MAY 6 | 2022

Appendix D: Benthic Resource Characterization Report

Coastal Virginia Offshore Wind Commercial Project

Dominion Energy®

Submitted by:
Dominion Energy Services, Inc.
707 E. Main Street,
Richmond, VA 23219

Prepared by:
Tetra Tech, Inc.
4101 Cox Road, Suite 120
Glen Allen, VA 23060

Submitted to:
Bureau of Ocean Energy Management
45600 Woodland Road
Sterling, VA 20166

The assessment presented herein is consistent with the Project Design Envelope considered by Dominion Energy Virginia (Dominion Energy) prior to summer 2022. Due to maturation of the Coastal Virginia Offshore Wind Commercial Project (Project) design, Dominion Energy was able to refine several components of the Project and has subsequently revised the Construction and Operations Plan (COP) as re-submitted in February 2023. The primary changes are summarized as follows:

- The Maximum Layout includes up to 202 wind turbine generators (WTGs), with a maximum WTG capacity of 16 megawatts. As the Preferred Layout, Dominion Energy proposes to install a total of 176, 14.7-megawatt capacity WTGs with 7 additional positions identified as spare WTG locations. For both the Preferred Layout and Maximum Layout, the Offshore Substations will be within the WTG grid pattern oriented at 35 degrees and spaced approximately 0.75 nautical mile (1.39 kilometers) in an east-west direction and 0.93 nautical mile (1.72 kilometers) in a north-south direction.
- Removal of Interconnection Cable Route Options 2, 3, 4, and 5 from consideration. As the Preferred Interconnection Cable Route Option, Dominion Energy proposes to install Interconnection Cable Route Option 1.

The analysis presented in this appendix reflects the initial 205 WTG position layout as well as Interconnection Cable Route Options 1, 2, 3, 4, 5, and 6 as the maximum Project Design Envelope. Reduction in the Project Design Envelope is not anticipated to result in any additional impacts not previously considered in the COP. Therefore, in accordance with the Bureau of Ocean Energy Management's Draft Guidance Regarding the Use of a Project Design Envelope in a Construction and Operations Plan (2018), the appendix has not been revised. Additional details regarding evolution of the Project is provided in Section 2 of the COP and details regarding the full Project Design Envelope are provided in Section 3 of the COP.

CONSTRUCTION AND OPERATIONS PLAN

Coastal Virginia Offshore Wind Commercial Project

Appendix D

Benthic Resource Characterization

Prepared for:

Dominion Energy®

707 East Main Street
Richmond, VA 23219

Prepared by:

TETRA TECH

Tetra Tech, Inc.
4101 Cox Road, Suite 120
Glen Allen, VA 23060

www.tetratech.com

Submitted March 2021, Revised May 2022

EXECUTIVE SUMMARY

Tetra Tech, Inc. (Tetra Tech) conducted a benthic survey in 2020 in support of the Coastal Virginia Offshore Wind Commercial Project (Project). The Project will be constructed and operated under the Commercial Lease of Submerged Lands for Renewable Energy Development on the Outer Continental Shelf Offshore Virginia (Lease No. OCS-A-0483, Lease Area). Benthic survey sampling activities were conducted in the Offshore Survey Area, which includes the portions of the Project Components in the Lease Area and Offshore Export Cable Route Corridor that could be directly or indirectly affected by the construction, operations, and decommissioning of the Project.

The Benthic Survey Protocol and the Benthic Resource Characterization were prepared in accordance with BOEM's site characterization requirements (30 Code of Federal Regulations § 585.627); 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) and the Greater Atlantic Regional Fisheries Office's *Recommendations for Mapping Fish Habitat* (NOAA Fisheries 2020). The Benthic Survey Protocol (Attachment D-3) was submitted to NOAA Fisheries and BOEM for review and comment prior to execution of the surveys.

No hardbottom habitats were observed or detected within the Offshore Survey Area. Sand dominated all grab samples, with a mean of 93.2 percent (primarily fine sand), followed by gravel (3.7 percent) and silt and clay (3.0 percent). At least 26 unique taxa were identified in towed video images (e.g., arthropod crustaceans, cnidarians, ctenophores, echinoderms, fishes, mollusks). Sand tracks, moon snail eggs, skate egg cases, squid egg mops, burrows, mounds, and siphon holes provided further evidence of benthic organisms throughout the Offshore Survey Area. Annelids (specifically, polychaete worms) were numerically dominant throughout the Offshore Survey Area. Mollusks comprised approximately 78.2 percent of the total biomass, followed by annelids (9.6 percent) and arthropods (7.8 percent).

Grain size and organic content of sediment in grab samples were consistent with the expected site conditions in the Offshore Survey Area. The fine- and medium-grained sand of the Offshore Survey Area provides uniform and simple (non-complex) habitat for benthic infaunal organisms typical of this region. Samples were analyzed for species richness (number of species), abundance (number of individuals), diversity (measure of species richness and abundance), and evenness (measure of relative abundance). The species assemblage sieved from the grab samples was consistent with prior descriptions of benthic habitats in the Lease Area. Neither the Lease Area nor the Offshore Export Cable Route Corridor samples differed substantially from the reference samples. All surveyed sites were characterized as softbottom habitat dominated by sand. The results of the High Resolution Geophysical (HRG) surveys were used to develop the habitat characterization maps included in Appendix E, EFH Assessment, which documents no evidence of complex or biogenic habitat within the Offshore Project Area, based on the criteria in the NMFS-GARFO (2021) recommendations.

Results are summarized in Table ES-1.

Table ES-1 Summary of Results for the 2020 Benthic Survey

Parameter	Lease Area		Offshore Export Cable Route Corridor	
	Samples	Reference Samples	Samples	Reference Samples
Number of Samples	52	6	13	3
Sample Numbers	GS-17 through GS-51	GS-52-REF through GS-57-REF	GS-04 through GS-16	GS-01-REF through GS-03-REF
Average Grain Size	59.9% fine sand, 29.7% medium sand, 4.4% coarse sand, 3.9% gravel, 2.0% silt/clay	51.5% fine sand, 39.9% medium sand, 4.5% coarse sand, 2.6% gravel, 1.6% silt/clay	64.3% fine sand, 21.2% medium sand, 6.4% silt/clay, 4.4% coarse sand, 3.6% gravel	66.3% fine sand, 18.6% medium sand, 10.5% silt/clay, 3.0% coarse sand, 1.6% gravel
Organic Content	0.1 – 1.2%	0.08 - 0.5%	0.2 - 1.0%	0.1 - 0.5%
Number of Species per Sample	127 – 1,936	495 – 1,642	191 – 1,067	92 – 1,453
Species Richness	25 – 70	47 – 83	28 – 80	28 – 37
Species Diversity (H')	0.55 – 3.50	1.93 – 3.25	2.01 – 3.60	1.78 – 2.72
Dominant Phyla	Annelida Arthropoda Mollusca	Annelida Arthropoda Mollusca	Annelida Arthropoda Mollusca	Annelida Arthropoda Mollusca
Dominant Species and Approximate % Abundance	*Byblis serrata*, 34%	Oligochaetes, 18%	Ascidiaceans, 7%	Oligochaetes, 41%

Appendix D BENTHIC RESOURCE CHARACTERIZATION

TABLE OF CONTENTS

TABLES

FIGURES

ATTACHMENTS

ACRONYMS AND ABBREVIATIONS

ac	acre
ASTM	American Society for Testing and Materials
BOEM	Bureau of Ocean Energy Management
CFR	Code of Federal Regulations
cm	centimeter
CMECS	Coastal and Marine Ecological Classification Standard
COP	Construction and Operations Plan
CVOW	Coastal Virginia Offshore Wind
Dominion Energy	Virginia Electric and Power Company, a wholly-owned subsidiary of Dominion Resources Inc.
EPA	Environmental Protection Agency
ESA	Endangered Species Act
ft	foot
ft2	square foot
GARFO	Greater Atlantic Regional Fisheries Office
in	inch
km	kilometer
km2	square kilometer
knot	nautical mile per hour
Lease Area	BOEM-designated Renewable Energy Lease Area OCS-A 0483
m	meter
m2	square meter
MARCO	Mid-Atlantic Regional Council on the Ocean
mg/kg	milligram per kilogram
mi2	square mile
MLLW	Mean Lower Low Water
µm	micrometer
MSFCMA	Magnuson-Stevens Fishery Conservation and Management Act
NAD83	North American Datum 1983
NEPA	National Environmental Policy Act
nm	nautical mile
NOAA Fisheries	National Oceanic and Atmospheric Administration's (NOAA) National Marine Fisheries Service
OCS	Outer Continental Shelf
Project	Coastal Virginia Offshore Wind Commercial Project
Tetra Tech	Tetra Tech, Inc.
TOC	Total Organic Content
U.S.	United States
UTM	Universal Transverse Mercator
VDEQ	Virginia Department of Environmental Quality
VDWR	Virginia Department of Wildlife Resources
VMRC	Virginia Marine Resources Commission
VOWTAP	Virginia Offshore Wind Technology Advancement Project
WEA	Wind Energy Area

D.1 INTRODUCTION

Virginia Electric and Power Company, d/b/a Dominion Energy Virginia (Dominion Energy), submits this Benthic Resource Characterization of sampling activities conducted in Summer 2020 in support of the Coastal Virginia Offshore Wind (CVOW) Commercial Project (Project). The Project will be constructed and operated under the Commercial Lease of Submerged Lands for Renewable Energy Development on the Outer Continental Shelf (OCS) Offshore Virginia (Lease No. OCS-A-0483, Lease Area). Sampling activities were conducted in the Offshore Survey Area, which includes the portions of the Project Components in the Lease Area and Offshore Export Cable Route Corridor that could be directly or indirectly affected by the construction, operations, or decommissioning of the Project (Figure D-1).

Characterization of benthic resources is required by the United States (U.S.) Department of Interior's Bureau of Ocean Energy Management (BOEM) to support regulatory filings for renewable energy projects proposed on the Atlantic OCS. This Report was prepared in accordance with BOEM's site characterization requirements (30 Code of Federal Regulations [CFR] § 585.627); 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); and the Greater Atlantic Regional Fisheries Office's (GARFO) *Recommendations for Mapping Fish Habitat* (NOAA Fisheries 2020).

The benthic site characterization described herein was designed to facilitate evaluation of existing seafloor and sub-seafloor conditions, inform Project design and development, and inform an assessment of potential effects on physical, biological, and socioeconomic marine resources resulting from the proposed activities within the Offshore Survey Area. The objective of this Report is to provide federal and state reviewers the data necessary to support permitting decisions under the National Environmental Policy Act (NEPA), Endangered Species Act (ESA), Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA), and state environmental laws and regulations. This report includes the identification and confirmation of benthic species collected from the Offshore Survey Area; the characterization of benthic community composition, surficial sediment layers, and physical hydrodynamic properties of the Offshore Survey Area; and the identification of baseline reference areas with similar physical and biological characteristics outside the Offshore Survey Area.

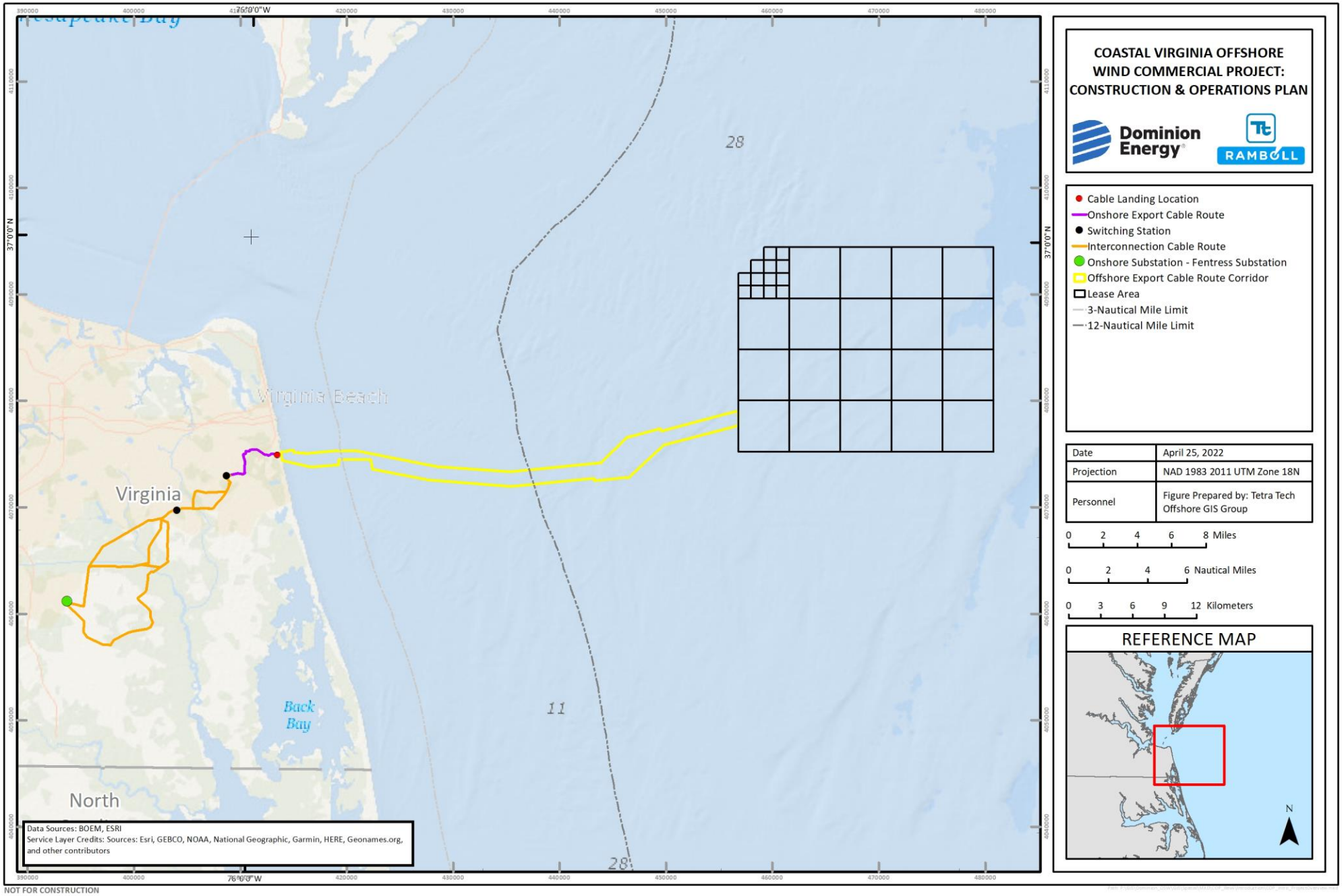

COASTAL VIRGINIA OFFSHORE WIND COMMERCIAL PROJECT: CONSTRUCTION & OPERATIONS PLAN
Dominion Energy
RAMBOLL
Cable Landing Location
Onshore Export Cable Route
Switching Station
Interconnection Cable Route
Onshore Substation - Fentress Substation
Offshore Export Cable Route Corridor
Lease Area
3-Nautical Mile Limit
12-Nautical Mile Limit
Date
April 25, 2022
Projection
NAD 1983 2011 UTM Zone 18N
Personnel
Figure Prepared by: Tetra Tech Offshore GIS Group
0 2 4 6 8 Miles
0 2 4 6 Nautical Miles
0 3 6 9 12 Kilometers
REFERENCE MAP
N
Virginia Beach
Virginia
North
Back Bay
28
11
28
37°0'0"N
76°0'0"W
Data Sources: BOEM, ESRI
Service Layer Credits: Sources: Esri, GEBCO, NOAA, National Geographic, Garmin, HERE, Geonames.org, and other contributors
NOT FOR CONSTRUCTION

Figure D-1. CVOW Commercial Offshore Survey Area Overview.

D.1.1 Offshore Survey Area Description

The Lease Area consists of 19 full OCS Lease Blocks and 13 sub-blocks, located in the southern Mid-Atlantic Bight shelf (Figure D-1). The northwest corner of the Lease Area is located 20.5 nautical miles (nm, 38.0 kilometers [km]) from the Eastern Shore Peninsula and 23.75 nm (44.1 km) from Virginia Beach, Virginia. The Lease Area covers approximately 112,799 acres (ac, 45,648 hectares [ha]) of seafloor, as defined in Addendum A, Section II of the Lease. Water depths within the Offshore Survey Area range from 0 to 98 feet (ft, 0 to 30 meters [m]) in the Offshore Export Cable Route Corridor and 49 to 131 ft (15 to 40 m) in the Lease Area (NOAA 2021). The Lease Area is shallowest in the northwestern and southwestern corners and deepest in the northeast corner (Guida et al. 2017).

BOEM (2019) requires that benthic resources be characterized throughout the Offshore Survey Area, with recommended sample coverage of one sample location approximately every 0.4 to 0.8 mi^2 (1 to 2 square kilometers [km^2]) in the Lease Area and approximately one sample location every 0.6 to 1.2 mi (1 to 2 km) along the Offshore Export Cable Route Corridor. Dominion Energy's 2020 benthic grab survey augments existing data with grab samples and towed video imagery in the Lease Area (Figure D-2) and along the Offshore Export Cable Route Corridor (Figure D-3) so that the recommended sampling density is met (Table D-1**)**.

Prior to selecting locations for the 2020 benthic survey, Dominion Energy reviewed benthic characterization data within and adjacent to the Offshore Survey Area reported by other parties. Data collected for the U.S. Geological Survey usSEABED, Fugro 2013 HRG Survey, Atlantic Marine Assessment Program for Protected Species (AMAPPS) within the Lease Area were incorporated into this report as warranted. Grab samples collected in the Offshore Export Cable Route Corridor for the usSEABED programs and the CVOW Pilot Project Research Lease Area (formerly the Virginia Offshore Wind Technology Advancement Project [VOWTAP]) and associated cable route corridor (Tetra Tech 2014) were also included in this report.

Most of Dominion Energy's 2020 benthic sample locations were selected to ground-truth data previously collected by other parties, fill spatial gaps, or further investigate areas of potentially complex habitat. Areas with sandwaves, variable sediment types, and transition zones were targeted to more fully represent the range of benthic habitats in the Offshore Survey Area. Dominion Energy collected grab samples in the "Fish Haven," a VMRC-managed artificial reef in the northern portion of the Lease Area (also known as the Triangle Reef, Figure D-2) in the northern portion of the Lease Area. Six reference locations associated with the Lease Area and three locations associated with the Offshore Export Cable Route Corridor were sampled to characterize pre-construction conditions; reference samples were collected from comparable habitat approximately 6,562 ft (2,000 m) outside the Offshore Survey Area.

No seagrass beds are reported or expected to occur within the Offshore Export Cable Route Corridor (VIMS 2018); therefore, Dominion Energy does not propose in-water seagrass surveys at this time. If new data become available that indicate seagrasses near or within the proposed cable landfall site, Dominion Energy recognizes that seagrass surveys may be recommended by federal or state resource managers.

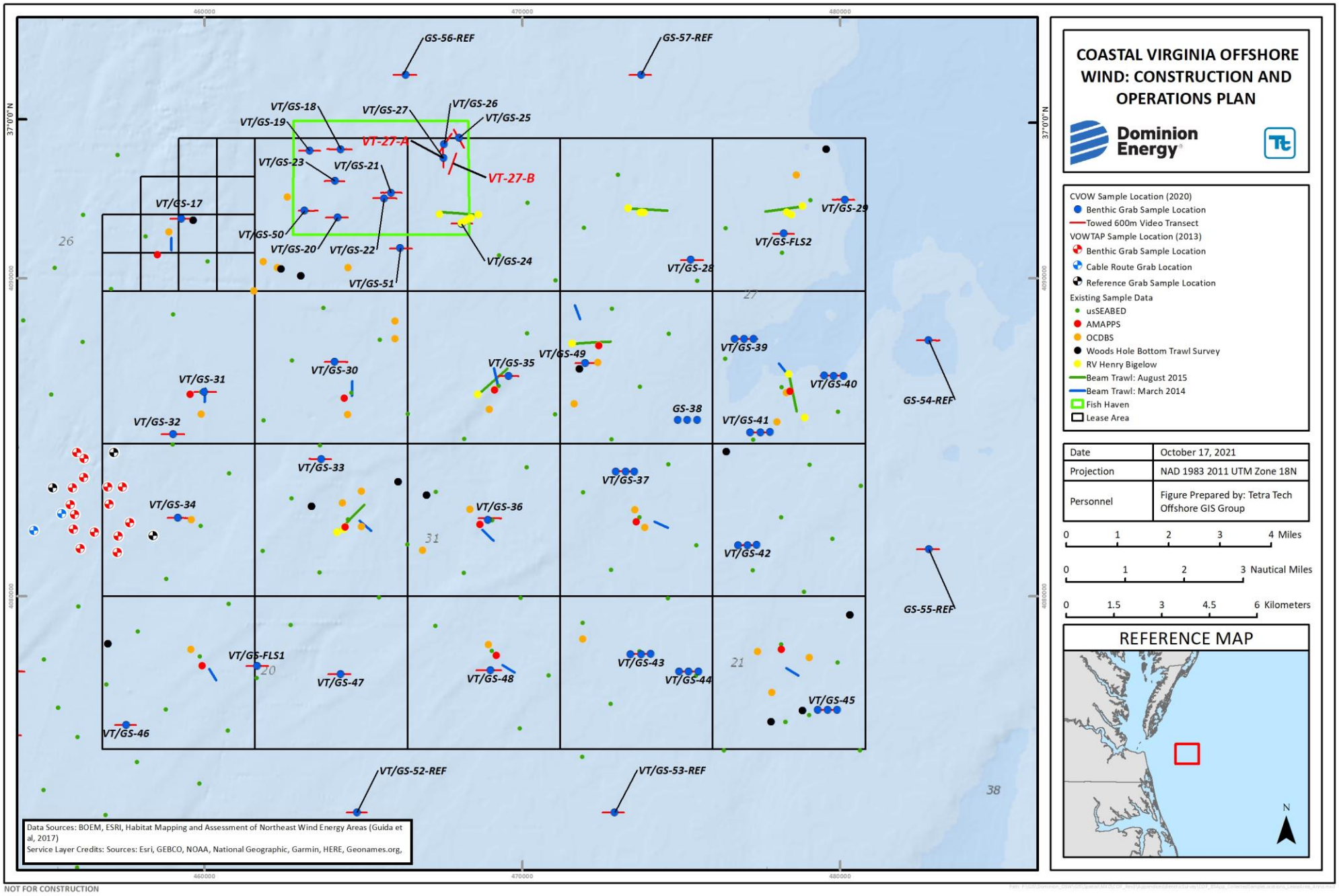


Figure D-2. Benthic Locations Surveyed by Tetra Tech (2020, 2013) and Other Parties - Lease Area

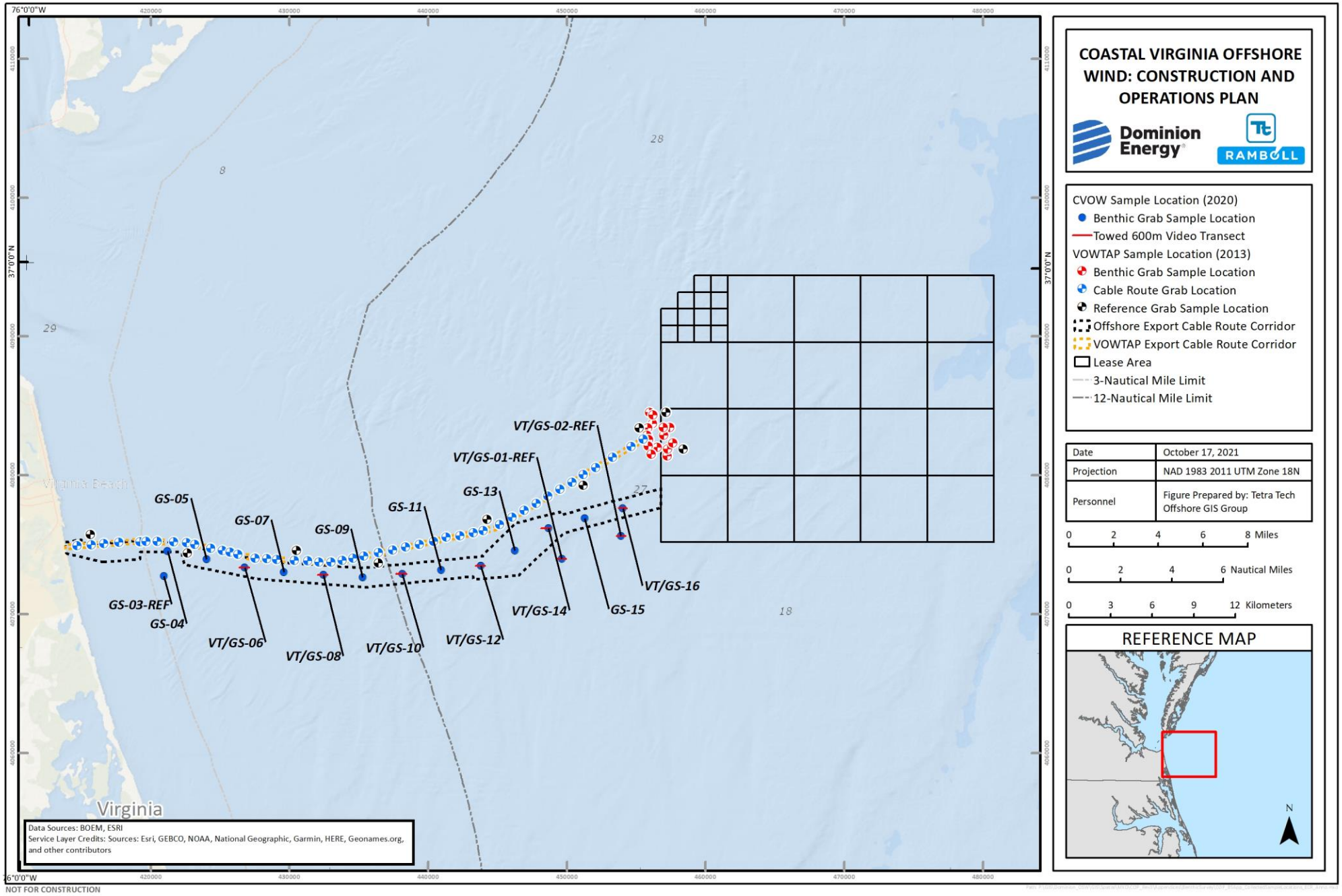


Figure D-3. Benthic Locations Surveyed by Tetra Tech (2020, 2013) and Other Parties - Offshore Export Cable Route Corridor

D.1.2 Survey Planning and Regulatory Permitting

Pursuant to 30 CFR § 585.626 and 627, BOEM requires that site characterization surveys and information be provided to determine the presence of live bottom, hardbottom, and topographic features that could represent important benthic habitats for marine species in the Offshore Survey Area to support the Construction and Operations Plan (COP), which will include a supplementary Essential Fish Habitat Assessment. The benthic survey provides site-specific data necessary to support review by federal agencies (BOEM and the National Oceanic and Atmospheric Administration's National Marine Fisheries Service [NOAA Fisheries]) and Commonwealth of Virginia resource management agencies (Virginia Marine Resources Commission [VMRC], Virginia Department of Environmental Quality [VDEQ], and the Virginia Department of Wildlife Resources [VDWR]) responsible for evaluating environmental impacts under NEPA and other applicable statutes. The Commonwealth of Virginia does not have an Ocean Plan, but instead uses the Mid-Atlantic Ocean Action Plan developed by the Mid-Atlantic Regional Council on the Ocean (MARCO) (MARCO 2020) to implement its "ocean strategy" and to coordinate Coastal Zone Management on a regional level.

Dominion Energy submitted an initial Benthic Survey Protocol (Attachment D-3) to BOEM and NOAA Fisheries on May 19, 2020 and a final Benthic Survey Protocol on June 05, 2020, then hosted a Pre-Benthic Survey agency meeting on June 09, 2020. On June 29, 2020, BOEM acknowledged (via email) that the Benthic survey Protocol would meet the information requirements for COP submittal. Dominion Energy received a Scientific Collecting Permit (#20-053) from VMRC authorizing activities conducted under this survey on July 09, 2020.

D.1.3 Existing Benthic Resource Conditions

Before conducting the 2020 benthic survey, Dominion Energy compiled and reviewed publicly available databases, technical literature, and site-specific reports containing benthic survey data collected by other parties in the Offshore Survey Area from 1998 to 2018 (Table D-1). These major sources as well as numerous primary research publications were used to support the description of existing conditions provided below. Dominion Energy's 2020 benthic survey results are presented in Section D.2 within the context of these earlier data reports.

The softbottom sediments east of the Virginia shoreline are representative of the Mid-Atlantic Bight, characterized as fine sand punctuated by gravel and silt/sand mixes (Milliman 1972; Steimle and Zetlin 2000). Substrates in the Offshore Survey Area are consistent with this regional pattern and include unconsolidated sediments comprised of gravel (larger than 2000 micrometers [µm]), sand (62.5 to 2000 µm), silt (4 to 62.5 µm), clay (smaller than 4 µm), and shell debris (Williams et al. 2006). Benthic habitats in the Mid-Atlantic Bight are typically described as seven bathymetric/morphologic subdivisions (the inner shelf, central shelf, central and inner shelf swales, outer shelf, outer shelf swales, shelf break, and continental slope) (Johnson 2002). These subdivisions are based on depth, faunal zone, characteristic macrofauna, and other factors. The Offshore Survey Area is in the inner shelf zone (characterized by average depths of 0 to 98 ft [0 to 30 m], coarse to fine sands, sand waves, and benthic macrofauna dominated by polychaetes) and central shelf zone (characterized by average depths of 98 to 164 ft [30 to 50 m], coarse to fine sands, and benthic macrofauna dominated by polychaetes and amphipods) (BOEM 2012).

Numerous sources report that the Offshore Survey Area is dominated by fine- and coarse-grain sand, with isolated patches of mud from the center of the Lease Area west along the Offshore Export Cable Route Corridor and gravel in the eastern portion of the Lease Area (Cutter and Diaz 1998; Diaz et al. 2004; Diaz et al. 2006; USACE 2009; Greene et al. 2010; Fugro 2013; Guida et al. 2017; NOAA Fisheries and BOEM 2019; MARCO 2020). Shallow- and medium-penetration sub-bottom profiler data indicate that the upper 19.7 ft (6.0 m) of the subsurface is typically composed of unconsolidated sand with some interbedded silt, clay, and gravel (Fugro 2013). Buried, relict drainage systems and clay-filled fluvial systems are known to occur within the inner and mid-shelf region of the Mid-Atlantic Bight, as confirmed by seismic data (Fugro 2013). The lack of natural hard substrate within the Offshore Survey Area is further supported by the results of previous hydrographic surveys in this region (Poppe et al. 2005). The Offshore Survey Area bottom topography is characterized by a sedimentary fan, shelf valley tributaries to the north and east of the Lease Area, and a series of sand ridges trending northeast to southwest throughout the Lease Area (Guida et al. 2017). The slopes in the Offshore Survey Area generally fall within 1.2 degrees and there is minimal rugosity throughout the area (Guida et al. 2017).

The primary morphological features of the Mid-Atlantic Bight shelf include shoal massifs, scarps, sand ridges, and swales. Sand waves primarily occur on the inner shelf, often on the sides of sand ridges. Ripples and megaripples are the most dynamic of these sand formations and occur on sand waves or separately on the inner or central shelf. Megaripples tend to survive for less than a season; they can quickly form during a storm and reshape the upper 19.6 inches (in) to 39.4 in (50 centimeters [cm] to 100 cm) of the sediments within a few hours. Ripples, which usually have lengths of about 0.4 in to 59.1 in (1 cm to 150 cm) and heights of a few centimeters, are also found everywhere on the shelf and appear or disappear within hours or days, depending upon storms and currents (BOEM 2016).

In 2013, Tetra Tech, Inc. (Tetra Tech) completed BOEM-compliant HRG and benthic characterization surveys (including multibeam echosounder bathymetry, sidescan sonar imagery, sub-bottom profiling, seismic geophysical data) and collected benthic grab samples in three aliquots in the western portion of the Lease Area and three aliquots adjacent to the western border of the Lease Area in the CVOW Pilot Project Research Lease Area (Tetra Tech 2013; Tetra Tech 2014). Tetra Tech's survey reports characterized the area as a soft-bottom mosaic with fine to coarse sands and very low organic content. Northeasterly-trending sand ridges of high relief and extent are situated on a broad shallow shoal complex that dominates the southwestern half of the Lease Area. The northern portions of the Lease Area consist of sand ridges and superimposed bedforms. Smaller surficial features, including dunes and sediment ripples resulting from short-term wave and tidal processes, are superimposed on the larger features throughout the Lease Area, indicating the potential for sediment transport in this region. Within the offshore export cable route corridor, substrates are typically fine- to medium-grain sand, with some gravel and small sand ridges and waves no higher than 8.2 ft (2.5 m) in the deeper portions. Slopes are consistently less than 5 degrees along the Offshore Export Cable Route Corridor. Nearing the Lease Area, ridges and waves increase in width and attain maximum heights of 16.4 ft (5.0 m) (Tetra Tech 2013). Site-specific geophysical surveys provide more detailed description of bottom habitat features for the Lease Area and Offshore Export Cable Route Corridor (see Appendix E, Essential Fish Habitat Assessment).

Table D-1. Existing Benthic Habitat Characterization Data in the Offshore Survey Area

Data Source	Date	Coverage Area	Data Types	Output
TerraSond and Alpine HRG Survey of the CVOW Commercial Project, Lease Area and Offshore Export Cable Route Corridor	Ongoing; started April 2020	Offshore Survey Area,	Multibeam echo sounder (MBES) bathymetry, side scan sonar, and sub-bottom profiling; grab samples for grain size distribution	Acoustic data, grain size
BOEM Habitat Mapping and Assessment Report (Guida et al. 2017). Includes a compilation of data, such as the Atlantic Marine Assessment Program for Protected Species; Coastal and Marine Hazards and Resources Program (usSEABED), and the seasonal trawl survey data from NOAA Fisheries	2017	Virginia Wind Energy Area (WEA)	Compilation of existing and new data on sediment, benthic habitats, and fisheries resources in the WEA.	Comprehensive database that characterizes contemporary benthic habitats in the WEA
BOEM, Virginia Ocean Geophysical Survey Phase II Analyses Offshore Virginia Wind Energy Area (BOEM 2016)	2016	Lease Area	MBES bathymetry, bottom type, and sub-bottom profiling	Sand ridges situated on a broad shallow shoal complex throughout the Lease Area. Sediments are comprised primarily of sand and silty sand.
Fugro/BOEM, Regional Geophysical Survey and Interpretive Report: Virginia WEA Offshore Southeastern Virginia (Fugro 2013)	2013			
Dominion Energy HRG, Geotechnical, and Benthic Survey of the Coastal Virginia Offshore Wind Pilot Project Research Lease Area and associated offshore export cable route corridor to Virginia Beach, VA (Tetra Tech 2013; Tetra Tech 2014)	2013	Research Lease Area	MBES bathymetry, side scan sonar, and sub-bottom profiling; 60 benthic grab samples, and still photos	Generally flat, sandy substrate with sand waves. Areas of gravel on west side; typical biodiversity for region
The Nature Conservancy, Northwest Atlantic Marine Ecoregional Assessment (Greene et al. 2010)	2010	Northeast U.S. Continental Shelf, Large Marine Ecosystem	Benthic habitat classification based on grain size data and existing habitat models, with representative organisms.	Coarse-level habitat classifications
U.S. Army Corps of Engineers, Norfolk District, Environmental Assessment Sandbridge Beach Erosion Control and Hurricane Protection Project (Cutter and Diaz 1998; Diaz et al. 2004; Diaz et al. 2006; USACE 2009)	1998-2009	Dam Neck Ocean Disposal Site, Ocean Channel	Benthic samples: 25 grabs; 50 Sediment Profile Imagery; 33 otter trawl transects	Benthic communities and demersal fishes were similar in areas disturbed by sand mining and undisturbed reference sites.

Naturally occurring hardbottom substrates and structured reefs are rare in the Mid-Atlantic Bight and were not observed in the CVOW Pilot Project Research Lease Area surveys. In the northern portion of the Lease Area, known as the Fish Haven, several large World War II-era tankers and transport ships, cables, tires, and other materials have been placed to form an artificial reef (Triangle Reef) (Lucy 1983). The VMRC continues to expand Triangle Reef by placing scuttled cables, tires, and other materials within the Fish Haven (VMRC 2020).

The sandy sediments within the Mid-Atlantic Bight support a diverse fauna dominated by polychaete species and, to a lesser extent, mollusks and arthropods (Diaz et al. 2004; Diaz et al. 2006; Greene et al. 2010; BOEM 2012; BOEM 2016). U.S. Fish and Wildlife Service benthic sampling programs determined that the most abundant taxa in Virginia nearshore habitats (in descending order of abundance) were polychaete worms, bivalve mollusks, and amphipods (USACE 2009). Cutter and Diaz (1998) noted these taxa as well as decapods, sand dollars, and lancelets. Benthic community analyses in the Offshore Survey Area vary by season. Epifaunal communities were defined by dwarf surfclam (*Milunia lateralis*), sand shrimp (*Crangon septemspinosa*), and unclassified snails in March surveys and calico scallop (*Argopecten gibbus*), dwarf warty sea slug (*Pleurobranchaea bubala*), longclaw hermit crab (*Pagurus longicarpus*), and New England dog whelk snail (*Nassarius trivittatus*) in August surveys (Guida et al. 2017). Infaunal communities were defined by polychaetes and oligochaetes in March surveys and a variety of taxa in August surveys (Guida et al. 2017). Across both survey seasons, communities were largely comprised of non-core taxa (i.e., taxa not occurring in 80.0 percent or more of samples), suggesting high infaunal diversity (Guida et al. 2017). The CVOW Pilot Project Research Lease Area identified sand ridges, sand waves, megaripples, and ripples in the survey area. Such non-complex habitats, which are typical of the Mid-Atlantic Bight, are inhabited by annelids (especially polychaetes), mollusks, and arthropods (notably crustaceans) in the CVOW Pilot Project Research Lease Area. Mollusks comprised approximately 66 percent of the total sample biomass, followed by annelids (approximately 17 percent), and crustaceans (approximately 11 percent) (Tetra Tech 2013; Tetra Tech 2014).

D.1.4 Survey Overview

Dominion Energy's Summer 2020 benthic survey activities included collecting grab samples and measuring water quality parameters; sieving infaunal organisms from grab samples for identification and enumeration in the laboratory; and collecting and analyzing towed video and time-lapse still camera images of bottom habitats (listed in Table D-2). The Benthic Survey Protocol is in Attachment D-3 and results are summarized in Section D.2.

Table D-2. Benthic Sampling Survey Schedule

Start Date	End Date	Activity
08/15/2020	08/19/2020	Benthic grab sampling and towed video recording.
09/01/2020	09/17/2020	Laboratory sediment processing (grain size and TOC).
09/01/2020	01/21/2021	Laboratory infauna processing (taxonomy and biomass).
09/16/2020	10/30/2020	Towed video and still image processing.
11/19/2020	02/08/2021	Data analysis and report writing.

Dominion Energy's 2020 Benthic Survey was designed to fill data gaps in previous studies within the Offshore Survey Area (see Table D-1). The survey collected grab sediment samples to characterize grain size, measure total organic content (TOC), and catalog benthic infauna. Underwater still imagery and towed video imagery were collected to supplement the discrete grab samples. Water quality parameters (e.g., temperature, salinity, dissolved oxygen, pH) measured throughout the water column were standardized to represent near-bottom conditions at each grab sample location. A crosswalk of Dominion Energy's survey sampling activities selected to align with current guidance from BOEM (BOEM 2019) and recommendations from GARFO (NOAA Fisheries 2020) is provided in Table D-3.

Table D-3. Crosswalk of Sampling Activities with BOEM's Benthic Guidelines and GARFO's Recommendations

Proposed Benthic Survey Parameter	Benthic Characterization Method		
	Towed video and time-lapse Still Photo Imagery (visible habitat features, epifauna, demersal fish and invertebrates)	Grab Samples (grain size distribution, total organic content, sieved infauna)	HRG Survey (MBES, sidescan sonar, Bathymetry, Backscatter Mosaic, Slope)
BOEM Benthic Survey Guidelines (BOEM 2019)			
Identification of potentially sensitive seafloor habitat or taxa	✔	✔	✔
Classification to CMECS Biotic Subclass and Biotic Group	✔	✔	--
Characterization of macrofaunal community	✔	--	--
Identification of taxonomic diversity	✔	✔	--
Characterization of benthic habitat attributes	✔	✔	✔
Identification of invasive taxa	✔	✔	--
GARFO Recommendations for Mapping Fish Habitat (NOAA Fisheries 2020)			
Map and characterize benthic habitat types within the Project Area [mapping is forthcoming as part of the EFH Assessment, pending completion of HRG survey data analysis, and resolution depends on complexity of habitat type]			
Non-Complex habitat (sand ripples, sand waves, ridges) and extensive areas of homogeneous substrate types *[provide maps at a landscape-scale ranging from 1:25,000 to 1:100,000, with a resolution of 0.25 m to 0.50 m]*	✔	✔	✔
Complex habitat 1. hardbottom substrates (rock, gravels/gravel mixes/gravelly/shell) 2. hardbottom substrates with epifauna or macroalgae cover 3. vegetated habitats *[provide maps at a scale ranging from 1:1,000 to 1:5,000, with a resolution of 0.10 m or better, within a 2,000 m^2 minimum area]*	✔	✔ [for areas of high substrate heterogeneity; multiple stations, 3 replicates per station]	✔
Other biogenic habitats (corals, tube-dwelling anemones, structure-forming polychaetes)			✔
Bathymetry, backscatter mosaic, and slope maps *[provide maps with a resolution of 0.10 m to 0.50 m, using continuous variables – color ramp displays]*	--	--	✔

Surveys were conducted from the Northstar Commander, a 240 ft (73.2 m) vessel with a 7,590 ft^2 (705.5 m^2) back deck area and an A-frame, winches, and crane for deployment of the towed survey and sediment sampling equipment (Figure D-4). The 50 towed video transects were completed in the Offshore Survey Area:

- 36 in the Lease Area (plus 6 reference samples). (Figure D-2)
- 6 in the Offshore Export Cable Route Corridor (plus 2 reference samples). (Figure D-3).

Towed video transects extended for up to 1,968 ft (600 m on either side of a grab location transect) orientated to account for prevailing wind, known seafloor obstructions, and sea conditions. In some cases, pre-selected survey transects were relocated up to 200 m to avoid obstructions. The original vector was altered in some cases to avoid contact with shipwrecks within the Fish Haven (see as-sampled locations in Figure 2 and planned locations in the Benthic Survey Location Map Book contained in Attachment D-3).

Seafloor imagery was collected at selected sample locations using a custom, underwater camera system comprised of two cameras to capture still images (one facing down and one facing forward) and one camera to record video, as described in Attachment D-3. The cameras were towed at approximately 0.5 – 1.0 knots.

Figure D-4. Northstar Commander Underway During the 2020 Benthic Survey

Grab sampling was consistent with methods described in the U.S. Environmental Protection Agency (EPA) National Coastal Condition Assessment (EPA 2015) using a 0.04-m^2 Young-modified Van Veen grab sampler, deployed from a vessel-mounted A-frame in soft bottom sediments (e.g., sand, mud, silt). The 74 benthic grab samples were collected in the Offshore Survey Area, included:

- 52 in the Lease Area (plus 6 nearby reference samples). (Figure D-2)
- 13 in the Offshore Export Cable Route Corridor (plus 3 nearby reference samples). (Figure D-3)

All grab samples were collected at a penetration depth of at least 2.75 in (7 cm) and only samples that were greater than 50 percent full were retained and processed for analysis. In areas of predicted gravel, triplicate grab samples were collected at the start, midpoint and end of a towed video transect.

Penetration depth, sediment color, odor, surface features of each sediment sample were recorded when the sampler was brought aboard. The sample was photographed and visible macrofauna were described and returned to the water. Subsamples for grain size and TOC analysis were removed. Then the remaining sediments in the grab were sieved through a clean 500-µm sieve. Material retained by the sieve was preserved in buffered formalin and shipped in coolers to the taxonomic laboratory for identification and enumeration (see Attachment D-3). Grain size and TOC samples were shipped on ice to Tetra Tech's in-house geotechnical laboratory for processing using standard methods (see Attachment D-3).

D.2 SURVEY RESULTS

The following sections summarize the results of the benthic analysis, including analysis of macrofauna in digital imagery, benthic habitat and sediment type, and benthic infauna in sieved grab samples collected within the Offshore Survey Area. Overall results common to the entire Offshore Survey Area are presented first, followed by results specific to the Lease Area (and associated reference locations) and results specific to the Offshore Export Cable Route Corridor (and associated reference locations). Reference locations were selected to ensure that future comparisons can be made between the baseline conditions reported here and the conditions following construction and operations within and outside the Offshore Survey Area.

This section presents data for grab samples, digital imagery, and laboratory analyses for the following targets in the Offshore Survey Area:

- 52 locations in the Lease Area (GS-17 through GS-51) and 6 locations in the reference area (GS-52-REF through GS-57-REF) (Figure D-2); and
- 13 locations in the Offshore Export Cable Route Corridor (GS-04 through GS-16) and 3 locations in the reference area (GS-01-REF through GS-03-REF) (Figure D-3**)**.

Near-bottom water quality parameters measured were within ranges typical in the Mid-Atlantic Bight (Table D-4). The water quality sonde fixed to the grab sampler collected continuous data at 2 Hz during drop/retrieval at all 74 grab sample stations. Results were standardized to 6.23 ft (1.9 m) above the seafloor to avoid effects of the grab sampler on water quality readings.

Table D-4. Summary of Near-Bottom Water Quality Parameters in the Offshore Survey Area

Water Quality Parameter	Mean (n=74)	Minimum	Maximum
Temperature (°C)	15.2	12.6	19.2
Salinity (Practical Salinity Units)	32.4	31.9	32.8
Dissolved Oxygen (milligrams per liter)	8.1	6.7	8.7
Dissolved Oxygen (% saturation)	99.1	86.9	101.8
pH	7.98	7.83	8.04

D.2.1 Underwater Imagery

Underwater imagery was collected to visually corroborate sediment grab sample results, identify presence or absence of hardbottom, and provide a brief overview of epibenthic and demersal macrofauna that may be present in the Offshore Survey Area (described in greater detail in Appendix E Supplement to the COP, Essential Fish Habitat Assessment). Visible fishes, crustaceans, and mollusks were identified and enumerated to the extent practical to document the presence of organisms in the target areas. Many of the species observed are highly mobile and occupy geographically broad habitats exceeding the boundaries of the Offshore Survey Area. Due to the variable presence of these species in a single location at a given time, limited comparisons can be made across Project and reference transect results; reference transects will not be relied upon to provide a baseline for pre-construction Lease Area community composition. However, the epibenthic and demersal species present in both Project and reference transects were similarly represented across both transect types. The moon snail (*Neverita lewisii*) was present in 9.5 percent of Project transects and 12.5 percent of reference transects; urchin (Echinoidia sp.) was present in 19 percent of Project transects and 12.5 percent of reference transects; northern sea robin (*Prionotus carolinus*) was present in 40.5 percent of Project transects and 37.5 percent of reference transects; and sand dollar (*Echinarachnius parma*) was present in 54.8 percent of Project transects and 75.0 percent of reference transects.

No hardbottom habitats were observed in the 30 km of towed video collected in the Offshore Survey Area and reference transects. The 26 taxa identified in the Offshore Survey Area are typical of the sandy substrates common in the Mid-Atlantic Bight (Table D-5**;** Table D-6**)**. Hard clam (*Mercenaria mercenaria*) and blue mussel (*Mytilus edulis*) were observed in the Offshore Export Cable Route Corridor but not the Lease Area. Conversely, black sea bass (*Centropristis striata*) and several other fish and invertebrates were reported in the Lease Area but not the cable corridor (Table D-5; Table D-6). Evidence of benthic invertebrate and fish presence throughout the Offshore Survey Area included sand tracks, moon snail egg collars, skate egg cases, cephalopod egg mops, burrows, mounds, and siphon holes. Marine debris (including bottles, cables, and grates) was reported in five Lease Area transects and one Offshore Export Cable Route Corridor transect. Representative images from each towed video transect are in Attachment D-1.

Table D-5. Summary of Organisms Observed in Project Video Transect Imagery (ranked by percent presence)

Type of Organism	Scientific Name	Common Name	Project Transects Containing Organisms		Percent Presence in All Transects
			Lease Area	Offshore Export Cable Route Corridor	
Cnidarian	*Cyanea capillata*	lion's mane jellyfish	35	6	97.6%
Echinoderm	*Echinarachnius parma*	sand dollar	19	4	54.8%
Fish	*Prionotus carolinus*	northern sea robin	12	5	40.5%
Fish	*Anchoa mitchilli*	bay anchovy	8	1	21.4%
Fish	*Urophycis regia*	spotted hake	8	1	21.4%
Echinoderm	*Asteroidea sp.*	sea star	7	0	19.0%
Arthropod	*Cancer irroratus*	Atlantic rock crab	7	1	19.0%

Type of Organism	Scientific Name	Common Name	Project Transects Containing Organisms		Percent Presence in All Transects
			Lease Area	Offshore Export Cable Route Corridor	
Echinoderm	*Echinoida sp.*	urchin	6	1	19.0%
Fish	*Centropristis striata*	black sea bass	4	0	9.5%
Arthropod	*Libinia emarginata*	spider crab	4	0	9.5%
Fish	*Micrpogonias undulatus*	Atlantic croaker	1	3	9.5%
Mollusk	*Neverita lewisii*	moon snail	4	0	9.5%
Fish	*Ammodytes americanus*	sand lance	3	0	7.1%
Cnidarian	*Aurelia aurita*	moon jellyfish	3	0	7.1%
Arthropod	*Limulus polyphemus*	horseshoe crab	2	1	7.1%
Fish	*Raja eglanteria*	clearnose skate	3	0	7.1%
Fish	*Trichiurus lepturus*	cutlassfish	2	1	7.1%
Ctenophore	*Beroe ovata*	comb jellyfish	2	0	4.8%
Mollusk	*Busycon carica*	whelk	1	1	4.8%
Arthropod	*Coenobitidae sp.*	hermit crab	2	0	4.8%
Arthropod	*Ovalipes ocellatus*	lady crab	2	0	4.8%
Fish	*Peprilus triacanthus*	Atlantic butterfish	2	0	4.8%
Fish	*Lagodon rhomboides*	pinfish	1	0	2.4%
Mollusk	*Mercenaria mercenaria*	quahog	0	0	2.4%
Mollusk	*Mytilus edulis*	blue mussel	0	1	2.4%
Fish	*Stenotomus chrysops*	scup	1	0	2.4%

Table D-6. Summary of Organisms Observed in Reference Video Transect Imagery (ranked by percent presence)

Type of Organism	Scientific Name	Common Name	Reference Transects Containing Organisms		Percent Presence in All Transects
			Lease Area	Offshore Export Cable Route Corridor	
Cnidarian	*Cyanea capillata*	lion's mane jellyfish	5	2	87.5%
Echinoderm	*Echinarachnius parma*	sand dollar	5	1	75.0%
Fish	*Prionotus carolinus*	northern sea robin	2	1	37.5%
Echinoderm	*Echinoida sp.*	urchin	1	0	12.5%
Mollusk	*Neverita lewisii*	moon snail	1	0	12.5%

Lease Area: Macrofauna Visible in Digital Imagery

A total of 24 taxa were identified in Lease Area towed video transects, including arthropods, cnidarians, ctenophores, echinoderms, fishes, and mollusks (Figure D-6). In addition to the organisms themselves, 24 of the 42 video transects (including 2 reference locations) contained separate evidence of benthic organisms,

such as moon snail egg collars, skate egg cases, cephalopod egg mops, tracks, burrows, mounds, and siphon holes in the predominantly sandy substrate. As expected, marine debris (e.g., cables and a metal grate) was observed in five Lease Area transects located in Fish Haven. Black sea bass and other structure-associated species were observed aggregating around the abandoned cables (Figure D-5).

Figure D-5. Black Sea Bass aggregating around abandoned cables in Fish Haven (VT-20)

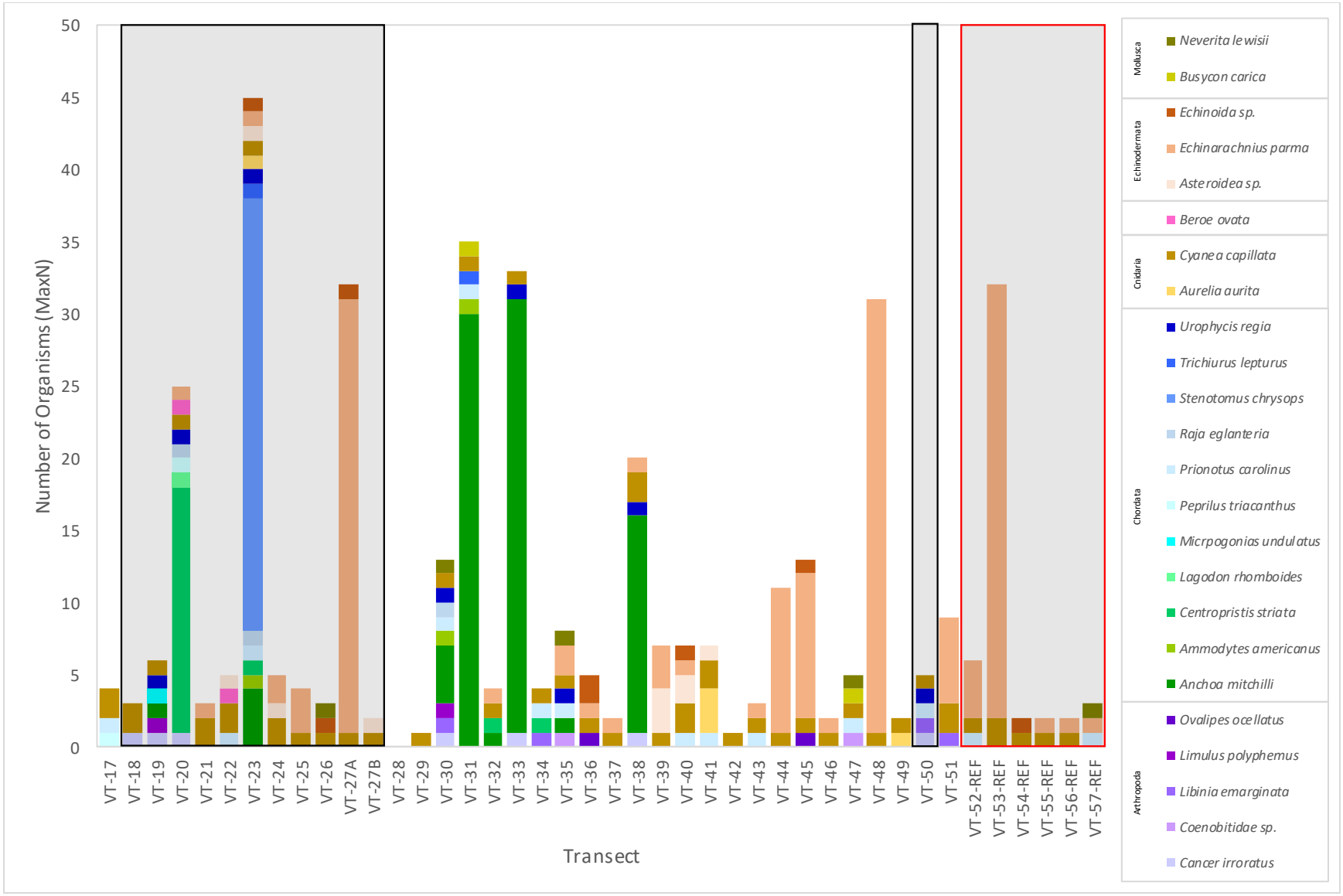


Figure D-6. Macrofauna Observed in Towed Video Imagery: Lease Area.
Note: Locations inside black boxes are within Fish Haven; locations inside red box are reference transects

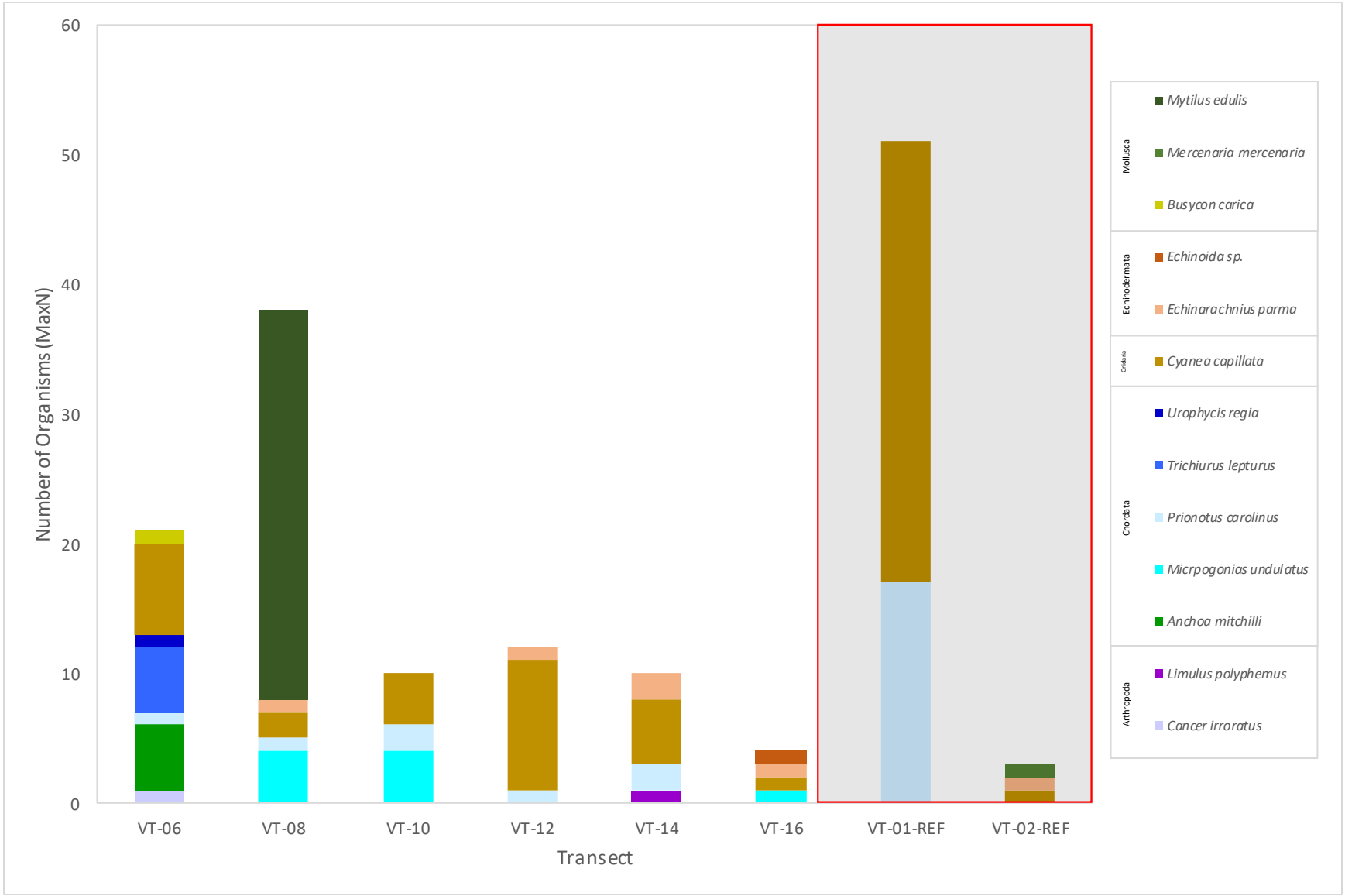


Figure D-7. Demersal Organisms Observed in Offshore Export Cable Route Corridor Towed Video Transects
Note: Locations on far right inside red box are reference transects

Offshore Export Cable Route Corridor: Macrofauna Visible in Digital Imagery

The eight Project and reference transects in the Offshore Export Cable Route Corridor contained 13 macrofauna taxa, notably fishes, mollusks, arthropods, echinoderms, and cnidarians (Figure D-7). In seven of the transects, evidence of benthic organisms typical of softbottom sediment included moon snail egg collars, skate egg cases, tracks, burrows, and mounds. The only biogenic habitat observed was a mussel bed in about 5.0 percent of transect VT-08. Marine debris was limited in these transects; one glass bottle was seen in transect VT-14.

D.2.2 Benthic Habitat and Sediment Types

No hardbottom habitats were observed or detected within the Offshore Survey Area. Sand dominated all grab samples, with a mean of 93.2 percent (primarily fine sand), followed by gravel (3.7 percent) and silt and clay (3.0 percent). Each sediment grab sample was classified using geologic metrics and benthic infauna consistent with the Coastal and Marine Ecological Classification Standard (CMECS) as refined by GARFO (NOAA Fisheries 2020) (Table D-7).

Table D-7. CMECS Classifications of Geologic and Biogenic Substrates in Grab Samples in the Offshore Survey Area

CMECS Class	CMECS Subclass	CMECS Group	CMECS Subgroup	Particle Size Range (mm)	Bathymetric and Geophysical Characteristics
Unconsolidated Mineral Substrate	Coarse Unconsolidated Substrate	Gravels	Pebble/ Granule	2 mm to <64 mm	Geologic Substrate >80% Gravel
		Gravel Mixes	Sandy Gravel	2 mm to <4096 mm	Geologic Substrate is 30% to <80% Gravel, with Sand composing 90% or more of the remaining Sand-Mud mix.
		Gravelly	Gravelly Sand		Geologic Substrate is 5% to <30% Gravel, and the remaining Sand-Mud mix is 90% or more Sand.
	Fine Unconsolidated Substrate	Sand	Very Coarse/Coarse Sand	0.5 mm to <2.0 mm	Geologic Substrate surface layer contains no trace of Gravel and is composed of >90% Sand.
			Medium Sand	0.25 mm to <0.50 mm	
			Fine/Very Fine Sand	0.0625 mm to <0.2500 mm	

CMECS Class	CMECS Subclass	CMECS Group	CMECS Subgroup	Particle Size Range (mm)	Bathymetric and Geophysical Characteristics
Shell Substrate	Mussel Reef Substrate			>4096 mm	Substrate that is dominated by living or non-living cemented, conglomerated, or otherwise self-adhered shell reefs.
	Shell Rubble			64 mm to <4096 mm	Substrate that is dominated by living or non-living shells forming Rubble. Particles may be either loose, individual shells (whole or broken) or—particularly in the larger Rubble sizes—cemented, conglomerated, or otherwise consolidated shell material.
	Shell Hash			2 mm to <64 mm	Surface substrate layers are dominated by loose shell accumulations. Shells may be broken or whole.

Note: CMECS definitions are in FGDC (2012) and NOAA Fisheries (2020)

Lease Area: Benthic Habitat and Sediment Type

Sediment characteristics and benthic infauna in the 52 grab samples in the Lease Area (GS-17 through GS-51) and 6 grab samples in the reference area (GS-52-REF through GS-57-REF) are summarized below. Sample locations are shown in Figure D-2. The complete descriptions for Project samples within and reference samples around the Lease Area are included in Table D-8 and Table D-9.

Table D-8. Sample Log and Description for Project Samples within the Lease Area

Sample Number	Easting	Northing	CMECS Description
GS-17	459278.90	4091875.79	Fine sand with shell hash
GS-18	464297.57	4094058.19	Fine sand with shell hash
GS-19	463310.62	4094016.31	Fine sand
GS-20	464196.97	4091916.48	Fine sand with shell hash
GS-21	465803.43	4092635.91	Medium to fine sand with shell hash
GS-22	465655.84	4092505.75	Fine sand with shell hash
GS-23	464112.86	4093056.44	Coarse to fine sand with shell hash
GS-24	468092.99	4091704.19	Fine sand with shell hash
GS-25	468013.89	4094416.69	Medium to fine sand with shell hash
GS-26	467549.91	4094214.71	Medium to fine sand with shell hash
GS-27	467524.82	4093776.24	Medium to fine sand
GS-28	475310.10	4090579.71	Medium to fine sand with shell hash
GS-29	480157.22	4092462.45	Fine sand with shell hash
GS-30	464108.07	4087367.75	Fine sand with shell hash
GS-31	459995.28	4086419.27	Fine sand with shell hash
GS-32	459022.36	4085094.77	Medium to fine sand with shell hash
GS-33	463677.63	4084312.37	Fine sand with shell hash
GS-34	459169.56	4082463.09	Medium to fine sand with shell hash
GS-35	469570.04	4086922.10	Medium to fine sand with shell hash
GS-36	468922.30	4082402.91	Medium to fine sand with shell hash
GS-37-A	473254.90	4083920.58	Medium to fine sand with shell hash
GS-37-B	473532.96	4083928.60	Medium to fine sand with shell hash
GS-37-C	473532.75	4083925.13	Medium to fine sand with shell hash
GS-38-A	475195.50	4085546.25	Fine sand with shell hash

Sample Number	Easting	Northing	CMECS Description
GS-38-B	475206.84	4085548.34	Fine sand with shell hash
GS-38-C	475510.53	4085543.20	Fine sand with shell hash
GS-39-A	476692.17	4088094.39	Fine sand with shell hash
GS-39-B	476991.59	4088089.09	Fine sand with shell hash
GS-39-C	476692.17	4088094.39	Fine sand with shell hash
GS-40-A	480113.30	4086931.10	Fine sand with shell hash
GS-40-B	480113.30	4086931.10	Coarse to medium sand and gravel with shell hash
GS-40-C	480113.30	4086931.10	Medium to fine sand and gravel with shell hash
GS-41-A	477177.51	4085149.34	Medium to fine sand with shell hash
GS-41-B	477499.71	4085156.80	Medium to fine sand and gravel with shell hash
GS-41-C	477793.33	4085169.40	Medium to fine sand with shell hash
GS-42-A	477080.42	4081614.24	Medium to fine sand with shell hash
GS-42-B	477366.04	4081618.18	Medium to fine sand with shell hash
GS-42-C	477379.00	4081609.00	Medium to fine sand with shell hash
GS-43-A	473403.65	4078181.10	Medium to fine sand and gravel with shell hash
GS-43-B	473960.49	4078189.27	Medium to fine sand with shell hash
GS-43-C	474040.81	4078184.77	Medium to fine sand with shell hash
GS-44-A	474942.01	4077633.53	Medium to fine sand with shell hash
GS-44-B	475244.03	4077632.23	Medium to fine sand with shell hash
GS-45-A	475552.40	4077631.51	Medium to fine sand with shell hash
GS-45-B	479295.12	4076424.29	Medium to fine sand with shell hash
GS-45-C	479612.45	4076425.50	Medium to fine sand with shell hash
GS-46	479907.68	4076425.35	Medium to fine sand with shell hash
GS-47	457550.88	4075952.28	Medium to fine sand with shell hash
GS-48	464284.57	4077547.03	Medium to fine sand with shell hash
GS-49	469004.91	4077675.02	Fine sand with shell hash
GS-50	471995.89	4087329.40	Medium to fine sand and gravel with shell hash
GS-51	463160.68	4092125.33	Fine sand with shell hash

Table D-9. Sample Log and Description for Reference Samples around the Lease Area

Sample Number	Easting	Northing	Complete Description
GS-52-REF	466326.10	4090993.76	Medium to fine sand with shell hash
GS-53-REF	464803.81	4073196.52	Medium to fine sand with shell hash
GS-54-REF	472913.67	4073205.15	Medium to fine sand with shell hash
GS-55-REF	482792.14	4088046.06	Medium to fine sand with shell hash
GS-56-REF	466332.18	4096401.03	Fine sand with shell hash
GS-57-REF	473746.03	4096399.57	Medium to fine sand with shell hash

Mean sediment composition for Project grab samples was approximately 59.9 percent fine sand, 29.7 percent medium sand, 4.4 percent coarse sand, 3.9 percent gravel, and 2.0 percent silt and clay (Table D-9, Figure D-8). Coarse sand and gravel were noted in five samples (GS-23, GS-40-B, GS-40-C, GS-41-B, and GS-50). On average, the sediment composition for reference samples was approximately 51.5 percent fine sand, 39.9 percent medium sand, 4.5 percent coarse sand, 2.6 percent gravel, and 1.6 percent silt and clay (Table D-11, Figure D-8). Mean TOC of the Project samples was 0.3 percent (range 0.1 to 1.2 percent) (Table D-10); mean TOC in the reference samples was 0.2 percent (range 0.08 to 0.5 percent) (Table D-11). Given the similarities in mean sediment grain size and TOC composition across Project and reference Lease Area samples, reference samples have been determined to provide an adequate baseline for comparison in future survey efforts.

Table D-10. Grain Size and Organic Content for Project Samples within the Lease Area

Grab Sample	Total Organic Content (%)[a/]	Particle-Size Distribution (dry mass basis)[b/]						
		Mean Particle Size (mm)	Median Particle Size (mm)	% Gravel	% Sand			% Silt and Clay
					Coarse	Medium	Fine	
GS-17	0.34	0.16	0.14	0.33	0.16	1.04	94.48	3.99
GS-18	0.22	0.20	0.19	0	0.07	0.55	97.56	1.82
GS-19	0.67	0.12	0.12	0.17	0.12	0.14	92.55	7.02
GS-20	0.21	0.24	0.21	0	0.20	5.84	92.48	1.48
GS-21	0.18	0.40	0.34	0.93	0.79	27.86	69.33	1.09
GS-22	0.20	0.30	0.28	1.92	2.88	11.32	82.45	1.43
GS-23	0.15	2.28	1.29	16.97	21.45	42.04	18.29	1.25
GS-24	0.45	0.16	0.14	1.05	1.04	2.40	91.08	4.43
GS-25	0.23	0.38	0.33	0.32	0.47	27.29	70.80	1.12
GS-26	1.20	0.37	0.33	1.38	0.85	19.76	76.75	1.26
GS-27	0.20	0.43	0.35	2.29	2.80	27.76	65.66	1.49
GS-28	0.21	1.02	0.50	9.56	7.51	40.22	41.51	1.20
GS-29	0.33	0.28	0.27	1.48	0.42	6.24	89.58	2.28
GS-30	0.27	0.17	0.16	0	0.10	1.03	95.40	3.47
GS-31	0.36	0.13	0.12	0.57	0.79	0.97	92.64	5.03
GS-32	0.18	0.70	0.50	3.64	5.77	49.35	40.06	1.18
GS-33	0.24	0.31	0.31	0.01	0.24	9.46	87.91	2.38
GS-34	0.27	0.29	0.20	0.78	2.81	21.03	70.91	4.47
GS-35	0.23	0.73	0.52	6.09	5.80	50.57	36.47	1.07
GS-36	0.15	1.20	0.67	7.24	12.38	56.09	23.47	0.82
GS-37-A	0.20	0.59	0.47	2.01	5.31	47.39	44.51	0.78
GS-37-B	0.23	0.54	0.46	0.06	2.74	51.22	44.82	1.16
GS-37-C	0.28	0.45	0.38	0.46	0.98	39.27	58.25	1.04
GS-38-A	0.41	0.17	0.16	0.17	0.16	1.49	94.84	3.34
GS-38-B	0.49	0.15	0.14	0.14	0.02	0.39	92.82	6.63
GS-38-C	0.50	0.13	0.13	0	0.08	0.19	94.23	5.50
GS-39-A	0.27	0.30	0.30	0.13	0.39	11.53	86.60	1.35
GS-39-B	0.50	0.22	0.21	0	0.09	1.84	94.95	3.12
GS-39-C	0.80	0.14	0.13	0	0	0.30	92.75	6.95
GS-40-A	0.37	0.29	0.29	0.46	0.14	12.34	85.50	1.56
GS-40-B	0.23	2.61	1.36	22.09	18.54	49.62	9.06	0.69
GS-40-C	0.18	2.33	0.69	20.86	8.46	42.67	26.46	1.55
GS-41-A	0.38	1.28	0.66	9.08	11.74	51.84	26.54	0.80
GS-41-B	0.20	1.91	0.77	15.51	13.81	47.93	22.18	0.57
GS-41-C	0.22	0.80	0.54	1.06	10.62	51.05	36.51	0.76
GS-42-A	0.20	1.28	0.66	9.87	10.46	51.10	27.70	0.87
GS-42-B	0.20	0.86	0.62	5.25	5.38	61.21	27.27	0.89
GS-42-C	0.27	0.85	0.56	3.95	8.66	50.76	35.59	1.04
GS-43-A	0.20	1.60	0.67	13.23	10.58	49.00	26.78	0.41
GS-43-B	0.20	0.87	0.57	3.80	9.87	51.25	34.05	1.03
GS-43-C	0.27	0.56	0.52	0	1.87	61.43	35.87	0.83
GS-44-A	0.18	0.50	0.45	0	1.37	52.68	45.08	0.87
GS-44-B	0.13	0.57	0.45	0.51	2.19	49.93	46.72	0.65
GS-45-A	0.11	0.75	0.53	0.99	7.32	51.84	39.15	0.70
GS-45-B	0.13	0.43	0.37	0	0.21	35.86	63.03	0.90
GS-45-C	0.16	0.40	0.35	0.05	0.44	30.29	68.00	1.22
GS-46	0.20	0.80	0.41	3.95	8.63	34.85	50.89	1.68
GS-47	0.19	1.01	0.64	5.75	10.68	57.04	25.51	1.02
GS-48	0.22	0.63	0.52	0.12	2.15	59.97	36.86	0.90
GS-49	0.20	0.29	0.29	0.20	0.29	14.95	82.30	2.26

Grab Sample	Total Organic Content (%)[a/]	Particle-Size Distribution (dry mass basis)[b/]						
		Mean Particle Size (mm)	Median Particle Size (mm)	% Gravel	% Sand			% Silt and Clay
					Coarse	Medium	Fine	
GS-50	0.27	3.29	0.70	29.98	10.03	22.34	36.69	0.96
GS-51	0.46	0.16	0.15	0.91	0.49	1.70	92.79	4.11
Mean	0.29	0.70	0.43	3.95	4.43	29.74	59.88	2.01

Notes:
a/ Organic content in accordance with ASTM Standard D2974 "Moisture, Ash and Organic Matter of Peat and Other Organic Soils," Method C (loss on ignition at 440°C).
b/ Particle-size distribution in accordance with ASTM Standard D422 "Particle-Size Analysis of Soils" using sieve analysis or ASTM Standard D6913 "Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis." Gravel-size: retained on No. 4 sieve (0.185"); coarse sand-size: passing No. 4 sieve and retained on No. 10 sieve (0.078"); medium sand-size: passing No. 10 sieve and retained on No. 40 sieve (0.0164"); fine sand-size: passing No. 40 sieve and retained on No. 200 sieve (0.0029"); silt- and clay-size: passing No. 200 sieve.

Table D-11. Grain Size and Organic Content for Reference Samples around the Lease Area

Grab Sample	Total Organic Content (%)[a/]	Particle-Size Distribution (dry mass basis)[b/]						
		Mean Particle Size (mm)	Median Particle Size (mm)	% Gravel	% Sand			% Silt and Clay
					Coarse	Medium	Fine	
GS-52-REF	0.17	0.79	0.58	3.56	5.60	59.10	31.10	0.64
GS-53-REF	0.15	0.89	0.60	3.88	9.55	54.49	31.50	0.58
GS-54-REF	0.08	0.47	0.39	0.71	1.10	41.64	55.54	1.01
GS-55-REF	0.17	0.44	0.36	0	1.44	33.73	63.84	0.99
GS-56-REF	0.50	0.13	0.10	0	0.28	2.67	91.81	5.24
GS-57-REF	0.13	0.96	0.56	7.36	8.83	47.69	35.18	0.94
Mean	0.2	0.61	0.43	2.59	4.47	39.89	51.50	1.57

Notes:
a/ Organic content in accordance with ASTM Standard D2974 "Moisture, Ash and Organic Matter of Peat and Other Organic Soils," Method C (loss on ignition at 440°C).
b/ Particle-size distribution in accordance with ASTM Standard D422 "Particle-Size Analysis of Soils" using sieve analysis or ASTM Standard D6913 "Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis." Gravel-size: retained on No. 4 sieve (0.185"); coarse sand-size: passing No. 4 sieve and retained on No. 10 sieve (0.078"); medium sand-size: passing No. 10 sieve and retained on No. 40 sieve (0.0164"); fine sand-size: passing No. 40 sieve and retained on No. 200 sieve (0.0029"); silt- and clay-size: passing No. 200 sieve.

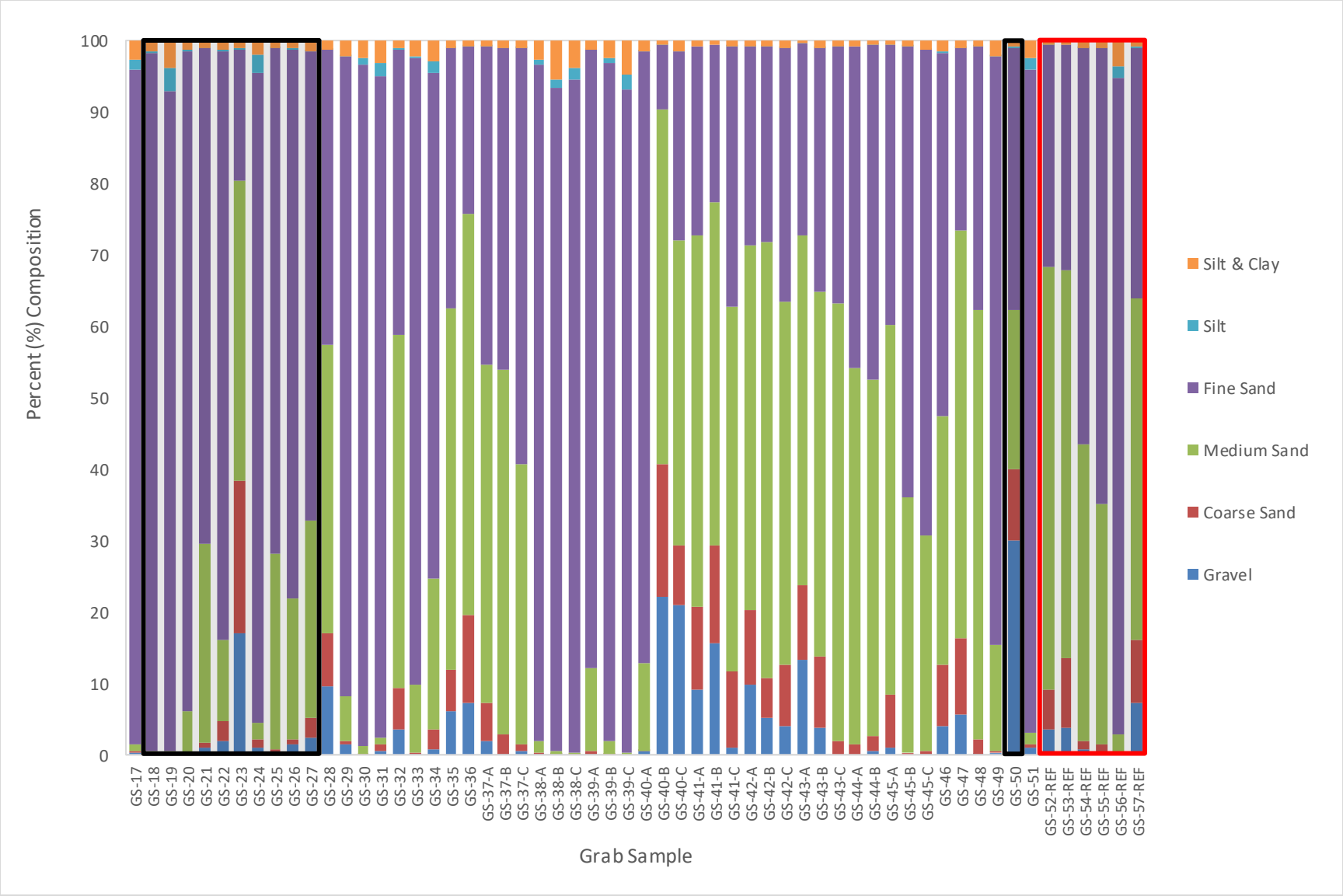


Figure D-8. Grain-size Distribution in Lease Area Grab Samples
Note: Locations inside black boxes are within Fish Haven; locations in red box are reference samples

Offshore Export Cable Route Corridor: Benthic Habitat and Sediment Type

The complete descriptions for Project samples within and reference samples around the Offshore Export Cable Route Corridor are included in Table D-12 and Table D-13.

Table D-12. Sample Log and Description for Project Samples within the Offshore Export Cable Route Corridor

Sample Number	Easting	Northing	CMECS Description
GS-04	421219.34	4074550.39	Fine sand with silt and clay
GS-05	424014.38	4073956.79	Fine sand with silt and clay
GS-06	426782.93	4073373.44	Fine sand with silt, clay, and shell hash
GS-07	429613.59	4073022.33	Medium to fine sand
GS-08	432445.54	4072837.92	Medium to fine sand and gravel with shell rubble
GS-09	435293.99	4072643.11	Medium to fine sand with shell hash
GS-10	438144.41	4072913.62	Medium to fine sand with shell hash
GS-11	440939.08	4073185.52	Medium to fine sand
GS-12	443808.11	4073480.58	Medium to fine sand with shell hash
GS-13	446258.48	4074577.81	Fine sand with shell hash
GS-14	448459.64	4076206.95	Fine sand with shell hash
GS-15	451291.65	4076918.31	Fine sand with shell hash
GS-16	454041.40	4077636.21	Medium to fine sand with shell hash

Table D-13. Sample Log and Description for Reference Samples along the Offshore Export Cable Route Corridor

Sample Number	Easting	Northing	CMECS Description
GS-01-REF	449642.79	4073984.07	Fine sand
GS-02-REF	453904.81	4075637.85	Medium to fine sand with shell hash
GS-03-REF	420962.69	4072729.90	Fine sand with silt and clay

Mean sediment composition for Project grab samples were approximately 64.3 percent fine sand, 21.2 percent medium sand, 6.4 percent silt and clay, 4.4 percent coarse sand, and 3.6 percent gravel (Table D-14, Figure D-9). Notable exceptions to this pattern included GS-04 (25.7 percent silt/clay) and GS-12 (41.0 percent medium sand and 17.9 percent coarse sand). On average, the sediment composition for reference samples was approximately 66.3 percent fine sand, 18.6 percent medium sand, 10.5 percent silt and clay, 3.0 percent coarse sand, and 1.6 percent gravel (Table D-15, Figure D-9). Silt and clay were higher than average (25.0 percent) in GS-03-REF. Mean TOC of the Project samples was 0.4 percent (range 0.2 to 1.0 percent) (Table D-14). Mean TOC of the reference samples was 0.3 percent (range 0.1 to 0.5 percent) (Table D-15). Given the similarities in mean sediment grain size and TOC composition across Project and reference Offshore Export Cable Route Corridor samples, reference samples have been determined to provide an adequate baseline for comparison in future survey efforts.

