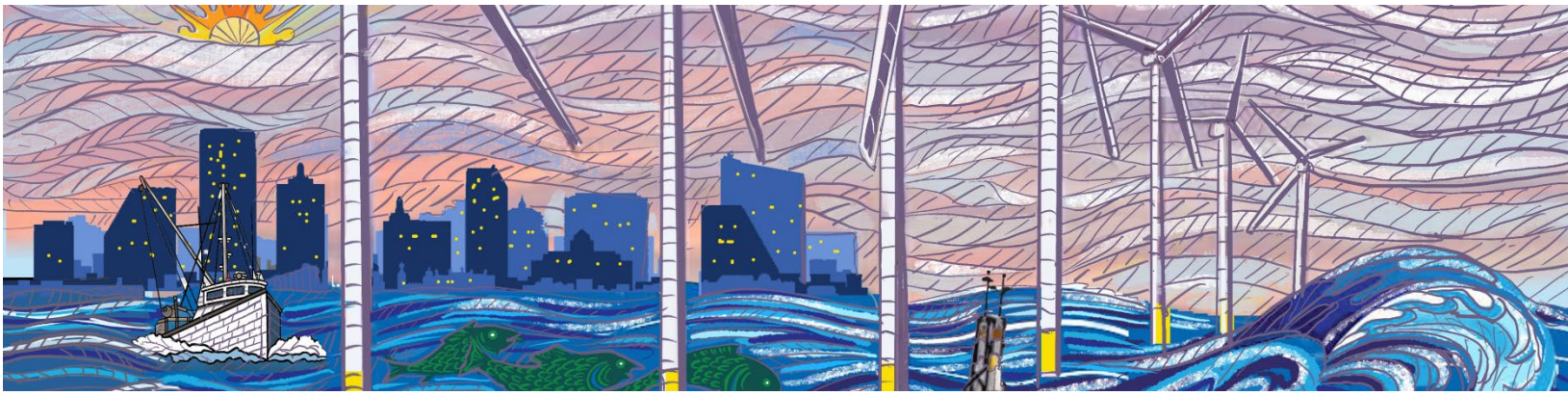

Appendix II-G2

2020 and 2022 Benthic Assessment Report

May 2024

ATLANTIC SHORES SOUTH

2020 and 2022 Benthic Assessment Report

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Table of Abbreviations

ANOSIM	Analysis of Similarities
BOEM	Bureau of Ocean Energy Management
C	Celsius
CAR	Cardiff (now referred to as Atlantic)
cm	Centimeters
CMECS	Coastal and Marine Ecological Classifications Standards
ECC	Export Cable Corridor
EFH	Essential Fish Habitat
EPA	United States Environmental Protection Agency
GPS	Global Positioning System
kg	Kilogram
LAR	Larabee (now referred to as Monmouth)
LPTL	Lowest Practical Taxonomic Level
m	Meters
mg	Milligrams
NLA	Northern Lease Area
NMDS	Nonmetric Multidimensional Scaling
NMFS	National Marine Fisheries Service
OCS	Outer Continental Shelf; OCS-Lease Area 499
PEP	Project Execution Plan
SIMPER	Analysis of Similarity Percentages
SPI/PV	Sediment Profile Imaging and Plan View
TOC	Total Organic Carbon
USBL	Ultra-short Baseline
WTA	Wind Turbine Area

1 INTRODUCTION

RPS was contracted by Atlantic Shores via Environmental Design & Research (EDR) to post-process and compile benthic grab data collected by Fugro USA Marine, Inc. (Fugro) in the Offshore Project Area associated with development of Federal Lease Area OCS-A 0499, offshore of New Jersey. The Atlantic Shores marine benthic survey was conducted in four distinct locations within and outside of the Offshore Project Area. Survey locations within the Offshore Project Area, include the Lease Area OCS-A 0499, otherwise known as the Wind Turbine Area (WTA), which is further defined as Project Areas 1 & 2 with an overlap region, and along two proposed export cable corridors (ECCs), Monmouth and Atlantic (Figure 1-1). The Northern Lease Area (NLA) or OCS-A 0549, which is outside of the Offshore Project Area, was also surveyed. The Project Area associated with the Construction and Operation Plan (COP) includes the WTA (Project Areas 1 and 2 with overlap), Monmouth ECC (MECC), and Atlantic ECC (AECC). Sampling occurred in July and September 2020 aboard the Fugro Enterprise and Westerly for offshore and nearshore sampling, respectively. Atlantic Shores acquired additional high resolution geophysical data in June 2022 across small portions of the WTA to expand Inter Array Cable (IAC) data coverage that did not exist in earlier datasets. Additional benthic survey data, including seabed grab samples and SPI-PV imagery were also acquired in 2022. These datasets were interpreted and integrated in this report with prior information from 2020 across Lease Areas OCS-A 0499 (WTA), OCS-A 0549 (NLA), and the ECCs.

The grab sample data and associated grab video is used in conjunction with remotely sensed geotechnical and geophysical data and sediment profile imaging and plan view data (SPI/PV) to characterize surficial sediment conditions and evaluate the benthic habitat in the Offshore Project Area and NLA. It is important to note that the Fugro sample locations are indicated by CAR and LAR based on the former naming convention of the ECCs. The samples referred to as CAR are for the Atlantic ECC and the samples referred as to LAR are for the Monmouth ECC.

This evaluation identifies the dominant substrates in the Offshore Project Area and NLA to establish a pre-construction baseline and characterizes potentially sensitive or important seafloor areas that may serve as essential fish habitat (EFH). In accordance with Bureau of Ocean Energy Management (BOEM 2019) and National Marine Fisheries Service (NMFS 2020) guidelines, both sampling protocols and a modified version of the Coastal and Marine Ecological Classifications Standards (CMECS; FGDC 2012) were used to characterize the benthic environment. This report presents:

- a description of the benthic grab sampling methods;
- sediment grain size analysis results;
- benthic macroinvertebrate community analysis using summary statistics and metrics such as taxa richness, density, community composition and more detailed multivariate methods;
- CMECS substrate component classification of each sampling station based on a review of grab sample video imagery and grain size results; and

- a summary of overall results, including a brief comparison to SPI/PV survey results conducted in the project area.

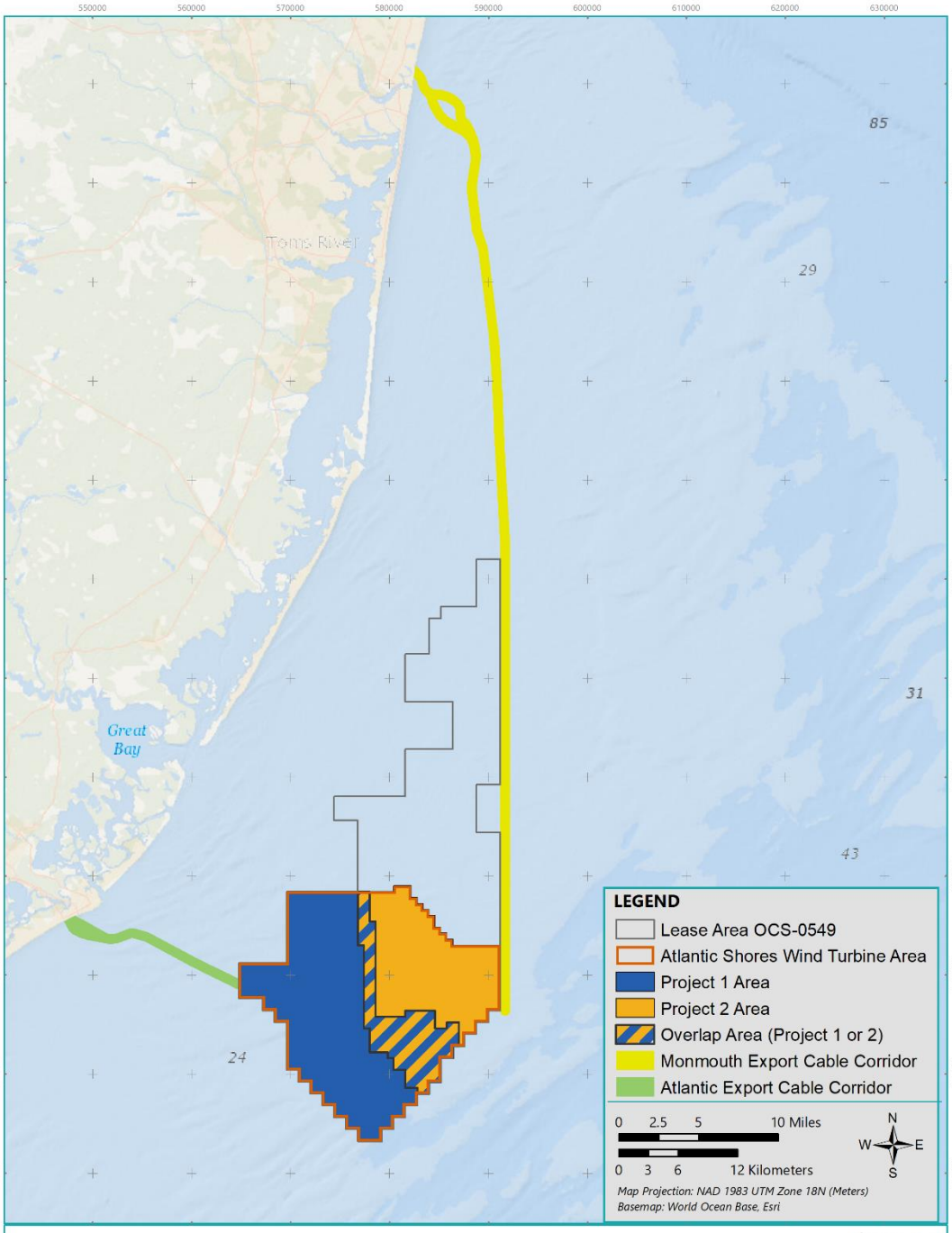


Figure 1-1
Atlantic Shores Offshore Wind Lease Areas OCS-A-0499 and OCS-A-0549, Wind Turbine Area, and Export Cable Corridors Offshore New Jersey

Figure 1-1. Atlantic Shores Offshore Wind development area in the Federal Lease Area OCS-A 0499 (Project 1 Area, Project 2 Area, and Overlap Area). Project area for the COP includes WTA, Monmouth ECC, and Atlantic ECC.

2 METHODS

2.1 Sampling Design

The benthic survey methods (e.g., recommended equipment, sampling methodology, procedures, lab analyses, etc.) for this study were selected to meet federal guidance including the Bureau of Ocean Energy Management (BOEM) 2019 benthic survey guidance and National Marine Fisheries Service (NMFS) 2020 recommendations for mapping essential fish habitat. The design meets the required sampling density of about 1 sample per 2 km area on average with some sites variably spaced to target apparently different or interesting features/habitats based on geophysical data. A pre-survey meeting with Atlantic Shores, BOEM, EDR-Epsilon, Fugro, NMFS and RPS was held to discuss the planned benthic survey methodology.[1]

Grab samples were collected over several survey campaigns between 2020 and 2022 for a combined total of 157 grab sampling sites in the Lease Areas (OCS-A 0499 [WTA] and OCS-A 0549 [NLA]), and along two potential ECCs: 1- Monmouth, which extends to the north, and 2- Atlantic, to the southwest (Table 2-1, Figure 2-1). In July and September 2020, Fugro conducted benthic grab sampling at 121 sites within the Lease Areas (WTA and NLA), and in the ECCs. A total of 90 benthic grab sites were within the Lease Areas (WTA and the NLA) with 46 located in the WTA and 44 in the NLA. Within the ECCs, 21 grab sites were located along the Monmouth ECC, and 10 were located along the Atlantic ECC. Additional benthic survey was conducted by Fugro in June 2022 at 36 grab sample locations both in the Lease Areas (WTA and NLA) and the ECCs. A total of 19 grab sites were sampled within the Lease Areas (WTA and NLA) with 9 in the NLA and 10 in the WTA along with 11 SPI/PV imagery location, 3 of which were co-located. Within the ECC, 16 grab sites were sampled along the Monmouth ECC. At each site, “GrabCam” video was recorded and Fugro scientists reviewed the video in real-time, described the contents of the grab, and reviewed the video after the survey to make notes for a visual analysis. RPS biologists also reviewed the GrabCam video for confirmation of CMECS classification and to capture representative images for this report.

Table 2-1. Grab sample locations and number of sample locations from 2020 and 2022

Station Location	2020	2022	Total
Lease Areas	90	20	**110**
WTA (OCS-A 0499)	46	11	**57**
NLA (OCS-A_0549)	44	9	**53**
MECC	21	16	**37**
AECC	10	0	**10**
Total	**121**	**36**	**157**

In a separate effort, Integral Consulting Inc. (Integral) collected SPI/PV data for 3 replicate samples at 125 sites to obtain high definition still images of the seafloor and the sediment-water interface. Thirty-eight of

[1] April 28th 2020 Benthic Survey Plan Meeting

the SPI/PV sites overlapped with grab sample sites. Results from the SPI-PV survey are described in a separate report (Integral 2020) and the classifications for the overlapping sites are briefly compared to grab sample results in Section 3.5.

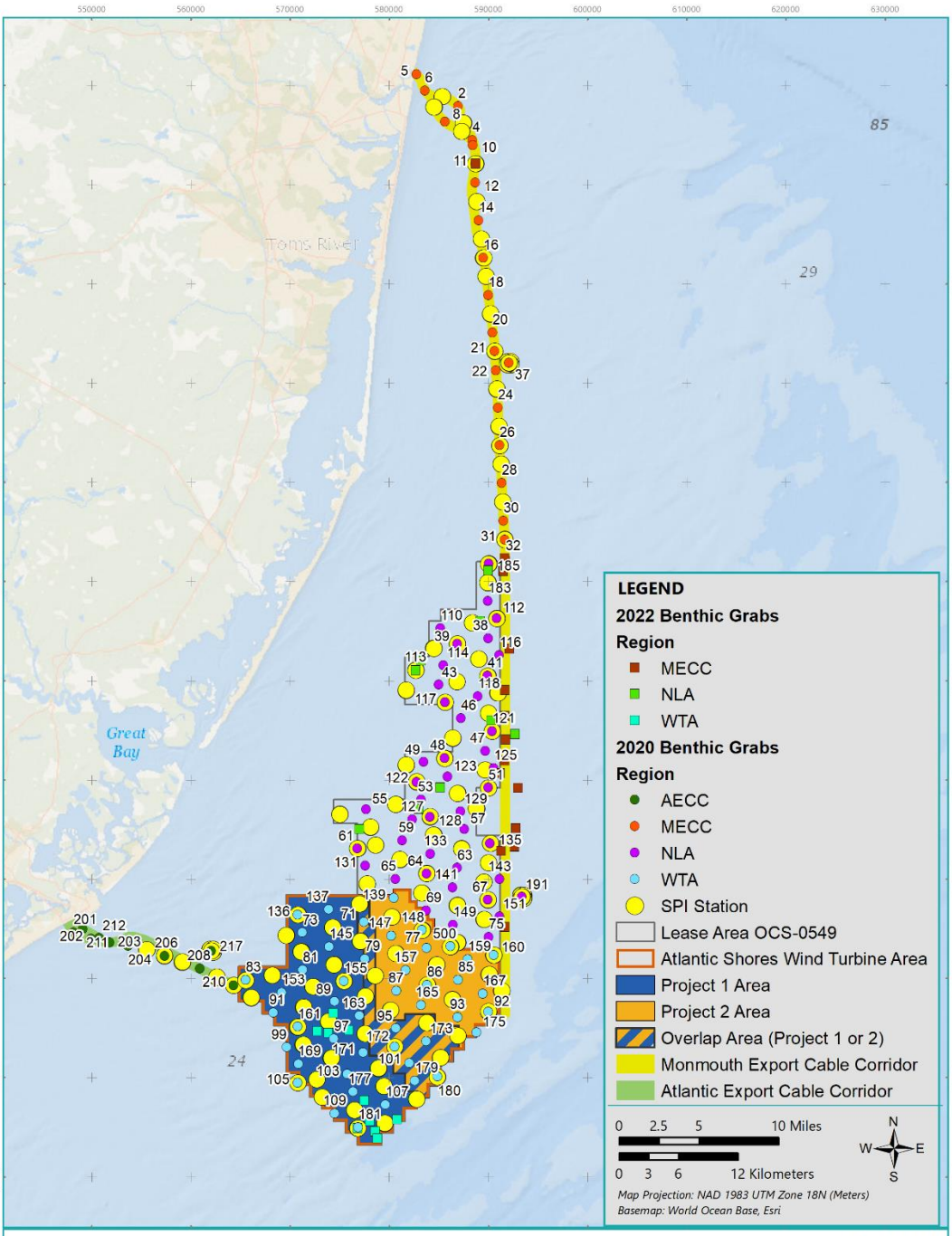


Figure 2-1
Benthic Grab / SPI Stations in the Atlantic Shores Offshore Wind Lease Areas OCS-A-0499 and OCS-A-0549, Wind Turbine Area, and Export Cable Corridors Offshore New Jersey

2.2 Field Survey Grab Sampling

Benthic grab samples were acquired using a Ted Young-modified double Van Veen grab sampler equipped with a real-time video camera (i.e., Fugro GrabCam). The dual-bucket (each 0.04 m^2) configured grab sampler with GrabCam provided sediment samples for physical and (limited) chemical sediment characterization, taxonomic identification of benthic macro invertebrates, estimates of the wet-weight biomass of benthic macrofauna, and real-time high-definition video footage of the seafloor conditions and grab operation at the time of sampling. An ultra-short baseline (USBL) beacon was fixed to the grab sampler to obtain global positioning system (GPS) coordinates in conjunction with a USBL system.

For a detailed description of the sampling protocol for the Atlantic Shores 2020 and 2022 benthic survey, refer to the Project Execution Plan (PEP)/Ops Plan (Fugro 2020). Upon retrieval during sampling, the grab sampler was examined for sample acceptability. If a sample did not fulfil requirements as outlined in the PEP, the entire contents were returned to the water and another sampling attempt was made.

Once an acceptable sample was obtained, the following steps were taken:

1. A photograph was taken of the sample next to an identification label containing sample identification number.

2. Field notes were entered about the contents of the sample (i.e., smell, texture, presence of organisms on the surface, etc.).

Each bucket of the dual-bucket grab sampler was processed separately. One bucket was processed for physical and chemical analysis of the sediment (sediment grain size and total organic carbon [TOC]), while the other was processed for macroinvertebrate species identification. Sediment grain size samples contained at least 200 mL of substrate, collected from the full grab depth. TOC samples contained at least 100 mL of substrate, sampled from the top two 2 centimeters (cm) of the grab and stored in glass or high-density plastic containers, sealed, and kept refrigerated (about 4°C) until they were delivered to the laboratory.

The entirety of the second grab bucket was used for the identification of benthic macroinvertebrates at that station. The sample was loaded onto a processing table and material washed through a 0.5-milimeter (mm) sieve and the sample was fixed/preserved with 10% buffered formalin solution. Containers were tightly

Figure 2-1.Benthic grab and overlapping SPI/PV sample sites in the Atlantic Shores Lease Areas (WTA and NLA) and ECCs.

sealed with tape and stored in a cooler at ambient temperature (not frozen or refrigerated). Samples were labelled as OCS if located in the WTA (OCS-A 0499) or in the NLA (OCS-A 0549), LAR if located along the Monmouth ECC, or CAR if located along the Atlantic ECC.

2.3 Lab Analysis

2.3.1 Grain Size and TOC Analysis

Grain size samples were analyzed by GeoTesting Express (125 Nagog Park, Acton, MA) in 2020 and by Alpha Analytical Inc. (8 Walkup Drive, Westborough, MA) in 2022 according to ASTM D6913/D7928 (sieve and hydrometer) to obtain particle size distributions by weight. Additional measurement steps were included to ensure results matched Wentworth Scale size bins and complied with CMECS recommendations.

TOC samples were analyzed by TestAmerica (5755 8th Street, East Tacoma, WA). TOC content of sediment samples was determined using U.S. Environmental Protection Agency (EPA) Method 9060 with results reported in milligrams per kilogram (mg/kg). Moisture content was determined using Standard Method 2540G with results reported in percent.

2.3.2 Benthic Macroinvertebrate Lab Analysis

The benthic macroinvertebrate samples were sent to EcoAnalysts (1420 S Blaine St, Ste. 14, Moscow, ID) for processing and identification of organisms to lowest practical taxonomic level according to the following steps:

1. Benthic invertebrate samples were catalogued and verified against the Chain of Custody to ensure samples received match those listed in the shipment.
2. Samples were rinsed with freshwater to remove the formalin and transferred to 70 percent ethanol alcohol for sorting and storage.
3. Organisms were identified to the lowest practical taxonomic level (LPTL) (at least to family) and counted by taxonomists using the most appropriate taxonomic references for the region (Bousfield 1973; Cutler 1994; Winston and Hayward 2012).
4. Species classification and abundance were recorded in project data sheets and summarized in both tabular and graphical formats.
5. Prior to performing the invertebrate data analyses, the overall dataset was scanned for non-benthic taxa (i.e., pelagic or planktonic organisms) that were excluded from all analyses; examples include chaetognaths, hyperiid amphipods, and decapod zoea/megalopae.
6. Calculations of abundance included all taxa occurring in each sample, whether those taxa were identified to species level or not.

2.4 Benthic Community Data Post-Processing

The benthic community analysis was based on the benthic macroinvertebrate laboratory data from EcoAnalysts. Community composition was characterized for both individual stations and for the entire survey aggregated at both phylum-level and LPTL. Macroinvertebrate community statistics were calculated using family (or next lowest taxonomic level possible based on LPTL) abundance estimates in each sample, which were reported as count per 0.04 square meters (m^2) grab sample (i.e., the area of the grab sample processed for biological analysis). Community composition parameters included: total abundance, number

of phyla, number of taxa, Margalef's Richness Index, Shannon Diversity Index, and Pielou's Index of Evenness for each station. A multivariate analysis was conducted to examine dissimilarity/similarity of samples based on the invertebrate assemblages (composition of all taxa and their abundances). Note that Nematode worms (Phylum Nematoda) were excluded in the 2022 analysis as these macroinvertebrates are considered meiofauna and not part of the most recent BOEM (2019) or NMFS (2021) guidance for benthic community assessments. Since each survey period differed in analytical strategies, results from the Benthic Community Composition (Section 3.2) analyses are discussed in separate subsections by survey year.

2.4.1 Taxonomic Composition

Benthic macroinvertebrate taxonomic composition was assessed to characterize the high-level trends in community data. Community composition summaries included summaries of each station and of the entire survey aggregated at both phylum-level and LPTL.

2.4.2 Richness, Diversity, and Evenness

Taxonomic richness, evenness, and diversity are common ecological parameters used to measure the overall biodiversity of a community or discrete unit. Taxonomic richness is the number of unique species or taxonomic groups represented in an area of interest. In this assessment, taxonomic richness was calculated using Margalef's Richness Index (Formula 1) for each station to acquire individual and average richness indices calculated using family (or next lowest taxonomic level possible based on LPTL) abundances.

Formula 1. Margalef's Richness Index (RI).

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

Where:

S= the number of taxa

N= the total number of individuals in the sample

Interpretation: The higher the index, the greater the taxonomic richness.

The diversity index for a community considers taxonomic richness and the proportion of each unique taxa. The Shannon Diversity Index (H'; Formula 2) was calculated using the number of each taxa (family or LPTL), the proportion of each taxa relative to the total number of individuals, and the sum of the proportions. This index was used to assess diversity of each station. The diversity index (H') increases with increasing taxonomic richness and evenness.

Formula 2. H'- Shannon Diversity Index.

$$H' = -\sum_{i=1}^{N} p_i \ln(p_i)$$

Where:

p_i is the proportion of individuals belonging to taxa i in the dataset of interest

Interpretation: The greater the H', the greater the richness and evenness.

Evenness of a community refers to the similarity in abundances of different species comprising a community or sample. Pielou's Index of Evenness (J'; Formula 3) includes H' (Shannon-Weiner Diversity Index) in its calculation.

Formula 3. J'- Pielou's Index of Evenness.

$$J' = \frac{H'}{H_{Max}}$$

Where:

H' is the Shannon-Weiner Diversity Index

H_{Max} is the maximum possible value of H', where each species/taxa occurs in equal abundances.

$$H_{Max} = \ln(s)$$

Where: s = Number of species

Interpretation: J' is constrained between 0 and 1. The greater the value of J', the more evenness in the sample.

2.4.3 Multivariate Analysis

Multivariate analyses were conducted with R software (Oksanen et al. 2019; R Core Team 2020) to examine dissimilarity/similarity of samples based on the invertebrate assemblages (composition of all taxa and their abundances). These analyses included nonmetric multidimensional scaling (NMDS), analysis of similarities (ANOSIM), and analysis of similarity percentages (SIMPER; Clarke 1993). All analyses were built on a Bray-Curtis Similarity Index, using a square-root transformation of the data to ensure all taxa (not just those that dominated samples) would contribute to similarity measures. As with the community indices, invertebrate data were limited to the family level or next LPTL. Differences in assemblages between stations were compared and assessed using NMFS (2020) modified CMECS substrate classifications and location of sample in WTA, NLA, Monmouth ECC, and Atlantic ECC.

Two-dimensional NMDS was used to visually compare the ordinate distance (difference) between samples and evaluate the similarity of community assemblages. Samples were ordinated based on similarity to one another with samples of higher similarity appearing in closer proximity to one another in NMDS plots.

Samples were also colored according to assigned NMFS (2020) modified CMECS classifications and sample location.

SIMPER was used to identify the percent dissimilarity between assemblages within NMFS (2020) modified CMECS substrate components and sample location and to identify taxa that were most responsible for that dissimilarity (i.e., the taxa with the largest differences in mean abundance). ANOSIM was used to help determine if substrate classifications or location were predictive of the invertebrate assemblage clusters. The test statistic (R values) calculated in the Global ANOSIM indicates whether samples within classification groups were more similar than samples between groups. R values closer to 1 with significance levels of $p < 0.05$ indicate that samples within a classification group are more similar to each other than to those in different groups. R values closer to 0 indicate samples are equally similar within a classification group as they are between different groups. Specifically, ANOSIM was used to test the null hypotheses:

$H_0$1: The similarity of invertebrate assemblages between NMFS CMECS groups is greater than or equal to the similarity within NMFS CMECS groups.

$H_0$2: The similarity of invertebrate assemblages between sample location groups is greater than or equal to the similarity within location groups.

3 RESULTS

The water depth and geographic locations of the 157 stations at which grab samples were obtained within the Offshore Project Area and NLA are described in Table 3-1, Table 3-2, and

Table 3-3. The tables provide results for the Offshore Project Area and NLA (Figure 1-1). Collection of sediment material was successful at all benthic grab stations except station LAR-20-003 due to the presence of large ocean quahog clam shells preventing sediment retrieval. In addition, three attempts were made at LAR-20-017, but none were successful at retrieving a passing sediment sample due to improper closure. One partial sample at this site contained fine sand with large clam rubble and sand dollars but did not contain enough intact surface sediment to send for grain size analysis; however, the partial samples were mixed and sent for macroinvertebrate analysis.

Table 3-1. Grab sample station locations and water depth in the Atlantic ECC Project Area.

Sample	Date (UTC)	Time (UTC)	Latitude (°N)	Longitude (°W)	Water Depth (m)	Penetration Depth (cm)
CAR-20-201	29-Jul-20	1:36 PM	39° 20' 22.260" N	74° 26' 26.645" W	5.2	7
CAR-20-202	29-Jul-20	2:59 PM	39° 20' 0.952" N	74° 25' 12.970" W	7.3	9
CAR-20-203	29-Jul-20	5:30 PM	39° 19' 49.099" N	74° 23' 55.892" W	11.3	8
CAR-20-204	29-Jul-20	6:20 PM	39° 19' 37.726" N	74° 22' 37.589" W	12.2	8
CAR-20-206	20-Jul-20	8:01 PM	39° 19' 3.864" N	74° 20' 4.650" W	16.2	7
CAR-20-208	20-Jul-20	1:46 PM	39° 18' 20.832" N	74° 17' 36.059" W	18.4	8
CAR-20-210	20-Jul-20	12:04 PM	39° 17' 25.517" N	74° 15' 14.225" W	22.8	8
CAR-20-211	29-Jul-20	2:18 PM	39° 20' 33.207" N	74° 25' 47.972" W	4.8	8
CAR-20-212	29-Jul-20	4:52 PM	39° 20' 3.449" N	74° 24' 38.754" W	8.4	8
CAR-20-217	20-Jul-20	2:32 PM	39° 19' 19.165" N	74° 16' 47.041" W	14.4	8

Table 3-2. Grab sample station locations and water depth in the Monmouth Project Area.

Sample	Date (UTC)	Time (UTC)	Latitude (°N)	Longitude (°W)	Water Depth (m)	Penetration Depth (cm)
LAR-20-002	18-Jul-20	2:27 PM	40° 05' 11.507" N	73° 58' 48.214" W	24	9
LAR-20-004	18-Jul-20	5:24 PM	40° 03' 19.796" N	73° 57' 49.295" W	22.1	8
LAR-20-005	30-Jul-20	6:00 PM	40° 06' 57.468" N	74° 1' 43.932" W	5.2	8
LAR-20-006	30-Jul-20	5:13 PM	40° 06' 4.193" N	74° 1' 7.240" W	14.8	7
LAR-20-008	18-Jul-20	3:12 PM	40° 04' 21.122" N	73° 59' 44.552" W	23.2	9.5
LAR-20-010	18-Jul-20	6:09 PM	40° 03' 3.694" N	73° 57' 46.320" W	22.9	8

Sample	Date (UTC)	Time (UTC)	Latitude (°N)	Longitude (°W)	Water Depth (m)	Penetration Depth (cm)
LAR-20-011	18-Jul-20	6:38 PM	40° 02' 2.587" N	73° 57' 36.510" W	22.2	9
LAR-20-012	18-Jul-20	7:38 PM	40° 01' 1.242" N	73° 57' 37.441" W	22.1	9
LAR-20-014	18-Jul-20	9:25 PM	39° 58' 58.173" N	73° 57' 25.881" W	21.4	8
LAR-20-016	18-Jul-20	9:54 AM	39° 56' 55.940" N	73° 57' 7.578" W	21.2	7
LAR-20-018	18-Jul-20	8:47 AM	39° 54' 53.285" N	73° 56' 48.398" W	21.6	9
LAR-20-020	18-Jul-20	3:38 AM	39° 52' 50.546" N	73° 56' 31.626" W	21.4	8
LAR-20-021	18-Jul-20	2:32 AM	39° 51' 49.791" N	73° 56' 24.537" W	21.7	8
LAR-20-022	17-Jul-20	11:16 PM	39° 50' 46.908" N	73° 56' 19.834" W	22.2	8
LAR-20-024	17-Jul-20	10:21 PM	39° 48' 44.232" N	73° 56' 13.001" W	23	9
LAR-20-026	19-Jul-20	2:06 AM	39° 46' 41.926" N	73° 56' 7.711" W	23.3	8
LAR-20-028	17-Jul-20	8:58 PM	39° 44' 38.709" N	73° 56' 0.950" W	23.8	8
LAR-20-030	17-Jul-20	8:02 PM	39° 42' 35.754" N	73° 55' 55.154" W	24.7	9
LAR-20-031	19-Jul-20	5:30 AM	39° 41' 33.793" N	73° 55' 51.887" W	23.9	9
LAR-20-032	17-Jul-20	7:11 PM	39° 40' 31.119" N	73° 55' 49.050" W	25.5	9
LAR-20-037	18-Jul-20	1:39 AM	39° 51' 10.772" N	73° 55' 24.782" W	22.1	8
LAR-22-383	28-May-22	3:56 PM	40° 02' 02.566" N	73° 57' 35.417" W	22	6.5
LAR-22-415	29-May-22	6:12 AM	39° 40' 33.028" N	73° 55' 52.813" W	25	6.5
LAR-22-420	29-May-22	8:14 AM	39° 39' 50.382" N	73° 55' 58.613" W	25	8.5
LAR-22-420d	29-May-22	8:14 AM	39° 39' 50.382" N	73° 55' 58.613" W	25	8.5
LAR-22-433	29-May-22	12:19 PM	39° 35' 36.175" N	73° 55' 35.072" W	27	6.5
LAR-22-446	29-May-22	4:49 PM	39° 33' 21.546" N	73° 55' 57.018" W	26	5
LAR-22-452	29-May-22	6:21 PM	39° 31' 57.187" N	73° 55' 58.210" W	25	8
LAR-22-457	29-May-22	8:19 PM	39° 30' 39.110" N	73° 55' 55.157" W	25	NA
LAR-22-459	6-Jun-22	11:25 PM	39° 29' 30.887" N	73° 56' 02.126" W	25	9
LAR-22-462	7-Jun-22	12:48 AM	39° 28' 50.326" N	73° 56' 21.239" W	25	8
LAR-22-464	29-May-22	11:21 PM	39° 28' 01.488" N	73° 55' 07.033" W	-27	6
LAR-22-469	30-May-22	12:42 AM	39° 25' 49.994" N	73° 55' 17.864" W	-27	8.5
LAR-22-472	30-May-22	1:56 AM	39° 24' 48.607" N	73° 55' 24.467" W	-29	7
LAR-22-472d	30-May-22	1:56 AM	39° 24' 48.607" N	73° 55' 24.467" W	-29	7
LAR-22-473	30-May-22	6:17 AM	39° 24' 35.748" N	73° 56' 21.361" W	26	8.5
LAR-22-479	7-Jun-22	5:19 AM	39° 20' 27.550" N	73° 56' 09.265" W	27	7.5

Table 3-3. Grab sample station locations and water depth in the WTA and NLA project regions

Project Area	Sample	Date (UTC)	Time (UTC)	Latitude (°N)	Longitude (°W)	Water Depth (m)	Penetration Depth (cm)
WTA	OCS-20-071	15-Jul-20	11:45 PM	39° 20' 49.512" N	74° 06' 2.474" W	24.2	7
WTA	OCS-20-073	16-Jul-20	1:05 AM	39° 20' 15.765" N	74° 10' 23.668" W	26.5	8
WTA	OCS-20-077	15-Jul-20	6:53 AM	39° 19' 21.325" N	74° 01' 40.727" W	25.3	9
WTA	OCS-20-079	15-Jul-20	8:25 AM	39° 18' 47.575" N	74° 06' 1.253" W	26.1	9
WTA	OCS-20-081	14-Jul-20	5:43 PM	39° 18' 13.741" N	74° 10' 23.077" W	25.6	8
WTA	OCS-20-083	20-Jul-20	10:49 AM	39° 17' 43.032" N	74° 14' 24.309" W	19.9	7.5
WTA	OCS-20-085	13-Jul-20	7:15 PM	39° 17' 36.398" N	73° 59' 29.049" W	32.5	8
WTA	OCS-20-086	13-Jul-20	7:55 PM	39° 17' 20.318" N	74° 01' 40.392" W	28.2	8
WTA	OCS-20-087	13-Jul-20	8:58 PM	39° 17' 3.061" N	74° 03' 49.554" W	29.9	7
WTA	OCS-20-089	14-Jul-20	8:06 PM	39° 16' 29.894" N	74° 08' 10.530" W	24.6	9
WTA	OCS-20-091	14-Jul-20	11:50 AM	39° 15' 54.594" N	74° 12' 28.223" W	25.0	7
WTA	OCS-20-092	13-Jul-20	4:05 PM	39° 15' 50.521" N	73° 57' 23.570" W	31.1	7
WTA	OCS-20-093	13-Jul-20	9:06 AM	39° 15' 34.453" N	73° 59' 32.876" W	27.1	8
WTA	OCS-20-095	13-Jul-20	10:38 AM	39° 15' 0.519" N	74° 03' 53.436" W	29.0	7.5
WTA	OCS-20-097	14-Jul-20	3:08 AM	39° 14' 27.537" N	74° 08' 15.152" W	31.5	8
WTA	OCS-20-099	14-Jul-20	1:00 PM	39° 14' 1.359" N	74° 11' 33.456" W	26.6	8
WTA	OCS-20-101	12-Jul-20	10:42 PM	39° 13' 6.269" N	74° 02' 57.661" W	23.9	8
WTA	OCS-20-103	14-Jul-20	5:40 AM	39° 12' 31.636" N	74° 07' 19.094" W	24.0	8
WTA	OCS-20-105	14-Jul-20	8:55 AM	39° 12' 5.197" N	74° 10' 47.861" W	21.7	8
WTA	OCS-20-107	12-Jul-20	2:51 PM	39° 10' 51.444" N	74° 04' 40.735" W	23.0	7
WTA	OCS-20-109	12-Jul-20	5:17 PM	39° 10' 23.561" N	74° 8' 13.807" W	24.2	8
WTA	OCS-20-136	16-Jul-20	2:32 AM	39° 21' 14.346" N	74° 10' 41.191" W	19.7	8
WTA	OCS-20-137	16-Jul-20	3:41 AM	39° 21' 30.745" N	74° 08' 31.290" W	20.3	8
WTA	OCS-20-139	16-Jul-20	5:29 AM	39° 22' 6.350" N	74° 03' 55.637" W	24.5	8.5
WTA	OCS-20-145	15-Jul-20	10:50 AM	39° 19' 29.188" N	74° 08' 30.364" W	21.2	9
WTA	OCS-20-147	15-Jul-20	12:21 PM	39° 20' 2.867" N	74° 04' 9.161" W	24.2	9
WTA	OCS-20-148	15-Jul-20	1:02 PM	39° 20' 20.196" N	74° 01' 58.625" W	25.2	9.5
WTA	OCS-20-153	14-Jul-20	4:09 PM	39° 17' 1.302" N	74° 11' 51.721" W	21.8	7
WTA	OCS-20-155	14-Jul-20	8:33 PM	39° 17' 35.997" N	74° 07' 29.590" W	24.6	8
WTA	OCS-20-157	14-Jul-20	10:38 PM	39° 18' 9.771" N	74° 03' 9.654" W	27.6	8

Project Area	Sample	Date (UTC)	Time (UTC)	Latitude (°N)	Longitude (°W)	Water Depth (m)	Penetration Depth (cm)
WTA	OCS-20-159	15-Jul-20	2:21 AM	39° 18' 42.963" N	73° 58' 48.053" W	27.7	8
WTA	OCS-20-160	15-Jul-20	2:53 AM	39° 18' 56.258" N	73° 56' 57.712" W	31.3	8
WTA	OCS-20-161	14-Jul-20	1:04 AM	39° 15' 8.373" N	74° 10' 46.594" W	23.6	8
WTA	OCS-20-163	13-Jul-20	10:43 PM	39° 15' 42.290" N	74° 06' 26.004" W	30.9	7
WTA	OCS-20-165	13-Jul-20	1:38 PM	39° 16' 15.428" N	74° 02' 5.890" W	28.4	9.5
WTA	OCS-20-167	13-Jul-20	3:34 PM	39° 16' 49.541" N	73° 57' 45.363" W	28.9	7
WTA	OCS-20-169	14-Jul-20	1:51 PM	39° 13' 6.729" N	74° 10' 43.461" W	26.9	9
WTA	OCS-20-171	14-Jul-20	5:01 AM	39° 13' 42.164" N	74° 06' 11.815" W	25.7	9
WTA	OCS-20-172	13-Jul-20	12:44 AM	39° 13' 59.520" N	74° 03' 59.282" W	29.5	7
WTA	OCS-20-173	13-Jul-20	2:21 AM	39° 14' 17.055" N	74° 01' 46.522" W	26.0	7
WTA	OCS-20-175	13-Jul-20	8:00 AM	39° 14' 43.937" N	73° 58' 14.326" W	29.5	8
WTA	OCS-20-177	12-Jul-20	6:43 PM	39° 11' 34.225" N	74° 06' 55.652" W	24.4	8
WTA	OCS-20-179	12-Jul-20	8:13 PM	39° 12' 7.681" N	74° 02' 35.311" W	24.5	9
WTA	OCS-20-180	12-Jul-20	8:43 PM	39° 12' 20.546" N	74° 01' 0.766" W	28.3	8
WTA	OCS-20-181	12-Jul-20	10:16 AM	39° 9' 37.391" N	74° 06' 36.658" W	29.2	8
WTA	OCS-20-500	15-Jul-20	5:39 AM	39° 19' 25.745" N	73° 59' 59.810" W	28.8	8.5
WTA	OCS-22-490	11-Jun-22	7:13 AM	39° 15' 51.793" N	74° 08' 15.324" W	22	8
WTA	OCS-22-491	11-Jun-22	6:08 AM	39° 14' 55.324" N	74° 07' 10.708" W	28	8.5
WTA	OCS-22-491d	11-Jun-22	6:08 AM	39° 14' 55.324" N	74° 07' 10.708" W	28	8.5
WTA	OCS-22-492	11-Jun-22	4:18 AM	39° 14' 53.455" N	74° 09' 23.386" W	32	8.5
WTA	OCS-22-493	11-Jun-22	3:28 AM	39° 14' 47.425" N	74° 08' 37.334" W	33	8
WTA	OCS-22-498	10-Jun-22	9:40 PM	39° 11' 05.302" N	74° 06' 09.194" W	22	8.5
WTA	OCS-22-501	10-Jun-22	6:32 PM	39° 10' 01.884" N	74° 03' 51.556" W	34	8
WTA	OCS-22-502	10-Jun-22	5:08 PM	39° 09' 57.557" N	74° 05' 46.439" W	28	9
WTA	OCS-22-503	10-Jun-22	4:25 PM	39° 09' 35.172" N	74° 06' 38.599" W	28	7
WTA	OCS-22-505	10-Jun-22	2:38 PM	39° 09' 22.662" N	74° 05' 23.132" W	33	8.5
WTA	OCS-22-506	10-Jun-22	9:45 AM	39° 09' 00.598" N	74° 05' 14.917" W	36	8
NLA	OCS-20-038	17-Jul-20	3:54 PM	39° 36' 10.822" N	73° 57' 5.516" W	25.8	8
NLA	OCS-20-039	19-Jul-20	10:59 AM	39° 35' 54.259" N	73° 59' 16.512" W	24.8	8
NLA	OCS-20-041	19-Jul-20	5:33 PM	39° 34' 9.011" N	73° 57' 10.012" W	24.2	9
NLA	OCS-20-043	17-Jul-20	1:46 PM	39° 33' 42.091" N	74° 00' 37.476" W	23.0	8.5
NLA	OCS-20-046	17-Jul-20	1:05 PM	39° 31' 52.033" N	73° 59' 4.465" W	23.7	8.2
NLA	OCS-20-047	17-Jul-20	11:41 AM	39° 30' 3.547" N	73° 57' 23.332" W	24.9	8.5

Project Area	Sample	Date (UTC)	Time (UTC)	Latitude (°N)	Longitude (°W)	Water Depth (m)	Penetration Depth (cm)
NLA	OCS-20-048	19-Jul-20	10:53 PM	39° 29' 41.261" N	74° 00' 15.414" W	25.1	9
NLA	OCS-20-049	17-Jul-20	8:42 AM	39° 29' 29.872" N	74° 01' 44.525" W	22.9	8
NLA	OCS-20-051	17-Jul-20	4:13 AM	39° 28' 3.284" N	73° 57' 12.572" W	23.0	7
NLA	OCS-20-053	17-Jul-20	6:36 AM	39° 27' 26.508" N	74° 01' 57.206" W	25.2	7.2
NLA	OCS-20-055	16-Jul-20	11:13 PM	39° 26' 56.479" N	74° 05' 49.575" W	21.3	8
NLA	OCS-20-057	16-Jul-20	5:53 PM	39° 25' 48.571" N	73° 58' 55.144" W	22.8	8
NLA	OCS-20-059	16-Jul-20	7:16 PM	39° 25' 14.266" N	74° 03' 17.719" W	25.1	7
NLA	OCS-20-061	16-Jul-20	8:29 PM	39° 24' 50.008" N	74° 06' 28.403" W	21.7	7
NLA	OCS-20-063	16-Jul-20	9:44 AM	39° 23' 42.242" N	73° 59' 26.920" W	24.2	7.5
NLA	OCS-20-064	16-Jul-20	10:22 AM	39° 23' 25.108" N	74° 01' 37.334" W	23.7	7.5
NLA	OCS-20-065	16-Jul-20	11:39 AM	39° 23' 8.259" N	74° 03' 47.779" W	24.1	9
NLA	OCS-20-067	15-Jul-20	8:29 PM	39° 21' 56.629" N	73° 57' 20.426" W	27.4	9
NLA	OCS-20-069	15-Jul-20	10:18 PM	39° 21' 23.759" N	74° 01' 40.637" W	25.5	8
NLA	OCS-20-075	15-Jul-20	3:51 AM	39° 19' 55.075" N	73° 57' 18.867" W	27.0	9
NLA	OCS-20-110	17-Jul-20	5:08 PM	39° 36' 46.632" N	74° 00' 26.503" W	23.6	7
NLA	OCS-20-112	19-Jul-20	8:56 AM	39° 37' 16.671" N	73° 56' 29.165" W	24.3	8
NLA	OCS-20-113	19-Jul-20	12:56 PM	39° 34' 30.958" N	74° 02' 14.507" W	22.3	8
NLA	OCS-20-114	17-Jul-20	2:15 PM	39° 34' 45.715" N	74° 00' 16.166" W	24.1	8.7
NLA	OCS-20-116	17-Jul-20	3:12 PM	39° 35' 15.837" N	73° 56' 20.655" W	25.7	7.1
NLA	OCS-20-117	19-Jul-20	2:51 PM	39° 32' 44.588" N	74° 00' 12.102" W	24.8	9
NLA	OCS-20-118	19-Jul-20	7:18 PM	39° 33' 2.825" N	73° 57' 52.343" W	24.5	8
NLA	OCS-20-121	19-Jul-20	8:45 PM	39° 31' 8.198" N	73° 56' 54.728" W	24.1	9
NLA	OCS-20-122	17-Jul-20	7:10 AM	39° 28' 24.493" N	74° 02' 16.121" W	23.1	8
NLA	OCS-20-123	17-Jul-20	9:31 AM	39° 28' 41.697" N	74° 00' 4.681" W	24.7	7
NLA	OCS-20-125	17-Jul-20	11:07 AM	39° 29' 6.859" N	73° 56' 48.259" W	25.3	8
NLA	OCS-20-127	17-Jul-20	12:50 AM	39° 26' 22.044" N	74° 02' 34.234" W	25.2	9
NLA	OCS-20-128	17-Jul-20	1:20 AM	39° 26' 30.189" N	74° 01' 20.928" W	25.3	9
NLA	OCS-20-129	17-Jul-20	2:36 AM	39° 26' 47.159" N	73° 59' 10.063" W	23.3	9
NLA	OCS-20-131	16-Jul-20	1:17 PM	39° 23' 53.412" N	74° 05' 55.043" W	21.0	8
NLA	OCS-20-133	16-Jul-20	2:51 PM	39° 24' 28.665" N	74° 01' 19.693" W	24.6	8.5
NLA	OCS-20-135	16-Jul-20	4:52 PM	39° 25' 1.166" N	73° 57' 8.045" W	25.9	8
NLA	OCS-20-141	16-Jul-20	7:04 AM	39° 22' 38.342" N	73° 59' 48.892" W	25.5	9
NLA	OCS-20-143	16-Jul-20	8:23 AM	39° 23' 3.464" N	73° 56' 29.509" W	28.3	9.5

Project Area	Sample	Date (UTC)	Time (UTC)	Latitude (°N)	Longitude (°W)	Water Depth (m)	Penetration Depth (cm)
NLA	OCS-20-149	15-Jul-20	2:44 PM	39° 20' 36.848" N	73° 59' 48.514" W	28.7	7
NLA	OCS-20-151	15-Jul-20	4:37 PM	39° 21' 2.465" N	73° 56' 31.493" W	27.2	8
NLA	OCS-20-183	17-Jul-20	6:07 PM	39° 38' 13.184" N	73° 57' 4.627" W	25.1	9
NLA	OCS-20-185	19-Jul-20	6:40 AM	39° 40' 15.188" N	73° 57' 0.733" W	24.3	8
NLA	OCS-20-191	15-Jul-20	5:21 PM	39° 22' 5.695" N	73° 54' 56.238" W	28.4	7
NLA	OCS-22-419	29-May-22	7:11 AM	39° 39' 54.065" N	73° 57' 02.858" W	24	7.5
NLA	OCS-22-427	6-Jun-22	8:51 AM	39° 37' 07.512" N	73° 57' 38.686" W	25	9
NLA	OCS-22-427d	6-Jun-22	8:51 AM	39° 37' 07.512" N	73° 57' 38.686" W	25	9
NLA	OCS-22-436	29-May-22	2:26 PM	39° 35' 00.330" N	74° 01' 49.753" W	22	8.5
NLA	OCS-22-440	29-May-22	2:58 PM	39° 34' 30.115" N	74° 02' 14.086" W	22	8.5
NLA	OCS-22-453	11-Jun-22	2:18 PM	39° 31' 43.291" N	73° 56' 57.134" W	25	8.5
NLA	OCS-22-463	29-May-22	9:46 PM	39° 28' 05.776" N	74° 00' 34.470" W	25	9
NLA	OCS-22-467	7-Jun-22	12:02 PM	39° 26' 55.766" N	74° 02' 05.831" W	25	8.5
NLA	OCS-22-470	7-Jun-22	10:07	39° 25' 52.903" N	74° 06' 18.558" W	21	8.5

3.1 Grain Size Analysis

3.1.1 WTA and NLA Samples

Samples from the 110 grab sample stations in the Lease Areas (WTA and NLA) were generally sandy, comprised of 0 to 100% sand-sized particles with a mean across samples of 83% sand (

Table 3-4, Figure 3-1, and Figure 3-2). Twenty-one samples contained no gravel-sized particles (> 2 mm) and four samples had ≥ 30% gravel. Fine silt and clay particles (< 0.0625 mm) comprised 0 – 34% of each sample (mean of 4%), with 21 samples containing ≥ 5% silt and clay and only 3 samples in the Lease Areas (2 in the WTA, OCS-22-491 and OCS-20-097; 1 in the NLA–OCS-22-440) with ≥ 30% silt and clay. Only one sample in the WTA (OCS-20-097) had detectable levels (i.e., 2,000 mg/kg) of Total Organic Carbon with 3,700 mg/kg.

