Empire Offshore Wind LLC
Empire Wind 2 Project

Article VII Application

Appendix E
Benthic Resource Characterization Reports

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ACRONYMS AND ABBREVIATIONS

Alpine	Alpine Ocean Seismic Survey, Inc.
BOEM	U.S. Bureau of Ocean Energy Management
CFR	Code of Federal Regulations
Empire, or the Applicant	Empire Offshore Wind LLC
EW 2	Empire Wind 2
ft	foot
Lease Area	BOEM-designated Renewable Energy Lease Area OCS-A 0512
m	meter
NYSPSC or Commission	New York Public Service Commission
NY Project	portions of the EW 2 Project transmission system located within the State of New York
PSL	New York Public Service Law
SPI	sediment profile imagery

E.1 INTRODUCTION

Empire Offshore Wind LLC (Empire, or the Applicant) proposes to construct and operate the Empire Wind 2 (EW 2) Project as one of two separate offshore wind projects to be located within the Bureau of Ocean Energy Management (BOEM) designated Renewable Energy Lease Area OCS-A 0512 (Lease Area). This assessment is being submitted to the New York Public Service Commission (NYPSC or Commission) for the portions of the EW 2 Project transmission system located within the State of New York (collectively the NY Project) pursuant to Article VII of the New York Public Service Law (PSL).

E.2 BENTHIC SURVEY REPORTS

This Appendix to the EW 2 Project Article VII Application presents complete reports of benthic surveys conducted by Empire and its contractors to support the characterization of benthic resources in the submarine export cable corridor in the State of New York (NY Project Area). Note that survey reports cover a larger area than the NY Project Area. As the concept of the EW 2 Project has evolved, survey reports may reflect routing that has subsequently been modified. The 2019 benthic survey report is included as **Attachment E-1, Benthic Assessment Survey of Proposed Export Cable Routes in Support of the Equinor Wind OCS-A 0512 Offshore Wind Farm Project** (Empire[1]/Inspire 2019). The report for benthic surveys conducted in 2021 is included as **Attachment E-2, Empire Wind 2021 Surveys Environmental Campaign – EW2 RV Shearwater**.

Benthic surveys were conducted in accordance with the following guidelines:

- BOEM's site characterization requirements in 30 Code of Federal Regulations (CFR) § 585.626;
- BOEM's *Guidelines for Providing Benthic Habitat Survey Information for Renewable Energy Development on the Atlantic Outer Continental Shelf Pursuant to 30 CFR Part 585* (BOEM 2019a);
- BOEM's *Guidelines for Providing Information on Fisheries for Renewable Energy Development on the Atlantic Outer Continental Shelf Pursuant to 30 CFR Part 585* (BOEM 2019b); and
- The National Oceanic and Atmospheric Administration National Marine Fisheries Service Greater Atlantic Regional Fisheries Office's *Recommendations for Mapping Fish Habitat* (NOAA Fisheries 2020)[2].

The characterization of benthic resources in the Benthic Characterization Study Area depicted in **Figure E-1** incorporated data from Empire's site-specific surveys; publicly-available databases (e.g., NOAA Fisheries 2019, Northeast Regional Ocean Council 2019, Mid-Atlantic Regional Ocean Council 2019); regional surveys; resource reports (e.g., NYSERDA 2017, NEFMC 2017, NOAA Fisheries 2017, MAFMC 2016 and 2017); and relevant peer-reviewed literature. Empire's project-specific survey is summarized in **Table E-1** and briefly described below.

Empire contracted Inspire, LLC to conduct benthic sampling along the proposed submarine export cable siting corridor in spring 2019 using sediment profile imagery (SPI) and grab samples to characterize benthic habitats (**Attachment E-1)**. The interpretation of benthic substrate indicated by backscatter was well-correlated with SPI results. Grain size distribution was analyzed in six sediment grab samples to ground-truth the SPI results;

[1] Empire is a direct, wholly owned subsidiary of Empire Offshore Wind Holdings LLC ("Empire HoldCo"). Empire HoldCo is jointly owned by (1) an indirect, wholly owned subsidiary of Equinor ASA (collectively, "Equinor"); and (2) an indirect, wholly owned subsidiary of BP Wind Energy North America Inc. ("BP"). BP acquired ownership interest in Empire HoldCo in a transaction that closed on January 29, 2021.
[2] This guidance was released in May 2020 and is referenced in the 2020 and 2021 survey reports.

no infauna or epifauna were sampled (see **Table E-1**). Full survey reports are included in this appendix. Digital imagery is available upon request.

To augment the 2019 survey data and characterize previously unsurveyed portions of the EW 2 submarine export cable siting corridor, Empire conducted additional benthic surveys in April and May 2021. Empire contracted Alpine Ocean Seismic Survey, Inc. (Alpine) to perform a geophysical and environmental survey along the EW 2 export cable corridor to ground-truth the results of geophysical data, characterize surficial sediment conditions, and provide benthic habitat classification as per BOEM guidelines and NOAA Fisheries recommendations (**Attachment E-2**). Empire also contracted Alpine to perform an additional high-resolution geophysical survey at the EW 2 landfall. The survey spanned April to May 2021 and employed multi-beam echosounder; ultra-short baseline; sound velocity profiler; modified Van Veen grab; shallower water camera system; and water quality profiler data. The surveys corroborated characterizations of softbottom habitat in previously surveyed portions of the EW 2 submarine export cable siting corridor and detected novel hardbottom (e.g., cobbles, boulders) in previously unsurveyed portions of the corridor.

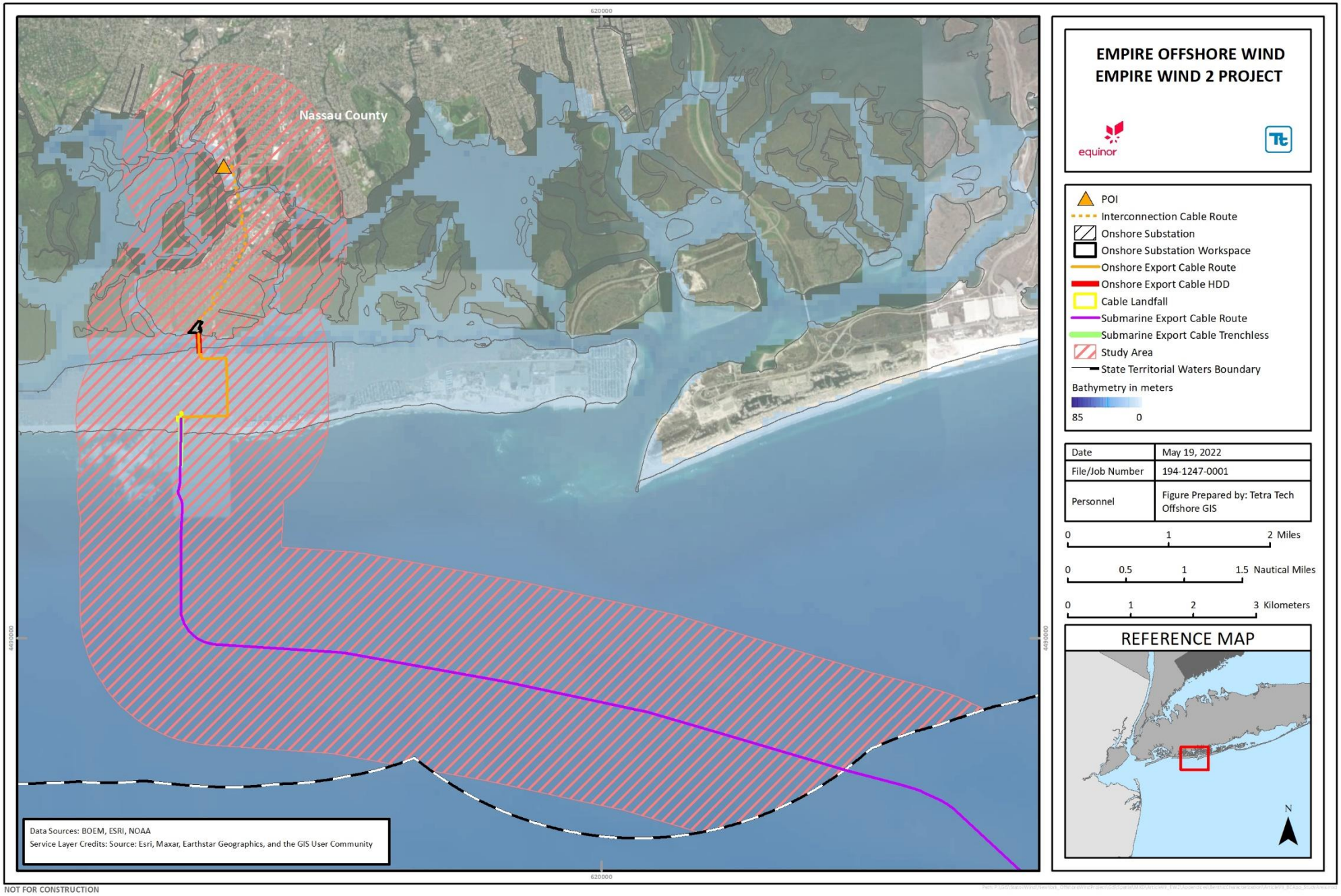

Figure E-1 Benthic Characterization Study Area

Table E-1 Project-Specific Benthic Surveys in EW 2 Project Area

Project Subarea	Sediment Grabs (Grain Size)	Sediment Grabs (Benthic Infauna)		Benthic Imagery		Description of Survey	
		Method a/	Sample Number	Method	Sample Number	Sample Dates	Surveyor
Benthic Assessment Survey Report (EW 1 and EW 2) (**Attachment E-1**) b/	16	no organisms collected		SPI/PV	172	2019 July	Inspire
Habitat Characterization Report (EW 2) (**Attachment E-2**)	37	Modified Day Grab/Van Veen	37	Drop-down still images and 600-m towed video transects	15 transects; 1,683 still images and 227 video snapshots)	2020 Nov-Dec	Gardline

Notes:
a/ Total sample number, including additional samples outside the NY Project area.
MBES = Multibeam echo sounder
SPI/PV = Sediment profile image/plan view image
SSS = Side-scan sonar

E.3 REFERENCES

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ATTACHMENT E-1
BENTHIC ASSESSMENT SURVEY OF PROPOSED EXPORT CABLE ROUTES

Benthic Assessment Survey of Proposed Export Cable Routes in Support of the Equinor Wind OCS-A 0512 Offshore Wind Farm Project

DATA REPORT

Survey Conducted 10-15 July 2019

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LIST OF ACRONYMS

aRPD	apparent Redox Potential Discontinuity
BOEM	Bureau of Ocean Energy Management
CMECS	Coastal and Marine Ecological Classification Standard
COP	Construction and Operations Plan
DSLR	Digital single-lens reflex
Equinor	Equinor Wind US, LLC
FGDC	Federal Geographic Data Committee
G&G	Geological and Geophysical Survey
GPS	Global Positioning System
INSPIRE	INSPIRE Environmental, LLC
LIECR	Long Island Export Cable Route
NEF	Nikon Electronic Format
NJECR	New Jersey Export Cable Route
NYHECR	New York Harbor Export Cable Route
OCS	Outer Continental Shelf
PEP	Project Execution Plan
PSD	Photoshop Document
PV	Plan View
SOD	Sediment oxygen demand
SOP	Standard operating procedure
SPI	Sediment Profile Imaging

EXECUTIVE SUMMARY

INSPIRE Environmental conducted a combined Sediment Profile and Plan View Imaging (SPI/PV) survey at stations along the proposed potential Equinor Wind Export Cable Routes and at reference stations. The SPI/PV survey was conducted as part of a benthic assessment of Equinor Wind Offshore Lease Area OCS-A 0512 and provides an interpretive assessment of discrete sampling stations to characterize and delineate the benthic habitat.

The Equinor lease area OCS-A 0512 is located in the federal waters of the New York Bight. The proposed cable routes transit much of the NY Bight in federal waters, but portions also extend into NY and NJ state waters as well. To conduct a benthic assessment of the proposed area that met the Bureau of Ocean Energy Management (BOEM) guidelines, INSPIRE designed a 157-station SPI/PV survey along the cable route and 15 stations at pre-determined reference stations for a total of 172 stations surveyed. Sixteen sediment grabs were also collected to ground-truth the SPI/PV data.

Sediment type along the proposed cable routes varied at large but not small scales. Surficial sediments across the surveyed area were spatially heterogenous at the inter-station scale (i.e., sediment type varied by station) and mostly homogenous at the intra-station scale (i.e., most replicates at a station were similar in sediment type). This trend was true at the reference stations. Despite the spatial variations in sediment types, most of the sediment found along the cable routes and at the reference stations were varying sizes of mobile sand or mobile sand mixed with gravel, with a few instances of silt-clay and cobbles/boulders. The sediment types documented during the SPI/PV survey were used to ground-truth USGS backscatter data. The SPI/PV data corresponded well with the backscatter data along the cable routes and at the reference stations. Extrapolating bottom type in the area using the SPI/PV and USGS backscatter data is appropriate given the ground-truth verification. Grain-size deduced from sediment grabs was generally in agreement with the sediment types designated with SPI/PV. Disagreement between the grab and SPI/PV data can be attributed to the sediment grabs collecting only a single replicate of a relatively small area of the seafloor and not capturing the intra-station heterogeneity present at the surveyed areas.

The sediment types documented along the proposed cable routes corresponded to the designated Habitat Types. Habitat Types were defined based on the physical habitat structure and mobility, as well as the dominant CMECS Biotic Subclass and CMECS Biotic Group. Three broad habitat types were identified at the surveyed area, Sand Sheets, Sand with Mobile Gravel, and Patchy, Cobbles, Boulders on Sand. Stations were predominantly Sand Sheet habitat, and the Hudson Shelf Valley appeared to be the primary delineation of Habitat Type in the surveyed area. The transition from a seafloor habitat of Sand Sheet to one of Sand with Mobile Gravel occurred right at the Hudson Shelf Valley for both the reference stations and stations along the proposed cable routes. Stations east of the submarine valley were Sand Sheet habitat, and stations west of the submarine valley were a habitat of Sand with Mobile Gravel. Patchy, Cobbles, Boulders on Sand were documented at Station 050 situated on Cholera Bank, and along the NJECR at Station 010 in the Hudson Shelf Valley. Cobbles and

boulders tend to be predominantly stationary allowing for attached fauna to settle and grow, whereas sand and gravel are particles that are small enough that the average hydrodynamic forcing on the bottom can mobilize and transport them; mobilized grains makes the presence and subsistence of attached fauna unlikely.

Soft Sediment Fauna was the dominant Biotic Subclass observed across the surveyed area. The predominance of Soft Sediment Fauna corresponded to the predominant Sediment Types and Habitat Types observed along the proposed cable routes. There were a few instances of Attached Fauna present (12 of the 157 station samples), and Mussel Beds made-up the majority of observations (7 of the 12 stations). At the remaining stations, one station had trace coverage of barnacles (Station 133), and the other instances were sparse coverage of sponges, hydroids, and mussels at Stations 010, 046, and 068, respectively. Station 050 was an exception with dense cover of diverse attached fauna (corals, sponges, barnacles, hydroids). The reference stations were exclusively composed of Soft Sediment Fauna.

Along the proposed cable routes Biotic Group was observed to be spatial heterogenous, with a high diversity of Biotic Groups documented. Sand dollar beds and both Small and Larger Tube-Building Fauna were the predominant Biotic Groups that were observed, with much of the tube-building activity the product of the polychaete *Diopatra cuprea. D. cuprea* produce tubes reinforced with shell fragments and tiny pebbles which are cemented in the style of an overlapping mosaic giving these tubes a distinct appearance. The high variability in dominant Biotic Groups along the proposed cable routes highlights the diversity of benthic fauna on the seafloor in the NY Bight.

Sensitive taxa were only documented at one station, Station 050, where the Northern Star Coral *Astrangia* spp. was observed in all replicates. *Astrangia* is a stony coral that attaches to hard substrate instead of building its own structure like those corals commonly observed in tropical reefs. The polyps are translucent, and the colony has a furry appearance when they are expanded. These sensitive taxa were observed in conjunction with other non-sensitive attached fauna (sponges, hydroids, barnacles).

The results and images from this survey will allow accurate characterization and delineation of the benthic environment and establish a baseline of both large- and small-scale biological features along the potential proposed cable routes and at the three reference areas. The results will also allow Equinor to broadly communicate the results of the survey using seafloor images of predevelopment conditions. Contributions from this survey will provide valuable information to address BOEM guidelines and regulations.

1.0 INTRODUCTION

1.1 Project Background

Equinor Wind US, LLC (Equinor) and the U.S. Department of Interior's Bureau of Ocean Energy Management (BOEM) executed a commercial lease for the development of a wind energy facility on the Outer Continental Shelf (OCS) offshore New York in Lease OCS-A-512, (referred to in this report as the "Lease Area"), effective April 1, 2017. Equinor awarded INSPIRE Environmental (INSPIRE) the benthic assessment investigation of the proposed potential cable routes to support spatial planning decisions, reduce uncertainty associated with baseline conditions, and inform future approaches to quantify changes in the benthic community associated with proposed Project activities.

The Equinor lease area is in the federal waters of the New York Bight, an average of 20 miles south of Long Island, east of the Rockaways. The Equinor Wind site extends 14 to 30 miles southeast of Long Island and covers water depths between 20 to 40 meters (65 to 131 feet); the bulk of the work will take place in the shelf waters adjacent New York (NY) and New Jersey (NJ), which range in depth from approximately 5 to 63 meters (16 to 206 ft) (Figure 1-1). The proposed cable routes transit much of the NY Bight in federal waters, but portions also extend into NY and NJ state waters as well.

The continental shelf within the NY Bight region is characterized primarily by ridge and swale topography, isolated and shore-attached linear sand shoals and ridges, and localized artificial topographic highs (Figure 1-2, Byrnes et al. 2004). The most prominent sea floor feature in this area is the 170-km-long submarine Hudson River Shelf Valley which extends southeasterly across the continental shelf offshore New York City toward the shelf break until it connects with the Hudson Canyon (Rona et al. 2015 Figure 1-2). Northeast of the Hudson River Shelf Valley is a prominent northeast-southwest trending shoal. It is referred to as Cholera Banks and is characterized as an eastward extension of one or more coastal plain strata (Williams and Duane 1974). It has been suggested that this area was an emergent headland covered by coastal plain strata during the early Holocene (Schwab et al. 2000).

INSPIRE Environmental conducted a benthic assessment survey along the proposed cable routes for Equinor's lease area utilizing combined Sediment Profile and Plan View Imaging (SPI/PV). The survey was conducted at stations along the cable route and at pre-determined reference stations.

1.2 Objectives

The overall objective of this project was to conduct a benthic assessment survey along proposed export cable routes, specifically:

1. Identify and confirm dominant benthic macrofaunal and macrofloral communities and substrata in the potential Export Cable Corridors from the Lease Area to landfalls in NY and NJ associated with development of offshore wind energy within BOEM's Lease Area OCS-A-512;

- Dominant and Co-Occurring Coastal and Marine Ecological Classification Standard (CMECS) Biotic Subclasses and Groups
- Observed flora and fauna and evidence of their presence (i.e., tracks, burrows, tubes)
- Infaunal successional stage (functional indicator of benthic community)

2. Prepare for the design of a pre-construction baseline study that will be established later to assess whether detectable changes occurred in post-construction benthic habitat associated with proposed operations;

   - Statistically sound sampling density and arrangement that meets BOEM requirements of stations spaced at a distance of 1.9 km.

3. Collect information aimed at supporting spatial planning decisions;

   - Statistically sound sampling density and arrangement
   - Identification of benthic habitat types and potentially sensitive habitats

4. Collect information aimed at reducing uncertainty associated with baseline conditions and/or to inform the interpretation of survey results; and

   - Use of regional data. For example, INSPIRE contributed data collected for the New York State Energy Development Authority (NYSERDA) to NOAA to improve a regional grain size prediction model (Poti et al. 2012)

5. Inform development of an approach to quantify substantial changes in the benthic community composition associated with proposed Project activities.

   - Collection of data at reference stations for comparison

BOEM has produced regulations and guidelines for conducting a site characterization for the proposed development of all offshore wind projects in U.S. federal waters. The SPI/PV benthic assessment was conducted to provide Equinor with data contributing to:

- Guidelines for Information Requirements for a Renewable Energy Construction and Operation Plan (COP) (BOEM 2016),
- Guidelines for Providing Geophysical, Geotechnical, and Geohazard Information Pursuant to 30 CFR Part 585 (BOEM 2015),
- Guidelines for Providing Archaeological and Historic Property Information Pursuant to 30 CFR Part 585, prepared by BOEM July 2015 and March 2017 (BOEM 2017), and;
- Guidelines for Providing Benthic Habitat Survey Information for Renewable Energy Development on the Atlantic Outer Continental Shelf Pursuant to 30 CFR Part 585 (BOEM 2019).

SPI/PV parameters collected as part of this survey were ‘mapped’ to corresponding BOEM Site Characterization guidelines for benthic assessment (BOEM 2019). This allows for a clear representation of how data collected as part of this survey satisfies BOEM recommended guidelines.

2.0 METHODS

2.1 Sediment Profile and Plan View Imaging

Sediment profile and plan view (SPI/PV) imaging is a monitoring technique used to provide data on the physical characteristics of the seafloor and the status of the benthic biological community (Germano et al. 2011). SPI/PV imaging has been shown to be a powerful reconnaissance tool that can efficiently map gradients in sediment type, biological communities, or disturbances from physical forces, anthropogenic input, or organic enrichment. Results and interpretations from SPI/PV data are about dynamic processes that have been deduced from imaged structures; as such, they should be considered hypotheses available for further testing/confirmation.

A 172–station SPI/PV survey was conducted by scientists from INSPIRE Environmental 10-15 July 2019 aboard the utility vessel *Northstar Commander*, along the proposed export cable routes for the Equinor Wind lease area, and at three pre-determined reference areas (Figure 2-1). The Equinor lease area is in federal waters on the continental shelf adjacent NY and NJY, and the proposed cable routes transit federal as well as NY and NJ state waters. Per BOEM guidelines stations were spaced at a distance of 1.9 km along the proposed cable routes, and reference locations were determined based on USGS backscatter data of the New York Bight (Figure 2-2).

SPI/PV station locations are provided in Appendix A. The methodology for data acquisition and analysis for these images was consistent with the sampling methods described in detail in the Project Execution Plan (PEP) for this project (INSPIRE 2019a) and INSPIRE standard operating procedures (INSPIRE 2019b).

2.1.1 Sediment Profile Imaging

The SPI technique involves deploying an underwater camera system to photograph a cross-section of the sediment–water interface. High-resolution SPI images were acquired using a Nikon® D7200 digital single-lens reflex (DSLR) camera mounted inside an Ocean Imaging® Model 3731 pressure housing. The pressure housing sat atop a wedge-shaped steel prism with a plexiglass front faceplate and a back mirror, that was mounted at a 45° angle. The camera lens looked down at the mirror, which reflected the image from the faceplate. The prism had an internal strobe mounted inside at the back of the wedge to provide illumination for the image; this chamber was filled with distilled water, so the camera always had an optically clear path. The descent of the prism into the sediment was controlled by a hydraulic piston. As the prism penetrated the seafloor, a trigger activated a time-delayed circuit that fired the internal strobe to obtain a cross-sectional image of the upper 15–20 cm of the sediment column (Figure 2-3). The camera remained on the seafloor for approximately 20 seconds to ensure that successful images were obtained.

Test exposures of a Color Calibration Target were made on deck at the beginning of the survey to verify that all internal electronic systems were working to design specifications and to provide a color standard against which final images could be checked for proper white balance. Test images were also captured to confirm proper camera settings for site conditions. For this

survey, the ISO-equivalent was set at 640, shutter speed was 1/250s, and the f-stop was f11. Images were stored in compressed raw Nikon Electronic Format (NEF) files (approximately 30 MB each). Images were checked periodically throughout the survey to confirm that the initial camera settings were still resulting in the highest quality images possible. All camera settings and any setting changes were recorded in the field log (Appendix B). Details of the camera settings for each digital image also are available in the associated parameters file embedded in each electronic image file.

Whenever the camera was brought back on board (typically after every third to fifth station), the frame counter was checked to ensure that the requisite number of replicates had been obtained. In addition, a prism penetration depth indicator on the camera frame was checked to verify that the optical prism had penetrated the bottom to a sufficient depth. If images were missed or the penetration depth was insufficient, the camera frame stop collars were adjusted and/or weights were added or removed, and additional replicate images were taken. Frame counts, time of image acquisition, water depth, frame stop-collar position, and the number of weights used were recorded in the field log for each replicate image (Appendix B). If mud doors were needed, their use was also recorded in the field log. Visual checks and hand tightening checks of all nuts and bolts on the SPI/PV camera frame were conducted periodically to make sure nothing vibrated loose during the survey.

Prior to field operations, the internal clock in the digital SPI system was synchronized with the vessel's navigation. Each image was assigned a unique time stamp in the digital file attributes by the camera's data logger and cross-checked with the time stamp in the navigational system's computer data file. Images were downloaded periodically to verify successful sample acquisition and/or to assess the type(s) of sediment and other relevant features present at a given station. Digital image files were renamed with the appropriate station names immediately after downloading as a further quality assurance step.

2.1.2 Plan View Imaging

An Ocean Imaging® Model DSC24000 plan view underwater camera system with two Ocean Imaging® Model 400-37 Deep Sea Scaling lasers was attached to the sediment profile camera frame and used to collect plan view images of the seafloor surface. Both SPI and PV images were collected during each "drop" of the system. The PV system consisted of a Nikon® D7200 DSLR camera encased in a pressure housing, a 24 VDC autonomous power pack, a 500 W strobe, and a bounce trigger. A weight was attached to the bounce trigger with a stainless-steel cable so that the weight hung below the camera frame; the scaling lasers projected two red dots that were separated by a constant distance (26 cm) regardless of the field of view of the PV system. The field of view can be varied by increasing or decreasing the length of the trigger wire and, thereby, the camera height above the bottom when the picture is taken. As the SPI/PV camera system was lowered to the seafloor, the weight attached to the bounce trigger contacted the seafloor prior to the camera frame reaching the seafloor and triggered the PV camera (Figure 2-3).

During set-up and testing of the PV camera, the positions of lasers on the PV camera were checked and calibrated to ensure separation of 26 cm. Test images were also captured to confirm proper camera settings for site conditions. For this survey, the ISO-equivalent was set at 800, shutter speed was 1/15s and the f-stop was f8. Images were stored in compressed raw Nikon Electronic Format (NEF) files (approximately 30 MB each). Images were checked periodically throughout the survey to confirm that the initial camera settings were still resulting in the highest quality images possible. The ISO setting was changed to 640 and the f-stop setting was changed to f10 after reviewing images from the first station. The f-stop was adjusted again to f16 after the first images were taken on the second day of the survey. All camera settings and any setting changes were recorded in the field log (Appendix B). Details of the camera settings for each digital image also are available in the associated parameters file embedded in each electronic image file.

Prior to field operations, the internal clock in the digital PV system was synchronized with the vessel's navigation system and the SPI camera. Each image was assigned a unique time stamp in the digital file attributes by the camera's data logger and cross-checked with the time stamp in the navigational system's computer data file. In addition, the field crew kept redundant written sample logs (Appendix B). Throughout the survey, PV images were downloaded at the same time as SPI images and were evaluated for successful image acquisition and image clarity. Digital image files were renamed with the appropriate station names immediately after downloading as a further quality assurance step.

The ability of the PV system to collect usable images is dependent on the clarity of the water column. Initially the trigger wire was set to 1.8 m and most of the stations furthest offshore were sampled at this trigger wire distance. As stations became shallower and moved more in-shore, increased turbidity resulted in adjusting the trigger wire to 1.2 m for the majority of the survey, resulting in a mean image width of 1.2 m and a mean field of view of 1.1 m^2.

2.1.3 SPI and PV Data Collection

The SPI/PV survey was conducted at Equinor Wind Offshore Wind Farm Project area from 10 July to 14 July aboard the utility vessel *Northstar Commander*. At each station, the vessel was positioned at the target coordinates and the camera was deployed within a defined station radius tolerance of 7.5 m. Four replicate SPI and PV images were collected at each station (Appendix B). The three replicate images with the best quality (adequate prism penetration, no or minimal sampling artifacts) at each station were selected for analysis (Appendices C and D).

Vessel positioning was carried out by INSPIRE. A Hemisphere vector V102 GPS compass was used to accurately record vessel heading and differential position accuracy to within a meter. During mobilization the navigator conducted a positional accuracy check on the system by placing the antenna on a known GPS point and ensuring the antenna's position fell within a meter of the known coordinates. During operations HYPACK Ultralite software was used to receive positional data and direct the vessel to sampling stations. When the vessel was within a 7.5-meter radius of the target location, the SPI/PV camera system was deployed to the seafloor.

As soon as the camera system made contact with the seafloor, the navigator recorded the time and position of the camera electronically in HYPACK and the written field log. This process was repeated for five SPI/PV replicate "drops" of the SPI/PV camera system at each sampling station. After all stations were surveyed the navigator exported all recorded positional data into an Excel sheet. The Excel sheet included the station name, replicate number, date, time, depth, and position of every SPI/PV replicate.

2.1.4 Image Conversion and Calibration

Following completion of field operations, quality control checks were conducted of filenames, date/time stamps, and the field log. After these procedures, the NEF raw image files were color calibrated in Adobe Camera Raw® by synchronizing the raw color profiles to the Color Calibration Target that was photographed prior to field operations with the SPI camera. The raw SPI and PV images were then converted to high-resolution Photoshop Document (PSD) format files, using a lossless conversion file process and maintaining an Adobe RGB (1998) color profile. The PSD images were then calibrated and analyzed in Adobe Photoshop®. Length and area measurements were recorded as number of pixels and converted to scientific units using the calibration information.

2.1.5 SPI and PV Data Analysis

Computer-aided analysis of SPI/PV images provided a set of standard measurements to allow for comparisons among different areas of interest. Parameters measured from SPI/PV image analysis directly correspond to BOEM Benthic Site Characterization Requirements and Guidelines (Table 2-1). Measured parameters for SPI and PV images were recorded in Microsoft Excel© spreadsheets. These data were subsequently checked by one of INSPIRE's senior scientists as an independent quality assurance/quality control review before final interpretation was performed. Spatial distributions of SPI/PV parameters were mapped using ESRI ArcGIS 10.5.

2.1.5.1 Sediment Profile Image Analysis Parameters

The parameters discussed below were assessed and/or measured and recorded for each replicate SPI image selected for analysis (Appendix C). Descriptive comments were also recorded for each. Many variables can be seen and annotated in context in SPI images from soft bottom coastal and estuarine environments (Figure 2-4).

2.1.5.1.1 Sediment Type

The sediment grain size major mode and range were visually estimated from the color images by overlaying a grain size comparator that was at the same scale. This comparator was prepared by photographing a series of Udden-Wentworth size classes (equal to or less than coarse silt up to granule and larger sizes) with the SPI camera: silt–clay (>4 phi), very fine sand (4 to 3 phi), fine sand (3 to 2 phi), medium sand (2 to 1 phi), coarse sand (1 to 0 phi), very coarse sand (0 to -1 phi), and granule and larger (<-1 phi). The lower limit of optical resolution of the photographic system is about 62 microns, allowing recognition of grain sizes equal to, or greater than, coarse silt (≥4 phi). The accuracy of this method has been documented by

comparing SPI estimates with grain size statistics determined from laboratory sieve analyses (Germano et al. 2011).

The comparison of the SPI images with Udden-Wentworth sediment standards photographed through the SPI optical system was also used to map near-surface stratigraphy such as sand-over-mud and mud-over-sand, where observed. When mapped on a local scale, this stratigraphy can provide information on relative transport magnitude and frequency.

2.1.5.1.2 Prism Penetration Depth

The SPI prism penetration depth was measured from the bottom of the image to the sediment–water interface. The area of the entire cross-sectional sedimentary portion of the image was digitized; the number of pixels within this area was divided by the calibrated linear width of the image to determine the mean penetration depth. Linear maximum and minimum depths of penetration were also measured. All three measurements (maximum, minimum, and mean penetration depths) were recorded in the data file.

If the stop collar settings and the number of weights used in the camera frame are held constant throughout the survey, the camera functions as a static-load penetrometer. Comparative penetration values from sites of similar grain size give an indication of the relative water content of the sediment. Highly bioturbated sediments and rapidly accumulating sediments tend to have the highest water contents and greatest prism penetration depths.

The depth of penetration also reflects the bearing capacity and shear strength of the sediments. Over-consolidated or relic sediments and shell-bearing sands resist camera penetration. Highly bioturbated, sulfidic, or methanogenic muds are the least consolidated and deep penetration is typical. Seasonal changes in camera prism penetration have been observed at the same station in other studies and are related to the control of sediment geotechnical properties by bioturbation (Rhoads and Boyer 1982). The effect of water temperature on bioturbation rates appears to be important in controlling both biogenic surface relief and prism penetration depth (Rhoads and Germano 1982).

2.1.5.1.3 Small-Scale Surface Boundary Roughness

Surface boundary roughness was determined by measuring the vertical distance between the highest and lowest points of the sediment–water interface. The camera must be level to record accurate boundary roughness measurements. The surface boundary roughness (sediment surface relief) measured over the width of sediment profile images typically ranges from 0 to 4 cm and may be related to either physical structures (ripples, rip-up structures) or biogenic features (burrow openings, fecal mounds, foraging depressions). Biogenic roughness typically changes seasonally and is related to the interaction of bottom turbulence and bioturbation.

In sandy sediments, boundary roughness can be a measure of sand wave height. On silt–clay bottoms, boundary roughness values often reflect biogenic features such as fecal mounds or surface burrows. The size and scale of boundary roughness values can have dramatic effects

on both sediment erodibility and localized oxygen penetration into subsurface sediments (Huettel et al. 1996).

2.1.5.1.4 Apparent Redox Potential Discontinuity Depth

Aerobic near-surface marine sediments typically have higher reflectance relative to underlying hypoxic or anoxic sediments. Surface sands washed free of mud also have higher optical reflectance than underlying muddy sands. These differences in optical reflectance are apparent in SPI images; oxidized surface sediments contain particles coated with ferric hydroxide (an olive or tan color when associated with particles) and reduced and muddy sediments below this oxygenated layer are darker, generally gray to black (Fenchel 1969; Lyle 1983; Sturdivant and Shimizu 2017). The boundary between colored ferric hydroxide surface sediments and underlying gray to black sediments is called the apparent redox potential discontinuity (aRPD).

The depth of the aRPD in the sediment column is an important time integrator of dissolved oxygen conditions within sediment porewaters. In the absence of bioturbation, this high reflectance layer (in muds) will typically reach a thickness of 2 mm below the sediment–water interface (Rhoads 1974). This depth is related to the supply rate of molecular oxygen by diffusion into subsurface sediments and the consumption of that oxygen by the sediment and associated microflora. In sediments that have very high sediment oxygen demand (SOD), the sediment may lack a high reflectance layer even when the overlying water column is aerobic. In the presence of bioturbating macrofauna, the thickness of the high reflectance layer may be several centimeters.

The relationship between the thickness of the high reflectance layer and the presence or absence of free molecular oxygen in the associated porewaters must be considered with caution. The actual RPD is the boundary or horizon that separates the positive Eh region of the sediment column from the underlying negative Eh region. The exact location of this Eh = 0 boundary can be determined accurately only with microelectrodes; hence, the relationship between the change in optical reflectance, as imaged with the SPI camera, and the actual RPD can be determined only by making *in situ* Eh measurements. For this reason, the optical reflectance boundary, as imaged, is described in this study as the “apparent” RPD (aRPD) and was measured as a mean value. The mean aRPD measured in SPI has been shown to be a suitable proxy for the RPD with the depth of the actual Eh = 0 horizon generally either equal to or slightly shallower than the depth of the optical reflectance boundary (Rosenberg et al. 2001; Simone and Grant 2017). There is a lag time between when Eh reaches 0 mV and the precipitation of darker sulfidic sediments (Jorgensen and Fenchel 1974) under reducing conditions and, therefore, the related color reflectance change used to indicate the aRPD may be slightly deeper than the RPD. Additionally, bioturbating organisms can mix ferric hydroxide-coated particles downward below the Eh = 0 horizon; with active ventilation, burrows have been shown to extend below the aRPD (Sturdivant et al. 2012; Sturdivant and Shimizu 2017). Because bioturbating organisms are not uniformly distributed in the sediment matrix, the depth of the aRPD can vary across the width of a SPI image (approximately 14–15 cm). As a result,

the mean aRPD depth serves as a valuable estimate of the depth of porewater exchange, usually through porewater irrigation (bioturbation).

The rate of depression of the aRPD within the sediment is relatively slow in organic-rich muds, on the order of 200 to 300 micrometers per day; therefore, this parameter has a long time constant (Germano and Rhoads 1984). The rebound in the aRPD is also slow (Germano 1983). Measurable changes in the aRPD depth using the SPI optical technique can be detected over periods of 1 or 2 months. This parameter is used effectively to document changes (or gradients) that develop over seasonal or yearly cycles related to seasonal hypoxia, SOD, water temperature effects on bioturbation rates, and infaunal recruitment. For example, the aRPD has been shown to be a sensitive and specific indicator of hypoxic conditions experienced over the preceding 1 day to 4 weeks (Shumchenia and King 2010), and to be correlated to concurrent *in situ* dissolved oxygen concentrations (Sturdivant et al. 2012). Time-series aRPD measurements following a disturbance can be a critical diagnostic element in monitoring the degree of recolonization in an area by the ambient benthos (Rhoads and Germano 1986).

The mean aRPD depth also can be affected by local erosion. Scouring can wash away fines and shell or gravel lag deposits and can result in a very thin surface oxidized layer. During storm periods, erosion may completely remove any evidence of the aRPD (Fredette et al. 1988).

Another important characteristic of the aRPD is the contrast in reflectance at this boundary. This contrast is related to the interactions among the degree of organic loading, the bioturbation activity in the sediment, and the concentrations of bottom-water dissolved oxygen in an area. High inputs of labile organic material increase SOD and, subsequently, sulfate reduction rates and the associated abundance of sulfide end products. This results in more highly reduced, lower-reflectance sediments at depth and high contrasts between these sediments and the overlying oxidized sediments, i.e., high aRPD contrasts. In a region where there is generally more uniform reflectance across the sediment column, i.e., low aRPD contrasts, images with high aRPD contrasts indicate localized sites of relatively large inputs of organic-rich material such as phytoplankton, other naturally occurring organic detritus, dredged material, or sewage sludge.

Because the determination of the aRPD requires discrimination of optical contrast between oxidized and reduced particles, it is difficult, if not impossible, to determine the depth of the aRPD in well-sorted sands of any size that have little to no silt or organic matter in them. When using SPI technology on sand bottoms, little information other than grain size, prism penetration depth, and boundary roughness values can be measured; while oxygen has penetrated the sand beneath the sediment–water interface due to physical forcing factors acting on surface roughness elements (Ziebis et al. 1996; Huettel et al. 1998), estimates of the mean aRPD depths in these types of sediments are indeterminate with conventional white light photography.

2.1.5.1.5 Organic Enrichment, Sedimentary Methane, and Thiophilic Bacteria

Sediment oxygen demand (SOD) represents the overall rate of oxygen consumption, biologically and chemically, by the sediment column. Organic loading to a system results in increased SOD and reduced sediments. The relative amount of organic enrichment is indicated by sediment color; darker coloration indicates that sediment is more reduced and has greater organic loading (Fenchel 1969; Rhoads 1974; Lyle 1983; Bull and Williamson 2001; Sturdivant and Shimizu 2017). SOD levels (i.e., none, low, medium, and high) were assessed for all images. Images in which dark-gray or black reduced sediments were in contact with the water column across the entire length of the sediment–water interface were recorded as having low dissolved oxygen conditions. If organic loading is extremely high, porewater sulfate is depleted and methanogenesis occurs. The process of methanogenesis is indicated by the appearance of methane bubbles in the sediment column. These gas-filled voids are readily discernable in SPI images because of their irregular, generally circular aspect and glassy texture (due to the reflection of the strobe off the gas bubble). The presence of subsurface methane bubbles were noted.

A primary diagnostic feature indicating an area is suffering from hypoxic conditions due to organic enrichment is the presence of *Beggiatoa* or *Beggiatoa*-like colonies. (Note: while it cannot be determined with certainty that any bacterial colonies seen in profile images are the genus *Beggiatoa* without microscopic identification, these bacteria are known to be in the same family of sulfur-oxidizing bacteria that only appear in hypoxic or anoxic conditions). These colonies have diagnostic morphology that has been documented in numerous other sediment profile imaging surveys (Nilsson and Rosenberg 1997; Rosenberg et al. 2001; Karakassis et al. 2002; Germano et al. 2011). The presence of sulfur-oxidizing bacterial colonies indicates hypoxic dissolved oxygen concentrations in the water column at the benthic boundary layer (Rosenberg and Diaz 1993; Sturdivant et al. 2012). The presence and extent (e.g., threads, trace, patches, mat) of *Beggiatoa* or *Beggiatoa*-like colonies were noted.

2.1.5.1.6 Infaunal Successional Stage

The mapping of infaunal successional stages is readily accomplished with SPI technology. These stages are recognized in SPI images by the presence of dense assemblages of near-surface polychaetes and/or the presence of subsurface feeding voids; both may be present in the same image. Mapping of successional stages is based on the theory that organism–sediment interactions in fine-grained sediments follow a predictable sequence after a major seafloor perturbation. This theory states that primary succession results in “the predictable appearance of macrobenthic invertebrates belonging to specific functional types following a benthic disturbance. These invertebrates interact with sediment in specific ways. Because functional types are the biological units of interest, our definition does not demand a sequential appearance of particular invertebrate species or genera” (Rhoads and Boyer 1982). This theory is presented in Pearson and Rosenberg (1978) and further developed in Rhoads and Germano (1982) and Rhoads and Boyer (1982).

This continuum of change in animal communities after a disturbance (primary succession) has been divided subjectively into four stages: Stage 0, indicative of a sediment column that is largely devoid of macrofauna, occurs immediately following a physical disturbance or in close proximity to an organic enrichment source; Stage 1 is the initial community of tiny, densely populated polychaete assemblages; Stage 2 is the start of the transition to head-down deposit feeders; and Stage 3 is the mature, equilibrium community of deep-dwelling, head-down deposit feeders (Figure 2-5).

The first invertebrate assemblage (Stage 1) appears within days after an area of bottom is disturbed by natural or anthropogenic events. Stage 1 consists of assemblages of tiny tube-dwelling marine polychaetes that reach population densities of 10^4 to 10^6 individuals per m². These animals feed at or near the sediment–water interface and physically stabilize or bind the sediment surface by producing a mucous “glue” that they use to build their tubes. Sometimes deposited dredged material layers contain Stage 1 tubes still attached to mud clasts from their location of origin; these transported individuals are considered as part of the *in situ* fauna in our assignment of successional stages.

If there are no repeated disturbances to the newly colonized area, then these initial tube-dwelling suspension or surface-deposit-feeding taxa are followed by burrowing, head-down deposit-feeders that rework the sediment deeper and deeper over time and mix oxygen from the overlying water into the sediment. The animals in these later-appearing communities (Stage 2 or 3) are larger, have lower overall population densities (10 to 100 individuals per m²), and can rework the sediments to depths of 3 to 20 cm or more. These animals “loosen” the sedimentary fabric and increase the water content in the sediment, thereby lowering the sediment shear strength, and actively recycle nutrients because of the high exchange rate with the overlying waters resulting from their burrowing and feeding activities.

In dynamic environments, it is simplistic to assume that benthic communities always progress completely and sequentially through all four stages in accordance with the idealized conceptual model depicted in Figure 2-5. Various combinations of these basic successional stages are possible. For example, secondary succession can occur (Horn 1974) in response to additional labile carbon input to surface sediments, with surface-dwelling Stage 1 or 2 organisms coexisting at the same time and place with Stage 3, resulting in the assignment of a “Stage 1 on 3” or “Stage 2 on 3” designation. If both Stage 1 and Stage 2 organisms exist in an image with Stage 3 fauna, the Stage 1 on 3 designation is used because it is more important to document the presence of recruiting organisms than intermediate Stage 2 fauna.

While the successional dynamics of invertebrate communities in fine-grained sediments have been well documented, the successional dynamics of invertebrate communities in sand and coarser sediments are not well known. Consequently, the insights gained from sediment profile imaging technology regarding biological community structure and dynamics in sandy and coarse-grained bottoms can be limited highlighting the importance of combining SPI with PV.

2.1.5.2 Plan View Image Analysis

Plan view images provide a much larger field of view than SPI images and provide valuable information about the landscape ecology and sediment topography in the area where the pinpoint "optical core" of the sediment profile was taken (Figure 2-6). Unusual surface sediment layers, textures, or structures detected in any of the sediment profile images can be interpreted by considering the larger context of surface sediment features; i.e., whether a surface layer or topographic feature is a regularly occurring feature and typical of the seafloor in this general vicinity or an isolated anomaly. The scale information provided by the underwater lasers allows accurate density counts of attached epifaunal colonies, sediment burrow openings, or larger macrofauna or fish which may have been missed in the sediment profile cross-section, as well as measurements of the percent cover of *Beggiatoa* colonies and other features of interest. Information on sediment transport dynamics and bedform wavelength is also available from PV image analysis. The parameters discussed below were assessed and/or measured and recorded for each replicate PV image selected for analysis (Appendix D).

2.1.5.2.1 Field-of-View

For each replicate PV image, the field-of-view area was measured. The scale information provided by the underwater lasers allows accurate density counts of attached epifaunal colonies, sediment burrow openings, or larger macrofauna or fish which may not have been captured in the sediment profile cross-section, as well as measurements of features of interest observed in the image.

2.1.5.2.2 CMECS Biotic Subclass and CMECS Biotic Group

The Biotic Component of CMECS is a classification of the living organisms of the seabed and water column together with their physical associations at a variety of spatial scales. The Biotic Component is organized into a branched hierarchy of five nested levels: Biotic Setting, Biotic Class, Biotic Subclass, Biotic Group, and Biotic Community. The Biotic Subclass is a key CMECS classifier that presents valuable information about the surveyed area in terms of physical habitat and the potential presence of sensitive taxa; therefore, it was identified as a parameter for PV image analysis. Biotic Component classifications are defined by the dominance of life forms, taxa, or other classifiers in the observation. In the case of PV images dominance is assigned to the taxa with the greatest percent cover in the observational footprint (Federal Geographic Data Committee [FGDC] 2012).

Biotic Subclasses describe dominant biota at a coarse level. Within the Benthic/Attached Biota Biotic Component setting, there are eight classes, of which the Faunal Bed class is of most relevance to the OCS. Three subclasses fall under the Faunal Bed hierarchy: Attached Fauna, Soft Sediment Fauna, and Inferred Fauna. Inferred Fauna (e.g., tracks and trails, egg masses) are often present, but in this study, were primarily used to inform or confirm the selection of either the Attached or Soft Sediment Fauna subclass. Although the Biotic Subclass is not directly based on sediment grain size distributions, it reflects them at the scale of relevance to the dominant fauna present, thus serving as an integrator of physical and biological characteristics of the seafloor. CMECS expressly states that "substrate type is such a defining

aspect of the Faunal Bed class that CMECS Faunal Bed subclasses are assigned as physical-biological associations involving both biota and substrate (FGDC 2012)."

Plan view images were assigned one of three Biotic Subclasses (definitions from FGDC 2012):

- Attached Fauna – "Areas characterized by rock substrates, gravel substrates, other hard substrates, or mixed substrates that are dominated by fauna which maintain contact with the substrate surface, including firmly attached, crawling, resting, interstitial, or clinging fauna. Fauna may be found on, between, or under rocks or other hard substrates or substrate mixes. These fauna use pedal discs, cement, byssal threads, feet, claws, appendages, spines, suction, negative density, or other means to stay in contact with the (generally) hard substratum and may or may not be capable of slow movement over the substratum. Many attached fauna are suspension feeders and feed from the water column. Other attached fauna are benthic feeders, including herbivores, predators, detritivores, and omnivores."

- Soft Sediment Fauna – "Areas that are characterized by fine unconsolidated substrates (sand, mud) and that are dominated in percent cover or in estimated biomass by infauna, sessile epifauna, mobile epifauna, mobile fauna that create semi-permanent burrows as homes, or by structures or evidence associated with these fauna (e.g., tilefish burrows, lobster burrows). These animals may tunnel freely within the sediment or embed themselves wholly or partially in the sediment. In many cases, they will regularly leave their burrows, and may move rapidly or swim actively after doing so, but any animal that creates a semi-permanent home in the sediment can be classified as Soft Sediment Fauna. These animals may also move slowly over the sediment surface but are not capable of moving outside of the boundaries of the classification unit within one day. Most of these fauna possess specialized organs for burrowing, digging, embedding, tube-building, anchoring, or locomotory activities in soft substrates."

- IND – an indeterminate Biotic Subclass

The Biotic Component subclasses of Attached and Soft Sediment Fauna are excellent broad-brush tools for screening-level assessments of seafloor habitats for offshore wind development. Mapping proposed development areas with this CMECS classifier can highlight locations, that from a benthic habitat perspective, might be considered suitable for offshore wind development (Soft Sediment Fauna) and those that may be unsuitable or require further detailed study to determine suitability (Attached Fauna). Depending on the results and scale of reconnaissance surveys, additional studies would likely be needed as specific siting alternatives are examined.

Attached Fauna habitats are also referred to in some documents as "live bottom." These hard bottom habitats that support "live bottom" are considered potentially valuable and sensitive resources for regionally important taxa. Additionally, cobbles and boulders can provide habitat for a diverse range of taxa and serve as valuable habitat for corals and as a place for squid to lay their eggs. Soft coral habitats also may play a role in creating or enhancing habitat for black

sea bass (*Centropristis striata*), a species of concern for the SJWF and SJEC areas (Guida et al. 2017). Hard bottom habitats are limited in distribution along the Mid-Atlantic and Northeast portions of the OCS relative to sandy and soft bottom habitats (Guida et al. 2017; USGS 2018).

While Biotic Subclasses describe major biological characteristics at a fairly coarse level, Biotic Groups are descriptive terms based on finer distinctions of taxonomy, structure, position, environment, and salinity levels (FGDC 2012). CMECS provides definitions and descriptions of dozens of Biotic Groups. Only a subset of these Biotic Groups could potentially occur in the surveyed area (based on water depth, latitude, depth, etc.). The full set of defined Biotic Groups are available in the CMECS document (FGDC 2012) and a subset of Biotic Groups observed within the surveyed area are found in Table 2-2.

2.1.5.2.3 Sensitive Taxa and Species of Concern

While Geological and Geophysical (G&G) multibeam echosounder and side scan sonar data provide high quality remote imaging of the seafloor, they do not provide adequate resolution for the identification of sensitive taxa. The image resolution of the SPI/PV survey allows for the identification of sensitive taxa. Sensitive seafloor habitats include corals, submerged aquatic vegetation beds, and valuable cobble and boulder habitat (BOEM 2019). Cobble and boulder habitat can serve as structure for hard and soft corals, nursery ground for juvenile lobster, and as preferable benthic habitat for squid to deposit their eggs. Taxa considered sensitive for this survey included corals, seagrasses, squid eggs, and American lobster. Species of concern for this area included black sea bass, Atlantic cod, sea scallops, and ocean quahog (Guida et al. 2017). Presence/absence of each sensitive taxa or species of concern was noted for each replicate SPI and PV image.

2.1.5.2.4 Invasive Taxa

The introduction of invasive species to the water column and benthic habitat is an important concern related to offshore development. The utilization of vessels originating from many different ports can lead to the introduction of invasive species through fouled hulls and contaminated ballast water. The introduction of new structures, such as scour protection, turbine structure, transmission cable, and concrete mattresses, to the water column and seafloor during construction may also lead to the introduction of invasive species. The SPI/PV survey collected baseline presence/absence data for marine invasive species within the surveyed area. A list of potential invasive species was derived from the Northeastern Aquatic Nuisance Species Panel (https://www.northeastans.org/) and a Pennsylvania Sea Grant report (https://seagrant.psu.edu/sites/default/files/MidAtlantic%20AIS%20Field%20Guide_Web.pdf).

2.2 Sediment Grabs

2.2.1 Sediment Acquisition

A double, 0.1m^2 Ted Young Modified Van Veen grab sampler was used to collect surficial sediment samples following procedures outlined in the SOP for Sediment Grab Sampling

(INSPIRE 2019c). Sediments were retained from a total of 16 stations sampled along the proposed export cable routes (Figure 2-1).

Once the boat was positioned to within 25 m of the planned sampling station, the sampler was lowered vertically through the water column until it came into contact with the sediment surface. Once on the bottom, the jaws closed and the line went slack, indicating that a sample had been collected. Position data were collected, and the grab was raised to the surface and retrieved on deck.

Upon recovery of the sample, the sediment within the grab bucket was inspected to assess whether the sample was acceptable (i.e., had not been subject to partial washout during retrieval, and was of sufficient volume). If the sample was not acceptable, two additional attempts were made at the target station. If, after three attempts, a successful grab was not collected, the vessel moved off station in an attempt to find suitable bottom.

Each grab attempted was logged. Once a sample was deemed acceptable, a photograph of the undisturbed grab was obtained. The station name, latitude/longitude, and time of collection and descriptive features were recorded on the Sediment Sample Log Form (Appendix E).

2.2.2 Sediment Processing

After the grab was photographed and logged, a subsample was collected for grain size analysis. Surficial samples for grain size analyses were collected from the top 10 cm from one of the buckets. Before subsamples of the surficial sediments were taken, any overlying water was removed by slowly siphoning off the overlying water near one side of the sampler. A ruler was placed in the center of the grab (deepest section) and the top 10 cm of sediment was removed and transferred to a clean glass bowl for homogenization. Following homogenization, approximately 500 grams of sediment was placed in a zip top bag, sealed and labelled with StationID, date and time. Samples were stored at 4°C prior to analysis (samples may be held for up to 6 months before analysis). Samples were not frozen or dried prior to analysis. A Chain of custody form (Appendix F) was prepared in the field and accompanied the samples when shipped to the laboratory for analysis.

Aqua Survey, Inc. (ASI) performed the Grain Size Distribution analysis for this project. Sixteen sediment samples were delivered to ASI on July 15, 2019, under chain of custody procedures. Upon arrival, all samples were assigned unique ASI sample numbers. The samples containing mostly sand were analyzed by the sieve method (ASTM D6910-04), while the samples containing sand and silt were analyzed with the combined sieve and hydrometer method (ASTM D798-17). See Table 2-3 for sample identification and for which method was used for each sample. The appendices contain all supporting documentation including sample use forms (Appendix E) and chains of custody (Appendix F).

The particle size of the sediments was analyzed in the laboratory using ASTM Methods D6913/D7928, sieve/hydrometer methods (these methods supersede ASTM D422).

2.3 Data Quality Assurance and Quality Control

Measures were taken both during field data collection and during post-collection analysis for data quality assurance and control in alignment with the PEP for this project (INSPIRE 2019a).

Prior to survey mobilization, the camera electronics were “bench-tested” to ensure the cameras were focused and firing properly, the lasers were aligned properly, and the strobe was operational. The positions of lasers on the PV camera were checked and calibrated to ensure separation of 26 cm. Spare camera parts, fully charged battery packs, and spare cables were carried in the field to ensure uninterrupted sample acquisition. At the beginning of the survey, the times on the digital SPI and PV cameras were synchronized with the navigation system clock. Each SPI and PV station replicate is identified by the time stamp recorded as part of the digital image file and the corresponding time and position recorded by the navigation system. Redundant written sample logs were kept by the field crew (Appendix B). Test shots were fired on deck at the beginning of each field day to verify all internal electronic systems were working according to specifications. These test shots included taking pictures of standard color cards to ensure proper color balance of the digital images during collection and to verify the calibration of the image analysis system during processing.

At regular intervals during each survey day, the frame counter on the SPI camera was checked to make sure the desired number of replicates had been taken. In addition, both the SPI and PV images were downloaded at regular intervals (typically every 3 to 5 stations) using external USB ports. These images then were viewed to confirm the settings on the digital cameras were optimal for the conditions in the survey area. These settings were adjusted if necessary and changes noted in the field log (Appendix B). In addition, if images were missed or penetration depth was insufficient, proper adjustments were made (e.g., weight added to the frame) and additional replicates taken. Digital image files were renamed with the appropriate station names immediately after downloading as a further quality assurance step. Visual checks and hand tightening checks of all nuts and bolts on the SPI/PV camera frame were conducted periodically to make sure nothing vibrated loose during the survey.

A quality assurance review of all data and results presented in this report was performed in accordance with the PEP for this project (INSPIRE 2019a).

Table 2-1. SPI/PV Survey Parameters with Corresponding BOEM Site Characterization Requirements and Guidelines

	SPI/PV	BOEM Guideline (BOEM 2019)
Analysis Parameters	Sensitive Taxa (SPI/PV)	• Identification of potentially sensitive seafloor habitat
	Invasive Taxa (SPI/PV)	• Identification of invasive taxa
	Attached Flora/Fauna (PV)	• Identification of potentially sensitive seafloor habitat • Classification to CMECS Biotic Subclass • Classification to CMECS Biotic Group
	Soft Sediment Infauna Community (SPI/PV)	• Identification of potentially sensitive seafloor habitat • Characterization of macrofaunal community • Identification of taxa diversity • Classification to CMECS Biotic Subclass • Classification to CMECS Biotic Group
	Dominant and Co-occurring Biotic Subclasses & Groups	• Identification of potentially sensitive seafloor habitat • Classification to CMECS Biotic Subclass • Classification to CMECS Biotic Group
	Mobile Epifauna (SPI/PV)	• Characterization of macrofaunal community • Identification of taxa diversity
	Fish (PV)	• Characterization of macrofaunal community
	Burrows/Tubes/Tracks (PV)	• Characterization of macrofaunal community
	Flora (PV)	• Characterization of macrofloral community
	Apparent Redox Potential Discontinuity (SPI)	• Characterization of benthic habitat attributes
	Sediment Oxygen Demand (SPI)	• Characterization of benthic habitat attributes
	Successional Stage (SPI)	• Characterization of benthic habitat attributes
	Low Dissolved Oxygen Presence (SPI)	• Characterization of benthic habitat attributes
	Methane Presence (SPI)	• Characterization of benthic habitat attributes

Table 2-2. CMECS Classification Levels Used in Analysis and Classifications for the Equinor Wind Survey

CMECS Term	Scale of Classification	Classifications
Geoform Component		
Tectonic Setting	Site	Passive Continental Margin
Physiographic Setting	Site	Continental Shelf
Geoform Origin	Site	Geologic
Substrata Component		
Substrate Origin	Site	Geologic Substrate
Substrate Class	SPI/PV	Unconsolidated Mineral Substrate
+Substrata Subclass	SPI/PV	Fine Unconsolidated Substrate; Coarse Unconsolidated Substrate
+Substrata Group	PV	Sandy Mud; Muddy Sand; Sand; Slightly Gravelly; Gravelly Sand; Sandy Gravel; Boulder
+Substrata Subgroup	SPI	Silt-Clay; Very Fine Sand; Fine Sand; Medium Sand; Coarse Sand; Very Coarse Sand; Granule; Pebble; Cobble
Biotic Component		
Biotic Setting	SPI/PV	Benthic/Attached Biota
Biotic Class	SPI/PV	Faunal Bed
+Biotic Subclass	SPI/PV	**Soft Sediment Fauna**; Attached Fauna; Inferred Fauna
+Biotic Group	SPI/PV	**Larger Tube-Building Fauna;** Tracks and Trails; Sand Dollar Bed; Attached Corals; Attached Hydroids; Burrowing Anemones; Mobile Crustaceans on Hard or Mixed Substrates; Mobile Crustaceans on Soft Sediments; Diverse Soft Sediment Epifauna; Small Tube-Building Fauna; Attached Bryozoans; Larger Deep-Burrowing Fauna; Mobile Mollusks on Soft Sediments; Mobile Mollusks on Hard or Mixed Substrates; Barnacles

+ Indicates variability within the surveyed area at this level of the hierarchy
Bold text indicates an overwhelming dominant classification across the surveyed area

Table 2-3. Sediment Grab Sample Identification

Station ID	ASI ID	Grain Size Analysis Method
003	20190565	ASTM D6913-04
006	20190566	ASTM D6913-04
010	20190567	ASTM D7928-17
011	20190568	ASTM D7928-17
147	20190569	ASTM D6913-04
157	20190570	ASTM D6913-04
020	20190571	ASTM D6913-04
038	20190572	ASTM D6913-04
060	20190573	ASTM D7928-17
076	20190574	ASTM D7928-17
091	20190575	ASTM D6913-04
095	20190576	ASTM D6913-04
100	20190577	ASTM D7928-17
057	20190578	ASTM D7928-17
133	20190579	ASTM D6913-04
136	20190580	ASTM D6913-04

3.0 RESULTS

A complete set of all the data measured and assessed from each analyzed SPI image is presented in Appendix C; data measured and assessed from each PV image are in Appendix D. Station summary data was grouped by proposed cable route of interest for ease of interpretation (Long Island Cable Routes, New Jersey Cable Routes, New York Harbor Cable Routes, and reference stations; Figure 3-1) and are presented in Tables 3-1 through 3-4. Section 3.1 summarizes results for the entire surveyed area. Section 3.2 reports results from the Long Island Cable Routes, Section 3.3 reports results from the New Jersey Cable Routes, Section 3.4 reports results from the New York Harbor Cable Routes, and Section 3.5 reports results from the reference stations.

3.1 Site Overview

3.1.1 Physical Features

Surface sediment types observed in both the SPI and PV images across the surveyed areas were diverse and spatially variable (Figures 3-2, 3-3, 3-4, 3-5). Sediments ranged from: fine sediments of silt/clay and very fine sand; to larger sand sizes; to coarser material of granules and pebbles; and larger cobbles and boulders (Figures 3-2, 3-3, 3-4, and 3-6). Surficial sediments (up to 20 cm below the sediment–water interface) were assessed from SPI images and assigned phi size classes for the grain size major mode parameter (Appendix C). Many sediments imaged exhibited a surface layer of coarse sediment over a range of finer grain size classes. For interpretive purposes, these images have been aggregated into “over sand/finer sediment” groupings, such as “pebble over finer sediment”, “granule over sand”, and “very coarse sand over sand” (Tables 3-1a, 3-2a, 3-3a, 3-4a, 3-5; Figures 3-3, 3-7).

The combination of the PV images and SPI provided context on the composition of surface sediments, which were mixed in distribution (Figures 3-2, 3-3) with instances of small- and large-scale spatial heterogeneity driven by hydrodynamic forcing on the seabed. Small-scale (intra-station) heterogeneity was represented by two or three replicate images for a station being classified into two or three different sediment types (Figure 3-2,3-3). E.g., Station 51 contained three gravel sediment types (granule, pebble, pebble over fine sediment) with coarser grains oriented in the troughs of the seabed by fluid dynamics (Figure 3-8). Intra-station heterogeneity was predominantly observed at stations along the New Jersey cable route, stations in the state waters of the Long Island cable route, and stations along and adjacent Cholera Bank (Figures 3-3, 3-4, 3-5). At stations where the predominant sediment type was consistent across replicates there were still occasions where hydrodynamics influenced grain orientation, e.g., Station 40 (Figure 3-9). Larger grains were located within the trough of asymmetric sand ripples formed via bedload transport. Spatial heterogeneity in surface sediments was also observed at a larger scale (inter-station). For example, Stations 009 and 010 had different sediment types despite their close spatial proximity (Figure 3-2). Station 010 was located within a submarine valley along the edge and was composed of fine sand over silt-clay (Figure 3-10A), whereas Station 009 was situated just outside of the valley and was composed of coarse granules (Figure 3-10B); deeper valleys or basins are noted for the

reduced fluid shear force on the seabed found in these areas, compared to adjacent shallower areas. Subsequently finer material can be found in these relatively deeper locations; Station 011 located directly in the submarine valley was composed of silt-clay (Figure 3-6A). The observations of sediment types in the profile and plan view images corresponded to the USGS backscatter data (Figure 2-2), ground-truthing this information and providing a level of confidence in areas of backscatter return where SPI/PV data was not collected. There was a sharp spatial contrast in backscatter returns either side of the Hudson River Shelf Valley, and this difference in backscatter was also observed in the sediment types documented.

The prism penetration measurement provides additional information about the bearing capacity and shear strength of sediments sampled. The camera frame stops and weights were mostly held constant throughout the survey with a few notable exceptions (Appendix B). The weights are the key adjustment to hold constant in order to use prism penetration to assess relative sediment shear strength. During the survey, weights were constant at every station except Station 030. There was some adjustment to the stops, but the stops rarely had any influence on penetration as most stations contained shallow to medium penetration that rarely reached the maximum stop height. Prism penetration is therefore useful as a barometer of relative sediment shear strength and load-bearing capacity. Penetration values across the surveyed areas ranged from 2.0 cm to 19.8 cm, with a mean of 6.0 cm (SD±2.3) (Tables 3-1a, 3-2a, 3-3a, 3-4a). Nearly two-thirds of all stations were characterized by medium to high load-bearing strength reflected in the relatively shallow prism penetration depths observed (<6 cm) (Figures 3-11 and 3-12). Approximately one-third of all stations had low to medium bearing capacity reflected in prism penetration values between 6 and 20 cm (Figures 3-11 and 3-12 B and C). Station 128 had the lowest shear strength of any station sampled, with the prism over-penetrating and exceeding the field of view of the face plate (Figure 3-13), as a result this station was not included as part of the assessment for prism penetration values.

Small-scale surface boundary roughness measured in SPI images can indicate physical shaping activity related to bedforms and hydrodynamics as well as biological activities such as infaunal burrowing and fish foraging. Station mean boundary roughness across the surveyed area averaged 1.3 cm (SD±0.5), with a range of 0.5 to 3.2 cm (Tables 3-1a, 3-2a, 3-3a and 3-4a; Figure 3-14). Physical forcing was the primary driver shaping small-scale boundary roughness for the majority of the SPI images analyzed (Appendix C).

3.1.2 Biological Features and Habitat

The CMECS Biotic Subclass of Soft Sediment Fauna was the dominant Biotic Subclass observed across the surveyed areas (Tables 3-1b, 3-2b, 3-3b, 3-4b; Figure 3-15). This subclass is defined as “Areas that are characterized by fine unconsolidated substrates (sand, mud) and that are dominated in percent cover or in estimated biomass by infauna, sessile epifauna, mobile epifauna, mobile fauna that create semi-permanent burrows as homes, or by structures or evidence associated with these fauna (e.g., tilefish burrows, lobster burrows)” (See Section 2.1.5.2.2 for a full definition). Observations of the Soft Sediment Fauna Subclass typically were present in the form of infaunal tubes and burrows at the sediment–water interface and sand

dollars on the sediment surface (Tables 3-1b, 3-2b, 3-3b, 3-4b; Figure 3-16). Epifaunal tracks were present across much of the surveyed areas and were created by small epifauna, such as snails and hermit crabs (Figure 3-17A) and by larger epifauna, such as cancer crabs and sea stars (Figures 3-10A, 3-17B).

The CMECS Biotic Subclass of Attached Fauna was infrequently observed as either the dominant Subclass or as the Co-occurring Biotic Subclass in the surveyed areas (Tables 3-1b, 3-2b, 3-3b, 3-4b; Figure 3-18). Attached fauna were documented: in the state waters along the planned path of the New York Export Cable where mussel beds were observed amongst shell fragments overlying silt-clay (Figure 3-19); at stations located on Cholera Bank where a diverse assemblage of attached fauna was observed (hydroids, sponges, corals; Figure 3-20); and at one station along the proposed NJ cable route (Figure 3-10A). This subclass is defined as "Areas characterized by rock substrates, gravel substrates, other hard substrates, or mixed substrates that are dominated by fauna which maintain contact with the substrate surface, including firmly attached, crawling, resting, interstitial, or clinging fauna" (See Section 2.1.5.2.2 for a full definition). When present, the percent cover of attached fauna was dense (Figure 3-21), as highlighted by the mussel beds observed along the New York Export Cable route (Figure 3-19) and the diverse attached fauna at Station 050 on Cholera Bank (Figure 3-20B); moderate, sparse and trace (Stations 095, 068, 010 respectively).

The CMECS Biotic Group of Small Tube-Building Fauna was the most common Dominant Biotic Group observed across the surveyed areas (Tables 3-1b, 3-2b, 3-3b, 3-4b; Figures 3-22 and 3-23). This group is defined as "Soft sediment areas dominated by tube-building annelids (e.g., spionids, sabellids), amphipods, small phoronids, or other small, surface-dwelling, tube-building fauna. These animals have a small tube width (< 2 millimeters), and the tubes often occur in dense mats. The animal itself may reside above or below the sediment surface within the constructed tube, which may be composed of a variety of materials (e.g., glued sediments, calcium carbonate, mucus, chitin, proteins)." Other frequently occurring Dominant CMECS Biotic Groups observed across the surveyed areas included Larger Tube Building Fauna (Figure 3-24A), Sand Dollar Beds (Figure 3-24B), Small Surface-Burrowing Fauna (Figure 3-24C), Mussel Beds (Figure 3-24D), and Burrowing Anemones (Figure 3-24E). The Dominant Co-occurring Biotic Group was variable across the surveyed area with no predominant group (Figure 3-25), highlighting the diversity of seafloor taxa in the surveyed area. Definitions of all CMECS Biotic Groups can be found in the Classification Standard (FGDC 2012).