Table D-14. Grain Size and Organic Content for Project Samples within the Offshore Export Cable Route Corridor

Grab Sample	Total Organic Content (%)[a/]	Particle-Size Distribution (dry mass basis)[b/]						
		Mean Particle Size (mm)	Median Particle Size (mm)	% Gravel	% Sand			% Silt and Clay
					Coarse	Medium	Fine	
GS-04	0.62	0.09	0.09	0	0.03	0.23	74.04	25.70
GS-05	0.49	0.13	0.11	0.05	0.05	1.11	88.54	10.25
GS-06	0.55	0.10	0.10	0	0.05	0.19	85.52	14.24
GS-07	0.42	0.80	0.50	6.21	7.40	44.10	38.73	3.56
GS-08	1.02	2.00	0.40	19.16	8.11	20.57	45.78	6.38
GS-09	0.65	0.24	0.20	0.28	2.60	14.08	71.20	11.84
GS-10	0.25	0.51	0.41	1.62	2.42	43.49	51.56	0.91
GS-11	0.29	0.72	0.50	0.26	5.57	50.52	42.69	0.96
GS-12	0.17	1.32	0.67	6.33	17.93	40.98	34.03	0.73
GS-13	0.32	0.22	0.20	0	0.01	0.38	97.46	2.15
GS-14	0.27	0.32	0.32	0.27	0.21	15.10	83.12	1.30
GS-15	0.21	0.31	0.30	0.46	0.25	13.99	83.41	1.89
GS-16	0.40	1.48	0.54	12.59	12.89	31.07	40.21	3.24
Mean	0.44	0.63	0.33	3.63	4.42	21.22	64.33	6.40

Notes:
a/. Organic content in accordance with ASTM Standard D2974 "Moisture, Ash and Organic Matter of Peat and Other Organic Soils," Method C (loss on ignition at 440°C).
b/. Particle-size distribution in accordance with ASTM Standard D422 "Particle-Size Analysis of Soils" using sieve analysis or ASTM Standard D6913 "Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis." Gravel-size: retained on No. 4 sieve (0.185"); coarse sand-size: passing No. 4 sieve and retained on No. 10 sieve (0.078"); medium sand-size: passing No. 10 sieve and retained on No. 40 sieve (0.0164"); fine sand-size: passing No. 40 sieve and retained on No. 200 sieve (0.0029"); silt- and clay-size: passing No. 200 sieve.

Table D-15. Grain Size and Organic Content for Reference Samples along the Offshore Export Cable Route Corridor

Grab Sample	Total Organic Content (%)[a/]	Particle-Size Distribution (dry mass basis)[b/]						
		Mean Particle Size (mm)	Median Particle Size (mm)	% Gravel	% Sand			% Silt and Clay
					Coarse	Medium	Fine	
GS-01-REF	0.39	0.15	0.14	0	0.23	0.38	93.74	5.65
GS-02-REF	0.12	0.92	0.63	4.81	8.79	55.19	30.46	0.75
GS-03-REF	0.45	0.09	0.09	0	0.04	0.09	74.83	25.04
Mean	0.32	0.39	0.29	1.60	3.02	18.56	66.34	10.48

Notes:
a/. Organic content in accordance with ASTM Standard D2974 "Moisture, Ash and Organic Matter of Peat and Other Organic Soils," Method C (loss on ignition at 440°C).
b/. Particle-size distribution in accordance with ASTM Standard D422 "Particle-Size Analysis of Soils" using sieve analysis or ASTM Standard D6913 "Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis." Gravel-size: retained on No. 4 sieve (0.185"); coarse sand-size: passing No. 4 sieve and retained on No. 10 sieve (0.078"); medium sand-size: passing No. 10 sieve and retained on No. 40 sieve (0.0164"); fine sand-size: passing No. 40 sieve and retained on No. 200 sieve (0.0029"); silt- and clay-size: passing No. 200 sieve.

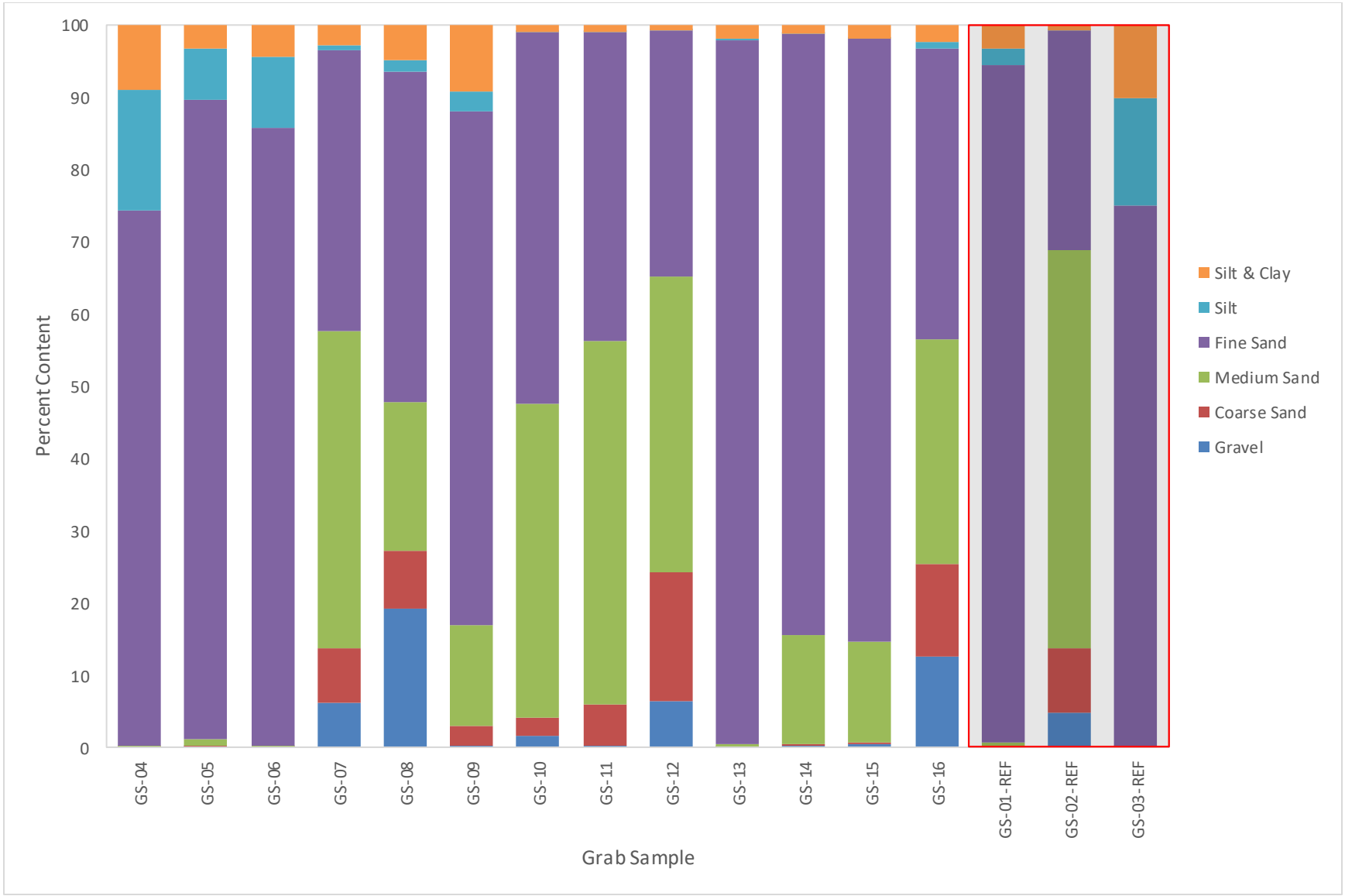


Figure D-9. Grain-size Distribution in Offshore Export Cable Route Corridor Grab Samples
Note: Locations on the far right inside red box are reference samples

Six sediment grab samples collected during Tetra Tech's Summer 2013 survey of the CVOW Pilot Project Research Lease Area (Tetra Tech 2014) in Virginia State waters are relevant to this analysis, since those samples overlap with the CVOW Commercial Project Offshore Export Cable Route Corridor (see Figure D-3 and Table D-16).

Table D-16. Sample Log and Description for CVOW Pilot Project Grab Samples Collected within State Waters of the Offshore Export Cable Route Corridor (Tetra Tech 2014)

2013 Grab Sample[a/]	Easting	Northing	Complete Description
GS-016	414712.4	4074924.7	Fine sand with silt, clay, and shell hash
GS-017	415747.4	4074995.2	Fine sand with shell hash
GS-018	416645.4	4075063.8	Fine sand with shell hash
GS-019	417719.7	4075154.5	Fine sand with shell hash
GS-020	419236.6	4075206.7	Fine sand with shell hash
GS-REF-001	415683.8	4075737.7	Fine sand with shell hash

Notes:
a/ Grey-shaded row indicates reference sample.

The six CVOW Pilot Project grab samples collected from summer 2013 within the CVOW Commercial Project Offshore Export Cable Route Corridor were dominated by fine sand, followed by silt and clay (Tetra Tech, 2014). The average sediment composition of the five CVOW Pilot Project grab samples was approximately 85.3 percent fine sand, 14.0 percent silt and clay, 0.4 percent medium sand, 0.1 percent coarse sand, and 0.1 percent gravel. The sediment composition of the reference sample was 86.8 percent fine sand, 12.7 percent silt and clay, 0.3 percent medium sand, 0.2 percent coarse sand (Table D-17, Figure D-10). TOC of the CVOW Pilot Project grab samples ranged from 0.5 to 0.7 percent (Table D-17).

Table D-17. Grain Size and Organic Content for CVOW Pilot Project Grab Samples Collected within State Waters of the Offshore Export Cable Route Corridor (Tetra Tech 2014)

2013 Grab Sample[c/]	Organic Content (%)[a/]	Particle-Size Distribution (dry mass basis)[b/]						
		Mean Particle Size (mm)	Median Particle Size (mm)	Gravel-Size (%)	Sand-Size (%)			Silt- & Clay-Size (%)
					Coarse	Medium	Fine	
GS-016	0.7	-	-	0.4	0.1	0.6	78.8	20.1
GS-017	0.6	-	-	0.0	0.1	0.4	87.3	12.2
GS-018	0.6	-	-	0.0	0.1	0.5	86.8	12.6
GS-019	0.5	-	-	0.0	0.2	0.3	86.9	12.6
GS-020	0.7	-	-	0.0	0.2	0.3	86.8	12.7
Mean	0.6	-	-	0.1	0.1	0.4	85.3	14.0
GS-REF-001	0.6	-	-	0.0	0.2	0.3	86.8	12.7

Notes:
a/ Organic content in accordance with ASTM Standard D2974 "Moisture, Ash and Organic Matter of Peat and Other Organic Soils," Method C (loss on ignition at 440°C).
b/ Particle-size distribution in accordance with ASTM Standard D422 "Particle-Size Analysis of Soils" using sieve analysis or ASTM Standard D6913 "Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis." Gravel-size: retained on No. 4 sieve (0.185"); coarse sand-size: passing No. 4 sieve and retained on No. 10 sieve (0.078"); medium sand-size: passing No. 10 sieve and retained on No. 40 sieve (0.0164"); fine sand-size: passing No. 40 sieve and retained on No. 200 sieve (0.0029"); silt- and clay-size: passing No. 200 sieve.
c/ Grey-shaded row indicates reference sample.

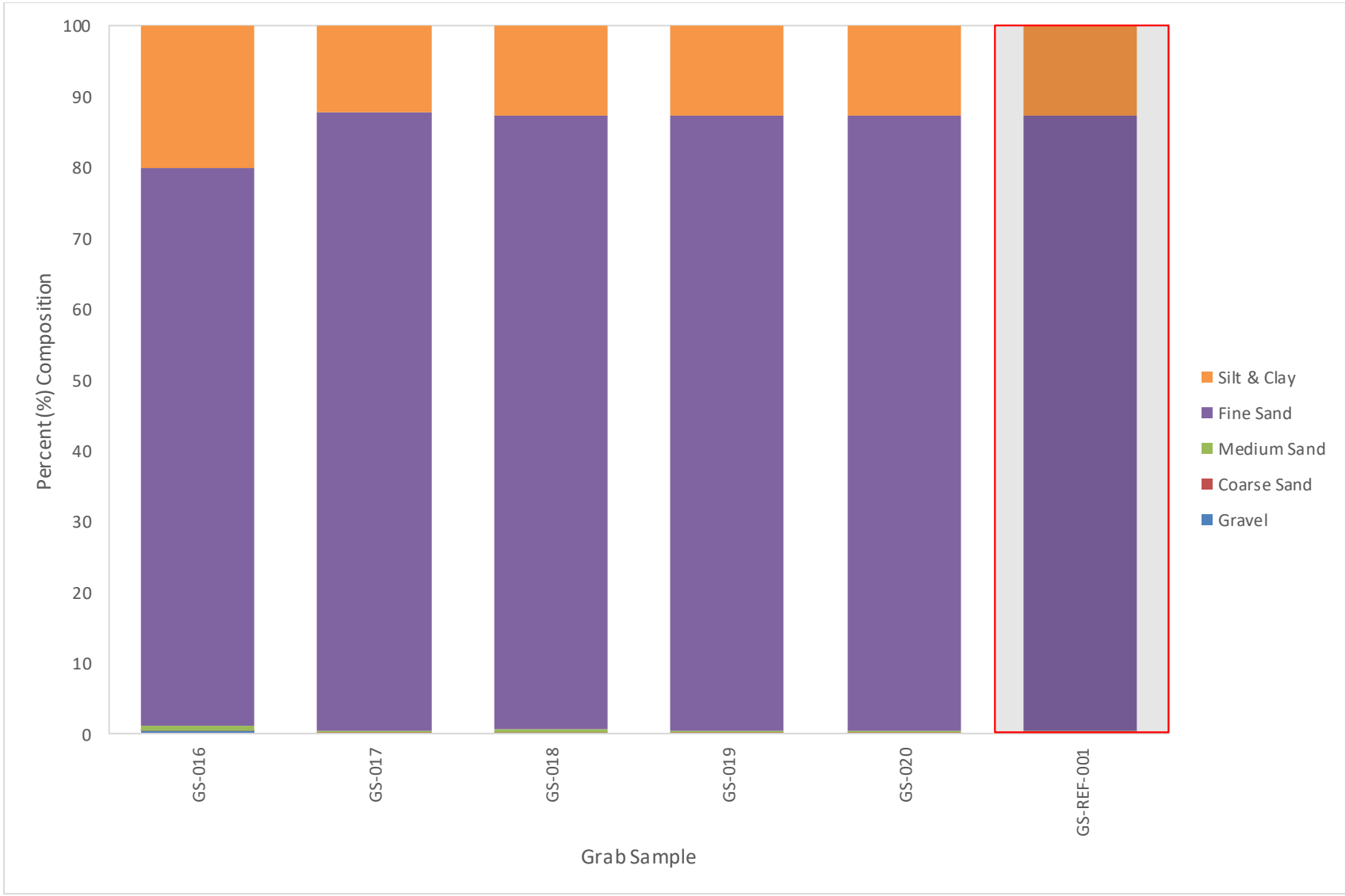


Figure D-10. Percent Composition of Sediment Type in CVOW Pilot Project 2013 Grab Samples Collected in State Waters of the Offshore Export Cable Route Corridor (Tetra Tech 2014)

(Note: Location on the far right inside red box is reference sample)

D.2.3 Benthic Infauna

Organisms sieved from sediment grab samples were identified to the lowest practical taxonomic level (generally to Family in accordance with the laboratory's quality assurance plan) and enumerated. All non-infaunal taxa (e.g., epibenthic mysid shrimp) were excluded from the dataset prior to infaunal analysis. Samples were analyzed for species richness (number of species), abundance (number of individuals), diversity (measure of species richness and abundance), and evenness (measure of relative abundance). Calculations of abundance included all taxa in each sample regardless of level of taxonomic identification. Calculations based on species (richness, diversity, and evenness) included only taxa identified to species.

The benthic infaunal species assemblage in Dominion Energy's 2020 grab samples was comparable to findings of previous surveys in the area (see Section D.1.3, Existing Benthic Resource Conditions). Polychaetes were numerically dominant throughout the Offshore Survey Area, followed by arthropods and mollusks. Mollusks comprised approximately 78.2 percent of total biomass, with annelids (9.6 percent) and arthropods (7.8 percent) making up the rest (Attachment D-2).

Lease Area: Benthic Infauna

The relative dominance of various taxa was comparable in the Project samples and reference samples. Annelids and arthropods made up nearly 90 percent of the individuals in samples from the Lease Area and the associated reference area (Table D-18). The differences in abundance between the Project area and reference area reflects the more extensive sampling effort in the Project Area (52 samples) than in the reference area (six samples).

Table D-18. Total and Relative Abundance of Phyla in Sediment Grab Samples: Lease Area

Phylum	Project Samples		Reference Samples	
	Total Individuals (Abundance)	% Total	Total Individuals (Abundance)	% Total
Annelida	15,412	49.04	4,020	77.16
Arthropoda	12,712	40.45	672	12.90
Mollusca	2,257	7.18	387	7.43
Chordata	803	2.56	74	1.42
Nemertea	172	0.55	49	0.94
Echinodermata	40	0.13	7	0.13
Platyhelminthes	11	0.04	1	0.02
Phoronida	10	0.03	0	0.00
Sipuncula	6	0.02	0	0.00
Hemichordata	3	0.01	0	0.00
Cnidaria	1	<0.01	0	0.00
Xenacoelomorpha	1	<0.01	0	0.00

Species richness ranged from 22 to 56 species per Project sample (mean = 37) and 36 to 64 species per reference sample (mean = 44). Shannon diversity (*H'*) was generally low (mean = 2.15 in Project samples and 2.44 in reference samples) and bounded by similar maxima across Project and reference samples (0.52 to 3.30 in Project samples and 1.67 to 3.36 in reference samples). Pielou's evenness (*J'*) varied from 0.07 to 0.67 in Project samples (mean = 0.38) and 0.25 to 0.56 (mean = 0.39) in reference samples (Table D-19, Table D-20). Species abundance and richness were not well correlated (Pearson's correlation coefficient

[r]=0.17); however, samples with a greater number of individual organisms tended to have lower diversity and evenness (r=0.70 and 0.77, respectively). Species diversity and evenness were tightly correlated (r=0.97); correlations of species richness with diversity and evenness were less than 0.30.

Table D-19. Abundance, Species Richness, and Diversity Indices for Project Samples in the Lease Area

Grab Sample	Number of Individuals (Abundance)	Number of Species (Species Richness)	Shannon Diversity (H')	Pielou's Evenness (J')
GS-17	460	27	1.80	0.30
GS-18	1,936	31	0.52	0.07
GS-19	130	28	2.57	0.56
GS-20	595	22	0.52	0.08
GS-21	492	24	0.91	0.15
GS-22	719	39	1.41	0.21
GS-23	127	30	2.45	0.53
GS-24	298	44	2.83	0.51
GS-25	1,333	31	1.04	0.15
GS-26	677	40	1.29	0.20
GS-27	509	36	1.57	0.25
GS-28	378	56	3.26	0.57
GS-29	1,019	45	1.56	0.23
GS-30	171	23	2.67	0.56
GS-31	165	29	2.71	0.54
GS-32	522	31	2.50	0.42
GS-33	829	23	0.71	0.11
GS-34	655	32	1.69	0.26
GS-35	355	32	2.50	0.46
GS-36	506	39	2.54	0.45
GS-37-A	559	39	2.10	0.34
GS-37-B	992	46	2.08	0.31
GS-37-C	365	42	2.51	0.44
GS-38-A	219	42	3.30	0.63
GS-38-B	293	43	2.91	0.52
GS-38-C	426	50	2.63	0.44
GS-39-A	1,196	39	1.09	0.15
GS-39-B	677	41	1.70	0.26
GS-39-C	323	42	2.82	0.49
GS-40-A	1,473	45	0.87	0.12
GS-40-B	402	34	2.86	0.56
GS-40-C	398	36	2.78	0.50
GS-41-A	563	40	2.46	0.40
GS-41-B	293	37	3.20	0.63
GS-41-C	410	37	2.77	0.50
GS-42-A	429	29	2.20	0.40
GS-42-B	1,102	39	1.31	0.19
GS-42-C	422	33	2.62	0.48
GS-43-A	506	35	2.54	0.43
GS-43-B	849	35	2.43	0.40
GS-43-C	620	36	2.56	0.43
GS-44-A	235	29	2.64	0.51
GS-44-B	229	31	2.59	0.51
GS-45-A	645	40	2.20	0.36
GS-45-B	587	38	2.03	0.33
GS-45-C	917	42	2.00	0.30
GS-46	556	42	2.37	0.40
GS-47	719	48	2.43	0.39

Grab Sample	Number of Individuals (Abundance)	Number of Species (Species Richness)	Shannon Diversity (H')	Pielou's Evenness (J')
GS-48	1,256	43	2.50	0.37
GS-49	929	38	0.93	0.14
GS-50	807	40	2.06	0.32
GS-51	155	35	3.30	0.67
Mean (standard error)	604.38 (51.7)	36.69 (0.99)	2.15 (0.10)	0.38 (0.02)

Table D-20. Abundance, Species Richness, and Diversity Indices for Project Reference Samples in the Lease Area

Grab Sample	Number of Individuals (Abundance)	Number of Species (Species Richness)	Shannon Diversity (H')	Pielou's Evenness (J')
GS-52-REF	724	36	2.47	0.40
GS-53-REF	864	36	2.51	0.40
GS-54-REF	870	48	2.75	0.44
GS-55-REF	495	37	1.67	0.27
GS-56-REF	1,642	45	1.88	0.25
GS-57-REF	615	64	3.36	0.56
Mean	868.33	44.33	2.44	0.39

The amphipod *Byblis serrata* (a small shrimplike crustacean) accounted for approximately 34.1 percent of all individuals identified in Project samples from the Lease Area (Attachment D-2, Table D-2-1). Oligochaetes (segmented worms) were most abundant (about 18.4 percent of all organisms) in reference samples near the Lease Area (Attachment D-2, Table D-2-2). Ten taxa comprised more than 71.4 percent of infauna in all Lease Area samples and more than 68.0 percent in reference samples. More than half of the 20 most abundant species in grab samples in the Lease Area and reference areas were polychaete worms (Attachment D-2, Table D-2-1, Table D-2-2).

Grab samples from the Project and reference areas had taxa from 11 classes in common. An additional three classes were identified in Project samples but not reference samples (Attachment D-2, Table D-2-1, Table D-2-2). Given the similarities in community diversity (averaging 2.15 in Project samples and 2.44 in reference samples) and in evenness (0.38 in Project samples and 0.39 reference samples), reference samples have been determined to provide an adequate baseline for comparison in future survey efforts.

Bivalve mollusks dominated the biomass of samples from the Lease and reference areas (Figure D-11), which is not surprising because they are larger and heavier than most soft-bodied invertebrates. Common species include *Ameritella tenella, Nucula proxima,* and *Spisula solidissima*.

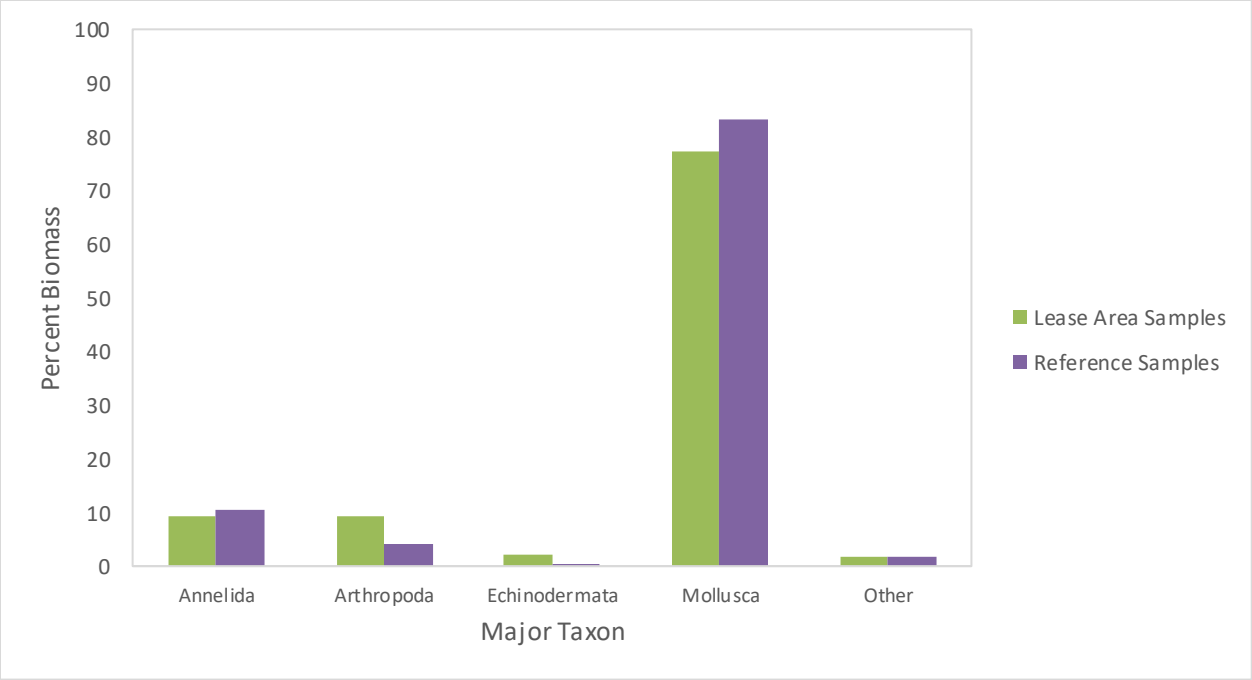


Figure D-11. Biomass of the Most Common Taxa Identified in Lease Area Grab Samples

Offshore Export Cable Route Corridor: Benthic Infauna

Annelids made up approximately 51.9 percent of all species identified in grab samples collected within the Offshore Export Cable Route Corridor (and 77.2 percent in reference samples), followed by arthropods and mollusks. These three taxa together accounted for more than 89.0 percent of all species in the Offshore Export Cable Route Corridor samples and reference samples (Table D-21).

Table D-21. Total and Relative Abundance of Phyla in Sediment Grab Samples: Offshore Export Cable Route Corridor

Phylum	Project Samples		Reference Samples	
	Total Individuals (Abundance)	% Total	Total Individuals (Abundance)	% Total
Annelida	3,101	51.85	1,540	77.15
Arthropoda	1,226	20.50	121	6.06
Mollusca	1,017	17.00	166	8.32
Chordata	561	9.38	153	7.67
Nemertea	45	0.75	7	0.35
Echinodermata	29	0.48	2	0.10
Hemichordata	1	0.02	1	0.05
Phoronida	1	0.02	1	0.05
Cnidaria	0	0.00	5	0.25

Mean species richness (number of species) was similar in Project samples (mean = 37; range 22 to 64) and reference samples (mean = 35; range 26 to 40). Shannon diversity (*H'*) was generally low in all samples, ranging from 1.65 to 3.43 in Project samples (mean = 2.60) and from 2.42 to 2.63 in reference samples (mean = 2.51). Pielou's evenness (*J'*) was similar in Project and reference samples (0.27 to 0.65 in Project samples and 0.40 to 0.58 in reference samples) (Table D-22, Table D-23).

Table D-22. Abundance, Species Richness, and Diversity Indices for Project Samples in the Lease Area

Grab Sample	Number of Individuals (Abundance)	Number of Species (Species Richness)	Shannon Diversity (H')	Pielou's Evenness (J')
GS-04	487	29	2.28	0.38
GS-05	278	34	2.65	0.48
GS-06	246	32	2.50	0.47
GS-07	467	57	2.70	0.47
GS-08	1,067	64	3.28	0.48
GS-09	225	48	3.43	0.65
GS-10	671	37	2.59	0.41
GS-11	642	45	3.08	0.54
GS-12	551	29	2.58	0.45
GS-13	285	26	2.38	0.43
GS-14	191	22	2.23	0.44
GS-15	230	26	2.44	0.47
GS-16	641	34	1.65	0.27
Mean	460.08	37.15	2.6	0.46

Table D-23. Abundance, Species Richness, and Diversity Indices for Project Reference Samples along the Offshore Export Cable Route Corridor

Grab Sample	Number of Individuals (Abundance)	Number of Species (Species Richness)	Shannon Diversity (H')	Pielou's Evenness (J')
GS-01-REF	92	26	2.63	0.58
GS-02-REF	1,453	40	2.42	0.40
GS-03-REF	451	39	2.49	0.41
Mean	665.33	35	2.51	0.46

Community composition was relatively evenly distributed across samples, with juvenile Ascidiacean species accounting for approximately 7.4 percent of all individuals in Project samples (Attachment D-2, Table D-2-3). Oligochaetes dominated reference samples along the Offshore Export Cable Route Corridor, accounting for approximately 41.1 percent of all individuals (Attachment D-2, Table D-2-4). The ten most abundant taxa comprised nearly 42.0 percent of Offshore Export Cable Route Corridor infauna and nearly 78.0 percent of reference sample infauna. About half of the 20 most abundant species in grab samples were polychaete worms in the Offshore Export Cable Route Corridor (Attachment D-2, Table D-2-3). and reference areas (Attachment D-2, Table D-2-4).

Grab samples from the Project and reference areas had taxa from 11 classes in common. An additional two classes were identified in Project samples but not reference samples, while two classes were identified in reference samples but not Project samples (Attachment D-2, Table D-2-3, Table D-2-4). Given the similarities in community diversity (averaging 2.6 in Project samples and 2.5 in reference samples) and in evenness (0.46 in both Project and reference samples), reference samples have been determined to provide an adequate baseline for comparison in future survey efforts.

As in the Lease Area, mollusks dominated the biomass in both sample sets (Figure D-12). Typical mollusk species encountered in Lease Area and reference samples included the bivalves *Ameritella agilis* and *Ameritella tenella*, and the gastropod *Tritia trivitatta*, all of which have calcareous shells.

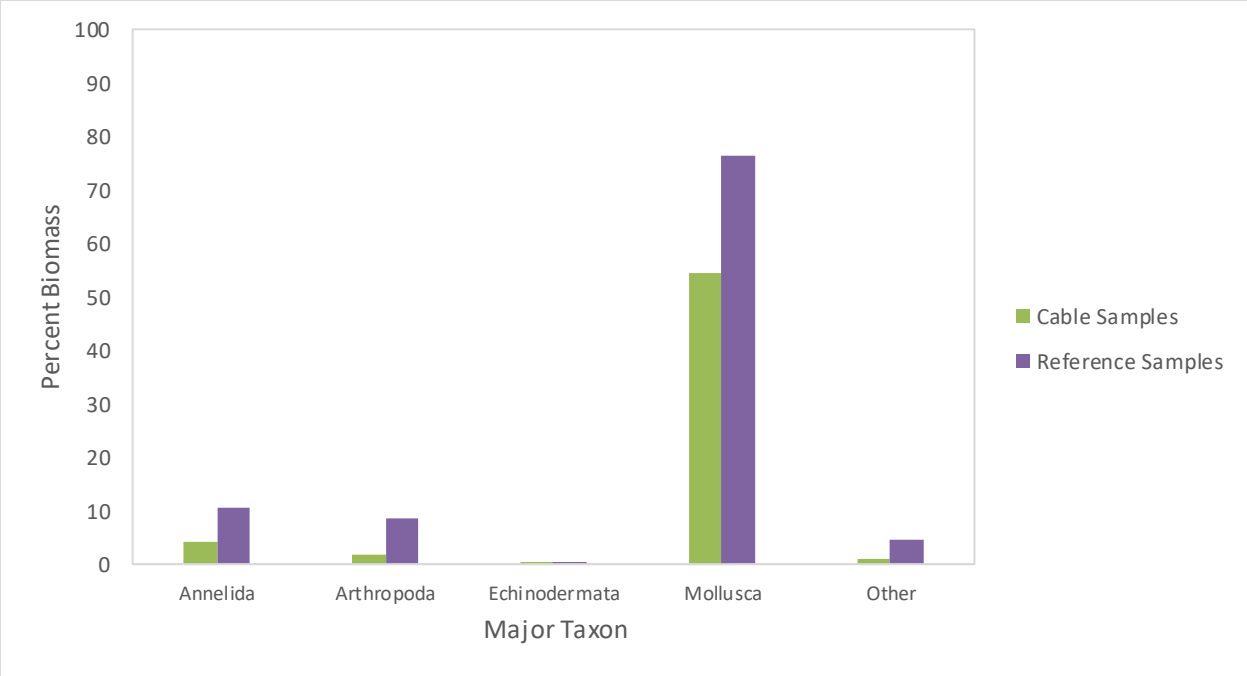


Figure D-12. Biomass of the Most Common Taxa of Grab Samples Identified in Offshore Export Cable Route Corridor Grab Samples

Infaunal organisms in the 2013 CVOW Pilot Project sediment grab samples in Virginia State waters were similar to those in Dominion Energy's 2020 grab samples in the Offshore Project Area. Annelids, mollusks, and arthropods accounted for more than 89.0 percent of all species identified in both CVOW Pilot Project samples and reference samples (Tetra Tech 2014; Table D-24).

Table D-24. Relative Abundance of Phyla in CVOW Pilot Project Grab Samples in Virginia State Waters

Phylum	CVOW Pilot Project Samples		Reference Sample	
	Total Individuals (Abundance)	% Total	Total Individuals (Abundance)	% Total
Annelida	1,078	77.33	44	41.12
Mollusca	193	13.85	41	38.32
Arthropoda	65	4.66	11	10.28
Nemertea	25	1.79	10	9.35
Turbellaria	25	1.79	1	0.93
Cnidaria	3	0.22	0	0
Hemichordata	3	0.22	0	0
Cephalochordata	2	0.14	0	0

Species richness ranged from 22 to 35 per CVOW Pilot Project sample (mean = 27) and 24 in the reference sample. Shannon diversity (*H'*) was generally low in all samples, ranging from 1.94 to 2.89 in CVOW Pilot Project samples (mean = 2.31) and 2.53 in the reference sample. Pielou's evenness (*J'*) varied from 0.35 to 0.58 for Pilot Project samples (mean = 0.42) and was 0.54 for the reference sample (Table D-25).

Table D-25. Abundance, Species Richness, and Diversity Indices for CVOW Pilot Project Grab Samples in Virginia State Waters

Grab Sample[a/]	Number of Individuals (Abundance)	Number of Species (Species Richness)	H'	J'
GS-016	147	32	2.89	0.58
GS-017	407	35	2.57	0.43
GS-018	318	23	2.19	0.38
GS-019	266	22	1.95	0.35
GS-020	256	23	1.94	0.35
Mean	279	27	2.31	0.42
GS-REF-001	107	24	2.53	0.54

Notes:
a/ Grey-shaded row indicates reference sample.

The annelid worm *Prionospio pygmaeus* was the most abundant species in CVOW Pilot Project grab samples (approximately 21.6 percent of all individuals) (Attachment D-2, Table D-2-5). The razor clam (*Ensis* species) dominated the reference sample, accounting for approximately 25.2 percent of all individuals (Attachment D-2, Table D-2-6). The ten most abundant infaunal taxa comprised nearly 86 percent of all CVOW Pilot Project samples. More than half of the 20 most abundant species in grab samples were polychaete worms in the CVOW Pilot Project (Attachment D-2, Table D-2-5) and the reference sample (Attachment D-2, Table D-2-6).

Grab samples from the CVOW Pilot Project and reference areas had taxa from five phyla in common. An additional three phyla were identified in Pilot Project samples but not reference samples (Attachment D-2, Table D-2-5, Table D-2-6).

D.3 DISCUSSION

Dominion Energy's 2020 Benthic Survey provided data on epibenthic and demersal macrofauna along 30 km of video transects and sediment grain size, TOC, and infaunal community metrics at 74 sediment locations in the Offshore Survey Area (Table D-26). As expected, all surveyed sites exhibit the type of softbottom habitat that is ubiquitous within the Virginia WEA (BOEM 2012; BOEM 2016) and neither the Lease Area nor the Offshore Export Cable Route Corridor samples differed substantially from the reference samples in sediment grain size or infaunal community structure. Sediment grab samples collected in Virginia State waters were not notably different from samples in adjacent federal waters.

The 26 macrofauna taxa identified in video imagery included fishes, mollusks, arthropods, echinoderms, ctenophores, and cnidarians. Species present in both Project and reference transects were represented similarly across both transect types. Infaunal species richness was highest at the locations with the greatest sample density, as expected based on fundamental species-area relationships for marine ecosystems (Neigel 2003). The number of species per sample, Shannon diversity (*H'*), and Pielou's evenness (*J'*) were similar at Project and reference sites. Annelids (especially polychaetes), arthropods, and mollusks were consistently the dominant phyla across all samples in the Offshore Survey Area.

Substrate and species composition in the Offshore Survey Area were consistent with the description of benthic habitats in the Virginia Wind Energy Area (WEA) (BOEM 2012; BOEM 2016), as well as the other

studies discussed in Section D.1.3, Existing Benthic Resource Conditions. The fine- and medium-grained sand of the Offshore Survey Area provides uniform and simple (non-complex) habitat for benthic infaunal organisms typical of this region (Cutter and Diaz 1998). Principal infaunal species occurring in the Offshore Survey Area included *Byblis serrata, Fabricinuda trilobata, Spio setosa, Aricidea (Acmira) cerrutii,* and *Leptocheirus pinguis* (Attachment D-2). These findings are consistent with the conclusions of previously published reports on benthic infauna in coastal and offshore Virginia waters (Cutter and Diaz 1998; Diaz et al. 2004; Diaz et al. 2006; USACE 2009; Guida et al. 2017).

Table D-26. Summary of Results for the 2020 Benthic Survey

Parameter	Lease Area		Offshore Export Cable Route Corridor	
	Samples	Reference Samples	Samples	Reference Samples
Number of Samples	52	6	13	3
Sample Numbers	GS-17 through GS-51	GS-52-REF through GS-57-REF	GS-04 through GS-16	GS-01-REF through GS-03-REF
Average Grain Size	59.9% fine sand, 29.7% medium sand, 4.4% coarse sand, 3.9% gravel, 2.0% silt/clay	51.5% fine sand, 39.9% medium sand, 4.5% coarse sand, 2.6% gravel, 1.6% silt/clay	64.3% fine sand, 21.2% medium sand, 6.4% silt/clay, 4.4% coarse sand, 3.6% gravel	66.3% fine sand, 18.6% medium sand, 10.5% silt/clay, 3.0% coarse sand, 1.6% gravel
Organic Content	0.1 – 1.2%	0.08 - 0.5%	0.2 - 1.0%	0.1 - 0.5%
Number of Species per Sample	127 – 1,936	495 – 1,642	191 – 1,067	92 – 1,453
Species Richness	25 – 70	47 – 83	28 – 80	28 – 37
Species Diversity (H')	0.55 – 3.50	1.93 – 3.25	2.01 – 3.60	1.78 – 2.72
Dominant Phyla	Annelida Arthropoda Mollusca	Annelida Arthropoda Mollusca	Annelida Arthropoda Mollusca	Annelida Arthropoda Mollusca
Dominant Species and Approximate % Abundance	*Byblis serrata,* 34%	Oligochaetes, 18%	Ascidiaceans, 7%	Oligochaetes, 41%

D.4 REFERENCES

ASTM International. 2002. ASTM Standard D422-63 (2002) Standard Test Method for Particle-Size Analysis of Soils. ASTM International, West Conshohocken, PA. https://www.astm.org/DATABASE.CART/HISTORICAL/D422-63R02.htm. Accessed 8 Feb 2021.

BOEM (Bureau of Ocean Energy Management). 2012. *Commercial wind lease issuance and site assessment activities on the Atlantic Outer Continental Shelf offshore New Jersey, Delaware, Maryland, and Virginia: Final Environmental Assessment.* Bureau of Ocean Energy Management Office of Renewable Energy Programs. OCS EIS.EA BOEM 2012-003. Available online at: https://www.boem.gov/sites/default/files/uploadedFiles/BOEM/Renewable_Energy_Program/Smart_from_the_Start/Mid-Atlantic_Final_EA_012012.pdf. Accessed 8 Feb 2021.

BOEM. 2016. *Virginia Ocean Geophysical Survey Phase II Analyses Offshore Virginia Wind Energy Area*. Department of the Interior. Bureau of Ocean Energy Management. Office of Renewable Energy Programs. Available online at: https://www.boem.gov/sites/default/files/environmental-stewardship/Environmental-Studies/Renewable-Energy/VA-WEA-Phase-2-Geophysical-Report.pdf. Accessed 8 Feb 2021.

BOEM. 2019. *Guidelines for Providing Benthic Habitat Survey Information for Renewable Energy Development on the Atlantic Outer Continental Shelf Pursuant to 30 CFR Part 585*. Available online at: https://www.boem.gov/renewable-energy/survey-guidelines-renewable-energy-development. Accessed 8 Feb 2021.

Cutter, G. and R. Diaz. 1998. "Part I: Benthic habitats and biological resources off the Virginia Coast 1996 and 1997." In: *Environmental studies relative to potential sand mining in the vicinity of the* City of Virginia Beach, Virginia. Virginia Institute of Marine Science, College of William and Mary. Available online at: http://dx.doi.org/doi:10.21220/m2-mx15-9c77. Accessed 8 Feb 2021.

Diaz, R., G. Cutter, and C. Hobbs. 2004. "Potential impacts of sand mining offshore of Maryland and Delaware: Part 2 - Biological considerations." *Journal of Coastal Research 20:61-69*. Available online at: https://doi.org/10.2112/1551-5036(2004)20[61:PIOSMO]2.0.CO;2. Accessed 8 Feb 2021.

Diaz, R., C. Tallent, and J. Nestlerode. 2006. "Benthic resources and habitats at the Sandbridge Borrow Area: A test of monitoring protocols." In: *Field testing of a physical/biological monitoring methodology for offshore dredging and mining operations*. Prepared by Virginia Institute of Marine Science under MMS Cooperative Agreement 1435-01-02-CA85050. Available online at: https://scholarworks.wm.edu/reports/563/. Accessed 8 Feb 2021.

EPA (U.S. Environmental Protection Agency). 2015. *National Coastal Condition Assessment 2015 Field Operations* Manual. EPA-841-R-14-007. Available online at: https://www.epa.gov/sites/production/files/2016-03/documents/national_coastal_condition_assessment_2015_field_operation_manual_version_1.0_1.pdf. Accessed 8 Feb 2021.

FGDC (Federal Geographic Data Committee). 2012. *Coastal and Marine Ecological Classification Standard, June* 2012. FGDC-STD-018-2012. 353 pp. Available online at: https://www.fgdc.gov/standards/projects/cmecs-folder/CMECS_Version_06-2012_FINAL.pdf. Accessed 8 Feb 2021.

Fugro (Fugro Consultants, Inc.). 2013. *Regional geophysical survey and interpretive report: Virginia Wind Energy Area offshore southeastern Virginia*. Prepared for the U.S. Dept. of Interior, Bureau of Ocean Energy Management. OCS Study BOEM 2013-220. Available online at: https://www.dmme.virginia.gov/DE/LinkDocuments/OffshoreWind/VA_WEA_Phase-2_Geophysical_Report%20(small).pdf. Accessed 8 Feb 2021.

Greene, J., M. Anderson, J. Odell, and N. Steinberg. 2010. *The Northwest Atlantic Marine Ecoregional Assessment: Species, Habitats and Ecosystems. Phase One*. The Nature Conservancy, Eastern U.S. Division, Boston, MA. Available online at: http://www.conservationgateway.org/conservationbygeography/northamerica/unitedstates/edc/documents/cover_ack_intro.pdf. Accessed 8 Feb 2021.

Guida, V., A. Drohan, H. Welch, J. McHenry, D. Johnson, V. Kentner, J. Brink, D. Timmons, and E. Estlea-Gomez. 2017. *Habitat Mapping and Assessment of Northeast Wind Energy Areas*. Sterling, VA: U.S. Department of the Interior, Bureau of Ocean Energy Management. OCS Study BOEM 2017-088. Available online at: https://espis.boem.gov/final%20reports/5647.pdf. Accessed on 8 Feb 2021.

Johnson, K. 2002. *Characterization of the fishing practices and marine benthic ecosystems of the northeast U.S. shelf*. NOAA Technical memorandum NMFS-NE-181. Available online at: https://repository.library.noaa.gov/view/noaa/3481. Accessed on 8 Feb 2021.

Lucy, J. 1983. *Development of Virginia's Artificial Fishing Reefs: A Historical Outline (1959-1977)*. Sea Grant Marine Advisory Service, Virginia Institute of Marine Science Marine Resource Report No. 83-6. Available online at: https://www.vims.edu/GreyLit/VIMS/mrr83-6ocr.pdf. Accessed on 8 Feb 2021.

MARCO (Mid-Atlantic Regional Council on the Ocean). 2020. "Mid-Atlantic Ocean Data Portal." Available online at: http://portal.midatlanticocean.org/visualize/. Accessed 19 Nov 2020.

Milliman, J. 1972. *Atlantic continental shelf and slope of the United States: Petrology of the sand fraction of sediments, Northern New Jersey to Southern Florida*. U.S. Geological Survey Professional Paper 529-J. Available online at: https://pubs.usgs.gov/pp/0529j/report.pdf. Accessed 8 Feb 2021.

Neigel, J. 2003. "Species-area relationships and marine conservation." *Ecological Applications* 13(1) Supplement 2003: S138-S145. Available online at: https://www.jstor.org/stable/3100003. Accessed 8 Feb 2021.

NMFS-GARFO (National Marine Fisheries Service's Greater Atlantic Regional Fisheries Office). 2021. *Updated Recommendations for Mapping Fish Habitat*. Habitat Conservation and Ecosystem Services Division. March 2021. 22 pp. Available at: https://media.fisheries.noaa.gov/2021-03/March292021_NMFS_Habitat_Mapping_Recommendations.pdf?null.

NOAA (National Oceanic and Atmospheric Administration). 2021. "National Centers for Environmental Information: Bathymetri Data Viewer." Available online at: https://www.ngdc.noaa.gov/maps/bathymetry/. Accessed 05 Feb 2021.

NOAA Fisheries (National Marine Fisheries Service). 2020. *Recommendations for Mapping Fish Habitat.* National Marine Fisheries Service, Greater Atlantic Regional Fisheries Office (GARFO), Habitat Conservation and Ecosystem Services Division. NOAA Fisheries and BOEM. 2019. "Marine Cadastre Viewer." Available online at: https://marinecadastre.gov/. Accessed: 19 Nov 2020.

Poppe, L., S. Williams, and V. Paskevich. 2005. U.S. *Geological Survey east-coast sediment analysis: procedures, data*base, and GIS data. Open-File Report 2005-1001. Available online at: https://doi.org/10.3133/ofr20051001. Accessed on 8 Feb 2021.

Steimle, F. and C. Zetlin. 2000. "Reef habitats in the Middle Atlantic Bight: Abundance, distribution, associated biological communities, and fishery resource use." *Marine Fisheries Review* 62:24-42. Available online at: https://spo.nmfs.noaa.gov/sites/default/files/pdf-content/MFR/mfr622/mfr6222.pdf. Accessed on 8 Feb 2021.

Tetra Tech (Tetra Tech, Inc.). 2013. *Draft Marine Site Characterization Survey Report. Virginia Offshore Wind Technology Advancement Project (VOWTAP)*. Prepared for Dominion Resources, Inc. 51 pp.

Tetra Tech. 2014. *Benthic Survey Report, Virginia Offshore Wind Technology Advancement Project (VOWTAP).* Prepared for Dominion Energy. Submitted December 2013, Revised February 2014. 154 pp.

USACE (U.S. Army Corps of Engineers, Norfolk District). 2009. *Sandbridge Beach Erosion Control and Hurricane Protection Project, Environmental Assessment, Virginia Beach, Virginia*. 218 pp.

VIMS (Virginia Institute of Marine Science). 2018. "2018 SAV Report: Distribution of Submerged Aquatic Vegetation in Chesapeake Bay and Coastal Bays." Available online at: https://www.vims.edu/research/units/programs/sav/reports/2018/index.php. Accessed 8 Feb 2021.

VMRC (Virginia Marine Resources Commission). 2020. "Artificial Reefs Map." Available online: https://webapps.mrc.virginia.gov/public/maps/artificial_reefs.php. Accessed 19 Nov 2020.

Williams, S., M. Arsenault, B. Buczowski, J. Reid, J. Flocks, M. Kulp, S. Penland, and C. Jenkins. 2006. *Surficial sediment character of the Louisiana offshore continental shelf region: a GIS compilation*. U.S. Geological Survey Open-File Report 2006-1195. Available online at: https://doi.org/10.3133/ofr20061195. Accessed 8 Feb 2021.

Attachment D-1. Representative Underwater Imagery and Sediment Classification, Laboratory Data

CONSTRUCTION AND OPERATIONS PLAN

Coastal Virginia Offshore Wind Commercial Project

Attachment D-1 Representative Underwater Imagery and Sediment Classification, Laboratory Data

Prepared for:

Dominion Energy®

707 East Main Street
Richmond, VA 23219

Prepared by:

TETRA TECH

Tetra Tech, Inc.
4101 Cox Road, Suite 120
Glen Allen, VA 23060

www.tetratech.com

Submitted October 2021

Attachment D-1- Representative Underwater Imagery and Sediment Classification, Laboratory Data

FIGURES

DOWN ID: 14567 Time: 15:49 E: 449461.33 N: 4073983.27

FWD ID: 12460 Time: 15:47 E: 449381.40 N: 4073984.04

Video Transect: VT-01-REF

Sediment Description:

DOWN: Fine sand, 5% shell hash

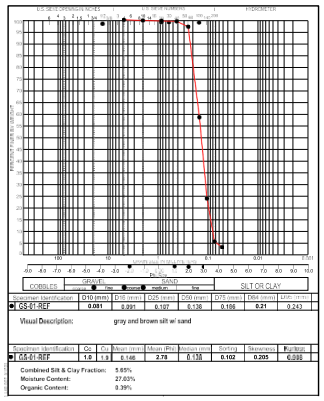
FWD: Fine sand, 5% shell hash

Fauna Description:

DOWN: Cnidaria (Cyaneidae)

FWD: Cnidaria (Cyaneidae)

Grab ID: GS-01-REF Time: 12:26



Grab ID: GS-01-REF Time: 12:26

Grab Sample: GS-01-REF

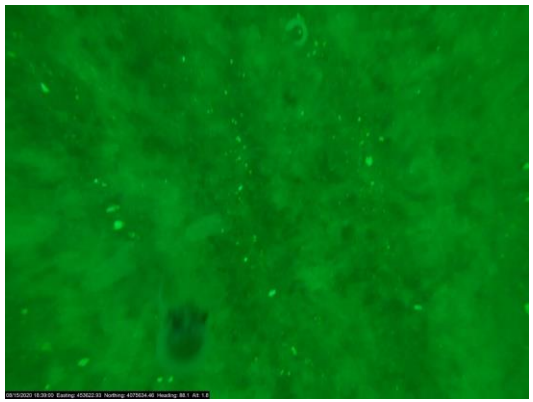
Sediment Description:

Visual Description: Gray and brown silt with sand

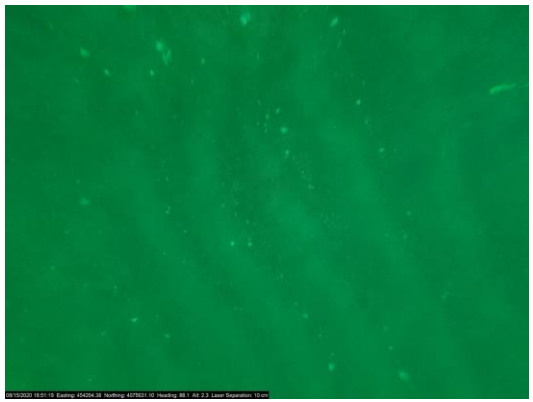
Mean Grain Size: 0.146 mm

Median Grain Size: 0.138 mm

Figure D-1-1. Representative Underwater Imagery and Sediment Description: VT-01-REF



DOWN ID: 16601 Time: 18:39 E: 453622.93 N: 4075636.46



FWD ID: 15193 Time: 18.51 E: 454204.38 N: 4075631.10

Video Transect: VT-02-REF

Sediment Description:

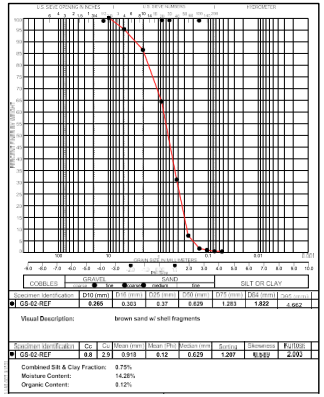
DOWN: Coarse sand, 5% shell hash, ripples

FWD: Coarse sand, 5% shell hash, ripples

Fauna Description:

DOWN: Cnidaria (Cyaneidae); Mollusca (Naticidae) egg collar

Grab ID: GS-02-REF Time: 15:16



Grab ID: GS-02-REF Time: 15:16

Grab Sample: GS-02-REF

Sediment Description:

Visual Description: Brown sand with shell fragments

Mean Grain Size: 0.918 mm

Median Grain Size: 0.629 mm

Figure D-1-2. Representative Underwater Imagery and Sediment Description: VT-02-REF

DOWN ID: 16693 Time: 05:03 E: 426513.28 N: 4073368.71

FWD ID: 19818 Time: 05:04 E: 426555.56 N: 4073367.89

Video Transect: VT-06

Sediment Description:

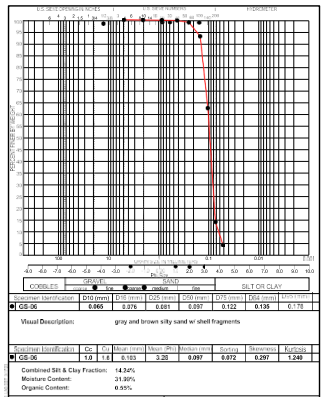
DOWN: Fine sand, 5% shell hash

FWD: Fine sand, 3% shell hash, ripples

Fauna Description:

DOWN: Chordata (Trichiuridae); Chordata (Engraulidae)

Grab ID: GS-06 Time: 01:33



Grab ID: GS-06 Time: 01:33

Grab Sample: GS-06

Sediment Description:

Visual Description: Gray and brown silty sand with shell fragments

Mean Grain Size: 0.103 mm

Median Grain Size: 0.097 mm

Figure D-1-3. Representative Underwater Imagery and Sediment Description: VT-06

DOWN ID: 16524 Time: 07:02 E: 432056.81 N: 4072838.09

FWD ID: 12456 Time: 07:13 E: 432578.87 N: 4072836.63

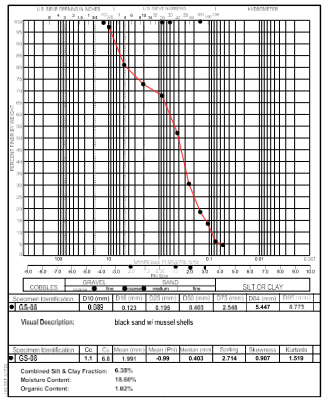
Video Transect: VT-08

Sediment Description:

DOWN: Medium to coarse sand, 8% shell hash

FWD: Medium to coarse sand, 5% shell hash, ripples

Grab ID: GS-08 Time: 03:36



Grab ID: GS-08 Time: 03:36

Grab Sample: GS-08

Sediment Description:

Visual Description: Black sand with mussel shells

Mean Grain Size: 1.991 mm

Median Grain Size: 0.403 mm

Figure D-1-4. Representative Underwater Imagery and Sediment Description: VT-08

DOWN ID: 18125 Time: 09:23 E: 437714.12 N: 4072914.85

FWD ID: 15017 Time: 09:39 E: 438440.70 N: 4072914.89

Video Transect: VT-10

Sediment Description:

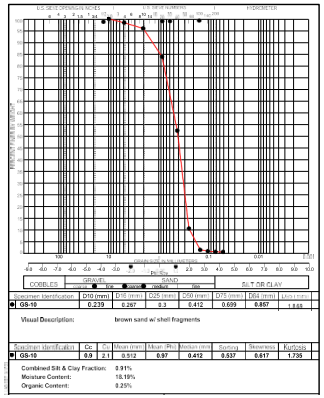
DOWN: Medium sand, 10% shell hash

FWD: Medium sand, 8% shell hash, ripples

Fauna Description:

DOWN: Chordata (Triglidae)

Grab ID: GS-10 Time: 06:02



Grab ID: GS-10 Time: 06:02

Grab Sample: GS-10

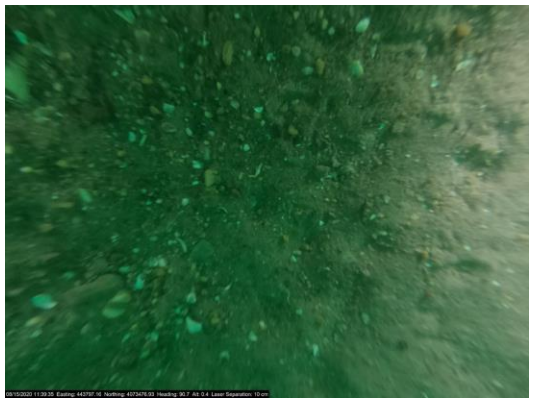
Sediment Description:

Visual Description: Brown sand with shell fragments

Mean Grain Size: 0.512 mm

Median Grain Size: 0.412 mm

Figure D-1-5. Representative Underwater Imagery and Sediment Description: VT-10



FWD ID: 17490 Time: 11:39 E: 443797.16 N: 4073476.93

FWD ID: 16983 Time: 11:31 E: 443437.12 N: 4073479.65

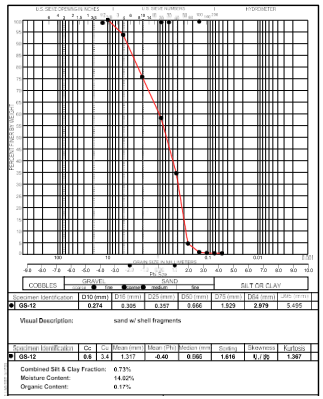
Video Transect: VT-12

Sediment Description:

FWD: Coarse sand, 10% shell hash

FWD: Coarse sand, 6% shell hash

Grab ID: GS-12 Time: 08.05



Grab ID: GS-12 Time: 08.05

Grab Sample: GS-12

Sediment Description:

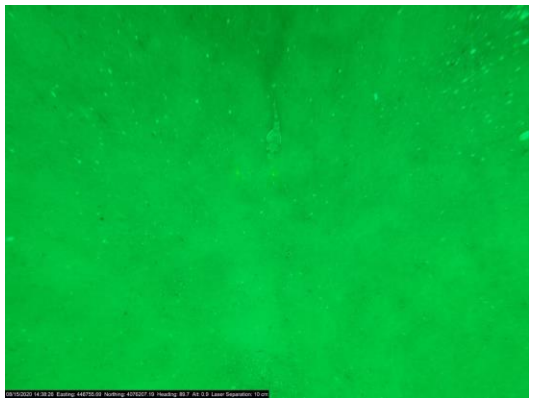
Visual Description: Sand with shell fragments

Mean Grain Size: 1.317 mm

Median Grain Size: 0.666 mm

Figure D-1-6. Representative Underwater Imagery and Sediment Description: VT-12

DOWN ID: 11749 Time: 14:29 E: 448311.80 N: 4076208.69



FWD ID: 20197 Time: 14:38 E: 448755.69 N: 4076207.19

Video Transect: VT-14

Sediment Description:

DOWN: Medium sand, 12% shell sash

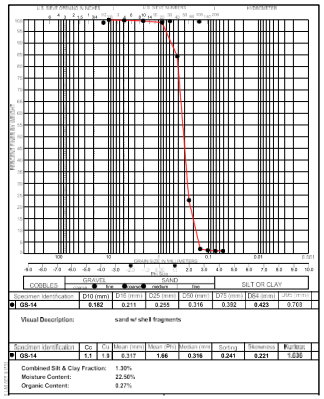
FWD: Medium sand, 8% shell hash

Fauna Description:

DOWN: Cnidaria (Cyaneidae)

FWD: Chordata (Triglidae)

Grab ID: GS-14 Time: 10:55



Grab ID: GS-14 Time: 10:55

Grab Sample: GS-14

Sediment Description:

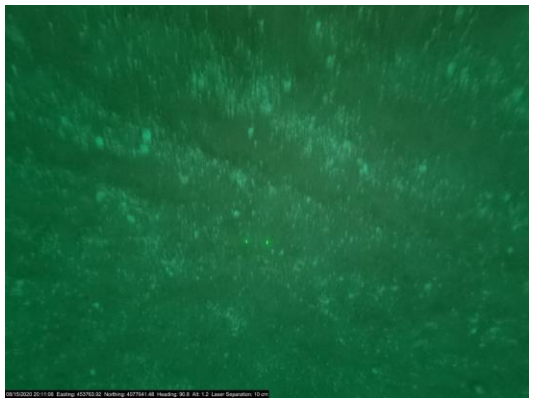
Visual Description: Sand with shell fragments

Mean Grain Size: 0.317 mm

Median Grain Size: 0.316 mm

Figure D-1-7. Representative Underwater Imagery and Sediment Description: VT-14

DOWN ID: 18942 Time: 20:20 E: 454196.96



FWD ID: 16248 Time: 20:11 E: 453763.92 N: 4077641.48

Video Transect: VT-16

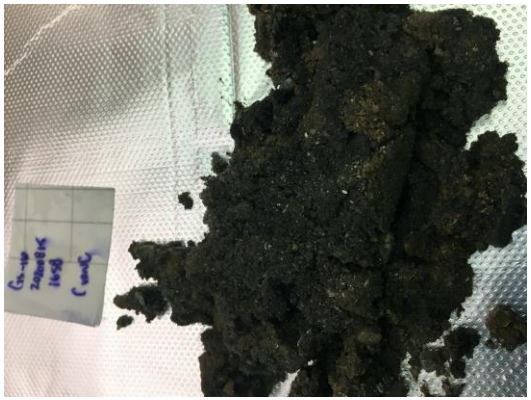
Sediment Description:

DOWN: Coarse sand with cobble, 12% shell hash

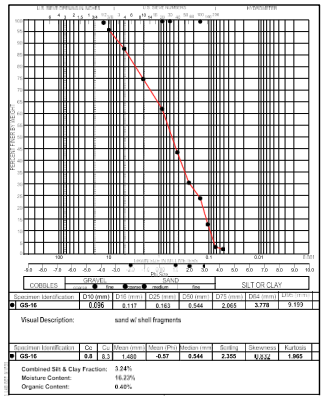
FWD: Coarse sand, 15% shell hash, ripples

Fauna Description:

DOWN: Chordata (Rajidae) egg cases, Echinodermata (Echinarachniidae)



Grab ID: GS-16 Time: 16:58



Grab ID: GS-16 Time: 16:58

Grab Sample: GS-16

Sediment Description:

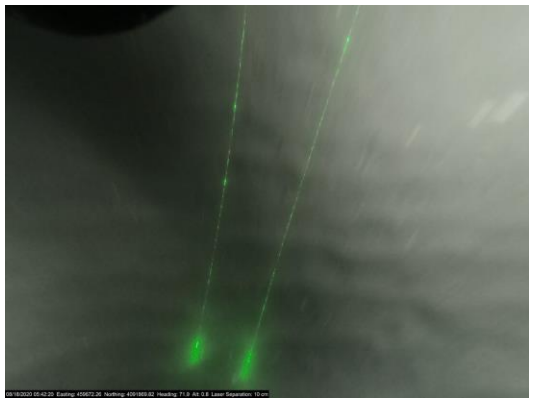
Visual Description: Sand with shell fragments

Mean Grain Size: 1.480 mm

Median Grain Size: 0.544 mm

Figure D-1-8. Representative Underwater Imagery and Sediment Description: VT-16

DOWN ID: 25989 Time: 05:53 E: 459133.74 N: 4091874.49



FWD ID: 15676 Time: 05:42 E: 459672.26 N: 4091869.82

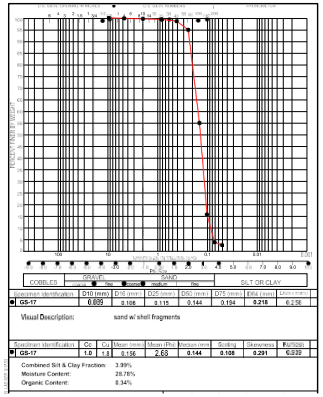
Video Transect: VT-17

Sediment Description:

DOWN: Fine sand, 10% shell hash, ripples

FWD: Fine sand, 5% shell hash, ripples

Grab ID: GS-17 Time: 02:10



Grab ID: GS-17 Time: 02:10

Grab Sample: VT-17

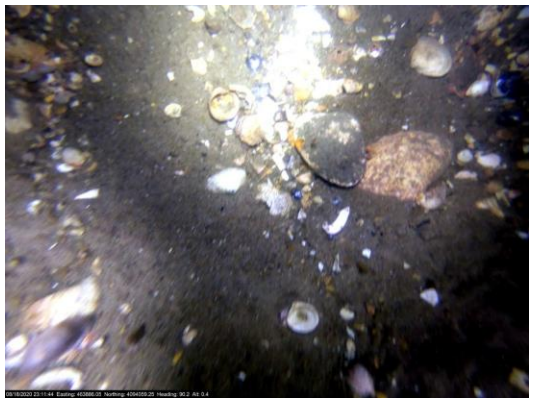
Sediment Description:

Visual Description: Sand with shell fragments

Mean Grain Size: 0.156 mm

Median Grain Size: 0.144 mm

Figure D-1-9. Representative Underwater Imagery and Sediment Description: VT-17



DOWN ID: 19065 Time: 23:11 E: 463886.05 N: 4094059.25

FWD ID: 19075 Time: 23.13 E: 463964.87 N: 4094057.77

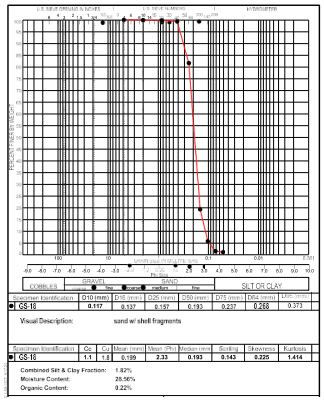
Video Transect: VT-18

Sediment Description:

DOWN: Fine sand, 25% shell hash

FWD: Fine sand, 15% shell hash

Grab ID: GS-18 Time: 14:42



Grab ID: GS-18 Time: 14:42

Grab Sample: GS-18

Sediment Description:

Visual Description: Sand with shell fragments

Mean Grain Size: 0.199 mm

Median Grain Size: 0.193 mm

Figure D-1-10. Representative Underwater Imagery and Sediment Description: VT-18

DOWN ID: 10812 Time: 00:36 E: 463566.45 N: 4094014.80

FWD ID: 10892 Time: 00:38 E: 463444.58 N: 4094015.02

Video Transect: VT-19

Sediment Description:

DOWN: Fine sand, 5% shell hash, ripples

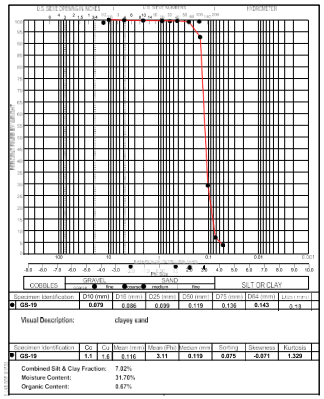
FWD: Fine sand, 5% shell hash, ripples

Fauna Description:

DOWN: Mollusca (Loliginidae) egg mop

FWD: Mollusca (Naticidae) egg collar

Grab ID: GS-19 Time: 20:17



Grab ID: GS-19 Time: 20:17

Grab Sample: GS-19

Sediment Description:

Visual Description: Clayey sand

Mean Grain Size: 0.116 mm

Median Grain Size: 0.119 mm

Figure D-1-11. Representative Underwater Imagery and Sediment Description: VT-19

DOWN ID: 15457 Time: 03:56 E: 463998.11 N: 4091916.04

FWD ID: 15557 Time: 03:55 E: 463971.52 N: 4091916.72

Video Transect: VT-20

Sediment Description:

DOWN: Fine sand, 30% shell hash

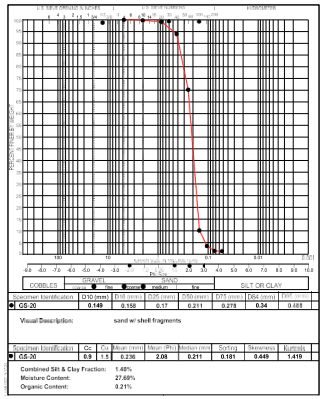
FWD: Fine sand, 25% shell hash

Fauna Description:

DOWN: Chordata (Rajidae), Chordata (Serranidae)

FWD: Chordata (Serranidae)

Grab ID: GS-20 Time: 00:20



Grab ID: GS-20 Time: 00:20

Grab Sample: GS-20

Sediment Description:

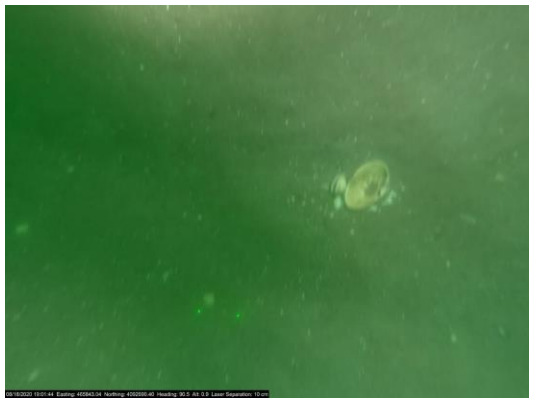
Visual Description: Sand with shell fragments

Mean Grain Size: 0.236 mm

Median Grain Size: 0.211 mm

Figure D-1-12. Representative Underwater Imagery and Sediment Description: VT-20

DOWN ID: 26511 Time: 19:08 E: 466166.64 N: 4092690.38



FWD ID: 28952 Time: 19:01 E: 465843.04 N: 4092690.40

Video Transect: VT-21

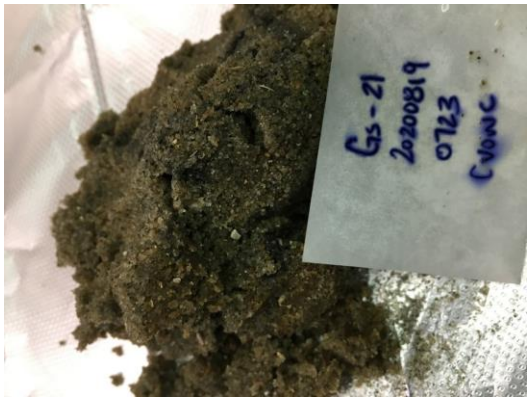
Sediment Description:

DOWN: Medium sand, 10% shell hash

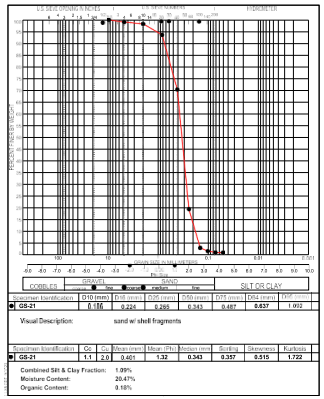
FWD: Medium sand, 10% shell hash

Fauna Description:

DOWN: Cnidaria (Cyaneidae), Echinodermata (Asteriidae)



Grab ID: GS-21 Time: 07:23



Grab ID: GS-21 Time: 07:23

Grab Sample: GS-21

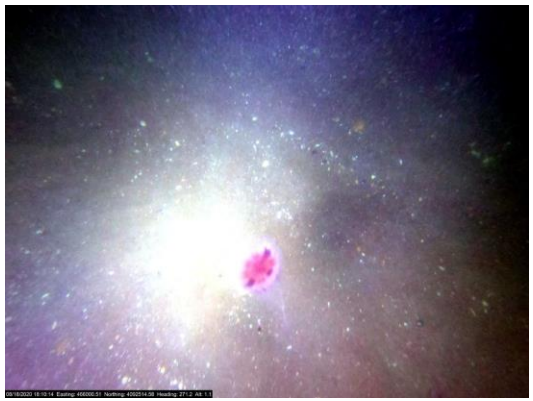
Sediment Description:

Visual Description: Sand with shell fragments

Mean Grain Size: 0.401 mm

Median Grain Size: 0.343 mm

Figure D-1-13. Representative Underwater Imagery and Sediment Description: VT-21



DOWN ID: 14141 Time: 18:10 E: 466000.51 N: 4092514.58

FWD ID: 17149 Time: 18:12 E: 465881.84 N: 4092515.97

Video Transect: VT-22

Sediment Description:

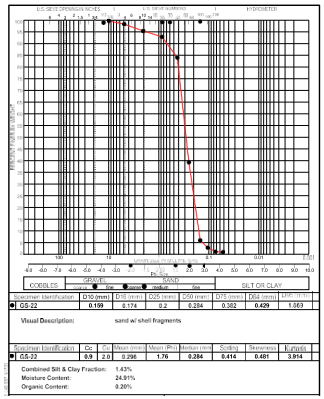
DOWN: Medium sand, 12% shell hash

FWD: Medium sand, 45% shell hash

Fauna Description:

DOWN: Cnidaria (Cyaneidae)

Grab ID: GS-22 Time: 07:08



Grab ID: GS-22 Time: 07:08

Grab Sample: GS-22

Sediment Description:

Visual Description: Sand with shell fragments

Mean Grain Size: 0.296 mm

Median Grain Size: 0.284 mm

Figure D-1-14. Representative Underwater Imagery and Sediment Description: VT-22

DOWN ID: 12548 Time: 01:38 E: 464041.64 N: 4093055.69

FWD ID: 22844 Time: 01:43 E: 464281.12 N: 4093054.31

Video Transect: VT-23

Sediment Description:

DOWN: Coarse to gravelly sand, 5% shell hash

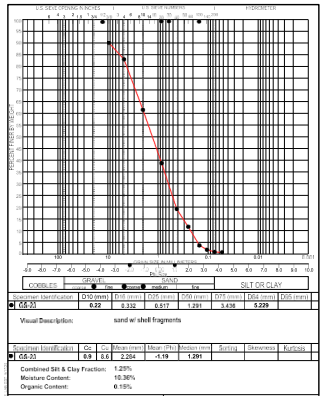
FWD: Coarse to gravelly sand, 25% shell hash

Fauna Description:

DOWN: Chordata (Phycidae)

FWD: Chordata (Triglidae)

Grab ID: GS-23 Time: 22:07



Grab ID: GS-23 Time: 22:07

Grab Sample: GS-23

Sediment Description:

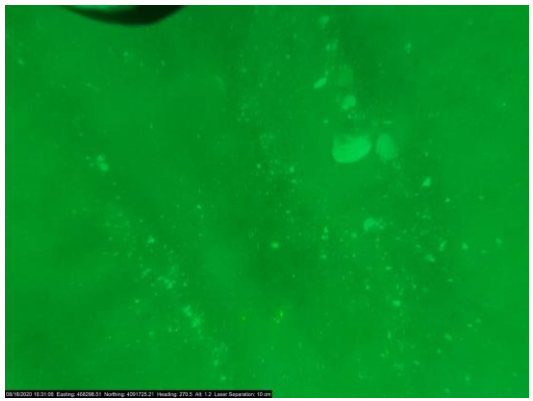
Visual Description: Sand with shell fragments

Mean Grain Size: 2.284 mm

Median Grain Size: 1.291 mm

Figure D-1-15. Representative Underwater Imagery and Sediment Description: VT-23

DOWN ID: 12673 Time: 16:31 E: 468300.64 N: 4091725.18



FWD ID: 13943 Time: 16:31 E: 468298.51 N: 4091725.21

Video Transect: VT-24

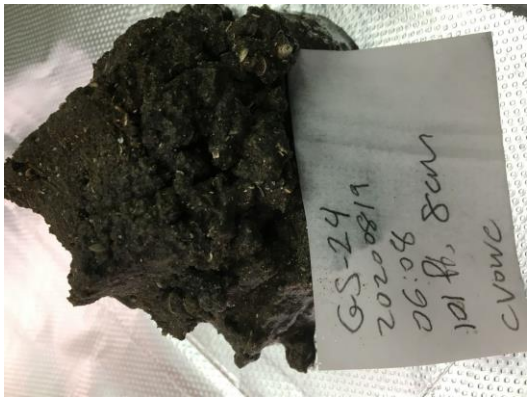
Sediment Description:

DOWN: Fine sand, 10% shell hash, ripples

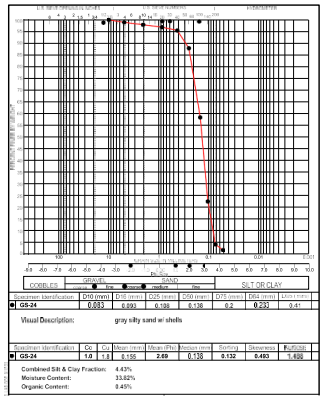
FWD: Fine sand, 15% shell hash, ripples

Fauna Description:

DOWN: Cnidaria (Cyaneidae)



Grab ID: GS-24 Time: 06:08



Grab ID: GS-24 Time: 06:08

Grab Sample: GS-24

Sediment Description:

Visual Description: Gray silty sand with shells

Mean Grain Size: 0.155 mm

Median Grain Size: 0.138 mm

Figure D-1-16. Representative Underwater Imagery and Sediment Description: VT-24

DOWN ID: 16801 Time: 13:30 E: 468067.14 N: 4094295.79

FWD ID: 17261 Time: 13:25 E: 468162.72 N: 4094128.29

Video Transect: VT-25

Sediment Description:

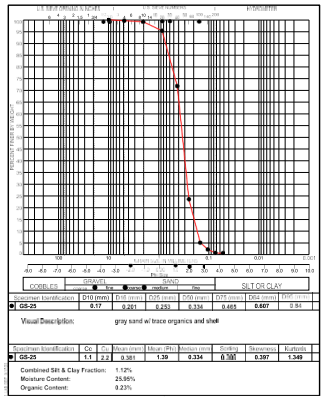
DOWN: Medium sand with cobble, 8% shell hash

FWD: Medium sand, 10% shell hash

Fauna Description:

DOWN: Cnidaria (Cyaneidae)

Grab ID: GS-25 Time: 11:45



Grab ID: GS-25 Time: 11:45

Grab Sample: GS-25

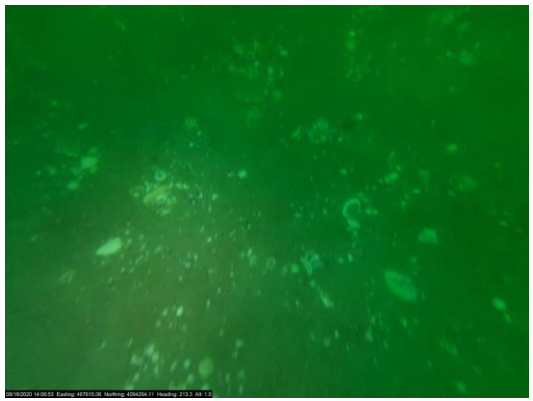
Sediment Description:

Visual Description: Gray sand with trace organics and shell

Mean Grain Size: 0.381 mm

Median Grain Size: 0.334 mm

Figure D-1-17. Representative Underwater Imagery and Sediment Description: VT-25



DOWN ID: 18999 Time: 14:06 E: 467615.06 N: 4094294.11

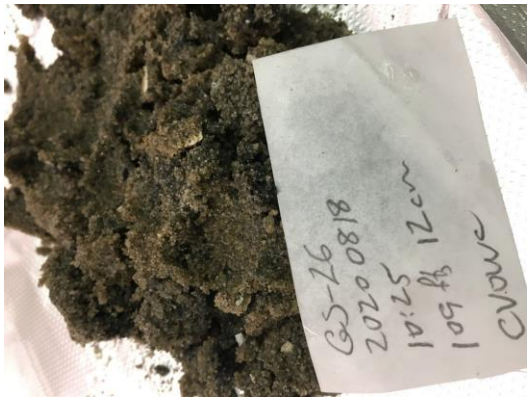
FWD ID: 19621 Time: 14:05 E: 467656.52 N: 4094357.08

Video Transect: VT-26

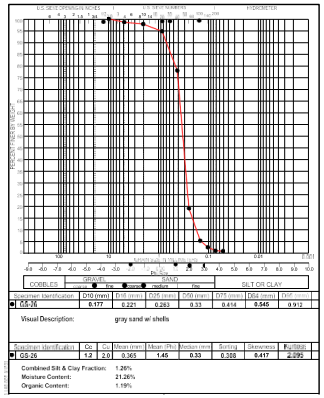
Sediment Description:

DOWN: Medium sand, 25% shell hash

FWD: Medium sand, 15% shell hash



Grab ID: GS-26 Time: 10:25



Grab ID: GS-26 Time: 10:25

Grab Sample: GS-26

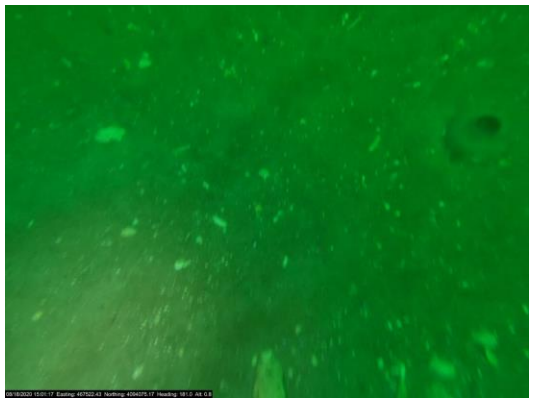
Sediment Description:

Visual Description: Gray sand with shells

Mean Grain Size: 0.365 mm

Median Grain Size: 0.330 mm

Figure D-1-18. Representative Underwater Imagery and Sediment Description: VT-26



DOWN ID: 20929 Time: 15:01 E: 467522.43 N: 4094075.17

FWD ID: 15872 Time: 13:02 E: 467784.12 N: 4093526.05

Video Transect: VT-27

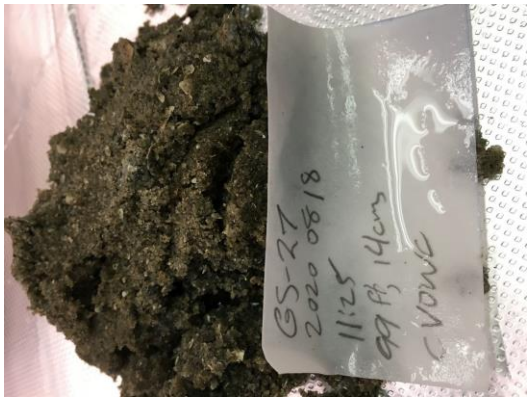
Sediment Description:

DOWN: Medium sand, 15% shell hash, ripples

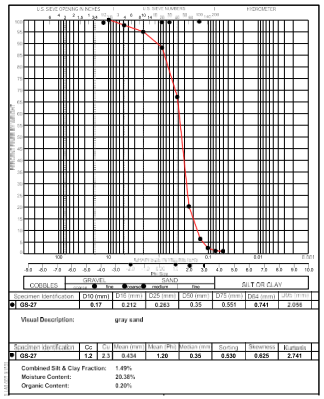
FWD: Medium sand, 15% shell hash, ripples

Fauna Description:

DOWN: Mollusca (Naticidae) egg collar



Grab ID: GS-27 Time: 11:25



Grab ID: GS-27 Time: 11:25

Grab Sample: GS-27

Sediment Description:

Visual Description: Gray sand

Mean Grain Size: 0.434 mm

Median Grain Size: 0.350 mm

Figure D-1-19. Representative Underwater Imagery and Sediment Description: VT-27

DOWN ID: 12687 Time: 11:26 E: 475691.79 N: 4090575.50

FWD ID: 14038 Time: 11:34 E: 475291.69 N: 4090575.27

Video Transect: VT-28

Sediment Description:

