> 2 mm particles), which designates them as complex habitat under the NMFS (2021) modified CMECS guidelines. Of the samples designated as complex, 10 had $\geq 30\%$ gravel (EW2-02-A1, EW2-02-W1, EW2-03-E1, EW2-04-A1, EW2-04-E1, EW2-05-E1, EW2-06-W1, EW2-07-A1, EW2-07-W1, EW2-12-E1). There were no cobbles or boulders in the grab samples (> 64 mm). Fine silt and clay particles (< 0.075 mm) composed 0.8 – 21.9% of each sample (mean of 5.14%), with no samples containing $\geq 30\%$ silt and clay (Figure 3-8).

Total organic carbon (TOC) percentages ranged from 0.1 – 1.6%, with an average of 0.3%. No samples were above 3% TOC. The majority of samples (34 of 36) had less than 1% TOC.

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Table 3-8. Grain size composition from grab samples collected along the EW2 (continued on next page).

Station	Boulder % (256- 4096 mm)	Cobble % (76-256 mm)	Pebble/ Granule % (2-76 mm)	Very Coarse Sand % (1-2 mm)	Coarse Sand % (0.5-1 mm)	Medium Sand % (0.25-0.5 mm)	Fine Sand % (0.125-0.25 mm)	Very Fine Sand % (0.075- 0.125 mm)	Silt/Clay % (0.075 mm)	d50 (mm)	Total Organic Carbon (%)
EW2-01-A1	0	0	0	0.4	20.7	69.4	4.5	3.3	1.7	0.41	0.2
EW2-01-E2	0	0	3.6	0.3	1	5.2	53.5	32.3	4.1	0.16	0.2
EW2-01-W2	0	0	0.2	0.1	2	8.8	35.5	47.7	5.7	0.12	0.2
EW2-02-A1	0	0	33.8	18.7	38.6	4.5	1.6	1	1.8	1.07	0.2
EW2-02-E1	0	0	0.6	0.2	0.6	5.1	47.8	40	5.7	0.13	0.3
EW2-02-W1	0	0	52.2	7.7	23	14	1.1	0.8	1.2	2.3	0.4
EW2-03-A3	0	0	0	0.5	1.2	1.8	27.3	59.4	9.8	0.1	0.3
EW2-03-E1	0	0	51	9.2	26.6	3.8	2	4.3	3.1	2.14	0.3
EW2-03-W3	0	0	0.1	1.8	1.9	2.1	36.8	48.4	8.9	0.11	0.3
EW2-04-A1	0	0	37.4	9	33.4	16.7	1	0.7	1.8	0.81	0.2
EW2-04-E1	0	0	47.5	14.4	29.9	4.3	1.1	0.9	1.9	1.74	0.3
EW2-04-W1	0	0	0.5	1.6	13.8	68.7	8.9	2.8	3.7	0.36	0.2
EW2-05-A1	0	0	0.2	0.9	25.9	60.5	4.8	2.9	4.8	0.41	0.2
EW2-05-E1	0	0	58.5	21.3	10.9	4.2	0.7	2.1	2.3	2.55	0.2
EW2-05-W1	0	0	4.8	4.8	37.6	44.9	2	1	4.9	0.47	0.2
EW2-06-A1	0	0	24.1	9.5	23.8	24	7.4	2.4	8.8	0.62	0.9
EW2-06-E1	0	0	0.1	0.3	1.1	9.2	41.2	26.2	21.9	0.13	1.6
EW2-06-W1	0	0	32.9	12.8	18.9	26.6	6.1	0.8	1.9	0.76	0.2
EW2-07-A1	0	0	47.3	5.3	16.7	24	4.5	1.4	0.8	1.41	0.1
EW2-07-E1	0	0	0.4	0.9	4.4	39.2	43.4	8.3	3.4	0.22	0.2
EW2-07-W1	0	0	42.5	11.2	23.4	17.4	2.7	0.8	2	1.32	0.3
EW2-08-A2	0	0	0.1	0.2	1	4.2	30.3	57.7	6.5	0.11	0.2
EW2-08-E2	0	0	0	0.2	0.9	4.6	30.3	56.9	7.1	0.11	0.3
EW2-08-W1	0	0	0.1	0.2	2.1	6.2	33.8	51.2	6.4	0.12	0.3
EW2-09-A4	0	0	0.3	0.4	2.1	20.1	38.3	33.9	4.9	0.15	0.6
EW2-09-E2	0	0	0.1	0.2	0.8	8.8	30.6	51.4	8.1	0.11	0.3
EW2-09-W3	0	0	0.3	1	4.7	13.4	34.2	40.7	5.7	0.14	0.3
EW2-10-A2	0	0	0.2	0.2	1.4	14.2	43.4	30.9	9.7	0.13	0.6
EW2-10-E2	0	0	0.3	1.3	40.4	50.6	3.8	1.7	1.9	0.44	0.1
EW2-10-W2	0	0	0.2	0.7	2.5	3.7	30.3	49	13.6	0.11	1.3
EW2-11-A1	0	0	0.2	0.2	1.2	37.6	48.6	10.1	2.1	0.22	0.2
EW2-11-E1	0	0	0.3	0.1	0.3	3.4	61.2	30	4.7	0.15	0.2
EW2-11-W3	0	0	0.3	0.2	2.3	9.1	39	43.4	5.7	0.13	0.3
EW2-12-A1	0	0	12.4	3.2	26.8	46.1	8.3	0.7	2.5	0.44	0.2
EW2-12-E1	0	0	47.4	14.2	20.7	11.7	2	0.6	3.4	1.74	0.4
EW2-12-W1	0	0	1.9	1.3	11.6	64.2	16.5	1.9	2.6	0.33	0.1

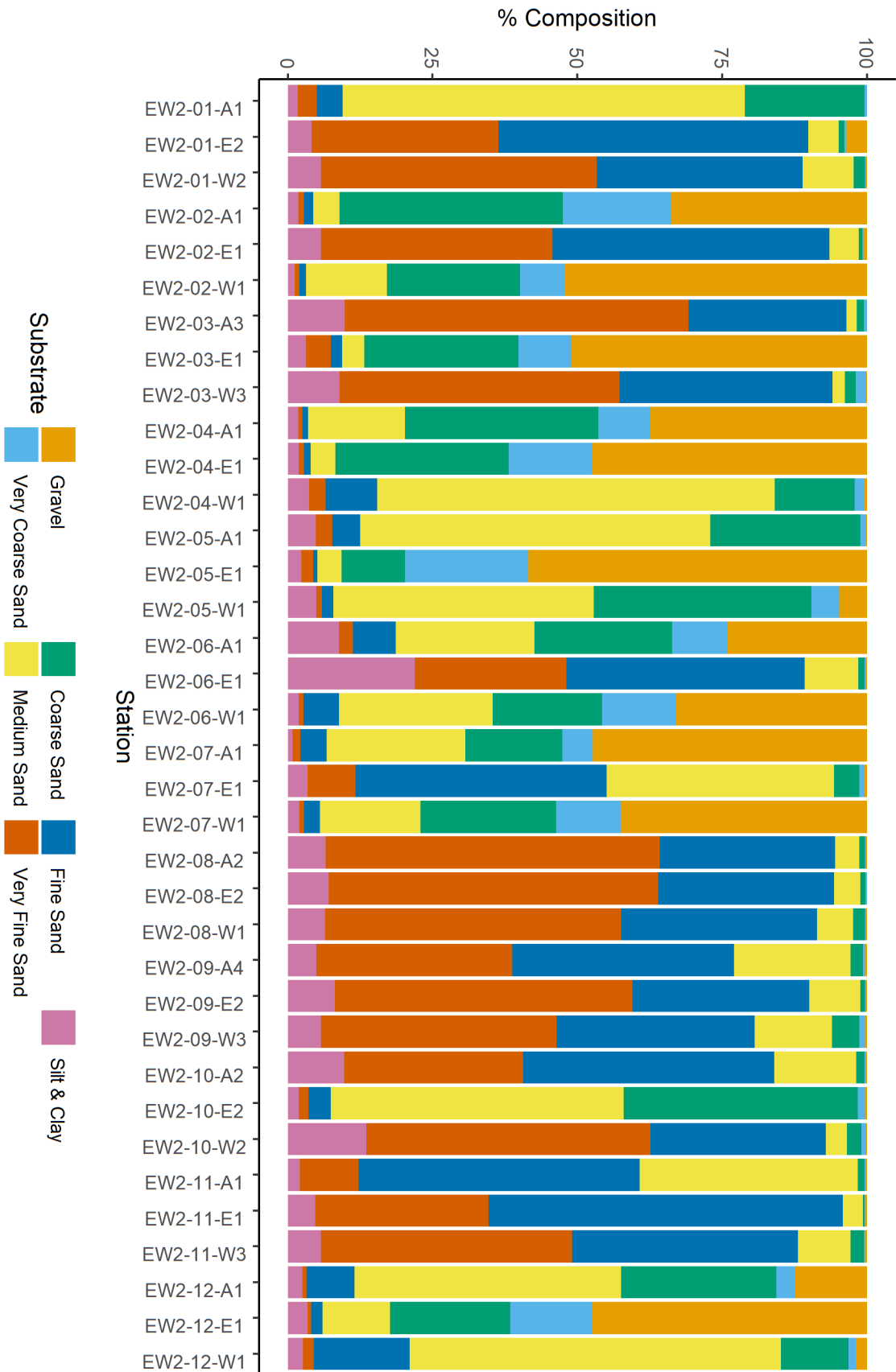


Figure 3-8. Grain size composition at each grab sample station collected along the EW2.

3.2.3 Benthic Community Analysis

3.2.3.1 Taxonomic Composition

Grab samples were attempted at 12 stations, with 3 replicate grabs taken at each station for a total of 36 samples for infaunal macroinvertebrate analysis. The 36 successful grab samples yielded a total of 3,084 individual organisms (i.e., per all 36 0.04 m² samples). Organisms collected in this survey area were from eight unique phyla comprising 55 families or NLPTL (Table 3-9). The Phyla Annelida, Arthropoda, and Mollusca dominated both the abundance and unique taxa in samples, representing 99% of all organisms and 91% of the taxa identified (Figure 3-9).

Sample abundance across the 36 benthic grab samples ranged from 2 organisms in EW2-12-A1 to 303 in EW2-07-E1 (Table 3-10). Polychaete worms from the family Polygordiidae had the highest abundance of any organism identified, with 736 identified in 18 of the 36 samples. Amphipods from the family Aoridae and Mussels from the family Mytilidae were also numerous with a total of 616 individuals identified in 13 samples and 519 individuals identified in 18 of the 36 samples respectively. The percent composition of each sample by phyla is shown in Figure 3-10 and abundance of unique taxa is presented in Table 3-11.

Table 3-9. Phyla present in the 36 benthic grab samples collected in the sampling area. The density values represent abundance summed across all 0.04 m² samples.

Phylum	Abundant Taxonomic Groups (common names)	Sample Abundance	Number of Families (or NLPTL)
Annelida	Polychaetae worms	1,673	22
Arthropoda	Amphipods, isopods, hermit crabs	803	18
Mollusca	Nut Clams, pyramid shells, slipper snails, tellins	599	10
Nemertea	Ribbon worms	4	1
Chordata	Sea squirts	1	1
Cnidaria	Sea anemones	2	1
Echinodermata	Sand dollars, sea urchins, sea cucumbers	1	1
Platyhelminthes	Flat worms	1	1
Total		3,084	55

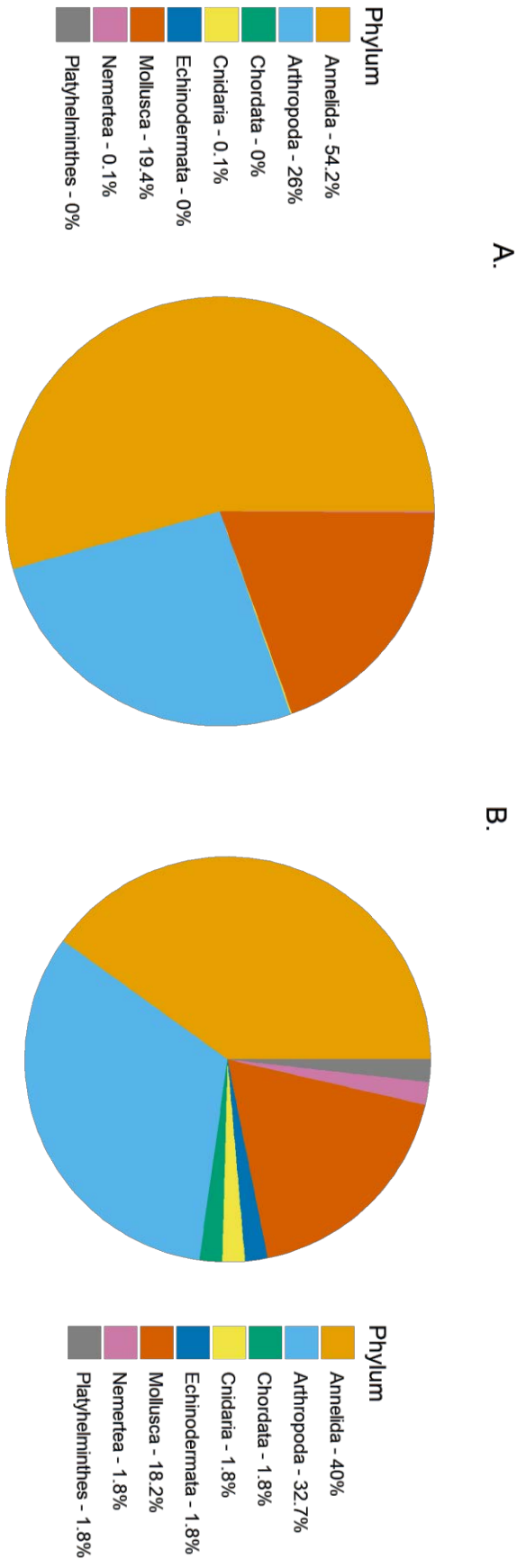


Figure 3-9. Proportional abundance (A) and proportion of unique taxa (family or NLP.TL) (B) for each phylum collected in all benthic grab samples in the sampling area. Results presented as percentage of total

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Table 3-10. Abundance of each Phylum counted within each grab sample collected in the sampling area (continued on next page).

Station	Annelida	Arthropoda	Chordata	Cnidaria	Echinodermata	Mollusca	Nemertea	Sipuncula	Sample Abundance (per 0.04 m ²)
EW2-01-A1	2	3	0	0	0	3	0	0	8
EW2-01-E2	4	7	0	0	0	11	2	0	24
EW2-01-W2	44	7	0	0	0	6	0	0	57
EW2-02-A1	41	2	0	0	0	1	0	0	44
EW2-02-E1	115	10	0	0	0	8	0	0	133
EW2-02-W1	41	1	0	0	0	1	0	0	43
EW2-03-A3	69	9	0	0	0	8	0	0	86
EW2-03-E1	130	0	0	0	0	0	0	0	130
EW2-03-W3	9	1	0	0	0	7	0	0	17
EW2-04-A1	100	1	0	0	0	0	0	0	101
EW2-04-E1	4	0	0	0	0	0	0	0	4
EW2-04-W1	12	48	0	0	0	1	0	0	61
EW2-05-A1	27	2	0	0	0	2	0	0	31
EW2-05-E1	224	31	0	0	0	0	0	0	255
EW2-05-W1	64	0	0	0	0	0	0	0	64
EW2-06-A1	97	64	0	0	0	4	0	0	165
EW2-06-E1	67	1	0	0	0	18	0	0	86
EW2-06-W1	24	11	1	0	0	2	0	0	38
EW2-07-A1	202	50	0	0	0	1	0	0	253
EW2-07-E1	3	300	0	0	0	0	0	0	303
EW2-07-W1	48	0	0	2	0	0	0	0	50
EW2-08-A2	52	7	0	0	1	186	0	0	246
EW2-08-E2	17	5	0	0	0	6	0	0	28
EW2-08-W1	12	2	0	0	0	25	0	0	39
EW2-09-A4	29	9	0	0	0	24	0	1	63
EW2-09-E2	48	11	0	0	0	163	0	0	222
EW2-09-W3	62	13	0	0	0	57	0	0	132
EW2-10-A2	18	2	0	0	0	6	0	0	26
EW2-10-E2	10	13	0	0	0	5	0	0	28
EW2-10-W2	45	5	0	0	0	44	0	0	94
EW2-11-A1	1	41	0	0	0	0	0	0	42
EW2-11-E1	7	6	0	0	0	5	0	0	18
EW2-11-W3	31	4	0	0	0	5	2	0	42
EW2-12-A1	0	2	0	0	0	0	0	0	2
EW2-12-E1	8	0	0	0	0	0	0	0	8
EW2-12-W1	6	135	0	0	0	0	0	0	141
Total	1,673	803	1	2	1	599	4	1	3,084

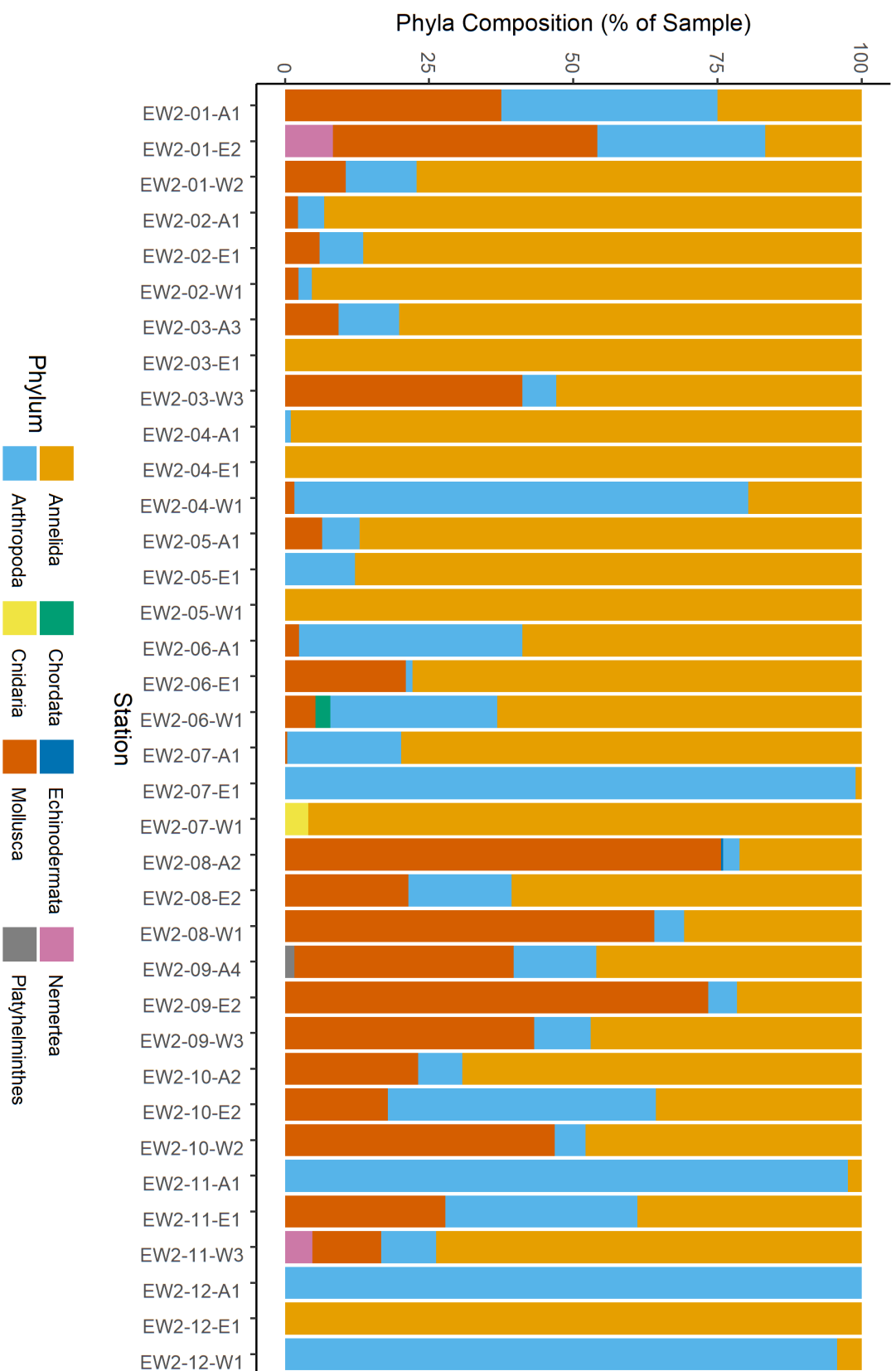


Figure 3-10. Percent composition of organisms in each represented phylum for the 36 benthic grab samples collected in the sampling area.

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Table 3-11. Abundance of each phylum and taxon (family or NLPTL) across all grab samples (continued on next page).

Phylum	Family or NLPTL	Abundance Across All Samples	Mean Abundance per 0.04 m ²	Median Abundance per 0.04 m ²	Frequency of Occurrence
Annelida	Ampharetidae	49	1.4	0	11
	Capitellidae	428	11.9	0	16
	Chaetopteridae	1	0	0	1
	Cirratulidae	132	3.7	0.5	18
	Enchytraeidae	58	1.6	0	9
	Flabelligeridae	2	0.1	0	2
	Glyceridae	7	0.2	0	6
	Magelonidae	2	0.1	0	2
	Naididae	69	1.9	0	14
	Nephtyidae	40	1.1	0	15
	Oeonidae	4	0.1	0	4
	Onuphidae	16	0.4	0	7
	Orbiniidae	2	0.1	0	2
	Paraonidae	10	0.3	0	5
	Phyllodocidae	11	0.3	0	5
	Polygordiidae	736	20.4	0	15
	Polynoidae	1	0	0	1
	Sigalionidae	4	0.1	0	4
	Spionidae	58	1.6	0.5	18
	Syllidae	31	0.9	0	11
Arthropoda	Terebellidae	10	0.3	0	5
	Travisidae	2	0.1	0	1
	Ampeliscidae	9	0.2	0	2
	Amphipoda	35	1	0	4
	Ancinidae	20	0.6	0	12
	Aoridae	616	17.1	0	13
	Bodotriidae	12	0.3	0	2
	Chaetiliidae	6	0.2	0	3
	Cirolanidae	2	0.1	0	1
	Corophiidae	1	0	0	1
	Cumacea	6	0.2	0	1
	Diastylidae	2	0.1	0	2
	Haustoriidae	42	1.2	0	9
	Idoteidae	23	0.6	0	8
	Oedicerotidae	10	0.3	0	6
	Ovalipidae	1	0	0	1
	Paguridae	1	0	0	1
	Photidae	2	0.1	0	2
	Phoxocephalidae	13	0.4	0	9
	Pinnotheridae	2	0.1	0	1
Chordata	Perophoridae	1	0	0	1
Cnidaria	Actinaria	2	0.1	0	1
Echinodermata	Echinarachniidae	1	0	0	1
Mollusca	Bivalvia	7	0.2	0	1
	Calyptraeidae	1	0	0	5
	Donacidae	2	0.1	0	1
	Mactridae	9	0.2	0	1
	Mytilidae	519	14.4	0.5	7
	Nassariidae	4	0.1	0	18
	Naticidae	4	0.1	0	2
	Nuculidae	1	0	0	1
	Solenidae	13	0.4	0	1
	Tellinidae	39	1.1	0	8
Nemertea	Nemertea	4	0.1	0	14
Platyhelminthes	Polycladida	1	0	0	2

3.2.3.2 Richness, Diversity, and Evenness

Mean density was 86 organisms per sample, averaged across 36 sample sites in the sampling area (Table 3-12). Taxonomic richness was 1.93, on average, with individual samples ranging from 0 at EW2-05-W1 and EW2-12-A1 to 3.71 at EW2-01-W2 (Figure 3-11). Average diversity across the individual grab samples was 1.28 with a range from 0 at EW2-05-W1 and EW2-12-A1 to 2.08 at EW2-06-W1. Evenness ranged from 0 at EW2-05-W1 and EW2-12-A1 to 0.95 at EW2-01-A1, which consisted of eight organisms from four families (or NLPTL). Mean evenness across the 36 samples was 0.60. Richness, diversity, and evenness are unitless indices; however, higher values indicate greater amounts of richness, diversity, or evenness in each sample.

Table 3-12. Community composition parameters calculated for each grab sample station (continued on next page).

Station	Sample Abundance (per 0.04 m ²)	Number of Families (or NLPTL)	Ecological Indices		
			Richness	Diversity	Evenness
EW2-01-A1	8	4	1.44	1.32	0.95
EW2-01-E2	24	10	2.83	1.99	0.86
EW2-01-W2	57	16	3.71	1.80	0.65
EW2-02-A1	44	8	1.85	1.55	0.75
EW2-02-E1	133	15	2.86	1.36	0.50
EW2-02-W1	43	7	1.60	1.42	0.73
EW2-03-A3	86	14	2.92	1.48	0.56
EW2-03-E1	130	3	0.41	0.09	0.08
EW2-03-W3	17	9	2.82	2.00	0.91
EW2-04-A1	101	4	0.65	0.24	0.18
EW2-04-E1	4	2	0.72	0.56	0.81
EW2-04-W1	61	6	1.22	1.25	0.70
EW2-05-A1	31	4	0.87	0.78	0.56
EW2-05-E1	255	4	0.54	0.75	0.54
EW2-05-W1	64	1	0.00	0.00	0.00
EW2-06-A1	165	11	1.96	1.80	0.75
EW2-06-E1	86	14	2.92	1.76	0.67
EW2-06-W1	38	12	3.02	2.15	0.87
EW2-07-A1	253	10	1.63	1.26	0.55
EW2-07-E1	303	6	0.88	0.18	0.10
EW2-07-W1	50	7	1.53	1.47	0.76
EW2-08-A2	246	16	2.72	1.07	0.39
EW2-08-E2	28	11	3.00	1.93	0.81
EW2-08-W1	39	10	2.46	1.56	0.68
EW2-09-A4	63	14	3.14	1.91	0.73
EW2-09-E2	222	15	2.59	1.15	0.43
EW2-09-W3	132	13	2.46	1.59	0.62
EW2-10-A2	26	8	2.15	1.77	0.85
EW2-10-E2	28	9	2.40	1.76	0.80
EW2-10-W2	94	14	2.86	1.63	0.62
EW2-11-A1	42	6	1.34	1.07	0.60
EW2-11-E1	18	9	2.77	2.04	0.93
EW2-11-W3	42	13	3.21	1.78	0.69
EW2-12-A1	2	1	0.00	0.00	0.00
EW2-12-E1	8	4	1.44	1.21	0.88
EW2-12-W1	141	4	0.61	0.22	0.16

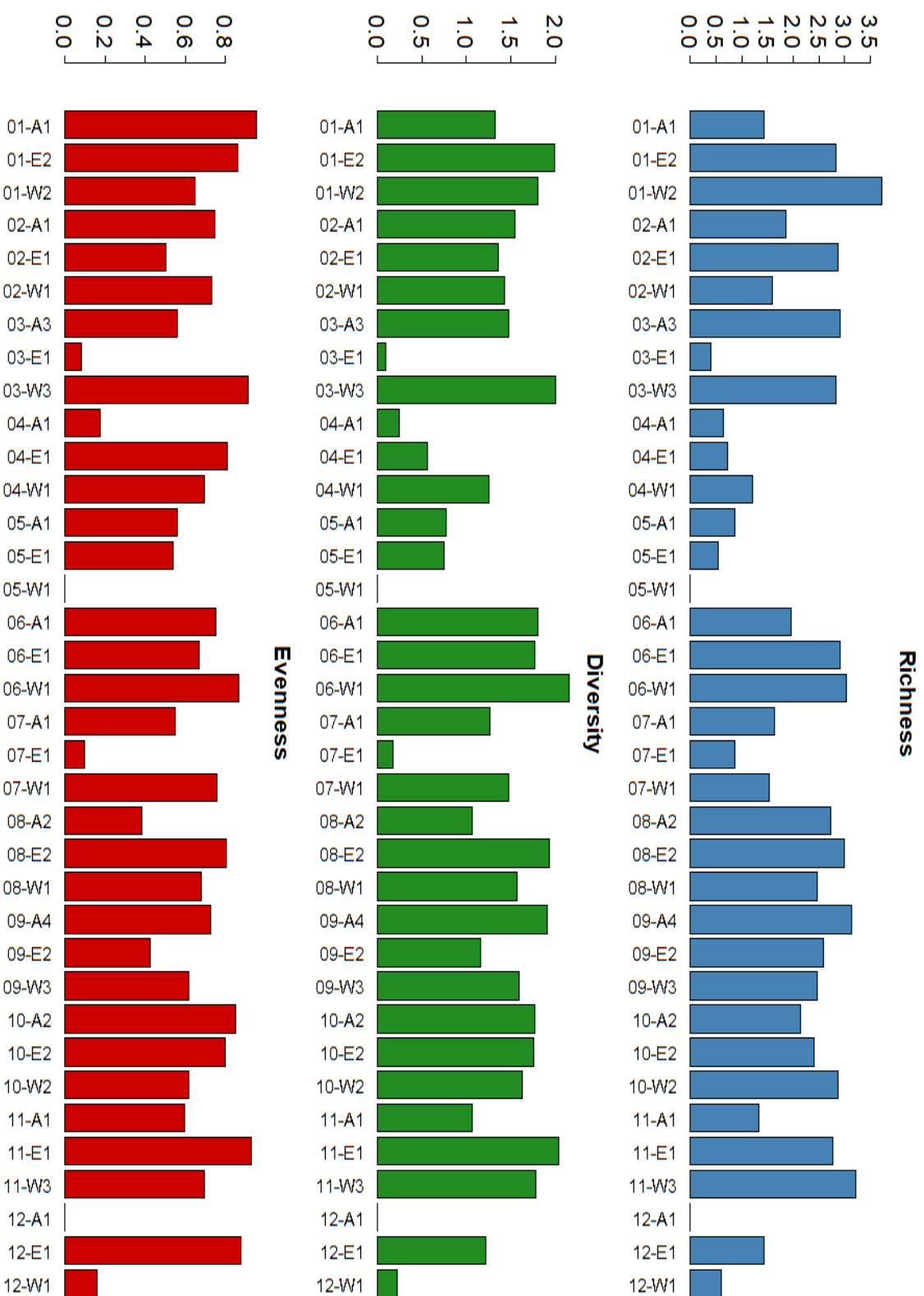


Figure 3-11. Ecological index values calculated for each sample station in the sampling area.

4 CMECS CLASSIFICATIONS

4.1 Video Transects

4.1.1 Substrate Component

For underwater video transects, each still image taken along the transect during the percent cover analysis was assigned a CMECS substrate classification following NMFS modifications (NMFS, 2021). In addition to substrate classes, the density of shell and flora/fauna cover were calculated for each still image and summarized at the transect level. Representative images of different CMECS classifications are presented in Table 4-3. Maps displaying the location and CMECS classification of each still image analyzed from the video transects are provided in Appendix D.

Across the five video transects, a total of 370 still images were assigned a CMECS classification, covering an area of ~210 m². The number of still images classified as geologic origin, unconsolidated, fine substrate of sand/mud size (242) was far greater than any other CMECS group, composing 117 m² of the analyzed area (Table 4-1, Table 4-2, Figure 4-1). Of the five transects, one was composed only of stills classified as sand/mud, indicating substrate homogeneity within that transect line. The sand/mud CMECS group is not considered complex under the NMFS guidelines (NMFS, 2021); therefore 56% of the area analyzed along the EW2 ECR is not classified as complex.

Complex habitat includes those with ≥ 5% of gravel-sized particles (> 2 mm), those dominated by biogenic origin shell substrates, or those with a substantial amount of biological activity or presence. Gravel mixes of pebble/granule and sand/mud (< 80% and ≥ 30% gravel) were classified in 73 still images for a total of 53 m² from 3 transects, with EW2-02 containing the most by area (27 m²). Gravelly sand/mud (< 30% and ≥ 5% gravel) was classified in 55 images across 4 transects for a total of (40 m²), with only a gravel type of pebble/granule.

In addition to the main CMECS substrate component, which is the substrate comprising the majority of the surface area in each still, secondary or co-occurring substrate classifications were assigned for other substrate origin types present in each image (e.g., geologic, biogenic, or anthropogenic). Biogenic shell substrate was the most frequent co-occurring substrate type, classified as a secondary CMECS group in 183 (~50%) of still images at the sparse and trace cover densities with the majority classified as shell hash 96% (Table 4-1, Table 4-2, Figure 4-2). Decorator worm tubes (small strands of sand and shell particles fused together) occurred in three transects (EW2-02, -07, -12) with the majority occurring along the EW2-07 transect line in 16 still images.

The area of the biological elements recorded in the percent cover analysis was summarized to approximate the density of flora/fauna cover for each still image along the transect. Higher densities of flora/fauna suggest the presence of potentially greater complex habitat due to greater biological activity (e.g., burrows,

megafauna) or the occurrence of additional structure in the environment (e.g., infaunal structures, encrusting organisms, algae). Nearly all of the still images analyzed across all five transects contained zero to sparse (< 30%) flora/fauna cover (Figure 4-1), and half of the flora/fauna cover was due to moderate coverage of a floating green algae (*Ulva* spp.) along the EW2-11 transect. Representative images of CMECS substrate types are in Table 4-3.

Table 4-1. The number of stills and total area (m²) classified to each combination of main CMECS substrate component and secondary/co-occurring substrate groups for each of the five video transects in the sampling area. Abbreviations are as follows: S/M = Sand/Mud, B = Boulder, C = Cobble, and P/G = Pebble/Granule. All substrate component groups except sand/mud/shell mix and sand/mud are considered 'complex' habitat by NMFS (2021).

Main and Co-Occurring CMECS Substrate Group Combinations	Number of Stills per Group	Percent of Stills per Group (%)	Area of Stills Classified to Group (m ²)	Percent of Area Classified to Group (%)
Gravel Mixes – Pebble/Granule with S/M	31	8.38	19.86	9.46
Gravel Mixes – Pebble/Granule with S/M and Sparse Shell Hash	23	6.22	17.89	8.52
Gravel Mixes - Pebble/Granule with S/M and Sparse Shell Rubble	1	0.27	0.82	0.39
Gravel Mixes - Pebble/Granule with S/M and Trace Shell Hash	16	4.32	13.33	6.35
Gravel Mixes - Pebble/Granule with S/M and Trace Shell Rubble	2	0.54	0.74	0.35
Gravelly Sand/Mud with P/G	26	7.03	22.30	10.62
Gravelly Sand/Mud with P/G and Sparse Shell Hash	16	4.32	11.68	5.57
Gravelly Sand/Mud with P/G and Trace Shell Hash	12	3.24	5.26	2.50
Gravelly Sand/Mud with P/G and Trace Shell Rubble	1	0.27	0.27	0.13
Sand/Mud	130	35.14	62.74	29.89
Sand/Mud with Sparse Shell Hash	60	16.22	30.05	14.31
Sand/Mud with Trace Shell Hash	49	13.24	23.29	11.09
Sand/Mud with Trace Shell Rubble	3	0.81	1.70	0.81
Totals	370	100	209.92	100

Table 4-2. Area (m²) classified to main CMECS substrate component groups for each of the five video transects in the sampling area. Abbreviations are as follows: S/M = Sand/Mud, B = Boulder, C = Cobble, and P/G = Pebble/Granule. All substrate component groups except sand/mud/shell mix and sand/mud are considered 'complex' habitat by NMFS (2021).

Transect	Biogenic Shell Rubble	Biogenic Shell Hash	Gravel		Gravel Mixes with P/G	Gravelly Sand/Mud			Sand/Mud
			C	P/G		with B	with C	with P/G	
EW2-02	0	0	0	0	26.80	0	0	15.99	2.92
EW2-06	0	0	0	0	0	0	0	1.44	20.30
EW2-07	0	0	0	0	0.51	0	0	9.43	55.97
EW2-11	0	0	0	0	0	0	0	0	26.05
EW2-12	0	0	0	0	25.3	0	0	12.65	12.53
Total Area per Main CMECS (m²)	0	0	0	0	52.64	0	0	39.51	117.77

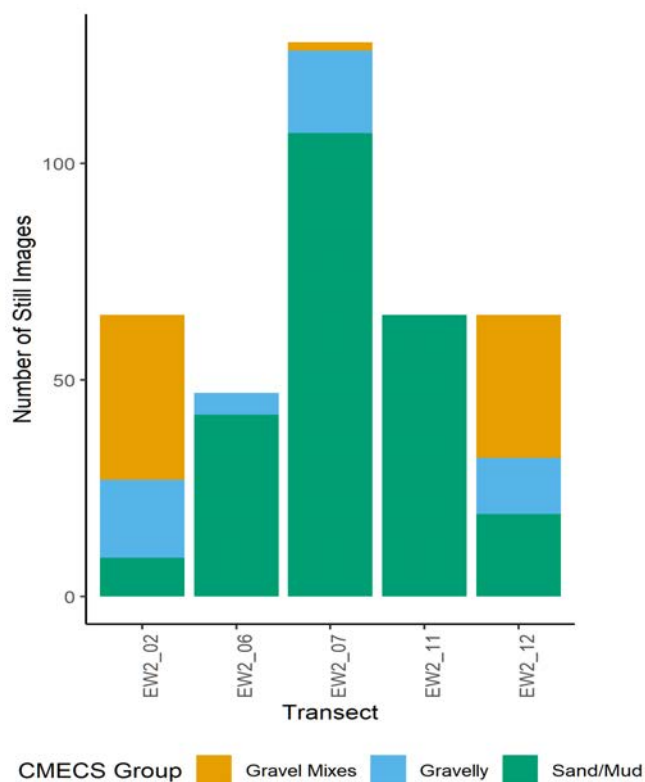


Figure 4-1. The number of still images classified to CMECS substrate component groups/classes in each transect

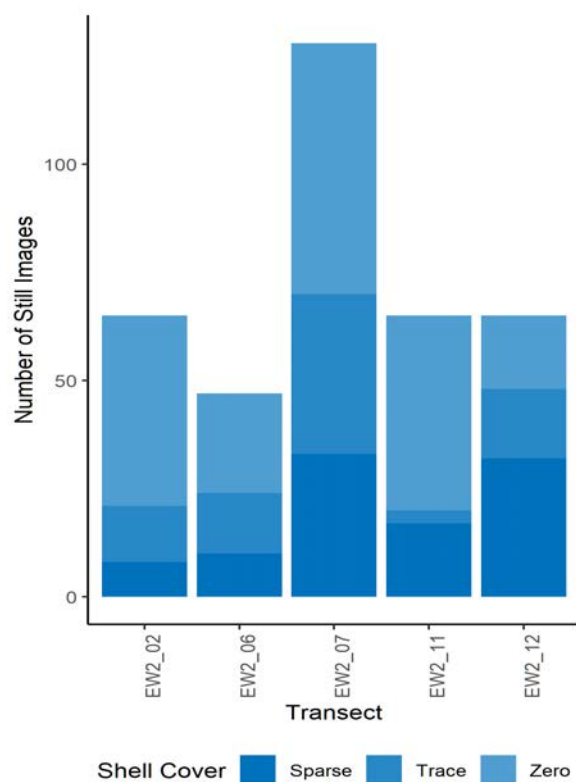


Figure 4-2. The number of still images classified to shell cover density. Trace is <2%, Sparse is 2 to <30% cover.

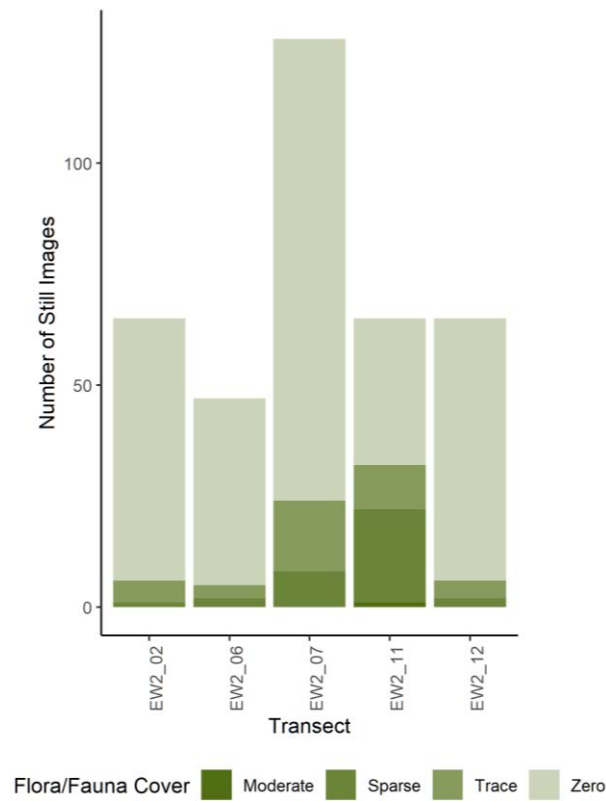
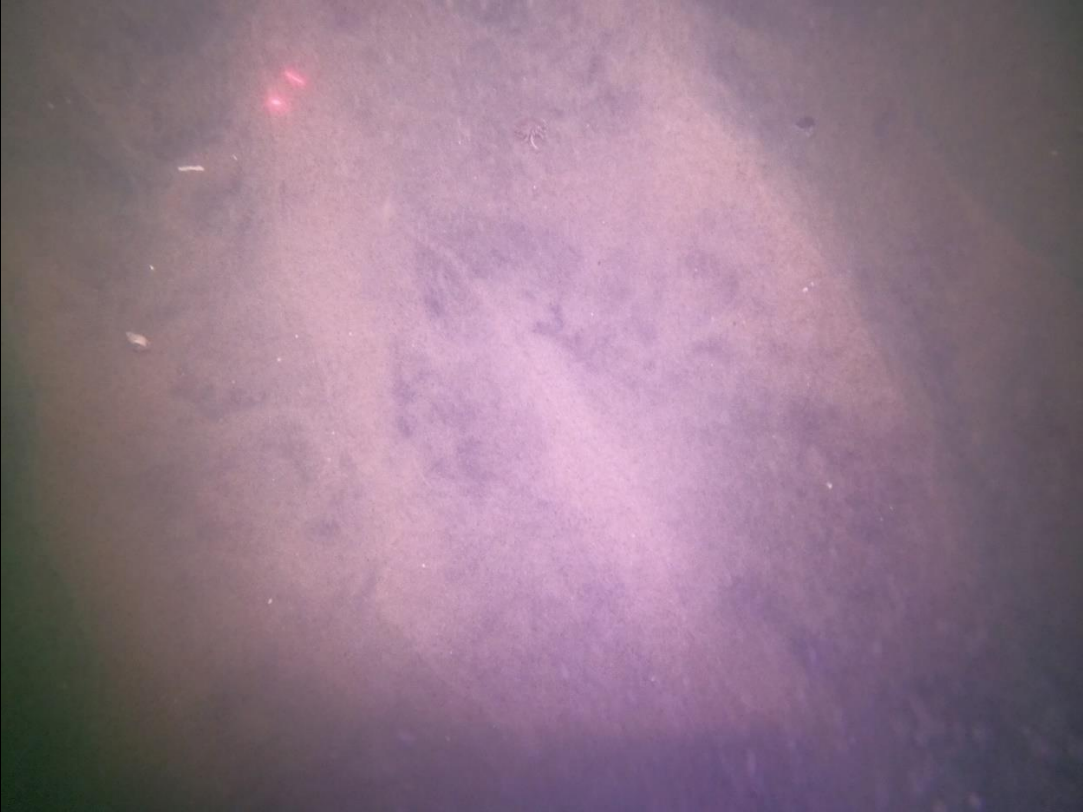
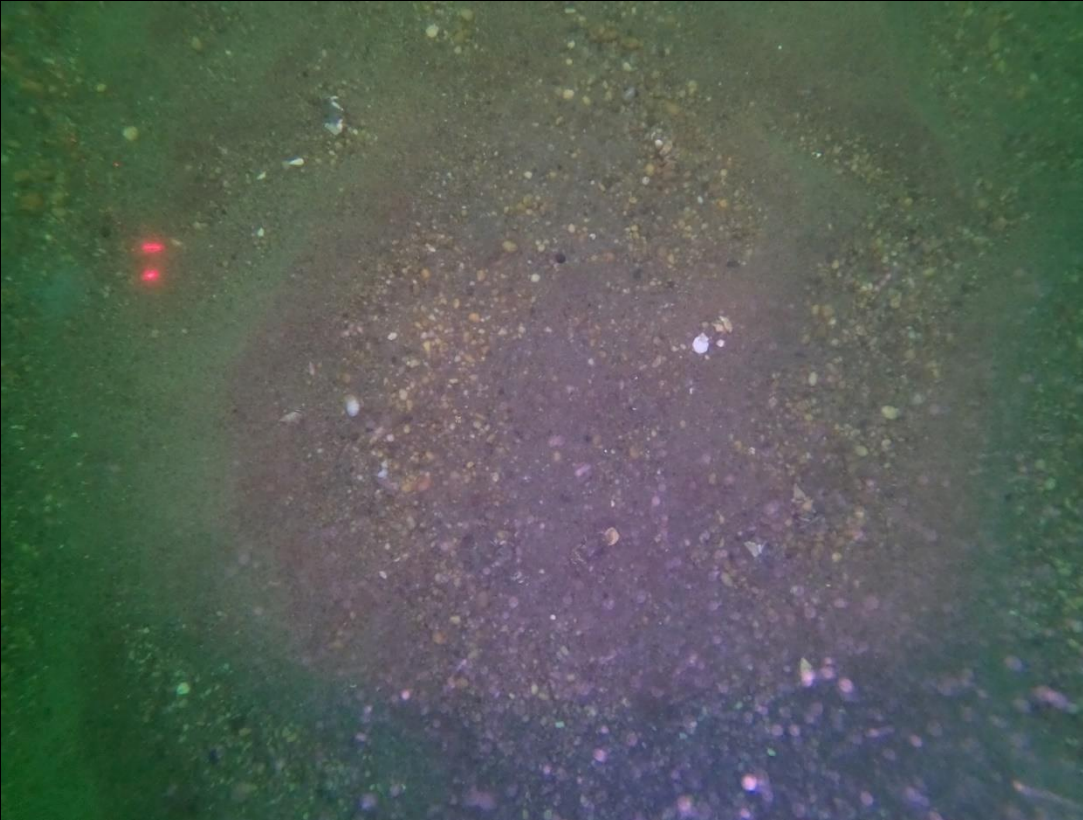
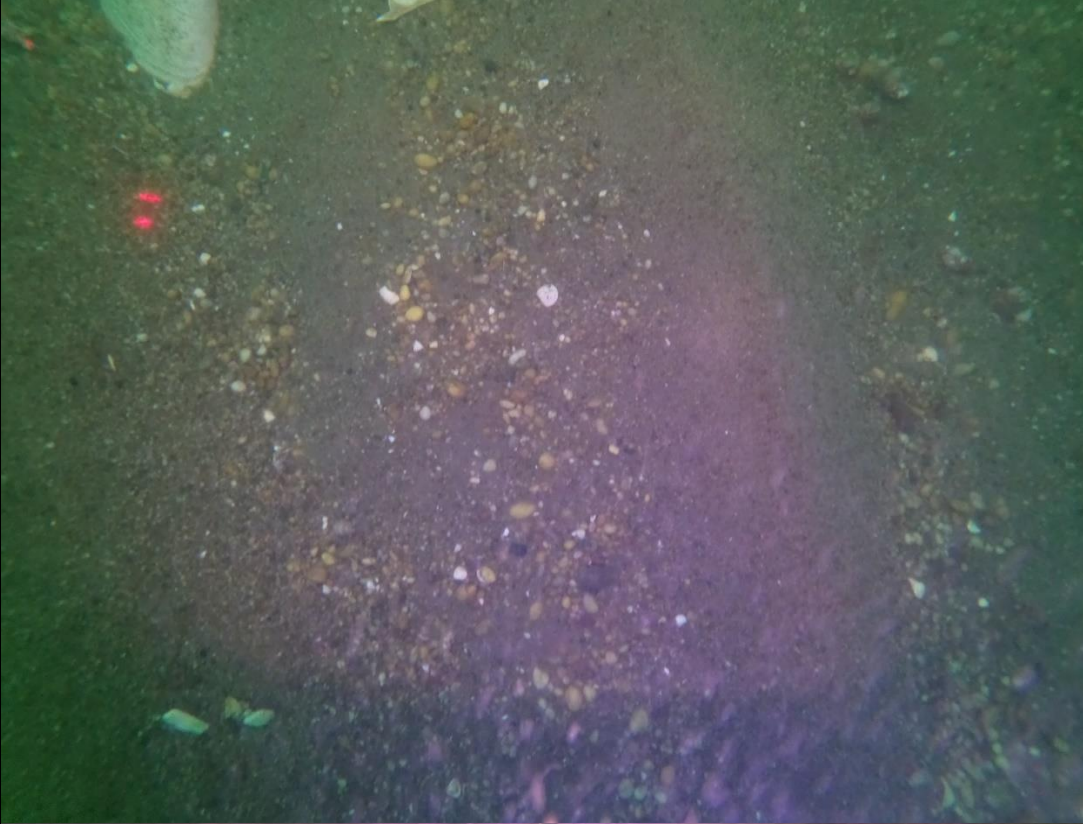


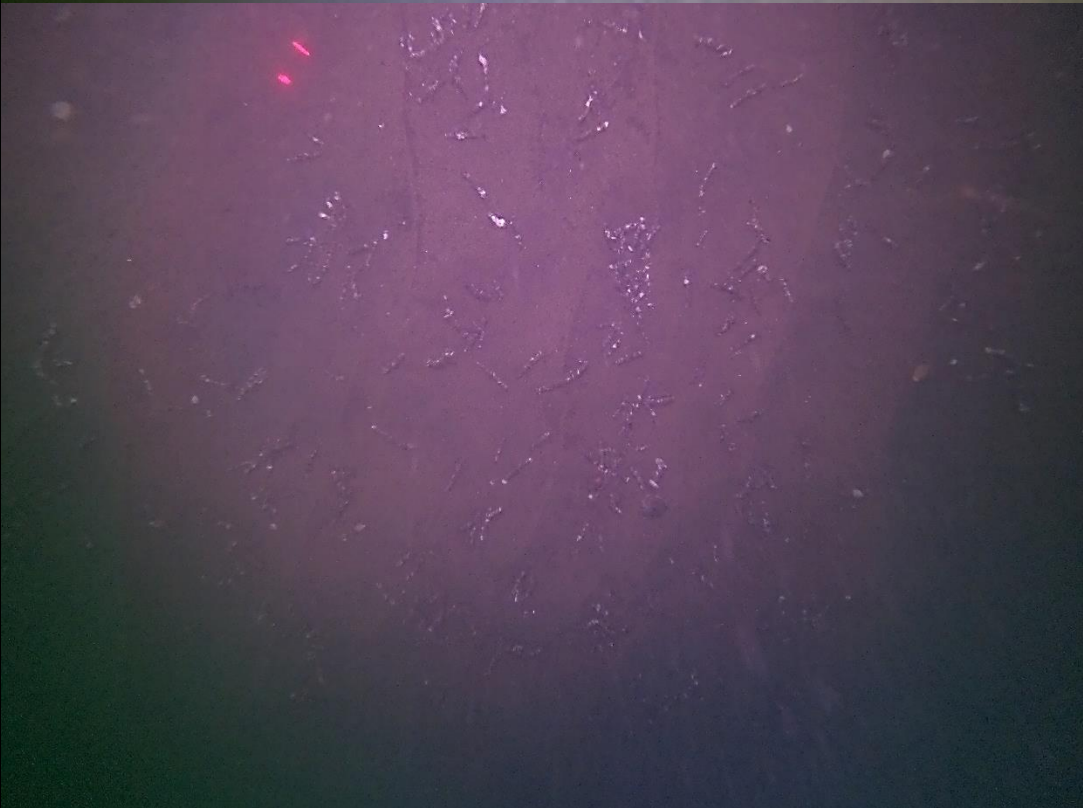
Figure 4-3. The number of still images classified to each flora/fauna density category within each video. Trace is < 2%. Sparse is 2 to < 30%, Moderate is 30 to < 70%, Dense is 70 to < 90%, and Complete is 90 to 100% cover.

Table 4-3. Representative still images of various habitat types observed in the sampling area. Still number in parenthesis. Abbreviations are as follows: S/M = Sand/Mud, B = Boulder, C = Cobble, and P/G = Pebble/Granule.

Geologic Unconsolidate d Fine Sand/Mud EW2-UWV-07- 1(still 101)	
Geologic Unconsolidate d Coarse Gravelly Sand/Mud EW2-UWV-02- 1 (still 30)	

Geologic Unconsolidate d Coarse Gravelly Sand/Mud with P/G Trace Shell Hash EW2-UWV-06- 2 (still 119)	
Geologic Unconsolidate d Coarse Gravel Mixes Sandy/Muddy Gravel EW2-UWV-02- 1 (still 3)	

Geologic Unconsolidate d Coarse Gravel Mixes Sandy/Muddy Gravel Sparse Shell Rubble EW2-UWV- 02-1 (still 29)	
Geologic Unconsolidate d Fine Sand/Mud With >30% Cover of Algae EW2-UWV-11- 2 (Still 66)	

Geologic Unconsolidate d Fine Sand/Mud Sparse Shell Hash Sparse Flora/Fauna EW2-UWV-11- 2 (Still 120)	
Geologic Unconsolidate d Fine Sand/Mud Sparse Flora/Fauna (Decorator Worm Tubes) EW2-UWV-07- 1 (Still 182)	

4.1.2 Biotic Component

The biotic component classifications all fell under the “faunal bed with soft sediment fauna” CMECS category (Table 4-4). Mobile mollusks, represented by only moon snails, defined the biotic group for all transects but EW2-07. Transect EW2-07 contained a diverse array of organisms, including moon snails, burrowing anemones, crabs, and many unidentifiable organisms. Transects EW2-02, EW2-07, and EW2-12 contained *Diopatra* beds or individuals.

Table 4-4. CMECS hierarchical biotic classifications based on percent cover analysis of still images and enumeration of flora/fauna summarized at the transect level.

Transect	Biotic Setting	Biotic Class	Biotic Subclass	Biotic Group	Co-occurring Biotic Group
EW2-UWV-02-1	Benthic Biota	Faunal Bed	Soft Sediment Fauna	Mobile Mollusks	Burrowing Anemones
EW2-UWV-06-2	Benthic Biota	Faunal Bed	Soft Sediment Fauna	Mobile Mollusks	Burrowing Anemones
EW2-UWV-07-1	Benthic Biota	Faunal Bed	Soft Sediment Fauna	Diverse Epifauna	
EW2-UWV-11-02	Benthic Biota	Faunal Bed	Soft Sediment Fauna	Mobile Mollusks	Mobile Crustaceans
EW2-UWV-12-1	Benthic Biota	Faunal Bed	Soft Sediment Fauna	Mobile Mollusks	Burrowing Anemones/ Diverse Epifauna

4.2 Grab Sample Stations

We assigned NMFS (2021) modified CMECS classifications to each benthic grab sample station based on visual inspection of the sample once on board the survey vessel, laboratory analysis of grain size, and still image point count analysis for grabs with insufficient sediment recovery and those with substantial amounts of shell cover based on the imagery collected prior to grab deployment. Substrate classification results are presented in geographic context in Figure 4-4 and as a hierarchy in Table 4-5. Biotic component classification results are presented in Table 4-6.

4.2.1 Substrate Component

Sediment grab samples were dominated by fine unconsolidated substrate of geologic origin, with 58% of samples classified as medium sand or finer (Figure 4-4 and Table 4-5). The most abundant classification was Fine/Very Fine Sand for 16 of the 36 total samples (44%), and the average d50 was 0.14 mm. There were no failed grab stations that required image analysis and all CMECS classifications were made based on the Terrasense lab data.

There were 12 samples which contained $\geq 5\%$ gravel that designates them as complex habitat according to the NMFS (2021) modified CMECS classifications, and no cobbles or boulders were present in any samples. These samples equate to 33% of the grab samples, two samples were classified as either gravelly muddy sand or gravelly sand containing $<30\%$ gravel. The remaining ten samples were classified as sandy gravel containing $\geq 30\%$ gravel (EW2-02-A1, EW2-02-W1, EW2-03-E1, EW2-04-A1, EW2-04-E1, EW2-05-E1, EW2-06-W1, EW2-07-A1, EW2-07-W1, EW2-12-E1). Six samples were classified as medium sand, and two samples were classified as muddy sand.

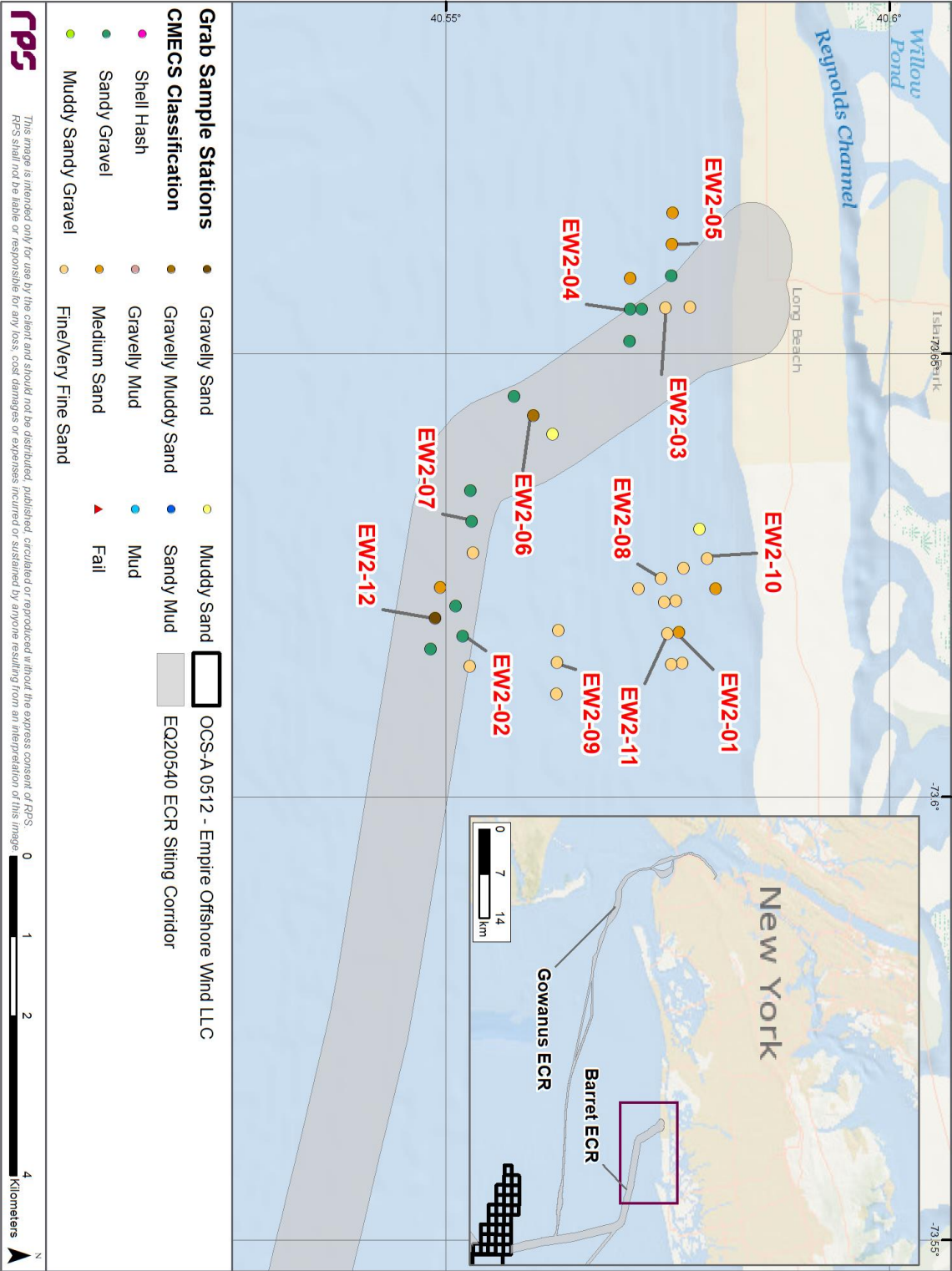
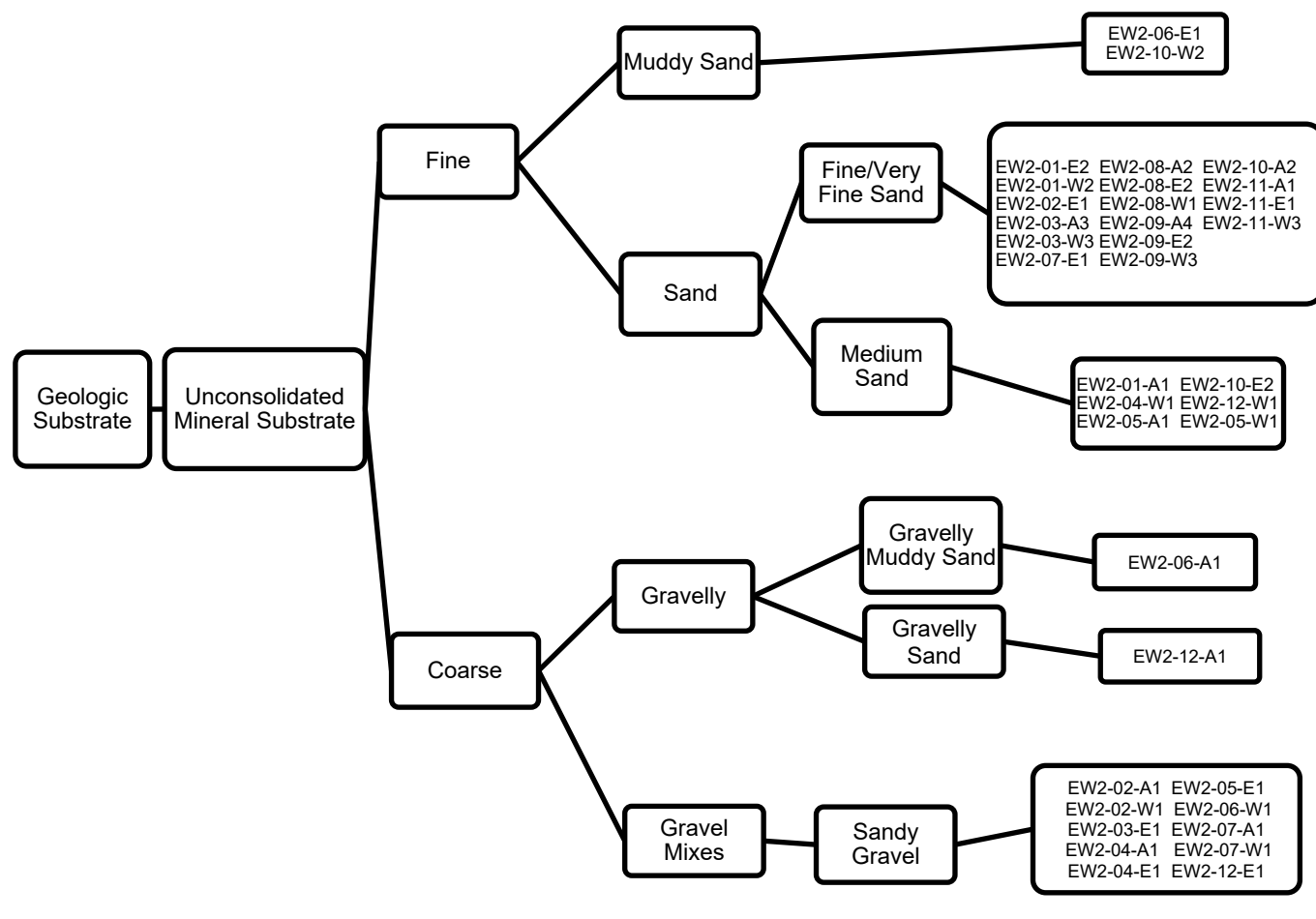


Figure 4-4. CMECS classification designated for each benthic grab sample collected in the project area. Point colors indicate different CMECS substrates.

Table 4-5. CMECS hierarchical classification of substrates collected at each grab sample along EW2.

Origin	Class	Subclass	Group	Subgroup	Grab Sample
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4.2.2 Biotic Component

The CMECS biotic component classification for each successful grab sample collected in the survey area is presented in the table below (Table 4-6). The subclass was soft sediment fauna for all 36 benthic grab stations. The biotic group of most samples (69%) was small surface-burrowing fauna, which included a diverse number of annelid worms, amphipods, and isopods. Many small mussels were observed in four grab samples, which often also included a mix of surface burrowing and small-tube building organisms.

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Table 4-6. CMECS classification of the biotic component of the seabed and the dominant taxa as derived from the lab analysis at each benthic grab sample.

Sample Site	Biotic Setting	Biotic Class	Biotic Subclass	Biotic Group	Co-Occurring Biotic Group	Biotic Community
EW2-01-A1	Benthic biota	Faunal bed	Soft sediment fauna			
EW2-01-E2	Benthic biota	Faunal bed	Soft sediment fauna	Small surface-burrowing fauna		
EW2-01-W2	Benthic biota	Faunal bed	Soft sediment fauna	Small surface-burrowing fauna		
EW2-02-A1	Benthic biota	Faunal bed	Soft sediment fauna	Small surface-burrowing fauna	Small tube-building fauna	
EW2-02-E1	Benthic biota	Faunal bed	Soft sediment fauna	Small surface-burrowing fauna	Small tube-building fauna	Capitellid Bed
EW2-02-W1	Benthic biota	Faunal bed	Soft sediment fauna	Small surface-burrowing fauna		
EW2-03-A3	Benthic biota	Faunal bed	Soft sediment fauna	Small surface-burrowing fauna		Capitellid Bed
EW2-03-E1	Benthic biota	Faunal bed	Soft sediment fauna	Small surface-burrowing fauna		
EW2-03-W3	Benthic biota	Faunal bed	Soft sediment fauna	Small surface-burrowing fauna		
EW2-04-A1	Benthic biota	Faunal bed	Soft sediment fauna	Small surface-burrowing fauna		
EW2-04-E1	Benthic biota	Faunal bed	Soft sediment fauna			
EW2-04-W1	Benthic biota	Faunal bed	Soft sediment fauna	Small surface-burrowing fauna		
EW2-05-A1	Benthic biota	Faunal bed	Soft sediment fauna	Small tube-building fauna		
EW2-05-E3	Benthic biota	Faunal bed	Soft sediment fauna	Small surface-burrowing fauna		
EW2-05-W1	Benthic biota	Faunal bed	Soft sediment fauna	Small surface-burrowing fauna		
EW2-06-A1	Benthic biota	Faunal bed	Soft sediment fauna	Small surface-burrowing fauna		
EW2-06-E1	Benthic biota	Faunal bed	Soft sediment fauna	Small surface-burrowing fauna	Diverse Soft Sediment Epifauna	
EW2-06-W1	Benthic biota	Faunal bed	Soft sediment fauna	Small surface-burrowing fauna		
EW2-07-A1	Benthic biota	Faunal bed	Soft sediment fauna	Small surface-burrowing fauna		
EW2-07-E1	Benthic biota	Faunal bed	Soft sediment fauna	Small surface-burrowing fauna		
EW2-07-W1	Benthic biota	Faunal bed	Soft sediment fauna	Small surface-burrowing fauna		
EW2-08-A2	Benthic biota	Faunal bed	Soft sediment fauna	Mussel bed	Diverse Soft Sediment Epifauna	
EW2-08-E2	Benthic biota	Faunal bed	Soft sediment fauna	Small surface-burrowing fauna		
EW2-08-W1	Benthic biota	Faunal bed	Soft sediment fauna	Mussel bed		
EW2-09-A4	Benthic biota	Faunal bed	Soft sediment fauna	Small surface-burrowing fauna	Mussel bed	
EW2-09-E2	Benthic biota	Faunal bed	Soft sediment fauna	Mussel bed	Diverse Soft Sediment Epifauna	
EW2-09-W3	Benthic biota	Faunal bed	Soft sediment fauna	Small surface-burrowing fauna	Mussel bed	
EW2-10-A2	Benthic biota	Faunal bed	Soft sediment fauna	Small tube-building fauna		
EW2-10-E2	Benthic biota	Faunal bed	Soft sediment fauna	Small surface-burrowing fauna		
EW2-10-W2	Benthic biota	Faunal bed	Soft sediment fauna	Mussel bed	Diverse Soft Sediment Epifauna	
EW2-11-A1	Benthic biota	Faunal bed	Soft sediment fauna	Small surface-burrowing fauna		
EW2-11-E1	Benthic biota	Faunal bed	Soft sediment fauna			
EW2-11-W3	Benthic biota	Faunal bed	Soft sediment fauna	Small surface-burrowing fauna		
EW2-12-A1	Benthic biota	Faunal bed	Soft sediment fauna			
EW2-12-E1	Benthic biota	Faunal bed	Soft sediment fauna			
EW2-12-W1	Benthic biota	Faunal bed	Soft sediment fauna	Small surface-burrowing fauna		

5 SUMMARY

RPS was contracted by Alpine to collect, process, analyze, and compile benthic data collected with a towed video sled and grab sampler in the Barret ECR associated with Equinor's Lease Area OCS-A 0512, offshore of Long Island, New York. In total, five transects were surveyed and 36 grab samples collected to classify seafloor habitats and document species abundance in the project area. The CMECS hierarchical system has classification thresholds based primarily on the percent and composition of gravel particles (> 2 mm) to identify substrates that may be considered "complex" by NMFS for the purposes of essential fish habitat mapping. CMECS classifications were generated using both visual analysis of stills taken from video transects and analysis of sediment grain size lab results.

Organism Abundances

The 2.5 hours of video from five transects were reviewed and a total of 139 organisms from 5 phyla were identified. Most organisms observed were invertebrates which totaled 112 or 81% and 14 vertebrates were also observed. The rest of the observations were unidentifiable. The most numerous organisms were moon snails at 63% of all organisms. Amongst vertebrates, the most numerous observations were 8 instances of little or winter skate.

The 36 successful grab samples yielded a total of 3,084 individual organisms per all 0.04 m² samples. Organisms collected in this survey area were from 8 unique phyla comprising 55 families or NLPTL. The Phyla Annelida, Arthropoda, and Mollusca, dominated both the abundance and unique taxa in samples, representing 9%% of all organisms and 91% of the taxa identified respectively. The phylum Annelida was most abundant comprising 54% of all organisms identified followed by Arthropoda with 26%. Polychaete worms from the family Polygordiidae had the highest abundance of any organism identified, with 736 identified in 18 of the 36 samples. On average, 86 organisms were identified, and 13 families were identified per sample. Average taxonomic richness was 1.94, average diversity was 1.27, and average evenness was 0.60.

CMECS Classifications

A total of 370 still images with a combined area of ~210 m² were analyzed for CMECS substrate component classification using point count methods. Geologic origin, unconsolidated, fine sand/mud was by far the most common classification with 65% of stills and 56% of total area analyzed. The sand/mud CMECS group is not considered complex under the NMFS guidelines (NMFS, 2021), therefore 56% of the area analyzed is not complex. Complex substrate in the form of gravelly and gravel mixes as the main CMECS classification occurred in 92 m² or 44% of the analyzed area. Gravel mixes with sand/mud were classified in 73 images and 52.6 m² from 3 transects. Gravelly sand/mud was classified in 55 images and 39.6 m²

from 4 transects. Pebble/granule was the only gravel size throughout. Biogenic shell substrates (also considered complex) were not identified as the main substrate component in any transect.

The CMECS biotic component along the video transects was consistently classified as faunal beds across three transects. These faunal beds were soft sediment fauna. The three soft sediment fauna subclass transects were distinguished by the presence of *Diopatra* spp. One transect had instances of floating/suspended macroalgae (*Ulva lactuca*).

Sediment analysis of grab samples showed a predominance of fine unconsolidated substrate of geologic origin, with 58% of the 36 total samples classified as medium sand or finer. 12 of the 36 total grab samples, contained $\geq 5\%$ gravel and would be designated as complex habitat according to the NMFS (2021) modified CMECS classifications (the rest being classified as varieties of sand, silt, and mud). However, no cobbles or boulders were present in any samples. Of these 12, 10 samples contained $\geq 30\%$ gravel (classified as gravel mixes – sandy gravel). The remaining complex samples were comprised of gravelly sand (1), or gravelly muddy sand (1).

CMECS classification of the biotic component of grab samples was soft sediment fauna for all 36 benthic grab stations. In 69% of samples, the biotic group was classified as small-surface dwelling fauna, which included a diverse assemblage of annelid worms, amphipods, and isopods. The biotic group of four benthic grab sites was classified as mussel beds, which often also included with a diverse mix of surface burrowing and small-tube building organisms.

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APPENDIX A: BENTHIC GRAB FIELD NOTES

Table A - 1. Field notes and biologic information for each grab station.

Station	Grab Pass/Fail	Grab Failure Note	Sediment Characteristics	Field Description of Grab	Plant-like organisms	Anthropogenic or Terrestrial Debris/Fishing Activity
EW2-05-W1	Pass		Light brown coarse sand w/ pebbles	Trace shellhash	Not Present	Not Present
EW2-05-A1	Pass		Light brown coarse sand w/ pebbles	Trace shellhash	Not Present	Not Present
EW2-05-E1	Fail	Jaws open	N/A	N/A	Not Present	Not Present
EW2-05-E2	Fail	Jaws open	N/A	N/A	Not Present	Not Present
EW2-05-E3	Pass		Light brown coarse sand w/ pebbles	N/A	Not Present	Not Present
EW2-03-W1	Fail	<7 cm	Grey, smooth, fine, dense/compact	N/A	Not Present	Not Present
EW2-03-W2	Fail	<7 cm	Grey, smooth, fine, dense/compact	N/A	Not Present	Not Present
EW2-03-W3	Pass		Grey, smooth, fine, dense/compact	Sediment appears to have a clay component. The sediment is compact and can be shaped. Unlikely to get more than 5 to 6 cm, some sites right at 7 cm, penetration depth. No water drains through the sediment. Received the OK from Client Rep to sample.	Not Present	Not Present
EW2-03-A1	Fail	<7 cm	Grey, smooth, fine, dense/compact	N/A	Not Present	Not Present
EW2-03-A2	Fail	<7 cm	Grey, smooth, fine, dense/compact	N/A	Not Present	Not Present
EW2-03-A3	Pass		Grey, smooth, fine, dense/compact	Trace shellhash (see EW2-03-W3)	Not Present	Not Present
EW2-03-E1	Pass		Light brown coarse sand w/ pebbles	Trace shellhash	Not Present	Not Present
EW2-04-W1	Pass		Yellowish brown fine sand	Trace shellhash	Not Present	Not Present
EW2-04-A1	Pass		Yellowish brown coarse sand w/ pebbles	Trace shellhash	Not Present	Not Present
EW2-04-E1	Pass		Yellowish brown coarse sand w/ pebbles	Trace shellhash	Not Present	Not Present
EW2-06-E1	Pass		Grey muddy fine sand/silt	Trace shellhash	Not Present	Not Present
EW2-06-A1	Pass		Yellowish brown coarse sand w/ pebbles	Trace shellhash	Not Present	Not Present
EW2-06-W1	Pass		Yellowish brown medium sand w/ pebbles	Trace shellhash	Not Present	Not Present
EW2-07-W1	Pass		Yellowish brown medium sand w/ pebbles	Trace shellhash	Not Present	Not Present
EW2-07-A1	Pass		Yellowish brown coarse sand w/ pebbles	Trace shellhash	Not Present	Not Present
EW2-07-E1	Pass		Greyish brown fine soft/goopy sand/mud	N/A	Not Present	Not Present

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Station	Grab Pass/Fail	Grab Failure Note	Sediment Characteristics	Field Description of Grab	Plant-like organisms	Anthropogenic or Terrestrial Debris/Fishing Activity
EW2-12-W1	Pass		Greyish brown medium/fine soft sand/mud	Trace shellhash	Not Present	Not Present
EW2-12-A1	Pass		Yellowish brown medium/fine sand w/ pebbles	Trace shellhash	Not Present	Not Present
EW2-12-E1	Pass		Yellowish brown coarse/medium sand w/ pebbles	Trace shellhash	Not Present	Not Present
EW2-02-E1	Pass		Grey fine sediment	Sparse shellhash	Not Present	Not Present
EW2-02-A1	Pass		Light brown coarse sand w/ pebbles	Trace shellhash	Not Present	Not Present
EW2-02-W1	Pass		Brown coarse sand w/ pebbles	Trace shellhash	Not Present	Not Present
EW2-09-W1	Fail	<7 cm	Grey, smooth, fine, dense/compact	N/A	Not Present	Not Present
EW2-09-W2	Fail	<7 cm	Grey, smooth, fine, dense/compact	N/A	Not Present	Not Present
EW2-09-W3	Pass		Grey, smooth, fine, dense/compact	Trace shellhash (see EW2-03-W3)	Not Present	Not Present
EW2-09-A1	Fail	<7 cm	Brown, smooth, fine, dense/compact	N/A	Not Present	Not Present
EW2-09-A2	Fail	<7 cm	Brown, smooth, fine, dense/compact	N/A	Not Present	Not Present
EW2-09-A3	Fail	Empty	N/A	N/A	Not Present	Not Present
EW2-09-A4	Pass		Brown, smooth, fine, dense/compact	Trace shellhash (see EW2-03-W3)	Present	Not Present
EW2-09-E1	Fail	<7 cm	Grey, smooth, fine, dense/compact	N/A	Not Present	Not Present
EW2-09-E2	Pass		Grey, smooth, fine, dense/compact	Trace shellhash (see EW2-03-W3)	Not Present	Not Present
EW2-08-E1	Fail	<7 cm	Grey, smooth, fine, dense/compact	N/A	Not Present	Not Present
EW2-08-E2	Pass		Grey, smooth, fine, dense/compact	Trace shellhash (see EW2-03-W3)	Not Present	Not Present
EW2-08-A1	Fail	<7 cm	Grey, smooth, fine, dense/compact	N/A	Not Present	Not Present
EW2-08-A2	Pass		Grey, smooth, fine, dense/compact	Trace shellhash (see EW2-03-W3)	Not Present	Not Present
EW2-08-W1	Pass		Grey, smooth, fine, dense/compact	Trace shellhash (see EW2-03-W3)	Not Present	Not Present
EW2-11-W1	Fail	<7 cm	Grey, smooth, fine, dense/compact	N/A	Not Present	Not Present
EW2-11-W2	Fail	<7 cm	Grey, smooth, fine, dense/compact	N/A	Not Present	Not Present
EW2-10-W1	Fail	<7 cm	Grey, smooth, fine, dense/compact	N/A	Not Present	Not Present
EW2-10-W2	Pass		Grey, smooth, fine, dense/compact	Trace shellhash (see EW2-03-W3)	Not Present	Not Present
EW2-10-A1	Fail	<7 cm	Grey, smooth, fine, dense/compact	N/A	Not Present	Not Present
EW2-10-A2	Pass		Grey, smooth, fine, dense/compact	Trace shellhash (see EW2-03-W3)	Not Present	Not Present
EW2-10-E1	Fail	Empty	N/A	N/A	Not Present	Not Present
EW2-10-E2	Pass	N/A	Light brown coarse/medium sand	Trace shellhash	Not Present	Not Present
EW2-01-W1	Fail	<7 cm	Grey, smooth, fine, dense/compact	N/A	Not Present	Not Present
EW2-01-W2	Pass		Grey, smooth, fine, dense/compact	Trace shellhash (see EW2-03-W3)	Not Present	Not Present
EW2-01-A1	Pass		Light greyish brown coarse/medium sand	Trace shellhash	Not Present	Not Present
EW2-01-E1	Fail	<7 cm	Grey, smooth, fine, dense/compact, black streaks	N/A	Not Present	Not Present
EW2-01-E2	Pass		Grey, smooth, fine, dense/compact, black streaks	Trace shellhash (see EW2-03-W3)	Not Present	Not Present

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Station	Grab Pass/Fail	Grab Failure Note	Sediment Characteristics	Field Description of Grab	Plant-like organisms	Anthropogenic or Terrestrial Debris/Fishing Activity
EW2-11-E1	Pass		Grey, smooth, fine, dense/compact	Trace shellhash (see EW2-03-W3)	Not Present	Not Present
EW2-11-A1	Pass		Light greyish brown coarse/medium sand	Trace shellhash	Not Present	Not Present
EW2-11-W3	Pass		Grey, smooth, fine, dense/compact	Trace shellhash (see EW2-03-W3)	Not Present	Not Present

APPENDIX B: VIDEO TRANSECT REVIEWER NOTES

Table B - 2. Video reviewer notes while analyzing transects.

Transect	Videography	Encrusting Organisms/Macroflor a	Ground Cover	Substrate	Organisms	Other
EW2-12- UWV-1	Good speed and visibility, washout occurred when camera lifts too high from seafloor.	Potential hidden brandia red alga	Flat, little epifauna/flora	Flat/sand mud to trace/sparse/moderate granule-pebble	Sand dollars and polychaete worm tubes	N/A
EW2-02- UWV-1	Green coloration and high speeds resulted in poor visibility. Part 2 of video was in very turbid water.	N/A	N/A	Very coarse sand, shell hash, and pebble in the first half then more fine sand; sand waves present at times	N/A	decorator worm tubes present
EW2-07- UWV-1- Part1	High turbidity leading to poor visibility. Video coloration appeared mostly green. Turbidity of water column makes it difficult for the camera to focus when not close to the bottom. Laser visibility fades in and out during transect and in some instances disappears.	N/A	Thick fine sediment along the bottom, sparse occurrences of shell hash and small gravel. Troughs in the sediment were observed and a change in color of sediment to a blacker coloration. Holes were observed in the sediment, in some instances with worms coming out of them.	Substrate alternates between trace to sparse shell hash and gravel and fine sand/mud throughout transect.	Organisms below size cutoff included hermit crabs and tube worms. Sea lettuce was sparse and free floating. Sand dollars and moon snails were present throughout the entire transect. Empty surf clam, whelk, and oyster shell were present.	Sand dollars were partially buried by sediment in most occurrences.
EW2-07- UWV-1- Part2	High turbidity leading to poor visibility. Video coloration appeared mostly green. Turbidity of water column makes it difficult for the camera to focus when not close to the bottom. Laser visibility fades in and out during transect and in some instances disappears.	Small clumps of red-orange bushy plant-like organisms, likely young macroalgae attached to bottom sediment (Phylum Rhodophyta), present throughout entire transect.	Fine sand/mud with worm tubes scattered throughout. Shell hash and gravel was sparse. Ripples in the sediment were observed as well as patches of algae along the bottom. Sediment shifted to dark/black in color. Small holes observed in sediment with worms partially inside.	Fine sand/mud	Organisms below size cutoff included hermit crabs and tube worms. Occurrences of tube worms in large groups. Sea lettuce was sparse and free floating.	Sand dollars were partially buried by sediment in most occurrences.

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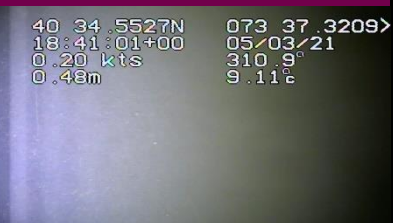
Transect	Videography	Encrusting Organisms/Macroflor ^a	Ground Cover	Substrate	Organisms	Other
EW2-06- UWV	High turbidity leading to poor visibility. Video coloration appeared mostly green. Turbidity of water column makes it difficult for the camera to focus when not close to the bottom. Laser visibility fades in and out during transect and in some instances disappears.	Small clumps of red-orange bushy plant-like organisms, likely young macroalgae attached to bottom sediment (Phylum Rhodophyta), present throughout entire transect.	Trace to sparse shell hash and gravel with aggregated and solitary worm tubes scattered throughout. Ripples in the sediment, patches of algae along the bottom, and a change in color of sediment to a dark coloration observed. Small holes possible worm tube holes.	Substrate alternates between trace to sparse shell hash and gravel and fine sand/mud throughout transect.	Organisms below size cutoff included hermit crabs and tube worms. Occurrences of tube worms in groups of several or more and solitary. Bivalve shells observed throughout transect and more abundant near end of transect. Some partially buried in sediment. Sea lettuce was sparse and free floating.	Decorator tube worms, sediment dwelling worms and white worms on surface of sediment were observed.
EW2-11- UWV-2	Green coloration and high speeds resulted in poor visibility.	N/A	Open/flat sand with ripples and scattered shell hash	Consistent throughout transect.	Small hermit crabs, surf clam shells	Dense floating ulva and other macroalgae

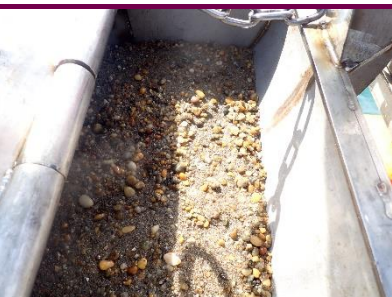
Appendix C: GRAB SAMPLE IMAGES

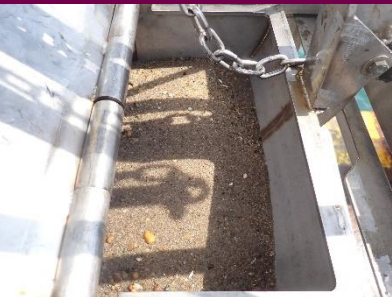
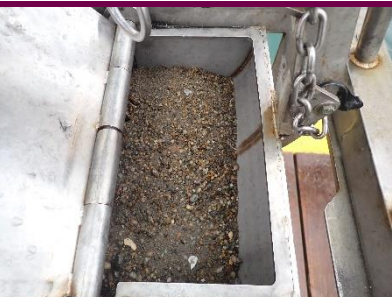
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APPENDIX C: GRAB SAMPLE IMAGES

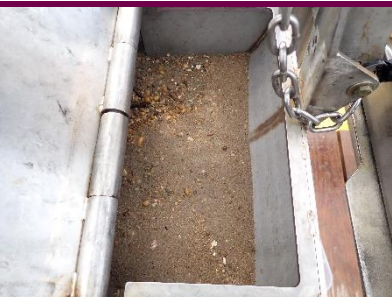
Table C-1. Images of both sides of the grab sample bucket (A and B) immediately after recovery/draining and of the bottom just prior to sampling (C). NMFS Modified CMECS (2021) and d50 (median grain size) reported below images.

Station	A	B	C
EW2-01-A1	 CMECS classified= Medium Sand	 NMFS Complex Habitat= No	 d50= 0.41
EW2-01-E2	 CMECS classified= Fine/Very Fine Sand	 NMFS Complex Habitat= No	 d50= 0.16
EW2-01-W2	 CMECS classified= Fine/Very Fine Sand	 NMFS Complex Habitat= No	 d50= 0.12
EW2-02-A1	 CMECS classified= Sandy Gravel	 NMFS Complex Habitat= Yes	 d50= 1.07

Station	A	B	C
EW2-02-E1			 40 33.1602N 073 36.8799 18:36:06+00 05/02/21 0.19 kts 102.0° 2.36m 8.53° d50= 0.13
EW2-02-W1			 40 33.0652N 073 37.2870 19:17:31+00 05/02/21 0.20 kts 66.6° m 8.43° d50= 2.3
EW2-03-A3			 40 34.4867N 073 39.3059> 13:28:07+00 05/02/21 0.20 kts 324.9° 2.04m 9.06° d50= 0.1
EW2-03-E1			 40 34.3258N 073 39.2997> 13:44:56+00 05/02/21 0.20 kts 224.2° 0.84m 8.78° d50= 2.14
	CMECS classified= Fine/Very Fine Sand	NMFS Complex Habitat= No	
	CMECS classified= Sandy Gravel	NMFS Complex Habitat= No	
	CMECS classified= Fine/Very Fine Sand	NMFS Complex Habitat= No	
	CMECS classified= Sandy Gravel	NMFS Complex Habitat= Yes	

Station	A	B	C
EW2-03-W3			 40 34.6494N 073 39.3130> 12:46:29+00 05/02/21 0.20 kts 343.3 0.69m 8.98c d50= 0.11
	CMECS classified= Fine/Very Fine Sand	NMFS Complex Habitat= No	
EW2-04-A1			 40 34.2442N 073 39.2973 14:22:30+00 05/02/21 0.32 kts 253.3 2.28m 9.15c d50= 0.81
	CMECS classified= Sandy Gravel	NMFS Complex Habitat= Yes	
EW2-04-E1			 40 34.2433N 073 39.0802 15:10:54+00 05/02/21 0.69 kts 58.7 0.71m 9.26c d50= 1.74
	CMECS classified= Sandy Gravel	NMFS Complex Habitat= Yes	
EW2-04-W1			 40 34.2482N 073 39.5067 14:03:28+00 05/02/21 0.20 kts 196.4 0.97m 8.79c d50= 0.36
	CMECS classified= Medium Sand	NMFS Complex Habitat= No	

Station	A	B	C
EW2-05-A1	 CMECS classified= Medium Sand	 NMFS Complex Habitat= No	Not pictured d50= 0.41
EW2-05-E1	 CMECS classified= Sandy Gravel	 NMFS Complex Habitat= Yes	 d50= 2.55
EW2-05-W1	 CMECS classified= Medium	 NMFS Complex Habitat= No	 d50= 0.47
EW2-06-A1	 CMECS classified= Gravelly Muddy Sand	 NMFS Complex Habitat= Yes	 d50= 0.62

Station	A	B	C
EW2-06-E1			40 33.7213N 073 38.4519 15.29:09+00 05/02/21 0.34 kts 23.2° 2.28m 8.59c d50= 0.13
	CMECS classified= Muddy Sand	NMFS Complex Habitat= No	
EW2-06-W1			40 33.4609N 073 38.7062 16.14:48+00 05/02/21 0.20 kts 16.1° 0.71m 8.72c d50= 0.76
	CMECS classified= Sandy Gravel	NMFS Complex Habitat= Yes	
EW2-07-A1			40 33.1729N 073 37.8599 16.54:13+00 05/02/21 0.82 kts 138.5° 1.50m 8.59c d50= 1.41
	CMECS classified= Sandy Gravel	NMFS Complex Habitat= Yes	
EW2-07-E1			40 33.1820N 073 37.6466 17.13:01+00 05/02/21 0.20 kts 111.8° 0.45m 8.44c d50= 0.22
	CMECS classified= Fine/Very Fine Sand	NMFS Complex Habitat= No	

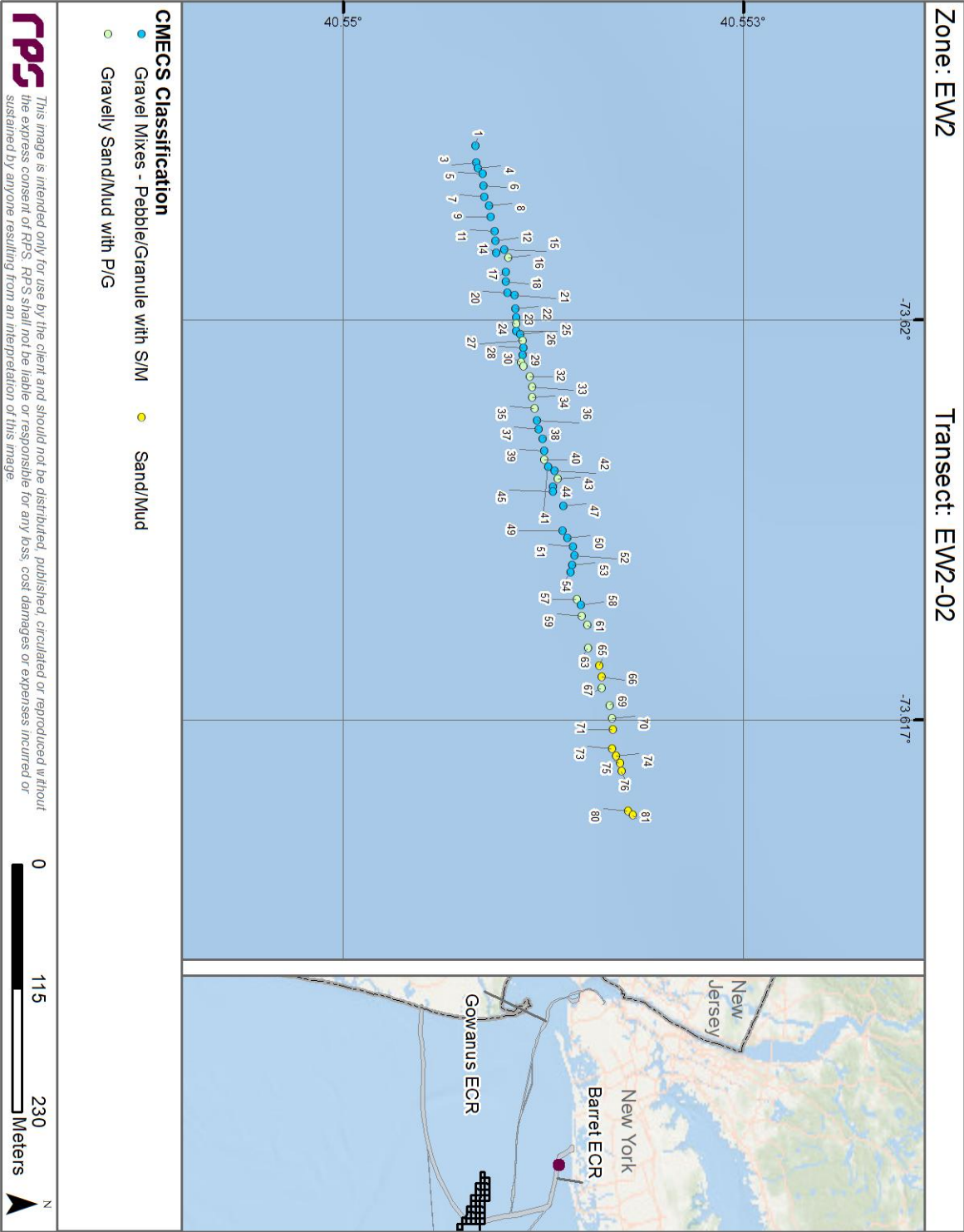
Station	A	B	C
EW2-07-W1			40 33.1663N 073 38.0712 16:36:00+00 05/02/21 0.20 kts 51.4° 0.71m 8.59% d50= 1.32
	CMECS classified= Sandy Gravel	NMFS Complex Habitat= Yes	
EW2-08-A2			40 34.4567N 073 37.4734> 21:56:35+00 05/02/21 0.19 kts 330.0° 0.75m 9.40% d50= 0.11
	CMECS classified= Fine/Very Fine Sand	NMFS Complex Habitat= No	
EW2-08-E2			40 34.3027N 073 37.4030> 21:30:54+00 05/02/21 0.19 kts 222.4° 0.39m 9.40% d50= 0.11
	CMECS classified= Fine/Very Fine Sand	NMFS Complex Habitat= No	
EW2-08-W1			40 34.6081N 073 37.5447 22:16:16+00 05/02/21 0.20 kts 33.5° 0.52m 9.79% d50= 0.12
	CMECS classified= Fine/Very Fine Sand	NMFS Complex Habitat= No	

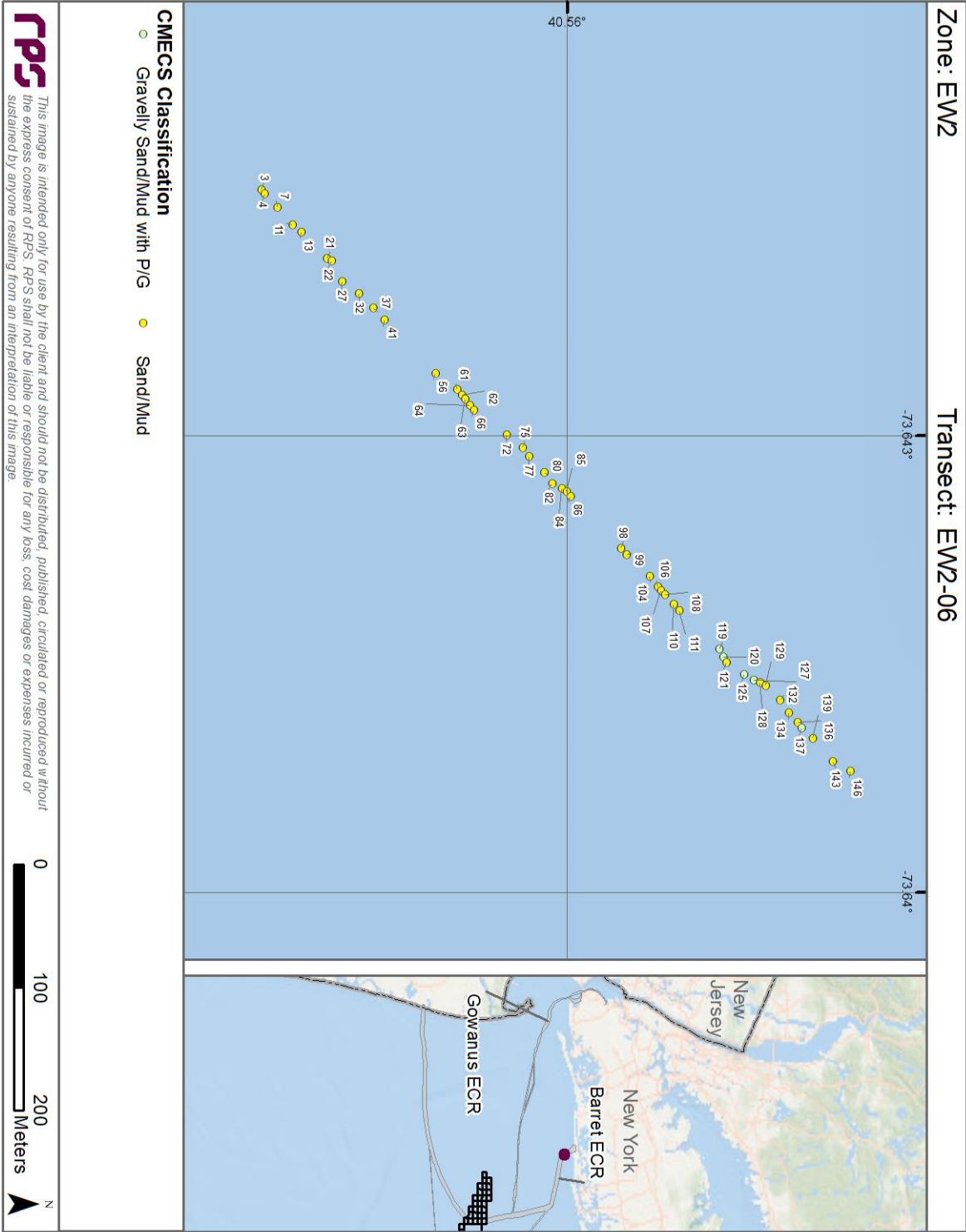
Station	A	B	C
EW2-09-A4			40 33.7492N 20:35:31+00 0.20 kts 2.49m 073 36.9077 05/02/21 48.8° 9.03% d50= 0.15
	CMECS classified= Fine/Very Fine Sand NMFS Complex Habitat= No		
EW2-09-E2			40 33.7457N 21:03:12+00 0.00 kts 0.54m 073 36.6930 05/02/21 162.3° 8.85% d50= 0.11
	CMECS classified= Fine/Very Fine Sand NMFS Complex Habitat= No		
EW2-09-W3			40 33.7598N 19:44:41+00 0.00 kts 10.70m 073 37.1193 05/02/21 246.2° 8.96% d50= 0.14
	CMECS classified= Fine/Very Fine Sand NMFS Complex Habitat= No		
EW2-10-A2			40 34.7689N 17:31:19+00 0.20 kts 0.73m 073 37.6069 05/03/21 216.6° 9.15% d50= 0.13
	CMECS classified= Fine/ Very Fine Sand NMFS Complex Habitat= No		

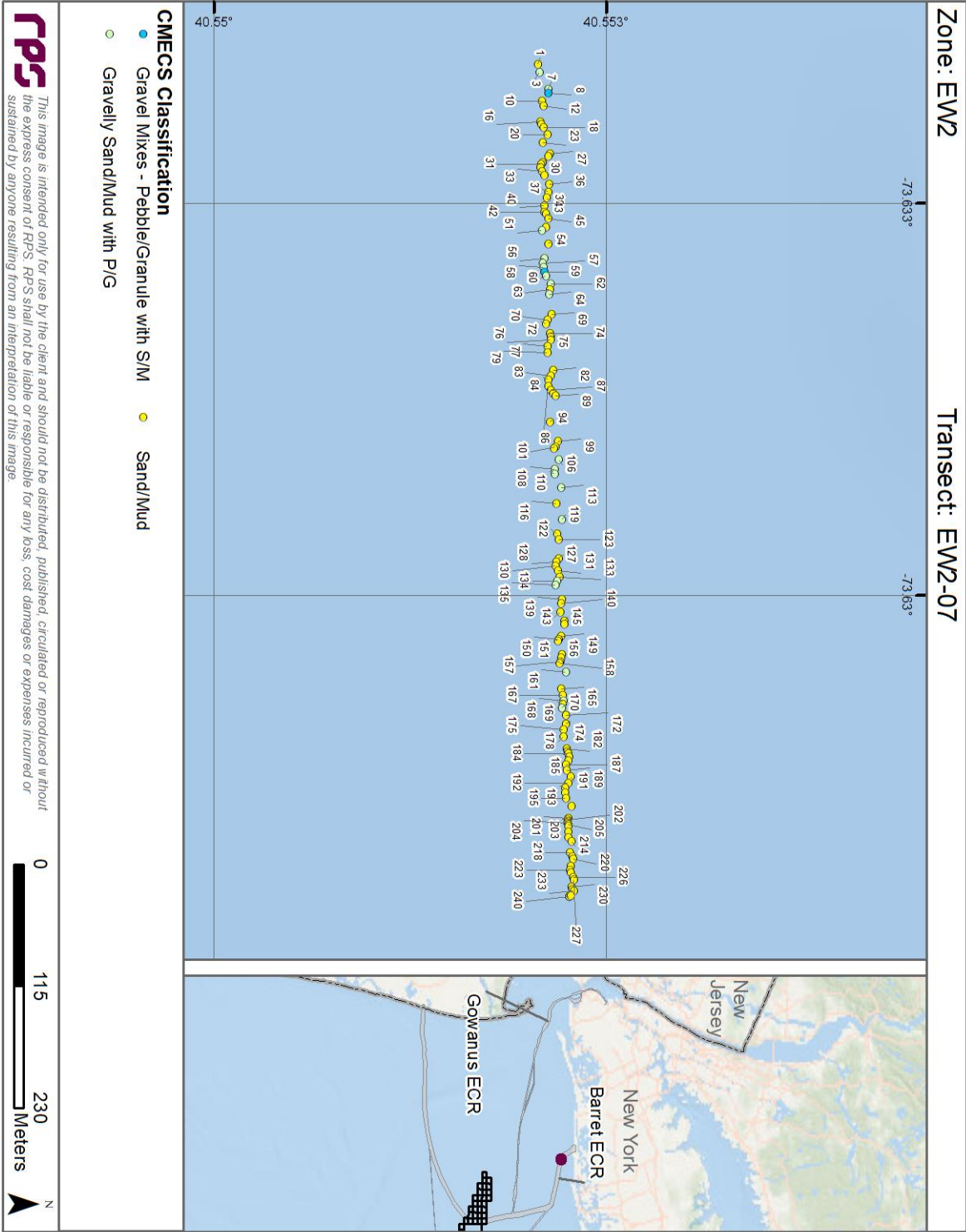
Station	A	B	C
EW2-10-E2	 CMECS classified= Medium Sand	 NMFS Complex Habitat= No	40 34.8229N 073 37.4059 18:03:18+00 05/03/21 0.19 kts 192.3° 0.69m 9.40c d50= 0.44
EW2-10-W2	 CMECS classified= Muddy Sand	 NMFS Complex Habitat= No	40 34.7168N 073 37.8082> 17:00:12+00 05/03/21 0.61 kts 250.2° 2.38m 9.42c d50= 0.11
EW2-11-A1	 CMECS classified= Fine/Very Fine Sand	 NMFS Complex Habitat= No	40 34.4989N 073 37.1005 20:25:29+00 05/03/21 0.20 kts 280.5° m 9.33c d50= 0.22
EW2-11-E1	 CMECS classified= Fine/Very Fine Sand	 NMFS Complex Habitat= No	40 34.5221N 073 36.8909 20:00:10+00 05/03/21 0.25 kts 251.1° 8.53m 9.15c d50= 0.15

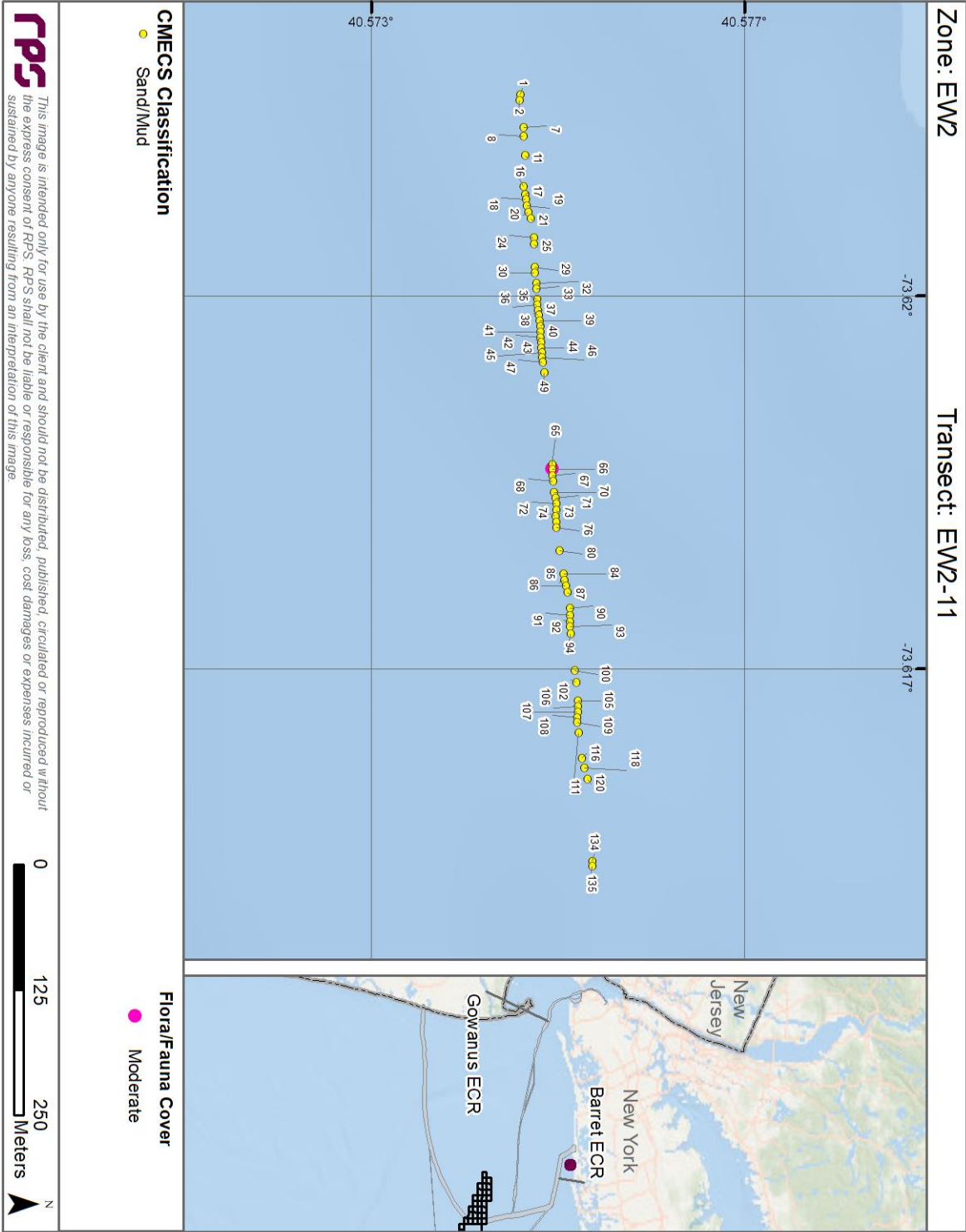
Station	A	B	C
EW2-11-W3			40 34.4771N 073 37.3118 20:46:44+00 05/03/21 0.19 kts 209.9° 0.45m 9.33% d50= 0.13
EW2-12-A1			40 32.9283N 073 37.2037> 17:54:08+00 05/02/21 0.20 kts 45.0° 0.93m 8.60% d50= 0.44
EW2-12-E1			40 32.8972N 073 36.9955> 18:16:35+00 05/02/21 0.20 kts 115.5° 0.73m 8.50% d50= 1.74
EW2-12-W1			40 32.9593N 073 37.4138 17:31:34+00 05/02/21 0.20 kts 254.6° 0.97m 8.50% d50= 0.33
	CMECS classified= Fine/Very Fine Sand	NMFS Complex Habitat= No	
	CMECS classified= Gravelly Sand	NMFS Complex Habitat= Yes	
	CMECS classified= Sandy Gravel	NMFS Complex Habitat= Yes	
	CMECS classified= Medium Sand	NMFS Complex Habitat= No	

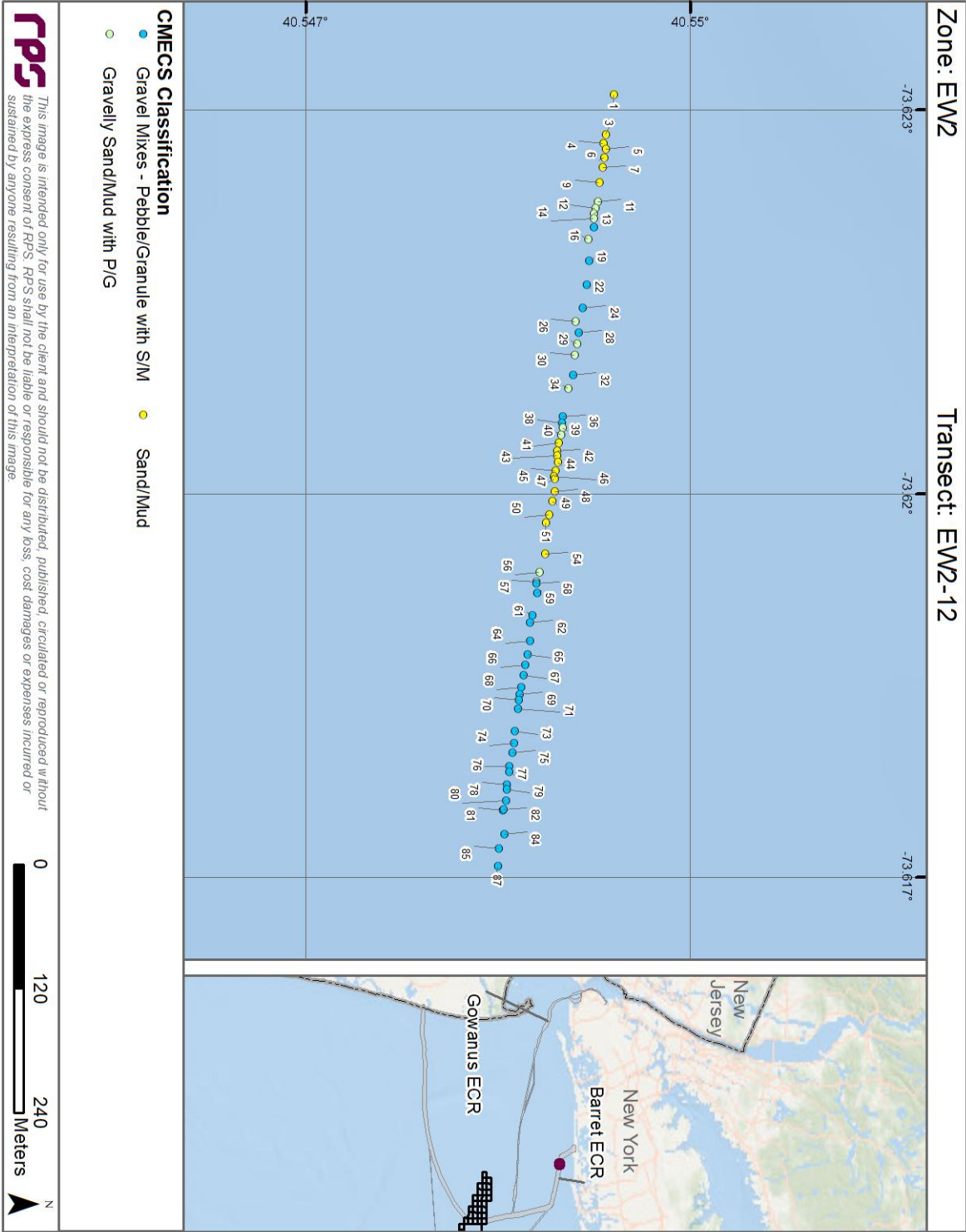
Appendix D: CMECS CLASSIFICATIONS FOR STILL IMAGES DERIVED FROM VIDEO ANALYSIS











APPENDIX F GRAIN SIZE ANALYSIS AND TOC

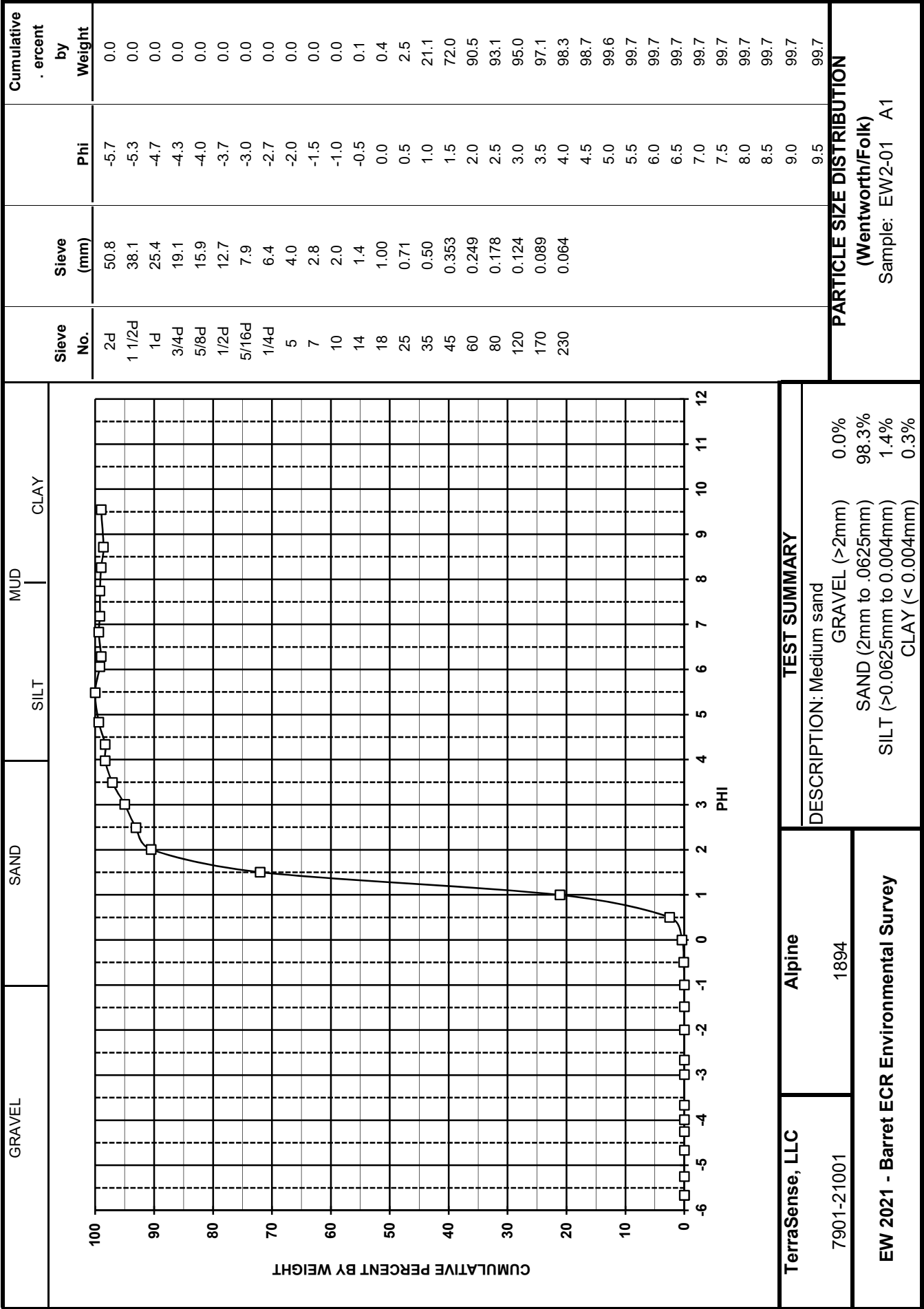
Alpine #1894
EW 2021 - Barret ECR Environmental Survey
LABORATORY TESTING DATA SUMMARY

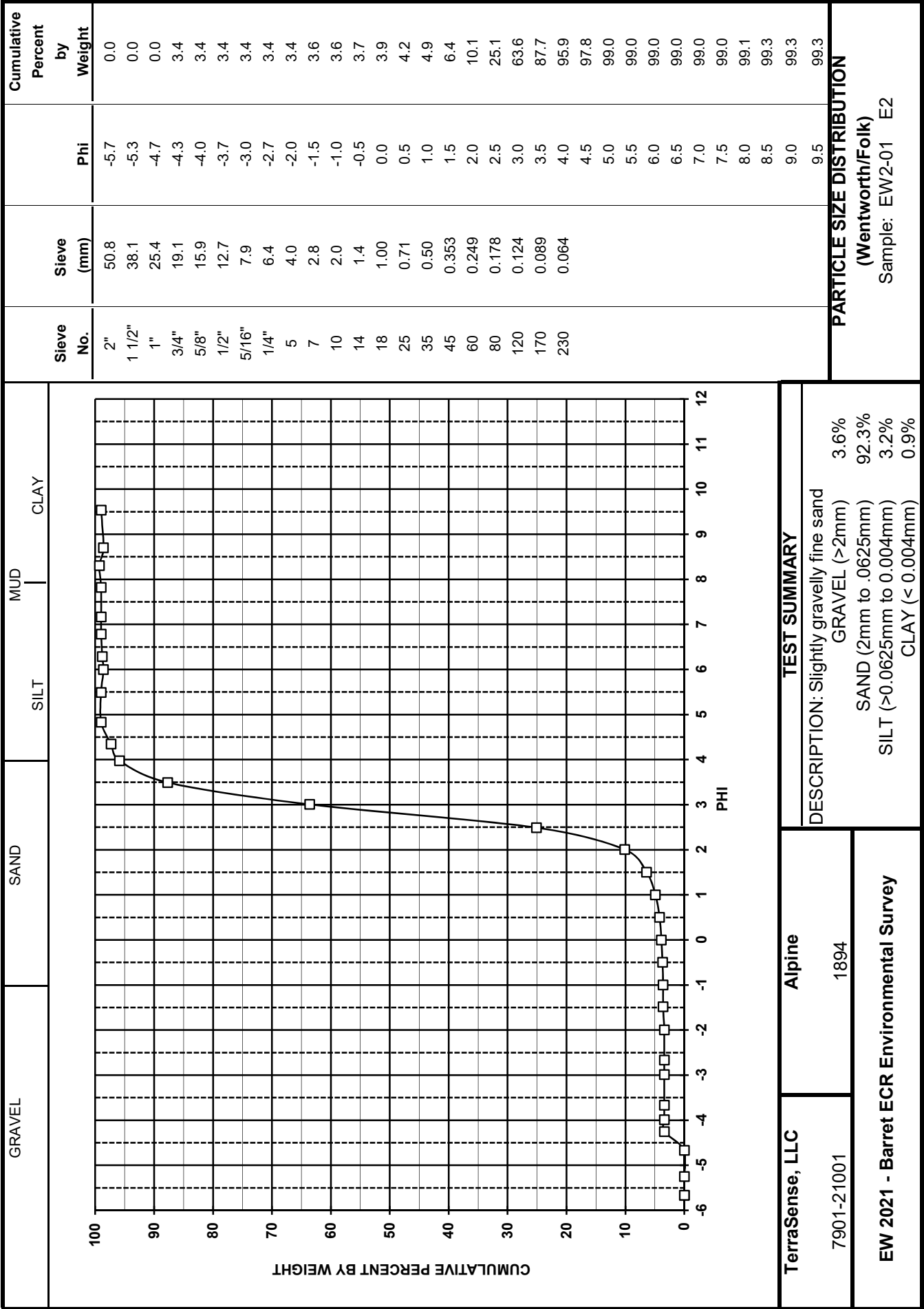
EXPLORATION NO.	SAMPLE	IDENTIFICATION TESTS		USCS SYMB. (1)	CMECS Grain Size Descriptors								
		WATER CONTENT ASTM D2216 (%)	ORGANIC CONTENT (burnoff) ASTM D2974 (%)		%GRAVEL	%SAND				%Mud	% SILT	% CLAY	
						VERY COARSE	COARSE	MEDIUM	FINE				VERY FINE
EW2-01	A1	20.7	0.2	SP	0.0	20.7	69.4	0.4	4.5	3.3	1.7	1.4	0.3
EW2-01	E2	25.0	0.2	SP-SM	3.6	1.0	5.2	0.3	53.5	32.3	4.1	3.2	0.9
EW2-01	W2	24.8	0.2	SP-SM	0.2	2.0	8.8	0.1	35.5	47.7	5.7	5.2	0.5
EW2-02	A1	11.9	0.2	SP	33.8	38.6	4.5	18.7	1.6	1.0	1.8	1.0	0.8
EW2-02	E1	30.1	0.3	SP-SM	0.6	0.6	5.1	0.2	47.8	40.0	5.7	3.6	2.1
EW2-02	W1	11.9	0.4	SP	52.2	23.0	14.0	7.7	1.1	0.8	1.2	0.2	1.0
EW2-03	A3	28.0	0.3	SM	0.0	1.2	1.8	0.5	27.3	59.4	9.8	5.6	4.2
EW2-03	E1	11.1	0.3	SP	51.0	26.6	3.8	9.2	2.0	4.3	3.1	1.4	1.7
EW2-03	W3	25.7	0.3	SM	0.1	1.9	2.1	1.8	36.8	48.4	8.9	5.4	3.5
EW2-04	A1	13.7	0.2	SP	37.4	33.4	16.7	9.0	1.0	0.7	1.8	0.6	1.2
EW2-04	E1	12.1	0.3	SP	47.5	29.9	4.3	14.4	1.1	0.9	1.9	1.1	0.8
EW2-04	W1	21.7	0.2	SP	0.5	13.8	68.7	1.6	8.9	2.8	3.7	0.7	3.0
EW2-05	A1	20.6	0.2	SP-SM	0.2	25.9	60.5	0.9	4.8	2.9	4.8	2.0	2.8
EW2-05	E1	8.5	0.2	SP	58.5	10.9	4.2	21.3	0.7	2.1	2.3	0.9	1.4
EW2-05	W1	19.1	0.2	SP-SM	4.8	37.6	44.9	4.8	2.0	1.0	4.9	2.2	2.7
EW2-06	A1	28.9	0.9	SW-SC	24.1	23.8	24.0	9.5	7.4	2.4	8.8	4.3	4.5
EW2-06	E1	41.4	1.6	SC	0.1	1.1	9.2	0.3	41.2	26.2	21.9	13.1	8.8
EW2-06	W1	14.0	0.2	SP	32.9	18.9	26.6	12.8	6.1	0.8	1.9	1.3	0.6
EW2-07	A1	11.6	0.1	SP	47.3	16.7	24.0	5.3	4.5	1.4	0.8	0.1	0.7
EW2-07	E1	24.1	0.2	SP	0.4	4.4	39.2	0.9	43.4	8.3	3.4	2.5	0.9
EW2-07	W1	11.9	0.3	SP	42.5	23.4	17.4	11.2	2.7	0.8	2.0	1.5	0.5
EW2-08	A2	26.4	0.2	SP-SM	0.1	1.0	4.2	0.2	30.3	57.7	6.5	5.5	1.0
EW2-08	E2	25.6	0.3	SM	0.0	0.9	4.6	0.2	30.3	56.9	7.1	5.2	1.9
EW2-08	W1	25.2	0.3	SP-SM	0.1	2.1	6.2	0.2	33.8	51.2	6.4	4.5	1.9
EW2-09	A4	22.9	0.6	SP-SM	0.3	2.1	20.1	0.4	38.3	33.9	4.9	3.6	1.3
EW2-09	E2	28.4	0.3	SM	0.1	0.8	8.8	0.2	30.6	51.4	8.1	5.1	3.0
EW2-09	W3	24.8	0.3	SP-SM	0.3	4.7	13.4	1.0	34.2	40.7	5.7	4.1	1.6

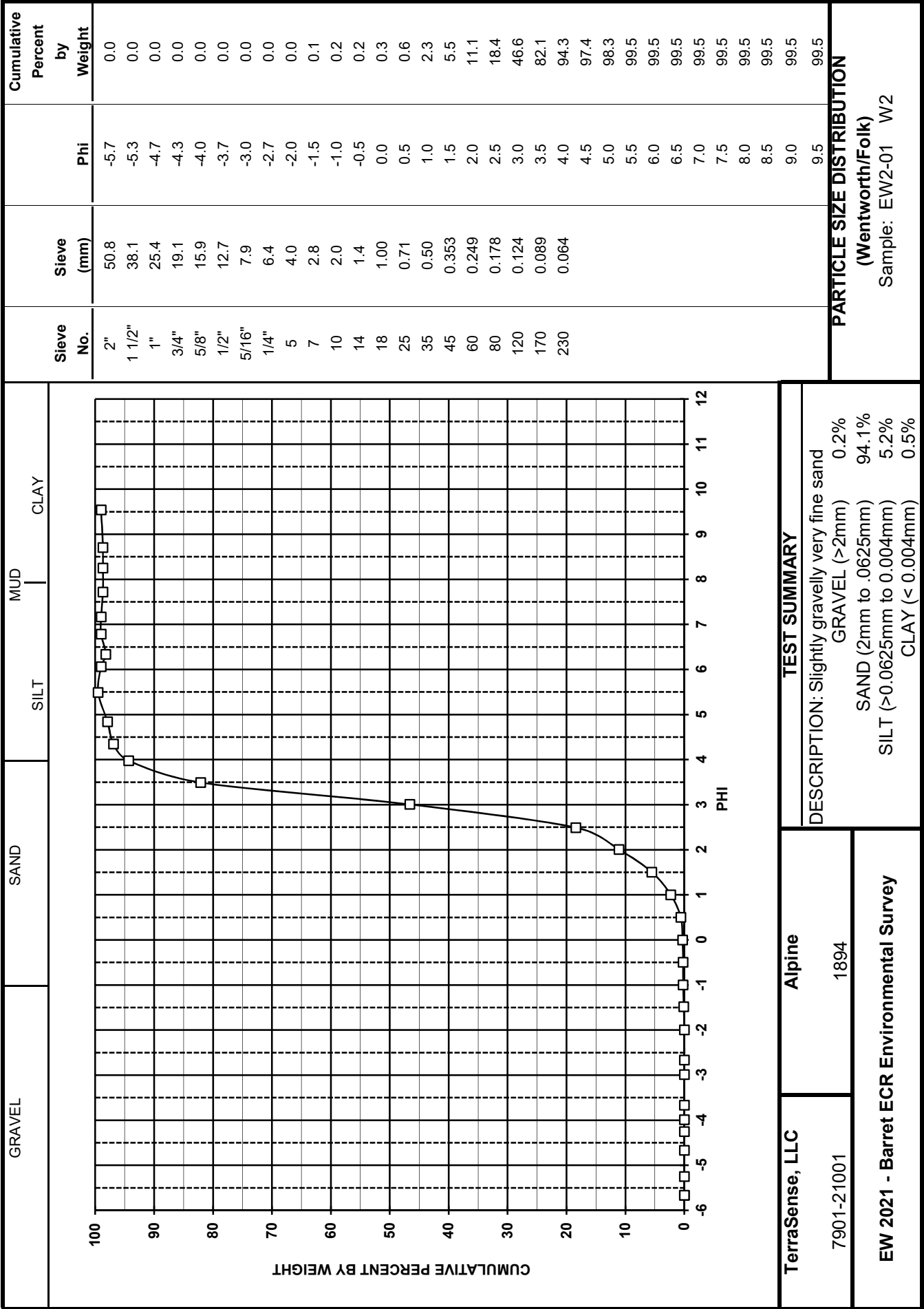
Alpine #1894
EW 2021 - Barret ECR Environmental Survey
LABORATORY TESTING DATA SUMMARY

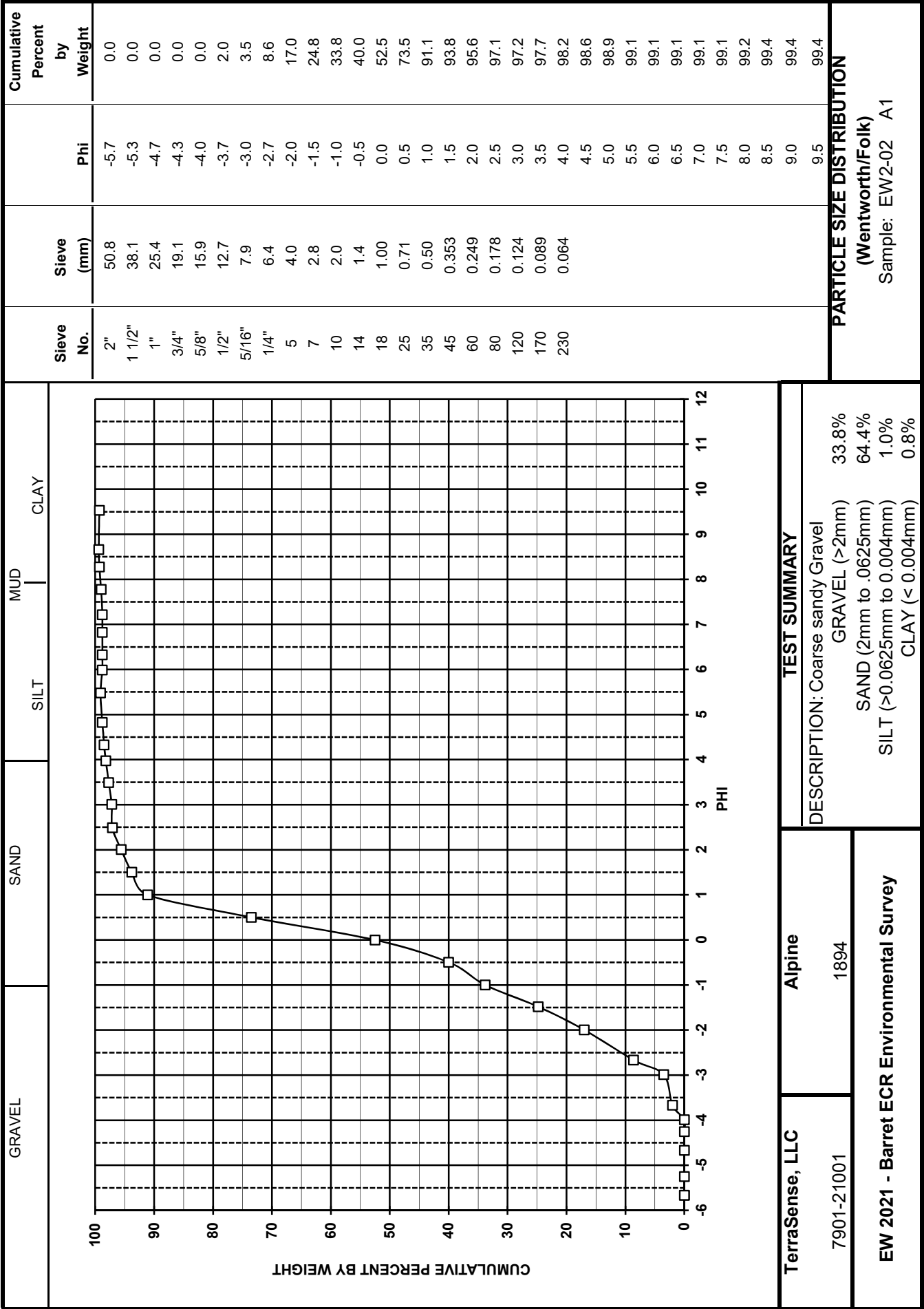
EXPLORATION	SAMPLE	IDENTIFICATION TESTS		USCS SYMB. (1)	CMECS Grain Size Descriptors								
		WATER CONTENT ASTM D2216 (%)	ORGANIC CONTENT (burnoff) ASTM D2974 (%)		%SAND					%GRAVEL	%Mud	% SILT	% CLAY
					VERY COARSE	COARSE	MEDIUM	FINE	VERY FINE				
EW2-10	A2	31.4	0.6	SM	0.2	0.2	1.4	14.2	43.4	30.9	9.7	5.7	4.0
EW2-10	E2	20.3	0.1	SP	0.3	1.3	40.4	50.6	3.8	1.7	1.9	1.2	0.7
EW2-10	W2	46.3	1.3	SC	0.2	0.7	2.5	3.7	30.3	49.0	13.6	7.4	6.2
EW2-11	A1	21.1	0.2	SP	0.2	0.2	1.2	37.6	48.6	10.1	2.1	1.9	0.2
EW2-11	E1	25.2	0.2	SP-SM	0.3	0.1	0.3	3.4	61.2	30.0	4.7	4.5	0.2
EW2-11	W3	24.5	0.3	SP-SM	0.3	0.2	2.3	9.1	39.0	43.4	5.7	4.5	1.2
EW2-12	A1	19.0	0.2	SP	12.4	3.2	26.8	46.1	8.3	0.7	2.5	1.7	0.8
EW2-12	E1	18.4	0.4	SP	47.4	14.2	20.7	11.7	2.0	0.6	3.4	1.6	1.8
EW2-12	W1	21.6	0.1	SP	1.9	1.3	11.6	64.2	16.5	1.9	2.6	1.7	0.9

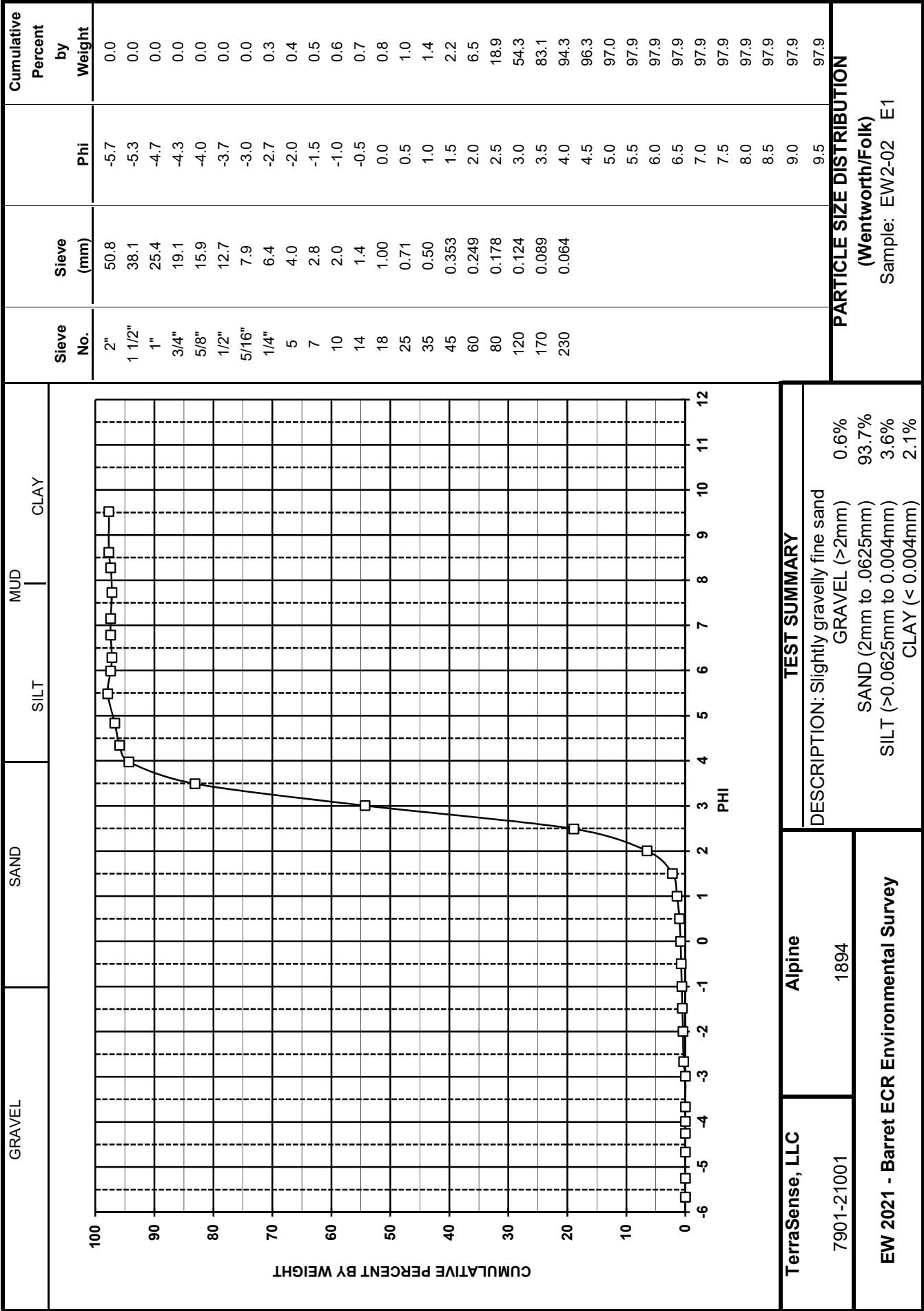
Notes: (1) USCS symbol based on visual observation and Sieve results reported.

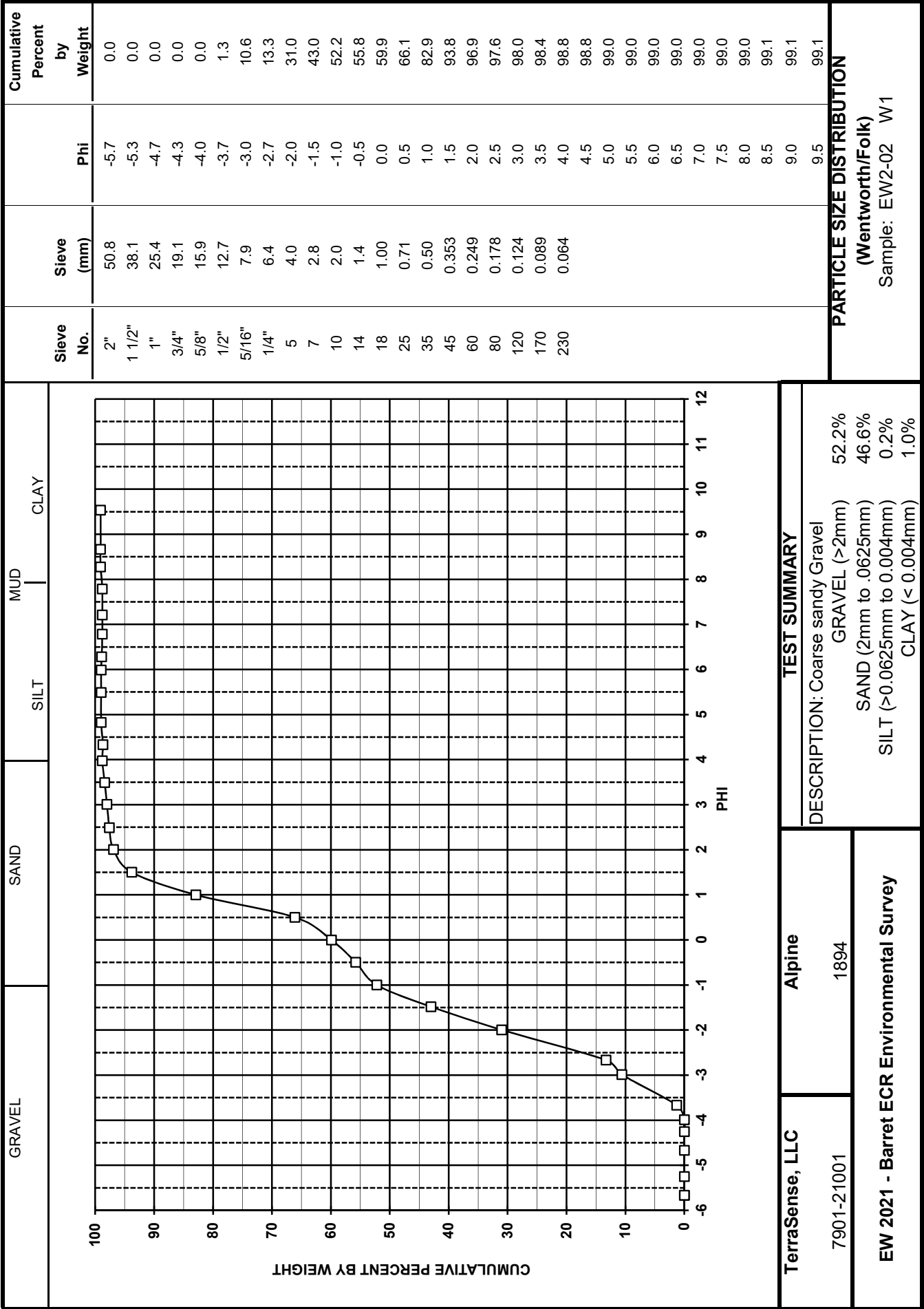


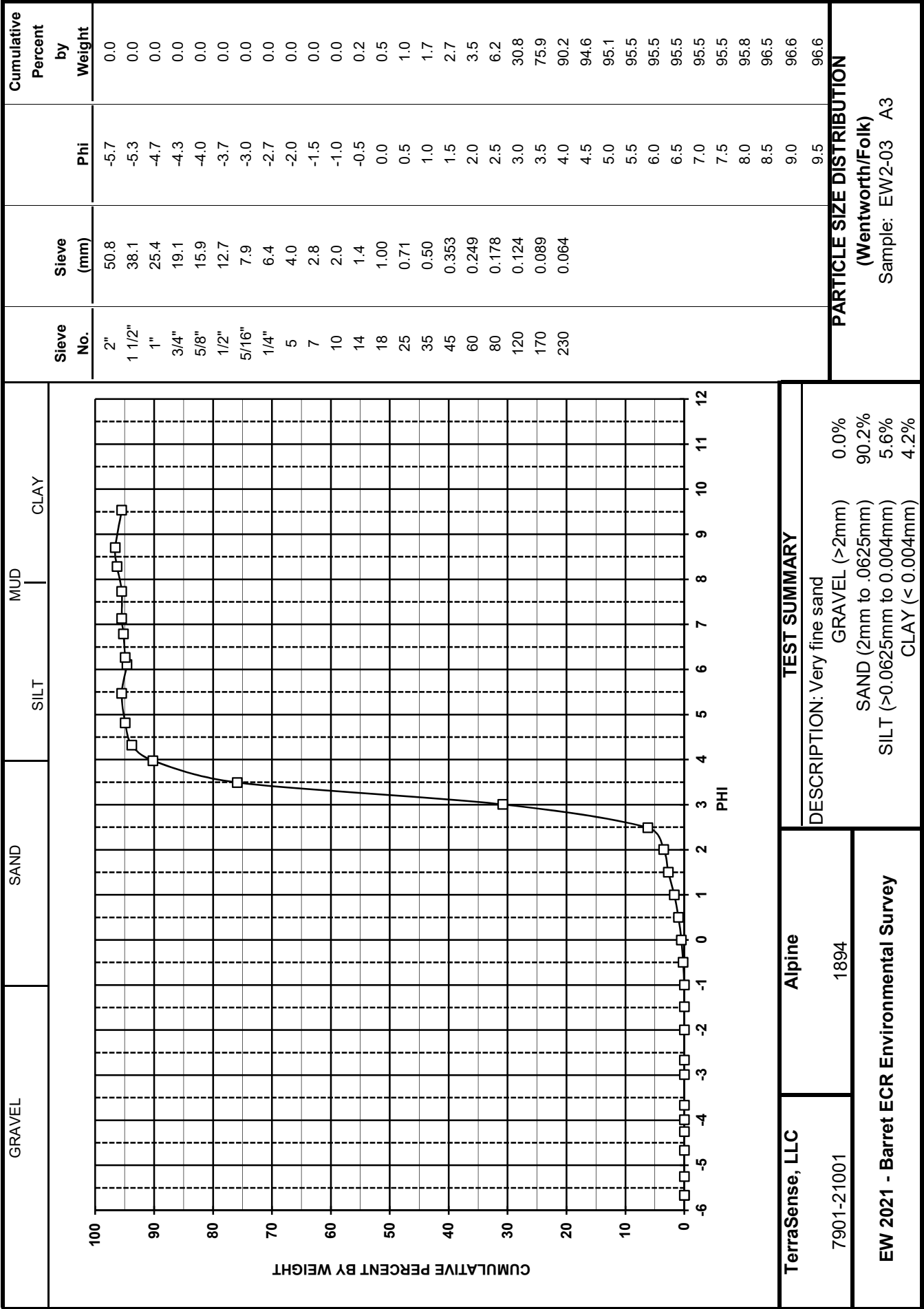


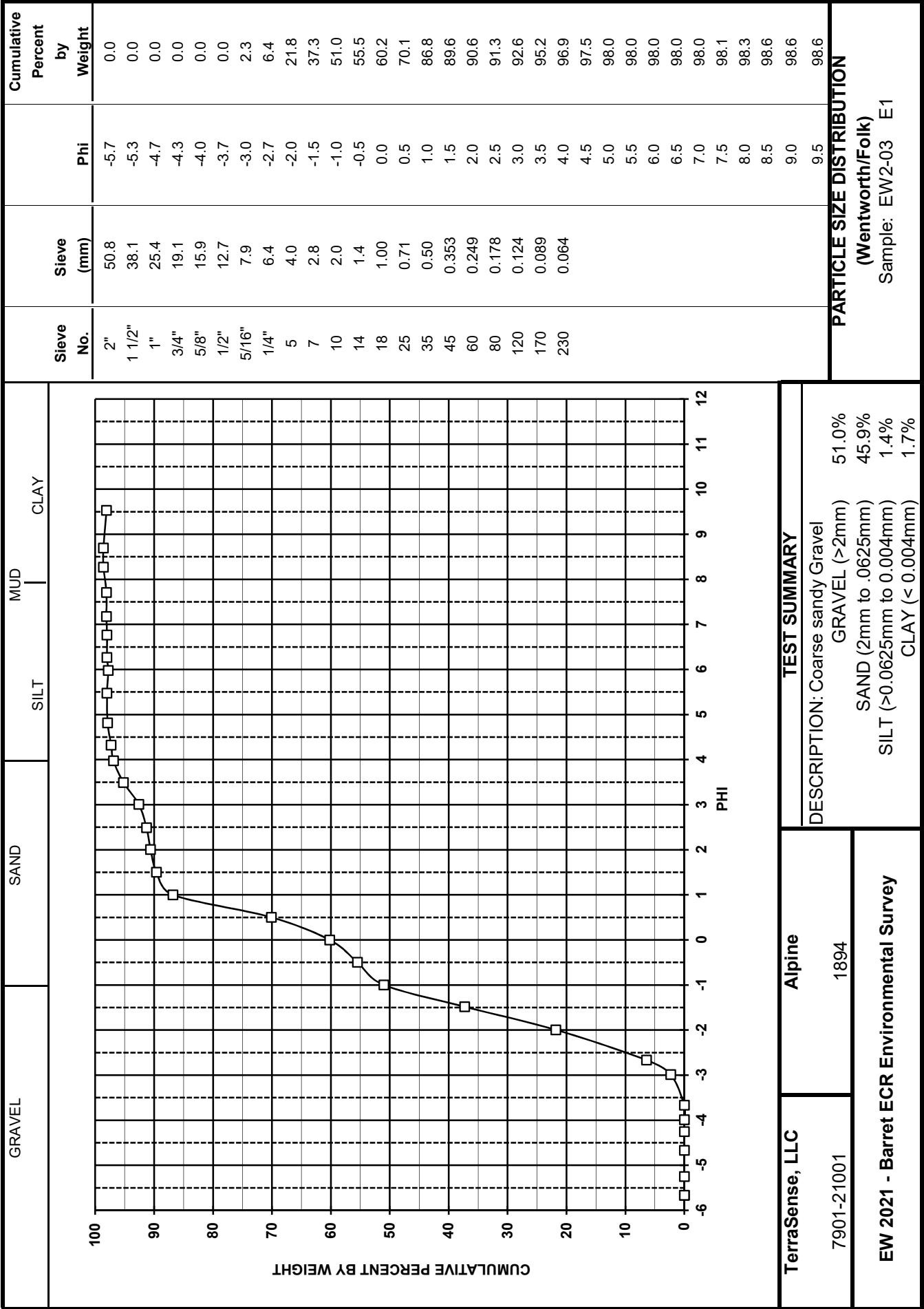


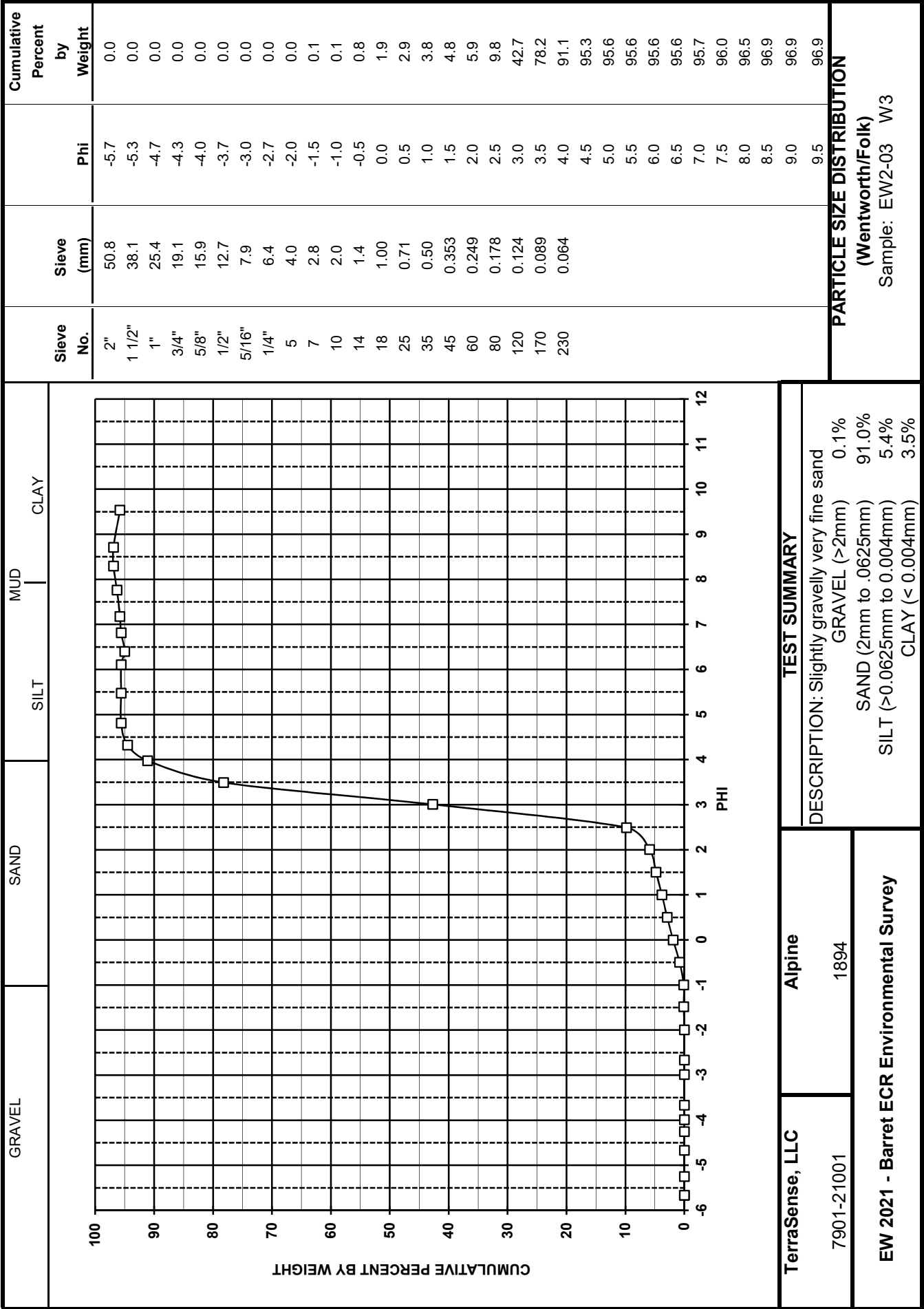


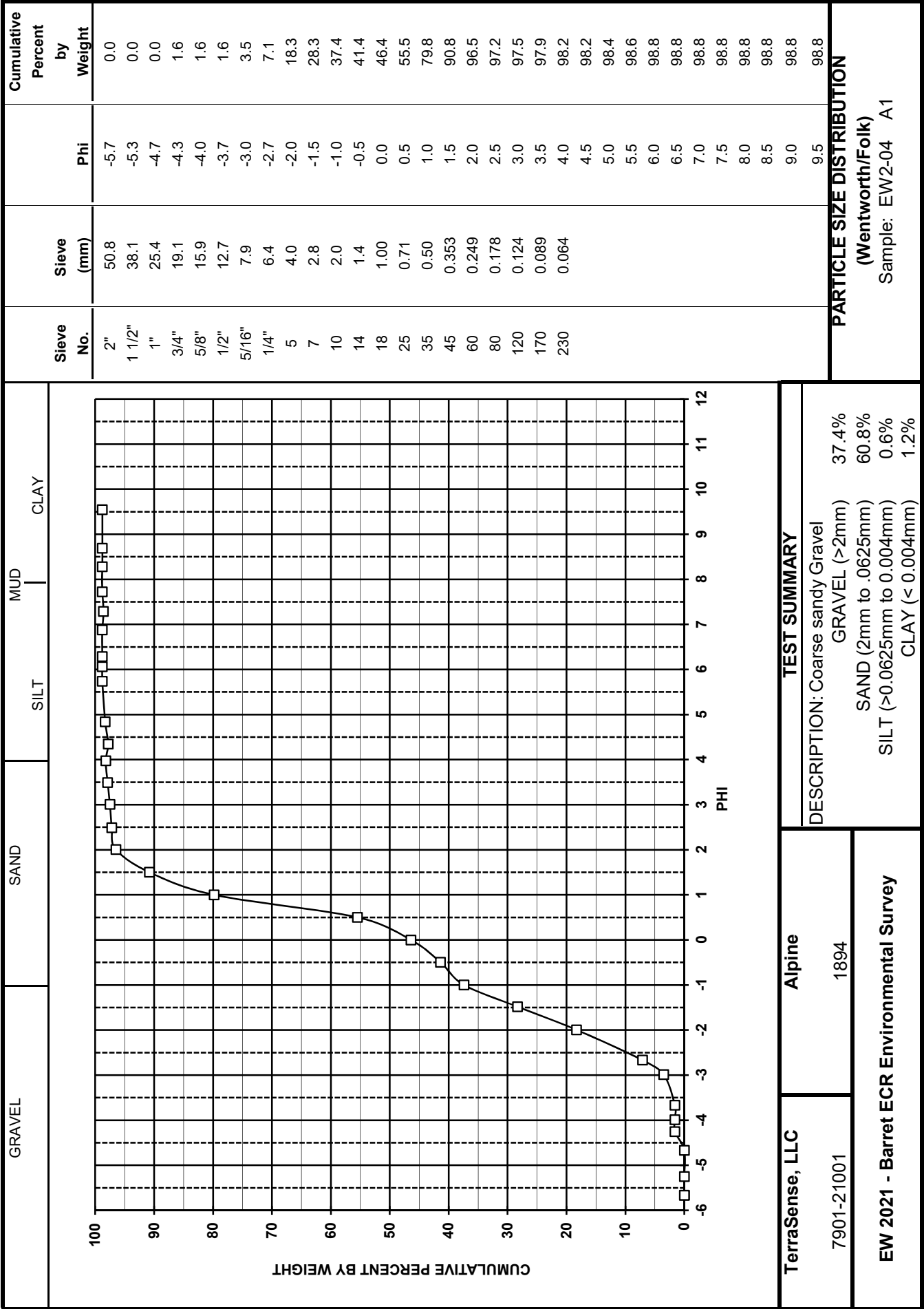


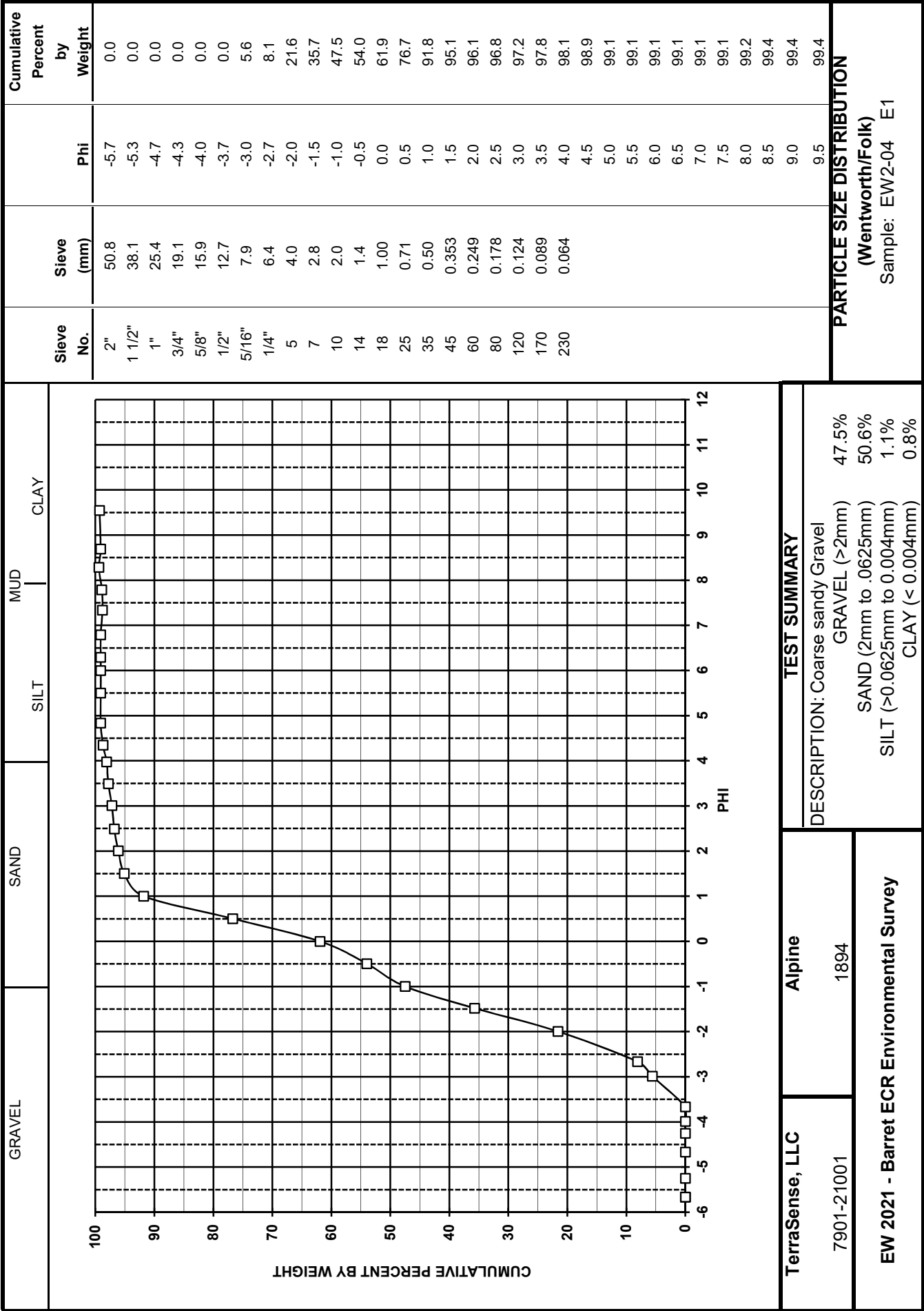


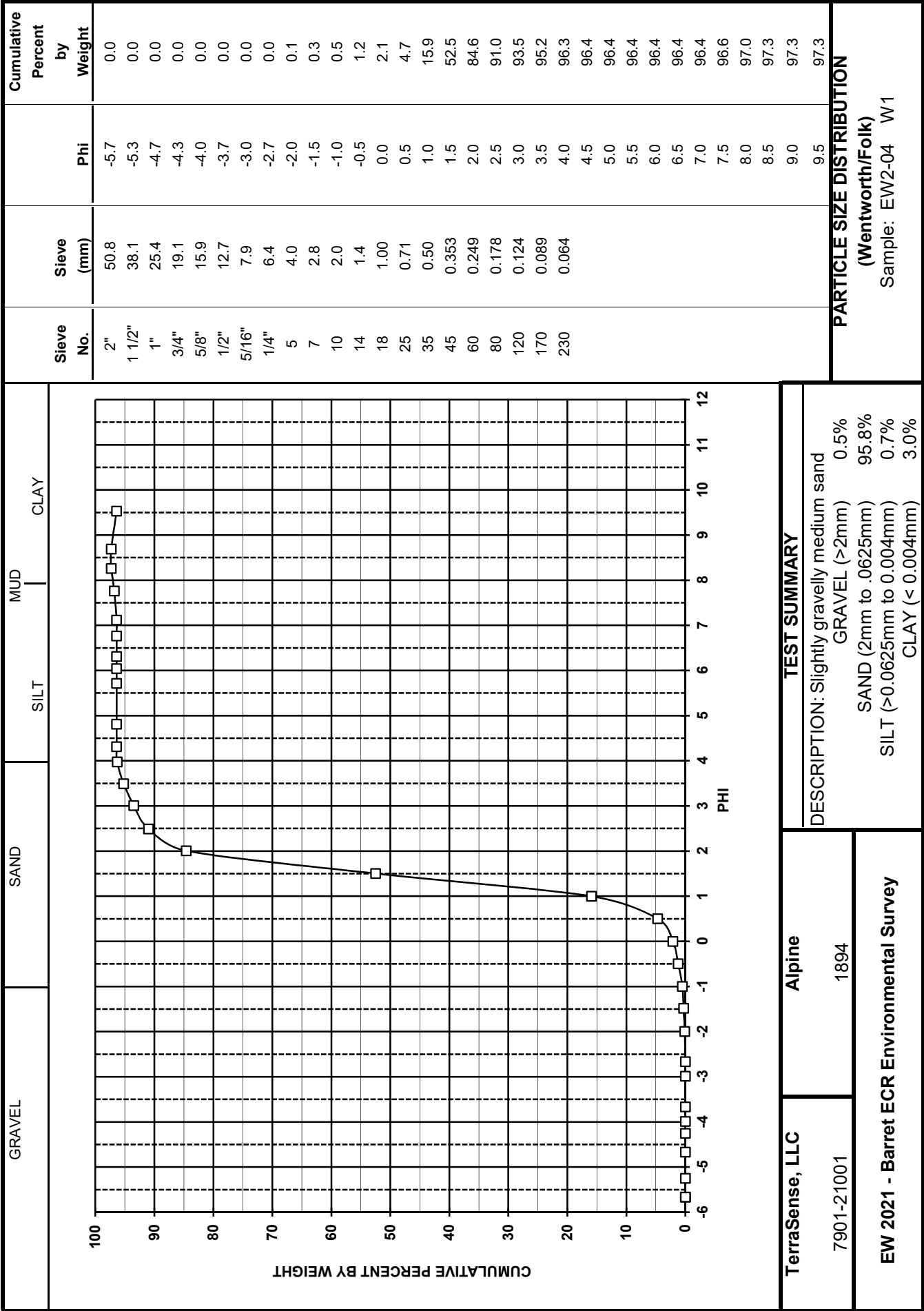


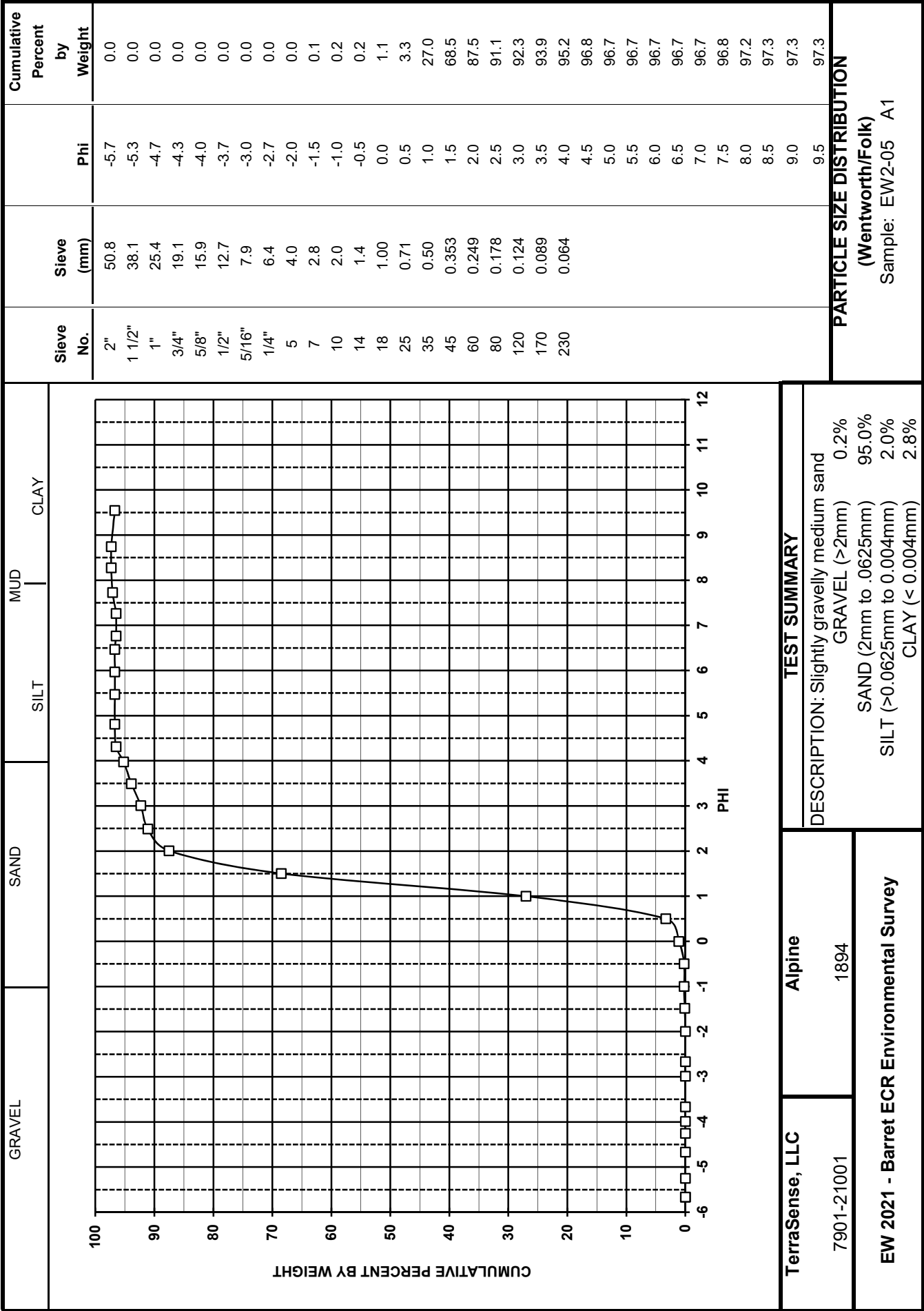


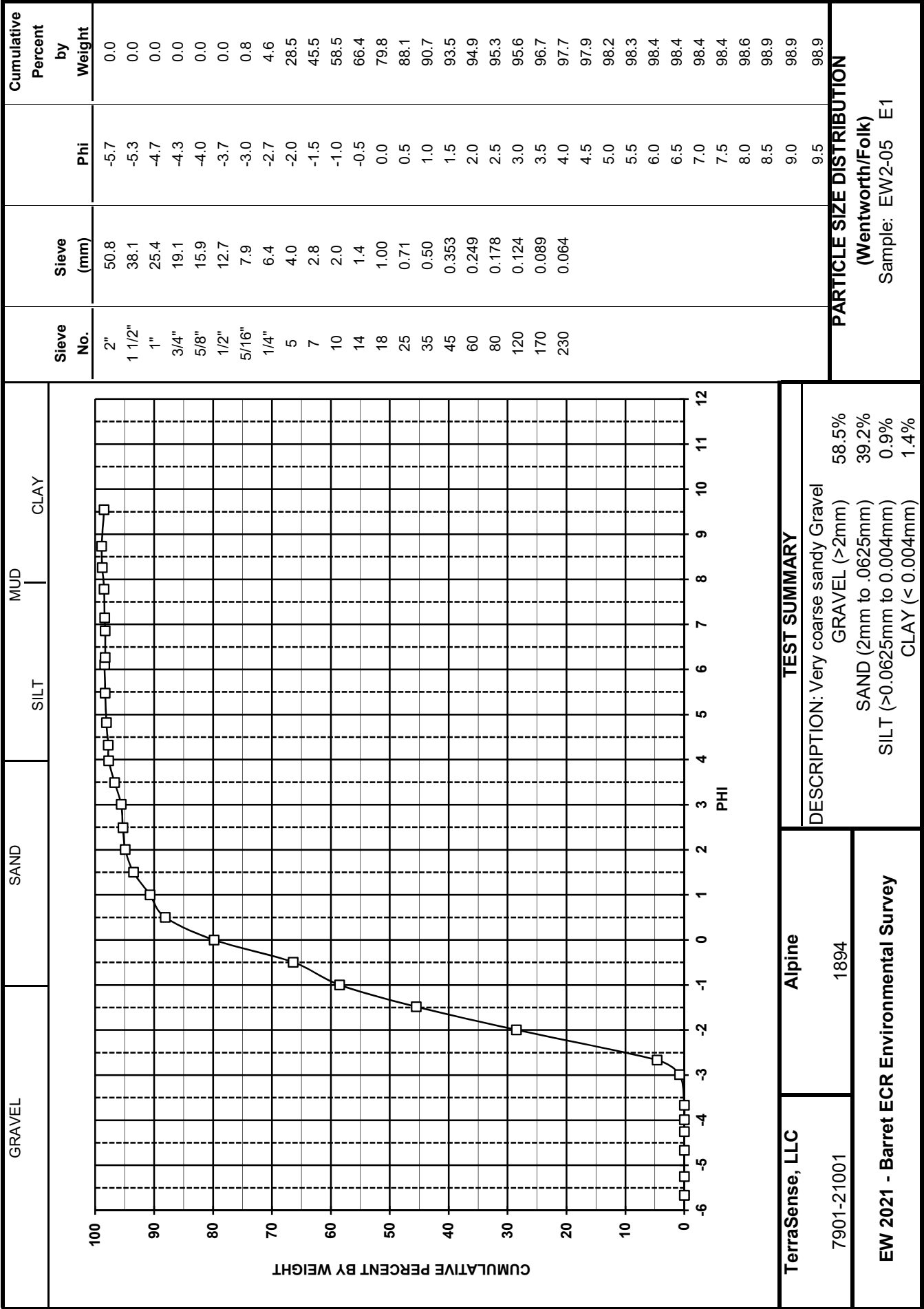


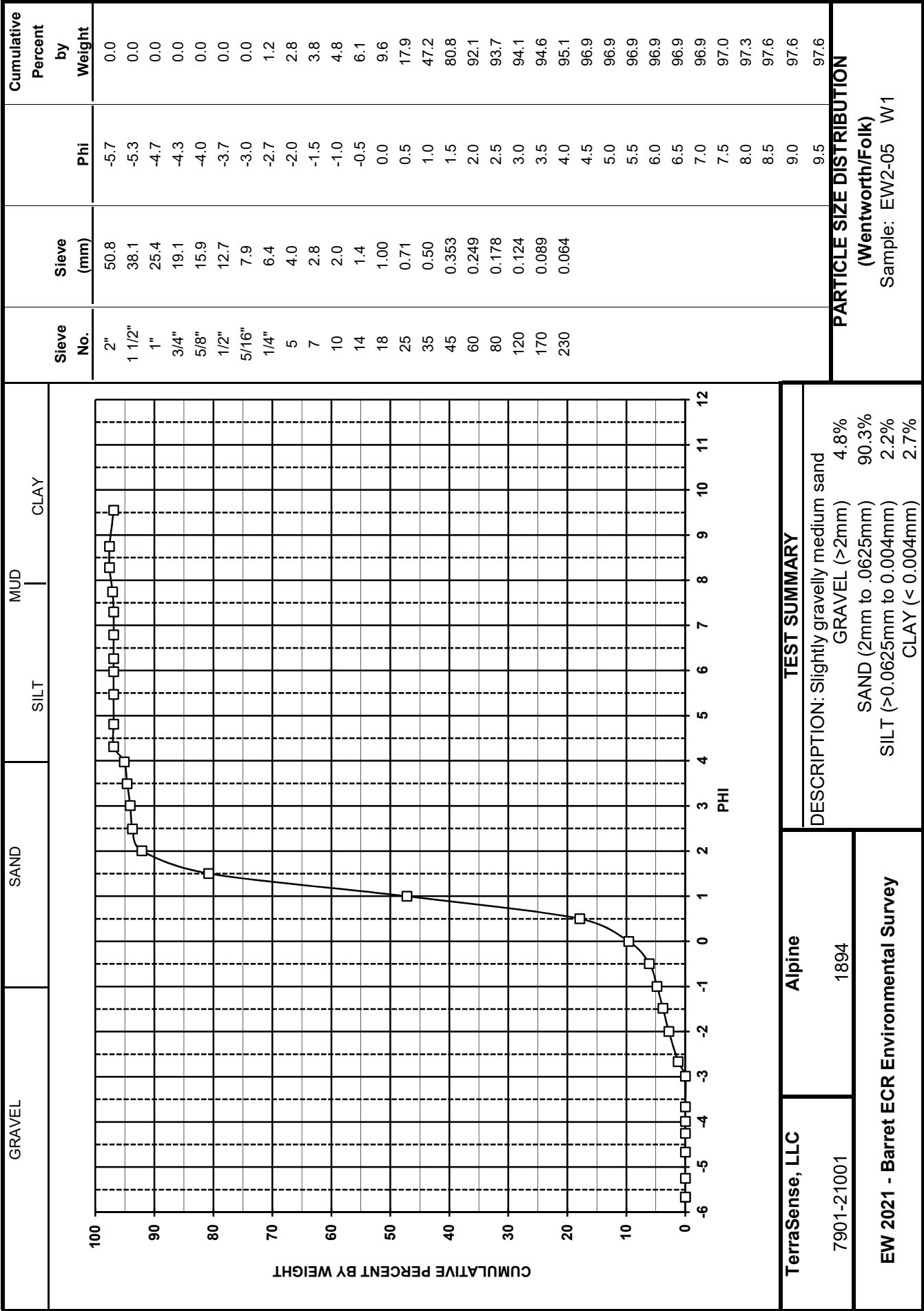


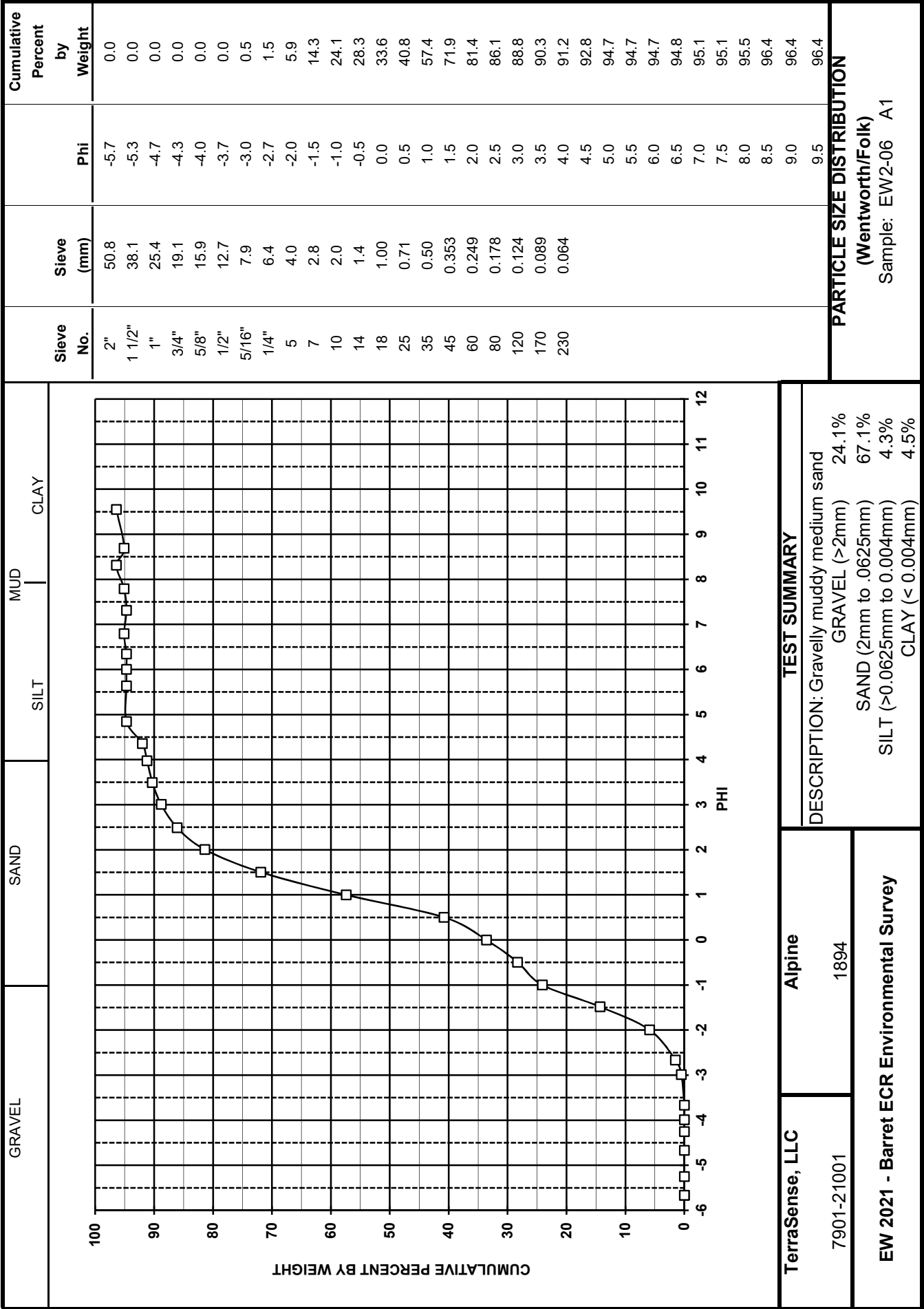


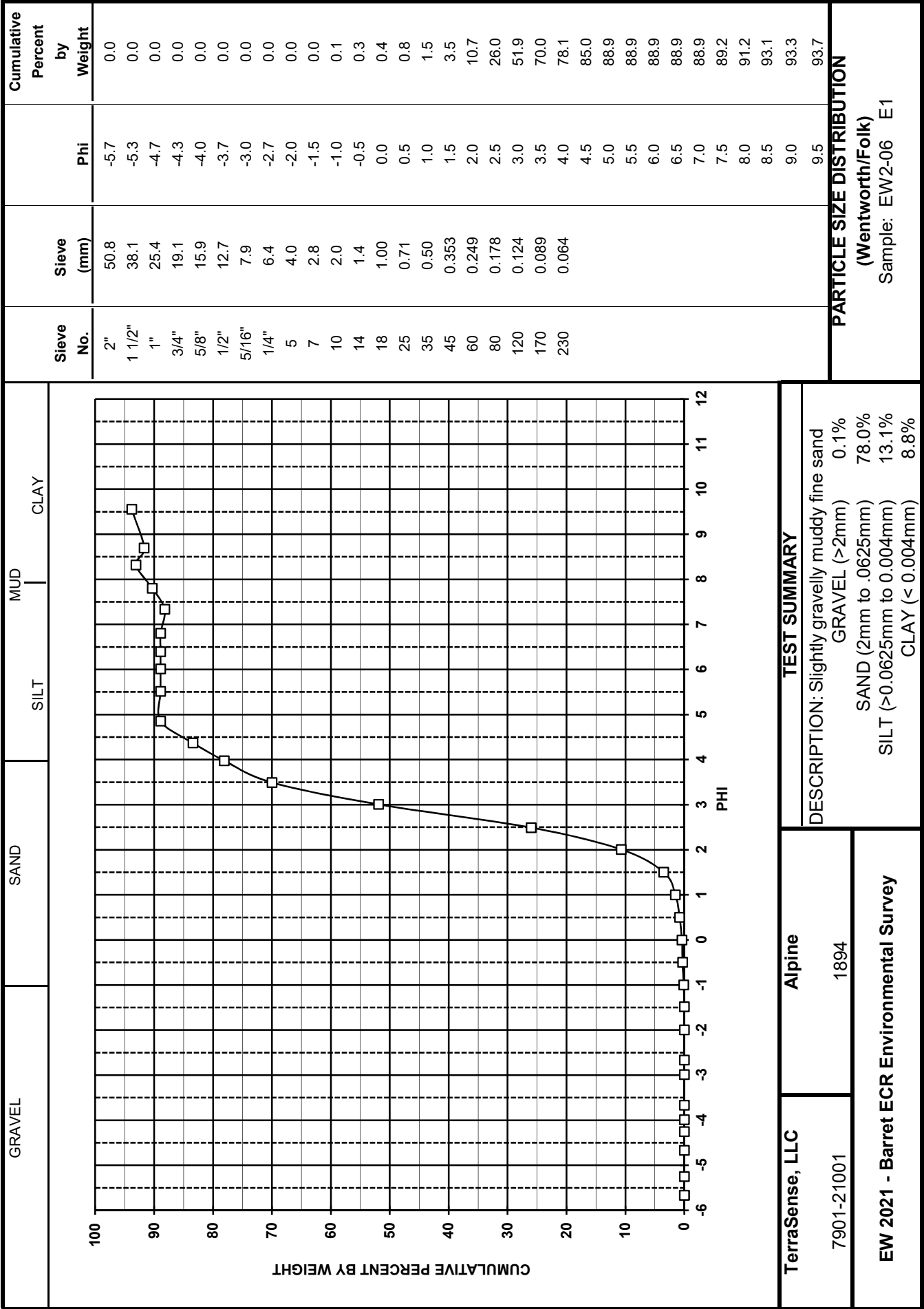












TerraSense, LLC

Alpine

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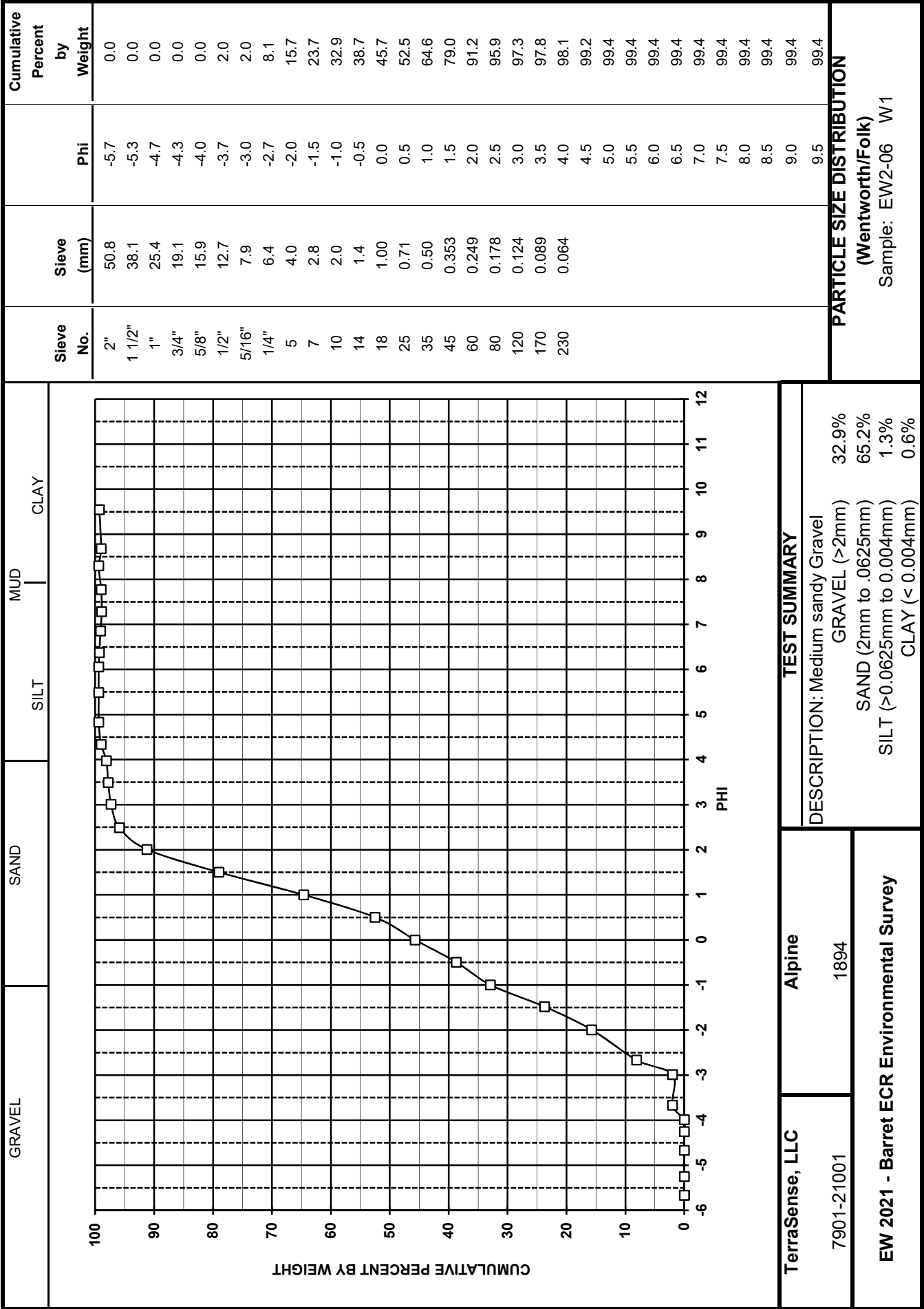
1894