The majority of the biological features observed at the surveyed area were driven by the seafloor habitat. The predominant habitat was Sand Sheets with numerous instances of Sand with Mobile Gravel, and a couple of stations where a habitat of Patchy Cobbles and Boulders on Sand was observed (Figures 3-2, 3-26, 3-27). Cobbles and boulders can provide habitat for a diverse range of taxa and serve as valuable habitat for corals and as a place for squid to lay their eggs (Guida et al. 2017). Sensitive taxa (Section 2.1.5.2.3) were only observed in SPI/PV imagery at one station (Tables 3-1b, 3-2b, 3-3b, 3-4b; Figure 3-28). At Station 50 the non-reef building Northern Star coral, *Astrangia* spp., was observed in all replicates (Figures 3-6E, 3-

20B, 3-29). *Astrangia* is a stony coral that attaches to hard substrate instead of building its own structure dissimilar from those corals commonly observed in tropical reefs. The polyps are translucent, and the colony has a furry appearance when they are expanded (Figure 3-29 inset). These sensitive taxa were observed in conjunction with other non-sensitive attached fauna (sponges, hydroids, barnacles) (Figure 3-20). In addition to those associated with sensitive habitats, species of concern known to occur in the area are black sea bass (warmer months), Atlantic cod (colder months), sea scallops, surf clams, and ocean quahog (Guida et al. 2017); sea scallops and the ocean quahog were the only species of concern observed during the SPI/PV survey (Figures 3-30, 3-31).

3.2 Long Island Export Cable Route (LIECR)

Fifty-six SPI/PV stations were sampled along the portion of the proposed route that was defined as the Long Island Export Cable Route (LIECR, Figure 3-1). The LIECR encompassed Stations 030-042, 79-80, 82-88, 98-106, and 116-130

3.2.1 Physical Features

Surficial sediment types varied along the LIECR with observed grain size classes ranging from silt-clay to granules and pebbles (Tables 3-1a, 3-5; Figures 3-2, 3-3, 3-6D, and 3-13). Stations located furthest offshore (Stations 030-045) were predominantly composed of medium sand (Figure 3-32) with a few instances of fine and coarse sand (Figures 3-2, 3-7C). Stations closer to shore were predominantly very fine sand or fine sand (Figures 3-3, 3-33) with a few stations composed of granules or pebbles (Figures 3-3, 3-6D). While there was inter-station spatial heterogeneity in sediment type along the LIECR, intra-station heterogeneity, i.e. two or three replicate images with different grain size categories, of primary sediments was minimal (Figures 3-2, 3-3, and 3-5). Low intra-station heterogeneity provided the ability to more accurately and finely categorize sediment types. Stations exhibiting sediment types with medium or high intra-station heterogeneity, were observed to be haphazardly distributed along the LIECR (Figure 3-5). No boulders were observed along the LIECR (Figure 3-4).

Station mean prism penetration values along the LIECR ranged from 3.6 to 13.8 cm, with a mean of 5.4 cm (SD±1.6) (Table 3-1a). Approximately 80% of the stations along the LIECR contained medium to high load-bearing strength reflected in the relatively low prism penetration depths observed (<6 cm) while the remaining predominantly had low to medium bearing capacity reflected in prism penetration values between 6 and 15 cm (Figure 3-11). Station 128 had extremely low bearing capacity and was over-penetrated (Figures 3-11, 3-13); this station was not included in the statistical assessment of prism penetration along the LIECR. There was no discernible spatial trend in sediment load-bearing capacity along the LIECR (Figure 3-11).

Station mean boundary roughness along the LIECR averaged 1.3 cm (SD±0.5), with a range of 0.5 to 2.8 cm (Table 3-1a; Figure 3-14). Well-formed and irregular ripples were the predominant bedform observed along the LIECR. Higher boundary roughness values (>1.5 cm) were primarily present at stations with larger more pronounced ripples which occurred at the stations closer to shore (Figures 3-14, 3-34A). Stations further from shore were generally characterized

by smaller ripples or contained no evident bedforms and generally had lower boundary roughness (<1.5 cm) (Figures 3-14, 3-34B). Physical forcing was the primary influence shaping small-scale boundary roughness for the majority of images (Appendix C). As is common in mobile sands, larger grains settled into the trough of the sand ripples (Figure 3-34).

3.2.2 Biological Features and Habitat

The dominant CMECS Biotic Subclass observed along the LIECR was Soft Sediment Fauna (Table 3-1b; Figure 3-15) with every station containing soft sediment fauna as the dominant Biotic Subclass. One station, Station 046, contained Attached Fauna as the Co-occurring Biotic Subclass (Figure 3-18); at Station 046 hydroids were observed in one replicated attached to pieces of gravel (Table 3-1b, Figure 3-20A). No other biotic subclasses were observed along the LIECR.

Biotic group was variable along the LIECR (Figure 3-22). Starting offshore and moving inshore, Stations 030-042 were determined to have Sand Dollar Beds as the dominant biotic group (Figure 3-32), with a few stations (Stations 030, 037, 040, 042) along this stretch of the proposed cable route composed of Small Surface-Burrowing or Small Tube-Building Fauna (Table 3-1b, Figures 3-24C, 3-31A). The next stretch of the LIECR (Stations 029, 043-047, 081, 078) had the dominant Biotic Group predominantly classified as Small Tube-Building Fauna (Figures 3-22, 3-35). Stations 046 and 047 were the exception, with dominant biotic groups at these stations classified as Small Surface-Burrowing Fauna and Sand Dollar Beds, respectively (Table 3-1b, Figure 3-22). The stations closest to shore, the portion of the LIECR that branches into state waters, had a variety of dominant biotic groups (Figure 3-22). Tube-Building Fauna, both small and large, were the most common Biotic Groups observed along this portion of the proposed route, while Tracks and Trails, Mobile Crustaceans on Soft Sediments, and Mobile Crustaceans on Hard or Mixed Substrates were also prevalent, amongst a few other occurring Biotic Groups not mentioned (Table 3-1b, Figure 3-22). The dominant Co-occurring Biotic Group was spatially variable along the LIECR (Figure 3-25) highlighting the diversity of taxa found on the seafloor along the LIECR.

The aRPD was often not measurable at stations along LIECR, with more than half the stations (32 out of 56) having aRPDs that were classified as IND (Figure 3-36). When determinable, mean aRPD depths ranged from 0.5 to 5.9 cm with an area mean of 3.1 cm (SD±1.2) (Table 3-1b; Figure 3-37). In mobile sandy sediments, the aRPD depth is based more on diffusion through sand grains and sediment mixing by fluid dynamics, and less on organic inputs and bioturbation of deposit-feeding infauna. Low organic inputs make optical distinction of the aRPD difficult. Similarly, with low deposition of organic materials, the sediment oxygen demand at stations along the LIECR was predominantly low (Table 3-1b, Figures, 3-37B, 3-38). Only a few stations showed evidence of elevated SOD (Figure 3-37A). No indications of low water column dissolved oxygen was observed (Table 3-1b), but the presence of methane was documented at station 128 (Table 3-1b, Figure 3-13).

The predominant state of infauna succession observed along the LIECR was Stage 2 (Table 3-1b, Figures 3-39, 3-40), an intermediate successional state. Stage 2 taxa were evidenced by the presence of polychaete tubes at the sediment–water interface (Figure 3-41), including the specialized shell tubes created by the polychaete *Diopatra cuprea* (Figure 3-41B). The presence of Stage 2 fauna along the LIECR reflects the dynamic nature of this mobile sand environment; frequent bedload transport through fluid dynamics creates an environment with regular disturbance. Due to the dynamic nature of these sandy environments and the very low organic loads found in medium and coarse sands intermediate Stage 2 taxa predominate. There were a few stations that were designated as being in transition from Stage 1 to 2 with a Stage 1 -> 2 designation (Figures 3-39, 3-40). These stations often had indications of substantial hydrodynamic forcing on the bottom, evidenced by the presence of distinct sand ripples (Figure 3-42). The small tubes present at the sediment–water interface were often located in the trough of the sand ripples (Figure 3-42B). Stage 1 -> 2 designations predominantly occurred along the LIECR between Station 116 to 123 (Figure 3-40). There were a few stations along the LIECR with advanced successional taxa indicated by Stage 2 -> 3 and Stage 3 designations (Figures 3-39, 3-40). Evidence of the presence of Stage 3 fauna included deep subsurface burrows and/or feeding voids that were both open and infilled and are the products of infaunal deposit feeder activity (Figure 3-43A). The replicates designated as being in transition from Stage 2 to 3 with a Stage 2 -> 3 designation, indicated that features (e.g., burrows in PV image pair, deep burrowing textures) were visible that indicated that Stage 3 taxa may be present but specific evidence (feeding voids) were not imaged (Figure 3-43B).

There were no sensitive taxa identified along the LIECR (Table 3-1b; Figure 3-28) and species of concern in the form of the Ocean quahog were observed at Stations 030 and 034 (Table 3-1b; Figures 3-30, 3-31A). When the Ocean quahog was observed it was in low densities as a single individual in a plan view image replicate.

The predominant habitat observed along the LIECR was Sand Sheets, with a few instances of Sand with Mobile Gravel (Figures 3-26, 3-27). Instances of habitat composed of Sand with Mobile Gravel predominantly occurred in the stations closest to shore that were in or adjacent NY state waters (Figures 3-6D, 3-26, 3-27); a couple of stations with this habitat were located further offshore (Stations 037 and 046; Figures 3-7C, 3-20A, 3-31A).

Epifauna observed with SPI and PV imagery along the LIECR was dominated by the presence of anemones, gastropods, hermit crabs, and sand dollars, among others (Table 3-1b, Figure 3-44). Epifauna were documented by PV and/or SPI at 52 of the 56 stations. Station 046 contained attached epifauna, and the percent coverage of the attached fauna at this station was sparse (1 to <30% coverage) (Table 3-1b; Figures 3-20A, 3-21).

Fish were rarely documented at stations along the LIECR; skate were documented at two stations, Stations 032 and 033 (Table 3-1b; Figure 3-45). Macroflora were not observed at any stations along the LIECR.

3.3 New Jersey Export Cable Route (NJECR)

Forty-three SPI/PV stations were sampled along the NJECR (Figure 3-1). The NJECR were the southernmost stations, and encompassed those stations extending from the Equinor lease area into NJ state waters. The NJECR included Stations 001-027 and 141-157.

3.3.1 Types of Sediment and Bedforms Observed

Similar to the LIECR surficial sediment types varied along the NJECR with observed sediment types ranging from silt-clay, to very fine sand, to sediments as large as granules (Tables 3-2a, 3-5; Figures 3-2, 3-6A, 3-6B, 3-10B). The majority of stations along the NJECR, especially those stations located east of the Hudson River Shelf Valley (Stations 012-027, 141-157), were predominantly composed of fine and medium sand (Figures 3-2, 3-23B) with a few instances of very fine sand at Stations 019 and 020 (Figures 3-2, 3-46). Station 011, located directly in the shelf valley, was composed of silt-clay (Figure 3-6A), reflecting the reduced hydrodynamics in this deeper portion of the survey area. Stations 010 and 012, located in the shelf valley but near the edge (possibly on the slopes of the valley), were composed of fine sand and very fine sand, respectively (Figure 3-10A). West of the shelf valley, moving into shallower waters and the NJ state boundaries, the sediment type was variable, with fine sand and granules the predominant sediment types (Figures 3-2, 3-7B, 3-10B, 3-12A). Intra-station sediment heterogeneity, i.e. two or three replicate images with different grain size categories, was generally low along the NJECR (Figure 3-5). A few stations had medium sediment type heterogeneity, but there was not spatial trend to the location of those stations. Boulders were present at one station along the NJECR (Table 3-2a; Figure 3-4). Station 010, located along the slope of a submarine valley, contained a boulder in one replicate (Figure 3-23A).

Station mean prism penetration values along the NJECR ranged from 2.0 to 19.8 cm, with a mean of 5.9 cm (SD±2.5) (Table 3-2a). Approximately 70% of the stations along the NJECR contained medium to high load-bearing strength reflected in the relatively low prism penetration depths observed (<6 cm), while the remaining predominantly had low to medium bearing capacity reflected in prism penetration values between 6 and 15 cm (Figure 3-11). Station 011 had extremely low load-bearing capacity with prism penetration >15 cm; this station was uniquely situated in the center of the Hudson River Shelf Valley and composed of silt-clay (Figures 3-6A, 3-11). There was no discernible spatial trend in sediment load-bearing capacity along the NJECR (Figure 3-11).

Station mean boundary roughness along the NJECR averaged 1.3 cm (SD±0.6), with a range of 0.6 to 3.2 cm (Table 3-2a; Figure 3-14). Boundary roughness was influenced by biological processes, from both infauna and epifauna activity (Table 3-2a; Figures 3-6A, 3-16B; Appendix C), and physical forcing from hydrodynamic movement of sand occasionally creating bedforms on the seafloor. When present bedforms were well-formed or uneven sand ripples (Figure 3-47). Well-formed sand ripples were oriented with larger particles in the trough of the ripple (Figure 3-47B), a common observation in mobile sands.

3.3.2 Type of Biota and Habitat Observed

The dominant CMECS Biotic Subclass along the NJECR was Soft Sediment Fauna (Table 3-2b; Figure 3-15) with every station composed of soft sediment fauna as the dominant Biotic Subclass. Most stations did not have a Co-occurring Biotic Subclass (Figure 3-18), except Stations 004 and 010 which were documented with Inferred Fauna and Attached Fauna, respectively (Table 3-2b; Figures 3-10A, 3-48).

Along the NJECR the dominant Biotic Group was variable (Table 3-2b; Figure 3-22). There was no discernible spatial trend, but Sand Dollar Beds and Small Tube-Building Fauna were the most prevalent dominant Biotic Groups observed (Figures 3-22, 3-23B, 3-46). Other biotic groups observed along the NJECR were Mobile Crustaceans on Hard or Mixed Substrates, Larger-Tube Building Fauna, Small Surface-Burrowing Fauna, and Diverse Soft Sediment Epifauna (Table 3-2b; Figure 3-22). The dominant Co-occurring Biotic Group was spatially highly variable along the NJECR with numerous Co-occurring Biotic Groups, and no particular group dominant (Figure 3-25), highlighting the diversity of taxa found on the seafloor along the NJECR.

The aRPD was often not measurable at stations along NJECR, with approximately half the stations (22 out of 43) having aRPDs that were classified as IND (Figure 3-36). When determinable, mean aRPD depths ranged from 1.5 to 4.8 cm with a mean of 3.3 cm (SD±0.8) (Table 3-2b; Figure 3-49). In mobile sandy sediments, the aRPD depth can be influenced by diffusion through sand grains during sediment mixing, and less on organic inputs and bioturbation of deposit-feeding infauna. Though at times both processes can contribute to the depth of the aRPD (Figure 3-50). Along the NJECR, when detectable, the aRPDs were generally well-mixed deep into the sediment column by both physical forcing and biological activity (Figures 3-36, 3-49, 3-50). Low organic inputs make optical distinction of the aRPD difficult, this resulted in the high number of stations with aRPDs that were indeterminate (Figure 3-36). Similarly, with low deposition of organic materials, the sediment oxygen demand at stations along the NJECR was predominantly low (Table 3-2b, Figures, 3-49B, 3-50). Only a few stations showed evidence of elevated SOD (Figure 3-49A). No indications of low water column dissolved oxygen or methane presence was observed at any stations along the NJECR (Table 3-2b).

The predominant state of infauna succession observed along the NJECR was Stage 2 (Table 3-2b, Figure 3-39). Stage 2 taxa were evidenced by the presence of polychaetae tubes at the sediment–water interface and shallow burrowing (Figures 3-49, 3-50), including tubes created by the polychaete *Diopatra cuprea*. (Figure 3-50). *D. cuprea* often incorporate shell fragments when forming their tubes (Figure 3-16A) providing the tubes with a unique appearance. Along the NJECR we observed *D. cuprea* tubes observed without shells present due to the lack of shell hash at some stations. The presence of Stage 2 fauna along the NJECR reflects the dynamic nature of this mobile sand environment. There were a few instances where the successional stage was designated as being in transition from Stage 1 to 2 with a Stage 1 -> 2 designation (Table 3-2b; Figure 3-39). These occurrences were at Stations located offshore

(Stations 150, 153, 157) and were indicated by small tubes present at the sediment–water interface. Advanced succession was documented at Stations 010, 011, and 012; each station was located in the Hudson Shelf Valley (Figure 3-39). Stage 3 fauna were evidenced by the presence of deep subsurface burrows and/or feeding voids, the products of head-down deposit feeders (Figures 3-6A, 3-49A, 3-51). There were a few stations along the NJECR with replicates designated as being in transition from Stage 2 to 3 with a Stage 2 -> 3 designation (Figure 3-39).

There were no sensitive taxa identified along the NJECR (Table 3-2b; Figure 3-28) and species of concern in the form of the ocean quahog and sea scallop were observed at Stations 024 and Station 005, 010, respectively (Table 3-2b; Figures 3-10A, 3-30). Both the ocean quahog and sea scallop were observed in low densities of one to two individuals in a plan view image replicate.

Along the NJECR habitat type varied on either side of the Hudson Shelf Valley (Table 3-2b; Figure 3-26). Stations located east of the shelf valley were exclusive composed of Sand Sheet habitat (Figure 3-23B), and stations located west of the shelf valley were predominantly a habitat of Sand with Mobile Gravel (Figure 3-10B) with some instances of Sand Sheets (Figure 3-48) and one occurrence of Patchy Cobbles, Boulders on Sand (Figure 3-23A). The habitat types observed along the NJECR corresponded to the backscatter data collected by USGS (2-2). Stronger backscatter returns indicate coarser sediments, and weaker returns indicate finer material. Areas with stronger returns were located west of the submarine valley, which coincided with the coarser habitat of Sand with Mobile Gravel and Cobbles observed in this area (Figures 2-2, 3-26).

Epifauna observed with SPI and PV imagery along the NJECR was dominated by the presence of hermit crabs and sand dollars, among others (Table 3-2b; Figure 3-46,) though crabs, sea stars and other diverse fauna were also observed (Figures 3-10A, 3-17B). Epifauna were documented by PV and/or SPI at every station along the NJECR except Station 14 (Table 3-2b), which had a seafloor covered in polychaete tubes (Figure 3-52).

Fish were infrequently observed at stations along the NJECR, with the sea robin and skate as the only taxa documented (Table 3-2b; Figure 3-53). Macroflora were not observed at any stations along the NJECR. (Table 3-2b).

3.4 New York Harbor Export Cable Route (NYHECR)

Fifty-eight SPI/PV stations were sampled along the NYHECR (Figure 3-1). The NYHECR passes over Cholera Bank, extends into NY state waters and traverses the narrows between Staten Island and Brooklyn. The NYHECR included Stations 048-077, 089-097, 107-115 and 131-140.

3.4.1 Types of Sediment and Bedforms Observed

Surficial sediment types varied along the NYHECR with observed grain size classes ranging from silt-clay to granules and pebbles (Tables 3-3a, 3-5; Figures 3-2, 3-19, 3-8A, 3-8B), with

boulders present at one station, Station 050 (Figures 3-4, 3-20B). The majority of stations along the NYHECR were predominantly composed of very fine and fine sand (Table 3-3a; Figures 3-2, 3-16A, 3-54). All of the silt-clay sediments observed along the NYHECR were located in NY state waters and were frequently associated with overlying mussel beds (Table 3-3a, Table 3-3b; Figures 3-2, 3-19). Stations with coarser sediment types were primarily located on and adjacent to Cholera Bank (Stations 050-054, 068-071, and 131-138) where coarse and very coarse sand, pebbles and granules, and boulders were observed (Figures 3-8, 3-20B, 3-55). Cholera Bank is a known shoal, and the presence of coarse grains in this area was expected. The sediment types observed along the NYHECR corresponded to the backscatter results from the USGS (Figures 2-2, 3-2). Intra-station sediment heterogeneity, i.e. two or three replicate images with different grain size categories, was generally low along the NYHECR (Figure 3-5). A few stations had medium heterogeneity in sediment type, but there was no spatial trend to the location of these stations. One station, Station 051, had high heterogeneity with each replicate containing a different sediment type (Table 3-3a; Figure 3-8). Boulders were present at one station, Station 050, located on Cholera Bank (Table 3-3a; Figure 3-4). Every replicate at Station 050 had documented boulders (Table 3-3a; Figures 3-6E, 3-20B, 3-29).

Station mean prism penetration values along the NYHECR ranged from 2.3 to 18.9 cm, with a mean of 6.5 cm (SD±2.8) (Table 3-3a). Approximately 50% of the stations (31 out of 58) along the NYHECR contained medium to high load-bearing strength reflected in the relatively low prism penetration depths observed (<6 cm), while the remaining predominantly had low to medium bearing capacity reflected in prism penetration values between 6 and 15 cm (Figure 3-11). Station 115 had extremely low load-bearing capacity with prism penetration >15 cm. Station 115 was located in NY harbor and composed of silt-clay sediments; fine sediments commonly found in harbor settings have low load-bearing capacity (Figures 3-11, 3-56). Stations with low load bearing capacity were predominantly located at the shallower stations in NY state waters and corresponded with those stations containing silt-clay or very fine sand sediment types (Figures 3-2, 3-11, 3-19, 3-56).

Station mean boundary roughness along the NYHECR averaged 1.2 cm (SD±0.5), with a range of 0.5 to 2.8 cm (Table 3-3a; Figure 3-14). Boundary roughness was influenced by biological processes, from both infauna and epifauna activity (Table 3-3a; Figures 3-19, 3-56; Appendix C), and physical forcing from hydrodynamic movement of sand occasionally creating bedforms on the seafloor (Figure 3-55). When present bedforms were well-formed or uneven sand ripples (Table 3-3a).

3.4.2 Type of Biota and Habitat Observed

The predominant CMECS Biotic Subclass along the NYHECR was Soft Sediment Fauna (Table 3-3b; Figure 3-15) with most station designated with this Biotic Subclass. The Attached Fauna Biotic Subclass was found at: Station 050 located on Cholera Bank, which was composed of boulders (Figures 3-4, 3-6E, 3-20B, 3-29); Station 068 where Soft Sediment and Attached Fauna were both designated as the dominant Biotic Subclass due to the presence of mussels along with tube building fauna (Figure 3-57); and Stations 107-110 located in NY state waters,

the seafloor at these stations was covered in shell material with numerous mussels situated in the interstitial spaces of the shell assemblage (Figure 3-19). Co-occurring Biotic Subclass was patchily distributed along the NYHECR (Figure 3-18). When designated, Attached Fauna or Soft Sediment Fauna were the Co-occurring Biotic Subclass (Table 3-3b). The percent cover of Attached Fauna was variable along the NYHECR (Figure 3-21). Station 050 was the only location where Attached Fauna were assessed to be densely covering the bottom (Figures 3-6E, 3-20B, 3-29). Most of the stations containing Mussel Beds (Station 095, 096, 107-110) contained moderate coverage, though some stations had sparse coverage (Figures 3-19, 3-24D).

Along the NYHECR biotic group was variable (Table 3-3b; Figure 3-22). There was no specific spatial trend, but Tube-Building Fauna (both small and larger) were the most prevalent biotic groups observed (Figures 3-22, 3-17A, 3-54). Mussel Beds and Attached Mussels were prevalent at the stations in NY state waters just before the “Narrows” (Figures 3-19, 3-22, 3-24D). Other biotic groups observed along the NYHECR were Mobile Crustaceans on Hard or Mixed Substrates, Burrowing Anemones, and Sand Dollar Beds among a few others (Table 3-3b; Figure 3-22). The dominant Co-occurring Biotic Group was spatially variable along the NYHECR with numerous co-occurring groups and no particular group dominant (Figure 3-25), highlighting the diversity of taxa found on the seafloor along the NYHECR. The diversity of Co-occurring biotic groups was similarly observed at other portions of the cable route (LIECR, NJECR).

The aRPD was often not measurable at stations along NYHECR, with approximately half the stations (26 out of 58) having aRPDs that were classified as IND (Figure 3-36). When determinable, mean aRPD depths ranged from 0.1 to 5.3 cm with a mean of 2.3 cm (SD±1.1) (Table 3-3b; Figure 3-58). Many of the NYHECR stations in federal waters were composed of mobile sands (Table 3-3a; Figure 3-2) resulting in an aRPD depth that was influenced by diffusion through sediment mixing, and less on organic inputs and bioturbation of deposit-feeding infauna (Figures 3-54, 3-57). In NY state waters the sediment became finer and the closer proximity to land increased the influence of organic input; sediment oxygen demand was much higher at NYHECR stations located in state waters (Figures 3-38, 3-57, 3-58). The aRPD at stations located in NY state waters were influenced by biological activity and organic input (Figures 3-19, 3-58). Many of the stations located on or adjacent Cholera Bank had aRPDs that were indeterminate (Figure 3-36); the aRPD can be difficult to impossible to discern in the coarse grains prevalent at stations in this location. There were no indications of low water column dissolved oxygen or methane presence was observed at any stations along the NJECR (Table 3-3b).

The infauna succession observed along the NYHECR was variable (Table 3-3b, Figure 3-39). Stations located in NY state waters had successional designations that were often either Indeterminate or advanced Stage 2->3 or Stage 3 succession; there were also a few instances of stations with Stage 2 succession. Advanced succession was evidenced by the presence of feeding voids in the sediment column (Figure 3-19). Intermediate Stage 2 succession was

evidence by shallow burrowing and tubes at the sediment–water interface (Figure 3-59A). In federal waters the predominant state of infauna succession was Stage 2, evidenced by tubes at the sediment water interface (Figure 3-59B). Stage 2 succession is a common state in mobile sand environments; mobile sands were frequently observed along the portion of the NYHECR that was situated in federal waters (Figures 3-2, 3-26). While Stage 2 taxa was the predominant state of succession of the portion of the NYHECR in federal waters, advanced succession (Stage 2->3, Stage 3) was documented between Stations 056 to 062 and 089 (Figure 3-39) evidenced by large burrowing fauna (Figure 3-59C). Replicates at a few stations were designated as being in transition from Stage 1 to 2 with a Stage 1 -> 2 designation (Table 3-3b; Figure 3-39).

Along the NYHECR sensitive taxa were identified at Station 050 (Table 3-3b; Figure 3-28). At Station 050 the non-reef building Northern Star coral, *Astrangia* spp., was observed in all replicates (Figures 3-6E, 3-20B, 3-29). Species of concern, in the form of sea scallops, were observed only at station along the NYHECR in federal waters: Stations 057, 058, and 091 (Table 3-3b; Figures 3-30, 3-60A). At each station sea scallops were observed in low densities of one individual per image replicate.

The predominant habitat observed along the NYHECR was sand sheets, and the portion of NYHECR transiting Cholera Bank was composed of Sand with Mobile Gravel habitat (Table 3-3b; Figure 3-26). One station, Station 050, was composed of Patchy, Cobbles, Boulders on Sand habitat (Figures 3-6E, 3-20B, 3-29). The habitat trends observed along the NYHECR corresponded with USGS backscatter data (Figure 2-2).

Epifauna observed with SPI and PV imagery along the NYHECR was dominated by the presence of anemones, gastropods, and hermit crabs, among others (Table 3-3b; Figure 3-60). Epifauna were documented by PV and/or SPI at every station along the NYHECR except Station 74 (Table 3-3b), which had a seafloor covered in *D. cuprea*. polychaete tubes (Figure 3-61).

Fish were only observed at Stations 131 and 132 with the sea robin identified as the taxa (Table 3-3b). Macroflora were not observed at any stations along the NYHECR. (Table 3-3b).

3.5 Reference Area Stations

Fifteen reference stations were surveyed, divided into three areas with five stations in each area. Locations for the reference areas were selected to provide a representation of the breadth of seafloor covered by the proposed export cable routes. Backscatter data from the USGS (Figure 2-2) was used to define reference locations. Reference A was selected in an area of stronger backscatter return, Reference C was selected in an area of lower backscatter return, and Reference C was selected in and around the prominent shoal Cholera Bank.

3.5.1 Types of Sediment and Bedforms Observed

Surficial sediment types varied amongst the reference areas (Table 3-4a; Figure 3-2). The predominant sediment type at Reference A was composed of granules and pebbles (Figure 3-

62A), Reference B had predominant sediment types of medium sand over fine sand, (Figure 3-62B) and Reference C had predominant sediment types of medium sand (Figure 3-62C). The sediment types observed in the reference areas corresponded to the backscatter results from the USGS (Figures 2-2, 3-2). Intra-station sediment heterogeneity was generally low with each reference area having approximately similar sediment types amongst its stations (Figure 3-2).

Station mean prism penetration values at the reference areas ranged from 4.4 to 8.0 cm, with a mean of 6.2 cm (SD±1.1) (Table 3-4a). Approximately 50% of the reference stations (6 out of 15) contained medium to high load-bearing strength reflected in the relatively low prism penetration depths observed (<6 cm), while the remaining stations predominantly had low to medium bearing capacity reflected in prism penetration values between 6 and 15 cm (Figure 3-11). Stations at Reference A had the highest load bearing capacity; Reference A had the largest sediment type of the three reference areas (Figure 3-2).

Station mean boundary roughness at the reference areas averaged 1.5 cm (SD±0.5), with a range of 0.6 to 2.3 cm (Table 3-4a; Figure 3-14). Boundary roughness at the reference stations was predominantly influenced by physical processes given the prevalence of mobile sand and gravel at the three reference areas (Table 3-4a; Figures 3-60, 3-56; Appendices C and D), and physical forcing from hydrodynamic movement of sand occasionally creating bedforms on the seafloor (Figure 3-55). When present bedforms were well-formed or uneven sand ripples (Table 3-4a).

3.5.2 Type of Biota and Habitat Observed

The dominant CMECS Biotic Subclass at the reference areas was Soft Sediment Fauna (Table 3-4b; Figure 3-15) with every station in each of the three reference areas composed of soft sediment fauna as the dominant Biotic Subclass. None of the reference stations had a Co-occurring Biotic Subclass (Table 3-4b; Figure 3-18).

Biotic Group was variable between the three reference areas (Table 3-4b; Figure 3-22). The dominant Biotic Group for all stations at Reference A was Burrowing Anemones (Figures 3-63A). Reference B was a mix of dominant biotic groups, with Diverse Soft Sediment Epifauna and Larger Tube-Building Fauna the predominant groups (Figure 3-64). All of the stations at Reference C had Larger Tube-Building Fauna designated as the dominant Biotic Group (Figure 3-63B). The dominant Co-occurring Biotic Group was variable at the reference stations with numerous co-occurring groups and no particular group dominant (Figure 3-25), highlighting the diversity of taxa found on the seafloor at the reference stations. The diversity of Co-occurring biotic groups was similarly observed along the proposed cable routes (LIECR, NJECR, NYHECR).

The aRPD was often not measurable at the reference stations, with approximately half the stations (7 out of 15) having aRPDs that were classified as IND (Figure 3-36). When determinable, mean aRPD depths ranged from 2.8 to 6.8 cm with a mean of 4.4 cm (SD±1.3) (Table 3-4b; Figure 3-65). No stations showed evidence of elevated sediment oxygen demand

(Figure 3-38), and there were no indications of low water column dissolved oxygen or methane presence any of the reference stations (Table 3-4b).

Infauna succession observed at the reference stations was predominantly Stage 2 (Table 3-4b, Figure 3-39). Stage 2 succession was primarily evidenced by tubes at the sediment–water interface (Figure 3-65A). A few stations contained advanced Stage 2->3 succession, evidenced by the presence of large burrowing fauna but no feeding voids (Figure 3-65B). Reference station REFB_05 was designated as being in transition from Stage 1 to 2 with a Stage 1 -> 2 designation (Table 3-4b; Figure 3-39).

The predominant habitat observed at the reference stations was variable (Figure 3-26). Reference A was exclusively composed of Sand with Mobile Gravel habitat (Figure 3-63A). Reference B and C were exclusively composed of Sand Sheet habitat (Figures 3-63B, 3-64B). The habitat trends observed at the reference stations corresponded with USGS backscatter data (Figure 2-2), which was used to delineate the locations of the reference areas.

There were no sensitive taxa or species of concern identified at the reference stations (Table 3-4b; Figures 3-28, 3-30). Epifauna observed with SPI and PV imagery at the reference stations was dominated by the presence of anemones at Reference A (Table 3-4b; Figure 3-63A), gastropods, hermit crabs and sand dollars at Reference B (Table 3-4b; Figure 3-64B) and a few sea stars at Reference C (Table 3-4b; Figure 3-63B).

Fish were only observed at three stations, Stations REFA_01, REFA_05, and REFB01, with sea robin, flounder and skate identified as the taxa (Table 3-4b). Macroflora were not observed at any reference stations. (Table 3-4b).

3.6 Sediment Grabs

Grain size distribution analysis were completed for sixteen sediment samples. The Grain Size Distribution results are shown in Table 3-6. Sediment grab results were approximately similar to sediment types determined by SPI/PV (Table 3-6; Figures 3-2, 3-3). Sediment grab grain size analysis determined stations to be predominantly sand, which was the predominant sediment type observed in SPI/PV imagery. At Stations 010 and 011 the grain size analysis delineated the change in sediment type from fine sand over silt-clay at Station 010 to predominantly silt-clay at Station 011 located in the center of the submarine valley. The grain-size analysis for Station 010 included approximately 40% gravel. Observations of the replicate SPI/PV images for Station 010 noted that gravel was present in small patches but was not a substantial component of the sediment type at this station. The ambiguity between the grab and SPI/PV data can be attributed to the sediment grabs collecting only a single replicate of a relatively small area of the seafloor and not capturing the intra-station heterogeneity. There was general agreement between the SPI/PV and sediment grab data, but fine scales differences in the data were attributed to the limited capability for the sediment grab approach to capture intra-station sediment heterogeneity.

Table 3-1a. Summary of Plan View Image Analysis Results at the Long Island Export Cable Route Stations

Long Island Export Cable Route Station	Water Depth (m)	SPI Replicate (n)	Mean Prism Penetration Depth (cm)	Mean Boundary Roughness (cm)	SPI Sediment Type (by replicate)			PV Replicate (n)	Gravel Mode (mm)	Dominant CMECS Substrate Group	Dominant CMECS Substrate Subgroup	Boulder Presence	Bedforms (by replicate)			Bedform Size Measurement (cm)	Debris	Habitat Type
027	30	3	4.1	0.9	Fine sand	Fine sand	Fine sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	None	Sand Sheet
028	27	3	4.7	1.2	Fine sand	Fine sand	Fine sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	Shell Hash	Sand Sheet
029	27	3	4.6	0.8	Fine sand	Medium sand	Medium sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	Shell Hash	Sand Sheet
030	37	3	5.7	1.2	Medium sand	Medium sand	Medium sand	3	IND	Sand	Sand or Finer	No	None	Uneven Ripples	Uneven Ripples	IND	Shell Hash	Sand Sheet
031	36	3	6.0	1.0	Medium sand	Medium sand	Medium sand	3	IND	Sand	Sand or Finer	No	None	Uneven Ripples	Uneven Ripples	IND	Shell Hash	Sand Sheet
032	36	3	5.9	0.8	Medium sand	Medium sand	Medium sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	Shell Hash	Sand Sheet
033	34	3	5.9	0.8	Medium sand	Medium sand	Medium sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	Shell Hash	Sand Sheet
034	33	3	5.6	0.7	Medium sand	Medium sand	Medium sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	Shell Hash	Sand Sheet
035	34	3	6.1	1.0	Medium sand	Medium sand	Medium sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	Shell Hash	Sand Sheet
036	30	3	6.3	0.7	Medium sand	Medium sand	Medium sand	3	IND	Sand	Sand or Finer	No	None	Ripples	Ripples	39.4	Shell Hash	Sand Sheet
037	32	3	6.0	0.6	Very coarse sand over sand	Very coarse sand over sand	Very coarse sand over sand	3	3.0	Gravelly	Gravelly Sand	No	None	None	IND	-	Shell Hash	Sand with Mobile Gravel
038	30	3	6.4	0.5	Medium sand	Medium sand	Medium sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	Shell Hash	Sand Sheet
039	30	3	5.4	0.9	Fine sand	Medium sand	Medium sand	3	IND	Sand	Sand or Finer	No	None	Ripples	Ripples	41.4	Shell Hash	Sand Sheet
040	30	3	6.3	1.4	Medium sand	Medium sand	Medium sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	Shell Hash	Sand Sheet
041	29	3	5.9	0.6	Fine sand	Fine sand	Fine sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	None	Sand Sheet
042	29	3	8.4	1.6	Very fine sand	Very fine sand	Very fine sand over silt/clay	3	IND	Sand	Sand or Finer	No	None	None	None	-	Shell Hash	Sand Sheet
043	27	3	4.3	1.2	Medium sand	Medium sand	Medium sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	Shell Hash	Sand Sheet

Long Island Export Cable Route Station	Water Depth (m)	SPI Replicate (n)	Mean Prism Penetration Depth (cm)	Mean Boundary Roughness (cm)	SPI Sediment Type (by replicate)			PV Replicate (n)	Gravel Mode (mm)	Dominant CMECS Substrate Group	Dominant CMECS Substrate Subgroup	Boulder Presence	Bedforms (by replicate)			Bedform Size Measurement (cm)	Debris	Habitat Type
044	27	3	5.0	0.9	Medium sand	Medium sand	Medium sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	Shell Hash	Sand Sheet
045	25	3	4.4	1.5	Medium sand	Medium sand	Medium sand	3	IND	Sand	Sand or Finer	No	None	None	Ripples	4.5	Shell Hash	Sand Sheet
046	26	3	4.3	1.0	Medium sand	Medium sand	Pebble over finer sediment	3	12.5	Gravelly	Gravelly Sand	No	None	None	None	-	None	Sand with Mobile Gravel
047	25	3	4.4	1.0	Fine sand	Fine sand	Fine sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	None	Sand Sheet
078	23	3	4.8	1.3	Very fine sand	Very fine sand	Very fine sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	Shell Hash	Sand Sheet
079	24	3	4.1	1.5	Fine sand	Fine sand	Fine sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	Shell Hash	Sand Sheet
080	21	3	5.2	0.9	Fine sand	Fine sand	Fine sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	Shell Hash	Sand Sheet
081	25	3	6.7	1.0	Very fine sand	Very fine sand	Very fine sand	3	IND	Sand	Sand or Finer	No	None	None	Uneven Ripples	IND	None	Sand Sheet
082	23	3	5.3	1.0	Medium sand	Medium sand	Medium sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	Shell Hash	Sand Sheet
083	23	3	8.0	1.0	Very fine sand over silt/clay	Very fine sand over silt/clay	Very fine sand over silt/clay	1	IND	Sand	Sand or Finer	No	None	-	-	-	None	Sand Sheet
084	19	3	4.2	0.8	Fine sand	Fine sand	Fine sand	3	IND	Sand	Sand or Finer	No	None	None	Uneven Ripples	IND	None	Sand Sheet
085	20	3	5.7	0.8	Fine sand	Fine sand	Fine sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	Shell Hash	Sand Sheet
086	16	3	5.0	0.8	Fine sand	Fine sand	Fine sand	3	IND	Sand	Sand or Finer	No	None	Uneven Ripples	Uneven Ripples	IND	Shell Hash	Sand Sheet
087	13	3	3.8	2.5	Very fine sand	Very fine sand	Very fine sand	3	IND	Sand	Sand or Finer	No	Ripples	Ripples	Ripples	21.1	Shell Hash	Sand Sheet
088	11	3	5.8	2.8	Fine sand	Fine sand	Fine sand	3	IND	Sand	Sand or Finer	No	None	Ripples	Ripples	-	Shell Hash	Sand Sheet
098	18	3	4.2	1.0	Very fine sand	Very fine sand	Very fine sand	3	IND	Sand	Sand or Finer	No	Uneven Ripples	Uneven Ripples	Uneven Ripples	IND	Shell Hash	Sand Sheet
099	18	3	4.8	1.1	Fine sand	Medium sand over finer sediment	Medium sand over finer sediment	3	2.0	Slightly Gravelly	Slightly Gravelly Sand	No	None	None	None	-	Shell Hash	Sand with Mobile Gravel
100	15	3	4.5	1.4	Very fine sand	Very fine sand	Very fine sand	3	IND	Sand	Sand or Finer	No	Ripples	Ripples	Ripples	11.1	None	Sand Sheet

Long Island Export Cable Route Station	Water Depth (m)	SPI Replicate (n)	Mean Prism Penetration Depth (cm)	Mean Boundary Roughness (cm)	SPI Sediment Type (by replicate)			PV Replicate (n)	Gravel Mode (mm)	Dominant CMECS Substrate Group	Dominant CMECS Substrate Subgroup	Boulder Presence	Bedforms (by replicate)			Bedform Size Measurement (cm)	Debris	Habitat Type
101	15	3	3.8	1.7	Very fine sand	Very fine sand	Very fine sand	3	IND	Sand	Sand or Finer	No	Ripples	Ripples	Ripples	16.9	Shell Hash	Sand Sheet
102	17	3	5.6	1.2	Fine sand	Fine sand	Fine sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	Shell Hash	Sand Sheet
103	17	3	3.6	1.3	Very fine sand	Very fine sand	Very fine sand	3	IND	Sand	Sand or Finer	No	Ripples	Ripples	Ripples	8.6	Shell Hash	Sand Sheet
104	14	3	4.6	2.2	Very fine sand	Very fine sand	Very fine sand	3	IND	Sand	Sand or Finer	No	Ripples	Ripples	Ripples	13.6	Shell Hash	Sand Sheet
105	11	3	3.6	1.4	Fine sand	Fine sand	Fine sand	3	IND	Sand	Sand or Finer	No	Ripples	Ripples	Ripples	29.3	Shell Hash	Sand Sheet
106	10	3	5.6	2.0	Medium sand	Medium sand	Medium sand over finer sediment	3	IND	Sand	Sand or Finer	No	Ripples	Ripples	Ripples	IND	Shell Hash	Sand Sheet
116	14	3	5.4	1.2	Medium sand	Medium sand	Medium sand	3	IND	Sand	Sand or Finer	No	Ripples	Ripples	Ripples	8.2	Shell Hash	Sand Sheet
117	14	3	4.2	1.3	Very fine sand	Very fine sand	Very fine sand	3	IND	Sand	Sand or Finer	No	Ripples	Ripples	Ripples	12.4	Shell Hash	Sand Sheet
118	14	3	4.7	1.7	Fine sand	Fine sand	Fine sand	3	IND	Sand	Sand or Finer	No	Ripples	Ripples	Ripples	9.0	None	Sand Sheet
119	14	3	4.9	1.2	Fine sand	Fine sand	Fine sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	Shell Hash	Sand Sheet
120	11	3	4.0	2.4	Very fine sand	Very fine sand	Very fine sand	3	IND	Sand	Sand or Finer	No	None	None	Ripples	-	None	Sand Sheet
121	8	3	5.6	0.7	Very fine sand	Very fine sand	Very fine sand	0	-	-	-	-	-	-	-	-	-	-
122	13	3	4.5	2.1	Fine sand	Fine sand	Fine sand	3	IND	Sand	Sand or Finer	No	Ripples	Ripples	Ripples	10.5	Shell Hash	Sand Sheet
123	14	3	5.3	1.8	Medium sand	Medium sand	Medium sand	3	2.1	Slightly Gravelly	Slightly Gravelly Sand	No	Ripples	Ripples	Uneven Ripples	12.0	Shell Hash	Sand with Mobile Gravel
124	12	3	5.6	1.6	Fine sand	Fine sand	Fine sand	3	IND	Sand	Sand or Finer	No	Ripples	Ripples	Ripples	19.9	Shell Hash	Sand Sheet
125	13	3	5.3	2.0	Fine sand over very fine sand	Fine sand over very fine sand	Fine sand over very fine sand	3	IND	Sand	Sand or Finer	No	Ripples	Ripples	Ripples	16.0	None	Sand Sheet
126	11	3	6.3	1.3	Pebble over finer sediment	Pebble over finer sediment	Pebble over finer sediment	3	IND	Gravel Mixes	Sandy Gravel	No	None	None	None	-	None	Sand with Mobile Gravel

Long Island Export Cable Route Station	Water Depth (m)	SPI Replicate (n)	Mean Prism Penetration Depth (cm)	Mean Boundary Roughness (cm)	SPI Sediment Type (by replicate)			PV Replicate (n)	Gravel Mode (mm)	Dominant CMECS Substrate Group	Dominant CMECS Substrate Subgroup	Boulder Presence	Bedforms (by replicate)			Bedform Size Measurement (cm)	Debris	Habitat Type
127	13	3	5.9	1.1	Granule over sand	Pebble over finer sediment	Pebble over finer sediment	3	6.0	Gravelly	Gravelly Sand	No	None	None	Ripples	15.4	None	Sand with Mobile Gravel
128	13	3	IND	IND	Silt/clay	Silt/clay	Silt/clay	2	IND	Sand	Sand or Finer	No	Ripples	Ripples	-	11.5	None	Sand Sheet
129	12	3	13.8	1.3	Silt/clay over sand	Silt/clay over sand	Very fine sand over silt/clay	0	-	-	-	-	-	-	-	-	-	-
130	9	3	5.5	1.0	Pebble over finer sediment	Pebble over finer sediment	Pebble over finer sediment	3	IND	Gravel Mixes	Sandy Gravel	No	None	None	None	-	None	Sand with Mobile Gravel
n = SPI-56, PV-54																		
Max	**37**		**13.8**	**2.8**					**12.5**							**41.4**		
Min	**8**		**3.6**	**0.5**					**2.0**							**4.5**		
Mean	**21**		**5.4**	**1.3**					**5.1**							**16.7**		
Standard Deviation			**1.6**	**0.5**					**4.4**							**10.3**		

IND=Indeterminate
"-" Replicate image not analyzed

Table 3-1b. Summary of Sediment Profile Image Analysis Results at the Long Island Export Cable Route Stations

Long Island Export Cable Route Station	Water Depth (m)	SPI Replicate (n)	Mean aRPD Depth (cm)	Sediment Oxygen Demand Level	Methane Presence	Successional Stage (by replicate)			PV Replicate (n)	Possible Habitat of Interest	Dominant CMECS Biotic Subclass	Dominant CMECS Co-occurring Biotic Subclasses (# of reps)	Dominant CMECS Biotic Group	Dominant CMECS Co-occurring Biotic Group	Maximum Attached Fauna Percent Cover (CMECS Percent Cover Modifier)	Burrow Presence	Tracks Presence	Fish Present[1]	Presence of Tubes[1]	Epifauna Present[1]	Invasive Taxa Present[1]	Sensitive Taxa Present[1]	Sensitive Taxa[1]	Species of Concern[1]	Habitat Type
027	30	3	IND	Low	No	2	2	2	3	No	Soft Sediment Fauna	None	Small Tube-Building Fauna	Sand Dollar Bed	None	Yes	Yes	None	Yes	Anemone(s), Hermit Crab(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
028	27	3	IND	Low	No	2	2	2	3	No	Soft Sediment Fauna	None	Larger Tube-Building Fauna	Sand Dollar Bed	None	Yes	Yes	None	Yes	Gastropod(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
029	27	3	0.5	Low	No	2	2	2 -> 3	3	No	Soft Sediment Fauna	None	Larger Tube-Building Fauna	Sand Dollar Bed	None	Yes	Yes	None	Yes	Sand Dollar(s)	No	No	None	None	Sand Sheet
030	37	3	4.0	Low	No	2	2	2	3	No	Soft Sediment Fauna	None	Small Tube-Building Fauna	Sand Dollar Bed	None	Yes	Yes	None	Yes	Gastropods, Hermit Crab(s), Ocean Quahog, Sand Dollar(s)	No	No	None	Ocean Quahog	Sand Sheet
031	36	3	IND	Low	No	IND	IND	IND	3	No	Soft Sediment Fauna	None	Sand Dollar Bed	Diverse Soft Sediment Epifauna	None	No	Yes	None	Yes	Hermit Crab(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
032	36	3	3.8	Low	No	1 -> 2	2	2	3	No	Soft Sediment Fauna	None	Sand Dollar Bed	Small Tube-Building Fauna	None	No	Yes	Skate	Yes	Sand Dollar(s)	No	No	None	None	Sand Sheet
033	34	3	IND	Low	No	IND	1 -> 2	2	3	No	Soft Sediment Fauna	None	Sand Dollar Bed	Diverse Soft Sediment Epifauna; Small Tube-Building Fauna	None	No	No	Skate	Yes	Gastropod(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
034	33	3	4.0	Low	No	IND	2	2	3	No	Soft Sediment Fauna	None	Sand Dollar Bed	Small Tube-Building Fauna	None	Yes	No	None	Yes	Ocean Quahog, Sand Dollar(s)	No	No	None	Ocean Quahog	Sand Sheet
035	34	3	IND	Low	No	2	2	2	3	No	Soft Sediment Fauna	None	Sand Dollar Bed	Diverse Soft Sediment Epifauna; Small Tube-Building Fauna	None	Yes	No	None	Yes	Caprellid, Gastropod(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
036	30	3	IND	Low	No	IND	2	2	3	No	Soft Sediment Fauna	None	Sand Dollar Bed	Diverse Soft Sediment Epifauna; Sand Dollar Bed	None	No	No	None	Yes	Crab, Gastropod(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
037	32	3	3.9	Low	No	IND	2 -> 3	2 -> 3	3	No	Soft Sediment Fauna	None	Small Surface-Burrowing Fauna	Burrowing Anemones	None	Yes	Yes	None	Yes	Anemone(s), Hermit Crab(s), Sand Dollars	No	No	None	None	Sand with Mobile Gravel
038	30	3	IND	Low	No	IND	2	2	3	No	Soft Sediment Fauna	None	Sand Dollar Bed	Diverse Soft Sediment Epifauna	None	No	Yes	None	Yes	Gastropod(s), Sand Dollar(s), Sea Stars	No	No	None	None	Sand Sheet
039	30	3	IND	Low	No	2	2	2	3	No	Soft Sediment Fauna	None	Sand Dollar Bed	Larger Tube-Building Fauna; Sand Dollar Bed	None	No	No	None	Yes	Hermit Crab, Gastropod(s), Sand Dollar(s)	No	No	None	None	Sand Sheet

Long Island Export Cable Route Station	Water Depth (m)	SPI Replicate (n)	Mean aRPD Depth (cm)	Sediment Oxygen Demand Level	Methane Presence	Successional Stage (by replicate)			PV Replicate (n)	Possible Habitat of Interest	Dominant CMECS Biotic Subclass	Dominant CMECS Co-occurring Biotic Subclasses (# of reps)	Dominant CMECS Biotic Group	Dominant CMECS Co-occurring Biotic Group	Maximum Attached Fauna Percent Cover (CMECS Percent Cover Modifier)	Burrow Presence	Tracks Presence	Fish Present[1]	Presence of Tubes[1]	Epifauna Present[1]	Invasive Taxa Present[1]	Sensitive Taxa Present[1]	Sensitive Taxa[1]	Species of Concern[1]	Habitat Type
040	30	3	IND	Low	No	2	2	2	3	No	Soft Sediment Fauna	None	Small Surface-Burrowing Fauna	Small Tube-Building Fauna	None	Yes	No	None	Yes	Sand Dollar(s)	No	No	None	None	Sand Sheet
041	29	3	IND	Low	No	2	2	2	3	No	Soft Sediment Fauna	None	Sand Dollar Bed	Sand Dollar Bed; Small Surface-Burrowing Fauna	None	No	No	None	Yes	Sand Dollar(s)	No	No	None	None	Sand Sheet
042	29	3	2.9	Medium	No	2	2 -> 3	2 on 3	3	No	Soft Sediment Fauna	None	Small Surface-Burrowing Fauna	Tracks and Trails	None	Yes	Yes	None	Yes	Anemone(s), Caprellid(s), Gastropod(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
043	27	3	IND	Low	No	2	2	2	3	No	Soft Sediment Fauna	None	Larger Tube-Building Fauna	Sand Dollar Bed; Tracks and Trails	None	Yes	Yes	None	Yes	Gastropod(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
044	27	3	IND	Low	No	IND	2	2	3	No	Soft Sediment Fauna	None	Larger Tube-Building Fauna	Varies	None	Yes	Yes	None	Yes	Anemone(s), Crab, Hermit Crab(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
045	25	3	IND	Low	No	IND	1 -> 2	2 -> 3	3	No	Soft Sediment Fauna	None	Larger Tube-Building Fauna	Small Surface-Burrowing Fauna	None	Yes	No	None	Yes	Gastropod(s), Hermit Crab(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
046	26	3	IND	Low	No	IND	2	3	3	Yes	Soft Sediment Fauna	Attached Fauna (1)	Small Surface-Burrowing Fauna	Attached Hydroids	Sparse (1 to <30%)	No	Yes	None	No	Caprellid(s), Hydroids	No	No	None	None	Sand with Mobile Gravel
047	25	3	IND	Low	No	IND	IND	2	3	No	Soft Sediment Fauna	None	Sand Dollar Bed	Larger Tube-Building Fauna; Sand Dollar Bed	None	Yes	Yes	None	Yes	Anemone, Hydroids, Sand Dollar(s)	No	No	None	None	Sand Sheet
078	23	3	IND	Low	No	2	2	2	3	No	Soft Sediment Fauna	None	Larger Tube-Building Fauna	Burrowing Anemones; Diverse Soft Sediment Epifauna	None	No	Yes	None	Yes	Anemones, Gastropod(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
079	24	3	IND	Low	No	2	2	2	3	No	Soft Sediment Fauna	None	Small Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	Yes	Yes	None	Yes	Anemone(s), Gastropod(s), Hermit Crab(s), Sand Dollars, Urchin	No	No	None	None	Sand Sheet
080	21	3	IND	Low	No	2	2	2	3	No	Soft Sediment Fauna	None	Larger Tube-Building Fauna	Mobile Crustaceans on Soft Sediments	None	Yes	Yes	None	Yes	Anemone(s), Gastropod, Hermit Crab(s), Sponge	No	No	None	None	Sand Sheet
081	25	3	2.4	Low	No	2 -> 3	2 -> 3	2 -> 3	3	No	Soft Sediment Fauna	None	Larger Tube-Building Fauna	Varies	None	Yes	Yes	None	Yes	Anemone(s), Gastropod(s), Hermit Crab(s)	No	No	None	None	Sand Sheet
082	23	3	IND	Low	No	IND	IND	2	3	No	Soft Sediment Fauna	None	Sand Dollar Bed	Larger Tube-Building Fauna; Sand Dollar Bed	None	Yes	Yes	None	Yes	Anemone, Gastropod(s), Hermit Crab(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
083	23	3	1.1	Medium	No	2 -> 3	2 -> 3	2 on 3	1	No	Soft Sediment Fauna	None	Burrowing Anemones	Small Surface-Burrowing Fauna	None	Yes	No	None	Yes	Anemone(s)	No	No	None	None	Sand Sheet

Long Island Export Cable Route Station	Water Depth (m)	SPI Replicate (n)	Mean aRPD Depth (cm)	Sediment Oxygen Demand Level	Methane Presence	Successional Stage (by replicate)			PV Replicate (n)	Possible Habitat of Interest	Dominant CMECS Biotic Subclass	Dominant CMECS Co-occurring Biotic Subclasses (# of reps)	Dominant CMECS Biotic Group	Dominant CMECS Co-occurring Biotic Group	Maximum Attached Fauna Percent Cover (CMECS Percent Cover Modifier)	Burrow Presence	Tracks Presence	Fish Present[1]	Presence of Tubes[1]	Epifauna Present[1]	Invasive Taxa Present[1]	Sensitive Taxa Present[1]	Sensitive Taxa[1]	Species of Concern[1]	Habitat Type
084	19	3	IND	Low	No	IND	IND	IND	3	No	Soft Sediment Fauna	None	Sand Dollar Bed	Burrowing Anemones; Mobile Crustaceans on Soft Sediments	None	Yes	Yes	None	Yes	Anemone(s), Hermit Crab(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
085	20	3	IND	Low	No	IND	1 -> 2	1 -> 2	3	No	Soft Sediment Fauna	None	Small Tube-Building Fauna	Diverse Soft Sediment Epifauna; Small Surface-Burrowing Fauna	None	Yes	Yes	None	Yes	Hermit Crab(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
086	16	3	IND	Low	No	2	2	2 -> 3	3	No	Soft Sediment Fauna	None	Larger Tube-Building Fauna	Diverse Soft Sediment Epifauna; Mobile Crustaceans on Soft Sediments	None	Yes	No	None	Yes	Hermit Crab(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
087	13	3	3.8	Low	No	IND	2	2	3	No	Soft Sediment Fauna	None	Larger Tube-Building Fauna	Small Tube-Building Fauna	None	Yes	Yes	None	Yes	Gastropod(s), Hermit Crab(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
088	11	3	IND	Low	No	IND	IND	IND	3	No	IND	IND	Mobile Crustaceans on Soft Sediments	IND	None	IND	IND	None	No	None	No	No	None	IND	Sand Sheet
098	18	3	3.0	Low	No	IND	2	2	3	No	Soft Sediment Fauna	None	Sand Dollar Bed	Varies	None	Yes	Yes	None	Yes	Anemone(s), Hermit Crab(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
099	18	3	4.2	Low	No	2	2	2	3	No	Soft Sediment Fauna	None	Small Tube-Building Fauna	Diverse Soft Sediment Epifauna; Mobile Crustaceans on Soft Sediments	None	Yes	No	None	Yes	Gastropod(s), Hermit Crab(s), Sand Dollar(s), Sponges	No	No	None	None	Sand with Mobile Gravel
100	15	3	2.9	Low	No	2 -> 3	2 -> 3	2 -> 3	3	No	Soft Sediment Fauna	None	Small Surface-Burrowing Fauna	Mobile Crustaceans on Soft Sediments; Small Tube-Building Fauna	None	Yes	No	None	Yes	Gastropod(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
101	15	3	3.3	Low	No	IND	2 -> 3	2 -> 3	3	No	Soft Sediment Fauna	None	Diverse Soft Sediment Epifauna	Diverse Soft Sediment Epifauna; Small Surface-Burrowing Fauna	None	Yes	No	None	Yes	Anemone(s), Gastropod(s), Hermit Crab(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
102	17	3	3.1	Low	No	IND	2	2	3	No	Soft Sediment Fauna	None	Small Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	Yes	Yes	None	Yes	Hermit Crab(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
103	17	3	2.2	Low	No	2	2	2	3	No	Soft Sediment Fauna	None	Small Tube-Building Fauna	Diverse Soft Sediment Epifauna; Sand Dollar Bed	None	Yes	Yes	None	Yes	Hermit Crab(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
104	14	3	IND	Low	No	IND	2	2	3	No	Soft Sediment Fauna	None	Tracks and Trails	Diverse Soft Sediment Epifauna	None	Yes	No	None	Yes	Anemone(s), Hermit Crab(s), Sand Dollars	No	No	None	None	Sand Sheet
105	11	3	IND	Low	No	IND	IND	2	3	No	Soft Sediment Fauna	None	Mobile Crustaceans on Soft Sediments	Larger Tube-Building Fauna	None	Yes	No	None	Yes	Hermit Crab(s)	No	No	None	None	Sand Sheet

Long Island Export Cable Route Station	Water Depth (m)	SPI Replicate (n)	Mean aRPD Depth (cm)	Sediment Oxygen Demand Level	Methane Presence	Successional Stage (by replicate)			PV Replicate (n)	Possible Habitat of Interest	Dominant CMECS Biotic Subclass	Dominant CMECS Co-occurring Biotic Subclasses (# of reps)	Dominant CMECS Biotic Group	Dominant CMECS Co-occurring Biotic Group	Maximum Attached Fauna Percent Cover (CMECS Percent Cover Modifier)	Burrow Presence	Tracks Presence	Fish Present[1]	Presence of Tubes[1]	Epifauna Present[1]	Invasive Taxa Present[1]	Sensitive Taxa Present[1]	Sensitive Taxa[1]	Species of Concern[1]	Habitat Type
106	10	3	3.2	Low	No	IND	1 -> 2	2	3	No	Soft Sediment Fauna	None	Larger Tube-Building Fauna	Mobile Crustaceans on Soft Sediments	None	No	No	None	Yes	Hermit Crab	No	No	None	None	Sand Sheet
116	14	3	3.8	Low	No	IND	1 -> 2	1 -> 2	3	No	Soft Sediment Fauna	None	Larger Tube-Building Fauna	Mobile Crustaceans on Soft Sediments; Tracks and Trails	None	Yes	Yes	None	Yes	Hermit Crab(s)	No	No	None	None	Sand Sheet
117	14	3	2.6	Low	No	IND	2	2	3	No	Soft Sediment Fauna	None	Larger Tube-Building Fauna	Diverse Soft Sediment Epifauna; Small Surface-Burrowing Fauna	None	Yes	No	None	Yes	Gastropod(s), Hermit Crab(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
118	14	3	IND	Low	No	1 -> 2	2	2	3	No	Soft Sediment Fauna	None	Small Tube-Building Fauna	Mobile Crustaceans on Soft Sediments	None	Yes	No	None	Yes	Hermit Crab(s)	No	No	None	None	Sand Sheet
119	14	3	IND	Low	No	2	2	2	3	No	Soft Sediment Fauna	None	Small Tube-Building Fauna	Mobile Crustaceans on Soft Sediments	None	Yes	No	None	Yes	Hermit Crab(s)	No	No	None	None	Sand Sheet
120	11	3	3.0	Low	No	IND	IND	2	3	No	Soft Sediment Fauna	None	Larger Tube-Building Fauna	Mobile Crustaceans on Soft Sediments	None	Yes	No	None	Yes	Hermit Crab(s)	No	No	None	None	Sand Sheet
121	8	3	5.9	Low	No	IND	2	2 -> 3	0	-	-	-	-	-	-	-	-	-	Yes	IND	IND	IND	IND	IND	-
122	13	3	2.6	Low	No	1 -> 2	1 -> 2	1 -> 2	3	No	Soft Sediment Fauna	None	Small Tube-Building Fauna	Varies	None	Yes	No	None	Yes	Hermit Crab(s)	No	No	None	None	Sand Sheet
123	14	3	3.5	Low	No	1 -> 2	1 -> 2	2	3	No	Soft Sediment Fauna	None	Small Tube-Building Fauna	Larger Tube-Building Fauna; Mobile Crustaceans on Soft Sediments	None	Yes	No	None	Yes	Hermit Crab(s)	No	No	None	None	Sand with Mobile Gravel
124	12	3	3.4	Low	No	IND	1 -> 2	2	3	No	Soft Sediment Fauna	None	Mobile Crustaceans on Soft Sediments	Mobile Crustaceans on Soft Sediments; Small Surface-Burrowing Fauna	None	Yes	No	None	Yes	Gastropod(s), Hermit Crab(s), Mollusc	No	No	None	None	Sand Sheet
125	13	3	IND	Low	No	IND	1 -> 2	2	3	No	Soft Sediment Fauna	None	Small Tube-Building Fauna	Mobile Crustaceans on Soft Sediments; Small Surface-Burrowing Fauna	None	Yes	No	None	Yes	Hermit Crab(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
126	11	3	IND	Low	No	IND	2	2 -> 3	3	No	Soft Sediment Fauna	IND	Mobile Crustaceans on Hard or Mixed Substrates	IND	None	No	No	None	No	Hermit Crab(s), Hydroids	No	No	None	None	Sand with Mobile Gravel
127	13	3	IND	Low	No	IND	IND	IND	3	No	Soft Sediment Fauna	None	Mobile Crustaceans on Hard or Mixed Substrates	Larger Tube-Building Fauna	None	Yes	Yes	None	Yes	Gastropod(s), Hermit Crab(s)	No	No	None	None	Sand with Mobile Gravel
128	13	3	IND	High	Yes	IND	IND	3	2	No	Soft Sediment Fauna	None	Small Tube-Building Fauna	Mobile Crustaceans on Soft Sediments	None	Yes	No	None	Yes	Gastropod(s), Hermit Crab(s)	No	No	None	None	Sand Sheet

Long Island Export Cable Route Station	Water Depth (m)	SPI Replicate (n)	Mean aRPD Depth (cm)	Sediment Oxygen Demand Level	Methane Presence	Successional Stage (by replicate)			PV Replicate (n)	Possible Habitat of Interest	Dominant CMECS Biotic Subclass	Dominant CMECS Co-occurring Biotic Subclasses (# of reps)	Dominant CMECS Biotic Group	Dominant CMECS Co-occurring Biotic Group	Maximum Attached Fauna Percent Cover (CMECS Percent Cover Modifier)	Burrow Presence	Tracks Presence	Fish Present[1]	Presence of Tubes[1]	Epifauna Present[1]	Invasive Taxa Present[1]	Sensitive Taxa Present[1]	Sensitive Taxa[1]	Species of Concern[1]	Habitat Type
129	12	3	0.5	Medium	No	2	2	2 -> 3	0	-	-	-	-	-	-	-	-	-	Yes	IND	IND	IND	IND	IND	-
130	9	3	IND	Low	No	IND	IND	IND	3	No	IND	IND	IND	IND	None	IND	IND	None	No	None	No	No	None	None	Sand with Mobile Gravel
n = SPI-56, PV-54																									
Max	**37**		**5.9**																						
Min	**21**		**0.5**																						
Mean	**29**		**3.1**																						
Standard Deviation			**1.2**																						

IND=Indeterminate
"-" Replicate image not analyzed
[1]Variable determined from combined SPI and PV analysis

Table 3-2a. Summary of Plan View Image Analysis Results at the New Jersey Export Cable Route Stations

New Jersey Export Cable Route Station	Water Depth (m)	SPI Replicate (n)	Mean Prism Penetration Depth (cm)	Mean Boundary Roughness (cm)	SPI Sediment Type (by replicate)			PV Replicate (n)	Gravel Mode (mm)	Dominant CMECS Substrate Group	Dominant CMECS Substrate Subgroup	Boulder Presence	Bedforms (by replicate)			Bedform Size Measurement (cm)	Debris	Habitat Type
001	16	3	2.0	1.5	Fine sand	Fine sand	Fine sand	3	15.6	Gravelly	Gravelly Sand	No	None	None	None	-	Shell Hash	Sand with Mobile Gravel
002	20	3	5.6	1.2	Granule over sand	Granule over sand	Granule over sand	3	16.0	Gravel Mixes	Sandy Gravel	No	None	None	None	-	Shell Hash	Sand with Mobile Gravel
003	21	3	5.4	1.0	Fine sand	Fine sand	Fine sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	None	Sand Sheet
004	22	3	6.2	1.5	Fine sand	Fine sand	Fine sand over silt/clay	3	IND	Sand	Sand or Finer	No	None	None	None	-	Shell Hash	Sand Sheet
005	23	3	7.3	2.0	Granule over sand	Granule over sand	Medium sand	3	6.1	Gravelly	Gravelly Sand	No	None	None	None	-	Shell Hash	Sand with Mobile Gravel
006	21	3	6.6	1.0	Granule over sand	Granule over sand	Medium sand	3	2.1	Gravelly	Gravelly Sand	No	None	None	None	-	Shell Hash	Sand with Mobile Gravel
007	23	3	5.7	1.7	IND	IND	IND	3	IND	Sand	Sand or Finer	No	None	None	None	-	Shell Hash	Sand Sheet
008	26	3	6.3	1.2	Medium sand	Medium sand	Medium sand	3	2.0	Gravelly	Gravelly Sand	No	None	None	None	-	Shell Hash	Sand with Mobile Gravel
009	29	3	6.7	1.3	Granule over sand	Granule over sand	Granule over sand	3	16.1	Gravel Mixes	Sandy Gravel	No	None	None	None	-	Shell Hash	Sand with Mobile Gravel
010	35	3	6.4	1.9	Fine sand over silt/clay	Fine sand over silt/clay	Fine sand over silt/clay	3	14.1	Gravelly	Gravelly Muddy Sand	Yes	None	None	None	-	Shell Hash	Patchy Cobbles & Boulders on Sand
011	68	3	19.8	1.0	Silt/clay	Silt/clay	Silt/clay	3	IND	Sand	Sand or Finer	No	None	None	None	-	None	Sand Sheet

New Jersey Export Cable Route Station	Water Depth (m)	SPI Replicate (n)	Mean Prism Penetration Depth (cm)	Mean Boundary Roughness (cm)	SPI Sediment Type (by replicate)			PV Replicate (n)	Gravel Mode (mm)	Dominant CMECS Substrate Group	Dominant CMECS Substrate Subgroup	Boulder Presence	Bedforms (by replicate)			Bedform Size Measurement (cm)	Debris	Habitat Type
012	39	3	9.1	2.4	Very fine sand	Very fine sand	Very fine sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	None	Sand Sheet
013	34	3	6.9	2.4	Medium sand	Medium sand	Medium sand	3	IND	Sand	Sand or Finer	No	Ripples	Ripples	Ripples	44.4	Shell Hash	Sand Sheet
014	36	3	6.5	2.3	Medium sand	Medium sand	Medium sand over finer sediment	3	IND	Sand	Sand or Finer	No	None	Ripples	Ripples	25.2	Shell Hash	Sand Sheet
015	33	3	6.4	2.4	Very fine sand	Very fine sand	Very fine sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	None	Sand Sheet
016	29	3	4.3	0.9	Very fine sand	Very fine sand	Very fine sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	None	Sand Sheet
017	28	3	5.4	0.7	Very fine sand	Very fine sand	Very fine sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	None	Sand Sheet
018	27	3	4.9	0.7	Very fine sand	Very fine sand	Very fine sand	3	IND	Sand	Sand or Finer	No	None	None	Ripples	23.2	Shell Hash	Sand Sheet
019	30	3	8.7	1.1	Very fine sand	Very fine sand	Very fine sand over finer sediment	3	IND	Sand	Sand or Finer	No	None	None	None	-	None	Sand Sheet
020	28	3	3.9	2.1	Very fine sand over finer sediment	Very fine sand over finer sediment	Very fine sand over finer sediment	3	IND	Sand	Sand or Finer	No	None	None	None	-	None	Sand Sheet
021	30	3	5.3	0.9	Medium sand	Medium sand	Medium sand	3	IND	Sand	Sand or Finer	No	Ripples	Ripples	Ripples	48.9	Shell Hash	Sand Sheet
022	29	3	4.7	3.2	Fine sand	Fine sand	Fine sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	Shell Hash	Sand Sheet
023	28	3	5.4	1.6	Medium sand	Medium sand	Medium sand	3	IND	Sand	Sand or Finer	No	Uneven Ripples	Uneven Ripples	Uneven Ripples	IND	Shell Hash	Sand Sheet
024	30	3	5.1	1.0	Medium sand	Medium sand	Medium sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	Shell Hash	Sand Sheet
025	31	3	5.3	0.9	Medium sand	Medium sand	Medium sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	Shell Hash	Sand Sheet
026	30	3	4.8	1.1	Fine sand	Fine sand	Fine sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	None	Sand Sheet
141	29	3	6.6	1.5	Very fine sand	Very fine sand	Very fine sand	1	IND	Sand	Sand or Finer	No	None	-	-	-	None	Sand Sheet
142	29	3	4.6	1.2	Very fine sand	Very fine sand	Very fine sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	None	Sand Sheet