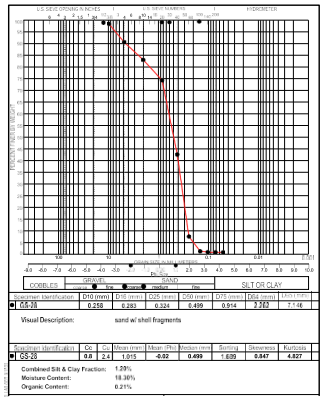
DOWN: Coarse sand, 20% shell hash

FWD: Coarse sand, 25% shell hash

Fauna Description:

DOWN: Echinodermata (Echinarachniidae)

Grab ID: GS-28 Time: 07:57



Grab ID: GS-28 Time: 07:57

Grab Sample: GS-28

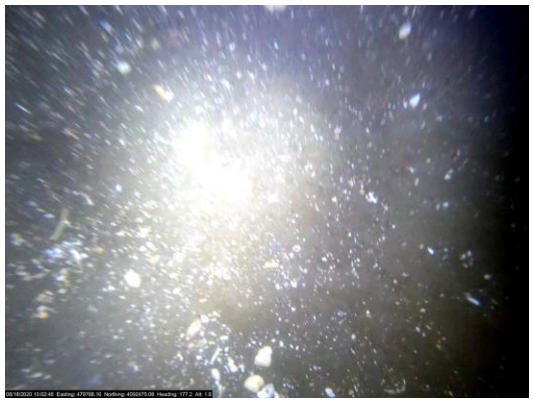
Sediment Description:

Visual Description: Sand with shell fragments

Mean Grain Size: 1.015 mm

Median Grain Size: 0.499 mm

Figure D-1-20. Representative Underwater Imagery and Sediment Description: VT-28



DOWN ID: 11247 Time: 10:02 E: 479768.16 N: 4092475.08

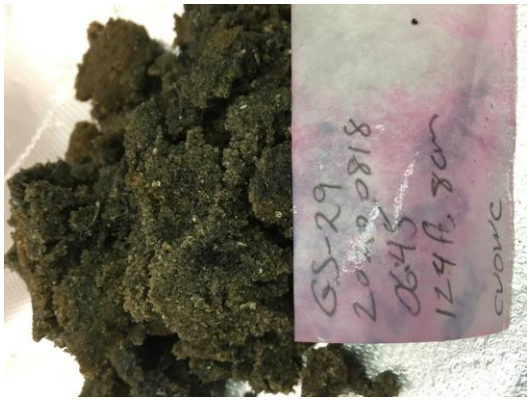
FWD ID: 11412 Time: 10:03 E: 479773.91 N: 4092472.90

Video Transect: VT-29

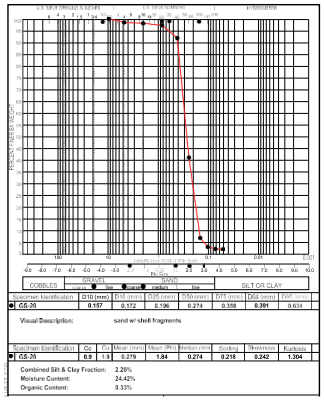
Sediment Description:

DOWN: Fine sand, 25% shell hash

FWD: Fine sand, 15% shell hash



Grab ID: GS-29 Time: 06:45



Grab ID: GS-29 Time: 06:45

Grab Sample: GS-29

Sediment Description:

Visual Description: Sand with shell fragments

Mean Grain Size: 0.172 mm

Median Grain Size: 0.274 mm

Figure D-1-21. Representative Underwater Imagery and Sediment Description: VT-29

DOWN ID: 12103 Time: 03:18 E: 464071.53 N: 4087367.85

FWD ID: 12133 Time: 03:18 E: 464047.55 N: 4087367.70

Video Transect: VT-30

Sediment Description:

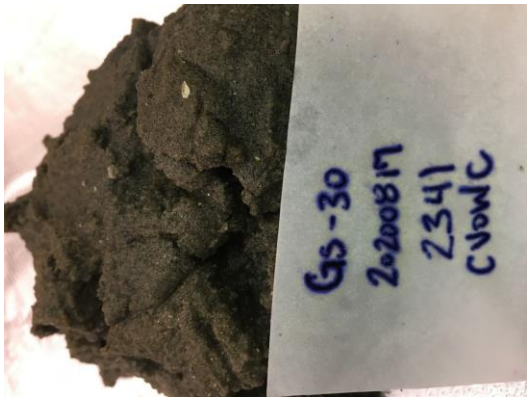
DOWN: Fine sand, 5% shell hash, ripples

FWD: Fine sand, 5% shell hash, ripples

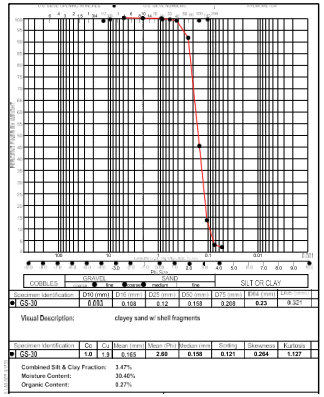
Fauna Description:

DOWN: Mollusca (Naticidae)

FWD: Arthropoda (Limulidae)



Grab ID: GS-30 Time: 23:41



Grab ID: GS-30 Time: 23:41

Grab Sample: GS-30

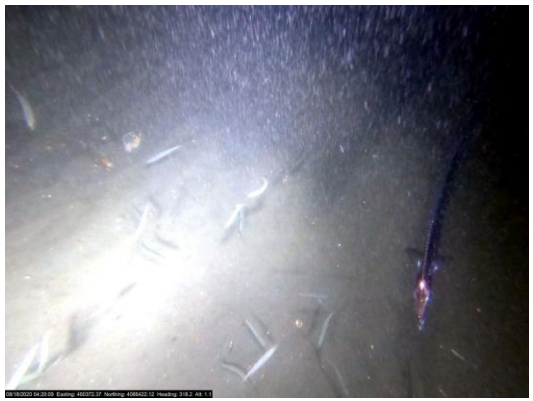
Sediment Description:

Visual Description: Clayey sand with shell fragments

Mean Grain Size: 0.165 mm

Median Grain Size: 0.158 mm

Figure D-1-22. Representative Underwater Imagery and Sediment Description: VT-30



DOWN ID: 13267 Time: 04:20 E: 460372.37 N: 4086422.12

FWD ID: 13726 Time: 04:21 E: 460310.66 N: 4086423.05

Video Transect: VT-31

Sediment Description:

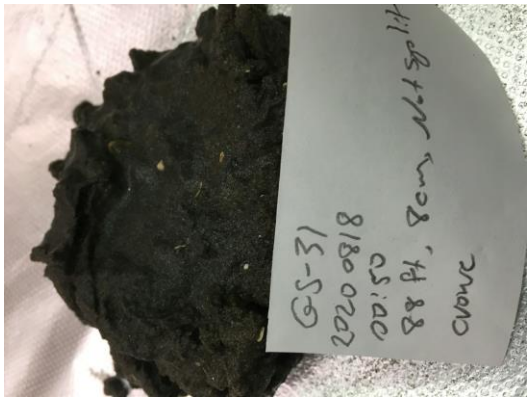
DOWN: Fine sand, 5% shell hash, ripples

FWD: Fine sand, 5% shell hash, ripples

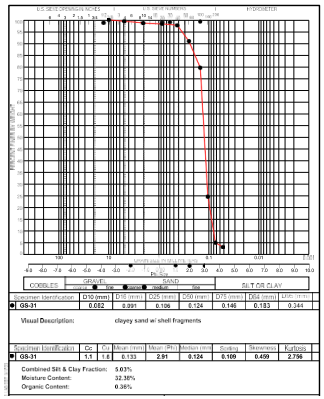
Fauna Description:

DOWN: Chordata (Engraulidae); Chordata (Trichiuridae)

FWD: Chordata (Engraulidae)



Grab ID: GS-31 Time: 00:50



Grab ID: GS-31 Time: 00:50

Grab Sample: GS-31

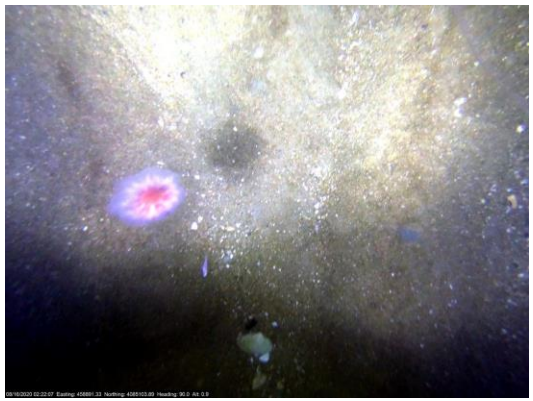
Sediment Description:

Visual Description: Clayey sand with shell fragments

Mean Grain Size: 0.133 mm

Median Grain Size: 0.124 mm

Figure D-1-23. Representative Underwater Imagery and Sediment Description: VT-31



DOWN ID: 14621 Time: 02:22 E: 458891.33 N: 4085103.89

FWD ID: 12319 Time: 02:22 E: 458916.43 N: 4085104.22

Video Transect: VT-32

Sediment Description:

DOWN: Coarse sand, 15% shell hash, organic deposits

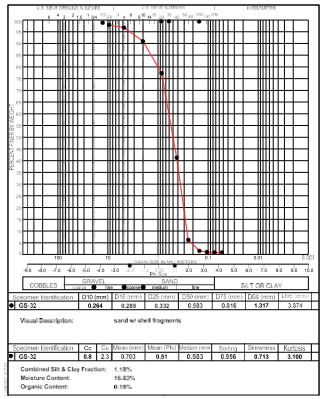
FWD: Coarse sand, 15% shell hash, ripples

Fauna Description:

DOWN: Cnidaria (Cyaneidae)

FWD: Cnidaria (Cyaneidae)

Grab ID: GS-32 Time: 22:59



Grab ID: GS-32 Time: 22:59

Grab Sample: GS-32

Sediment Description:

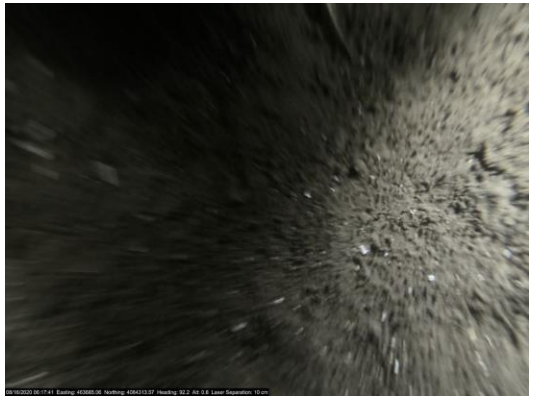
Visual Description: Sand with shell fragments

Mean Grain Size: 0.703 mm

Median Grain Size: 0.503 mm

Figure D-1-24. Representative Underwater Imagery and Sediment Description: VT-32

DOWN ID: 18961 Time: 15:55 E: 463601.58 N: 4084315.57



FWD ID: 26599 Time: 06:17 E: 463685.06 N: 4084313.57

Video Transect: VT-33

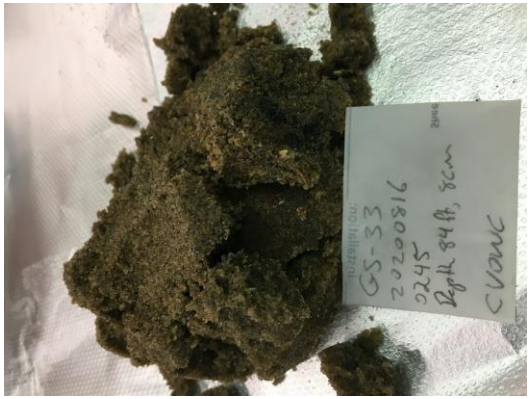
Sediment Description:

DOWN: Medium sand, 15% shell hash

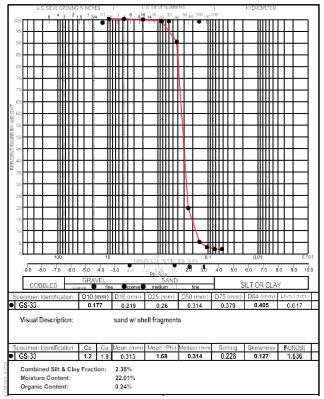
FWD: Medium sand, 5% shell hash

Fauna Description:

DOWN: Arthropoda (Portunidae)



Grab ID: GS-33 Time: 02:45



Grab ID: GS-33 Time: 02:45

Grab Sample: GS-33

Sediment Description:

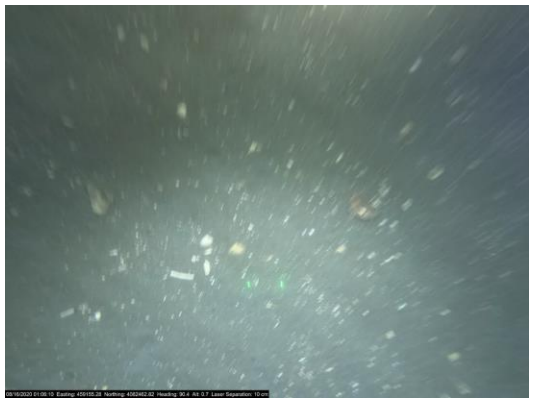
Visual Description: Sand with shell fragments

Mean Grain Size: 0.313 mm

Median Grain Size: 0.314 mm

Figure D-1-25. Representative Underwater Imagery and Sediment Description: VT-33

DOWN ID: 13226 Time: 01:09 E: 459303.29 N: 4082462.83



FWD ID: 20801 Time: 01:06 E: 459155.26 N: 4082462.82

Video Transect: VT-34

Sediment Description:

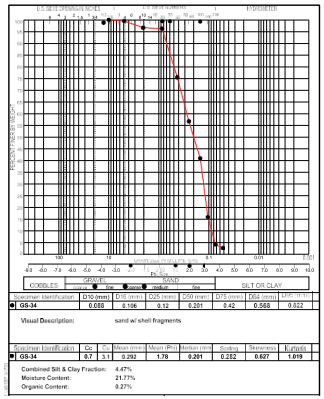
DOWN: Fine to medium sand, 15% shell hash

FWD: Fine to medium sand, 15% shell hash

Fauna Description:

DOWN: Arthropoda (Majidae)

Grab ID: GS-34 Time: 21:35



Grab ID: GS-34 Time: 21:35

Grab Sample: GS-34

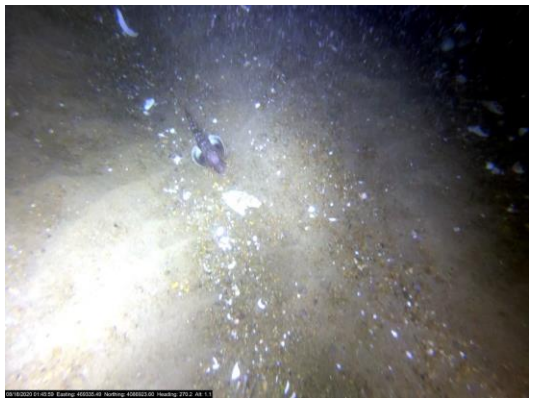
Sediment Description:

Visual Description: Sand with shell fragments

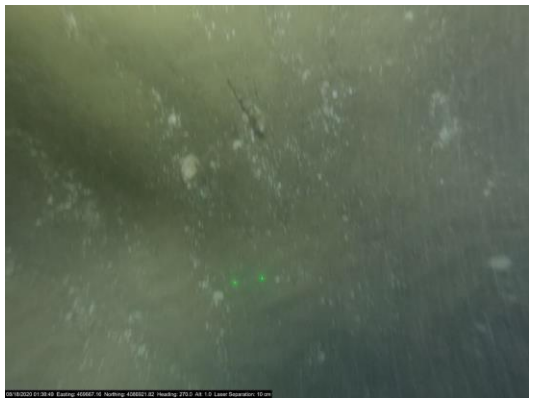
Mean Grain Size: 0.292 mm

Median Grain Size: 0.201 mm

Figure D-1-26. Representative Underwater Imagery and Sediment Description: VT-34



DOWN ID: 20718 Time: 01:45 E: 469335.49 N: 4086923.60



FWD ID: 20471 Time: 01:38 E: 469667.16 N: 4086921.82

Video Transect: VT-35

Sediment Description:

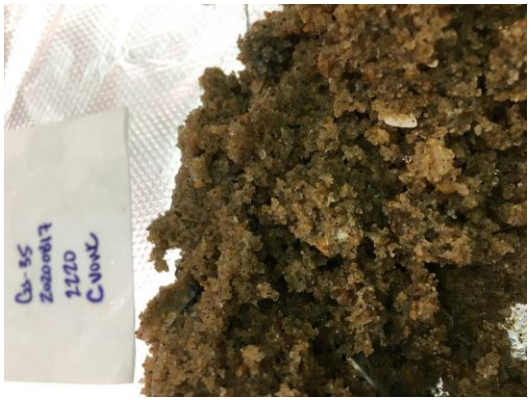
DOWN: Coarse sand, 35% shell hash

FWD: Coarse sand, 25% shell hash

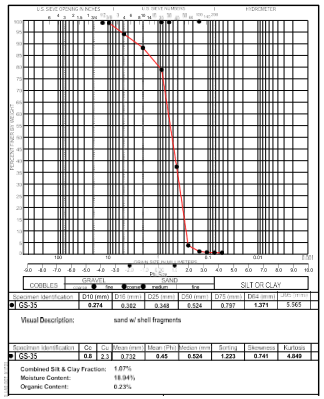
Fauna Description:

DOWN: Chordata (Triglidae)

FWD: Chordata (Triglidae)



Grab ID: GS-35 Time: 22:20



Grab ID: GS-35 Time: 22:20

Grab Sample: GS-35

Sediment Description:

Visual Description: Sand with shell fragments

Mean Grain Size: 0.732 mm

Median Grain Size: 0.524 mm

Figure D-1-27. Representative Underwater Imagery and Sediment Description: VT-35

DOWN ID: 14564 Time: 11:48 E: 468882.30 N: 4082449.91

FWD ID: 14742 Time: 11:50 E: 468789.95 N: 4082449.19

Video Transect: VT-36

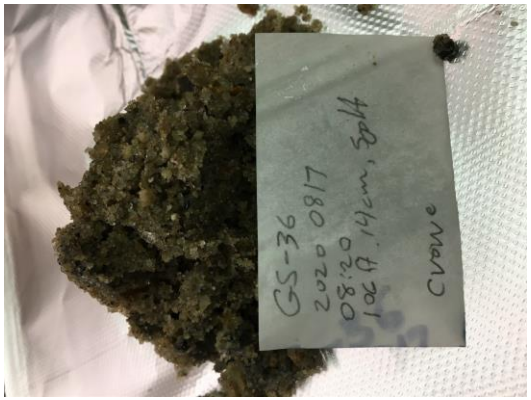
Sediment Description:

DOWN: Coarse grain, 20% shell hash, ripples

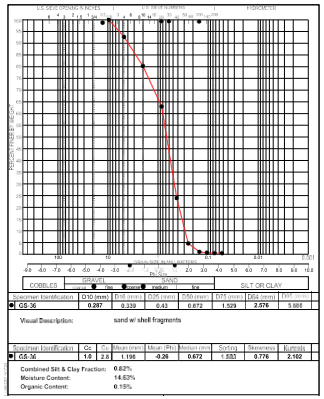
FWD: Coarse grain, 15% shell hash, ripples

Fauna Description:

DOWN: Cnidaria (Cyaneidae)



Grab ID: GS-36 Time: 08:20



Grab ID: GS-36 Time: 08:20

Grab Sample: GS-36

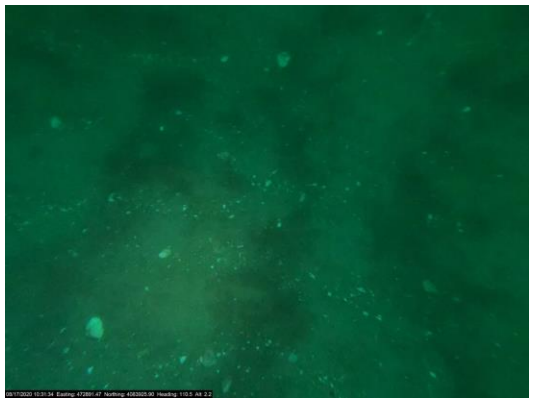
Sediment Description:

Visual Description: Sand with shell fragments

Mean Grain Size: 1.196 mm

Median Grain Size: 0.672 mm

Figure D-1-28. Representative Underwater Imagery and Sediment Description: VT-36



DOWN ID: 11962 Time: 10:31 E: 472891.47 N: 4083925.90

FWD ID: 12034 Time: 10:32 E: 472892.91 N: 4083925.44

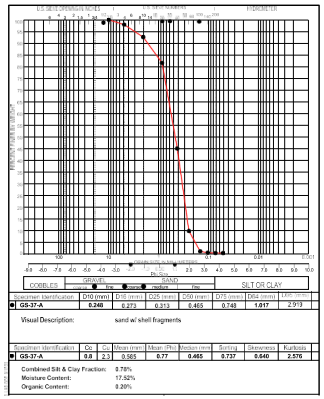
Video Transect: VT-37

Sediment Description:

DOWN: Medium to coarse sand, 10% shell hash, organic deposits

FWD: Medium to coarse sand, 10% shell hash, organic deposits

Grab ID: GS-37-A



Grab ID: GS-37-A

Grab Sample: GS-37-A

Sediment Description:

Visual Description: Sand with shell fragments

Mean Grain Size: 0.585 mm

Median Grain Size: 0.465 mm

Figure D-1-29. Representative Underwater Imagery and Sediment Description: VT-37

DOWN ID: 18016 Time: 07:30 E: 474836.55 N: 4085549.33

FWD ID: 18572 Time: 10:39 E: 473180.33 N: 4083925.40

Video Transect: VT-38

Sediment Description:

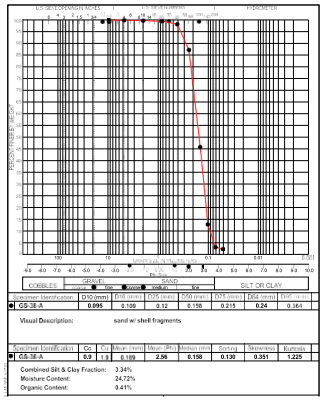
DOWN: Fine sand, 8% shell hash

FWD: Fine sand, 5% shell hash

Fauna Description:

DOWN: Chordata (Engraulidae)

Grab ID: GS-38-A



Grab ID: GS-38-A

Grab Sample: GS-38-A

Sediment Description:

Visual Description: Sand with shell fragments

Mean Grain Size: 0.169 mm

Median Grain Size: 0.158 mm

Figure D-1-30. Representative Underwater Imagery and Sediment Description: VT-38

DOWN ID: 16268 Time: 21:45 E: 477092.35 N: 4088080.87

FWD ID: 16173 Time: 21:40 E: 477357.48 N: 4088091.34

Video Transect: VT-39

Sediment Description:

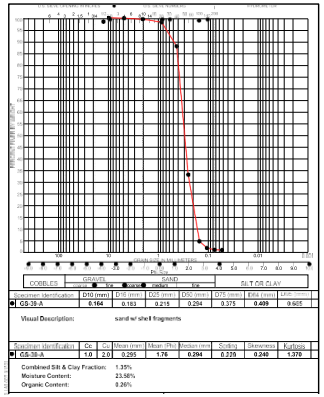
DOWN: Medium sand, 8% shell hash

FWD: Medium sand, 5% shell hash

Fauna Description:

DOWN: Mollusca (Naticidae) egg collar

Grab ID: GS-39-A



Grab ID: GS-39-A

Grab Sample: GS-39-A

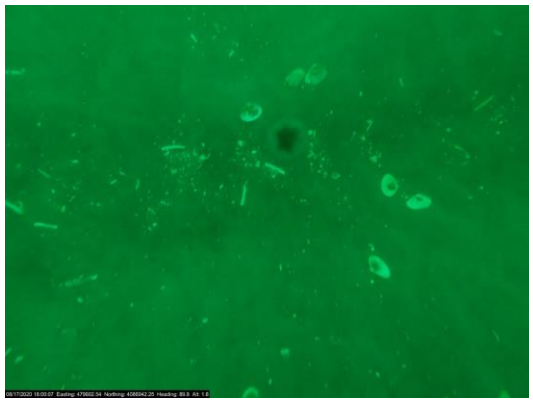
Sediment Description:

Visual Description: Sand with shell fragments

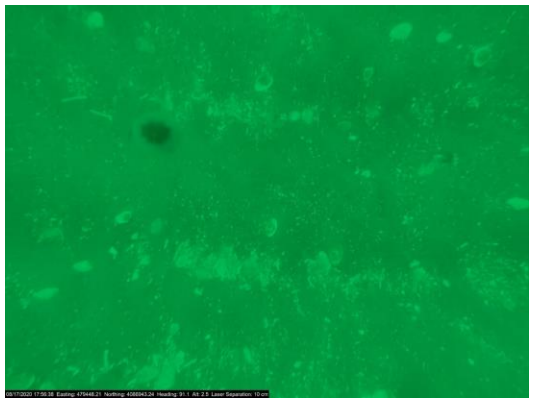
Mean Grain Size: 0.295 mm

Median Grain Size: 0.294 mm

Figure D-1-31. Representative Underwater Imagery and Sediment Description: VT-39



DOWN ID: 12445 Time: 18:00 E: 479602.54 N: 4086942.25



FWD ID: 12239 Time: 17:56 E: 479448.21 N: 4086943.24

Video Transect: VT-40

Sediment Description:

DOWN: Medium sand, 10% shell fragments

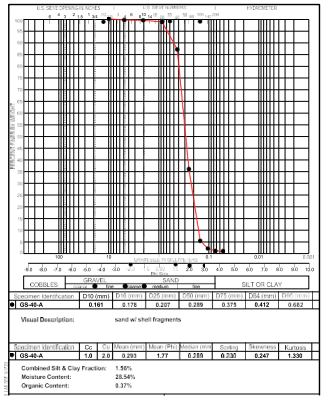
FWD: Medium sand, 25% shell fragments

Fauna Description:

DOWN: Cnidaria (Cyaneidae)

FWD: Cnidaria (Cyaneidae)

Grab ID: GS-40-A Time: 15:03



Grab ID: GS-40-A Time: 15:03

Grab Sample: GS-40-A

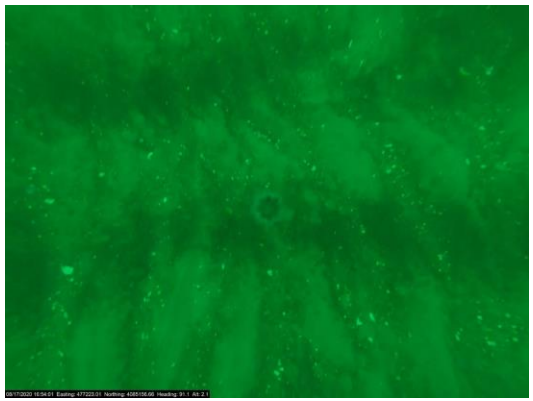
Sediment Description:

Visual Description: Sand with shell fragments

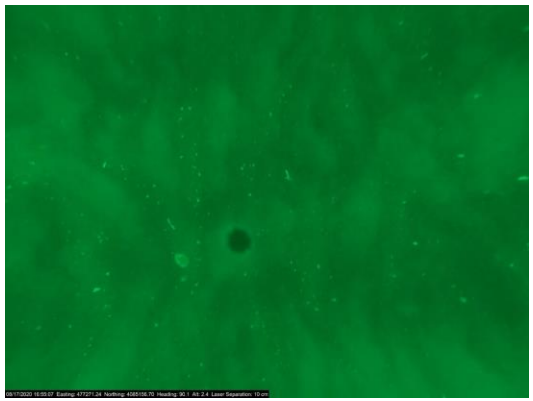
Mean Grain Size: 0.293 mm

Median Grain Size: 0.289 mm

Figure D-1-32. Representative Underwater Imagery and Sediment Description: VT-40



DOWN ID: 20476 Time: 16:54 E: 477223.01 N: 4085156.66



FWD ID: 20627 Time: 16:55 E: 477271.24 N: 4085156.70

Video Transect: VT-41

Sediment Description:

DOWN: Coarse grain, 10% shell hash, ripples

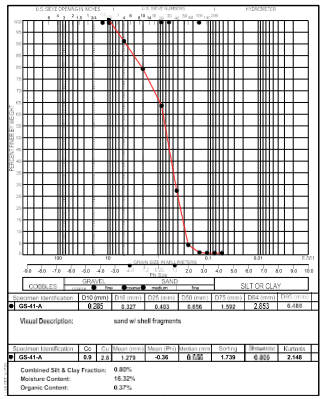
FWD: Coarse grain, 5% shell hash, ripples

Fauna Description:

DOWN: Cnidaria (Cyaneidae)

FWD: Cnidaria (Cyaneidae)

Grab ID: GS-41-A Time: 12:34



Grab ID: GS-41-A Time: 12:34

Grab Sample: GS-41-A

Sediment Description:

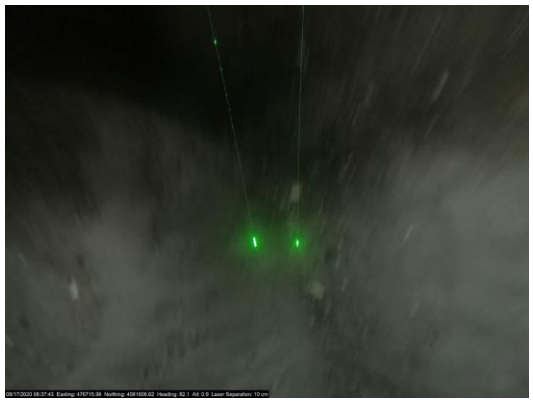
Visual Description: Sand with shell fragments

Mean Grain Size: 1.279 mm

Median Grain Size: 0.656 mm

Figure D-1-33. Representative Underwater Imagery and Sediment Description: VT-41

DOWN ID: 20182 Time: 08:37 E: 476712.25 N: 4081605.47



FWD ID: 20173 Time: 08:37 E: 476715.98 N: 4081606.62

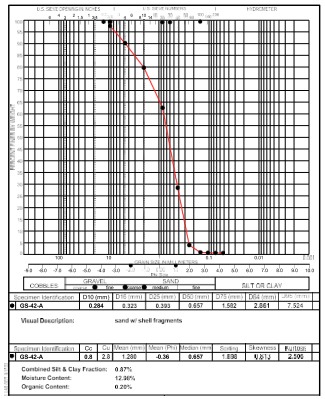
Video Transect: VT-42

Sediment Description:

DOWN: Coarse sand, 8% shell hash, organic deposits

FWD: Coarse sand, 5% shell hash

Grab ID: GS-42-A Time: 00:58



Grab ID: GS-42-A Time: 00:58

Grab Sample: GS-42-A

Sediment Description:

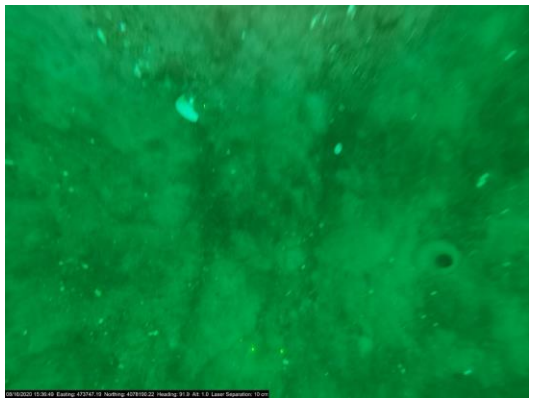
Visual Description: Sand with shell fragments

Mean Grain Size: 1.280 mm

Median Grain Size: 0.657 mm

Figure D-1-34. Representative Underwater Imagery and Sediment Description: VT-42

DOWN ID: 20569 Time: 15:29 E: 473408.60 N: 4078191.91



FWD ID: 18971 Time: 15:36 E: 473747.19 N: 4078190.22

Video Transect: VT-43

Sediment Description:

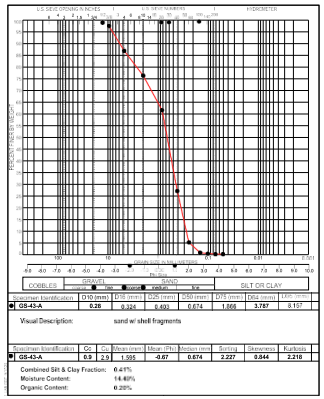
DOWN: Coarse sand, 5% shell hash, organic deposits

FWD: Coarse sand, 5% shell hash, organic deposits

Fauna Description:

FWD: Mollusca (Naticidae) egg collar

Grab ID: GS-43-A Time: 11:14



Grab ID: GS-43-A Time: 11:14

Grab Sample: GS-43-A

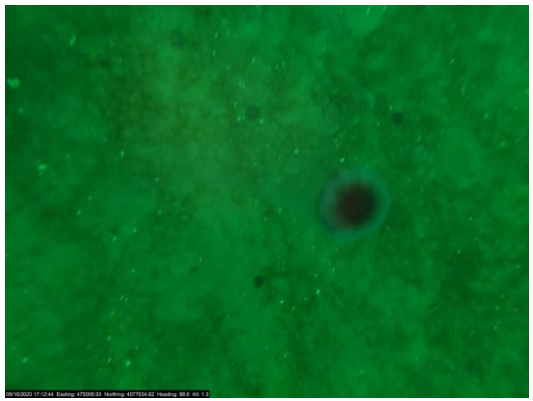
Sediment Description:

Visual Description: Sand with shell fragments

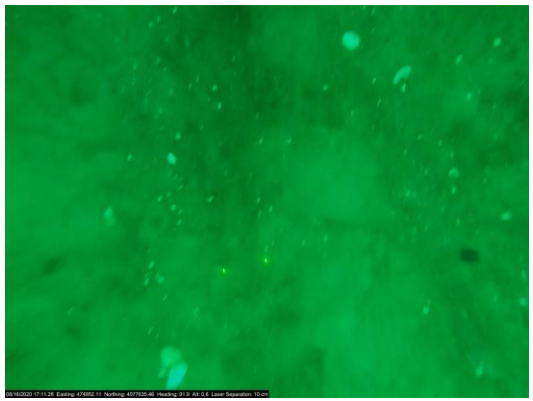
Mean Grain Size: 1.595 mm

Median Grain Size: 0.674 mm

Figure D-1-35. Representative Underwater Imagery and Sediment Description: VT-43



DOWN ID: 11374 Time: 17:12 E: 475009.93 N: 4077634.82



FWD ID: 11192 Time: 17:11 E: 474952.11 N: 4077635.46

Video Transect: VT-44

Sediment Description:

DOWN: Medium sand, 5% shell hash

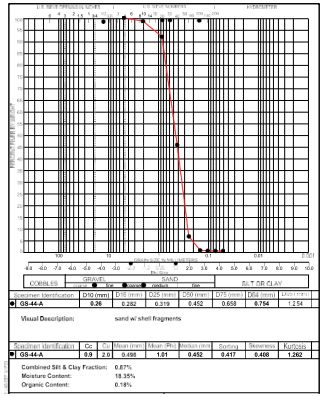
FWD: Medium sand, 5% shell hash

Fauna Description:

DOWN: Cnidaria (Cyaneidae); Echinodermata (Echinarachniidae)

FWD: Echinodermata (Echinarachniidae

Grab ID: GS-44-A Time: 15:44



Grab ID: GS-44-A Time: 15:44

Grab Sample: GS-44-A

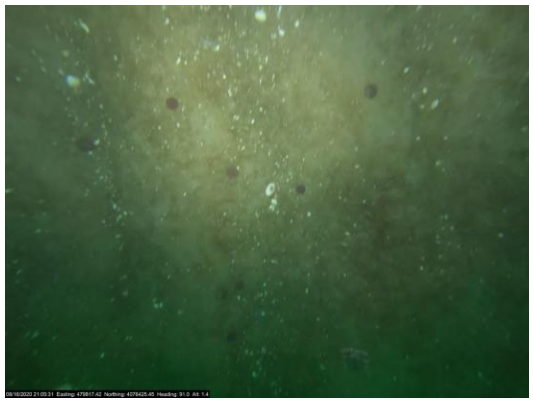
Sediment Description:

Visual Description: Sand with shell fragments

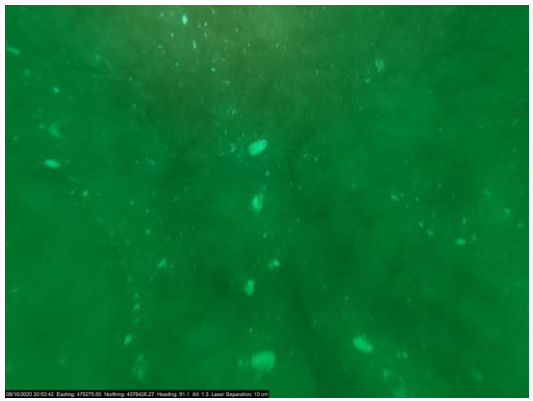
Mean Grain Size: 0.496 mm

Median Grain Size: 0.492 mm

Figure D-1-36. Representative Underwater Imagery and Sediment Description: VT-44



DOWN ID: 13923 Time: 21:05 E: 479817.42 N: 4076425.45



FWD ID: 13122 Time: 20:53 E: 479275.60 N: 4076426.27

Video Transect: VT-45

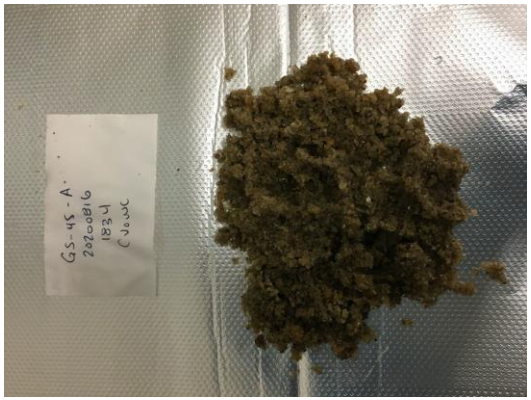
Sediment Description:

DOWN: Coarse sand, 10% shell hash

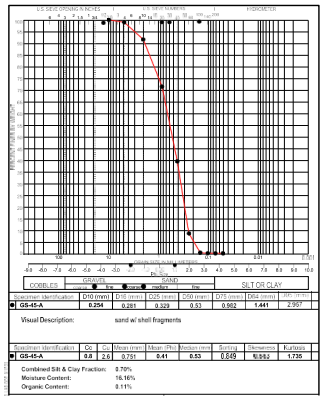
FWD: Coarse sand, 10% shell hash

Fauna Description:

DOWN: Arthropoda (Portunidae); Echinodermata (Echinarachniidae)



Grab ID: GS-45-A Time: 18:34



Grab ID: GS-45-A Time: 18:34

Grab Sample: GS-45-A

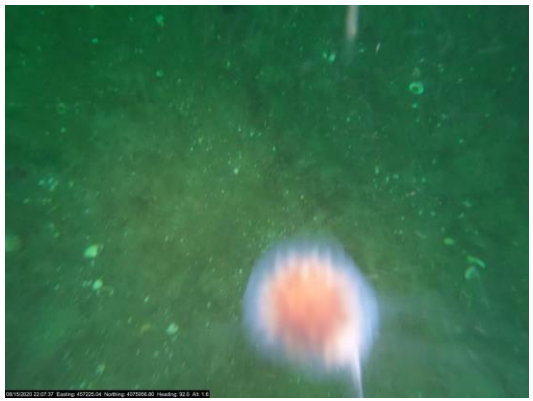
Sediment Description:

Visual Description: Sand and shell fragments

Mean Grain Size: 0.751 mm

Median Grain Size: 0.530 mm

Figure D-1-37. Representative Underwater Imagery and Sediment Description: VT-45



DOWN ID: 20174 Time: 22:07 E: 457225.04 N: 4075956.80

FWD ID: 17975 Time: 22:06 E: 457197.42 N: 4075957.89

Video Transect: VT-46

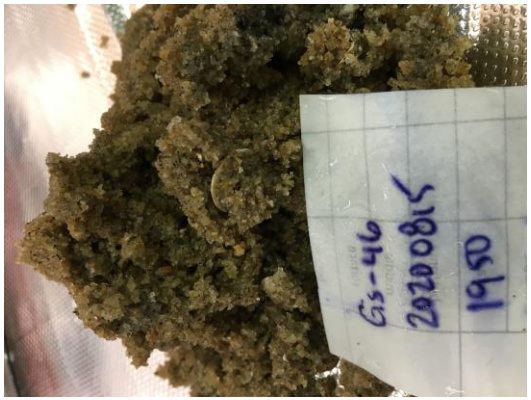
Sediment Description:

DOWN: Coarse sand, 8% shell hash

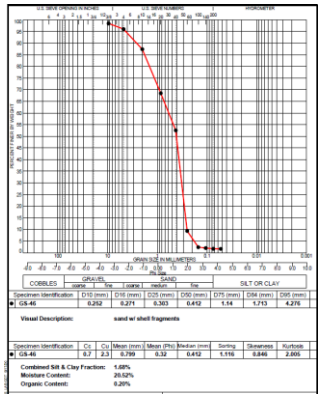
FWD: Coarse sand, 5% shell hash

Fauna Description:

DOWN: Cnidaria (Cyaneidae)



Grab ID: GS-46 Time: 19:50



Grab ID: GS-46 Time: 19:50

Grab Sample: GS-46

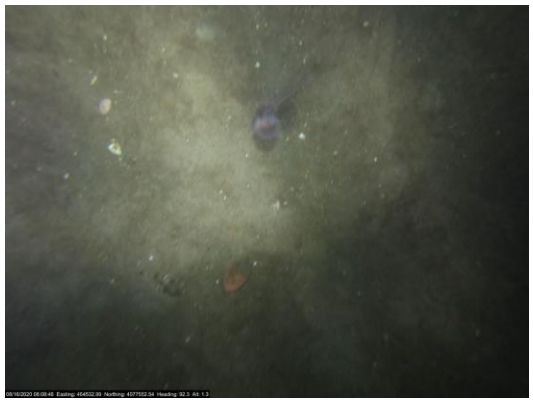
Sediment Description:

Visual Description: Sand with shell fragments

Mean Grain Size: 0.799 mm

Median Grain Size: 0.412 mm

Figure D-1-38. Representative Underwater Imagery and Sediment Description: VT-46



DOWN ID: 21447 Time: 08:08 E: 464532.99 N: 4077552.54

FWD ID: 18045 Time: 07:54 E: 463902.97 N: 4077548.46

Video Transect: VT-47

Sediment Description:

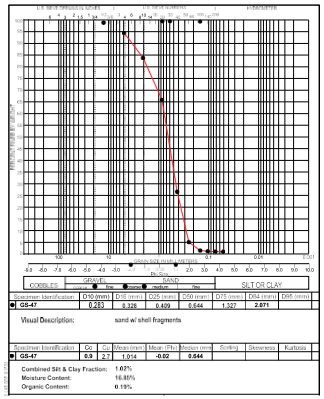
DOWN: Coarse sand, 8% shell hash

FWD: Coarse sand, 5% shell hash

Fauna Description:

DOWN: Cnidaria (Cyaneidae)

Grab ID: GS-47 Time: 04:25



Grab ID: GS-47 Time: 04:25

Grab Sample: GS-47

Sediment Description:

Visual Description: Sand with shell fragments

Mean Grain Size: 1.014 mm

Median Grain Size: 0.644 mm

Figure D-1-39. Representative Underwater Imagery and Sediment Description: VT-47

DOWN ID: 14390 Time: 11:50 E: 469242.83 N: 4077673.88

FWD ID: 12563 Time: 11:50 E: 469276.62 N: 4077673.91

Video Transect: VT-48

Sediment Description:

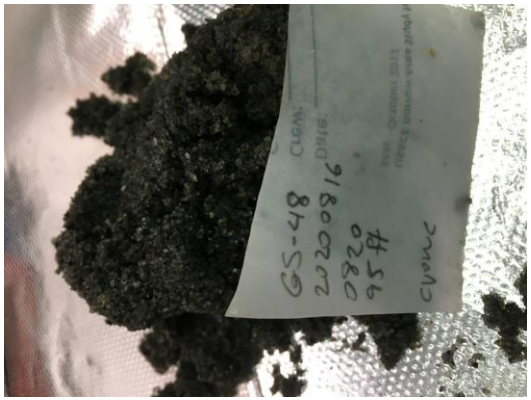
DOWN: Coarse sand, 8% shell hash

FWD: Coarse sand, 10% shell hash

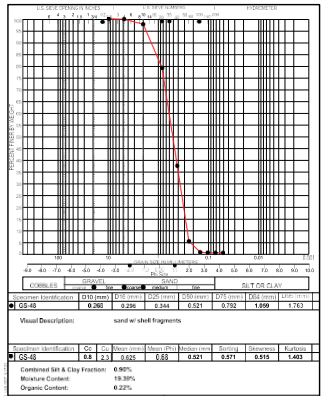
Fauna Description:

DOWN: Echinodermata (Echinarachniidae)

FWD: Echinodermata (Echinarachniidae)



Grab ID: GS-48 Time: 08:20



Grab ID: GS-48 Time: 08:20

Grab Sample: GS-48

Sediment Description:

Visual Description: Sand with shell fragments

Mean Grain Size: 0.625 mm

Median Grain Size: 0.521 mm

Figure D-1-40. Representative Underwater Imagery and Sediment Description: VT-48

DOWN ID: 18510 Time: 00:13 E: 471807.44 N: 4087332.48

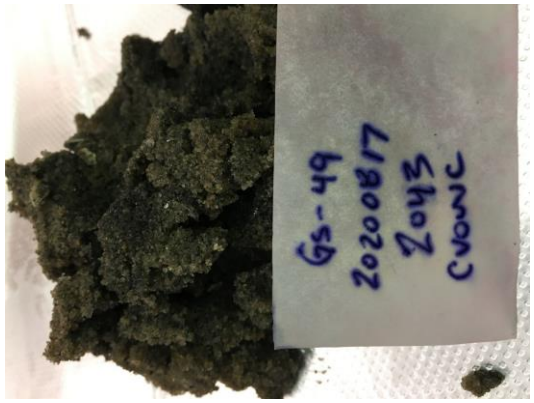
FWD ID: 17974 Time: 00:01 E: 472367.97 N: 4087330.97

Video Transect: VT-49

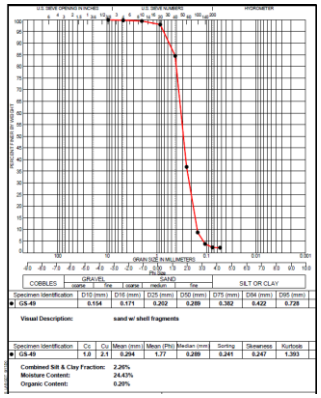
Sediment Description:

DOWN: Coarse sand, 5% shell hash

FWD: Coarse sand, 5% shell hash



Grab ID: GS-49 Time: 20:43



Grab ID: GS-49 Time: 20:43

Grab Sample: GS-49

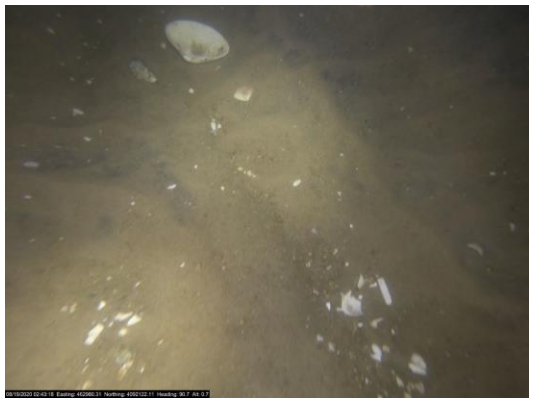
Sediment Description:

Visual Description: Sand with shell fragments

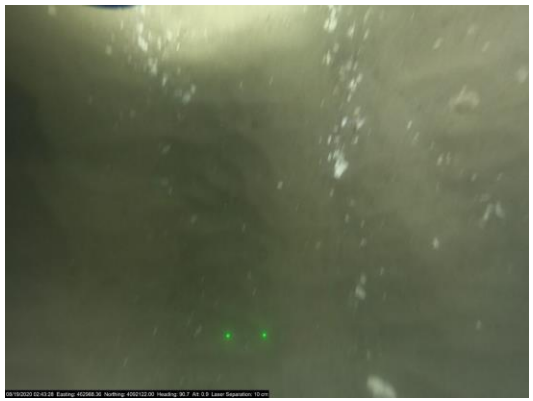
Mean Grain Size: 0.294 mm

Median Grain Size: 0.289 mm

Figure D-1-41. Representative Underwater Imagery and Sediment Description: VT-49



DOWN ID: 13860 Time: 02:43 E: 462980.31 N: 4092122.11



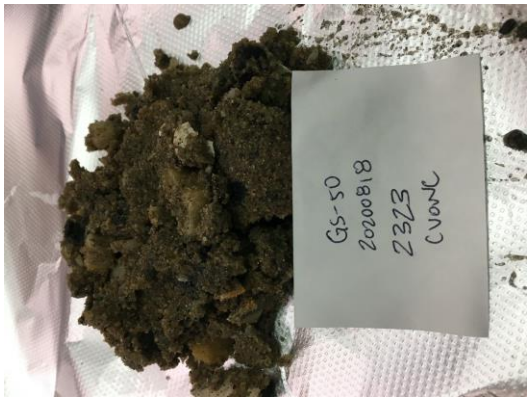
FWD ID: 13942 Time: 02:43 E: 462988.36 N: 4092122.00

Video Transect: VT-50

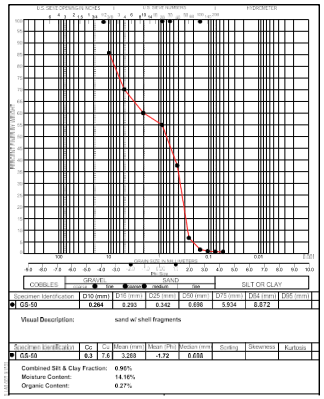
Sediment Description:

DOWN: Coarse sand, 15% shell hash, ripples

FWD: Coarse sand, 15% shell hash, ripples



Grab ID: GS-50 Time: 23:23



Grab ID: GS-50 Time: 23:23

Grab Sample: GS-50

Sediment Description:

Visual Description: Sand with shell fragments

Mean Grain Size: 3.288 mm

Median Grain Size: 0.698 mm

Figure D-1-42. Representative Underwater Imagery and Sediment Description: VT-50

DOWN ID: 14596 Time: 17:23 E: 466156.11 N: 4090940.35

FWD ID: 25901 Time: 17:25 E: 466091.48 N: 4090940.70

Video Transect: VT-51

Sediment Description:

DOWN: Fine sand, 5% shell hash

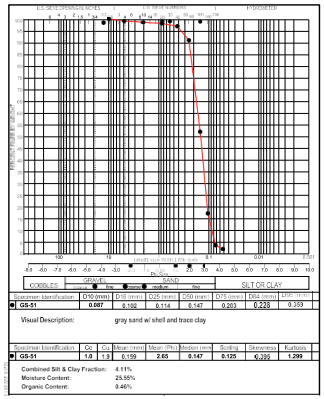
FWD: Fine sand, 5% shell hash

Fauna Description:

DOWN: Cnidaria (Cyaneidae)

FWD: Cnidaria (Cyaneidae)

Grab ID: GS-51 Time: 06:44



Grab ID: GS-51 Time: 06:44

Grab Sample: GS-51

Sediment Description:

Visual Description: Gray sand with shell and trace clay

Mean Grain Size: 0.159 mm

Median Grain Size: 0.147 mm

Figure D-1-43. Representative Underwater Imagery and Sediment Description: VT-51

DOWN ID: 12927 Time: 09:33 E: 464726.62 N: 4073200.23

FWD ID: 20282 Time: 09:31 E: 464662.97 N: 4073200.47

Video Transect: VT-52-REF

Sediment Description:

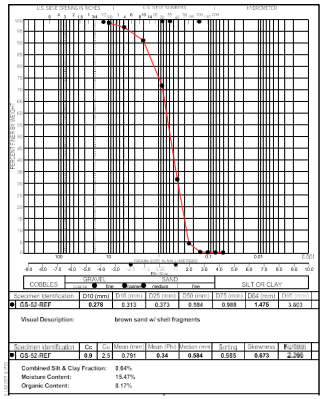
DOWN: Coarse sand, 8% shell hash

FWD: Coarse sand, 10% shell hash

Fauna Description:

DOWN: Cnidaria (Cyaneidae)

Grab ID: GS-52-REF Time: 06:05



Grab ID: GS-52-REF Time: 06:05

Grab Sample: GS-52-REF

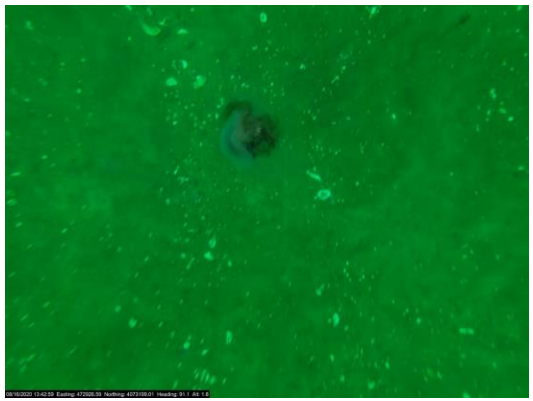
Sediment Description:

Visual Description: Brown sand with shell fragments

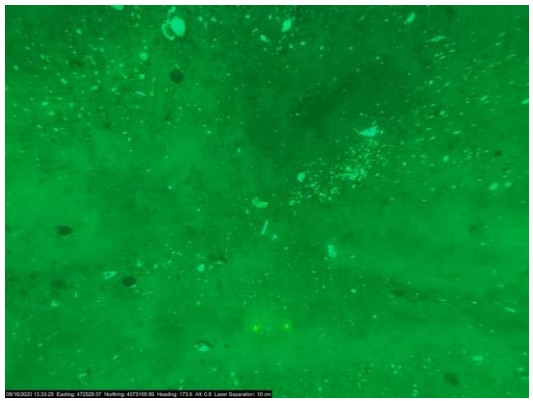
Mean Grain Size: 0.791 mm

Median Grain Size: 0.584 mm

Figure D-1-44. Representative Underwater Imagery and Sediment Description: VT-52-REF



DOWN ID: 17385 Time: 13:42 E: 472926.59 N: 4073199.01



FWD ID: 14854 Time: 13:33 E: 472529.57 N: 4073199.99

Video Transect: VT-53-REF

Sediment Description:

DOWN: Coarse sand, 10% shell hash

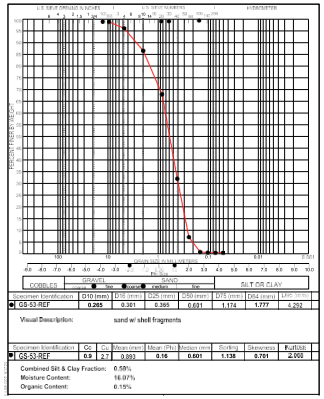
FWD: Coarse sand, 10% shell hash

Fauna Description:

DOWN: Cnidaria (Cyaneidae)

FWD: Echinodermata (Echinarachniidae)

Grab ID: GS-53-REF Time: 10:00



Grab ID: GS-53-REF Time: 10:00

Grab Sample: GS-53-REF

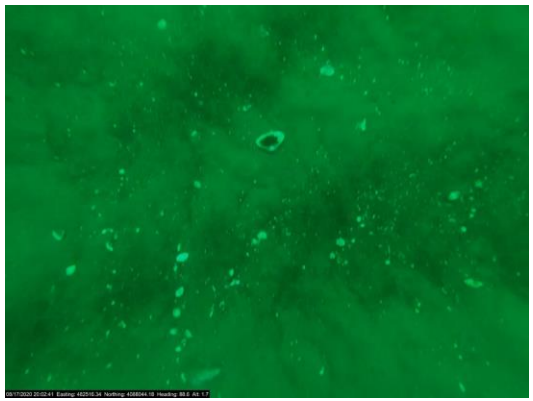
Sediment Description:

Visual Description: Sand with shell fragments

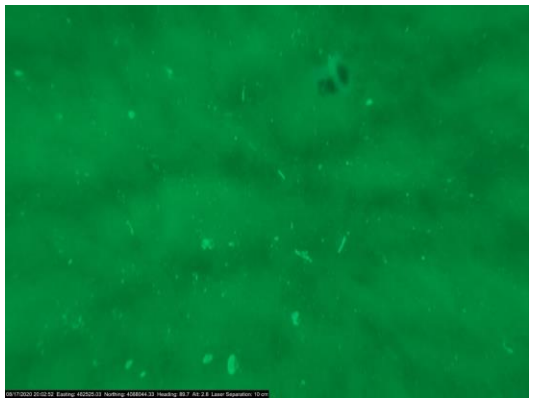
Mean Grain Size: 0.893 mm

Median Grain Size: 0.601 mm

Figure D-1-45. Representative Underwater Imagery and Sediment Description: VT-53-REF



DOWN ID: 14119 Time: 20:02 E: 482516.34 N: 4088044.18



FWD ID: 14160 Time: 20:02 E: 482525.03 N: 4088044.33

Video Transect: VT-54-REF

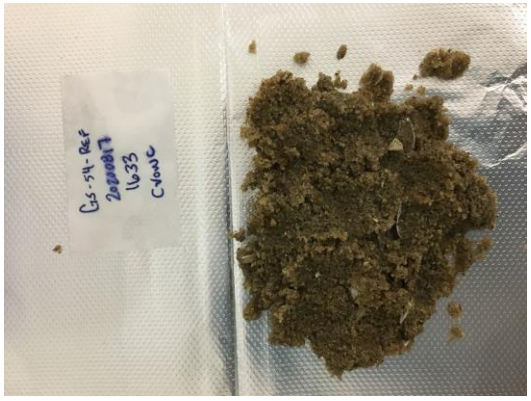
Sediment Description:

DOWN: Medium sand, 15% shell hash, ripples

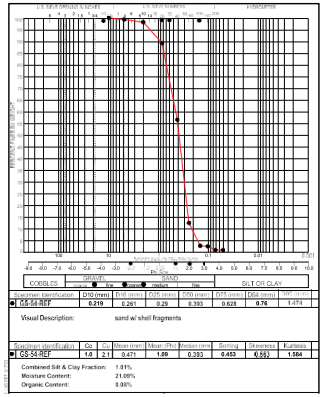
FWD: Medium sand, 5% shell hash, ripples

Fauna Description:

FWD: Cnidaria (Cyaneidae)



Grab ID: GS-54-REF Time: 16:33



Grab ID: GS-54-REF Time: 16:33

Grab Sample: GS-54-REF

Sediment Description:

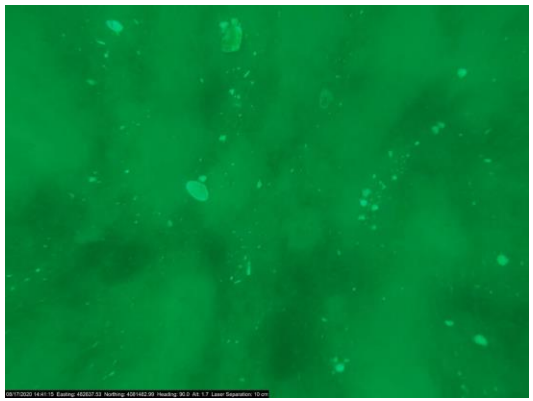
Visual Description: Sand with shell fragments

Mean Grain Size: 0.471 mm

Median Grain Size: 0.373 mm

Figure D-1-46. Representative Underwater Imagery and Sediment Description: VT-54-REF

DOWN ID: 16837 Time: 14:13 E: 482503.35 N: 4081421.35



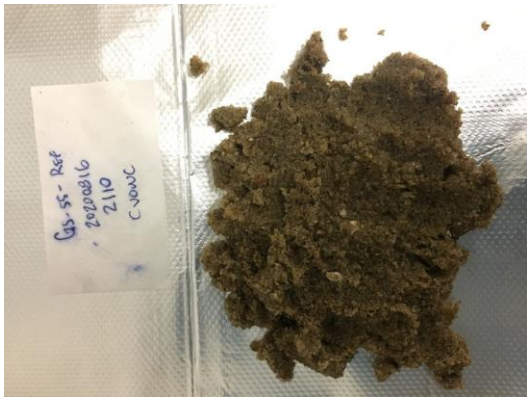
FWD ID: 18580 Time: 14:41 E: 482637.53 N: 4081482.99

Video Transect: VT-55-REF

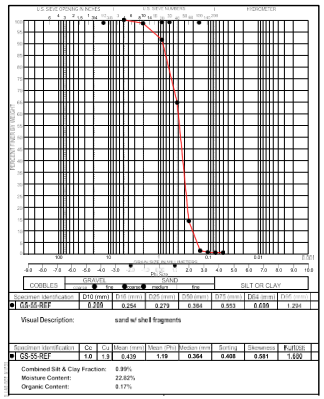
Sediment Description:

DOWN: Medium sand, 30% shell hash

FWD: Medium sand, 10% shell hash, organic deposits



Grab ID: GS-55-REF Time: 21:10



Grab ID: GS-55-REF Time: 21:10

Grab Sample: GS-55-REF

Sediment Description:

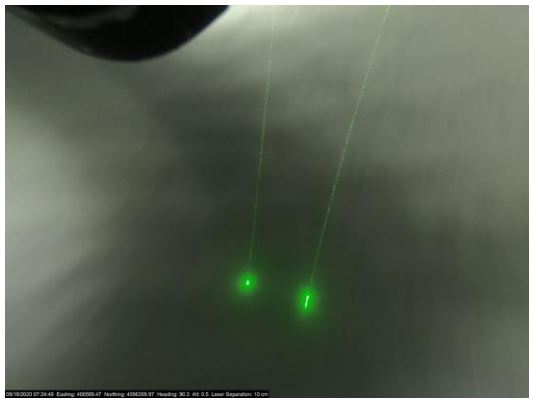
Visual Description: Sand with shell fragments

Mean Grain Size: 0.439 mm

Median Grain Size: 0.364 mm

Figure D-1-47. Representative Underwater Imagery and Sediment Description: VT-55-REF

DOWN ID: 17526 Time: 07:14 E: 466092.51 N: 4096399.32



FWD ID: 18420 Time: 07:24 E: 466569.47 N: 4096399.97

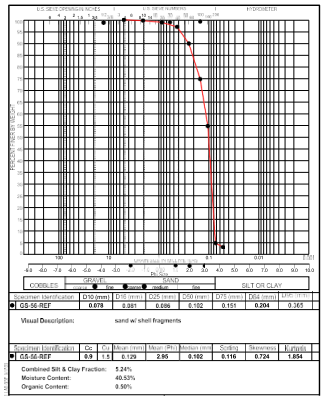
Video Transect: VT-56-REF

Sediment Description:

DOWN: Fine sand, 25% shell hash

FWD: Fine sand, 5% shell hash, ripples

Grab ID: GS-56-REF Tim: 03:40



Grab ID: GS-56-REF Tim: 03:40

Grab Sample: GS-56-REF

Sediment Description:

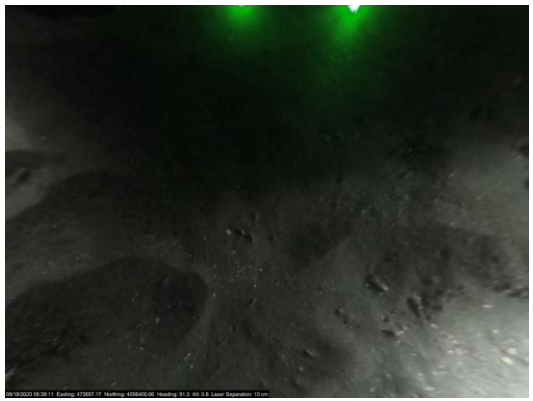
Visual Description: Sand with shell fragments

Mean Grain Size: 0.129 mm

Median Grain Size: 0.102 mm

Figure D-1-48. Representative Underwater Imagery and Sediment Description: VT-56-REF

DOWN ID: 19801 Time: 08:38 E: 473658.36 N: 4096400.03



FWD ID: 19923 Time: 08:38 E: 473657.17 N: 4096400.06

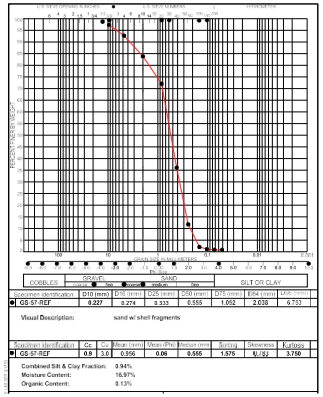
Video Transect: VT-57-REF

Sediment Description:

DOWN: Coarse sand, 8% shell hash

FWD: Coarse sand, 5% shell hash

Grab ID: GS-57-REF Time: 05:00



Grab ID: GS-57-REF Time: 05:00

Grab Sample: GS-57-REF

Sediment Description:

Visual Description: Sand with shell fragments

Mean Grain Size: 0.956 mm

Median Grain Size: 0.555 mm

Figure D-1-49. Representative Underwater Imagery and Sediment Description: VT-57-REF

Attachment D-2. Benthic Taxonomy, Laboratory Data

CONSTRUCTION AND OPERATIONS PLAN

Coastal Virginia Offshore Wind Commercial Project

Attachment D-2

Benthic Taxonomy, Laboratory Data

Prepared for:

Dominion Energy®

707 East Main Street
Richmond, VA 23219

Prepared by:

TETRA TECH

Tetra Tech, Inc.
4101 Cox Road, Suite 120
Glen Allen, VA 23060

www.tetratech.com

Submitted October 2021

Attachment D-2- Benthic Taxonomy, Laboratory Data

TABLES

Table D-2-1. Rank and Abundance of Organisms Present in Grab Samples within the Lease Area

Major Taxon	Species Name	Lease Area Samples	
		Total Individuals	% Total
Arthropoda - Malacostraca	*Byblis serrata*	10,726	34.13
Annelida - Clitellata	*Oligochaeta sp.*	3,285	10.45
Annelida - Polychaeta	*Fabricinuda trilobata*	2,867	9.12
Annelida - Polychaeta	*Polygordius jouinae*	1,698	5.40
Annelida - Polychaeta	*Aricidea (Acmira) cerrutii*	1,098	3.49
Chordata - Ascidiacea	*Ascidiacea sp. juvenile*	737	2.35
Annelida - Polychaeta	*Aricidea (Acmira) catherinae*	689	2.19
Mollusca - Bivalvia	*Ameritella tenella*	571	1.82
Annelida - Polychaeta	*Hesionura coineaui*	393	1.25
Annelida - Polychaeta	*Clymenella torquata*	387	1.23
Annelida - Polychaeta	*Scalibregma inflatum*	377	1.20
Annelida - Polychaeta	*Protodorvillea kefersteini*	363	1.16
Annelida - Polychaeta	*Brania wellfleetensis*	337	1.07
Arthropoda - Malacostraca	*Metharpinia floridana*	329	1.05
Arthropoda - Malacostraca	*Unciola irrorata*	327	1.04
Annelida - Polychaeta	*Paradoneis sp. A*	292	0.93
Arthropoda - Malacostraca	*Rhepoxynius hudsoni*	272	0.87
Mollusca - Bivalvia	*Pandora gouldiana*	249	0.79
Mollusca - Bivalvia	*Nucula proxima*	243	0.77
Annelida - Polychaeta	*Caulleriella venefica*	234	0.74
Mollusca - Bivalvia	*Spisula solidissima*	233	0.74
Arthropoda - Malacostraca	*Protohaustorius cf. deichmannae*	228	0.73
Annelida - Polychaeta	*Aphelochaeta sp. A*	214	0.68
Annelida - Polychaeta	*Scoletoma acicularum*	188	0.60
Annelida - Polychaeta	*Paradoneis sp. B*	182	0.58
Mollusca - Bivalvia	*Solamen glandula*	179	0.57
Annelida - Polychaeta	*Lumbrinerides dayi*	176	0.56
Annelida - Polychaeta	*Aricidea (Aricidea) wassi*	170	0.54
Arthropoda - Malacostraca	*Tanaissus psammophilus*	168	0.53
Arthropoda - Malacostraca	*Protohaustorius wigleyi*	157	0.50
Annelida - Polychaeta	*Scoloplos capensis*	150	0.48
Annelida - Polychaeta	*Exogone hebes*	136	0.43
Annelida - Polychaeta	*Capitella capitata*	123	0.39
Annelida - Polychaeta	*Kirkegaardia baptisteae*	116	0.37
Annelida - Polychaeta	*Ampharete oculata*	102	0.32
Annelida - Polychaeta	*Opistodonta longocirrata*	102	0.32
Annelida - Polychaeta	*Streptosyllis websteri*	96	0.31
Mollusca - Bivalvia	*Astarte castanea*	96	0.31
Annelida - Polychaeta	*Hemipodia simplex*	93	0.30
Annelida - Polychaeta	*Ampharete lindstroemi*	92	0.29
Annelida - Polychaeta	*Goniadella gracilis*	90	0.29
Annelida - Polychaeta	*Polycirrus eximius*	87	0.28
Arthropoda - Malacostraca	*Ampelisca verrilli*	86	0.27
Annelida - Polychaeta	*Aphelochaeta sp. B*	81	0.26
Mollusca - Bivalvia	*Periploma sp.*	81	0.26
Annelida - Polychaeta	*Leitoscoloplos robustus*	79	0.25
Arthropoda - Malacostraca	*Ampelisca bicarinata*	75	0.24
Mollusca - Bivalvia	*Ameritella agilis*	75	0.24
Annelida - Polychaeta	*Onuphidae sp. juvenile*	71	0.23
Mollusca - Gastropoda	*Tritia trivitatta*	71	0.23
Annelida - Polychaeta	*Pettiboneia sp. A*	69	0.22
Annelida - Polychaeta	*Nephtys picta*	66	0.21
Chordata - Leptocardii	*Branchiostoma virginiae*	65	0.21
Annelida - Polychaeta	*Scoloplos armiger*	64	0.20
Mollusca - Bivalvia	*Arctica islandica*	63	0.20
Annelida - Polychaeta	*Tharyx sp. indeterminate*	60	0.19

Major Taxon	Species Name	Lease Area Samples	
		Total Individuals	% Total
Arthropoda - Malacostraca	*Pagurus annulipes*	59	0.19
Nemertea	*Nemertea sp.*	50	0.16
Annelida - Polychaeta	*Paraonis sp. A*	47	0.15
Annelida - Polychaeta	*Sthenelais limicola*	46	0.15
Nemertea - Palaeonemertea	*Cephalothrix spiralis*	44	0.14
Mollusca - Gastropoda	*Caecum johnsoni*	43	0.14
Annelida - Polychaeta	*Onuphis eremita oculata*	40	0.13
Mollusca - Gastropoda	*Epitonium sp.*	40	0.13
Echinodermata - Echinoidea	*Echinarachnius parma*	39	0.12
Annelida - Polychaeta	*Paraonis pygoenigmatica*	37	0.12
Annelida - Polychaeta	*Tharyx acutus*	37	0.12
Annelida - Polychaeta	*Orbinia americana*	32	0.10
Nemertea - Hoplonemertea	*Amphiporus caecus*	30	0.10
Annelida - Polychaeta	*Spio setosa*	29	0.09
Mollusca - Bivalvia	*Pitar morrhuanus*	29	0.09
Annelida - Polychaeta	*Scoletoma tenuis*	28	0.09
Arthropoda - Malacostraca	*Americhelidium americanum*	28	0.09
Mollusca - Gastropoda	*Dentimargo aureocinctus*	28	0.09
Annelida - Polychaeta	*Spirorbis sp.*	27	0.09
Mollusca - Bivalvia	*Bivalvia sp.*	27	0.09
Mollusca - Bivalvia	*Parvilucina crenella*	27	0.09
Mollusca - Bivalvia	*Parvicardium pinnulatum*	26	0.08
Mollusca - Gastropoda	*Caecum sp.*	25	0.08
Annelida - Polychaeta	*Sigalion arenicola*	24	0.08
Arthropoda - Malacostraca	*Leptocheirus pinguis*	24	0.08
Annelida - Polychaeta	*Tharyx sp. A (MWRA)*	23	0.07
Annelida - Polychaeta	*Dipolydora socialis*	22	0.07
Mollusca - Bivalvia	*Ensis leei*	21	0.07
Annelida - Polychaeta	*Phylo felix*	20	0.06
Annelida - Polychaeta	*Travisia sp. A*	20	0.06
Annelida - Polychaeta	*Erinaceusyllis erinaceus*	19	0.06
Annelida - Polychaeta	*Harmothoe extenuata*	19	0.06
Arthropoda - Malacostraca	*Pagurus longicarpus*	19	0.06
Annelida - Polychaeta	*Clymenella zonalis*	17	0.05
Mollusca - Bivalvia	*Thraciidae sp.*	17	0.05
Annelida - Polychaeta	*Maldanidae sp.*	16	0.05
Annelida - Polychaeta	*Polycirrus phosphoreus*	16	0.05
Arthropoda - Malacostraca	*Liljeborgia sp. A*	16	0.05
Annelida - Polychaeta	*Kirkegaardia hampsoni*	15	0.05
Annelida - Polychaeta	*Longibrachium atlanticum*	15	0.05
Annelida - Polychaeta	*Ninoe nigripes*	15	0.05
Annelida - Polychaeta	*Parougia caeca*	15	0.05
Annelida - Polychaeta	*Pisione remota*	15	0.05
Arthropoda - Malacostraca	*Acanthohaustorius bousfieldi*	15	0.05
Arthropoda - Malacostraca	*Batea catharinensis*	15	0.05
Annelida - Polychaeta	*Orbiniidae sp. indeterminate*	14	0.04
Arthropoda - Malacostraca	*Cancer irroratus*	14	0.04
Arthropoda - Malacostraca	*Oxyurostylis smithi*	14	0.04
Nemertea - Palaeonemertea	*Tubulanus pellucidus*	14	0.04
Arthropoda - Malacostraca	*Acanthohaustorius shoemakeri*	13	0.04
Arthropoda - Malacostraca	*Bathyporeia parkeri*	13	0.04
Arthropoda - Malacostraca	*Bathyporeia quoddyensis*	13	0.04
Mollusca - Bivalvia	*Modiolus sp.*	13	0.04
Annelida - Polychaeta	*Spiophanes bombyx*	12	0.04
Arthropoda - Malacostraca	*Nannosquilla carolinensis*	12	0.04
Arthropoda - Malacostraca	*Acanthohaustorius sp. D*	11	0.04
Mollusca - Bivalvia	*Placopectin magellanicus*	11	0.04
Annelida - Polychaeta	*Aglaophamus circinata*	10	0.03

Major Taxon	Species Name	Lease Area Samples	
		Total Individuals	% Total
Annelida - Polychaeta	*Ophelia sp.*	10	0.03
Annelida - Polychaeta	*Paucibranchia sp. A*	10	0.03
Annelida - Polychaeta	*Syllidae sp.*	10	0.03
Arthropoda - Malacostraca	*Chiridotea coeca*	10	0.03
Nemertea - Palaeonemertea	*Carinomella lactea*	10	0.03
Phoronida – [unassigned]	*Phoronis sp.*	10	0.03
Annelida - Polychaeta	*Cirrophorus sp. A*	9	0.03
Platyhelminthes	*Platyhelminthes sp. 11 (MWRA)*	9	0.03
Annelida - Polychaeta	*Drilonereis longa*	8	0.03
Arthropoda - Malacostraca	*Ampelisca vadorum*	8	0.03
Arthropoda - Malacostraca	*Politolana polita*	8	0.03
Mollusca - Bivalvia	*Cyclocardia borealis*	8	0.03
Mollusca - Bivalvia	*Lyonsia hyalina*	8	0.03
Mollusca - Bivalvia	*Periploma fragile*	8	0.03
Mollusca - Gastropoda	*Crepidula fornicata*	8	0.03
Mollusca - Gastropoda	*Tectonatica pusilla*	8	0.03
Annelida - Polychaeta	*Glycera dibranchiata*	7	0.02
Annelida - Polychaeta	*Polygordius sp. A*	7	0.02
Arthropoda - Malacostraca	*Ptilanthura tenuis*	7	0.02
Mollusca - Bivalvia	*Crassinella lunulata*	7	0.02
Nemertea - Pilidiophora	*Micrura sp.*	7	0.02
Nemertea - Pilidiophora	*Zygeupolia rubens*	7	0.02
Annelida - Polychaeta	*Notomastus luridus*	6	0.02
Mollusca - Gastropoda	*Granulina ovuliformis*	6	0.02
Sipuncula	*Sipuncula sp.*	6	0.02
Annelida - Polychaeta	*Nephtys bucera*	5	0.02
Annelida - Polychaeta	*Psammodrilus balanoglossoides*	5	0.02
Annelida - Polychaeta	*Spiochaetopterus oculatus*	5	0.02
Annelida - Polychaeta	*Syllides sp.*	5	0.02
Arthropoda - Malacostraca	*Argissa hamatipes*	5	0.02
Mollusca - Bivalvia	*Mytilus edulis*	5	0.02
Mollusca - Bivalvia	*Solemya velum*	5	0.02
Mollusca - Gastropoda	*Turbonilla interrupta*	5	0.02
Nemertea - Hoplonemertea	*Amphiporus bioculatus*	5	0.02
Nemertea - Pilidiophora	*Cerebratulus lacteus*	5	0.02
Annelida - Polychaeta	*Aphrodita hastata*	4	0.01
Annelida - Polychaeta	*Meiodorvillea sp. A*	4	0.01
Arthropoda - Malacostraca	*Acanthohaustorius sp. juvenile*	4	0.01
Arthropoda - Malacostraca	*Leptochela papulata*	4	0.01
Arthropoda - Malacostraca	*Pseudoleptocuma minus*	4	0.01
Mollusca - Gastropoda	*Nudibranchia sp.*	4	0.01
Annelida - Polychaeta	*Arabella multidentata*	3	0.01
Annelida - Polychaeta	*Magelona sp. B Jones, 1968*	3	0.01
Annelida - Polychaeta	*Microphthalmus aberrans*	3	0.01
Annelida - Polychaeta	*Owenia artifex*	3	0.01
Annelida - Polychaeta	*Prionospio pygmaeus*	3	0.01
Arthropoda - Malacostraca	*Aeginina longicornis*	3	0.01
Arthropoda - Malacostraca	*Crangon septemspinosa*	3	0.01
Hemichordata - Enteropneusta	*Saccoglossus kowalevskii*	3	0.01
Annelida - Polychaeta	*Hypereteone heteropoda*	2	0.01
Annelida - Polychaeta	*Mooreonuphis sp. A*	2	0.01
Annelida - Polychaeta	*Ophelia denticulata*	2	0.01
Annelida - Polychaeta	*Paranaitis speciosa*	2	0.01
Annelida - Polychaeta	*Paraonis fulgens*	2	0.01
Annelida - Polychaeta	*Pectinaria gouldii*	2	0.01
Annelida - Polychaeta	*Phyllodoce arenae*	2	0.01
Annelida - Polychaeta	*Polycirrus sp. A*	2	0.01
Annelida - Polychaeta	*Sabaco elongatus*	2	0.01

Major Taxon	Species Name	Lease Area Samples	
		Total Individuals	% Total
Annelida - Polychaeta	*Sabellaria vulgaris*	2	0.01
Annelida - Polychaeta	*Salvatoria clavata*	2	0.01
Annelida - Polychaeta	*Syllides longocirrata*	2	0.01
Annelida - Polychaeta	*Syllis cornuta*	2	0.01
Arthropoda - Malacostraca	*Amakusanthura magnifica*	2	0.01
Arthropoda - Malacostraca	*Majidae sp. juvenile*	2	0.01
Arthropoda - Malacostraca	*Metatiron tropakis*	2	0.01
Arthropoda - Malacostraca	*Monocorophium acherusicum*	2	0.01
Arthropoda - Malacostraca	*Parahaustorius attenuatus*	2	0.01
Arthropoda - Malacostraca	*Protohaustorius sp. juvenile*	2	0.01
Arthropoda - Malacostraca	*Stomatopoda sp. juvenile*	2	0.01
Mollusca - Bivalvia	*Abra aequalis*	2	0.01
Mollusca - Gastropoda	*Diaphana minuta*	2	0.01
Mollusca - Gastropoda	*Gastropoda sp.*	2	0.01
Mollusca - Gastropoda	*Naticidae sp.*	2	0.01
Platyhelminthes – [unassigned]	*Plehnia ellipsoides*	2	0.01
Annelida - Polychaeta	*Aglaophamus verrilli*	1	< 0.01
Annelida - Polychaeta	*Cirriformia grandis*	1	< 0.01
Annelida - Polychaeta	*Eteone foliosa*	1	< 0.01
Annelida - Polychaeta	*Exogone dispar*	1	< 0.01
Annelida - Polychaeta	*Flabelligera affinis*	1	< 0.01
Annelida - Polychaeta	*Levinsenia gracilis*	1	< 0.01
Annelida - Polychaeta	*Mooreonuphis nebulosa*	1	< 0.01
Annelida - Polychaeta	*Mooreonuphis pallidula*	1	< 0.01
Annelida - Polychaeta	*Neanthes arenaceodentata*	1	< 0.01
Annelida - Polychaeta	*Notocirrus spinifera*	1	< 0.01
Annelida - Polychaeta	*Opheliidae sp.*	1	< 0.01
Annelida - Polychaeta	*Paraonidae sp. A*	1	< 0.01
Annelida - Polychaeta	*Pista cristata*	1	< 0.01
Annelida - Polychaeta	*Podarkeopsis levifuscina*	1	< 0.01
Annelida - Polychaeta	*Polycirrus sp. indeterminate*	1	< 0.01
Annelida - Polychaeta	*Sabellidae sp. (indeterminate)*	1	< 0.01
Annelida - Polychaeta	*Schistomeringos rudolphi*	1	< 0.01
Annelida - Polychaeta	*Sigambra tentaculata*	1	< 0.01
Annelida - Polychaeta	*Streptosyllis verrilli*	1	< 0.01
Arthropoda - Malacostraca	*Ampelisca sp. indeterminate*	1	< 0.01
Arthropoda - Malacostraca	*Cyclaspis varians*	1	< 0.01
Arthropoda - Malacostraca	*Edotia triloba*	1	< 0.01
Arthropoda - Malacostraca	*Hippomedon serratus*	1	< 0.01
Arthropoda - Malacostraca	*Idunella barnardi*	1	< 0.01
Arthropoda - Malacostraca	*Melitidae sp. B LeCroy, 2000*	1	< 0.01
Arthropoda - Malacostraca	*Pedicorophium laminosum*	1	< 0.01
Arthropoda - Malacostraca	*Unciola dissimilis*	1	< 0.01
Chordata - Ascidiacea	*Molgula arenata*	1	< 0.01
Cnidaria - Anthozoa	*Edwardsia elegans*	1	< 0.01
Echinodermata - Holothuroidea	*Holothuroidea sp. juvenile*	1	< 0.01
Mollusca - Bivalvia	*Anadara transversa*	1	< 0.01
Mollusca - Bivalvia	*Yoldia sp.*	1	< 0.01
Mollusca - Gastropoda	*Anachis lafresnayi*	1	< 0.01
Mollusca - Gastropoda	*Astyris lunata*	1	< 0.01
Mollusca - Gastropoda	*Boonea bisuturalis*	1	< 0.01
Mollusca - Gastropoda	*Crepidula plana*	1	< 0.01
Mollusca - Gastropoda	*Crepidula sp.*	1	< 0.01
Mollusca - Gastropoda	*Cyclostremiscus beauii*	1	< 0.01
Mollusca - Gastropoda	*Prunum roscidum*	1	< 0.01
Xenacoelomorpha	*Xenacoelomorpha sp. 1 (MWRA)*	1	< 0.01