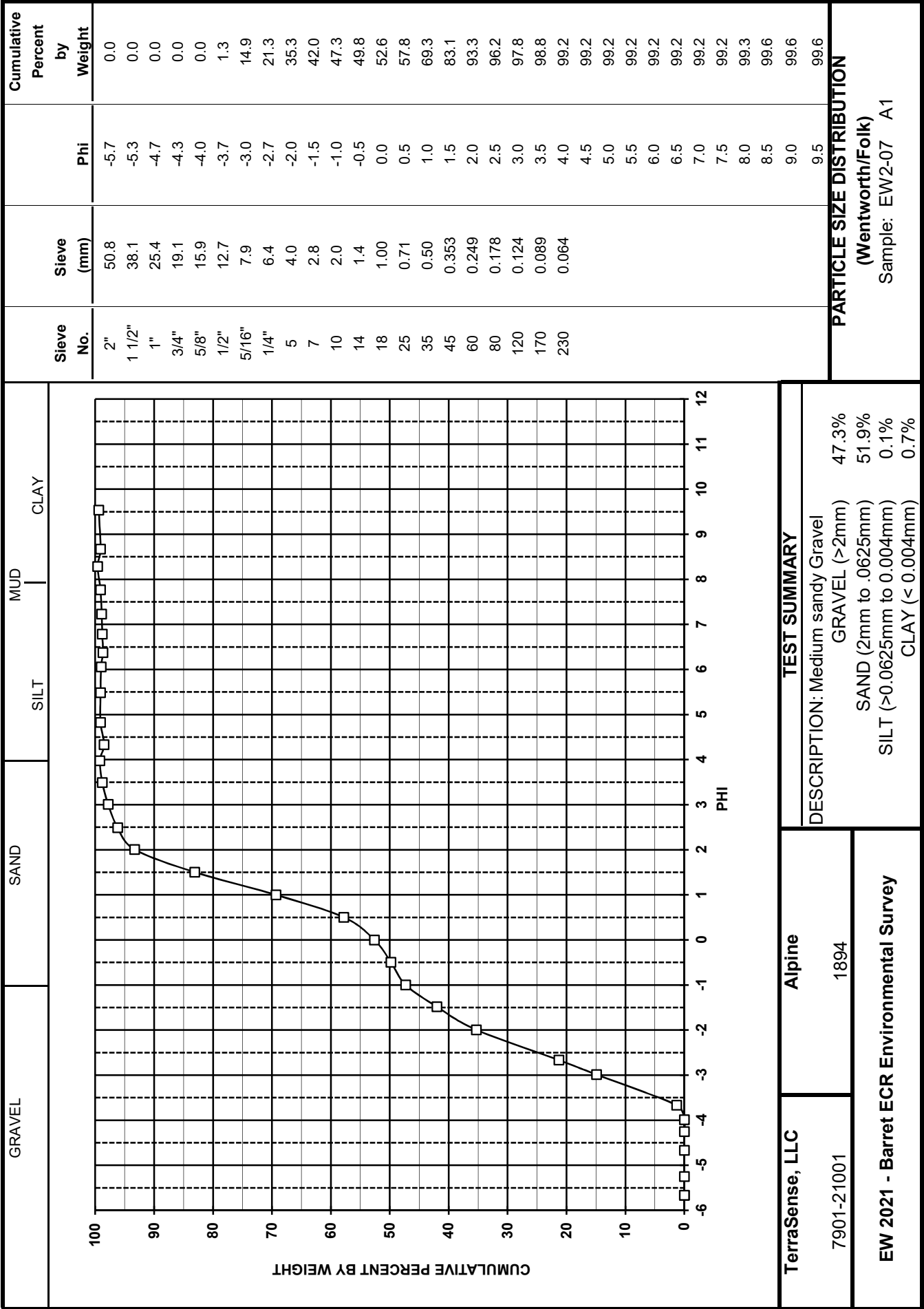
EW 2021 - Barret ECR Environmental Survey

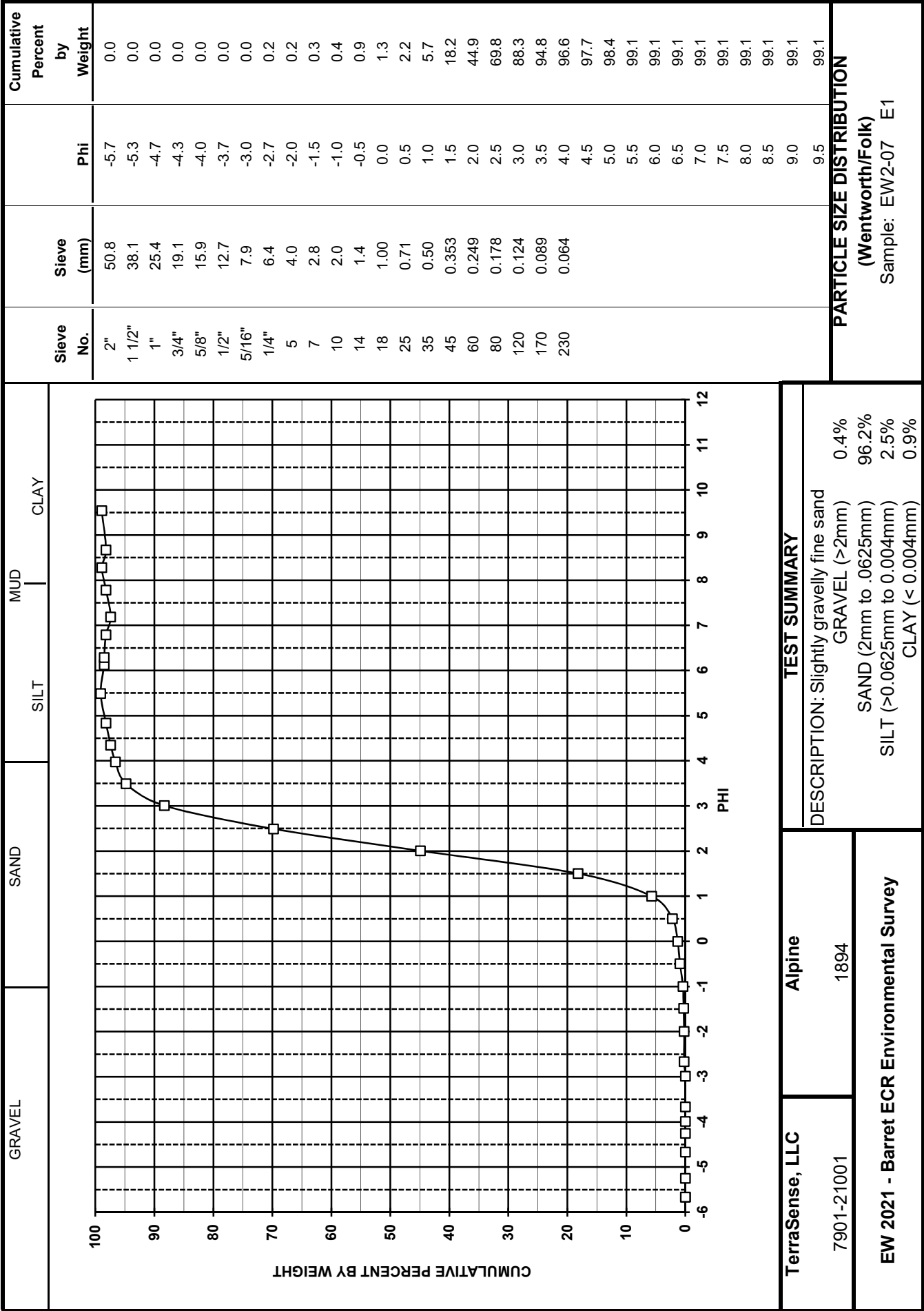
PARTICLE SIZE DISTRIBUTION

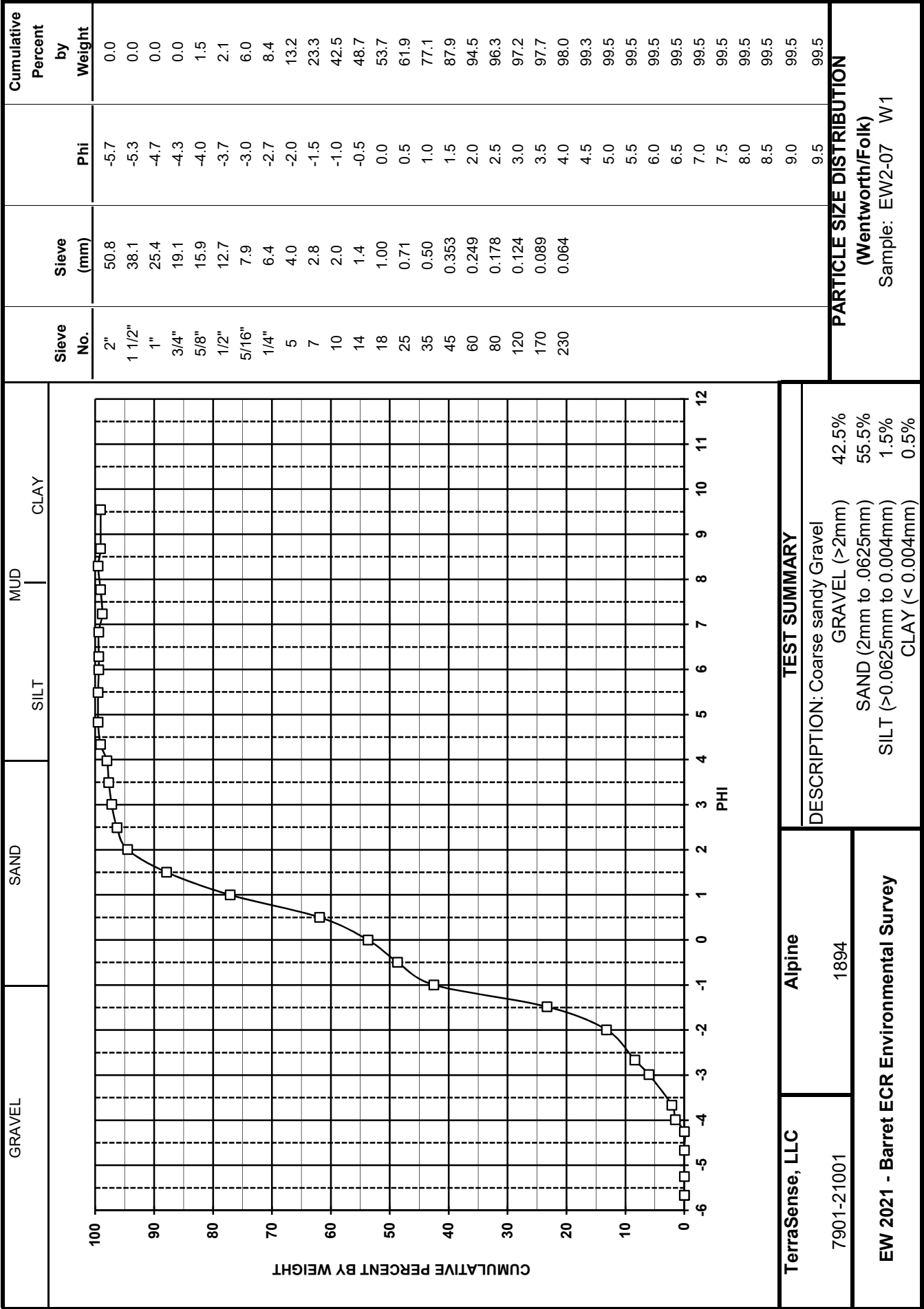
(Wentworth/Folk)

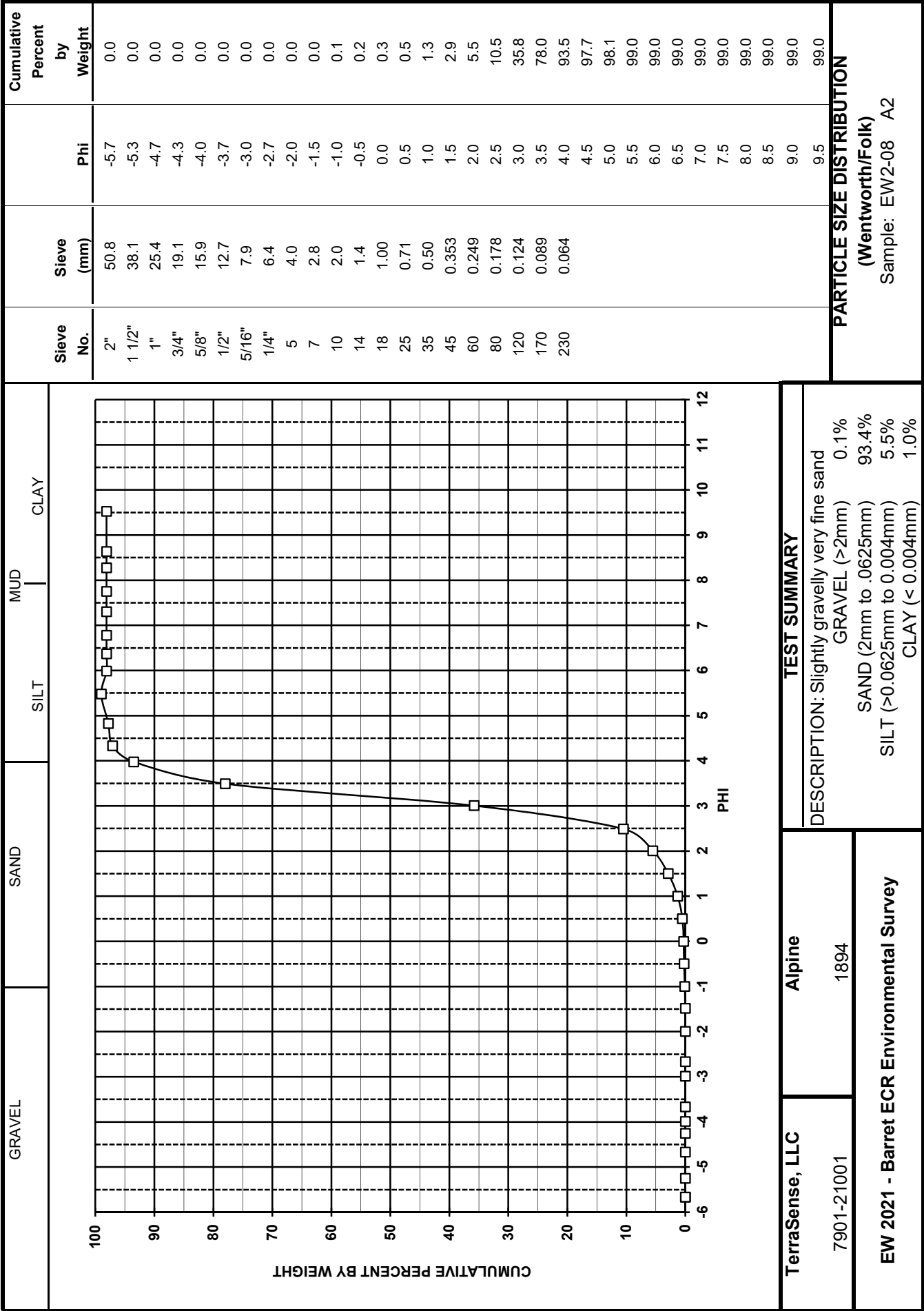
Sample: EW2-06 E1

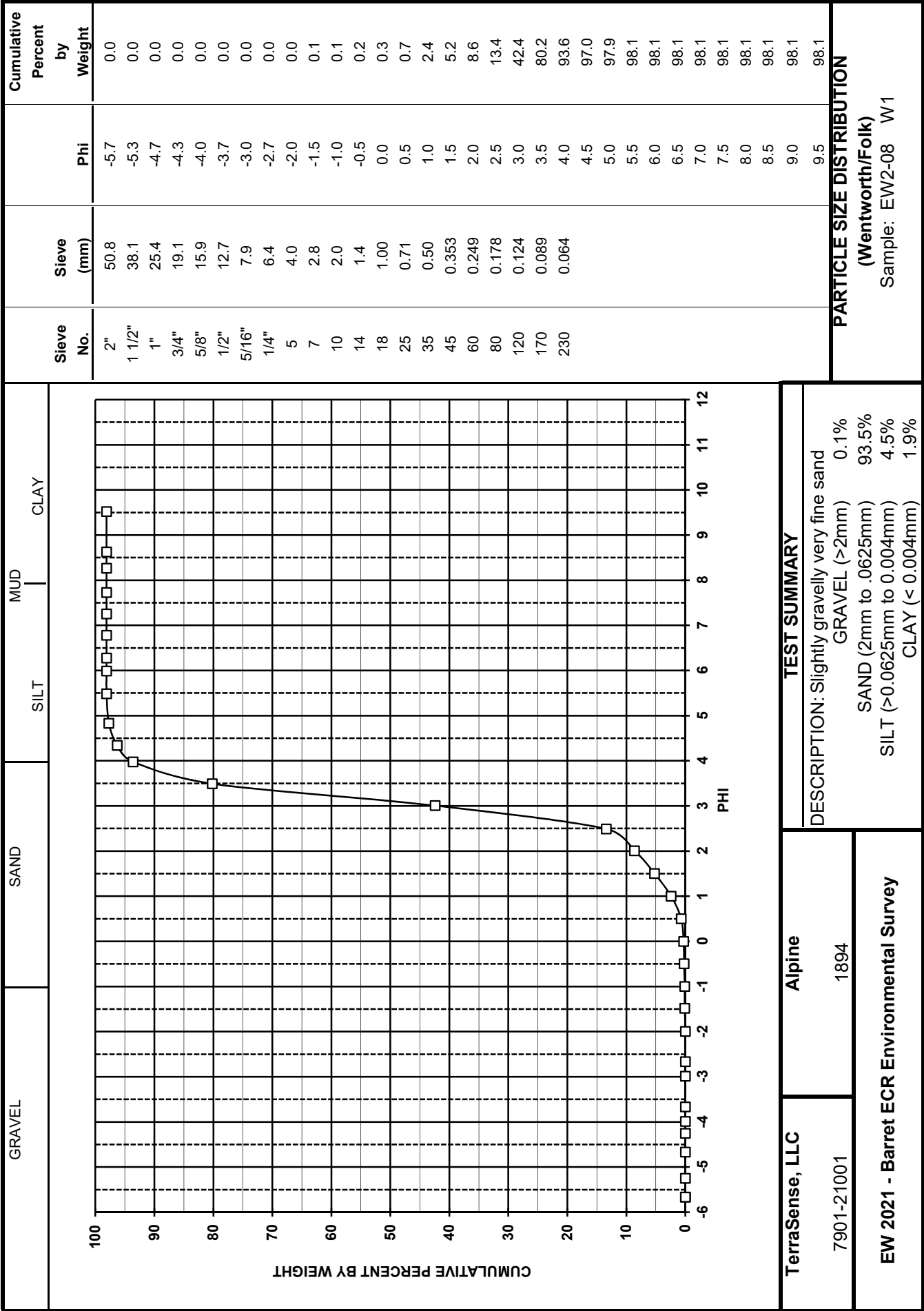


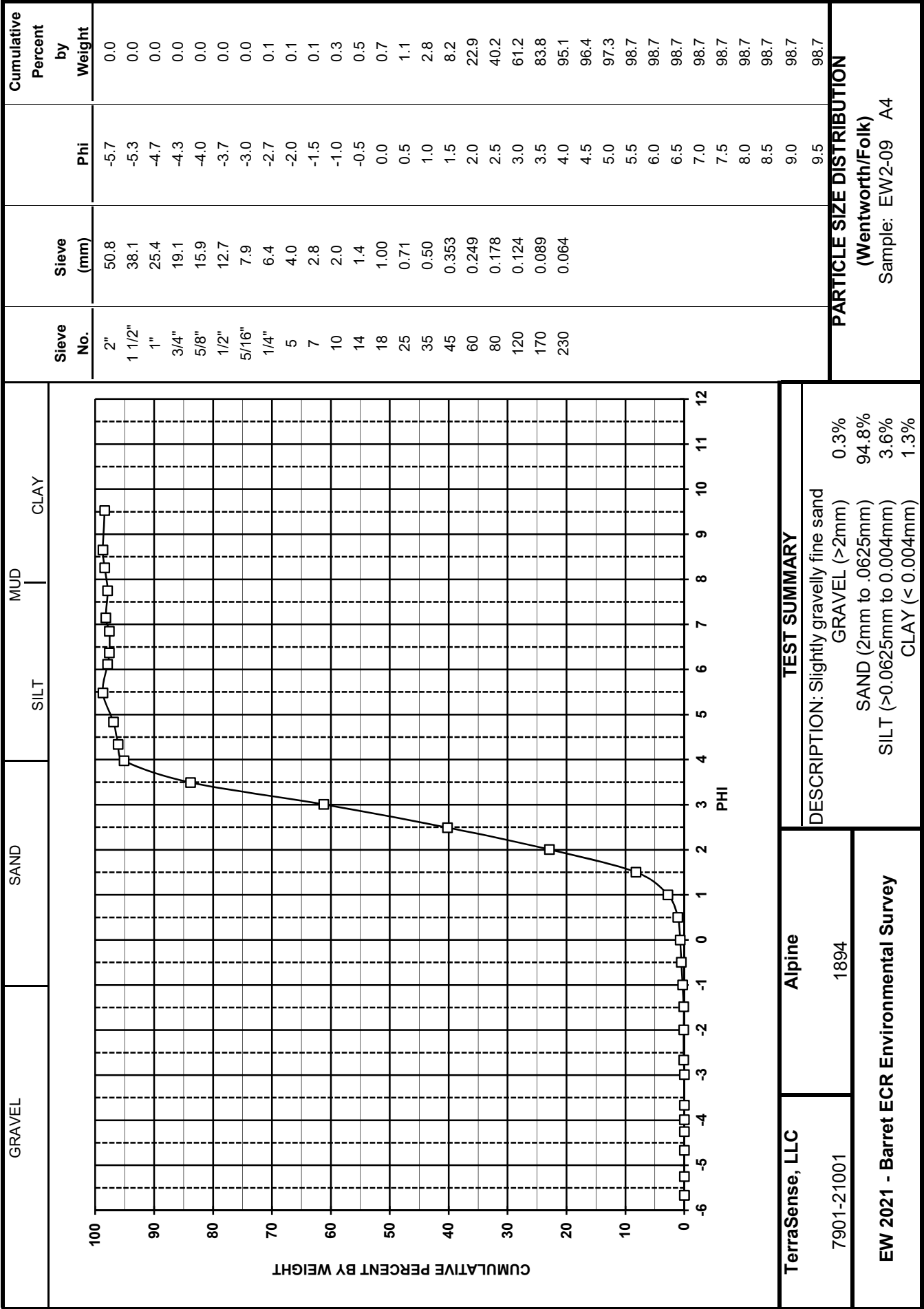


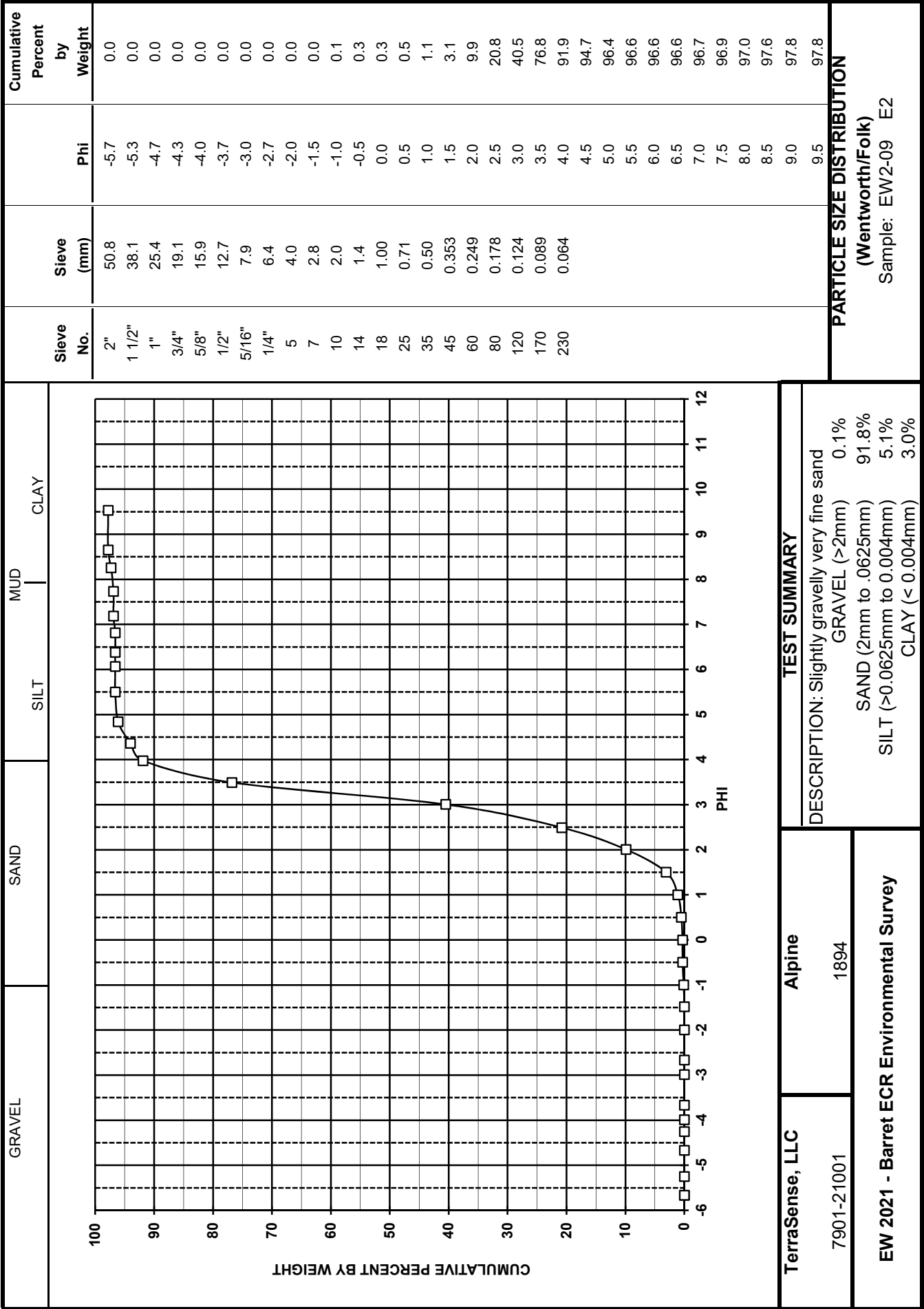


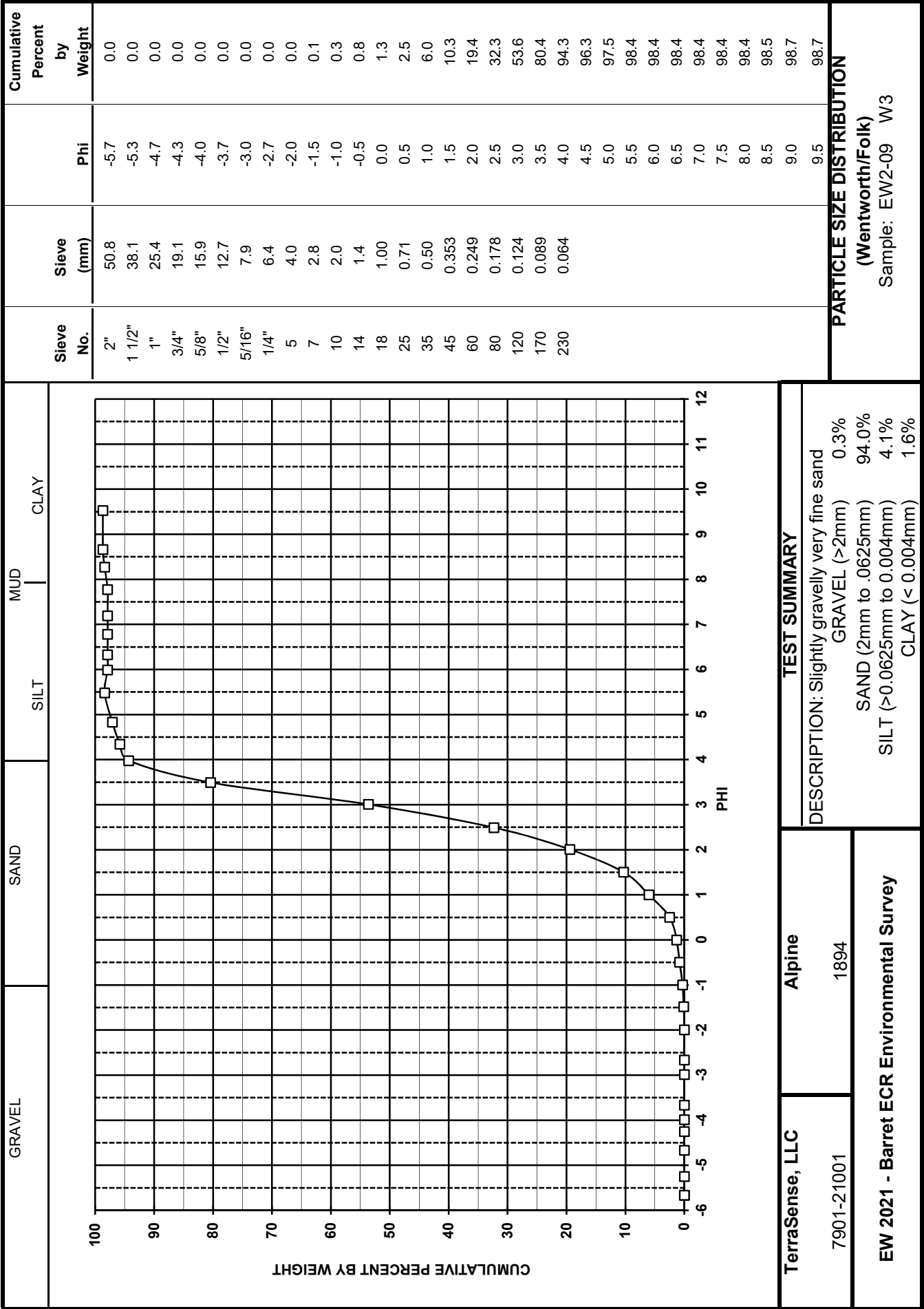


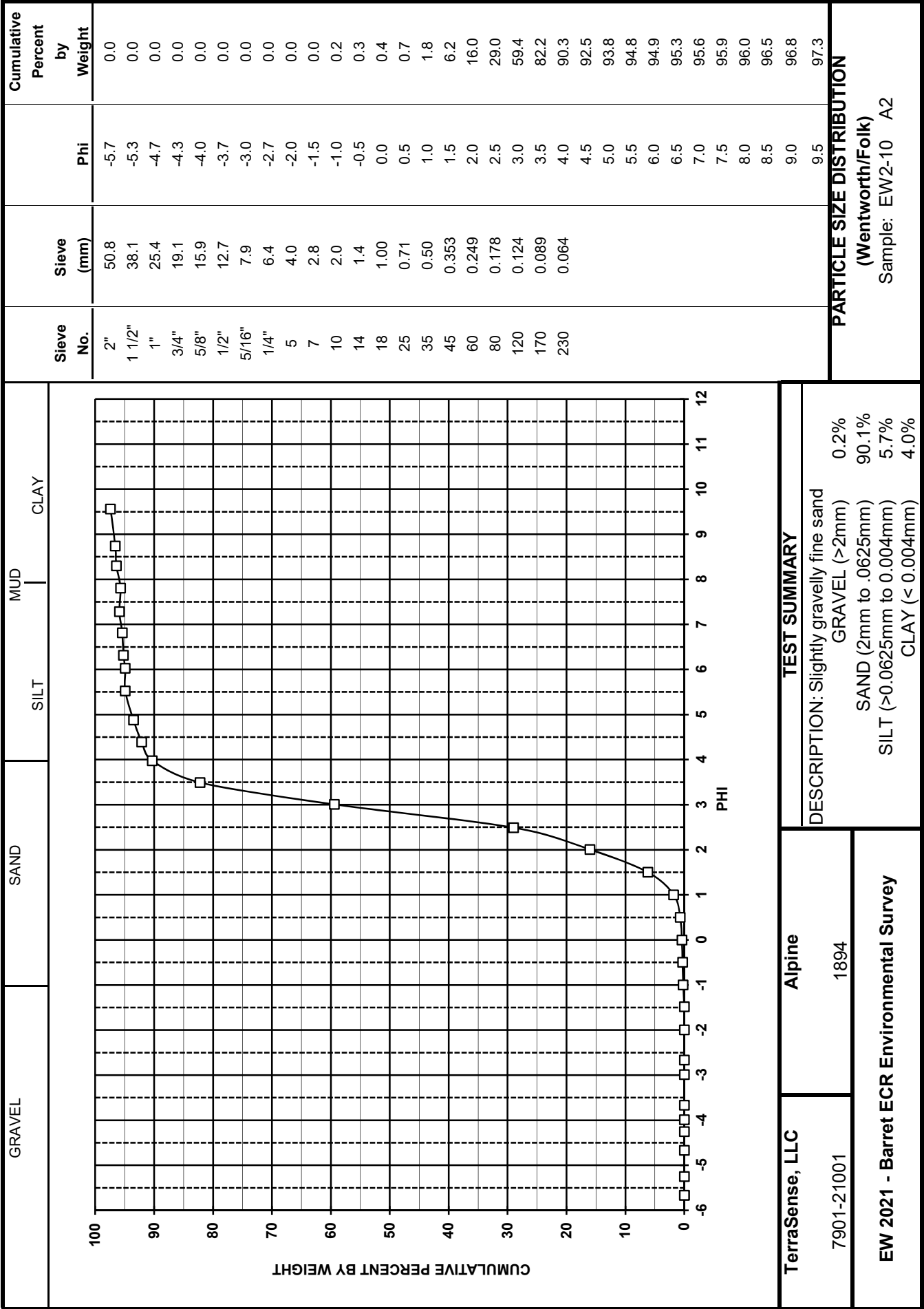


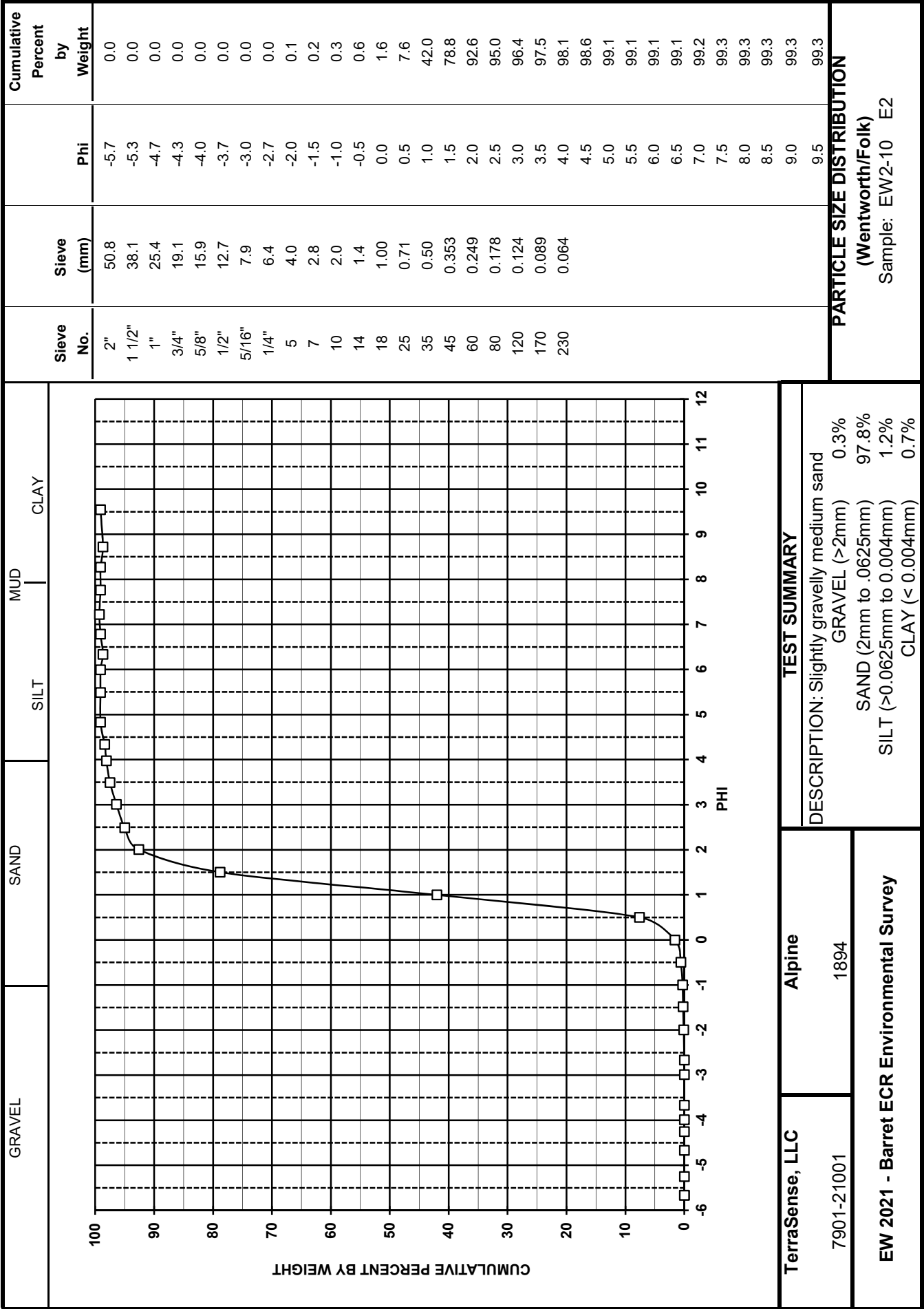


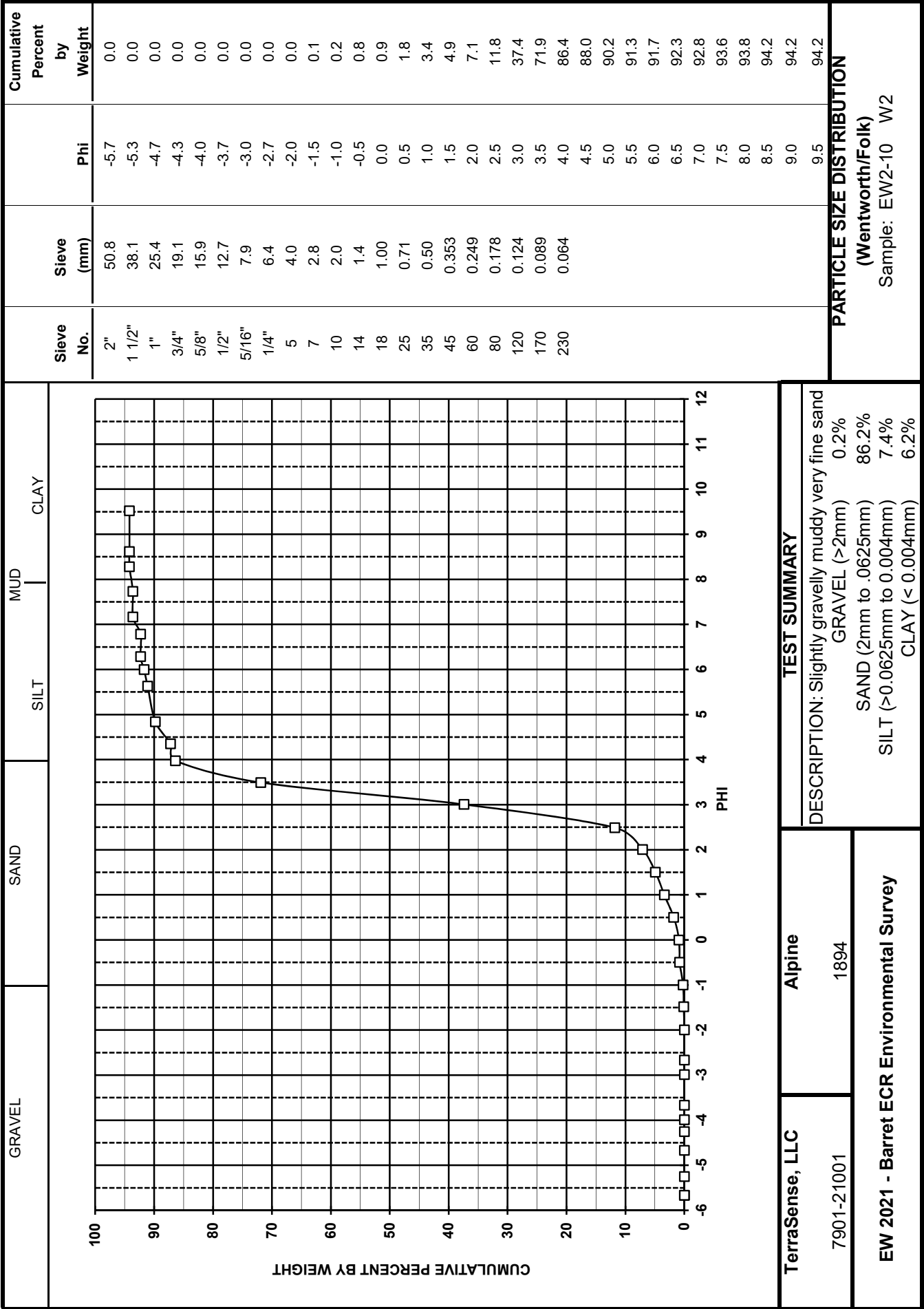


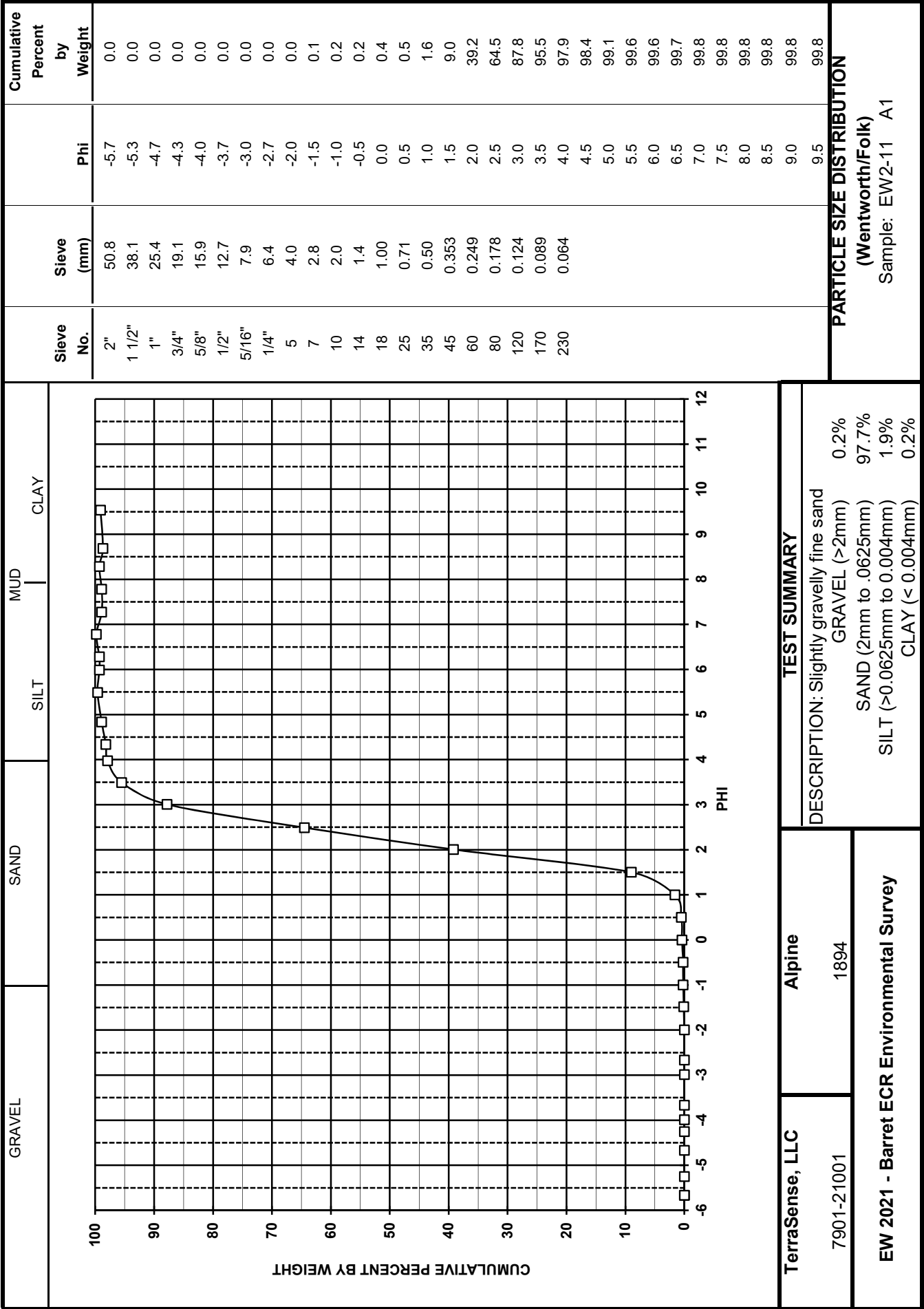


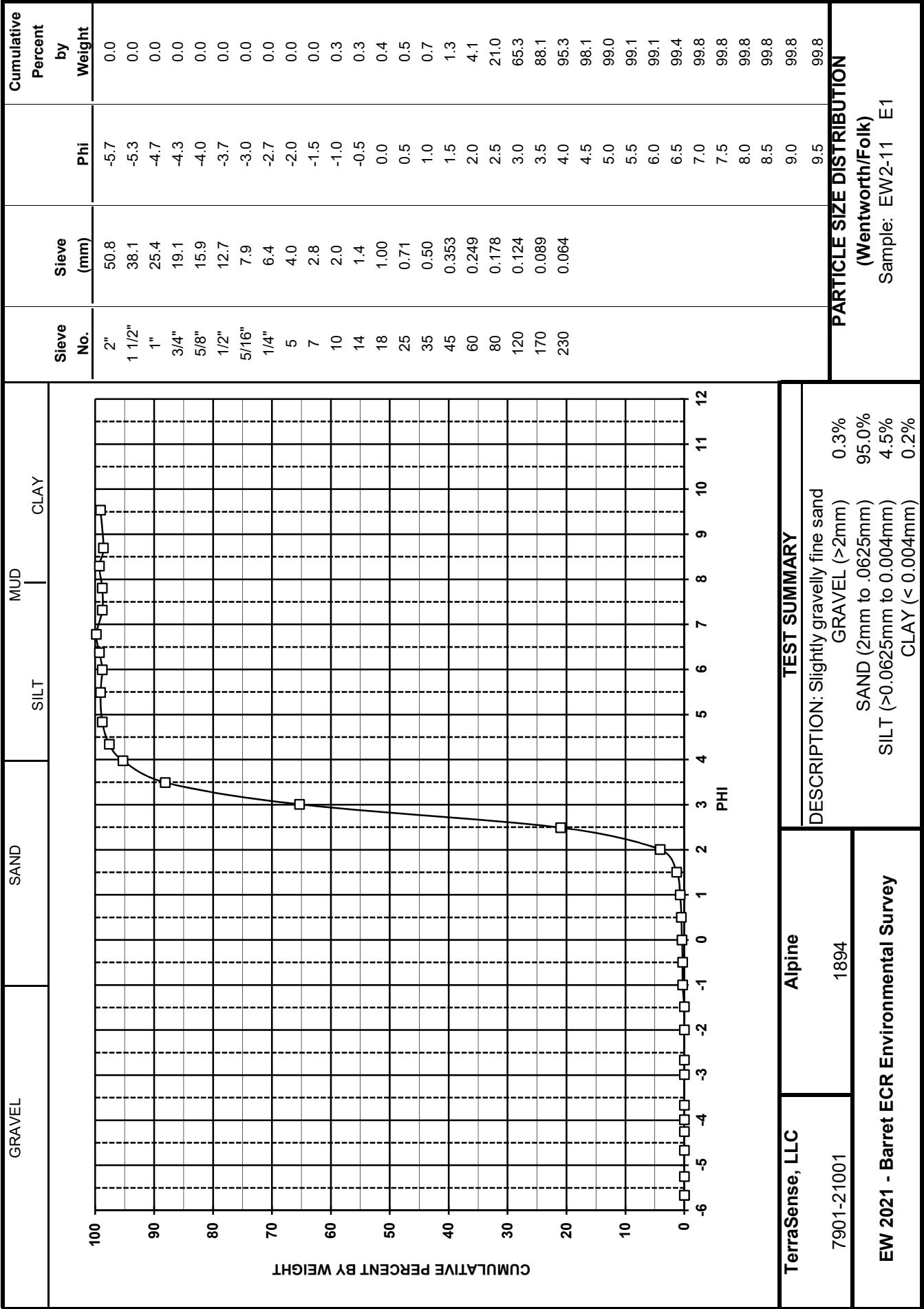


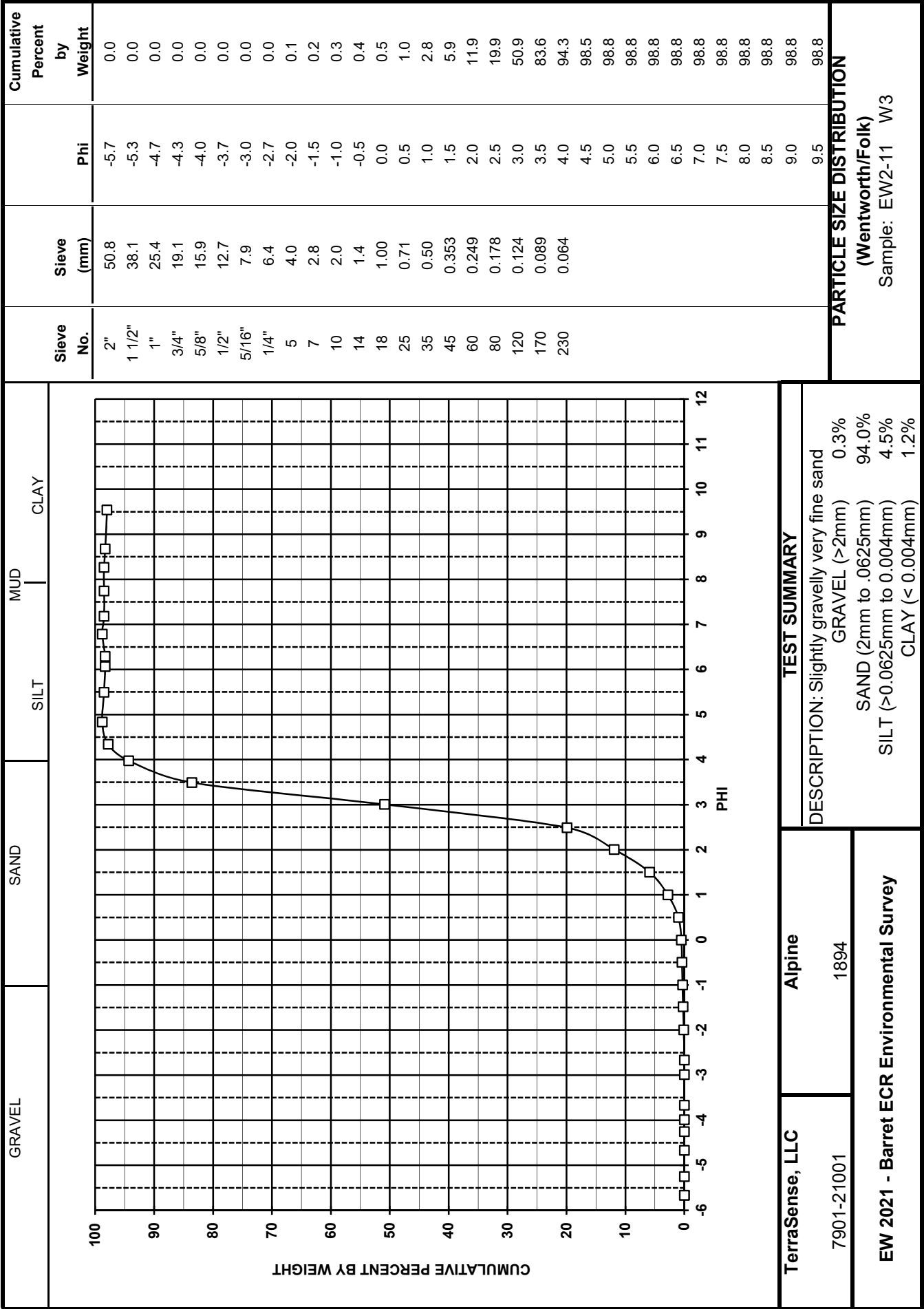


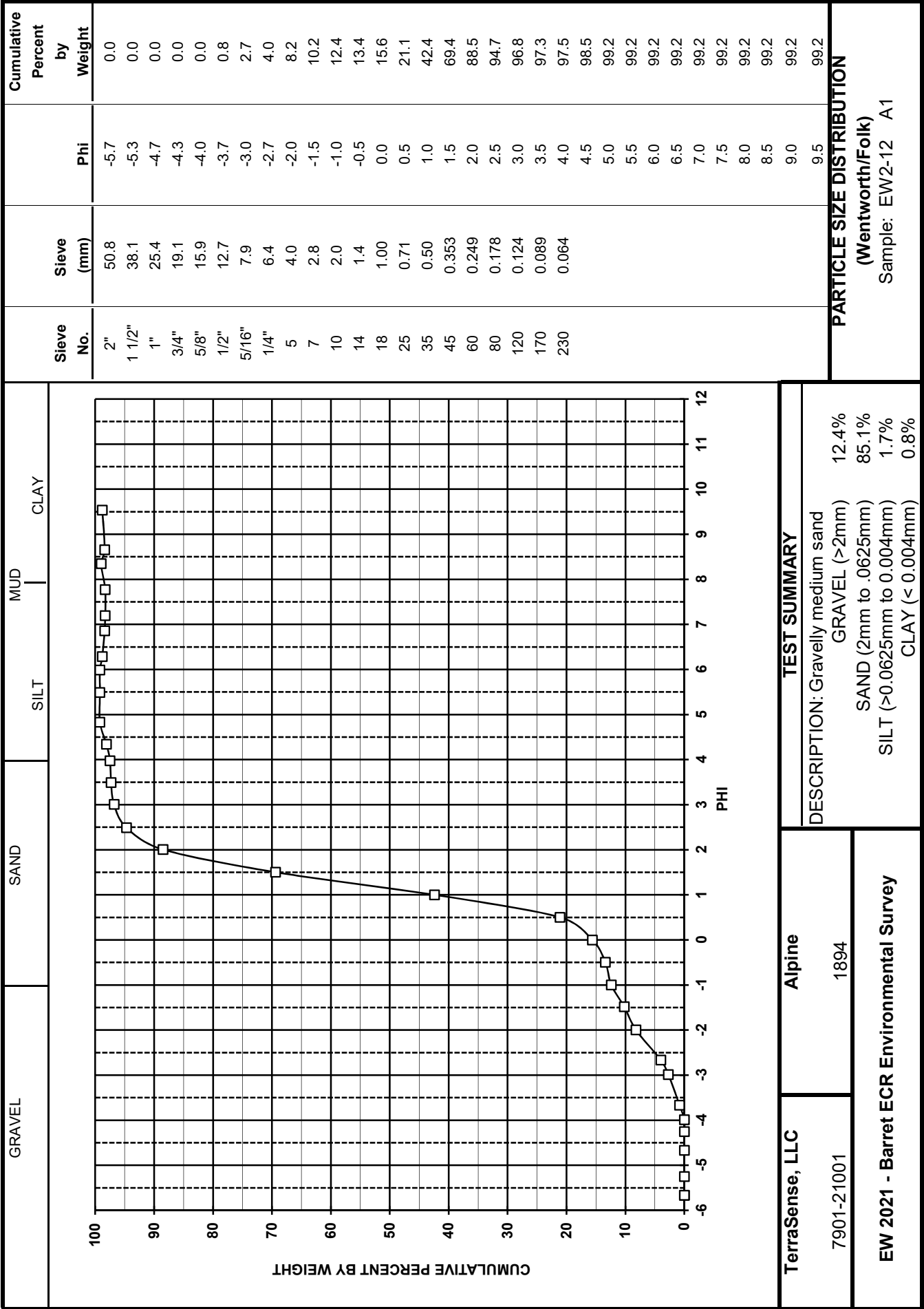


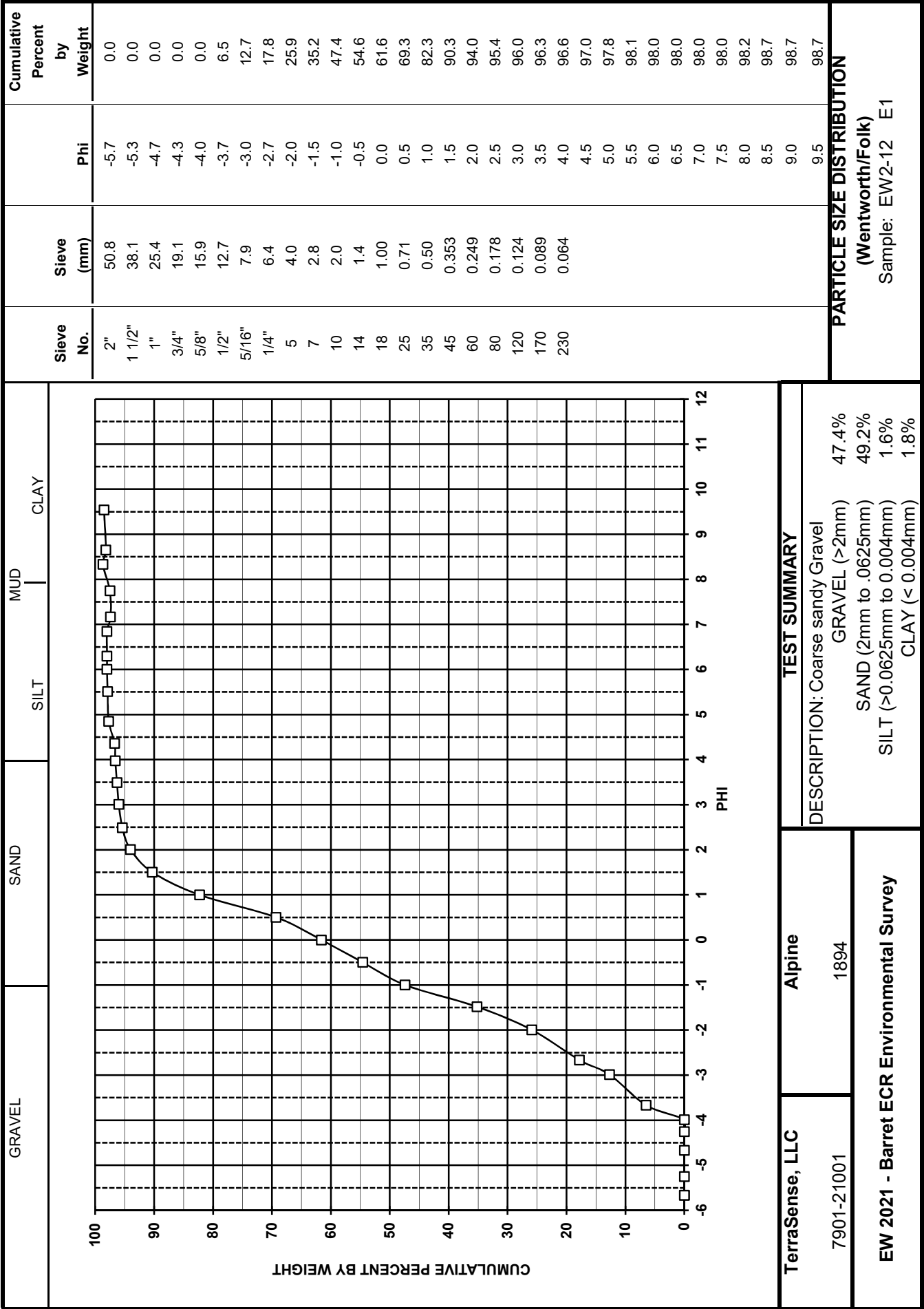


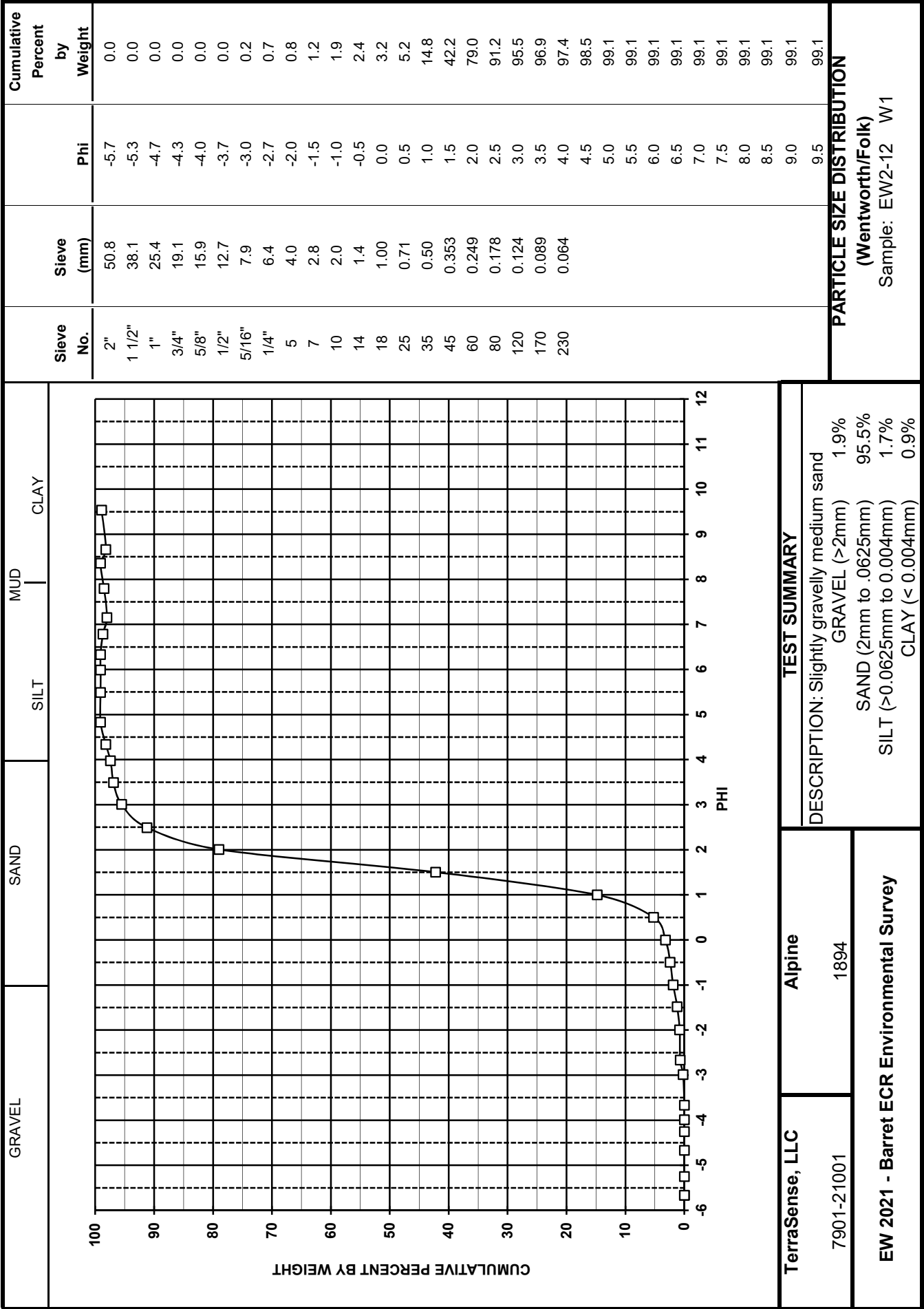












ATTACHMENT T-6
COP BENTHIC SURVEY REPORT: EW 2 SUBMARINE EXPORT CABLE SITING
CORRIDOR

Gardline Report: *Interim Habitat Characterisation Report, Barrett Route*



Survey Report for
Equinor US Wind LLC

Project:
EQ20547 – Empire Wind Extension

Description:
**Habitat Characterisation Report
Barrett Route**

Survey Date:
**Survey: Oct-10-2020 to Apr-29-2021
Environmental: Jan-01-2021 to Apr-18-2021**

Project Number:
11543

Client Reference:
EQ20547

Report Status:
Rev1

REPORT AUTHORIZATION AND DISTRIBUTION

Compilation

Geophysics	C Thacker
Surveying	T Stynes
Environmental	K Sanders, H McLennan, G Allen

Authorisation

Checked and Approved	 L Hearnden
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Revision	Date	Title
0	Sep-20-2021	Draft
1	Dec-02-2021	Rev1

Distribution

pdf

Equinor ASA
N-4035 Stavanger
Forus Vest E-2

For attention of
Kevin Clements

EXECUTIVE SUMMARY

Gardline completed a geophysical and environmental habitat characterization survey on behalf of Equinor US Wind LLC along the proposed export cable corridors across the Commercial Lease of Submerged Lands and renewable Energy Development on the Outer Continental Shelf (OCS-A 0512). Survey operations were undertaken onboard the Gardline motor vessel *Ocean Endeavour* between Oct-10-2020 and Apr-29-2021, with all environmental work conducted between Jan-01-2021 and Apr-18-2021.

The overall survey aim was to augment previously completed benthic surveys as well as characterize the new portions of the export cable corridors. The overall purpose of the habitat characterization, as defined by the benthic SOW (Equinor Wind, 2020a), was to ground truth the results of geophysical data to characterize surficial sediment conditions and provide benthic habitat classification as per guidelines (BOEM, 2019; NOAA Fisheries, 2020).

A total of fifteen camera transects were pre-selected by the client and were distributed along the survey route corridor. Three water profiling and seabed sediment sampling stations were selected along each camera transect: at the start, centre and end of each transect. The exceptions were Stations EW2-4, EW2-9, EW2-11 and EW2-16, where sampling stations were to be undertaken at the centre of the imagery transect only. All transects were successfully investigated using a shallow water camera system and all stations were successfully sampled with a CTD profiler and either a Day grab or dual Van Veen grab.

Geophysical data interpretation was supported by seabed imagery and observations made from grab sampling, confirming sediments comprising sand with areas slightly gravelly sand. Numerous objects were recorded along the route, the majority of these were thought to be cobbles and boulders. However, 23 objects were interpreted as anthropogenic. Water depths varied along the route centreline, ranging from 9.2m the northwest to 38.1m in the southeast area of the route. Seabed gradients were generally less than 1°, with localised gradients reaching 20° on the flanks of relict bedforms.

Environmental camera imagery across the survey area revealed that the seabed predominantly comprised sand, with occasional patches of gravel. Overall, the most frequently observed taxa or features were the echinoderm *E. parma*, Animalia tubes and the mollusc family Nassariidae.

A total of 51 individuals of *Leucoraja ocellata* (winter skate) were observed throughout 10 of the 15 transects along the route. This is listed as an endangered species on the International Union for the Conservation of Nature (IUCN) Global Red List (2021). The survey area was also within an area designated as an Essential Fish Habitat (EFH) for juvenile winter skates (NOAA, 2021c). Five individuals of *Squalus acanthias* (spiny dogfish) were recorded along 2 of the transects. It is listed as vulnerable on the IUCN Red List (2021) and the survey was in an area designated as an EFH (NOAA, 2021c) for this species. One individual of *Limulus polyphemus* (American horseshoe crab) was observed along Transect EW2-8, which is listed as vulnerable on the IUCN Red List (2021).

The survey route was also within an area designated as an EFH for the ocean quahog (*Arctica islandica*). Siphons thought to belong to *A. islandica* were recorded on 60 occasions, with Station EW2-14 recording the greatest number of siphons. The presence of *A. islandica* was further indicated by sightings of dead individuals in the form of *A. islandica* shells, recorded in 50 images.

Rajidae egg cases were observed along all transects, with 21% of all cases recorded along Transect EW2-5. A total of 723 anthozoan individuals were observed throughout the survey area. Ceriantharia represented 95% of all anthozoan individuals enumerated, with the highest densities recorded along Transect EW2-3.

The survey area did not fall in any Habitat Areas of Particular Concern, as defined by NOAA (2021b), or in any final or proposed Critical Habitat as defined by the United States Fish and Wildlife Service (USFWS, 2021). Apart from those habitats and species mentioned above, there was no further evidence from seabed imagery of any other sensitive benthic habitats as defined by BOEM (2019), species listed on the IUCN Red List of threatened species (2021) nor any critical habitats or endangered species listed under the Endangered Species Act of 1973 (USFWS, 2021).

The majority of transects were categorized with biotic groups of 'Sand Dollar Bed' and/or 'Diverse Soft Sediment Fauna' due to variation in faunal communities along the transects, according to the Coastal and Marine Ecological Classification Standard (FGDC, 2012). Transects EW2-3 and EW2-10 were characterized by burrowing Cerianthid anemones and were therefore categorized as the biotic community 'Cerianthus Bed' according to CMECS (FGDC, 2012).

Particle size analysis supported the geophysical interpretation and seabed imagery, with stations classified as sand to sandy gravel according to Folk and Ward (1957). Generally, the sand fraction ($\geq 63\mu\text{m}$ and $< 2\text{mm}$) accounted for the majority of sediment, ranging from 43% to 98%. Concentrations of total organic matter ranged from 0.2% to 6.5% and had a statistically significant negative correlation with sediment grain size.

Overall, CTD profiles generally revealed similar trends between stations. Potential temperature remained relatively constant throughout the water column; however, there was a general trend for surface waters to be slightly warmer than deeper waters. There was no evident thermocline at any of the stations. Salinity increased with depth at all stations; however, no halocline was apparent indicating that waters were well mixed throughout the water column. Dissolved oxygen generally decreased with depth and values were generally above the Canadian Council of Ministers of the Environment (CCME, 1999a) interim guideline of 8mg L^{-1} . pH values were within the CCME (1999b) interim guideline range of 7.0 to 8.7 units. Turbidity generally decreased with increased distance from coastline and increase in water depth. Conductivity displayed similar trends to those of temperature and pH, with Stations EW2-5B and EW2-6B recording the highest values.

Overall, analysis of the macrofaunal community revealed a relatively equitably distributed community, with instances of patchiness and a lack of consistent dominance, albeit with a notable higher abundance of the polychaete *Polygordius jouinae*. Multivariate analysis of the faunal data revealed that stations were more dissimilar than similar and that differences largely corresponded with absences and higher abundances of the top ten ranking taxa. Furthermore, percentage of fines at stations was found to have a significant yet limited effect on the separation of stations.

Two individuals of *A. islandica* were recorded from the macrofauna sample at Station EW2-14C, which was located within an area designated as an EFH for this taxon (NOAA, 2021c). Three individuals of Anthozoa (Actiniaria and Ceriantharia) were recorded along the route; however, these are not listed by BOEM (2019) as comprising sensitive habitats.

The majority of stations ($n=12$; 32%) were categorized at the biotic group level as 'Mobile Crustaceans on Soft Sediments'. Furthermore, Station EW2-3A was categorized with the co-occurring element of 'Large Deep Burrowing Fauna' and Station EW2-12A was categorized with the co-occurring element of 'Mobile Mollusks on Soft Sediments'. The biotic groups 'Diverse Soft Sediment Epifauna' and 'Small Surface-Burrowing Fauna' were also relatively common, accounting for 24% ($n=9$) of station classifications, respectively.

Report volumes are as follows:

Report	Report No.
EQ20547– Empire Wind Extension – Barrett Route Geophysical Report	11543.1
EQ20547– Empire Wind Extension – Oceanview Route Geophysical Report	11543.2
EQ20547– Empire Wind Extension – Lease Area Report Geophysical Report	11543.3
EQ20547 – Empire Wind Extension – Operations Report	11543.4
EQ20547 – Empire Wind Extension – Protected Species Mitigation Plan	11543.E00
EQ20547 – Empire Wind Extension – Protected Species Observation Report - Interim Report 1 (Oct-10-2020 to Dec-11-2020)	11543.E01.0
EQ20547 – Empire Wind Extension – Protected Species Observation Report - Interim Report 2 (Dec-11-2020 to Mar-11-2021)	11543.E01.1
EQ20547 – Empire Wind Extension – Protected Species Observation Report - Interim Report 3 (Mar-12-2021 to Apr-29-2021)	11543.E01.2
EQ20547 – Empire Wind Extension – Protected Species Observation Report - Completed Survey Report	11543.E02
EQ20547 – Empire Wind Extension – Barrett Route - Habitat Characterisation Report - Interim	11543.E03
EQ20547 – Empire Wind Extension – Barrett Route - Habitat Characterisation Report	11543.E04
EQ20547 – Empire Wind Extension – Oceanview Route - Habitat Characterisation Report - Interim	11543.E05
EQ20547 – Empire Wind Extension – Oceanview Route - Habitat Characterisation Report	11543.E06

SERVICE WARRANTY

USE OF THIS REPORT

This report has been prepared with due care and diligence and with the skill reasonably expected of a reputable contractor experienced in the types of work carried out under the contract and as such the findings in this report are based on an interpretation of data which is a matter of opinion on which professionals may differ and unless clearly stated is not a recommendation of any course of action.

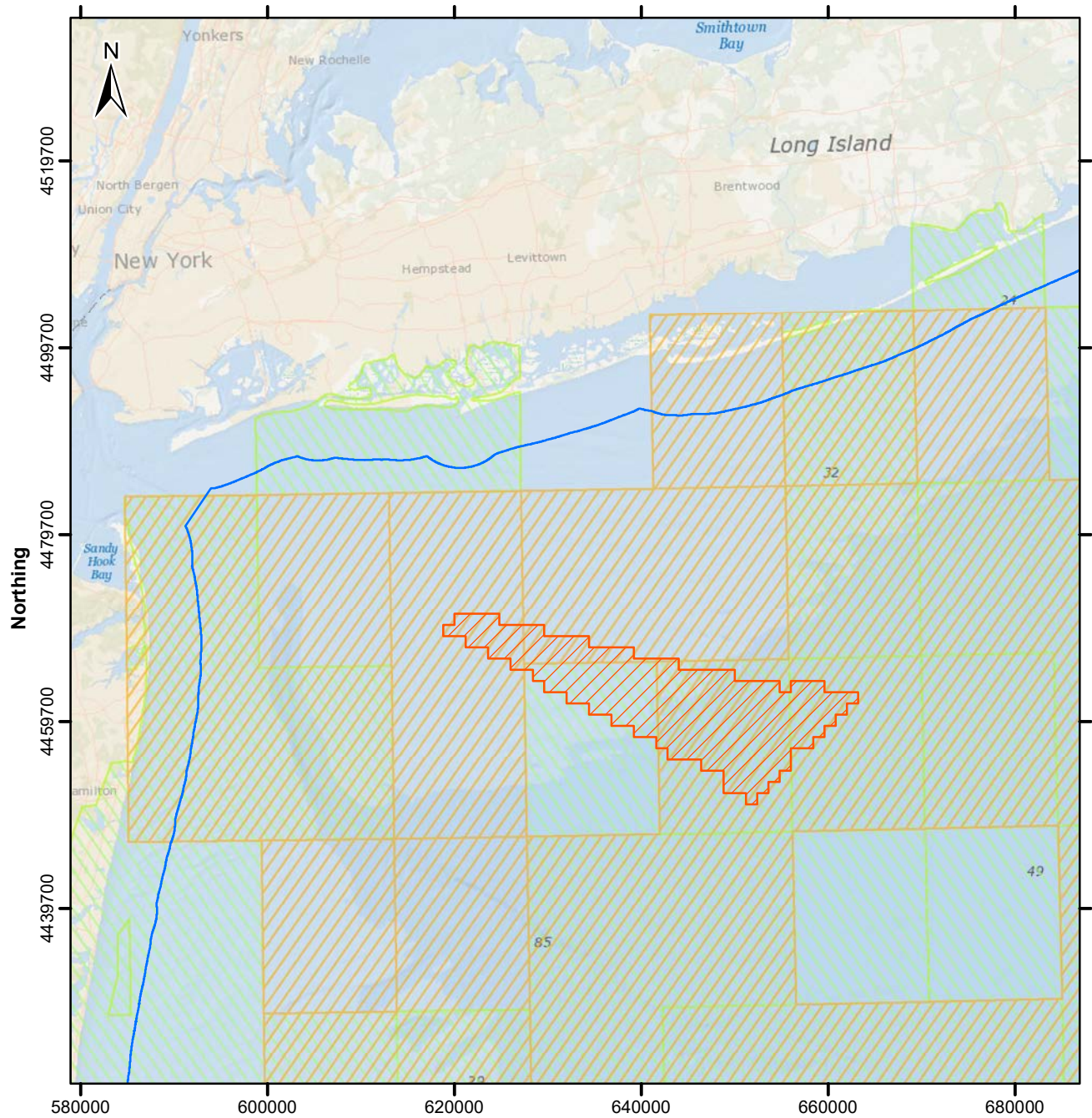
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LOCATION MAP



Background Layer Credits

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Easting

Coordinate System: NAD 1983 UTM Zone 18N

Projection: Transverse Mercator Datum: North American 1983
 Central Meridian: -75.0°E

Key

 Lease Area OCS-A 0512

 3 Nautical Mile Limit

Essential Fish Habitat (NOAA, 2021)

 Spiny Dogfish

 Ocean Quahog

 Kilometers
 0 5 10 15 20

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GLOSSARY OF TERMS AND ABBREVIATIONS

Benthic	Relating to the seabed	MF	Macrofauna - Organisms that are normally larger than the mesh size of the sieve used. In this case 0.5mm
BOEM	Bureau of Ocean Energy Management	Mud	Sediment grains <63µm (includes Silt and Clay)
Clay	Sediment grains <3.9µm in diameter	MV	Motor Vessel
CM	Central Meridian	NAD	North American Datum
CMECS	Coastal and Marine Ecological Classification Standard	NOAA	National Oceanic and Atmospheric Administration
CTD	Conductivity Temperature Depth Profiler	NOAA Fisheries	National Marine Fisheries Service
DO	Dissolved Oxygen	NTU	Nephelometric Turbidity Units
EFH	Essential Fish Habitat	PSA	Particle Size Analysis
EOT	End of Transect	PSU	Practical Salinity Units
FGDC	Federal Geographic Data Committee	Sand	Sediment grains ≥63µm and <2mm in diameter
Fines	Sediment grains <63µm in diameter (same as Mud)	SBP	Sub Bottom Profiler
GARFO	Greater Atlantic Regional Fisheries Office	Silt	Sediment grains ≥3.9µm and <63µm in diameter
Gravel	Sediment grains ≥2mm in diameter	SOT	Start of Transect
GRS	Geodetic Reference System	SOW	Scope of Work
HAPC	Habitat Areas of Particular Concern	SSS	Side Scan Sonar
HD	High Definition	TOM	Total Organic Matter
HRG	High Resolution Geophysical	UHRS	Ultra-High Resolution Seismic
IUCN	International Union for Conservation of Nature	USBL	Ultra-Short Base Line
LAT	Lowest Astronomical Tide	USFWS	United States Fish and Wildlife Service
LOI	Loss on Ignition	UTM	Universal Transverse Mercator
MBES	Multi-beam Echo Sounder		

1 PROJECT SUMMARY

1.1 Scope of Work

Gardline completed a geophysical and environmental habitat characterization survey on behalf of Equinor Wind US LLC (hereafter Equinor Wind) along the proposed export cable corridors across the Commercial Lease of Submerged Lands and renewable Energy Development on the Outer Continental Shelf (OCS-A 0512) offshore Long Island, New York. Survey operations were undertaken onboard the Gardline motor vessel (MV) *Ocean Endeavour* between Oct-10-2020 and Apr-29-2021, with all environmental sampling conducted between Jan-01-2021 and Apr-18-2021.

This report details the results of the habitat characterization survey for the Barrett route. The geophysical results for the Barrett route are summarized where relevant in the current report and are reported in full separately (Gardline Limited, 2021).

The purpose of the survey was to augment previous benthic surveys (Gardline Limited, 2019; Alpine, 2021), as well as characterize new portions of the export cable corridors. The overall aim of the geophysical survey, as defined by the geophysical and geotechnical scope of work (SOW; Equinor Wind, 2020b), was to acquire high resolution geophysical (HRG) data along the proposed cable corridor. The purpose of the habitat characterization, as defined by the benthic SOW (Equinor Wind, 2020a), was to ground truth the results of geophysical data to characterize surficial sediment conditions and provide benthic habitat classification as per guidelines (BOEM, 2019; NOAA Fisheries, 2020). As such the objectives of the survey were to acquire data for:

- Identification of historic properties on or within the seabed.
- Identification of seafloor sediment and seafloor morphology.
- Identification of seabed obstructions.
- Identification of mobile sand deposits.
- Quantification and description of the characteristics of seabed sediments.
- Description of the biological nature of the seabed.
- Mapping of sand thickness and identification of the unconformity related to the last sea level lowstand.
- Identification of shallow paleo-landforms that could represent high probability locations (e.g. former river bank areas) where humans would have inhabited when the continental shelf was emergent during the last sea level lowstand.
- Identification of geological or manmade hazards (e.g. buried objects, shallow gas, lithological heterogeneities, etc.) beneath the seafloor that could affect the mooring systems.
- Image the shallow subsurface conditions to support the interpretation and mapping of stratigraphic layering and geologic structure.
- Characterization and mapping sediment structure and bedrock stratigraphy and structure down to 80 meters below the seafloor.
- Mapping shallow and deep channel infill.
- Mapping presence of gravel lag.
- Description of unit formation and stratigraphy.

The geophysical SOW (Equinor Wind, 2020b) requirements were achieved by using a multi-beam echo sounder (MBES), side scan sonar (SSS), magnetometer and shallow and medium penetration sub-bottom profiler (SBP); specifically, ultra-high resolution seismic (UHRS) pinger and sparker spread. The environmental survey component utilized a shallow water camera system for seabed imagery acquisition, a 0.1m² dual Van Veen grab and 0.1m² Day grab to obtain sediment samples, and a Valeport Midas CTD+ probe to record water parameters throughout the survey area.

All positional information in this report is referenced to geographic reference system (GRS) 1980 Ellipsoid, North American Datum (NAD) 1983. All grid coordinates are projected using Universal Transverse Mercator (UTM) Projection, Grid Zone 18N, Central Meridian (CM) 75°W.

1.2 Environmental Survey Strategy

A total of fifteen camera transects were pre-selected by the client and were distributed along the survey route corridor. Three water profiling and seabed sediment sampling stations were selected along each camera transect and were denoted by letters after the station number. Stations were selected from the start (A), centre (B) and end (C) of each camera transect. The exceptions were Stations EW2-4, EW2-9, EW2-11 and EW2-16, where sampling stations were to be undertaken at the centre of the imagery transect only and as such were not to be denoted with a letter suffix. The environmental scientists onboard reviewed the selections and made minor adjustments in order to capture the range of different sediment types and depths. All stations were successfully investigated with a drop-down camera system, in order to provide ground truthing, prior to CTD profiles with the Valeport MIDAS CTD+ and sediment sampling with either a dual Van Veen grab or a modified Day grab, with samples acquired for faunal and physico-chemical analysis.

Three or four sediment samples were collected at all stations, one sample (designated CHEM) was sub-sampled for particle size analysis (PSA) and organic content along with a spare and frozen upon collection prior to analysis. When required, an additional sample (designated CHEM SPR) was also sub-sampled for PSA, organic content, and a spare. The remaining samples (designated MFA and MFB) were sieved onboard through a 0.5mm mesh sieve to provide benthic sieved infauna (hereafter referred to as macrofauna) samples which were preserved in buffered formalin. One of the faunal samples (MFA) were worked up in the laboratory, with the other retained as a spare.

All stations and transects were prefixed with the client reference “EQ20547_” before the station name and number, to aid provision of a clear and concise report these have been removed. These concise names have been used throughout the report where possible, though it should be noted that it is not possible to change the survey logs and image file names. Therefore, these have retained their original name. Due to the length of the station names, video overlay used the truncated station names. For further information see Table 1.1 and Table 1.2.

Details of target imagery transects are tabulated in Table 1.1, whilst details of target grab locations and samples collected at each station along the transects are summarized in Table 1.2. Target and actual sampling locations, the latter of which may be slightly offset from the former, are presented in Figure 1.1 to Figure 1.3 and in the surveyor’s log sheets in Appendix A, which details positioning for the entire survey; however, this report only details the Barrett route results. Detailed methods are given in Appendix B.

1.3 Scope Deviations and Concessions

At Station EW2-2B there were repeated rejected samples due to low sediment retention (40%). More weights were added to the grab; however, three additional acquired samples only retained 40% of the grab's capacity. The low retention was attributed to the denser sediment at the location and it was agreed by the onboard client representative that the three samples were acceptable and would be retained and worked up.

At stations where repeated unsuccessful sediment samples were recovered, the target location was repositioned 10m away from the original location. A single sample at Stations EW2-8C and EW-14B were acquired within 11m of their target location, due to the vessel repositioning following multiple rejected samples due to low retention. It was decided by the onboard client representative that to improve the possibility of sampling success, these two samples would be accepted.

CTD profile target locations were reduced from three targets per camera transect to one; positioned in the centre of each camera transect.

At Station EW2-14B the upcast of the CTD profile was complete; however, the downcast of the profile did not include readings for the top 9m of the water column. Overall, the profile was deemed acceptable by the onboard client representative. Following review of the data, it was determined that a repeat CTD profile was required at Stations EW2-16 and EW2-15B. These were acquired successfully and stations were named as Stations EW2-16-1 and EW2-15B-1, indicating redeployments not relocations. The CTD profile at Station EW2-6B was also repeated due to potential inaccuracies in the pH readings during the first attempt. The second attempt, which recovered similar data was approved by the onboard client representative and no further re-attempts were required.

During CTD acquisition the vessel's propellers were disengaged as a safety requirement. Best attempts were made to remain as close to the station target location as possible; however, due to weather and/or current conditions which caused the vessel to drift, seven CTD stations were sampled beyond 10m of their respective target location.

Table 1.1 Summary of Environmental Transects

Transect	Transect as referred to in this Report	Start/End of Transect	Target Easting ¹	Target Nothing ¹	Target Transect Length (m)	Acquired Transect Length (m)
EQ20547_EW2-2	EW2-2	SOT	627152	4485119	600	978
		EOT	627742	4485231		
EQ20547_EW2-3	EW2-3	SOT	628291	4484319	600	882
		EOT	628710	4483889		
EQ20547_EW2-4	EW2-4	SOT	629286	4483323	600	2098
		EOT	629705	4482894		
EQ20547_EW2-5	EW2-5	SOT	630605	4481931	600	910
		EOT	631024	4481502		
EQ20547_EW2-6	EW2-6	SOT	632191	4480346	600	1131
		EOT	632610	4479917		
EQ20547_EW2-7	EW2-7	SOT	634079	4477919	600	788
		EOT	634512	4478335		
EQ20547_EW2-8	EW2-8	SOT	634694	4477766	600	891
		EOT	635113	4477337		
EQ20547_EW2-9	EW2-9	SOT	636776	4475396	600	668
		EOT	637347	4475213		
EQ20547_EW2-10	EW2-10	SOT	638213	4474131	600	959
		EOT	638632	4473701		
EQ20547_EW2-11	EW2-11	SOT	639641	4472198	600	708
		EOT	640069	4472618		
EQ20547_EW2-12	EW2-12	SOT	640722	4471578	599	847
		EOT	641140	4471149		
EQ20547_EW2-13	EW2-13	SOT	642459	4469306	600	869
		EOT	642860	4469752		
EQ20547_EW2-14	EW2-14	SOT	643664	4468684	599	874
		EOT	644082	4468255		
EQ20547_EW2-15	EW2-15	SOT	644530	4467182	600	717
		EOT	644943	4467617		
EQ20547_EW2-15B-1	EW2-15B-1	SOT	-	-	-	110
		EOT	-	-		
EQ20547_EW2-16	EW2-16	SOT	646116	4466040	600	686
		EOT	646535	4465611		

SOT = Start of transect; EOT = End of transect

¹ Environmental target locations; actual positioning for each individual image is detailed in Appendix A

Table 1.2 Summary of Environmental Sampling Positions and Samples Acquired

Station	Target	Water Depth (m) ¹	Target Easting ²	Target Northing ²	Imagery	CTD	Samples Acquired ³			
							Fauna	Sub-samples		
								Organic Matter	Particle Size	Spare ⁴
EW2-2A	Area of medium SSS reflectivity	20	627152	4485119	Y	N	2	1	1	2
EW2-2B	Low SSS reflectivity – main sediment type	20	627447	4485175	Y	Y	2	1	1	2
EW2-2C	Low SSS reflectivity – main sediment type	21	627742	4485231	Y	N	2	1	1	2
EW2-3A	Low SSS reflectivity – main sediment type	23	628291	4484319	Y	N	2	1	1	2
EW2-3B	Area of medium SSS reflectivity	24	628500	4484104	Y	Y	2	1	1	2
EW2-3C	Area of medium to high SSS reflectivity	24	628710	4483889	Y	N	2	1	1	2
EW2-4	Low SSS reflectivity – main sediment type	20	629495	4483108	Y	Y	2	1	1	2
EW2-5A	Low SSS reflectivity – main sediment type	24	630605	4481931	Y	N	2	1	1	2
EW2-5B	Area of medium SSS reflectivity	25	630814	4481716	Y	Y	2	1	1	2
EW2-5C	Area of medium to high SSS reflectivity	26	631024	4481502	Y	N	2	1	1	2
EW2-6A	Low SSS reflectivity – main sediment type	25	632191	4480346	Y	N	2	1	1	2
EW2-6B	Low SSS reflectivity – main sediment type	24	632401	4480131	Y	Y	2	1	1	2
EW2-6C	Area of high SSS reflectivity	25	632610	4479917	Y	N	2	1	1	2
EW2-7A	Area of low to medium SSS reflectivity with ripples	28	634079	4477919	Y	N	2	1	1	2
EW2-7B	Area of low to medium SSS reflectivity	29	634296	4478127	Y	Y	2	1	1	2
EW2-7C	Area of low to medium SSS reflectivity	29	634512	4478335	Y	N	2	1	1	2
EW2-8A	Area of medium SSS reflectivity	28	634694	4477766	Y	N	2	1	1	2
EW2-8B	Area of medium SSS reflectivity	28	634903	4477552	Y	Y	2	1	1	2
EW2-8C	Low SSS reflectivity – main sediment type	28	635113	4477337	Y	N	2	1	1	2
EW2-9	Low SSS reflectivity – main sediment type	30	637061	4475304	Y	Y	2	1	1	2
EW2-10A	Low SSS reflectivity – main sediment type	32	638213	4474131	Y	N	2	1	1	2
EW2-10B	Area of low to medium SSS reflectivity	32	638423	4473916	Y	Y	2	1	1	2
EW2-10C	Area of low to medium SSS reflectivity	31	638632	4473701	Y	N	2	1	1	2
EW2-11	Low SSS reflectivity – main sediment type	30	639855	4472408	Y	Y	2	1	1	2
EW2-12A	Low SSS reflectivity – main sediment type	34	640722	4471578	Y	N	2	1	1	2
EW2-12B	Area of medium SSS reflectivity	34	640931	4471363	Y	Y	2	1	1	2
EW2-12C	Area of low to medium SSS reflectivity	34	641140	4471149	Y	N	2	1	1	2
EW2-13A	Low SSS reflectivity – main sediment type	35	642459	4469306	Y	N	2	1	1	2
EW2-13B	Area of mottled medium SSS reflectivity	33	642660	4469529	Y	Y	2	1	1	2
EW2-13C	Area of mottled medium SSS reflectivity	31	642860	4469752	Y	N	2	1	1	2
EW2-14A	Area of mottled medium SSS reflectivity	34	643664	4468684	Y	N	2	1	1	2
EW2-14B	Area of mottled medium SSS reflectivity	34	643873	4468469	Y	Y	2	1	1	2

Station	Target	Water Depth (m) ¹	Target Easting ²	Target Northing ²	Imagery	CTD	Samples Acquired ³			
							Fauna	Sub-samples		
								Organic Matter	Particle Size	Spare ⁴
EW2-14C	Area of low to medium SSS reflectivity	33	644082	4468255	Y	N	2	1	1	2
EW2-15A	Area of low to medium SSS reflectivity with ripples	33	644530	4467182	Y	N	2	1	1	2
EW2-15B	Area of low to medium SSS reflectivity	33	644737	4469399	Y	N	0	0	0	0
EW2-15B-1	Relocated due to potential archaeological object upon investigation of the original EW2-15B location	33	644751	4467414	Y	Y	2	1	1	2
EW2-15C	Area of low to medium SSS reflectivity	34	644943	4467617	Y	N	2	1	1	2
EW2-16	Low SSS reflectivity – main sediment type	34	646326	4465825	Y	Y	2	1	1	2

1 Depths have been taken from the observed depth of the chemistry grab

2 Environmental target locations; actual sampling positions for each individual grab sample are detailed in Appendix A

3 One macrofauna sample was sent to be analyzed, one sample kept as a spare at room temperature. Analysis methods are as detailed in Appendix B.

4 Two spare sub-samples from each chemistry grab, was stored in a double-lined zip-lock bag and available for analysis of organics and particle size if required. Analysis methods are as detailed in Appendix B.

Figure 1.1 Target and Actual Sampling Locations; Transects EW2-2 to EW2-6

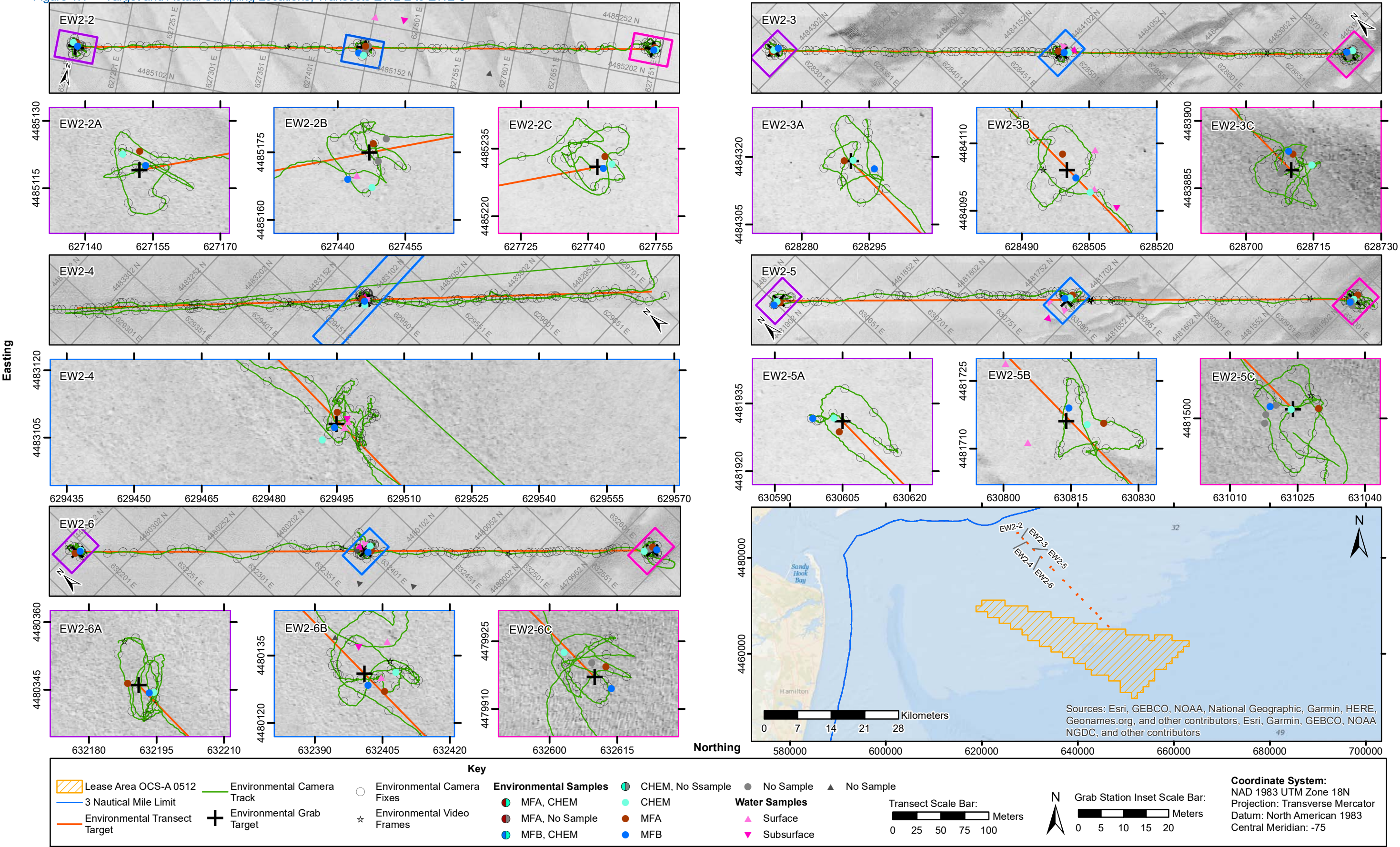


Figure 1 Map of the OCS-A 0512 Lease Area showing environmental monitoring locations and data. The figure includes a main map of the lease area with a 3 Nautical Mile limit, and several inset maps showing detailed views of specific locations: EW2-7, EW2-7A, EW2-7B, EW2-7C, EW2-9, and EW2-11. The maps show environmental camera tracks, environmental grab targets, environmental video frames, and environmental samples (MFA, MFB, CHEM). A key explains the symbols used.

Key

- Lease Area OCS-A 0512 (Hatched area)
- 3 Nautical Mile Limit (Blue line)
- Environmental Transect Target (Orange line)
- Environmental Camera Track (Green line)
- Environmental Grab Target (Black cross)
- Environmental Camera Fixes (Open circle)
- Environmental Video Frames (Star)
- Environmental Samples
 - MFA, CHEM (Red circle)
 - MFA, No Sample (Red circle with black outline)
 - MFB, CHEM (Blue circle)
 - CHEM, No Sample (Blue circle with black outline)
 - CHEM (Cyan circle)
 - MFA (Brown circle)
 - MFB (Blue circle)
- Water Samples
 - Surface (Pink triangle)
 - Subsurface (Purple triangle)
 - No Sample (Black triangle)

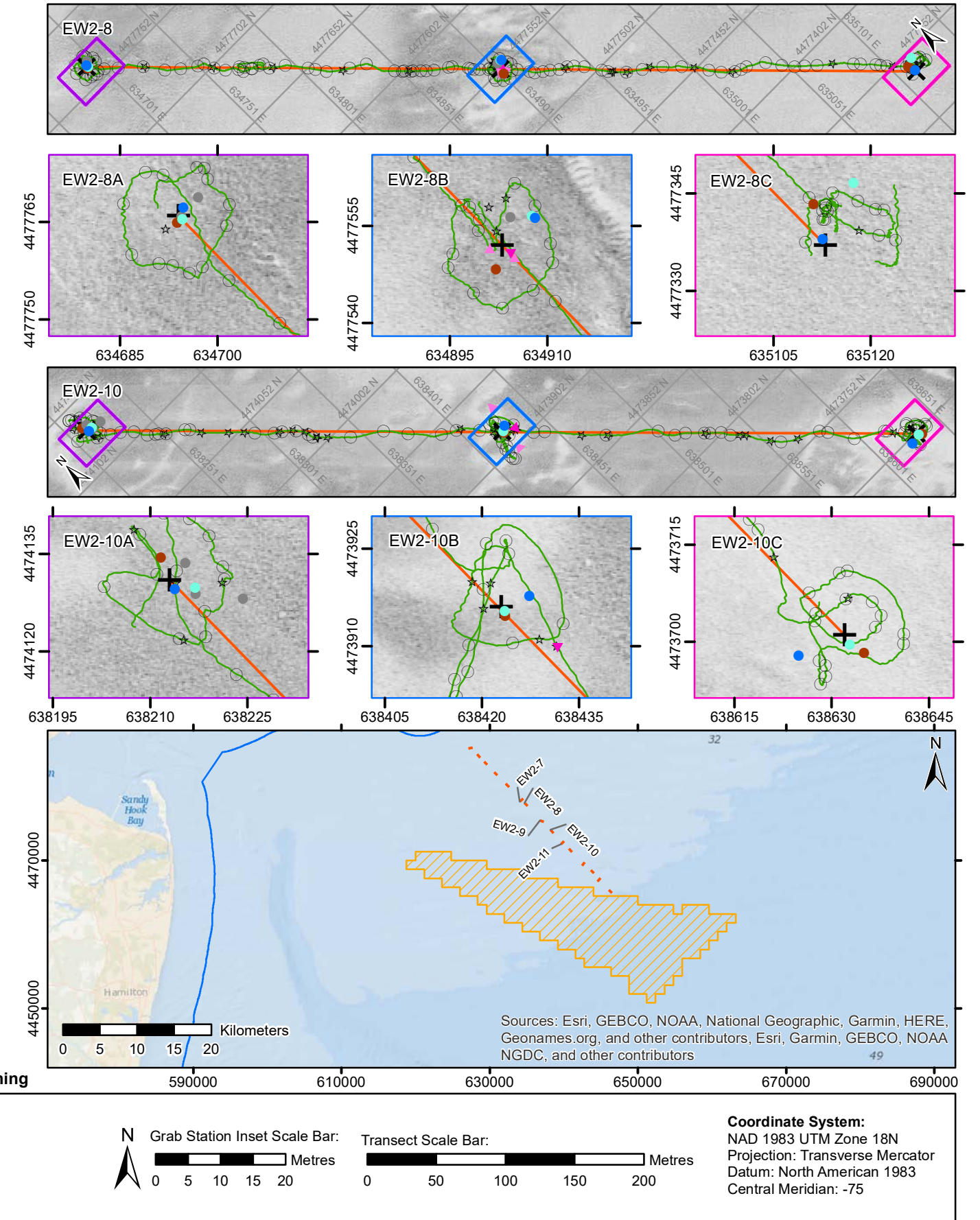
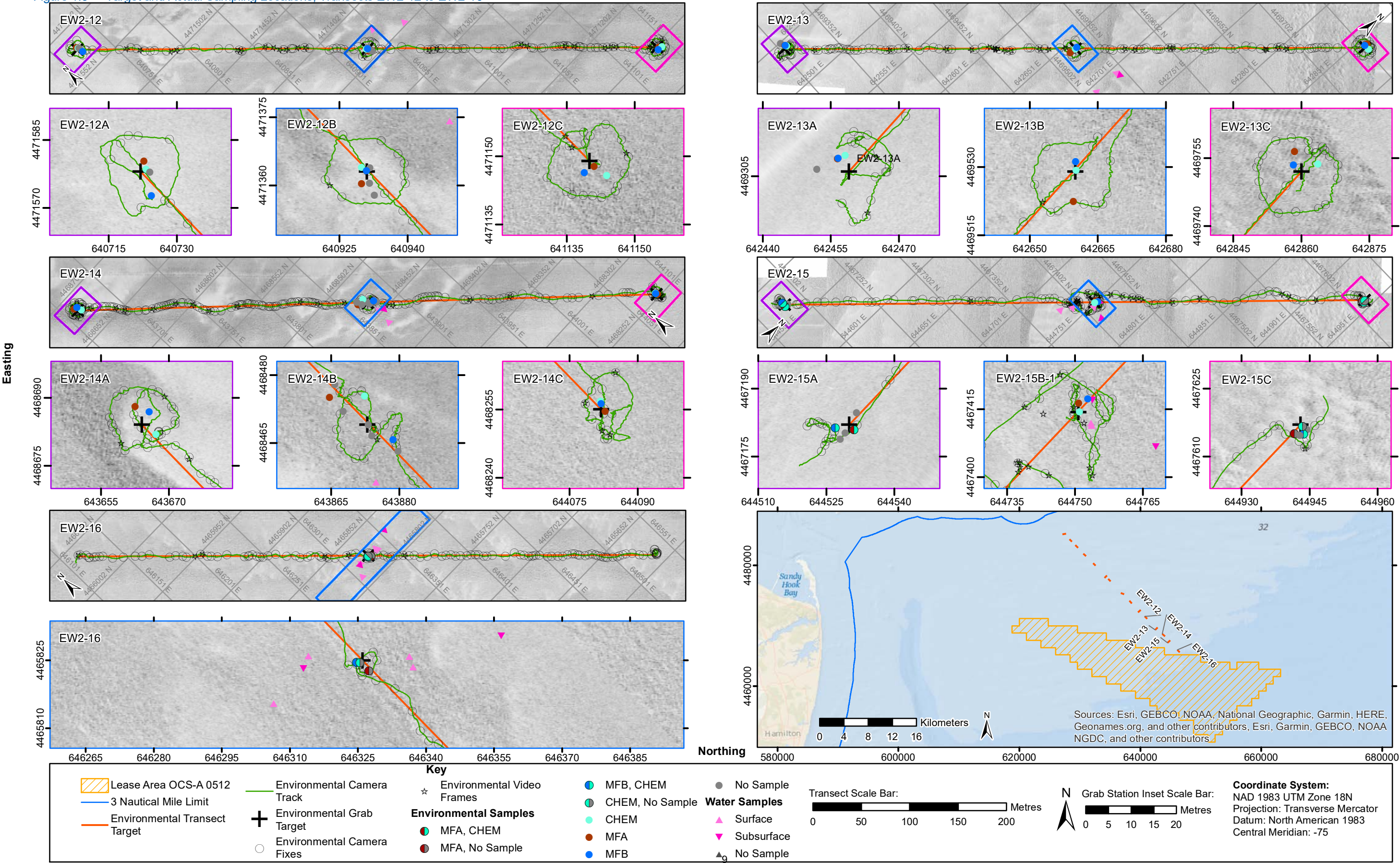


Figure 1.3 Target and Actual Sampling Locations; Transects EW2-12 to EW2-16



2 RESULTS AND DISCUSSION

2.1 Geophysical Survey Summary

2.1.1 Geophysical Survey Overview

Gardline acquired HRG data along the proposed cable corridor, connecting to the Main Lease Area OCS-A 0512 offshore Long Island, New York. The shallow geophysical data were interpreted in line with integrated datasets EQ19549 and EQ20547, for full details see the Barrett route geophysical interpretation report (Gardline Limited, 2021). The survey utilized MBES, SSS, magnetometer and SBP; specifically, an Innomar, pinger and sparker UHRS spread. Color shaded relief of the bathymetry, gridded at 0.5m, together with interpreted seabed features along the Barret route are presented in Figure 2.1 to Figure 2.7.

2.1.2 Bathymetry

Water depth varied along the route centreline from 9.2m (KP0) to 38.1m (KP50.6). Seabed gradients were generally less than 1°, with localised gradients reaching 20° on the flanks of relict bedforms. These bedforms were interpreted as megaripples and were present throughout the site. NCEI (2016) background data indicate these features are part of a wider are of bedforms with height approximately 0.3m, wavelength of 70m, orientation NNE/SSE with gradients of less than 1°. These findings indicated the presence of the natural seafloor hazard category Bedforms/Mobile Seabed.

2.1.3 Seabed Features and Shallow Soils

Sand and slightly gravelly sand were interpreted along the route. Topographic lows between bedforms were interpreted as areas of slightly gravelly sand. Ripples generally coincided with these areas, with heights of approximately less than 0.2m, wavelengths of approximately 1m, mainly NNE/SSW orientation and gradients less than 1°. Occasional trawl scars were observed on between KP26 and KP42.

Numerous objects (n=622) were present at seabed along the Barrett route, within 90m of the route centreline, identified on both SSS and MBES data. The majority of these (n=599) were interpreted as natural features; namely cobbles and boulders, with measured lengths and widths ranging from 0.1m to 1.9m and heights above seabed up to 0.9m. The density of seafloor objects was higher toward the start of the route and became less dense towards the end of the route. The remaining 23 objects were interpreted as anthropogenic. Of these, 16 point contacts had measured lengths and widths ranging from 0.1m to 6.4m and heights above seabed up to 1.1m and were interpreted as items of debris. The remaining eight contacts were interpreted as linear debris and measured up to 12.5m in length, generally had no measurable width and a measured height above seabed of up to 0.4m.

A total of 457 magnetic anomalies were interpreted within 90m of the Barrett route centerline, ranging from 1.6nT to 600nT. Of these, 77 anomalies were interpreted to be associated with cables and 1 was associated with an item of debris, mapped in both SSS and MBES data. The remaining 379 magnetic anomalies did not correlate with any known infrastructure or interpreted seabed contacts. A large magnetometer anomaly of 181nT was recorded at KP37.3, which may have represented an item of buried debris.

There were no wrecks or obstructions identified along the proposed route. There were six known cables crossing the Barrett route identified primarily from magnetometer anomalies. Two further cables were expected to cross but were not identified. Three additional sets of magnetic anomalies oriented in a linear arrangement were interpreted to represent unknown cables.

Figure 2.1 Color Shaded Relief of Bathymetry and Seabed Features; Stations EW2-2 to EW2-4

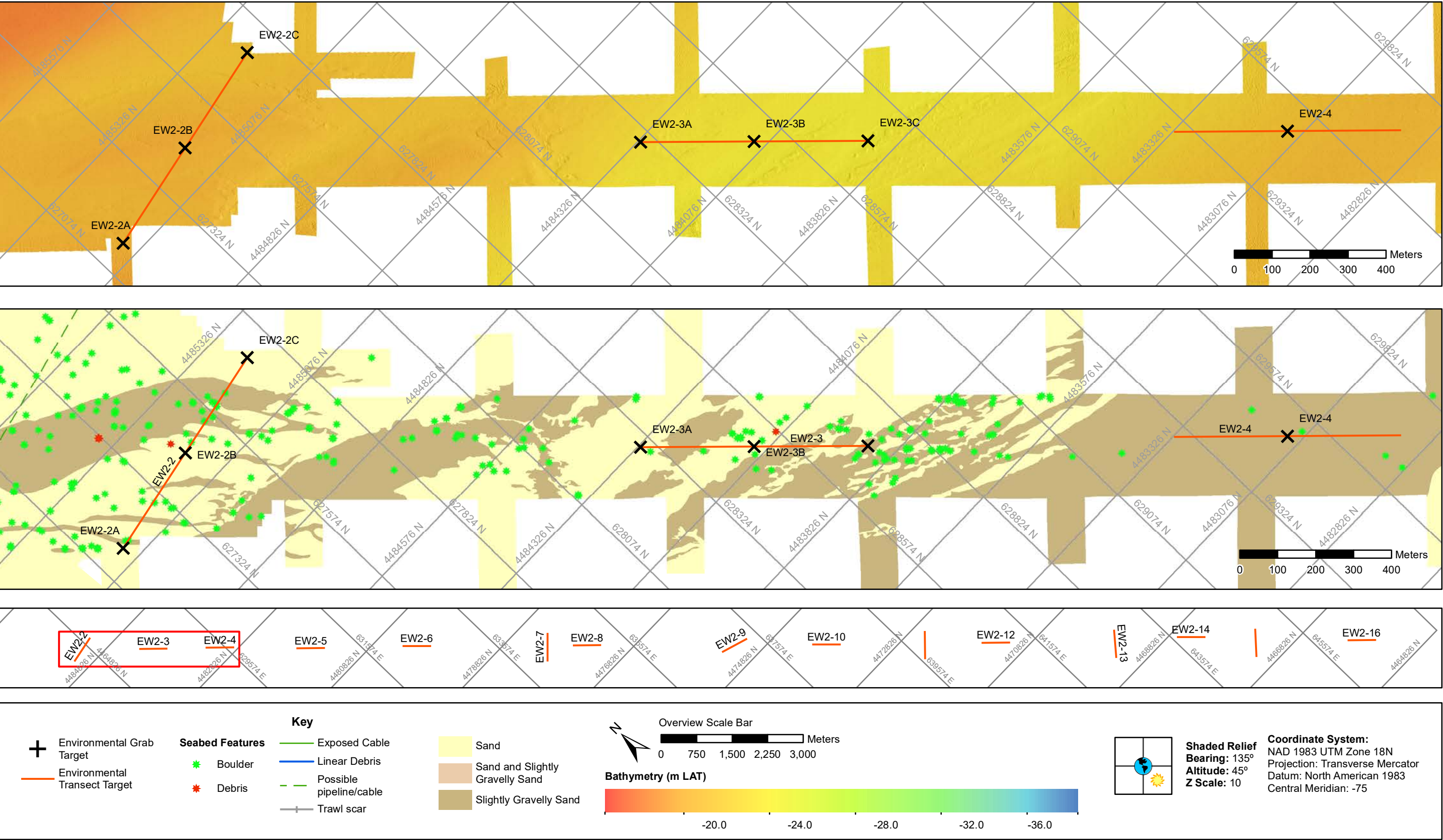


Figure 2.2 Color Shaded Relief of Bathymetry and Seabed Features; Stations EW2-5 and EW2-6

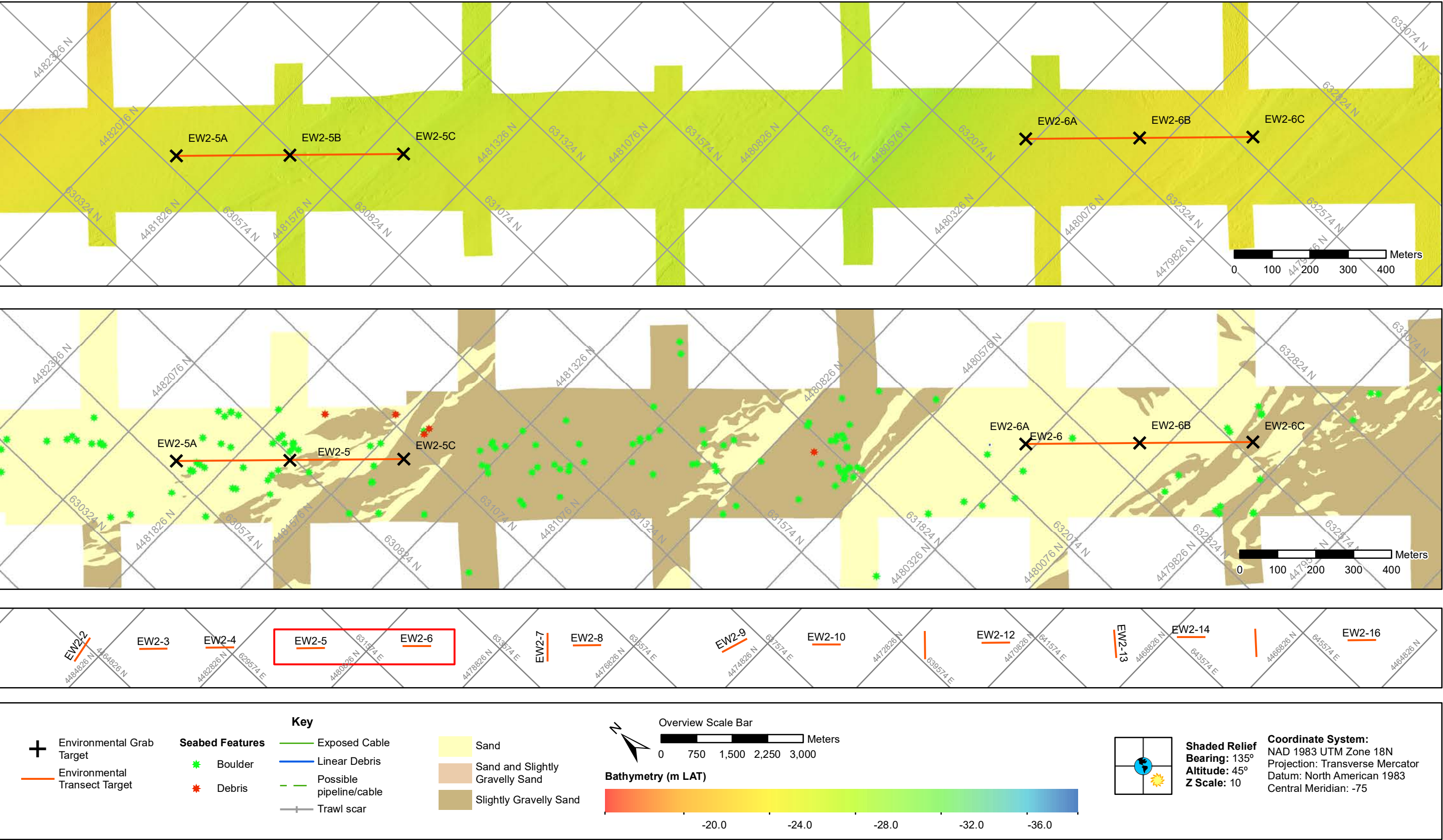


Figure 2.3 Color Shaded Relief of Bathymetry and Seabed Features; Stations EW2-7 and EW2-8

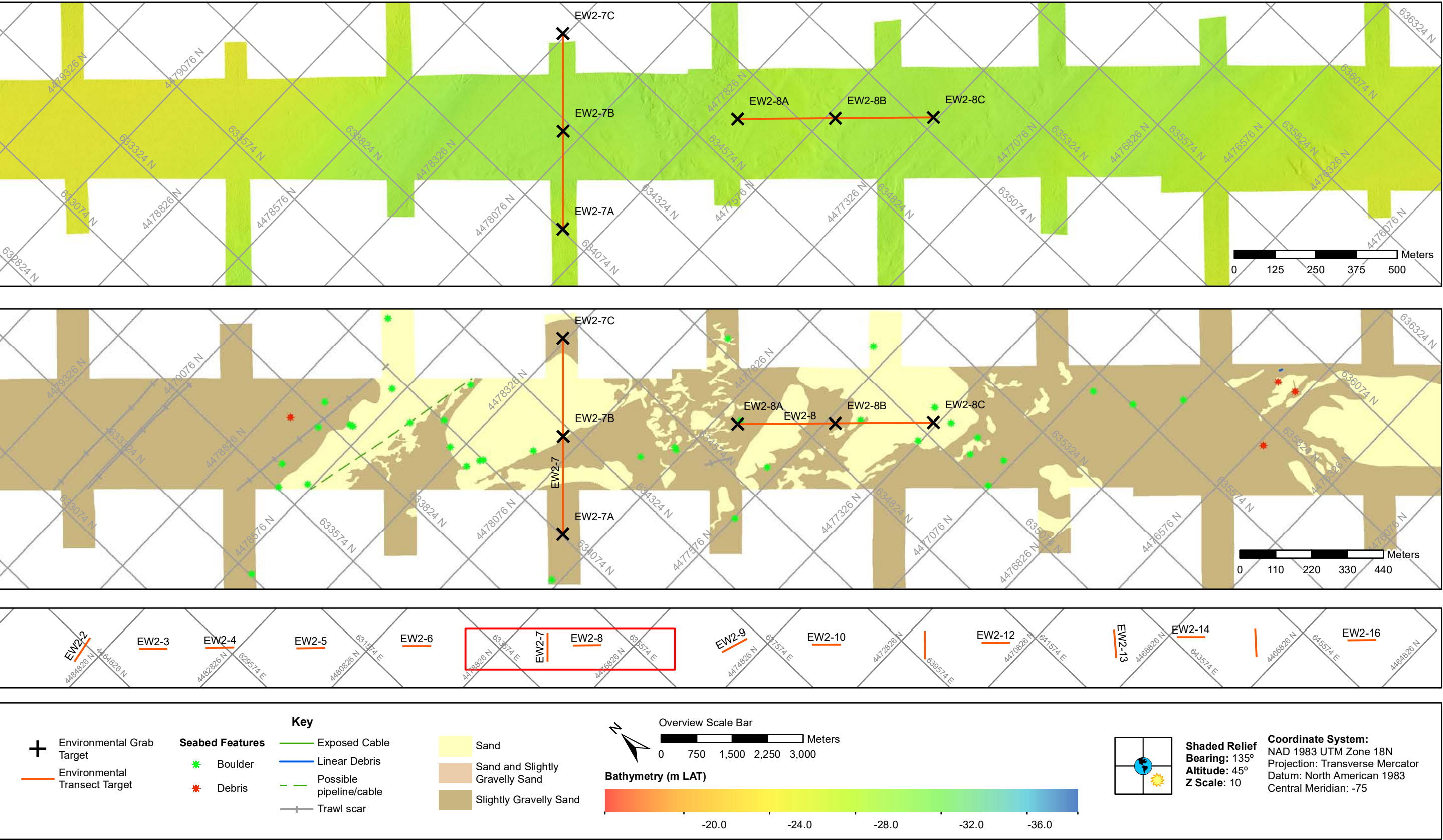


Figure 2.4 Color Shaded Relief of Bathymetry and Seabed Features; Stations EW2-9 and EW2-10

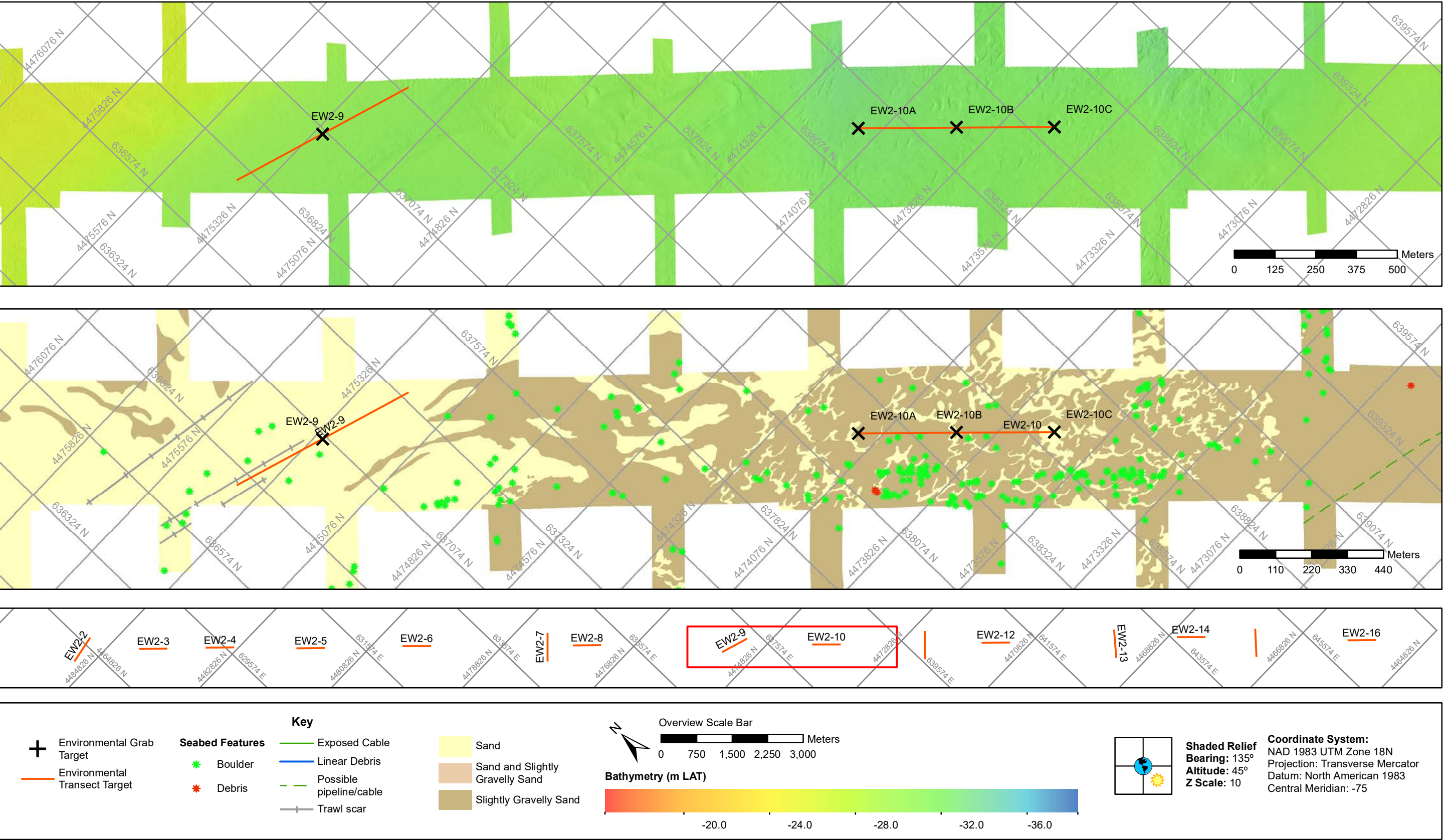


Figure 2.5 Color Shaded Relief of Bathymetry and Seabed Features; Stations EW2-11 and EW2-12

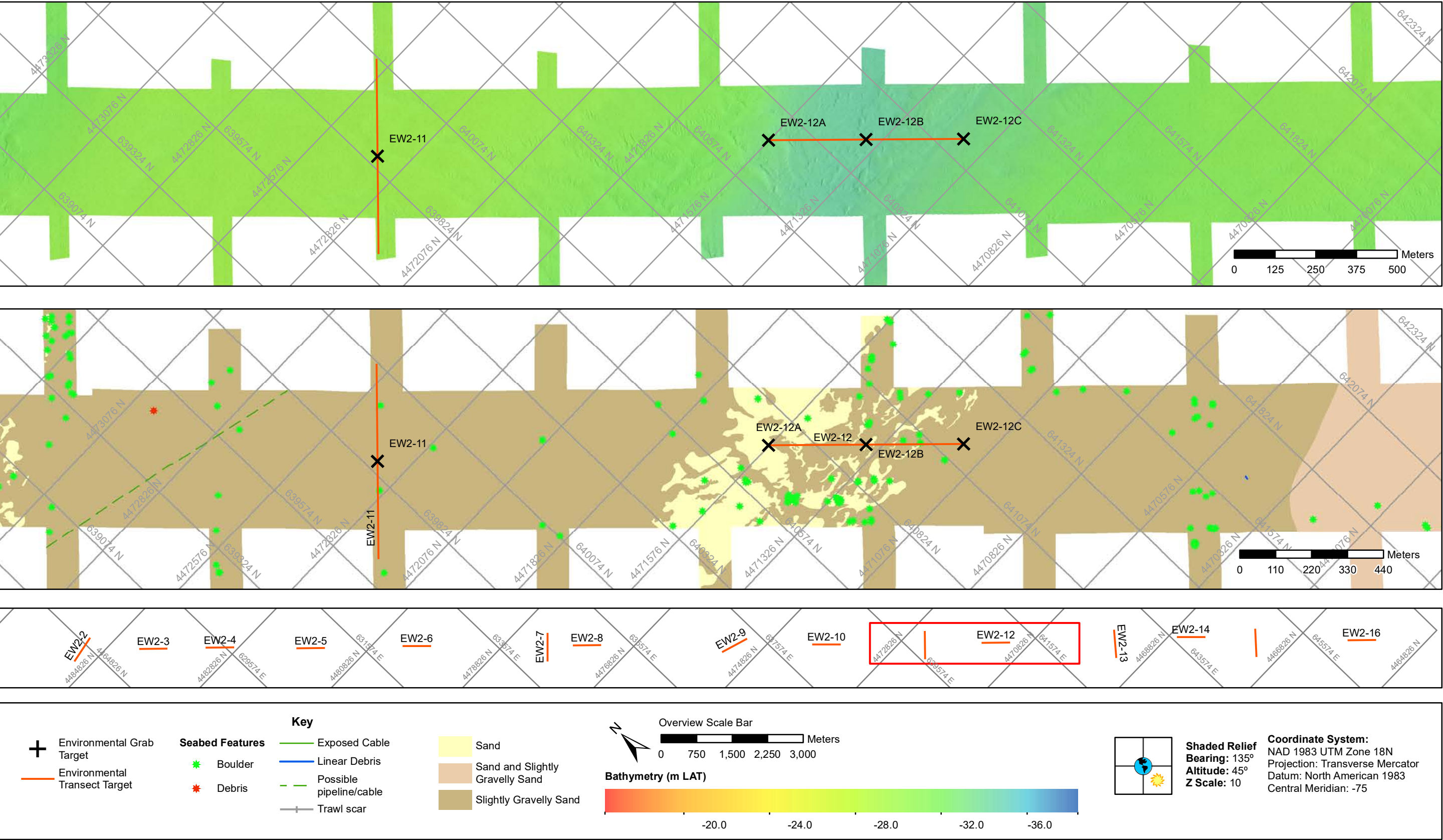


Figure 2.6 Color Shaded Relief of Bathymetry and Seabed Features; Stations EW2-13 and EW2-14

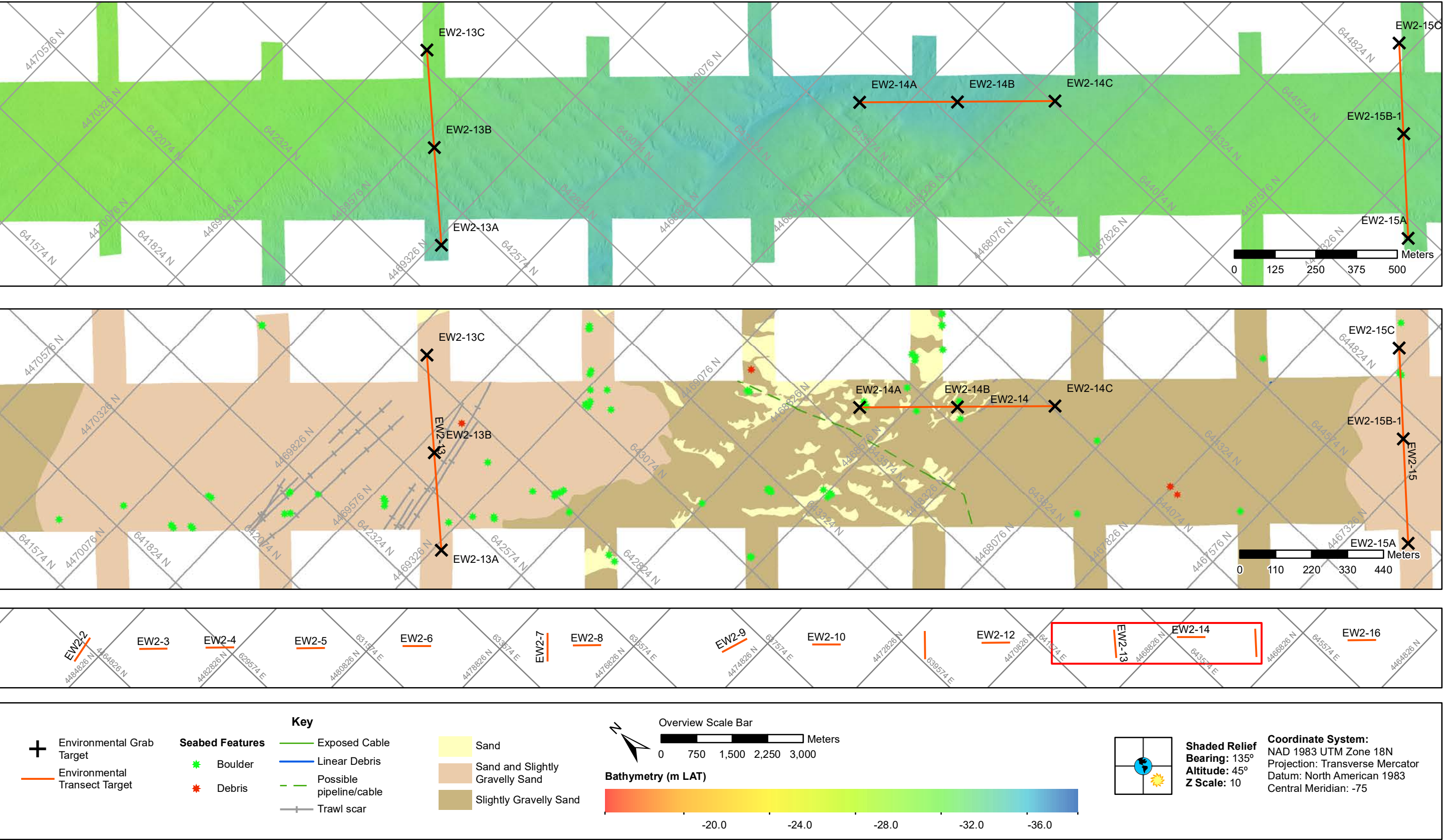
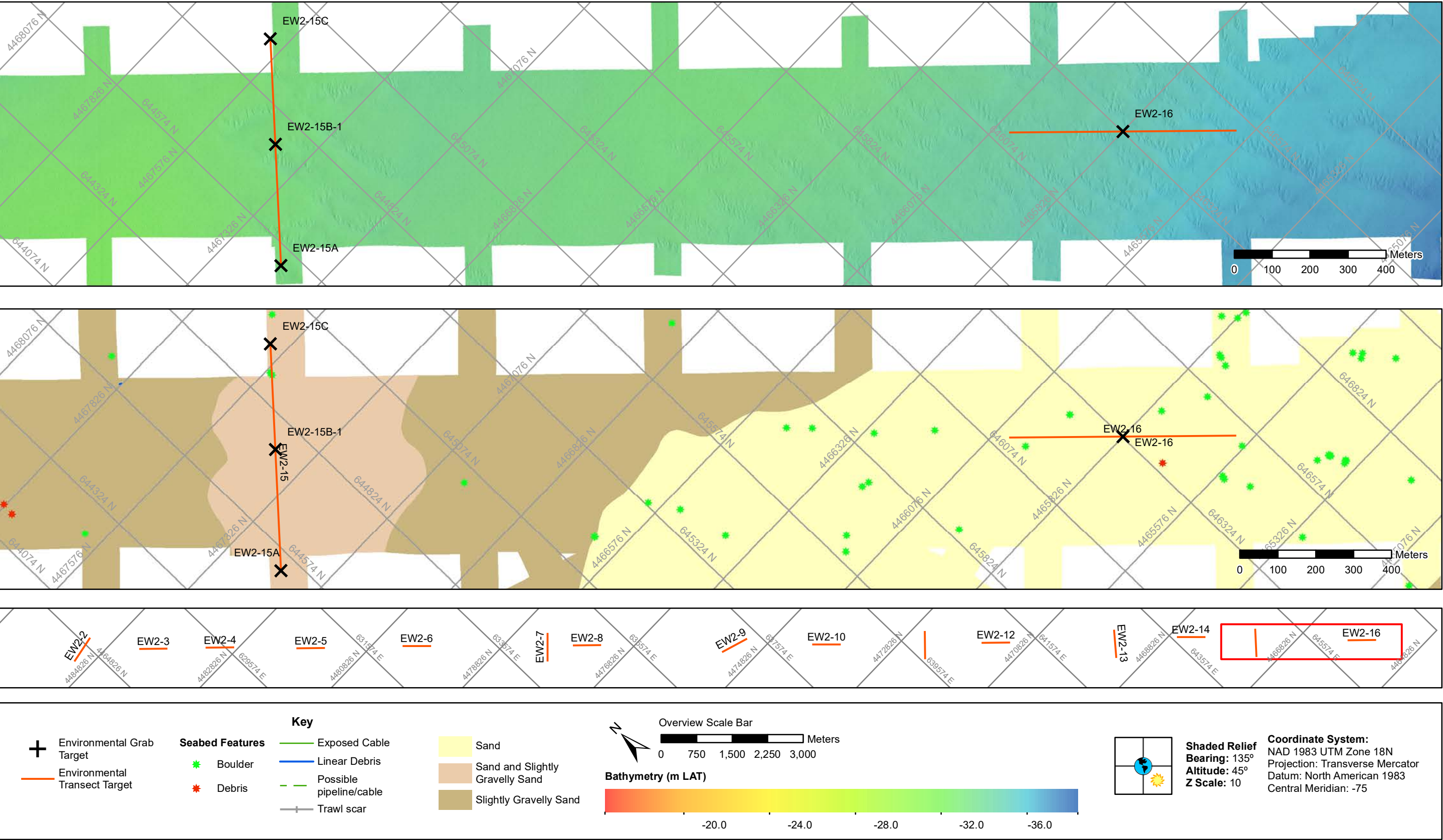


Figure 2.7 Color Shaded Relief of Bathymetry and Seabed Features; Stations EW2-15 and EW2-16



2.2 Seabed Imagery Observations Summary

All fifteen transects selected for investigation were successfully ground truthed with a digital camera system. Environmental camera imagery across the survey area revealed that the seabed predominantly consisted of sand, with occasional patches of gravel.

In total, 1683 photographs were acquired across the 15 transects. A further 227 video snapshots were captured for analysis to ensure that all protected species were enumerated. Environmental deck and positioning logs are presented in Appendix A, whilst example images of species identified in this survey are presented in Appendix C and a faunal observation summary by station is presented in Appendix D and by image in Appendix E.

Visible fauna identified to the lowest taxonomic level with confidence included:

- Animalia indeterminate, Animalia tubes
- Annelida (*Hyalinoecia tubicola*, Pectenariidae, Polychaeta, Sabellidae, Serpulidae)
- Arthropoda (Brachyura, *Cancer borealis*, Caridea, Cirripeda, *Limulus polyphemus*, Paguroidea)
- Chordata (Actinopterygii, Ascidiacea, Blennidae, Elasmobranchii, *Leucoraja ocellata*, Phycidae, Pleuronectiformes, Rajidae egg cases, *Squalus acanthias*, Sygnathinae, Triglidae)
- Cnidaria (Actinaria, *Adamsia* sp., Ceriantharia, *Edwardsia*, *Halcampoides*, Hydrozoa, *Tubularia*)
- Echinodermata (cf. *Asterias forbesi*, Crinoidea, *Echinarachnius parma*)
- Mollusca (*Arctica islandica* – dead shell, *Arctica islandica* siphons, *Astarte* sp., Bivalvia, Bivalvia siphons, cf. *Doryteuthis (Amerigo) pealeii*, *Crepidula* sp., Decapodiformes, *Ensis* sp., Gastropoda, *Modiolus* sp., Nassariidae, Naticidae, Naticidae eggs, Nudibranchia, Pectinidae).

Bioturbation in the form of faunal burrows and tracks were also observed as well as faunal turf.

Overall, the most frequently observed taxa was the echinoderm *E. parma* (present in 77% of photographs). This species lives on mixed sandy sediments, generally in shallow waters (below intertidal zone to 1600m; Ellers & Telford, 1987). The survey area provides both these parameters and so the dominance of this species was expected. Animalia tubes (42%) and the mollusc family Nassariidae (30%) were also frequently observed across the survey area.

One individual of *L. polyphemus* (American horseshoe crab) was observed along Transect EW2-8. It is listed as a vulnerable species on the International Union for Conservation of Nature's (IUCN) Global Red List of threatened species (2021).

A total of 51 individuals of *L. ocellata* (winter skate) were observed throughout 10 of the 15 transects along the route, across areas of both fine and coarse sediment. It is listed as an endangered species on the IUCN Red List (2021). Furthermore, the survey area was also within an area designated as an Essential Fish Habitat (EFH) for juvenile winter skates (NOAA, 2021c). NOAA (2003) notes that a permanent resident population of *L. ocellata* off southern New England, between 15 and 46m depth, has been recorded; therefore, observations of this species was not unexpected. Further, this species is typically found on sandy and gravelly substrate (NOAA, 2003). A single individual of *S. acanthias* (spiny dogfish) was recorded along Transects EW2-14, whilst a further 4 individuals were recorded along Transect EW2-15. This species is listed as vulnerable on the IUCN Red List (2021) and the survey was in an area designated as an EFH (NOAA, 2021c) for this species.

The survey route was also within an area designated as an EFH for the ocean quahog (*A. islandica*). Siphons thought to belong to *A. islandica* were recorded on 60 occasions, with Transect EW2-14 recording the greatest number of siphons (n=21). The presence of *A. islandica* was further indicated by sightings of dead individuals in the form of *A. islandica* shells, recorded in 50 images.

Rajidae egg cases were observed along all transects, with Transect EW2-5 recording 21% of all egg cases recorded. A total of 723 anthozoan individuals were observed throughout the survey area. Ceriantharia represented 690 (95%) of all anthozoan individuals enumerated, with the highest densities occurring along Transect EW2-3. Numbers of species of interest observed at each transect is tabulated in Table 2.1.

The survey area did not fall in any Habitat Areas of Particular Concern (HAPC) as defined by NOAA (2021b) or in any final or proposed Critical Habitat as defined by the United States Fish and Wildlife Service (USFWS, 2021). Special attention was given to the presence of sensitive benthic habitats as defined by BOEM (2019). These include areas where information suggests the presence of exposed hard bottoms of high, moderate, or low relief; hard bottoms covered by thick, ephemeral sand layers; seagrass patches; or kelp and other algal beds, as well as the presence of anthozoan species (BOEM, 2019).

Apart from those habitats and species mentioned above, there was no further evidence from seabed imagery of any other sensitive benthic habitats as defined by BOEM (2019), species listed on the IUCN Red List of threatened species (2021) nor any critical habitats or endangered species listed under the Endangered Species Act of 1973 (USFWS, 2021).

Coastal and Marine Ecological Classification Standard (CMECS) biotic classification of transects based on seabed imagery (FGDC, 2012) is tabulated in Table 2.2, graphically in Figure 2.8 and spatially in Figure 2.9. CMECS classification was possible to community level along two transects, where clusters of burrowing anemones; Ceriantharia, were observed. Transects EW2-3 and EW2-10 the biotic community was categorized as '*Cerianthus* Bed' and corresponded with areas of fine sand. Ceriantharia individuals were also observed in lower densities along Transects EW2-2 and E2-14 on slightly gravelly sands.

The common sand dollar *E. parma* were observed in relatively high densities along all transects, with the exceptions of Transects EW2-10 and EW2-14. As such transects were categorized to the biotic group level as 'sand dollar bed'. Transects EW2-3 and Transect EW2-4 were categorized as 'larger tube-building fauna' due to the relatively higher frequency of occurrence of animal tubes with a width greater than 2mm. Transects EW2-6, EW2-8, EW2-9, EW2-10, EW2-11, EW2-12, EW2-13, EW2-14, EW2-15 and EW2-16 observed images with a mix of fauna taxa. These were categorized with the biotic group of 'diverse soft sediment fauna'.

Table 2.1 Species of Interest Counts per Transect from Visual Assessment

Transect	Species of Interest Number of Individuals ¹										
	<i>Limulus polyphemus</i>	<i>Leucoraja ocellata</i>	Rajidae Egg Case	<i>Squalus acanthias</i>	Anthozoa					<i>A. islandica</i>	
					Actiniaria 1	Ceriantharia 1	Ceriantharia 3	Edwardsia	<i>Halcampoides</i> 1	Siphons	Dead shell
EW2-2	0	2	1	0	2	61	6	0	0	0	1
EW2-3	0	0	3	0	7	358	22	1	0	0	1
EW2-4	0	0	1	0	2	6	0	0	1	0	0
EW2-5	0	0	62	0	1	33	1	0	0	0	4
EW2-6	0	0	4	0	1	8	0	0	0	0	5
EW2-7	0	1	5	0	0	1	0	0	0	0	1
EW2-8	1	0	26	0	0	15	0	1	0	1	5
EW2-9	0	8	21	0	0	0	0	0	0	1	0
EW2-10	0	13	32	0	0	99	5	1	0	14	9
EW2-11	0	3	12	0	0	0	0	0	0	1	2
EW2-12	0	7	29	0	1	21	3	2	0	7	4
EW2-13	0	6	27	0	0	1	0	5	0	6	1
EW2-14	0	3	33	1	3	50	0	0	0	21	17
EW2-15	0	5	35	4	0	0	0	4	0	7	0
EW2-16	0	3	6	0	0	0	0	1	0	2	0
Total	1	51	297	5	17	653	37	15	1	60	50

¹ Species enumerated from photographs and video frames

Table 2.2 CMECS Biotic Classification from Visual Assessment

Transect	Biotic Setting	Biotic Class	Biotic Subclass	Biotic Group	Biotic Community
EW2-2	Benthic/Attached Biota	Faunal Bed	Soft Sediment Fauna	Sand Dollar Bed	
EW2-3	Benthic/Attached Biota	Faunal Bed	Soft Sediment Fauna	Burrowing Anemones	<i>Cerianthus</i> Bed
				Sand Dollar Bed	
				Larger Tube-Building Fauna	
EW2-4	Benthic/Attached Biota	Faunal Bed	Soft Sediment Fauna	Larger Tube-Building Fauna	
				Sand Dollar Bed	
EW2-5	Benthic/Attached Biota	Faunal Bed	Soft Sediment Fauna	Sand Dollar Bed	
EW2-6	Benthic/Attached Biota	Faunal Bed	Soft Sediment Fauna	Diverse Soft Sediment Fauna	
				Sand Dollar Bed	
EW2-7	Benthic/Attached Biota	Faunal Bed	Soft Sediment Fauna	Sand Dollar Bed	
EW2-8	Benthic/Attached Biota	Faunal Bed	Soft Sediment Fauna	Diverse Soft Sediment Fauna	
				Sand Dollar Bed	
EW2-9	Benthic/Attached Biota	Faunal Bed	Soft Sediment Fauna	Diverse Soft Sediment Fauna	
EW2-10	Benthic/Attached Biota	Faunal Bed	Soft Sediment Fauna	Burrowing Anemones	<i>Cerianthus</i> Bed
				Diverse Soft Sediment Fauna	
EW2-11	Benthic/Attached Biota	Faunal Bed	Soft Sediment Fauna	Diverse Soft Sediment Fauna	
				Sand Dollar Bed	
EW2-12	Benthic/Attached Biota	Faunal Bed	Soft Sediment Fauna	Diverse Soft Sediment Fauna	
EW2-13	Benthic/Attached Biota	Faunal Bed	Soft Sediment Fauna	Sand Dollar Bed	
EW2-14	Benthic/Attached Biota	Faunal Bed	Soft Sediment Fauna	Diverse Soft Sediment Fauna	
EW2-15	Benthic/Attached Biota	Faunal Bed	Soft Sediment Fauna	Diverse Soft Sediment Fauna	
				Sand Dollar Bed	
EW2-16	Benthic/Attached Biota	Faunal Bed	Soft Sediment Fauna	Diverse Soft Sediment Fauna	
				Sand Dollar Bed	

Grey cells indicate where biotic community categories could not be classified

Figure 2.8 CMECS Biotic Group from Visual Assessment

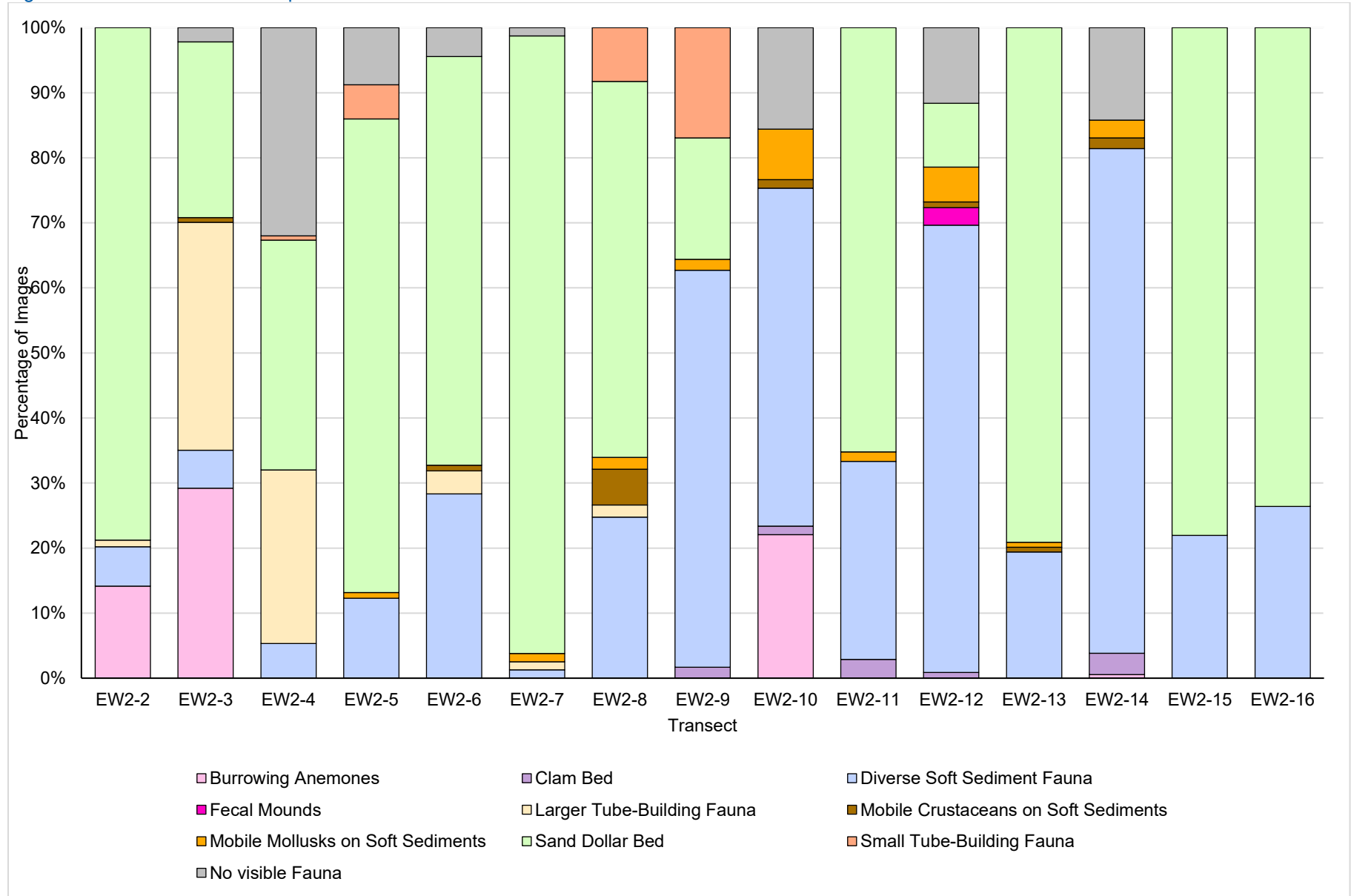
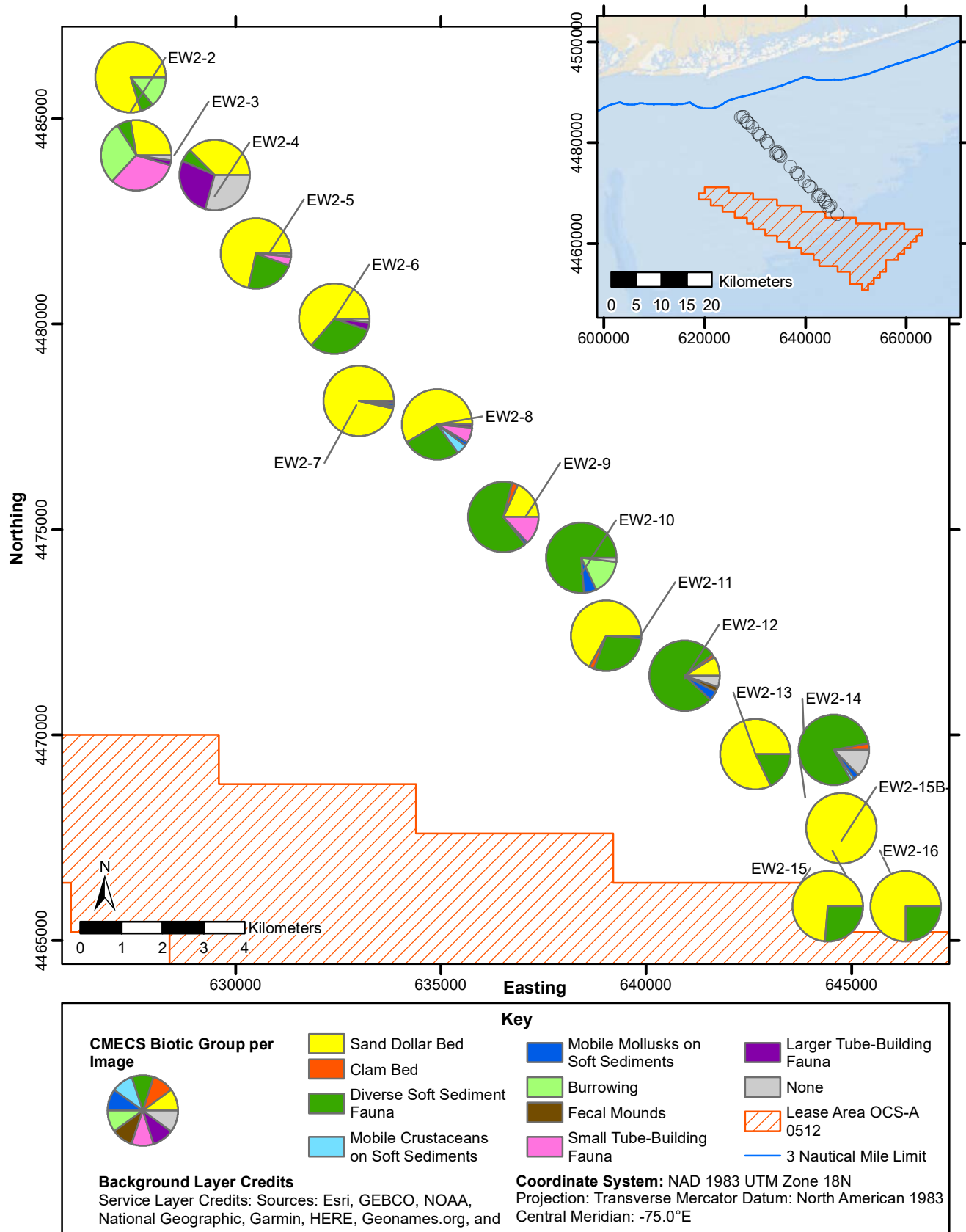


Figure 2.9 Spatial Distribution of CMECS Biotic Group from Visual Assessment



2.3 Sediment Sampling Summary

Seabed sampling observations were used to ground truth the geophysical interpretation and seabed imagery, with results supporting the findings. Sediments predominantly comprised fine to medium sand with shell fragments and occasional gravel. Samples were acquired with a dual Van Veen at three stations: EW2-15A, EW2-15C, EW2-16, and a modified Day grab at the remaining stations. Environmental deck and positioning logs are presented in Appendix A, whilst a selection of photographs of the recovered samples, together with sample description and positions are given in Appendix D.

Across the 37 grab sampling stations, distributed over the 15 camera transects, 114 acceptable grab samples were recovered. There were 38 failed sampling attempts, the majority were due to gravel or shell fragments trapped in the grab's jaws leading to sample washout. All retained samples, with the exception of two, were acquired within 10m of their target location. A single sample from Station EW2-8C and EW-14B were acquired within 11m of their target location, due to the vessel repositioning following multiple rejected samples due to low retention. It was decided by the onboard client representative that to improve the possibility of sampling success, these two samples would be accepted. On average, retained samples were acquired 3.5m (± 2.2 SD) from their target location.

Stations with areas of higher SSS reflectivity recorded sediment comprising fine sand with shell fragments and gravel, whilst stations with areas of medium SSS reflectivity recorded sediment comprising fine to medium sand with occasional shell fragments and gravel. Stations with areas of lower SSS reflectivity generally recorded sediment comprising fine to silty sand.

Visible fauna within the grab samples included:

- Annelida (*Lanice* sp., Polychaeta)
- Arthropoda (Amphipoda)
- Cnidaria (Hydrozoa)
- Echinodermata (Clypeasteroidea)
- Mollusca (Bivalvia, possible *A. islandica*, Gastropoda)

There was no evidence from seabed sampling of any species listed on the ICUN Red List of threatened species (2021) or endangered species listed under the Endangered Species Act of 1973 (USFWS, 2021) within the survey area.

2.4 Sediment Characteristics

2.4.1 Particle Size Analysis

The results of the PSA determined using wet and dry sieving, are tabulated in Table 2.3, whilst CMECS substrate components classification (FGDC, 2012) are tabulated in Table 2.4. Furthermore, the sediment composition at each station presented graphically in Figure 2.10 and spatially in Figure 2.11. Full results and histograms illustrating particle size distributions at each sampled station are presented in Appendix G.

The PSA results supported the geophysical interpretation, seabed imagery findings and observations of the recovered samples. Sand ($\geq 63\mu\text{m}$, $< 2\text{mm}$) was generally the dominant fraction across the stations

sampled, accounting for 89% (± 14 SD) of the sediment on average. However, sediment composition across stations varied, with increased gravel ($\geq 2\text{mm}$; 12% to 49%) recorded at Stations EW2-5C, EW2-8A, EW2-10A, EW2-10B and EW2-12B. These stations were therefore classified as poorly sorted under Folk and Ward (1957) and as either gravelly sand or sandy gravel under Folk (1954). At all remaining stations, gravel accounted for less than 6% of the sediment composition. Conversely at Stations EW2-2C, EW2-3B, EW2-5A, EW2-5B and EW2-8B increased fines (silt and clay, $< 63\mu\text{m}$) were recorded, accounted for 12% to 57% of the sediment. These stations were classified as either poorly or very poorly sorted under Folk and Ward (1957) and as either sandy mud or slightly gravelly muddy sand under Folk (1954). At all remaining stations, fines accounted for less than 7% of the sediment composition.

Generally, stations displayed a unimodal distribution which peaked at $151\mu\text{m}$ (fine sand), $301\mu\text{m}$ (medium sand) or $427\mu\text{m}$ (medium sand). The only exception was Station EW2-3C, which peaked at $603\mu\text{m}$ (coarse sand). Stations EW2-8A, EW2-12B and EW2-14A had bimodal distributions. Station EW2-8A displayed a primary mode which peaked at $427\mu\text{m}$ (medium sand) whilst Station EW2-12B displayed a primary mode which peaked at $603\mu\text{m}$ (coarse sand). Secondary peaks were recorded at $5169\mu\text{m}$ (pebble) and $7144\mu\text{m}$ (pebble gravel), respectively, corresponding to the high percentage of gravel recorded at these stations. Station EW2-14A had a primary peak at $427\mu\text{m}$ (medium sand) and an additional peak at $151\mu\text{m}$ (fine sand). Furthermore, Stations EW2-10A and EW2-10B had trimodal distributions corresponding to the poorly sorted, increased gravel component recorded at these stations. Whilst Station EW2-2C had a polymodal distribution, corresponding to the very poorly sorted, increased fines component recorded.

Overall, the sediment Wentworth (1922) classifications of coarse silt to very coarse sand and CMECS substrate components classifications (2012) of sandy clay to gravelly sand suggested natural spatial variation in composition across the survey area. In conclusion, with no evidence of seabed disturbance within the area, the sandy sediments were considered representative of the wider area and region.

2.4.2 Total Organic Matter

The results of the total organic matter (TOM) analysis are presented in Table 2.3. Organic matter in marine sediments is primarily made up of detrital matter and naphthenic materials (carboxylic acids and humic substances with a small proportion of biological biomass). TOM ranged between 0.2% and 6.5%, with a mean value of 0.8% (± 1.2 SD).

Increased organic matter is expected within fine ($< 63\mu\text{m}$ fraction) sediment, as it adsorbs to the increased surface area provided by the fine grain particles. As would be expected, a Spearman's rank correlation revealed a statistically significant negative correlation between concentrations of TOM and mean sediment diameter ($r = -0.47$, $p < 0.01$), consistent with the association between fines and organic matter.

Table 2.3 Sediment Characteristics

Station	Mean Diameter (µm) ¹	Mean Diameter (Phi) ¹	Fines %	Sand %	Gravel %	Wentworth Classification of Mean Grain Size	Sorting ¹	Folk Classification ²	Total Organic Matter %
EW2-2A	304.1	1.7	2.4	97.4	0.2	Medium sand	Moderately well	Slightly gravelly sand	0.3
EW2-2B	179.6	2.5	3.1	96.4	0.5	Fine sand	Moderately well	Slightly gravelly sand	0.4
EW2-2C	18.0	5.8	57.1	42.9	0.0	Coarse silt	Very Poorly	Sandy mud	6.5
EW2-3A	155.4	2.7	5.4	94.5	0.1	Fine sand	Moderately	Slightly gravelly sand	0.7
EW2-3B	39.2	4.7	29.1	70.2	0.7	Very coarse silt	Very Poorly	Slightly gravelly muddy sand	3.8
EW2-3C	492.7	1.0	4.3	91.4	4.3	Medium sand	Poorly	Slightly gravelly sand	0.9
EW2-4	348.2	1.5	2.1	97.3	0.6	Medium sand	Moderately well	Slightly gravelly sand	0.2
EW2-5A	126.4	3.0	12.2	86.4	1.4	Fine sand	Poorly	Slightly gravelly muddy sand	1.1
EW2-5B	40.8	4.6	25.3	73.2	1.5	Very coarse silt	Very Poorly	Slightly gravelly muddy sand	2.0
EW2-5C	555.6	0.8	4.0	84.4	11.6	Coarse sand	Poorly	Gravelly sand	0.7
EW2-6A	355.4	1.5	2.6	95.6	1.8	Medium sand	Moderately well	Slightly gravelly sand	0.3
EW2-6B	291.4	1.8	2.0	97.8	0.2	Medium sand	Well	Slightly gravelly sand	0.3
EW2-6C	395.9	1.3	6.5	90.9	2.6	Medium sand	Poorly	Slightly gravelly sand	0.8
EW2-7A	318.5	1.7	2.5	97.3	0.2	Medium sand	Moderately well	Slightly gravelly sand	0.7
EW2-7B	296.6	1.8	2.9	97.1	0.0	Medium sand	Moderately	Sand	0.6
EW2-7C	415.7	1.3	1.8	97.9	0.3	Medium sand	Moderately well	Slightly gravelly sand	0.4
EW2-8A	1832.3	-0.9	0.9	49.8	49.3	Very coarse sand	Poorly	Sandy gravel	0.2
EW2-8B	128.5	3.0	16.7	80.2	3.1	Fine sand	Very Poorly	Slightly gravelly muddy sand	2.6
EW2-8C	302.9	1.7	3.0	97.0	0.0	Medium sand	Moderately well	Sand	0.5
EW2-9	158.1	2.7	3.4	96.6	0.0	Fine sand	Moderately	Sand	0.4
EW2-10A	752.4	0.4	1.5	80.1	18.4	Coarse sand	Poorly	Gravelly sand	0.2
EW2-10B	1213.9	-0.3	2.5	64.1	33.4	Very coarse sand	Poorly	Sandy gravel	0.3
EW2-10C	238.8	2.1	2.7	96.3	1.0	Fine sand	Moderately	Slightly gravelly sand	0.4
EW2-11	390.7	1.4	2.2	97.3	0.5	Medium sand	Moderately well	Slightly gravelly sand	0.2
EW2-12A	164.5	2.6	2.7	97.3	0.0	Fine sand	Moderately well	Sand	0.4
EW2-12B	1241.7	-0.3	1.6	60.0	38.4	Very coarse sand	Poorly	Sandy gravel	0.2
EW2-12C	403.8	1.3	1.5	97.2	1.3	Medium sand	Moderately well	Slightly gravelly sand	0.6
EW2-13A	466.8	1.1	2.1	96.9	1.0	Medium sand	Moderately	Slightly gravelly sand	0.4
EW2-13B	425.4	1.2	2.1	96.2	1.7	Medium sand	Moderately	Slightly gravelly sand	0.4
EW2-13C	430.8	1.2	1.4	97.6	1.0	Medium sand	Moderately well	Slightly gravelly sand	0.3
EW2-14A	376.8	1.4	3.9	91.2	4.9	Medium sand	Poorly	Slightly gravelly sand	0.6
EW2-14B	177.1	2.5	4.6	89.9	5.5	Fine sand	Poorly	Gravelly sand	0.7
EW2-14C	344.3	1.5	2.0	97.5	0.5	Medium sand	Moderately well	Slightly gravelly sand	0.3
EW2-15A	361.2	1.5	3.3	95.9	0.8	Medium sand	Moderately	Slightly gravelly sand	0.5
EW2-15B-1	315.9	1.7	2.2	97.4	0.4	Medium sand	Moderately	Slightly gravelly sand	0.3
EW2-15C	344.4	1.5	1.8	98.0	0.2	Medium sand	Moderately well	Slightly gravelly sand	0.2
EW2-16	362.9	1.5	1.9	97.8	0.3	Medium sand	Moderately well	Slightly gravelly sand	0.3
Minimum	18.0	-0.9	0.9	42.9	0.0	Coarse silt to very coarse sand	Very poor to well sorted	Sand to sandy gravel	0.2
Maximum	1832.3	5.8	57.1	98.0	49.3				6.5
Mean	399.1	1.8	6.1	88.8	5.1				0.8
±SD	349.0	1.3	10.5	14.1	11.2				1.2

Sediments were not treated to removed carbonates prior to particle size analysis

1 Sorting according to Folk and Ward (1957)

2 Calculated using the Folk classification triangle (Folk & Ward, 1957), presented in Appendix B.6

Table 2.4 CMECS Substrate Component Classification

Station	Substrate Origin	Substrate Class	Substrate Subclass ¹	Substrate Group ¹	Substrate Subgroup ¹
EW2-2A	Geologic Substrate	Unconsolidated Mineral Substrate	Fine Unconsolidated Substrate	Slightly Gravelly	Slightly gravelly sand
EW2-2B	Geologic Substrate	Unconsolidated Mineral Substrate	Fine Unconsolidated Substrate	Slightly Gravelly	Slightly gravelly sand
EW2-2C	Geologic Substrate	Unconsolidated Mineral Substrate	Fine Unconsolidated Substrate	Sandy Mud	Sandy clay
EW2-3A	Geologic Substrate	Unconsolidated Mineral Substrate	Fine Unconsolidated Substrate	Slightly Gravelly	Slightly gravelly sand
EW2-3B	Geologic Substrate	Unconsolidated Mineral Substrate	Fine Unconsolidated Substrate	Slightly Gravelly	Slightly gravelly muddy sand
EW2-3C	Geologic Substrate	Unconsolidated Mineral Substrate	Fine Unconsolidated Substrate	Slightly Gravelly	Slightly gravelly sand
EW2-4	Geologic Substrate	Unconsolidated Mineral Substrate	Fine Unconsolidated Substrate	Slightly Gravelly	Slightly gravelly sand
EW2-5A	Geologic Substrate	Unconsolidated Mineral Substrate	Fine Unconsolidated Substrate	Slightly Gravelly	Slightly gravelly muddy sand
EW2-5B	Geologic Substrate	Unconsolidated Mineral Substrate	Fine Unconsolidated Substrate	Slightly Gravelly	Slightly gravelly muddy sand
EW2-5C	Geologic Substrate	Unconsolidated Mineral Substrate	Coarse Unconsolidated Substrate	Gravelly	Gravelly sand
EW2-6A	Geologic Substrate	Unconsolidated Mineral Substrate	Fine Unconsolidated Substrate	Slightly Gravelly	Slightly gravelly sand
EW2-6B	Geologic Substrate	Unconsolidated Mineral Substrate	Fine Unconsolidated Substrate	Slightly Gravelly	Slightly gravelly sand
EW2-6C	Geologic Substrate	Unconsolidated Mineral Substrate	Fine Unconsolidated Substrate	Slightly Gravelly	Slightly gravelly sand
EW2-7A	Geologic Substrate	Unconsolidated Mineral Substrate	Fine Unconsolidated Substrate	Slightly Gravelly	Slightly gravelly sand
EW2-7B	Geologic Substrate	Unconsolidated Mineral Substrate	Fine Unconsolidated Substrate	Sand	Medium sand
EW2-7C	Geologic Substrate	Unconsolidated Mineral Substrate	Fine Unconsolidated Substrate	Slightly Gravelly	Slightly gravelly sand
EW2-8A	Geologic Substrate	Unconsolidated Mineral Substrate	Coarse Unconsolidated Substrate	Gravel Mixes	Sandy gravel
EW2-8B	Geologic Substrate	Unconsolidated Mineral Substrate	Fine Unconsolidated Substrate	Slightly Gravelly	Slightly gravelly muddy sand
EW2-8C	Geologic Substrate	Unconsolidated Mineral Substrate	Fine Unconsolidated Substrate	Sand	Medium sand
EW2-9	Geologic Substrate	Unconsolidated Mineral Substrate	Fine Unconsolidated Substrate	Sand	Fine sand
EW2-10A	Geologic Substrate	Unconsolidated Mineral Substrate	Coarse Unconsolidated Substrate	Gravelly	Gravelly sand
EW2-10B	Geologic Substrate	Unconsolidated Mineral Substrate	Coarse Unconsolidated Substrate	Gravel Mixes	Sandy gravel
EW2-10C	Geologic Substrate	Unconsolidated Mineral Substrate	Fine Unconsolidated Substrate	Slightly Gravelly	Slightly gravelly sand

Station	Substrate Origin	Substrate Class	Substrate Subclass ¹	Substrate Group ¹	Substrate Subgroup ¹
EW2-11	Geologic Substrate	Unconsolidated Mineral Substrate	Fine Unconsolidated Substrate	Slightly Gravelly	Slightly gravelly sand
EW2-12A	Geologic Substrate	Unconsolidated Mineral Substrate	Fine Unconsolidated Substrate	Sand	Fine sand
EW2-12B	Geologic Substrate	Unconsolidated Mineral Substrate	Coarse Unconsolidated Substrate	Gravel Mixes	Sandy gravel
EW2-12C	Geologic Substrate	Unconsolidated Mineral Substrate	Fine Unconsolidated Substrate	Slightly Gravelly	Slightly gravelly sand
EW2-13A	Geologic Substrate	Unconsolidated Mineral Substrate	Fine Unconsolidated Substrate	Slightly Gravelly	Slightly gravelly sand
EW2-13B	Geologic Substrate	Unconsolidated Mineral Substrate	Fine Unconsolidated Substrate	Slightly Gravelly	Slightly gravelly sand
EW2-13C	Geologic Substrate	Unconsolidated Mineral Substrate	Fine Unconsolidated Substrate	Slightly Gravelly	Slightly gravelly sand
EW2-14A	Geologic Substrate	Unconsolidated Mineral Substrate	Fine Unconsolidated Substrate	Slightly Gravelly	Slightly gravelly sand
EW2-14B	Geologic Substrate	Unconsolidated Mineral Substrate	Coarse Unconsolidated Substrate	Gravelly	Gravelly sand
EW2-14C	Geologic Substrate	Unconsolidated Mineral Substrate	Fine Unconsolidated Substrate	Slightly Gravelly	Slightly gravelly sand
EW2-15A	Geologic Substrate	Unconsolidated Mineral Substrate	Fine Unconsolidated Substrate	Slightly Gravelly	Slightly gravelly sand
EW2-15B-1	Geologic Substrate	Unconsolidated Mineral Substrate	Fine Unconsolidated Substrate	Slightly Gravelly	Slightly gravelly sand
EW2-15C	Geologic Substrate	Unconsolidated Mineral Substrate	Fine Unconsolidated Substrate	Slightly Gravelly	Slightly gravelly sand
EW2-16	Geologic Substrate	Unconsolidated Mineral Substrate	Fine Unconsolidated Substrate	Slightly Gravelly	Slightly gravelly sand

Figure 2.10 Sediment Composition per Station

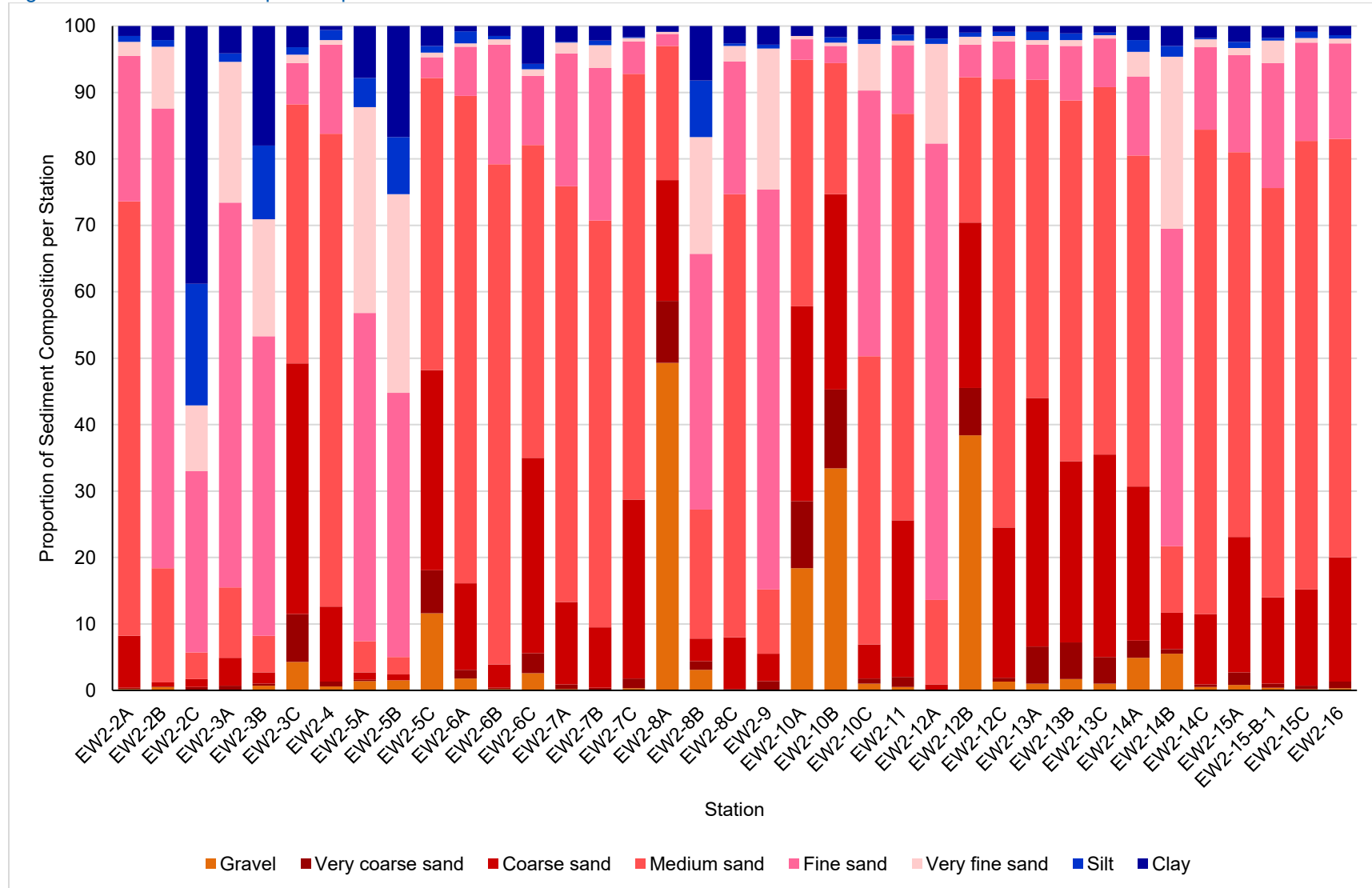
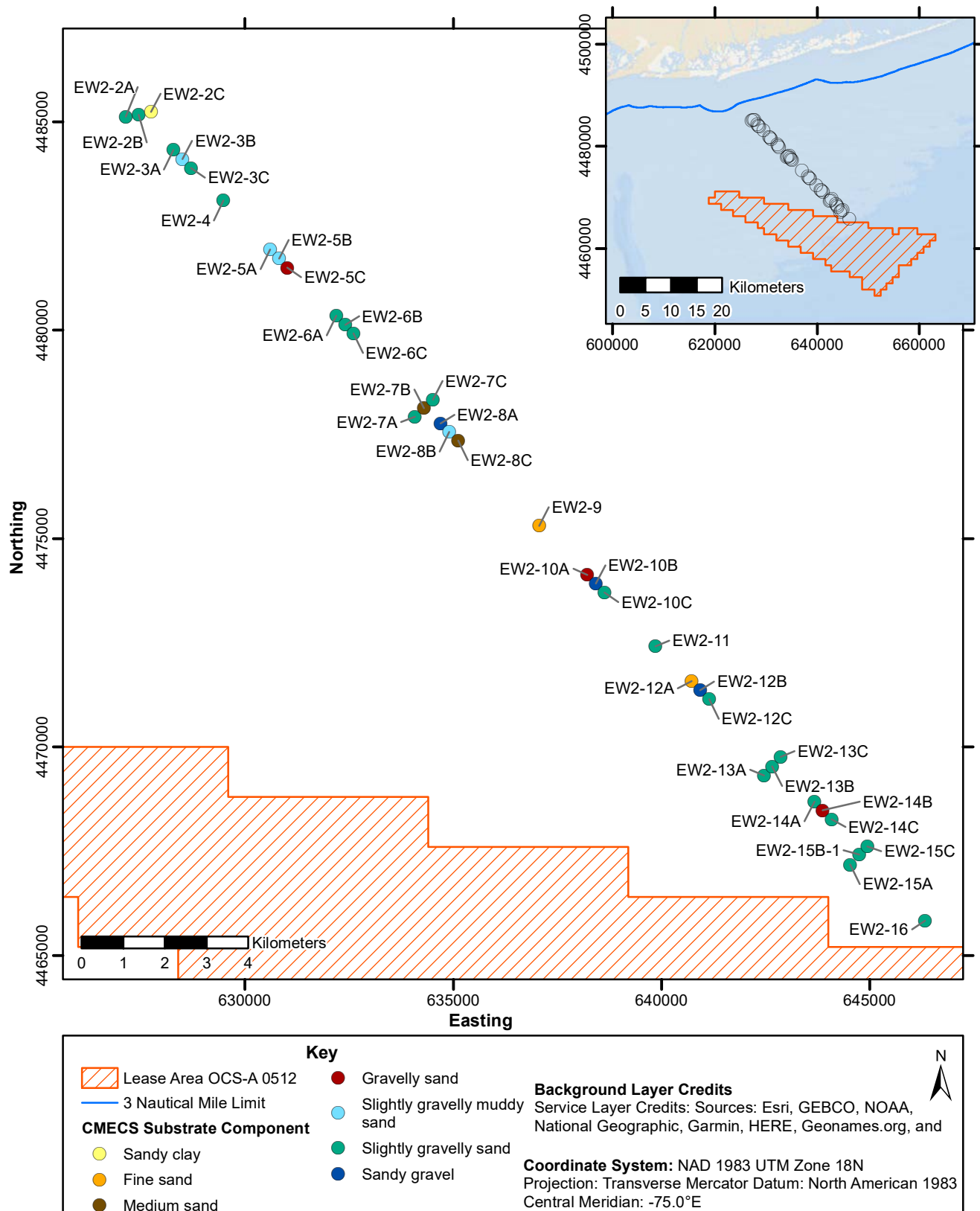


Figure 2.11 Spatial Distribution of CMECS Substrate Group



2.5 Water Profiling Summary

Water CTD profiles were acquired at fifteen stations. The upcast profiles for the different physico-chemical variables are graphically presented in Appendix H.

To aid comparison between different profiled stations, a summary of potential temperatures ($\theta^\circ\text{C}$; temperature corrected for adiabatic pressure) measurements are tabulated in Table 2.5 for specific depth horizons. The potential temperature profiles revealed similar trends between stations, with surface temperatures between 6.1°C (Station EW2-10B) and 7.7°C (Station EW2-6B), remaining relatively constant throughout the water column. There was a general trend for upper surface water to be warmer than the deeper water; however, no clear thermocline was evident at any of the stations. Temperature reached a minimum of 5.73°C at EW2-14B; at a depth of 31.5m.

Table 2.5 Potential Temperature ($^\circ\text{C}$) Summary

Stations	Minimum	Maximum	Surface ¹	10m	20m	30m
EW2-2B	6.48	7.30	7.20	6.69		
EW2-3B	6.39	7.12	7.06	6.77	6.39	
EW2-4B	6.52	7.10	7.07	6.83		
EW2-5B	7.29	7.48	7.45	7.40	7.31	
EW2-6B	7.45	7.68	7.67	7.60	7.45	
EW2-7B	5.94	6.92	6.89	6.35	5.97	
EW2-8B	5.89	6.95	6.90	6.13	5.93	
EW2-9	5.87	6.73	6.59	6.23	5.91	
EW2-10B	5.86	6.11	6.10	6.06	5.94	
EW2-11	5.88	6.24	6.23	6.12	5.98	
EW2-12B	5.87	6.17	6.15	6.06	5.95	5.87
EW2-13B	5.83	6.14	6.13	6.11	5.97	
EW2-14B	5.73	6.75	6.74	6.74	6.02	5.74
EW2-15B-1	5.81	6.82	6.80	6.57	6.35	
EW2-16-1	5.86	6.90	6.87	6.76	6.36	5.97
Minimum	5.73	6.11	6.10	6.06	5.91	5.74
Maximum	7.45	7.68	7.67	7.60	7.45	5.97
Mean	6.18	6.83	6.79	6.56	6.27	5.86
$\pm$ SD	0.55	0.49	0.48	0.48	0.52	0.12

Grey cells indicate where not applicable; depths shown where data available

¹ Average value for top 5m of water column

A summary of salinity values in practical salinity units (PSU) are tabulated below in Table 2.6. The surface waters remained steady, with values ranging between 32.12 PSU and 32.57 PSU in the surface waters for all station profiles. Stations EW2-2B and EW2-3B recorded the lowest salinity values which corresponded to them being the stations nearest the coastline. The highest salinity values were recorded at Stations EW2-15B-1 and EW2-16-1 at the maximum profile depth, corresponding with the cooler temperatures and greater water depth. Overall, salinity increased with depth at all stations; however, no halocline was evident indicating that waters were well mixed throughout the entire water column.

Table 2.6 Salinity (PSU) Summary

Stations	Minimum	Maximum	Surface ¹	10m	20m	30m
EW2-2B	32.09	32.30	32.19	32.24		
EW2-3B	32.09	32.39	32.15	32.17	32.38	
EW2-4B	32.10	32.33	32.12	32.19		
EW2-5B	32.27	32.31	32.28	32.29	32.31	
EW2-6B	32.30	32.38	32.32	32.32	32.38	
EW2-7B	32.18	32.47	32.19	32.35	32.44	
EW2-8B	32.17	32.49	32.20	32.40	32.47	
EW2-9	32.26	32.52	32.33	32.43	32.50	
EW2-10B	32.47	32.53	32.48	32.48	32.50	
EW2-11	32.46	32.55	32.48	32.49	32.51	
EW2-12B	32.45	32.57	32.49	32.50	32.53	32.56
EW2-13B	32.48	32.62	32.50	32.50	32.54	
EW2-14B	32.50	32.72	32.52	32.52	32.58	32.71
EW2-15B-1	32.51	32.74	32.54	32.55	32.56	
EW2-16-1	32.48	32.81	32.57	32.58	32.61	32.75
Minimum	32.09	32.30	32.12	32.17	32.31	32.56
Maximum	32.51	32.81	32.57	32.58	32.61	32.75
Mean	32.32	32.51	32.36	32.40	32.49	32.68
± SD	0.16	0.16	0.16	0.13	0.09	0.10

Grey cells indicate where not applicable; depths shown where data available

1 Average value for top 5m of water column

A summary of dissolved oxygen (DO) values are tabulated in Table 2.7, with DO concentrations ranging from 6.83mg L⁻¹ to 10.47mg L⁻¹. There was a general decline in DO as depth decreased across stations. Stations EW2-2B and EW2-3B reported a notable decrease in the DO content between 9m and 14.5m. Whilst DO values at Station EW2-9 increased with decreasing depth. With the exception of Station EW2-4B, the concentrations were above the Canadian Council of Ministers of the Environment (CCME, 1999a) interim guideline of 8mg L⁻¹; however, they are thought to represent natural DO concentrations for the area. Stations EW2-7B and EW2-11 DO data were removed due to the spurious nature and not consistent with the dataset.

DO readings in excess of 100% air saturation are possible due to the production of pure oxygen by photosynthetically-active organisms and due to non-ideal equilibrium of DO between the water and the air above (YSI, 2019). This was the case for all stations, with the exception of Stations EW2-5B, EW2-9, EW2-10B, EW2-12B and EW2-13B.

Table 2.7 Dissolved Oxygen (mg L⁻¹) Summary

Stations	Minimum	Maximum	Surface ¹	10m	20m	30m
EW2-2B	9.26	9.92	9.82	9.64		
EW2-3B	9.06	10.19	10.14	9.66	9.14	
EW2-4B	6.83	6.97	6.97	6.92		
EW2-5B	9.42	9.70	9.69	9.59	9.52	
EW2-6B	9.56	9.74	9.73	9.69	9.64	
EW2-7B						
EW2-8B	9.49	9.95	9.91	9.86	9.60	
EW2-9	9.72	10.47	9.79	9.88	10.16	
EW2-10B	9.60	9.96	9.94	9.93	9.78	
EW2-11						
EW2-12B	9.49	9.95	9.93	9.89	9.76	9.55
EW2-13B	9.47	9.97	9.95	9.95	9.72	
EW2-14B	9.34	9.96	9.95	9.94	9.69	9.36
EW2-15B-1	9.44	9.98	9.94	9.96	9.84	
EW2-16-1	9.37	9.98	9.95	9.96	9.89	9.40
Minimum	6.83	6.97	6.97	6.92	9.14	9.36
Maximum	9.72	10.47	10.14	9.96	10.16	9.55
Mean	9.24	9.75	9.67	9.60	9.70	9.44
± SD	3.32	3.52	3.49	3.46	3.65	0.10

Grey cells indicate where not applicable; depths shown where data available

1 Average value for top 5m of water column

A summary of pH values are tabulated below in Table 2.8. Overall, pH values throughout the water column remained fairly consistent, with a slight decrease in values as water depths increased. Across stations pH values ranged from 7.83 to 7.95. Stations EW2-2B, EW2-3B and EW2-4 reporting the greatest change with depth. This corresponds with the increase in salinity with depth displayed at these stations nearest the coastline. These values were within the CCME (1999b) interim guideline range of 7.0 to 8.7 units.

Table 2.8 pH Summary

Stations	Minimum	Maximum	Surface ¹	10m	20m	30m
EW2-2B	7.85	7.90	7.90	7.88		
EW2-3B	7.84	7.92	7.92	7.89	7.84	
EW2-4B	7.86	7.91	7.91	7.89		
EW2-5B	7.92	7.94	7.94	7.93	7.92	
EW2-6B	7.94	7.95	7.94	7.94	7.94	
EW2-7B	7.84	7.88	7.88	7.87	7.85	
EW2-8B	7.84	7.88	7.88	7.86	7.84	
EW2-9	7.84	7.87	7.87	7.86	7.84	
EW2-10B	7.83	7.87	7.86	7.86	7.85	
EW2-11	7.84	7.87	7.86	7.86	7.85	
EW2-12B	7.83	7.86	7.86	7.86	7.85	7.83

Stations	Minimum	Maximum	Surface ¹	10m	20m	30m
EW2-13B	7.83	7.86	7.86	7.86	7.85	
EW2-14B	7.86	7.91	7.91	7.91	7.89	7.87
EW2-15B-1	7.87	7.91	7.91	7.91	7.91	
EW2-16-1	7.88	7.94	7.91	7.92	7.92	7.88
Minimum	7.83	7.86	7.86	7.86	7.84	7.83
Maximum	7.94	7.95	7.94	7.94	7.94	7.88
Mean	7.86	7.90	7.89	7.89	7.87	7.86
± SD	0.03	0.03	0.03	0.03	0.04	0.03

Grey cells indicate where not applicable; depths shown where data available

¹ Average value for top 5m of water column

A summary of turbidity values in nephelometric turbidity units (NTU) are tabulated in Table 2.9. Turbidity profiles, presented in Appendix H, indicated that overall the turbidity of the water was relatively consistent throughout the water column, with the exception of Station EW2-5B. Turbidity at this station peaked towards the seabed, recording a maximum turbidity of 10.18 NTU. Turbidity generally decreased with increased distance from coastline and increase in water depth.

Table 2.9 Turbidity (NTU) Summary

Stations	Minimum	Maximum	Surface ¹	10m	20m	30m
EW2-2B	8.34	8.63	8.53	8.54		
EW2-3B	8.18	8.98	8.50	8.46	8.39	
EW2-4B	8.28	8.48	8.42	8.39		
EW2-5B	8.20	10.18	8.26	8.37	9.13	
EW2-6B	8.04	9.33	8.16	8.20	8.42	
EW2-7B	8.15	8.34	8.23	8.23	8.20	
EW2-8B	8.11	8.51	8.22	8.18	8.33	
EW2-9	8.04	8.51	8.09	8.09	8.14	
EW2-10B	8.04	8.59	8.10	8.08	8.09	
EW2-11	7.98	8.35	8.02	8.03	8.03	
EW2-12B	7.95	8.29	7.99	8.00	8.04	8.04
EW2-13B	7.91	8.33	7.96	7.96	7.97	
EW2-14B	7.91	8.68	7.96	7.94	8.00	8.00
EW2-15B-1	7.90	8.08	7.96	7.95	7.96	
EW2-16-1	7.91	8.71	7.98	7.95	7.98	7.97
Minimum	7.90	8.08	7.96	7.94	7.96	7.97
Maximum	8.34	10.18	8.53	8.54	9.13	8.04
Mean	8.06	8.66	8.16	8.16	8.21	8.00
± SD	0.14	0.52	0.20	0.20	0.32	0.04

Grey cells indicate where not applicable; depths shown where data available

¹ Average value for top 5m of water column

A summary of conductivity values are tabulated in Table 2.7. Conductivity profiles across the survey area revealed similar trends to those of temperature and pH, with Stations EW2-5B and EW2-6B recording the highest values ($33.22\mu\text{S cm}^{-1}$ and $33.42\mu\text{S cm}^{-1}$, respectively). In the surface waters, conductivity ranged from $32.21\mu\text{S cm}^{-1}$ to $33.42\mu\text{S cm}^{-1}$ across all stations.