New Jersey Export Cable Route Station	Water Depth (m)	SPI Replicate (n)	Mean Prism Penetration Depth (cm)	Mean Boundary Roughness (cm)	SPI Sediment Type (by replicate)			PV Replicate (n)	Gravel Mode (mm)	Dominant CMECS Substrate Group	Dominant CMECS Substrate Subgroup	Boulder Presence	Bedforms (by replicate)			Bedform Size Measurement (cm)	Debris	Habitat Type
143	28	3	4.3	0.6	Very fine sand	Very fine sand	Very fine sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	None	Sand Sheet
144	29	3	4.2	0.7	Very fine sand	Very fine sand	Very fine sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	None	Sand Sheet
145	30	3	5.5	0.6	Very fine sand	Very fine sand	Very fine sand	2	IND	Sand	Sand or Finer	No	None	None	-	-	None	Sand Sheet
146	30	3	4.3	0.6	Very fine sand	Very fine sand	Very fine sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	None	Sand Sheet
147	31	3	4.6	1.3	Fine sand	Fine sand	Fine sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	Shell Hash	Sand Sheet
148	35	3	5.2	1.4	Fine sand	Fine sand	Fine sand	3	IND	Sand	Sand or Finer	No	None	Ripples	Ripples	39.1	Shell Hash	Sand Sheet
149	34	3	6.0	0.9	Fine sand	Fine sand	Fine sand	2	IND	Sand	Sand or Finer	No	None	None	-	-	Shell Hash	Sand Sheet
150	34	3	5.4	0.6	Fine sand	Fine sand	Fine sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	Shell Hash	Sand Sheet
151	34	3	4.8	0.9	Fine sand	Medium sand	Medium sand	3	IND	Sand	Sand or Finer	No	Ripples	Ripples	Ripples	31.8	Shell Hash	Sand Sheet
152	34	3	5.6	1.1	Medium sand	Medium sand	Medium sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	Shell Hash	Sand Sheet
153	36	3	5.6	1.4	Fine sand	Fine sand	Medium sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	Shell Hash	Sand Sheet
154	37	3	5.6	1.9	Fine sand	Fine sand	Fine sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	Shell Hash	Sand Sheet
155	37	3	5.8	1.1	Fine sand	Fine sand	Fine sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	Shell Hash	Sand Sheet
156	36	3	5.2	0.9	Fine sand	Fine sand	Fine sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	Shell Hash	Sand Sheet
157	37	3	6.2	1.2	Medium sand	Medium sand	Medium sand	3	IND	Sand	Sand or Finer	No	None	Ripples	Ripples	30.9	Shell Hash	Sand Sheet
n = 43																		
Max	**68**		**19.8**	**3.2**					**16.1**							**48.9**		
Min	**16**		**2.0**	**0.6**					**2.0**							**23.2**		
Mean	**31**		**5.9**	**1.3**					**10.3**							**34.8**		
Standard Deviation			**2.5**	**0.6**					**6.6**							**9.7**		

IND=Indeterminate
"-" Replicate image not analyzed

Table 3-2b. Summary of Sediment Profile Image Analysis Results at the New Jersey Export Cable Route Stations

New Jersey Export Cable Route Station	Water Depth (m)	SPI Replicate (n)	Mean aRPD Depth (cm)	Sediment Oxygen Demand Level	Methane Presence	Successional Stage (by replicate)			PV Replicate (n)	Possible Habitat of Interest	Dominant CMECS Biotic Subclass	Dominant CMECS Co-occurring Biotic Subclasses (# of reps)	Dominant CMECS Biotic Group	Dominant CMECS Co-occurring Biotic Group	Maximum Attached Fauna Percent Cover (CMECS Percent Cover Modifier)	Burrow Presence	Tracks Presence	Fish Present[1]	Presence of Tubes[1]	Epifauna Present[1]	Invasive Taxa Present[1]	Sensitive Taxa Present[1]	Sensitive Taxa[1]	Species of Concern[1]	Habitat Type
001	16	3	IND	Low	No	IND	IND	2	3	No	Soft Sediment Fauna	None	Larger Tube-Building Fauna	Small Tube-Building Fauna	None	No	No	None	Yes	Crab	No	No	None	None	Sand with Mobile Gravel
002	20	3	IND	Low	No	IND	2	2	3	No	Soft Sediment Fauna	None	Mobile Crustaceans on Hard or Mixed Substrates	Burrowing Anemones	None	No	No	Sea Robin	Yes	Anemone(s), Hermit Crab(s)	No	No	None	None	Sand with Mobile Gravel
003	21	3	IND	Low	No	2	2	2	3	No	Soft Sediment Fauna	IND	Small Tube-Building Fauna	Burrowing Anemones	None	No	Yes	None	Yes	Anemone(s), Gastropod(s)	No	No	None	None	Sand Sheet
004	22	3	IND	Low	No	2	2	2	3	No	Soft Sediment Fauna	Inferred Fauna (1)	Small Tube-Building Fauna	Burrowing Anemones	None	No	Yes	None	Yes	Anemone, Gastropod(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
005	23	3	IND	Low	No	IND	IND	IND	3	No	Soft Sediment Fauna	None	Mobile Crustaceans on Hard or Mixed Substrates	Sand Dollar Bed	None	No	No	Sea Robin	No	Crabs, Hermit Crab(s), Sand Dollar(s), Scallop	No	No	None	Sea Scallop	Sand with Mobile Gravel
006	21	3	IND	Low	No	IND	IND	2	3	No	Soft Sediment Fauna	None	Mobile Crustaceans on Hard or Mixed Substrates	Burrowing Anemones	None	No	No	None	Yes	Anemone(s), Gastropod(s), Hermit Crab(s)	No	No	None	None	Sand with Mobile Gravel
007	23	3	IND	IND	No	IND	IND	IND	3	No	Soft Sediment Fauna	None	Sand Dollar Bed	Sand Dollar Bed; Small Tube-Building Fauna	None	Yes	Yes	None	Yes	Gastropod(s), Hermit Crab(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
008	26	3	IND	Low	No	IND	2	2	3	No	Soft Sediment Fauna	None	Small Tube-Building Fauna	Mobile Crustaceans on Hard or Mixed Substrates; Sand Dollar Bed	None	Yes	No	None	Yes	Gastropod(s), Hermit Crab(s), Sand Dollar(s)	No	No	None	None	Sand with Mobile Gravel
009	29	3	IND	Low	No	IND	IND	IND	3	No	Soft Sediment Fauna	None	Small Surface-Burrowing Fauna	Burrowing Anemones; Egg Masses	None	No	No	None	No	Anemone(s)	No	No	None	None	Sand with Mobile Gravel
010	35	3	3.2	Low	No	2	2 on 3	2 on 3	3	Yes	Soft Sediment Fauna	Attached Fauna (2)	Small Tube-Building Fauna	Diverse Soft Sediment Epifauna	Sparse (1 to <30%)	Yes	No	None	Yes	Caprellid(s), Crab, Hermit Crab, Scallop(s), Sponge	No	No	None	Sea Scallop	Patchy Cobbles & Boulders on Sand
011	68	3	1.5	High	No	2 on 3	2 on 3	2 on 3	3	No	Soft Sediment Fauna	None	Small Tube-Building Fauna	Small Surface-Burrowing Fauna	None	Yes	Yes	None	Yes	Anemone(s)	No	No	None	None	Sand Sheet

New Jersey Export Cable Route Station	Water Depth (m)	SPI Replicate (n)	Mean aRPD Depth (cm)	Sediment Oxygen Demand Level	Methane Presence	Successional Stage (by replicate)			PV Replicate (n)	Possible Habitat of Interest	Dominant CMECS Biotic Subclass	Dominant CMECS Co-occurring Biotic Subclasses (# of reps)	Dominant CMECS Biotic Group	Dominant CMECS Co-occurring Biotic Group	Maximum Attached Fauna Percent Cover (CMECS Percent Cover Modifier)	Burrow Presence	Tracks Presence	Fish Present[1]	Presence of Tubes[1]	Epifauna Present[1]	Invasive Taxa Present[1]	Sensitive Taxa Present[1]	Sensitive Taxa[1]	Species of Concern[1]	Habitat Type
012	39	3	3.5	Low	No	2	2 on 3	2 on 3	3	No	Soft Sediment Fauna	None	Small Tube-Building Fauna	Small Surface-Burrowing Fauna	None	Yes	No	None	Yes	Crab, Penaeid Shrimp	No	No	None	None	Sand Sheet
013	34	3	IND	Low	No	2	2	2	3	No	Soft Sediment Fauna	None	Small Tube-Building Fauna	Varies	None	No	No	None	Yes	Anemone, Caprellid(s), Gastropod, Crab, Urchin	No	No	None	None	Sand Sheet
014	36	3	3.7	Low	No	2	2	2	3	No	Soft Sediment Fauna	None	Small Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	No	None	Yes	None	No	No	None	None	Sand Sheet
015	33	3	3.5	Low	No	2	2	2	3	No	Soft Sediment Fauna	None	Small Tube-Building Fauna	Varies	None	Yes	Yes	None	Yes	Caprellid(s), Crab, Gastropod(s)	No	No	None	None	Sand Sheet
016	29	3	3.6	Low	No	2	2	2 on 3	3	No	Soft Sediment Fauna	None	Sand Dollar Bed	Small Tube-Building Fauna	None	Yes	No	None	Yes	Gastropod(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
017	28	3	4.5	Low	No	2	2	2 on 3	3	No	Soft Sediment Fauna	None	Small Tube-Building Fauna	Diverse Soft Sediment Epifauna; Sand Dollar Bed	None	Yes	Yes	None	Yes	Gastropod(s), Hermit Crab(s), Sand Dollar(s), Sea Star	No	No	None	None	Sand Sheet
018	27	3	2.5	Low	No	2	2	2	3	No	Soft Sediment Fauna	None	Small Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	Yes	Yes	Unknown	Yes	Crab, Gastropod(s), Hermit Crab(s), Sand Dollar(s), Sea Star	No	No	None	None	Sand Sheet
019	30	3	4.8	Low	No	2	2	2	3	No	Soft Sediment Fauna	None	Small Tube-Building Fauna	Small Surface-Burrowing Fauna	None	Yes	No	None	Yes	Crab, Gastropod(s)	No	No	None	None	Sand Sheet
020	28	3	3.5	Low	No	2	2	2	3	No	Soft Sediment Fauna	None	Sand Dollar Bed	Larger Tube-Building Fauna	None	Yes	Yes	None	Yes	Gastropod(s), Hermit Crab(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
021	30	3	IND	Low	No	IND	IND	IND	3	No	Soft Sediment Fauna	None	Sand Dollar Bed	Diverse Soft Sediment Epifauna	None	No	No	None	Yes	Hermit Crab(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
022	29	3	3.8	Low	No	2	2	2	3	No	Soft Sediment Fauna	None	Small Tube-Building Fauna	Diverse Soft Sediment Epifauna; Small Surface-Burrowing Fauna	None	Yes	Yes	None	Yes	Gastropod(s), Hermit Crab(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
023	28	3	IND	Low	No	IND	IND	IND	3	No	Soft Sediment Fauna	None	Diverse Soft Sediment Epifauna	Larger Tube-Building Fauna; Small Tube-Building Fauna	None	Yes	Yes	None	Yes	Gastropod(s), Hermit Crab(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
024	30	3	IND	Low	No	2	2	2	3	No	Soft Sediment Fauna	None	Sand Dollar Bed	Diverse Soft Sediment Epifauna; Sand Dollar Bed	None	No	Yes	None	Yes	Gastropod(s), Hermit Crab(s), Sand Dollar(s)	No	No	None	Ocean Quahog	Sand Sheet
025	31	3	2.2	Low	No	2	2	2	3	No	Soft Sediment Fauna	IND	Sand Dollar Bed	IND	None	No	No	None	Yes	Hermit Crab, Sand Dollar(s)	No	No	None	None	Sand Sheet

New Jersey Export Cable Route Station	Water Depth (m)	SPI Replicate (n)	Mean aRPD Depth (cm)	Sediment Oxygen Demand Level	Methane Presence	Successional Stage (by replicate)			PV Replicate (n)	Possible Habitat of Interest	Dominant CMECS Biotic Subclass	Dominant CMECS Co-occurring Biotic Subclasses (# of reps)	Dominant CMECS Biotic Group	Dominant CMECS Co-occurring Biotic Group	Maximum Attached Fauna Percent Cover (CMECS Percent Cover Modifier)	Burrow Presence	Tracks Presence	Fish Present[1]	Presence of Tubes[1]	Epifauna Present[1]	Invasive Taxa Present[1]	Sensitive Taxa Present[1]	Sensitive Taxa[1]	Species of Concern[1]	Habitat Type
026	30	3	IND	Low	No	IND	2	2	3	No	Soft Sediment Fauna	None	Small Tube-Building Fauna	Sand Dollar Bed	None	Yes	Yes	None	Yes	Sand Dollar(s)	No	No	None	None	Sand Sheet
141	29	3	3.6	Low	No	2	2	2	1	No	Soft Sediment Fauna	None	Sand Dollar Bed	Larger Deep-Burrowing Fauna	None	Yes	No	None	Yes	Gastropod(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
142	29	3	3.3	Low	No	2	2	2	3	No	Soft Sediment Fauna	None	Small Tube-Building Fauna	Diverse Soft Sediment Epifauna; Larger Deep-Burrowing Fauna	None	Yes	Yes	None	Yes	Gastropod(s), Sand Dollar(s), Sea Stars	No	No	None	None	Sand Sheet
143	28	3	IND	Low	No	2	2	2	3	No	Soft Sediment Fauna	None	Larger Tube-Building Fauna	Diverse Soft Sediment Epifauna; Larger Deep-Burrowing Fauna	None	Yes	Yes	None	Yes	Anemones, Caprellid(s), Gastropod(s), Hermit Crab(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
144	29	3	IND	Low	No	2	2	2	3	No	Soft Sediment Fauna	None	Larger Tube-Building Fauna	Sand Dollar Bed	None	Yes	No	None	Yes	Gastropod(s), Hermit Crab, Sand Dollar(s)	No	No	None	None	Sand Sheet
145	30	3	2.4	Low	No	2	2 -> 3	2 -> 3	2	No	Soft Sediment Fauna	None	Larger Tube-Building Fauna	Sand Dollar Bed	None	Yes	Yes	Skate	Yes	Gastropod(s), Hermit Crab(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
146	30	3	2.2	Low	No	2	2	2	3	No	Soft Sediment Fauna	None	Sand Dollar Bed	Larger Deep-Burrowing Fauna; Larger Tube-Building Fauna	None	Yes	Yes	None	Yes	Gastropod(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
147	31	3	IND	Low	No	IND	IND	IND	3	No	Soft Sediment Fauna	None	Sand Dollar Bed	Mobile Mollusks on Soft Sediments; Small Tube-Building Fauna	None	Yes	Yes	None	Yes	Gastropod(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
148	35	3	IND	Low	No	2	2	2	3	No	Soft Sediment Fauna	None	Larger Tube-Building Fauna	Small Surface-Burrowing Fauna	None	Yes	Yes	None	Yes	Gastropod(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
149	34	3	IND	Low	No	2	2	2	2	No	Soft Sediment Fauna	None	Sand Dollar Bed	Mobile Mollusks on Soft Sediments	None	Yes	No	None	Yes	Gastropod(s), Hermit Crab(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
150	34	3	3.6	Low	No	IND	1 -> 2	2	3	No	Soft Sediment Fauna	None	Sand Dollar Bed	Mobile Mollusks on Soft Sediments; Small Tube-Building Fauna	None	Yes	Yes	None	Yes	Gastropod(s), Sand Dollar(s)	No	No	None	None	Sand Sheet

New Jersey Export Cable Route Station	Water Depth (m)	SPI Replicate (n)	Mean aRPD Depth (cm)	Sediment Oxygen Demand Level	Methane Presence	Successional Stage (by replicate)			PV Replicate (n)	Possible Habitat of Interest	Dominant CMECS Biotic Subclass	Dominant CMECS Co-occurring Biotic Subclasses (# of reps)	Dominant CMECS Biotic Group	Dominant CMECS Co-occurring Biotic Group	Maximum Attached Fauna Percent Cover (CMECS Percent Cover Modifier)	Burrow Presence	Tracks Presence	Fish Present[1]	Presence of Tubes[1]	Epifauna Present[1]	Invasive Taxa Present[1]	Sensitive Taxa Present[1]	Sensitive Taxa[1]	Species of Concern[1]	Habitat Type
151	34	3	IND	Low	No	IND	2	2 -> 3	3	No	Soft Sediment Fauna	None	Sand Dollar Bed	Larger Deep-Burrowing Fauna; Small Tube-Building Fauna	None	Yes	No	None	Yes	Gastropod(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
152	34	3	IND	Low	No	2	2	2	3	No	Soft Sediment Fauna	None	Small Surface-Burrowing Fauna	Diverse Soft Sediment Epifauna	None	Yes	Yes	None	Yes	Gastropod(s), Hermit Crab(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
153	36	3	IND	Low	No	1 -> 2	2	2	3	No	Soft Sediment Fauna	None	Small Tube-Building Fauna	Diverse Soft Sediment Epifauna; Sand Dollar Bed	None	Yes	Yes	None	Yes	Gastropod(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
154	37	3	3.9	Low	No	2	2	2	3	No	Soft Sediment Fauna	None	Small Tube-Building Fauna	Varies	None	Yes	Yes	None	Yes	Hermit Crab(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
155	37	3	3.2	Low	No	2	2	2	3	No	Soft Sediment Fauna	None	Small Tube-Building Fauna	Diverse Soft Sediment Epifauna; Larger Deep-Burrowing Fauna	None	Yes	Yes	None	Yes	Hermit Crab(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
156	36	3	3.0	Low	No	IND	2	2	3	No	Soft Sediment Fauna	None	Small Tube-Building Fauna	Diverse Soft Sediment Epifauna; Sand Dollar Bed	None	Yes	Yes	None	Yes	Gastropod(s), Sand Dollar(s), Unknown Organism	No	No	None	None	Sand Sheet
157	37	3	IND	Low	No	1 -> 2	1 -> 2	1 -> 2	3	No	Soft Sediment Fauna	None	Small Tube-Building Fauna	Varies	None	Yes	Yes	None	Yes	Anemone, Gastropod(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
n = 43																									
Max	**68**		**4.8**																						
Min	**16**		**1.5**																						
Mean	**31**		**3.3**																						
Standard Deviation			**0.8**																						

IND=Indeterminate
"-" Replicate image not analyzed
[1]Variable determined from combined SPI and PV analysis

Table 3-3a. Summary of Plan View Image Analysis Results at the New York Harbor Export Cable Route Stations

New York Harbor Export Cable Route Station	Water Depth (m)	SPI Replicate (n)	Mean Prism Penetration Depth (cm)	Mean Boundary Roughness (cm)	SPI Sediment Type (by replicate)			PV Replicate (n)	Gravel Mode (mm)	Dominant CMECS Substrate Group	Dominant CMECS Substrate Subgroup	Boulder Presence	Bedforms (by replicate)			Bedform Size Measurement (cm)	Debris	Habitat Type
048	23	3	3.9	0.9	Medium sand	Medium sand	Medium sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	Shell Hash	Sand Sheet
049	27	3	10.4	0.9	Very fine sand	Very fine sand	Very fine sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	None	Sand Sheet
050	27	3	2.3	1.0	Fine sand	IND	IND	3	195.8	Gravel Mixes	Sandy Gravel	Yes	None	None	None	-	Shell Hash	Patchy Cobbles & Boulders on Sand
051	26	3	7.9	1.1	Granule	Pebble	Pebble over finer sediment	3	4.4	Gravel Mixes	Sandy Gravel	No	None	None	None	-	None	Sand with Mobile Gravel
052	23	3	4.8	0.7	Fine sand	Fine sand	Fine sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	None	Sand Sheet
053	22	3	4.7	1.1	Fine sand	Fine sand	Fine sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	Shell Hash	Sand Sheet
054	22	3	4.5	1.1	Coarse sand	Coarse sand	Coarse sand over finer sediment	3	1.9	Slightly Gravelly	Slightly Gravelly Sand	No	None	None	None	-	None	Sand with Mobile Gravel
055	22	3	5.7	1.2	Fine sand	Fine sand	Fine sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	Shell Hash	Sand Sheet
056	25	3	5.7	1.1	Very fine sand	Very fine sand	Very fine sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	None	Sand Sheet
057	26	3	7.3	0.8	Very fine sand	Very fine sand	Very fine sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	None	Sand Sheet
058	28	3	7.2	1.7	Very fine sand	Very fine sand	Very fine sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	None	Sand Sheet
059	29	3	9.1	1.1	Very fine sand over silt/clay	Very fine sand over silt/clay	Very fine sand over silt/clay	1	IND	Sand	Sand or Finer	No	None	-	-	-	None	Sand Sheet
060	29	3	7.2	1.7	Very fine sand	Very fine sand over silt/clay	Very fine sand over silt/clay	3	IND	Sand	Sand or Finer	No	None	None	None	-	Shell Hash	Sand Sheet
061	28	3	8.5	1.4	Very fine sand over silt/clay	Very fine sand over silt/clay	Very fine sand over silt/clay	3	IND	Sand	Sand or Finer	No	None	None	None	-	None	Sand Sheet
062	27	3	6.2	2.7	Very fine sand	Very fine sand	Very fine sand	3	IND	Sand	Sand or Finer	No	None	None	IND	-	None	Sand Sheet

New York Harbor Export Cable Route Station	Water Depth (m)	SPI Replicate (n)	Mean Prism Penetration Depth (cm)	Mean Boundary Roughness (cm)	SPI Sediment Type (by replicate)			PV Replicate (n)	Gravel Mode (mm)	Dominant CMECS Substrate Group	Dominant CMECS Substrate Subgroup	Boulder Presence	Bedforms (by replicate)			Bedform Size Measurement (cm)	Debris	Habitat Type
063	23	3	3.7	0.7	Very fine sand	Very fine sand	Very fine sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	None	Sand Sheet
064	22	3	3.4	0.6	Very fine sand	Very fine sand	Very fine sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	None	Sand Sheet
065	23	3	4.3	0.8	Very fine sand	Very fine sand	Very fine sand	3	IND	Sand	Sand or Finer	No	None	None	IND	-	None	Sand Sheet
066	25	3	3.7	0.9	Fine sand	Fine sand	Fine sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	Shell Hash	Sand Sheet
067	23	3	5.3	0.8	Fine sand	Fine sand	Fine sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	Shell Hash	Sand Sheet
068	21	3	6.6	1.2	Pebble over finer sediment	Pebble over finer sediment	Very coarse sand over sand	3	8.6	Gravel Mixes	Sandy Gravel	No	None	None	None	-	Shell Hash	Sand with Mobile Gravel
069	21	3	5.4	0.9	Coarse sand	Very coarse sand over sand	Very coarse sand over sand	3	2.5	Slightly Gravelly	Slightly Gravelly Sand	No	None	None	Ripples	54.4	Shell Hash	Sand with Mobile Gravel
070	23	3	5.3	1.2	Fine sand	Fine sand	Fine sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	None	Sand Sheet
071	22	3	6.0	1.3	Medium sand	Medium sand	Medium sand	3	IND	Sand	Sand or Finer	No	None	None	Uneven Ripples	IND	None	Sand Sheet
072	23	3	3.4	1.4	Fine sand	Fine sand	Fine sand	3	IND	Sand	Sand or Finer	No	None	None	Uneven Ripples	IND	None	Sand Sheet
073	25	3	4.6	0.9	Very fine sand	Very fine sand	Very fine sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	None	Sand Sheet
074	26	3	5.8	0.9	Fine sand	Fine sand	Fine sand	1	IND	Sand	Sand or Finer	No	None	-	-	-	None	Sand Sheet
075	28	3	10.5	0.7	Very fine sand over silt/clay	Very fine sand over silt/clay	Very fine sand over silt/clay	3	IND	Sand	Sand or Finer	No	None	None	None	-	None	Sand Sheet
076	27	3	5.4	1.3	Fine sand	Fine sand	Fine sand over silt/clay	3	IND	Sand	Sand or Finer	No	None	None	None	-	None	Sand Sheet
077	26	3	9.1	1.1	Very fine sand over silt/clay	Very fine sand over silt/clay	Very fine sand over silt/clay	3	IND	Sand	Sand or Finer	No	None	None	None	-	None	Sand Sheet
089	24	3	6.7	1.8	Very fine sand	Very fine sand	Very fine sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	None	Sand Sheet
090	21	3	5.3	1.1	Very fine sand	Very fine sand	Very fine sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	Shell Hash	Sand Sheet
091	18	3	4.4	1.3	Fine sand	Fine sand	Fine sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	Shell Hash	Sand Sheet

New York Harbor Export Cable Route Station	Water Depth (m)	SPI Replicate (n)	Mean Prism Penetration Depth (cm)	Mean Boundary Roughness (cm)	SPI Sediment Type (by replicate)			PV Replicate (n)	Gravel Mode (mm)	Dominant CMECS Substrate Group	Dominant CMECS Substrate Subgroup	Boulder Presence	Bedforms (by replicate)			Bedform Size Measurement (cm)	Debris	Habitat Type
092	17	3	3.5	1.1	Very fine sand	Very fine sand	Very fine sand	3	IND	Sand	Sand or Finer	No	Uneven Ripples	Uneven Ripples	Uneven Ripples	IND	Shell Hash	Sand Sheet
093	13	3	3.7	1.8	Fine sand	Fine sand	Fine sand	3	IND	Sand	Sand or Finer	No	Ripples	Ripples	Ripples	15.4	Shell Hash	Sand Sheet
094	13	3	4.5	2.3	Fine sand	Fine sand	Fine sand	3	IND	Sand	Sand or Finer	No	Uneven Ripples	Uneven Ripples	Uneven Ripples	IND	None	Sand Sheet
095	9	3	6.1	1.3	Medium sand	Medium sand	Medium sand	3	IND	Sand	Sand or Finer	No	Ripples	Ripples	Ripples	14.4	None	Sand Sheet
096	7	3	5.2	2.0	Very coarse sand over sand	Very coarse sand over sand	Very coarse sand over sand	3	2.1	Gravelly	Gravelly Sand	No	None	None	Ripples	18.0	Shell Hash	Sand with Mobile Gravel
097	10	3	5.0	2.1	Fine sand	Fine sand	Fine sand	3	IND	Sand	Sand or Finer	No	Uneven Ripples	Uneven Ripples	Uneven Ripples	IND	Shell Hash	Sand Sheet
107	16	3	7.0	1.4	Fine sand	Fine sand	Fine sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	Shell Hash	Sand Sheet
108	15	3	10.0	2.8	Silt/clay	Silt/clay	Silt/clay	3	IND	IND	IND	No	None	None	None	-	Shell Hash	IND
109	11	3	10.1	1.6	Silt/clay	Silt/clay	Silt/clay	3	IND	IND	IND	No	None	None	None	-	Shell Hash	IND
110	16	3	12.4	2.6	Silt/clay	Silt/clay	Silt/clay	3	IND	Sand	Sand or Finer	No	None	None	None	-	Shell Hash	Sand Sheet
111	26	3	8.1	0.9	Very fine sand	Very fine sand	Very fine sand over silt/clay	3	IND	Sand	Sand or Finer	No	None	None	None	-	Shell Hash	Sand Sheet
112	20	3	6.1	2.3	Very fine sand	Very fine sand	Very fine sand	3	IND	IND	IND	No	None	None	None	-	Shell Hash	IND
113	14	3	6.4	1.5	Very fine sand	Very fine sand	Very fine sand	3	IND	Sand	Sand or Finer	No	Uneven Ripples	Uneven Ripples	Uneven Ripples	IND	None	Sand Sheet
114	15	3	14.3	1.1	Very fine sand over silt/clay	Very fine sand over silt/clay	Very fine sand over silt/clay	0	-	-	-	-	-	-	-	-	-	-
115	13	3	18.9	1.1	Silt/clay	Silt/clay	Silt/clay	0	-	-	-	-	-	-	-	-	-	-
131	21	3	6.1	0.9	Granule over sand	Pebble over finer sediment	Pebble over finer sediment	3	5.1	Gravelly	Gravelly Sand	No	None	None	None	-	Shell Hash	Sand with Mobile Gravel
132	23	3	6.1	0.9	Granule over sand	Pebble over finer sediment	Pebble over finer sediment	3	8.9	Gravelly	Gravelly Sand	No	None	None	None	-	Shell Hash	Sand with Mobile Gravel

New York Harbor Export Cable Route Station	Water Depth (m)	SPI Replicate (n)	Mean Prism Penetration Depth (cm)	Mean Boundary Roughness (cm)	SPI Sediment Type (by replicate)			PV Replicate (n)	Gravel Mode (mm)	Dominant CMECS Substrate Group	Dominant CMECS Substrate Subgroup	Boulder Presence	Bedforms (by replicate)			Bedform Size Measurement (cm)	Debris	Habitat Type
133	24	3	6.7	0.7	Granule over sand	Granule over sand	Granule over sand	3	2.9	Gravelly	Gravelly Sand	No	None	None	None	-	None	Sand with Mobile Gravel
134	24	3	8.4	0.9	Very coarse sand over sand	Very coarse sand over sand	Very coarse sand over sand	3	5.6	Gravel Mixes	Sandy Gravel	No	None	None	None	-	Shell Hash	Sand with Mobile Gravel
135	23	3	5.6	0.9	Fine sand	Fine sand	Fine sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	None	Sand Sheet
136	25	3	6.5	1.1	Medium sand	Medium sand	Pebble over finer sediment	3	4.1	Gravelly	Gravelly Sand	No	None	None	None	-	Shell Hash	Sand with Mobile Gravel
137	28	3	4.6	1.2	Medium sand	Medium sand	Medium sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	None	Sand Sheet
138	27	3	4.9	0.5	Medium sand	Medium sand	Medium sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	Shell Hash	Sand Sheet
139	27	3	4.3	0.6	Very fine sand	Very fine sand	Very fine sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	Shell Hash	Sand Sheet
140	28	3	5.9	0.7	Fine sand	Fine sand	Fine sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	None	Sand Sheet
n = SPI-58, PV-56																		
Max	**29**		**18.9**	**2.8**					**195.8**							**54.4**		
Min	**7**		**2.3**	**0.5**					**1.9**							**14.4**		
Mean	**22**		**6.5**	**1.2**					**22.0**							**25.5**		
Standard Deviation			**2.8**	**0.5**					**57.7**							**19.3**		

IND=Indeterminate
"-" Replicate image not analyzed

Table 3-3b. Summary of Sediment Profile Image Analysis Results at the New York Harbor Export Cable Route Stations

New York Harbor Export Cable Route Station	Water Depth (m)	SPI Replicate (n)	Mean aRPD Depth (cm)	Sediment Oxygen Demand Level	Methane Presence	Successional Stage (by replicate)			PV Replicate (n)	Possible Habitat of Interest	Dominant CMECS Biotic Subclass	Dominant CMECS Co-occurring Biotic Subclasses (# of reps)	Dominant CMECS Biotic Group	Dominant CMECS Co-occurring Biotic Group	Maximum Attached Fauna Percent Cover (CMECS Percent Cover Modifier)	Burrow Presence	Tracks Presence	Fish Present[1]	Presence of Tubes[1]	Epifauna Present[1]	Invasive Taxa Present[1]	Sensitive Taxa Present[1]	Sensitive Taxa[1]	Species of Concern[1]	Habitat Type
048	23	3	IND	Low	No	IND	IND	2	3	No	Soft Sediment Fauna	None	Larger Tube-Building Fauna	Diverse Soft Sediment Epifauna; Sand Dollar Bed	None	Yes	Yes	None	Yes	Gastropod(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
049	27	3	2.7	High	No	2 -> 3	2 -> 3	2 on 3	3	No	Soft Sediment Fauna	None	Larger Tube-Building Fauna	Small Surface-Burrowing Fauna	None	Yes	No	None	Yes	Anemone(s), Caprellid(s), Hermit Crab(s)	No	No	None	None	Sand Sheet
050	27	3	IND	Low	No	IND	IND	2	3	Yes	Attached Fauna	Soft Sediment Fauna (1)	Attached Hydroids	Attached Bryozoans; Attached Sponges	Dense (70 to < 90%)	No	No	None	Yes	Corals, Hydroids, Sea Star, Sponges	No	Yes	Non-Reef Building Hard Coral	None	Patchy Cobbles & Boulders on Sand
051	26	3	IND	Low	No	IND	IND	IND	3	No	IND	IND	Mobile Crustaceans on Hard or Mixed Substrates	Burrowing Anemones	None	No	No	None	No	Anemone(s), Hermit Crab(s)	No	No	None	None	Sand with Mobile Gravel
052	23	3	IND	Low	No	2	2	2	3	No	Soft Sediment Fauna	None	Sand Dollar Bed	Mobile Crustaceans on Soft Sediments; Sand Dollar Bed	None	Yes	Yes	None	Yes	Gastropod(s), Hermit Crab(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
053	22	3	IND	Low	No	1 -> 2	1 -> 2	2	3	No	Soft Sediment Fauna	None	Sand Dollar Bed	Diverse Soft Sediment Epifauna; Mobile Crustaceans on Soft Sediments	None	Yes	Yes	None	Yes	Gastropod(s), Hermit Crab(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
054	22	3	IND	Low	No	IND	IND	2	3	No	Soft Sediment Fauna	None	Small Tube-Building Fauna	Diverse Soft Sediment Epifauna; Small Tube-Building Fauna	None	Yes	No	None	Yes	Gastropod(s), Hermit Crab(s)	No	No	None	None	Sand with Mobile Gravel
055	22	3	3.3	Low	No	IND	2	2	3	No	Soft Sediment Fauna	None	Larger Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	No	None	Yes	Gastropod(s), Hermit Crab(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
056	25	3	1.7	Low	No	2 -> 3	2 -> 3	2 -> 3	3	No	Soft Sediment Fauna	None	Larger Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	Yes	None	Yes	Crab, Gastropod(s), Hermit Crab(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
057	26	3	2.8	Low	No	2 -> 3	2 -> 3	2 -> 3	3	No	Soft Sediment Fauna	None	Larger Tube-Building Fauna	Diverse Soft Sediment Epifauna; Small Surface-Burrowing Fauna	None	Yes	Yes	None	Yes	Caprellid(s), Gastropod(s), Hermit Crab(s), Sea Scallop	No	No	None	Sea Scallop	Sand Sheet
058	28	3	2.7	Low	No	2	2 -> 3	2 -> 3	3	No	Soft Sediment Fauna	None	Larger Tube-Building Fauna	Varies	None	Yes	Yes	None	Yes	Aphrodita, Caprellid, Gastropod(s), Hermit Crab(s), Sand Dollar(s), Sea Scallop	No	No	None	Sea Scallop	Sand Sheet
059	29	3	1.9	Low	No	2 -> 3	2 -> 3	2 on 3	1	No	Soft Sediment Fauna	None	Small Tube-Building Fauna	Small Surface-Burrowing Fauna	None	Yes	Yes	None	Yes	Anemones, Gastropod(s), Hermit Crab(s)	No	No	None	None	Sand Sheet

New York Harbor Export Cable Route Station	Water Depth (m)	SPI Replicate (n)	Mean aRPD Depth (cm)	Sediment Oxygen Demand Level	Methane Presence	Successional Stage (by replicate)			PV Replicate (n)	Possible Habitat of Interest	Dominant CMECS Biotic Subclass	Dominant CMECS Co-occurring Biotic Subclasses (# of reps)	Dominant CMECS Biotic Group	Dominant CMECS Co-occurring Biotic Group	Maximum Attached Fauna Percent Cover (CMECS Percent Cover Modifier)	Burrow Presence	Tracks Presence	Fish Present[1]	Presence of Tubes[1]	Epifauna Present[1]	Invasive Taxa Present[1]	Sensitive Taxa Present[1]	Sensitive Taxa[1]	Species of Concern[1]	Habitat Type
060	29	3	1.3	Low	No	2 -> 3	2 -> 3	2 -> 3	3	No	Soft Sediment Fauna	None	Burrowing Anemones	Burrowing Anemones; Small Surface-Burrowing Fauna	None	Yes	Yes	None	Yes	Anemone(s), Aphrodita, Clams, Gastropod(s), Hermit Crab(s)	No	No	None	None	Sand Sheet
061	28	3	1.7	Low	No	2	2 -> 3	2 -> 3	3	No	Soft Sediment Fauna	None	Small Tube-Building Fauna	Small Surface-Burrowing Fauna	None	Yes	No	None	Yes	Anemone(s), Gastropod(s)	No	No	None	None	Sand Sheet
062	27	3	2.1	Low	No	2 -> 3	2 -> 3	2 -> 3	3	No	Soft Sediment Fauna	None	Small Tube-Building Fauna	Small Surface-Burrowing Fauna	None	Yes	No	None	Yes	Anemone(s), Gastropod(s)	No	No	None	None	Sand Sheet
063	23	3	IND	Low	No	IND	2	2	3	No	Soft Sediment Fauna	None	Diverse Soft Sediment Epifauna	Small Surface-Burrowing Fauna; Small Tube-Building Fauna	None	Yes	Yes	None	Yes	Anemone, Gastropod(s), Hermit Crab, Sand Dollar(s)	No	No	None	None	Sand Sheet
064	22	3	IND	Low	No	2	2	2	3	No	Soft Sediment Fauna	None	Sand Dollar Bed	Varies	None	Yes	Yes	None	Yes	Anemone, Gastropod(s), Hermit Crab(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
065	23	3	3.0	Low	No	2	2	2	3	No	Soft Sediment Fauna	None	Small Surface-Burrowing Fauna	Small Surface-Burrowing Fauna; Tracks and Trails	None	Yes	Yes	None	Yes	Anemones, Gastropod(s), Hermit Crab, Sand Dollars	No	No	None	None	Sand Sheet
066	25	3	IND	Low	No	IND	2	2	3	No	Soft Sediment Fauna	None	Larger Tube-Building Fauna	Sand Dollar Bed	None	Yes	No	None	Yes	Gastropod(s), Hermit Crab(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
067	23	3	IND	Low	No	IND	2	2	3	No	Soft Sediment Fauna	None	Sand Dollar Bed	Larger Tube-Building Fauna	None	Yes	No	None	Yes	Sand Dollar(s)	No	No	None	None	Sand Sheet
068	21	3	3.1	Low	No	IND	IND	IND	3	No	Soft Sediment Fauna	Attached Fauna (2)	Mobile Crustaceans on Hard or Mixed Substrates	Attached Mussels; Diverse Soft Sediment Epifauna	Sparse (1 to <30%)	No	No	None	Yes	Hermit Crab(s), Mussels, Sand Dollars	No	No	None	None	Sand with Mobile Gravel
069	21	3	IND	Low	No	IND	IND	2	3	No	Soft Sediment Fauna	None	Small Tube-Building Fauna	Mobile Crustaceans on Hard or Mixed Substrates; Small Surface-Burrowing Fauna	None	Yes	Yes	None	Yes	Gastropod(s), Hermit Crab(s), Sand Dollar(s)	No	No	None	None	Sand with Mobile Gravel
070	23	3	3.4	Low	No	1 -> 2	2	2	3	No	Soft Sediment Fauna	None	Small Tube-Building Fauna	Burrowing Anemones; Small Surface-Burrowing Fauna	None	Yes	Yes	None	Yes	Anemone(s), Gastropod(s), Hermit Crab(s)	No	No	None	None	Sand Sheet
071	22	3	3.0	Low	No	IND	2	2	3	No	Soft Sediment Fauna	None	Sand Dollar Bed	Larger Tube-Building Fauna; Small Tube-Building Fauna	None	No	Yes	None	Yes	Gastropod(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
072	23	3	IND	Low	No	2	2	2	3	No	Soft Sediment Fauna	None	Small Tube-Building Fauna	Small Surface-Burrowing Fauna; Tracks and Trails	None	Yes	Yes	None	Yes	Gastropod(s), Hermit Crab(s), Sand Dollar(s)	No	No	None	None	Sand Sheet

New York Harbor Export Cable Route Station	Water Depth (m)	SPI Replicate (n)	Mean aRPD Depth (cm)	Sediment Oxygen Demand Level	Methane Presence	Successional Stage (by replicate)			PV Replicate (n)	Possible Habitat of Interest	Dominant CMECS Biotic Subclass	Dominant CMECS Co-occurring Biotic Subclasses (# of reps)	Dominant CMECS Biotic Group	Dominant CMECS Co-occurring Biotic Group	Maximum Attached Fauna Percent Cover (CMECS Percent Cover Modifier)	Burrow Presence	Tracks Presence	Fish Present[1]	Presence of Tubes[1]	Epifauna Present[1]	Invasive Taxa Present[1]	Sensitive Taxa Present[1]	Sensitive Taxa[1]	Species of Concern[1]	Habitat Type
073	25	3	2.0	Low	No	2	2	2	3	No	Soft Sediment Fauna	None	Small Tube-Building Fauna	Diverse Soft Sediment Epifauna; Mobile Mollusks on Soft Sediments	None	Yes	Yes	Unknown	Yes	Anemones, Gastropod(s), Hermit Crab(s)	No	No	None	None	Sand Sheet
074	26	3	IND	Low	No	2	2	2 -> 3	1	No	Soft Sediment Fauna	None	Small Tube-Building Fauna	Small Surface-Burrowing Fauna	None	Yes	No	None	Yes	None	No	No	None	None	Sand Sheet
075	28	3	1.8	Medium	No	2	2	2 -> 3	3	No	Soft Sediment Fauna	None	Small Tube-Building Fauna	Burrowing Anemones	None	Yes	Yes	None	Yes	Anemone(s), Gastropod(s), Hermit Crab(s), Unknown Organism	No	No	None	None	Sand Sheet
076	27	3	1.3	Low	No	2	2	2	3	No	Soft Sediment Fauna	None	Larger Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	Yes	Yes	None	Yes	Gastropod(s), Hermit Crab(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
077	26	3	1.7	Medium	No	2	2	2 on 3	3	No	Soft Sediment Fauna	None	Burrowing Anemones	Small Tube-Building Fauna	None	Yes	Yes	None	Yes	Anemone(s), Gastropod(s)	No	No	None	None	Sand Sheet
089	24	3	1.4	Medium	No	2	2 -> 3	2 -> 3	3	No	Soft Sediment Fauna	None	Larger Tube-Building Fauna	Small Surface-Burrowing Fauna; Small Tube-Building Fauna	None	Yes	No	None	Yes	Anemone(s), Hermit Crab(s)	No	No	None	None	Sand Sheet
090	21	3	2.4	Medium	No	2	2	2 -> 3	3	No	Soft Sediment Fauna	None	Larger Tube-Building Fauna	Small Surface-Burrowing Fauna	None	Yes	No	None	Yes	Anemone(s), Gastropod(s)	No	No	None	None	Sand Sheet
091	18	3	IND	Low	No	IND	2	2	3	No	Soft Sediment Fauna	None	Larger Tube-Building Fauna	Sand Dollar Bed; Small Surface-Burrowing Fauna	None	Yes	Yes	None	Yes	Moon Snail, Sand Dollar(s), Sea Scallop	No	No	None	Sea Scallop	Sand Sheet
092	17	3	3.3	Low	No	2	2	2	3	No	Soft Sediment Fauna	None	Small Tube-Building Fauna	Mobile Mollusks on Soft Sediments	None	Yes	No	None	Yes	Anemone(s), Gastropod(s), Hermit Crab(s)	No	No	None	None	Sand Sheet
093	13	3	2.9	Low	No	IND	2	2	3	No	Soft Sediment Fauna	None	Larger Tube-Building Fauna	Small Surface-Burrowing Fauna; Small Tube-Building Fauna	None	Yes	No	None	Yes	Unknown Organism	No	No	None	None	Sand Sheet
094	13	3	IND	Low	No	IND	2	2 -> 3	3	No	Soft Sediment Fauna	None	Small Tube-Building Fauna	Varies	None	Yes	No	None	Yes	Anemone(s), Gastropod(s), Hermit Crab(s), Moon Snail, Sand Dollar	No	No	None	None	Sand Sheet
095	9	3	IND	Low	No	IND	IND	IND	3	No	Soft Sediment Fauna	Attached Fauna (3)	Attached Mussels	Attached Mussels; Tracks and Trails	Moderate (30 to < 70%)	Yes	Yes	None	Yes	Hermit Crab(s), Mussels	No	No	None	None	Sand Sheet
096	7	3	IND	Low	No	IND	IND	IND	3	No	Soft Sediment Fauna	Attached Fauna (2)	Attached Mussels	None	Trace (<1%)	Yes	No	None	Yes	Mussels	No	No	None	None	Sand with Mobile Gravel
097	10	3	IND	Low	No	IND	IND	IND	3	No	Soft Sediment Fauna	None	Tracks and Trails	Mobile Crustaceans on Soft Sediments	None	Yes	No	None	Yes	None	No	No	None	None	Sand Sheet

New York Harbor Export Cable Route Station	Water Depth (m)	SPI Replicate (n)	Mean aRPD Depth (cm)	Sediment Oxygen Demand Level	Methane Presence	Successional Stage (by replicate)			PV Replicate (n)	Possible Habitat of Interest	Dominant CMECS Biotic Subclass	Dominant CMECS Co-occurring Biotic Subclasses (# of reps)	Dominant CMECS Biotic Group	Dominant CMECS Co-occurring Biotic Group	Maximum Attached Fauna Percent Cover (CMECS Percent Cover Modifier)	Burrow Presence	Tracks Presence	Fish Present[1]	Presence of Tubes[1]	Epifauna Present[1]	Invasive Taxa Present[1]	Sensitive Taxa Present[1]	Sensitive Taxa[1]	Species of Concern[1]	Habitat Type
107	16	3	5.3	Low	No	IND	IND	IND	3	No	Attached Fauna	Soft Sediment Fauna (3)	Mussel Bed	Mobile Crustaceans on Soft Sediments	Moderate (30 to < 70%)	Yes	No	None	Yes	Hermit Crab, Mussels	No	No	None	None	Sand Sheet
108	15	3	0.3	High	No	IND	2 on 3	2 on 3	3	No	Attached Fauna	None	Mussel Bed	Attached Hydroids; Attached Sea Urchins	Sparse (1 to <30%)	IND	IND	None	Yes	Hydroids, Spider Crab(s), Sea Urchin(s)	No	No	None	None	IND
109	11	3	0.1	High	No	IND	2 on 3	2 on 3	3	No	Attached Fauna	IND	Mussel Bed	Attached Hydroids	Moderate (30 to < 70%)	IND	IND	None	Yes	Hydroids, Mussels	No	No	None	None	IND
110	16	3	0.1	High	No	2 on 3	2 on 3	2 on 3	3	No	Attached Fauna	Soft Sediment Fauna (1)	Mussel Bed	Attached Hydroids	Moderate (30 to < 70%)	Yes	No	None	Yes	Hydroids	No	No	None	None	Sand Sheet
111	26	3	2.8	Medium	No	IND	IND	IND	3	No	Soft Sediment Fauna	Attached Fauna (1)	Mobile Crustaceans on Soft Sediments	Attached Hydroids	Sparse (1 to <30%)	Yes	No	None	Yes	Hermit Crabs, Hydroids	No	No	None	None	Sand Sheet
112	20	3	IND	Low	No	2	2	2	3	No	IND	IND	IND	IND	None	IND	IND	IND	Yes	Hermit Crab	IND	None	None	IND	IND
113	14	3	2.4	Low	No	IND	2	2	3	No	IND	IND	IND	IND	None	IND	IND	IND	No	IND	IND	None	None	IND	Sand Sheet
114	15	3	1.7	High	No	2 -> 3	2 on 3	2 on 3	0	-	-	-	-	-	-	-	-	-	Yes	IND	IND	IND	IND	IND	-
115	13	3	1.9	High	No	2 on 3	2 on 3	2 on 3	0	-	-	-	-	-	-	-	-	-	Yes	IND	IND	IND	IND	IND	-
131	21	3	IND	Low	No	IND	1 -> 2	1 -> 2	3	No	Soft Sediment Fauna	None	Small Surface-Burrowing Fauna	Larger Tube-Building Fauna	None	Yes	No	Sea Robin	Yes	Gastropod(s), Hermit Crab	No	No	None	None	Sand with Mobile Gravel
132	23	3	IND	Low	No	IND	2	2	3	No	Soft Sediment Fauna	None	Small Tube-Building Fauna	Varies	None	Yes	No	Sea Robin	Yes	Barnacles	No	No	None	None	Sand with Mobile Gravel
133	24	3	IND	Low	No	IND	2	2	3	No	Soft Sediment Fauna	Attached Fauna (1)	Small Tube-Building Fauna	Diverse Soft Sediment Epifauna; Mobile Crustaceans on Hard or Mixed Substrates	Trace (<1%)	Yes	Yes	None	Yes	Anemones, Barnacles, Gastropod(s), Hermit Crab(s), Sand Dollar(s)	No	No	None	None	Sand with Mobile Gravel
134	24	3	IND	Low	No	IND	IND	IND	3	No	Soft Sediment Fauna	None	Mobile Crustaceans on Hard or Mixed Substrates	Burrowing Anemones; Mobile Crustaceans on Hard or Mixed Substrates	None	Yes	No	None	Yes	Anemone(s), Hermit Crab(s)	No	No	None	None	Sand with Mobile Gravel
135	23	3	2.8	Low	No	IND	1 -> 2	2	3	No	Soft Sediment Fauna	None	Larger Tube-Building Fauna	Sand Dollar Bed	None	Yes	Yes	None	Yes	Gastropod(s), Hermit Crab(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
136	25	3	IND	Low	No	1 -> 2	2	2	3	No	Soft Sediment Fauna	None	Burrowing Anemones	Burrowing Anemones; Mobile Crustaceans on Soft Sediments	None	Yes	No	None	Yes	Anemone(s), Gastropod(s), Hermit Crab(s)	No	No	None	None	Sand with Mobile Gravel
137	28	3	2.4	Low	No	2	2	2	3	No	Soft Sediment Fauna	None	Larger Tube-Building Fauna	Larger Tube-Building Fauna; Sand Dollar Bed	None	Yes	Yes	None	Yes	Anemone(s), Gastropod(s), Hermit Crab(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
138	27	3	IND	Low	No	IND	IND	2	3	No	Soft Sediment Fauna	None	Sand Dollar Bed	Larger Tube-Building Fauna; Small Tube-Building Fauna	None	Yes	Yes	None	Yes	Sand Dollar(s)	No	No	None	None	Sand Sheet

New York Harbor Export Cable Route Station	Water Depth (m)	SPI Replicate (n)	Mean aRPD Depth (cm)	Sediment Oxygen Demand Level	Methane Presence	Successional Stage (by replicate)			PV Replicate (n)	Possible Habitat of Interest	Dominant CMECS Biotic Subclass	Dominant CMECS Co-occurring Biotic Subclasses (# of reps)	Dominant CMECS Biotic Group	Dominant CMECS Co-occurring Biotic Group	Maximum Attached Fauna Percent Cover (CMECS Percent Cover Modifier)	Burrow Presence	Tracks Presence	Fish Present[1]	Presence of Tubes[1]	Epifauna Present[1]	Invasive Taxa Present[1]	Sensitive Taxa Present[1]	Sensitive Taxa[1]	Species of Concern[1]	Habitat Type
139	27	3	IND	Low	No	2	2	2 -> 3	3	No	Soft Sediment Fauna	None	Sand Dollar Bed	Larger Tube-Building Fauna	None	Yes	Yes	None	Yes	Anemones, Gastropod(s), Hermit Crab(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
140	28	3	3.4	Low	No	2	2	2 -> 3	3	No	Soft Sediment Fauna	None	Sand Dollar Bed	Small Tube-Building Fauna	None	Yes	Yes	None	Yes	Anemone, Hermit Crab(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
n = SPI-58, PV-56																									
Max	**29**		**5.3**																						
Min	**7**		**0.1**																						
Mean	**22**		**2.3**																						
Standard Deviation			**1.1**																						

IND=Indeterminate
"-" Replicate image not analyzed
[1]Variable determined from combined SPI and PV analysis

Table 3-4a. Summary of Plan View Image Analysis Results at the Reference Stations

Reference Station	Water Depth (m)	SPI Replicate (n)	Mean Prism Penetration Depth (cm)	Mean Boundary Roughness (cm)	SPI Sediment Type (by replicate)			PV Replicate (n)	Gravel Mode (mm)	Dominant CMECS Substrate Group	Dominant CMECS Substrate Subgroup	Boulder Presence	Bedforms (by replicate)			Bedform Size Measurement (cm)	Debris	Habitat Type
REFA_01	29	3	6.5	1.7	Pebble over finer sediment	Pebble over finer sediment	Pebble over finer sediment	3	10.6	Gravel Mixes	Sandy Gravel	No	None	None	None	-	Shell Hash	Sand with Mobile Gravel
REFA_02	32	3	7.1	1.9	Granule over sand	Granule over sand	Granule over sand	3	6.6	Gravel Mixes	Sandy Gravel	No	None	None	None	-	Shell Hash	Sand with Mobile Gravel
REFA_03	31	3	7.2	2.1	Pebble over finer sediment	Pebble over finer sediment	Pebble over finer sediment	3	8.7	Gravel Mixes	Sandy Gravel	No	None	None	None	-	Shell Hash	Sand with Mobile Gravel
REFA_04	30	3	8.0	1.8	Granule over sand	Pebble over finer sediment	Pebble over finer sediment	3	8.9	Gravel Mixes	Sandy Gravel	No	None	None	None	-	Shell Hash	Sand with Mobile Gravel
REFA_05	33	3	7.3	2.1	Coarse sand over finer sediment	Pebble over finer sediment	Pebble over finer sediment	3	8.3	Gravel Mixes	Sandy Gravel	No	None	None	None	-	None	Sand with Mobile Gravel
REFB_01	23	3	5.6	0.9	Medium sand over finer sediment	Medium sand over finer sediment	Medium sand over finer sediment	3	IND	Sand	Sand or Finer	No	None	None	None	-	Shell Hash	Sand Sheet
REFB_02	23	3	6.2	0.6	Medium sand over finer sediment	Medium sand over finer sediment	Medium sand over finer sediment	3	IND	Sand	Sand or Finer	No	None	None	None	-	None	Sand Sheet
REFB_03	23	3	6.1	1.8	Medium sand over finer sediment	Medium sand over finer sediment	Medium sand over finer sediment	3	IND	Sand	Sand or Finer	No	None	None	None	-	None	Sand Sheet
REFB_04	23	3	4.4	0.9	Medium sand over finer sediment	Medium sand over finer sediment	Medium sand over finer sediment	3	IND	Sand	Sand or Finer	No	None	None	Uneven Ripples	IND	Shell Hash	Sand Sheet
REFB_05	24	3	4.4	0.9	Fine sand	Fine sand	Fine sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	None	Sand Sheet
REFC_01	36	3	5.3	1.1	Medium sand	Medium sand	Medium sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	Shell Hash	Sand Sheet
REFC_02	36	3	5.8	1.4	Medium sand	Medium sand	Medium sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	Shell Hash	Sand Sheet
REFC_03	36	3	5.1	1.3	Medium sand	Medium sand	Medium sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	None	Sand Sheet

Reference Station	Water Depth (m)	SPI Replicate (n)	Mean Prism Penetration Depth (cm)	Mean Boundary Roughness (cm)	SPI Sediment Type (by replicate)			PV Replicate (n)	Gravel Mode (mm)	Dominant CMECS Substrate Group	Dominant CMECS Substrate Subgroup	Boulder Presence	Bedforms (by replicate)			Bedform Size Measurement (cm)	Debris	Habitat Type
REFC_04	35	3	7.4	1.1	Medium sand	Medium sand	Medium sand over finer sediment	3	IND	Sand	Sand or Finer	No	None	None	None	-	None	Sand Sheet
REFC_05	35	3	6.9	2.3	Medium sand	Medium sand	Medium sand	3	IND	Sand	Sand or Finer	No	None	None	None	-	None	Sand Sheet
n = 15																		
Max	**36**		**8.0**	**2.3**					**10.6**									
Min	**23**		**4.4**	**0.6**					**6.6**									
Mean	**30**		**6.2**	**1.5**					**8.6**									
Standard Deviation			**1.1**	**0.5**					**1.5**									

IND=Indeterminate
"-" Replicate image not analyzed

Table 3-4b. Summary of Sediment Profile Image Analysis Results at the Reference Stations

Reference Station	Water Depth (m)	SPI Replicate (n)	Mean aRPD Depth (cm)	Sediment Oxygen Demand Level	Methane Presence	Successional Stage (by replicate)			PV Replicate (n)	Possible Habitat of Interest	Dominant CMECS Biotic Subclass	Dominant CMECS Co-occurring Biotic Subclasses (# of reps)	Dominant CMECS Biotic Group	Dominant CMECS Co-occurring Biotic Group	Maximum Attached Fauna Percent Cover (CMECS Percent	Burrow Presence	Tracks Presence	Fish Present[1]	Presence of Tubes[1]	Epifauna Present[1]	Invasive Taxa Present[1]	Sensitive Taxa Present[1]	Sensitive Taxa[1]	Species of Concern[1]	Habitat Type
REFA_01	29	3	IND	Low	No	IND	2	2	3	No	Soft Sediment Fauna	None	Burrowing Anemones	None	None	Yes	No	Sea Robin	Yes	Anemone(s)	No	No	None	None	Sand with Mobile Gravel
REFA_02	32	3	3.9	Low	No	2	2	2	3	No	Soft Sediment Fauna	None	Burrowing Anemones	Small Tube-Building Fauna	None	Yes	No	None	Yes	Anemone(s)	No	No	None	None	Sand with Mobile Gravel
REFA_03	31	3	3.4	Low	No	2	2	2 -> 3	3	No	Soft Sediment Fauna	None	Burrowing Anemones	Mobile Crustaceans on Hard or Mixed Substrates; Small Tube-Building Fauna	None	Yes	No	None	Yes	Anemone(s), Hermit Crab(s)	No	No	None	None	Sand with Mobile Gravel
REFA_04	30	3	5.5	Low	No	IND	2	2	3	No	Soft Sediment Fauna	None	Burrowing Anemones	Mobile Crustaceans on Hard or Mixed Substrates	None	Yes	No	None	Yes	Anemone(s), Hermit Crab(s)	No	No	None	None	Sand with Mobile Gravel
REFA_05	33	3	2.8	Low	No	2	2	2	3	No	Soft Sediment Fauna	None	Burrowing Anemones	Mobile Crustaceans on Hard or Mixed Substrates; Small Tube-Building Fauna	None	Yes	No	Flounder; Skate	Yes	Anemone(s), Hermit Crab(s)	No	No	None	None	Sand with Mobile Gravel
REFB_01	23	3	4.1	Low	No	2	2	2	3	No	Soft Sediment Fauna	None	Larger Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	Yes	Yes	None	Yes	Gastropod(s), Hermit Crab(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
REFB_02	23	3	IND	Low	No	IND	2	2	3	No	Soft Sediment Fauna	None	Larger Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	Yes	Yes	Flounder	Yes	Gastropod(s), Hermit Crab(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
REFB_03	23	3	3.5	Low	No	IND	2	2	3	No	Soft Sediment Fauna	None	Diverse Soft Sediment Epifauna	Diverse Soft Sediment Epifauna; Larger Tube-Building Fauna	None	Yes	Yes	None	Yes	Gastropod(s), Hermit Crab(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
REFB_04	23	3	IND	Low	No	IND	IND	2	3	No	Soft Sediment Fauna	None	Diverse Soft Sediment Epifauna	Larger Tube-Building Fauna; Mobile Crustaceans on Soft Sediments	None	Yes	Yes	None	Yes	Gastropod(s), Hermit Crab(s), Hydroids, Sand Dollar(s)	No	No	None	None	Sand Sheet
REFB_05	24	3	IND	Low	No	1 -> 2	1 -> 2	1 -> 2	3	No	Soft Sediment Fauna	None	Sand Dollar Bed	Varies	None	Yes	Yes	None	Yes	Gastropod(s), Hermit Crab(s), Sand Dollar(s)	No	No	None	None	Sand Sheet
REFC_01	36	3	IND	Low	No	2	2	2	3	No	Soft Sediment Fauna	None	Larger Tube-Building Fauna	Mobile Crustaceans on Soft Sediments	None	Yes	No	None	Yes	Caprellid(s), Shrimp	No	No	None	None	Sand Sheet
REFC_02	36	3	IND	Low	No	2	2	2	3	No	Soft Sediment Fauna	None	Larger Tube-Building Fauna	Mobile Crustaceans on Soft Sediments	None	Yes	No	None	Yes	Shrimp	No	No	None	None	Sand Sheet
REFC_03	36	3	IND	Low	No	2	2	2	3	No	Soft Sediment Fauna	None	Larger Tube-Building Fauna	Varies	None	Yes	No	None	Yes	Sea Star(s)	No	No	None	None	Sand Sheet
REFC_04	35	3	4.8	Low	No	2	2	2 -> 3	3	No	Soft Sediment Fauna	None	Larger Tube-Building Fauna	Diverse Soft Sediment Epifauna; Mobile Crustaceans on Soft Sediments	None	Yes	No	None	Yes	Sea Star(s), Shrimp	No	No	None	None	Sand Sheet
REFC_05	35	3	6.8	Low	No	2	2	2 -> 3	3	No	Soft Sediment Fauna	None	Larger Tube-Building Fauna	Diverse Soft Sediment Epifauna; Mobile Crustaceans on Soft Sediments	None	Yes	No	None	Yes	Clam, Gastropod, Sea Star(s), Shrimp	No	No	None	None	Sand Sheet
n = 15																									
Max	**36**		**6.8**																						
Min	**23**		**2.8**																						
Mean	**30**		**4.4**																						

Reference Station	Water Depth (m)	SPI Replicate (n)	Mean aRPD Depth (cm)	Sediment Oxygen Demand Level	Methane Presence	Successional Stage (by replicate)			PV Replicate (n)	Possible Habitat of Interest	Dominant CMECS Biotic Subclass	Dominant CMECS Co-occurring Biotic Subclasses (# of reps)	Dominant CMECS Biotic Group	Dominant CMECS Co-occurring Biotic Group	Maximum Attached Fauna Percent Cover (CMECS Percent	Burrow Presence	Tracks Presence	Fish Present[1]	Presence of Tubes[1]	Epifauna Present[1]	Invasive Taxa Present[1]	Sensitive Taxa Present[1]	Sensitive Taxa[1]	Species of Concern[1]	Habitat Type
Standard Deviation			**1.3**																						

IND=Indeterminate
"-" Replicate image not analyzed
[1]Variable determined from combined SPI and PV analysis

Table 3-5. SPI Sediment Type to Grain Size (phi)

SPI Sediment Type	Grain Size Major Mode (phi)
Cobble & Cobble over sand	<-8
	<-8 / 3 to 2
Pebble	-4 to -5
	-3 to -4
	-2 to -3
Pebble over finer sediment	-4 to -5 / 0 to -1
	-3 to -4 / 0 to -1
	-3 to -4 / 1 to 0
	-3 to -4 / >4
	-2 to -3 / 1 to 0
	-2 to -3 / 3 to 2
	1 to 0 / -2 to -3*
Granule	-1 to -2
Granule over sand	-1 to -2 / 1 to 0
	-1 to -2 / 2 to 1
	-1 to -2 / 3 to 2
Very coarse sand	0 to -1
Very coarse sand over sand	0 to -1 / 1 to 0
	0 to -1 / 2 to 1
Coarse sand	1 to 0
Coarse sand over finer sediment	1 to 0 / 2 to 1
	1 to 0 / 3 to 2
	1 to 0 / >4
Medium sand	2 to 1
Medium sand over silt/clay	2 to 1 / >4
Fine sand	3 to 2
Very fine sand	4 to 3
Very fine sand over silt/clay	4 to 3/>4
Silt/clay & Silt/clay over sand	>4
	>4 / -1 to -2
	>4 / 0 to -1
	>4 / 1 to 0
	>4 / 2 to 1
	>4 / 3 to 2
	>4 / 4 to 3
Indeterminate	IND

*designation used for a near even distribution of these grain size classes throughout the sediment column

Table 3-6. Sediment Grabs Grain Size Distribution (USCS Classification)

Station	ASI #	% Coarse Gravel	% Fine Gravel	Total Gravel	% Coarse Sand	% Medium Sand	% Fine Sand	Total Sand	% Silt	% Clay	Total Fines
003	20190565	0.0	0.0	0.0	0.0	2.2	97.8	100	0.0		
006	20190566	0.1	0.5	0.6	8.5	74.3	16.6	99.4	0.0	0.0	0.0
010	20190567	0.1	38.4	38.5	17.2	23.5	15.4	56.1	1.8	3.6	5.4
011	20190568	0.0	0.0	0.0	0.0	11.9	9.0	20.9	48.1	31.0	79.1
147	20190569	0.0	0.0	0.0	0.4	35.2	64.3	99.9	0.1		
157	20190570	0.0	0.3	0.3	0.5	42.0	57.2	99.7	0.0		
020	20190571	0.0	0.0	0.0	0.1	1.1	98.7	99.9	0.1		
038	20190572	0.0	0.0	0.0	1.2	53.6	45.2	100	0.0		
060	20190573	0.0	0.6	0.6	0.2	20.6	53.5	74.3	16.2	8.9	25.1
076	20190574	0.0	0.6	0.6	0.1	36.6	48.0	84.7	7.7	7.0	14.7
091	20190575	0.0	0.0	0.0	0.8	8.7	90.3	99.8	0.2		
095	20190576	0.0	0.0	0.0	0.0	51.2	48.8	100	0.0		
100	20190577	0.2	6.5	6.7	2.2	29.3	33.5	65.0	13.5	14.8	28.3
057	20190578	0.0	0.1	0.1	0.1	39.4	47.1	86.6	8.2	5.1	13.3
133	20190579	1.3	6.3	7.6	17.0	56.9	18.5	92.4	0.0		
136	20190580	1.5	7.4	8.9	13.3	39.9	37.9	91.1	0.0	0.0	0.0

4.0 SUMMARY

The purpose of the SPI/PV survey was to provide data about surficial sediments and characterize benthic habitats along the proposed export cable routes for the Equinor Wind Offshore lease area OCS-A 0512. Results from the SPI/PV survey are intended to support spatial planning decisions, reduce uncertainty associated with baseline conditions, and inform future approaches. This SPI/PV study provides a secondary line of data for the assessment of the physical, geological, and biological conditions of the surficial sediments within the surveyed area. This study also carefully considered all BOEM regulations and guideline recommendations; SPI and PV images provide important data pertaining to several of these regulations and guidelines (Table 4-1). The data from this study was collected and interpreted in consideration of these regulations and guidelines so Equinor can provide federal regulators have the best available information for review. The SPI and PV images were useful in mapping physical, geological, and biological properties of the surface sediments and helped to document and characterize processes structuring surface sediments along the proposed cable routes and at the reference stations.

Surficial sediments were heterogenous across the surveyed area at an inter-station scale; intra-station sediment heterogeneity was largely low (most replicates were similar in sediment type), but there were a few instances of high variability. These results highlight that sediment type along the export cable routes varied at large but not small scales; this trend was true at the reference stations. Despite the spatial variations in sediment types, most of the sediment found along the cable routes and at the reference stations were varying sizes of mobile sand. There were a few distinct locations where the sediment type varied from sand: silt-clay was documented in the submarine valley (the Hudson Shelf Valley) traversing the NJECR and at the stations located near the “Narrows” along the NYHECR; granules and pebbles were observed at stations located on Cholera Bank, at stations west of the submarine valley (including at Reference A), and at some of the shallow stations near Long Island; and boulders were documented at a few stations, most notably Station 050 on Cholera Bank. The sediment types documented during the SPI/PV survey were used to ground truth USGS backscatter data. The SPI/PV data corresponded well with the backscatter data, and it is appropriate to extrapolate bottom type in the area using the SPI/PV and USGS backscatter data.