Table D-2-2. Rank and Abundance of Organisms Present in Reference Samples around the Lease Area

Major Taxon	Species Name	Reference Samples	
		Total Individuals	% Total
Annelida - Clitellata	*Oligochaeta sp.*	962	18.46
Annelida - Polychaeta	*Spio setosa*	758	14.55
Annelida - Polychaeta	*Fabricinuda trilobata*	432	8.29
Arthropoda - Malacostraca	*Leptocheirus pinguis*	334	6.41
Annelida - Polychaeta	*Aricidea (Acmira) cerrutii*	310	5.95
Annelida - Polychaeta	*Polygordius jouinae*	251	4.82
Annelida - Polychaeta	*Clymenella torquata*	163	3.13
Annelida - Polychaeta	*Scalibregma inflatum*	121	2.32
Mollusca - Bivalvia	*Ameritella tenella*	120	2.30
Annelida - Polychaeta	*Aricidea (Acmira) catherinae*	96	1.84
Arthropoda - Malacostraca	*Metharpinia floridana*	88	1.69
Mollusca - Bivalvia	*Spisula solidissima*	82	1.57
Annelida - Polychaeta	*Protodorvillea kefersteini*	74	1.42
Arthropoda - Malacostraca	*Unciola irrorata*	72	1.38
Chordata – Ascidiacea	*Ascidiacea sp. juvenile*	68	1.31
Mollusca - Bivalvia	*Nucula proxima*	64	1.23
Annelida - Polychaeta	*Scoletoma acicularum*	58	1.11
Annelida - Polychaeta	*Hesionura coineaui*	54	1.04
Arthropoda - Malacostraca	*Byblis serrata*	50	0.96
Annelida - Polychaeta	*Lumbrinerides dayi*	49	0.94
Annelida - Polychaeta	*Brania wellfleetensis*	44	0.84
Annelida - Polychaeta	*Aphelochaeta sp. B*	43	0.83
Annelida - Polychaeta	*Streptosyllis websteri*	42	0.81
Annelida - Polychaeta	*Caulleriella venefica*	36	0.69
Annelida - Polychaeta	*Scoloplos capensis*	36	0.69
Annelida - Polychaeta	*Kirkegaardia baptisteae*	35	0.67
Annelida - Polychaeta	*Exogone hebes*	33	0.63
Arthropoda - Malacostraca	*Tanaissus psammophilus*	32	0.61
Annelida - Polychaeta	*Aphelochaeta sp. A*	30	0.58
Annelida - Polychaeta	*Goniadella gracilis*	30	0.58
Annelida - Polychaeta	*Hemipodia simplex*	30	0.58
Annelida - Polychaeta	*Pettiboneia sp. A*	30	0.58
Arthropoda - Malacostraca	*Rhepoxynius hudsoni*	25	0.48
Annelida - Polychaeta	*Scoletoma tenuis*	22	0.42
Annelida - Polychaeta	*Paraonis pygoenigmatica*	20	0.38
Nemertea - Paleonemertea	*Cephalothrix spiralis*	18	0.35
Annelida - Polychaeta	*Dipolydora socialis*	17	0.33
Annelida - Polychaeta	*Ampharete lindstroemi*	16	0.31
Annelida - Polychaeta	*Parougia caeca*	16	0.31
Annelida - Polychaeta	*Tharyx sp. indeterminate*	16	0.31
Annelida - Polychaeta	*Opistodonta longocirrata*	15	0.29
Arthropoda - Malacostraca	*Pagurus annulipes*	15	0.29
Mollusca - Bivalvia	*Pandora gouldiana*	15	0.29
Mollusca - Bivalvia	*Parvicardium pinnulatum*	15	0.29
Annelida - Polychaeta	*Scoloplos armiger*	14	0.27
Mollusca - Gastropoda	*Tritia trivitatta*	14	0.27
Nemertea - Paleonemertea	*Carinomella lactea*	14	0.27
Annelida - Polychaeta	*Onuphidae sp. juvenile*	13	0.25
Mollusca - Bivalvia	*Solamen glandula*	13	0.25
Annelida - Polychaeta	*Paraonis sp. A*	12	0.23
Annelida - Polychaeta	*Tharyx acutus*	11	0.21
Annelida - Polychaeta	*Paradoneis sp. A*	10	0.19
Arthropoda - Malacostraca	*Acanthohaustorius bousfieldi*	10	0.19
Arthropoda - Malacostraca	*Ampelisca bicarinata*	10	0.19
Nemertea	*Nemertea sp.*	9	0.17
Annelida - Polychaeta	*Harmothoe extenuata*	8	0.15

Major Taxon	Species Name	Reference Samples	
		Total Individuals	% Total
Annelida - Polychaeta	*Leitoscoloplos robustus*	8	0.15
Annelida - Polychaeta	*Syllidae sp.*	8	0.15
Mollusca - Bivalvia	*Solemya velum*	8	0.15
Annelida - Polychaeta	*Nephtys picta*	7	0.13
Annelida - Polychaeta	*Syllides convolutus*	7	0.13
Annelida - Polychaeta	*Tharyx sp. A (MWRA)*	7	0.13
Echinodermata - Echinoidea	*Echinarachnius parma*	7	0.13
Mollusca - Bivalvia	*Bivalvia sp.*	7	0.13
Mollusca - Gastropoda	*Caecum johnsoni*	7	0.13
Annelida - Polychaeta	*Paradoneis sp. B*	6	0.12
Annelida - Polychaeta	*Polycirrus phosphoreus*	6	0.12
Chordata – Leptocardii	*Branchiostoma virginiae*	6	0.12
Annelida - Polychaeta	*Aricidea (Aricidea) wassi*	5	0.10
Annelida - Polychaeta	*Paraonidae sp. A*	5	0.10
Annelida - Polychaeta	*Phylo felix*	5	0.10
Arthropoda - Malacostraca	*Ampelisca vadorum*	5	0.10
Mollusca - Bivalvia	*Arctica islandica*	5	0.10
Mollusca - Bivalvia	*Periploma fragile*	5	0.10
Nemertea - Hoplonemertea	*Amphiporus caecus*	5	0.10
Annelida - Polychaeta	*Polycirrus eximius*	4	0.08
Arthropoda - Malacostraca	*Ampelisca verrilli*	4	0.08
Arthropoda - Malacostraca	*Bathyporeia quoddyensis*	4	0.08
Mollusca - Bivalvia	*Cyclocardia borealis*	4	0.08
Mollusca - Bivalvia	*Parvilucina crenella*	4	0.08
Annelida - Polychaeta	*Ampharete oculata*	3	0.06
Annelida - Polychaeta	*Erinaceusyllis erinaceus*	3	0.06
Annelida - Polychaeta	*Paucibranchia sp. A*	3	0.06
Annelida - Polychaeta	*Psammodrilus balanoglossoides*	3	0.06
Annelida - Polychaeta	*Sigalion arenicola*	3	0.06
Arthropoda - Malacostraca	*Liljeborgia sp. A*	3	0.06
Arthropoda - Malacostraca	*Protohaustorius wigleyi*	3	0.06
Mollusca - Bivalvia	*Ameritella agilis*	3	0.06
Mollusca - Bivalvia	*Astarte castanea*	3	0.06
Mollusca - Bivalvia	*Pitar morrhuanus*	3	0.06
Mollusca - Gastropoda	*Caecum sp.*	3	0.06
Annelida - Polychaeta	*Capitella capitata*	2	0.04
Annelida - Polychaeta	*Cirrophorus sp. A*	2	0.04
Annelida - Polychaeta	*Clymenella zonalis*	2	0.04
Annelida - Polychaeta	*Meiodorvillea sp. A*	2	0.04
Annelida - Polychaeta	*Ninoe nigripes*	2	0.04
Annelida - Polychaeta	*Orbinia americana*	2	0.04
Annelida - Polychaeta	*Phyllodoce arenae*	2	0.04
Annelida - Polychaeta	*Sthenelais limicola*	2	0.04
Annelida - Polychaeta	*Syllides sp.*	2	0.04
Arthropoda - Malacostraca	*Cancer irroratus*	2	0.04
Arthropoda - Malacostraca	*Edotia triloba*	2	0.04
Arthropoda - Malacostraca	*Metatiron tropakis*	2	0.04
Arthropoda - Malacostraca	*Protohaustorius cf. deichmannae*	2	0.04
Mollusca - Gastropoda	*Dentimargo aureocinctus*	2	0.04
Mollusca - Gastropoda	*Nudibranchia sp.*	2	0.04
Nemertea - Paleonemertea	*Tubulanus pellucidus*	2	0.04
Annelida - Polychaeta	*Bradabyssa villosa*	1	0.02
Annelida - Polychaeta	*Glycera americana*	1	0.02
Annelida - Polychaeta	*Longibrachium atlanticum*	1	0.02
Annelida - Polychaeta	*Maldanidae sp.*	1	0.02
Annelida - Polychaeta	*Nephtys bucera*	1	0.02
Annelida - Polychaeta	*Notomastus luridus*	1	0.02
Annelida - Polychaeta	*Onuphis eremita oculata*	1	0.02

Major Taxon	Species Name	Reference Samples	
		Total Individuals	% Total
Annelida - Polychaeta	*Ophelia denticulata*	1	0.02
Annelida - Polychaeta	*Ophelia sp.*	1	0.02
Annelida - Polychaeta	*Spiochaetopterus oculatus*	1	0.02
Annelida - Polychaeta	*Spirorbis sp.*	1	0.02
Annelida - Polychaeta	*Travisia sp. A*	1	0.02
Arthropoda - Malacostraca	*Acanthohaustorius shoemakeri*	1	0.02
Arthropoda - Malacostraca	*Americhelidium americanum*	1	0.02
Arthropoda - Malacostraca	*Hippomedon serratus*	1	0.02
Arthropoda - Malacostraca	*Majidae sp. juvenile*	1	0.02
Arthropoda - Malacostraca	*Oxyurostylis smithi*	1	0.02
Arthropoda - Malacostraca	*Pagurus longicarpus*	1	0.02
Arthropoda - Malacostraca	*Pedicorophium laminosum*	1	0.02
Arthropoda - Malacostraca	*Politolana polita*	1	0.02
Arthropoda - Malacostraca	*Pseudunciola obliquua*	1	0.02
Mollusca - Bivalvia	*Abra aequalis*	1	0.02
Mollusca - Bivalvia	*Modiolus sp.*	1	0.02
Mollusca - Bivalvia	*Periploma sp.*	1	0.02
Mollusca - Bivalvia	*Placopectin magellanicus*	1	0.02
Mollusca - Bivalvia	*Thraciidae sp.*	1	0.02
Mollusca - Gastropoda	*Crepidula fornicata*	1	0.02
Mollusca - Gastropoda	*Granulina ovuliformis*	1	0.02
Mollusca - Gastropoda	*Prunum roscidum*	1	0.02
Nemertea - Pilidiophora	*Cerebratulus lacteus*	1	0.02
Platyhelminthes	*Platyhelminthes sp. 11 (MWRA)*	1	0.02

Table D-2-3. Rank and Abundance of Organisms Present in Grab Samples within the Offshore Export Cable Route Corridor

Major Taxon	Species Name	Lease Area Samples	
		Total Individuals	% Total
Chordata - Ascidiacea	*Ascidiacea sp. juvenile*	444	7.42
Annelida - Polychaeta	*Spio setosa*	428	7.16
Annelida - Clitellata	*Oligochaeta sp.*	300	5.02
Annelida - Polychaeta	*Aricidea (Acmira) catherinae*	253	4.23
Arthropoda - Malacostraca	*Byblis serrata*	226	3.78
Annelida - Polychaeta	*Prionospio pygmaeus*	206	3.44
Mollusca - Bivalvia	*Ameritella agilis*	199	3.33
Arthropoda - Malacostraca	*Protohaustorius wigleyi*	155	2.59
Arthropoda - Malacostraca	*Metharpinia floridana*	151	2.52
Annelida - Polychaeta	*Aphelochaeta sp. B*	149	2.49
Annelida - Polychaeta	*Polygordius jouinae*	135	2.26
Annelida - Polychaeta	*Kirkegaardia hampsoni*	134	2.24
Annelida - Polychaeta	*Mediomastus ambiseta*	128	2.14
Annelida - Polychaeta	*Tharyx sp. indeterminate*	125	2.09
Annelida - Polychaeta	*Brania wellfleetensis*	118	1.97
Chordata - Leptocardii	*Branchiostoma virginiae*	116	1.94
Annelida - Polychaeta	*Aricidea (Acmira) cerrutii*	95	1.59
Mollusca - Gastropoda	*Tritia trivitatta*	95	1.59
Arthropoda - Malacostraca	*Ampelisca bicarinata*	90	1.50
Mollusca - Gastropoda	*Crepidula fornicata*	90	1.50
Annelida - Polychaeta	*Polycirrus eximius*	82	1.37
Annelida - Polychaeta	*Tharyx sp. A (MWRA)*	81	1.35
Annelida - Polychaeta	*Scalibregma inflatum*	77	1.29
Mollusca - Bivalvia	*Ameritella tenella*	77	1.29
Annelida - Polychaeta	*Aphelochaeta sp. A*	73	1.22
Arthropoda - Malacostraca	*Bathyporeia parkeri*	73	1.22
Annelida - Polychaeta	*Kirkegaardia baptisteae*	72	1.20
Mollusca - Gastropoda	*Astyris lunata*	61	1.02

Major Taxon	Species Name	Lease Area Samples	
		Total Individuals	% Total
Mollusca - Gastropoda	*Anachis lafresnayi*	51	0.85
Mollusca - Gastropoda	*Crepidula plana*	48	0.80
Mollusca - Bivalvia	*Crassinella lunulata*	46	0.77
Mollusca - Gastropoda	*Caecum johnsoni*	46	0.77
Annelida - Polychaeta	*Protodorvillea kefersteini*	45	0.75
Arthropoda - Malacostraca	*Bathyporeia quoddyensis*	45	0.75
Annelida - Polychaeta	*Caulleriella venefica*	43	0.72
Arthropoda - Malacostraca	*Hexapanopeus angustifrons*	42	0.70
Annelida - Polychaeta	*Amastigos caperatus*	40	0.67
Mollusca - Bivalvia	*Ameritella sp.*	40	0.67
Arthropoda - Malacostraca	*Tanaissus psammophilus*	39	0.65
Annelida - Polychaeta	*Owenia artifex*	37	0.62
Arthropoda - Malacostraca	*Ampelisca verrilli*	36	0.60
Annelida - Polychaeta	*Lumbrinerides dayi*	35	0.59
Mollusca - Gastropoda	*Cylichnella bidentata*	30	0.50
Arthropoda - Malacostraca	*Eobrolgus spinosus*	29	0.48
Arthropoda - Malacostraca	*Amakusanthura magnifica*	28	0.47
Annelida - Polychaeta	*Scoloplos capensis*	27	0.45
Echinodermata - Echinoidea	*Echinarachnius parma*	27	0.45
Mollusca - Bivalvia	*Limecola balthica*	27	0.45
Annelida - Polychaeta	*Paraonis pygoenigmatica*	26	0.43
Arthropoda - Malacostraca	*Deutella incerta*	25	0.42
Arthropoda - Malacostraca	*Lembos websteri*	25	0.42
Annelida - Polychaeta	*Harmothoe extenuata*	23	0.38
Arthropoda - Malacostraca	*Monocorophium acherusicum*	23	0.38
Arthropoda - Malacostraca	*Pagurus annulipes*	23	0.38
Arthropoda - Malacostraca	*Acanthohaustorius intermedius*	22	0.37
Arthropoda - Malacostraca	*Pagurus longicarpus*	21	0.35
Annelida - Polychaeta	*Nephtys picta*	20	0.33
Annelida - Polychaeta	*Spiophanes bombyx*	20	0.33
Arthropoda - Malacostraca	*Acanthohaustorius sp. D*	20	0.33
Annelida - Polychaeta	*Scoletoma acicularum*	19	0.32
Mollusca - Gastropoda	*Naticidae sp.*	19	0.32
Arthropoda - Malacostraca	*Ericthonius sp. B LeCroy, 2007*	18	0.30
Annelida - Polychaeta	*Hemipodia simplex*	17	0.28
Annelida - Polychaeta	*Maldanidae sp.*	17	0.28
Arthropoda - Malacostraca	*Gammaropsis sutherlandi*	16	0.27
Arthropoda - Malacostraca	*Unciola irrorata*	16	0.27
Mollusca - Bivalvia	*Mytilus edulis*	16	0.27
Mollusca - Gastropoda	*Parvanachis obesa*	16	0.27
Annelida - Polychaeta	*Clymenella zonalis*	15	0.25
Mollusca - Gastropoda	*Turbonilla interrupta*	15	0.25
Nemertea - Palaeonemertea	*Carinomella lactea*	15	0.25
Nemertea	*Nemertea sp.*	15	0.25
Arthropoda - Malacostraca	*Unciola serrata*	13	0.22
Mollusca - Bivalvia	*Ensis leei*	13	0.22
Mollusca - Bivalvia	*Macoploma tenta*	13	0.22
Mollusca - Gastropoda	*Boonea seminuda*	13	0.22
Annelida - Polychaeta	*Schistomeringos rudolphi*	12	0.20
Annelida - Polychaeta	*Spiochaetopterus oculatus*	12	0.20
Annelida - Polychaeta	*Phyllodoce arenae*	11	0.18
Annelida - Polychaeta	*Streptosyllis websteri*	11	0.18
Mollusca - Bivalvia	*Mysella planulata*	11	0.18
Mollusca - Bivalvia	*Pandora gouldiana*	11	0.18
Mollusca - Gastropoda	*Prunum roscidum*	11	0.18
Annelida - Polychaeta	*Lysilla alba*	9	0.15
Annelida - Polychaeta	*Sabaco elongatus*	9	0.15
Annelida - Polychaeta	*Aglaophamus verrilli*	8	0.13

Major Taxon	Species Name	Lease Area Samples	
		Total Individuals	% Total
Annelida - Polychaeta	*Exogone dispar*	8	0.13
Annelida - Polychaeta	*Exogone hebes*	8	0.13
Annelida - Polychaeta	*Loimia medusa*	8	0.13
Annelida - Polychaeta	*Paraonis sp. A*	8	0.13
Annelida - Polychaeta	*Polygordius sp. A*	8	0.13
Annelida - Polychaeta	*Scoletoma tenuis*	8	0.13
Nemertea - Pilidiophora	*Micrura sp.*	8	0.13
Annelida - Polychaeta	*Cirrophorus sp. A*	7	0.12
Annelida - Polychaeta	*Neanthes arenaceodentata*	7	0.12
Annelida - Polychaeta	*Opistodonta longocirrata*	7	0.12
Annelida - Polychaeta	*Sabellaria vulgaris*	7	0.12
Arthropoda - Malacostraca	*Leptochela papulata*	7	0.12
Arthropoda - Malacostraca	*Oxyurostylis smithi*	7	0.12
Arthropoda - Malacostraca	*Protohaustorius sp. juvenile*	7	0.12
Mollusca - Gastropoda	*Crepidula sp.*	7	0.12
Mollusca - Gastropoda	*Kurtziella atrostyla*	7	0.12
Annelida - Polychaeta	*Drilonereis longa*	6	0.10
Annelida - Polychaeta	*Glycera dibranchiata*	6	0.10
Annelida - Polychaeta	*Pettiboneia sp. A*	6	0.10
Arthropoda - Malacostraca	*Majidae sp. juvenile*	6	0.10
Arthropoda - Malacostraca	*Ogyrides alphaerostris*	6	0.10
Arthropoda - Malacostraca	*Parahaustorius attenuatus*	6	0.10
Arthropoda - Malacostraca	*Pedicorophium laminosum*	6	0.10
Arthropoda - Malacostraca	*Photis pugnator*	6	0.10
Annelida - Polychaeta	*Aricidea (Aricidea) wassi*	5	0.08
Annelida - Polychaeta	*Cirriformia grandis*	5	0.08
Annelida - Polychaeta	*Clymenella torquata*	5	0.08
Annelida - Polychaeta	*Leitoscoloplos robustus*	5	0.08
Arthropoda - Malacostraca	*Cancer irroratus*	5	0.08
Arthropoda - Malacostraca	*Cyclaspis varians*	5	0.08
Mollusca - Bivalvia	*Bivalvia sp.*	5	0.08
Mollusca - Gastropoda	*Gastropoda sp.*	5	0.08
Mollusca - Gastropoda	*Vitrinellidae sp.*	5	0.08
Annelida - Polychaeta	*Glycera americana*	4	0.07
Annelida - Polychaeta	*Proceraea cornuta*	4	0.07
Annelida - Polychaeta	*Scolelepis (Parascolelepis) bousfieldi*	4	0.07
Mollusca - Bivalvia	*Anomia simplex*	4	0.07
Mollusca - Bivalvia	*Nucula proxima*	4	0.07
Mollusca - Bivalvia	*Parvilucina crenella*	4	0.07
Mollusca - Bivalvia	*Spisula solidissima*	4	0.07
Nemertea - Hoplonemertea	*Amphiporus caecus*	4	0.07
Annelida - Polychaeta	*Ampharete lindstroemi*	3	0.05
Annelida - Polychaeta	*Goniadella gracilis*	3	0.05
Annelida - Polychaeta	*Onuphidae sp. juvenile*	3	0.05
Annelida - Polychaeta	*Pista cristata*	3	0.05
Annelida - Polychaeta	*Podarkeopsis levifuscina*	3	0.05
Annelida - Polychaeta	*Polycirrus sp. A*	3	0.05
Annelida - Polychaeta	*Tharyx acutus*	3	0.05
Annelida - Polychaeta	*Travisia sp.*	3	0.05
Arthropoda - Malacostraca	*Acanthohaustorius millsi*	3	0.05
Arthropoda - Malacostraca	*Liljeborgia sp. A*	3	0.05
Arthropoda - Malacostraca	*Protohaustorius cf. deichmannae*	3	0.05
Annelida - Polychaeta	*Ampharete oculata*	2	0.03
Annelida - Polychaeta	*Capitella capitata*	2	0.03
Annelida - Polychaeta	*Diopatra cuprea*	2	0.03
Annelida - Polychaeta	*Leodamas rubrus*	2	0.03
Annelida - Polychaeta	*Onuphis eremita oculata*	2	0.03
Annelida - Polychaeta	*Ophelia denticulata*	2	0.03

Major Taxon	Species Name	Lease Area Samples	
		Total Individuals	% Total
Annelida - Polychaeta	*Paraonis fulgens*	2	0.03
Annelida - Polychaeta	*Polydora websteri*	2	0.03
Annelida - Polychaeta	*Spio pettiboneae*	2	0.03
Annelida - Polychaeta	*Spionidae sp. indeterminate*	2	0.03
Arthropoda - Malacostraca	*Acanthohaustorius bousfieldi*	2	0.03
Arthropoda - Malacostraca	*Americhelidium americanum*	2	0.03
Echinodermata - Ophiuroidea	*Ophiuroidea sp. juvenile*	2	0.03
Mollusca - Bivalvia	*Anadara transversa*	2	0.03
Mollusca - Bivalvia	*Astarte castanea*	2	0.03
Mollusca - Bivalvia	*Ennucula tenuis*	2	0.03
Mollusca - Bivalvia	*Lyonsia hyalina*	2	0.03
Mollusca - Gastropoda	*Turbonilla stricta*	2	0.03
Nemertea - Pilidiophora	*Cerebratulus lacteus*	2	0.03
Annelida - Polychaeta	*Ancistrosyllis hartmanae*	1	0.02
Annelida - Polychaeta	*Cabira incerta*	1	0.02
Annelida - Polychaeta	*Cirrophorus sp. B*	1	0.02
Annelida - Polychaeta	*Dipolydora sp. A*	1	0.02
Annelida - Polychaeta	*Eumida sanguinea*	1	0.02
Annelida - Polychaeta	*Hesionura coineaui*	1	0.02
Annelida - Polychaeta	*Mediomastus sp.*	1	0.02
Annelida - Polychaeta	*Meiodorvillea sp. A*	1	0.02
Annelida - Polychaeta	*Notomastus luridus*	1	0.02
Annelida - Polychaeta	*Ophelia sp.*	1	0.02
Annelida - Polychaeta	*Orbiniidae sp. indeterminate*	1	0.02
Annelida - Polychaeta	*Paradoneis sp. A*	1	0.02
Annelida - Polychaeta	*Parougia caeca*	1	0.02
Annelida - Polychaeta	*Sigambra bassi*	1	0.02
Annelida - Polychaeta	*Sigambra tentaculata*	1	0.02
Annelida - Polychaeta	*Streblospio benedicti*	1	0.02
Annelida - Polychaeta	*Streptosyllis sp.*	1	0.02
Annelida - Polychaeta	*Syllidae sp.*	1	0.02
Annelida - Polychaeta	*Syllides sp.*	1	0.02
Arthropoda - Malacostraca	*Ampelisca vadorum*	1	0.02
Arthropoda - Malacostraca	*Ancinus depressus*	1	0.02
Arthropoda - Malacostraca	*Axiidea sp. juvenile*	1	0.02
Arthropoda - Malacostraca	*Calappidae sp. juvenile*	1	0.02
Arthropoda - Malacostraca	*Edotia triloba*	1	0.02
Arthropoda - Malacostraca	*Gilvossius setimanus*	1	0.02
Arthropoda - Malacostraca	*Microprotopus raneyi*	1	0.02
Arthropoda - Malacostraca	*Nannosquilla carolinensis*	1	0.02
Arthropoda - Malacostraca	*Ovalipes ocellatus*	1	0.02
Arthropoda - Malacostraca	*Pagurus pollicaris*	1	0.02
Arthropoda - Malacostraca	*Politolana polita*	1	0.02
Arthropoda - Malacostraca	*Portunidae sp. juvenile*	1	0.02
Arthropoda - Malacostraca	*Processa sp. indeterminate*	1	0.02
Arthropoda - Malacostraca	*Ptilanthura tenuis*	1	0.02
Arthropoda - Malacostraca	*Rhepoxynius hudsoni*	1	0.02
Arthropoda - Malacostraca	*Unciola dissimilis*	1	0.02
Chordata - Ascidiacea	*Molgula arenata*	1	0.02
Hemichordata - Enteropneusta	*Saccoglossus kowalevskii*	1	0.02
Mollusca - Bivalvia	*Cyclocardia borealis*	1	0.02
Mollusca - Bivalvia	*Mercenaria mercenaria*	1	0.02
Mollusca - Bivalvia	*Parvicardium pinnulatum*	1	0.02
Mollusca - Gastropoda	*Boonea impressa*	1	0.02
Mollusca - Gastropoda	*Caecum cooperi*	1	0.02
Mollusca - Gastropoda	*Cyclostremiscus beauii*	1	0.02
Mollusca - Gastropoda	*Dentimargo aureocinctus*	1	0.02
Mollusca - Gastropoda	*Doridella obscura*	1	0.02

Major Taxon	Species Name	Lease Area Samples	
		Total Individuals	% Total
Mollusca - Gastropoda	*Epitonium sp.*	1	0.02
Mollusca - Gastropoda	*Eupleura caudata*	1	0.02
Mollusca - Gastropoda	*Nudibranchia sp.*	1	0.02
Mollusca - Gastropoda	*Odostomia engonia*	1	0.02
Mollusca - Gastropoda	*Odostomia sp.*	1	0.02
Mollusca - Gastropoda	*Tectonatica pusilla*	1	0.02
Nemertea - Palaeonemertea	*Cephalothrix spiralis*	1	0.02
Phoronida – [unassigned]	*Phoronis sp.*	1	0.02

Table D-2-4. Rank and Abundance of Organisms Present in Reference Samples along the Offshore Export Cable Route Corridor

Major Taxon	Species Name	Lease Area Samples	
		Total Individuals	% Total
Annelida - Clitellata	*Oligochaeta sp.*	821	41.13
Annelida - Polychaeta	*Aricidea (Acmira) cerrutii*	159	7.97
Chordata - Ascidiacea	*Ascidiacea sp. juvenile*	147	7.36
Annelida - Polychaeta	*Prionospio pygmaeus*	118	5.91
Annelida - Polychaeta	*Aricidea (Acmira) catherinae*	72	3.61
Annelida - Polychaeta	*Mediomastus ambiseta*	70	3.51
Mollusca - Bivalvia	*Ameritella agilis*	70	3.51
Annelida - Polychaeta	*Brania wellfleetensis*	43	2.15
Annelida - Polychaeta	*Hesionura coineaui*	32	1.60
Mollusca - Gastropoda	*Tritia trivitatta*	24	1.20
Annelida - Polychaeta	*Protodorvillea kefersteini*	23	1.15
Annelida - Polychaeta	*Owenia artifex*	22	1.10
Arthropoda - Malacostraca	*Ampelisca verrilli*	22	1.10
Annelida - Polychaeta	*Aphelochaeta sp. A*	21	1.05
Arthropoda - Malacostraca	*Pagurus longicarpus*	21	1.05
Annelida - Polychaeta	*Opistodonta longocirrata*	18	0.90
Annelida - Polychaeta	*Tharyx sp. indeterminate*	18	0.90
Arthropoda - Malacostraca	*Byblis serrata*	17	0.85
Arthropoda - Malacostraca	*Metharpinia floridana*	17	0.85
Annelida - Polychaeta	*Spiophanes bombyx*	16	0.80
Annelida - Polychaeta	*Tharyx sp. A (MWRA)*	15	0.75
Annelida - Polychaeta	*Lumbrinerides dayi*	13	0.65
Mollusca - Bivalvia	*Ameritella tenella*	11	0.55
Annelida - Polychaeta	*Paradoneis sp. A*	10	0.50
Arthropoda - Malacostraca	*Ericthonius sp. B LeCroy, 2007*	10	0.50
Arthropoda - Malacostraca	*Pagurus annulipes*	10	0.50
Annelida - Polychaeta	*Aglaophamus verrilli*	9	0.45
Mollusca - Gastropoda	*Parvanachis obesa*	9	0.45
Mollusca - Gastropoda	*Caecum johnsoni*	7	0.35
Mollusca - Gastropoda	*Cylichnella bidentata*	7	0.35
Annelida - Polychaeta	*Polygordius jouinae*	6	0.30
Chordata - Leptocardii	*Branchiostoma virginiae*	6	0.30
Mollusca - Bivalvia	*Spisula solidissima*	6	0.30
Mollusca - Gastropoda	*Kurtziella atrostyla*	6	0.30
Annelida - Polychaeta	*Amastigos caperatus*	5	0.25
Annelida - Polychaeta	*Caulleriella venefica*	5	0.25
Annelida - Polychaeta	*Nephtys picta*	5	0.25
Cnidaria - Anthozoa	*Haloclava producta*	5	0.25
Annelida - Polychaeta	*Hemipodia simplex*	4	0.20
Annelida - Polychaeta	*Polydora websteri*	4	0.20
Annelida - Polychaeta	*Streptosyllis websteri*	4	0.20
Arthropoda - Malacostraca	*Ampelisca bicarinata*	4	0.20
Mollusca - Bivalvia	*Limecola balthica*	4	0.20
Nemertea - Paleonemertea	*Carinomella lactea*	4	0.20

Major Taxon	Species Name	Lease Area Samples	
		Total Individuals	% Total
Annelida - Polychaeta	*Leitoscoloplos robustus*	3	0.15
Annelida - Polychaeta	*Scoletoma tenuis*	3	0.15
Annelida - Polychaeta	*Scoloplos capensis*	3	0.15
Arthropoda - Malacostraca	*Edotia triloba*	3	0.15
Mollusca - Bivalvia	*Astarte castanea*	3	0.15
Mollusca - Bivalvia	*Ensis leei*	3	0.15
Mollusca - Gastropoda	*Japonactaeon punctostriatus*	3	0.15
Annelida - Polychaeta	*Ancistrosyllis hartmanae*	2	0.10
Annelida - Polychaeta	*Phylo felix*	2	0.10
Arthropoda - Malacostraca	*Ampelisca abdita*	2	0.10
Arthropoda - Malacostraca	*Bathyporeia parkeri*	2	0.10
Arthropoda - Malacostraca	*Ogyrides alphaerostris*	2	0.10
Echinodermata - Ophiuroidea	*Ophiuroidea sp. juvenile*	2	0.10
Mollusca - Gastropoda	*Turbonilla interrupta*	2	0.10
Nemertea - Paleonemertea	*Cephalothrix spiralis*	2	0.10
Annelida - Polychaeta	*Ampharete lindstroemi*	1	0.05
Annelida - Polychaeta	*Ampharete oculata*	1	0.05
Annelida - Polychaeta	*Aricidea (Aricidea) wassi*	1	0.05
Annelida - Polychaeta	*Cirrophorus sp. A*	1	0.05
Annelida - Polychaeta	*Loimia medusa*	1	0.05
Annelida - Polychaeta	*Mooreonuphis sp. A*	1	0.05
Annelida - Polychaeta	*Ophelia denticulata*	1	0.05
Annelida - Polychaeta	*Paraonis pygoenigmatica*	1	0.05
Annelida - Polychaeta	*Parougia caeca*	1	0.05
Annelida - Polychaeta	*Scolelepis (Parascolelepis) bousfieldi*	1	0.05
Annelida - Polychaeta	*Scoletoma acicularum*	1	0.05
Annelida - Polychaeta	*Spio setosa*	1	0.05
Annelida - Polychaeta	*Syllidae sp.*	1	0.05
Annelida - Polychaeta	*Tharyx acutus*	1	0.05
Arthropoda - Malacostraca	*Acanthohaustorius bousfieldi*	1	0.05
Arthropoda - Malacostraca	*Argissa hamatipes*	1	0.05
Arthropoda - Malacostraca	*Cancer irroratus*	1	0.05
Arthropoda - Malacostraca	*Idunella barnardi*	1	0.05
Arthropoda - Malacostraca	*Leptochela papulata*	1	0.05
Arthropoda - Malacostraca	*Majidae sp. juvenile*	1	0.05
Arthropoda - Malacostraca	*Nannosquilla carolinensis*	1	0.05
Arthropoda - Malacostraca	*Parametopella cypris*	1	0.05
Arthropoda - Malacostraca	*Persephona mediterranea*	1	0.05
Arthropoda - Malacostraca	*Tanaissus psammophilus*	1	0.05
Arthropoda - Malacostraca	*Unciola irrorata*	1	0.05
Hemichordata - Enteropneusta	*Saccoglossus kowalevskii*	1	0.05
Mollusca - Bivalvia	*Bivalvia sp.*	1	0.05
Mollusca - Bivalvia	*Mulinia lateralis*	1	0.05
Mollusca - Bivalvia	*Nucula proxima*	1	0.05
Mollusca - Bivalvia	*Pandora gouldiana*	1	0.05
Mollusca - Bivalvia	*Parvilucina crenella*	1	0.05
Mollusca - Bivalvia	*Pitar morrhuanus*	1	0.05
Mollusca - Gastropoda	*Crepidula fornicata*	1	0.05
Mollusca - Gastropoda	*Epitonium sp.*	1	0.05
Mollusca - Gastropoda	*Naticidae sp.*	1	0.05
Mollusca - Gastropoda	*Prunum roscidum*	1	0.05
Mollusca - Scaphopoda	*Dentaliidae sp.*	1	0.05
Nemertea - Hoplonemertea	*Amphiporus caecus*	1	0.05
Phoronida – [unassigned]	*Phoronis sp.*	1	0.05

Table D-2-5. Rank and Abundance of Organisms Present in Grab Samples Collected in CVOW Pilot Project Survey within State Waters of the Offshore Export Cable Route Corridor

Major Taxon	Species Name	Lease Area Samples	
		Total Individuals	% Total
Annelida-Polychaeta	*Prionospio pygmaeus*	302	21.66
Annelida-Polychaeta	*Amastigos caperatus*	232	16.64
Annelida-Polychaeta	*Spiophanes bombyx*	179	12.84
Annelida-Polychaeta	*Streblospio benedicti*	145	10.40
Mollusca-Bivalvia	*Ensis sp.*	94	6.74
Mollusca-Bivalvia	*Tellina versicolor*	79	5.67
Annelida-Polychaeta	*Mediomastus sp.*	59	4.23
Crustacea-Amphipoda	*Rhepoxynius epistomus*	42	3.01
Annelida-Polychaeta	*Tharyx sp. A sensu MWRA, 2007*	39	2.80
Turbellaria	*Stylochus oculiferus*	24	1.72
Nemertea	*Palaeonemertea spp.*	22	1.58
Annelida-Polychaeta	*Asabellides oculata*	19	1.36
Annelida-Polychaeta	*Drilonereis filum*	15	1.08
Annelida-Polychaeta	*Aglaophamus verrilli*	14	1.00
Annelida-Polychaeta	*Nephtys picta*	13	0.93
Annelida-Polychaeta	*Eteone longa*	8	0.57
Annelida-Polychaeta	*Samythella elongata*	7	0.50
Annelida-Polychaeta	*Sigambra tentaculata*	6	0.43
Mollusca-Bivalvia	*Bivalvia spp.*	6	0.43
Annelida-Polychaeta	*Glycera capitata*	4	0.29
Annelida-Polychaeta	*Pectinaria gouldi*	4	0.29
Crustacea-Amphipoda	*Americhelidium americanum*	4	0.29
Crustacea-Amphipoda	*Unciola irrorata*	4	0.29
Crustacea-Decapoda	*Pinnixa chaetopterana*	4	0.29
Mollusca-Bivalvia	*Macoma calcarea*	4	0.29
Annelida-Polychaeta	*Carazziella hobsonae*	3	0.22
Annelida-Polychaeta	*Cirratulidae spp.*	3	0.22
Annelida-Polychaeta	*Clymenella mucosa*	3	0.22
Annelida-Polychaeta	*Magelona rosea*	3	0.22
Cnidaria	*Actiniaria sp.*	3	0.22
Hemichordata	*Enteropneusta sp.*	3	0.22
Nemertea	*Lineidae spp.*	3	0.22
Annelida-Oligochaeta	*Oligochaeta spp.*	2	0.14
Annelida-Polychaeta	*Capitellidae sp.*	2	0.14
Annelida-Polychaeta	*Glycera americana*	2	0.14
Annelida-Polychaeta	*Leitoscoloplos fragilis*	2	0.14
Annelida-Polychaeta	*Onuphidae sp.*	2	0.14
Annelida-Polychaeta	*Scalibregma inflatum*	2	0.14
Annelida-Polychaeta	*Spiochaetopterus oculatus*	2	0.14
Cephalochordata	*Branchiostoma sp.*	2	0.14
Crustacea-Decapoda	*Crangon septemspinosa*	2	0.14
Crustacea-Decapoda	*Pinnixa cylindrica*	2	0.14
Mollusca-Gastropoda	*Turbonilla sp.*	2	0.14
Annelida-Polychaeta	*Aricidea (Acmira) catherinae*	1	0.07
Annelida-Polychaeta	*Notomastus hemipodus*	1	0.07
Annelida-Polychaeta	*Onuphis eremita*	1	0.07
Annelida-Polychaeta	*Owenia fusiformis*	1	0.07
Annelida-Polychaeta	*Polygordius jouinae*	1	0.07
Annelida-Polychaeta	*Tharyx acutus*	1	0.07
Crustacea-Amphipoda	*Microprotopus sp.*	1	0.07
Crustacea-Amphipoda	*Photis sp.*	1	0.07
Crustacea-Cumacea	*Oxyurostylis smithi*	1	0.07
Crustacea-Cumacea	*Pseudoleptocuma minus*	1	0.07
Crustacea-Decapoda	*Pagurus politus*	1	0.07

Major Taxon	Species Name	Lease Area Samples	
		Total Individuals	% Total
Crustacea-Isopoda	*Edotea montosa*	1	0.07
Crustacea-Mysidacea	*Neomysis americana*	1	0.07
Mollusca-Bivalvia	*Lucinoma filosa*	1	0.07
Mollusca-Bivalvia	*Mysella planulata*	1	0.07
Mollusca-Bivalvia	*Pitar morrhuanus*	1	0.07
Mollusca-Bivalvia	*Veneridae sp.*	1	0.07
Mollusca-Gastropoda	*Busycotypus canaliculatus*	1	0.07
Mollusca-Gastropoda	*Euspira immaculata*	1	0.07
Mollusca-Gastropoda	*Rissoidae sp.*	1	0.07
Mollusca-Gastropoda	*Turridae sp.*	1	0.07
Turbellaria	*Bdelloura sp.*	1	0.07

Table D-2-6. Rank and Abundance of Organisms Present in the Reference Sample Collected in CVOW Pilot Project Survey within State Waters of the Offshore Export Cable Route Corridor

Major Taxon	Species Name	Lease Area Samples	
		Total Individuals	% Total
Mollusca-Bivalvia	*Ensis sp.*	27	25.23
Annelida-Polychaeta	*Prionospio pygmaeus*	17	15.89
Crustacea-Amphipoda	*Rhepoxynius epistomus*	9	8.41
Mollusca-Bivalvia	*Tellina versicolor*	9	8.41
Annelida-Polychaeta	*Spiophanes bombyx*	8	7.48
Nemertea	*Palaeonemertea spp.*	7	6.54
Annelida-Polychaeta	*Streblospio benedicti*	6	5.61
Annelida-Polychaeta	*Aglaophamus verrilli*	4	3.74
Nemertea	*Lineidae spp.*	3	2.80
Crustacea-Amphipoda	*Americhelidium americanum*	2	1.87
Mollusca-Gastropoda	*Turbonilla sp.*	2	1.87
Annelida-Polychaeta	*Aphelochaeta sp.*	1	0.93
Annelida-Polychaeta	*Aricidea (Acmira) catherinae*	1	0.93
Annelida-Polychaeta	*Drilonereis filum*	1	0.93
Annelida-Polychaeta	*Glycera capitata*	1	0.93
Annelida-Polychaeta	*Magelona rosea*	1	0.93
Annelida-Polychaeta	*Mediomastus sp.*	1	0.93
Annelida-Polychaeta	*Nephtys picta*	1	0.93
Annelida-Polychaeta	*Sigambra tentaculata*	1	0.93
Annelida-Polychaeta	*Spiochaetopterus oculatus*	1	0.93
Mollusca-Bivalvia	*Abra longicallus*	1	0.93
Mollusca-Gastropoda	*Euspira immaculata*	1	0.93
Mollusca-Gastropoda	*Turridae sp.*	1	0.93
Turbellaria	*Stylochus oculiferus*	1	0.93

Table D-2-7. Benthic Infauna Identified in Grab Samples GS-1-REF through GS-22

Scientific Name	Grab Sample ID[a/b/]																					
	GS-1-R	GS-2-R	GS-3-R	GS-4	GS-5	GS-6	GS-7	GS-8	GS-9	GS-10	GS-11	GS-12	GS-13	GS-14	GS-15	GS-16	GS-17	GS-18	GS-19	GS-20	GS-21	GS-22
Annelida - Clitellata																						
Oligochaeta sp.	-	821	-	1	-	-	5	11	1	20	43	75	1	3	22	118	2	5	-	3	24	66
Annelida - Polychaeta																						
Aglaophamus circinata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-
Aglaophamus verrilli	2	-	7	2	5	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Amastigos caperatus	-	-	5	24	11	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ampharete lindstroemi	1	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	1	2
Ampharete oculata	-	-	1	-	-	1	-	1	-	-	-	-	-	-	-	-	-	6	-	2	-	1
Ancistrosyllis hartmanae	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
Aphelochaeta sp. A	-	21	-	-	-	-	35	-	-	2	34	1	-	-	-	1	-	-	-	-	-	-
Aphelochaeta sp. B	-	-	-	-	-	-	12	1	-	51	62	16	-	-	-	7	-	-	-	-	-	2
Aphrodita hastata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arabella multidentata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aricidea (Acmira) catherinae	3	67	2	1	-	-	25	4	1	142	43	19	-	-	-	18	28	-	-	-	1	3
Aricidea (Acmira) cerrutii	-	159	-	-	-	-	-	-	-	76	6	12	-	-	-	1	-	-	-	-	-	-
Aricidea (Aricidea) wassi	1	-	-	-	-	-	-	-	-	-	-	-	2	1	2	-	17	-	-	1	9	3
Bradabyssa villosa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Brania wellfleetensis	-	43	-	-	-	-	13	1	3	40	38	15	-	1	5	2	-	-	-	-	-	-
Cabira incerta	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Capitella capitata	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Caulleriella venefica	3	2	-	-	-	-	3	10	3	7	6	-	3	1	1	9	3	2	-	1	6	6
Cirriformia grandis	-	-	-	-	-	-	-	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cirrophorus sp. A	-	1	-	-	-	-	3	2	-	-	1	-	-	-	-	1	-	-	-	-	-	-
Cirrophorus sp. B	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Clymenella torquata	-	-	-	-	-	-	-	3	2	-	-	-	-	-	-	-	-	-	1	-	-	-
Clymenella zonalis	-	-	-	-	-	-	2	3	7	-	1	-	-	-	-	2	-	-	-	-	-	1
Diopatra cuprea	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-
Dipolydora socialis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dipolydora sp. A	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Drilonereis longa	-	-	-	-	-	-	-	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
Erinaceusyllis erinaceus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Eteone foliosa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Eumida sanguinea	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Exogone dispar	-	-	-	-	-	-	-	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Exogone hebes	-	-	-	-	-	-	-	-	-	3	-	-	-	4	1	-	-	-	-	-	-	-
Fabricinuda trilobata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Flabelligera affinis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Glycera americana	-	-	-	-	-	-	1	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-
Glycera dibranchiata	-	-	-	2	1	-	-	1	-	-	-	-	-	-	-	2	-	-	-	-	-	-
Goniadella gracilis	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-
Harmothoe extenuata	-	-	-	-	-	-	-	23	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hemipodia simplex	-	4	-	-	-	-	1	-	-	-	3	13	-	-	-	-	-	-	-	-	-	-
Hesionura coineaui	-	32	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
Hypereteone heteropoda	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Kirkegaardia baptisteae	-	-	-	-	-	-	3	23	-	10	10	26	-	-	-	-	-	-	-	-	-	-
Kirkegaardia hampsoni	-	-	-	-	-	-	2	122	10	-	-	-	-	-	-	-	-	-	-	-	-	1
Leitoscoloplos robustus	2	-	1	-	-	1	1	-	1	-	-	-	-	-	-	2	2	1	1	-	-	-
Leodamas rubrus	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Levinsenia gracilis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Loimia medusa	-	-	1	7	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Longibrachium atlanticum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
Lumbrinerides davi	-	13	-	-	-	-	-	-	-	6	7	21	-	1	-	-	-	-	-	-	-	-

Scientific Name	Grab Sample ID[a/b/]																				
	GS-1-R	GS-2-R	GS-3-R	GS-4	GS-5	GS-6	GS-7	GS-8	GS-9	GS-10	GS-11	GS-12	GS-13	GS-14	GS-15	GS-16	GS-17	GS-18	GS-19	GS-20	GS-21	GS-22
Lysilla alba	-	-	-	-	-	-	8	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
Magelona sp. B Jones, 1968	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Maldanidae sp.	-	-	-	-	-	-	1	5	11	-	-	-	-	-	-	-	-	-	-	-	-	-
Mediomastus ambiseta	-	-	70	112	9	6	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mediomastus sp.	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Meiodorvillea sp. A	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
Microphthalmus aberrans	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mooreonuphis nebulosa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mooreonuphis pallidula	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mooreonuphis sp. A	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Neanthes arenaceodentata	-	-	-	-	-	-	-	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nephtys bucera	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nephtys picta	2	-	3	3	6	1	2	-	2	-	1	1	-	1	-	3	4	5	-	2	-	1
Ninoe nigripes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-
Notocirrus spinifera	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Notomastus luridus	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
Onuphidae sp. Juvenile	-	-	-	1	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-
Onuphis eremita oculata	-	-	-	-	1	-	-	-	-	-	-	-	1	-	-	-	-	-	1	-	-	-
Ophelia denticulata	-	1	-	-	-	-	1	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
Ophelia sp.	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
Opheliidae sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Opistodonta longocirrata	-	18	-	1	-	-	4	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-
Orbinia americana	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	1	-	-
Orbiniidae sp. Indeterminate	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
Owenia artifex	-	-	22	12	14	10	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Paradoneis sp. A	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Paradoneis sp. B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Paranaitis speciosa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Paraonidae sp. A	-	10	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
Paraonis fulgens	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	1	-
Paraonis pygoenigmatica	-	1	-	-	-	-	1	-	-	14	8	-	-	1	1	1	-	-	-	-	2	-
Paraonis sp. A	-	-	-	-	-	-	-	-	-	2	-	-	-	1	5	-	-	-	-	-	-	-
Parougia caeca	-	1	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
Paucibranchia sp. A	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Pectinaria gouldii	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-
Pettiboneia sp. A	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	-	-	-	-	-	2
Phyllodoce arenae	-	-	-	1	-	1	2	2	-	-	1	-	-	-	-	4	-	-	-	-	-	-
Phylo felix	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pisione remota	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pista cristata	-	-	-	-	-	-	1	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-
Podarkeopsis levifuscina	-	-	-	-	-	-	-	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-
Polycirrus eximius	-	-	-	-	-	-	1	79	2	-	-	-	-	-	-	-	-	-	-	-	-	-
Polycirrus phosphoreus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Polycirrus sp. A	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-
Polycirrus sp. indeterminate	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Polydora websteri	-	-	4	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-
Polygordius jouinae	3	3	-	-	1	-	3	14	-	46	5	-	-	8	25	33	6	5	-	11	16	50
Polygordius sp. A	-	-	-	-	-	-	-	-	-	-	-	8	-	-	-	-	-	-	-	-	-	-
Prionospio pygmaeus	5	-	113	95	41	64	3	1	1	-	1	-	-	-	-	-	-	1	1	-	-	-
Proceraea cornuta	-	-	-	-	-	-	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Protodorvillea kefersteini	-	23	-	-	-	-	5	-	-	2	20	-	-	-	-	18	-	-	-	-	2	-
Psammodrilus balanoglossoides	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sabaco elongatus	-	-	-	-	-	-	-	1	8	-	-	-	-	-	-	-	-	-	-	-	-	-
Sabellaria vulgaris	-	-	-	-	-	1	5	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Scientific Name	Grab Sample ID[a/b/]																				
	GS-1-R	GS-2-R	GS-3-R	GS-4	GS-5	GS-6	GS-7	GS-8	GS-9	GS-10	GS-11	GS-12	GS-13	GS-14	GS-15	GS-16	GS-17	GS-18	GS-19	GS-20	GS-21	GS-22
Sabellidae sp. (indeterminate)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Salvatoria clavata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Scalibregma inflatum	-	-	-	-	-	-	-	26	10	-	7	-	-	-	-	34	20	19	17	2	-	11
Schistomeringos rudolphi	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	10	-	-	-	-	-	-
Scolelepis (Parascolelepis) bousfieldi	-	-	1	-	1	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Scoletoma acicularum	-	1	-	-	-	-	5	5	-	1	-	-	-	-	-	8	-	1	1	1	1	-
Scoletoma tenuis	-	3	-	-	-	-	3	4	-	-	-	-	-	-	-	1	-	-	8	-	-	-
Scoloplos armiger	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	-	-	-
Scoloplos capensis	-	3	-	-	-	-	1	-	-	9	15	2	-	-	-	-	-	-	-	-	-	2
Sigalion arenicola	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-
Sigambra bassi	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
Sigambra tentaculata	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-
Spio pettiboneae	-	-	-	-	-	-	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
Spio setosa	-	1	-	-	-	-	1	104	6	-	1	-	-	-	-	316	-	-	1	-	-	-
Spiochaetopterus oculatus	-	-	-	-	-	1	8	1	1	-	-	-	1	-	-	-	-	-	-	-	-	2
Spionidae sp. indeterminate	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-
Spiophanes bombyx	1	-	15	4	11	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Spirorbis sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sthenelais limicola	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-
Streblospio benedicti	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Streptosyllis sp.	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
Streptosyllis verrilli	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Streptosyllis websteri	-	4	-	-	-	-	-	-	-	4	1	-	-	-	6	-	-	-	-	-	1	-
Syllidae sp.	-	1	-	-	-	-	-	-	-	-	-	1	-	-	-	1	-	-	-	-	-	-
Syllides convolutus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Syllides longocirrata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Syllides sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Syllis cornuta	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tharyx acutus	-	-	1	2	-	1	-	-	-	-	-	-	-	-	-	-	-	-	22	-	-	-
Tharyx sp. A (MWRA)	-	-	15	34	18	19	2	4	-	2	-	-	-	-	-	2	1	-	1	-	-	-
Tharyx sp. indeterminate	1	-	17	45	13	17	4	41	3	1	-	-	-	-	-	1	2	-	34	-	-	-
Travisia sp.	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Travisia sp. A	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1
Arthropoda - Malacostraca																						
Acanthohaustorius bousfieldi	-	1	-	-	-	-	-	-	-	-	2	-	22	-	-	-	-	-	-	-	-	-
Acanthohaustorius intermedius	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acanthohaustorius millsi	-	-	-	-	-	-	-	-	-	-	-	-	-	2	1	-	-	-	-	-	-	-
Acanthohaustorius shoemakeri	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acanthohaustorius sp. D	-	-	-	-	-	-	-	-	-	-	-	1	19	-	-	-	-	3	-	-	8	-
Acanthohaustorius sp. juvenile	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-
Aeginina longicornis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Amakusanthura magnifica	-	-	-	-	-	-	1	12	11	1	-	3	-	-	-	-	-	-	-	-	-	-
Americhelidium americanum	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	1	-	-	-	1	-	2
Ampelisca abdita	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ampelisca bicarinata	-	4	-	-	-	7	-	-	-	28	7	3	34	4	7	-	1	2	-	-	2	2
Ampelisca sp. indeterminate	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ampelisca vadorum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
Ampelisca verrilli	22	-	-	3	-	13	4	-	15	-	-	-	1	-	-	-	32	2	1	-	2	3
Ancinus depressus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-
Argissa hamatipes	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Axiidea sp. juvenile	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Batea catharinensis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bathyporeia parkeri	1	1	-	-	-	-	-	-	-	2	2	14	9	17	29	-	-	-	-	-	-	-
Bathyporeia quoddyensis	-	-	-	-	-	-	-	-	1	-	-	-	-	43	1	-	-	-	-	-	-	-

Scientific Name	Grab Sample ID[a/b/]																				
	GS-1-R	GS-2-R	GS-3-R	GS-4	GS-5	GS-6	GS-7	GS-8	GS-9	GS-10	GS-11	GS-12	GS-13	GS-14	GS-15	GS-16	GS-17	GS-18	GS-19	GS-20	GS-21	GS-22
Byblis serrata	14	3	-	-	-	-	137	-	14	23	12	6	24	-	10	-	217	1750	4	503	389	445
Calappidae sp. juvenile	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
Cancer irroratus	-	-	1	-	-	-	-	5	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Chiridotea coeca	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Crangon septemspinosa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Cyclaspis varians	-	-	-	-	1	1	-	-	-	-	-	-	2	-	1	-	-	-	-	-	-	-
Deutella incerta	-	-	-	-	-	-	-	14	11	-	-	-	-	-	-	-	-	-	-	-	-	-
Edotia triloba	-	1	2	-	-	1	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-
Eobrolgus spinosus	-	-	-	-	-	-	-	28	1	-	-	-	-	-	-	-	-	-	-	-	-	-
Ericthonius sp. B LeCroy, 2007	-	-	10	-	3	-	-	15	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gammaropsis sutherlandi	-	-	-	-	-	-	-	15	1	-	-	-	-	-	-	-	-	-	-	-	-	-
Gilvossius setimanus	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
Hexapanopeus angustifrons	-	-	-	-	-	-	-	39	3	-	-	-	-	-	-	-	-	-	-	-	-	-
Hippomedon serratus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Idunella barnardi	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lembos websteri	-	-	-	-	-	-	-	25	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Leptocheirus pinguis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-
Leptochela papulata	-	1	-	-	-	-	-	-	-	2	-	2	2	-	1	-	-	-	-	-	-	-
Liljeborgia sp. A	-	-	-	-	-	-	-	-	-	2	-	1	-	-	-	-	-	-	-	1	-	-
Majidae sp. juvenile	-	-	1	-	-	-	-	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
Melitidae sp. B LeCroy, 2000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Metatiron tropakis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Metharpinia floridana	-	17	-	-	-	-	7	-	-	47	30	38	14	5	10	-	-	1	-	-	3	44
Microprotopus raneyi	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
Monocorophium acherusicum	-	-	-	-	-	-	-	-	-	19	3	1	-	-	-	-	-	-	-	-	-	1
Nannosquilla carolinensis	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1
Ogyrides alphaerostris	1	-	1	1	1	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ovalipes ocellatus	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oxyurostylis smithi	-	-	-	-	-	-	-	2	1	-	-	-	1	-	3	-	1	-	-	-	-	-
Pagurus annulipes	3	-	7	-	2	1	1	2	11	-	-	-	1	-	-	6	1	-	1	-	1	1
Pagurus longicarpus	3	1	17	1	4	-	2	1	4	2	-	4	1	-	-	2	1	-	1	-	-	3
Pagurus pollicaris	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
Parahaustorius attenuatus	-	-	-	-	-	-	-	-	-	-	-	-	-	6	-	-	-	-	-	-	-	-
Parametopella cypris	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pedicorophium laminosum	-	-	-	-	1	-	-	4	-	1	-	-	-	-	-	-	-	-	-	-	-	-
Persephona mediterranea	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Photis pugnator	-	-	-	-	-	-	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Politolana polita	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Portunidae sp. juvenile	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Processa sp. indeterminate	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
Protohaustorius cf. deichmannae	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	65	74	1	33	-	-
Protohaustorius sp. juvenile	-	-	-	-	-	-	-	-	-	-	-	-	-	7	-	-	-	-	-	-	-	2
Protohaustorius wigleyi	-	-	-	-	-	-	-	-	-	1	-	-	74	33	47	-	-	1	-	2	10	5
Pseudoleptocuma minus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pseudunciola obliquua	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ptilanthura tenuis	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	1
Rhepoxynius hudsoni	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	24	15	3	2	-	-
Stomatopoda sp. juvenile	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1
Tanaissus psammophilus	-	1	-	-	-	-	-	-	-	22	13	-	-	1	3	-	-	-	-	2	5	-
Unciola dissimilis	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
Unciola irrorata	-	1	-	1	2	-	1	-	6	-	1	-	1	-	1	3	5	15	2	3	4	7
Unciola serrata	-	-	-	-	-	-	-	12	1	-	-	-	-	-	-	-	-	-	-	-	-	-
Chordata - Ascidiacea																						
Ascidiacea sp. juvenile	-	147	-	-	-	-	36	-	-	46	180	127	17	16	17	5	1	-	-	1	-	7

Scientific Name	Grab Sample ID[a/b/]																					
	GS-1-R	GS-2-R	GS-3-R	GS-4	GS-5	GS-6	GS-7	GS-8	GS-9	GS-10	GS-11	GS-12	GS-13	GS-14	GS-15	GS-16	GS-17	GS-18	GS-19	GS-20	GS-21	GS-22
Molgula arenata	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
Chordata - Leptocardii																						
Branchiostoma virginiae	-	6	-	1	-	-	17	-	-	4	3	85	6	-	-	-	-	-	-	-	-	2
Cnidaria - Anthozoa																						
Edwardsia elegans	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Haloclava producta	-	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Echinodermata - Echinoidea																						
Echinarachnius parma	-	-	-	-	-	-	-	-	-	-	-	-	23	2	2	-	-	-	-	-	-	-
Echinodermata - Holothuroidea																						
Holothuroidea sp. juvenile	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Echindermata – Ophiuroidea																						
Ophiuroidea sp. juvenile	-	-	2	-	-	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hemichordata - Enteropneusta																						
Saccoglossus kowalevskii	-	-	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mollusca - Bivalvia																						
Abra aequalis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ameritella agilis	1	-	69	57	69	30	2	18	17	-	-	-	6	-	-	-	1	-	1	-	-	-
Ameritella sp.	-	-	-	-	-	-	37	-	-	1	-	-	-	-	-	2	-	-	-	-	-	-
Ameritella tenella	-	11	-	-	-	-	2	-	-	10	14	5	-	25	21	-	-	-	-	1	4	4
Anadara transversa	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	1	-	-	-	-
Anomia simplex	-	-	-	-	-	-	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arctica islandica	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7	4	2	-	2
Astarte castanea	-	3	-	-	-	-	-	-	1	-	1	-	-	-	-	-	-	-	-	-	-	-
Bivalvia sp.	-	1	-	-	-	1	1	-	-	2	-	-	1	-	-	-	-	-	1	-	-	1
Crassinella lunulata	-	-	-	-	1	-	1	33	1	1	3	5	-	-	-	1	-	-	-	-	-	-
Cyclocardia borealis	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
Ennucula tenuis	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
Ensis leei	-	-	3	5	-	1	-	-	5	-	-	-	1	-	-	1	-	-	-	-	-	-
Limecola balthica	-	-	4	-	9	2	-	10	4	1	1	-	-	-	-	-	-	-	-	-	-	-
Lyonsia hyalina	-	-	-	-	-	-	-	1	-	-	1	-	-	-	-	-	-	1	-	1	-	-
Macoploma tenta	-	-	-	11	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mercenaria mercenaria	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Modiolus sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mulinia lateralis	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mysella planulata	-	-	-	-	-	-	8	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mytilus edulis	-	-	-	-	-	-	-	16	-	-	-	-	-	-	-	-	-	1	-	-	-	-
Nucula proxima	1	-	-	-	1	-	-	1	1	-	1	-	-	-	-	-	6	1	4	-	-	-
Pandora gouldiana	-	-	1	-	2	2	1	-	1	1	2	1	1	-	-	-	2	6	-	4	-	2
Parvicardium pinnulatum	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	1	-	1	-	2
Parvilucina crenella	-	-	1	-	2	-	-	-	-	-	-	-	-	-	-	2	1	-	5	-	-	-
Periploma fragile	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Periploma sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pitar morrhuanus	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	1	1	-	-	-
Placopectin magellanicus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Solamen glandula	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Solemya velum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Spisula solidissima	1	3	2	-	-	-	-	-	-	-	-	-	2	-	1	1	5	1	-	4	3	10
Thraciidae sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-
Yoldia sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mollusca - Gastropoda																						
Anachis lafresnayi	-	-	-	-	-	-	-	48	3	-	-	-	-	-	-	-	-	-	-	-	-	-
Astyris lunata	-	-	-	-	-	-	-	53	8	-	-	-	-	-	-	-	-	-	-	-	-	-
Boonea bisuturalis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boonea impressa	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Scientific Name	Grab Sample ID[a/b/]																				
	GS-1-R	GS-2-R	GS-3-R	GS-4	GS-5	GS-6	GS-7	GS-8	GS-9	GS-10	GS-11	GS-12	GS-13	GS-14	GS-15	GS-16	GS-17	GS-18	GS-19	GS-20	GS-21	GS-22
Boonea seminuda	-	-	-	-	-	-	-	13	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Caecum cooperi	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
Caecum johnsoni	-	7	-	-	-	-	2	-	-	1	25	18	-	-	-	-	-	-	-	-	-	-
Caecum sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Crepidula fornicata	-	-	1	-	-	-	-	86	-	-	-	-	-	1	-	3	1	-	-	-	-	-
Crepidula plana	-	-	-	-	-	-	-	42	-	3	1	-	2	-	-	-	-	-	-	-	-	-
Crepidula sp.	-	-	-	1	-	-	-	4	-	1	-	-	1	-	-	-	-	-	-	-	-	-
Cyclostremiscus beauii	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
Cylichnella bidentata	-	-	7	9	13	7	1	-	1	-	-	-	1	-	-	-	-	-	-	-	-	-
Dentimargo aureocinctus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Diaphana minuta	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Doridella obscura	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Epitonium sp.	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Eupleura caudata	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gastropoda sp.	-	-	-	-	-	-	-	3	1	1	-	-	-	-	-	-	-	-	-	-	-	-
Granulina ovuliformis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Japonactaeon punctostriatus	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Kurtziella atrostyla	1	-	5	-	2	4	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Naticidae sp.	-	-	1	1	2	4	5	4	-	-	2	-	-	1	-	-	-	-	-	-	-	-
Nudibranchia sp.	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Odostomia engonia	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Odostomia sp.	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Parvanachis obesa	-	-	9	3	6	6	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Prunum roscidum	1	-	-	7	-	-	2	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-
Tectonatica pusilla	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	1	-	-	-
Tritia trivitatta	13	1	10	22	18	24	6	-	3	-	1	2	11	1	3	4	1	2	1	1	2	5
Turbonilla interrupta	1	-	1	9	1	1	-	1	3	-	-	-	-	-	-	-	1	-	-	-	-	-
Turbonilla stricta	-	-	-	-	1	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
Vitrinellidae sp.	-	-	-	-	-	-	-	-	-	-	1	4	-	-	-	-	-	-	-	-	-	-
Mollusca Scaphopoda																						
Dentaliidae sp.	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nemertea - Hoplonemertea																						
Amphiporus bioculatus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-
Amphiporus caecus	-	1	-	-	-	-	2	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-
Nemertea - Paleonemertea																						
Carinomella lactea	-	-	4	3	1	-	2	4	-	1	2	-	-	-	-	2	-	-	-	-	-	2
Cephalothrix spiralis	-	2	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
Tubulanus pellucidus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nemertea – Pilidiophora																						
Cerebratulus lacteus	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Micrura sp.	-	-	-	-	1	-	-	-	3	1	2	1	-	-	-	-	-	-	-	-	-	2
Zygeupolia rubens	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nemertea																						
Nemertea sp.	-	-	-	-	-	-	-	-	-	-	8	6	-	-	-	1	-	-	-	-	-	-
Phoronida																						
Phoronis sp.	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Platyhelminthes																						
Platyhelminthes sp. 11 (MWRA)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Plehnia ellipsoides	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sipuncula																						
Sipuncula sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Xenacoelomorpha																						
Xenacoelomorpha sp. 1 (MWRA)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Notes:																						

Scientific Name	Grab Sample ID[a/b/]																				
	GS-1-R	GS-2-R	GS-3-R	GS-4	GS-5	GS-6	GS-7	GS-8	GS-9	GS-10	GS-11	GS-12	GS-13	GS-14	GS-15	GS-16	GS-17	GS-18	GS-19	GS-20	GS-21	GS-22
a/ - indicates no presence in gab sample b/ grey shading indicates reference sample																						

Table D-2-8. Benthic Infauna Identified in Grab Samples GS-23 through GS-38-C

Scientific Name	Grab Sample ID[a/]																			
	GS-23	GS-24	GS-25	GS-26	GS-27	GS-28	GS-29	GS-30	GS-31	GS-32	GS-33	GS-34	GS-35	GS-36	GS-37-A	GS-37-B	GS-37-C	GS-38-A	GS-38-B	GS-38-C
Annelida - Clitellata																				
Oligochaeta sp.	7	21	93	18	13	23	70	-	-	81	-	18	86	141	66	132	41	8	8	2
Annelida - Polychaeta																				
Aglaophamus circinata	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	2
Aglaophamus verrilli	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
Amastigos caperatus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ampharete lindstroemi	-	1	12	1	-	-	6	-	-	1	1	-	5	-	1	2	1	2	2	2
Ampharete oculata	-	3	2	2	-	-	-	-	2	-	-	-	-	1	2	1	1	10	13	14
Ancistrosyllis hartmanae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aphelochaeta sp. A	1	-	-	-	1	2	-	-	-	7	-	-	1	4	8	32	10	-	-	-
Aphelochaeta sp. B	-	1	2	1	-	-	-	-	-	4	-	-	3	2	-	14	1	-	-	-
Aphrodita hastata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1
Arabella multidentata	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
Aricidea (Acmira) catherinae	-	9	3	2	2	15	3	6	23	45	-	21	7	10	20	48	14	7	6	7
Aricidea (Acmira) cerrutii	1	-	-	1	-	23	-	-	-	109	-	-	32	21	23	58	7	-	-	-
Aricidea (Aricidea) wassi	1	5	4	2	5	-	1	7	26	-	1	2	-	-	-	-	1	17	8	4
Bradabyssa villosa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Brania wellfleetensis	-	-	-	-	-	2	-	-	-	18	1	-	2	6	16	33	-	-	-	-
Cabira incerta	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Capitella capitata	1	-	1	1	-	7	-	-	-	-	-	-	-	1	-	-	-	-	-	-
Caulleriella venefica	-	5	11	4	4	-	6	1	-	13	1	40	1	1	-	1	1	2	1	-
Cirriformia grandis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cirrophorus sp. A	-	-	-	1	1	-	3	-	-	-	-	1	-	-	-	-	-	-	-	-
Cirrophorus sp. B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Clymenella torquata	-	-	-	-	2	-	-	1	-	-	-	1	-	-	-	-	-	14	89	167
Clymenella zonalis	4	1	-	2	2	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1
Diopatra cuprea	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dipolydora socialis	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	1	-	-
Dipolydora sp. A	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Drilonereis longa	-	3	-	-	1	-	-	-	-	-	-	3	-	-	-	-	-	-	-	1
Erinaceusyllis erinaceus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-
Eteone foliosa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Eumida sanguinea	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Exogone dispar	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Exogone hebes	-	-	28	6	3	1	3	-	-	3	-	-	-	-	-	6	19	-	-	-
Fabricinuda trilobata	-	-	-	-	-	1	5	-	-	-	-	-	-	1	230	408	94	-	-	1
Flabelligera affinis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Glycera americana	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Glycera dibranchiata	-	-	-	1	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	1
Goniadella gracilis	-	-	-	-	-	8	-	-	-	1	-	-	-	2	6	4	2	1	-	-
Harmothoe extenuata	1	-	-	-	-	1	2	-	-	-	-	1	-	-	1	2	1	-	-	-
Hemipodia simplex	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hesionura coineaui	-	-	-	-	-	7	-	-	-	23	-	-	4	-	11	22	25	-	-	-
Hypereteone heteropoda	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Kirkegaardia baptisteae	1	-	-	-	2	1	2	-	-	-	-	-	1	1	2	9	-	2	9	10

Scientific Name	Grab Sample ID[a/]																		
	GS-23	GS-24	GS-25	GS-26	GS-27	GS-28	GS-29	GS-30	GS-31	GS-32	GS-33	GS-34	GS-35	GS-36	GS-37-A	GS-37-B	GS-37-C	GS-38-A	GS-38-B	GS-38-C
Kirkegaardia hampsoni	-	-	-	2	-	1	5	-	-	1	-	-	-	-	-	-	-	-	-	-
Leitoscoloplos robustus	-	21	-	-	-	-	3	3	2	-	-	2	-	-	-	-	-	9	10	9
Leodamas rubrus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Levinsenia gracilis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Loimia medusa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Longibrachium atlanticum	-	-	-	-	-	1	-	-	-	-	-	-	-	-	1	-	1	-	-	-
Lumbrinerides dayi	-	-	-	-	-	1	3	-	-	5	2	-	4	3	5	12	2	-	-	-
Lysilla alba	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Magelona sp. B Jones, 1968	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Maldanidae sp.	-	1	-	-	-	1	-	-	-	-	-	-	-	-	-	-	1	1	-	-
Mediomastus ambiseta	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mediomastus sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Meiodorvillea sp. A	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Microphthalmus aberrans	1	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-
Mooreonuphis nebulosa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-
Mooreonuphis pallidula	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mooreonuphis sp. A	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Neanthes arenaceodentata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Nephtys bucera	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-
Nephtys picta	-	4	-	1	1	-	5	5	1	-	-	4	-	-	-	1	-	5	8	7
Ninoe nigripes	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	2
Notocirrus spinifera	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Notomastus luridus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Onuphidae sp. juvenile	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-
Onuphis eremita oculata	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	2	7	5
Ophelia denticulata	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	-	-	-
Ophelia sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Opheliidae sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-
Opistodonta longocirrata	1	-	1	-	-	5	-	-	-	5	-	-	1	3	1	5	1	-	-	-
Orbinia americana	-	1	-	-	-	-	2	-	-	-	-	-	-	-	4	3	1	-	-	-
Orbiniidae sp. indeterminate	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	2	8
Owenia artifex	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-
Paradoneis sp. A	-	-	-	-	-	1	-	-	-	11	-	-	5	18	2	4	1	-	-	-
Paradoneis sp. B	-	-	-	-	-	4	-	-	-	1	-	-	1	2	3	6	2	-	-	-
Paranaitis speciosa	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Paraonidae sp. A	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Paraonis fulgens	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Paraonis pygoenigmatica	-	-	1	-	-	1	2	-	-	3	-	-	1	-	-	3	1	-	-	-
Paraonis sp. A	-	-	5	-	1	1	1	-	-	1	-	-	-	-	-	-	1	-	-	-
Parougia caeca	-	-	-	-	1	1	-	-	-	-	1	-	-	1	-	-	-	-	1	-
Paucibranchia sp. A	2	-	-	-	1	-	1	-	-	-	-	-	-	-	-	1	-	-	-	-
Pectinaria gouldii	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
Pettiboneia sp. A	1	10	-	1	1	2	-	-	1	-	-	-	-	-	-	1	-	3	-	1
Phyllodoce arenae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Phylo felix	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	5	4	6
Pisione remota	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
Pista cristata	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Podarkeopsis levifuscina	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Polycirrus eximius	1	-	-	-	1	3	-	-	-	-	-	-	-	2	-	30	1	-	-	-
Polycirrus phosphoreus	1	-	-	1	2	1	1	-	-	-	-	-	-	-	-	-	-	-	-	1
Polycirrus sp. A	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Polycirrus sp. indeterminate	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Polydora websteri	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Polygordius jouinae	14	22	10	50	40	39	14	-	-	44	1	95	30	39	28	52	49	3	2	1

Scientific Name	Grab Sample ID[a/]																			
	GS-23	GS-24	GS-25	GS-26	GS-27	GS-28	GS-29	GS-30	GS-31	GS-32	GS-33	GS-34	GS-35	GS-36	GS-37-A	GS-37-B	GS-37-C	GS-38-A	GS-38-B	GS-38-C
Polygordius sp. A	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Prionospio pygmaeus	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
Proceraea cornuta	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Protodorvillea kefersteini	-	-	3	15	13	4	6	-	-	12	-	-	3	6	1	-	1	-	-	-
Psammodrilus balanoglossoides	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sabaco elongatus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-
Sabellaria vulgaris	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sabellidae sp. (indeterminate)	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
Salvatoria clavata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Scalibregma inflatum	3	68	32	6	15	-	23	7	9	-	1	22	-	-	-	1	-	13	5	4
Schistomeringos rudolphi	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Scolelepis (Parascolelepis) bousfieldi	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Scoletoma acicularum	2	10	13	7	5	2	33	2	1	-	-	4	-	1	1	12	3	4	1	3
Scoletoma tenuis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	4
Scoloplos armiger	-	1	-	-	-	-	-	1	3	-	-	-	1	-	-	-	-	5	13	7
Scoloplos capensis	-	-	4	1	1	4	4	-	-	1	-	-	-	1	2	1	1	3	5	11
Sigalion arenicola	-	-	1	-	-	3	-	-	-	-	-	-	-	1	1	2	1	-	-	-
Sigambra bassi	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sigambra tentaculata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Spio pettiboneae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Spio setosa	14	1	1	1	-	-	2	-	-	-	-	1	-	-	-	-	-	-	-	-
Spiochaetopterus oculatus	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Spionidae sp. indeterminate	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Spiophanes bombyx	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	3	2
Spirorbis sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sthenelais limicola	-	3	-	-	1	-	-	2	6	-	-	1	-	-	-	-	-	2	7	3
Streblospio benedicti	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Streptosyllis sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Streptosyllis verrilli	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Streptosyllis websteri	-	-	3	1	4	2	-	-	-	-	-	-	1	1	5	6	1	-	-	-
Syllidae sp.	-	-	-	-	-	-	1	-	-	1	-	-	-	-	-	-	1	-	-	-
Syllides convolutus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Syllides longocirrata	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-
Syllides sp.	-	-	-	2	-	1	1	-	-	-	-	-	-	-	-	-	-	1	-	-
Syllis cornuta	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tharyx acutus	-	5	-	-	-	-	-	-	1	-	-	2	-	-	-	-	-	1	1	-
Tharyx sp. A (MWRA)	-	-	-	-	-	1	-	-	1	-	-	2	-	-	-	-	-	7	-	-
Tharyx sp. indeterminate	-	2	-	-	-	-	-	2	1	-	-	4	-	-	-	-	-	1	6	1
Travisia sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Travisia sp. A	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-
Arthropoda - Malacostraca																				
Acanthohaustorius bousfieldi	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-
Acanthohaustorius intermedius	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acanthohaustorius millsi	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acanthohaustorius shoemaker	-	-	-	-	-	2	-	-	-	-	-	-	-	-	5	1	-	-	-	-
Acanthohaustorius sp. D	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acanthohaustorius sp. juvenile	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
Aeginina longicornis	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Amakusanthura magnifica	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-
Americhelidium americanum	-	2	-	-	1	3	2	-	2	-	-	-	-	-	-	-	1	1	1	3
Ampelisca abdita	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ampelisca bicarinata	-	-	-	1	-	1	-	-	-	1	3	-	2	-	2	-	1	3	-	1
Ampelisca sp. indeterminate	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ampelisca vadorum	-	2	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-

Scientific Name	Grab Sample ID[a/]																			
	GS-23	GS-24	GS-25	GS-26	GS-27	GS-28	GS-29	GS-30	GS-31	GS-32	GS-33	GS-34	GS-35	GS-36	GS-37-A	GS-37-B	GS-37-C	GS-38-A	GS-38-B	GS-38-C
Ampelisca verrilli	-	3	-	-	-	-	-	20	12	-	2	2	-	-	-	-	-	-	-	-
Ancinus depressus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Argissa hamatipes	-	1	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	1
Axiidea sp. juvenile	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Batea catharinensis	15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bathyporeia parkeri	-	-	-	-	-	-	-	-	-	-	6	-	-	-	-	-	-	-	-	-
Bathyporeia quoddyensis	-	-	-	-	-	1	-	-	-	-	-	-	-	-	1	2	3	-	-	-
Byblis serrata	-	1	991	486	324	19	659	16	5	15	694	363	55	92	1	1	6	9	2	2
Calappidae sp. juvenile	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cancer irroratus	-	-	-	-	1	-	-	-	-	-	1	1	-	-	-	1	-	-	1	-
Chiridotea coeca	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	-	-
Crangon septemspinosa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Cyclaspis varians	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
Deutella incerta	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Edotia triloba	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Eobrolgus spinosus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ericthonius sp. B LeCroy, 2007	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gammaropsis sutherlandi	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gilvossius setimanus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hexapanopeus angustifrons	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hippomedon serratus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Idunella barnardi	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lembos websteri	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Leptocheirus pinguis	-	-	1	3	-	1	1	-	-	-	-	-	-	-	-	-	-	2	1	2
Leptochela papulata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	-
Liljeborgia sp. A	2	-	-	-	-	1	-	-	-	1	-	1	-	1	1	1	-	-	-	-
Majidae sp. juvenile	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
Melitidae sp. B LeCroy, 2000	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Metatiron tropakis	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Metharpinia floridana	-	-	25	8	19	-	-	-	1	17	40	3	18	11	-	-	-	-	-	-
Microprotopus raneyi	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Monocorophium acherusicum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nannosquilla carolinensis	-	1	-	-	1	1	-	-	1	-	-	-	-	1	-	-	-	-	-	-
Ogyrides alphaerostris	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ovalipes ocellatus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oxyurostylis smithi	-	-	-	1	-	-	-	-	1	-	-	2	-	-	-	1	2	1	-	3
Pagurus annulipes	5	1	-	-	2	3	-	1	1	-	-	11	-	-	1	1	2	2	2	1
Pagurus longicarpus	3	2	-	2	-	1	1	-	-	-	-	3	-	-	-	-	-	-	-	1
Pagurus pollicaris	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Parahaustorius attenuatus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-
Parametopella cypris	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pedicorophium laminosum	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Persephona mediterranea	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Photis pugnator	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Politolana polita	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Portunidae sp. juvenile	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Processa sp. indeterminate	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Protohaustorius cf. deichmannae	3	-	-	-	-	-	-	50	2	-	-	-	-	-	-	-	-	-	-	-
Protohaustorius sp. juvenile	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Protohaustorius wigleyi	-	1	1	4	-	-	11	-	-	-	50	-	7	-	2	1	2	-	-	-
Pseudoleptocuma minus	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-
Pseudunciola obliquua	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ptilanthura tenuis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-
Rhepoxynius hudsoni	-	-	18	-	-	-	29	15	24	-	-	-	-	-	-	-	-	23	14	20

Scientific Name	Grab Sample ID[a/]																			
	GS-23	GS-24	GS-25	GS-26	GS-27	GS-28	GS-29	GS-30	GS-31	GS-32	GS-33	GS-34	GS-35	GS-36	GS-37-A	GS-37-B	GS-37-C	GS-38-A	GS-38-B	GS-38-C
Stomatopoda sp. juvenile	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tanaissus psammophilus	-	-	-	-	-	2	1	-	-	10	2	-	2	-	4	3	7	-	-	-
Unciola dissimilis	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Unciola irrorata	-	1	37	14	9	6	15	8	2	-	2	9	4	9	5	1	1	8	8	19
Unciola serrata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chordata - Ascidiacea																				
Ascidiacea sp. juvenile	11	7	1	-	5	37	14	4	2	40	10	2	15	46	31	7	14	3	-	5
Molgula arenata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chordata - Leptocardii																				
Branchiostoma virginiae	9	-	-	-	-	3	-	-	-	1	1	-	1	1	2	-	2	-	-	-
Cnidaria - Anthozoa																				
Edwardsia elegans	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Haloclava producta	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Echinodermata - Echinoidea																				
Echinarachnius parma	-	-	-	-	-	5	-	-	-	1	-	-	-	2	-	-	-	5	4	-
Echinodermata - Holothuroidea																				
Holothuroidea sp. juvenile	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Echinodermata - Ophiuroidea																				
Ophiuroidea sp. juvenile	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hemichordata - Enteropneusta																				
Saccoglossus kowalevskii	1	-	-	1	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
Mollusca - Bivalvia																				
Abra aequalis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Ameritella agilis	-	3	-	-	-	40	1	-	1	-	1	-	-	-	-	-	-	1	5	4
Ameritella sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ameritella tenella	-	2	1	-	-	-	-	-	-	30	3	-	43	29	34	30	23	-	-	-
Anadara transversa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Anomia simplex	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arctica islandica	-	1	-	-	1	-	2	4	1	-	-	1	1	-	-	-	-	-	2	5
Astarte castanea	-	6	5	2	4	5	2	-	-	-	-	-	2	16	-	3	1	-	-	-
Bivalvia sp.	-	1	-	-	-	-	-	-	1	-	1	-	1	6	-	1	-	-	-	1
Crassinella lunulata	-	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cyclocardia borealis	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-
Ennucula tenuis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ensis leei	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11	5
Limecola balthica	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lyonsia hyalina	1	-	-	1	-	-	-	-	-	-	-	1	-	1	-	-	-	-	-	-
Macoploma tenta	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mercenaria mercenaria	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Modiolus sp.	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mulinia lateralis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mysella planulata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mytilus edulis	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nucula proxima	-	37	3	2	1	-	16	-	13	-	-	6	-	-	-	-	-	9	13	27
Pandora gouldiana	-	2	3	1	3	18	17	8	-	2	-	1	2	1	8	6	3	4	5	21
Parvicardium pinnulatum	-	-	-	3	-	1	1	-	-	-	-	-	-	-	-	-	-	-	1	3
Parvilucina crenella	-	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	3	1
Periploma fragile	-	-	-	-	-	3	-	-	-	-	-	-	1	-	-	1	-	-	-	1
Periploma sp.	-	-	-	-	-	-	3	-	-	-	-	-	3	-	3	4	1	-	-	-
Pitar morrhuanus	-	2	1	1	-	-	1	3	5	-	-	1	-	1	-	-	-	-	-	1
Placopectin magellanicus	-	-	-	-	-	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Solamen glandula	-	-	-	-	1	2	-	-	-	1	-	-	1	4	3	-	-	-	-	-
Solemya velum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Spisula solidissima	1	4	12	12	6	24	19	1	5	-	-	15	2	-	1	-	-	-	-	-