Table 2.10 Conductivity ($\mu\text{S cm}^{-1}$) Summary

Stations	Minimum	Maximum	Surface ¹	10m	20m	30m
EW2-2B	32.37	32.97	32.89	32.50		
EW2-3B	32.37	32.79	32.74	32.51	32.39	
EW2-4B	32.45	32.74	32.73	32.59		
EW2-5B	33.09	33.22	33.20	33.16	33.11	
EW2-6B	33.28	33.42	33.42	33.37	33.29	
EW2-7B	32.07	32.65	32.64	32.31	32.08	
EW2-8B	32.05	32.69	32.65	32.17	32.07	
EW2-9	32.06	32.58	32.49	32.28	32.08	
EW2-10B	32.06	32.22	32.21	32.18	32.10	
EW2-11	32.10	32.33	32.32	32.24	32.15	
EW2-12B	32.11	32.28	32.27	32.20	32.14	32.11
EW2-13B	32.11	32.27	32.26	32.25	32.17	
EW2-14B	32.11	32.82	32.81	32.81	32.24	32.13
EW2-15B-1	32.19	32.89	32.87	32.69	32.52	
EW2-16-1	32.31	32.99	32.96	32.88	32.56	32.36
Minimum	32.05	32.22	32.21	32.17	32.07	32.11
Maximum	33.28	33.42	33.42	33.37	33.29	32.36
Mean	32.31	32.72	32.70	32.54	32.38	32.20
± SD	0.38	0.35	0.35	0.37	0.40	0.14

Grey cells indicate where not applicable; depths shown where data available

1 Average value for top 5m of water column

2.6 Macrofaunal Interpretation

2.6.1 Overview

Two 0.1m^2 faunal samples (MFA and MFB) were collected from each station, one of which (the MFA sample) was worked up and the other retained and appropriately stored as a spare. All faunal samples were screened through a 0.5mm mesh sieve. Before analysing the data set provided by the laboratory, several taxa were removed as per Gardline's stated methods; however, all records, regardless of whether they were included in statistical analyses, are listed in Appendix I. Further, a matrix detailing each individual sample is recorded in Appendix E.

2.6.2 Summary Statistics

A total of 6336 individuals representing 183 taxa were recorded across 37 stations. Of these, juvenile taxa accounted for 539 individuals from 25 taxa, representing 9% of the total individuals and 14% of the total taxa. Juveniles, although a valid part of the community, are ephemeral in their nature due to high levels of mortality and usually have little impact on faunal communities. A single juvenile taxon; Tellinidae, was

within the top ten most dominant taxa. However, a RELATE analysis test conducted in PRIMER v7 (Plymouth Marine Laboratories) determined that the data sets were 98% similar, indicating that the presence of juveniles did not cause significant variation between the rationalised full and adult only data sets. As such, although the results of the full and adult only data sets are presented, the interpretation will focus on the full data set and where necessary the influence of juveniles on the community is discussed.

Two individuals of *A. islandica* were recorded from the macrofaunal sample at Station EW2-14C, which was located within an area designated as an EFH for this taxon (NOAA, 2021c). Furthermore, the greatest number of siphons, thought to belong to *A. islandica*, were observed along Transect EW2-14. Three individuals of Anthozoa (Actiniaria and Ceriantharia) were recorded along the route; however, these are not listed by BOEM (2019) as comprising sensitive habitats.

The faunal dataset was divided into five major taxonomic groups: Annelida (Polychaeta), Arthropoda (Crustacea), Mollusca, Echinodermata and 'Others'. The 'Other's category consisted of Annelida (Clitellata), Chordata (Asciacea, Leptocardii), Cnidaria (Anthozoa), Foraminifera (Morphnallamea), Hemichordata (Enteropneusta), Nemertea, Phoronida, Platyhelminthes and Sipuncula. The absolute and proportional contributions of these five taxonomic groups to the overall community structure are summarized in Table 2.11. Furthermore, the contributions of the five taxonomic groups, split by adult and juveniles, are illustrated as stacked bar charts by individuals in Figure 2.12 and taxa in Figure 2.13.

The full faunal community was dominated by Annelida (Polychaeta; n=2962), accounting for 47% of recorded individuals and 49% of the taxa. Within this group, a single taxon; *Polygordius jouinae* (n=1207), accounted for 41% of the total Annelida abundance and 19% of the overall total abundance. Snelgrove *et al.* (2001) showed that *Polygordius* sp. at times makes up more than 50% of the macrofauna in sandy sediment communities on the continental shelf off New Jersey.

Of the 183 taxa recorded overall, none were recorded at every station. A total of 64 (35%) taxa were found at only one station, of which 47 (26%) were represented by a single individual. It is generally accepted that ecological communities which are frequently subjected to local disturbance or contamination events will be dominated by a limited number of tolerant taxa, which will be represented in high individual abundances (Clarke & Warwick, 2006). While to some extent the aforementioned *P. jouinae* may be an example of this, the relatively high numbers of single and low abundance species recorded in this survey suggests a reasonably diverse community that has been subjected to relatively little disturbance or contamination.

Table 2.11 Contribution of Gross Taxonomic Groups

Taxonomic Group	Individuals		Taxa	
	Abundance	Proportional Contribution %	Abundance	Proportional Contribution %
Full Fauna				
Annelida (Polychaeta)	2962	47	90	49
Arthropoda (Crustacea)	1944	31	41	22
Mollusca	950	15	33	18
Echinodermata	260	4	5	3
Others	220	3	14	8
Total	6336	100	183	100
Adult Only Fauna				
Annelida (Polychaeta)	2836	49	83	52
Arthropoda (Crustacea)	1941	33	39	24
Mollusca	691	12	24	15
Echinodermata	134	2	4	2
Others	195	3	11	7
Total	5797	100	161	100

Figure 2.12 Contribution of Individuals in Gross Taxonomic Groups

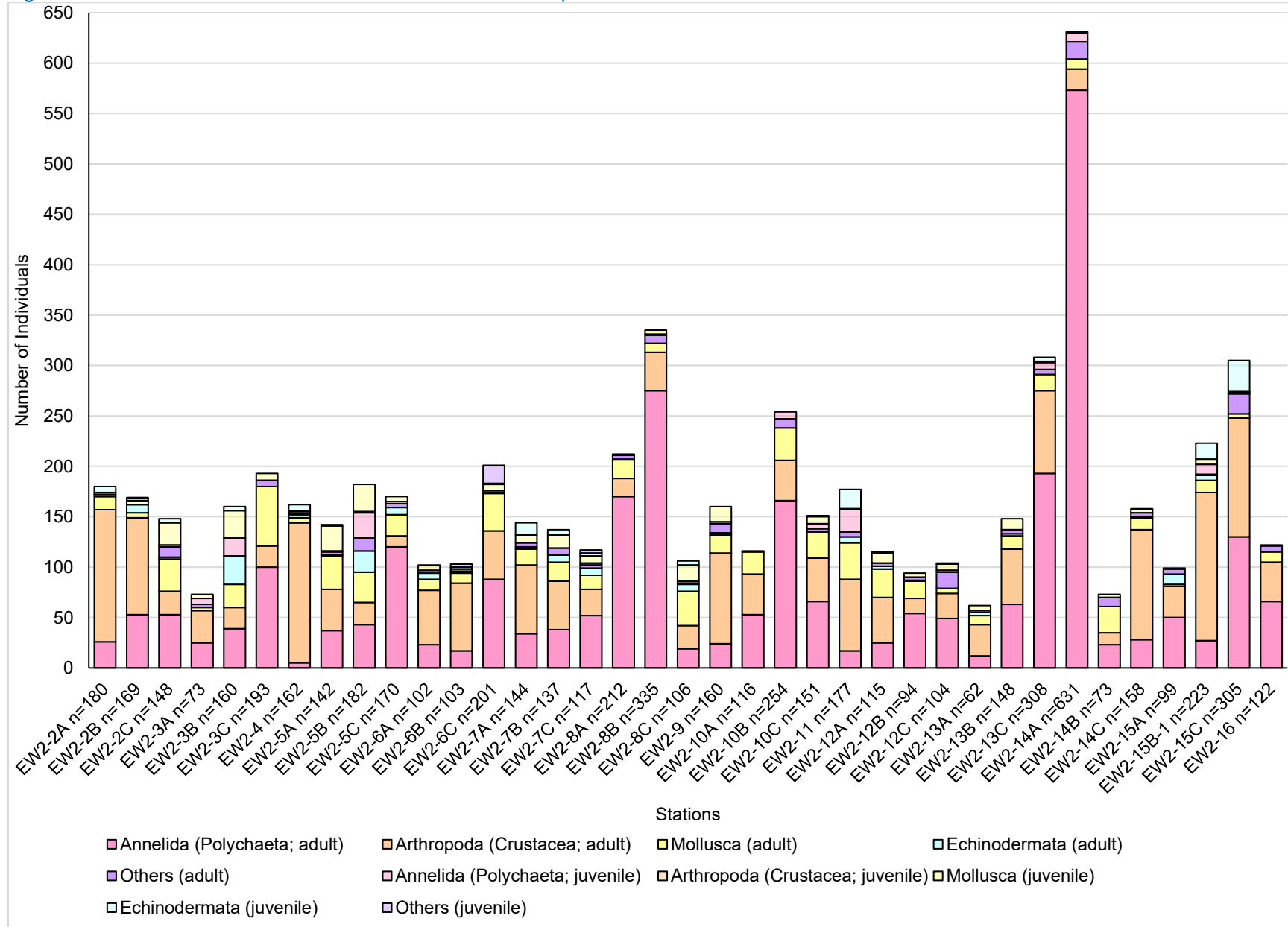
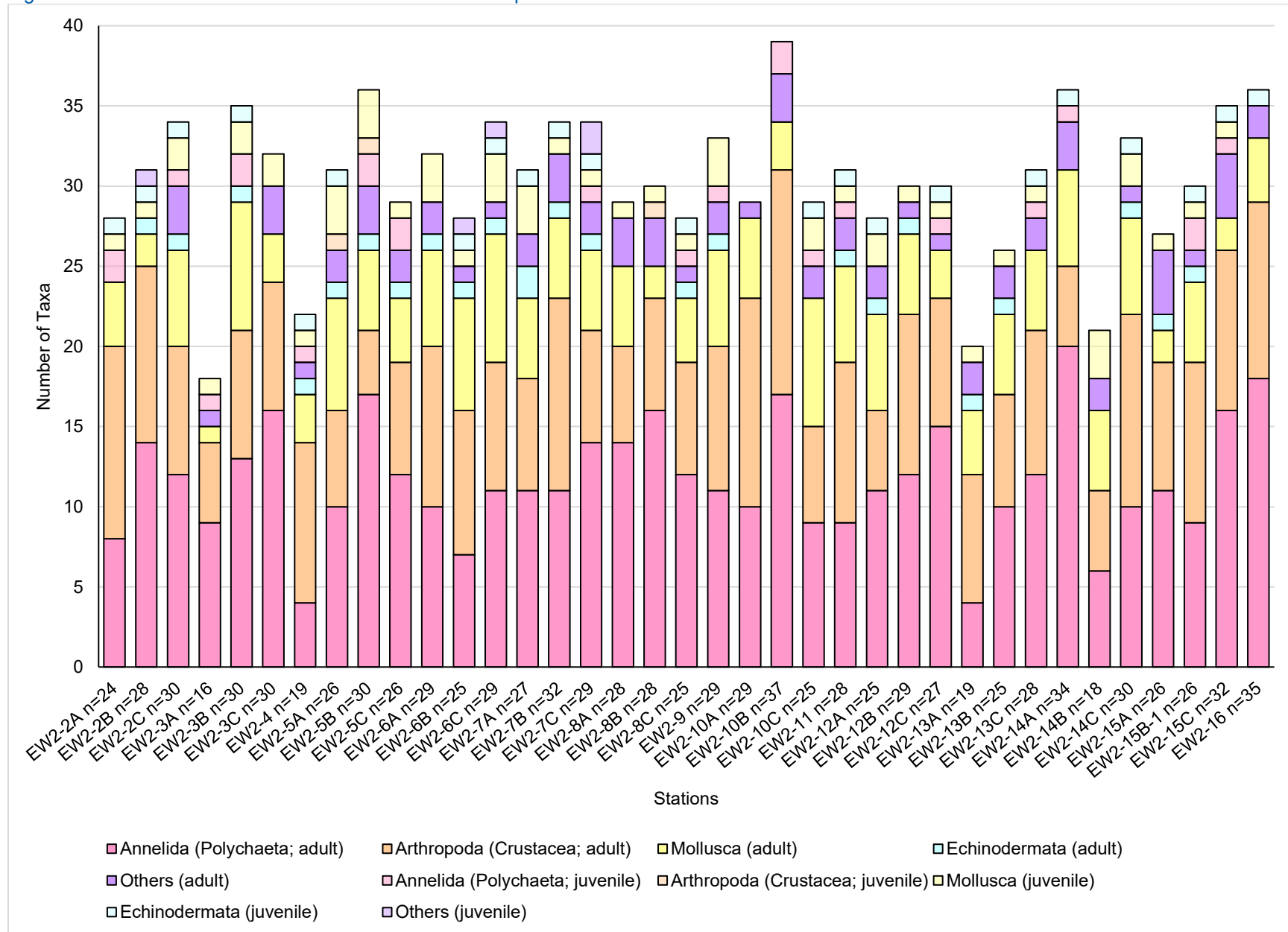


Figure 2.13 Contribution of Taxa in Gross Taxonomic Groups



Species ranking provides additional information on the dominance structure of the faunal community in the survey area and is tabulated in Table 2.12. Species ranking per station was also calculated for the full fauna data set and is tabulated in Appendix J. Only 3 of the 10 highest ranked taxa were present at more than 30 stations surveyed, indicating that there is a lack of consistent dominance structure across the stations.

The fidelity of the species ranking can give an indication of the taxonomic distribution. Values equal to or between 0.8 and 1.2 indicate a generally evenly distributed community, whilst values outside this range represent a patchier distribution. Within both the full and adult data sets, only two taxa; *Tanaissus psammophilus* and *Americhelidium americanum*, were within this range. All remaining top ten ranked taxa presented values outside this range which indicated a patchy distribution of taxa between stations. When ranked by abundance, rather than score, there was reordering of all taxa further indicating a patchy distribution of the top ten ranked taxa.

Table 2.12 Species Ranking

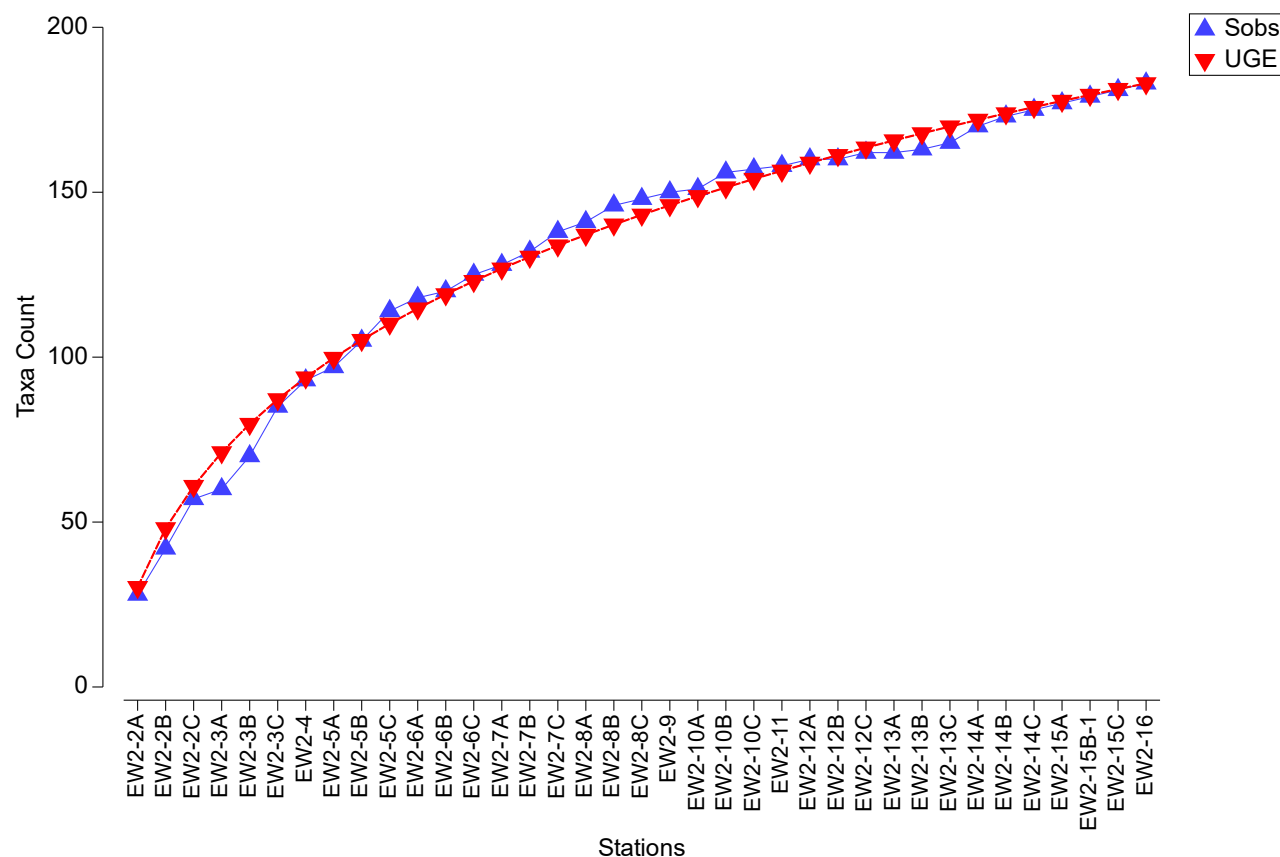
Rank		Taxon	Total Rank Score	Fidelity	Total Abundance
Score	Abundance				
Full Fauna					
1	5	<i>Nephtys picta</i>	188	0.51	266
2	3	<i>Rhepoxynius hudsoni</i>	176	0.53	313
3	1	<i>Polygordius jouinae</i>	168	0.57	1207
4	4	<i>Bivalvia</i>	153	0.59	279
5	7	<i>Pseudoleptocuma minus</i>	152	0.68	251
6	8	Tellinidae (Juvenile)	140	0.76	201
7	2	<i>Tanaissus psammophilus</i>	133	0.90	405
8	11	<i>Americhelidium americanum</i>	107	0.96	152
9	12	<i>Nucula proxima</i>	100	1.35	138
10	14	<i>Echinarachnius parma</i>	97	2.62	130
Adult Only Fauna					
1	6	<i>Nephtys picta</i>	194	0.52	261
2	3	<i>Rhepoxynius hudsoni</i>	187	0.56	313
3	1	<i>Polygordius jouinae</i>	175	0.59	1207
4	4	<i>Bivalvia</i>	170	0.66	279
5	7	<i>Pseudoleptocuma minus</i>	165	0.74	251
6	2	<i>Tanaissus psammophilus</i>	138	0.75	405
7	10	<i>Americhelidium americanum</i>	119	0.80	152
8	11	<i>Nucula proxima</i>	112	1.01	138
9	13	<i>Echinarachnius parma</i>	110	1.49	130
10	12	<i>Unciola irrorata</i>	109	2.95	137

Cells are coloured to indicate taxonomic division: Annelida (Polychaeta), Arthropoda (Crustacea), Mollusca, Echinodermata

A species accumulation plot for the full fauna data set is presented in Figure 2.14. This plot shows the increasing total number of different taxa observed as stations are successfully pooled. Two lines are plotted; the first (plotted in blue and often referred to as a Sobs curve) adds the new taxa to those already recorded in a station order. The second curve (plotted in red and often referred to as a UGE curve) is smooth as it is average output based on the sample being added in random order 999 times (Ugland *et al.*, 2003).

The Sobs curve was below the UGE curve until the addition of the sample from Station EW2-5C. It then dips below the UGE curve again, and remains that way, with the addition of the sample from Station EW2-12B. This indicates that fewer species were elicited at these stations than average for the survey area. Significant changes in the slope of the Sobs curve compared to the UGE curve can be an indication of differences in the community composition. Large changes in slope were noted in several instances which was expected due to the patchy distribution of taxa and the relatively high numbers of low abundance species recorded in the survey. The Sobs and UGE curve continue to rise with the addition of the last sample, reflecting that further sampling across the survey area, may elicit additional taxa.

Figure 2.14 Species Accumulation Plot – Full Fauna



2.6.3 Diversity using Univariate Statistics

The full and adult only data sets were analysed to provide the total number of individuals and taxa, Shannon Wiener diversity index (H'); calculated using logarithm base 2 (Shannon & Weaver, 1949), Pielou's evenness (J), Simpson's dominance (λ) and Margalef's richness index (d). Increasing values of the Shannon Wiener diversity index correspond to increasing diversity of the community. Values for the Simpson's dominance index and Pielou's evenness both range from 0 to 1; with 1 indicating a dominated community for the former and an even community for the latter. Margalef's index takes account of the number of species present for a given number of individuals. The station univariate statistics for the full fauna data set and the summary statistics for the adult only data set are presented in Table 2.13 and detailed information on methods for univariate statistics is presented in Appendix B.

Shannon Wiener diversity values indicated varying density across the site, with values ranging from 2.11 to 4.51. Pielou's evenness values ranged from 0.41 to 0.92 across the survey area with a mean value of 0.79 (± 0.1 SD), suggesting the faunal community was generally equitably distributed with occasional instances of patchiness. This was supported by Simpson's values suggesting relatively low species dominance ranging between 0.06 and 0.49. Overall, the ranges recorded across the survey area indicated a relatively equitably distributed community, with instances of patchiness and a lack of consistent dominance.

Table 2.13 Faunal Univariate Statistics

Station	n Taxa	n Individuals	Margalef's Richness (d)	Simpson's Diversity (λ)	Pielou's Evenness (J')	Shannon Wiener Diversity ($H'_{\log 2}$)
Full Fauna						
EW2-2A	28	180	5.20	0.11	0.78	3.76
EW2-2B	31	169	5.85	0.13	0.77	3.83
EW2-2C	34	148	6.60	0.07	0.87	4.40
EW2-3A	18	73	3.96	0.08	0.92	3.82
EW2-3B	35	160	6.70	0.08	0.84	4.31
EW2-3C	32	193	5.89	0.14	0.72	3.58
EW2-4	22	162	4.13	0.15	0.72	3.22
EW2-5A	31	142	6.05	0.07	0.85	4.20
EW2-5B	36	182	6.73	0.06	0.86	4.43
EW2-5C	29	170	5.45	0.15	0.74	3.59
EW2-6A	32	102	6.70	0.10	0.84	4.18
EW2-6B	28	103	5.83	0.09	0.84	4.05
EW2-6C	34	201	6.22	0.07	0.83	4.20
EW2-7A	31	144	6.04	0.08	0.85	4.20
EW2-7B	34	137	6.71	0.06	0.89	4.51
EW2-7C	34	117	6.93	0.07	0.87	4.44
EW2-8A	29	212	5.23	0.20	0.67	3.26
EW2-8B	30	335	4.99	0.19	0.64	3.15
EW2-8C	28	106	5.79	0.08	0.86	4.12
EW2-9	33	160	6.31	0.10	0.81	4.08
EW2-10A	29	116	5.89	0.09	0.84	4.07
EW2-10B	39	254	6.86	0.20	0.68	3.59
EW2-10C	29	151	5.58	0.10	0.82	4.00
EW2-11	31	177	5.80	0.11	0.79	3.91
EW2-12A	28	115	5.69	0.14	0.78	3.73

Station	n Taxa	n Individuals	Margalef's Richness (d)	Simpson's Diversity (λ)	Pielou's Evenness (J')	Shannon Wiener Diversity ($H'_{\log 2}$)
Full Fauna						
EW2-12B	30	94	6.38	0.08	0.88	4.31
EW2-12C	30	104	6.24	0.08	0.86	4.24
EW2-13A	20	62	4.60	0.10	0.87	3.77
EW2-13B	26	148	5.00	0.14	0.77	3.63
EW2-13C	31	308	5.24	0.33	0.55	2.71
EW2-14A	36	631	5.43	0.49	0.41	2.11
EW2-14B	21	73	4.66	0.09	0.87	3.80
EW2-14C	33	158	6.32	0.12	0.79	3.98
EW2-15A	27	99	5.66	0.10	0.84	3.98
EW2-15B-1	30	223	5.36	0.22	0.68	3.36
EW2-15C	35	305	5.94	0.15	0.69	3.56
EW2-16	36	122	7.29	0.08	0.85	4.38
Minimum	18	62	3.96	0.06	0.41	2.11
Maximum	39	631	7.29	0.49	0.92	4.51
Mean	30	171	5.82	0.13	0.79	3.85
± SD	5	101	0.78	0.08	0.10	0.51
Adult Only Fauna						
Minimum	16	57	3.58	0.06	0.40	2.01
Maximum	37	621	7.09	0.51	0.90	4.41
Mean	27	157	5.35	0.14	0.78	3.69
± SD	4	100	0.77	0.09	0.11	0.51

Beta diversity indices measure the change in diversity of taxa from one environment to another by calculating the number of taxa that are different between the two environments. The Jaccard (1908) similarity index ranges from 0 to 1; with 1 indicating a high level of similarity in the species composition of the community; however, these values do not reflect relative abundance differences.

In order to quantitatively assess the changes in diversity across the wider region, beta diversity between the Barrett route and Ocean View route was calculated using the Jaccard similarity index (1908). The resulting index of 0.54 suggests a degree of similarity in the macrofaunal community across the wider area.

2.6.4 Faunal Community Structure using Multivariate Analyses

In comparison to univariate statistics, multivariate analyses enable subtle trends within the full and adult data sets to be identified. Multivariate analyses were performed on the rationalised data using PRIMER v7. Bray-Curtis similarity matrices were produced based on the square root transformed abundance data set. This transformation was chosen in order to down-weight the influence of the numerically dominant species and to ensure that the intermediately abundant and sparse species contributed to the multivariate pattern.

A SIMPROF permutation test was conducted in conjunction with CLUSTER analysis and the results were illustrated on dendrograms. Red lines join stations or samples that are statistically indistinguishable, whilst black lines join stations which are distinct from one another. Non-metric multidimensional scaling (nMDS) plots were also created which display the configuration of samples as a reflection of their similarity, with distances between samples being representative of their dissimilarity. The Bray-Curtis similarity

dendrogram and nMDS plot for the full data set are presented in Figure 2.15 and the Bray-Curtis similarity dendrogram for the adult only data set in Figure 2.16.

The CLUSTER analysis and resulting dendrogram for the full fauna data set formed seven distinct groups: SIMPROF groups *a* to *g*. All stations were grouped together at 29% similarity, indicating that overall the macrofaunal community across all stations were more dissimilar than similar. The results of the SIMPER analyses in conjunction with examination of the raw data, presented in Table 2.14, showed that the differences between SIMPROF groups were largely influenced by the relative abundances of the top ten highest ranked taxa. Testing of the macrofaunal community, by running an ANOSIM routine, demonstrated a significant pattern in the multivariate community due to the percentage of fines at stations ($Rho = 0.428$, $p < 0.01$). As discussed in Section 2.4.1, percentage of fines ($< 63\mu m$) varied between $< 1\%$ and 57% of the sediment composition across the survey area; therefore, a model matrix, run in conjunction with a RELATE routine test, investigated the influence of spatial distribution on the macrofaunal community. Results revealed a 37% ($p < 0.01$) certainty that the recorded patterns of the macrofaunal community across stations were a factor of two-dimensional spatial separation due to sediment composition and more specifically the percentage of fines present.

The nMDS ordination for the full fauna data set; Figure 2.15b, overlain with the SIMPROF groups, revealed a similar pattern to the CLUSTER analysis and with a stress value of 0.16, this ordination can be considered as a useful representation of rank (dis)similarities of the overall pattern observed in the data.

Table 2.14 SIMPROF Groups – Full Fauna Data Set

SIMPROF Groups Comparison	Bray-Curtis Similarity (%)	Distinct Macrofauna
<i>abc v defg</i>	29.19	• Lowest abundances or absence of <i>P. jouniae</i> • Presence of <i>Ampelisca verrilli</i> • Lower abundances of <i>T. psammophilus</i> • Higher abundances of <i>N. proxima</i>
<i>a v bc</i>	35.41	• Absence of <i>A. verrilli</i>, <i>Spiophanes bombyx</i> complex, <i>Agriopoma morrhuanum</i> • Lower abundance of Tellinidae (Juv) • Higher abundance of Bivalvia
<i>b v c</i>	40.05	• Absence of <i>A. morrhuanum</i>, <i>Yoldia</i> sp. (Juv), <i>E. parma</i>, Bivalvia • Higher abundances of Maldanidae (Juv), <i>P. minus</i>
<i>def v g</i>	31.30	• Lower abundances of <i>P. jouniae</i>, <i>Spio filicornis</i>, Bivalvia • Higher abundances of <i>T. psammophilus</i>, <i>R. hudsoni</i>
<i>d v ef</i>	37.26	• Highest abundance of <i>Protohaustorius deichmannae</i>, <i>Onuphis eremita</i> • Lower abundances of <i>P. jouniae</i> • Absence of <i>Pseudunciola obliqua</i>
<i>e v f</i>	39.26	• Highest abundance of <i>Protohaustorius wigleyi</i> • Lower abundances of <i>P. jouniae</i>, <i>T. psammophilus</i> • Higher abundances of <i>P. obliqua</i>, <i>R. hudsoni</i>

Taxa in **bold** are ranked as the top ten most dominant taxa in the full data set

Figure 2.15 Multivariate Analysis of Faunal Data – Full Fauna Data Set

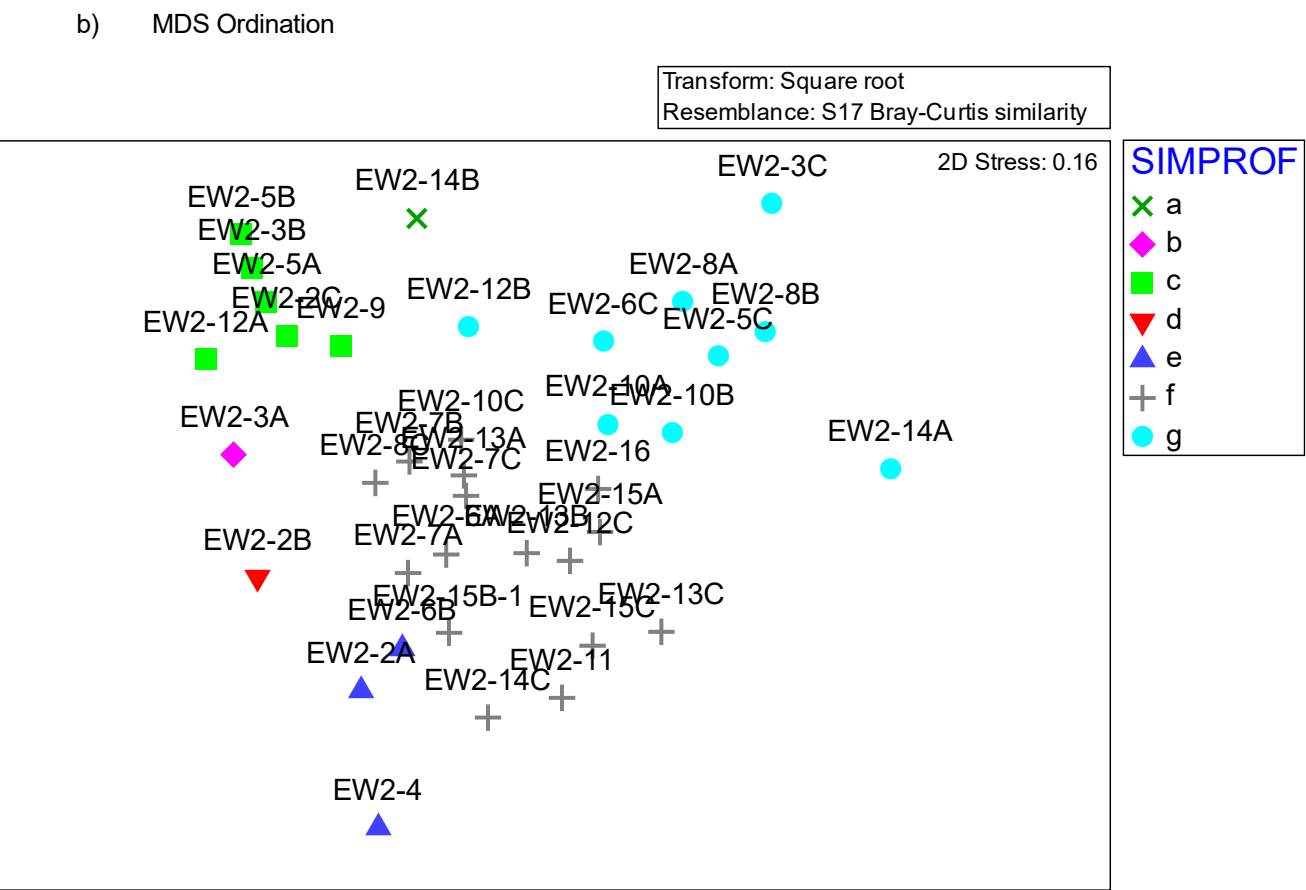
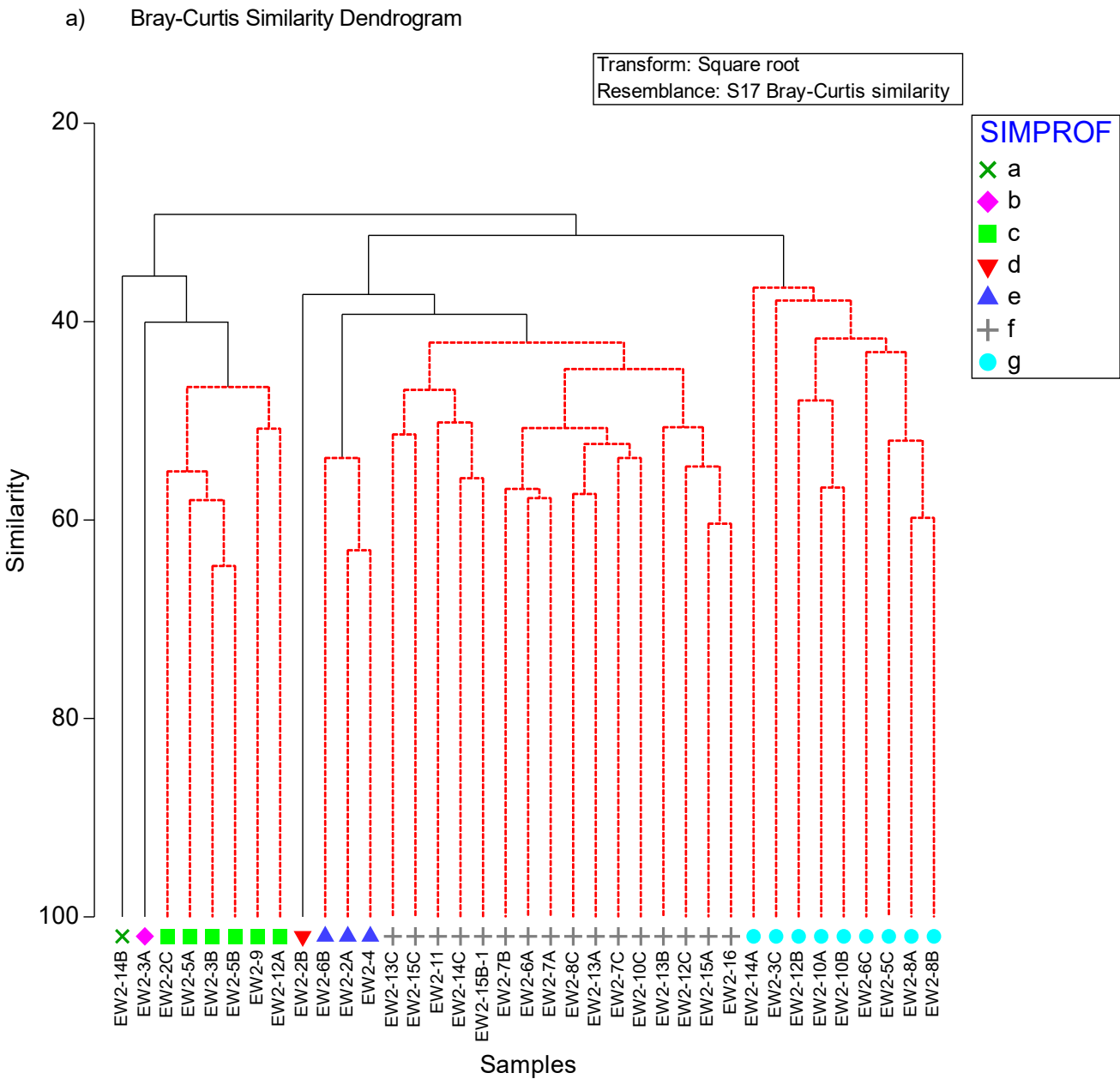
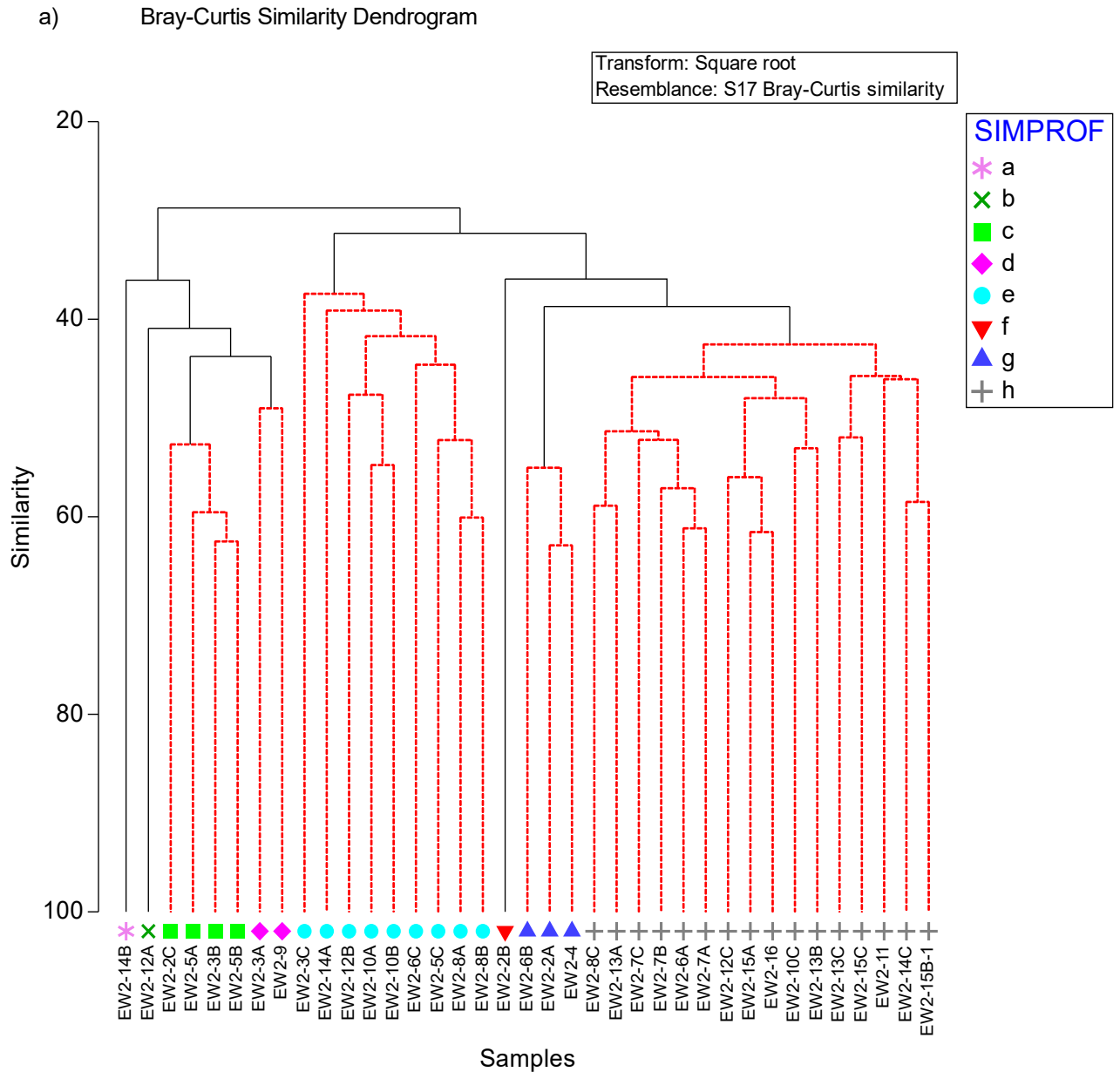


Figure 2.16 Multivariate Analysis of Faunal Data – Adult Only Fauna Data Set



2.6.5 CMECS Biotic Classification

CMECS biotic classification (FGDC, 2012) of stations based on macrofaunal grab analysis results was mostly confirmed by SIMPROF groups and the highest ranking taxa at each station, which allowed classification to the lowest level, see Table 2.15. The spatial distribution of the CMECS biotic classification is displayed in Figure 2.17.

All stations were categorized as 'Soft Sediment Fauna' at the biotic subclass level. Three stations were categorized to the biotic community level; while some stations were classified with a co-occurring element at biotic group level, indicating a mixture of classification units at these stations.

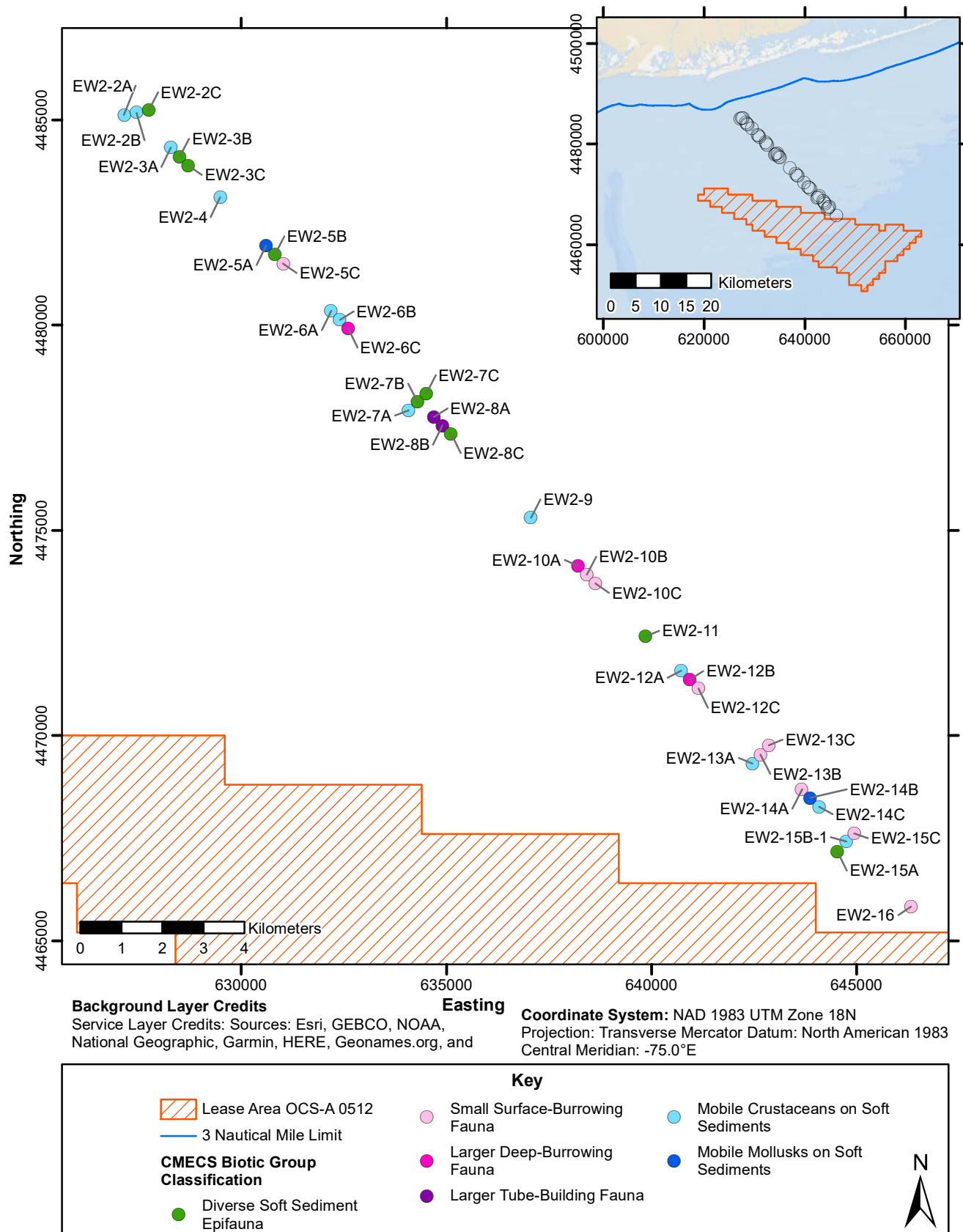
The majority of stations (n=12; 32%) were categorized at the biotic group level as 'Mobile Crustaceans on Soft Sediments'. Three of these stations (Station EW2-2A, EW2-2B and EW2-12A) were categorized to the Biotic Community 'Haustoriid Bed' due to the abundance of taxa within the Superfamily Haustorioidea. Furthermore, Station EW2-3A was categorized with the co-occurring element of 'Large Deep Burrowing Fauna' due to the abundance of larger polychaete species notably *Nephtys picta* while Station EW2-12A was categorized with the co-occurring element of 'Mobile Mollusks on Soft Sediments'. The biotic groups 'Diverse Soft Sediment Epifauna' and 'Small Surface-Burrowing Fauna' were also relatively common, accounting for 24% (n=9) of station classifications, respectively. Three stations classified within the 'Small Surface-Burrowing Fauna' (Stations EW2-10C, EW2-13B and EW2-15C) were categorized with the co-occurring element 'Mobile Crustaceans on Soft Sediments'.

Table 2.15 CMECS Biotic Classification from Macrofaunal Samples

Station	Biotic Setting	Biotic Class	Biotic Subclass	Biotic Group	CMECS Biotic Community	Co-Occurring Element
EW2-2A	Benthic/Attached Biota	Faunal Bed	Soft Sediment Fauna	Mobile Crustaceans on Soft Sediments	Haustoriid Bed	
EW2-2B	Benthic/Attached Biota	Faunal Bed	Soft Sediment Fauna	Mobile Crustaceans on Soft Sediments	Haustoriid Bed	
EW2-2C	Benthic/Attached Biota	Faunal Bed	Soft Sediment Fauna	Diverse Soft Sediment Epifauna		
EW2-3A	Benthic/Attached Biota	Faunal Bed	Soft Sediment Fauna	Mobile Crustaceans on Soft Sediments		Larger Deep Burrowing Fauna
EW2-3B	Benthic/Attached Biota	Faunal Bed	Soft Sediment Fauna	Diverse Soft Sediment Epifauna		
EW2-3C	Benthic/Attached Biota	Faunal Bed	Soft Sediment Fauna	Diverse Soft Sediment Epifauna		Larger Tube-Building Fauna
EW2-4	Benthic/Attached Biota	Faunal Bed	Soft Sediment Fauna	Mobile Crustaceans on Soft Sediments		
EW2-5A	Benthic/Attached Biota	Faunal Bed	Soft Sediment Fauna	Mobile Mollusks on Soft Sediments		Mobile Crustaceans on Soft Sediments
EW2-5B	Benthic/Attached Biota	Faunal Bed	Soft Sediment Fauna	Diverse Soft Sediment Epifauna		
EW2-5C	Benthic/Attached Biota	Faunal Bed	Soft Sediment Fauna	Small Surface-Burrowing fauna		
EW2-6A	Benthic/Attached Biota	Faunal Bed	Soft Sediment Fauna	Mobile Crustaceans on Soft Sediments		
EW2-6B	Benthic/Attached Biota	Faunal Bed	Soft Sediment Fauna	Mobile Crustaceans on Soft Sediments		
EW2-6C	Benthic/Attached Biota	Faunal Bed	Soft Sediment Fauna	Larger Deep-Burrowing Fauna		
EW2-7A	Benthic/Attached Biota	Faunal Bed	Soft Sediment Fauna	Mobile Crustaceans on Soft Sediments		
EW2-7B	Benthic/Attached Biota	Faunal Bed	Soft Sediment Fauna	Diverse Soft Sediment Epifauna		
EW2-7C	Benthic/Attached Biota	Faunal Bed	Soft Sediment Fauna	Diverse Soft Sediment Epifauna		Larger Deep Burrowing Fauna
EW2-8A	Benthic/Attached Biota	Faunal Bed	Soft Sediment Fauna	Larger Tube-Building Fauna		Small Surface-Burrowing Fauna
EW2-8B	Benthic/Attached Biota	Faunal Bed	Soft Sediment Fauna	Larger Tube-Building Fauna		Small Surface-Burrowing Fauna
EW2-8C	Benthic/Attached Biota	Faunal Bed	Soft Sediment Fauna	Diverse Soft Sediment Epifauna		

Station	Biotic Setting	Biotic Class	Biotic Subclass	Biotic Group	CMECS Biotic Community	Co-Occurring Element
EW2-9	Benthic/Attached Biota	Faunal Bed	Soft Sediment Fauna	Mobile Crustaceans on Soft Sediments		Mobile Crustaceans on Soft Sediments
EW2-10A	Benthic/Attached Biota	Faunal Bed	Soft Sediment Fauna	Larger Deep-Burrowing Fauna		
EW2-10B	Benthic/Attached Biota	Faunal Bed	Soft Sediment Fauna	Small Surface-Burrowing fauna		
EW2-10C	Benthic/Attached Biota	Faunal Bed	Soft Sediment Fauna	Small Surface-Burrowing fauna		
EW2-11	Benthic/Attached Biota	Faunal Bed	Soft Sediment Fauna	Diverse Soft Sediment Epifauna		
EW2-12A	Benthic/Attached Biota	Faunal Bed	Soft Sediment Fauna	Mobile Crustaceans on Soft Sediments	Haustoriid Bed	Mobile Mollusks on Soft Sediments
EW2-12B	Benthic/Attached Biota	Faunal Bed	Soft Sediment Fauna	Larger Deep-Burrowing Fauna		Larger Deep-Burrowing Fauna
EW2-12C	Benthic/Attached Biota	Faunal Bed	Soft Sediment Fauna	Small Surface-Burrowing fauna		
EW2-13A	Benthic/Attached Biota	Faunal Bed	Soft Sediment Fauna	Mobile Crustaceans on Soft Sediments		
EW2-13B	Benthic/Attached Biota	Faunal Bed	Soft Sediment Fauna	Small Surface-Burrowing Fauna		
EW2-13C	Benthic/Attached Biota	Faunal Bed	Soft Sediment Fauna	Small Surface-Burrowing Fauna		
EW2-14A	Benthic/Attached Biota	Faunal Bed	Soft Sediment Fauna	Small Surface-Burrowing Fauna		
EW2-14B	Benthic/Attached Biota	Faunal Bed	Soft Sediment Fauna	Mobile Mollusks on Soft Sediments		
EW2-14C	Benthic/Attached Biota	Faunal Bed	Soft Sediment Fauna	Mobile Crustaceans on Soft Sediments		
EW2-15A	Benthic/Attached Biota	Faunal Bed	Soft Sediment Fauna	Diverse Soft Sediment Epifauna		
EW2-15B-1	Benthic/Attached Biota	Faunal Bed	Soft Sediment Fauna	Mobile Crustaceans on Soft Sediments		
EW2-15C	Benthic/Attached Biota	Faunal Bed	Soft Sediment Fauna	Small Surface-Burrowing Fauna		
EW2-16	Benthic/Attached Biota	Faunal Bed	Soft Sediment Fauna	Small Surface-Burrowing Fauna		

Figure 2.17 Spatial Distribution of CMECS Biotic Group from Grab Samples



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APPENDICES

APPENDIX A FIELD SAMPLING LOGS



APPENDIX A FIELD SAMPLING LOGS

Gardline										Seafloor Sampling Positioning Summary												
Job No		11543							Vessel		MV Ocean Endeavour											
Client		Equinor US Wind LLC							Vessel Reference Point (VRP)		CoG											
Project Name		Empire Wind Extension							Deployment Location		Grab Deployment Point				x	6.7	y	21.94	z	2.93		
Primary Positioning System		Starpack 1							Actual Coordinates derived from		Deployment Location											
Geodetic Reference System		Datum			WGS 84 - NAD 83 (2018.0 ITRF 2014)			Ellipsoid	GRS 80		Projection				UTM ZONE 18 N (75 W)				Vertical / Tidal Datum		NAVD 88	
Date	Time	Fix number	Station Number	Penetration	Sample	Retention	Observed	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks					
Jan-12-21	04:59:51	1376	EQ20547 BW1-13			Camera	36	636690	4456903	636691	4456897	-1	6	6	167		(Corr'd Nav, Kongsberg 14208, img#182) (V) (T.A)					
Jan-12-21	05:01:26	1377	EQ20547 BW1-13			Camera	36	636691	4456901	636691	4456897	0	4	4	182		(Corr'd Nav, Kongsberg 14208, img#183) (V) (T.A)					
Jan-12-21	05:02:25	1378	EQ20547 BW1-13			Camera	36	636696	4456900	636691	4456897	5	3	5	242		(Corr'd Nav, Kongsberg 14208, img#184) (V) (T.A)					
Jan-12-21	05:02:33	1379	EQ20547 BW1-13			Camera	36	636696	4456900	636691	4456897	5	3	6	242		(Corr'd Nav, Kongsberg 14208, img#185) (V) (T.A)					
Jan-12-21	05:03:17	1380	EQ20547 BW1-13			Camera	36	636693	4456899	636691	4456897	2	2	3	230		(Corr'd Nav, Kongsberg 14208, img#186) (V) (T.A)					
Jan-12-21	05:03:37	1381	EQ20547 BW1-13			Camera	36	636691	4456897	636691	4456897	0	0	0	353		(Corr'd Nav, Kongsberg 14208, img#187) (V) (T.A)					
Jan-12-21	05:04:00	1382	EQ20547 BW1-13			Camera	36	636688	4456894	636691	4456897	-3	-3	4	49		(Corr'd Nav, Kongsberg 14208, img#188) (V) (T.A)					
Jan-12-21	05:04:10	1383	EQ20547 BW1-13			Camera	36	636686	4456895	636691	4456897	-5	-2	6	67		(Corr'd Nav, Kongsberg 14208, img#189) (V) (T.A)					
Jan-12-21	05:04:32	1384	EQ20547 BW1-13			Camera	36	636683	4456896	636691	4456897	-8	-1	8	80		(Corr'd Nav, Kongsberg 14208, img#190) (V) (T.A)					
Jan-12-21	05:04:48	1385	EQ20547 BW1-13			Camera	36	636682	4456896	636691	4456897	-9	-1	9	86		(Corr'd Nav, Kongsberg 14208, img#191) (V) (T.A)					
Jan-12-21	05:04:55	1386	EQ20547 BW1-13			Camera	36	636683	4456897	636691	4456897	-8	0	8	87		(Corr'd Nav, Kongsberg 14208, img#192) (V) (T.A)					
Jan-12-21	05:05:12	1387	EQ20547 BW1-13			Camera	36	636684	4456898	636691	4456897	-7	1	7	98		(Corr'd Nav, Kongsberg 14208, img#193) (V) (T.A)					
Jan-12-21	05:05:39	1388	EQ20547 BW1-13			Camera	36	636689	4456900	636691	4456897	-2	3	3	142		(Corr'd Nav, Kongsberg 14208, img#194) (V) (T.A)					
Jan-12-21	05:05:48	1389	EQ20547 BW1-13			Camera	36	636691	4456901	636691	4456897	0	4	4	182		(Corr'd Nav, Kongsberg 14208, img#195) (V) (T.A)					
Jan-12-21	05:06:07	1390	EQ20547 BW1-13			Camera	36	636695	4456901	636691	4456897	4	4	6	223		(Corr'd Nav, Kongsberg 14208, img#196) (V) (T.A)					
Jan-12-21	05:06:23	1391	EQ20547 BW1-13			Camera	36	636698	4456901	636691	4456897	7	4	8	242		(Corr'd Nav, Kongsberg 14208, img#197) (V) (T.A)					
Jan-12-21	05:35:44	1392	EQ20547 BW1-13			Camera	36	636699	4456902	636691	4456897	8	5	10	240		(Corr'd Nav, Kongsberg 14208, img#198) (V) (T.A)					
Jan-12-21	05:36:20	1393	EQ20547 BW1-13			Camera	36	636698	4456902	636691	4456897	7	5	8	231		(Corr'd Nav, Kongsberg 14208, img#199) (V) (T.A)					
Jan-12-21	05:37:54	1394	EQ20547 BW1-13			Camera	36	636695	4456897	636691	4456897	4	0	4	271		(Corr'd Nav, Kongsberg 14208, img#200) (V) (T.A)					
Jan-12-21	05:38:30	1395	EQ20547 BW1-13			Camera	36	636689	4456895	636691	4456897	-2	-2	3	46		(Corr'd Nav, Kongsberg 14208, img#201) (V) (T.A)					
Jan-12-21	05:39:10	1396	EQ20547 BW1-13			Camera	36	636679	4456897	636691	4456897	-12	0	12	88		(Corr'd Nav, Kongsberg 14208, img#202) (V) (T.A)					
Jan-12-21	05:39:34	1397	EQ20547 BW1-13			Camera	36	636674	4456898	636691	4456897	-17	1	17	92		(Corr'd Nav, Kongsberg 14208, img#203) (V) (T.A)					
Jan-12-21	05:40:17	1398	EQ20547 BW1-13			Camera	36	636665	4456899	636691	4456897	-26	2	26	94		(Corr'd Nav, Kongsberg 14208, img#204) (V) (T.A)					
Jan-12-21	05:40:46	1399	EQ20547 BW1-13			Camera	36	636661	4456900	636691	4456897	-31	3	31	95		(Corr'd Nav, Kongsberg 14208, img#205) (V) (T.A)					
Jan-12-21	05:43:28	1400	EQ20547 BW1-13			Camera	36	636635	4456900	636691	4456897	-56	3	56	93		(Corr'd Nav, Kongsberg 14208, img#206) (V) (T.A)					
Jan-12-21	05:44:40	1401	EQ20547 BW1-13			Camera	36	636615	4456901	636691	4456897	-76	4	76	93		(Corr'd Nav, Kongsberg 14208, img#207) (V) (T.A)					
Jan-12-21	05:45:23	1402	EQ20547 BW1-13			Camera	36	636601	4456902	636691	4456897	-90	5	90	93		(Corr'd Nav, Kongsberg 14208, img#208) (V) (T.A)					
Jan-12-21	05:47:42	1403	EQ20547 BW1-13			Camera	36	636556	4456910	636691	4456897	-135	13	136	95		(Corr'd Nav, Kongsberg 14208, img#209) (V) (T.A)					
Jan-12-21	05:48:12	1404	EQ20547 BW1-13			Camera	36	636550	4456907	636691	4456897	-141	10	141	94		(Corr'd Nav, Kongsberg 14208, img#210) (V) (T.A)					
Jan-12-21	05:49:14	1405	EQ20547 BW1-13			Camera	36	636542	4456905	636691	4456897	-149	8	149	93		(Corr'd Nav, Kongsberg 14208, img#211) (V) (T.A)					
Jan-12-21	05:50:46	1406	EQ20547 BW1-13			Camera	36	636533	4456909	636691	4456897	-158	12	158	94		(Corr'd Nav, Kongsberg 14208, img#212) (V) (T.A)					
Jan-12-21	05:52:22	1407	EQ20547 BW1-13			Camera	36	636521	4456906	636691	4456897	-170	9	170	93		(Corr'd Nav, Kongsberg 14208, img#213) (V) (T.A)					
Jan-12-21	05:52:59	1408	EQ20547 BW1-13			Camera	36	636515	4456907	636691	4456897	-176	10	176	93		(Corr'd Nav, Kongsberg 14208, img#214) (V) (T.A)					
Jan-12-21	05:53:45	1409	EQ20547 BW1-13			Camera	36	636510	4456905	636691	4456897	-181	8	182	93		(Corr'd Nav, Kongsberg 14208, img#215) (V) (T.A)					
Jan-12-21	05:55:01	1410	EQ20547 BW1-13			Camera	36	636496	4456913	636691	4456897	-195	16	195	95		(Corr'd Nav, Kongsberg 14208, img#216) (V) (T.A)					
Jan-12-21	05:56:33	1411	EQ20547 BW1-13			Camera	36	636486	4456908	636691	4456897	-205	11	206	93		(Corr'd Nav, Kongsberg 14208, img#217) (V) (T.A)					
Jan-12-21	05:56:51	1412	EQ20547 BW1-13			Camera	36	636484	4456908	636691	4456897	-207	11	207	93		(Corr'd Nav, Kongsberg 14208, img#218) (V) (T.A)					
Jan-12-21	05:57:57	1413	EQ20547 BW1-13			Camera	36	636477	4456909	636691	4456897	-214	12	214	93		(Corr'd Nav, Kongsberg 14208, img#219) (V) (T.A)					
Jan-12-21	06:00:40	1414	EQ20547 BW1-13			Camera	36	636454	4456911	636691	4456897	-237	14	238	93		(Corr'd Nav, Kongsberg 14208, img#220) (V) (T.A)					
Jan-12-21	06:02:40	1415	EQ20547 BW1-13			Camera	36	636441	4456911	636691	4456897	-250	14	250	93		(Corr'd Nav, Kongsberg 14208, img#221) (V) (T.A)					
Jan-12-21	06:02:45	1416	EQ20547 BW1-13			Camera	36	636441	4456911	636691	4456897	-250	14	251	93		(Corr'd Nav, Kongsberg 14208, img#222) (V) (T.A)					
Jan-12-21	06:03:27	1417	EQ20547 BW1-13			Camera	36	636436	4456911	636691	4456897	-255	14	255	93		(Corr'd Nav, Kongsberg 14208, img#223) (V) (T.A)					
Jan-12-21	06:04:05	1418	EQ20547 BW1-13			Camera	36	636433	4456910	636691	4456897	-258	13	258	93		(Corr'd Nav, Kongsberg 14208, img#224) (V) (T.A)					
Jan-12-21	06:05:55	1419	EQ20547 BW1-13			Camera	36	636417	4456915	636691	4456897	-274	18	275	94		(Corr'd Nav, Kongsberg 14208, img#225) (V) (T.A)					
Jan-12-21	06:07:08	1420	EQ20547 BW1-13			Camera	36	636408	4456916	636691	4456897	-283	19	284	94		(Corr'd Nav, Kongsberg 14208, img#226) (V) (T.A)					
Jan-12-21	06:07:54	1421	EQ20547 BW1-13			Camera	36	636404	4456914	636691	4456897	-287	17	287	93		(Corr'd Nav, Kongsberg 14208, img#227) (V) (T.A)					
Jan-12-21	06:08:01	1422	EQ20547 BW1-13			Camera	36	636404	4456913	636691	4456897	-287	16	288	93		(Corr'd Nav, Kongsberg 14208, img#228) (V) (T.A)					
Jan-12-21	06:08:59	1423	EQ20547 BW1-13			Camera	36	636397	4456913	636691	4456897	-294	16	294	93		(Corr'd Nav, Kongsberg 14208, img#229) (V) (T.A)					
Jan-12-21	06:09:54	1424	EQ20547 BW1-13			Camera	36	636394	4456915	636691	4456897	-297	18	297	93		(Corr'd Nav, Kongsberg 14208, img#230) (V) (T.A)					
Jan-12-21	06:10:30	1425	EQ20547 BW1-13			Camera	36	636394	4456916	636691	4456897	-297	19	298	94		(Corr'd Nav, Kongsberg 14208, img#231) (V) (T.A)					
Jan-12-21	06:11:09	1426	EQ20547 BW1-13			Camera	36	636393	4456921	636691	4456897	-298	24	299	95		(Corr'd Nav, Kongsberg 14208, img#232) (V) (T.A)					
Jan-12-21	06:11:43	1427	EQ20547 BW1-13			Camera	36	636397	4456924	636691	4456897	-294	27	296	95		(Corr'd Nav, Kongsberg 14208, img#233) (V) (T.A)					
Jan-12-21	06:12:12	1428	EQ20547 BW1-13			Camera	36	636399	4456923	636691	4456897	-292	26	293	95		(Corr'd Nav, Kongsberg 14208, img#234) (V) (T.A)					
Jan-12-21	06:12:36	1429	EQ20547 BW1-13			Camera	36	636398	4456919	636691	445689											



APPENDIX A FIELD SAMPLING LOGS

Gardline										Seafloor Sampling Positioning Summary											
Job No		11543							Vessel		MV <i>Ocean Endeavour</i>										
Client		Equinor US Wind LLC							Vessel Reference Point (VRP)		CoG										
Project Name		Empire Wind Extension							Deployment Location		Grab Deployment Point					x	6.7	y	21.94	z	2.93
Primary Positioning System		Starpack 1							Actual Coordinates derived from		Deployment Location										
Geodetic Reference System		Datum			WGS 84 - NAD 83 (2018.0 ITRF 2014)			Ellipsoid	GRS 80		Projection		UTM ZONE 18 N (75 W)					Vertical / Tidal Datum		NAVD 88	
Date	Time	Fix number	Station Number	Penetration	Sample	Retention	Observed	Actual coordinates		Target coordinates		Offset from target			Surveyor	Remarks					
Jan-12-21	06:25:12	1439	EQ20547 BW1-13			Camera	36	636362	4456918	636691	4456897	-329	21	330	94		(Corr'd Nav, Kongsberg 14208, img#245) (V) (T.A)				
Jan-12-21	06:26:48	1440	EQ20547 BW1-13			Camera	36	636349	4456917	636691	4456897	-342	20	343	93		(Corr'd Nav, Kongsberg 14208, img#246) (V) (T.A)				
Jan-12-21	06:28:00	1441	EQ20547 BW1-13			Camera	36	636338	4456921	636691	4456897	-353	24	354	94		(Corr'd Nav, Kongsberg 14208, img#247) (V) (T.A)				
Jan-12-21	06:28:15	1442	EQ20547 BW1-13			Camera	36	636337	4456921	636691	4456897	-354	24	355	94		(Corr'd Nav, Kongsberg 14208, img#248) (V) (T.A)				
Jan-12-21	06:29:03	1443	EQ20547 BW1-13			Camera	36	636336	4456921	636691	4456897	-355	24	356	94		(Corr'd Nav, Kongsberg 14208, img#249) (V) (T.A)				
Jan-12-21	06:29:47	1444	EQ20547 BW1-13			Camera	36	636335	4456920	636691	4456897	-356	23	357	94		(Corr'd Nav, Kongsberg 14208, img#250) (V) (T.A)				
Jan-12-21	06:30:39	1445	EQ20547 BW1-13			Camera	36	636333	4456919	636691	4456897	-358	22	359	93		(Corr'd Nav, Kongsberg 14208, img#251) (V) (T.A)				
Jan-12-21	06:33:20	1446	EQ20547 BW1-13			Camera	36	636320	4456917	636691	4456897	-371	20	372	93		(Corr'd Nav, Kongsberg 14208, img#252) (V) (T.A)				
Jan-12-21	06:34:27	1447	EQ20547 BW1-13			Camera	36	636311	4456913	636691	4456897	-380	16	380	92		(Corr'd Nav, Kongsberg 14208, img#253) (V) (T.A)				
Jan-12-21	06:36:21	1448	EQ20547 BW1-13			Camera	36	636282	4456923	636691	4456897	-409	26	409	94		(Corr'd Nav, Kongsberg 14208, img#254) (V) (T.A)				
Jan-12-21	06:37:25	1449	EQ20547 BW1-13			Camera	36	636273	4456928	636691	4456897	-418	31	419	94		(Corr'd Nav, Kongsberg 14208, img#255) (V) (T.A)				
Jan-12-21	06:37:33	1450	EQ20547 BW1-13			Camera	36	636273	4456929	636691	4456897	-418	32	419	94		(Corr'd Nav, Kongsberg 14208, img#256) (V) (T.A)				
Jan-12-21	06:39:50	1451	EQ20547 BW1-13			Camera	36	636264	4456927	636691	4456897	-427	30	428	94		(Corr'd Nav, Kongsberg 14208, img#257) (V) (T.A)				
Jan-12-21	06:40:53	1452	EQ20547 BW1-13			Camera	36	636252	4456924	636691	4456897	-439	27	440	93		(Corr'd Nav, Kongsberg 14208, img#258) (V) (T.A)				
Jan-12-21	06:41:32	1453	EQ20547 BW1-13			Camera	36	636243	4456923	636691	4456897	-448	26	449	93		(Corr'd Nav, Kongsberg 14208, img#259) (V) (T.A)				
Jan-12-21	06:43:18	1454	EQ20547 BW1-13			Camera	36	636227	4456924	636691	4456897	-464	27	465	93		(Corr'd Nav, Kongsberg 14208, img#260) (V) (T.A)				
Jan-12-21	06:44:35	1455	EQ20547 BW1-13			Camera	36	636224	4456922	636691	4456897	-467	25	468	93		(Corr'd Nav, Kongsberg 14208, img#261) (V) (T.A)				
Jan-12-21	06:44:53	1456	EQ20547 BW1-13			Camera	36	636221	4456922	636691	4456897	-470	25	470	93		(Corr'd Nav, Kongsberg 14208, img#262) (V) (T.A)				
Jan-12-21	06:45:31	1457	EQ20547 BW1-13			Camera	36	636213	4456926	636691	4456897	-478	29	479	93		(Corr'd Nav, Kongsberg 14208, img#263) (V) (T.A)				
Jan-12-21	06:46:39	1458	EQ20547 BW1-13			Camera	36	636200	4456932	636691	4456897	-491	35	492	94		(Corr'd Nav, Kongsberg 14208, img#264) (V) (T.A)				
Jan-12-21	06:47:46	1459	EQ20547 BW1-13			Camera	36	636183	4456932	636691	4456897	-508	36	509	94		(Corr'd Nav, Kongsberg 14208, img#265) (V) (T.A)				
Jan-12-21	06:48:26	1460	EQ20547 BW1-13			Camera	36	636175	4456928	636691	4456897	-516	31	517	93		(Corr'd Nav, Kongsberg 14208, img#266) (V) (T.A)				
Jan-12-21	06:49:07	1461	EQ20547 BW1-13			Camera	36	636166	4456928	636691	4456897	-525	31	525	93		(Corr'd Nav, Kongsberg 14208, img#267) (V) (T.A)				
Jan-12-21	06:52:15	1462	EQ20547 BW1-13			Camera	36	636149	4456930	636691	4456897	-542	33	543	93		(Corr'd Nav, Kongsberg 14208, img#268) (V) (T.A)				
Jan-12-21	06:53:04	1463	EQ20547 BW1-13			Camera	36	636139	4456927	636691	4456897	-552	30	553	93		(Corr'd Nav, Kongsberg 14208, img#269) (V) (T.A)				
Jan-12-21	06:53:26	1464	EQ20547 BW1-13			Camera	36	636135	4456928	636691	4456897	-556	31	557	93		(Corr'd Nav, Kongsberg 14208, img#270) (V) (T.A)				
Jan-12-21	06:54:41	1465	EQ20547 BW1-13			Camera	36	636124	4456936	636691	4456897	-567	39	569	94		(Corr'd Nav, Kongsberg 14208, img#271) (V) (T.A)				
Jan-12-21	06:56:34	1466	EQ20547 BW1-13			Camera	36	636113	4456927	636691	4456897	-578	30	579	93		(Corr'd Nav, Kongsberg 14208, img#272) (V) (T.A)				
Jan-12-21	06:57:35	1467	EQ20547 BW1-13			Camera	36	636102	4456927	636691	4456897	-589	30	590	93		(Corr'd Nav, Kongsberg 14208, img#273) (V) (T.A)				
Jan-12-21	06:57:57	1468	EQ20547 BW1-13			Camera	36	636096	4456930	636691	4456897	-595	33	596	93		(Corr'd Nav, Kongsberg 14208, img#274) (V) (T.A)				
Jan-12-21	06:58:32	1469	EQ20547 BW1-13			Camera	36	636088	4456939	636691	4456897	-603	42	604	94		(Corr'd Nav, Kongsberg 14208, img#275) (V) (T.A)				
Jan-12-21	07:01:50	1470	EQ20547 BW1-13			Camera	36	636109	4456946	636691	4456897	-582	49	584	95		(Corr'd Nav, Kongsberg 14208, img#276) (V) (T.A)				
Jan-12-21	07:04:54	1471	EQ20547 BW1-13			Camera	36	636101	4456932	636691	4456897	-590	35	591	93		(Corr'd Nav, Kongsberg 14208, img#277) (V) (T.A)				
Jan-12-21	07:05:03	1472	EQ20547 BW1-13			Camera	36	636100	4456931	636691	4456897	-591	34	592	93		(Corr'd Nav, Kongsberg 14208, img#278) (V) (T.A)				
Jan-12-21	07:05:24	1473	EQ20547 BW1-13			Camera	36	636099	4456930	636691	4456897	-592	33	593	93		(Corr'd Nav, Kongsberg 14208, img#279) (V) (T.A)				
Jan-12-21	07:05:46	1474	EQ20547 BW1-13			Camera	36	636096	4456928	636691	4456897	-595	31	596	93		(Corr'd Nav, Kongsberg 14208, img#280) (V) (T.A)				
Jan-12-21	07:06:36	1475	EQ20547 BW1-13			Camera	36	636087	4456929	636691	4456897	-604	32	604	93		(Corr'd Nav, Kongsberg 14208, img#281) (V) (T.A)				
Jan-12-21	07:07:37	1476	EQ20547 BW1-13			Camera	36	636085	4456935	636691	4456897	-606	38	607	94		(Corr'd Nav, Kongsberg 14208, img#282) (V) (T.A)				
Jan-12-21	07:07:58	1477	EQ20547 BW1-13			Camera	36	636085	4456936	636691	4456897	-606	39	607	94		(Corr'd Nav, Kongsberg 14208, img#283) (V) (T.A)				
Jan-12-21	07:08:31	1478	EQ20547 BW1-13			Camera	36	636087	4456941	636691	4456897	-604	44	605	94		(Corr'd Nav, Kongsberg 14208, img#284) (V) (T.A)				
Jan-12-21	07:08:42	1479	EQ20547 BW1-13			Camera	36	636089	4456942	636691	4456897	-602	45	604	94		(Corr'd Nav, Kongsberg 14208, img#285) (V) (T.A)				
Jan-12-21	07:09:22	1480	EQ20547 BW1-13			Camera	36	636097	4456942	636691	4456897	-594	45	596	94		(Corr'd Nav, Kongsberg 14208, img#286) (V) (T.A)				
Jan-12-21	07:09:33	1481	EQ20547 BW1-13			Camera	36	636099	4456941	636691	4456897	-592	44	594	94		(Corr'd Nav, Kongsberg 14208, img#287) (V) (T.A)				
Jan-12-21	07:49:30	1482	EQ20547 BW1-12			Camera	38	634778	4456781	634760	4456783	18	-2	18	276		(Corr'd Nav, Kongsberg 14208, img#288) (V) (T.A)				
Jan-12-21	07:50:30	1483	EQ20547 BW1-12			Camera	37	634773	4456777	634760	4456783	13	-6	14	295		(Corr'd Nav, Kongsberg 14208, img#289) (V) (T.A)				
Jan-12-21	07:51:41	1484	EQ20547 BW1-12			Camera	37	634769	4456781	634760	4456783	9	-2	9	283		(Corr'd Nav, Kongsberg 14208, img#290) (V) (T.A)				
Jan-12-21	07:52:09	1485	EQ20547 BW1-12			Camera	37	634768	4456782	634760	4456783	8	-1	8	279		(Corr'd Nav, Kongsberg				



APPENDIX A FIELD SAMPLING LOGS

Gardline										Seafloor Sampling Positioning Summary										
Job No		11543							Vessel		MV Ocean Endeavour									
Client		Equinor US Wind LLC							Vessel Reference Point (VRP)		CoG									
Project Name		Empire Wind Extension							Deployment Location		Grab Deployment Point				x	6.7	y	21.94	z	2.93
Primary Positioning System		Starpack 1							Actual Coordinates derived from		Deployment Location									
Geodetic Reference System		Datum			WGS 84 - NAD 83 (2018.0 ITRF 2014)			Ellipsoid	GRS 80	Projection		UTM ZONE 18 N (75 W)				Vertical / Tidal Datum		NAVD 88		
Date	Time	Fix number	Station Number	Penetration	Sample	Retention	Observed	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks			
Jan-12-21	08:01:06	1502	EQ20547 BW1-12			Camera	38	634722	4456771	634760	4456783	-38	-12	39	72		(Corr'd Nav, Kongsberg 14208, img#308) (V) (T.A)			
Jan-12-21	08:01:32	1503	EQ20547 BW1-12			Camera	38	634719	4456766	634760	4456783	-41	-17	44	68		(Corr'd Nav, Kongsberg 14208, img#309) (V) (T.A)			
Jan-12-21	08:01:48	1504	EQ20547 BW1-12			Camera	37	634717	4456764	634760	4456783	-43	-19	47	66		(Corr'd Nav, Kongsberg 14208, img#310) (V) (T.A)			
Jan-12-21	08:02:14	1505	EQ20547 BW1-12			Camera	37	634715	4456761	634760	4456783	-45	-22	50	64		(Corr'd Nav, Kongsberg 14208, img#311) (V) (T.A)			
Jan-12-21	08:02:39	1506	EQ20547 BW1-12			Camera	37	634710	4456761	634760	4456783	-50	-22	55	67		(Corr'd Nav, Kongsberg 14208, img#312) (V) (T.A)			
Jan-12-21	08:03:34	1507	EQ20547 BW1-12			Camera	37	634698	4456761	634760	4456783	-62	-22	66	70		(Corr'd Nav, Kongsberg 14208, img#313) (V) (T.A)			
Jan-12-21	08:04:24	1508	EQ20547 BW1-12			Camera	37	634690	4456756	634760	4456783	-70	-27	75	69		(Corr'd Nav, Kongsberg 14208, img#314) (V) (T.A)			
Jan-12-21	08:05:02	1509	EQ20547 BW1-12			Camera	37	634685	4456750	634760	4456783	-75	-33	82	67		(Corr'd Nav, Kongsberg 14208, img#315) (V) (T.A)			
Jan-12-21	08:06:16	1510	EQ20547 BW1-12			Camera	37	634674	4456744	634760	4456783	-86	-39	95	66		(Corr'd Nav, Kongsberg 14208, img#316) (V) (T.A)			
Jan-12-21	08:06:51	1511	EQ20547 BW1-12			Camera	37	634669	4456745	634760	4456783	-91	-38	99	67		(Corr'd Nav, Kongsberg 14208, img#317) (V) (T.A)			
Jan-12-21	08:07:51	1512	EQ20547 BW1-12			Camera	37	634661	4456743	634760	4456783	-99	-40	107	68		(Corr'd Nav, Kongsberg 14208, img#318) (V) (T.A)			
Jan-12-21	08:08:44	1513	EQ20547 BW1-12			Camera	37	634653	4456737	634760	4456783	-107	-46	116	67		(Corr'd Nav, Kongsberg 14208, img#319) (V) (T.A)			
Jan-12-21	08:10:33	1514	EQ20547 BW1-12			Camera	37	634632	4456728	634760	4456783	-128	-55	139	67		(Corr'd Nav, Kongsberg 14208, img#320) (V) (T.A)			
Jan-12-21	08:11:07	1515	EQ20547 BW1-12			Camera	37	634627	4456726	634760	4456783	-133	-57	144	67		(Corr'd Nav, Kongsberg 14208, img#321) (V) (T.A)			
Jan-12-21	08:12:01	1516	EQ20547 BW1-12			Camera	37	634618	4456723	634760	4456783	-142	-60	154	67		(Corr'd Nav, Kongsberg 14208, img#322) (V) (T.A)			
Jan-12-21	08:12:42	1517	EQ20547 BW1-12			Camera	37	634611	4456722	634760	4456783	-149	-61	161	68		(Corr'd Nav, Kongsberg 14208, img#323) (V) (T.A)			
Jan-12-21	08:13:32	1518	EQ20547 BW1-12			Camera	37	634606	4456719	634760	4456783	-154	-64	167	67		(Corr'd Nav, Kongsberg 14208, img#324) (V) (T.A)			
Jan-12-21	08:13:57	1519	EQ20547 BW1-12			Camera	37	634604	4456716	634760	4456783	-156	-67	169	67		(Corr'd Nav, Kongsberg 14208, img#325) (V) (T.A)			
Jan-12-21	08:15:26	1520	EQ20547 BW1-12			Camera	37	634595	4456711	634760	4456783	-165	-72	180	66		(Corr'd Nav, Kongsberg 14208, img#326) (V) (T.A)			
Jan-12-21	08:16:35	1521	EQ20547 BW1-12			Camera	37	634583	4456705	634760	4456783	-177	-78	193	66		(Corr'd Nav, Kongsberg 14208, img#327) (V) (T.A)			
Jan-12-21	08:18:02	1522	EQ20547 BW1-12			Camera	37	634562	4456700	634760	4456783	-198	-83	214	67		(Corr'd Nav, Kongsberg 14208, img#328) (V) (T.A)			
Jan-12-21	08:19:34	1523	EQ20547 BW1-12			Camera	37	634547	4456695	634760	4456783	-213	-88	231	67		(Corr'd Nav, Kongsberg 14208, img#329) (V) (T.A)			
Jan-12-21	08:22:14	1524	EQ20547 BW1-12			Camera	36	634513	4456682	634760	4456783	-247	-101	267	68		(Corr'd Nav, Kongsberg 14208, img#330) (V) (T.A)			
Jan-12-21	08:23:34	1525	EQ20547 BW1-12			Camera	36	634500	4456680	634760	4456783	-260	-103	280	68		(Corr'd Nav, Kongsberg 14208, img#331) (V) (T.A)			
Jan-12-21	08:24:35	1526	EQ20547 BW1-12			Camera	36	634489	4456675	634760	4456783	-271	-108	292	68		(Corr'd Nav, Kongsberg 14208, img#332) (V) (T.A)			
Jan-12-21	08:26:20	1527	EQ20547 BW1-12			Camera	36	634479	4456672	634760	4456783	-281	-111	302	68		(Corr'd Nav, Kongsberg 14208, img#333) (V) (T.A)			
Jan-12-21	08:27:32	1528	EQ20547 BW1-12			Camera	36	634491	4456666	634760	4456783	-269	-117	294	66		(Corr'd Nav, Kongsberg 14208, img#334) (V) (T.A)			
Jan-12-21	08:28:00	1529	EQ20547 BW1-12			Camera	36	634491	4456666	634760	4456783	-269	-117	293	67		(Corr'd Nav, Kongsberg 14208, img#335) (V) (T.A)			
Jan-12-21	08:28:58	1530	EQ20547 BW1-12			Camera	36	634487	4456673	634760	4456783	-273	-110	295	68		(Corr'd Nav, Kongsberg 14208, img#336) (V) (T.A)			
Jan-12-21	08:29:15	1531	EQ20547 BW1-12			Camera	36	634486	4456674	634760	4456783	-274	-109	295	68		(Corr'd Nav, Kongsberg 14208, img#337) (V) (T.A)			
Jan-12-21	08:30:28	1532	EQ20547 BW1-12			Camera	36	634474	4456671	634760	4456783	-286	-112	307	69		(Corr'd Nav, Kongsberg 14208, img#338) (V) (T.A)			
Jan-12-21	08:30:44	1533	EQ20547 BW1-12			Camera	36	634474	4456670	634760	4456783	-286	-113	308	68		(Corr'd Nav, Kongsberg 14208, img#339) (V) (T.A)			
Jan-12-21	08:31:21	1534	EQ20547 BW1-12			Camera	36	634479	4456665	634760	4456783	-281	-118	304	67		(Corr'd Nav, Kongsberg 14208, img#340) (V) (T.A)			
Jan-12-21	08:31:54	1535	EQ20547 BW1-12			Camera	36	634485	4456665	634760	4456783	-275	-118	299	67		(Corr'd Nav, Kongsberg 14208, img#341) (V) (T.A)			
Jan-12-21	08:32:30	1536	EQ20547 BW1-12			Camera	36	634485	4456669	634760	4456783	-275	-114	298	68		(Corr'd Nav, Kongsberg 14208, img#342) (V) (T.A)			
Jan-12-21	08:33:19	1537	EQ20547 BW1-12			Camera	36	634477	4456663	634760	4456783	-283	-120	307	67		(Corr'd Nav, Kongsberg 14208, img#343) (V) (T.A)			
Jan-12-21	08:34:45	1538	EQ20547 BW1-12			Camera	37	634446	4456632	634760	4456783	-314	-151	348	64		(Corr'd Nav, Kongsberg 14208, img#344) (V) (T.A)			
Jan-12-21	08:40:07	1539	EQ20547 BW1-12			Camera	36	634460	4456650	634760	4456783	-300	-133	328	66		(Corr'd Nav, Kongsberg 14208, img#345) (V) (T.A)			
Jan-12-21	08:40:44	1540	EQ20547 BW1-12			Camera	36	634469	4456654	634760	4456783	-291	-129	319	66		(Corr'd Nav, Kongsberg 14208, img#346) (V) (T.A)			
Jan-12-21	08:41:29	1541	EQ20547 BW1-12			Camera	36	634474	4456657	634760	4456783	-286	-126	312	66		(Corr'd Nav, Kongsberg 14208, img#347) (V) (T.A)			
Jan-12-21	08:42:55	1542	EQ20547 BW1-12			Camera	36	634471	4456659	634760	4456783	-289	-124	315	67		(Corr'd Nav, Kongsberg 14208, img#348) (V) (T.A)			
Jan-12-21	08:43:31	1543	EQ20547 BW1-12			Camera	36	634470	4456658	634760	4456783	-290	-125	316	67		(Corr'd Nav, Kongsberg 14208, img#349) (V) (T.A)			
Jan-12-21	08:45:29	1544	EQ20547 BW1-12			Camera	37	634452	4456652	634760	4456783	-308	-131	335	67		(Corr'd Nav, Kongsberg 14208, img#350) (V) (T.A)			
Jan-12-21	08:46:30	1545	EQ20547 BW1-12			Camera	37	634442	4456651	634760	4456783	-318	-132	345	68		(Corr'd Nav, Kongsberg 14208, img#351) (V) (T.A)			
Jan-12-21	08:48:00	1546	EQ20547 BW1-12			Camera	36	634431	4456646	634760	4456783	-329	-137	356	67		(Corr'd Nav, Kongsberg 14208, img#352) (V) (T.A)			
Jan-12-21	08:48:44	1547	EQ20547 BW1-12			Camera	36	634426	4456645	634760	4456783	-334	-138	361	68		(Corr'd Nav, Kongsberg 14208, img#353) (V) (T.A)			
Jan-12-21	08:49:47	1548	EQ20547 BW1-12			Camera	36	634417	4456640	634760	4456783	-343	-143	371	67		(Corr'd Nav, Kongsberg 14208, img#354) (V) (T.A)			
Jan-12-21	08:51:46	1549	EQ20547 BW1-12			Camera	36	634396	4456633	634760	4456783	-364	-150	394	68		(Corr'd Nav, Kongsberg 14208, img#355) (V) (T.A)			
Jan-12-21	08:53:12	1550	EQ20547 BW1-12			Camera	36	634386	4456627	634760	4456783	-374	-156	406	67		(Corr'd Nav, Kongsberg 14208, img#356) (V) (T.A)			
Jan-12-21	08:54:17	1551	EQ20547 BW1-12			Camera	36	634376	4456622	634760	4456783	-384	-161	416	67		(Corr'd Nav, Kongsberg 14208, img#357) (V) (T.A)			
Jan-12-21	08:55:15	1552	EQ20547 BW1-12			Camera	36	634367	4456620	634760	4456783	-393	-163	425	67		(Corr'd Nav, Kongsberg 14208, img#358) (V) (T.A)			
Jan-12-21	08:55:44	1553	EQ20547 BW1-12			Camera	36	634364	4456620	634760	4456783	-396	-163	428	68		(Corr'd Nav, Kongsberg 14208, img#359) (V) (T.A)			
Jan-12-21	08:56:01	1554	EQ20547 BW1-12			Camera	36	634363	4456619	634760	4456783	-397	-164	429	68		(Cor'd			



APPENDIX A FIELD SAMPLING LOGS

Gardline										Seafloor Sampling Positioning Summary										
Job No		11543							Vessel		MV <i>Ocean Endeavour</i>									
Client		Equinor US Wind LLC							Vessel Reference Point (VRP)		CoG									
Project Name		Empire Wind Extension							Deployment Location		Grab Deployment Point				x	6.7	y	21.94	z	2.93
Primary Positioning System		Starpack 1							Actual Coordinates derived from		Deployment Location									
Geodetic Reference System		Datum			WGS 84 - NAD 83 (2018.0 ITRF 2014)			Ellipsoid	GRS 80		Projection		UTM ZONE 18 N (75 W)				Vertical / Tidal Datum		NAVD 88	
Date	Time	Fix number	Station Number	Penetration	Sample	Retention	Observed	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks			
Jan-12-21	09:07:40	1565	EQ20547 BW1-12			Camera	36	634259	4456572	634760	4456783	-501	-211	544	67		(Corr'd Nav, Kongsberg 14208, img#371) (V) (T.A)			
Jan-12-21	09:08:52	1566	EQ20547 BW1-12			Camera	36	634250	4456566	634760	4456783	-510	-217	555	67		(Corr'd Nav, Kongsberg 14208, img#372) (V) (T.A)			
Jan-12-21	09:10:53	1567	EQ20547 BW1-12			Camera	36	634236	4456561	634760	4456783	-524	-222	568	67		(Corr'd Nav, Kongsberg 14208, img#373) (V) (T.A)			
Jan-12-21	09:11:44	1568	EQ20547 BW1-12			Camera	36	634231	4456557	634760	4456783	-529	-226	575	67		(Corr'd Nav, Kongsberg 14208, img#374) (V) (T.A)			
Jan-12-21	09:12:11	1569	EQ20547 BW1-12			Camera	36	634227	4456556	634760	4456783	-533	-227	579	67		(Corr'd Nav, Kongsberg 14208, img#375) (V) (T.A)			
Jan-12-21	09:13:08	1570	EQ20547 BW1-12			Camera	36	634219	4456553	634760	4456783	-541	-230	588	67		(Corr'd Nav, Kongsberg 14208, img#376) (V) (T.A)			
Jan-12-21	09:14:02	1571	EQ20547 BW1-12			Camera	36	634213	4456552	634760	4456783	-547	-231	594	67		(Corr'd Nav, Kongsberg 14208, img#377) (V) (T.A)			
Jan-12-21	09:14:34	1572	EQ20547 BW1-12			Camera	36	634211	4456554	634760	4456783	-549	-229	594	67		(Corr'd Nav, Kongsberg 14208, img#378) (V) (T.A)			
Jan-12-21	09:15:13	1573	EQ20547 BW1-12			Camera	36	634211	4456558	634760	4456783	-549	-225	594	68		(Corr'd Nav, Kongsberg 14208, img#379) (V) (T.A)			
Jan-12-21	09:15:30	1574	EQ20547 BW1-12			Camera	36	634210	4456559	634760	4456783	-550	-224	594	68		(Corr'd Nav, Kongsberg 14208, img#380) (V) (T.A)			
Jan-12-21	09:16:23	1575	EQ20547 BW1-12			Camera	36	634207	4456558	634760	4456783	-553	-225	597	68		(Corr'd Nav, Kongsberg 14208, img#381) (V) (T.A)			
Jan-12-21	09:17:06	1576	EQ20547 BW1-12			Camera	36	634202	4456556	634760	4456783	-558	-227	602	68		(Corr'd Nav, Kongsberg 14208, img#382) (V) (T.A)			
Jan-12-21	09:17:46	1577	EQ20547 BW1-12			Camera	36	634201	4456552	634760	4456783	-559	-231	605	68		(Corr'd Nav, Kongsberg 14208, img#383) (V) (T.A)			
Jan-12-21	09:18:23	1578	EQ20547 BW1-12			Camera	36	634205	4456548	634760	4456783	-555	-235	603	67		(Corr'd Nav, Kongsberg 14208, img#384) (V) (T.A)			
Jan-12-21	09:19:04	1579	EQ20547 BW1-12			Camera	36	634209	4456546	634760	4456783	-551	-237	600	67		(Corr'd Nav, Kongsberg 14208, img#385) (V) (T.A)			
Jan-12-21	09:19:32	1580	EQ20547 BW1-12			Camera	36	634211	4456547	634760	4456783	-549	-236	598	67		(Corr'd Nav, Kongsberg 14208, img#386) (V) (T.A)			
Jan-12-21	09:20:04	1581	EQ20547 BW1-12			Camera	36	634212	4456550	634760	4456783	-548	-233	596	67		(Corr'd Nav, Kongsberg 14208, img#387) (V) (T.A)			
Jan-12-21	09:20:47	1582	EQ20547 BW1-12			Camera	36	634213	4456550	634760	4456783	-547	-233	594	67		(Corr'd Nav, Kongsberg 14208, img#388) (V) (T.A)			
Jan-12-21	09:22:14	1583	EQ20547 BW1-12			Camera	36	634210	4456549	634760	4456783	-550	-234	598	67		(Corr'd Nav, Kongsberg 14208, img#389) (V) (T.A)			
Jan-12-21	09:22:42	1584	EQ20547 BW1-12			Camera	36	634207	4456551	634760	4456783	-553	-232	599	67		(Corr'd Nav, Kongsberg 14208, img#390) (V) (T.A)			
Jan-12-21	09:23:10	1585	EQ20547 BW1-12			Camera	36	634207	4456549	634760	4456783	-553	-234	601	67		(Corr'd Nav, Kongsberg 14208, img#391) (V) (T.A)			
Jan-12-21	10:38:12	1586	EQ20547 BW1-11			Camera	36	632013	4456386	632005	4456390	8	-4	9	298		(Corr'd Nav, Kongsberg 14208, img#1) (V) (T.A)			
Jan-12-21	10:38:30	1587	EQ20547 BW1-11			Camera	36	632011	4456386	632005	4456390	6	-4	7	307		(Corr'd Nav, Kongsberg 14208, img#2) (V) (T.A)			
Jan-12-21	10:39:43	1588	EQ20547 BW1-11			Camera	36	631999	4456389	632005	4456390	-6	-1	6	77		(Corr'd Nav, Kongsberg 14208, img#3) (V) (T.A)			
Jan-12-21	10:40:21	1589	EQ20547 BW1-11			Camera	36	631992	4456388	632005	4456390	-13	-2	13	83		(Corr'd Nav, Kongsberg 14208, img#4) (V) (T.A)			
Jan-12-21	10:41:54	1590	EQ20547 BW1-11			Camera	36	631977	4456385	632005	4456390	-28	-5	28	81		(Corr'd Nav, Kongsberg 14208, img#5) (V) (T.A)			
Jan-12-21	10:42:24	1591	EQ20547 BW1-11			Camera	36	631973	4456383	632005	4456390	-32	-7	33	78		(Corr'd Nav, Kongsberg 14208, img#6) (V) (T.A)			
Jan-12-21	10:43:43	1592	EQ20547 BW1-11			Camera	36	631961	4456381	632005	4456390	-44	-9	44	79		(Corr'd Nav, Kongsberg 14208, img#7) (V) (T.A)			
Jan-12-21	10:45:10	1593	EQ20547 BW1-11			Camera	36	631945	4456379	632005	4456390	-60	-11	61	80		(Corr'd Nav, Kongsberg 14208, img#8) (V) (T.A)			
Jan-12-21	10:45:52	1594	EQ20547 BW1-11			Camera	36	631936	4456378	632005	4456390	-69	-12	70	80		(Corr'd Nav, Kongsberg 14208, img#9) (V) (T.A)			
Jan-12-21	10:46:51	1595	EQ20547 BW1-11			Camera	36	631924	4456375	632005	4456390	-81	-15	82	79		(Corr'd Nav, Kongsberg 14208, img#10) (V) (T.A)			
Jan-12-21	10:47:59	1596	EQ20547 BW1-11			Camera	36	631910	4456376	632005	4456390	-95	-14	96	82		(Corr'd Nav, Kongsberg 14208, img#11) (V) (T.A)			
Jan-12-21	10:48:38	1597	EQ20547 BW1-11			Camera	36	631904	4456376	632005	4456390	-101	-14	102	82		(Corr'd Nav, Kongsberg 14208, img#12) (V) (T.A)			
Jan-12-21	10:49:40	1598	EQ20547 BW1-11			Camera	36	631895	4456375	632005	4456390	-110	-15	111	82		(Corr'd Nav, Kongsberg 14208, img#13) (V) (T.A)			
Jan-12-21	10:50:45	1599	EQ20547 BW1-11			Camera	36	631887	4456374	632005	4456390	-118	-16	119	82		(Corr'd Nav, Kongsberg 14208, img#14) (V) (T.A)			
Jan-12-21	10:52:26	1600	EQ20547 BW1-11			Camera	36	631871	4456376	632005	4456390	-134	-14	135	84		(Corr'd Nav, Kongsberg 14208, img#15) (V) (T.A)			
Jan-12-21	10:53:02	1601	EQ20547 BW1-11			Camera	36	631865	4456377	632005	4456390	-140	-13	140	85		(Corr'd Nav, Kongsberg 14208, img#16) (V) (T.A)			
Jan-12-21	10:53:56	1602	EQ20547 BW1-11			Camera	36	631858	4456376	632005	4456390	-147	-14	148	85		(Corr'd Nav, Kongsberg 14208, img#17) (V) (T.A)			
Jan-12-21	10:54:07	1603	EQ20547 BW1-11			Camera	36	631857	4456376	632005	4456390	-148	-14	149	84		(Corr'd Nav, Kongsberg 14208, img#18) (V) (T.A)			
Jan-12-21	10:57:01	1604	EQ20547 BW1-11			Camera	36	631829	4456368	632005	4456390	-176	-22	177	83		(Corr'd Nav, Kongsberg 14208, img#19) (V) (T.A)			
Jan-12-21	10:57:26	1605	EQ20547 BW1-11			Camera	36	631826	4456367	632005	4456390	-179	-23	181	83		(Corr'd Nav, Kongsberg 14208, img#20) (V) (T.A)			
Jan-12-21	10:58:01	1606	EQ20547 BW1-11			Camera	35	631820	4456366	632005	4456390	-185	-24	186	83		(Corr'd Nav, Kongsberg 14208, img#21) (V) (T.A)			
Jan-12-21	10:59:28	1607	EQ20547 BW1-11			Camera	35	631805	4456364	632005	4456390	-200	-26	202	83		(Corr'd Nav, Kongsberg 14208, img#22) (V) (T.A)			
Jan-12-21	11:00:23	1608	EQ20547 BW1-11			Camera	36	631796	4456363	632005	4456390	-209	-27	211	83		(Corr'd Nav, Kongsberg 14208, img#23) (V) (T.A)			
Jan-12-21	11:01:08	1609	EQ20547 BW1-11			Camera	35	631789	4456361	632005	4456390	-216	-29	218	82		(Corr'd Nav, Kongsberg 14208, img#24) (V) (T.A)			
Jan-12-21	11:02:11	1610	EQ20547 BW1-11			Camera	36	631779	4456359	632005	4456390	-226	-31	228	82		(Corr'd Nav, Kongsberg 14208, img#25) (V) (T.A)			
Jan-12-21	11:03:18	1611	EQ20547 BW1-11			Camera	36	631769	4456360	632005	4456390	-236	-30	238	83		(Corr'd Nav, Kongsberg 14208, img#26) (V) (T.A)			
Jan-12-21	11:04:11	1612	EQ20547 BW1-11			Camera	36	631762	4456361	632005	4456390	-243	-29	245	83		(Corr'd Nav, Kongsberg 14208, img#27) (V) (T.A)			
Jan-12-21	11:04:58	1613	EQ20547 BW1-11			Camera	35	631756	4456360	632005	4456390	-249	-30	251	83		(Corr'd Nav, Kongsberg 14208, img#28) (V) (T.A)			
Jan-12-21	11:05:55	1614	EQ20547 BW1-11			Camera	36	631747	4456359	632005	4456390	-258	-31	260	83		(Corr'd Nav, Kongsberg 14208, img#29) (V) (T.A)			
Jan-12-21	11:06:36	1615	EQ20547 BW1-11			Camera	36	631741	4456356	632005	4456390	-264	-34	266	83		(Corr'd Nav, Kongsberg 14208, img#30) (V) (T.A)			
Jan-12-21	11:07:11	1616	EQ20547 BW1-11			Camera	36	631736	4456354	632005	4456390	-269	-36	271	82		(Corr'd Nav, Kongsberg 14208, img#31) (V) (T.A)			
Jan-12-21	11:08:14	1617	EQ20547 BW1-11			Camera	36	631726	4456353	632005	4456390	-279	-37	281	82		(Corr'd Nav, Kongsberg 14208, img#32) (V) (T.A)			
Jan-12-21	11:09:19	16																		



APPENDIX A FIELD SAMPLING LOGS

Gardline										Seafloor Sampling Positioning Summary										
Job No		11543							Vessel		MV <i>Ocean Endeavour</i>									
Client		Equinor US Wind LLC							Vessel Reference Point (VRP)		CoG									
Project Name		Empire Wind Extension							Deployment Location		Grab Deployment Point				x	6.7	y	21.94	z	2.93
Primary Positioning System		Starpack 1							Actual Coordinates derived from		Deployment Location									
Geodetic Reference System		Datum			WGS 84 - NAD 83 (2018.0 ITRF 2014)			Ellipsoid	GRS 80		Projection		UTM ZONE 18 N (75 W)				Vertical / Tidal Datum		NAVD 88	
Date	Time	Fix number	Station Number	Penetration	Sample	Retention	Observed	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks			
Jan-12-21	11:17:39	1628	EQ20547 BW1-11			Camera	36	631700	4456349	632005	4456390	-305	-41	308	82		(Corr'd Nav, Kongsberg 14208, img#43) (V) (T.A)			
Jan-12-21	11:18:20	1629	EQ20547 BW1-11			Camera	36	631700	4456348	632005	4456390	-305	-42	308	82		(Corr'd Nav, Kongsberg 14208, img#44) (V) (T.A)			
Jan-12-21	11:18:49	1630	EQ20547 BW1-11			Camera	36	631699	4456349	632005	4456390	-306	-41	309	82		(Corr'd Nav, Kongsberg 14208, img#45) (V) (T.A)			
Jan-12-21	11:19:06	1631	EQ20547 BW1-11			Camera	36	631699	4456350	632005	4456390	-306	-40	309	83		(Corr'd Nav, Kongsberg 14208, img#46) (V) (T.A)			
Jan-12-21	11:19:25	1632	EQ20547 BW1-11			Camera	36	631697	4456352	632005	4456390	-308	-38	310	83		(Corr'd Nav, Kongsberg 14208, img#47) (V) (T.A)			
Jan-12-21	11:19:40	1633	EQ20547 BW1-11			Camera	36	631696	4456353	632005	4456390	-309	-37	311	83		(Corr'd Nav, Kongsberg 14208, img#48) (V) (T.A)			
Jan-12-21	11:20:05	1634	EQ20547 BW1-11			Camera	36	631692	4456354	632005	4456390	-313	-36	315	83		(Corr'd Nav, Kongsberg 14208, img#49) (V) (T.A)			
Jan-12-21	11:20:16	1635	EQ20547 BW1-11			Camera	36	631691	4456354	632005	4456390	-314	-36	316	84		(Corr'd Nav, Kongsberg 14208, img#50) (V) (T.A)			
Jan-12-21	11:20:57	1636	EQ20547 BW1-11			Camera	36	631684	4456356	632005	4456390	-321	-34	323	84		(Corr'd Nav, Kongsberg 14208, img#51) (V) (T.A)			
Jan-12-21	11:21:43	1637	EQ20547 BW1-11			Camera	36	631676	4456357	632005	4456390	-329	-33	330	84		(Corr'd Nav, Kongsberg 14208, img#52) (V) (T.A)			
Jan-12-21	11:22:00	1638	EQ20547 BW1-11			Camera	36	631674	4456357	632005	4456390	-331	-33	333	84		(Corr'd Nav, Kongsberg 14208, img#53) (V) (T.A)			
Jan-12-21	11:22:56	1639	EQ20547 BW1-11			Camera	36	631667	4456354	632005	4456390	-338	-36	340	84		(Corr'd Nav, Kongsberg 14208, img#54) (V) (T.A)			
Jan-12-21	11:24:04	1640	EQ20547 BW1-11			Camera	36	631660	4456355	632005	4456390	-345	-35	347	84		(Corr'd Nav, Kongsberg 14208, img#55) (V) (T.A)			
Jan-12-21	11:24:35	1641	EQ20547 BW1-11			Camera	36	631658	4456352	632005	4456390	-347	-38	349	84		(Corr'd Nav, Kongsberg 14208, img#56) (V) (T.A)			
Jan-12-21	11:25:25	1642	EQ20547 BW1-11			Camera	36	631651	4456346	632005	4456390	-354	-44	357	83		(Corr'd Nav, Kongsberg 14208, img#57) (V) (T.A)			
Jan-12-21	11:27:00	1643	EQ20547 BW1-11			Camera	35	631634	4456343	632005	4456390	-371	-47	374	83		(Corr'd Nav, Kongsberg 14208, img#58) (V) (T.A)			
Jan-12-21	11:27:10	1644	EQ20547 BW1-11			Camera	36	631633	4456343	632005	4456390	-372	-47	375	83		(Corr'd Nav, Kongsberg 14208, img#59) (V) (T.A)			
Jan-12-21	11:27:57	1645	EQ20547 BW1-11			Camera	36	631626	4456346	632005	4456390	-379	-44	382	83		(Corr'd Nav, Kongsberg 14208, img#60) (V) (T.A)			
Jan-12-21	11:28:36	1646	EQ20547 BW1-11			Camera	36	631619	4456348	632005	4456390	-386	-42	389	84		(Corr'd Nav, Kongsberg 14208, img#61) (V) (T.A)			
Jan-12-21	11:29:32	1647	EQ20547 BW1-11			Camera	35	631609	4456346	632005	4456390	-396	-44	399	84		(Corr'd Nav, Kongsberg 14208, img#62) (V) (T.A)			
Jan-12-21	11:29:47	1648	EQ20547 BW1-11			Camera	36	631607	4456346	632005	4456390	-398	-44	401	84		(Corr'd Nav, Kongsberg 14208, img#63) (V) (T.A)			
Jan-12-21	11:30:38	1649	EQ20547 BW1-11			Camera	36	631599	4456345	632005	4456390	-406	-45	409	84		(Corr'd Nav, Kongsberg 14208, img#64) (V) (T.A)			
Jan-12-21	11:32:07	1650	EQ20547 BW1-11			Camera	36	631585	4456338	632005	4456390	-420	-52	423	83		(Corr'd Nav, Kongsberg 14208, img#65) (V) (T.A)			
Jan-12-21	11:33:00	1651	EQ20547 BW1-11			Camera	35	631577	4456338	632005	4456390	-428	-52	431	83		(Corr'd Nav, Kongsberg 14208, img#66) (V) (T.A)			
Jan-12-21	11:35:50	1652	EQ20547 BW1-11			Camera	35	631547	4456341	632005	4456390	-458	-49	461	84		(Corr'd Nav, Kongsberg 14208, img#67) (V) (T.A)			
Jan-12-21	11:36:26	1653	EQ20547 BW1-11			Camera	35	631539	4456341	632005	4456390	-466	-49	468	84		(Corr'd Nav, Kongsberg 14208, img#68) (V) (T.A)			
Jan-12-21	11:37:13	1654	EQ20547 BW1-11			Camera	35	631529	4456339	632005	4456390	-476	-51	479	84		(Corr'd Nav, Kongsberg 14208, img#69) (V) (T.A)			
Jan-12-21	11:38:18	1655	EQ20547 BW1-11			Camera	35	631517	4456336	632005	4456390	-488	-54	491	84		(Corr'd Nav, Kongsberg 14208, img#70) (V) (T.A)			
Jan-12-21	11:39:39	1656	EQ20547 BW1-11			Camera	35	631504	4456330	632005	4456390	-501	-60	505	83		(Corr'd Nav, Kongsberg 14208, img#71) (V) (T.A)			
Jan-12-21	11:40:19	1657	EQ20547 BW1-11			Camera	35	631497	4456328	632005	4456390	-508	-62	512	83		(Corr'd Nav, Kongsberg 14208, img#72) (V) (T.A)			
Jan-12-21	11:41:29	1658	EQ20547 BW1-11			Camera	36	631485	4456324	632005	4456390	-520	-66	524	83		(Corr'd Nav, Kongsberg 14208, img#73) (V) (T.A)			
Jan-12-21	11:42:04	1659	EQ20547 BW1-11			Camera	35	631480	4456324	632005	4456390	-525	-66	529	83		(Corr'd Nav, Kongsberg 14208, img#74) (V) (T.A)			
Jan-12-21	11:43:12	1660	EQ20547 BW1-11			Camera	35	631470	4456328	632005	4456390	-535	-62	539	83		(Corr'd Nav, Kongsberg 14208, img#75) (V) (T.A)			
Jan-12-21	11:44:04	1661	EQ20547 BW1-11			Camera	35	631460	4456331	632005	4456390	-545	-59	549	84		(Corr'd Nav, Kongsberg 14208, img#76) (V) (T.A)			
Jan-12-21	11:44:52	1662	EQ20547 BW1-11			Camera	35	631450	4456331	632005	4456390	-555	-59	558	84		(Corr'd Nav, Kongsberg 14208, img#77) (V) (T.A)			
Jan-12-21	11:45:26	1663	EQ20547 BW1-11			Camera	35	631442	4456331	632005	4456390	-563	-59	566	84		(Corr'd Nav, Kongsberg 14208, img#78) (V) (T.A)			
Jan-12-21	11:46:37	1664	EQ20547 BW1-11			Camera	35	631428	4456328	632005	4456390	-577	-62	580	84		(Corr'd Nav, Kongsberg 14208, img#79) (V) (T.A)			
Jan-12-21	11:48:01	1665	EQ20547 BW1-11			Camera	35	631416	4456319	632005	4456390	-589	-71	593	83		(Corr'd Nav, Kongsberg 14208, img#80) (V) (T.A)			
Jan-12-21	11:48:29	1666	EQ20547 BW1-11			Camera	35	631413	4456316	632005	4456390	-592	-74	597	83		(Corr'd Nav, Kongsberg 14208, img#81) (V) (T.A)			
Jan-12-21	12:45:39	1667	EQ20547 BW1-10			Camera	34	629459	4456213	629452	4456220	7	-7	10	316		(Corr'd Nav, Kongsberg 14208, img#82) (V) (T.A)			
Jan-12-21	12:47:14	1668	EQ20547 BW1-10			Camera	34	629453	4456219	629452	4456220	1	-1	2	307		(Corr'd Nav, Kongsberg 14208, img#83) (V) (T.A)			
Jan-12-21	12:47:44	1669	EQ20547 BW1-10			Camera	34	629453	4456218	629452	4456220	1	-2	2	338		(Corr'd Nav, Kongsberg 14208, img#84) (V) (T.A)			
Jan-12-21	12:48:46	1670	EQ20547 BW1-10			Camera	34	629454	4456217	629452	4456220	2	-3	4	322		(Corr'd Nav, Kongsberg 14208, img#85) (V) (T.A)			
Jan-12-21	12:50:38	1671	EQ20547 BW1-10			Camera	34	629457	4456222	629452	4456220	5	2	6	248		(Corr'd Nav, Kongsberg 14208, img#86) (V) (T.A)			
Jan-12-21	12:51:17	1672	EQ20547 BW1-10			Camera	34	629455	4456223	629452	4456220	3	3	4	224		(Corr'd Nav, Kongsberg 14208, img#87) (V) (T.A)			
Jan-12-21	12:51:46	1673	EQ20547 BW1-10			Camera	34	629453	4456224	629452	4456220	1	4	4	194		(Corr'd Nav, Kongsberg 14208, img#88) (V) (T.A)			
Jan-12-21	12:52:40	1674	EQ20547 BW1-10			Camera	34	629450	4456223	629452	4456220	-2	3	4	144		(Corr'd Nav, Kongsberg 14208, img#89) (V) (T.A)			
Jan-12-21	12:53:29	1675	EQ20547 BW1-10			Camera	34	629450	4456220	629452	4456220	-2	0	2	91		(Corr'd Nav, Kongsberg 14208, img#90) (V) (T.A)			
Jan-12-21	12:53:42	1676	EQ20547 BW1-10			Camera	34	629450	4456219	629452	4456220	-2	-1	2	64		(Corr'd Nav, Kongsberg 14208, img#91) (V) (T.A)			
Jan-12-21	12:53:59	1677	EQ20547 BW1-10			Camera	34	629451	4456217	629452	4456220	-1	-3	3	22		(Corr'd Nav, Kongsberg 14208, img#92) (V) (T.A)			
Jan-12-21	12:54:27	1678	EQ20547 BW1-10			Camera	34	629453	4456213	629452	4456220	1	-7	7	353		(Corr'd Nav, Kongsberg 14208, img#93) (V) (T.A)			
Jan-12-21	12:55:14	1679	EQ20547 BW1-10			Camera	34	629456	4456212	629452	4456220	4	-8	9	333		(Corr'd Nav, Kongsberg 14208, img#94) (V) (T.A)			
Jan-12-21	12:56:34	1680	EQ20547 BW1-10			Camera	34	629461	4456219	629452	4456220	9	-1	9	274		(Corr'd Nav, Kongsberg 14208, img#95) (V) (T.A)			
Jan-12-21	12:58:16	1681	EQ20547 BW1-10			Camera	34	629449	4456228	629										



APPENDIX A FIELD SAMPLING LOGS

Gardline										Seafloor Sampling Positioning Summary													
Job No		11543							Vessel		MV <i>Ocean Endeavour</i>												
Client		Equinor US Wind LLC							Vessel Reference Point (VRP)		CoG												
Project Name		Empire Wind Extension							Deployment Location		Grab Deployment Point				x	6.7	y	21.94	z	2.93			
Primary Positioning System		Starpack 1							Actual Coordinates derived from		Deployment Location												
Geodetic Reference System		Datum			WGS 84 - NAD 83 (2018.0 ITRF 2014)			Ellipsoid	GRS 80			Projection				UTM ZONE 18 N (75 W)				Vertical / Tidal Datum		NAVD 88	
Date	Time	Fix number	Station Number	Penetration	Sample	Retention	Observed	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks						
Jan-12-21	13:14:47	1691	EQ20547 BW1-10			Camera	35	629357	4456164	629452	4456220	-95	-56	110	59		(Corr'd Nav, Kongsberg 14208, img#106) (V) (T.A)						
Jan-12-21	13:15:47	1692	EQ20547 BW1-10			Camera	35	629348	4456160	629452	4456220	-104	-60	120	60		(Corr'd Nav, Kongsberg 14208, img#107) (V) (T.A)						
Jan-12-21	13:16:32	1693	EQ20547 BW1-10			Camera	34	629342	4456158	629452	4456220	-110	-62	127	61		(Corr'd Nav, Kongsberg 14208, img#108) (V) (T.A)						
Jan-12-21	13:17:03	1694	EQ20547 BW1-10			Camera	34	629336	4456156	629452	4456220	-116	-64	132	61		(Corr'd Nav, Kongsberg 14208, img#109) (V) (T.A)						
Jan-12-21	13:19:09	1695	EQ20547 BW1-10			Camera	34	629319	4456144	629452	4456220	-133	-76	153	60		(Corr'd Nav, Kongsberg 14208, img#110) (V) (T.A)						
Jan-12-21	13:20:31	1696	EQ20547 BW1-10			Camera	34	629308	4456137	629452	4456220	-144	-83	166	60		(Corr'd Nav, Kongsberg 14208, img#111) (V) (T.A)						
Jan-12-21	13:21:56	1697	EQ20547 BW1-10			Camera	34	629296	4456131	629452	4456220	-156	-89	180	60		(Corr'd Nav, Kongsberg 14208, img#112) (V) (T.A)						
Jan-12-21	13:23:26	1698	EQ20547 BW1-10			Camera	34	629284	4456123	629452	4456220	-168	-97	194	60		(Corr'd Nav, Kongsberg 14208, img#113) (V) (T.A)						
Jan-12-21	13:25:21	1699	EQ20547 BW1-10			Camera	34	629270	4456118	629452	4456220	-182	-102	209	61		(Corr'd Nav, Kongsberg 14208, img#114) (V) (T.A)						
Jan-12-21	13:27:35	1700	EQ20547 BW1-10			Camera	35	629252	4456105	629452	4456220	-200	-115	231	60		(Corr'd Nav, Kongsberg 14208, img#115) (V) (T.A)						
Jan-12-21	13:29:15	1701	EQ20547 BW1-10			Camera	34	629238	4456100	629452	4456220	-214	-120	246	61		(Corr'd Nav, Kongsberg 14208, img#116) (V) (T.A)						
Jan-12-21	13:31:18	1702	EQ20547 BW1-10			Camera	34	629224	4456090	629452	4456220	-228	-130	263	60		(Corr'd Nav, Kongsberg 14208, img#117) (V) (T.A)						
Jan-12-21	13:33:19	1703	EQ20547 BW1-10			Camera	34	629210	4456085	629452	4456220	-242	-135	277	61		(Corr'd Nav, Kongsberg 14208, img#118) (V) (T.A)						
Jan-12-21	13:34:25	1704	EQ20547 BW1-10			Camera	34	629203	4456078	629452	4456220	-249	-142	286	60		(Corr'd Nav, Kongsberg 14208, img#119) (V) (T.A)						
Jan-12-21	13:36:58	1705	EQ20547 BW1-10			Camera	34	629190	4456076	629452	4456220	-262	-144	299	61		(Corr'd Nav, Kongsberg 14208, img#120) (V) (T.A)						
Jan-12-21	13:38:12	1706	EQ20547 BW1-10			Camera	34	629190	4456063	629452	4456220	-262	-157	305	59		(Corr'd Nav, Kongsberg 14208, img#121) (V) (T.A)						
Jan-12-21	13:39:27	1707	EQ20547 BW1-10			Camera	34	629196	4456066	629452	4456220	-256	-154	299	59		(Corr'd Nav, Kongsberg 14208, img#122) (V) (T.A)						
Jan-12-21	13:40:44	1708	EQ20547 BW1-10			Camera	34	629198	4456075	629452	4456220	-254	-145	292	60		(Corr'd Nav, Kongsberg 14208, img#123) (V) (T.A)						
Jan-12-21	13:41:30	1709	EQ20547 BW1-10			Camera	34	629194	4456081	629452	4456220	-258	-139	293	62		(Corr'd Nav, Kongsberg 14208, img#124) (V) (T.A)						
Jan-12-21	13:42:32	1710	EQ20547 BW1-10			Camera	34	629187	4456079	629452	4456220	-265	-141	300	62		(Corr'd Nav, Kongsberg 14208, img#125) (V) (T.A)						
Jan-12-21	13:43:07	1711	EQ20547 BW1-10			Camera	34	629185	4456076	629452	4456220	-267	-144	303	62		(Corr'd Nav, Kongsberg 14208, img#126) (V) (T.A)						
Jan-12-21	13:45:19	1712	EQ20547 BW1-10			Camera	34	629197	4456060	629452	4456220	-255	-160	301	58		(Corr'd Nav, Kongsberg 14208, img#127) (V) (T.A)						
Jan-12-21	13:46:01	1713	EQ20547 BW1-10			Camera	34	629197	4456068	629452	4456220	-255	-152	296	59		(Corr'd Nav, Kongsberg 14208, img#128) (V) (T.A)						
Jan-12-21	13:46:58	1714	EQ20547 BW1-10			Camera	34	629194	4456073	629452	4456220	-258	-147	297	60		(Corr'd Nav, Kongsberg 14208, img#129) (V) (T.A)						
Jan-12-21	13:47:31	1715	EQ20547 BW1-10			Camera	34	629193	4456074	629452	4456220	-259	-146	297	61		(Corr'd Nav, Kongsberg 14208, img#130) (V) (T.A)						
Jan-12-21	13:47:55	1716	EQ20547 BW1-10			Camera	34	629191	4456072	629452	4456220	-261	-148	300	60		(Corr'd Nav, Kongsberg 14208, img#131) (V) (T.A)						
Jan-12-21	13:48:50	1717	EQ20547 BW1-10			Camera	34	629189	4456068	629452	4456220	-263	-152	304	60		(Corr'd Nav, Kongsberg 14208, img#132) (V) (T.A)						
Jan-12-21	13:49:25	1718	EQ20547 BW1-10			Camera	34	629187	4456069	629452	4456220	-265	-151	305	60		(Corr'd Nav, Kongsberg 14208, img#133) (V) (T.A)						
Jan-12-21	13:51:10	1719	EQ20547 BW1-10			Camera	34	629175	4456063	629452	4456220	-277	-157	318	61		(Corr'd Nav, Kongsberg 14208, img#134) (V) (T.A)						
Jan-12-21	13:51:44	1720	EQ20547 BW1-10			Camera	34	629170	4456061	629452	4456220	-282	-159	324	61		(Corr'd Nav, Kongsberg 14208, img#135) (V) (T.A)						
Jan-12-21	13:52:07	1721	EQ20547 BW1-10			Camera	34	629167	4456058	629452	4456220	-285	-162	328	60		(Corr'd Nav, Kongsberg 14208, img#136) (V) (T.A)						
Jan-12-21	13:53:08	1722	EQ20547 BW1-10			Camera	34	629157	4456052	629452	4456220	-295	-168	340	60		(Corr'd Nav, Kongsberg 14208, img#137) (V) (T.A)						
Jan-12-21	13:54:30	1723	EQ20547 BW1-10			Camera	34	629150	4456051	629452	4456220	-302	-169	346	61		(Corr'd Nav, Kongsberg 14208, img#138) (V) (T.A)						
Jan-12-21	13:55:56	1724	EQ20547 BW1-10			Camera	35	629136	4456045	629452	4456220	-316	-175	361	61		(Corr'd Nav, Kongsberg 14208, img#139) (V) (T.A)						
Jan-12-21	13:57:04	1725	EQ20547 BW1-10			Camera	35	629128	4456037	629452	4456220	-324	-183	372	61		(Corr'd Nav, Kongsberg 14208, img#140) (V) (T.A)						
Jan-12-21	13:57:49	1726	EQ20547 BW1-10			Camera	35	629122	4456034	629452	4456220	-330	-186	379	61		(Corr'd Nav, Kongsberg 14208, img#141) (V) (T.A)						
Jan-12-21	13:59:24	1727	EQ20547 BW1-10			Camera	35	629108	4456024	629452	4456220	-344	-196	396	60		(Corr'd Nav, Kongsberg 14208, img#142) (V) (T.A)						
Jan-12-21	14:00:29	1728	EQ20547 BW1-10			Camera	35	629101	4456022	629452	4456220	-351	-198	403	61		(Corr'd Nav, Kongsberg 14208, img#143) (V) (T.A)						
Jan-12-21	14:01:34	1729	EQ20547 BW1-10			Camera	35	629095	4456021	629452	4456220	-357	-199	409	61		(Corr'd Nav, Kongsberg 14208, img#144) (V) (T.A)						
Jan-12-21	14:01:37	1730	EQ20547 BW1-10			Camera	35	629095	4456021	629452	4456220	-357	-199	409	61		(Corr'd Nav, Kongsberg 14208, img#145) (V) (T.A)						
Jan-12-21	14:03:57	1731	EQ20547 BW1-10			Camera	35	629085	4456014	629452	4456220	-367	-206	421	61		(Corr'd Nav, Kongsberg 14208, img#146) (V) (T.A)						
Jan-12-21	14:05:03	1732	EQ20547 BW1-10			Camera	35	629077	4456009	629452	4456220	-375	-211	431	61		(Corr'd Nav, Kongsberg 14208, img#147) (V) (T.A)						
Jan-12-21	14:06:19	1733	EQ20547 BW1-10			Camera	35	629067	4456001	629452	4456220	-385	-219	443	60		(Corr'd Nav, Kongsberg 14208, img#148) (V) (T.A)						
Jan-12-21	14:07:01	1734	EQ20547 BW1-10			Camera	35	629062	4456000	629452	4456220	-390	-220	447	61		(Corr'd Nav, Kongsberg 14208, img#149) (V) (T.A)						
Jan-12-21	14:07:39	1735	EQ20547 BW1-10			Camera	34	629058	4455999	629452	4456220	-394	-221	452	61		(Corr'd Nav, Kongsberg 14208, img#150) (V) (T.A)						
Jan-12-21	14:08:56	1736	EQ20547 BW1-10			Camera	35	629049	4455992	629452	4456220	-403	-228	463	61		(Corr'd Nav, Kongsberg 14208, img#151) (V) (T.A)						
Jan-12-21	14:09:47	1737	EQ20547 BW1-10			Camera	34	629043	4455989	629452	4456220	-409	-231	470	61		(Corr'd Nav, Kongsberg 14208, img#152) (V) (T.A)						
Jan-12-21	14:10:40	1738	EQ20547 BW1-10			Camera	34	629037	4455986	629452	4456220	-415	-234	477	61		(Corr'd Nav, Kongsberg 14208, img#153) (V) (T.A)						
Jan-12-21	14:11:10	1739	EQ20547 BW1-10			Camera	35	629033	4455984	629452	4456220	-419	-236	481	61		(Corr'd Nav, Kongsberg 14208, img#154) (V) (T.A)						
Jan-12-21	14:12:06	1740	EQ20547 BW1-10			Camera	34	629028	4455981	629452	4456220	-424	-239	487	61		(Corr'd Nav, Kongsberg 14208, img#155) (V) (T.A)						
Jan-12-21	14:13:02	1741	EQ20547 BW1-10			Camera	34	629022	4455981	629452	4456220	-430	-239	492	61		(Corr'd Nav, Kongsberg 14208, img#156) (V) (T.A)						
Jan-12-21	14:13:31	1742	EQ20547 BW1-10			Camera	34	629018	4455978	629452	4456220	-434	-242	497	61		(Corr'd Nav, Kongsberg 14208, img#157) (V) (T.A)						
Jan-12-21	14:14:35	1743	EQ20547 BW1-10			Camera	34	629012	4455971	629452	4456												



APPENDIX A FIELD SAMPLING LOGS

Gardline										Seafloor Sampling Positioning Summary										
Job No		11543							Vessel		MV Ocean Endeavour									
Client		Equinor US Wind LLC							Vessel Reference Point (VRP)		CoG									
Project Name		Empire Wind Extension							Deployment Location		Grab Deployment Point				x	6.7	y	21.94	z	2.93
Primary Positioning System		Starpack 1							Actual Coordinates derived from		Deployment Location									
Geodetic Reference System		Datum			WGS 84 - NAD 83 (2018.0 ITRF 2014)			Ellipsoid	GRS 80		Projection		UTM ZONE 18 N (75 W)				Vertical / Tidal Datum		NAVD 88	
Date	Time	Fix number	Station Number	Penetration	Sample	Retention	Observed	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks			
Jan-12-21	14:30:30	1754	EQ20547 BW1-10			Camera	35	628935	4455924	629452	4456220	-517	-296	596	60		(Corr'd Nav, Kongsberg 14208, img#169) (V) (T.A)			
Jan-12-21	14:31:33	1755	EQ20547 BW1-10			Camera	35	628937	4455928	629452	4456220	-515	-292	592	60		(Corr'd Nav, Kongsberg 14208, img#170) (V) (T.A)			
Jan-12-21	14:32:18	1756	EQ20547 BW1-10			Camera	35	628932	4455935	629452	4456220	-520	-285	593	61		(Corr'd Nav, Kongsberg 14208, img#171) (V) (T.A)			
Jan-12-21	14:34:16	1757	EQ20547 BW1-10			Camera	35	628924	4455932	629452	4456220	-528	-288	601	61		(Corr'd Nav, Kongsberg 14208, img#172) (V) (T.A)			
Jan-12-21	14:34:34	1758	EQ20547 BW1-10			Camera	35	628923	4455930	629452	4456220	-529	-290	603	61		(Corr'd Nav, Kongsberg 14208, img#173) (V) (T.A)			
Jan-12-21	14:35:41	1759	EQ20547 BW1-10			Camera	35	628924	4455918	629452	4456220	-528	-302	608	60		(Corr'd Nav, Kongsberg 14208, img#174) (V) (T.A)			
Jan-12-21	15:34:40	1760	EQ20547 BW1-8			Camera	31	624839	4455632	624840	4455633	-1	-1	2	51		(Corr'd Nav, Kongsberg 14208, img#175) (V) (T.A)			
Jan-12-21	15:35:54	1761	EQ20547 BW1-8			Camera	31	624837	4455638	624840	4455633	-3	5	5	151		(Corr'd Nav, Kongsberg 14208, img#176) (V) (T.A)			
Jan-12-21	15:37:22	1762	EQ20547 BW1-8			Camera	32	624833	4455638	624840	4455633	-7	5	8	127		(Corr'd Nav, Kongsberg 14208, img#177) (V) (T.A)			
Jan-12-21	15:37:51	1763	EQ20547 BW1-8			Camera	31	624831	4455634	624840	4455633	-9	1	9	94		(Corr'd Nav, Kongsberg 14208, img#178) (V) (T.A)			
Jan-12-21	15:38:23	1764	EQ20547 BW1-8			Camera	31	624833	4455626	624840	4455633	-7	-7	10	46		(Corr'd Nav, Kongsberg 14208, img#179) (V) (T.A)			
Jan-12-21	15:39:06	1765	EQ20547 BW1-8			Camera	31	624841	4455619	624840	4455633	1	-14	14	358		(Corr'd Nav, Kongsberg 14208, img#180) (V) (T.A)			
Jan-12-21	15:39:55	1766	EQ20547 BW1-8			Camera	31	624842	4455621	624840	4455633	2	-12	12	350		(Corr'd Nav, Kongsberg 14208, img#181) (V) (T.A)			
Jan-12-21	15:40:33	1767	EQ20547 BW1-8			Camera	31	624841	4455623	624840	4455633	1	-10	10	353		(Corr'd Nav, Kongsberg 14208, img#182) (V) (T.A)			
Jan-12-21	15:41:18	1768	EQ20547 BW1-8			Camera	31	624845	4455627	624840	4455633	5	-6	8	319		(Corr'd Nav, Kongsberg 14208, img#183) (V) (T.A)			
Jan-12-21	15:41:46	1769	EQ20547 BW1-8			Camera	31	624847	4455631	624840	4455633	7	-2	8	287		(Corr'd Nav, Kongsberg 14208, img#184) (V) (T.A)			
Jan-12-21	15:42:10	1770	EQ20547 BW1-8			Camera	31	624847	4455634	624840	4455633	7	1	7	259		(Corr'd Nav, Kongsberg 14208, img#185) (V) (T.A)			
Jan-12-21	15:43:08	1771	EQ20547 BW1-8			Camera	31	624843	4455637	624840	4455633	3	4	5	218		(Corr'd Nav, Kongsberg 14208, img#186) (V) (T.A)			
Jan-12-21	15:43:30	1772	EQ20547 BW1-8			Camera	31	624841	4455635	624840	4455633	1	2	2	202		(Corr'd Nav, Kongsberg 14208, img#187) (V) (T.A)			
Jan-12-21	15:43:40	1773	EQ20547 BW1-8			Camera	31	624840	4455634	624840	4455633	0	1	1	187		(Corr'd Nav, Kongsberg 14208, img#188) (V) (T.A)			
Jan-12-21	15:44:32	1774	EQ20547 BW1-8			Camera	31	624835	4455629	624840	4455633	-5	-4	7	49		(Corr'd Nav, Kongsberg 14208, img#189) (V) (T.A)			
Jan-12-21	15:45:04	1775	EQ20547 BW1-8			Camera	31	624829	4455626	624840	4455633	-11	-7	13	57		(Corr'd Nav, Kongsberg 14208, img#190) (V) (T.A)			
Jan-12-21	15:45:43	1776	EQ20547 BW1-8			Camera	31	624824	4455625	624840	4455633	-16	-8	18	64		(Corr'd Nav, Kongsberg 14208, img#191) (V) (T.A)			
Jan-12-21	15:46:23	1777	EQ20547 BW1-8			Camera	31	624817	4455624	624840	4455633	-23	-9	25	68		(Corr'd Nav, Kongsberg 14208, img#192) (V) (T.A)			
Jan-12-21	15:46:57	1778	EQ20547 BW1-8			Camera	31	624810	4455622	624840	4455633	-30	-11	32	70		(Corr'd Nav, Kongsberg 14208, img#193) (V) (T.A)			
Jan-12-21	15:47:56	1779	EQ20547 BW1-8			Camera	31	624801	4455620	624840	4455633	-39	-13	41	72		(Corr'd Nav, Kongsberg 14208, img#194) (V) (T.A)			
Jan-12-21	15:50:37	1780	EQ20547 BW1-8			Camera	31	624778	4455615	624840	4455633	-62	-18	65	74		(Corr'd Nav, Kongsberg 14208, img#195) (V) (T.A)			
Jan-12-21	15:52:43	1781	EQ20547 BW1-8			Camera	31	624761	4455611	624840	4455633	-79	-22	82	75		(Corr'd Nav, Kongsberg 14208, img#196) (V) (T.A)			
Jan-12-21	15:52:58	1782	EQ20547 BW1-8			Camera	31	624759	4455611	624840	4455633	-81	-22	84	75		(Corr'd Nav, Kongsberg 14208, img#197) (V) (T.A)			
Jan-12-21	15:53:18	1783	EQ20547 BW1-8			Camera	31	624757	4455609	624840	4455633	-83	-24	87	74		(Corr'd Nav, Kongsberg 14208, img#198) (V) (T.A)			
Jan-12-21	15:53:44	1784	EQ20547 BW1-8			Camera	31	624753	4455609	624840	4455633	-88	-24	91	74		(Corr'd Nav, Kongsberg 14208, img#199) (V) (T.A)			
Jan-12-21	15:55:06	1785	EQ20547 BW1-8			Camera	31	624739	4455604	624840	4455633	-101	-29	105	74		(Corr'd Nav, Kongsberg 14208, img#200) (V) (T.A)			
Jan-12-21	15:57:04	1786	EQ20547 BW1-8			Camera	31	624726	4455600	624840	4455633	-114	-33	119	74		(Corr'd Nav, Kongsberg 14208, img#201) (V) (T.A)			
Jan-12-21	15:58:06	1787	EQ20547 BW1-8			Camera	31	624715	4455597	624840	4455633	-125	-36	130	74		(Corr'd Nav, Kongsberg 14208, img#202) (V) (T.A)			
Jan-12-21	15:58:23	1788	EQ20547 BW1-8			Camera	31	624712	4455596	624840	4455633	-128	-37	133	74		(Corr'd Nav, Kongsberg 14208, img#203) (V) (T.A)			
Jan-12-21	16:00:56	1789	EQ20547 BW1-8			Camera	31	624689	4455590	624840	4455633	-151	-43	157	74		(Corr'd Nav, Kongsberg 14208, img#204) (V) (T.A)			
Jan-12-21	16:01:37	1790	EQ20547 BW1-8			Camera	31	624684	4455590	624840	4455633	-156	-43	162	74		(Corr'd Nav, Kongsberg 14208, img#205) (V) (T.A)			
Jan-12-21	16:02:46	1791	EQ20547 BW1-8			Camera	31	624672	4455584	624840	4455633	-168	-49	175	74		(Corr'd Nav, Kongsberg 14208, img#206) (V) (T.A)			
Jan-12-21	16:03:23	1792	EQ20547 BW1-8			Camera	31	624668	4455582	624840	4455633	-172	-51	180	73		(Corr'd Nav, Kongsberg 14208, img#207) (V) (T.A)			
Jan-12-21	16:04:04	1793	EQ20547 BW1-8			Camera	31	624663	4455583	624840	4455633	-177	-50	184	74		(Corr'd Nav, Kongsberg 14208, img#208) (V) (T.A)			
Jan-12-21	16:05:15	1794	EQ20547 BW1-8			Camera	31	624651	4455578	624840	4455633	-189	-55	197	74		(Corr'd Nav, Kongsberg 14208, img#209) (V) (T.A)			
Jan-12-21	16:07:15	1795	EQ20547 BW1-8			Camera	31	624639	4455576	624840	4455633	-201	-57	209	74		(Corr'd Nav, Kongsberg 14208, img#210) (V) (T.A)			
Jan-12-21	16:08:04	1796	EQ20547 BW1-8			Camera	31	624630	4455576	624840	4455633	-210	-57	217	75		(Corr'd Nav, Kongsberg 14208, img#211) (V) (T.A)			
Jan-12-21	16:08:35	1797	EQ20547 BW1-8			Camera	31	624624	4455573	624840	4455633	-216	-60	224	74		(Corr'd Nav, Kongsberg 14208, img#212) (V) (T.A)			
Jan-12-21	16:09:20	1798	EQ20547 BW1-8			Camera	31	624616	4455568	624840	4455633	-224	-65	233	74		(Corr'd Nav, Kongsberg 14208, img#213) (V) (T.A)			
Jan-12-21	16:11:24	1799	EQ20547 BW1-8			Camera	31	624597	4455562	624840	4455633	-243	-71	253	74		(Corr'd Nav, Kongsberg 14208, img#214) (V) (T.A)			
Jan-12-21	16:12:10	1800	EQ20547 BW1-8			Camera	31	624590	4455561	624840	4455633	-250	-72	260	74		(Corr'd Nav, Kongsberg 14208, img#215) (V) (T.A)			
Jan-12-21	16:13:50	1801	EQ20547 BW1-8			Camera	31	624577	4455558	624840	4455633	-263	-75	273	74		(Corr'd Nav, Kongsberg 14208, img#216) (V) (T.A)			
Jan-12-21	16:14:07	1802	EQ20547 BW1-8			Camera	31	624576	4455558	624840	4455633	-264	-75	275	74		(Corr'd Nav, Kongsberg 14208, img#217) (V) (T.A)			
Jan-12-21	16:14:27	1803	EQ20547 BW1-8			Camera	31	624573	4455557	624840	4455633	-267	-76	277	74		(Corr'd Nav, Kongsberg 14208, img#218) (V) (T.A)			
Jan-12-21	16:15:09	1804	EQ20547 BW1-8			Camera	31	624566	4455554	624840	4455633	-274	-79	285	74		(Corr'd Nav, Kongsberg 14208, img#219) (V) (T.A)			
Jan-12-21	16:15:35	1805	EQ20547 BW1-8			Camera	31	624561	4455554	624840	4455633	-279	-79	290	74		(Corr'd Nav, Kongsberg 14208, img#220) (V) (T.A)			
Jan-12-21	16:16:20	1806	EQ20547 BW1-8			Camera	31	624553	4455553	624840	4455633	-287	-80	298	74		(Corr'd Nav, Kongsberg 14208, img#221) (V) (T.A)			
Jan-12-21	16:17:06	1807	EQ20547 BW1-8			Camera	31	624548	4455546	624840	4455633	-292								



APPENDIX A FIELD SAMPLING LOGS

Gardline										Seafloor Sampling Positioning Summary										
Job No		11543							Vessel		MV Ocean Endeavour									
Client		Equinor US Wind LLC							Vessel Reference Point (VRP)		CoG									
Project Name		Empire Wind Extension							Deployment Location		Grab Deployment Point				x	6.7	y	21.94	z	2.93
Primary Positioning System		Starpack 1							Actual Coordinates derived from		Deployment Location									
Geodetic Reference System		Datum		WGS 84 - NAD 83 (2018.0 ITRF 2014)				Ellipsoid	GRS 80		Projection		UTM ZONE 18 N (75 W)				Vertical / Tidal Datum		NAVD 88	
Date	Time	Fix number	Station Number	Penetration	Sample	Retention	Observed	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks			
Jan-12-21	16:25:53	1817	EQ20547 BW1-8			Camera	31	624550	4455551	624840	4455633	-290	-82	302	74		(Corr'd Nav, Kongsberg 14208, img#232) (V) (T.A)			
Jan-12-21	16:27:16	1818	EQ20547 BW1-8			Camera	31	624535	4455546	624840	4455633	-305	-87	317	74		(Corr'd Nav, Kongsberg 14208, img#233) (V) (T.A)			
Jan-12-21	16:27:46	1819	EQ20547 BW1-8			Camera	31	624531	4455546	624840	4455633	-309	-87	322	74		(Corr'd Nav, Kongsberg 14208, img#234) (V) (T.A)			
Jan-12-21	16:29:06	1820	EQ20547 BW1-8			Camera	31	624518	4455541	624840	4455633	-322	-92	335	74		(Corr'd Nav, Kongsberg 14208, img#235) (V) (T.A)			
Jan-12-21	16:29:31	1821	EQ20547 BW1-8			Camera	31	624516	4455541	624840	4455633	-324	-92	337	74		(Corr'd Nav, Kongsberg 14208, img#236) (V) (T.A)			
Jan-12-21	16:31:00	1822	EQ20547 BW1-8			Camera	31	624504	4455539	624840	4455633	-336	-94	349	74		(Corr'd Nav, Kongsberg 14208, img#237) (V) (T.A)			
Jan-12-21	16:32:54	1823	EQ20547 BW1-8			Camera	31	624485	4455535	624840	4455633	-355	-98	368	75		(Corr'd Nav, Kongsberg 14208, img#238) (V) (T.A)			
Jan-12-21	16:35:06	1824	EQ20547 BW1-8			Camera	32	624460	4455525	624840	4455633	-380	-108	395	74		(Corr'd Nav, Kongsberg 14208, img#239) (V) (T.A)			
Jan-12-21	16:36:16	1825	EQ20547 BW1-8			Camera	31	624449	4455524	624840	4455633	-391	-109	406	74		(Corr'd Nav, Kongsberg 14208, img#240) (V) (T.A)			
Jan-12-21	16:37:00	1826	EQ20547 BW1-8			Camera	32	624441	4455522	624840	4455633	-399	-111	414	74		(Corr'd Nav, Kongsberg 14208, img#241) (V) (T.A)			
Jan-12-21	16:38:15	1827	EQ20547 BW1-8			Camera	32	624429	4455518	624840	4455633	-411	-115	427	74		(Corr'd Nav, Kongsberg 14208, img#242) (V) (T.A)			
Jan-12-21	16:38:40	1828	EQ20547 BW1-8			Camera	32	624424	4455515	624840	4455633	-416	-118	432	74		(Corr'd Nav, Kongsberg 14208, img#243) (V) (T.A)			
Jan-12-21	16:39:35	1829	EQ20547 BW1-8			Camera	32	624414	4455513	624840	4455633	-426	-120	442	74		(Corr'd Nav, Kongsberg 14208, img#244) (V) (T.A)			
Jan-12-21	16:39:52	1830	EQ20547 BW1-8			Camera	32	624411	4455511	624840	4455633	-429	-122	446	74		(Corr'd Nav, Kongsberg 14208, img#245) (V) (T.A)			
Jan-12-21	16:40:48	1831	EQ20547 BW1-8			Camera	32	624402	4455512	624840	4455633	-438	-121	455	75		(Corr'd Nav, Kongsberg 14208, img#246) (V) (T.A)			
Jan-12-21	16:42:41	1832	EQ20547 BW1-8			Camera	32	624386	4455501	624840	4455633	-454	-132	473	74		(Corr'd Nav, Kongsberg 14208, img#247) (V) (T.A)			
Jan-12-21	16:43:24	1833	EQ20547 BW1-8			Camera	32	624383	4455503	624840	4455633	-457	-130	476	74		(Corr'd Nav, Kongsberg 14208, img#248) (V) (T.A)			
Jan-12-21	16:44:21	1834	EQ20547 BW1-8			Camera	32	624375	4455502	624840	4455633	-465	-131	483	74		(Corr'd Nav, Kongsberg 14208, img#249) (V) (T.A)			
Jan-12-21	16:45:23	1835	EQ20547 BW1-8			Camera	32	624367	4455499	624840	4455633	-473	-134	492	74		(Corr'd Nav, Kongsberg 14208, img#250) (V) (T.A)			
Jan-12-21	16:46:17	1836	EQ20547 BW1-8			Camera	32	624358	4455496	624840	4455633	-482	-137	501	74		(Corr'd Nav, Kongsberg 14208, img#251) (V) (T.A)			
Jan-12-21	16:47:22	1837	EQ20547 BW1-8			Camera	32	624345	4455494	624840	4455633	-495	-139	514	74		(Corr'd Nav, Kongsberg 14208, img#252) (V) (T.A)			
Jan-12-21	16:47:50	1838	EQ20547 BW1-8			Camera	32	624339	4455493	624840	4455633	-501	-140	520	74		(Corr'd Nav, Kongsberg 14208, img#253) (V) (T.A)			
Jan-12-21	16:48:50	1839	EQ20547 BW1-8			Camera	32	624332	4455490	624840	4455633	-508	-143	528	74		(Corr'd Nav, Kongsberg 14208, img#254) (V) (T.A)			
Jan-12-21	16:50:11	1840	EQ20547 BW1-8			Camera	32	624322	4455488	624840	4455633	-518	-145	538	74		(Corr'd Nav, Kongsberg 14208, img#255) (V) (T.A)			
Jan-12-21	16:52:09	1841	EQ20547 BW1-8			Camera	32	624306	4455487	624840	4455633	-534	-146	554	75		(Corr'd Nav, Kongsberg 14208, img#256) (V) (T.A)			
Jan-12-21	16:52:52	1842	EQ20547 BW1-8			Camera	32	624298	4455481	624840	4455633	-542	-152	562	74		(Corr'd Nav, Kongsberg 14208, img#257) (V) (T.A)			
Jan-12-21	16:54:14	1843	EQ20547 BW1-8			Camera	32	624288	4455478	624840	4455633	-552	-155	574	74		(Corr'd Nav, Kongsberg 14208, img#258) (V) (T.A)			
Jan-12-21	16:55:21	1844	EQ20547 BW1-8			Camera	31	624277	4455470	624840	4455633	-563	-163	586	74		(Corr'd Nav, Kongsberg 14208, img#259) (V) (T.A)			
Jan-12-21	16:56:37	1845	EQ20547 BW1-8			Camera	31	624262	4455466	624840	4455633	-578	-167	602	74		(Corr'd Nav, Kongsberg 14208, img#260) (V) (T.A)			
Jan-12-21	16:57:03	1846	EQ20547 BW1-8			Camera	32	624258	4455466	624840	4455633	-582	-167	605	74		(Corr'd Nav, Kongsberg 14208, img#261) (V) (T.A)			
Jan-12-21	16:57:48	1847	EQ20547 BW1-8			Camera	31	624258	4455470	624840	4455633	-582	-163	604	74		(Corr'd Nav, Kongsberg 14208, img#262) (V) (T.A)			
Jan-12-21	16:58:52	1848	EQ20547 BW1-8			Camera	31	624262	4455481	624840	4455633	-578	-152	597	75		(Corr'd Nav, Kongsberg 14208, img#263) (V) (T.A)			
Jan-12-21	16:59:24	1849	EQ20547 BW1-8			Camera	31	624262	4455481	624840	4455633	-578	-152	598	75		(Corr'd Nav, Kongsberg 14208, img#264) (V) (T.A)			
Jan-12-21	17:00:01	1850	EQ20547 BW1-8			Camera	31	624264	4455478	624840	4455633	-576	-155	597	75		(Corr'd Nav, Kongsberg 14208, img#265) (V) (T.A)			
Jan-12-21	17:00:34	1851	EQ20547 BW1-8			Camera	32	624266	4455473	624840	4455633	-574	-160	596	74		(Corr'd Nav, Kongsberg 14208, img#266) (V) (T.A)			
Jan-12-21	17:01:38	1852	EQ20547 BW1-8			Camera	31	624269	4455467	624840	4455633	-571	-166	595	74		(Corr'd Nav, Kongsberg 14208, img#267) (V) (T.A)			
Jan-12-21	17:02:09	1853	EQ20547 BW1-8			Camera	31	624268	4455466	624840	4455633	-572	-167	596	74		(Corr'd Nav, Kongsberg 14208, img#268) (V) (T.A)			
Jan-12-21	17:02:43	1854	EQ20547 BW1-8			Camera	31	624266	4455467	624840	4455633	-574	-166	598	74		(Corr'd Nav, Kongsberg 14208, img#269) (V) (T.A)			
Jan-12-21	17:04:48	1855	EQ20547 BW1-8			Camera	31	624254	4455479	624840	4455633	-586	-154	606	75		(Corr'd Nav, Kongsberg 14208, img#270) (V) (T.A)			
Jan-12-21	17:05:52	1856	EQ20547 BW1-8			Camera	31	624259	4455483	624840	4455633	-581	-150	601	76		(Corr'd Nav, Kongsberg 14208, img#271) (V) (T.A)			
Jan-12-21	17:07:37	1857	EQ20547 BW1-8			Camera	31	624268	4455471	624840	4455633	-572	-162	595	74		(Corr'd Nav, Kongsberg 14208, img#272) (V) (T.A)			
Jan-12-21	17:07:50	1858	EQ20547 BW1-8			Camera	31	624268	4455471	624840	4455633	-572	-162	595	74		(Corr'd Nav, Kongsberg 14208, img#273) (V) (T.A)			
Jan-12-21	17:08:06	1859	EQ20547 BW1-8			Camera	31	624268	4455470	624840	4455633	-572	-163	595	74		(Corr'd Nav, Kongsberg 14208, img#274) (V) (T.A)			
Jan-12-21	19:07:33	1860	EQ20547 BW1-7			Camera	30	622695	4455295	622702	4455292	-7	3	8	110		(Corr'd Nav, Kongsberg 14208, img#1) (V) (T.A)			
Jan-12-21	19:10:11	1861	EQ20547 BW1-7			Camera	30	622700	4455302	622702	4455292	-2	10	10	170		(Corr'd Nav, Kongsberg 14208, img#2) (V) (T.A)			
Jan-12-21	19:11:08	1862	EQ20547 BW1-7			Camera	30	622708	4455296	622702	4455292	6	4	7	235		(Corr'd Nav, Kongsberg 14208, img#3) (V) (T.A)			
Jan-12-21	19:11:46	1863	EQ20547 BW1-7			Camera	30	622708	4455290	622702	4455292	6	-2	7	286		(Corr'd Nav, Kongsberg 14208, img#4) (V) (T.A)			
Jan-12-21	19:12:20	1864	EQ20547 BW1-7			Camera	30	622704	4455284	622702	4455292	2	-8	8	346		(Corr'd Nav, Kongsberg 14208, img#5) (V) (T.A)			
Jan-12-21	19:12:36	1865	EQ20547 BW1-7			Camera	30	622702	4455283	622702	4455292	0	-9	9	358		(Corr'd Nav, Kongsberg 14208, img#6) (V) (T.A)			
Jan-12-21	19:13:53	1866	EQ20547 BW1-7			Camera	30	622696	4455291	622702	4455292	-6	-1	6	82		(Corr'd Nav, Kongsberg 14208, img#7) (V) (T.A)			
Jan-12-21	19:14:14	1867	EQ20547 BW1-7			Camera	30	622699	4455294	622702	4455292	-3	2	3	127		(Corr'd Nav, Kongsberg 14208, img#8) (V) (T.A)			
Jan-12-21	19:14:52	1868	EQ20547 BW1-7			Camera	30	622705	4455298	622702	4455292	3	6	6	207		(Corr'd Nav, Kongsberg 14208, img#9) (V) (T.A)			
Jan-12-21	19:15:08	1869	EQ20547 BW1-7			Camera	30	622704	4455302	622702	4455292	2	10	10	193		(Corr'd Nav, Kongsberg 14208, img#10) (V) (T.A)			
Jan-12-21	19:15:45	1870	EQ20547 BW1-7			Camera														



APPENDIX A FIELD SAMPLING LOGS

Gardline										Seafloor Sampling Positioning Summary											
Job No		11543							Vessel		MV Ocean Endeavour										
Client		Equinor US Wind LLC							Vessel Reference Point (VRP)		CoG										
Project Name		Empire Wind Extension							Deployment Location		Grab Deployment Point			x	6.7	y	21.94	z	2.93		
Primary Positioning System		Starpack 1							Actual Coordinates derived from		Deployment Location										
Geodetic Reference System		Datum			WGS 84 - NAD 83 (2018.0 ITRF 2014)			Ellipsoid		GRS 80		Projection			UTM ZONE 18 N (75 W)			Vertical / Tidal Datum		NAVD 88	
Date	Time	Fix number	Station Number	Penetration	Sample	Retention	Observed	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks				
Jan-12-21	19:24:45	1880	EQ20547 BW1-7			Camera	30	622698	4455294	622702	4455292	-4	2	5	118		(Corr'd Nav, Kongsberg 14208, img#21) (V) (T.A)				
Jan-12-21	19:24:54	1881	EQ20547 BW1-7			Camera	30	622697	4455295	622702	4455292	-5	3	6	119		(Corr'd Nav, Kongsberg 14208, img#22) (V) (T.A)				
Jan-12-21	19:25:30	1882	EQ20547 BW1-7			Camera	30	622693	4455298	622702	4455292	-9	6	11	122		(Corr'd Nav, Kongsberg 14208, img#23) (V) (T.A)				
Jan-12-21	19:27:46	1883	EQ20547 BW1-7			Camera	30	622679	4455293	622702	4455292	-23	1	23	92		(Corr'd Nav, Kongsberg 14208, img#24) (V) (T.A)				
Jan-12-21	19:28:44	1884	EQ20547 BW1-7			Camera	30	622666	4455296	622702	4455292	-36	4	36	96		(Corr'd Nav, Kongsberg 14208, img#25) (V) (T.A)				
Jan-12-21	19:29:58	1885	EQ20547 BW1-7			Camera	30	622649	4455296	622702	4455292	-53	4	53	94		(Corr'd Nav, Kongsberg 14208, img#26) (V) (T.A)				
Jan-12-21	19:31:22	1886	EQ20547 BW1-7			Camera	30	622629	4455297	622702	4455292	-73	5	73	94		(Corr'd Nav, Kongsberg 14208, img#27) (V) (T.A)				
Jan-12-21	19:32:31	1887	EQ20547 BW1-7			Camera	30	622607	4455297	622702	4455292	-95	5	95	93		(Corr'd Nav, Kongsberg 14208, img#28) (V) (T.A)				
Jan-12-21	19:33:08	1888	EQ20547 BW1-7			Camera	30	622595	4455296	622702	4455292	-107	4	107	92		(Corr'd Nav, Kongsberg 14208, img#29) (V) (T.A)				
Jan-12-21	19:33:43	1889	EQ20547 BW1-7			Camera	30	622583	4455298	622702	4455292	-119	6	119	93		(Corr'd Nav, Kongsberg 14208, img#30) (V) (T.A)				
Jan-12-21	19:33:58	1890	EQ20547 BW1-7			Camera	30	622577	4455299	622702	4455292	-125	7	125	93		(Corr'd Nav, Kongsberg 14208, img#31) (V) (T.A)				
Jan-12-21	19:34:20	1891	EQ20547 BW1-7			Camera	30	622569	4455300	622702	4455292	-133	8	133	94		(Corr'd Nav, Kongsberg 14208, img#32) (V) (T.A)				
Jan-12-21	19:34:34	1892	EQ20547 BW1-7			Camera	30	622564	4455301	622702	4455292	-138	9	138	94		(Corr'd Nav, Kongsberg 14208, img#33) (V) (T.A)				
Jan-12-21	19:35:32	1893	EQ20547 BW1-7			Camera	30	622543	4455301	622702	4455292	-159	9	160	93		(Corr'd Nav, Kongsberg 14208, img#34) (V) (T.A)				
Jan-12-21	19:36:07	1894	EQ20547 BW1-7			Camera	30	622531	4455301	622702	4455292	-171	9	171	93		(Corr'd Nav, Kongsberg 14208, img#35) (V) (T.A)				
Jan-12-21	19:36:40	1895	EQ20547 BW1-7			Camera	30	622520	4455300	622702	4455292	-182	8	182	93		(Corr'd Nav, Kongsberg 14208, img#36) (V) (T.A)				
Jan-12-21	19:36:59	1896	EQ20547 BW1-7			Camera	30	622513	4455301	622702	4455292	-189	9	189	93		(Corr'd Nav, Kongsberg 14208, img#37) (V) (T.A)				
Jan-12-21	19:37:11	1897	EQ20547 BW1-7			Camera	30	622509	4455301	622702	4455292	-193	9	193	93		(Corr'd Nav, Kongsberg 14208, img#38) (V) (T.A)				
Jan-12-21	19:37:39	1898	EQ20547 BW1-7			Camera	30	622499	4455302	622702	4455292	-203	10	203	93		(Corr'd Nav, Kongsberg 14208, img#39) (V) (T.A)				
Jan-12-21	19:38:22	1899	EQ20547 BW1-7			Camera	30	622484	4455304	622702	4455292	-218	12	218	93		(Corr'd Nav, Kongsberg 14208, img#40) (V) (T.A)				
Jan-12-21	19:39:42	1900	EQ20547 BW1-7			Camera	30	622456	4455306	622702	4455292	-246	14	246	93		(Corr'd Nav, Kongsberg 14208, img#41) (V) (T.A)				
Jan-12-21	19:40:38	1901	EQ20547 BW1-7			Camera	30	622440	4455307	622702	4455292	-262	15	262	93		(Corr'd Nav, Kongsberg 14208, img#42) (V) (T.A)				
Jan-12-21	19:42:43	1902	EQ20547 BW1-7			Camera	30	622410	4455308	622702	4455292	-292	16	292	93		(Corr'd Nav, Kongsberg 14208, img#43) (V) (T.A)				
Jan-12-21	19:43:11	1903	EQ20547 BW1-7			Camera	30	622406	4455313	622702	4455292	-296	21	297	94		(Corr'd Nav, Kongsberg 14208, img#44) (V) (T.A)				
Jan-12-21	19:43:48	1904	EQ20547 BW1-7			Camera	30	622401	4455320	622702	4455292	-301	28	302	95		(Corr'd Nav, Kongsberg 14208, img#45) (V) (T.A)				
Jan-12-21	19:44:22	1905	EQ20547 BW1-7			Camera	30	622395	4455320	622702	4455292	-307	28	309	95		(Corr'd Nav, Kongsberg 14208, img#46) (V) (T.A)				
Jan-12-21	19:45:07	1906	EQ20547 BW1-7			Camera	30	622396	4455317	622702	4455292	-306	25	307	95		(Corr'd Nav, Kongsberg 14208, img#47) (V) (T.A)				
Jan-12-21	19:47:43	1907	EQ20547 BW1-7			Camera	30	622402	4455305	622702	4455292	-300	13	300	92		(Corr'd Nav, Kongsberg 14208, img#48) (V) (T.A)				
Jan-12-21	19:49:40	1908	EQ20547 BW1-7			Camera	30	622394	4455312	622702	4455292	-308	20	308	94		(Corr'd Nav, Kongsberg 14208, img#49) (V) (T.A)				
Jan-12-21	19:50:07	1909	EQ20547 BW1-7			Camera	30	622398	4455317	622702	4455292	-304	25	305	95		(Corr'd Nav, Kongsberg 14208, img#50) (V) (T.A)				
Jan-12-21	19:50:36	1910	EQ20547 BW1-7			Camera	30	622402	4455318	622702	4455292	-300	26	302	95		(Corr'd Nav, Kongsberg 14208, img#51) (V) (T.A)				
Jan-12-21	19:51:00	1911	EQ20547 BW1-7			Camera	30	622405	4455317	622702	4455292	-297	25	298	95		(Corr'd Nav, Kongsberg 14208, img#52) (V) (T.A)				
Jan-12-21	19:51:15	1912	EQ20547 BW1-7			Camera	30	622407	4455316	622702	4455292	-295	24	296	95		(Corr'd Nav, Kongsberg 14208, img#53) (V) (T.A)				
Jan-12-21	19:51:28	1913	EQ20547 BW1-7			Camera	30	622409	4455314	622702	4455292	-293	22	293	94		(Corr'd Nav, Kongsberg 14208, img#54) (V) (T.A)				
Jan-12-21	19:51:49	1914	EQ20547 BW1-7			Camera	30	622412	4455308	622702	4455292	-290	16	291	93		(Corr'd Nav, Kongsberg 14208, img#55) (V) (T.A)				
Jan-12-21	19:52:26	1915	EQ20547 BW1-7			Camera	30	622412	4455306	622702	4455292	-290	14	290	93		(Corr'd Nav, Kongsberg 14208, img#56) (V) (T.A)				
Jan-12-21	19:53:14	1916	EQ20547 BW1-7			Camera	30	622409	4455308	622702	4455292	-293	16	294	93		(Corr'd Nav, Kongsberg 14208, img#57) (V) (T.A)				
Jan-12-21	19:53:46	1917	EQ20547 BW1-7			Camera	30	622405	4455309	622702	4455292	-297	17	298	93		(Corr'd Nav, Kongsberg 14208, img#58) (V) (T.A)				
Jan-12-21	19:54:09	1918	EQ20547 BW1-7			Camera	30	622403	4455309	622702	4455292	-299	17	300	93		(Corr'd Nav, Kongsberg 14208, img#59) (V) (T.A)				
Jan-12-21	19:54:37	1919	EQ20547 BW1-7			Camera	30	622399	4455309	622702	4455292	-303	17	303	93		(Corr'd Nav, Kongsberg 14208, img#60) (V) (T.A)				
Jan-12-21	19:55:04	1920	EQ20547 BW1-7			Camera	30	622397	4455309	622702	4455292	-305	17	305	93		(Corr'd Nav, Kongsberg 14208, img#61) (V) (T.A)				
Jan-12-21	19:55:45	1921	EQ20547 BW1-7			Camera	30	622397	4455313	622702	4455292	-305	21	305	94		(Corr'd Nav, Kongsberg 14208, img#62) (V) (T.A)				
Jan-12-21	19:56:36	1922	EQ20547 BW1-7			Camera	30	622402	4455316	622702	4455292	-300	24	301	95		(Corr'd Nav, Kongsberg 14208, img#63) (V) (T.A)				
Jan-12-21	19:57:03	1923	EQ20547 BW1-7			Camera	30	622406	4455314	622702	4455292	-296	22	297	94		(Corr'd Nav, Kongsberg 14208, img#64) (V) (T.A)				
Jan-12-21	19:57:37	1924	EQ20547 BW1-7			Camera	30	622411	4455307	622702	4455292	-291	15	292	93		(Corr'd Nav, Kongsberg 14208, img#65) (V) (T.A)				
Jan-12-21	19:58:30	1925	EQ20547 BW1-7			Camera	30	622415	4455308	622702	4455292	-287	16	288	93		(Corr'd Nav, Kongsberg 14208, img#66) (V) (T.A)				
Jan-12-21	19:59:27	1926	EQ20547 BW1-7			Camera	30	622412	4455313	622702	4455292	-290	21	291	94		(Corr'd Nav, Kongsberg 14208, img#67) (V) (T.A)				
Jan-12-21	20:01:55	1927	EQ20547 BW1-7			Camera	30	622396	4455311	622702	4455292	-306	19	307	94		(Corr'd Nav, Kongsberg 14208, img#68) (V) (T.A)				
Jan-12-21	20:02:01	1928	EQ20547 BW1-7			Camera	30	622395	4455311	622702	4455292	-307	19	307	94		(Corr'd Nav, Kongsberg 14208, img#69) (V) (T.A)				
Jan-12-21	20:03:23	1929	EQ20547 BW1-7			Camera	30	622384	4455315	622702	4455292	-318	23	319	94		(Corr'd Nav, Kongsberg 14208, img#70) (V) (T.A)				
Jan-12-21	20:06:09	1930	EQ20547 BW1-7			Camera	30	622324	4455315	622702	4455292	-378	23	379	93		(Corr'd Nav, Kongsberg 14208, img#71) (V) (T.A)				
Jan-12-21	20:09:38	1931	EQ20547 BW1-7			Camera	30	622248	4455319	622702	4455292	-454	27	455	93		(Corr'd Nav, Kongsberg 14208, img#72) (V) (T.A)				
Jan-12-21	20:10:29	1932	EQ20547 BW1-7			Camera	30	622232	4455318	622702	4455292	-470	26	471	93		(Corr'd Nav, Kongsberg 14208, img#73) (V) (T.A)				
Jan-12-21	20:11:58	1933	EQ20547 BW1-7			Camera	30	622201	4455323	622702	4455292	-501	31	502	9						



APPENDIX A FIELD SAMPLING LOGS

Gardline										Seafloor Sampling Positioning Summary										
Job No		11543							Vessel		MV <i>Ocean Endeavour</i>									
Client		Equinor US Wind LLC							Vessel Reference Point (VRP)		CoG									
Project Name		Empire Wind Extension							Deployment Location		Grab Deployment Point				x	6.7	y	21.94	z	2.93
Primary Positioning System		Starpack 1							Actual Coordinates derived from		Deployment Location									
Geodetic Reference System		Datum			WGS 84 - NAD 83 (2018.0 ITRF 2014)			Ellipsoid	GRS 80		Projection		UTM ZONE 18 N (75 W)				Vertical / Tidal Datum		NAVD 88	
Date	Time	Fix number	Station Number	Penetration	Sample	Retention	Observed	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks			
Jan-12-21	20:23:40	1943	EQ20547 BW1-7			Camera	30	622095	4455335	622702	4455292	-607	43	609	94		(Corr'd Nav, Kongsberg 14208, img#84) (V) (T.A)			
Jan-12-21	20:24:34	1944	EQ20547 BW1-7			Camera	30	622095	4455332	622702	4455292	-607	40	608	94		(Corr'd Nav, Kongsberg 14208, img#85) (V) (T.A)			
Jan-12-21	20:24:55	1945	EQ20547 BW1-7			Camera	30	622098	4455330	622702	4455292	-604	38	605	94		(Corr'd Nav, Kongsberg 14208, img#86) (V) (T.A)			
Jan-12-21	20:25:58	1946	EQ20547 BW1-7			Camera	30	622110	4455326	622702	4455292	-592	34	593	93		(Corr'd Nav, Kongsberg 14208, img#87) (V) (T.A)			
Jan-12-21	20:26:20	1947	EQ20547 BW1-7			Camera	30	622110	4455323	622702	4455292	-592	31	593	93		(Corr'd Nav, Kongsberg 14208, img#88) (V) (T.A)			
Jan-12-21	20:26:53	1948	EQ20547 BW1-7			Camera	30	622108	4455321	622702	4455292	-594	29	594	93		(Corr'd Nav, Kongsberg 14208, img#89) (V) (T.A)			
Jan-12-21	20:27:12	1949	EQ20547 BW1-7			Camera	30	622107	4455322	622702	4455292	-595	30	595	93		(Corr'd Nav, Kongsberg 14208, img#90) (V) (T.A)			
Jan-12-21	20:27:58	1950	EQ20547 BW1-7			Camera	30	622106	4455327	622702	4455292	-596	35	597	93		(Corr'd Nav, Kongsberg 14208, img#91) (V) (T.A)			
Jan-12-21	21:40:20	1951	EQ20547 BW1-6-1			Camera	30	618509	4454971	618518	4454983	-9	-12	15	38		(Corr'd Nav, Kongsberg 14208, img#92) (V) (T.A)			
Jan-12-21	21:40:48	1952	EQ20547 BW1-6-1			Camera	30	618503	4454969	618518	4454983	-15	-14	21	47		(Corr'd Nav, Kongsberg 14208, img#93) (V) (T.A)			
Jan-12-21	21:41:28	1953	EQ20547 BW1-6-1			Camera	30	618495	4454966	618518	4454983	-23	-16	28	55		(Corr'd Nav, Kongsberg 14208, img#94) (V) (T.A)			
Jan-12-21	21:42:48	1954	EQ20547 BW1-6-1			Camera	30	618479	4454958	618518	4454983	-39	-25	46	58		(Corr'd Nav, Kongsberg 14208, img#95) (V) (T.A)			
Jan-12-21	21:43:17	1955	EQ20547 BW1-6-1			Camera	30	618472	4454957	618518	4454983	-47	-26	53	61		(Corr'd Nav, Kongsberg 14208, img#96) (V) (T.A)			
Jan-12-21	21:43:52	1956	EQ20547 BW1-6-1			Camera	30	618464	4454954	618518	4454983	-54	-29	61	62		(Corr'd Nav, Kongsberg 14208, img#97) (V) (T.A)			
Jan-12-21	21:44:09	1957	EQ20547 BW1-6-1			Camera	30	618461	4454952	618518	4454983	-58	-31	65	62		(Corr'd Nav, Kongsberg 14208, img#98) (V) (T.A)			
Jan-12-21	21:45:11	1958	EQ20547 BW1-6-1			Camera	30	618451	4454944	618518	4454983	-67	-39	78	60		(Corr'd Nav, Kongsberg 14208, img#99) (V) (T.A)			
Jan-12-21	21:46:28	1959	EQ20547 BW1-6-1			Camera	30	618441	4454938	618518	4454983	-77	-45	90	60		(Corr'd Nav, Kongsberg 14208, img#100) (V) (T.A)			
Jan-12-21	21:48:23	1960	EQ20547 BW1-6-1			Camera	30	618423	4454927	618518	4454983	-96	-56	111	60		(Corr'd Nav, Kongsberg 14208, img#101) (V) (T.A)			
Jan-12-21	21:49:12	1961	EQ20547 BW1-6-1			Camera	30	618415	4454923	618518	4454983	-103	-59	119	60		(Corr'd Nav, Kongsberg 14208, img#102) (V) (T.A)			
Jan-12-21	21:50:14	1962	EQ20547 BW1-6-1			Camera	30	618405	4454920	618518	4454983	-114	-63	130	61		(Corr'd Nav, Kongsberg 14208, img#103) (V) (T.A)			
Jan-12-21	21:51:46	1963	EQ20547 BW1-6-1			Camera	30	618388	4454910	618518	4454983	-130	-72	149	61		(Corr'd Nav, Kongsberg 14208, img#104) (V) (T.A)			
Jan-12-21	21:52:03	1964	EQ20547 BW1-6-1			Camera	30	618385	4454908	618518	4454983	-134	-75	153	61		(Corr'd Nav, Kongsberg 14208, img#105) (V) (T.A)			
Jan-12-21	21:54:30	1965	EQ20547 BW1-6-1			Camera	30	618359	4454899	618518	4454983	-160	-84	180	62		(Corr'd Nav, Kongsberg 14208, img#106) (V) (T.A)			
Jan-12-21	21:56:07	1966	EQ20547 BW1-6-1			Camera	30	618343	4454889	618518	4454983	-176	-94	199	62		(Corr'd Nav, Kongsberg 14208, img#107) (V) (T.A)			
Jan-12-21	21:57:27	1967	EQ20547 BW1-6-1			Camera	30	618327	4454881	618518	4454983	-191	-101	216	62		(Corr'd Nav, Kongsberg 14208, img#108) (V) (T.A)			
Jan-12-21	21:58:15	1968	EQ20547 BW1-6-1			Camera	30	618318	4454877	618518	4454983	-200	-106	227	62		(Corr'd Nav, Kongsberg 14208, img#109) (V) (T.A)			
Jan-12-21	21:59:45	1969	EQ20547 BW1-6-1			Camera	30	618300	4454868	618518	4454983	-218	-114	246	62		(Corr'd Nav, Kongsberg 14208, img#110) (V) (T.A)			
Jan-12-21	22:00:24	1970	EQ20547 BW1-6-1			Camera	30	618292	4454864	618518	4454983	-226	-119	256	62		(Corr'd Nav, Kongsberg 14208, img#111) (V) (T.A)			
Jan-12-21	22:02:18	1971	EQ20547 BW1-6-1			Camera	30	618273	4454857	618518	4454983	-245	-126	276	63		(Corr'd Nav, Kongsberg 14208, img#112) (V) (T.A)			
Jan-12-21	22:02:53	1972	EQ20547 BW1-6-1			Camera	30	618268	4454855	618518	4454983	-251	-128	281	63		(Corr'd Nav, Kongsberg 14208, img#113) (V) (T.A)			
Jan-12-21	22:03:32	1973	EQ20547 BW1-6-1			Camera	30	618263	4454850	618518	4454983	-255	-132	287	63		(Corr'd Nav, Kongsberg 14208, img#114) (V) (T.A)			
Jan-12-21	22:07:28	1974	EQ20547 BW1-6-1			Camera	30	618250	4454840	618518	4454983	-268	-143	304	62		(Corr'd Nav, Kongsberg 14208, img#115) (V) (T.A)			
Jan-12-21	22:08:13	1975	EQ20547 BW1-6-1			Camera	30	618251	4454837	618518	4454983	-268	-145	305	62		(Corr'd Nav, Kongsberg 14208, img#116) (V) (T.A)			
Jan-12-21	22:09:13	1976	EQ20547 BW1-6-1			Camera	30	618250	4454838	618518	4454983	-268	-145	305	62		(Corr'd Nav, Kongsberg 14208, img#117) (V) (T.A)			
Jan-12-21	22:10:31	1977	EQ20547 BW1-6-1			Camera	30	618251	4454838	618518	4454983	-267	-145	304	62		(Corr'd Nav, Kongsberg 14208, img#118) (V) (T.A)			
Jan-12-21	22:11:14	1978	EQ20547 BW1-6-1			Camera	30	618254	4454837	618518	4454983	-264	-146	302	61		(Corr'd Nav, Kongsberg 14208, img#119) (V) (T.A)			
Jan-12-21	22:12:01	1979	EQ20547 BW1-6-1			Camera	30	618255	4454837	618518	4454983	-264	-146	301	61		(Corr'd Nav, Kongsberg 14208, img#120) (V) (T.A)			
Jan-12-21	22:13:13	1980	EQ20547 BW1-6-1			Camera	30	618255	4454838	618518	4454983	-263	-145	300	61		(Corr'd Nav, Kongsberg 14208, img#121) (V) (T.A)			
Jan-12-21	22:13:46	1981	EQ20547 BW1-6-1			Camera	30	618255	4454838	618518	4454983	-263	-145	300	61		(Corr'd Nav, Kongsberg 14208, img#122) (V) (T.A)			
Jan-12-21	22:14:08	1982	EQ20547 BW1-6-1			Camera	30	618256	4454838	618518	4454983	-262	-144	299	61		(Corr'd Nav, Kongsberg 14208, img#123) (V) (T.A)			
Jan-12-21	22:17:38	1983	EQ20547 BW1-6-1			Camera	30	618231	4454824	618518	4454983	-287	-158	328	61		(Corr'd Nav, Kongsberg 14208, img#124) (V) (T.A)			
Jan-12-21	22:19:16	1984	EQ20547 BW1-6-1			Camera	30	618215	4454818	618518	4454983	-303	-165	345	61		(Corr'd Nav, Kongsberg 14208, img#125) (V) (T.A)			
Jan-12-21	22:20:35	1985	EQ20547 BW1-6-1			Camera	30	618202	4454811	618518	4454983	-316	-172	360	61		(Corr'd Nav, Kongsberg 14208, img#126) (V) (T.A)			
Jan-12-21	22:21:59	1986	EQ20547 BW1-6-1			Camera	30	618188	4454803	618518	4454983	-330	-180	376	61		(Corr'd Nav, Kongsberg 14208, img#127) (V) (T.A)			
Jan-12-21	22:22:24	1987	EQ20547 BW1-6-1			Camera	30	618184	4454801	618518	4454983	-335	-181	381	62		(Corr'd Nav, Kongsberg 14208, img#128) (V) (T.A)			
Jan-12-21	22:22:46	1988	EQ20547 BW1-6-1			Camera	30	618180	4454800	618518	4454983	-338	-183	385	62		(Corr'd Nav, Kongsberg 14208, img#129) (V) (T.A)			
Jan-12-21	22:23:36	1989	EQ20547 BW1-6-1			Camera	30	618173	4454797	618518	4454983	-346	-185	392	62		(Corr'd Nav, Kongsberg 14208, img#130) (V) (T.A)			
Jan-12-21	22:25:16	1990	EQ20547 BW1-6-1			Camera	30	618161	4454788	618518	4454983	-358	-194	407	61		(Corr'd Nav, Kongsberg 14208, img#131) (V) (T.A)			
Jan-12-21	22:25:26	1991	EQ20547 BW1-6-1			Camera	30	618159	4454787	618518	4454983	-359	-196	409	61		(Corr'd Nav, Kongsberg 14208, img#132) (V) (T.A)			
Jan-12-21	22:26:04	1992	EQ20547 BW1-6-1			Camera	30	618154	4454782	618518	4454983	-364	-200	416	61		(Corr'd Nav, Kongsberg 14208, img#133) (V) (T.A)			
Jan-12-21	22:26:55	1993	EQ20547 BW1-6-1			Camera	30	618143	4454781	618518	4454983	-375	-202	426	62		(Corr'd Nav, Kongsberg 14208, img#134) (V) (T.A)			
Jan-12-21	22:28:02	1994	EQ20547 BW1-6-1			Camera	29	618131	4454776	618518	4454983	-387	-206	438	62		(Corr'd Nav, Kongsberg 14208, img#135) (V) (T.A)			
Jan-12-21	22:29:12	1995	EQ20547 BW1-6-1			Camera	30	618121	4454769	618518	4454983	-398	-214							



APPENDIX A FIELD SAMPLING LOGS

Gardline										Seafloor Sampling Positioning Summary											
Job No		11543							Vessel		MV <i>Ocean Endeavour</i>										
Client		Equinor US Wind LLC							Vessel Reference Point (VRP)		CoG										
Project Name		Empire Wind Extension							Deployment Location		Grab Deployment Point			x	6.7	y	21.94	z	2.93		
Primary Positioning System		Starpack 1							Actual Coordinates derived from		Deployment Location										
Geodetic Reference System		Datum			WGS 84 - NAD 83 (2018.0 ITRF 2014)			Ellipsoid		GRS 80		Projection			UTM ZONE 18 N (75 W)			Vertical / Tidal Datum		NAVD 88	
Date	Time	Fix number	Station Number	Penetration	Sample	Retention	Observed	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks				
Jan-12-21	22:37:54	2006	EQ20547 BW1-6-1			Camera	30	618036	4454722	618518	4454983	-482	-261	548	62		(Corr'd Nav, Kongsberg 14208, img#147) (V) (T.A)				
Jan-12-21	22:38:54	2007	EQ20547 BW1-6-1			Camera	30	618027	4454720	618518	4454983	-491	-263	557	62		(Corr'd Nav, Kongsberg 14208, img#148) (V) (T.A)				
Jan-12-21	22:39:37	2008	EQ20547 BW1-6-1			Camera	30	618021	4454717	618518	4454983	-497	-265	564	62		(Corr'd Nav, Kongsberg 14208, img#149) (V) (T.A)				
Jan-12-21	22:39:45	2009	EQ20547 BW1-6-1			Camera	29	618020	4454717	618518	4454983	-498	-266	565	62		(Corr'd Nav, Kongsberg 14208, img#150) (V) (T.A)				
Jan-12-21	22:40:06	2010	EQ20547 BW1-6-1			Camera	30	618017	4454715	618518	4454983	-501	-267	568	62		(Corr'd Nav, Kongsberg 14208, img#151) (V) (T.A)				
Jan-12-21	22:41:26	2011	EQ20547 BW1-6-1			Camera	30	618007	4454707	618518	4454983	-511	-275	580	62		(Corr'd Nav, Kongsberg 14208, img#152) (V) (T.A)				
Jan-12-21	22:42:17	2012	EQ20547 BW1-6-1			Camera	30	617999	4454704	618518	4454983	-519	-279	589	62		(Corr'd Nav, Kongsberg 14208, img#153) (V) (T.A)				
Jan-12-21	22:43:13	2013	EQ20547 BW1-6-1			Camera	30	617992	4454698	618518	4454983	-527	-284	599	62		(Corr'd Nav, Kongsberg 14208, img#154) (V) (T.A)				
Jan-13-21	00:43:06	2014	EQ20547 BW1-5-1			Camera	31	614294	4454473	614298	4454489	-5	-16	17	17		(Corr'd Nav, Kongsberg 14208, img#1) (V) (T.A)				
Jan-13-21	00:43:33	2015	EQ20547 BW1-5-1			Camera	31	614290	4454471	614298	4454489	-9	-18	20	26		(Corr'd Nav, Kongsberg 14208, img#2) (V) (T.A)				
Jan-13-21	00:43:57	2016	EQ20547 BW1-5-1			Camera	31	614284	4454470	614298	4454489	-14	-19	24	37		(Corr'd Nav, Kongsberg 14208, img#3) (V) (T.A)				
Jan-13-21	00:44:23	2017	EQ20547 BW1-5-1			Camera	30	614279	4454471	614298	4454489	-20	-18	27	47		(Corr'd Nav, Kongsberg 14208, img#4) (V) (T.A)				
Jan-13-21	00:45:04	2018	EQ20547 BW1-5-1			Camera	31	614268	4454471	614298	4454489	-31	-18	35	59		(Corr'd Nav, Kongsberg 14208, img#5) (V) (T.A)				
Jan-13-21	00:45:21	2019	EQ20547 BW1-5-1			Camera	31	614264	4454471	614298	4454489	-35	-18	39	62		(Corr'd Nav, Kongsberg 14208, img#6) (V) (T.A)				
Jan-13-21	00:45:40	2020	EQ20547 BW1-5-1			Camera	31	614260	4454471	614298	4454489	-39	-19	43	64		(Corr'd Nav, Kongsberg 14208, img#7) (V) (T.A)				
Jan-13-21	00:46:34	2021	EQ20547 BW1-5-1			Camera	31	614250	4454467	614298	4454489	-48	-23	53	65		(Corr'd Nav, Kongsberg 14208, img#8) (V) (T.A)				
Jan-13-21	00:47:09	2022	EQ20547 BW1-5-1			Camera	31	614245	4454463	614298	4454489	-54	-26	60	64		(Corr'd Nav, Kongsberg 14208, img#9) (V) (T.A)				
Jan-13-21	00:47:34	2023	EQ20547 BW1-5-1			Camera	31	614241	4454460	614298	4454489	-57	-29	64	63		(Corr'd Nav, Kongsberg 14208, img#10) (V) (T.A)				
Jan-13-21	00:47:49	2024	EQ20547 BW1-5-1			Camera	31	614238	4454459	614298	4454489	-60	-31	68	63		(Corr'd Nav, Kongsberg 14208, img#11) (V) (T.A)				
Jan-13-21	00:48:19	2025	EQ20547 BW1-5-1			Camera	31	614231	4454457	614298	4454489	-67	-33	75	64		(Corr'd Nav, Kongsberg 14208, img#12) (V) (T.A)				
Jan-13-21	00:48:49	2026	EQ20547 BW1-5-1			Camera	30	614227	4454455	614298	4454489	-72	-35	80	64		(Corr'd Nav, Kongsberg 14208, img#13) (V) (T.A)				
Jan-13-21	00:49:24	2027	EQ20547 BW1-5-1			Camera	31	614222	4454454	614298	4454489	-76	-36	84	65		(Corr'd Nav, Kongsberg 14208, img#14) (V) (T.A)				
Jan-13-21	00:50:40	2028	EQ20547 BW1-5-1			Camera	31	614214	4454452	614298	4454489	-84	-38	92	66		(Corr'd Nav, Kongsberg 14208, img#15) (V) (T.A)				
Jan-13-21	00:51:44	2029	EQ20547 BW1-5-1			Camera	31	614206	4454447	614298	4454489	-93	-42	102	66		(Corr'd Nav, Kongsberg 14208, img#16) (V) (T.A)				
Jan-13-21	00:52:38	2030	EQ20547 BW1-5-1			Camera	31	614201	4454444	614298	4454489	-97	-45	107	65		(Corr'd Nav, Kongsberg 14208, img#17) (V) (T.A)				
Jan-13-21	00:53:02	2031	EQ20547 BW1-5-1			Camera	31	614198	4454443	614298	4454489	-100	-46	110	65		(Corr'd Nav, Kongsberg 14208, img#18) (V) (T.A)				
Jan-13-21	00:53:28	2032	EQ20547 BW1-5-1			Camera	31	614195	4454442	614298	4454489	-103	-47	114	65		(Corr'd Nav, Kongsberg 14208, img#19) (V) (T.A)				
Jan-13-21	00:54:40	2033	EQ20547 BW1-5-1			Camera	31	614186	4454440	614298	4454489	-112	-50	123	66		(Corr'd Nav, Kongsberg 14208, img#20) (V) (T.A)				
Jan-13-21	00:55:43	2034	EQ20547 BW1-5-1			Camera	31	614178	4454438	614298	4454489	-120	-52	131	67		(Corr'd Nav, Kongsberg 14208, img#21) (V) (T.A)				
Jan-13-21	00:56:33	2035	EQ20547 BW1-5-1			Camera	31	614172	4454434	614298	4454489	-126	-56	138	66		(Corr'd Nav, Kongsberg 14208, img#22) (V) (T.A)				
Jan-13-21	00:57:02	2036	EQ20547 BW1-5-1			Camera	31	614168	4454432	614298	4454489	-131	-58	143	66		(Corr'd Nav, Kongsberg 14208, img#23) (V) (T.A)				
Jan-13-21	00:57:14	2037	EQ20547 BW1-5-1			Camera	31	614166	4454431	614298	4454489	-133	-59	145	66		(Corr'd Nav, Kongsberg 14208, img#24) (V) (T.A)				
Jan-13-21	00:57:44	2038	EQ20547 BW1-5-1			Camera	31	614162	4454431	614298	4454489	-137	-58	149	67		(Corr'd Nav, Kongsberg 14208, img#25) (V) (T.A)				
Jan-13-21	00:58:39	2039	EQ20547 BW1-5-1			Camera	31	614154	4454429	614298	4454489	-144	-61	156	67		(Corr'd Nav, Kongsberg 14208, img#26) (V) (T.A)				
Jan-13-21	00:59:22	2040	EQ20547 BW1-5-1			Camera	31	614148	4454426	614298	4454489	-150	-64	163	67		(Corr'd Nav, Kongsberg 14208, img#27) (V) (T.A)				
Jan-13-21	00:59:45	2041	EQ20547 BW1-5-1			Camera	31	614145	4454424	614298	4454489	-153	-66	167	67		(Corr'd Nav, Kongsberg 14208, img#28) (V) (T.A)				
Jan-13-21	01:00:15	2042	EQ20547 BW1-5-1			Camera	31	614141	4454420	614298	4454489	-157	-69	172	66		(Corr'd Nav, Kongsberg 14208, img#29) (V) (T.A)				
Jan-13-21	01:00:37	2043	EQ20547 BW1-5-1			Camera	31	614138	4454418	614298	4454489	-161	-72	176	66		(Corr'd Nav, Kongsberg 14208, img#30) (V) (T.A)				
Jan-13-21	01:00:50	2044	EQ20547 BW1-5-1			Camera	31	614136	4454416	614298	4454489	-163	-73	178	66		(Corr'd Nav, Kongsberg 14208, img#31) (V) (T.A)				
Jan-13-21	01:01:29	2045	EQ20547 BW1-5-1			Camera	31	614124	4454417	614298	4454489	-175	-73	189	67		(Corr'd Nav, Kongsberg 14208, img#32) (V) (T.A)				
Jan-13-21	01:01:46	2046	EQ20547 BW1-5-1			Camera	31	614120	4454417	614298	4454489	-178	-72	192	68		(Corr'd Nav, Kongsberg 14208, img#33) (V) (T.A)				
Jan-13-21	01:02:56	2047	EQ20547 BW1-5-1			Camera	31	614105	4454412	614298	4454489	-193	-78	208	68		(Corr'd Nav, Kongsberg 14208, img#34) (V) (T.A)				
Jan-13-21	01:03:21	2048	EQ20547 BW1-5-1			Camera	31	614101	4454410	614298	4454489	-198	-80	213	68		(Corr'd Nav, Kongsberg 14208, img#35) (V) (T.A)				
Jan-13-21	01:03:57	2049	EQ20547 BW1-5-1			Camera	31	614096	4454407	614298	4454489	-202	-83	218	68		(Corr'd Nav, Kongsberg 14208, img#36) (V) (T.A)				
Jan-13-21	01:04:28	2050	EQ20547 BW1-5-1			Camera	31	614092	4454404	614298	4454489	-207	-85	224	68		(Corr'd Nav, Kongsberg 14208, img#37) (V) (T.A)				
Jan-13-21	01:06:06	2051	EQ20547 BW1-5-1			Camera	31	614076	4454393	614298	4454489	-222	-97	242	67		(Corr'd Nav, Kongsberg 14208, img#38) (V) (T.A)				
Jan-13-21	01:06:49	2052	EQ20547 BW1-5-1			Camera	31	614068	4454391	614298	4454489	-230	-98	250	67		(Corr'd Nav, Kongsberg 14208, img#39) (V) (T.A)				
Jan-13-21	01:07:50	2053	EQ20547 BW1-5-1			Camera	31	614058	4454391	614298	4454489	-240	-99	260	68		(Corr'd Nav, Kongsberg 14208, img#40) (V) (T.A)				
Jan-13-21	01:08:19	2054	EQ20547 BW1-5-1			Camera	31	614054	4454389	614298	4454489	-245	-101	265	68		(Corr'd Nav, Kongsberg 14208, img#41) (V) (T.A)				
Jan-13-21	01:08:35	2055	EQ20547 BW1-5-1			Camera	31	614051	4454388	614298	4454489	-247	-102	267	68		(Corr'd Nav, Kongsberg 14208, img#42) (V) (T.A)				
Jan-13-21	01:09:15	2056	EQ20547 BW1-5-1			Camera	31	614044	4454384	614298	4454489	-254	-105	275	67		(Corr'd Nav, Kongsberg 14208, img#43) (V) (T.A)				
Jan-13-21	01:09:34	2057	EQ20547 BW1-5-1			Camera	31	614041	4454382	614298	4454489	-257	-107	279	67		(Corr'd Nav, Kongsberg 14208, img#44) (V) (T.A)				
Jan-13-21	01:10:13	2058	EQ20547 BW1-5-1			Camera	31	614034	4454377	614298	4454489	-264	-112	287	67		(Corr'd Nav, Kongsberg 14208, img#45) (V) (T.A)				