The sediment type observed across the surveyed area corresponded to the Habitat Types documented. Three broad habitat types were identified at the surveyed area, Sand Sheets, Sand with Mobile Gravel, and Patchy, Cobbles, Boulders on Sand. These Habitat Types were defined based on their physical habitat structure and mobility, as well as their dominant CMECS Biotic Subclass and CMECS Biotic Group. Sand Sheets were the overwhelming habitat observed. Habitats such as Sand with Mobile Gravel and Patchy, Cobbles, Boulders on Sand were observed in distinct locations. Sand with Mobile Gravel was documented in the shallow portions of the NJECR just west of the Hudson Shelf Valley, along Cholera Bank, and in the most western portion of the LIECR in NY state waters. Patchy, Cobbles, Boulders on Sand were documented at Station 050 situated on Cholera Bank, and along the NJECR at Station 010 in

the Hudson Shelf Valley. Cobbles and boulders can provide habitat for a diverse range of taxa and serve as valuable habitat for juvenile fauna. Similar habitat observations were made at the reference stations. Sand Sheets were the predominant habitat and exclusive to Reference B (adjacent Cholera Bank) and Reference C (just east of the Hudson Shelf Valley). Sand with Mobile Gravel was exclusively observed at Reference A just west of the Hudson Shelf Valley. There did appear to be a spatial orientation to the presence of Sand with Mobile Gravel. The transition from a seafloor habitat of Sand Sheet to one of Sand with Mobile Gravel occurred right at the Hudson Shelf Valley for both the reference stations and stations along the proposed cable routes. Stations east of the submarine valley were Sand Sheet habitat, and stations west of the submarine valley were a habitat of Sand with Mobile Gravel.

The vast majority of stations (nearly two-thirds) were characterized by medium to high load-bearing strength reflected in the relatively shallow prism penetration depths (<6 cm) observed along the proposed cable routes. There was a similar trend at the reference stations where approximately half of the reference stations were characterized by medium to high load-bearing strength. Sediment load-bearing capacity, indicated by prism penetration depth, is related to grain size, and prism penetration values correlated well with sediment composition across the surveyed area. Stations with a higher prevalence of gravel, including boulders, had the highest bearing capacities (<4 cm prism penetration) or prism penetration was refused when the camera system landed directly on large boulders (e.g., Station 050). Penetration depth range is not strictly controlled by grain size but can also be influenced by compaction/porosity, as well as infaunal bioturbation. There were no discernible trends in prism penetration and bioturbation observed at the surveyed area.

Ripples indicate frequent and persistent hydrodynamic forcing at the surface of the seafloor. Ripples of varying amplitude and wavelength were the predominant bedform across the sandy and gravelly sandy portions of the surveyed area, the predominant habitat types along the proposed cable routes. Often larger particles were oriented in the trough of the sand ripples. Smaller ripples and an absence of rippling were observed at some stations haphazardly dispersed along the proposed cable routes and in a few distinct locations: the deeper stations located in the submarine valley; the stations near the Narrows where the seafloor was “armored” with bivalves; and stations where boulders were present (Stations 010 and 050). Mean small-scale surface boundary roughness measured from SPI images followed a similar spatial pattern, with higher values coincident with larger scale ripples. In addition, thin surface layers of coarse sediment over fine sediment (e.g., pebbles over finer sediment, coarse sand over fine sand) were observed throughout the surveyed area and indicated coarse sediments that were subject to frequent hydrodynamic activity over finer base sediments. The size of any larger bedforms present in the area exceeded the field-of-view of the SPI and PV images and would need to be measured in multibeam and side-scan sonar data.

The dominant Biotic Subclass across the surveyed area was Soft Sediment Fauna. The dominance of Soft Sediment Fauna corresponded with the predominant Sediment and Habitat Types observed. Attached Fauna were present as the CMECS Biotic Subclass or Co-occurring

Biotic Subclass at 12 of the 157 stations sampled across the surveyed area. Mussels in dense Mussel Beds were the Attached fauna observed in the state waters along the NYHECR; stations with Mussel Beds accounted for more than half (7 of the 12 stations) of the observations of Attached Fauna documented. At the remaining stations, one station had trace coverage of barnacles (Station 133), and the other instances were sparse coverage of sponges, hydroids, and mussels at Stations 010, 046, and 068, respectively. Station 050 was an exception with dense cover of diverse attached fauna (corals, sponges, barnacles, hydroids). The reference stations reflected what was observed along the proposed cable routes, with Soft Sediment Fauna the predominant Biotic Subclass. There were no observations of Attached Fauna at any of the reference stations.

While dominant Biotic Subclass was somewhat homogeneous across the surveyed area, Biotic Group was much more heterogeneous. Sand dollar beds and both Small and Larger Tube-Building Fauna were the predominant Biotic Groups that were observed. Tubes at the sediment–water interface were often the result of polychaetae activity, but amphipod tubes were also observed. Many tubes were formed by the polychaetae *Diopatra cuprea*, a polychaete that regularly incorporates shell particles into its tube construction giving these tubes a distinct appearance. The variability in dominant Biotic and Co-Occurring Biotic Groups along the proposed cable routes highlights the benthic diversity of the seafloor in the surveyed area. Dominant Biotic groups at the reference areas was a bit more homogeneous. The dominant Biotic Group at Reference A and Reference C was exclusively Burrowing Anemones and Larger Tube-Building Fauna, respectively. The dominant Biotic Group at Reference B was more diverse with 3 different Biotic Groups represented (Diverse Soft Sediment Epifauna, Larger Tube-Building Fauna, Sand Dollar Bed). The reference areas were generally more homogeneous with the biotic groups observed in each area because the reference areas represented a relatively small area, whereas the proposed cable routes cover vast swaths of the NY Bight.

Sensitive taxa were only documented at one station, Station 050, where the Northern Star Coral *Astrangia* spp. was observed. *Astrangia* spp. is not a reef forming coral but enhances the value of hard substratum toward attracting other fauna when it occurs (Guida et al. 2017). This taxon is found in hard bottom habitats attached to cobbles and boulders; Station 050, where *Astrangia* spp. was observed, had a habitat of cobble and boulders. *Astrangia* spp. has a broad geographical distribution, and its low relief and non-reef building life history strategy provides a population level resiliency to disturbance. *Astrangia* spp. is also not documented to provide essential fish habitat (Dimond and Carrington 2007). Any impacts to the star coral from cable construction should be minimal, localized, and recovery should be rapid (Aronson et al. 2008). No sensitive taxa were documented at the reference stations.

Throughout the surveyed area, successional taxa were overwhelmingly designated as Stage 2, with only a few stations documented to contain some other successional designation. In many cases, the Stage 2 determination was based on the presence of *D. cuprea* tubes; specialized shell tubes. Due to the dynamic nature of these sandy environments and the very low organic

loads found in medium and coarse sands, Stage 3 head-down deposit feeders would not be expected in these habitats. In instances where more advanced successional taxa were observed, the sediment grain-size was finer which can correlate with a higher organic content to support advanced successional taxa (Pearson and Rosenberg 1978). The aRPD was not determinable at many of the stations, often because it was not optically determinable. This is a common occurrence in mobile, well-washed sands with high porewater content. In coarser sandy sediments, the oxidation depth is based more on diffusion through sand grains and less on organic inputs and bioturbation of deposit-feeding infauna. The result is that the vast majority of stations also had low sediment oxygen demand, and there were no signs of bottom water hypoxia or methanogenesis.

The results and images from this survey will provide an accurate characterization and delineation of benthic habitats and establish a baseline of both large- and small-scale biological features along the proposed cable routes and at the reference areas. The results will also allow Equinor to broadly communicate the results of the survey using seafloor images of predevelopment conditions. Contributions from this survey will provide valuable information to address the BOEM guidelines and regulations, as well as stakeholder concerns.

Table 4-1. BOEM Guidelines, SPI Survey Approaches and Results

Guideline	SPI/PV Survey Approach and/or Parameter(s)	Results
Identify and confirm benthic flora and fauna	Epifauna, Infauna, Tracks, Burrows, Flora, CMECS Biotic Subclass and Group	No living flora observed
		Soft Sediment Fauna dominated with patchy presence of Attached Fauna
Establish a pre-construction baseline	Epifauna, Infauna, Tracks, Burrows, Flora, CMECS Biotic Subclass and Group	Sample density along the potential Equinor Wind Export Cable Routes establishes a baseline benthic characterization
Collect data to reduce uncertainty associated with baseline estimates and to inform interpretation of survey results	Epifauna, Infauna, Tracks, Burrows, Flora, CMECS Biotic Subclass and Group	Results from the SPI/PV survey may be integrated and analyzed with regional data to reduce uncertainty in existing datasets
Identify communities of sessile and slow-moving marine invertebrates	Epifauna, Infauna, CMECS Biotic Subclass and Group	Habitat Types
		Lists of observed species and CMECS Biotic Groups
Identify sensitive benthic habitats	Sensitive Taxa; CMECS Substrate Group; CMECS Biotic Subclass (dominant and co-occurring)	Sensitive taxa types recorded
		Attached Fauna presence/coverage
		Habitat Types
		*best to integrate with G&G data for full picture
Characterize seasonal and inter-annual variability of benthic community	Sampled in Summer during biologically active period (July)	Communities seen in proposed project (nearshore sands, shelf sands and cobble) not subject to substantial inter-annual variability
Identify areas to serve as baseline reference	Sampled 5 stations in three representative reference areas	Reference areas identified and baseline assessment at reference areas conducted
Characterize and delineate hard bottom gradients and rock outcroppings	Mapped presence of boulders, Sediment type assessment.	Habitat Types
		Spatial assessment of features completed
Characterize surficial sediments	Sediment Types mapped	Comprehensive assessment of surficial sediments completed as part of SPI/PV survey, including presence of boulders.

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Benthic Assessment Survey of Proposed Export Cable Routes in Support of the Equinor Wind OCS-A-0512 Offshore Wind Farm Project

DATA REPORT

Survey Conducted 08-15 July 2019

FIGURES

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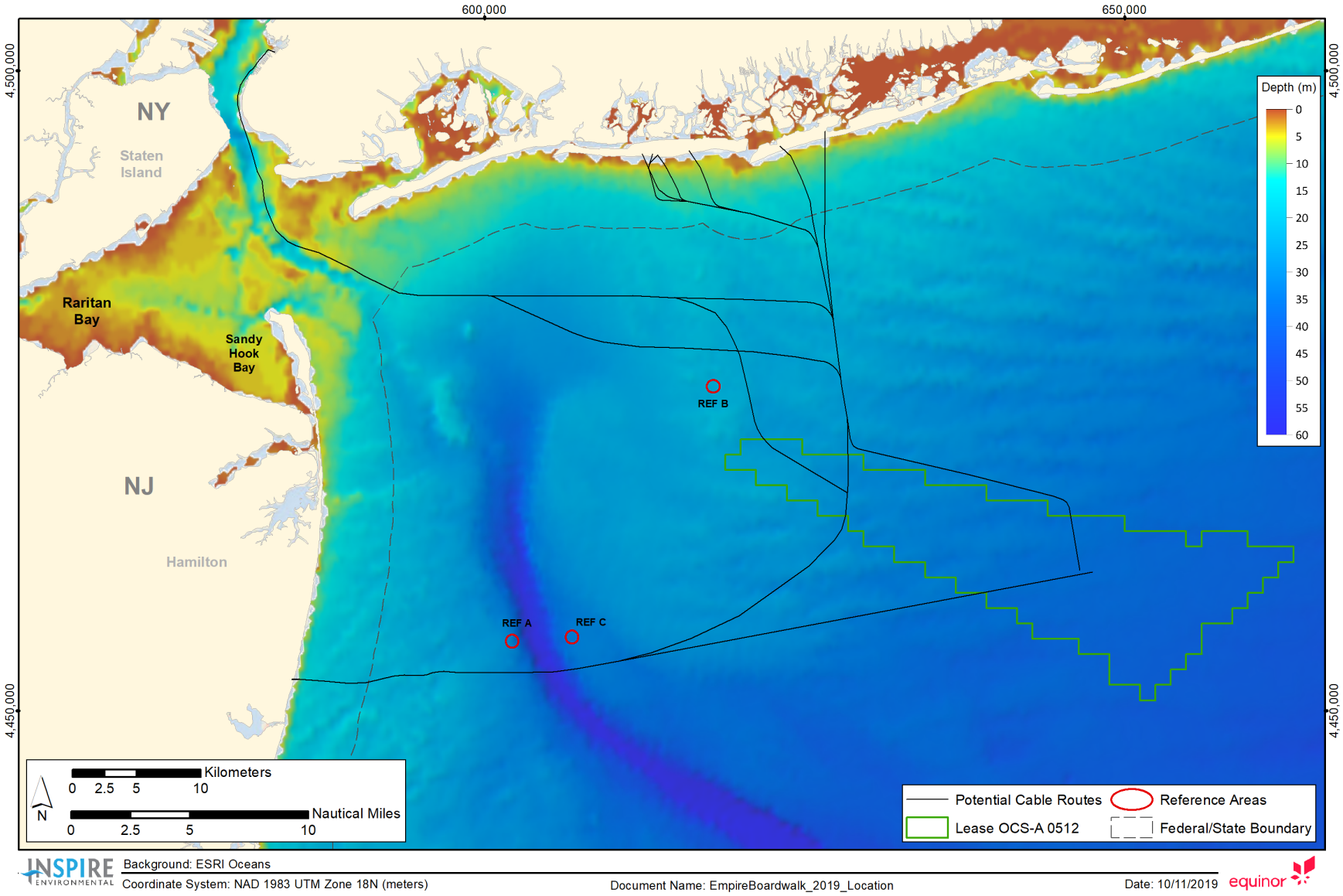

Figure 1-1. Location of the Equinor Wind export cable survey area including the lease area and proposed cable routes

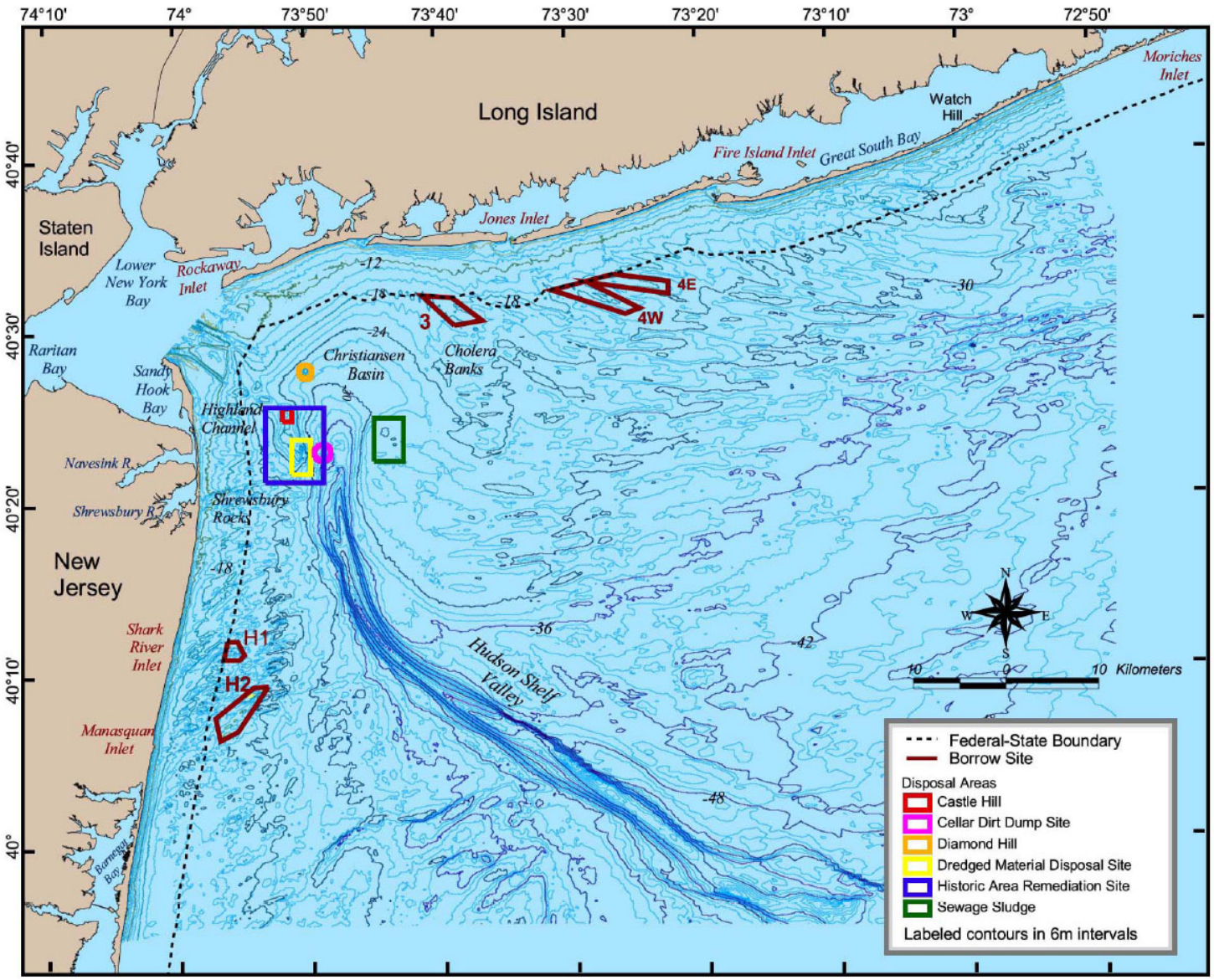

Figure 1-2. Prominent geomorphic features of the New York Bight continental shelf (adapted from Byrnes et al. 2004)

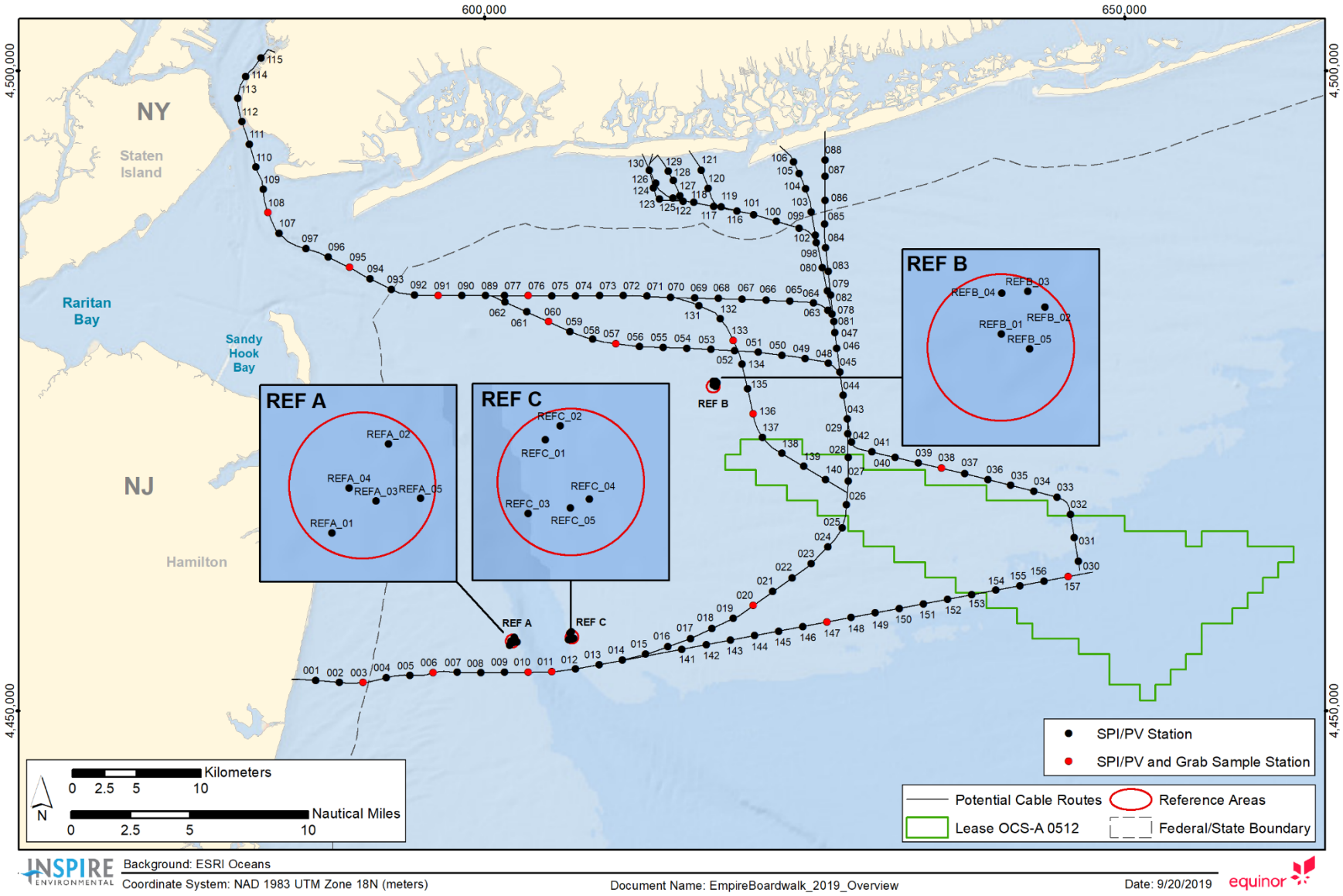

Figure 2-1. Station locations sampled for SPI, PV, and grabs along the proposed export cable routes at the Equinor Wind Offshore Wind Farm Project

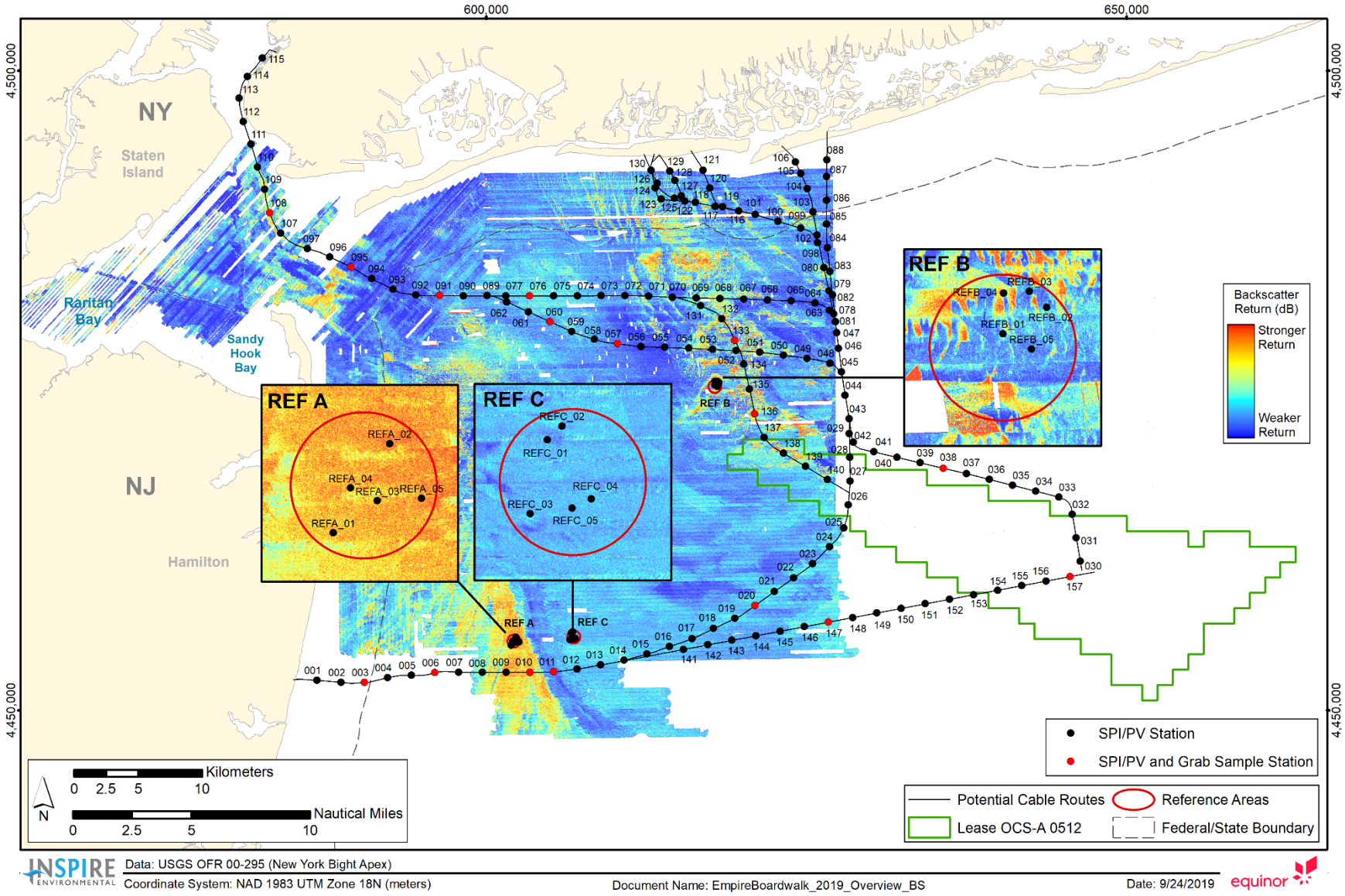

Figure 2-2. Station locations sampled for SPI, PV, and grabs over USGS Backscatter data along the proposed export cable routes at the Equinor Wind Offshore Wind Farm Project

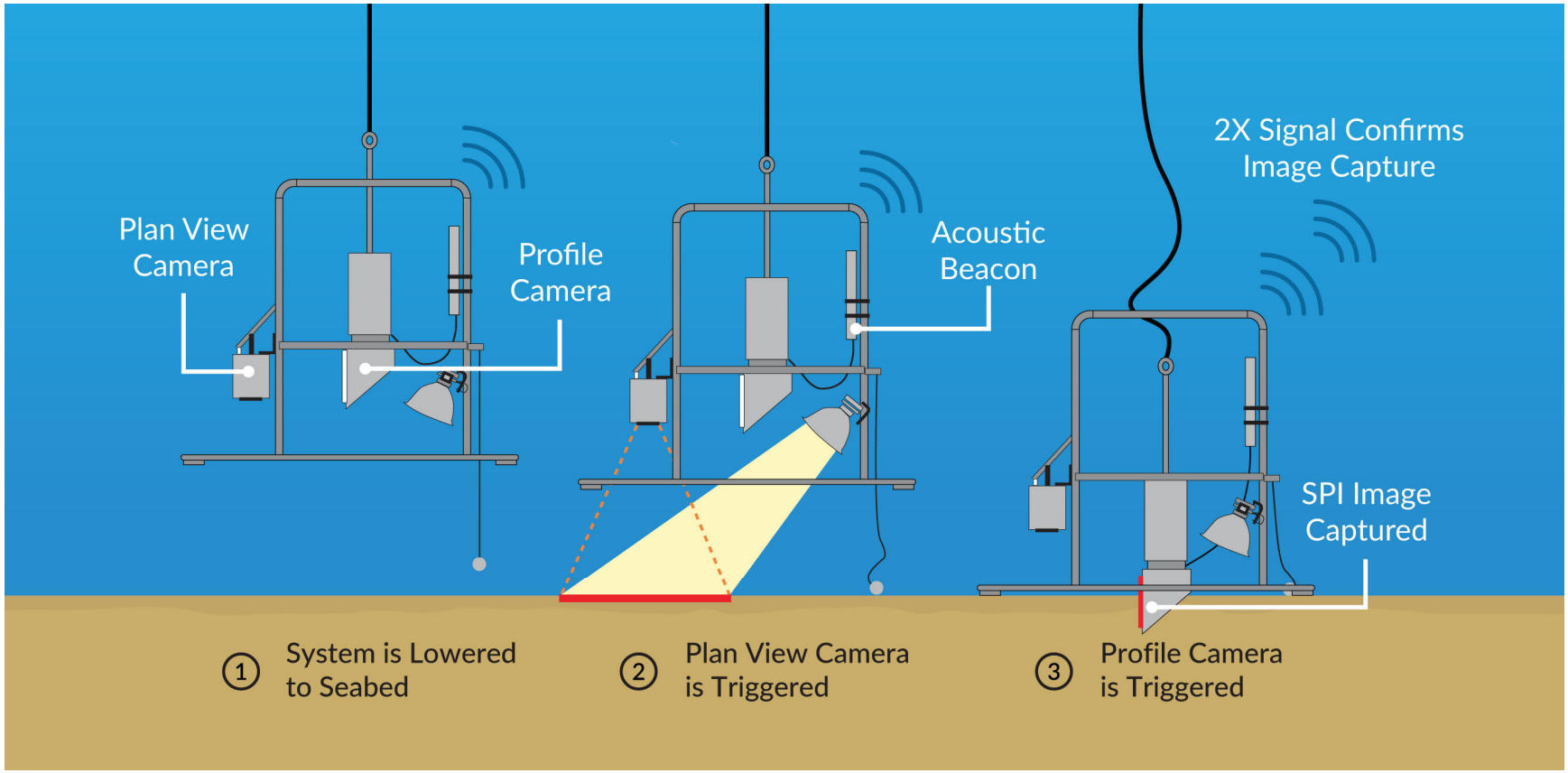

Figure 2-3. Schematic diagram of the operation of the sediment profile and plan view camera imaging system

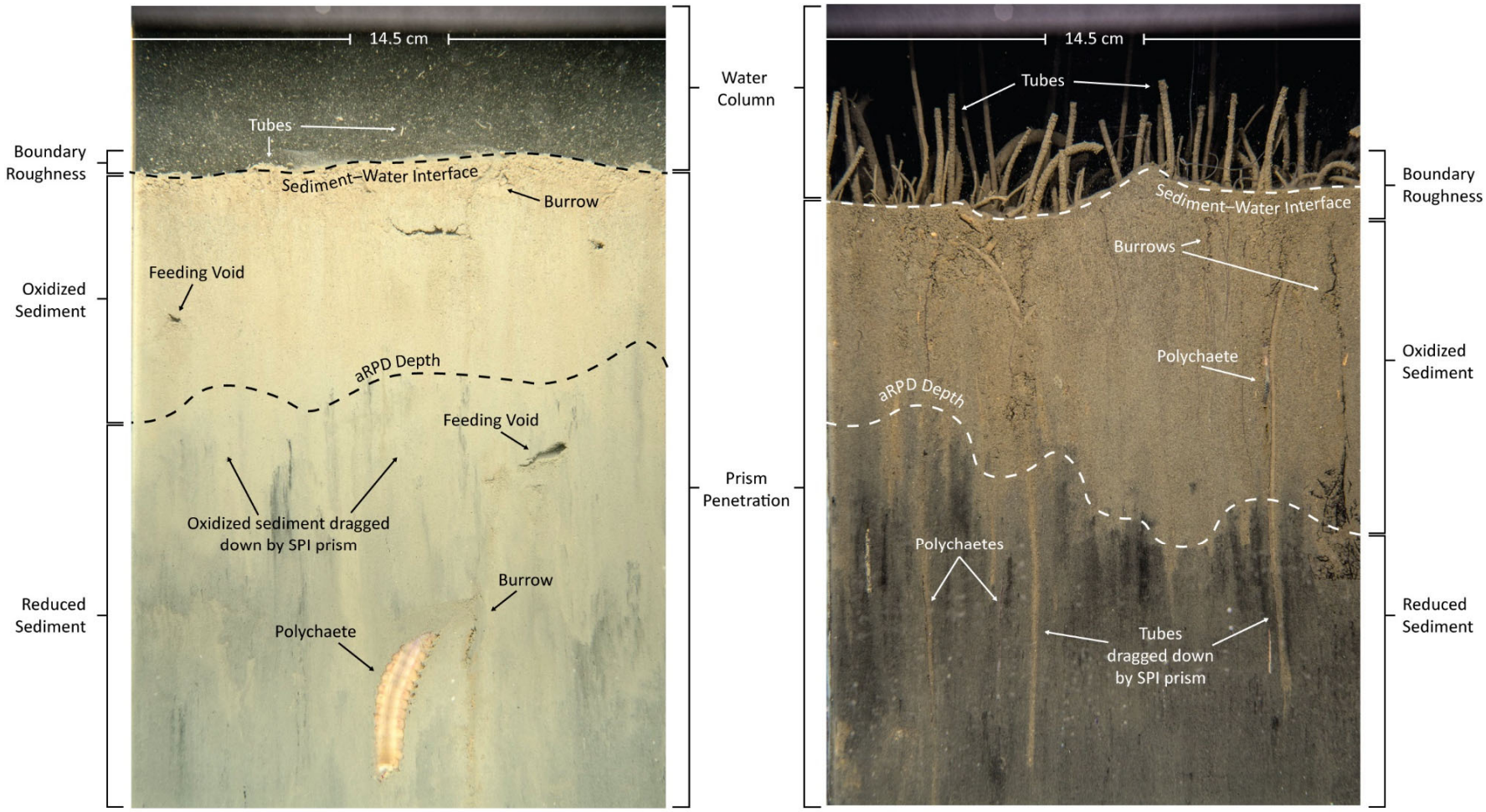

Figure 2-4. ***SPI images from soft bottom coastal and estuarine environments annotated with many standard variables derived from SPI images. The water column, depth of prism penetration, boundary roughness of the sediment–water interface, and zones of oxidized and reduced sediment are denoted with brackets. The apparent redox potential discontinuity (aRPD), the boundary between oxidized and reduced sediments, is marked with a dashed line. Infauna and related structures (tubes, burrows, feeding voids) are noted with arrows.***

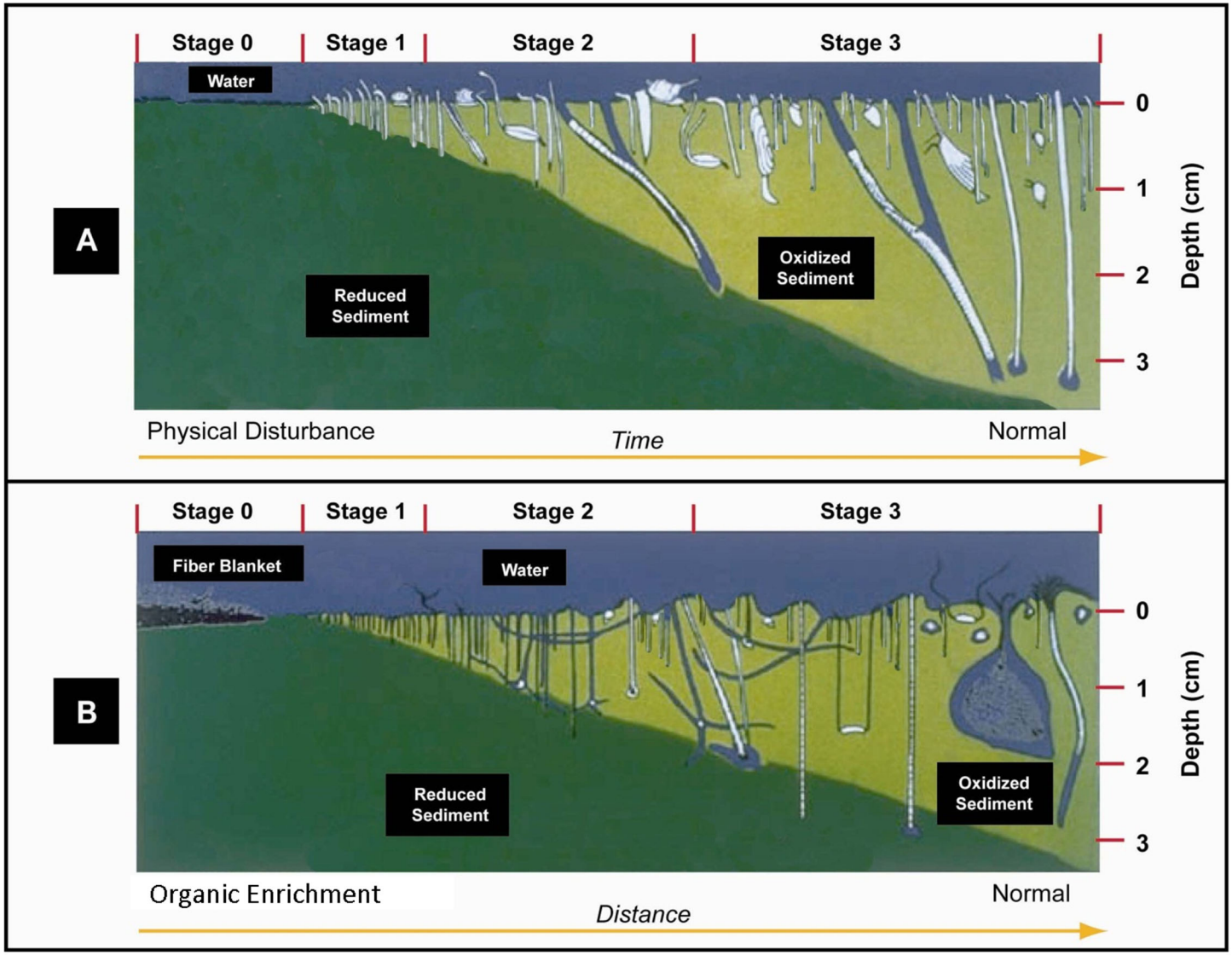

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Figure 2-6. ***This representative plan view image shows the sampling relationship between plan view and sediment profile images. Note: plan view images differ between surveys and stations and the area covered by each plan view image may vary slightly between images and stations.***

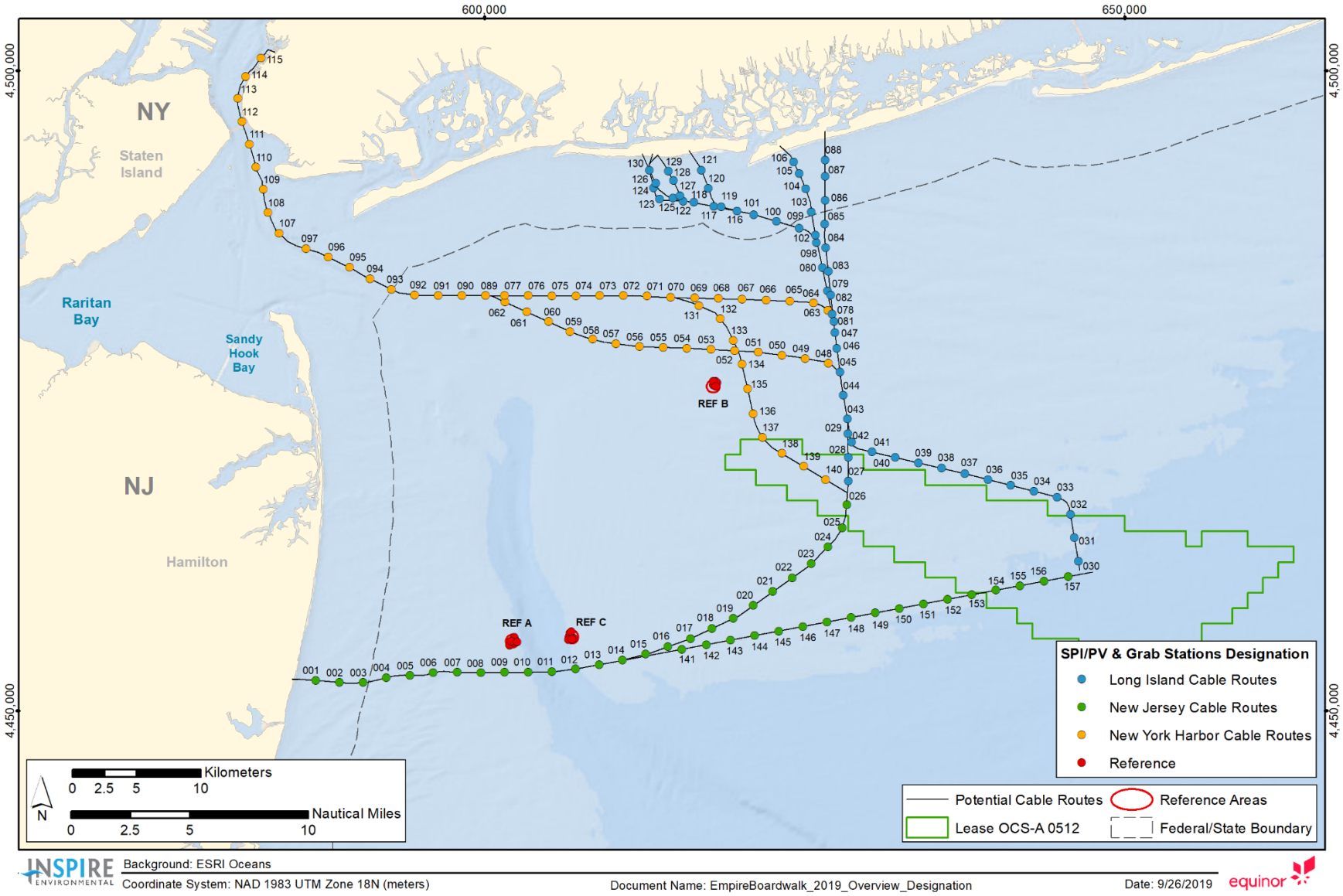
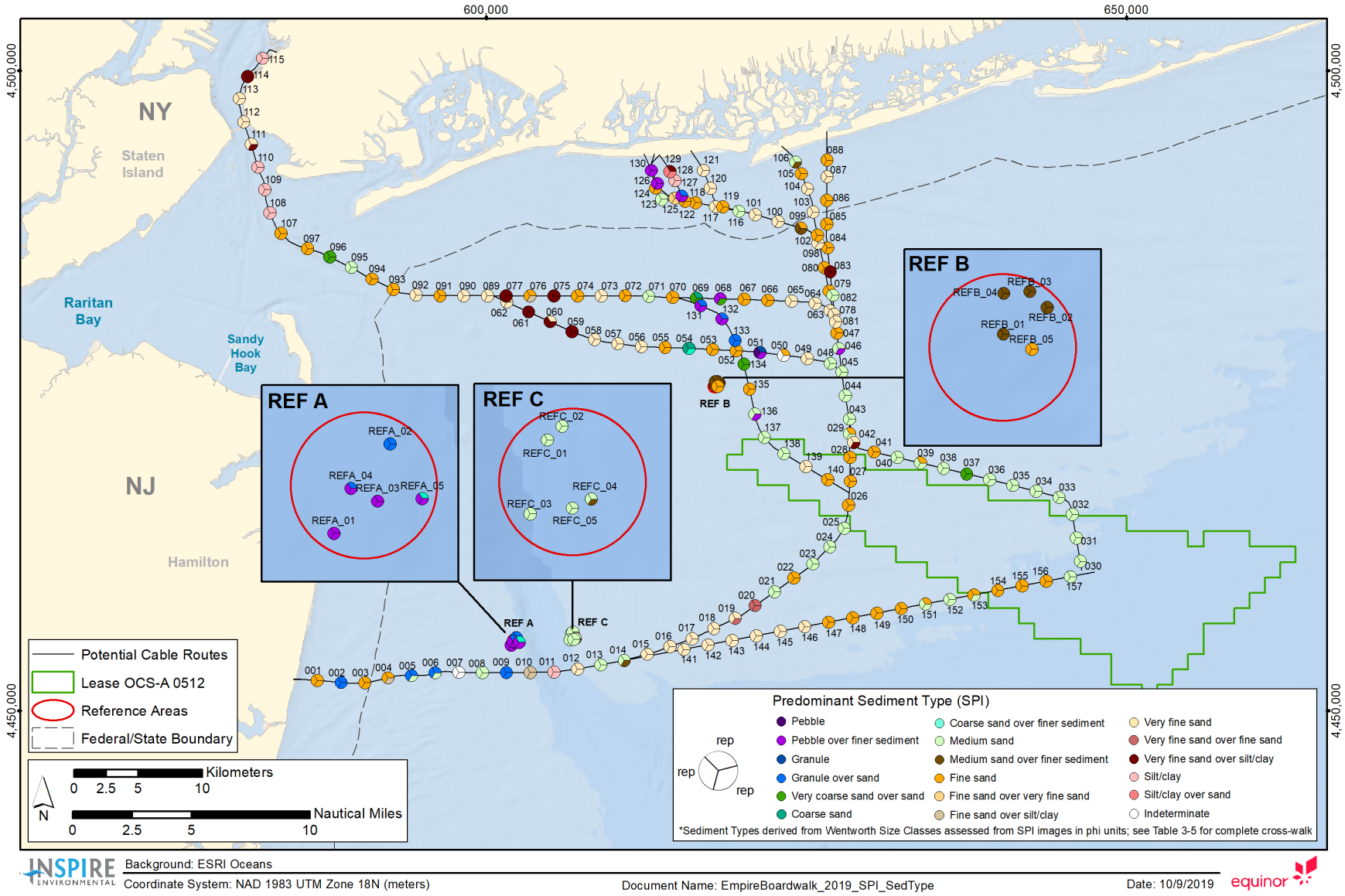


Figure 3-1. Delineation of survey area by cable route



Background: ESRI Oceans
Coordinate System: NAD 1983 UTM Zone 18N (meters)
Document Name: EmpireBoardwalk_2019_SPI_SedType
Date: 10/9/2019

Figure 3-2. Predominant sediment types aggregated from grain size major mode (phi units) derived from SPI images across the surveyed area

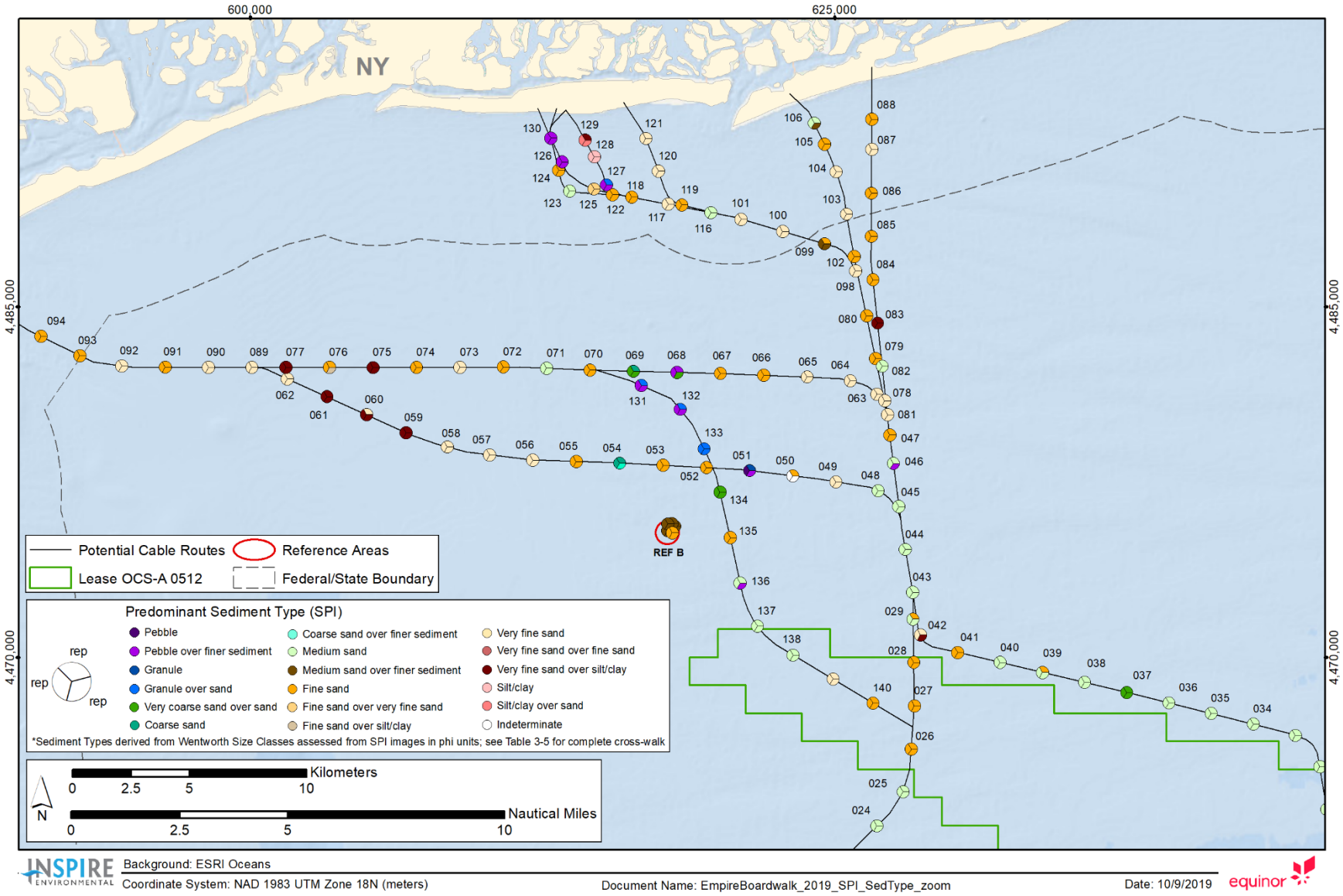


Figure 3-3. Zoom-in of the Long Island export cable route. Predominant sediment types aggregated from grain size major mode (phi units) derived from SPI images across the surveyed area.

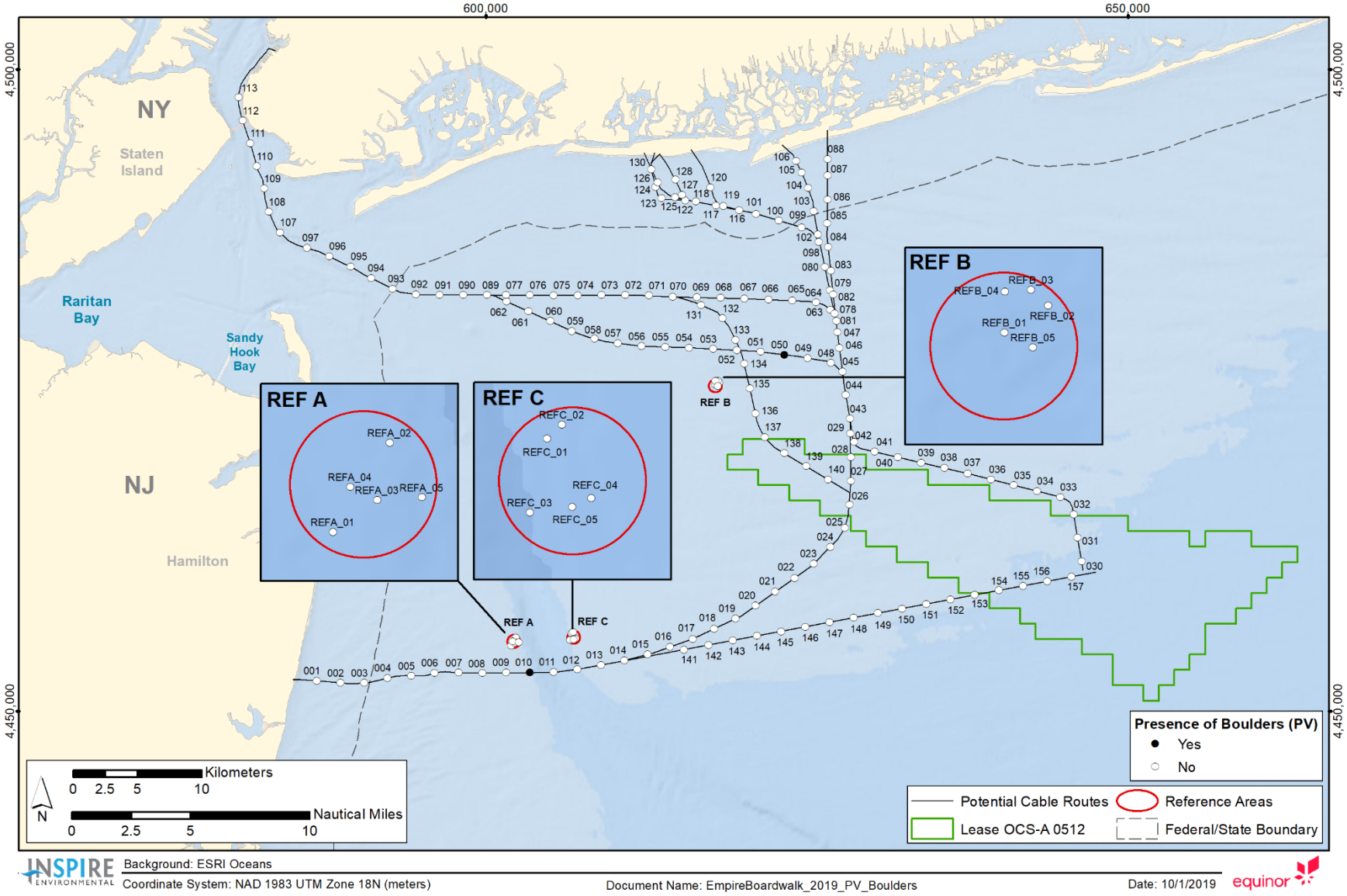


Figure 3-4. Presence/absence of boulders across the surveyed area

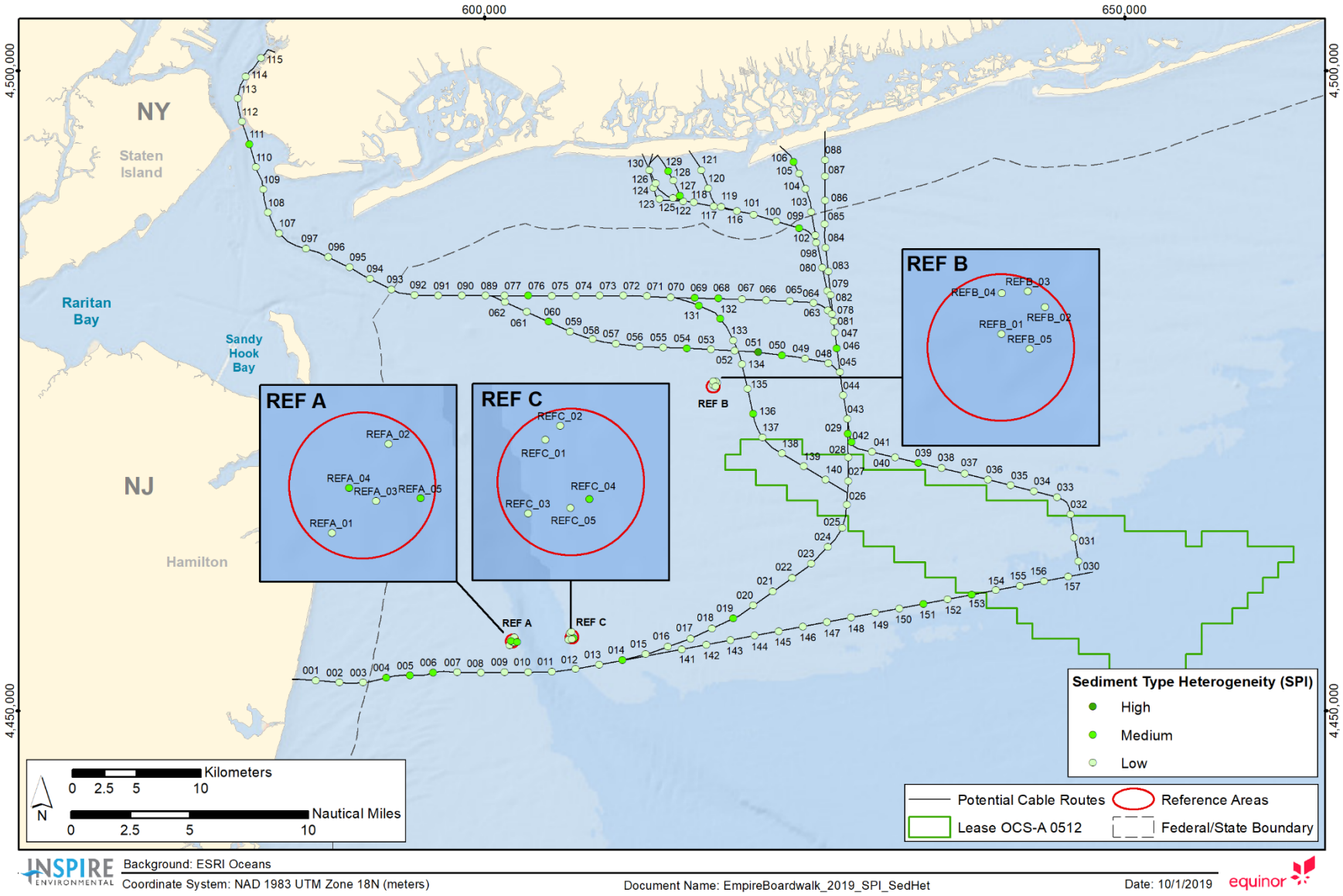


Figure 3-5. Intra-station sediment type heterogeneity determined from SPI images across the surveyed area

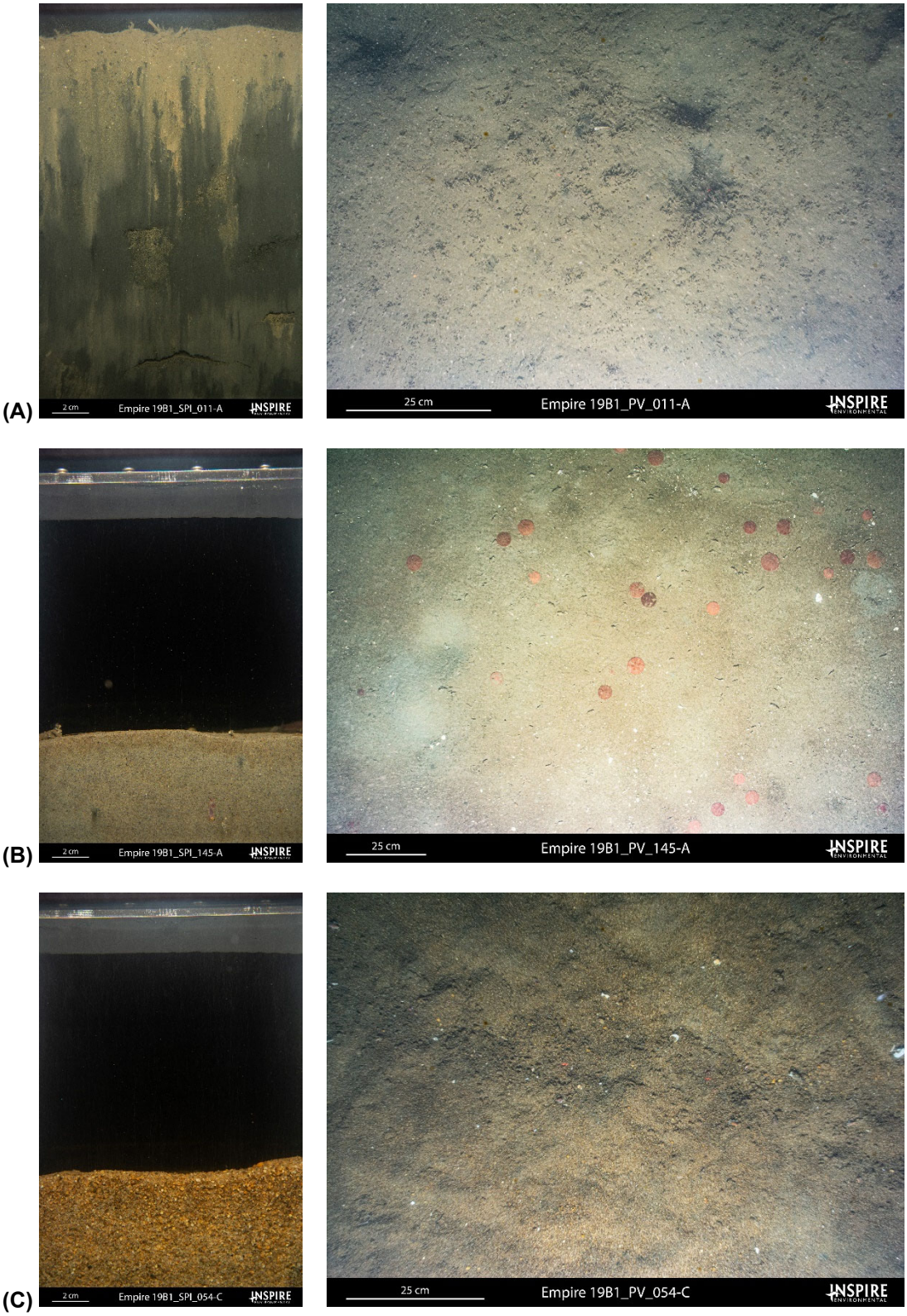
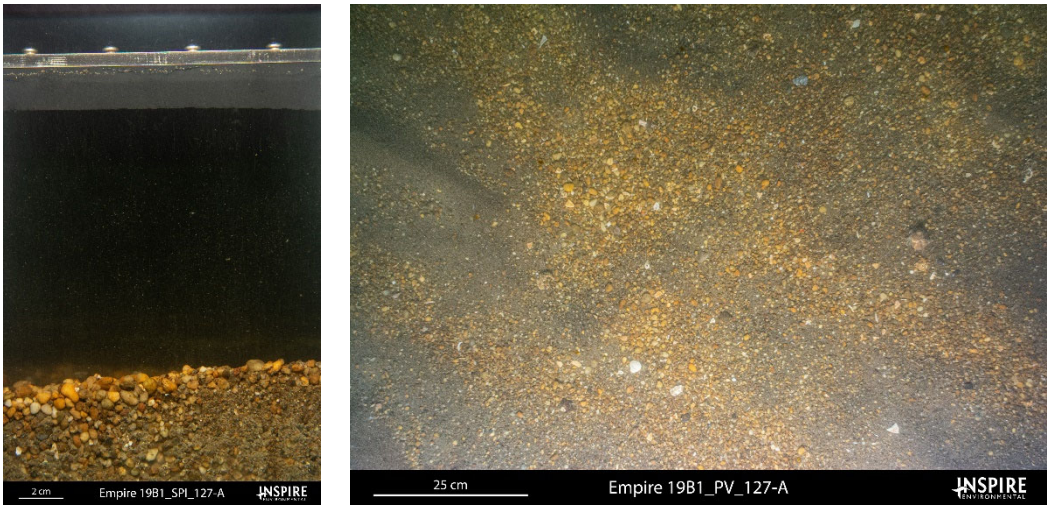


Figure 3-6. Representative SPI and PV images depicting the range of sediment types across the surveyed area; (A) silt-clay; (B) very fine sand; (C) medium to coarse sand; (D) small gravel (granule and pebble); and (E) large gravel (cobbles and small boulders)

(D)



(E)

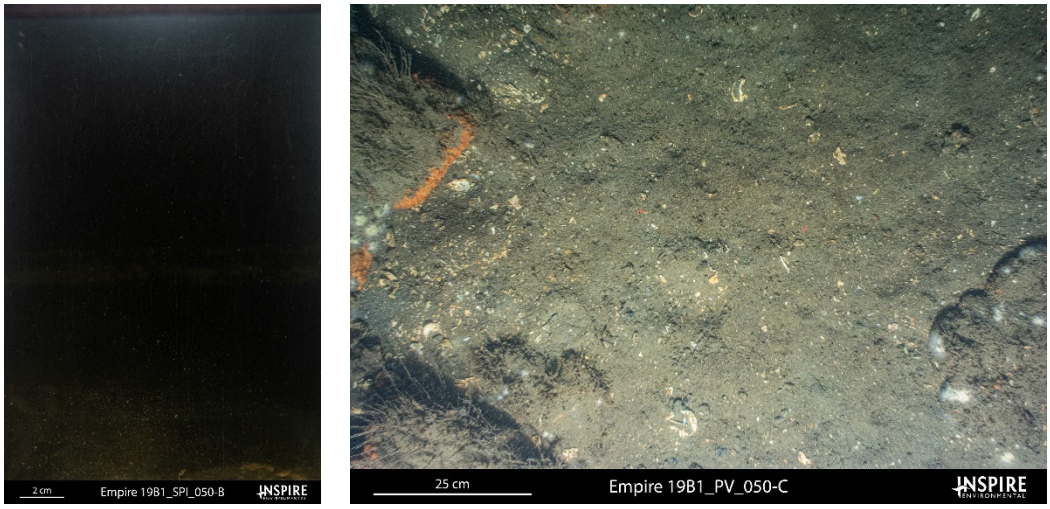
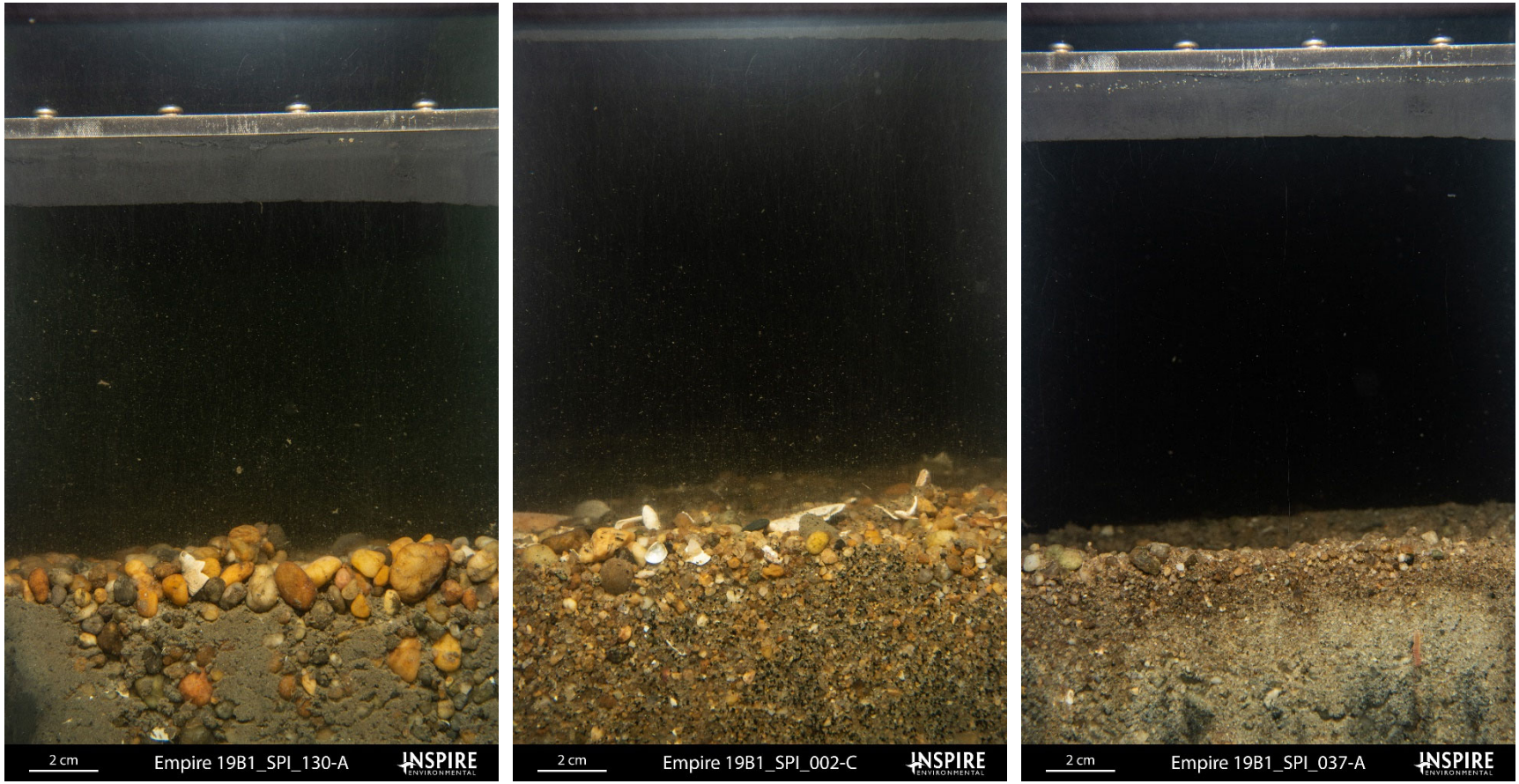


Figure 3-6. continued ***Representative SPI and PV images depicting the range of sediment types across the surveyed area; (A) silt-clay; (B) very fine sand; (C) medium to coarse sand; (D) small gravel (granule and pebble); and (E) large gravel (cobbles and small boulders)***



(A) **(B)** **(C)**

Figure 3-7. Representative SPI images showing layering of coarse material over sand; (A) pebble over sand; (B) granule over sand; and (C) very coarse sand over sand

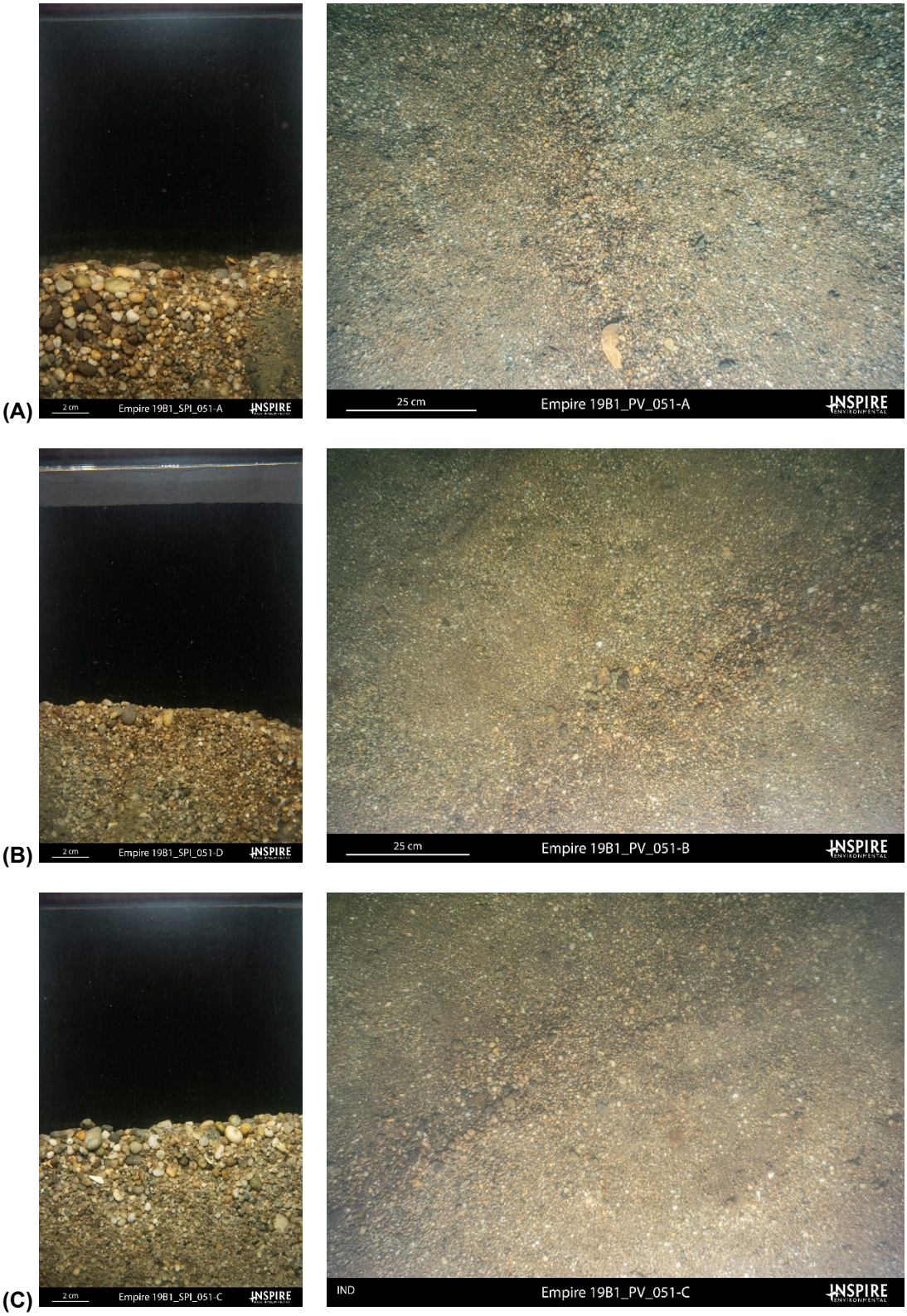


Figure 3-8. Representative SPI and PV images showing intra-station heterogeneity in sediment type at Station 051 with the following predominant sediment types characterized: (A) granule; (B) pebble; and (C) pebble over finer sediment. Small, long-period, low relief asymmetric bedforms were present amongst the gravel.