Of the 57 samples in the WTA, only 8 had ≥ 5% gravel with no samples having ≥ 30% gravel. Samples in the WTA were primarily sandy, with 51 samples consisting of over 85% sand or mud. Of the 53 samples in the NLA project area, 20 had ≥ 5% gravel with 5 samples having ≥ 30% gravel (OCS-22-467, OCS-22-436, OCS-22-427d OCS-22-419, and OCS-20-185) (

Table 3-4). Samples in the NLA were primarily sandy, with 53 samples consisting of 87% sand.

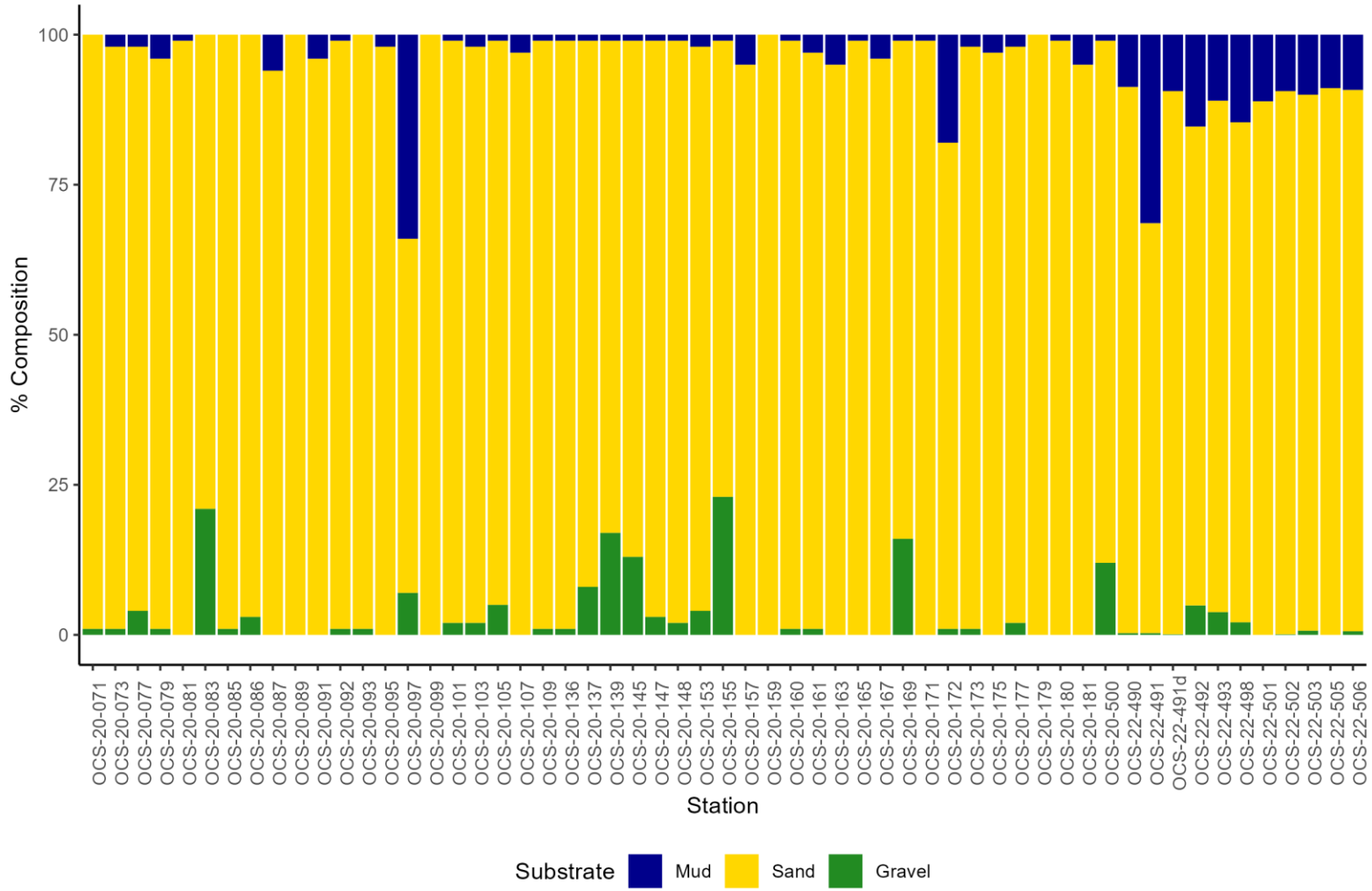
Table 3-4. Grain size composition and moisture content from grab samples in the WTA and NLA project regions (continued on next page).

Project Area	Sample	% Boulder or Cobble (> 64 mm)	% Pebble or Granule (2 to < 64 mm)	% Very Coarse / Coarse Sand (0.5 to < 2 mm)	% Medium Sand (0.25 to < 0.5 mm)	% Fine / Very Fine Sand (0.0625 mm to < 0.25 mm)	% Silt / Clay (< 0.0625 mm)	Median Grain Size (mm)	% Moisture Content
WTA	OCS-22-490	0	0	10	61	20	9	0.3103	NA
WTA	OCS-22-491	0	0	4	38	26	31	0.2212	NA
WTA	OCS-22-491d	0	0	4	40	46	9	0.2352	NA
WTA	OCS-22-492	0	5	16	28	35	15	0.2467	NA
WTA	OCS-22-493	0	4	19	29	37	11	0.2588	NA
WTA	OCS-22-498	0	2	19	52	12	15	0.3447	NA
WTA	OCS-22-501	0	0	0	2	87	11	0.1611	NA
WTA	OCS-22-502	0	0	1	12	78	9	0.1797	NA
WTA	OCS-22-503	0	1	2	13	74	10	0.1825	NA
WTA	OCS-22-505	0	0	0	10	81	9	0.1758	NA
WTA	OCS-22-506	0	1	6	75	10	9	0.4065	NA
WTA	OCS-22-490	0	0	10	61	20	9	0.3103	NA
WTA	OCS-20-071	0	1	27	65	7	0	0.3968	22.8
WTA	OCS-20-073	0	1	3	66	28	2	0.3085	24.8
WTA	OCS-20-077	0	4	38	53	3	2	0.4504	20.5
WTA	OCS-20-079	0	1	18	65	12	4	0.3610	22.7
WTA	OCS-20-081	0	0	12	68	19	1	0.3382	16.9
WTA	OCS-20-083	0	21	30	41	8	0	0.5097	12.9
WTA	OCS-20-085	0	1	8	68	23	0	0.3279	17.2
WTA	OCS-20-086	0	3	45	46	6	0	0.5000	14.6
WTA	OCS-20-087	0	0	2	50	42	6	0.2562	25.5
WTA	OCS-20-089	0	0	4	68	28	0	0.3127	18.6
WTA	OCS-20-091	0	0	27	62	7	4	0.3861	20.9

Project Area	Sample	% Boulder or Cobble (> 64 mm)	% Pebble or Granule (2 to < 64 mm)	% Very Coarse / Coarse Sand (0.5 to < 2 mm)	% Medium Sand (0.25 to < 0.5 mm)	% Fine / Very Fine Sand (0.0625 mm to < 0.25 mm)	% Silt / Clay (< 0.0625 mm)	Median Grain Size (mm)	% Moisture Content
WTA	OCS-20-092	0	1	3	67	28	1	0.3114	17.8
WTA	OCS-20-093	0	1	13	68	18	0	0.3464	22.6
WTA	OCS-20-095	0	0	4	55	39	2	0.2792	24
WTA	OCS-20-097	0	7	29	24	6	34	0.3333	27.4
WTA	OCS-20-099	0	0	11	63	26	0	0.3272	22.7
WTA	OCS-20-101	0	2	9	57	31	1	0.3120	22.7
WTA	OCS-20-103	0	2	36	51	9	2	0.4259	18
WTA	OCS-20-105	0	5	39	47	8	1	0.4588	15.6
WTA	OCS-20-107	0	0	14	66	17	3	0.3426	22.1
WTA	OCS-20-109	0	1	32	58	8	1	0.4063	21.5
WTA	OCS-20-136	0	1	32	62	4	1	0.4138	21.3
WTA	OCS-20-137	0	8	38	50	3	1	0.4753	21.3
WTA	OCS-20-139	0	17	47	33	2	1	0.6750	22.7
WTA	OCS-20-145	0	13	39	42	5	1	0.5281	16.6
WTA	OCS-20-147	0	3	40	52	4	1	0.4557	19.7
WTA	OCS-20-148	0	2	31	59	7	1	0.4085	20.7
WTA	OCS-20-153	0	4	36	52	6	2	0.4357	22.7
WTA	OCS-20-155	0	23	34	30	12	1	0.6251	22.6
WTA	OCS-20-157	0	0	11	74	10	5	0.3473	21.3
WTA	OCS-20-159	0	0	20	71	9	0	0.3729	21.7
WTA	OCS-20-160	0	1	10	68	20	1	0.3351	22.9
WTA	OCS-20-161	0	1	18	68	10	3	0.3645	17.3
WTA	OCS-20-163	0	0	2	13	80	5	0.1826	21.3
WTA	OCS-20-165	0	0	17	71	11	1	0.3626	17.3
WTA	OCS-20-167	0	0	10	66	20	4	0.3298	22.8
WTA	OCS-20-169	0	16	40	39	4	1	0.5760	14.1
WTA	OCS-20-171	0	0	11	74	14	1	0.3470	20.0
WTA	OCS-20-172	0	1	4	47	30	18	0.2564	17.7
WTA	OCS-20-173	0	1	10	63	24	2	0.3249	22.0
WTA	OCS-20-175	0	0	7	66	24	3	0.3211	17.0
WTA	OCS-20-177	0	2	35	55	6	2	0.4255	20.7
WTA	OCS-20-179	0	0	14	62	24	0	0.3348	20.0
WTA	OCS-20-180	0	0	4	56	39	1	0.2829	22.9
WTA	OCS-20-181	0	0	1	11	83	5	0.1782	23.6
WTA	OCS-20-500	0	12	67	19	1	1	0.6840	24.7
NLA	OCS-22-419	0	70	22	7	1	0	4.5643	NA
NLA	OCS-22-427	0	27	36	26	4	7	0.7445	NA
NLA	OCS-22-427d	0	32	34	23	3	8	0.5803	NA
NLA	OCS-22-436	0	54	27	16	2	1	2.7640	NA
NLA	OCS-22-440	0	1	37	26	2	34	0.4008	NA
NLA	OCS-22-453	0	2	19	60	8	11	0.3619	NA
NLA	OCS-22-463	0	13	48	35	3	1	0.5890	NA
NLA	OCS-22-467	0	59	18	4	0	19	3.1028	NA
NLA	OCS-22-470	0	3	27	52	5	13	0.4211	NA
NLA	OCS-20-038	0	1	34	58	6	1	0.4172	19.6
NLA	OCS-20-039	0	1	57	38	3	1	0.5909	16.9

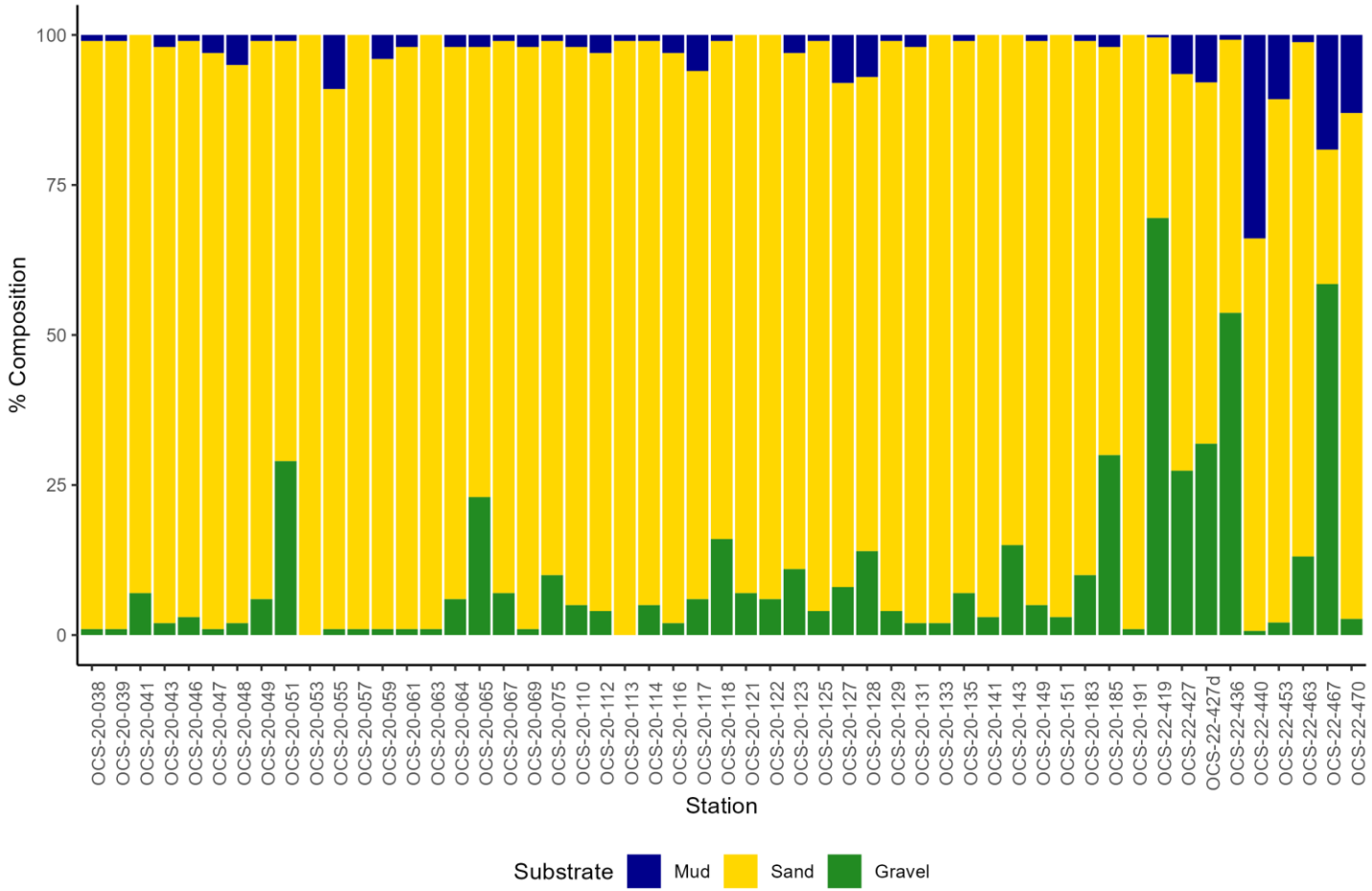
Project Area	Sample	% Boulder or Cobble (> 64 mm)	% Pebble or Granule (2 to < 64 mm)	% Very Coarse / Coarse Sand (0.5 to < 2 mm)	% Medium Sand (0.25 to < 0.5 mm)	% Fine / Very Fine Sand (0.0625 mm to < 0.25 mm)	% Silt / Clay (< 0.0625 mm)	Median Grain Size (mm)	% Moisture Content
NLA	OCS-20-041	0	7	37	50	6	0	0.462	15.4
NLA	OCS-20-043	0	2	39	52	5	2	0.4445	20.3
NLA	OCS-20-046	0	3	39	53	4	1	0.4481	15.7
NLA	OCS-20-047	0	1	21	67	8	3	0.3745	15.8
NLA	OCS-20-048	0	2	27	59	7	5	0.3904	19.0
NLA	OCS-20-049	0	6	47	43	3	1	0.5290	17.7
NLA	OCS-20-051	0	29	29	36	5	1	0.6657	17.0
NLA	OCS-20-053	0	0	18	71	11	0	0.3645	21.4
NLA	OCS-20-055	0	1	27	59	4	9	0.3855	100
NLA	OCS-20-057	0	1	41	54	4	0	0.4531	13.2
NLA	OCS-B4-059	0	1	43	49	3	4	0.4575	15.2
NLA	OCS-20-061	0	1	53	42	2	2	0.5303	14.4
NLA	OCS-20-063	0	1	26	64	9	0	0.3886	21.0
NLA	OCS-20-064	0	6	47	42	3	2	0.5323	18.1
NLA	OCS-20-065	0	23	52	22	1	2	0.9446	7.7
NLA	OCS-20-067	0	7	50	39	3	1	0.5832	17.6
NLA	OCS-20-069	0	1	22	68	7	2	0.3812	21.5
NLA	OCS-20-075	0	10	41	45	3	1	0.5113	21.8
NLA	OCS-20-110	0	5	45	44	4	2	0.5024	20.6
NLA	OCS-20-112	0	4	24	59	10	3	0.3852	24.3
NLA	OCS-20-113	0	0	9	74	16	1	0.3402	15.6
NLA	OCS-20-114	0	5	53	39	2	1	0.5726	18.5
NLA	OCS-20-116	0	2	32	58	5	3	0.4133	20.9
NLA	OCS-20-117	0	6	29	53	6	6	0.4083	26.3
NLA	OCS-20-118	0	16	47	34	2	1	0.6957	18.5
NLA	OCS-20-121	0	7	44	44	5	0	0.5076	14.5
NLA	OCS-20-122	0	6	42	48	4	0	0.4869	10.6
NLA	OCS-20-123	0	11	39	43	4	3	0.4983	10.6
NLA	OCS-20-125	0	4	32	56	7	1	0.4217	19.6
NLA	OCS-20-127	0	8	19	36	29	8	0.3185	21.6
NLA	OCS-20-128	0	14	62	16	1	7	0.7538	7.8
NLA	OCS-20-129	0	4	44	46	5	1	0.4828	14.5
NLA	OCS-20-131	0	2	49	43	4	2	0.5101	21.2
NLA	OCS-20-133	0	2	30	62	6	0	0.4078	15.8
NLA	OCS-20-135	0	7	48	41	3	1	0.5584	16.8
NLA	OCS-20-141	0	3	36	56	5	0	0.4349	19.8
NLA	OCS-20-143	0	15	42	39	4	0	0.6212	18.2
NLA	OCS-20-149	0	5	45	44	5	1	0.4971	20.3
NLA	OCS-20-151	0	3	56	38	3	0	0.5860	15.2
NLA	OCS-20-183	0	10	38	45	6	1	0.4869	14.4
NLA	OCS-20-185	0	30	39	27	2	2	0.7666	16.5
NLA	OCS-20-191	0	1	22	63	14	0	0.3714	22.9

*NA – % moisture content not available for 2022 data



[2] Gravel comprises boulder, cobble, pebble, and granule sediment size classes. Sand comprises very coarse through very fine sand sediment size classes. Mud comprises silt and clay sediment size classes.

Figure 3-1. Grain size composition at each of the 57 grab sample stations from both years in the WTA project region[2].



[3] Gravel comprises boulder, cobble, pebble, and granule sediment size classes. Sand comprises very coarse through very fine sand sediment size classes. Mud comprises silt and clay sediment size classes.

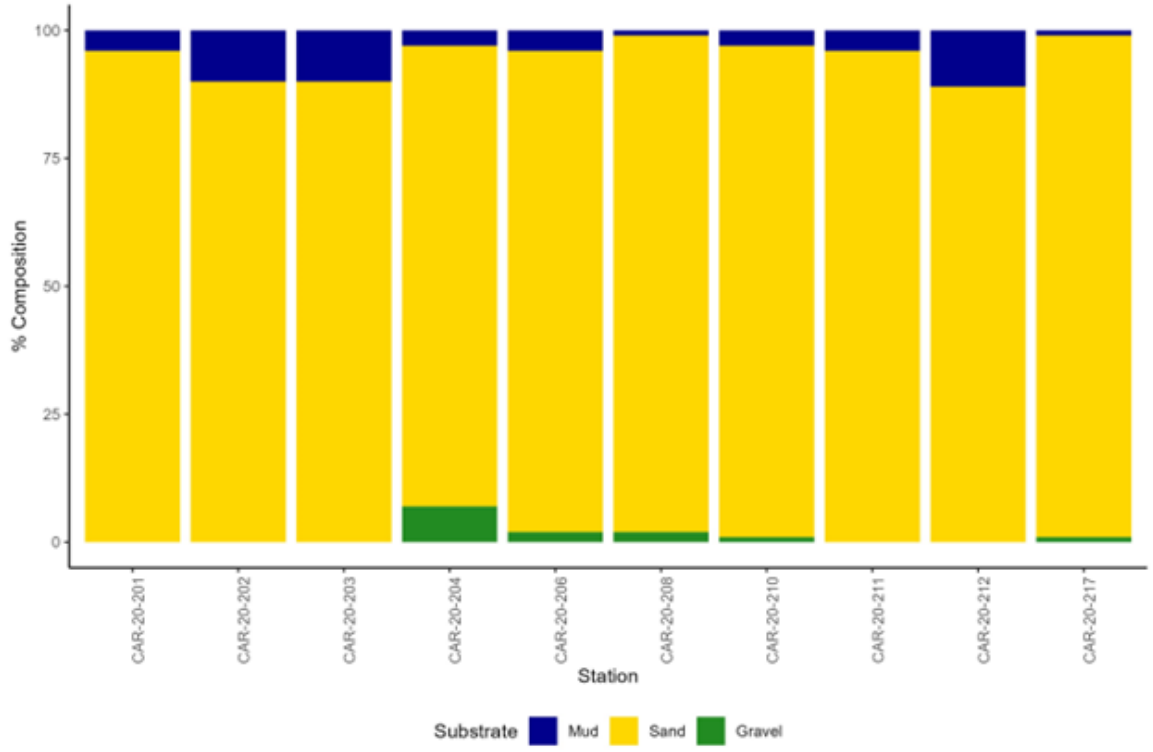
Figure 3-2. Grain size composition at each of the 53 grab sample stations from both years in the NLA region[3].

3.1.2 Atlantic ECC Samples

Samples from 10 benthic grab stations along the Atlantic ECC were generally sandy, comprised of 89 – 98% sand grains with a mean across samples of 94% (Table 3-5 and Figure 3-3). There were no samples with ≥ 30% gravel-sized sediment (> 2 mm), one sample with ≥ 5% gravel, and all nine remaining samples consisted of 2% or less gravel. Fine silt and clay particles (< 0.0625 mm) comprised 1 – 11% of each sample (mean of 5%). No detectable levels of Total Organic Carbon were recorded in any of the grab samples collected along the Atlantic ECC.

Table 3-5. Grain size composition and moisture content from grab samples collected along the Atlantic ECC.

Sample	% Boulder or Cobble (> 64 mm)	% Pebble or Granule (2 to < 64 mm)	% Very Course / Coarse Sand (0.5 to < 2 mm)	% Medium Sand (0.25 to < 0.5 mm)	% Fine / Very Fine Sand (0.0625 mm to < 0.25 mm)	% Silt / Clay (< 0.0625 mm)	Median Grain Size (mm)	% Moisture Content
CAR-20-201	0	0	1	1	94	4	0.1155	24.4
CAR-20-202	0	0	0	1	89	10	0.0931	25.7
CAR-20-203	0	0	0	1	89	10	0.1072	25.3
CAR-20-204	0	7	65	23	2	3	0.6522	27.0
CAR-20-206	0	2	36	47	11	4	0.4319	20.7
CAR-20-208	0	2	79	18	0	1	0.698	20.0
CAR-20-210	0	1	31	55	10	3	0.3987	23.2
CAR-20-211	0	0	1	14	81	4	0.1254	25.9
CAR-20-212	0	0	0	1	88	11	0.0955	19.0
CAR-20-217	0	1	28	64	6	1	0.3982	19.4



3.1.3 Monmouth ECC Samples

Samples from 37 grab stations (indicated by 'LAR') along the Monmouth ECC were generally sandy, comprised of 23 – 98% sand grains with a mean across samples of 80% (Table 3-6 and Figure 3-4). Four samples (LAR-22-415, LAR-20-024, LAR-20-028, and LAR-20-037) consisted of ≥ 30% gravel, with 71%, 76%, 33%, and 52% gravel, respectively. Two sites (LAR-20-005 and LAR-20-011) contained no gravel. Fine silt and clay particles (< 0.0625 mm) comprised 0 – 58% of each sample (mean of 5%), with six samples (LAR-22-479, LAR-22-462, LAR-20-037, LAR-20-008, LAR-20-005, and LAR-20-002) containing ≥ 5% silt and clay. Only two samples had detectable levels of Total Organic Carbon, with 2,700 mg/kg in sample LAR-20-002 and 5,600 mg/kg in sample LAR-20-008.

Table 3-6. Grain size composition and moisture content from grab samples collected during both years along the Monmouth ECC (continued on next page).

Figure 3-3. Grain size composition at each of the 10 grab sample stations collected along the Atlantic ECC[4].

[4] Gravel comprises boulder, cobble, pebble, and granule sediment size classes. Sand comprises very coarse through very fine sand sediment size classes. Mud comprises silt and clay sediment size classes.

Sample	% Boulder or Cobble (> 64 mm)	% Pebble or Granule (2 to < 64 mm)	% Very Course / Coarse Sand (0.5 to < 2 mm)	% Medium Sand (0.25 to < 0.5 mm)	% Fine / Very Fine Sand (0.0625 mm to < 0.25 mm)	% Silt / Clay (< 0.0625 mm)	Median Grain Size (mm)	% Moisture Content
LAR-22-383	0	5	50	34	10	1	0.5427	NA
LAR-22-415	0	71	22	5	1	1	4.6154	NA
LAR-22-420	0	25	40	30	4	1	0.6768	NA
LAR-22-420d	0	24	47	24	4	1	0.9238	NA
LAR-22-433	0	0	9	72	18	2	0.3206	NA
LAR-22-446	0	14	44	37	3	2	0.5803	NA
LAR-22-452	0	0	12	69	15	4	0.3347	NA
LAR-22-457	0	6	46	43	4	1	0.5122	NA
LAR-22-459	0	1	27	57	7	8	0.3992	NA
LAR-22-462	0	7	16	26	21	30	0.2462	NA
LAR-22-464	0	2	3	19	19	58	0.0539	NA
LAR-22-469	0	13	22	58	6	1	0.4161	NA
LAR-22-472	0	9	44	44	3	1	0.5137	NA
LAR-22-472d	0	11	48	36	3	3	0.8355	NA
LAR-22-473	0	3	54	40	2	1	0.5400	NA
LAR-22-479	0	6	25	53	9	8	0.3954	NA
LAR-20-002	0	6	8	26	40	20	0.2002	27.3
LAR-20-004	0	22	62	15	1	0	0.8614	16.6
LAR-20-005	0	0	1	8	86	5	0.1082	27.5
LAR-20-006	0	3	51	42	3	1	0.5403	20.6
LAR-20-008	0	16	11	8	51	14	0.1875	34.3
LAR-20-010	0	14	52	27	4	3	0.6471	14.3
LAR-20-011	0	0	5	45	46	4	0.2505	18.4
LAR-20-012	0	2	32	51	11	4	0.4013	13.6
LAR-20-014	0	25	52	16	3	4	0.8389	4.2
LAR-20-016	0	2	29	57	10	2	0.3972	22.2
LAR-20-018	0	27	51	19	2	1	1.2224	16.5
LAR-20-020	0	7	48	39	5	1	0.5484	23.2
LAR-20-021	0	4	66	27	3	0	0.6588	8.1
LAR-20-022	0	11	23	48	17	1	0.3969	13
LAR-20-024	0	76	17	4	2	1	2.9337	12.6
LAR-20-026	0	22	48	24	3	3	0.7179	16.6
LAR-20-028	0	33	25	35	5	2	0.6645	20.6
LAR-20-030	0	17	34	43	6	0	0.5127	21.5
LAR-20-031	0	5	50	38	5	2	0.5475	13
LAR-20-032	0	22	29	40	7	2	0.5204	19.3
LAR-20-037	0	52	22	15	6	5	2.2451	14.7

*NA - % moisture content not available for 2022 data

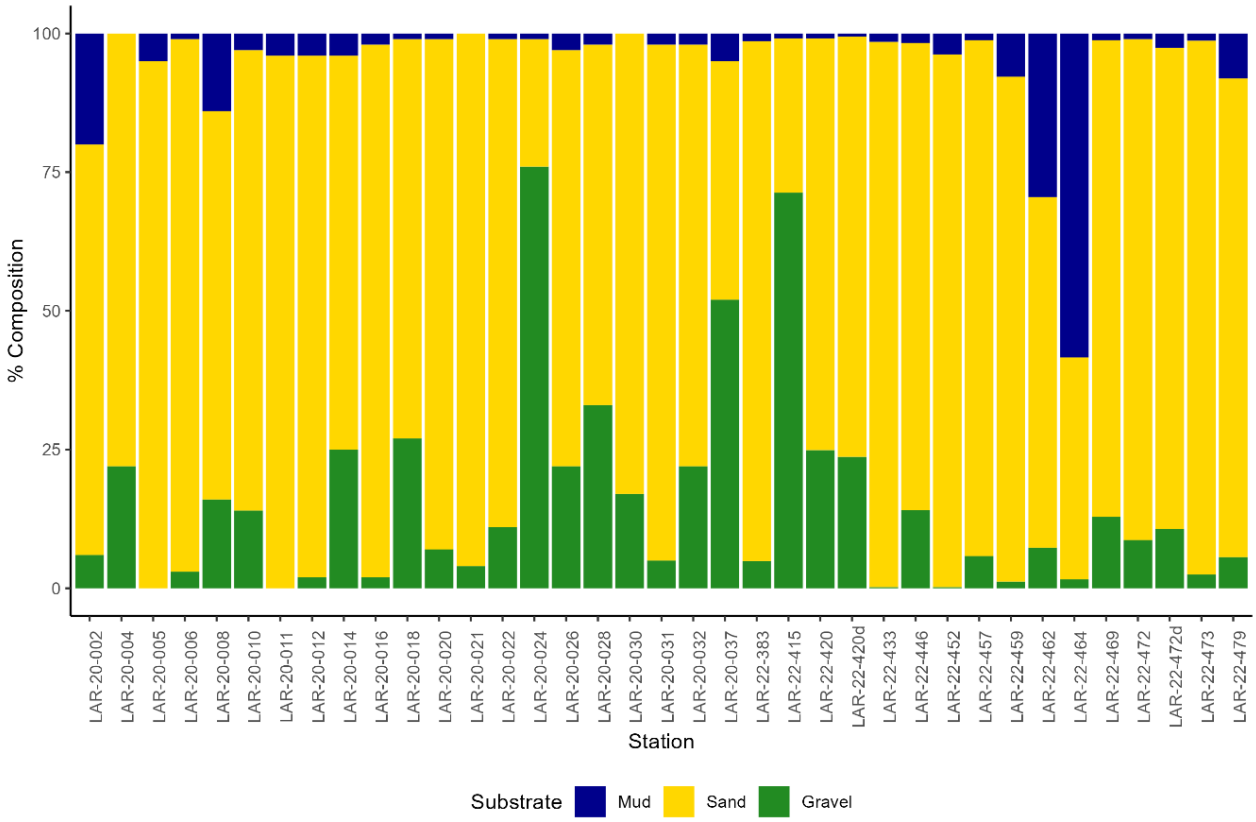


Figure 3-4. Grain size composition at each of the 37 grab sample stations during both years along the Monmouth ECC[5].

[5] Gravel comprises boulder, cobble, pebble, and granule sediment size classes. Sand comprises very coarse through very fine sand sediment size classes. Mud comprises silt and clay sediment size classes.

3.2 Benthic Community Composition

3.2.1 WTA and NLA Samples

3.2.1.1 WTA and NLA Taxonomic Composition

Survey Year 2020

Grab samples were collected for benthic macroinvertebrate analysis from 90 sites in the Lease Areas (WTA and NLA) in 2020. The grab samples yielded a total of 27,921 individual macrofaunal organisms (per all ninety 0.04 m^2 grab samples). Organisms collected in the Lease Areas (WTA and NLA) were from 12 phyla, 102 families or LPTL, and 172 unique taxa identified to the LPTL (Table 3-7). Organisms from the phyla Nematoda were most abundant across all samples, accounting for 73% of all identified organisms and were identified in every sample collected (Figure 3-5). The majority of unique taxa identified were from the Annelida (65 unique taxa), Arthropoda (47 unique taxa), and Mollusca (35 unique taxa) phyla (Table 3-7).

Cnidaria that were collected were sea anemones (Actiniaria) with no corals detected. No ocean quahogs or sea scallops were collected but surfclams were collected at over half the stations (59 of 90; denoted with * in Table 3-8).

No invasive tunicates (*Ascidiella aspersa, Botrylloides violaceus, Botryllus schlosseri, Didemnum vexillum, Diplosoma listerianum, or Styela clava*) were confirmed present in the Lease Areas (WTA and NLA) but there were organisms identified to the LPTL Ascidiacea at nine stations: OCS-20-171, OCS-20-086, OCS-20-165, OCS-20-151, OCS-20-148, OCS-20-118, OCS-20-083, OCS-20-049, and OCS-20-122.

Density across the 90 benthic grab sites ranged from 33 organisms in OCS-20-107 to 2,069 organisms in OCS-20-117 (Table 3-8). The percent composition of each sample by phyla is shown in Figure 3-6 **Error! Reference source not found.Error! Reference source not found.**and Figure 3-7, and abundance of unique taxa is presented in Table 3-9. The number of unique taxa represented in each sample ranged from 8 taxa at OCS-20-143 to 36 taxa at OCS-20-091.

More specifically, the 46 grab samples collected from the WTA yielded a total of 12,926 individual macrofaunal organisms (per 46 0.04 m^2 grab samples). Organisms collected in the WTA were from 12 phyla, 90 families or LPTL, and 143 unique taxa identified to the LPTL (Table 3-7). Organisms from the phyla Nematoda were most abundant across all samples, accounting for 72% of all identified organisms and were identified in every sample collected (Figure 3-5). The majority of unique taxa identified were from the Annelida (53 unique taxa), Arthropoda (42 unique taxa), and Mollusca (28 unique taxa) phyla.

Density across the 46 benthic grab sites from the WTA ranged from 33 organisms in OCS-20-107 to 962 organisms in OCS-20-097 (Table 3-8). The percent composition of each sample by phyla and abundance of unique taxa by Lease Areas (WTA and NLA) and only in the WTA is presented in Figure 3-5.

For the NLA, the 44 grab samples collected from the area yielded a total of 14,995 individual macrofaunal organisms (per 44 0.04 m^2 grab samples). Organisms collected in the NLA were from 11 phyla, 79 families or LPTL, and 116 unique taxa identified to the LPTL. Organisms from the phyla Nematoda were most abundant across all samples, accounting for 74% of all identified organism and were identified in every sample collected. The majority of unique taxa identified were from the Annelida (36 unique taxa), Arthropoda (35 unique taxa), and Mollusca (27 unique taxa) phyla. Density across the 44 benthic grab sites from the NLA ranged from 35 organisms in OCS-20-143 to 2,069 organisms in OCS-20-117.

Table 3-7. Survey year 2020. Phyla present in the 90 benthic grab samples collected in the Lease Areas (WTA and NLA).

	Lease Areas (WTA and NLA)				WTA		
Phyla[1]	**Abundant Taxonomic Groups**	**Density[1]**	**Number of Families[2]**	**Number of LPTL[3]**	**Density[1]**	**Number of Families[2]**	**Number of LPTL[3]**
Annelida	Polychaete worms (segmented and bamboo worms)	1,508	29	65	619	26	53
Arthropoda	Amphipods, calanoid copepods, ostracods	3,558	28	47	1,675	26	42
Chordata	Tunicate	97	4	4	74	4	4
Cnidaria	Hydroid	2	1	1	0	0	0
Echinodermata	Sand dollars, sea cucumbers	928	5	5	506	4	4
Ectoprocta	Bryozoa	19	5	5	11	2	3
Foraminifera		22	1	1	19	1	1
Mollusca	Nut clams	1,305	21	35	665	19	28
Nematoda	Nematodes	20,423	1	1	9,319	1	1
Nemertea	Ribbon worms	51	4	4	32	4	4
Platyhelminthes		3	1	1	3	1	1
Sipuncula	Peanut worms	5	2	3	3	2	2
	Totals	**27,921**	**102**	**172**	**12,926**	**90**	**143**

[1]Common names of abundance taxa identified in benthic samples.
[2] Density represents abundance per 90 (WTA and NLA) or 46 (WTA only) 0.04 m^2 samples.
[3] Family or LPTL

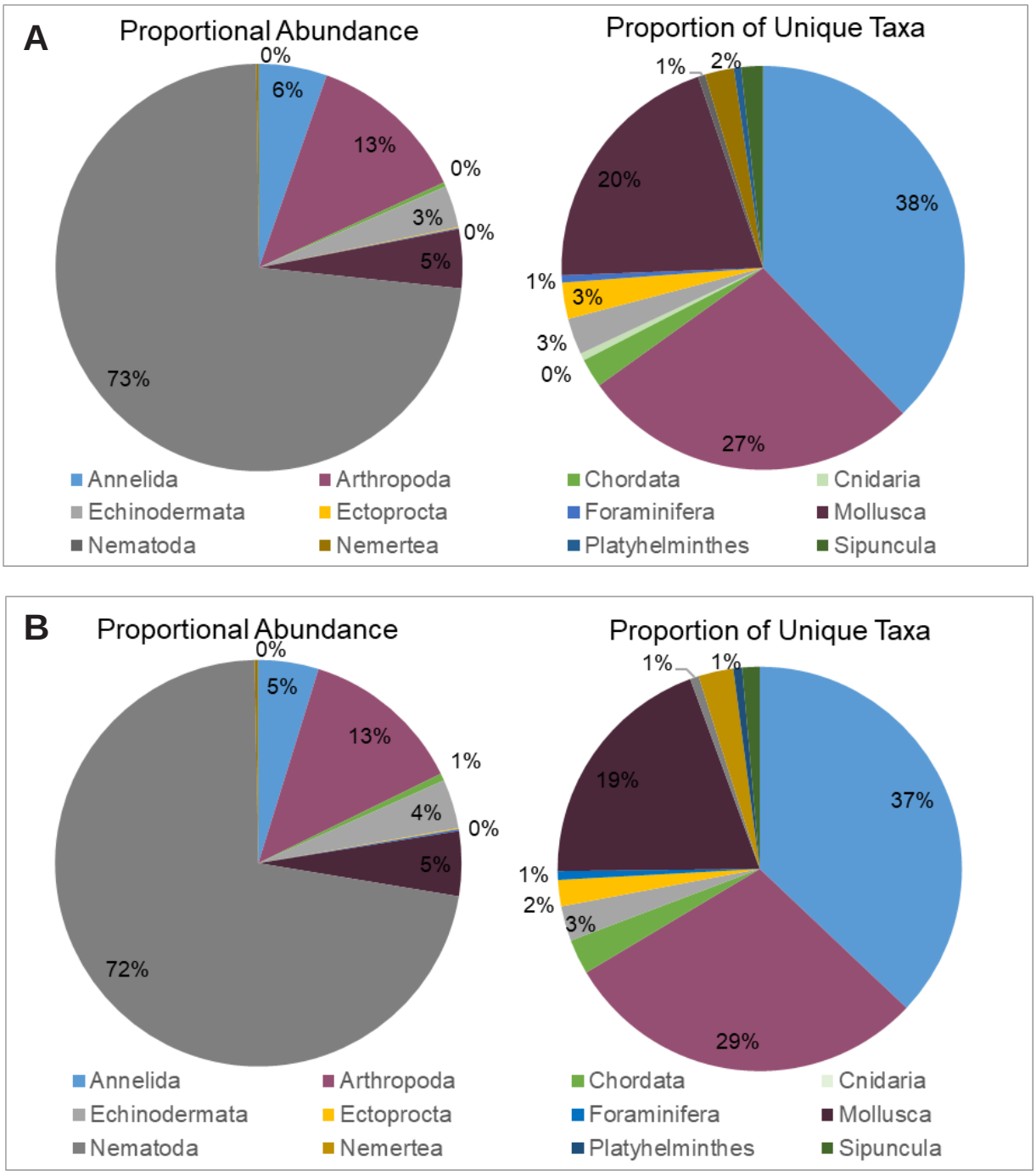


Figure 3-5. Survey year 2020. Proportional abundance and proportion of unique taxa (Family or LPTL) for each phylum collected in benthic grab samples. Results presented as percentage of total: A) in the Lease Areas (WTA and NLA); B) only in the WTA.

Table 3-8. Survey year 2020. Abundance of each Phylum counted within each grab sample collected in the Lease Areas (WTA and NLA) (continued on next page). Surfclams were collected at stations marked with an * in the "Mollusca" column.