APPENDIX A FIELD SAMPLING LOGS

Gardline										Seafloor Sampling Positioning Summary												
Job No		11543							Vessel		MV Ocean Endeavour											
Client		Equinor US Wind LLC							Vessel Reference Point (VRP)		CoG											
Project Name		Empire Wind Extension							Deployment Location		Grab Deployment Point				x	6.7	y	21.94	z	2.93		
Primary Positioning System		Starpack 1							Actual Coordinates derived from		Deployment Location											
Geodetic Reference System		Datum			WGS 84 - NAD 83 (2018.0 ITRF 2014)			Ellipsoid	GRS 80		Projection				UTM ZONE 18 N (75 W)				Vertical / Tidal Datum		NAVD 88	
Date	Time	Fix number	Station Number	Penetration	Sample	Retention	Observed	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks					
Jan-13-21	01:17:21	2069	EQ20547 BW1-5-1			Camera	31	614022	4454367	614298	4454489	-277	-122	303	66		(Corr'd Nav, Kongsberg 14208, img#56) (V) (T.A)					
Jan-13-21	01:17:59	2070	EQ20547 BW1-5-1			Camera	31	614018	4454366	614298	4454489	-281	-124	307	66		(Corr'd Nav, Kongsberg 14208, img#57) (V) (T.A)					
Jan-13-21	01:19:06	2071	EQ20547 BW1-5-1			Camera	31	614017	4454373	614298	4454489	-281	-117	305	67		(Corr'd Nav, Kongsberg 14208, img#58) (V) (T.A)					
Jan-13-21	01:19:43	2072	EQ20547 BW1-5-1			Camera	31	614013	4454368	614298	4454489	-285	-122	310	67		(Corr'd Nav, Kongsberg 14208, img#59) (V) (T.A)					
Jan-13-21	01:21:12	2073	EQ20547 BW1-5-1			Camera	31	613999	4454366	614298	4454489	-299	-123	324	68		(Corr'd Nav, Kongsberg 14208, img#60) (V) (T.A)					
Jan-13-21	01:21:45	2074	EQ20547 BW1-5-1			Camera	31	613994	4454365	614298	4454489	-305	-125	329	68		(Corr'd Nav, Kongsberg 14208, img#61) (V) (T.A)					
Jan-13-21	01:21:58	2075	EQ20547 BW1-5-1			Camera	31	613992	4454364	614298	4454489	-307	-125	331	68		(Corr'd Nav, Kongsberg 14208, img#62) (V) (T.A)					
Jan-13-21	01:23:24	2076	EQ20547 BW1-5-1			Camera	31	613979	4454359	614298	4454489	-320	-130	345	68		(Corr'd Nav, Kongsberg 14208, img#63) (V) (T.A)					
Jan-13-21	01:23:38	2077	EQ20547 BW1-5-1			Camera	31	613976	4454358	614298	4454489	-322	-131	348	68		(Corr'd Nav, Kongsberg 14208, img#64) (V) (T.A)					
Jan-13-21	01:24:06	2078	EQ20547 BW1-5-1			Camera	31	613973	4454356	614298	4454489	-326	-133	352	68		(Corr'd Nav, Kongsberg 14208, img#65) (V) (T.A)					
Jan-13-21	01:25:02	2079	EQ20547 BW1-5-1			Camera	31	613965	4454351	614298	4454489	-333	-138	361	68		(Corr'd Nav, Kongsberg 14208, img#66) (V) (T.A)					
Jan-13-21	01:25:35	2080	EQ20547 BW1-5-1			Camera	31	613961	4454349	614298	4454489	-337	-141	365	67		(Corr'd Nav, Kongsberg 14208, img#67) (V) (T.A)					
Jan-13-21	01:25:50	2081	EQ20547 BW1-5-1			Camera	31	613959	4454347	614298	4454489	-340	-142	368	67		(Corr'd Nav, Kongsberg 14208, img#68) (V) (T.A)					
Jan-13-21	01:26:34	2082	EQ20547 BW1-5-1			Camera	31	613952	4454344	614298	4454489	-346	-146	376	67		(Corr'd Nav, Kongsberg 14208, img#69) (V) (T.A)					
Jan-13-21	01:27:11	2083	EQ20547 BW1-5-1			Camera	31	613947	4454341	614298	4454489	-351	-149	381	67		(Corr'd Nav, Kongsberg 14208, img#70) (V) (T.A)					
Jan-13-21	01:27:54	2084	EQ20547 BW1-5-1			Camera	31	613941	4454337	614298	4454489	-358	-152	389	67		(Corr'd Nav, Kongsberg 14208, img#71) (V) (T.A)					
Jan-13-21	01:29:00	2085	EQ20547 BW1-5-1			Camera	31	613931	4454334	614298	4454489	-368	-155	399	67		(Corr'd Nav, Kongsberg 14208, img#72) (V) (T.A)					
Jan-13-21	01:29:23	2086	EQ20547 BW1-5-1			Camera	31	613927	4454334	614298	4454489	-371	-156	403	67		(Corr'd Nav, Kongsberg 14208, img#73) (V) (T.A)					
Jan-13-21	01:29:54	2087	EQ20547 BW1-5-1			Camera	31	613922	4454332	614298	4454489	-376	-157	408	67		(Corr'd Nav, Kongsberg 14208, img#74) (V) (T.A)					
Jan-13-21	01:30:15	2088	EQ20547 BW1-5-1			Camera	31	613919	4454330	614298	4454489	-380	-159	412	67		(Corr'd Nav, Kongsberg 14208, img#75) (V) (T.A)					
Jan-13-21	01:31:02	2089	EQ20547 BW1-5-1			Camera	31	613911	4454326	614298	4454489	-387	-164	420	67		(Corr'd Nav, Kongsberg 14208, img#76) (V) (T.A)					
Jan-13-21	01:31:16	2090	EQ20547 BW1-5-1			Camera	31	613909	4454326	614298	4454489	-389	-163	422	67		(Corr'd Nav, Kongsberg 14208, img#77) (V) (T.A)					
Jan-13-21	01:31:33	2091	EQ20547 BW1-5-1			Camera	31	613906	4454326	614298	4454489	-392	-163	425	67		(Corr'd Nav, Kongsberg 14208, img#78) (V) (T.A)					
Jan-13-21	01:31:53	2092	EQ20547 BW1-5-1			Camera	31	613903	4454325	614298	4454489	-395	-164	428	67		(Corr'd Nav, Kongsberg 14208, img#79) (V) (T.A)					
Jan-13-21	01:32:12	2093	EQ20547 BW1-5-1			Camera	31	613901	4454325	614298	4454489	-398	-165	431	67		(Corr'd Nav, Kongsberg 14208, img#80) (V) (T.A)					
Jan-13-21	01:33:01	2094	EQ20547 BW1-5-1			Camera	31	613894	4454322	614298	4454489	-405	-167	438	68		(Corr'd Nav, Kongsberg 14208, img#81) (V) (T.A)					
Jan-13-21	01:33:39	2095	EQ20547 BW1-5-1			Camera	31	613887	4454319	614298	4454489	-411	-170	445	68		(Corr'd Nav, Kongsberg 14208, img#82) (V) (T.A)					
Jan-13-21	01:33:59	2096	EQ20547 BW1-5-1			Camera	31	613884	4454317	614298	4454489	-415	-172	449	67		(Corr'd Nav, Kongsberg 14208, img#83) (V) (T.A)					
Jan-13-21	01:34:25	2097	EQ20547 BW1-5-1			Camera	31	613879	4454315	614298	4454489	-419	-174	454	67		(Corr'd Nav, Kongsberg 14208, img#84) (V) (T.A)					
Jan-13-21	01:35:02	2098	EQ20547 BW1-5-1			Camera	31	613874	4454312	614298	4454489	-425	-177	460	67		(Corr'd Nav, Kongsberg 14208, img#85) (V) (T.A)					
Jan-13-21	01:35:36	2099	EQ20547 BW1-5-1			Camera	31	613869	4454310	614298	4454489	-430	-180	466	67		(Corr'd Nav, Kongsberg 14208, img#86) (V) (T.A)					
Jan-13-21	01:35:45	2100	EQ20547 BW1-5-1			Camera	31	613867	4454309	614298	4454489	-431	-180	467	67		(Corr'd Nav, Kongsberg 14208, img#87) (V) (T.A)					
Jan-13-21	01:36:43	2101	EQ20547 BW1-5-1			Camera	31	613859	4454307	614298	4454489	-440	-182	476	68		(Corr'd Nav, Kongsberg 14208, img#88) (V) (T.A)					
Jan-13-21	01:37:39	2102	EQ20547 BW1-5-1			Camera	31	613851	4454304	614298	4454489	-448	-185	484	68		(Corr'd Nav, Kongsberg 14208, img#89) (V) (T.A)					
Jan-13-21	01:38:04	2103	EQ20547 BW1-5-1			Camera	31	613847	4454302	614298	4454489	-451	-187	489	67		(Corr'd Nav, Kongsberg 14208, img#90) (V) (T.A)					
Jan-13-21	01:38:49	2104	EQ20547 BW1-5-1			Camera	31	613840	4454300	614298	4454489	-458	-189	496	68		(Corr'd Nav, Kongsberg 14208, img#91) (V) (T.A)					
Jan-13-21	01:39:18	2105	EQ20547 BW1-5-1			Camera	31	613836	4454299	614298	4454489	-463	-191	500	68		(Corr'd Nav, Kongsberg 14208, img#92) (V) (T.A)					
Jan-13-21	01:40:10	2106	EQ20547 BW1-5-1			Camera	31	613828	4454295	614298	4454489	-471	-195	509	68		(Corr'd Nav, Kongsberg 14208, img#93) (V) (T.A)					
Jan-13-21	01:40:41	2107	EQ20547 BW1-5-1			Camera	31	613823	4454293	614298	4454489	-475	-197	514	68		(Corr'd Nav, Kongsberg 14208, img#94) (V) (T.A)					
Jan-13-21	01:41:04	2108	EQ20547 BW1-5-1			Camera	31	613820	4454291	614298	4454489	-478	-199	518	67		(Corr'd Nav, Kongsberg 14208, img#95) (V) (T.A)					
Jan-13-21	01:41:29	2109	EQ20547 BW1-5-1			Camera	31	613817	4454288	614298	4454489	-482	-201	522	67		(Corr'd Nav, Kongsberg 14208, img#96) (V) (T.A)					
Jan-13-21	01:41:48	2110	EQ20547 BW1-5-1			Camera	31	613813	4454288	614298	4454489	-485	-201	525	67		(Corr'd Nav, Kongsberg 14208, img#97) (V) (T.A)					
Jan-13-21	01:42:24	2111	EQ20547 BW1-5-1			Camera	31	613808	4454287	614298	4454489	-491	-203	531	68		(Corr'd Nav, Kongsberg 14208, img#98) (V) (T.A)					
Jan-13-21	01:42:49	2112	EQ20547 BW1-5-1			Camera	31	613803	4454285	614298	4454489	-495	-204	536	68		(Corr'd Nav, Kongsberg 14208, img#99) (V) (T.A)					
Jan-13-21	01:43:00	2113	EQ20547 BW1-5-1			Camera	31	613801	4454284	614298	4454489	-497	-205	538	68		(Corr'd Nav, Kongsberg 14208, img#100) (V) (T.A)					
Jan-13-21	01:44:07	2114	EQ20547 BW1-5-1			Camera	31	613790	4454278	614298	4454489	-508	-212	551	67		(Corr'd Nav, Kongsberg 14208, img#101) (V) (T.A)					
Jan-13-21	01:44:28	2115	EQ20547 BW1-5-1			Camera	31	613786	4454276	614298	4454489	-512	-213	555	67		(Corr'd Nav, Kongsberg 14208, img#102) (V) (T.A)					
Jan-13-21	01:45:06	2116	EQ20547 BW1-5-1			Camera	31	613779	4454276	614298	4454489	-519	-213	561	68		(Corr'd Nav, Kongsberg 14208, img#103) (V) (T.A)					
Jan-13-21	01:45:22	2117	EQ20547 BW1-5-1			Camera	31	613777	4454276	614298	4454489	-521	-213	563	68		(Corr'd Nav, Kongsberg 14208, img#104) (V) (T.A)					
Jan-13-21	01:45:36	2118	EQ20547 BW1-5-1			Camera	31	613775	4454276	614298	4454489	-523	-213	565	68		(Corr'd Nav, Kongsberg 14208, img#105) (V) (T.A)					
Jan-13-21	01:45:45	2119	EQ20547 BW1-5-1			Camera	31	613774	4454276	614298	4454489	-525	-213	567	68		(Corr'd Nav, Kongsberg 14208, img#106) (V) (T.A)					
Jan-13-21	01:46:36	2120	EQ20547 BW1-5-1			Camera	31	613767	4454272	614298	4454489	-532	-217	574	68		(Corr'd Nav, Kongsberg 14208, img#107) (V) (T.A)					
Jan-13-21	01:46:48	2121	EQ20547 BW1-5-1			Camera	31	613765	4454271	614298												



APPENDIX A FIELD SAMPLING LOGS

Gardline										Seafloor Sampling Positioning Summary										
Job No		11543							Vessel		MV Ocean Endeavour									
Client		Equinor US Wind LLC							Vessel Reference Point (VRP)		CoG									
Project Name		Empire Wind Extension							Deployment Location		Grab Deployment Point				x	6.7	y	21.94	z	2.93
Primary Positioning System		Starpack 1							Actual Coordinates derived from		Deployment Location									
Geodetic Reference System		Datum			WGS 84 - NAD 83 (2018.0 ITRF 2014)			Ellipsoid	GRS 80		Projection		UTM ZONE 18 N (75 W)				Vertical / Tidal Datum		NAVD 88	
Date	Time	Fix number	Station Number	Penetration	Sample	Retention	Observed	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks			
Jan-13-21	03:39:42	2132	EQ20547 BW1-4			Camera	58	605936	4453079	605928	4453081	8	-2	8	285		(Corr'd Nav, Kongsberg 14208, img#119) (V) (T.A)			
Jan-13-21	03:40:30	2133	EQ20547 BW1-4			Camera	58	605935	4453086	605928	4453081	7	5	8	237		(Corr'd Nav, Kongsberg 14208, img#120) (V) (T.A)			
Jan-13-21	03:40:48	2134	EQ20547 BW1-4			Camera	58	605934	4453088	605928	4453081	6	7	9	222		(Corr'd Nav, Kongsberg 14208, img#121) (V) (T.A)			
Jan-13-21	03:41:23	2135	EQ20547 BW1-4			Camera	58	605931	4453089	605928	4453081	3	8	8	198		(Corr'd Nav, Kongsberg 14208, img#122) (V) (T.A)			
Jan-13-21	03:41:34	2136	EQ20547 BW1-4			Camera	58	605929	4453089	605928	4453081	1	8	8	190		(Corr'd Nav, Kongsberg 14208, img#123) (V) (T.A)			
Jan-13-21	03:41:48	2137	EQ20547 BW1-4			Camera	58	605928	4453089	605928	4453081	0	8	8	178		(Corr'd Nav, Kongsberg 14208, img#124) (V) (T.A)			
Jan-13-21	03:42:07	2138	EQ20547 BW1-4			Camera	58	605925	4453089	605928	4453081	-3	8	9	159		(Corr'd Nav, Kongsberg 14208, img#125) (V) (T.A)			
Jan-13-21	03:42:35	2139	EQ20547 BW1-4			Camera	58	605922	4453087	605928	4453081	-6	6	9	133		(Corr'd Nav, Kongsberg 14208, img#126) (V) (T.A)			
Jan-13-21	03:43:35	2140	EQ20547 BW1-4			Camera	58	605919	4453074	605928	4453081	-9	-7	11	52		(Corr'd Nav, Kongsberg 14208, img#127) (V) (T.A)			
Jan-13-21	03:43:41	2141	EQ20547 BW1-4			Camera	58	605920	4453073	605928	4453081	-8	-8	11	45		(Corr'd Nav, Kongsberg 14208, img#128) (V) (T.A)			
Jan-13-21	03:44:05	2142	EQ20547 BW1-4			Camera	58	605926	4453070	605928	4453081	-2	-11	11	12		(Corr'd Nav, Kongsberg 14208, img#129) (V) (T.A)			
Jan-13-21	03:44:18	2143	EQ20547 BW1-4			Camera	58	605928	4453069	605928	4453081	0	-12	12	1		(Corr'd Nav, Kongsberg 14208, img#130) (V) (T.A)			
Jan-13-21	03:44:42	2144	EQ20547 BW1-4			Camera	58	605929	4453069	605928	4453081	1	-12	12	354		(Corr'd Nav, Kongsberg 14208, img#131) (V) (T.A)			
Jan-13-21	03:45:57	2145	EQ20547 BW1-4			Camera	58	605929	4453078	605928	4453081	1	-3	3	351		(Corr'd Nav, Kongsberg 14208, img#132) (V) (T.A)			
Jan-13-21	03:46:08	2146	EQ20547 BW1-4			Camera	58	605928	4453080	605928	4453081	0	-1	1	354		(Corr'd Nav, Kongsberg 14208, img#133) (V) (T.A)			
Jan-13-21	03:47:29	2147	EQ20547 BW1-4			Camera	58	605929	4453081	605928	4453081	1	0	1	258		(Corr'd Nav, Kongsberg 14208, img#134) (V) (T.A)			
Jan-13-21	03:48:10	2148	EQ20547 BW1-4			Camera	58	605929	4453082	605928	4453081	1	1	1	238		(Corr'd Nav, Kongsberg 14208, img#135) (V) (T.A)			
Jan-13-21	03:50:06	2149	EQ20547 BW1-4			Camera	58	605923	4453081	605928	4453081	-5	0	5	85		(Corr'd Nav, Kongsberg 14208, img#136) (V) (T.A)			
Jan-13-21	03:50:28	2150	EQ20547 BW1-4			Camera	58	605920	4453081	605928	4453081	-8	0	8	91		(Corr'd Nav, Kongsberg 14208, img#137) (V) (T.A)			
Jan-13-21	03:50:33	2151	EQ20547 BW1-4			Camera	58	605919	4453081	605928	4453081	-9	0	9	88		(Corr'd Nav, Kongsberg 14208, img#138) (V) (T.A)			
Jan-13-21	03:50:45	2152	EQ20547 BW1-4			Camera	58	605917	4453080	605928	4453081	-11	-1	11	85		(Corr'd Nav, Kongsberg 14208, img#139) (V) (T.A)			
Jan-13-21	03:50:53	2153	EQ20547 BW1-4			Camera	58	605916	4453080	605928	4453081	-12	-1	12	84		(Corr'd Nav, Kongsberg 14208, img#140) (V) (T.A)			
Jan-13-21	03:51:16	2154	EQ20547 BW1-4			Camera	58	605912	4453078	605928	4453081	-16	-3	17	79		(Corr'd Nav, Kongsberg 14208, img#141) (V) (T.A)			
Jan-13-21	03:51:51	2155	EQ20547 BW1-4			Camera	58	605908	4453077	605928	4453081	-20	-4	21	79		(Corr'd Nav, Kongsberg 14208, img#142) (V) (T.A)			
Jan-13-21	03:52:05	2156	EQ20547 BW1-4			Camera	58	605905	4453077	605928	4453081	-23	-4	23	79		(Corr'd Nav, Kongsberg 14208, img#143) (V) (T.A)			
Jan-13-21	03:53:26	2157	EQ20547 BW1-4			Camera	58	605892	4453074	605928	4453081	-36	-7	37	80		(Corr'd Nav, Kongsberg 14208, img#144) (V) (T.A)			
Jan-13-21	03:53:47	2158	EQ20547 BW1-4			Camera	58	605889	4453077	605928	4453081	-39	-4	39	84		(Corr'd Nav, Kongsberg 14208, img#145) (V) (T.A)			
Jan-13-21	03:54:30	2159	EQ20547 BW1-4			Camera	58	605882	4453078	605928	4453081	-46	-3	46	86		(Corr'd Nav, Kongsberg 14208, img#146) (V) (T.A)			
Jan-13-21	03:54:45	2160	EQ20547 BW1-4			Camera	59	605880	4453077	605928	4453081	-48	-4	49	85		(Corr'd Nav, Kongsberg 14208, img#147) (V) (T.A)			
Jan-13-21	03:54:55	2161	EQ20547 BW1-4			Camera	58	605878	4453076	605928	4453081	-50	-5	50	84		(Corr'd Nav, Kongsberg 14208, img#148) (V) (T.A)			
Jan-13-21	03:56:11	2162	EQ20547 BW1-4			Camera	59	605866	4453076	605928	4453081	-62	-5	62	85		(Corr'd Nav, Kongsberg 14208, img#149) (V) (T.A)			
Jan-13-21	03:58:16	2163	EQ20547 BW1-4			Camera	59	605846	4453071	605928	4453081	-82	-10	83	83		(Corr'd Nav, Kongsberg 14208, img#151) (V) (T.A)			
Jan-13-21	03:59:15	2164	EQ20547 BW1-4			Camera	59	605839	4453073	605928	4453081	-89	-8	89	85		(Corr'd Nav, Kongsberg 14208, img#152) (V) (T.A)			
Jan-13-21	04:00:33	2165	EQ20547 BW1-4			Camera	59	605826	4453072	605928	4453081	-102	-9	102	85		(Corr'd Nav, Kongsberg 14208, img#153) (V) (T.A)			
Jan-13-21	04:02:00	2166	EQ20547 BW1-4			Camera	59	605812	4453065	605928	4453081	-116	-16	117	82		(Corr'd Nav, Kongsberg 14208, img#154) (V) (T.A)			
Jan-13-21	04:04:04	2167	EQ20547 BW1-4			Camera	60	605803	4453065	605928	4453081	-125	-16	126	83		(Corr'd Nav, Kongsberg 14208, img#155) (V) (T.A)			
Jan-13-21	04:04:22	2168	EQ20547 BW1-4			Camera	60	605801	4453064	605928	4453081	-127	-17	129	82		(Corr'd Nav, Kongsberg 14208, img#156) (V) (T.A)			
Jan-13-21	04:04:53	2169	EQ20547 BW1-4			Camera	60	605793	4453060	605928	4453081	-135	-21	137	81		(Corr'd Nav, Kongsberg 14208, img#157) (V) (T.A)			
Jan-13-21	04:06:53	2170	EQ20547 BW1-4			Camera	60	605775	4453062	605928	4453081	-153	-19	154	83		(Corr'd Nav, Kongsberg 14208, img#158) (V) (T.A)			
Jan-13-21	04:08:17	2171	EQ20547 BW1-4			Camera	60	605762	4453059	605928	4453081	-166	-22	168	82		(Corr'd Nav, Kongsberg 14208, img#159) (V) (T.A)			
Jan-13-21	04:08:48	2172	EQ20547 BW1-4			Camera	60	605757	4453060	605928	4453081	-171	-21	173	83		(Corr'd Nav, Kongsberg 14208, img#160) (V) (T.A)			
Jan-13-21	04:09:24	2173	EQ20547 BW1-4			Camera	60	605751	4453060	605928	4453081	-177	-21	178	83		(Corr'd Nav, Kongsberg 14208, img#161) (V) (T.A)			
Jan-13-21	04:10:01	2174	EQ20547 BW1-4			Camera	60	605744	4453060	605928	4453081	-184	-21	186	83		(Corr'd Nav, Kongsberg 14208, img#162) (V) (T.A)			
Jan-13-21	04:10:42	2175	EQ20547 BW1-4			Camera	61	605737	4453058	605928	4453081	-191	-23	192	83		(Corr'd Nav, Kongsberg 14208, img#163) (V) (T.A)			
Jan-13-21	04:11:43	2176	EQ20547 BW1-4			Camera	61	605726	4453056	605928	4453081	-202	-25	204	83		(Corr'd Nav, Kongsberg 14208, img#164) (V) (T.A)			
Jan-13-21	04:12:03	2177	EQ20547 BW1-4			Camera	61	605723	4453057	605928	4453081	-205	-24	206	83		(Corr'd Nav, Kongsberg 14208, img#165) (V) (T.A)			
Jan-13-21	04:16:26	2178	EQ20547 BW1-4			Camera	62	605681	4453052	605928	4453081	-247	-29	249	83		(Corr'd Nav, Kongsberg 14208, img#166) (V) (T.A)			
Jan-13-21	04:16:57	2179	EQ20547 BW1-4			Camera	62	605676	4453052	605928	4453081	-252	-29	254	83		(Corr'd Nav, Kongsberg 14208, img#167) (V) (T.A)			
Jan-13-21	04:17:21	2180	EQ20547 BW1-4			Camera	62	605672	4453052	605928	4453081	-256	-29	258	84		(Corr'd Nav, Kongsberg 14208, img#168) (V) (T.A)			
Jan-13-21	04:18:32	2181	EQ20547 BW1-4			Camera	62	605660	4453050	605928	4453081	-268	-31	270	83		(Corr'd Nav, Kongsberg 14208, img#169) (V) (T.A)			
Jan-13-21	04:20:22	2182	EQ20547 BW1-4			Camera	62	605643	4453048	605928	4453081	-285	-33	287	83		(Corr'd Nav, Kongsberg 14208, img#170) (V) (T.A)			
Jan-13-21	04:21:03	2183	EQ20547 BW1-4			Camera	63	605637	4453050	605928	4453081	-291	-31	292	84		(Corr'd Nav, Kongsberg 14208, img#171) (V) (T.A)			
Jan-13-21	04:21:20	2184	EQ20547 BW1-4			Camera	63	605635	4453049	605928	4453081	-293	-32	295	84		(Corr'd Nav, Kongsberg 14208, img#172) (V) (T.A)			
Jan-13-21	04:21:41	2185	EQ20547 BW1-4			Camera	63	605631	4453048	605928	4453081	-297	-33	299	84		(Corr'd Nav, Kongsberg 142084			



APPENDIX A FIELD SAMPLING LOGS

Gardline										Seafloor Sampling Positioning Summary																
Job No		11543							Vessel		MV Ocean Endeavour															
Client		Equinor US Wind LLC							Vessel Reference Point (VRP)		CoG															
Project Name		Empire Wind Extension							Deployment Location		Grab Deployment Point				x		6.7		y		21.94		z		2.93	
Primary Positioning System		Starpack 1							Actual Coordinates derived from		Deployment Location															
Geodetic Reference System		Datum			WGS 84 - NAD 83 (2018.0 ITRF 2014)				Ellipsoid		GRS 80		Projection		UTM ZONE 18 N (75 W)				Vertical / Tidal Datum		NAVD 88					
Date		Time		Fix number	Station Number		Penetration	Sample	Retention	Observed	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks						
Jan-13-21		04:27:43		2195	EQ20547 BW1-4				Camera	63	605623	4453047	605928	4453081	-305	-34	307	84		(Corr'd Nav, Kongsberg 14208, img#183) (V) (T.A)						
Jan-13-21		04:28:06		2196	EQ20547 BW1-4				Camera	63	605624	4453044	605928	4453081	-304	-37	306	83		(Corr'd Nav, Kongsberg 14208, img#184) (V) (T.A)						
Jan-13-21		04:28:33		2197	EQ20547 BW1-4				Camera	63	605626	4453040	605928	4453081	-302	-41	304	82		(Corr'd Nav, Kongsberg 14208, img#185) (V) (T.A)						
Jan-13-21		04:29:11		2198	EQ20547 BW1-4				Camera	63	605631	4453038	605928	4453081	-297	-43	300	82		(Corr'd Nav, Kongsberg 14208, img#186) (V) (T.A)						
Jan-13-21		04:30:13		2199	EQ20547 BW1-4				Camera	63	605633	4453038	605928	4453081	-295	-43	298	82		(Corr'd Nav, Kongsberg 14208, img#187) (V) (T.A)						
Jan-13-21		04:31:30		2200	EQ20547 BW1-4				Camera	63	605632	4453046	605928	4453081	-296	-35	298	83		(Corr'd Nav, Kongsberg 14208, img#188) (V) (T.A)						
Jan-13-21		04:32:41		2201	EQ20547 BW1-4				Camera	63	605619	4453046	605928	4453081	-309	-35	311	84		(Corr'd Nav, Kongsberg 14208, img#189) (V) (T.A)						
Jan-13-21		04:34:08		2202	EQ20547 BW1-4				Camera	63	605603	4453044	605928	4453081	-325	-37	327	83		(Corr'd Nav, Kongsberg 14208, img#190) (V) (T.A)						
Jan-13-21		04:35:50		2203	EQ20547 BW1-4				Camera	64	605587	4453041	605928	4453081	-341	-40	343	83		(Corr'd Nav, Kongsberg 14208, img#191) (V) (T.A)						
Jan-13-21		04:36:33		2204	EQ20547 BW1-4				Camera	64	605581	4453043	605928	4453081	-347	-38	349	84		(Corr'd Nav, Kongsberg 14208, img#192) (V) (T.A)						
Jan-13-21		04:37:12		2205	EQ20547 BW1-4				Camera	64	605575	4453043	605928	4453081	-353	-38	355	84		(Corr'd Nav, Kongsberg 14208, img#193) (V) (T.A)						
Jan-13-21		04:40:02		2206	EQ20547 BW1-4				Camera	65	605547	4453036	605928	4453081	-381	-45	384	83		(Corr'd Nav, Kongsberg 14208, img#194) (V) (T.A)						
Jan-13-21		04:42:17		2207	EQ20547 BW1-4				Camera	65	605524	4453034	605928	4453081	-404	-47	407	83		(Corr'd Nav, Kongsberg 14208, img#195) (V) (T.A)						
Jan-13-21		04:42:51		2208	EQ20547 BW1-4				Camera	65	605518	4453033	605928	4453081	-410	-48	413	83		(Corr'd Nav, Kongsberg 14208, img#196) (V) (T.A)						
Jan-13-21		04:44:36		2209	EQ20547 BW1-4				Camera	66	605500	4453031	605928	4453081	-428	-50	431	83		(Corr'd Nav, Kongsberg 14208, img#197) (V) (T.A)						
Jan-13-21		04:45:54		2210	EQ20547 BW1-4				Camera	66	605488	4453032	605928	4453081	-440	-49	443	84		(Corr'd Nav, Kongsberg 14208, img#198) (V) (T.A)						
Jan-13-21		04:46:58		2211	EQ20547 BW1-4				Camera	66	605477	4453029	605928	4453081	-451	-52	454	83		(Corr'd Nav, Kongsberg 14208, img#199) (V) (T.A)						
Jan-13-21		04:47:23		2212	EQ20547 BW1-4				Camera	66	605472	4453027	605928	4453081	-456	-54	459	83		(Corr'd Nav, Kongsberg 14208, img#200) (V) (T.A)						
Jan-13-21		04:48:04		2213	EQ20547 BW1-4				Camera	66	605466	4453027	605928	4453081	-462	-54	465	83		(Corr'd Nav, Kongsberg 14208, img#201) (V) (T.A)						
Jan-13-21		04:49:05		2214	EQ20547 BW1-4				Camera	67	605456	4453026	605928	4453081	-472	-55	475	83		(Corr'd Nav, Kongsberg 14208, img#202) (V) (T.A)						
Jan-13-21		04:49:22		2215	EQ20547 BW1-4				Camera	67	605454	4453026	605928	4453081	-474	-55	478	83		(Corr'd Nav, Kongsberg 14208, img#203) (V) (T.A)						
Jan-13-21		04:50:12		2216	EQ20547 BW1-4				Camera	67	605447	4453025	605928	4453081	-481	-56	484	83		(Corr'd Nav, Kongsberg 14208, img#204) (V) (T.A)						
Jan-13-21		04:51:13		2217	EQ20547 BW1-4				Camera	67	605436	4453025	605928	4453081	-492	-56	495	84		(Corr'd Nav, Kongsberg 14208, img#205) (V) (T.A)						
Jan-13-21		04:52:39		2218	EQ20547 BW1-4				Camera	67	605422	4453023	605928	4453081	-506	-58	510	83		(Corr'd Nav, Kongsberg 14208, img#206) (V) (T.A)						
Jan-13-21		04:54:21		2219	EQ20547 BW1-4				Camera	68	605404	4453020	605928	4453081	-524	-61	528	83		(Corr'd Nav, Kongsberg 14208, img#207) (V) (T.A)						
Jan-13-21		04:54:57		2220	EQ20547 BW1-4				Camera	68	605398	4453020	605928	4453081	-530	-61	534	83		(Corr'd Nav, Kongsberg 14208, img#208) (V) (T.A)						
Jan-13-21		04:56:38		2221	EQ20547 BW1-4				Camera	68	605383	4453018	605928	4453081	-545	-63	549	83		(Corr'd Nav, Kongsberg 14208, img#209) (V) (T.A)						
Jan-13-21		04:57:57		2222	EQ20547 BW1-4				Camera	68	605371	4453017	605928	4453081	-557	-64	561	83		(Corr'd Nav, Kongsberg 14208, img#210) (V) (T.A)						
Jan-13-21		04:58:18		2223	EQ20547 BW1-4				Camera	68	605368	4453018	605928	4453081	-560	-63	563	84		(Corr'd Nav, Kongsberg 14208, img#211) (V) (T.A)						
Jan-13-21		04:58:45		2224	EQ20547 BW1-4				Camera	68	605364	4453019	605928	4453081	-564	-62	567	84		(Corr'd Nav, Kongsberg 14208, img#212) (V) (T.A)						
Jan-13-21		04:59:08		2225	EQ20547 BW1-4				Camera	68	605360	4453020	605928	4453081	-568	-61	571	84		(Corr'd Nav, Kongsberg 14208, img#213) (V) (T.A)						
Jan-13-21		05:01:33		2226	EQ20547 BW1-4				Camera	68	605343	4453027	605928	4453081	-585	-54	588	85		(Corr'd Nav, Kongsberg 14208, img#214) (V) (T.A)						
Jan-13-21		05:01:49		2227	EQ20547 BW1-4				Camera	68	605342	4453027	605928	4453081	-586	-54	589	85		(Corr'd Nav, Kongsberg 14208, img#215) (V) (T.A)						
Jan-13-21		05:03:15		2228	EQ20547 BW1-4				Camera	68	605348	4453007	605928	4453081	-580	-74	585	83		(Corr'd Nav, Kongsberg 14208, img#216) (V) (T.A)						
Jan-13-21		05:06:48		2229	EQ20547 BW1-4				Camera	68	605332	4453019	605928	4453081	-596	-62	599	84		(Corr'd Nav, Kongsberg 14208, img#217) (V) (T.A)						
Jan-13-21		05:07:14		2230	EQ20547 BW1-4				Camera	68	605337	4453018	605928	4453081	-591	-63	594	84		(Corr'd Nav, Kongsberg 14208, img#218) (V) (T.A)						
Jan-13-21		05:07:32		2231	EQ20547 BW1-4				Camera	67	605339	4453016	605928	4453081	-589	-65	593	84		(Corr'd Nav, Kongsberg 14208, img#219) (V) (T.A)						
Jan-13-21		05:07:53		2232	EQ20547 BW1-4				Camera	68	605340	4453012	605928	4453081	-588	-69	592	83		(Corr'd Nav, Kongsberg 14208, img#220) (V) (T.A)						
Jan-13-21		05:08:27		2233	EQ20547 BW1-4				Camera	68	605341	4453007	605928	4453081	-587	-74	591	83		(Corr'd Nav, Kongsberg 14208, img#221) (V) (T.A)						
Jan-13-21		05:09:05		2234	EQ20547 BW1-4				Camera	68	605338	4453006	605928	4453081	-590	-75	595	83		(Corr'd Nav, Kongsberg 14208, img#222) (V) (T.A)						
Jan-13-21		05:09:16		2235	EQ20547 BW1-4				Camera	68	605337	4453006	605928	4453081	-591	-75	596	83		(Corr'd Nav, Kongsberg 14208, img#223) (V) (T.A)						
Jan-13-21		05:09:46		2236	EQ20547 BW1-4				Camera	69	605331	4453008	605928	4453081	-597	-73	601	83		(Corr'd Nav, Kongsberg 14208, img#224) (V) (T.A)						
Jan-13-21		05:10:38		2237	EQ20547 BW1-4				Camera	68	605329	4453020	605928	4453081	-599	-61	603	84		(Corr'd Nav, Kongsberg 14208, img#225) (V) (T.A)						
Jan-13-21		05:11:39		2238	EQ20547 BW1-4				Camera	68	605335	4453016	605928	4453081	-593	-65	597	84		(Corr'd Nav, Kongsberg 14208, img#226) (V) (T.A)						
Jan-13-21		05:12:31		2239	EQ20547 BW1-4				Camera	68	605344	4453007	605928	4453081	-584	-74	589	83		(Corr'd Nav, Kongsberg 14208, img#227) (V) (T.A)						
Jan-13-21		05:57:48		2240	EQ20547 BW1-3				Camera	58	604990	4452744	604983	4452748	7	-4	8	299		(Corr'd Nav, Kongsberg 14208, img#228) (V) (T.A)						
Jan-13-21		05:59:38		2241	EQ20547 BW1-3				Camera	59	604985	4452751	604983	4452748	2	3	4	215		(Corr'd Nav, Kongsberg 14208, img#229) (V) (T.A)						
Jan-13-21		06:00:09		2242	EQ20547 BW1-3				Camera	58	604986	4452746	604983	4452748	3	-2	3	305		(Corr'd Nav, Kongsberg 14208, img#230) (V) (T.A)						
Jan-13-21		06:01:22		2243	EQ20547 BW1-3				Camera	58	604982	4452746	604983	4452748	-1	-2	2	39		(Corr'd Nav, Kongsberg 14208, img#231) (V) (T.A)						
Jan-13-21		06:02:16		2244	EQ20547 BW1-3				Camera	58	604974	4452757	604983	4452748	-9	9	13	137		(Corr'd Nav, Kongsberg 14208, img#232) (V) (T.A)						
Jan-13-21		06:03:06		2245	EQ20547 BW1-3				Camera	58	604970	4452768	604983	4452748	-13	21	24	147		(Corr'd Nav, Kongsberg 14208, img#233) (V) (T.A)						
Jan-13-21		06:04:08		2246	EQ20547 BW1-3				Camera	58	604963	4452778	604983	4452748	-20	30	36	147		(Corr'd Nav, Kongsberg 14208, img#234) (V) (T.A)						
Jan-13-21		06:05:03		2247	EQ20547 BW1-3				Camera	58	604959	4452785	604983	4452748	-24	37	44	147		(Corr'd Nav, Kongsberg 14208, img#235) (V) (T.A)						
Jan-13-21		06:06:26		2248	EQ20547 BW1-3				Camera	58	604953	4452796	604983	4452748	-30	48	56	147		(Corr'd Nav, Kongsberg 14208, img#236) (V) (T.A)						
Jan-13-21		06:07:28		2249	EQ20547 BW1-3				Camera	58	604948	4452805	604983	4452748	-35	57	66	149		(Corr'd Nav, Kongsberg 14208, img#237) (V) (T.A)						
Jan-13-21		06:08:26		2250	EQ20547 BW1-3				Camera	58	604945	4452816	604983	4452748	-38	68	78	151		(Corr'd Nav, Kongsberg 14208, img#238) (V) (T.A)						
Jan-13-21		06:09:30		2251	EQ20547 BW1-3				Camera	58</																



APPENDIX A FIELD SAMPLING LOGS

Gardline										Seafloor Sampling Positioning Summary																							
Job No		11543							Vessel		MV Ocean Endeavour																						
Client		Equinor US Wind LLC							Vessel Reference Point (VRP)		CoG																						
Project Name		Empire Wind Extension							Deployment Location		Grab Deployment Point				x	6.7	y	21.94	z	2.93													
Primary Positioning System		Starpack 1							Actual Coordinates derived from		Deployment Location																						
Geodetic Reference System		Datum			WGS 84 - NAD 83 (2018.0 ITRF 2014)			Ellipsoid		GRS 80		Projection				UTM ZONE 18 N (75 W)				Vertical / Tidal Datum		NAVD 88											
Date		Time		Fix number		Station Number		Penetration		Sample		Retention		Observed		Actual coordinates				Target coordinates				Offset from target				Surveyor		Remarks			
Jan-13-21		06:14:11		2258		EQ20547 BW1-3				Camera		58		604899		4452889		604983		4452748		-84		141		164		149		(Corr'd Nav, Kongsberg 14208, img#246) (V) (T.A)			
Jan-13-21		06:14:19		2259		EQ20547 BW1-3				Camera		58		604899		4452891		604983		4452748		-84		143		166		149		(Corr'd Nav, Kongsberg 14208, img#247) (V) (T.A)			
Jan-13-21		06:15:34		2260		EQ20547 BW1-3				Camera		58		604891		4452904		604983		4452748		-92		156		181		150		(Corr'd Nav, Kongsberg 14208, img#248) (V) (T.A)			
Jan-13-21		06:15:49		2261		EQ20547 BW1-3				Camera		58		604888		4452908		604983		4452748		-95		160		186		149		(Corr'd Nav, Kongsberg 14208, img#249) (V) (T.A)			
Jan-13-21		06:16:47		2262		EQ20547 BW1-3				Camera		58		604879		4452919		604983		4452748		-104		171		200		149		(Corr'd Nav, Kongsberg 14208, img#250) (V) (T.A)			
Jan-13-21		06:17:09		2263		EQ20547 BW1-3				Camera		58		604878		4452922		604983		4452748		-105		174		203		149		(Corr'd Nav, Kongsberg 14208, img#251) (V) (T.A)			
Jan-13-21		06:18:25		2264		EQ20547 BW1-3				Camera		58		604873		4452930		604983		4452748		-110		182		212		149		(Corr'd Nav, Kongsberg 14208, img#252) (V) (T.A)			
Jan-13-21		06:19:18		2265		EQ20547 BW1-3				Camera		58		604868		4452938		604983		4452748		-115		190		222		149		(Corr'd Nav, Kongsberg 14208, img#253) (V) (T.A)			
Jan-13-21		06:19:59		2266		EQ20547 BW1-3				Camera		58		604862		4452942		604983		4452748		-121		194		228		148		(Corr'd Nav, Kongsberg 14208, img#254) (V) (T.A)			
Jan-13-21		06:20:59		2267		EQ20547 BW1-3				Camera		58		604856		4452952		604983		4452748		-127		204		241		148		(Corr'd Nav, Kongsberg 14208, img#255) (V) (T.A)			
Jan-13-21		06:22:23		2268		EQ20547 BW1-3				Camera		58		604847		4452970		604983		4452748		-136		222		260		148		(Corr'd Nav, Kongsberg 14208, img#256) (V) (T.A)			
Jan-13-21		06:24:17		2269		EQ20547 BW1-3				Camera		58		604838		4452986		604983		4452748		-145		238		279		149		(Corr'd Nav, Kongsberg 14208, img#257) (V) (T.A)			
Jan-13-21		06:25:21		2270		EQ20547 BW1-3				Camera		58		604833		4452992		604983		4452748		-150		244		286		148		(Corr'd Nav, Kongsberg 14208, img#258) (V) (T.A)			
Jan-13-21		06:26:50		2271		EQ20547 BW1-3				Camera		58		604829		4453001		604983		4452748		-154		253		297		149		(Corr'd Nav, Kongsberg 14208, img#259) (V) (T.A)			
Jan-13-21		06:27:55		2272		EQ20547 BW1-3				Camera		59		604834		4453008		604983		4452748		-149		260		300		150		(Corr'd Nav, Kongsberg 14208, img#260) (V) (T.A)			
Jan-13-21		06:28:51		2273		EQ20547 BW1-3				Camera		59		604833		4453010		604983		4452748		-150		262		302		150		(Corr'd Nav, Kongsberg 14208, img#261) (V) (T.A)			
Jan-13-21		06:29:18		2274		EQ20547 BW1-3				Camera		58		604828		4453012		604983		4452748		-155		264		306		150		(Corr'd Nav, Kongsberg 14208, img#262) (V) (T.A)			
Jan-13-21		06:30:29		2275		EQ20547 BW1-3				Camera		58		604820		4453004		604983		4452748		-163		256		303		147		(Corr'd Nav, Kongsberg 14208, img#263) (V) (T.A)			
Jan-13-21		06:30:49		2276		EQ20547 BW1-3				Camera		58		604821		4453001		604983		4452748		-162		253		301		147		(Corr'd Nav, Kongsberg 14208, img#264) (V) (T.A)			
Jan-13-21		06:31:48		2277		EQ20547 BW1-3				Camera		58		604829		4452996		604983		4452748		-154		248		292		148		(Corr'd Nav, Kongsberg 14208, img#265) (V) (T.A)			
Jan-13-21		06:32:07		2278		EQ20547 BW1-3				Camera		58		604832		4452994		604983		4452748		-151		246		289		148		(Corr'd Nav, Kongsberg 14208, img#266) (V) (T.A)			
Jan-13-21		06:32:15		2279		EQ20547 BW1-3				Camera		58		604833		4452993		604983		4452748		-150		245		287		148		(Corr'd Nav, Kongsberg 14208, img#267) (V) (T.A)			
Jan-13-21		06:32:37		2280		EQ20547 BW1-3				Camera		58		604835		4452990		604983		4452748		-148		242		284		149		(Corr'd Nav, Kongsberg 14208, img#268) (V) (T.A)			
Jan-13-21		06:34:04		2281		EQ20547 BW1-3				Camera		58		604833		4452997		604983		4452748		-150		249		290		149		(Corr'd Nav, Kongsberg 14208, img#269) (V) (T.A)			
Jan-13-21		06:34:46		2282		EQ20547 BW1-3				Camera		58		604831		4453003		604983		4452748		-152		255		297		149		(Corr'd Nav, Kongsberg 14208, img#270) (V) (T.A)			
Jan-13-21		06:35:39		2283		EQ20547 BW1-3				Camera		58		604832		4453014		604983		4452748		-151		266		306		150		(Corr'd Nav, Kongsberg 14208, img#271) (V) (T.A)			
Jan-13-21		06:36:31		2284		EQ20547 BW1-3				Camera		58		604827		4453015		604983		4452748		-156		267		309		150		(Corr'd Nav, Kongsberg 14208, img#272) (V) (T.A)			
Jan-13-21		06:37:15		2285		EQ20547 BW1-3				Camera		58		604820		4453021		604983		4452748		-163		273		318		149		(Corr'd Nav, Kongsberg 14208, img#273) (V) (T.A)			
Jan-13-21		06:37:51		2286		EQ20547 BW1-3				Camera		58		604816		4453028		604983		4452748		-167		280		326		149		(Corr'd Nav, Kongsberg 14208, img#274) (V) (T.A)			
Jan-13-21		06:38:53		2287		EQ20547 BW1-3				Camera		58		604809		4453036		604983		4452748		-174		288		336		149		(Corr'd Nav, Kongsberg 14208, img#275) (V) (T.A)			
Jan-13-21		06:40:18		2288		EQ20547 BW1-3				Camera		58		604800		4453048		604983		4452748		-183		300		351		149		(Corr'd Nav, Kongsberg 14208, img#276) (V) (T.A)			
Jan-13-21		06:41:21		2289		EQ20547 BW1-3				Camera		58		604794		4453056		604983		4452748		-189		308		361		148		(Corr'd Nav, Kongsberg 14208, img#277) (V) (T.A)			
Jan-13-21		06:42:28		2290		EQ20547 BW1-3				Camera		58		604789		4453066		604983		4452748		-194		318		373		149		(Corr'd Nav, Kongsberg 14208, img#278) (V) (T.A)			
Jan-13-21		06:43:51		2291		EQ20547 BW1-3				Camera		58		604783		4453081		604983		4452748		-200		333		389		149		(Corr'd Nav, Kongsberg 14208, img#279) (V) (T.A)			
Jan-13-21		06:45:49		2292		EQ20547 BW1-3				Camera		58		604772		4453093		604983		4452748		-211		345		404		149		(Corr'd Nav, Kongsberg 14208, img#280) (V) (T.A)			
Jan-13-21		06:47:01		2293		EQ20547 BW1-3				Camera		58		604766		4453102		604983		4452748		-217		354		415		148		(Corr'd Nav, Kongsberg 14208, img#281) (V) (T.A)			
Jan-13-21		06:48:38		2294		EQ20547 BW1-3				Camera		58		604760		4453116		604983		4452748		-223		368		431		149		(Corr'd Nav, Kongsberg 14208, img#282) (V) (T.A)			
Jan-13-21		06:49:35		2295		EQ20547 BW1-3				Camera		58		604754		4453119		604983		4452748		-229		371		436		148		(Corr'd Nav, Kongsberg 14208, img#283) (V) (T.A)			
Jan-13-21		06:50:32		2296		EQ20547 BW1-3				Camera		58		604753		4453127		604983		4452748		-230		379		444		149		(Corr'd Nav, Kongsberg 14208, img#284) (V) (T.A)			
Jan-13-21		06:50:51		2297		EQ20547 BW1-3				Camera		58		604752		4453130		604983		4452748		-231		382		446		149		(Corr'd Nav, Kongsberg 14208, img#285) (V) (T.A)			
Jan-13-21		06:51:44		2298		EQ20547 BW1-3				Camera		58		604749		4453134		604983		4452748		-234		386		451		149		(Corr'd Nav, Kongsberg 14208, img#286) (V) (T.A)			
Jan-13-21		06:52:29		2299		EQ20547 BW1-3				Camera		58		604745		4453142		604983		4452748		-238		394		460		149		(Corr'd Nav, Kongsberg 14208, img#287) (V) (T.A)			
Jan-13-21		06:53:53		2300		EQ20547 BW1-3				Camera		58		604731		4453149		604983		4452748		-252		401		474		148		(Corr'd Nav, Kongsberg 14208, img#288) (V) (T.A)			
Jan-13-21		06:55:24		2301		EQ20547 BW1-3				Camera		58		604735		4453152		604983		4452748		-248		404		4							



APPENDIX A FIELD SAMPLING LOGS

Gardline										Seafloor Sampling Positioning Summary										
Job No		11543							Vessel		MV Ocean Endeavour									
Client		Equinor US Wind LLC							Vessel Reference Point (VRP)		CoG									
Project Name		Empire Wind Extension							Deployment Location		Grab Deployment Point				x	6.7	y	21.94	z	2.93
Primary Positioning System		Starpack 1							Actual Coordinates derived from		Deployment Location									
Geodetic Reference System		Datum			WGS 84 - NAD 83 (2018.0 ITRF 2014)			Ellipsoid	GRS 80	Projection		UTM ZONE 18 N (75 W)				Vertical / Tidal Datum		NAVD 88		
Date	Time	Fix number	Station Number	Penetration	Sample	Retention	Observed	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks			
Jan-13-21	09:20:26	2321	EQ20547 BW1-2			Camera	22	591497	4452374	591501	4452375	-4	-1	4	81		(Corr'd Nav, Kongsberg 14208, img#309) (V) (T.A)			
Jan-13-21	09:20:48	2322	EQ20547 BW1-2			Camera	22	591498	4452372	591501	4452375	-3	-3	4	49		(Corr'd Nav, Kongsberg 14208, img#310) (V) (T.A)			
Jan-13-21	09:21:11	2323	EQ20547 BW1-2			Camera	22	591498	4452370	591501	4452375	-3	-5	6	30		(Corr'd Nav, Kongsberg 14208, img#311) (V) (T.A)			
Jan-13-21	09:21:29	2324	EQ20547 BW1-2			Camera	22	591500	4452369	591501	4452375	-2	-6	7	13		(Corr'd Nav, Kongsberg 14208, img#312) (V) (T.A)			
Jan-13-21	09:21:59	2325	EQ20547 BW1-2			Camera	22	591503	4452368	591501	4452375	2	-8	8	345		(Corr'd Nav, Kongsberg 14208, img#313) (V) (T.A)			
Jan-13-21	09:22:19	2326	EQ20547 BW1-2			Camera	22	591504	4452369	591501	4452375	3	-6	7	332		(Corr'd Nav, Kongsberg 14208, img#314) (V) (T.A)			
Jan-13-21	09:22:42	2327	EQ20547 BW1-2			Camera	22	591505	4452371	591501	4452375	4	-4	6	314		(Corr'd Nav, Kongsberg 14208, img#315) (V) (T.A)			
Jan-13-21	09:23:04	2328	EQ20547 BW1-2			Camera	22	591506	4452373	591501	4452375	5	-2	5	294		(Corr'd Nav, Kongsberg 14208, img#316) (V) (T.A)			
Jan-13-21	09:23:32	2329	EQ20547 BW1-2			Camera	22	591505	4452376	591501	4452375	4	1	4	262		(Corr'd Nav, Kongsberg 14208, img#317) (V) (T.A)			
Jan-13-21	09:23:52	2330	EQ20547 BW1-2			Camera	22	591504	4452377	591501	4452375	3	2	4	241		(Corr'd Nav, Kongsberg 14208, img#318) (V) (T.A)			
Jan-13-21	09:24:43	2331	EQ20547 BW1-2			Camera	22	591500	4452378	591501	4452375	-2	3	3	151		(Corr'd Nav, Kongsberg 14208, img#319) (V) (T.A)			
Jan-13-21	09:25:17	2332	EQ20547 BW1-2			Camera	22	591496	4452376	591501	4452375	-5	1	6	103		(Corr'd Nav, Kongsberg 14208, img#320) (V) (T.A)			
Jan-13-21	09:25:23	2333	EQ20547 BW1-2			Camera	22	591495	4452376	591501	4452375	-6	1	6	98		(Corr'd Nav, Kongsberg 14208, img#321) (V) (T.A)			
Jan-13-21	09:26:13	2334	EQ20547 BW1-2			Camera	22	591489	4452373	591501	4452375	-12	-2	12	79		(Corr'd Nav, Kongsberg 14208, img#322) (V) (T.A)			
Jan-13-21	09:27:01	2335	EQ20547 BW1-2			Camera	22	591483	4452371	591501	4452375	-18	-4	19	76		(Corr'd Nav, Kongsberg 14208, img#323) (V) (T.A)			
Jan-13-21	09:27:09	2336	EQ20547 BW1-2			Camera	22	591482	4452370	591501	4452375	-19	-5	20	77		(Corr'd Nav, Kongsberg 14208, img#324) (V) (T.A)			
Jan-13-21	09:28:32	2337	EQ20547 BW1-2			Camera	22	591470	4452368	591501	4452375	-31	-7	32	78		(Corr'd Nav, Kongsberg 14208, img#325) (V) (T.A)			
Jan-13-21	09:29:54	2338	EQ20547 BW1-2			Camera	22	591460	4452364	591501	4452375	-41	-11	43	75		(Corr'd Nav, Kongsberg 14208, img#326) (V) (T.A)			
Jan-13-21	09:30:33	2339	EQ20547 BW1-2			Camera	22	591454	4452362	591501	4452375	-47	-13	49	74		(Corr'd Nav, Kongsberg 14208, img#327) (V) (T.A)			
Jan-13-21	09:31:11	2340	EQ20547 BW1-2			Camera	22	591449	4452360	591501	4452375	-52	-15	54	74		(Corr'd Nav, Kongsberg 14208, img#328) (V) (T.A)			
Jan-13-21	09:33:53	2341	EQ20547 BW1-2			Camera	22	591418	4452350	591501	4452375	-83	-25	86	73		(Corr'd Nav, Kongsberg 14208, img#329) (V) (T.A)			
Jan-13-21	09:34:00	2342	EQ20547 BW1-2			Camera	22	591417	4452350	591501	4452375	-84	-25	88	73		(Corr'd Nav, Kongsberg 14208, img#330) (V) (T.A)			
Jan-13-21	09:34:59	2343	EQ20547 BW1-2			Camera	22	591406	4452350	591501	4452375	-95	-25	98	75		(Corr'd Nav, Kongsberg 14208, img#331) (V) (T.A)			
Jan-13-21	09:35:09	2344	EQ20547 BW1-2			Camera	22	591404	4452350	591501	4452375	-97	-25	100	76		(Corr'd Nav, Kongsberg 14208, img#332) (V) (T.A)			
Jan-13-21	09:35:45	2345	EQ20547 BW1-2			Camera	22	591398	4452350	591501	4452375	-103	-25	106	76		(Corr'd Nav, Kongsberg 14208, img#333) (V) (T.A)			
Jan-13-21	09:36:08	2346	EQ20547 BW1-2			Camera	22	591394	4452350	591501	4452375	-107	-25	110	77		(Corr'd Nav, Kongsberg 14208, img#334) (V) (T.A)			
Jan-13-21	09:36:57	2347	EQ20547 BW1-2			Camera	22	591384	4452349	591501	4452375	-117	-26	119	77		(Corr'd Nav, Kongsberg 14208, img#335) (V) (T.A)			
Jan-13-21	09:37:29	2348	EQ20547 BW1-2			Camera	22	591379	4452348	591501	4452375	-123	-27	125	78		(Corr'd Nav, Kongsberg 14208, img#336) (V) (T.A)			
Jan-13-21	09:38:21	2349	EQ20547 BW1-2			Camera	22	591369	4452347	591501	4452375	-132	-28	135	78		(Corr'd Nav, Kongsberg 14208, img#337) (V) (T.A)			
Jan-13-21	09:39:54	2350	EQ20547 BW1-2			Camera	23	591352	4452341	591501	4452375	-149	-34	152	77		(Corr'd Nav, Kongsberg 14208, img#338) (V) (T.A)			
Jan-13-21	09:42:25	2351	EQ20547 BW1-2			Camera	23	591325	4452329	591501	4452375	-176	-46	182	75		(Corr'd Nav, Kongsberg 14208, img#339) (V) (T.A)			
Jan-13-21	09:43:30	2352	EQ20547 BW1-2			Camera	23	591315	4452325	591501	4452375	-186	-50	193	75		(Corr'd Nav, Kongsberg 14208, img#340) (V) (T.A)			
Jan-13-21	09:43:51	2353	EQ20547 BW1-2			Camera	23	591311	4452325	591501	4452375	-190	-50	196	75		(Corr'd Nav, Kongsberg 14208, img#341) (V) (T.A)			
Jan-13-21	09:43:54	2354	EQ20547 BW1-2			Camera	23	591311	4452325	591501	4452375	-190	-50	197	75		(Corr'd Nav, Kongsberg 14208, img#342) (V) (T.A)			
Jan-13-21	09:44:08	2355	EQ20547 BW1-2			Camera	23	591308	4452325	591501	4452375	-193	-50	199	76		(Corr'd Nav, Kongsberg 14208, img#343) (V) (T.A)			
Jan-13-21	09:44:32	2356	EQ20547 BW1-2			Camera	23	591304	4452325	591501	4452375	-197	-50	204	76		(Corr'd Nav, Kongsberg 14208, img#344) (V) (T.A)			
Jan-13-21	09:45:29	2357	EQ20547 BW1-2			Camera	23	591292	4452325	591501	4452375	-209	-50	215	76		(Corr'd Nav, Kongsberg 14208, img#345) (V) (T.A)			
Jan-13-21	09:46:34	2358	EQ20547 BW1-2			Camera	23	591278	4452323	591501	4452375	-223	-52	229	77		(Corr'd Nav, Kongsberg 14208, img#346) (V) (T.A)			
Jan-13-21	09:47:08	2359	EQ20547 BW1-2			Camera	23	591272	4452322	591501	4452375	-229	-53	235	77		(Corr'd Nav, Kongsberg 14208, img#347) (V) (T.A)			
Jan-13-21	09:48:15	2360	EQ20547 BW1-2			Camera	23	591261	4452319	591501	4452375	-240	-56	246	77		(Corr'd Nav, Kongsberg 14208, img#348) (V) (T.A)			
Jan-13-21	09:49:16	2361	EQ20547 BW1-2			Camera	23	591250	4452317	591501	4452375	-251	-58	257	77		(Corr'd Nav, Kongsberg 14208, img#349) (V) (T.A)			
Jan-13-21	09:50:14	2362	EQ20547 BW1-2			Camera	23	591240	4452315	591501	4452375	-261	-60	268	77		(Corr'd Nav, Kongsberg 14208, img#350) (V) (T.A)			
Jan-13-21	09:51:12	2363	EQ20547 BW1-2			Camera	23	591232	4452313	591501	4452375	-269	-62	276	77		(Corr'd Nav, Kongsberg 14208, img#351) (V) (T.A)			
Jan-13-21	09:51:56	2364	EQ20547 BW1-2			Camera	23	591229	4452311	591501	4452375	-272	-64	279	77		(Corr'd Nav, Kongsberg 14208, img#352) (V) (T.A)			
Jan-13-21	09:53:01	2365	EQ20547 BW1-2			Camera	23	591221	4452309	591501	4452375	-280	-66	287	77		(Corr'd Nav, Kongsberg 14208, img#353) (V) (T.A)			
Jan-13-21	09:54:47	2366	EQ20547 BW1-2			Camera	23	591215	4452306	591501	4452375	-286	-69	294	77		(Corr'd Nav, Kongsberg 14208, img#354) (V) (T.A)			
Jan-13-21	09:55:29	2367	EQ20547 BW1-2			Camera	23	591214	4452309	591501	4452375	-287	-66	294	77		(Corr'd Nav, Kongsberg 14208, img#355) (V) (T.A)			
Jan-13-21	09:55:53	2368	EQ20547 BW1-2			Camera	23	591214	4452312	591501	4452375	-287	-63	294	78		(Corr'd Nav, Kongsberg 14208, img#356) (V) (T.A)			
Jan-13-21	09:56:24	2369	EQ20547 BW1-2			Camera	23	591212	4452314	591501	4452375	-289	-61	296	78		(Corr'd Nav, Kongsberg 14208, img#357) (V) (T.A)			
Jan-13-21	09:56:37	2370	EQ20547 BW1-2			Camera	23	591210	4452314	591501	4452375	-291	-61	297	78		(Corr'd Nav, Kongsberg 14208, img#358) (V) (T.A)			
Jan-13-21	09:57:10	2371	EQ20547 BW1-2			Camera	23	591208	4452311	591501	4452375	-293	-64	300	78		(Corr'd Nav, Kongsberg 14208, img#359) (V) (T.A)			
Jan-13-21	09:57:32	2372	EQ20547 BW1-2			Camera	23	591206	4452309	591501	4452375	-295	-66	302	77		(Corr'd Nav, Kongsberg 14208, img#360) (V) (T.A)			
Jan-13-21	09:57:56	2373	EQ20547 BW1-2			Camera	23	591205	4452308	591501	4452375	-296	-67	304	77		(Corr'd Nav, Kongsberg 14208, img#361) (V) (T.A)			
Jan-13-21	09:58:16	2374	EQ20547 BW1-2			Camera	23	591203	4452306	591501	4452375	-298	-69							



APPENDIX A FIELD SAMPLING LOGS

Gardline										Seafloor Sampling Positioning Summary										
Job No		11543							Vessel		MV <i>Ocean Endeavour</i>									
Client		Equinor US Wind LLC							Vessel Reference Point (VRP)		CoG									
Project Name		Empire Wind Extension							Deployment Location		Grab Deployment Point				x	6.7	y	21.94	z	2.93
Primary Positioning System		Starpack 1							Actual Coordinates derived from		Deployment Location									
Geodetic Reference System		Datum	WGS 84 - NAD 83 (2018.0 ITRF 2014)					Ellipsoid	GRS 80		Projection		UTM ZONE 18 N (75 W)				Vertical / Tidal Datum		NAVD 88	
Date	Time	Fix number	Station Number	Penetration	Sample	Retention	Observed	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks			
Jan-13-21	10:04:24	2384	EQ20547 BW1-2			Camera	23	591204	4452307	591501	4452375	-297	-68	305	77		(Corr'd Nav, Kongsberg 14208, img#372) (V) (T.A)			
Jan-13-21	10:04:33	2385	EQ20547 BW1-2			Camera	23	591203	4452306	591501	4452375	-298	-69	306	77		(Corr'd Nav, Kongsberg 14208, img#373) (V) (T.A)			
Jan-13-21	10:04:47	2386	EQ20547 BW1-2			Camera	23	591201	4452304	591501	4452375	-300	-71	308	77		(Corr'd Nav, Kongsberg 14208, img#374) (V) (T.A)			
Jan-13-21	10:05:14	2387	EQ20547 BW1-2			Camera	23	591199	4452301	591501	4452375	-302	-74	311	76		(Corr'd Nav, Kongsberg 14208, img#375) (V) (T.A)			
Jan-13-21	10:05:32	2388	EQ20547 BW1-2			Camera	23	591197	4452299	591501	4452375	-304	-76	313	76		(Corr'd Nav, Kongsberg 14208, img#376) (V) (T.A)			
Jan-13-21	10:06:13	2389	EQ20547 BW1-2			Camera	23	591190	4452297	591501	4452375	-311	-78	320	76		(Corr'd Nav, Kongsberg 14208, img#377) (V) (T.A)			
Jan-13-21	10:07:04	2390	EQ20547 BW1-2			Camera	23	591185	4452296	591501	4452375	-316	-79	325	76		(Corr'd Nav, Kongsberg 14208, img#378) (V) (T.A)			
Jan-13-21	10:07:17	2391	EQ20547 BW1-2			Camera	23	591184	4452296	591501	4452375	-317	-79	326	76		(Corr'd Nav, Kongsberg 14208, img#379) (V) (T.A)			
Jan-13-21	10:07:48	2392	EQ20547 BW1-2			Camera	23	591181	4452296	591501	4452375	-320	-79	330	76		(Corr'd Nav, Kongsberg 14208, img#380) (V) (T.A)			
Jan-13-21	10:08:16	2393	EQ20547 BW1-2			Camera	23	591177	4452297	591501	4452375	-324	-78	334	76		(Corr'd Nav, Kongsberg 14208, img#381) (V) (T.A)			
Jan-13-21	10:08:38	2394	EQ20547 BW1-2			Camera	23	591174	4452296	591501	4452375	-327	-79	336	76		(Corr'd Nav, Kongsberg 14208, img#382) (V) (T.A)			
Jan-13-21	10:09:11	2395	EQ20547 BW1-2			Camera	23	591170	4452296	591501	4452375	-331	-79	341	77		(Corr'd Nav, Kongsberg 14208, img#383) (V) (T.A)			
Jan-13-21	10:09:26	2396	EQ20547 BW1-2			Camera	23	591168	4452295	591501	4452375	-333	-80	342	77		(Corr'd Nav, Kongsberg 14208, img#384) (V) (T.A)			
Jan-13-21	10:10:16	2397	EQ20547 BW1-2			Camera	23	591161	4452294	591501	4452375	-340	-81	349	77		(Corr'd Nav, Kongsberg 14208, img#385) (V) (T.A)			
Jan-13-21	10:10:56	2398	EQ20547 BW1-2			Camera	23	591156	4452293	591501	4452375	-345	-82	354	77		(Corr'd Nav, Kongsberg 14208, img#386) (V) (T.A)			
Jan-13-21	10:11:47	2399	EQ20547 BW1-2			Camera	23	591149	4452291	591501	4452375	-352	-84	362	77		(Corr'd Nav, Kongsberg 14208, img#387) (V) (T.A)			
Jan-13-21	10:13:02	2400	EQ20547 BW1-2			Camera	23	591140	4452288	591501	4452375	-361	-87	371	76		(Corr'd Nav, Kongsberg 14208, img#388) (V) (T.A)			
Jan-13-21	10:13:34	2401	EQ20547 BW1-2			Camera	23	591136	4452286	591501	4452375	-365	-89	375	76		(Corr'd Nav, Kongsberg 14208, img#389) (V) (T.A)			
Jan-13-21	10:14:56	2402	EQ20547 BW1-2			Camera	23	591123	4452280	591501	4452375	-378	-95	390	76		(Corr'd Nav, Kongsberg 14208, img#390) (V) (T.A)			
Jan-13-21	10:15:13	2403	EQ20547 BW1-2			Camera	23	591122	4452280	591501	4452375	-379	-95	391	76		(Corr'd Nav, Kongsberg 14208, img#391) (V) (T.A)			
Jan-13-21	10:16:08	2404	EQ20547 BW1-2			Camera	23	591117	4452280	591501	4452375	-384	-95	395	76		(Corr'd Nav, Kongsberg 14208, img#392) (V) (T.A)			
Jan-13-21	10:17:15	2405	EQ20547 BW1-2			Camera	23	591108	4452280	591501	4452375	-393	-95	405	76		(Corr'd Nav, Kongsberg 14208, img#393) (V) (T.A)			
Jan-13-21	10:18:38	2406	EQ20547 BW1-2			Camera	23	591093	4452278	591501	4452375	-408	-97	419	77		(Corr'd Nav, Kongsberg 14208, img#394) (V) (T.A)			
Jan-13-21	10:19:11	2407	EQ20547 BW1-2			Camera	23	591088	4452276	591501	4452375	-413	-99	424	76		(Corr'd Nav, Kongsberg 14208, img#395) (V) (T.A)			
Jan-13-21	10:20:54	2408	EQ20547 BW1-2			Camera	23	591073	4452270	591501	4452375	-428	-105	441	76		(Corr'd Nav, Kongsberg 14208, img#396) (V) (T.A)			
Jan-13-21	10:22:38	2409	EQ20547 BW1-2			Camera	23	591058	4452268	591501	4452375	-443	-107	455	76		(Corr'd Nav, Kongsberg 14208, img#397) (V) (T.A)			
Jan-13-21	10:24:37	2410	EQ20547 BW1-2			Camera	23	591041	4452264	591501	4452375	-460	-111	473	76		(Corr'd Nav, Kongsberg 14208, img#398) (V) (T.A)			
Jan-13-21	10:25:46	2411	EQ20547 BW1-2			Camera	23	591030	4452260	591501	4452375	-471	-115	485	76		(Corr'd Nav, Kongsberg 14208, img#399) (V) (T.A)			
Jan-13-21	10:27:18	2412	EQ20547 BW1-2			Camera	23	591013	4452256	591501	4452375	-488	-119	503	76		(Corr'd Nav, Kongsberg 14208, img#400) (V) (T.A)			
Jan-13-21	10:29:16	2413	EQ20547 BW1-2			Camera	23	590988	4452252	591501	4452375	-513	-123	527	76		(Corr'd Nav, Kongsberg 14208, img#401) (V) (T.A)			
Jan-13-21	10:32:50	2414	EQ20547 BW1-2			Camera	23	590948	4452243	591501	4452375	-553	-132	568	77		(Corr'd Nav, Kongsberg 14208, img#402) (V) (T.A)			
Jan-13-21	10:33:04	2415	EQ20547 BW1-2			Camera	23	590945	4452242	591501	4452375	-556	-133	571	77		(Corr'd Nav, Kongsberg 14208, img#403) (V) (T.A)			
Jan-13-21	10:34:38	2416	EQ20547 BW1-2			Camera	23	590933	4452238	591501	4452375	-568	-137	585	76		(Corr'd Nav, Kongsberg 14208, img#404) (V) (T.A)			
Jan-13-21	10:35:06	2417	EQ20547 BW1-2			Camera	23	590930	4452238	591501	4452375	-571	-137	587	77		(Corr'd Nav, Kongsberg 14208, img#405) (V) (T.A)			
Jan-13-21	10:37:27	2418	EQ20547 BW1-2			Camera	23	590922	4452237	591501	4452375	-579	-138	596	77		(Corr'd Nav, Kongsberg 14208, img#406) (V) (T.A)			
Jan-13-21	10:37:59	2419	EQ20547 BW1-2			Camera	23	590921	4452238	591501	4452375	-580	-137	596	77		(Corr'd Nav, Kongsberg 14208, img#407) (V) (T.A)			
Jan-13-21	10:38:47	2420	EQ20547 BW1-2			Camera	23	590923	4452243	591501	4452375	-578	-132	593	77		(Corr'd Nav, Kongsberg 14208, img#408) (V) (T.A)			
Jan-13-21	10:39:03	2421	EQ20547 BW1-2			Camera	23	590922	4452245	591501	4452375	-579	-130	594	77		(Corr'd Nav, Kongsberg 14208, img#409) (V) (T.A)			
Jan-13-21	10:39:17	2422	EQ20547 BW1-2			Camera	23	590921	4452246	591501	4452375	-580	-129	594	77		(Corr'd Nav, Kongsberg 14208, img#410) (V) (T.A)			
Jan-13-21	10:40:02	2423	EQ20547 BW1-2			Camera	23	590920	4452247	591501	4452375	-581	-128	595	78		(Corr'd Nav, Kongsberg 14208, img#411) (V) (T.A)			
Jan-13-21	10:40:23	2424	EQ20547 BW1-2			Camera	23	590919	4452245	591501	4452375	-582	-130	596	77		(Corr'd Nav, Kongsberg 14208, img#412) (V) (T.A)			
Jan-13-21	10:41:04	2425	EQ20547 BW1-2			Camera	23	590918	4452241	591501	4452375	-583	-134	599	77		(Corr'd Nav, Kongsberg 14208, img#413) (V) (T.A)			
Jan-13-21	10:41:25	2426	EQ20547 BW1-2			Camera	23	590916	4452238	591501	4452375	-585	-137	601	77		(Corr'd Nav, Kongsberg 14208, img#414) (V) (T.A)			
Jan-13-21	10:41:41	2427	EQ20547 BW1-2			Camera	23	590915	4452236	591501	4452375	-586	-139	602	77		(Corr'd Nav, Kongsberg 14208, img#415) (V) (T.A)			
Jan-13-21	10:42:02	2428	EQ20547 BW1-2			Camera	23	590914	4452234	591501	4452375	-587	-141	604	77		(Corr'd Nav, Kongsberg 14208, img#416) (V) (T.A)			
Jan-13-21	10:42:24	2429	EQ20547 BW1-2			Camera	23	590913	4452233	591501	4452375	-588	-142	604	76		(Corr'd Nav, Kongsberg 14208, img#417) (V) (T.A)			
Jan-13-21	10:42:46	2430	EQ20547 BW1-2			Camera	23	590915	4452232	591501	4452375	-586	-143	604	76		(Corr'd Nav, Kongsberg 14208, img#418) (V) (T.A)			
Jan-13-21	10:43:29	2431	EQ20547 BW1-2			Camera	23	590918	4452232	591501	4452375	-583	-143	600	76		(Corr'd Nav, Kongsberg 14208, img#419) (V) (T.A)			
Jan-13-21	10:43:49	2432	EQ20547 BW1-2			Camera	23	590919	4452233	591501	4452375	-582	-142	599	76		(Corr'd Nav, Kongsberg 14208, img#420) (V) (T.A)			
Jan-13-21	10:44:03	2433	EQ20547 BW1-2			Camera	23	590920	4452234	591501	4452375	-581	-141	598	76		(Corr'd Nav, Kongsberg 14208, img#421) (V) (T.A)			
Jan-13-21	10:44:49	2434	EQ20547 BW1-2			Camera	23	590918	4452239	591501	4452375	-583	-136	599	77		(Corr'd Nav, Kongsberg 14208, img#423) (V) (T.A)			
Jan-13-21	10:45:21	2435	EQ20547 BW1-2			Camera	23	590916	4452242	591501	4452375	-585	-133	600	77		(Corr'd Nav, Kongsberg 14208, img#424) (V) (T.A)			
Jan-13-21	10:45:32	2436	EQ20547 BW1-2			Camera	23	590915	4452242	591501	4452375	-586	-133	601	77		(Corr'd Nav, Kongsberg 14208, img#425) (V) (T.A)			



APPENDIX A FIELD SAMPLING LOGS

Gardline															Seafloor Sampling Positioning Summary									
Job No		11543							Vessel		MV Ocean Endeavour													
Client		Equinor US Wind LLC							Vessel Reference Point (VRP)		CoG													
Project Name		Empire Wind Extension							Deployment Location		Grab Deployment Point				x	6.7	y	21.94	z	2.93				
Primary Positioning System		Starpack 1							Actual Coordinates derived from		Deployment Location													
Geodetic Reference System		Datum			WGS 84 - NAD 83 (2018.0 ITRF 2014)			Ellipsoid	GRS 80		Projection		UTM ZONE 18 N (75 W)				Vertical / Tidal Datum		NAVD 88					
Date	Time	Fix number	Station Number	Penetration	Sample	Retention	Observed	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks							
Mar-21-21	20:46:18	2769	EQ20547 BW1-2B-1			Camera	23	591217	4452275	591209	4452287	8	-12	15	327		(Corr'd Nav, Kongsberg 14208, img#10) (V) (T.A)							
Mar-21-21	20:48:01	2770	EQ20547 BW1-2B-1			Camera	23	591212	4452290	591209	4452287	3	3	5	228		(Corr'd Nav, Kongsberg 14208, img#11) (V) (T.A)							
Mar-21-21	20:48:38	2771	EQ20547 BW1-2B-1			Camera	23	591215	4452291	591209	4452287	6	4	7	239		(Corr'd Nav, Kongsberg 14208, img#12) (V) (T.A)							
Mar-21-21	20:48:58	2772	EQ20547 BW1-2B-1			Camera	23	591214	4452288	591209	4452287	5	1	5	260		(Corr'd Nav, Kongsberg 14208, img#13) (V) (T.A)							
Mar-21-21	20:49:19	2773	EQ20547 BW1-2B-1			Camera	23	591211	4452286	591209	4452287	2	-1	3	298		(Corr'd Nav, Kongsberg 14208, img#14) (V) (T.A)							
Mar-21-21	20:49:42	2774	EQ20547 BW1-2B-1			Camera	23	591211	4452285	591209	4452287	2	-2	2	315		(Corr'd Nav, Kongsberg 14208, img#15) (V) (T.A)							
Mar-21-21	20:50:28	2775	EQ20547 BW1-2B-1			Camera	23	591210	4452290	591209	4452287	1	3	3	200		(Corr'd Nav, Kongsberg 14208, img#16) (V) (T.A)							
Mar-21-21	20:51:40	2776	EQ20547 BW1-2B-1			Camera	23	591208	4452289	591209	4452287	-1	2	2	158		(Corr'd Nav, Kongsberg 14208, img#17) (V) (T.A)							
Mar-21-21	20:52:37	2777	EQ20547 BW1-2B-1			Camera	23	591211	4452290	591209	4452287	2	3	4	212		(Corr'd Nav, Kongsberg 14208, img#18) (V) (T.A)							
Mar-21-21	20:52:43	2778	EQ20547 BW1-2B-1			Camera	23	591211	4452290	591209	4452287	2	3	3	212		(Corr'd Nav, Kongsberg 14208, img#19) (V) (T.A)							
Mar-21-21	20:53:56	2779	EQ20547 BW1-2B-1			Camera	23	591210	4452290	591209	4452287	1	3	3	192		(Corr'd Nav, Kongsberg 14208, img#20) (V) (T.A)							
Mar-21-21	20:54:18	2780	EQ20547 BW1-2B-1			Camera	23	591212	4452290	591209	4452287	3	3	4	221		(Corr'd Nav, Kongsberg 14208, img#21) (V) (T.A)							
Mar-21-21	20:54:52	2781	EQ20547 BW1-2B-1			Camera	23	591211	4452291	591209	4452287	2	4	5	209		(Corr'd Nav, Kongsberg 14208, img#22) (V) (T.A)							
Mar-21-21	20:55:27	2782	EQ20547 BW1-2B-1			Camera	23	591211	4452293	591209	4452287	2	6	6	201		(Corr'd Nav, Kongsberg 14208, img#23) (V) (T.A)							
Mar-21-21	20:55:45	2783	EQ20547 BW1-2B-1			Camera	23	591209	4452292	591209	4452287	0	5	5	183		(Corr'd Nav, Kongsberg 14208, img#24) (V) (T.A)							
Mar-21-21	20:56:16	2784	EQ20547 BW1-2B-1			Camera	23	591211	4452294	591209	4452287	2	7	7	195		(Corr'd Nav, Kongsberg 14208, img#25) (V) (T.A)							
Mar-21-21	20:56:48	2785	EQ20547 BW1-2B-1			Camera	23	591212	4452291	591209	4452287	3	4	5	216		(Corr'd Nav, Kongsberg 14208, img#26) (V) (T.A)							
Mar-21-21	20:57:18	2786	EQ20547 BW1-2B-1			Camera	23	591211	4452289	591209	4452287	2	2	3	234		(Corr'd Nav, Kongsberg 14208, img#27) (V) (T.A)							
Mar-21-21	20:57:47	2787	EQ20547 BW1-2B-1			Camera	23	591211	4452290	591209	4452287	2	3	4	214		(Corr'd Nav, Kongsberg 14208, img#28) (V) (T.A)							
Mar-21-21	20:58:17	2788	EQ20547 BW1-2B-1			Camera	23	591212	4452289	591209	4452287	3	2	4	235		(Corr'd Nav, Kongsberg 14208, img#29) (V) (T.A)							
Mar-21-21	20:59:14	2789	EQ20547 BW1-2B-1			Camera	23	591209	4452291	591209	4452287	0	4	4	184		(Corr'd Nav, Kongsberg 14208, img#30) (V) (T.A)							
Mar-21-21	20:59:47	2790	EQ20547 BW1-2B-1			Camera	23	591205	4452293	591209	4452287	-4	6	8	146		(Corr'd Nav, Kongsberg 14208, img#31) (V) (T.A)							
Mar-21-21	21:00:04	2791	EQ20547 BW1-2B-1			Camera	23	591205	4452294	591209	4452287	-4	7	8	153		(Corr'd Nav, Kongsberg 14208, img#32) (V) (T.A)							
Mar-21-21	21:00:31	2792	EQ20547 BW1-2B-1			Camera	23	591204	4452292	591209	4452287	-5	5	7	138		(Corr'd Nav, Kongsberg 14208, img#33) (V) (T.A)							
Mar-21-21	21:00:47	2793	EQ20547 BW1-2B-1			Camera	23	591205	4452291	591209	4452287	-4	4	6	131		(Corr'd Nav, Kongsberg 14208, img#34) (V) (T.A)							
Mar-21-21	21:01:01	2794	EQ20547 BW1-2B-1			Camera	23	591203	4452290	591209	4452287	-6	3	6	115		(Corr'd Nav, Kongsberg 14208, img#35) (V) (T.A)							
Mar-21-21	21:01:16	2795	EQ20547 BW1-2B-1			Camera	23	591205	4452288	591209	4452287	-4	1	4	100		(Corr'd Nav, Kongsberg 14208, img#36) (V) (T.A)							
Mar-21-21	21:01:24	2796	EQ20547 BW1-2B-1			Camera	23	591206	4452287	591209	4452287	-3	0	3	87		(Corr'd Nav, Kongsberg 14208, img#37) (V) (T.A)							
Mar-21-21	21:01:53	2797	EQ20547 BW1-2B-1			Camera	23	591207	4452283	591209	4452287	-2	-4	5	29		(Corr'd Nav, Kongsberg 14208, img#38) (V) (T.A)							
Mar-21-21	21:02:11	2798	EQ20547 BW1-2B-1			Camera	23	591207	4452280	591209	4452287	-2	-7	8	18		(Corr'd Nav, Kongsberg 14208, img#39) (V) (T.A)							
Mar-21-21	21:02:19	2799	EQ20547 BW1-2B-1			Camera	23	591207	4452279	591209	4452287	-2	-8	9	14		(Corr'd Nav, Kongsberg 14208, img#40) (V) (T.A)							
Mar-22-21	00:09:56	2800	EQ20547 BW1-7C-1			Camera	30	622705	4455273	622702	4455272	3	1	3	249		(Corr'd Nav, Kongsberg 14208, img#41) (V) (T.A)							
Mar-22-21	00:11:49	2801	EQ20547 BW1-7C-1			Camera	30	622695	4455267	622702	4455272	-7	-5	9	52		(Corr'd Nav, Kongsberg 14208, img#42) (V) (T.A)							
Mar-22-21	00:12:42	2802	EQ20547 BW1-7C-1			Camera	30	622701	4455267	622702	4455272	-1	-5	5	8		(Corr'd Nav, Kongsberg 14208, img#43) (V) (T.A)							
Mar-22-21	00:13:54	2803	EQ20547 BW1-7C-1			Camera	30	622707	4455269	622702	4455272	5	-3	6	304		(Corr'd Nav, Kongsberg 14208, img#44) (V) (T.A)							
Mar-22-21	00:14:35	2804	EQ20547 BW1-7C-1			Camera	30	622710	4455275	622702	4455272	8	3	8	249		(Corr'd Nav, Kongsberg 14208, img#45) (V) (T.A)							
Mar-22-21	00:14:51	2805	EQ20547 BW1-7C-1			Camera	30	622708	4455278	622702	4455272	6	6	8	225		(Corr'd Nav, Kongsberg 14208, img#46) (V) (T.A)							
Mar-22-21	00:15:04	2806	EQ20547 BW1-7C-1			Camera	30	622706	4455279	622702	4455272	4	7	8	208		(Corr'd Nav, Kongsberg 14208, img#47) (V) (T.A)							
Mar-22-21	00:15:26	2807	EQ20547 BW1-7C-1			Camera	30	622703	4455280	622702	4455272	1	8	8	189		(Corr'd Nav, Kongsberg 14208, img#48) (V) (T.A)							
Mar-22-21	00:15:43	2808	EQ20547 BW1-7C-1			Camera	30	622700	4455279	622702	4455272	-2	7	7	167		(Corr'd Nav, Kongsberg 14208, img#49) (V) (T.A)							
Mar-22-21	00:16:03	2809	EQ20547 BW1-7C-1			Camera	30	622697	4455277	622702	4455272	-5	5	6	135		(Corr'd Nav, Kongsberg 14208, img#50) (V) (T.A)							
Mar-22-21	00:16:17	2810	EQ20547 BW1-7C-1			Camera	30	622696	4455275	622702	4455272	-6	3	7	120		(Corr'd Nav, Kongsberg 14208, img#51) (V) (T.A)							
Mar-22-21	00:17:00	2811	EQ20547 BW1-7C-1			Camera	30	622698	4455273	622702	4455272	-4	1	4	98		(Corr'd Nav, Kongsberg 14208, img#52) (V) (T.A)							
Mar-22-21	00:17:18	2812	EQ20547 BW1-7C-1			Camera	30	622700	4455272	622702	4455272	-2	0	3	97		(Corr'd Nav, Kongsberg 14208, img#53) (V) (T.A)							
Mar-22-21	00:17:50	2813	EQ20547 BW1-7C-1			Camera	30	622704	4455271	622702	4455272	2	-1	2	286		(Corr'd Nav, Kongsberg 14208, img#54) (V) (T.A)							
Mar-22-21	00:18:33	2814	EQ20547 BW1-7C-1			Camera	30	622709	4455272	622702	4455272	7	0	7	266		(Corr'd Nav, Kongsberg 14208, img#55) (V) (T.A)							
Mar-22-21	00:19:02	2815	EQ20547 BW1-7C-1			Camera	30	622708	4455270	622702	4455272	6	-2	6	289		(Corr'd Nav, Kongsberg 14208, img#56) (V) (T.A)							
Mar-22-21	00:19:29	2816	EQ20547 BW1-7C-1			Camera	30	622706	4455267	622702	4455272	4	-5	7	326		(Corr'd Nav, Kongsberg 14208, img#57) (V) (T.A)							
Mar-22-21	00:19:53	2817	EQ20547 BW1-7C-1			Camera	30	622705	4455265	622702	4455272	3	-7	8	335		(Corr'd Nav, Kongsberg 14208, img#58) (V) (T.A)							
Mar-22-21	00:20:38	2818	EQ20547 BW1-7C-1			Camera	30	622705	4455272	622702	4455272	3	0	3	263		(Corr'd Nav, Kongsberg 14208, img#59) (V) (T.A)							
Mar-22-21	00:21:11	2819	EQ20547 BW1-7C-1			Camera	30	622703	4455278	622702	4455272	1	6	6	190		(Corr'd Nav, Kongsberg 14208, img#60) (V) (T.A)							
Mar-22-21	00:21:41	2820	EQ20547 BW1-7C-1			Camera	30	622699	4455280	622702	4455272	-3	8	9	163		(Corr'd Nav, Kongsberg 14208, img#61) (V) (T.A)							
Mar-22-21	00:22:10	2821	EQ20547 BW1-7C-1			Camera	30	622695	4455276	622702	4455272	-7	4	8	121		(Corr'd Nav, Kongsberg 14208, img#62) (V) (T.A)							
Mar-22-21	00:23:03	2822	EQ20547 BW1-7C-1			Camera	30	622695	4455266	622702	4455272	-7	-6	9	50		(Corr'd Nav, Kongsberg 14208, img#63) (V) (T.A)							
Mar-22-21	00:23:37	2823	EQ20547 BW1-7C-1			Camera	30	622699	4455267	622702	4455272	-3	-5	6	26		(Corr'd Nav, Kongsberg 14208, img#64) (V) (T.A)							
Mar-22-21	00:23:47	2824	EQ20547 BW1-7C-1			Camera	30	622701	4455268	622702	4455272	-1	-4	4	14		(Corr'd Nav, Kongsberg 14208, img#65) (V) (T.A)							
Mar-22-21	00:24:01	2825	EQ20547 BW1-7C-1			Camera	30	622703	4455269	622702	4455272	1	-3	3	344		(Corr'd Nav, Kongsberg 14208, img#66) (V) (T.A)							
Mar-22-21	00:24:18	2826	EQ20547 BW1-7C-1			Camera	30	622704	4455271	622702	4455272	2	-1	2	292		(Corr'd Nav, Kongsberg 14208, img#67) (V) (T.A)							
Mar-22-21	00:24:44	2827	EQ20547 BW1-7C-1			Camera	30	622705	4455274	622702	4455272	3	2	4	240		(Corr'd Nav, Kongsberg 14208, img#68) (V) (T.A)							
Mar-22-21	00:25:48	2828	EQ20547 BW1-7C-1			Camera	30	622701	4455278	622702	4455272	-1	6	7	167		(Corr'd Nav, Kongsberg 14208, img#69) (V) (T.A)							
Mar-22-21	01:36:15	2829	EQ20547 BW1-9			Camera	32	627489	4455975	627494	4455975	-5	1	5	97		(Corr'd Nav, Kongsberg 14208, img#70) (V) (T.A)							
Mar-22-21	01:36:40	2830	EQ20547 BW1-9			Camera	32	627488	4455970	627494	4455975	-6	-4	7										



APPENDIX A FIELD SAMPLING LOGS

Gardline										Seafloor Sampling Positioning Summary										
Job No		11543							Vessel		MV Ocean Endeavour									
Client		Equinor US Wind LLC							Vessel Reference Point (VRP)		CoG									
Project Name		Empire Wind Extension							Deployment Location		Grab Deployment Point				x	6.7	y	21.94	z	2.93
Primary Positioning System		Starpack 1							Actual Coordinates derived from		Deployment Location									
Geodetic Reference System		Datum			WGS 84 - NAD 83 (2018.0 ITRF 2014)			Ellipsoid	GRS 80		Projection		UTM ZONE 18 N (75 W)				Vertical / Tidal Datum		NAVD 88	
Date	Time	Fix number	Station Number	Penetration	Sample	Retention	Observed	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks			
Mar-22-21	01:37:13	2832	EQ20547 BW1-9			Camera	32	627493	4455969	627494	4455975	-1	-6	6	11		(Corr'd Nav, Kongsberg 14208, img#73) (V) (T.A)			
Mar-22-21	01:37:19	2833	EQ20547 BW1-9			Camera	32	627494	4455969	627494	4455975	0	-6	6	0		(Corr'd Nav, Kongsberg 14208, img#74) (V) (T.A)			
Mar-22-21	01:37:32	2834	EQ20547 BW1-9			Camera	32	627497	4455970	627494	4455975	3	-4	5	325		(Corr'd Nav, Kongsberg 14208, img#75) (V) (T.A)			
Mar-22-21	01:37:45	2835	EQ20547 BW1-9			Camera	32	627500	4455971	627494	4455975	6	-3	7	300		(Corr'd Nav, Kongsberg 14208, img#76) (V) (T.A)			
Mar-22-21	01:37:59	2836	EQ20547 BW1-9			Camera	32	627502	4455973	627494	4455975	8	-2	8	283		(Corr'd Nav, Kongsberg 14208, img#77) (V) (T.A)			
Mar-22-21	01:38:23	2837	EQ20547 BW1-9			Camera	32	627504	4455973	627494	4455975	10	-2	10	279		(Corr'd Nav, Kongsberg 14208, img#78) (V) (T.A)			
Mar-22-21	01:39:12	2838	EQ20547 BW1-9			Camera	32	627502	4455978	627494	4455975	8	4	9	245		(Corr'd Nav, Kongsberg 14208, img#79) (V) (T.A)			
Mar-22-21	01:39:20	2839	EQ20547 BW1-9			Camera	32	627501	4455980	627494	4455975	7	5	8	235		(Corr'd Nav, Kongsberg 14208, img#80) (V) (T.A)			
Mar-22-21	01:39:34	2840	EQ20547 BW1-9			Camera	32	627500	4455980	627494	4455975	5	6	8	222		(Corr'd Nav, Kongsberg 14208, img#81) (V) (T.A)			
Mar-22-21	01:40:13	2841	EQ20547 BW1-9			Camera	32	627495	4455980	627494	4455975	1	5	5	191		(Corr'd Nav, Kongsberg 14208, img#82) (V) (T.A)			
Mar-22-21	01:40:29	2842	EQ20547 BW1-9			Camera	32	627493	4455980	627494	4455975	-1	5	5	165		(Corr'd Nav, Kongsberg 14208, img#83) (V) (T.A)			
Mar-22-21	01:40:42	2843	EQ20547 BW1-9			Camera	32	627491	4455980	627494	4455975	-3	6	7	150		(Corr'd Nav, Kongsberg 14208, img#84) (V) (T.A)			
Mar-22-21	01:40:54	2844	EQ20547 BW1-9			Camera	32	627490	4455980	627494	4455975	-5	5	7	138		(Corr'd Nav, Kongsberg 14208, img#85) (V) (T.A)			
Mar-22-21	01:41:28	2845	EQ20547 BW1-9			Camera	32	627490	4455978	627494	4455975	-5	4	6	127		(Corr'd Nav, Kongsberg 14208, img#86) (V) (T.A)			
Mar-22-21	01:41:35	2846	EQ20547 BW1-9			Camera	32	627489	4455977	627494	4455975	-5	3	6	119		(Corr'd Nav, Kongsberg 14208, img#87) (V) (T.A)			
Mar-22-21	01:41:52	2847	EQ20547 BW1-9			Camera	32	627489	4455975	627494	4455975	-5	1	5	95		(Corr'd Nav, Kongsberg 14208, img#88) (V) (T.A)			
Mar-22-21	01:42:04	2848	EQ20547 BW1-9			Camera	32	627488	4455973	627494	4455975	-6	-2	6	75		(Corr'd Nav, Kongsberg 14208, img#89) (V) (T.A)			
Mar-22-21	01:42:17	2849	EQ20547 BW1-9			Camera	32	627490	4455971	627494	4455975	-4	-3	5	51		(Corr'd Nav, Kongsberg 14208, img#90) (V) (T.A)			
Mar-22-21	01:42:29	2850	EQ20547 BW1-9			Camera	32	627493	4455971	627494	4455975	-2	-3	4	24		(Corr'd Nav, Kongsberg 14208, img#91) (V) (T.A)			
Mar-22-21	01:42:59	2851	EQ20547 BW1-9			Camera	32	627499	4455973	627494	4455975	5	-2	5	292		(Corr'd Nav, Kongsberg 14208, img#92) (V) (T.A)			
Mar-22-21	01:43:39	2852	EQ20547 BW1-9			Camera	32	627502	4455973	627494	4455975	7	-2	8	284		(Corr'd Nav, Kongsberg 14208, img#93) (V) (T.A)			
Mar-22-21	01:44:13	2853	EQ20547 BW1-9			Camera	32	627497	4455974	627494	4455975	3	-1	3	280		(Corr'd Nav, Kongsberg 14208, img#94) (V) (T.A)			
Mar-22-21	01:45:06	2854	EQ20547 BW1-9			Camera	32	627493	4455979	627494	4455975	-1	4	4	166		(Corr'd Nav, Kongsberg 14208, img#95) (V) (T.A)			
Mar-22-21	01:45:34	2855	EQ20547 BW1-9			Camera	32	627497	4455976	627494	4455975	3	1	3	244		(Corr'd Nav, Kongsberg 14208, img#96) (V) (T.A)			
Mar-22-21	01:48:06	2856	EQ20547 BW1-9			Camera	32	627516	4455971	627494	4455975	21	-4	22	280		(Corr'd Nav, Kongsberg 14208, img#97) (V) (T.A)			
Mar-22-21	01:49:17	2857	EQ20547 BW1-9			Camera	32	627529	4455965	627494	4455975	35	-10	36	285		(Corr'd Nav, Kongsberg 14208, img#98) (V) (T.A)			
Mar-22-21	01:49:45	2858	EQ20547 BW1-9			Camera	32	627536	4455964	627494	4455975	42	-11	44	285		(Corr'd Nav, Kongsberg 14208, img#99) (V) (T.A)			
Mar-22-21	01:50:47	2859	EQ20547 BW1-9			Camera	32	627552	4455961	627494	4455975	58	-14	59	284		(Corr'd Nav, Kongsberg 14208, img#100) (V) (T.A)			
Mar-22-21	01:51:40	2860	EQ20547 BW1-9			Camera	32	627568	4455956	627494	4455975	74	-19	76	284		(Corr'd Nav, Kongsberg 14208, img#101) (V) (T.A)			
Mar-22-21	01:52:13	2861	EQ20547 BW1-9			Camera	32	627579	4455953	627494	4455975	84	-22	87	285		(Corr'd Nav, Kongsberg 14208, img#102) (V) (T.A)			
Mar-22-21	01:52:45	2862	EQ20547 BW1-9			Camera	32	627589	4455950	627494	4455975	95	-24	98	284		(Corr'd Nav, Kongsberg 14208, img#103) (V) (T.A)			
Mar-22-21	01:53:06	2863	EQ20547 BW1-9			Camera	32	627594	4455949	627494	4455975	100	-26	103	284		(Corr'd Nav, Kongsberg 14208, img#104) (V) (T.A)			
Mar-22-21	01:54:12	2864	EQ20547 BW1-9			Camera	32	627606	4455948	627494	4455975	112	-26	115	283		(Corr'd Nav, Kongsberg 14208, img#105) (V) (T.A)			
Mar-22-21	01:54:47	2865	EQ20547 BW1-9			Camera	32	627614	4455947	627494	4455975	120	-28	123	283		(Corr'd Nav, Kongsberg 14208, img#106) (V) (T.A)			
Mar-22-21	01:54:55	2866	EQ20547 BW1-9			Camera	32	627616	4455947	627494	4455975	121	-28	124	283		(Corr'd Nav, Kongsberg 14208, img#107) (V) (T.A)			
Mar-22-21	01:55:30	2867	EQ20547 BW1-9			Camera	32	627622	4455944	627494	4455975	128	-31	132	283		(Corr'd Nav, Kongsberg 14208, img#108) (V) (T.A)			
Mar-22-21	01:56:02	2868	EQ20547 BW1-9			Camera	32	627630	4455941	627494	4455975	136	-34	140	284		(Corr'd Nav, Kongsberg 14208, img#109) (V) (T.A)			
Mar-22-21	01:56:40	2869	EQ20547 BW1-9			Camera	32	627639	4455940	627494	4455975	145	-35	149	284		(Corr'd Nav, Kongsberg 14208, img#110) (V) (T.A)			
Mar-22-21	01:57:32	2870	EQ20547 BW1-9			Camera	32	627651	4455936	627494	4455975	157	-38	162	284		(Corr'd Nav, Kongsberg 14208, img#111) (V) (T.A)			
Mar-22-21	01:57:59	2871	EQ20547 BW1-9			Camera	32	627658	4455935	627494	4455975	164	-40	168	284		(Corr'd Nav, Kongsberg 14208, img#112) (V) (T.A)			
Mar-22-21	01:58:18	2872	EQ20547 BW1-9			Camera	32	627661	4455933	627494	4455975	167	-41	172	284		(Corr'd Nav, Kongsberg 14208, img#113) (V) (T.A)			
Mar-22-21	01:58:44	2873	EQ20547 BW1-9			Camera	32	627667	4455932	627494	4455975	173	-42	178	284		(Corr'd Nav, Kongsberg 14208, img#114) (V) (T.A)			
Mar-22-21	01:59:49	2874	EQ20547 BW1-9			Camera	32	627684	4455928	627494	4455975	189	-46	195	284		(Corr'd Nav, Kongsberg 14208, img#115) (V) (T.A)			
Mar-22-21	02:00:30	2875	EQ20547 BW1-9			Camera	32	627692	4455927	627494	4455975	198	-48	204	284		(Corr'd Nav, Kongsberg 14208, img#116) (V) (T.A)			
Mar-22-21	02:01:04	2876	EQ20547 BW1-9			Camera	32	627701	4455925	627494	4455975	206	-50	212	284		(Corr'd Nav, Kongsberg 14208, img#117) (V) (T.A)			
Mar-22-21	02:01:41	2877	EQ20547 BW1-9			Camera	32	627710	4455922	627494	4455975	216	-53	222	284		(Corr'd Nav, Kongsberg 14208, img#118) (V) (T.A)			
Mar-22-21	02:02:23	2878	EQ20547 BW1-9			Camera	32	627720	4455920	627494	4455975	226	-55	233	284		(Corr'd Nav, Kongsberg 14208, img#119) (V) (T.A)			
Mar-22-21	02:03:22	2879	EQ20547 BW1-9			Camera	32	627735	4455917	627494	4455975	241	-58	248	284		(Corr'd Nav, Kongsberg 14208, img#120) (V) (T.A)			
Mar-22-21	02:04:04	2880	EQ20547 BW1-9			Camera	32	627746	4455915	627494	4455975	252	-60	259	283		(Corr'd Nav, Kongsberg 14208, img#121) (V) (T.A)			
Mar-22-21	02:05:02	2881	EQ20547 BW1-9			Camera	32	627760	4455910	627494	4455975	266	-65	274	284		(Corr'd Nav, Kongsberg 14208, img#122) (V) (T.A)			
Mar-22-21	02:05:25	2882	EQ20547 BW1-9			Camera	32	627766	4455909	627494	4455975	271	-66	279	284		(Corr'd Nav, Kongsberg 14208, img#123) (V) (T.A)			
Mar-22-21	02:05:57	2883	EQ20547 BW1-9			Camera	32	627773	4455908	627494	4455975	279	-66	287	283		(Corr'd Nav, Kongsberg 14208, img#124) (V) (T.A)			
Mar-22-21	02:07:42	2884	EQ20547 BW1-9			Camera	32	627784	4455902	627494	4455975	290	-72	299	284		(Corr'd Nav, Kongsberg 14208, img#125) (V) (T.A)			
Mar-22-21	02:08:05	2885	EQ20547 BW1-9			Camera	32	627787	4455900	627494	4455975	293	-75	303	284		(Corr'd Nav, Kongsberg 14208			



APPENDIX A FIELD SAMPLING LOGS

Gardline										Seafloor Sampling Positioning Summary										
Job No		11543							Vessel		MV <i>Ocean Endeavour</i>									
Client		Equinor US Wind LLC							Vessel Reference Point (VRP)		CoG									
Project Name		Empire Wind Extension							Deployment Location		Grab Deployment Point				x	6.7	y	21.94	z	2.93
Primary Positioning System		Starpack 1							Actual Coordinates derived from		Deployment Location									
Geodetic Reference System		Datum			WGS 84 - NAD 83 (2018.0 ITRF 2014)			Ellipsoid	GRS 80		Projection		UTM ZONE 18 N (75 W)				Vertical / Tidal Datum		NAVD 88	
Date	Time	Fix number	Station Number	Penetration	Sample	Retention	Observed	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks			
Mar-22-21	02:12:36	2895	EQ20547 BW1-9			Camera	32	627787	4455902	627494	4455975	293	-72	301	284		(Corr'd Nav, Kongsberg 14208, img#136) (V) (T.A)			
Mar-22-21	02:12:59	2896	EQ20547 BW1-9			Camera	32	627785	4455904	627494	4455975	290	-70	299	284		(Corr'd Nav, Kongsberg 14208, img#137) (V) (T.A)			
Mar-22-21	02:13:19	2897	EQ20547 BW1-9			Camera	32	627781	4455906	627494	4455975	287	-69	295	283		(Corr'd Nav, Kongsberg 14208, img#138) (V) (T.A)			
Mar-22-21	02:13:46	2898	EQ20547 BW1-9			Camera	32	627781	4455907	627494	4455975	287	-68	295	283		(Corr'd Nav, Kongsberg 14208, img#139) (V) (T.A)			
Mar-22-21	02:14:05	2899	EQ20547 BW1-9			Camera	32	627785	4455905	627494	4455975	291	-70	299	283		(Corr'd Nav, Kongsberg 14208, img#140) (V) (T.A)			
Mar-22-21	02:14:50	2900	EQ20547 BW1-9			Camera	32	627791	4455903	627494	4455975	296	-72	305	284		(Corr'd Nav, Kongsberg 14208, img#141) (V) (T.A)			
Mar-22-21	02:15:03	2901	EQ20547 BW1-9			Camera	32	627791	4455903	627494	4455975	297	-72	305	284		(Corr'd Nav, Kongsberg 14208, img#142) (V) (T.A)			
Mar-22-21	02:15:47	2902	EQ20547 BW1-9			Camera	32	627790	4455907	627494	4455975	296	-67	304	283		(Corr'd Nav, Kongsberg 14208, img#143) (V) (T.A)			
Mar-22-21	02:18:54	2903	EQ20547 BW1-9			Camera	32	627799	4455901	627494	4455975	304	-73	313	284		(Corr'd Nav, Kongsberg 14208, img#144) (V) (T.A)			
Mar-22-21	02:19:29	2904	EQ20547 BW1-9			Camera	32	627807	4455900	627494	4455975	313	-75	321	283		(Corr'd Nav, Kongsberg 14208, img#145) (V) (T.A)			
Mar-22-21	02:19:51	2905	EQ20547 BW1-9			Camera	32	627812	4455898	627494	4455975	318	-77	327	284		(Corr'd Nav, Kongsberg 14208, img#146) (V) (T.A)			
Mar-22-21	02:20:36	2906	EQ20547 BW1-9			Camera	32	627826	4455895	627494	4455975	332	-80	341	283		(Corr'd Nav, Kongsberg 14208, img#147) (V) (T.A)			
Mar-22-21	02:21:14	2907	EQ20547 BW1-9			Camera	32	627837	4455891	627494	4455975	343	-84	353	284		(Corr'd Nav, Kongsberg 14208, img#148) (V) (T.A)			
Mar-22-21	02:23:26	2908	EQ20547 BW1-9			Camera	32	627869	4455884	627494	4455975	374	-91	385	284		(Corr'd Nav, Kongsberg 14208, img#149) (V) (T.A)			
Mar-22-21	02:24:02	2909	EQ20547 BW1-9			Camera	33	627878	4455882	627494	4455975	384	-92	395	284		(Corr'd Nav, Kongsberg 14208, img#150) (V) (T.A)			
Mar-22-21	02:24:47	2910	EQ20547 BW1-9			Camera	33	627889	4455879	627494	4455975	394	-95	406	284		(Corr'd Nav, Kongsberg 14208, img#151) (V) (T.A)			
Mar-22-21	02:25:40	2911	EQ20547 BW1-9			Camera	33	627900	4455877	627494	4455975	405	-98	417	284		(Corr'd Nav, Kongsberg 14208, img#152) (V) (T.A)			
Mar-22-21	02:26:05	2912	EQ20547 BW1-9			Camera	33	627905	4455875	627494	4455975	411	-100	423	284		(Corr'd Nav, Kongsberg 14208, img#153) (V) (T.A)			
Mar-22-21	02:26:35	2913	EQ20547 BW1-9			Camera	33	627911	4455873	627494	4455975	417	-101	429	284		(Corr'd Nav, Kongsberg 14208, img#154) (V) (T.A)			
Mar-22-21	02:26:50	2914	EQ20547 BW1-9			Camera	33	627915	4455874	627494	4455975	421	-101	433	284		(Corr'd Nav, Kongsberg 14208, img#155) (V) (T.A)			
Mar-22-21	02:27:46	2915	EQ20547 BW1-9			Camera	33	627928	4455869	627494	4455975	433	-105	446	284		(Corr'd Nav, Kongsberg 14208, img#156) (V) (T.A)			
Mar-22-21	02:28:21	2916	EQ20547 BW1-9			Camera	33	627937	4455868	627494	4455975	442	-107	455	284		(Corr'd Nav, Kongsberg 14208, img#157) (V) (T.A)			
Mar-22-21	02:29:34	2917	EQ20547 BW1-9			Camera	33	627955	4455863	627494	4455975	461	-111	474	284		(Corr'd Nav, Kongsberg 14208, img#158) (V) (T.A)			
Mar-22-21	02:30:47	2918	EQ20547 BW1-9			Camera	33	627974	4455860	627494	4455975	480	-115	493	283		(Corr'd Nav, Kongsberg 14208, img#159) (V) (T.A)			
Mar-22-21	02:32:38	2919	EQ20547 BW1-9			Camera	34	628005	4455851	627494	4455975	510	-124	525	284		(Corr'd Nav, Kongsberg 14208, img#160) (V) (T.A)			
Mar-22-21	02:33:25	2920	EQ20547 BW1-9			Camera	34	628015	4455849	627494	4455975	521	-126	536	284		(Corr'd Nav, Kongsberg 14208, img#161) (V) (T.A)			
Mar-22-21	02:34:42	2921	EQ20547 BW1-9			Camera	34	628036	4455844	627494	4455975	542	-130	558	284		(Corr'd Nav, Kongsberg 14208, img#162) (V) (T.A)			
Mar-22-21	02:35:27	2922	EQ20547 BW1-9			Camera	34	628049	4455842	627494	4455975	555	-133	570	283		(Corr'd Nav, Kongsberg 14208, img#163) (V) (T.A)			
Mar-22-21	02:36:09	2923	EQ20547 BW1-9			Camera	34	628060	4455839	627494	4455975	566	-136	582	284		(Corr'd Nav, Kongsberg 14208, img#164) (V) (T.A)			
Mar-22-21	02:36:34	2924	EQ20547 BW1-9			Camera	34	628066	4455837	627494	4455975	572	-137	588	284		(Corr'd Nav, Kongsberg 14208, img#165) (V) (T.A)			
Mar-22-21	02:38:05	2925	EQ20547 BW1-9			Camera	35	628086	4455831	627494	4455975	592	-143	609	284		(Corr'd Nav, Kongsberg 14208, img#166) (V) (T.A)			
Mar-22-21	02:38:24	2926	EQ20547 BW1-9			Camera	35	628086	4455830	627494	4455975	591	-145	609	284		(Corr'd Nav, Kongsberg 14208, img#167) (V) (T.A)			
Mar-22-21	02:38:35	2927	EQ20547 BW1-9			Camera	35	628084	4455828	627494	4455975	590	-146	607	284		(Corr'd Nav, Kongsberg 14208, img#168) (V) (T.A)			
Mar-22-21	02:39:40	2928	EQ20547 BW1-9			Camera	35	628074	4455827	627494	4455975	579	-148	598	284		(Corr'd Nav, Kongsberg 14208, img#169) (V) (T.A)			
Mar-22-21	02:39:59	2929	EQ20547 BW1-9			Camera	35	628070	4455828	627494	4455975	576	-146	594	284		(Corr'd Nav, Kongsberg 14208, img#170) (V) (T.A)			
Mar-22-21	02:40:44	2930	EQ20547 BW1-9			Camera	34	628074	4455837	627494	4455975	580	-138	596	283		(Corr'd Nav, Kongsberg 14208, img#171) (V) (T.A)			
Mar-22-21	02:42:14	2931	EQ20547 BW1-9			Camera	35	628080	4455836	627494	4455975	586	-139	602	283		(Corr'd Nav, Kongsberg 14208, img#172) (V) (T.A)			
Mar-22-21	02:42:37	2932	EQ20547 BW1-9			Camera	35	628078	4455831	627494	4455975	584	-144	601	284		(Corr'd Nav, Kongsberg 14208, img#173) (V) (T.A)			
Mar-22-21	02:43:12	2933	EQ20547 BW1-9			Camera	35	628074	4455831	627494	4455975	580	-143	597	284		(Corr'd Nav, Kongsberg 14208, img#174) (V) (T.A)			
Mar-22-21	02:43:50	2934	EQ20547 BW1-9			Camera	35	628070	4455835	627494	4455975	576	-139	592	284		(Corr'd Nav, Kongsberg 14208, img#175) (V) (T.A)			
Mar-22-21	02:44:16	2935	EQ20547 BW1-9			Camera	34	628072	4455839	627494	4455975	577	-136	593	283		(Corr'd Nav, Kongsberg 14208, img#176) (V) (T.A)			
Mar-22-21	02:45:08	2936	EQ20547 BW1-9			Camera	34	628076	4455839	627494	4455975	582	-136	598	283		(Corr'd Nav, Kongsberg 14208, img#177) (V) (T.A)			
Mar-22-21	02:45:26	2937	EQ20547 BW1-9			Camera	34	628079	4455840	627494	4455975	585	-134	600	283		(Corr'd Nav, Kongsberg 14208, img#178) (V) (T.A)			
Mar-22-21	02:45:38	2938	EQ20547 BW1-9			Camera	35	628080	4455840	627494	4455975	586	-134	601	283		(Corr'd Nav, Kongsberg 14208, img#179) (V) (T.A)			
Mar-22-21	02:46:11	2939	EQ20547 BW1-9			Camera	34	628079	4455837	627494	4455975	584	-138	601	283		(Corr'd Nav, Kongsberg 14208, img#180) (V) (T.A)			
Mar-22-21	02:46:26	2940	EQ20547 BW1-9			Camera	35	628078	4455834	627494	4455975	583	-140	600	284		(Corr'd Nav, Kongsberg 14208, img#181) (V) (T.A)			
Mar-22-21	04:44:08	2941	EQ20547 BW1-14			Camera	36	638012	4456883	627494	4455975	10517	908	10557	265		(Corr'd Nav, Kongsberg 14208, img#182) (V) (T.A)			
Mar-22-21	04:44:57	2942	EQ20547 BW1-14			Camera	36	638017	4456888	627494	4455975	10523	913	10562	265		(Corr'd Nav, Kongsberg 14208, img#183) (V) (T.A)			
Mar-22-21	04:46:58	2943	EQ20547 BW1-14			Camera	36	638036	4456915	627494	4455975	10542	940	10584	265		(Corr'd Nav, Kongsberg 14208, img#184) (V) (T.A)			
Mar-22-21	04:47:33	2944	EQ20547 BW1-14			Camera	36	638041	4456924	627494	4455975	10547	949	10589	265		(Corr'd Nav, Kongsberg 14208, img#185) (V) (T.A)			
Mar-22-21	04:48:15	2945	EQ20547 BW1-14			Camera	36	638046	4456934	627494	4455975	10552	959	10595	265		(Corr'd Nav, Kongsberg 14208, img#186) (V) (T.A)			
Mar-22-21	04:48:45	2946	EQ20547 BW1-14			Camera	36	638050	4456940	627494	4455975	10556	965	10600	265		(Corr'd Nav, Kongsberg 14208, img#187) (V) (T.A)			
Mar-22-21	04:49:01	2947	EQ20547 BW1-14			Camera	36	638052	4456943	627494	4455975	10558	968	10602	265		(Corr'd Nav, Kongsberg 14208, img#188) (V) (T.A)			
Mar-22-21	04:49:49	2948	EQ20547 BW1-14			Camera	36	638058	4456953	627494	4455975	10564	979	10609	265		(Corr'd Nav, Kongsberg 14208, img#189) (V) (T.A)			
Mar-22-21	04:51:12	2949	EQ20547 BW																	



APPENDIX A FIELD SAMPLING LOGS

Gardline										Seafloor Sampling Positioning Summary										
Job No		11543							Vessel		MV Ocean Endeavour									
Client		Equinor US Wind LLC							Vessel Reference Point (VRP)		CoG									
Project Name		Empire Wind Extension							Deployment Location		Grab Deployment Point				x	6.7	y	21.94	z	2.93
Primary Positioning System		Starpack 1							Actual Coordinates derived from		Deployment Location									
Geodetic Reference System		Datum	WGS 84 - NAD 83 (2018.0 ITRF 2014)					Ellipsoid	GRS 80		Projection	UTM ZONE 18 N (75 W)					Vertical / Tidal Datum		NAVD 88	
Date	Time	Fix number	Station Number	Penetration	Sample	Retention	Observed	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks			
Mar-22-21	04:54:51	2958	EQ20547 BW1-14			Camera	36	638101	4457023	627494	4455975	10606	1049	10658	264		(Corr'd Nav, Kongsberg 14208, img#199) (V) (T.A)			
Mar-22-21	04:55:14	2959	EQ20547 BW1-14			Camera	36	638103	4457028	627494	4455975	10608	1053	10660	264		(Corr'd Nav, Kongsberg 14208, img#200) (V) (T.A)			
Mar-22-21	04:55:47	2960	EQ20547 BW1-14			Camera	37	638105	4457036	627494	4455975	10611	1061	10664	264		(Corr'd Nav, Kongsberg 14208, img#201) (V) (T.A)			
Mar-22-21	04:56:35	2961	EQ20547 BW1-14			Camera	37	638109	4457047	627494	4455975	10615	1073	10669	264		(Corr'd Nav, Kongsberg 14208, img#202) (V) (T.A)			
Mar-22-21	04:57:12	2962	EQ20547 BW1-14			Camera	37	638113	4457057	627494	4455975	10619	1082	10674	264		(Corr'd Nav, Kongsberg 14208, img#203) (V) (T.A)			
Mar-22-21	04:57:36	2963	EQ20547 BW1-14			Camera	37	638116	4457062	627494	4455975	10622	1087	10677	264		(Corr'd Nav, Kongsberg 14208, img#204) (V) (T.A)			
Mar-22-21	04:58:17	2964	EQ20547 BW1-14			Camera	37	638123	4457070	627494	4455975	10629	1095	10685	264		(Corr'd Nav, Kongsberg 14208, img#205) (V) (T.A)			
Mar-22-21	04:58:34	2965	EQ20547 BW1-14			Camera	37	638126	4457072	627494	4455975	10632	1098	10688	264		(Corr'd Nav, Kongsberg 14208, img#206) (V) (T.A)			
Mar-22-21	04:59:08	2966	EQ20547 BW1-14			Camera	37	638131	4457078	627494	4455975	10637	1103	10694	264		(Corr'd Nav, Kongsberg 14208, img#207) (V) (T.A)			
Mar-22-21	04:59:42	2967	EQ20547 BW1-14			Camera	37	638135	4457085	627494	4455975	10641	1111	10699	264		(Corr'd Nav, Kongsberg 14208, img#208) (V) (T.A)			
Mar-22-21	05:00:14	2968	EQ20547 BW1-14			Camera	37	638139	4457092	627494	4455975	10645	1118	10704	264		(Corr'd Nav, Kongsberg 14208, img#209) (V) (T.A)			
Mar-22-21	05:00:35	2969	EQ20547 BW1-14			Camera	37	638142	4457097	627494	4455975	10647	1122	10706	264		(Corr'd Nav, Kongsberg 14208, img#210) (V) (T.A)			
Mar-22-21	05:01:11	2970	EQ20547 BW1-14			Camera	37	638146	4457105	627494	4455975	10651	1130	10711	264		(Corr'd Nav, Kongsberg 14208, img#211) (V) (T.A)			
Mar-22-21	05:01:35	2971	EQ20547 BW1-14			Camera	37	638148	4457111	627494	4455975	10654	1136	10714	264		(Corr'd Nav, Kongsberg 14208, img#212) (V) (T.A)			
Mar-22-21	05:02:05	2972	EQ20547 BW1-14			Camera	37	638152	4457117	627494	4455975	10657	1142	10718	264		(Corr'd Nav, Kongsberg 14208, img#213) (V) (T.A)			
Mar-22-21	05:03:21	2973	EQ20547 BW1-14			Camera	37	638162	4457126	627494	4455975	10667	1152	10729	264		(Corr'd Nav, Kongsberg 14208, img#214) (V) (T.A)			
Mar-22-21	05:03:44	2974	EQ20547 BW1-14			Camera	37	638164	4457127	627494	4455975	10670	1152	10732	264		(Corr'd Nav, Kongsberg 14208, img#215) (V) (T.A)			
Mar-22-21	05:04:14	2975	EQ20547 BW1-14			Camera	37	638165	4457129	627494	4455975	10671	1154	10733	264		(Corr'd Nav, Kongsberg 14208, img#216) (V) (T.A)			
Mar-22-21	05:05:00	2976	EQ20547 BW1-14			Camera	37	638166	4457133	627494	4455975	10672	1158	10735	264		(Corr'd Nav, Kongsberg 14208, img#217) (V) (T.A)			
Mar-22-21	05:05:30	2977	EQ20547 BW1-14			Camera	37	638168	4457135	627494	4455975	10673	1160	10736	264		(Corr'd Nav, Kongsberg 14208, img#218) (V) (T.A)			
Mar-22-21	05:06:03	2978	EQ20547 BW1-14			Camera	37	638166	4457139	627494	4455975	10672	1165	10735	264		(Corr'd Nav, Kongsberg 14208, img#219) (V) (T.A)			
Mar-22-21	05:06:57	2979	EQ20547 BW1-14			Camera	37	638160	4457143	627494	4455975	10665	1168	10729	264		(Corr'd Nav, Kongsberg 14208, img#220) (V) (T.A)			
Mar-22-21	05:08:13	2980	EQ20547 BW1-14			Camera	37	638152	4457138	627494	4455975	10658	1163	10721	264		(Corr'd Nav, Kongsberg 14208, img#221) (V) (T.A)			
Mar-22-21	05:08:40	2981	EQ20547 BW1-14			Camera	37	638154	4457135	627494	4455975	10659	1161	10722	264		(Corr'd Nav, Kongsberg 14208, img#222) (V) (T.A)			
Mar-22-21	05:09:23	2982	EQ20547 BW1-14			Camera	37	638155	4457137	627494	4455975	10660	1163	10724	264		(Corr'd Nav, Kongsberg 14208, img#223) (V) (T.A)			
Mar-22-21	05:10:07	2983	EQ20547 BW1-14			Camera	37	638156	4457140	627494	4455975	10662	1165	10726	264		(Corr'd Nav, Kongsberg 14208, img#224) (V) (T.A)			
Mar-22-21	05:11:07	2984	EQ20547 BW1-14			Camera	37	638164	4457145	627494	4455975	10670	1171	10734	264		(Corr'd Nav, Kongsberg 14208, img#225) (V) (T.A)			
Mar-22-21	05:11:45	2985	EQ20547 BW1-14			Camera	37	638169	4457145	627494	4455975	10675	1170	10739	264		(Corr'd Nav, Kongsberg 14208, img#226) (V) (T.A)			
Mar-22-21	05:12:02	2986	EQ20547 BW1-14			Camera	37	638171	4457143	627494	4455975	10677	1169	10741	264		(Corr'd Nav, Kongsberg 14208, img#227) (V) (T.A)			
Mar-22-21	05:13:12	2987	EQ20547 BW1-14			Camera	37	638174	4457137	627494	4455975	10680	1162	10743	264		(Corr'd Nav, Kongsberg 14208, img#228) (V) (T.A)			
Mar-22-21	05:13:24	2988	EQ20547 BW1-14			Camera	37	638173	4457135	627494	4455975	10679	1161	10742	264		(Corr'd Nav, Kongsberg 14208, img#229) (V) (T.A)			
Mar-22-21	05:13:54	2989	EQ20547 BW1-14			Camera	37	638171	4457132	627494	4455975	10677	1158	10739	264		(Corr'd Nav, Kongsberg 14208, img#230) (V) (T.A)			
Mar-22-21	05:14:42	2990	EQ20547 BW1-14			Camera	37	638164	4457131	627494	4455975	10669	1156	10732	264		(Corr'd Nav, Kongsberg 14208, img#231) (V) (T.A)			
Mar-22-21	05:15:03	2991	EQ20547 BW1-14			Camera	37	638163	4457132	627494	4455975	10669	1158	10732	264		(Corr'd Nav, Kongsberg 14208, img#232) (V) (T.A)			
Mar-22-21	05:16:16	2992	EQ20547 BW1-14			Camera	37	638166	4457141	627494	4455975	10671	1166	10735	264		(Corr'd Nav, Kongsberg 14208, img#233) (V) (T.A)			
Mar-22-21	05:16:49	2993	EQ20547 BW1-14			Camera	37	638168	4457147	627494	4455975	10674	1173	10738	264		(Corr'd Nav, Kongsberg 14208, img#234) (V) (T.A)			
Mar-22-21	05:17:16	2994	EQ20547 BW1-14			Camera	37	638169	4457152	627494	4455975	10675	1177	10740	264		(Corr'd Nav, Kongsberg 14208, img#235) (V) (T.A)			
Mar-22-21	05:17:46	2995	EQ20547 BW1-14			Camera	37	638173	4457159	627494	4455975	10678	1184	10744	264		(Corr'd Nav, Kongsberg 14208, img#236) (V) (T.A)			
Mar-22-21	05:18:12	2996	EQ20547 BW1-14			Camera	37	638175	4457165	627494	4455975	10681	1191	10747	264		(Corr'd Nav, Kongsberg 14208, img#237) (V) (T.A)			
Mar-22-21	05:18:53	2997	EQ20547 BW1-14			Camera	37	638181	4457176	627494	4455975	10687	1201	10754	264		(Corr'd Nav, Kongsberg 14208, img#238) (V) (T.A)			
Mar-22-21	05:19:23	2998	EQ20547 BW1-14			Camera	37	638187	4457181	627494	4455975	10692	1206	10760	264		(Corr'd Nav, Kongsberg 14208, img#239) (V) (T.A)			
Mar-22-21	05:19:45	2999	EQ20547 BW1-14			Camera	37	638190	4457185	627494	4455975	10696	1210	10764	264		(Corr'd Nav, Kongsberg 14208, img#240) (V) (T.A)			
Mar-22-21	05:20:05	3000	EQ20547 BW1-14			Camera	37	638193	4457189	627494	4455975	10699	1214	10768	264		(Corr'd Nav, Kongsberg 14208, img#241) (V) (T.A)			
Mar-22-21	05:20:25	3001	EQ20547 BW1-14			Camera	37	638196	4457193	627494	4455975	10702	1218	10771	264		(Corr'd Nav, Kongsberg 14208, img#242) (V) (T.A)			
Mar-22-21	05:20:51	3002	EQ20547 BW1-14			Camera	37	638199	4457198	627494	4455975	10705	1223	10775	263		(Corr'd Nav, Kongsberg 14208, img#243) (V) (T.A)			
Mar-22-21	05:21:06	3003	EQ20547 BW1-14			Camera	37	638201	4457201	627494	4455975	10706	1226	10776	263		(Corr'd Nav, Kongsberg 14208, img#244) (V) (T.A)			
Mar-22-21	05:21:50	3004	EQ20547 BW1-14			Camera	38	638204	4457208	627494	4455975	10710	1234	10781	263		(Corr'd Nav, Kongsberg 14208, img#245) (V) (T.A)			
Mar-22-21	05:22:07	3005	EQ20547 BW1-14			Camera	38	638206	4457212	627494	4455975	10711	1237	10783	263		(Corr'd Nav, Kongsberg 14208, img#246) (V) (T.A)			
Mar-22-21	05:22:45	3006	EQ20547 BW1-14			Camera	37	638208	4457219	627494	4455975	10714	1244	10786	263		(Corr'd Nav, Kongsberg 14208, img#247) (V) (T.A)			
Mar-22-21	05:23:10	3007	EQ20547 BW1-14			Camera	38	638209	4457222	627494	4455975	10715	1247	10787	263		(Corr'd Nav, Kongsberg 14208, img#248) (V) (T.A)			
Mar-22-21	05:24:00	3008	EQ20547 BW1-14			Camera	37	638214	4457229	627494	4455975	10720	1254	10793	263		(Corr'd Nav, Kongsberg 14208, img#249) (V) (T.A)			
Mar-22-21	05:24:31	3009	EQ20547 BW1-14			Camera	37	638217	4457234	627494	4455975	10723	1260	10797	263		(Corr'd Nav, Kongsberg 14208, img#250) (V) (T.A)			
Mar-22-21	05:25:14	3010	EQ20547 BW1-14			Camera	38	638223	4457245	627494	4455975	10729	1270	10804	263		(Corr'd Nav, Kongsberg 14208, img#251) (V) (T.A)			
Mar-22-21	05:25:40	3011	EQ20547 BW1-14			Camera	37	638227	4457252	627494	4455975	10733	1277	10809	263		(Corr'd Nav, Kongsberg 14208, img#252) (V) (T.A)			
Mar-22-21	05:25:58	3012	EQ20547 BW1-14			Camera	37	638230	4457256	627494	4455975	10736	1282	10812	263		(Corr'd Nav, Kongsberg 14208, img#253) (V) (T.A)			
Mar-22-21	05:26:23	3013	EQ20547 BW1-14			Camera	37	638234	4457262	627494	4455975	10739	1287	10816	263		(Corr'd Nav, Kongsberg 14208, img#254) (V) (T.A)			
Mar-22-21	05:27:08	3014	EQ20547 BW1-14			Camera	37	638240	4457271	627494	4455975	10746	1297	10824	263		(Corr'd Nav, Kongsberg 14208, img#255) (V) (T.A)			
Mar-22-21	05:27:22	3015	EQ20547 BW1-14			Camera	37	638242	4457275	627494	4455975	10748	1300	10826	263		(Corr'd Nav, Kongsberg 14208, img#256) (V) (T.A)			
Mar-22-21	05:27:40	3016	EQ20547 BW1-14			Camera	37	638244	4457278	627494	4455975	10750	1304	10829	263		(Corr'd Nav, Kongsberg 14208, img#257) (V) (T.A)			
Mar-22-21	05:28:17	3017	EQ20547 BW1-14																	

APPENDIX A FIELD SAMPLING LOGS

Garline

Seafloor Sampling Positioning Summary

Job No	11543							Vessel	MV <i>Ocean Endeavour</i>								
Client	Equinor US Wind LLC							Vessel Reference Point (VRP)	CoG								
Project Name	Empire Wind Extension							Deployment Location	Grab Deployment Point			x	6.7	y	21.94	z	2.93
Primary Positioning System	Starpack 1							Actual Coordinates derived from	Deployment Location								
Geodetic Reference System	Datum	WGS 84 - NAD 83 (2018.0 ITRF 2014)					Ellipsoid	GRS 80		Projection	UTM ZONE 18 N (75 W)				Vertical / Tidal Datum	NAVD 88	
Date	Time	Fix number	Station Number	Penetration	Sample	Retention	Observed	Actual coordinates		Target coordinates		Offset from target			Surveyor	Remarks	
Mar-22-21	05:29:22	3021	EQ20547 BW1-14			Camera	37	638258	4457301	627494	4455975	10763	1326	10845	263		(Corr'd Nav, Kongsberg 14208, img#262) (V) (T.A)
Mar-22-21	05:29:56	3022	EQ20547 BW1-14			Camera	37	638262	4457307	627494	4455975	10768	1333	10850	263		(Corr'd Nav, Kongsberg 14208, img#263) (V) (T.A)
Mar-22-21	05:30:22	3023	EQ20547 BW1-14			Camera	38	638266	4457313	627494	4455975	10771	1338	10854	263		(Corr'd Nav, Kongsberg 14208, img#264) (V) (T.A)
Mar-22-21	05:31:12	3024	EQ20547 BW1-14			Camera	38	638272	4457324	627494	4455975	10777	1349	10861	263		(Corr'd Nav, Kongsberg 14208, img#265) (V) (T.A)
Mar-22-21	05:31:23	3025	EQ20547 BW1-14			Camera	37	638273	4457326	627494	4455975	10779	1352	10863	263		(Corr'd Nav, Kongsberg 14208, img#266) (V) (T.A)
Mar-22-21	05:31:45	3026	EQ20547 BW1-14			Camera	37	638276	4457331	627494	4455975	10782	1356	10867	263		(Corr'd Nav, Kongsberg 14208, img#267) (V) (T.A)
Mar-22-21	05:32:02	3027	EQ20547 BW1-14			Camera	37	638278	4457334	627494	4455975	10784	1360	10869	263		(Corr'd Nav, Kongsberg 14208, img#268) (V) (T.A)
Mar-22-21	05:32:18	3028	EQ20547 BW1-14			Camera	37	638280	4457337	627494	4455975	10786	1363	10872	263		(Corr'd Nav, Kongsberg 14208, img#269) (V) (T.A)
Mar-22-21	05:32:51	3029	EQ20547 BW1-14			Camera	38	638285	4457344	627494	4455975	10791	1369	10877	263		(Corr'd Nav, Kongsberg 14208, img#270) (V) (T.A)
Mar-22-21	05:33:17	3030	EQ20547 BW1-14			Camera	37	638288	4457349	627494	4455975	10794	1374	10881	263		(Corr'd Nav, Kongsberg 14208, img#271) (V) (T.A)
Mar-22-21	05:33:34	3031	EQ20547 BW1-14			Camera	38	638291	4457352	627494	4455975	10796	1377	10884	263		(Corr'd Nav, Kongsberg 14208, img#272) (V) (T.A)
Mar-22-21	05:33:57	3032	EQ20547 BW1-14			Camera	37	638294	4457356	627494	4455975	10800	1381	10888	263		(Corr'd Nav, Kongsberg 14208, img#273) (V) (T.A)
Mar-22-21	05:34:18	3033	EQ20547 BW1-14			Camera	37	638297	4457360	627494	4455975	10802	1385	10891	263		(Corr'd Nav, Kongsberg 14208, img#274) (V) (T.A)
Mar-22-21	05:34:53	3034	EQ20547 BW1-14			Camera	37	638300	4457366	627494	4455975	10806	1391	10895	263		(Corr'd Nav, Kongsberg 14208, img#275) (V) (T.A)
Mar-22-21	05:35:23	3035	EQ20547 BW1-14			Camera	37	638303	4457372	627494	4455975	10808	1397	10898	263		(Corr'd Nav, Kongsberg 14208, img#276) (V) (T.A)
Mar-22-21	05:35:58	3036	EQ20547 BW1-14			Camera	37	638306	4457378	627494	4455975	10811	1404	10902	263		(Corr'd Nav, Kongsberg 14208, img#277) (V) (T.A)
Mar-22-21	05:36:22	3037	EQ20547 BW1-14			Camera	37	638308	4457383	627494	4455975	10814	1408	10905	263		(Corr'd Nav, Kongsberg 14208, img#278) (V) (T.A)
Mar-22-21	05:36:47	3038	EQ20547 BW1-14			Camera	37	638311	4457387	627494	4455975	10817	1412	10909	263		(Corr'd Nav, Kongsberg 14208, img#279) (V) (T.A)
Mar-22-21	05:37:17	3039	EQ20547 BW1-14			Camera	37	638315	4457391	627494	4455975	10820	1417	10913	263		(Corr'd Nav, Kongsberg 14208, img#280) (V) (T.A)
Mar-22-21	05:37:31	3040	EQ20547 BW1-14			Camera	38	638316	4457393	627494	4455975	10822	1419	10914	263		(Corr'd Nav, Kongsberg 14208, img#281) (V) (T.A)
Mar-22-21	05:37:45	3041	EQ20547 BW1-14			Camera	38	638318	4457395	627494	4455975	10823	1421	10916	263		(Corr'd Nav, Kongsberg 14208, img#282) (V) (T.A)
Mar-22-21	05:38:07	3042	EQ20547 BW1-14			Camera	38	638319	4457397	627494	4455975	10825	1423	10918	263		(Corr'd Nav, Kongsberg 14208, img#283) (V) (T.A)
Mar-22-21	06:30:18	3043	EQ20547 BW1-15			Camera	38	639389	4457790	639398	4457799	-9	-9	13	44		(Corr'd Nav, Kongsberg 14208, img#284) (V) (T.A)
Mar-22-21	06:30:52	3044	EQ20547 BW1-15			Camera	38	639392	4457794	639398	4457799	-6	-5	7	50		(Corr'd Nav, Kongsberg 14208, img#285) (V) (T.A)
Mar-22-21	06:31:31	3045	EQ20547 BW1-15			Camera	38	639397	4457798	639398	4457799	-1	-1	2	47		(Corr'd Nav, Kongsberg 14208, img#286) (V) (T.A)
Mar-22-21	06:32:15	3046	EQ20547 BW1-15			Camera	38	639400	4457799	639398	4457799	2	0	2	278		(Corr'd Nav, Kongsberg 14208, img#287) (V) (T.A)
Mar-22-21	06:32:44	3047	EQ20547 BW1-15			Camera	38	639405	4457799	639398	4457799	7	0	7	272		(Corr'd Nav, Kongsberg 14208, img#288) (V) (T.A)
Mar-22-21	06:33:20	3048	EQ20547 BW1-15			Camera	38	639408	4457798	639398	4457799	10	-1	10	278		(Corr'd Nav, Kongsberg 14208, img#289) (V) (T.A)
Mar-22-21	06:33:48	3049	EQ20547 BW1-15			Camera	38	639406	4457796	639398	4457799	8	-3	9	288		(Corr'd Nav, Kongsberg 14208, img#290) (V) (T.A)
Mar-22-21	06:33:59	3050	EQ20547 BW1-15			Camera	38	639405	4457795	639398	4457799	7	-4	8	299		(Corr'd Nav, Kongsberg 14208, img#291) (V) (T.A)
Mar-22-21	06:34:23	3051	EQ20547 BW1-15			Camera	38	639402	4457792	639398	4457799	4	-7	8	330		(Corr'd Nav, Kongsberg 14208, img#292) (V) (T.A)
Mar-22-21	06:34:45	3052	EQ20547 BW1-15			Camera	38	639398	4457790	639398	4457799	0	-9	9	3		(Corr'd Nav, Kongsberg 14208, img#293) (V) (T.A)
Mar-22-21	06:35:00	3053	EQ20547 BW1-15			Camera	38	639394	4457790	639398	4457799	-4	-9	10	24		(Corr'd Nav, Kongsberg 14208, img#294) (V) (T.A)
Mar-22-21	06:35:16	3054	EQ20547 BW1-15			Camera	38	639392	4457790	639398	4457799	-6	-9	11	33		(Corr'd Nav, Kongsberg 14208, img#295) (V) (T.A)
Mar-22-21	06:35:35	3055	EQ20547 BW1-15			Camera	37	639390	4457790	639398	4457799	-8	-9	11	42		(Corr'd Nav, Kongsberg 14208, img#296) (V) (T.A)
Mar-22-21	06:36:38	3056	EQ20547 BW1-15			Camera	37	639391	4457794	639398	4457799	-7	-5	9	54		(Corr'd Nav, Kongsberg 14208, img#297) (V) (T.A)
Mar-22-21	06:37:00	3057	EQ20547 BW1-15			Camera	38	639391	4457796	639398	4457799	-7	-3	8	70		(Corr'd Nav, Kongsberg 14208, img#298) (V) (T.A)
Mar-22-21	06:37:49	3058	EQ20547 BW1-15			Camera	38	639389	4457803	639398	4457799	-9	4	10	113		(Corr'd Nav, Kongsberg 14208, img#299) (V) (T.A)
Mar-22-21	06:37:58	3059	EQ20547 BW1-15			Camera	38	639390	4457804	639398	4457799	-8	5	9	120		(Corr'd Nav, Kongsberg 14208, img#300) (V) (T.A)
Mar-22-21	06:38:19	3060	EQ20547 BW1-15			Camera	37	639392	4457804	639398	4457799	-6	5	8	131		(Corr'd Nav, Kongsberg 14208, img#301) (V) (T.A)
Mar-22-21	06:38:52	3061	EQ20547 BW1-15			Camera	37	639396	4457805	639398	4457799	-2	6	6	162		(Corr'd Nav, Kongsberg 14208, img#302) (V) (T.A)
Mar-22-21	06:40:02	3062	EQ20547 BW1-15			Camera	37	639402	4457803	639398	4457799	4	4	6	224		(Corr'd Nav, Kongsberg 14208, img#303) (V) (T.A)
Mar-22-21	06:40:54	3063	EQ20547 BW1-15			Camera	37	639410	4457805	639398	4457799	12	6	14	242		(Corr'd Nav, Kongsberg 14208, img#304) (V) (T.A)
Mar-22-21	06:41:43	3064	EQ20547 BW1-15			Camera	37	639421	4457811	639398	4457799	23	12	26	243		(Corr'd Nav, Kongsberg 14208, img#305) (V) (T.A)
Mar-22-21	06:41:56	3065	EQ20547 BW1-15			Camera	37	639424	4457813	639398	4457799	26	14	29	242		(Corr'd Nav, Kongsberg 14208, img#306) (V) (T.A)
Mar-22-21	06:42:31	3066	EQ20547 BW1-15			Camera	37	639431	4457817	639398	4457799	33	18	37	241		(Corr'd Nav, Kongsberg 14208, img#307) (V) (T.A)
Mar-22-21	06:42:58	3067	EQ20547 BW1-15			Camera	38	639436	4457820	639398	4457799	38	21	44	241		(Corr'd Nav, Kongsberg 14208, img#308) (V) (T.A)
Mar-22-21	06:43:34	3068	EQ20547 BW1-15			Camera	38	639444	4457824	639398	4457799	46	25	52	241		(Corr'd Nav, Kongsberg 14208, img#309) (V) (T.A)
Mar-22-21	06:43:52	3069	EQ20547 BW1-15			Camera	38	639447	4457827	639398	4457799	49	28	56	241		(Corr'd Nav, Kongsberg 14208, img#310) (V) (T.A)
Mar-22-21	06:44:17	3070	EQ20547 BW1-15			Camera	38	639452	4457830	639398	4457799	54	31	62	241		(Corr'd Nav, Kongsberg 14208, img#311) (V) (T.A)
Mar-22-21	06:44:26	3071	EQ20547 BW1-15			Camera	38	639455	4457831	639398	4457799	57	32	65	241		(Corr'd Nav, Kongsberg 14208, img#312) (V) (T.A)
Mar-22-21	06:44:49	3072	EQ20547 BW1-15			Camera	38	639459	4457834	639398	4457799	61	35	70	240		(Corr'd Nav, Kongsberg 14208, img#313) (V) (T.A)
Mar-22-21	06:44:58	3073	EQ20547 BW1-15			Camera	38	639461	4457835	639398	4457799	63	36	72	240		(Corr'd Nav, Kongsberg 14208, img#314) (V) (T.A)
Mar-22-21	06:45:42	3074	EQ20547 BW1-15			Camera	38	639472	4457841	639398	4457799	74	42	85	241		(Corr'd Nav, Kongsberg 14208, img#315) (V) (T.A)
Mar-22-21	06:46:38	3075	EQ20547 BW1-15			Camera	38	639487	4457847	639398	4457799	89	48	101	242		(Corr'd Nav, Kongsberg 14208, img#316) (V) (T.A)
Mar-22-21	06:47:09	3076	EQ20547 BW1-15			Camera	38	639493	4457850	639398	4457799	95	51	108	242		(Corr'd Nav, Kongsberg 14208, img#317) (V) (T.A)
Mar-22-21	06:47:38	3077	EQ20547 BW1-15			Camera	37	639499	4457852	639398	4457799	101	53	114	242		(Corr'd Nav, Kongsberg 14208, img#318) (V) (T.A)
Mar-22-21	06:48:16	3078	EQ20547 BW1-15			Camera	38	639509	4457856	639398	4457799	111	57	124	243		(Corr'd Nav, Kongsberg 14208, img#319) (V) (T.A)
Mar-22-21	06:48:38	3079	EQ20547 BW1-15			Camera	37	639514	4457858	639398	4457799	116	59	130	243		(Corr'd Nav, Kongsberg 14208, img#320) (V) (T.A)
Mar-22-21	06:48:55	3080	EQ20547 BW1-15			Camera	38	639518	4457861	639398	4457799	120	62	135	243		(Corr'd Nav, Kongsberg 14208, img#321) (V) (T.A)
Mar-22-21	06:49:12	3081	EQ20547 BW1-15			Camera	38	639522	4457863	639398	4457799	124	64	140	243		(Corr'd Nav, Kongsberg 14208, img#322) (V) (T.A)
Mar-22-21	06:49:31	3082	EQ20547 BW1-15			Camera	38	639527	4457866	639398	4457799	129	67	145	243		(Corr'd Nav, Kongsberg 14208, img#323) (V) (T.A)
Mar-22-21	06:49:41	3083	EQ20547 BW1-15			Camera	38	639530	4457867	639398	4457799	132	68	148	243		(Corr'd Nav, Kongsberg 14208, img#324) (V) (T.A)



APPENDIX A FIELD SAMPLING LOGS

Gardline										Seafloor Sampling Positioning Summary										
Job No		11543							Vessel		MV <i>Ocean Endeavour</i>									
Client		Equinor US Wind LLC							Vessel Reference Point (VRP)		CoG									
Project Name		Empire Wind Extension							Deployment Location		Grab Deployment Point				x	6.7	y	21.94	z	2.93
Primary Positioning System		Starpack 1							Actual Coordinates derived from		Deployment Location									
Geodetic Reference System		Datum	WGS 84 - NAD 83 (2018.0 ITRF 2014)				Ellipsoid	GRS 80		Projection		UTM ZONE 18 N (75 W)				Vertical / Tidal Datum		NAVD 88		
Date	Time	Fix number	Station Number	Penetration	Sample	Retention	Observed	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks			
Mar-22-21	06:50:06	3084	EQ20547 BW1-15			Camera	38	639536	4457871	639398	4457799	138	72	156	242		(Corr'd Nav, Kongsberg 14208, img#325) (V) (T.A)			
Mar-22-21	06:51:00	3085	EQ20547 BW1-15			Camera	38	639548	4457879	639398	4457799	150	80	170	242		(Corr'd Nav, Kongsberg 14208, img#326) (V) (T.A)			
Mar-22-21	06:51:20	3086	EQ20547 BW1-15			Camera	38	639552	4457882	639398	4457799	154	83	175	242		(Corr'd Nav, Kongsberg 14208, img#327) (V) (T.A)			
Mar-22-21	06:51:37	3087	EQ20547 BW1-15			Camera	38	639556	4457884	639398	4457799	158	85	179	242		(Corr'd Nav, Kongsberg 14208, img#328) (V) (T.A)			
Mar-22-21	06:52:05	3088	EQ20547 BW1-15			Camera	38	639562	4457887	639398	4457799	164	88	186	242		(Corr'd Nav, Kongsberg 14208, img#329) (V) (T.A)			
Mar-22-21	06:52:13	3089	EQ20547 BW1-15			Camera	38	639564	4457888	639398	4457799	166	89	188	242		(Corr'd Nav, Kongsberg 14208, img#330) (V) (T.A)			
Mar-22-21	06:53:08	3090	EQ20547 BW1-15			Camera	38	639575	4457894	639398	4457799	177	95	201	242		(Corr'd Nav, Kongsberg 14208, img#331) (V) (T.A)			
Mar-22-21	06:53:48	3091	EQ20547 BW1-15			Camera	38	639583	4457897	639398	4457799	185	98	209	242		(Corr'd Nav, Kongsberg 14208, img#332) (V) (T.A)			
Mar-22-21	06:54:15	3092	EQ20547 BW1-15			Camera	38	639589	4457899	639398	4457799	191	100	215	242		(Corr'd Nav, Kongsberg 14208, img#333) (V) (T.A)			
Mar-22-21	06:55:04	3093	EQ20547 BW1-15			Camera	38	639599	4457905	639398	4457799	201	106	227	242		(Corr'd Nav, Kongsberg 14208, img#334) (V) (T.A)			
Mar-22-21	06:55:19	3094	EQ20547 BW1-15			Camera	38	639602	4457907	639398	4457799	204	108	231	242		(Corr'd Nav, Kongsberg 14208, img#335) (V) (T.A)			
Mar-22-21	06:56:06	3095	EQ20547 BW1-15			Camera	38	639614	4457913	639398	4457799	216	114	244	242		(Corr'd Nav, Kongsberg 14208, img#336) (V) (T.A)			
Mar-22-21	06:57:23	3096	EQ20547 BW1-15			Camera	38	639633	4457922	639398	4457799	235	123	265	242		(Corr'd Nav, Kongsberg 14208, img#337) (V) (T.A)			
Mar-22-21	06:57:33	3097	EQ20547 BW1-15			Camera	38	639635	4457923	639398	4457799	237	124	267	242		(Corr'd Nav, Kongsberg 14208, img#338) (V) (T.A)			
Mar-22-21	06:58:29	3098	EQ20547 BW1-15			Camera	38	639647	4457930	639398	4457799	249	131	281	242		(Corr'd Nav, Kongsberg 14208, img#339) (V) (T.A)			
Mar-22-21	06:58:45	3099	EQ20547 BW1-15			Camera	38	639650	4457932	639398	4457799	252	133	285	242		(Corr'd Nav, Kongsberg 14208, img#340) (V) (T.A)			
Mar-22-21	06:59:22	3100	EQ20547 BW1-15			Camera	38	639657	4457935	639398	4457799	259	136	292	242		(Corr'd Nav, Kongsberg 14208, img#341) (V) (T.A)			
Mar-22-21	06:59:32	3101	EQ20547 BW1-15			Camera	38	639657	4457936	639398	4457799	259	137	293	242		(Corr'd Nav, Kongsberg 14208, img#342) (V) (T.A)			
Mar-22-21	07:00:13	3102	EQ20547 BW1-15			Camera	38	639660	4457939	639398	4457799	262	140	297	242		(Corr'd Nav, Kongsberg 14208, img#343) (V) (T.A)			
Mar-22-21	07:01:08	3103	EQ20547 BW1-15			Camera	38	639667	4457933	639398	4457799	269	134	301	244		(Corr'd Nav, Kongsberg 14208, img#344) (V) (T.A)			
Mar-22-21	07:01:32	3104a	EQ20547 BW1-15			Camera	38	639669	4457934	639398	4457799	271	135	8	303		(Raw Nav, Kongsberg 14208, img#345) (V)			
Mar-22-21	07:01:41	3104b	EQ20547 BW1-15			Camera	38	639669	4457934	639398	4457799	271	135	8	303		(Raw Nav, Kongsberg 14208, img#346) (V)			
Mar-22-21	07:09:26	3104c	EQ20547 BW1-15			Camera	38	639656	4457937	639398	4457799	258	138	292	242		(Corr'd Nav, Kongsberg 14208, img#1) (V) (T.A)			
Mar-22-21	07:10:30	3105	EQ20547 BW1-15			Camera	38	639653	4457936	639398	4457799	255	137	290	242		(Corr'd Nav, Kongsberg 14208, img#2) (V) (T.A)			
Mar-22-21	07:11:47	3106	EQ20547 BW1-15			Camera	38	639658	4457934	639398	4457799	260	135	293	243		(Corr'd Nav, Kongsberg 14208, img#3) (V) (T.A)			
Mar-22-21	07:13:00	3107	EQ20547 BW1-15			Camera	38	639663	4457933	639398	4457799	265	134	297	243		(Corr'd Nav, Kongsberg 14208, img#4) (V) (T.A)			
Mar-22-21	07:13:06	3108	EQ20547 BW1-15			Camera	38	639663	4457933	639398	4457799	265	134	297	243		(Corr'd Nav, Kongsberg 14208, img#5) (V) (T.A)			
Mar-22-21	07:14:25	3109	EQ20547 BW1-15			Camera	38	639668	4457940	639398	4457799	270	141	305	242		(Corr'd Nav, Kongsberg 14208, img#6) (V) (T.A)			
Mar-22-21	07:14:37	3110	EQ20547 BW1-15			Camera	38	639668	4457942	639398	4457799	270	143	306	242		(Corr'd Nav, Kongsberg 14208, img#7) (V) (T.A)			
Mar-22-21	07:14:56	3111	EQ20547 BW1-15			Camera	38	639668	4457945	639398	4457799	270	146	307	241		(Corr'd Nav, Kongsberg 14208, img#8) (V) (T.A)			
Mar-22-21	07:15:21	3112	EQ20547 BW1-15			Camera	38	639665	4457949	639398	4457799	267	150	307	241		(Corr'd Nav, Kongsberg 14208, img#9) (V) (T.A)			
Mar-22-21	07:15:44	3113	EQ20547 BW1-15			Camera	38	639662	4457951	639398	4457799	264	152	305	240		(Corr'd Nav, Kongsberg 14208, img#10) (V) (T.A)			
Mar-22-21	07:16:23	3114	EQ20547 BW1-15			Camera	38	639660	4457947	639398	4457799	262	148	301	241		(Corr'd Nav, Kongsberg 14208, img#11) (V) (T.A)			
Mar-22-21	07:17:09	3115	EQ20547 BW1-15			Camera	38	639657	4457937	639398	4457799	259	138	294	242		(Corr'd Nav, Kongsberg 14208, img#12) (V) (T.A)			
Mar-22-21	07:17:45	3116	EQ20547 BW1-15			Camera	38	639659	4457931	639398	4457799	261	132	292	243		(Corr'd Nav, Kongsberg 14208, img#13) (V) (T.A)			
Mar-22-21	07:18:34	3117	EQ20547 BW1-15			Camera	38	639664	4457933	639398	4457799	266	134	297	243		(Corr'd Nav, Kongsberg 14208, img#14) (V) (T.A)			
Mar-22-21	07:19:15	3118	EQ20547 BW1-15			Camera	38	639667	4457934	639398	4457799	269	135	301	243		(Corr'd Nav, Kongsberg 14208, img#15) (V) (T.A)			
Mar-22-21	07:20:00	3119	EQ20547 BW1-15			Camera	38	639670	4457934	639398	4457799	272	135	303	244		(Corr'd Nav, Kongsberg 14208, img#16) (V) (T.A)			
Mar-22-21	07:20:42	3120	EQ20547 BW1-15			Camera	38	639673	4457939	639398	4457799	275	140	308	243		(Corr'd Nav, Kongsberg 14208, img#17) (V) (T.A)			
Mar-22-21	07:21:28	3121	EQ20547 BW1-15			Camera	38	639677	4457947	639398	4457799	279	148	316	242		(Corr'd Nav, Kongsberg 14208, img#18) (V) (T.A)			
Mar-22-21	07:21:39	3122	EQ20547 BW1-15			Camera	38	639678	4457948	639398	4457799	280	149	317	242		(Corr'd Nav, Kongsberg 14208, img#19) (V) (T.A)			
Mar-22-21	07:23:22	3123	EQ20547 BW1-15			Camera	38	639701	4457957	639398	4457799	303	158	342	242		(Corr'd Nav, Kongsberg 14208, img#20) (V) (T.A)			
Mar-22-21	07:23:33	3124	EQ20547 BW1-15			Camera	38	639703	4457957	639398	4457799	305	158	344	243		(Corr'd Nav, Kongsberg 14208, img#21) (V) (T.A)			
Mar-22-21	07:23:53	3125	EQ20547 BW1-15			Camera	38	639707	4457959	639398	4457799	309	160	348	243		(Corr'd Nav, Kongsberg 14208, img#22) (V) (T.A)			
Mar-22-21	07:24:34	3126	EQ20547 BW1-15			Camera	38	639715	4457968	639398	4457799	317	169	359	242		(Corr'd Nav, Kongsberg 14208, img#23) (V) (T.A)			
Mar-22-21	07:25:18	3127	EQ20547 BW1-15			Camera	38	639724	4457975	639398	4457799	326	176	370	242		(Corr'd Nav, Kongsberg 14208, img#24) (V) (T.A)			
Mar-22-21	07:25:52	3128	EQ20547 BW1-15			Camera	38	639732	4457978	639398	4457799	334	179	379	242		(Corr'd Nav, Kongsberg 14208, img#25) (V) (T.A)			
Mar-22-21	07:26:10	3129	EQ20547 BW1-15			Camera	38	639735	4457980	639398	4457799	337	181	383	242		(Corr'd Nav, Kongsberg 14208, img#26) (V) (T.A)			
Mar-22-21	07:27:03	3130	EQ20547 BW1-15			Camera	38	639750	4457985	639398	4457799	352	186	398	242		(Corr'd Nav, Kongsberg 14208, img#27) (V) (T.A)			
Mar-22-21	07:27:52	3131	EQ20547 BW1-15			Camera	38	639761	4457990	639398	4457799	363	191	411	242		(Corr'd Nav, Kongsberg 14208, img#28) (V) (T.A)			
Mar-22-21	07:28:06	3132	EQ20547 BW1-15			Camera	38	639765	4457992	639398	4457799	367	193	415	242		(Corr'd Nav, Kongsberg 14208, img#29) (V) (T.A)			
Mar-22-21	07:28:39	3133	EQ20547 BW1-15			Camera	38	639772	4457999	639398	4457799	374	200	424	242		(Corr'd Nav, Kongsberg 14208, img#30) (V) (T.A)			
Mar-22-21	07:29:26	3134	EQ20547 BW1-15			Camera	38	639783	4458005	639398	4457799	385								



APPENDIX A FIELD SAMPLING LOGS

Gardline																		Seafloor Sampling Positioning Summary									
Job No		11543							Vessel		MV Ocean Endeavour																
Client		Equinor US Wind LLC							Vessel Reference Point (VRP)		CoG																
Project Name		Empire Wind Extension							Deployment Location		Grab Deployment Point				x	6.7	y	21.94	z	2.93							
Primary Positioning System		Starpack 1							Actual Coordinates derived from		Deployment Location																
Geodetic Reference System		Datum			WGS 84 - NAD 83 (2018.0 ITRF 2014)			Ellipsoid	GRS 80	Projection		UTM ZONE 18 N (75 W)				Vertical / Tidal Datum		NAVD 88									
Date	Time	Fix number	Station Number		Penetration	Sample	Retention	Observed	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks									
Mar-22-21	07:35:10	3146	EQ20547 BW1-15				Camera	38	639865	4458046	639398	4457799	467	247	528	242		(Corr'd Nav, Kongsberg 14208, img#43) (V) (T.A)									
Mar-22-21	07:35:37	3147	EQ20547 BW1-15				Camera	38	639871	4458049	639398	4457799	473	250	535	242		(Corr'd Nav, Kongsberg 14208, img#44) (V) (T.A)									
Mar-22-21	07:36:18	3148	EQ20547 BW1-15				Camera	38	639880	4458055	639398	4457799	482	256	546	242		(Corr'd Nav, Kongsberg 14208, img#45) (V) (T.A)									
Mar-22-21	07:36:50	3149	EQ20547 BW1-15				Camera	38	639887	4458059	639398	4457799	489	260	554	242		(Corr'd Nav, Kongsberg 14208, img#46) (V) (T.A)									
Mar-22-21	07:37:06	3150	EQ20547 BW1-15				Camera	38	639890	4458061	639398	4457799	492	262	557	242		(Corr'd Nav, Kongsberg 14208, img#47) (V) (T.A)									
Mar-22-21	07:37:41	3151	EQ20547 BW1-15				Camera	38	639898	4458064	639398	4457799	500	265	565	242		(Corr'd Nav, Kongsberg 14208, img#48) (V) (T.A)									
Mar-22-21	07:38:17	3152	EQ20547 BW1-15				Camera	38	639905	4458067	639398	4457799	507	268	574	242		(Corr'd Nav, Kongsberg 14208, img#49) (V) (T.A)									
Mar-22-21	07:38:56	3153	EQ20547 BW1-15				Camera	38	639914	4458071	639398	4457799	516	272	583	242		(Corr'd Nav, Kongsberg 14208, img#50) (V) (T.A)									
Mar-22-21	07:39:09	3154	EQ20547 BW1-15				Camera	38	639917	4458071	639398	4457799	519	272	586	242		(Corr'd Nav, Kongsberg 14208, img#51) (V) (T.A)									
Mar-22-21	07:39:30	3155	EQ20547 BW1-15				Camera	38	639922	4458073	639398	4457799	524	274	591	242		(Corr'd Nav, Kongsberg 14208, img#52) (V) (T.A)									
Mar-22-21	07:39:53	3156	EQ20547 BW1-15				Camera	38	639925	4458076	639398	4457799	527	277	595	242		(Corr'd Nav, Kongsberg 14208, img#53) (V) (T.A)									
Mar-22-21	07:40:32	3157	EQ20547 BW1-15				Camera	38	639925	4458081	639398	4457799	527	282	598	242		(Corr'd Nav, Kongsberg 14208, img#54) (V) (T.A)									
Mar-22-21	07:41:00	3158	EQ20547 BW1-15				Camera	38	639923	4458082	639398	4457799	525	283	597	242		(Corr'd Nav, Kongsberg 14208, img#55) (V) (T.A)									
Mar-22-21	07:41:30	3159	EQ20547 BW1-15				Camera	38	639923	4458084	639398	4457799	525	285	597	242		(Corr'd Nav, Kongsberg 14208, img#56) (V) (T.A)									
Mar-22-21	07:42:07	3160	EQ20547 BW1-15				Camera	38	639926	4458084	639398	4457799	528	285	600	242		(Corr'd Nav, Kongsberg 14208, img#57) (V) (T.A)									
Mar-22-21	07:43:52	3161	EQ20547 BW1-15				Camera	38	639937	4458081	639398	4457799	539	282	608	242		(Corr'd Nav, Kongsberg 14208, img#58) (V) (T.A)									
Mar-22-21	07:44:16	3162	EQ20547 BW1-15				Camera	38	639936	4458079	639398	4457799	538	280	606	242		(Corr'd Nav, Kongsberg 14208, img#59) (V) (T.A)									
Mar-22-21	07:44:31	3163	EQ20547 BW1-15				Camera	38	639935	4458078	639398	4457799	537	279	605	243		(Corr'd Nav, Kongsberg 14208, img#60) (V) (T.A)									
Mar-22-21	07:45:43	3164	EQ20547 BW1-15				Camera	38	639927	4458074	639398	4457799	529	275	597	243		(Corr'd Nav, Kongsberg 14208, img#61) (V) (T.A)									
Mar-22-21	07:46:15	3165	EQ20547 BW1-15				Camera	38	639922	4458074	639398	4457799	524	275	592	242		(Corr'd Nav, Kongsberg 14208, img#62) (V) (T.A)									
Mar-22-21	07:46:41	3166	EQ20547 BW1-15				Camera	38	639919	4458074	639398	4457799	521	275	589	242		(Corr'd Nav, Kongsberg 14208, img#63) (V) (T.A)									
Mar-22-21	07:47:22	3167	EQ20547 BW1-15				Camera	38	639922	4458076	639398	4457799	524	277	593	242		(Corr'd Nav, Kongsberg 14208, img#64) (V) (T.A)									
Mar-22-21	07:47:50	3168	EQ20547 BW1-15				Camera	38	639925	4458080	639398	4457799	527	281	597	242		(Corr'd Nav, Kongsberg 14208, img#65) (V) (T.A)									
Mar-22-21	07:48:38	3169	EQ20547 BW1-15				Camera	38	639924	4458087	639398	4457799	526	288	599	241		(Corr'd Nav, Kongsberg 14208, img#66) (V) (T.A)									
Mar-22-21	07:49:15	3170	EQ20547 BW1-15				Camera	38	639924	4458082	639398	4457799	526	283	598	242		(Corr'd Nav, Kongsberg 14208, img#67) (V) (T.A)									
Apr-17-21	13:31:05	3177	EQ20547 BW1-3-1				Camera	36	603329	4452997	603328	4453004	1	-7	8	349		(Corr'd Nav, Kongsberg 14208, img#2) (V) (T.A)									
Apr-17-21	13:31:20	3178	EQ20547 BW1-3-1				Camera	36	603329	4453001	603328	4453004	1	-3	3	339		(Corr'd Nav, Kongsberg 14208, img#3) (V) (T.A)									
Apr-17-21	13:31:37	3179	EQ20547 BW1-3-1				Camera	36	603329	4453005	603328	4453004	1	1	2	216		(Corr'd Nav, Kongsberg 14208, img#4) (V) (T.A)									
Apr-17-21	13:31:51	3180	EQ20547 BW1-3-1				Camera	36	603329	4453007	603328	4453004	1	3	3	199		(Corr'd Nav, Kongsberg 14208, img#5) (V) (T.A)									
Apr-17-21	13:32:19	3181	EQ20547 BW1-3-1				Camera	36	603328	4453008	603328	4453004	0	4	4	180		(Corr'd Nav, Kongsberg 14208, img#6) (V) (T.A)									
Apr-17-21	13:32:55	3182	EQ20547 BW1-3-1				Camera	36	603327	4453006	603328	4453004	-1	2	3	156		(Corr'd Nav, Kongsberg 14208, img#7) (V) (T.A)									
Apr-17-21	13:33:35	3183	EQ20547 BW1-3-1				Camera	36	603327	4453005	603328	4453004	-1	1	2	125		(Corr'd Nav, Kongsberg 14208, img#8) (V) (T.A)									
Apr-17-21	13:34:04	3184	EQ20547 BW1-3-1				Camera	36	603326	4453003	603328	4453004	-2	-1	2	64		(Corr'd Nav, Kongsberg 14208, img#9) (V) (T.A)									
Apr-17-21	13:34:43	3185	EQ20547 BW1-3-1				Camera	36	603328	4453002	603328	4453004	0	-2	2	355		(Corr'd Nav, Kongsberg 14208, img#10) (V) (T.A)									
Apr-17-21	13:35:28	3186	EQ20547 BW1-3-1				Camera	36	603328	4453002	603328	4453004	0	-2	2	353		(Corr'd Nav, Kongsberg 14208, img#11) (V) (T.A)									
Apr-17-21	13:35:54	3187	EQ20547 BW1-3-1				Camera	36	603329	4453004	603328	4453004	1	0	1	289		(Corr'd Nav, Kongsberg 14208, img#12) (V) (T.A)									
Apr-17-21	13:37:12	3188	EQ20547 BW1-3-1				Camera	36	603327	4453003	603328	4453004	-1	-1	2	37		(Corr'd Nav, Kongsberg 14208, img#13) (V) (T.A)									
Apr-17-21	13:37:30	3189	EQ20547 BW1-3-1				Camera	36	603329	4453002	603328	4453004	1	-2	2	334		(Corr'd Nav, Kongsberg 14208, img#14) (V) (T.A)									
Apr-17-21	13:37:56	3190	EQ20547 BW1-3-1				Camera	36	603329	4453002	603328	4453004	1	-2	2	329		(Corr'd Nav, Kongsberg 14208, img#15) (V) (T.A)									
Apr-17-21	13:38:34	3191	EQ20547 BW1-3-1				Camera	36	603330	4453005	603328	4453004	2	1	2	236		(Corr'd Nav, Kongsberg 14208, img#16) (V) (T.A)									
Apr-17-21	13:39:00	3192	EQ20547 BW1-3-1				Camera	36	603328	4453007	603328	4453004	0	3	3	180		(Corr'd Nav, Kongsberg 14208, img#17) (V) (T.A)									
Apr-17-21	13:39:39	3193	EQ20547 BW1-3-1				Camera	36	603326	4453007	603328	4453004	-2	3	4	146		(Corr'd Nav, Kongsberg 14208, img#18) (V) (T.A)									
Apr-17-21	13:41:13	3194	EQ20547 BW1-3-1				Camera	36	603328	4453002	603328	4453004	0	-2	2	354		(Corr'd Nav, Kongsberg 14208, img#19) (V) (T.A)									
Apr-17-21	13:42:03	3195	EQ20547 BW1-3-1				Camera	36	603329	4453004	603328	4453004	1	0	1	283		(Corr'd Nav, Kongsberg 14208, img#20) (V) (T.A)									
Apr-17-21	13:42:25	3196	EQ20547 BW1-3-1				Camera	36	603327	4453004	603328	4453004	-1	0	1	88		(Corr'd Nav, Kongsberg 14208, img#21) (V) (T.A)									
Apr-17-21	13:42:47	3197	EQ20547 BW1-3-1				Camera	36	603322	4453004	603328	4453004	-6	0	6	86		(Corr'd Nav, Kongsberg 14208, img#22) (V) (T.A)									
Apr-17-21	13:43:09	3198	EQ20547 BW1-3-1				Camera	36	603321	4453001	603328	4453004	-7	-3	7	65		(Corr'd Nav, Kongsberg 14208, img#23) (V) (T.A)									
Apr-17-21	13:43:20	3199	EQ20547 BW1-3-1				Camera	36	603322	4452999	603328	4453004	-6	-5	8	53		(Corr'd Nav, Kongsberg 14208, img#24) (V) (T.A)									
Apr-17-21	13:43:45	3200	EQ20547 BW1-3-1				Camera	36	603325	4452998	603328	4453004	-3	-6	7	27		(Corr'd Nav, Kongsberg 14208, img#25) (V) (T.A)									
Apr-17-21	13:44:14	3201	EQ20547 BW1-3-1				Camera	36	603330	4452998	603328	4453004	2	-6	6	345		(Corr'd Nav, Kongsberg 14208, img#26) (V) (T.A)									
Apr-17-21	13:44:40	3202	EQ20547 BW1-3-1				Camera	36	603332	4453000	603328	4453004	4	-4	6	317		(Corr'd Nav, Kongsberg 14208, img#27) (V) (T.A)									
Apr-17-21	13:45:09	3203	EQ20547 BW1-3-1				Camera	36	603335	4453003	603328	4453004	7	-1	7	279		(Corr'd Nav, Kongsberg 14208, img#28) (V) (T.A)									
Apr-17-21	13:45:26	3204	EQ20547 BW1-3-1				Camera	36	603335	4453005																	

APPENDIX A FIELD SAMPLING LOGS

SEABED IMAGERY LOG SHEET (Deck)						FOR-ENV-0538								
Job No:		11543		Area:		OCS-A 0512		Scale: Green line laser, 10cm separation						
Project:		Empire Wind Extension						Equipment: Kongsberg 14-208 Shallow Water Camera System Subsea with 1CAM MkIII						
Client:		Equinor Wind US LLC						Vessel: MV Ocean Endeavour						
Station Number	Date	Time on Overlay Start	Time on Overlay Finish	DVD No. & Chapter	Media Location	Sediment Description	Fauna Description	Operator	No. of Photos	First Fix No.	Last Fix No.	Comments		
EQ20547_EW2-16 (Part 1 of transect)	Jan-01-2021	17:48:00	18:50:00		DVR Video Files: Dive 02 EW2-16 21-01-01 _C1 Dive 02 EW2-16 21-01-01 _C2 1Cam Video Files: 00005.MTS, 00006.MTS, 00007.MTS, 00008.MTS, 00009.MTS	Medium sand with occasional shell fragments and shells. Burrows observed. Sediment easily suspended.	Arthropoda (Paguroidea), Chordata (Pisces, Rajidae egg cases), Echinodermata (Clypeasteroidea), Mollusca (Gastropoda, Phariidae)	TSH/KH	69	1	69	Poor visibility in water column Depth on overlay incorrect Depth on EELS not logged for first 36 fixes		
EQ20547_EW2-16 (Grab location)	Jan-01-2021	18:50:00	18:59:00		DVR Video Files: Dive 02 EW2-16 21-01-01 _C1 Dive 02 EW2-16 21-01-01 _C2 1Cam Video File: 00010.MTS	Medium sand with occasional shell fragments and shells. Burrows observed. Sediment easily suspended.	Arthropoda (Paguroidea), Echinodermata (Clypeasteroidea), Mollusca (Gastropoda - possible <i>Arctica islandica</i>)	TSH/KH	10	70	80	Poor visibility in water column Depth on overlay incorrect		
EQ20547_EW2-16 (Part 2 of transect)	Jan-01-2021	18:59:00	19:54:00		DVR Video Files: Dive 02 EW2-16 21-01-01 _C1 Dive 02 EW2-16 21-01-01 _C2 1Cam Video Files: 00010.MTS, 00011.MTS, 00012.MTS, 00013.MTS, 00014.MTS, 00015.MTS	Medium sand with occasional shell fragments and shells. Burrows observed. Sediment easily suspended.	Arthropoda (Paguroidea), Chordata (Rajidae), Echinodermata (Clypeasteroidea), Mollusca (Decabrachia, Gastropoda).	TSH/KH	45	81	125	Poor visibility in water column. Depth on overlay incorrect.		
EQ20547_EW2-15 (Grab 'A' location)	Jan-01-2021	23:31:00	23:39:00		DVR Video Files: Dive 03 EW2-15 21-01-01 _C1 Dive 03 EW2-15 21-01-01 _C2 1Cam Video Files: 00016.MTS	Medium sand with occasional shell fragments and shells. Burrows observed.	Arthropoda (Paguroidea), Echinodermata (Clypeasteroidea), Mollusca (Gastropoda, Naticidae)	TSH	11	126	136	Poor visibility in water column. Depth on overlay incorrect.		
EQ20547_EW2-15 (Part 1 of transect)	Jan-01-2021	23:39:00	00:12:00		DVR Video Files: Dive 03 EW2-15 21-01-01 _C1 Dive 03 EW2-15 21-01-01 _C2 1Cam Video Files: 00016.MTS, 00017.MTS, 00018.MTS, 00019.MTS	Rippled sand with burrows.	Arthropoda (Paguroidea), Chordata (Actinopterygii, Rajidae egg cases, Squaliformes), Echinodermata (Clypeasteroidea), Mollusca (Decabrachia, Gastropoda - possible <i>A. islandica</i>)	TSH	35	137	173	Poor visibility in water column. Depth on overlay incorrect. Fixes without photos: 153 & 167.		
EQ20547_EW2-15 (Grab 'B' location)	Jan-02-2021	00:12:00	00:21:00		DVR Video Files: Dive 03 EW2-15 21-01-01 _C1 Dive 03 EW2-15 21-01-01 _C2 1Cam Video Files: 00019.MTS, 00020.MTS	Medium sand with occasional shell fragments and shells. Burrows observed.	Arthropoda (Paguroidea), Chordata (Rajidae egg cases), Echinodermata (Clypeasteroidea), Mollusca (Cephalopoda, Gastropoda)	TSH	10	174	184	Poor visibility in water column. Depth on overlay incorrect. Fix without photo: 183		
EQ20547_EW2-15 (Part 2 of transect)	Jan-02-2021	00:21:00	00:50:00		DVR Video Files: Dive 03 EW2-15 21-01-01 _C1 Dive 03 EW2-15 21-01-01 _C2 1Cam Video Files: 00020.MTS, 00021.MTS, 00022.MTS, 00023.MTS	Medium sand with occasional shell fragments and shells. Burrows and sand ripples observed.	Arthropoda (Paguroidea), Chordata (Rajidae, Rajidae egg cases), Echinodermata (Clypeasteroidea), Mollusca (Gastropoda - possible <i>A. islandica</i>)	TSH	33	185	219	Poor visibility in water column. Depth on overlay incorrect.		
EQ20547_EW2-15 (Grab 'C' location)	Jan-02-2021	00:50:00	00:55:00		DVR Video Files: Dive 03 EW2-15 21-01-01 _C1 Dive 03 EW2-15 21-01-01 _C2 1Cam Video Files: 00023.MTS	Medium sand with occasional shell fragments and shells. Burrows observed.	Arthropoda (Paguroidea), Echinodermata (Clypeasteroidea), Mollusca (Gastropoda - possible <i>A. islandica</i>)	TSH	11	220	230	Poor visibility in water column. Depth on overlay incorrect		
EQ20547_EW2-15B-1 (Grab 'B' location)	Jan-10-2021	21:04:51	21:29:19		DVR Video Files: Dive 04 EW2-15B(rev1) 21-01-10_C1 Dive 04 EW2-15B(rev1) 21-01-10_C2 1Cam Video Files: 00000.MTS, 00001.MTS, 00002.MTS	Sand with shell fragments and shell hash. Burrows and sand ripples observed.	Arthropoda (Paguroidea), Chordata (Rajidae), Echinodermata (Clypeasteroidea), Mollusca (Gastropoda)	JE	23	231	253	This is the additional camera investigation put forward following interpretation of imagery data for EW2-15 grab station B whereby a possible archaeological artefact was observed. The grab station was moved 20m NE, and this drop-down station is only required (no complete transect re-run) to investigate this new target prior to grab sampling. Kongsberg signal lost on arrival at seabed, restarted three times at seabed, then it reconnected successfully. First three photos have the same fix number.		
EQ20547_EW2-14 (Grab 'A' location)	Jan-10-2021	22:20:35	22:35:11		DVR Video Files: Dive 05 EW2-14 21-01-10 _C1 Dive 05 EW2-14 21-01-10 _C2 1Cam Video Files: 00003.MTS, 00004.MTS	Sand with shell fragments and shell hash. Some ripples observed.	Annelida (Polychaeta), Chordata (Actinopterygii, Rajidae, Rajidae egg cases), Echinodermata (Clypeasteroidea), Mollusca (Gastropoda - possible <i>A. islandica</i>)	JE	12	254	265			

APPENDIX A FIELD SAMPLING LOGS

SEABED IMAGERY LOG SHEET (Deck)											FOR-ENV-0538	
Job No: 11543		Area: OCS-A 0512		Scale: Green line laser, 10cm separation								
Project: Empire Wind Extension		Equipment: Kongsberg 14-208 Shallow Water Camera System Subsea with 1CAM MkIII										
Client: Equinor Wind US LLC		Vessel: MV Ocean Endeavour										
Station Number	Date	Time on Overlay Start	Time on Overlay Finish	DVD No. & Chapter	Media Location	Sediment Description	Fauna Description	Operator	No. of Photos	First Fix No.	Last Fix No.	Comments
EQ20547_EW2-14 (Part 1 of transect)	Jan-10-2021	22:35:11	23:08:23		DVR Video Files: Dive 05 EW2-14 21-01-10 _C1 Dive 05 EW2-14 21-01-10 _C2 1Cam Video Files: 00004.MTS, 00005.MTS, 00006.MTS, 00007.MTS	Sand with shell fragments and shell hash. Some ripples observed. Faunal burrows and casts. Sparse gravel and gravel patches from fix 280, along with occasional increases in shells and shell fragments.	Annelida (Polychaeta), Arthropoda (Epialtidae, Paguroidea), Chordata (Rajidae egg cases) Cnidaria (Actiniaria), Echinodermata (Asterias sp., Clypeasteroidea), Mollusca (Cephalopoda, Gastropoda - possible A. islandica)	JE	43	266	308	Possible small pieces of mudstone (e.g. fix 297)
EQ20547_EW2-14 (Grab 'B' location)	Jan-10-2021	23:08:23	23:23:23		DVR Video Files: Dive 05 EW2-14 21-01-10 _C1 Dive 05 EW2-14 21-01-10 _C2 1Cam Video Files: 00007.MTS, 00008.MTS	Sand with shell fragments shell hash, sparse gravel and gravel patches from fix 309. Some ripples observed. Faunal burrows and casts.	Arthropoda (Caridea, Paguroidea), Chordata (Actinopterygii), Cnidaria (Actiniaria)	JE	19	309	327	Fix 316 - unidentified debris: possible metal debris or possible brick Possible small pieces of mudstone (e.g. fix 326)
EQ20547_EW2-14 (Part 1 of transect)	Jan-10-2021	23:23:23	23:50:00		DVR Video Files: Dive 05 EW2-14 21-01-10 _C1 Dive 05 EW2-14 21-01-10 _C2 1Cam Video Files: 00008.MTS, 00009.MTS, 00010.MTS, 00011.MTS	Sand with shell fragments shell hash, sparse gravel and gravel patches. Some ripples observed. Faunal burrows.	Annelida (Polychaeta), Arthropoda (Paguroidea), Chordata (Actinopterygii, Rajidae, Rajidae egg cases), Cnidaria (Actiniaria), Echinodermata (Clypeasteroidea), Mollusca (Gastropoda - possible A. islandica)	JE + IE	82	328	410	A. islandica siphons at surface fixes: 360, 361, 390, 391, 393, 403, 404 Empty A. islandica shell at surface: fix 393 Possible small pieces of mudstone (e.g. fix 332) No Fix 335 Unidentified object (possibly metal, similar in shape to a pick axe head) in fix 373
EQ20547_EW2-14 (Grab 'C' location)	Jan-10-2021	23:50:00	00:00:00		DVR Video Files: Dive 05 EW2-14 21-01-10 _C1 Dive 05 EW2-14 21-01-10 _C2 1Cam Video Files: 00011.MTS, 00012.MTS	Sand with shell fragments, empty shells and shell hash. Some ripples observed. Faunal tracks.	Annelida (Polychaeta), Arthropoda (Paguroidea), Echinodermata (Clypeasteroidea), Mollusca (Cephalopoda, Gastropoda - possible A. islandica), Porifera	JE + IE	28	411	438	Intact A. islandica shell at surface, possibly live: fix 417 Empty A. islandica shell at surface: fix 418
EQ20547_EW2-13 (Grab 'A' location)	Jan-11-2021	00:58:41	01:09:17		DVR Video Files: Dive 06 EW2-13 21-01-11 _C1 Dive 06 EW2-13 21-01-11 _C2 1Cam Video Files: 00013.MTS, 00014.MTS	Sand with shell fragments, empty shells and shell hash. Some ripples observed. Faunal tracks.	Arthropoda (Paguroidea), Chordata (Actinopterygii, Rajidae), Cnidaria (Actiniaria), Echinodermata (Clypeasteroidea), Mollusca (Gastropoda, Naticidae)	JE	13	439	451	No fix 439
EQ20547_EW2-13 (Part 1 of transect)	Jan-11-2021	01:09:17	01:37:31		DVR Video Files: Dive 06 EW2-13 21-01-11 _C1 Dive 06 EW2-13 21-01-11 _C2 1Cam Video Files: 00014.MTS, 00015.MTS, 00016.MTS	Sand with shell fragments, empty shells and shell hash. Some ripples observed. Faunal tracks and burrows.	Annelida (Polychaeta), Arthropoda (Paguroidea), Chordata (Actinopterygii, Rajidae, Rajidae egg cases), Echinodermata (Clypeasteroidea), Mollusca (Gastropoda, Naticidae)	JE	43	452	494	Long thin possibly anthropogenic object: fix 489
EQ20547_EW2-13 (Grab 'B' location)	Jan-11-2021	01:37:31	01:48:22		DVR Video Files: Dive 06 EW2-13 21-01-11 _C1 Dive 06 EW2-13 21-01-11 _C2 1Cam Video Files: 00016.MTS, 00017.MTS	Sand with shell fragments and shell hash. Some ripples observed.	Arthropoda (Paguroidea), Chordata (Actinopterygii, Rajidae, Rajidae egg cases), Echinodermata (Clypeasteroidea), Mollusca (Gastropoda, Naticidae)	JE	11	495	505	
EQ20547_EW2-13 (Part 2 of transect)	Jan-11-2021	01:48:22	02:17:10		DVR Video Files: Dive 06 EW2-13 21-01-11 _C1 Dive 06 EW2-13 21-01-11 _C2 1Cam Video Files: 00017.MTS, 00018.MTS, 00019.MTS, 00020.MTS	Sand with shell fragments and shell hash. Some ripples observed. Faunal burrows.	Arthropoda (Paguroidea), Chordata (Actinopterygii, Rajidae, Rajidae egg case), Echinodermata (Asteroidea, Clypeasteroidea), Mollusca (Gastropoda - possible A. islandica, Naticidae)	JE	46	506	551	A. islandica siphons at surface: fix 526
EQ20547_EW2-13 (Grab 'C' location)	Jan-11-2021	02:17:10	02:27:27		DVR Video Files: Dive 06 EW2-13 21-01-11 _C1 Dive 06 EW2-13 21-01-11 _C2 1Cam Video Files: 00020.MTS, 00021.MTS	Sand with shell fragments, some large empty shells and shell hash. Some ripples observed. Small, sparse gravel (fix 565). Faunal tracks and burrows.	Arthropoda (Paguroidea), Chordata (Rajidae egg case), Cnidaria (Actiniaria), Echinodermata (Clypeasteroidea), Mollusca (possible A. islandica, Gastropoda, Nudibranchia)	JE	21	552	572	A. islandica siphons at surface fixes: 561, possible 565
EQ20547_EW2-12 (Grab 'C' location)	Jan-11-2021	03:22:00	03:32:57		DVR Video Files: Dive 07 EW2-13 21-01-11 _C1 Dive 07 EW2-13 21-01-11 _C2 1Cam Video Files: 00022.MTS, 00023.MTS	Sand with shell fragments, some large empty shells and shell hash. Some ripples observed. Faunal tracks and burrows.	Annelida (Polychaeta), Arthropoda (Paguroidea), Chordata (Rajidae egg case), Echinodermata (Clypeasteroidea), Mollusca (possible A. islandica, Gastropoda, Pectinidae)	JE	18	573	590	A. islandica siphons at surface: fix 582 Empty A. islandica shell at surface: fix 584
EQ20547_EW2-12 (Part 1 of transect)	Jan-11-2021	03:32:57	03:55:26		DVR Video Files: Dive 07 EW2-13 21-01-11 _C1 Dive 07 EW2-13 21-01-11 _C2 1Cam Video Files: 00023.MTS, 00024.MTS, 00025.MTS	Sand with shell fragments, some large empty shells and shell hash. Some ripples observed. Sparse gravel and gravel patches from fix 205. Faunal tracks, burrows and casts.	Annelida (Polychaeta), Arthropoda (Paguroidea), Cnidaria (Actiniaria), Chordata (Actinopterygii, Rajidae), Echinodermata (Asteroidea, Clypeasteroidea), Mollusca (possible A. islandica, Gastropoda, Nudibranchia)	JE	39	591	629	A. islandica siphons at surface fixes: 591, 592, 601, 613