Figure 3-9. Plan view image depicting a small long-period asymmetric bedform with a semi-distinct sand ridge with granules and pebbles in the trough

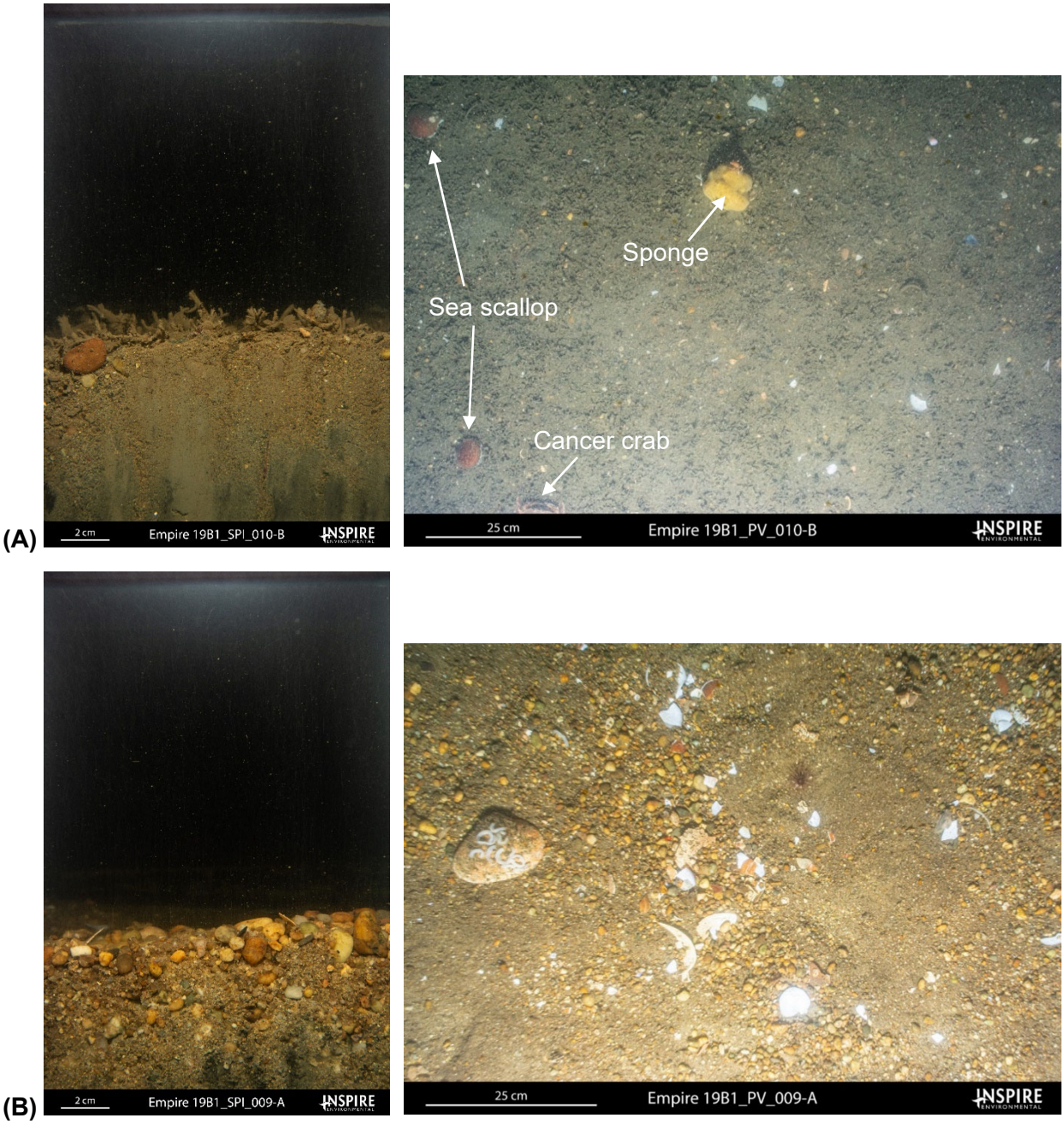


Figure 3-10. Profile and plan view images contrasting sediment type at two adjacent stations: (A) Station 010 located in a submarine channel (at the edge of the channel) was composed of very fine sand over silt-clay with sparse coverage of sponges present as Attached Fauna and sea scallops and a Cancer crab present; and (B) Station 009 located just outside of the channel composed of granule over sand

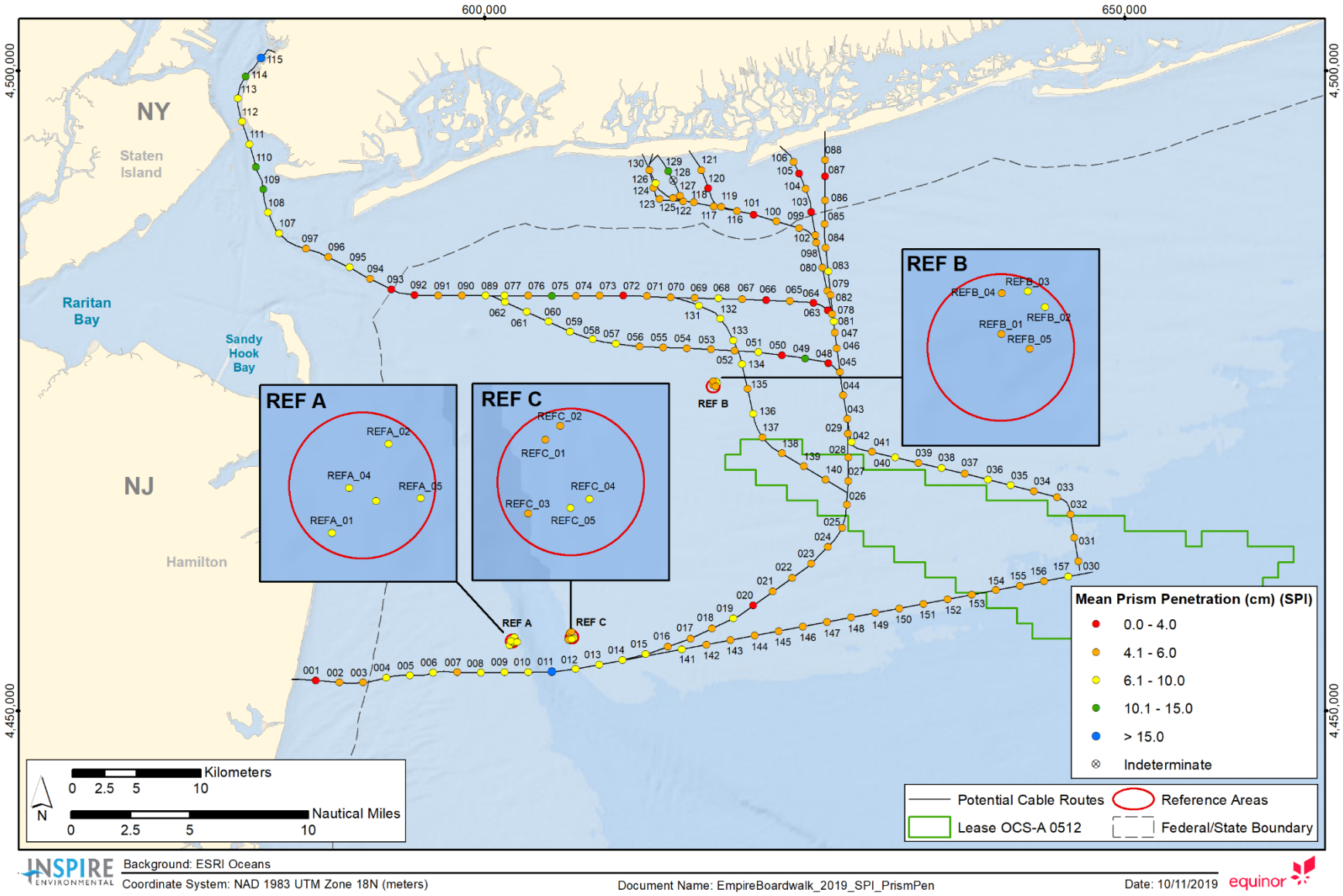
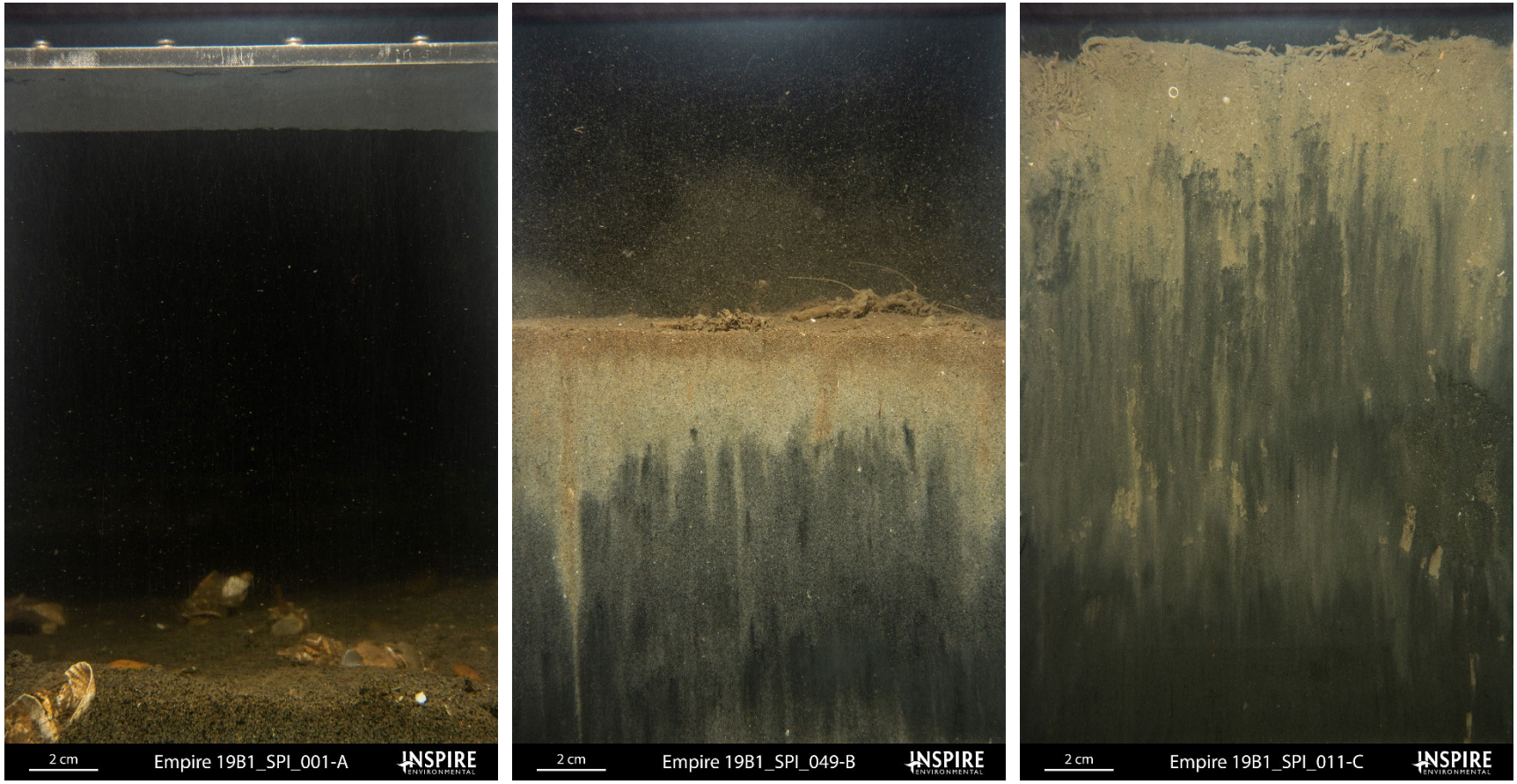


Figure 3-11. Mean station camera prism penetration depths (cm) at the Equinor Wind survey area



(A) **(B)** **(C)**

Figure 3-12. Representative SPI images showing sediments with; (A) low; (B) medium; and (C) high prism penetration values, corresponding to high, medium, and low load-bearing strength, respectively

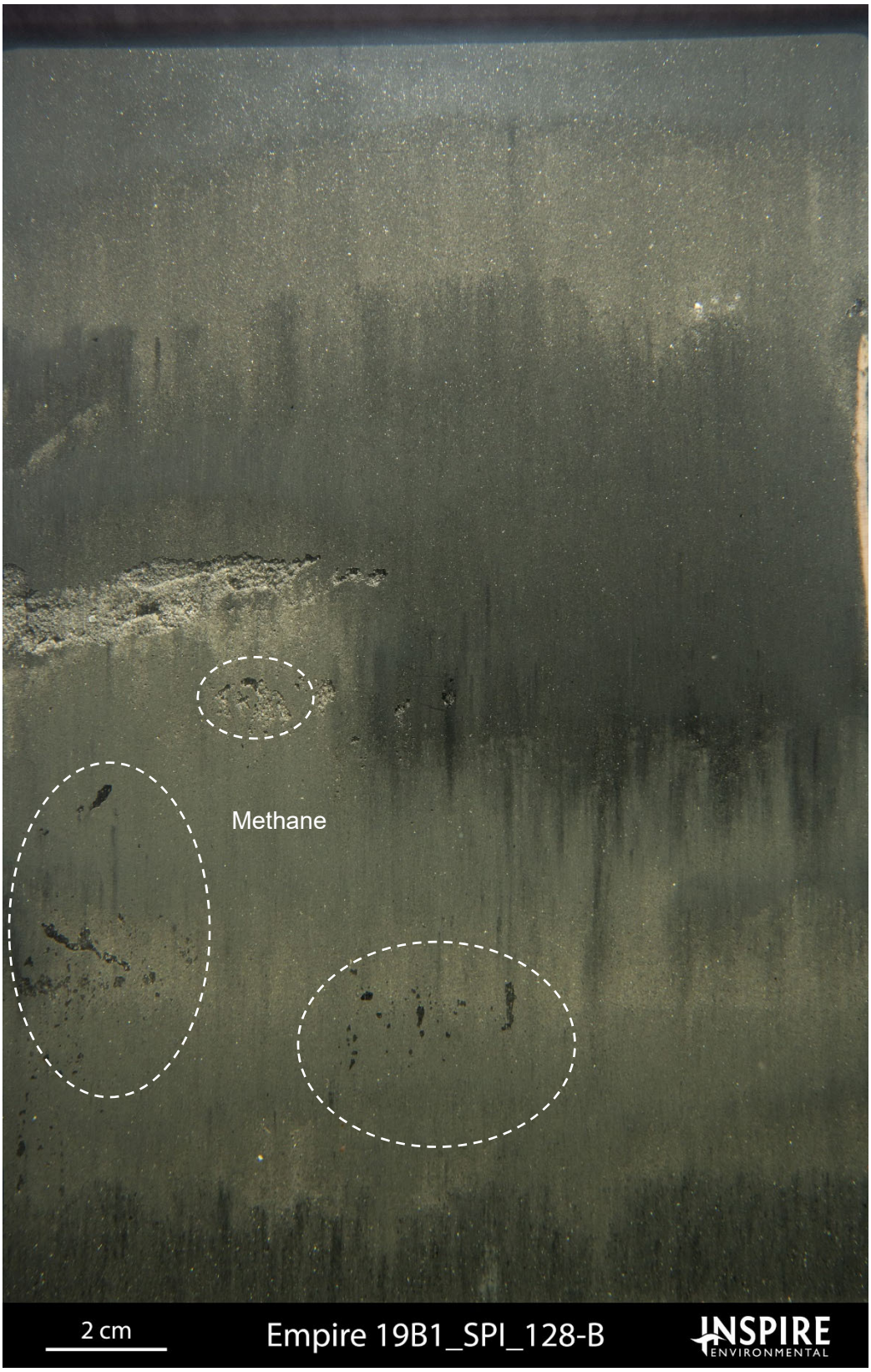


Figure 3-13. Profile image of Station 128 depicting over penetration in silt-clay sediment with low shear strength, and the presence of methane vesicles in the sediment column

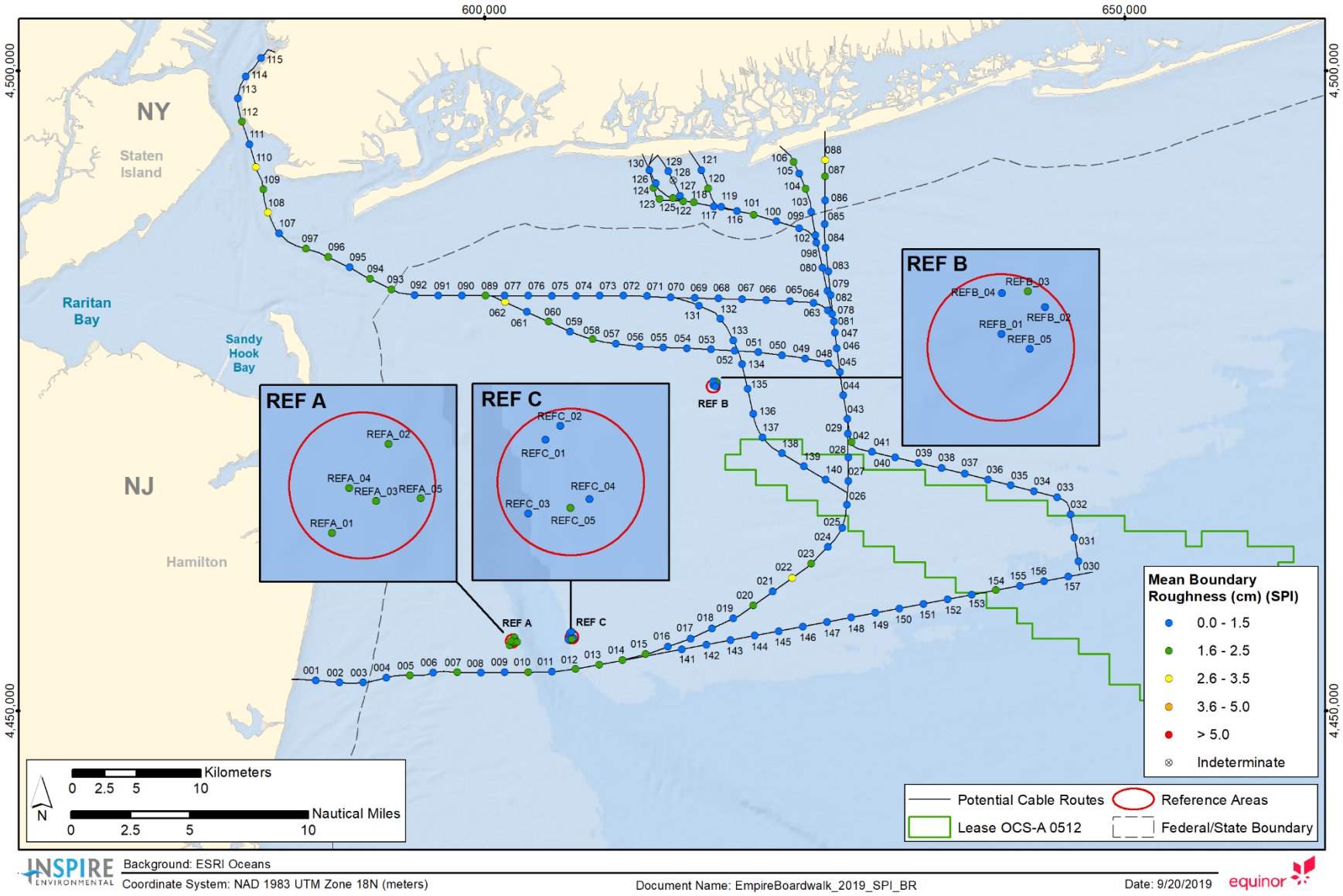


Figure 3-14. Mean station small-scale boundary roughness (cm) at the Equinor Wind survey area

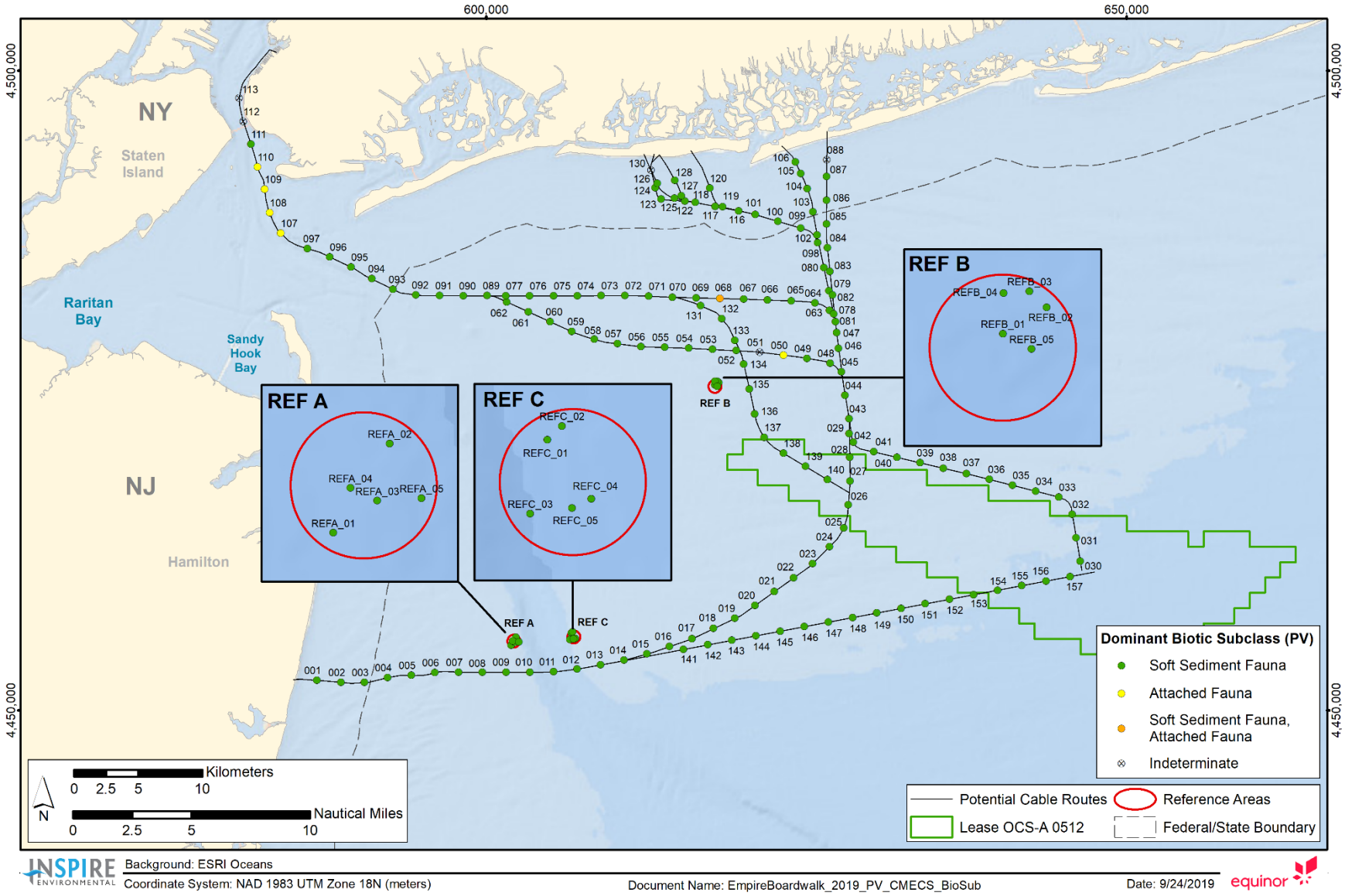
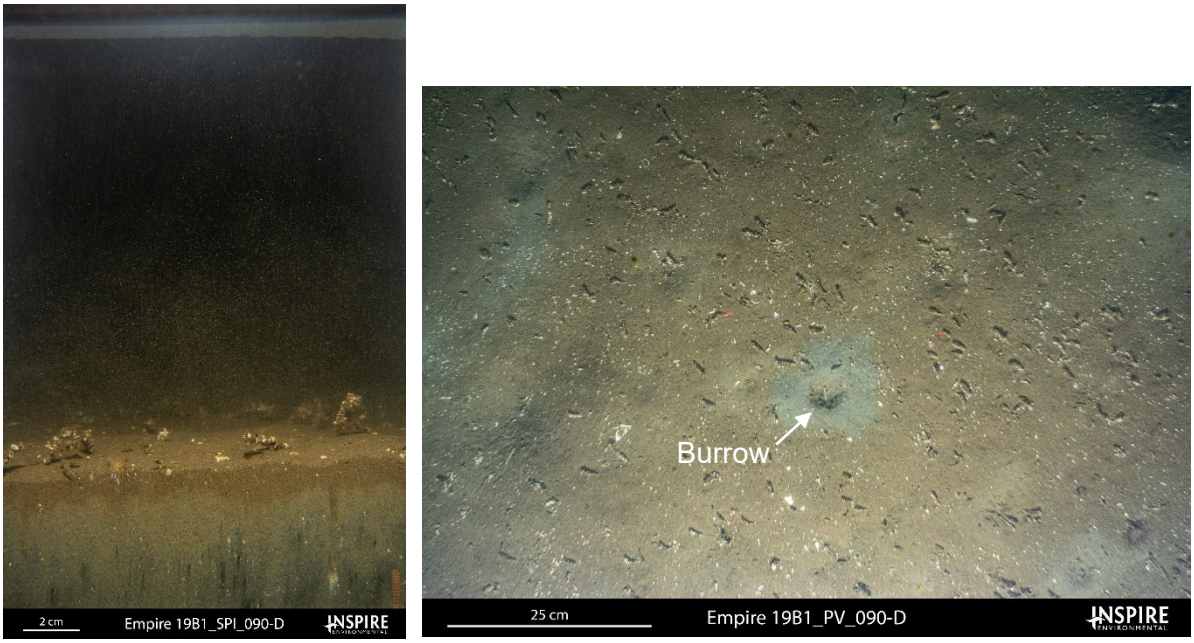


Figure 3-15. Dominant CMECS Biotic Subclass at the Equinor Wind survey area

(A)



(B)

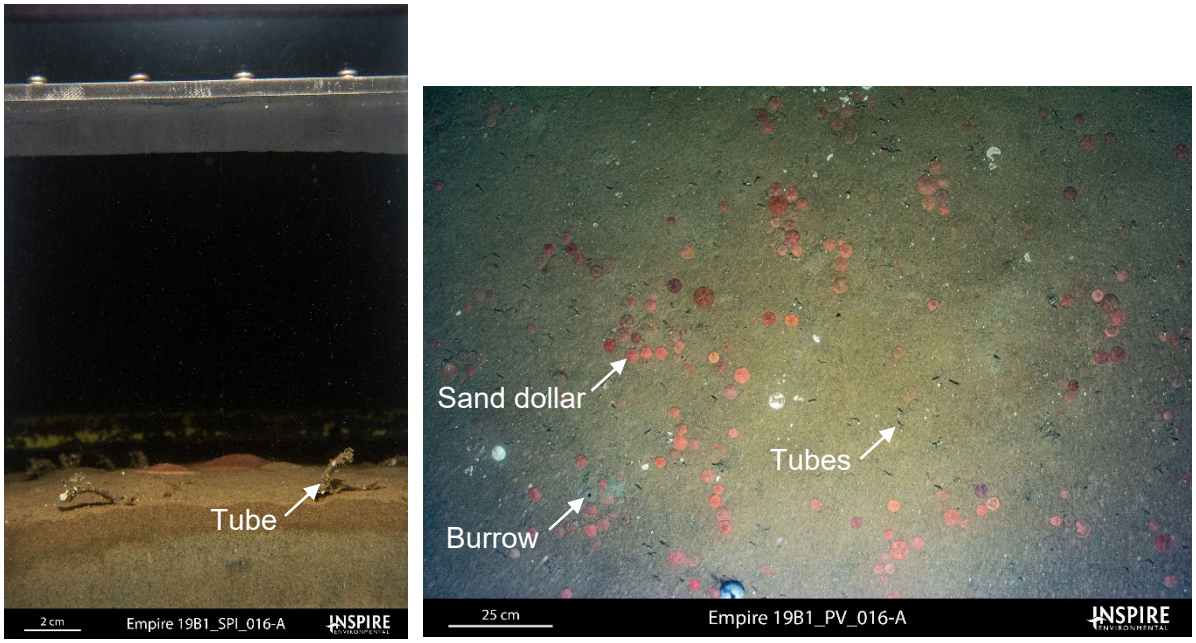


Figure 3-16. Representative SPI and PV images showing evidence of the CMECS Soft Sediment Fauna Biotic Subclass at (A) Station 090 composed of very fine sand depicting tubes and evidence of burrowing at the sediment-water interface; and (B) Station 016 depicting sand dollars, tubes and burrows on the seafloor, fauna driving seafloor boundary roughness

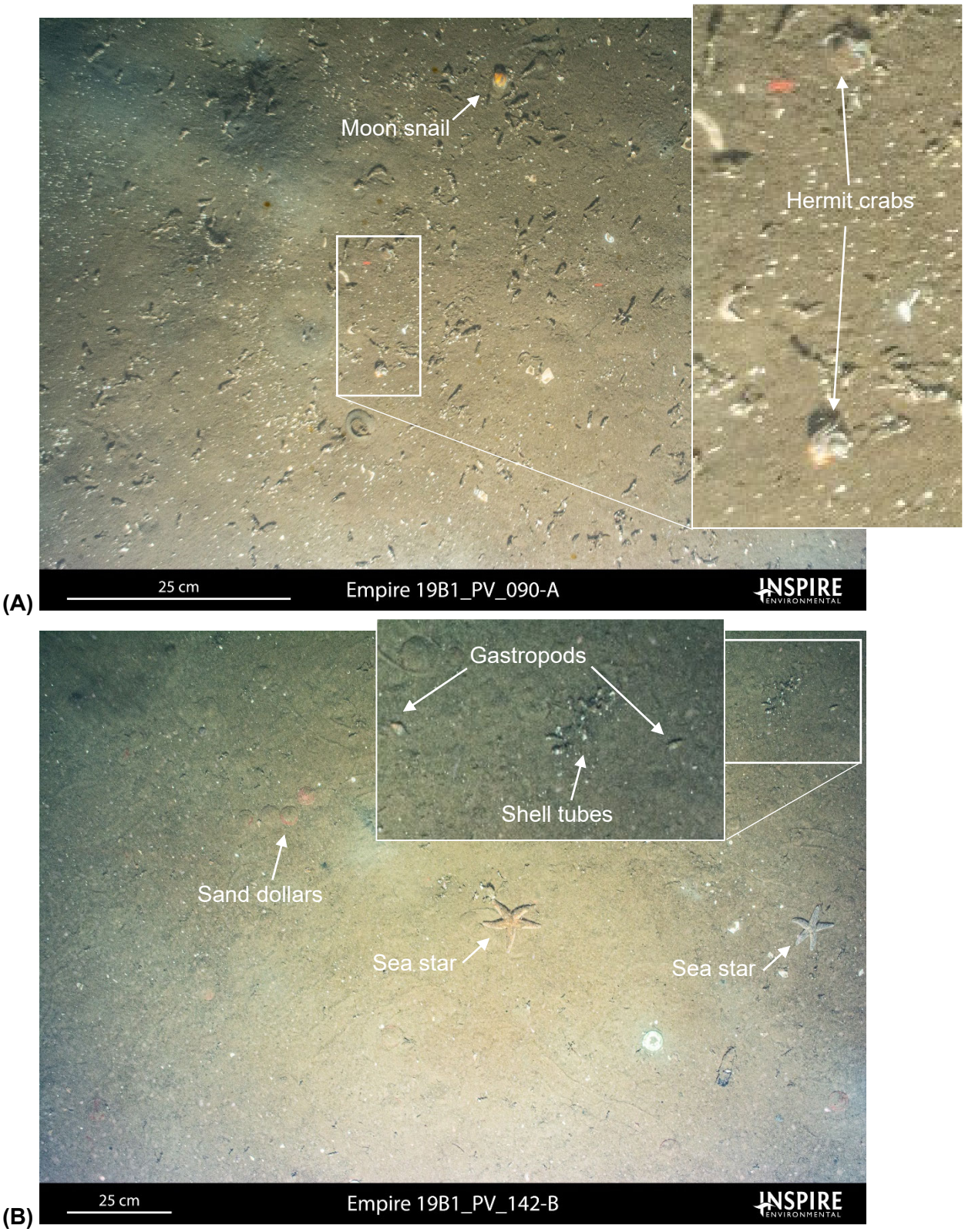


Figure 3-17. Representative PV images depicting epifauna activity on the seafloor at (A) Station 090 with hermit crabs and a moon snail present amongst numerous Diopatra cuprea tubes; and (B) Station 142 with sea stars, gastropods, hermit crabs, and sand dollars present amongst the distinct shell tubes formed by Diopatra cuprea worms.

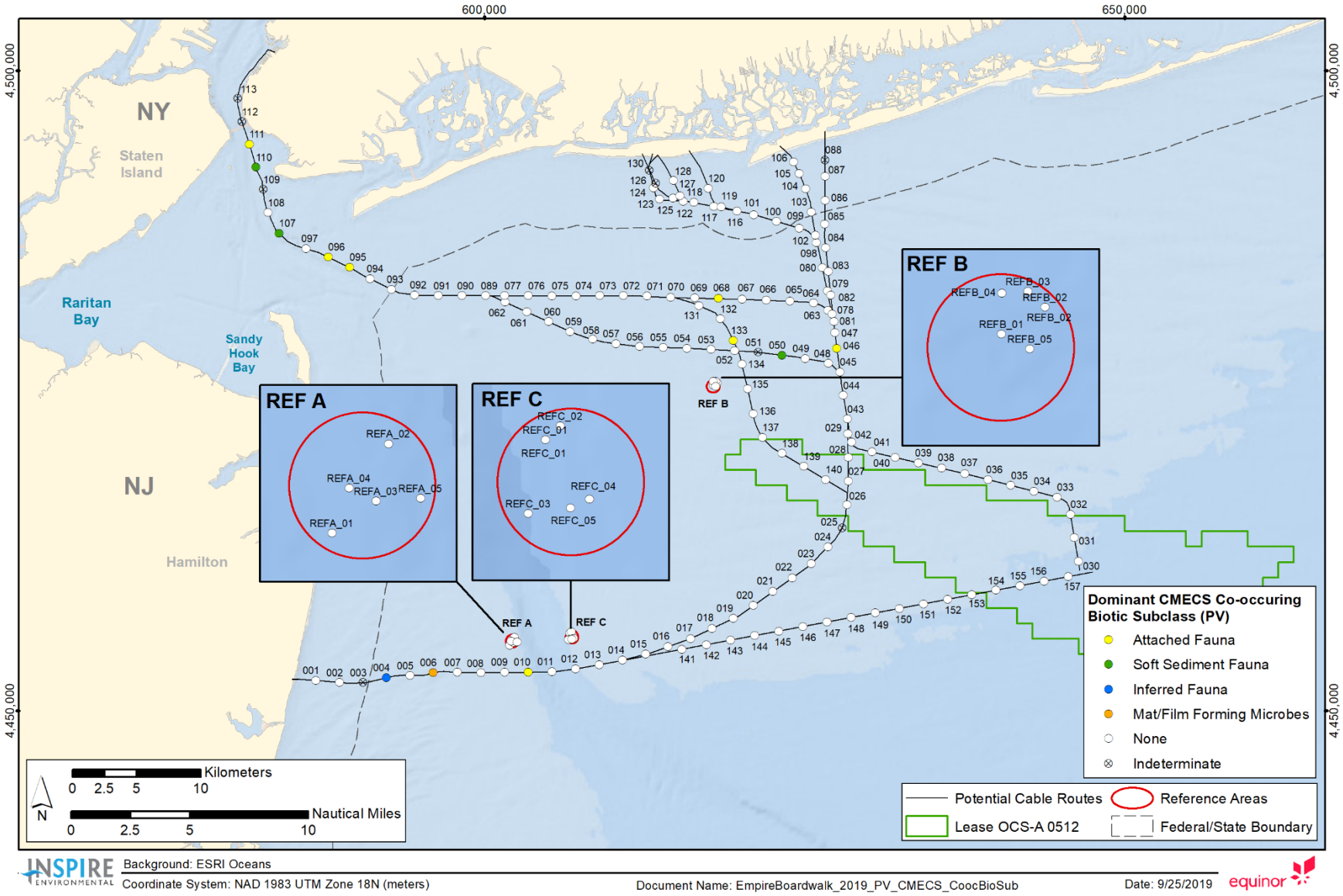


Figure 3-18. Dominant CMECS Co-occurring Biotic Subclass at the Equinor Wind survey area

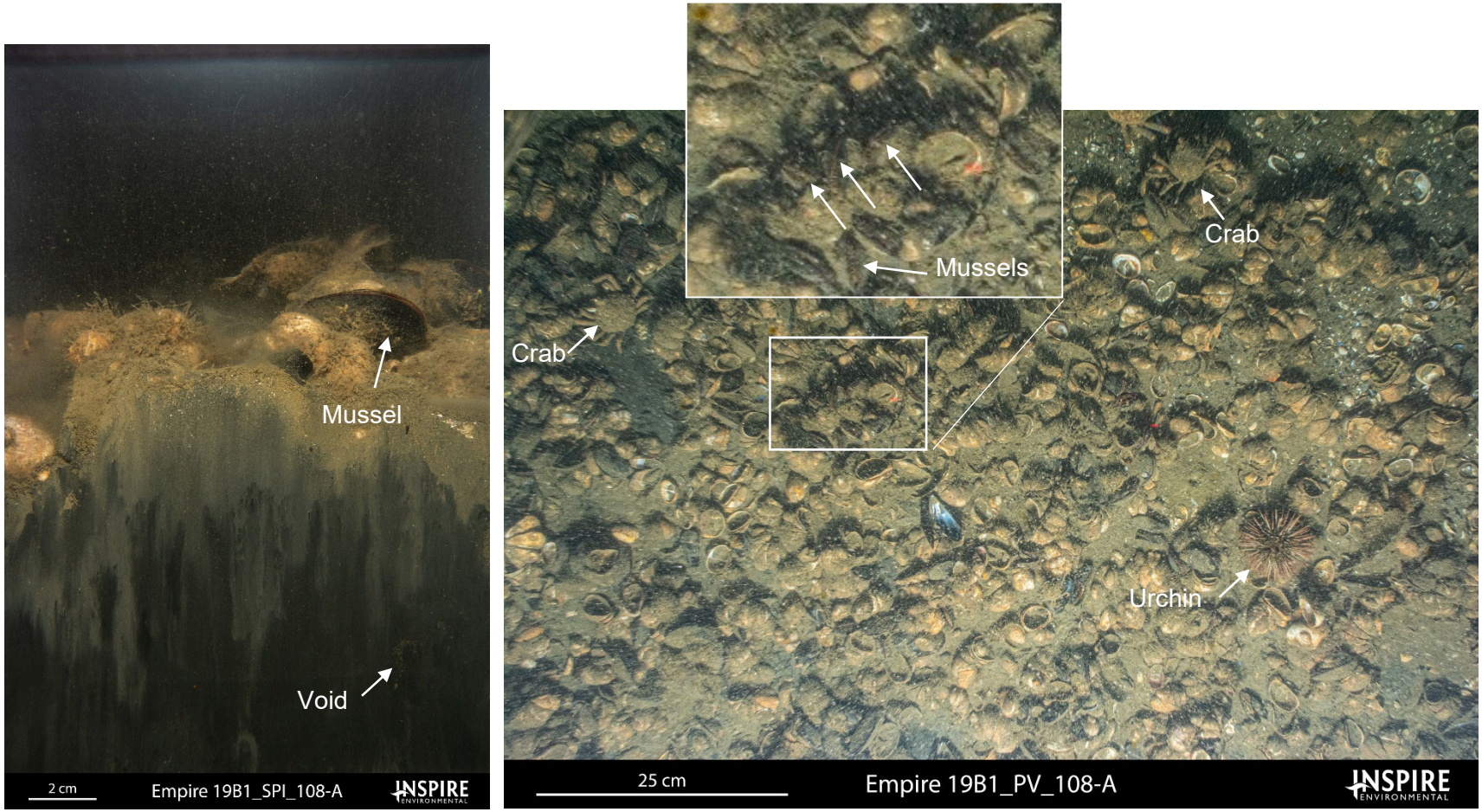
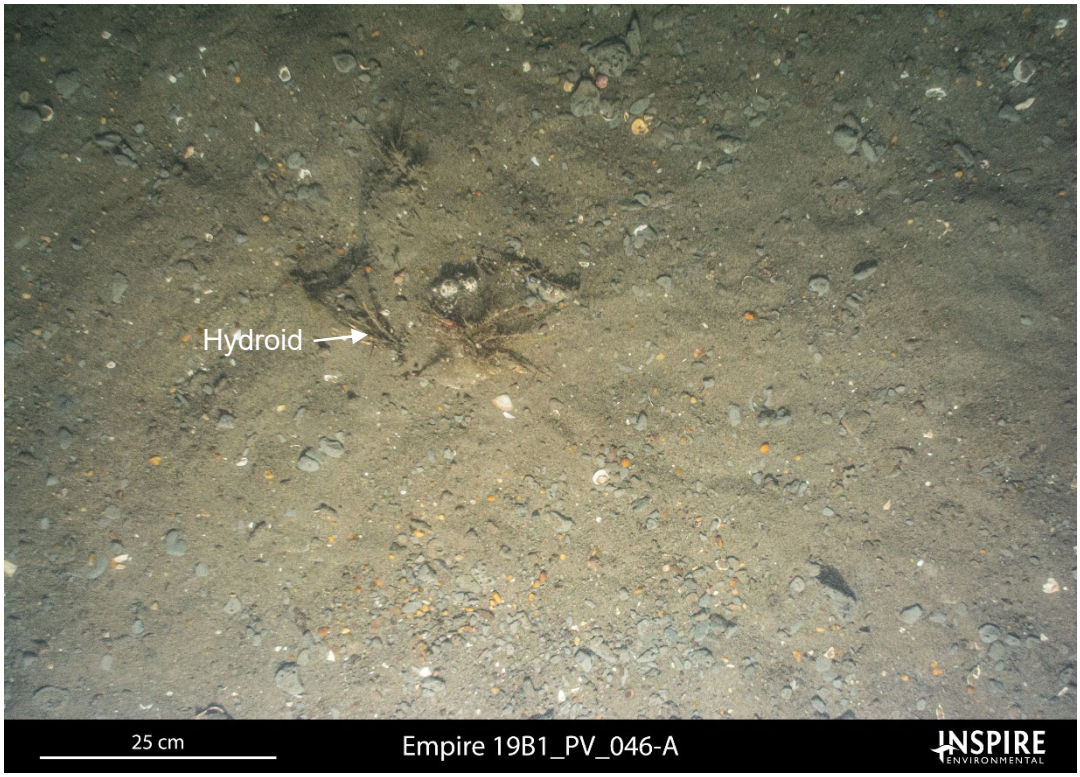
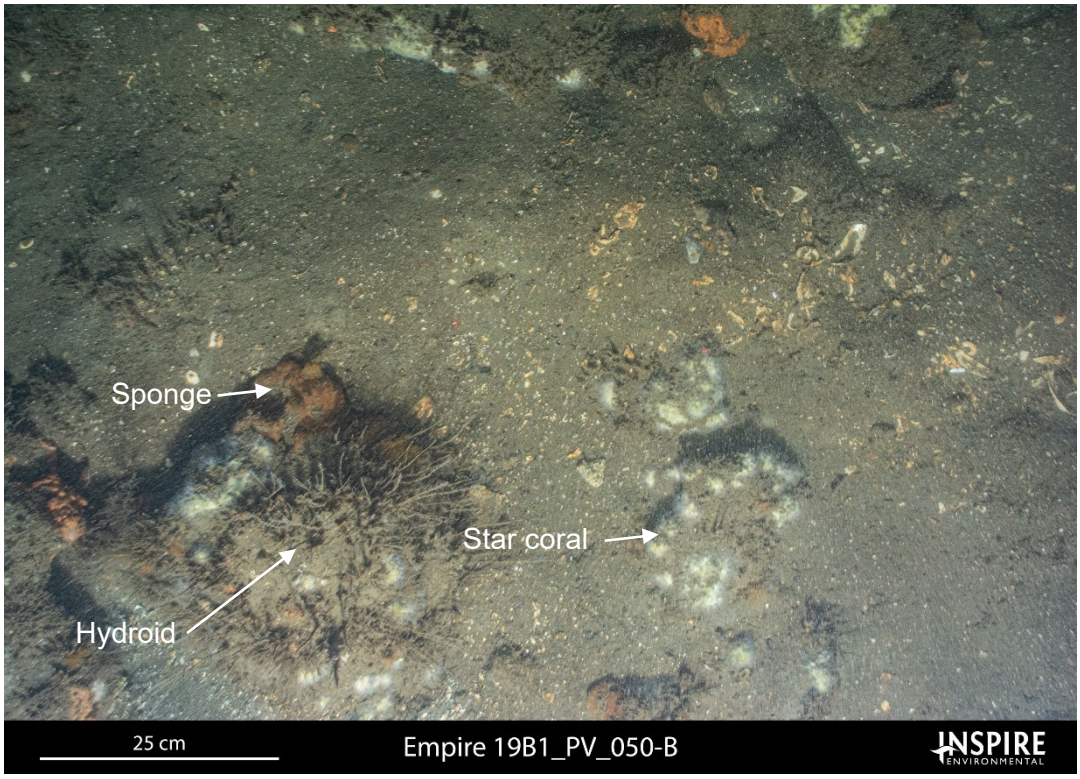


Figure 3-19. Representative SPI and PV images at Station 108 composed of silt-clay with dense mussel bed coverage on the seafloor and crabs, urchins and other interstitial fauna. Infilled feeding void from Stage 3 fauna visible in profile image.



(A)



(B)

Figure 3-20. Representative PV images showing attached fauna at (A) Station 046 with the presence of hydroids; and (B) Station 050 with the presence of hydroids, sponges, and the star coral Astrangia spp., which is defined as sensitive taxa

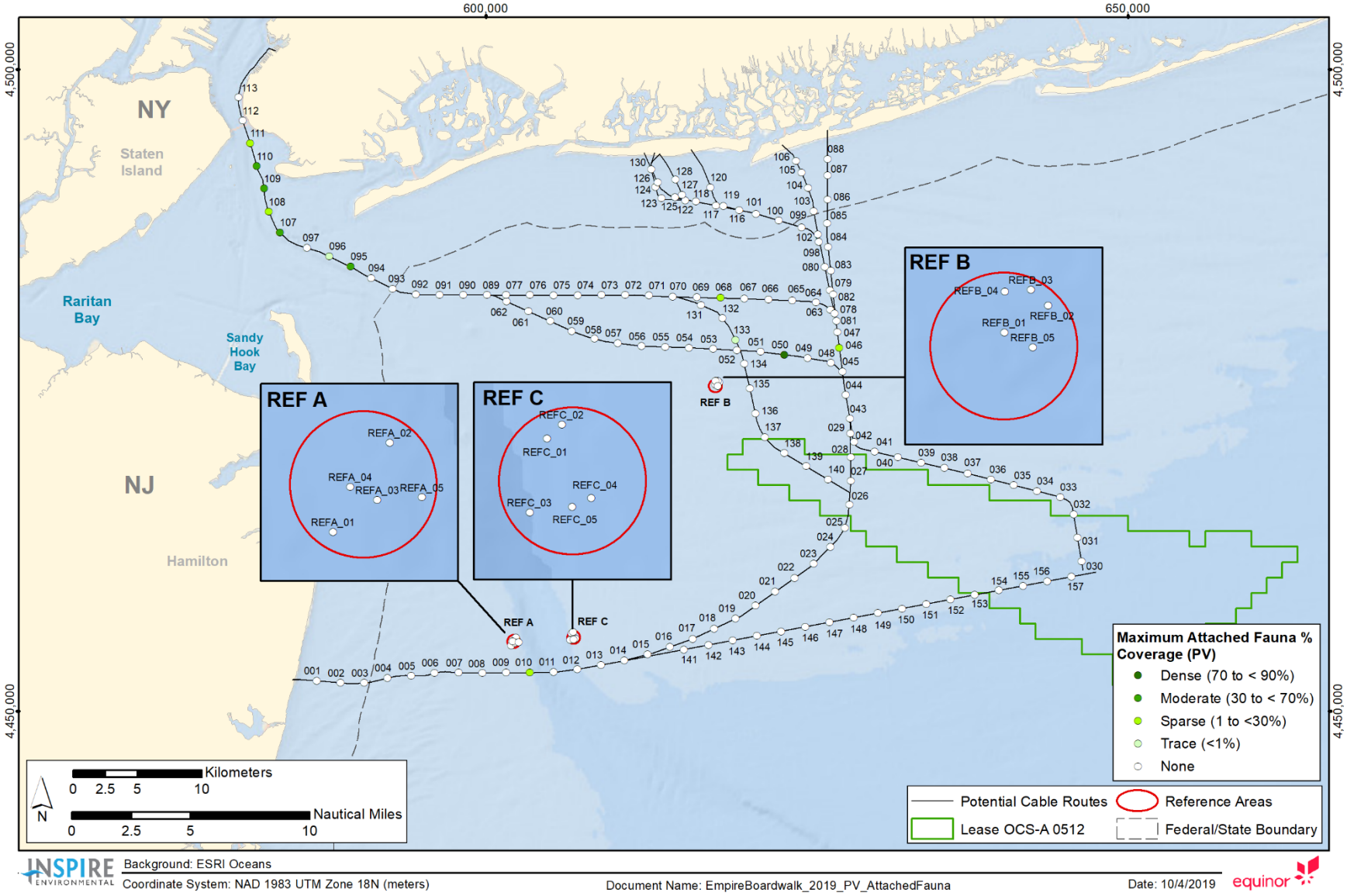


Figure 3-21. Maximum Attached Fauna Percent Cover (CMES Percent Cover Modifier) at the Equinor Wind survey area

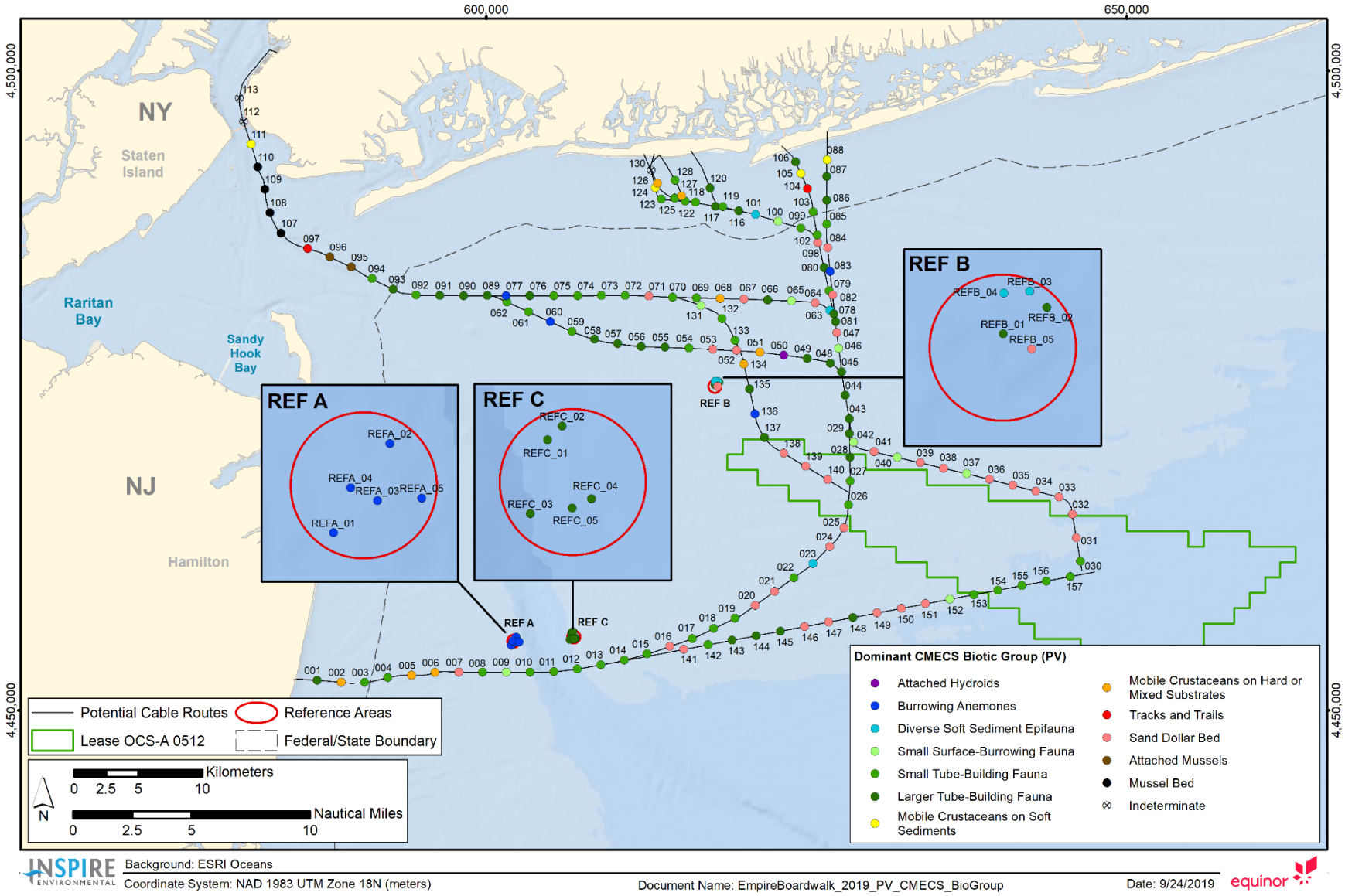
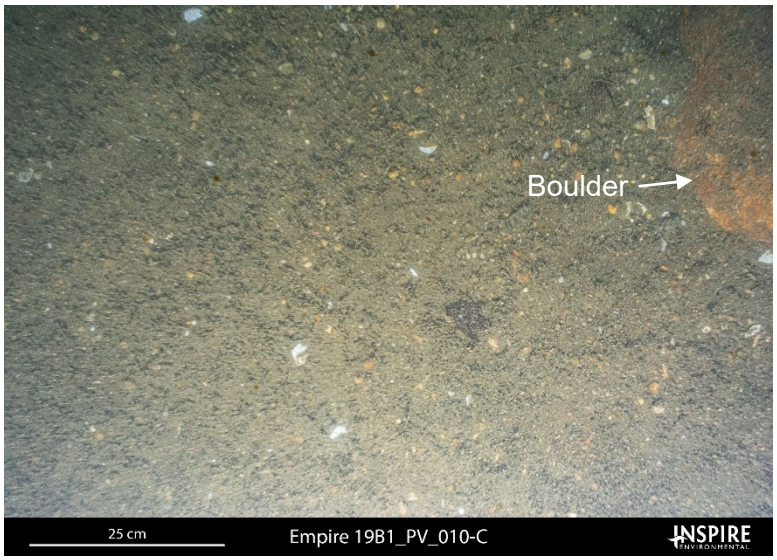


Figure 3-22. Dominant CMECS Biotic Group at the Equinor Wind survey area

(A)



(B)

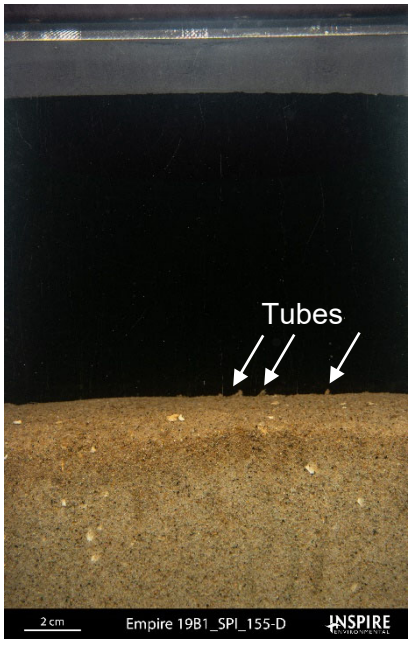


Figure 3-23. Representative SPI and PV images where the CMECS Biotic Group, Small Tube-Building Fauna, was observed at (A) Station 010 composed of fine sand over silt-clay with a boulder present; and (B) Station 155 composed of fine sand with small-tubes present at the sediment–water interface

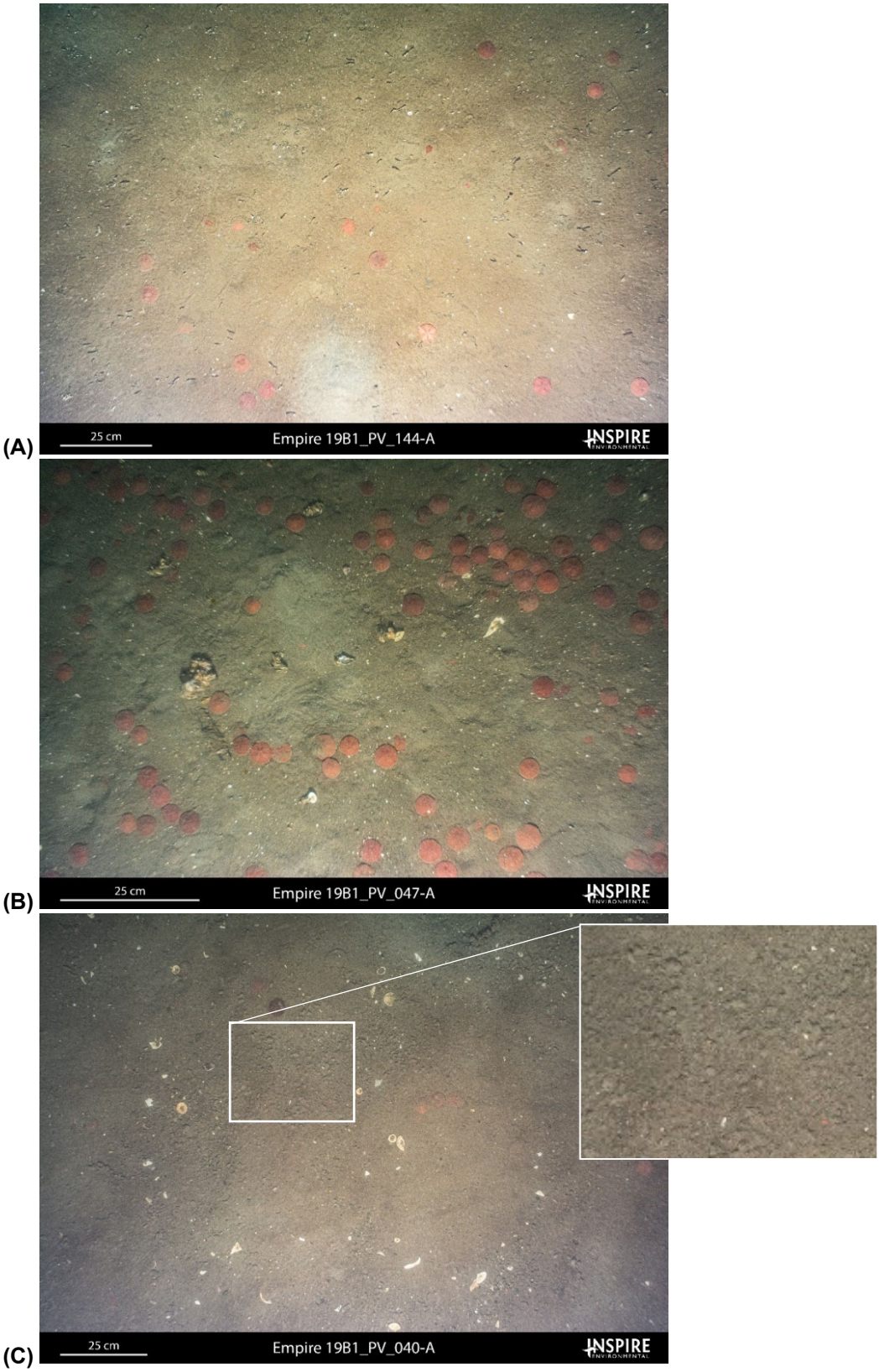


Figure 3-24. Representative PV images where the following CMECS Biotic Groups were observed: (A) Larger Tube- Building Fauna; (B) Sand Dollar Beds; (C) Small Surface-Burrowing Fauna; and (D) Mussel Beds (E) Burrowing Anemones

(D)

(E)

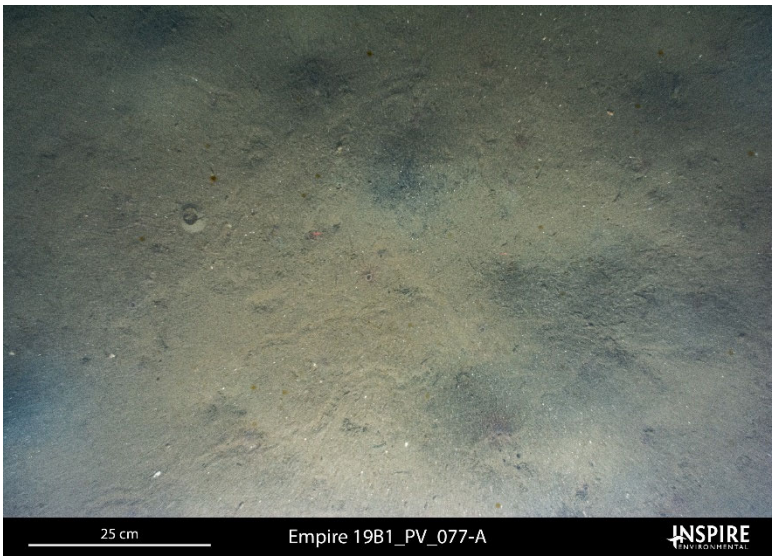
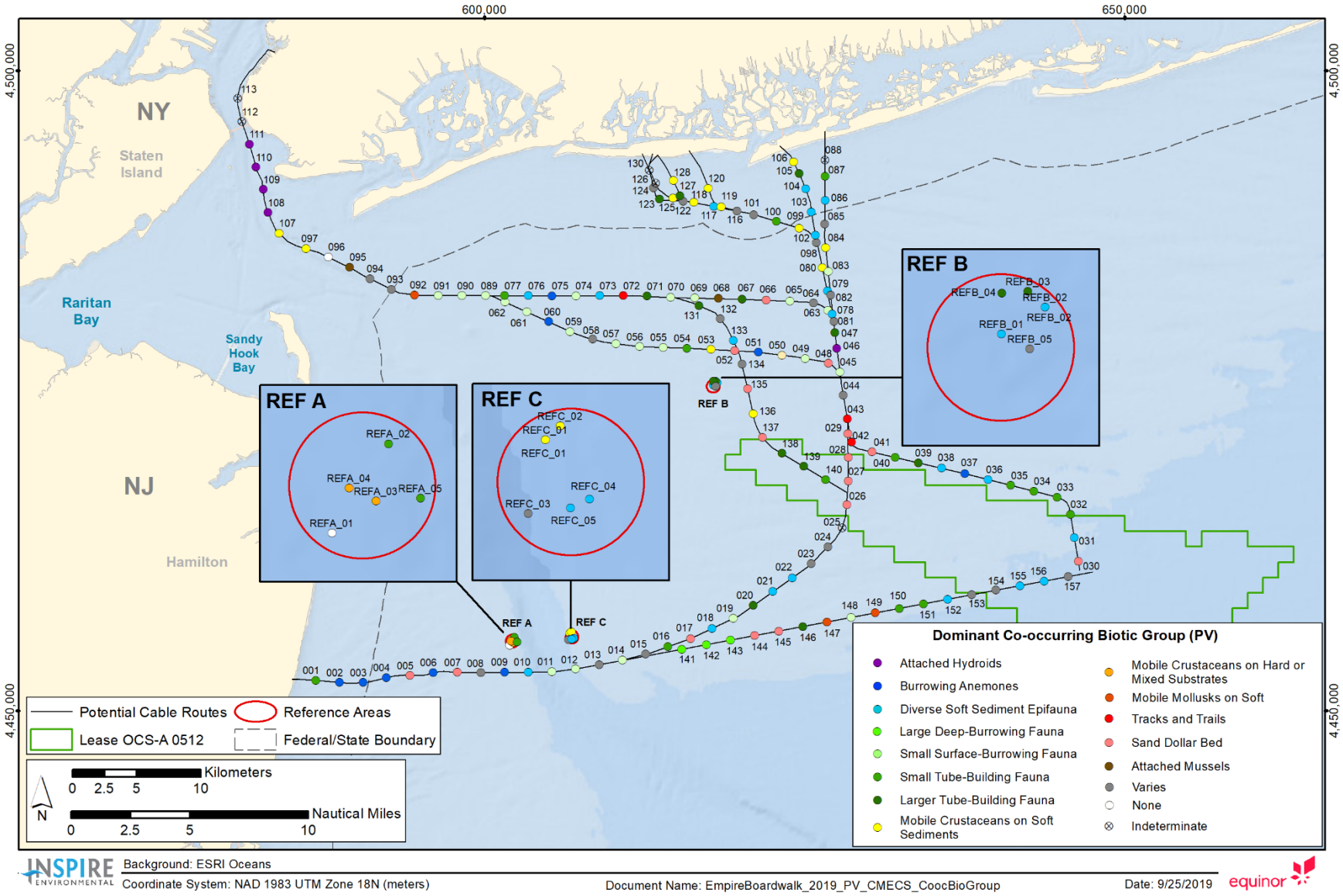


Figure 3-24. continued ***Representative PV images where the following CMECS Biotic Groups were observed: (A) Larger Tube- Building Fauna; (B) Sand Dollar Beds; (C) Small Surface-Burrowing Fauna; and (D) Mussel Beds (E) Burrowing Anemones***



Background: ESRI Oceans
Coordinate System: NAD 1983 UTM Zone 18N (meters)
Document Name: EmpireBoardwalk_2019_PV_CMECS_CoocBioGroup
Date: 9/25/2019

Figure 3-25. Dominant CMECS Co-occurring Biotic Group at the Equinor Wind survey area