Location	Station	Annelida	Arthropoda	Chordata	Cnidaria	Echino-dermata	Ectoprocta	Forami-nifera	Mollusca	Nematoda	Nemertea	Platyhel-minthes	Sipuncula	Density
WTA	OCS-20-071	13	44	0	0	0	0	0	12	93	0	0	0	162
WTA	OCS-20-073	15	98	1	0	2	0	0	12*	119	1	0	0	248
WTA	OCS-20-077	52	32	8	0	38	0	0	36*	231	5	0	0	402
WTA	OCS-20-079	11	19	0	0	8	0	0	10*	238	0	0	0	286
WTA	OCS-20-081	18	119	0	0	4	0	0	9	782	1	0	0	933
WTA	OCS-20-083	4	15	30	0	1	0	0	16*	61	2	0	1	130
WTA	OCS-20-085	3	57	0	0	13	0	0	3	75	0	0	0	151
WTA	OCS-20-086	12	12	1	0	7	1	0	9*	564	0	0	0	606
WTA	OCS-20-087	9	75	1	0	64	1	0	48*	269	0	0	0	467
WTA	OCS-20-089	8	61	0	0	6	0	0	16	122	0	0	0	213
WTA	OCS-20-091	14	76	0	0	3	1	1	24*	167	2	0	0	288
WTA	OCS-20-092	13	5	0	0	7	0	0	5	41	2	0	0	73
WTA	OCS-20-093	6	12	0	0	0	0	0	5*	38	0	0	0	61
WTA	OCS-20-095	5	26	0	0	13	0	0	5*	2	0	0	0	51
WTA	OCS-20-097	12	65	0	0	0	1	0	34*	849	1	0	0	962
WTA	OCS-20-099	15	60	0	0	6	0	0	35*	351	2	0	0	469
WTA	OCS-20-101	8	40	0	0	43	0	0	7*	51	0	0	0	149
WTA	OCS-20-103	8	3	0	0	1	0	0	7*	55	0	0	0	74
WTA	OCS-20-105	12	4	0	0	23	0	0	62*	365	0	0	0	466
WTA	OCS-20-107	9	12	3	0	3	0	0	5*	1	0	0	0	33
WTA	OCS-20-109	11	46	0	0	14	0	4	12	213	0	0	0	300
WTA	OCS-20-136	5	14	0	0	7	0	0	18*	142	0	0	0	186
WTA	OCS-20-137	11	17	1	0	7	0	0	22*	42	0	0	1	101
WTA	OCS-20-139	7	33	1	0	4	0	0	6*	364	0	0	0	415
WTA	OCS-20-145	11	19	0	0	8	0	0	16*	107	1	0	0	162
WTA	OCS-20-147	18	49	0	0	5	0	2	13*	164	0	0	0	251
WTA	OCS-20-148	12	15	1	0	6	0	0	6	162	0	0	0	202
WTA	OCS-20-153	11	21	0	0	7	0	0	18*	415	0	0	0	472
WTA	OCS-20-155	25	24	0	0	0	0	1	1	452	0	0	1	504
WTA	OCS-20-157	11	91	0	0	30	1	5	14*	175	1	0	0	328
WTA	OCS-20-159	9	5	1	0	29	0	0	5	186	2	0	0	237
WTA	OCS-20-160	11	26	0	0	17	1	0	6	75	3	0	0	139
WTA	OCS-20-161	5	25	0	0	6	2	1	21*	87	0	0	0	147
WTA	OCS-20-163	13	71	0	0	0	0	0	11	5	0	0	0	100
WTA	OCS-20-165	15	28	4	0	4	0	0	12*	181	0	0	0	244
WTA	OCS-20-167	7	6	0	0	5	0	0	6*	87	0	0	0	111
WTA	OCS-20-169	50	23	0	0	6	0	0	13*	433	5	0	0	530

Location	Station	Annelida	Arthropoda	Chordata	Cnidaria	Echino-dermata	Ectoprocta	Forami-nifera	Mollusca	Nematoda	Nemertea	Platyhel-minthes	Sipuncula	Density
WTA	OCS-20-171	13	41	2	0	11	0	0	20*	157	0	0	0	244
WTA	OCS-20-172	15	33	0	0	1	0	0	11*	259	2	0	0	321
WTA	OCS-20-173	14	16	0	0	15	0	0	10*	117	0	0	0	172
WTA	OCS-20-175	10	22	0	0	2	0	0	5	108	0	0	0	147
WTA	OCS-20-177	16	6	15	0	0	0	0	18*	40	0	0	0	95
WTA	OCS-20-179	3	13	3	0	4	0	0	2	16	0	0	0	41
WTA	OCS-20-180	20	108	2	0	65	0	5	10*	35	0	3	0	248
WTA	OCS-20-181	31	58	0	0	9	1	0	11*	30	2	0	0	142
WTA	OCS-20-500	18	30	0	0	2	2	0	18*	793	0	0	0	863
NLA	OCS-20-038	8	67	0	0	17	0	0	9*	46	0	0	0	147
NLA	OCS-20-039	26	67	0	0	5	1	0	26*	426	2	0	0	553
NLA	OCS-20-041	6	32	0	0	56	1	0	12	113	0	0	0	220
NLA	OCS-20-043	7	39	0	0	8	0	0	42*	142	1	0	0	239
NLA	OCS-20-046	6	25	0	0	10	0	0	8*	71	0	0	0	120
NLA	OCS-20-047	11	37	0	0	9	0	0	22	43	0	0	0	122
NLA	OCS-20-048	9	32	1	0	25	1	0	18*	149	0	0	0	235
NLA	OCS-20-049	16	32	1	0	4	0	0	20*	86	0	0	0	159
NLA	OCS-20-051	7	26	4	0	11	0	0	18*	296	0	0	0	362
NLA	OCS-20-053	36	52	0	0	0	2	0	10*	195	1	0	0	296
NLA	OCS-20-055	14	26	0	0	42	0	0	46*	276	0	0	1	405
NLA	OCS-20-057	12	22	0	1	14	0	0	14*	145	0	0	0	208
NLA	OCS-20-059	22	38	1	0	16	0	0	17*	223	0	0	0	317
NLA	OCS-20-061	34	16	0	0	22	0	0	68*	235	0	0	0	375
NLA	OCS-20-063	14	13	3	0	1	0	0	4*	71	0	0	0	106
NLA	OCS-20-064	18	53	0	0	2	0	0	30*	329	0	0	0	432
NLA	OCS-20-065	27	10	1	0	1	0	0	9*	371	0	0	0	419
NLA	OCS-20-067	37	7	0	0	8	0	0	17*	207	0	0	0	276
NLA	OCS-20-069	12	5	1	0	2	0	0	18	212	0	0	0	250
NLA	OCS-20-075	19	20	0	0	1	0	0	7	297	0	0	0	344
NLA	OCS-20-110	25	89	0	0	2	0	0	19	288	0	0	0	423
NLA	OCS-20-112	23	84	0	0	0	0	0	9	178	0	0	0	294
NLA	OCS-20-113	1	128	0	0	3	0	0	5*	5	3	0	0	145
NLA	OCS-20-114	24	65	0	0	5	2	0	19*	286	0	0	0	401
NLA	OCS-20-116	53	13	0	0	7	0	0	6	138	0	0	0	217
NLA	OCS-20-117	47	145	0	0	0	0	0	15	1861	1	0	0	2069
NLA	OCS-20-118	35	61	1	0	21	0	0	17*	299	0	0	0	434
NLA	OCS-20-121	12	28	1	0	26	0	0	5*	74	2	0	0	148
NLA	OCS-20-122	13	14	1	0	1	0	0	6*	93	0	0	0	128
NLA	OCS-20-123	6	19	0	0	3	0	0	4	55	1	0	0	88
NLA	OCS-20-125	15	13	0	0	4	0	0	10	65	0	0	0	107

Location	Station	Annelida	Arthropoda	Chordata	Cnidaria	Echino-dermata	Ectoprocta	Forami-nifera	Mollusca	Nematoda	Nemertea	Platyhel-minthes	Sipuncula	Density
NLA	OCS-20-127	85	111	0	0	0	0	0	6*	622	3	0	1	828
NLA	OCS-20-128	17	13	0	0	1	0	0	4*	159	1	0	0	195
NLA	OCS-20-129	26	38	0	0	37	0	0	19*	376	0	0	0	496
NLA	OCS-20-131	14	5	0	0	4	0	0	14	84	0	0	0	121
NLA	OCS-20-133	14	18	0	0	11	0	0	13*	513	0	0	0	569
NLA	OCS-20-135	11	6	0	1	7	0	0	10	305	0	0	0	340
NLA	OCS-20-141	23	9	0	0	9	0	0	9*	193	0	0	0	243
NLA	OCS-20-143	8	0	0	0	0	0	0	2	24	1	0	0	35
NLA	OCS-20-149	28	2	0	0	0	1	0	7	315	1	0	0	354
NLA	OCS-20-151	9	2	2	0	1	0	0	3	34	0	0	0	51
NLA	OCS-20-183	21	56	0	0	10	0	0	14*	292	2	0	0	395
NLA	OCS-20-185	32	342	0	0	0	0	0	0	775	0	0	0	1149
NLA	OCS-20-191	6	3	6	0	16	0	3	9	137	0	0	0	180
	Total	**1,508**	**3,558**	**97**	**2**	**928**	**19**	**22**	**1,305**	**20,423**	**51**	**3**	**5**	**27,921**

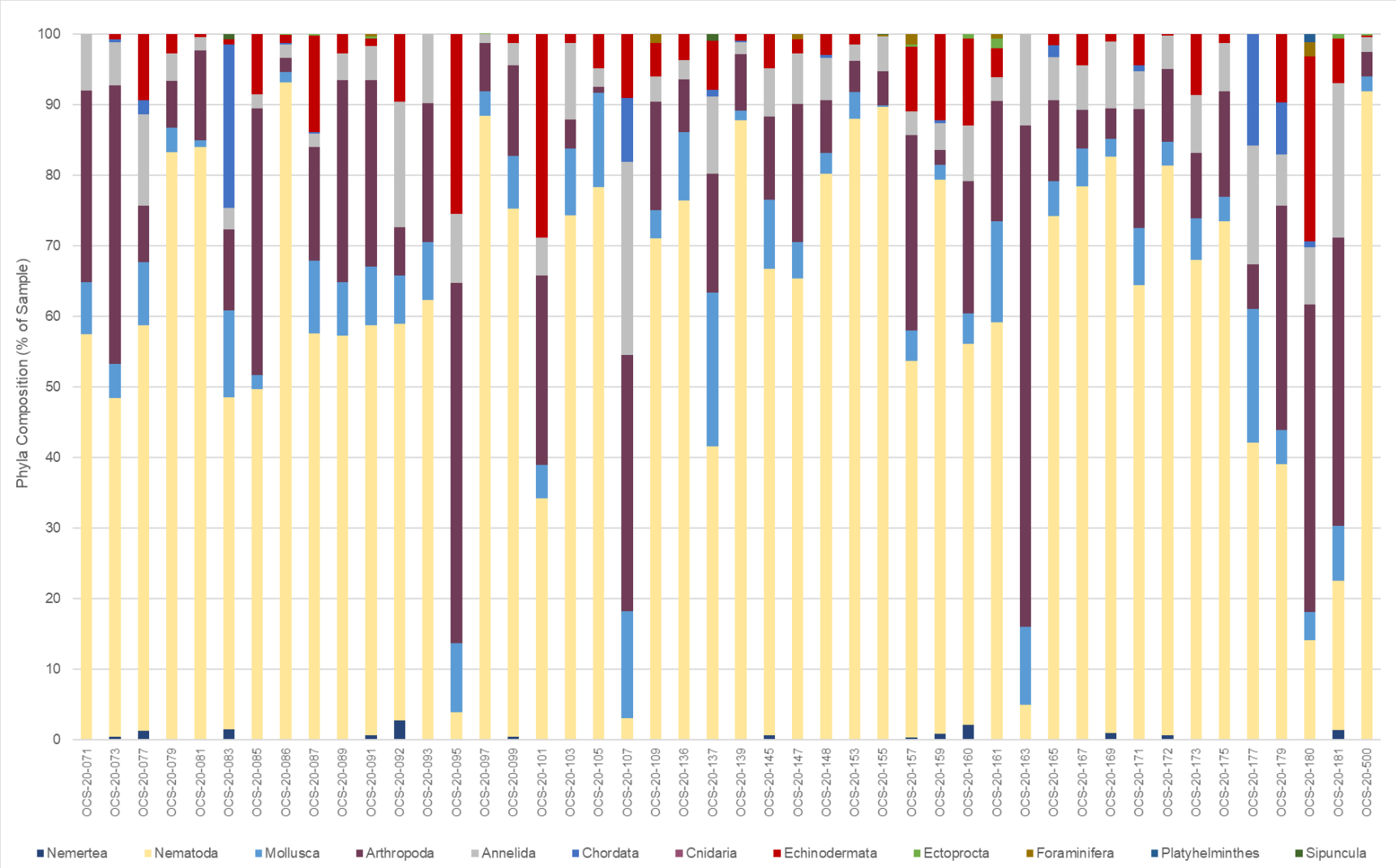


Figure 3-6. Survey year 2020. Percent composition of organisms in each represented phylum for the 46 benthic grab samples in the WTA.

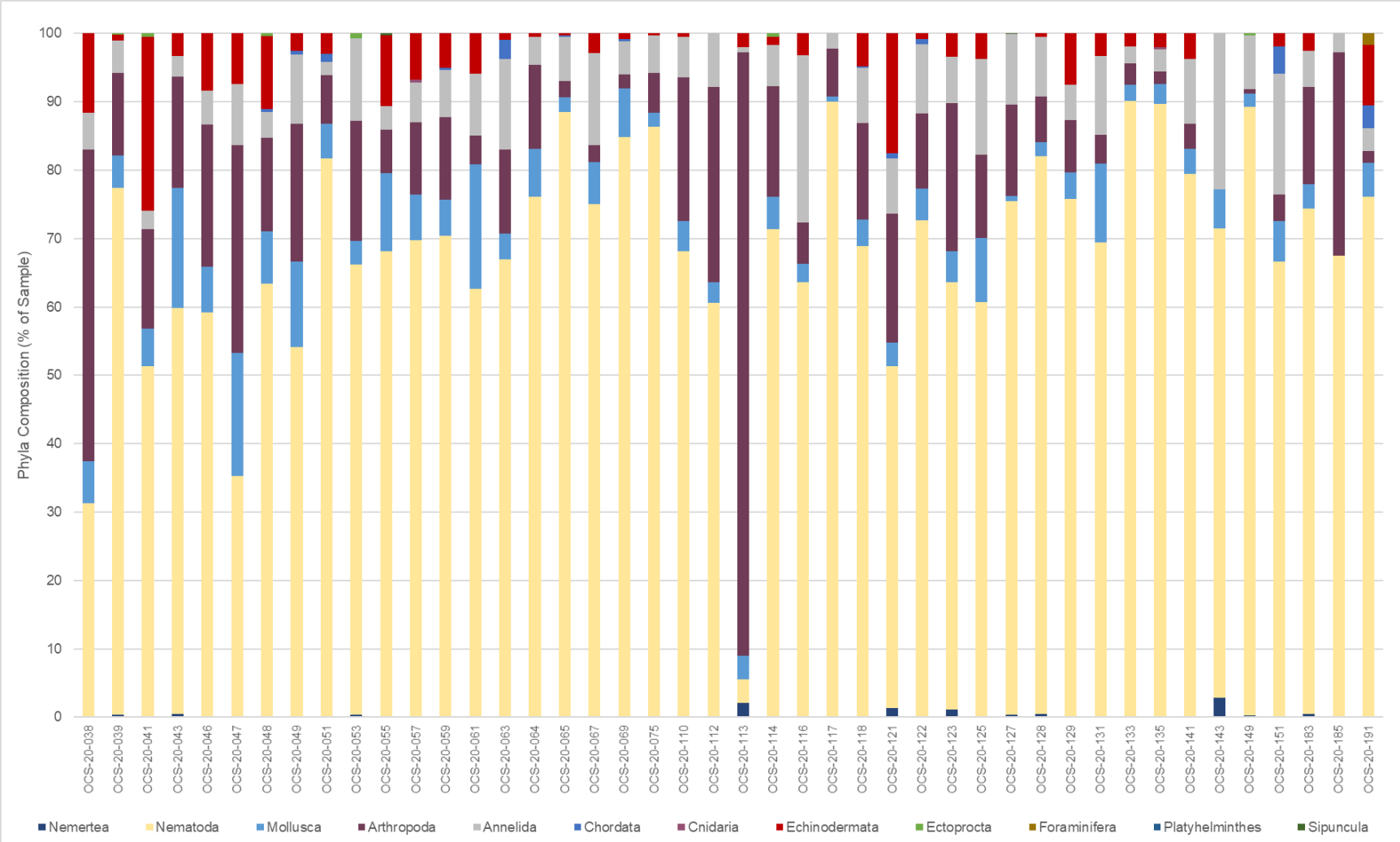


Table 3-9. Survey year 2020. Mean density and frequency of occurrence of each phyla and taxa (LPTL) across samples collected in Lease Areas (WTA and NLA) and only for the WTA samples (continued on next page).

Figure 3-7. Survey year 2020. Percent composition of organisms in each represented phylum for the 44 benthic grab samples in the NLA.

Phylum	Family or LPTL	Lease Areas (WTA and NLA)				WTA			
		Abundance Across Samples	Mean Abundance per 0.04 m^2	Median Abundance per 0.04 m^2	Frequency of Occurrence	Abundance of WTA Samples	Mean Abundance per 0.04 m^2	Median Abundance per 0.04 m^2	Frequency of Occurrence
Annelida	Ampharetidae	23	0.3	0	18	14	0.3	0	16
	Chaetopteridae	1	0	0	1	1	0	0	1
	Dorvilleidae	1	0	0	1	1	0	0	1
	Glyceridae	166	1.8	0	43	58	1.3	0	38
	Goniadidae	290	3.2	1	49	56	1.2	0	48
	Hesionidae	1	0	0	1	1	0	0	1
	Lumbrineridae	152	1.7	1	71	55	1.2	1	52
	Magelonidae	7	0.1	0	7	7	0.2	0	6
	Maldanidae	2	0	0	2	1	0	0	2
	Nephtyidae	251	2.8	1	82	199	4.3	3.5	63
	Nereididae	24	0.3	0	4	0	0	0	3
	Neridae	1	0	0	1	1	0	0	1
	Oenonidae	4	0	0	4	2	0	0	4
	Oligochaeta	110	1.2	0	24	24	0.5	0	24
	Onuphidae	19	0.2	0	9	17	0.4	0	9
	Opheliidae	18	0.2	0	17	8	0.2	0	15
	Orbiniidae	1	0	0	1	1	0	0	1
	Paraonidae	23	0.3	0	5	19	0.4	0	4
	Pholoidae	1	0	0	1	0	0	0	1
	Phyllodocidae	1	0	0	1	1	0	0	1
	Pilargidae	1	0	0	1	1	0	0	1
	Polygordiidae	4	0	0	2	4	0.1	0	2
	Polynoidae	17	0.2	0	10	6	0.1	0	9
	Scalibregmatidae	14	0.2	0	5	6	0.1	0	5
	Sigalionidae	241	2.7	0	95	94	2	2	69
	Sphaerodoridae	110	1.2	0	35	34	0.7	0	34
	Spionidae	20	0.2	0	9	6	0.1	0	9
	Syllidae	2	0	0	2	2	0	0	2
	Terebellidae	3	0	0	3	0	0	0	3
Arthropoda	Acari	32	0.4	0	19	17	0.4	0	19
	Ampeliscidae	561	6.2	0	36	57	1.2	0	30
	Anthuridae	3	0	0	1	3	0.1	0	1
	Aoridae	385	4.3	1	53	67	1.5	0	51
	Argissidae	3	0	0	2	3	0.1	0	2
	Balanidae	6	0.1	0	2	0	0	0	2
	Bodotriidae	15	0.2	0	15	6	0.1	0	15
	Cancridae	21	0.2	0	13	8	0.2	0	13
	Caprellidae	8	0.1	0	3	0	0	0	3
	Chaetiliidae	55	0.6	0	32	28	0.6	0	32
	Cirolanidae	16	0.2	0	13	6	0.1	0	13
	Corophiidae	21	0.2	0	8	3	0.1	0	8
	Crangonidae	1	0	0	1	1	0	0	1
	Diastylidae	6	0.1	0	5	5	0.1	0	5

Phylum	Family or LPTL	Lease Areas (WTA and NLA)				WTA			
		Abundance Across Samples	Mean Abundance per 0.04 m^2	Median Abundance per 0.04 m^2	Frequency of Occurrence	Abundance of WTA Samples	Mean Abundance per 0.04 m^2	Median Abundance per 0.04 m^2	Frequency of Occurrence
	Harpacticoida	18	0.2	0	13	12	0.3	0	13
	Haustoriidae	99	1.1	0	24	93	2	0	21
	Idoteidae	33	0.4	0	20	26	0.6	0	20
	Liljeborgiidae	11	0.1	0	7	3	0.1	0	7
	Lysianassidae	14	0.2	0	12	10	0.2	0	12
	Oedicerotidae	20	0.2	0	11	19	0.4	0	11
	Ostracoda	246	2.7	0	29	233	5.1	0	29
	Paguridae	74	0.8	0	40	36	0.8	0	36
	Phoxocephalidae	253	2.8	0	42	173	3.8	1	40
	Pinnotheridae	6	0.1	0	4	4	0.1	0	4
	Pontoporeiidae	78	0.9	0	27	72	1.6	0	27
	Synopiidae	5	0.1	0	4	1	0	0	4
	Tanaissuidae	1,113	12.4	6.5	78	522	11.3	6	78
	Unciolidae	455	5.1	0	24	267	5.8	0	24
Chordata	Ascidiacea	65	0.7	0	13	54	1.2	0	13
	Branchiostomatidae	2	0	0	2	1	0	0	2
	Molgulidae	29	0.3	0	12	18	0.4	0	12
	Styelidae	1	0	0	1	1	0	0	1
Cnidaria	Actiniaria	2	0	0	2	0	0	0	2
Echinodermata	Echinarachniidae	193	2.1	1	62	106	2.3	1	62
	Echinoida	13	0.1	0	1	0	0	0	1
	Echinoidea	713	7.9	2	56	394	8.6	2	56
	Holothuroidea	8	0.1	0	6	5	0.1	0	6
	Synaptidae	1	0	0	1	1	0	0	1
Ectoprocta	Alcyonidiidae	10	0.1	0	9	8	0.2	0	9
	Cribrilinidae	2	0	0	2	2	0	0	2
	Electridae	3	0	0	3	1	0	0	3
	Hippothoidae	3	0	0	3	0	0	0	3
	Nolellidae	1	0	0	1	0	0	0	1
Foraminifera	Astrorhizidae	22	0.2	0	8	19	0.4	0	8
Mollusca	Astartidae	169	1.9	1	61	63	1.4	1	61
	Bivalvia	89	1	0	38	40	0.9	0	38
	Calyptraeidae	78	0.9	0	33	29	0.6	0	29
	Cardiidae	36	0.4	0	26	15	0.3	0	25
	Columbellidae	5	0.1	0	3	4	0.1	0	2
	Corbulidae	1	0	0	1	1	0	0	1
	Epitoniidae	1	0	0	1	0	0	0	1
	Gastropoda	103	1.1	0	37	82	1.8	1	37
	Lyonsiidae	2	0	0	1	2	0	0	1
	Mactridae	222	2.5	1	59	110	2.4	1.5	59
	Mytilidae	23	0.3	0	17	13	0.3	0	16
	Nassariidae	74	0.8	0	44	46	1	1	44
	Naticidae	23	0.3	0	15	15	0.3	0	15

Phylum	Family or LPTL	Lease Areas (WTA and NLA)				WTA			
		Abundance Across Samples	Mean Abundance per 0.04 m^2	Median Abundance per 0.04 m^2	Frequency of Occurrence	Abundance of WTA Samples	Mean Abundance per 0.04 m^2	Median Abundance per 0.04 m^2	Frequency of Occurrence
	Nuculidae	31	0.3	0	9	23	0.5	0	9
	Pandoridae	8	0.1	0	8	5	0.1	0	8
	Pectinidae	2	0	0	1	0	0	0	1
	Periplomatidae	211	2.3	1	63	58	1.3	0	55
	Pharidae	5	0.1	0	5	2	0	0	5
	Tellinidae	204	2.3	1	56	139	3	1	50
	Veneridae	17	0.2	0	5	17	0.4	0	4
	Vitrinellidae	1	0	0	1	1	0	0	1
Nematoda	Nematoda	20,423	226.9	160.5	90	9,319	202.6	132	90
Nemertea	Amphiporidae	1	0	0	1	1	0	0	1
	Carinomidae	13	0.1	0	7	6	0.1	0	7
	Lineidae	9	0.1	0	7	4	0.1	0	7
	Nemertea	28	0.3	0	17	21	0.5	0	17
Platyhelminthes	Turbellaria	3	0	0	1	3	0.1	0	1
Sipuncula	Golfingiidae	3	0	0	3	1	0	0	3
	Sipuncula	2	0	0	2	2	0	0	2

Survey Year 2022

Grab samples were collected for benthic macroinvertebrate analysis from 7 sites in the Lease Areas (WTA and NLA) in 2022. The grab samples yielded a total of 1,265 individual macrofaunal organisms (per all seven 0.04 m^2 grab samples). Organisms collected in the Lease Areas (WTA and NLA) were from 5 phyla, 59 families or LPTL, and 94 unique taxa identified to the LPTL (Table 3-10). Organisms from the phyla Annelida were most abundant across all samples, accounting for 73% of all identified organisms and were identified in every sample collected (Figure 3-8). The majority of unique taxa identified were from the Annelida (49 unique taxa), Arthropoda (20 unique taxa), and Mollusca (17 unique taxa) phyla (Table 3-10). As previously mentioned, Nematode worms were excluded in this analysis as these macroinvertebrates are considered meiofauna and not part of BOEM (2019) or NMFS (2021) guidance for benthic community assessments.

No Cnidarians were present in the 2022 WTA and NLA samples. Ocean quahogs were present at 3 of the 7 stations (OCS-22-505, OCS-22-501, and OCS-22-492) but no sea scallops were present in the 2022 the WTA and NLA samples. Surfclams were collected at 5 of the 7 stations (OCS-22-505, OCS-22-501, OCS-22-492, OCS-22-470, and OCS-22-419 ; denoted with * in Table 3-11)

No invasive tunicates (*Ascidiella aspersa, Botrylloides violaceus, Botryllus schlosseri, Didemnum vexillum, Diplosoma listerianum, or Styela clava*) were present in the 2022 WTA and NLA samples as no tunicates were identified in this sampling effort (Family Ascidiacea).

Density across the 7 benthic grab sites ranged from 105 organisms in OCS-22-505 to 266 organisms in OCS-22-419 (Table 3-11). The percent composition of each sample by phyla is shown in Figure 3-9, and abundance of unique taxa is presented in Table 3-12. The number of unique taxa represented in each sample ranged from 19 taxa at OCS-22-419 to 31 taxa at OCS-22-505.

More specifically, the 3 grab samples collected from the WTA yielded a total of 442 individual macrofaunal organisms (per three 0.04 m^2 grab samples). Organisms collected in the WTA were from 5 phyla, 41 families or LPTL, and 53 unique taxa identified to the LPTL (Table 3-10). Organisms from the phyla Annelida were most abundant across all samples, accounting for 47% of all identified organisms and were identified in every sample collected (Figure 3-8). The majority of unique taxa identified were from the Annelida (23 unique taxa), Arthropoda (13 unique taxa), and Mollusca (13 unique taxa) phyla.

Density across the 3 benthic grab sites from the WTA ranged from 105 organisms in OCS-22-505 to 229 organisms in OCS-22-492 (Table 3-11). The percent composition of each sample by phyla and abundance of unique taxa in both WTA and NLA regions and only in the WTA is presented in Figure 3-8.

For the NLA, the 4 grab samples collected from the area yielded a total of 823 individual macrofaunal organisms (per four 0.04 m^2 grab samples). Organisms collected in the NLA were from 4 phyla, 18 families or LPTL, and 41 unique taxa identified to the LPTL. Organisms from the phyla Annelida were most abundant across all samples, accounting for 87% of all identified organism and were identified in every sample collected. The majority of unique taxa identified were from the Annelida (26 unique taxa), Arthropoda (7 unique taxa),

and Mollusca (4 unique taxa) phyla. Density across the 4 benthic grab sites from the NLA ranged from 143 organisms in OCS-22-453 to 466 organisms in OCS-22-419 (Table 3-11).

Table 3-10. Survey year 2022. Phyla present in the 7 benthic grab samples collected in the Lease Areas (WTA and NLA).

	Lease Areas (WTA and NLA)				WTA		
Phyla[1]	**Abundant Taxonomic Groups**	**Density[1]**	**Number of Families[2]**	**Number of LPTL[3]**	**Density[1]**	**Number of Families[2]**	**Number of LPTL[3]**
Annelida	Polychaete worms (segmented and bamboo worms)	920	22	49	208	17	23
Arthropoda	Amphipods, calanoid copepods, ostracods	83	14	20	30	8	13
Echinodermata	Sand dollars, sea cucumbers	33	2	2	30	2	2
Mollusca	Nut clams	205	15	17	167	12	13
Nemertea	Ribbon worms	21	4	4	7	2	2
Platyhelminthes		3	2	2	0	0	0
	Totals	**1,265**	**59**	**94**	**442**	**41**	**53**

[1]Common names of abundance taxa identified in benthic samples.
[2] Density represents abundance per 7 (WTA and NLA) or 3 (WTA only) 0.04 m^2 samples.
[3] Family or LPTL

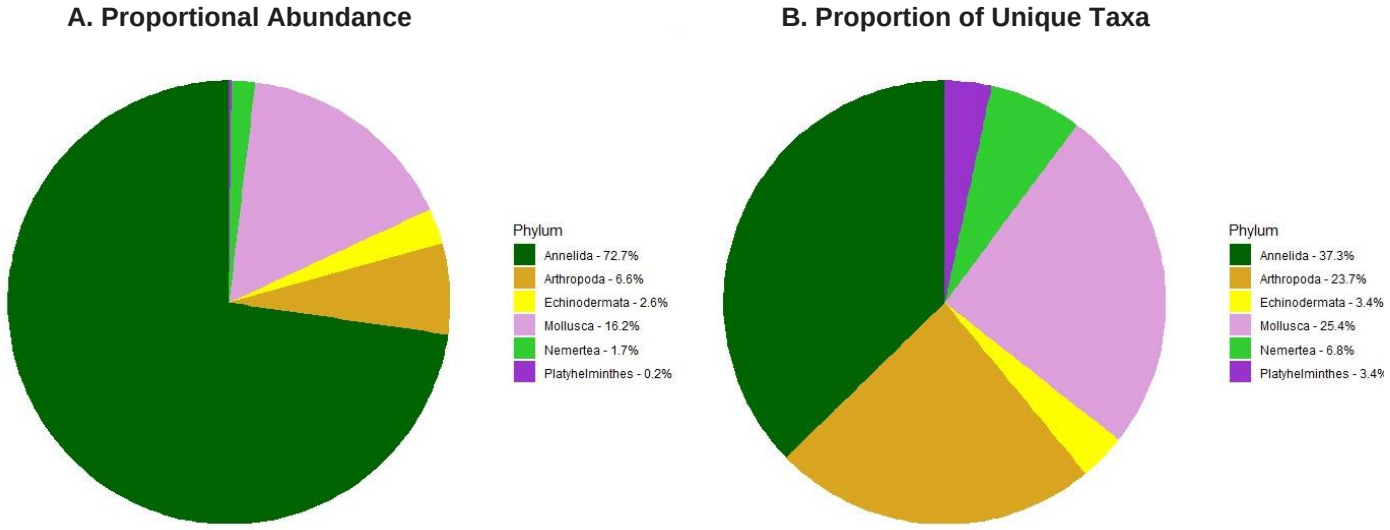


Figure 3-8. Survey year 2022. A) Proportional abundance and B) proportion of unique taxa (Family or LPTL) for each phylum collected in benthic grab samples. Results presented as percentage of total in the Lease Areas (WTA and NLA).

Table 3-11. Survey year 2022. Abundance of each Phylum counted within each grab sample collected in the Lease Areas (WTA and NLA). Surfclams were collected at stations marked with an * in the “Mollusca” column.

Location	Station	Annelida	Arthropoda	Chordata	Cnidaria	Echino-dermata	Ectoprocta	Forami-nifera	Mollusca	Nematoda	Nemertea	Platyhel-minthes	Sipuncula	Density
WTA	OCS-22-492	121	8	0	0	0	0	0	95*	0	5	0	0	229
WTA	OCS-22-501	48	6	0	0	15	0	0	39*	0	0	0	0	108
WTA	OCS-22-505	39	16	0	0	15	0	0	33*	0	2	0	0	105
NLA	OCS-22-419	247	15	0	0	0	0	0	2	0	0	2	0	266
NLA	OCS-22-427	224	12	0	0	0	0	0	10*	0	8	0	0	254
NLA	OCS-22-453	104	15	0	0	2	0	0	16	0	5	1	0	143
NLA	OCS-22-470	137	11	0	0	1	0	0	10*	0	1	0	0	160
Total		**920**	**83**	**0**	**0**	**33**	**0**	**0**	**205**	**0**	**21**	**3**	**0**	**1265**

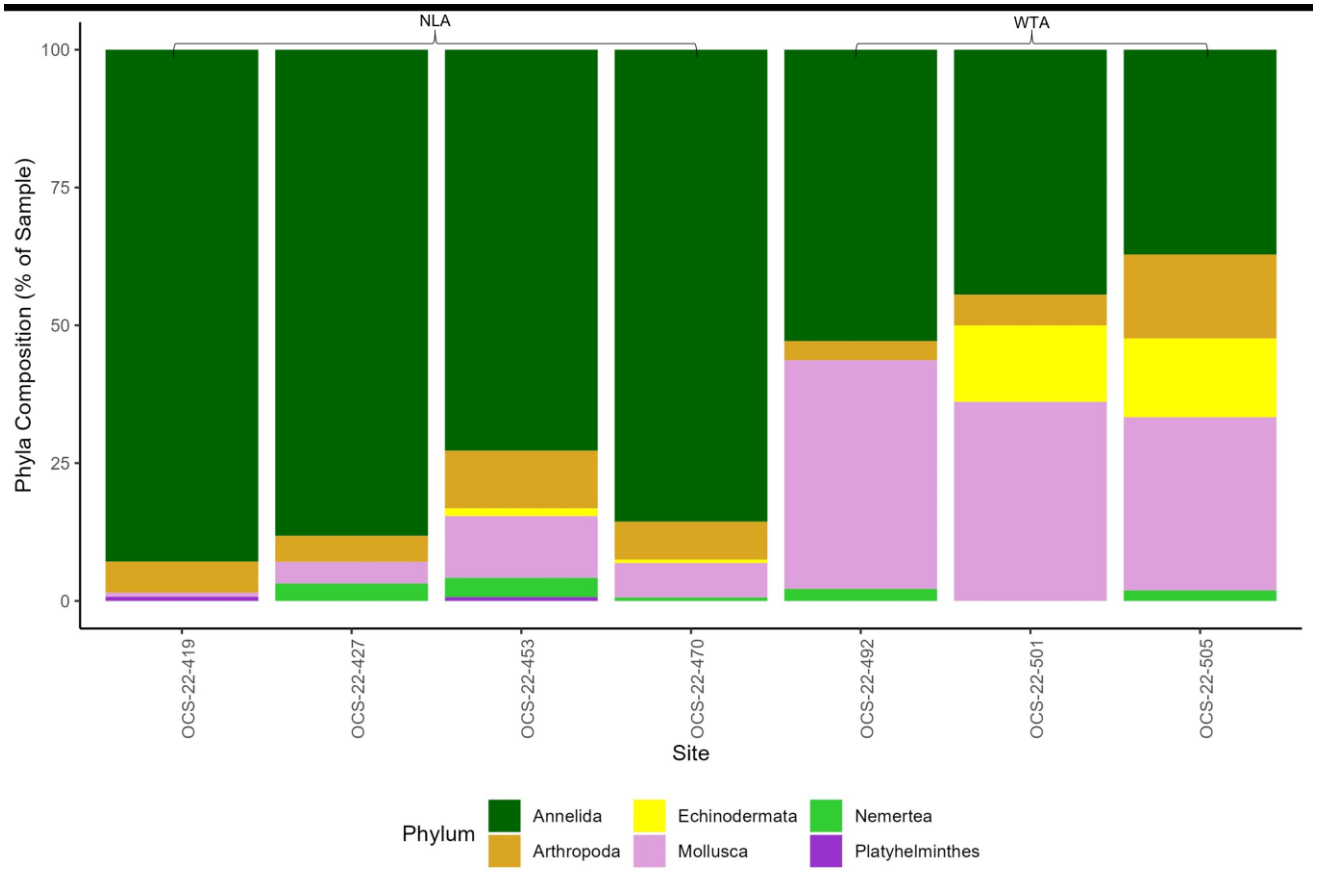


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Table 3-12. Survey year 2022. Mean density and frequency of occurrence of each phyla and taxa (LPTL) across samples collected in Lease Areas (WTA and NLA) and only for the WTA samples (continued on next page).

Figure 3-9. Survey year 2022. Percent composition of organisms in each represented phylum for the 7 benthic grab samples in the WTA and NLA. WTA samples include OCS-22-492, OCS-22-501, and OCS-22-505. NLA samples include OCS-22-419, OCS-22-427, OCS-22-453 and OCS-22-470.

Phylum	Family or LPTL	Lease Areas (WTA and NLA)				WTA			
		Abundance Across Samples	Mean Abundance per 0.04 m^2	Median Abundance per 0.04 m^2	Frequency of Occurrence	Abundance of WTA Samples	Mean Abundance per 0.04 m^2	Median Abundance per 0.04 m^2	Frequency of Occurrence
Annelida	Cirratulidae	29	0.3	3	6	18	0.4	4	2
	Dorvilleidae	8	0.1	0	3	0	0	0	0
	Glyceridae	109	1.1	3	6	6	0.1	2	3
	Goniadidae	10	0.1	0	2	0	0	0	0
	Lumbrineridae	30	0.3	4	7	15	0.3	5	3
	Magelonidae	3	0	0	2	1	0	0	1
	Maldanidae	4	0	1	4	2	0	1	2
	Nephtyidae	36	0.4	4	7	23	0.5	5	3
	Oenonidae	2	0	0	1	2	0	0	1
	Oligochaeta	294	3	8	7	8	0.2	2	3
	Onuphidae	4	0	1	4	2	0	1	2
	Opheliidae	2	0	0	1	0	0	0	0
	Orbiniidae	3	0	0	3	3	0.1	1	3
	Paraonidae	85	0.9	8	7	64	1.3	8	3
	Phyllodocidae	1	0	0	1	0	0	0	0
	Polygordiidae	186	1.9	12	7	42	0.9	12	3
	Polynoidae	2	0	0	1	2	0	0	1
	Scalibregmatidae	3	0	0	1	3	0.1	0	1
	Sigalionidae	28	0.3	1	4	3	0.1	1	2
	Spionidae	52	0.5	5	7	13	0.3	5	3
	Syllidae	10	0.1	0	2	0	0	0	0
	Terebellidae	19	0.2	0	3	1	0	0	1
Arthropoda	Ampeliscidae	2	0	0	2	1	0	0	1
	Aoridae	27	0.3	2	6	5	0.1	1	2
	Bodotriidae	4	0	0	2	0	0	0	0
	Chaetiliidae	1	0	0	1	0	0	0	0
	Diastylidae	1	0	0	1	1	0	0	1
	Idoteidae	2	0	0	2	2	0	1	2
	Lysianassidae	1	0	0	1	0	0	0	0
	Oedicerotidae	6	0.1	0	3	6	0.1	2	3
	Paguridae	8	0.1	0	3	6	0.1	3	2
	Paguroidea	1	0	0	1	1	0	0	1
	Phoxocephalidae	19	0.2	2	5	8	0.2	2	3
	Pontoporeiidae	3	0	0	2	0	0	0	0
	Tanaissuidae	6	0.1	0	2	0	0	0	0
	Unciolidae	2	0	0	2	0	0	0	0
Echinodermata	Echinarachniidae	20	0.2	0	3	18	0.4	7	2
	Echinoidea	13	0.1	0	3	12	0.2	4	2
Mollusca	Arcticidae	5	0.1	0	3	5	0.1	1	3
	Astartidae	5	0.1	0	2	0	0	0	0
	Bivalvia	12	0.1	1	4	4	0.1	0	1

Phylum	Family or LPTL	Lease Areas (WTA and NLA)				WTA			
		Abundance Across Samples	Mean Abundance per 0.04 m^2	Median Abundance per 0.04 m^2	Frequency of Occurrence	Abundance of WTA Samples	Mean Abundance per 0.04 m^2	Median Abundance per 0.04 m^2	Frequency of Occurrence
	Calyptraeidae	1	0	0	1	0	0	0	0
	Gastropoda	1	0	0	1	1	0	0	1
	Lyonsiidae	1	0	0	1	1	0	0	1
	Mactridae	25	0.3	1	5	23	0.5	10	3
	Mytilidae	2	0	0	2	1	0	0	1
	Nassariidae	6	0.1	1	5	2	0	1	2
	Nuculidae	94	1	1	4	93	1.9	9	3
	Periplomatidae	14	0.1	2	4	2	0	0	1
	Solenidae	2	0	0	1	0	0	0	0
	Tellinidae	12	0.1	1	4	11	0.2	3	3
	Veneridae	24	0.2	1	4	23	0.5	7	3
	Yoldiidae	1	0	0	1	1	0	0	1
Nemertea	Carinomidae	4	0	0	2	2	0	0	1
	Lineidae	5	0.1	0	1	5	0.1	0	1
	Nemertea	8	0.1	0	1	0	0	0	0
	Tubulanidae	4	0	0	2	0	0	0	0
Platyhelminthes	Nemertea	8	0.1	0	1	0	0	0	0
	Tubulanidae	4	0	0	2	0	0	0	0

3.2.1.2 WTA and NLA Richness, Diversity, and Evenness

Survey Year 2020

Mean density was 310 organisms per station, averaged across 90 sample stations in the Lease Areas (WTA and NLA). The richness of organisms collected at each grab sample location ranged from 1.14 at OCS-20-185 to 5.83 at OCS-20-091 with a mean taxonomic richness of 3.31 across all grab samples collected in the Lease Areas (WTA and NLA). Average diversity across the individual grab samples was 1.33 with a range from 0.42 at OCS-20-086 to 2.57 at OCS-20-181. Evenness across the samples ranged from 0.15 at OCS-20-086 to 0.91 at OCS-29-107. Richness, diversity, and evenness are unitless indices; however, higher values indicate greater amounts of richness, diversity, or evenness in each sample (Table 3-13, Figure 3-10, and Figure 3-11).

Stations located in the WTA had 281 organisms from 20 families (or LPTL) on average, while those within the NLA had 341 organisms from 18 families on average. Mean richness (3.56 and 3.06), diversity (1.43 and 1.22), and evenness (0.49 and 0.43) were higher across samples collected in the WTA than in the NLA, respectively. Of samples collected in the WTA, richness ranged from 1.99 at OCS-20-139 to 5.83 at OCS-20-091, diversity ranged from 0.42 at OCS-20-86 to 2.57 at OCS-20-181, and evenness ranged from 0.15 at OCS-20-086 to 0.91 at OCS-29-107. For NLA samples, richness ranged from 1.14 at OCS-20-185 to 4.45 at OCS-20-041 and OCS-20-118, diversity ranged from 0.56 at OCS-20-117 and OCS-20-133 to 2.06 at OCS-20-047, and evenness ranged from 0.17 at OCS-20-117 to 0.73 at OCS-20-047.

Table 3-13. Survey year 2020. Community composition parameters calculated for each grab sample station in the Lease Areas (WTA and NLA) (continued on next page).