APPENDIX A FIELD SAMPLING LOGS

SEABED IMAGERY LOG SHEET (Deck)												FOR-ENV-0538
Job No: 11543			Area: OCS-A 0512			Scale: Green line laser, 10cm separation						
Project: Empire Wind Extension						Equipment: Kongsberg 14-208 Shallow Water Camera System Subsea with 1CAM MkIII						
Client: Equinor Wind US LLC						Vessel: MV Ocean Endeavour						
Station Number	Date	Time on Overlay Start	Time on Overlay Finish	DVD No. & Chapter	HDD File Name(s)	Sediment Description	Fauna Description	Operator	No. of Photos	First Fix No.	Last Fix No.	Comments
EQ20547_EW2-12 (Grab 'B' location)	Jan-11-2021	03:55:26	04:12:07		DVR Video Files: Dive 07 EW2-13 21-01-11 _C1 Dive 07 EW2-13 21-01-11 _C2 1Cam Video Files: 00025.MTS, 00026.MTS	Sand with shell fragments, some large empty shells and shell hash. Some ripples observed. Fine sediment with worm tubes. Sparse gravel and gravel patches. Faunal tracks, burrows and casts.	Annelida (Polychaeta), Chordata (Actinopterygii, Rajidae, Rajidae egg case), Cnidaria (Actiniaria), Echinodermata (Clypeasteroidea), Mollusca (possible <i>A. islandica</i>), Gastropoda, Naticidae	JE	34	630	663	Cobbles: fix 633 <i>A. islandica</i> siphon at surface: fix 663
EQ20547_EW2-12 (Part 2 of transect)	Jan-11-2021	04:12:07	04:40:14		DVR Video Files: Dive 07 EW2-13 21-01-11 _C1 Dive 07 EW2-13 21-01-11 _C2 1Cam Video Files: 00026.MTS, 00027.MTS, 00028.MTS, 00029.MTS	Sand with shell fragments, some large empty shells and shell hash. Some ripples observed. Fine sediment with worm tubes. Sparse gravel and gravel patches. Faunal tracks, burrows and casts.	Annelida (Polychaeta), Arthropoda (Paguroidea), Chordata (Rajidae), Echinodermata (Clypeasteroidea), Mollusca (Gastropoda, Naticidae)	JE	12	664	675	
EQ20547_EW2-12 (Grab 'A' location)	Jan-11-2021	04:40:14	04:51:30		DVR Video Files: Dive 07 EW2-13 21-01-11 _C1 Dive 07 EW2-13 21-01-11 _C2 1Cam Video Files: 00029.MTS, 00030.MTS	Sand with shell fragments, shells and shell hash. Some ripples observed.	Annelida (Polychaeta), Echinodermata (Clypeasteroidea), Mollusca (Gastropoda, Naticidae)	JE	9	676	684	
EQ20547_EW2-11 (Part 1 of transect)	Jan-11-2021	05:55:00	06:21:00		DVR Video Files: Dive 08 21-01-11 _C1 Dive 08 21-01-11 _C2 1Cam Video Files: 00001.MTS, 00002.MTS, 00003.MTS	Sand with shell fragments and shell hash. Some ripples observed.	Chordata (Rajidae, Rajidae egg case), Echinodermata (<i>Asterias</i> sp., Clypeasteroidea), Mollusca (possible <i>A. islandica</i>)	KH	26	685	710	Laser stopped working before deployment swapped with one of two spares.
EQ20547_EW2-11 (Grab location)	Jan-11-2021	06:21:00	06:31:00		DVR Video Files: Dive 08 21-01-11 _C1 Dive 08 21-01-11 _C2 1Cam Video Files: 00003.MTS, 00004.MTS	Sand with shell fragments and shell hash. Some ripples observed.	Chordata (Actinopterygii), Echinodermata (Clypeasteroidea)	KH	14	711	724	
EQ20547_EW2-11 (Part 2 of transect)	Jan-11-2021	06:31:00	06:58:00		DVR Video Files: Dive 08 21-01-11 _C1 Dive 08 21-01-11 _C2 1Cam Video Files: 00004.MTS, 00005.MTS, 00006.MTS, 00007.MTS	Sand with shell fragments and shell hash. Some ripples observed. Occasional burrows and pebbles observed.	Chordata (Rajidae, Rajidae egg case), Echinodermata (Clypeasteroidea), Mollusca (Gastropoda, Naticidae)	KH	30	725	754	
EQ20547_EW2-10 (Grab 'C' location)	Jan-11-2021	07:44:00	07:55:00		DVR Video Files: Dive 09 21-01-11 _C1 Dive 09 21-01-11 _C2 1Cam Video Files: 00008.MTS, 00009.MTS	Coarse sand with shell fragments and occasional gravel.	Arthropoda (Paguroidea), Chordata (Rajidae, Rajidae egg case), Echinodermata (Clypeasteroidea), Mollusca (<i>A. islandica</i>)	KH	15	755	769	
EQ20547_EW2-10 (Part 1 of transect)	Jan-11-2021	07:55:00	08:10:00		DVR Video Files: Dive 09 21-01-11 _C1 Dive 09 21-01-11 _C2 1Cam Video Files: 00009.MTS, 00010.MTS	Coarse sand with shell fragments and occasional gravel. Burrows observed.	Chordata (Rajidae), Echinodermata (Clypeasteroidea), Mollusca (Naticidae)	KH	15	770	785	No photo: fix 773 Possible Porifera around fix 779 Suspended sediment/turbid waters
EQ20547_EW2-10 (Grab 'B' location)	Jan-11-2021	08:10:00	08:21:00		DVR Video Files: Dive 09 21-01-11 _C1 Dive 09 21-01-11 _C2 1Cam Video Files: 00010.MTS	Coarse sand with shell fragments and occasional gravel. Burrows and sand ripples observed. Bioturbation.	Chordata (Rajidae egg case), Cnidaria (Anthozoa), Mollusca (Pectinidae)	KH	13	786	798	
EQ20547_EW2-10 (Part 2 of transect)	Jan-11-2021	08:21:00	08:39:00		DVR Video Files: Dive 09 21-01-11 _C1 Dive 09 21-01-11 _C2 1Cam Files: 00010.MTS, 00011.MTS, 00012.MTS, 00013.MTS	Gravelly sand with shell fragments. Burrows and sand ripples observed. Bioturbation.	Arthropoda (Decapoda, Paguroidea), Chordata (Rajidae, Rajidae egg case), Cnidaria (Anthozoa), Echinodermata (Clypeasteroidea)	KH	20	799	819	No photo: fix 806 Possible Porifera: fix 802
EQ20547_EW2-10 (Grab 'A' location)	Jan-11-2021	08:39:00	08:49:00		DVR Video Files: Dive 09 21-01-11 _C1 Dive 09 21-01-11 _C2 1Cam Video Files: 00013.MTS, 00014.MTS	Coarse sand with gravel. Burrows and sand ripples observed.	Chordata (Rajidae egg case), Cnidaria (Anthozoa), Echinodermata (Clypeasteroidea)	KH	14	820	834	No photo: fix 829

APPENDIX A FIELD SAMPLING LOGS

SEABED IMAGERY LOG SHEET (Deck)											FOR-ENV-0538	
Job No: 11543			Area: OCS-A 0512			Scale: Green line laser, 10cm separation						
Project: Empire Wind Extension						Equipment: Kongsberg 14-208 Shallow Water Camera System Subsea with 1CAM MkIII						
Client: Equinor Wind US LLC						Vessel: MV Ocean Endeavour						
Station Number	Date	Time on Overlay Start	Time on Overlay Finish	DVD No. & Chapter	Media Location	Sediment Description	Fauna Description	Operator	No. of Photos	First Fix No.	Last Fix No.	Comments
EQ20547_EW2-09 (Part 1 of transect)	Jan-11-2021	09:33:00	09:59:00		DVR Video Files: Dive 10 21-01-11 _C1 Dive 10 21-01-11 _C2 1Cam Video Files: 00015.MTS, 00016.MTS, 00017.MTS	Sand. Some ripples observed. Burrows and bioturbation also observed.	Arthropoda (Paguroidea), Chordata (Rajidae egg case), Echinodermata (Clypeasteroidea), Mollusca (Gastropoda)	KH	26	835	860	
EQ20547_EW2-09 (Grab location)	Jan-11-2021	09:59:00	10:09:00		DVR Video Files: Dive 10 21-01-11 _C1 Dive 10 21-01-11 _C2 1Cam Video Files: 00017.MTS	Sand with occasional gravel. Some burrows and ripples observed.	Chordata (Rajidae egg case), Echinodermata (Clypeasteroidea), Mollusca (Gastropoda, Naticidae)	KH	13	861	874	No photo: fix 868
EQ20547_EW2-09 (Part 2 of transect)	Jan-11-2021	10:09:00	10:34:00		DVR Video Files: Dive 10 21-01-11 _C1 Dive 10 21-01-11 _C2 1Cam Video Files: 00017.MTS, 00018.MTS, 00019.MTS	Sand with occasional gravel. Some burrows and ripples observed.	Arthropoda (Paguroidea), Chordata (Rajidae egg case), Echinodermata (Clypeasteroidea), Mollusca (possible A. islandica , Gastropoda)	KH	20	875	894	Rajidae: fixes 877, 886 Horseshoe crab shell: fix 883
EQ20547_EW2-08 (Grab 'C' location)	Jan-11-2021				DVR Video Files: Dive 11 11.28.30 21-01-11 _C1 Dive 11 11.28.30 21-01-11 _C2 1Cam Video File: 00020.MTS			KH	1	895	895	895 - no lamp. Camera frame brought back on board.
EQ20547_EW2-08-1 (Grab 'C' location)	Jan-11-2021				DVR Video Files: Dive 11 12.03.25 21-01-11 _C1 Dive 11 12.03.2 21-01-11 _C2 1Cam Video File: 00021.MTS			KH	1	896	896	896 - 1Cam connection failure: "No signal" Camera frame brought back on board.
EQ20547_EW2-08-2 (Grab 'C' location)	Jan-11-2021	12:36:00	12:47:00		DVR Video Files: Dive 12 21-01-11 _C1 Dive 12 21-01-11 _C2 1Cam Video Files: 00022.MTS	Sand.	Arthropoda (Paguroidea), Echinodermata (Clypeasteroidea), Mollusca (Gastropoda)	KH	13	897	909	
EQ20547_EW2-08-2 (Part 1 of transect)	Jan-11-2021	12:47:00	13:08:00		DVR Video Files: Dive 12 21-01-11 _C1 Dive 12 21-01-11 _C2 1Cam Video Files: 00022.MTS, 00023.MTS, 00024.MTS	Sand. Burrows observed. Gravel, pebbles seen towards end of transect (part 1).	Arthropoda (Paguroidea, Limulus polyphemus), Chordata (Rajidae egg case), Echinodermata (Clypeasteroidea), Mollusca (Naticidae),	KH/IE	30	910	939	1Cam started to jump in and out of signal from 13:03.
EQ20547_EW2-08-2 (Grab 'B' location)	Jan-11-2021	13:08:00	13:11:00		DVR Video Files: Dive 12 21-01-11 _C1 Dive 12 21-01-11 _C2 1Cam Video File: 00024.MTS			KH	0			Camera showed 'No Signal' and didn't return. Camera frame brought back on board. 00024.MTS - 02:35mins in, camera is brought back up, 'No signal' on overlay meant that the operator couldn't see that the camera was still recording.
EQ20547_EW2-08-3 (Grab 'B' location)	Jan-11-2021	13:40:00	13:51:00		DVR Video Files: Dive 13 21-01-11 _C1 Dive 13 21-01-11 _C2 1Cam Video Files: 00026.MTS, 00027.MTS	Gravelly sand with occasional pebbles. Shell fragments and shell hash observed.	Arthropoda (Paguroidea), Cnidaria (Anthozoa), Echinodermata (Clypeasteroidea), Mollusca (Naticidae), Egg Case (Rajidae).	KH	13	940	952	
EQ20547_EW2-08-3 (Part 2 of transect)	Jan-11-2021	13:51:00	14:20:00		DVR Video Files: Dive 13 21-01-11 _C1 Dive 13 21-01-11 _C2 1Cam Video Files: 00027.MTS, 00028.MTS, 00029.MTS, 00030.MTS	Sand with some grave and occasional pebbles. Sand ripples observed.	Arthropoda (Paguroidea), Chordata (Actinopterygii, Rajidae egg case), Cnidaria (Anthozoa), Echinodermata (Clypeasteroidea), Mollusca (Naticidae), Porifera	KH/IE	38	953	990	
EQ20547_EW2-08-3 (Grab 'A' location)	Jan-11-2021	14:20:00	14:30:00		DVR Video Files: Dive 13 21-01-11 _C1 Dive 13 21-01-11 _C2 1Cam Video Files: 00030.MTS, 00031.MTS	Sand with gravel and pebbles.	Arthropoda (Paguroidea), Cnidaria (Anthozoa), Echinodermata (Clypeasteroidea)	KH/IE	13	991	1003	No photo: fix 993
EQ20547_EW2-07 (Grab 'A' location)	Jan-11-2021	14:59:00	15:09:00		DVR Video Files: Dive 14 21-01-11 _C1 Dive 14 21-01-11 _C2 1Cam Video File: 00032.MTS	Sand with shell fragments.	Arthropoda (Caridae, Paguroidea), Chordata (Rajidae egg case), Echinodermata (Asterias sp., Clypeasteroidea), Mollusca (Gastropoda)	KH	11	1004	1014	No overlay video recording for this station

APPENDIX A FIELD SAMPLING LOGS

SEABED IMAGERY LOG SHEET (Deck)												FOR-ENV-0538
Job No: 11543			Area: OCS-A 0512			Scale: Green line laser, 10cm separation						
Project: Empire Wind Extension						Equipment: Kongsberg 14-208 Shallow Water Camera System Subsea with 1CAM MkIII						
Client: Equinor Wind US LLC						Vessel: MV Ocean Endeavour						
Station Number	Date	Time on Overlay Start	Time on Overlay Finish	DVD No. & Chapter	Media Location	Sediment Description	Fauna Description	Operator	No. of Photos	First Fix No.	Last Fix No.	Comments
EQ20547_EW2-07 (Part 1 of transect)	Jan-11-2021	15:09:50	15:36:00		DVR Video Files: Dive 14 21-01-11 _C1 Dive 14 21-01-11 _C2 1Cam Video Files: 00032.MTS, 00033.MTS, 00034.MTS	Sand with shell fragments. Burrows and sand ripples seen.	Arthropoda (Paguroidea), Chordata (Actinopterygii, Rajidae), Echinodermata (Clypeasteroidea)	KH	25	1015	1039	No overlay video recording for the first 13 minutes
EQ20547_EW2-07 (Grab 'B' location)	Jan-11-2021	15:36:00	15:48:00		DVR Video Files: Dive 14 21-01-11 _C1 Dive 14 21-01-11 _C2 1Cam Video Files: 00034.MTS, 00035.MTS	Sand with shell fragments. Burrows and sand ripples seen.	Echinodermata (Clypeasteroidea), Mollusca (Gastropoda)	KH	9	1040	1048	
EQ20547_EW2-07 (Part 2 of transect)	Jan-11-2021	15:48:00	16:18:00		DVR Video Files: Dive 14 21-01-11 _C1 Dive 14 21-01-11 _C2 1Cam Video Files: 00035.MTS, 00036.MTS, 00037.MTS	Sand with shell fragments. Burrows and sand ripples seen.	Arthropoda (Paguroidea), Chordata (Rajidae egg case), Echinodermata (Clypeasteroidea), Mollusca (Gastropoda)	KH	28	1049	1076	
EQ20547_EW2-07 (Grab 'C' location)	Jan-11-2021	16:18:00	16:28:00		DVR Video Files: Dive 14 21-01-11 _C1 Dive 14 21-01-11 _C2 1Cam Video Files: 00037.MTS, 00038.MTS	Sand with shell fragments. Bioturbation observed.	Arthropoda (Paguroidea), Chordata (Actinopterygii), Cnidaria (Actiniaria), Echinodermata (Clypeasteroidea)	KH	6	1077	1082	
EQ20547_EW2-06 (Grab 'C' location)	Jan-11-2021	17:50:41	18:05:41		DVR Video Files: Dive 15 21-01-11 _C1 Dive 15 21-01-11 _C2 1Cam Video Files: 00039.MTS, 00040.MTS	Sand with shell fragments, shell hash, sparse gravel. Some ripples observed. Faunal burrows.	Annelida (Polychaeta), Arthropoda (Paguroidea), Chordata (Actinopterygii), Echinodermata (Clypeasteroidea)	JE	19	1083	1101	High suspended sediments and swell Possible small pieces of mudstone, e.g. fix 1100
EQ20547_EW2-06 (Part 1 of transect)	Jan-11-2021	18:05:41	18:21:54		DVR Video Files: Dive 15 21-01-11 _C1 Dive 15 21-01-11 _C2 1Cam Video Files: 00040.MTS, 00041.MTS	Sand with shell fragments, shell hash, sparse gravel. Some ripples observed. Faunal burrows and casts.	Annelida (Polychaeta), Arthropoda (Paguroidea), Cnidaria (Actiniaria), Echinodermata (Clypeasteroidea), Mollusca (Gastropoda)	JE	37	1102	1138	High suspended sediments just above seabed Possible small pieces of mudstone, e.g. fix 1102
EQ20547_EW2-06 (Grab B)	Jan-11-2021	18:21:54	18:36:26		DVR Video Files: Dive 15 21-01-11 _C1 Dive 15 21-01-11 _C2 1Cam Video Files: 00041.MTS, 00042.MTS	Sand with shell fragments, shell hash. Some ripples observed. Faunal burrows and tracks.	Annelida (Polychaeta), Arthropoda (Decapoda), Echinodermata (Clypeasteroidea), Mollusca (Gastropoda)	JE	23	1139	1162	High suspended sediments just above seabed Missing fix 1156
EQ20547_EW2-06 (Part 2 of transect)	Jan-11-2021	18:36:26	18:57:01		DVR Video Files: Dive 15 21-01-11 _C1 Dive 15 21-01-11 _C2 1Cam Video Files: 00042.MTS, 00043.MTS, 00044.MTS	Sand with shell fragments, shell hash, sparse gravel. Some ripples observed. Faunal burrows.	Annelida (Polychaeta), Echinodermata (Clypeasteroidea), Mollusca (Gastropoda)	JE	21	1163	1183	High suspended sediments just above seabed
EQ20547_EW2-06 (Grab A)	Jan-11-2021	18:57:01	19:08:00		DVR Video Files: Dive 15 21-01-11 _C1 Dive 15 21-01-11 _C2 1Cam Video Files: 00044.MTS, 00045.MTS	Sand with shell fragments, shell hash, sparse gravel. Some ripples observed. Faunal burrows.	Annelida (Polychaeta), Arthropoda (Paguroidea), Echinodermata (Clypeasteroidea), Mollusca (Naticidae)	JE	13	1184	1196	High suspended sediments just above seabed
EQ20547_EW2-05 (Grab 'C' location)	Jan-11-2021	20:24:18	20:37:50		DVR Video Files: Dive 17 21-01-11 _C1 Dive 17 21-01-11 _C2 1Cam Video File: 0001.MTS	Sand with shell fragments, shell hash. Some ripples observed. Sparse gravel and gravel patches. Faunal casts.	Annelida (Polychaeta), Arthropoda (Paguroidea), Cnidaria (Actiniaria), Echinodermata (Clypeasteroidea), Mollusca (Bivalvia, Gastropoda)	JE	21	1197	1217	Tag line got caught around the leg of the frame during deployment into the water, couldn't free it without recovering frame to deck level. Continued to seabed, Kongsberg topside feed went dark. Reset the camera and feed, returned to normal. Requesting control of V5 via EELS failed, disconnected Kongsberg, reset EELS. High suspended sediments just above seabed
EQ20547_EW2-05 (Part 1 of transect)	Jan-11-2021	20:37:50	20:50:23		DVR Video Files: Dive 17 21-01-11 _C1 Dive 17 21-01-11 _C2 1Cam Video File: 0001.MTS	Sand with shell fragments, shell hash, sparse gravel. Some ripples observed. Faunal burrows and casts.	Annelida (Polychaeta), Arthropoda (Decapoda), Chordata (Actinopterygii, Rajidae egg case), Cnidaria (Actiniaria), Echinodermata (Clypeasteroidea), Mollusca (Gastropoda, Pectinidae)	JE	23	1218	1240	High suspended sediments just above seabed Fix 1222 missing Possible small pieces of mudstone, e.g. fix 1232

APPENDIX A FIELD SAMPLING LOGS

SEABED IMAGERY LOG SHEET (Deck)						FOR-ENV-0538								
Job No:		11543		Area:		OCS-A 0512		Scale: Green line laser, 10cm separation						
Project:		Empire Wind Extension						Equipment: Kongsberg 14-208 Shallow Water Camera System Subsea with 1CAM MkIII						
Client:		Equinor Wind US LLC						Vessel: MV Ocean Endeavour						
Station Number	Date	Time on Overlay Start	Time on Overlay Finish	DVD No. & Chapter	Media Location	Sediment Description	Fauna Description	Operator	No. of Photos	First Fix No.	Last Fix No.	Comments		
EQ20547_EW2-05 (Grab 'B' location)	Jan-11-2021	20:50:23	21:03:28		DVR Video Files: Dive 17 21-01-11 _C1 Dive 17 21-01-11 _C2 1Cam Video Files: 0001.MTS, 0002.MTS	Sand with shell fragments, shell hash. Some ripples observed. Faunal burrows and casts.	Arthropoda (Paguroidea), Chordata (Rajidae egg case), Cnidaria (Actiniana), Echinodermata (Clypeasteroidea), Mollusca (Nudibranchia, Pectinidae)	JE	16	1241	1256	High suspended sediments just above seabed. Overlay frozen		
EQ20547_EW2-05 (Part 2 of transect)	Jan-11-2021	21:03:28	21:33:13		DVR Video Files: Dive 17 21-01-11 _C1 Dive 17 21-01-11 _C2 1Cam Video Files: 0002.MTS, 0003.MTS	Sand with shell fragments. Some ripples observed. Faunal burrows and casts.	Annelida (Polychaeta), Arthropoda (Decapoda, Paguroidea), Chordata (Actinopterygii, Rajidae egg case), Cnidaria (Actiniana), Echinodermata (Clypeasteroidea), Mollusca (Gastropoda)	JE	44	1257	1300	High suspended sediments just above seabed Fix 1300 - approx ten Rajidae egg cases No Overlay		
EQ20547_EW2-05 (Grab 'A' location)	Jan-11-2021	21:33:13	21:43:11		DVR Video Files: Dive 17 21-01-11 _C1 Dive 17 21-01-11 _C2 1Cam Video File: 0003.MTS	Sand with shell fragments. Some ripples observed.	Chordata (Actinopterygii, Rajidae egg case), Echinodermata (Clypeasteroidea)	JE	11	1301	1311	High suspended sediments just above seabed Fix 1308 - two Rajidae egg cases No Overlay		
EQ20547_EW2-04 (Part 1 of transect)	Jan-11-2021	23:20:00	23:51:52		DVR Video Files: Dive 18 21-01-11 _C1 Dive 18 21-01-11 _C2 1Cam Video Files: 0004.MTS, 0005.MTS, 0006.MTS	Rippled sand with shell fragments.	Chordata (Actinopterygii), Echinodermata (Clypeasteroidea)	JE	33	1312	1345	Very high suspended sediments. Poor visibility. Unable to complete fauna identification at entirety of this location. May need to revisit. Missing fixes 1312 and 1313 Fix 1341 is a double-fix (images renamed '11543_EQ20547_BW2-4_Fix(1341)a_Kongsberg14208' and '11543_EQ20547_BW2-4_Fix(1341)b_Kongsberg14208' accordingly)		
EQ20547_EW2-04 (Grab)	Jan-11-2021	23:51:52	00:03:58		DVR Video Files: Dive 18 21-01-11 _C1 Dive 18 21-01-11 _C2 1Cam Video File: 0006.MTS	Rippled sand with shell fragments.	Arthropoda (Paguroidea), Chordata (Actinopterygii), Echinodermata (Clypeasteroidea)	IE	12	1346	1357	Very high suspended sediments. Poor visibility. Unable to complete fauna identification at entirety of this location. May need to revisit.		
EQ20547_EW2-04 (Part 2 of transect)	Jan-12-2021	00:03:58	00:28:16		DVR Video Files: Dive 18 21-01-11 _C1 Dive 18 21-01-11 _C2 1Cam Video Files: 0006.MTS, 0007.MTS	Rippled sand with shell fragments.	No fauna visible for identification due to high concentration of suspended sediments just above the seabed inhibiting view of seabed.	JE/IE	18	1358	1375	Very high suspended sediments. Poor visibility. Unable to complete fauna identification at this location. May need to revisit.		
EQ20547_BW1-13 (Grab 'C' location)	Jan-12-2021	04:56:00	05:08:34		DVR Video Files: Dive 19 21-01-11 _C1 Dive 19 21-01-11 _C2 1Cam Video File: 0008.MTS	Rippled sand with shell fragments. Sparse gravel in places. Faunal tracks.	Arthropoda (Paguroidea), Echinodermata (Clypeasteroidea), Mollusca (Decabrachia, Gastropoda, Naticidae), Porifera	JE	15	1376	1391	Recovering at shift change (circa midnight local time) to swap out the crane driver.		
EQ20547_BW1-13-1 (Part 1 of transect)	Jan-12-2021	05:35:00	06:08:23		DVR Video Files: Dive 19 21-01-11 _C1 Dive 19 21-01-11 _C2 1Cam Video Files: 0008.MTS, 0009.MTS, 0010.MTS, 0011.MTS	Rippled sand with shell fragments and shell hash. Occasional burrows observed.	Arthropoda (Paguroidea), Chordata (Actinopterygii, Rajidae, Rajidae egg case), Echinodermata (Clypeasteroidea), Mollusca (Decabrachia, Gastropoda, Naticidae)	KH	30	1392	1422	Named as rev 1. Not a re-run, just a shift change.		
EQ20547_BW1-13-1 (Grab 'B' location)	Jan-12-2021	06:08:23	06:22:20		DVR Video Files: Dive 19 21-01-11 _C1 Dive 19 21-01-11 _C2 1Cam Video Files: 0011.MTS, 0012.MTS	Rippled sand with shell fragments and shell hash. Occasional burrows observed.	Arthropoda (Paguroidea), Chordata (Rajidae egg case), Echinodermata (Clypeasteroidea), Mollusca (Gastropoda, Naticidae)	KH	12	1423	1434			
EQ20547_BW1-13-1 (Part 2 of transect)	Jan-12-2021	06:22:20	06:57:50		DVR Video Files: Dive 19 21-01-11 _C1 Dive 19 21-01-11 _C2 1Cam Video Files: 0012.MTS, 0013.MTS, 0014.MTS, 0015.MTS	Rippled sand with shell fragments and shell hash. Burrows observed. Occasional gravel and pebbles seen after 464m of transect. Gravel seen collecting within the sand ripples.	Arthropoda (Paguroidea), Chordata (Actinopterygii, Rajidae, Rajidae egg case), Echinodermata (Clypeasteroidea), Mollusca (A. islandica, Decabrachia, Naticidae)	KH	33	1435	1467			
EQ20547_BW1-13-1 (Grab 'A' location)	Jan-12-2021	06:57:50	07:09:58		DVR Video Files: Dive 19 21-01-11 _C1 Dive 19 21-01-11 _C2 1Cam Video Files: 0015.MTS, 0016.MTS	Rippled sand with frequent shell hash. Burrows observed.	Arthropoda (Paguroidea), Chordata (Actinopterygii, Rajidae, Rajidae egg case), Echinodermata (Clypeasteroidea), Mollusca (Decabrachia, Gastropoda, Naticidae), Porifera	KH	14	1468	1481	Wind picked up slightly, vessel knocked of station at 06:59, back in at 07:04:48		

APPENDIX A FIELD SAMPLING LOGS

SEABED IMAGERY LOG SHEET (Deck)											FOR-ENV-0538	
Job No: 11543			Area: OCS-A 0512			Scale: Green line laser, 10cm separation						
Project: Empire Wind Extension						Equipment: Kongsberg 14-208 Shallow Water Camera System Subsea with 1CAM MkIII						
Client: Equinor Wind US LLC						Vessel: MV Ocean Endeavour						
Station Number	Date	Time on Overlay Start	Time on Overlay Finish	DVD No. & Chapter	Media Location	Sediment Description	Fauna Description	Operator	No. of Photos	First Fix No.	Last Fix No.	Comments
EQ20547_BW1-12 (Grab 'C' location)	Jan-12-2021	07:43:26	07:58:31		DVR Video Files: Dive 20 21-01-11 _C1 Dive 20 21-01-11 _C2 1Cam Video Files: 00017.MTS, 00018.MTS	Sand with shell fragments. Burrows observed.	Chordata (Rajidae egg case), Echinodermata (Clypeasteroidea), Mollusca (A. islandica , Naticidae), Porifera	KH	15	1482	1496	Started video fix taken once inside 10m grab target
EQ20547_BW1-12 (Part 1 of transect)	Jan-12-2021	07:58:31	08:24:24		DVR Video Files: Dive 20 21-01-11 _C1 Dive 20 21-01-11 _C2 1Cam Video Files: 00018.MTS, 00019.MTS, 00020.MTS	Sand with shell fragments. Burrows observed.	Arthropoda (Paguroidea), Chordata (Actinopterygii, Rajidae, Rajidae egg case), Echinodermata (Clypeasteroidea), Mollusca (Decabrachia, Gastropoda, Naticidae), Porifera	KH	29	1497	1525	
EQ20547_BW1-12 (Grab 'B' location)	Jan-12-2021	08:24:24	08:33:28		DVR Video Files: Dive 20 21-01-11 _C1 Dive 20 21-01-11 _C2 1Cam Video File: 00020.MTS	Sand with frequent shell fragments. Burrows observed.	Chordata (Rajidae egg case), Echinodermata (Clypeasteroidea)	KH	12	1526	1537	
EQ20547_BW1-12 (Part 2 of transect)	Jan-12-2021	08:33:28	09:13:21		DVR Video Files: Dive 20 21-01-11 _C1 Dive 20 21-01-11 _C2 1Cam Video Files: 00020.MTS, 00021.MTS, 00022.MTS, 00023.MTS, 00024.MTS	Sand with shell fragments. Burrows observed.	Arthropoda (Paguroidea), Chordata (Rajidae, Rajidae egg case), Echinodermata (Clypeasteroidea), Mollusca (Decabrachia, Naticidae)	KH	33	1538	1570	Speed of vessel increased due to weather, vessel backtracked along transect in order to capture images of first 50m Fix 1538 out side transect line
EQ20547_BW1-12 (Grab 'A' location)	Jan-12-2021	09:13:21	09:23:30		DVR Video Files: Dive 20 21-01-11 _C1 Dive 20 21-01-11 _C2 1Cam Video Files: 00024.MTS, 00025.MTS	Rippled sand with shell fragments. Burrows observed.	Chordata (Rajidae egg case), Echinodermata (Clypeasteroidea)	KH	15	1571	1585	
EQ20547_BW1-11 (Part 1 of transect)	Jan-12-2021	10:37:18	11:11:27		DVR Video Files: Dive 21 21-01-11 _C1 Dive 21 21-01-11 _C2 1Cam Video Files: 00000.MTS, 00001.MTS, 00002.MTS	Sand with shell fragments and shell hash.	Arthropoda (Paguroidea), Chordata (Rajidae, Rajidae egg case), Cnidaria (Actiniaria), Echinodermata (Clypeasteroidea), Mollusca (Decabrachia, Gastropoda, Naticidae, Pharidae), Porifera	KH	34	1586	1619	Swapped out 1Cam to M4Alpha, interference on overlay & Kongsberg overlay was dark 1Cam HD video upside down
EQ20547_BW1-11 (Grab location)	Jan-12-2021	11:11:27	11:19:55		DVR Video Files: Dive 21 21-01-11 _C1 Dive 21 21-01-11 _C2 1Cam Video Files: 00002.MTS, 00003.MTS	Sand with shell fragments and shell hash. Burrows observed.	Echinodermata (Clypeasteroidea), Mollusca (Gastropoda), Porifera	KH	14	1620	1633	
EQ20547_BW1-11 (Part 2 of transect)	Jan-12-2021	11:19:55	11:48:50		DVR Video Files: Dive 21 21-01-11 _C1 Dive 21 21-01-11 _C2 1Cam Video Files: 00003.MTS, 00004.MTS, 00005.MTS, 00006.MTS	Sand with shell fragments and shell hash. Burrows observed.	Arthropoda, Chordata (Actinopterygii, Rajidae, Rajidae egg case), Cnidaria (Actiniaria), Echinodermata (Clypeasteroidea), Mollusca (Naticidae)	KH	33	1634	1666	
EQ20547_BW1-10 (Grab 'C' location)	Jan-12-2021	12:43:44	12:58:16		DVR Video Files: Dive 22 21-01-11 _C1 Dive 22 21-01-11 _C2 1Cam Video Files: 00007.MTS, 00008.MTS	Sand with shell fragments and shell hash. Occasional sand ripples and burrows observed.	Arthropoda (Paguroidea), Chordata (Rajidae egg case), Echinodermata (Clypeasteroidea), Mollusca (Gastropoda)	KH/IE	15	1667	1681	
EQ20547_BW1-10 (Part 1 of transect)	Jan-12-2021	12:58:16	13:34:55		DVR Video Files: Dive 22 21-01-11 _C1 Dive 22 21-01-11 _C2 1Cam Video Files: 00008.MTS, 00009.MTS, 00010.MTS	Sand with shell fragments and shell hash. Occasional sand ripples and burrows observed.	Arthropoda (Brachyura, Paguroidea), Chordata (Rajidae egg case), Echinodermata (Clypeasteroidea), Mollusca (A. islandica , Gastropoda)	KH/IE	23	1682	1704	
EQ20547_BW1-10 (Grab 'B' location)	Jan-12-2021	13:34:55	13:50:19		DVR Video Files: Dive 22 21-01-11 _C1 Dive 22 21-01-11 _C2 1Cam Video Files: 00010.MTS, 00011.MTS, 00012.MTS	Sand with shell fragments and shell hash. Occasional sand ripples and burrows observed.	Arthropoda (Paguroidea), Chordata (Rajidae egg case), Echinodermata (Clypeasteroidea)	KH/IE	14	1705	1718	Drifted outside of 10m grab location
EQ20547_BW1-10 (Part 2 of transect)	Jan-12-2021	13:50:19	14:23:40		DVR Video Files: Dive 22 21-01-11 _C1 Dive 22 21-01-11 _C2 1Cam Video Files: 00012.MTS, 00013.MTS, 00014.MTS	Sand with shell fragments and shell hash. Occasional sand ripples and burrows observed.	Arthropoda (Paguroidea), Chordata (Rajidae egg case, Squaliformes), Echinodermata (Clypeasteroidea)	KH/IE	31	1719	1749	

APPENDIX A FIELD SAMPLING LOGS

SEABED IMAGERY LOG SHEET (Deck)												FOR-ENV-0538	
Job No:	11543			Area:	OCS-A 0512			Scale: Green line laser, 10cm separation					
Project:	Empire Wind Extension								Equipment: Kongsberg 14-208 Shallow Water Camera System Subsea with 1CAM MkIII				
Client:	Equinor Wind US LLC								Vessel: MV Ocean Endeavour				
Station Number	Date	Time on Overlay Start	Time on Overlay Finish	DVD No. & Chapter	HDD File Name(s)	Sediment Description	Fauna Description	Operator	No. of Photos	First Fix No.	Last Fix No.	Comments	
EQ20547_BW1-10 (Grab 'A' location)	Jan-12-2021	14:23:40	14:36:07		DVR Video Files: Dive 22 21-01-11 _C1 Dive 22 21-01-11 _C2 1Cam Video Files: 00014.MTS, 00015.MTS, 00016.MTS	Sand with shell fragments and shell hash. Occasional sand ripples and burrows observed.	Arthropoda (Paguroidea), Chordata (Rajidae egg case), Echinodermata (Clypeasteroidea)	KH/IE	10	1750	1759		
EQ20547_BW1-8 (Grab 'C' location)	Jan-12-2021	15:33:36	15:44:50		DVR Video Files: Dive 23 21-01-11 _C1 Dive 23 21-01-11 _C2 1Cam Video File: 00017.MTS	Sand with shell fragments and shell hash. Occasional sand ripples observed. Faunal burrows, tracks and casts.	Annelida (Polychaeta), Arthropoda (Paguroidea), Chordata (Rajidae egg case), Echinodermata (Clypeasteroidea)	KH	15	1760	1774		
EQ20547_BW1-8 (Part 1 of transect)	Jan-12-2021	15:44:50	16:15:22		DVR Video Files: Dive 23 21-01-11 _C1 Dive 23 21-01-11 _C2 1Cam Video Files: 00017.MTS, 00018.MTS, 00019.MTS, 00020.MTS	Sand with shell fragments and shell hash. Occasional sand ripples and burrows observed.	Echinodermata (Clypeasteroidea), Mollusca (Naticidae, Gastropoda)	KH	31	1775	1805		
EQ20547_BW1-8 (Grab 'B' location)	Jan-12-2021	16:15:22	16:26:50		DVR Video Files: Dive 23 21-01-11 _C1 Dive 23 21-01-11 _C2 1Cam Video Files: 00020.MTS, 00021.MTS	Sand with shell fragments and shell hash. Occasional sand ripples and burrows observed.	Echinodermata (Clypeasteroidea), Mollusca (Naticidae)	KH	12	1806	1817		
EQ20547_BW1-8 (Part 2 of transect)	Jan-12-2021	16:26:50	17:58:05		DVR Video Files: Dive 23 21-01-11 _C1 Dive 23 21-01-11 _C2 1Cam Video Files: 00021.MTS, 00022.MTS, 00023.MTS	Sand with shell fragments and shell hash. Occasional sand ripples and burrows observed.	Echinodermata (Clypeasteroidea), Mollusca (Gastropoda)	KH	27	1818	1844	Fish following under 1Cam lens	
EQ20547_BW1-8 (Grab 'A' location)	Jan-12-2021	17:58:05	17:08:21		DVR Video Files: Dive 23 21-01-11 _C1 Dive 23 21-01-11 _C2 1Cam Video Files: 00023.MTS, 00024.MTS	Sand with shell fragments. Occasional sand ripples and burrows observed.	Arthropoda (Paguroidea), Echinodermata (Clypeasteroidea), Mollusca (Naticidae)	KH	15	1845	1859		
EQ20547_BW1-7 (Grab 'C' location)	Jan-12-2021	19:06:57	19:25:40		DVR Video Files: Dive 24 21-01-11 _C1 Dive 24 21-01-11 _C2 Dive 25 21-01-11 _C1 Dive 25 21-01-11 _C2 1Cam Video Files: 00030.MTS, 00031.MTS	Rippled sand, shell fragments and shell hash. Faunal tracks and burrows.	Annelida (Polychaeta), Arthropoda (Paguroidea), Chordata (Actinopterygii), Echinodermata (Clypeasteroidea), Mollusca (Gastropoda)	JE	23	1860	1882	1Cam didn't initially register 'record' command. Reset comms in EELS. V5 control request then failed. Restarted EELS, restarted Digital Edge, disconnected and reconnected camera again. Reset v5 Online. Kongsberg footage appeared dark, powered down and restarted the system, continued troubleshooting and returned the camera to deck. Cleaned connections, swapped camera for secondary Kongsberg and system functioned well. Extended data acquisition slightly due to investigation of items/debris observed on the seabed. Debris: cube / cuboid black object: fix 1870 (possible tray/box or lobster pot) Debris: Partially buried black debris: fix 1874, possibly plastic or metal. Review - TBC Debris: Possible pipe, terracotta-coloured and partially buried. No fix but screengrab taken: 'BW1-7 possible pipe - terracotta coloured (Kongsberg screenshot) 12-1-2021-19h22m' stored in field folder: T:\Equinor_NY_Empire_Wind_Extension_11543\08_ENV\3_Photo graphs\Benthic\Video Screenshots of Debris BW1-7_unidentified (square) debris)	
EQ20547_BW1-7 (Part 1 of transect)	Jan-12-2021	19:25:40	19:43:07		DVR Video Files: Dive 25 21-01-11 _C1 Dive 25 21-01-11 _C2 1Cam Video Files: 00031.MTS, 00032.MTS	Rippled sand, shell fragments and shell hash. Faunal tracks, casts and burrows.	Annelida (Polychaeta), Chordata (Rajidae egg case), Echinodermata (Clypeasteroidea), Mollusca (Gastropoda)	JE	23	1883	1905	Possible Porifera: fix 1886	

APPENDIX A FIELD SAMPLING LOGS

SEABED IMAGERY LOG SHEET (Deck)											FOR-ENV-0538	
Job No:		11543		Area:		OCS-A 0512		Scale: Green line laser, 10cm separation				
Project:		Empire Wind Extension						Equipment: Kongsberg 14-208 Shallow Water Camera System Subsea with 1CAM MkIII				
Client:		Equinor Wind US LLC						Vessel: MV Ocean Endeavour				
Station Number	Date	Time on Overlay Start	Time on Overlay Finish	Media Location		Sediment Description	Fauna Description	Operator	No. of Photos	First Fix No.	Last Fix No.	Comments
				DVD No. & Chapter	HDD File Name(s)							
EQ20547_BW1-7 (Grab 'B' location)	Jan-12-2021	19:43:07	19:58:00		DVR Video Files: Dive 25 21-01-11 _C1 Dive 25 21-01-11 _C2 1Cam Video Files: 00032.MTS, 00033.MTS, 00034.MTS	Rippled sand with shell fragments. Faunal tracks, casts and burrows.	Annelida (Polychaeta), Arthropoda (Paguroidea), Echinodermata (Clypeasteroidea), Mollusca (Gastropoda)	JE	22	1906	1927	Fix 1916 (Debris: possible rusted metal/ brick)
EQ20547_BW1-7 (Part 2 of transect)	Jan-12-2021	19:58:00	20:16:58		DVR Video Files: Dive 25 21-01-11 _C1 Dive 25 21-01-11 _C2 1Cam Video Files: 00034.MTS, 00035.MTS	Rippled sand with shell fragments. Faunal tracks, casts and burrows.	Annelida (Polychaeta), Arthropoda (Paguroidea), Chordata (Rajidae egg case), Echinodermata (Clypeasteroidea), Mollusca (Gastropoda)	JE/IE	11	1928	1938	Suspended sediment
EQ20547_BW1-7 (Grab 'A' location)	Jan-12-2021	20:16:58	20:27:12		DVR Video Files: Dive 25 21-01-11 _C1 Dive 25 21-01-11 _C2 1Cam Video Files: 00035.MTS, 00036.MTS	Rippled sand with some shell fragments. Faunal burrows.	Annelida (Polychaeta), Arthropoda (Paguroidea), Echinodermata (Clypeasteroidea), Mollusca (Gastropoda)	JE/IE	12	1939	1950	Camera date was one day out
EQ20547_BW1-6-1 (Part 1 of transect)	Jan-12-2021	21:38:15	22:02:53		DVR Video Files: Dive 26 21-01-11 _C1 Dive 26 21-01-11 _C2 1Cam Video Files: 00037.MTS, 00038.MTS, 00039.MTS	Rippled sand with shell fragments. Faunal burrows.	Annelida (Polychaeta), Arthropoda (Paguroidea), Chordata (Actinopterygii, Rajidae), Echinodermata (Clypeasteroidea), Mollusca (Gastropoda)	JE/IE	22	1951	1972	Suspended sediment
EQ20547_BW1-6-1 (Grab location)	Jan-12-2021	22:02:53	22:16:20		DVR Video Files: Dive 26 21-01-11 _C1 Dive 26 21-01-11 _C2 1Cam Video Files: 00039.MTS, 00040.MTS	Rippled sand with shell fragments. Faunal burrows.	Annelida (Polychaeta), Arthropoda (Paguroidea), Chordata (Actinopterygii), Echinodermata (Clypeasteroidea), Mollusca (Gastropoda)	JE/IE	10	1973	1982	Suspended sediment and strong currents
EQ20547_BW1-6-1 (Part 2 of transect)	Jan-12-2021	22:16:20	22:43:43		DVR Video Files: Dive 26 21-01-11 _C1 Dive 26 21-01-11 _C2 1Cam Video Files: 00040.MTS, 00041.MTS, 00042.MTS	Rippled sand with shell fragments. Faunal burrows.	Annelida (Polychaeta), Arthropoda (Caridea, Decapoda, Paguroidea), Chordata (Rajidae), Echinodermata (Clypeasteroidea), Mollusca (A. islandica, Gastropoda, Naticidae)	JE/IE	31	1983	2013	Suspended sediment and strong currents
EQ20547_BW1-5-1 (Part 1 of transect)	Jan-13-2021	00:38:35	01:10:50		DVR Video Files: Dive 27 21-01-11 _C1 Dive 27 21-01-11 _C2 1Cam Video Files: 00000.MTS, 00001.MTS, 00002.MTS	Rippled sand with shell fragments. Faunal burrows and tracks.	Annelida (Polychaeta), Arthropoda (Paguroidea), Chordata (Actinopterygii, Echinodermata (Clypeasteroidea), Mollusca	JE	44	2014	2057	Could not gain control of V5 through EELS prior to beginning the transect despite multiple request attempts. Online 7 and EELS were restarted and attempts to request control repeated unsuccessfully. Ultimately found that both ENV and Surveyor connection to the project had ceased unexpectedly, so navigated to and re-selected the current project. Requested control from the Online Surveyor again and were successfully able to begin the transect. High suspended sediments and swell
EQ20547_BW1-5-1 (Grab location)	Jan-13-2021	01:10:50	01:19:43		DVR Video Files: Dive 27 21-01-11 _C1 Dive 27 21-01-11 _C2 1Cam Video Files: 00002.MTS, 00003.MTS	Rippled sand with shell fragments. Faunal burrows.	Annelida (Polychaeta), Chordata (Actinopterygii, Myxinidae, Rajidae), Echinodermata (Asteroidea, Clypeasteroidea), Mollusca (Gastropoda)	JE	15	2058	2072	High suspended sediments and swell
EQ20547_BW1-5-1 (Part 2 of transect)	Jan-13-2021	01:19:43	01:44:28		DVR Video Files: Dive 27 21-01-11 _C1 Dive 27 21-01-11 _C2 1Cam Video Files: 00003.MTS, 00004.MTS, 00005.MTS	Rippled sand with shell fragments. Faunal tracks, casts and burrows.	Annelida (Polychaeta), Arthropoda (Paguroidea), Chordata (Actinopterygii, Myxinidae, Rajidae egg case), Echinodermata (Asteroidea, Clypeasteroidea), Mollusca (Cephalopoda)	JE	52	2073	2124	
EQ20547_BW1-4 (Grab 'C' location)	Jan-13-2021	03:36:00	03:48:05		DVR Video Files: Dive 28 21-01-11 _C1 Dive 28 21-01-11 _C2 1Cam Video File: 00006.MTS	Fine sand (no ripples). Faunal burrows.	Annelida (Polychaeta), Arthropoda (Caridea, Decapoda), Chordata (Actiopterygii, Pleuronectiformes, Triglidae), Cnidaria (Ceriantharia), Echinodermata (Asteroidea), Mollusca (Decabrachia)	JE	24	2125	2148	Easily disturbed fine sediment Pleuronectiformes - fix 2129 & 2136, Triglidae - fix 2130
EQ20547_BW1-4 (Part 1 of transect)	Jan-13-2021	03:48:05	04:20:22		DVR Video Files: Dive 28 21-01-11 _C1 Dive 28 21-01-11 _C2 1Cam Video Files: 00007.MTS, 00008.MTS, 00009.MTS	Fine sand (no ripples). Faunal tracks and burrows observed.	Arthropoda (Decapoda), Chordata (Actiopterygii, Pleuronectiformes), Cnidaria (Ceriantharia), Echinodermata (Asteroidea), Mollusca (Decabrachia)	JE	33	2149	2182	Easily disturbed fine sediment Unidentified fish in burrow (fix 2178)

APPENDIX A FIELD SAMPLING LOGS

SEABED IMAGERY LOG SHEET (Deck)												FOR-ENV-0538
Job No:		11543		Area:		OCS-A 0512		Scale: Green line laser, 10cm separation				
Project:		Empire Wind Extension						Equipment: Kongsberg 14-208 Shallow Water Camera System Subsea with 1CAM MkIII				
Client:		Equinor Wind US LLC						Vessel: MV Ocean Endeavour				
Station Number	Date	Time on Overlay Start	Time on Overlay Finish	DVD No. & Chapter	Media Location	Sediment Description	Fauna Description	Operator	No. of Photos	First Fix No.	Last Fix No.	Comments
EQ20547_BW1-4 (Grab 'B' location)	Jan-13-2021	04:20:22	04:31:30		DVR Video Files: Dive 28 21-01-11 _C1 Dive 28 21-01-11 _C2 1Cam Video Files: 00009.MTS, 00010.MTS	Fine sand (no ripples). Faunal tracks, casts and burrows.	Chordata (Pleuronectiformes), Cnidaria (Cerialantharia), Echinodermata (Asteroidea)	JE	18	2183	2200	Easily disturbed fine sediment
EQ20547_BW1-4 (Part 2 of transect)	Jan-13-2021	04:31:30	05:03:15		DVR Video Files: Dive 28 21-01-11 _C1 Dive 28 21-01-11 _C2 1Cam Video Files: 00010.MTS, 00011.MTS, 00012.MTS, 00013.MTS	Fine sand (no ripples). Faunal tracks, casts and burrows.	Arthropoda (Decapoda), Chordata (Actiopterygii, Myxinidae, Pleuronectiformes), Cnidaria (Cerialantharia), Echinodermata (Asteroidea)	JE	28	2201	2228	Easily disturbed fine sediment Large burrow (10cm; fix 2201)
EQ20547_BW1-4 (Grab 'A' location)	Jan-13-2021	05:03:15	05:13:00		DVR Video Files: Dive 28 21-01-11 _C1 Dive 28 21-01-11 _C2 1Cam Video File: 00013.MTS	Fine sand. Faunal tracks, casts and burrows.	Arthropoda (Decapoda), Chordata (Actinopterygii, Rajidae), Cnidaria (Cerialtharia), Echinodermata (Asteroidea)	JE	11	2229	2239	Easily disturbed fine sediment Crab tracks: fix 2235
EQ20547_BW1-3 (Part 1 of transect)	Jan-13-2021	05:57:14	06:26:03		DVR Video Files: Dive 29 21-01-11 _C1 Dive 29 21-01-11 _C2 1Cam Video Files: 00014.MTS, 00015.MTS, 00016.MTS	Fine and with occasional shell fragments. Faunal burrows and tubes observed.	Chordata (Actinopterygii, Myxinidae), Cnidaria (Cerialtharia), Echinodermata (Asteroidea), Mollusca (Decabrachia)	KH	31	2240	2270	Fishing/lobster pot - fix 2254
EQ20547_BW1-3 (Grab location)	Jan-13-2021	06:26:03	06:36:40		DVR Video Files: Dive 29 21-01-11 _C1 Dive 29 21-01-11 _C2 1Cam Video Files: 00016.MTS, 00017.MTS	Fine sand. Faunal burrows observed.	Arthropoda (Brachyura), Chordata (Actinopterygii), Cnidaria (Anthozoa), Echinodermata (Asteroidea), Mollusca (Decabrachia)	KH	14	2271	2284	
EQ20547_BW1-3 (Part 2 of transect)	Jan-13-2021	06:36:40	07:04:46		DVR Video Files: Dive 29 21-01-11 _C1 Dive 29 21-01-11 _C2 1Cam Video Files: 00017.MTS, 00018.MTS, 00019.MTS	Fine sand. Faunal burrows observed.	Chordata (Rajidae), Cnidaria (Anthozoa), Echinodermata (Asteroidea), Mollusca (Decabrachia)	KH	27	2285	2311	
EQ20547_BW1-2 (Grab 'C' location)	Jan-13-2021	09:14:45	09:26:00		DVR Video Files: Dive 30 21-01-11 _C1 Dive 30 21-01-11 _C2 1Cam Video File: 00000.MTS	Sand with shell fragments. Occasional burrows and bioturbation observed.	Arthropoda (Brachyura, Paguroidea), Chordata (Actinopterygii, Rajidae, Rajidae egg case), Echinodermata (Clypeasteroida), Mollusca (Cirripedia, Naticidae)	KH	22	2312	2333	Kongsberg flickering sometime when images are taken, fixes were allocated. Five images are white (fixes 2313, 2314, 2315, 2316, 2333). No photo for fix 2329, 16 usable images
EQ20547_BW1-2 (Part 1 of transect)	Jan-13-2021	09:26:00	09:53:01		DVR Video Files: Dive 30 21-01-11 _C1 Dive 30 21-01-11 _C2 1Cam Video Files: 00000.MTS, 00001.MTS, 00002.MTS, 00003.MTS	Sand with shell fragments. Occasional burrows and bioturbation observed.	Arthropoda (Paguroidea), Chordata (Actinopterygii, Rajidae egg case), Echinodermata (Clypeasteroida), Mollusca (Naticidae), Porifera	KH	31	2334	2364	Three white images (fixes 2337, 2345, 2346). No photos for fixes 2344, 2350, 2353. 25 usable images
EQ20547_BW1-2 (Grab 'B' location)	Jan-13-2021	09:53:01	10:05:00		DVR Video Files: Dive 30 21-01-11 _C1 Dive 30 21-01-11 _C2 1Cam Video Files: 00003.MTS, 00004.MTS	Muddy sand, with gravel patches. Cobbles/pebbles observed.	Annelida (Polychaeta tubes), Chordata (Rajidae egg case), Cnidaria (Anthozoa), Echinodermata (Clypeasteroida), Mollusca (Buccinidae)	KH	22	2365	2386	Two white images (fixes 2366 & 2379). 20 usable images Debris/Rope/Wire rope in images, fixes 2369, 2374, 2382, 2385
EQ20547_BW1-2 (Part 2 of transect)	Jan-13-2021	10:05:00	10:36:08		DVR Video Files: Dive 30 21-01-11 _C1 Dive 30 21-01-11 _C2 1Cam Video Files: 00004.MTS, 00005.MTS, 00006.MTS	Muddy sand, with gravel patches. Cobbles/pebbles observed.	Arthropoda (Paguroidea), Chordata (Actinopterygii, Rajidae), Cnidaria (Actinaria, Anthozoa), Echinodermata (Clypeasteroida), Mollusca (Nudibranchia)	KH	31	2387	2417	Four white images (fixes 2400, 2401, 2406, 2408). 27 usable images
EQ20547_BW1-2 (Grab 'A' location)	Jan-13-2021	10:36:08	10:46:26		DVR Video Files: Dive 30 21-01-11 _C1 Dive 30 21-01-11 _C2 1Cam Video Files: 00006.MTS, 00007.MTS	Muddy sand, with shell fragments..	Arthropoda (Paguroidea), Chordata (Actinopterygii, Pleuronectiformes, Rajidae), Cnidaria (Anthozoa), Echinodermata (Clypeasteroida)	KH	20	2418	2437	One white image, fix 2422. 19 usable images

APPENDIX A FIELD SAMPLING LOGS

SEABED IMAGERY LOG SHEET (Deck)						FOR-ENV-0538						
Job No:		11543		Area:		OCS-A 0512		Scale: Green line laser, 10cm separation				
Project:		Empire Wind Extension						Equipment: Kongsberg 14-208 Shallow Water Camera System Subsea with 1CAM MkIII				
Client:		Equinor Wind US LLC						Vessel: MV Ocean Endeavour				
Station Number	Date	Time on Overlay Start	Time on Overlay Finish	Media Location		Sediment Description	Fauna Description	Operator	No. of Photos	First Fix No.	Last Fix No.	Comments
				DVD No. & Chapter	HDD File Name(s)							
EQ20547_EW2-4 (Part 1 of transect)	Mar-21-2021	11:26:35	11:46:19		DVR Video Files: Dive 32 21-03-21 11.26.24_C1 Dive 32 21-03-21 11.26.24_C2 1Cam Video File: 20210321112652.MTS	Rippled sand. Some shell fragments and hash.	Annelida (Polychaeta), Echinodermata (Clypeasteroidea), Mollusca (A. islandica shells)	WA	19	2438	2456	Vessel speed high at times. This is the re-attempt at acquisition at this station due to high sediments in suspension obscuring the view of the seabed during the first, unsuccessful attempt at data acquisition at this station. Revisit undertaken during the lowest point of the weather forecast (the best weather during a weather window).
ENV 2-4 (Grab 'B' location)	Mar-21-2021	11:46:20	11:55:51		DVR Video Files: Dive 32 21-03-21 11.26.24_C1 Dive 32 21-03-21 11.26.24_C2 1Cam Video File: 20210321112652.MTS	Rippled sand. Some shell fragments and hash.	Annelida (Polychaeta), Echinodermata (Clypeasteroidea)	WA	18	2457	2474	Some images overexposed on topside SD footage due to long line drive.
ENV2-4 (Part 2 of transect)	Mar-21-2021	11:55:52	12:16:14		DVR Video Files: Dive 32 21-03-21 11.26.24_C1 Dive 32 21-03-21 11.26.24_C2 1Cam Video File: 20210321112652.MTS	Rippled sand. Some shell fragments and hash.	Annelida (Polychaeta), Arthropoda (Paguroidea), Chordata (Actinopterygii), Echinodermata (Clypeasteroidea), Mollusca (Naticidae)	WA	48	2475	2522	Fix 2511: plastic/biogenic debris. A. islandica shell observed on video footage at 12:06:00. 1Cam finished 12:17
EQ20547_EW2-3 (Grab 'C' location)	Mar-21-2021	12:55:45	13:07:54		DVR Video Files: Dive 33 21-03-21 12.55.40_C1 Dive 33 21-03-21 12.55.40_C2 1Cam Video File: 20210321125557	Rippled muddy sand with shell hash. Some gravel areas.	Annelida (Polychaeta), Arthropoda (Brachyura), Cnidaria (Cerianthidae), Eukaryota (Foraminifera), Mollusca (A. islandica shells), Porifera	WA	23	2523	2545	
EQ20547_EW2-3 (Part 1 of transect)	Mar-21-2021	13:07:55	13:20:19		DVR Video Files: Dive 33 21-03-21 12.55.40_C1 Dive 33 21-03-21 12.55.40_C2 1Cam Video File: 20210321125557	Rippled muddy sand with shell fragments. Areas of gravel and mudstone or clay extrusions. Cobbles or cobble-sized mudstone.	Annelida (Polychaeta), Arthropoda (Brachyura), Cnidaria (Cerianthidae), Echinodermata (Clypeasteroidea)	WA	42	2546	2588	Small debris observed on the video at 13:07:59 Moderate vis at 13:25
EQ20547_EW2-3 (Grab 'B' location)	Mar-21-2021	13:20:20	13:35:09		DVR Video Files: Dive 33 21-03-21 12.55.40_C1 Dive 33 21-03-21 12.55.40_C2 1Cam Video File: 20210321125557	Rippled sand with occasional shell hash. Occasional burrows.	Annelida (Polychaeta), Arthropoda (Paguroidea), Annelida (Polychaeta), Chordata (egg case), Cnidaria (Cerianthidae), Echinodermata (Clypeasteroidea), Mollusca (Gastropoda)	WA	14	2589	2601	Moderate visibility at times Debris, possibly biogenic (fix 2591)
EQ20547_EW2-3 (Part 2 of transect)	Mar-21-2021	13:35:10	13:56:19		DVR Video Files: Dive 33 21-03-21 12.55.40_C1 Dive 33 21-03-21 12.55.40_C2 1Cam Video File: 20210321125557	Rippled sand with occasional shell hash. Occasional burrows. Areas of muddy sand, gravel and shell fragments	Annelida (Polychaeta), Cnidaria (Actiniaria, Hydrozoa), Echinodermata (Clypeasteroidea), Mollusca (A.islandica shells, Gastropoda)	WA	43	2602	2644	Moderate visibility at times
EQ20547_EW2-3 (Grab 'A' location)	Mar-21-2021	13:56:20	14:06:29		DVR Video Files: Dive 33 21-03-21 12.55.40_C1 Dive 33 21-03-21 12.55.40_C2 1Cam Video File: 20210321125557	Rippled sand with shell hash and fragments.	Annelida (Polychaeta), Arthropoda (Paguroidea), Cnidaria (Cerianthidae), Echinodermata (Clypeasteroidea), Mollusca (Gastropoda)	WA	15	2645	2659	Moderate visibility at times 1Cam recording stopped at 14:08
EQ20547_EW2-2 (Grab 'C' location)	Mar-21-2021	14:56:11	15:07:30		DVR Video Files: Dive 34 21-03-21 14.56.07_C1 Dive 34 21-03-21 14.56.07_C2 1Cam Video File: 20210321145625	Rippled sand with shell hash and fragments.	Annelida (Polychaeta), Arthropoda (Brachyura, Paguroidea), Cnidaria (Cerianthidae), Echinodermata (Clypeasteroidea), Mollusca (Gastropoda, Naticidae)	WA	15	2660	2674	Moderate visibility
EQ20547_EW2-2 (Part 1 of transect)	Mar-21-2021	15:07:30	15:30:19		DVR Video Files: Dive 34 21-03-21 14.56.07_C1 Dive 34 21-03-21 14.56.07_C2 1Cam Video File: 20210321145625	Rippled sand with shell hash. Some areas of abundant shell hash.	Annelida (Polychaeta), Arthropoda (Paguroidea), Cnidaria (Cerianthidae), Echinodermata (Clypeasteroidea), Chordata (Actinopterygii, Pleuronectiformes, Rajidae), Mollusca (A. islandica shells, Gastropoda, Naticidae)	WA	26	2675	2700	

APPENDIX A FIELD SAMPLING LOGS

SEABED IMAGERY LOG SHEET (Deck)												FOR-ENV-0538
Job No:		11543		Area:		OCS-A 0512		Scale: Green line laser, 10cm separation				
Project:		Empire Wind Extension						Equipment: Kongsberg 14-208 Shallow Water Camera System Subsea with 1CAM MkIII				
Client:		Equinor Wind US LLC						Vessel: MV Ocean Endeavour				
Station Number	Date	Time on Overlay Start	Time on Overlay Finish	DVD No. & Chapter	Media Location	Sediment Description	Fauna Description	Operator	No. of Photos	First Fix No.	Last Fix No.	Comments
EQ20547_EW2-2 (Grab 'B' location)	Mar-21-2021	15:30:20	15:41:44		DVR Video Files: Dive 34 21-03-21 14.56.07_C1 Dive 34 21-03-21 14.56.07_C2 1Cam Video File: 20210321145625	Rippled sand with shell hash.	Annelida (Polychaeta), Chordata (Actinopterygii), Cnidaria (Cerianthidae), Echinodermata (Clypeasteroidea), Mollusca (Naticidae)	WA	14	2701	2714	
EQ20547_EW2-2 (Part 2 of transect)	Mar-21-2021	15:41:45	16:02:09		DVR Video Files: Dive 34 21-03-21 14.56.07_C1 Dive 34 21-03-21 14.56.07_C2 1Cam Video File: 20210321145625	Rippled sand with shell hash and fragments. Areas of abundant shell hash.	Annelida (Polychaeta), Arthropoda (Paguroidea), Chordata (Actinopterygii), Cnidaria (Cerianthidae), Echinodermata (Clypeasteroidea), Mollusca (Gastropoda, Naticidae)	WA	23	2715	2738	
EQ20547_EW2-2 (Grab 'A' location)	Mar-21-2021	16:02:10	16:12:30		DVR Video Files: Dive 34 21-03-21 14.56.07_C1 Dive 34 21-03-21 14.56.07_C2 1Cam Video File: 20210321145625	Rippled sand. Areas of abundant shell hash and fragments.	Annelida (Polychaeta), Chordata (Actinopterygii, Pleuronectiformes, Egg case), Cnidaria (Cerianthidae), Echinodermata (Clypeasteroidea), Mollusca (Gastropoda, Scaphopoda)	WA	21	2739	2759	
EQ20547_BW1-2B-1	Mar-21-2021	20:39:34	21:02:39		DVR Video Files: Dive 35 21-03-21 20.39.36_C1 Dive 35 21-03-21 20.39.36_C2 1Cam Video Files: 00000.MTS, 00001.MTS, 00002.MTS	Rippled sand and gravel patches.	Annelida (Polychaeta), Chordata (Egg case), Cnidaria (Cerianthidae), Mollusca (Bivalvia, Gastropoda, Naticidae, Nudibranchia)	JE	40	2760	2799	
EQ20547_BW1-7C-1	Mar-22-2021	00:11:40	00:26:00		DVR Video Files: Dive 36 21-03-22 00.09.16_C1 Dive 36 21-03-22 00.09.16_C2 1Cam Video Files: 00000.MTS, 00001.MTS, 00002.MTS	Rippled sand with shell fragments. Occasional burrows.	Annelida (Polychaeta), Arthropoda (Caridea), Chordata (Actinopterygii), Echinodermata (Clypeasteroidea), Mollusca (A. islandica, Gastropoda)	JE	29	2800	2828	
EQ20547_BW1-9 (Grab A location)	Mar-22-2021	01:34:58	01:45:20		DVR Video Files: Dive 38 21-03-22 01.33.47_C1 Dive 38 21-03-22 01.33.47_C2 1Cam Video File: 00005.MTS	Rippled sand with shell fragments.	Annelida (Polychaeta), Chordata (Actinopterygii, Rajidae, Egg case), Echinodermata (Clypeasteroidea), Mollusca (Naticidae)	JE	27	2829	2855	
EQ20547_BW1-9 (Part 1 of transect)	Mar-22-2021	01:45:20	02:06:52		DVR Video Files: Dive 38 21-03-22 01.33.47_C1 Dive 38 21-03-22 01.33.47_C2 1Cam Video Files: 00005.MTS, 00006.MTS, 00007.MTS	Rippled sand with shell fragments.	Annelida (Polychaeta), Arthropoda (Paguroidea), Chordata (Actinopterygii), Cnidaria (Cerianthidae), Echinodermata (Clypeasteroidea), Mollusca (Gastropoda, Naticidae)	JE	28	2856	2883	
EQ20547_BW1-9 (Grab 'B' location)	Mar-22-2021	02:06:52	02:16:00		DVR Video Files: Dive 38 21-03-22 01.33.47_C1 Dive 38 21-03-22 01.33.47_C2 1Cam Video Files: 00007.MTS, 00008.MTS	Rippled sand with shell fragments.	Arthropoda (Paguroidea), Chordata (Actinopterygii, Rajidae, Rajidae egg case), Echinodermata (Asteroidea, Clypeasteroidea), Mollusca (Gastropoda, Naticidae)	JE	19	2884	2902	
EQ20547_BW1-9 (Part 2 of transect)	Mar-22-2021	02:16:00	02:36:47		DVR Video Files: Dive 38 21-03-22 01.33.47_C1 Dive 38 21-03-22 01.33.47_C2 1Cam Video Files: 00008.MTS, 00009.MTS, 00010.MTS	Rippled sand with shell fragments. Areas of abundant shell hash.	Arthropoda (Paguroidea), Chordata (Actinopterygii, Rajidae egg case), Echinodermata (Clypeasteroidea), Mollusca (Gastropoda)	JE	22	2903	2924	
EQ20547_BW1-9 (Grab 'C' location)	Mar-22-2021	02:36:47	02:46:30		DVR Video Files: Dive 38 21-03-22 01.33.47_C1 Dive 38 21-03-22 01.33.47_C2 1Cam Video File: 00010.MTS	Rippled sand with shell fragments. Occasional burrows.	Annelida (Polychaeta), Arthropoda (Paguroidea), Chordata (Actinopterygii), Echinodermata (Clypeasteroidea), Mollusca (Gastropoda)	JE	16	2925	2940	Fix 2926: Metal can
EQ20547_BW1-14 (Part 1 of transect)	Mar-22-2021	04:42:54	05:03:34		DVR Video Files: Dive 39 21-03-22 04.42.42_C1 Dive 39 21-03-22 04.42.42_C2 1Cam Video Files: 000011.MTS, 000012.MTS	Sand with shell fragments and shell hash	Arthropoda (Paguroidea), Echinodermata (Clypeasteroidea)	WA	33	2941	2973	Fixes were labelled at station BW1-9A in the logs due to an EELS error. Renamed in QC. Fix 2942-3 extra image - no fix
EQ20547_BW1-14 (Grab 'B' location)	Mar-22-2021	05:03:35	05:16:54		DVR Video Files: Dive 39 21-03-22 04.42.42_C1 Dive 39 21-03-22 04.42.42_C2 1Cam Video Files: 000012.MTS, 000013.MTS	Sand with shell fragments and shell hash. Areas of disturbed sediment, possible bioturbation.	Arthropoda (Paguroidea), Chordata (Actinopterygii, Rajidae), Echinodermata (Clypeasteroidea), Mollusca (A. islandica siphons, Gastropoda)	WA	19	2974	2992	Fixes were labelled at station BW1-9A in the logs due to an EELS error. Renamed in QC

APPENDIX A FIELD SAMPLING LOGS

SEABED IMAGERY LOG SHEET (Deck)											FOR-ENV-0538	
Job No: 11543			Area: OCS-A 0512			Scale: Green line laser, 10cm separation						
Project: Empire Wind Extension			Equipment: Kongsberg 14-208 Shallow Water Camera System Subsea with 1CAM MkIII									
Client: Equinor Wind US LLC			Vessel: MV Ocean Endeavour									
Station Number	Date	Time on Overlay Start	Time on Overlay Finish	DVD No. & Chapter	HDD File Name(s)	Sediment Description	Fauna Description	Operator	No. of Photos	First Fix No.	Last Fix No.	Comments
EQ20547_BW1-14 (Part 2 of transect)	Mar-22-2021	05:16:55	05:38:20		DVR Video Files: Dive 39 21-03-22 04.42.42_C1 Dive 39 21-03-22 04.42.42_C2 1Cam Video Files: 000013.MTS, 000014.MTS, 000015.MTS	Sand with shell fragments and shell hash. Areas of disturbed sediment, possible bioturbation.	Arthropoda (Paguroidea), Echinodermata (Clypeasteroidae), Chordata (Actinopterygii, Pleuronectiformes, Rajiformes), Mollusca (Scaphopoda)	WA	50	2993	3042	Fixes were labelled at station BW1-9A in the logs due to an EELS error. Renamed in QC Possible <i>A. islandica</i> shells
EQ20547_BW1-15 (Grab 'A' location)	Mar-22-2021	06:29:00	06:40:26		DVR Video Files: Dive 40 21-03-22 06.29.02_C1 Dive 40 21-03-22 06.29.02_C2 1Cam Video File: 00016.MTS	Sand with shell hash.	Annelida (Polychaeta), Arthropoda (Paguroidea), Chordata (Egg case), Echinodermata (Clypeasteroida), Mollusca (Gastropoda, Naticidae, Scaphopoda)	WA	20	3043	3062	
EQ20547_BW1-15 (Part 1 of transect)	Mar-22-2021	06:40:27	06:59:58		DVR Video Files: Dive 40 21-03-22 06.29.02_C1 Dive 40 21-03-22 06.29.02_C2 1Cam Video Files: 00016.MTS, 00017.MTS	Sand with shell hash and fragments.	Echinodermata (Clypeasteroida)	WA	39	3063	3101	<i>A. islandica</i> shell (fix 3069)
EQ20547_BW1-15 (Grab 'B' location)	Mar-22-2021	06:59:59	07:20:39		DVR Video Files: Dive 40 21-03-22 06.29.02_C1 Dive 40 21-03-22 06.29.02_C2 1Cam Video Files: 00018.MTS, 00019.MTS	Sand with shell hash and occasional burrows.	Annelida (Polychaeta), Arthropoda (Paguroidea), Chordata (Rajidae, Egg case), Echinodermata (Clypeasteroida), Mollusca (Gastropoda, Naticidae), Porifera	WA	20	3102	3119	EELS crashed 07:00 - 07:09, was open and station continued. Two extra images with fix information 3104a, 3104b Possible Porifera: fixes 3107, 3108, 3110
EQ20547_BW1-15 (Part 2 of transect)	Mar-22-2021	07:20:40	07:39:39		DVR Video Files: Dive 40 21-03-22 06.29.02_C1 Dive 40 21-03-22 06.29.02_C2 1Cam Video Files: 00019.MTS, 00020.MTS	Sand with shell hash and fragments.	Chordata (Actinopterygii, Pleuronectiformes, Rajidae), Echinodermata (Clypeasteroida)	WA	35	3120	3155	Transect line unloaded from EELS, but fixing and positional information wasn't affected. Possible debris/rope near fix 3146 Fix 3142 has no associated image
EQ20547_BW1-15 (Grab 'C' location)	Mar-22-2021	07:39:40	07:49:30		DVR Video Files: Dive 40 21-03-22 06.29.02_C1 Dive 40 21-03-22 06.29.02_C2 1Cam Video Files: 00021.MTS, 00022.MTS	Sand with shell hash and occasional burrows.	Annelida (Polychaeta), Arthropoda (Paguroidea), Cnidaria (Hydrozoa), Chordata (Actinopterygii), Echinodermata (Clypeasteroida), Mollusca (<i>A. islandica</i> , Gastropoda, Scaphopoda)	WA	15	3156	3170	
EQ20547_BW1-3-1 (Northern end of transect location)	Mar-22-2021	13:20:04	13:24:50		DVR Video Files: Dive 51 21-04-17_C1 Dive 51 21-04-17_C2 1Cam Video File: 0002.MTS	Gravelly sand with shell fragments.	Annelida (Polychaeta), Arthropoda (Brachyura, Paguroidea), Chordata (Actinopterygii), Cnidaria (Actinaria), Mollusca (Gastropoda), Porifera	AM	6			Dive 51: EELS Error - no positional data collected for six images. Restarting system
EQ20547_BW1-3-1 (Northern end of transect location)	Mar-22-2021	13:29:33	07:49:30		DVR Video Files: Dive 52 21-04-17_C1 Dive 52 21-04-17_C2 1Cam Video Files: 0003.MTS, 0004.MTS	Gravelly sand with shell fragments. Burrows and bioturbation observed.	Annelida (Polychaeta), Arthropoda (Brachyura, Paguroidea), Chordata (Actinopterygii), Cnidaria (Actinaria), Mollusca (Pectinidae, Gastropoda), Porifera	AM	39	3176	3214	

APPENDIX A FIELD SAMPLING LOGS



Seafloor Sampling Positioning Summary

Job No		11543							Vessel		MV Ocean Endeavour									
Client		Equinor US Wind LLC							Vessel Reference Point (VRP)		COG									
Project Name		Empire Wind Extension							Deployment Location		Camera Deployment Node			x	6.7	y	21.94	z	2.93	
Primary Positioning System		Starpack 1							Actual Coordinates derived from		Deployment Location									
Geodetic Reference System		Datum		NAD 83			Ellipsoid		GRS 80		Projection		UTM ZONE 18 N (75W)				Vertical / Tidal Datum		NAVD 88	
Date	Time (UTC/GMT)	Fix number	Station Number	Penetration	Sample Retention	Retention	Observed Seafloor Depth (m)	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks			
								Easting	Northing	Easting	Northing	dE	dN	Range	Bearing					
Jan-01-2021	20:34:00	1	EQ20547_EW2-16	60% 0%	MFA NS	DVV	34	646327	4465823	646326	4465825	1	-2	3	149	CS				
Jan-01-2021	20:56:00	2	EQ20547_EW2-16	60% 60%	MFB CHEM		DVV	34	646325	4465825	646326	4465825	-1	0	1	250	CS			
Jan-01-2021	21:16:00	3	EQ20547_EW2-16	70% 0%	CHEM (SPR) NS	DVV	34	646325	4465824	646326	4465825	-1	-1	1	225	CS				
Jan-08-2021	11:39:00	4	EQ20547_EW2-15A	0% 0%	NS NS		DVV	33	644532	4467185	644530	4467182	2	3	3	32	RV	No trigger		
Jan-08-2021	11:52:00	5	EQ20547_EW2-15A	0% 0%	NS NS	DVV	33	644529	4467180	644530	4467182	-1	-2	2	206	RV	No trigger			
Jan-08-2021	12:03:00	6	EQ20547_EW2-15A	0% 0%	NS NS		DVV	33	644528	4467179	644530	4467182	-2	-3	4	212	RV	No trigger		
Jan-08-2021	13:47:00	7	EQ20547_EW2-15A	70% 70%	MFA CHEM	DVV	33	644531	4467181	644530	4467182	1	-1	2	134	RV				
Jan-08-2021	20:08:00	8	EQ20547_EW2-15A	80% 70%	MFB CHEM (SPR)		DVV	34	644527	4467181	644530	4467182	-3	-1	3	257	CS			
Jan-08-2021	20:42:00	9	EQ20547_EW2-15C	70% 0%	MFA NS	DVV	33	644942	4467615	644943	4467617	-1	-2	2	214	CS				
Jan-08-2021	20:55:00	10	EQ20547_EW2-15C	0% 0%	NS NS		DVV	33	644944	4467616	644943	4467617	1	-1	2	124	CS			
Jan-08-2021	21:01:00	11	EQ20547_EW2-15C	80% 70%	CHEM MFB	DVV	33	644944	4467615	644943	4467617	1	-2	2	161	CS				
Jan-08-2021	21:23:00	12	EQ20547_EW2-15C	0% 0%	NS NS		DVV	33	644943	4467615	644943	4467617	0	-2	2	183	CS			
Jan-08-2021	21:26:00	13	EQ20547_EW2-15C	60% 0%	CHEM (SPR) NS	DVV	33	644943	4467617	644943	4467617	0	0	1	126	CS				
Mar-22-2021	10:03	14	EQ20547_BW1-13C	70% 10%	MFA NS		DVV	36	636690	4456899	636691	4456897	-1	2	2	324	CS			
Mar-22-2021	10:28	15	EQ20547_BW1-13C	80% 80%	CHEM MFB	DVV		36	636689	4456896	636691	4456897	-2	-1	2	247	CS			
Mar-22-2021	10:50	16	EQ20547_BW1-13C	0% 0%	NS NS	DVV	36	636685	4456890	636691	4456897	-6	-7	9	219	CS				
Mar-22-2021	11:35	17	EQ20547_BW1-13C	0% 0%	NS NS		DVV	36	636690	4456900	636691	4456897	-1	3	3	339	CS			
Mar-22-2021	11:45	18	EQ20547_BW1-13C	0% 0%	NS NS	DVV	36	636688	4456893	636691	4456897	-3	-4	5	214	CS				
Mar-22-2021	11:59	19	EQ20547_BW1-13C	0% 0%	NS NS		DVV	35	636688	4456886	636691	4456897	-3	-11	11	196	CS			
Mar-22-2021	12:09	20	EQ20547_BW1-13C	0% 0%	NS NS	DVV	35	636691	4456894	636691	4456897	0	-3	3	170	CS				
Mar-22-2021	12:26	21	EQ20547_BW1-13C	0% 0%	NS NS		DVV	35	636684	4456891	636691	4456897	-7	-6	10	228	CS			
Mar-22-2021	12:35	22	EQ20547_BW1-13C	70% 70%	CHEM (SPR) CHEM (SPR)	DVV	35	636695	4456889	636691	4456897	4	-8	9	155	CS				
Mar-22-2021	13:18	23	EQ20547_BW1-13B	90%	MFA		DG	35	636392	4456916	636392	4456916	0	0	0	41	CS			
Mar-22-2021	13:34	24	EQ20547_BW1-13B	70%	CHEM	DG	36	636387	4456915	636392	4456916	-5	-1	5	264	CS				
Mar-22-2021	13:49	25	EQ20547_BW1-13B	80%	MFB	DG	36	636390	4456921	636392	4456916	-2	5	6	342	CS				
Mar-22-2021	14:08	26	EQ20547_BW1-13B	80%	CHEM (SPR)	DG	36	636393	4456913	636392	4456916	1	-3	3	170	CS				
Mar-22-2021	15:01	27	EQ20547_BW1-13A	80%	MFA	DG	36	636091	4456932	636092	4456935	-1	-3	4	201	CS				
Mar-22-2021	15:16	28	EQ20547_BW1-13A	70%	CHEM	DG	36	636090	4456931	636092	4456935	-2	-4	4	204	CS				
Mar-22-2021	15:32	29	EQ20547_BW1-13A	70%	MFB	DG	36	636093	4456931	636092	4456935	1	-4	5	163	CS				
Mar-22-2021	15:44	30	EQ20547_BW1-13A	70%	CHEM (SPR)	DG	36	636092	4456929	636092	4456935	0	-6	6	178	CS				
Mar-22-2021	16:47	31	EQ20547_BW1-12C	60%	MFA	DG	38	634752	4456778	634760	4456783	-8	-5	9	237	MNM				
Mar-22-2021	17:13	32	EQ20547_BW1-12C	70%	CHEM	DG	37	634766	4456786	634760	4456783	6	3	7	63	MNM				

APPENDIX A FIELD SAMPLING LOGS



Seafloor Sampling Positioning Summary

Job No	11543										Vessel		MV Ocean Endeavour								
Client	Equinor US Wind LLC										Vessel Reference Point (VRP)		COG								
Project Name	Empire Wind Extension										Deployment Location		Camera Deployment Node			x	6.7	y	21.94	z	2.93
Primary Positioning System	Starpack 1										Actual Coordinates derived from		Deployment Location								
Geodetic Reference System	Datum		NAD 83					Ellipsoid	GRS 80		Projection		UTM ZONE 18 N (75W)					Vertical / Tidal Datum		NAVD 88	
Date	Time (UTC/GMT)	Fix number	Station Number	Penetration	Sample Retention	Retention	Observed Seafloor Depth (m)	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks				
								Easting	Northing	Easting	Northing	dE	dN	Range	Bearing						
Mar-22-2021	17:35	33	EQ20547_BW1-12C	70%	MFB	DG	37	634758	4456781	634760	4456783	-2	-2	3	213	MNM					
Mar-22-2021	17:58	34	EQ20547_BW1-12C	90%	CHEM (SPR)	DG	37	634760	4456777	634760	4456783	0	-7	7	182	MNM					
Mar-22-2021	18:28	35	EQ20547_BW1-12B	80%	CHEM	DG	36	634476	4456674	634483	4456668	-7	6	9	311	MNM					
Mar-22-2021	18:41	36	EQ20547_BW1-12B	90%	MFA	DG	36	634482	4456662	634483	4456668	-1	-6	6	186	MNM					
Mar-22-2021	18:56	37	EQ20547_BW1-12B	80%	CHEM (SPR)	DG	36	634475	4456668	634483	4456668	-8	0	8	273	MNM					
Mar-22-2021	19:17	38	EQ20547_BW1-12B	90%	MFB	DG	36	634479	4456665	634483	4456668	-4	-3	6	232	MNM					
Mar-22-2021	19:51	39	EQ20547_BW1-12A	80%	CHEM	DG	36	634210	4456557	634207	4456553	3	4	5	39	MNM					
Mar-22-2021	20:15	40	EQ20547_BW1-12A	80%	CHEM (SPR)	DG	36	634205	4456551	634207	4456553	-2	-2	2	220	MNM					
Mar-27-2021	20:04	41	EQ20547_BW1-15C	90%	MFA	DG	37	639929	4458084	639928	4458080	1	4	4	22	MNM					
Mar-27-2021	20:20	42	EQ20547_BW1-15C	80%	CHEM	DG	37	639926	4458079	639928	4458080	-2	-1	2	247	MNM	Rejected due to hagfish				
Mar-27-2021	20:32	43	EQ20547_BW1-15C	90%	CHEM / CHEM SPR	DG	37	639930	4458090	639928	4458080	2	10	10	9	MNM					
Mar-27-2021	20:47	44	EQ20547_BW1-15B	80%	MFB	DG	38	639927	4458086	639928	4458080	-1	6	6	354	MNM					
Mar-27-2021	21:29	45	EQ20547_BW1-15B	80%	CHEM / CHEM SPR	DG	38	639663	4457944	639663	4457940	0	4	4	2	MNM					
Mar-27-2021	21:49	46	EQ20547_BW1-15B	70%	MFA	DG	38	639662	4457943	639663	4457940	-1	3	3	336	MNM					
Mar-27-2021	22:08	47	EQ20547_BW1-15B	80%	MFB	DG	38	639661	4457943	639663	4457940	-2	3	4	334	MNM					
Mar-27-2021	23:04	48	EQ20547_BW1-15A	80%	CHEM / CHEM SPR	DG	38	639396	4457806	639398	4457799	-2	7	7	347	MNM					
Mar-27-2021	23:23	49	EQ20547_BW1-15A	60%	MFA	DG	38	639404	4457795	639398	4457799	6	-4	7	125	MNM					
Mar-27-2021	23:44	50	EQ20547_BW1-15A	60%	MFB	DG	38	639398	4457799	639398	4457799	0	0	0	76	MNM					
Mar-28-2021	00:29	51	EQ20547_BW1-14	60%	MFA	DG	38	638164	4457141	638165	4457139	0	2	2	349	MNM					
Mar-28-2021	00:51	52	EQ20547_BW1-14	60%	CHEM / CHEM SPR	DG	37	638163	4457134	638165	4457139	-1	-5	5	197	MNM					
Mar-28-2021	01:05	53	EQ20547_BW1-14	60%	MFB	DG	37	638164	4457144	638165	4457139	-1	5	5	354	MNM					
Mar-28-2021	02:00	54	EQ20547_BW1-12A	60%	MFA	DG	36	634207	4456556	634207	4456553	0	3	3	6	MNM					
Mar-28-2021	02:14	55	EQ20547_BW1-12A	60%	MFB	DG	36	634205	4456550	634207	4456553	-2	-3	4	219	MNM					
Mar-28-2021	03:00	56	EQ20547_BW1-11	65%	CHEM / CHEM SPR	DG	35	631706	4456354	631707	4456356	-1	-2	2	201	MNM					
Mar-28-2021	03:21	57	EQ20547_BW1-11	80%	MFA	DG	35	631701	4456358	631707	4456356	-6	2	6	290	MNM					
Mar-28-2021	03:39	58	EQ20547_BW1-11	90%	MFB	DG	35	631711	4456355	631707	4456356	4	-1	4	99	MNM					
Mar-28-2021	04:22	59	EQ20547_BW1-10C	70%	MFA	DG	33	629456	4456216	629452	4456220	4	-4	6	136	CS					
Mar-28-2021	04:34	60	EQ20547_BW1-10C	50%	MFB	DG	33	629452	4456223	629452	4456220	0	3	3	357	CS					
Mar-28-2021	05:25	61	EQ20547_BW1-10C	60%	CHEM / CHEM SPR	DG	33	629452	4456225	629452	4456220	0	5	5	358	CS					
Mar-28-2021	05:53	62	EQ20547_BW1-10B	55%	MFA	DG	33	629188	4456075	629191	4456073	-3	2	4	300	CS					
Mar-28-2021	06:23	63	EQ20547_BW1-10B	60%	MFB	DG	33	629189	4456075	629191	4456073	-2	2	3	319	CS					
Mar-28-2021	06:31	64	EQ20547_BW1-10B	70%	CHEM / CHEM SPR	DG	33	629188	4456077	629191	4456073	-3	4	5	328	CS					
Mar-28-2021	07:09	65	EQ20547_BW1-10A	60%	MFA	DG	34	628928	4455929	628929	4455927	-1	2	2	339	CS					
Mar-28-2021	07:18	66	EQ20547_BW1-10A	70%	MFB	DG	34	628929	4455930	628929	4455927	0	3	3	0	CS					
Mar-28-2021	07:26	67	EQ20547_BW1-10A	80%	CHEM / CHEM SPR	DG	34	628929	4455925	628929	4455927	0	-2	2	183	CS					
Mar-29-2021	23:33	68	EQ20547_BW1-9C	50%	MFA	DG	35	628077	4455833	628077	4455834	0	0	1	228	MNM					
Mar-29-2021	23:43	69	EQ20547_BW1-9C	50%	MFB	DG	35	628077	4455839	628077	4455834	0	6	6	0	MNM					
Mar-30-2021	00:01	70	EQ20547_BW1-9C	65%	CHEM / CHEM SPR	DG	35	628078	4455838	628077	4455834	0	4	4	4	MNM					
Mar-30-2021	00:23	71	EQ20547_BW1-9B	70%	MFA	DG	33	627785	4455903	627786	4455904	-1	-1	1	205	MNM					
Mar-30-2021	00:29	72	EQ20547_BW1-9B	70%	CHEM / CHEM SPR	DG	33	627786	4455899	627786	4455904	0	-5	5	176	MNM					
Mar-30-2021	00:42	73	EQ20547_BW1-9B	70%	MFB	DG	33	627788	4455899	627786	4455904	2	-5	6	155	MNM					
Mar-30-2021	01:20	74	EQ20547_BW1-9A	90%	CHEM / CHEM SPR	DG	32	627497	4455974	627494	4455975	3	-1	3	105	MNM					
Mar-30-2021	01:33	75	EQ20547_BW1-9A	90%	MFA	DG	32	627496	4455973	627494	4455975	2	-2	3	138	MNM					

APPENDIX A FIELD SAMPLING LOGS



Seafloor Sampling Positioning Summary

Job No		11543							Vessel		MV Ocean Endeavour										
Client		Equinor US Wind LLC							Vessel Reference Point (VRP)		COG										
Project Name		Empire Wind Extension							Deployment Location		Camera Deployment Node				x	6.7	y	21.94	z	2.93	
Primary Positioning System		Starpack 1							Actual Coordinates derived from		Deployment Location										
Geodetic Reference System		Datum			NAD 83			Ellipsoid		GRS 80		Projection		UTM ZONE 18 N (75W)				Vertical / Tidal Datum		NAVD 88	
Date	Time (UTC/GMT)	Fix number	Station Number	Penetration	Sample Retention	Retention	Observed Seafloor Depth (m)	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks				
								Easting	Northing	Easting	Northing	dE	dN	Range	Bearing						
Mar-30-2021	01:47	76	EQ20547_BW1-9A	90%	MFB	DG	32	627496	4455974	627494	4455975	1	-1	1	112	MNM					
Mar-30-2021	02:26	77	EQ20547_BW1-8C	70%	CHEM / CHEM SPR	DG	32	624841	4455632	624840	4455633	1	-1	1	115	MNM					
Mar-30-2021	02:41	78	EQ20547_BW1-8C	20%	NS	DG	32	624841	4455627	624840	4455633	1	-6	7	168	MNM	Shell trapped in grab jaw				
Mar-30-2021	02:53	79	EQ20547_BW1-8C	80%	MFA	DG	32	624839	4455631	624840	4455633	-1	-2	2	204	MNM					
Mar-30-2021	03:31	80	EQ20547_BW1-8C	60%	MFB	DG	31	624843	4455626	624840	4455633	3	-7	7	157	MNM					
Mar-30-2021	03:57	81	EQ20547_BW1-8B	55%	MFA	DG	31	624552	4455547	624551	4455552	1	-5	5	162	CS					
Mar-30-2021	04:20	82	EQ20547_BW1-8B	60%	MFB	DG	31	624554	4455550	624551	4455552	3	-2	4	119	CS					
Mar-30-2021	04:35	83	EQ20547_BW1-8B	70%	CHEM / CHEM SPR	DG	31	624554	4455546	624551	4455552	3	-6	6	148	CS					
Mar-30-2021	05:00	84	EQ20547_BW1-8A	70%	MFA	DG	31	624262	4455470	624262	4455472	0	-2	2	181	CS					
Mar-30-2021	05:11	85	EQ20547_BW1-8A	75%	MFB	DG	31	624264	4455474	624262	4455472	2	2	3	50	CS					
Mar-30-2021	05:30	86	EQ20547_BW1-8A	60%	CHEM / CHEM SPR	DG	30	624266	4455473	624262	4455472	4	1	4	77	CS					
Mar-30-2021	06:22	87	EQ20547_BW1-7C-1	70%	MFA	DG	29	622705	4455271	622702	4455272	3	-1	3	108	CS	Target moved due to debris				
Mar-30-2021	06:32	88	EQ20547_BW1-7C-1	65%	MFB	DG	29	622704	4455268	622702	4455272	2	-4	4	155	CS	Target moved due to debris				
Mar-30-2021	06:44	89	EQ20547_BW1-7C-1	70%	CHEM / CHEM SPR	DG	29	622703	4455271	622702	4455272	1	-1	1	128	CS	Target moved due to debris				
Mar-30-2021	07:22	90	EQ20547_BW1-7B	55%	MFA	DG	29	622404	4455312	622402	4455311	2	1	2	57	CS					
Mar-30-2021	07:35	91	EQ20547_BW1-7B	65%	MFB	DG	29	622407	4455314	622402	4455311	5	3	6	56	CS					
Mar-30-2021	07:46	92	EQ20547_BW1-7B	60%	CHEM / CHEM SPR	DG	29	622403	4455307	622402	4455311	1	-4	5	163	CS					
Mar-30-2021	08:25	93	EQ20547_BW1-7A	60%	CHEM / CHEM SPR	DG	29	622103	4455332	622103	4455329	0	3	3	6	CS					
Mar-30-2021	08:40	94	EQ20547_BW1-7A	50%	MFB	DG	29	622107	4455331	622103	4455329	4	2	4	57	CS					
Mar-30-2021	08:48	95	EQ20547_BW1-7A	60%	MFA	DG	29	622104	4455328	622103	4455329	1	-1	1	135	CS					
Mar-30-2021	09:55	96	EQ20547_BW1-6-1	30%	NS	DG	29	618249	4454846	618253	4454843	-4	3	5	305	CS					
Mar-30-2021	10:06	97	EQ20547_BW1-6-1	50%	MFA	DG	29	618250	4454848	618253	4454843	-3	5	6	325	CS					
Mar-30-2021	10:15	98	EQ20547_BW1-6-1	60%	MFB	DG	29	618249	4454844	618253	4454843	-4	2	5	290	CS					
Mar-30-2021	10:26	99	EQ20547_BW1-6-1	50%	CHEM / CHEM SPR	DG	29	618252	4454845	618253	4454843	-1	2	2	343	CS					
Mar-30-2021	11:23	100	EQ20547_BW1-5-1	30%	NS	DG	31	614019	4454374	614021	4454375	-2	-1	2	234	CS					
Mar-30-2021	11:32	101	EQ20547_BW1-5-1	20%	NS	DG	31	614018	4454375	614021	4454375	-3	0	3	265	CS					
Mar-30-2021	11:42	102	EQ20547_BW1-5-1	70%	MFA	DG	31	614019	4454376	614021	4454375	-2	1	3	287	CS					
Mar-30-2021	11:52	103	EQ20547_BW1-5-1	50%	CHEM / CHEM SPR	DG	31	614018	4454377	614021	4454375	-3	1	3	297	CS					
Mar-30-2021	12:08	104	EQ20547_BW1-5-1	30%	NS	DG	31	614020	4454376	614021	4454375	-1	1	2	294	CS					
Mar-30-2021	12:16	105	EQ20547_BW1-5-1	40%	NS	DG	31	614019	4454371	614021	4454375	-2	-5	5	204	CS					
Mar-30-2021	12:26	106	EQ20547_BW1-5-1	50%	MFB	DG	31	614016	4454371	614021	4454375	-5	-5	7	226	CS	OE repositioned 10m south of target due to no samples				
Mar-30-2021	15:26:00	107	EQ20547_EW2-15B-1	60%	MFA	DG	33	644751	4467416	644751	4467414	0	2	2	1	CS					
Mar-30-2021	15:38:00	108	EQ20547_EW2-15B-1	80%	MFB	DG	33	644753	4467417	644751	4467414	2	3	4	35	CS					
Mar-30-2021	15:49:00	109	EQ20547_EW2-15B-1	70%	CHEM / CHEM SPR	DG	33	644751	4467414	644751	4467414	0	0	0	66	CS					
Mar-30-2021	16:27:00	110	EQ20547_EW2-14C	90%	MFA	DG	33	644083	4468255	644082	4468255	1	0	1	109	MNM					
Mar-30-2021	16:38:00	111	EQ20547_EW2-14C	70%	CHEM / CHEM SPR	DG	33	644082	4468257	644082	4468255	0	2	2	355	MNM					
Mar-30-2021	17:01:00	112	EQ20547_EW2-14C	80%	MFB	DG	33	644082	4468256	644082	4468255	0	1	1	0	MNM					
Mar-30-2021	17:36:00	113	EQ20547_EW2-14B	20%	NS	DG	34	643874	4468467	643873	4468469	1	-2	3	158	MNM					
Mar-30-2021	17:44:00	114	EQ20547_EW2-14B	20%	NS	DG	34	643873	4468469	643873	4468469	0	0	0	90	MNM					
Mar-30-2021	17:59:00	115	EQ20547_EW2-14B	20%	NS	DG	34	643880	4468463	643873	4468469	7	-6	9	131	MNM	OE repositioned 10m SE of target d/t no samples				
Mar-30-2021	18:15:00	116	EQ20547_EW2-14B	55%	MFA	DG	34	643865	4468475	643873	4468469	-8	6	10	306	MNM	OE repositioned 10m NW of target d/t no samples				
Mar-30-2021	18:26:00	117	EQ20547_EW2-14B	60%	CHEM / CHEM SPR	DG	34	643872	4468475	643873	4468469	-1	6	6	354	MNM					
Mar-30-2021	18:53:00	118	EQ20547_EW2-14B	20%	NS	DG	34	643868	4468472	643873	4468469	-5	3	6	299	MNM					

APPENDIX A FIELD SAMPLING LOGS



Seafloor Sampling Positioning Summary

Job No		11543							Vessel		MV Ocean Endeavour									
Client		Equinor US Wind LLC							Vessel Reference Point (VRP)		COG									
Project Name		Empire Wind Extension							Deployment Location		Camera Deployment Node				x	6.7	y	21.94	z	2.93
Primary Positioning System		Starpack 1							Actual Coordinates derived from		Deployment Location									
Geodetic Reference System		Datum		NAD 83			Ellipsoid		GRS 80		Projection		UTM ZONE 18 N (75W)				Vertical / Tidal Datum		NAVD 88	
Date	Time (UTC/GMT)	Fix number	Station Number	Penetration	Sample Retention	Retention	Observed Seafloor Depth (m)	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks			
								Easting	Northing	Easting	Northing	dE	dN	Range	Bearing					
Mar-30-2021	19:01:00	119	EQ20547_EW2-14B	30%	NS	DG	34	643866	4468478	643873	4468469	-7	9	11	321	MNM	OE repositioned 10m NW of target d/t no samples			
Mar-30-2021	19:09:00	120	EQ20547_EW2-14B	65%	MFB	DG	34	643879	4468466	643873	4468469	6	-3	7	120	MNM				
Mar-30-2021	19:31:00	121	EQ205647_EW2-14A	90%	MFA	DG	34	643663	4468688	643664	4468684	-1	4	4	340	MNM				
Mar-30-2021	19:42:00	122	EQ20547_EW2-14A	55%	CHEM / CHEM SPR	DG	34	643667	4468682	643664	4468684	3	-2	4	123	MNM				
Mar-30-2021	19:58:00	123	EQ20547_EW2-14A	55%	MFB	DG	34	643666	4468687	643664	4468684	2	3	3	30	MNM				
Mar-30-2021	20:50:00	124	EQ20547_EW2-13C	70%	MFA	DG	31	642859	4469757	642860	4469752	-1	5	5	342	MNM				
Mar-30-2021	21:03:00	125	EQ20547_EW2-13C	80%	CHEM / CHEM SPR	DG	31	642864	4469754	642860	4469752	4	2	4	65	MNM				
Mar-30-2021	21:14:00	126	EQ20547_EW2-13C	80%	MFB	DG	31	642858	4469754	642860	4469752	-2	2	2	311	MNM				
Mar-30-2021	22:07:00	127	EQ20547_EW2-13B	90%	MFA	DG	33	642660	4469523	642660	4469529	0	-6	6	183	MNM				
Mar-30-2021	22:21:00	128	EQ20547_EW2-13B	80%	CHEM / CHEM SPR	DG	33	642660	4469529	642660	4469529	0	0	0	29	MNM				
Mar-30-2021	22:31:00	129	EQ20547_EW2-13B	90%	MFB	DG	33	642660	4469531	642660	4469529	0	2	2	2	MNM				
Mar-30-2021	22:58:00	130	EQ20547_EW2-13A	20%	NS	DG	35	642452	4469307	642459	4469306	-7	1	7	275	MNM				
Mar-30-2021	23:07:00	131	EQ20547_EW2-13A	55%	MFA	DG	35	642456	4469309	642459	4469306	-3	3	4	319	MNM				
Mar-30-2021	23:14:00	132	EQ20547_EW2-13A	90%	CHEM / CHEM SPR	DG	35	642458	4469310	642459	4469306	-1	4	4	348	MNM				
Mar-30-2021	23:27:00	133	EQ20547_EW2-13A	90%	MFB	DG	35	642457	4469309	642459	4469306	-2	3	4	322	MNM				
Mar-31-2021	00:21:00	134	EQ20547_EW2-12A	70%	MFA	DG	34	640723	4471580	640722	4471578	1	2	2	19	MNM				
Mar-31-2021	00:34:00	135	EQ20547_EW2-12A	60%	CHEM / CHEM SPR	DG	34	640723	4471579	640722	4471578	1	1	1	65	MNM				
Mar-31-2021	00:46:00	136	EQ20547_EW2-12A	30%	NS	DG	34	640724	4471578	640722	4471578	2	0	2	90	MNM				
Mar-31-2021	00:56:00	137	EQ20547_EW2-12A	50%	MFB	DG	34	640724	4471573	640722	4471578	2	-5	6	155	MNM				
Mar-31-2021	01:19:00	138	EQ20547_EW2-12B	0%	NS	DG	35	640932	4471364	640931	4471363	1	1	1	37	MNM				
Mar-31-2021	01:27:00	139	EQ20547_EW2-12B	60%	MFA	DG	35	640930	4471360	640931	4471363	-1	-3	3	204	MNM				
Mar-31-2021	01:39:00	140	EQ20547_EW2-12B	10%	NS	DG	35	640932	4471361	640931	4471363	1	-2	3	165	MNM				
Mar-31-2021	01:48:00	141	EQ20547_EW2-12B	10%	NS	DG	35	640933	4471358	640931	4471363	2	-5	5	162	MNM				
Apr-03-2021	16:17:00	142	EQ20547_EW2-12C	90%	MFA	DG	34	641141	4471148	641140	4471149	1	-1	2	138	MNM				
Apr-03-2021	16:25:00	143	EQ20547_EW2-12C	70%	CHEM / CHEM SPR	DG	34	641144	4471146	641140	4471149	4	-3	5	130	MNM				
Apr-03-2021	16:47:00	144	EQ20547_EW2-12C	80%	MFB	DG	34	641139	4471146	641140	4471149	-1	-3	3	205	MNM				
Apr-03-2021	17:10:00	145	EQ20547_EW2-12B	80%	CHEM / CHEM SPR	DG	34	640930	4471364	640931	4471363	-1	1	2	311	MNM				
Apr-03-2021	17:28:00	146	EQ20547_EW2-12B	60%	MFB	DG	34	640931	4471363	640931	4471363	0	0	0	348	MNM				
Apr-03-2021	18:06:00	147	EQ20547_EW2-11	80%	MFA	DG	30	639859	4472407	639855	4472408	4	-1	4	107	MNM				
Apr-03-2021	18:17:00	148	EQ20547_EW2-11	80%	CHEM / CHEM SPR	DG	30	639858	4472406	639855	4472408	3	-2	3	120	MNM				
Apr-03-2021	18:30:00	149	EQ20547_EW2-11	80%	MFB	DG	30	639853	4472403	639855	4472408	-2	-5	5	203	MNM				
Apr-03-2021	19:07:00	150	EQ20547_EW2-10C	60%	MFA	DG	31	638635	4473698	638632	4473701	3	-3	4	132	MNM				
Apr-03-2021	19:16:00	151	EQ20547_EW2-10C	60%	CHEM / CHEM SPR	DG	31	638633	4473700	638632	4473701	1	-1	2	150	MNM				
Apr-03-2021	19:36:00	152	EQ20547_EW2-10C	50%	MFB	DG	31	638625	4473698	638632	4473701	-7	-3	8	247	MNM				
Apr-03-2021	19:56:00	153	EQ20547_EW2-10B	60%	MFA	DG	32	638424	4473915	638423	4473916	1	-1	1	157	MNM				
Apr-03-2021	20:04:00	154	EQ20547_EW2-10B	70%	CHEM / CHEM SPR	DG	32	638424	4473915	638423	4473916	1	-1	1	135	MNM				
Apr-03-2021	20:18:00	155	EQ20547_EW2-10B	90%	MFB	DG	32	638427	4473918	638423	4473916	4	2	5	67	MNM				
Apr-03-2021	20:40:00	156	EQ20547_EW2-10A	70%	MFA	DG	32	638212	4474134	638213	4474131	-1	3	4	339	MNM				
Apr-03-2021	20:56:00	157	EQ20547_EW2-10A	40%	NS	DG	32	638215	4474134	638213	4474131	2	3	4	43	MNM				
Apr-03-2021	21:04:00	158	EQ20547_EW2-10A	30%	NS	DG	32	638224	4474128	638213	4474131	11	-3	12	104	MNM				
Apr-03-2021	21:16:00	159	EQ20547_EW2-10A	0%	NS	DG	32	638217	4474129	638213	4474131	4	-2	5	118	MNM	No trigger			
Apr-03-2021	21:18:00	160	EQ20547_EW2-10A	80%	CHEM / CHEM SPR	DG	32	638217	4474130	638213	4474131	4	-1	4	106	MNM				
Apr-03-2021	21:27:00	161	EQ20547_EW2-10A	50%	MFB	DG	32	638214	4474130	638213	4474131	1	-1	2	149	MNM				

APPENDIX A FIELD SAMPLING LOGS



Seafloor Sampling Positioning Summary

Job No		11543							Vessel		MV Ocean Endeavour									
Client		Equinor US Wind LLC							Vessel Reference Point (VRP)		COG									
Project Name		Empire Wind Extension							Deployment Location		Camera Deployment Node				x	6.7	y	21.94	z	2.93
Primary Positioning System		Starpack 1							Actual Coordinates derived from		Deployment Location									
Geodetic Reference System		Datum			NAD 83			Ellipsoid	GRS 80		Projection		UTM ZONE 18 N (75W)				Vertical / Tidal Datum		NAVD 88	
Date	Time (UTC/GMT)	Fix number	Station Number	Penetration	Sample Retention	Retention	Observed Seafloor Depth (m)	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks			
								Easting	Northing	Easting	Northing	dE	dN	Range	Bearing					
Apr-03-2021	22:15:00	162	EQ20547_EW2-9	80%	MFA	DG	30	637059	4475304	637061	4475304	-2	0	2	263	MNM				
Apr-03-2021	22:25:00	163	EQ20547_EW2-9	60%	CHEM / CHEM SPR	DG	30	637065	4475306	637061	4475304	4	2	4	69	MNM				
Apr-03-2021	22:42:00	164	EQ20547_EW2-9	80%	MFB	DG	30	637060	4475307	637061	4475304	-1	3	3	339	MNM				
Apr-03-2021	23:32:00	165	EQ20547_EW2-8C	80%	MFA	DG	28	635111	4477343	635113	4477337	-2	6	7	344	MNM				
Apr-03-2021	23:39:00	166	EQ20547_EW2-8C	80%	CHEM / CHEM SPR	DG	28	635117	4477347	635113	4477337	4	10	11	24	MNM				
Apr-03-2021	23:53:00	167	EQ20547_EW2-8C	90%	MFB	DG	28	635113	4477338	635113	4477337	0	1	1	340	MNM				
Apr-04-2021	00:16:00	168	EQ20547_EW2-8B	45%	NS	DG	28	634904	4477556	634903	4477552	1	4	5	17	MNM				
Apr-04-2021	00:28:00	169	EQ20547_EW2-8B	90%	CHEM / CHEM SPR	DG	28	634908	4477557	634903	4477552	5	5	7	45	MNM				
Apr-04-2021	00:43:00	170	EQ20547_EW2-8B	90%	MFA	DG	28	634902	4477548	634903	4477552	-1	-4	4	194	MNM				
Apr-04-2021	00:54:00	171	EQ20547_EW2-8B	90%	MFB	DG	28	634908	4477556	634903	4477552	5	4	7	50	MNM				
Apr-04-2021	01:36:00	172	EQ20547_EW2-8A	10%	NS	DG	28	634694	4477766	634694	4477766	0	0	0	97	MNM				
Apr-04-2021	01:46:00	173	EQ20547_EW2-8A	50%	MFA	DG	28	634694	4477765	634694	4477766	0	-1	1	193	MNM				
Apr-04-2021	01:54:00	174	EQ20547_EW2-8A	0%	NS	DG	28	634697	4477769	634694	4477766	3	3	4	46	MNM	No trigger			
Apr-04-2021	01:56:00	175	EQ20547_EW2-8A	50%	CHEM / CHEM SPR	DG	28	634695	4477766	634694	4477766	1	0	1	128	MNM				
Apr-04-2021	02:14:00	176	EQ20547_EW2-8A	70%	MFB	DG	28	634695	4477767	634694	4477766	1	1	1	31	MNM				
Apr-04-2021	02:37:00	177	EQ20547_EW2-7C	90%	MFA	DG	29	634513	4478336	634512	4478335	1	1	2	53	MNM				
Apr-04-2021	02:51:00	178	EQ20547_EW2-7C	90%	CHEM / CHEM SPR	DG	29	634513	4478335	634512	4478335	1	0	1	70	MNM				
Apr-04-2021	03:06:00	179	EQ20547_EW2-7C	80%	MFB	DG	29	634513	4478336	634512	4478335	1	1	2	43	MNM				
Apr-04-2021	03:28:00	180	EQ20547_EW2-7B	80%	MFA	DG	29	634296	4478126	634296	4478127	0	-1	1	159	MNM				
Apr-04-2021	03:42:00	181	EQ20547_EW2-7B	70%	CHEM / CHEM SPR	DG	29	634297	4478129	634296	4478127	1	2	2	29	MNM				
Apr-04-2021	03:53:00	182	EQ20547_EW2-7B	70%	MFB	DG	29	634296	4478126	634296	4478127	0	-1	1	187	MNM				
Apr-04-2021	04:23:00	183	EQ20547_EW2-7A	80%	MFA	DG	28	634085	4477922	634079	4477919	6	3	7	67	CS				
Apr-04-2021	04:33:00	184	EQ20547_EW2-7A	60%	CHEM / CHEM SPR	DG	28	634076	4477918	634079	4477919	-3	-1	3	243	CS				
Apr-04-2021	04:49:00	185	EQ20547_EW2-7A	60%	MFB	DG	28	634084	4477918	634079	4477919	5	-1	5	97	CS				
Apr-04-2021	05:36:00	186	EQ20547_EW2-6C	30%	NS	DG	25	632609	4479920	632610	4479917	-1	3	3	349	CS				
Apr-04-2021	05:44:00	187	EQ20547_EW2-6C	50%	MFA	DG	25	632613	4479919	632610	4479917	3	2	3	46	CS				
Apr-04-2021	05:54:00	188	EQ20547_EW2-6C	60%	CHEM / CHEM SPR	DG	25	632603	4479923	632610	4479917	-7	6	9	309	CS				
Apr-04-2021	06:10:00	189	EQ20547_EW2-6C	50%	MFB	DG	25	632614	4479914	632610	4479917	4	-3	4	124	CS				
Apr-04-2021	06:41:00	190	EQ20547_EW2-6B	60%	MFA	DG	24	632406	4480127	632401	4480131	5	-4	6	131	CS				
Apr-04-2021	06:51:00	191	EQ20547_EW2-6B	60%	CHEM / CHEM SPR	DG	24	632408	4480131	632401	4480131	7	0	7	87	CS				
Apr-04-2021	07:08:00	192	EQ20547_EW2-6B	70%	MFB	DG	24	632402	4480128	632401	4480131	1	-3	3	161	CS				
Apr-04-2021	07:41:00	193	EQ20547_EW2-6A	80%	MFA	DG	25	632189	4480346	632191	4480346	-2	0	2	280	CS				
Apr-04-2021	07:48:00	194	EQ20547_EW2-6A	70%	CHEM / CHEM SPR	DG	25	632194	4480344	632191	4480346	3	-2	4	115	CS				
Apr-04-2021	08:02:00	195	EQ20547_EW2-6A	80%	MFB	DG	25	632193	4480344	632191	4480346	2	-2	3	125	CS				
Apr-04-2021	08:52:00	196	EQ20547_EW2-5C	30%	NS	DG	26	631018	4481501	631024	4481502	-6	-1	6	259	CS				
Apr-04-2021	09:00:00	197	EQ20547_EW2-5C	60%	MFA	DG	26	631030	4481502	631024	4481502	6	0	6	88	CS				
Apr-04-2021	09:08:00	198	EQ20547_EW2-5C	60%	CHEM / CHEM SPR	DG	26	631024	4481502	631024	4481502	0	0	0	261	CS				
Apr-04-2021	09:27:00	199	EQ20547_EW2-5C	0%	NS	DG	26	631020	4481503	631024	4481502	-4	1	4	285	CS	Shell in bucket jaws			
Apr-04-2021	09:37:00	200	EQ20547_EW2-5C	0%	NS	DG	26	631018	4481499	631024	4481502	-6	-3	7	244	CS	Crab in bucket jaws			
Apr-04-2021	09:45:00	201	EQ20547_EW2-5C	50%	MFB	DG	26	631019	4481503	631024	4481502	-5	1	5	277	CS				
Apr-04-2021	10:10:00	202	EQ20547_EW2-5B	50%	MFA	DG	25	630822	4481716	630814	4481716	8	0	8	93	CS				
Apr-04-2021	10:17:00	203	EQ20547_EW2-5B	70%	CHEM / CHEM SPR	DG	25	630819	4481715	630814	4481716	5	-1	5	99	CS				

APPENDIX A FIELD SAMPLING LOGS



Seafloor Sampling Positioning Summary

Job No	11543							Vessel	MV Ocean Endeavour									
Client	Equinor US Wind LLC							Vessel Reference Point (VRP)		COG								
Project Name	Empire Wind Extension							Deployment Location			Camera Deployment Node		x	6.7	y	21.94	z	2.93
Primary Positioning System	Starpack 1							Actual Coordinates derived from		Deployment Location								
Geodetic Reference System	Datum	NAD 83					Ellipsoid	GRS 80		Projection	UTM ZONE 18 N (75W)					Vertical / Tidal Datum	NAVD 88	
Date	Time (UTC/GMT)	Fix number	Station Number	Penetration	Sample Retention	Retention	Observed Seafloor Depth (m)	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks	
								Easting	Northing	Easting	Northing	dE	dN	Range	Bearing			
Apr-04-2021	10:32:00	204	EQ20547_EW2-5B	60%	MFB	DG	25	630815	4481719	630814	4481716	1	3	3	11	CS		
Apr-04-2021	11:26:00	205	EQ20547_EW2-5A	50%	MFA	DG	24	630604	4481929	630605	4481931	-1	-2	2	196	CS		
Apr-04-2021	11:34:00	206	EQ20547_EW2-5A	50%	CHEM / CHEM SPR	DG	24	630603	4481932	630605	4481931	-2	1	2	293	CS		
Apr-04-2021	11:48:00	207	EQ20547_EW2-5A	50%	MFB	DG	24	630598	4481932	630605	4481931	-7	1	7	276	CS		
Apr-04-2021	12:29:00	208	EQ20547_EW2-4	70%	MFA	DG	20	629495	4483111	629495	4483108	0	3	3	3	CS		
Apr-04-2021	12:41:00	209	EQ20547_EW2-4	70%	CHEM / CHEM SPR	DG	20	629492	4483105	629495	4483108	-3	-3	5	222	CS		
Apr-04-2021	12:52:00	210	EQ20547_EW2-4	80%	MFB	DG	20	629495	4483107	629495	4483108	0	-1	1	213	CS		
Apr-04-2021	13:22:00	211	EQ20547_EW2-3C	60%	MFA	DG	24	628710	4483893	628710	4483889	0	4	4	7	CS		
Apr-04-2021	13:32:00	212	EQ20547_EW2-3C	30%	NS	DG	24	628708	4483890	628710	4483889	-2	1	2	287	CS		
Apr-04-2021	13:40:00	213	EQ20547_EW2-3C	30%	NS	DG	24	628708	4483888	628710	4483889	-2	-1	2	255	CS		
Apr-04-2021	13:48:00	214	EQ20547_EW2-3C	60%	CHEM / CHEM SPR	DG	24	628715	4483890	628710	4483889	5	1	5	75	CS		
Apr-04-2021	14:03:00	215	EQ20547_EW2-3C	50%	MFB	DG	24	628710	4483893	628710	4483889	0	4	4	353	CS		
Apr-04-2021	14:30:00	216	EQ20547_EW2-3B	50%	MFA	DG	23	628499	4484109	628500	4484104	-1	4	4	346	CS		
Apr-04-2021	14:39:00	217	EQ20547_EW2-3B	60%	CHEM / CHEM SPR	DG	24	628505	4484098	628500	4484104	5	-5	7	132	CS		
Apr-04-2021	14:58:00	218	EQ20547_EW2-3B	50%	MFB	DG	24	628502	4484102	628500	4484104	2	-2	3	128	CS		
Apr-04-2021	15:20:00	219	EQ20547_EW2-3A	60%	MFA	DG	23	628289	4484319	628291	4484319	-2	0	2	277	CS		
Apr-04-2021	15:29:00	220	EQ20547_EW2-3A	50%	CHEM / CHEM SPR	DG	23	628291	4484319	628291	4484319	0	0	1	57	CS		
Apr-04-2021	15:46:00	221	EQ20547_EW2-3A	50%	MFB	DG	23	628296	4484317	628291	4484319	5	-2	5	107	CS		
Apr-04-2021	16:26:00	222	EQ20547_EW2-2C	70%	MFA	DG	21	627744	4485233	627742	4485231	2	2	3	37	MNM		
Apr-04-2021	16:36:00	223	EQ20547_EW2-2C	60%	CHEM / CHEM SPR	DG	21	627745	4485232	627742	4485231	3	1	3	79	MNM		
Apr-04-2021	17:00:00	224	EQ20547_EW2-2C	60%	MFB	DG	21	627743	4485231	627742	4485231	1	0	1	101	MNM		
Apr-04-2021	17:29:00	225	EQ20547_EW2-2A	60%	MFA	DG	20	627152	4485123	627152	4485119	0	4	4	1	MNM		
Apr-04-2021	17:35:00	226	EQ20547_EW2-2A	50%	CHEM / CHEM SPR	DG	20	627148	4485123	627152	4485119	-4	4	5	315	MNM		
Apr-04-2021	17:47:00	227	EQ20547_EW2-2A	50%	MFB	DG	20	627153	4485120	627152	4485119	1	1	2	52	MNM		
Apr-04-2021	18:11:00	228	EQ20547_EW2-2B	40%	NS	DG	20	627449	4485173	627447	4485175	2	-2	3	134	MNM		
Apr-04-2021	18:19:00	229	EQ20547_EW2-2B	40%	NS	DG	20	627451	4485178	627447	4485175	4	3	5	52	MNM		
Apr-04-2021	18:40:00	230	EQ20547_EW2-2B	40%	MFA	DG	20	627448	4485177	627447	4485175	1	2	2	24	MNM		
Apr-04-2021	18:49:00	231	EQ20547_EW2-2B	40%	MFB	DG	20	627442	4485169	627447	4485175	-5	-6	8	219	MNM		
Apr-04-2021	19:10:00	232	EQ20547_EW2-2B	40%	CHEM / CHEM SPR	DG	20	627448	4485167	627447	4485175	1	-8	8	175	MNM		
Apr-15-2021	05:09	233	EQ20547_BW1-4C	>100%	NS	DG	58	605926	4453086	605928	4453081	-2	5	5	340	VRN		
Apr-15-2021	05:23	234	EQ20547_BW1-4C	>100%	NS	DG	58	605928	4453081	605928	4453081	0	0	0	240	VRN		
Apr-15-2021	05:34	235	EQ20547_BW1-4C	95%	MFA	DG	57	605939	4453093	605928	4453081	11	12	16	43	VRN		
Apr-15-2021	05:45	236	EQ20547_BW1-4C	95%	CHEM / CHEM SPR	DG	57	605930	4453085	605928	4453081	2	4	4	34	VRN		
Apr-15-2021	06:06	237	EQ20547_BW1-4C	>100%	NS	DG	57	605931	4453082	605928	4453081	3	1	3	67	VRN		
Apr-15-2021	06:14	238	EQ20547_BW1-4C	95%	MFB	DG	57	605924	4453077	605928	4453081	-4	-4	6	231	VRN		
Apr-15-2021	06:50	239	EQ20547_BW1-4B	95%	MFA	DG	62	605631	4453048	605630	4453047	1	1	2	56	VRN		
Apr-15-2021	07:00	240	EQ20547_BW1-4B	95%	CHEM / CHEM SPR	DG	62	605631	4453054	605630	4453047	1	7	7	9	VRN		
Apr-15-2021	07:15	241	EQ20547_BW1-4B	95%	MFB	DG	62	605630	4453044	605630	4453047	0	-3	3	172	VRN		
Apr-15-2021	08:06	242	EQ20547_BW1-4A	95%	MFA	DG	68	605332	4453016	605332	4453013	0	3	3	353	VRN		
Apr-15-2021	08:20	243	EQ20547_BW1-4A	95%	CHEM / CHEM SPR	DG	67	605337	4453022	605332	4453013	5	9	10	32	VRN		
Apr-15-2021	08:41	244	EQ20547_BW1-4A	95%	MFB	DG	68	605332	4453017	605332	4453013	0	4	4	1	VRN		
Apr-15-2021	10:58	245	EQ20547_BW1-2C	50%	MFA	DG	22	591498	4452377	591501	4452375	-3	2	3	304	VRN		

APPENDIX A FIELD SAMPLING LOGS



Seafloor Sampling Positioning Summary

Job No	11543							Vessel	MV Ocean Endeavour								
Client	Equinor US Wind LLC							Vessel Reference Point (VRP)	COG								
Project Name	Empire Wind Extension							Deployment Location	Camera Deployment Node			x	6.7	y	21.94	z	2.93
Primary Positioning System	Starpack 1							Actual Coordinates derived from	Deployment Location								
Geodetic Reference System	Datum	NAD 83					Ellipsoid	GRS 80		Projection	UTM ZONE 18 N (75W)					Vertical / Tidal Datum	NAVD 88
Date	Time (UTC/GMT)	Fix number	Station Number	Penetration	Sample Retention	Retention	Observed Seafloor Depth (m)	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks
								Easting	Northing	Easting	Northing	dE	dN	Range	Bearing		
Apr-15-2021	11:07	246	EQ20547_BW1-2C	70%	CHEM / CHEM SPR	DG	22	591499	4452377	591501	4452375	-2	2	3	327	VRN	
Apr-15-2021	11:22	247	EQ20547_BW1-2C	60%	MFB	DG	22	591501	4452378	591501	4452375	0	3	3	355	VRN	
Apr-15-2021	12:03	248	EQ20547_BW1-2B-1	<40%	NS	DG	23	591206	4452291	591209	4452287	-3	4	5	320	VRN	
Apr-15-2021	12:10	249	EQ20547_BW1-2B-1	70%	MFA	DG	23	591208	4452288	591209	4452287	-1	1	1	309	VRN	
Apr-15-2021	12:19	250	EQ20547_BW1-2B-1	<40%	NS	DG	23	591207	4452291	591209	4452287	-2	4	4	328	VRN	
Apr-15-2021	12:26	251	EQ20547_BW1-2B-1	<40%	NS	DG	23	591216	4452273	591209	4452287	7	-14	16	153	VRN	
Apr-15-2021	12:31	252	EQ20547_BW1-2B-1	0%	NS	DG	23	591208	4452301	591209	4452287	-1	14	14	355	VRN	
Apr-15-2021	12:54	253	EQ20547_BW1-2B-1A	<10%	NS	DG	24	591225	4452298	591209	4452297	16	1	17	85	VRN	
Apr-15-2021	13:01	254	EQ20547_BW1-2B-1A	<10%	NS	DG	23	591212	4452311	591209	4452297	3	14	15	10	VRN	
Apr-15-2021	13:07	255	EQ20547_BW1-2B-1A	60%	MFB	DG	23	591216	4452286	591209	4452297	7	-11	13	148	VRN	
Apr-15-2021	13:19	256	EQ20547_BW1-2B-1A	0%	NS	DG	24	591212	4452297	591209	4452297	3	0	3	87	VRN	
Apr-15-2021	14:06	257	EQ20547_BW1-2A	90%	MFA	DG	23	590920	4452239	590917	4452238	3	1	3	68	VRN	
Apr-15-2021	14:15	258	EQ20547_BW1-2A	60%	CHEM / CHEM SPR	DG	23	590917	4452232	590917	4452238	0	-6	6	176	VRN	
Apr-15-2021	14:34	259	EQ20547_BW1-2A	0%	NS	DG	23	590920	4452236	590917	4452238	3	-2	3	125	VRN	
Apr-15-2021	14:40	260	EQ20547_BW1-2A	60%	NS	DG	23	590927	4452234	590917	4452238	10	-4	11	113	VRN	
Apr-15-2021	14:48	261	EQ20547_BW1-2A	70%	MFB	DG	23	590920	4452238	590917	4452238	3	0	3	95	VRN	
Apr-17-2021	17:10	262	EQ20547_BW1-3-1	60%	MFA	DG	36	603327	4453005	603328	4453004	-1	1	1	298	AOR	
Apr-17-2021	17:20	263	EQ20547_BW1-3-1	80%	CHEM / CHEM SPR	DG	36	603326	4453003	603328	4453004	-2	-1	3	236	AOR	
Apr-17-2021	17:35	264	EQ20547_BW1-3-1	80%	MFB	DG	36	603328	4452999	603328	4453004	0	-5	5	178	AOR	

APPENDIX A FIELD SAMPLING LOGS

SEABED SAMPLING LOG SHEET (Deck)										FOR-ENV-0539	
Job No: 11543				Area: OCS-A 0512				Sieve Size: 0.5mm			
Project: Empire Wind Extension								Equipment: Dual Van-Veen Grab / Day Grab			
Client: Equinor Wind US LLC								Vessel: MV <i>Ocean Endeavour</i>			
Sample Number	Station Number	Date	Time	Penetration	Sample Retention	Sample Receptacle	Sediment Description	Fauna Description	Operator(s)	Comments	
Dual Van Veen Grab											
1	EQ20547_EW2-16	Jan-01-2021	20:34:00	60%	MFA	3 x 1L	Medium sand with shell fragments and shells. Munsell: 10YR 3/2 Grayish brown	Annelida (Polychaeta), Mollusca (Bivalvia and Gastropoda)	TSH/KH		
				0%	NS		No sample	No sample	TSH/KH	Sample wash out	
2	EQ20547_EW2-16	Jan-01-2021	20:56:00	60%	MFB	1 x 5L	Medium sand with shell fragments and shells. Munsell: 10YR 3/2 Grayish brown	Echinodermata (Clypeasteroida), Mollusca (Gastropoda)	TSH/KH		
				60%	CHEM	2 x Ziploc	Medium sand with shell fragments and shells. Munsell: 10YR 3/2 Grayish brown	Annelida (Polychaeta), Echinodermata (Clypeasteroida)	TSH/KH		
3	EQ20547_EW2-16	Jan-01-2021	21:16:00	70%	CHEM (SPR)	2 x Ziploc	Medium sand with shell fragments and shells. Munsell: 10YR 3/2 Grayish brown	Mollusca (Gastropoda)	TSH/KH		
				0%	NS		No sample	No sample	TSH/KH	Sample wash out	
4	EQ20547_EW2-15A	Jan-08-2021	11:39:00	0%	NS		No sample	No sample	KH	Sample wash out	
				0%	NS		No sample	No sample	KH	Not triggered	
5	EQ20547_EW2-15A	Jan-08-2021	11:52:00	0%	NS		No sample	No sample	KH	Not triggered	
				0%	NS		No sample	No sample	KH	Not triggered	
6	EQ20547_EW2-15A	Jan-08-2021	12:03:00	0%	NS		No sample	No sample	KH	Sample wash out	
				0%	NS		No sample	No sample	KH	Not triggered	
7	EQ20547_EW2-15A	Jan-08-2021	13:47:00	70%	MFA	2 x 5L	Medium sand with shell fragments and shells. Munsell: 2.5YR 5/2 Grayish brown ; 2.5YR 5/3 Light olive brown	Annelida (Polychaeta), Echinodermata (Clypeasteroida)	KH		
				70%	CHEM	2 x Ziploc	Medium sand with shell fragments and shells. Munsell: 2.5YR 5/2 Grayish brown ; 2.5YR 5/3 Light olive brown	Echinodermata (Clypeasteroida)	KH		
8	EQ20547_EW2-15A	Jan-08-2021	20:08:00	80%	MFB	1 x 5L	Medium sand with shell fragments and shells. Munsell: 2.5YR 5/2 Grayish brown ; 2.5YR 5/3 Light olive brown	Annelida (Polychaeta), Echinodermata (Clypeasteroida)	TSH		
				70%	CHEM (SPR)	2 x Ziploc	Medium sand with shell fragments and shells. Munsell: 2.5YR 5/2 Grayish brown ; 2.5YR 5/3 Light olive brown	Echinodermata (Clypeasteroida)	TSH		
9	EQ20547_EW2-15C	Jan-08-2021	20:42:00	70%	MFA	1 x 5L	Fine gravel, coarse sand with shell fragments and shells. Munsell: 2.5YR 5/2 Grayish brown ; 2.5YR 5/3 Light olive brown	Mollusca (Bivalvia)	TSH		
				0%	NS		No sample	No sample	TSH		
10	EQ20547_EW2-15C	Jan-08-2021	20:55:00	0%	NS		No sample	No sample	TSH		
				0%	NS		No sample	No sample	TSH		

APPENDIX A FIELD SAMPLING LOGS

SEABED SAMPLING LOG SHEET (Deck)										FOR-ENV-0539	
Job No: 11543				Area: OCS-A 0512				Sieve Size: 0.5mm			
Project: Empire Wind Extension								Equipment: Dual Van-Veen Grab / Day Grab			
Client: Equinor Wind US LLC								Vessel: MV <i>Ocean Endeavour</i>			
Sample Number	Station Number	Date	Time	Penetration	Sample Retention	Sample Receptacle	Sediment Description	Fauna Description	Operator(s)	Comments	
11	EQ20547_EW2-15C	Jan-08-2021	21:01:00	80%	CHEM	2 x Ziploc	Fine gravel, coarse sand with shell fragments and shells. Munsell: 2.5YR 5/2 Grayish brown ; 2.5YR 5/3 Light olive brown	No visible fauna	TSH		
				70%	MFB	1 x 5L	Fine gravel, coarse sand with shell fragments and shells. Munsell: 2.5YR 5/2 Grayish brown ; 2.5YR 5/3 Light olive brown	No visible fauna	TSH		
12	EQ20547_EW2-15C	Jan-08-2021	21:23:00	0%	NS		No sample	No sample	TSH		
				0%	NS		No sample	No sample	TSH		
13	EQ20547_EW2-15C	Jan-08-2021	21:26:00	60%	CHEM (SPR)	2 x Ziploc	Fine gravel, coarse sand with shell fragments and shells. Munsell: 2.5YR 5/2 Grayish brown ; 2.5YR 5/3 Light olive brown	Echinodermata (Clypeasteroida)	TSH		
				0%	NS		No sample	No sample	TSH		
14	EQ20547_BW1-13C	Mar-22-2021	10:03:00	70%	MFA	4 x 5L	Medium sand with shell fragments. Munsell 2.5Y 6/2 Light brownish gray	No visible fauna	WA		
				10%	NS		Medium sand with shell fragments. Munsell 2.5Y 6/2 Light brownish gray	Echinodermata (Clypeasteroida)	WA		
15	EQ20547_BW1-13C	Mar-22-2021	10:28:00	80%	MFB	4 x 5L	Medium sand with shell fragments. Munsell 2.5Y 6/2 Light brownish gray	Annelida (Polychaeta)	WA		
				80%	CHEM	2 x Ziploc	Medium sand with shell fragments. Munsell 2.5Y 6/2 Light brownish gray	Annelida (Polychaeta)	WA		
16	EQ20547_BW1-13C	Mar-22-2021	10:50:00	0%	NS		No sample	No sample	WA	Washout	
				0%	NS		No sample	No sample	WA	No trigger	

APPENDIX A FIELD SAMPLING LOGS

SEABED SAMPLING LOG SHEET (Deck)										FOR-ENV-0539
Job No: 11543				Area: OCS-A 0512				Sieve Size: 0.5mm		
Project: Empire Wind Extension								Equipment: Dual Van-Veen Grab / Day Grab		
Client: Equinor Wind US LLC								Vessel: MV <i>Ocean Endeavour</i>		
Sample Number	Station Number	Date	Time	Penetration	Sample Retention	Sample Receptacle	Sediment Description	Fauna Description	Operator(s)	Comments
17	EQ20547_BW1-13C	Mar-22-2021	11:35:00	0%	NS		No sample	No sample	WA	No trigger
				0%	NS		No sample	No sample	WA	Washout
18	EQ20547_BW1-13C	Mar-22-2021	11:45:00	0%	NS		No sample	No sample	WA	Entanglement
				0%	NS		No sample	No sample	WA	Entanglement
19	EQ20547_BW1-13C	Mar-22-2021	11:59:00	0%	NS		No sample	No sample	WA	Moved 10m south. Moved weights to arms of grab. No trigger
				0%	NS		No sample	No sample	WA	Washout
20	EQ20547_BW1-13C	Mar-22-2021	12:09:00	0%	NS		No sample	No sample	WA	No trigger
				0%	NS		No sample	No sample	WA	Washout
21	EQ20547_BW1-13C	Mar-22-2021	12:26:00	0%	NS		No sample	No sample	WA	
				0%	NS		No sample	No sample	WA	
22	EQ20547_BW1-13C	Mar-22-2021	12:35:00	70%	CHEM (SPR)	2 x Ziploc	Fine to medium sand with shell fragments. Munsell 2.5Y 6/2 Light brownish gray	No visible fauna	WA	
				70%	CHEM (SPR)		Fine to medium sand with shell fragments. Munsell 2.5Y 6/2 Light brownish gray	No visible fauna	WA	

APPENDIX A FIELD SAMPLING LOGS

SEABED SAMPLING LOG SHEET (Deck)										FOR-ENV-0539
Job No: 11543				Area: OCS-A 0512				Sieve Size: 0.5mm		
Project: Empire Wind Extension							Equipment: Dual Van-Veen Grab / Day Grab			
Client: Equinor Wind US LLC							Vessel: MV <i>Ocean Endeavour</i>			
Sample Number	Station Number	Date	Time	Penetration	Sample Retention	Sample Receptacle	Sediment Description	Fauna Description	Operator(s)	Comments
Day Grab										
23	EQ20547_BW1-13B	Mar-22-2021	13:18:00	90%	MFA	3 x 5L	Fine to medium sand with shell fragments. Munsell 2.5Y 6/2 Light brownish gray	Echinodermata (Clypeasteroidea)	WA	Switched to Day Grab
24	EQ20547_BW1-13B	Mar-22-2021	13:34:00	70%	CHEM	2 x Ziploc	Fine to medium sand with shell fragments. Munsell 2.5Y 6/2 Light brownish gray	Annelida (Polychaeta)	WA	
25	EQ20547_BW1-13B	Mar-22-2021	13:49:00	80%	MFB	3 x 5L	Fine to medium sand with shell fragments. Munsell 2.5Y 6/2 Light brownish gray	Annelida (Polychaeta)	WA	
26	EQ20547_BW1-13B	Mar-22-2021	14:08:00	80%	CHEM (SPR)	2 x Ziploc	Fine to medium sand with shell fragments. Munsell 2.5Y 6/2 Light brownish gray	Arthropoda (Paguroidea)	WA	
27	EQ20547_BW1-13A	Mar-22-2021	15:01:00	80%	MFA	3 x 5L	Fine to medium sand with shell fragments. Munsell 2.5Y 6/3 Light yellowish brown	Annelida (Polychaeta)	WA	
28	EQ20547_BW1-13A	Mar-22-2021	15:16:00	70%	CHEM	2 x Ziploc	Fine to medium sand with shell fragments. Munsell 2.5Y 6/3 Light yellowish brown	Annelida (Polychaeta)	WA	
29	EQ20547_BW1-13A	Mar-22-2021	15:32:00	70%	MFB	3 x 5L	Fine to medium sand with shell fragments. Munsell 2.5Y 6/3 Light yellowish brown	Echinodermata (Clypeasteroidea)	WA	
30	EQ20547_BW1-13A	Mar-22-2021	15:44:00	70%	CHEM (SPR)	2 x Ziploc	Fine to medium sand with shell fragments. Munsell 2.5Y 6/3 Light yellowish brown	Annelida (Polychaeta)	WA	
31	EQ20547_BW1-12C	Mar-22-2021	16:47:00	60%	MFA	1 x 5L	Fine to medium sand with shell fragments. Munsell: 2.5Y 3/2 Very dark grayish brown	Annelida (Polychaeta), Echinodermata (Clypeasteroidea), Mollusca	JE	
32	EQ20547_BW1-12C	Mar-22-2021	17:13:00	70%	CHEM	2 x Ziploc	Fine to medium sand with shell fragments. Munsell: 2.5Y 3/2 Very dark grayish brown	Annelida (Polychaeta), Echinodermata (Clypeasteroidea), Mollusca	JE	
33	EQ20547_BW1-12C	Mar-22-2021	17:35:00	70%	MFB	1 x 5L	Fine to medium sand with shell fragments. Munsell: 2.5Y 3/2 Very dark grayish brown	Annelida (Polychaeta), Echinodermata (Clypeasteroidea), Mollusca	JE	
34	EQ20547_BW1-12C	Mar-22-2021	17:58:00	90%	CHEM (SPR)	2 x Ziploc	Fine to medium sand with shell fragments. Munsell 2.5Y 6/2 Light brownish gray	Annelida (Polychaeta), Echinodermata (Clypeasteroidea), Mollusca	JE	
35	EQ20547_BW1-12B	Mar-22-2021	18:28:00	80%	CHEM	2 x Ziploc	Fine to medium sand with shell fragments. Munsell 2.5Y 6/2 Light brownish gray	Annelida (Polychaeta), Echinodermata (Clypeasteroidea), Mollusca	JE	
36	EQ20547_BW1-12B	Mar-22-2021	18:41:00	90%	MFA	2 x 5L	Fine to medium sand with shell fragments. Munsell 2.5Y 6/2 Light brownish gray	Annelida (Polychaeta), Echinodermata (Clypeasteroidea), Mollusca	JE	

APPENDIX A FIELD SAMPLING LOGS

SEABED SAMPLING LOG SHEET (Deck)										FOR-ENV-0539
Job No: 11543				Area: OCS-A 0512				Sieve Size: 0.5mm		
Project: Empire Wind Extension								Equipment: Dual Van-Veen Grab / Day Grab		
Client: Equinor Wind US LLC								Vessel: MV <i>Ocean Endeavour</i>		
Sample Number	Station Number	Date	Time	Penetration	Sample Retention	Sample Receptacle	Sediment Description	Fauna Description	Operator(s)	Comments
37	EQ20547_BW1-12B	Mar-22-2021	18:56:00	80%	CHEM (SPR)	2 x Ziploc	Fine to medium sand with shell fragments. Munsell 2.5Y 6/2 Light brownish gray	Annelida (Polychaeta), Echinodermata (Clypeasteroida), Mollusca	JE	
38	EQ20547_BW1-12B	Mar-22-2021	19:17:00	90%	MFB	2 x 5L	Fine to medium sand with shell fragments. Munsell 2.5Y 6/2 Light brownish gray	Echinodermata (Clypeasteroida)	JE	
39	EQ20547_BW1-12A	Mar-22-2021	19:51:00	80%	CHEM	2 x Ziploc	Fine to medium sand with shell fragments. Munsell 2.5Y 6/2 Light brownish gray	Echinodermata (Clypeasteroida)	JE	
40	EQ20547_BW1-12A	Mar-22-2021	20:15:00	80%	CHEM (SPR)	2 x Ziploc	Fine to medium sand with shell fragments.. Munsell 2.5Y 6/2 Light brownish gray	Echinodermata (Clypeasteroida)	JE	
41	EQ20547_BW1-15C	Mar-27-2021	20:04:00	90%	MFA	1 x 5L	Fine to medium sand with shell fragments. Munsell 2.5Y 6/2 Light brownish gray	Annelida (Polychaeta), Echinodermata (Clypeasteroida)	JE	
42	EQ20547_BW1-15C	Mar-27-2021	20:20:00	80%	NS		Sample rejected due to hagfish	Chordata (<i>Myxine glutinosa</i>)	JE	Labelled as CHEM in deck photos as hagfish was buried in sediment so wasn't identified immediately on recovery
43	EQ20547_BW1-15C	Mar-27-2021	20:32:00	90%	CHEM / CHEM SPR	4 x Ziploc	Fine sand with shell fragments. Munsell 2.5Y 6/2 Light brownish gray	No visible fauna	JE	Chem + Chem Spare subsamples now taken from the same grab sample. Minimum number of Day grab attempts required per station reduced from four to three, from this sampling attempt onwards
44	EQ20547_BW1-15C	Mar-27-2021	20:47:00	80%	MFB	2 x 5L	Fine to medium sand with shell fragments. Munsell 2.5Y 6/2 Light brownish gray	Echinodermata (Clypeasteroida), Mollusca (Bivalvia)	JE	Still processing at beginning of following station
45	EQ20547_BW1-15B	Mar-27-2021	21:29:00	80%	CHEM / CHEM SPR	4 x Ziploc	Fine to medium sand with shell fragments. Munsell 2.5Y 6/2 Light brownish gray	No visible fauna	JE/AL	
46	EQ20547_BW1-15B	Mar-27-2021	21:49:00	70%	MFA	2 x 5L	Fine to medium sand with shell fragments. Munsell 2.5Y 6/2 Light brownish gray	Annelida (Polychaeta), Echinodermata (Clypeasteroida)	JE/AL	
47	EQ20547_BW1-15B	Mar-27-2021	22:08:00	80%	MFB	2 x 5L	Fine to medium sand with shell fragments. Munsell 2.5Y 6/2 Light brownish gray	Annelida (Polychaeta), Echinodermata (Clypeasteroida)	JE/AL	
48	EQ20547_BW1-15A	Mar-27-2021	23:04:00	80%	CHEM / CHEM SPR	4 x Ziploc	Fine to medium sand with shell fragments. Munsell 2.5Y 6/2 Light brownish gray	Annelida (Polychaeta), Mollusca (Bivalvia - possible <i>Arctica islandica</i>)	JE/AL	Possible <i>A. islandica</i> photographed 80mm x 57mm x 45mm
49	EQ20547_BW1-15A	Mar-27-2021	23:23:00	60%	MFA	2 x 5L	Fine to medium sand with shell fragments. Munsell 2.5Y 6/2 Light brownish gray	Annelida (Polychaeta)	JE/AL	

APPENDIX A FIELD SAMPLING LOGS

SEABED SAMPLING LOG SHEET (Deck)										FOR-ENV-0539
Job No: 11543				Area: OCS-A 0512				Sieve Size: 0.5mm		
Project: Empire Wind Extension							Equipment: Dual Van-Veen Grab / Day Grab			
Client: Equinor Wind US LLC							Vessel: MV <i>Ocean Endeavour</i>			
Sample Number	Station Number	Date	Time	Penetration	Sample Retention	Sample Receptacle	Sediment Description	Fauna Description	Operator(s)	Comments
50	EQ20547_BW1-15A	Mar-27-2021	23:44:00	60%	MFB	2 x 5L	Fine to medium sand with shell fragments. Munsell 2.5Y 6/2 Light brownish gray	Annelida (Polychaeta)	JE/AL	
51	EQ20547_BW1-14	Mar-28-2021	00:29:00	60%	MFA	2 x 5L	Fine to medium sand with shell fragments. Munsell 2.5Y 6/2 Light brownish gray	Echinodermata (Clypeasteroidea)	JE/BGDS	
52	EQ20547_BW1-14	Mar-28-2021	00:51:00	60%	CHEM / CHEM SPR	4 x Ziploc	Fine to medium sand with shell fragments. Munsell 2.5Y 6/2 Light brownish gray	No visible fauna	JE/BGDS	
53	EQ20547_BW1-14	Mar-28-2021	01:05:00	60%	MFB	2 x 5L	Fine sand with shell fragments. Munsell 2.5Y 6/2 Light brownish gray	Annelida (Polychaeta)	JE/BGDS	
54	EQ20547_BW1-12A	Mar-28-2021	02:00:00	60%	MFA	2 x 5L	Fine to medium sand with shell fragments. Munsell 2.5Y 6/2 Light brownish gray	Annelida (Polychaeta)	JE/BGDS	
55	EQ20547_BW1-12A	Mar-28-2021	02:14:00	60%	MFB	2 x 5L	Fine to medium sand with shell fragments. Munsell 2.5Y 6/2 Light brownish gray	Annelida (Polychaeta)	JE/BGDS	
56	EQ20547_BW1-11	Mar-28-2021	03:00:00	65%	CHEM / CHEM SPR	4 x Ziploc	Fine to medium sand with shell fragments. Munsell 2.5Y 4/2 Dark grayish brown	No visible fauna	JE/BGDS	
57	EQ20547_BW1-11	Mar-28-2021	03:21:00	80%	MFA	2 x 5L	Fine to medium sand with shell fragments. Munsell 2.5Y 4/2 Dark grayish brown	Annelida (Polychaeta)	JE/BGDS	
58	EQ20547_BW1-11	Mar-28-2021	03:39:00	90%	MFB	2 x 5L	Fine to medium sand with shell fragments. Munsell 2.5Y 4/2 Dark grayish brown	Echinodermata (Clypeasteroidea)	JE/BGDS	
59	EQ20547_BW1-10C	Mar-28-2021	04:22:00	70%	MFA	2 x 5L	Fine sand with shell fragments. Munsell 2.5Y 5/2 Grayish brown	Echinodermata (Clypeasteroidea)	WA/JB	
60	EQ20547_BW1-10C	Mar-28-2021	04:34:00	50%	MFB	1 x 5L	Fine sand with shell fragments. Munsell 2.5Y 5/2 Grayish brown	Annelida (Polychaeta), Echinodermata (Clypeasteroidea)	WA/JB	
61	EQ20547_BW1-10C	Mar-28-2021	05:25:00	60%	CHEM / CHEM SPR	4 x Ziploc	Fine sand with shell fragments. Munsell 2.5Y 5/2 Grayish brown	Annelida (Polychaeta), Echinodermata (Clypeasteroidea)	WA/JB	
62	EQ20547_BW1-10B	Mar-28-2021	05:53:00	55%	MFA	1 x 5L	Sand with shell hash. Munsell 2.5Y 4/2 Dark grayish brown	No visible fauna	WA/JB	
63	EQ20547_BW1-10B	Mar-28-2021	06:23:00	60%	MFB	1 x 5L	Sand with shell hash. Munsell 2.5Y 4/2 Dark grayish brown	Annelida (Polychaeta)	WA/JB	
64	EQ20547_BW1-10B	Mar-28-2021	06:31:00	70%	CHEM / CHEM SPR	4 x Ziploc	Sand with shell hash. Munsell 2.5Y 4/2 Dark grayish brown	Arthropoda (Paguroidea), Echinodermata (Clypeasteroidea), Mollusca (Bivalvia - possible <i>A. islandica</i>)	WA/JB	<i>A. islandica</i> 40mm x 35mm x 25mm

APPENDIX A FIELD SAMPLING LOGS

SEABED SAMPLING LOG SHEET (Deck)										FOR-ENV-0539
Job No: 11543				Area: OCS-A 0512				Sieve Size: 0.5mm		
Project: Empire Wind Extension							Equipment: Dual Van-Veen Grab / Day Grab			
Client: Equinor Wind US LLC							Vessel: MV <i>Ocean Endeavour</i>			
Sample Number	Station Number	Date	Time	Penetration	Sample Retention	Sample Receptacle	Sediment Description	Fauna Description	Operator(s)	Comments
65	EQ20547_BW1-10A	Mar-28-2021	07:09:00	60%	MFA	1 x 5L	Sand with shell hash. Munsell 2.5Y 4/2 Dark grayish brown	Arthropoda (Paguroidea), Mollusca (Cephalopoda)	WA/JB	
66	EQ20547_BW1-10A	Mar-28-2021	07:18:00	70%	MFB	1 x 5L	Sand with shell hash. Munsell 2.5Y 4/2 Dark grayish brown	Echinodermata (Clypeasteroidea)	WA/JB	
67	EQ20547_BW1-10A	Mar-28-2021	07:26:00	80%	CHEM / CHEM SPR	4 x Ziploc	Sand with shell hash. Munsell 2.5Y 4/2 Dark grayish brown	No visible fauna	WA/JB	
68	EQ20547_BW1-9C	Mar-29-2021	23:33:00	50%	MFA	1 x 1L	Fine sand. Munsell 2.5Y 4/2 dark grayish brown	Annelida (Polychaeta), Mollusca	JE/BGS	
69	EQ20547_BW1-9C	Mar-29-2021	23:43:00	50%	MFB	1 x 1L	Fine sand. Munsell 2.5Y 4/2 dark grayish brown	No visible fauna	JE/BGS	
70	EQ20547_BW1-9C	Mar-30-2021	00:01:00	65%	CHEM / CHEM SPR	4 x Ziploc	Fine sand. Munsell 2.5Y 4/2 dark grayish brown	No visible fauna	JE/BGS	
71	EQ20547_BW1-9B	Mar-30-2021	00:23:00	70%	MFA	2 x 5L	Fine to medium sand. Munsell 2.5Y 4/2 dark grayish brown	No visible fauna	JE/BGS	
72	EQ20547_BW1-9B	Mar-30-2021	00:29:00	70%	CHEM / CHEM SPR	4 x Ziploc	Fine to medium sand. Munsell 2.5Y 4/2 dark grayish brown	No visible fauna	JE/BGS	
73	EQ20547_BW1-9B	Mar-30-2021	00:42:00	70%	MFB	2 x 5L	Fine to medium sand. Munsell 2.5Y 4/2 dark grayish brown	No visible fauna	JE/BGS	
74	EQ20547_BW1-9A	Mar-30-2021	01:20:00	90%	CHEM / CHEM SPR	4 x Ziploc	Fine to medium sand. Munsell 2.5Y 4/3 olive brown	No visible fauna	JE/BGS	
75	EQ20547_BW1-9A	Mar-30-2021	01:33:00	90%	MFA	2 x 5L	Fine to medium sand. Munsell 2.5Y 4/3 olive brown	Annelida (<i>Lanice</i> sp.), Mollusca (Bivalvia - possible <i>A. islandica</i>)	JE/BGS	<i>A. islandica</i> 32mm x 29mm x 18mm
76	EQ20547_BW1-9A	Mar-30-2021	01:47:00	90%	MFB	2 x 5L	Fine to medium sand. Munsell 2.5Y 4/3 olive brown	No visible fauna	JE/BGS	
77	EQ20547_BW1-8C	Mar-30-2021	02:26:00	70%	CHEM / CHEM SPR	4 x Ziploc	Fine sand. Munsell: 2.5Y 4/4 olive brown	No visible fauna	JE/BGS	
78	EQ20547_BW1-8C	Mar-30-2021	02:41:00	20%	NS		No sample	No sample	JE/BGS	Shell trapped in jaws causing washout
79	EQ20547_BW1-8C	Mar-30-2021	02:53:00	80%	MFA	2 x 5L	Fine sand. Munsell: 2.5Y 4/4 olive brown	Annelida (Polychaeta)	JE/BGS	
80	EQ20547_BW1-8C	Mar-30-2021	03:31:00	60%	MFB	2 x 5L	Fine sand. Munsell: 2.5Y 4/4 olive brown	No visible fauna	JE/BGS	
81	EQ20547_BW1-8B	Mar-30-2021	03:57:00	55%	MFA	1 x 1L	Fine sand. Munsell: 2.5Y 4/1 dark gray	Annelida (Polychaeta), Echinodermata (Clypeasteroidea)	WA/JB	
82	EQ20547_BW1-8B	Mar-30-2021	04:20:00	60%	MFB	1 x 1L	Fine sand. Munsell: 2.5Y 4/1 dark gray	Annelida (Polychaeta), Arthropoda (Paguroidea), Echinodermata (Clypeasteroidea)	WA/JB	

APPENDIX A FIELD SAMPLING LOGS

SEABED SAMPLING LOG SHEET (Deck)										FOR-ENV-0539
Job No: 11543				Area: OCS-A 0512				Sieve Size: 0.5mm		
Project: Empire Wind Extension							Equipment: Dual Van-Veen Grab / Day Grab			
Client: Equinor Wind US LLC							Vessel: MV <i>Ocean Endeavour</i>			
Sample Number	Station Number	Date	Time	Penetration	Sample Retention	Sample Receptacle	Sediment Description	Fauna Description	Operator(s)	Comments
83	EQ20547_BW1-8B	Mar-30-2021	04:35:00	70%	CHEM / CHEM SPR	4 x Ziploc	Fine sand. Munsell: 2.5Y 4/1 dark gray	Annelida (Polychaeta), Arthropoda (Paguroidea), Echinodermata (Clypeasteroidea)	WA/JB	
84	EQ20547_BW1-8A	Mar-30-2021	05:00:00	70%	MFA	1 x 1L	Fine, silty sand. Munsell: 2.5Y 3/2 very dark grayish brown	Annelida (Polychaeta), Arthropoda (Paguroidea)	WA/JB	
85	EQ20547_BW1-8A	Mar-30-2021	05:11:00	75%	MFB	1 x 1L	Fine, silty sand. Munsell: 2.5Y 3/2 very dark grayish brown	Annelida (Polychaeta), Echinodermata (Clypeasteroidea)	WA/JB	
86	EQ20547_BW1-8A	Mar-30-2021	05:30:00	60%	CHEM / CHEM SPR	4 x Ziploc	Fine, silty sand. Munsell: 2.5Y 3/2 very dark grayish brown	Annelida (Polychaeta), Echinodermata (Clypeasteroidea)	WA/JB	
87	EQ20547_BW1-7C-1	Mar-30-2021	06:22:00	70%	MFA	1 x 5L	Sand with shell hash. Munsell: 2.5Y 5/3 light olive brown	Arthropoda (Caridea), Echinodermata (Clypeasteroidea)	WA/JB	
88	EQ20547_BW1-7C-1	Mar-30-2021	06:32:00	65%	MFB	1 x 5L	Sand with shell hash. Munsell: 2.5Y 5/3 light olive brown	Arthropoda (Paguroidea)	WA/JB	
89	EQ20547_BW1-7C-1	Mar-30-2021	06:44:00	70%	CHEM / CHEM SPR	4 x Ziploc	Sand with shell hash. Munsell: 2.5Y 5/3 light olive brown	No visible fauna	WA/JB	
90	EQ20547_BW1-7B	Mar-30-2021	07:22:00	55%	MFA	1 x 1L	Silty sand. Munsell: 2.5Y 3/2 very dark grayish brown	Annelida (Polychaeta), Echinodermata (Clypeasteroidea), Mollusca (Gastropoda)	WA/JB	
91	EQ20547_BW1-7B	Mar-30-2021	07:35:00	65%	MFB	1 x 1L	Silty sand. Munsell: 2.5Y 3/2 very dark grayish brown	Mollusca (Bivalvia - possible <i>A. islandica</i>)	WA/JB	<i>A. islandica</i> 30mm x 29mm x 17mm
92	EQ20547_BW1-7B	Mar-30-2021	07:46:00	60%	CHEM / CHEM SPR	4 x Ziploc	Silty sand. Munsell: 2.5Y 3/2 very dark grayish brown	No visible fauna	WA/JB	
93	EQ20547_BW1-7A	Mar-30-2021	08:25:00	60%	CHEM / CHEM SPR	4 x Ziploc	Silty sand. Munsell: 2.5Y 3/2 very dark grayish brown	No visible fauna	WA/JB	
94	EQ20547_BW1-7A	Mar-30-2021	08:40:00	50%	MFB	1 x 1L	Silty sand. Munsell: 2.5Y 3/2 very dark grayish brown	Annelida (Polychaeta)	WA/JB	
95	EQ20547_BW1-7A	Mar-30-2021	08:48:00	60%	MFA	1 x 1L	Silty sand. Munsell: 2.5Y 3/2 very dark grayish brown	Annelida (Polychaeta)	WA/JB	
96	EQ20547_BW1-6-1	Mar-30-2021	09:55:00	30%	NS		No sample	Annelida (Polychaeta)	WA/JB	No sample due to low retention
97	EQ20547_BW1-6-1	Mar-30-2021	10:06:00	50%	MFA	1 x 1L	Silty sand. Munsell: 2.5Y 3/3 dark olive brown	Echinodermata (Clypeasteroidea)	WA/JB	
98	EQ20547_BW1-6-1	Mar-30-2021	10:15:00	60%	MFB	1 x 1L	Silty sand. Munsell: 2.5Y 3/3 dark olive brown	Mollusca (Gastropoda)	WA/JB	
99	EQ20547_BW1-6-1	Mar-30-2021	10:26:00	50%	CHEM / CHEM SPR	4 x Ziploc	Silty sand. Munsell: 2.5Y 3/3 dark olive brown	Echinodermata (Clypeasteroidea)	WA/JB	
100	EQ20547_BW1-5-1	Mar-30-2021	11:23:00	30%	NS		No sample	Annelida (Polychaeta)	WA/JB	No sample due to low retention
101	EQ20547_BW1-5-1	Mar-30-2021	11:32:00	20%	NS		No sample	No sample	WA/JB	No sample due to shell caught in jaws

APPENDIX A FIELD SAMPLING LOGS

SEABED SAMPLING LOG SHEET (Deck)										FOR-ENV-0539
Job No: 11543				Area: OCS-A 0512				Sieve Size: 0.5mm		
Project: Empire Wind Extension								Equipment: Dual Van-Veen Grab / Day Grab		
Client: Equinor Wind US LLC								Vessel: MV <i>Ocean Endeavour</i>		
Sample Number	Station Number	Date	Time	Penetration	Sample Retention	Sample Receptacle	Sediment Description	Fauna Description	Operator(s)	Comments
102	EQ20547_BW1-5-1	Mar-30-2021	11:42:00	70%	MFA	1 x 1L	Silty sand. Munsell 2.5Y 4/2 dark grayish brown	Annelida (Polychaeta)	WA/JB	
103	EQ20547_BW1-5-1	Mar-30-2021	11:52:00	50%	CHEM / CHEM SPR	4 x Ziploc	Silty sand. Munsell 2.5Y 4/2 dark grayish brown	No visible fauna	WA/JB	
104	EQ20547_BW1-5-1	Mar-30-2021	12:08:00	30%	NS		No sample	No sample	WA/JB	No sample due to low retention
105	EQ20547_BW1-5-1	Mar-30-2021	12:16:00	40%	NS		No sample	No sample	WA/JB	No sample due to low retention
106	EQ20547_BW1-5-1	Mar-30-2021	12:26:00	50%	MFB	1 x 1L	Silty sand. Munsell 2.5Y 4/2 dark grayish brown	No visible fauna	WA/JB	Moved 10m south (within target radius)
107	EQ20547_EW2-15B-1	Mar-30-2021	15:26:00	60%	MFA	1 x 5L	Fine to medium sand. Munsell: 5Y 5/3 olive sand	Annelida (Polychaeta), Echinodermata (Clypeasteroidea)	WA/JB	Sieve photo taken in bucket
108	EQ20547_EW2-15B-1	Mar-30-2021	15:38:00	80%	MFB	2 x 5L	Fine to medium sand. Munsell: 5Y 5/3 olive sand	Echinodermata (Clypeasteroidea)	WA/JB	
109	EQ20547_EW2-15B-1	Mar-30-2021	15:49:00	70%	CHEM / CHEM SPR	4 x Ziploc	Fine to medium sand. Munsell: 5Y 5/3 olive sand	No visible fauna	WA/JB	
110	EQ20547_EW2-14C	Mar-30-2021	16:27:00	90%	MFA	1 x 5L	Fine to medium sand. Munsell 2.5Y 4/2 dark grayish brown	Arthropoda (Amphipoda)	JE	
111	EQ20547_EW2-14C	Mar-30-2021	16:38:00	70%	CHEM / CHEM SPR	4 x Ziploc	Fine to medium sand. Munsell 2.5Y 4/2 dark grayish brown	No visible fauna	JE	
112	EQ20547_EW2-14C	Mar-30-2021	17:01:00	80%	MFB	1 x 5L	Fine to medium sand. Munsell 2.5Y 4/2 dark grayish brown	No visible fauna	JE	
113	EQ20547_EW2-14B	Mar-30-2021	17:36:00	20%	NS		No sample	No sample	JE/AL	No sample due to gravel in jaws
114	EQ20547_EW2-14B	Mar-30-2021	17:44:00	20%	NS		No sample	No sample	JE/AL	No sample due to gravel in jaws
115	EQ20547_EW2-14B	Mar-30-2021	17:59:00	20%	NS		No sample	No sample	JE/AL	No sample due to gravel in jaws
116	EQ20547_EW2-14B	Mar-30-2021	18:15:00	55%	MFA	1 x 5L	Fine sand with underlying gravel. Munsell: 2.5Y 4/1 dark gray	No visible fauna	JE/AL	
117	EQ20547_EW2-14B	Mar-30-2021	18:26:00	60%	CHEM / CHEM SPR	4 x Ziploc	Fine sand with underlying gravel. Munsell: 2.5Y 4/1 dark gray	No visible fauna	JE/AL	
118	EQ20547_EW2-14B	Mar-30-2021	18:53:00	20%	NS		No sample	No sample	JE/AL	No sample due to gravel in jaws
119	EQ20547_EW2-14B	Mar-30-2021	19:01:00	30%	NS		No sample	No sample	JE/AL	No sample due to gravel in jaws
120	EQ20547_EW2-14B	Mar-30-2021	19:09:00	65%	MFB	2 x 5L	Fine sand with underlying gravel. Munsell: 2.5Y 4/1 dark gray	No visible fauna	JE/AL	Sample marker says '14B' instead of '14A'
121	EQ20547_EW2-14A	Mar-30-2021	19:31:00	90%	MFA	4 x 5L	Fine to medium sand with shells, shell fragments and gravel. Munsell 2.5Y 4.3 olive brown	Annelida (Polychaeta)	JE/AL	
122	EQ20547_EW2-14A	Mar-30-2021	19:42:00	55%	CHEM / CHEM SPR	4 x Ziploc	Fine to medium sand with shells, shell fragments and gravel. Munsell 2.5Y 4.3 olive brown	No visible fauna	JE/AL	
123	EQ20547_EW2-14A	Mar-30-2021	19:58:00	55%	MFB	2 x 5L	Fine to medium sand with shells, shell fragments and gravel. Munsell 2.5Y 4.3 olive brown	Cnidaria (Hydrozoa)	JE/AL	

APPENDIX A FIELD SAMPLING LOGS

SEABED SAMPLING LOG SHEET (Deck)										FOR-ENV-0539
Job No: 11543				Area: OCS-A 0512				Sieve Size: 0.5mm		
Project: Empire Wind Extension								Equipment: Dual Van-Veen Grab / Day Grab		
Client: Equinor Wind US LLC								Vessel: MV <i>Ocean Endeavour</i>		
Sample Number	Station Number	Date	Time	Penetration	Sample Retention	Sample Receptacle	Sediment Description	Fauna Description	Operator(s)	Comments
124	EQ20547_EW2-13C	Mar-30-2021	20:50:00	70%	MFA	2 x 5L	Fine to medium sand with shells, shell fragments and gravel. Munsell 2.5Y 5/3 light olive brown	No visible fauna	JE/BGS	
125	EQ20547_EW2-13C	Mar-30-2021	21:03:00	80%	CHEM / CHEM SPR	4 x Ziploc	Fine to medium sand with shells, shell fragments and gravel. Munsell 2.5Y 5/3 light olive brown	No visible fauna	JE/BGS	
126	EQ20547_EW2-13C	Mar-30-2021	21:14:00	80%	MFB	2 x 5L	Fine to medium sand with shells, shell fragments and gravel. Munsell 2.5Y 5/3 light olive brown	No visible fauna	JE/BGS	
127	EQ20547_EW2-13B	Mar-30-2021	22:07:00	90%	MFA	2 x 5L	Fine to medium sand. Munsell 2.5Y 5/3 light olive brown	No visible fauna	JE/BGS	
128	EQ20547_EW2-13B	Mar-30-2021	22:21:00	80%	CHEM / CHEM SPR	4 x Ziploc	Fine to medium sand. Munsell 2.5Y 5/3 light olive brown	Echinodermata (Clypeasteroidea)	JE/BGS	
129	EQ20547_EW2-13B	Mar-30-2021	22:31:00	90%	MFB	2 x 5L	Fine to medium sand. Munsell 2.5Y 5/3 light olive brown	No visible fauna	JE/BGS	
130	EQ20547_EW2-13A	Mar-30-2021	22:58:00	20%	NS		No sample	No sample	JE/BGS	No sample due to shell caught in jaws
131	EQ20547_EW2-13A	Mar-30-2021	23:07:00	55%	MFA	2 x 5L	Fine to medium sand. Munsell 2.5Y 4/3 olive brown	No visible fauna	JE/BGS	
132	EQ20547_EW2-13A	Mar-30-2021	23:14:00	90%	CHEM / CHEM SPR	4 x Ziploc	Fine to medium sand. Munsell 2.5Y 4/3 olive brown	No visible fauna	JE/BGS	
133	EQ20547_EW2-13A	Mar-30-2021	23:27:00	90%	MFB	2 x 5L	Fine to medium sand. Munsell 2.5Y 4/3 olive brown	No visible fauna	JE/BGS	
134	EQ20547_EW2-12A	Mar-31-2021	00:21:00	70%	MFA	1 x 1L	Fine sand with shell fragments. Munsell 2.5Y 4/2 dark grayish brown	No visible fauna	JE/BGS	
135	EQ20547_EW2-12A	Mar-31-2021	00:34:00	60%	CHEM / CHEM SPR	4 x Ziploc	Fine sand with shell fragments. Munsell 2.5Y 4/2 dark grayish brown	Echinodermata (Clypeasteroidea)	JE/BGS	
136	EQ20547_EW2-12A	Mar-31-2021	00:46:00	30%	NS		No sample	No sample	JE/BGS	No sample due to shell caught in jaws
137	EQ20547_EW2-12A	Mar-31-2021	00:56:00	50%	MFB	1 x 1L	Fine sand with shell fragments. Munsell 2.5Y 4/2 dark grayish brown	Annelida (Polychaeta), Mollusca	JE/BGS	
138	EQ20547_EW2-12B	Mar-31-2021	01:19:00	0%	NS		No sample	No sample	JE/BGS	
139	EQ20547_EW2-12B	Mar-31-2021	01:27:00	60%	MFA	1 x 1L	Fine sand. Munsell 2.5Y 3/2 very dark grayish brown	Echinodermata (Clypeasteroidea), Mollusca (Bivalvia - possible <i>A. islandica</i>)	JE/BGS	<i>A. islandica</i> 55mm x 49mm x 38mm
140	EQ20547_EW2-12B	Mar-31-2021	01:39:00	10%	NS		No sample	No sample	JE/BGS	No sample due to rock in jaws causing washout
141	EQ20547_EW2-12B	Mar-31-2021	01:48:00	10%	NS		No sample	No sample	JE/BGS	No sample due to rock in jaws causing washout
142	EQ20547_EW2-12C	Apr-03-2021	16:17:00	90%	MFA	2 x 5L	Fine to medium sand. Munsell 2.5Y 5/2 grayish brown	Annelida (Polychaeta), Mollusca (Gastropoda)	JE	

APPENDIX A FIELD SAMPLING LOGS

SEABED SAMPLING LOG SHEET (Deck)										FOR-ENV-0539
Job No: 11543				Area: OCS-A 0512				Sieve Size: 0.5mm		
Project: Empire Wind Extension							Equipment: Dual Van-Veen Grab / Day Grab			
Client: Equinor Wind US LLC							Vessel: MV <i>Ocean Endeavour</i>			
Sample Number	Station Number	Date	Time	Penetration	Sample Retention	Sample Receptacle	Sediment Description	Fauna Description	Operator(s)	Comments
143	EQ20547_EW2-12C	Apr-03-2021	16:25:00	70%	CHEM / CHEM SPR	4 x Ziploc	Fine to medium sand. Munsell 2.5Y 5/2 grayish brown	No visible fauna	JE	
144	EQ20547_EW2-12C	Apr-03-2021	16:47:00	80%	MFB	2 x 5L	Fine to medium sand. Munsell 2.5Y 5/2 grayish brown	Annelida (Polychaeta), Echinodermata (Clypeasteroida), Mollusca (Bivalvia - possible <i>A. islandica</i>)	JE	<i>A. islandica</i> 3.8mm x 3.2mm x 20mm
145	EQ20547_EW2-12B	Apr-03-2021	17:10:00	80%	CHEM / CHEM SPR	4 x Ziploc	Fine sand with gravel. Munsell 2.5Y 3/2 very dark grayish brown	No visible fauna	JE	
146	EQ20547_EW2-12B	Apr-03-2021	17:28:00	60%	MFB	3 x 5L	Fine sand with gravel. Munsell 2.5Y 3/2 very dark grayish brown	No visible fauna	JE	
147	EQ20547_EW2-11	Apr-03-2021	18:06:00	80%	MFA	1 x 5L	Fine to medium sand. Munsell 2.5Y 5/3 light olive brown	Annelida (Polychaeta), Mollusca (Bivalvia - possible <i>A. islandica</i>)	JE	<i>A. islandica</i> 2.8mm x 2.8mm x 1.4mm
148	EQ20547_EW2-11	Apr-03-2021	18:17:00	80%	CHEM / CHEM SPR	4 x Ziploc	Fine to medium sand. Munsell 2.5Y 5/3 light olive brown	No visible fauna	JE	
149	EQ20547_EW2-11	Apr-03-2021	18:30:00	80%	MFB	2 x 5L	Fine to medium sand. Munsell 2.5Y 5/3 light olive brown	Annelida (Polychaeta), Echinodermata (Clypeasteroida)	JE	
150	EQ20547_EW2-10C	Apr-03-2021	19:07:00	60%	MFA	1 x 5L	Fine to medium sand. Munsell 2.5Y 4/2 olive gray	No visible fauna	JE/AL	
151	EQ20547_EW2-10C	Apr-03-2021	19:16:00	60%	CHEM / CHEM SPR	4 x Ziploc	Fine to medium sand. Munsell 2.5Y 4/2 olive gray	No visible fauna	JE/AL	
152	EQ20547_EW2-10C	Apr-03-2021	19:36:00	50%	MFB	1 x 1L	Fine to medium sand. Munsell 2.5Y 4/2 olive gray	No visible fauna	JE/AL	
153	EQ20547_EW2-10B	Apr-03-2021	19:56:00	60%	MFA	3 x 5L	Fine to medium sand with gravel overlying anoxic black sediment. Munsell 2.5Y 4/1 dark gray	Mollusca (Bivalvia - possible <i>A. islandica</i>)	JE	<i>A. islandica</i> 3.3mm x 2.7mm x 1.5mm
154	EQ20547_EW2-10B	Apr-03-2021	20:04:00	70%	CHEM / CHEM SPR	4 x Ziploc	Fine to medium sand with gravel overlying anoxic black sediment. Munsell 2.5Y 4/1 dark gray	No visible fauna	JE	
155	EQ20547_EW2-10B	Apr-03-2021	20:18:00	90%	MFB	3 x 5L	Fine to medium sand with gravel. Munsell 2.5Y 4/1 dark gray	Annelida (Polychaeta)	JE	
156	EQ20547_EW2-10A	Apr-03-2021	20:40:00	70%	MFA	2 x 5L	Fine to medium sand with gravel. Munsell 2.5Y 5/1	No visible fauna	JE	
157	EQ20547_EW2-10A	Apr-03-2021	20:56:00	40%	NS		No sample	No sample	JE	
158	EQ20547_EW2-10A	Apr-03-2021	21:04:00	30%	NS		No sample	No sample	JE	
159	EQ20547_EW2-10A	Apr-03-2021	21:16:00	0%	NS		No sample	No sample	JE	No trigger
160	EQ20547_EW2-10A	Apr-03-2021	21:18:00	80%	CHEM / CHEM SPR	4 x Ziploc	Fine to medium sand with gravel. Munsell 2.5Y 5/1	No visible fauna	JE	
161	EQ20547_EW2-10A	Apr-03-2021	21:27:00	50%	MFB	2 x 5L	Fine to medium sand with gravel overlying darker sediment. Munsell 2.5Y 4/2 dark grayish brown	No visible fauna	JE	

APPENDIX A FIELD SAMPLING LOGS

SEABED SAMPLING LOG SHEET (Deck)										FOR-ENV-0539
Job No: 11543				Area: OCS-A 0512				Sieve Size: 0.5mm		
Project: Empire Wind Extension							Equipment: Dual Van-Veen Grab / Day Grab			
Client: Equinor Wind US LLC							Vessel: MV <i>Ocean Endeavour</i>			
Sample Number	Station Number	Date	Time	Penetration	Sample Retention	Sample Receptacle	Sediment Description	Fauna Description	Operator(s)	Comments
162	EQ20547_EW2-9	Apr-03-2021	22:15:00	80%	MFA	1 x 1L	Fine to medium sand overlying darker sediment. Munsell 2.5Y 4/2 dark grayish brown	No visible fauna	JE	
163	EQ20547_EW2-9	Apr-03-2021	22:25:00	60%	CHEM / CHEM SPR	4 x Ziploc	Fine to medium sand overlying darker sediment. Munsell 2.5Y 4/2 dark grayish brown	No visible fauna	JE/BGS	
164	EQ20547_EW2-9	Apr-03-2021	22:42:00	70%	MFB	1 x 1L	Fine to medium sand. Munsell 2.5Y 5/2 grayish brown	No visible fauna	JE/BGS	
165	EQ20547_EW2-8C	Apr-03-2021	23:32:00	80%	MFA	2 x 1L	Fine to medium sand. Munsell 2.5Y 5/3 light olive brown	Annelida (Polychaeta), Echinodermata (Clypeasteroidea), Mollusca	JE/BGS	
166	EQ20547_EW2-8C	Apr-03-2021	23:39:00	80%	CHEM / CHEM SPR	4 x Ziploc	Fine to medium sand. Munsell 2.5Y 5/3 light olive brown	Echinodermata (Clypeasteroidea)	JE/BGS	
167	EQ20547_EW2-8C	Apr-03-2021	23:53:00	90%	MFB	1 x 5L	Fine to medium sand. Munsell 2.5Y 5/3 light olive brown	Mollusca (Bivalvia - possible <i>A. islandica</i>)	JE/BGS	<i>A. islandica</i> 30mm x 20mm x 15mm
168	EQ20547_EW2-8B	Apr-04-2021	00:16:00	45%	NS		No sample	No sample	JE/BGS	Washout - shell trapped in jaws
169	EQ20547_EW2-8B	Apr-04-2021	00:28:00	90%	CHEM / CHEM SPR	4 x Ziploc	Very fine sand/silt with gravel. Munsell 2.5Y 3/1 very dark gray	No visible fauna	JE/BGS	
170	EQ20547_EW2-8B	Apr-04-2021	00:43:00	90%	MFA	4 x 5L	Very fine sand/silt with gravel. Munsell 2.5Y 3/1 very dark gray	No visible fauna	JE/BGS	
171	EQ20547_EW2-8B	Apr-04-2021	00:54:00	90%	MFB	2 x 5L	Very fine sand/silt with gravel. Munsell 2.5Y 3/1 very dark gray	No visible fauna	JE/BGS	
172	EQ20547_EW2-8A	Apr-04-2021	01:36:00	10%	NS		No sample	No sample	JE/BGS	
173	EQ20547_EW2-8A	Apr-04-2021	01:46:00	50%	MFA	2 x 5L	Fine to medium sand with gravel and shell fragments. Munsell 2.5Y 3/1 very dark gray	Annelida (Polychaeta)	JE/BGS	
174	EQ20547_EW2-8A	Apr-04-2021	01:54:00	0%	NS		No sample	No sample	JE/BGS	
175	EQ20547_EW2-8A	Apr-04-2021	01:56:00	50%	CHEM / CHEM SPR	4 x Ziploc	Fine to medium sand with gravel and shell fragments. Munsell 2.5Y 3/1 very dark gray	Annelida (Polychaeta)	JE/BGS	
176	EQ20547_EW2-8A	Apr-04-2021	02:14:00	70%	MFB	3 x 5L	Fine to medium sand with gravel. Munsell 2.5Y 4/3 olive brown	No visible fauna	JE/BGS	
177	EQ20547_EW2-7C	Apr-04-2021	02:37:00	90%	MFA	2 x 5L	Fine to medium sand. Munsell 2.5Y 4/2 dark grayish brown	Annelida (<i>Lanice</i> sp.), Echinodermata (Clypeasteroidea)	JE/BGS	
178	EQ20547_EW2-7C	Apr-04-2021	02:51:00	90%	CHEM / CHEM SPR	4 x Ziploc	Fine to medium sand. Munsell 2.5Y 4/2 dark grayish brown	No visible fauna	JE/BGS	
179	EQ20547_EW2-7C	Apr-04-2021	03:06:00	80%	MFB	2 x 5L	Fine to medium sand. Munsell 2.5Y 4/2 dark grayish brown	No visible fauna	JE/BGS	
180	EQ20547_EW2-7B	Apr-04-2021	03:28:00	80%	MFA	1 x 5L	Fine to medium sand. Munsell 2.5Y 4/2 dark grayish brown	Echinodermata (Clypeasteroidea)	JE/BGS	
181	EQ20547_EW2-7B	Apr-04-2021	03:42:00	70%	CHEM / CHEM SPR	4 x Ziploc	Fine to medium sand. Munsell 2.5Y 4/2 dark grayish brown	No visible fauna	JE/BGS	

APPENDIX A FIELD SAMPLING LOGS

SEABED SAMPLING LOG SHEET (Deck)										FOR-ENV-0539
Job No: 11543				Area: OCS-A 0512				Sieve Size: 0.5mm		
Project: Empire Wind Extension								Equipment: Dual Van-Veen Grab / Day Grab		
Client: Equinor Wind US LLC								Vessel: MV <i>Ocean Endeavour</i>		
Sample Number	Station Number	Date	Time	Penetration	Sample Retention	Sample Receptacle	Sediment Description	Fauna Description	Operator(s)	Comments
182	EQ20547_EW2-7B	Apr-04-2021	03:53:00	70%	MFB	1 x 5L	Fine to medium sand. Munsell 2.5Y 4/2 dark grayish brown	No visible fauna	JE/BGS	
183	EQ20547_EW2-7A	Apr-04-2021	04:23:00	80%	MFA	1 x 5L	Fine to medium sand with gravel and pebbles. Munsell 5Y 4/2 olive gray	No visible fauna	WA/JB	
184	EQ20547_EW2-7A	Apr-04-2021	04:33:00	60%	CHEM / CHEM SPR	4 x Ziploc	Fine to medium sand with gravel and pebbles. Munsell 5Y 4/2 olive gray	Echinodermata (Clypeasteroidea, Echinoidea)	WA/JB	
185	EQ20547_EW2-7A	Apr-04-2021	04:49:00	60%	MFB	1 x 5L	Fine to medium sand with gravel and pebbles. Munsell 5Y 4/2 olive gray	Annelida (<i>Lanice</i> sp.), Echinodermata (Clypeasteroidea)	WA/JB	
186	EQ20547_EW2-6C	Apr-04-2021	05:36:00	30%	NS		Silty sand with clay	No sample	WA/JB	Low retention
187	EQ20547_EW2-6C	Apr-04-2021	05:44:00	50%	MFA	1 x 5L	Silty sand with clay, gravel and shell hash. Munsell: 2.5Y 4/3 olive brown	No visible fauna	WA/JB	
188	EQ20547_EW2-6C	Apr-04-2021	05:54:00	60%	CHEM / CHEM SPR	4 x Ziploc	Silty sand with clay, gravel and shell hash. Munsell: 2.5Y 4/3 olive brown	No visible fauna	WA/JB	
189	EQ20547_EW2-6C	Apr-04-2021	06:10:00	50%	MFB	2 x 5L	Silty sand with clay, gravel and shell hash. Munsell: 2.5Y 4/3 olive brown	Mollusca (Gastropoda)	WA/JB	No sieve photo
190	EQ20547_EW2-6B	Apr-04-2021	06:41:00	60%	MFA	1 x 5L	Fine to medium sand with shell hash. Munsell: 2.5Y 5/3 light olive brown	Annelida (Polychaeta), Mollusca (Gastropoda)	WA/JB	
191	EQ20547_EW2-6B	Apr-04-2021	06:51:00	60%	CHEM / CHEM SPR	4 x Ziploc	Fine to medium sand with shell hash. Munsell: 2.5Y 5/3 light olive brown	No visible fauna	WA/JB	
192	EQ20547_EW2-6B	Apr-04-2021	07:08:00	70%	MFB	1 x 5L	Fine to medium sand with shell hash. Munsell: 2.5Y 5/3 light olive brown	Echinodermata (Clypeasteroidea)	WA/JB	
193	EQ20547_EW2-6A	Apr-04-2021	07:41:00	80%	MFA	1 x 5L	Fine to medium sand. Munsell: 2.5Y 5/3 light olive brown	Echinodermata (Clypeasteroidea)	WA/JB	
194	EQ20547_EW2-6A	Apr-04-2021	07:48:00	70%	CHEM / CHEM SPR	4 x Ziploc	Fine to medium sand. Munsell: 2.5Y 5/3 light olive brown	Echinodermata (Clypeasteroidea), Mollusca (Gastropoda)	WA/JB	
195	EQ20547_EW2-6A	Apr-04-2021	08:02:00	80%	MFB	1 x 5L	Fine to medium sand. Munsell: 2.5Y 5/3 light olive brown	Annelida (Polychaeta), Echinodermata (Clypeasteroidea)	WA/JB	
196	EQ20547_EW2-5C	Apr-04-2021	08:52:00	30%	NS		No sample	No sample	WA/JB	Gravel/shells stuck in jaws
197	EQ20547_EW2-5C	Apr-04-2021	09:00:00	60%	MFA	4 x 5L	Silty sand with gravel and shells. Munsell: 2.5Y 4/1 dark gray	No visible fauna	WA/JB	
198	EQ20547_EW2-5C	Apr-04-2021	09:08:00	60%	CHEM / CHEM SPR	4 x Ziploc	Silty sand with gravel and shells. Munsell: 2.5Y 4/1 dark gray	No visible fauna	WA/JB	
199	EQ20547_EW2-5C	Apr-04-2021	09:27:00	0%	NS		No sample	No sample	WA/JB	Shell stuck in jaws
200	EQ20547_EW2-5C	Apr-04-2021	09:37:00	30%	NS		No sample	No sample	WA/JB	Crab stuck in jaws
201	EQ20547_EW2-5C	Apr-04-2021	09:45:00	50%	MFB	2 x 5L	Silty sand with gravel, pebbles and shells. Munsell: 2.5Y 4/1 dark gray	Annelida (Polychaeta)	WA/JB	
202	EQ20547_EW2-5B	Apr-04-2021	10:10:00	50%	MFA	1 x 1L	Silty sand. Munsell: 5Y 3/2 dark olive gray	Echinodermata (Clypeasteroidea)	WA/JB	

APPENDIX A FIELD SAMPLING LOGS

SEABED SAMPLING LOG SHEET (Deck)										FOR-ENV-0539
Job No: 11543				Area: OCS-A 0512				Sieve Size: 0.5mm		
Project: Empire Wind Extension							Equipment: Dual Van-Veen Grab / Day Grab			
Client: Equinor Wind US LLC							Vessel: MV <i>Ocean Endeavour</i>			
Sample Number	Station Number	Date	Time	Penetration	Sample Retention	Sample Receptacle	Sediment Description	Fauna Description	Operator(s)	Comments
203	EQ20547_EW2-5B	Apr-04-2021	10:17:00	70%	CHEM / CHEM SPR	4 x Ziploc	Silty sand. Munsell: 5Y 3/2 dark olive gray	Echinodermata (Clypeasteroidea)	WA/MG	
204	EQ20547_EW2-5B	Apr-04-2021	10:32:00	60%	MFB	1 x 1L	Silty sand. Munsell: 5Y 3/2 dark olive gray	Echinodermata (Clypeasteroidea)	WA/MG	
205	EQ20547_EW2-5A	Apr-04-2021	11:26:00	50%	MFA	1 x 1L	Silty sand. Munsell: 2.5Y 4/2 dark grayish brown	Annelida (Polychaeta)	WA/MG	
206	EQ20547_EW2-5A	Apr-04-2021	11:34:00	50%	CHEM / CHEM SPR	4 x Ziploc	Silty sand. Munsell: 2.5Y 4/2 dark grayish brown	Echinodermata (Clypeasteroidea)	WA/MG	
207	EQ20547_EW2-5A	Apr-04-2021	11:48:00	50%	MFB	1 x 1L	Silty sand. Munsell: 2.5Y 4/2 dark grayish brown	Annelida (Polychaeta), Echinodermata (Clypeasteroidea)	WA/MG	
208	EQ20547_EW2-4	Apr-04-2021	12:29:00	70%	MFA	1 x 5L	Fine to medium sand with shell hash. Munsell: 2.5Y 6/3 light yellowish brown	Echinodermata (Clypeasteroidea)	WA/MG	
209	EQ20547_EW2-4	Apr-04-2021	12:41:00	70%	CHEM / CHEM SPR	4 x Ziploc	Fine to medium sand with shell hash. Munsell: 2.5Y 6/3 light yellowish brown	No visible fauna	WA/MG	
210	EQ20547_EW2-4	Apr-04-2021	12:52:00	80%	MFB	1 x 5L	Fine to medium sand with shell hash. Munsell: 2.5Y 6/3 light yellowish brown	No visible fauna	WA/MG	No sieve photo
211	EQ20547_EW2-3C	Apr-04-2021	13:22:00	60%	MFA	2 x 5L	Fine sand with shell fragments, pebbles, gravel and clay. Munsell: 2.5Y 3/3 dark olive brown	Annelida (Polychaeta)	WA/JB	No sieve photo
212	EQ20547_EW2-3C	Apr-04-2021	13:32:00	30%	NS		No sample	No sample	WA/JB	Gravel stuck in jaws
213	EQ20547_EW2-3C	Apr-04-2021	13:40:00	30%	NS		No sample	No sample	WA/JB	Gravel stuck in jaws
214	EQ20547_EW2-3C	Apr-04-2021	13:48:00	60%	CHEM / CHEM SPR	4 x Ziploc	Fine sand with shell fragments, pebbles, gravel and clay. Munsell: 2.5Y 3/3 dark olive brown	No visible fauna	WA/JB	
215	EQ20547_EW2-3C	Apr-04-2021	14:03:00	50%	MFB	2 x 5L	Fine sand with shell fragments, pebbles, gravel and clay. Munsell: 2.5Y 3/3 dark olive brown	No visible fauna	WA/JB	
216	EQ20547_EW2-3B	Apr-04-2021	14:30:00	50%	MFA	1 x 1L	Fine sand. Munsell: 2.5Y 4/2 dark grayish brown	Arthropoda (Paguroidea), Echinodermata (Clypeasteroidea)	WA/JB	
217	EQ20547_EW2-3B	Apr-04-2021	14:39:00	60%	CHEM / CHEM SPR	4 x Ziploc	Fine sand. Munsell: 2.5Y 4/2 dark grayish brown	Echinodermata (Clypeasteroidea)	WA/JB	
218	EQ20547_EW2-3B	Apr-04-2021	14:58:00	50%	MFB	1 x 1L	Fine sand. Munsell: 2.5Y 4/2 dark grayish brown	Echinodermata (Clypeasteroidea)	WA/JB	
219	EQ20547_EW2-3A	Apr-04-2021	15:20:00	60%	MFA	1 x 1L	Fine sand. Munsell: 2.5Y 4/2 dark grayish brown	Echinodermata (Clypeasteroidea)	WA/JB	
220	EQ20547_EW2-3A	Apr-04-2021	15:29:00	50%	CHEM / CHEM SPR	4 x Ziploc	Fine sand. Munsell: 2.5Y 4/2 dark grayish brown	Echinodermata (Clypeasteroidea)	WA/JB	
221	EQ20547_EW2-3A	Apr-04-2021	15:46:00	50%	MFB	1 x 1L	Fine sand. Munsell: 2.5Y 4/2 dark grayish brown	Annelida (Polychaeta), Echinodermata (Clypeasteroidea)	WA/JB	