Scientific Name	Grab Sample ID[a/]																			
	GS-23	GS-24	GS-25	GS-26	GS-27	GS-28	GS-29	GS-30	GS-31	GS-32	GS-33	GS-34	GS-35	GS-36	GS-37-A	GS-37-B	GS-37-C	GS-38-A	GS-38-B	GS-38-C
Thraciidae sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
Yoldia sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mollusca - Gastropoda																				
Anachis lafresnayi	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Astyris lunata	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boonea bisuturalis	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boonea impressa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boonea seminuda	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Caecum cooperi	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Caecum johnsoni	-	-	-	-	-	1	-	-	-	2	-	-	1	7	1	5	-	-	-	-
Caecum sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Crepidula fornicata	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Crepidula plana	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Crepidula sp.	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cyclostremiscus beauii	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cylichnella bidentata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dentimargo aureocinctus	-	-	-	-	-	1	4	-	-	-	2	-	-	-	1	1	-	3	-	-
Diaphana minuta	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
Doridella obscura	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Epitonium sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Eupleura caudata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gastropoda sp.	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Granulina ovuliformis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-
Japonactaeon punctostriatus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Kurtziella atrostyla	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Naticidae sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nudibranchia sp.	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Odostomia engonia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Odostomia sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Parvanachis obesa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Prunum roscidum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tectonatica pusilla	-	1	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	2	1	-
Tritia trivitatta	1	-	-	1	3	2	-	1	-	-	-	-	1	1	-	-	-	2	2	-
Turbonilla interrupta	-	2	-	-	-	-	-	1	-	-	-	-	-	-	-	1	-	-	-	-
Turbonilla stricta	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vitrinellidae sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mollusca - Scaphopoda																				
Dentaliidae sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nemertea - Hoplonemertea																				
Amphiporus bioculatus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Amphiporus caecus	-	-	3	-	-	1	-	-	-	1	-	-	1	1	4	-	3	-	-	-
Nemertea - Palaeonemertea																				
Carinomella lactea	1	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
Cephalothrix spiralis	5	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1	-	-	-	-
Tubulanus pellucidus	-	-	-	-	-	2	-	-	-	3	-	-	-	2	-	-	2	-	-	-
Nemertea - Pilidiophora																				
Cerebratulus lacteus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Micrura sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zygeupolia rubens	-	-	-	-	1	-	1	-	-	-	1	-	-	-	-	-	-	2	-	-
Nemertea																				
Nemertea sp.	1	-	-	-	-	1	-	-	-	-	-	-	-	-	1	-	-	-	-	-
Phoronida																				
Phoronis sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
Platyhelminthes																				

Scientific Name	Grab Sample ID[a/]																			
	GS-23	GS-24	GS-25	GS-26	GS-27	GS-28	GS-29	GS-30	GS-31	GS-32	GS-33	GS-34	GS-35	GS-36	GS-37-A	GS-37-B	GS-37-C	GS-38-A	GS-38-B	GS-38-C
Platyhelminthes sp. 11 (MWRA)	-	-	-	-	1	3	-	-	-	-	-	-	-	-	2	-	-	-	-	-
Plehnia ellipsoides	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sipuncula																				
Sipuncula sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Xenacoelomorpha																				
Xenacoelomorpha sp. 1 (MWRA)	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes:
a/ - indicates no species presence in grab sample

Table D-2-9. Benthic Infauna Identified in Grab Samples GS-39-A through GS-44-B

Scientific Name	Grab Sample ID[a/]																
	GS-39-A	GS-39-B	GS-39-C	GS-40-A	GS-40-B	GS-40-C	GS-41-A	GS-41-B	GS-41-C	GS-42-A	GS-42-B	GS-42-C	GS-43-A	GS-43-B	GS-43-C	GS-44-A	GS-44-B
Annelida - Clitellata																	
Oligochaeta sp.	16	14	5	91	148	54	53	77	92	94	139	113	73	274	107	24	43
Annelida - Polychaeta																	
Aglaophamus circinata	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aglaophamus verrilli	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Amastigos caperatus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ampharete lindstroemi	5	9	6	5	-	-	3	1	2	1	3	1	1	2	-	-	-
Ampharete oculata	1	11	15	1	-	-	1	-	1	-	1	-	-	1	1	-	-
Ancistrosyllis hartmanae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aphelochaeta sp. A	-	-	-	-	5	4	4	5	8	3	3	12	8	-	29	1	9
Aphelochaeta sp. B	2	1	-	3	-	1	2	2	5	-	-	4	2	14	5	-	1
Aphrodita hastata	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arabella multidentata	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aricidea (Acmira) catherinae	8	2	6	-	4	49	23	7	1	24	60	24	30	28	35	21	8
Aricidea (Acmira) cerrutii	-	-	-	-	9	4	5	5	9	5	31	32	115	115	121	23	51
Aricidea (Aricidea) wassi	9	7	-	8	-	-	-	-	-	-	-	-	-	-	-	-	-
Bradabyssa villosa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Brania wellfleetensis	-	-	-	-	25	9	3	5	14	4	5	11	17	22	41	2	8
Cabira incerta	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Capitella capitata	-	1	-	-	-	-	3	-	1	-	-	-	-	3	-	-	-
Caulleriella venefica	11	3	-	18	1	-	-	-	2	-	-	1	1	5	2	5	-
Cirriformia grandis	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
Cirrophorus sp. A	-	-	-	-	-	-	-	1	-	-	2	-	-	-	-	-	-
Cirrophorus sp. B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Clymenella torquata	3	8	88	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Clymenella zonalis	-	-	-	2	-	-	-	-	-	-	-	-	-	1	-	-	-
Diopatra cuprea	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dipolydora socialis	-	2	-	-	1	-	-	-	1	-	-	-	1	1	-	-	-
Dipolydora sp. A	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Drilonereis longa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Erinaceusyllis erinaceus	-	-	-	-	4	-	5	-	2	1	-	-	-	1	1	1	-
Eteone foliosa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Eumida sanguinea	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Exogone dispar	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Exogone hebes	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	10	-
Fabricinuda trilobata	-	-	-	-	1	35	199	9	79	117	621	75	-	4	1	37	21
Flabelligera affinis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Glycera americana	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Glycera dibranchiata	-	-	3	1	-	-	-	-	-	-	-	-	-	-	-	-	-

Scientific Name	Grab Sample ID[a/]																
	GS-39-A	GS-39-B	GS-39-C	GS-40-A	GS-40-B	GS-40-C	GS-41-A	GS-41-B	GS-41-C	GS-42-A	GS-42-B	GS-42-C	GS-43-A	GS-43-B	GS-43-C	GS-44-A	GS-44-B
Goniadella gracilis	-	-	-	-	-	13	8	3	12	-	1	1	5	9	3	1	2
Harmothoe extenuata	-	2	-	-	1	-	1	2	1	1	-	1	-	-	-	-	1
Hemipodia simplex	-	-	-	-	6	14	12	8	4	7	10	9	6	-	-	-	2
Hesionura coineaui	-	-	-	-	28	9	10	13	21	15	12	16	39	15	36	15	7
Hypereteone heteropoda	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Kirkegaardia baptisteae	2	5	24	2	-	1	-	1	-	8	4	5	-	-	8	1	4
Kirkegaardia hampsoni	-	-	-	1	-	-	-	-	1	-	-	1	-	2	-	-	-
Leitoscoloplos robustus	-	2	8	1	-	-	-	-	-	-	-	-	-	-	-	-	-
Leodamas rubrus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Levinsenia gracilis	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Loimia medusa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Longibrachium atlanticum	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	1
Lumbrinerides dayi	-	-	-	-	2	6	2	7	8	9	2	5	2	6	15	9	9
Lysilla alba	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Magelona sp. B Jones, 1968	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Maldanidae sp.	1	1	-	7	-	-	-	-	-	1	-	-	-	-	1	-	-
Mediomastus ambiseta	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mediomastus sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Meiodorvillea sp. A	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
Microphthalmus aberrans	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mooreonuphis nebulosa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mooreonuphis pallidula	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-
Mooreonuphis sp. A	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Neanthes arenaceodentata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nephtys bucera	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-
Nephtys picta	3	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-
Ninoe nigripes	-	-	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Notocirrus spinifera	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Notomastus luridus	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1
Onuphidae sp. juvenile	-	-	-	-	-	-	1	-	-	1	-	1	5	3	-	4	2
Onuphis eremita oculata	-	-	3	1	-	-	-	-	-	-	-	-	-	-	-	-	-
Ophelia denticulate	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ophelia sp.	-	-	-	-	-	4	2	-	-	-	-	1	-	-	-	-	-
Opheliidae sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Opistodonta longocirrata	-	-	-	-	8	-	4	1	-	2	3	4	5	9	5	1	-
Orbinia americana	2	-	-	1	-	-	-	-	-	-	-	-	-	-	2	-	-
Orbiniidae sp. Indeterminate	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Owenia artifex	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Paradoneis sp. A	-	-	-	-	2	-	1	-	2	2	32	11	6	106	21	1	-
Paradoneis sp. B	-	-	-	-	6	-	20	41	24	7	34	21	-	-	2	-	-
Paranaitis speciosa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Paraonidae sp. A	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-
Paraonis fulgens	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Paraonis pygoenigmatica	-	-	-	-	-	-	-	-	-	-	1	-	2	3	2	-	1
Paraonis sp. A	3	-	-	3	-	-	-	-	-	-	-	-	-	2	1	1	-
Parougia caeca	-	-	-	1	-	-	-	-	-	-	-	-	1	1	1	-	-
Paucibranchia sp. A	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	1
Pectinaria gouldii	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pettiboneia sp. A	-	-	-	-	-	-	3	1	2	-	1	1	1	7	3	-	-
Phyllodoce arenae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phylo felix	-	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pisione remota	-	-	-	-	-	3	-	1	1	3	2	-	1	-	1	-	-
Pista cristata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Podarkeopsis levifuscina	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Scientific Name	Grab Sample ID[a/]																
	GS-39-A	GS-39-B	GS-39-C	GS-40-A	GS-40-B	GS-40-C	GS-41-A	GS-41-B	GS-41-C	GS-42-A	GS-42-B	GS-42-C	GS-43-A	GS-43-B	GS-43-C	GS-44-A	GS-44-B
Polycirrus eximius	-	-	-	-	3	5	7	1	8	-	-	-	9	1	5	-	1
Polycirrus phosphoreus	-	-	1	2	-	-	-	-	-	-	-	-	-	-	-	-	-
Polycirrus sp. A	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Polycirrus sp. Indeterminate	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Polydora websteri	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Polygordius jouinae	4	2	2	1	-	3	16	7	9	4	11	6	62	103	55	24	8
Polygordius sp. A	-	-	-	-	6	-	-	-	-	-	-	-	-	-	-	-	-
Prionospio pygmaeus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Proceraea cornuta	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Protodorvillea kefersteini	-	-	-	-	4	-	3	3	4	2	1	3	8	27	6	1	2
Psammodrilus balanoglossoides	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-
Sabaco elongatus	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sabellaria vulgaris	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sabellidae sp. (indeterminate)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Salvatoria clavata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Scalibregma inflatum	4	57	1	21	1	-	-	-	-	-	-	-	-	-	-	-	-
Schistomeringos rudolphi	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Scolelepis (Parascolelepis) bousfieldi	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Scoletoma acicularum	10	6	1	21	1	2	1	-	-	-	-	-	-	3	7	1	-
Scoletoma tenuis	-	-	5	-	1	-	-	-	-	-	-	-	-	-	-	-	-
Scoloplos armiger	-	-	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Scoloplos capensis	1	1	2	1	1	2	11	4	4	2	4	9	6	2	-	3	5
Sigalion arenicola	2	-	-	-	-	-	3	1	3	1	1	-	-	-	-	1	-
Sigambra bassi	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sigambra tentaculata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Spio pettiboneae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Spio setosa	3	-	1	-	-	-	-	-	-	-	-	1	-	-	-	-	-
Spiochaetopterus oculatus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Spionidae sp. indeterminate	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Spiophanes bombyx	2	-	-	1	-	-	-	-	-	-	-	-	-	1	1	-	-
Spirorbis sp.	-	-	-	-	4	6	-	-	-	17	-	-	-	-	-	-	-
Sthenelais limicola	2	2	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Streblospio benedicti	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Streptosyllis sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Streptosyllis verrilli	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
Streptosyllis websteri	-	-	-	1	-	1	4	-	-	3	3	3	4	2	4	3	1
Syllidae sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Syllides convolutus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Syllides longocirrata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Syllides sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Syllis cornuta	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tharyx acutus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tharyx sp. A (MWRA)	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
Tharyx sp. indeterminate	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Travisia sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Travisia sp. A	-	1	-	-	6	2	-	-	-	1	-	-	-	-	-	-	-
Arthropoda - Malacostraca																	
Acanthohaustorius bousfieldi	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1	-	-
Acanthohaustorius intermedius	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acanthohaustorius millsi	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acanthohaustorius shoemakeri	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acanthohaustorius sp. D	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acanthohaustorius sp. juvenile	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aeginina longicornis	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-

Scientific Name	Grab Sample ID[a/]																
	GS-39-A	GS-39-B	GS-39-C	GS-40-A	GS-40-B	GS-40-C	GS-41-A	GS-41-B	GS-41-C	GS-42-A	GS-42-B	GS-42-C	GS-43-A	GS-43-B	GS-43-C	GS-44-A	GS-44-B
Amakusanthura magnifica	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Americhelidium americanum	1	3	1	2	-	-	-	-	-	1	-	-	-	-	-	-	-
Ampelisca abdita	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ampelisca bicarinata	17	-	-	-	-	-	1	-	2	-	-	-	2	3	7	1	-
Ampelisca sp. indeterminate	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-
Ampelisca vadorum	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ampelisca verrilli	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ancinus depressus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Argissa hamatipes	1	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
Axiidea sp. juvenile	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Batea catharinensis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bathyporeia parkeri	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bathyporeia quoddyensis	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	1	1
Byblis serrata	938	424	3	1147	1	-	-	2	-	-	-	-	1	-	2	1	-
Calappidae sp. juvenile	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cancer irroratus	1	1	-	1	-	1	-	-	-	-	2	1	-	-	-	-	-
Chiridotea coeca	-	-	-	-	1	-	1	2	-	-	-	-	1	1	1	-	-
Crangon septemspinosa	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cyclaspis varians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Deutella incerta	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Edotia triloba	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Eobrolgus spinosus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ericthonius sp. B LeCroy, 2007	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gammaropsis sutherlandi	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gilvossius setimanus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hexapanopeus angustifrons	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hippomedon serratus	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Idunella barnardi	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lembos websteri	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Leptocheirus pinguis	-	8	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Leptochela papulata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Liljeborgia sp. A	-	-	-	-	-	4	-	-	-	1	1	-	-	-	1	-	-
Majidae sp. Juvenile	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
Melitidae sp. B LeCroy, 2000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Metatiron tropakis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Metharpinia floridana	4	-	-	1	-	3	-	-	-	-	-	-	10	14	4	-	-
Microprotopus raneyi	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Monocorophium acherusicum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nannosquilla carolinensis	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-
Ogyrides alphaerostris	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ovalipes ocellatus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oxyurostylis smithi	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pagurus annulipes	-	8	1	-	-	2	-	1	1	-	1	-	-	-	-	-	1
Pagurus longicarpus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pagurus pollicaris	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Parahaustorius attenuatus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Parametopella cypris	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pedicorophium laminosum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Persephona mediterranea	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Photis pugnator	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Politolana polita	-	-	-	-	-	1	-	4	-	-	-	-	-	-	2	-	-
Portunidae sp. juvenile	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Processa sp. indeterminate	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Protohaustorius cf. deichmannae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Scientific Name	Grab Sample ID[a/]																
	GS-39-A	GS-39-B	GS-39-C	GS-40-A	GS-40-B	GS-40-C	GS-41-A	GS-41-B	GS-41-C	GS-42-A	GS-42-B	GS-42-C	GS-43-A	GS-43-B	GS-43-C	GS-44-A	GS-44-B
Protohaustorius sp. juvenile	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Protohaustorius wigleyi	21	-	-	-	-	-	-	4	1	-	-	-	-	3	3	-	1
Pseudoleptocuma minus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pseudunciola obliquua	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ptilanthura tenuis	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
Rhepoxynius hudsoni	41	11	1	15	-	-	-	-	-	-	1	3	-	-	-	-	1
Stomatopoda sp. juvenile	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tanaissus psammophilus	4	-	-	-	-	-	7	-	3	-	2	-	-	2	4	6	1
Unciola dissimilis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Unciola irrorate	16	22	11	25	5	5	1	6	1	3	1	2	-	-	-	-	-
Unciola serrata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chordata - Ascidiacea																	
Ascidiacea sp. juvenile	28	4	2	4	12	4	3	3	10	43	32	6	23	19	31	17	7
Molgula arenata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chordata - Leptocardii																	
Branchiostoma virginiae	-	-	-	-	1	2	-	5	-	2	1	-	2	2	3	1	1
Cnidaria - Anthozoa																	
Edwardsia elegans	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
Haloclava producta	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Echinodermata - Echinoidea																	
Echinarachnius parma	-	5	-	-	-	1	-	1	-	1	1	-	2	2	-	-	2
Echinodermata - Holothuroidea																	
Holothuroidea sp. juvenile	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Echinodermata - Ophiuroidea																	
Ophiuroidea sp. Juvenile	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hemichordata - Enteropneusta																	
Saccoglossus kowalevskii	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mollusca - Bivalvia																	
Abra aequalis	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
Ameritella agilis	1	3	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-
Ameritella sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ameritella tenella	-	-	-	-	-	9	18	22	24	19	13	5	17	22	16	9	12
Anadara transversa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Anomia simplex	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arctica islandica	-	1	19	1	-	-	3	-	1	-	-	1	-	-	-	-	-
Astarte castanea	1	-	-	2	9	1	10	-	2	1	8	1	1	-	-	-	-
Bivalvia sp.	-	1	-	-	-	2	-	-	-	2	-	1	-	-	2	-	-
Crassinella lunulata	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
Cyclocardia borealis	-	1	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-
Ennucula tenuis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ensis leei	-	1	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-
Limecola balthica	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lyonsia hyalina	-	-	-	-	-	1	-	-	-	-	-	-	1	-	-	-	-
Macoploma tenta	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mercenaria mercenaria	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Modiolus sp.	-	-	-	2	1	2	1	1	-	-	-	1	-	1	-	-	-
Mulinia lateralis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mysella planulata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mytilus edulis	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-
Nucula proxima	4	27	21	34	1	1	2	2	-	-	2	-	-	-	-	-	-
Pandora gouldiana	2	-	1	3	4	6	10	3	8	6	6	6	14	-	7	-	1
Parvicardium pinnulatum	-	-	1	1	-	-	2	1	1	2	1	-	-	-	-	-	-
Parvilucina crenella	-	1	6	1	-	2	2	-	-	-	-	-	-	-	-	-	-
Periploma fragile	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Scientific Name	Grab Sample ID[a/]																
	GS-39-A	GS-39-B	GS-39-C	GS-40-A	GS-40-B	GS-40-C	GS-41-A	GS-41-B	GS-41-C	GS-42-A	GS-42-B	GS-42-C	GS-43-A	GS-43-B	GS-43-C	GS-44-A	GS-44-B
Periploma sp.	2	-	-	-	31	18	5	1	1	-	1	1	1	-	2	1	-
Pitar morrhuanus	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Placopectin magellanicus	-	-	-	-	1	1	-	1	-	-	-	-	-	-	-	-	-
Solamen glandula	-	-	-	-	15	43	44	7	11	4	17	5	1	-	-	-	2
Solemya velum	-	-	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Spisula solidissima	1	1	-	8	16	17	16	13	12	-	1	-	7	1	-	1	-
Thraciidae sp.	-	-	10	4	-	-	-	-	-	-	-	-	-	-	-	-	-
Yoldia sp.	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mollusca - Gastropoda																	
Anachis lafresnayi	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
Astyris lunata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boonea bisuturalis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boonea impressa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boonea seminuda	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Caecum cooperi	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Caecum johnsoni	-	-	-	-	-	-	3	2	-	2	5	3	-	-	3	-	1
Caecum sp.	-	-	-	5	-	8	2	-	2	-	4	-	1	1	-	-	1
Crepidula fornicata	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
Crepidula plana	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
Crepidula sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cyclostremiscus beauii	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cylichnella bidentata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dentimargo aureocinctus	7	3	1	1	-	-	-	-	-	-	-	-	-	-	-	-	1
Diaphana minuta	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
Doridella obscura	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Epitonium sp.	-	-	-	-	15	25	-	-	-	-	-	-	-	-	-	-	-
Eupleura caudata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gastropoda sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Granulina ovuliformis	-	-	-	-	-	1	-	-	-	-	1	1	-	-	-	-	-
Japonactaeon punctostriatus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Kurtziella atrostyla	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Naticidae sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-
Nudibranchia sp.	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-
Odostomia engonia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Odostomia sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Parvanachis obesa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Prunum roscidum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tectonatica pusilla	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
Tritia trivitatta	1	2	3	5	-	-	-	-	-	-	-	1	6	1	-	-	-
Turbonilla interrupta	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Turbonilla stricta	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vitrinellidae sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mollusca - Scaphopoda																	
Dentaliidae sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nemertea - Hoplonemertea																	
Amphiporus bioculatus	2	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Amphiporus caecus	-	-	-	-	1	-	-	-	2	1	-	3		-	-	1	-
Nemertea - Palaeonemertea																	
Carinomella lactea	3	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-
Cephalothrix spiralis	-	-	-	-	3	-	12	1	5	-	1	1	4	-	3	-	1
Tubulanus pellucidus	-	-	-	-	-	-	-	1	-	-	-	-	-	-	1	-	-
Nemertea - Pilidiophora																	
Cerebratulus lacteus	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	2	-
Micrura sp.	1	-	-	1	-	-	-	-	-	1	-	-	-	-	1	-	-

Scientific Name	Grab Sample ID[a/]																
	GS-39-A	GS-39-B	GS-39-C	GS-40-A	GS-40-B	GS-40-C	GS-41-A	GS-41-B	GS-41-C	GS-42-A	GS-42-B	GS-42-C	GS-43-A	GS-43-B	GS-43-C	GS-44-A	GS-44-B
Zygeupolia rubens	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nemertea																	
Nemertea sp.	-	-	-	-	-	4	6	-	1	5	7	4	-	2	4	-	4
Phoronida																	
Phoronis sp.	-	1	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Platyhelminthes																	
Platyhelminthes sp. 11 (MWRA)	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-
Plehnia ellipsoides	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-
Sipuncula																	
Sipuncula sp.	-	-	1	-	3	1	-	-	-	-	1	-	-	-	-	-	-
Xenacoelomorpha																	
Xenacoelomorpha sp. 1 (MWRA)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes:
a/ - indicates no species presence in grab sample

Table D-2-10. Benthic Infauna Identified in Grab Samples GS-45-A through GS-57-REF

Scientific Name	Grab Sample ID[a/b/]														
	GS-45-A	GS-45-B	GS-45-C	GS-46	GS-47	GS-48	GS-49	GS-50	GS-51	GS-52-R	GS-53-R	GS-54-R	GS-55-R	GS-56-R	GS-57-R
Annelida - Clitellata															
Oligochaeta sp.	123	107	31	114	74	301	22	168	-	137	296	329	39	-	161
Annelida - Polychaeta															
Aglaophamus circinata	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
Aglaophamus verrilli	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Amastigos caperatus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ampharete lindstroemi	1	-	3	-	-	-	3	3	3	1	-	3	5	5	2
Ampharete oculata	-	1	-	-	-	-	6	1	1	-	1	-	-	1	1
Ancistrosyllis hartmanae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aphelochaeta sp. A	17	2	2	1	34	1	-	-	-	5	11	2	-	-	12
Aphelochaeta sp. B	-	-	2	1	-	5	1	-	-	30	1	10	2	-	-
Aphrodita hastata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arabella multidentata	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
Aricidea (Acmira) catherinae	20	4	9	8	18	10	2	2	6	40	35	1	4	15	1
Aricidea (Acmira) cerrutii	15	5	16	12	126	104	-	20	-	172	125	-	13	-	-
Aricidea (Aricidea) wassi	-	-	-	1	-	1	25	1	4	-	-	2	-	2	1
Bradabyssa villosa	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-
Brania wellfleetensis	21	1	2	7	19	43	-	-	-	25	18	-	1	-	-
Cabira incerta	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Capitella capitata	3	10	85	-	5	-	-	-	-	-	-	1	-	1	-
Caulleriella venefica	-	9	9	13	3	36	4	1	-	1	4	9	16	6	2
Cirriformia grandis	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-
Cirrophorus sp. A	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cirrophorus sp. B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Clymenella torquata	-	-	-	-	-	-	2	-	11	-	-	-	-	162	1
Clymenella zonalis	-	-	1	-	-	-	1	-	-	-	-	-	-	-	2
Diopatra cuprea	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dipolydora socialis	-	-	1	1	-	10	-	-	-	-	-	1	-	5	11
Dipolydora sp. A	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Drilonereis longa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Erinaceusyllis erinaceus	-	1	-	-	-	-	-	1	-	-	-	3	-	-	-
Eteone foliosa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Eumida sanguinea	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Scientific Name	Grab Sample ID[a/b/]														
	GS-45-A	GS-45-B	GS-45-C	GS-46	GS-47	GS-48	GS-49	GS-50	GS-51	GS-52-R	GS-53-R	GS-54-R	GS-55-R	GS-56-R	GS-57-R
Exogone dispar	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Exogone hebes	1	27	12	1	-	1	6	8	-	-	-	5	15	-	13
Fabricinuda trilobata	242	251	434	1	-	1	-	-	-	-	-	146	286	-	-
Flabelligera affinis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Glycera americana	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-
Glycera dibranchiata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Goniadella gracilis	6	-	-	-	2	-	-	-	-	-	1	7	1	-	21
Harmothoe extenuata	-	-	-	-	-	-	-	-	-	-	-	-	-	1	7
Hemipodia simplex	2	-	-	-	7	-	-	-	-	6	17	-	-	-	7
Hesionura coineaui	15	4	7	1	8	24	-	6	-	32	8	3	2	-	9
Hypereteone heteropoda	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-
Kirkegaardia baptisteae	-	-	1	4	2	3	-	-	1	2	6	6	7	-	14
Kirkegaardia hampsoni	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Leitoscoloplos robustus	-	-	-	-	-	-	-	-	5	-	-	-	-	7	1
Leodamas rubrus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Levinsenia gracilis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Loimia medusa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Longibrachium atlanticum	1	2	5	-	-	1	-	-	-	-	-	-	1	-	-
Lumbrinerides dayi	12	8	3	8	18	7	-	1	-	26	9	3	9	-	2
Lysilla alba	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Magelona sp. B Jones, 1968	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
Maldanidae sp.	-	-	-	-	-	-	-	1	-	-	-	1	-	-	-
Mediomastus ambiseta	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mediomastus sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Meiodorvillea sp. A	-	-	-	3	-	-	-	-	-	-	-	1	-	-	1
Microphthalmus aberrans	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mooreonuphis nebulosi	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mooreonuphis pallidula	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mooreonuphis sp. A	-	1	-	1	-	-	-	-	-	-	-	-	-	-	-
Neanthes arenaceodentata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nephtys bucera	-	-	-	-	-	2	-	-	-	-	-	-	1	-	-
Nephtys picta	-	-	1	-	-	-	2	-	3	-	1	2	-	1	3
Ninoe nigripes	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-
Notocirrus spinifera	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
Notomastus luridus	-	1	-	-	1	-	-	2	-	-	-	-	-	-	1
Onuphidae sp. juvenile	5	28	12	-	-	6	-	1	-	9	3	-	-	-	1
Onuphis eremita oculata	-	-	1	18	-	1	-	-	-	-	-	-	-	1	-
Ophelia denticulata	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
Ophelia sp.	-	-	-	-	3	-	-	-	-	1	-	-	-	-	-
Opheliidae sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Opistodonta longocirrata	4	1	14	5	2	10	-	1	-	3	5	3	1	-	3
Orbinia americana	-	-	-	1	1	4	3	1	2	1	-	1	-	-	-
Orbiniidae sp. indeterminate	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Owenia artifex	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Paradoneis sp. A	-	1	-	8	2	55	-	-	-	5	5	-	-	-	-
Paradoneis sp. B	1	-	-	-	7	-	-	-	-	-	1	-	-	-	5
Paranaitis speciosa	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
Paraonidae sp. A	-	-	-	-	-	-	-	-	-	-	-	1	4	-	-
Paraonis fulgens	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
Paraonis pygoenigmatica	1	-	2	2	1	6	2	-	-	10	2	5	3	-	-
Paraonis sp. A	-	4	7	-	-	14	1	1	-	1	-	1	3	-	7
Parougia caeca	-	-	1	-	-	5	-	-	-	11	2	-	-	2	1
Paucibranchia sp. A	-	-	-	-	1	-	-	1	-	-	2	1	-	-	-
Pectinaria gouldii	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Scientific Name	Grab Sample ID[a/b/]														
	GS-45-A	GS-45-B	GS-45-C	GS-46	GS-47	GS-48	GS-49	GS-50	GS-51	GS-52-R	GS-53-R	GS-54-R	GS-55-R	GS-56-R	GS-57-R
Pettiboneia sp. A	-	-	4	9	-	14	-	-	-	9	8	2	2	-	9
Phyllodoce arenae	-	-	1	-	-	-	-	-	-	-	-	-	-	2	-
Phylo felix	-	-	-	-	-	-	-	-	-	-	-	-	-	5	-
Pisione remota	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pista cristata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Podarkeopsis levifuscina	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Polycirrus eximius	6	1	-	-	1	-	-	1	-	-	-	-	2	-	2
Polycirrus phosphoreus	-	-	-	-	-	-	2	3	-	-	-	1	-	3	2
Polycirrus sp. A	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-
Polycirrus sp. indeterminate	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Polydora websteri	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Polygordius jouinae	11	28	104	167	13	217	8	206	6	8	85	76	5	6	71
Polygordius sp. A	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
Prionospio pygmaeus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Proceraea cornuta	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Protodorvillea kefersteini	5	9	10	11	17	165	-	16	-	4	8	24	10	-	28
Psammodrilus balanoglossoides	-	-	2	-	-	-	-	-	-	-	-	-	-	-	3
Sabaco elongatus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sabellaria vulgaris	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-
Sabellidae sp. (indeterminate)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Salvatoria clavata	-	-	-	-	-	1	-	1	-	-	-	-	-	-	-
Scalibregma inflatum	-	-	-	-	2	-	1	3	9	-	-	2	-	106	13
Schistomeringos rudolphi	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Scolelepis (Parascolelepis) bousfieldi	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Scoletoma acicularum	8	5	8	2	2	1	-	1	-	-	-	42	2	4	10
Scoletoma tenuis	-	-	-	-	-	-	-	-	9	-	-	-	-	22	-
Scoloplos armiger	-	-	-	-	-	-	1	-	5	-	-	-	-	13	1
Scoloplos capensis	18	9	14	3	1	-	-	6	-	2	5	11	5	-	13
Sigalion arenicola	-	-	-	-	-	-	2	-	-	-	1	-	1	-	1
Sigambra bassi	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sigambra tentaculata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Spio pettiboneae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Spio setosa	-	-	-	2	1	-	-	-	-	-	-	-	-	749	9
Spiochaetopterus oculatus	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-
Spionidae sp. indeterminate	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Spiophanes bombyx	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Spirorbis sp.	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-
Sthenelais limicola	-	-	-	-	-	-	-	-	4	-	-	-	-	-	2
Streblospio benedicti	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Streptosyllis sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Streptosyllis verrilli	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Streptosyllis websteri	2	2	3	4	3	21	-	4	-	9	27	1	1	-	4
Syllidae sp.	-	-	2	4	-	1	-	-	-	1	-	1	1	-	5
Syllides convolutus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7
Syllides longocirrata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Syllides sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
Syllis cornuta	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tharyx acutus	-	-	-	-	-	-	-	-	5	-	-	-	-	11	-
Tharyx sp. A (MWRA)	1	-	-	2	-	2	-	-	4	2	-	-	1	3	1
Tharyx sp. indeterminate	-	-	1	-	1	-	-	1	4	1	1	-	1	11	2
Travisia sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Travisia sp. A	-	-	-	-	3	1	-	2	-	-	-	-	-	-	1
Arthropoda - Malacostraca															
Acanthohaustorius bousfieldi	1	1	-	3	-	6	-	-	-	5	5	-	-	-	-

Scientific Name	Grab Sample ID[a/b/]														
	GS-45-A	GS-45-B	GS-45-C	GS-46	GS-47	GS-48	GS-49	GS-50	GS-51	GS-52-R	GS-53-R	GS-54-R	GS-55-R	GS-56-R	GS-57-R
Acanthohaustorius intermedius	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acanthohaustorius millsi	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acanthohaustorius shoemakeri	-	2	-	3	-	-	-	-	-	-	1	-	-	-	-
Acanthohaustorius sp. D	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acanthohaustorius sp. juvenile	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-
Aeginina longicornis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Amakusanthura magnifica	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Americhelidium americanum	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-
Ampelisca abdita	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ampelisca bicarinata	1	-	-	1	5	6	6	1	-	6	1	1	-	-	2
Ampelisca sp. indeterminate	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ampelisca vadorum	-	-	-	-	-	-	-	-	-	-	-	-	-	5	-
Ampelisca verrilli	-	-	-	-	-	-	-	-	7	-	-	-	-	2	2
Ancinus depressus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Argissa hamatipes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Axiidea sp. juvenile	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Batea catharinensis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bathyporeia parkeri	-	-	-	2	-	4	-	1	-	-	-	-	-	-	-
Bathyporeia quoddyensis	1	-	-	-	1	-	-	-	-	2	-	1	1	-	-
Byblis serrata	-	-	-	4	167	10	760	210	7	2	-	38	3	4	3
Calappidae sp. juvenile	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cancer irroratus	-	-	-	-	-	-	1	-	-	-	-	-	-	-	2
Chiridotea coeca	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Crangon septemspinosa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cyclaspis varians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Deutella incerta	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Edotia triloba	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-
Eobrolgus spinosus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ericthonius sp. B LeCroy, 2007	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gammaropsis sutherlandi	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gilvossius setimanus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hexapanopeus angustifrons	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hippomedon serratus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Idunella barnardi	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lembos websteri	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Leptocheirus pinguis	-	-	-	-	-	-	1	-	1	-	-	-	-	330	4
Leptochela papulata	-	-	-	-	-	1	-	-	1	-	-	-	-	-	-
Liljeborgia sp. A	-	-	-	-	-	-	-	-	-	-	1	-	-	-	2
Majidae sp. juvenile	-	-	-	-	-	-	-	-	-	-	1	-	-	-	2
Melitidae sp. B LeCroy, 2000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Metatiron tropakis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Metharpinia floridana	-	-	1	39	22	10	6	25	-	25	62	-	-	-	1
Microprotopus raneyi	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Monocorophium acherusicum	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
Nannosquilla carolinensis	-	-	-	1	1	-	1	-	-	-	-	-	-	-	-
Ogyrides alphaerostris	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ovalipes ocellatus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oxyurostylis smithi	-	-	-	-	1	-	-	-	1	-	-	-	-	-	1
Pagurus annulipes	2	1	-	1	2	-	1	-	-	-	-	3	-	6	6
Pagurus longicarpus	-	-	-	1	-	-	-	-	-	-	-	-	-	-	1
Pagurus pollicaris	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Parahaustorius attenuatus	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
Parametopella cypris	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pedicorophium laminosum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1

Scientific Name	Grab Sample ID[a/b/]														
	GS-45-A	GS-45-B	GS-45-C	GS-46	GS-47	GS-48	GS-49	GS-50	GS-51	GS-52-R	GS-53-R	GS-54-R	GS-55-R	GS-56-R	GS-57-R
Persephona mediterranea	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Photis pugnator	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Politolana polita	-	-	-	1	-	-	-	-	-	-	1	-	-	-	-
Portunidae sp. juvenile	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Processa sp. indeterminate	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-
Protohaustorius cf. deichmannae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Protohaustorius sp. juvenile	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Protohaustorius wigleyi	-	1	1	6	3	3	4	9	-	-	-	1	-	-	2
Pseudoleptocuma minus	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
Pseudunciola obliquua	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-
Ptilanthura tenuis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rhepoxynius hudsoni	1	1	3	-	-	-	3	-	4	-	-	20	-	5	-
Stomatopoda sp. juvenile	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tanaissus psammophilus	9	7	28	1	1	14	-	41	-	1	2	15	12	-	2
Unciola dissimilis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Unciola irrorata	-	-	-	-	4	-	21	2	8	1	-	3	1	64	3
Unciola serrata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chordata - Acidiacea															
Ascidiacea sp. juvenile	34	9	20	36	81	37	1	3	5	24	39	-	4	-	1
Molgula arenata	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
Chordata - Leptocardii															
Branchiostoma virginiae	2	-	-	-	4	4	-	13	-	1	1	-	1	-	3
Cnidaria - Anthozoa															
Edwardsia elegans	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Haloclava producta	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Echinodermata - Echinoidea															
Echinarachnius parma	-	2	2	-	-	2	-	-	1	-	4	-	1	-	2
Echinodermata – Holothuroidea															
Holothuroidea sp. juvenile	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Echinodermata – Ophiuroidea															
Ophiuroidea sp. juvenile	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hemichordata – Enteropneusta															
Saccoglossus kowalevskii	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mollusca – Bivalvia															
Abra aequalis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Ameritella agilis	-	-	-	-	-	-	4	-	7	-	-	1	-	2	-
Ameritella sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ameritella tenella	12	15	19	26	22	66	2	19	-	64	39	6	4	1	6
Anadara transversa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Anomia simplex	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arctica islandica	-	-	-	-	-	-	1	-	3	-	-	3	-	1	1
Astarte castanea	-	-	-	6	4	2	-	2	-	1	-	-	1	1	-
Bivalvia sp.	1	-	1	-	1	-	-	2	-	3	-	2	-	-	2
Crassinella lunulata	-	-	-	1	3	-	-	-	-	-	-	-	-	-	-
Cyclocardia borealis	-	-	-	1	-	-	-	-	-	3	1	-	-	-	-
Ennucula tenuis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ensis leei	-	-	-	-	1	-	-	-	1	-	-	-	-	-	-
Limecola balthica	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lyonsia hyaline	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Macoploma tenta	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mercenaria mercenaria	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Modiolus sp.	-	-	1	-	1	-	-	-	1	-	-	-	-	-	1
Mulinia lateralis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mysella planulata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Scientific Name	Grab Sample ID[a/b/]														
	GS-45-A	GS-45-B	GS-45-C	GS-46	GS-47	GS-48	GS-49	GS-50	GS-51	GS-52-R	GS-53-R	GS-54-R	GS-55-R	GS-56-R	GS-57-R
Mytilus edulis	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
Nucula proxima	1	-	-	-	-	-	6	-	4	-	-	7	-	52	5
Pandora gouldiana	14	11	18	-	1	1	5	-	3	-	1	8	4	-	2
Parvicardium pinnulatum	-	-	-	-	-	-	2	1	1	-	-	6	-	4	5
Parvilucina crenella	-	-	-	-	-	-	-	-	1	-	-	-	-	4	-
Periploma fragile	-	-	-	-	-	-	-	-	-	2	-	2	-	-	1
Periploma sp.	-	1	1	-	-	-	-	1	-	-	-	-	-	-	1
Pitar morrhuanus	-	-	-	-	-	-	1	-	6	-	-	1	-	-	2
Placopectin magellanicus	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-
Solamen glandula	5	3	2	1	2	4	-	1	-	-	-	12	-	-	1
Solemya velum	-	-	-	-	-	-	-	-	-	-	-	-	8	-	-
Spisula solidissima	-	2	1	2	-	2	4	1	1	2	4	21	-	5	50
Thraciidae sp.	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
Yoldia sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mollusca – Gastropoda															
Anachis lafresnayi	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Astyris lunata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boonea bisuturalis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boonea impressa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boonea seminuda	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Caecum cooperi	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Caecum johnsoni	2	-	-	-	3	2	-	-	-	6	1	-	-	-	-
Caecum sp.	-	-	-	1	-	-	-	-	-	1	2	-	-	-	-
Crepidula fornicata	-	-	-	-	-	-	-	4	-	-	-	-	-	-	1
Crepidula plana	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Crepidula sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cyclostremiscus beauii	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cylichnella bidentata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dentimargo aureocinctus	1	1	-	-	-	-	1	-	-	-	1	-	1	-	-
Diaphana minuta	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Doridella obscura	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Epitonium sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Eupleura caudata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gastropoda sp.	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
Granulina ovuliformis	-	-	1	-	-	-	-	-	-	-	-	-	1	-	-
Japonactaeon punctostriatus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Kurtziella atrostyla	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Naticidae sp.	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
Nudibranchia sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1
Odostomia engonia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Odostomia sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Parvanachis obesa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Prunum roscidum	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-
Tectonatica pusilla	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
Tritia trivitatta	-	1	1	-	1	3	1	2	6	4	1	2	-	7	-
Turbonilla interrupta	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Turbonilla stricta	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vitrinellidae sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mollusca - Scaphopoda															
Dentaliidae sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nemertea - Hoplonemertea															
Amphiporus bioculatus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Amphiporus caecus	2	1	2	1	-	2	-	-	-	2	2	-	1	-	-
Nemertea - Palaeonemertea															

Scientific Name	Grab Sample ID[a/b/]														
	GS-45-A	GS-45-B	GS-45-C	GS-46	GS-47	GS-48	GS-49	GS-50	GS-51	GS-52-R	GS-53-R	GS-54-R	GS-55-R	GS-56-R	GS-57-R
Carinomella lactea	-	1	-	-	-	-	-	-	-	-	-	-	6	-	8
Cephalothrix spiralis	3	-	-	-	1	2	-	-	-	9	3	1	-	-	5
Tubulanus pellucidus	1	-	2	-	-	-	-	-	-	1	-	1	-	-	-
Nemertea - Pilidiophora															
Cerebratulus lacteus	1	-	-	-	-	-	-	-	-	-	-	-	-	1	-
Micrura sp.	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
Zygeupolia rubens	-	1	-	-	-	-	-	1	-	-	-	-	-	-	-
Nemertea															
Nemertea sp.	7	1	-	-	1	-	-	-	1	3	3	3	-	-	-
Phoronida															
Phoronis sp.	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-
Platyhelminthes															
Platyhelminthes sp. 11 (MWRA)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Plehnia ellipsoids	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
Sipuncula															
Sipuncula sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Xenacoelomorpha															
Xenacoelomorpha sp. 1 (MWRA)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes:
a/ - indicates no species presence in grab sample
b/ grey shading indicates reference sample

Table D-2-11. Benthic Infauna Identified in Grab Samples GS-016 through GS-REF-001 during CVOW Pilot Project Survey

Scientific Name	Grab Sample ID[a/b/]					
	GS-016	GS-017	GS-018	GS-019	GS-20	GS-R-001
Turbellaria						
Bdelloura sp.	-	1	-	-	-	-
Stylochus oculiferus	11	13	-	-	-	1
Cnidaria						
Actiniaria sp.	3	-	-	-	-	-
Nemertea						
Lineidae spp.	-	3	-	-	-	3
Palaeonemertea spp.	1	4	-	16	1	7
Annelida - Oligochaeta						
Oligochaeta spp.	-	-	-	2	-	-
Annelida - Polychaeta						
Aglaophamus verrilli	3	6	2	3	0	4
Amastigos caperatus	8	66	36	15	107	0
Aphelochaeta sp.	-	-	-	-	-	1
Aricidea (Acmira) catherinae	1	-	-	-	-	1
Asabellides oculata	3	-	3	9	4	-
Capitellidae sp.	-	1	-	-	1	-
Carazziella hobsonae	3	-	-	-	-	-
Cirratulidae spp.	-	2	1	-	-	-
Clymenella mucosa	-	2	-	1	-	-
Drilonereis filum	4	7	2	-	2	1
Eteone longa	-	4	1	-	3	-
Glycera americana	-	-	-	1	1	-
Glycera capitata	1	1	-	-	2	1
Leitoscoloplos fragilis	-	2	-	-	-	-
Magelona rosea	-	-	2	-	1	1
Mediomastus sp.	23	17	10	5	4	1
Nephtys picta	2	2	3	2	4	1
Onuphidae sp.	-	2	-	-	-	-
Onuphis eremita	1	-	-	-	-	-
Owenia fusiformis	-	-	1	-	-	-
Pectinaria gouldi	2	1	1	-	-	-
Polygordius jouinae	-	1	-	-	-	-
Prionospio pygmaeus	9	65	101	106	21	17
Samythella elongata	-	7	-	-	-	-
Scalibregma inflatum	-	-	-	-	2	-
Sigambra tentaculata	5	1	-	-	-	1
Spiochaetopterus oculatus	-	1	-	-	1	1
Spionidae sp.	-	-	-	-	-	-
Spiophanes bombyx	-	58	43	68	10	8

Scientific Name	Grab Sample ID[a/b/]					
	GS-016	GS-017	GS-018	GS-019	GS-20	GS-R-001
Streblospio benedicti	3	63	18	-	61	6
Tharyx acutus	-	1	-	-	-	-
Tharyx sp. A sensu MWRA, 2007	25	-	-	2	12	-
Mollusca - Bivalvia						
Abra longicallus	-	-	-	-	-	1
Bivalvia spp.	-	3	3	-	-	-
Ensis sp.	10	29	43	10	2	27
Lucinoma filosa	1	-	-	-	-	-
Macoma calcarea	2	1	1	-	-	-
Mysella planulata	1	-	-	-	-	-
Pitar morrhuanus	-	-	1	-	-	-
Tellina versicolor	12	23	21	12	11	9
Veneridae sp.	1	-	-	-	-	-
Mollusca - Gastropoda						
Busycotypus canaliculatus	-	-	-	1	-	-
Euspira immaculata	-	-	-	1	-	1
Rissoidae sp.	-	-	1	-	-	-
Turbonilla sp.	-	1	1	-	-	2
Turridae sp.	-	1	-	-	-	1
Crustacea - Amphipoda						
Americhelidium americanum	-	-	2	-	2	2
Photis sp.	-	-	-	-	1	-
Rhepoxynius epistomus	-	15	21	6	-	9
Unciola irrorata	-	-	-	2	2	-
Crustacea - Cumacea						
Oxyurostylis smithi	1	-	-	-	-	-
Pseudoleptocuma minus	-	1	-	-	-	-
Crustacea - Decapoda						
Crangon septemspinosa	-	-	-	1	1	-
Pagurus politus	-	-	-	1	-	-
Pinnixa chaetopterana	4	-	-	-	-	-
Pinnixa cylindrica	1	1	-	-	-	-
Crustacea - Isopoda						
Edotea montosa	1	-	-	-	-	-
Crustacea - Mysidacea						
Neomysis americana	-	-	-	1	-	-
Cephalochordata						
Branchiostoma sp.	2	-	-	-	-	-
Hemichordata						
Enteropneusta sp.	1	1	-	1	-	-

Scientific Name	Grab Sample ID[a/b/]					
	GS-016	GS-017	GS-018	GS-019	GS-20	GS-R-001
Notes: a/ - indicates no species presence in grab sample b/ grey shading indicates reference sample						

Attachment D-3. Benthic Survey Protocol

Coastal Virginia Offshore Wind Commercial Project

Benthic Survey Protocol

Prepared for:

600 E Canal Street
Richmond, VA 23219

Prepared by:

Tetra Tech, Inc.
4101 Cox Road, Suite 120
Glen Allen, VA 23060

www.tetratech.com

Submitted to BOEM June 2020

TABLE OF CONTENTS

TABLES

FIGURES

APPENDICES

ACRONYMS AND ABBREVIATIONS

ASTM	American Society for Testing and Materials
Benthic Guidelines	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	Bureau of Ocean Energy Management
CFR	Code of Federal Regulations
COP	Construction and Operations Plan
cm	centimeter
CMECS	Coastal and Marine Ecological Classification Standard
CVOW	Coastal Virginia offshore Wind
CVOW Pilot	Coastal Virginia Offshore Wind Pilot Project, formerly known as the Virginia Offshore Wind Technology Advancement Project
Dominion Energy	Virginia Electric and Power Company, d/b/a Dominion Energy Virginia
ECRE	export cable route envelope
EFH	Essential Fish Habitat
ft	foot
Fugro	Fugro Consultants, Inc.
GARFO	NOAA Fisheries Greater Atlantic Regional Fisheries Office
HRG	high-resolution geophysical
in	inch
km	kilometer
km/hr	kilometers per hour
knots	nautical miles per hour
Lease Area	the OCS-A 0483 Lease, located approximately 26.5 mi (23 nm, 42.6 km) off the coast of Virginia and includes approximately 112,799 acres (176 square miles) of submerged lands
m	meter
MBES	multibeam echo sounder
mi	mile
nm	nautical mile
NOAA	National Oceanographic and Atmospheric Administration
NOAA Fisheries	NOAA National Marine Fisheries Service
NTL	Notice to Lessees
OCS	Outer Continental Shelf
Offshore Survey Area	The area within the Lease Area and the export cable route envelope where surveys will be conducted
Project	the CVOW Commercial Project
Protocol	Benthic Survey Protocol
SAP	Site Assessment Plan
Tetra Tech	Tetra Tech, Inc.
TOC	total organic carbon
WEA	Wind Energy Area

1 INTRODUCTION

Virginia Electric and Power Company, d/b/a Dominion Energy Virginia (Dominion Energy), submits this Benthic Survey Protocol (Protocol) in support of the Coastal Virginia Offshore Wind (CVOW) Commercial Project (the Project). The Project will be constructed and operated under the Commercial Lease of Submerged Lands for Renewable Energy Development on the Outer Continental Shelf (OCS) Offshore Virginia (Lease No. OCS-A-0483, Lease Area). The Project Area includes the offshore Lease Area and an export cable route envelope (ECRE) where an offshore export cable will be established to transmit power from the Lease Area to an onshore landing in Virginia, as shown in Figure 1 and described in the Site Assessment Plan (SAP)/Construction and Operations Plan (COP) Survey Plan (Tetra Tech 2020).

Characterization of benthic resources is required by the U.S. Department of Interior's Bureau of Ocean Energy Management (BOEM) to support regulatory filings for renewable energy projects proposed on the Atlantic OCS (30 Code of Federal Regulations [CFR] § 585.627[3]). In accordance with these requirements, the benthic site characterization studies described herein are designed to facilitate a thorough understanding of existing seafloor and sub-seafloor conditions, inform project design and development, and inform an assessment of potential effects on physical, biological, and socioeconomic marine resources resulting from the construction and operation of proposed offshore project facilities (i.e., export cables, wind turbine generators, and supporting structures). The benthic survey is planned to be completed in advance of submittal of the COP.

1.1 Project Background and Description

The western boundary of the CVOW Commercial Lease Area is approximately 26.5 statute miles (mi, 23 nautical miles [nm], 42.6 kilometers [km]) off the Virginia coast; the Lease Area is approximately 112,799 acres (176 square miles), as defined in Addendum A, Section II of the Lease. Water depths in the Lease Area range from about 59 to 135 feet (ft) (18 to 41 meters [m]). Water depths in the ECRE range from about 23 to 92 ft (7 to 28 m).

The offshore export cable will extend approximately 27 nm (50 km) from the western side of the Lease Area southwest toward the Virginia coastline. The export cable will terminate at a location yet to be determined between downtown Virginia Beach and Sandbridge. Because the exact location of the cable route has not been selected, Dominion Energy has identified an ECRE within which the final offshore export cable will be installed. The Lease Area and the ECRE together make up the Offshore Survey Area.

Geophysical surveys began in April 2020 within the Offshore Survey Area, which traverses federal waters and state waters of Virginia. Benthic surveys are expected to begin in August 2020.

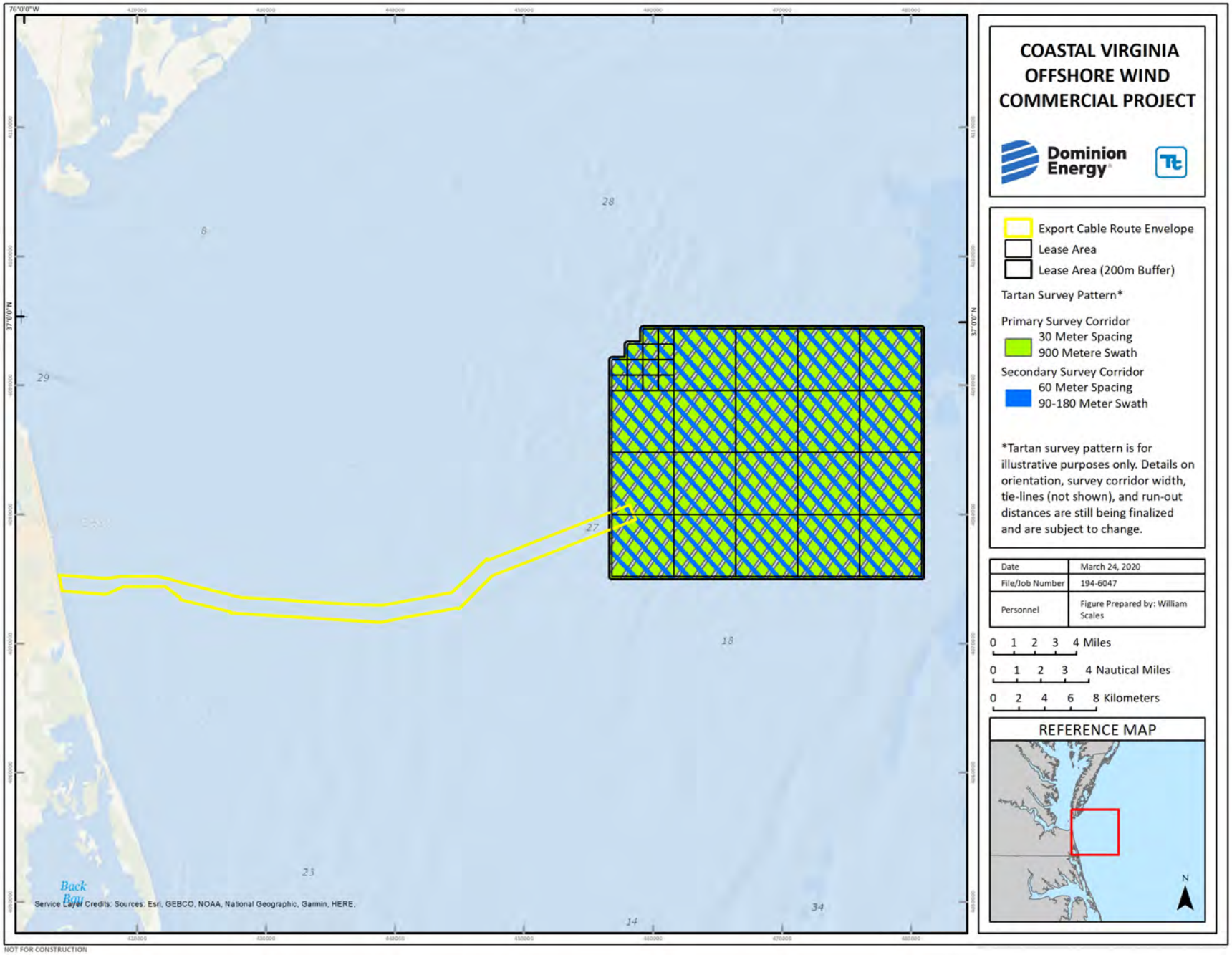


Figure 1. CVOW Commercial Project Offshore Survey Area, including the Lease Area and the Export Cable Route Envelope. The HRG Survey Pattern is shown within the Lease Area.

The SAP/COP Survey Plan submitted to BOEM on February 14, 2020 provided a description of the proposed approach to surveys and site assessments that Dominion Energy intends to complete to support BOEM's review of the COP under 30 CFR § 585.621, 626, and 627. This Protocol is being submitted for review, comment, and acceptance by BOEM and other jurisdictional agencies prior to the start of the benthic survey.

This Protocol was designed to support the COP by supplementing benthic characterization data previously collected within the Offshore Survey Area. Dominion Energy plans to begin the benthic survey during summer 2020 to support the filing of the COP planned for December 2020. Section 1.0 introduces the proposed Project and Offshore Survey Area; Section 2.0 presents the objectives and approach to the benthic survey; Section 3.0 outlines the proposed benthic survey methods and locations; and Section 4.0 details how Dominion Energy intends to ensure compliance with the requirements of the Lease through survey activities. Appendix A includes sources for existing data applicable to the CVOW Commercial Project. Appendix B includes a map book of proposed benthic sampling locations for the CVOW Commercial Project.

1.2 Regulatory Framework

Pursuant to 30 CFR § 585.626 and 627, BOEM requires that site characterization surveys and information be provided to determine the presence of live bottoms, hard bottoms, and topographic features that could represent important benthic habitats for marine species in the Offshore Survey Area to support the COP, which will include an Essential Fish Habitat Assessment. The Protocol conforms to BOEM's Guidelines for Providing Benthic Habitat Survey Information for Renewable Energy Development on the Atlantic Outer Continental Shelf Pursuant to 30 CFR § 585 (Benthic Guidelines; BOEM 2019).

The proposed benthic surveys will provide site-specific data necessary to support review by federal agencies (BOEM and the National Oceanic and Atmospheric Administration's [NOAA's] National Marine Fisheries Service [NOAA Fisheries]) and Virginia State resource management agencies (Virginia Marine Resources Commission, Virginia Department of Environmental Quality, and the Virginia Department of Game and Inland Fisheries) responsible for evaluating environmental impacts under the National Environmental Policy Act and applicable Virginia State statutes. Virginia does not have a state-level Ocean Plan, but instead uses the Mid-Atlantic Ocean Action Plan developed by the Mid-Atlantic Regional Council on the Ocean (MARCO 2020) to implement its "ocean strategy" and to coordinate Coastal Zone Management on a regional level.

Species listed as threatened or endangered will be evaluated under the Endangered Species Act of 1973, as amended (16 United States Code § 1531-1544). The Atlantic sturgeon (*Acipenser oxyrhynchus oxyrhynchus*) and shortnose sturgeon (*Acipenser brevirostrum*), both listed as endangered, occur in the Project Area; sturgeon will be noted and avoided if encountered during the survey. The benthic survey will note marine and estuarine resources identified as Essential Fish Habitat (EFH under the Magnuson-Stevens Fishery Conservation and Management Act of 1976, as amended (16 United States Code § 1801-1884). Impacts to EFH and NOAA Trust Resources will be addressed in the COP.

1.3 Coordination with Federal and State Agencies

Dominion Energy views the development of this Protocol as a collaborative process in which Dominion Energy works with BOEM, NOAA Fisheries, the Virginia Marine Resources Commission, and the Virginia Department of Environmental Quality to ensure the design and execution of an appropriately scaled plan.

In accordance with Addendum C, Lease Stipulation 2.1.2 (see Section 4), Dominion Energy will conduct pre-survey meetings with BOEM and other stakeholders to discuss survey logistics (proposed Survey Area, dates, times, survey period length, weather limitations); field techniques and equipment; data acquisition systems; parameters to be measured; data processing, analysis, and interpretation; and report format, as recommended by BOEM (2019), and further described by the NOAA Fisheries Greater Atlantic Region Fisheries Office (GARFO) (NOAA Fisheries 2020). Preliminary findings of the benthic survey will be incorporated into the COP, with a survey report to be included as an appendix to the COP.

2 OBJECTIVES AND APPROACH TO THE BENTHIC SURVEY

Objectives of this Protocol are to provide federal and state reviewers the data necessary to support permitting decisions under the National Environmental Policy Act, Endangered Species Act, Magnuson-Stevens Fishery Conservation and Management Act, and state environmental regulations. Considering the Project Area is dominated by fine to coarse-grained sand with minimal habitat complexity (BOEM 2012), the overall approach to this benthic survey is to focus on areas that exhibit habitat complexities such as areas with higher concentrations of gravel and areas with known structure (e.g., the wrecks/debris placed in the "fish haven" in the northern portion of the Lease Area. Dominion Energy's proposed Protocol focuses on both "ground-truthing" existing datasets and conducting targeted investigations of areas of potential interest, as recommended by BOEM (2019) and GARFO (NOAA Fisheries 2020).

2.1 Objectives of the Benthic Survey

This Protocol meets the objectives given in Section II and Section III of BOEM's Benthic Guidelines (2019) and GARFO's Recommendations (NOAA Fisheries 2020).

Items in Section II of the BOEM's Benthic Guidelines (2019) include:

- Identify and confirm dominant benthic macrofaunal and macrofloral communities and substrate present where development is proposed;
- Provide data necessary to support a baseline characterization of benthic habitat and resources to support an Essential Fish Habitat Assessment and analysis of impacts associated with the Project;
- Collect additional information aimed at reducing uncertainty associated with baseline estimates and/or to inform the interpretation of survey results; and
- Provide data to support development of an approach to quantify substantial changes in the benthic community composition associated with proposed construction and operations.

Items in Section III of the BOEM's Benthic Guidelines (2019) include:

- Applicability of existing data;

- Survey logistics (e.g., proposed Survey Area, dates, times, survey period length, weather limitations, etc.);
- Field techniques and equipment to be utilized/specifications of data acquisition systems;
- Data to be acquired;
- Data processing and analysis; and
- Data and information to be submitted.

Items in the GARFO Benthic Recommendations (NOAA Fisheries 2020):

- Characterize benthic habitat types (complex and non-complex) within the Project Area based on acoustic data, grain size, and visual imagery:
  - Complex habitats are defined as hard bottom substrates, hard bottom substrates with epifauna or macroalgae cover, and vegetated habitats;
  - Non-Complex habitats include sand ripples, sand waves, and ridges; and
  - Updated Coastal and Marine Ecological Classification Standard (CMECS) Modifiers outline how substrate types should be classified when analyzing grab samples and/or images; and
- Map benthic habitat types within the Project Area (where potential direct and indirect benthic impacts may occur):
  - Landscape/small scale maps (zoomed out) of all non-complex habitat types in the project area processed at 0.1 m to 0.5 m resolution. Map scale ranges 1:50,000 to 1:100,000;
  - Large scale maps (zoomed in) at 0.1 m resolution in areas of complex habitats. Map scale ranges 1:1,000 to 1:5,000; and
  - Bathymetry, backscatter mosaic, and slope maps processed at 0.1 to 0.5 m, using continuous variables (displayed with color ramps).

2.2 Existing Data on Benthic Resources in the Project Area

2.2.1 High-Resolution Geophysical Survey Data

The Lease Area was the subject of three NOAA charting expeditions between 2011-2012 that provided full coverage, high resolution bathymetry data across the Lease Area, which are now contained in NOAA's Bathymetric Data Viewer (NOAA 2020). Additionally, two High-Resolution Geophysical (HRG) surveys completed in 2013 described existing conditions in the Lease Area. Fugro Consultants, Inc. (Fugro) conducted a reconnaissance level bathymetric and geophysical survey in 2013 to support offshore planning for BOEM and the Virginia Department of Mines Minerals and Energy (Fugro 2013a). Primary line spacing for the Fugro HRG Survey was 0.8 nm (1.5 km). As part of this effort, Fugro incorporated the 2011-2012 NOAA bathymetric data into their charts to show full coverage bathymetry across the area. Fugro also completed a Desktop Study focused on geoscience in 2013 for the Virginia Wind Energy Area (Fugro 2013b).

Tetra Tech, Inc. (Tetra Tech) completed a BOEM-compliant HRG survey of three aliquots in the western portion of the Lease Area as well as three aliquots adjacent to the western border of the Lease Area in the

CVOW Pilot Project Research Lease Area (formerly the Virginia Offshore Wind Technology Advancement Project) (Tetra Tech 2013; Tetra Tech 2014).

Data from the two HRG surveys and the Desktop Study were used to inform the characterization of benthic habitat and select sampling sites to both ground-truth and fill spatial gaps in the existing datasets.

Water depths in the Lease Area range from approximately 59 to 135 ft (18 to 41 m). Northeasterly-trending sand ridges of high relief and extent are situated on a broad shallow shoal complex that dominates the southwestern half of the Lease Area. The northern portions of the Lease Area consist of sand ridges and superimposed bedforms. Smaller surficial features, including dunes and sediment ripples resulting from short-term wave and tidal processes, are superimposed on the larger features throughout the Lease Area, indicating the potential for sediment transport in this region. Grab samples collected during the Fugro HRG Survey contained primarily poorly- to well-graded sand and silty sand.

Shallow- and medium-penetration sub-bottom profiler data collected during the Tetra Tech CVOW Pilot Survey and the Fugro HRG Survey indicate that the upper 19.7 ft (6 m) of the subsurface is typically composed of unconsolidated sand with some interbedded silt, clay and gravel. Buried, relict drainage systems and clay-filled fluvial systems are known to occur within the inner and mid-shelf region of the Mid-Atlantic, as confirmed by the seismic data in the Fugro HRG Survey (Fugro 2013a).

The Mid-Atlantic Bight is relatively flat with primarily soft sediments (Steimel and Zetlin 2000). Results of Tetra Tech's 2013 HRG Survey conducted adjacent to the ECRE are considered representative of the ECRE, as geological setting and shallow hazards are reported to be relatively uniform off this portion of the Virginia coast (Fugro 2013a, b; Tetra Tech 2013),

Water depths in the ECRE range from 0 to 85 ft (0 to 26 m); substrates are typically fine to medium grain sand, with some gravel in the deeper portions of the ECRE, which is also characterized by small sand ridges and waves no more than 8 ft (2.5 m) high. Slopes are fairly consistent and shallow along the ECRE, not exceeding 5-degrees. As the ECRE approaches the Lease Area, these ridges and waves increase in width and attain heights up to 16 ft (5 m) (Tetra Tech 2013).

The HRG surveys are being conducted under the BOEM-compliant SAP/COP Survey Plan in the Offshore Survey Area including the Lease Area and ECRE by Dominion Energy's contractors, TerraSond and Alpine, respectively, to support the permitting and design of the Project. The surveys will establish high-resolution seabed bathymetry and composition, identify potential natural and man-made obstructions on or below the seabed, and identify magnetic anomalies throughout the Offshore Survey Area.

The TerraSond 2020 HRG Survey will cover the entire Lease Area using a tartan-pattern grid of survey lines (see Figure 1). The primary survey grid will be oriented northeast-to-southwest and secondary lines will be northwest-to-southeast. The survey line orientations are similar to those used for the Fugro HRG regional survey in 2013. The line direction, however, will be rotated from the azimuths used in 2013 so that the primary lie direction coincides with the anticipated turbine row orientation in its primary direction.

Alpine will conduct a full-coverage HRG survey in the 44-km ECRE. The width of the survey corridor will range from 1,968 to 2,953 ft (600 to 900 m). Line spacing will be 98 ft (30 m) in the direction parallel to the route (generally east-west) with 1,640 ft (500 m) tie-lines perpendicular to the route (generally north-south).

2.2.2 Benthic Survey Data

Benthic habitats in the Mid-Atlantic bight, including the Offshore Survey Area, are typically described as seven bathymetric/morphologic subdivisions (the inner shelf, central shelf, central and inner shelf swales, outer shelf, outer shelf swales, shelf break, and continental slope [Johnson 2002]). These subdivisions are based on depth, faunal zone, characteristic macrofauna, and other factors (BOEM 2012). The Offshore Survey Area is contained within the inner shelf and the central shelf zones.

Numerous sources characterize the Offshore Survey Area and vicinity as predominately fine to coarse-grained sand: the Marine Cadastre Viewer (NOAA and BOEM 2019), the Mid-Atlantic Ocean Data Portal (MARCO 2020), The Nature Conservancy's Benthic Habitat Model (Greene et al. 2010), and other regional studies (Cutter and Diaz 1998; Diaz et al. 2004; USACE 2009; Guida et al. 2017).

Benthic habitats adjacent to the Offshore Survey Area were characterized during the CVOW Pilot Project using multibeam, sidescan sonar, sub-bottom profiling, seismic geophysical data, and benthic grab samples (Tetra Tech 2013; Tetra Tech 2014). No natural hard substrate was detected in the CVOW Pilot Project Area, which was characterized as a soft-bottom mosaic with fine to coarse sands with very low organic content; (Tetra Tech 2013).

Dominant benthic organisms within the Lease Area include polychaetes, mollusks, and arthropods (Diaz et al. 2004, BOEM 2012). U.S. Fish and Wildlife Service benthic sampling programs determined that the most abundant taxa in Virginia nearshore habitats (in descending order) were polychaete worms, bivalve mollusks, and amphipods (USACE 2009). Cutter and Diaz (1998) noted these taxa as well as decapods, sand dollars, and lancelets.

In addition to the HRG Surveys previously discussed, publicly available databases, technical literature, and site-specific reports provide useful benthic survey data that was collected in the Offshore Survey Area. The primary data sources used to support this survey protocol are listed in Table 1 and described in more detail in Appendix A.

Table 1. Existing Benthic Habitat Characterization Data in the Offshore Survey Area

Data Source	Date	Coverage Area	Data Types	Output
TerraSond HRG Survey of the CVOW Commercial Project, Lease Area and ECRE	Ongoing; started April 2020	Tartan pattern within the Offshore Survey Area, full coverage within the ECRE	Multibeam echo sounder (MBES) bathymetry, side scan sonar, and sub-bottom profiling; grab samples for grain size distribution	Acoustic data, grain size
NOAA Invertebrate Prey Base and Essential Fish Habitat, Omnibus Amendment (NOAA Fisheries 2018)	2018	Northeast U.S. Continental Shelf, Large Marine Ecosystem	Narrative descriptions and maps of EFH	Spatial overlap of Offshore Survey Area and EFH for species/life stages managed by the Northeast Fishery Management Council, Mid-Atlantic Fishery Management Council, and NOAA Headquarters
BOEM Habitat Mapping and Assessment Report (Guida et al. 2017). Includes a compilation of data, such as the Atlantic Marine Assessment Program for Protected Species; Coastal and Marine Hazards and Resources Program (usSEABED), and the seasonal trawl survey data from NOAA Fisheries	2017	Virginia Wind Energy Area (WEA)	Compilation of existing and new data on sediment, benthic habitats, and fisheries resources in the WEA.	Comprehensive database that characterizes contemporary benthic habitats in the WEA
BOEM, Virginia Ocean Geophysical Survey Phase II Analyses Offshore Virginia Wind Energy Area (BOEM 2016a)	2016	Lease Area	MBES bathymetry, bottom type, and sub-bottom profiling	Sand ridges situated on a broad shallow shoal complex throughout the Lease Area. Sediments are comprised primarily of sand and silty sand.
Fugro/BOEM, Regional Geophysical Survey and Interpretive Report: Virginia WEA Offshore Southeastern Virginia (Fugro 2013a)	2013			
Dominion HRG, Geotechnical, and Benthic Survey of the Coastal Virginia Offshore Wind – Pilot Project, Research Lease Area and Export Cable Route Corridor to Virginia Beach, VA (Tetra Tech 2013; Tetra Tech 2014)	2013	Research Lease Area	MBES bathymetry, side scan sonar, and sub-bottom profiling; 60 benthic grab samples, and still photos	Generally flat, sandy substrate with sand waves. Areas of gravel on west side; typical biodiversity for region
The Nature Conservancy, Northwest Atlantic Marine Ecoregional Assessment (Greene et al. 2010)	2010	Northeast U.S. Continental Shelf, Large Marine Ecosystem	Benthic habitat classification based on grain size data and existing habitat models, with representative organisms.	Coarse-level habitat classifications
U.S. Army Corps of Engineers, Norfolk District, Environmental Assessment Sandbridge Beach Erosion Control and Hurricane Protection Project (USACE 2009, Cutter and Diaz 1998; Diaz et al. 2006)	2009	Dam Neck Ocean Disposal Site, Ocean Channel	Benthic samples: 25 grabs; 50 Sediment Profile Imagery; 33 otter trawl transects	Little discernable difference in benthic communities or demersal fishes in areas disturbed by sand mining and nearby reference sites
Virginia Department of Mines Minerals and Energy, Heavy-Mineral Studies Virginia Inner Continental Shelf (DMME 1990)	1990	Cape Henry to Sandbridge	111 grab samples off Virginia Beach near the ECRE	Mineral composition of nearshore sediments, including grain size

2.3 Approach to the 2020 Benthic Survey

The proposed benthic survey will include physical sediment characterization of grab samples, identification and enumeration of infaunal organisms sieved from grab samples, towed video and time-lapse still camera images of bottom habitats along transects, and measurement of water quality parameters. Each of these is described briefly in Section 3. Parameters included in the proposed survey are listed in Table 2.

Table 2. Parameters of Interest in Benthic Sampling Protocol

Parameter of Interest
Sediment texture (grain size distribution)
Sediment total organic carbon (TOC)
Seafloor imagery (towed video and time-lapse still photo images transects)
Water depth
Water quality parameters (temperature, dissolved oxygen, pH, salinity)
Visual evidence of benthic activity by organisms (burrows, trails, biogenic reefs)
Identification and enumeration of living benthic invertebrates within the sediment [infauna]) and identification of epibenthic invertebrates to characterize relative abundance and density of benthic species
Epibenthic organisms on/near the seafloor (sponges, invertebrates, and fish)
Presence of complex benthic habitats (submerged aquatic vegetation, shellfish beds, gravel, hardbottom)
Evidence of fishing activity (trawl scars; active traps, pots, or nets; 'ghost gear')

3 BENTHIC SURVEY METHODS

Standard survey methods consistent with similar studies previously approved by BOEM and other agencies will be used to characterize benthic resources in the Offshore Survey Area. The data collected in this survey will support characterization of dominant benthic communities and habitats in the Project Area and provide Dominion Energy with key information for engineering and siting the Project. If required, a Scientific Collecting Permit from Virginia Marine Resources Commission or Virginia Department of Game and Fisheries will be obtained prior to beginning survey activities described in this Survey Plan.

3.1 Sample Numbers and Density

BOEM (2019) requires that benthic resources be characterized throughout the entire Offshore Survey Area, with recommended sample coverage of one sample location approximately every 0.4 to 0.8 mi^2 (1 to 2 km^2) in the Lease Area and approximately one sample location every 0.6 to 1.2 mi (1 to 2 km) along the ECRE. The proposed benthic survey utilizes existing data described in Table 2 and newly obtained data to collectively achieve that recommended sampling density.

Benthic characterization data collected in the Lease Area by various agencies were compiled and summarized in Guida et al. (2017) (see Appendix A). Available datasets include primarily grab samples (U.S. Geological Survey usSEABED, the 2013 Fugro HRG Survey, and the Atlantic Marine Assessment Program for Protected Species). Available data in the ECRE are limited to the usSEABED grab samples programs, as well as the grab samples collected along the VOWTAP (CVOW Pilot Project) cable corridor route (Tetra Tech 2014), portions of which partially overlap the ECRE boundary. This Protocol identifies

locations in the Offshore Survey Area where grab samples and underwater imagery will be collected to either ground-truth existing data or fill spatial gaps in existing datasets. Some proposed locations were selected to further investigate an area of interest (e.g., "complex habitat") or to reduce uncertainty of anomalous findings, as described below.

Preliminary benthic survey locations were selected to determine whether the aggregate density of existing and new locations would be adequate to support benthic characterization in the COP and meet BOEM's minimum sample density recommendations (2019), as follows:

- Using ArcGIS tools, existing sampling locations were placed on a 2 km grid overlain on the Offshore Survey Area to evenly distribute sampling locations at the required density.
- New sample locations were placed in grid cells with no existing samples so that the final dataset would include at least one sample from every cell, resulting in the sampling density shown in the SAP/COP Survey Plan (Tetra Tech 2020).
- Sample numbers, densities, and locations were further refined by evaluating the seabed type, predicted grain size, and bathymetry from existing data sources identified in Section 3.2.
- In the Lease Area (including reference locations), this exercise resulted in up to 59 new sediment grab locations and a subset of up to 41 of those locations would include underwater imagery (towed video and still photo images) collected along up to a 1,969 ft (600 m) transect.
    - Combined with the 167 locations sampled between 2012 and 2016 (Guida et al. 2017; Fugro 2013a; Tetra Tech 2013; Tetra Tech 2014; usSEABED) and the 79 locations expected to be sampled during the 2020 HRG Survey, the Lease Area will have benthic grabs or imagery collected at a total of 305 locations, (i.e., sampling density of one sample per 1.50 km^2).
    - Reference sample locations will be located in habitat similar to, but approximately 6,562 ft (2,000 m) outside of, the Offshore Survey Area.
- Within and along the ECRE (including reference locations), this same exercise resulted in up to 16 new sediment grab locations and a subset of up to 10 of those locations would include underwater imagery (towed video and time-lapse still photo images) collected along up to a 600-m transect.
    - Combined with the 25 locations sampled between 2012 and 2016 (Tetra Tech 2014; usSEABED) and the 21 locations expected to be sampled during the 2020 HRG Survey, the ECRE will have benthic grabs or imagery collected at a total of 62 locations within and along the ECRE (i.e., sampling density of one sample per 0.46 mi [0.74 km]).
    - All sampling locations within and along the ECRE will be located in water depths greater than 33 ft (10 m), for navigational safety reasons. Existing benthic samples collected along the VOWTAP (CVOW Pilot Project) Cable Corridor are expected to be suitable to characterize the ECRE within these shallow areas.
    - Reference sample locations will be located in habitat similar to, but approximately 6,562 ft (2,000 m) outside of, the Offshore Survey Area.

Existing and proposed benthic sample numbers in the Offshore Survey Area are summarized in Table 3, with proposed locations further refined in Section 3.2.

Table 2. Number of Benthic Samples from Existing and Proposed Studies

Data Source	Number of Samples in the Lease Area	Number of Samples in the Export Cable Route Envelope
Existing Studies		
usSEABED	89	2
Atlantic Marine Assessment Program for Protected Species, NEFSC (Guida et al. 2017)	72	0
Fugro Regional Geophysical Survey (Fugro 2013a)	60	0
Tetra Tech, VOWTAP Geophysical/Benthic Survey (Tetra Tech 2013; Tetra Tech 2014)	6	23
TOTAL EXISTING	*227*	*25*
Proposed Studies		
2020 TerraSond HRG Survey	79 (estimated)	21 (estimated)
2020 Benthic Survey (this Protocol)	59 grab sample locations (up to 41 with towed video)	16 grab sample locations (up to 10 with towed video)
TOTAL PROPOSED	*138*	*37*
GRAND TOTAL (existing + proposed)	**365**	**62**
Benthic Sample Density	**one sample per 0.48 mi^2 (1.25 km^2)**	**one sample per 0.46 mi (0.74 km)**
NOTE: The number of grab samples to be collected during the 2020 TerraSond HRG Survey is estimated. Actual numbers may change the final sample density in the Lease Area and in the ECRE, but still within the recommendations outlined in BOEM (2019).		

3.2 Sample Locations

As discussed briefly in Section 3.1, the locations of the proposed sample numbers to achieve the desired sample density were further refined by evaluating the existing interpreted seabed data (Guida et al. 2017; Fugro 2013a) and available high-resolution bathymetry data (NOAA 2020) to identify areas of "complex habitats" within the Offshore Survey Area. In accordance with the GARFO recommendations (NOAA Fisheries 2020), areas of complex habitats include the following:

- Hard bottom substrates, defined as the following in the attached CMECS categories:
  - Substrate Class = Rock Substrate;
  - Substrate Class = Unconsolidated Mineral Substrate:
    - Substrate Group = Gravels;
    - Substrate Group = Gravel Mixes; and
    - Substrate Group = Gravelly; and
  - Substrate Class = Shell; and
- Hard bottom substrates with epifauna or macroalgae cover; and
- Vegetated habitats (e.g. submerged aquatic vegetation and tidal wetlands).

A team of subject matter experts in Geographic Information Systems, Marine Geology, and Marine Biology evaluated existing data and selected the benthic sampling locations shown in Figure 2 and Figure 3 and

summarized in Table 3, with more detailed maps included in Appendix B. Most benthic sample locations were selected to either ground-truth existing data, fill spatial gaps, or further investigate complex habitat. Areas of sand waves, variable sediment types, and transition zones were also targeted to more fully represent the range of benthic habitats in the Offshore Survey Area. Additionally, the "fish haven" (also known as the triangle reef) area in the northern portion of the lease area was included for additional characterization, with a sample location placed near known locations of seafloor structure, with clearance maintained to reduce snagging hazards to equipment by structure on the seabed (Appendix B). Reference sample locations (six locations associated with the Lease Area, and three locations associated with the ECRE) were placed approximately 6,562 ft (2,000 m) away from the Offshore Survey Area, in habitat similar to the Offshore Survey Area. Following discussions with federal and state stakeholders, proposed sample locations may be adjusted.

Maps of seagrass beds in the lower Chesapeake Bay and Virginia Beach do not show any occurrences of seagrass beds within the ECRE (VIMS 2018); therefore, Dominion Energy does not propose in-water seagrass surveys at this time, but recognizes that federal and state agencies may require seagrass surveys near the proposed cable landfall site once that location is finalized.