Project Area	Station	Density (abundance per 0.04 m^2)	Biomass (wet weight in g)	Number of LPTLs	Number of Families (or LPTL)	Ecological Indices		
						Richness	Diversity	Evenness
WTA	OCS-20-071	162	4.45	19	18	3.34	1.66	0.58
WTA	OCS-20-073	248	2.36	30	26	4.53	1.99	0.61
WTA	OCS-20-077	402	0.47	34	32	5.17	1.86	0.54
WTA	OCS-20-079	286	21.69	20	20	3.36	0.9	0.3
WTA	OCS-20-081	933	15.12	26	25	3.51	0.73	0.23
WTA	OCS-20-083	130	1.14	20	20	3.9	1.83	0.61
WTA	OCS-20-085	151	21.02	15	15	2.79	1.67	0.62
WTA	OCS-20-086	606	6.65	17	17	2.5	0.42	0.15
WTA	OCS-20-087	467	32.66	29	28	4.39	1.71	0.51
WTA	OCS-20-089	213	12.09	27	26	4.66	1.77	0.54
WTA	OCS-20-091	288	1.07	36	34	5.83	1.9	0.54
WTA	OCS-20-092	73	11.19	18	16	3.5	1.74	0.63
WTA	OCS-20-093	61	0.10	12	12	2.68	1.46	0.59
WTA	OCS-20-095	51	13.82	17	16	3.82	2.19	0.79
WTA	OCS-20-097	962	1.00	34	29	4.08	0.65	0.19
WTA	OCS-20-099	469	0.69	29	24	3.74	1.25	0.39
WTA	OCS-20-101	149	7.82	20	18	3.4	1.94	0.67
WTA	OCS-20-103	74	0.69	13	12	2.56	1.15	0.46
WTA	OCS-20-105	466	0.49	20	17	2.6	0.98	0.35
WTA	OCS-20-107	33	13.14	17	16	4.29	2.52	0.91
WTA	OCS-20-109	300	1.97	20	17	2.81	1.12	0.4
WTA	OCS-20-136	186	40.81	14	14	2.49	1.11	0.42

Project Area	Station	Density (abundance per 0.04 m^2)	Biomass (wet weight in g)	Number of LPTLs	Number of Families (or LPTL)	Ecological Indices		
						Richness	Diversity	Evenness
WTA	OCS-20-137	101	31.03	22	20	4.12	2.13	0.71
WTA	OCS-20-139	415	0.45	13	13	1.99	0.58	0.23
WTA	OCS-20-145	162	0.87	16	15	2.75	1.39	0.51
WTA	OCS-20-147	251	14.27	26	24	4.16	1.39	0.44
WTA	OCS-20-148	202	12.29	14	14	2.45	0.93	0.35
WTA	OCS-20-153	472	6.42	25	24	3.74	0.72	0.23
WTA	OCS-20-155	504	0.63	24	21	3.21	0.6	0.2
WTA	OCS-20-157	328	0.42	32	31	5.18	1.79	0.52
WTA	OCS-20-159	237	17.37	18	18	3.11	0.93	0.32
WTA	OCS-20-160	139	6.78	22	22	4.26	1.91	0.62
WTA	OCS-20-161	147	0.81	23	23	4.41	1.79	0.57
WTA	OCS-20-163	100	0.49	18	16	3.26	1.59	0.57
WTA	OCS-20-165	244	10.76	23	21	3.64	1.24	0.41
WTA	OCS-20-167	111	5.92	11	11	2.12	1	0.42
WTA	OCS-20-169	530	1.13	27	25	3.83	0.98	0.3
WTA	OCS-20-171	244	0.99	20	19	3.27	1.5	0.51
WTA	OCS-20-172	321	1.17	23	23	3.81	1.02	0.33
WTA	OCS-20-173	172	0.09	18	16	2.91	1.34	0.48
WTA	OCS-20-175	147	8.18	14	13	2.4	1.19	0.46
WTA	OCS-20-177	95	0.49	17	15	3.07	1.97	0.73
WTA	OCS-20-179	41	3.75	15	14	3.5	2.11	0.8
WTA	OCS-20-180	248	0.91	27	25	4.35	2.2	0.68
WTA	OCS-20-181	142	29.17	28	27	5.25	2.57	0.78
WTA	OCS-20-500	863	0.92	23	22	3.11	0.49	0.16
NLA	OCS-20-038	147	21.55	17	17	3.21	1.99	0.7
NLA	OCS-20-039	553	33.03	31	29	4.43	1.19	0.35
NLA	OCS-20-041	220	14.08	26	25	4.45	1.58	0.49
NLA	OCS-20-043	239	3.91	15	15	2.56	1.48	0.54
NLA	OCS-20-046	120	3.27	14	14	2.72	1.43	0.54
NLA	OCS-20-047	122	13.72	20	17	3.33	2.06	0.73
NLA	OCS-20-048	235	0.11	25	24	4.21	1.54	0.48
NLA	OCS-20-049	159	0.46	19	17	3.16	1.63	0.57
NLA	OCS-20-051	362	7.13	22	19	3.06	0.95	0.32
NLA	OCS-20-053	296	1.76	26	25	4.22	1.52	0.47
NLA	OCS-20-055	405	0.69	25	24	3.83	1.41	0.44
NLA	OCS-20-057	208	33.25	18	16	2.81	1.26	0.46
NLA	OCS-20-059	317	6.36	24	22	3.65	1.29	0.42
NLA	OCS-20-061	375	22.32	27	27	4.39	1.64	0.5
NLA	OCS-20-063	106	9.24	13	12	2.36	1.28	0.52
NLA	OCS-20-064	432	2.63	21	19	2.97	1.01	0.34
NLA	OCS-20-065	419	10.39	17	16	2.48	0.63	0.23
NLA	OCS-20-067	276	33.68	27	22	3.74	1.23	0.4
NLA	OCS-20-069	250	13.98	17	17	2.9	0.8	0.28
NLA	OCS-20-075	344	6.53	17	17	2.74	0.72	0.26
NLA	OCS-20-110	423	1.82	24	21	3.31	1.35	0.45
NLA	OCS-20-112	294	2.37	19	17	2.82	1.36	0.48
NLA	OCS-20-113	145	6.27	12	12	2.21	1.07	0.43
NLA	OCS-20-114	401	3.31	21	21	3.34	1.23	0.41
NLA	OCS-20-116	217	0.15	16	14	2.42	1.4	0.53
NLA	OCS-20-117	2069	6.00	31	27	3.41	0.56	0.17
NLA	OCS-20-118	434	2.43	30	28	4.45	1.36	0.41
NLA	OCS-20-121	148	8.32	24	23	4.4	1.8	0.57
NLA	OCS-20-122	128	15.14	17	16	3.09	1.24	0.45
NLA	OCS-20-123	88	6.80	15	14	2.9	1.46	0.55
NLA	OCS-20-125	107	1.25	17	16	3.21	1.64	0.59
NLA	OCS-20-127	828	0.63	20	19	2.68	1	0.34
NLA	OCS-20-128	195	0.44	12	12	2.09	0.86	0.34
NLA	OCS-20-129	496	1.43	26	24	3.71	1.13	0.35
NLA	OCS-20-131	121	23.79	14	14	2.71	1.35	0.51

Project Area	Station	Density (abundance per 0.04 m^2)	Biomass (wet weight in g)	Number of LPTLs	Number of Families (or LPTL)	Ecological Indices		
						Richness	Diversity	Evenness
NLA	OCS-20-133	569	8.46	18	17	2.52	0.56	0.2
NLA	OCS-20-135	340	5.19	16	15	2.4	0.57	0.21
NLA	OCS-20-141	243	3.83	15	15	2.55	0.98	0.36
NLA	OCS-20-143	35	0.44	8	7	1.69	1.11	0.57
NLA	OCS-20-149	354	6.11	15	13	2.04	0.57	0.22
NLA	OCS-20-151	51	14.41	11	10	2.29	1.33	0.58
NLA	OCS-20-183	395	5.13	21	20	3.18	1.17	0.39
NLA	OCS-20-185	1149	1.34	11	9	1.14	0.84	0.38
NLA	OCS-20-191	180	0.88	16	16	2.89	1.07	0.39

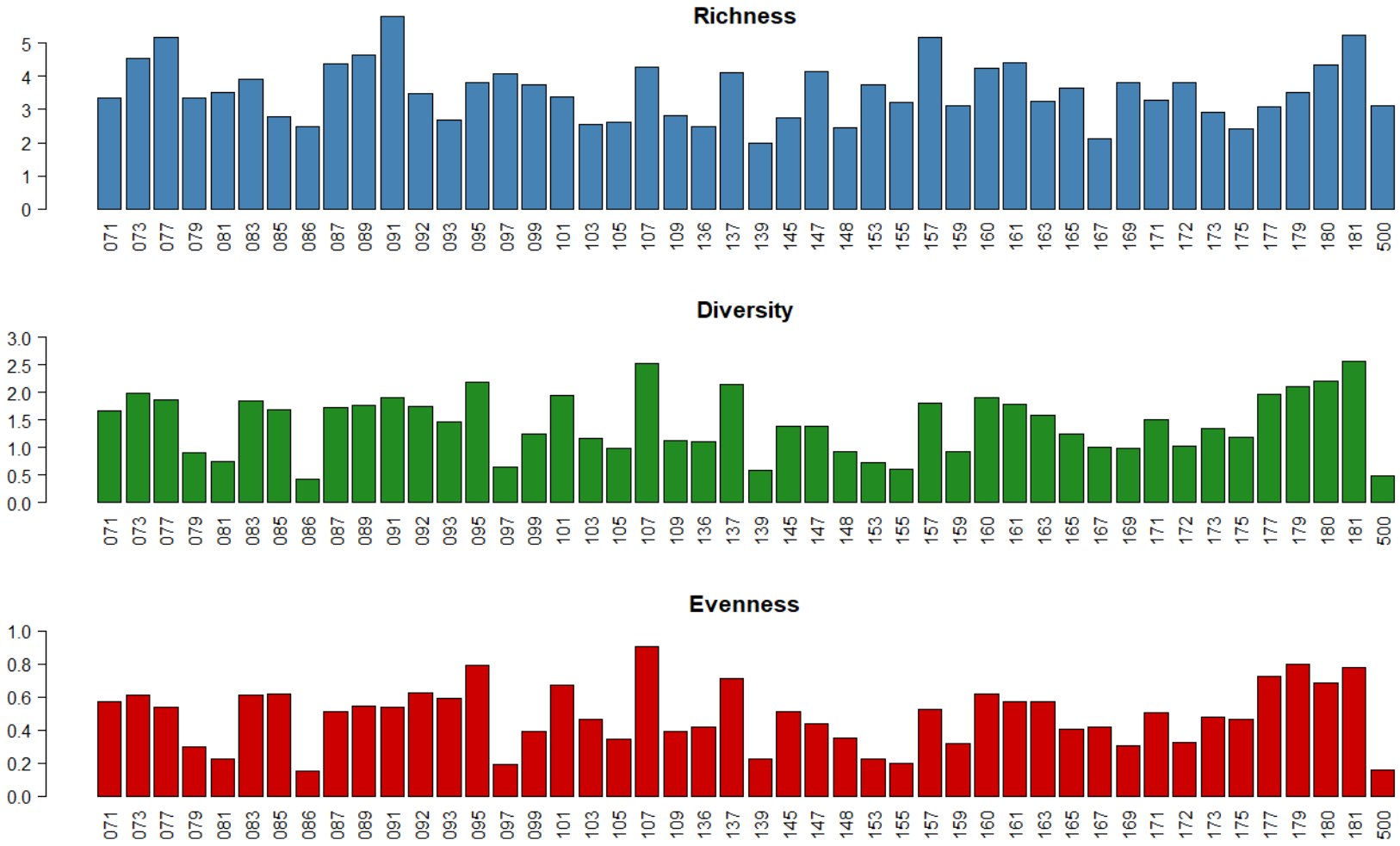


Figure 3-10. Survey year 2020. Ecological index values calculated for each sample station (x-axis) collected in the WTA.

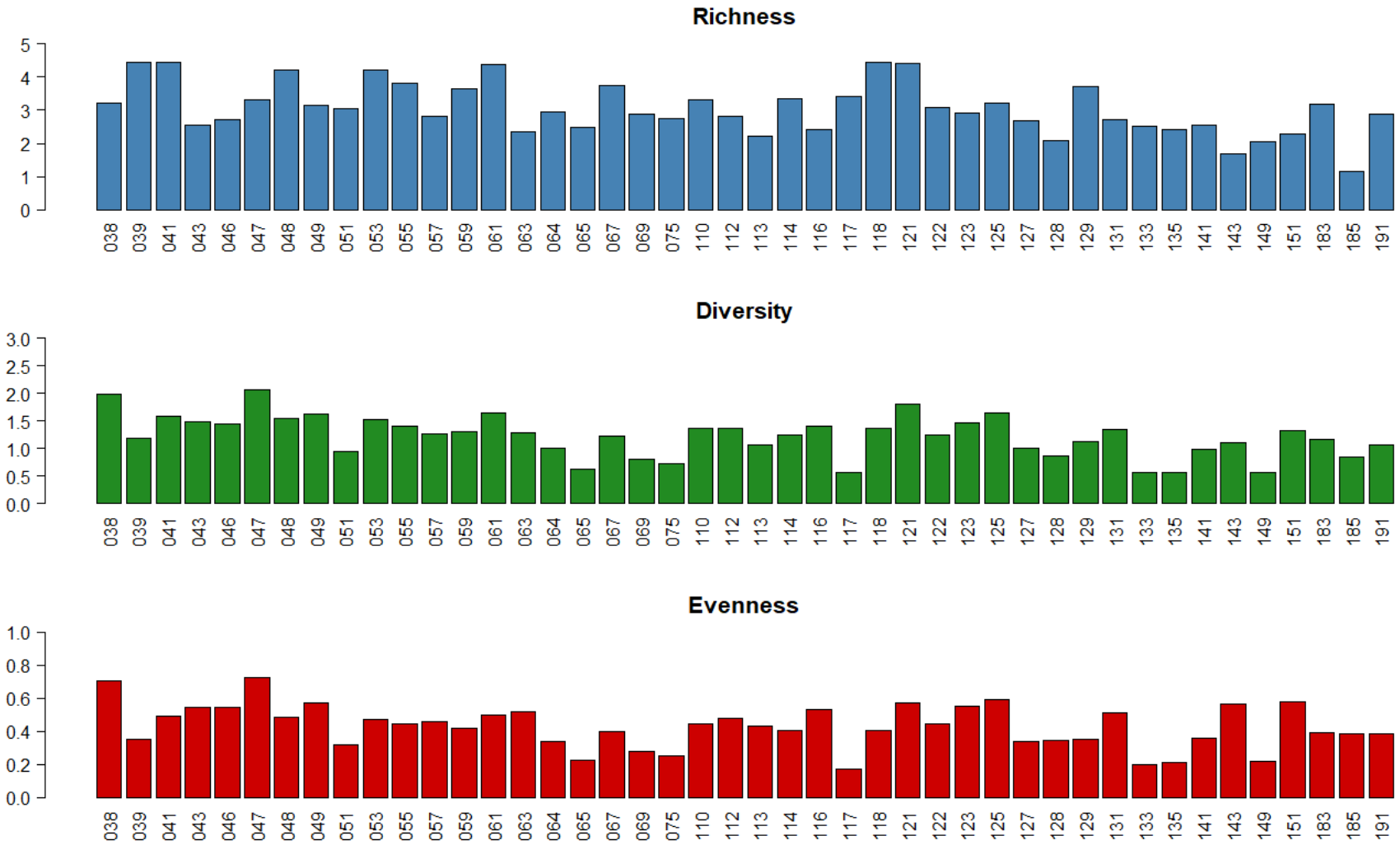


Figure 3-11. Survey year 2020. Ecological index values calculated for each sample station (x-axis) collected in the NLA.

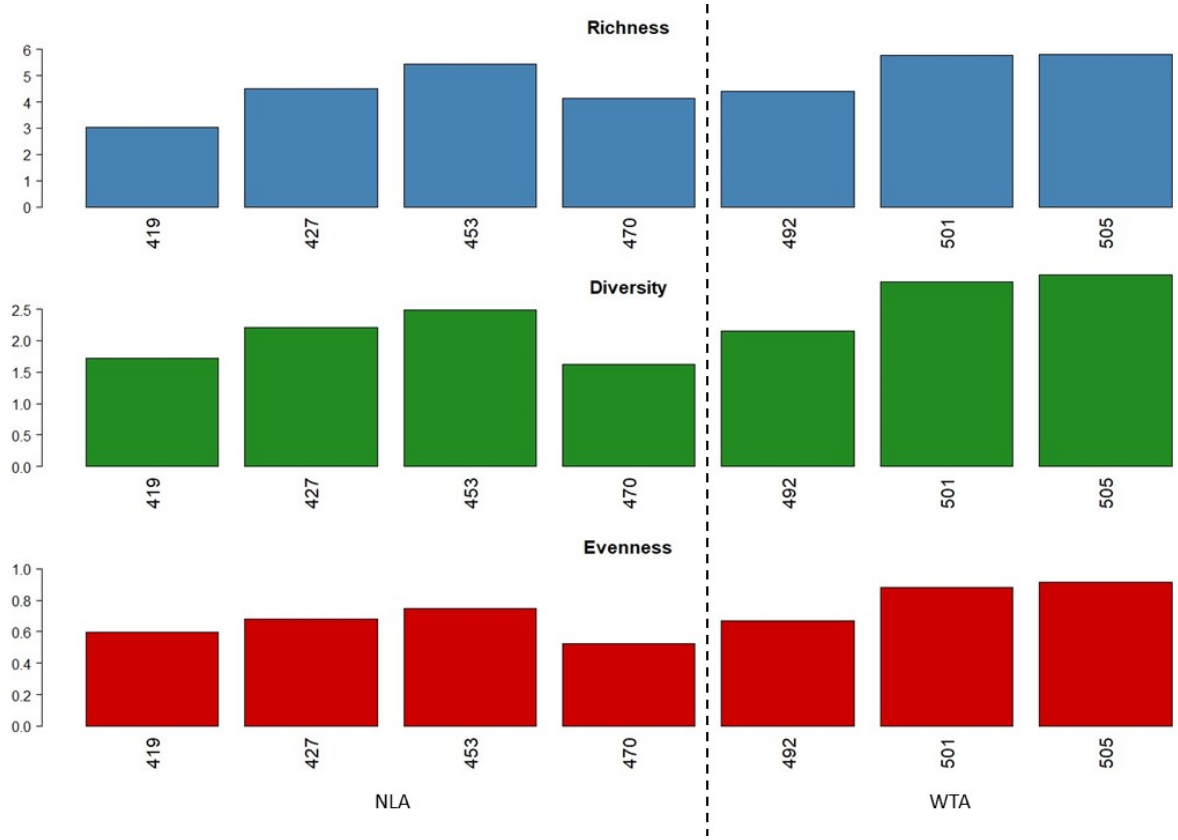
Survey Year 2022

Mean density was 181 organisms per station, averaged across 7 sample stations in the Lease Areas (WTA and NLA). The richness of organisms collected at each grab sample location ranged from 3.04 at OCS-22-419 to 5.80 at OCS-22-505 with a mean taxonomic richness of 4.73 across all grab samples collected in the Lease Areas (WTA and NLA). Average diversity across the individual grab samples was 2.31 with a range from 1.62 at OCS-22-470 to 3.04 at OCS-22-505. Evenness across the samples ranged from 0.52 at OCS-22-470 to 0.91 at OCS-22-505. Richness, diversity, and evenness are unitless indices; however, higher values indicate greater amounts of richness, diversity, or evenness in each sample (Table 3-14 and Figure 3-12).

Stations located in the WTA had 147 organisms on average, while those within the NLA had 206 organisms on average. Mean richness (5.33 and 4.28), diversity (2.71 and 2.01), and evenness (0.82 and 0.64) were higher across samples collected in the WTA than in the NLA, respectively. Of samples collected in the WTA, richness ranged from 4.42 at OCS-22-492 to 5.80 at OCS-22-505, diversity ranged from 2.16 at OCS-22-492 to 3.04 at OCS-22-505, and evenness ranged from 0.67 at OCS-22-492 to 0.91 at OCS-22-505. For NLA samples, richness ranged from 3.04 at OCS-22-419 to 5.44 at OCS-22-453, diversity ranged from 1.62 at OCS-22-470 and OCS-22-453 to 2.49 at OCS-20-047, and evenness ranged from 0.52 at OCS-22-470 to 0.75 at OCS-22-453.

Table 3-14. Survey year 2022. Community composition parameters calculated for each grab sample station in Lease Areas (WTA and NLA).

Project Area	Station	Density (abundance per 0.04 m^2)	Biomass (wet weight in g)	Number of LPTLs	Number of Families (or LPTL)	Ecological Indices		
						Richness	Diversity	Evenness
WTA	OCS-22-492	229	NA	27	25	4.42	2.16	0.67
WTA	OCS-22-501	108	NA	30	28	5.77	2.94	0.88
WTA	OCS-22-505	105	NA	31	28	5.80	3.04	0.91
NLA	OCS-22-419	266	NA	19	18	3.04	1.72	0.59
NLA	OCS-22-427	254	NA	30	26	4.51	2.21	0.68
NLA	OCS-22-453	143	NA	30	28	5.44	2.49	0.75
NLA	OCS-22-470	160	NA	26	22	4.14	1.62	0.52



3.2.2 Atlantic ECC Samples

3.2.2.1 Atlantic (CAR) Taxonomic Composition

Grab samples were collected for benthic macroinvertebrate analysis from 10 sites in the Atlantic (CAR) ECC in 2020 only. The grab samples yielded a total of 1,397 individual macrofaunal organisms (per all ten 0.04 m^2 grab samples). Organisms collected in the Atlantic ECC were from 8 phyla, 52 families or LPTL, and 67 unique taxa identified to the LPTL (Table 3-15). Organisms from the phyla Nematoda and Arthropoda were most abundant across all samples, accounting for 41% and 36% of all identified organisms respectively and were identified in every sample collected (Figure 3-13) The majority of unique taxa identified were from the Annelida (17 unique taxa), Arthropoda (20 unique taxa), and Mollusca (21 unique taxa) phyla (Table 3-15).

The Cnidarian that was collected was a sea anemone (Ceriantharia) with no corals detected. No ocean

Figure 3-12. Survey year 2022. Ecological index values calculated for each sample station (x-axis) collected in the Lease Areas (WTA and NLA). WTA samples include OCS-22-492, OCS-22-501, and OCS-22-505. NLA samples include OCS-22-419, OCS-22-427, OCS-22-453 and OCS-22-470.

quahogs or sea scallops were collected but surfclams were collected at CAR-20-217, CAR-20-210, CAR-20-208, CAR-20-206, and CAR-20-203.

No invasive tunicates (*Ascidiella aspersa*, *Botrylloides violaceus*, *Botryllus schlosseri*, *Didemnum vexillum*, *Diplosoma listerianum*, or *Styela clava*) were confirmed present in the Atlantic ECC but there were organisms identified to the LPTL Ascidiacea at three stations: CAR-20-217, CAR-20-206, and CAR-20-204.

Density across the 10 benthic grab sites ranged from 45 organisms in CAR-20-212 to 269 organisms in CAR-20-206 (Table 3-16). The percent composition of each sample by phyla is shown in (Figure 3-14) and abundance of unique taxa is presented in Figure 3-17. The number of unique taxa represented in each sample ranged from 9 taxa at CAR-20-208 to 19 taxa at CAR-20-202.

Table 3-15. Phyla present in the 10 benthic grab samples collected along the Atlantic (CAR) export cable corridor.

Phyla	Abundant Taxonomic Groups (common names)	Density (Abundance per ninety 0.04 m^2 samples)	Number of Families (or LPTL)	Number of LPTL
Annelida	Oligochaeta worms	90	11	17
Arthropoda	Amphipods	505	15	20
Chordata	Tunicate	55	3	3
Cnidaria	Hydroid	1	1	1
Echinodermata	Sea urchins	9	2	2
Mollusca	Many-colored tellin	145	17	21
Nematoda	Nematodes	575	1	1
Nemertea	Ribbon worms	17	2	2
Totals		**1,397**	**52**	**67**

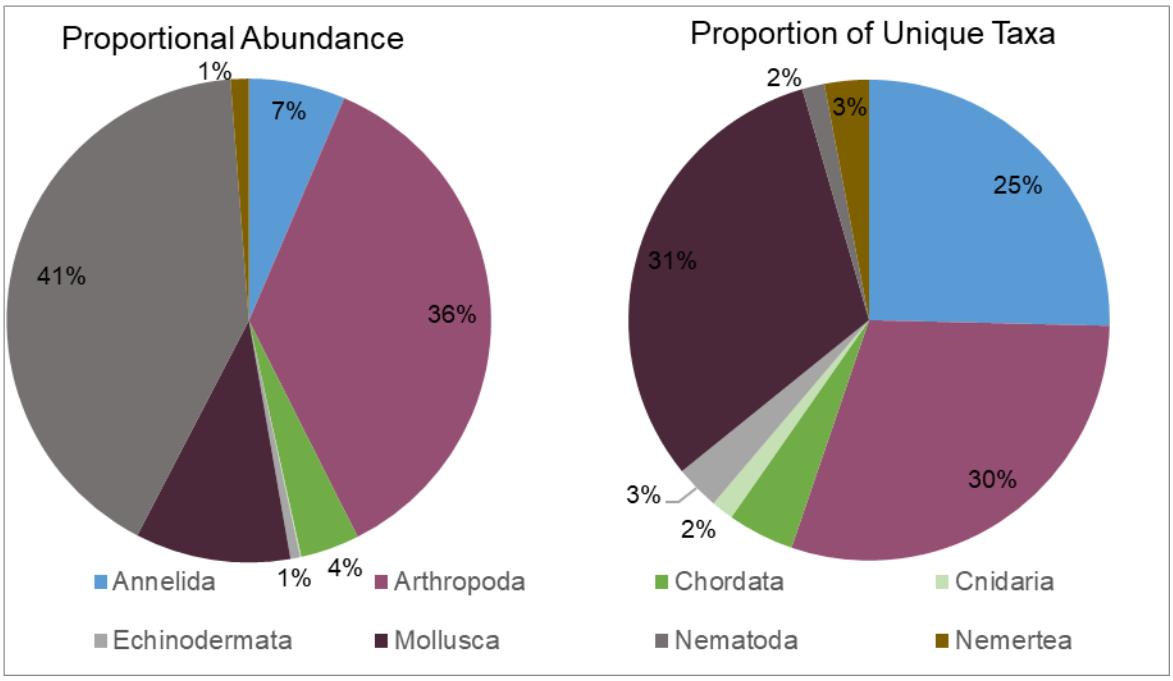


Figure 3-13. Proportional abundance and proportion of unique taxa (Family or LPTL) for each phylum collected in all benthic grab samples along the Atlantic (CAR) cable route. Results presented as percentage of total.

Table 3-16. Abundance of each Phylum counted within each grab sample collected along the Atlantic (CAR) export cable corridor.

Station	Annelida	Arthropoda	Chordata	Cnidaria	Echinodermata	Mollusca	Nematoda	Nemertea	Density (Abundance per 0.04 m^2)
CAR-20-201	2	222	0	0	1	9	6	4	244
CAR-20-202	14	7	0	0	1	12	14	5	53
CAR-20-203	24	2	0	0	0	29	10	3	68
CAR-20-204	14	6	37	0	3	7	175	0	242
CAR-20-206	5	22	16	0	0	22	204	0	269
CAR-20-208	1	22	0	0	0	4	52	0	79
CAR-20-210	2	24	1	0	2	25	26	0	80
CAR-20-211	10	159	0	0	1	5	2	0	177
CAR-20-212	18	5	0	1	1	13	2	5	45
CAR-20-217	0	36	1	0	0	19	84	0	140
Total	**90**	**505**	**55**	**1**	**9**	**145**	**575**	**17**	**1,397**

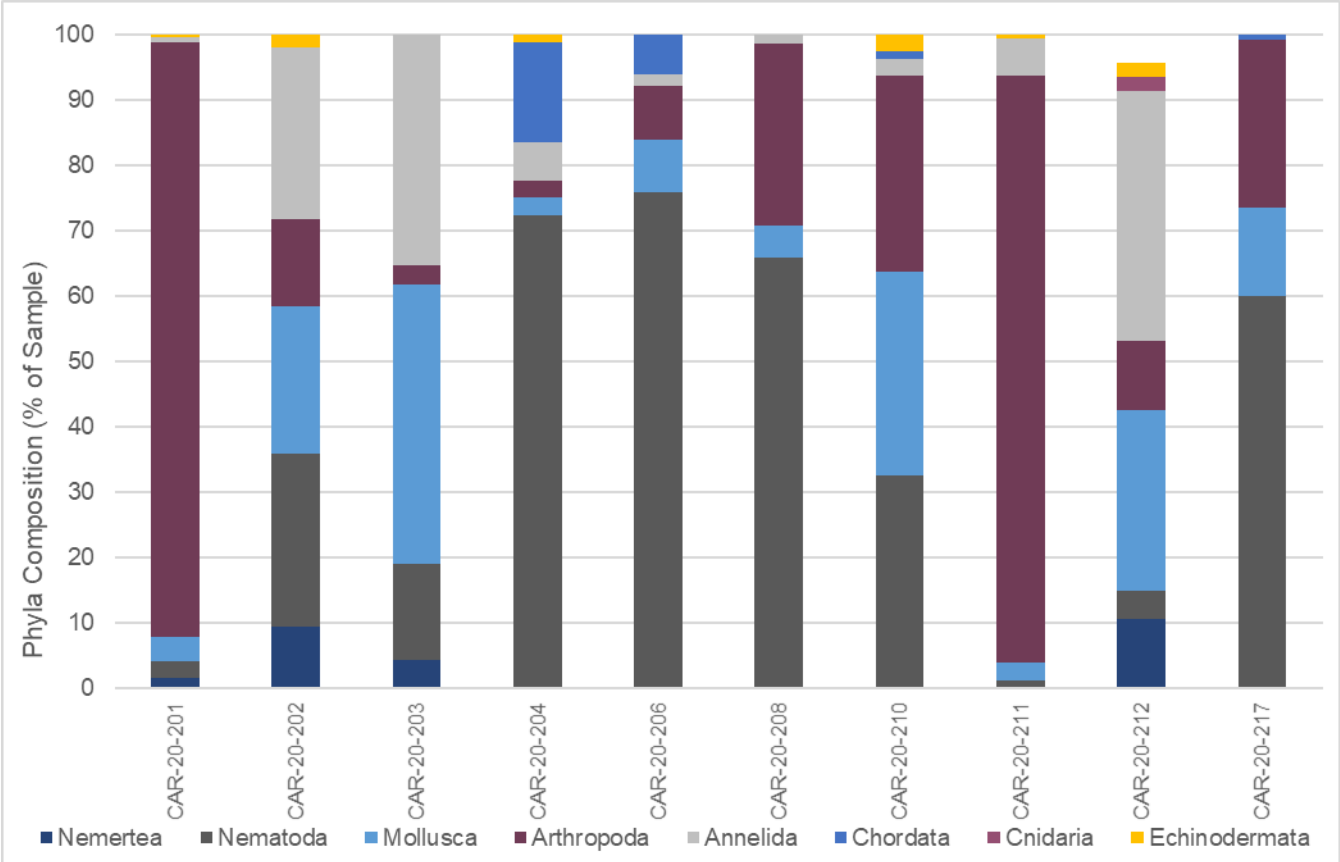


Figure 3-14. Percent composition of organisms in each represented phylum for the 21 benthic grab samples collected along the Atlantic (CAR) cable route.

Table 3-17. Mean density and frequency of occurrence of each phyla and taxa (LPTL) across all samples collected along the Atlantic (CAR) cable route (continued on next page).

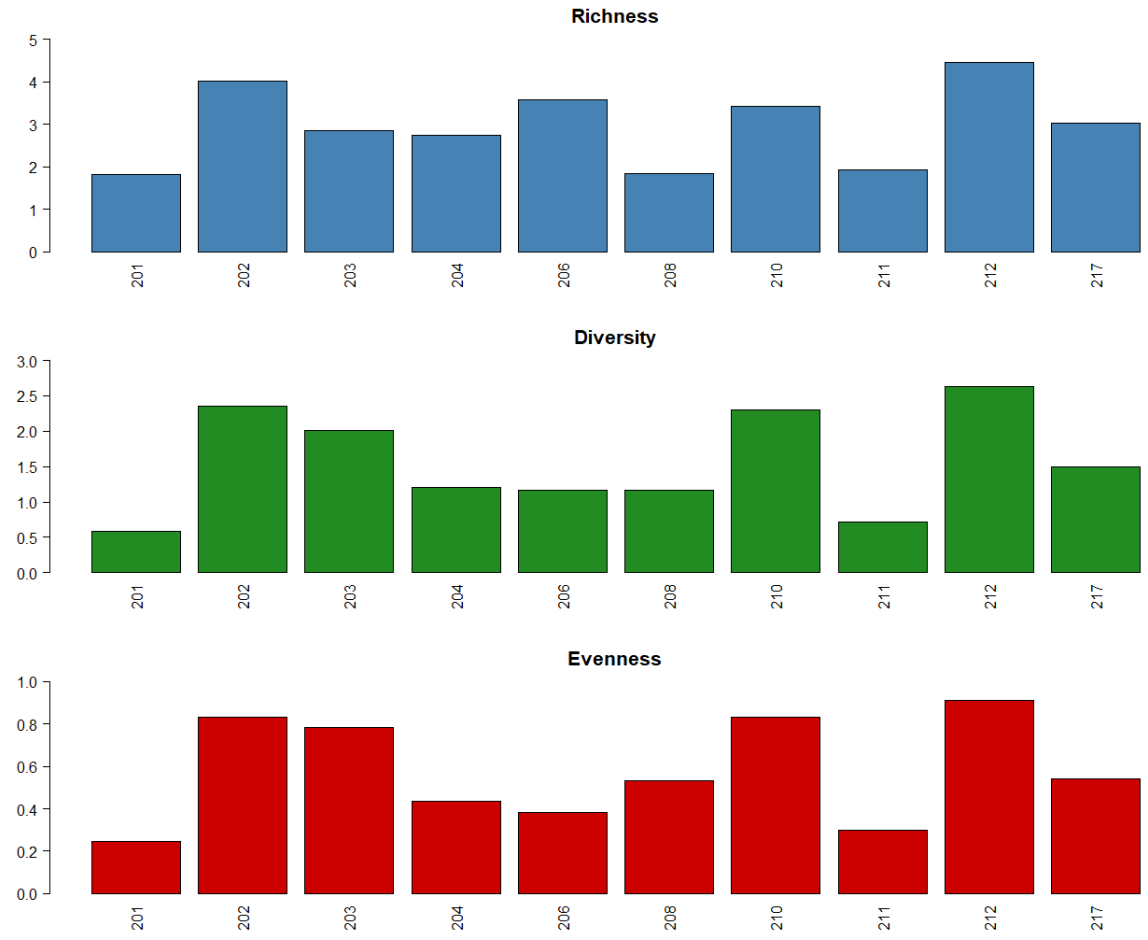
Phylum	Family or LPTL	Abundance Across All Samples	Mean Abundance per 0.04 m^2	Median Abundance per 0.04 m^2	Frequency of Occurrence
Annelida	Ampharetidae	5	0.5	0	3
	Glyceridae	4	0.4	0	3
	Magelonidae	6	0.6	0	2
	Nephtyidae	20	2	1	6
	Oenonidae	2	0.2	0	1
	Oligochaeta	36	3.6	0	4
	Onuphidae	1	0.1	0	1
	Orbiniidae	5	0.5	0	3
	Sigalionidae	6	0.6	0	2
	Spionidae	1	0.1	0	1
	Syllidae	4	0.4	0	1
Arthropoda	Ampeliscidae	11	1.1	0	3
	Aoridae	7	0.7	0	2
	Bodotriidae	5	0.5	0	3
	Cancridae	1	0.1	0	1
	Chaetiliidae	8	0.8	0	4
	Haustoriidae	413	41.3	2.5	8
	Idoteidae	3	0.3	0	3
	Liljeborgiidae	4	0.4	0	3
	Oedicerotidae	5	0.5	0	4
	Ostracoda	4	0.4	0	4
	Paguridae	1	0.1	0	1
	Phoxocephalidae	30	3	2.5	9
	Pontoporeiidae	2	0.2	0	1
	Tanaissuidae	10	1	0	4
	Unciolidae	1	0.1	0	1
Chordata	Ascidiacea	30	3	0	3
	Branchiostomatidae	3	0.3	0	1
	Molgulidae	22	2.2	0	2
Cnidaria	Ceriantharia	1	0.1	0	1
Echinodermata	Echinarachniidae	2	0.2	0	2
	Echinoidea	7	0.7	0	4
Mollusca	Astartidae	1	0.1	0	1
	Bivalvia	2	0.2	0	2
	Calyptraeidae	13	1.3	0	2
	Cardiidae	1	0.1	0	1
	Gastropoda	1	0.1	0	1
	Lyonsiidae	1	0.1	0	1
	Mactridae	18	1.8	0.5	5
	Montacutidae	1	0.1	0	1
	Nassariidae	6	0.6	0	4
	Naticidae	10	1	0	3
	Nuculidae	21	2.1	0	4
	Periplomatidae	10	1	0	3
	Pharidae	1	0.1	0	1
	Pyramidellidae	1	0.1	0	1
	Tellinidae	54	5.4	5.5	10
	Turridae	2	0.2	0	1
	Yoldiidae	2	0.2	0	1
Nematoda	Nematoda	575	57.5	20	10
Nemertea	Nemertea	11	1.1	0	3
	Tubulanidae	6	0.6	0	2

3.2.2.2 Atlantic Richness, Diversity, and Evenness

Mean density was 140 organisms per station, averaged across 10 stations in the Atlantic (CAR) ECC. The richness of organisms collected at each grab sample location ranged from 1.82 at CAR-20-201 to 4.47 at CAR-20-212, with an average richness of 2.97. Average diversity across the individual grab samples was 1.56 with a range from 0.59 at CAR-20-201 to 2.64 at CAR-20-212. Evenness across the samples ranged from 0.25 at CAR-20-201 to 0.91 at CAR-20-212. Richness, diversity, and evenness are unitless indices; however, higher values indicate greater amounts of richness, diversity, or evenness in each sample (Table 3-18 and Figure 3-15).

Table 3-18. Community composition parameters calculated for each grab sample station along the Atlantic (CAR) cable route.

Station	Density (Abundance per 0.04 m^2)	Number of LPTLs	Number of Families (or LPTL)	Ecological Indices		
				Richness	Diversity	Evenness
CAR-20-201	244	11	12	1.82	0.59	0.25
CAR-20-202	53	17	19	4.03	2.35	0.83
CAR-20-203	68	13	14	2.84	2.00	0.78
CAR-20-204	242	16	17	2.73	1.20	0.43
CAR-20-206	269	21	23	3.57	1.17	0.38
CAR-20-208	79	9	9	1.83	1.17	0.53
CAR-20-210	80	16	17	3.42	2.30	0.83
CAR-20-211	177	11	13	1.93	0.71	0.30
CAR-20-212	45	18	18	4.47	2.64	0.91
CAR-20-217	140	16	17	3.04	1.50	0.54



3.2.3 Monmouth ECC Samples

3.2.3.1 Monmouth Taxonomic Composition

Survey Year 2020

Grab samples were collected for benthic macroinvertebrate analysis from 21 sites along the potential Monmouth (LAR) ECC in 2020. The grab samples yielded a total of 10,966 individual macrofaunal organisms (per all twenty-one 0.04 m^2 grab samples). Organisms collected in the Monmouth ECC were from 11 phyla, 100 families or LPTL, and 150 unique taxa identified to the LPTL (**Error! Reference source not found.**). Organisms from the phyla Nematoda were most abundant across all samples, accounting for 73% of all identified organisms and were identified in every sample collected (Figure 3-16). The majority of unique taxa identified were from the Annelida (59 unique taxa), Arthropoda (34 unique taxa), and Mollusca (36 unique taxa) phyla (**Error! Reference source not found.**).

Figure 3-15. Ecological index values calculated for each sample station collected along the Atlantic (CAR) cable route.

The Cnidaria that were collected were sea anemones (Actiniaria and Ceriantharia) with no corals detected. One sea scallop was collected at LAR-20-037 and one ocean quahog was collected at LAR-20-0020. Atlantic surfclams were collected at LAR-20-032, LAR-20-031, LAR-20-030, LAR-20-028, LAR-20-026, LAR-20-024, LAR-20-021, LAR-20-020, LAR-20-014, LAR-20-012, LAR-20-006, and LAR-20-005. No invasive tunicates (*Ascidiella aspersa*, *Botrylloides violaceus*, *Botryllus schlosseri*, *Didemnum vexillum*, *Diplosoma listerianum*, or *Styela clava*) were confirmed present in the Monmouth ECC.

Density across the 21 benthic grab sites ranged from 69 organisms in LAR-20-005 to 1,541 organisms in LAR-20-020 (Table 3-20). The percent composition of each sample by phyla is shown in Figure 3-17, and abundance of unique taxa is presented in Table 3-21. The number of unique taxa represented in each sample ranged from 8 taxa at LAR-20-016 to 40 taxa at LAR-20-014.

Table 3-19. Survey year 2020. Phyla present in the 21 benthic grab samples collected along the Monmouth (LAR) export cable route.

Phyla	Abundant Taxonomic Groups (common names)	Density (Abundance per ninety 0.04 m^2 samples)	Number of Families (or LPTL)	Number of LPTL
Annelida	Oligochaeta worms	852	29	59
Arthropoda	Amphipods	1,171	26	34
Chordata	Tunicate	3	2	2
Cnidaria	Hydroid	9	3	3
Echinodermata	Sea urchins, sea cucumbers	110	4	4
Ectoprocta	Bryozoa	8	5	5
Foraminifera	Forams	6	1	1
Mollusca	Nut clams, Atlantic surfclam	745	24	36
Nematoda	Nematodes	8,025	1	1
Nemertea	Ribbon worms	14	2	2
Sipuncula	Peanut worms	23	3	3
Totals		**10,966**	**100**	**150**

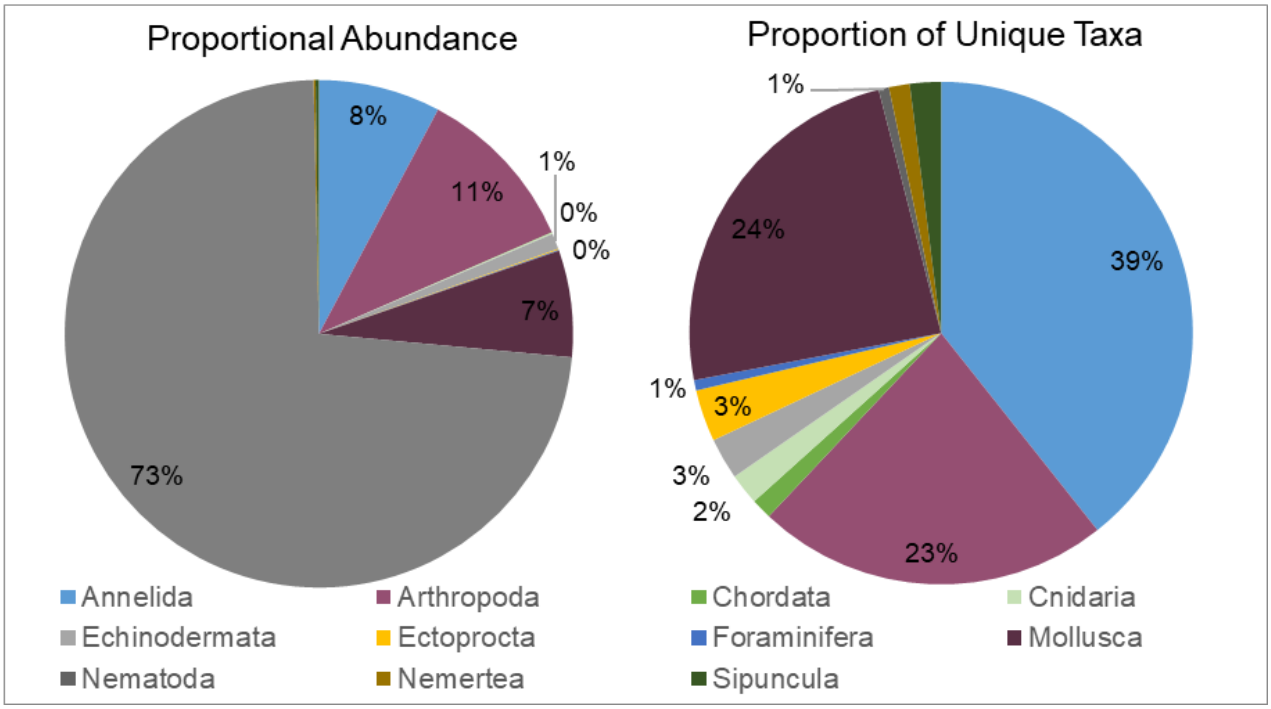


Figure 3-16. Survey year 2020.Proportional abundance and proportion of unique taxa (Family or LPTL) for each phylum collected in all benthic grab samples along the Monmouth (LAR) export cable route (ECC). Results presented as percentage of total.

Table 3-20. Survey year 2020. Abundance of each Phylum counted within each grab sample collected along the Monmouth (LAR) export cable corridor.