APPENDIX A FIELD SAMPLING LOGS

SEABED SAMPLING LOG SHEET (Deck)										FOR-ENV-0539
Job No: 11543				Area: OCS-A 0512				Sieve Size: 0.5mm		
Project: Empire Wind Extension							Equipment: Dual Van-Veen Grab / Day Grab			
Client: Equinor Wind US LLC							Vessel: MV <i>Ocean Endeavour</i>			
Sample Number	Station Number	Date	Time	Penetration	Sample Retention	Sample Receptacle	Sediment Description	Fauna Description	Operator(s)	Comments
222	EQ20547_EW2-2C	Apr-04-2021	16:26:00	70%	MFA	1 x 1L	Fine sand. Munsell: 2.5Y 5/2 grayish brown	No visible fauna	JE	
223	EQ20547_EW2-2C	Apr-04-2021	16:36:00	60%	CHEM / CHEM SPR	4 x Ziploc	Fine sand. Munsell: 2.5Y 5/2 grayish brown	Annelida (Polychaeta), Arthropoda (Crustacea), Echinodermata (Clypeasteroidea)	JE	Bungee added to grab
224	EQ20547_EW2-2C	Apr-04-2021	17:00:00	60%	MFB	1 x 1L	Fine sand. Munsell: 2.5Y 4/2 dark grayish brown	Annelida (Polychaeta), Mollusca	JE	
225	EQ20547_EW2-2A	Apr-04-2021	17:29:00	60%	MFA	1 x 1L	Fine sand. Munsell: 2/5Y 5/3 light olive brown	Echinodermata (Clypeasteroidea)	JE	
226	EQ20547_EW2-2A	Apr-04-2021	17:35:00	50%	CHEM / CHEM SPR	4 x Ziploc	Fine sand. Munsell: 2/5Y 5/3 light olive brown	No visible fauna	JE	
227	EQ20547_EW2-2A	Apr-04-2021	17:47:00	50%	MFB	1 x 1L	Fine sand. Munsell: 2/5Y 5/2 grayish brown	Echinodermata (Clypeasteroidea)	JE	
228	EQ20547_EW2-2B	Apr-04-2021	18:11:00	40%	NS		No sample	No sample	JE	Low retention
229	EQ20547_EW2-2B	Apr-04-2021	18:19:00	40%	NS		No sample	No sample	JE	Low retention. Added weights
230	EQ20547_EW2-2B	Apr-04-2021	18:40:00	40%	MFA	1 x 1L	Fine, dense sand. Munsell: 2/5Y 5/2 grayish brown	No visible fauna	JE	Low retention but verbally accepted by onboard client rep
231	EQ20547_EW2-2B	Apr-04-2021	18:49:00	40%	MFB	1 x 1L	Fine, dense sand. Munsell: 2/5Y 5/2 grayish brown	No visible fauna	JE	Low retention but verbally accepted by onboard client rep
232	EQ20547_EW2-2B	Apr-04-2021	19:10:00	40%	CHEM / CHEM SPR	4 x Ziploc	Fine, dense sand. Munsell: 2/5Y 5/2 grayish brown	No visible fauna	JE	Low retention but verbally accepted by onboard client rep
233	EQ20547_BW1-4C	Apr-15-2021	05:09:00	>100%	NS		Very fine muddy sand. Munsell: 2.5Y 2.5/1 black	No sample	AM	Overfull, sample rejected, removed two weights from day grab
234	EQ20547_BW1-4C	Apr-15-2021	05:23:00	>100%	NS		Very fine muddy sand. Munsell: 2.5Y 2.5/1 black	No sample	AM	Overfull, sample rejected, removed two weights from day grab
235	EQ20547_BW1-4C	Apr-15-2021	05:34:00	95	MFA	1 x 1L	Very fine muddy sand. Munsell: 2.5Y 2.5/1 black	Annelida (Polychaeta)	AM	
236	EQ20547_BW1-4C	Apr-15-2021	05:45:00	95	CHEM / CHEM SPR	4 x Ziploc	Very fine muddy sand. Munsell: 2.5Y 2.5/1 black	No visible fauna	AM	
237	EQ20547_BW1-4C	Apr-15-2021	06:06:00	>100%	NS		Very fine muddy sand. Munsell: 2.5Y 2.5/1 black	No sample	AM	Overfull, sample rejected, removed all weights from Day grab
238	EQ20547_BW1-4C	Apr-15-2021	06:14:00	95%	MFB	1 x 1L	Very fine muddy sand. Munsell: 2.5Y 2.5/1 black	Annelida (Polychaeta)	AM	
239	EQ20547_BW1-4B	Apr-15-2021	06:50:00	95%	MFA	1 x 1L	Very fine muddy sand. Munsell: 2.5Y 2.5/1 black	Annelida (Polychaeta)	AM	
240	EQ20547_BW1-4B	Apr-15-2021	07:00:00	95%	CHEM / CHEM SPR	4 x Ziploc	Very fine muddy sand. Munsell: 2.5Y 2.5/1 black	No visible fauna	AM	
241	EQ20547_BW1-4B	Apr-15-2021	07:15:00	95%	MFB	1 x 1L	Very fine muddy sand. Munsell: 2.5Y 2.5/1 black	Annelida (Polychaeta)	AM	No sieve photo

APPENDIX A FIELD SAMPLING LOGS

SEABED SAMPLING LOG SHEET (Deck)										FOR-ENV-0539
Job No: 11543				Area: OCS-A 0512				Sieve Size: 0.5mm		
Project: Empire Wind Extension				Equipment: Dual Van-Veen Grab / Day Grab						
Client: Equinor Wind US LLC				Vessel: MV <i>Ocean Endeavour</i>						
Sample Number	Station Number	Date	Time	Penetration	Sample Retention	Sample Receptacle	Sediment Description	Fauna Description	Operator(s)	Comments
242	EQ20547_BW1-4A	Apr-15-2021	08:06:00	95%	MFA	1 x 1L	Very fine muddy sand. Munsell: 2.5Y 3/2 very dark grayish brown	Annelida (Polychaeta), Mollusca (Bivalvia)	AM	
243	EQ20547_BW1-4A	Apr-15-2021	08:20:00	95%	CHEM / CHEM SPR	4 x Ziploc	Very fine muddy sand. Munsell: 2.5Y 3/2 very dark grayish brown	No visible fauna	AM	
244	EQ20547_BW1-4A	Apr-15-2021	08:41:00	95%	MFB	1 x 1L	Very fine muddy sand. Munsell: 2.5Y 3/2 very dark grayish brown	Annelida (Polychaeta), Mollusca (Bivalvia)	AM	
245	EQ20547_BW1-2C	Apr-15-2021	10:58:00	50%	MFA	2 x 5L	Medium sand. Munsell: 2.5Y 4/3 olive brown	Echinodermata (Clypeasteroida), Annelida (Polychaeta)	AM	All weights added to the Day grab before deployment
246	EQ20547_BW1-2C	Apr-15-2021	11:07:00	70%	CHEM / CHEM SPR	4 x Ziploc	Medium sand. Munsell: 2.5Y 4/3 olive brown	No visible fauna	AM	
247	EQ20547_BW1-2C	Apr-15-2021	11:22:00	60%	MFB	2 x 5L	Medium sand. Munsell: 2.5Y 4/3 olive brown	Echinodermata (Clypeasteroida), Annelida (Polychaeta), Mollusca (Bivalvia)	AM	No sieve photo
248	EQ20547_BW1-2B-1	Apr-15-2021	12:03:00	<40%	NS		No sample	No sample	AM	Low retention
249	EQ20547_BW1-2B-1	Apr-15-2021	12:10:00	70%	MFA	3 x 5L	Gravelly sand. Munsell: 2.5Y 3/3 dark olive brown	Annelida (Polychaeta)	AM	No sieve photo
250	EQ20547_BW1-2B-1	Apr-15-2021	12:19:00	<40%	NS		No sample	No sample	AM	Partial washout, grab did not close properly due to gravel
251	EQ20547_BW1-2B-1	Apr-15-2021	12:26:00	<40%	NS		No sample	No sample	AM	Partial washout, grab did not close properly due to gravel, station relocated
252	EQ20547_BW1-2B-1	Apr-15-2021	12:31:00	0%	NS		No sample	No sample	AM	
253	EQ20547_BW1-2B-1A	Apr-15-2021	12:54:00	<10%	NS		No sample	No sample	AM	Washout, grab did not close properly due to gravel
254	EQ20547_BW1-2B-1A	Apr-15-2021	13:01:00	<10%	NS		No sample	No sample	AM	Washout, grab did not close properly due to gravel
255	EQ20547_BW1-2B-1A	Apr-15-2021	13:07:00	60%	MFB	3 x 5L	Gravelly sand. Munsell: 2.5Y 3/3 dark olive brown	Annelida (Polychaeta)	AM	No sieve photo
256	EQ20547_BW1-2B-1A	Apr-15-2021	13:19:00	<10%	NS		No sample	No sample	AM	Washout, grab did not close properly due to gravel
257	EQ20547_BW1-2A	Apr-15-2021	14:06:00	90%	MFA	3 x 5L	Muddy coarse sand. Munsell: 2.5Y 4/2 dark grayish brown	Annelida (Polychaeta)	AM	
258	EQ20547_BW1-2A	Apr-15-2021	14:15:00	60%	CHEM / CHEM SPR	4 x Ziploc	Muddy coarse sand. Munsell: 2.5Y 4/2 dark grayish brown	Annelida (Polychaeta)	AM	
259	EQ20547_BW1-2A	Apr-15-2021	14:34:55	0%	NS		No sample	No sample	AM	Washout - shell trapped in jaws
260	EQ20547_BW1-2A	Apr-15-2021	14:40:46	60%	NS		Muddy coarse sand. Munsell: 2.5Y 4/2 dark grayish brown	No sample	AM	Partial washout, grab did not close properly due to gravel
261	EQ20547_BW1-2A	Apr-15-2021	14:48:00	70%	MFB	3 x 5L	Muddy coarse sand. Munsell: 2.5Y 4/2 dark grayish brown	Annelida (Polychaeta)	AM	

APPENDIX A FIELD SAMPLING LOGS

SEABED SAMPLING LOG SHEET (Deck)										FOR-ENV-0539	
Job No: 11543				Area: OCS-A 0512				Sieve Size: 0.5mm			
Project: Empire Wind Extension								Equipment: Dual Van-Veen Grab / Day Grab			
Client: Equinor Wind US LLC								Vessel: MV <i>Ocean Endeavour</i>			
Sample Number	Station Number	Date	Time	Penetration	Sample Retention	Sample Receptacle	Sediment Description	Fauna Description	Operator(s)	Comments	
262	EQ20547_BW1-3-1	Apr-17-2021	17:10:00	60%	MFA	3 x 5L	Coarse sand and gravel. Munsell: 2.5Y, 4/1 dark gray	Annelida (Polychaeta), Arthropoda (Crustacea), Mollusca	JE		
263	EQ20547_BW1-3-1	Apr-17-2021	17:20:00	80%	CHEM / CHEM SPR	4 x Ziploc	Coarse sand and gravel. Munsell: 2.5Y 4/1 dark gray	No visible fauna	JE		
264	EQ20547_BW1-3-1	Apr-17-2021	17:35:00	80%	MFB	3 x 5L	Coarse sand and gravel. Munsell: 2.5Y 4/1 dark gray	No visible fauna	JE		



APPENDIX A FIELD SAMPLING LOGS

Gardline																	Seafloor Sampling Positioning Summary						
Job No		11543							Vessel		MV <i>Ocean Endeavour</i>												
Client		Equinor US Wind LLC							Vessel Reference Point (VRP)		COG												
Project Name		Empire Wind Extension							Deployment Location		CTD Node			x	-0.01		y	-36.91		z	4.09		
Primary Positioning System		Starpack 1							Actual Coordinates derived from		Deployment Location												
Geodetic Reference System		Datum	NAD 83				Ellipsoid	GRS 80				Projection	UTM ZONE 18 N (75W)				Vertical / Tidal Datum		NAVD 88				
Date	Time (UTC/GMT)	Fix number	Station Number	Penetration	Sample Retention	Retention	Observed Seafloor Depth (m)	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks						
								Easting	Northing	Easting	Northing	dE	dN	Range	Bearing								
Jan-01-2021	22:32:00	1	EQ20547_EW2-16				34.85	646314	4465826	646326	4465825	-12	1	12	275	CS	At surface						
	22:34:00	2					34.96	646313	4465823	646326	4465825	-13	-2	13	262	CS	At depth						
	22:37:00	3					34.83	646306	4465815	646326	4465825	-20	-10	22	244	CS	At surface						
Jan-08-2021	22:11:00	4	EQ20547_EW2-15B				33.39	644754	4467411	644751	4467414	3	-3	4	135	CS	Grab deployment location used, due to vessel hydraulic issue At surface						
	22:14:00	5					33.35	644754	4467417	644751	4467414	3	3	4	49	CS	Grab deployment location used, due to vessel hydraulic issue At depth						
	22:18:00	6					33.36	644754	4467412	644751	4467414	3	-2	4	131	CS	Grab deployment location used, due to vessel hydraulic issue At surface						
Apr-04-2021	23:10:00	7	EQ20547_EW2-2B				19.48	627580	4485175	627447	4485175	133	0	133	90	MNM	Aborted						
Apr-05-2021	00:20:00	8					19.88	627444	4485170	627447	4485175	-3	-5	6	208	MNM	Vessel decluthed and drifting At surface						
Apr-05-2021	00:24:00	9					19.71	627482	4485211	627447	4485175	35	36	50	45	MNM	Vessel decluthed and drifting At depth						
Apr-05-2021	00:26:00	10					19.83	627452	4485209	627447	4485175	5	34	34	9	MNM	Vessel decluthed and drifting At surface						
Apr-05-2021	01:26:00	11	EQ20547_EW2-3B				23.91	628506	4484100	628500	4484104	6	-4	7	124	MNM	At surface						
Apr-05-2021	01:30:00	12					23.88	628511	4484096	628500	4484104	11	-8	14	127	MNM	At depth						
Apr-05-2021	01:34:00	13					23.88	628506	4484109	628500	4484104	6	5	8	54	MNM	At surface						
Apr-05-2021	02:26:00	14	EQ20547_EW2-4				21	629498	4483109	629495	4483108	3	1	3	77	MNM	At surface						
Apr-05-2021	02:29:00	15					21	629497	4483109	629495	4483108	2	1	3	64	MNM	At depth						
Apr-05-2021	02:32:00	16					21	629497	4483107	629495	4483108	2	-1	2	113	MNM	At surface						
Apr-05-2021	03:54:00	17	EQ20547_EW2-7B				29	634297	4478127	634296	4478127	1	0	1	89	MNM	At surface						
Apr-05-2021	04:01:00	18					29	634295	4478126	634296	4478127	-1	-1	2	224	MNM	At depth						
Apr-05-2021	04:03:00	19					29	634296	4478126	634296	4478127	0	-1	1	220	MNM	At surface						
Apr-05-2021	05:11:00	20	EQ20547_EW2-8B				29	634905	4477550	634903	4477552	2	-2	3	132	CS	At surface						
Apr-05-2021	05:16:00	21					29	634904	4477551	634903	4477552	1	-1	2	134	CS	At depth						
Apr-05-2021	05:21:00	22					29	634901	4477552	634903	4477552	-2	0	2	256	CS	At surface						
Apr-05-2021	06:26:00	23	EQ20547_EW2-9				31	637064	4475301	637061	4475304	3	-3	4	132	CS	At surface						
Apr-05-2021	06:33:00	24					31	637063	4475305	637061	4475304	2	1	2	57	CS	At depth						
Apr-05-2021	06:38:00	25					31	637060	4475305	637061	4475304	-1	1	1	335	CS	At surface						



APPENDIX A FIELD SAMPLING LOGS

Gardline																	Seafloor Sampling Positioning Summary								
Job No		11543							Vessel		MV <i>Ocean Endeavour</i>														
Client		Equinor US Wind LLC							Vessel Reference Point (VRP)		COG														
Project Name		Empire Wind Extension							Deployment Location		CTD Node				x	-0.01		y	-36.91		z	4.09			
Primary Positioning System		Starpack 1							Actual Coordinates derived from		Deployment Location														
Geodetic Reference System		Datum		NAD 83				Ellipsoid	GRS 80					Projection		UTM ZONE 18 N (75W)					Vertical / Tidal Datum		NAVD 88		
Date	Time (UTC/GMT)	Fix number	Station Number	Penetration	Sample Retention	Retention	Observed Seafloor Depth (m)	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks								
								Easting	Northing	Easting	Northing	dE	dN	Range	Bearing										
Apr-05-2021	07:50:00	26	EQ20547_EW2-10B				32	638424	4473900	638423	4473916	1	-16	16	177	CS	At surface								
Apr-05-2021	07:58:00	27					32	638432	4473910	638423	4473916	9	-6	11	126	CS	At depth								
Apr-05-2021	08:06:00	28					32	638430	4473934	638423	4473916	7	18	20	22	CS	At surface								
Apr-05-2021	09:07:00	29	EQ20547_EW2-11				30	639875	4472431	639855	4472408	20	23	31	40	CS	Current impacting vessel position towards the end of observation At surface								
Apr-05-2021	09:14:00	30					30	639853	4472404	639855	4472408	-2	-4	4	209	CS	Current impacting vessel position towards the end of observation At depth								
Apr-05-2021	09:22:00	31					30	639945	4472507	639855	4472408	90	99	134	42	CS	Current impacting vessel position towards the end of observation At surface								
Apr-05-2021	10:30:00	32	EQ20547_EW2-12B				34	640949	4471374	640931	4471363	18	11	21	59	CS	At surface								
Apr-05-2021	10:36:00	33					34	640976	4471392	640931	4471363	45	29	54	57	CS	At depth								
Apr-05-2021	10:45:00	34					34	640977	4471356	640931	4471363	46	-7	47	99	CS	At surface								
Apr-05-2021	11:44:00	35	EQ20547_EW2-13B				33	642707	4469545	642660	4469529	47	16	50	71	CS	At surface								
Apr-05-2021	11:50:00	36					33	642711	4469544	642660	4469529	51	15	53	74	CS	At depth								
Apr-05-2021	11:59:00	37					33	642708	4469517	642660	4469529	48	-12	50	104	CS	At surface								
Apr-05-2021	21:46:00	38	EQ20547_EW2-16-1				35	646336	4465826	646326	4465825	10	1	10	85	MNM	At surface								
Apr-05-2021	21:50:00	39					35	646357	4465830	646326	4465825	31	5	31	80	MNM	At depth								
Apr-05-2021	21:55:00	40					35	646337	4465824	646326	4465825	11	-2	11	98	MNM	At surface								
Apr-05-2021	22:49:00	41	EQ20547_EW2-15B-1				33	644732	4467384	644751	4467414	-19	-30	35	212	MNM	At surface								
Apr-05-2021	22:54:00	42					33	644768	4467407	644751	4467414	17	-8	19	114	MNM	At depth								
Apr-05-2021	22:59:00	43					33	644739	4467395	644751	4467414	-12	-19	22	212	MNM	At surface								
Apr-05-2021	23:40:00	44	EQ20547_EW2-14B				35	643875	4468456	643873	4468469	2	-13	13	171	MNM	At surface								
Apr-05-2021	23:48:00	45					35	643880	4468451	643873	4468469	7	-18	19	160	MNM	At depth								
Apr-05-2021	23:53:00	46					35	643873	4468440	643873	4468469	0	-29	29	180	MNM	At surface								
Apr-14-2021	14:50:00	47	EQ20547_EW2-5B				25	630800	4481729	630814	4481716	-14	13	19	314	VRN	At surface								
Apr-14-2021	14:53:00	48					26	630787	4481716	630814	4481716	-27	0	27	269	VRN	At depth								
Apr-14-2021	14:56:00	49					26	630805	4481711	630814	4481716	-9	-5	10	241	VRN	At surface								
Apr-14-2021	15:27:00	50	EQ20547_EW2-6B				24	632395	4480139	632401	4480131	-6	8	10	321	VRN	At surface								
Apr-14-2021	15:31:00	51					24	632373	4480113	632401	4480131	-28	-18	33	238	VRN	At depth								
Apr-14-2021	15:34:00	52					24	632410	4480071	632401	4480131	9	-60	61	172	VRN	At surface								



APPENDIX A FIELD SAMPLING LOGS

Gardline																	Seafloor Sampling Positioning Summary						
Job No			11543						Vessel		MV <i>Ocean Endeavour</i>												
Client			Equinor US Wind LLC						Vessel Reference Point (VRP)		COG												
Project Name			Empire Wind Extension						Deployment Location		CTD Node				x	-0.01	y	-36.91		z	4.09		
Primary Positioning System			Starpack 1						Actual Coordinates derived from		Deployment Location												
Geodetic Reference System			Datum		NAD 83			Ellipsoid	GRS 80				Projection		UTM ZONE 18 N (75W)				Vertical / Tidal Datum		NAVD 88		
Date	Time (UTC/GMT)	Fix number	Station Number	Penetration	Sample Retention	Retention	Observed Seafloor Depth (m)	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks						
								Easting	Northing	Easting	Northing	dE	dN	Range	Bearing								
Apr-14-2021	16:17:00	53	EQ20547_EW2-6B				24	632406	4480138	632401	4480131	5	7	9	36	VRN	At surface						
Apr-14-2021	16:27:00	54					24	632400	4480137	632401	4480131	-1	6	6	348	VRN	At depth						
Apr-14-2021	16:31:00	55					24	632405	4480130	632401	4480131	4	-1	4	102	VRN	At surface						
Apr-15-2021	17:44:00	56	EQ20547_BW1-2B1				23	591210	4452294	591209	4452287	1	7	7	6	AOR	At surface						
Apr-15-2021	17:46:00	57					23	591207	4452291	591209	4452287	-2	4	5	329	AOR	At depth						
Apr-15-2021	17:48:00	58					23	591207	4452294	591209	4452287	-2	7	8	346	AOR	At surface						
Apr-17-2021	19:35:00	59	EQ20547_BW1-3-1				36	603327	4453012	603328	4453004	-1	8	8	353	AOR	At surface						
Apr-17-2021	19:38:00	60					36	603326	4453007	603328	4453004	-2	3	4	328	AOR	At depth						
Apr-17-2021	19:40:00	61					36	603330	4453005	603328	4453004	2	1	2	56	AOR	At surface						
Apr-17-2021	21:34:00	62	EQ20547_BW1-4B				62	605629	4453057	605630	4453047	-1	10	10	356	AOR	At surface						
Apr-17-2021	21:37:00	63					62	605637	4453044	605630	4453047	7	-3	7	114	AOR	At depth						
Apr-17-2021	21:41:00	64					61	605691	4453057	605630	4453047	61	10	62	81	AOR	At surface						
Apr-17-2021	23:15:00	65	EQ20547_BW1-5-1				31	614015	4454368	614021	4454375	-6	-7	9	219	AOR	At surface						
Apr-17-2021	23:18:00	66					31	614025	4454372	614021	4454375	4	-3	5	124	AOR	At depth						
Apr-17-2021	23:20:00	67					31	614025	4454372	614021	4454375	4	-4	5	132	AOR	At surface						
Apr-18-2021	00:23:00	68	EQ20547_BW1-6-1				30	618251	4454840	618253	4454843	-2	-3	3	219	AOR	At surface						
Apr-18-2021	00:30:00	69					30	618254	4454850	618253	4454843	1	7	7	9	AOR	At depth						
Apr-18-2021	00:32:00	70					30	618255	4454840	618253	4454843	2	-2	3	138	AOR	At surface						
Apr-18-2021	01:31:00	71	EQ20547_BW1-7B				30	622403	4455315	622402	4455311	1	4	4	14	AOR	At surface						
Apr-18-2021	01:38:00	72					30	622402	4455313	622402	4455311	0	2	2	13	AOR	At depth						
Apr-18-2021	01:40:00	73					30	622404	4455311	622402	4455311	2	0	2	101	AOR	At surface						
Apr-18-2021	02:27:00	74	EQ20547_BW1-8B				31	624555	4455554	624551	4455552	4	2	4	62	AOR	At surface						
Apr-18-2021	02:29:00	75					31	624552	4455550	624551	4455552	1	-2	3	159	AOR	At depth						
Apr-18-2021	02:31:00	76					31	624550	4455551	624551	4455552	-1	-1	2	213	AOR	At surface						
Apr-18-2021	03:21:00	77	EQ20547_BW1-9B				32	627787	4455905	627786	4455904	1	1	2	60	AOR	At surface						
Apr-18-2021	03:23:00	78					32	627788	4455904	627786	4455904	2	0	2	89	AOR	At depth						
Apr-18-2021	03:26:00	79					32	627786	4455905	627786	4455904	0	1	1	336	AOR	At surface						



APPENDIX A FIELD SAMPLING LOGS

Gardline																		Seafloor Sampling Positioning Summary							
Job No			11543							Vessel		MV <i>Ocean Endeavour</i>													
Client			Equinor US Wind LLC							Vessel Reference Point (VRP)		COG													
Project Name			Empire Wind Extension							Deployment Location		CTD Node				x	-0.01	y	-36.91	z	4.09				
Primary Positioning System			Starpack 1							Actual Coordinates derived from		Deployment Location													
Geodetic Reference System			Datum		NAD 83				Ellipsoid	GRS 80					Projection	UTM ZONE 18 N (75W)					Vertical / Tidal Datum		NAVD 88		
Date	Time (UTC/GMT)	Fix number	Station Number	Penetration	Sample Retention	Retention	Observed Seafloor Depth (m)	Actual coordinates		Target coordinates		Offset from target				Surveyor	Remarks								
								Easting	Northing	Easting	Northing	dE	dN	Range	Bearing										
Apr-18-2021	04:22:00	80	EQ20547_BW1-10B				35	629192	4456071	629191	4456073	1	-2	2	163	VRN	At surface								
Apr-18-2021	04:25:00	81					34	629193	4456073	629191	4456073	2	0	2	75	VRN	At depth								
Apr-18-2021	04:28:00	82					35	629194	4456077	629191	4456073	3	4	5	35	VRN	At surface								
Apr-18-2021	05:28:00	83	EQ20547_BW1-11				35	631706	4456362	631707	4456356	-1	6	6	348	VRN	At surface								
Apr-18-2021	05:32:00	84					36	631707	4456356	631707	4456356	0	0	0	310	VRN	At depth								
Apr-18-2021	05:35:00	85					36	631707	4456356	631707	4456356	0	0	1	238	VRN	At surface								
Apr-18-2021	06:42:00	86	EQ20547_BW1-12B				36	634483	4456663	634483	4456668	0	-5	5	180	VRN	At surface								
Apr-18-2021	06:45:00	87					36	634483	4456671	634483	4456668	0	3	3	5	VRN	At depth								
Apr-18-2021	06:48:00	88					36	634485	4456667	634483	4456668	2	-1	2	125	VRN	At surface								
Apr-18-2021	07:21:00	89	EQ20547_BW1-12B				36	634487	4456669	634483	4456668	4	1	4	77	VRN	At surface								
Apr-18-2021	07:24:00	90					36	634482	4456668	634483	4456668	-1	0	1	285	VRN	At depth								
Apr-18-2021	07:27:00	91					36	634484	4456665	634483	4456668	1	-3	3	155	VRN	At surface								
Apr-18-2021	07:41:00	92	EQ20547_BW1-12B				36	634482	4456669	634483	4456668	-1	1	1	317	VRN	At surface								
Apr-18-2021	07:44:00	93					36	634481	4456666	634483	4456668	-2	-2	3	234	VRN	At depth								
Apr-18-2021	07:47:00	94					36	634483	4456669	634483	4456668	-1	1	1	330	VRN	At surface								
Apr-18-2021	08:45:00	95	EQ20547_BW1-13B				36	636390	4456916	636392	4456916	-2	0	2	279	VRN	At surface								
Apr-18-2021	08:48:00	96					36	636390	4456914	636392	4456916	-2	-2	3	226	VRN	At depth								
Apr-18-2021	08:51:00	97					36	636394	4456919	636392	4456916	2	3	4	26	VRN	At surface								
Apr-18-2021	09:44:00	98	EQ20547_BW1-14				37	638159	4457139	638165	4457139	-6	0	6	272	VRN	At surface								
Apr-18-2021	09:47:00	99					37	638165	4457141	638165	4457139	0	2	2	13	VRN	At depth								
Apr-18-2021	09:50:00	100					37	638166	4457140	638165	4457139	1	1	1	47	VRN	At surface								
Apr-18-2021	10:50:00	101	EQ20547_BW1-15B				38	639663	4457945	639663	4457940	0	5	5	356	VRN	At surface								
Apr-18-2021	10:53:00	102					38	639664	4457940	639663	4457940	1	0	1	92	VRN	At depth								
Apr-18-2021	10:57:00	103					38	639664	4457937	639663	4457940	1	-3	3	156	VRN	At surface								

APPENDIX A FIELD SAMPLING LOGS

WATER PROFILING LOG SHEET (Deck)								QPRO-0755	
Job No:	11543			Area:	OCS-A 0512			Sensors: 4, 7, 10 (Idronaut pH probe), Oxygen optode / OxyGuard probe, Seapoint turbidity probe	
Project:	Empire Wind Extension							Equipment: Valeport MIDAS CTD+	
Client:	Equinor US Wind LLC							Vessel: MV <i>Ocean Endeavour</i>	
Sample Number	Station Number	Date	Start Time	End Time	Interval	Overall Depth (m)	Profile Depth (m)	Filename(s)	Comments
1	EQ20547_EW2-16	Jan-01-2021	22:32:03	22:38:15	00:06:12	35	31	20210101_41939.txt	Fix Numbers 1, 2, 3 // 01/01/2021
2	EQ20547_EW2-15B	Jan-08-2021	22:12:55	22:18:53	00:05:58	33	27	FILE49.BIN	Fix Numbers 4, 5, 6 // 01/08/2021
3	EQ20547_EW2-2B	Apr-04-2021	00:20:51	00:26:39	00:05:48	20	16	20210405-41939.001.txt	Fix Numbers 8, 9, 10 // 04/05/2021
4	EQ20547_EW2-3B	Apr-05-2021	02:26:40	02:34:00	00:07:20	24	20	20210405-41939.002.txt	Fix Numbers 11, 12, 13 // 04/05/2021
5	EQ20547_EW2-4	Apr-05-2021	02:26:10	02:31:55	00:05:45	21	18	20210405-41939.003.txt	Fix Numbers 14, 15, 16 // 04/05/2021
6	EQ20547_EW2-7B	Apr-05-2021	03:54:19	04:03:49	00:09:30	29	26	20210405-41939.004.txt	Fix Numbers 17, 18, 19 // 04/05/2021
7	EQ20547_EW2-8B	Apr-05-2021	05:11:22	05:21:03	00:09:41	29	26	20210405-41939.005.txt	Fix Numbers 20, 21, 22 // 04/05/2021
8	EQ20547_EW2-9	Apr-05-2021	06:26:13	06:38:40	00:12:27	31	28	20210405-41939.006.txt	Fix Numbers 23, 24, 25 // 04/05/2021
9	EQ20547_EW2-10B	Apr-05-2021	07:50:50	08:06:20	00:15:30	32	29	20210405-41939.007.txt	Fix Numbers 26, 27, 28 // 04/05/2021
10	EQ20547_EW2-11	Apr-05-2021	09:07:05	09:22:50	00:15:45	30	28	FILE16.BIN	Fix Numbers 29, 30, 31 // 04/05/2021 Data was saved on CTD, not on PC, but was successfully recovered using Datalog Pro.
11	EQ20547_EW2-12B	Apr-05-2021	10:30:35	10:45:25	0.01030093	34	31	20210405-41939.009.txt	Fix Numbers 32, 33, 34 // 04/05/2021
12	EQ20547_EW2-13B	Apr-05-2021	11:44:24	11:59:26	0.01043981	33	29	20210405-41939.010.txt	Fix Numbers 35, 36, 37 // 04/05/2021
13	EQ20547_EW2-16-1	Apr-05-2021	21:46:22	21:55:34	0.00638889	35	32	20210405-41939.011.txt	Fix Numbers 38, 39, 40 // 04/05/2021 First deployment at this station was unsuccessful. Software froze during acclimatization. Restarted but not successful, disconnected & reconnected and comms were re-established with the unit. Needed to recover (from surface during acclimatization) to undertake pressure tare in air, as depth readout would have been inaccurate otherwise.
14	EQ20547_EW2-15B-1	Apr-05-2021	22:49:25	22:59:37	0.00708333	33	29	20210405-41939.012.txt	Fix Numbers 41, 42, 43 //04/05/2021

APPENDIX A FIELD SAMPLING LOGS

WATER PROFILING LOG SHEET (Deck)								QPRO-0755	
Job No:	11543			Area:	OCS-A 0512			Sensors: 4, 7, 10 (Idronaut pH probe), Oxygen optode / OxyGuard probe, Seapoint turbidity probe	
Project:	Empire Wind Extension							Equipment: Valeport MIDAS CTD+	
Client:	Equinor US Wind LLC							Vessel: MV <i>Ocean Endeavour</i>	
Sample Number	Station Number	Date	Start Time	End Time	Interval	Overall Depth (m)	Profile Depth (m)	Filename(s)	Comments
15	EQ20547_EW2-14B	Apr-05-2021	23:40:15	23:53:25	0.00914352	35	32	20210405-41939.013.txt	Fix Numbers 44, 45, 46 // 04/05/2021 First nine metres of downcast data absent. Entire upcast recorded. Onboard client representative verbally agreed to its acceptability with Bryan (Party Chief) over the phone. No requirement to reattempt.
16	EQ20547_EW2-5B	Apr-14-2021	14:50:00	14:56:00	0.00416667	26	24	20210414_41939_014.txt	Fix Numbers 47, 48, 49 // 04/14/2021 Profile undertaken from 14:52:51 to 14:59:33 based on the data (6mins 42secs).
17	EQ20547_EW2-6B	Apr-14-2021	15:27:00	15:34:00	0.00486111	24		20210414_41939_015.txt	Fix Numbers 50, 51, 52 // 04/14/2021 Profile undertaken from 15:29:59 to 15:37:17 based on the data (7mins 18secs), pH reading spikes observed in the data.
18	EQ20547_EW2-6B	Apr-14-2021	16:17:00	16:31:00	0.00972222	24	21	20210414_41939_015a.txt	Fix Numbers 53, 54, 55 // 04/14/2021 Profile undertaken from 16:26:16 to 16:35:07 based on the data (8mins 51secs). Reattempt due to pH reading spikes observed in the data during the first attempt at this location. Showed client rep the data acquired from this second profile attempt, although pH appeared similar, this data was approved and it was agreed that no further re-attempt was required at this location.

APPENDIX A FIELD SAMPLING LOGS

WATER PROFILING LOG SHEET (Deck)								QPRO-0755	
Job No:	11543			Area:	OCS-A 0512			Sensors: 4, 7, 10 (Idronaut pH probe), Oxygen optode / OxyGuard probe, Seapoint turbidity probe	
Project:	Empire Wind Extension							Equipment: Valeport MIDAS CTD+	
Client:	Equinor US Wind LLC							Vessel: MV <i>Ocean Endeavour</i>	
Sample Number	Station Number	Date	Start Time	End Time	Interval	Overall Depth (m)	Profile Depth (m)	Filename(s)	Comments
19	EQ20547_BW1-2B1	Apr-15-2021	17:44:00	17:48:00	0.00277778	23	23	FILE29.BIN	Fix Numbers 56, 57, 58 // 04/15/2021 Acquisition completed at this station and the remainder of the stations using hired Ashtead CTD S/N: 29917 and pH probe 39766. Only possible to set this CTD to record data internally, no live viewing capability. Requires data download following recovery of the unit after the profile acquisition attempt.
20	EQ20547_BW1-3-1	Apr-17-2021	19:32:42	19:39:05	0.00443287	36	35	FILE37.BIN	Fix Numbers 59, 60, 61 // 04/17/2021
21	EQ20547_BW1-4B	Apr-17-2021	21:34:00	21:41:00	0.00486111	62	58	FILE40.BIN	Fix Numbers 62, 63, 64 // 04/17/2021
22	EQ20547_BW1-5-1	Apr-17-2021	23:15:00	23:20:00	0.00347222	31	25	FILE42.BIN	Fix Numbers 65, 66, 67 // 04/17/2021
23	EQ20547_BW1-6-1	Apr-18-2021	00:23:00	00:32:00	0.00625	30	27	FILE44.BIN	Fix Numbers 68, 69, 70 // 04/18/2021
24	EQ20547_BW1-7B	Apr-18-2021	01:31:00	01:40:00	0.00625	30	27	FILE46.BIN	Fix Numbers 71, 72, 73 // 04/18/2021
25	EQ20547_BW1-8B	Apr-18-2021	02:27:00	02:31:00	0.00277778	31	27	FILE48.BIN	Fix Numbers 74, 75, 76 // 04/18/2021
26	EQ20547_BW1-9B	Apr-18-2021	03:21:00	03:26:00	0.00347222	32	28	FILE51.BIN	Fix Numbers 77, 78, 79 // 04/18/2021
27	EQ20547_BW1-10B	Apr-18-2021	04:24:00	04:30:00	0.00416667	35	27	FILE53.BIN	Fix Numbers 80, 81, 82 // 04/18/2021
28	EQ20547_BW1-11	Apr-18-2021	05:28:00	05:35:00	0.00486111	36	29	FILE56.BIN	Fix Numbers 83, 84, 85 // 04/18/2021
29	EQ20547_BW1-12B	Apr-18-2021	06:42:00	06:48:00	0.00416667	36		FILE58.BIN	Fix Numbers 86, 87, 88 // 04/18/2021 Dissolved oxygen graph inconsistent with other stations.
30	EQ20547_BW1-12B	Apr-18-2021	07:21:00	07:27:00	0.00416667	36			Fix Numbers 89, 90, 91 // 04/18/2021 Re-attempt. No data file.
31	EQ20547_BW1-12B	Apr-18-2021	07:41:00	07:48:00	0.00486111	36	29	FILE61.BIN	Fix Numbers 92, 93, 94 // 04/18/2021 Second re-attempt. Dissolved oxygen graph consistent with other stations.
32	EQ20547_BW1-13B	Apr-18-2021	08:45:00	08:51:00	0.00416667	36	29	FILE63.BIN	Fix Numbers 95, 96, 97 // 04/18/2021
33	EQ20547_BW1-14	Apr-18-2021	09:44:00	09:50:00	0.00416667	37	30	FILE64.BIN	Fix Numbers 98, 99, 100 // 04/18/2021

APPENDIX A FIELD SAMPLING LOGS

WATER PROFILING LOG SHEET (Deck)										QPRO-0755
Job No:	11543				Area:	OCS-A 0512			Sensors: 4, 7, 10 (Idronaut pH probe), Oxygen optode / OxyGuard probe, Seapoint turbidity probe	
Project:	Empire Wind Extension							Equipment: Valeport MIDAS CTD+		
Client:	Equinor US Wind LLC							Vessel: MV <i>Ocean Endeavour</i>		
Sample Number	Station Number	Date	Start Time	End Time	Interval	Overall Depth (m)	Profile Depth (m)	Filename(s)	Comments	
34	EQ20547_BW1-15B	Apr-18-2021	10:50:00	10:57:00	0.00486111	38	30	FILE65.BIN	Fix Numbers 101, 102, 103 // 04/18/2021	

APPENDIX B METHODS

APPENDIX B METHODS

B.1 Seabed Imagery Acquisition

Environmental seabed images were taken by means of a digital stills shallow water camera system with a dedicated strobe and video lamps, mounted within a stainless-steel frame. Video footage was also acquired throughout target investigations using a high definition (HD) video camera. The vessel offset of camera deployment was used to represent the position of the system.

Footage was viewed in real time via an umbilical, assisting in the control of the digital stills camera. This allowed for shot selection, in the event that the system recorded a sediment change or feature at the seafloor.

During acquisition, a minimum of length of 600m and 20 seabed photographs were collected at each transect at appropriate intervals. This technique allowed the frame to move progressively along the seabed as the vessel traversed the work area on its thrusters or drifted. The images were captured remotely using the surface control unit and stored on the camera's internal memory card. Video footage was overlaid with time, position, and depth, and recorded directly onto PC hard drive. On completion, photographs were downloaded onto a PC via a USB download cable and copied onto HDD. All HDDs were labelled with the relevant job details, write-protected and stored.

During acquisition, total of 1683 photographs were taken using the stills camera system along 15 transects. Environmental deck and positioning logs are contained in Appendix A and a selection of seabed photographs is presented in Appendix C.

Table B.1 Camera Equipment Specifications

Equipment	HD Camera System	Stills Camera System
Manufacturer	SubC Control Ltd.	Kongsberg/Simrad.
Model	1CamMkIII	OE14-208
Lens	Wide angle (26.3mm), f 3.8 ~ 38.0 mm (5/32 ~ 1 1/2 in.), 10x optical zoom and automatic or manual focus control	f 7.2 – 28.8 (35mm format equivalent to 38 – 140mm) 4x optical zoom and automatic or manual focus control
Pixels	12.0 M (Picture mode) OR 8.3 M (Video mode)	5.0 M
Video Resolution	1920 x 1080p	PAL 625 Line/50 Hz PAL
Image Resolution (pixels)	4000 x 3000 (Picture mode) 3264 x 2448 (Video mode)	2592 x 1944
Field of View	47.8° horizontal (β) by 36.2° vertical (α)	48.4° horizontal (β) by 29.9° vertical (α)
Video Overlay	Digital Edge DVR	
Trigger	Remote from deck	
Height Control	Video footage	
Lighting	1 fixed forward-facing strobe, 2 fixed and 2 mobile LED lamps	
Scale bar	Green line lasers with 100mm separation between lines.	

Table unit definitions: M = megapixels, p = progressive scan, PAL = phase alternating line, Hz = Hertz

B.2 Imagery Processing

A total of the 1683 photographs were acquired with the Kongsberg 14-208 camera during the survey. Seabed images were assessed using the Gardline developed imagery analysis program (CountEM). The program allows for individual fauna to be tagged and a sediment description to be assigned to each image. The software allows features to be selected within an image to provide an accurate figure of percentage coverage of each individual element (e.g. cobbles, and boulders, sponge) based upon the proportion of pixels. CountEM can also measure the area of seabed and observed features primarily in pixels, though can be converted to millimeters (mm) given a reference scale within the image, such as two laser lines with a known separation.

Each visible morphotype was tagged once in each image to record its presence. The exceptions were specific features or taxa of potential conservation interest, which were enumerated from all images to allow for assessment of protected habitats.

In addition to the 1683 images taken across all targets, video footage was reviewed and video frames were captured whenever any further observations of specific features or taxa of potential interest occurred. This resulted in an additional 227 video frames, which were analyzed in CountEM. Other than enumerating any specific features or taxa of potential interest in these video frames and tagging any previously unobserved morphotypes, no further tagging was conducted.

Following quality control, data were exported into Excel file used to summarize seabed imagery observations and allow for further analysis as applicable. An example image of species identified in this survey are presented in Appendix F.

B.3 Benthic Sampling

Benthic samples were recovered using either an in-house constructed, modified, stainless-steel 0.1m² Day grab or dual Van Veen grab. The grabs carried extra weights where appropriate to induce better penetration on impact with the Day grab possessing an extended bucket lip to reduce sediment washout. Storm feet and elastic straps were used on the Day grab to reduce the likelihood of the instrument pre-triggering in the water column during deployment. The vessel offset of grab deployment was used to represent the position of the sampler.

Grab sampling operational procedures were as follows:

The vessel's sampling area was pre-cleaned using a powerful deck fire-hose and seawater. The grab was thoroughly washed down using pentane prior to deployment at every station to prevent hydrocarbon cross contamination. A 500m-length of 13mm, dry-core, galvanised-steel cable was used to lower the grab to the seabed.

All containers were thoroughly washed with appropriate solvents and labelled externally prior to use. Biology samples were placed in 1-litre polypropylene, screw-top, squat jars or 5 litre buckets and provided with an additional internal waterproof label. Particle size samples were placed in double-lined zip-lock bags.

Communication between the deck, bridge crew and the surveyors was conducted by means of VHF radio. When directly over the sampling station the grab was winched to the seabed and recovered so that the sample could be obtained, and the apparatus prepared for the next deployment.

Positional fixes were taken for each grab sample immediately following the grab reaching the sea floor. The precise time that the grab reached the seabed was determined by observations of the tension on the winch cable.

On recovery of a sample, the grab would first be examined for acceptability following strict quality assurance criteria. In the following cases, a sample would be rejected, and the instrument prepared for the next deployment:

1. Jammed sample closure due to entrapment of a large stone, shell or other objects allowing surface sediment washout.
2. Accidental premature opening of sampler on recovery, causing possible surface washout.
3. Half sample obtained where the grab has not struck a flat area of bottom, or not hit true, causing a side or half bite of sediment.
4. Disruption of the sample by obvious shaking or contamination (these can occur when a sample is badly handled or if the grab strikes the side of the vessel during operations).
5. The sample represents less than 50% of the grab's total capacity (*i.e.* less than 6 litres) or totally fills the grab.
6. Sample is an unacceptable distance from the target. 10m acceptable range requested.
7. The presence of exopolymeric substances, mucus coagulants and/or fauna that generate them *i.e.*, Myxinidae.

Grab samples deemed acceptable were photographed and described prior to sub-sampling.

Surficial (<2cm depth) sediments were taken directly from the grab for physico-chemical analysis. Two sediment samples; one for particle size and TOM and the other to act as a spare, were taken using a plastic scoop and placed into plastic zip-lock bags. All physico-chemical samples were stored at less than -18°C prior to analysis.

Two separate grab samples from each station were collected for infaunal macroinvertebrate identification. For each faunal sample the entire contents of a single grab were washed into a clean plastic tray using seawater and then transferred to a 0.5mm sieve. Finer sediment fractions were washed from the sample using an auto-sieve, which sprayed a low-powered seawater jet onto the underside of the sieve. The sieve residue was transferred to uniquely labelled sample jars using a scoop and/or funnel, making sure that none of the sample was lost or trapped in the sieve mesh. Sieved samples were immediately fixed with a known concentration of formaldehyde solution ('formalin', less than 20%). The formalin in the sample pots was subsequently diluted to a concentration of approximately 4%. One of the faunal samples (normally identified as A) was worked up as a matter of course and a second retained as a spare (normally sample B).

B.4 Water Profiling

A Valeport Midas CTD+ multi-parameter CTD was used to measure the characteristics of the seawater column; collecting data on depth, temperature, conductivity, dissolved oxygen, pressure, and turbidity in order to produce water profiles of the investigated area.

The probe was attached directly to the 13mm dry-core galvanized steel cable along with a purse weight to maintain vertical transit. The offset of the deployment point from the vessel's centre of gravity was used to represent the probe's position. Positional fixes were taken immediately after deployment, at the greatest depth and at the end of the deployment. Readings were taken from the CTD at 2Hz approximately every 0.3m s⁻¹. After recovery, recorded data were saved on the computer and backed up to the vessel server and removable hard drive.

B.5 Sample Analysis

Sediment and faunal samples were analyzed by the following laboratories:

- Particle size and sediment TOM analyses were carried out by TerraSense LLC, Totowa, New Jersey, USA.
- Benthic macrofaunal identification was undertaken by EcoAnalysts Inc, Moscow, Idaho, USA

B.6 Particle Size Analysis

PSA was carried out in accordance with the ASTM method D422.

No dispersants were used, and the sediment was not treated to remove carbonates or organic matter prior to analysis. The range of sieve sizes, together with their Wentworth classifications (Wentworth, 1922), is given in Table B. 1 .

The results, given in Appendix G and summarized in Section 2.4.1, present particle size distributions in terms of mean phi, fraction percentages (*i.e.* gravel, sand and fines), sorting (mixture of sediment sizes) and skewness (weighting of sediment fractions above and below the mean sediment size; Folk & Ward, 1957). These indices are described below:

- 1 Graphic Mean - a measure of average particle size in phi units (-log₂(diamm), Folk & Ward, 1957).

$$M_z = \frac{\phi_{16} + \phi_{84} + \phi_{50}}{3}$$

where M_z = The graphic mean particle size in phi
 ϕ = the phi size of the nth percentile of the sample

- 2 Sorting – the inclusive graphic standard deviation of the sample is a measure of the degree of sorting. Sorting classifications are presented in Table B. 2.

$$\sigma_1 = \frac{\phi 84 - \phi 16}{4} + \frac{\phi 95 - \phi 5}{6.6}$$

where σ_1 = the inclusive graphic standard deviation

- 3 Inclusive Graphic Skewness – the degree of asymmetry of a frequency or cumulative curve, Skewness classification are presented in Table B. 3.

$$S = \frac{\phi 16 + \phi 84 - 2(\phi 50)}{2(\phi 84 - \phi 16)} + \frac{\phi 5 + \phi 95 - 2(\phi 50)}{2(\phi 95 - \phi 5)}$$

where S = the skewness of the sample

- 4 Graphic Kurtosis – The degree of peakedness or departure from a 'normal' frequency or cumulative curve. Kurtosis classifications are presented in Table B. 4.

$$K = \frac{\phi 95 - \phi 5}{2.44(\phi 75 - \phi 25)}$$

where K = Kurtosis

The sediment samples were additionally classified using the Folk classification triangles (Folk, 1954), utilized by the CMECS Substrate Classification (FGDC, 2012), which uses the threshold values for Gravel-Sand-Mud combinations and for Sand-Silt-Clay combinations (Folk, 1954). The Folk triangles are presented in Figure B. 1, which adds colors to show the hierarchical framework of the CMECS Substrate Classification applied to the Folk diagrams.

Table B. 1 Phi and Sieve Aperture with Wentworth Classifications

Aperture in microns	Aperture in Phi Unit	Sediment Description	
≥16000	≤-4	Pebble	GRAVEL
<16000 to 11200	>-4 to -3.5		
<11200 to 8000	>-3.5 to -3		
<8000 to 5600	>-3 to -2.5		
<5600 to 4000	>-2.5 to -2		
<4000 to 2800	>-2 to -1.5		
<2800 to 2000	>-1.5 to -1		
<2000 to 1400	>-1 to -0.5	Very Coarse Sand	SAND
<1400 to 1000	>-0.5 to 0		
<1000 to 710	>0 to 0.5	Coarse Sand	
<710 to 500	>0.5 to 1		
<500 to 355	>1 to 1.5	Medium Sand	
<355 to 250	>1.5 to 2		
<250 to 180	>2 to 2.5	Fine Sand	
<180 to 125	>2.5 to 3		
<125 to 90	>3 to 3.5	Very Fine Sand	
<90 to 63	>3.5 to 4		
<63 to 44	>4 to 4.5	Coarse Silt	FINES
<44 to 31.5	>4.5 to 5		
<31.5 to 22	>5 to 5.5	Medium Silt	
<22 to 15.6	>5.5 to 6		
<15.6 to 11	>6 to 6.5	Fine Silt	
<11 to 7.8	>6.5 to 7		
<7.8 to 5.5	>7 to 7.5	Very Fine Silt	
<5.5 to 3.9	>7.5 to 8		
<3.9 to 2.8	>8 to 8.5	Clay	
<2.8 to 2	>8.5 to 9		
<2 to 1.4	>9 to 9.5		
<1.4 to 1	>9.5 to 10		
<1	>10		

Table B. 2 Sorting Classifications

Sorting Coefficient (Graphical Standard Deviation)	Sorting Classifications
$0 < 0.35$	Very well sorted
$0.35 < 0.50$	Well sorted
$0.50 < 0.71$	Moderately well sorted
$0.71 < 1.00$	Moderately sorted
$1.00 < 2.00$	Poorly sorted
$2.00 < 4.00$	Very poorly sorted
4.00	Extremely poorly sorted

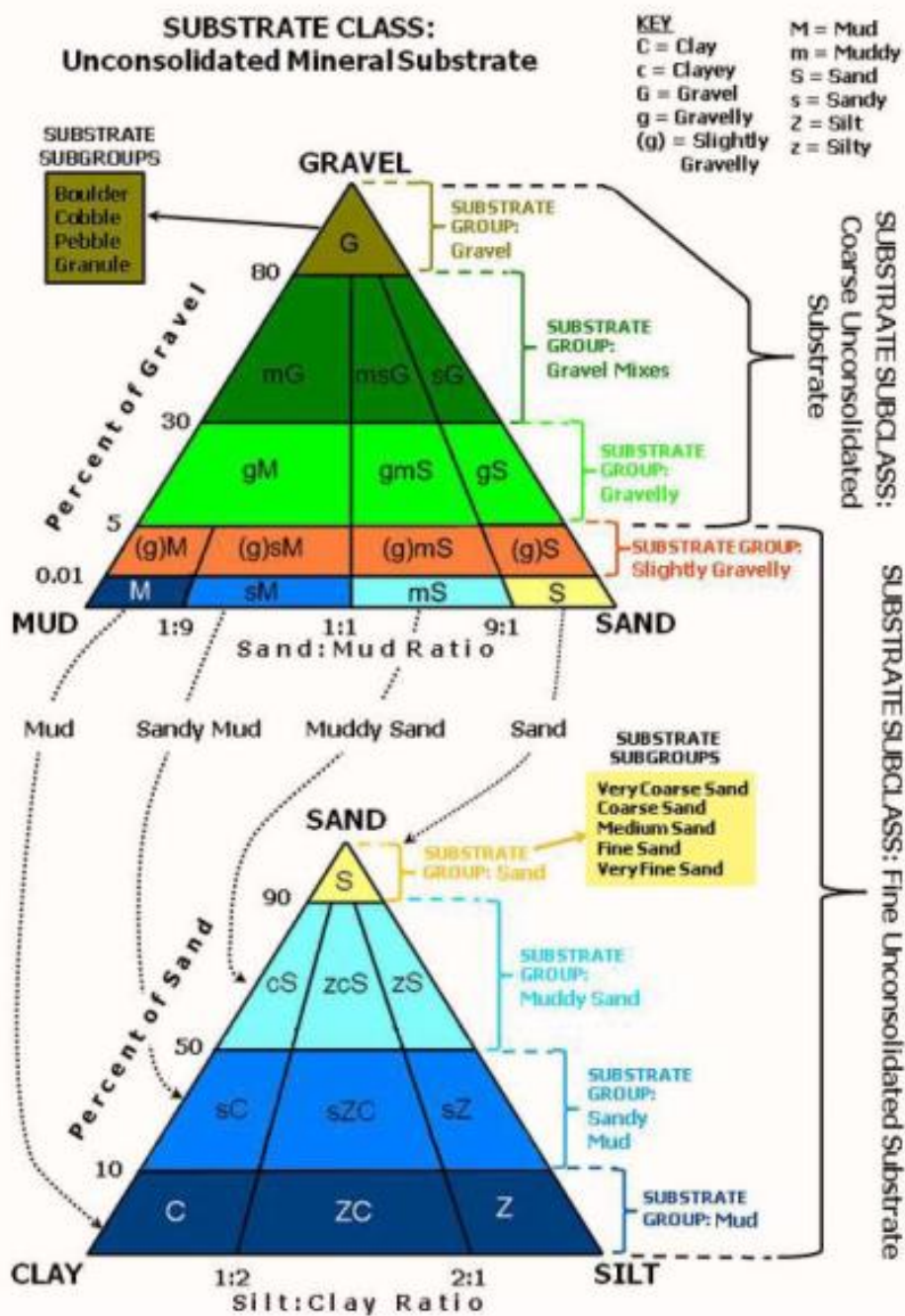
Table B. 3 Skewness Classification

Skewness Coefficient	Mathematical Skewness	Graphical Skewness
$1.00 > 0.30$	Strongly Positive	Strongly fine skewed
$0.30 > 0.10$	Positive	Fine skewed
$0.10 > -0.10$	Near Symmetrical	Symmetrical
$-0.10 > -0.30$	Negative	Coarse skewed
$-0.30 > -1.00$	Strongly Negative	Strongly coarse skewed

Table B. 4 Kurtosis Classification

Kurtosis Coefficient	Kurtosis Classification	Graphical meaning
≤ 0.67	Very Platykurtic	Flat-peaked; the ends are better sorted than the centre
$0.67 < 0.90$	Platykurtic	
$0.90 < 1.11$	Mesokurtic	Normal; bell shaped curve
$1.11 < 1.50$	Leptokurtic	Curves are excessively peaked; the centre is better sorted than the ends
$1.50 < 3.00$	Very Leptokurtic	
≥ 3.00	Extremely Leptokurtic	

Figure B. 1 Folk Triangles with the Hierarchical Framework of the CMECS Substrate Class



Adapted from Folk (1954) by (FGDC, 2012)

B.7 Total Organic Matter

Total Organic Matter (TOM) was carried out in accordance with the ASTM method D2974. A portion of the sample was placed in a crucible and dried in an oven at 110°C for 16 hours. The weight was recorded after drying to the nearest 0.1% and the sample placed in a desiccator to cool. The sample was then transferred to a cold muffle furnace and heated to 450 ±25°C until the sample was reduced completely to

ash and the sample placed in a desiccator to cool. The crucible was then reweighed and the loss on ignition (LOI) calculated and reported as a percentage of the original sample mass.

LOI was calculated as follows:

$$\text{Total Organic Matter (TOM)} = \frac{b - f}{b} \times 100\% (W/W)$$

Where b = weight of dried analysis sample (g)

f = weight of residue after ignition (g)

B.8 Macrofaunal Analysis

B.8.1 Sorting and Identification

In the laboratory, samples were gently washed across a 0.5mm mesh sieve to remove any sediment fines and preservative. The retained material was sorted by hand to extract all macrofauna. The organisms were identified and counted to produce a species list for each grab sample. Sample residues were checked by a second individual to provide a degree of quality control.

B.8.2 Data Set Rationalisation

The faunal data set was rationalised according to the standard Gardline (2018) procedure, which is largely based on British Standard ISO16665:2005 (BSI, 2005) and OSPAR (2017) guidelines. A summary of these methods follows.

Juveniles

The inclusion of juvenile organisms in data sets is a contentious issue, as is the definition of a juvenile. Only when the following conditions were satisfied was an organism recorded as a juvenile:

- Organisms that were too small or immature to be identified to species were identified to the lowest possible taxonomic level and recorded as juveniles.
- The organism was in a pre-adult life stage e.g. megalopa, praniza, etc.
- For large-bodied (>4cm) species of echinoderm and bivalve, the organism was less than 10% of the maximum body size reported in the literature.

In accordance with ISO16665:2005 guidelines, juveniles are recorded separately in the faunal list in Appendix I. Juveniles were included in the analysed data set at the lowest achievable taxonomic level. In the first instance, statistical analyses were performed after counts of juveniles of known species had been combined with adult records of that same species. In accordance with OSPAR (2017), if one or more of the juvenile taxa, or species that included juvenile records, were among the ten most dominant, then a RELATE analysis was carried out to compare the data sets with and without juveniles to determine if discussion of both sets separately is required. If the two data sets are found to be at least 95% similar, then the juveniles are included in the data set for all further multivariate analyses and discussion. Alternatively, the multivariate analyses are additionally performed following exclusion of all juvenile records in order to illustrate their influence.

Damaged Specimens

Destructive sampling techniques and sieving may damage delicate benthic organisms. It is, therefore, commonplace for fragmented organisms to be found in faunal samples. The following conditions were applied to the recording of damaged specimens and fragments:

- Fragments that constituted a major component of an individual, that unequivocally represented the presence of an entire organism, and that could be identified to species level, were recorded and included with other counts of that species. Examples include: the heads of polychaetes and crustaceans; the complete mouth structure or central disk of brittle stars; the oral area/feeding tentacles of holothurians.
- Fragments that constituted a significant component of an individual, that unequivocally represented the presence of an entire organism, but that could not be identified to species by virtue of their incompleteness, were recorded to the lowest possible taxonomic level.
- Fragments that did not unequivocally represent the presence of an entire organism were ignored, e.g. *Ophiura* arms, *Echinocardium* shell fragments, etc.

Recorded fragments, therefore, represent discrete observations of individuals that were present at the time of sampling and were included in the analysed data set.

Treatment of Specific Groups of Organisms

Gardline defines macrofauna as organisms that are normally larger than the mesh size of the sieve used to separate them from the sediment (Gardline, 2018). Meiofaunal organisms, such as the Ostracoda and Copepoda, which would not be consistently sampled, were not recorded. Due to their generally small size (in fully marine environments), species from the Oligochaeta, Tardigrada and Gnathostomulida were only enumerated when a sieve with a mesh size of 0.5mm or less was used to separate organisms from sediments.

The testate amoeba *Astrorhiza* sp. was the only foram routinely enumerated.

In accordance with our in-house guidelines the following organisms were not identified to species, but were enumerated and included in the data set for analyses at a higher taxonomic level:

- Nemertea – identified to phylum
- Platyhelminthes – identified to phylum
- Phoronida – identified to genus
- Cephalochordata – identified to subphylum.

B.9 Statistical Analysis

B.9.1 Univariate Macrofauna Indices

Univariate community analyses were undertaken using the PRIMER (version 7) software package. Univariate indices seek, by means of a single number, to summarise information about some aspect of community structure. The two aspects of community structure contributing to the concept of diversity are species richness (a measure related to the total number of species present) and evenness (a measure relating to the pattern of distribution of individuals among the species present).

Diversity indices, as typified by the Shannon-Wiener index, are considered to be a relatively insensitive measure of anthropogenic disturbance. However, benthic ecologists have been able to demonstrate a

clear inverse relationship between diversity and total oil concentrations in sediments (Davies *et al.*, 1984). They are therefore of some practical use for making comparisons between stations and sites.

The following indices were calculated and are presented in the report:

Margalef's Richness Index

Species richness is sometimes given simply as the number of species in a sample but this is of course very dependent upon sample size. Alternatively, Margalef's index (d) may be used as this takes account of the number of species present for a given number of individuals. Margalef's richness index is calculated as follows:

$$d = \frac{(S - 1)}{\ln N}$$

where d = Margalef's richness
 S = total number of species
 N = total number of individuals

Shannon-Wiener Diversity Index

This is a widely used measure of diversity providing an integrated index of species richness and relative abundance (Clarke & Warwick, 2006). It is basically a measure of the difficulty of predicting the identity of an individual based on overall community composition. The Shannon-Wiener diversity index is expressed as:

$$H' = - \sum_{i=1}^s p_i \log_n p_i$$

where H' = Shannon-Wiener diversity index
 p_i = proportion of the total number of individuals from the i^{th} species.
 n = log base value (log base 2 is used during this report; Shannon & Weaver, 1949)

H' integrates the number of species and individual abundance to provide a summary value reflecting the diversity of fauna at a station. This index of diversity is influenced by both species richness (*i.e.* the number of species) and evenness (or equitability) of distribution of individuals between species.

Simpson's Dominance Index

Simpson's is a dominance index derived from the probability of picking two individuals from a community at random that are from the same species. Therefore Simpson's dominance index values will be large when a community is dominated by one or a few species but lower when the community is diverse. Simpson's dominance index was calculated as follows:

$$\lambda = \sum p_i^2$$

where λ = Simpson's dominance index
 p_i = proportion of the total number of individuals from the i^{th} species

Simpson's dominance index ranges from 0 to 1 with values typically reflecting the abundances of the most common species in the samples.

Pielou's Evenness

Evenness (or equitability) is a representation of how uniformly individuals are spread between species in a sample. It is a component of, and calculated using, a theoretical diversity measure (in this instance Shannon-Wiener). Values range from 0 to 1 with high values indicating low dominance and high evenness (*N.B.* the log base that was used to calculate H' must also be used to calculate evenness).

$$J = \frac{H'}{\log_n S}$$

where J = Pielou's evenness

H' = Shannon-Wiener diversity index

S = total number of species in a sample

Species Accumulation Curves

Species accumulation curves show the increasing total number of different taxa observed as samples are successively pooled. Two versions are plotted in this report; the first (plotted in blue) simply takes the samples in their label order, this is often referred to as the "species observed" (Sobs) curve. The second curve (plotted in red) is smooth as it is an averaged output based on the samples being added in random order 999 times. This is referred to as the UGE (Ugland, Gray, Ellingsen) curve after Ugland *et al.* (2003).

Species Ranking

A measure of the overall dominance pattern in the sampling area may be achieved by ranking the top species per station according to abundance, giving a rank score of ten to the most abundant species, decreasing to one for the tenth most abundant species, and summing these scores for all stations to provide an overall dominance score for each species (Eleftheriou & Basford, 1989). For those species ranked in the top ten, the fidelity of the species ranking can be assessed by comparing the actual rank score with the maximum possible score (thus ten multiplied by number of stations for the top rank *etc.*) for that rank as a proportion; perfect fidelity is equal to one; values lower than 0.8 or higher than 1.2 represent erratic ranking, as in a species with a patchy distribution.

Beta Diversity

The Jaccard index of similarity (1908) calculates the change in diversity on a normalised scale from 0 to 1; with 1 indicating a high level of similarity.

$$Jaccard = \frac{J}{A + B - J}$$

where A = number of taxa in first region

B = number of taxa in second region

J = number of shared taxa

B.9.2 Multivariate Analyses

In addition to univariate analyses, the data were subjected to multivariate analysis using a number of different methods available within the PRIMER package (Clarke & Warwick, 2006). By considering the full data matrix as a whole and comparing each station with every other, multivariate analyses are able to highlight subtle trends in data sets that are commonly not identified when using univariate techniques.

Multivariate techniques are not restricted to use with faunal data sets and if treated appropriately may also be used to compare complex physico-chemical data sets. Multivariate analyses were computed from resemblance or similarity matrices. In the case of faunal abundance data these were constructed using the Bray-Curtis measure of similarity following transformation of the data to down-weight the influence of highly abundant or dominant species. For the purposes of this survey, a square-root transformation was utilised. According to Clarke and Warwick (2006), square root transformation allows the intermediately abundant species to contribute to the similarity, while a fourth root takes account of the rarer species.

Cluster Analysis and SIMPROF

Cluster analysis groups samples according to their similarity *i.e.*, samples within a group are more similar to each other than they are to samples in other groups. Clustering was by a hierarchical agglomerative method using group average sorting, and the results are presented as a dendrogram. Using PRIMER v7 it is possible to perform a SIMPROF (similarity profile) test at the same time as the cluster analysis to determine whether groups of samples are statistically indistinguishable or whether they contain identifiable structure. SIMPROF is an *a priori* test designed to identify groups of samples from unstructured data sets. The test employs a permutation-based analysis to determine whether groups of samples below each successive node of a dendrogram possess identifiable internal structure. If the result of a test at a particular node is not significant there is no identifiable structure within the samples below the node and they might therefore be considered to be a uniform group. A significant result indicates that samples within a group (below a particular node in the dendrogram) contain some structure and therefore may not be considered uniform. The analysis therefore identifies groups of samples that are each highly self-similar and also that are distinguishable from each other.

Ordination Analyses using non-Metric Multidimensional Scaling

Non-metric multidimensional scaling (nMDS or MDS) is a type of ordination method which creates a 2- or 3-dimensional 'map' of the samples (or stations) from the similarity matrix. The configuration of the samples on the 'map' is a reflection of their similarity, with distances between samples being representative of their dissimilarity.

It is normal for there to be some distortion (stress) between actual similarity values (in the resemblance matrix) and distance between samples on the ordination plot; perfect solutions are very rarely achieved when dealing with complex data sets. In order to achieve the lowest possible stress PRIMER adopts an iterative approach to ordination, constructing the plot by successively refining the positions of samples until the lowest stress is achieved. In reality the lowest possible stress is not always achieved since data points may become trapped in local minima. It is therefore necessary to re-run the analyses multiple times to ensure that the lowest achievable stress is found. The ordination analysis results reported were the product of a minimum of 25 restarts. In instances where the lowest achieved stress was found for <5 (20%) of the restarts the ordination was repeated with 999 restarts to ensure that a lower stress result could not be found.

The scale and orientation of MDS ordinations are arbitrary so no axes are drawn on the plots. Stress values increase with sample size, and usually also with increasingly severe transformation of the initial data set (due to the increasing influence of rarer species on the outcome of analyses). The stress value may be used as an indication of the usefulness of plots, with a general guide being as follows (Clarke & Warwick, 2006):

<0.05	Almost perfect representation of rank similarities
0.05 to <0.1	Good representation
0.1 to <0.2	Still useful
0.2 to <0.3	Should be treated with caution
>0.3	Little better than random points

ANOSIM

ANOSIM is a multivariate equivalent of an ANOVA test. It is applied to a priori structured data sets to test for differences between pre-selected groups of samples or stations. For instance, ANOSIM may be used to test whether the fauna found <1km of an offshore installation differs from that found at >1km. The result of such an analysis might provide an indication of whether the installation and operation of offshore facilities has affected the benthic community. Results of ANOSIM tests are given as R values that range from 0 (no difference) to 1 (highly different), and the significance is determined by comparison to the randomly permuted distribution of the samples included in the analysis.

2-Dimensional Model Matrix

A model matrix calculates the resemblance of a data set based on given factors (e.g. depth). A RELATE test can then be used to calculate if the factor is significant regarding the correlations of the observed patterns.

SIMPER

Where differences between groups of samples are found, SIMPER may be used to interpret which species, or environmental variables, are principally responsible for the differences between the groups and which are most responsible for the similarities within groups. The SIMPER analysis decomposes differences between all pairs of sample, one from each identified group, into their contributions from each species or variable, and ranks them in decreasing order of their contribution to overall dissimilarity.

RELATE

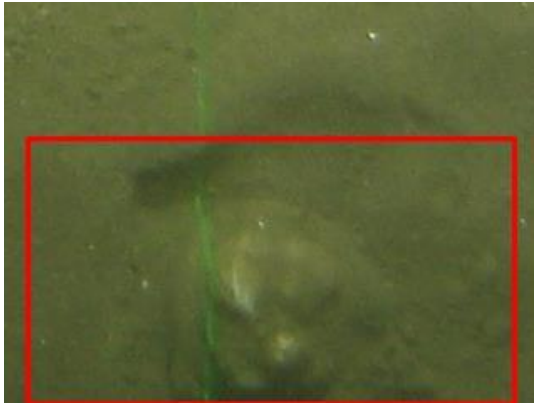
The RELATE test of PRIMER calculates the rank similarity of two specified data matrices, so, for instance, may be used to provide an indication of the effect of the removal of a subset of taxa (e.g., juveniles) on the structure of the data set overall.

B.9.3 Spearman's Rank Correlation

Spearman's rank correlation coefficient is a non-parametric correlation analysis that may be used to test for relationships between environmental variables. Significant relationships indicate that environmental variables vary similarly. Large numbers of significant correlations might suggest the presence of an environmental gradient, that in the absence of obvious natural changes in the environment (such as a depth gradient), may be attributable to point source pollution or some other form of anthropogenic interference. A matrix of Spearman's rank correlation coefficients, comparing many of the environmental variables, was calculated using Microsoft Excel.

APPENDIX C IMAGE CATALOGUE

APPENDIX C IMAGE CATALOGUE



1. Animalia indeterminate 1

Possible shelled animal with three protrusions on the dorsal surface of the shell.

Station: EW2-3 Fix: 2603



2. Animalia indeterminate 4

Possible hermit crab, can possibly see legs on right side merging with track.

Station EW2-16 Fix: 6



3. Animalia indeterminate 9

Dark columnar body protruding from the seabed, with possible white edged fins.

Station: EW2-10 Fix: 799



4. Animalia tubes

Animal tubes constructed from shell fragments.

Station: EW2-10 Fix: 816

APPENDIX C IMAGE CATALOGUE



5. Annelida - *Hyalinoecia tubicola*

Polychaete worm with clear, cylindrical tube.

Station: EW2-3 Fix: 2556



6. Annelida - Pectinaridae

Annelid tube constructed by fine grains of sand.

Station: EW2-3 Fix: 2593



7. Annelida - Polychaeta 1

Tentacle worm, dark red in colour, in tube constructed of very fine sediment particles.

Station: EW2-3 Fix: 2540



8. Annelida - Sabellidae

Feather duster worm. Large tube constructed with fine sediment.

Station: EW2-8 Fix: 963

APPENDIX C IMAGE CATALOGUE



9. Annelida - Serpulidae

Pale tube, small .

Station: EW2-16 Fix: 81



10. Annelida 1

Pink annelid worm.

Station: EW2-13 Fix: 464



11. Arthropoda - Brachyura 1

Dark brown crab, with white claw tips.

Station: EW2-14 Fix: 274



12. Arthropoda - Brachyura indeterminate

Small crab, indistinct features.

Station: EW2-5 Fix: 1233

APPENDIX C IMAGE CATALOGUE



13. Arthropoda - *Cancer borealis*

Rounded, rough-edged carapace with small light spots.
Robust claws with dark brown-black tips.

Station: EW2-3 Fix: 2523



14. Arthropoda - Caridea

Cream/brown shrimp.

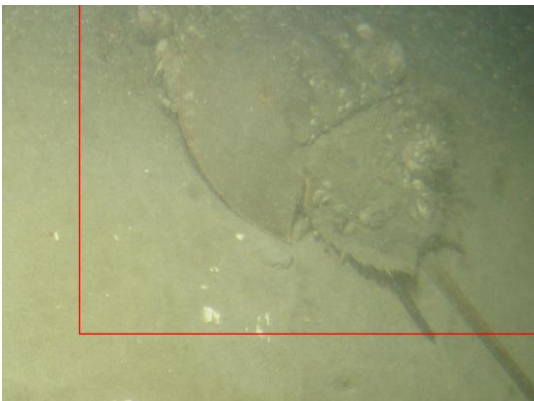
Station: EW2-3 Fix: 2536



15. Arthropoda - Cirripedia

Barnacles.

Station: EW2-2 Fix: 2725



16. Arthropoda - *Limulus polyphemus*

Horseshoe crab.

Station: EW2-8 Fix: 912

APPENDIX C IMAGE CATALOGUE



17. Arthropoda - Paguroidea

Hermit crab.

Station: EW2-2 Fix: 2660



18. Chordata - Actinopterygii indeterminate

Ray-finned fish.

Station: EW2-5 Fix: 1277



19. Chordata - Ascidiacea 1

Solitary tunicate, transparent.

Station: EW2-12 Fix: 656



20. Chordata - Blennidae

Small, curvy blenny usually seen buried or swimming along the surface of the sediment.

Station: EW2-2 Fix: 2726

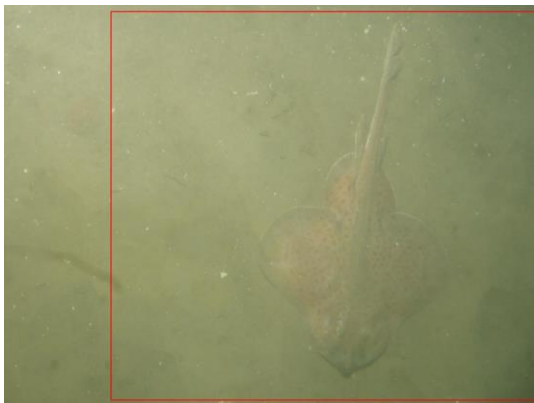
APPENDIX C IMAGE CATALOGUE



21. Chordata - Elasmobranchia indeterminate

Large ray.

Station: EW2-9 Fix: 845



22. Chordata - *Leucoraja ocellata*

Winter skate. Skate with rounded snout and lobed pectoral and pelvic fins, all light brown and covered in dark spots on top, mature individuals may have white 'eyes' on the dorsal surface.

Station: EW2-2 Fix: 2677



23. Chordata - Phycidae 1

Hake family, with two distinctive barbs.

Station: EW2-2 Fix: 2747



24. Chordata - Pleuronectiformes 1

Small flat fish, solonette shaped, left-eyed.

Station: EW2-15B-1 Fix: 240

APPENDIX C IMAGE CATALOGUE



25. Chordata - Pleuronectiformes indeterminate

Indeterminate flatfish.

Station: EW2-15 Fix: 185



26. Chordata - Rajidae Egg Case

Dark Rajidae egg case.

Station: EW2-2 Fix: 2754



27. Chordata - *Squalus acanthias*

Spiny dogfish shark.

Station: EW2-15 Fix: 165



28. Chordata - Syngnathinae

Pipefish. The body and tail are long, thin, and snake-like.

Station: EW2-12 Fix: 626

APPENDIX C IMAGE CATALOGUE



29. Chordata - Triglidae 1

Sea robin or gurnard.

Station: EW2-8 Fix: 969



30. Cnidaria - Actiniaria 1

Anemone with dense fine arms, oral disc not visible.
Possibly more arms that Ceriantharia 3.

Station: EW2-2 Fix: 2678



31. Cnidaria - *Adamsia* sp.

Cloak anemone on the shell of Paguroidea.

Station: EW2-11 Fix: 699

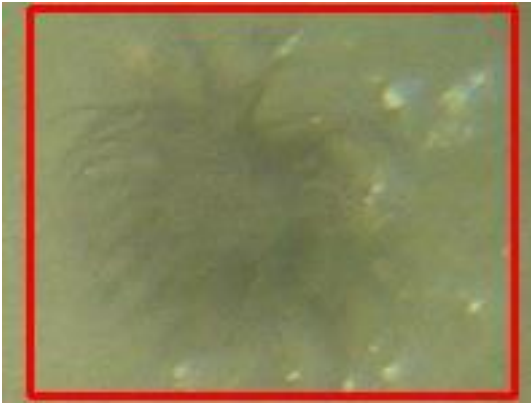


32. Cnidaria - Ceriantharia 1

Burrowing anemone with pink tentacle and white oral disc.

Station: EW2-2 Fix: 2660

APPENDIX C IMAGE CATALOGUE



33. Cnidaria - *Ceriantharia* 3

Dark, uniform colour, burrowing anemone.

Station: EW2-2 Fix: 2688



34. Cnidaria - *Edwardsia*

Burrowing anemone with short tentacles close to the sediment surface.

Station: EW2-13 Fix: 443



35. Cnidaria - *Halicampoides* 1

Burrowing anemone with tall column above the sediment surface and long transparent tentacles.

Station: EW2-4 Fix: 2472



36. Cnidaria - *Hydrozoa* 1

Hydrozoan, furry encrusting.

Station: EW2-2 Fix: 2725

APPENDIX C IMAGE CATALOGUE



37. Cnidaria - Hydrozoa indeterminate

Branching hydrozoans.

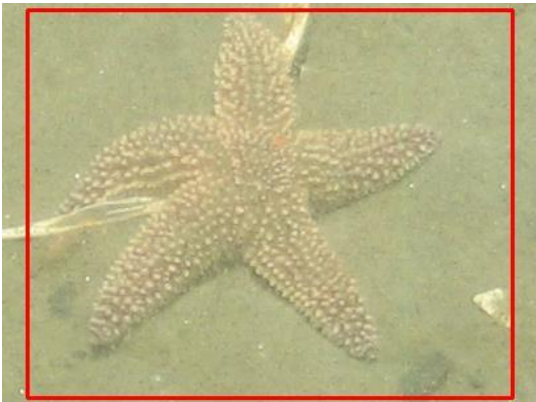
Station: EW2-3 Fix: 2628



38. Cnidaria - *Tubularia*

Hydroid has tough stem, with a pale pink polyp.

Station: EW2-10 Fix: 814



39. Echinodermata - *cf. Asterias forbesi*

Five arms; plump and broad at the base tapering to a blunt tip, covered in blunt spines. Brown or tan to reddish-purple.

Station: EW2-14 Fix: 296



40. Echinodermata - Crinoidea

Ten fluffy arms located around a central disc.

Station: EW2-15 Fix: 196

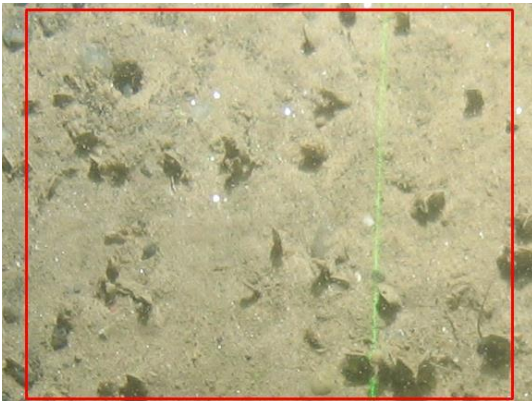
APPENDIX C IMAGE CATALOGUE



41. Echinodermata - *Echinarachnius parma*

Sand dollar.

Station: EW2-16 Fix: 4



42. Faunal Turf

Indeterminate biological matter.

Station: EW2-10 Fix: 776



43. Foraminifera - *Astrorhiza* 1

Foraminiferous rhizopod.

Station: EW2-2 Fix: 2722



44. Mollusca - *Arctica islandica* - dead shell

Bivalve shell with black periostracum. Periostracum flaking off revealing white structure beneath.

Station: EW2-10 Fix: 815

APPENDIX C IMAGE CATALOGUE



45. Mollusca - *Arctica islandica* siphons

Two siphons of *Bivalvia* clear on sediment surface. One circular siphon edged with frills and one siphon smooth and circular, classic *Arctica islandica*.

Station: EW2-14 Fix: 267



46. Mollusca - *Astarte*

Brown to tan bivalve.

Station: EW2-10 Fix: 824



47. Mollusca - *Bivalvia* 1

Possible piddock - *Pholadidae*

Station: EW2-3 Fix: 2565



48. Mollusca - *Bivalvia* 2

Orange coloured lips.

Station: EW2-14 Fix: 292

APPENDIX C IMAGE CATALOGUE



49. Mollusca - Bivalvia indeterminate

Bivalve mollusc.

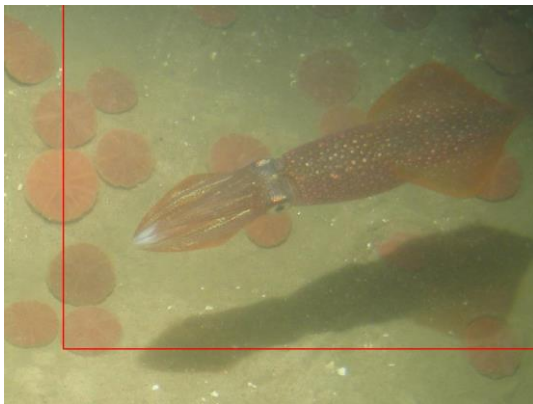
Station: EW2-14 Fix: 362



50. Mollusca - Bivalvia Siphons

Bivalve siphons.

Station: EW2-16 Fix: 62



51. Mollusca - cf. *Doryteuthis (Amerigo) pealeii*

Long-finned inshore squid.

Station: EW2-15 Fix: 140



52. Mollusca - *Crepidula*

Slipper snail or slipper limpet.

Station: EW2-3 Fix: 2636

APPENDIX C IMAGE CATALOGUE



53. Mollusca - Decapodiformes 1

Indeterminate squid, transparent.

Station: EW2-14 Fix: 287



54. Mollusca - *Ensis* sp.

Razor shell, long elongated shell with slight curved anterior end.

Station: EW2-16 Fix: 50



55. Mollusca - Gastropoda 1

Elongated oval shell.

Station: EW2-10 Fix: 811



56. Mollusca - *Modiolus*

Dark black bivalve shell with orange lips.

Station: EW2-13 Fix: 565

APPENDIX C IMAGE CATALOGUE



57. Mollusca - Nassariidae

Gastropod snail, small to medium size, rounded shall with a high spire.

Station: EW2-2 Fix: 2661



58. Mollusca - Naticidae

Moon snail with white foot and globular shell.

Station: EW2-13 Fix: 451



59. Mollusca - Naticidae eggs

Egg collar of Naticidae.

Station: EW2-2 Fix: 2710



60. Mollusca - Nudibranchia 1

Pale elongated nudibrach with large pale rhinophores.

Station: EW2-2 Fix: 2711

APPENDIX C IMAGE CATALOGUE



61. Mollusca - Nudibranchia 3

Small sand coloured nudibranch.

Station: EW2-8 Fix: 992



62. Mollusca - Pectinidae

Scallop.

Station: EW2-5 Fix: 1221

APPENDIX D FAUNAL OBSERVATION SUMMARY – STATION OVERVIEW

APPENDIX D FAUNAL OBSERVATION SUMMARY – STATION OVERVIEW

Table D. 1 Semi-Quantitative Faunal Summary

Transect	EW2-2	EW2-3	EW2-4	EW2-5	EW2-6	EW2-7	EW2-8	EW2-9	EW2-10	EW2-11	EW2-12	EW2-13	EW2-14	EW2-15	EW2-16	Total
Number of Images Assessed	100	139	151	141	117	84	128	77	107	82	137	159	206	151	131	1910
Phylum - Taxon	Abundance	Abundance	Abundance	Abundance	Abundance	Abundance	Abundance	Abundance	Abundance	Abundance	Abundance	Abundance	Abundance	Abundance	Abundance	Abundance
Arthropoda - <i>Limulus polyphemus</i>	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
Chordata - <i>Leucoraja ocellata</i>	2	0	0	0	0	1	0	8	13	3	7	6	3	5	3	51
Chordata - Rajidae egg case	1	3	1	62	4	5	26	21	32	12	29	27	33	35	6	297
Chordata - <i>Squalus acanthias</i>	0	0	0	0	0	0	0	0	0	0	0	0	1	4	0	5
Cnidaria - Actiniaria 1	2	7	2	1	1	0	0	0	0	0	1	0	3	0	0	17
Cnidaria - Ceriantharia 1	61	358	6	33	8	1	15	0	99	0	21	1	50	0	0	653
Cnidaria - Ceriantharia 3	6	22	0	1	0	0	0	0	5	0	3	0	0	0	0	37
Cnidaria - <i>Edwardsia</i>	0	1	0	0	0	0	1	0	1	0	2	5	0	4	1	15
Cnidaria - <i>Halcampoides</i> 1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
Total Anthozoa	69	388	9	35	9	1	16	0	105	0	27	6	53	4	1	723
Mollusca - <i>Arctica islandica</i> - dead shell	1	1	0	4	5	1	5	0	9	2	4	1	17	0	0	50
Mollusca - <i>Arctica islandica</i> siphons	0	0	0	0	0	0	1	1	14	1	7	6	21	7	2	67
Total <i>Arctica islandica</i>	1	1	0	4	5	1	6	1	23	3	11	7	38	7	2	117

Table D.2 Other Fauna Summary

Transect	EW2-2	EW2-3	EW2-4	EW2-5	EW2-6	EW2-7	EW2-8	EW2-9	EW2-10	EW2-11	EW2-12	EW2-13	EW2-14	EW2-15	EW2-16	Total
Number of Stills Assessed	99	137	150	114	113	79	109	59	77	69	112	134	183	123	125	1683
Phylum - Taxon	% Stills	% Stills	% Stills	% Stills	% Stills	% Stills	% Stills	% Stills	% Stills	% Stills	% Stills	% Stills	% Stills	% Stills	% Stills	% Stills
Animalia indeterminate 1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0.2
Animalia indeterminate 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.1
Animalia indeterminate 9	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0.1
Animalia tubes	52	82	51	40	57	49	54	86	26	43	36	33	21	15	15	42
Annelida - <i>Hyalinoecia tubicola</i>	0	1	0	0	0	0	0	2	0	0	0	0	0	0	0	0.1
Annelida - Pectinariidae	2	3	0	2	0	0	1	2	3	0	0	0	0	0	0	1
Annelida - Polychaeta 1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1
Annelida - Sabellidae	0	0	0	0	0	0	1	0	0	0	1	0	1	0	0	0.2
Annelida - Serpulidae	1	0	0	0	0	1	0	2	0	0	0	0	0	0	1	0.2
Annelida 1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0.1
Anthropogenic Debris	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0.1
Arthropoda - Brachyura 1	1	0	0	1	0	0	0	0	1	0	0	0	1	0	0	0.2
Arthropoda - Brachyura indeterminate	0	2	0	4	4	3	3	0	1	0	1	0	0	1	0	1
Arthropoda - <i>Cancer borealis</i>	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1
Arthropoda - Caridea	0	4	0	0	0	0	1	0	0	0	0	0	1	0	0	0.4
Arthropoda - Cirripedia	1	4	1	5	3	3	2	0	0	0	6	1	4	2	0	2
Arthropoda - Paguroidea	24	36	4	18	13	38	41	36	27	20	25	35	22	33	30	26
Burrow	10	34	0	27	30	18	6	42	29	25	24	28	22	44	27	24
Chordata - Actinopterygii indeterminate	0	0	0	4	0	0	0	0	0	1	0	0	0	0	0	0.4
Chordata - Ascidiacea 1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0.1
Chordata - Blennidae	3	2	0	4	3	11	3	0	8	6	2	7	1	2	1	3
Chordata - Elasmobranchia indeterminate	0	0	0	0	0	0	1	3	1	0	1	0	0	0	0	0.3
Chordata - Phycidae 1	1	0	1	2	1	0	0	2	0	0	0	0	2	0	0	1
Chordata - Pleuronectiformes 1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0.1
Chordata - Pleuronectiformes indeterminate	0	0	0	1	0	0	0	0	0	0	0	0	0	2	0	0.2
Chordata - Syngnathinae	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0.1
Chordata - Triglidae 1	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0.1
Cnidaria - <i>Adamsia</i> sp.	0	0	0	0	0	0	0	0	0	1	1	1	0	1	0	0.2
Cnidaria - Hydrozoa 1	1	1	0	0	0	0	0	2	0	0	0	0	0	0	0	0.2
Cnidaria - Hydrozoa indeterminate	0	4	1	2	3	0	0	0	1	1	0	0	2	1	0	1
Cnidaria - <i>Tubularia</i>	1	0	0	0	1	0	0	0	1	0	0	0	0	0	1	0.2
Echinodermata - <i>cf. Asterias forbesi</i>	0	0	0	0	0	0	0	0	0	3	0	0	1	0	0	0.2

Transect	EW2-2	EW2-3	EW2-4	EW2-5	EW2-6	EW2-7	EW2-8	EW2-9	EW2-10	EW2-11	EW2-12	EW2-13	EW2-14	EW2-15	EW2-16	Total
Number of Stills Assessed	99	137	150	114	113	79	109	59	77	69	112	134	183	123	125	1683
Phylum - Taxon	% Stills	% Stills	% Stills	% Stills	% Stills	% Stills	% Stills	% Stills	% Stills	% Stills	% Stills	% Stills	% Stills	% Stills	% Stills	% Stills
Echinodermata - Crinoidea	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0.1
Echinodermata - <i>Echinarachnius parma</i>	100	64	55	87	87	99	83	93	35	99	43	100	45	98	100	77
Faunal Turf	1	4	0	4	0	0	2	5	17	1	20	2	5	2	0	4
Foraminifera - <i>Astrorhiza</i> 1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1
Mollusca - <i>Astarte</i> 1	0	0	2	1	1	0	0	0	1	0	0	2	0	1	0	1
Mollusca - Bivalvia 1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1
Mollusca - Bivalvia 2	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0.1
Mollusca - Bivalvia indeterminate	0	0	0	1	4	0	0	2	0	7	4	3	2	2	2	2
Mollusca - Bivalvia siphons	0	1	0	0	2	1	3	17	17	30	25	6	20	20	5	9
Mollusca - <i>cf. Doryteuthis (Amerigo) pealeii</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0.1
Mollusca - <i>Crepidula</i>	0	3	0	12	3	0	1	0	1	0	0	0	0	0	0	1
Mollusca - Decapodiformes 1	0	0	0	0	0	0	0	0	0	0	0	0	2	2	0	0.3
Mollusca - <i>Ensis</i> sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.1
Mollusca - Gastropoda 1	0	0	0	0	0	0	0	0	3	0	11	1	5	0	0	1
Mollusca - <i>Modiolus</i>	0	0	0	2	0	0	1	0	0	13	1	1	0	0	0	1
Mollusca - Nassariidae	21	31	5	8	6	34	27	42	22	62	41	74	15	57	24	30
Mollusca - Naticidae	8	0	5	0	3	3	6	7	13	4	8	8	2	2	0	4
Mollusca - Naticidae eggs	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1
Mollusca - Nudibranchia 1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1
Mollusca - Nudibranchia 3	0	0	0	0	0	0	1	2	1	3	6	1	5	2	0	2
Mollusca - Pectinidae	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0.1

APPENDIX E FAUNAL OBSERVATION SUMMARY – PER IMAGE/SAMPLE

Appendix E: Faunal Observation Summary – per Image/Sample can be found in the attached Excel document entitled GISData_11543ED00_EquinorEmpireWindBarrettRoute_Rev0_Nov_12_2021.

Show/Hide Attachments

APPENDIX F SAMPLING AND SEABED PHOTOGRAPHS

APPENDIX F SAMPLING AND SEABED PHOTOGRAPHS



Station: EW2-2A
Fix: 2740 **E:** 627155 **N:** 4485122
Depth (m): 20

Sediment Description:
Rippled sand with shell fragments

Faunal Description:
Animalia tubes, Cnidaria (Ceriantharia 1, Ceriantharia 3), Echinodermata (*Echinarachnius parma*)



Station: EW2-2A
Fix: 2754 **E:** 627155 **N:** 4485120
Depth (m): 20

Sediment Description:
Rippled sand with shell fragments

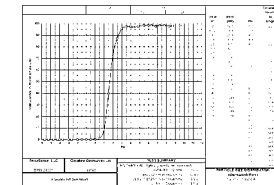
Faunal Description:
Chordata (Rajidae Egg Case), Cnidaria (Ceriantharia 1), Echinodermata (*E. parma*), Faunal Turf



Station: EW2-2A
Fix: 225 **E:** 627152 **N:** 4485123
Depth (m): 20 **Retention:** MFA

Sediment Description:
Fine sand

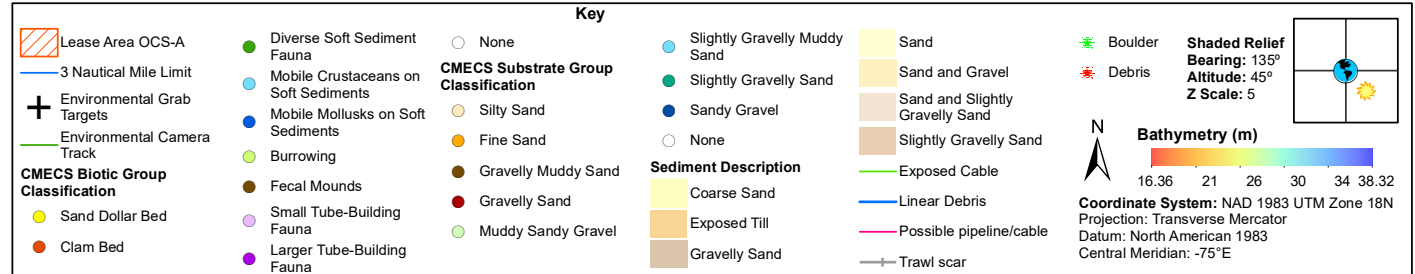
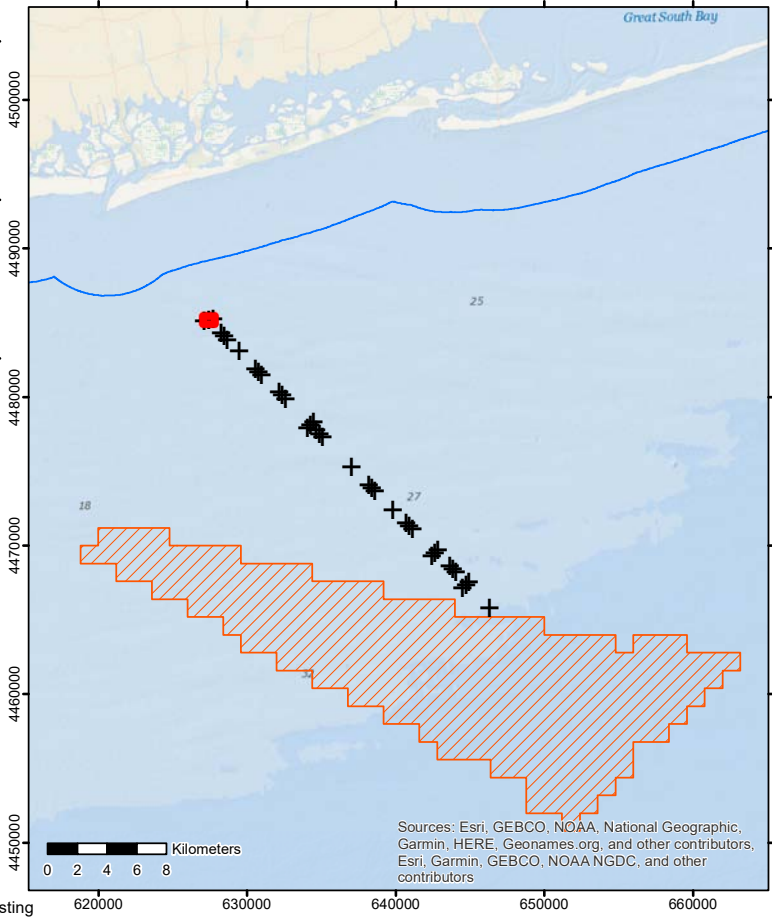
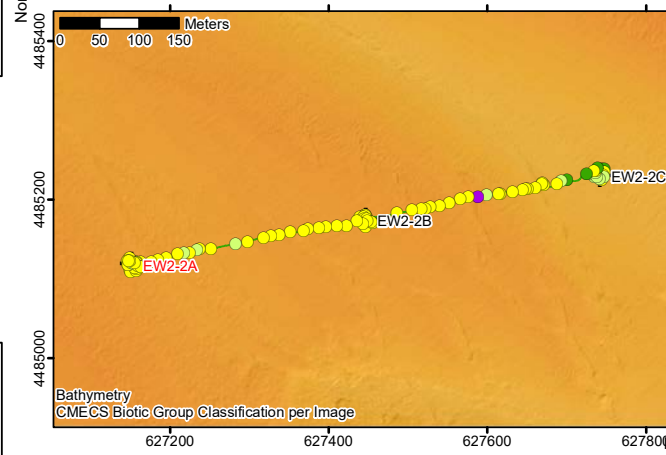
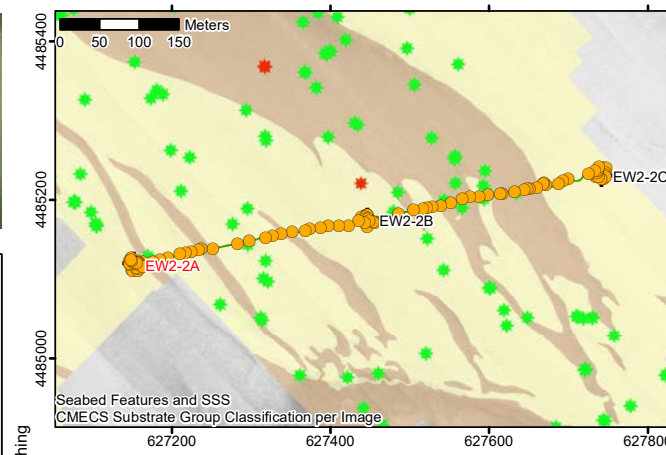
Faunal Description:
Echinodermata (Clypeasteroidea)



Station: EW2-2A
Fix: 226 **E:** 627148 **N:** 4485123
Depth (m): 20

PSA Sample:
CHEM

CMECS Substrate Classification:
Slightly gravelly sand



APPENDIX F SAMPLING AND SEABED PHOTOGRAPHS



Station: EW2-2B
Fix: 2707 **E:** 627446 **N:** 4485182
Depth (m): 20

Sediment Description:
Rippled sand with shell fragments

Faunal Description:
Animalia tubes, Cnidaria (Ceriantharia 1), Echinodermata (*E. parma*)



Station: EW2-2B
Fix: 2714 **E:** 627449 **N:** 4485173
Depth (m): 20

Sediment Description:
Rippled sand with shell fragments

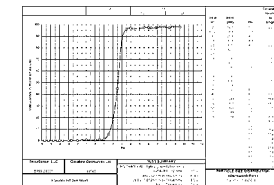
Faunal Description:
Animalia tubes, Echinodermata (*E. parma*)



Station: EW2-2B
Fix: 232 **E:** 627448 **N:** 4485167
Depth (m): 20 **Retention:** CHEM

Sediment Description:
Fine, dense sand

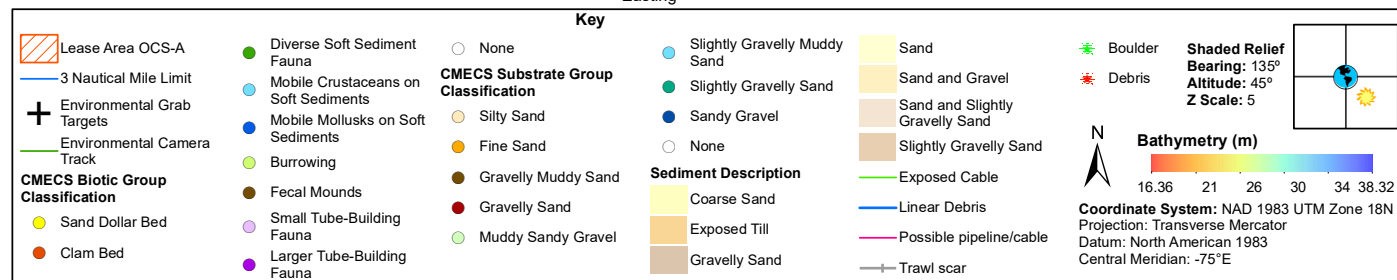
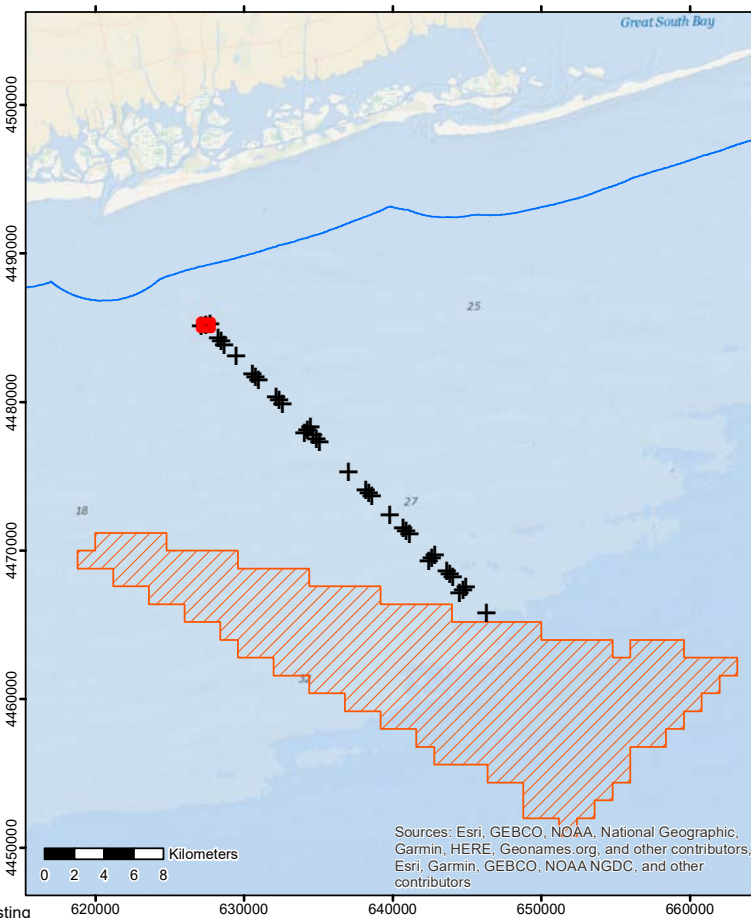
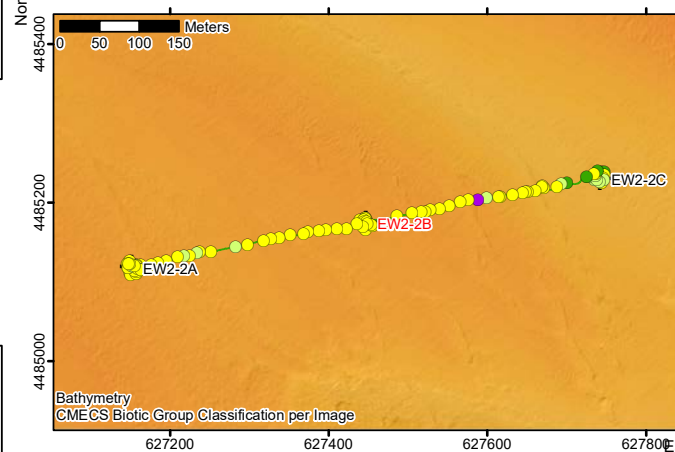
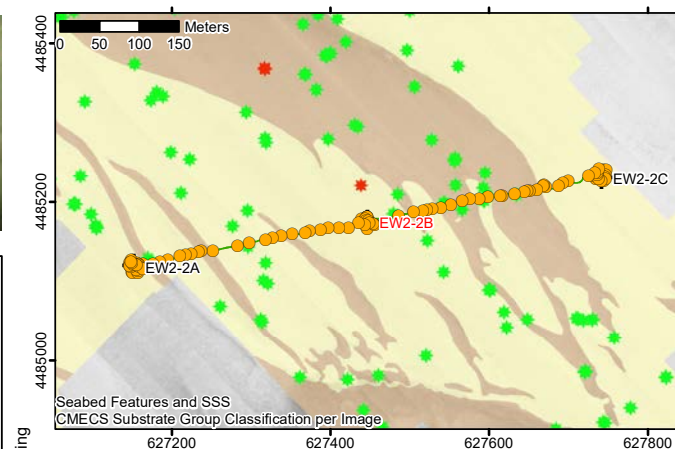
Faunal Description:
No visible fauna



Station: EW2-2B
Fix: 232 **E:** 627448 **N:** 4485167
Depth (m): 20

PSA Sample:
CHEM

CMECS Substrate Classification:
Slightly gravelly sand



APPENDIX F SAMPLING AND SEABED PHOTOGRAPHS



Station: EW2-2C
Fix: 2664 **E:** 627744 **N:** 4485226
Depth (m) : 21

Sediment Description:
Rippled sand with shell fragments

Faunal Description:
Animalia tubes, Cnidaria (Ceriantharia 1), Echinodermata (*E. parma*)



Station: EW2-2C
Fix: 2672 **E:** 627736 **N:** 4485234
Depth (m) : 21

Sediment Description:
Rippled sand with shell fragments

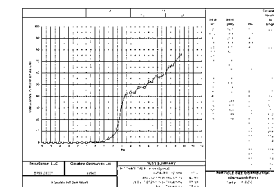
Faunal Description:
Animalia tubes, Arthropoda (Paguroidea), Cnidaria (Ceriantharia 1), Echinodermata (*E. parma*), Mollusca (Nassariidae)



Station: EW2-2C
Fix: 224 **E:** 627743 **N:** 4485231
Depth (m) : 21 **Retention:** MFB

Sediment Description:
Fine sand

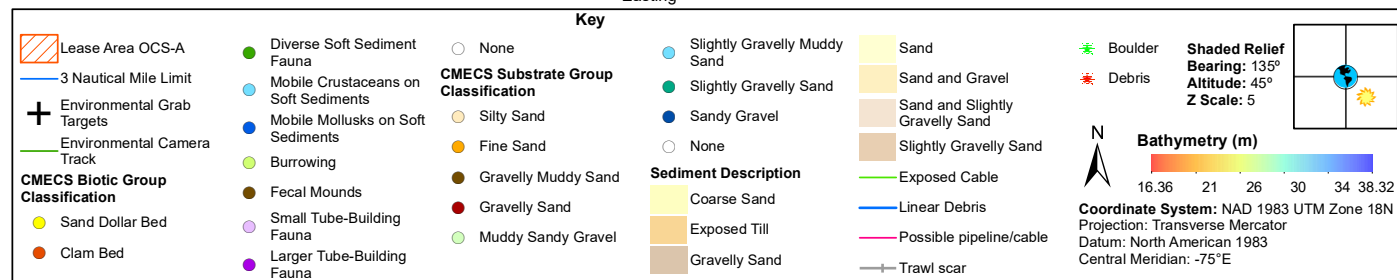
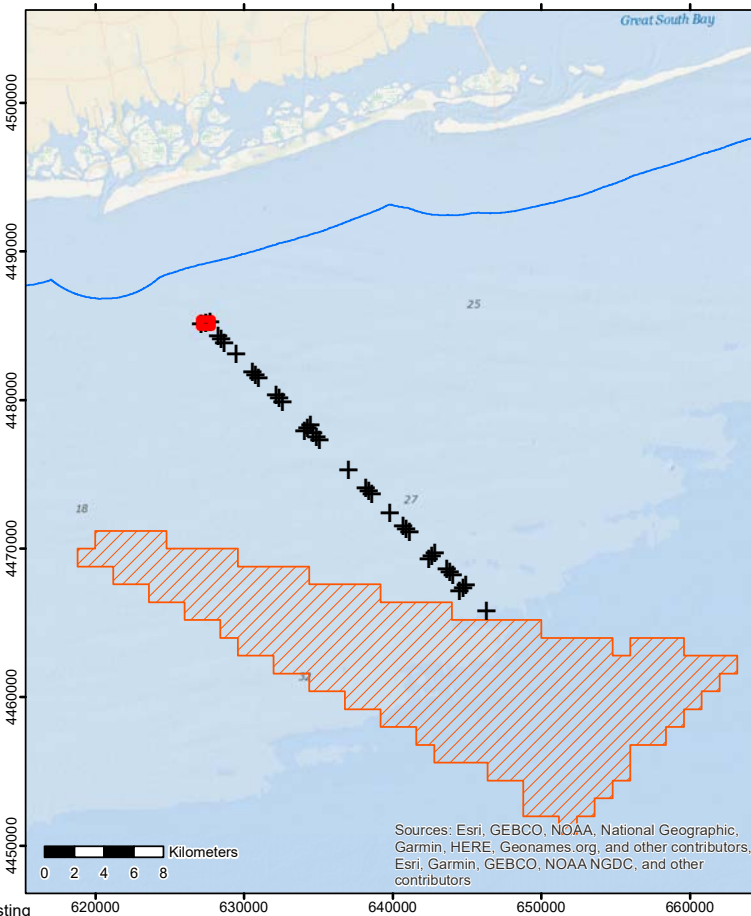
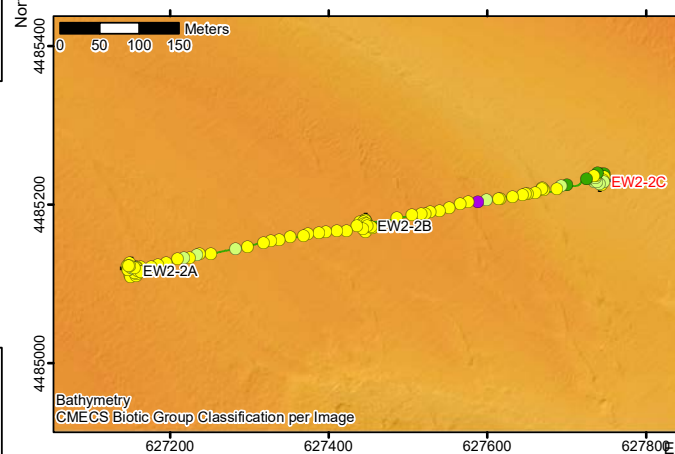
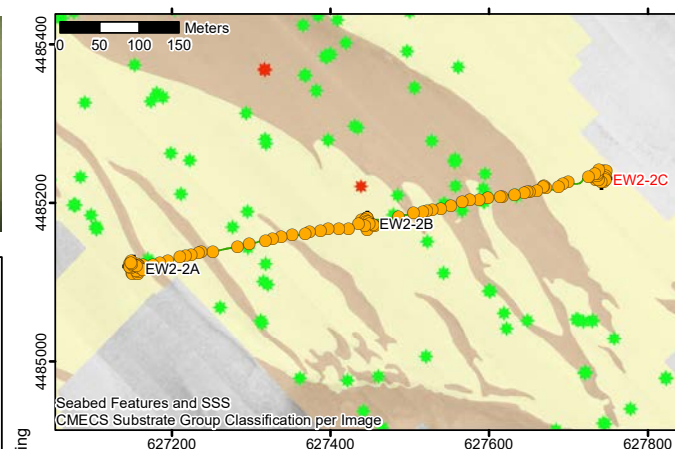
Faunal Description:
Annelida (Polychaeta), Mollusca



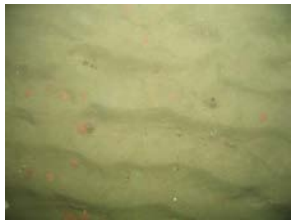
Station: EW2-2C
Fix: 223 **E:** 627745 **N:** 4485232
Depth (m) : 21

PSA Sample:
CHEM

CMECS Substrate Classification:
Sandy Clay



APPENDIX F SAMPLING AND SEABED PHOTOGRAPHS



Station: EW2-3A
Fix: 2645 **E:** 628293 **N:** 4484317
Depth (m) : 23

Sediment Description:
Rippled sand with shell fragments

Faunal Description:
Animalia tubes, Arthropoda (Paguroidea), Cnidaria (Ceriantharia 1), Echinodermata (E. parma), Mollusca (Nassariidae)



Station: EW2-3A
Fix: 2659 **E:** 628294 **N:** 4484328
Depth (m) : 23

Sediment Description:
Rippled muddy sand with shell fragments

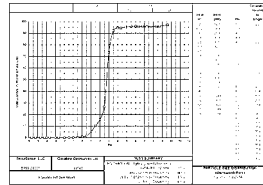
Faunal Description:
Animalia tubes, Cnidaria (Ceriantharia 1), Echinodermata (E. parma), Mollusca (Nassariidae)



Station: EW2-3A
Fix: 221 **E:** 628296 **N:** 4484317
Depth (m) : 23 **Retention:** MFB

Sediment Description:
Fine sand

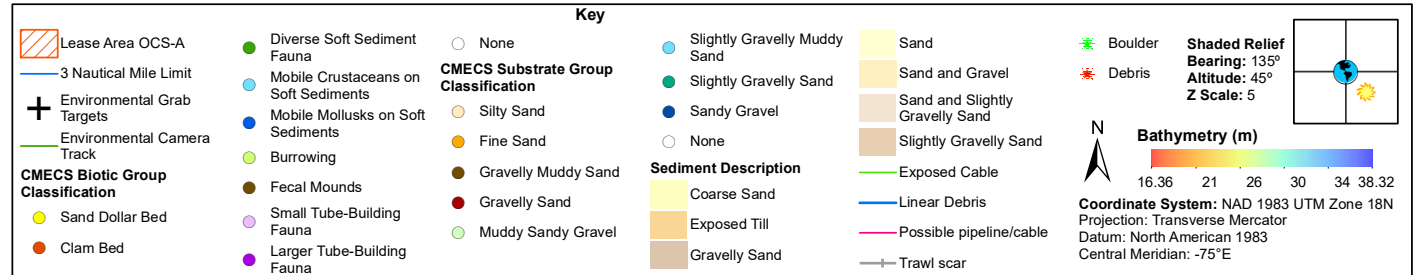
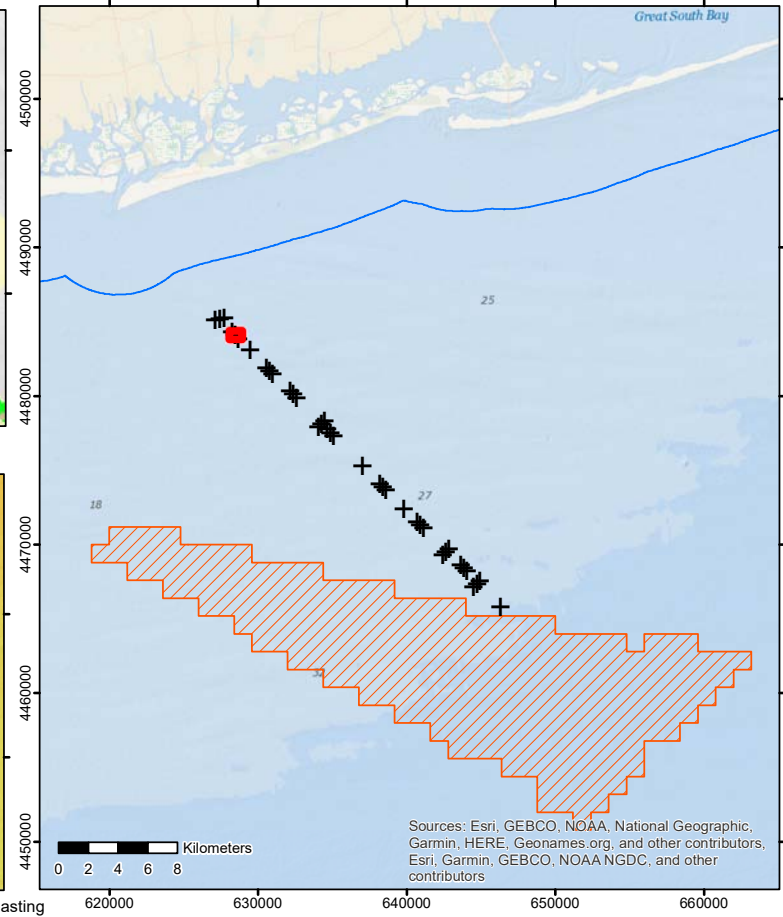
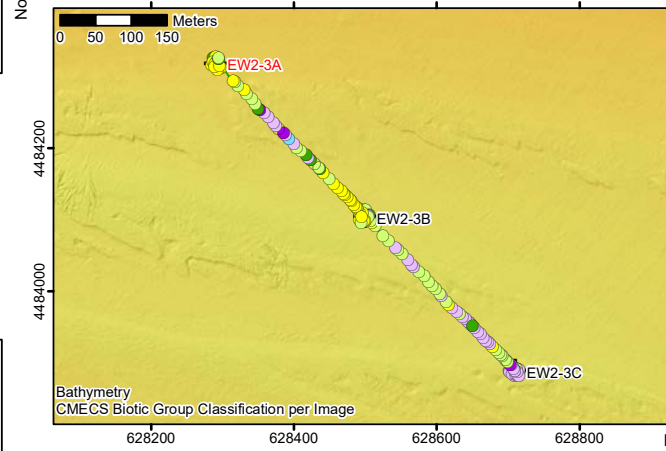
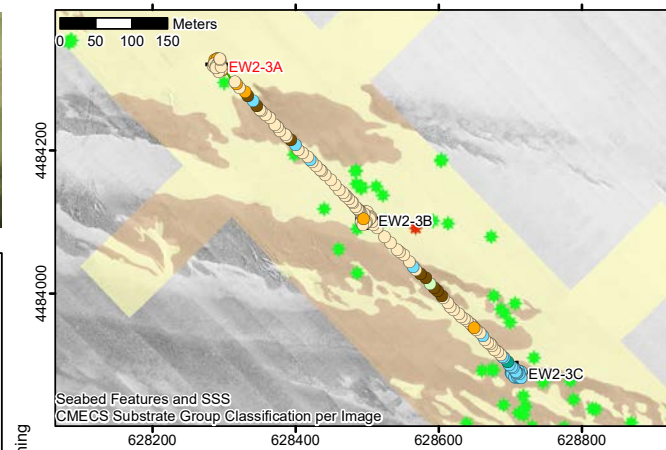
Faunal Description:
Annelida (Polychaeta), Echinodermata (Clypeasteroidea)



Station: EW2-3A
Fix: 220 **E:** 628291 **N:** 4484319
Depth (m) : 23

PSA Sample:
CHEM

CMECS Substrate Classification:
Slightly gravelly sand



APPENDIX F SAMPLING AND SEABED PHOTOGRAPHS



Station: EW2-3B
Fix: 2598 **E:** 628504 **N:** 4484104
Depth (m) : 24

Sediment Description:
Rippled muddy sand with shell fragments

Faunal Description:
Animalia tubes, Arthropoda (Paguroidea), Cnidaria (Ceriantharia 1, Ceriantharia 3)



Station: EW2-3B
Fix: 2601 **E:** 628492 **N:** 4484101
Depth (m) : 24

Sediment Description:
Rippled muddy sand with shell fragments

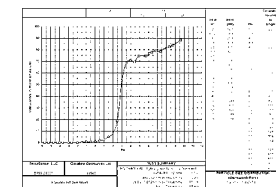
Faunal Description:
Animalia tubes, Cnidaria (Ceriantharia 1, Hydrozoa indeterminate), Echinodermata (E. parma), Mollusca (Nassariidae)



Station: EW2-3B
Fix: 216 **E:** 628499 **N:** 4484108
Depth (m) : 23 **Retention:** MFA

Sediment Description:
Fine sand

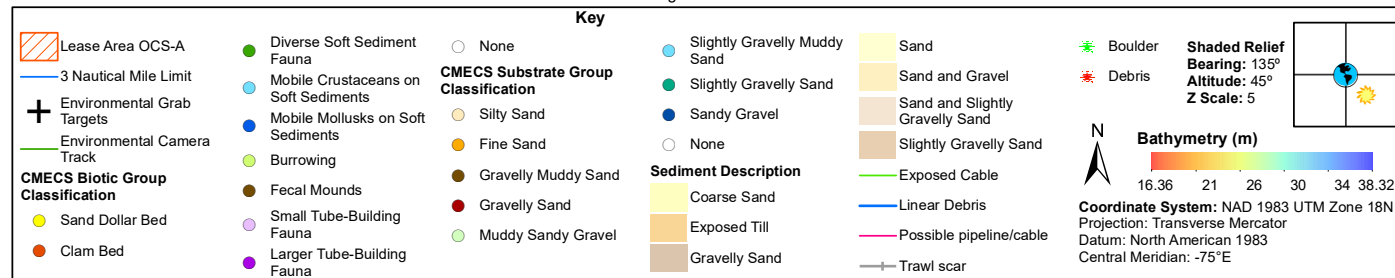
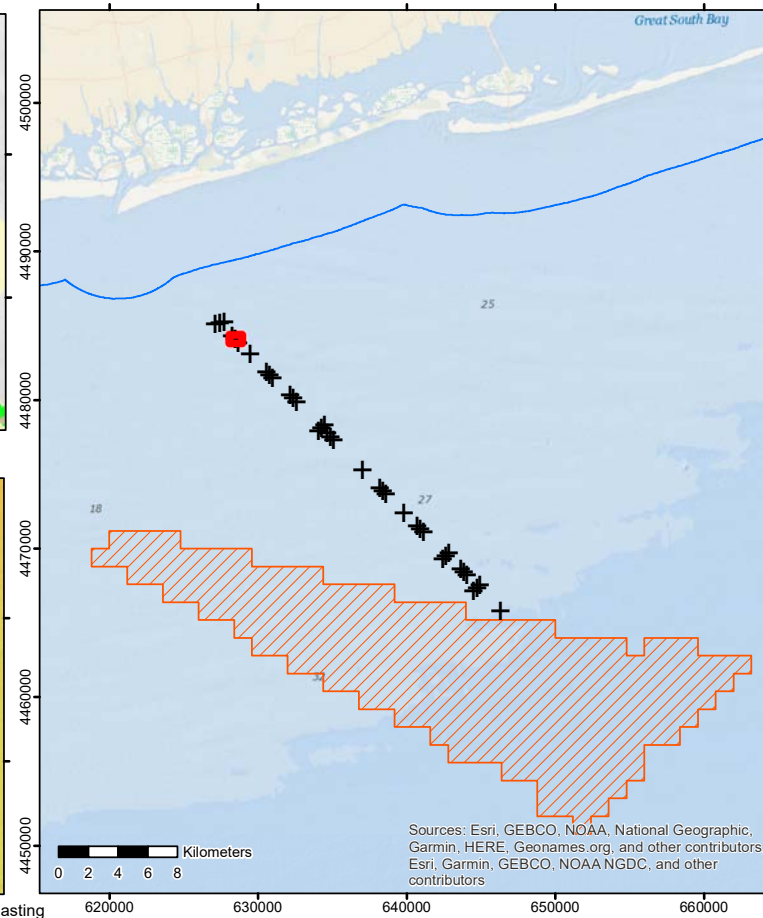
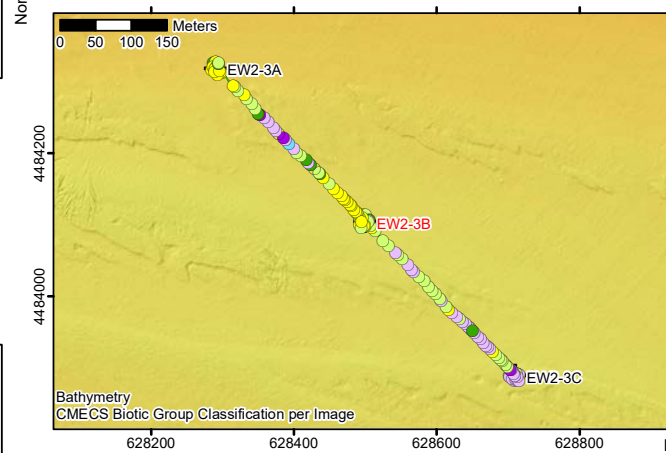
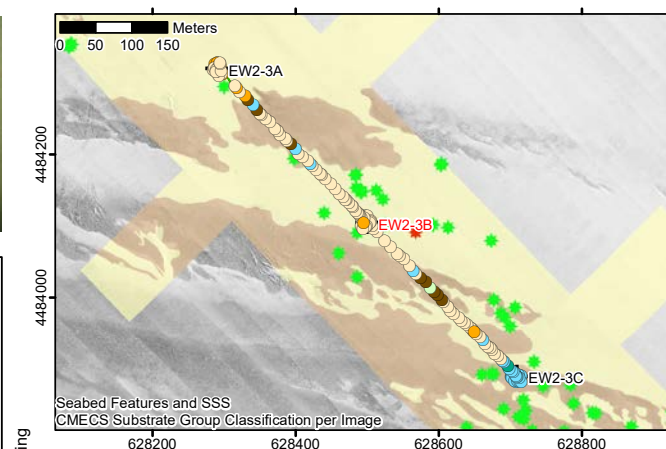
Faunal Description:
Arthropoda (Paguroidea), Echinodermata (Clypeasteroida)



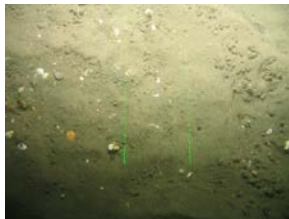
Station: EW2-3B
Fix: 217 **E:** 628505 **N:** 4484099
Depth (m) : 24

PSA Sample:
CHEM

CMECS Substrate Classification:
Slightly gravelly muddy sand



APPENDIX F SAMPLING AND SEABED PHOTOGRAPHS



Station: EW2-3C
Fix: 2528 **E:** 628710 **N:** 4483886
Depth (m) : 24

Sediment Description:
Rippled muddy sand with gravel patches

Faunal Description:
Animalia tubes



Station: EW2-3C
Fix: 2542 **E:** 628710 **N:** 4483889
Depth (m) : 24

Sediment Description:
Rippled muddy sand with gravel patches

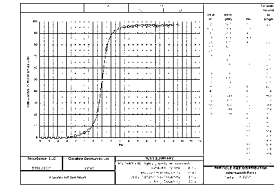
Faunal Description:
Animalia tubes, Cnidaria (Ceriantharia 1), Echinodermata (*E. parma*)



Station: EW2-3C
Fix: 214 **E:** 628715 **N:** 4483890
Depth (m) : 24 **Retention:** CHEM

Sediment Description:
Fine sand with shell fragments, pebbles, gravel and clay

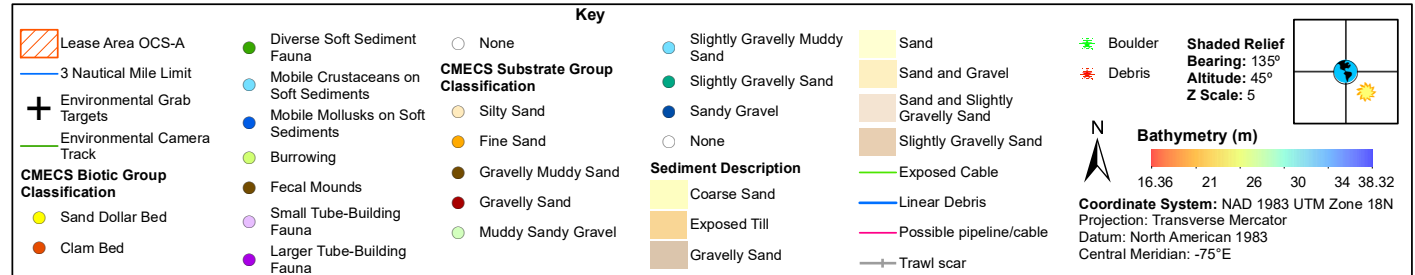
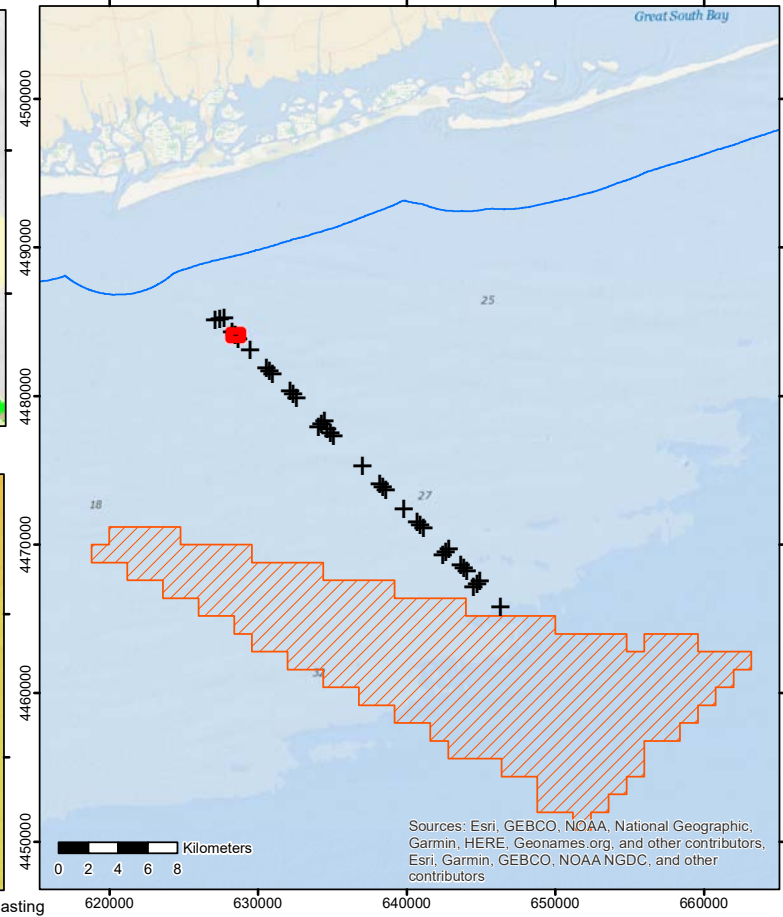
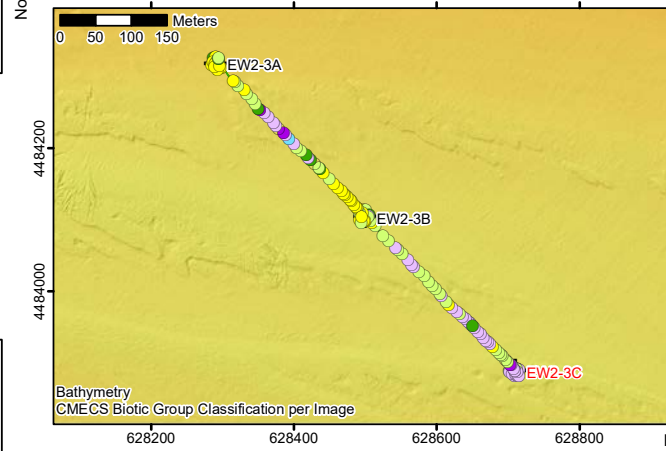
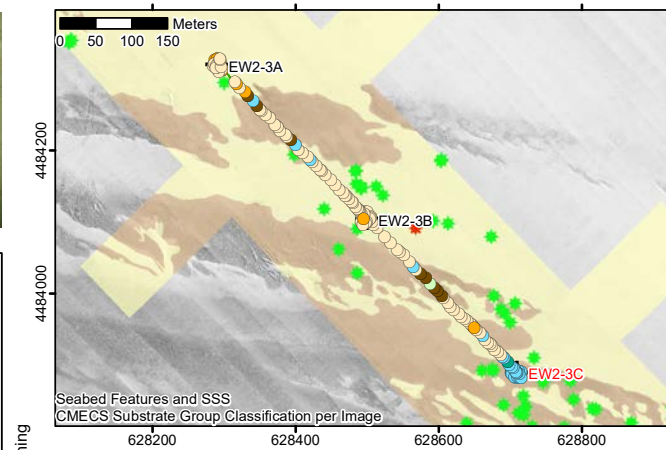
Faunal Description:
No visible fauna



Station: EW2-3C
Fix: 214 **E:** 628715 **N:** 4483890
Depth (m) : 24

PSA Sample:
CHEM

CMECS Substrate Classification:
Slightly gravelly sand



APPENDIX F SAMPLING AND SEABED PHOTOGRAPHS



Station: EW2-4
Fix: 2472 **E:** 629495 **N:** 4483104
Depth (m) : 21

Sediment Description:
Rippled sand with shell fragments

Faunal Description:
Animalia tubes, Cnidaria
(Halicampoides 1),
Mollusca (Nassariidae)



Station: EW2-4
Fix: 2474 **E:** 629489 **N:** 4483111
Depth (m) : 21

Sediment Description:
Rippled sand with shell fragments

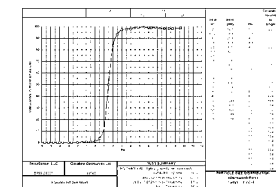
Faunal Description:
Animalia tubes, Echinodermata (*E. parma*)



Station: EW2-4
Fix: 209 **E:** 629492 **N:** 4483105
Depth (m) : 20 **Retention:** CHEM

Sediment Description:
Fine to medium sand with shell hash

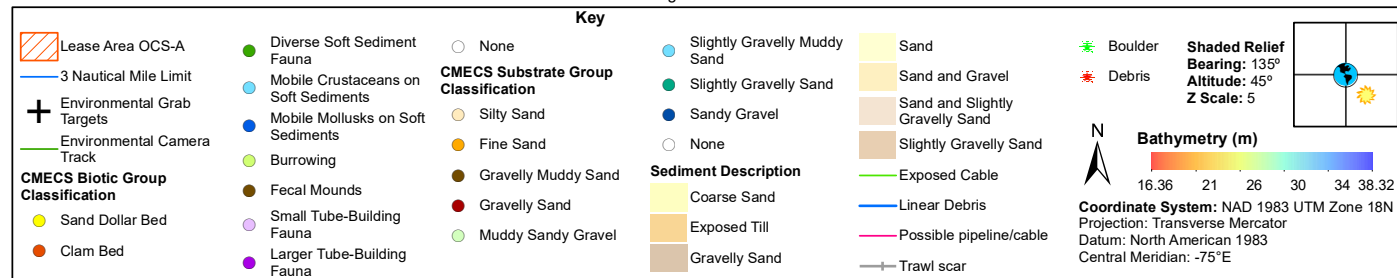
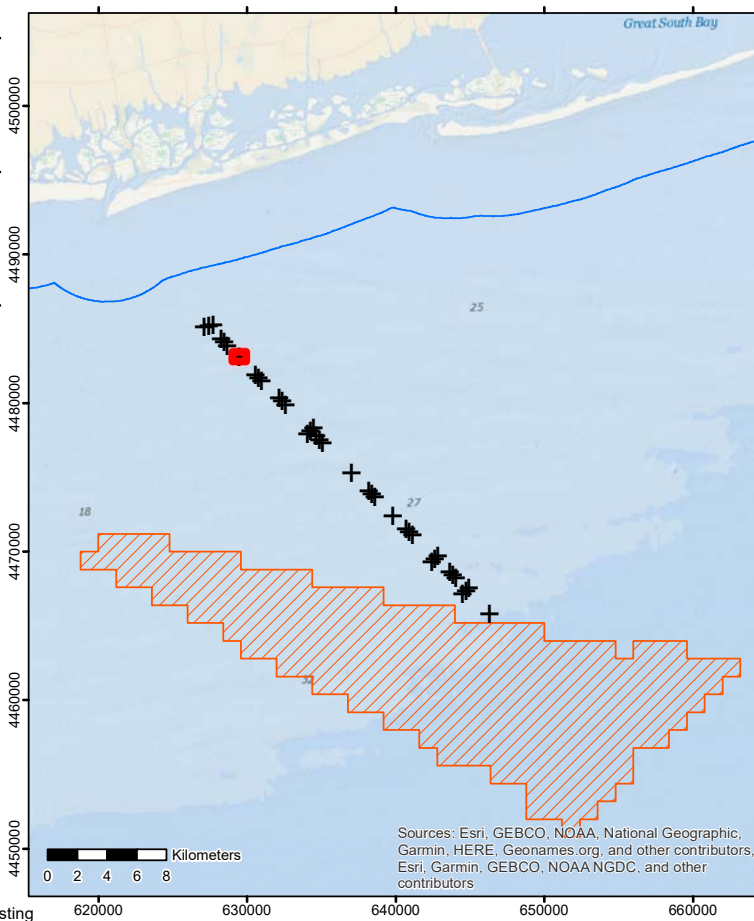
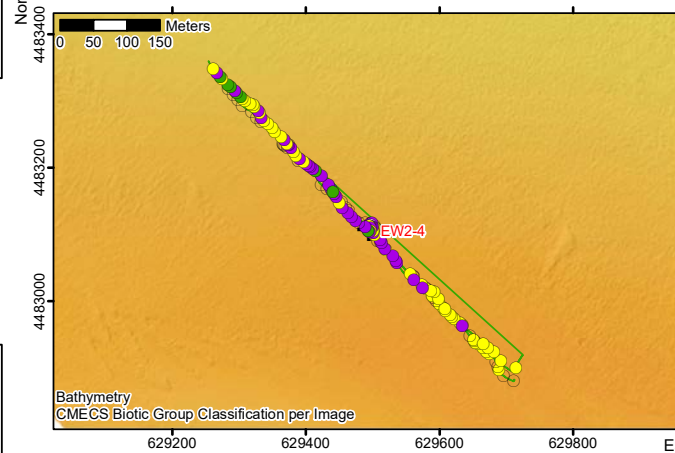
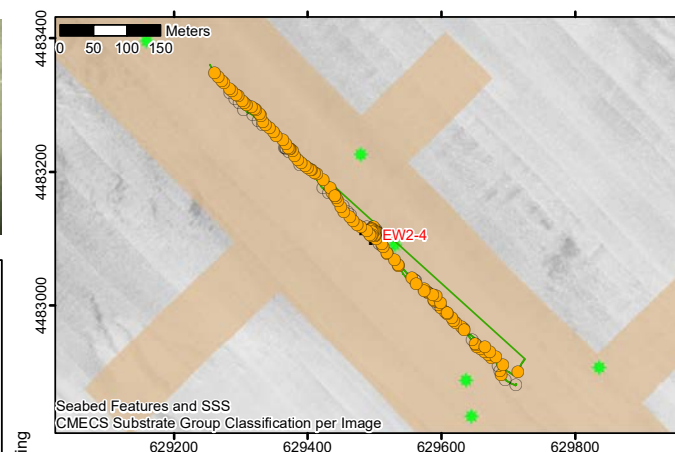
Faunal Description:
No visible fauna



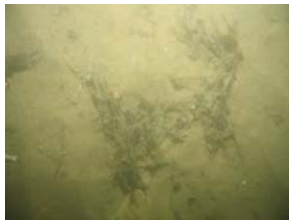
Station: EW2-4
Fix: 209 **E:** 629492 **N:** 4483105
Depth (m) : 20

PSA Sample:
CHEM

CMECS Substrate Classification:
Slightly gravelly sand



APPENDIX F SAMPLING AND SEABED PHOTOGRAPHS



Station: EW2-5A
Fix: 1308 **E:** 630609 **N:** 4481923
Depth (m) : 25

Sediment Description:
Rippled muddy sand with shell fragments

Faunal Description:
Animalia tubes, Annelida (Pectinariidae), Arthropoda (Brachyura indeterminate), Chordata (Rajidae Egg Case), Echinodermata (*E. parma*), Faunal Turf



Station: EW2-5A
Fix: 1308 **E:** 630603 **N:** 4481933
Depth (m) : 25

Sediment Description:
Rippled muddy sand with shell fragments

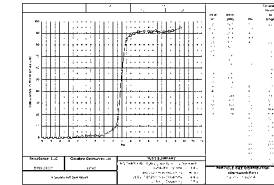
Faunal Description:
Animalia tubes, Chordata (Rajidae Egg Case), Cnidaria (Ceriantharia 1), Echinodermata (*E. parma*), Faunal Turf



Station: EW2-5A
Fix: 206 **E:** 630603 **N:** 4481932
Depth (m) : 24 **Retention:** CHEM

Sediment Description:
Silty sand

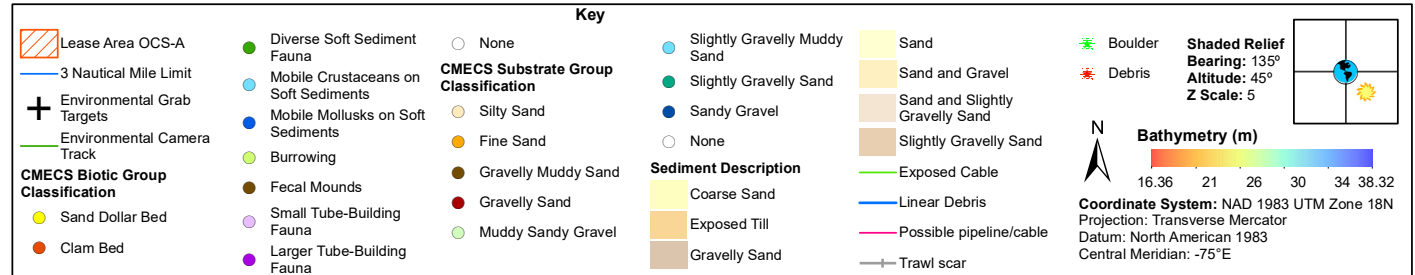
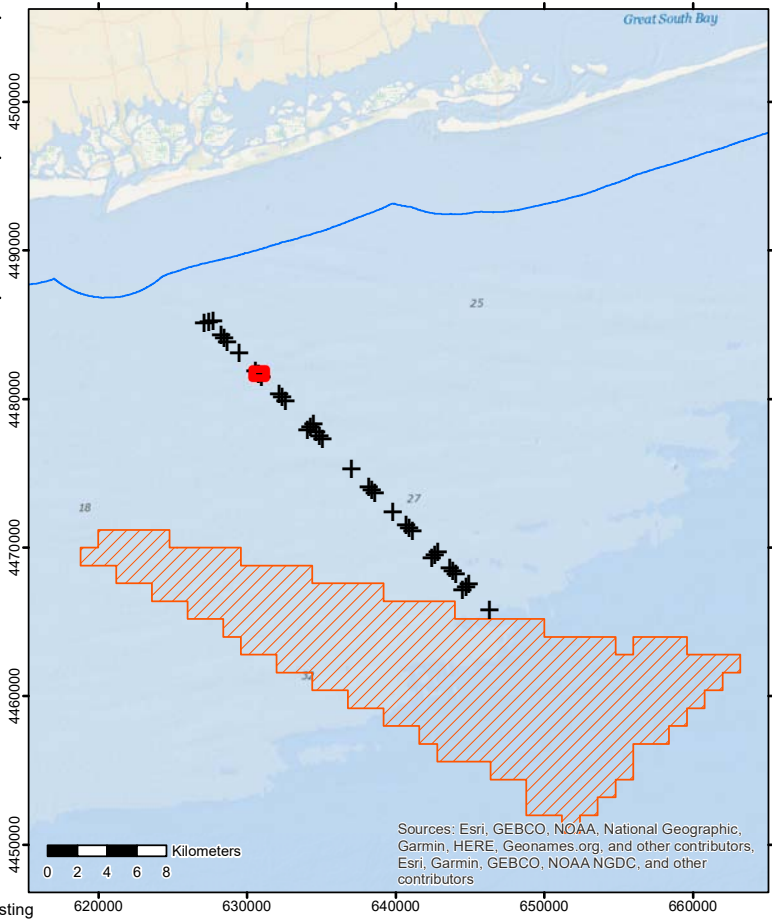
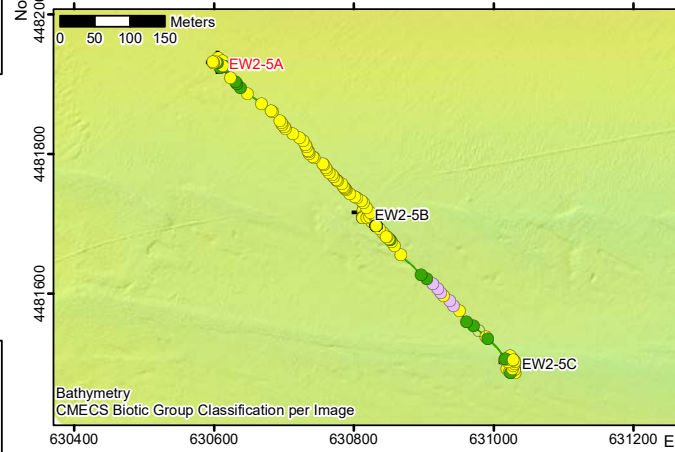
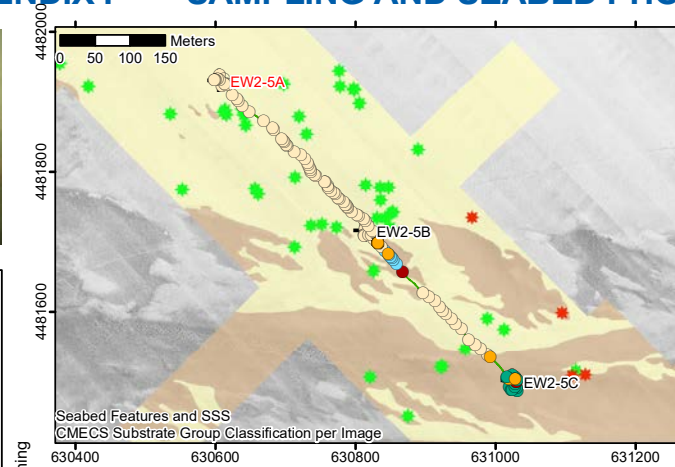
Faunal Description:
Echinodermata (Clypeasteroidea)



Station: EW2-5A
Fix: 206 **E:** 630603 **N:** 4481932
Depth (m) : 24

PSA Sample:
CHEM

CMECS Substrate Classification:
Slightly gravely muddy sand



APPENDIX F SAMPLING AND SEABED PHOTOGRAPHS



Station: EW2-5B
Fix: 1248 **E:** 630812 **N:** 4481708
Depth (m) : 26

Sediment Description:
Rippled muddy sand with shell fragments

Faunal Description:
Animalia tubes, Echinodermata (*E. parma*)



Station: EW2-5B
Fix: 1256 **E:** 630824 **N:** 4481716
Depth (m) : 26

Sediment Description:
Rippled muddy sand with shell fragments

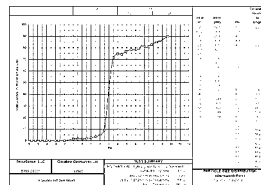
Faunal Description:
Animalia tubes, Arthropoda (Paguroidea), Cnidaria (Ceriantharia 1, Ceriantharia 3), Echinodermata (*E. parma*)



Station: EW2-5B
Fix: 204 **E:** 630815 **N:** 4481719
Depth (m) : 25 **Retention:** MFB

Sediment Description:
Silty sand

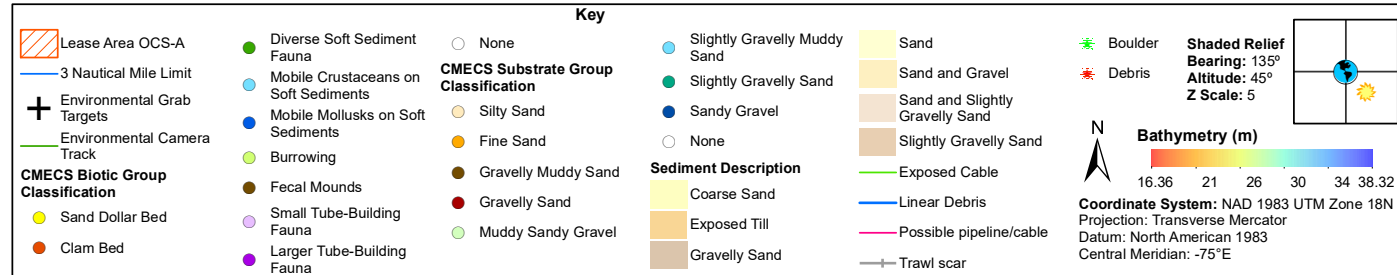
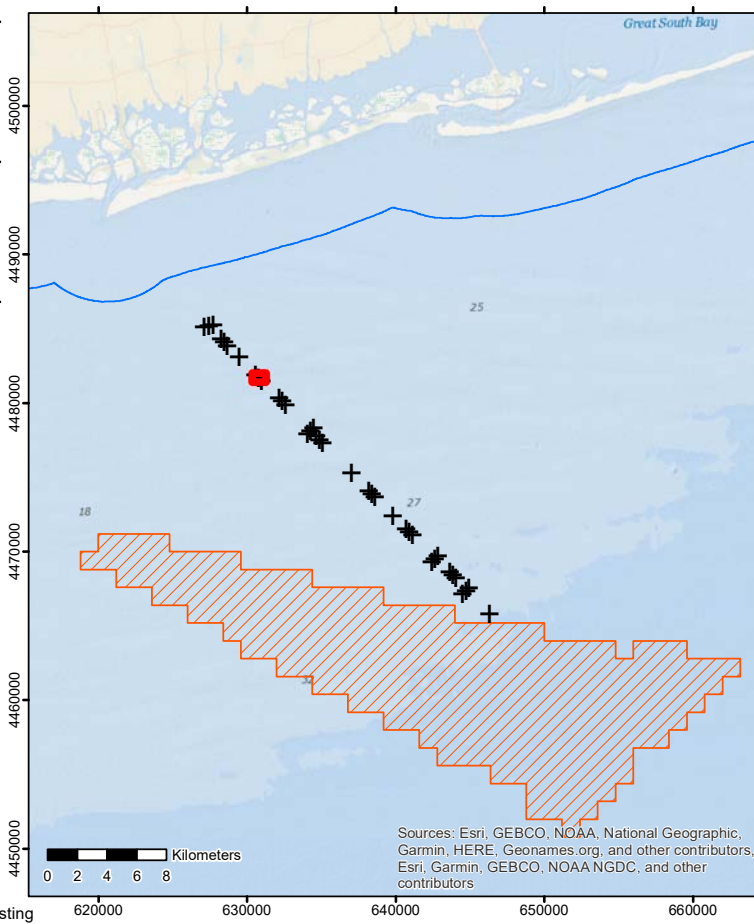
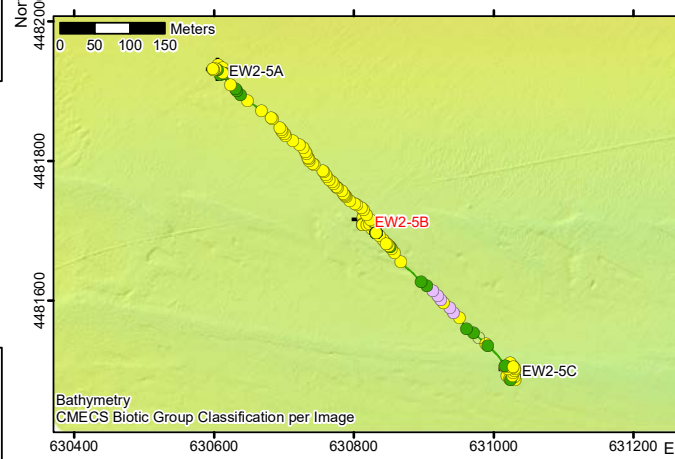
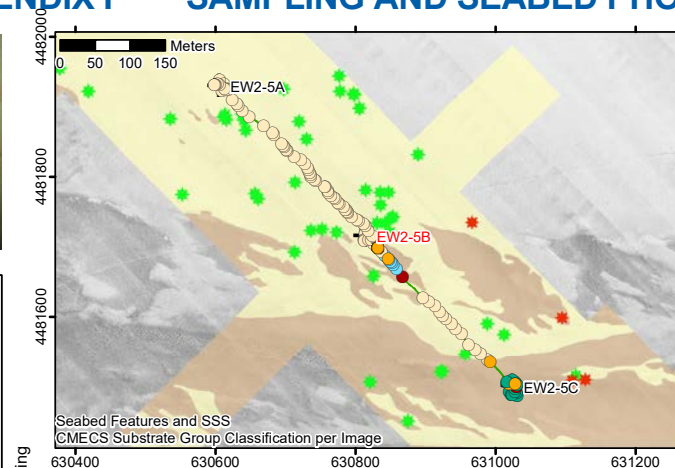
Faunal Description:
Echinodermata (Clypeasteroidea)



Station: EW2-5B
Fix: 203 **E:** 630819 **N:** 4481715
Depth (m) : 25

PSA Sample:
CHEM

CMECS Substrate Classification:
Slightly gravelly muddy sand



APPENDIX F SAMPLING AND SEABED PHOTOGRAPHS



Station: EW2-5C
Fix: 1212 **E:** 631030 **N:** 4481501
Depth (m) : 27

Sediment Description:
Rippled sand with gravel patches

Faunal Description:
Arthropoda (Paguroidea), Cnidaria (Actiniaria 1), Echinodermata (*E. parma*)



Station: EW2-5C
Fix: 1217 **E:** 631016 **N:** 4481507
Depth (m) : 27

Sediment Description:
Rippled sand with gravel patches

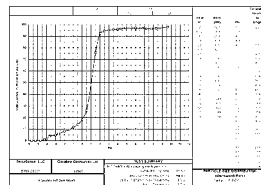
Faunal Description:
Echinodermata (*E. parma*), Mollusca (Crepidula), Mollusca (Nassariidae)



Station: EW2-5C
Fix: 201 **E:** 631019 **N:** 4481503
Depth (m) : 26 **Retention:** MFB

Sediment Description:
Silty sand with gravel, pebbles and shells

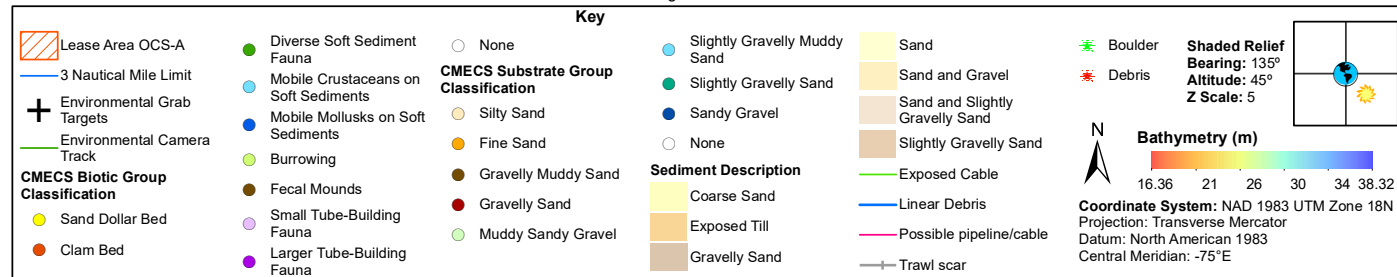
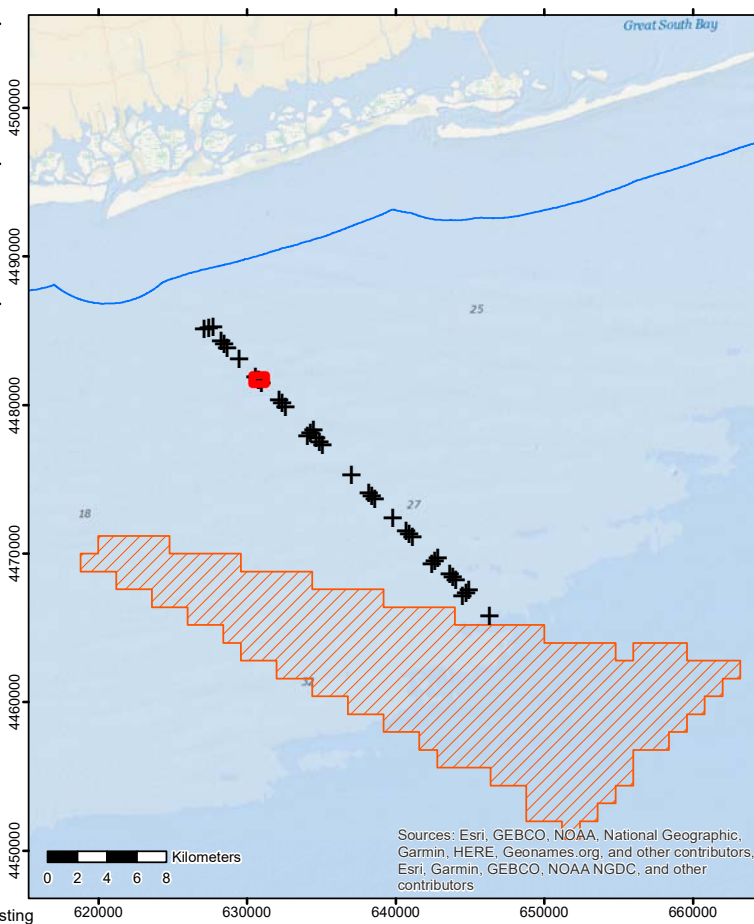
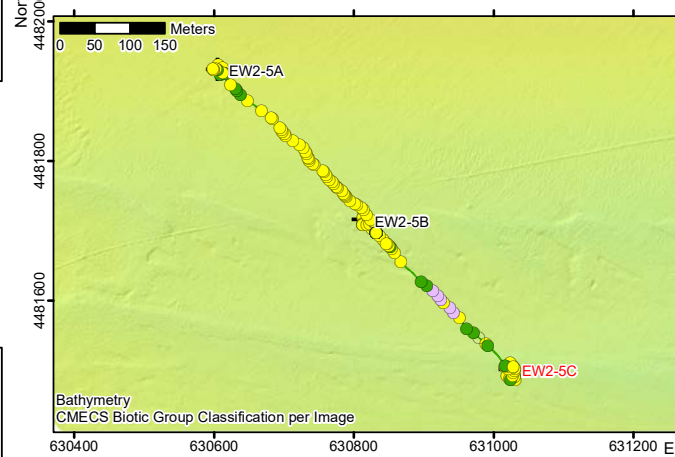
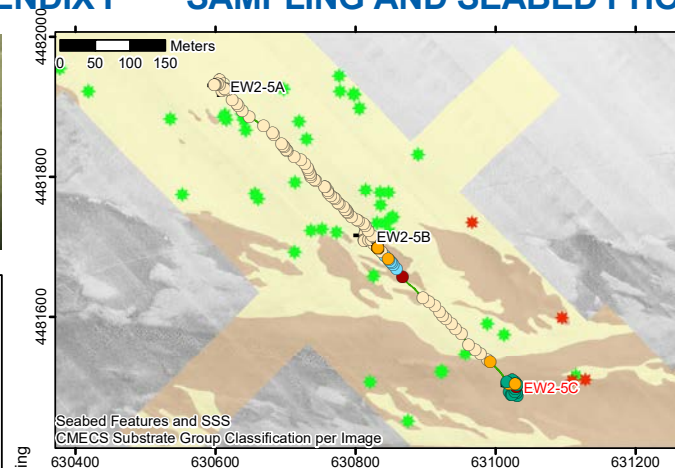
Faunal Description:
No visible fauna



Station: EW2-5C
Fix: 198 **E:** 631024 **N:** 4481502
Depth (m) : 26

PSA Sample:
CHEM

CMECS Substrate Classification:
Gravelly sand



APPENDIX F SAMPLING AND SEABED PHOTOGRAPHS



Station: EW2-6A
Fix: 1188 **E:** 632192 **N:** 4480339
Depth (m): 26

Sediment Description:
Rippled sand with shell fragments

Faunal Description:
Animalia tubes, Arthropoda (Paguroidea), Echinodermata (E. parma)



Station: EW2-6A
Fix: 1195 **E:** 632186 **N:** 4480353
Depth (m): 26

Sediment Description:
Rippled sand with shell fragments

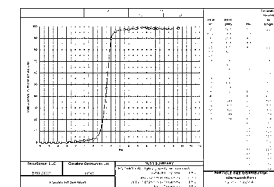
Faunal Description:
Animalia tubes, Arthropoda (Paguroidea), Echinodermata (E. parma)



Station: EW2-6A
Fix: 195 **E:** 632193 **N:** 4480344
Depth (m): 25 **Retention:** MFB

Sediment Description:
Fine to medium sand

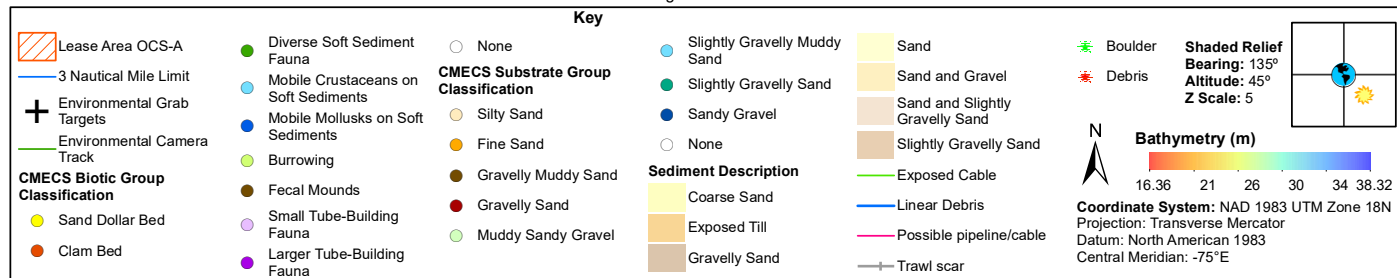
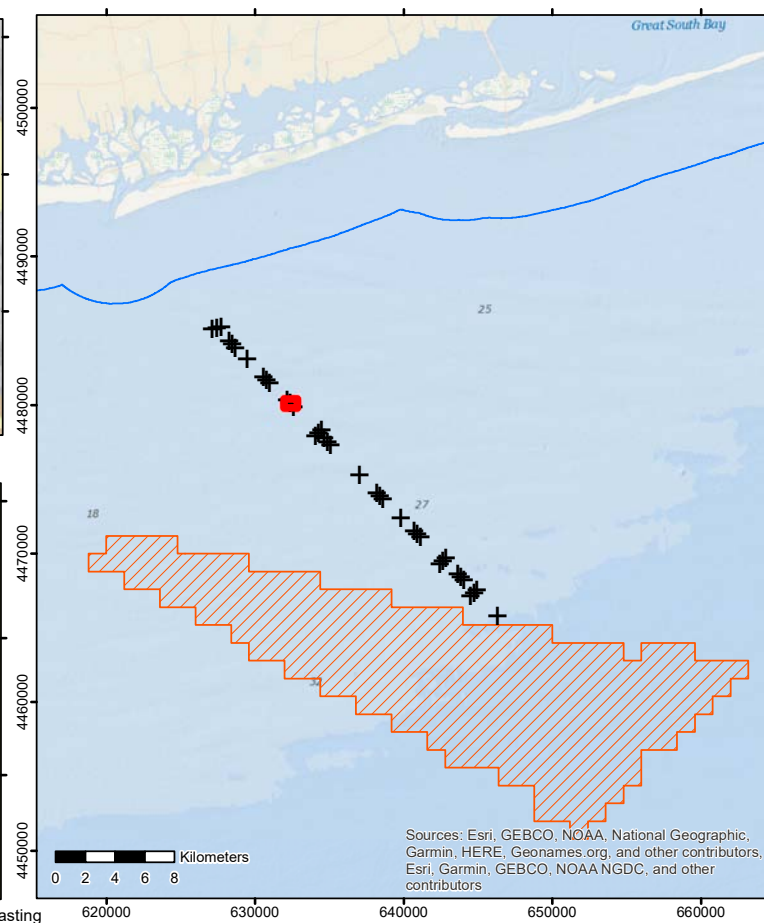
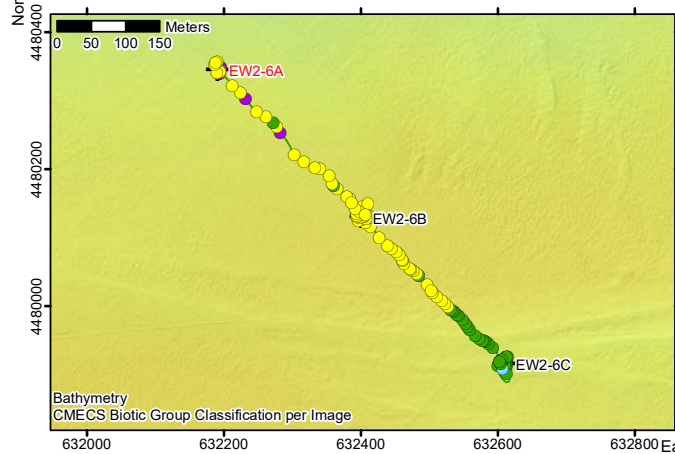
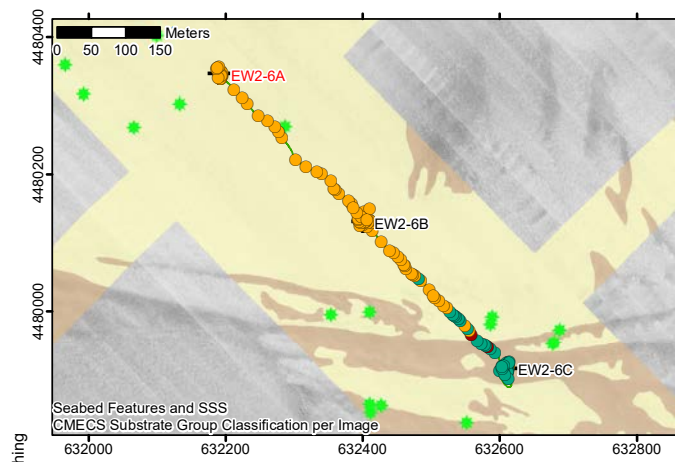
Faunal Description:
Annelida (Polychaeta), Echinodermata (Clypeasteroidea)



Station: EW2-6A
Fix: 194 **E:** 632194 **N:** 4480344
Depth (m): 25

PSA Sample:
CHEM

CMECS Substrate Classification:
Slightly gravelly sand



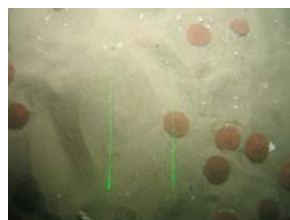
APPENDIX F SAMPLING AND SEABED PHOTOGRAPHS



Station: EW2-6B
Fix: 1147 **E:** 632407 **N:** 4480132
Depth (m) : 24

Sediment Description:
Rippled sand with shell fragments

Faunal Description:
Arthropoda (Brachyura indeterminate),
Echinodermata (*E. parma*)



Station: EW2-6B
Fix: 1159 **E:** 632395 **N:** 4480131
Depth (m) : 24

Sediment Description:
Rippled sand with shell fragments

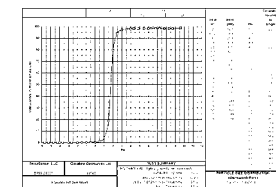
Faunal Description:
Animalia tubes



Station: EW2-6B
Fix: 192 **E:** 632402 **N:** 4480128
Depth (m) : 24 **Retention:** MFB

Sediment Description:
Fine to medium sand with shell hash

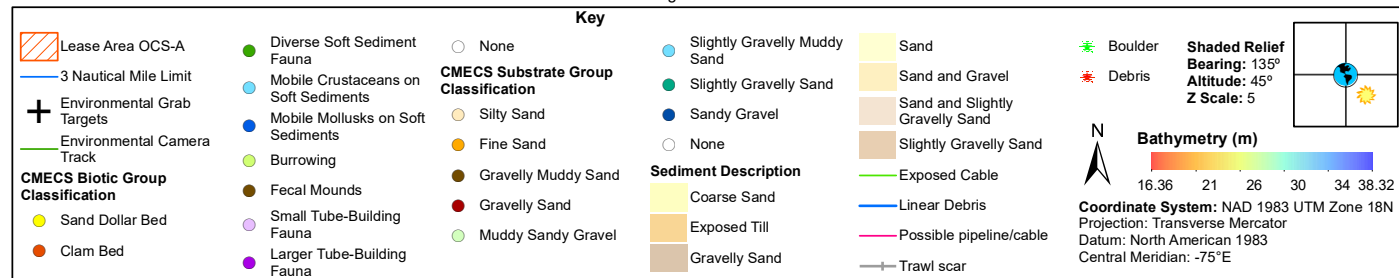
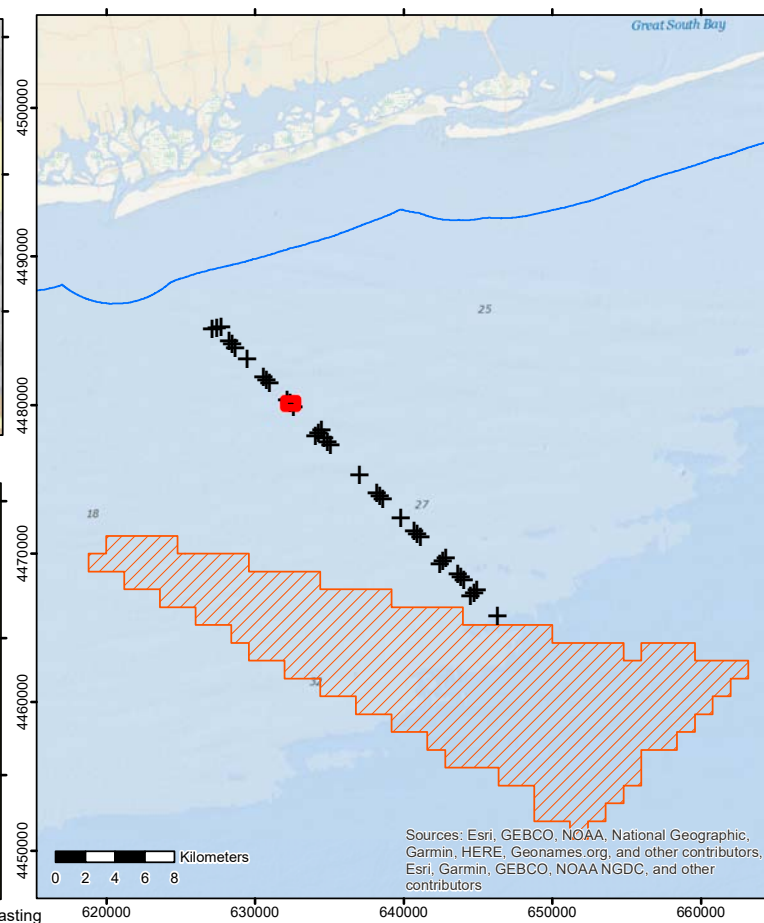
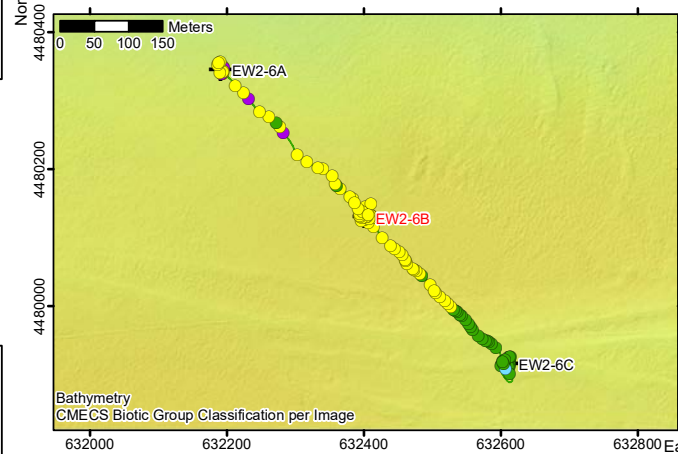
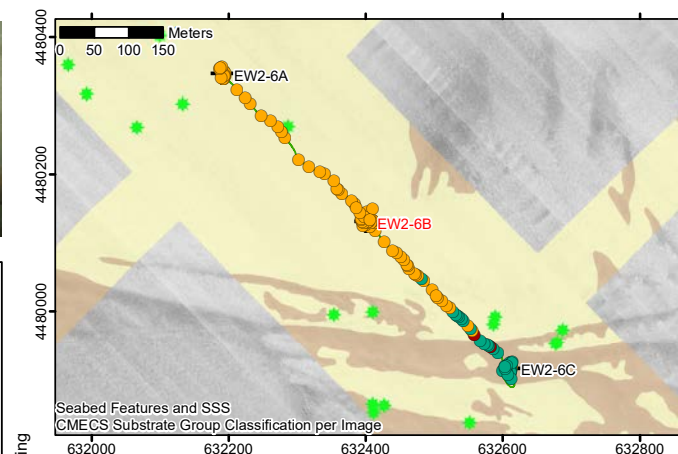
Faunal Description:
Echinodermata (Clypeasteroidea)



Station: EW2-6B
Fix: 191 **E:** 632408 **N:** 4480131
Depth (m) : 24

PSA Sample:
CHEM

CMECS Substrate Classification:
Slightly gravelly sand



APPENDIX F SAMPLING AND SEABED PHOTOGRAPHS



Station: EW2-6C
Fix: 1089 **E:** 632612 **N:** 4479912
Depth (m) : 25

Sediment Description:
Rippled sand with gravel patches

Faunal Description:
Echinodermata (*E. parma*)



Station: EW2-6C
Fix: 1100 **E:** 632604 **N:** 4479916
Depth (m) : 25

Sediment Description:
Rippled sand with gravel patches

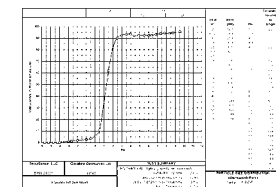
Faunal Description:
Arthropoda (Paguroidea),
Echinodermata (*E. parma*)



Station: EW2-6C
Fix: 188 **E:** 632603 **N:** 4479923
Depth (m) : 25 **Retention:** CHEM

Sediment Description:
Silty sand with clay, gravel and shell hash

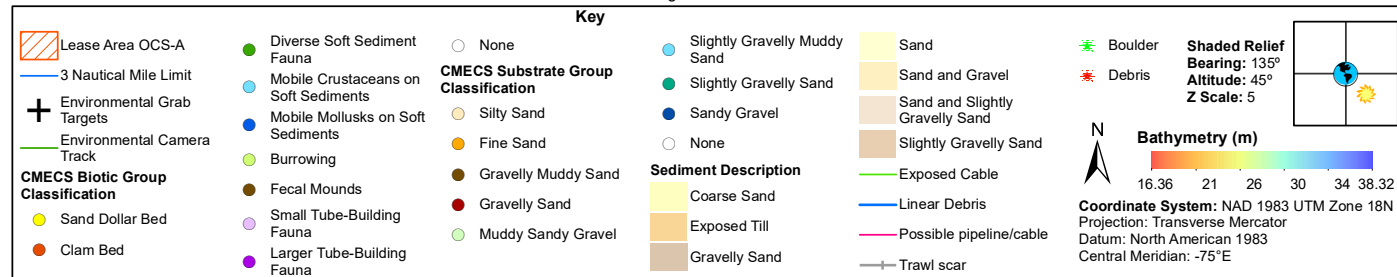
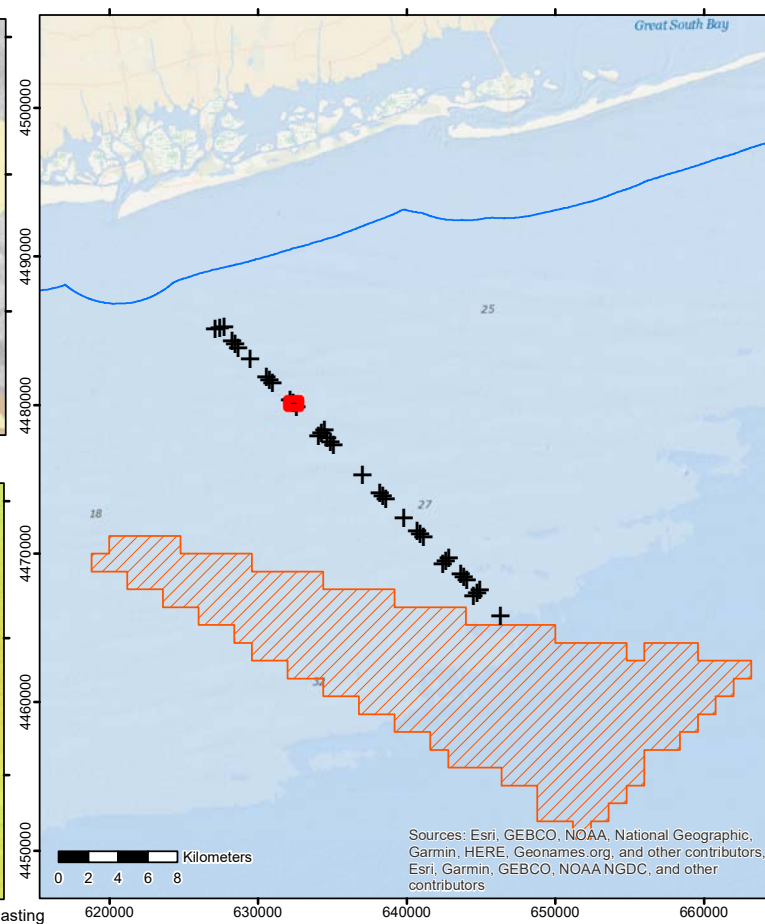
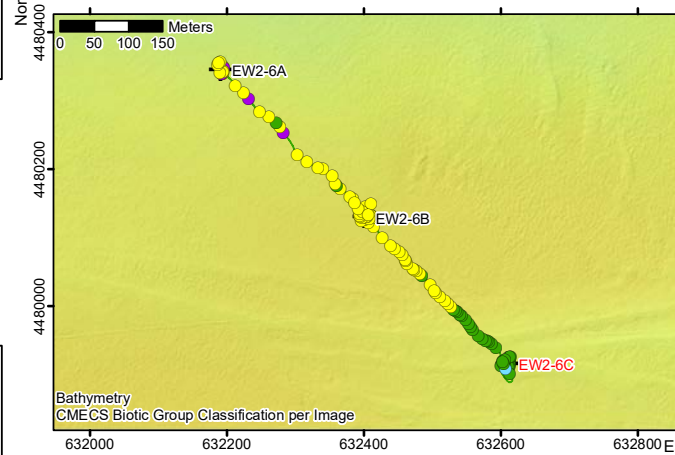
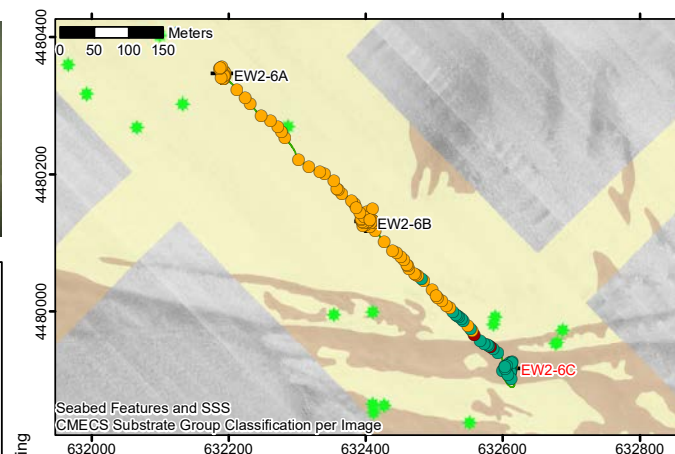
Faunal Description:
No visible fauna



Station: EW2-6C
Fix: 188 **E:** 632603 **N:** 4479923
Depth (m) : 25

PSA Sample:
CHEM

CMECS Substrate Classification:
Slightly gravelly sand



APPENDIX F SAMPLING AND SEABED PHOTOGRAPHS



Station: EW2-7A
Fix: 1004 **E:** 634077 **N:** 4477917
Depth (m): 28

Sediment Description:
Rippled sand

Faunal Description:
Animalia tubes, Echinodermata (*E. parma*), Mollusca (Nassaridae)



Station: EW2-7A
Fix: 1009 **E:** 634077 **N:** 4477920
Depth (m): 28

Sediment Description:
Rippled sand

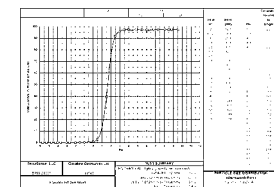
Faunal Description:
Arthropoda (Paguroidea), Echinodermata (*E. parma*), Mollusca (Nassaridae)



Station: EW2-7A
Fix: 185 **E:** 634084 **N:** 4477918
Depth (m): 28 **Retention:** MFB

Sediment Description:
Fine to medium sand with gravel and pebbles

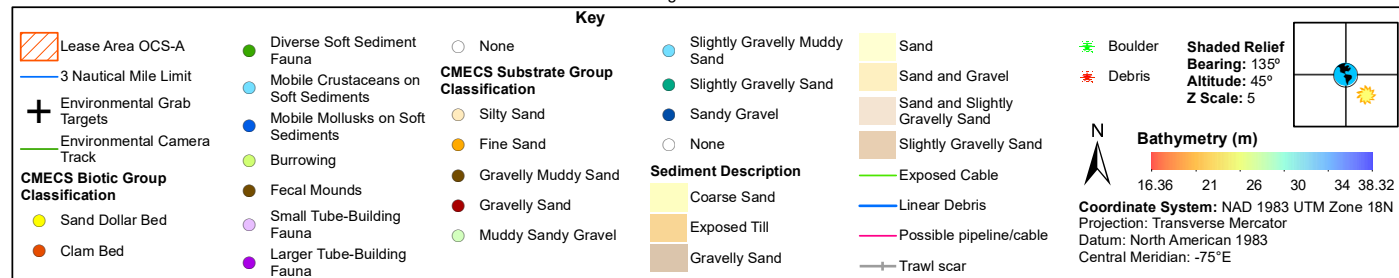
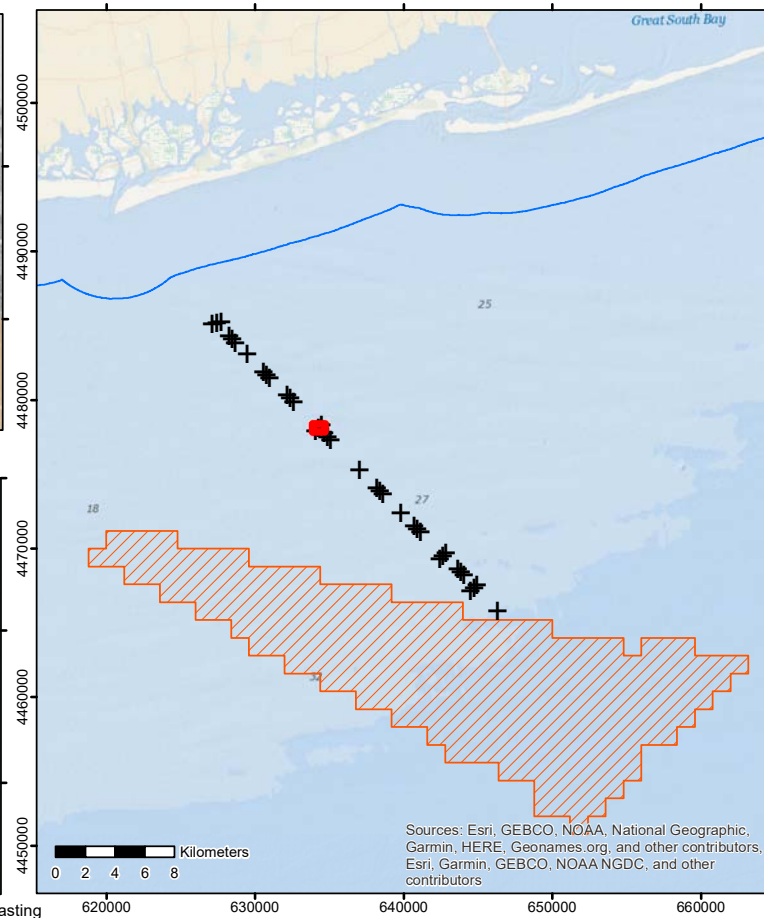
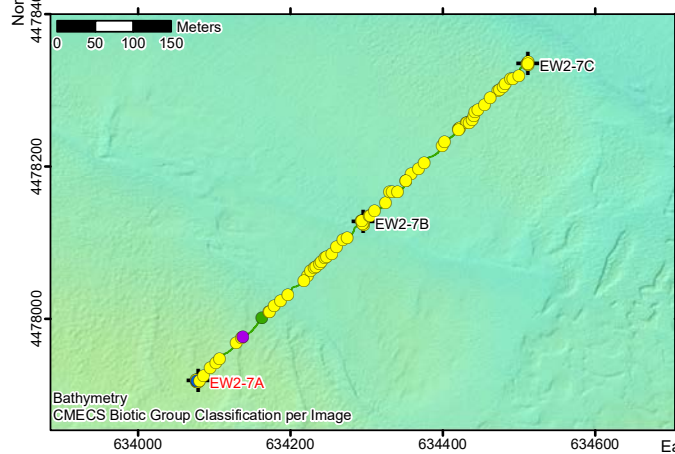
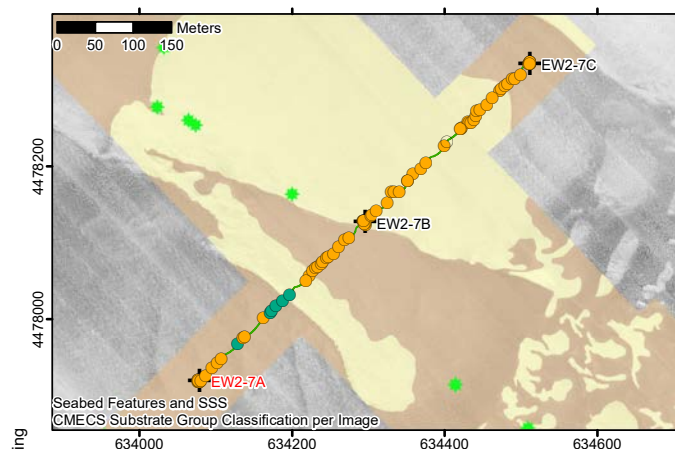
Faunal Description:
Annelida (*Lanice* sp.), Echinodermata (Clypeasteroidea)



Station: EW2-7A
Fix: 184 **E:** 634076 **N:** 4477918
Depth (m): 28

PSA Sample:
CHEM

CMECS Substrate Classification:
Slightly gravelly sand



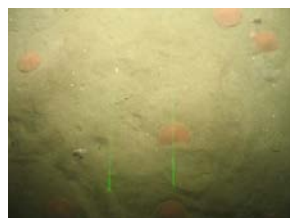
APPENDIX F SAMPLING AND SEABED PHOTOGRAPHS



Station: EW2-7B
Fix: 1041 **E:** 634296 **N:** 4478124
Depth (m): 29

Sediment Description:
Rippled sand

Faunal Description:
Chordata (Blennidae), Echinodermata (*E. parma*)



Station: EW2-7B
Fix: 1046 **E:** 634294 **N:** 4478128
Depth (m): 29

Sediment Description:
Sand with shell fragments

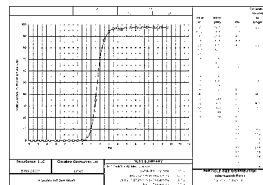
Faunal Description:
Arthropoda (Paguroidea), Echinodermata (*E. parma*), Mollusca (Nassariidae)



Station: EW2-7B
Fix: 182 **E:** 634296 **N:** 4478126
Depth (m): 29 **Retention:** MFB