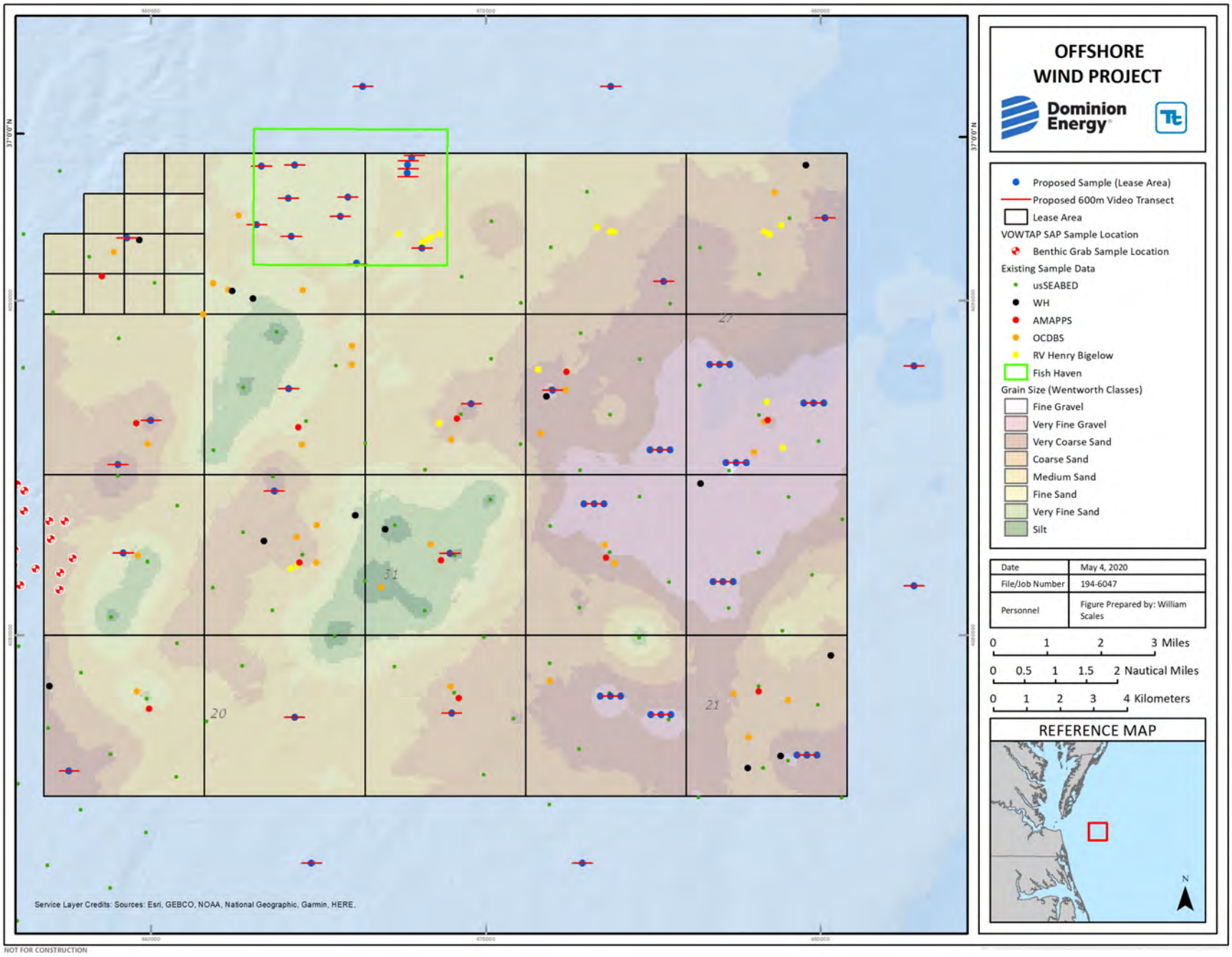


Figure 2. CVOW Commercial Project: Proposed and Existing Benthic Sample Locations in the Lease Area

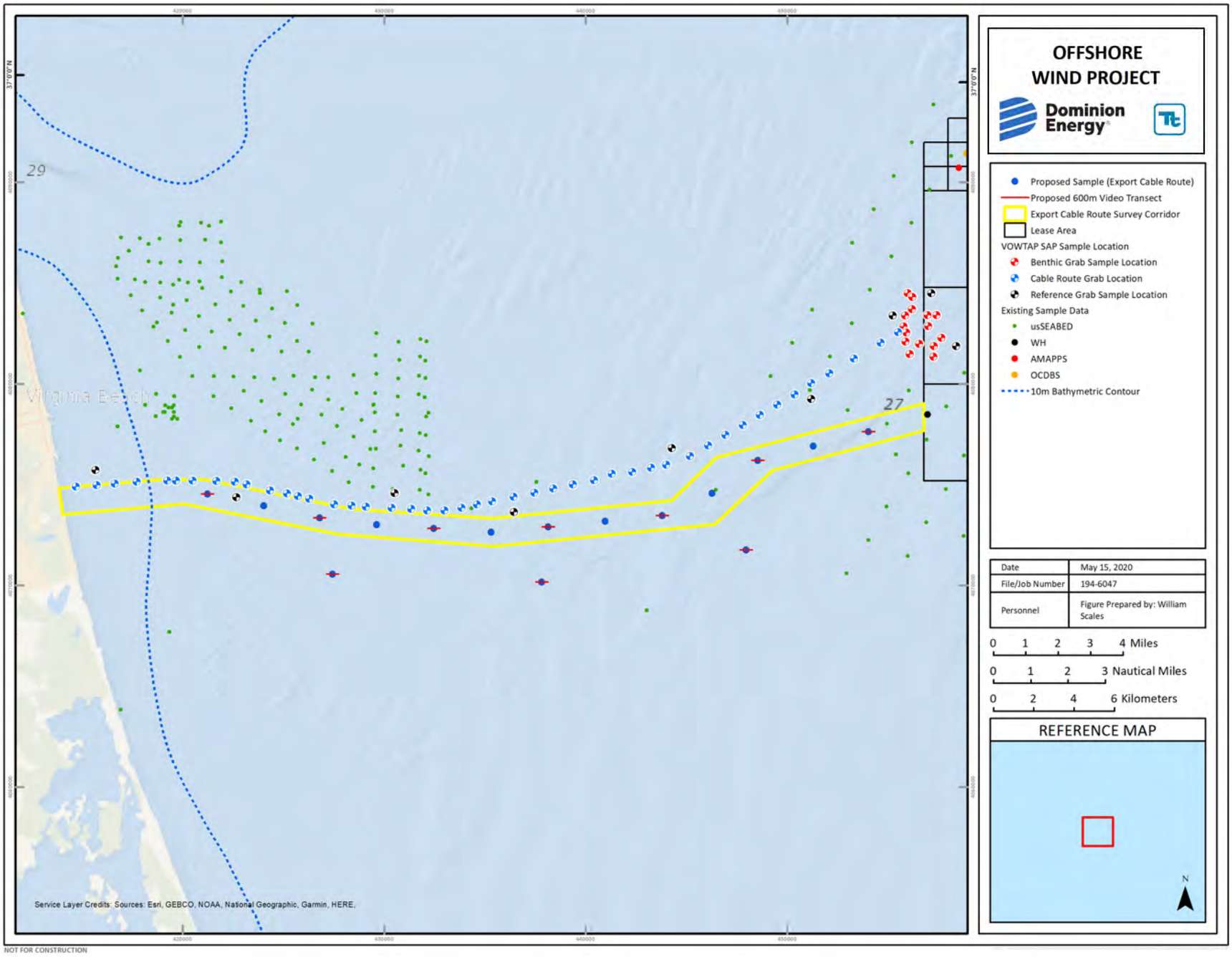


Figure 3 CVOW Commercial Project: Proposed and Existing Benthic Sample Locations in the ECRE

Table 3. Method, Location, and Number of Benthic Grab Samples

Type of Sampling	Location	# of Stations	# of Samples	Analysis
Ted Young-modified 0.04 m^2 Van Veen sampler, Towed Video and Time-Lapse Still Photo Transects	Lease Area	Up to 59	One grab sample at each station	Taxonomic identification and enumeration of sieved infauna
				TOC in a 2.5 centimeter (cm) diameter tube subsample
				Grain size distribution in a 2.5 cm diameter tube subsample
			One towed imagery transect (up to 600 m) at up to 41 stations	Underwater imagery (video/time-lapse still photos) along the transect analyzed for visible complex habitat and epibenthic organisms
	44 km ECRE	Up to 16	One grab sample at each station	Sieved benthic infauna samples from each grab sample for taxonomic ID/count.
				TOC to be analyzed from each grab sample (2.5 cm diameter tube for subsample collection)
				Grain size to be analyzed from each grab sample (2.5 cm diameter tube for subsample collection)
			One towed imagery transect (up to 600 m) at up to 10 stations	Underwater imagery (video/time-lapse still photos) along the transect analyzed for visible complex habitat and epibenthic organisms

3.3 Sample Collection Frequency

In the various surveys conducted in the Lease Area summarized in Guida et al. (2017), infaunal and epibenthic organisms in the Lease Area were collected in benthic grabs, beam trawls, and otter trawls in March and August, providing a cold season and warm season snapshot of species abundance, biomass, and diversity. Other biological data is available from benthic grabs and Sediment Profile Imagery samples were collected in part of the ECRE as part of the U.S. Army Corps of Engineers ocean disposal program at the Dam Neck Ocean Disposal Site (Cutter and Diaz 1998; Diaz et al. 2006) and the beach renourishment program at the Sandbridge Borrow Area (USACE 2009) The Proposed Summer 2020 Benthic Survey is a one-time effort to augment existing physical and biological data in the Offshore Survey Area to support COP submittal in late 2020. The recommended seasonal component of benthic characterization described in BOEM's Benthic Guidelines (2019) will be addressed following COP submittal as part of the pre-construction surveys and in consultation with resource agencies.

3.4 Equipment

Benthic surveys will be conducted using industry standard equipment from a local vessel of opportunity. The proposed equipment is listed in Table 4. Information on the vessel(s) selected will be provided prior to the start of the survey.

Table 4. Proposed Benthic Survey Equipment

Equipment Use	Type or Specification
Underwater Imagery, towed video	Underwater camera (digital color towed video and time-lapse still photos in oblique and/or plan-view orientation), scaling laser, and lighting. (IXSEA Global Acoustic Positioning System).
Grab Sampler	0.04 m^2 Young-modified or 0.1 m^2 standard Van Veen grab sampler and 500 micrometer sieve. Time-lapse still image camera, fixed to sampling frame in plan-view orientation.
Water Quality	Seabird SBE19 plus, YSI 6600 EDS or similar equipment.

3.5 Data Collection and Analysis

A crosswalk of proposed benthic survey activities with current guidance from BOEM and recommendations from GARFO is in Table 5.

Table 5. Crosswalk of Proposed Benthic Survey Methods with BOEM's Benthic Guidelines and NOAA Fisheries GARFO's Recommendations

Proposed Benthic Survey Parameter	Benthic Characterization Method		
	Towed video and time-lapse Still Photo Imagery (visible habitat features, epifauna, demersal fish and invertebrates)	Grab Samples (grain size distribution, total organic carbon, sieved infauna)	HRG Survey (MBES, sidescan sonar, Bathymetry, Backscatter Mosaic, Slope)
BOEM Benthic Survey Guidelines (2019)			
Identification of potentially sensitive seafloor habitat or taxa	✔	✔	✔
Classification to CMECS Biotic Subclass and Biotic Group	✔	✔	--
Characterization of macrofaunal community	✔	--	--
Identification of taxonomic diversity	✔	✔	--
Characterization of benthic habitat attributes	✔	✔	✔
Identification of invasive taxa	✔	✔	--
NOAA Fisheries (2020), Recommendations for Mapping Fish Habitat			
Map and characterize benthic habitat types within the Project Area *[mapping resolution depends on complexity of habitat type]*			
Non-Complex habitat (sand ripples, sand waves, ridges) and extensive areas of homogeneous substrate types *[provide maps at a landscape-scale ranging from 1:25,000 to 1:100,000, with a resolution of 0.25 m to 0.50 m]*	✔	✔	✔

Proposed Benthic Survey Parameter	Benthic Characterization Method		
	Towed video and time-lapse Still Photo Imagery (visible habitat features, epifauna, demersal fish and invertebrates)	Grab Samples (grain size distribution, total organic carbon, sieved infauna)	HRG Survey (MBES, sidescan sonar, Bathymetry, Backscatter Mosaic, Slope)
Complex habitat 1. hard bottom substrates (rock, gravels/gravel mixes/gravelly/shell) 2. hard bottom substrates with epifauna or macroalgae cover 3. vegetated habitats *[provide maps at a scale ranging from 1:1,000 to 1:5,000, with a resolution of 0.10 m or better, within a 2,000 m^2 minimum area]*	✔	✔ [for areas of high substrate heterogeneity; multiple stations, 3 replicates per station]	✔
Other biogenic habitats (corals, tube-dwelling anemones, structure-forming polychaetes)			✔
Bathymetry, backscatter mosaic, and slope maps *[provide maps with a resolution of 0.10 m to 0.50 m, using continuous variables – color ramp displays]*	--	--	✔

3.5.1 Underwater Imagery

3.5.1.1 Methods

- Towed video survey transects will be completed at up to 41 target areas in the Lease Area and 10 target areas along the ECRE to Virginia Beach.
- Selection of video imagery transects locations will be focused on areas where the substrate at the target location is gravelly or otherwise unsuitable for benthic grab sampling or locations where submerged aquatic vegetation or other biogenic habitats such as wrecks, reefs, or mollusk beds are observed.
- Seafloor images will be collected at selected sample location using an underwater camera system towed over a target location or lowered to near the bottom for a closer view.
- The video system is towed from a winch with joy-stick control and is "flown" above the seafloor by an operator watching the real-time video (see Figure 4).
- The orientation of the video transect will be selected by the survey team to account for prevailing wind and sea conditions
- The system captures rea-time video and on-board recorded still images of habitat and biota along the transect.

- The underwater video camera will be viewed in real-time by a scientist aboard the vessel to ensure that the video is of sufficient quality to identify key items. Still images will be downloaded and viewed after recovery of the towed system.
- The location of the underwater camera will be tracked with an ultra-short baseline acoustic positioning system integrated with above water GPS and a navigation computer and synchronized by time with the video recorder and camera clocks.
- Video transects will be up to approximately 1,968 ft (600 m) long.
- The camera will be towed at approximately 0.5 nautical miles per hour (knots) at an elevation of about 6.6 to 13.1 ft (2 to 4 m) above the sea floor to ensure consistent footage, depending on sea-state conditions.

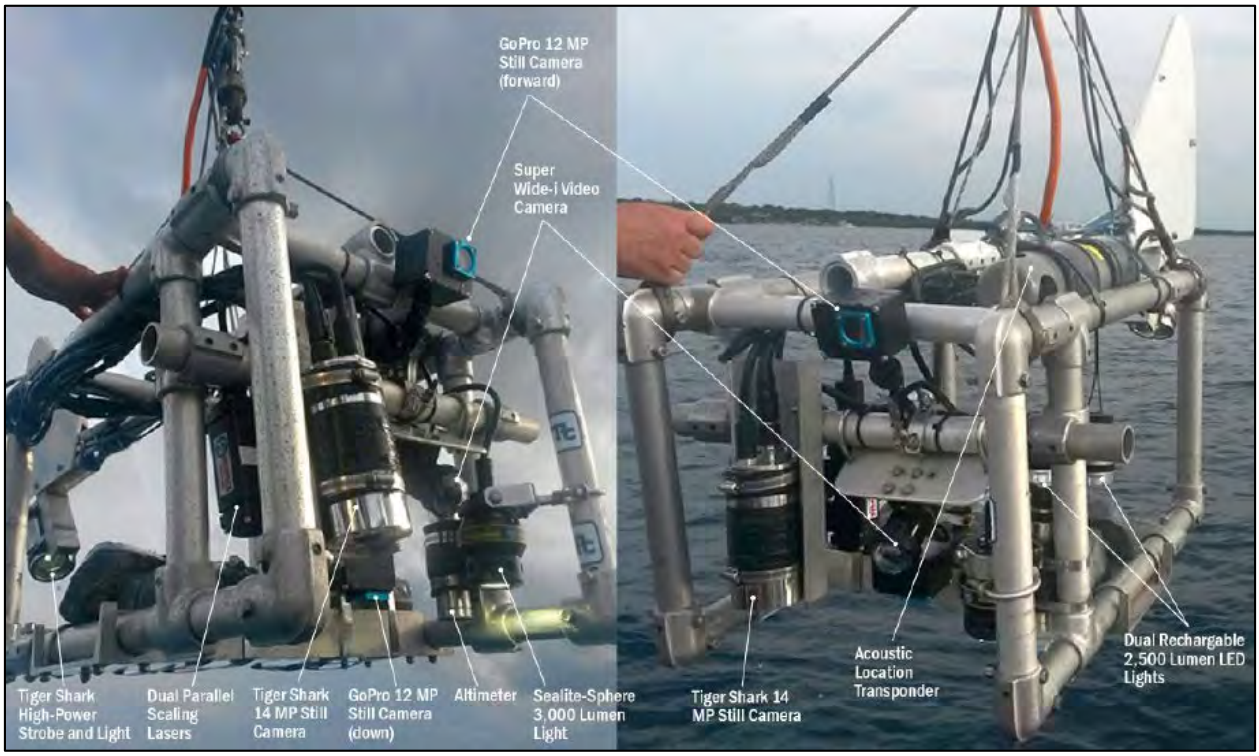


Figure 4. Tetra Tech's Underwater Imagery System with Still/Video Cameras Mounted to a Towing Frame

3.5.1.2 Deployment

- The camera frame is deployed from either a davit winch or A-frame and can be deployed and recovered with minimal observation and guidance by a single deckhand.
- Towed imagery transects will extend for up to 984 ft (300 m) on either side of a target area (as the vessel approaches the target area, passes over the target area, and leaves the target area) for a total length of up to approximately 1,968 ft (600 m) of imagery at each target.
- When the target is soft bottom, a grab sample will be collected at the approximate midpoint of the video survey transect. A plan-view still image of the grab target will be captured prior to collecting the grab. Triplicate grab samples will be collected in areas of predicted gravel, where possible, at

the start, mid-point, and end of the transect. However, grab sampler penetration may preclude sample collection in coarser-grained sediments or gravel areas. For such areas, the imagery collected along the transect will suffice as the benthic sample.

3.5.1.3 Data Analysis

The combination of grab samples and underwater images provides a comprehensive approach for sampling each of the target locations to characterize the benthic substrate and habitat within the context of CMECS classifications (FGDC 2012), as modified by GARFO (NOAA Fisheries 2020). Dominant habitat classifications will be determined from the HRG data and confirmed through the benthic imagery data. The marine scientist reviewing imagery from each transect will record the following observations:

- General characterization of substrate including texture, micro-topography, and presence and approximate thickness (absent, light, moderate, or heavy) of sedimentation ("drape") covering hard substrates;
- Evidence of benthic activity by organisms (burrows, trails, biogenic reefs);
- Identification of epibenthic macroinvertebrates (decapod crustaceans, mollusks [including squid mops], echinoderms) and habitat;
- Presence/evidence and general characterization of submerged aquatic vegetation (macroalgae, sea grass);
- Identification of fishes and habitats;
- Identification of organisms to the lowest practical taxonomic level (generally, at least 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, or other marine debris.

Observations will be summarized and portrayed using representative screen shots to support CMECS characterization. Visible fishes, crustaceans, and mollusks will be identified and enumerated to the extent practicable to document the presence of organisms in the target areas.

3.5.2 Sediment Grab Samples

Grab sampling will be consistent with methods described in the U.S. Environmental Protection Agency National Coastal Condition Assessment (EPA 2015) as summarized below.

3.5.2.1 Methods

Sediment samples will be obtained using a 0.04-m^2 Young-modified Van Veen grab sampler (or 0.1 m^2 standard Van Veen) deployed from a vessel-mounted A-frame in soft bottom sediments (sand/mud/silt). If a grab sampler with a larger area is used, then subsamples will be processed for infaunal analysis. The following methods will be used to collect grab samples:

- Ensure that the grab sample meets acceptability criteria upon retrieval, based on the following:
  - penetration depth of at least 2.75 inches (in) (7 cm), or greater than 50 percent full;

  - not over penetrated;
  - overlying water; and
  - undisturbed surface.
- Triplicate grab samples will be collected in areas of predicted gravel, where possible, at the start, mid-point, and end of an underwater imagery transect. However, grab sampler penetration may preclude sample collection in coarser-grained sediments or gravel areas. For such areas, the imagery collected along the transect will suffice as the benthic sample.
- The physical features (penetration depth, sediment color, texture, odor, surface features) will be described.
- Macro-fauna on the surface of the grab sample will be described and returned to the water; any squid mops in the grab sample will be photographed and returned to the water.
- Survey personnel will perform on-board sample collection and processing, including any sample wash-down, sieving, preservation, staining, placing into containers, sample log, and chain of custody preparation.
- Samples for grain size and total organic carbon (TOC) will be taken directly from the grab samples, prior to sieving. The sample will be collected using a 1.0 in (2.5 cm) diameter vertical core, or similar extraction device, and transferred to separate clean plastic containers for each analysis.
- The remaining sediments in the grab will be sieved through a clean 500-micrometer sieve using agitation and gentle water pressure to break-up sediments. The volume of sediment sieved will be measured or estimated for use in calculating the density of organisms in the sample:
  - If a full-size Van Veen grab sampler (0.1 m^2) is used, the grab will be subsampled using an appropriately sized vertical core tube (e.g., 10 cm) to standardize the sediment volume sieved for benthic infauna to match that of the 0.04 m^2 Young modified Van Veen.
- The organisms, shell fragments, and other debris retained by the sieve after rinsing will be placed into either sample jars or cloth bags that will be placed in sealed plastic containers containing 10 percent buffered formalin.
- If requested by the laboratory, samples may be field stained using Rose Bengal dye to aid in the efficiency of picking organisms from the sample debris.
- The preserved benthic samples will be labeled, stored in a cooler at ambient temperature in a shaded area, and shipped to qualified benthic and analytical laboratories. Standard laboratory protocols will be followed for enumeration and identification of organisms down to the lowest practical taxonomic level (at least to Family), including subsampling where applicable.
- TOC and grain size samples will be kept on ice in a cooler and shipped to Tetra Tech's in-house geotechnical laboratory in Florida.
- Additional details on sample handling, preservation, packaging, custody, and storage will be provided to the field crews prior to the survey.

3.5.2.2 Deployment

- Regardless of survey vessel used, an experienced deck hand will launch and land the grab sampler via hydraulic A-frame.
- The A-frame will allow landing the grab sampler away from the transom allowing the science team to stay well inboard of the stern.
- All staff on deck will be wearing appropriate personal protective equipment as detailed in the Incident Prevention Plan.

3.5.2.3 Data Analysis

Grain Size and Total Organic Carbon

Benthic grab samples will be analyzed by Tetra Tech's geotechnical laboratory using standard American Society for Testing and Materials (ASTM) methods for grain size and TOC. These two parameters will be measured because they often influence the composition and distribution of benthic assemblages.

- Samples will be placed in sturdy high-density plastic containers (or double-bagged in zip-top plastic bags), sealed, and kept on ice until they are analyzed in the laboratory.
- Grain size samples will be analyzed using ASTM D422 Standard Method for Particle-size Analysis of Soils (ASTM International 2002). This method sifts the sediment samples through progressively smaller, nested sieves (USDA 1993). Percentage will be determined by dividing the post-drying weight of material retained by each sieve by the total post-drying weight of the sample. Results will be expressed as percent gravel, sand, silt, and clay using the Wentworth (1922) scale. The surficial sediment samples will be classified according to the CMECS, as recommended in BOEM (2019) and refined by GARFO (NOAA Fisheries 2020).
- TOC content of sediment samples will be analyzed using ASTM D4129 (ASTM International 2013), or equivalent. TOC results will be reported in milligram per kilogram and percent.

Benthic Infauna

Grab samples will be sieved through a 500-micometer sieve and preserved as described in Section 3.3.2.1.

- When received by the laboratory, benthic infaunal samples will be rinsed with freshwater to remove the formalin and transferred to 70 percent isopropyl alcohol for sorting and storage.
- Subsampling (or splitting) will be allowed in accordance with the laboratory's standard operating procedures and minimal quantity criteria.
- Organisms will be identified to the lowest practical taxonomic level (generally to Family in accordance with the laboratory's quality assurance plan) and enumerated.
- Species classification and abundance will be entered onto Project-specific data sheets; these data will then be entered into a species database for the Project and summarized in tables. To ensure consistent taxonomic identification of benthic organisms, the most up-to-date regional taxonomic references will be used. All sorting and identification processes will be subject to quality control inspections.

- Prior to performing the infaunal data analyses non-infaunal taxa (e.g., epibenthic mysid shrimp) will be excluded from the dataset. Benthic infaunal samples will be classified to the lowest taxonomic unit practicable.
- Calculations of abundance will include all taxa occurring in each sample whether identified to species level or not. Calculations based on species (diversity, evenness, and number of species) will include only those taxa identified to species.

3.6 Data Interpretation and Presentation

Benthic survey data will be interpreted in the context of the underlying geological resources in the area. The correlation of species abundance with benthic habitat type will be evaluated to support identification of species assemblages, distributions, and relative abundance. Each sample will be classified based on sediment and benthic infauna according to the CMECS as refined by GARFO (NOAA Fisheries 2020) (Table 6). The characterization of benthic resources in the Survey Area and reference areas will include the following components:

- Classifications of geologic and biogenic substrates in accordance with CMECS (FGDC 2012; NOAA Fisheries 2020);
- Identification and enumeration of infaunal organisms;
- Sample log and description (sample ID, UTC date, UTC time, northing, easting, water depth, and sample description);
- Grain size distribution (using Wentworth scale) and TOC;
- Relative abundance of species (total number of individuals and percent of all species collected);
- Total individuals and species, Shannon's diversity Index (H'), and Pielou's evenness index (J') per sample; and
- Rank and abundance of organisms (number of grabs where species was present, number of individuals per grab (indexed to sediment volume), percent of total organisms collected.

Dominion Energy is aware that BOEM is currently considering an update to their 2019 Benthic Guidelines to incorporate GARFO's Recommendations for Mapping Fish Habitat (NOAA Fisheries 2020); which focus on benthic characterization on features that influence the complexity and value of benthic habitat for managed fisheries. The HRG survey planned for 2020 will aim to provide the mapping requirements for the report, to the extent practicable within equipment limitations, as specified in the NOAA recommendations, as follows:

- Landscape/small scale maps (zoomed out) of all habitat types in the project area processed at 0.1 m to 0.5 m resolution (for the Project Area – "non-complex" habitats). Map scale ranges 1:50,000 to 1:100,000;
- Large scale maps (zoomed in) at 0.1 m resolution (in areas of "complex" habitats [e.g., hard bottom, epifauna/macroalgae, or vegetated habitats]). Map scale ranges 1:1,000 to 1:5,000; and
- Bathymetry, backscatter mosaic, and slope maps processed at 0.1 to 0.5 m, using continuous variables (displayed with color ramps).

Table 6. Range of Sediment Characteristics Expected within the Offshore Survey Area, for use in Habitat Interpretation in Accordance with CMECS (FGDC 2012; NOAA Fisheries 2020)

CMECS Class	CMECS Subclass	CMECS Group	CMECS Subgroup	Particle	
Rock Substrate	Bedrock/Megaclast			N/A	Substrate with mostly continuous formations of bedrock that cover 50% or more of the Geologic Substrate surface. Substrate where individual rocks—with particle sizes greater than or equal to 4.0 meters (4,096 millimeters) in any dimension—cover 50% or more of the Geologic Substrate surface
Unconsolidated Mineral Substrate	Coarse Unconsolidated Substrate	Gravels	Boulder	256 mm to < 4096	Geologic Substrate contains > 80% Gravel
			Cobble	64 mm to < 256	
			Pebble/ Granule	2 mm to < 64	
			Gravel/ Pavement	--	
		Gravel Mixes	Sandy Gravel	2 mm to < 4096 mm	Geologic Substrate is 30% to < 80% Gravel, with Sand composing 90% or more of the remaining Sand-Mud mix.
			Muddy Sandy Gravel		Geologic Substrate is 30% to < 80% Gravel, with Sand composing from 50% to < 90% of the remaining Sand-Mud mix.
			Muddy Gravel		Geologic Substrate is 30% to < 80% Gravel, with Mud composing 50% or more of the remaining Mud-Sand mix.
		Gravelly	Gravelly Sand		Geologic Substrate is 5% to < 30% Gravel, and the remaining Sand-Mud mix is 90% or more Sand.
			Gravelly Muddy Sand		Geologic Substrate is 5% to < 30% Gravel, and the remaining Sand-Mud mix is 50% to < 90% Sand.
			Gravelly Mud		Geologic Substrate is 5% to < 30% Gravel, and the remaining Sand-Mud mix is 50% or more Mud.
	Fine Unconsolidated Substrate	Sand	Very Coarse/Coarse Sand	0.5 mm to < 2.0 mm	Geologic Substrate surface layer contains no trace of Gravel and is composed of > 90% Sand.
			Medium Sand	0.25 mm to < 0.50 mm	
			Fine/Very Fine Sand	0.0625 mm to < 0.2500 mm	

CMECS Class	CMECS Subclass	CMECS Group	CMECS Subgroup	Particle	
		Muddy Sand		< 0.0625 mm	Geologic Substrate surface layer contains no trace of Gravel and is composed of 50% to < 90% Sand.
		Sandy Mud		< 0.0625 mm	Geologic Substrate surface layer contains no trace of Gravel and is composed of 10% to < 50% Sand; the remainder is composed of Mud.
		Mud		< 0.0625 mm	Geologic Substrate surface layer contains no trace of Gravel and is composed of 90% or more Mud; the remainder (< 10%) is composed of Sand.
Shell Substrate	Shell Reef Substrate	Clam Reef Substrate		> 4096 mm	Substrate that is dominated by living or non-living cemented, conglomerated, or otherwise self-adhered shell reefs. Live reef building fauna may or may not be present;
		Crepidula Reef Substrate			
		Mussel Reef Substrate			
		Oyster Reef Substrate			
	Shell Rubble			64 mm to < 4096 mm	Substrate that is dominated by living or non-living shells forming Rubble. Particles may be either loose, individual shells (whole or broken) or—particularly in the larger Rubble sizes—cemented, conglomerated, or otherwise attached so as to form Boulders of consolidated shell material.
	Shell Hash			2 mm to < 64 mm	Surface substrate layers are dominated by loose shell accumulations. Shells may be broken or whole.

3.7 Reporting

Dominion Energy will incorporate the preliminary benthic survey results into the COP, with a technical report as an appendix to the COP, developed in accordance with BOEM's 2019 Benthic Guidelines. The report will include cumulative results of all survey efforts, species or other taxonomic abundance estimates, analysis of the effectiveness of survey techniques, comparison with reference areas, and refinements of techniques for future studies, as necessary. Results will be presented in tabulated form supported by figures, as appropriate.

4 CONFORMANCE WITH LEASE STIPULATIONS

The Lease stipulates various pre-survey, survey, post-survey, and reporting requirements. Table 7 and Table 8 summarize Dominion Energy's compliance with stipulations in the Lease. See OCS-A 0483 for complete stipulations.

Table 7. Pre-Survey Conditions in the OCS-A 0483

Addendum "C" Stipulation: Activity	Pre-Survey Conditions	Compliance
2.1.1.2: COP survey plan	The Lessee must submit to the Lessor for review a complete COP survey plan providing details and timelines of the surveys to be conducted on this lease that are necessary to support the submission of a COP (i.e., necessary to satisfy the information requirements in the applicable regulations, including but not limited to 30 CFR § 585.621, 626, 627). The COP survey plan must be submitted to the Lessor no later than on the first anniversary of this lease's Effective Date and at least 30 calendar days prior to the date of the pre-survey meeting with the Lessor (see 2.1.2). The Lessee must modify the COP survey plan to address any comments the Lessor submits to the Lessee on the contents of the COP survey plan in a manner deemed satisfactory to the Lessor prior to the commencement of these survey activities.	The COP Survey Plan, submitted to BOEM on February 14, 2020, meets the requirements of Condition 2.1.1.2
2.1.2: Pre-Survey Meeting with Lessor	At least 60 calendar days prior to the initiation of survey activities in support of the submission of a plan (i.e., SAP and COP), the Lessee must hold a pre-survey meeting with the Lessor to discuss the applicable proposed survey plan and timelines. The Lessee must ensure the presence of a Qualified Marine Archaeologist at this meeting (See 4.2.2).	The Pre-Survey Meeting was held on March 17, 2020. Dominion Energy was granted a waiver from the timing requirements for the pre-survey meeting. The pre-survey meeting was held 23 days prior to the start of surveys. [confirmed with BOEM through a Waiver Request]
2.1.3: HRG Survey Milestone	The Lessee must complete the HRG surveys that are necessary to support the submission of a COP no later than the third anniversary of this lease's Effective Date. The Lessee must include this milestone in the COP survey plan (See 2.1.1.2).	Dominion Energy received a waiver on this stipulation.
2.2.1 Semi-Annual Progress Report	The Lessee must submit to the Lessor a semi-annual (i.e., every six months) progress report through the duration of the site assessment term that includes a brief narrative of the overall progress since the last progress report, or – in the case of the first report – since the Effective Date. The progress report must include an update regarding progress in executing the activities included in the survey plans and include as an enclosure updated survey plans accounting for any modifications in schedule.	Dominion Energy established a schedule to submit a Semi-Annual Progress Report (on or around May 1 and November 1 of each year starting in 2014 and has maintained compliance with semi-annual reporting.

Addendum "C" Stipulation: Activity	Pre-Survey Conditions	Compliance
3.2.1: General	The Lessee hereby recognizes and agrees that the United States reserves and has the right to temporarily suspend operations and/or require evacuation on this lease in the interest of national security pursuant to Section 3(c) of this lease.	Noted.
3.2.4: Lessee Point-of-Contact for Evacuation/ Suspension Notifications	The Lessee must inform the Lessor of the persons/offices to be notified to implement the terms of 3.2.2 and 3.2.3.	Lloyd Eley, Manager Generation Site Construction, Offshore Wind Dominion Energy 600 East Canal St. Richmond, VA 23219 Phone: (804) 273-4934
3.2.5: Coordination with Command Headquarters	The Lessee must establish and maintain early contact and coordination with the appropriate command headquarters, in order to avoid or minimize the potential to conflict with and minimize the potential effects of conflicts with military operations.	Prior to the start of surveys, Dominion Energy has established contact with the U.S. Department of the Navy and will maintain communications to ensure that all survey activities are deconflicted.

The vessel(s) proposed for work on the benthic survey will be certified per Dominion Energy's vessel classification program, which will confirm the vessel's safety and environmental integrity status. The proposed vessels will be subject to an inspection/audit process, which assesses the vessel's operating safety status, by examining all aspects of the safety management systems that are in place onboard. This will include any observations with regard to the vessel's internal structural integrity, the safety of its personnel, and its compliance with environmental protection requirements. Vessels operating in the Lease Areas and in support of the benthic surveys will abide by the Lease stipulations summarized in Table 8 below.

Table 8. Vessel Operations Conditions in the OCS-A 0483 Lease

Addendum "C" Stipulation: Activity	Vessel Operations Conditions	Compliance
4.1.1 Vessel Strike Avoidance Measures	The Lessee must ensure that all vessels conducting activities in support of plan (i.e., SAP and COP) submittal comply with the vessel-strike avoidance measures specified in stipulations 4.1.1.1 through 4.1.1.7, except under extraordinary circumstances when the safety of the vessel or crew is in doubt or the safety of life at sea is in question.	Dominion Energy will conduct environmental training, which includes vessel strike avoidance measures, for all vessel operators, employees, and contractors prior to vessel operations.

Addendum "C" Stipulation: Activity	Vessel Operations Conditions	Compliance
4.1.2: Marine Trash and Debris Prevention	The Lessee must ensure that vessel operators, employees, and contractors actively engaged in activity in support of plan (i.e., SAP and COP) submittal are briefed on marine trash and debris awareness and elimination, as described in the BSEE Notice to Lessees (NTL) No. 2012-G01 ("Marine Trash and Debris Awareness and Elimination") or any NTL that supersedes this NTL, except that the Lessor will not require the Lessee, vessel operators, employees, and contractors to undergo formal training or post placards. The Lessee must ensure that these vessel operator employees and contractors are made aware of the environmental and socioeconomic impacts associated with marine trash and debris and their responsibilities for ensuring that trash and debris are not intentionally or accidentally discharged into the marine environment. The above-referenced NTL provides information the Lessee may use for this awareness training.	Dominion Energy will conduct environmental training for all vessel operators, employees, and contractors prior to vessel operations.
Vessel Strike Avoidance Measures		
4.1.1.1 and 4.1.1.2: General	The Lessee must ensure that vessel operators and crews maintain a vigilant watch for cetaceans, pinnipeds, and sea turtles and slow down or stop their vessel to avoid striking these protected species. The Lessee must ensure that all vessel operators comply with 10 knot (18.5 km/hr) speed restrictions in any Dynamic Management Area. In addition, the Lessee must ensure that all vessels operating from November 1 through April 30 operate at speeds of 10 knots (18.5 km/hr) or less.	Survey vessel crew members responsible for navigation duties will receive site-specific training on marine mammal and sea turtle sighting/reporting and vessel strike avoidance measures, as detailed in the Lease. The training program will be consistent with the training programs already reviewed and accepted by BOEM in support of other Dominion Energy marine surveys. Confirmation of the training and understanding of the requirements will be documented on a training course log sheet onboard the vessel with individuals signing off to state that training has been received. Signing the log sheet will certify that the crew members understand and will comply with the necessary requirements throughout the survey event.
4.1.1.3: North Atlantic right whales	The Lessee must ensure all vessels maintain a separation distance of 500 meters (1,640 ft) or greater from any sighted North Atlantic right whale. The Lessee must ensure that the following avoidance measures are taken if a vessel comes within 500 meters (1,640 ft) of any North Atlantic right whale: If underway, any vessel must steer a course away from the North Atlantic right whale at 10 knots (18.5 km/h) or less until the 500 meters (1,640 ft) minimum separation distance has been established (except as provided in 4.1.1.3.2.2).	Biologists and vessel operators conducting the boat-based benthic surveys will receive environmental training specific to vessel strike avoidance measures and protected species observation. Dominion Energy will adhere to speed restrictions and separation distances as described in this Lease stipulation.

Addendum "C" Stipulation: Activity	Vessel Operations Conditions	Compliance
	If a North Atlantic right whale is sighted within 100 meters (328 ft) to an underway vessel, the vessel operator must immediately reduce speed and promptly shift the engine to neutral. The vessel operator must not engage the engines until the North Atlantic right whale has moved beyond 100 meters (328 ft). If a vessel is stationary, the vessel must not engage engines until the North Atlantic right whale has moved beyond 100 meters (328 ft), at which point the Lessee must comply with 4.1.1.3.2.1.	
4.1.1.4: Non-delphinoid cetaceans other than North Atlantic right whale	The Lessee must ensure all vessels maintain a separation distance of 100 meters (328 ft) or greater from any sighted non-delphinoid cetacean.	Biologists and vessel operators conducting the boat-based benthic surveys will receive environmental training specific to strike avoidance measures and protected species observation. Dominion Energy will adhere to speed restrictions and separation distances as described in this Lease stipulation.
	The Lessee must ensure that the following avoidance measures are taken if a vessel comes within 100 meters (328 ft) of any non-delphinoid cetacean: If any non-delphinoid cetacean is sighted, the vessel underway must reduce speed and shift the engine to neutral and must not engage the engines until the non-delphinoid cetacean has moved beyond 100 meters (328 ft). If a vessel is stationary, the vessel must not engage engines until the nondelphinoid cetacean has moved beyond 100 meters (328 ft).	
4.1.1.5: Delphinoid cetaceans	The Lessee must ensure that all vessels maintain a separation distance of 50 meters (164 ft) or greater from any sighted delphinoid cetacean.	Biologists and vessel operators conducting the boat-based benthic surveys will receive environmental training specific to vessel strike avoidance measures and protected species observation. Dominion Energy will adhere to speed restrictions and separation distances as described in this Lease stipulation.
	The Lessee must ensure that the following avoidance measures are taken if the vessel comes within 50 meters (164 ft) of any delphinoid cetacean: The Lessee must ensure that any vessel underway remain parallel to a sighted delphinoid cetacean's course whenever possible and avoid excessive speed or abrupt changes in direction. The Lessee may not adjust course and speed until the delphinoid cetacean has moved beyond 50 meters (164 ft) or the delphinoid cetacean has moved abeam of the underway vessel. The Lessee must ensure that any vessel underway reduce vessel speed to 10 knots (18.5 km/h) or less when pods (including mother/calf pairs) or large assemblages of delphinoid cetaceans are observed. The Lessee may not adjust course and speed until the delphinoid cetaceans have moved beyond 50 meters (164 ft) or abeam of the underway vessel.	

Addendum "C" Stipulation: Activity	Vessel Operations Conditions	Compliance
4.1.1.6: Sea Turtles and Pinnipeds	The Lessee must ensure all vessels maintain a separation distance of 50 meters (164 ft) or greater from any sighted sea turtle or pinniped.	Biologists and vessel operators conducting the boat-based benthic surveys will receive environmental training specific to vessel strike avoidance measures and protected species observation. Dominion Energy will adhere to speed restrictions and separation distances as described in this Lease stipulation.
4.1.1.7: Vessel Operator Briefing	The Lessee must ensure that all vessel operators are briefed to ensure they are familiar with the requirements specified in 4.1.1.	Survey vessel crew members responsible for navigation duties will receive site-specific training on marine mammal and sea turtle sighting/reporting and vessel strike avoidance measures, as detailed in the Lease. The training program will be consistent with the training programs already reviewed and accepted by BOEM in support of other Dominion Energy marine surveys. Confirmation of the training and understanding of the requirements will be documented on a training course log sheet onboard the vessel with individuals signing off to state that training has been received. Signing the log sheet will certify that the crew members understand and will comply with the necessary requirements throughout the survey event.
4.4.1: Reporting Injured or Dead Protected Species	The Lessee must ensure that sightings of any injured or dead protected species (e.g., marine mammals, sea turtles or sturgeon) are reported to the Lessor, NMFS, and the NMFS Northeast Regional Stranding Hotline within 24 hours of sighting, regardless of whether the injury or death is caused by a vessel. In addition, if the injury or death was caused by a collision with a project-related vessel, the Lessee must ensure that the Lessor is notified of the incident within 24 hours. The Lessee must use the form provided in Appendix A to ADDENDUM "C" to report the sighting or incident. If the Lessee's activity is responsible for the injury or death, the Lessee must ensure that the vessel assist in any salvage effort as requested by NMFS.	Dominion Energy will make the appropriate notifications to NOAA Fisheries via the Northeast Region's Stranding Hotline and, if necessary, to BOEM within 24-hours of the sighting/incident. Dominion Energy will use the form included as Appendix C to report the sighting or incident (see Appendix C). If Dominion Energy is responsible for the injury or death, they will work with NOAA Fisheries to support the salvage effort, as necessary.

5 LITERATURE CITED

ASTM International. 2002. ASTM Standard D422-63 (2002) Standard Test Method for Particle-Size Analysis of Soils. ASTM International, West Conshohocken, PA, 2002. www.astm.org.

ASTM International. 2013. ASTM Standard D4129 (2013) Standard Test Method for Total and Organic Carbon. ASTM International, West Conshohocken, PA, 2013. www.astm.org.

BOEM (Bureau of Ocean Energy Management). 2012. *Commercial Wind Lease Issuance and Site Assessment Activities on the Atlantic Outer Continental Shelf Offshore New Jersey, Delaware, Maryland, and Virginia Final Environmental Assessment ("Mid-Atlantic EA")*. Bureau of Ocean Energy Management Office of Renewable Energy Programs. OCS EIS/EA BOEM 2012-003.

BOEM. 2015a. *Guidelines for Providing Geophysical, Geotechnical, and Geohazard Information Pursuant to 30 CFR Part 585*. Bureau of Ocean Energy Management Office of Renewable Energy Programs. Available online at: https://www.boem.gov/sites/default/files/renewable-energy-program/G_G_Guidelines_Providing_Geophysical_Geotechnical_Geohazard_Information_Pursuant_to_30_CFR_Part_585.pdf

BOEM. 2015b. *Guidelines for Providing Archaeological and Historic Property Information Pursuant to 30 CFR Part 585*. Bureau of Ocean Energy Management Office of Renewable Energy Programs.

BOEM. 2016. *Virginia Ocean Geophysical Survey Phase II Analyses Offshore Virginia Wind Energy Area*. June 2016. Department of the Interior. Bureau of Ocean Energy Management. Office of Renewable Energy Programs. Available at: https://www.boem.gov/sites/default/files/environmental-stewardship/Environmental-Studies/Renewable-Energy/VA-WEA-Phase-2-Geophysical-Report.pdf.

BOEM. 2019. *Guidelines for Providing Benthic Habitat Survey Information for Renewable Energy Development on the Atlantic Outer Continental Shelf Pursuant to 30 CFR Part 585*. June 2019. Available at: https://www.boem.gov/renewable-energy/survey-guidelines-renewable-energy-development

Cutter, G.R., and R.J. Diaz. 1998. Environmental studies relative to potential sand mining in the vicinity of the City of Virginia Beach, Virginia. Part 1: Benthic habitats and biological resources off the Virginia coast 1996 and 1997.

Diaz, R.J., G.R. Cutter, and C.H. Hobbs. 2004. "Potential impacts of sand mining offshore of Maryland and Delaware: Part 2 - Biological considerations". *Journal of Coastal Research*. 20(1), 61-69.

Diaz, R.J., G. L. Wikel, A. G. Browder, J. P.-Y. Maa, D. A. Milligan, C. S. Hardaway, C. O. Tallent, J. E. McNinch, H. K. Ha, J. A. Nestlerode, and C. H. Hobbs, III. 2006. "Field Testing of a Physical/Biological Monitoring Methodology for Offshore Dredging and Mining Operations". Prepared under MMS Cooperative Agreement 1435-01-02-CA-85050 by Virginia Institute of Marine Science College of William & Mary Gloucester Point, Virginia. OCS Study MMS 2005-056. 429 pp.

DMME (Virginia Division of Minerals and Energy).1990. "Heavy-Mineral Studies – Virginia Inner Continental Shelf". *Publication 103*. C.R. Berquist, Jr. Editor. 40 pp.

EPA (U.S. Environmental Protection Agency). 2015. *National Coastal Condition Assessment 2015 Field Operations Manual*. EPA-841-R-14-007. 180 pp.

FGDC (Federal Geographic Data Committee). 2012. *Coastal and Marine Ecological Classification Standard*. Federal Geographic Data Committee. FDGC-STD-018-2012. 337 pages.

Fugro (Fugro Consultants Inc.). 2013a. *Regional Geophysical Survey and Interpretive Report: Virginia Wind Energy Area Offshore Southeastern Virginia*. US Dept. of the Interior, Bureau of Ocean Energy Management, Office of Renewable Energy Programs, Herndon. OCS Study BOEM 2013-220. 240 pp.

Fugro. 2013b. *Geoscience-focus Desktop Study, Virginia Offshore Wind Energy Area, Virginia Outer Continental Shelf*. Prepared for: Commonwealth of Virginia, Department of Mines, Minerals and Energy.

Greene, J.K., Anderson, M.G., Odell, J., and Steinberg, N., eds. 2010. The Northwest Atlantic Marine Ecoregional Assessment: Species, Habitats and Ecosystems. Phase One. The Nature Conservancy, Eastern U.S. Division, Boston, MA.

Guida, V., A. Drohan, H. Welch, J. McHenry, D. Johnson, V. Kentner, J. Brink, D. Timmons, E. Estela-Gomez. 2017. *Habitat Mapping and Assessment of Northeast Wind Energy Areas*. Sterling, VA: US Department of the Interior, Bureau of Ocean Energy Management. OCS Study BOEM 2017-088. 312 pp.

Johnson, K.A. 2002. Characterization of the fishing practices and marine benthic ecosystems of the northeast U.S. shelf (NOAA Technical memo NMFS-NE-181, 2004).

MARCO (Mid-Atlantic Regional Council on the Ocean). 2020. Mid-Atlantic Ocean Data Portal. Available online at: http://portal.midatlanticocean.org/visualize/

NOAA. 2020. National Centers for Environmental Information – Bathymetric Data Viewer. Available online at: https://maps.ngdc.noaa.gov/viewers/bathymetry//

NOAA and BOEM. 2019. Marine Cadastre Viewer. Available online at: https://marinecadastre.gov/.

NOAA Fisheries (National Oceanographic and Atmospheric Administration National Marine Fisheries Service). 2014. *Report of the Atlantic Marine Assessment Program for Protected Species (AMAPPS) Workshop: Looking Forward to 2015-2019*.

NOAA Fisheries. 2018. *New England Fishery Management Council's Omnibus Essential Fish Habitat Amendment 2 Approval*. Dept. of Commerce. Gloucester, MA, National Marine Fisheries Service (NMFS): 5 pages.

NOAA Fisheries. 2020. *Recommendations for Mapping Fish Habitat*. National Marine Fisheries Service, Greater Atlantic Regional Fisheries Office (GARFO), Habitat Conservation and Ecosystem Services Division. January 2020.

Steimel, F.W., and C. Zetlin. 2000. “Reef habitats in the middle Atlantic Bight: Abundance, distribution, associated biological communities, and fishery resource use”. *Marine Fisheries Review*. 62: 24-42.

Tetra Tech (Tetra Tech, Inc.). 2013. *Draft Marine Site Characterization Survey Report. Virginia Offshore Wind Technology Advancement Project (VOWTAP)*. Prepared for Dominion Resources, Inc. 51 pp

Tetra Tech. 2014. *Benthic Survey Report, Virginia Offshore Wind Technology Advancement Project (VOWTAP).* Prepared for Dominion Energy. Submitted December 2013, Revised February 2014. 154 pp.

Tetra Tech. 2020. *Site Assessment Plan (SAP)/Construction and Operations Plan (COP) Survey Plan, prepared for the Coastal Virginia Offshore Wind Commercial Project*. March 2020.

USACE (U.S. Army Corps of Engineers). 2009. *Environmental Assessment; Sandbridge Beach Erosion Control and Hurricane Protection Project*. Norfolk District. 218 pp.

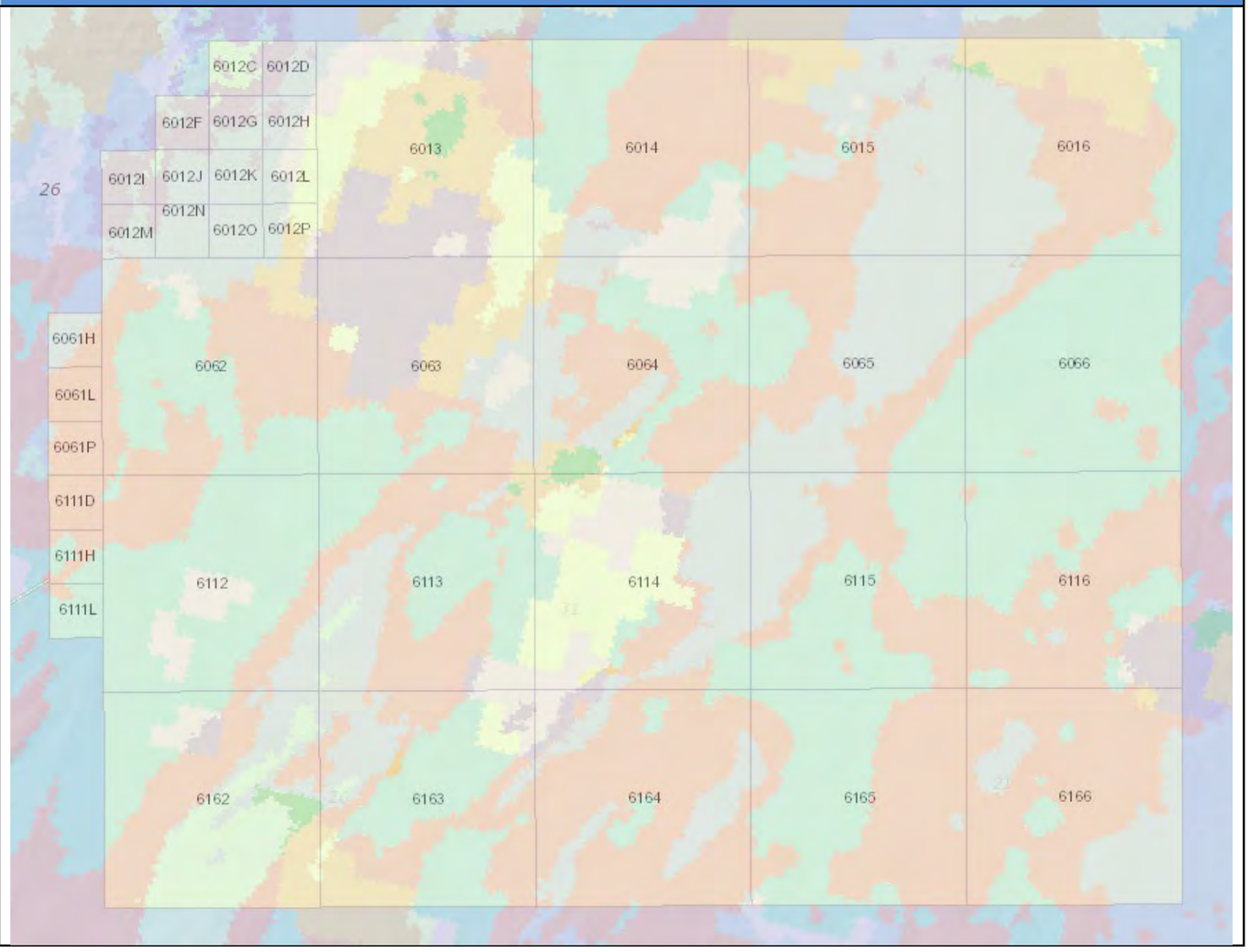
USDA (U.S. Department of Agriculture). 1993. *Soil Survey Manual*. Washington, DC: U.S. Government Printing Office.

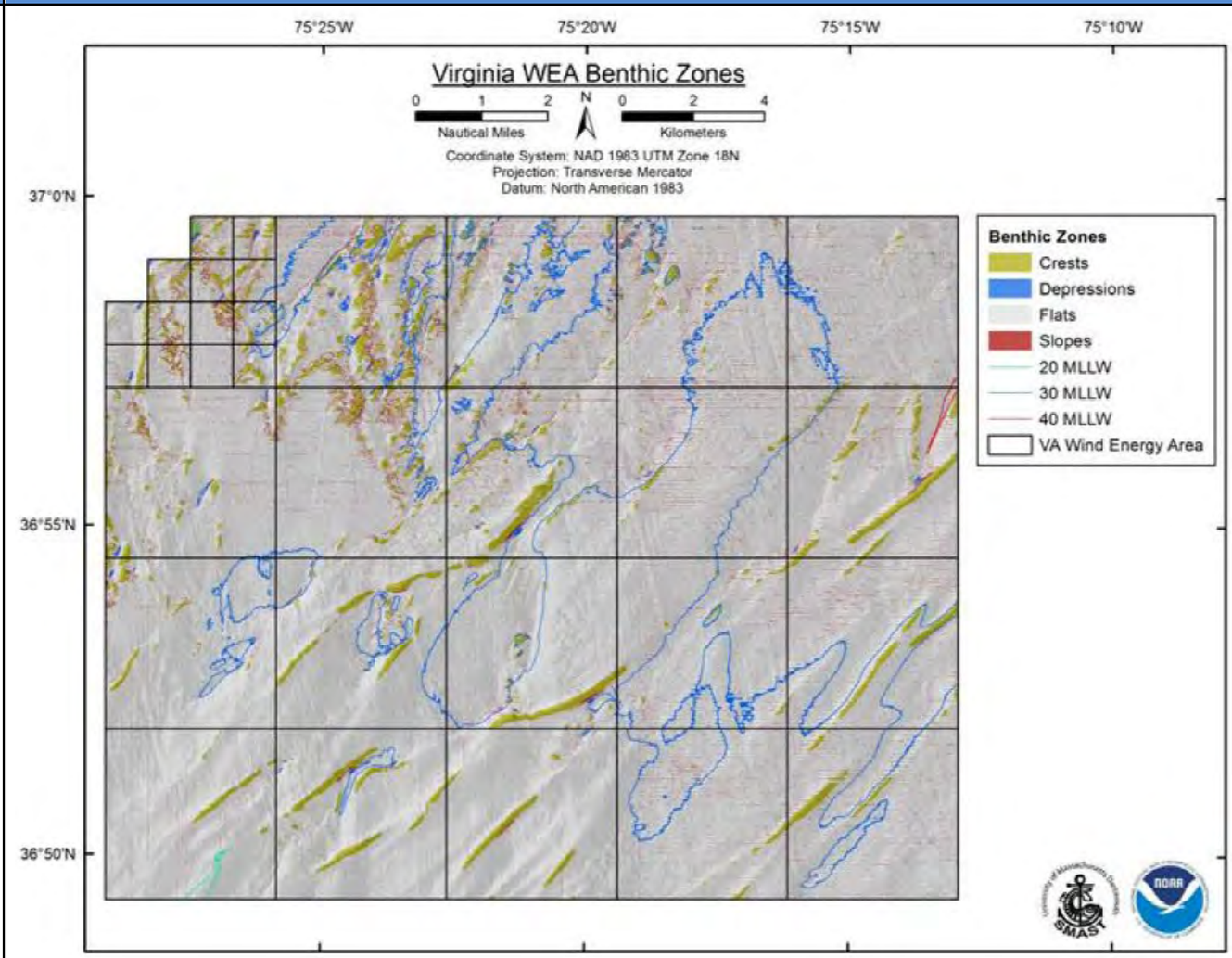
VIMS (Virginia Institute of Marine Science). 2018. Distribution of Submerged Aquatic Vegetation in Chesapeake Bay and Coastal Bays. December 2019.

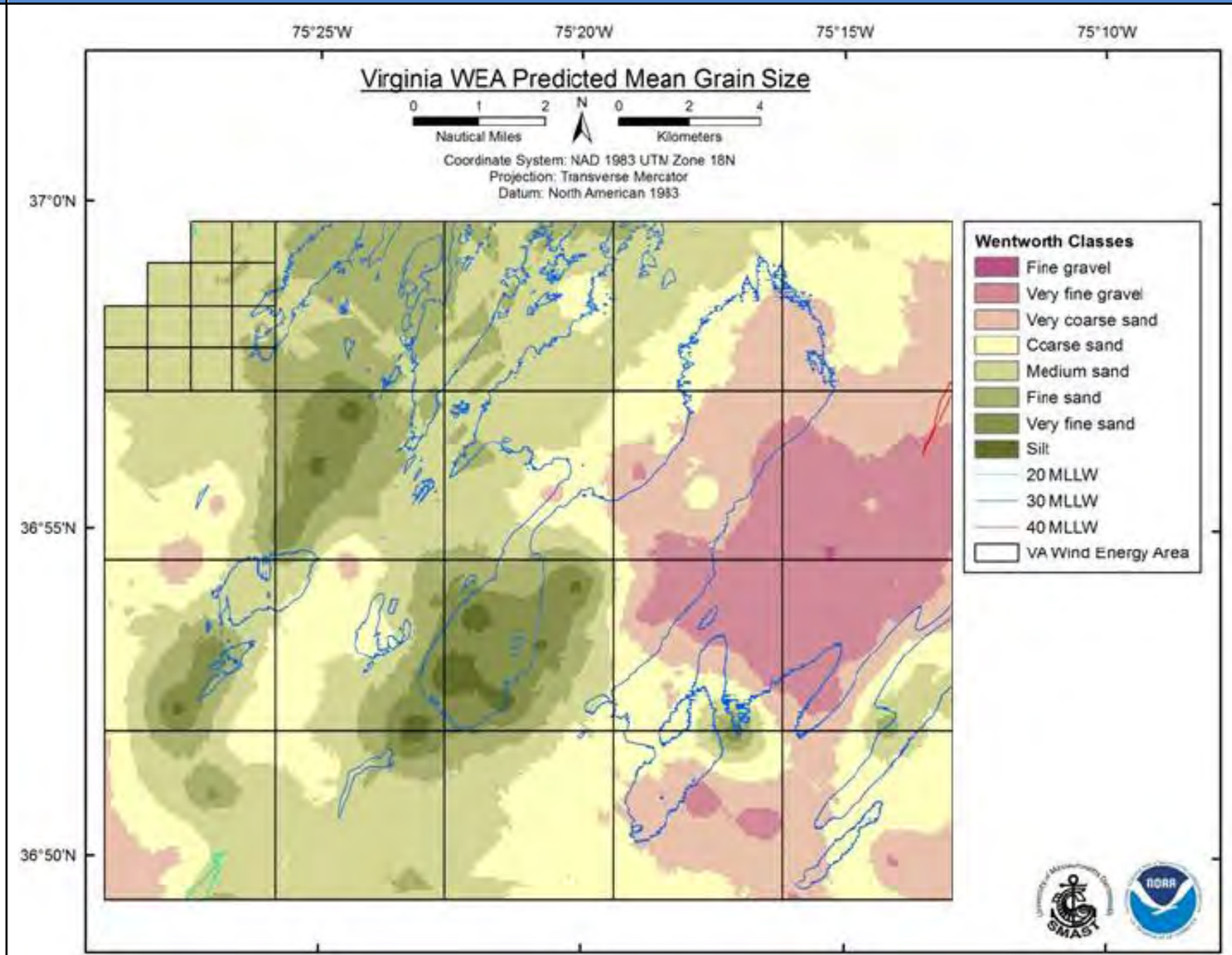
Wentworth, C.K. 1922. "A Scale of Grade and Class Terms for Clastic Sediments". *The Journal of Geology* 30, no. 5 (Jul. - Aug. 1922): 377-392.

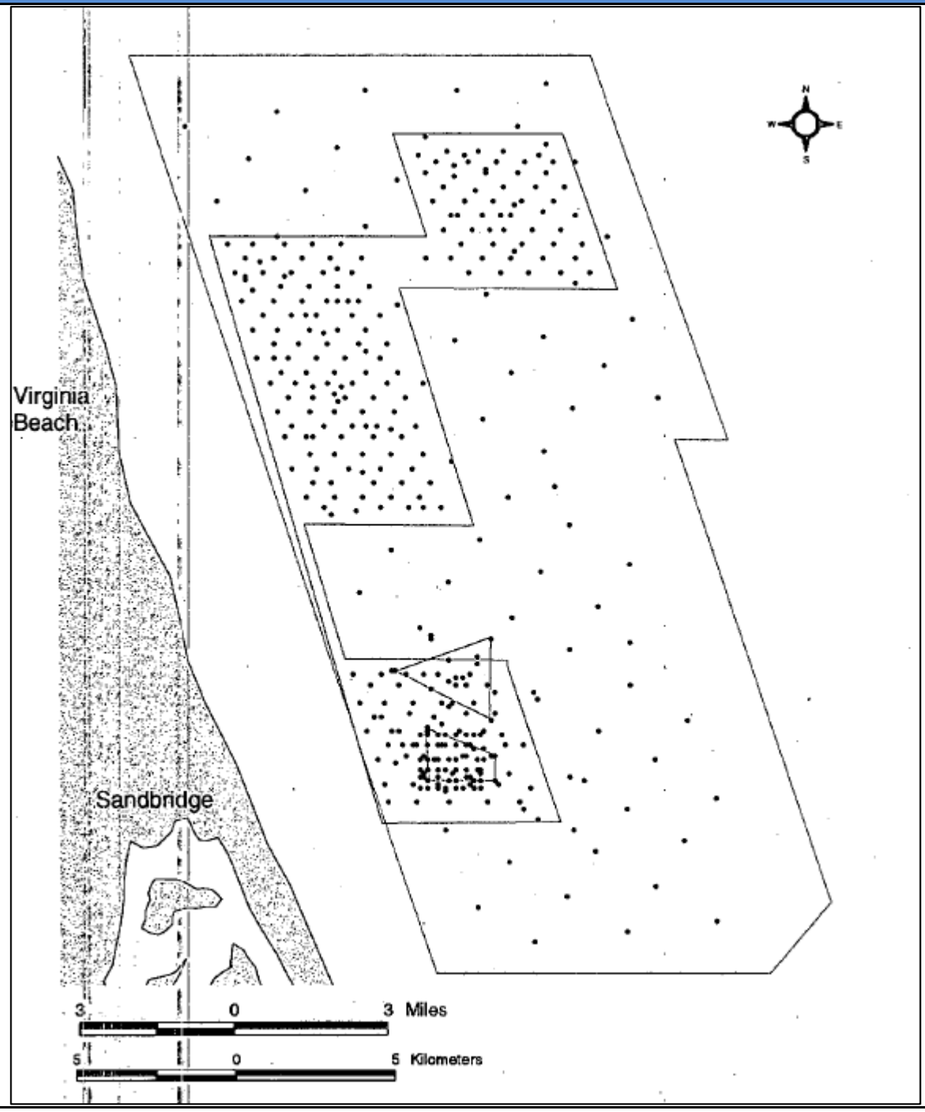
APPENDIX A:
SOURCES FOR EXISTING DATA IN COASTAL VIRGINIA

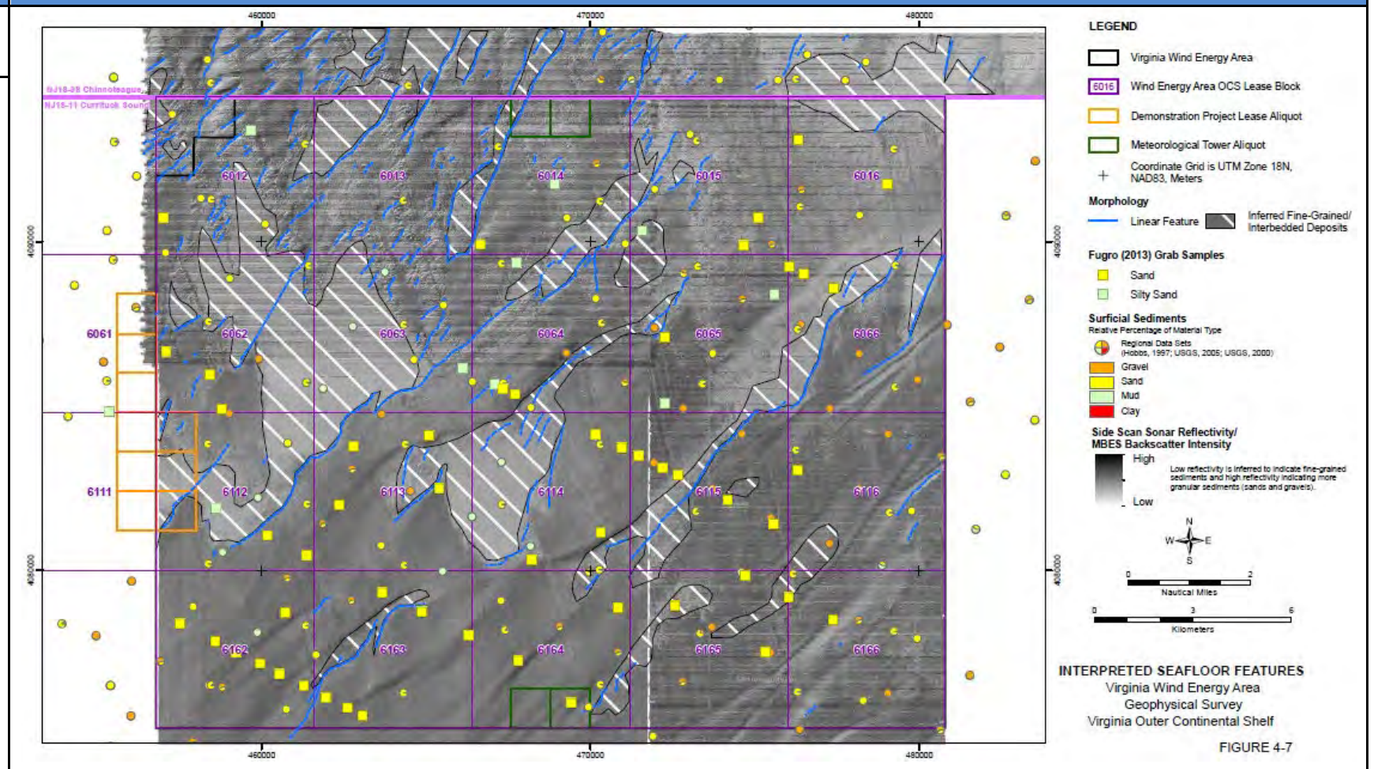
Existing Benthic Survey Data

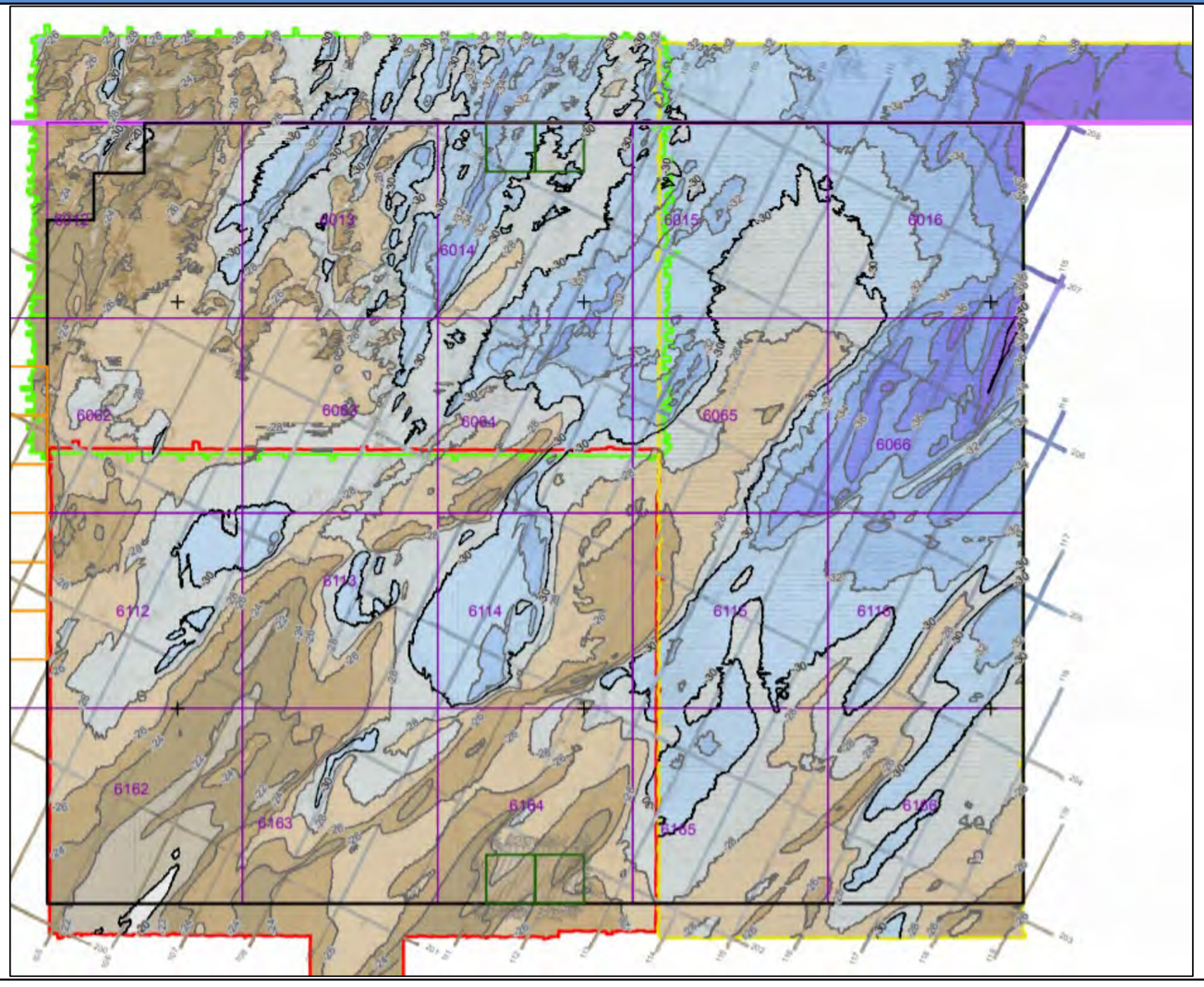
Data Source	Agency/ Collaborators	Years Covered	Summary and Data Application	Study Area Context
Northwest Atlantic Marine Ecoregional Assessment (Greene et al. 2010)	The Nature Conservancy	2010	The assessment covers benthic habitat classification based on grain size data and existing habitat models, with representative organisms. It also includes a coarse-level evaluation and initial habitat classifications to determine potential sample locations based on habitat types. The dataset is integrated into the MARCO data portal (MARCO 2020).	

Data Source	Agency/ Collaborators	Years Covered	Summary and Data Application	Study Area Context
Habitat Mapping and Assessment of Northeast Wind Energy Areas (Guida et al. 2017)	BOEM	Multiple	The goal of this assessment was to provide the data necessary to establish a contemporary and comprehensive benthic habitat database for the BOEM WEAs in the northeastern region of the United States in order to provide insight into benthic environmental issues and potential impacts associated wind power development on the continental shelf. Our investigations included the following WEAs: Massachusetts (MA), Rhode Island – Massachusetts (RIMA), New York (NY), New Jersey (NJ), Delaware (DE), Maryland (MD), Virginia (VA), and North Carolina – Kitty Hawk (NC-KH). The database is established at the J.J. Howard Laboratory of the Northeast Fisheries Science Center.	

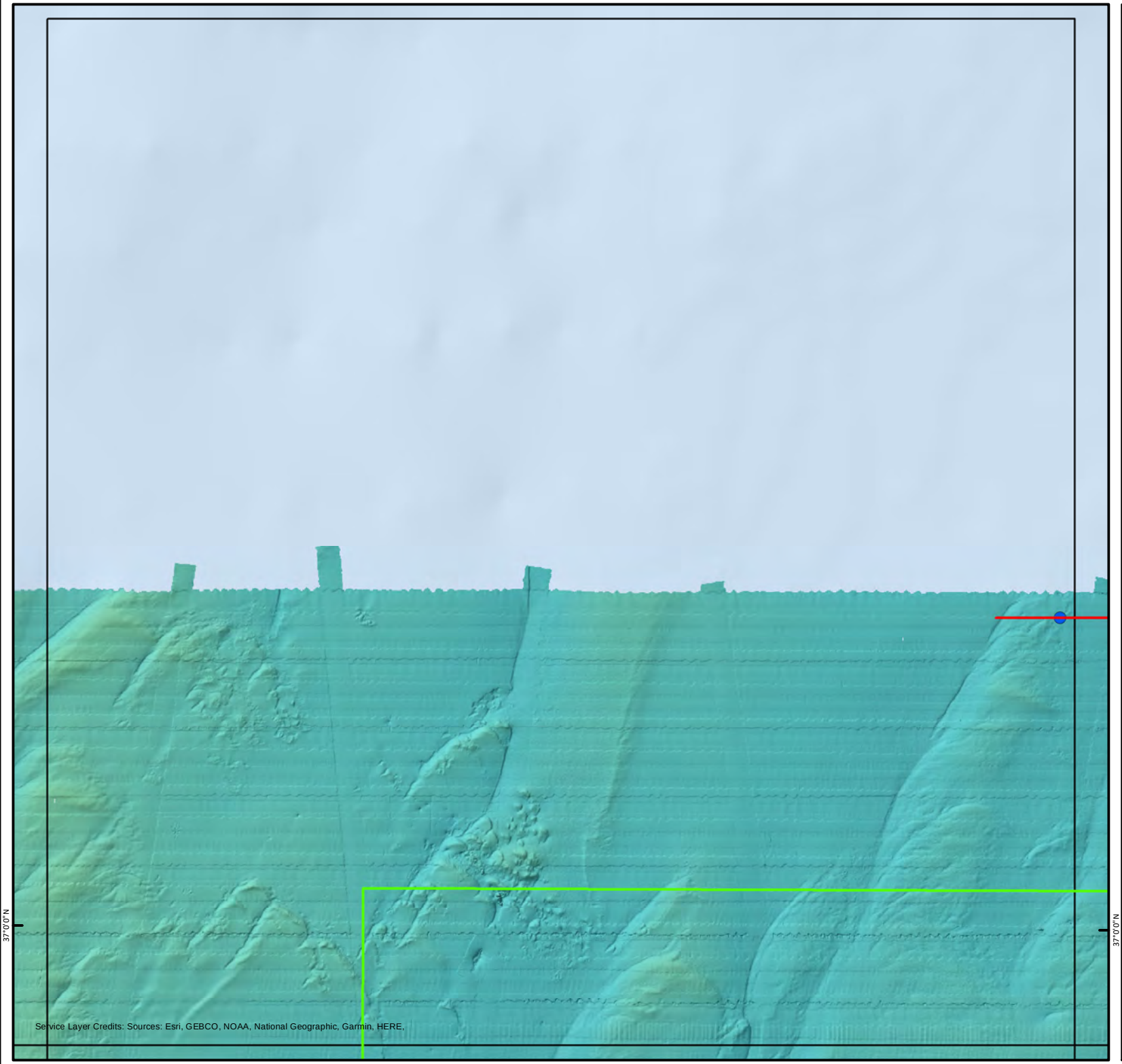
Data Source	Agency/ Collaborators	Years Covered	Summary and Data Application	Study Area Context
				

Data Source	Agency/ Collaborators	Years Covered	Summary and Data Application	Study Area Context
USACE Norfolk District, Environmental Assessment Sandbridge Beach Erosion Control and Hurricane Protection Project	USACE 2009, Cutter and Diaz 1998; Diaz et al. 2006	1997 to 2009	The concept of a monitoring protocol for the environmentally sound management of federal offshore borrow areas along the U.S. east and Gulf of Mexico coasts is complex. The proposed protocol addressed six issues: 1: Bathymetric and Substrate Surveys 2: Sediment Sampling and Analysis 3: Wave Monitoring and Modeling 4: Shoreline Monitoring and Modeling 5: Benthic Communities and Their Trophic Relationships to Fish, and 6: Marine Mammal and Wildlife Interactions During Dredging. The procedures, techniques, and tools advanced to examine these issues are fully appropriate for use in the study of each of the issues at specific sites and, if adopted as a mandatory element of dredging projects, should provide robust datasets. The current project had the combined goals of exercising and evaluating parts of the draft protocol and of considering the actual circumstances of the test area, Sandbridge Shoal and Sandbridge Beach, Virginia. The effort on Biological Monitoring and Evaluating the Biological Monitoring Protocol indicated that there was little discernable difference between areas that had been disturbed by sand mining and nearby areas that had not. Although substantial quantities of sand had been removed from the designated source areas, no negative environmental impacts have been observed for macrobenthos or demersal fishes. Also, although much of the suggested protocol proved valuable, there is a need to provide for a more mobile strategy that better facilitates responses to unanticipated changes in planned dredging activities.	
Regional Geophysical Survey and Interpretive Report: Virginia WEA Offshore Southeastern Virginia	Fugro 2013a	2013	During 2013, Fugro Consultants, Inc. (Fugro) conducted a regional marine geophysical survey for the Virginia Department of Mines, Minerals and Energy and the U.S. Department of Interior, BOEM in the designated WEA on the OCS offshore southeastern Virginia. The survey and reporting conducted in 2013 comprise Phase I of the Virginia Ocean Geophysical Survey. The primary purpose of	

Data Source	Agency/ Collaborators	Years Covered	Summary and Data Application	Study Area Context
			Phase I was to advance the state of knowledge relative to the geologic and subsurface conditions in the WEA.	
Virginia Ocean Geophysical Survey Phase II Analyses Offshore Virginia Wind Energy Area (BOEM 2016)	BOEM 2016	2016	Phase II of the Virginia Ocean Geophysical Survey utilized previously collected seismic data acquired within the offshore Virginia WEA in order to determine which seismic survey designs and processing steps provide the best imaging of the subsurface as needed for future site characterization studies and marine archaeological research. Additionally, the present study also identified key paleo-landforms along the Virginia OCS that could be used by archaeologists and geoscientists to reconstruct past environments along the U.S. Atlantic Margin. While this study was not conducted to meet the BOEM recommendations described in "*Guidelines for Providing Geophysical, Geotechnical, and Geohazard Information Pursuant to 30 CFR Part 585*" (BOEM 2015a) and "*Guidelines for Providing Archaeological and Historic Property Information Pursuant to 30 CFR Part 585*" (BOEM 2015b), this analysis provides an understanding of how a regional/reconnaissance-scale (i.e., primary lines spacing greater than 150 meters) seismic survey can be utilized to help inform the collection of more detailed (i.e., smaller-scale) surveys for both site characterization and archaeological site identification on the Atlantic OCS.	

Data Source	Agency/ Collaborators	Years Covered	Summary and Data Application	Study Area Context
				
Other Characterization Data; Atlantic Marine Assessment Program for Protected Species; Coastal and Marine Hazards and Resources Program (usSEABED)	Government reports and databases	various	Includes region- and species-specific studies.	