Station	Annelida	Arthropoda	Chordata	Cnidaria	Echino-dermata	Ectoprocta	Foraminifera	Mollusca	Nematoda	Nemertea	Sipuncula	Density (Abundance per 0.04 m^2)
LAR-20-002	23	60	0	0	0	0	0	298	283	1	0	665
LAR-20-004	34	6	0	1	3	0	0	6	278	0	0	328
LAR-20-005	2	26	0	0	0	0	0	35	5	1	0	69
LAR-20-006	16	4	0	0	0	0	0	17	1,228	0	0	1,265
LAR-20-008	83	89	0	0	0	0	0	82	346	0	0	600
LAR-20-010	7	26	0	0	3	0	0	3	116	0	0	155
LAR-20-011	17	100	0	0	0	0	0	5	284	0	0	406
LAR-20-012	19	48	0	0	4	0	0	9	291	1	0	372
LAR-20-014	68	21	1	2	12	0	0	23	435	1	2	565
LAR-20-016	2	15	0	0	1	0	0	3	81	0	0	102
LAR-20-018	74	25	0	1	12	0	0	2	668	9	3	794
LAR-20-020	106	29	0	1	0	2	0	6	1,397	0	0	1,541
LAR-20-021	48	236	2	0	23	2	0	48	481	0	0	840
LAR-20-022	85	102	0	0	0	2	0	6	303	0	0	498
LAR-20-024	123	18	0	3	33	0	0	49	435	0	8	669
LAR-20-026	27	39	0	1	0	0	0	10	104	0	3	184
LAR-20-028	33	18	0	0	3	1	1	7	586	0	0	649
LAR-20-030	31	43	0	0	4	0	0	33	210	0	0	321
LAR-20-031	12	17	0	0	3	0	3	14	112	0	0	161
LAR-20-032	13	18	0	0	8	0	2	68	70	0	0	179
LAR-20-037	29	231	0	0	1	1	0	21	312	1	7	603
Total	**852**	**1,171**	**3**	**9**	**110**	**8**	**6**	**745**	**8,025**	**14**	**23**	**10,966**

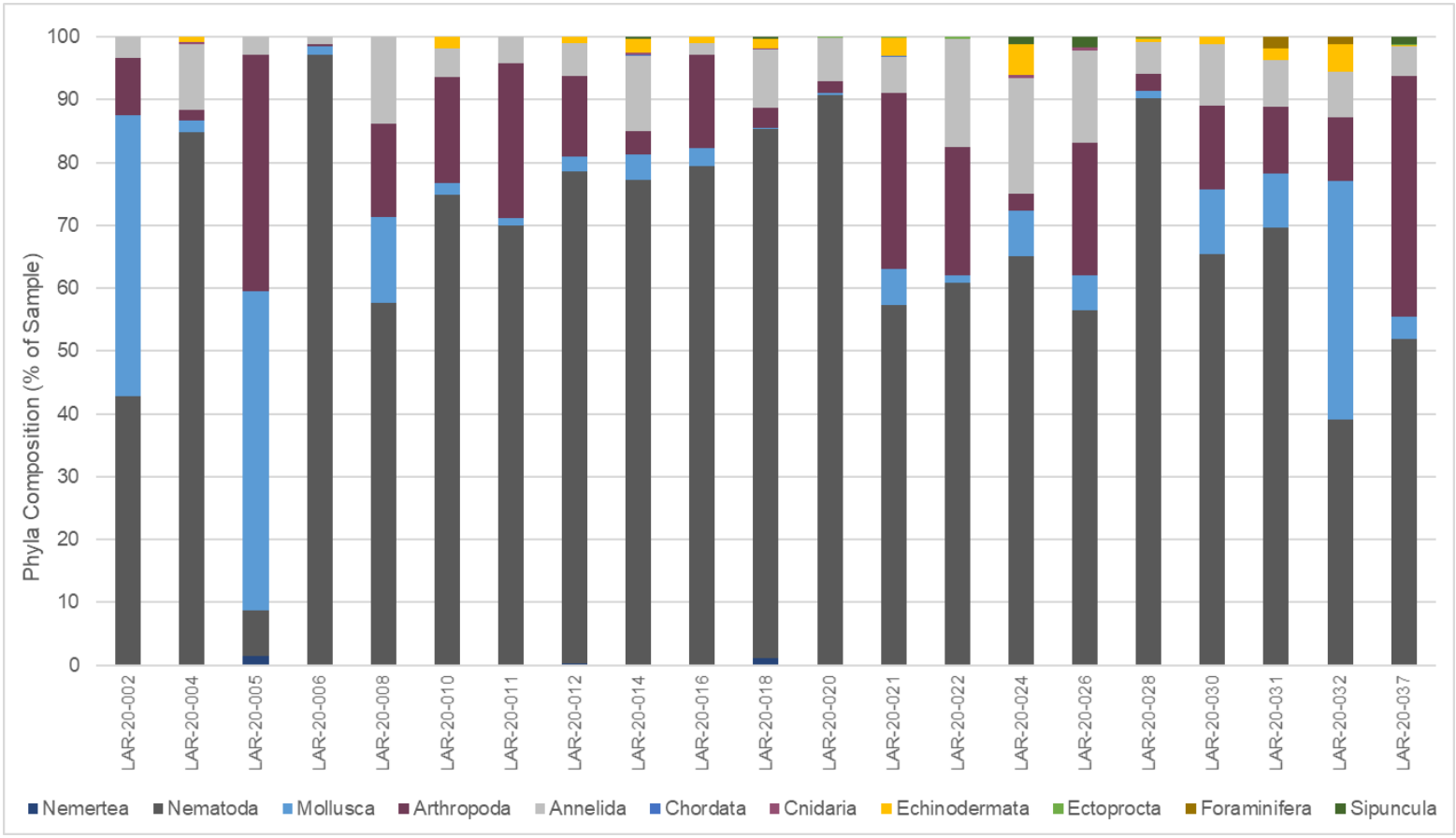


Figure 3-17. Survey year 2020. Percent composition of organisms in each represented phylum for the 21 benthic grab samples collected along the Monmouth (LAR) export cable corridor (ECC).

Table 3-21. Survey year 2020. Mean density and frequency of occurrence of each phyla and taxa (LPTL) across all samples collected along the Monmouth (LAR) export cable corridor (ECC) (continued on next pages).

Phylum	Family or LPTL	Abundance Across All Samples	Mean Abundance per 0.04 m^2	Median Abundance per 0.04 m^2	Frequency of Occurrence
Annelida	Ampharetidae	18	0.9	0.9	8
	Cirratulidae	14	0.7	0.7	3
	Dorvilleidae	2	0.1	0.1	2
	Eunicidae	1	0	0	1
	Flabelligeridae	1	0	0	1
	Glyceridae	37	1.8	1.8	11
	Goniadidae	35	1.7	1.7	7
	Hesionidae	3	0.1	0.1	1
	Lumbrineridae	77	3.7	3.7	14
	Magelonidae	2	0.1	0.1	1
	Maldanidae	38	1.8	1.8	3
	Nephtyidae	21	1	1	9
	Oenonidae	5	0.2	0.2	2
	Oligochaeta	196	9.3	9.3	13
	Onuphidae	5	0.2	0.2	3
	Opheliidae	71	3.4	3.4	10
	Oweniidae	1	0	0	1
	Paraonidae	45	2.1	2.1	10
	Pholoidae	2	0.1	0.1	2
	Pilargidae	8	0.4	0.4	1
	Polygordiidae	1	0	0	1
	Polynoidae	37	1.8	1.8	5
	Sabellariidae	1	0	0	1
	Scalibregmatidae	1	0	0	1
	Sigalionidae	116	5.5	5.5	16
	Sphaerodoridae	7	0.3	0.3	3
	Spionidae	101	4.8	4.8	8
	Syllidae	1	0	0	1
	Terebellidae	5	0.2	0.2	2
Arthropoda	Acari	1	0	0	1
	Ampeliscidae	282	13.4	13.4	9
	Aoridae	314	15	15	16
	Balanidae	1	0	0	1
	Bodotriidae	5	0.2	0.2	4
	Cancridae	10	0.5	0.5	6
	Caprellidae	1	0	0	1
	Chaetiliidae	3	0.1	0.1	2
	Cirolanidae	4	0.2	0.2	4
	Corophiidae	50	2.4	2.4	8
	Harpacticoida	3	0.1	0.1	2
	Haustoriidae	20	1	1	1
	Idoteidae	4	0.2	0.2	3
	Isaeidae	1	0	0	1
	Ischyroceridae	1	0	0	1
	Majidae	2	0.1	0.1	2
	Ostracoda	53	2.5	2.5	7
	Paguridae	12	0.6	0.6	8
	Panopeidae	1	0	0	1
	Phoxocephalidae	17	0.8	0.8	6
	Podoceridae	2	0.1	0.1	1
	Pontogeneiidae	1	0	0	1
	Pontoporeiidae	2	0.1	0.1	1
	Tanaissuidae	112	5.3	5.3	13
	Unciolidae	264	12.6	12.6	7
	Upogebiidae	5	0.2	0.2	2
Chordata	Branchiostomatidae	1	0	0	1
	Styelidae	2	0.1	0.1	1
Cnidaria	Actiniaria	6	0.3	0.3	4
	Ceriantharia	1	0	0	1
	Edwardsiidae	2	0.1	0.1	1
Echinodermata	Echinarachniidae	21	1	1	11
	Echinoidea	46	2.2	2.2	8
	Holothuroidea	16	0.8	0.8	2
	Synaptidae	27	1.3	1.3	3
Ectoprocta	Alcyonidiidae	2	0.1	0.1	1

Phylum	Family or LPTL	Abundance Across All Samples	Mean Abundance per 0.04 m^2	Median Abundance per 0.04 m^2	Frequency of Occurrence
	Cribrilinidae	1	0	0	1
	Electridae	3	0.1	0.1	3
	Hippothoidae	1	0	0	1
	Schizoporellidae	1	0	0	1
Foraminifera	Astrorhizidae	6	0.3	0.3	3
Mollusca	Arcidae	1	0	0	1
	Arcticidae	1	0	0	1
	Astartidae	23	1.1	1.1	10
	Bivalvia	16	0.8	0.8	6
	Calyptraeidae	40	1.9	1.9	7
	Cardiidae	3	0.1	0.1	3
	Columbellidae	10	0.5	0.5	2
	Epitoniidae	2	0.1	0.1	2
	Gastropoda	5	0.2	0.2	3
	Lyonsiidae	4	0.2	0.2	3
	Mactridae	137	6.5	6.5	13
	Mytilidae	62	3	3	7
	Nassariidae	22	1	1	10
	Naticidae	1	0	0	1
	Nuculidae	313	14.9	14.9	6
	Pandoridae	7	0.3	0.3	5
	Pectinidae	3	0.1	0.1	2
	Periplomatidae	18	0.9	0.9	10
	Pharidae	13	0.6	0.6	4
	Pleurobranchidae	1	0	0	1
	Pyramidellidae	19	0.9	0.9	4
	Tellinidae	25	1.2	1.2	5
	Veneridae	14	0.7	0.7	3
	Yoldiidae	5	0.2	0.2	2
Nematoda	Nematoda	8,025	382.1	382.1	21
Nemertea	Emplectonematidae	1	0	0	1
	Nemertea	13	0.6	0.6	5
Sipuncula	Golfingiidae	3	0.1	0.1	1
	Sipuncula	12	0.6	0.6	3
	Sipunculidae	8	0.4	0.4	1

Survey Year 2022

Grab samples were collected for benthic macroinvertebrate analysis from 10 sites along the potential Monmouth (LAR) ECC in 2022. The grab samples yielded a total of 2,144 individual macrofaunal organisms (per all ten 0.04 m^2 grab samples). Organisms collected in the Monmouth ECC were from 6 phyla, 52 families or LPTL, and 79 unique taxa identified to the LPTL (Table 3-22). Organisms from the phyla Annelida were most abundant across all samples, accounting for 82% of all identified organisms and were identified in every sample collected (Table 3-18). The majority of unique taxa identified were from the Annelida (40 unique taxa), Arthropoda (17 unique taxa), and Mollusca (16 unique taxa) phyla (Table 3-22).

No corals were identified in the Monmouth ECC, however, one organism collected belonging to Phylum Cnidaria was a sea anemone (*Edwardsia spp.*). No sea scallops nor ocean quahogs were collected during this sampling effort. Atlantic surfclams were collected at LAR-22-473, LAR-22-472, LAR-22-469, LAR-22-462, and LAR-22-420. No invasive tunicates (*Ascidiella aspersa*, *Botrylloides violaceus*, *Botryllus schlosseri*, *Didemnum vexillum*, *Diplosoma listerianum*, or *Styela clava*) or Chordates were confirmed present in the Monmouth ECC.

Density across the 10 benthic grab sites ranged from 37 organisms in LAR-22-452 to 684 organisms in LAR-22-420 (Table 3-23). The percent composition of each sample by phyla is shown in Figure 3-19, and abundance of unique taxa is presented in Table 3-24. The number of unique taxa represented in each sample ranged from 12 taxa at LAR-22-452 to 32 taxa at LAR-22-420.

Table 3-22. Survey year 2022. Phyla present in the 10 benthic grab samples collected along the Monmouth (LAR) export cable route.

Phyla	Abundant Taxonomic Groups (common names)	Density (Abundance per ten 0.04 m^2 samples)	Number of Families (or LPTL)	Number of LPTL
Annelida	Oligochaeta worms	1,763	19	40
Arthropoda	Amphipods	211	13	17
Cnidaria	Hydroid	1	1	1
Echinodermata	Sea urchins, sea cucumbers	57	3	3
Mollusca	Nut clams, Atlantic surfclam	106	14	16
Nemertea	Ribbon worms	6	2	2
Totals		**2,144**	**52**	**79**

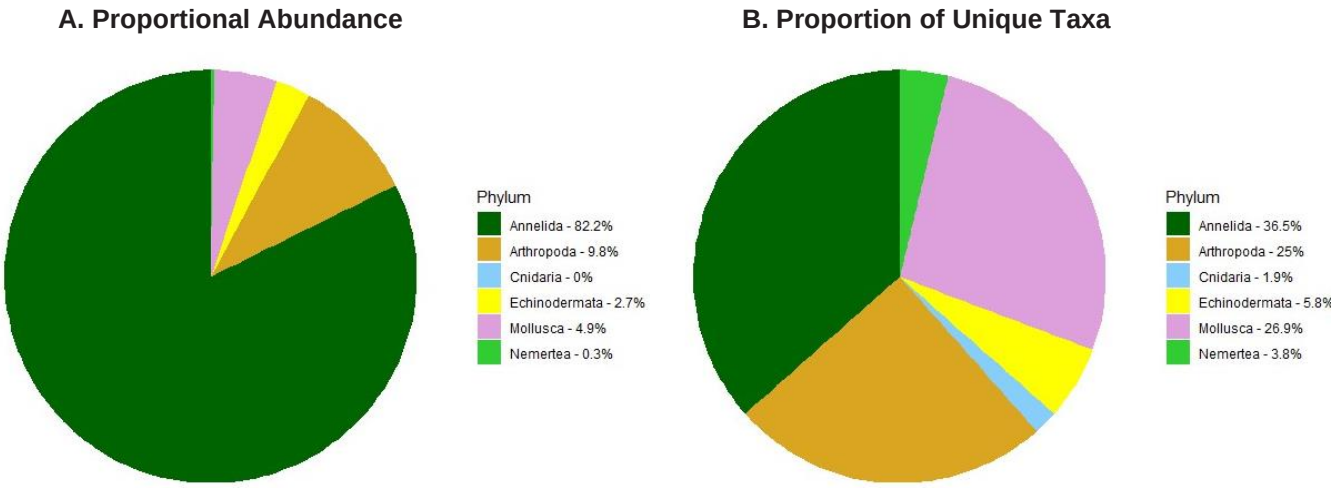


Figure 3-18. Survey year 2022. A) Proportional abundance and B) proportion of unique taxa (Family or LPTL) for each phylum collected in all benthic grab samples along the Monmouth (LAR) export cable route (ECC). Results presented as percentage of total.

Table 3-23. Survey year 2022. Abundance of each Phylum counted within each grab sample collected along the Monmouth (LAR) export cable corridor

Station	Annelida	Arthropoda	Chordata	Cnidaria	Echinodermata	Ectoprocta	Foraminifera	Mollusca	Nematoda	Nemertea	Sipuncula	Density (Abundance per 0.04 m^2)
LAR-22-420	629	27	0	1	8	0	0	19	0	0	0	684
LAR-22-433	17	85	0	0	15	0	0	10	0	0	0	127
LAR-22-452	15	10	0	0	9	0	0	3	0	0	0	37
LAR-22-457	88	15	0	0	10	0	0	18	0	0	0	131
LAR-22-459	491	7	0	0	13	0	0	8	0	0	0	519
LAR-22-462	143	9	0	0	0	0	0	11	0	3	0	166
LAR-22-464	98	26	0	0	0	0	0	5	0	0	0	129
LAR-22-469	62	18	0	0	1	0	0	9	0	0	0	90
LAR-22-472	86	13	0	0	1	0	0	13	0	0	0	113
LAR-22-473	134	1	0	0	0	0	0	10	0	3	0	148
Total	**1763**	**211**	**0**	**1**	**57**	**0**	**0**	**106**	**0**	**6**	**0**	**2144**

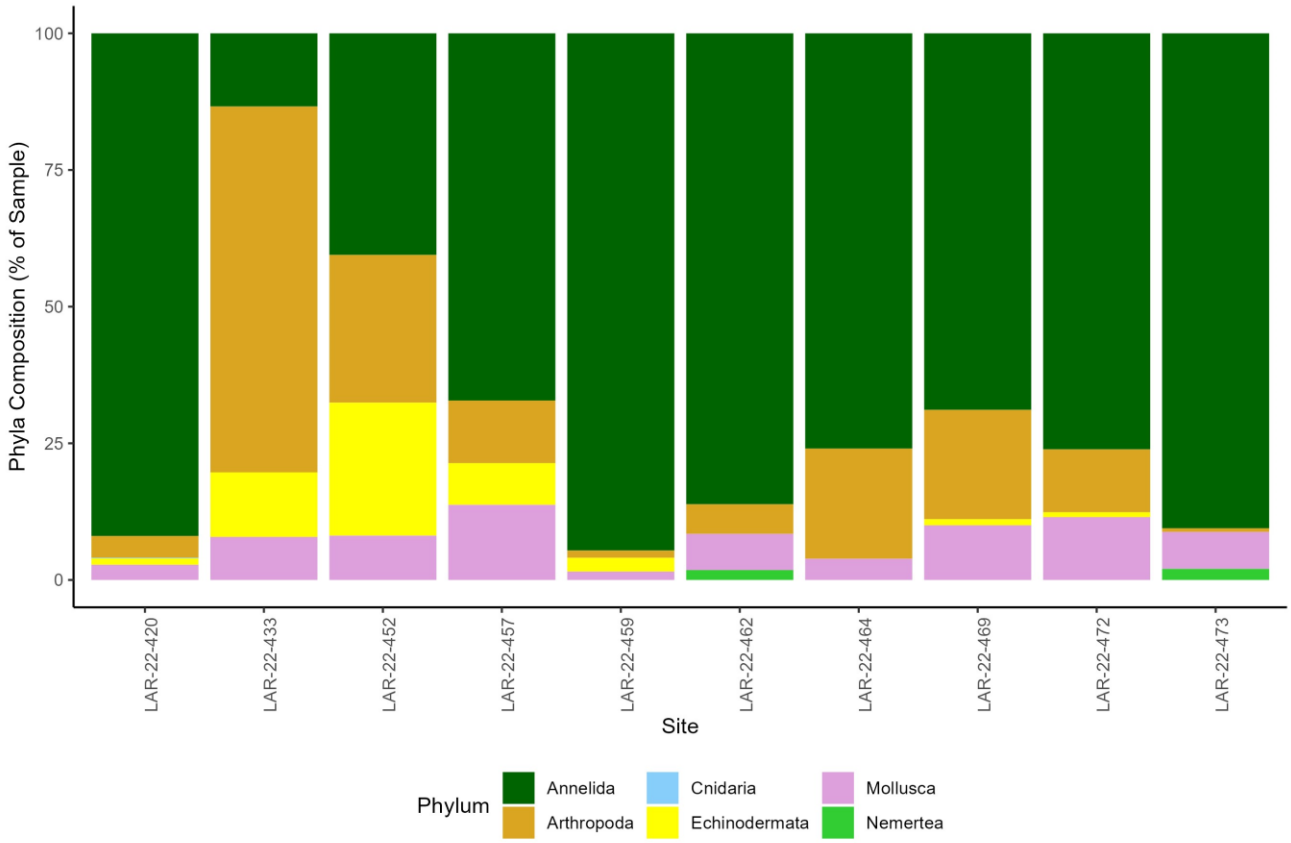


Figure 3-19. Survey year 2022. Percent composition of organisms in each represented phylum for the 10 benthic grab samples in the Monmouth Export Cable Corridor

Table 3-24. Survey year 2022. Mean density and frequency of occurrence of each phyla and taxa (LPTL) across all samples collected along the Monmouth (LAR) export cable corridor (ECC) (continued on next pages).

Phylum	Family or LPTL	Abundance Across All Samples	Mean Abundance per 0.04 m^2	Median Abundance per 0.04 m^2	Frequency of Occurrence
Annelida	Cirratulidae	33	1.1	2	7
	Dorvilleidae	1	0	0	1
	Eunicidae	1	0	0	1
	Glyceridae	38	1.2	1	7
	Goniadidae	67	2.2	2.5	5
	Lumbrineridae	25	0.8	1.5	8
	Maldanidae	2	0.1	0	2
	Nephtyidae	21	0.7	2	7
	Oligochaeta	251	8.1	10	9
	Opheliidae	1	0	0	1
	Paraonidae	10	0.3	0	4
	Phyllodocidae	58	1.9	2.5	6
	Polygordiidae	1006	32.5	11	9
	Polynoidae	4	0.1	0	3
	Sigalionidae	12	0.4	0	4
	Sphaerodoridae	1	0	0	1
	Spionidae	184	5.9	0.5	5
	Syllidae	37	1.2	3	7
	Terebellidae	11	0.4	0	4

Phylum	Family or LPTL	Abundance Across All Samples	Mean Abundance per 0.04 m^2	Median Abundance per 0.04 m^2	Frequency of Occurrence
Arthropoda	Ampeliscidae	1	0	0	1
	Aoridae	33	1.1	0.5	5
	Bodotriidae	1	0	0	1
	Caridea	1	0	0	1
	Chaetiliidae	8	0.3	0	3
	Diastylidae	1	0	0	1
	Hyalellidae	1	0	0	1
	Idoteidae	2	0.1	0	1
	Paguridae	2	0.1	0	2
	Phoxocephalidae	6	0.2	0	3
	Pontoporeiidae	2	0.1	0	2
	Tanaissuidae	75	2.4	6.5	10
	Unciolidae	78	2.5	0	4
Cnidaria	Edwardsiidae	1	0	0	1
Echinodermata	Echinarachniidae	40	1.3	2.5	5
	Echinoidea	16	0.5	0.5	5
	Loveniidae	1	0	0	1
Mollusca	Astartidae	22	0.7	1.5	7
	Bivalvia	14	0.5	1	7
	Cardiidae	2	0.1	0	2
	Ischnochitonidae	1	0	0	1
	Lyonsiidae	1	0	0	1
	Mactridae	21	0.7	1	5
	Mytilidae	1	0	0	1
	Nassariidae	3	0.1	0	3
	Naticidae	3	0.1	0	2
	Nuculidae	8	0.3	0	2
	Pandoridae	3	0.1	0	3
	Periplomatidae	20	0.6	0	4
	Solenidae	3	0.1	0	1
	Tellinidae	4	0.1	0	4
Nemertea	Carinomidae	3	0.1	0	1
	Nemertea	3	0.1	0	1

3.2.3.2 Monmouth (LAR) Richness, Diversity, and Evenness

Survey Year 2020

Mean density was 522 organisms per station, averaged across 21 stations in Monmouth (LAR) ECC. The richness of organisms collected at each grab sample location ranged from 1.51 at LAR-20-016 to 5.52 at LAR-20-014, with an average richness of 3.25. Average diversity across the individual grab samples was 1.21 with a range from 0.20 at LAR-20-006 to 1.87 at LAR-20-005. Evenness across the samples ranged from 0.07 at LAR-20-006 to 0.75 at LAR-20-005 (Table 3-25 and Figure 3-20).

Table 3-25. Survey year 2020. Community composition parameters calculated for each grab sample station along the Monmouth (LAR) export cable corridor (ECC).

Station	Density (Abundance per 0.04 m^2)	Number of LPTLs	Number of Families (or LPTL)	Ecological Indices		
				Richness	Diversity	Evenness
LAR-20-002	665	35	30	4.46	1.60	0.47
LAR-20-004	328	16	16	2.59	0.77	0.28
LAR-20-005	69	13	12	2.60	1.87	0.75
LAR-20-006	1,265	19	17	2.24	0.20	0.07
LAR-20-008	600	35	27	4.06	1.66	0.50
LAR-20-010	155	14	14	2.58	1.04	0.39
LAR-20-011	406	13	13	2.00	1.13	0.44
LAR-20-012	372	24	23	3.72	1.03	0.33
LAR-20-014	565	40	36	5.52	1.22	0.34
LAR-20-016	102	8	8	1.51	0.78	0.38
LAR-20-018	794	20	18	2.55	0.82	0.28
LAR-20-020	1,541	28	25	3.27	0.50	0.15
LAR-20-021	840	34	28	4.01	1.51	0.45
LAR-20-022	498	19	18	2.74	1.34	0.46
LAR-20-024	669	30	24	3.54	1.56	0.49
LAR-20-026	184	19	18	3.26	1.75	0.61
LAR-20-028	649	18	18	2.63	0.54	0.19
LAR-20-030	321	25	24	3.99	1.51	0.48
LAR-20-031	161	15	13	2.36	1.31	0.51
LAR-20-032	179	19	19	3.47	1.71	0.58
LAR-20-037	603	36	34	5.15	1.55	0.44

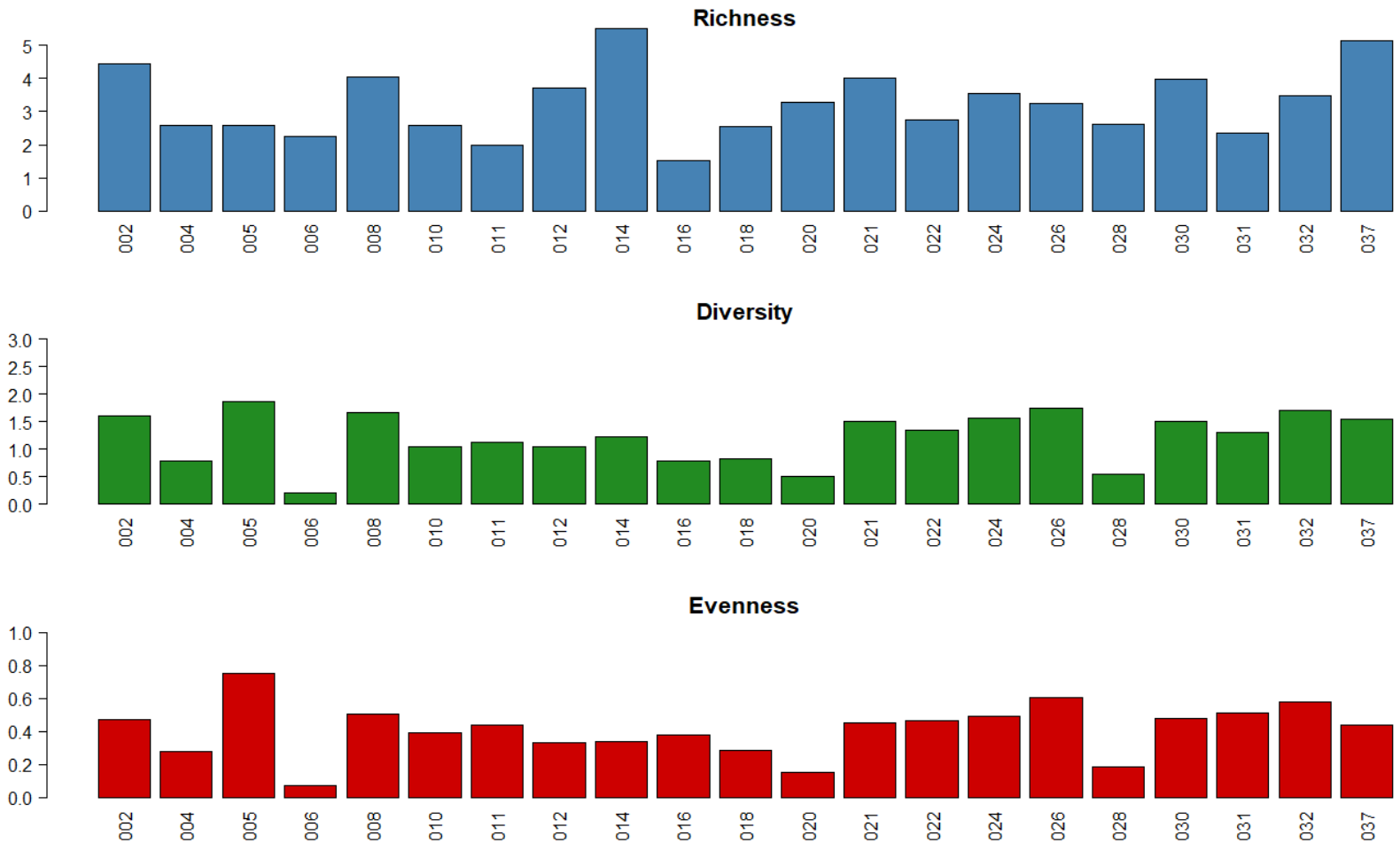


Figure 3-20. Survey year 2020. Ecological index values calculated for each sample station collected along the Monmouth (LAR) cable route

Survey Year 2022

Mean density was 214 organisms per station, averaged across 10 stations in Monmouth (LAR) ECC. The richness of organisms collected at each grab sample location ranged from 2.24 at LAR-22-459 to 4.51 at LAR-22-457, with an average richness of 3.44. Average diversity across the individual grab samples was 1.80 with a range from 1.11 at LAR-22-459 to 2.44 at LAR-22-469. Evenness across the samples ranged from 0.35 at LAR-22-420 to 0.86 at LAR-22-469, with an average evenness of 0.63 (Table 3-26 and Figure 3-21).

Table 3-26. Survey year 2022. Community composition parameters calculated for each grab sample station along the Monmouth (LAR) export cable corridor (ECC).

Station	Density (Abundance per 0.04 m^2)	Number of LPTLs	Number of Families (or LPTL)	Ecological Indices		
				Richness	Diversity	Evenness
LAR-22-420	684	27	32	3.98	1.15	0.35
LAR-22-433	127	22	23	4.34	1.92	0.62
LAR-22-452	37	11	12	2.77	2.04	0.85
LAR-22-457	131	23	24	4.51	2.42	0.77
LAR-22-459	519	15	17	2.24	1.11	0.41
LAR-22-462	166	19	19	3.52	1.45	0.49
LAR-22-464	129	13	14	2.47	1.58	0.62
LAR-22-469	90	17	20	3.56	2.44	0.86
LAR-22-472	113	18	20	3.60	1.92	0.66
LAR-22-473	148	18	20	3.40	1.96	0.68

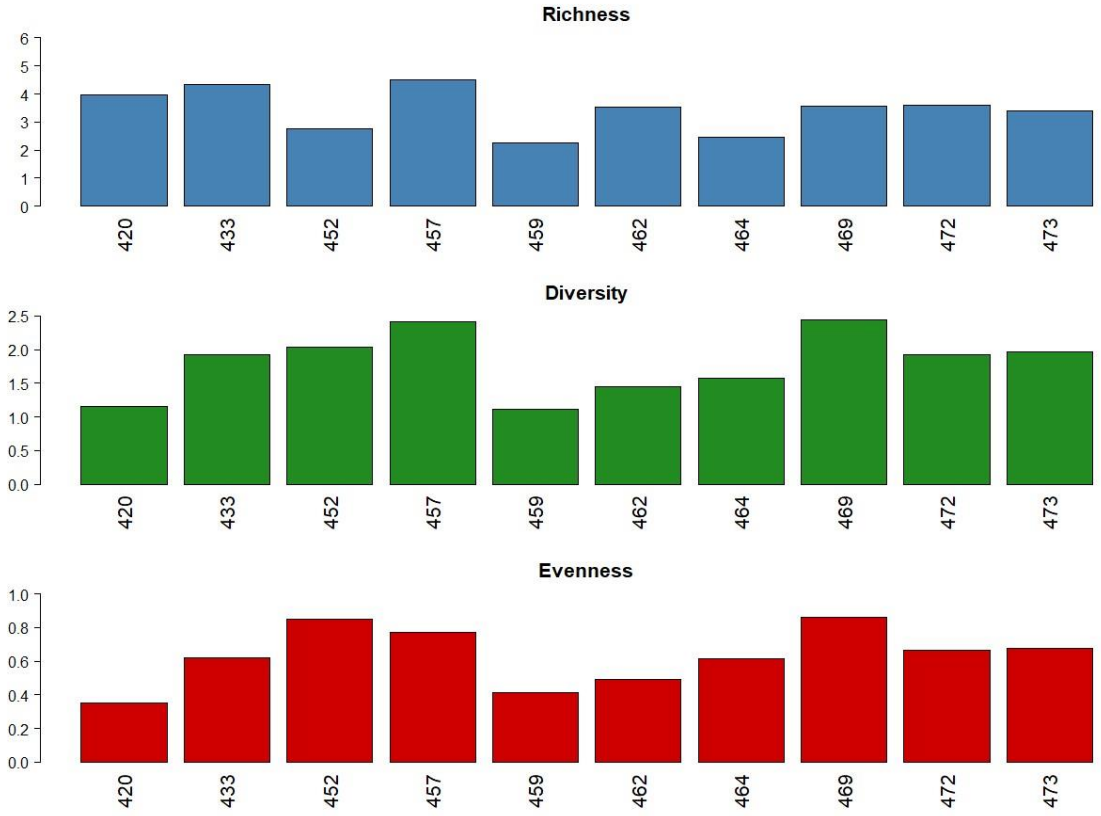


Figure 3-21. Survey year 2022. Ecological index values calculated for each sample station collected along the Monmouth (LAR) cable route

3.3 Multivariate Analysis

Due to differences in laboratory analysis methods, the following analysis was based solely on the grab data collected in 2020. The NMDS analysis and Bray-Curtis Similarity Index produced a stress value of 0.19, indicating a moderately good fit of the data in the ordination. After color-coding sample stations based on their NMFS (2020) modified CMECS classifications, sample stations formed loose apparent groupings corresponding to some of the CMECS classifications, including gravelly muddy sand and fine/very fine sand (Figure 3-22). The NMDS ordination plot color-coded by sample location within the Offshore Project Area indicated that the invertebrate assemblages of samples located along the two cable routes are highly dissimilar, represented by the wide spacing and loose clustering of sample points with each group (Figure 3-23). The invertebrate assemblages of samples collected in the NLA appear loosely clustered in the upper-right quadrant of the ordination plot, indicating that samples from the Northern Lease Area (NLA) are generally more similar to other samples collected in that area than to samples collected in other portions of the Offshore Project Area. Alternatively, samples collected in the WTA are widely dispersed and overlap multiple other sample locations, indicating no distinct similarity in the macroinvertebrate assemblages collected within the WTA.

Three stations (CAR-20-212, LAR-20-037, and OCS-20-172) from two substrate types (muddy sand and muddy sandy gravel) were removed from SIMPER and ANOSIM analyses and results based on CMECS substrate groupings because of limited intragroup variability between samples (<3 samples per substrate type). Based on ANOSIM global test results, the null hypothesis that similarity of invertebrate assemblages between NMFS CMECS groups is greater than or equal to the similarity within NMFS CMECS groups was rejected (R value = 0.30 and significance level p = 0.001). In other words, there is evidence that the assemblages within samples are more similar to other samples within the same NMFS CMECS substrate type than to other substrate types. The second null hypothesis that benthic invertebrate assemblages between sample location groups is greater than or equal to the similarity within location groups was rejected (R value = 0.28 and significance level p = 0.001). Although both models indicated significance, the within vs. between group relationships are only moderate in strength as indicated by the low- to mid-range R values of 0.30 and 0.28. Therefore, both CMECS classification and sample location can only explain a portion of the variance of assemblages displayed between sites.

The SIMPER analysis provided pairwise insight as to which NMFS CMECS groups and sample locations are more dissimilar to each other. According to the SIMPER results for NMFS CMECS groups, fine/very fine sand and sandy gravel are the substrate component pair with the least similar invertebrate assemblages, largely because of differences in Nematoda, Ampeliscidae, and Haustoriidae abundances (Table 3-27). The varying abundances of organisms belonging to the families (or LPTL) Nematoda, Tanaissuidae, Nuculidae, Haustoriidae, Aoridae and Echinoidea were the largest drivers of dissimilarity between pairs of CMECS substrate components. Invertebrate assemblages from samples with fine/very fine sand consistently had the highest dissimilarity to the other CMECS classifications, especially those with gravel components. Results from the SIMPER analysis based on sample location

indicated that benthic invertebrate assemblages from samples collected along the Monmouth and Atlantic ECCs were most dissimilar (75%) to each other, with abundances of organisms in the families (or LPTL) Nematoda, Haustoriidae, Aoridae driving much of the dissimilarity (Table 3-28). Benthic invertebrate assemblages from samples collected in the WTA and the NLA were most similar to each other.

To summarize the multivariate results, both the NMFS CMECS substrate component type and sample location classifications are reasonable grouping systems for predicting what invertebrate assemblages may be present at a given station, based on 2020 data. However, the predictive power varied by grouping, as displayed by cluster patterns in the NMDS plots. For instance, although there was some dissimilarity (wide spacing of points in NMDS plot) in the invertebrate assemblages in samples classified as fine/very fine sand, it is clear from the NMDS and SIMPER results that the assemblages were more similar to each other than to those in other substrate groupings (Figure 3-22;Table 3-27). In contrast, there is a high level of overlap (more similarity) between the invertebrate assemblages observed in samples collected in medium sand and sandy gravel substrates. Location of samples within the Offshore Project Area and NLA showed slightly less power in predicting benthic invertebrate assemblages according to the ANOSIM global test results, as there is high overlap (similarity) between the invertebrate assemblages in samples collected in the WTA and NLA. However, there was a high degree of dissimilarity between the assemblages from samples collected in the two ECCs, which had the largest spatial distance within the Offshore Project Area and NLA (Figure 3-23; Table 3-28).

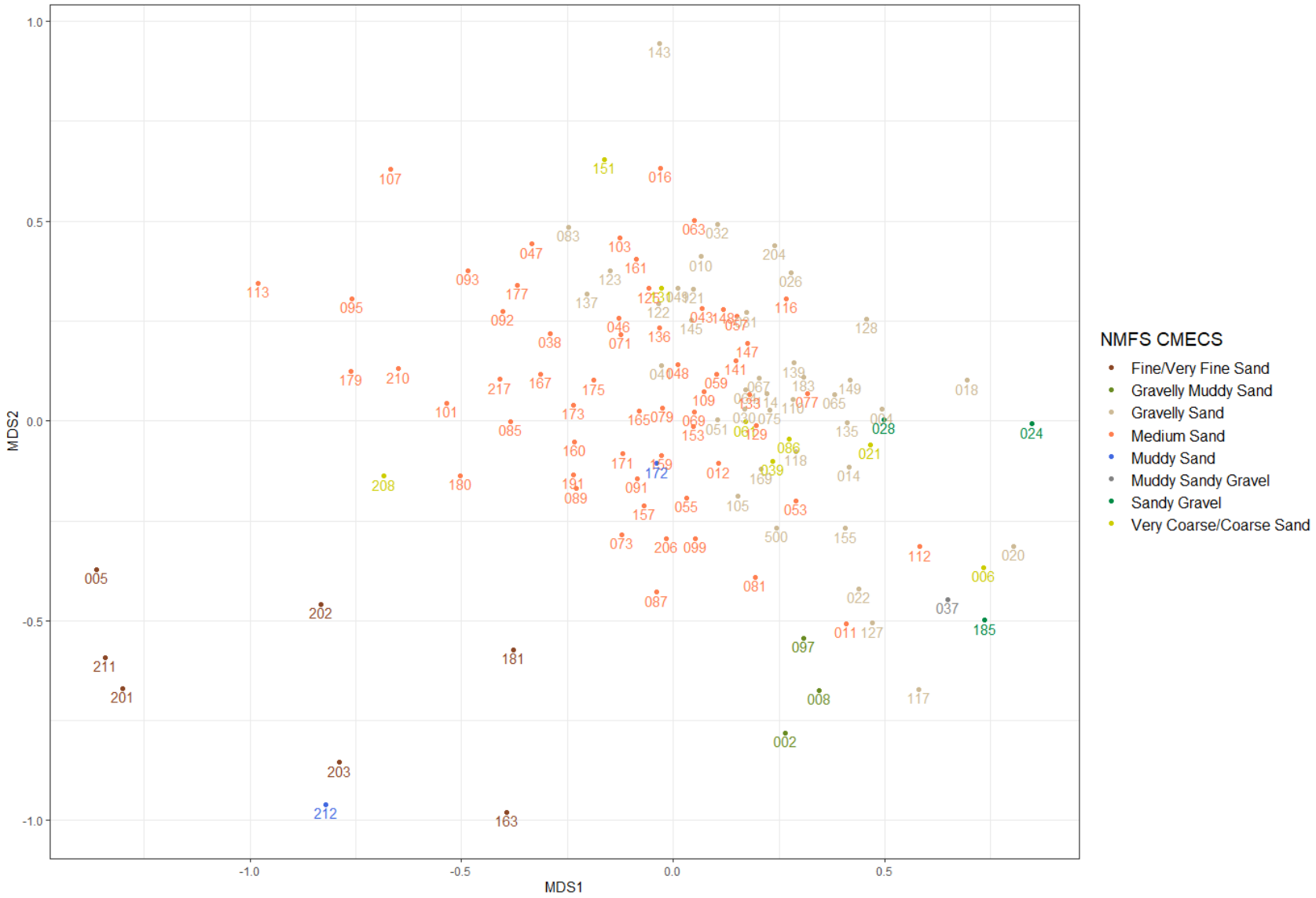


Figure 3-22. NMDS plot of Bray-Curtis similarities of square-root transformed taxonomic abundances at each station sampled in 2020. Points are color-coded based on NMFS (2020) modified CMECS substrate component types.

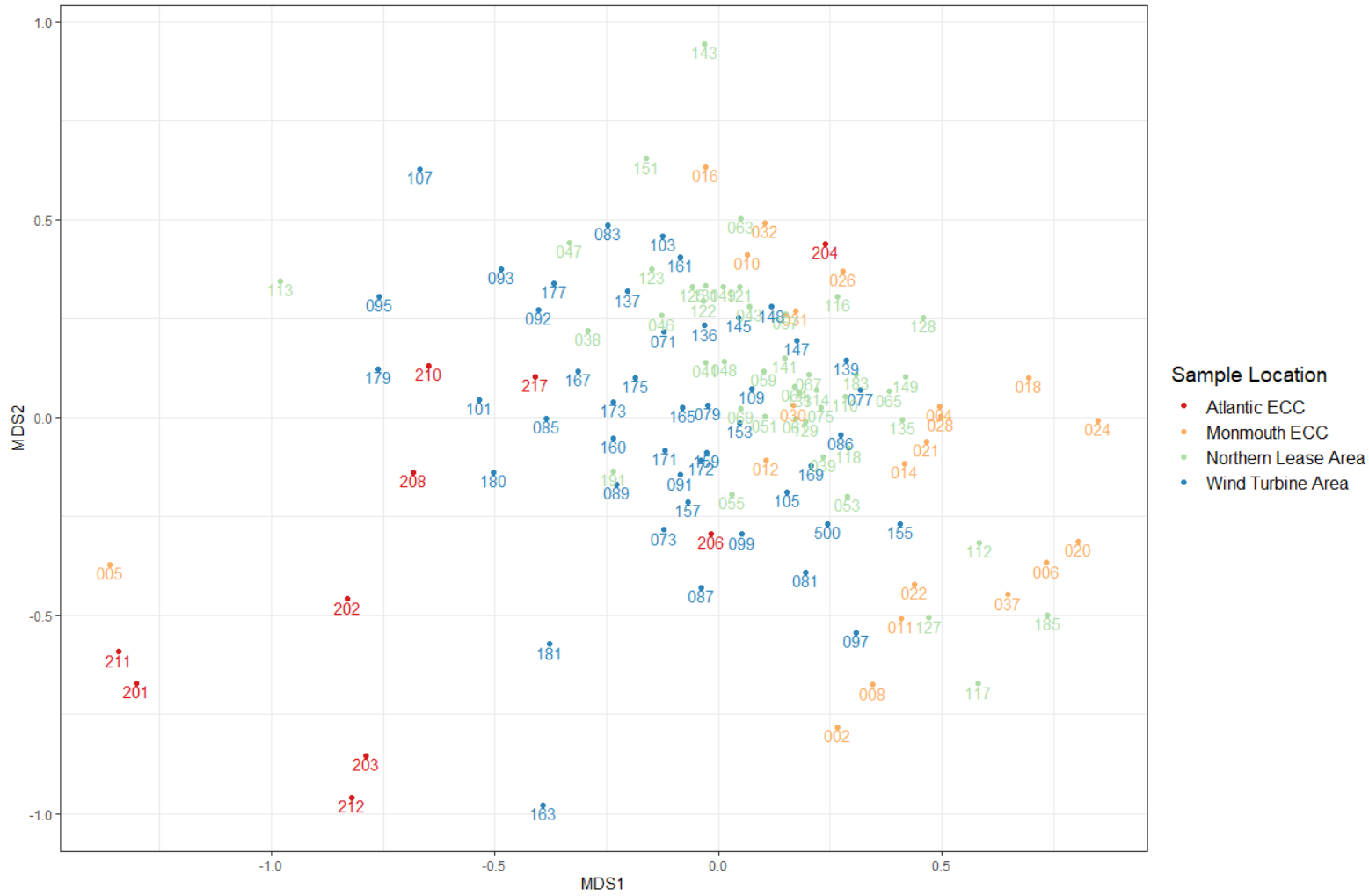


Figure 3-23. NMDS plot of Bray-Curtis similarities of square-root transformed taxonomic abundances at each station sampled in 2020. Points are color-coded based on sample station location…

Table 3-27. SIMPER results presenting the dissimilarity of community compositions between NMFS (2020) modified CMECS substrate types based on 2020 data.