Sediment Description:
Fine to medium sand

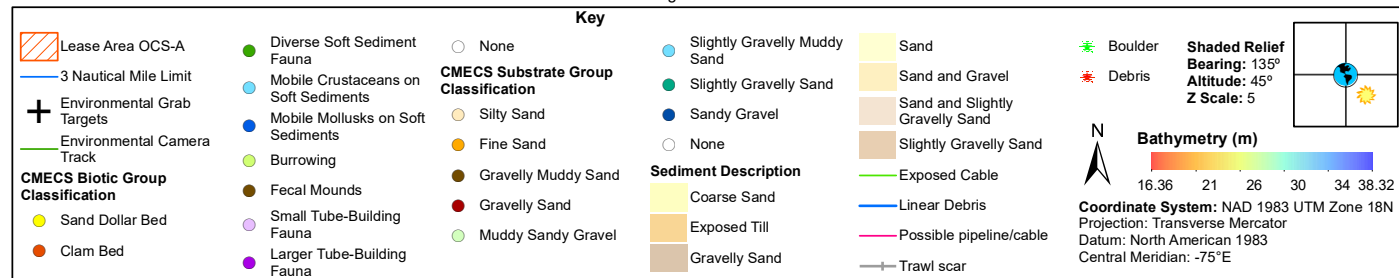
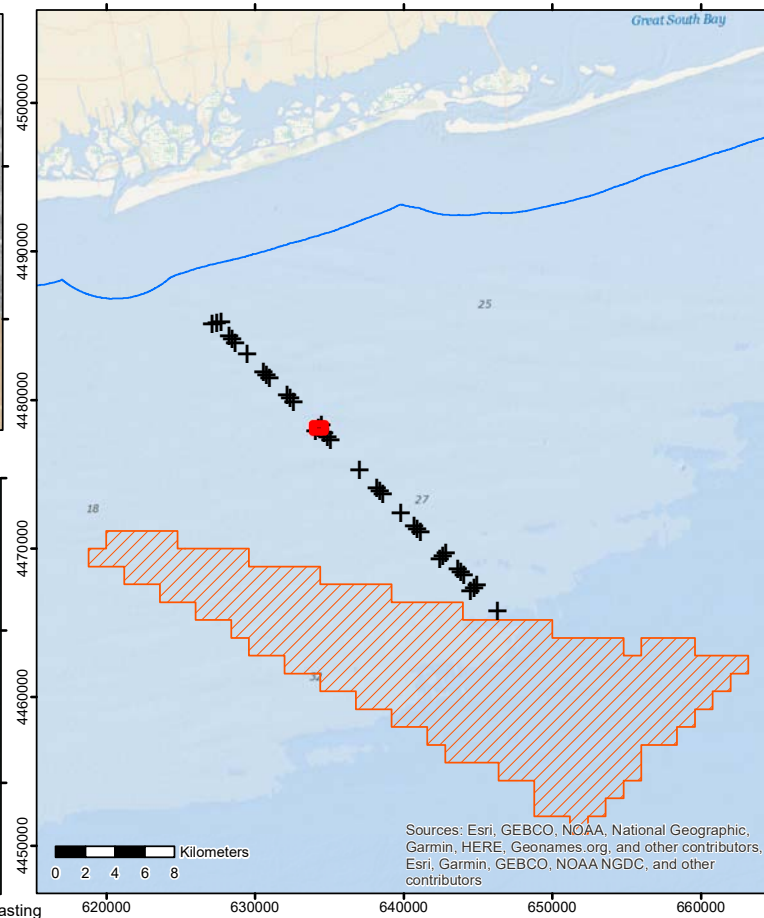
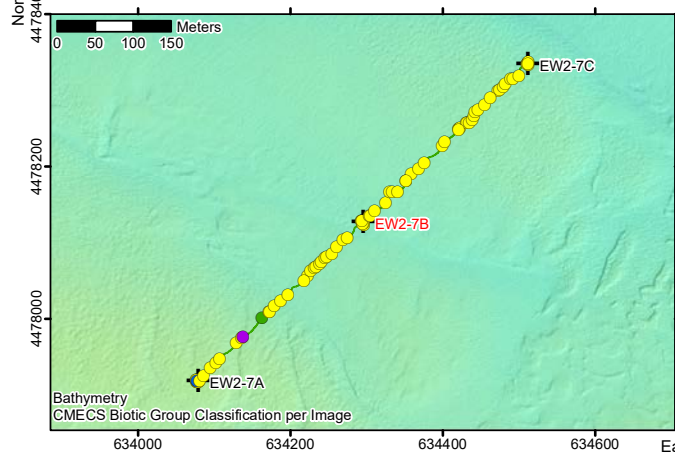
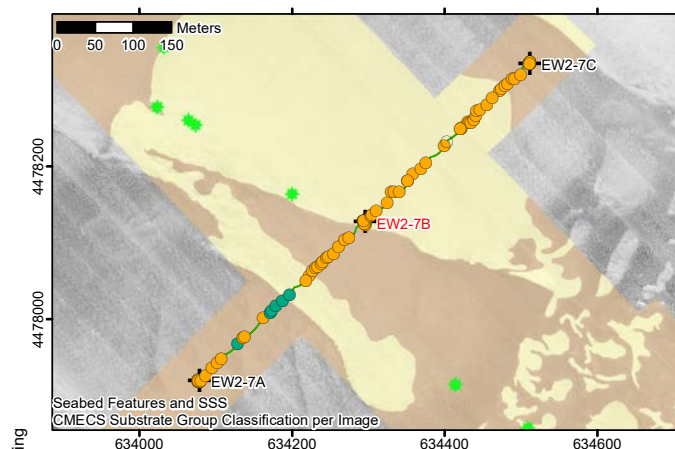
Faunal Description:
No visible fauna



Station: EW2-7B
Fix: 181 **E:** 634297 **N:** 4478129
Depth (m): 29

PSA Sample:
CHEM

CMECS Substrate Classification:
Medium Sand



APPENDIX F SAMPLING AND SEABED PHOTOGRAPHS



Station: EW2-7C
Fix: 1078 **E:** 634512 **N:** 4478334
Depth (m) : 29

Sediment Description:
Rippled sand with shell fragments

Faunal Description:
Echinodermata (*E. parma*)



Station: EW2-7C
Fix: 1082 **E:** 634512 **N:** 4478337
Depth (m) : 29

Sediment Description:
Rippled sand with shell fragments

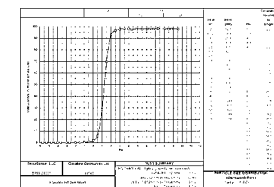
Faunal Description:
Animalia tubes, Arthropoda (Paguroidea), Echinodermata (*E. parma*), Mollusca (Nassariidae)



Station: EW2-7C
Fix: 177 **E:** 634513 **N:** 4478336
Depth (m) : 29 **Retention:** MFA

Sediment Description:
Fine to medium sand

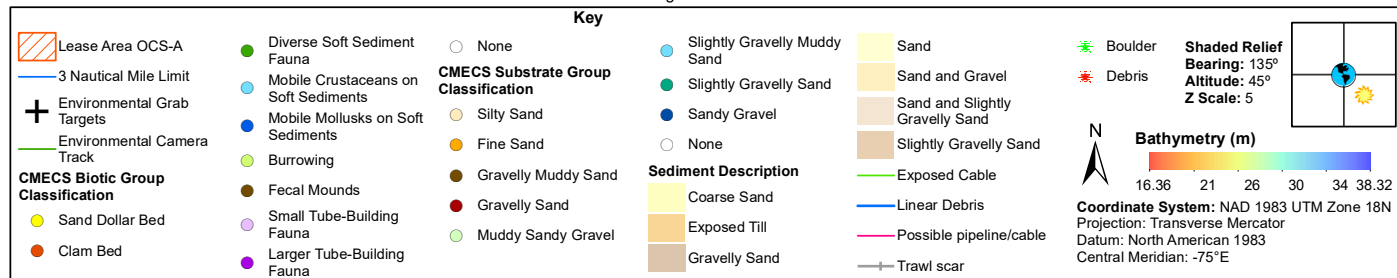
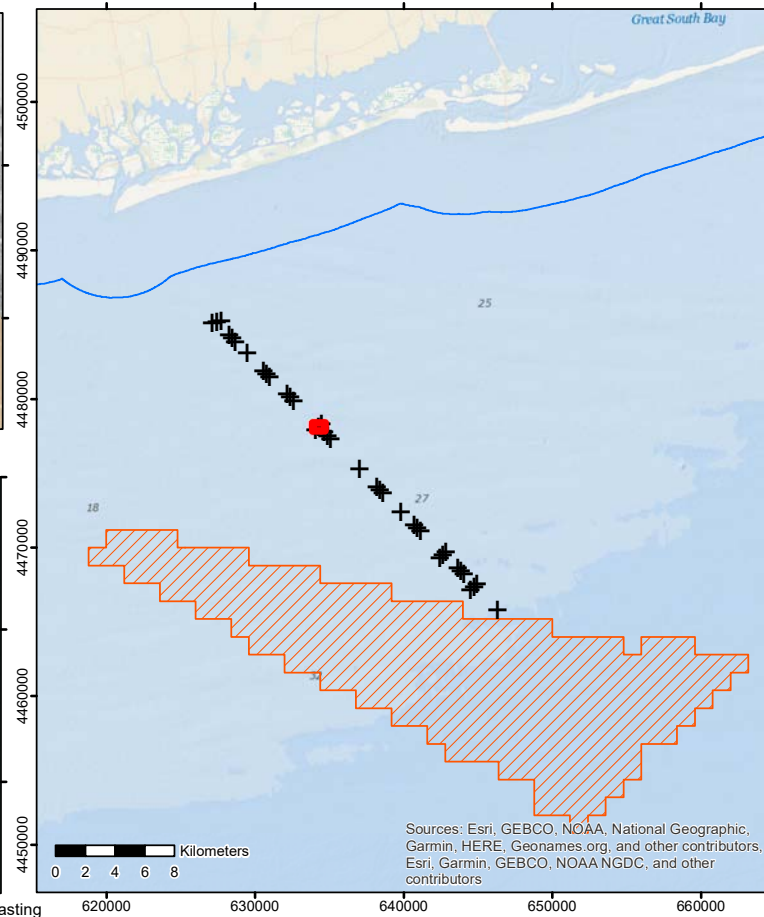
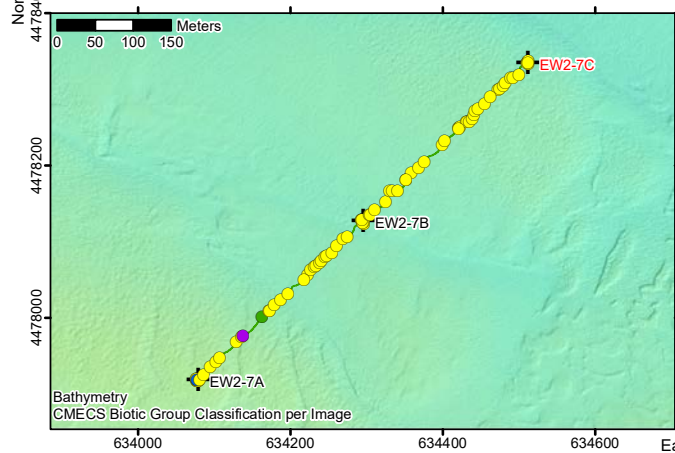
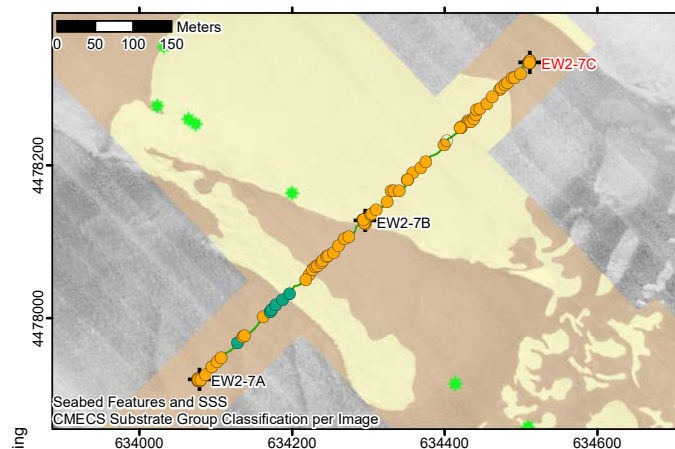
Faunal Description:
Annelida (*Lanice* sp.), Echinodermata (Clypeasteroidea)



Station: EW2-7C
Fix: 178 **E:** 634513 **N:** 4478335
Depth (m) : 29

PSA Sample:
CHEM

CMECS Substrate Classification:
Slightly gravelly sand



APPENDIX F SAMPLING AND SEABED PHOTOGRAPHS



Station: EW2-8A
Fix: 995 **E:** 634691 **N:** 4477759
Depth (m) : 28

Sediment Description:
Sand with gravel patches

Faunal Description:
Cnidaria (Ceriantharia 1),
Echinodermata (*E. parma*)



Station: EW2-8A
Fix: 1002 **E:** 634698 **N:** 4477773
Depth (m) : 28

Sediment Description:
Sand with gravel patches

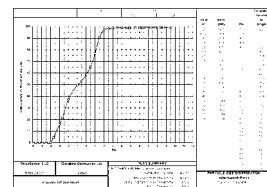
Faunal Description:
Chordata (Blennidae), Echinodermata
(*E. parma*)



Station: EW2-8A
Fix: 175 **E:** 634695 **N:** 4477766
Depth (m) : 28 **Retention:** CHEM

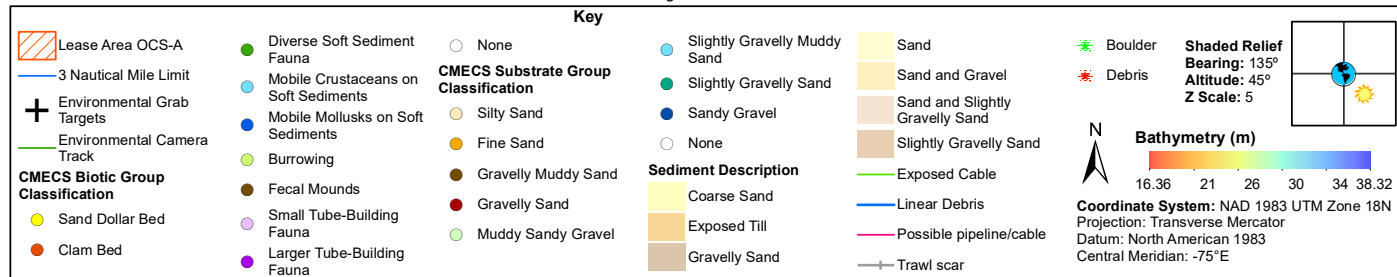
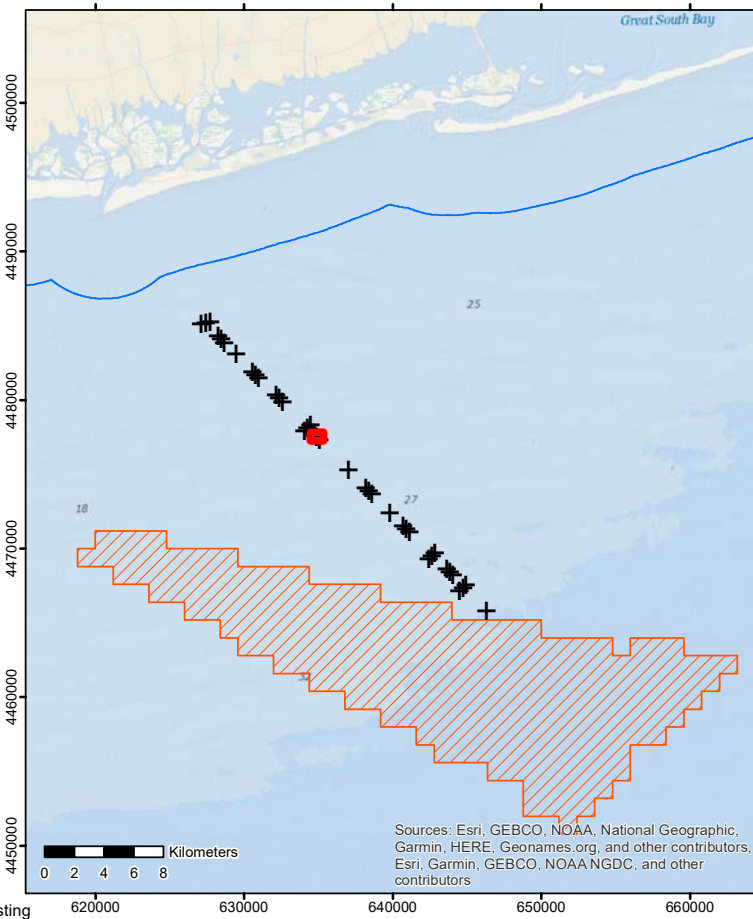
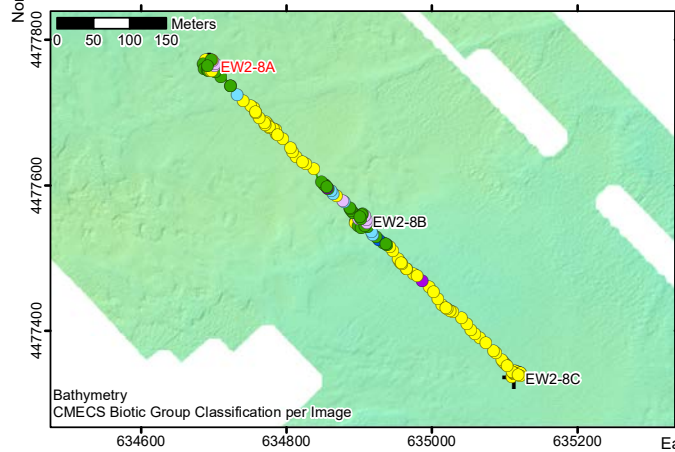
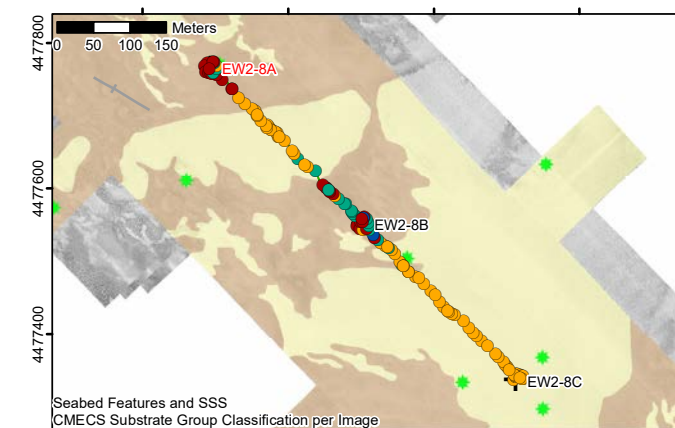
Sediment Description:
Fine to medium sand with gravel and
shell fragments

Faunal Description:
Annelida (Polychaeta)



Station: EW2-8A
Fix: 175 **E:** 634695 **N:** 4477766
Depth (m) : 28

PSA Sample:
CHEM
CMECS Substrate Classification:
Sandy gravel



APPENDIX F SAMPLING AND SEABED PHOTOGRAPHS



Station: EW2-8B
Fix: 944 **E:** 634895 **N:** 4477549
Depth (m) : 29

Sediment Description:
Sand with gravel patches

Faunal Description:
Animalia (tubes), Cnidaria (Ceriantharia 1), Echinodermata (*E. parma*)



Station: EW2-8B
Fix: 951 **E:** 634905 **N:** 4477562
Depth (m) : 29

Sediment Description:
Sand with gravel patches

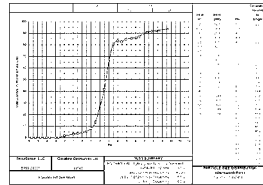
Faunal Description:
Animalia (tubes), Arthropoda (Paguroidea), Cnidaria (Ceriantharia 1)



Station: EW2-8B
Fix: 171 **E:** 634908 **N:** 4477556
Depth (m) : 28 **Retention:** MFB

Sediment Description:
Very fine sand/silt with gravel

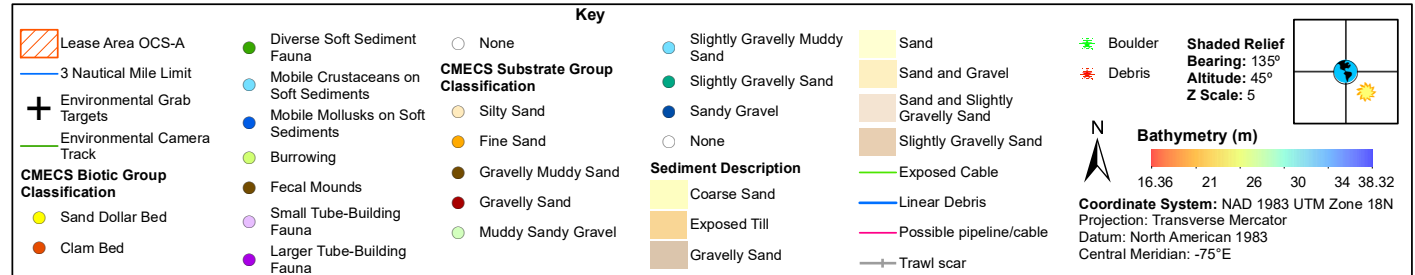
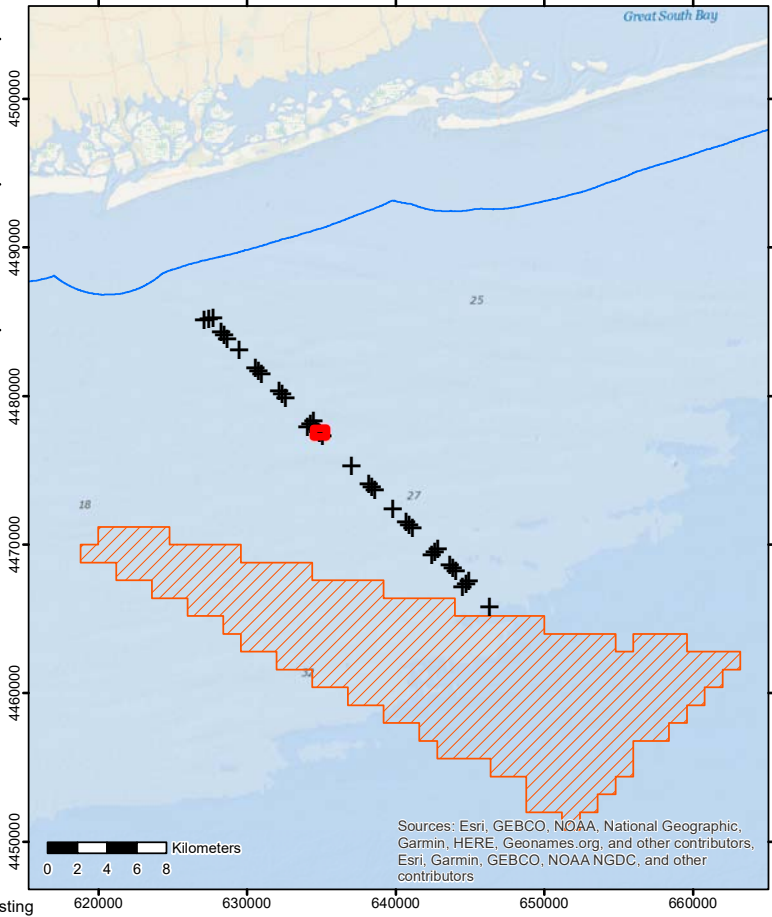
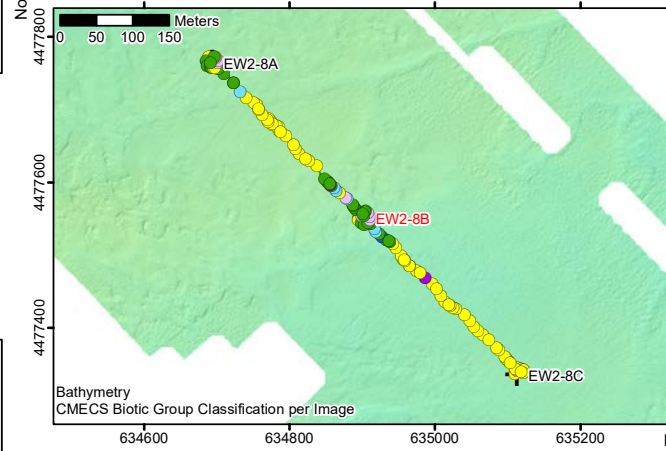
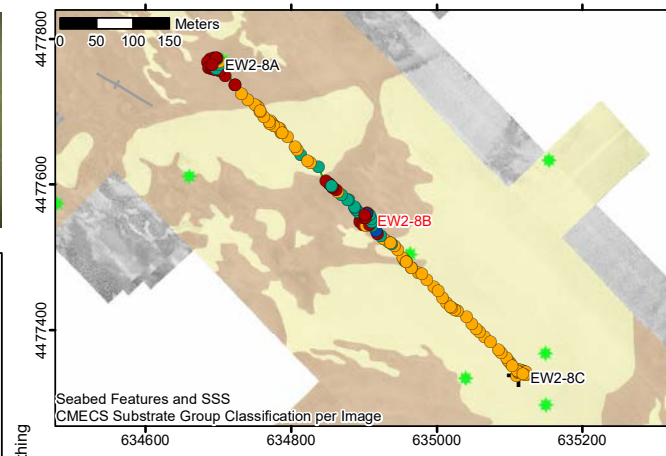
Faunal Description:
No visible fauna



Station: EW2-8B
Fix: 169 **E:** 634908 **N:** 4477557
Depth (m) : 28

PSA Sample:
CHEM

CMECS Substrate Classification:
Slightly gravelly muddy sand



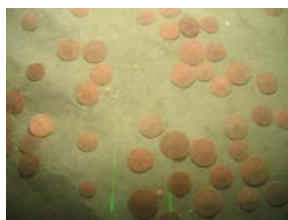
APPENDIX F SAMPLING AND SEABED PHOTOGRAPHS



Station: EW2-8C
Fix: 897 **E:** 635114 **N:** 4477343
Depth (m) : 29

Sediment Description:
Sand with shell fragments

Faunal Description:
Echinodermata (*E. parma*), Mollusca (Nassariidae)



Station: EW2-8C
Fix: 905 **E:** 635118 **N:** 4477344
Depth (m) : 29

Sediment Description:
Rippled sand with shell fragments

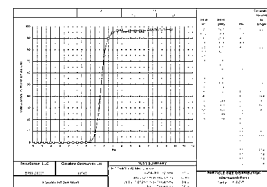
Faunal Description:
Echinodermata (*E. parma*), Mollusca (Nassariidae)



Station: EW2-8C
Fix: 166 **E:** 635117 **N:** 4477347
Depth (m) : 28 **Retention:** CHEM

Sediment Description:
Fine to medium sand

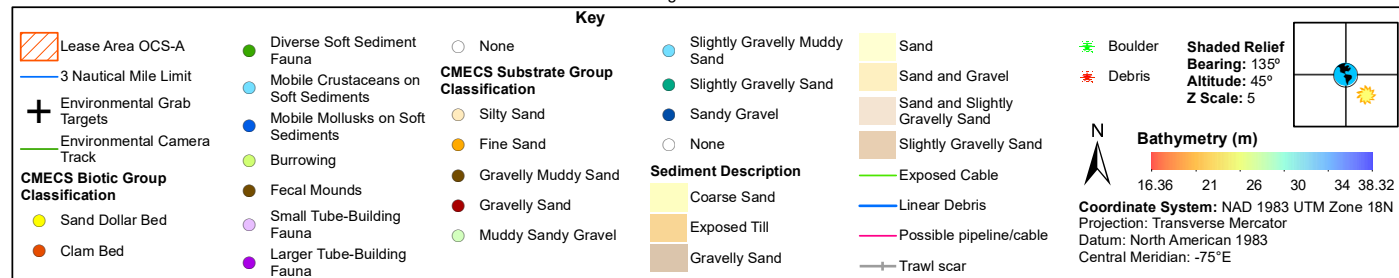
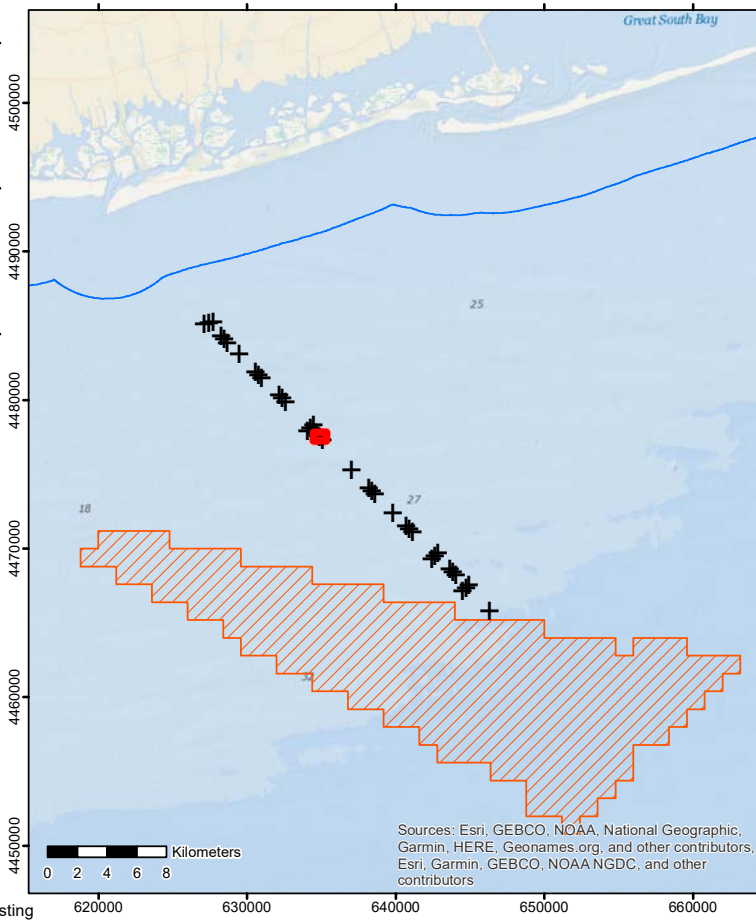
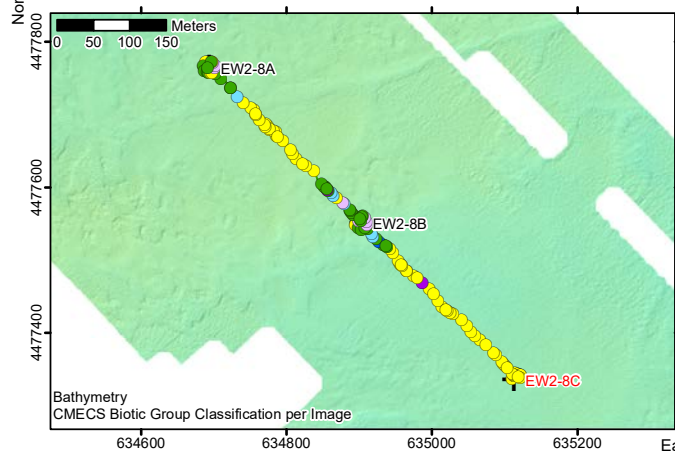
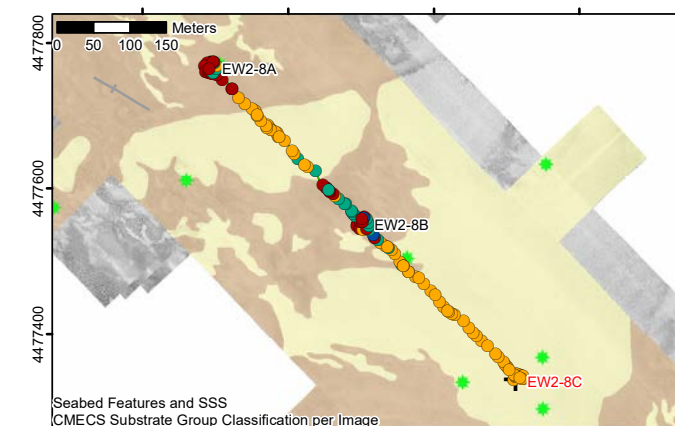
Faunal Description:
Echinodermata (Clypeasteroidea)



Station: EW2-8C
Fix: 166 **E:** 635117 **N:** 4477347
Depth (m) : 28

PSA Sample:
CHEM

CMECS Substrate Classification:
Medium Sand



APPENDIX F SAMPLING AND SEABED PHOTOGRAPHS



Station: EW2-9
Fix: 866 **E:** 637059 **N:** 4475300
Depth (m) : 31

Sediment Description:
Rippled sand with shell fragments

Faunal Description:
Animalia tubes, Echinodermata (*E. parma*)



Station: EW2-9
Fix: 871 **E:** 637055 **N:** 4475311
Depth (m) : 31

Sediment Description:
Rippled sand with shell fragments

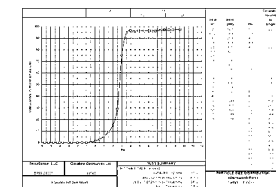
Faunal Description:
Animalia tubes, Arthropoda (Paguroidea), Echinodermata (*E. parma*)



Station: EW2-9
Fix: 164 **E:** 637060 **N:** 4475307
Depth (m) : 30 **Retention:** MFB

Sediment Description:
Fine to medium sand

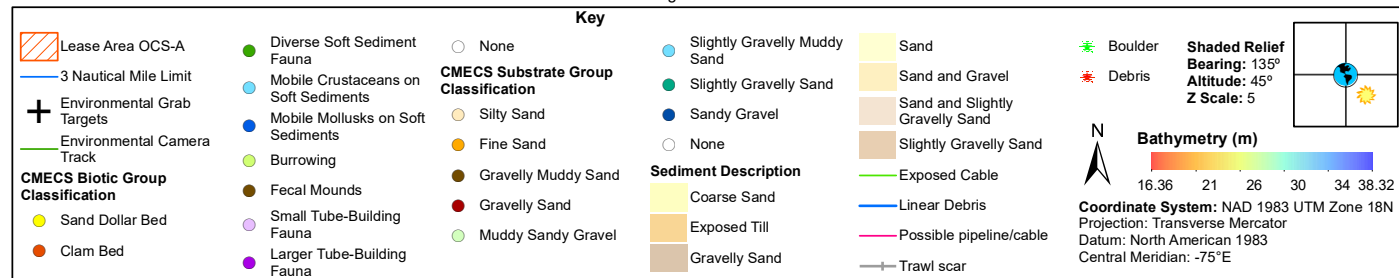
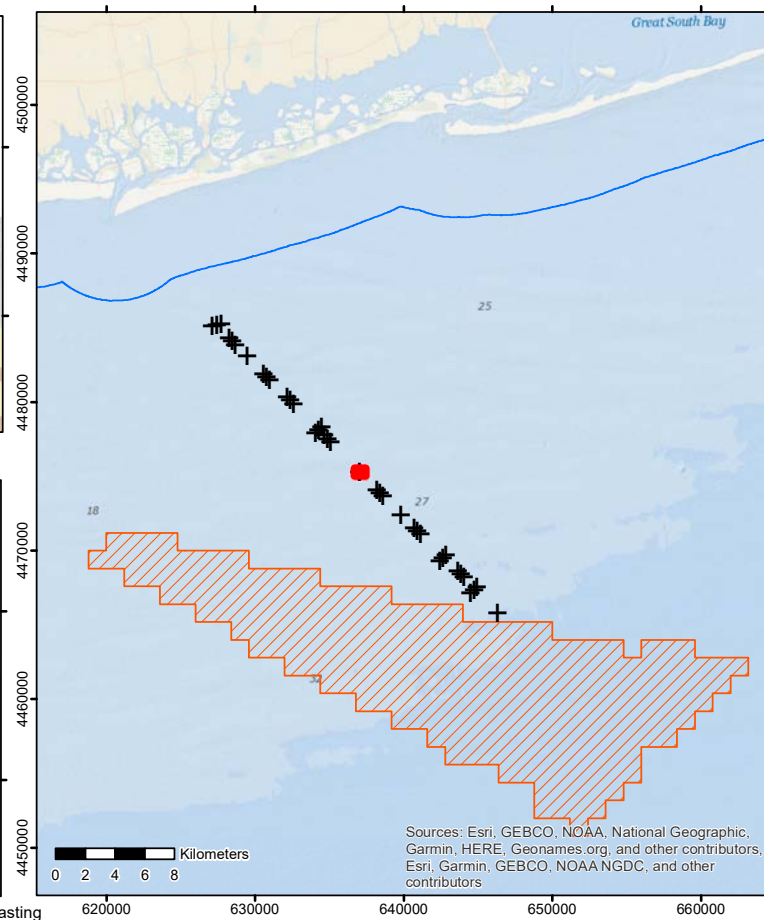
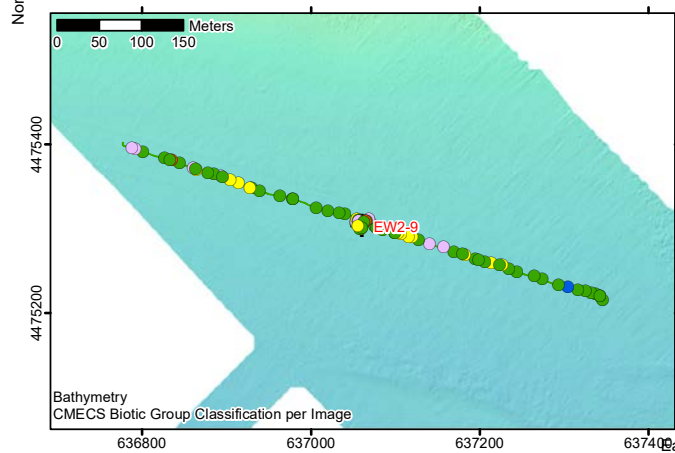
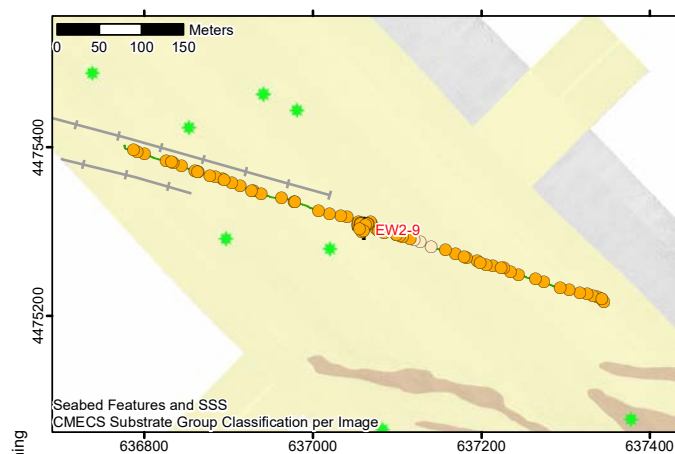
Faunal Description:
No visible fauna



Station: EW2-9
Fix: 163 **E:** 637065 **N:** 4475306
Depth (m) : 30

PSA Sample:
CHEM

CMECS Substrate Classification:
Fine Sand



APPENDIX F SAMPLING AND SEABED PHOTOGRAPHS



Station: EW2-10A
Fix: 827 **E:** 638221 **N:** 4474133
Depth (m): 33

Sediment Description:
Sand with gravel patches

Faunal Description:
Arthropoda (Paguroidea), Cnidaria (Ceriantharia 1), Echinodermata (*E. parma*)



Station: EW2-10A
Fix: 832 **E:** 638203 **N:** 4474130
Depth (m): 33

Sediment Description:
Sand with gravel patches

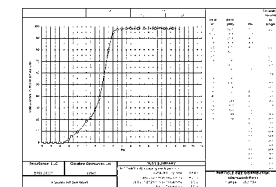
Faunal Description:
Cnidaria (Ceriantharia 1), Echinodermata (*E. parma*)



Station: EW2-10A
Fix: 161 **E:** 638214 **N:** 4474130
Depth (m): 32 **Retention:** MFB

Sediment Description:
Fine to medium sand with gravel overlying darker sediment

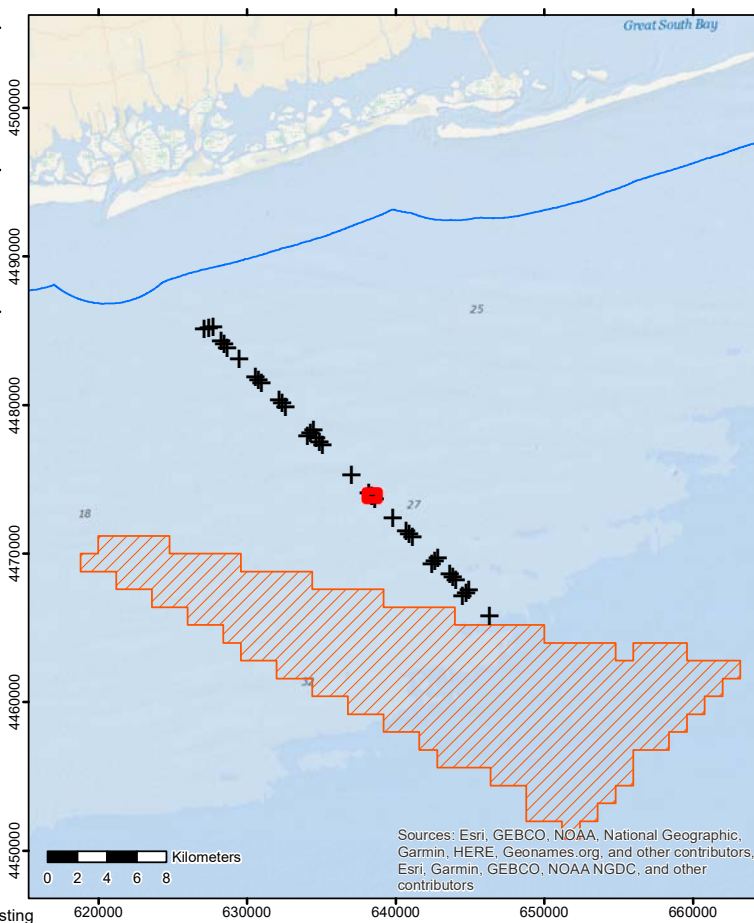
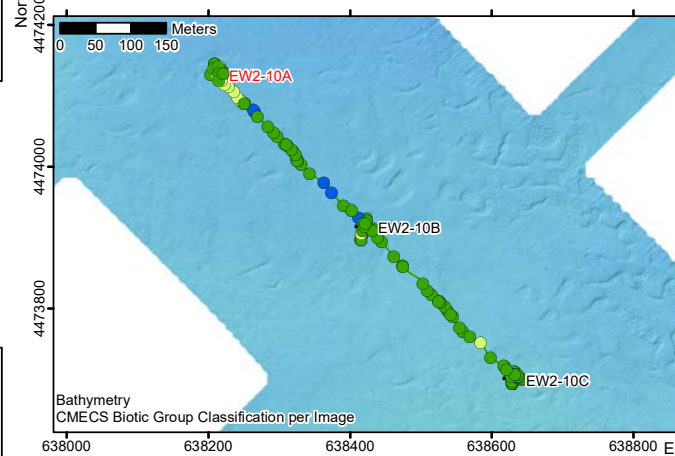
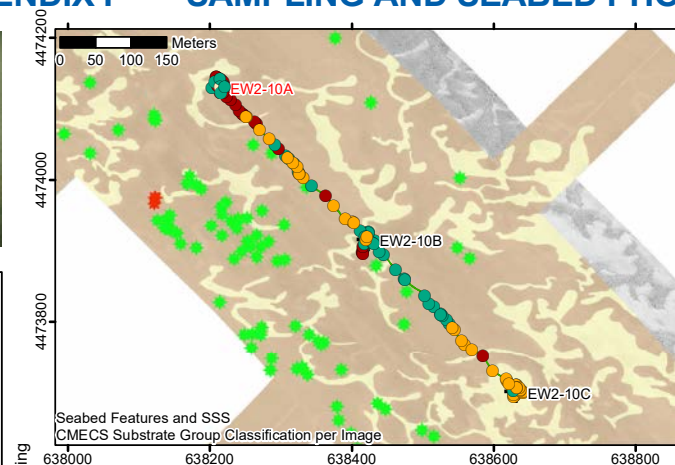
Faunal Description:
No visible fauna



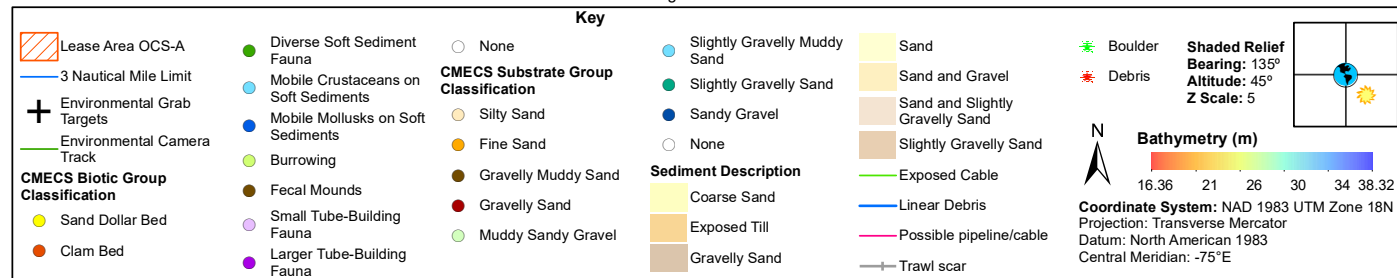
Station: EW2-10A
Fix: 160 **E:** 638217 **N:** 4474130
Depth (m): 32

PSA Sample:
CHEM

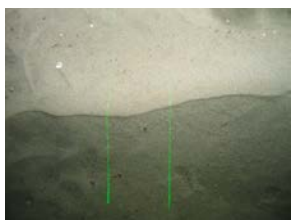
CMECS Substrate Classification:
Gravelly sand



Sources: Esri, GEBCO, NOAA, National Geographic, Garmin, HERE, Geonames.org, and other contributors, Esri, Garmin, GEBCO, NOAA NGDC, and other contributors



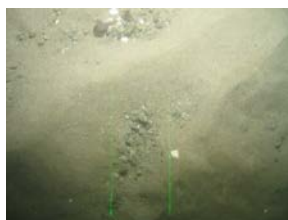
APPENDIX F SAMPLING AND SEABED PHOTOGRAPHS



Station: EW2-10B
Fix: 796 **E:** 638418 **N:** 4473910
Depth (m): 32

Sediment Description:
Rippled sand with gravel patches

Faunal Description:
Animalia (tubes)



Station: EW2-10B
Fix: 798 **E:** 638424 **N:** 4473924
Depth (m): 32

Sediment Description:
Rippled sand with gravel patches

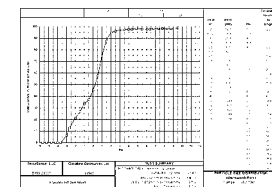
Faunal Description:
Mollusca (*Arctica islandica* dead shell)



Station: EW2-10B
Fix: 154 **E:** 638424 **N:** 4473915
Depth (m): 32 **Retention:** CHEM

Sediment Description:
Fine to medium sand with gravel overlying anoxic black sediment

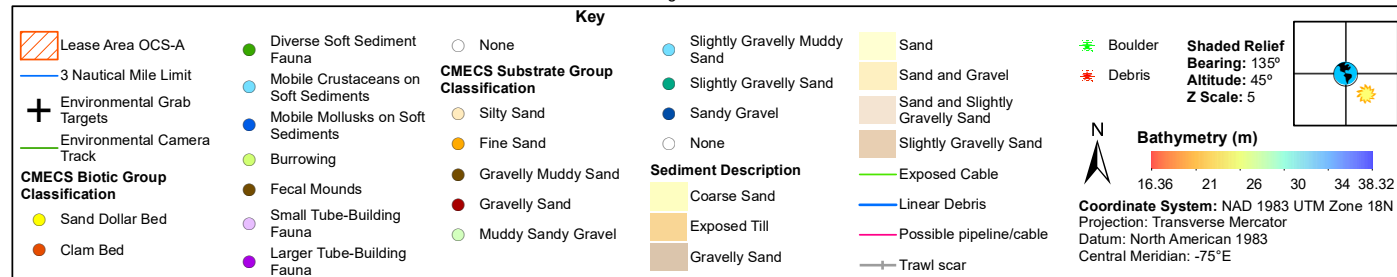
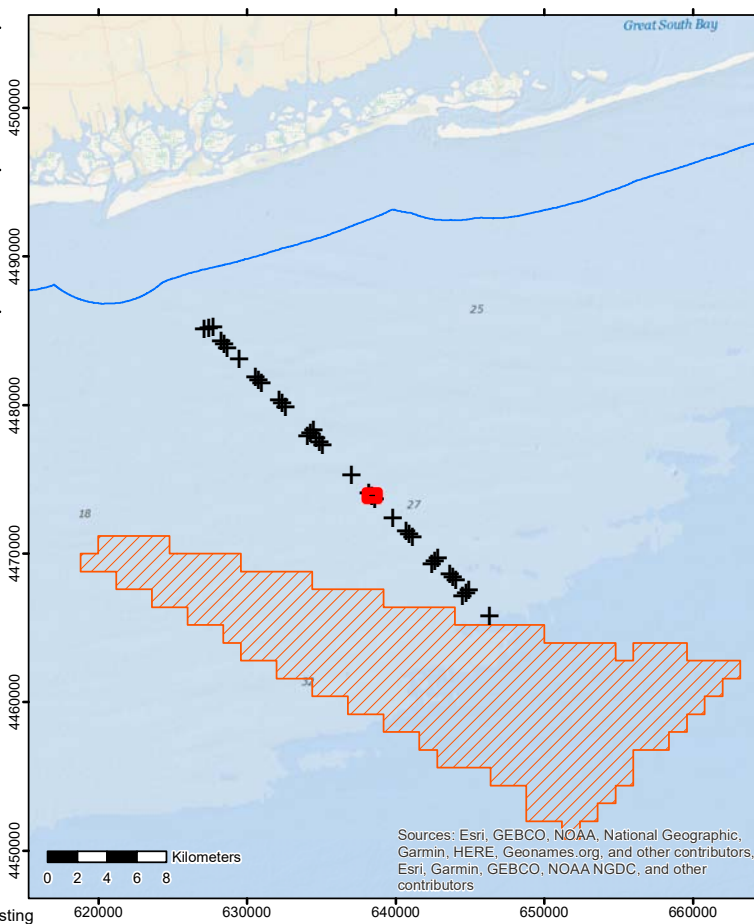
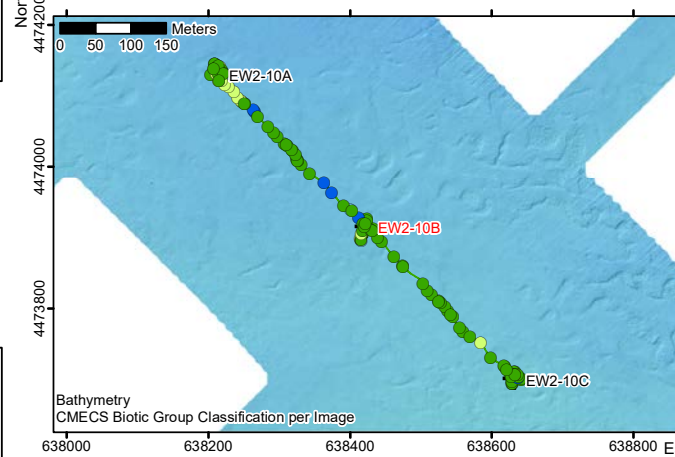
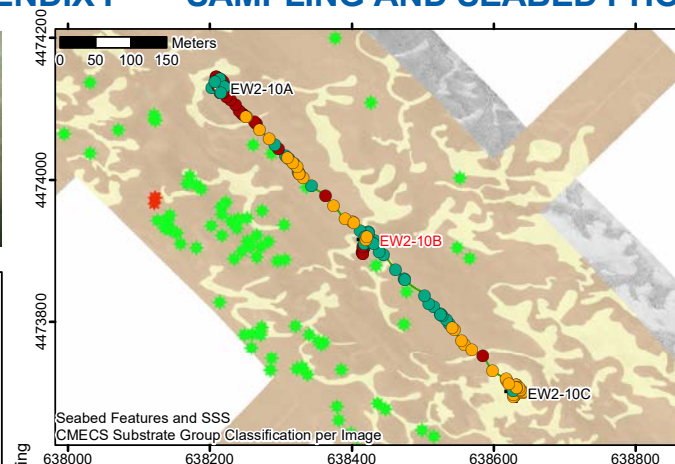
Faunal Description:
No visible fauna



Station: EW2-10B
Fix: 154 **E:** 638424 **N:** 4473915
Depth (m): 32

PSA Sample:
CHEM

CMECS Substrate Classification:
Sandy gravel



APPENDIX F SAMPLING AND SEABED PHOTOGRAPHS



Station: EW2-10C
Fix: 757 **E:** 638629 **N:** 4473695
Depth (m): 32

Sediment Description:
Rippled sand with shell fragments

Faunal Description:
Animalia (tubes)



Station: EW2-10C
Fix: 766 **E:** 638638 **N:** 4473704
Depth (m): 32

Sediment Description:
Rippled sand with shell fragments

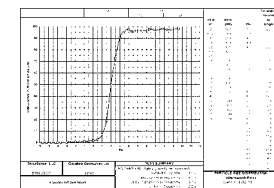
Faunal Description:
Animalia (tubes), Arthropoda (Paguroidea), Echinodermata (E. parma)



Station: EW2-10C
Fix: 151 **E:** 638633 **N:** 4473700
Depth (m): 31 **Retention:** CHEM

Sediment Description:
Fine to medium sand

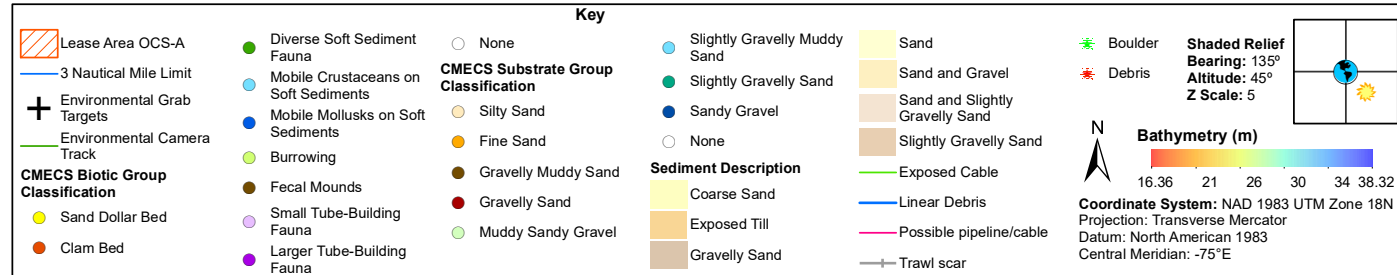
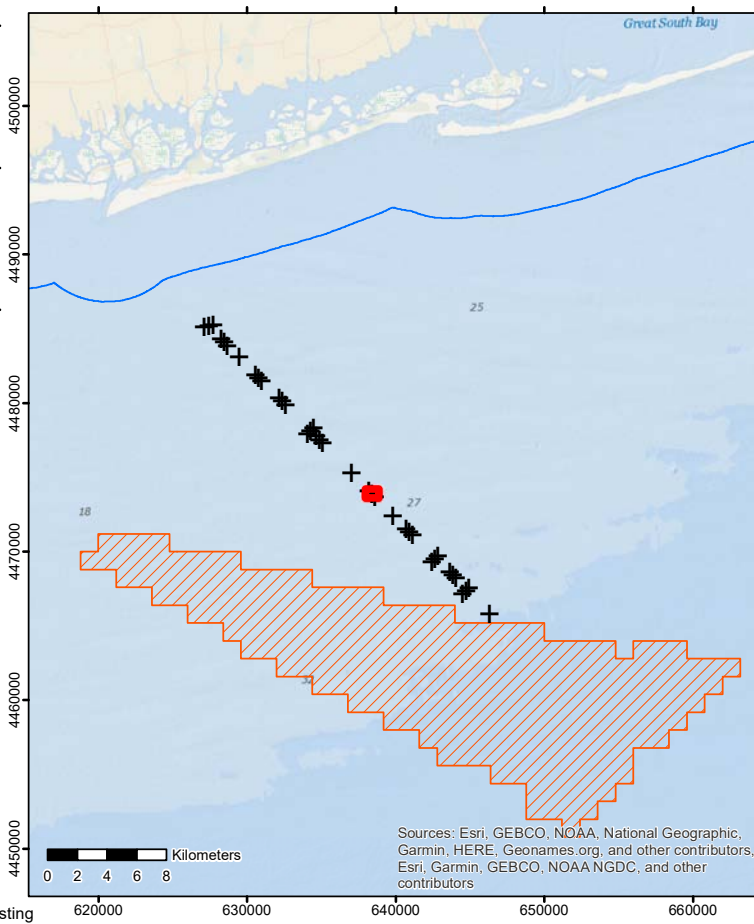
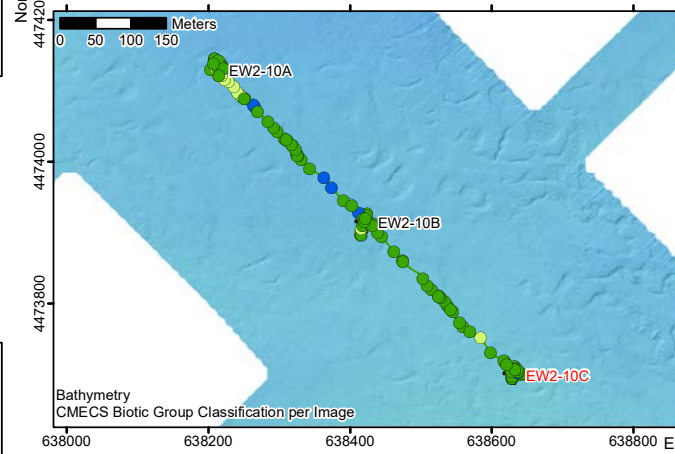
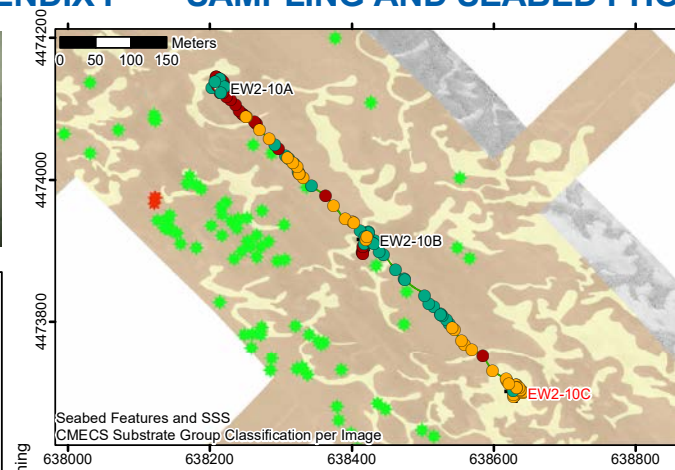
Faunal Description:
No visible fauna



Station: EW2-10C
Fix: 151 **E:** 638633 **N:** 4473700
Depth (m): 31

PSA Sample:
CHEM

CMECS Substrate Classification:
Slightly gravelly sand



APPENDIX F SAMPLING AND SEABED PHOTOGRAPHS



Station: EW2-11
Fix: 714 **E:** 639857 **N:** 4472402
Depth (m) : 30

Sediment Description:
Rippled sand with shell fragments

Faunal Description:
Animalia tubes, Chordata (Rajidae Egg Case), Echinodermata (*E. parma*), Mollusca (Nassariidae)



Station: EW2-11
Fix: 719 **E:** 639851 **N:** 4472415
Depth (m) : 30

Sediment Description:
Rippled sand with shell fragments

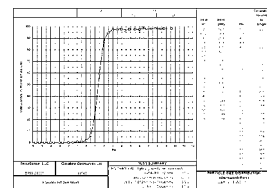
Faunal Description:
Animalia tubes, Echinodermata (*E. parma*), Mollusca (Bivalvia Siphons)



Station: EW2-11
Fix: 149 **E:** 639853 **N:** 4472403
Depth (m) : 30 **Retention:** MFB

Sediment Description:
Fine to medium sand

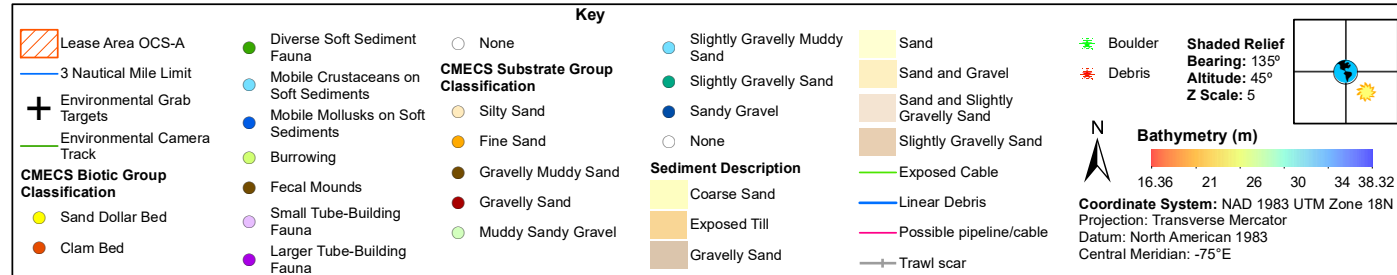
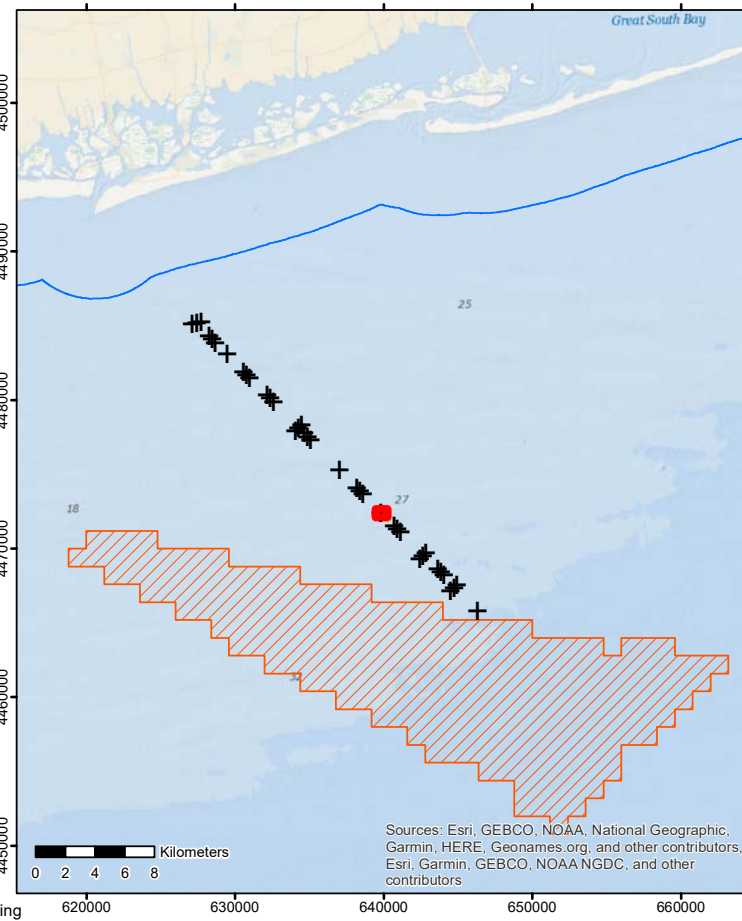
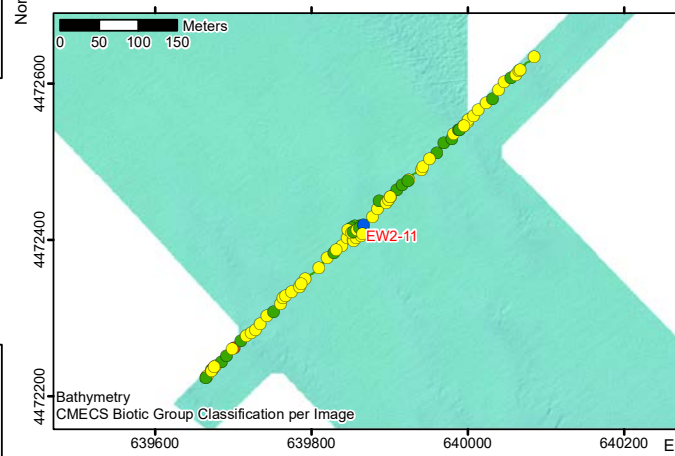
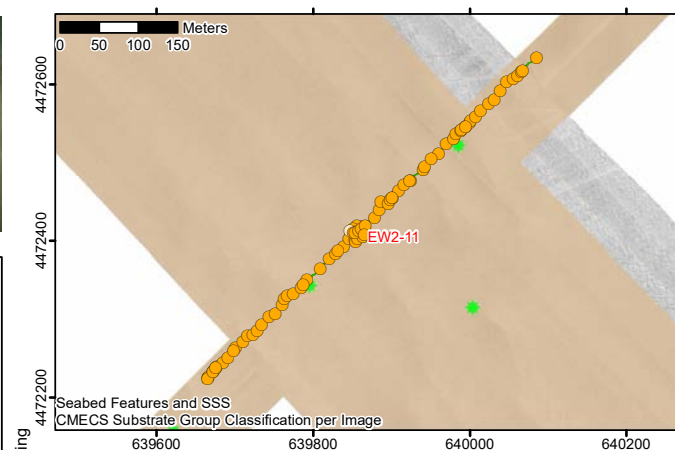
Faunal Description:
Annelida (Polychaeta), Echinodermata (Clypeasteroidea)



Station: EW2-11
Fix: 148 **E:** 639858 **N:** 4472406
Depth (m) : 30

PSA Sample:
CHEM

CMECS Substrate Classification:
Slightly gravelly sand



APPENDIX F SAMPLING AND SEABED PHOTOGRAPHS



Station: EW2-12A
Fix: 678 **E:** 640718 **N:** 4471584
Depth (m): 33

Sediment Description:
Rippled sand with shell fragments

Faunal Description:
Arthropoda (Paguroidea), Mollusca (Nassariidae), Mollusca (Naticidae)



Station: EW2-12A
Fix: 679 **E:** 640722 **N:** 4471570
Depth (m): 33

Sediment Description:
Rippled sand with shell fragments

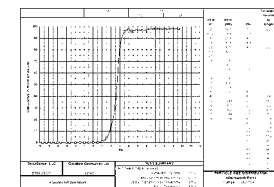
Faunal Description:
Animalia tubes, Echinodermata (*E. parma*), Mollusca (Nassariidae)



Station: EW2-12A
Fix: 135 **E:** 640723 **N:** 4471579
Depth (m): 34 **Retention:** CHEM

Sediment Description:
Fine sand with shell fragments

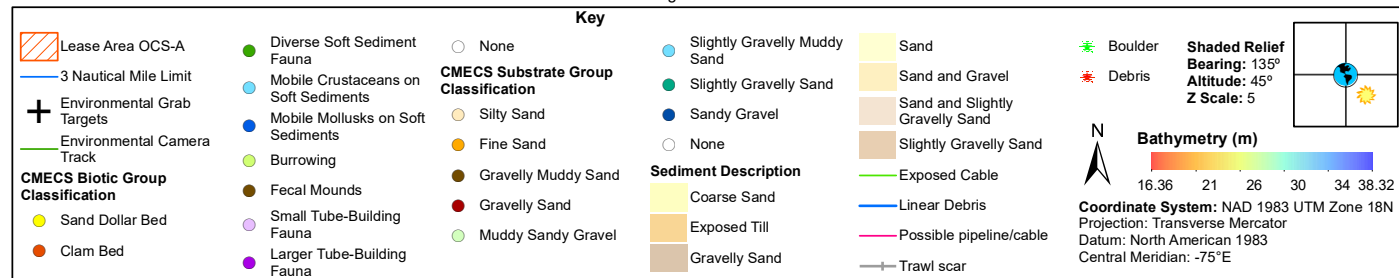
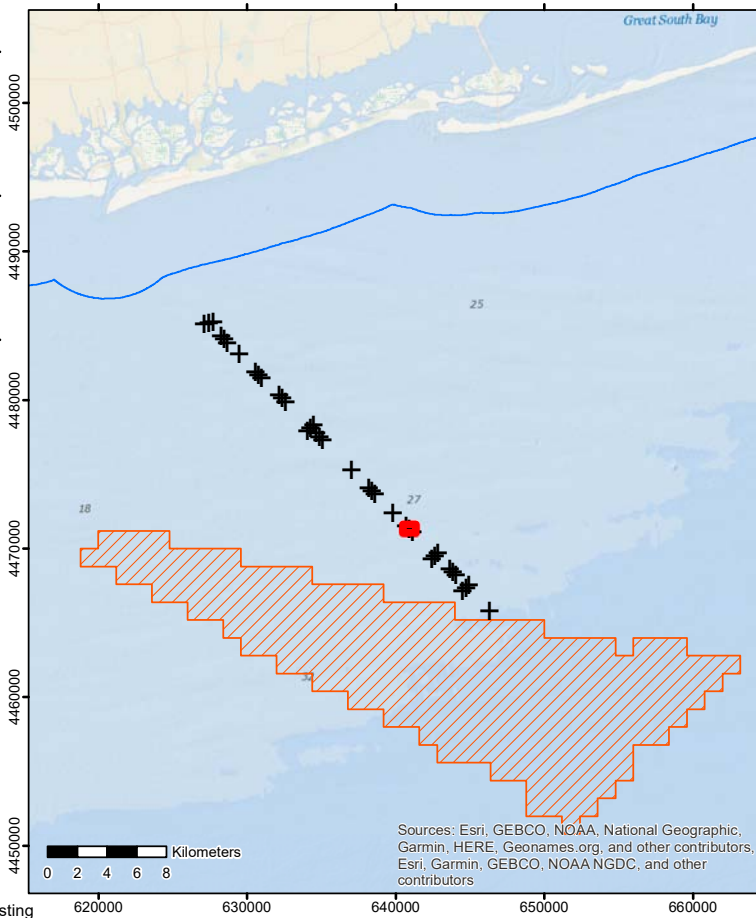
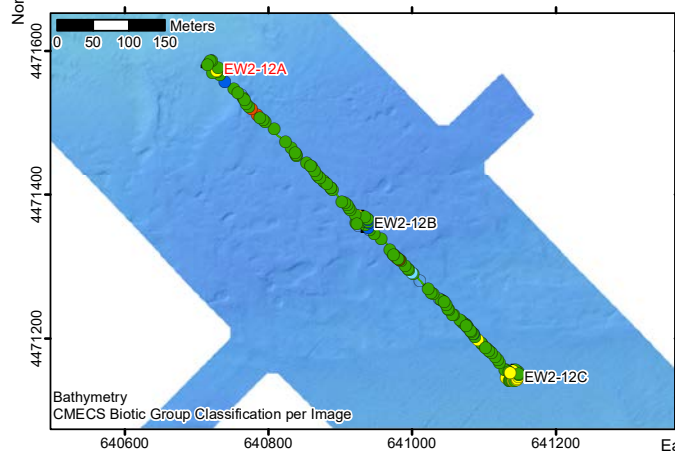
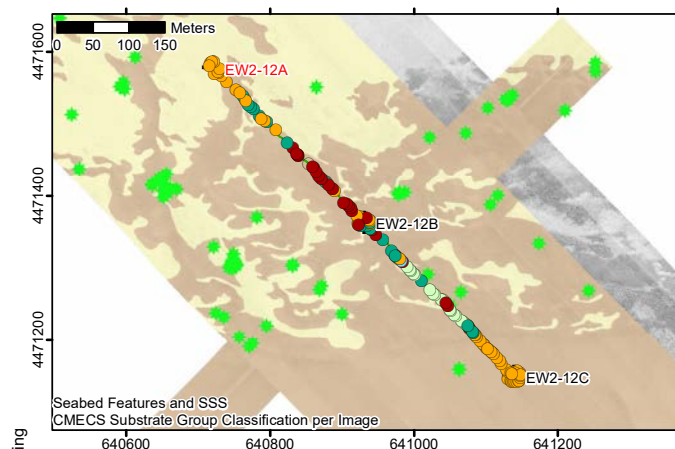
Faunal Description:
Echinodermata (Clypeasteroidea)



Station: EW2-12A
Fix: 135 **E:** 640723 **N:** 4471579
Depth (m): 34

PSA Sample:
CHEM

CMECS Substrate Classification:
Fine Sand



APPENDIX F SAMPLING AND SEABED PHOTOGRAPHS



Station: EW2-12B
Fix: 640 E: 640931 N: 4471363
Depth (m) : 34

Sediment Description:
Rippled sand with shell fragments

Faunal Description:
Echinodermata (Clypeasteroida)



Station: EW2-12B
Fix: 645 E: 640939 N: 4471362
Depth (m) : 34

Sediment Description:
Sand with gravel patches

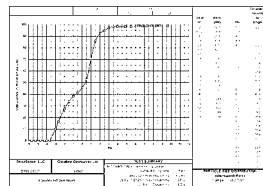
Faunal Description:
Animalia tubes, Cnidaria (Ceriantharia 3), Mollusca (Nassaridae)



Station: EW2-12B
Fix: 139 E: 640930 N: 4471360
Depth (m) : 35 **Retention:** MFA

Sediment Description:
Fine sand

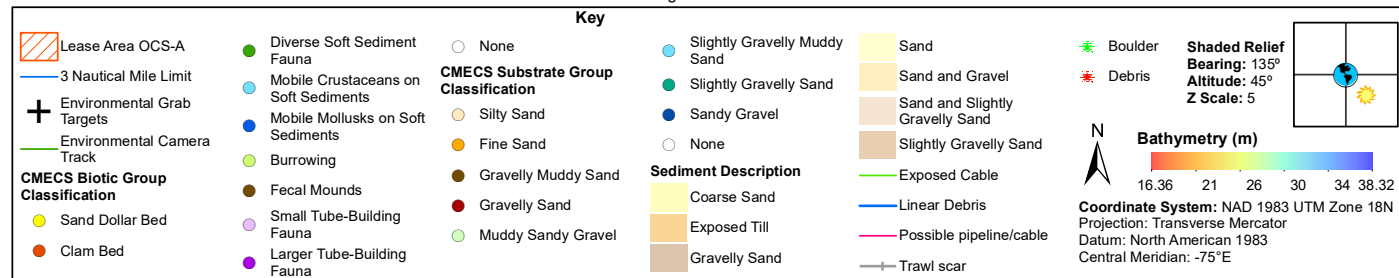
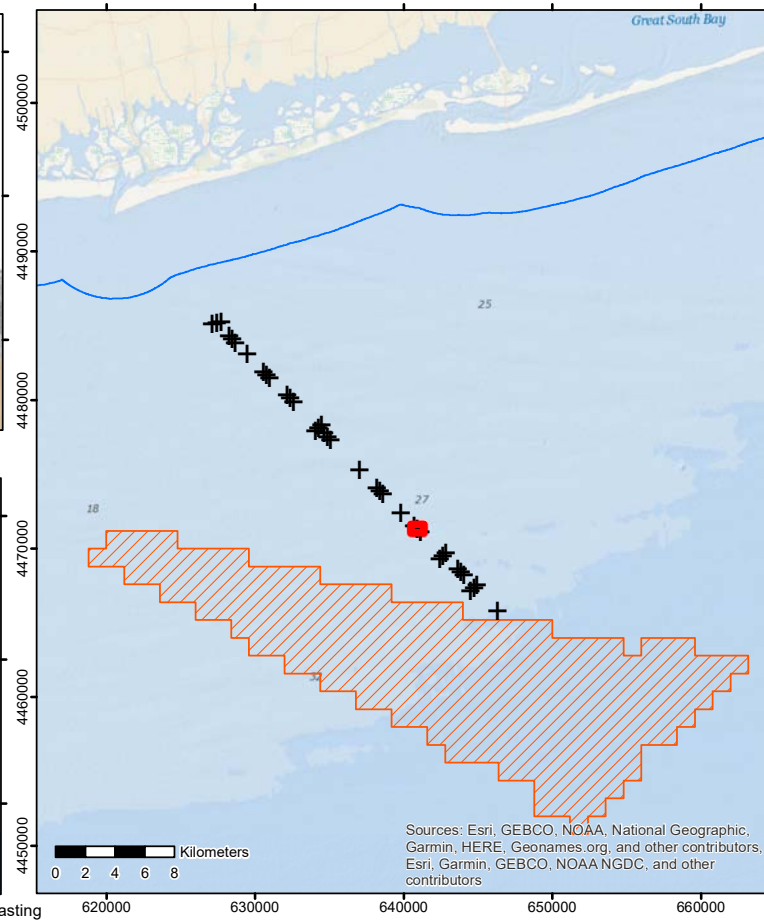
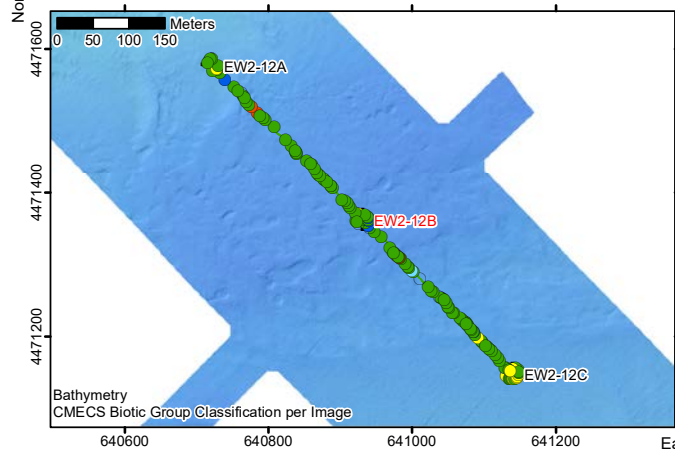
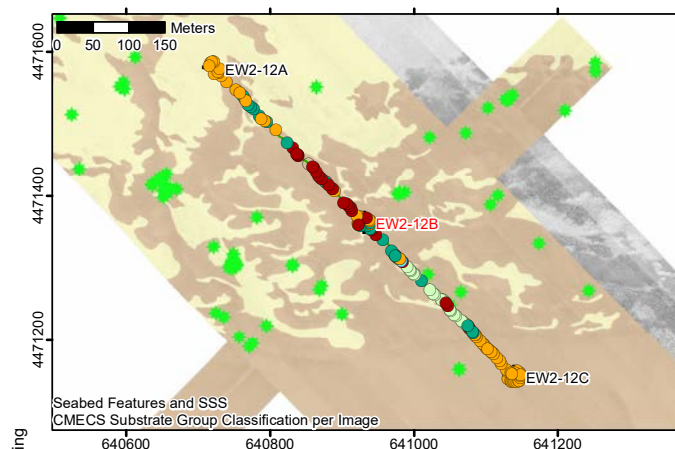
Faunal Description:
Echinodermata (Clypeasteroida)



Station: EW2-12B
Fix: 145 E: 640930 N: 4471364
Depth (m) : 34

PSA Sample:
CHEM

CMECS Substrate Classification:
Sandy gravel



APPENDIX F SAMPLING AND SEABED PHOTOGRAPHS



Station: EW2-12C
Fix: 573 **E:** 641142 **N:** 4471148
Depth (m) : 34

Sediment Description:
Rippled sand with shell fragments

Faunal Description:
Arthropoda (Paguroidea),
Echinodermata (*E. parma*)



Station: EW2-12C
Fix: 588 **E:** 641144 **N:** 4471157
Depth (m) : 34

Sediment Description:
Rippled sand with shell fragments

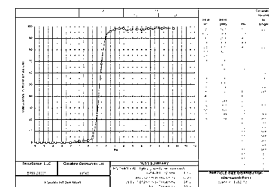
Faunal Description:
Animalia tubes, Cnidaria (*Edwardsia* sp.),
Echinodermata (*E. parma*),
Mollusca (Nassariidae)



Station: EW2-12C
Fix: 142 **E:** 641141 **N:** 4471148
Depth (m) : 34 **Retention:** MFA

Sediment Description:
Fine to medium sand

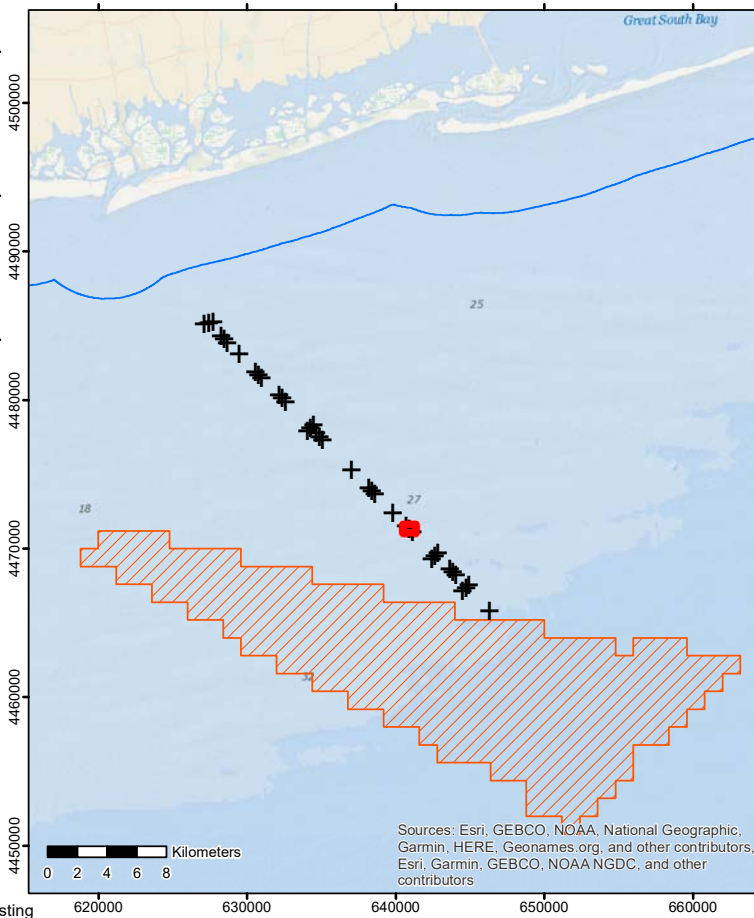
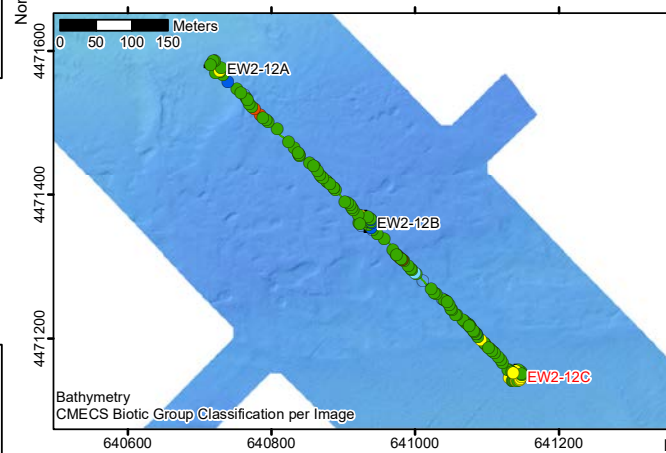
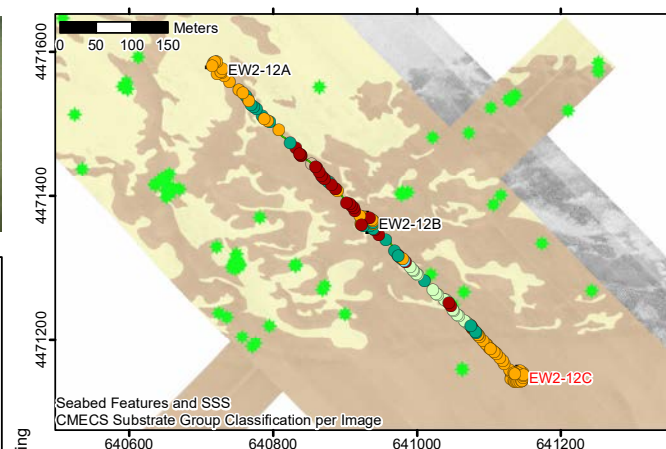
Faunal Description:
Annelida (Polychaeta),
(Gastropoda) Mollusca



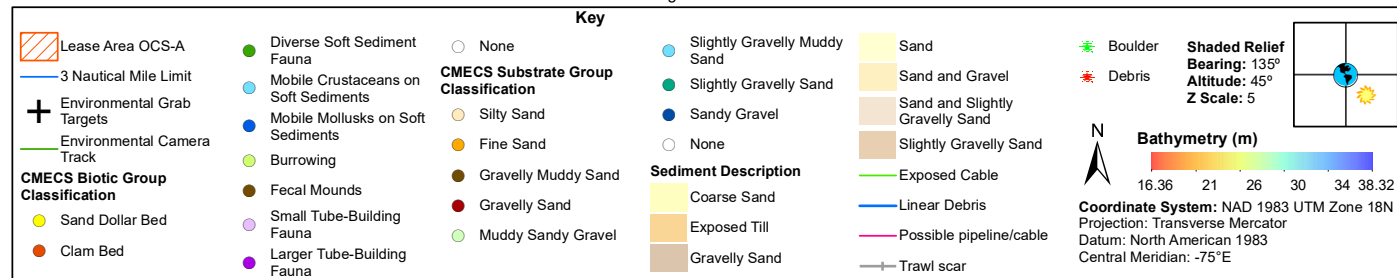
Station: EW2-12C
Fix: 143 **E:** 641144 **N:** 4471146
Depth (m) : 34

PSA Sample:
CHEM

CMECS Substrate Classification:
Slightly gravelly sand



Sources: Esri, GEBCO, NOAA, National Geographic, Garmin, HERE, Geonames.org, and other contributors, Esri, Garmin, GEBCO, NOAA NGDC, and other contributors



APPENDIX F SAMPLING AND SEABED PHOTOGRAPHS



Station: EW2-13A
Fix: 443 **E:** 642468 **N:** 4469307
Depth (m) : 35

Sediment Description:
Rippled sand with shell fragments

Faunal Description:
Arthropoda (Paguroidea), Cnidaria (Edwardsia), Echinodermata (E. parma), Mollusca (Nassariidae)



Station: EW2-13A
Fix: 445 **E:** 642460 **N:** 4469312
Depth (m) : 35

Sediment Description:
Rippled sand with shell fragments

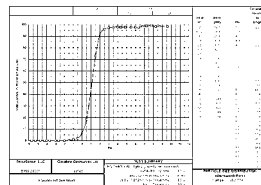
Faunal Description:
Animalia tubes, Chordata (*Leucoraja ocellata*), Echinodermata (*E. parma*)



Station: EW2-13A
Fix: 131 **E:** 642456 **N:** 4469309
Depth (m) : 35 **Retention:** MFA

Sediment Description:
Fine to medium sand

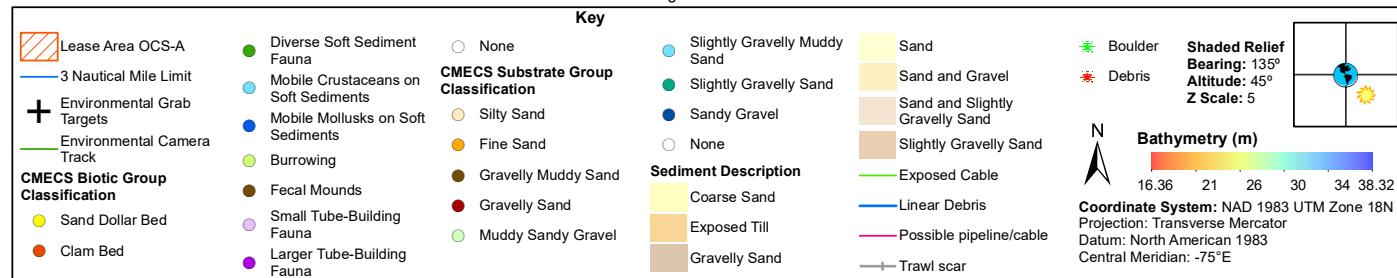
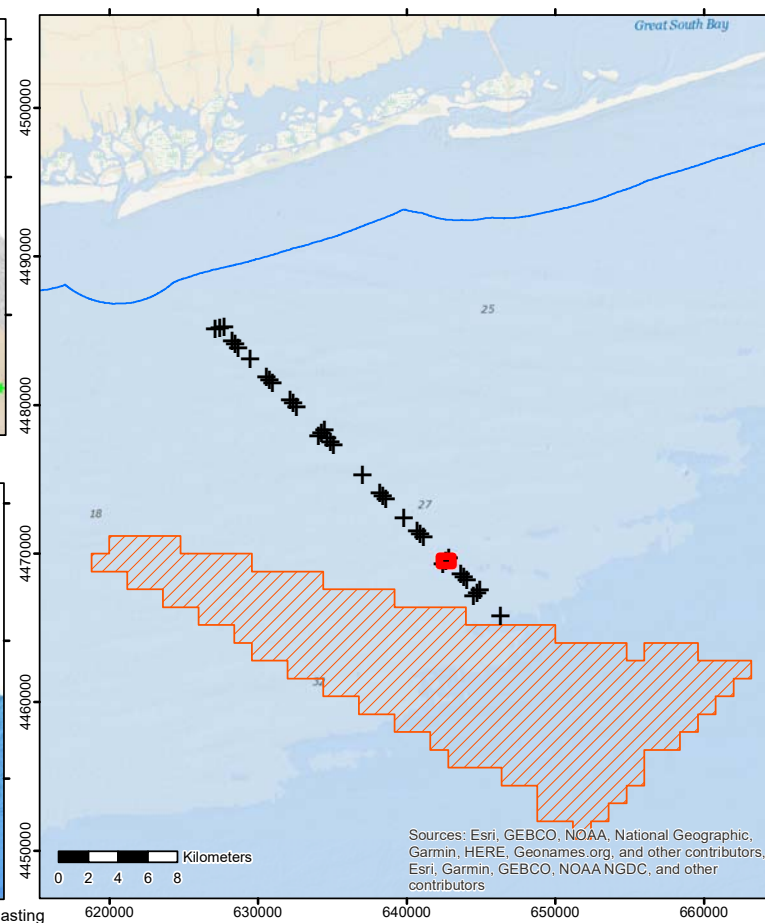
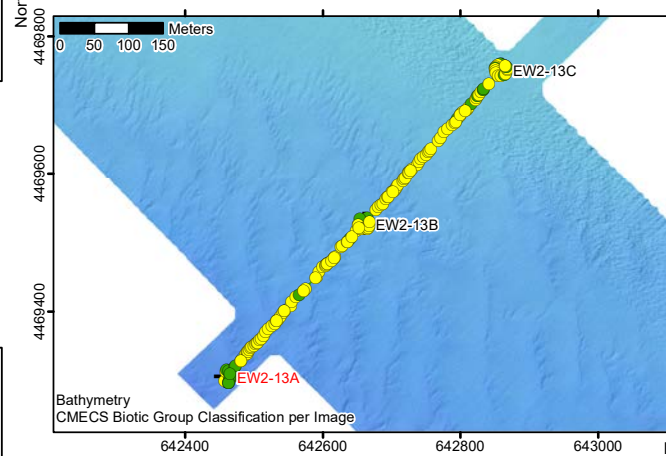
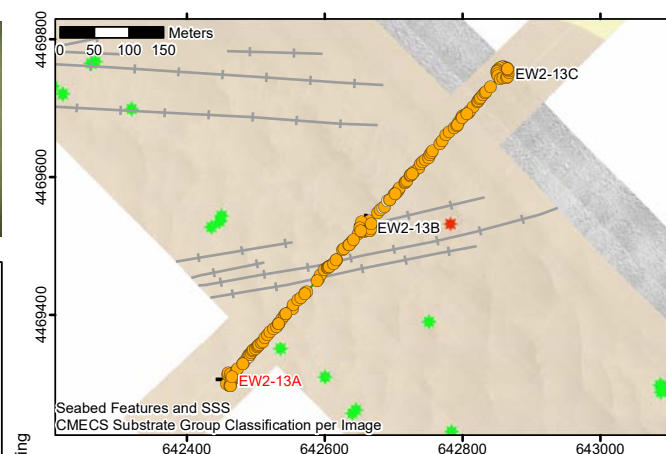
Faunal Description:
No visible fauna



Station: EW2-13A
Fix: 132 **E:** 642458 **N:** 4469310
Depth (m) : 35

PSA Sample:
CHEM

CMECS Substrate Classification:
Slightly gravelly sand



APPENDIX F SAMPLING AND SEABED PHOTOGRAPHS



Station: EW2-13B
Fix: 500 **E:** 642656 **N:** 4469520
Depth (m) : 34

Sediment Description:
Rippled sand with shell fragments

Faunal Description:
Animalia tubes, Echinodermata (*E. parma*), Mollusca (Nassaridae)



Station: EW2-13B
Fix: 504 **E:** 642667 **N:** 4469524
Depth (m) : 34

Sediment Description:
Rippled sand with shell fragments

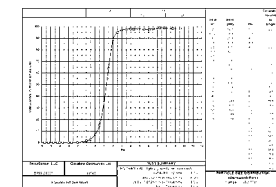
Faunal Description:
Cnidaria (*Edwardsia*), Mollusca (Nassaridae, Naticidae)



Station: EW2-13B
Fix: 128 **E:** 642660 **N:** 4469529
Depth (m) : 33 **Retention:** CHEM

Sediment Description:
Fine to medium sand

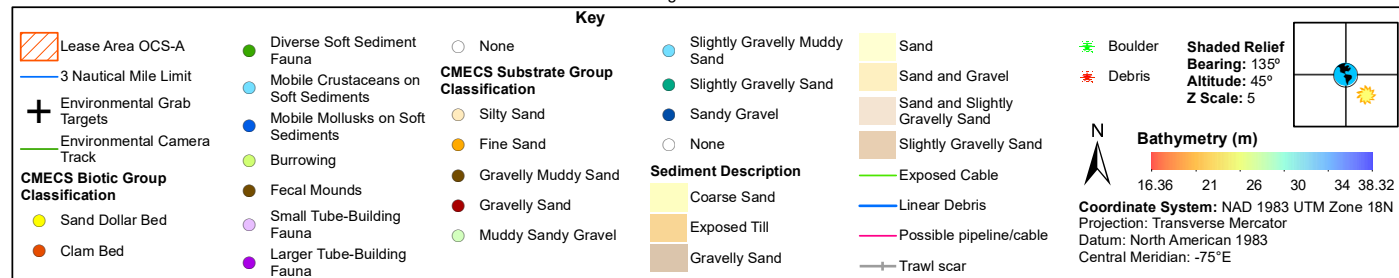
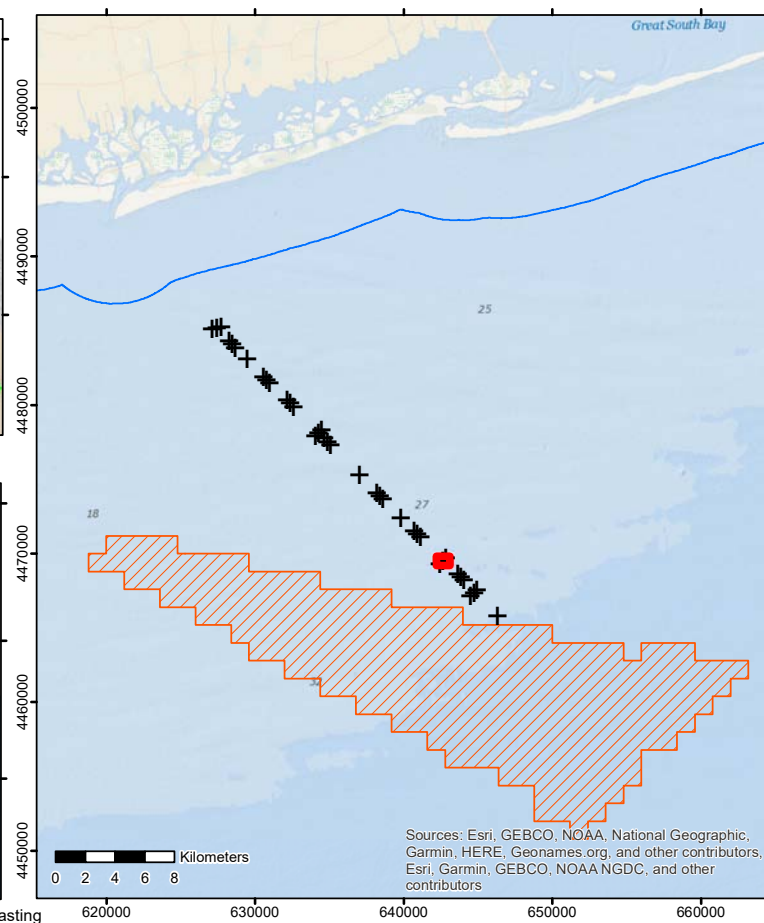
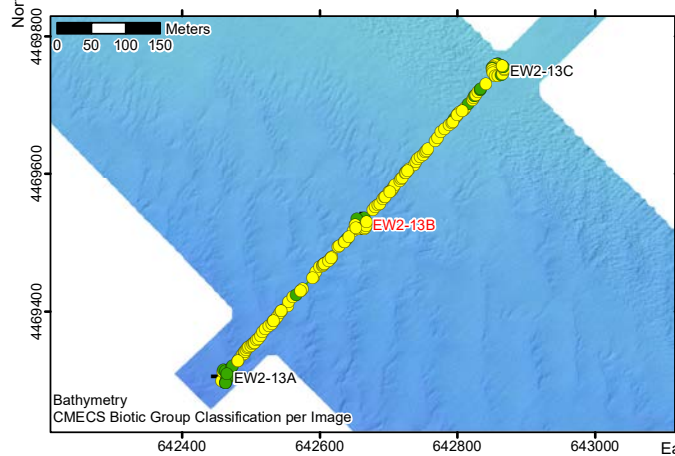
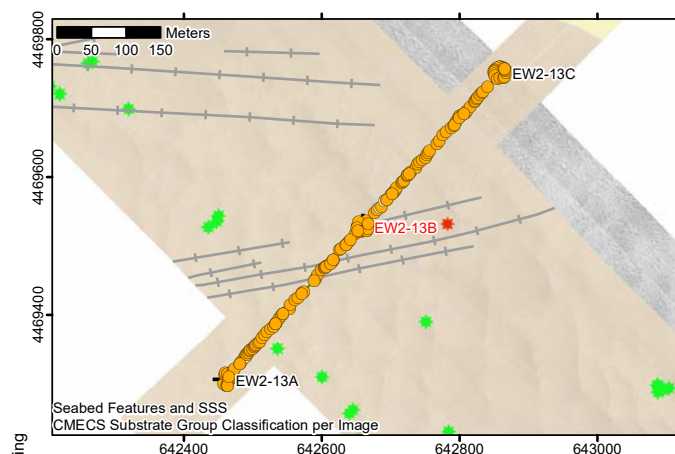
Faunal Description:
Echinodermata (*Clypeasteroida*)



Station: EW2-13B
Fix: 128 **E:** 642660 **N:** 4469529
Depth (m) : 33

PSA Sample:
CHEM

CMECS Substrate Classification:
Slightly gravelly sand



APPENDIX F SAMPLING AND SEABED PHOTOGRAPHS



Station: EW2-13C
Fix: 559 **E:** 642854 **N:** 4469759
Depth (m): 32

Sediment Description:
Rippled sand with shell fragments

Faunal Description:
Echinodermata (*E. parma*), Mollusca (Nassariidae)



Station: EW2-13C
Fix: 567 **E:** 642864 **N:** 4469744
Depth (m): 32

Sediment Description:
Rippled sand with shell fragments

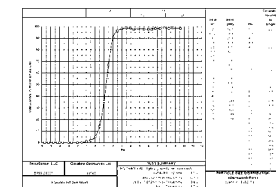
Faunal Description:
Echinodermata (*E. parma*), Mollusca (Astarte 1, Nassariidae)



Station: EW2-13C
Fix: 126 **E:** 642858 **N:** 4469754
Depth (m): 31 **Retention:** MFB

Sediment Description:
Fine to medium sand with shells, shell fragments and gravel

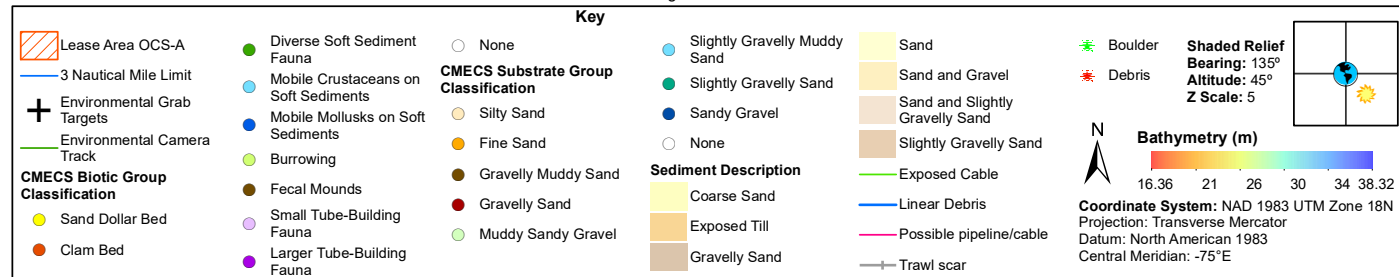
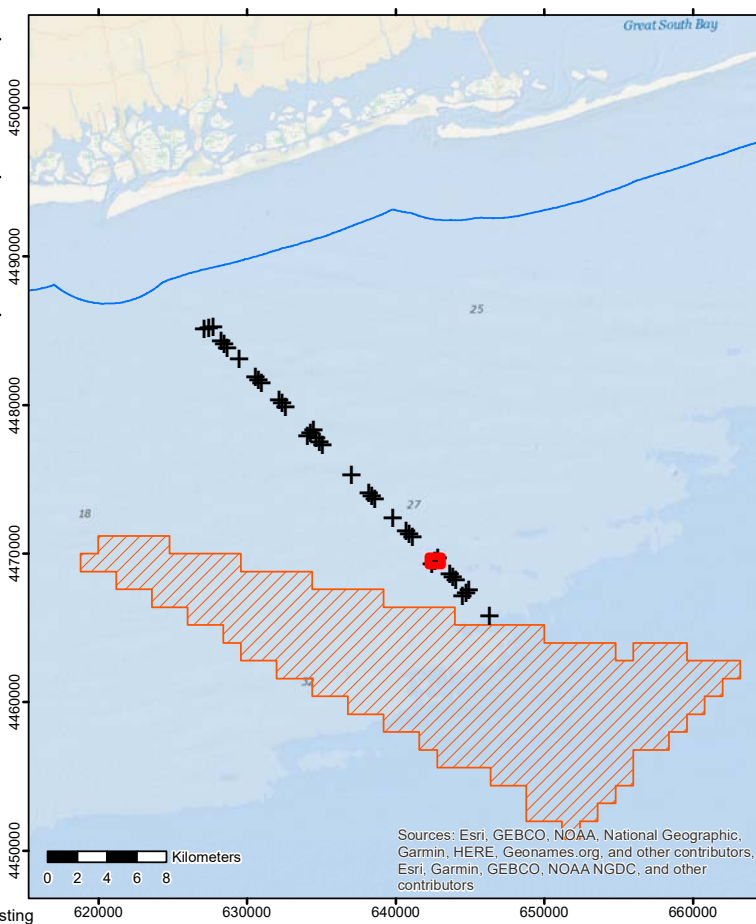
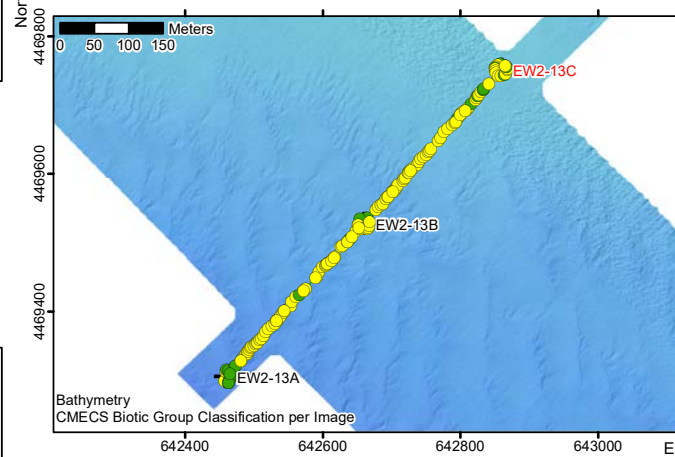
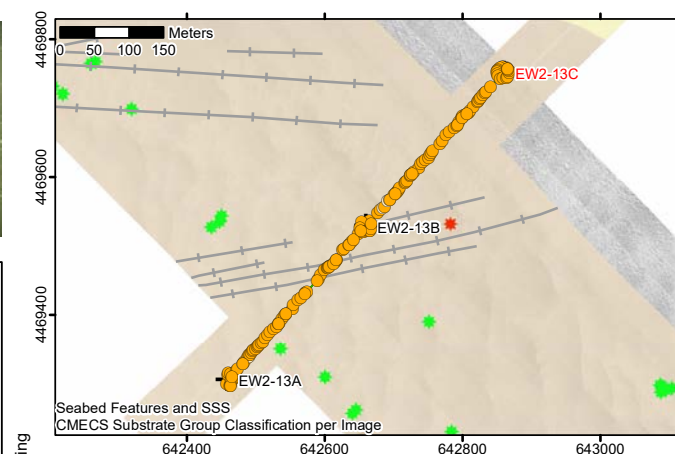
Faunal Description:
No visible fauna



Station: EW2-13C
Fix: 125 **E:** 642864 **N:** 4469754
Depth (m): 31

PSA Sample:
CHEM

CMECS Substrate Classification:
Slightly gravelly sand



APPENDIX F SAMPLING AND SEABED PHOTOGRAPHS



Station: EW2-14A
Fix: 417 **E:** 643657 **N:** 4468686
Depth (m) : 35

Sediment Description:
Sand with gravel patches

Faunal Description:
Chordata (Rajidae Egg Case),
Echinodermata (*E. parma*),
Mollusca (*A. islandica* dead shell, Nassariidae)



Station: EW2-14A
Fix: 423 **E:** 643671 **N:** 4468687
Depth (m) : 35

Sediment Description:
Rippled sand with shell fragments

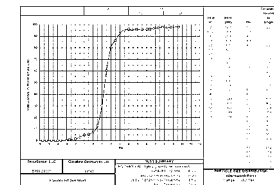
Faunal Description:
Echinodermata (*E. parma*)



Station: EW2-14A
Fix: 123 **E:** 643666 **N:** 4468687
Depth (m) : 34 **Retention:** MFA

Sediment Description:
Fine to medium sand with shells, shell fragments and gravel

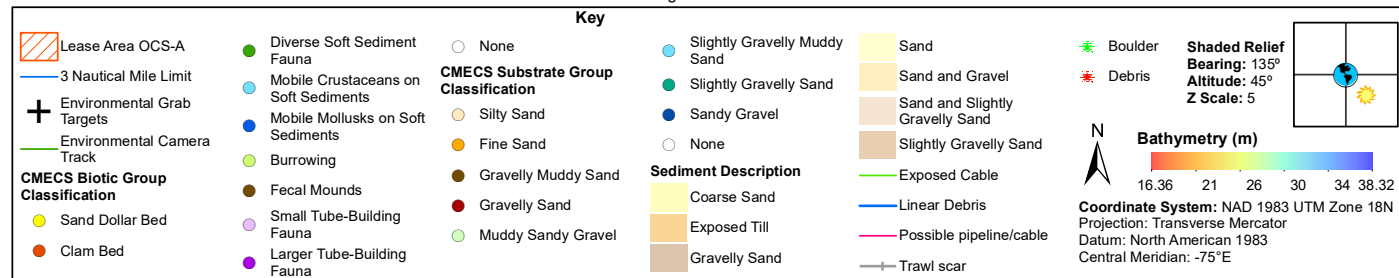
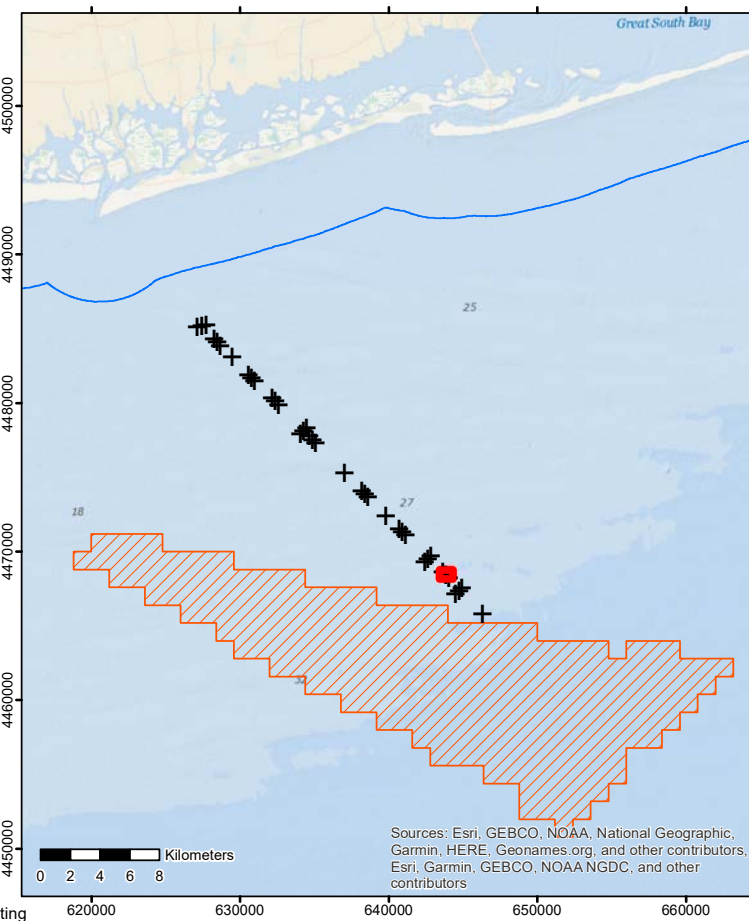
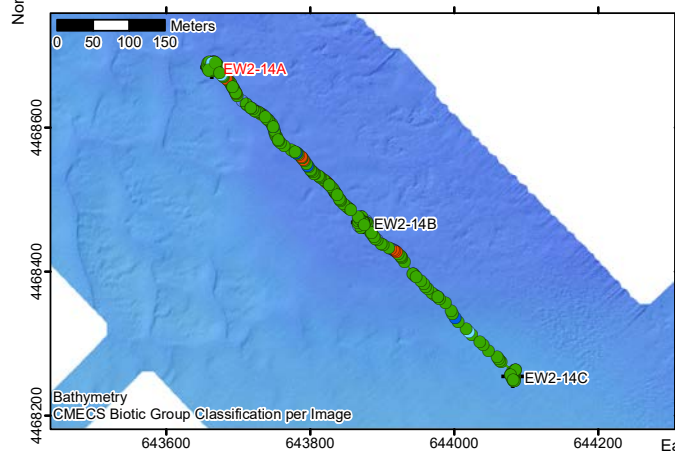
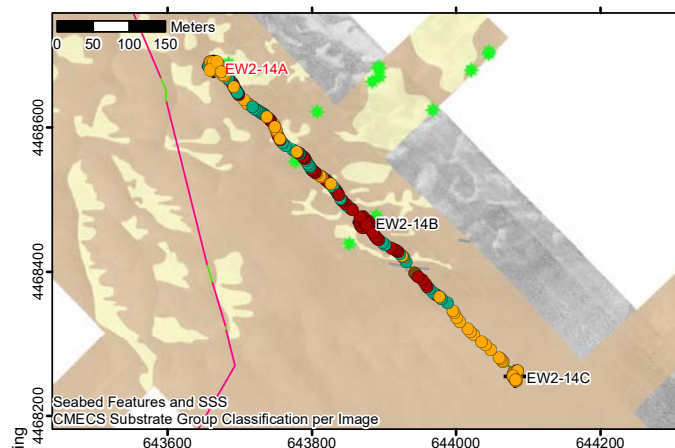
Faunal Description:
Annelida (Polychaeta)



Station: EW2-14A
Fix: 122 **E:** 643667 **N:** 4468682
Depth (m) : 34

PSA Sample:
CHEM

CMECS Substrate Classification:
Slightly gravelly sand



APPENDIX F SAMPLING AND SEABED PHOTOGRAPHS



Station: EW2-14B
Fix: 312 **E:** 643879 **N:** 4468468
Depth (m): 35

Sediment Description:
Sand with gravel patches

Faunal Description:
Faunal Turf, Mollusca (Nudibranchia 3)



Station: EW2-14B
Fix: 316 **E:** 643870 **N:** 4468462
Depth (m): 36

Sediment Description:
Sand with gravel patches

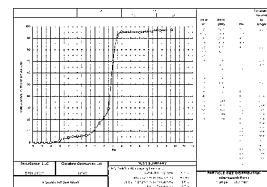
Faunal Description:
Arthropoda (Paguroidea), Cnidaria (Ceriantharia 1)



Station: EW2-14B
Fix: 120 **E:** 643879 **N:** 4468466
Depth (m): 34 **Retention:** MFB

Sediment Description:
Fine sand with underlying gravel

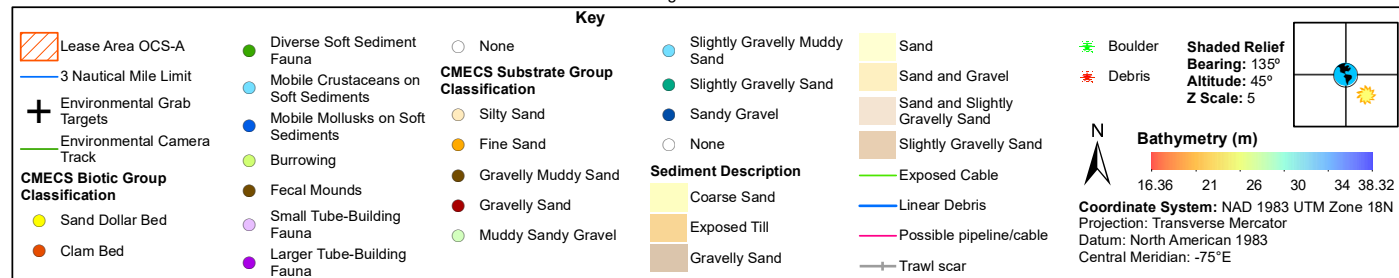
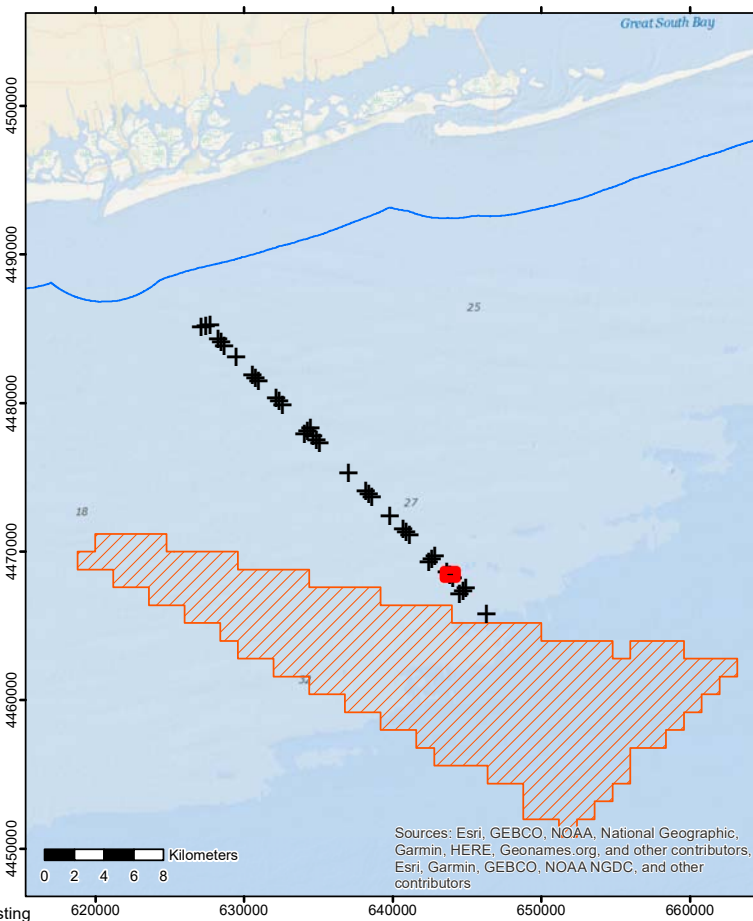
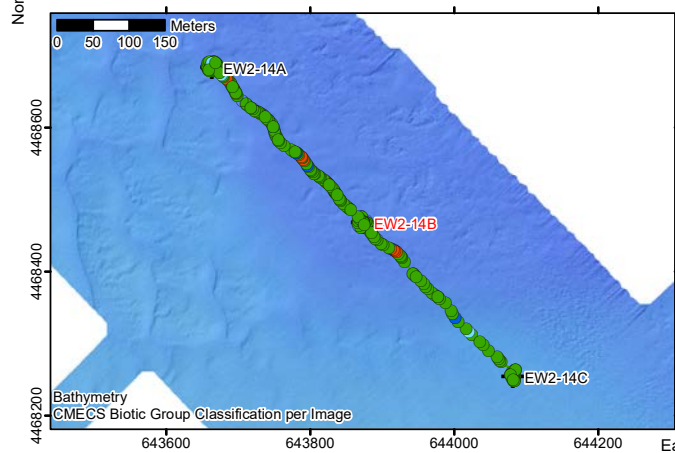
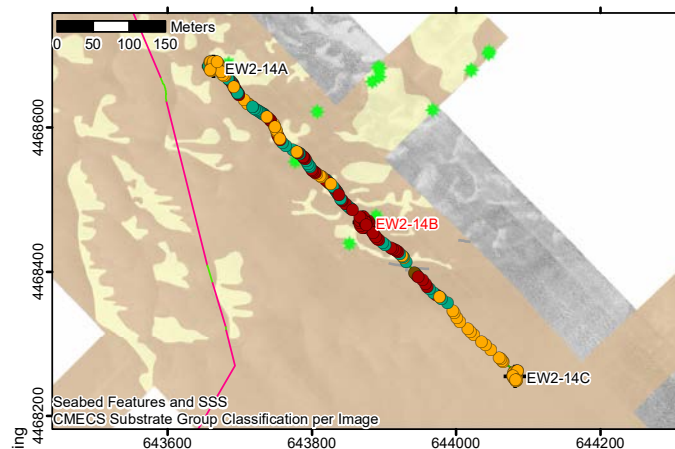
Faunal Description:
No visible fauna



Station: EW2-14B
Fix: 117 **E:** 643872 **N:** 4468475
Depth (m): 34

PSA Sample:
CHEM

CMECS Substrate Classification:
Gravelly sand



APPENDIX F SAMPLING AND SEABED PHOTOGRAPHS



Station: EW2-14C
Fix: 257 **E:** 644080 **N:** 4468259
Depth (m): 34

Sediment Description:
Rippled sand with shell fragments

Faunal Description:
Mollusca (*A. islandica* siphons),
Mollusca (Nassariidae)



Station: EW2-14C
Fix: 259 **E:** 644080 **N:** 4468253
Depth (m): 34

Sediment Description:
Rippled sand with shell fragments

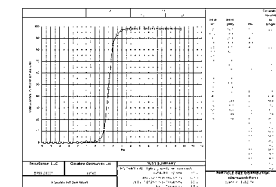
Faunal Description:
Animalia tubes, Echinodermata (*E. parma*), Mollusca (Nassariidae)



Station: EW2-14C
Fix: 110 **E:** 644083 **N:** 4468255
Depth (m): 33 **Retention:** MFA

Sediment Description:
Fine to medium sand

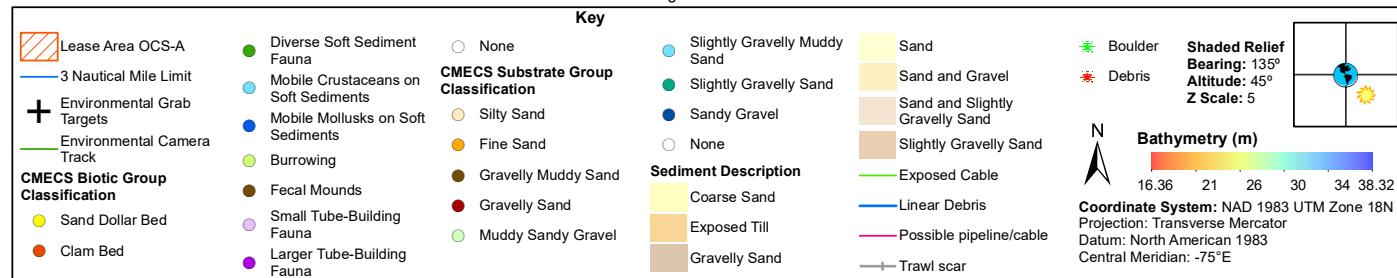
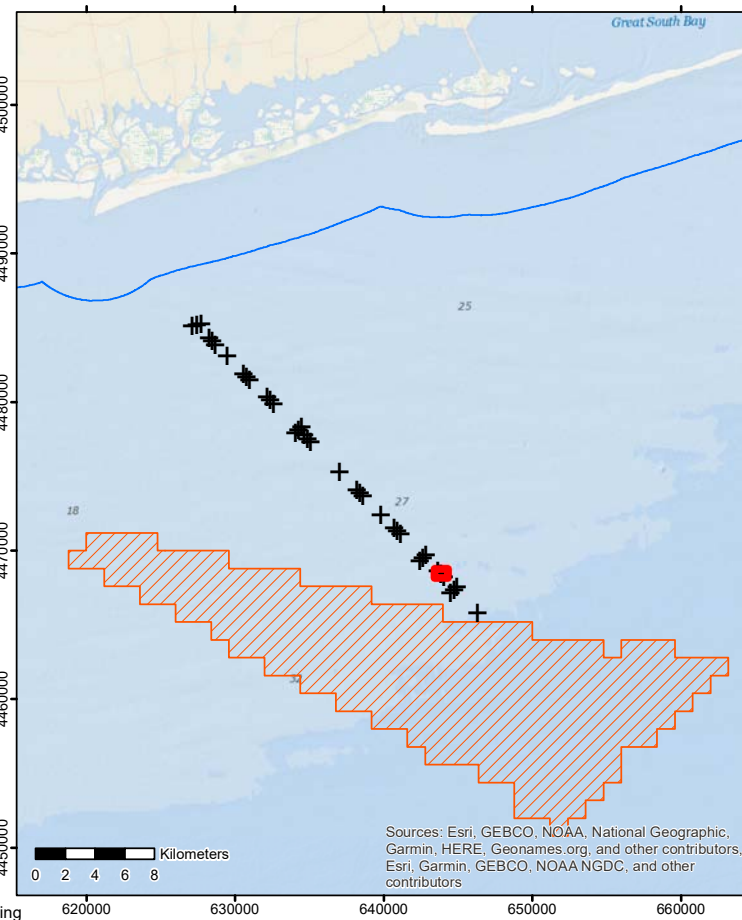
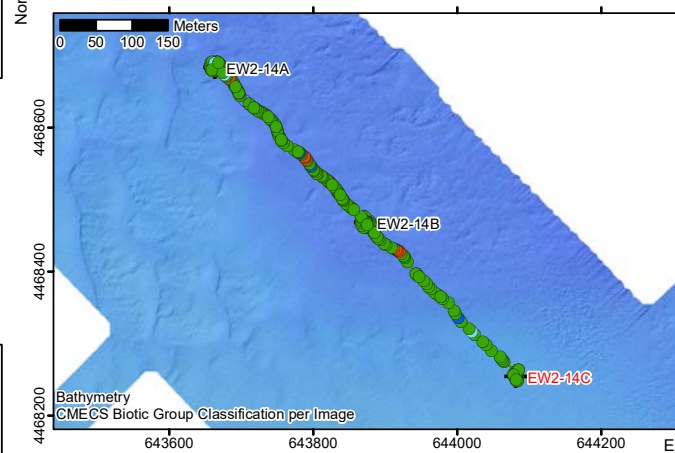
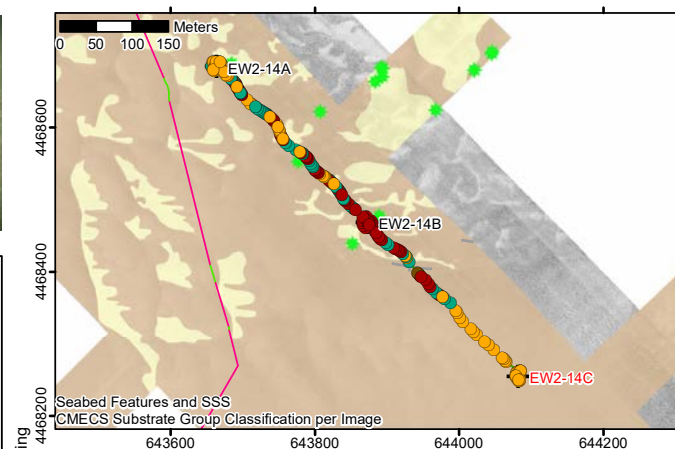
Faunal Description:
Arthropoda (Amphipoda)



Station: EW2-14C
Fix: 111 **E:** 644082 **N:** 4468257
Depth (m): 33

PSA Sample:
CHEM

CMECS Substrate Classification:
Slightly gravelly sand



APPENDIX F SAMPLING AND SEABED PHOTOGRAPHS



Station: EW2-15A
Fix: 127 **E:** 644525 **N:** 4467178
Depth (m): 33

Sediment Description:
Rippled muddy sand with shell fragments

Faunal Description:
Arthropoda (Brachyura indeterminate, Paguroidea), Chordata (Blennidae, Rajidae, Egg Case), Echinodermata (*E. parma*), Mollusca (Nassariidae)



Station: EW2-15A
Fix: 136 **E:** 644526 **N:** 4467179
Depth (m): 33

Sediment Description:
Rippled muddy sand with shell fragments

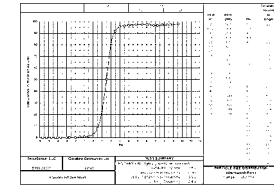
Faunal Description:
Animalia tubes, Arthropoda (Paguroidea)



Station: EW2-15A
Fix: 7 **E:** 644531 **N:** 4467181
Depth (m): 33 **Retention:** CHEM

Sediment Description:
Medium sand with shell fragments and shells

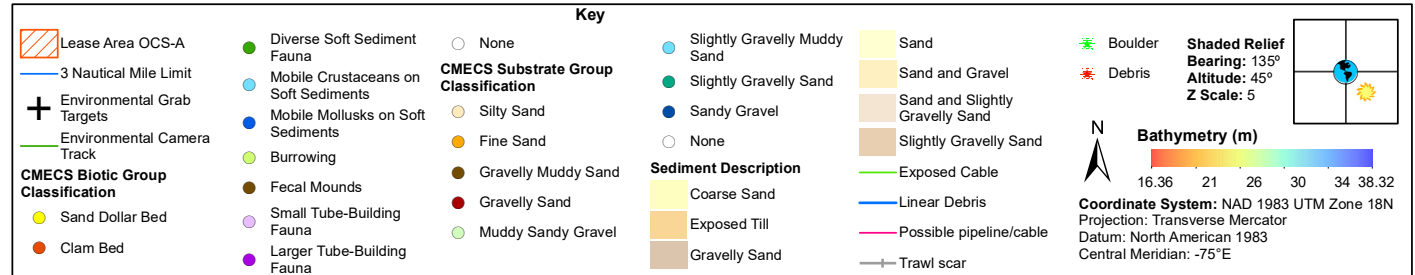
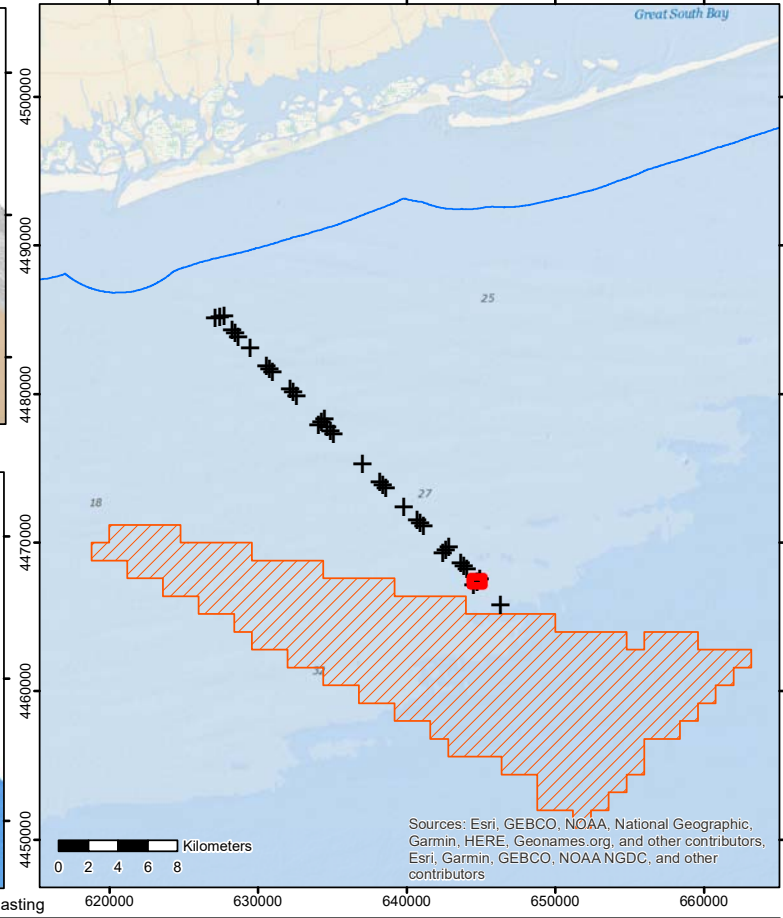
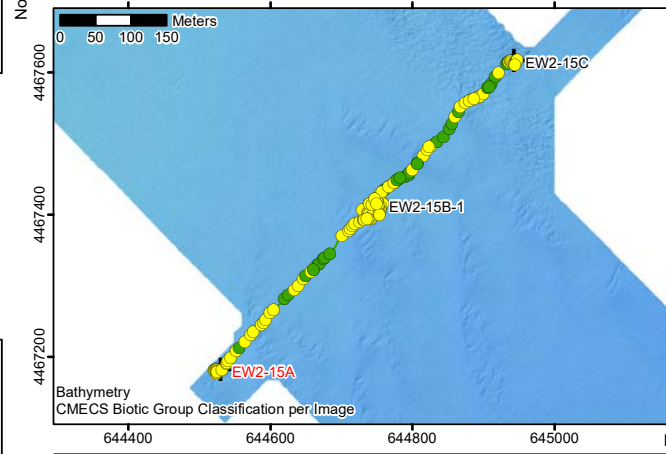
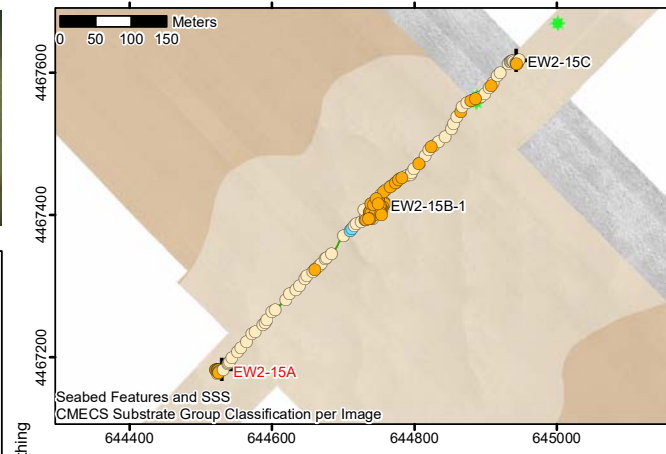
Faunal Description:
Echinodermata (Clypeasteroidea)



Station: EW2-15A
Fix: 7 **E:** 644531 **N:** 4467181
Depth (m): 33

PSA Sample:
CHEM

CMECS Substrate Classification:
Slightly gravelly sand



APPENDIX F SAMPLING AND SEABED PHOTOGRAPHS



Station: EW2-15B-1
Fix: 240 **E:** 644758 **N:** 4467415
Depth (m): 33

Sediment Description:
Rippled sand with shell fragments

Faunal Description:
Chordata (Pleuronectiformes 1),
Echinodermata (*E. parma*),
Mollusca (Bivalvia indeterminate)



Station: EW2-15B-1
Fix: 252 **E:** 644750 **N:** 4467418
Depth (m): 33

Sediment Description:
Rippled sand with shell fragments

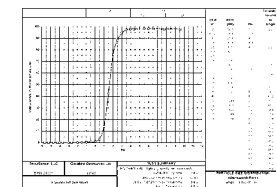
Faunal Description:
Arthropoda (Paguroidea),
Echinodermata (*E. parma*), Mollusca
(Bivalvia Siphons, Nassariidae)



Station: EW2-15B-1
Fix: 107 **E:** 644751 **N:** 4467416
Depth (m): 33 **Retention:** MFB

Sediment Description:
Fine to medium sand

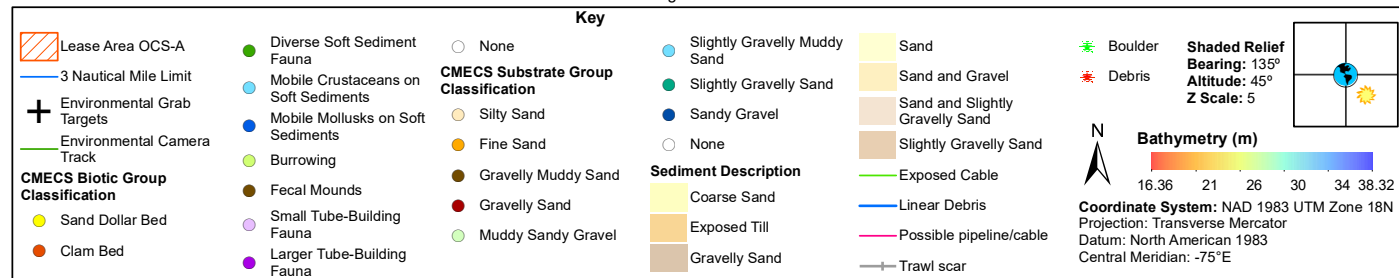
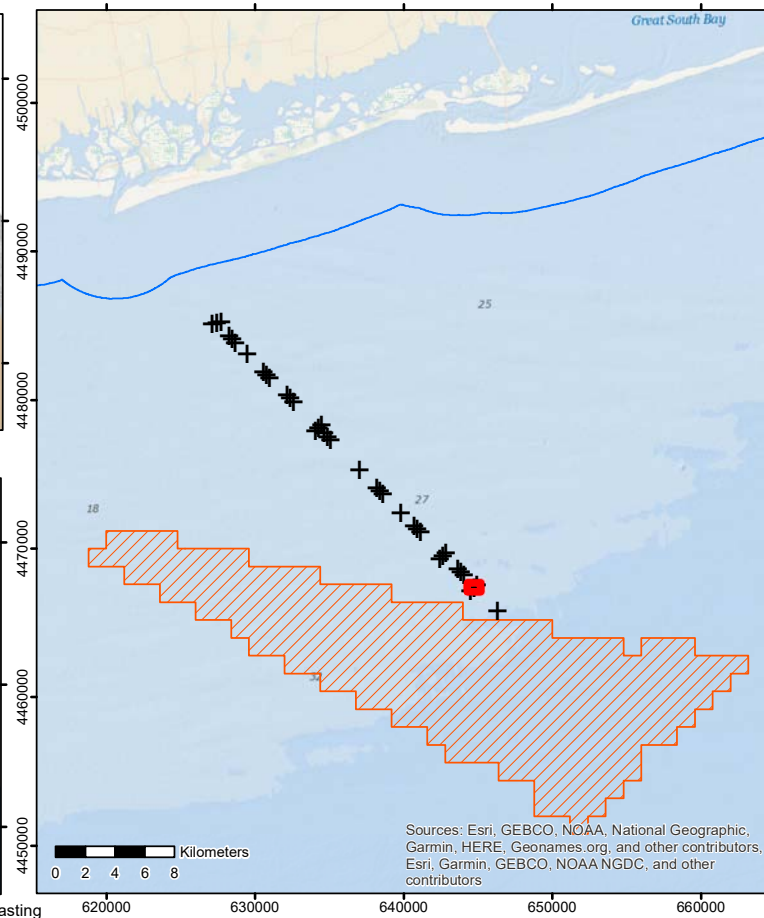
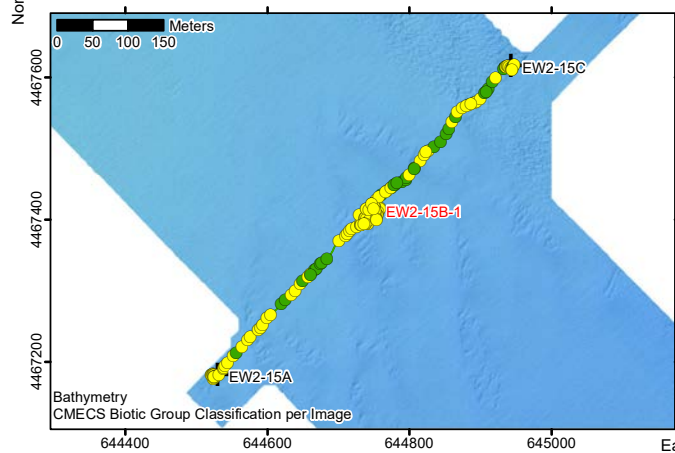
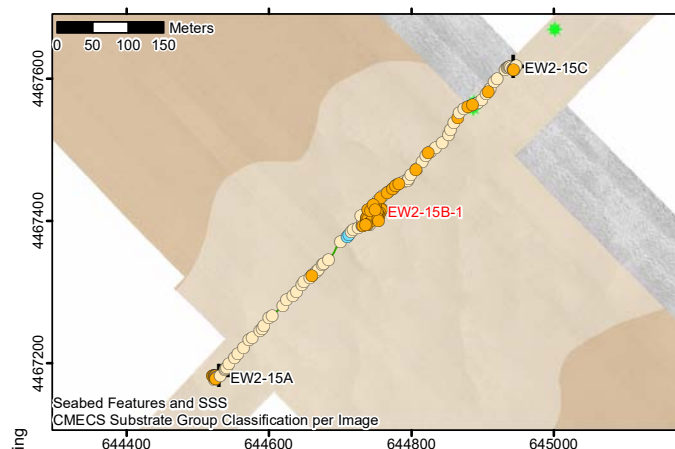
Faunal Description:
Echinodermata (Clypeasteroidea)



Station: EW2-15B-1
Fix: 109 **E:** 644751 **N:** 4467414
Depth (m): 33

PSA Sample:
CHEM

CMECS Substrate Classification:
Slightly gravelly sand



APPENDIX F SAMPLING AND SEABED PHOTOGRAPHS



Station: EW2-15C
Fix: 223 **E:** 644938 **N:** 4467617
Depth (m) : 33

Sediment Description:
Rippled muddy sand with shell fragments

Faunal Description:
Arthropoda (Paguroidea),
Echinodermata (*E. parma*), Mollusca
(Bivalvia Siphons, Nassariidae)



Station: EW2-15C
Fix: 229 **E:** 644946 **N:** 4467617
Depth (m) : 33

Sediment Description:
Rippled muddy sand with shell fragments

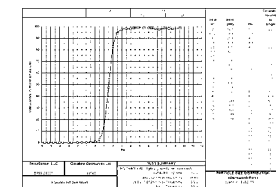
Faunal Description:
Echinodermata (*E. parma*)



Station: EW2-15C
Fix: 11 **E:** 644944 **N:** 4467615
Depth (m) : 33 **Retention:** CHEM

Sediment Description:
Fine gravel, coarse sand with shell fragments and shells

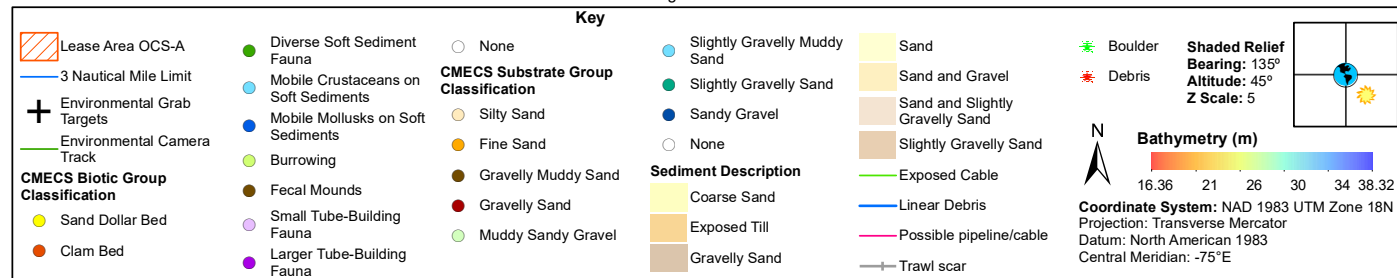
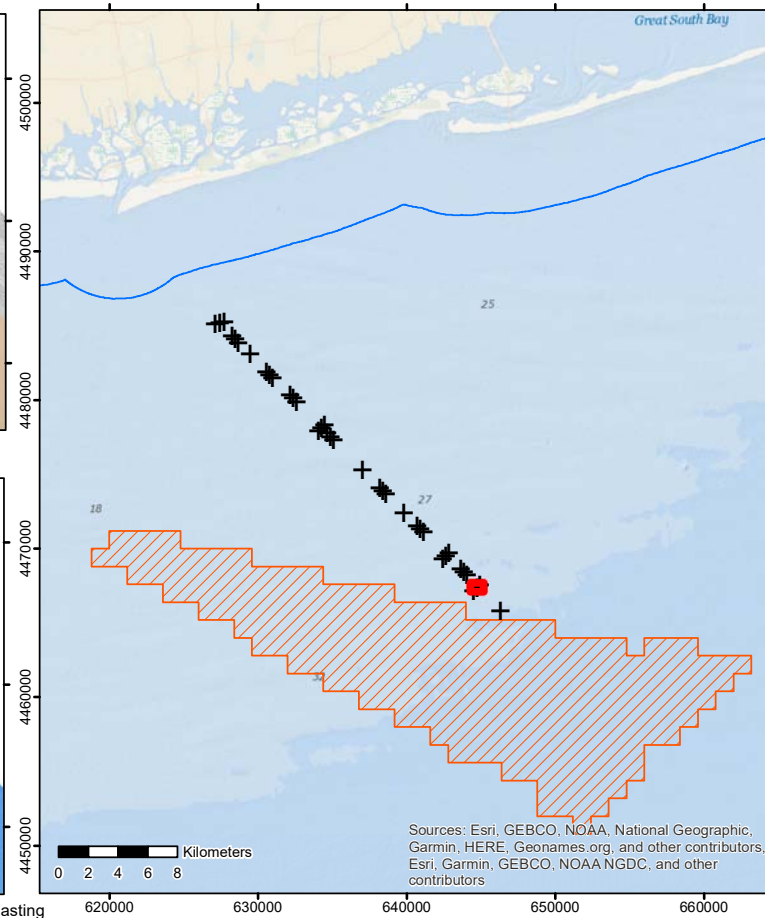
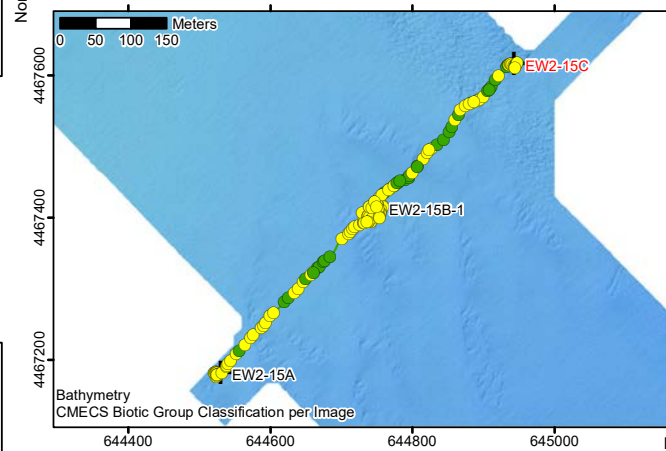
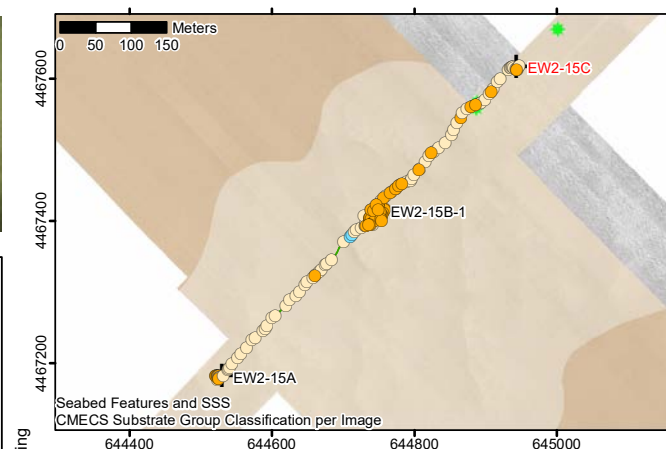
Faunal Description:
No visible fauna



Station: EW2-15C
Fix: 11 **E:** 644944 **N:** 4467615
Depth (m) : 33

PSA Sample:
CHEM

CMECS Substrate Classification:
Slightly gravelly sand



APPENDIX F SAMPLING AND SEABED PHOTOGRAPHS



Station: EW2-16
Fix: 70 **E:** 646333 **N:** 4465819
Depth (m) : 35

Sediment Description:
Rippled sand with shell fragments

Faunal Description:
Animalia tubes, Echinodermata (*E. parma*)



Station: EW2-16
Fix: 75 **E:** 646325 **N:** 4465824
Depth (m) : 35

Sediment Description:
Rippled sand with shell fragments, faunal burrows

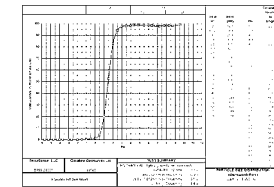
Faunal Description:
Animalia tubes, Arthropoda (Paguroidea), Echinodermata (*E. parma*)



Station: EW2-16
Fix: 2 **E:** 646325 **N:** 4465825
Depth (m) : 34 **Retention:** MFB

Sediment Description:
Medium sand with shell fragments and shells

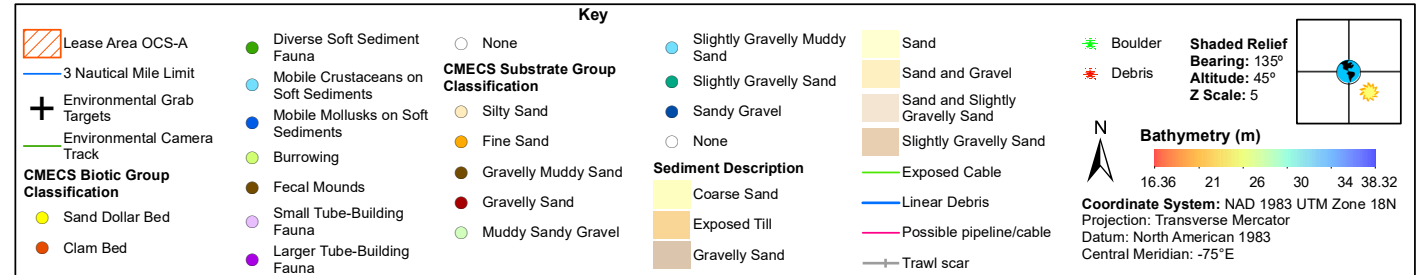
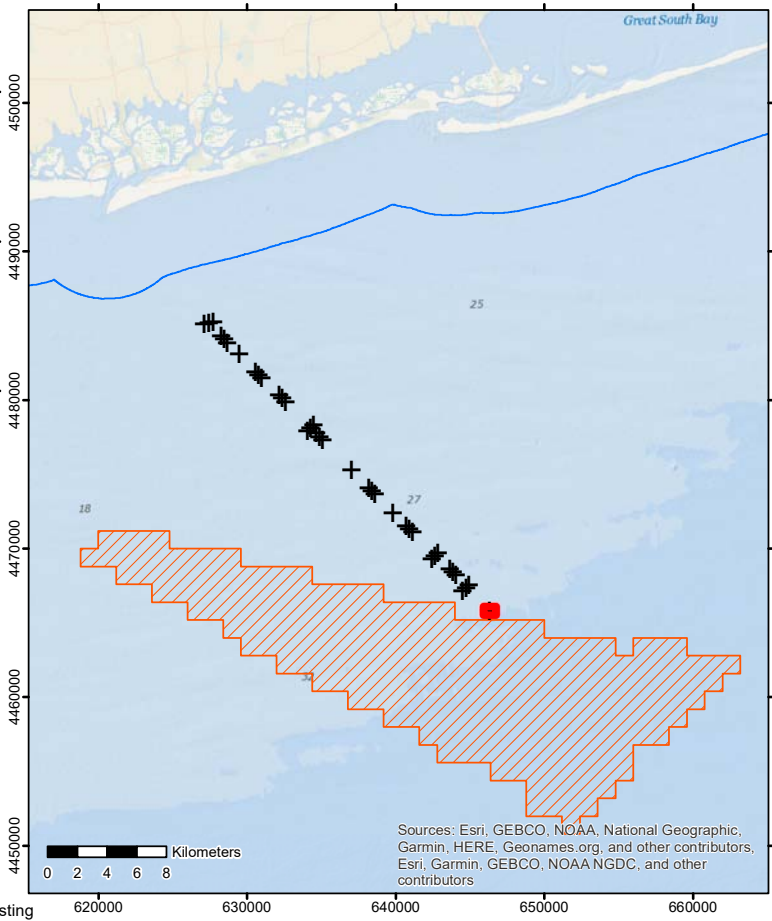
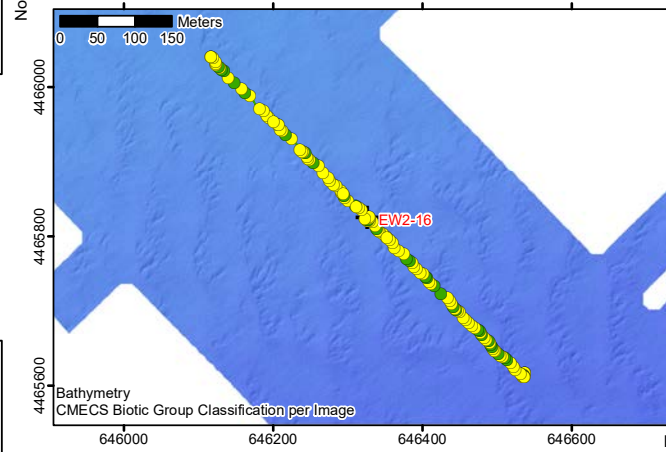
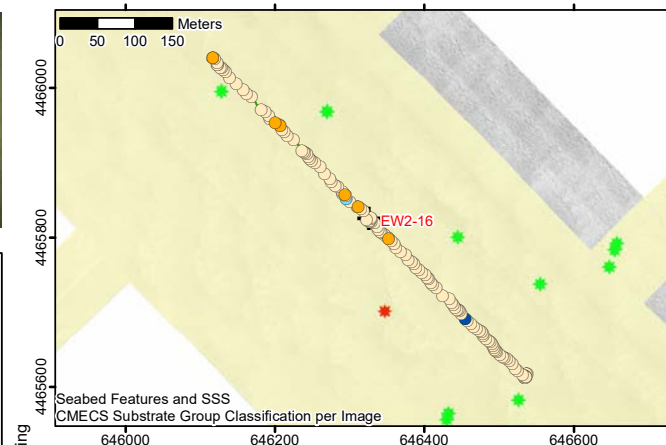
Faunal Description:
Echinodermata (Clypeasteroidea), Mollusca (Gastropoda)



Station: EW2-16
Fix: 2 **E:** 646325 **N:** 4465825
Depth (m) : 34

PSA Sample:
CHEM

CMECS Substrate Classification:
Slightly gravelly sand



APPENDIX G PARTICLE SIZE ANALYSIS RESULTS

APPENDIX G PARTICLE SIZE ANALYSIS RESULTS

SAMPLE STATISTICS

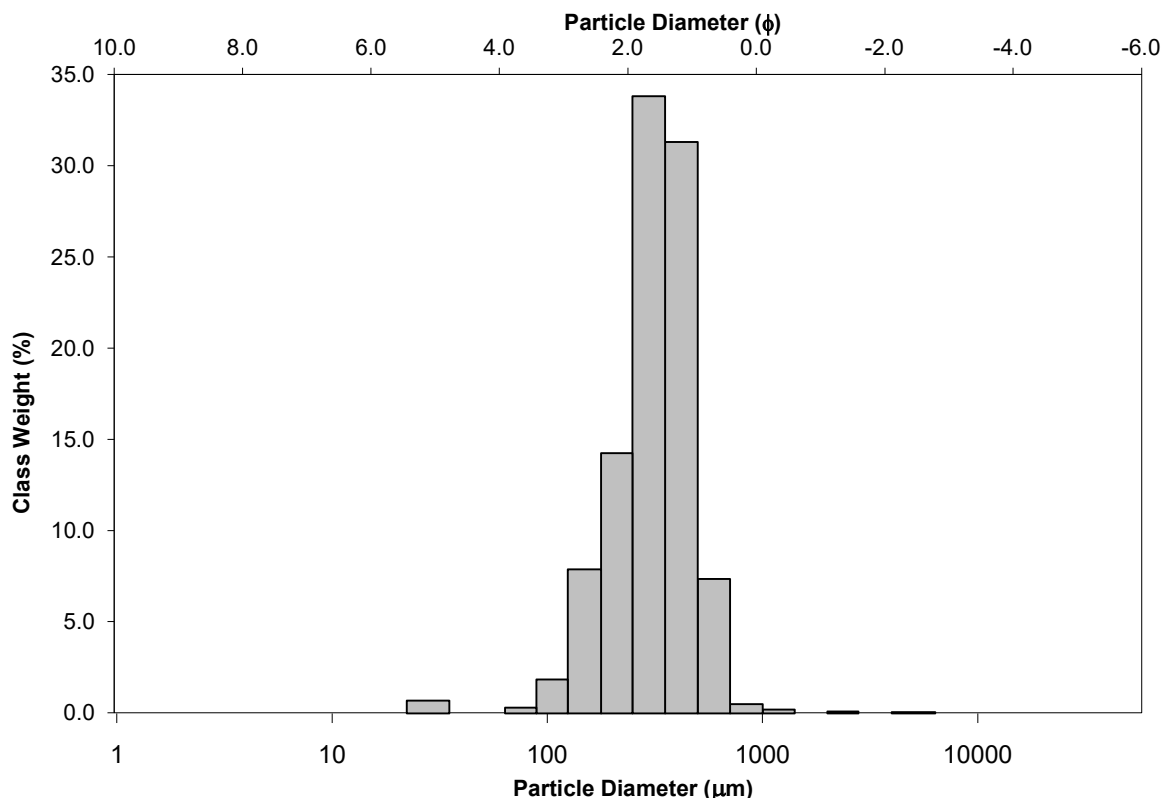
SAMPLE IDENTITY: **EW2-2A**

ANALYST & DATE: ,

SAMPLE TYPE: Unimodal, Moderately Well Sorted TEXTURAL GROUP: Slightly Gravelly Sand
SEDIMENT NAME: Slightly Very Fine Gravelly Medium Sand

	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	301.0	1.754	GRAVEL: 0.2%	COARSE SAND: 7.9%		
MODE 2:			SAND: 97.4%	MEDIUM SAND: 64.9%		
MODE 3:			MUD: 2.4%	FINE SAND: 22.2%		
D ₁₀ :	158.6	1.028		V FINE SAND: 2.2%		
MEDIAN or D ₅₀ :	317.3	1.656	V COARSE GRAVEL: 0.0%	V COARSE SILT: 0.2%		
D ₉₀ :	490.5	2.657	COARSE GRAVEL: 0.0%	COARSE SILT: 0.7%		
(D ₉₀ / D ₁₀):	3.093	2.585	MEDIUM GRAVEL: 0.0%	MEDIUM SILT: 0.0%		
(D ₉₀ - D ₁₀):	331.9	1.629	FINE GRAVEL: 0.1%	FINE SILT: 0.0%		
(D ₇₅ / D ₂₅):	1.726	1.621	V FINE GRAVEL: 0.1%	V FINE SILT: 0.0%		
(D ₇₅ - D ₂₅):	174.6	0.787	V COARSE SAND: 0.2%	CLAY: 1.5%		
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic	Geometric	Logarithmic	Geometric	Logarithmic	Description
	μm	μm	ϕ	μm	ϕ	
MEAN ($\bar{x}$):	338.7	280.0	1.837	304.1	1.717	Medium Sand
SORTING (σ):	217.2	2.287	1.193	1.563	0.644	Moderately Well Sorted
SKEWNESS (Sk):	12.00	-4.500	4.500	-0.174	0.174	Fine Skewed
KURTOSIS (K):	253.6	30.12	30.12	1.142	1.142	Leptokurtic

GRAIN SIZE DISTRIBUTION



APPENDIX G PARTICLE SIZE ANALYSIS RESULTS

SAMPLE STATISTICS

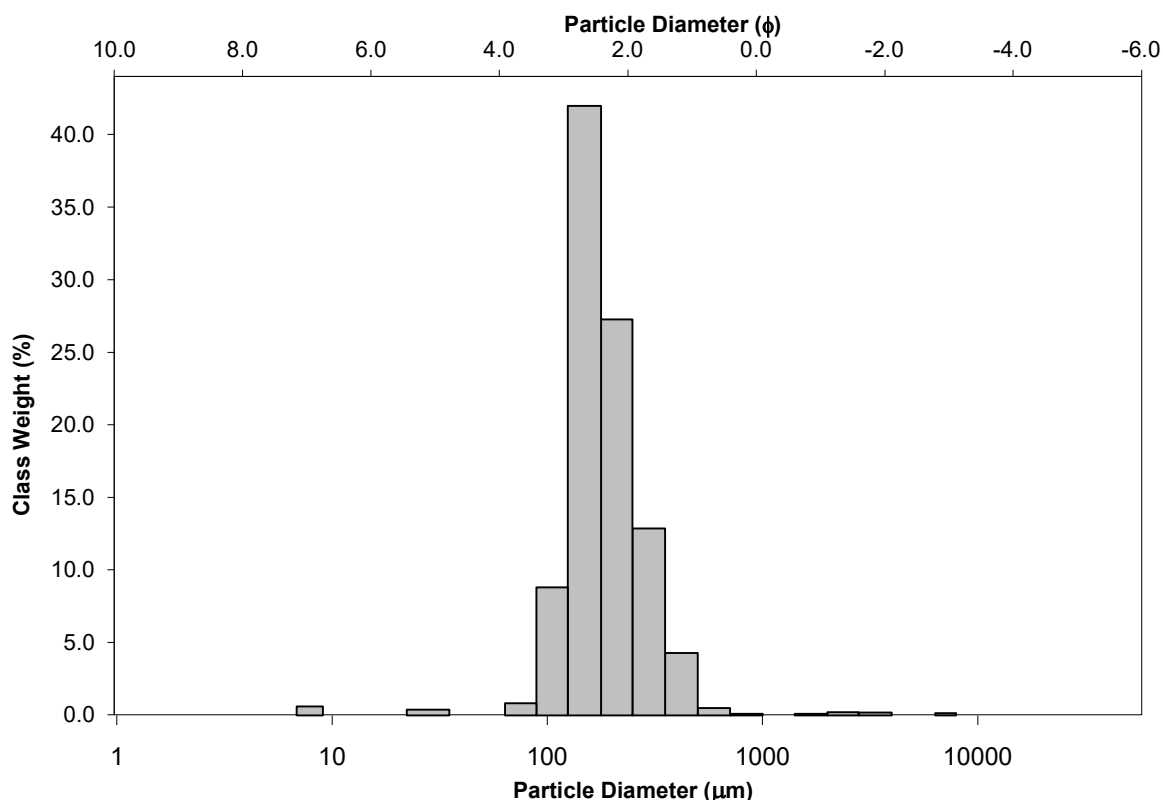
SAMPLE IDENTITY: **EW2-2B**

ANALYST & DATE: ,

SAMPLE TYPE: Unimodal, Moderately Well Sorted TEXTURAL GROUP: Slightly Gravelly Sand
SEDIMENT NAME: Slightly Very Fine Gravelly Fine Sand

	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	151.1	2.749	GRAVEL: 0.5%	COARSE SAND: 0.6%		
MODE 2:			SAND: 96.4%	MEDIUM SAND: 17.0%		
MODE 3:			MUD: 3.1%	FINE SAND: 68.8%		
D ₁₀ :	113.2	1.678		V FINE SAND: 9.8%		
MEDIAN or D ₅₀ :	170.1	2.555	V COARSE GRAVEL: 0.0%	V COARSE SILT: 0.1%		
D ₉₀ :	312.5	3.143	COARSE GRAVEL: 0.0%	COARSE SILT: 0.4%		
(D ₉₀ / D ₁₀):	2.761	1.873	MEDIUM GRAVEL: 0.0%	MEDIUM SILT: 0.3%		
(D ₉₀ - D ₁₀):	199.4	1.465	FINE GRAVEL: 0.1%	FINE SILT: 0.2%		
(D ₇₅ / D ₂₅):	1.655	1.342	V FINE GRAVEL: 0.4%	V FINE SILT: 0.0%		
(D ₇₅ - D ₂₅):	90.56	0.727	V COARSE SAND: 0.1%	CLAY: 2.1%		
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic	Geometric	Logarithmic	Geometric	Logarithmic	Description
	μm	μm	ϕ	μm	ϕ	
MEAN ($\bar{x}$):	212.3	163.0	2.617	179.6	2.477	Fine Sand
SORTING (σ):	297.0	2.400	1.263	1.478	0.563	Moderately Well Sorted
SKEWNESS (Sk):	16.11	-3.705	3.705	0.172	-0.172	Coarse Skewed
KURTOSIS (K):	329.5	23.30	23.30	1.119	1.119	Leptokurtic

GRAIN SIZE DISTRIBUTION



APPENDIX G PARTICLE SIZE ANALYSIS RESULTS

SAMPLE STATISTICS

SAMPLE IDENTITY: **EW2-2C**

ANALYST & DATE: ,

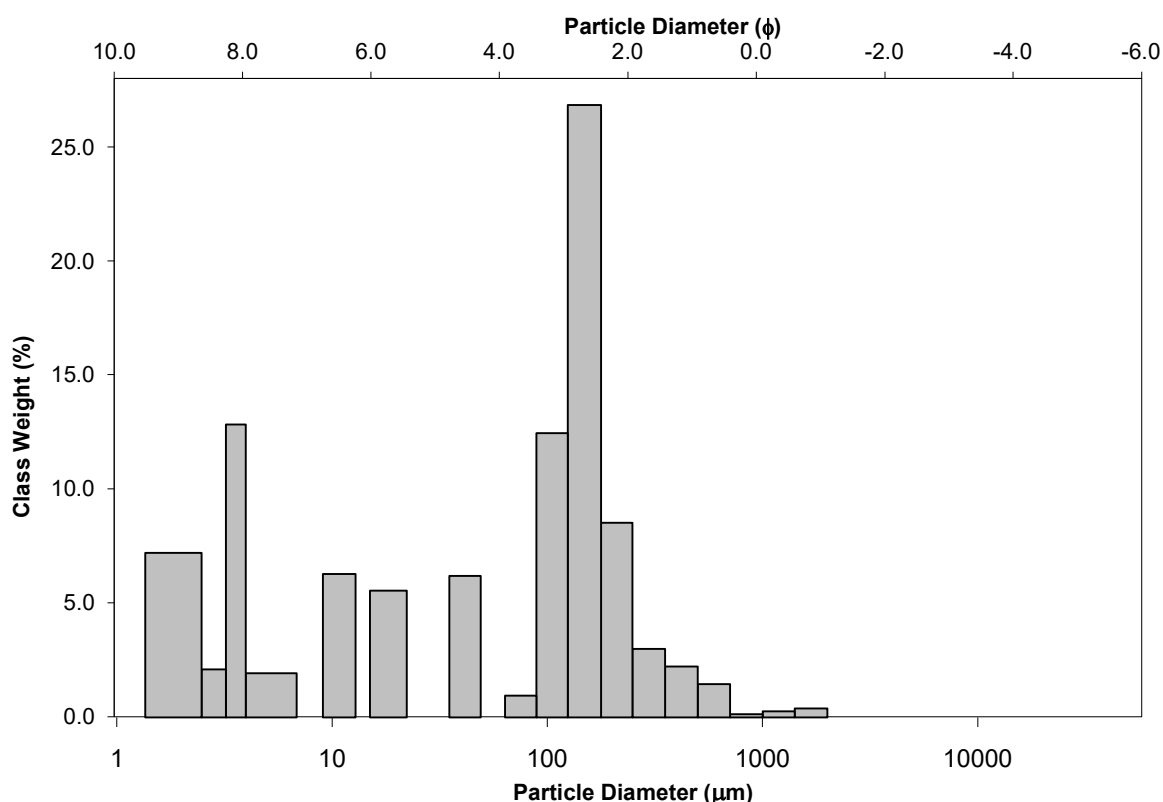
SAMPLE TYPE: Polymodal, Very Poorly Sorted

TEXTURAL GROUP: Sandy Mud

SEDIMENT NAME: Fine Sandy Mud

	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	3.590	8.130	GRAVEL: 0.0%	COARSE SAND: 1.2%		
MODE 2:	1.914	9.093	SAND: 42.9%	MEDIUM SAND: 4.0%		
MODE 3:	10.96	6.533	MUD: 57.1%	FINE SAND: 27.1%		
D ₁₀ :	2.509	2.338		V FINE SAND: 10.2%		
MEDIAN or D ₅₀ :	18.13	5.786	V COARSE GRAVEL: 0.0%	V COARSE SILT: 4.6%		
D ₉₀ :	197.8	8.638	COARSE GRAVEL: 0.0%	COARSE SILT: 4.3%		
(D ₉₀ / D ₁₀):	78.84	3.696	MEDIUM GRAVEL: 0.0%	MEDIUM SILT: 5.3%		
(D ₉₀ - D ₁₀):	195.3	6.301	FINE GRAVEL: 0.0%	FINE SILT: 2.8%		
(D ₇₅ / D ₂₅):	98.06	3.354	V FINE GRAVEL: 0.0%	V FINE SILT: 10.5%		
(D ₇₅ - D ₂₅):	141.1	6.616	V COARSE SAND: 0.5%	CLAY: 29.7%		
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic	Geometric	Logarithmic	Geometric	Logarithmic	Description
	μm	μm	ϕ	μm	ϕ	
MEAN ($\bar{x}$):	88.91	17.05	5.874	17.96	5.799	Coarse Silt
SORTING (σ):	149.9	8.928	3.158	6.012	2.588	Very Poorly Sorted
SKEWNESS (Sk):	5.367	-0.023	0.023	0.105	-0.105	Coarse Skewed
KURTOSIS (K):	49.38	1.349	1.349	0.401	0.401	Very Platykurtic

GRAIN SIZE DISTRIBUTION



APPENDIX G PARTICLE SIZE ANALYSIS RESULTS

SAMPLE STATISTICS

SAMPLE IDENTITY: **EW2-3A**

ANALYST & DATE: ,

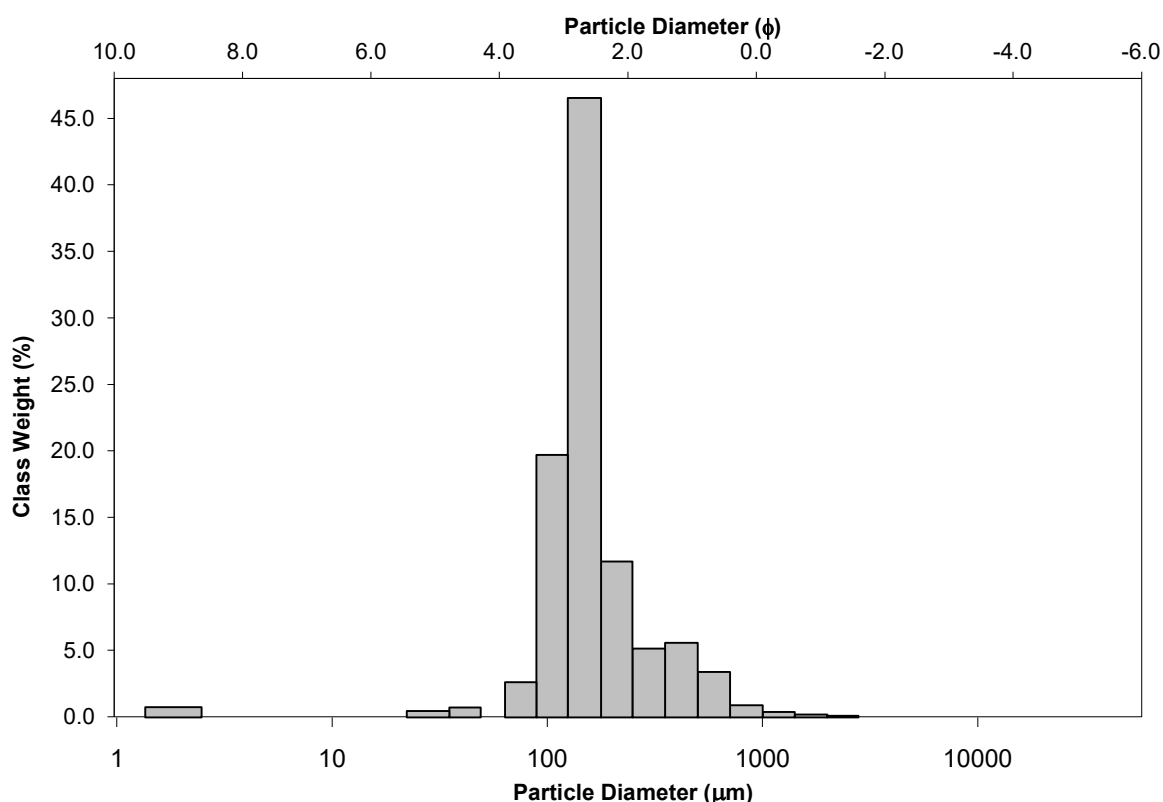
SAMPLE TYPE: Unimodal, Moderately Sorted

TEXTURAL GROUP: Slightly Gravelly Sand

SEDIMENT NAME: Slightly Very Fine Gravelly Fine Sand

	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	151.1	2.749	GRAVEL: 0.1%	COARSE SAND: 4.2%		
MODE 2:			SAND: 94.5%	MEDIUM SAND: 10.5%		
MODE 3:			MUD: 5.4%	FINE SAND: 57.4%		
D ₁₀ :	92.32	1.465		V FINE SAND: 21.8%		
MEDIAN or D ₅₀ :	148.8	2.749	V COARSE GRAVEL: 0.0%	V COARSE SILT: 0.9%		
D ₉₀ :	362.1	3.437	COARSE GRAVEL: 0.0%	COARSE SILT: 0.4%		
(D ₉₀ / D ₁₀):	3.922	2.346	MEDIUM GRAVEL: 0.0%	MEDIUM SILT: 0.0%		
(D ₉₀ - D ₁₀):	269.8	1.972	FINE GRAVEL: 0.0%	FINE SILT: 0.0%		
(D ₇₅ / D ₂₅):	1.543	1.259	V FINE GRAVEL: 0.1%	V FINE SILT: 0.5%		
(D ₇₅ - D ₂₅):	65.71	0.626	V COARSE SAND: 0.6%	CLAY: 3.6%		
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic	Geometric	Logarithmic	Geometric	Logarithmic	Description
	μm	μm	ϕ	μm	ϕ	
MEAN ($\bar{x}$):	193.8	136.5	2.873	155.4	2.686	Fine Sand
SORTING (σ):	176.1	2.980	1.575	1.817	0.862	Moderately Sorted
SKEWNESS (Sk):	4.900	-2.897	2.897	0.056	-0.056	Symmetrical
KURTOSIS (K):	42.61	13.87	13.87	2.369	2.369	Very Leptokurtic

GRAIN SIZE DISTRIBUTION



APPENDIX G PARTICLE SIZE ANALYSIS RESULTS

SAMPLE STATISTICS

SAMPLE IDENTITY: **EW2-3B**

ANALYST & DATE: ,

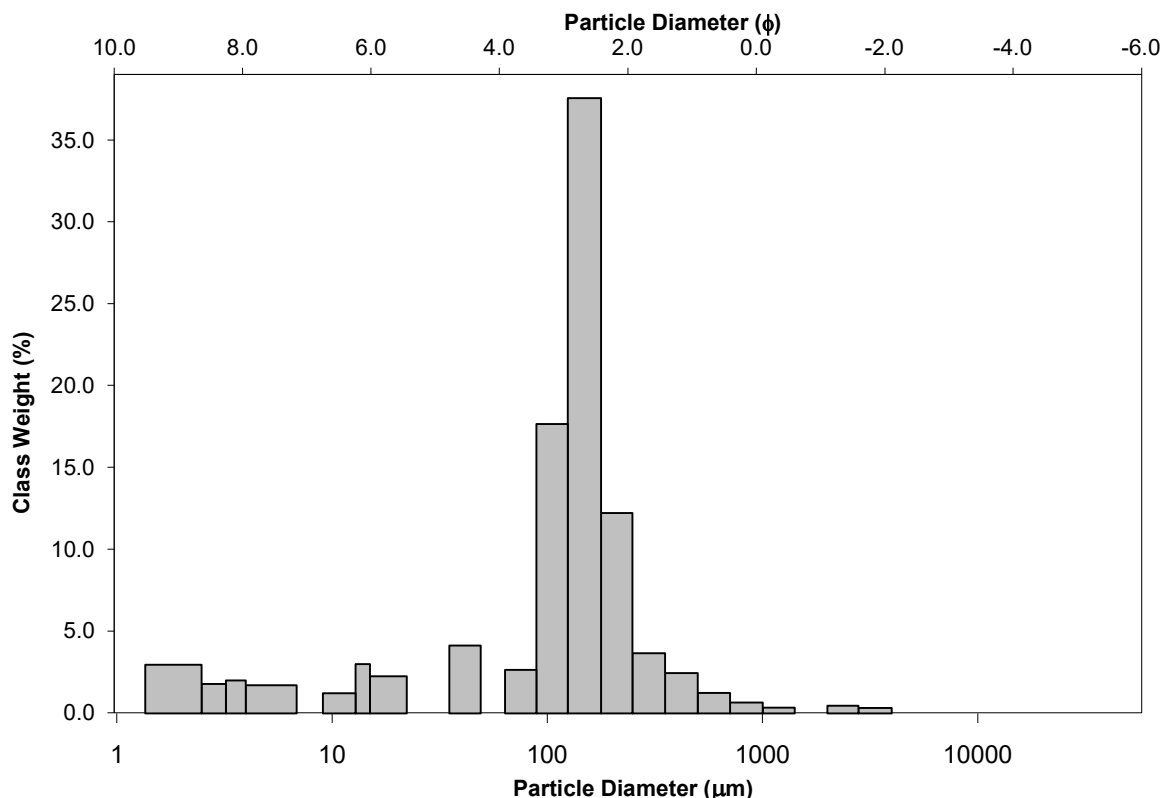
SAMPLE TYPE: Unimodal, Very Poorly Sorted

TEXTURAL GROUP: Slightly Gravelly Muddy Sand

SEDIMENT NAME: Slightly Very Fine Gravelly Muddy Fine Sand

	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	151.1	2.749	GRAVEL: 0.7%	COARSE SAND: 1.7%		
MODE 2:			SAND: 70.2%	MEDIUM SAND: 5.5%		
MODE 3:			MUD: 29.1%	FINE SAND: 44.7%		
D ₁₀ :	1.569	2.089		V FINE SAND: 18.0%		
MEDIAN or D ₅₀ :	128.8	2.957	V COARSE GRAVEL: 0.0%	V COARSE SILT: 3.6%		
D ₉₀ :	235.1	9.316	COARSE GRAVEL: 0.0%	COARSE SILT: 2.1%		
(D ₉₀ / D ₁₀):	149.8	4.460	MEDIUM GRAVEL: 0.0%	MEDIUM SILT: 2.5%		
(D ₉₀ - D ₁₀):	233.5	7.227	FINE GRAVEL: 0.0%	FINE SILT: 2.5%		
(D ₇₅ / D ₂₅):	8.161	2.172	V FINE GRAVEL: 0.7%	V FINE SILT: 4.0%		
(D ₇₅ - D ₂₅):	146.3	3.029	V COARSE SAND: 0.3%	CLAY: 14.4%		
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic	Geometric	Logarithmic	Geometric	Logarithmic	Description
	μm	μm	ϕ	μm	ϕ	
MEAN ($\bar{x}$):	149.9	53.59	4.222	39.21	4.673	Very Coarse Silt
SORTING (σ):	263.4	6.839	2.774	6.344	2.665	Very Poorly Sorted
SKEWNESS (Sk):	8.422	-1.046	1.046	-0.705	0.705	Very Fine Skewed
KURTOSIS (K):	91.19	2.760	2.760	0.966	0.966	Mesokurtic

GRAIN SIZE DISTRIBUTION



APPENDIX G PARTICLE SIZE ANALYSIS RESULTS

SAMPLE STATISTICS

SAMPLE IDENTITY: **EW2-3C**

ANALYST & DATE: ,

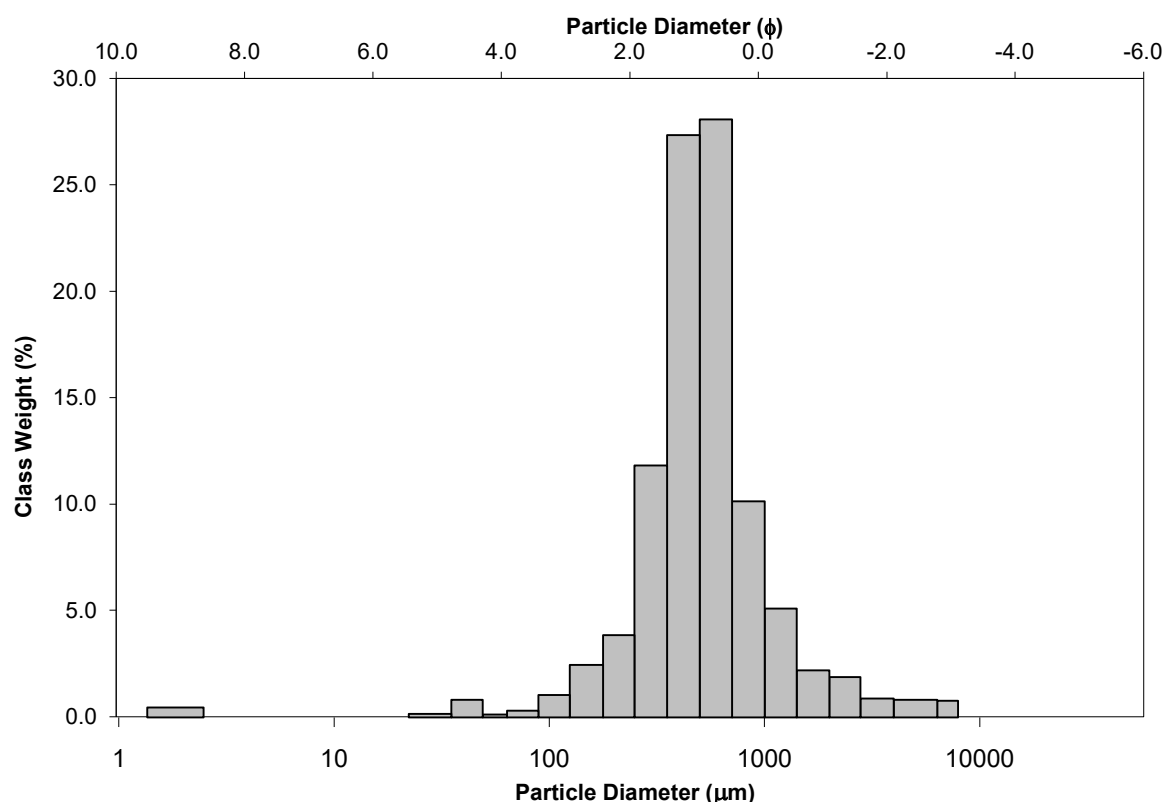
SAMPLE TYPE: Unimodal, Poorly Sorted

TEXTURAL GROUP: Slightly Gravelly Sand

SEDIMENT NAME: Slightly Very Fine Gravelly Medium Sand

	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	603.3	0.750	GRAVEL: 4.3%	COARSE SAND: 37.7%		
MODE 2:			SAND: 91.4%	MEDIUM SAND: 38.8%		
MODE 3:			MUD: 4.3%	FINE SAND: 6.3%		
D ₁₀ :	211.3	-0.149		V FINE SAND: 1.3%		
MEDIAN or D ₅₀ :	495.3	1.014	V COARSE GRAVEL: 0.0%	V COARSE SILT: 0.9%		
D ₉₀ :	1109.1	2.242	COARSE GRAVEL: 0.0%	COARSE SILT: 0.1%		
(D ₉₀ / D ₁₀):	5.248	-15.011	MEDIUM GRAVEL: 0.0%	MEDIUM SILT: 0.0%		
(D ₉₀ - D ₁₀):	897.8	2.392	FINE GRAVEL: 1.6%	FINE SILT: 0.0%		
(D ₇₅ / D ₂₅):	1.883	2.621	V FINE GRAVEL: 2.7%	V FINE SILT: 0.3%		
(D ₇₅ - D ₂₅):	317.3	0.913	V COARSE SAND: 7.2%	CLAY: 2.9%		
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic	Geometric	Logarithmic	Geometric	Logarithmic	Description
	μm	μm	ϕ	μm	ϕ	
MEAN ($\bar{x}$):	681.7	427.3	1.227	492.7	1.021	Medium Sand
SORTING (σ):	815.1	3.541	1.824	2.039	1.028	Poorly Sorted
SKEWNESS (Sk):	4.820	-2.927	2.927	-0.059	0.059	Symmetrical
KURTOSIS (K):	31.41	14.93	14.93	1.857	1.857	Very Leptokurtic

GRAIN SIZE DISTRIBUTION



APPENDIX G PARTICLE SIZE ANALYSIS RESULTS

SAMPLE STATISTICS

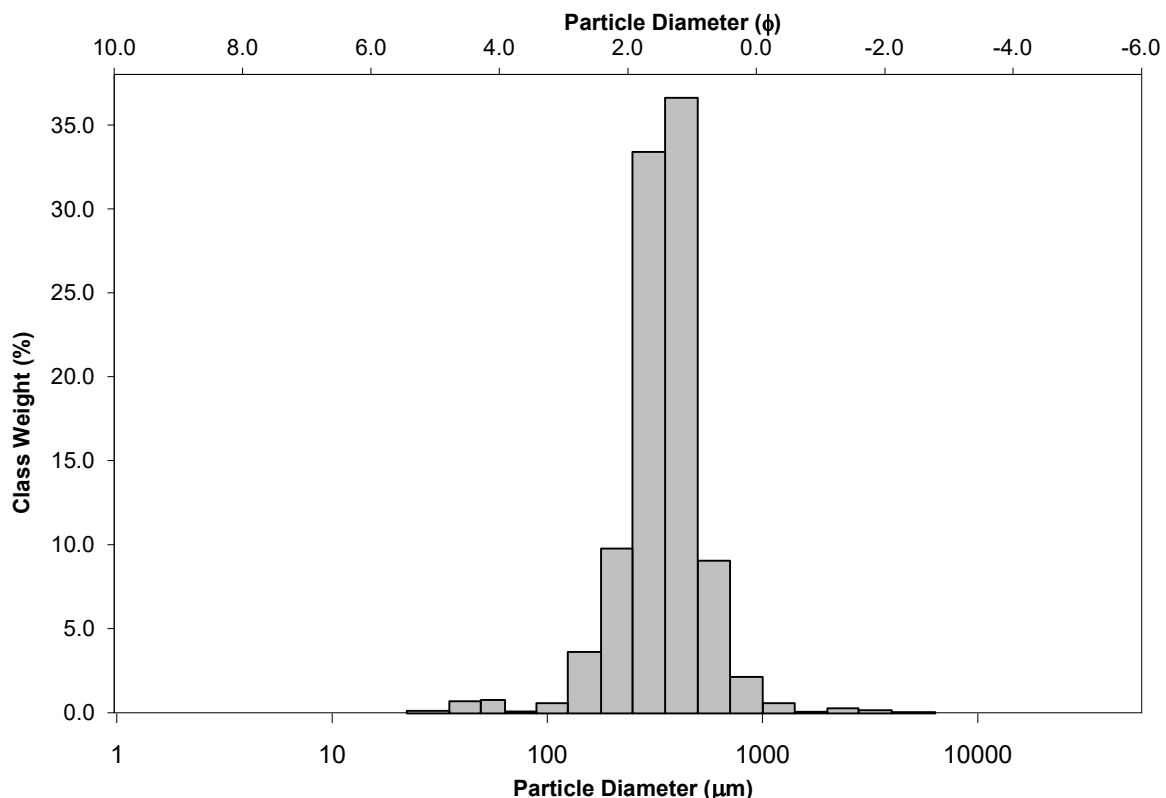
SAMPLE IDENTITY: **EW2-4**

ANALYST & DATE: ,

SAMPLE TYPE: Unimodal, Moderately Well Sorted TEXTURAL GROUP: Slightly Gravelly Sand
SEDIMENT NAME: Slightly Very Fine Gravelly Medium Sand

	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	426.7	1.250	GRAVEL: 0.6%	COARSE SAND: 11.4%		
MODE 2:			SAND: 97.3%	MEDIUM SAND: 70.7%		
MODE 3:			MUD: 2.1%	FINE SAND: 13.8%		
D ₁₀ :	200.3	0.857		V FINE SAND: 0.8%		
MEDIAN or D ₅₀ :	352.3	1.505	V COARSE GRAVEL: 0.0%	V COARSE SILT: 1.3%		
D ₉₀ :	552.1	2.320	COARSE GRAVEL: 0.0%	COARSE SILT: 0.1%		
(D ₉₀ / D ₁₀):	2.756	2.707	MEDIUM GRAVEL: 0.0%	MEDIUM SILT: 0.0%		
(D ₉₀ - D ₁₀):	351.8	1.463	FINE GRAVEL: 0.1%	FINE SILT: 0.0%		
(D ₇₅ / D ₂₅):	1.635	1.608	V FINE GRAVEL: 0.5%	V FINE SILT: 0.0%		
(D ₇₅ - D ₂₅):	173.0	0.709	V COARSE SAND: 0.7%	CLAY: 0.6%		
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic	Geometric	Logarithmic	Geometric	Logarithmic	Description
	μm	μm	ϕ	μm	ϕ	
MEAN ($\bar{x}$):	390.5	331.4	1.593	348.2	1.522	Medium Sand
SORTING (σ):	281.3	1.920	0.941	1.479	0.565	Moderately Well Sorted
SKEWNESS (Sk):	8.694	-4.079	4.079	-0.093	0.093	Symmetrical
KURTOSIS (K):	118.1	36.86	36.86	1.228	1.228	Leptokurtic