APPENDIX B:
BENTHIC SURVEY LOCATIONS – MAP BOOK



OFFSHORE WIND PROJECT

Dominion Energy

- Proposed Sample (Lease Area)
- Proposed 600m Video Transect

VOWTAP SAP Sample Location

- Benthic Grab Sample Location
- Cable Route Grab Location
- Reference Grab Sample Location
- Fish Haven
- BOEM Lease Block

BAG Hillshade Color Scale
(Depth in Meters)

0 — 7000

Lease Block 7113
Page 1 of 36

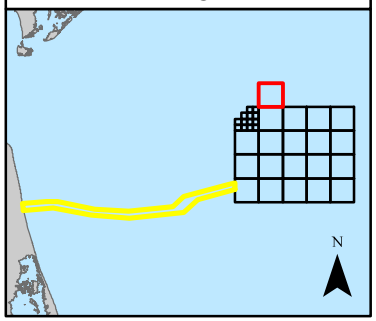
Date	May 14, 2020
File/Job Number	194-6047
Personnel	Figure Prepared by: William Scales

0 0.1 0.2 0.3 0.4 0.5 Miles

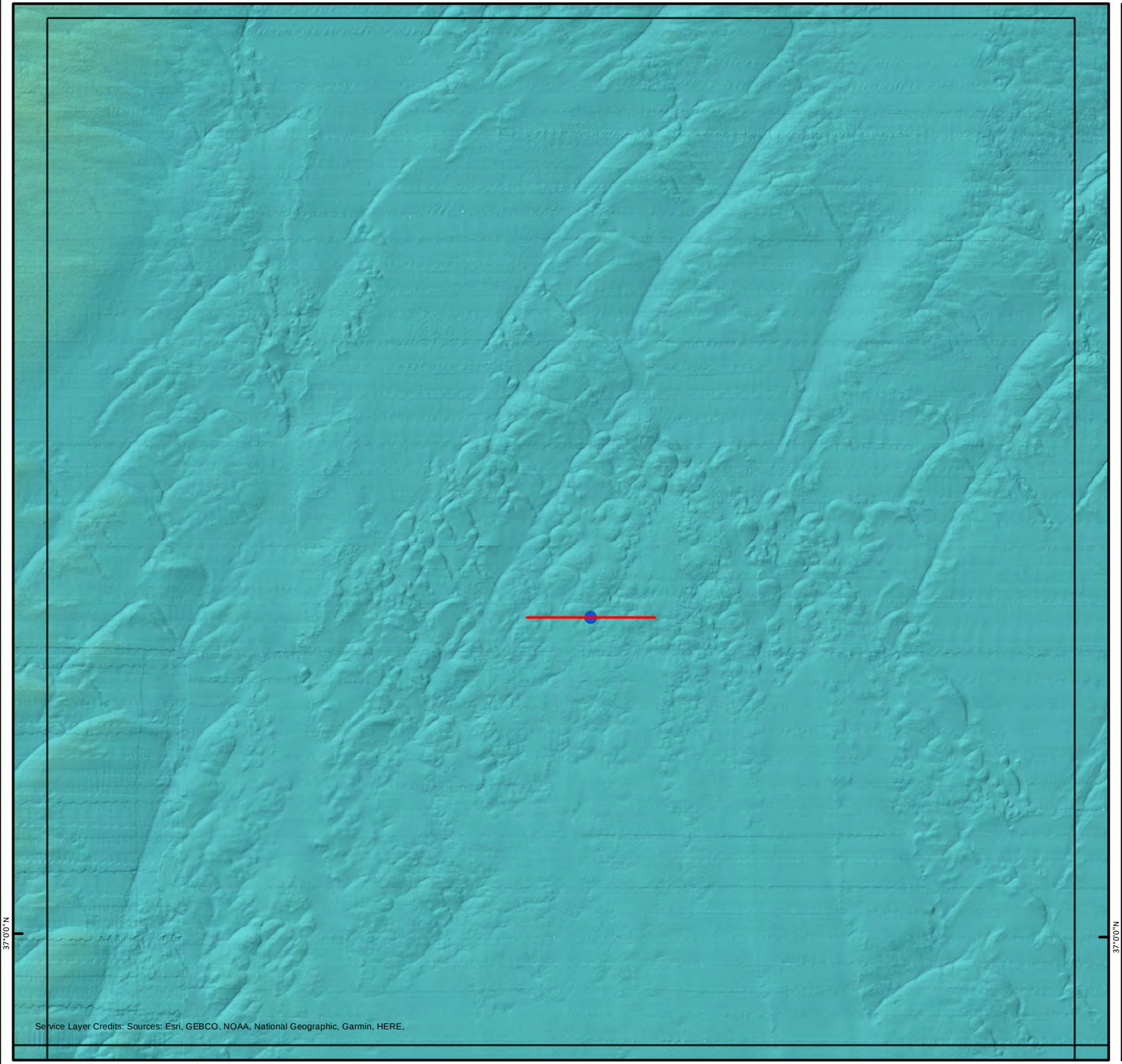
0 0.1 0.2 0.3 Nautical Miles

0 0.25 0.5 0.75 Kilometers

REFERENCE MAP



NOT FOR CONSTRUCTION



OFFSHORE WIND PROJECT

Dominion Energy

- Proposed Sample (Lease Area)
- Proposed 600m Video Transect

VOWTAP SAP Sample Location

- Benthic Grab Sample Location
- Cable Route Grab Location
- Reference Grab Sample Location
- BOEM Lease Block

BAG Hillshade Color Scale
(Depth in Meters)

0 7000

Lease Block 7115

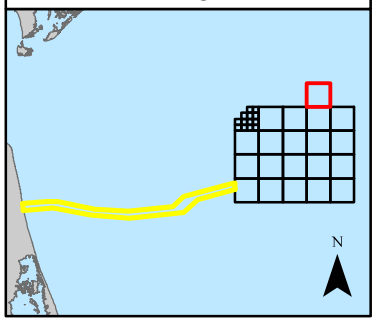
Date	May 14, 2020
File/Job Number	194-6047
Personnel	Figure Prepared by: William Scales

0 0.1 0.2 0.3 0.4 0.5 Miles

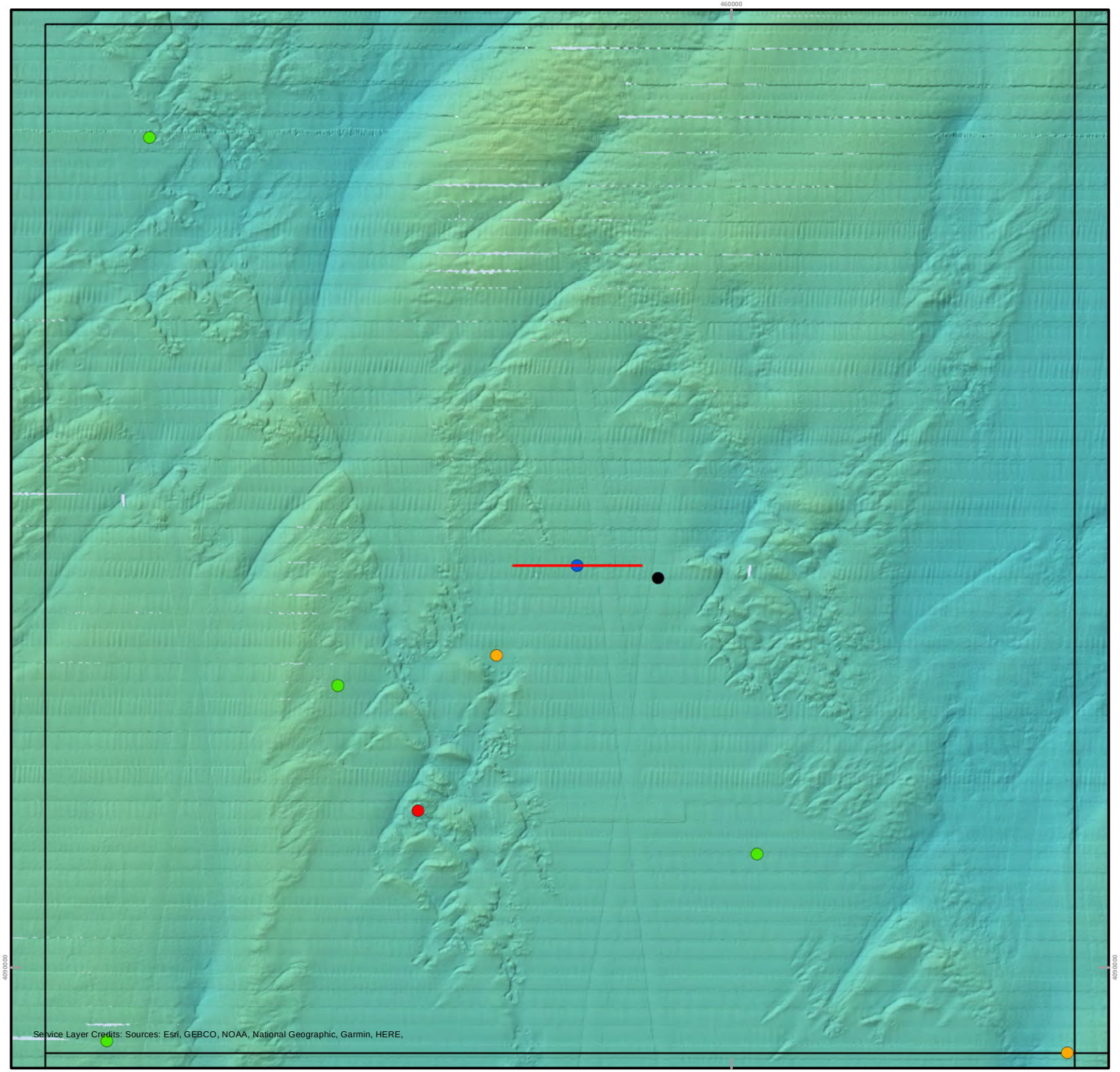
0 0.1 0.2 0.3 Nautical Miles

0 0.25 0.5 0.75 Kilometers

REFERENCE MAP



NOT FOR CONSTRUCTION



OFFSHORE WIND PROJECT

Dominion Energy

- Proposed Sample (Lease Area)
- Proposed 600m Video Transect

VOWTAP SAP Sample Location

- Benthic Grab Sample Location
- Cable Route Grab Location
- Reference Grab Sample Location

Existing Sample Data

- usSEABED
- WH
- AMAPPS
- OCDBS
- BOEM Lease Block

BAG Hillshade Color Scale
(Depth in Meters)

0 — 7000

Lease Block 6012

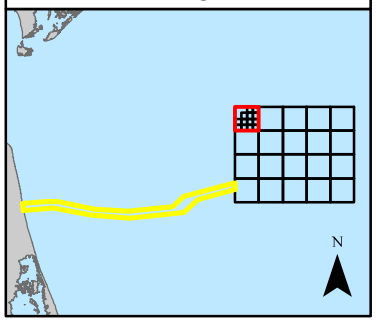
Date	May 14, 2020
File/Job Number	194-6047
Personnel	Figure Prepared by: William Scales

0 0.1 0.2 0.3 0.4 0.5 Miles

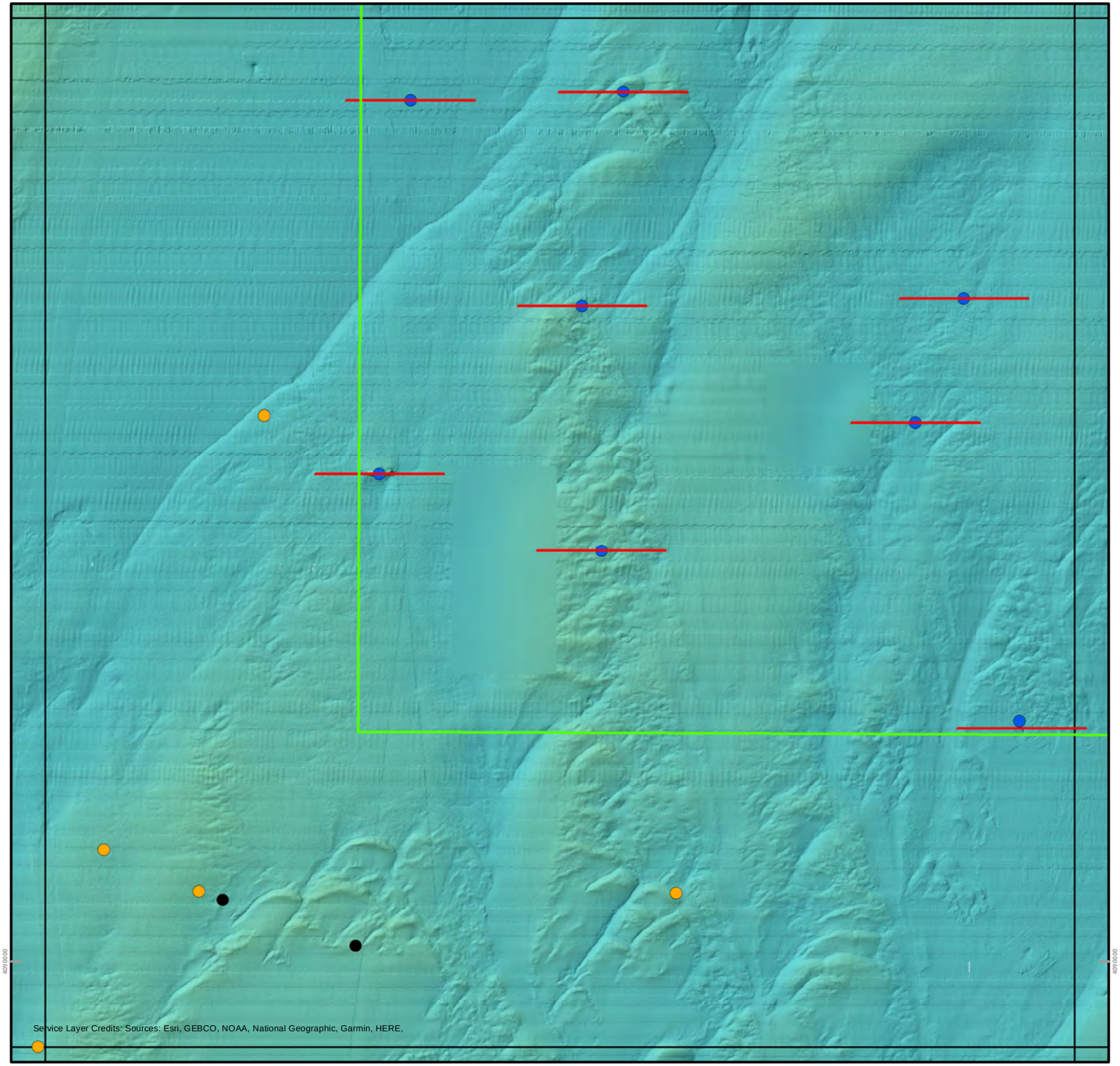
0 0.1 0.2 0.3 Nautical Miles

0 0.25 0.5 0.75 Kilometers

REFERENCE MAP



NOT FOR CONSTRUCTION



OFFSHORE WIND PROJECT

Dominion Energy

- Proposed Sample (Lease Area)
- Proposed 600m Video Transect

VOWTAP SAP Sample Location

- Benthic Grab Sample Location
- Cable Route Grab Location
- Reference Grab Sample Location
- WH
- OCDBS
- Fish Haven
- BOEM Lease Block

BAG Hillshade Color Scale
(Depth in Meters)

0 — 7000

Lease Block 6013
Page 4 of 36

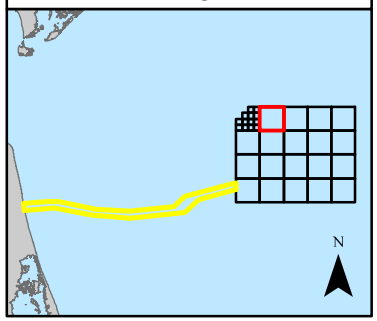
Date	May 14, 2020
File/Job Number	194-6047
Personnel	Figure Prepared by: William Scales

0 0.1 0.2 0.3 0.4 0.5 Miles

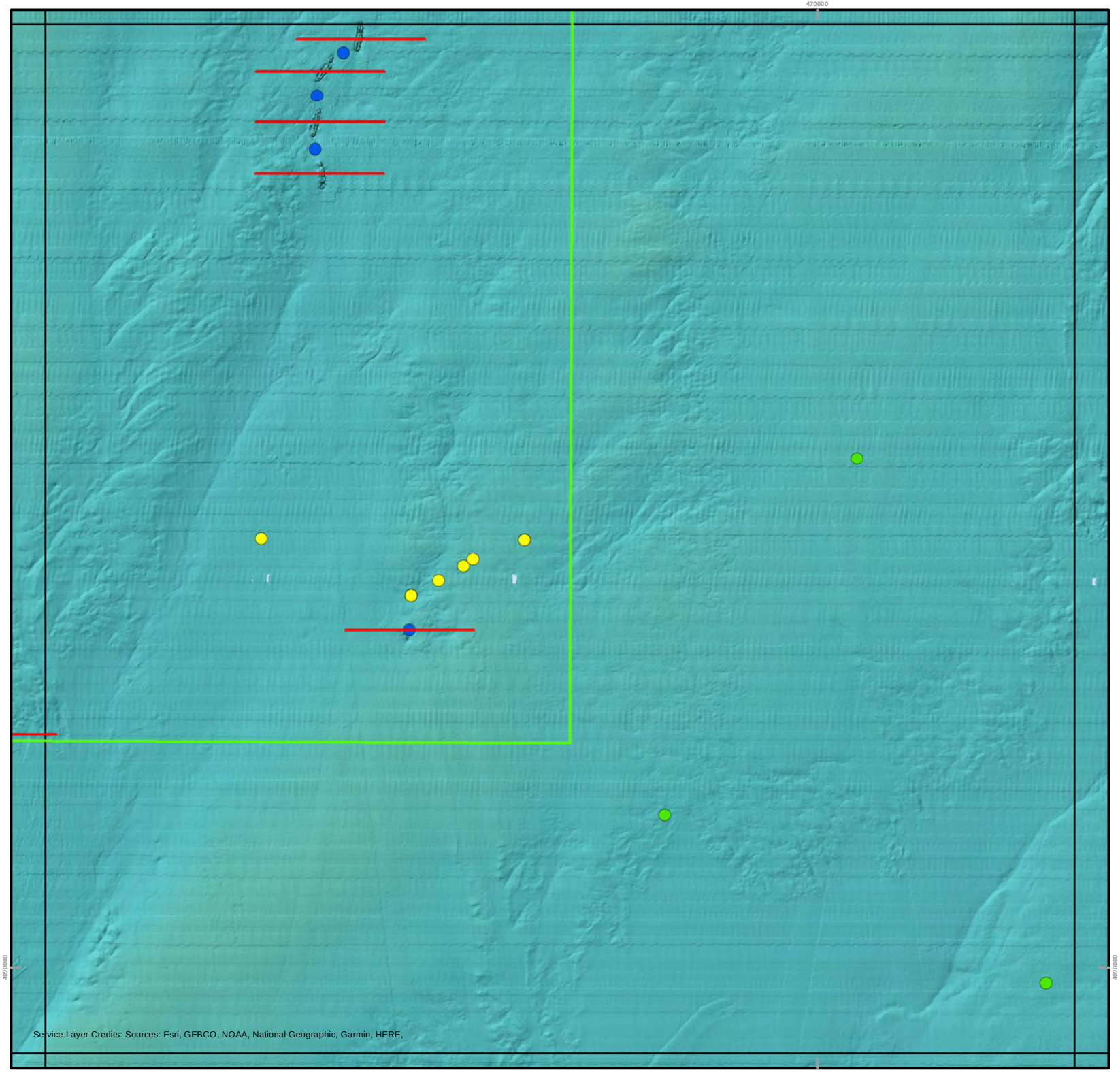
0 0.1 0.2 0.3 Nautical Miles

0 0.25 0.5 0.75 Kilometers

REFERENCE MAP



NOT FOR CONSTRUCTION



OFFSHORE WIND PROJECT

Dominion Energy

- Proposed Sample (Lease Area)
- Proposed 600m Video Transect

VOWTAP SAP Sample Location

- Benthic Grab Sample Location
- Cable Route Grab Location
- Reference Grab Sample Location

Existing Sample Data

- usSEABED
- RV Henry Bigelow
- Fish Haven
- BOEM Lease Block

BAG Hillshade Color Scale
(Depth in Meters)

0 — 7000

Lease Block 6014

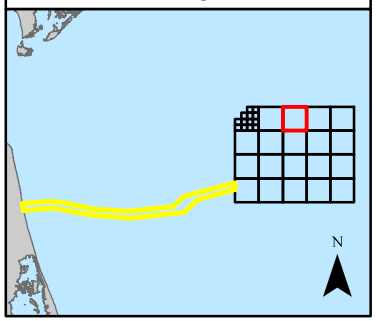
Date	May 14, 2020
File/Job Number	194-6047
Personnel	Figure Prepared by: William Scales

0 0.1 0.2 0.3 0.4 0.5 Miles

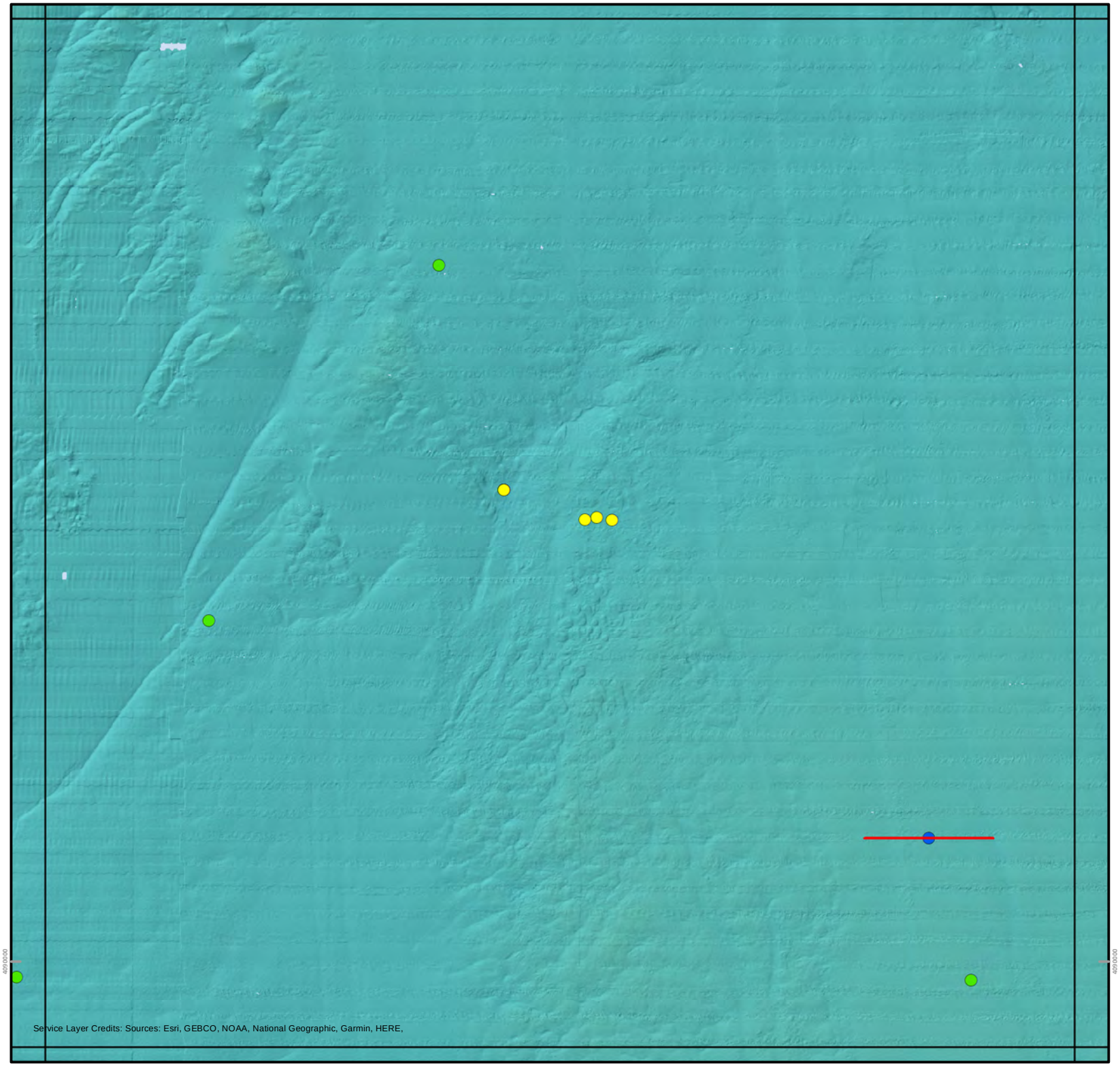
0 0.1 0.2 0.3 Nautical Miles

0 0.25 0.5 0.75 Kilometers

REFERENCE MAP



NOT FOR CONSTRUCTION



OFFSHORE WIND PROJECT

Dominion Energy

- Proposed Sample (Lease Area)
- Proposed 600m Video Transect

VOWTAP SAP Sample Location

- Benthic Grab Sample Location
- Cable Route Grab Location
- Reference Grab Sample Location

Existing Sample Data

- usSEABED
- RV Henry Bigelow
- BOEM Lease Block

BAG Hillshade Color Scale
(Depth in Meters)

0 — 7000

Lease Block 6015
Page 6 of 36

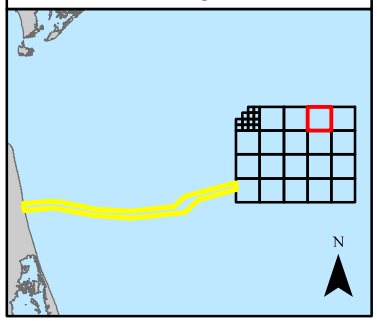
Date	May 14, 2020
File/Job Number	194-6047
Personnel	Figure Prepared by: William Scales

0 0.1 0.2 0.3 0.4 0.5 Miles

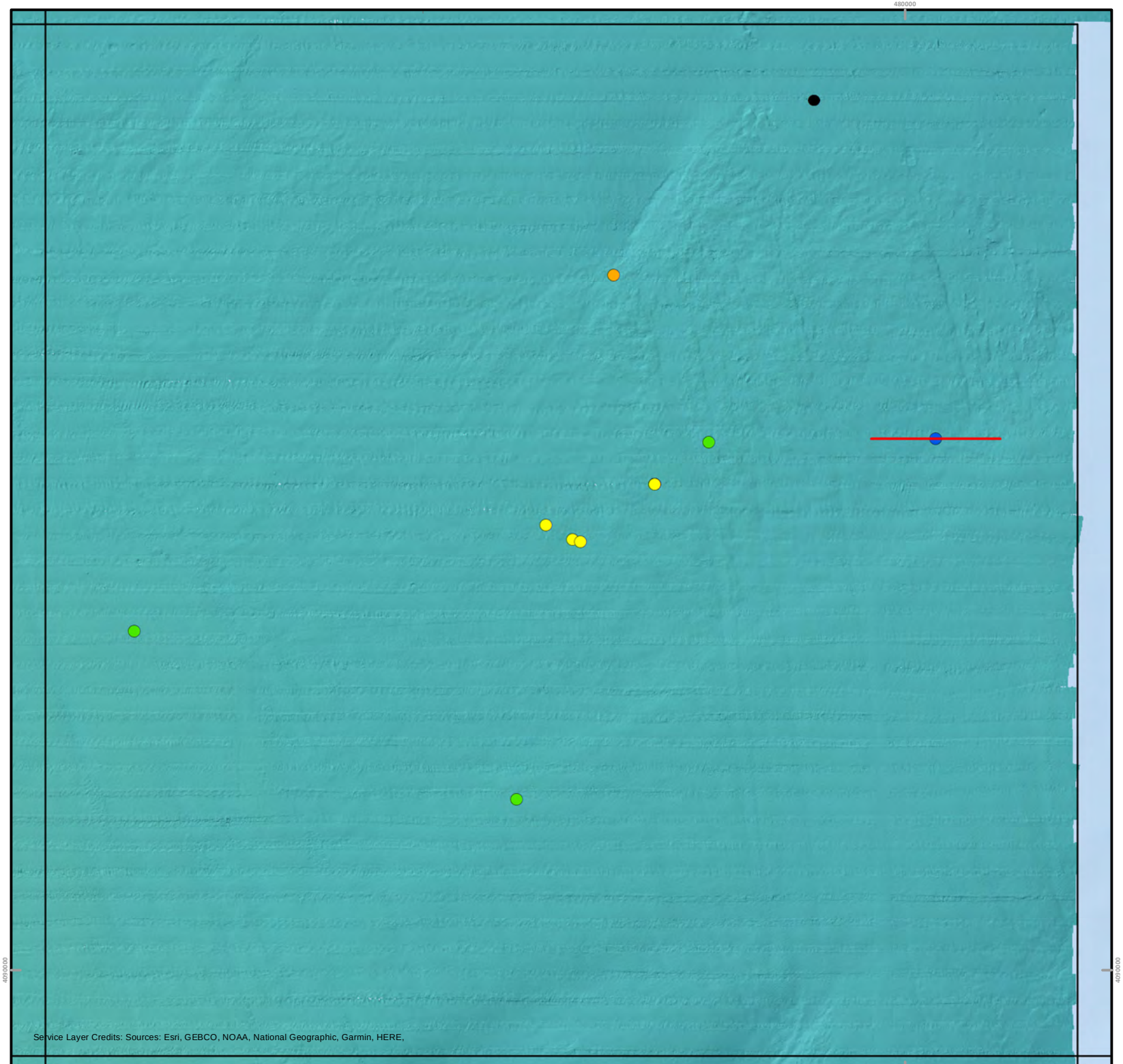
0 0.1 0.2 0.3 Nautical Miles

0 0.25 0.5 0.75 Kilometers

REFERENCE MAP



NOT FOR CONSTRUCTION



OFFSHORE WIND PROJECT

Dominion Energy

- Proposed Sample (Lease Area)
- Proposed 600m Video Transect

VOWTAP SAP Sample Location

- Benthic Grab Sample Location
- Cable Route Grab Location
- Reference Grab Sample Location

Existing Sample Data

- usSEABED
- WH
- OCDBS
- RV Henry Bigelow
- BOEM Lease Block

BAG Hillshade Color Scale
(Depth in Meters)

0 — 7000

Lease Block 6016

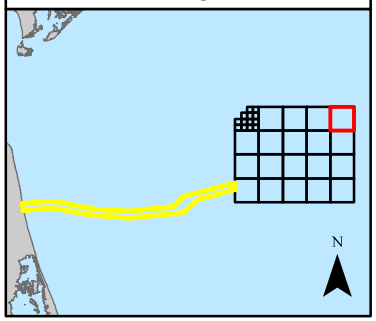
Date	May 14, 2020
File/Job Number	194-6047
Personnel	Figure Prepared by: William Scales

0 0.1 0.2 0.3 0.4 0.5 Miles

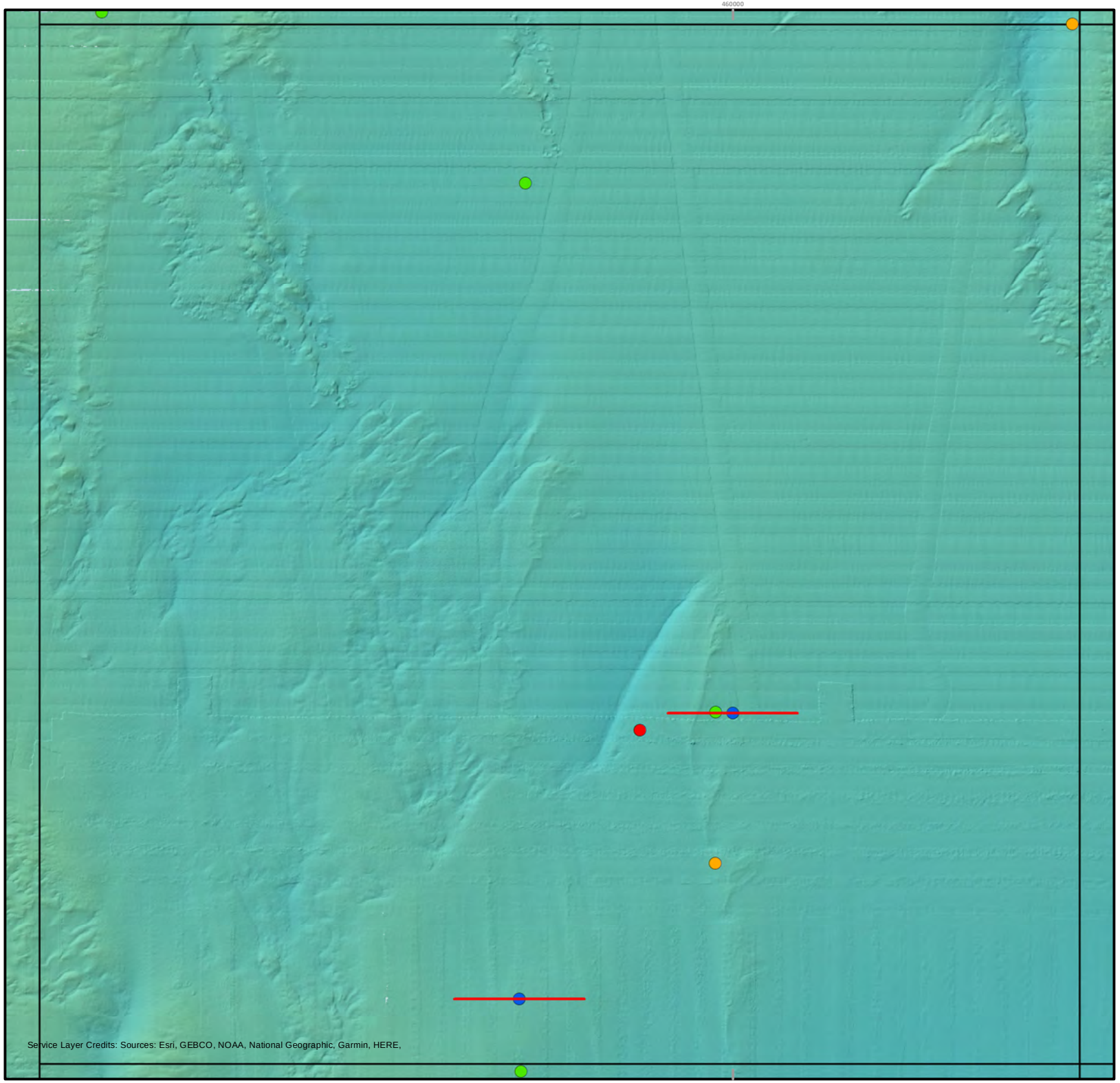
0 0.1 0.2 0.3 Nautical Miles

0 0.25 0.5 0.75 Kilometers

REFERENCE MAP



NOT FOR CONSTRUCTION



OFFSHORE WIND PROJECT

Dominion Energy

- Proposed Sample (Lease Area)
- Proposed 600m Video Transect

VOWTAP SAP Sample Location

- Benthic Grab Sample Location
- Cable Route Grab Location
- Reference Grab Sample Location

Existing Sample Data

- usSEABED
- AMAPPS
- OCDBS
- BOEM Lease Block

BAG Hillshade Color Scale
(Depth in Meters)

0 — 7000

Lease Block 6062
Page 8 of 36

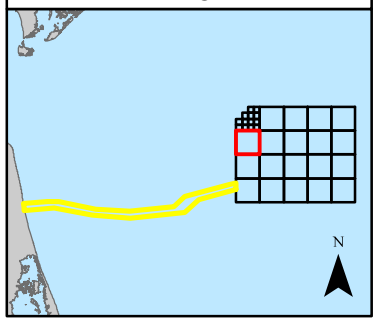
Date	May 14, 2020
File/Job Number	194-6047
Personnel	Figure Prepared by: William Scales

0 0.1 0.2 0.3 0.4 0.5 Miles

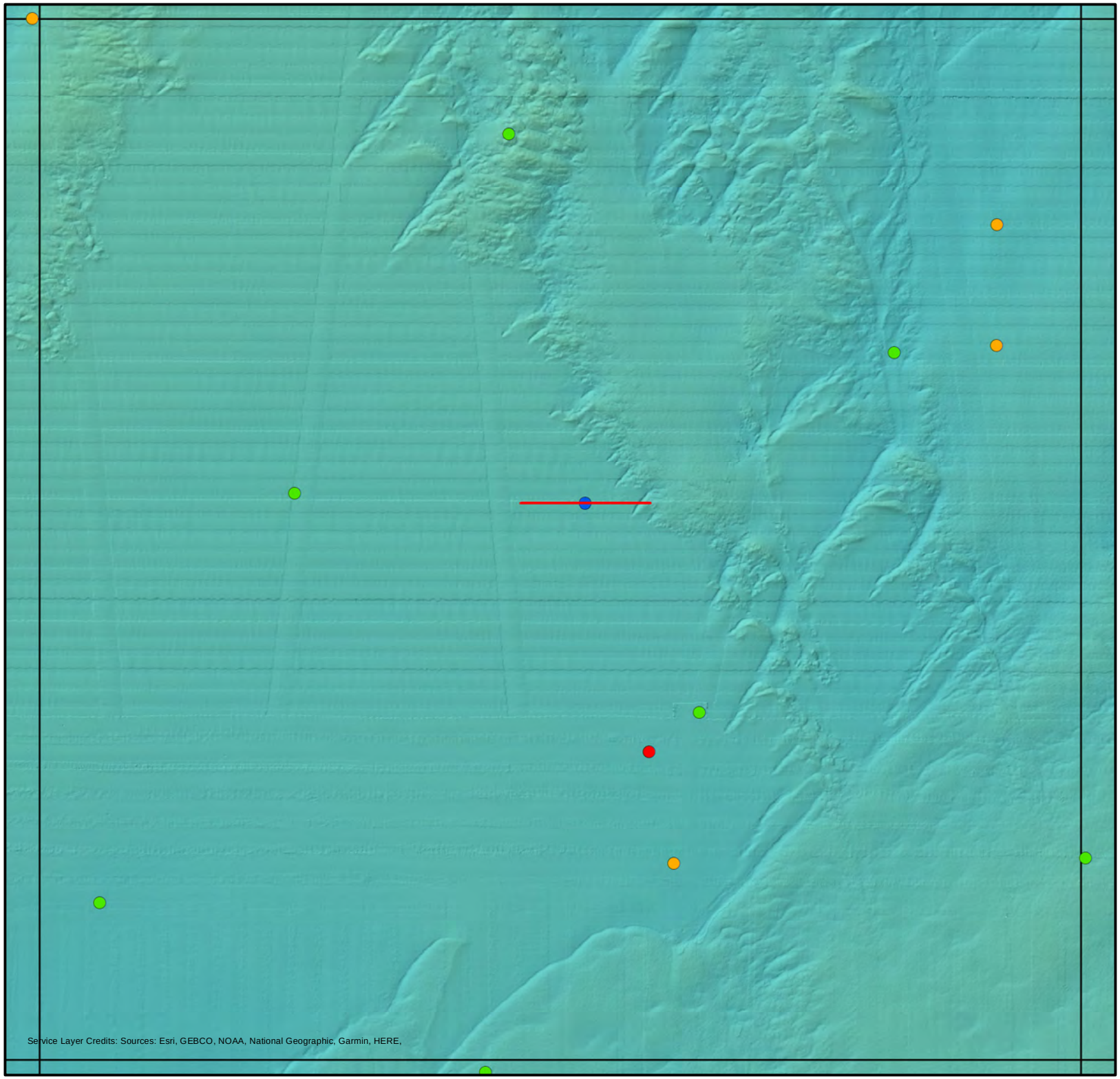
0 0.1 0.2 0.3 Nautical Miles

0 0.25 0.5 0.75 Kilometers

REFERENCE MAP



NOT FOR CONSTRUCTION



OFFSHORE WIND PROJECT

Dominion Energy

- Proposed Sample (Lease Area)
- Proposed 600m Video Transect

VOWTAP SAP Sample Location

- Benthic Grab Sample Location
- Cable Route Grab Location
- Reference Grab Sample Location

Existing Sample Data

- usSEABED
- AMAPPS
- OCDBS
- BOEM Lease Block

BAG Hillshade Color Scale
(Depth in Meters)

0 — 7000

Lease Block 6063

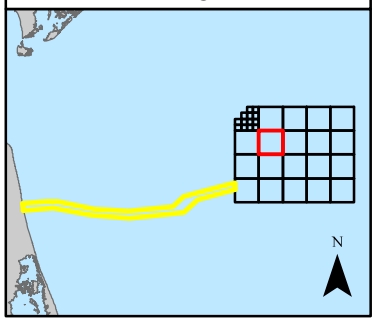
Date	May 14, 2020
File/Job Number	194-6047
Personnel	Figure Prepared by: William Scales

0 0.1 0.2 0.3 0.4 0.5 Miles

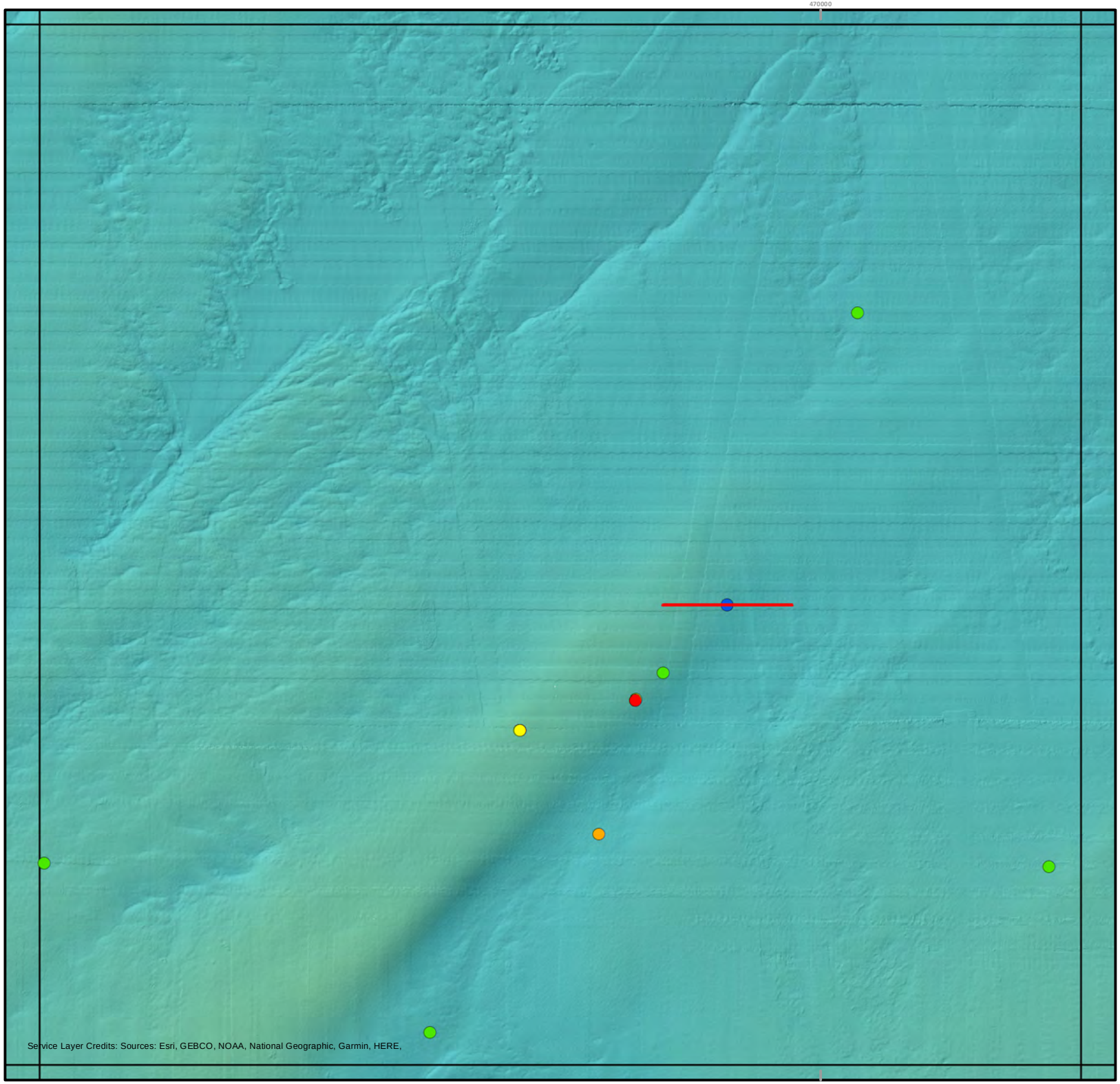
0 0.1 0.2 0.3 Nautical Miles

0 0.25 0.5 0.75 Kilometers

REFERENCE MAP



NOT FOR CONSTRUCTION



OFFSHORE WIND PROJECT

Dominion Energy

- Proposed Sample (Lease Area)
- Proposed 600m Video Transect

VOWTAP SAP Sample Location

- Benthic Grab Sample Location
- Cable Route Grab Location
- Reference Grab Sample Location

Existing Sample Data

- usSEABED
- AMAPPS
- OCDBS
- RV Henry Bigelow
- BOEM Lease Block

BAG Hillshade Color Scale
(Depth in Meters)

0 7000

Lease Block 6064
Page 10 of 36

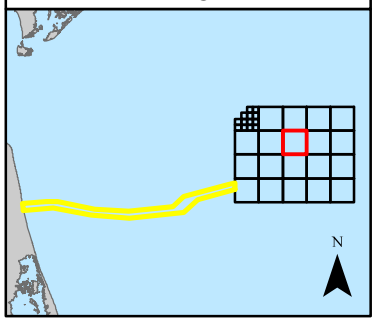
Date	May 14, 2020
File/Job Number	194-6047
Personnel	Figure Prepared by: William Scales

0 0.1 0.2 0.3 0.4 0.5 Miles

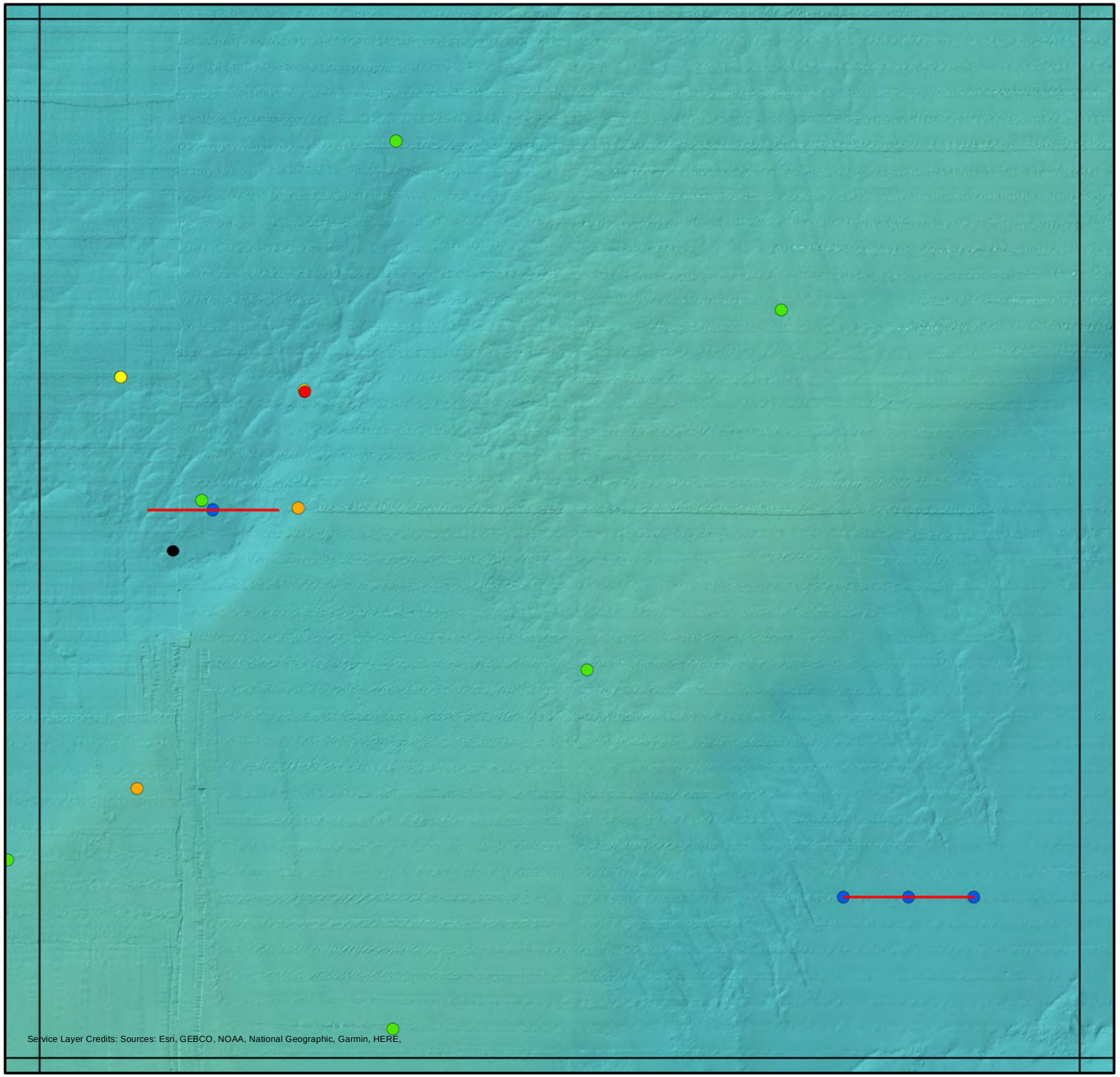
0 0.1 0.2 0.3 Nautical Miles

0 0.25 0.5 0.75 Kilometers

REFERENCE MAP



NOT FOR CONSTRUCTION



OFFSHORE WIND PROJECT

Dominion Energy

- Proposed Sample (Lease Area)
- Proposed 600m Video Transect

VOWTAP SAP Sample Location

- Benthic Grab Sample Location
- Cable Route Grab Location
- Reference Grab Sample Location

Existing Sample Data

- usSEABED
- WH
- AMAPPS
- OCDBS
- RV Henry Bigelow
- BOEM Lease Block

BAG Hillshade Color Scale
(Depth in Meters)

0 — 7000

Lease Block 6065

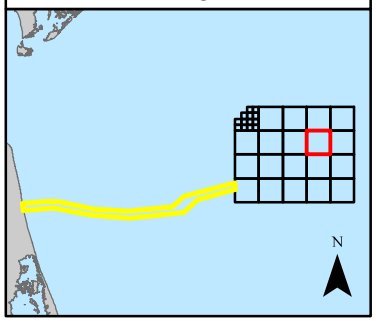
Date	May 14, 2020
File/Job Number	194-6047
Personnel	Figure Prepared by: William Scales

0 0.1 0.2 0.3 0.4 0.5 Miles

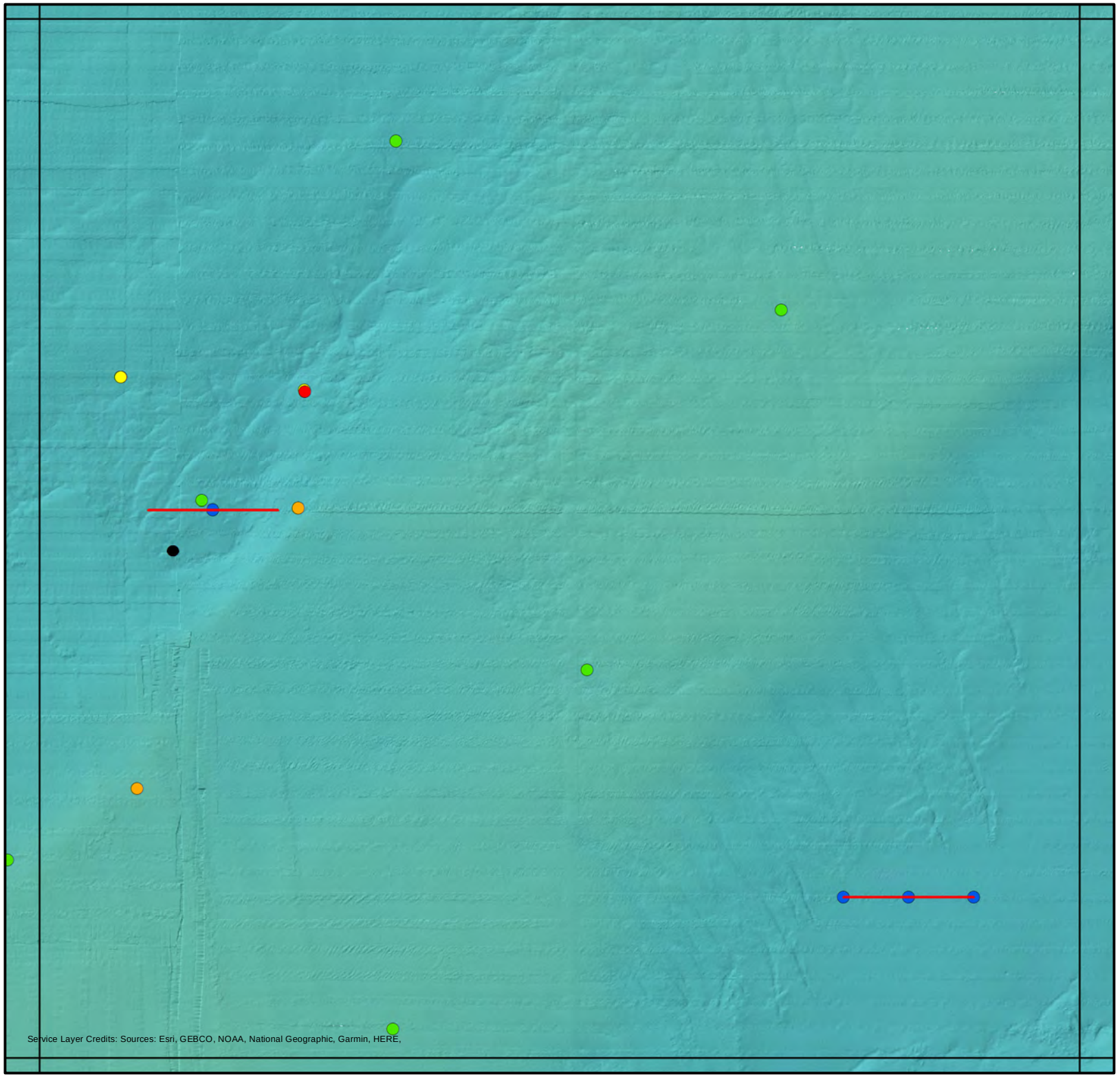
0 0.1 0.2 0.3 Nautical Miles

0 0.25 0.5 0.75 Kilometers

REFERENCE MAP



NOT FOR CONSTRUCTION



OFFSHORE WIND PROJECT

Dominion Energy

- Proposed Sample (Lease Area)
- Proposed 600m Video Transect

VOWTAP SAP Sample Location

- Benthic Grab Sample Location
- Cable Route Grab Location
- Reference Grab Sample Location

Existing Sample Data

- usSEABED
- WH
- AMAPPS
- OCDBS
- RV Henry Bigelow
- BOEM Lease Block

BAG Hillshade Color Scale
(Depth in Meters)

0 — 7000

Lease Block 6065

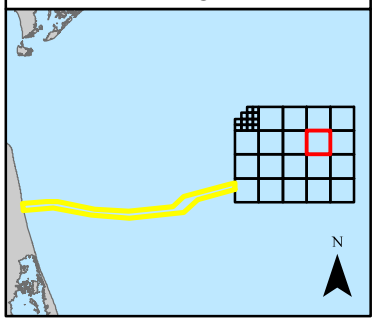
Date	May 14, 2020
File/Job Number	194-6047
Personnel	Figure Prepared by: William Scales

0 0.1 0.2 0.3 0.4 0.5 Miles

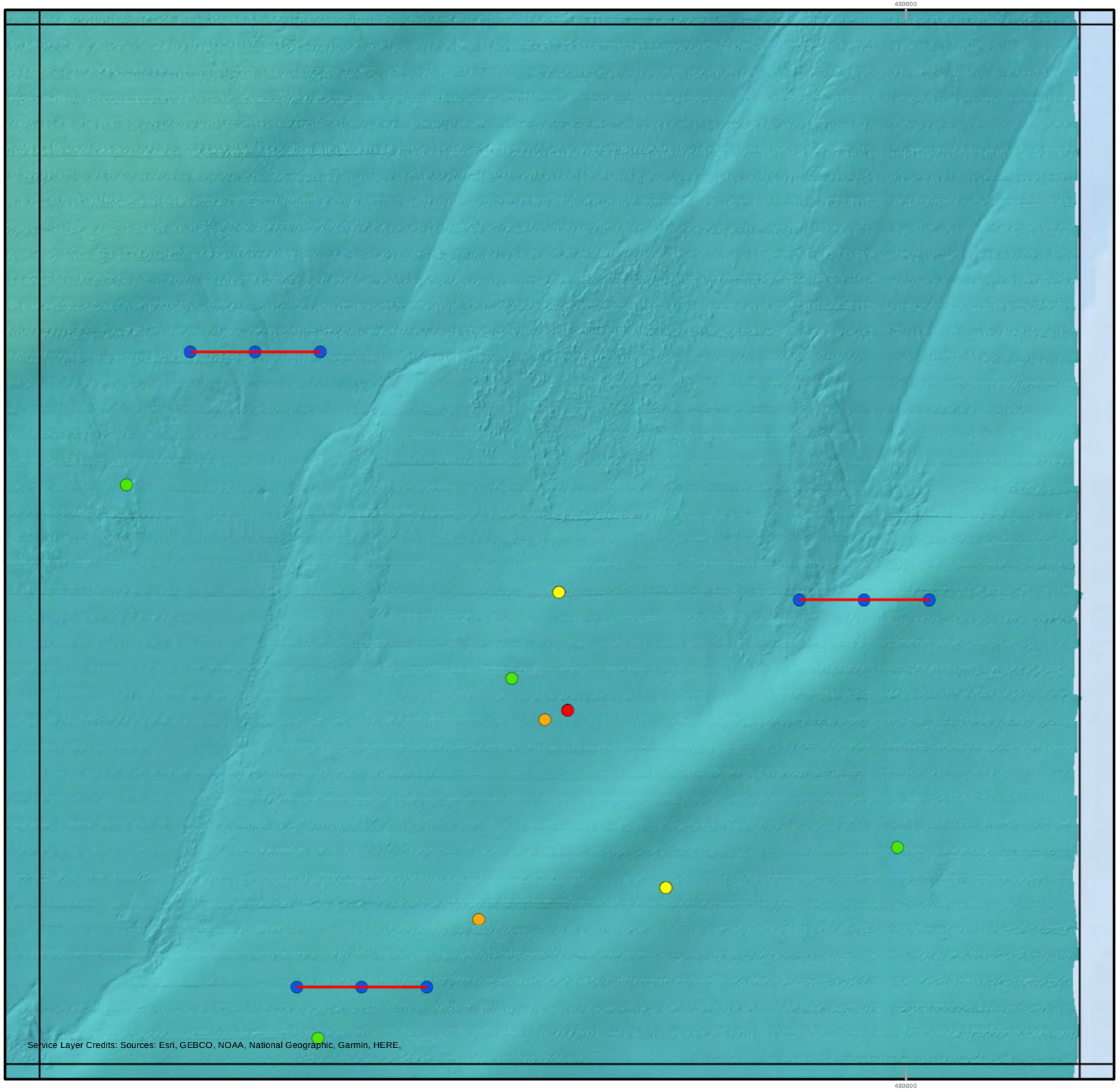
0 0.1 0.2 0.3 Nautical Miles

0 0.25 0.5 0.75 Kilometers

REFERENCE MAP



NOT FOR CONSTRUCTION



OFFSHORE WIND PROJECT

Dominion Energy

- Proposed Sample (Lease Area)
- Proposed 600m Video Transect

VOWTAP SAP Sample Location

- Benthic Grab Sample Location
- Cable Route Grab Location
- Reference Grab Sample Location

Existing Sample Data

- usSEABED
- AMAPPS
- OCDBS
- RV Henry Bigelow
- BOEM Lease Block

BAG Hillshade Color Scale
(Depth in Meters)

0 — 7000

Lease Block 6066

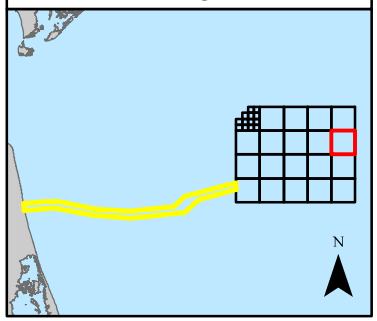
Date	May 14, 2020
File/Job Number	194-6047
Personnel	Figure Prepared by: William Scales

0 0.1 0.2 0.3 0.4 0.5 Miles

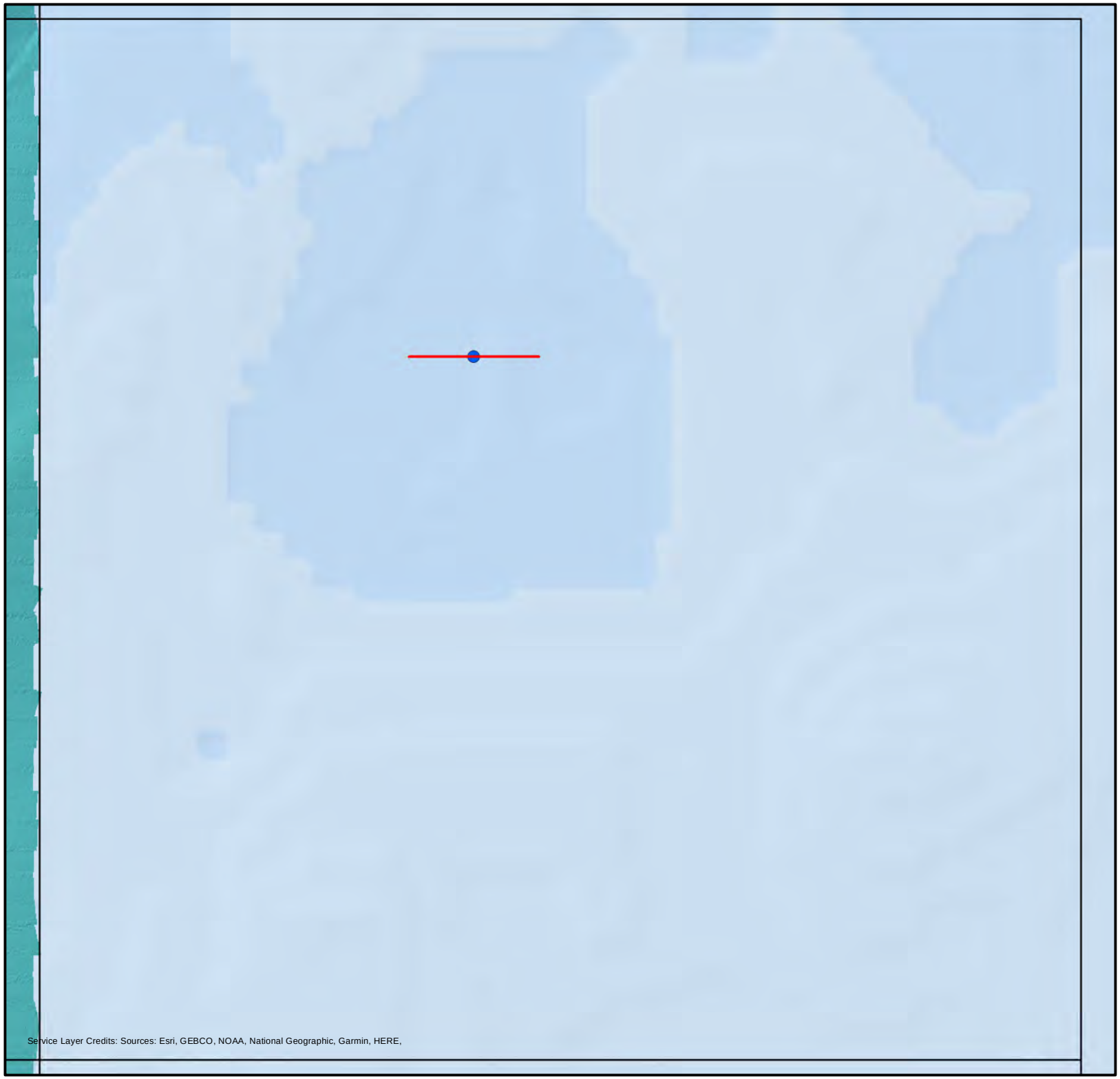
0 0.1 0.2 0.3 Nautical Miles

0 0.25 0.5 0.75 Kilometers

REFERENCE MAP



NOT FOR CONSTRUCTION



OFFSHORE WIND PROJECT

Dominion Energy

- Proposed Sample (Lease Area)
- Proposed 600m Video Transect

VOWTAP SAP Sample Location

- Benthic Grab Sample Location
- Cable Route Grab Location
- Reference Grab Sample Location
- BOEM Lease Block

BAG Hillshade Color Scale
(Depth in Meters)

0 7000

Lease Block 6067
Page 13 of 36

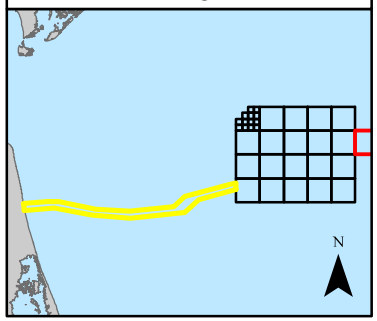
Date	May 14, 2020
File/Job Number	194-6047
Personnel	Figure Prepared by: William Scales

0 0.1 0.2 0.3 0.4 0.5 Miles

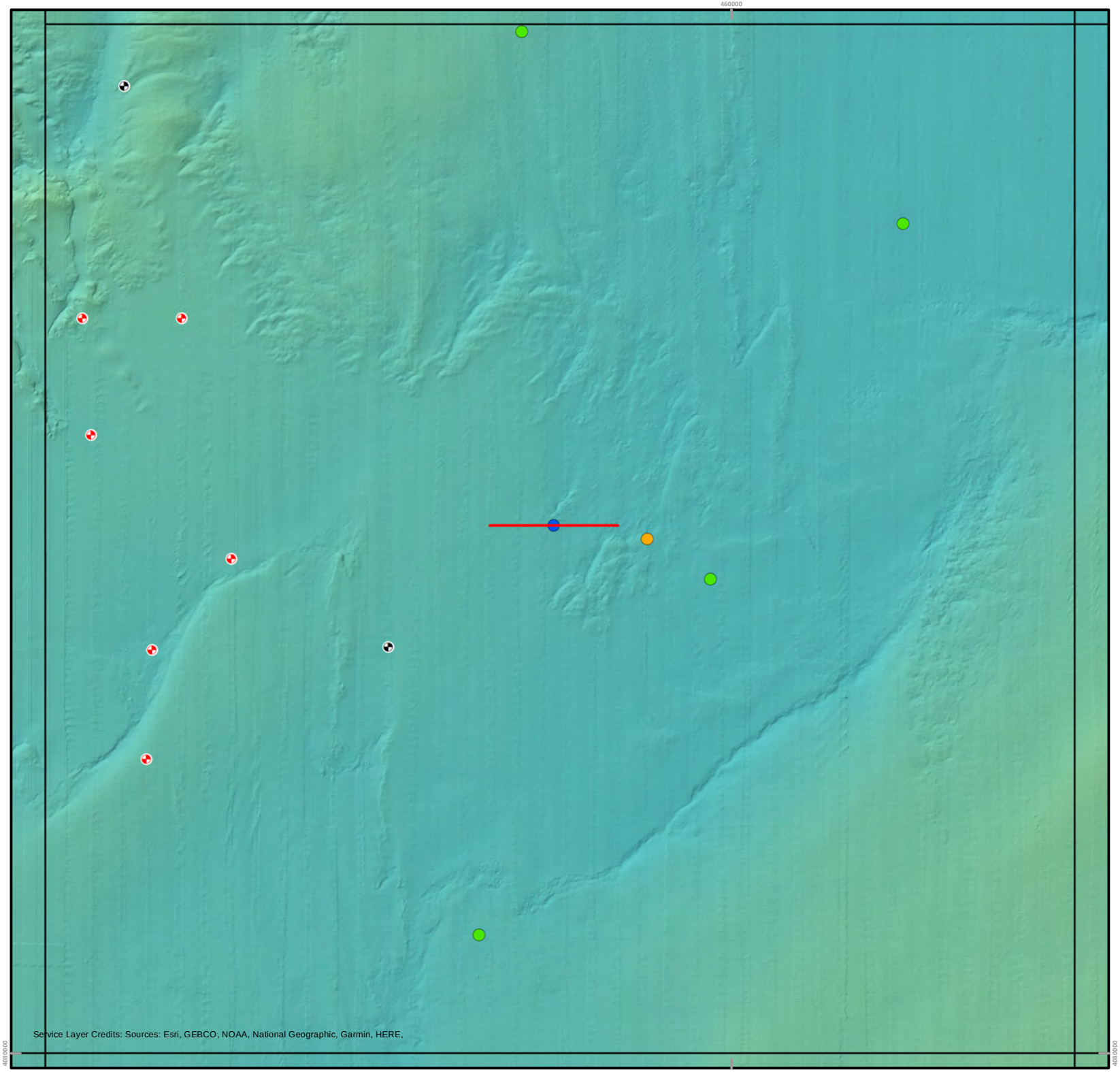
0 0.1 0.2 0.3 Nautical Miles

0 0.25 0.5 0.75 Kilometers

REFERENCE MAP



NOT FOR CONSTRUCTION



OFFSHORE WIND PROJECT

Dominion Energy

- Proposed Sample (Lease Area)
- Proposed 600m Video Transect

VOWTAP SAP Sample Location

- Benthic Grab Sample Location
- Cable Route Grab Location
- Reference Grab Sample Location

Existing Sample Data

- usSEABED
- OCDBS
- BOEM Lease Block

BAG Hillshade Color Scale
(Depth in Meters)

0 — 7000

Lease Block 6112
Page 14 of 36

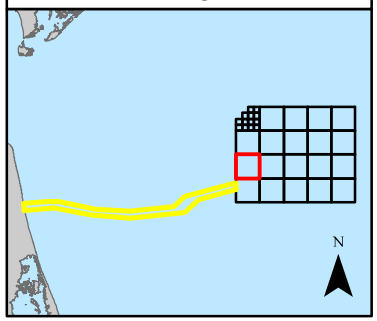
Date	May 14, 2020
File/Job Number	194-6047
Personnel	Figure Prepared by: William Scales

0 0.1 0.2 0.3 0.4 0.5 Miles

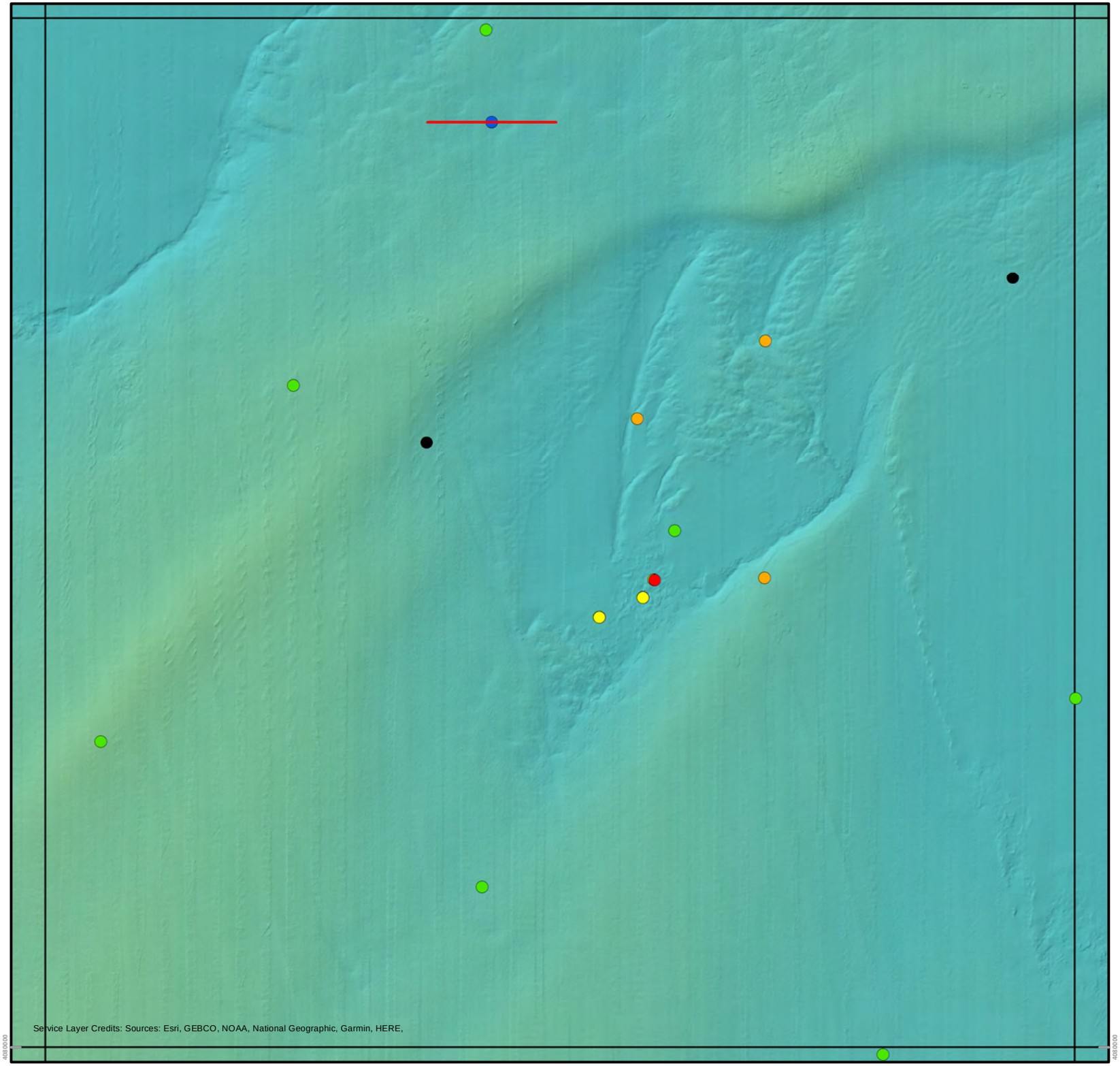
0 0.1 0.2 0.3 Nautical Miles

0 0.25 0.5 0.75 Kilometers

REFERENCE MAP



NOT FOR CONSTRUCTION



OFFSHORE WIND PROJECT

Dominion Energy

- Proposed Sample (Lease Area)
- Proposed 600m Video Transect

VOWTAP SAP Sample Location

- Benthic Grab Sample Location
- Cable Route Grab Location
- Reference Grab Sample Location

Existing Sample Data

- usSEABED
- WH
- AMAPPS
- OCDBS
- RV Henry Bigelow
- BOEM Lease Block

BAG Hillshade Color Scale
(Depth in Meters)

0 — 7000

Lease Block 6113
Page 15 of 36

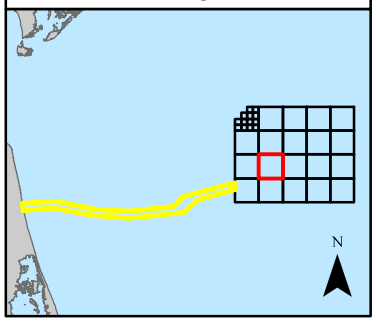
Date	May 14, 2020
File/Job Number	194-6047
Personnel	Figure Prepared by: William Scales

0 0.1 0.2 0.3 0.4 0.5 Miles

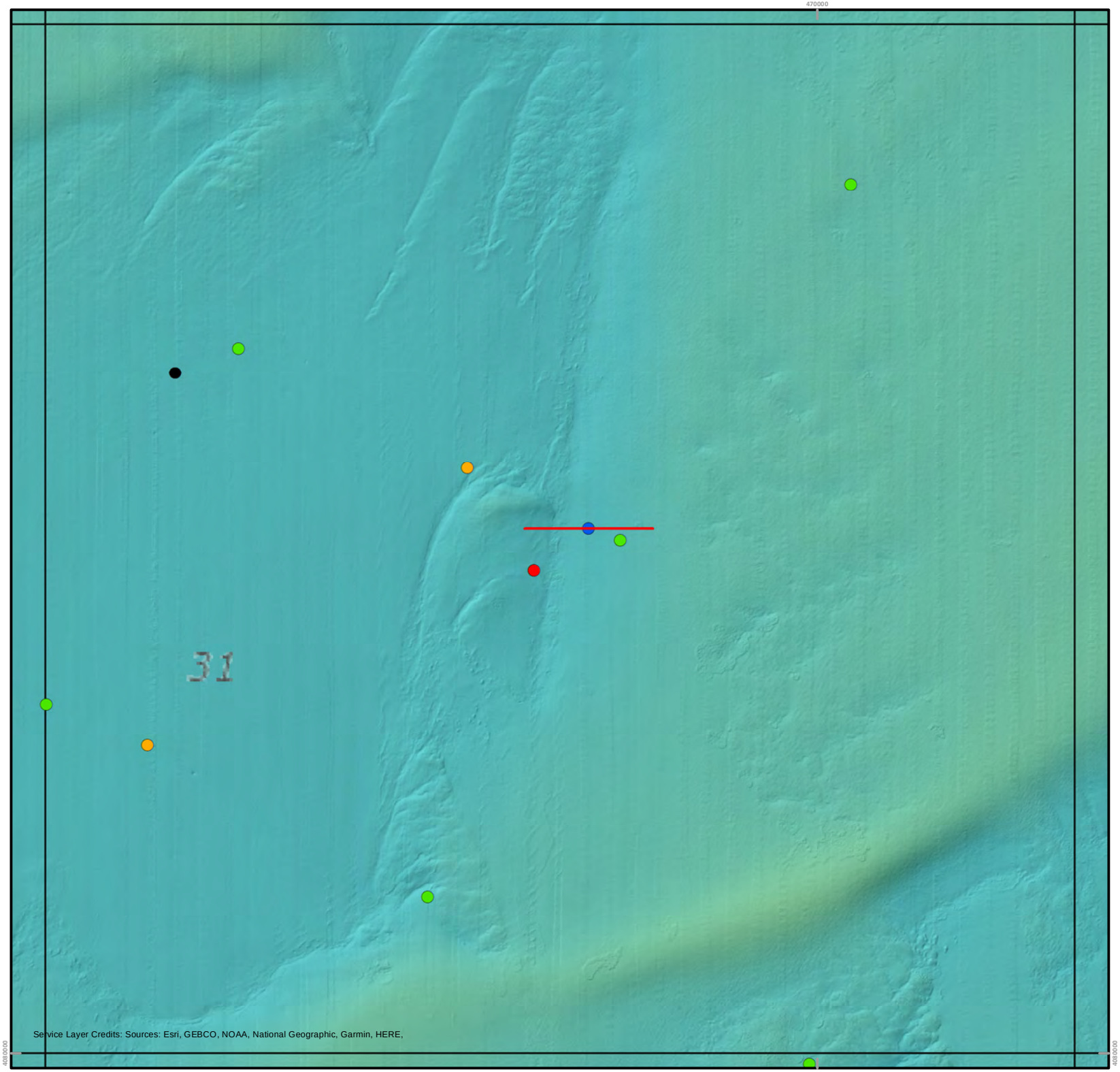
0 0.1 0.2 0.3 Nautical Miles

0 0.25 0.5 0.75 Kilometers

REFERENCE MAP



NOT FOR CONSTRUCTION



OFFSHORE WIND PROJECT

Dominion Energy

- Proposed Sample (Lease Area)
- Proposed 600m Video Transect

VOWTAP SAP Sample Location

- Benthic Grab Sample Location
- Cable Route Grab Location
- Reference Grab Sample Location

Existing Sample Data

- usSEABED
- WH
- AMAPPS
- OCDBS
- BOEM Lease Block

BAG Hillshade Color Scale
(Depth in Meters)

0 — 7000

Lease Block 6114
Page 16 of 36

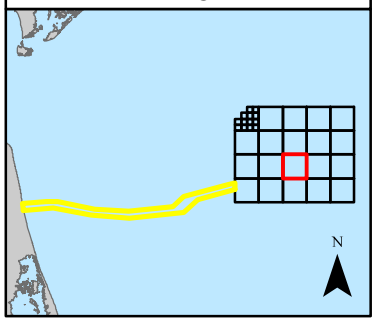
Date	May 14, 2020
File/Job Number	194-6047
Personnel	Figure Prepared by: William Scales

0 0.1 0.2 0.3 0.4 0.5 Miles

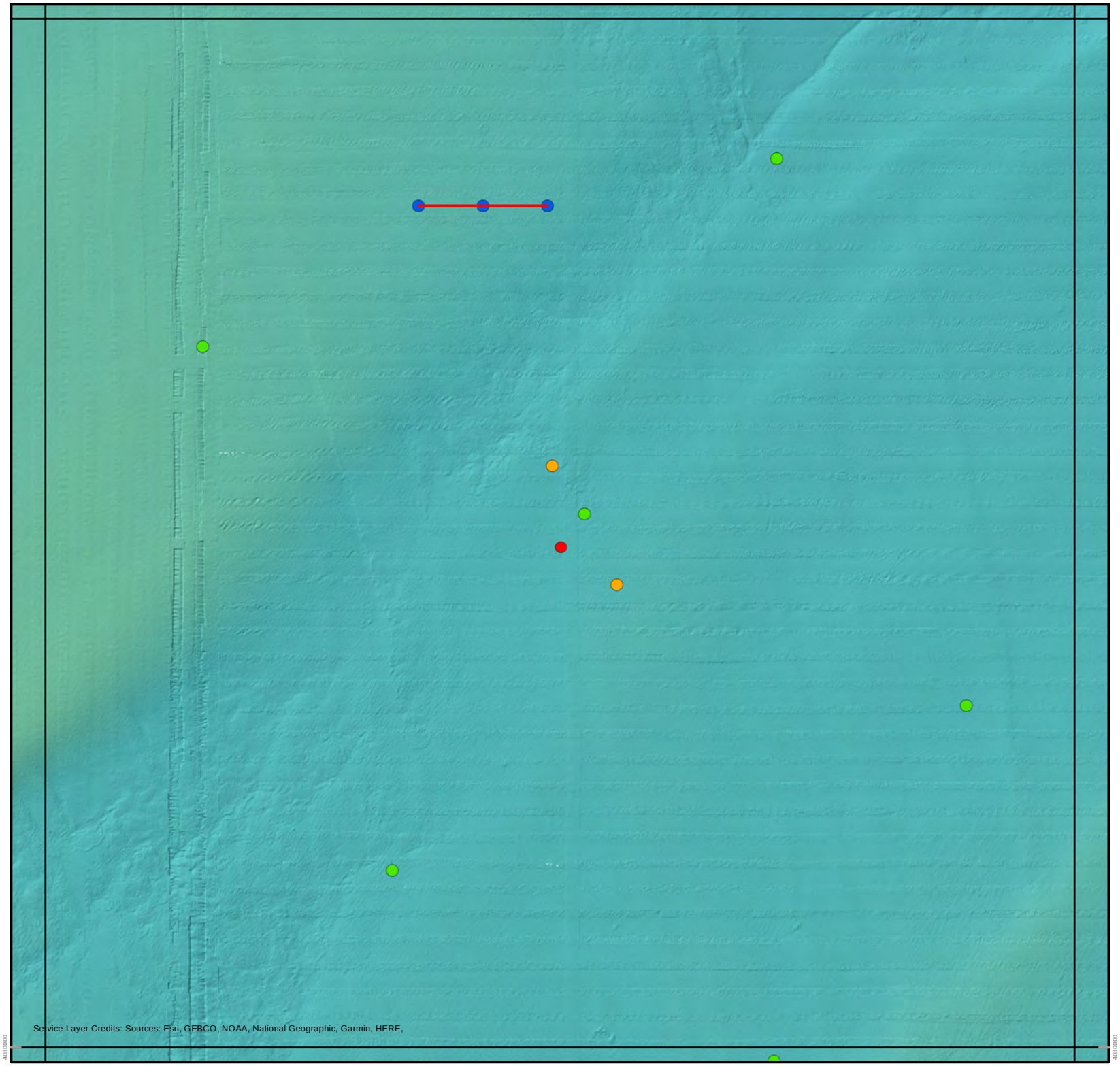
0 0.1 0.2 0.3 Nautical Miles

0 0.25 0.5 0.75 Kilometers

REFERENCE MAP



NOT FOR CONSTRUCTION



OFFSHORE WIND PROJECT

Dominion Energy

- Proposed Sample (Lease Area)
- Proposed 600m Video Transect

VOWTAP SAP Sample Location

- Benthic Grab Sample Location
- Cable Route Grab Location
- Reference Grab Sample Location

Existing Sample Data

- usSEABED
- AMAPPS
- OCDBS
- BOEM Lease Block

BAG Hillshade Color Scale
(Depth in Meters)

0 — 7000

Lease Block 6115
Page 17 of 36

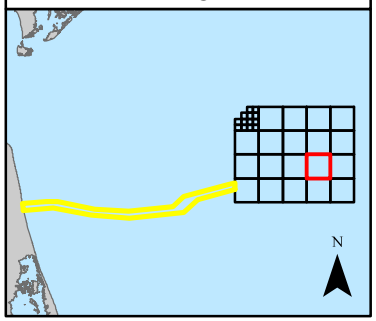
Date	May 14, 2020
File/Job Number	194-6047
Personnel	Figure Prepared by: William Scales