Substrate Type (A)	Substrate Type (B)	Bray-Curtis Dissimilarity	Dissimilar Taxa[1]	% Contribution
Fine/ Very Fine Sand	Sandy Gravel	87%	Nematoda	26%
			Ampeliscidae	8%
			Haustoriidae	6%
Fine/ Very Fine Sand	Gravelly Sand	80%	Nematoda	20%
			Haustoriidae	8%
			Tanaissuidae	4%
Fine/ Very Fine Sand	Very Coarse/ Coarse Sand	78%	Nematoda	22%
			Haustoriidae	9%
			Ostracoda	3%
Fine/ Very Fine Sand	Medium Sand	76%	Nematoda	15%
			Haustoriidae	9%
			Tanaissuidae	5%
Fine/ Very Fine Sand	Gravelly Muddy Sand	76%	Nematoda	23%
			Nuculidae	9%
			Haustoriidae	6%
Medium Sand	Gravelly Muddy Sand	68%	Nematoda	13%
			Nuculidae	11%
			Aoridae	4%
Medium Sand	Sandy Gravel	67%	Nematoda	19%
			Ampeliscidae	9%
			Aoridae	5%
Very Coarse/ Coarse Sand	Gravelly Muddy Sand	65%	Nematoda	13%
			Nuculidae	11%
			Aoridae	4%
Gravelly Sand	Gravelly Muddy Sand	63%	Nuculidae	11%
			Nematoda	11%
			Ostracoda	4%
Very Coarse/ Coarse Sand	Sandy Gravel	61%	Nematoda	17%
			Ampeliscidae	9%
			Aoridae	5%
Gravelly Muddy Sand	Sandy Gravel	60%	Nuculidae	10%
			Ampeliscidae	8%
			Nematoda	7%
Medium Sand	Very Coarse/ Coarse Sand	58%	Nematoda	18%
			Unciolidae	5%
			Tanaissuidae	4%
Gravelly Sand	Sandy Gravel	58%	Nematoda	16%
			Ampeliscidae	10%
			Aoridae	4%
Gravelly Sand	Medium Sand	56%	Nematoda	15%
			Tanaissuidae	5%
			Echinoidea	4%
Gravelly Sand	Very Coarse/ Coarse Sand	56%	Nematoda	19%
			Tanaissuidae	4%
			Aoridae	4%

Table 3-28. SIMPER results presenting the dissimilarity of community compositions between sample locations (WTA, NLA, Monmouth ECC, and Atlantic ECC) based on 2020 data.

Location (A)	Location (B)	Bray-Curtis Dissimilarity	Dissimilar Taxa[1]	% Contribution
Atlantic ECC	Monmouth ECC	75%	Nematoda	18%
			Haustoriidae	7%
			Aoridae	4%
Atlantic ECC	Northern Lease Area	71%	Nematoda	16%
			Haustoriidae	8%
			Tanaissuidae	5%
Atlantic ECC	Wind Turbine Area	68%	Nematoda	16%
			Haustoriidae	8%
			Tanaissuidae	5%
Monmouth ECC	Wind Turbine Area	63%	Nematoda	15%
			Aoridae	4%
			Tanaissuidae	4%
Monmouth ECC	Northern Lease Area	59%	Nematoda	15%
			Aoridae	5%
			Tanaissuidae	4%
Northern Lease Area	Wind Turbine Area	56%	Nematoda	15%
			Tanaissuidae	5%
			Echinoidea	4%

3.4 Visual Analysis and CMECS Classifications

The following section describes imagery recorded with a video camera affixed to the grab sampler operated by Fugro and images of the grab sample contents once on deck. According to Fugro's records from both the 2020 and 2022 surveys, sand dollars were the most common benthic species observed with presence at 93 of the 157 sampling stations. Sea robins were the most commonly observed fish with presence at 41 sampling stations. Other observed species include crabs, hermit crabs, scallops, hakes, shrimp, squid, nudibranchs, anemones, sea stars, elasmobranch egg cases, and squid eggs. Presence of algae or plant-like animals (macroalgae, sea grass, hydrozoans) were recorded at four stations (LAR-20-037, LAR-20-031, LAR-20-021, OCS-20-185, Figure 2-1). Presence of sand mounds or ripples were noted at 58 sample stations, with one occurrence (OCS-20-183) identified as possible evidence of fishing activity. No instances of derelict fishing gear, military expended materials, shipwrecks, or other anthropogenic debris were noted.

Overall, the geologic-origin substrate in most of the images was generally composed of sand that ranged in relief from flat to sand waves or mounds with 95 stations noted to contain some degree of shell debris. Shell debris can impact the classification of habitat because sediment grain size analyses will classify any gravel-sized shell debris as "gravel" component, which in the CMECS standards implies geologic origin. RPS reviewed the last 15 seconds of each GrabCam video snippet to discern whether the gravel component of a grab sample may have contained substantial amounts of shell. Only two sites in the OCS region (OCS-20-151 and OCS-20-128) and two sites along the Monmouth ECC (LAR-22-469 and LAR-22-464) appeared to have a large percent cover of shell debris near the grab sample location, but not large enough to conclude that the sample should have been classified as biogenic origin from shell cover rather than of geological origin. Thus, NMFS (2020) modified CMECS classifications were assigned to each grab sample station based primarily on laboratory analysis of sediment grain size.

CMECS classifications for each grab sample are displayed in Figure 3-24 to Figure 3-27 and mapped in Figure 3-28. Substrate classification results are presented as a hierarchy in Table 3-29, Table 3-30, Table 3-31, and Table 3-32 for WTA, NLA, Monmouth ECC, and Atlantic ECC project regions, respectively. Site locations and CMECS classifications are combined with key findings summarized from the Fugro field/video review records and presented in Appendix A – Grab Sample Site Locations, CMEC Classifications, and Key Findings from Field/Video Review Records. Representative images from the GrabCam video snippets along with images of the grab sampler aboard the ship are displayed in a table along with the CMECS classification and complex habitat designation for ease of reference in Appendix B – Representative GrabCam and Grab Sampler Images with Associated CMECs Classifications. A table with field and GrabCam video review notes as provided directly by Fugro is available in Appendix C – Fugro Field and GrabCam Video Notes.

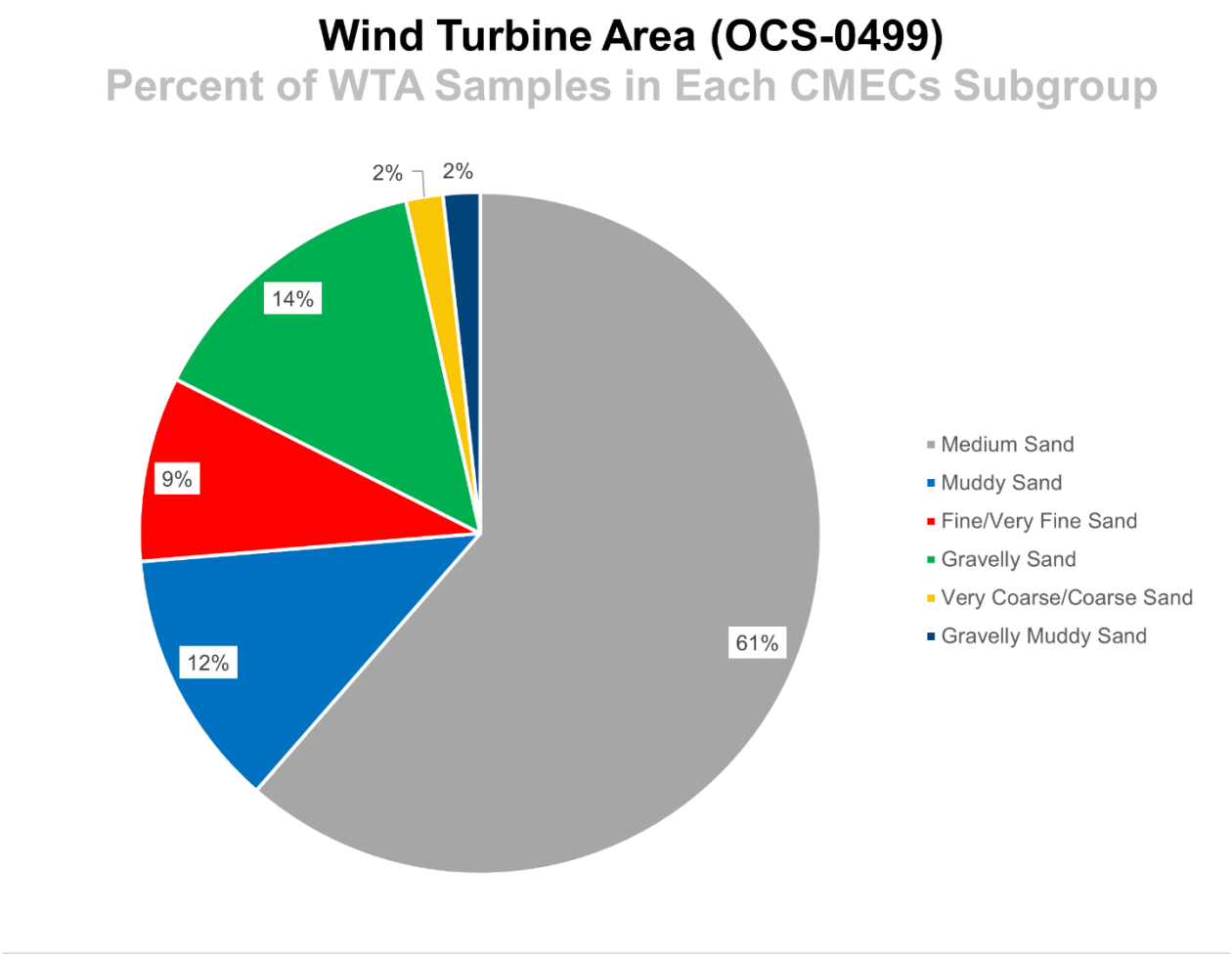


Figure 3-24. Percent of benthic grab samples in the WTA project area classified into CMECS geologic subgroups based on the laboratory grain size analysis for 2020 and 2022 samples.

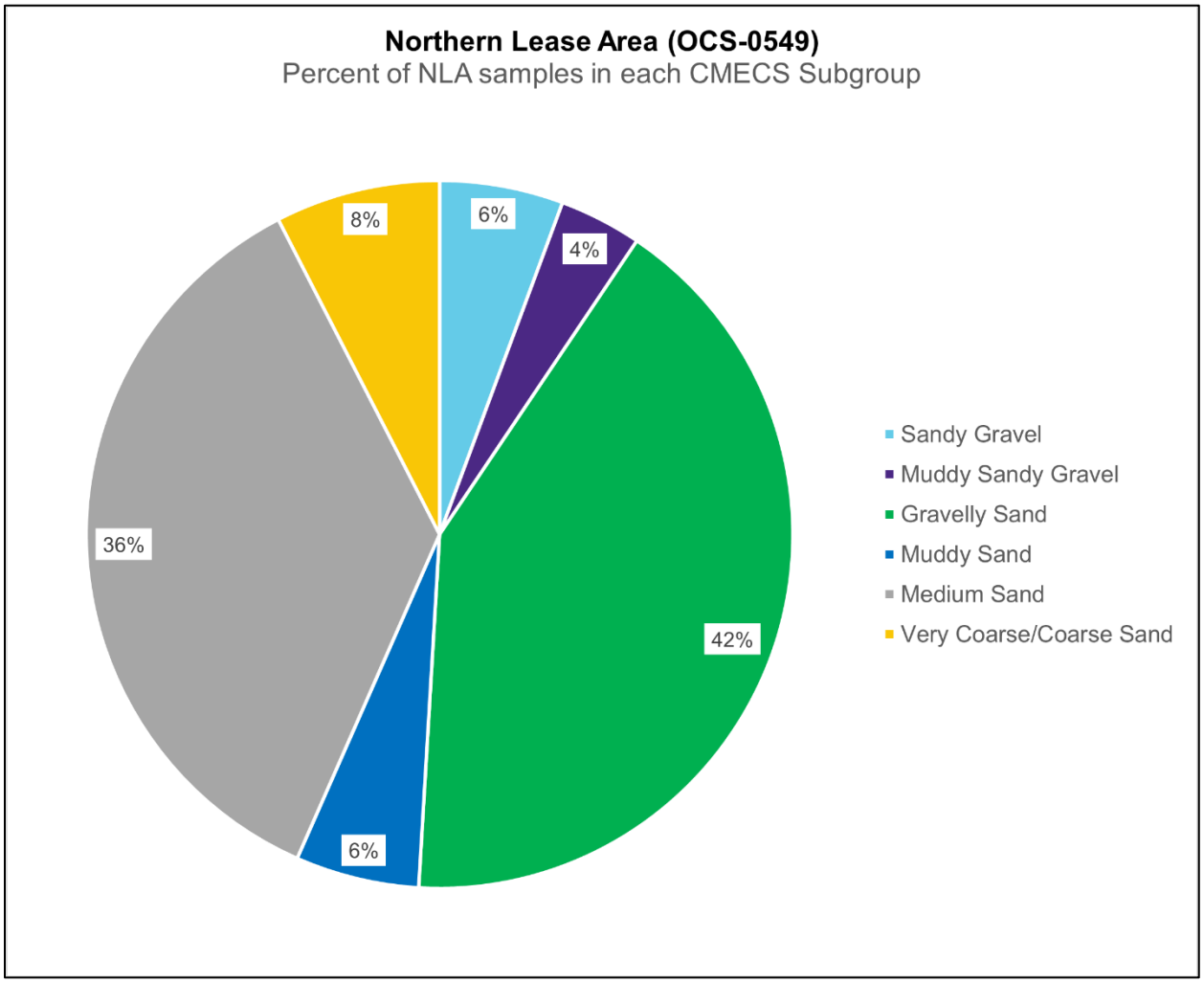


Figure 3-25. Percent of benthic grab samples in the NLA area classified into CMECS geologic subgroups based on the laboratory grain size analysis for 2020 and 2022 samples.

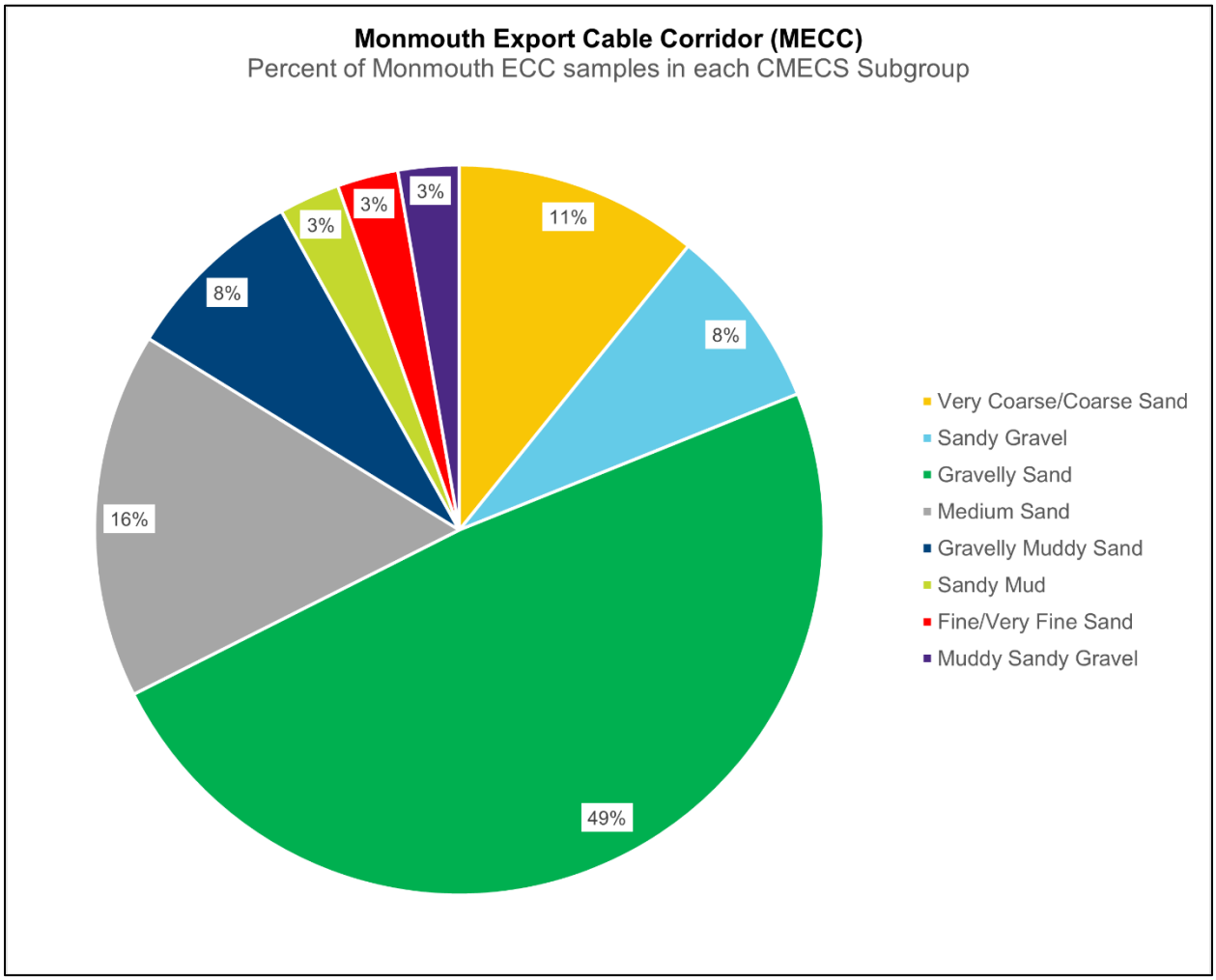


Figure 3-26. Percent of benthic grab samples in the Monmouth ECC project area classified into CMECS geologic subgroups based on the laboratory grain size analysis for 2020 and 2022 samples.

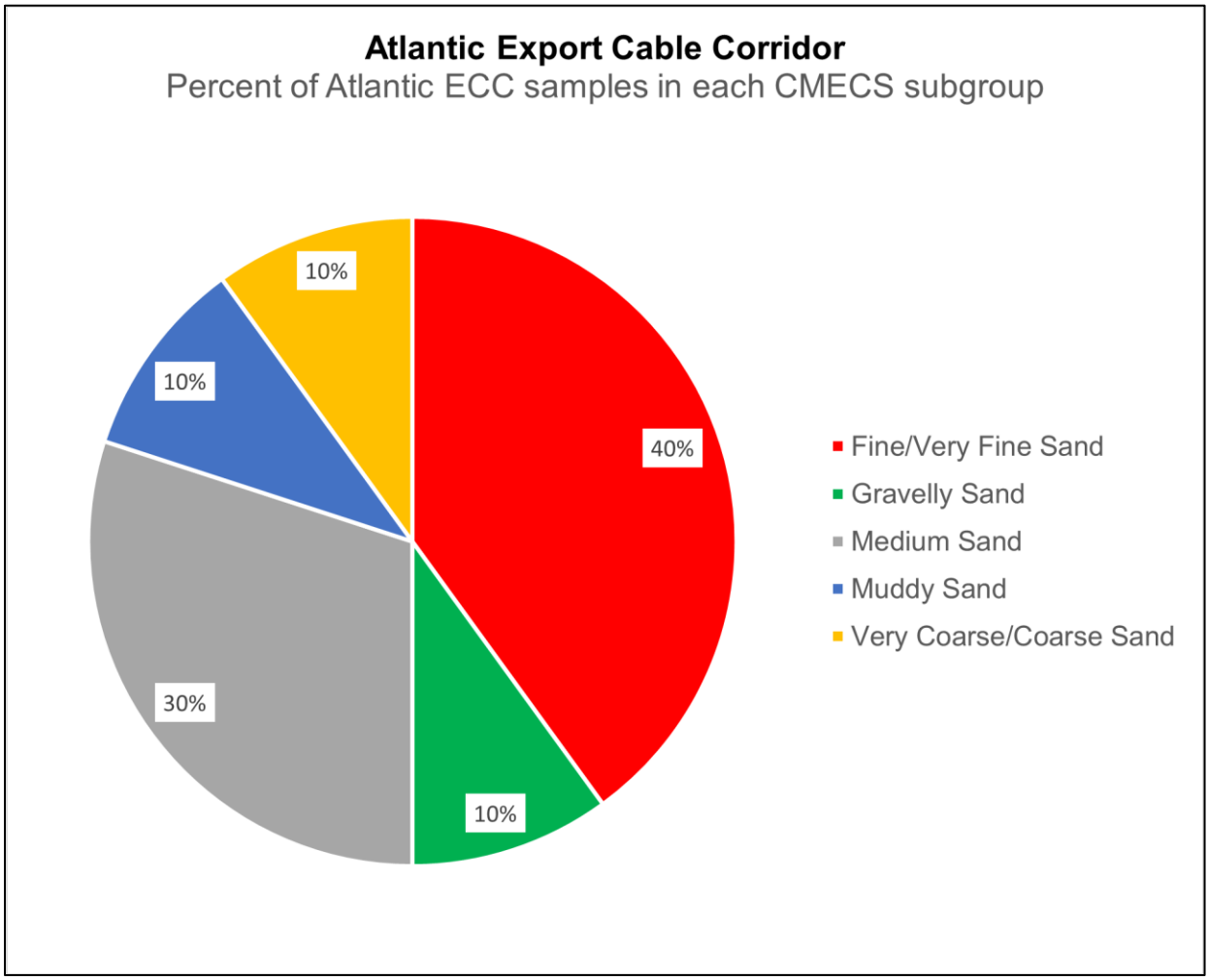
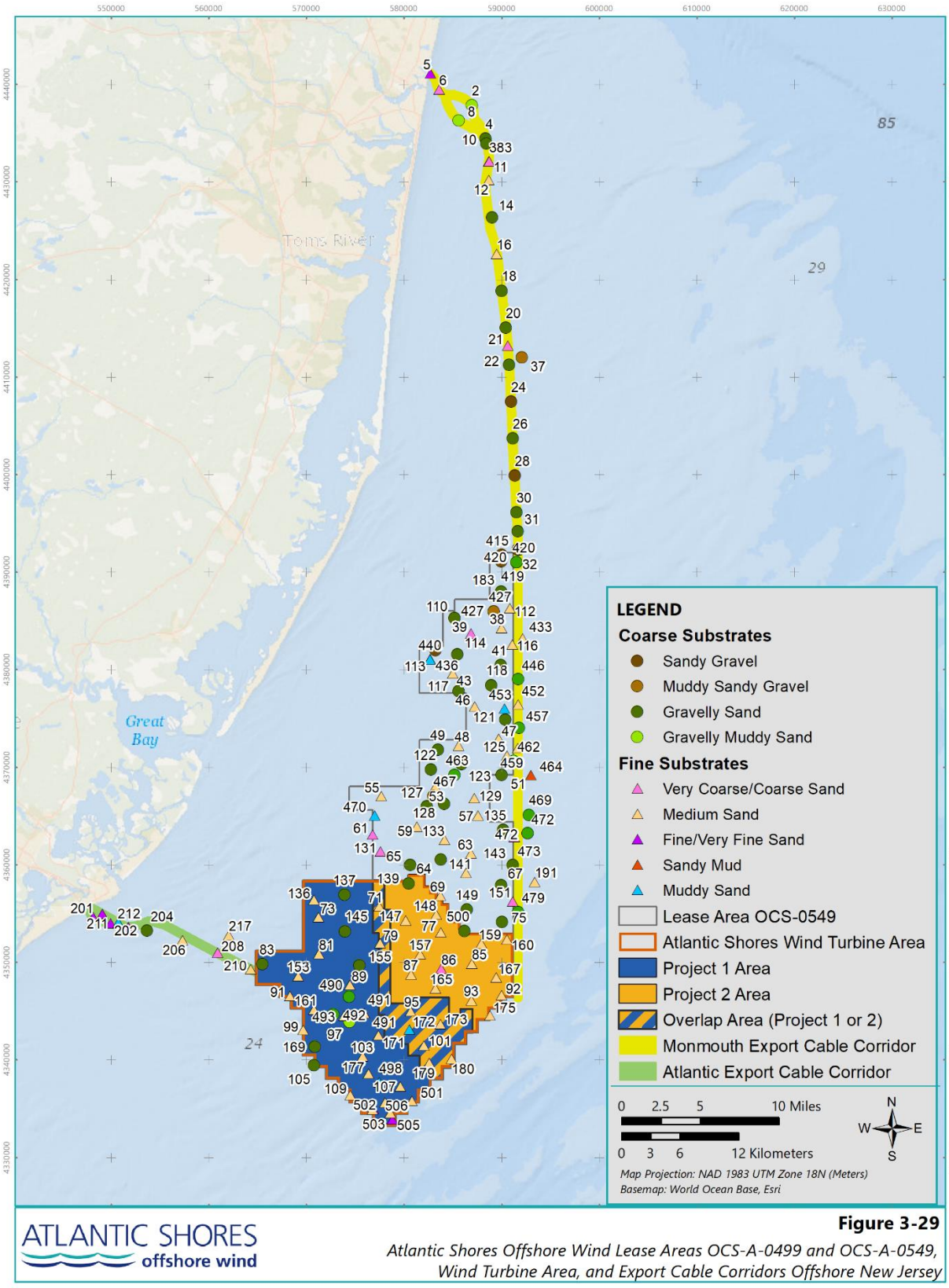


Figure 3-27. Percent of benthic grab samples in the Atlantic ECC project area classified into CMECS geologic subgroups based on the laboratory grain size analysis for 2020 samples.



ATLANTIC SHORES offshore wind

Figure 3-29

Atlantic Shores Offshore Wind Lease Areas OCS-A-0499 and OCS-A-0549, Wind Turbine Area, and Export Cable Corridors Offshore New Jersey

Figure 3-28. Benthic grab stations in the Atlantic Shores Offshore Wind Project Area and NLA classified into CMECS geologic subgroups based on the laboratory grain size analysis

Table 3-29. CMECS hierarchical classification of substrates collected at each grab station over both years within the WTA region.

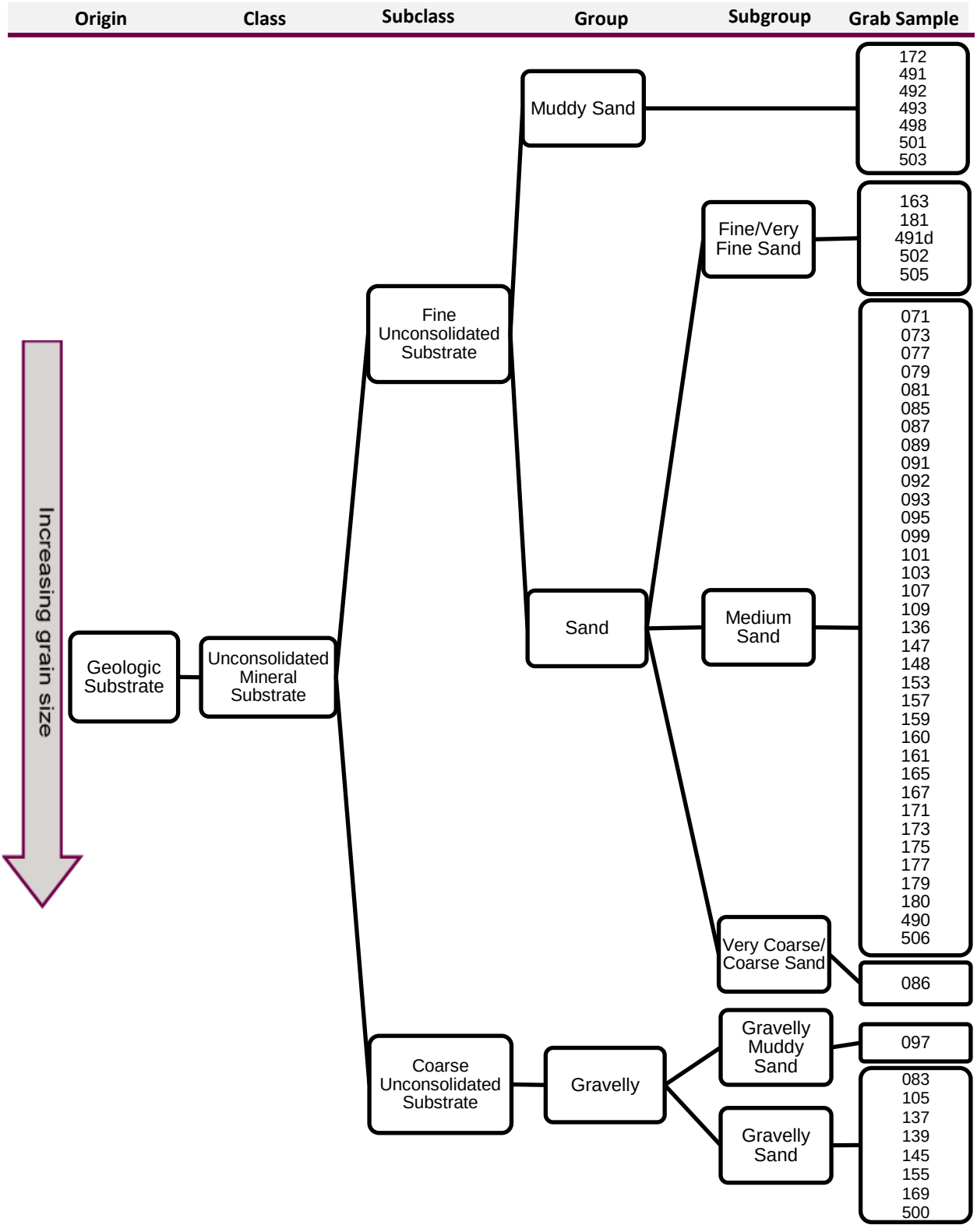


Table 3-30. CMECS hierarchical classification of substrates collected at each grab station over both years within the NLA region.

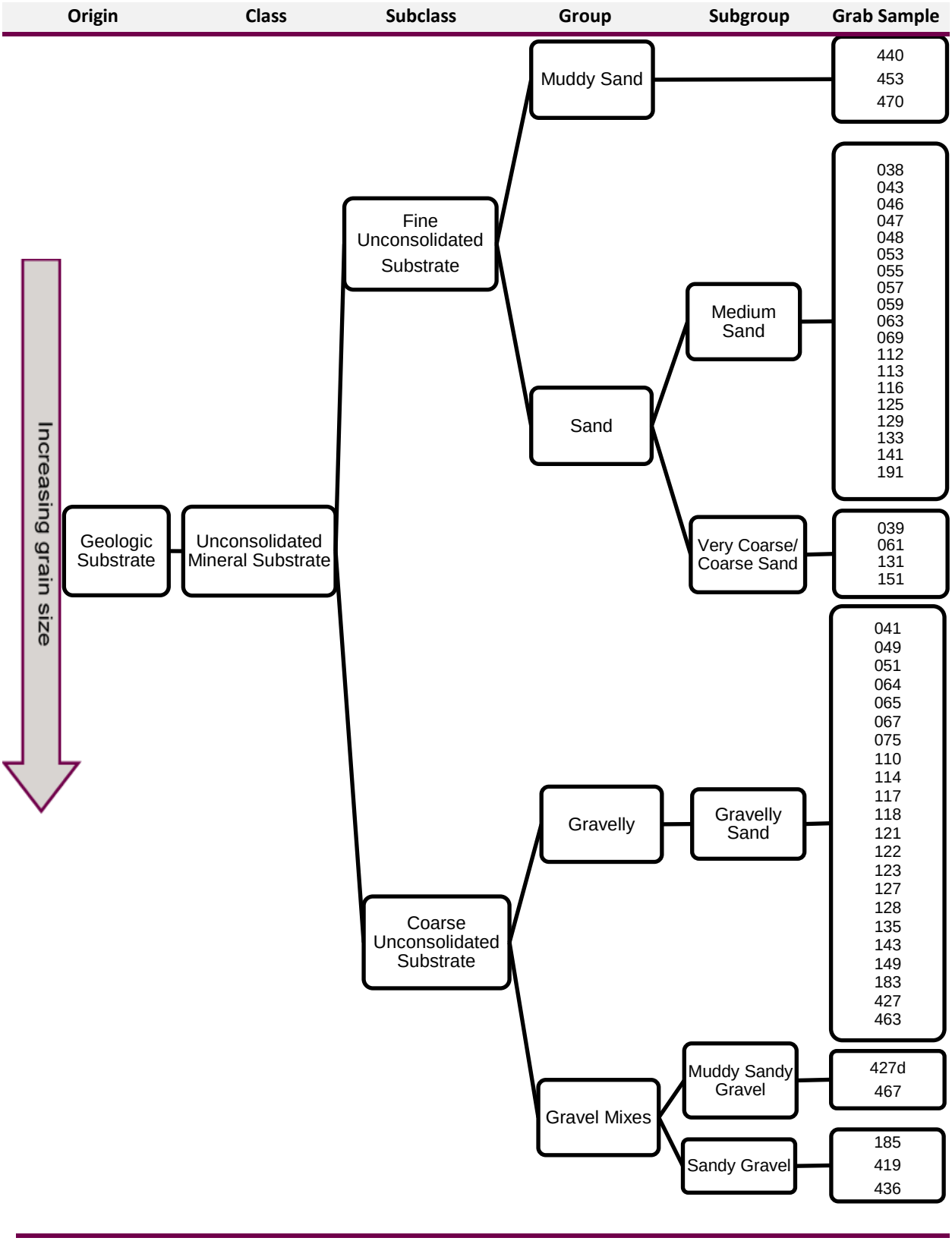


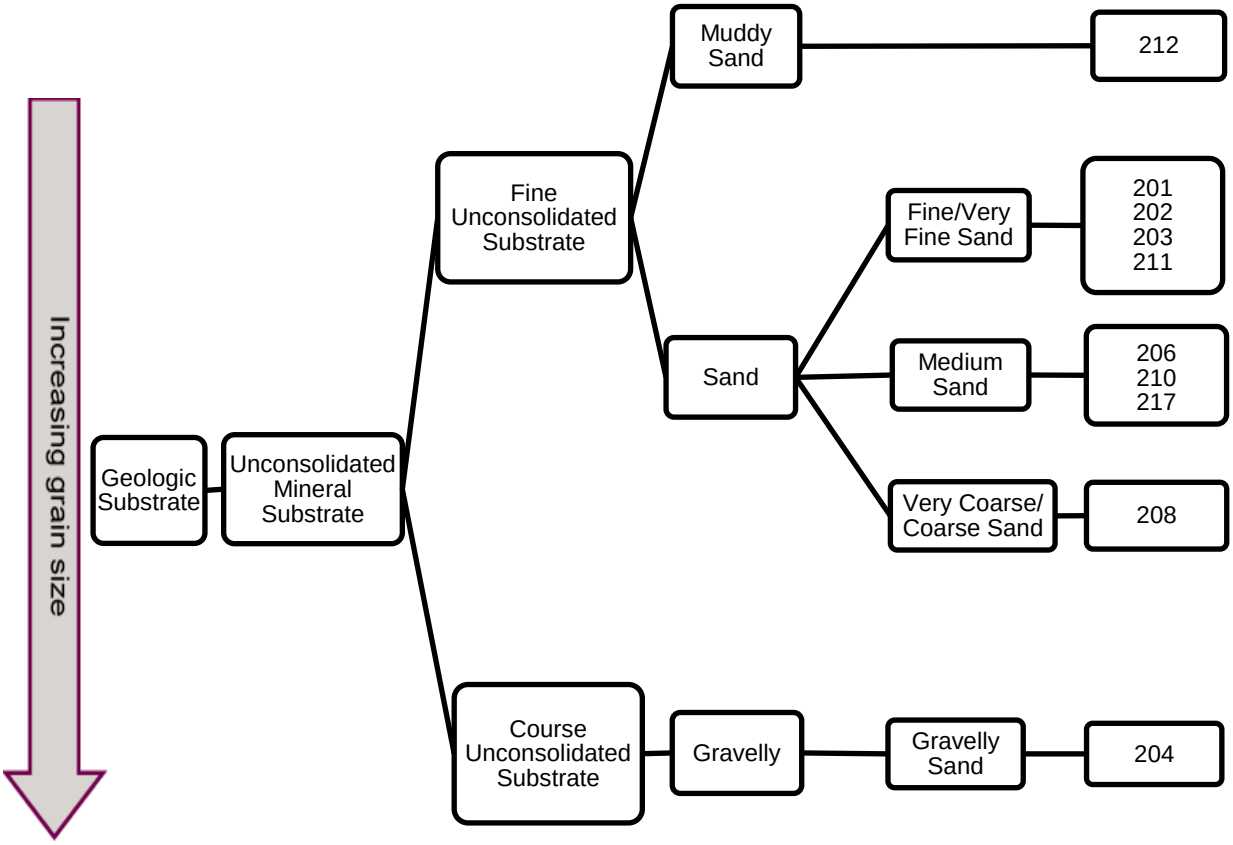
Table 3-31. CMECS hierarchical classification of substrates collected at each grab station over both years within the Monmouth ECC.

Origin	Class	Subclass	Group	Subgroup	Grab Sample
Geologic Substrate	Unconsolidated Mineral Substrate	Fine Unconsolidated Substrate	Sandy Mud		464
			Sand	Fine/Very Fine Sand	005
				Medium Sand	011 012 016 433 452 459
				Very Coarse/ Coarse Sand	006 021 383 473
		Coarse Unconsolidated Substrate	Gravelly	Gravelly Muddy Sand	002 008 462
				Gravelly Sand	004 010 014 018 020 022 026 030 031 032 420 420d 446 457 469 472 472d 479
			Gravel Mixes	Muddy Sandy Gravel	037
				Sandy Gravel	024 028 415

Increasing grain size

Table 3-32. CMECS hierarchical classification of substrates collected at each grab sample station from 2020 within the Atlantic ECC.

Origin	Class	Subclass	Group	Subgroup	Grab Sample



3.5 SPI/PV Comparison

NMFS (2020) modified CMECS information was provided from both SPI and PV imagery for triplicate samples at each SPI/PV station (Integral 2020). Grab samples processed for grain size data collected in 2020 were co-located with SPI/PV imagery at 38 overlapping stations throughout the Lease Areas (WTA and NLA), the Monmouth ECC, and the Atlantic ECC, enabling a comparison of CMECS substrate classifications between the sampling methods (see map in Figure 2-1, Section 2.1). Grab samples processed for grain size data collected in 2022 were co-located with SPI/PV imagery at 3 overlapping stations (OCS-22-492, OCS-22-501, and OCS-22-505) located within the southwest section of the WTA only.

When comparing CMECS substrate classifications at the substrate component group level, 24 of the 41 total co-located SPI classifications and 33 of the 41 PV classifications had at least one triplicate exactly match the CMECS classification at the group level according to the grab sample data from 2020 and 2022. Overall, 46% (57/123) of SPI and 47% (58/123) of PV substrate subgroup classifications exactly matched the grab sample classification. As with the subgroup classifications, the group-level classifications from SPI and PV imagery tended to underestimate the gravel component. In addition to the complication of shell debris described above, this discrepancy may also be due to fine scale variability, as grab stations and SPI/PV stations did not occur in exactly the same location. Sample depth may also play a role in biasing the visual classifications, as grab samples reached penetration depths into the seafloor that certainly exceeded the surface assessment of PV images and likely extended a few centimeters beyond the typical SPI penetration depth.

Overall, the 2020 and 2022 SPI/PV CMECS substrate classifications were consistently similar to the 2020 and 2022 grab sample grain size classifications, with most differences likely due to discrete grain size thresholds and consideration of shell debris.

4 SUMMARY

CMECS is a hierarchical system with thresholds based primarily on the percent and composition of gravel to identify substrates that may be considered “complex” by NMFS for the purposes of essential fish habitat mapping. Most (60.51%) of the grab samples in the project region were classified as geologic origin, fine unconsolidated substrate (not complex), with 42.31% of samples in the Offshore Project Area classified as Medium Sand (40.13% if NLA samples are included). Substrate classified as Fine/Very Fine Sand mainly occurred along the Atlantic ECC. In the Offshore Project Area, 33.65% percent of grab samples were classified as geologic origin, coarse unconsolidated substrates with ≥ 5% gravel (39.49% if NLA samples are included), which are considered complex habitat under the NMFS (2020) guidelines. However, the majority of those sites fell under the “Gravelly” CMECS group, which is the coarse substrate classification group with the lowest gravel composition (5 to < 30%) and was not considered complex habitat in this analysis. Gravelly Sand sites were particularly numerous and occurred throughout all three project regions (WTA, Atlantic ECC and Monmouth ECC). Only 3.85% of samples were comprised of coarse substrates defined by a threshold of 30% or more of gravel (5.73% if NLA samples are included). These three complex higher gravel threshold sites (Muddy Sandy Gravel and Sandy Gravel) are considered complex as they are more likely to be valuable fish habitat and occurred along the Monmouth ECC. The only other complex Sandy Gravel site occurred in the NLA near the Monmouth ECC. The bulk of the WTA was comprised of Medium Sand and a small proportion of Gravelly substrate .

Mean density of identified invertebrates was highest in samples collected along the Monmouth ECC. During the 2020 survey period, Nematodes accounted for 73% of all organisms identified in the samples collected in the Lease Areas (WTA and NLA) and along the Monmouth ECC and were the dominant taxa in most of the samples. Although nematodes were also highly abundant (41% of total abundance) in the samples collected along the Atlantic ECC, amphipods (from phylum Arthropoda) were almost equally abundant (36%). As macroinvertebrates from the Phylum Nematoda were excluded from the 2022 analyses, Phylum Annelida was found to be the dominant taxa during the 2022 surveys accounting for 73% and 82% of the organisms identified in the samples collected in the Lease Areas (WTA and NLA) and along the Monmouth ECC, respectively. In the three project regions and in both 2020 and 2022 survey periods, organisms from the phyla Annelida, Mollusca, and Arthropoda were represented by the largest numbers of unique taxa.

The multivariate analyses examined dissimilarities of the invertebrate assemblages between the various CMECS substrate types and project regions. Based on the statistical test results, there was evidence that the assemblages within samples are more similar to other samples within the same grouping (whether region or CMECS substrate type) than to other groupings. However, results also indicated only moderate predictive power of these factors, with some groupings displaying more within-group similarity (clustering) than other groupings. In general, these results demonstrated an increased dissimilarity between the invertebrate assemblages collected along the Atlantic ECC and those collected along the Monmouth ECC,

which makes sense considering that the samples along the Monmouth ECC had much coarser sediment sizes/CMECS classifications than those along the Atlantic ECC. In addition, there is a detectable difference in assemblages observed within the Fine/Very Fine Sand substrate and coarser sediment compositions.

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APPENDIX A – GRAB SAMPLE SITE LOCATIONS, CMEC CLASSIFICATIONS, AND KEY FINDINGS FROM FIELD/VIDEO REVIEW RECORDS

Table A - 1. Grab sample site locations and CMECS classifications based on laboratory grain size analysis, with summarized notes based on visual analysis. Geoform = sand waves (SW), ripples (R), or mounds (M). Shell = whole shell (S), fragment (SF), or hash (SH). Other features includes aquatic vegetation, anthropogenic debris, or evidence of fishing activity. Samples are marked "yes" for potentially complex habitat if they are in a NMFS CMECS substrate category with ≥ 30% gravel.