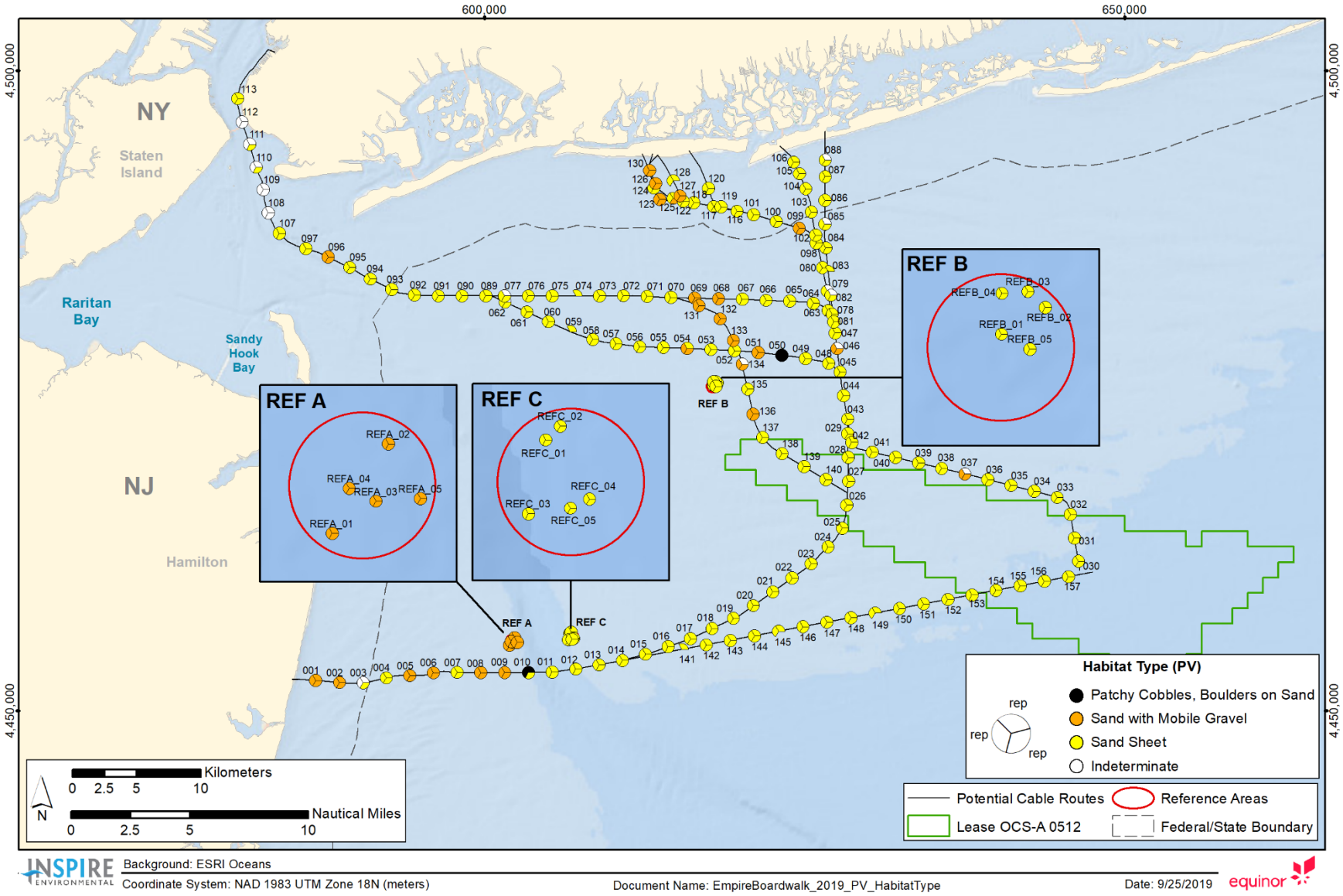


Figure 3-26. Habitat Type at the Equinor Wind survey area

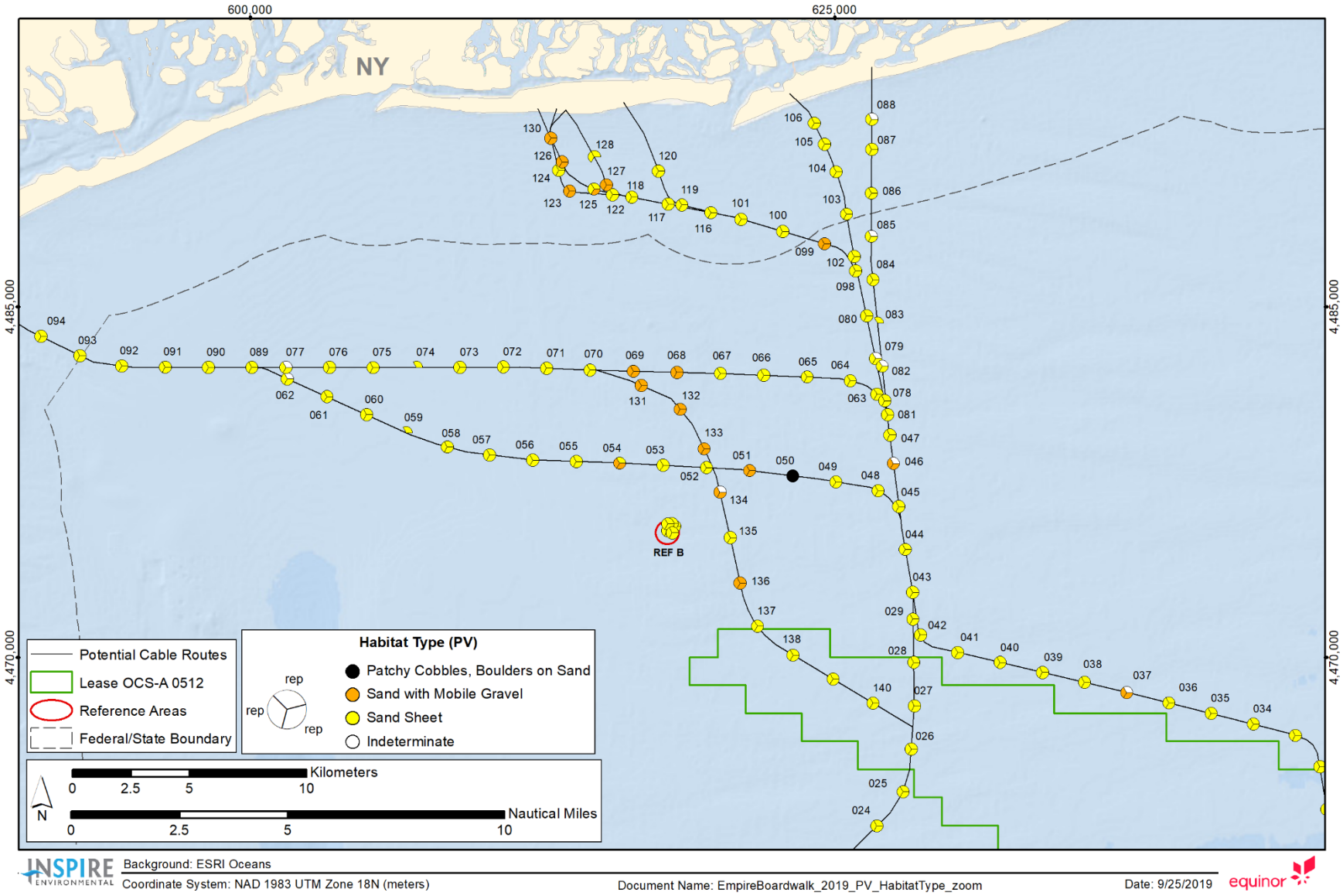


Figure 3-27. Zoom-in of the Long Island export cable route showing Habitat Type

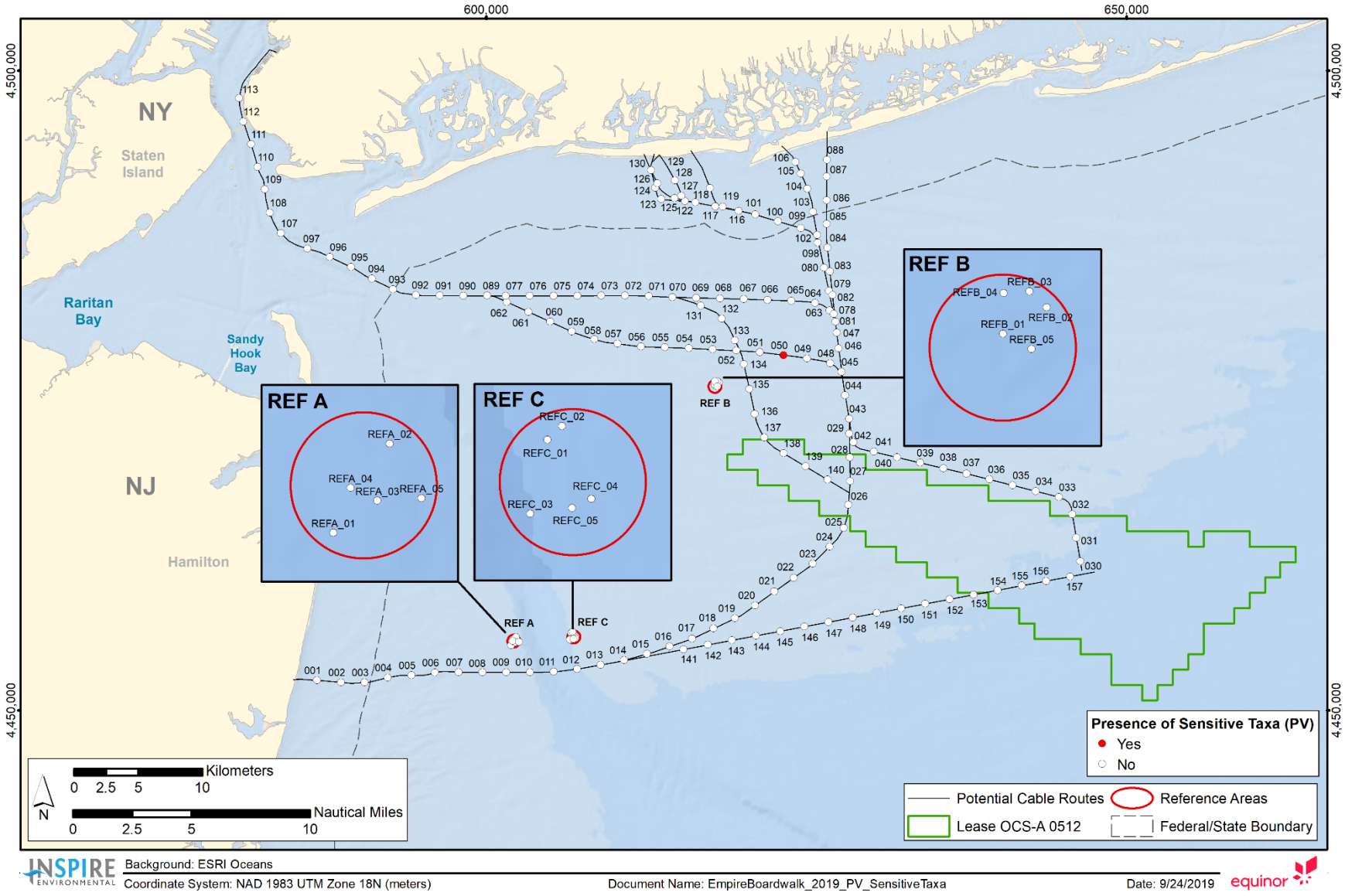


Figure 3-28. Sensitive Taxa Present at the Equinor Wind survey area

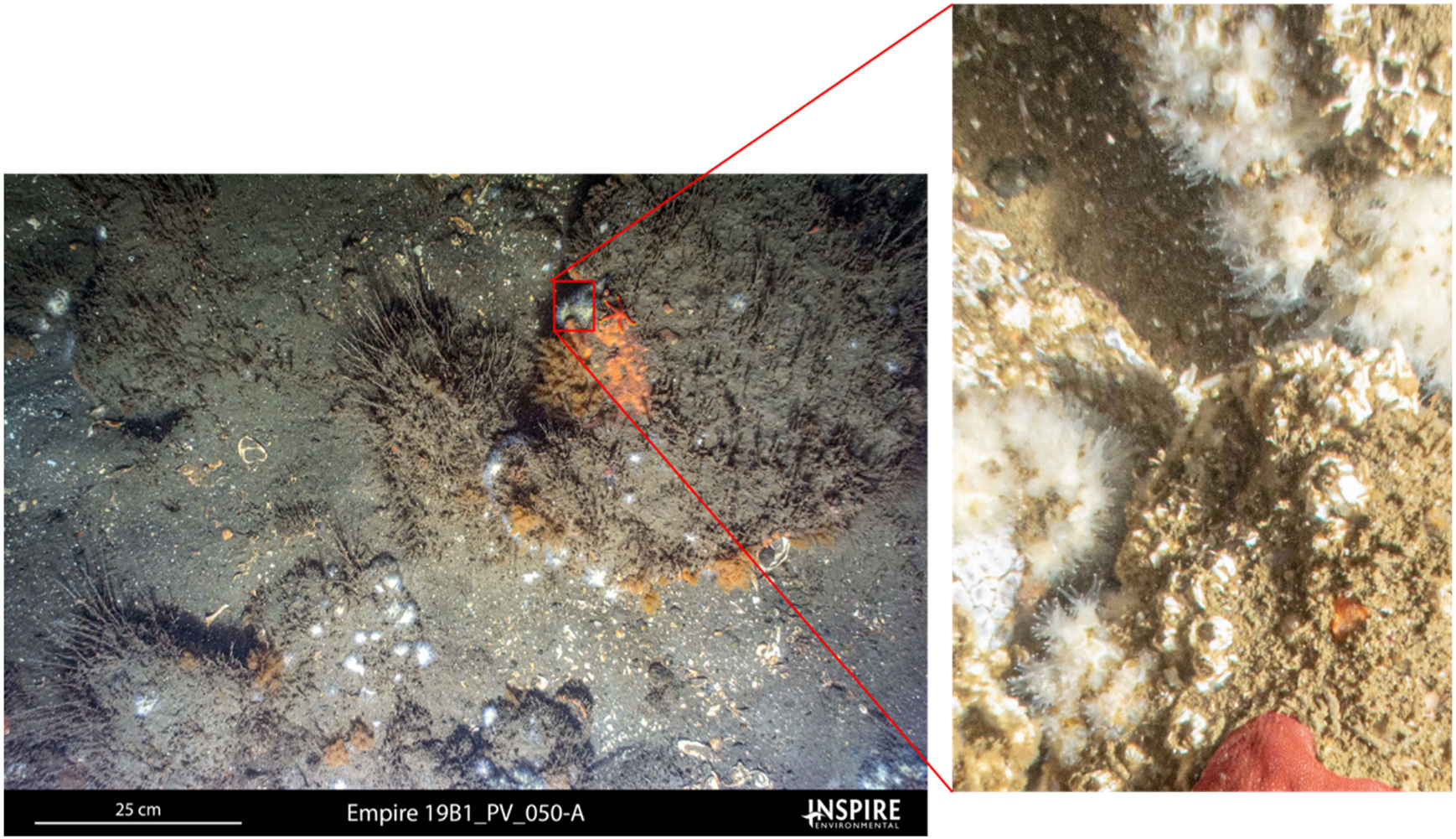


Figure 3-29. Station 050-A depicting a bottom with preferential habitat for attached fauna. The stony coral, Astrangia spp. (see inset), is visible as small white tufts on the cobble and boulders. This species is documented as sensitive taxa.

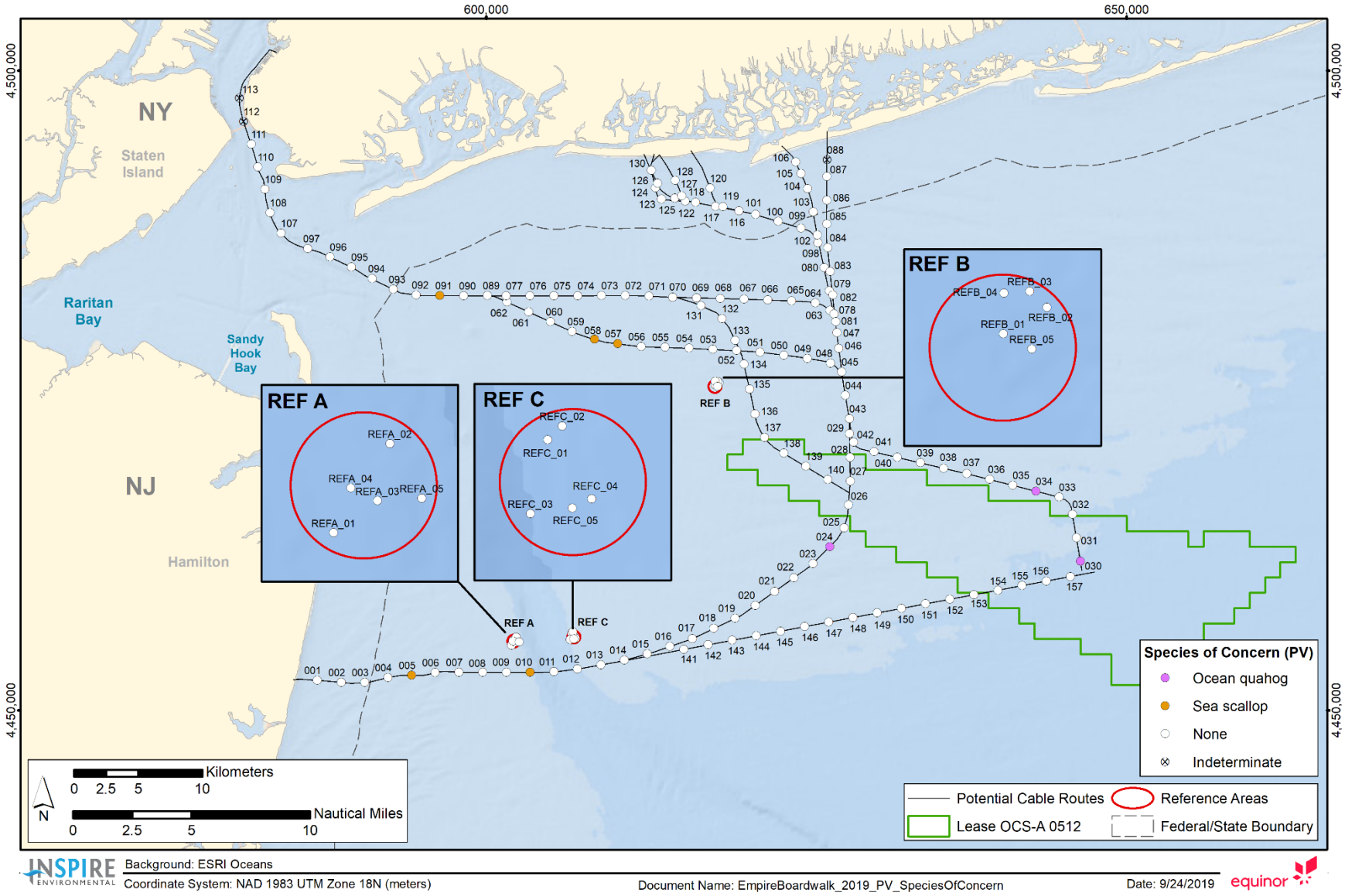
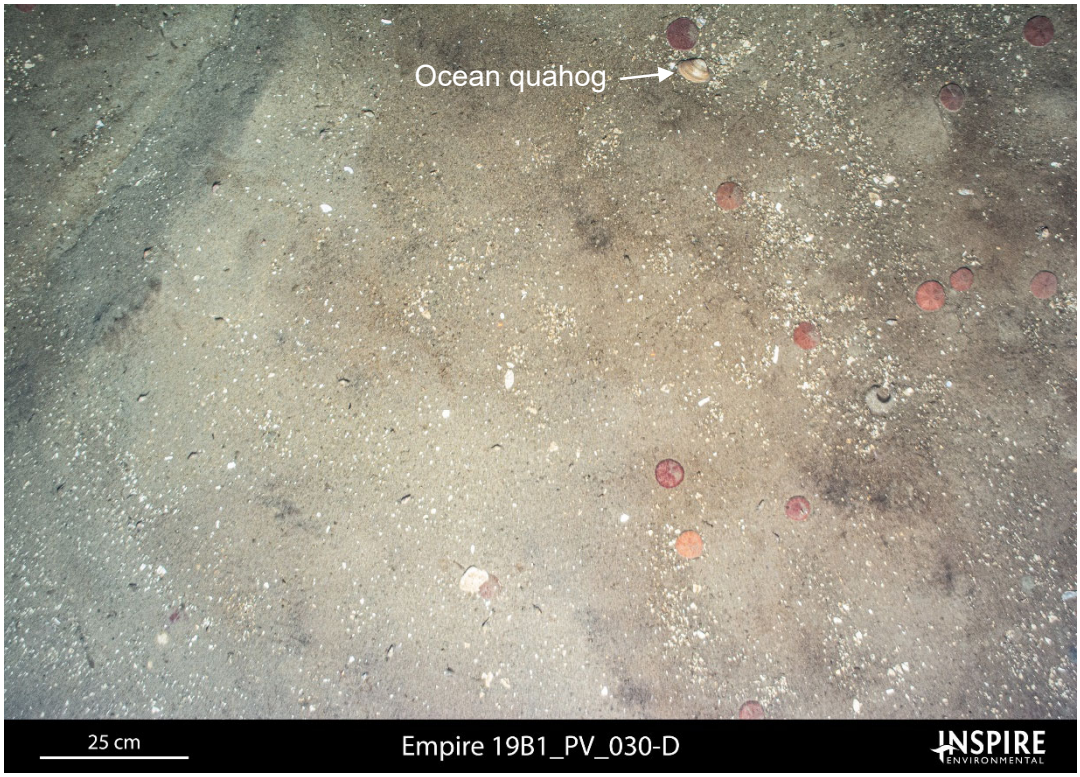


Figure 3-30. Species of Concern Type at the Equinor Wind survey area



(A)

(B)

Figure 3-31. Examples of species of concern present at the Equinor Wind survey area at (A) Station 030 composed of mobile sand with an ocean quahog present surrounded by small-tube building fauna; and (B) Station 010 with a sea scallop present

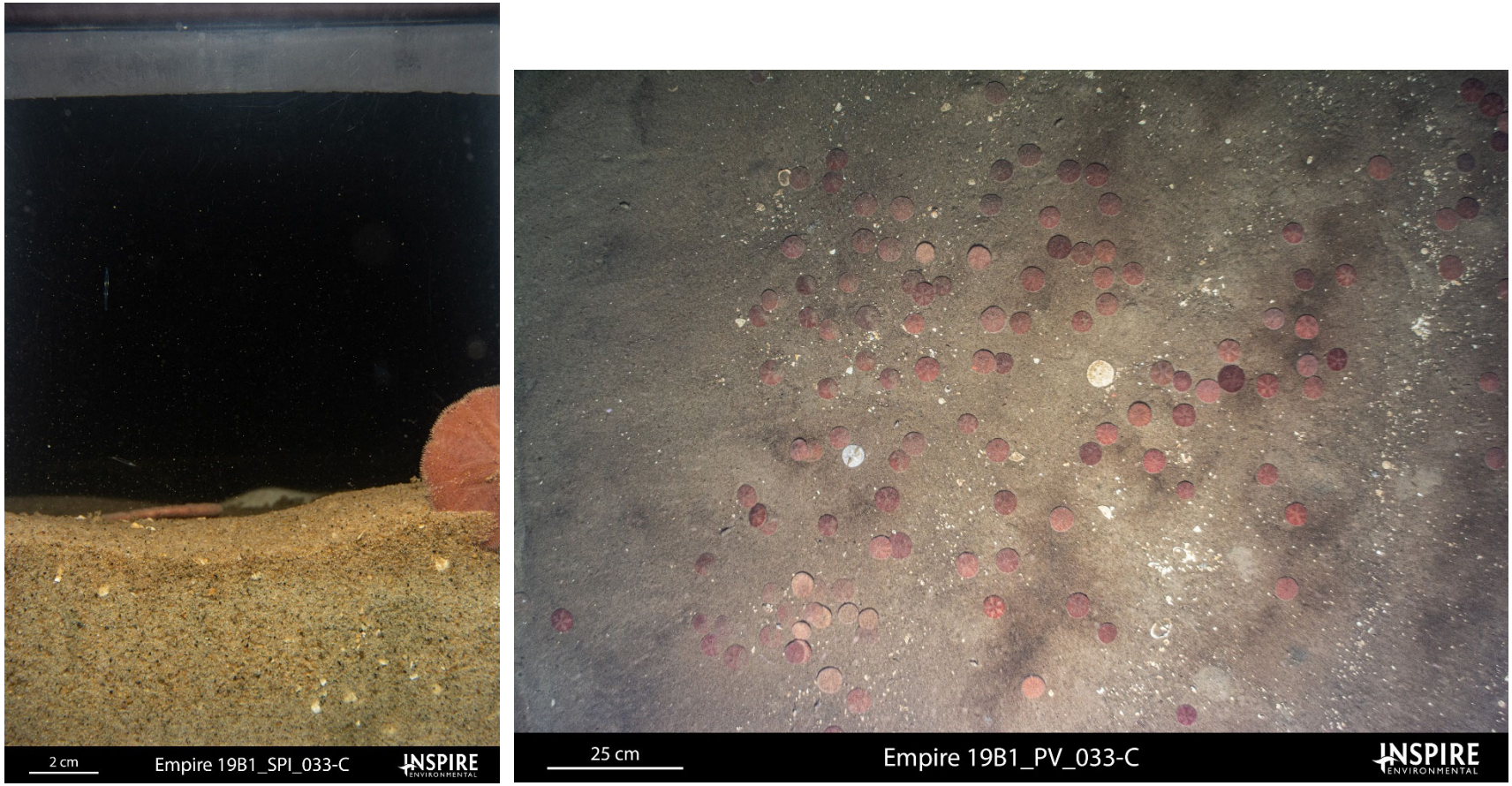
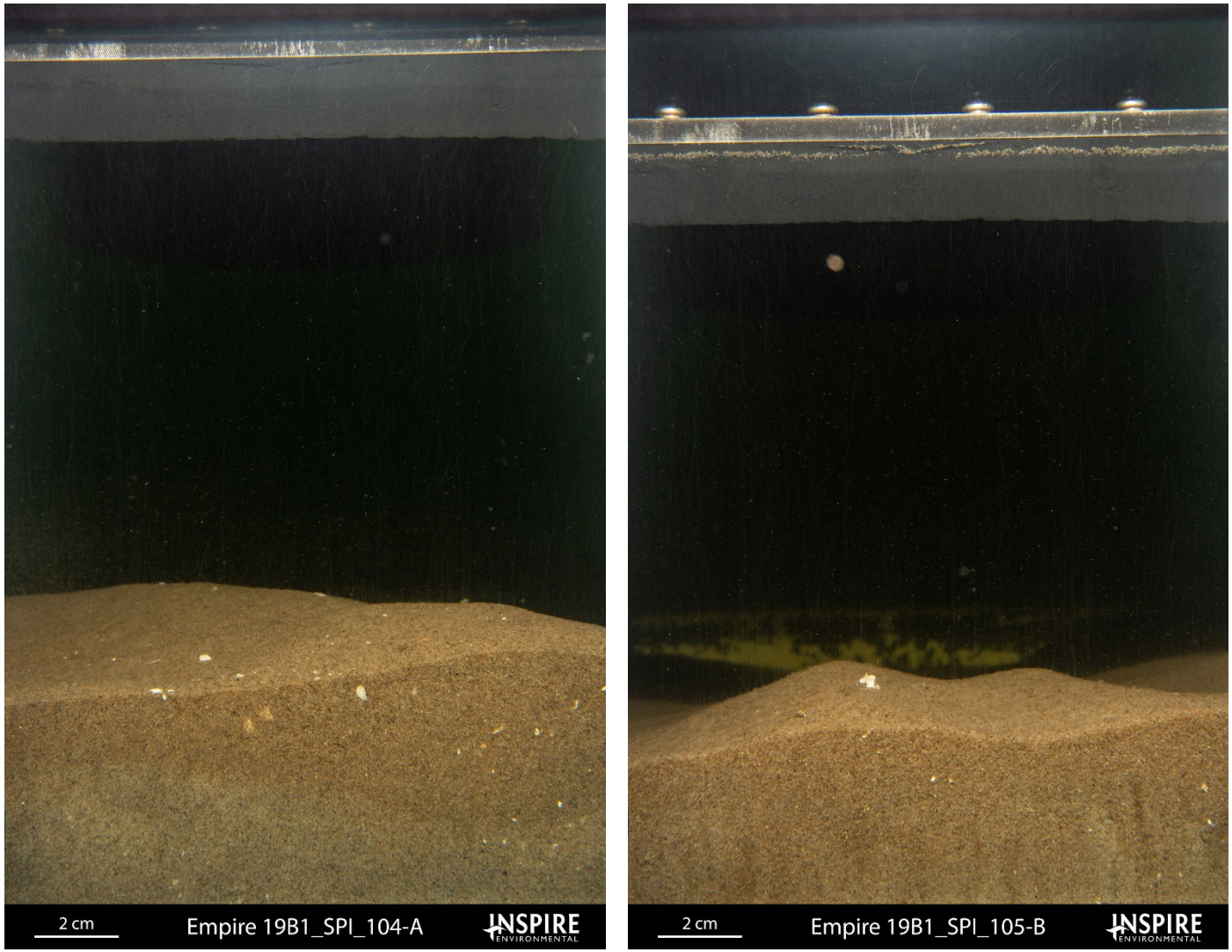
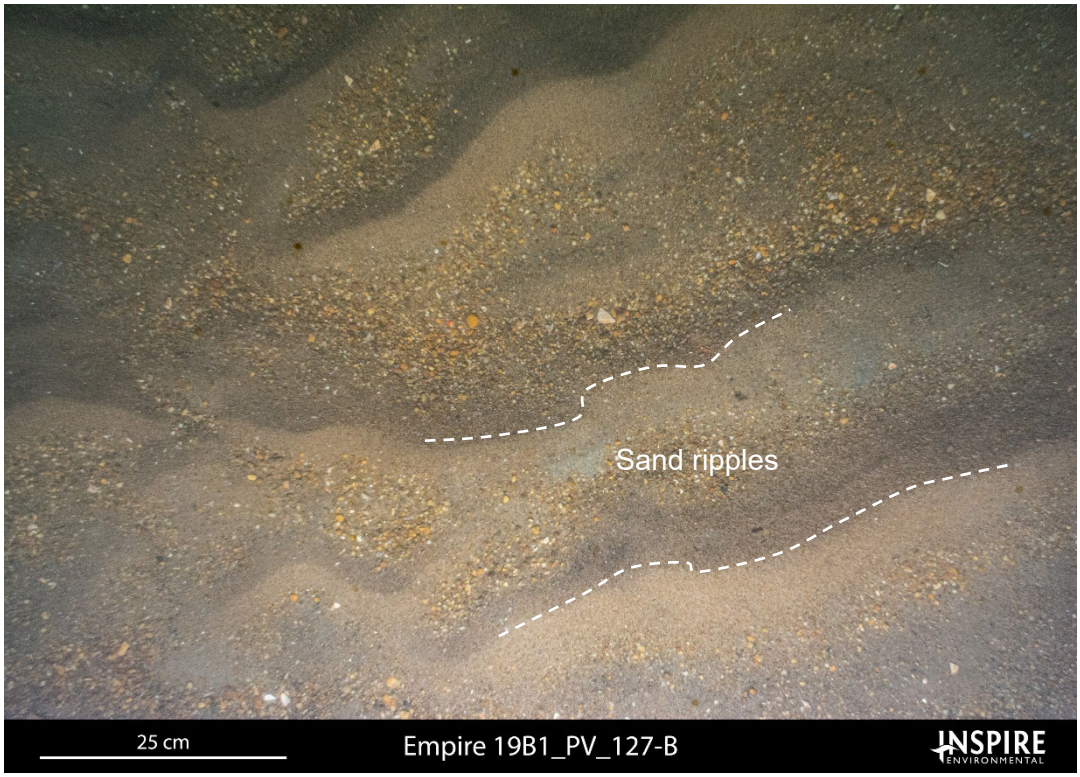


Figure 3-32. Representative SPI and PV images showing an area composed of medium sand with a seafloor covered in sand dollars

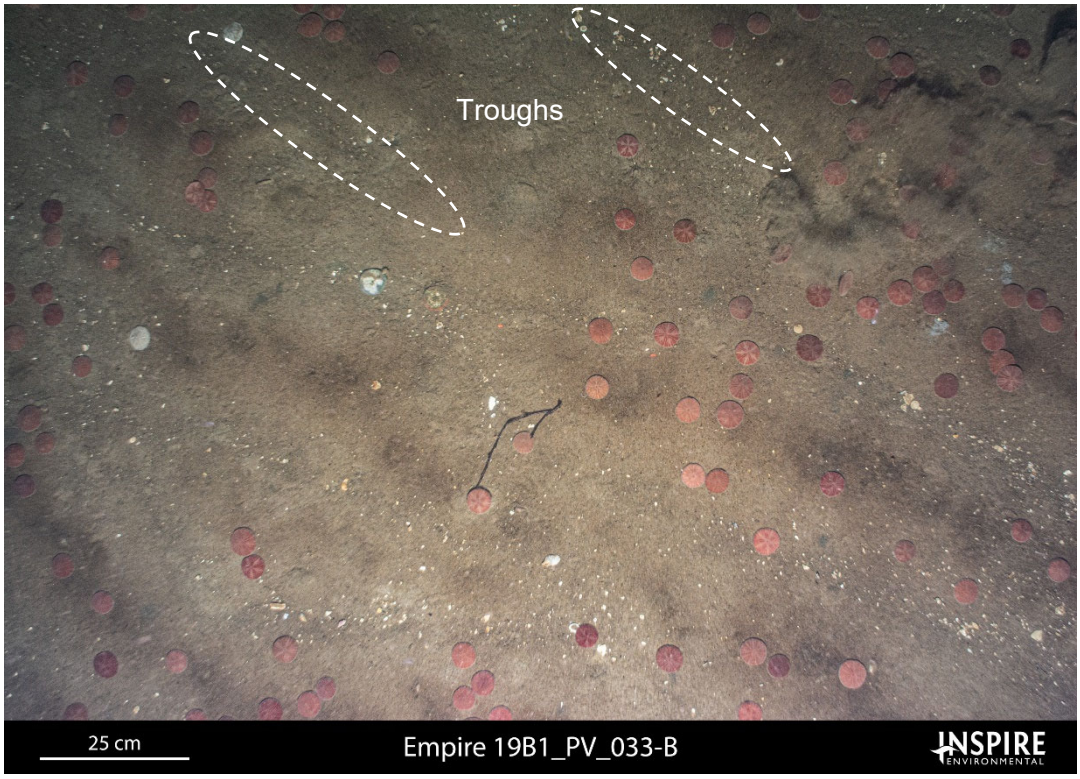


(A) **(B)**

Figure 3-33. Representative SPI images from (A) Station 104 composed of very fine sand; and (B) Station 105 composed of fine sand



(A)



(B)

Figure 3-34. Representative PV images depicting (A) pronounced sand ripples at Station 126; and (B) less-defined sand ripples at Station 033. In each image larger grains have settled into the trough of the sand ripples.

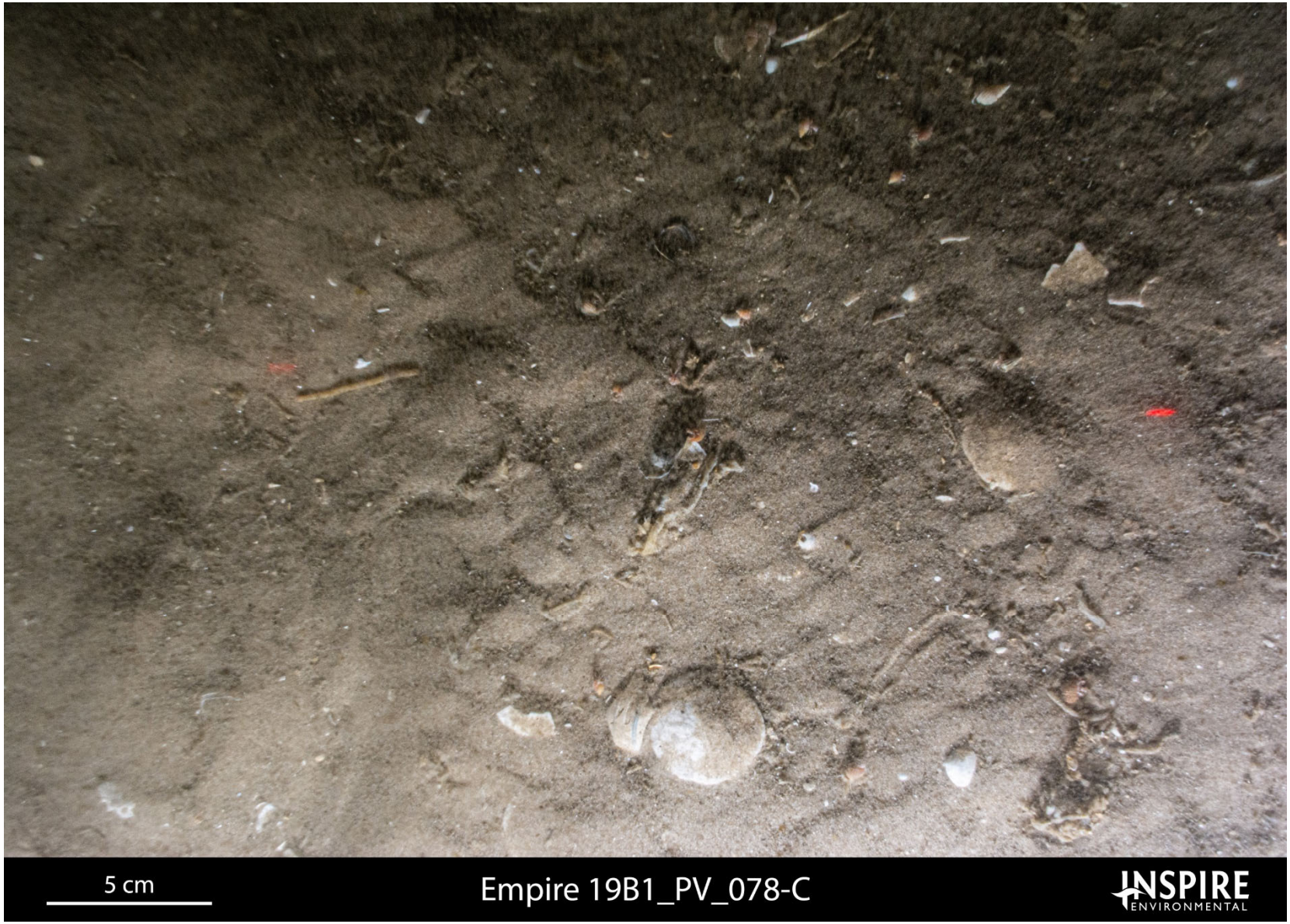


Figure 3-35. Plan view image from Station 078 with numerous small tubes on the seafloor

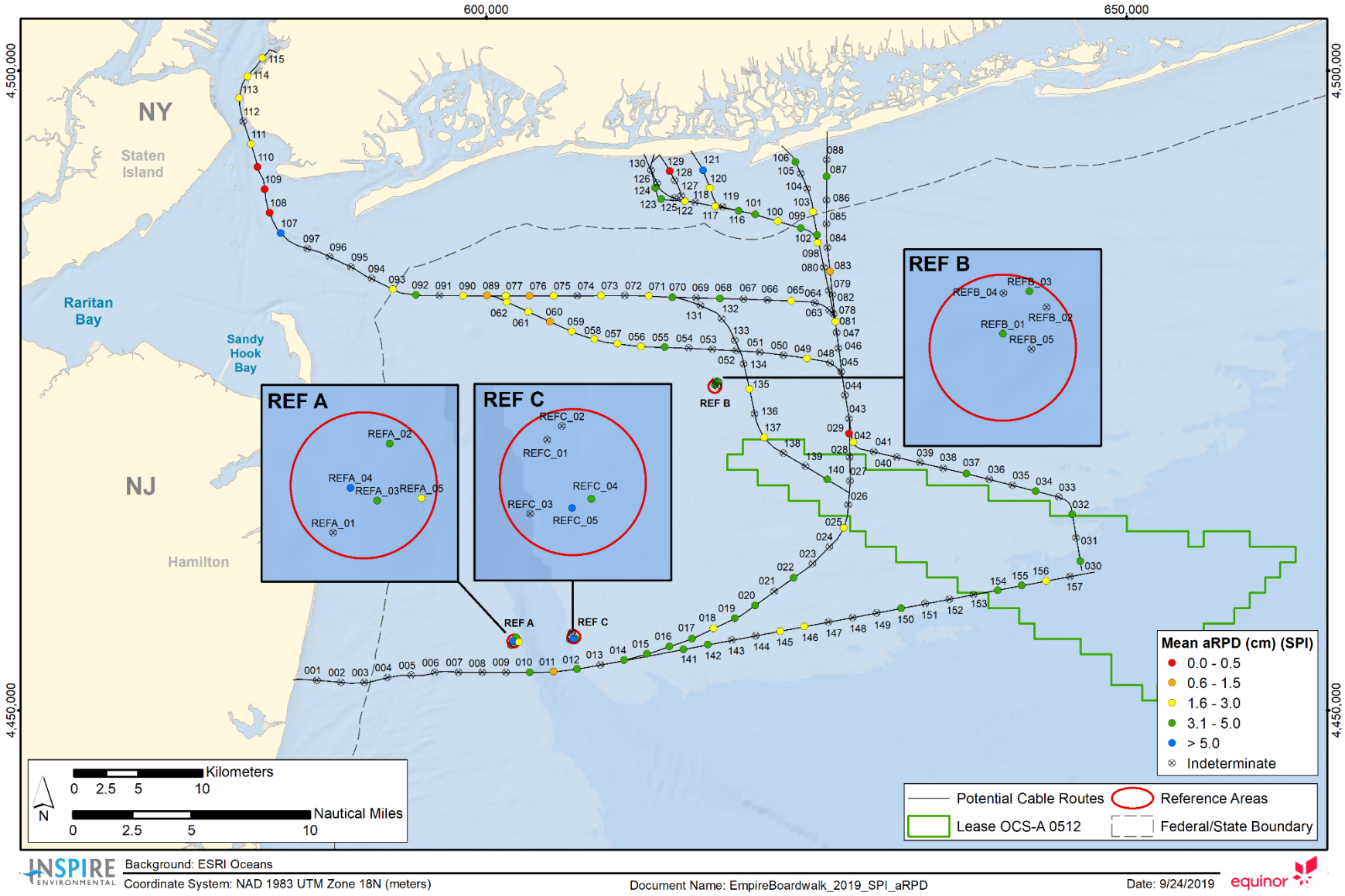
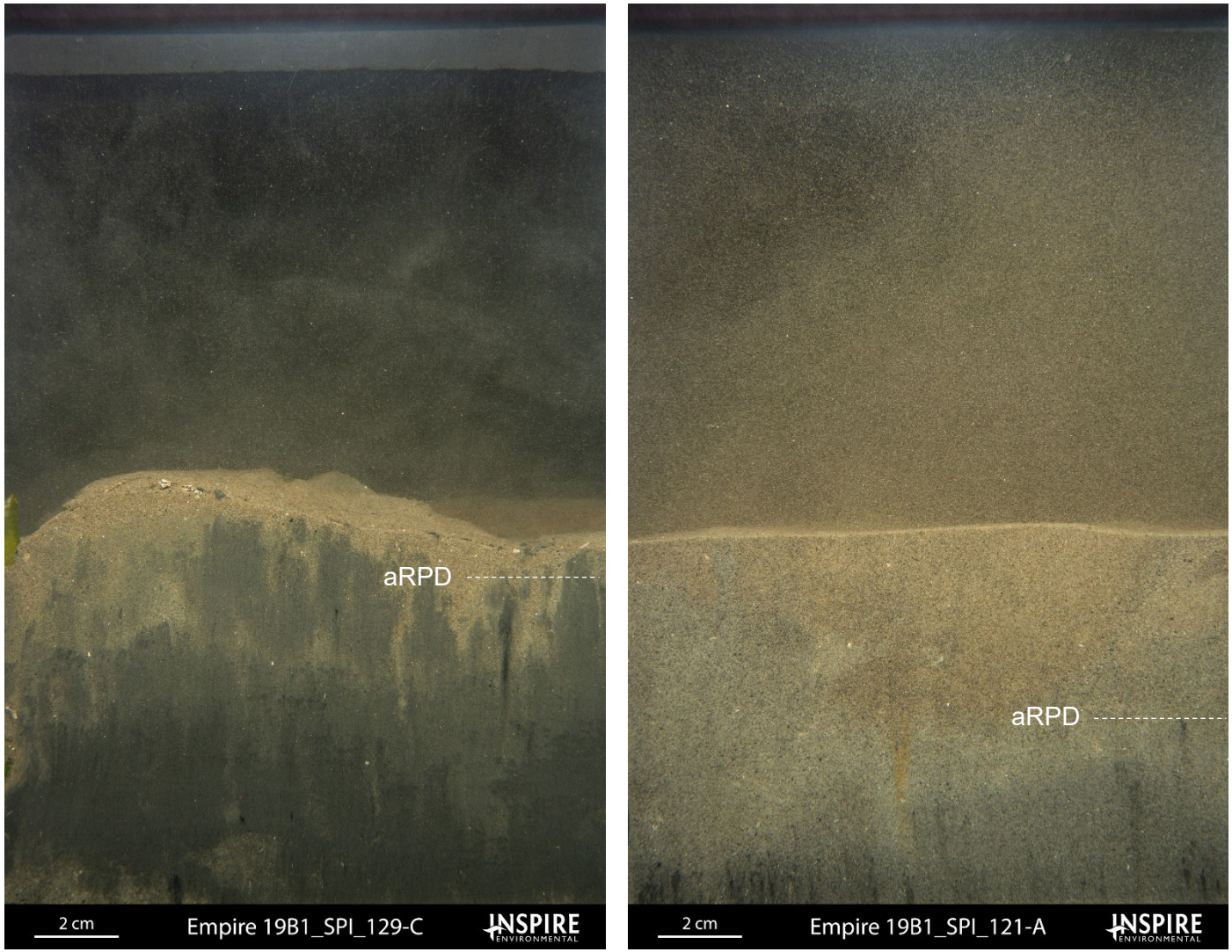


Figure 3-36. Mean station aRPD depth values (cm) at the Equinor Wind survey area



(A) (B)

Figure 3-37. Profile images depicting (A) Station 129 with a shallow aRPD and medium sediment oxygen demand (SOD); and (B) Station 121 with a deep aRPD and low SOD. Stations 129 and 121 had the shallowest and deepest aRPDs, respectively, along the Long Island Export Cable Route

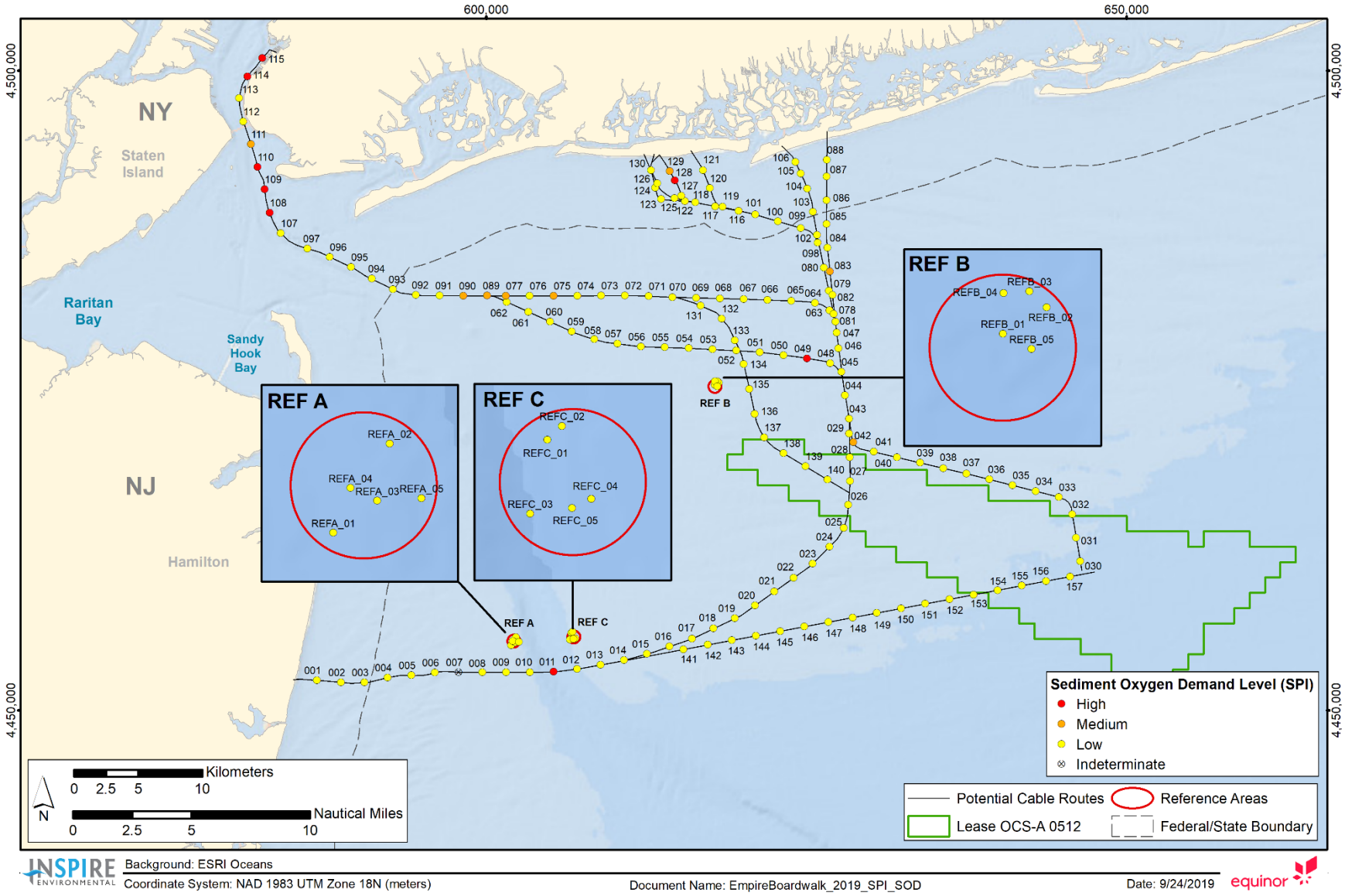


Figure 3-38. Dominant Sediment Oxygen Demand at the Equinor Wind survey area

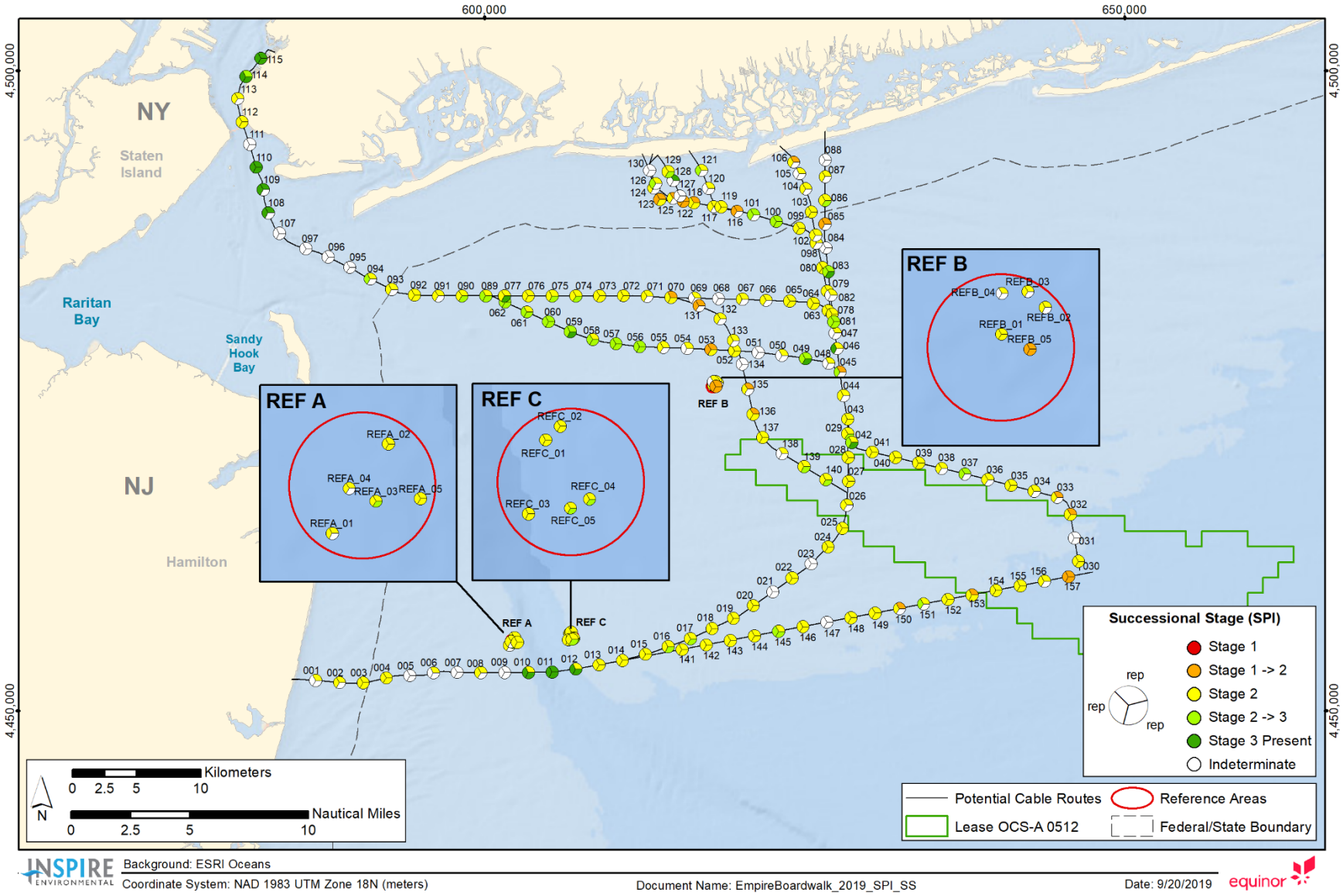


Figure 3-39. Infaunal successional stages at the Equinor Wind survey area. Results shown provide a value for each of three replicate images at each sampling station.

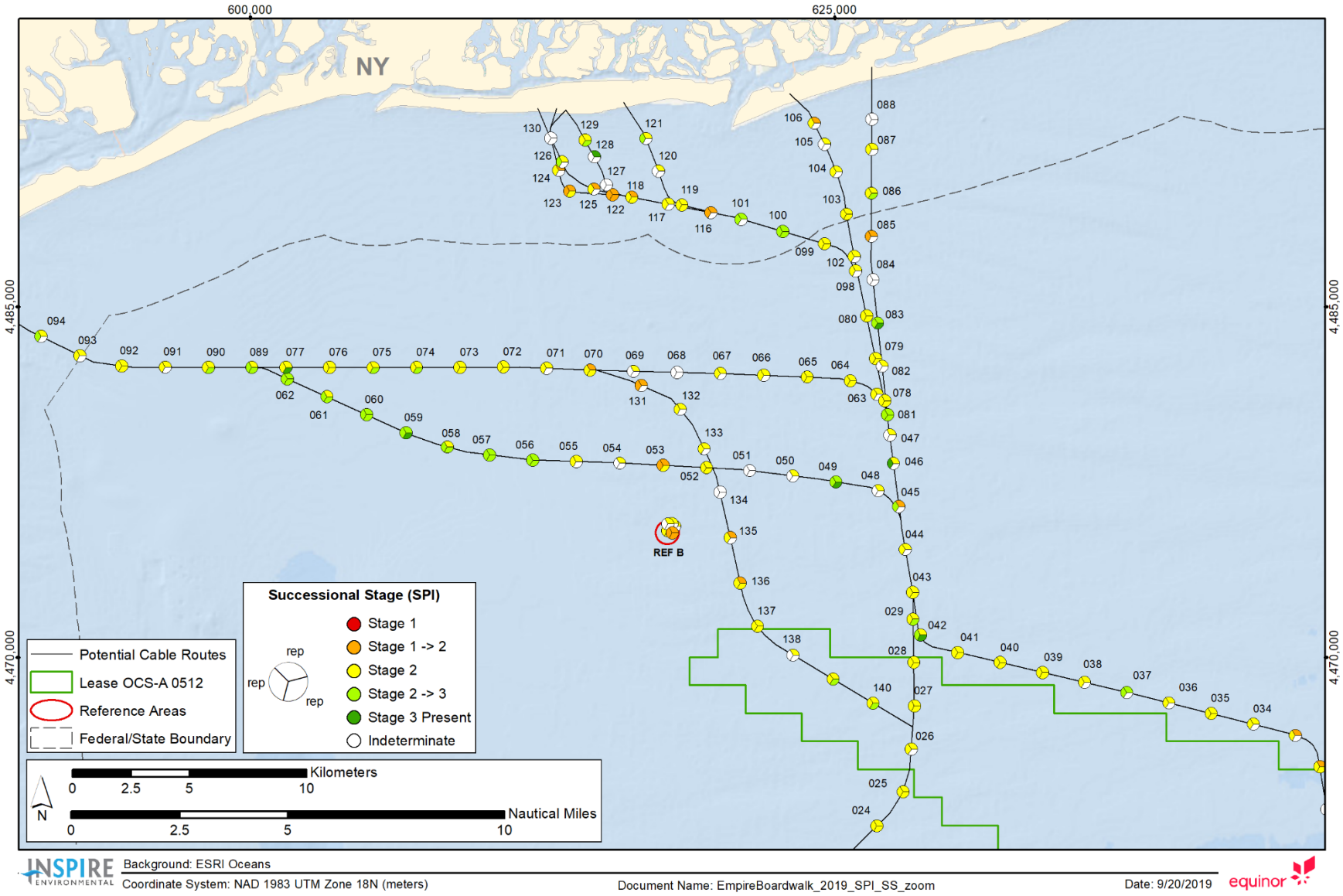
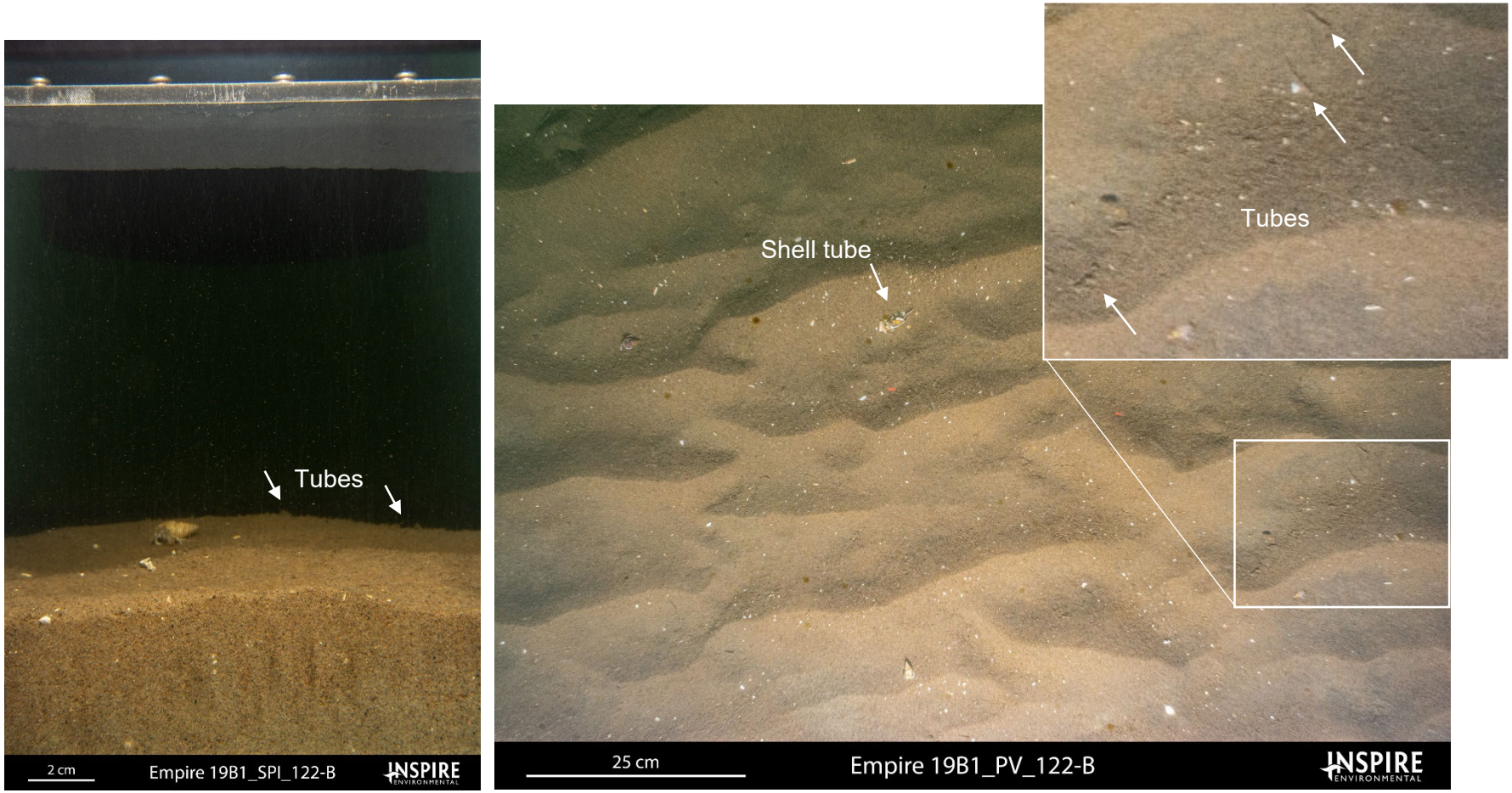


Figure 3-40. Zoom-in of the Long Island export cable route. Infaunal successional stages at the Equinor Wind survey area. Results shown provide a value for each of three replicate images at each sampling station.

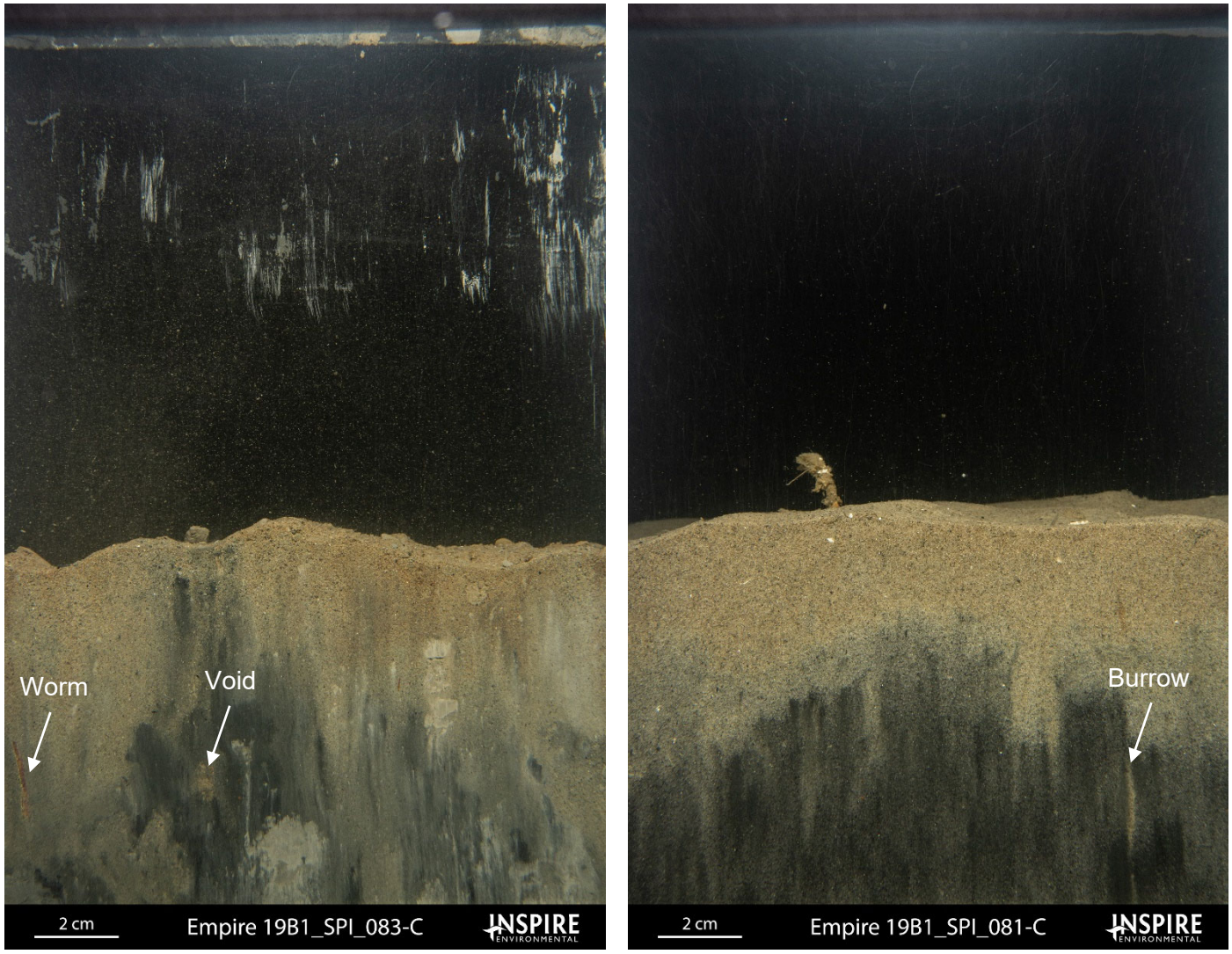
(A) **(B)**

Figure 3-41. Representative profile and plan view images depicting (A) Stage 2 tubes at the sediment-water interface; and (B) Stage 2 shell tubes produced by the polychaete Diopatra cuprea



(A) **(B)**

Figure 3-42. Representative profile and plan view images of a bottom shaped by hydrodynamic forcing with Stage 1->2 succession evidenced by (A) small tubes at the sediment–water interface in the background of the profile image, and (B) tubes in the trough of sand ripples



(A) (B)

Figure 3-43. Representative profile images of advanced succession at (A) Station 083 with filled and open feeding voids and a large worm in a burrow; and (B) Station 081 with a burrow penetrating deep into the sediment column

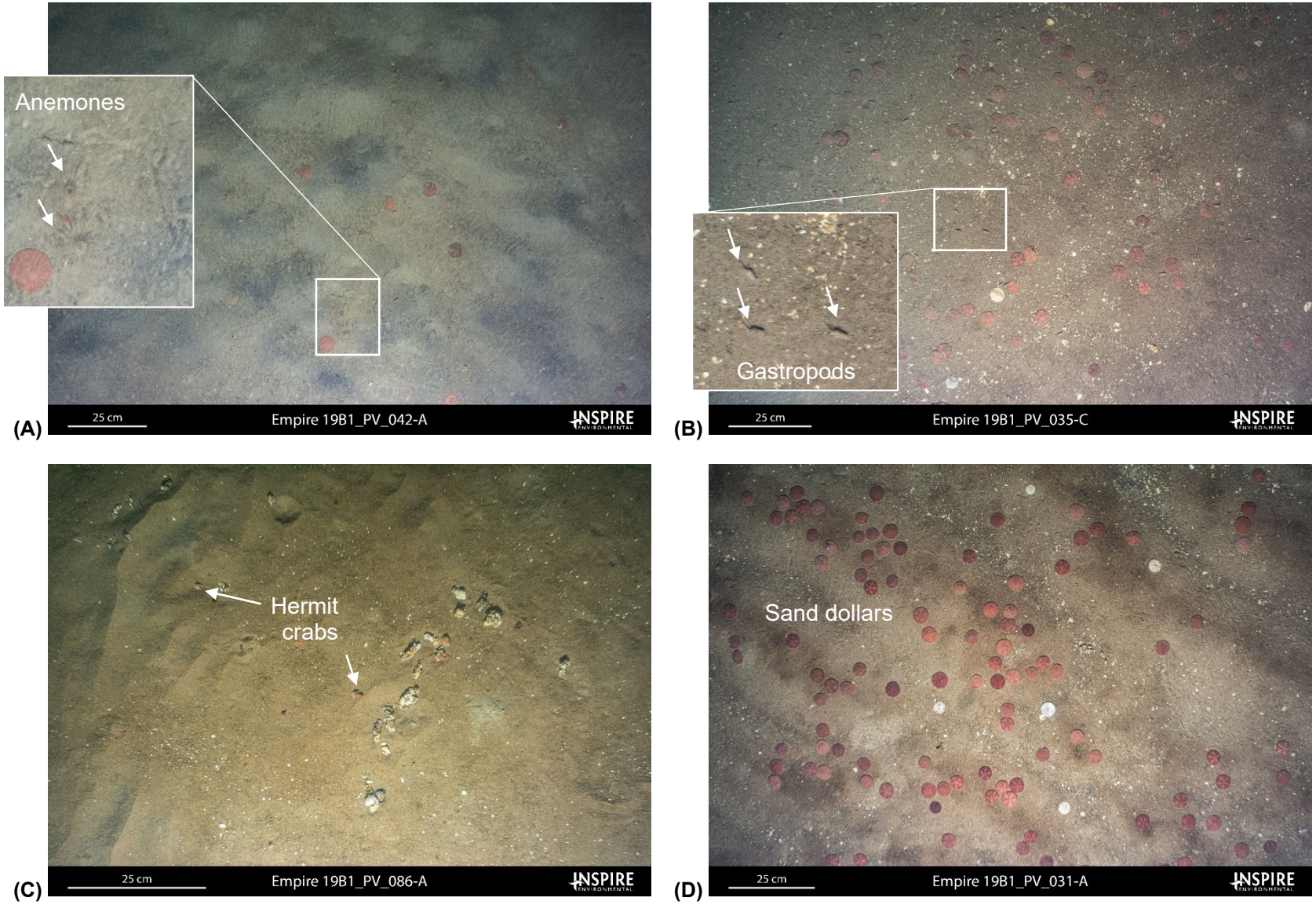


Figure 3-44. Representative plan view images indicating prevalent epifauna along the Long Island Export Cable route where (A) anemones were observed at Station 042; (B) gastropods were documented at Station 035; (C) hermit crabs were observed at Station 086; and (D) sand dollars documented at Station 031

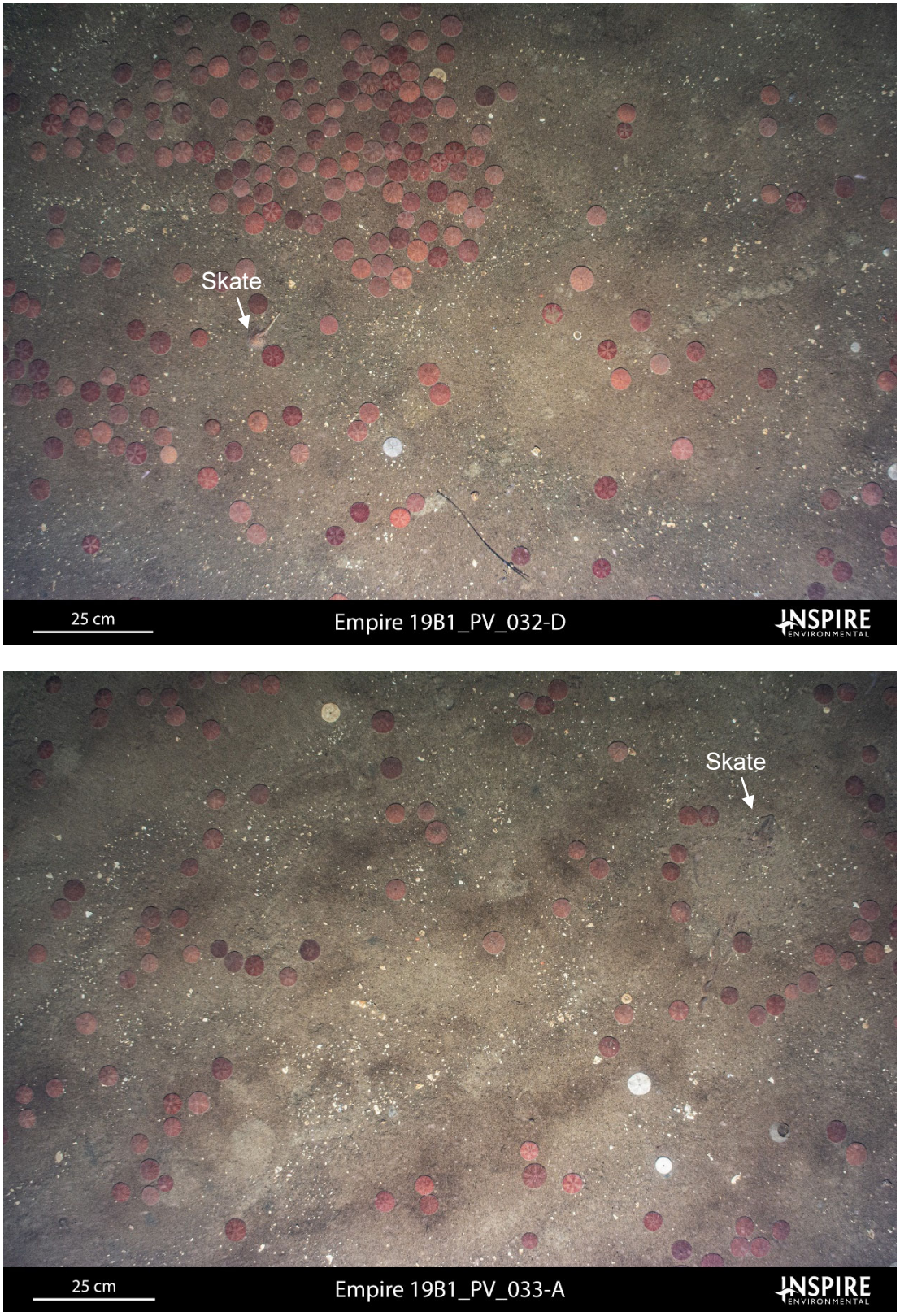


Figure 3-45. Plan view images at Stations 032 and 033 where skate were observed. At Station 033 the skate was observed partially buried in the seafloor.