0 0.1 0.2 0.3 0.4 0.5 Miles

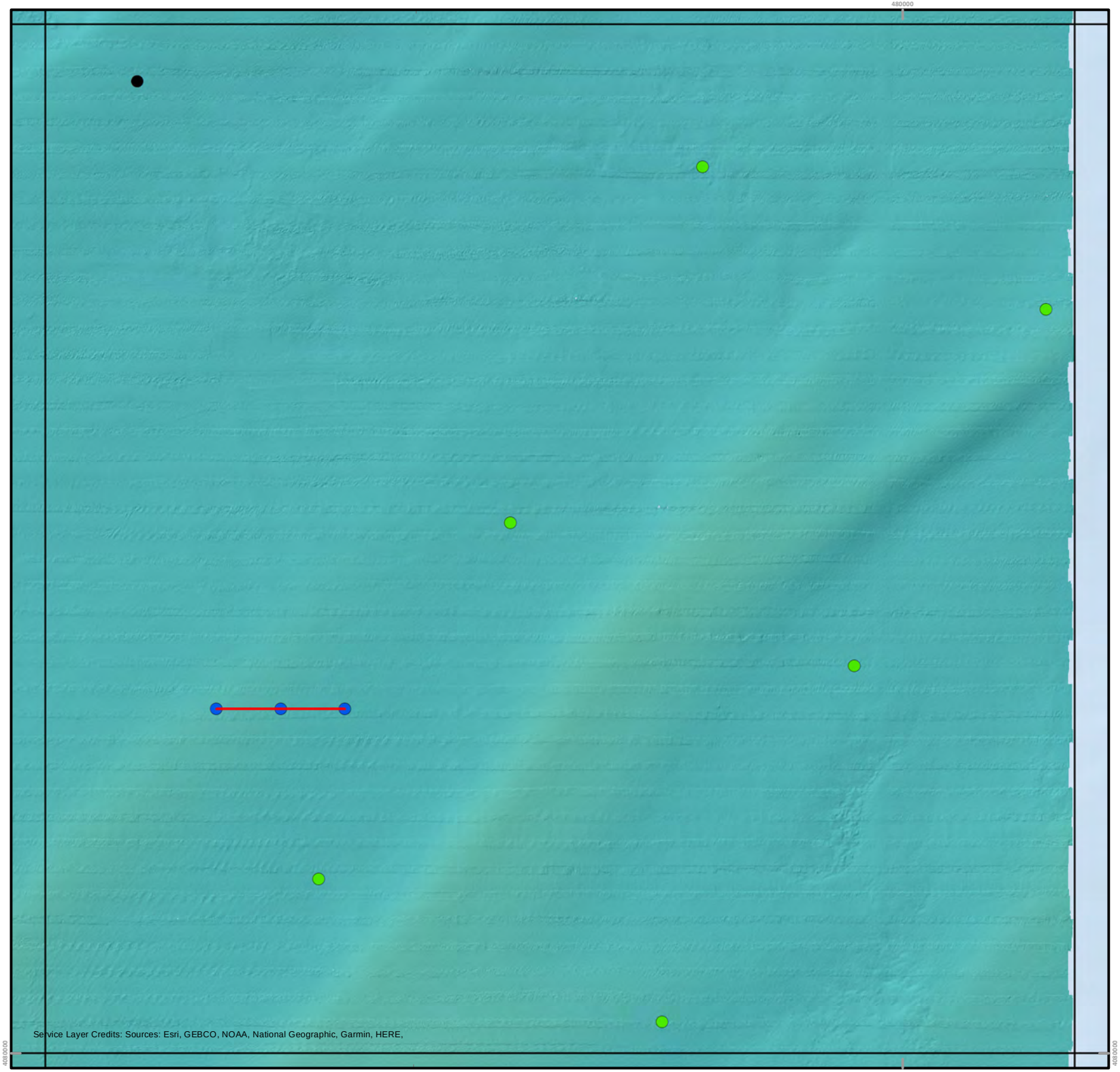
0 0.1 0.2 0.3 Nautical Miles

0 0.25 0.5 0.75 Kilometers

REFERENCE MAP



NOT FOR CONSTRUCTION



OFFSHORE WIND PROJECT

Dominion Energy

- Proposed Sample (Lease Area)
- Proposed 600m Video Transect

VOWTAP SAP Sample Location

- Benthic Grab Sample Location
- Cable Route Grab Location
- Reference Grab Sample Location

Existing Sample Data

- usSEABED
- WH
- BOEM Lease Block

BAG Hillshade Color Scale
(Depth in Meters)

0 — 7000

Lease Block 6116
Page 18 of 36

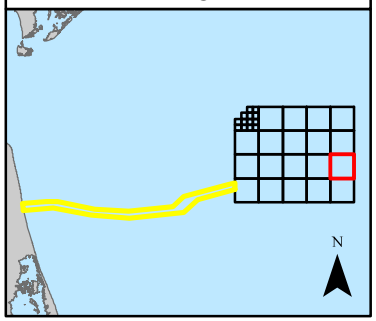
Date	May 14, 2020
File/Job Number	194-6047
Personnel	Figure Prepared by: William Scales

0 0.1 0.2 0.3 0.4 0.5 Miles

0 0.1 0.2 0.3 Nautical Miles

0 0.25 0.5 0.75 Kilometers

REFERENCE MAP



NOT FOR CONSTRUCTION

OFFSHORE WIND PROJECT

Dominion Energy

- Proposed Sample (Lease Area)
- Proposed 600m Video Transect

VOWTAP SAP Sample Location

- Benthic Grab Sample Location
- Cable Route Grab Location
- Reference Grab Sample Location

Existing Sample Data

- usSEABED
- BOEM Lease Block

BAG Hillshade Color Scale
(Depth in Meters)

0 — 7000

Lease Block 6117
Page 19 of 36

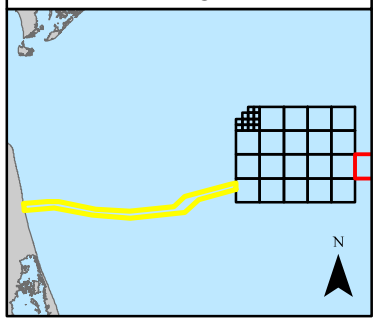
Date	May 14, 2020
File/Job Number	194-6047
Personnel	Figure Prepared by: William Scales

0 0.1 0.2 0.3 0.4 0.5 Miles

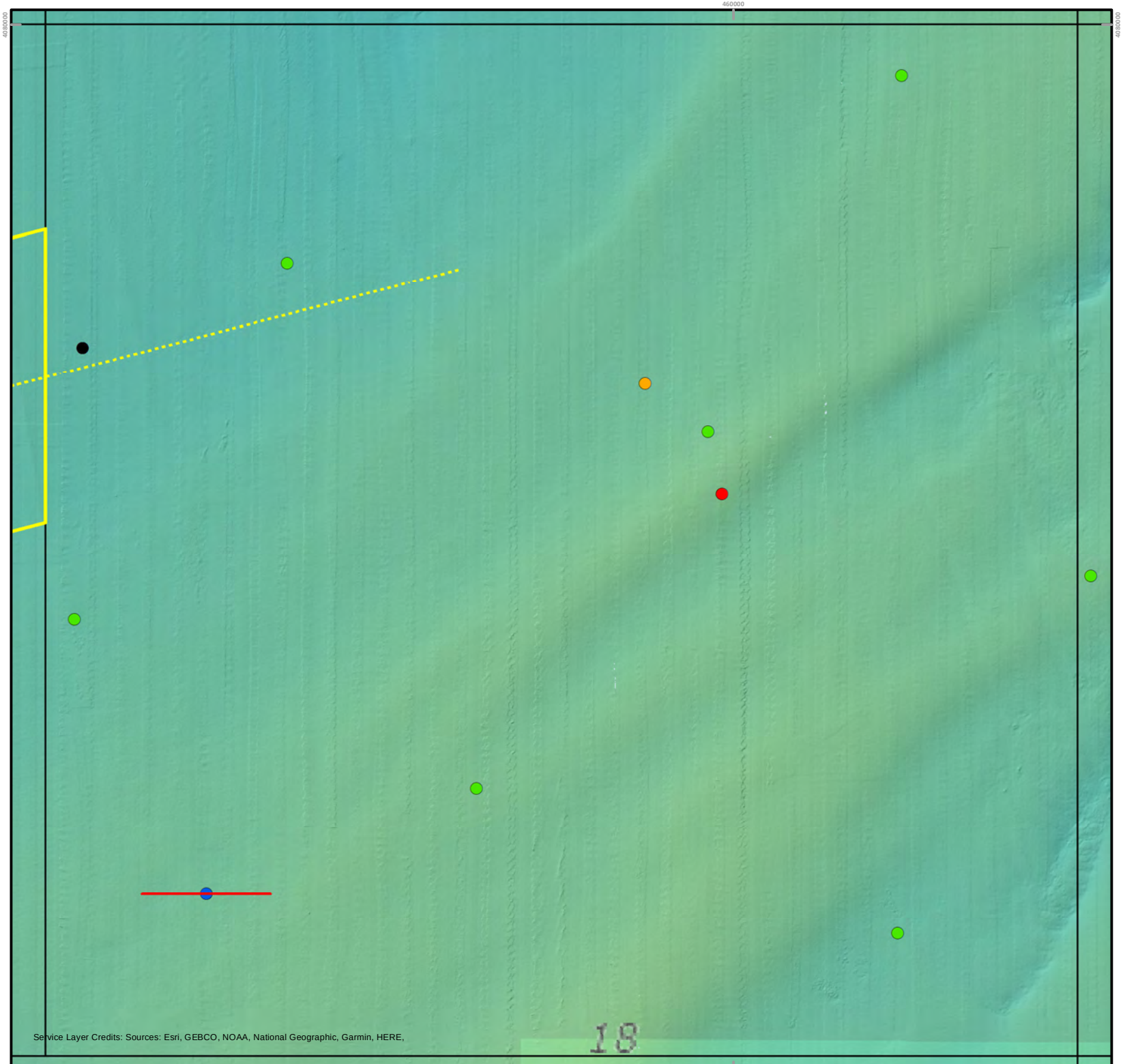
0 0.1 0.2 0.3 Nautical Miles

0 0.25 0.5 0.75 Kilometers

REFERENCE MAP



NOT FOR CONSTRUCTION



OFFSHORE WIND PROJECT

Dominion Energy

- Proposed Sample (Lease Area)
- Proposed 600m Video Transect

VOWTAP SAP Sample Location

- Benthic Grab Sample Location
- Cable Route Grab Location
- Reference Grab Sample Location

Existing Sample Data

- usSEABED
- WH
- AMAPPS
- OCDBS
- Export Cable Route Survey Corridor Centerline
- Export Cable Route Survey Corridor
- BOEM Lease Block

BAG Hillshade Color Scale
(Depth in Meters)

0 — 7000

Lease Block 6162

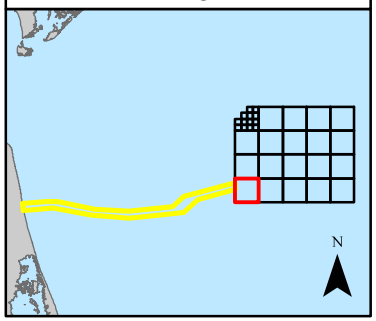
Date	May 14, 2020
File/Job Number	194-6047
Personnel	Figure Prepared by: William Scales

0 0.1 0.2 0.3 0.4 0.5 Miles

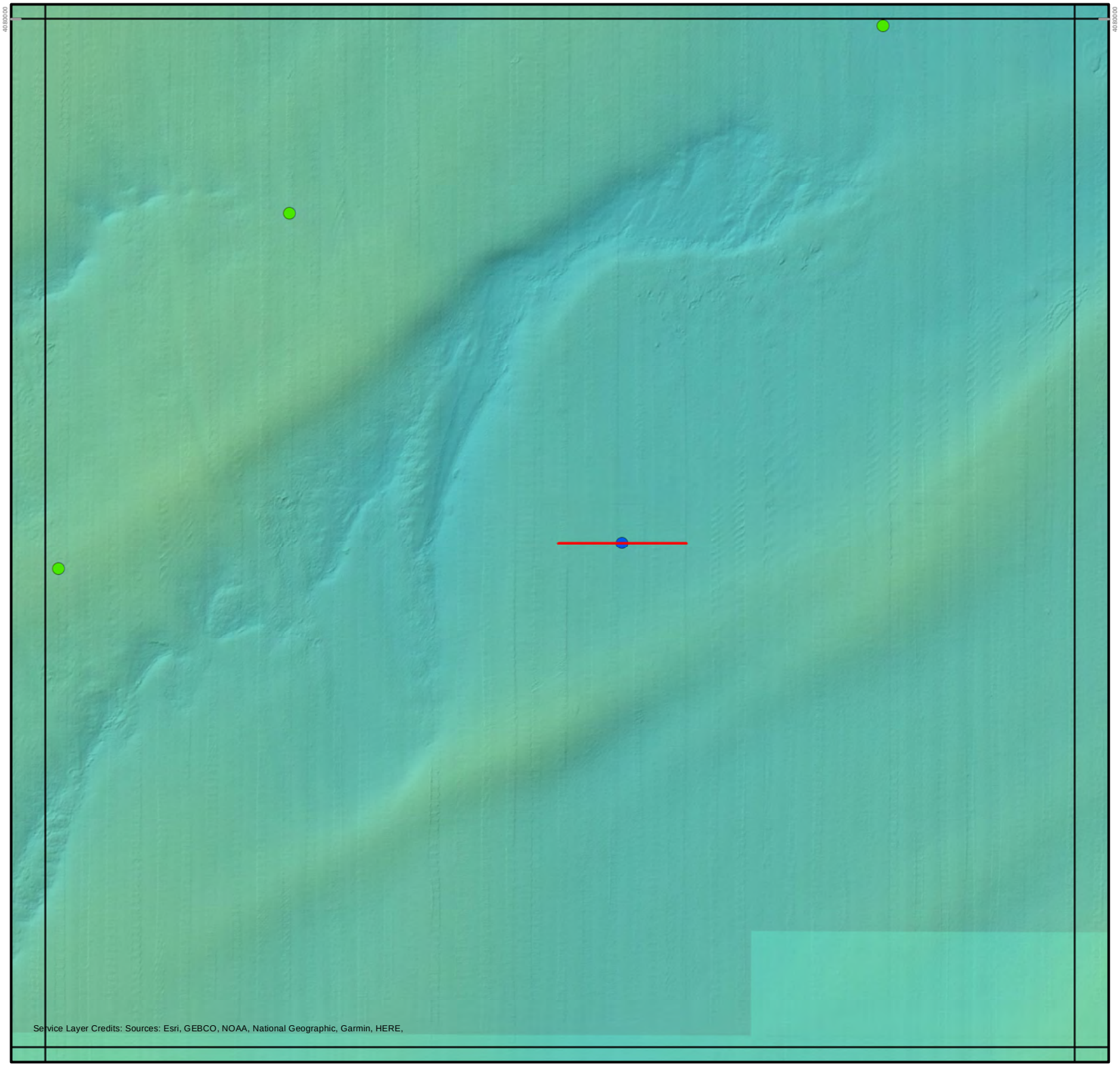
0 0.1 0.2 0.3 Nautical Miles

0 0.25 0.5 0.75 Kilometers

REFERENCE MAP



NOT FOR CONSTRUCTION



OFFSHORE WIND PROJECT

Dominion Energy

- Proposed Sample (Lease Area)
- Proposed 600m Video Transect

VOWTAP SAP Sample Location

- Benthic Grab Sample Location
- Cable Route Grab Location
- Reference Grab Sample Location

Existing Sample Data

- usSEABED
- BOEM Lease Block

BAG Hillshade Color Scale
(Depth in Meters)

0 — 7000

Lease Block 6163
Page 21 of 36

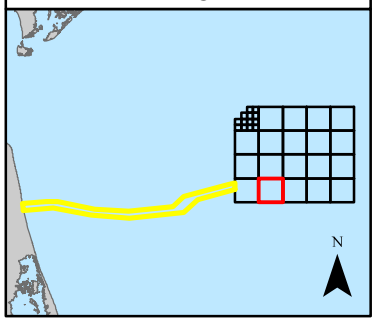
Date	May 14, 2020
File/Job Number	194-6047
Personnel	Figure Prepared by: William Scales

0 0.1 0.2 0.3 0.4 0.5 Miles

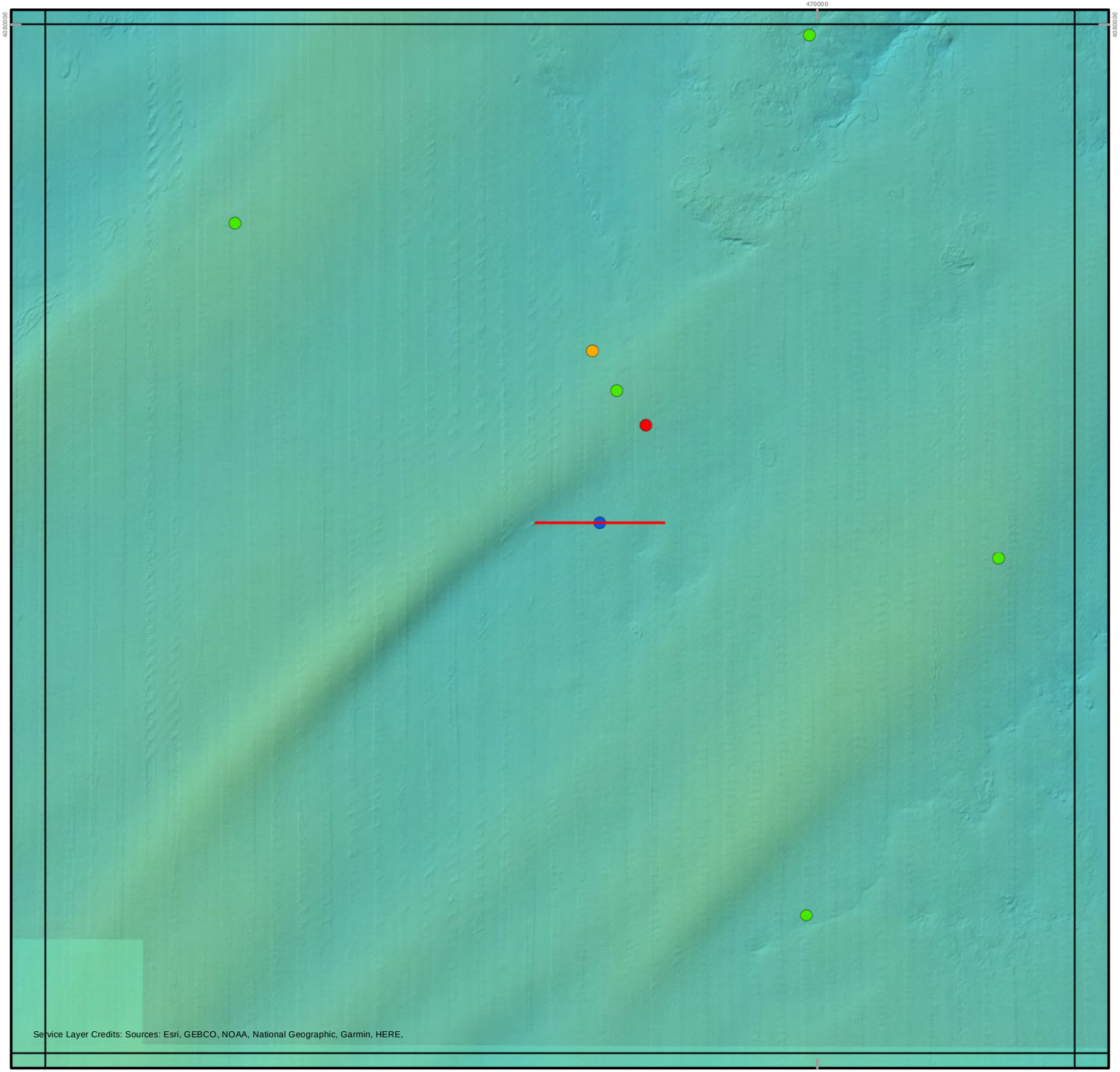
0 0.1 0.2 0.3 Nautical Miles

0 0.25 0.5 0.75 Kilometers

REFERENCE MAP



NOT FOR CONSTRUCTION



OFFSHORE WIND PROJECT

Dominion Energy

- Proposed Sample (Lease Area)
- Proposed 600m Video Transect

VOWTAP SAP Sample Location

- Benthic Grab Sample Location
- Cable Route Grab Location
- Reference Grab Sample Location

Existing Sample Data

- usSEABED
- AMAPPS
- OCDBS
- BOEM Lease Block

BAG Hillshade Color Scale
(Depth in Meters)

0 — 7000

Lease Block 6164

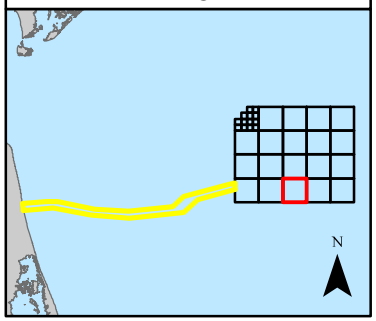
Date	May 14, 2020
File/Job Number	194-6047
Personnel	Figure Prepared by: William Scales

0 0.1 0.2 0.3 0.4 0.5 Miles

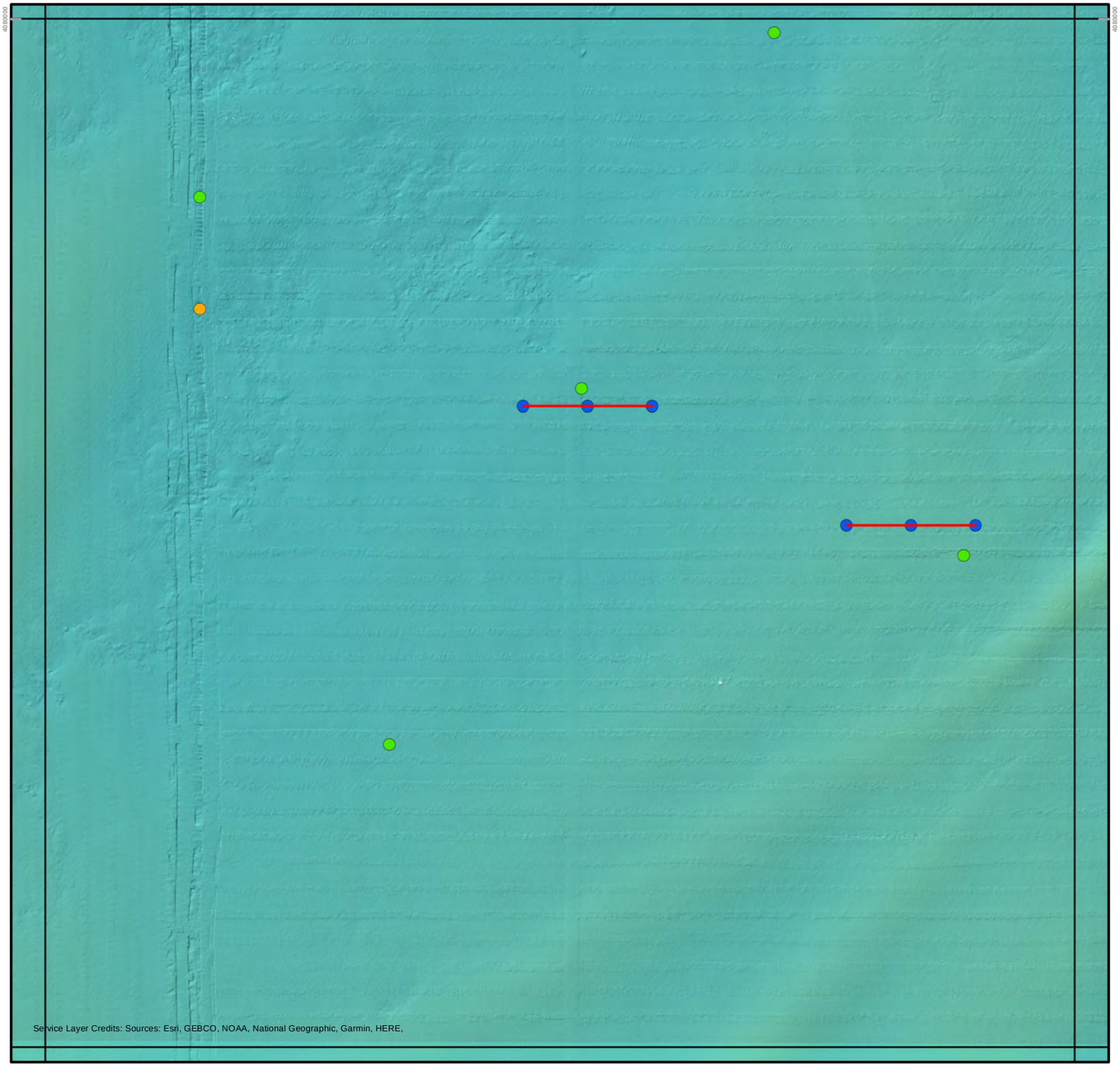
0 0.1 0.2 0.3 Nautical Miles

0 0.25 0.5 0.75 Kilometers

REFERENCE MAP



NOT FOR CONSTRUCTION



OFFSHORE WIND PROJECT

Dominion Energy

- Proposed Sample (Lease Area)
- Proposed 600m Video Transect

VOWTAP SAP Sample Location

- Benthic Grab Sample Location
- Cable Route Grab Location
- Reference Grab Sample Location

Existing Sample Data

- usSEABED
- OCDBS
- BOEM Lease Block

BAG Hillshade Color Scale
(Depth in Meters)

0 — 7000

Lease Block 6165
Page 23 of 36

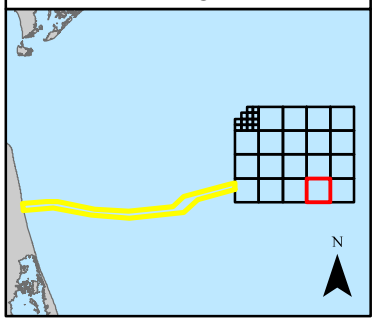
Date	May 14, 2020
File/Job Number	194-6047
Personnel	Figure Prepared by: William Scales

0 0.1 0.2 0.3 0.4 0.5 Miles

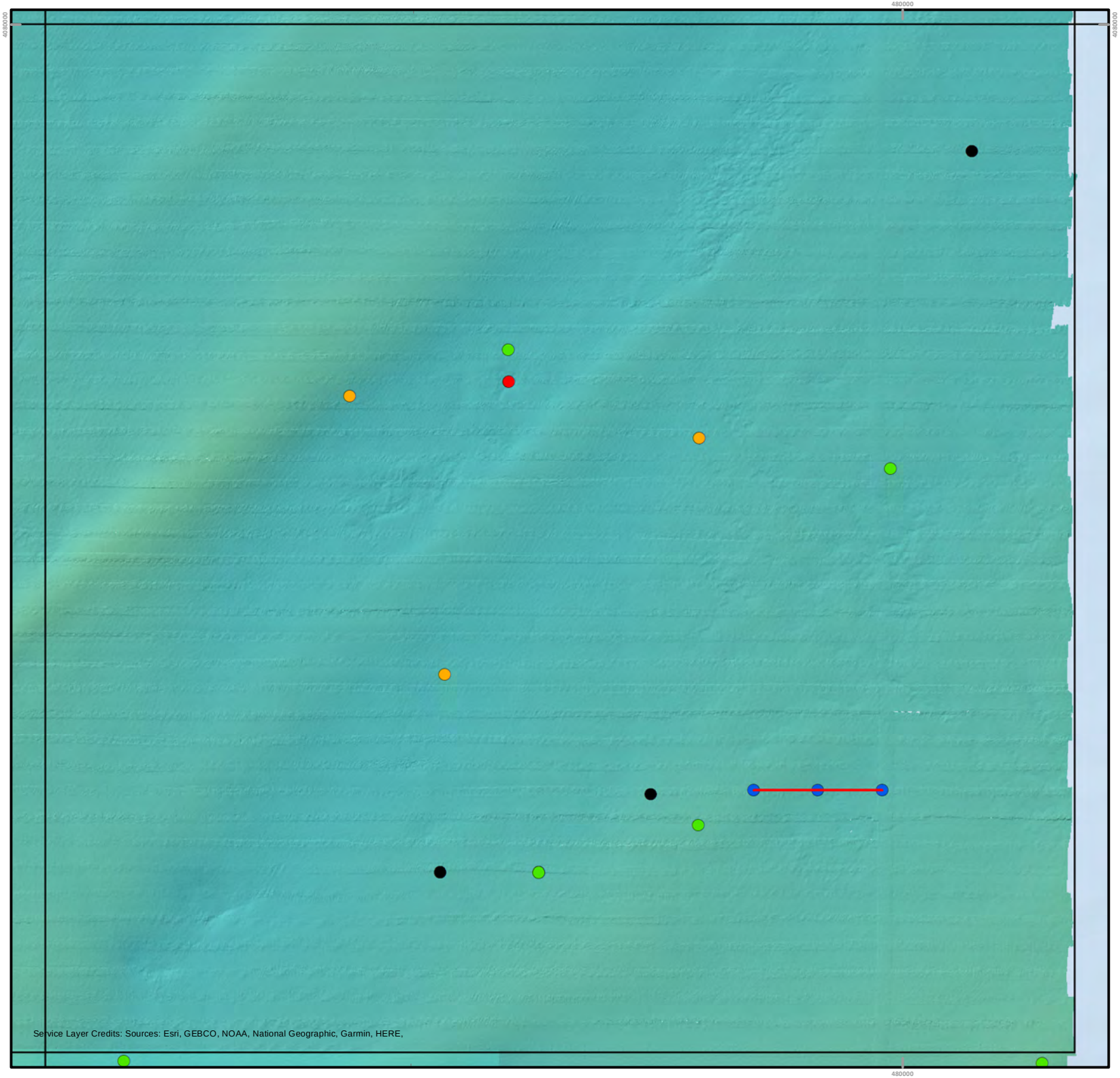
0 0.1 0.2 0.3 Nautical Miles

0 0.25 0.5 0.75 Kilometers

REFERENCE MAP



NOT FOR CONSTRUCTION



OFFSHORE WIND PROJECT

Dominion Energy

- Proposed Sample (Lease Area)
- Proposed 600m Video Transect

VOWTAP SAP Sample Location

- Benthic Grab Sample Location
- Cable Route Grab Location
- Reference Grab Sample Location

Existing Sample Data

- usSEABED
- WH
- AMAPPS
- OCDBS
- BOEM Lease Block

BAG Hillshade Color Scale
(Depth in Meters)

0 — 7000

Lease Block 6166

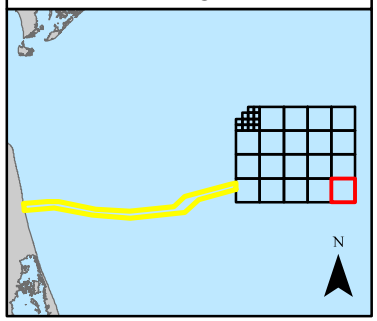
Date	May 14, 2020
File/Job Number	194-6047
Personnel	Figure Prepared by: William Scales

0 0.1 0.2 0.3 0.4 0.5 Miles

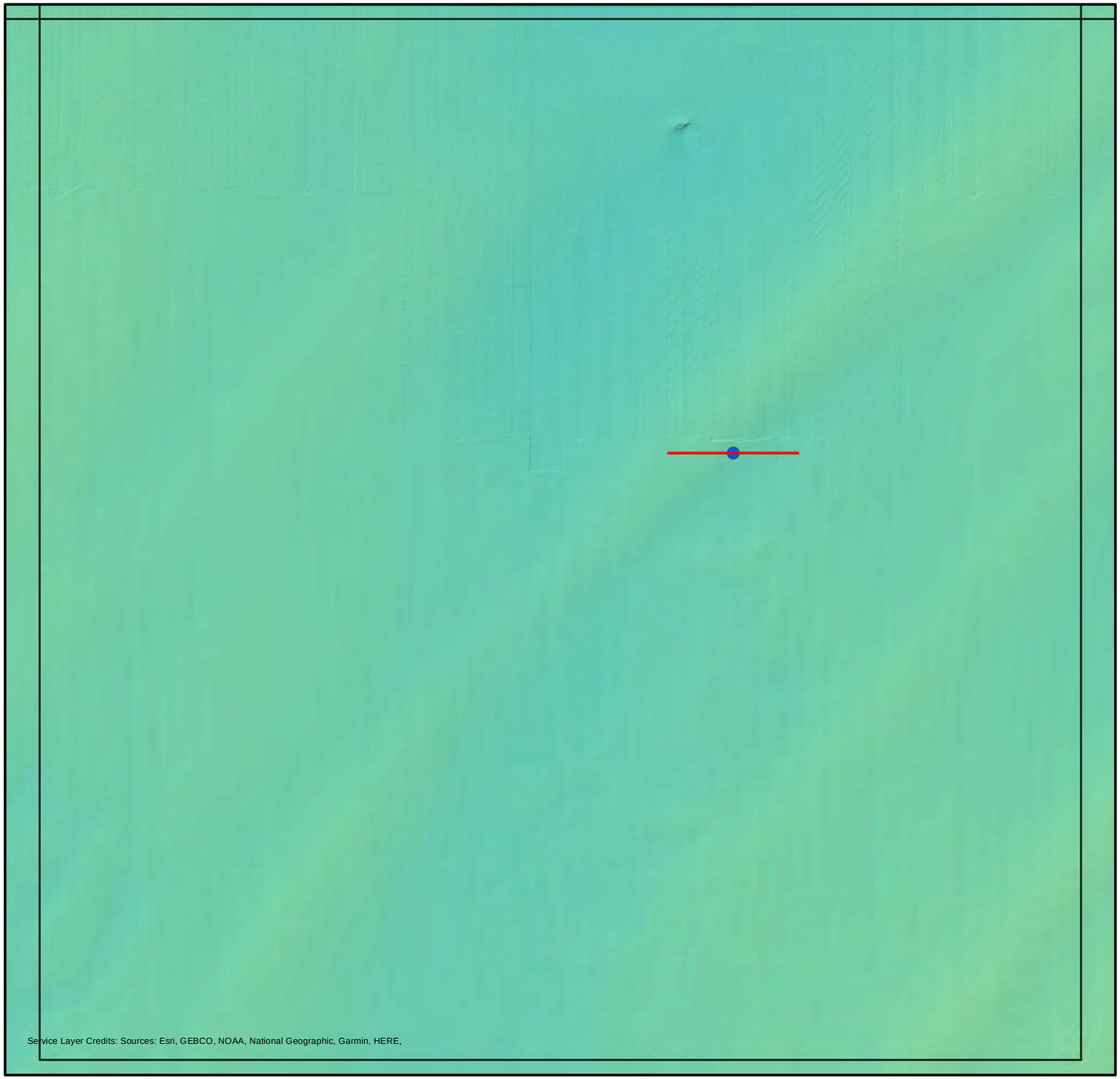
0 0.1 0.2 0.3 Nautical Miles

0 0.25 0.5 0.75 Kilometers

REFERENCE MAP



NOT FOR CONSTRUCTION



OFFSHORE WIND PROJECT

Dominion Energy

- Proposed Sample (Lease Area)
- Proposed 600m Video Transect

VOWTAP SAP Sample Location

- Benthic Grab Sample Location
- Cable Route Grab Location
- Reference Grab Sample Location
- BOEM Lease Block

BAG Hillshade Color Scale
(Depth in Meters)

0 — 7000

Lease Block 6213
Page 25 of 36

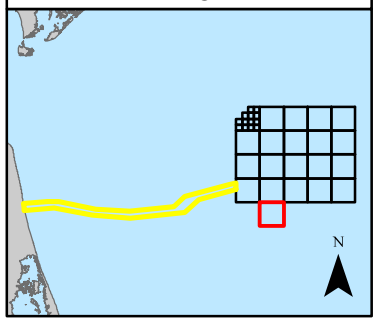
Date	May 14, 2020
File/Job Number	194-6047
Personnel	Figure Prepared by: William Scales

0 0.1 0.2 0.3 0.4 0.5 Miles

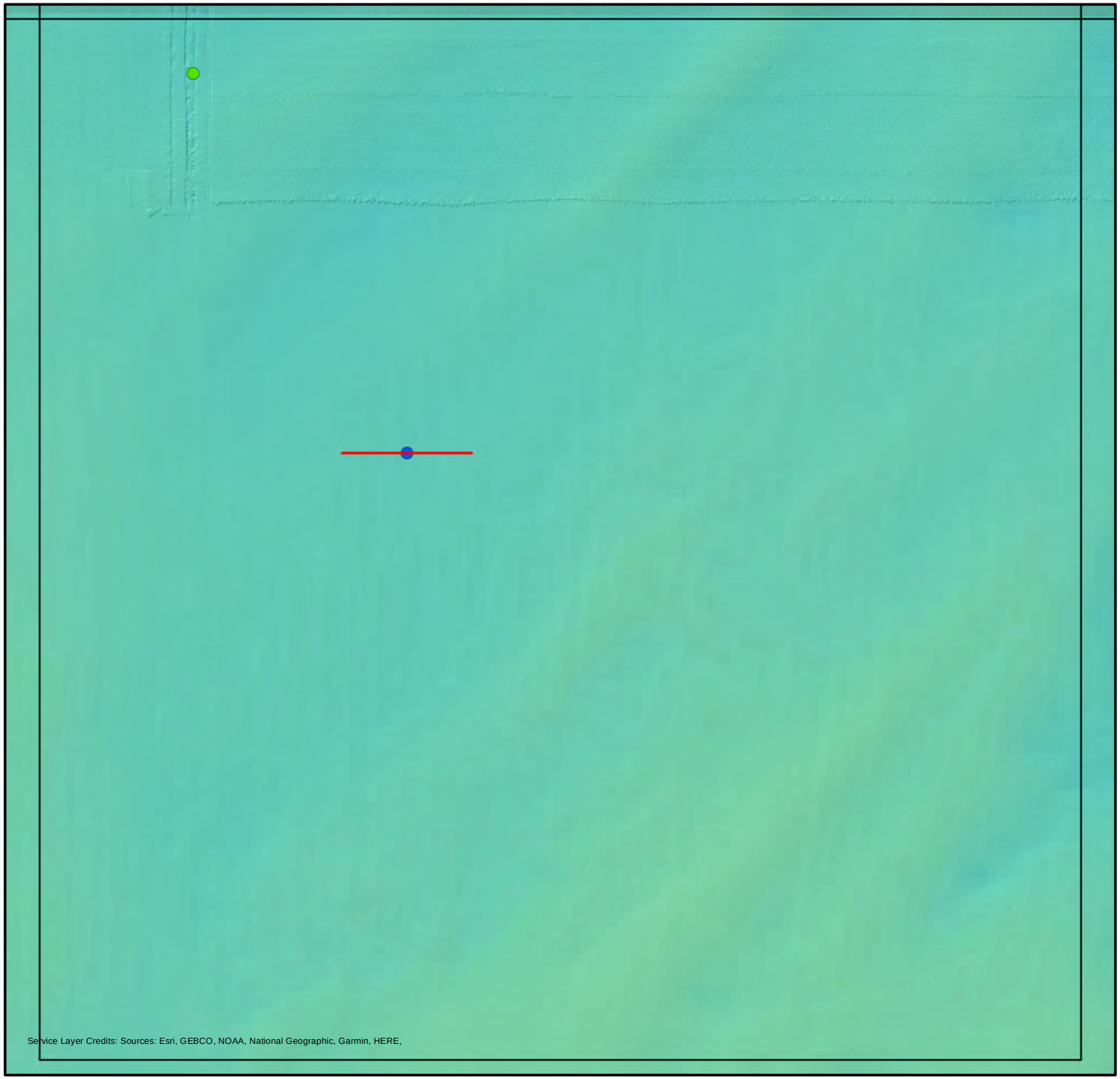
0 0.1 0.2 0.3 Nautical Miles

0 0.25 0.5 0.75 Kilometers

REFERENCE MAP



NOT FOR CONSTRUCTION



OFFSHORE WIND PROJECT

Dominion Energy

- Proposed Sample (Lease Area)
- Proposed 600m Video Transect

VOWTAP SAP Sample Location

- Benthic Grab Sample Location
- Cable Route Grab Location
- Reference Grab Sample Location

Existing Sample Data

- usSEABED
- BOEM Lease Block

BAG Hillshade Color Scale
(Depth in Meters)

0 — 7000

Lease Block 6215
Page 26 of 36

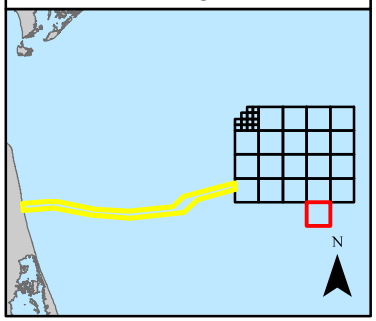
Date	May 14, 2020
File/Job Number	194-6047
Personnel	Figure Prepared by: William Scales

0 0.1 0.2 0.3 0.4 0.5 Miles

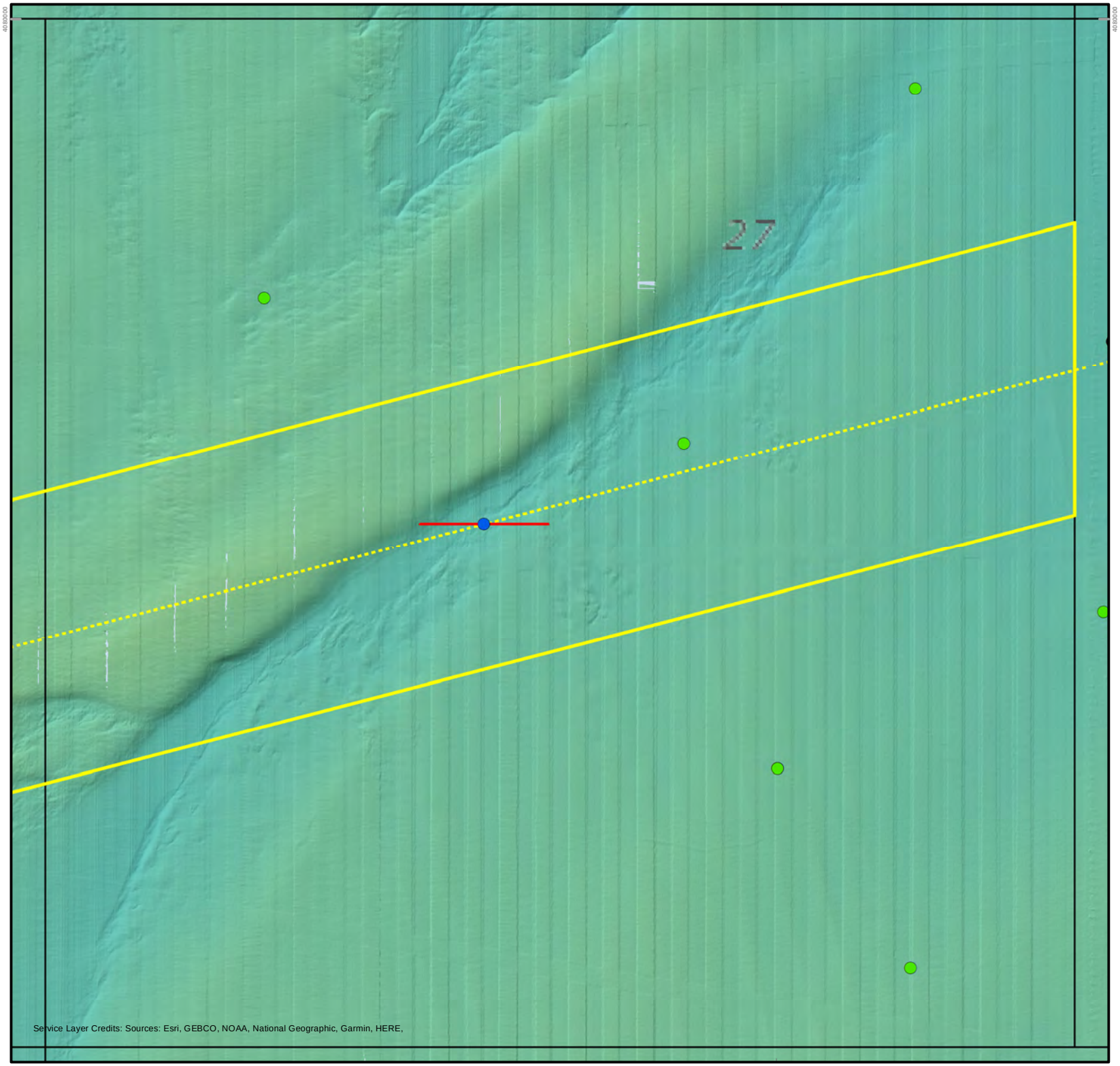
0 0.1 0.2 0.3 Nautical Miles

0 0.25 0.5 0.75 Kilometers

REFERENCE MAP



NOT FOR CONSTRUCTION



OFFSHORE WIND PROJECT

Dominion Energy

- Proposed Sample (Lease Area)
- Proposed 600m Video Transect

VOWTAP SAP Sample Location

- Benthic Grab Sample Location
- Cable Route Grab Location
- Reference Grab Sample Location

Existing Sample Data

- usSEABED
- WH
- Export Cable Route Survey Corridor Centerline
- Export Cable Route Survey Corridor
- BOEM Lease Block

BAG Hillshade Color Scale
(Depth in Meters)

0 — 7000

Lease Block 6161
Page 27 of 36

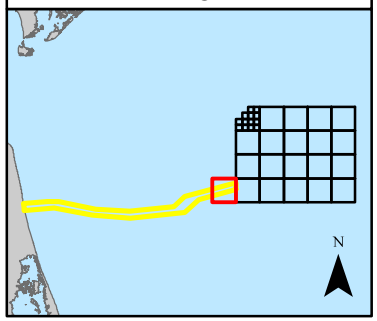
Date	May 14, 2020
File/Job Number	194-6047
Personnel	Figure Prepared by: William Scales

0 0.1 0.2 0.3 0.4 0.5 Miles

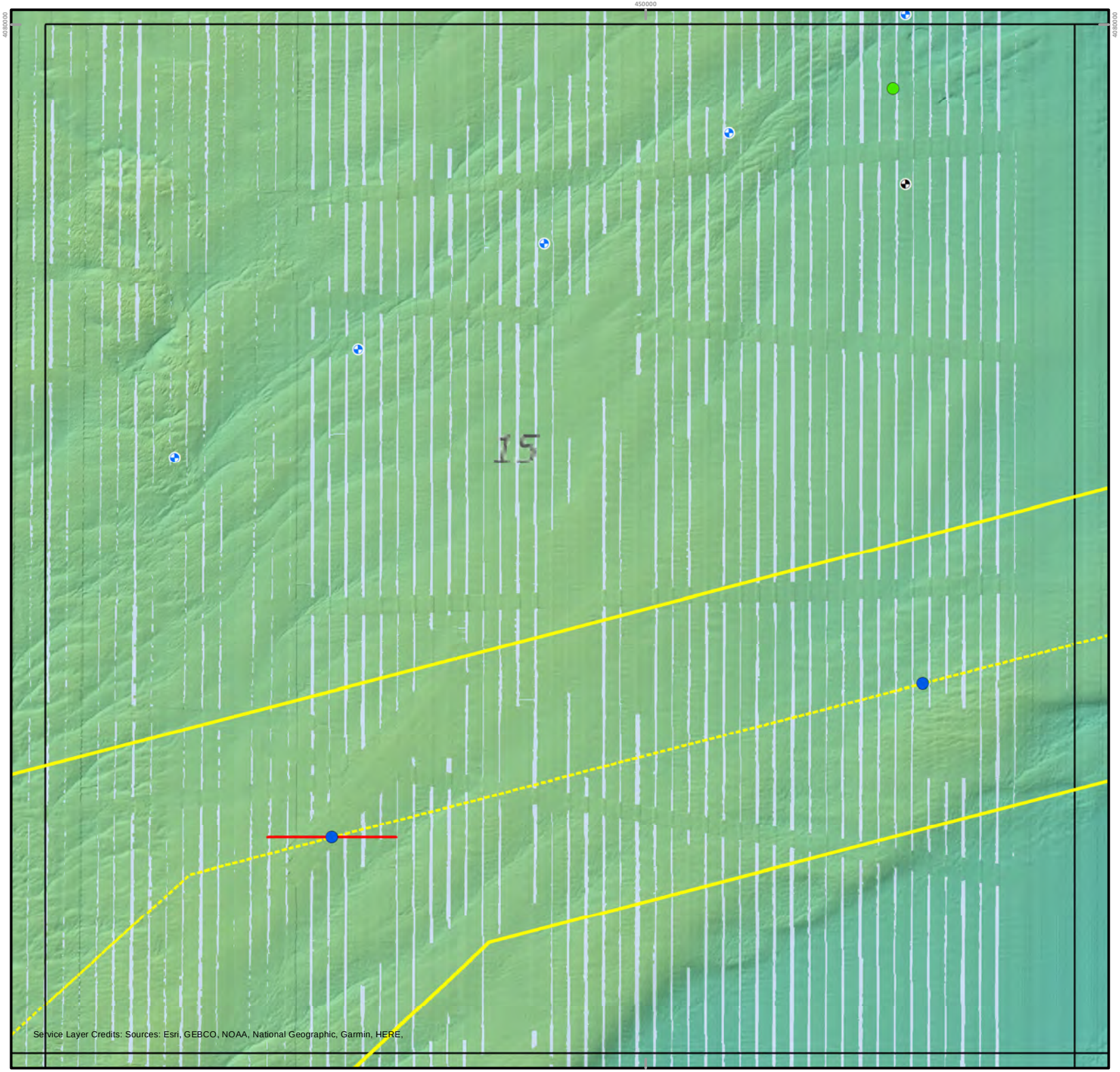
0 0.1 0.2 0.3 Nautical Miles

0 0.25 0.5 0.75 Kilometers

REFERENCE MAP



NOT FOR CONSTRUCTION



OFFSHORE WIND PROJECT

Dominion Energy

- Proposed Sample (Lease Area)
- Proposed 600m Video Transect

VOWTAP SAP Sample Location

- Benthic Grab Sample Location
- Cable Route Grab Location
- Reference Grab Sample Location

Existing Sample Data

- usSEABED
- Export Cable Route Survey Corridor Centerline
- Export Cable Route Survey Corridor
- BOEM Lease Block

BAG Hillshade Color Scale
(Depth in Meters)

0 — 7000

Lease Block 6160

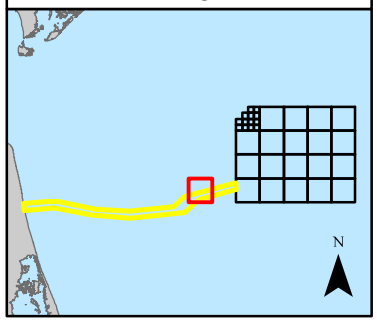
Date	May 14, 2020
File/Job Number	194-6047
Personnel	Figure Prepared by: William Scales

0 0.1 0.2 0.3 0.4 0.5 Miles

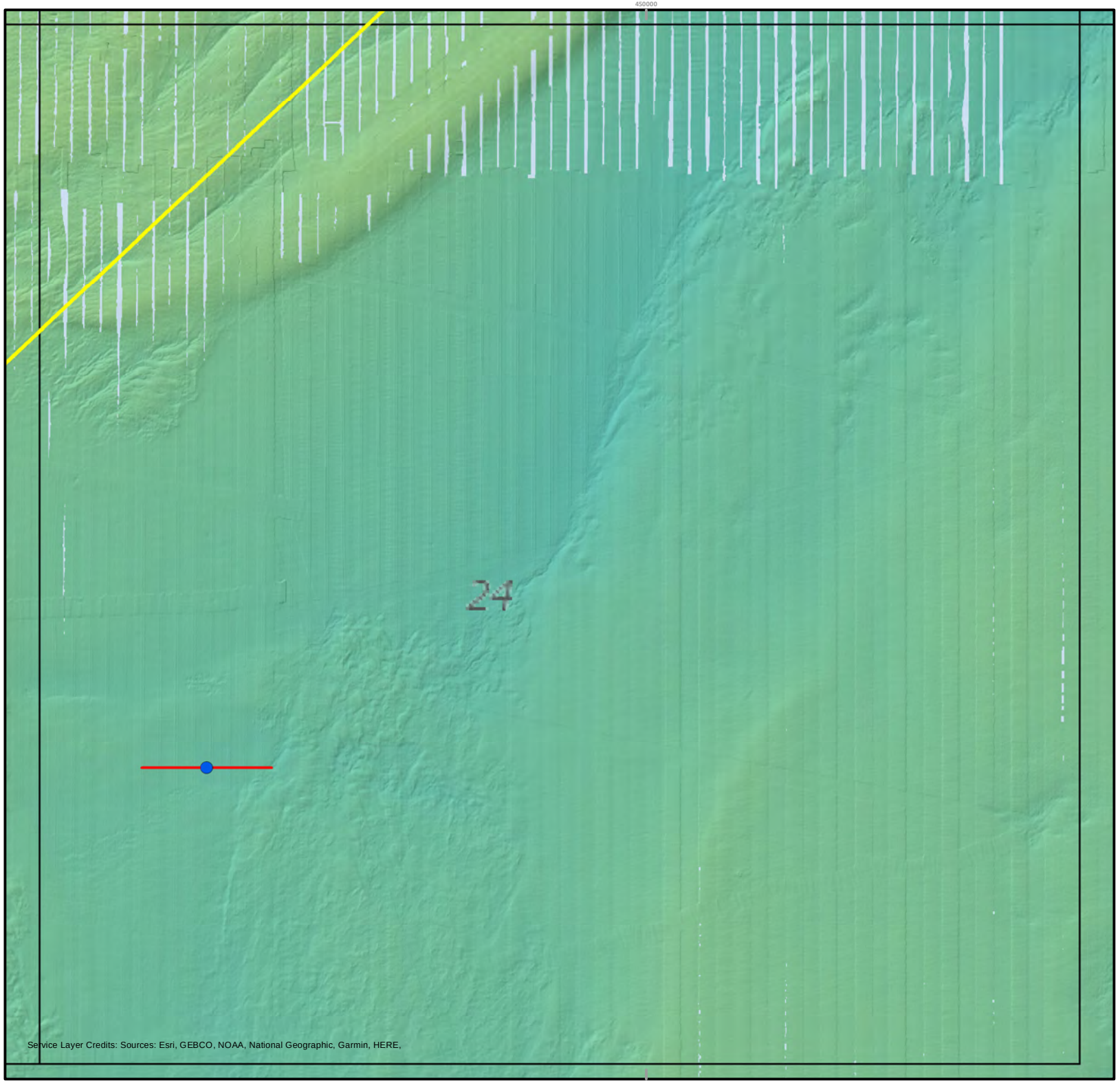
0 0.1 0.2 0.3 Nautical Miles

0 0.25 0.5 0.75 Kilometers

REFERENCE MAP



NOT FOR CONSTRUCTION



OFFSHORE WIND PROJECT

Dominion Energy

- Proposed Sample (Lease Area)
- Proposed 600m Video Transect

VOWTAP SAP Sample Location

- Benthic Grab Sample Location
- Cable Route Grab Location
- Reference Grab Sample Location
- Export Cable Route Survey Corridor
- BOEM Lease Block

BAG Hillshade Color Scale
(Depth in Meters)

0 — 7000

Lease Block 6210
Page 29 of 36

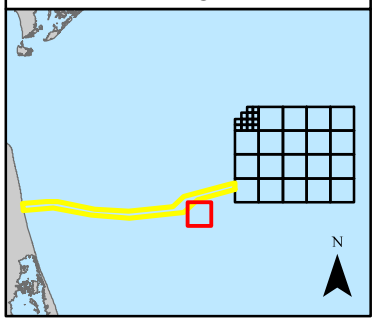
Date	May 14, 2020
File/Job Number	194-6047
Personnel	Figure Prepared by: William Scales

0 0.1 0.2 0.3 0.4 0.5 Miles

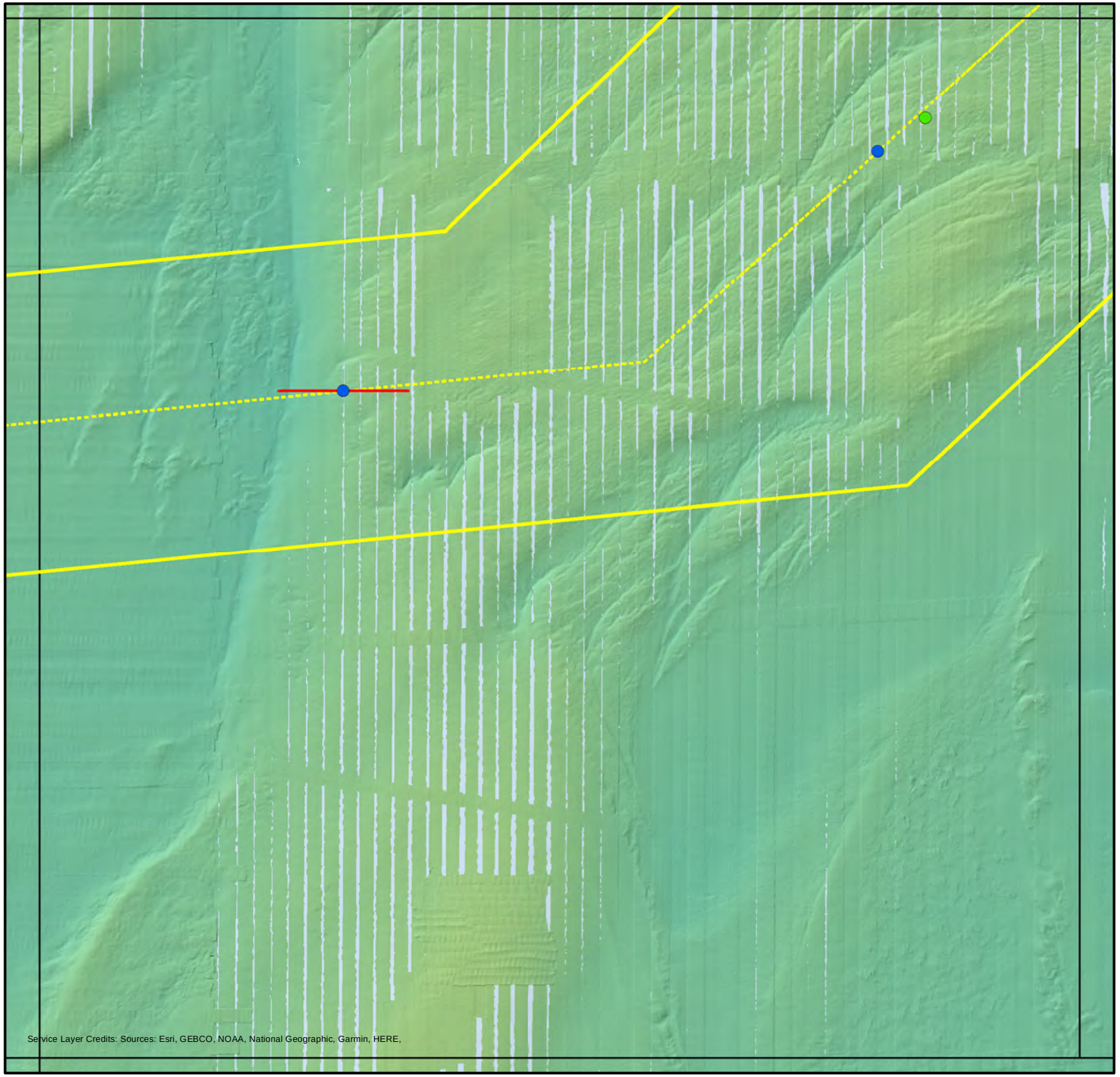
0 0.1 0.2 0.3 Nautical Miles

0 0.25 0.5 0.75 Kilometers

REFERENCE MAP



NOT FOR CONSTRUCTION



OFFSHORE WIND PROJECT

Dominion Energy

- Proposed Sample (Lease Area)
- Proposed 600m Video Transect

VOWTAP SAP Sample Location

- Benthic Grab Sample Location
- Cable Route Grab Location
- Reference Grab Sample Location

Existing Sample Data

- usSEABED
- Export Cable Route Survey Corridor Centerline
- Export Cable Route Survey Corridor
- BOEM Lease Block

BAG Hillshade Color Scale
(Depth in Meters)

0 — 7000

Lease Block 6209
Page 30 of 36

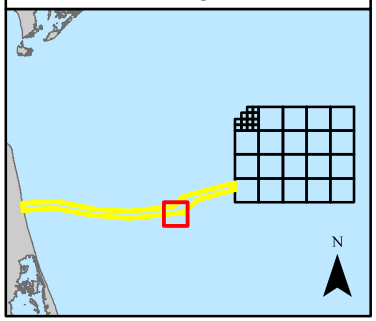
Date	May 14, 2020
File/Job Number	194-6047
Personnel	Figure Prepared by: William Scales

0 0.1 0.2 0.3 0.4 0.5 Miles

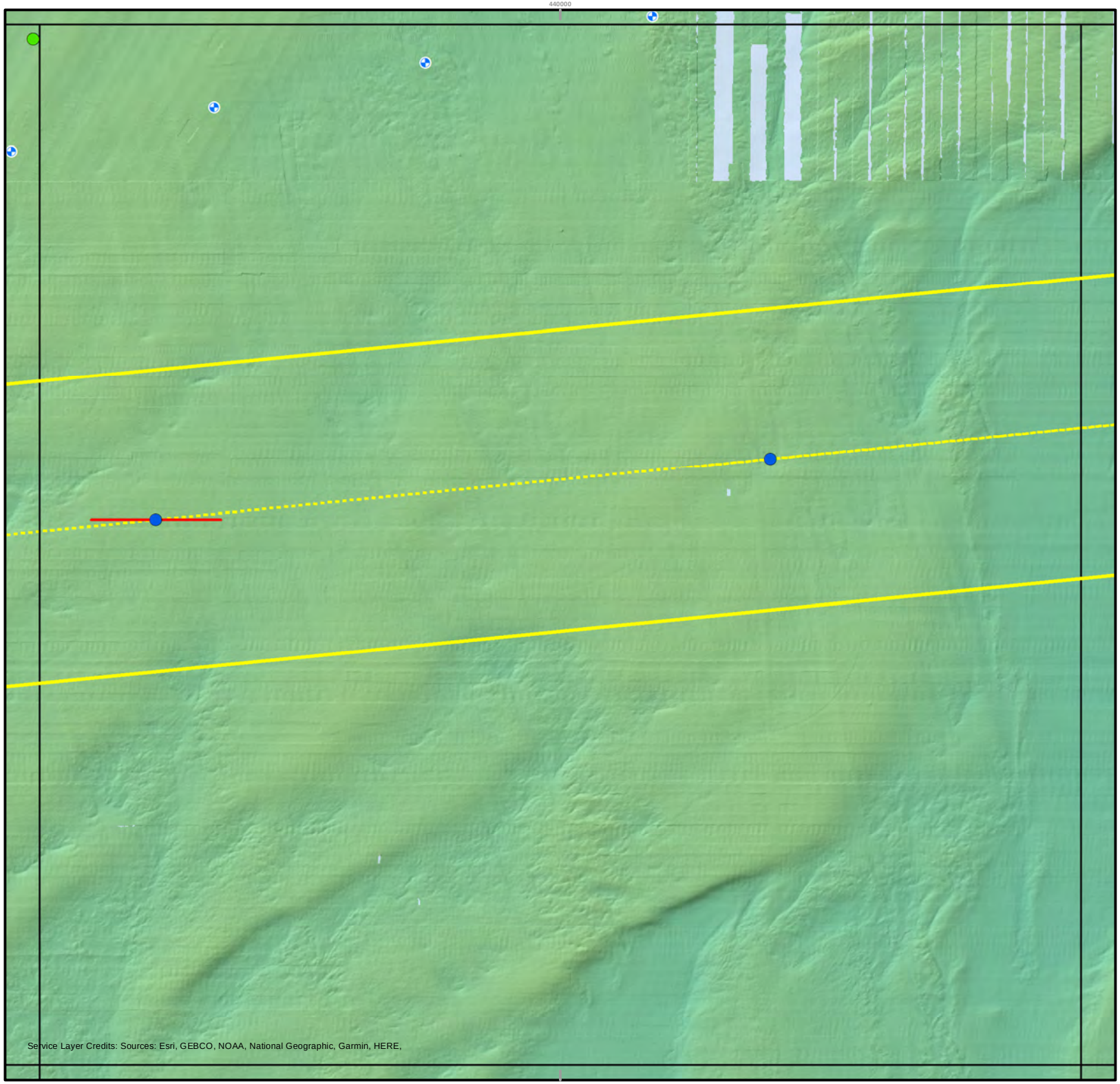
0 0.1 0.2 0.3 Nautical Miles

0 0.25 0.5 0.75 Kilometers

REFERENCE MAP



NOT FOR CONSTRUCTION



OFFSHORE WIND PROJECT

Dominion Energy

- Proposed Sample (Lease Area)
- Proposed 600m Video Transect

VOWTAP SAP Sample Location

- Benthic Grab Sample Location
- Cable Route Grab Location
- Reference Grab Sample Location

Existing Sample Data

- usSEABED
- Export Cable Route Survey Corridor Centerline
- Export Cable Route Survey Corridor
- BOEM Lease Block

BAG Hillshade Color Scale
(Depth in Meters)

0 — 7000

Lease Block 6208

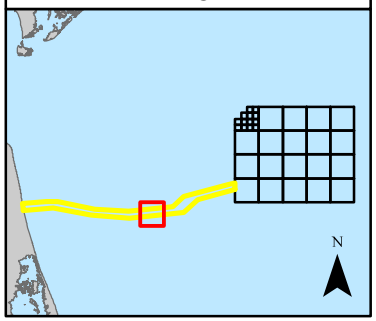
Date	May 14, 2020
File/Job Number	194-6047
Personnel	Figure Prepared by: William Scales

0 0.1 0.2 0.3 0.4 0.5 Miles

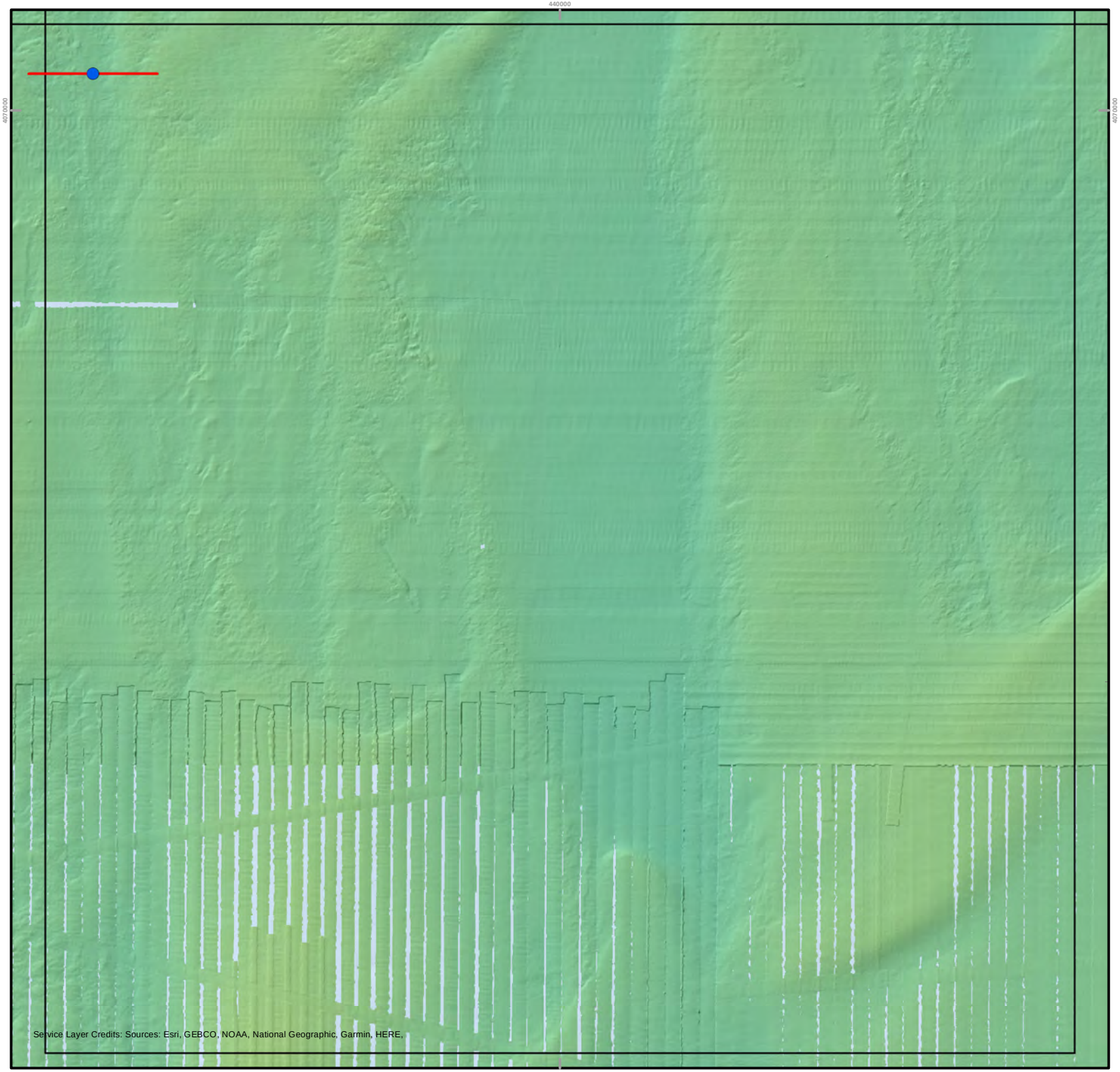
0 0.1 0.2 0.3 Nautical Miles

0 0.25 0.5 0.75 Kilometers

REFERENCE MAP



NOT FOR CONSTRUCTION



OFFSHORE WIND PROJECT

Dominion Energy

- Proposed Sample (Lease Area)
- Proposed 600m Video Transect

VOWTAP SAP Sample Location

- Benthic Grab Sample Location
- Cable Route Grab Location
- Reference Grab Sample Location
- BOEM Lease Block

BAG Hillshade Color Scale
(Depth in Meters)

0 — 7000

Lease Block 6258
Page 32 of 36

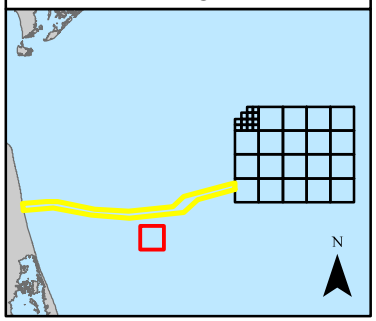
Date	May 14, 2020
File/Job Number	194-6047
Personnel	Figure Prepared by: William Scales

0 0.1 0.2 0.3 0.4 0.5 Miles

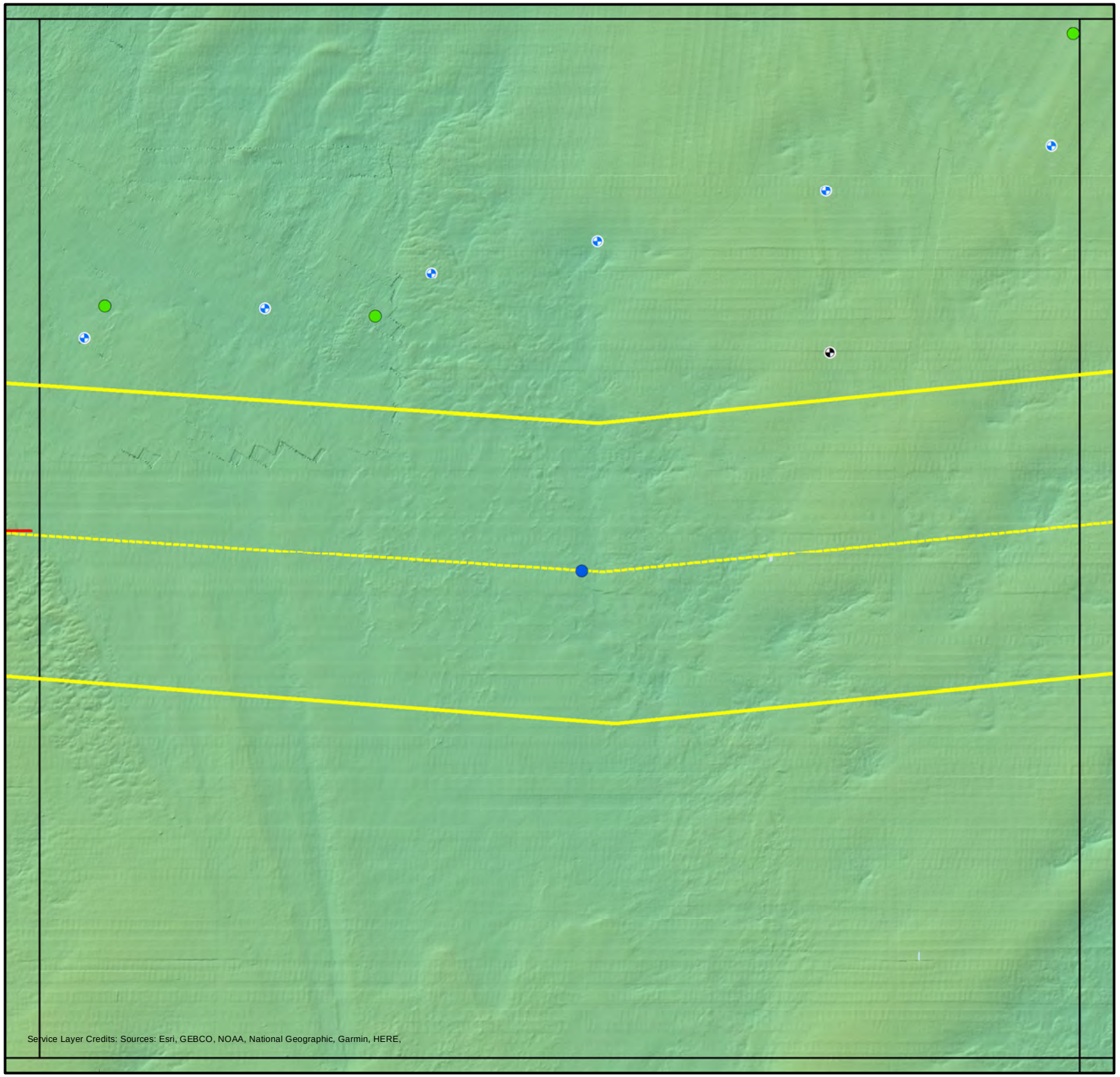
0 0.1 0.2 0.3 Nautical Miles

0 0.25 0.5 0.75 Kilometers

REFERENCE MAP



NOT FOR CONSTRUCTION



OFFSHORE WIND PROJECT

Dominion Energy

- Proposed Sample (Lease Area)
- Proposed 600m Video Transect

VOWTAP SAP Sample Location

- Benthic Grab Sample Location
- Cable Route Grab Location
- Reference Grab Sample Location

Existing Sample Data

- usSEABED
- Export Cable Route Survey Corridor Centerline
- Export Cable Route Survey Corridor
- BOEM Lease Block

BAG Hillshade Color Scale
(Depth in Meters)

0 — 7000

Lease Block 6207

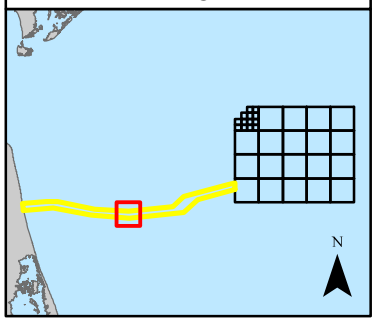
Date	May 14, 2020
File/Job Number	194-6047
Personnel	Figure Prepared by: William Scales

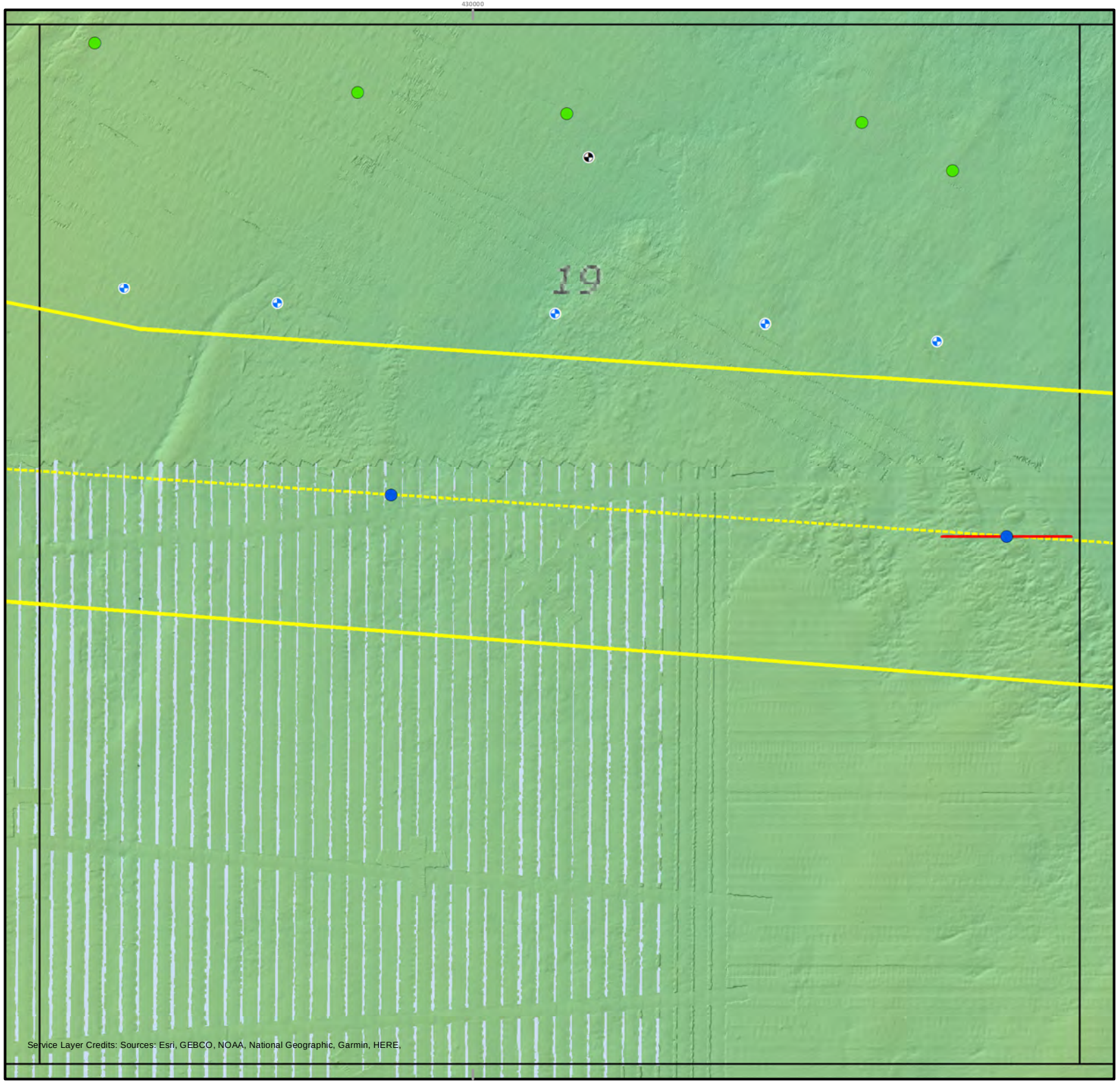
0 0.1 0.2 0.3 0.4 0.5 Miles

0 0.1 0.2 0.3 Nautical Miles

0 0.25 0.5 0.75 Kilometers

REFERENCE MAP





OFFSHORE WIND PROJECT

Dominion Energy

- Proposed Sample (Lease Area)
- Proposed 600m Video Transect

VOWTAP SAP Sample Location

- Benthic Grab Sample Location
- Cable Route Grab Location
- Reference Grab Sample Location

Existing Sample Data

- usSEABED
- Export Cable Route Survey Corridor Centerline
- Export Cable Route Survey Corridor
- BOEM Lease Block

BAG Hillshade Color Scale
(Depth in Meters)

0 — 7000

Lease Block 6206

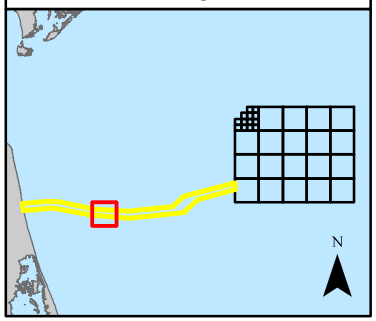
Date	May 14, 2020
File/Job Number	194-6047
Personnel	Figure Prepared by: William Scales

0 0.1 0.2 0.3 0.4 0.5 Miles

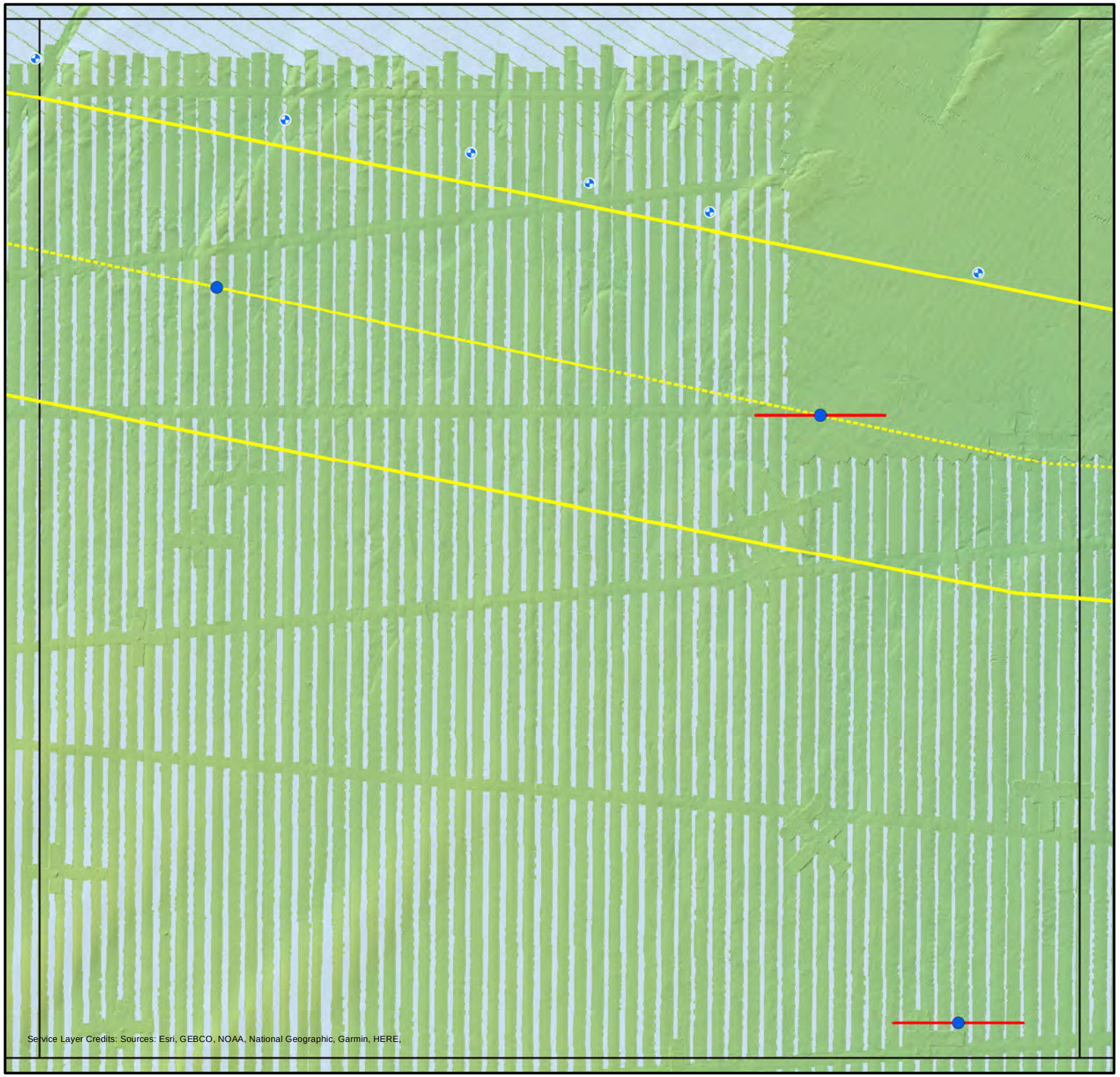
0 0.1 0.2 0.3 Nautical Miles

0 0.25 0.5 0.75 Kilometers

REFERENCE MAP



NOT FOR CONSTRUCTION



OFFSHORE WIND PROJECT

Dominion Energy

- Proposed Sample (Lease Area)
- Proposed 600m Video Transect

VOWTAP SAP Sample Location

- Benthic Grab Sample Location
- Cable Route Grab Location
- Reference Grab Sample Location
- Export Cable Route Survey Corridor Centerline
- Export Cable Route Survey Corridor
- BOEM Lease Block

BAG Hillshade Color Scale
(Depth in Meters)

0 — 7000

Lease Block 6205

Date	May 14, 2020
File/Job Number	194-6047
Personnel	Figure Prepared by: William Scales

0 0.1 0.2 0.3 0.4 0.5 Miles

0 0.1 0.2 0.3 Nautical Miles

0 0.25 0.5 0.75 Kilometers

REFERENCE MAP