Sample	Latitude (°N)	Longitude (°W)	NMFS CMECS	Megafauna Noted	Geoform (SW/R/M)	Shell (S/SF/SH)	Other Features	Potentially Complex Habitat
CAR-20-201	39° 20' 22.260" N	74° 26' 26.645" W	Fine/Very Fine Sand					
CAR-20-202	39° 20' 0.952" N	74° 25' 12.970" W	Fine/Very Fine Sand					
CAR-20-203	39° 19' 49.099" N	74° 23' 55.892" W	Fine/Very Fine Sand					
CAR-20-204	39° 19' 37.726" N	74° 22' 37.589" W	Gravelly Sand		SW	S		
CAR-20-206	39° 19' 3.864" N	74° 20' 4.650" W	Medium Sand			SF		
CAR-20-208	39° 18' 20.832" N	74° 17' 36.059" W	Very Coarse/Coarse Sand	hermit crabs	SW	SF		
CAR-20-210	39° 17' 25.517" N	74° 15' 14.225" W	Medium Sand	crab	SW	SH		
CAR-20-211	39° 20' 33.207" N	74° 25' 47.972" W	Fine/Very Fine Sand					
CAR-20-212	39° 20' 3.449" N	74° 24' 38.754" W	Muddy Sand	hermit crab				
CAR-20-217	39° 19' 19.165" N	74° 16' 47.041" W	Medium Sand	sea robin	SW	SF		
LAR-20-002	40° 5' 11.507" N	73° 58' 48.214" W	Gravelly Muddy Sand	hermit crabs, crab, anemone		SH		
LAR-20-004	40° 3' 19.796" N	73° 57' 49.295" W	Gravelly Sand			SF		
LAR-20-005	40° 6' 57.468" N	74° 1' 43.932" W	Fine/Very Fine Sand					

Sample	Latitude (°N)	Longitude (°W)	NMFS CMECS	Megafauna Noted	Geoform (SW/R/M)	Shell (S/SF/SH)	Other Features	Potentially Complex Habitat
LAR-20-006	40° 6' 4.193" N	74° 1' 7.240" W	Very Coarse/Coarse Sand					
LAR-20-008	40° 4' 21.122" N	73° 59' 44.552" W	Gravelly Muddy Sand	hermit crabs, crab		SF	macroinvertebrate tubes	
LAR-20-010	40° 3' 3.694" N	73° 57' 46.320" W	Gravelly Sand	anemone, sand dollars				
LAR-20-011	40° 2' 2.587" N	73° 57' 36.510" W	Medium Sand					
LAR-20-012	40° 1' 1.242" N	73° 57' 37.441" W	Medium Sand					
LAR-20-014	39° 58' 58.173" N	73° 57' 25.881" W	Gravelly Sand					
LAR-20-016	39° 56' 55.940" N	73° 57' 7.578" W	Medium Sand	sand dollars, sea robin	SW			
LAR-20-018	39° 54' 53.285" N	73° 56' 48.398" W	Gravelly Sand	crab	SW	SF		
LAR-20-020	39° 52' 50.546" N	73° 56' 31.626" W	Gravelly Sand	crab				
LAR-20-021	39° 51' 49.791" N	73° 56' 24.537" W	Very Coarse/Coarse Sand	sand dollars	R		vegetation	
LAR-20-022	39° 50' 46.908" N	73° 56' 19.834" W	Gravelly Sand	skate, sea robin				
LAR-20-024	39° 48' 44.232" N	73° 56' 13.001" W	Sandy Gravel	sea scallop	R			yes
LAR-20-026	39° 46' 41.926" N	73° 56' 7.711" W	Gravelly Sand	sea robins	R			
LAR-20-028	39° 44' 38.709" N	73° 56' 0.950" W	Sandy Gravel	sea star		SF		yes
LAR-20-030	39° 42' 35.754" N	73° 55' 55.154" W	Gravelly Sand	Atlantic surfclam	R	S		
LAR-20-031	39° 41' 33.793" N	73° 55' 51.887" W	Gravelly Sand	squid, sea robin	SW	SF	vegetation	
LAR-20-032	39° 40' 31.119" N	73° 55' 49.050" W	Gravelly Sand	crab	SW			
LAR-20-037	39° 51' 10.772" N	73° 55' 24.782" W	Muddy Sandy Gravel	bay scallop, mussel, urchin, sea robin, skate egg			vegetation	yes

Sample	Latitude (°N)	Longitude (°W)	NMFS CMECS	Megafauna Noted	Geoform (SW/R/M)	Shell (S/SF/SH)	Other Features	Potentially Complex Habitat
OCS-20-038	39° 36' 10.822" N	73° 57' 5.516" W	Medium Sand	sand dollars, sea star		SF		
OCS-20-039	39° 35' 54.259" N	73° 59' 16.512" W	Very Coarse/Coarse Sand					
OCS-20-041	39° 34' 9.011" N	73° 57' 10.012" W	Gravelly Sand	skate egg		SF		
OCS-20-043	39° 33' 42.091" N	74° 0' 37.476" W	Medium Sand	sand dollars, sea star, sea robin	SW	SF		
OCS-20-046	39° 31' 52.033" N	73° 59' 4.465" W	Medium Sand	sand dollars, sea robin, hermit crab		SH		
OCS-20-047	39° 30' 3.547" N	73° 57' 23.332" W	Medium Sand	hermit crab, sand dollars		SF		
OCS-20-048	39° 29' 41.261" N	74° 0' 15.414" W	Medium Sand			SF		
OCS-20-049	39° 29' 29.872" N	74° 1' 44.525" W	Gravelly Sand	sand dollars, sea robin				
OCS-20-051	39° 28' 3.284" N	73° 57' 12.572" W	Gravelly Sand	sand dollar, hermit crab		SF		
OCS-20-053	39° 27' 26.508" N	74° 1' 57.206" W	Medium Sand	crab, sand dollar, sea robin				
OCS-20-055	39° 26' 56.479" N	74° 5' 49.575" W	Medium Sand	sand dollars, sea robin	R			
OCS-20-057	39° 25' 48.571" N	73° 58' 55.144" W	Medium Sand	sand dollars	R			
OCS-20-059	39° 25' 14.266" N	74° 3' 17.719" W	Medium Sand	sand dollars, sea robin, skate egg		SF		
OCS-20-061	39° 24' 50.008" N	74° 6' 28.403" W	Very Coarse/Coarse Sand	sand dollars, moon snail egg case		SF		
OCS-20-063	39° 23' 42.242" N	73° 59' 26.920" W	Medium Sand	sand dollars, crab, sea robin	SW	SF		
OCS-20-064	39° 23' 25.108" N	74° 1' 37.334" W	Gravelly Sand	crab, sand dollars	SW	SF		
OCS-20-065	39° 23' 8.259" N	74° 3' 47.779" W	Gravelly Sand					

Sample	Latitude (°N)	Longitude (°W)	NMFS CMECS	Megafauna Noted	Geoform (SW/R/M)	Shell (S/SF/SH)	Other Features	Potentially Complex Habitat
OCS-20-067	39° 21' 56.629" N	73° 57' 20.426" W	Gravelly Sand	sand dollars		SF		
OCS-20-069	39° 21' 23.759" N	74° 1' 40.637" W	Medium Sand	sand dollars		SF	macroinvertebrate tubes	
OCS-20-071	39° 20' 49.512" N	74° 6' 2.474" W	Medium Sand	sand dollars, sea star, sea robin				
OCS-20-073	39° 20' 15.765" N	74° 10' 23.668" W	Medium Sand	crab, sand dollars				
OCS-20-075	39° 19' 55.075" N	73° 57' 18.867" W	Gravelly Sand	sand dollars, jelly fish				
OCS-20-077	39° 19' 21.325" N	74° 1' 40.727" W	Medium Sand	sand dollars, sea robin		SF		
OCS-20-079	39° 18' 47.575" N	74° 6' 1.253" W	Medium Sand	crab, sand dollars, sea robin		SF		
OCS-20-081	39° 18' 13.741" N	74° 10' 23.077" W	Medium Sand	sand dollars			macroinvertebrate tubes	
OCS-20-083	39° 17' 43.032" N	74° 14' 24.309" W	Gravelly Sand	sand dollar, crab		SH		
OCS-20-085	39° 17' 36.398" N	73° 59' 29.049" W	Medium Sand	sand dollars	R	SF		
OCS-20-086	39° 17' 20.318" N	74° 1' 40.392" W	Very Coarse/Coarse Sand	sand dollars, hake		SF		
OCS-20-087	39° 17' 3.061" N	74° 3' 49.554" W	Medium Sand	sand dollars		S		
OCS-20-089	39° 16' 29.894" N	74° 8' 10.530" W	Medium Sand	sand dollars				
OCS-20-091	39° 15' 54.594" N	74° 12' 28.223" W	Medium Sand	hermit crabs	R	SF		
OCS-20-092	39° 15' 50.521" N	73° 57' 23.570" W	Medium Sand	sand dollars, hake		SF		
OCS-20-093	39° 15' 34.453" N	73° 59' 32.876" W	Medium Sand	sand dollars	SW	SF		
OCS-20-095	39° 15' 0.519" N	74° 3' 53.436" W	Medium Sand	sand dollars	SW	SF		
OCS-20-097	39° 14' 27.537" N	74° 8' 15.152" W	Gravelly Muddy Sand			S		

Sample	Latitude (°N)	Longitude (°W)	NMFS CMECS	Megafauna Noted	Geoform (SW/R/M)	Shell (S/SF/SH)	Other Features	Potentially Complex Habitat
OCS-20-099	39° 14' 1.359" N	74° 11' 33.456" W	Medium Sand					
OCS-20-101	39° 13' 6.269" N	74° 2' 57.661" W	Medium Sand	sand dollars, hake		SF		
OCS-20-103	39° 12' 31.636" N	74° 7' 19.094" W	Medium Sand	sand dollars	R	SF		
OCS-20-105	39° 12' 5.197" N	74° 10' 47.861" W	Gravelly Sand	fish	R	SF		
OCS-20-107	39° 10' 51.444" N	74° 4' 40.735" W	Medium Sand	sand dollars, many hake	SW	SF		
OCS-20-109	39° 10' 23.561" N	74° 8' 13.807" W	Medium Sand	sand dollars				
OCS-20-110	39° 36' 46.632" N	74° 0' 26.503" W	Gravelly Sand		R	SF		
OCS-20-112	39° 37' 16.671" N	73° 56' 29.165" W	Medium Sand	sea robins, crab, skate	M	S		
OCS-20-113	39° 34' 30.958" N	74° 2' 14.507" W	Medium Sand	sand dollars, hermit crab, crabs, sea robin	M			
OCS-20-114	39° 34' 45.715" N	74° 0' 16.166" W	Gravelly Sand	sand dollar, sea robin		SH		
OCS-20-116	39° 35' 15.837" N	73° 56' 20.655" W	Medium Sand					
OCS-20-117	39° 32' 44.588" N	74° 0' 12.102" W	Gravelly Sand	hermit crab, sea robin, crab	M	SH		
OCS-20-118	39° 33' 2.825" N	73° 57' 52.343" W	Gravelly Sand	sea robin, sea star		S		
OCS-20-121	39° 31' 8.198" N	73° 56' 54.728" W	Gravelly Sand	sand dollars		SF		
OCS-20-122	39° 28' 24.493" N	74° 2' 16.121" W	Gravelly Sand	sand dollars		SF		
OCS-20-123	39° 28' 41.697" N	74° 0' 4.681" W	Gravelly Sand	sand dollar, crab, sea robin	SW			
OCS-20-125	39° 29' 6.859" N	73° 56' 48.259" W	Medium Sand	hermit crab, sand dollars, sea robins	SW	SH		
OCS-20-127	39° 26' 22.044" N	74° 2' 34.234" W	Gravelly Sand	skate egg				
OCS-20-128	39° 26' 30.189" N	74° 1' 20.928" W	Gravelly Sand	sea robins		SF		

Sample	Latitude (°N)	Longitude (°W)	NMFS CMECS	Megafauna Noted	Geoform (SW/R/M)	Shell (S/SF/SH)	Other Features	Potentially Complex Habitat
OCS-20-129	39° 26' 47.159" N	73° 59' 10.063" W	Medium Sand	sand dollars		SF		
OCS-20-131	39° 23' 53.412" N	74° 5' 55.043" W	Very Coarse/Coarse Sand	sand dollars, fish, sea robins		SF		
OCS-20-133	39° 24' 28.665" N	74° 1' 19.693" W	Medium Sand	sand dollars, sea robin		SF		
OCS-20-135	39° 25' 1.166" N	73° 57' 8.045" W	Gravelly Sand	sand dollars		SF		
OCS-20-136	39° 21' 14.346" N	74° 10' 41.191" W	Medium Sand	sand dollars				
OCS-20-137	39° 21' 30.745" N	74° 8' 31.290" W	Gravelly Sand	sand dollars, sea robin		S		
OCS-20-139	39° 22' 6.350" N	74° 3' 55.637" W	Gravelly Sand	sand dollars, hake, sea robin		SF		
OCS-20-141	39° 22' 38.342" N	73° 59' 48.892" W	Medium Sand	sand dollar, shrimp, squid	R	S		
OCS-20-143	39° 23' 3.464" N	73° 56' 29.509" W	Gravelly Sand	sand dollars, fish, sea robin		S		
OCS-20-145	39° 19' 29.188" N	74° 8' 30.364" W	Gravelly Sand	sand dollars, sea robin	SW	S		
OCS-20-147	39° 20' 2.867" N	74° 4' 9.161" W	Medium Sand	sand dollars, sea robin, sea star				
OCS-20-148	39° 20' 20.196" N	74° 1' 58.625" W	Medium Sand	sand dollars, shrimp, crab		SF		
OCS-20-149	39° 20' 36.848" N	73° 59' 48.514" W	Gravelly Sand					
OCS-20-151	39° 21' 2.465" N	73° 56' 31.493" W	Very Coarse/Coarse Sand	sand dollars				
OCS-20-153	39° 17' 1.302" N	74° 11' 51.721" W	Medium Sand	sand dollars				
OCS-20-155	39° 17' 35.997" N	74° 7' 29.590" W	Gravelly Sand			SF		
OCS-20-157	39° 18' 9.771" N	74° 3' 9.654" W	Medium Sand	sand dollars, hake				
OCS-20-159	39° 18' 42.963" N	73° 58' 48.053" W	Medium Sand	sand dollars				

Sample	Latitude (°N)	Longitude (°W)	NMFS CMECS	Megafauna Noted	Geoform (SW/R/M)	Shell (S/SF/SH)	Other Features	Potentially Complex Habitat
OCS-20-160	39° 18' 56.258" N	73° 56' 57.712" W	Medium Sand	sand dollars		SF		
OCS-20-161	39° 15' 8.373" N	74° 10' 46.594" W	Medium Sand		R	SF		
OCS-20-163	39° 15' 42.290" N	74° 6' 26.004" W	Fine/Very Fine Sand	skate egg				
OCS-20-165	39° 16' 15.428" N	74° 2' 5.890" W	Medium Sand	sand dollar				
OCS-20-167	39° 16' 49.541" N	73° 57' 45.363" W	Medium Sand	sand dollars				
OCS-20-169	39° 13' 6.729" N	74° 10' 43.461" W	Gravelly Sand	shrimp				
OCS-20-171	39° 13' 42.164" N	74° 6' 11.815" W	Medium Sand	crab, sea robin				
OCS-20-172	39° 13' 59.520" N	74° 3' 59.282" W	Muddy Sand	crab				
OCS-20-173	39° 14' 17.055" N	74° 1' 46.522" W	Medium Sand	sand dollars, crab				
OCS-20-175	39° 14' 43.937" N	73° 58' 14.326" W	Medium Sand	sand dollars, hake school				
OCS-20-177	39° 11' 34.225" N	74° 6' 55.652" W	Medium Sand	sand dollars				
OCS-20-179	39° 12' 7.681" N	74° 2' 35.311" W	Medium Sand	sand dollars, small crabs				
OCS-20-180	39° 12' 20.546" N	74° 1' 0.766" W	Medium Sand	sand dollars	SW	SH		
OCS-20-181	39° 9' 37.391" N	74° 6' 36.658" W	Fine/Very Fine Sand	sand dollars		SF	macroinvertebrate tubes	
OCS-20-183	39° 38' 13.184" N	73° 57' 4.627" W	Gravelly Sand			SF	Potential trawl/dredge marks	
OCS-20-185	39° 40' 15.188" N	73° 57' 0.733" W	Sandy Gravel	sea robin, crab, skate egg	M	SF	vegetation	yes
OCS-20-191	39° 22' 5.695" N	73° 54' 56.238" W	Medium Sand	sea star, sand dollars		SF		
OCS-20-500	39° 19' 25.745" N	73° 59' 59.810" W	Gravelly Sand			SF		
OCS-22-419	39° 39' 54.063" N	73° 57' 02.857" W	Sandy Gravel	Sea robin, gastropod egg case	R	SF		

Sample	Latitude (°N)	Longitude (°W)	NMFS CMECS	Megafauna Noted	Geoform (SW/R/M)	Shell (S/SF/SH)	Other Features	Potentially Complex Habitat
OCS-22-427d	39° 37' 07.510" N	73° 57' 38.685" W	Muddy Sandy Gravel	Sea robins, crabs, and shrimp	R	SF		
OCS-22-427	39° 37' 07.510" N	73° 57' 38.685" W	Gravelly Sand	Sea robins, crabs, and shrimp	R	SF		
OCS-22-436	39° 35' 00.330" N	74° 01' 49.752" W	Sandy Gravel	Skate egg cases	R	SF		
OCS-22-440	39° 34' 30.116" N	74° 02' 14.087" W	Muddy Sand	Numerous sand dollars, Diopatra	R	SF		
OCS-22-453	39° 31' 43.290" N	73° 56' 57.135" W	Muddy Sand	None	R	SF		
OCS-22-463	39° 28' 05.776" N	74° 00' 34.470" W	Gravelly Sand	Sand dollar, snail		SF		
OCS-22-467	39° 26' 55.767" N	74° 02' 05.831" W	Muddy Sandy Gravel	Worm tubes	R	SF		
OCS-22-470	39° 25' 52.904" N	74° 06' 18.557" W	Muddy Sand	Sand dollars	R	SF		
LAR-22-383	40° 2' 2.565" N	73° 57' 35.415" W	Very Coarse/Coarse Sand	Numerous sand dollars, fish	R	SF		
LAR-22-415	39° 40' 33.026" N	73° 55' 52.813" W	Sandy Gravel	Sea robins, sand dollar, skate egg case, skate	R	SF		
LAR-22-420d	39° 39' 50.383" N	73° 55' 58.611" W	Gravelly Sand	Numerous sand dollars, Diopatra	R	SF		
LAR-22-420	39° 39' 50.383" N	73° 55' 58.611" W	Gravelly Sand	Numerous sand dollars, Diopatra	R	SF		
LAR-22-433	39° 35' 36.174" N	73° 55' 35.071" W	Medium Sand	Numerous sand dollars, Diopatra, tubes		SF		
LAR-22-446	39° 33' 21.545" N	73° 55' 57.017" W	Gravelly Sand	Sand dollars	R	SF		
LAR-22-452	39° 31' 57.187" N	73° 55' 58.210" W	Medium Sand	Sand dollars, amphipod tracks, snail		SF		
LAR-22-457	39° 30' 39.111" N	73° 55' 55.158" W	Gravelly Sand	Sand dollars	R	SF		
LAR-22-459	39° 29' 30.888" N	73° 56' 02.125" W	Medium Sand	Sand dollars, starfish		SF		

Sample	Latitude (°N)	Longitude (°W)	NMFS CMECS	Megafauna Noted	Geoform (SW/R/M)	Shell (S/SF/SH)	Other Features	Potentially Complex Habitat
LAR-22-462	39° 28' 50.325" N	73° 56' 21.241" W	Gravelly Muddy Sand	Sea robin, juvenile flounder		SF		
LAR-22-464	39° 28' 01.486" N	73° 55' 07.003" W	Sandy Mud	Diopatra mounds and tubes		SF		
LAR-22-469	39° 25' 49.994" N	73° 55' 17.865" W	Gravelly Sand	Sand dollars, sea robins, clams		SF		
LAR-22-472d	39° 24' 48.607" N	73° 55' 24.468" W	Gravelly Sand	Sand dollars, worm mounds	R	SF		
LAR-22-472	39° 24' 48.607" N	73° 55' 24.468" W	Gravelly Sand	Sand dollars, worm mounds	R	SF		
LAR-22-473	39° 24' 35.747" N	73° 56' 21.360" W	Very Coarse/Coarse Sand	Sea robins, sand dollars		SF		
LAR-22-479	39° 20' 27.549" N	73° 56' 09.266" W	Gravelly Sand	Sand dollars, Diopatra, sea robin	R	SF		
OCS-22-490	39° 15' 51.792" N	74° 08' 15.323" W	Medium Sand	Sand dollars, Diopatra, squid, fish	R			
OCS-22-491	39° 14' 55.324" N	74° 07' 10.706" W	Muddy Sand	Sand dollars, Diopatra, sea robin, and crab	R			
OCS-22-491d	39° 14' 55.324" N	74° 07' 10.706" W	Muddy Sand	Sand dollars, Diopatra, sea robin, and crab	R			
OCS-22-492	39° 14' 53.457" N	74° 09' 23.387" W	Muddy Sand	Sand dollars, skate egg cases	R	SF		
OCS-22-493	39° 14' 47.425" N	74° 08' 37.334" W	Muddy Sand	Sponge, sand dollars, skate egg, snail, fish	R	SF		
OCS-22-498	39° 11' 05.303" N	74° 06' 09.195" W	Muddy Sand	Sand dollars	R			
OCS-22-501	39° 10' 01.884" N	74° 03' 51.554" W	Muddy Sand	Sand dollars, flounder				

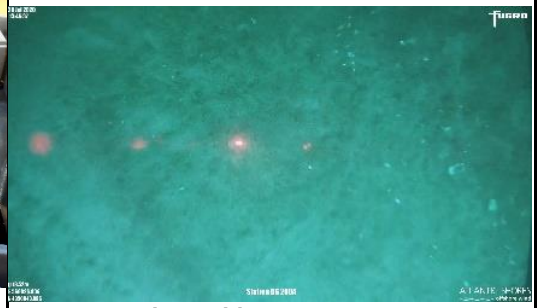
Sample	Latitude (°N)	Longitude (°W)	NMFS CMECS	Megafauna Noted	Geoform (SW/R/M)	Shell (S/SF/SH)	Other Features	Potentially Complex Habitat
OCS-22-502	39° 09' 57.559" N	74° 05' 46.437" W	Fine/Very Fine Sand	Sand dollars, skate egg				
OCS-22-503	39° 09' 35.173" N	74° 06' 38.600" W	Muddy Sand	Sand dollars, sea robins		SF		
OCS-22-505	39° 09' 22.662" N	74° 05' 23.131" W	Fine/Very Fine Sand	Sand dollars				
OCS-22-506	39° 09' 00.597" N	74° 05' 14.916" W	Medium Sand	Sand dollars, crab, fish	R			

APPENDIX B – REPRESENTATIVE GRABCAM AND GRAB SAMPLER IMAGES WITH ASSOCIATED CMECS CLASSIFICATIONS

Table B-1. Images of 90 OCS grab samples collected in 2020. A.) immediately after recovery/draining and B.) still image from the grab sampler prior to benthic sample collection. NMFS Modified CMECS (2020) classification and NMFS Complex Habitat designation reported below images (if in substrate category with ≥30% gravel). Note that parallel-mounted lasers are 0.208 m apart in the representative images displayed here.

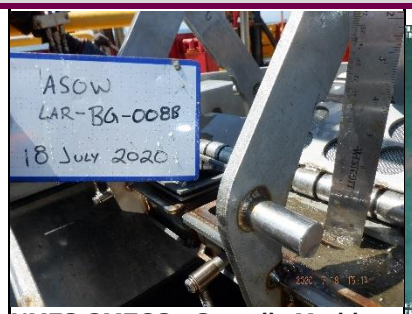
Station	A.	B.
CAR-20-201	 **NMFS CMECS: Fine/Very Fine Sand**	**(No grab video provided)** **NMFS Complex Habitat: No**
CAR-20-202	 **NMFS CMECS: Fine/Very Fine Sand**	 **NMFS Complex Habitat: No** **Poor Visibility**

Station	A.	B.
CAR-20-203		
	NMFS CMECS: Fine/Very Fine Sand	**NMFS Complex Habitat: No Poor Visibility**
CAR-20-204		
	NMFS CMECS: Gravelly Sand	**NMFS Complex Habitat: No**
CAR-20-206		
	NMFS CMECS: Medium Sand	**NMFS Complex Habitat: No**

Station	A.	B.
CAR-20-208	 NMFS CMECS: Very Coarse/Coarse Sand	 NMFS Complex Habitat: No
CAR-20-210	 NMFS CMECS: Medium Sand	 NMFS Complex Habitat: No
CAR-20-211	 NMFS CMECS: Fine/Very Fine Sand	 NMFS Complex Habitat: No Poor Visibility

Station	A.	B.
CAR-20-212	 NMFS CMECS: Muddy Sand	 NMFS Complex Habitat: No Poor Visibility
CAR-20-217	 NMFS CMECS: Medium Sand	 NMFS Complex Habitat: No
LAR-20-002	 NMFS CMECS: Gravelly Muddy Sand	 NMFS Complex Habitat: No

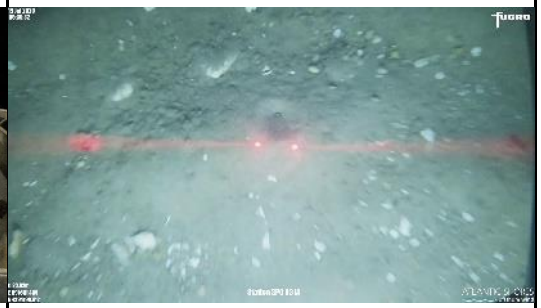
Station	A.	B.
LAR-20-004		
	NMFS CMECS: Gravelly Sand	**NMFS Complex Habitat: No**
LAR-20-005		
	NMFS CMECS: Fine/Very Fine Sand	**NMFS Complex Habitat: No** **Poor Visibility**
LAR-20-006		**(No grab video provided)** **NMFS Complex Habitat: No**
	NMFS CMECS: Very Coarse/Coarse Sand	

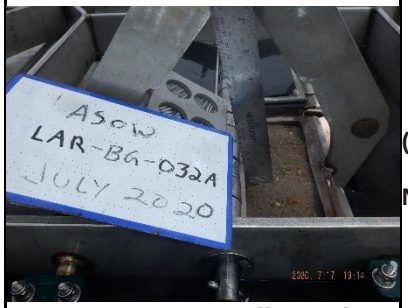
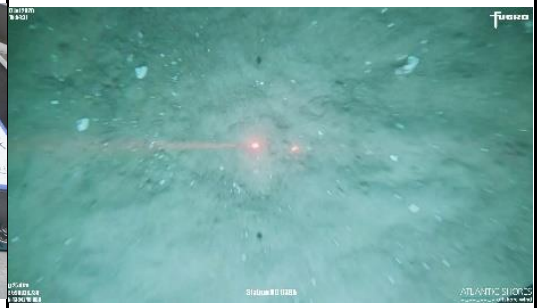
Station	A.	B.
LAR-20-008	 NMFS CMECS: Gravelly Muddy Sand	 NMFS Complex Habitat: No
LAR-20-010	 NMFS CMECS: Gravelly Sand	 NMFS Complex Habitat: No
LAR-20-011	 NMFS CMECS: Medium Sand	 NMFS Complex Habitat: No

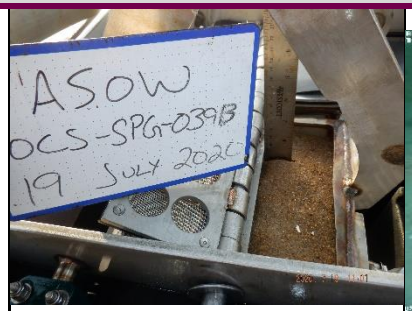
Station	A.	B.
LAR-20-012		
	NMFS CMECS: Medium Sand	NMFS Complex Habitat: No
LAR-20-014		
	NMFS CMECS: Gravelly Sand	NMFS Complex Habitat: No
LAR-20-016		
	NMFS CMECS: Medium Sand	NMFS Complex Habitat: No

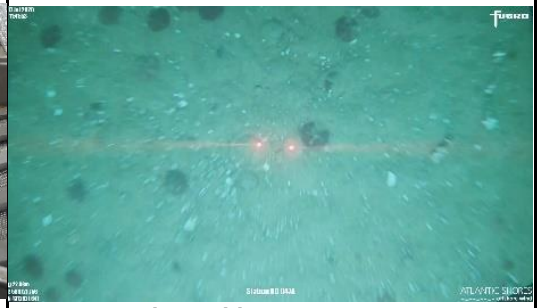
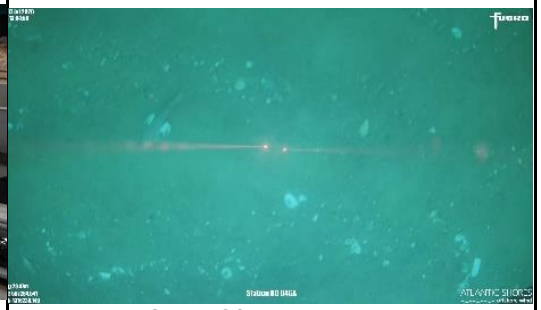
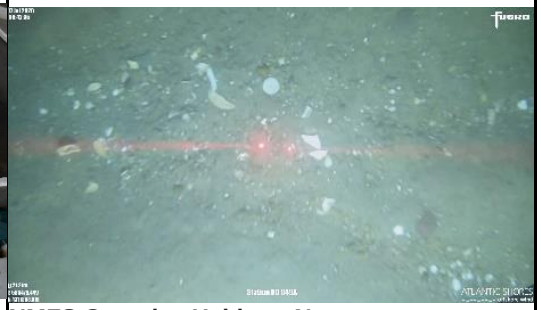
Station	A.	B.
LAR-20-018	 NMFS CMECS: Gravelly Sand	 NMFS Complex Habitat: No
LAR-20-020	 NMFS CMECS: Gravelly Sand	 NMFS Complex Habitat: No
LAR-20-021	 NMFS CMECS: Very Coarse/Coarse Sand	(No grab video provided) NMFS Complex Habitat: No

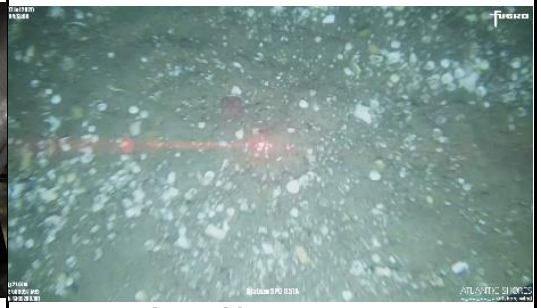
Station	A.	B.
LAR-20-022	 **NMFS CMECS: Gravelly Sand**	**(No grab video provided)** **NMFS Complex Habitat: No**
LAR-20-024	 **NMFS CMECS: Sandy Gravel**	 **NMFS Complex Habitat: Yes**
LAR-20-026	 **NMFS CMECS: Gravelly Sand**	 **NMFS Complex Habitat: No**

Station	A.	B.
LAR-20-028		
	NMFS CMECS: Sandy Gravel	**NMFS Complex Habitat: Yes**
LAR-20-030		
	NMFS CMECS: Gravelly Sand	**NMFS Complex Habitat: No**
LAR-20-031		
	NMFS CMECS: Gravelly Sand	**NMFS Complex Habitat: No**

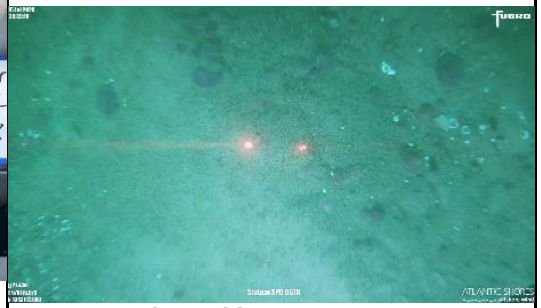
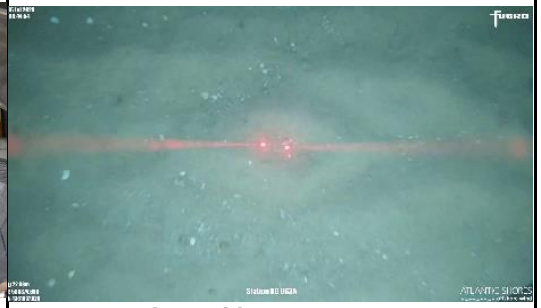
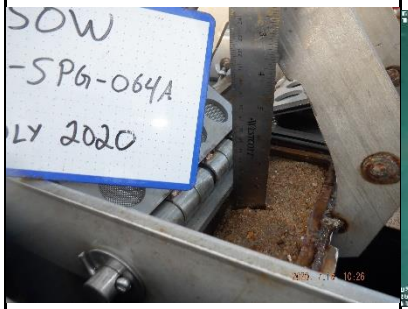
Station	A.	B.
LAR-20-032	 **NMFS CMECS: Gravelly Sand**	**(No grab video provided)** **NMFS Complex Habitat: No**
LAR-20-037	 **NMFS CMECS: Muddy Sandy Gravel**	 **NMFS Complex Habitat: Yes**
OCS-20-038	 **NMFS CMECS: Medium Sand**	 **NMFS Complex Habitat: No**

Station	A.	B.
OCS-20-039	 NMFS CMECS: Very Coarse/Coarse Sand	 NMFS Complex Habitat: No
OCS-20-041	 NMFS CMECS: Very Gravelly Sand	 NMFS Complex Habitat: No
OCS-20-043	 NMFS CMECS: Very Medium Sand	 NMFS Complex Habitat: No

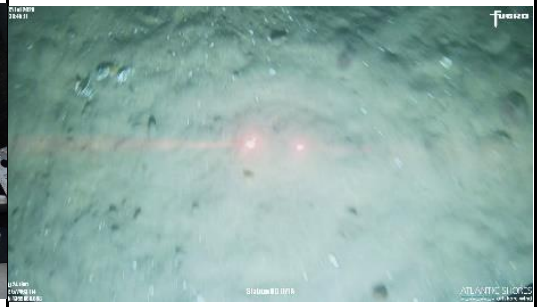
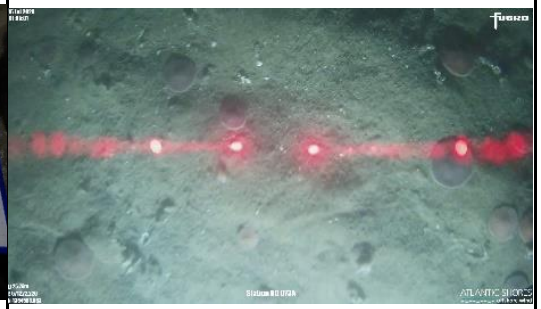
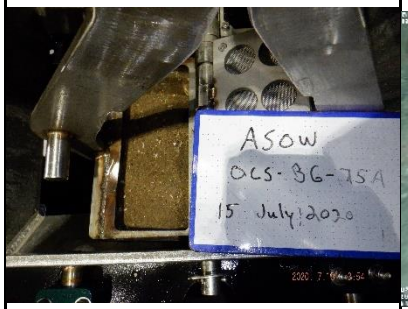
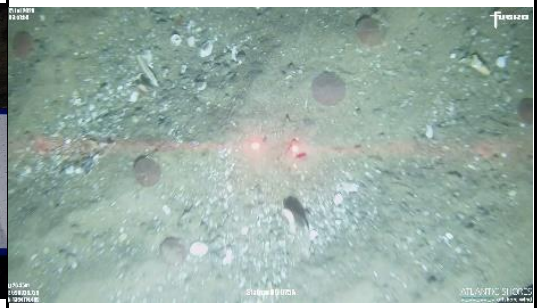
Station	A.	B.
OCS-20-046	 NMFS CMECS: Medium Sand	 NMFS Complex Habitat: No
OCS-20-047	 NMFS CMECS: Medium Sand	 NMFS Complex Habitat: No
OCS-20-048	 NMFS CMECS: Medium Sand	 NMFS Complex Habitat: No

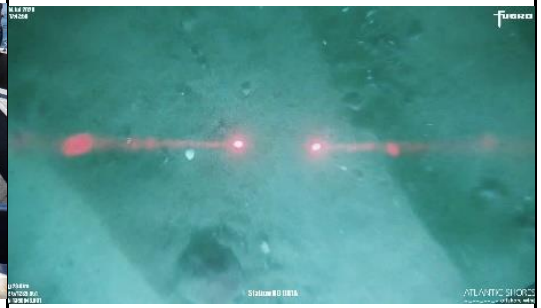
Station	A.	B.
OCS-20-049	 **NMFS CMECS: Gravelly Sand**	 **NMFS Complex Habitat: No**
OCS-20-051	 **NMFS CMECS: Gravelly Sand**	 **NMFS Complex Habitat: No**
OCS-20-053	 **NMFS CMECS: Medium Sand**	**(No grab video provided)** **NMFS Complex Habitat: No**

Station	A.	B.
OCS-20-055		
	NMFS CMECS: Medium Sand	**NMFS Complex Habitat: No**
OCS-20-057		
	NMFS CMECS: Medium Sand	**NMFS Complex Habitat: No**
OCS-20-059		
	NMFS CMECS: Medium Sand	**NMFS Complex Habitat: No**

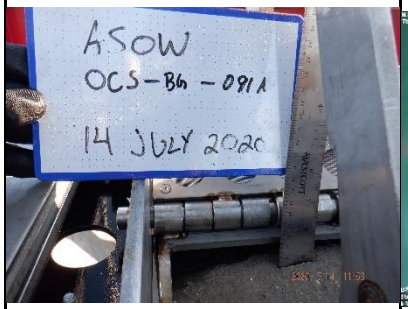
Station	A.	B.
OCS-20-061	 NMFS CMECS: Very Coarse/Coarse Sand	 NMFS Complex Habitat: No
OCS-20-063	 NMFS CMECS: Medium Sand	 NMFS Complex Habitat: No
OCS-20-064	 NMFS CMECS: Gravelly Sand	 NMFS Complex Habitat: No

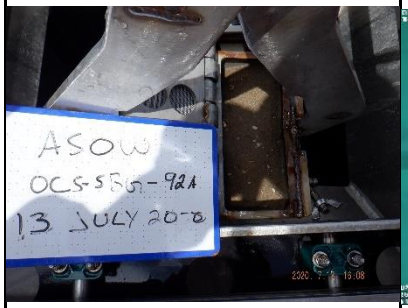
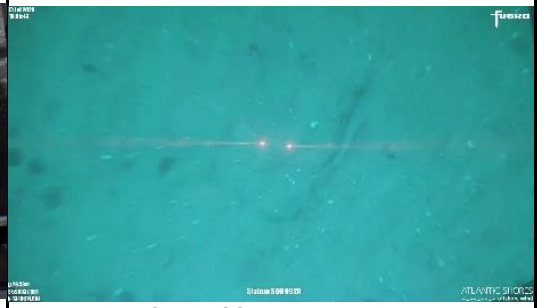
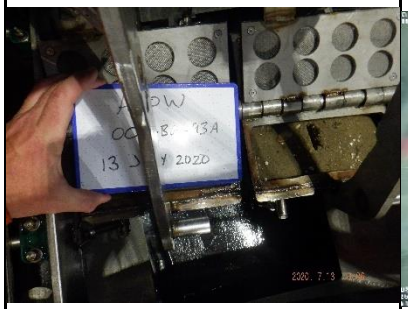
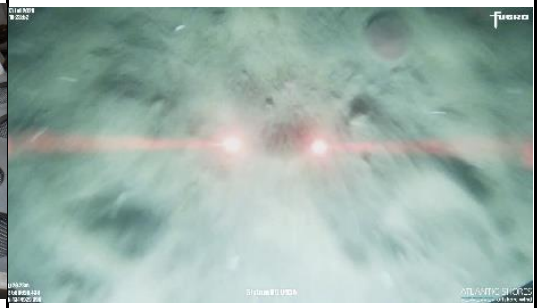
Station	A.	B.
OCS-20-065		
	NMFS CMECS: Gravelly Sand	**NMFS Complex Habitat: No**
OCS-20-067		
	NMFS CMECS: Gravelly Sand	**NMFS Complex Habitat: No**
OCS-20-069		
	NMFS CMECS: Medium Sand	**NMFS Complex Habitat: No**

Station	A.	B.
OCS-20-071	 NMFS CMECS: Medium Sand	 NMFS Complex Habitat: No
OCS-20-073	 NMFS CMECS: Medium Sand	 NMFS Complex Habitat: No
OCS-20-075	 NMFS CMECS: Gravelly Sand	 NMFS Complex Habitat: No

Station	A.	B.
OCS-20-077	 NMFS CMECS: Medium Sand	 NMFS Complex Habitat: No
OCS-20-079	 NMFS CMECS: Medium Sand	 NMFS Complex Habitat: No
OCS-20-081	 NMFS CMECS: Medium Sand	 NMFS Complex Habitat: No

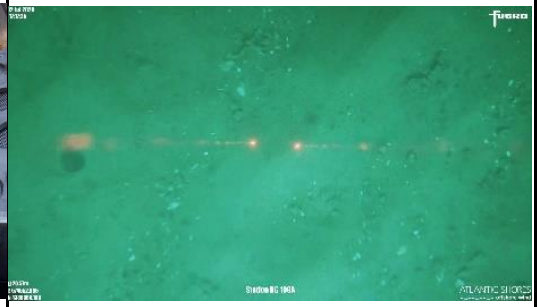
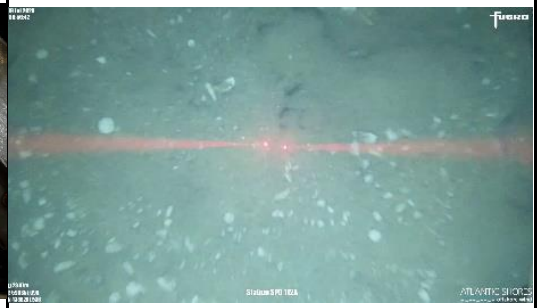
Station	A.	B.
OCS-20-083	 NMFS CMECS: Gravelly Sand	 NMFS Complex Habitat: No
OCS-20-085	 NMFS CMECS: Medium Sand	 NMFS Complex Habitat: No
OCS-20-086	 NMFS CMECS: Very Coarse/Coarse Sand	 NMFS Complex Habitat: No

Station	A.	B.
OCS-20-087	 NMFS CMECS: Medium Sand	 NMFS Complex Habitat: No
OCS-20-089	 NMFS CMECS: Medium Sand	 NMFS Complex Habitat: No
OCS-20-091	 NMFS CMECS: Medium Sand	 NMFS Complex Habitat: No

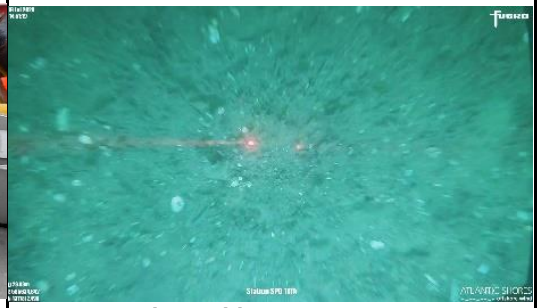
Station	A.	B.
OCS-20-092	 NMFS CMECS: Medium Sand	 NMFS Complex Habitat: No
OCS-20-093	 NMFS CMECS: Medium Sand	 NMFS Complex Habitat: No
OCS-20-095	 NMFS CMECS: Medium Sand	 NMFS Complex Habitat: No

Station	A.	B.
OCS-20-097		
	NMFS CMECS: Gravelly Muddy Sand	**NMFS Complex Habitat: No**
OCS-20-099		
	NMFS CMECS: Medium Sand	**NMFS Complex Habitat: No**
OCS-20-101		
	NMFS CMECS: Medium Sand	**NMFS Complex Habitat: No**

Station	A.	B.
OCS-20-103	 NMFS CMECS: Medium Sand	 NMFS Complex Habitat: No
OCS-20-105	 NMFS CMECS: Gravelly Sand	 NMFS Complex Habitat: No
OCS-20-107	 NMFS CMECS: Medium Sand	 NMFS Complex Habitat: No

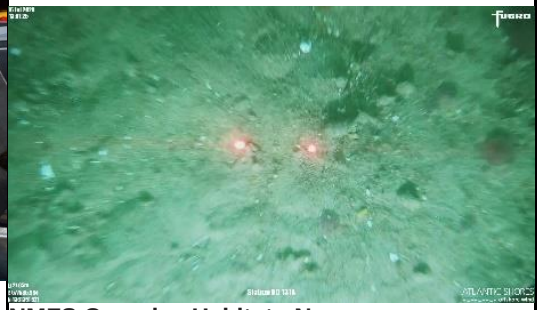
Station	A.	B.
OCS-20-109	 NMFS CMECS: Medium Sand	 NMFS Complex Habitat: No
OCS-20-110	 NMFS CMECS: Gravelly Sand	 NMFS Complex Habitat: No
OCS-20-112	 NMFS CMECS: Medium Sand	 NMFS Complex Habitat: No

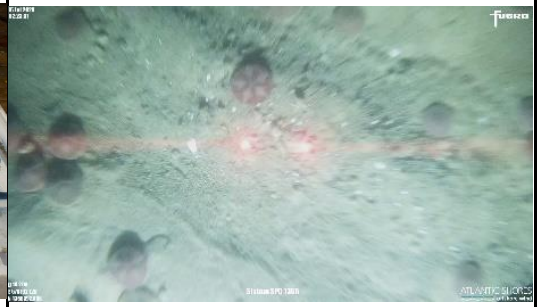
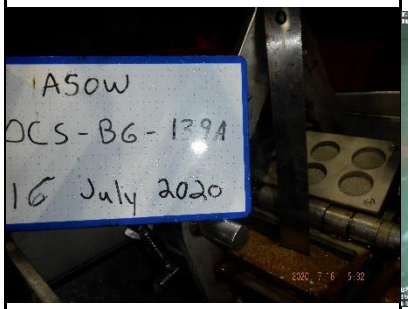
Station	A.	B.
OCS-20-113		
	NMFS CMECS: Medium Sand	**NMFS Complex Habitat: No**
OCS-20-114		
	NMFS CMECS: Gravelly Sand	**NMFS Complex Habitat: No**
OCS-20-116		
	NMFS CMECS: Medium Sand	**NMFS Complex Habitat: No**

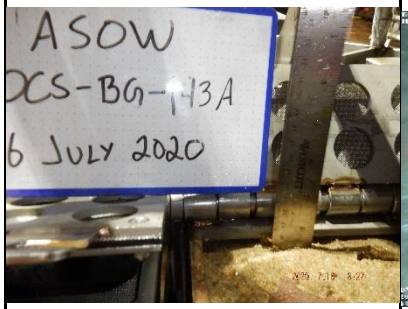
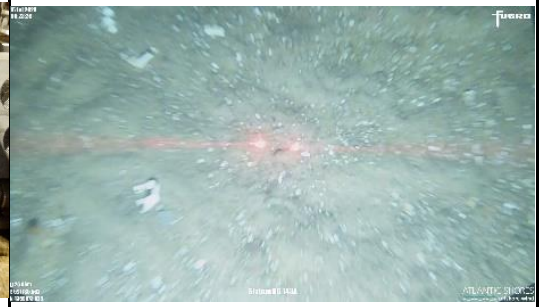
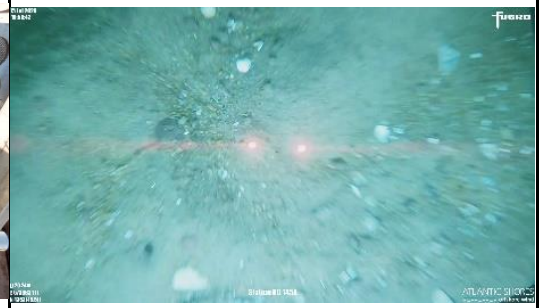
Station	A.	B.
OCS-20-117	 **NMFS CMECS: Gravelly Sand**	 **NMFS Complex Habitat: No**
OCS-20-118	 **NMFS CMECS: Gravelly Sand**	 **NMFS Complex Habitat: No**
OCS-20-121	 **NMFS CMECS: Gravelly Sand**	 **NMFS Complex Habitat: No**