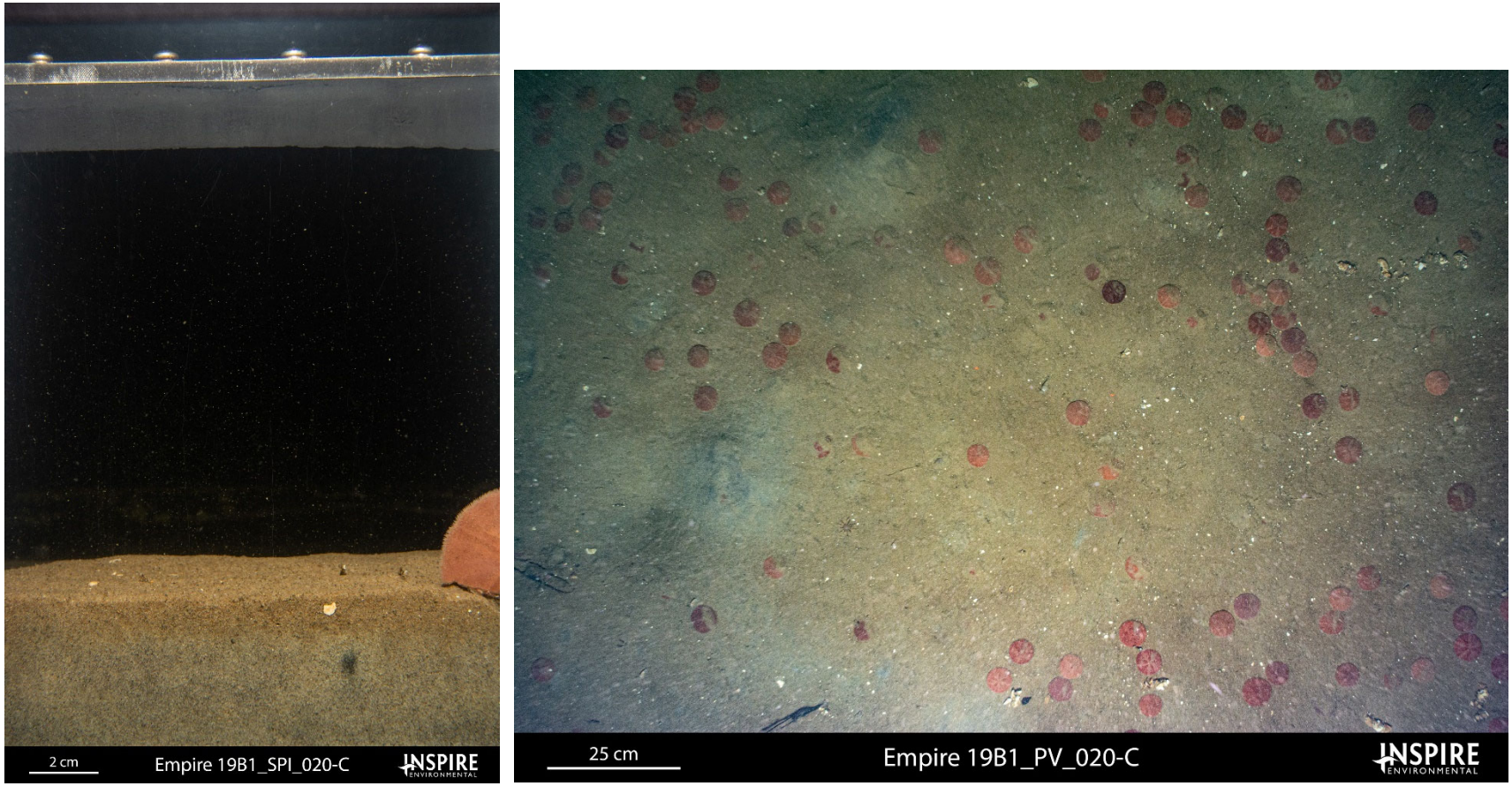


Figure 3-46. Representative profile and plan view images composed of very fine sand with sand dollars covering the seafloor

(A)

(B)

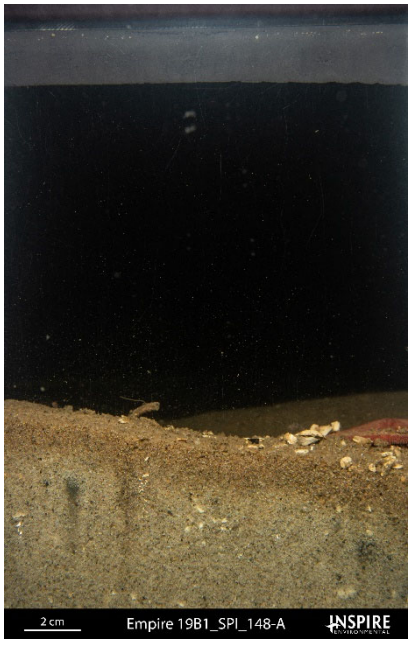


Figure 3-47. Profile images depicting bedforms at (A) Station 023 with uneven sand ripples; and (B) Station 148 with well-formed sand ripples

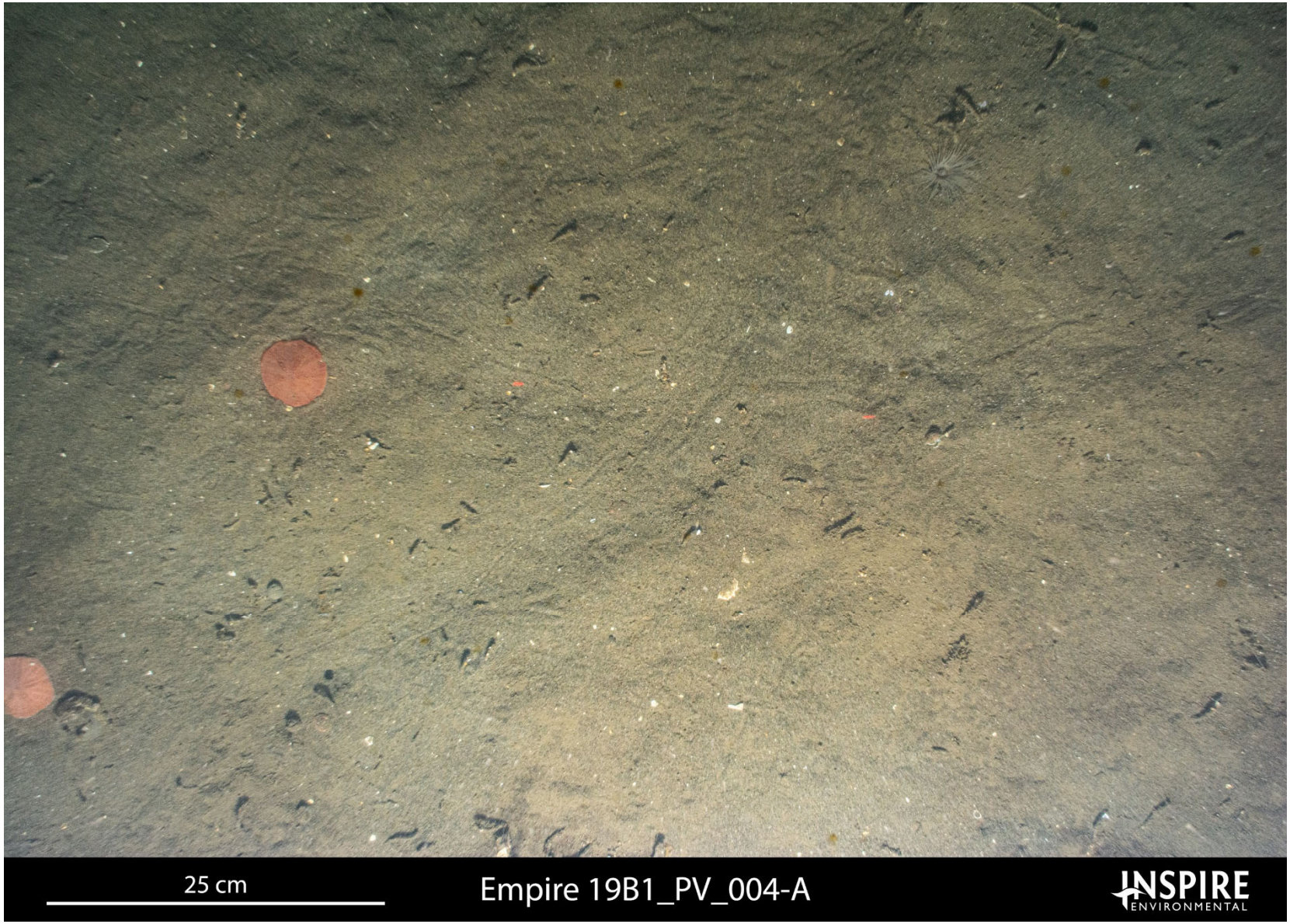
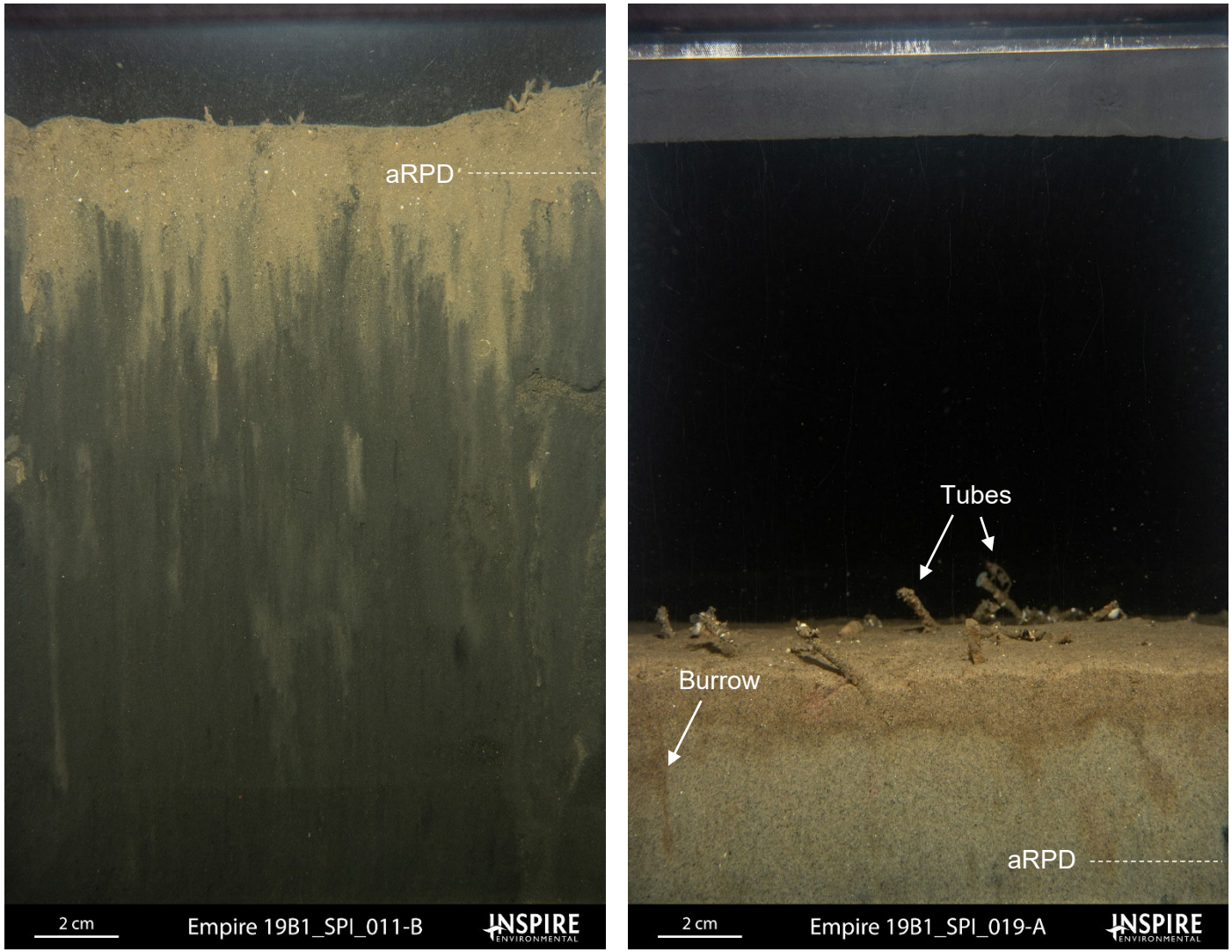


Figure 3-48. Representative plan view image of the Inferred Fauna Co-occurring Biotic Subclass, indicated by tracks on the seafloor



(A) (B)

Figure 3-49. Profile images depicting (A) Station 011 with a shallow aRPD and high sediment oxygen demand (SOD); and (B) Station 019 with a deep aRPD, low SOD, and Stage 2 tubes and shallow burrowing. Stations 011 and 019 had the shallowest and deepest aRPDs, respectively, along the New Jersey Export Cable Route

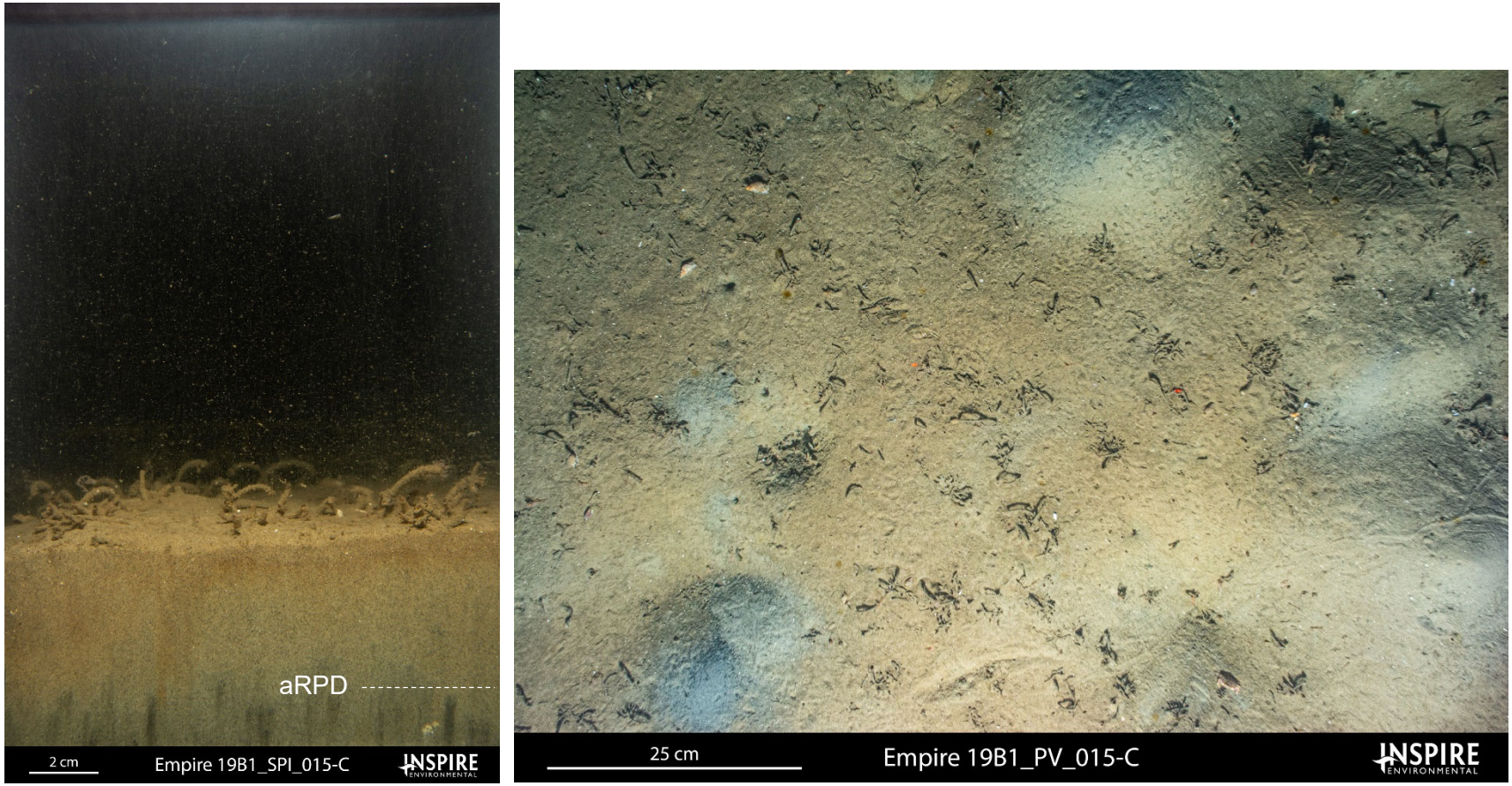


Figure 3-50. Profile and plan view images at Station 015 depicting a seafloor composed of mobile fine sand with heavy biological reworking from tube and burrowing fauna (gray mounds). These combined processes result in a deep aRPD >3.0 cm.

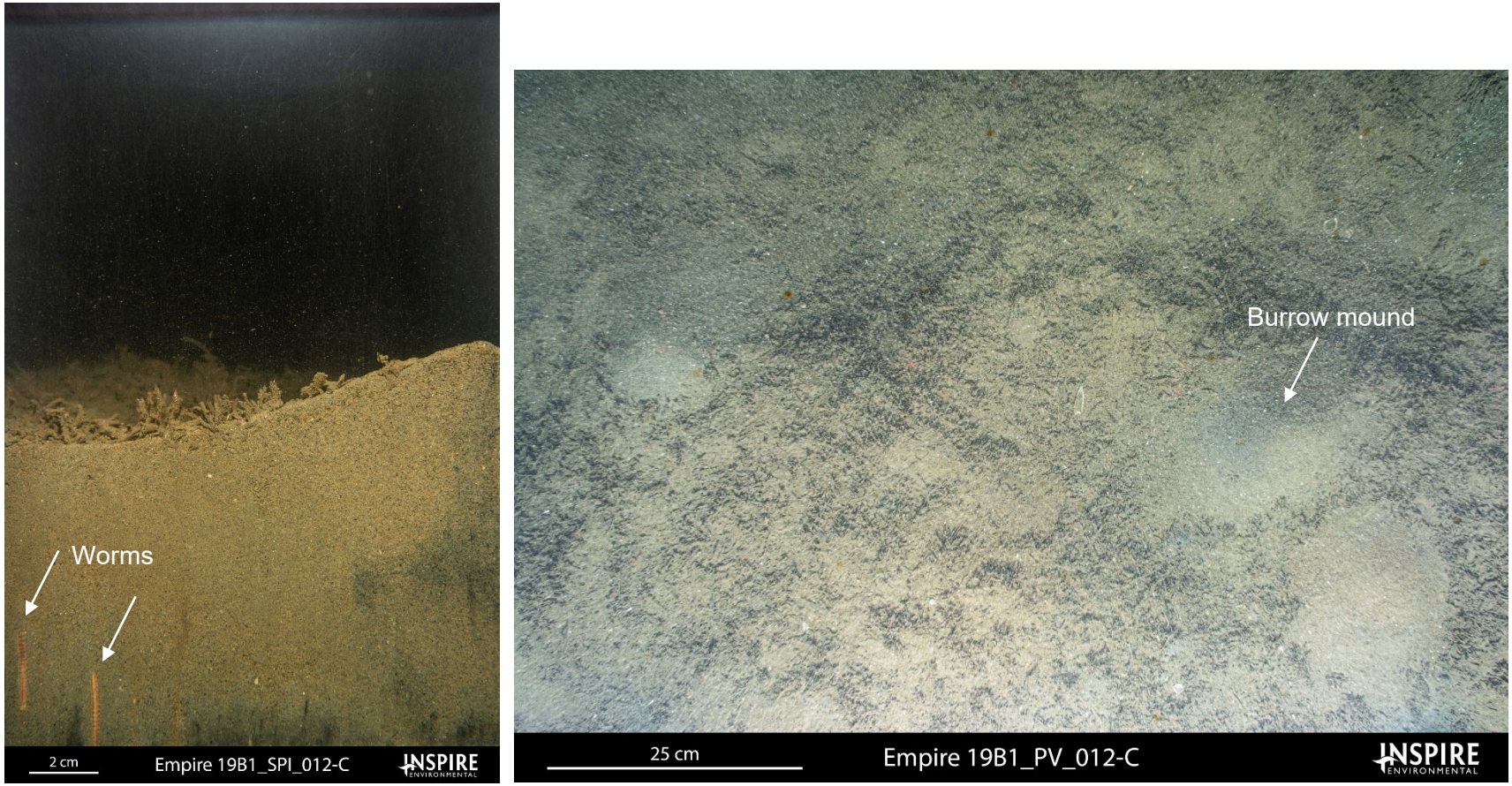


Figure 3-51. Profile and plan view images at Station 012 depicting evidence of deep burrowing fauna in the sediment and on the seafloor

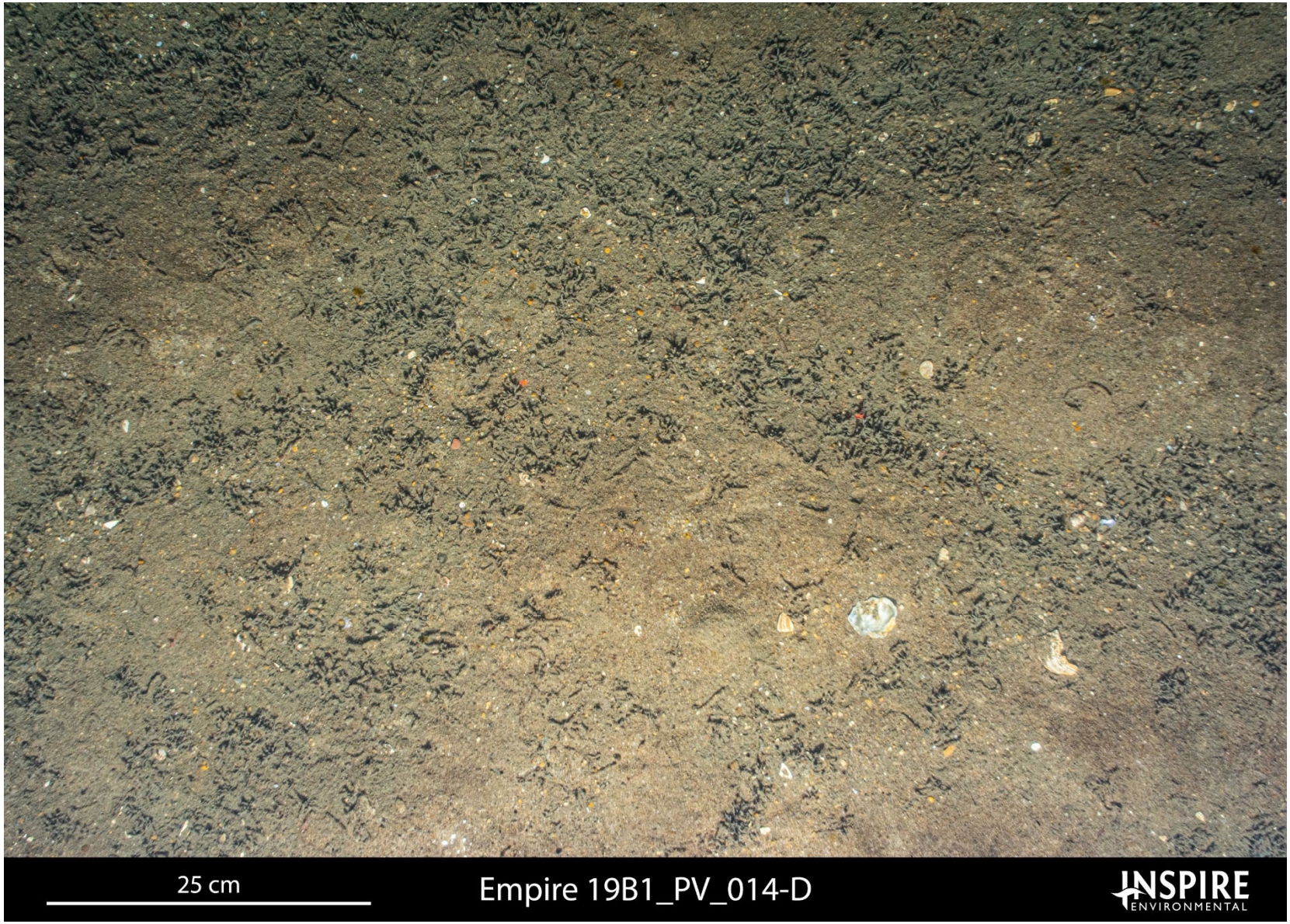


Figure 3-52. Plan view image at Station 014 depicting a seafloor covered in polychaete tubes

(A)

(B)

Figure 3-53. Plan view images at (A) Station 002 with a sea robin; and (B) Station 145 with a skate

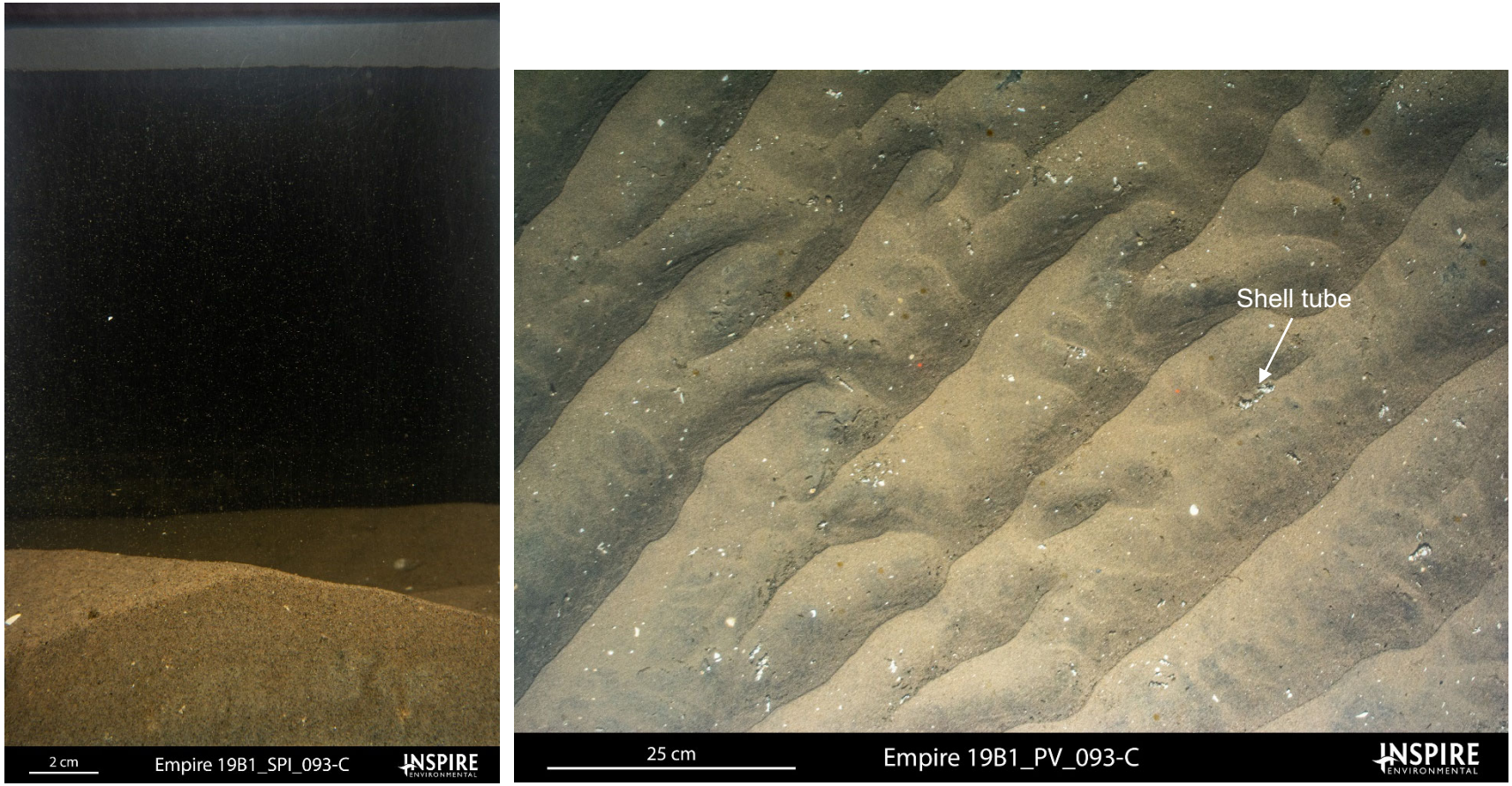


Figure 3-54. Profile and plan view images at Station 093 composed of fine sand with Diopatra cuprea tubes in the trough of the sand ripples. Profile image shows an aRPD driven by sediment transport.

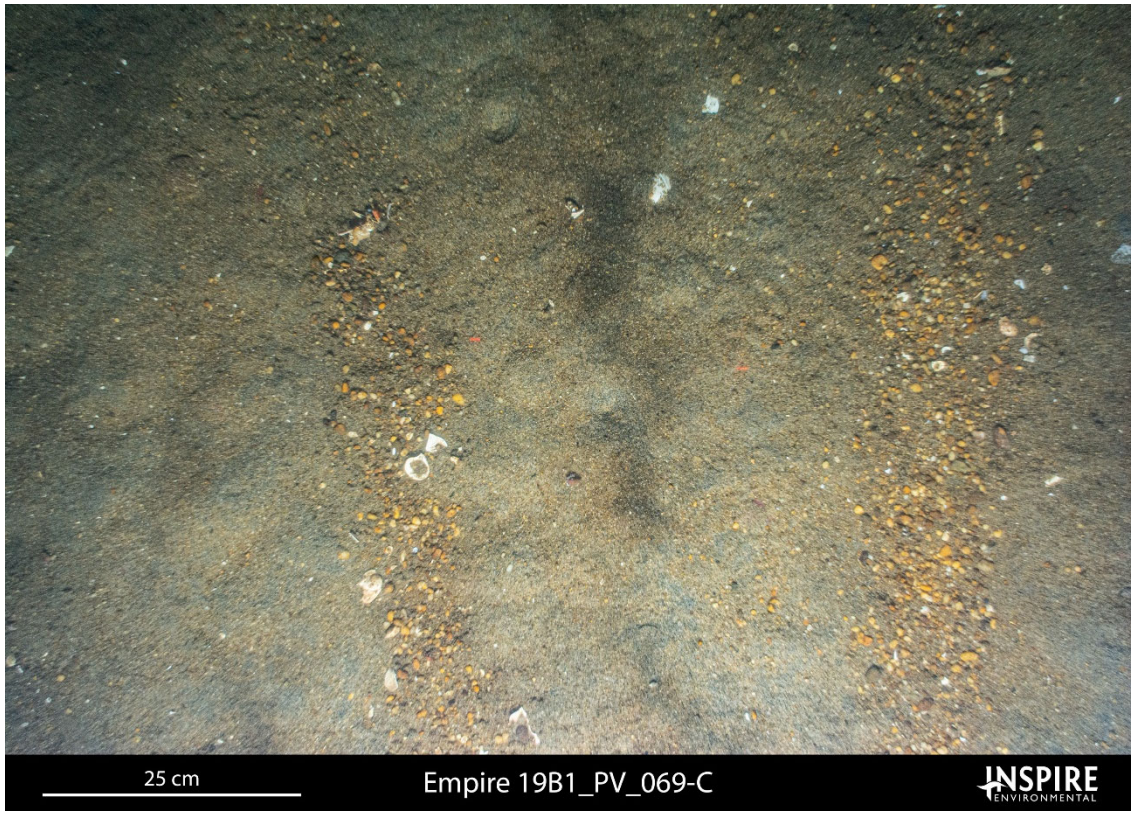


Figure 3-55. Profile and plan view image at Station 069 composed of coarse sand, with well-formed sand ripples

Figure 3-56. Profile image of Station 115 composed of silt-clay with deep prism penetration and the presence of feeding voids, deep burrowing fauna, and tubes on the sediment surface

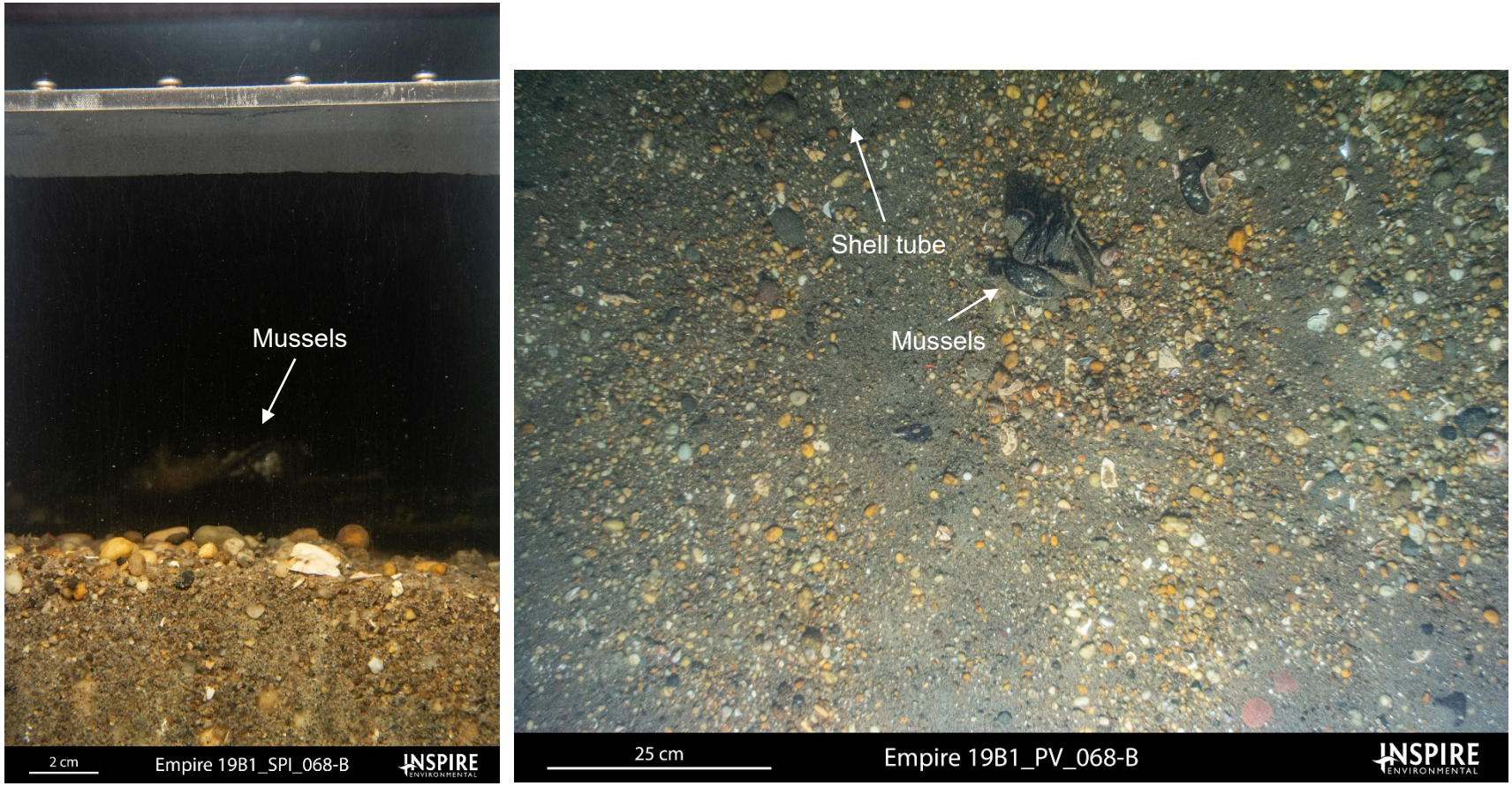
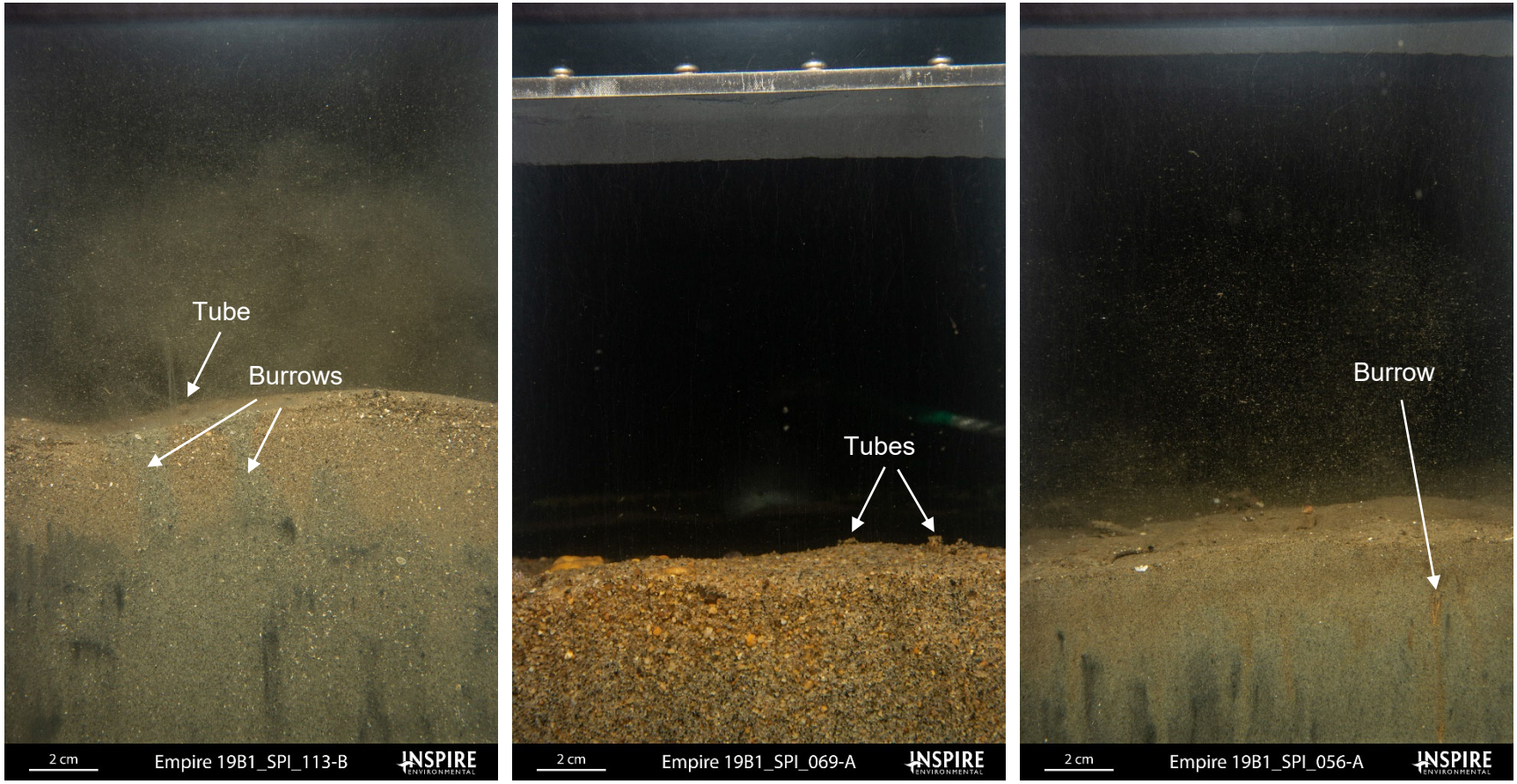


Figure 3-57. Profile and plan view images at Station 068 with mussels present on the seafloor along with tube building fauna (mussels visible in the background of the profile image). The sediment oxygen demand is low and the aRPD extends beneath the prism penetration.

(A) **(B)**

Figure 3-58. Profile images depicting (A) Station 110 with a diffusional aRPD and high sediment oxygen demand (SOD), note oxic brown sediment is dragged down into sediment column; and (B) Station 107 with a deep aRPD and medium SOD. Stations 110 and 107 had the shallowest and deepest aRPDs, respectively, along the New York Harbor Export Cable Route.



(A) **(B)** **(C)**

Figure 3-59. Profile images at (A) Station 113 depicting Stage 2 succession with shallow burrowing and a tube in the background; (B) Station 069 depicting Stage 2 succession evidenced by tubes at the sediment–water interface; and (C) Station 056 depicting Stage 2->3 succession evidence by large burrowing fauna

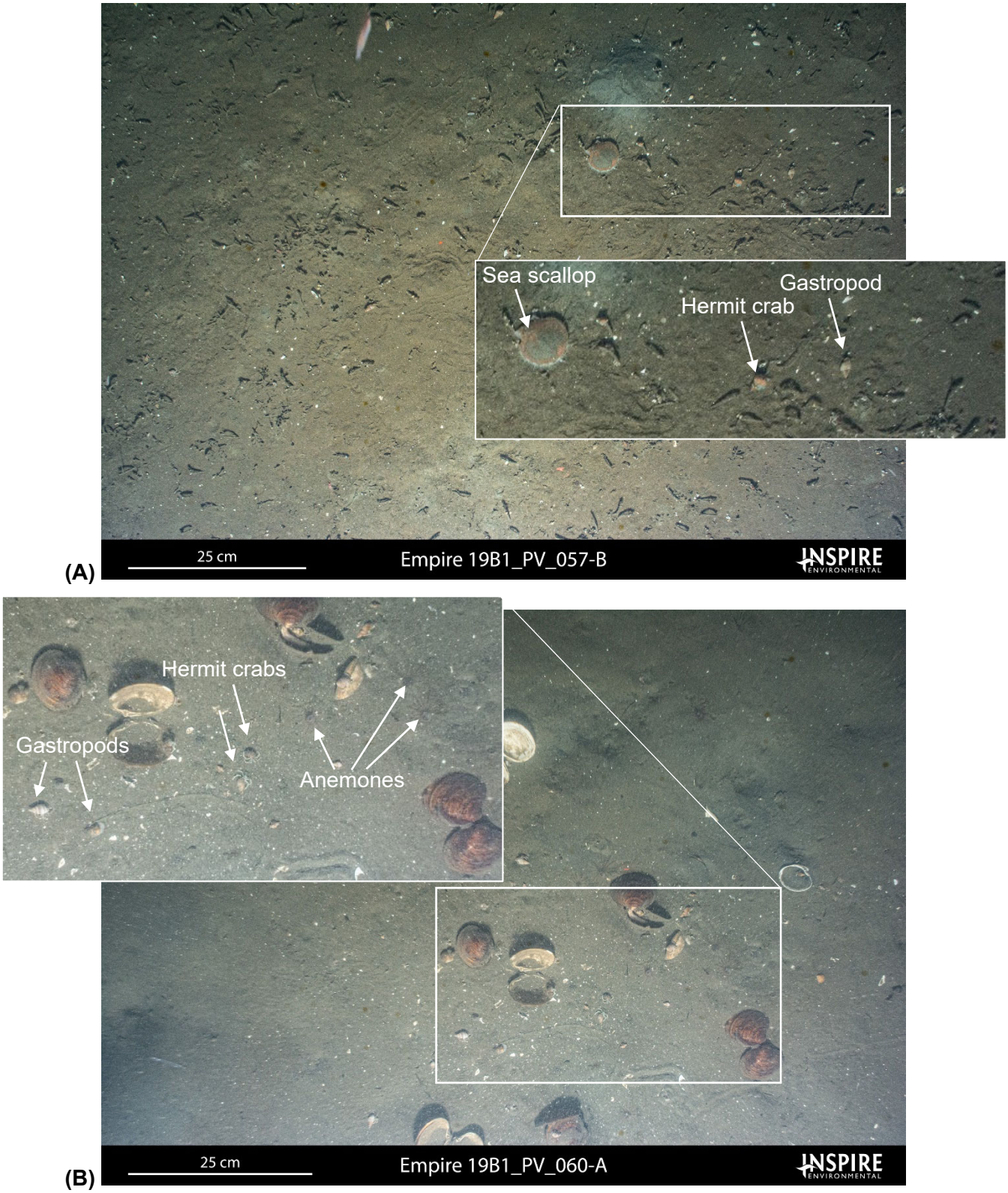


Figure 3-60. Plan view images at (A) Station 057 with a sea scallop visible amongst numerous hermit crabs and gastropods; and (B) Station 060 with numerous burrowing anemones, hermits crabs, and gastropods present

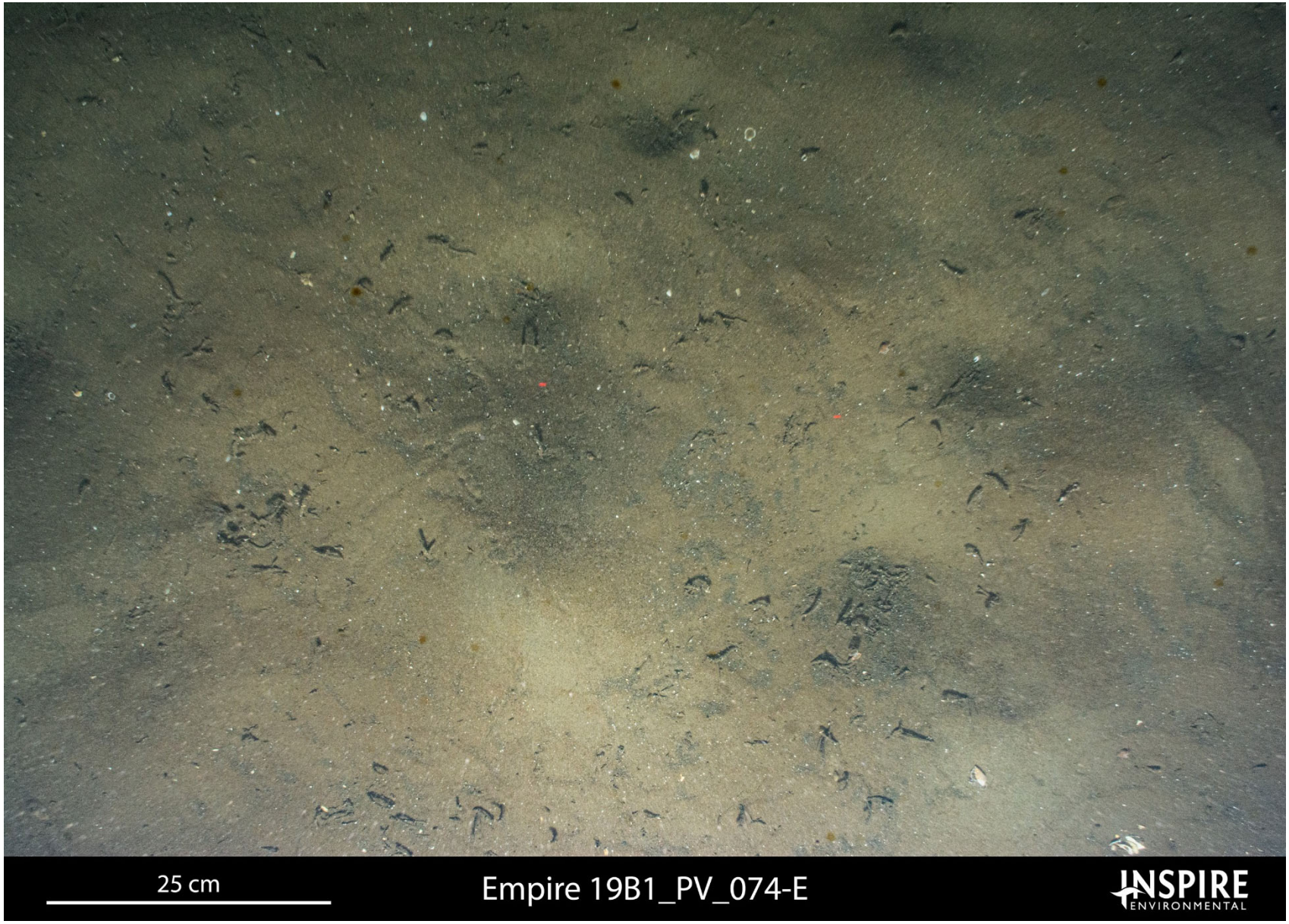


Figure 3-61. Plan view image at Station 074 with Diopatra cuprea tubes covering the seafloor

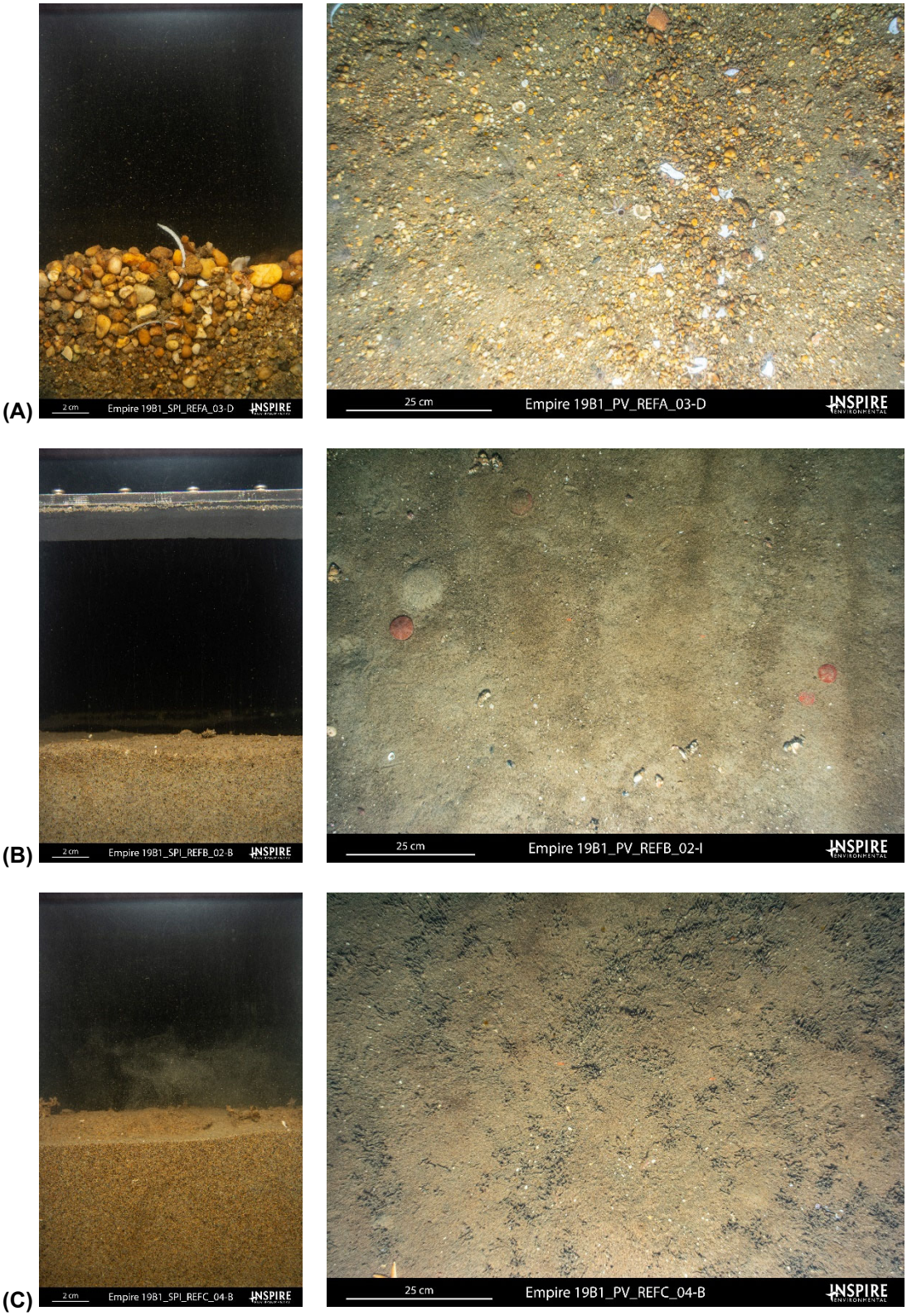
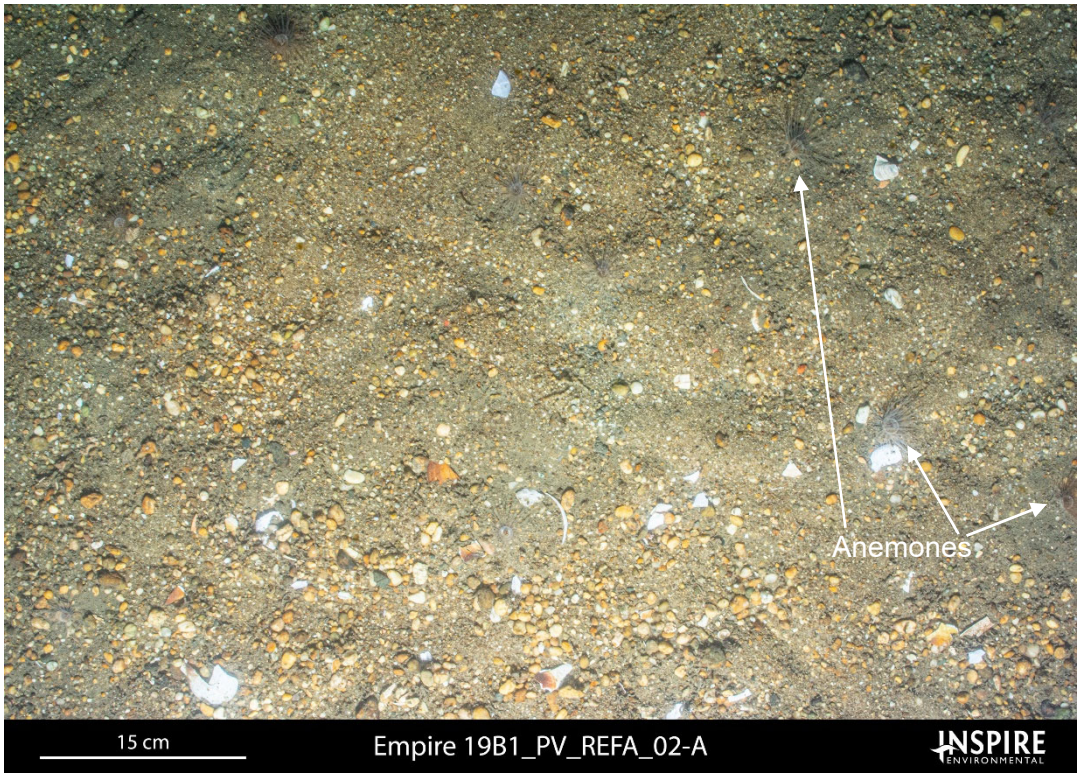
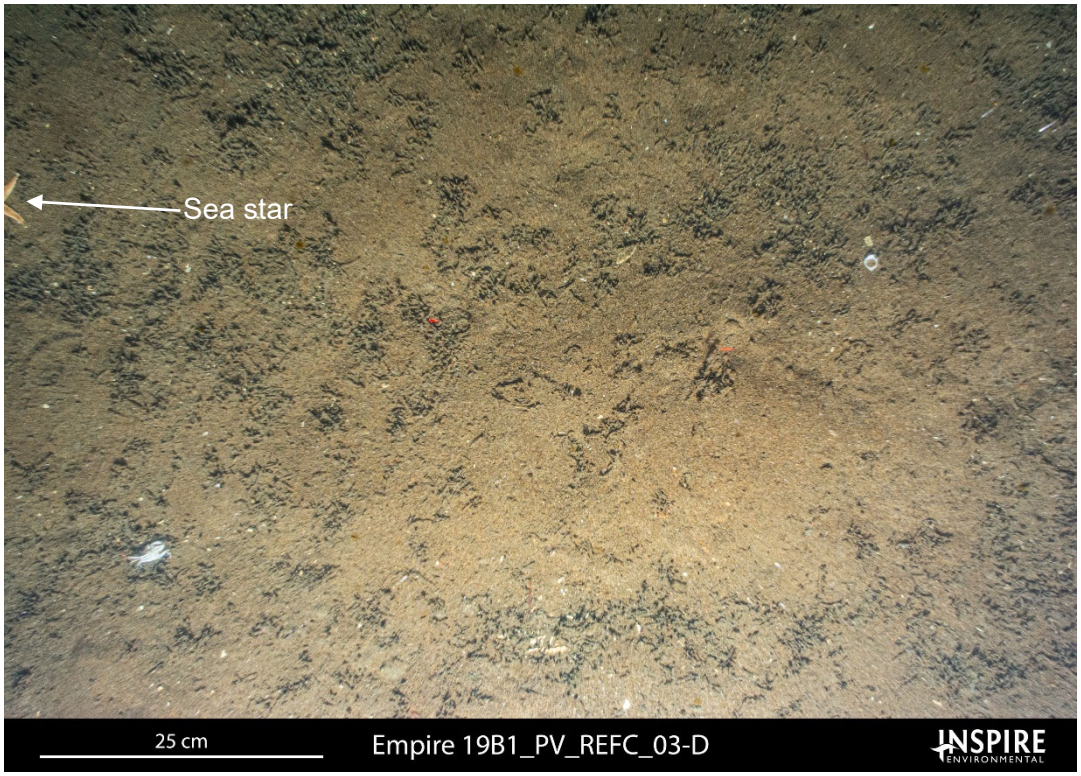


Figure 3-62. Representative profile and plan view images at (A) Station REFA_03 composed of pebbles over fine sand; (B) Station REFB_02 composed of medium sand over finer sediment, and (C) Station REFC_04 composed of medium sand

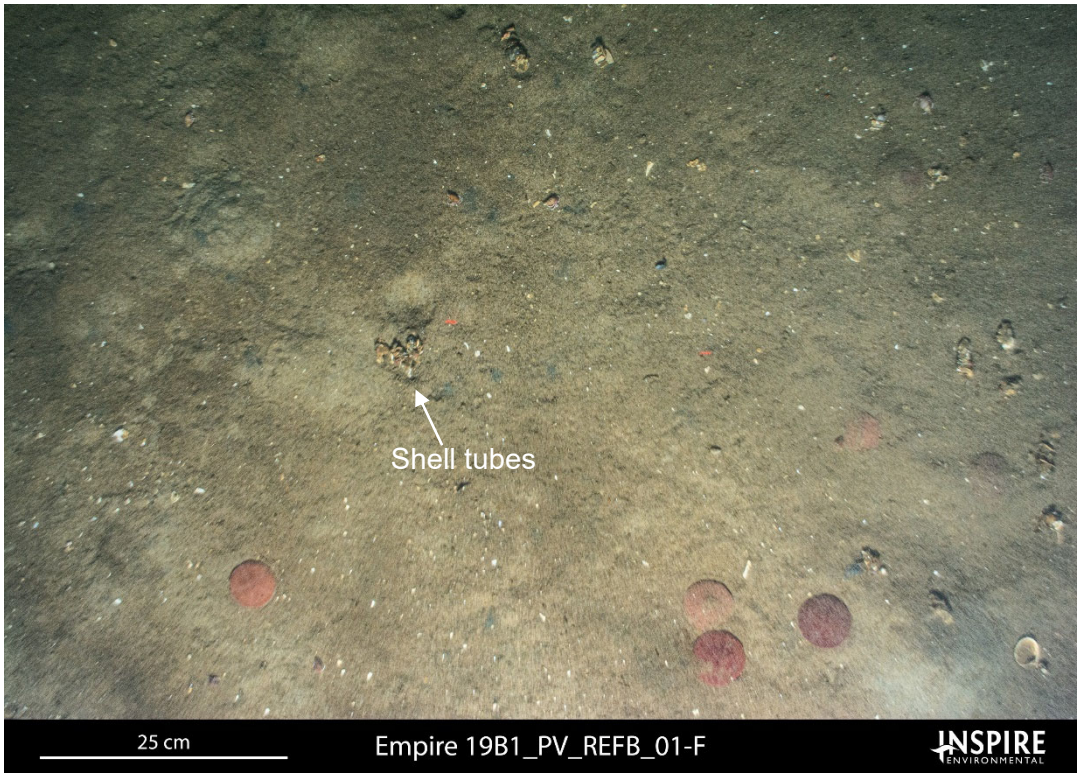


(A)

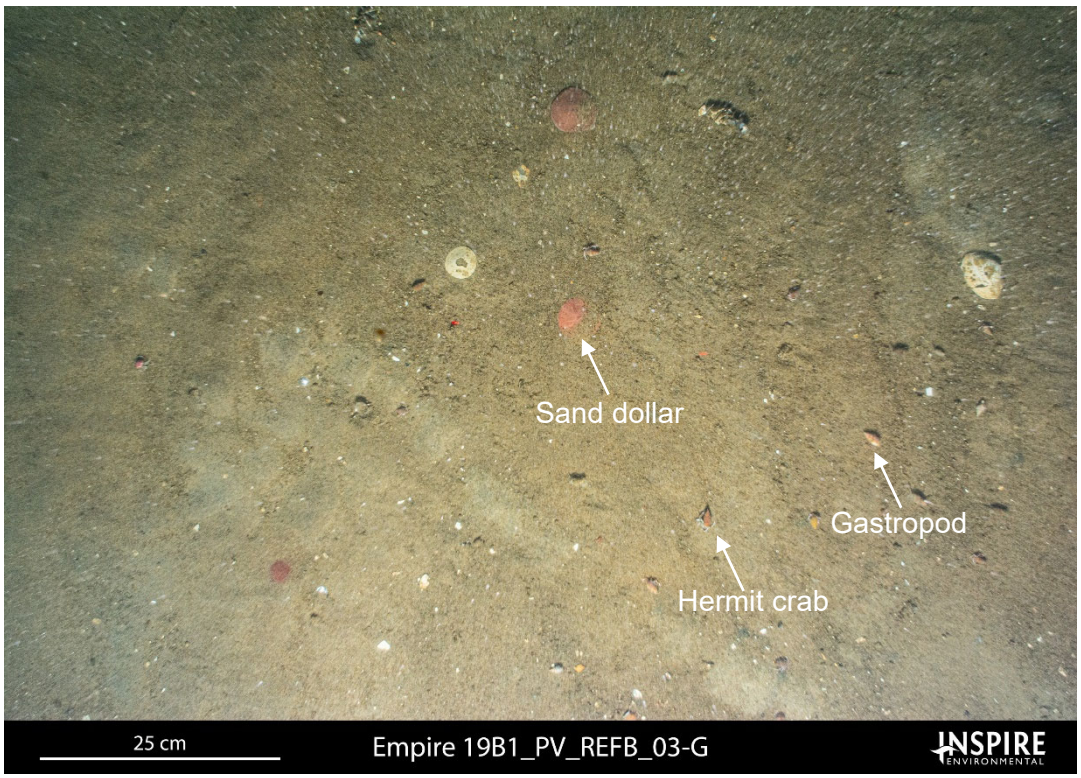


(B)

Figure 3-63. Plan view images at (A) Station REFA_02 with numerous burrowing anemones in a habitat of Sand with Mobile Gravel; and (B) Station REFC_03 with large tubes covering much of the seafloor composed of Sand Sheet habitat with a sea star present

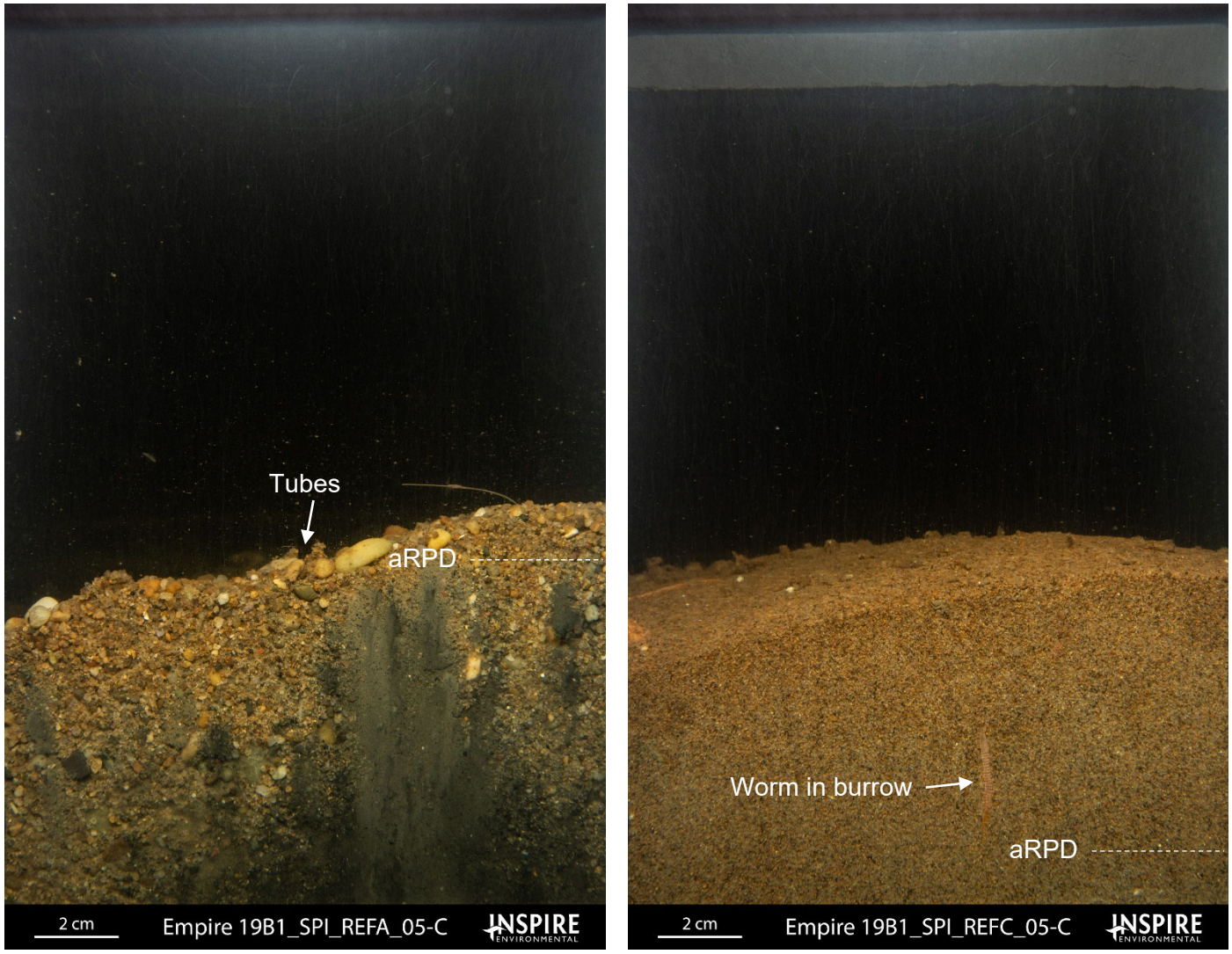


(A)