GRAIN SIZE DISTRIBUTION



APPENDIX G PARTICLE SIZE ANALYSIS RESULTS

SAMPLE STATISTICS

SAMPLE IDENTITY: **EW2-5A**

ANALYST & DATE: ,

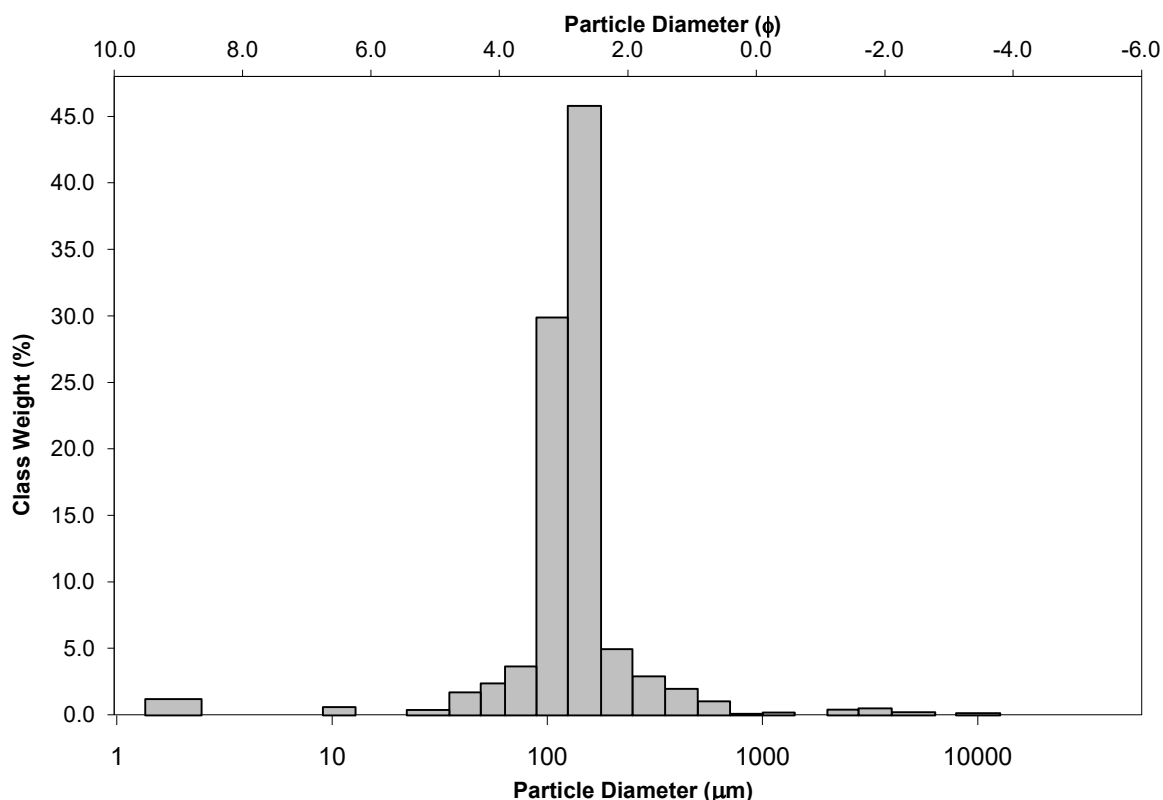
SAMPLE TYPE: Unimodal, Poorly Sorted

TEXTURAL GROUP: Slightly Gravelly Muddy Sand

SEDIMENT NAME: Slightly Very Fine Gravelly Muddy Fine Sand

	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	151.1	2.749	GRAVEL: 1.4%	COARSE SAND: 1.1%		
MODE 2:			SAND: 86.5%	MEDIUM SAND: 4.7%		
MODE 3:			MUD: 12.1%	FINE SAND: 48.9%		
D ₁₀ :	44.16	2.281		V FINE SAND: 31.6%		
MEDIAN or D ₅₀ :	131.4	2.928	V COARSE GRAVEL: 0.0%	V COARSE SILT: 3.3%		
D ₉₀ :	205.8	4.501	COARSE GRAVEL: 0.0%	COARSE SILT: 0.4%		
(D ₉₀ / D ₁₀):	4.660	1.974	MEDIUM GRAVEL: 0.2%	MEDIUM SILT: 0.6%		
(D ₉₀ - D ₁₀):	161.6	2.220	FINE GRAVEL: 0.3%	FINE SILT: 0.0%		
(D ₇₅ / D ₂₅):	1.608	1.260	V FINE GRAVEL: 0.9%	V FINE SILT: 0.8%		
(D ₇₅ - D ₂₅):	60.62	0.685	V COARSE SAND: 0.2%	CLAY: 7.0%		
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic	Geometric	Logarithmic	Geometric	Logarithmic	Description
	μm	μm	ϕ	μm	ϕ	
MEAN ($\bar{x}$):	200.0	96.80	3.369	126.4	2.983	Fine Sand
SORTING (σ):	602.1	4.029	2.010	2.657	1.410	Poorly Sorted
SKEWNESS (Sk):	12.12	-1.992	1.992	-0.413	0.413	Very Fine Skewed
KURTOSIS (K):	178.1	8.152	8.152	4.629	4.629	Extremely Leptokurtic

GRAIN SIZE DISTRIBUTION



APPENDIX G PARTICLE SIZE ANALYSIS RESULTS

SAMPLE STATISTICS

SAMPLE IDENTITY: **EW2-5B**

ANALYST & DATE: ,

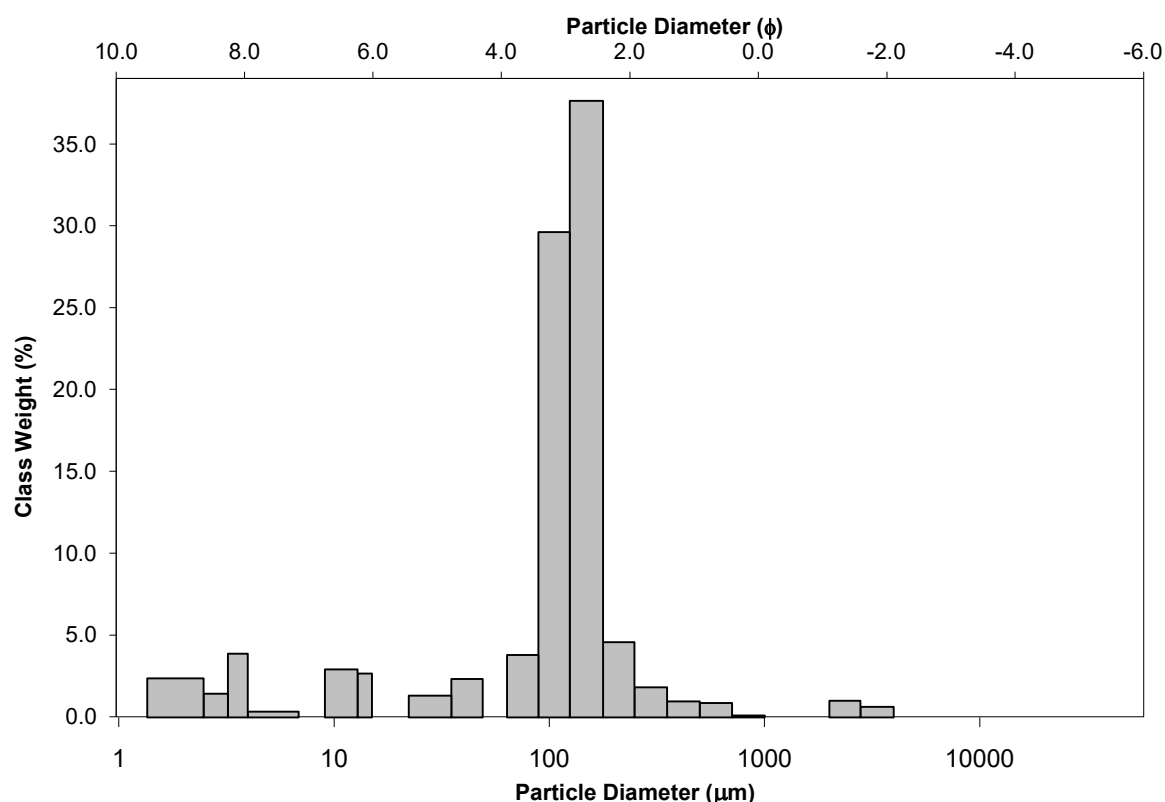
SAMPLE TYPE: Unimodal, Very Poorly Sorted

TEXTURAL GROUP: Slightly Gravelly Muddy Sand

SEDIMENT NAME: Slightly Very Fine Gravelly Muddy Fine Sand

	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	151.1	2.749	GRAVEL: 1.5%	COARSE SAND: 0.9%		
MODE 2:			SAND: 73.2%	MEDIUM SAND: 2.6%		
MODE 3:			MUD: 25.3%	FINE SAND: 39.4%		
D ₁₀ :	1.399	2.505		V FINE SAND: 30.3%		
MEDIAN or D ₅₀ :	116.5	3.101	V COARSE GRAVEL: 0.0%	V COARSE SILT: 2.5%		
D ₉₀ :	176.2	9.482	COARSE GRAVEL: 0.0%	COARSE SILT: 1.2%		
(D ₉₀ / D ₁₀):	126.0	3.786	MEDIUM GRAVEL: 0.0%	MEDIUM SILT: 3.8%		
(D ₉₀ - D ₁₀):	174.8	6.977	FINE GRAVEL: 0.0%	FINE SILT: 0.7%		
(D ₇₅ / D ₂₅):	3.243	1.624	V FINE GRAVEL: 1.5%	V FINE SILT: 4.5%		
(D ₇₅ - D ₂₅):	104.9	1.697	V COARSE SAND: 0.0%	CLAY: 12.6%		
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic	Geometric	Logarithmic	Geometric	Logarithmic	Description
	μm	μm	ϕ	μm	ϕ	
MEAN ($\bar{x}$):	152.2	55.82	4.163	40.76	4.617	Very Coarse Silt
SORTING (σ):	342.9	6.101	2.609	5.322	2.412	Very Poorly Sorted
SKEWNESS (Sk):	7.588	-1.153	1.153	-0.746	0.746	Very Fine Skewed
KURTOSIS (K):	64.28	3.324	3.324	1.626	1.626	Very Leptokurtic

GRAIN SIZE DISTRIBUTION



APPENDIX G PARTICLE SIZE ANALYSIS RESULTS

SAMPLE STATISTICS

SAMPLE IDENTITY: **EW2-5C**

ANALYST & DATE: ,

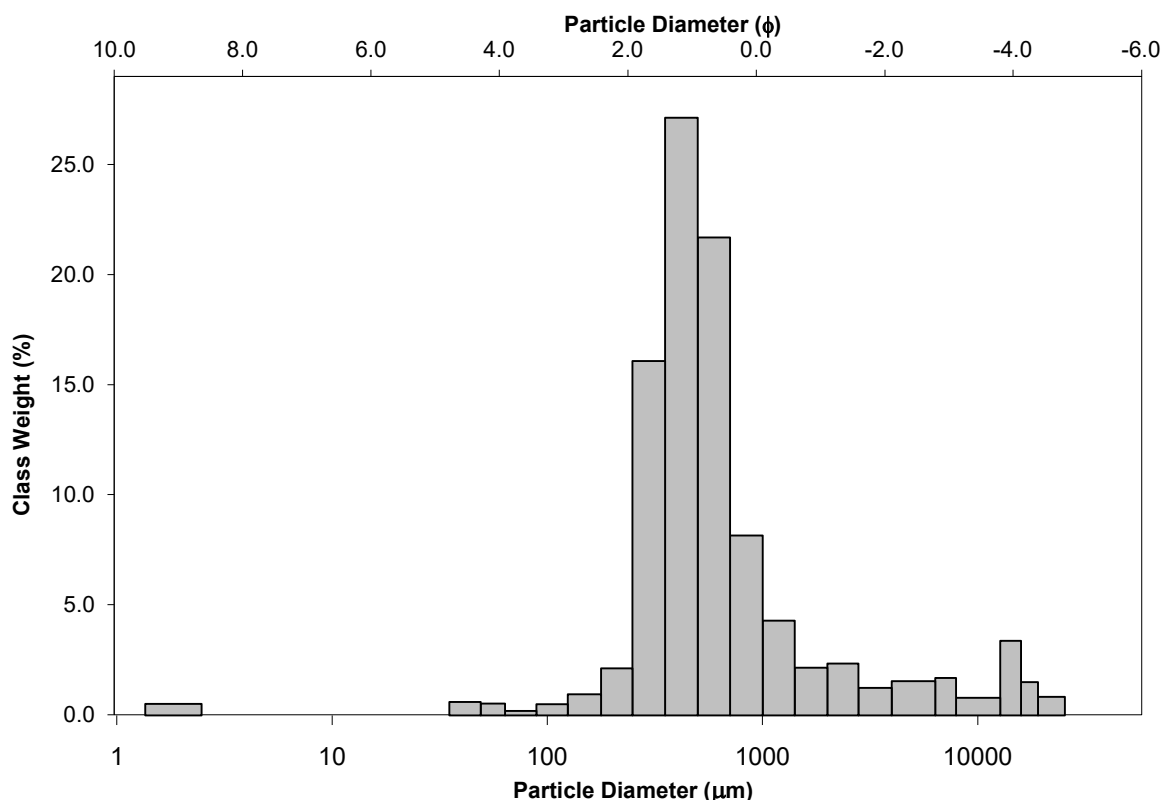
SAMPLE TYPE: Unimodal, Poorly Sorted

TEXTURAL GROUP: Gravelly Sand

SEDIMENT NAME: Very Fine Gravelly Medium Sand

	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	426.7	1.250	GRAVEL: 11.6%	COARSE SAND: 30.1%		
MODE 2:			SAND: 84.4%	MEDIUM SAND: 43.7%		
MODE 3:			MUD: 4.0%	FINE SAND: 3.3%		
D ₁₀ :	260.9	-1.335		V FINE SAND: 0.7%		
MEDIAN or D ₅₀ :	489.1	1.032	V COARSE GRAVEL: 0.0%	V COARSE SILT: 1.0%		
D ₉₀ :	2523.3	1.939	COARSE GRAVEL: 1.5%	COARSE SILT: 0.0%		
(D ₉₀ / D ₁₀):	9.673	-1.452	MEDIUM GRAVEL: 3.3%	MEDIUM SILT: 0.0%		
(D ₉₀ - D ₁₀):	2262.4	3.274	FINE GRAVEL: 3.2%	FINE SILT: 0.0%		
(D ₇₅ / D ₂₅):	2.100	3.566	V FINE GRAVEL: 3.6%	V FINE SILT: 0.4%		
(D ₇₅ - D ₂₅):	392.3	1.070	V COARSE SAND: 6.5%	CLAY: 2.6%		
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic	Geometric	Logarithmic	Geometric	Logarithmic	Description
	μm	μm	ϕ	μm	ϕ	
MEAN ($\bar{x}$):	1475.4	534.6	0.903	555.6	0.848	Coarse Sand
SORTING (σ):	3334.5	4.325	2.113	2.594	1.375	Poorly Sorted
SKEWNESS (Sk):	4.081	-1.393	1.393	0.323	-0.323	Very Coarse Skewed
KURTOSIS (K):	20.20	10.20	10.20	2.214	2.214	Very Leptokurtic

GRAIN SIZE DISTRIBUTION



APPENDIX G PARTICLE SIZE ANALYSIS RESULTS

SAMPLE STATISTICS

SAMPLE IDENTITY: **EW2-6A**

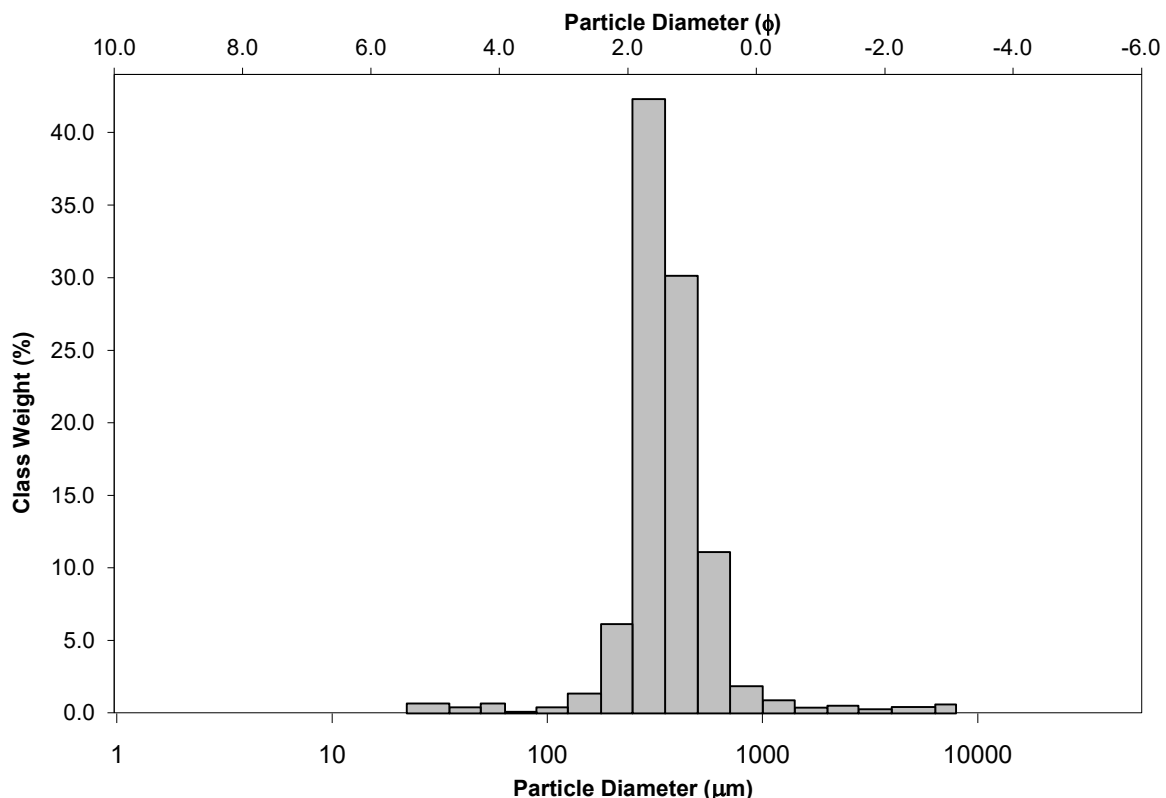
ANALYST & DATE: ,

SAMPLE TYPE: Unimodal, Moderately Well Sorted
SEDIMENT NAME: Slightly Fine Gravelly Medium Sand

TEXTURAL GROUP: Slightly Gravelly Sand

	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	301.0	1.754	GRAVEL: 1.8%	COARSE SAND: 13.1%		
MODE 2:			SAND: 95.6%	MEDIUM SAND: 72.8%		
MODE 3:			MUD: 2.6%	FINE SAND: 7.9%		
D ₁₀ :	242.0	0.726		V FINE SAND: 0.5%		
MEDIAN or D ₅₀ :	343.4	1.542	V COARSE GRAVEL: 0.0%	V COARSE SILT: 1.1%		
D ₉₀ :	604.6	2.047	COARSE GRAVEL: 0.0%	COARSE SILT: 0.7%		
(D ₉₀ / D ₁₀):	2.498	2.820	MEDIUM GRAVEL: 0.0%	MEDIUM SILT: 0.0%		
(D ₉₀ - D ₁₀):	362.6	1.321	FINE GRAVEL: 1.0%	FINE SILT: 0.0%		
(D ₇₅ / D ₂₅):	1.613	1.602	V FINE GRAVEL: 0.8%	V FINE SILT: 0.0%		
(D ₇₅ - D ₂₅):	171.8	0.690	V COARSE SAND: 1.3%	CLAY: 0.8%		
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic	Geometric	Logarithmic	Geometric	Logarithmic	Description
	μm	μm	ϕ	μm	ϕ	
MEAN ($\bar{x}$):	458.0	345.3	1.534	355.4	1.493	Medium Sand
SORTING (σ):	628.0	2.158	1.109	1.446	0.532	Moderately Well Sorted
SKEWNESS (Sk):	7.844	-2.993	2.993	0.112	-0.112	Coarse Skewed
KURTOSIS (K):	72.37	28.17	28.17	1.158	1.158	Leptokurtic

GRAIN SIZE DISTRIBUTION



APPENDIX G PARTICLE SIZE ANALYSIS RESULTS

SAMPLE STATISTICS

SAMPLE IDENTITY: **EW2-6B**

ANALYST & DATE: ,

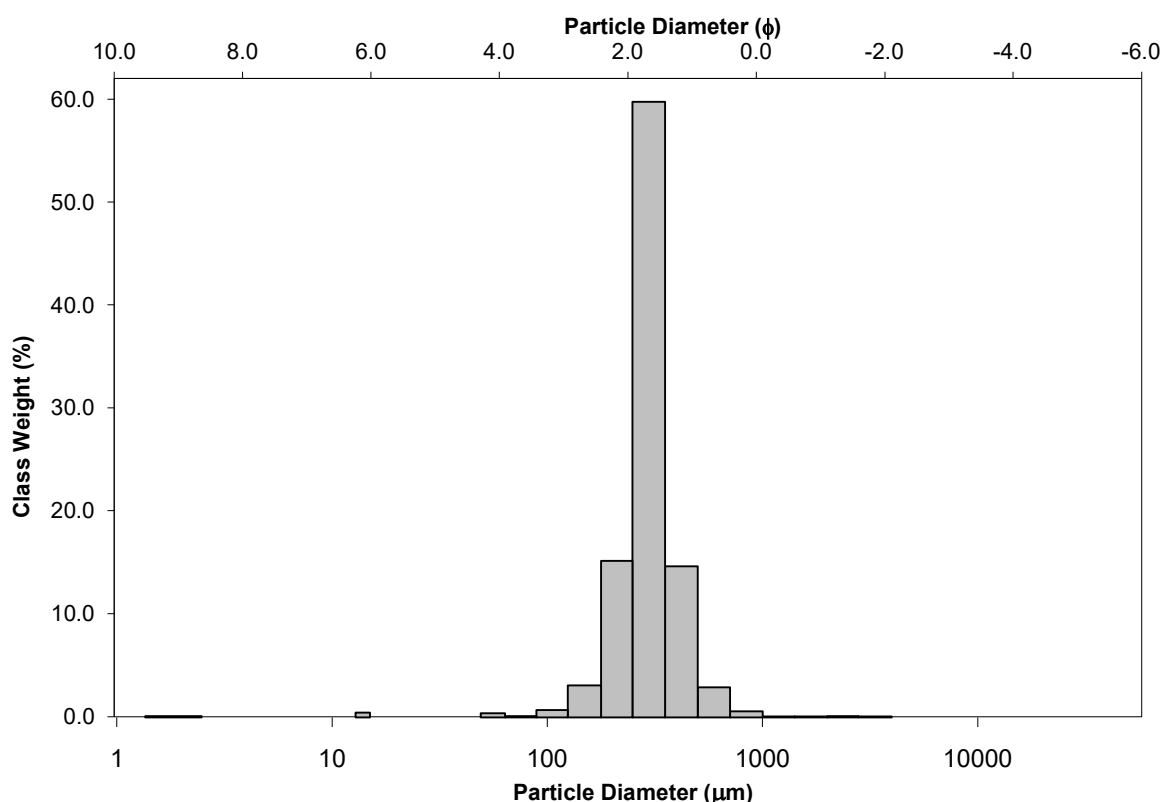
SAMPLE TYPE: Unimodal, Well Sorted

TEXTURAL GROUP: Slightly Gravelly Sand

SEDIMENT NAME: Slightly Very Fine Gravelly Medium Sand

	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	301.0	1.754	GRAVEL: 0.2%	COARSE SAND: 3.5%		
MODE 2:			SAND: 97.8%	MEDIUM SAND: 74.5%		
MODE 3:			MUD: 2.0%	FINE SAND: 18.7%		
D ₁₀ :	194.7	1.206		V FINE SAND: 0.9%		
MEDIAN or D ₅₀ :	294.7	1.763	V COARSE GRAVEL: 0.0%	V COARSE SILT: 0.3%		
D ₉₀ :	433.4	2.360	COARSE GRAVEL: 0.0%	COARSE SILT: 0.0%		
(D ₉₀ / D ₁₀):	2.226	1.957	MEDIUM GRAVEL: 0.0%	MEDIUM SILT: 0.2%		
(D ₉₀ - D ₁₀):	238.7	1.154	FINE GRAVEL: 0.0%	FINE SILT: 0.0%		
(D ₇₅ / D ₂₅):	1.335	1.268	V FINE GRAVEL: 0.2%	V FINE SILT: 0.1%		
(D ₇₅ - D ₂₅):	85.41	0.417	V COARSE SAND: 0.2%	CLAY: 1.4%		
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic	Geometric	Logarithmic	Geometric	Logarithmic	Description
	μm	μm	ϕ	μm	ϕ	
MEAN ($\bar{x}$):	314.0	271.2	1.883	291.4	1.779	Medium Sand
SORTING (σ):	165.0	2.124	1.087	1.350	0.433	Well Sorted
SKEWNESS (Sk):	9.450	-5.569	5.569	-0.082	0.082	Symmetrical
KURTOSIS (K):	153.3	40.75	40.75	1.589	1.589	Very Leptokurtic

GRAIN SIZE DISTRIBUTION



APPENDIX G PARTICLE SIZE ANALYSIS RESULTS

SAMPLE STATISTICS

SAMPLE IDENTITY: **EW2-6C**

ANALYST & DATE: ,

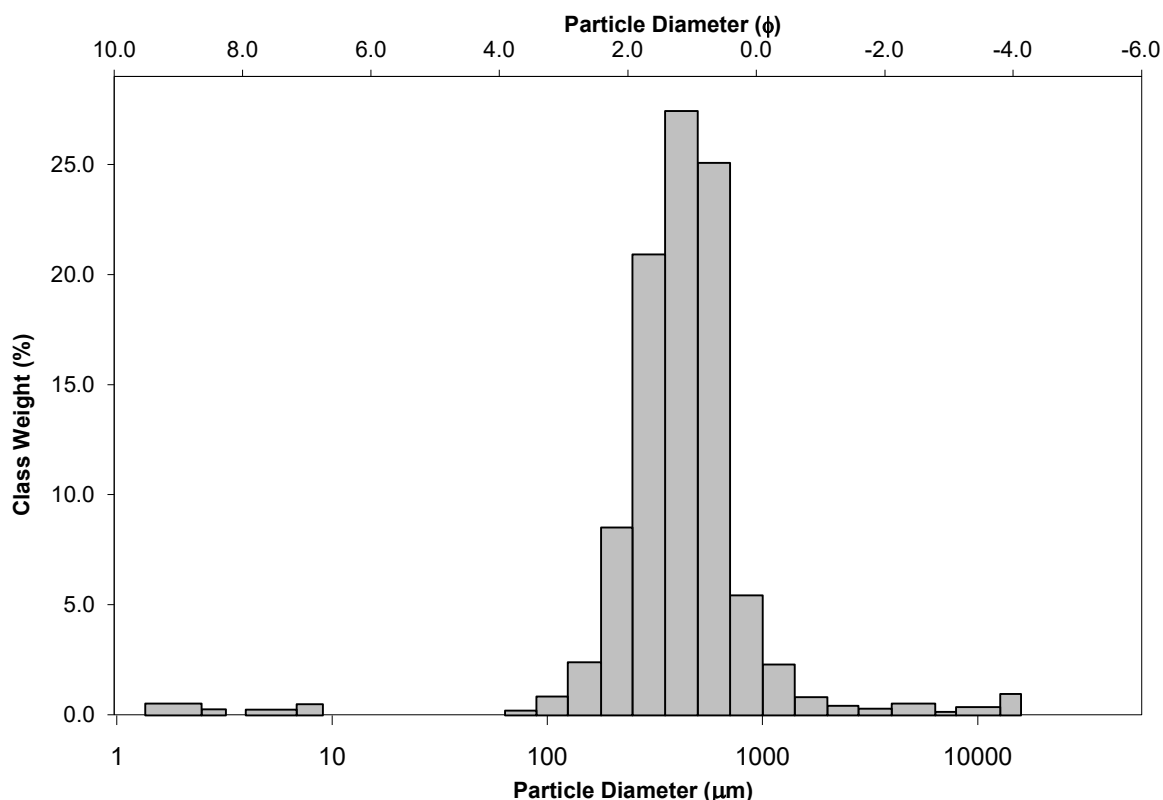
SAMPLE TYPE: Unimodal, Poorly Sorted

TEXTURAL GROUP: Slightly Gravelly Sand

SEDIMENT NAME: Slightly Medium Gravelly Medium Sand

	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	426.7	1.250	GRAVEL: 2.6%	COARSE SAND: 29.4%		
MODE 2:			SAND: 90.9%	MEDIUM SAND: 46.8%		
MODE 3:			MUD: 6.5%	FINE SAND: 10.6%		
D ₁₀ :	178.5	0.417		V FINE SAND: 1.0%		
MEDIAN or D ₅₀ :	411.4	1.282	V COARSE GRAVEL: 0.0%	V COARSE SILT: 0.0%		
D ₉₀ :	749.2	2.486	COARSE GRAVEL: 0.0%	COARSE SILT: 0.0%		
(D ₉₀ / D ₁₀):	4.196	5.967	MEDIUM GRAVEL: 1.1%	MEDIUM SILT: 0.2%		
(D ₉₀ - D ₁₀):	570.6	2.069	FINE GRAVEL: 0.8%	FINE SILT: 0.6%		
(D ₇₅ / D ₂₅):	2.053	2.309	V FINE GRAVEL: 0.7%	V FINE SILT: 0.6%		
(D ₇₅ - D ₂₅):	296.1	1.038	V COARSE SAND: 3.0%	CLAY: 5.1%		
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic	Geometric	Logarithmic	Geometric	Logarithmic	Description
	μm	μm	ϕ	μm	ϕ	
MEAN ($\bar{x}$):	628.3	309.7	1.691	395.9	1.337	Medium Sand
SORTING (σ):	1382.3	4.661	2.221	3.444	1.784	Poorly Sorted
SKEWNESS (Sk):	7.889	-2.457	2.457	-0.402	0.402	Very Fine Skewed
KURTOSIS (K):	70.65	10.17	10.17	3.663	3.663	Extremely Leptokurtic

GRAIN SIZE DISTRIBUTION



APPENDIX G PARTICLE SIZE ANALYSIS RESULTS

SAMPLE STATISTICS

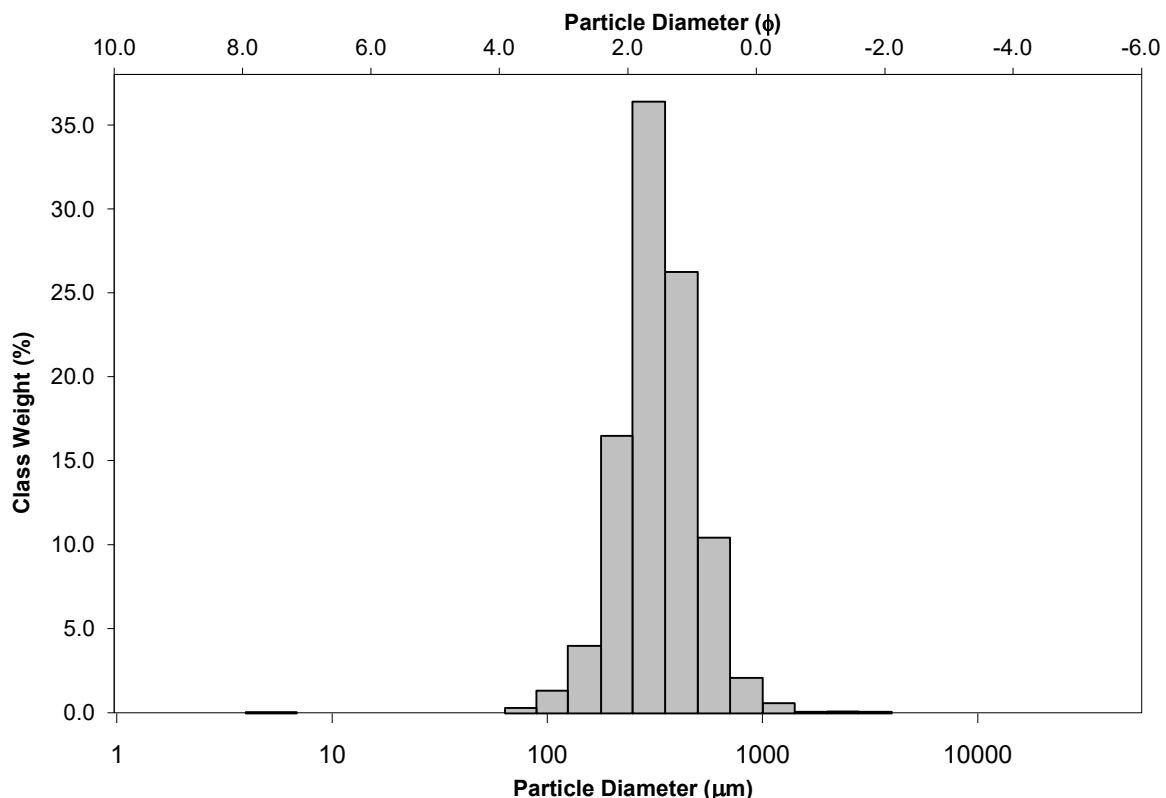
SAMPLE IDENTITY: **EW2-7A**

ANALYST & DATE: ,

SAMPLE TYPE: Unimodal, Moderately Well Sorted TEXTURAL GROUP: Slightly Gravelly Sand
SEDIMENT NAME: Slightly Very Fine Gravelly Medium Sand

	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	301.0	1.754	GRAVEL: 0.2%	COARSE SAND: 12.5%		
MODE 2:			SAND: 97.3%	MEDIUM SAND: 62.1%		
MODE 3:			MUD: 2.5%	FINE SAND: 20.4%		
D ₁₀ :	184.7	0.840		V FINE SAND: 1.6%		
MEDIAN or D ₅₀ :	319.2	1.647	V COARSE GRAVEL: 0.0%	V COARSE SILT: 0.0%		
D ₉₀ :	558.8	2.437	COARSE GRAVEL: 0.0%	COARSE SILT: 0.0%		
(D ₉₀ / D ₁₀):	3.025	2.902	MEDIUM GRAVEL: 0.0%	MEDIUM SILT: 0.0%		
(D ₉₀ - D ₁₀):	374.1	1.597	FINE GRAVEL: 0.0%	FINE SILT: 0.1%		
(D ₇₅ / D ₂₅):	1.706	1.629	V FINE GRAVEL: 0.2%	V FINE SILT: 0.0%		
(D ₇₅ - D ₂₅):	177.1	0.770	V COARSE SAND: 0.7%	CLAY: 2.4%		
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic	Geometric	Logarithmic	Geometric	Logarithmic	Description
	μm	μm	ϕ	μm	ϕ	
MEAN ($\bar{x}$):	357.9	285.4	1.809	318.5	1.651	Medium Sand
SORTING (σ):	206.3	2.639	1.400	1.567	0.648	Moderately Well Sorted
SKEWNESS (Sk):	5.046	-4.369	4.369	-0.047	0.047	Symmetrical
KURTOSIS (K):	61.01	25.51	25.51	1.221	1.221	Leptokurtic

GRAIN SIZE DISTRIBUTION



APPENDIX G PARTICLE SIZE ANALYSIS RESULTS

SAMPLE STATISTICS

SAMPLE IDENTITY: **EW2-7B**

ANALYST & DATE: ,

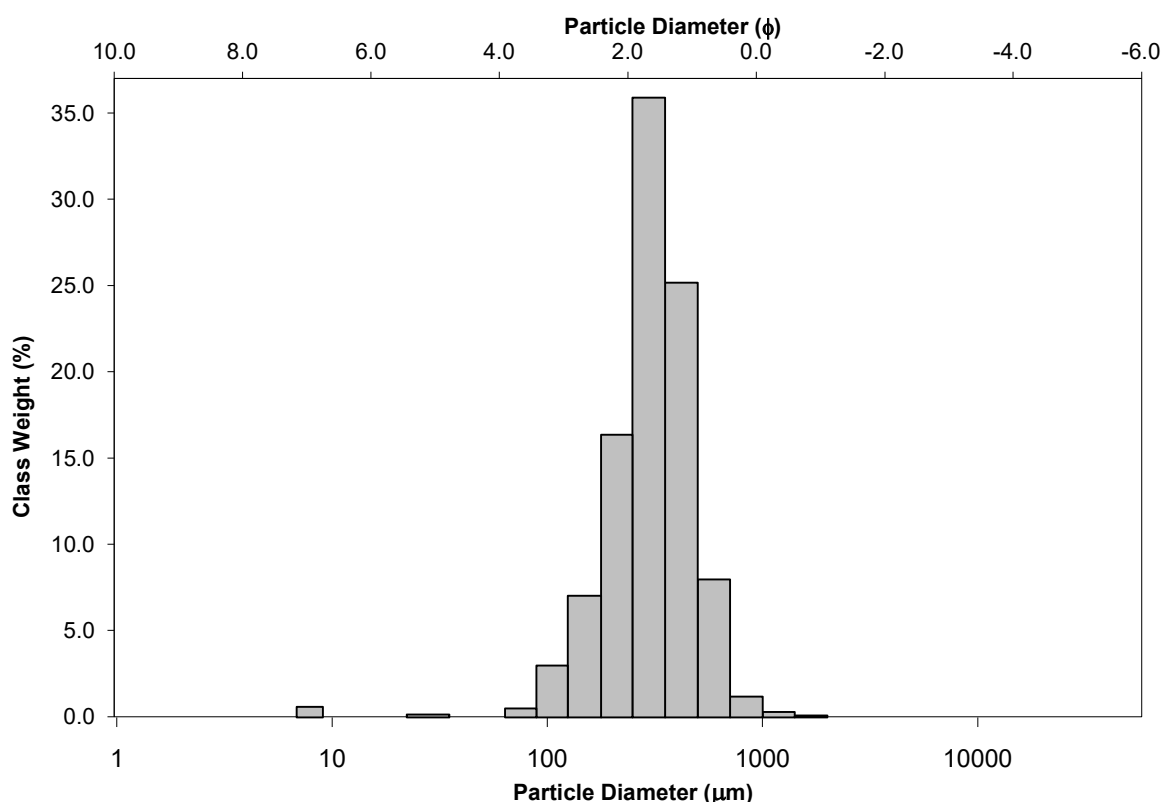
SAMPLE TYPE: Unimodal, Moderately Sorted

TEXTURAL GROUP: Sand

SEDIMENT NAME: Moderately Sorted Medium Sand

	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	301.0	1.754	GRAVEL: 0.0%		COARSE SAND: 9.2%	
MODE 2:			SAND: 97.1%		MEDIUM SAND: 60.7%	
MODE 3:			MUD: 2.9%		FINE SAND: 23.4%	
D ₁₀ :	149.5	1.009			V FINE SAND: 3.5%	
MEDIAN or D ₅₀ :	304.3	1.716	V COARSE GRAVEL: 0.0%		V COARSE SILT: 0.1%	
D ₉₀ :	496.9	2.742	COARSE GRAVEL: 0.0%		COARSE SILT: 0.1%	
(D ₉₀ / D ₁₀):	3.324	2.718	MEDIUM GRAVEL: 0.0%		MEDIUM SILT: 0.3%	
(D ₉₀ - D ₁₀):	347.4	1.733	FINE GRAVEL: 0.0%		FINE SILT: 0.2%	
(D ₇₅ / D ₂₅):	1.778	1.634	V FINE GRAVEL: 0.0%		V FINE SILT: 0.0%	
(D ₇₅ - D ₂₅):	176.6	0.830	V COARSE SAND: 0.4%		CLAY: 2.2%	
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic	Geometric	Logarithmic	Geometric	Logarithmic	Description
	μm	μm	ϕ	μm	ϕ	
MEAN ($\bar{x}$):	327.3	261.8	1.934	296.6	1.753	Medium Sand
SORTING (σ):	159.1	2.614	1.387	1.626	0.702	Moderately Sorted
SKEWNESS (Sk):	1.561	-4.161	4.161	-0.144	0.144	Fine Skewed
KURTOSIS (K):	11.35	23.47	23.47	1.238	1.238	Leptokurtic

GRAIN SIZE DISTRIBUTION



APPENDIX G PARTICLE SIZE ANALYSIS RESULTS

SAMPLE STATISTICS

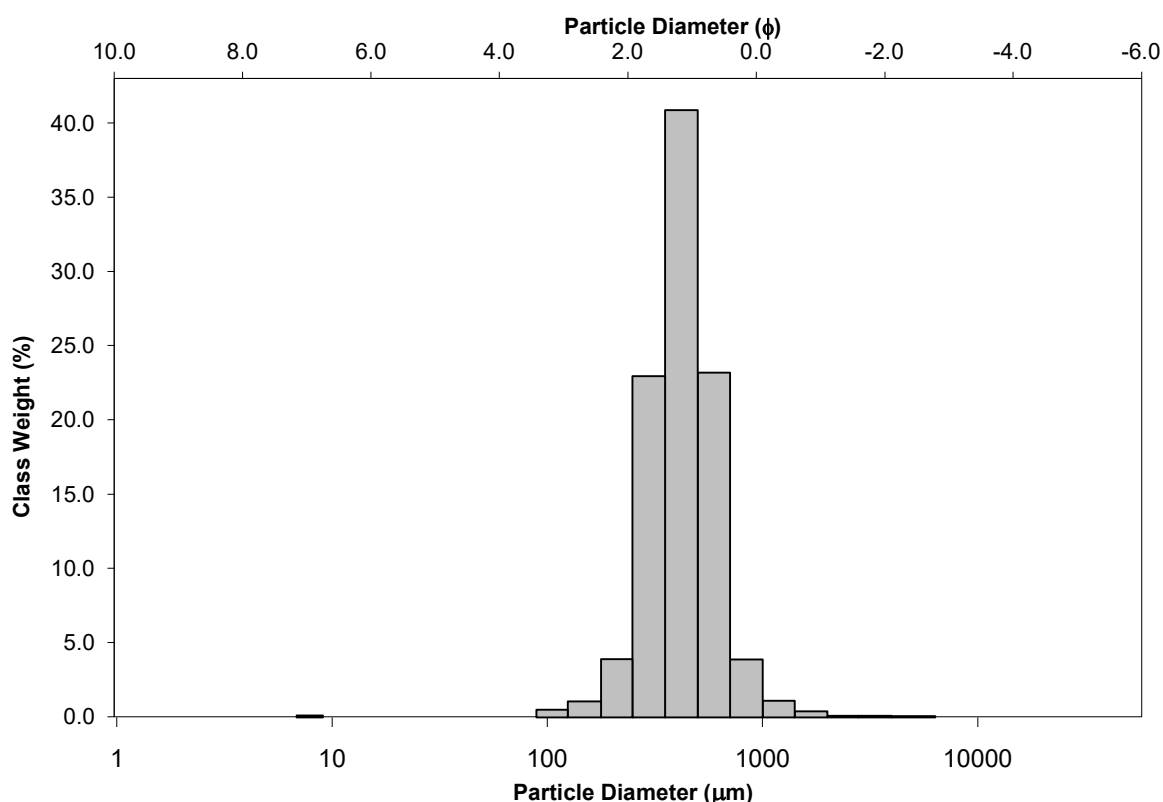
SAMPLE IDENTITY: **EW2-7C**

ANALYST & DATE: ,

SAMPLE TYPE: Unimodal, Moderately Well Sorted TEXTURAL GROUP: Slightly Gravelly Sand
SEDIMENT NAME: Slightly Very Fine Gravelly Medium Sand

	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	426.7	1.250	GRAVEL: 0.3%	COARSE SAND: 27.0%		
MODE 2:			SAND: 97.9%	MEDIUM SAND: 63.7%		
MODE 3:			MUD: 1.8%	FINE SAND: 5.2%		
D ₁₀ :	259.7	0.595		V FINE SAND: 0.5%		
MEDIAN or D ₅₀ :	417.5	1.260	V COARSE GRAVEL: 0.0%	V COARSE SILT: 0.0%		
D ₉₀ :	662.1	1.945	COARSE GRAVEL: 0.0%	COARSE SILT: 0.0%		
(D ₉₀ / D ₁₀):	2.550	3.270	MEDIUM GRAVEL: 0.0%	MEDIUM SILT: 0.1%		
(D ₉₀ - D ₁₀):	402.4	1.350	FINE GRAVEL: 0.1%	FINE SILT: 0.0%		
(D ₇₅ / D ₂₅):	1.623	1.760	V FINE GRAVEL: 0.2%	V FINE SILT: 0.0%		
(D ₇₅ - D ₂₅):	203.0	0.699	V COARSE SAND: 1.5%	CLAY: 1.7%		
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic	Geometric	Logarithmic	Geometric	Logarithmic	Description
	μm	μm	ϕ	μm	ϕ	
MEAN ($\bar{x}$):	457.9	380.5	1.394	415.7	1.266	Medium Sand
SORTING (σ):	267.6	2.370	1.245	1.471	0.557	Moderately Well Sorted
SKEWNESS (Sk):	7.763	-5.140	5.140	-0.056	0.056	Symmetrical
KURTOSIS (K):	116.2	35.40	35.40	1.100	1.100	Mesokurtic

GRAIN SIZE DISTRIBUTION



APPENDIX G PARTICLE SIZE ANALYSIS RESULTS

SAMPLE STATISTICS

SAMPLE IDENTITY: **EW2-8A**

ANALYST & DATE: ,

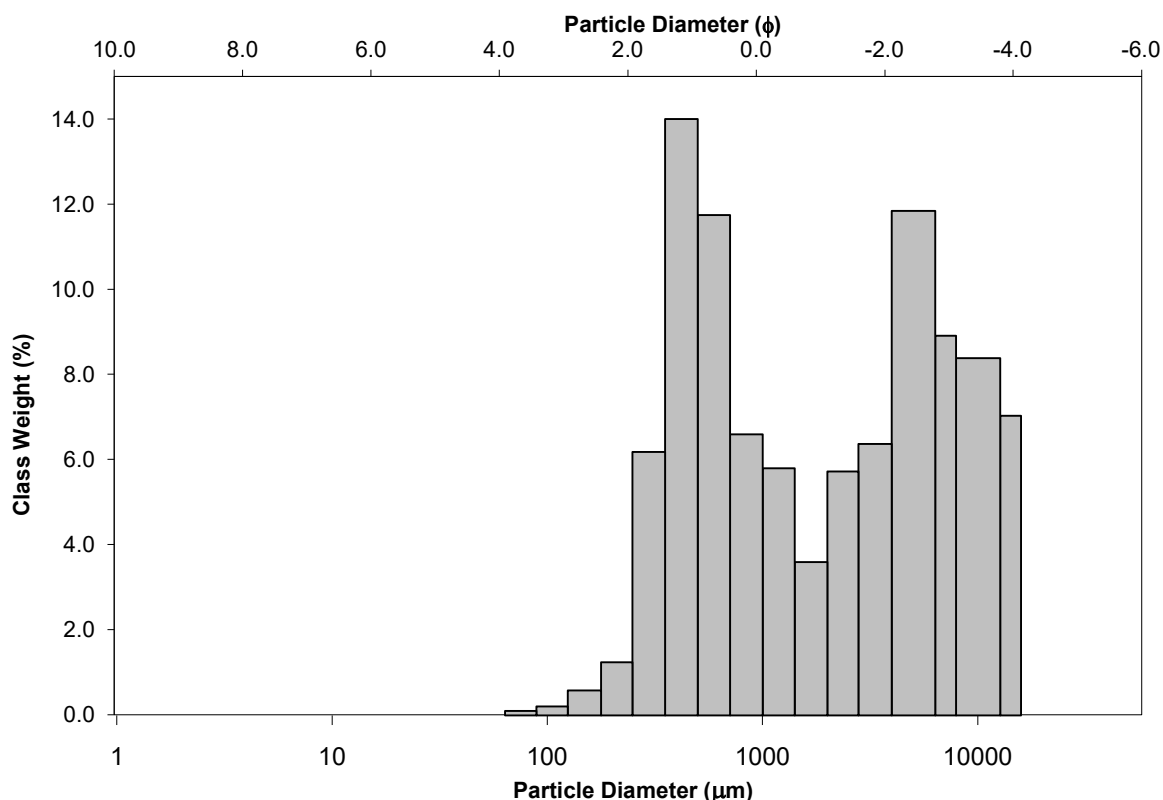
SAMPLE TYPE: Bimodal, Poorly Sorted

TEXTURAL GROUP: Sandy Gravel

SEDIMENT NAME: Sandy Fine Gravel

	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	426.7	1.250	GRAVEL: 49.3%	COARSE SAND: 18.2%		
MODE 2:	5168.9	-2.331	SAND: 49.8%	MEDIUM SAND: 20.1%		
MODE 3:			MUD: 0.9%	FINE SAND: 1.9%		
D ₁₀ :	360.2	-3.337		V FINE SAND: 0.3%		
MEDIAN or D ₅₀ :	1867.7	-0.901	V COARSE GRAVEL: 0.0%	V COARSE SILT: 0.0%		
D ₉₀ :	10103.1	1.473	COARSE GRAVEL: 0.0%	COARSE SILT: 0.0%		
(D ₉₀ / D ₁₀):	28.05	-0.442	MEDIUM GRAVEL: 15.6%	MEDIUM SILT: 0.0%		
(D ₉₀ - D ₁₀):	9742.9	4.810	FINE GRAVEL: 21.6%	FINE SILT: 0.0%		
(D ₇₅ / D ₂₅):	10.85	-0.366	V FINE GRAVEL: 12.1%	V FINE SILT: 0.0%		
(D ₇₅ - D ₂₅):	5200.3	3.440	V COARSE SAND: 9.3%	CLAY: 0.9%		
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic	Geometric	Logarithmic	Geometric	Logarithmic	Description
	μm	μm	ϕ	μm	ϕ	
MEAN ($\bar{x}$):	3723.6	1706.6	-0.771	1832.3	-0.874	Very Coarse Sand
SORTING (σ):	3981.9	4.289	2.101	3.704	1.889	Poorly Sorted
SKEWNESS (Sk):	1.155	-1.040	1.040	-0.011	0.011	Symmetrical
KURTOSIS (K):	3.307	6.675	6.675	0.653	0.653	Very Platykurtic

GRAIN SIZE DISTRIBUTION



APPENDIX G PARTICLE SIZE ANALYSIS RESULTS

SAMPLE STATISTICS

SAMPLE IDENTITY: **EW2-8B**

ANALYST & DATE: ,

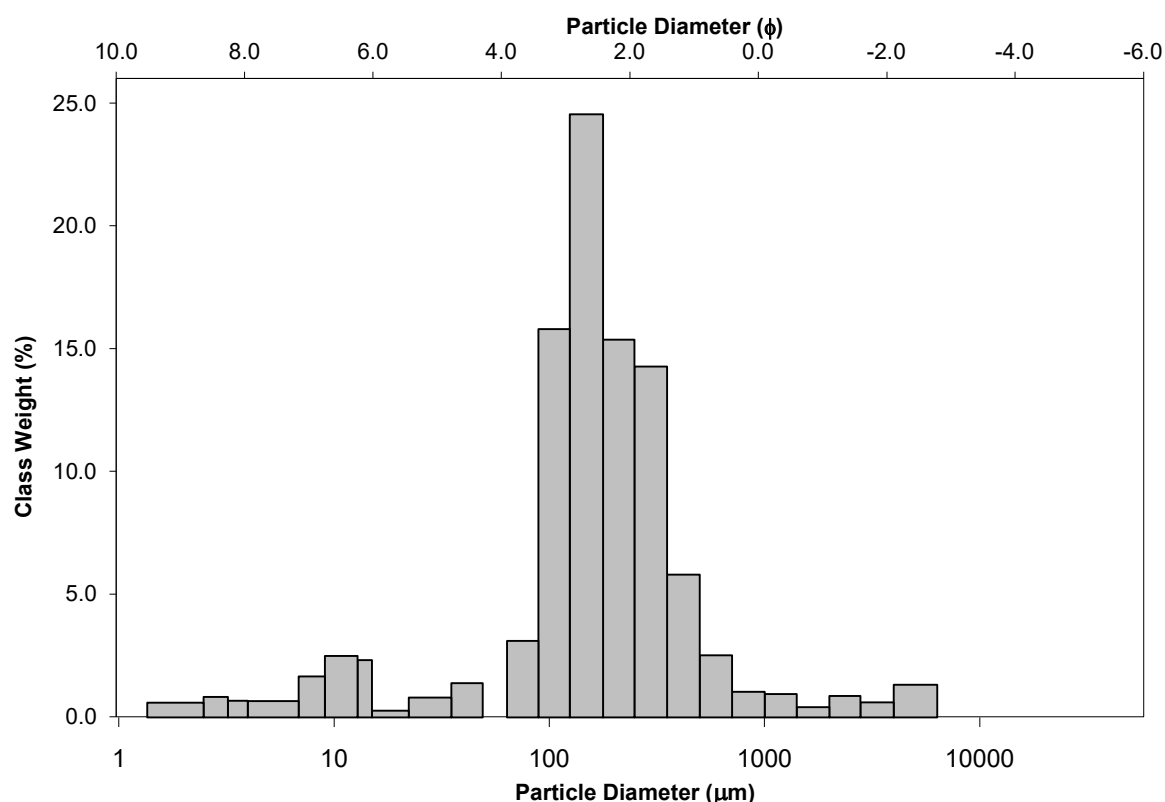
SAMPLE TYPE: Unimodal, Very Poorly Sorted

TEXTURAL GROUP: Slightly Gravelly Muddy Sand

SEDIMENT NAME: Slightly Fine Gravelly Muddy Fine Sand

	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	151.1	2.749	GRAVEL: 3.1%	COARSE SAND: 3.4%		
MODE 2:			SAND: 80.2%	MEDIUM SAND: 19.2%		
MODE 3:			MUD: 16.7%	FINE SAND: 38.4%		
D ₁₀ :	7.792	1.197		V FINE SAND: 17.9%		
MEDIAN or D ₅₀ :	156.9	2.672	V COARSE GRAVEL: 0.0%	V COARSE SILT: 1.6%		
D ₉₀ :	436.3	7.004	COARSE GRAVEL: 0.0%	COARSE SILT: 1.0%		
(D ₉₀ / D ₁₀):	55.99	5.853	MEDIUM GRAVEL: 0.0%	MEDIUM SILT: 4.1%		
(D ₉₀ - D ₁₀):	428.5	5.807	FINE GRAVEL: 1.7%	FINE SILT: 1.6%		
(D ₇₅ / D ₂₅):	2.616	1.720	V FINE GRAVEL: 1.4%	V FINE SILT: 1.4%		
(D ₇₅ - D ₂₅):	162.6	1.387	V COARSE SAND: 1.3%	CLAY: 7.0%		
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic	Geometric	Logarithmic	Geometric	Logarithmic	Description
	μm	μm	ϕ	μm	ϕ	
MEAN ($\bar{x}$):	320.0	112.4	3.153	128.5	2.960	Fine Sand
SORTING (σ):	737.6	5.537	2.469	4.289	2.101	Very Poorly Sorted
SKEWNESS (Sk):	5.468	-1.244	1.244	-0.376	0.376	Very Fine Skewed
KURTOSIS (K):	34.14	4.835	4.835	2.626	2.626	Very Leptokurtic

GRAIN SIZE DISTRIBUTION



APPENDIX G PARTICLE SIZE ANALYSIS RESULTS

SAMPLE STATISTICS

SAMPLE IDENTITY: **EW2-8C**

ANALYST & DATE: ,

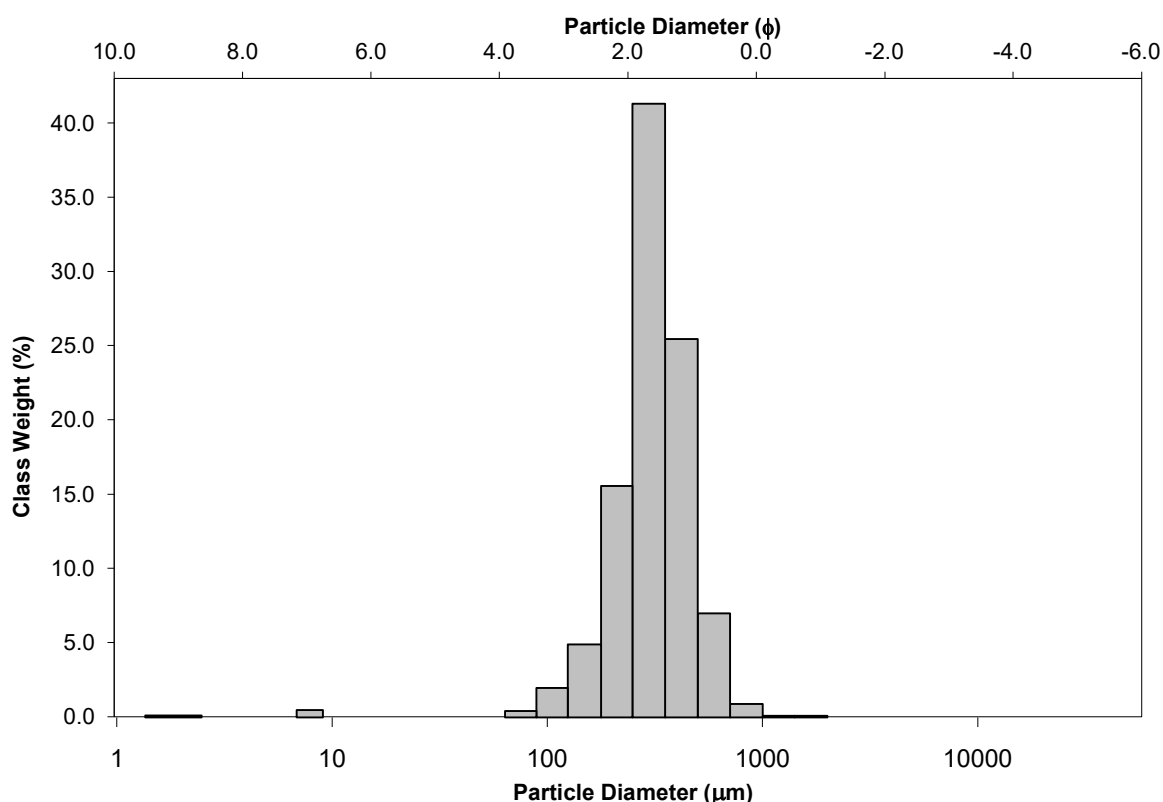
SAMPLE TYPE: Unimodal, Moderately Well Sorted

TEXTURAL GROUP: Sand

SEDIMENT NAME: Moderately Well Sorted Medium Sand

	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	301.0	1.754	GRAVEL: 0.0%	COARSE SAND: 7.9%		
MODE 2:			SAND: 97.0%	MEDIUM SAND: 66.1%		
MODE 3:			MUD: 3.0%	FINE SAND: 20.5%		
D ₁₀ :	174.0	1.039		V FINE SAND: 2.4%		
MEDIAN or D ₅₀ :	306.8	1.705	V COARSE GRAVEL: 0.0%	V COARSE SILT: 0.0%		
D ₉₀ :	486.8	2.523	COARSE GRAVEL: 0.0%	COARSE SILT: 0.0%		
(D ₉₀ / D ₁₀):	2.797	2.429	MEDIUM GRAVEL: 0.0%	MEDIUM SILT: 0.2%		
(D ₉₀ - D ₁₀):	312.8	1.484	FINE GRAVEL: 0.0%	FINE SILT: 0.2%		
(D ₇₅ / D ₂₅):	1.602	1.509	V FINE GRAVEL: 0.0%	V FINE SILT: 0.1%		
(D ₇₅ - D ₂₅):	149.0	0.680	V COARSE SAND: 0.2%	CLAY: 2.5%		
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic	Geometric	Logarithmic	Geometric	Logarithmic	Description
	μm	μm	ϕ	μm	ϕ	
MEAN ($\bar{x}$):	326.9	263.0	1.927	302.9	1.723	Medium Sand
SORTING (σ):	145.1	2.688	1.427	1.554	0.636	Moderately Well Sorted
SKEWNESS (Sk):	1.480	-4.351	4.351	-0.123	0.123	Fine Skewed
KURTOSIS (K):	13.04	23.85	23.85	1.386	1.386	Leptokurtic

GRAIN SIZE DISTRIBUTION



APPENDIX G PARTICLE SIZE ANALYSIS RESULTS

SAMPLE STATISTICS

SAMPLE IDENTITY: **EW2-9**

ANALYST & DATE: ,

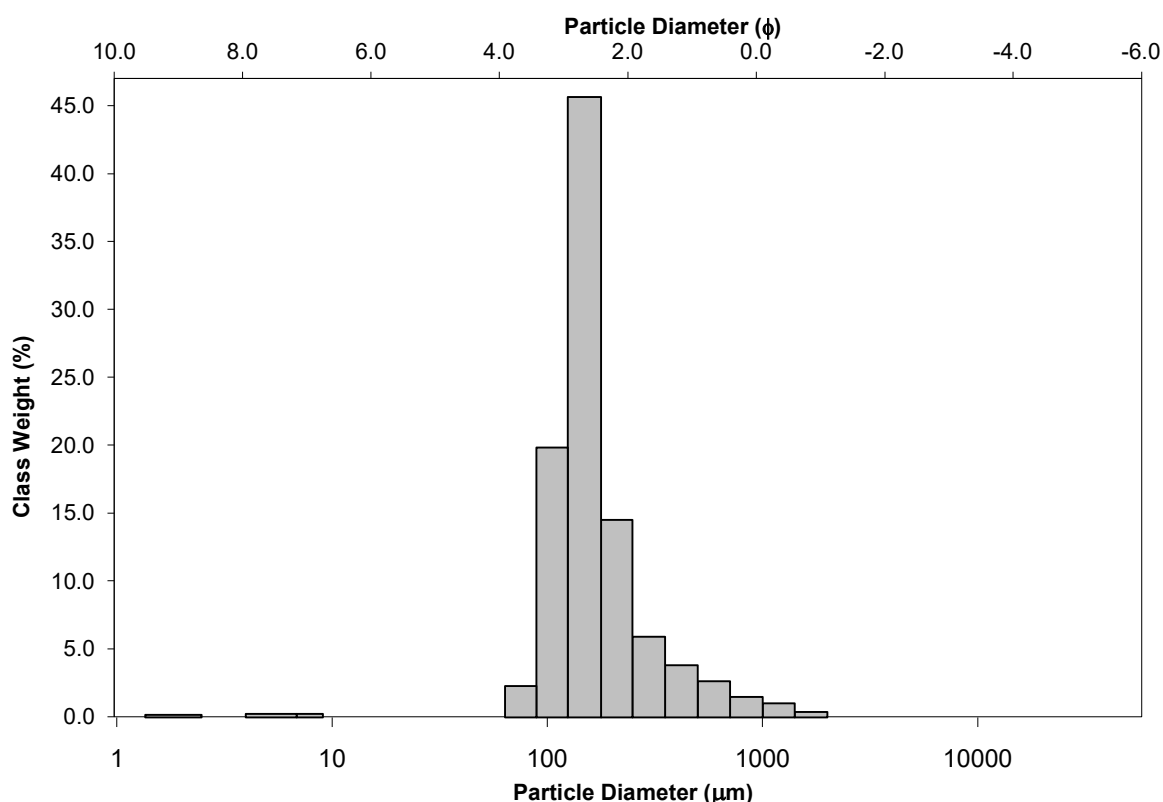
SAMPLE TYPE: Unimodal, Moderately Sorted

TEXTURAL GROUP: Sand

SEDIMENT NAME: Moderately Sorted Fine Sand

	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	151.1	2.749	GRAVEL: 0.0%	COARSE SAND: 4.1%		
MODE 2:			SAND: 96.6%	MEDIUM SAND: 9.6%		
MODE 3:			MUD: 3.4%	FINE SAND: 59.7%		
D ₁₀ :	96.10	1.562		V FINE SAND: 21.8%		
MEDIAN or D ₅₀ :	151.4	2.724	V COARSE GRAVEL: 0.0%	V COARSE SILT: 0.0%		
D ₉₀ :	338.7	3.379	COARSE GRAVEL: 0.0%	COARSE SILT: 0.0%		
(D ₉₀ / D ₁₀):	3.525	2.164	MEDIUM GRAVEL: 0.0%	MEDIUM SILT: 0.1%		
(D ₉₀ - D ₁₀):	242.6	1.817	FINE GRAVEL: 0.0%	FINE SILT: 0.5%		
(D ₇₅ / D ₂₅):	1.573	1.278	V FINE GRAVEL: 0.0%	V FINE SILT: 0.1%		
(D ₇₅ - D ₂₅):	71.51	0.653	V COARSE SAND: 1.4%	CLAY: 2.7%		
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic	Geometric	Logarithmic	Geometric	Logarithmic	Description
	μm	μm	ϕ	μm	ϕ	
MEAN ($\bar{x}$):	203.0	146.7	2.769	158.1	2.661	Fine Sand
SORTING (σ):	191.8	2.706	1.436	1.636	0.710	Moderately Sorted
SKEWNESS (Sk):	4.156	-2.980	2.980	0.248	-0.248	Coarse Skewed
KURTOSIS (K):	25.08	16.48	16.48	1.707	1.707	Very Leptokurtic

GRAIN SIZE DISTRIBUTION



APPENDIX G PARTICLE SIZE ANALYSIS RESULTS

SAMPLE STATISTICS

SAMPLE IDENTITY: **EW2-10A**

ANALYST & DATE: ,

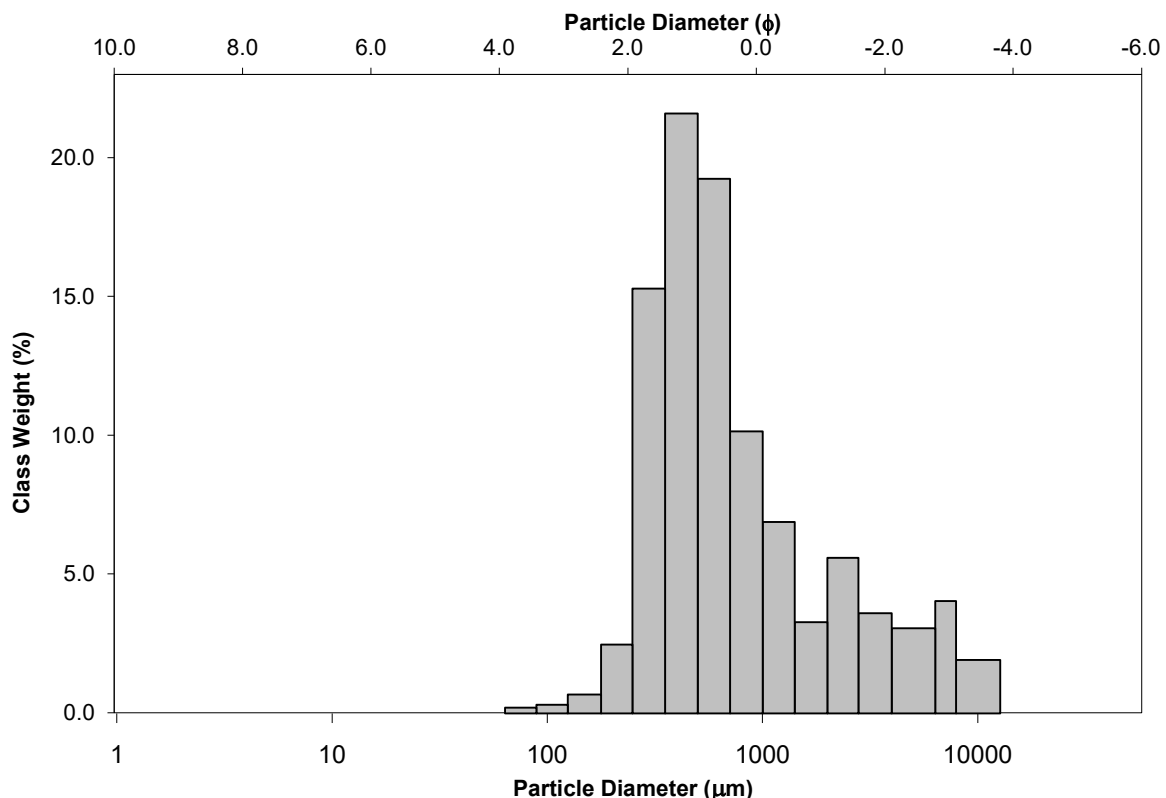
SAMPLE TYPE: Trimodal, Poorly Sorted

TEXTURAL GROUP: Gravelly Sand

SEDIMENT NAME: Very Fine Gravelly Medium Sand

	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	426.7	1.250	GRAVEL: 18.4%	COARSE SAND: 29.3%		
MODE 2:	2396.5	-1.241	SAND: 80.1%	MEDIUM SAND: 36.9%		
MODE 3:	7143.8	-2.828	MUD: 1.5%	FINE SAND: 3.3%		
D_{10} :	278.2	-1.898		V FINE SAND: 0.5%		
MEDIAN or D_{50} :	575.9	0.796	V COARSE GRAVEL: 0.0%	V COARSE SILT: 0.0%		
D_{90} :	3728.2	1.846	COARSE GRAVEL: 0.0%	COARSE SILT: 0.0%		
(D_{90} / D_{10}) :	13.40	-0.972	MEDIUM GRAVEL: 2.6%	MEDIUM SILT: 0.0%		
$(D_{90} - D_{10})$:	3450.0	3.744	FINE GRAVEL: 6.7%	FINE SILT: 0.0%		
(D_{75} / D_{25}) :	3.145	-5.470	V FINE GRAVEL: 9.1%	V FINE SILT: 0.0%		
$(D_{75} - D_{25})$:	814.2	1.653	V COARSE SAND: 10.1%	CLAY: 1.5%		
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic	Geometric	Logarithmic	Geometric	Logarithmic	Description
	μm	μm	ϕ	μm	ϕ	
MEAN ($\bar{x}$):	1406.9	698.0	0.519	752.4	0.410	Coarse Sand
SORTING (σ):	2083.3	3.494	1.805	2.696	1.431	Poorly Sorted
SKEWNESS (Sk):	2.787	-1.417	1.417	0.441	-0.441	Very Coarse Skewed
KURTOSIS (K):	10.71	11.68	11.68	1.170	1.170	Leptokurtic

GRAIN SIZE DISTRIBUTION



APPENDIX G PARTICLE SIZE ANALYSIS RESULTS

SAMPLE STATISTICS

SAMPLE IDENTITY: **EW2-10B**

ANALYST & DATE: ,

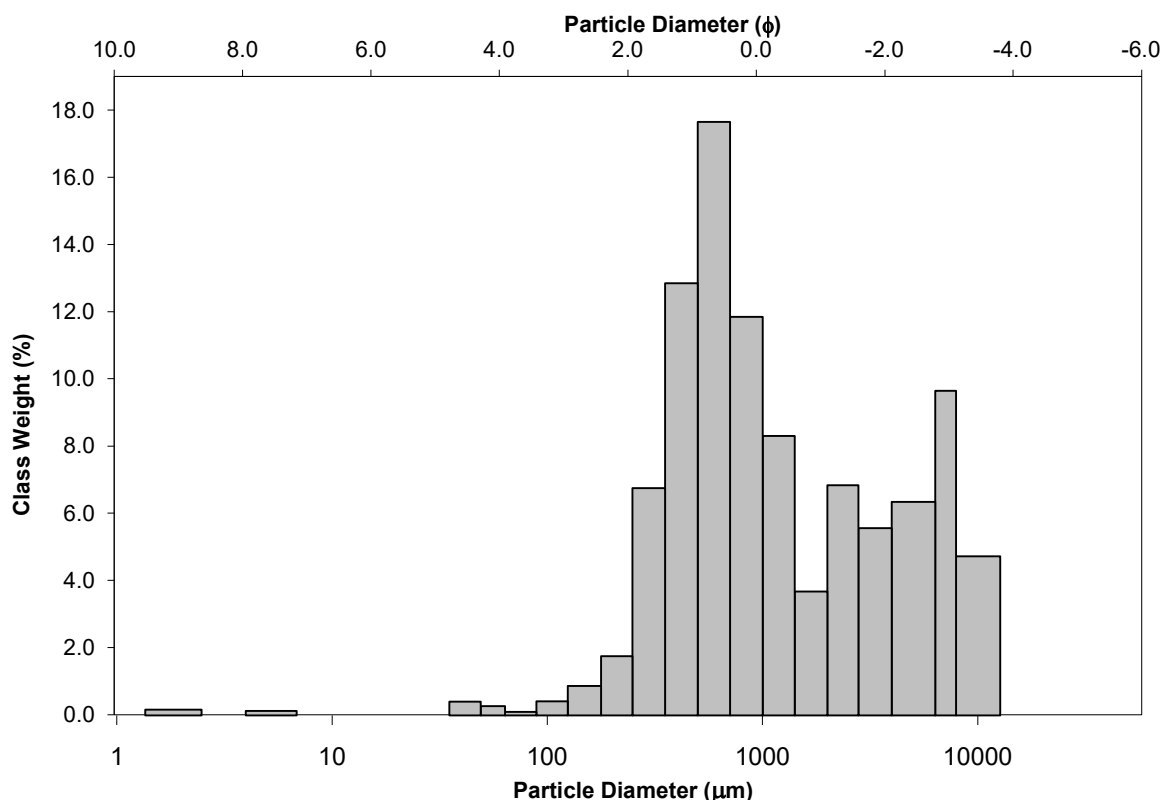
SAMPLE TYPE: Trimodal, Poorly Sorted

TEXTURAL GROUP: Sandy Gravel

SEDIMENT NAME: Sandy Fine Gravel

	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	603.3	0.750	GRAVEL: 33.4%	COARSE SAND: 29.4%		
MODE 2:	7143.8	-2.828	SAND: 64.1%	MEDIUM SAND: 19.6%		
MODE 3:	2396.5	-1.241	MUD: 2.5%	FINE SAND: 2.7%		
D ₁₀ :	312.1	-2.802		V FINE SAND: 0.5%		
MEDIAN or D ₅₀ :	872.0	0.198	V COARSE GRAVEL: 0.0%	V COARSE SILT: 0.6%		
D ₉₀ :	6972.9	1.680	COARSE GRAVEL: 0.0%	COARSE SILT: 0.0%		
(D ₉₀ / D ₁₀):	22.34	-0.600	MEDIUM GRAVEL: 6.3%	MEDIUM SILT: 0.0%		
(D ₉₀ - D ₁₀):	6660.8	4.482	FINE GRAVEL: 14.8%	FINE SILT: 0.2%		
(D ₇₅ / D ₂₅):	6.299	-0.615	V FINE GRAVEL: 12.3%	V FINE SILT: 0.1%		
(D ₇₅ - D ₂₅):	2629.9	2.655	V COARSE SAND: 11.9%	CLAY: 1.6%		
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic	Geometric	Logarithmic	Geometric	Logarithmic	Description
	μm	μm	ϕ	μm	ϕ	
MEAN ($\bar{x}$):	2344.5	1063.0	-0.088	1213.9	-0.280	Very Coarse Sand
SORTING (σ):	2862.7	4.352	2.122	3.352	1.745	Poorly Sorted
SKEWNESS (Sk):	1.608	-1.451	1.451	0.318	-0.318	Very Coarse Skewed
KURTOSIS (K):	4.524	8.832	8.832	0.820	0.820	Platykurtic

GRAIN SIZE DISTRIBUTION



APPENDIX G PARTICLE SIZE ANALYSIS RESULTS

SAMPLE STATISTICS

SAMPLE IDENTITY: **EW2-10C**

ANALYST & DATE: ,

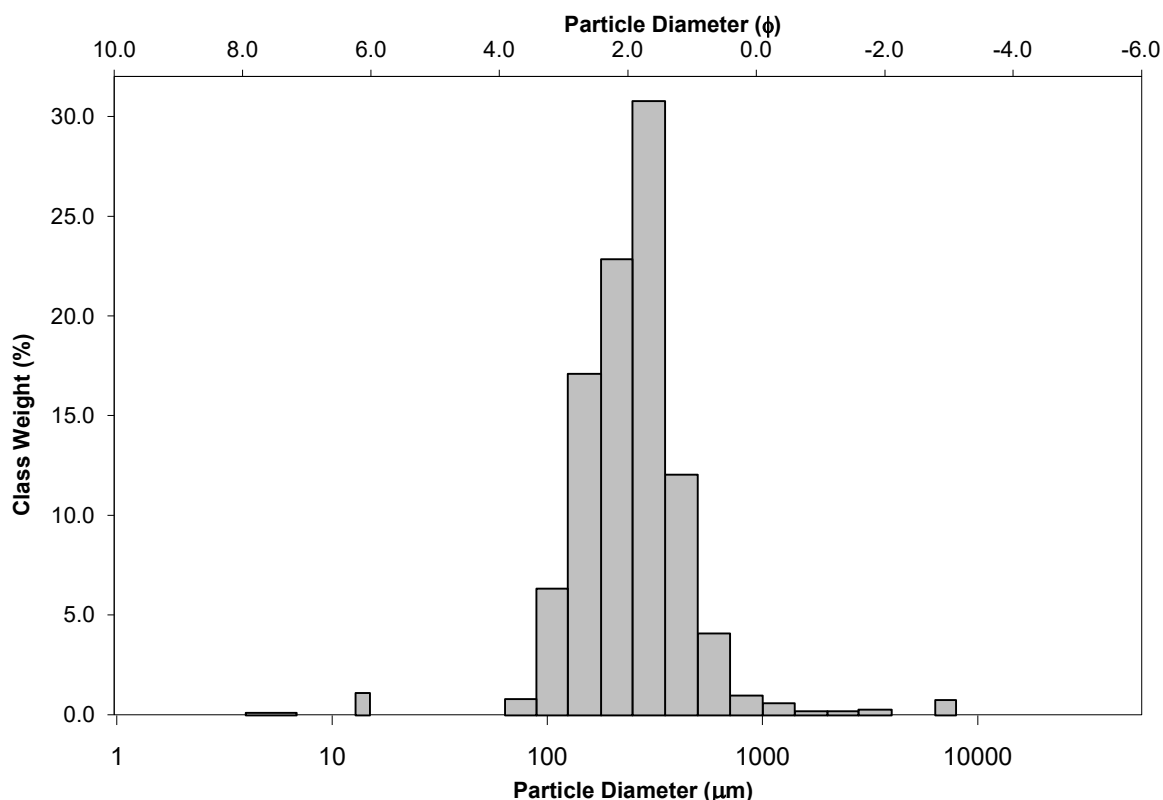
SAMPLE TYPE: Unimodal, Moderately Sorted

TEXTURAL GROUP: Slightly Gravelly Sand

SEDIMENT NAME: Slightly Fine Gravelly Medium Sand

	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	301.0	1.754	GRAVEL: 1.0%	COARSE SAND: 5.1%		
MODE 2:			SAND: 96.3%	MEDIUM SAND: 43.0%		
MODE 3:			MUD: 2.7%	FINE SAND: 40.2%		
D ₁₀ :	125.2	1.127		V FINE SAND: 7.2%		
MEDIAN or D ₅₀ :	249.8	2.001	V COARSE GRAVEL: 0.0%	V COARSE SILT: 0.0%		
D ₉₀ :	457.9	2.998	COARSE GRAVEL: 0.0%	COARSE SILT: 0.0%		
(D ₉₀ / D ₁₀):	3.657	2.660	MEDIUM GRAVEL: 0.0%	MEDIUM SILT: 0.5%		
(D ₉₀ - D ₁₀):	332.7	1.871	FINE GRAVEL: 0.5%	FINE SILT: 0.2%		
(D ₇₅ / D ₂₅):	1.951	1.604	V FINE GRAVEL: 0.5%	V FINE SILT: 0.0%		
(D ₇₅ - D ₂₅):	161.1	0.964	V COARSE SAND: 0.8%	CLAY: 2.0%		
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic	Geometric	Logarithmic	Geometric	Logarithmic	Description
	μm	μm	ϕ	μm	ϕ	
MEAN ($\bar{x}$):	322.2	222.4	2.169	238.8	2.066	Fine Sand
SORTING (σ):	547.2	2.643	1.402	1.690	0.757	Moderately Sorted
SKEWNESS (Sk):	10.38	-2.980	2.980	-0.094	0.094	Symmetrical
KURTOSIS (K):	124.2	19.26	19.26	1.108	1.108	Mesokurtic

GRAIN SIZE DISTRIBUTION



APPENDIX G PARTICLE SIZE ANALYSIS RESULTS

SAMPLE STATISTICS

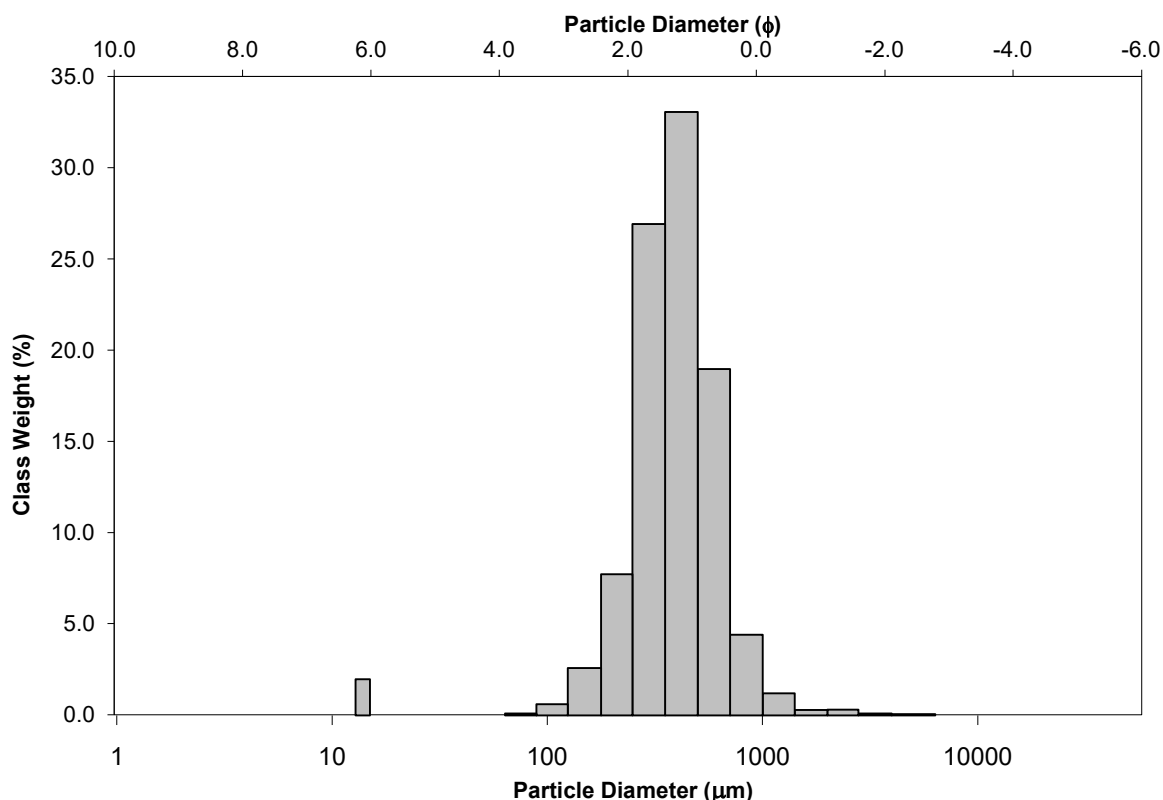
SAMPLE IDENTITY: **EW2-11**

ANALYST & DATE: ,

SAMPLE TYPE: Unimodal, Moderately Well Sorted TEXTURAL GROUP: Slightly Gravelly Sand
SEDIMENT NAME: Slightly Very Fine Gravelly Medium Sand

	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	426.7	1.250	GRAVEL: 0.5%	COARSE SAND: 23.7%		
MODE 2:			SAND: 97.3%	MEDIUM SAND: 60.8%		
MODE 3:			MUD: 2.2%	FINE SAND: 10.6%		
D ₁₀ :	216.0	0.593		V FINE SAND: 0.7%		
MEDIAN or D ₅₀ :	388.7	1.363	V COARSE GRAVEL: 0.0%	V COARSE SILT: 0.0%		
D ₉₀ :	662.9	2.211	COARSE GRAVEL: 0.0%	COARSE SILT: 0.0%		
(D ₉₀ / D ₁₀):	3.069	3.727	MEDIUM GRAVEL: 0.0%	MEDIUM SILT: 0.9%		
(D ₉₀ - D ₁₀):	446.9	1.618	FINE GRAVEL: 0.1%	FINE SILT: 0.0%		
(D ₇₅ / D ₂₅):	1.749	1.820	V FINE GRAVEL: 0.4%	V FINE SILT: 0.0%		
(D ₇₅ - D ₂₅):	216.6	0.807	V COARSE SAND: 1.5%	CLAY: 1.3%		
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic	Geometric	Logarithmic	Geometric	Logarithmic	Description
	μm	μm	ϕ	μm	ϕ	
MEAN ($\bar{x}$):	436.7	354.5	1.496	390.7	1.356	Medium Sand
SORTING (σ):	289.2	2.342	1.228	1.564	0.646	Moderately Well Sorted
SKEWNESS (Sk):	6.860	-4.308	4.308	-0.038	0.038	Symmetrical
KURTOSIS (K):	91.06	29.04	29.04	1.154	1.154	Leptokurtic

GRAIN SIZE DISTRIBUTION



APPENDIX G PARTICLE SIZE ANALYSIS RESULTS

SAMPLE STATISTICS

SAMPLE IDENTITY: **EW2-12A**

ANALYST & DATE: ,

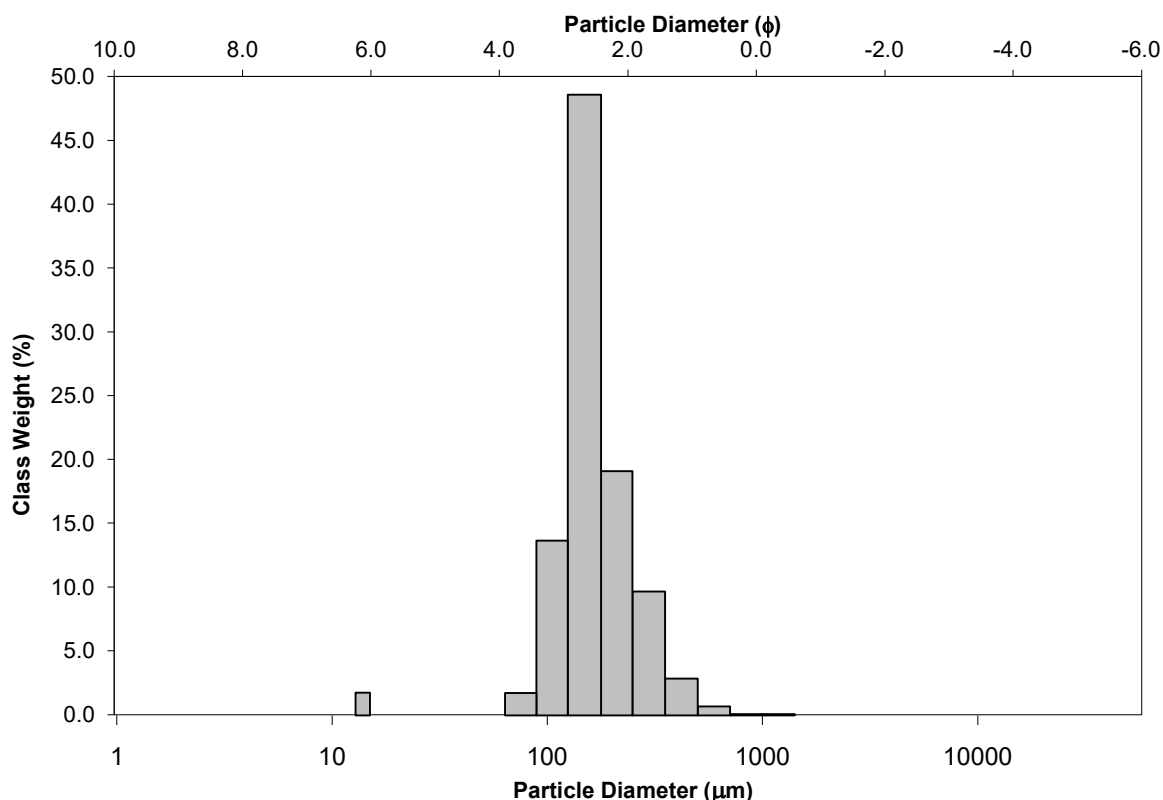
SAMPLE TYPE: Unimodal, Moderately Well Sorted

TEXTURAL GROUP: Sand

SEDIMENT NAME: Moderately Well Sorted Fine Sand

	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	151.1	2.749	GRAVEL: 0.0%	COARSE SAND: 0.8%		
MODE 2:			SAND: 97.3%	MEDIUM SAND: 12.6%		
MODE 3:			MUD: 2.7%	FINE SAND: 68.2%		
D ₁₀ :	102.4	1.821		V FINE SAND: 15.6%		
MEDIAN or D ₅₀ :	156.6	2.674	V COARSE GRAVEL: 0.0%	V COARSE SILT: 0.0%		
D ₉₀ :	283.0	3.287	COARSE GRAVEL: 0.0%	COARSE SILT: 0.0%		
(D ₉₀ / D ₁₀):	2.763	1.805	MEDIUM GRAVEL: 0.0%	MEDIUM SILT: 0.8%		
(D ₉₀ - D ₁₀):	180.6	1.466	FINE GRAVEL: 0.0%	FINE SILT: 0.0%		
(D ₇₅ / D ₂₅):	1.545	1.272	V FINE GRAVEL: 0.0%	V FINE SILT: 0.0%		
(D ₇₅ - D ₂₅):	71.43	0.628	V COARSE SAND: 0.1%	CLAY: 1.9%		
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic	Geometric	Logarithmic	Geometric	Logarithmic	Description
	μm	μm	ϕ	μm	ϕ	
MEAN ($\bar{x}$):	179.2	149.7	2.739	164.5	2.604	Fine Sand
SORTING (σ):	91.15	2.224	1.153	1.453	0.539	Moderately Well Sorted
SKEWNESS (Sk):	3.065	-4.325	4.325	0.189	-0.189	Coarse Skewed
KURTOSIS (K):	24.67	27.05	27.05	1.245	1.245	Leptokurtic

GRAIN SIZE DISTRIBUTION



APPENDIX G PARTICLE SIZE ANALYSIS RESULTS

SAMPLE STATISTICS

SAMPLE IDENTITY: **EW2-12B**

ANALYST & DATE: ,

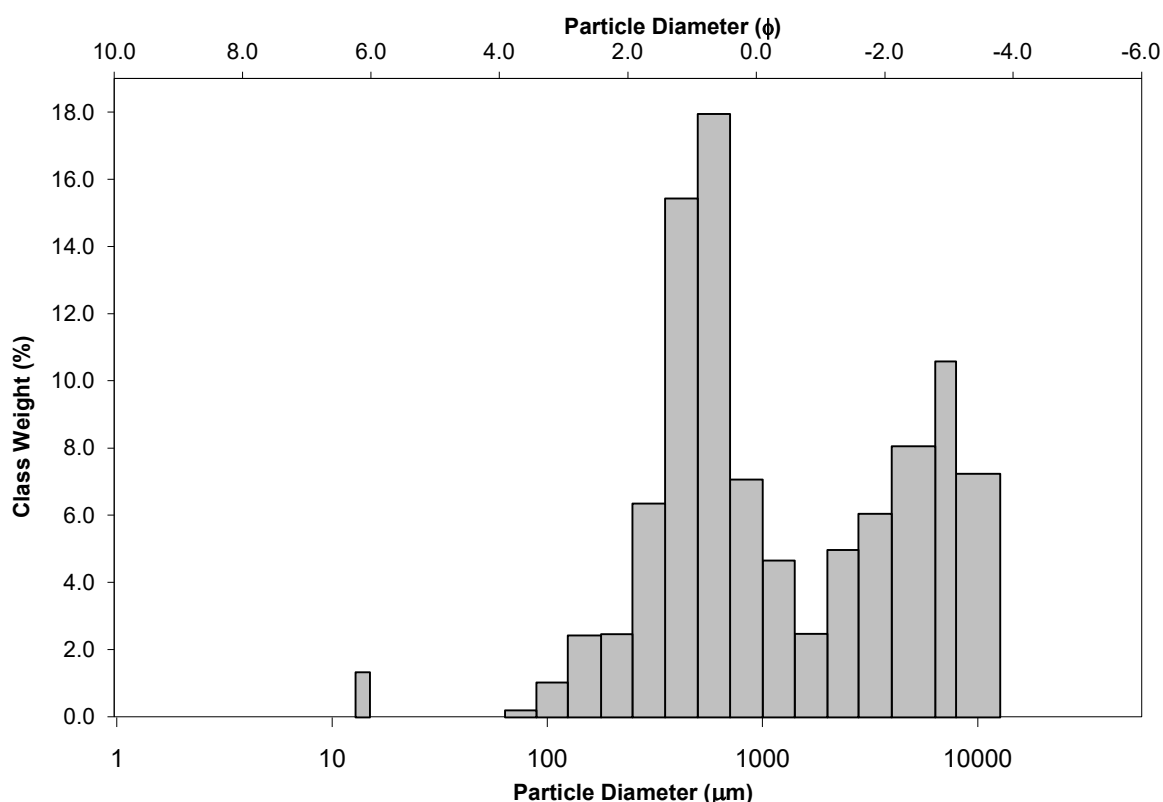
SAMPLE TYPE: Bimodal, Poorly Sorted

TEXTURAL GROUP: Sandy Gravel

SEDIMENT NAME: Sandy Fine Gravel

	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	603.3	0.750	GRAVEL: 38.4%	COARSE SAND: 24.9%		
MODE 2:	7143.8	-2.828	SAND: 60.0%	MEDIUM SAND: 21.8%		
MODE 3:			MUD: 1.6%	FINE SAND: 4.9%		
D ₁₀ :	282.2	-2.979		V FINE SAND: 1.2%		
MEDIAN or D ₅₀ :	802.3	0.318	V COARSE GRAVEL: 0.0%	V COARSE SILT: 0.0%		
D ₉₀ :	7885.6	1.825	COARSE GRAVEL: 0.0%	COARSE SILT: 0.0%		
(D ₉₀ / D ₁₀):	27.94	-0.613	MEDIUM GRAVEL: 9.6%	MEDIUM SILT: 0.6%		
(D ₉₀ - D ₁₀):	7603.3	4.804	FINE GRAVEL: 17.7%	FINE SILT: 0.0%		
(D ₇₅ / D ₂₅):	9.801	-0.535	V FINE GRAVEL: 11.1%	V FINE SILT: 0.0%		
(D ₇₅ - D ₂₅):	3970.9	3.293	V COARSE SAND: 7.1%	CLAY: 1.0%		
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic	Geometric	Logarithmic	Geometric	Logarithmic	Description
	μm	μm	ϕ	μm	ϕ	
MEAN ($\bar{x}$):	2742.2	1159.0	-0.213	1241.7	-0.312	Very Coarse Sand
SORTING (σ):	3248.3	4.435	2.149	3.795	1.924	Poorly Sorted
SKEWNESS (Sk):	1.264	-0.876	0.876	0.348	-0.348	Very Coarse Skewed
KURTOSIS (K):	3.301	6.120	6.120	0.731	0.731	Platykurtic

GRAIN SIZE DISTRIBUTION



APPENDIX G PARTICLE SIZE ANALYSIS RESULTS

SAMPLE STATISTICS

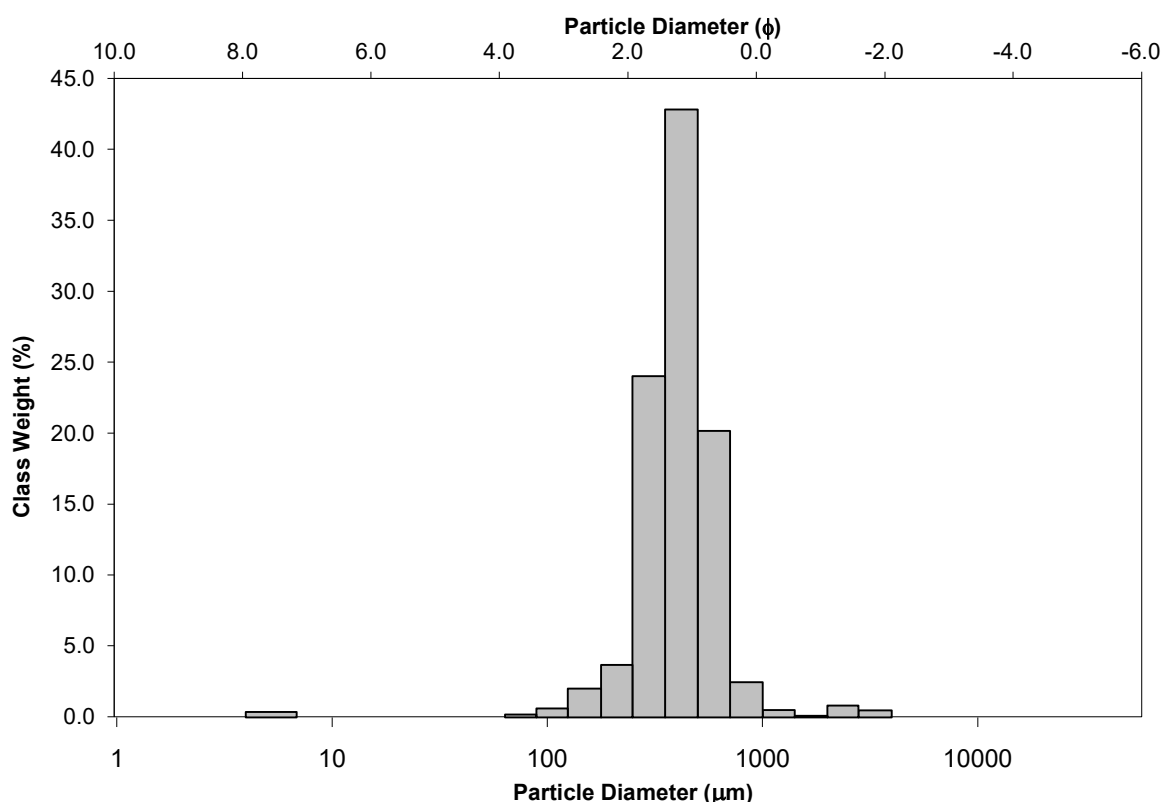
SAMPLE IDENTITY: **EW2-12C**

ANALYST & DATE: ,

SAMPLE TYPE: Unimodal, Moderately Well Sorted TEXTURAL GROUP: Slightly Gravelly Sand
SEDIMENT NAME: Slightly Very Fine Gravelly Medium Sand

	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	426.7	1.250	GRAVEL: 1.3%	COARSE SAND: 22.7%		
MODE 2:			SAND: 97.2%	MEDIUM SAND: 67.1%		
MODE 3:			MUD: 1.5%	FINE SAND: 6.0%		
D ₁₀ :	256.2	0.640		V FINE SAND: 0.8%		
MEDIAN or D ₅₀ :	407.3	1.296	V COARSE GRAVEL: 0.0%	V COARSE SILT: 0.0%		
D ₉₀ :	641.5	1.965	COARSE GRAVEL: 0.0%	COARSE SILT: 0.0%		
(D ₉₀ / D ₁₀):	2.504	3.068	MEDIUM GRAVEL: 0.0%	MEDIUM SILT: 0.0%		
(D ₉₀ - D ₁₀):	385.3	1.324	FINE GRAVEL: 0.0%	FINE SILT: 0.6%		
(D ₇₅ / D ₂₅):	1.568	1.646	V FINE GRAVEL: 1.3%	V FINE SILT: 0.0%		
(D ₇₅ - D ₂₅):	180.5	0.649	V COARSE SAND: 0.6%	CLAY: 0.9%		
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic	Geometric	Logarithmic	Geometric	Logarithmic	Description
	μm	μm	ϕ	μm	ϕ	
MEAN ($\bar{x}$):	455.6	378.4	1.402	403.8	1.308	Medium Sand
SORTING (σ):	316.6	2.161	1.112	1.464	0.550	Moderately Well Sorted
SKEWNESS (Sk):	5.906	-4.655	4.655	-0.106	0.106	Fine Skewed
KURTOSIS (K):	48.82	35.35	35.35	1.196	1.196	Leptokurtic

GRAIN SIZE DISTRIBUTION



APPENDIX G PARTICLE SIZE ANALYSIS RESULTS

SAMPLE STATISTICS

SAMPLE IDENTITY: **EW2-13A**

ANALYST & DATE: ,

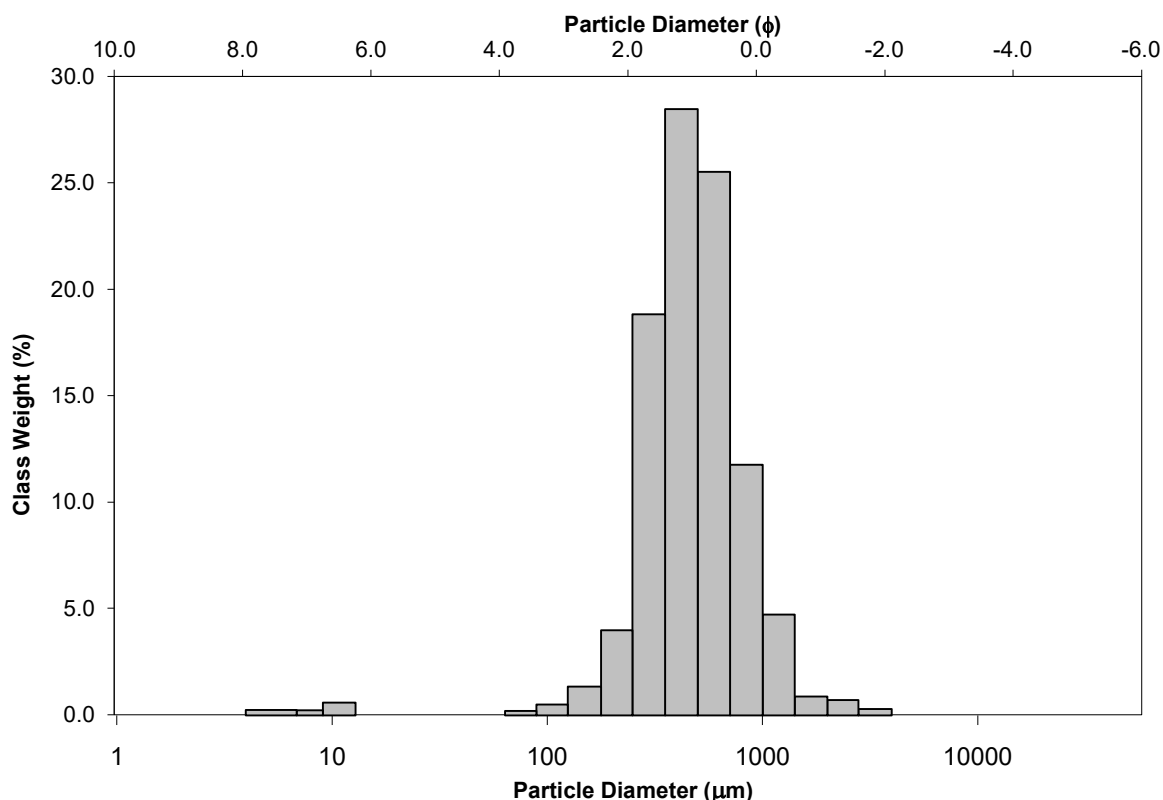
SAMPLE TYPE: Unimodal, Moderately Sorted

TEXTURAL GROUP: Slightly Gravelly Sand

SEDIMENT NAME: Slightly Very Fine Gravelly Medium Sand

	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	426.7	1.250	GRAVEL: 1.0%	COARSE SAND: 37.4%		
MODE 2:			SAND: 96.9%	MEDIUM SAND: 47.6%		
MODE 3:			MUD: 2.1%	FINE SAND: 5.5%		
D ₁₀ :	257.7	0.143		V FINE SAND: 0.7%		
MEDIAN or D ₅₀ :	465.3	1.104	V COARSE GRAVEL: 0.0%	V COARSE SILT: 0.0%		
D ₉₀ :	905.9	1.956	COARSE GRAVEL: 0.0%	COARSE SILT: 0.0%		
(D ₉₀ / D ₁₀):	3.515	13.71	MEDIUM GRAVEL: 0.0%	MEDIUM SILT: 0.7%		
(D ₉₀ - D ₁₀):	648.1	1.813	FINE GRAVEL: 0.0%	FINE SILT: 0.5%		
(D ₇₅ / D ₂₅):	1.907	2.482	V FINE GRAVEL: 1.0%	V FINE SILT: 0.0%		
(D ₇₅ - D ₂₅):	307.6	0.931	V COARSE SAND: 5.6%	CLAY: 0.9%		
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic	Geometric	Logarithmic	Geometric	Logarithmic	Description
	μm	μm	ϕ	μm	ϕ	
MEAN ($\bar{x}$):	545.9	433.7	1.205	466.8	1.099	Medium Sand
SORTING (σ):	349.9	2.396	1.261	1.668	0.738	Moderately Sorted
SKEWNESS (Sk):	3.148	-3.821	3.821	0.002	-0.002	Symmetrical
KURTOSIS (K):	20.57	25.02	25.02	1.127	1.127	Leptokurtic

GRAIN SIZE DISTRIBUTION



APPENDIX G PARTICLE SIZE ANALYSIS RESULTS

SAMPLE STATISTICS

SAMPLE IDENTITY: **EW2-13B**

ANALYST & DATE: ,

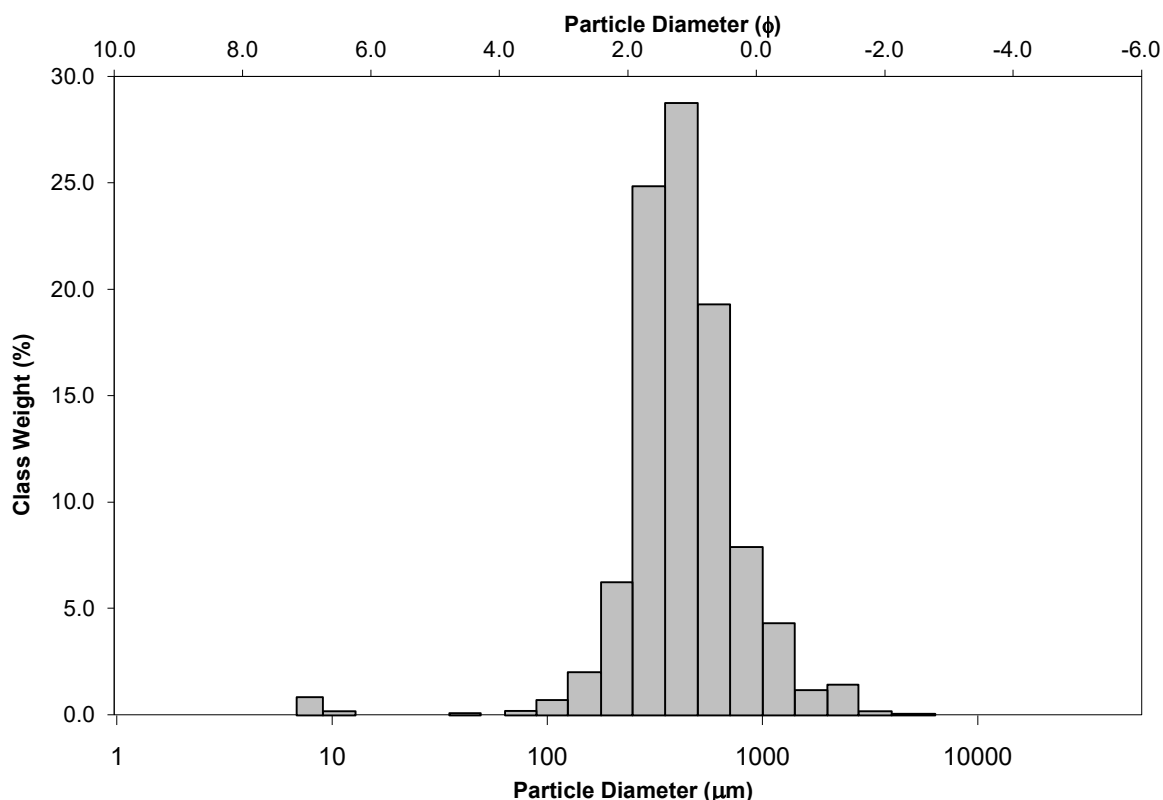
SAMPLE TYPE: Unimodal, Moderately Sorted

TEXTURAL GROUP: Slightly Gravelly Sand

SEDIMENT NAME: Slightly Very Fine Gravelly Medium Sand

	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	426.7	1.250	GRAVEL: 1.7%	COARSE SAND: 27.3%		
MODE 2:			SAND: 96.2%	MEDIUM SAND: 53.9%		
MODE 3:			MUD: 2.1%	FINE SAND: 8.5%		
D ₁₀ :	233.0	0.175		V FINE SAND: 0.9%		
MEDIAN or D ₅₀ :	415.6	1.267	V COARSE GRAVEL: 0.0%	V COARSE SILT: 0.1%		
D ₉₀ :	885.8	2.102	COARSE GRAVEL: 0.0%	COARSE SILT: 0.0%		
(D ₉₀ / D ₁₀):	3.802	12.01	MEDIUM GRAVEL: 0.0%	MEDIUM SILT: 0.6%		
(D ₉₀ - D ₁₀):	652.8	1.927	FINE GRAVEL: 0.1%	FINE SILT: 0.3%		
(D ₇₅ / D ₂₅):	1.967	2.294	V FINE GRAVEL: 1.6%	V FINE SILT: 0.0%		
(D ₇₅ - D ₂₅):	291.4	0.976	V COARSE SAND: 5.5%	CLAY: 1.1%		
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic	Geometric	Logarithmic	Geometric	Logarithmic	Description
	μm	μm	ϕ	μm	ϕ	
MEAN ($\bar{x}$):	519.7	398.6	1.327	425.4	1.233	Medium Sand
SORTING (σ):	406.2	2.463	1.300	1.701	0.767	Moderately Sorted
SKEWNESS (Sk):	4.000	-3.474	3.474	0.085	-0.085	Symmetrical
KURTOSIS (K):	29.91	23.20	23.20	1.163	1.163	Leptokurtic

GRAIN SIZE DISTRIBUTION



APPENDIX G PARTICLE SIZE ANALYSIS RESULTS

SAMPLE STATISTICS

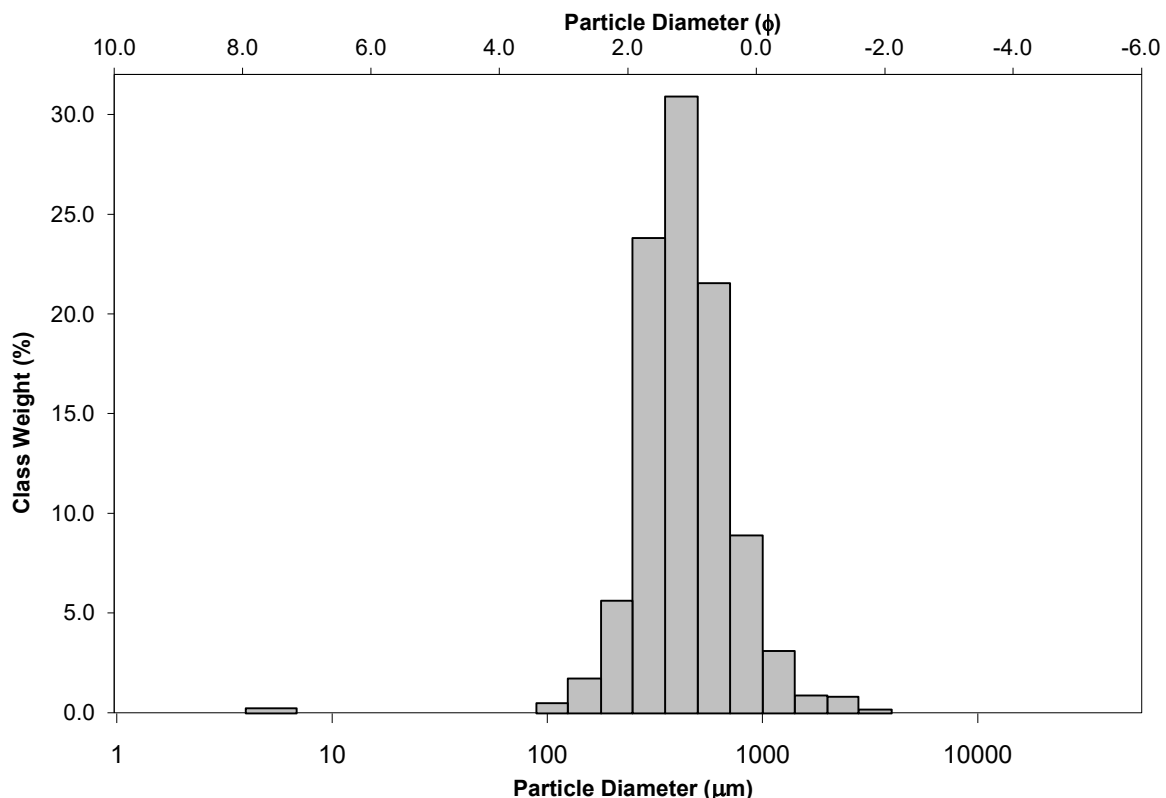
SAMPLE IDENTITY: **EW2-13C**

ANALYST & DATE: ,

SAMPLE TYPE: Unimodal, Moderately Well Sorted TEXTURAL GROUP: Slightly Gravelly Sand
SEDIMENT NAME: Slightly Very Fine Gravelly Medium Sand

	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	426.7	1.250	GRAVEL: 1.0%	COARSE SAND: 30.5%		
MODE 2:			SAND: 97.6%	MEDIUM SAND: 54.9%		
MODE 3:			MUD: 1.4%	FINE SAND: 7.6%		
D ₁₀ :	251.8	0.278		V FINE SAND: 0.5%		
MEDIAN or D ₅₀ :	425.5	1.233	V COARSE GRAVEL: 0.0%	V COARSE SILT: 0.0%		
D ₉₀ :	824.5	1.990	COARSE GRAVEL: 0.0%	COARSE SILT: 0.0%		
(D ₉₀ / D ₁₀):	3.274	7.146	MEDIUM GRAVEL: 0.0%	MEDIUM SILT: 0.0%		
(D ₉₀ - D ₁₀):	572.7	1.711	FINE GRAVEL: 0.0%	FINE SILT: 0.4%		
(D ₇₅ / D ₂₅):	1.891	2.216	V FINE GRAVEL: 1.0%	V FINE SILT: 0.0%		
(D ₇₅ - D ₂₅):	279.0	0.919	V COARSE SAND: 4.0%	CLAY: 1.0%		
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic	Geometric	Logarithmic	Geometric	Logarithmic	Description
	μm	μm	ϕ	μm	ϕ	
MEAN ($\bar{x}$):	505.9	410.0	1.286	430.8	1.215	Medium Sand
SORTING (σ):	331.1	2.256	1.173	1.612	0.689	Moderately Well Sorted
SKEWNESS (Sk):	3.462	-4.179	4.179	0.039	-0.039	Symmetrical
KURTOSIS (K):	22.48	31.16	31.16	1.060	1.060	Mesokurtic

GRAIN SIZE DISTRIBUTION



APPENDIX G PARTICLE SIZE ANALYSIS RESULTS

SAMPLE STATISTICS

SAMPLE IDENTITY: **EW2-14A**

ANALYST & DATE: ,

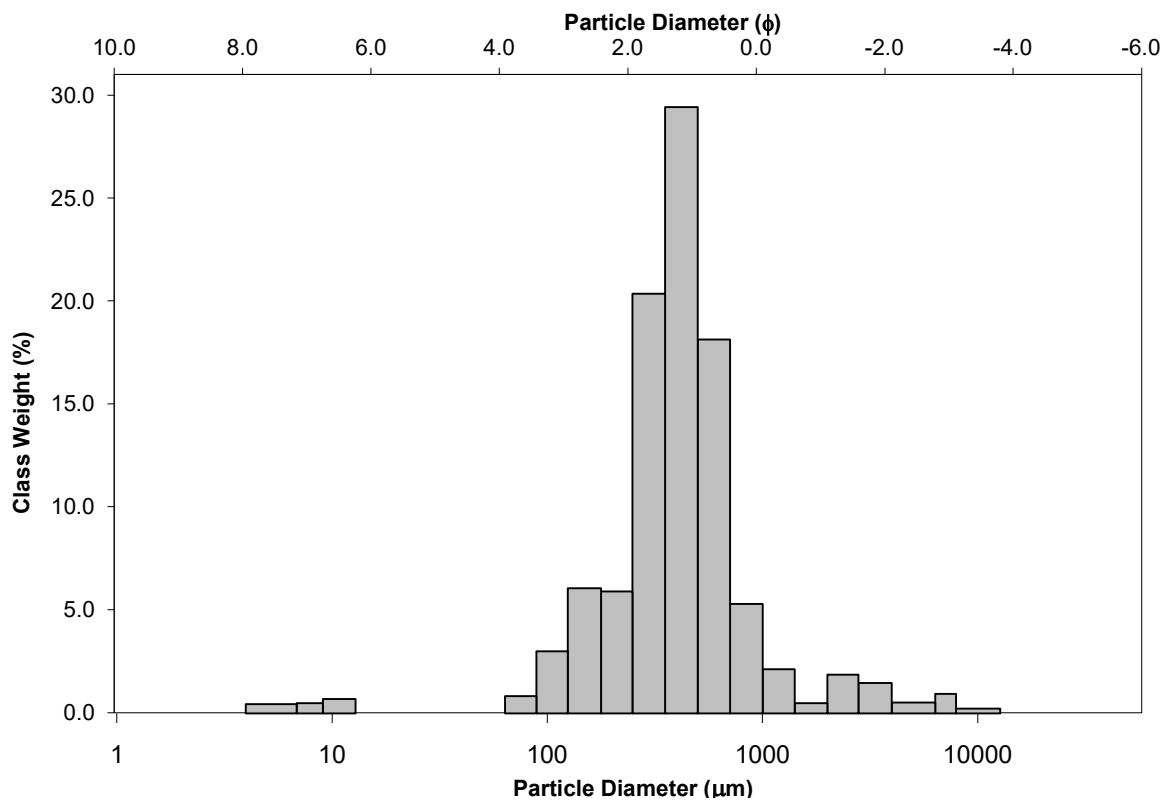
SAMPLE TYPE: Bimodal, Poorly Sorted

TEXTURAL GROUP: Slightly Gravelly Sand

SEDIMENT NAME: Slightly Very Fine Gravelly Medium Sand

	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	426.7	1.250	GRAVEL: 4.9%	COARSE SAND: 23.3%		
MODE 2:	151.1	2.749	SAND: 91.2%	MEDIUM SAND: 49.5%		
MODE 3:			MUD: 3.9%	FINE SAND: 12.1%		
D ₁₀ :	142.9	0.236		V FINE SAND: 3.8%		
MEDIAN or D ₅₀ :	398.0	1.329	V COARSE GRAVEL: 0.0%	V COARSE SILT: 0.0%		
D ₉₀ :	849.0	2.807	COARSE GRAVEL: 0.0%	COARSE SILT: 0.0%		
(D ₉₀ / D ₁₀):	5.942	11.88	MEDIUM GRAVEL: 0.3%	MEDIUM SILT: 0.9%		
(D ₉₀ - D ₁₀):	706.1	2.571	FINE GRAVEL: 1.3%	FINE SILT: 0.9%		
(D ₇₅ / D ₂₅):	2.041	2.225	V FINE GRAVEL: 3.3%	V FINE SILT: 0.0%		
(D ₇₅ - D ₂₅):	284.9	1.030	V COARSE SAND: 2.6%	CLAY: 2.1%		
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic	Geometric	Logarithmic	Geometric	Logarithmic	Description
	μm	μm	ϕ	μm	ϕ	
MEAN ($\bar{x}$):	603.3	347.0	1.527	376.8	1.408	Medium Sand
SORTING (σ):	974.5	3.408	1.769	2.123	1.086	Poorly Sorted
SKEWNESS (Sk):	5.951	-2.288	2.288	-0.056	0.056	Symmetrical
KURTOSIS (K):	46.42	12.59	12.59	1.727	1.727	Very Leptokurtic

GRAIN SIZE DISTRIBUTION



APPENDIX G PARTICLE SIZE ANALYSIS RESULTS

SAMPLE STATISTICS

SAMPLE IDENTITY: **EW2-14B**

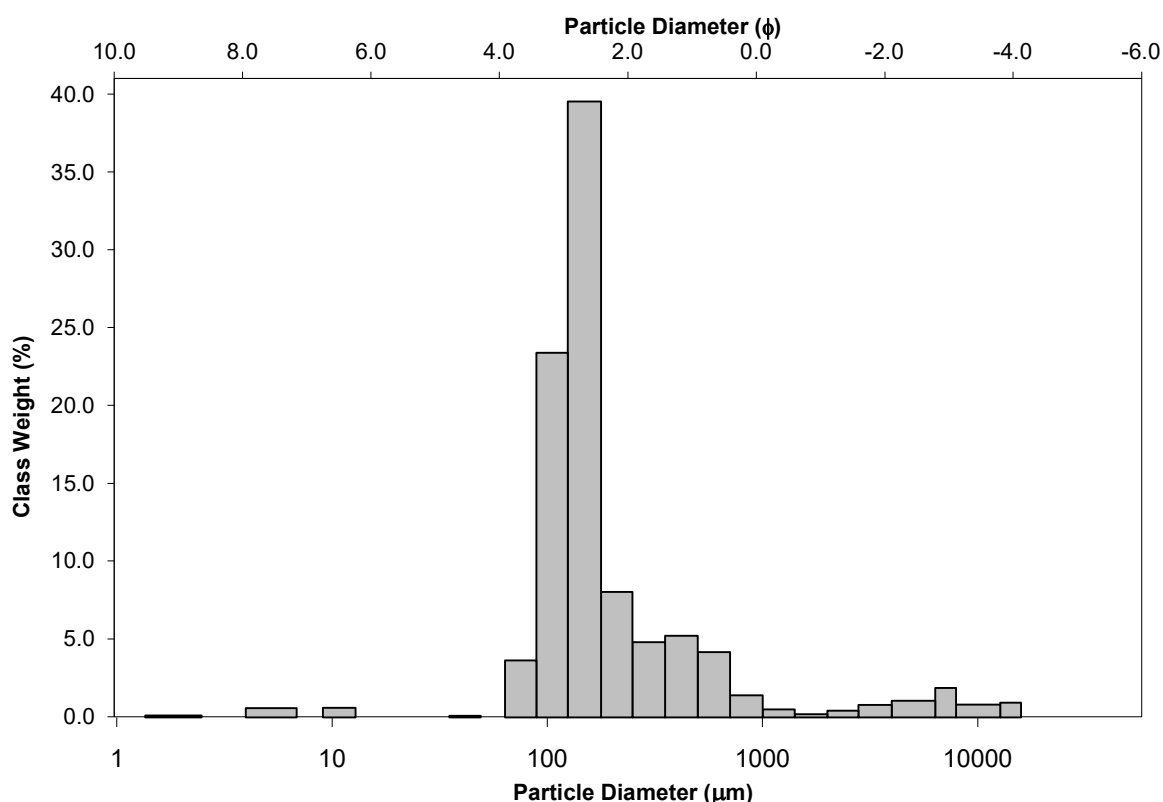
ANALYST & DATE: ,

SAMPLE TYPE: Unimodal, Poorly Sorted
SEDIMENT NAME: Fine Gravelly Fine Sand

TEXTURAL GROUP: Gravelly Sand

	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	151.1	2.749	GRAVEL: 5.5%	COARSE SAND: 5.5%		
MODE 2:			SAND: 89.9%	MEDIUM SAND: 9.9%		
MODE 3:			MUD: 4.6%	FINE SAND: 47.4%		
D ₁₀ :	91.47	0.793		V FINE SAND: 26.4%		
MEDIAN or D ₅₀ :	148.0	2.756	V COARSE GRAVEL: 0.0%	V COARSE SILT: 0.1%		
D ₉₀ :	577.2	3.450	COARSE GRAVEL: 0.0%	COARSE SILT: 0.0%		
(D ₉₀ / D ₁₀):	6.310	4.352	MEDIUM GRAVEL: 1.7%	MEDIUM SILT: 0.6%		
(D ₉₀ - D ₁₀):	485.7	2.658	FINE GRAVEL: 2.6%	FINE SILT: 0.9%		
(D ₇₅ / D ₂₅):	1.881	1.411	V FINE GRAVEL: 1.2%	V FINE SILT: 0.1%		
(D ₇₅ - D ₂₅):	100.9	0.911	V COARSE SAND: 0.7%	CLAY: 2.9%		
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic	Geometric	Logarithmic	Geometric	Logarithmic	Description
	μm	μm	ϕ	μm	ϕ	
MEAN ($\bar{x}$):	580.6	168.0	2.573	177.1	2.497	Fine Sand
SORTING (σ):	1796.6	3.963	1.986	2.471	1.305	Poorly Sorted
SKEWNESS (Sk):	5.257	-0.459	0.459	0.491	-0.491	Very Coarse Skewed
KURTOSIS (K):	32.61	8.519	8.519	2.460	2.460	Very Leptokurtic

GRAIN SIZE DISTRIBUTION



APPENDIX G PARTICLE SIZE ANALYSIS RESULTS

SAMPLE STATISTICS

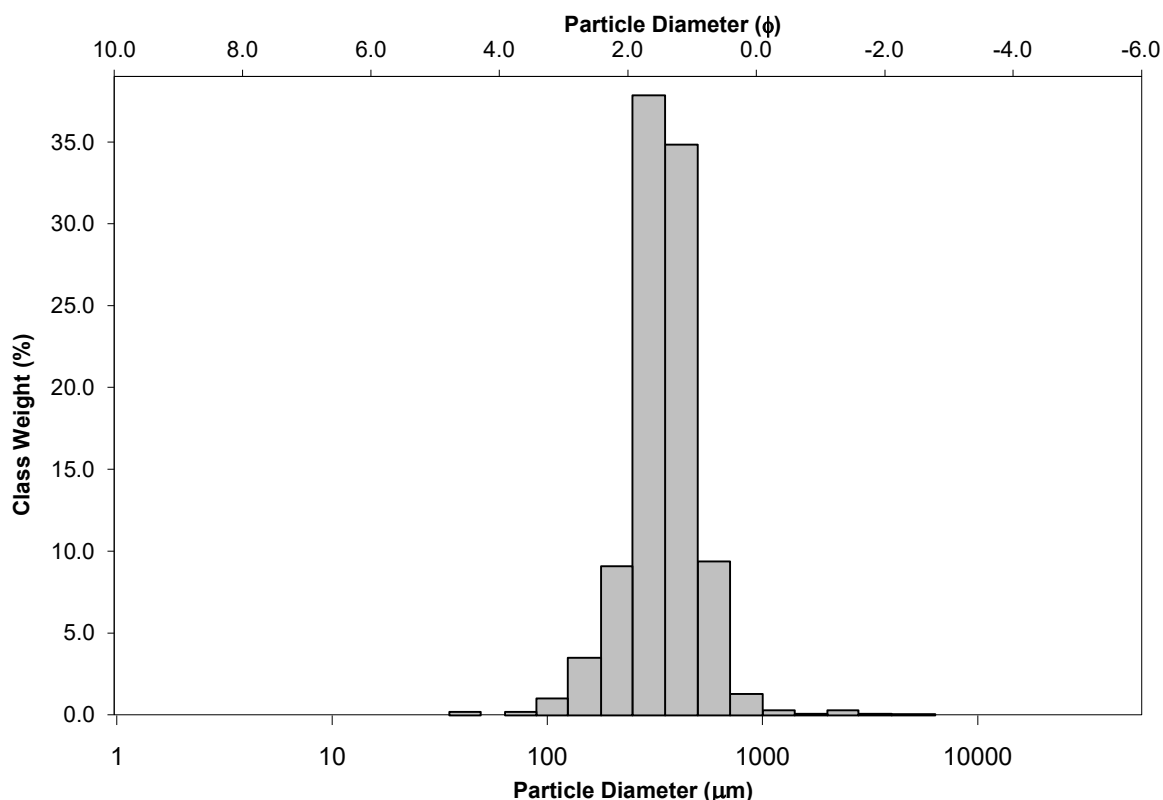
SAMPLE IDENTITY: **EW2-14C**

ANALYST & DATE: ,

SAMPLE TYPE: Unimodal, Moderately Well Sorted TEXTURAL GROUP: Slightly Gravelly Sand
SEDIMENT NAME: Slightly Very Fine Gravelly Medium Sand

	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	301.0	1.754	GRAVEL: 0.5%	COARSE SAND: 10.7%		
MODE 2:			SAND: 97.5%	MEDIUM SAND: 72.4%		
MODE 3:			MUD: 2.0%	FINE SAND: 12.8%		
D ₁₀ :	200.9	0.919		V FINE SAND: 1.2%		
MEDIAN or D ₅₀ :	341.6	1.550	V COARSE GRAVEL: 0.0%	V COARSE SILT: 0.2%		
D ₉₀ :	529.0	2.315	COARSE GRAVEL: 0.0%	COARSE SILT: 0.0%		
(D ₉₀ / D ₁₀):	2.632	2.520	MEDIUM GRAVEL: 0.0%	MEDIUM SILT: 0.0%		
(D ₉₀ - D ₁₀):	328.0	1.396	FINE GRAVEL: 0.1%	FINE SILT: 0.0%		
(D ₇₅ / D ₂₅):	1.611	1.576	V FINE GRAVEL: 0.4%	V FINE SILT: 0.0%		
(D ₇₅ - D ₂₅):	165.8	0.688	V COARSE SAND: 0.4%	CLAY: 1.8%		
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic	Geometric	Logarithmic	Geometric	Logarithmic	Description
	μm	μm	ϕ	μm	ϕ	
MEAN ($\bar{x}$):	377.1	310.3	1.688	344.3	1.538	Medium Sand
SORTING (σ):	258.3	2.363	1.241	1.466	0.552	Moderately Well Sorted
SKEWNESS (Sk):	9.652	-4.857	4.857	-0.053	0.053	Symmetrical
KURTOSIS (K):	149.4	32.76	32.76	1.249	1.249	Leptokurtic

GRAIN SIZE DISTRIBUTION



APPENDIX G PARTICLE SIZE ANALYSIS RESULTS

SAMPLE STATISTICS

SAMPLE IDENTITY: **EW2-15A**

ANALYST & DATE: ,

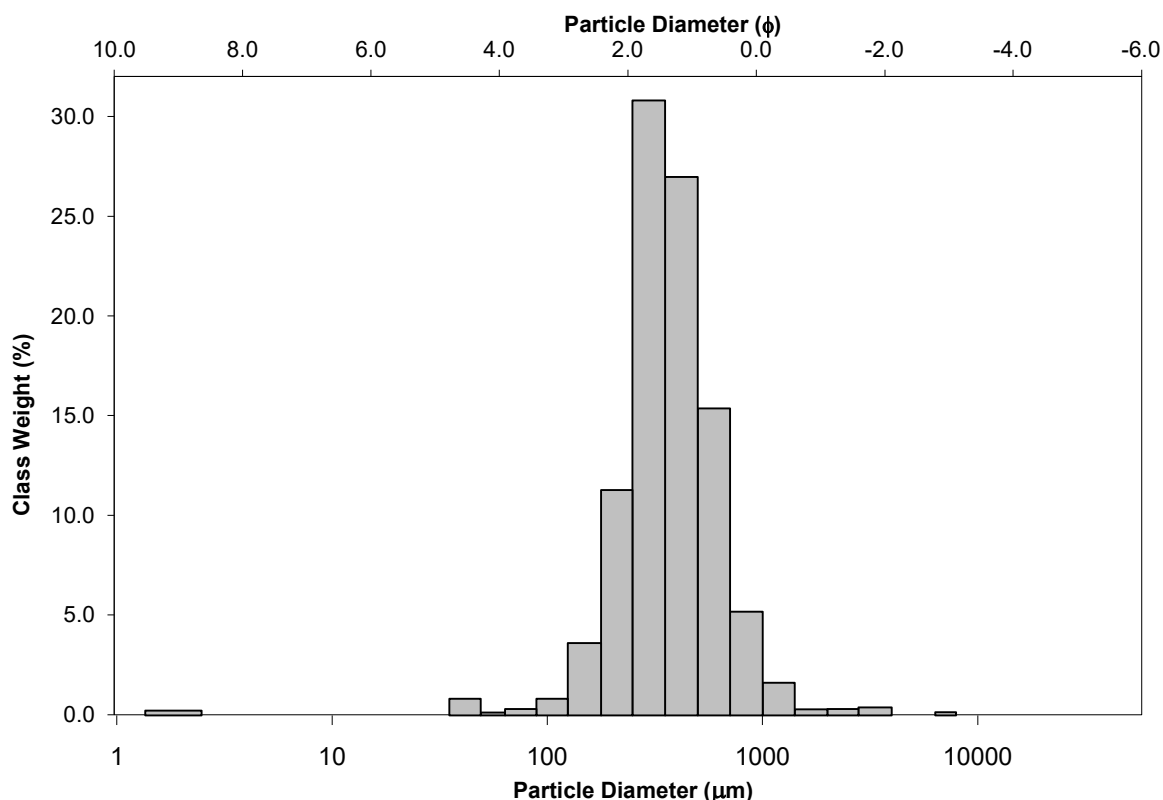
SAMPLE TYPE: Unimodal, Moderately Sorted

TEXTURAL GROUP: Slightly Gravelly Sand

SEDIMENT NAME: Slightly Very Fine Gravelly Medium Sand

	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	301.0	1.754	GRAVEL: 0.8%	COARSE SAND: 20.4%		
MODE 2:			SAND: 95.9%	MEDIUM SAND: 57.5%		
MODE 3:			MUD: 3.3%	FINE SAND: 14.9%		
D ₁₀ :	188.5	0.571		V FINE SAND: 1.2%		
MEDIAN or D ₅₀ :	353.5	1.500	V COARSE GRAVEL: 0.0%	V COARSE SILT: 0.9%		
D ₉₀ :	673.3	2.407	COARSE GRAVEL: 0.0%	COARSE SILT: 0.0%		
(D ₉₀ / D ₁₀):	3.571	4.218	MEDIUM GRAVEL: 0.0%	MEDIUM SILT: 0.0%		
(D ₉₀ - D ₁₀):	484.8	1.836	FINE GRAVEL: 0.1%	FINE SILT: 0.0%		
(D ₇₅ / D ₂₅):	1.833	1.845	V FINE GRAVEL: 0.7%	V FINE SILT: 0.2%		
(D ₇₅ - D ₂₅):	221.9	0.874	V COARSE SAND: 1.9%	CLAY: 2.2%		
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic	Geometric	Logarithmic	Geometric	Logarithmic	Description
	μm	μm	ϕ	μm	ϕ	
MEAN ($\bar{x}$):	426.9	320.1	1.644	361.2	1.469	Medium Sand
SORTING (σ):	374.5	2.775	1.472	1.685	0.753	Moderately Sorted
SKEWNESS (Sk):	8.448	-3.754	3.754	0.007	-0.007	Symmetrical
KURTOSIS (K):	122.4	21.66	21.66	1.267	1.267	Leptokurtic

GRAIN SIZE DISTRIBUTION



APPENDIX G PARTICLE SIZE ANALYSIS RESULTS

SAMPLE STATISTICS

SAMPLE IDENTITY: **EW2-15-B-1**

ANALYST & DATE: ,

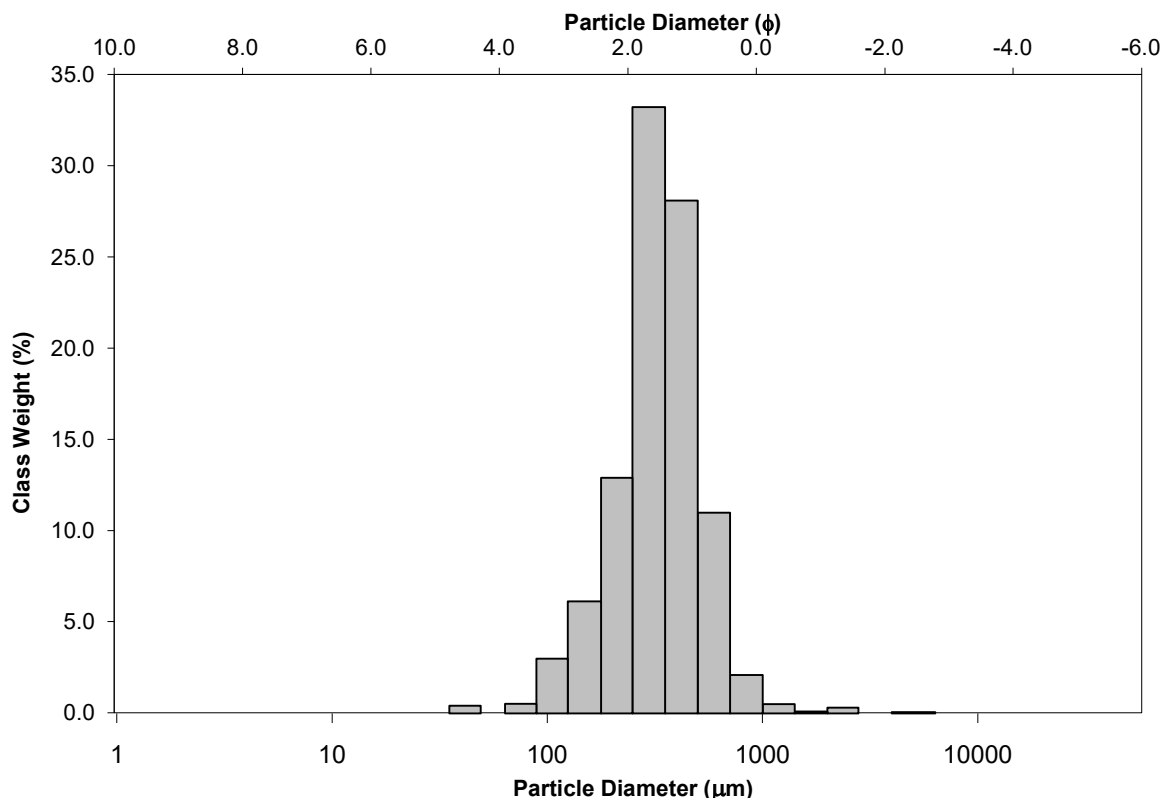
SAMPLE TYPE: Unimodal, Moderately Sorted

TEXTURAL GROUP: Slightly Gravelly Sand

SEDIMENT NAME: Slightly Very Fine Gravelly Medium Sand

	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	301.0	1.754	GRAVEL: 0.4%	COARSE SAND: 13.1%		
MODE 2:			SAND: 97.4%	MEDIUM SAND: 61.1%		
MODE 3:			MUD: 2.2%	FINE SAND: 19.1%		
D ₁₀ :	159.7	0.817		V FINE SAND: 3.5%		
MEDIAN or D ₅₀ :	325.4	1.620	V COARSE GRAVEL: 0.0%	V COARSE SILT: 0.4%		
D ₉₀ :	567.8	2.647	COARSE GRAVEL: 0.0%	COARSE SILT: 0.0%		
(D ₉₀ / D ₁₀):	3.556	3.241	MEDIUM GRAVEL: 0.0%	MEDIUM SILT: 0.0%		
(D ₉₀ - D ₁₀):	408.1	1.830	FINE GRAVEL: 0.1%	FINE SILT: 0.0%		
(D ₇₅ / D ₂₅):	1.744	1.671	V FINE GRAVEL: 0.3%	V FINE SILT: 0.0%		
(D ₇₅ - D ₂₅):	186.3	0.802	V COARSE SAND: 0.6%	CLAY: 1.8%		
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic	Geometric	Logarithmic	Geometric	Logarithmic	Description
	μm	μm	ϕ	μm	ϕ	
MEAN ($\bar{x}$):	364.5	291.4	1.779	315.9	1.662	Medium Sand
SORTING (σ):	255.6	2.444	1.289	1.631	0.706	Moderately Sorted
SKEWNESS (Sk):	8.546	-4.202	4.202	-0.140	0.140	Fine Skewed
KURTOSIS (K):	138.7	26.99	26.99	1.287	1.287	Leptokurtic

GRAIN SIZE DISTRIBUTION



APPENDIX G PARTICLE SIZE ANALYSIS RESULTS

SAMPLE STATISTICS

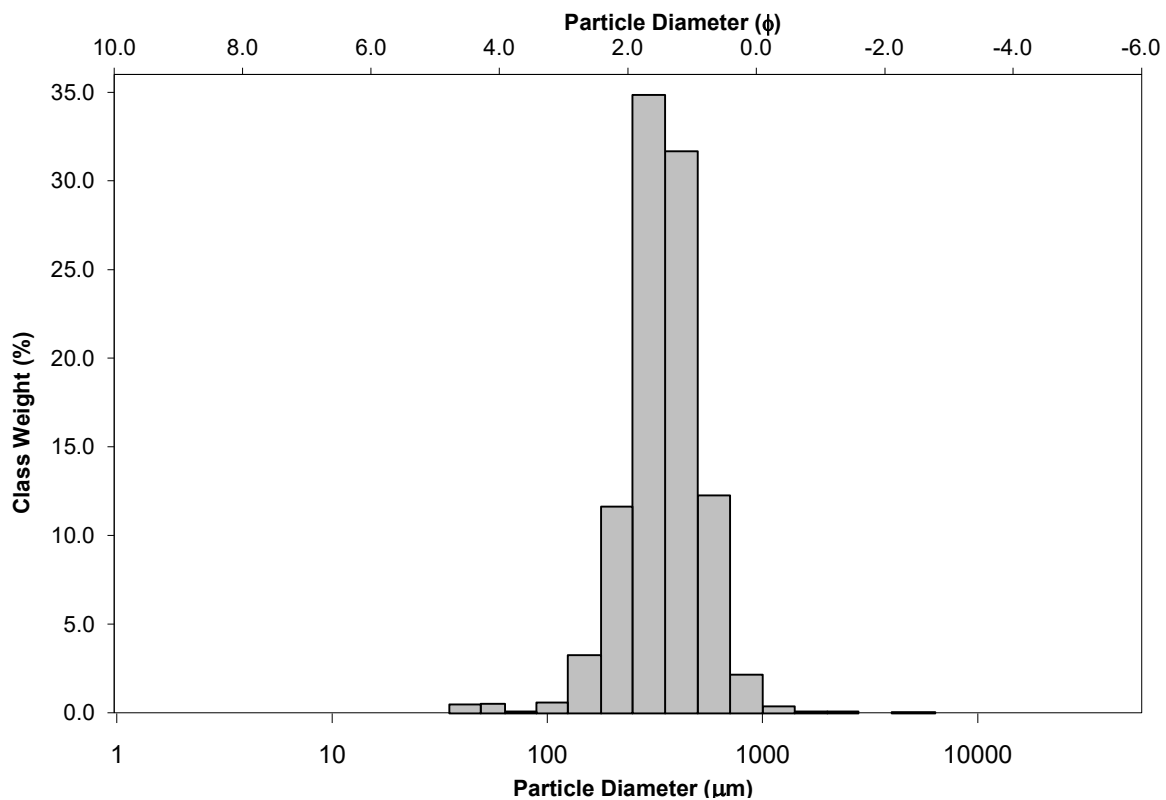
SAMPLE IDENTITY: **EW2-15C**

ANALYST & DATE: ,

SAMPLE TYPE: Unimodal, Moderately Well Sorted TEXTURAL GROUP: Slightly Gravelly Sand
SEDIMENT NAME: Slightly Very Fine Gravelly Medium Sand

	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	301.0	1.754	GRAVEL: 0.2%	COARSE SAND: 14.6%		
MODE 2:			SAND: 98.0%	MEDIUM SAND: 67.0%		
MODE 3:			MUD: 1.8%	FINE SAND: 15.2%		
D ₁₀ :	200.7	0.789		V FINE SAND: 0.8%		
MEDIAN or D ₅₀ :	343.8	1.540	V COARSE GRAVEL: 0.0%	V COARSE SILT: 0.9%		
D ₉₀ :	578.8	2.317	COARSE GRAVEL: 0.0%	COARSE SILT: 0.0%		
(D ₉₀ / D ₁₀):	2.884	2.937	MEDIUM GRAVEL: 0.0%	MEDIUM SILT: 0.0%		
(D ₉₀ - D ₁₀):	378.1	1.528	FINE GRAVEL: 0.1%	FINE SILT: 0.0%		
(D ₇₅ / D ₂₅):	1.675	1.646	V FINE GRAVEL: 0.1%	V FINE SILT: 0.0%		
(D ₇₅ - D ₂₅):	181.3	0.744	V COARSE SAND: 0.5%	CLAY: 0.9%		
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic	Geometric	Logarithmic	Geometric	Logarithmic	Description
	μm	μm	ϕ	μm	ϕ	
MEAN ($\bar{x}$):	381.2	326.4	1.615	344.4	1.538	Medium Sand
SORTING (σ):	230.7	2.002	1.002	1.486	0.572	Moderately Well Sorted
SKEWNESS (Sk):	10.11	-4.881	4.881	-0.029	0.029	Symmetrical
KURTOSIS (K):	193.8	40.62	40.62	1.124	1.124	Leptokurtic

GRAIN SIZE DISTRIBUTION



APPENDIX G PARTICLE SIZE ANALYSIS RESULTS

SAMPLE STATISTICS

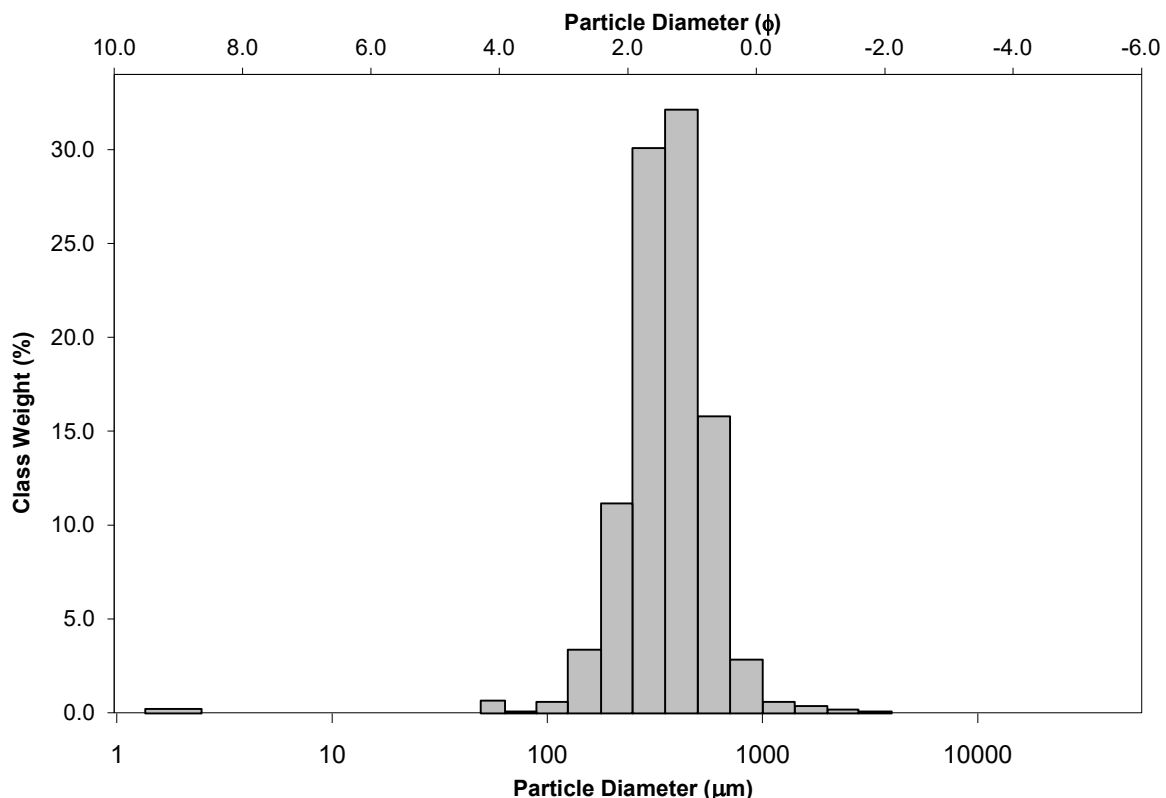
SAMPLE IDENTITY: **EW2-16**

ANALYST & DATE: ,

SAMPLE TYPE: Unimodal, Moderately Well Sorted TEXTURAL GROUP: Slightly Gravelly Sand
SEDIMENT NAME: Slightly Very Fine Gravelly Medium Sand

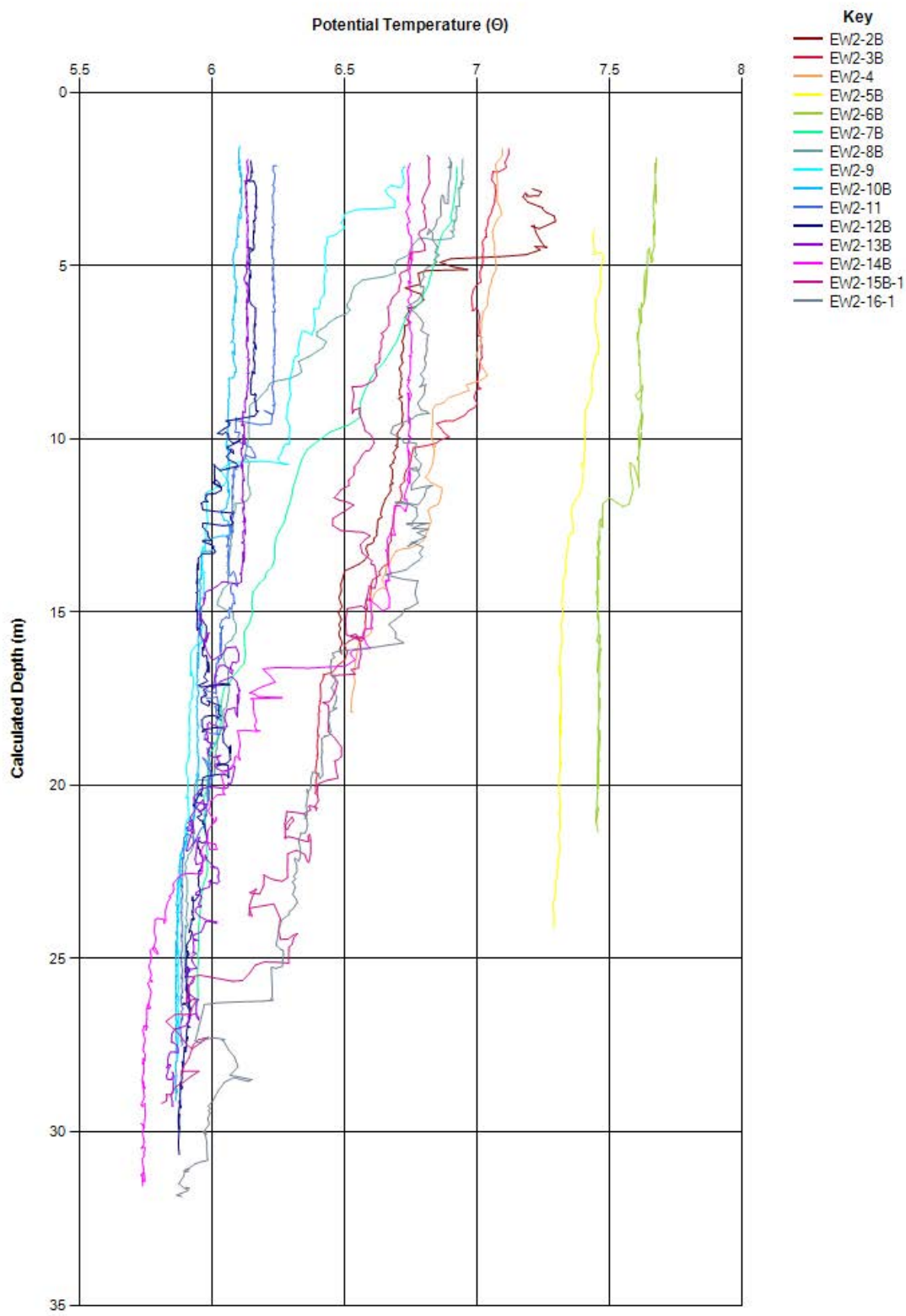
	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	426.7	1.250	GRAVEL: 0.3%	COARSE SAND: 18.8%		
MODE 2:			SAND: 97.8%	MEDIUM SAND: 62.6%		
MODE 3:			MUD: 1.9%	FINE SAND: 14.7%		
D ₁₀ :	200.5	0.684		V FINE SAND: 0.8%		
MEDIAN or D ₅₀ :	362.7	1.463	V COARSE GRAVEL: 0.0%	V COARSE SILT: 0.5%		
D ₉₀ :	622.3	2.318	COARSE GRAVEL: 0.0%	COARSE SILT: 0.0%		
(D ₉₀ / D ₁₀):	3.103	3.387	MEDIUM GRAVEL: 0.0%	MEDIUM SILT: 0.0%		
(D ₉₀ - D ₁₀):	421.7	1.634	FINE GRAVEL: 0.0%	FINE SILT: 0.0%		
(D ₇₅ / D ₂₅):	1.738	1.741	V FINE GRAVEL: 0.3%	V FINE SILT: 0.2%		
(D ₇₅ - D ₂₅):	201.4	0.798	V COARSE SAND: 1.0%	CLAY: 1.2%		
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic	Geometric	Logarithmic	Geometric	Logarithmic	Description
	μm	μm	ϕ	μm	ϕ	
MEAN ($\bar{x}$):	402.3	335.0	1.578	362.9	1.462	Medium Sand
SORTING (σ):	229.6	2.217	1.149	1.533	0.617	Moderately Well Sorted
SKEWNESS (Sk):	4.587	-4.656	4.656	-0.059	0.059	Symmetrical
KURTOSIS (K):	45.93	33.65	33.65	1.092	1.092	Mesokurtic

GRAIN SIZE DISTRIBUTION

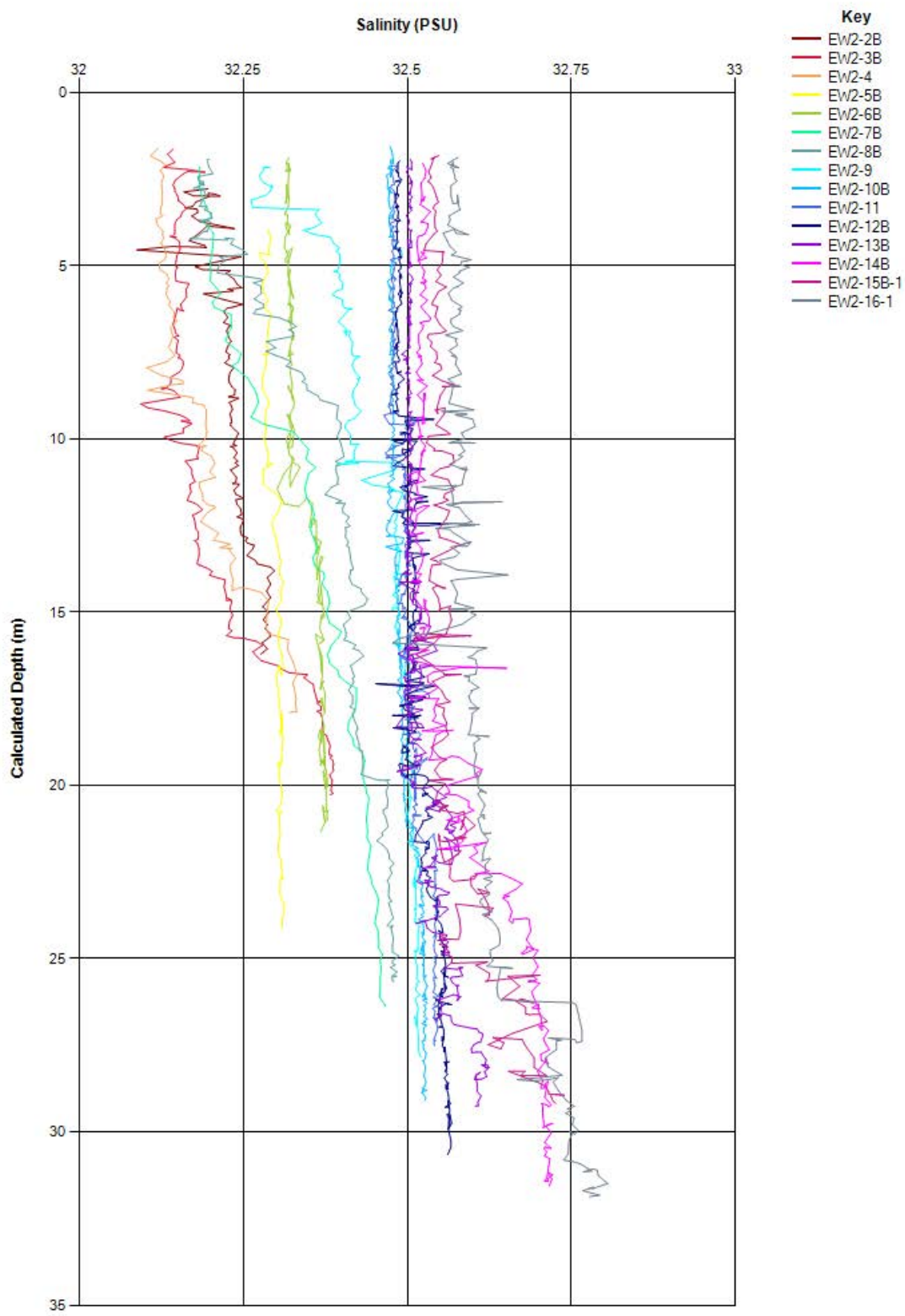


APPENDIX H CTD PROFILES

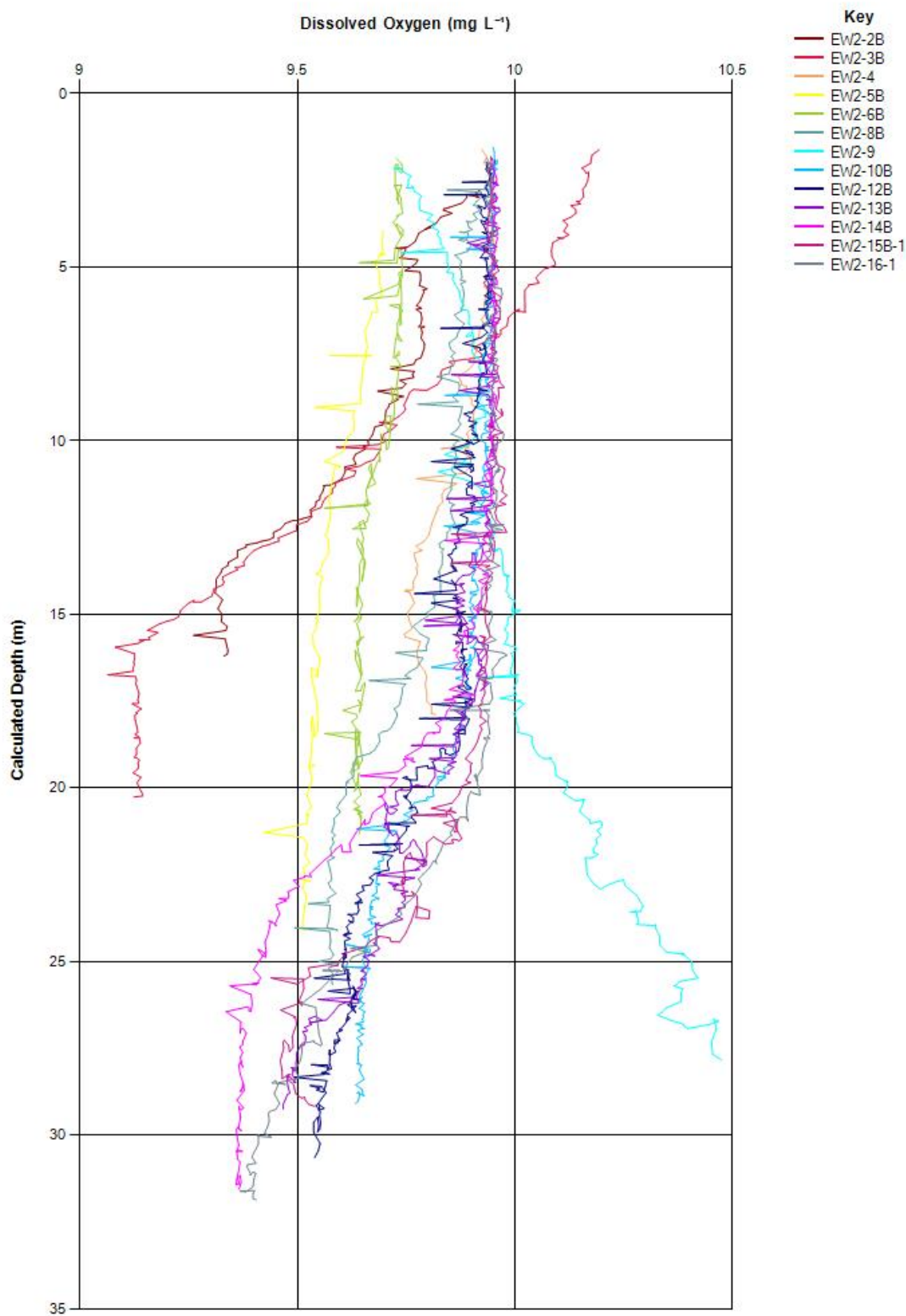
APPENDIX H CTD PROFILES



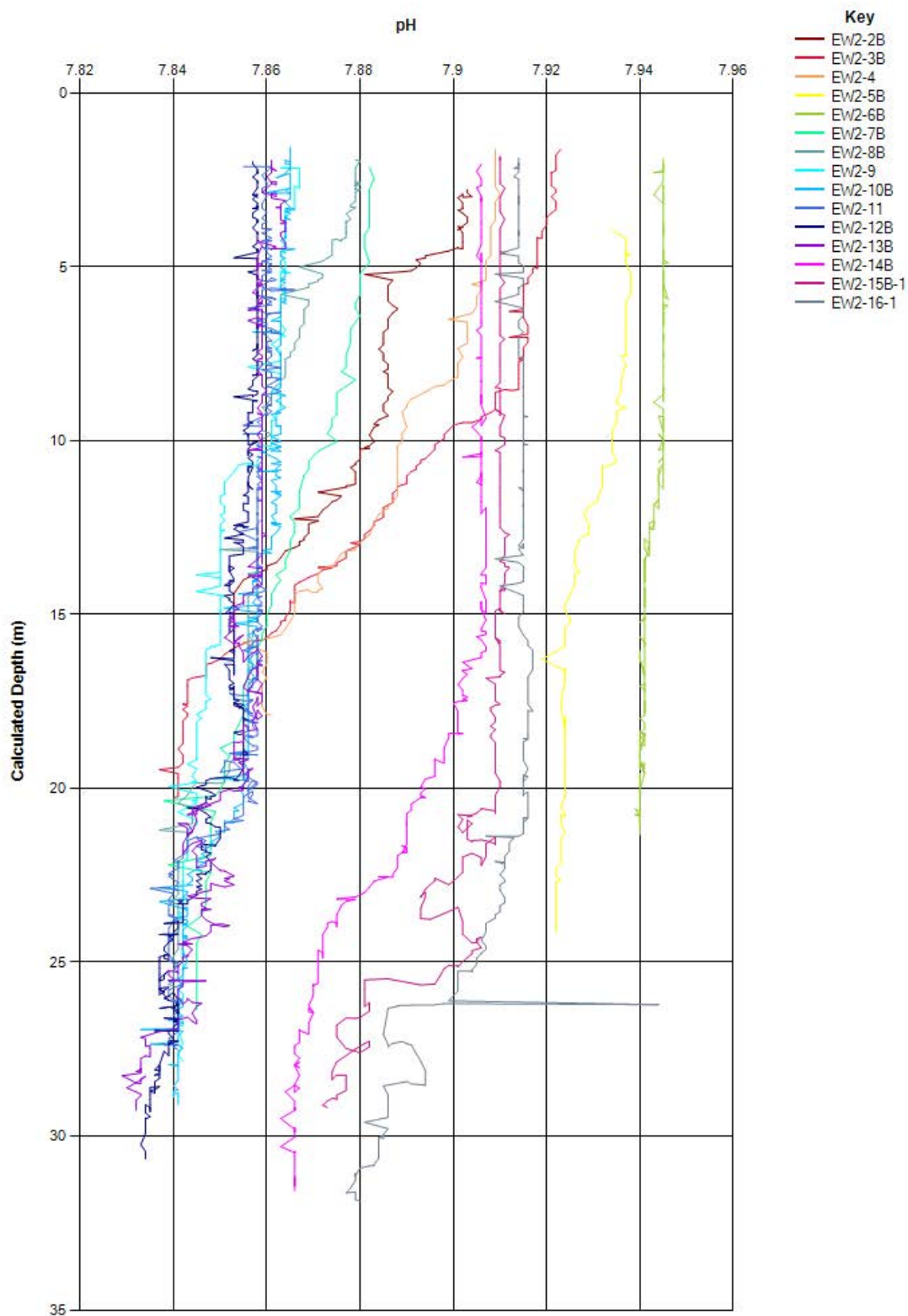
APPENDIX H CTD PROFILES



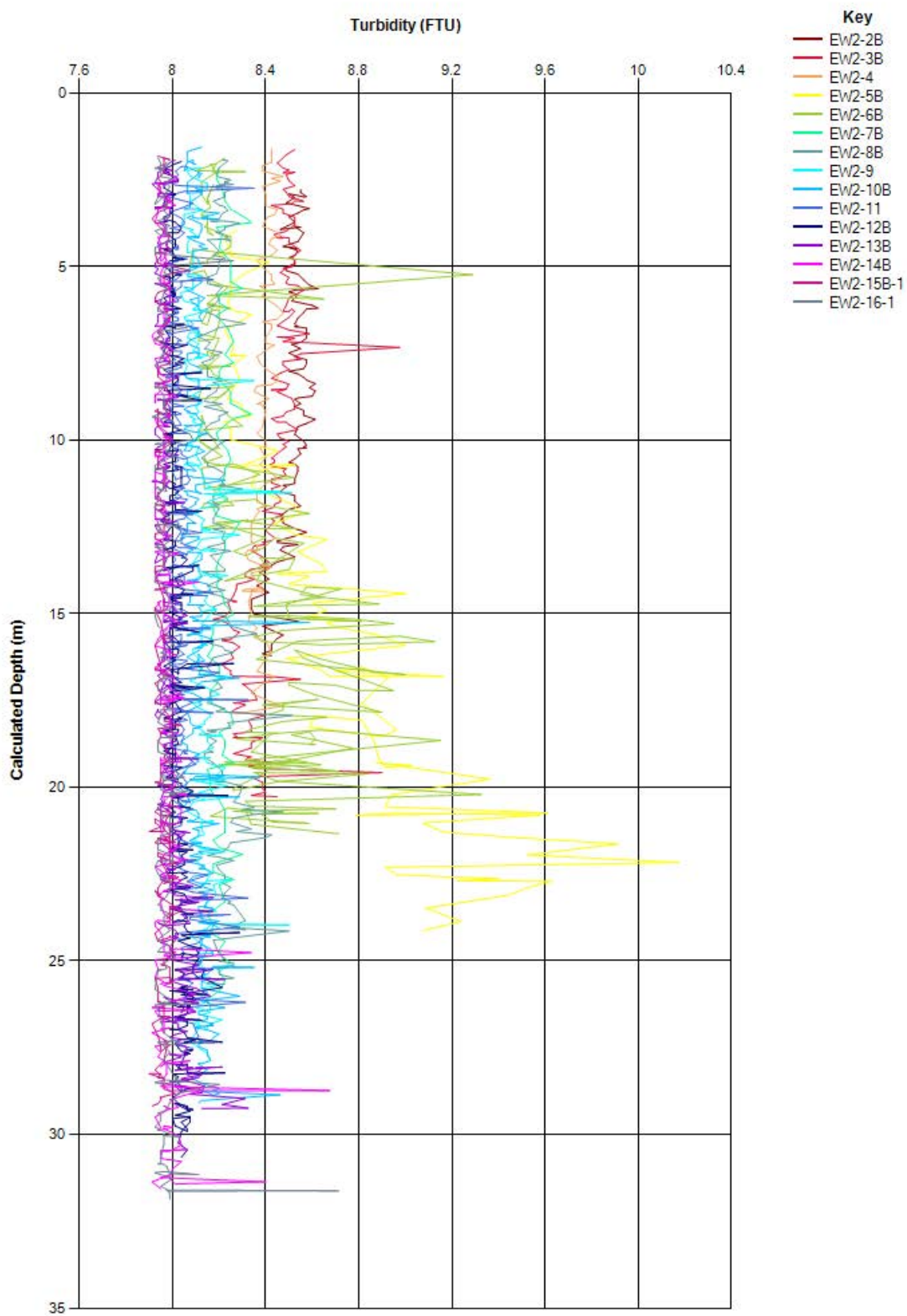
APPENDIX H CTD PROFILES



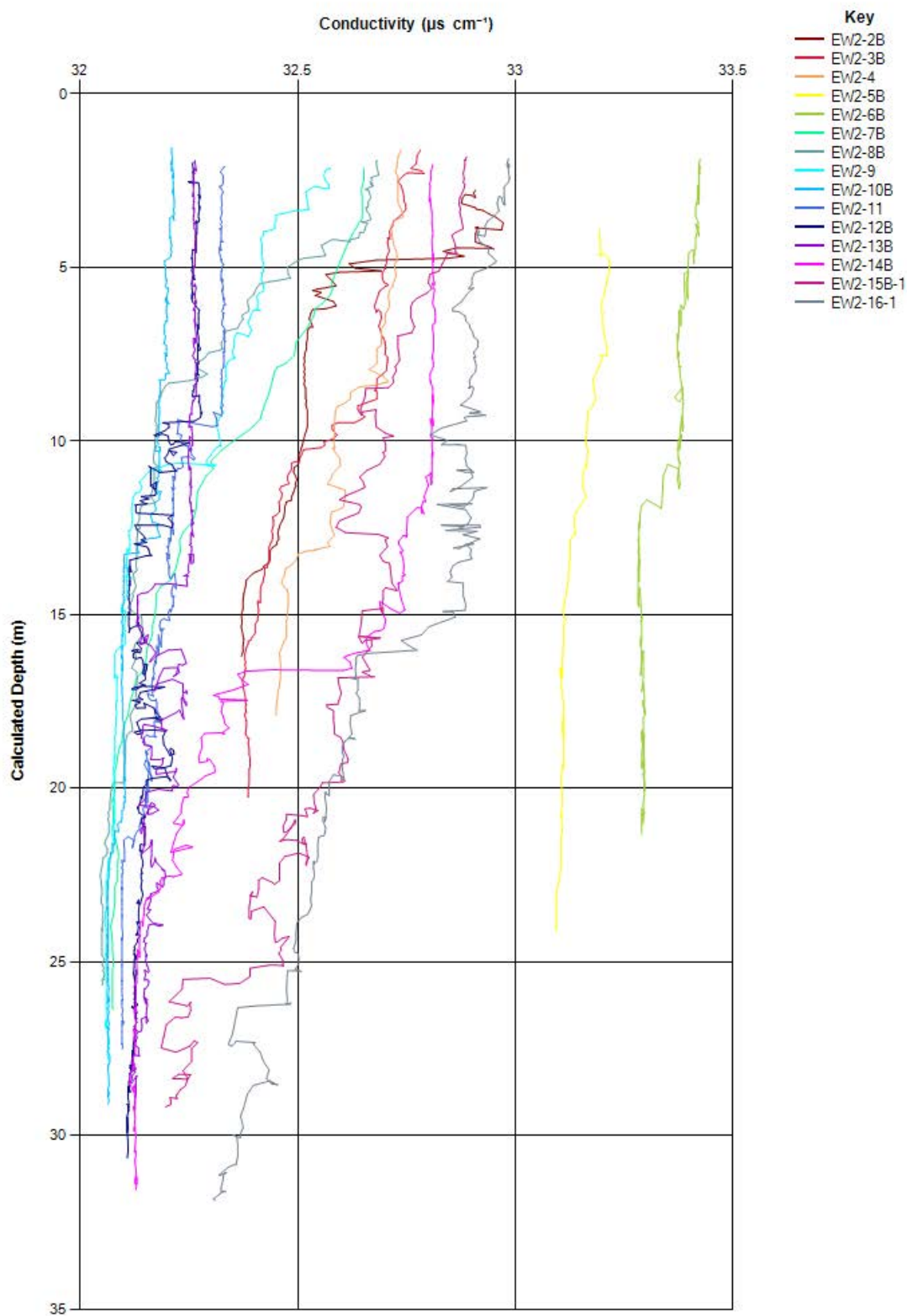
APPENDIX H CTD PROFILES



APPENDIX H CTD PROFILES



APPENDIX H CTD PROFILES



APPENDIX I MACROFAUNAL ANALYSIS - SUMMARY

APPENDIX I MACROFAUNAL ANALYSIS - SUMMARY

Phylum Class/Order	Taxon	Qualifier	EW2-2A	EW2-2B	EW2-2C	EW2-3A	EW2-3B	EW2-3C	EW2-4	EW2-5A	EW2-5B	EW2-5C	EW2-6A	EW2-6B	EW2-6C	EW2-7A	EW2-7B	EW2-7C	EW2-8A	EW2-8B	EW2-8C	EW2-9	EW2-10A	EW2-10B	EW2-10C	EW2-11	EW2-12A	EW2-12B	EW2-12C	EW2-13A	EW2-13B	EW2-13C	EW2-14A	EW2-14B	EW2-14C	EW2-15A	EW2-15B-1	EW2-15C	EW2-16	Total							
Taxa included in statistics																																															
ANNELIDA	Polychaeta	<i>Glycera americana</i>			1		1	1				2					1				1		1		1		2	8	1		2			2		3			2	29							
		<i>Glycera capitata</i>																		6		1			6	1											1	17									
		<i>Glycera dibranchiata</i>			1	4														1						6													5	24							
		<i>Hemipodia simplex</i>																																					1	68							
		<i>Goniadella gracilis</i>											12				16			2	15	4			3									10					1	24							
		<i>Goniadides caroliniae</i>																																						1	1						
		Nephtyidae	Juvenile					1																2																	3	1					
		Nephtyidae																																							3	3					
		<i>Aglaophamus circinata</i>																	1						1			3			4					3	1		1	2	3	16					
		<i>Nephtys bucera</i>		1			1																					3														2	2				
		<i>Nephtys incisa</i>				1																							1													2	5				
		<i>Nephtys picta</i>	Juvenile																								5															8	261				
		<i>Nephtys picta</i>		6	9	23	11	7				11	11	6	9	4	1	15	15	19	7	11	5	3	14		9			6	7	8				6	9	6	5	10	8	5	16				
		<i>Nephtys picta</i>		6	9	23	11	7				11	11	6	9	4	1	15	15	19	7	11	5	3	14		9			6	7	8				6	9	6	5	10	8	5	16				
		<i>Nephtys sp.</i>	Juvenile																															7	9							16	4				
		<i>Nephtys sp.</i>									1																	3							7	9						4	1				
		<i>Eumida sanguinea</i>																									1															2	100				
		<i>Phyllodoce mucosa</i>									1						1																									2	12				
		<i>Harmothoe extenuata</i>					1							23	1		1		1	2			10			3	10		2		2		2	8	31		3		1				100				
		<i>Harmothoe imbricata</i>								7												5																				12	2				
		<i>Harmothoe sp.</i>											2																														2	5			
		<i>Sigalion arenicola</i>	Juvenile																									22				2											24	41			
		<i>Sigalion arenicola</i>		2							1				1	5					3					1								4	2		6		13	2	1		65				
		<i>Sigalion arenicola</i>		2							1				1	5					3					1			22			2		4	2		6		13	2	1		65				
		<i>Sthenelais boa</i>											1																													1	24				
		<i>Sthenelais limicola</i>			2				3			1	3						1	2									4	1	1			1		4							2	1			
		<i>Sphaerodoropsis corrugata</i>																						1																		24					
		<i>Parexogone hebes</i>																			3						9																2	1			
		<i>Streptosyllis varians</i>																															5										23				
		<i>Syllides fulvus</i>																														1											1	3			
		<i>Parougia caeca</i>																			1								1							1							3	3			
		<i>Pettiboneia duofurca</i>																																			5						6	1			
		<i>Lumbrinerides acuta</i>																																2										3	3		
		<i>Ninoe nigripes</i>																																										2	2		
		<i>Scoletoma acicularum</i>					2							7				1												2	19	1	2	1	1	16	7		3	3	1	3	126				
		<i>Scoletoma hebes</i>										2																																5	1		
		<i>Scoletoma verrilli</i>											1																															1	1		
		<i>Drilonereis longa</i>					2																																					5	5		
		<i>Drilonereis magna</i>							1							1														1	1		2							1				9	1		
		<i>Notocirrus spinifera</i>					3	1					1																															6	1		
		<i>Diopatra cuprea</i>																																										1	1		
		<i>Onuphis eremita</i>																																										1	1		
		<i>Boccardia proboscidea</i>					13	3		2			2	2				2		2				1																				27	12		
		<i>Dipolydora socialis</i>									1																																	1	1		
		<i>Dispio uncinata</i>										1																								2								4	4		
		<i>Marenzelleria viridis</i>																																											1	1	
		<i>Prionospio pygmaeus</i>				2		2					3	2																															9	1	
		<i>Spio filicornis</i>				1																																							263	69	
		<i>Spiophanes bombyx</i> Complex		1	6	9	2	4	31				10	5			1	23		4	2	1	82	113		3	1	2	4	2	5	2	1		1										8	4	
		<i>Ampharete cf. lindstroemi</i>																																											4	4	
		<i>Ampharete</i> sp.																			1																								1	1	
		<i>Ampharete</i> sp.	Juvenile											1																															1	1	
		<i>Ampharete oculata</i>							2				4	1						1										2																14	7
		Cirratulidae						1	3	19						3		3	3	4	1	6	17	3	1	5	11			2	6	2		5	2	45		1	4						159	7	
		Cirratulidae	Juvenile																																											7	1
<i>Aphelochaeta marioni</i>																																												2	2		
<i>Caulieriella venefica</i>		11	6	2													2	4														4											36	8			
<i>Kirkegaardia baptisteeae</i>																																												14	8		
<i>Tharyx</i> sp. A sensu MWRA 2007				5								1																																8	1		
<i>Pherusa affinis</i>								</																																							

APPENDIX I MACROFAUNAL ANALYSIS - SUMMARY

Phylum Class/Order	Taxon	Qualifier	EW2-2A	EW2-2B	EW2-2C	EW2-3A	EW2-3B	EW2-3C	EW2-4	EW2-5A	EW2-5B	EW2-5C	EW2-6A	EW2-6B	EW2-6C	EW2-7A	EW2-7B	EW2-7C	EW2-8A	EW2-8B	EW2-8C	EW2-9	EW2-10A	EW2-10B	EW2-10C	EW2-11	EW2-12A	EW2-12B	EW2-12C	EW2-13A	EW2-13B	EW2-13C	EW2-14A	EW2-14B	EW2-14C	EW2-15A	EW2-15B-1	EW2-15C	EW2-16	Total				
	<i>Notomastus</i> sp. 1 EcoA 2021																																								2	2		
	<i>Magelona papillicornis</i>		1	1												5						1																				8		
	<i>Magelona rosea</i>								1				1	1	2		1	1									1				1		2									11		
	Maldanidae	Juvenile	1		2	6	17		2		24	1		2				2							5			1															63	
	<i>Clymenella mucosa</i>							1									1																1								4			
	<i>Clymenella mucosa</i>	Juvenile																																				3			3			
	<i>Clymenella mucosa</i>							1									1												1					1					3			7		
	<i>Clymenella torquata</i>							2																																		2		
	<i>Clymenella zonalis</i>							1																																		1		
	<i>Sabaco elongatus</i>																																									1		
	<i>Ophelia bicornis</i>																																									1		
	<i>Ophelia denticulata</i>																																									1		
	<i>Leitoscoloplos fragilis</i>			1			6	1		2	5															2			2									1				19		
	<i>Leitoscoloplos</i> sp.	Juvenile										1													2																	3		
	<i>Leitoscoloplos</i> sp.																		2	1	1	3						2						1							10			
	<i>Owenia fusiformis</i>																																									1		
	<i>Aricidea (Acмира) catherinae</i>						1								2		1								3			2	1				2	4						5		23		
	<i>Aricidea (Aricidea) wassi</i>		2	2																					2										1					6	1	23		
	<i>Aricidea</i> sp.				1																																					1		
	<i>Cirrophorus branchiatus</i>											1																														2		
	<i>Cirrophorus furcatus</i>																																									2		
	<i>Paradoneis lyra</i>																																									1		
	<i>Polygordius jouinae</i>		2	3			1	19	2			54	4	2	15		4	13	38	85				5	107	37	3			19	1	47	166	439			26		87	28	1207			
	<i>Scalibregma inflatum</i>											1	1				1		1						1																	6		
	<i>Travisia</i> sp.	Juvenile	1																																							1		
	<i>Travisia forbesii</i>																																									2		
	<i>Travisia parva</i>												1		1	1										1	2								3							9		
ARTHROPODA																																												
Malacostraca	<i>Pseudoleptocuma minus</i>		22	1	1	7		1	37	8		1	4	5	18	5	6	7	1			4	23	10	10	18	5			3	9	10	6	3	2	9	1	7	3	4	251			
	<i>Diastylis polita</i>			1	4						1							1					2		1										1						11			
	<i>Diastylis sculpta</i>		1				4	1		2									1						2				2					8	3			1		3	29			
	<i>Ampelisca vadorum</i>						1												3																						4			
	<i>Ampelisca verrilli</i>				12	8	10			23	13												38																		104			
	<i>Byblis serrata</i>			1											4		5	10								3	3		2			3	5								62			
	<i>Unciola irrorata</i>				2	3	2	10		1	6	4		1		7		3	1	9	31				7	6		6	2		4		1		11			2	3	11	137			
	<i>Argissa hamatipes</i>																																									1		
	<i>Monocorophium</i> sp.	Juvenile									1																															2		
	<i>Monocorophium</i> sp.																																									1		
	<i>Acanthohaustorius shoemakeri</i>			3																																						3		
	<i>Protohaustorius deichmannae</i>			54										4			7	1																							72			
	<i>Protohaustorius wigleyi</i>		14						20					6									3																			58		
	<i>Photis pollex</i>																																									4		
	<i>Siphonocetes smithianus</i>								1																																	8		
	<i>Idunella smithi</i>							1																																		1		
	<i>Liljeborgia</i> sp.																																									3		
	<i>Hippomedon serratus</i>																																									25		
	<i>Americhelidium americanum</i>		23	5	1	7		10	6				3	19	8	2	1					1	4	4	8	9				5		2	6	1		7	19	5	1	5	3	152		
	<i>Ameroculodes edwardsi</i>		2											1																												15		
	<i>Phoxocephalus holbolli</i>							3																																		23		
	<i>Rhepoxynius hudsoni</i>		37	12	1	7	1	36	1	2		2		11	18	3	19	16	8		1	3	16	3	3	11	4	35	3	4	2	17	4		1	8	5	9	11	2	313			
	<i>Dyopodos monacanthus</i>																	1																							2			
	<i>Bathyporeia quoddensis</i>								3																																	3		
	<i>Proboloides holmesi</i>																																									2		
	<i>Pseudunciola obliqua</i>		24						28					25	11		22		2			2					1	5			2			4			5	2	15	24	174			
	<i>Ptilanthura tenuis</i>		1	1				1				1													1	1															7			
	<i>Chiridotea tuftsi</i>		1	1	1																																				3			
	<i>Politolana polita</i>		1						1				1	1																											9			
	<i>Edotia triloba</i>		4	2	1		1		2				2	1									3	2	3		1		5	2			1	2	3						45			
	<i>Tanaissus psammophilus</i>		1	15					1				1	2	4	8	4	6	3</																									

APPENDIX I MACROFAUNAL ANALYSIS - SUMMARY

Phylum Class/Order	Taxon	Qualifier	EW2-2A	EW2-2B	EW2-2C	EW2-3A	EW2-3B	EW2-3C	EW2-4	EW2-5A	EW2-5B	EW2-5C	EW2-6A	EW2-6B	EW2-6C	EW2-7A	EW2-7B	EW2-7C	EW2-8A	EW2-8B	EW2-8C	EW2-9	EW2-10A	EW2-10B	EW2-10C	EW2-11	EW2-12A	EW2-12B	EW2-12C	EW2-13A	EW2-13B	EW2-13C	EW2-14A	EW2-14B	EW2-14C	EW2-15A	EW2-15B-1	EW2-15C	EW2-16	Total		
Bivalvia	Bivalvia		2		5		3	57			4	5	18	4	2	22	9	5	5	14	8	11	3	18	28	7	5	2	6		4		5	4	12		1	5		1	4	279
	<i>Ensis leei</i>		3											1	1		3	2						18	28		1				1			4	2				2	9		
	<i>Siliqua costata</i>	Juvenile								1	1																													12		
	Solenidae				4		1	1		1	1								1				1				2					3	1					3	2	4		
	<i>Anadara transversa</i>										2		1			1								1															1			
	<i>Astarte castanea</i>																							1			24			1				1	1	2			39			
	<i>Astarte undata</i>													1		1								1														4				
	<i>Parvicardium pinnulatum</i>													1										1															1			
	Tellinidae	Juvenile	2	4	19	4	21	3				9	16	5	3	2	4	6	13	7	1	4	16	11			6	1	8	4	6	5	11	1		1	2		5	1	201	
	<i>Ameritella versicolor</i>	Juvenile					1				1	1			3		2		1	1						1	1							1	2					12		
	Mytilidae	Juvenile						4																																4		
	<i>Crenella decussata</i>														1																									4		
	<i>Nucula proxima</i>	Juvenile	1	4	12	3	4					13	9		2	1	5		7	6	1		17	5			7		21	6		1						2		138		
	<i>Yoldia</i> sp.	Juvenile			3			6				15	10		1								3						2												41	
	<i>Yoldia limatula</i>								1				3										1						1											7		
	<i>Arctica islandica</i>																																							2		
	<i>Spisula solidissima</i>		7	1	5			2							1		3	1		1	1		5	1		3	4	3			3	1	3	6	1	1			2		55	
	Veneridae	Juvenile																																							1	
	<i>Agriopoma morrhuenum</i>				5		7				10	12							4		2			7			4		2				1								54	
	<i>Lyonsia</i> sp.	Juvenile																1								1										1				3		
	<i>Pandora gouldiana</i>												1																											1		
	<i>Periploma</i> sp.	Juvenile												1		1																								2		
	Gastropoda																																								6	
	<i>Crepidula plana</i>							3				1				1	1								1	1				1											3	
	<i>Crepidula</i> sp.																3																							6		
	Naticidae																																								1	
Naticidae	Juvenile																1									1														1		
<i>Euspira triseriata</i>									1						1											1									1				4			
Neogastropoda																																								1		
<i>Ilyanassa trivittata</i>				1		3	1			3		1	2	1	1	1	1	1			1	1	1	1		1		1		1	3	1	2	2	2		1		1	2	35	
<i>Turbonilla</i> sp.	Juvenile										1					1																								2		
ECHINODERMATA																																										
Echinoidea	Echinoidea	Juvenile	6	2	4		4		6	1				2	1	12	5	3				4				1	19	1		1								16	31	1	126	
	<i>Echinarachnius parma</i>			8	2		28		3	1	21	7	6	1	1	1	7	7				7					6	3	1		3	2		4	1		10	5		130		
Holothuroidea	<i>Echinocardium cordatum</i>																																							1		
	Holothuroidea																						2																2			
Synaptidae																																								1		
ANNELIDA																																										
Citellata	Naididae			3				2		2	2	3				2	1	2	1	3					2	2	3			16	1	2		7		1		13	4	72		
CHORDATA																																										
Ascidacea	Ascidacea	Juvenile														18																								18		
	<i>Leptocardii</i>	Juvenile																	1																				1			
Leptocardii	Cephalochordata								1											1																			3			
Cnidaria																																										
Anthozoa	Actiniaria																																									
	Ceriantharia																																									
Anthozoa																																										
HEMICHORDATA																																										
Enteropneusta	<i>Saccoglossus kowalevskii</i>																				1																					
NEMERTEA																																										
Nemertea	Nemertea	Juvenile		1											3																									84		
	<i>Nemertea</i>																																						6			
PHORONIDA	<i>Phoronis</i> sp.				4	3		1		1	7							1																								
PLATYHELMINTHES	Platyhelminthes													2																												
SIPUNCULA																																										
Sipunculidae	Sipuncula																																									
	<i>Phascolion cryptum</i>																																									
FORAMINIFERA																																										
Monothalamaea	<i>Astrorhiza</i> sp.																																									
		Number of Individuals	180	169	148	73	160	193	162	142	182	170	102	103	201	144	137	117	212	335	106	160	116	254	151	177	115	94	104	62	148	308	631	73	158	99	223	305	122	6336		
		Number of Taxa	28	31	34	18	35	32	22	31	36	29	32	28	34	31	34	34	29	30	28	33	29	39	29	31	28	30	30	20	26	31	36	21	33	27	30	35	36	183		
Taxa excluded from statistical analysis																																										
ARTHROPODA																																										
Malacostraca	<i>Americamysis bigelowi</i>																																									

APPENDIX J MACROFAUNAL ANALYSIS – STATION RANKING

APPENDIX J MACROFAUNAL ANALYSIS – STATION RANKING

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