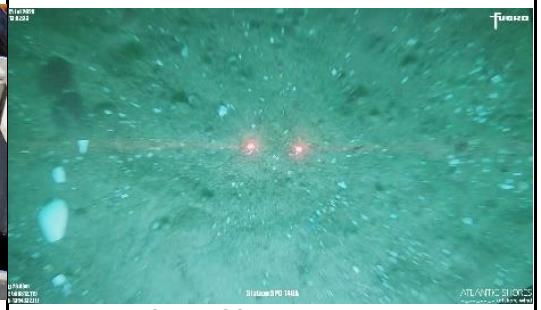
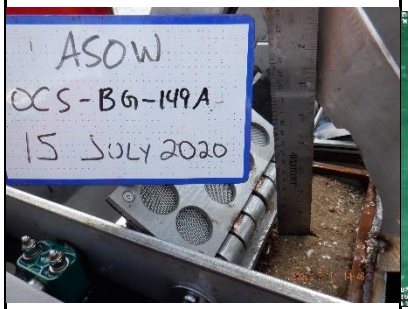
Station	A.	B.
OCS-20-122	 NMFS CMECS: Gravelly Sand	 NMFS Complex Habitat: No
OCS-20-123	 NMFS CMECS: Gravelly Sand	 NMFS Complex Habitat: No
OCS-20-125	 NMFS CMECS: Medium Sand	 NMFS Complex Habitat: No

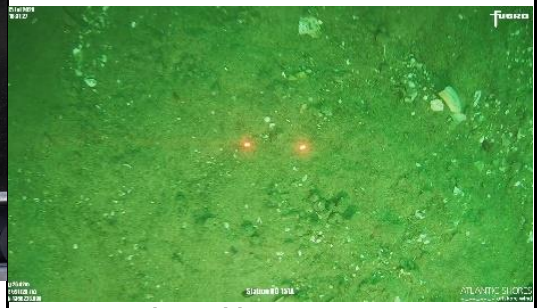
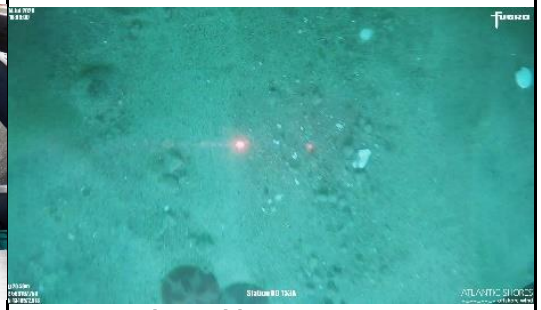
Station	A.	B.
OCS-20-127	 NMFS CMECS: Gravelly Sand	 NMFS Complex Habitat: No
OCS-20-128	 NMFS CMECS: Gravelly Sand	 NMFS Complex Habitat: No
OCS-20-129	 NMFS CMECS: Medium Sand	 NMFS Complex Habitat: No

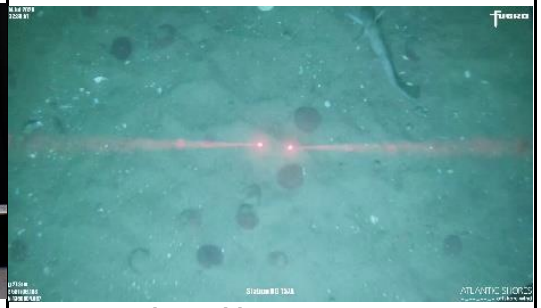
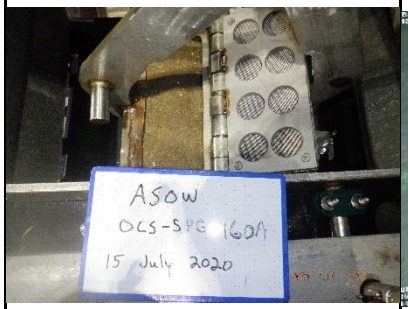
Station	A.	B.
OCS-20-131	 NMFS CMECS: Very Coarse/Coarse Sand	 NMFS Complex Habitat: No
OCS-20-133	 NMFS CMECS: Medium Sand	 NMFS Complex Habitat: No
OCS-20-135	 NMFS CMECS: Gravelly Sand	 NMFS Complex Habitat: No

Station	A.	B.
OCS-20-136	 NMFS CMECS: Medium Sand	 NMFS Complex Habitat: No
OCS-20-137	 NMFS CMECS: Gravelly Sand	 NMFS Complex Habitat: No
OCS-20-139	 NMFS CMECS: Gravelly Sand	 NMFS Complex Habitat: No

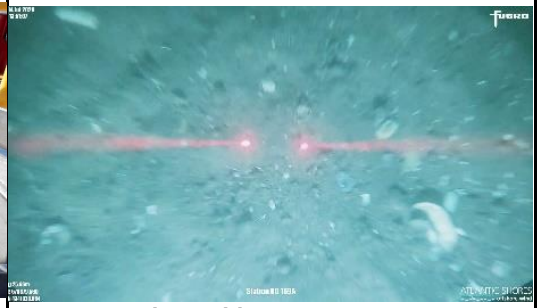
Station	A.	B.
OCS-20-141	 NMFS CMECS: Medium Sand	 NMFS Complex Habitat: No
OCS-20-143	 NMFS CMECS: Gravelly Sand	 NMFS Complex Habitat: No
OCS-20-145	 NMFS CMECS: Gravelly Sand	 NMFS Complex Habitat: No

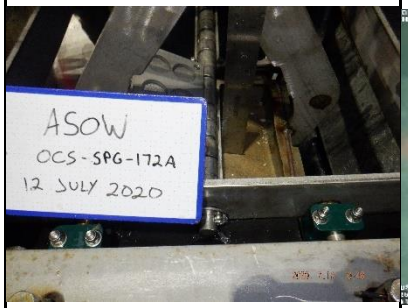
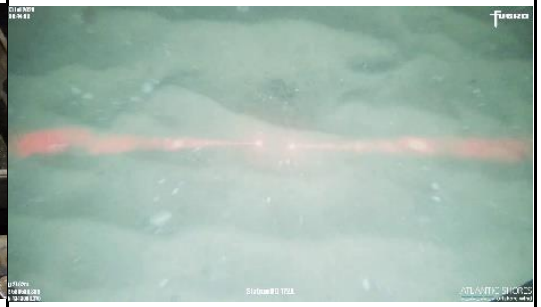
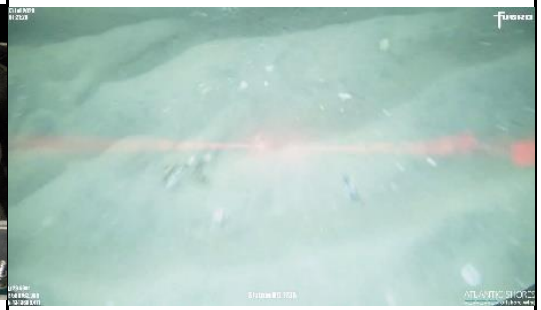
Station	A.	B.
OCS-20-147	 NMFS CMECS: Medium Sand	 NMFS Complex Habitat: No
OCS-20-148	 NMFS CMECS: Medium Sand	 NMFS Complex Habitat: No
OCS-20-149	 NMFS CMECS: Gravelly Sand	 NMFS Complex Habitat: No

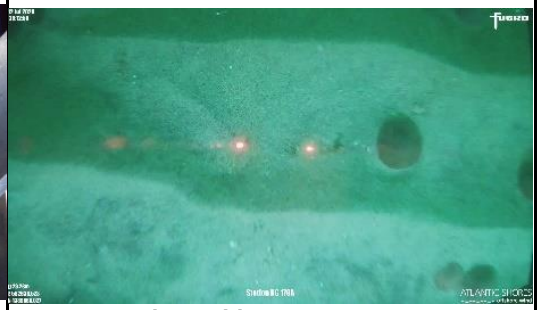
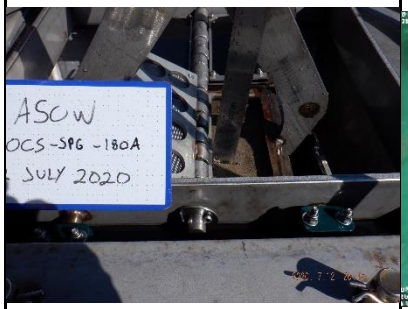
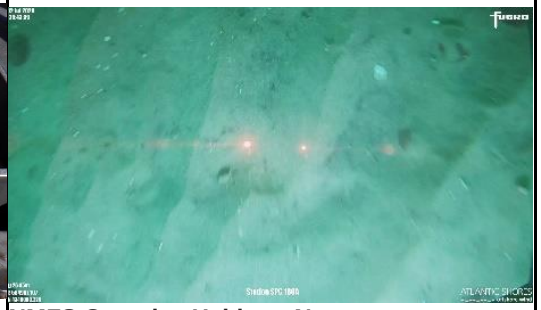
Station	A.	B.
OCS-20-151	 NMFS CMECS: Very Coarse/Coarse Sand	 NMFS Complex Habitat: No
OCS-20-153	 NMFS CMECS: Medium Sand	 NMFS Complex Habitat: No
OCS-20-155	 NMFS CMECS: Gravelly Sand	 NMFS Complex Habitat: No

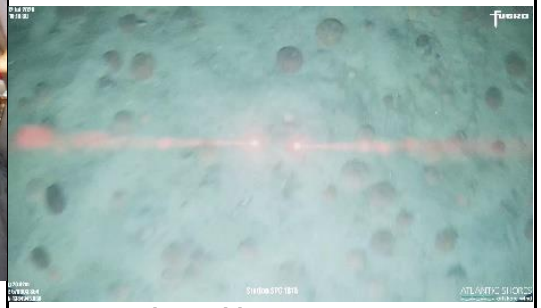
Station	A.	B.
OCS-20-157	 NMFS CMECS: Medium Sand	 NMFS Complex Habitat: No
OCS-20-159	 NMFS CMECS: Medium Sand	 NMFS Complex Habitat: No
OCS-20-160	 NMFS CMECS: Medium Sand	 NMFS Complex Habitat: No

Station	A.	B.
OCS-20-161	 NMFS CMECS: Medium Sand	 NMFS Complex Habitat: No
OCS-20-163	 NMFS CMECS: Fine/Very Fine Sand	 NMFS Complex Habitat: No
OCS-20-165	 NMFS CMECS: Medium Sand	 NMFS Complex Habitat: No

Station	A.	B.
OCS-20-167	 NMFS CMECS: Medium Sand	 NMFS Complex Habitat: No
OCS-20-169	 NMFS CMECS: Gravelly Sand	 NMFS Complex Habitat: No
OCS-20-171	 NMFS CMECS: Medium Sand	 NMFS Complex Habitat: No

Station	A.	B.
OCS-20-172	 NMFS CMECS: Muddy Sand	 NMFS Complex Habitat: No
OCS-20-173	 NMFS CMECS: Medium Sand	 NMFS Complex Habitat: No
OCS-20-175	 NMFS CMECS: Medium Sand	 NMFS Complex Habitat: No

Station	A.	B.
OCS-20-177		
	NMFS CMECS: Medium Sand	**NMFS Complex Habitat: No**
OCS-20-179		
	NMFS CMECS: Medium Sand	**NMFS Complex Habitat: No**
OCS-20-180		
	NMFS CMECS: Medium Sand	**NMFS Complex Habitat: No**

Station	A.	B.
OCS-20-181	 **NMFS CMECS: Fine/Very Fine Sand**	 **NMFS Complex Habitat: No**
OCS-20-183	 **NMFS CMECS: Gravelly Sand**	 **NMFS Complex Habitat: No**
OCS-20-185	 **NMFS CMECS: Sandy Gravel**	**(No grab video provided)** **NMFS Complex Habitat: Yes**

Station	A.	B.
OCS-20-191	 NMFS CMECS: Medium Sand	 NMFS Complex Habitat: No
OCS-20-500	 NMFS CMECS: Gravelly Sand	 NMFS Complex Habitat: No

APPENDIX C – FUGRO FIELD AND GRABCAM VIDEO NOTES

Table C - 1. Field and GrabCam video notes as provided directly by Fugro, unedited.

Station	Field preliminary visual grain description (wentworth scale)	Surface features or macrofauna	Grabcam video notes
CAR-20-201	FINE AND VERY FINE SAND	SAND	NEAR ZERO VISIBILITY
CAR-20-202	FINE AND VERY FINE SAND	SAND, FEW WORMS	NEAR ZERO VISIBILITY
CAR-20-203	FINE AND VERY FINE SAND WITH SILT	SAND, FEW SHELL FRAG	NEAR ZERO VISIBILITY. EN ROUTE TO STATION 204 CROSSED A MAJOR TURBIDITY FRONT
CAR-20-204	COARSE SAND, VERY COARSE SAND WITH SOME SILT	SAND, FULL SIEVES	SAND WAVES WITH SHELL HASH IN ROWS; LARGE SURFCLAM SHELLS
CAR-20-206	FINE, MEDIUM, COARSE SAND WITH SILT	SAND,SHELL FRAGMENTS, FEW VISIBLE	SAND, SHELLY BITS (?) IN WATER, SHELL FRAGMENTS, FLOUNDER 20:00:05?
CAR-20-208	MEDIUM AND COARSE SAND	MEDIUM SAND, HERMIT CRAB	SAND WAVES, SHELL FRAGMENTS, SEA ROBIN, SAND MOUNDS
CAR-20-210	FINE MEDIUM AND COARSE SAND, GRANULE	MEDIUM FINE SAND, WORMS, AN EGG	SAND WAVES, SHELL HASH, WORM CASING, SAND DOLLAR, CRAB
CAR-20-211	FINE AND VERY FINE SAND	SAND	NEAR ZERO VISIBILITY
CAR-20-212	FINE AND VERY FINE SAND	SAND, HERMIT CRAB	NEAR ZERO VISIBILITY

Station	Field preliminary visual grain description (wentworth scale)	Surface features or macrofauna	Grabcam video notes
CAR-20-217	FINE SAND TO COARSE SAND	FINE SAND, CLAM	SAND WAVES, SHELL FRAGMENTS, SEA ROBIN
LAR-20-002	VERY FINE SAND, COARSE SILT, COARSE SAND, GRANULE	VERY FINE SAND WITH HERMIT CRABS, NUMEROUS WORMSAND CASINGS	CASINGS, ANENOME, CRUSHED SELLS HASH, CRAB
LAR-20-004	MEDIUM+COARSE SAND WITH GRAVEL +SHELL	SAND WITH SHELL FRAGMENTS, FEW VISIBLE	GRAVEL ON SAND, SHELL FRAGMENTS, BUBBLES ON LENS
LAR-20-005	MOSTLY FINE AND VERY FINE SAND, SOME COARSE SAND AND SILT	SMOOTH FINE SAND	HIGH TURBIDITY
LAR-20-006	COARSE AND MEDIUM SAND WITH GRAVEL	SAND	VISIBILITY OK, FAST DRIFT OUTSIDE THE CIRCLE BEFORE MOVING BACK INTO IT
LAR-20-008	FINE SILT COARSE SILT, COARSE SAND, GRANULE, PEBBLE	COARSE SILT, NUMEROUS WORM CASINGS, HERMIT CRABS, WORMS	WORM CASINGS, CRAB, SHELL FRAGMENTS, FINE SAND
LAR-20-010	MEDIUM+COARSE SAND	SAND, DIAPATRA	ANEMONE, SAND, SAND DOLLARS
LAR-20-011	FINE+MEDIUM SAND	WARM TUBE BIOTURBATION	BIOTURBATION, SAND, NUDIBRANCH 18:37:00
LAR-20-012	MEDIUM, COARSE, VERY COARSE SAND	SAND, FEW VISIBLE	GRAVEL ROWS ON SAND

Station	Field preliminary visual grain description (wentworth scale)	Surface features or macrofauna	Grabcam video notes
LAR-20-014	COARSE AND VERY COARSE SAND WITHPEBBLES	PEBBLES ON SAND, FEW VISIBLE	QUICK, SAND+ GRAVEL
LAR-20-016	MEDIUM SAND, PEBBLES	FINE TO MEDIUM SAND, CLAM SHELLS, SAND DOLLARS	SEA ROBIN, MOUNDS OF SAND AND PEBBLES, TRANSITION TO SAND WAVES, CRAB
LAR-20-018	COARSE SAND, VERY COARSE SAND, GRANULE, PEBBLE	COURSE SAND, SEA SLUG	CRAB, SAND WAVES, PEBBLES, DHELL FRAGMENTS, SEA ROBIN
LAR-20-020	MEDIUM, COARSE SAND	SAND, LARGE DIAXION WARM, HALF CRAB	ONLY GRAB
LAR-20-021	MEDIUM, COARSE SAND WITH FEW SHELL FRAGMENTS	SAND, CHESTNUT ASTANT	SAND DOLLARS, SAND RIPPLES, SEA WED 2:32:48
LAR-20-022	FINE, MEDIUM, COARSE SAND	SAND "TUBES", NUDIBRANCH?	SKATE, SAND "MOUNDS", SEA ROBIN "WALKING", SKATE EGG
LAR-20-024	GRANULES, MEDIUM COARSE SAND	SANDY GRAVEL, FEW WARMS	SAND RAWS-LARGE, SCALLLLOP, 22:20:40 BLACK MASS, START SAND-GRAVEL
LAR-20-026	MEDIUM+COARSE SAND WITH GRAVEL	SAND WITH FEW GRAVEL, LITTLE VISIBLE	GRAVEL BETWEEN RIDGES, ONLY ONE LASER (LEFT), SEA ROBINS
LAR-20-028	MEDIUM TO VERY COARSE SAND WITH GRAVEL	SAND+GRAVEL	INCREASING GRAVEL, SHELL FRAGMENTS, STARFISH

Station	Field preliminary visual grain description (wentworth scale)	Surface features or macrofauna	Grabcam video notes
LAR-20-030	MEDIUM TO VERY COARSE SAND, GRAVEL	FEW SHELL FRAGMENTS, SAND, GRAVEL (GRAVELLY SAND), SUNFCLAM	SHELL/GRAVEL IN RIPPLES
LAR-20-031	FINE SAND PEBBLES, COARSE SAND	DINE SAND, SHELL, SNAIL, WORM	SAND WAVES, PEBBLES, SQUID, SEA ROBIN, SEA WEED ON CLAM, SHELL FRAGMENTS
LAR-20-032	MEDIUM, COARSE, VERY COARSE SAND WITH GRAVEL	SAND WITH GRAVEL, FEW VISIBLE	CRAB UNDER CLAM SHELL 19:10:10, GRAVEL WAVES
LAR-20-037	SILT, FINE SAND, MEDIUM SAND, COARSE SAND, GRAVEL	GRAVEL SAND, BAY SCALLOP, SKATE EGG, MUSSEL(IN OTHER BUCKET)	GRAVEL, URCHIN 1:36:42, SEA ROBIN, SKATE EGG, SEA WEED 1:38:09, SCALLOP
OCS-20-038	MEDIUM, COARSE, VERY COARSE SAND	SAND, SAND DOLLARS, FEW VISIBLE	SAND, SHELL FRAGMENTS, STARFISH, CLAMS
OCS-20-039	VERY COARSE SAND, COARSE SAND, MEDIUM SAND, PEBBLES	COARSE SAND, WORM, WORM CASINGS, CLAM, HERMIT CRAB	ONLY GRAB
OCS-20-041	MEDIUM+COARSE SAND	SAND, SOME BIOTURBATION, CHESTNUT ASTANT, FEW OTHER VISIBLE	SAND, SKATE EGG, BIOTURBATION, SHELL FRAGMENTS
OCS-20-043	MEDIUM TO COARSE SAND	SAND, SHELL, WORMS, SAND DOLLAR	SAND DOLLARS, SAND WAVES, SHELL FRAGMENTS, STAR FISH, SEA ROBIN, WORM CASING

Station	Field preliminary visual grain description (wentworth scale)	Surface features or macrofauna	Grabcam video notes
OCS-20-046	MEDIUM TO VERY COARSE SAND	SAND, SHELLS, SAND DOLLAR, HERMIT CRAB	SAND WAVES (SLIGHT) SHELL HASH, SAND DOLLARS, SEA ROBIN
OCS-20-047	FINE - COARSE SAND, PEBBLE	FINE SAND, SAND DOLLAR, SHELL FRAGMENT, HERMIT CRAB,	SAND, SAND DOLLARS, SHELL FRAGMENTS; HASH, SEA ROBIN, CLAMS WORM CASINGS
OCS-20-048	COARSE SAND	SAND, FEW VISIBLE	SAND, FRAGMENTS IN ROWS
OCS-20-049	COARSE TO VERY COARSE SAND	COARSE SAND, SAND DOLLARS	SAND WORMS, SHELL, SAND DOLLARS, SEA ROBIN, SHARK EGGS
OCS-20-051	MADIUM SAND, VERY COARSE SAND, PEBBLES, GRANULE	SAND, PEBBLES, SHELL, HERMIT CRAB	SHELL FRAGMENTS, SAND DOLLAR, PLANT LIFE (04:11) WORM CASING
OCS-20-053	FINE TO MEDIUM SAND, CLAY	WORM CASINGS, SHELL, SAND	CRAB, SAND DOLLAR, SEA ROBIN, MOUND OF SAND (6:35) (6:32 SACIL?)
OCS-20-055	MEDIUM+COARSE SAND WITH SHELL FRAGMENTS	SAND, SAND DOLLARS, DIAXIOS WARM	SAND RIPPLES, SAND DOLLARS
OCS-20-057	MEDIUM, COARSE, VERY COARSE SAND WITH SHELL FRAGMENTS	SAND, CLAM, SAND DOLLARS	SAND RIPPLES, SAND DOLLARS
OCS-20-059	MEDIUM, COARSE, VERY COARSE SAND	MIXED SAND, CLAM, SAND DOLLARS	SEA ROBIN, SKATE EGG, SHELL FRAGMENTS

Station	Field preliminary visual grain description (wentworth scale)	Surface features or macrofauna	Grabcam video notes
OCS-20-061	MEDIUM, COARSE, VERY COARSE SAND	SAND, SAND DOLLARS	SAND DOLLARS, SHELL FRAGMENTS
OCS-20-063	FINE TO COARSE SAND	SAND, SHELLS, CLAMS	CRAB, SAND WAVES, SHELL FRAGMENTS, SAND DOLLARS, SEA ROBIN
OCS-20-064	VERY COARSE SAND TO GRANULE	SAND, SHELLS, WORM, CLAM	SAND WAVES, SHELL FRAGMENTS, CRAB, SAND DOLLARS
OCS-20-065	COARSE TO GRANULE SAND	SAND, SHELLS, NO INFAUNA, EMPTY CLAM SHELLS	ONLY GRAB
OCS-20-067	MEDIUM, COARSE, VERY COARSE SAND, SHELL FRAGMENTS, FEW GRAVEL	SHELL FRAGMENTS + SAND, CLAM	SAND, SAND DOLLARS, CLAMS ON SURFACE
OCS-20-069	MEDIUM+COARSE SAND WITH SHELL FRAGMENTS	SAND, CLAM	SAND DOLLARS
OCS-20-071	MEDIUM+COARSE SAND	SAND, CLAM	SAND, SAND DOLLARS, STARFISH, SEA ROBIN
OCS-20-073	COARSE, MEDIUM, FINE SAND	SAND, SAND DOLLARS, SAND RIPPLES	CRAB, SAND DOLLARS
OCS-20-075	VERY COARSE SAND COARSE SAND WITH SHELL FRAGMENTS	SHELL FRAGMENTS AND SAND DOLLARS	JELLY FISH 03:50 SAND, SAND DOLLARS

Station	Field preliminary visual grain description (wentworth scale)	Surface features or macrofauna	Grabcam video notes
OCS-20-077	COARSE TO VERY COARSE SAND	SAND, SHELL FRAGMENTS	SAND, SAND DOLLARS, SHELL FRAGMENTS, SEA ROBIN
OCS-20-079	COARSE SAND WITH A VEIN OF FINE SAND	SAND, SHELL FRAGMENTS, CLAMS, SAND DOLLAR	CRAB, SEA ROBIN, SHARK EGG, SAND DOLLARS, SHELL FRAGMENTS
OCS-20-081	COARSE SAND	SAND, SAND DOLLARS, FEW WARMS	SAND, SAND DOLLARS
OCS-20-083	FINE AND COARSE SAND, GRANULE	COARS SAND, SHELLS, WORMS SAND DOLLAR	SAND WAVES, SHELL HASH, CRAB
OCS-20-085	MEDIUM, COARSE SAND WITH SHELL FRAGMENTS	SAND DOLLARS	SHELL FRAGMENTS, SAND DOLLARS, SAND RIPPLES
OCS-20-086	COARSE SAND, SHELL FRAGMENTS	SHELL	SAND DOLLARA, SHELL FRAGMENTS
OCS-20-087	FINE, MEDIUM, COARSE SAND	SHELL FRAGMENTS, SAND	SHELLS, SAND DOLLARS, DIOPATRA CASINGS
OCS-20-089	COARSE SAND	SAND, SAND DOLLARS	SAND
OCS-20-091	COARSE SAND WITH PEBBLES	SAND, SHELL FRAGMENTS, HERMIT CRABS, WORMS	SAND, SAND RIPPLES, WORM CASINGS SHELL FRAGMENTS
OCS-20-092	FINE SAND/CLCY/PEBBLES/SHELL FRAGMENTS	WARMS, SAND DOLLARS	SAND DOLLARS, SHELL FRAGMENTS

Station	Field preliminary visual grain description (wentworth scale)	Surface features or macrofauna	Grabcam video notes
OCS-20-093	COARSE TO MEDIUM SAND	SHELL FRAGMENTS, COARSE SAND, WORMS	SAND DOLLARS, SAND WAVES, SHELL FRAGMENTS
OCS-20-095	MEDIUM TO COARS SAND	SAND, SAND DOLLARS, SHELL FRAGMENTS	SAND WAVES, SAND DOLLARS, SHELL FRAGMENTS
OCS-20-097	MEDIUM + COARSE SAND AND CLAY	SHELL +CLAY BALLS, PEBBLE SIZED CLAY BALLS	SHELL, WORM CASINGS
OCS-20-099	COARSE SAND AND A LAYER OF FINE SAND	SAND, WORMS	LIMITED VIDEO DUE TO MURKY BOTTOM, NOT WORTH VESSEL LINE TO OBTAIN MORE VIDEO. MURKY BOTTOM, NOTICED A SAND WORM
OCS-20-101	MEDIUM, FINE SAND WITH SHELL FRAGMENTS	SHELL HASH FRAGMENTS	SHELL HASH IN ROWS, HAKE, SURFCLAM SHELLS
OCS-20-103	COARSE SAND	SAND, SHELL FRAGMENTS, WORMS	SAND RIPPLES, SHELL FRAGMENTS, SAND DOLLARS
OCS-20-105	COARSE SAND, PEBBLES	SAND, PEBBLES, SHELLS	SAND, SHELL FRAGMENTS, SAND RIPPLES, FISH, WORM CASINGS
OCS-20-107	MEDIUM TO COARSE SAND	SAND DOLLARS, WORMS, SHELL FRAGMENTS	SAND DOLLARS AND SAND WAVES. 20 HAKE FISH
OCS-20-109	MEDIUM AND COARSE SAND	SAND DOLLARS, WORMS	PREMATURE GRAB, BUT SAMPLE GOOD, SAND DOLLARS

Station	Field preliminary visual grain description (wentworth scale)	Surface features or macrofauna	Grabcam video notes
OCS-20-110	MEDIUM, COARSE, VERY COARSE SAND, FEW GRAVEL+SHELL FRAGMENTS	SAND, SHELL FRAGMENTS, WARM	SAND, SHELL FRAGMENTS, SAND RIPPLES
OCS-20-112	FINE SAND, COARSE SILT, COARSE SAND	SAND, WORMS, SNAILS	SEA ROBIN, SAND MOUNDS, SHELL HASH AND FRAGMENTS, CRAB, RAY
OCS-20-113	FINE SAND, MEDIUM SAND	FINE SAND, WORMS, SAND DOLLARS, HERMIT CRAB, CLAM	CRABS, SAND MOUND, SEA ROBIN SAND DOLLAR
OCS-20-114	MEDIUM TO COARSE SAND	MEDIUM SAND, CLAM, SHELL FRAGMENTS, WORM CAISING, BOTTOM CROWLING "BUG"	SAND DOLLAR, CLAMS, SHELL HASH, SEA ROBIN, SHARK EGG
OCS-20-116	MEDIUM TO COARSE SAND, FEW PEBBLES	SAND, SHELL FRAGMENTS, PEBBLES, NONE INFAUNA	ONLY GRAB
OCS-20-117	FINE SILT, MEDIUM SILT, FINE SAND, COARSE SAND, GRANULE	FINE SAND, SHELLS, HERMIT CRAB, WORM CASINGS, CLAM	SAND MOUNDS, SHELL HASH, SHELL, FRAGMENTS, SEA ROBIN, WORM, CLAM, WORM CASING, CRAB
OCS-20-118	MEDIUM TO VERY COARSE SAND, GRANULES	SAND+GRANULES, FEW VISIBLE	LOTS OF SHELL, CHESTNUT CLAMS+SEA ROBIN, BIOTURBATION, STARFISH
OCS-20-121	MEDIUM+COARSE SAND, FEW VERY COARSE SAND+GRANULE	SAND, JUVENILE SAND DOLLAR, SAND DOLLAR	SHELL FRAGMENTS + SAND

Station	Field preliminary visual grain description (wentworth scale)	Surface features or macrofauna	Grabcam video notes
OCS-20-122	FINE TO COARSE SAND	SAND, SHELL FRAGMENTS, WORM, CLAM, SAND DOLLAR	SAND DOLLARS, WORM CASINGS, SHELL FRAGMENTS, LARGE CLAMS
OCS-20-123	FINE TO COARSE SAND	FINE SAND, SHELLS, SAND DONLLAR, CLAM	SAND WAVES, SHELL, SAND DOLLARS, MOUNDS OF SAND, CRAB, SEA ROBIN
OCS-20-125	FINE, MEDIUM, COARSE SAND	HERMITE CRAB, FINE SAND, SAND, SHELL FRAGMENTS, WORM, SAND DOLLAR	SAN DOLLARS, SHELL HOSH, SAND WAVES, CLAMS, SEA ROBIN SHARK EGGS
OCS-20-127	CLAY, FINE, MEDIUM, COARSE, VERY COARSE AND GRANULE, PEBBLE WITH SHELL FRAGMENTS	CLAY BALLS (FEW), SKATE EGG	SAND, NO SAND DOLLARS-SOUTH-EAST, WORM TUBES 00:46:22-MIDDLE, CLAY BALLS 00:47:11-NORTHWEST
OCS-20-128	MEDIUM, COARSE, VERY COARSE SAND, GRANULE, PEBBLE, MANY SHELL FRAGMENTS	MANY SHELL FRAGMENTS, PEBBLES, FEW VISIBLE IN AMOUNT OF MATERIAL	DISTURBED, MANY SHELL FRAGMENTS, SEA ROBINS
OCS-20-129	MEDIUM, COARSE, VERY COARSE SAND WITH SHELL FRAGMENTS	SAND, SHELL FRAGMENTS, FEWER SAND DOLLARS	SAND, SAND DOLLARS, SHELL HASH, LITTLE BROWN CLAMS-CHESTNUT ASTARTE
OCS-20-131	COARSE TO FIND SAND	SAND DOLLARS, FINE SAND, FISH, CLAM	SAND DOLLARS, SHELL FRAGMENTS, SEA ROBINS
OCS-20-133	FINE TO COARSE SAND	SAND, SHELLS, SAND DOLLARS, CLAMS	SAND, SHELL FRAGMENTS, SAND DOLLARS, SEA ROBIN

Station	Field preliminary visual grain description (wentworth scale)	Surface features or macrofauna	Grabcam video notes
OCS-20-135	MEDIUM, COARSE, VERY COARSE SAND WITH SHELL FRAGMENTS	SAND, SHELL FRAGMENTS, CLAM	SAND, SAND DOLLARS
OCS-20-136	MEDIUM + COARSE SAND	SAND, SAND DOLLARS	SAND DOLLARS,
OCS-20-137	MEDIUM + COARSE SAND, VERY COARSE SAND	SAND, SAND DOLLARS, CLAMS	SAND DOLLARS, SUNFCLAM SHELLS, EAST TO WEAST, SEA ROBIN
OCS-20-139	VERY COARSE SAND TO GRANULATE SAND	SAND, SHELL FRAGMENTS, NO INFAUNA	SAND DOLLARS, SAND WAVES WITH SHELL FRAGMENTS, SHELLSIN THE TROUGHS, HAKE FISH, SEA ROBIN
OCS-20-141	MEDIUM TO COARSE SAND	SAND, SHELL FRAGMENTS, CLAMS	SAND, SHELLS, SAND DOLLAR, SHRIMP,SQUID, SAND RIPPLES
OCS-20-143	GRANULE, VERY COARSE, FINE	SAND, SHELLS, WRORM	SHELLS, SHELL FRAGMENT, SAND DOLLARS, FISH, SEA ROBIN, SHARK EGGS
OCS-20-145	VERY COARSE SAND, PEBBLES	SAND, SHELLS, SAN DOLLAR	SAND WAVES WITH SHELLS IN TROUGH, SEA ROBIN
OCS-20-147	COARSE SAND	SAND, SHELLS, CLAMS, CASING	SAND, SHELLS, SHELL FRAGMENTS, SAND DOLLARS, SEA ROBIN, STAR FISH
OCS-20-148	COARSE SAND AND VERY FINE SILT "BULBS"	SAND, SHELL FRAGMENTS, SAND DOLLAR	SAND, SHRIMP, SHELLS, SAND DOLLARS, CRAB

Station	Field preliminary visual grain description (wentworth scale)	Surface features or macrofauna	Grabcam video notes
OCS-20-149	VERY COARSE TO GRANULE SAND	GRANULE SAND WITH SHELL FRAGMENTS,CLAMS	SAND, SHELL FRAGMENT (EXTENSIVE)
OCS-20-151	MEDIUM COARSE SAND WITH SHELL FRAGMENTS	SAND, SHELL FRAGMENTS, CLAM	SAND, SAND DOLLARS
OCS-20-153	COARSE SAND	SAND DOLLARS, SURFCLAMS	SAND, SAND DOLLAS, SUNF CLAM SHELL
OCS-20-155	VERY COARSE+COARSE SAND WITH GRAVEL + PEBLLES+SHELL+SHELL FRAGMENTS	SAND, SHELL FRAGMENTS, WARM DIOPATRA, SHELL HANS	MANY SHELL FRAGMENTS, PEBBLES
OCS-20-157	COARSE SAND	SAND, SAND DOLLAS	SAND DOLLARS
OCS-20-159	VERY COARSE+COARSE SAND WITH FEW SHELL FRAGMENTS	SAND DOLLARS, SAND	SAND DOLLARS, SMOOTH NIDE
OCS-20-160	COARSE SAND WITH SHELL FRAGMENTS	SAND, SAND DOLLARS	SAND, SAND DOLLARS
OCS-20-161	MEDIUM+COARSE SAND WITH SHELL FRAGMENTS+FEW GRAVEL	SAND	TURBID WATER, SUNFCLAMS SHELLS, SAND RIPPLES
OCS-20-163	FINE+MEDIUM SAND WITH SHELL FRAGMENTS AND ORGANICS	SAND	MORE CONTROLLED, SKATE EGG, SAND RIPPLES

Station	Field preliminary visual grain description (wentworth scale)	Surface features or macrofauna	Grabcam video notes
OCS-20-165	COARSE SAND	SAND, SAND DOLLAR, SHELL FRAGMENTS	SAND, SAND DOLLARS, SHELL, SHELL FRAGMENTS
OCS-20-167	COARSE, MEDIUM SAND, PEBBLES	SAND DOLLARS	SAND, SHELL FRAGMENTS
OCS-20-169	COARSE SAND AND PEBBLES	SAND , SHELL FRAGMENTS, PEBBLES, SHRIMP	SAND, SHELLS, SHELL FRAGMENTS
OCS-20-171	COARSE SAND	SAND, SHELL, FRAGMENT	SAND RIPPLES, SAND, SHELL FRAGMENTS, CRAB, SEA ROBIN
OCS-20-172	MEDIUM, FINE SAND WITH SILTY CLAY	SAND ON TOP, SILTY CLAY 2-3" DEEP, WARM	1 SKATE EGG (OLD), SALPS?, CRAB, SAND INCREASED TURBIDITY
OCS-20-173	COARSE, MEDIUM, FINE SAND WITH SHELL FRAGMENTS	SAND, SAND DOLLARS	CRAB, SAND, SAND DOLLARS
OCS-20-175	COARSE TO MEDIUM SAND	HAKE, SAND DOLLARS, SHELL FRAGMENTS	SAND DOLLARS, SAND WAVES, HAKE FISH, SHELL FRAGMENTS
OCS-20-177	COARSE TO MEDIUM SAND	WORMS	SAND WAVES, SAND DOLLARS, SUNFCLAM SHELLS
OCS-20-179	FINE, MEDIUM, COARSE SAND	SAND DOLLARS, FEW INFAUNA VISIBLE	LOTS OF SAND DOLLARS, SAND WAVES, LITTLE CRABS WHEN SAMPLE TAKEN
OCS-20-180	MEDIUM, FINE SAND	SAND DOLLARS, WORMS	SMALL SAND WAVES, SAN DOLLARS, SHELL BITS

Station	Field preliminary visual grain description (wentworth scale)	Surface features or macrofauna	Grabcam video notes
OCS-20-181	VERY FINE SAND	SAND DOLLARS, SHELL FRAGMENTS	SAND DOLLARS AND SHELL FRAGMENTS
OCS-20-183	MEDIUM, COARSE, VERY COARSE WITH FEW GRAVEL+SHELL FRAGMENTS	UNCONSOLIDATED, RECENTLY PERTURBED SAND, FEW WARMS, CHESTNUT ASTANT	TRAWL MOUNDS, SHELL FRAGMENTS
OCS-20-185	FINE SAND, MEDIUM SAND, COARSE SAND, PEBBLE	SAND AND PEBBLE, NO INFAUNA, LOTS OF PEBBLES AND SHELL FRAGMENTS	SEA ROBIN, PEBBLES WITH MOUNDS OF SAND, SHELL FRAGMENTS, CRAB, SEA WEED, SKATE EGG
OCS-20-191	MEDIUM + COARSE SAND WITH SHELL FRAGMENTS	FEW SHELL FRAGMENTS	STARFISH, SAND DOLLARS
OCS-20-500	COARSE SAND	SAND AND SHELL FRAGMENTS, WORM CASING	ONLY GRAB
OCS-22-419	SANDY GRAVELS WITH SHELL FRAGMENTS, RIPPLES	N/A	SEA ROBIN, GASTROPOD EGG CASE
OCS-22-419	SANDY GRAVELS WITH SHELL FRAGMENTS, RIPPLES	N/A	SEA ROBIN, GASTROPOD EGG CASE
OCS-22-427D	COARSE SAND, SHELL FRAGMENTS AND GASTROPODS IN RIPPLE TROUGHS	TRACKS AND TRAILS, TUBES (PATCHY CLUSTERS)	SEA ROBINS, CRABS, DIOPATRA, ASTARTE BIVALVE, SCATTERED GASTROPOD EGG CASES, AND SMALL SHRIMP

Station	Field preliminary visual grain description (wentworth scale)	Surface features or macrofauna	Grabcam video notes
OCS-22-427	COARSE SAND, SHELL FRAGMENTS AND GASTROPODS IN RIPPLE TROUGHS	TRACKS AND TRAILS, TUBES (PATCHY CLUSTERS)	SEA ROBINS, CRABS, DIOPATRA, ASTARTE BIVALVE, SCATTERED GASTROPOD EGG CASES, AND SMALL SHRIMP
OCS-22-436	SMALL RIPPLES, SAND, SHELL FRAGMENTS ALIGNED IN RIPPLE TROUGHS	VERY COARSE SAND, AMPHIPOD ON SURFACE, ONE TUBE ON SURFACE WITH SOME FINE-GRAINED SAND	SKATE EGG CASES
OCS-22-440	SANDY, VERY SMALL SCALE RIPPLES, SCATTERED SHELL FRAGMENTS	BURROWS	NUMEROUS SAND DOLLARS, DIOPATRA, GASTROPOD EGG CASE, SEA GRAPE (TUNICATE), HERMIT CRAB
OCS-22-453	SANDY WITH SHELL FRAGMENTS, LOW/SUBTLE RIPPLES	NONE	NO ORGANISMS OBSERVED - SHORT VIDEO ONLY
OCS-22-463	SAND, SHELL FRAMENTS	SAND DOLLAR, SNAIL	N/A
OCS-22-467	SANDY, RIPPLED, WITH GRANULES/PEBBLES AND SMALL FRAGMENTS IN TROUGH	NONE OBSERVED	POOR VISIBILITY, HEAVE
OCS-22-470	SMALL SCALE RIPPLES (DIMPLED), SANDY, SCATTERED SHELL FRAGMENTS	SAND DOLLARS	RELATIVELY POOR VISIBILITY, CAMERA HEAVING
OCS-22-490	SAND RIPPLES	N/A	NUMEROUS SAND DOLLARS, SAND CLASTS, POSSIBLE DIOPATRA,

Station	Field preliminary visual grain description (wentworth scale)	Surface features or macrofauna	Grabcam video notes
			SQUIDS, FISH, AND SKATE EGG CASES
OCS-22-491	SANDY, SMALL RIPPLES	TRACKS AND TRAILS	SAND DOLLARS, DIOPATRA TUBES, SKATE EGG CASE, CRAB, AND SEA ROBIN
OCS-22-491D	SANDY, SMALL RIPPLES	TRACKS AND TRAILS	SAND DOLLARS, DIOPATRA TUBES, SKATE EGG CASE, CRAB, AND SEA ROBIN
OCS-22-492	SANDY, SMALL RIPPLES, SCATTERED SHELL FRAGMENTS	BURROWS AND TUBES	SAND DOLLARS AND SKATE EGG CASE
OCS-22-493	SAND, SOME SHELL FRAGMENTS, RIPPLES	TRACKS AND WORM TUBES	SPONGE, FEW SAND DOLLARS, SKATE EGG, SNAIL, FISH, HERMIT CRAB
OCS-22-498	SAND, RIPPLES, SAND CLASTS	WORM TUBES ON GRAB SURFACE	SAND DOLLARS
OCS-22-501	SAND	TRACKS	SAND DOLLARS, FLOUNDER, HERMIT CRAB
OCS-22-502	SAND	WORM TUBE	SAND DOLLARS, SKATE EGG
OCS-22-503	SAND, SHELL FRAGMENTS	N/A	SAND DOLLARS, SEA ROBINS, SPONGE
OCS-22-505	SANDY, NO BEDFORMS	BURROWS, TRACKS, TUBES	NUMEROUS SAND DOLLARS

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OCS-22-506	SANDY, SCATTERED SHELL FRAGMENTS	TRACKS AND TRAILS, TUBES	SAND DOLLARS, CRAB, AND FISH
LAR-22-383	SAND RIPPLES, SHELL FRAGMENTS IN TROUGHS	N/A	NUMEROUS SAND DOLLARS, FISH
LAR-22-415	SANDY, SHELLY, SAND RIPPLES WITH SHELLS IN THE TROUGHS, SOME GRAVEL	N/A	SAND DOLLARS, SEA ROBINS, SKATE EGG CASE, AND SKATE. ONE BUCKET FILLED, OTHER LOST DUE TO SPISULA SHELL IN JAWS
LAR-22-420D	SAND RIPPLES, SHELL FRAGMENTS IN TROUGHS, GRANULES AND PEBBLES		NUMEROUS SAND DOLLARS, DIOPATRA
LAR-22-420	SAND RIPPLES, SHELL FRAGMENTS IN TROUGHS, GRANULES AND PEBBLES		NUMEROUS SAND DOLLARS, DIOPATRA
LAR-22-433	SANDY SEAFLOOR, SHELL FRAGMENTS, NO BEDFORM	NUMEROUS SAND DOLLARS ON SURFACE OF GRAB, FEW WORM TUBES	NUMEROUS SAND DOLLARS, SOME DIOPATRA, TUBES
LAR-22-446	SAND, SHELL FRAGMENTS, GRAVELS, RIPPLES	BURROWS	SAND DOLLARS
LAR-22-452	SAND, SHELL FRAGMENTS	N/A	SAND DOLLARS, AMPHIPOD TRACKS, SNAIL

Station	Field preliminary visual grain description (wentworth scale)	Surface features or macrofauna	Grabcam video notes
LAR-22-457	SHELL FRAGMENTS, SAND, RIPPLES	N/A	SAND DOLLARS
LAR-22-459	SAND, SHELL FRAGMENTS	N/A	SAND DOLLARS, STARFISH
LAR-22-462	SAND, SHELL FRAGMENTS. MEDIUM COARSE SAND UPPER 3-4CM, UNDERLAIN BY GRAY CLAY	WORM TUBES	SEA ROBIN AND JUVENILE FLOUNDER
LAR-22-464	SAND, SHELL FRAGMENTS (DENSE)	DIOPATRA MOUNDS AND TUBES ON GRAB SURFACE, WORM TUBES, WORM BURROWS IN SIEVE	LOW VISIBILITY
LAR-22-469	SAND, SHELL FRAGMENTS (DENSE)	BURROWS AND TRACKS	SAND DOLLARS, SEA ROBIN, MOON SNAIL
LAR-22-472D	SAND, SHELL FRAGMENTS, RIPPLES	DIOPATRA MOUNDS	SAND DOLLARS
LAR-22-472	SAND, SHELL FRAGMENTS, RIPPLES	DIOPATRA MOUNDS	SAND DOLLARS
LAR-22-473	SANDY WITH SHELL FRAGMENTS	N/A	SAND DOLLARS AND SEA ROBIN
LAR-22-479	SMALL SCALE RIPPLES (DIMPLED), SANDY, SCATTERED SHELL FRAGMENTS	N/A	SAND DOLLARS, DIOPATRA, HERMIT CRAB, SEA ROBIN. RELATIVELY LARGE HEAVE ON VIDEO.