(B)

Figure 3-64. Plan view images at (A) Station REFB_01 with Diopatra cuprea shell tubes on the seafloor; and (B) Station REFB_03 with sand dollars, gastropods, and hermit crabs on a seafloor composed of Sand Sheet habitat



(A) (B)

Figure 3-65. Profile images at (A) Station REFA_05 with a shallow aRPD and Stage 2 tubes at the sediment–water interface; and (B) Station REFC_05 with a deep aRPD that partially extends below the prism penetration and a large worm visible in a burrow

Benthic Assessment Survey of Proposed Export Cable Routes in Support of the Equinor Wind OCS-A 0512 Offshore Wind Farm Project

DATA REPORT

Survey Conducted 08-15 July 2019

APPENDICES

Prepared for:

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Submitted by:

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18 November 2019

APPENDIX A

SPI/PV and Sediment Grab Station Locations

SampleType	StationID	Replicate	Date	Time	X_UTM_18N_m	Y_UTM_18N_m	Latitude_WGS84	Longitude_WGS84	Depth_ft
SPI_PV	001	A	7/14/2019	3:35:24	586780.31	4452349.92	40.21707794 N	73.98012949 W	53
SPI_PV	001	B	7/14/2019	3:36:09	586784.14	4452352.18	40.21709784 N	73.98008421 W	53
SPI_PV	001	C	7/14/2019	3:36:54	586780.76	4452353.76	40.21711243 N	73.98012376 W	53
SPI_PV	001	D	7/14/2019	3:37:33	586778.77	4452355.35	40.217127 N	73.98014694 W	53
SPI_PV	002	A	7/14/2019	3:13:31	588638.45	4452192.2	40.21546273 N	73.95831716 W	64
SPI_PV	002	B	7/14/2019	3:14:22	588638.89	4452194.74	40.21548556 N	73.95831173 W	64
SPI_PV	002	C	7/14/2019	3:14:55	588637.31	4452195.82	40.21549544 N	73.95833013 W	64
SPI_PV	002	D	7/14/2019	3:15:36	588634.93	4452194.74	40.21548599 N	73.95835819 W	64
SPI_PV	003	A	7/14/2019	2:50:41	590485.74	4452184.93	40.21519984 N	73.93661227 W	70
Grab	003	A	7/14/2019	4:28:52	590495.03	4452192.24	40.21526466 N	73.93650216 W	72
SPI_PV	003	B	7/14/2019	2:51:24	590486.23	4452186.38	40.21521283 N	73.9366063 W	70
SPI_PV	003	C	7/14/2019	2:52:06	590485.51	4452186.04	40.21520989 N	73.93661487 W	70
SPI_PV	003	D	7/14/2019	2:52:43	590483.83	4452185.49	40.21520513 N	73.93663463 W	70
SPI_PV	004	A	7/14/2019	2:29:02	592299.7	4452564.13	40.21841783 N	73.91524379 W	73
SPI_PV	004	B	7/14/2019	2:29:53	592299.83	4452563.73	40.21841418 N	73.91524226 W	73
SPI_PV	004	C	7/14/2019	2:30:32	592298.87	4452562	40.21839869 N	73.91525389 W	73
SPI_PV	004	D	7/14/2019	2:31:13	592297.65	4452568.76	40.2184598 N	73.91526719 W	73
SPI_PV	005	A	7/14/2019	2:07:34	594137.7	4452741.84	40.2198142 N	73.89362033 W	77
SPI_PV	005	B	7/14/2019	2:08:50	594144.74	4452737.18	40.21977136 N	73.89353832 W	77
SPI_PV	005	C	7/14/2019	2:09:31	594146.62	4452734.25	40.21974476 N	73.89351665 W	77
SPI_PV	005	D	7/14/2019	2:10:08	594145.83	4452735.22	40.21975363 N	73.89352578 W	77
SPI_PV	006	A	7/14/2019	1:47:23	595978.08	4452962.55	40.22159347 N	73.8719617 W	68
Grab	006	A	7/14/2019	5:11:20	595980.17	4452962.71	40.2215947 N	73.87193712 W	69
SPI_PV	006	B	7/14/2019	1:48:16	595974.9	4452963.88	40.22160587 N	73.87199889 W	68
Grab	006	B	7/14/2019	5:16:38	595973.86	4452961.78	40.22158705 N	73.87201141 W	69
SPI_PV	006	C	7/14/2019	1:48:53	595973.49	4452962.48	40.22159339 N	73.87201565 W	68
SPI_PV	006	D	7/14/2019	1:49:35	595973.24	4452961.19	40.22158184 N	73.8720188 W	68
SPI_PV	007	A	7/14/2019	1:24:38	597828.32	4452989.11	40.22161883 N	73.85021573 W	77
SPI_PV	007	B	7/14/2019	1:25:28	597828.69	4452987.77	40.22160672 N	73.85021157 W	77
SPI_PV	007	C	7/14/2019	1:26:02	597828.44	4452985.64	40.22158749 N	73.85021487 W	77
SPI_PV	007	D	7/14/2019	1:26:43	597825.96	4452986.06	40.2215916 N	73.85024391 W	77
SPI_PV	008	B	7/14/2019	0:19:33	599681.47	4452973.5	40.22125979 N	73.8284422 W	85
SPI_PV	008	C	7/14/2019	0:20:16	599683.01	4452976.99	40.22129105 N	73.82842353 W	85

SampleType	StationID	Replicate	Date	Time	X_UTM_18N_m	Y_UTM_18N_m	Latitude_WGS84	Longitude_WGS84	Depth_ft
SPI_PV	008	D	7/14/2019	0:21:02	599682.71	4452977.89	40.2212992 N	73.82842691 W	85
SPI_PV	008	E	7/14/2019	0:21:49	599678.78	4452975.16	40.22127506 N	73.8284736 W	85
SPI_PV	009	A	7/13/2019	23:50:28	601538.31	4452979.81	40.2210937 N	73.80662216 W	95
SPI_PV	009	B	7/13/2019	23:51:53	601539.23	4452982.04	40.2211137 N	73.80661098 W	95
SPI_PV	009	C	7/13/2019	23:53:19	601536.03	4452979.62	40.22109226 N	73.80664897 W	95
SPI_PV	009	D	7/13/2019	23:54:36	601535.82	4452981.66	40.22111065 N	73.80665115 W	95
SPI_PV	010	A	7/13/2019	23:25:32	603400.25	4452986.11	40.22092277 N	73.78474241 W	116
Grab	010	A	7/14/2019	6:04:04	603396.6	4452994.82	40.22100171 N	73.78478392 W	120
SPI_PV	010	B	7/13/2019	23:27:07	603398.39	4452985.31	40.22091576 N	73.78476443 W	116
SPI_PV	010	C	7/13/2019	23:28:30	603394.67	4452984.98	40.2209133 N	73.78480821 W	116
SPI_PV	010	D	7/13/2019	23:30:01	603395.36	4452982.65	40.2208922 N	73.7848005 W	116
SPI_PV	011	A	7/13/2019	22:56:54	605256.07	4453018.74	40.22098562 N	73.76293045 W	224
Grab	011	A	7/14/2019	6:35:52	605251.24	4453017.47	40.22097483 N	73.76298752 W	227
SPI_PV	011	B	7/13/2019	22:58:24	605253.41	4453015.09	40.22095307 N	73.76296236 W	224
Grab	011	B	7/14/2019	6:52:18	605251.34	4453016.53	40.22096632 N	73.76298649 W	227
SPI_PV	011	C	7/13/2019	23:00:01	605250.09	4453013.85	40.22094239 N	73.76300152 W	224
SPI_PV	011	D	7/13/2019	23:01:26	605252.29	4453016.04	40.22096184 N	73.7629754 W	224
SPI_PV	012	A	7/13/2019	19:29:49	607096.72	4453248.69	40.22282366 N	73.74126404 W	127
SPI_PV	012	B	7/13/2019	19:31:23	607100.58	4453247.85	40.2228156 N	73.74121883 W	127
SPI_PV	012	C	7/13/2019	19:32:44	607099.9	4453247.35	40.22281116 N	73.74122686 W	127
SPI_PV	012	D	7/13/2019	19:34:14	607099.27	4453247.57	40.22281328 N	73.74123418 W	127
SPI_PV	013	A	7/13/2019	19:05:16	608926.09	4453569.08	40.22547371 N	73.71971365 W	111
SPI_PV	013	B	7/13/2019	19:06:58	608926.93	4453573.8	40.22551607 N	73.71970293 W	111
SPI_PV	013	C	7/13/2019	19:08:26	608928.59	4453571	40.22549068 N	73.71968391 W	111
SPI_PV	013	D	7/13/2019	19:09:58	608929.73	4453572.22	40.22550154 N	73.7196703 W	111
SPI_PV	014	A	7/13/2019	18:40:51	610749.69	4453926.67	40.22845549 N	73.69822307 W	117
SPI_PV	014	B	7/13/2019	18:42:24	610748.55	4453923.43	40.22842642 N	73.69823697 W	117
SPI_PV	014	C	7/13/2019	18:43:55	610750.81	4453920.79	40.22840235 N	73.69821096 W	117
SPI_PV	014	D	7/13/2019	18:45:19	610754.29	4453925.15	40.22844118 N	73.69816925 W	117
SPI_PV	015	A	7/13/2019	18:14:48	612542.61	4454410.55	40.2325749 N	73.67706918 W	109
SPI_PV	015	B	7/13/2019	18:16:27	612541.83	4454409.42	40.23256485 N	73.6770785 W	109
SPI_PV	015	C	7/13/2019	18:18:08	612544.1	4454413.12	40.23259785 N	73.67705121 W	109
SPI_PV	015	D	7/13/2019	18:19:33	612544	4454406.43	40.2325376 N	73.67705357 W	109

SampleType	StationID	Replicate	Date	Time	X_UTM_18N_m	Y_UTM_18N_m	Latitude_WGS84	Longitude_WGS84	Depth_ft
SPI_PV	016	A	7/10/2019	19:07:05	614310.25	4454995.3	40.23760236 N	73.65619186 W	95
SPI_PV	016	B	7/10/2019	19:08:20	614305.2	4454999.03	40.23763665 N	73.65625057 W	95
SPI_PV	016	C	7/10/2019	19:09:35	614309.69	4454998	40.23762679 N	73.65619804 W	95
SPI_PV	016	D	7/10/2019	19:10:46	614311.37	4454993.21	40.23758339 N	73.65617907 W	95
SPI_PV	017	A	7/10/2019	18:46:54	616061.89	4455610.18	40.24289958 N	73.63549432 W	93
SPI_PV	017	B	7/10/2019	18:48:01	616062.76	4455614.48	40.24293824 N	73.63548327 W	93
SPI_PV	017	C	7/10/2019	18:49:14	616063.8	4455614.96	40.24294239 N	73.63547091 W	93
SPI_PV	017	D	7/10/2019	18:50:27	616061.09	4455615.42	40.24294695 N	73.63550266 W	93
SPI_PV	018	A	7/10/2019	18:25:27	617740.8	4456408.92	40.24985931 N	73.61561464 W	90
SPI_PV	018	B	7/10/2019	18:26:53	617738.97	4456408.43	40.24985512 N	73.61563627 W	90
SPI_PV	018	C	7/10/2019	18:28:09	617738.42	4456408.69	40.24985758 N	73.61564264 W	90
SPI_PV	018	D	7/10/2019	18:29:23	617742.57	4456410.59	40.24987406 N	73.61559354 W	90
SPI_PV	019	A	7/10/2019	18:03:21	619414.33	4457209.27	40.25683081 N	73.59579397 W	97
SPI_PV	019	B	7/10/2019	18:04:27	619418.11	4457212.29	40.25685742 N	73.59574895 W	97
SPI_PV	019	C	7/10/2019	18:05:37	619416.81	4457209.1	40.25682889 N	73.59576485 W	97
SPI_PV	019	D	7/10/2019	18:06:49	619419.59	4457208.71	40.25682496 N	73.59573228 W	97
Grab	020	A	7/10/2019	16:57:44	620970.99	4458211.39	40.26563294 N	73.57730527 W	91
SPI_PV	020	A	7/10/2019	17:43:10	620973.78	4458213.41	40.26565076 N	73.57727203 W	92
SPI_PV	020	B	7/10/2019	17:44:53	620978.22	4458213.71	40.26565279 N	73.57721983 W	92
SPI_PV	020	C	7/10/2019	17:46:13	620976.98	4458209.77	40.26561754 N	73.57723512 W	92
SPI_PV	020	D	7/10/2019	17:47:19	620975.08	4458211.83	40.26563631 N	73.5772571 W	92
SPI_PV	021	A	7/10/2019	22:18:30	622491.93	4459287.13	40.2751004 N	73.55921776 W	97
SPI_PV	021	B	7/10/2019	22:19:47	622489.02	4459282.72	40.27506103 N	73.55925278 W	97
SPI_PV	021	C	7/10/2019	22:21:03	622489.6	4459284.23	40.27507454 N	73.55924564 W	97
SPI_PV	021	D	7/10/2019	22:22:22	622488.88	4459284.53	40.27507741 N	73.55925411 W	97
SPI_PV	022	A	7/10/2019	22:37:49	624002.87	4460369.12	40.28462258 N	73.5412416 W	95
SPI_PV	022	B	7/10/2019	22:39:03	624004.34	4460364.07	40.28457691 N	73.54122536 W	95
SPI_PV	022	C	7/10/2019	22:40:18	624000.77	4460361.62	40.28455538 N	73.5412678 W	95
SPI_PV	022	D	7/10/2019	22:41:33	624000.76	4460365.09	40.28458666 N	73.54126717 W	95
SPI_PV	023	A	7/10/2019	22:57:37	625491.82	4461477.09	40.29437924 N	73.52351409 W	91
SPI_PV	023	B	7/10/2019	22:58:58	625487.13	4461475.01	40.29436119 N	73.52356967 W	91
SPI_PV	023	C	7/10/2019	23:00:16	625485.03	4461472.35	40.29433762 N	73.52359481 W	91
SPI_PV	023	D	7/10/2019	23:01:32	625488.26	4461475.93	40.29436933 N	73.52355615 W	91

SampleType	StationID	Replicate	Date	Time	X_UTM_18N_m	Y_UTM_18N_m	Latitude_WGS84	Longitude_WGS84	Depth_ft
SPI_PV	024	A	7/10/2019	23:17:06	626799.68	4462792.17	40.30602586 N	73.50787065 W	97
SPI_PV	024	B	7/10/2019	23:18:32	626798.15	4462790.44	40.30601052 N	73.507889 W	97
SPI_PV	024	C	7/10/2019	23:19:52	626798.65	4462793.81	40.30604078 N	73.50788241 W	97
SPI_PV	024	D	7/10/2019	23:21:18	626797.6	4462791.7	40.30602196 N	73.50789517 W	97
SPI_PV	025	A	7/11/2019	0:56:59	627923.01	4464253.95	40.3190197 N	73.49436359 W	102
SPI_PV	025	B	7/11/2019	0:57:46	627919.34	4464253.07	40.31901235 N	73.494407 W	102
SPI_PV	025	C	7/11/2019	0:58:39	627920.37	4464257.33	40.31905052 N	73.49439393 W	102
SPI_PV	025	D	7/11/2019	0:59:28	627919.43	4464255.78	40.31903676 N	73.49440531 W	102
SPI_PV	025	E	7/11/2019	1:47:23	627922.18	4464254.34	40.31902338 N	73.49437331 W	102
SPI_PV	025	F	7/11/2019	1:48:03	627924.03	4464258.09	40.31905686 N	73.49435072 W	102
SPI_PV	025	G	7/11/2019	1:48:41	627921.09	4464259.32	40.3190684 N	73.49438513 W	102
SPI_PV	025	H	7/11/2019	1:49:43	627914.11	4464255.6	40.31903594 N	73.49446803 W	102
SPI_PV	026	A	7/11/2019	2:18:36	628268.34	4466065.22	40.33527934 N	73.48993681 W	98
SPI_PV	026	B	7/11/2019	2:19:24	628272.29	4466070.34	40.33532483 N	73.48988939 W	98
SPI_PV	026	C	7/11/2019	2:20:07	628272.41	4466070.34	40.33532485 N	73.48988795 W	98
SPI_PV	026	D	7/11/2019	2:20:43	628274.61	4466072.73	40.33534603 N	73.48986157 W	98
SPI_PV	026	E	7/11/2019	2:21:12	628281.88	4466077.94	40.33539183 N	73.489775 W	98
SPI_PV	026	F	7/11/2019	2:22:27	628266.84	4466064.63	40.33527424 N	73.48995458 W	98
SPI_PV	026	G	7/11/2019	2:23:21	628268.55	4466069.32	40.33531621 N	73.4899336 W	98
SPI_PV	026	H	7/11/2019	10:09:49	628269.42	4466072.46	40.33534432 N	73.48992267 W	98
SPI_PV	026	I	7/11/2019	10:10:26	628263.5	4466072.15	40.3353425 N	73.48999244 W	98
SPI_PV	026	J	7/11/2019	10:10:56	628260.64	4466068.83	40.33531305 N	73.49002675 W	98
SPI_PV	026	K	7/11/2019	10:11:31	628262.99	4466063.41	40.33526387 N	73.49000021 W	98
SPI_PV	027	A	7/11/2019	10:39:07	628408.38	4467921.56	40.35197619 N	73.48791541 W	97
SPI_PV	027	B	7/11/2019	10:39:50	628410.8	4467917.8	40.35194201 N	73.48788764 W	97
SPI_PV	027	C	7/11/2019	10:40:35	628412.26	4467917.79	40.3519417 N	73.48787052 W	97
SPI_PV	027	D	7/11/2019	10:41:20	628411.24	4467917.83	40.35194216 N	73.48788247 W	97
SPI_PV	028	A	7/11/2019	10:56:35	628382.67	4469784.97	40.36876224 N	73.48784308 W	88
SPI_PV	028	B	7/11/2019	10:57:31	628376.65	4469776.48	40.3686867 N	73.48791562 W	88
SPI_PV	028	C	7/11/2019	10:58:20	628378.97	4469773.29	40.36865756 N	73.48788896 W	88
SPI_PV	028	D	7/11/2019	10:58:54	628378.02	4469776.35	40.3686853 N	73.48789954 W	88
SPI_PV	029	A	7/11/2019	11:15:09	628344.25	4471637.71	40.38545405 N	73.48792245 W	89
SPI_PV	029	B	7/11/2019	11:15:45	628348.55	4471631.44	40.38539689 N	73.487873 W	89

SampleType	StationID	Replicate	Date	Time	X_UTM_18N_m	Y_UTM_18N_m	Latitude_WGS84	Longitude_WGS84	Depth_ft
SPI_PV	029	C	7/11/2019	11:16:30	628352.83	4471633.5	40.38541483 N	73.48782221 W	89
SPI_PV	029	D	7/11/2019	11:17:09	628352.08	4471640.94	40.38548191 N	73.48782954 W	89
SPI_PV	030	A	7/10/2019	3:04:21	646372.57	4461665.55	40.29268105 N	73.27789409 W	123
SPI_PV	030	B	7/10/2019	3:06:38	646375.47	4461669.79	40.29271873 N	73.27785907 W	123
SPI_PV	030	C	7/10/2019	3:08:36	646370.35	4461655.53	40.29259125 N	73.27792244 W	123
SPI_PV	030	D	7/10/2019	3:10:21	646365.64	4461662.48	40.29265466 N	73.27797626 W	123
SPI_PV	030	E	7/10/2019	3:11:42	646368.21	4461664.19	40.29266958 N	73.27794564 W	123
SPI_PV	031	A	7/10/2019	4:08:05	646058.08	4463492.63	40.30918938 N	73.28117548 W	117
SPI_PV	031	B	7/10/2019	4:09:29	646064.09	4463491.77	40.3091806 N	73.28110502 W	117
SPI_PV	031	C	7/10/2019	4:10:17	646063.77	4463491.75	40.30918046 N	73.28110878 W	117
SPI_PV	031	D	7/10/2019	4:11:22	646056.65	4463491.04	40.30917532 N	73.28119268 W	117
SPI_PV	032	A	7/10/2019	4:43:38	645750.75	4465327.8	40.32576923 N	73.28437236 W	118
SPI_PV	032	B	7/10/2019	4:44:37	645743.89	4465321.04	40.32570959 N	73.28445461 W	118
SPI_PV	032	C	7/10/2019	4:45:54	645748.62	4465328.61	40.32577689 N	73.28439714 W	118
SPI_PV	032	D	7/10/2019	4:46:53	645743.88	4465332.86	40.32581601 N	73.28445202 W	118
SPI_PV	032	E	7/10/2019	4:52:42	645751.97	4465325.26	40.3257462 N	73.28435852 W	118
SPI_PV	033	A	7/10/2019	5:34:44	644702.6	4466659.86	40.33794716 N	73.29640318 W	110
SPI_PV	033	B	7/10/2019	5:35:41	644702.81	4466651.09	40.33786816 N	73.29640269 W	110
SPI_PV	033	C	7/10/2019	5:36:55	644702.69	4466654.17	40.33789587 N	73.29640345 W	110
SPI_PV	033	D	7/10/2019	5:38:08	644701.66	4466660.87	40.33795638 N	73.29641396 W	110
SPI_PV	033	E	7/10/2019	5:39:11	644698.1	4466663.02	40.33797637 N	73.29645544 W	110
SPI_PV	034	A	7/10/2019	6:02:24	642907.23	4467143.16	40.34260876 N	73.31742342 W	109
SPI_PV	034	B	7/10/2019	6:03:21	642905.29	4467138.33	40.34256564 N	73.31744731 W	109
SPI_PV	034	C	7/10/2019	6:06:33	642904.58	4467146.87	40.34264267 N	73.31745368 W	109
SPI_PV	034	D	7/10/2019	6:07:22	642903.42	4467148.62	40.34265865 N	73.31746702 W	109
SPI_PV	035	A	7/10/2019	6:34:51	641101.03	4467598.93	40.34702053 N	73.3385802 W	110
SPI_PV	035	B	7/10/2019	6:35:50	641090.62	4467599.2	40.34702478 N	73.33870265 W	110
SPI_PV	035	C	7/10/2019	6:37:57	641105.67	4467599.37	40.34702374 N	73.3385255 W	110
SPI_PV	035	D	7/10/2019	6:39:07	641103.4	4467602.66	40.34705377 N	73.33855143 W	110
SPI_PV	035	E	7/10/2019	6:40:53	641102.64	4467602.47	40.3470522 N	73.33856048 W	110
SPI_PV	036	A	7/10/2019	6:59:10	639294.02	4468051.88	40.35140325 N	73.35974992 W	100
SPI_PV	036	B	7/10/2019	7:00:11	639302.61	4468051.18	40.35139552 N	73.35964901 W	100
SPI_PV	036	C	7/10/2019	7:01:07	639296.64	4468053.04	40.35141329 N	73.35971884 W	100

SampleType	StationID	Replicate	Date	Time	X_UTM_18N_m	Y_UTM_18N_m	Latitude_WGS84	Longitude_WGS84	Depth_ft
SPI_PV	036	D	7/10/2019	7:02:01	639295.21	4468047.25	40.35136135 N	73.35973701 W	100
SPI_PV	037	A	7/10/2019	7:20:30	637491.67	4468496.64	40.35570757 N	73.38086958 W	105
SPI_PV	037	B	7/10/2019	7:21:21	637490.82	4468497.74	40.35571763 N	73.38087936 W	105
SPI_PV	037	C	7/10/2019	7:22:14	637491.63	4468498.84	40.3557274 N	73.38086953 W	105
SPI_PV	037	D	7/10/2019	7:23:37	637494.69	4468506.19	40.35579312 N	73.38083189 W	105
SPI_PV	038	A	7/10/2019	7:44:31	635684.98	4468927.16	40.35988057 N	73.40204612 W	100
Grab	038	A	7/10/2019	10:38:37	635696.38	4468916.46	40.35978239 N	73.40191413 W	102
SPI_PV	038	B	7/10/2019	7:45:25	635687.5	4468925.35	40.35986392 N	73.40201682 W	100
SPI_PV	038	C	7/10/2019	7:46:17	635683.18	4468928.1	40.3598894 N	73.40206706 W	100
SPI_PV	038	D	7/10/2019	7:47:11	635687.56	4468929.79	40.35990386 N	73.40201515 W	100
SPI_PV	039	A	7/10/2019	8:08:54	633884.74	4469351.38	40.36399197 N	73.42315063 W	98
SPI_PV	039	B	7/10/2019	8:10:34	633877.12	4469354.06	40.36401735 N	73.42323989 W	98
SPI_PV	039	C	7/10/2019	8:11:28	633882.56	4469357.59	40.36404826 N	73.42317503 W	98
SPI_PV	039	D	7/10/2019	8:12:22	633880.66	4469358.71	40.36405863 N	73.42319713 W	98
SPI_PV	040	A	7/10/2019	8:32:13	632069.15	4469780.6	40.36814705 N	73.4444377 W	98
SPI_PV	040	B	7/10/2019	8:33:04	632066.05	4469776.1	40.36810699 N	73.44447507 W	98
SPI_PV	040	C	7/10/2019	8:33:53	632069.6	4469779.16	40.36813399 N	73.44443266 W	98
SPI_PV	040	D	7/10/2019	8:36:07	632066.31	4469780.45	40.36814613 N	73.44447116 W	98
SPI_PV	041	A	7/10/2019	8:54:14	630261.42	4470208.31	40.3722834 N	73.46563516 W	96
SPI_PV	041	B	7/10/2019	8:54:57	630264.29	4470203.86	40.37224284 N	73.46560235 W	96
SPI_PV	041	C	7/10/2019	8:55:45	630261.7	4470204	40.3722445 N	73.46563281 W	96
SPI_PV	041	D	7/10/2019	8:56:29	630258.55	4470204.34	40.37224808 N	73.46566979 W	96
SPI_PV	041	E	7/10/2019	8:57:33	630258.97	4470202.2	40.37222875 N	73.46566527 W	96
SPI_PV	042	A	7/10/2019	9:17:04	628667.42	4470961.01	40.37930984 N	73.4842529 W	94
SPI_PV	042	B	7/10/2019	9:18:50	628671.99	4470970.66	40.379396 N	73.48419714 W	94
SPI_PV	042	C	7/10/2019	9:19:36	628673.16	4470962.77	40.37932474 N	73.48418492 W	94
SPI_PV	042	D	7/10/2019	9:20:27	628674.24	4470968.15	40.37937309 N	73.48417112 W	94
SPI_PV	043	A	7/11/2019	11:29:44	628335.47	4472781.42	40.39575571 N	73.48779537 W	88
SPI_PV	043	B	7/11/2019	11:30:21	628332.57	4472791.47	40.3958467 N	73.48782748 W	88
SPI_PV	043	C	7/11/2019	11:31:10	628325.12	4472788.95	40.39582515 N	73.48791583 W	88
SPI_PV	043	D	7/11/2019	11:32:21	628326.25	4472782.22	40.39576436 N	73.48790381 W	88
SPI_PV	044	A	7/11/2019	11:47:18	628014.38	4474615.78	40.41232545 N	73.49120872 W	87
SPI_PV	044	B	7/11/2019	11:48:08	628011.77	4474606.76	40.41224462 N	73.49124129 W	87

SampleType	StationID	Replicate	Date	Time	X_UTM_18N_m	Y_UTM_18N_m	Latitude_WGS84	Longitude_WGS84	Depth_ft
SPI_PV	044	C	7/11/2019	11:49:21	628018.16	4474610.6	40.41227825 N	73.49116521 W	87
SPI_PV	044	D	7/11/2019	11:50:10	628017.4	4474612.31	40.41229373 N	73.49117382 W	87
SPI_PV	044	E	7/11/2019	11:50:48	628014.11	4474614.18	40.41231105 N	73.49121219 W	87
SPI_PV	045	A	7/11/2019	12:07:35	627742.32	4476452.65	40.42891017 N	73.49404531 W	83
SPI_PV	045	B	7/11/2019	12:09:06	627742.81	4476453.14	40.42891449 N	73.49403944 W	83
SPI_PV	045	C	7/11/2019	12:10:18	627739.69	4476454.75	40.42892943 N	73.49407589 W	83
SPI_PV	045	D	7/11/2019	12:11:28	627744.68	4476446.27	40.42885232 N	73.49401872 W	83
SPI_PV	046	A	7/11/2019	19:50:59	627510.26	4478296.01	40.44554702 N	73.49641025 W	84
SPI_PV	046	B	7/11/2019	19:52:17	627514.58	4478296.01	40.4455464 N	73.4963593 W	84
SPI_PV	046	C	7/11/2019	19:53:29	627515.75	4478295.21	40.44553905 N	73.49634574 W	84
SPI_PV	046	D	7/11/2019	19:54:44	627515.75	4478294.64	40.44553392 N	73.49634586 W	84
SPI_PV	047	A	7/11/2019	19:22:56	627357.71	4479511.9	40.4565207 N	73.49796471 W	81
SPI_PV	047	D	7/11/2019	19:26:47	627352.58	4479509.92	40.45650372 N	73.49802564 W	81
SPI_PV	047	E	7/11/2019	19:31:15	627354.76	4479512.41	40.45652582 N	73.49799939 W	81
SPI_PV	047	F	7/11/2019	19:32:39	627355.46	4479510.22	40.45650598 N	73.49799162 W	81
SPI_PV	048	A	7/11/2019	12:24:30	626854.18	4477127.75	40.43512601 N	73.50437745 W	77
SPI_PV	048	B	7/11/2019	12:25:46	626855.22	4477131.49	40.43515951 N	73.50436446 W	77
SPI_PV	048	C	7/11/2019	12:27:04	626855.72	4477130.86	40.43515377 N	73.50435863 W	77
SPI_PV	048	D	7/11/2019	12:28:15	626854.05	4477130.67	40.43515231 N	73.5043784 W	77
SPI_PV	049	A	7/11/2019	12:41:59	625045.46	4477502.76	40.43877727 N	73.52562191 W	87
SPI_PV	049	B	7/11/2019	12:43:13	625041.04	4477507.61	40.43882167 N	73.52567299 W	87
SPI_PV	049	C	7/11/2019	12:44:24	625040.96	4477509.33	40.43883714 N	73.52567363 W	87
SPI_PV	049	D	7/11/2019	12:45:38	625043.3	4477507.34	40.43881886 N	73.52564648 W	87
SPI_PV	050	A	7/11/2019	12:59:47	623201.68	4477762.51	40.44139187 N	73.54730436 W	87
SPI_PV	050	B	7/11/2019	13:01:06	623200.46	4477762.73	40.44139398 N	73.54731874 W	87
SPI_PV	050	C	7/11/2019	13:02:14	623201.29	4477768.44	40.4414453 N	73.54730783 W	87
SPI_PV	050	D	7/11/2019	13:03:22	623200.25	4477760.21	40.4413713 N	73.54732163 W	87
SPI_PV	051	A	7/11/2019	13:18:27	621359.67	4477989.45	40.44370656 N	73.56897404 W	84
SPI_PV	051	B	7/11/2019	13:19:41	621356.9	4477991.09	40.44372173 N	73.56900636 W	84
SPI_PV	051	C	7/11/2019	13:20:52	621361.49	4477990.09	40.44371208 N	73.56895246 W	84
SPI_PV	051	D	7/11/2019	13:22:06	621360.71	4477995.51	40.44376106 N	73.56896064 W	84
SPI_PV	052	A	7/11/2019	14:06:29	619507.81	4478118.09	40.44513339 N	73.59077995 W	77
SPI_PV	052	B	7/11/2019	14:07:54	619509.17	4478116.07	40.44511496 N	73.59076432 W	77

SampleType	StationID	Replicate	Date	Time	X_UTM_18N_m	Y_UTM_18N_m	Latitude_WGS84	Longitude_WGS84	Depth_ft
SPI_PV	052	C	7/11/2019	14:09:10	619506.85	4478115.57	40.44511079 N	73.5907917 W	77
SPI_PV	052	D	7/11/2019	14:10:21	619508.71	4478118.61	40.44513796 N	73.59076928 W	77
SPI_PV	053	A	7/12/2019	20:56:49	617656.01	4478213.66	40.44625823 N	73.61259226 W	72
SPI_PV	053	B	7/12/2019	20:58:36	617651.44	4478210.68	40.44623206 N	73.6126467 W	72
SPI_PV	053	C	7/12/2019	21:00:00	617655.02	4478216.37	40.44628282 N	73.61260345 W	72
SPI_PV	053	D	7/12/2019	21:01:30	617655.14	4478210.4	40.44622904 N	73.6126032 W	72
SPI_PV	054	A	7/12/2019	21:19:28	615800.44	4478306.58	40.44735561 N	73.63445039 W	72
SPI_PV	054	B	7/12/2019	21:20:38	615797.65	4478310.7	40.44739313 N	73.6344826 W	72
SPI_PV	054	C	7/12/2019	21:22:20	615799.16	4478312.35	40.44740783 N	73.63446448 W	72
SPI_PV	054	D	7/12/2019	21:24:01	615798.57	4478308.69	40.44737492 N	73.63447212 W	72
SPI_PV	055	A	7/12/2019	23:58:51	613940.25	4478376.73	40.44824449 N	73.65636798 W	73
SPI_PV	055	B	7/13/2019	0:00:20	613941.55	4478377.48	40.44825108 N	73.65635251 W	73
SPI_PV	055	C	7/13/2019	0:01:54	613940.27	4478377.61	40.44825236 N	73.65636753 W	73
SPI_PV	055	D	7/13/2019	0:03:20	613942.18	4478377.84	40.44825421 N	73.65634502 W	73
SPI_PV	056	A	7/13/2019	0:22:09	612085.78	4478435.92	40.44902965 N	73.67822063 W	81
SPI_PV	056	B	7/13/2019	0:23:14	612082.96	4478436.34	40.44903387 N	73.67825385 W	81
SPI_PV	056	C	7/13/2019	0:23:58	612081.42	4478436.14	40.44903225 N	73.67827203 W	81
SPI_PV	056	D	7/13/2019	0:24:39	612080.6	4478436.61	40.44903662 N	73.67828161 W	81
SPI_PV	057	A	7/13/2019	0:44:29	610235.03	4478662.15	40.45131476 N	73.70000111 W	86
Grab	057	A	7/13/2019	15:12:58	610242.16	4478656.35	40.45126154 N	73.69991804 W	89
SPI_PV	057	B	7/13/2019	0:45:11	610239.25	4478661.69	40.45131006 N	73.69995136 W	86
SPI_PV	057	C	7/13/2019	0:45:54	610239.47	4478664.7	40.45133709 N	73.69994833 W	86
SPI_PV	057	D	7/13/2019	0:46:32	610236.82	4478666.42	40.45135294 N	73.6999792 W	86
SPI_PV	058	A	7/13/2019	1:08:11	608423.05	4479001.49	40.45460947 N	73.72130667 W	91
SPI_PV	058	B	7/13/2019	1:09:01	608420	4479001.69	40.45461163 N	73.72134256 W	91
SPI_PV	058	C	7/13/2019	1:09:42	608418.01	4479002.91	40.4546229 N	73.72136583 W	91
SPI_PV	058	D	7/13/2019	1:10:16	608415.72	4479003.98	40.45463283 N	73.72139273 W	91
SPI_PV	059	A	7/13/2019	1:29:51	606666.21	4479607.77	40.46029742 N	73.74191938 W	95
SPI_PV	059	B	7/13/2019	1:30:41	606666.73	4479609.85	40.4603161 N	73.74191295 W	95
SPI_PV	059	C	7/13/2019	1:31:24	606668.27	4479612.47	40.46033951 N	73.7418943 W	95
SPI_PV	059	D	7/13/2019	1:31:57	606668.46	4479613.95	40.46035283 N	73.74189184 W	95
SPI_PV	060	A	7/13/2019	1:54:40	604970.57	4480387.49	40.46753631 N	73.76178532 W	95
Grab	060	A	7/13/2019	14:37:17	604972.9	4480384.29	40.46750721 N	73.76175839 W	95

SampleType	StationID	Replicate	Date	Time	X_UTM_18N_m	Y_UTM_18N_m	Latitude_WGS84	Longitude_WGS84	Depth_ft
SPI_PV	060	B	7/13/2019	1:55:23	604976.73	4480390.18	40.46755974 N	73.76171217 W	95
SPI_PV	060	C	7/13/2019	1:56:07	604971.37	4480384.27	40.46750719 N	73.76177637 W	95
SPI_PV	060	D	7/13/2019	1:56:46	604968.26	4480379.9	40.46746823 N	73.76181385 W	95
SPI_PV	061	A	7/13/2019	2:18:49	603279.02	4481153.82	40.47465066 N	73.78160945 W	91
SPI_PV	061	B	7/13/2019	2:19:38	603281.98	4481152.87	40.4746417 N	73.78157467 W	91
SPI_PV	061	C	7/13/2019	2:20:22	603278.54	4481155.82	40.47466874 N	73.78161485 W	91
SPI_PV	061	D	7/13/2019	2:20:58	603279.33	4481156.95	40.47467877 N	73.78160527 W	91
SPI_PV	062	A	7/13/2019	2:40:28	601582.97	4481913.94	40.48170627 N	73.80149191 W	87
SPI_PV	062	B	7/13/2019	2:41:22	601583.67	4481918.68	40.48174893 N	73.80148289 W	87
SPI_PV	062	C	7/13/2019	2:42:05	601583.63	4481918.54	40.48174765 N	73.80148339 W	87
SPI_PV	062	D	7/13/2019	2:42:46	601588.75	4481919.31	40.48175391 N	73.80142292 W	87
SPI_PV	063	A	7/11/2019	18:30:59	626809.02	4481260.57	40.47235314 N	73.50408436 W	74
SPI_PV	063	B	7/11/2019	18:32:23	626807.61	4481260.32	40.47235115 N	73.50410103 W	74
SPI_PV	063	C	7/11/2019	18:33:33	626807.76	4481261.39	40.47236075 N	73.50409902 W	74
SPI_PV	063	D	7/11/2019	18:34:44	626812.67	4481262.55	40.47237047 N	73.50404091 W	74
SPI_PV	064	A	7/11/2019	17:43:57	625664.46	4481835.66	40.47770635 N	73.517468 W	72
SPI_PV	064	B	7/11/2019	17:45:36	625669.06	4481840.3	40.4777475 N	73.5174129 W	72
SPI_PV	064	C	7/11/2019	17:46:51	625668.72	4481838.6	40.4777322 N	73.51741724 W	72
SPI_PV	064	D	7/11/2019	17:48:07	625669.81	4481835.62	40.47770518 N	73.517405 W	72
SPI_PV	065	A	7/11/2019	16:59:27	623816.52	4481999.43	40.47945884 N	73.53923045 W	77
SPI_PV	065	B	7/11/2019	17:00:44	623819.82	4481990	40.47937346 N	73.53919336 W	77
SPI_PV	065	C	7/11/2019	17:01:52	623822.66	4481991.53	40.47938676 N	73.53915959 W	77
SPI_PV	065	D	7/11/2019	17:03:13	623820.46	4481989.74	40.47937101 N	73.53918581 W	77
SPI_PV	066	A	7/11/2019	16:38:29	621965.98	4482066.39	40.48033574 N	73.56104333 W	82
SPI_PV	066	B	7/11/2019	16:39:56	621965.56	4482070.94	40.48037684 N	73.56104744 W	82
SPI_PV	066	C	7/11/2019	16:41:20	621964.02	4482068.1	40.48035147 N	73.56106619 W	82
SPI_PV	066	D	7/11/2019	16:42:39	621962.13	4482072.69	40.48039306 N	73.56108762 W	82
SPI_PV	067	A	7/11/2019	16:19:03	620107.17	4482147.13	40.48133386 N	73.58295194 W	77
SPI_PV	067	B	7/11/2019	16:20:18	620110.45	4482149.52	40.48135487 N	73.58291281 W	77
SPI_PV	067	C	7/11/2019	16:21:40	620106.36	4482149.88	40.48135873 N	73.582961 W	77
SPI_PV	067	D	7/11/2019	16:22:54	620109.69	4482143.98	40.48130514 N	73.5829228 W	77
SPI_PV	068	A	7/11/2019	16:00:52	618249.54	4482191.89	40.48200359 N	73.60485402 W	70
SPI_PV	068	B	7/11/2019	16:02:08	618249.93	4482189.37	40.4819808 N	73.60484992 W	70

SampleType	StationID	Replicate	Date	Time	X_UTM_18N_m	Y_UTM_18N_m	Latitude_WGS84	Longitude_WGS84	Depth_ft
SPI_PV	068	C	7/11/2019	16:03:17	618250.93	4482195.21	40.48203329 N	73.60483708 W	70
SPI_PV	068	D	7/11/2019	16:04:33	618253.07	4482195.77	40.48203799 N	73.60481165 W	70
SPI_PV	069	A	7/11/2019	15:41:27	616390.1	4482240.49	40.48270398 N	73.62677738 W	70
SPI_PV	069	B	7/11/2019	15:42:54	616392.93	4482237.32	40.48267509 N	73.62674455 W	70
SPI_PV	069	C	7/11/2019	15:44:10	616394.07	4482243.31	40.48272886 N	73.62673 W	70
SPI_PV	069	D	7/11/2019	15:45:31	616393.15	4482240.22	40.48270117 N	73.62674142 W	70
SPI_PV	070	A	7/12/2019	20:11:23	614532.91	4482288.82	40.4833975 N	73.64867474 W	76
SPI_PV	070	B	7/12/2019	20:12:52	614531.68	4482286.48	40.48337661 N	73.64868968 W	76
SPI_PV	070	C	7/12/2019	20:14:22	614531.9	4482287.6	40.48338672 N	73.64868689 W	76
SPI_PV	070	D	7/12/2019	20:16:12	614535.25	4482285.86	40.48337054 N	73.64864768 W	76
SPI_PV	071	A	7/12/2019	19:53:16	612675.05	4482369.39	40.48437736 N	73.67057496 W	71
SPI_PV	071	B	7/12/2019	19:54:46	612676.1	4482370.42	40.48438651 N	73.6705624 W	71
SPI_PV	071	C	7/12/2019	19:56:20	612677.61	4482370.77	40.48438948 N	73.67054445 W	71
SPI_PV	071	D	7/12/2019	19:57:48	612678.14	4482369.82	40.48438086 N	73.67053838 W	71
SPI_PV	072	A	7/12/2019	19:35:25	610819.15	4482421.35	40.48509515 N	73.69245763 W	74
SPI_PV	072	B	7/12/2019	19:37:01	610820.45	4482422.44	40.48510475 N	73.69244214 W	74
SPI_PV	072	C	7/12/2019	19:38:30	610821.08	4482420.09	40.48508356 N	73.6924351 W	74
SPI_PV	072	D	7/12/2019	19:40:07	610818.55	4482423.51	40.48511466 N	73.69246434 W	74
SPI_PV	073	A	7/12/2019	19:18:27	608965.16	4482409.85	40.48523693 N	73.71432939 W	81
SPI_PV	073	B	7/12/2019	19:19:53	608960.37	4482414.16	40.48527644 N	73.71438514 W	81
SPI_PV	073	C	7/12/2019	19:21:23	608962.76	4482412.64	40.48526239 N	73.71435726 W	81
SPI_PV	073	D	7/12/2019	19:22:55	608959.11	4482410.66	40.48524508 N	73.71440065 W	81
SPI_PV	074	A	7/12/2019	18:45:55	607102.78	4482404.01	40.48542671 N	73.73629932 W	86
SPI_PV	074	B	7/12/2019	18:47:31	607103.81	4482401.14	40.48540068 N	73.73628772 W	86
SPI_PV	074	C	7/12/2019	18:48:56	607103.52	4482402.67	40.48541453 N	73.73629081 W	86
SPI_PV	074	D	7/12/2019	18:50:31	607105.86	4482402.58	40.48541343 N	73.73626326 W	86
SPI_PV	074	E	7/12/2019	19:00:06	607106.98	4482401.96	40.48540768 N	73.73625008 W	86
SPI_PV	074	F	7/12/2019	19:01:43	607105.49	4482401.05	40.48539971 N	73.73626785 W	86
SPI_PV	074	G	7/12/2019	19:03:30	607105.08	4482401.51	40.48540384 N	73.7362726 W	86
SPI_PV	074	H	7/12/2019	19:05:10	607105.85	4482402.91	40.48541634 N	73.73626329 W	86
SPI_PV	075	A	7/12/2019	18:25:48	605249.42	4482397.16	40.48560196 N	73.75816326 W	91
SPI_PV	075	B	7/12/2019	18:27:19	605243.88	4482397.69	40.48560748 N	73.75822858 W	91
SPI_PV	075	C	7/12/2019	18:28:56	605244.07	4482396.27	40.48559462 N	73.75822647 W	91

SampleType	StationID	Replicate	Date	Time	X_UTM_18N_m	Y_UTM_18N_m	Latitude_WGS84	Longitude_WGS84	Depth_ft
SPI_PV	075	D	7/12/2019	18:30:26	605246.58	4482396.25	40.48559417 N	73.75819696 W	91
SPI_PV	076	A	7/12/2019	17:52:56	603386.09	4482405.36	40.48590998 N	73.78014254 W	90
Grab	076	A	7/13/2019	14:16:00	603383.5	4482403.17	40.48589059 N	73.78017352 W	87
SPI_PV	076	B	7/12/2019	17:54:35	603384.31	4482401.41	40.48587465 N	73.78016416 W	90
SPI_PV	076	C	7/12/2019	17:56:10	603386.32	4482401.63	40.48587639 N	73.78014048 W	90
SPI_PV	076	D	7/12/2019	17:57:37	603385	4482403.56	40.48589388 N	73.78015571 W	90
SPI_PV	077	A	7/12/2019	17:33:02	601526.54	4482405.58	40.48614142 N	73.80207891 W	86
SPI_PV	077	B	7/12/2019	17:34:38	601529.03	4482406.98	40.48615373 N	73.80204928 W	86
SPI_PV	077	C	7/12/2019	17:36:03	601524.7	4482404.61	40.48613295 N	73.80210076 W	86
SPI_PV	077	D	7/12/2019	17:37:39	601529.12	4482403.11	40.48611884 N	73.80204885 W	86
SPI_PV	078	A	7/11/2019	18:45:49	627135.8	4480973.65	40.46971921 N	73.50028818 W	77
SPI_PV	078	B	7/11/2019	18:47:20	627133.58	4480964.79	40.4696398 N	73.50031615 W	77
SPI_PV	078	C	7/11/2019	18:48:37	627136.62	4480967.76	40.46966606 N	73.50027973 W	77
SPI_PV	078	D	7/11/2019	18:49:52	627133.11	4480968.42	40.46967256 N	73.500321 W	77
SPI_PV	079	A	7/12/2019	4:58:37	626749.45	4482789.32	40.4861301 N	73.50448128 W	80
SPI_PV	079	B	7/12/2019	4:59:36	626746.72	4482784.83	40.48609015 N	73.50451441 W	80
SPI_PV	079	C	7/12/2019	5:00:22	626744.9	4482784.98	40.48609178 N	73.5045358 W	80
SPI_PV	079	D	7/12/2019	5:01:01	626746.96	4482788.82	40.48612598 N	73.50451078 W	80
SPI_PV	080	A	7/12/2019	5:41:01	626365.78	4484604.67	40.50253761 N	73.50864475 W	69
SPI_PV	080	B	7/12/2019	5:41:58	626362.09	4484609.26	40.50257953 N	73.50868733 W	69
SPI_PV	080	C	7/12/2019	5:42:35	626364.84	4484614.71	40.50262819 N	73.50865383 W	69
SPI_PV	080	D	7/12/2019	5:43:32	626364.54	4484608.2	40.50256962 N	73.5086587 W	69
SPI_PV	081	A	7/11/2019	19:02:48	627260.95	4480382.73	40.46437826 N	73.49893087 W	83
SPI_PV	081	B	7/11/2019	19:04:23	627257.56	4480384.29	40.46439283 N	73.49897059 W	83
SPI_PV	081	C	7/11/2019	19:05:35	627258.23	4480386.51	40.46441267 N	73.49896224 W	83
SPI_PV	081	D	7/11/2019	19:06:47	627254.73	4480378.44	40.46434059 N	73.49900512 W	83
SPI_PV	082	A	7/12/2019	4:18:41	627035.34	4482455.05	40.48307603 N	73.50117616 W	76
SPI_PV	082	B	7/12/2019	4:19:45	627029.29	4482459.29	40.48311515 N	73.50124662 W	76
SPI_PV	082	C	7/12/2019	4:20:30	627031.98	4482462.43	40.48314302 N	73.50121434 W	76
SPI_PV	082	D	7/12/2019	4:21:33	627034.81	4482463.55	40.48315262 N	73.5011807 W	76
SPI_PV	083	A	7/12/2019	5:26:25	626835.52	4484300.89	40.49973011 N	73.50316354 W	76
SPI_PV	083	B	7/12/2019	5:27:10	626837.99	4484304.59	40.4997631 N	73.50313369 W	76
SPI_PV	083	C	7/12/2019	5:27:53	626838.68	4484304.13	40.49975886 N	73.50312561 W	76

SampleType	StationID	Replicate	Date	Time	X_UTM_18N_m	Y_UTM_18N_m	Latitude_WGS84	Longitude_WGS84	Depth_ft
SPI_PV	083	D	7/12/2019	5:28:49	626835.3	4484304.02	40.49975839 N	73.50316551 W	76
SPI_PV	084	A	7/12/2019	6:00:51	626636.72	4486155.58	40.5164637 N	73.50513801 W	62
SPI_PV	084	B	7/12/2019	6:01:37	626635.06	4486155.73	40.51646534 N	73.50515759 W	62
SPI_PV	084	C	7/12/2019	6:02:25	626640.41	4486152.06	40.5164314 N	73.50509522 W	62
SPI_PV	084	D	7/12/2019	6:03:05	626643.36	4486155.97	40.51646622 N	73.50505956 W	62
SPI_PV	085	A	7/12/2019	6:43:33	626565.5	4488012.69	40.53319952 N	73.50560692 W	66
SPI_PV	085	B	7/12/2019	6:44:27	626560.85	4488012.3	40.53319678 N	73.50566198 W	66
SPI_PV	085	C	7/12/2019	6:45:10	626563.58	4488008.86	40.53316539 N	73.50563036 W	66
SPI_PV	085	D	7/12/2019	6:45:56	626565.9	4488003.16	40.5331137 N	73.50560418 W	66
SPI_PV	086	A	7/12/2019	7:18:02	626568.58	4489860.28	40.54983829 N	73.50520076 W	51
SPI_PV	086	B	7/12/2019	7:18:55	626572.88	4489857.21	40.54980992 N	73.50515051 W	51
SPI_PV	086	C	7/12/2019	7:19:49	626573.17	4489862.77	40.54985995 N	73.50514599 W	51
SPI_PV	086	D	7/12/2019	7:20:41	626575.44	4489868.64	40.54991253 N	73.50511803 W	51
SPI_PV	087	A	7/12/2019	7:36:48	626581.63	4491728.67	40.56666273 N	73.50467227 W	43
SPI_PV	087	B	7/12/2019	7:38:06	626574.72	4491719.98	40.56658554 N	73.50475554 W	43
SPI_PV	087	C	7/12/2019	7:38:50	626578.4	4491727.11	40.56664917 N	73.5047107 W	43
SPI_PV	087	D	7/12/2019	7:39:38	626584.39	4491725.13	40.56663043 N	73.50464039 W	43
SPI_PV	088	A	7/12/2019	7:57:25	626584.34	4493020.43	40.57829564 N	73.50438113 W	36
SPI_PV	088	B	7/12/2019	7:58:16	626584.51	4493017.04	40.57826517 N	73.50437985 W	36
SPI_PV	088	C	7/12/2019	7:58:59	626588.68	4493011.53	40.57821491 N	73.50433165 W	36
SPI_PV	088	D	7/12/2019	7:59:44	626588.53	4493012.42	40.57822291 N	73.50433333 W	36
SPI_PV	089	A	7/13/2019	3:52:20	600066.12	4482413.48	40.48638987 N	73.8193057 W	80
SPI_PV	089	B	7/13/2019	3:53:44	600068.59	4482408.99	40.48634911 N	73.8192773 W	80
SPI_PV	089	C	7/13/2019	3:54:35	600072.68	4482404.81	40.48631099 N	73.81922974 W	80
SPI_PV	089	D	7/13/2019	3:55:12	600070.59	4482401.28	40.48627945 N	73.81925492 W	80
SPI_PV	090	A	7/13/2019	4:14:51	598212.13	4482405.99	40.4865438 N	73.84117806 W	70
SPI_PV	090	B	7/13/2019	4:15:38	598210.14	4482409.07	40.4865718 N	73.84120105 W	70
SPI_PV	090	C	7/13/2019	4:16:20	598211.03	4482405.71	40.48654142 N	73.84119114 W	70
SPI_PV	090	D	7/13/2019	4:16:59	598215.71	4482404.67	40.48653154 N	73.84113606 W	70
SPI_PV	091	A	7/13/2019	4:37:10	596358.46	4482416.76	40.48685802 N	73.86304412 W	60
Grab	091	A	7/13/2019	13:40:36	596353.35	4482414.44	40.48683776 N	73.86310469 W	57
SPI_PV	091	B	7/13/2019	4:37:57	596353.21	4482420.71	40.48689424 N	73.86310541 W	60
SPI_PV	091	C	7/13/2019	4:38:43	596350.78	4482416.08	40.48685278 N	73.86313487 W	60

SampleType	StationID	Replicate	Date	Time	X_UTM_18N_m	Y_UTM_18N_m	Latitude_WGS84	Longitude_WGS84	Depth_ft
SPI_PV	091	D	7/13/2019	4:39:26	596353.92	4482416.01	40.48685185 N	73.86309781 W	60
SPI_PV	092	A	7/13/2019	4:56:59	594504.36	4482470.86	40.48755849 N	73.88490899 W	55
SPI_PV	092	B	7/13/2019	4:57:46	594496.63	4482468.79	40.48754066 N	73.88500049 W	55
SPI_PV	092	C	7/13/2019	4:58:24	594497.73	4482467.3	40.48752711 N	73.88498781 W	55
SPI_PV	092	D	7/13/2019	4:59:14	594499.94	4482466.15	40.48751652 N	73.88496192 W	55
SPI_PV	093	A	7/13/2019	5:20:09	592714.83	4482911.55	40.49172968 N	73.9059562 W	44
SPI_PV	093	B	7/13/2019	5:20:53	592710.74	4482908.77	40.49170509 N	73.90600488 W	44
SPI_PV	093	C	7/13/2019	5:21:38	592712.99	4482912.89	40.49174196 N	73.9059777 W	44
SPI_PV	093	D	7/13/2019	5:22:29	592715.44	4482909.19	40.49170834 N	73.90594933 W	44
SPI_PV	094	A	7/13/2019	5:39:48	591049.78	4483733.65	40.49931904 N	73.92548243 W	44
SPI_PV	094	B	7/13/2019	5:40:40	591049.03	4483731.46	40.49929936 N	73.9254916 W	44
SPI_PV	094	C	7/13/2019	5:41:22	591042.78	4483730.6	40.49929232 N	73.92556547 W	44
SPI_PV	094	D	7/13/2019	5:42:07	591043.64	4483726.54	40.49925568 N	73.92555596 W	44
SPI_PV	094	E	7/13/2019	5:42:43	591046.21	4483720.89	40.49920445 N	73.9255264 W	44
SPI_PV	095	A	7/13/2019	6:01:21	589433.49	4484637.11	40.50763269 N	73.94442636 W	30
Grab	095	A	7/13/2019	13:00:56	589430.97	4484637.29	40.50763462 N	73.94445601 W	26
SPI_PV	095	B	7/13/2019	6:02:08	589435.66	4484635.88	40.50762138 N	73.94440096 W	30
SPI_PV	095	C	7/13/2019	6:02:46	589432.73	4484634.88	40.50761265 N	73.94443558 W	30
SPI_PV	095	D	7/13/2019	6:03:26	589429.4	4484633.46	40.50760029 N	73.94447509 W	30
SPI_PV	096	A	7/13/2019	6:17:55	587759.48	4485440.92	40.51505178 N	73.96406997 W	23
SPI_PV	096	B	7/13/2019	6:18:41	587758.21	4485439.52	40.51503934 N	73.96408519 W	23
SPI_PV	096	C	7/13/2019	6:19:23	587754.11	4485436.24	40.51501025 N	73.96413403 W	23
SPI_PV	096	D	7/13/2019	6:20:00	587751.15	4485438.22	40.51502842 N	73.96416864 W	23
SPI_PV	097	A	7/13/2019	6:37:05	586021.2	4486092.46	40.52110275 N	73.98449731 W	33
SPI_PV	097	B	7/13/2019	6:37:45	586019.55	4486092.5	40.52110323 N	73.98451677 W	33
SPI_PV	097	C	7/13/2019	6:38:23	586019.3	4486093.4	40.52111141 N	73.98451968 W	33
SPI_PV	097	E	7/13/2019	6:41:22	586019.17	4486092.93	40.52110717 N	73.98452123 W	33
SPI_PV	098	A	7/12/2019	6:15:59	625886.68	4486536.4	40.52000756 N	73.51391318 W	58
SPI_PV	098	B	7/12/2019	6:16:36	625883.29	4486540.66	40.52004643 N	73.5139523 W	58
SPI_PV	098	C	7/12/2019	6:17:27	625882.7	4486532.25	40.51997078 N	73.51396093 W	58
SPI_PV	098	D	7/12/2019	6:18:11	625883.56	4486535.35	40.51999852 N	73.5139502 W	58
SPI_PV	099	A	7/12/2019	10:08:50	624556.66	4487692.76	40.53062252 N	73.52938144 W	58
SPI_PV	099	B	7/12/2019	10:09:32	624563.68	4487691.92	40.53061395 N	73.52929876 W	58

SampleType	StationID	Replicate	Date	Time	X_UTM_18N_m	Y_UTM_18N_m	Latitude_WGS84	Longitude_WGS84	Depth_ft
SPI_PV	099	C	7/12/2019	10:10:57	624556.61	4487696.25	40.53065404 N	73.52938131 W	58
SPI_PV	099	D	7/12/2019	10:11:43	624557.63	4487701.51	40.53070119 N	73.5293682 W	58
SPI_PV	100	A	7/12/2019	10:31:01	622774.63	4488219.03	40.53562807 N	73.55031291 W	50
SPI_PV	100	B	7/12/2019	10:31:52	622779.93	4488218.82	40.53562531 N	73.55025042 W	50
SPI_PV	100	C	7/12/2019	10:32:44	622783.11	4488221.2	40.53564633 N	73.55021235 W	50
SPI_PV	100	D	7/12/2019	10:33:27	622781.76	4488221.26	40.5356471 N	73.55022837 W	50
SPI_PV	101	A	7/12/2019	10:51:58	620994.55	4488743.59	40.54061403 N	73.571225 W	48
SPI_PV	101	B	7/12/2019	10:53:06	620993.96	4488746.86	40.54064364 N	73.5712313 W	48
SPI_PV	101	C	7/12/2019	10:53:48	620998.64	4488750.08	40.54067195 N	73.57117543 W	48
SPI_PV	101	D	7/12/2019	10:54:35	621000.56	4488748.12	40.54065395 N	73.57115309 W	48
SPI_PV	102	A	7/12/2019	6:28:22	625836.63	4487149.24	40.52553431 N	73.51438191 W	57
SPI_PV	102	B	7/12/2019	6:29:17	625836.15	4487137.6	40.52542959 N	73.5143899 W	57
SPI_PV	102	C	7/12/2019	6:30:02	625836.41	4487139.8	40.5254494 N	73.51438636 W	57
SPI_PV	102	D	7/12/2019	6:31:08	625843.32	4487140.31	40.52545289 N	73.51430472 W	57
SPI_PV	103	A	7/12/2019	7:03:49	625502.41	4488963.63	40.54192527 N	73.51796645 W	56
SPI_PV	103	B	7/12/2019	7:04:31	625504.93	4488967.52	40.54195994 N	73.51793585 W	56
SPI_PV	103	C	7/12/2019	7:05:14	625509.96	4488972.38	40.54200297 N	73.5178755 W	56
SPI_PV	103	D	7/12/2019	7:05:57	625515.38	4488974.1	40.54201765 N	73.51781125 W	56
SPI_PV	104	A	7/12/2019	9:37:22	625062.43	4490770.57	40.55826506 N	73.52280276 W	45
SPI_PV	104	B	7/12/2019	9:39:31	625061.63	4490761.95	40.55818754 N	73.52281398 W	45
SPI_PV	104	C	7/12/2019	9:40:23	625062	4490763.84	40.55820447 N	73.52280921 W	45
SPI_PV	104	D	7/12/2019	9:41:12	625064.12	4490764.9	40.55821367 N	73.52278394 W	45
SPI_PV	105	A	7/12/2019	9:18:32	624563.4	4491954.92	40.56900642 N	73.5284617 W	37
SPI_PV	105	B	7/12/2019	9:19:38	624560.44	4491947.82	40.56894297 N	73.52849806 W	37
SPI_PV	105	C	7/12/2019	9:20:27	624565.35	4491947.48	40.56893913 N	73.52844013 W	37
SPI_PV	105	D	7/12/2019	9:21:13	624566.5	4491941.92	40.5688889 N	73.52842761 W	37
SPI_PV	106	A	7/12/2019	8:48:05	624125.61	4492856.23	40.57718932 N	73.53345476 W	32
SPI_PV	106	B	7/12/2019	8:48:55	624125.92	4492857.38	40.57719968 N	73.5334508 W	32
SPI_PV	106	C	7/12/2019	8:49:45	624124.17	4492860.88	40.57723143 N	73.53347083 W	32
SPI_PV	106	D	7/12/2019	8:50:54	624127.19	4492850.69	40.57713917 N	73.53343711 W	32
SPI_PV	106	E	7/12/2019	8:51:36	624126.46	4492845.52	40.57709275 N	73.53344678 W	32
SPI_PV	107	A	7/13/2019	7:02:02	583940.97	4487286.65	40.53207275 N	74.00889304 W	52
SPI_PV	107	B	7/13/2019	7:02:45	583941.38	4487287.13	40.53207702 N	74.00888809 W	52

SampleType	StationID	Replicate	Date	Time	X_UTM_18N_m	Y_UTM_18N_m	Latitude_WGS84	Longitude_WGS84	Depth_ft
SPI_PV	107	C	7/13/2019	7:03:24	583937.6	4487284.94	40.53205768 N	74.00893303 W	52
SPI_PV	107	D	7/13/2019	7:04:06	583940.94	4487289	40.53209394 N	74.00889303 W	52
SPI_PV	108	A	7/13/2019	7:36:16	583074.13	4488897.3	40.54666823 N	74.01891489 W	48
Grab	108	A	7/13/2019	12:22:52	583074.48	4488897.86	40.54667325 N	74.01891064 W	38
SPI_PV	108	B	7/13/2019	7:37:40	583070.77	4488899.45	40.5466879 N	74.01895425 W	48
SPI_PV	108	C	7/13/2019	7:38:18	583073.39	4488902.92	40.54671891 N	74.01892288 W	48
SPI_PV	108	D	7/13/2019	7:38:55	583072.56	4488905.66	40.54674371 N	74.01893228 W	48
SPI_PV	108	E	7/13/2019	7:39:19	583071.31	4488908.22	40.54676686 N	74.01894676 W	48
SPI_PV	108	F	7/13/2019	7:39:40	583071.88	4488910.52	40.54678757 N	74.01893966 W	48
SPI_PV	109	A	7/13/2019	7:58:33	582678.62	4490716.09	40.56309072 N	74.02334701 W	36
SPI_PV	109	B	7/13/2019	7:59:19	582679.55	4490713.91	40.56307106 N	74.02333638 W	36
SPI_PV	109	C	7/13/2019	7:59:59	582678.14	4490709.04	40.56302731 N	74.02335368 W	36
SPI_PV	109	D	7/13/2019	8:00:32	582678.53	4490705.64	40.56299664 N	74.02334954 W	36
SPI_PV	110	B	7/13/2019	8:19:46	582132.43	4492461.5	40.57886711 N	74.02957101 W	53
SPI_PV	110	C	7/13/2019	8:20:34	582137.09	4492458.91	40.57884332 N	74.02951634 W	53
SPI_PV	110	D	7/13/2019	8:21:12	582140.37	4492462	40.57887078 N	74.02947717 W	53
SPI_PV	110	E	7/13/2019	8:21:52	582136.16	4492464.08	40.57888998 N	74.02952664 W	53
SPI_PV	111	A	7/13/2019	8:41:44	581615.47	4494250.6	40.59503375 N	74.03544676 W	86
SPI_PV	111	B	7/13/2019	8:42:39	581615.91	4494247.67	40.59500736 N	74.03544199 W	86
SPI_PV	111	C	7/13/2019	8:43:15	581614.81	4494242.68	40.59496253 N	74.03545562 W	86
SPI_PV	111	D	7/13/2019	8:44:00	581615.25	4494240.41	40.59494202 N	74.03545069 W	86
SPI_PV	112	A	7/13/2019	9:06:19	581024.35	4496005.8	40.61090207 N	74.04220617 W	64
SPI_PV	112	B	7/13/2019	9:09:00	581020.57	4496007.49	40.61091764 N	74.0422506 W	64
SPI_PV	112	C	7/13/2019	9:11:01	581021.33	4496010.96	40.61094881 N	74.04224119 W	64
SPI_PV	112	D	7/13/2019	9:11:55	581019.57	4496006.7	40.61091058 N	74.0422625 W	64
SPI_PV	113	A	7/13/2019	9:43:00	580687.91	4497831.74	40.6273822 N	74.04594874 W	47
SPI_PV	113	B	7/13/2019	9:43:46	580682.09	4497823.89	40.62731206 N	74.04601856 W	47
SPI_PV	113	C	7/13/2019	9:44:58	580681.82	4497832.72	40.62739166 N	74.04602057 W	47
SPI_PV	113	D	7/13/2019	9:46:06	580686.27	4497827.46	40.62734381 N	74.0459687 W	47
SPI_PV	114	A	7/13/2019	10:07:32	581331	4499537.75	40.64268614 N	74.03812534 W	50
SPI_PV	114	B	7/13/2019	10:08:20	581333.64	4499538.56	40.64269317 N	74.038094 W	50
SPI_PV	114	C	7/13/2019	10:09:04	581333.58	4499537.78	40.64268616 N	74.03809486 W	50
SPI_PV	114	D	7/13/2019	10:09:44	581330.85	4499535.72	40.64266784 N	74.03812736 W	50

SampleType	StationID	Replicate	Date	Time	X_UTM_18N_m	Y_UTM_18N_m	Latitude_WGS84	Longitude_WGS84	Depth_ft
SPI_PV	114	E	7/13/2019	10:10:35	581330.67	4499531.87	40.64263322 N	74.03813005 W	50
SPI_PV	115	A	7/13/2019	10:28:43	582503.3	4500973.51	40.65550244 N	74.02407442 W	43
SPI_PV	115	B	7/13/2019	10:29:37	582503.85	4500978.81	40.65555007 N	74.0240672 W	43
SPI_PV	115	C	7/13/2019	10:30:27	582498.57	4500975.12	40.6555174 N	74.02413014 W	43
SPI_PV	115	D	7/13/2019	10:31:39	582500.8	4500969.58	40.6554673 N	74.02410452 W	43
SPI_PV	116	A	7/12/2019	11:15:28	619703.05	4489022.09	40.54330983 N	73.58641855 W	45
SPI_PV	116	B	7/12/2019	11:17:25	619704.2	4489038.64	40.54345877 N	73.58640185 W	45
SPI_PV	116	C	7/12/2019	11:18:11	619706.46	4489040.79	40.54347783 N	73.58637482 W	45
SPI_PV	116	D	7/12/2019	11:18:53	619708.12	4489034.25	40.5434186 N	73.58635642 W	45
SPI_PV	116	E	7/12/2019	11:19:34	619707.44	4489029.39	40.54337495 N	73.5863654 W	45
SPI_PV	117	A	7/12/2019	11:47:29	617879.23	4489386.94	40.54685725 N	73.60788212 W	46
SPI_PV	117	B	7/12/2019	11:48:16	617878.75	4489387.68	40.54686405 N	73.60788758 W	46
SPI_PV	117	C	7/12/2019	11:48:53	617884.65	4489384.61	40.54683554 N	73.60781852 W	46
SPI_PV	117	D	7/12/2019	11:49:31	617885.35	4489384.28	40.54683245 N	73.60781027 W	46
SPI_PV	118	A	7/12/2019	16:06:09	616315.47	4489690.73	40.54981434 N	73.62628859 W	47
SPI_PV	118	B	7/12/2019	16:07:40	616309.24	4489691.89	40.54982562 N	73.62636191 W	47
SPI_PV	118	C	7/12/2019	16:09:11	616308.69	4489689.17	40.54980127 N	73.62636898 W	47
SPI_PV	118	D	7/12/2019	16:10:40	616309.76	4489691.48	40.54982185 N	73.62635593 W	47
SPI_PV	119	A	7/12/2019	11:35:01	618461.07	4489358.57	40.5465188 N	73.60101793 W	45
SPI_PV	119	B	7/12/2019	11:35:44	618463.32	4489357.21	40.54650619 N	73.60099169 W	45
SPI_PV	119	C	7/12/2019	11:36:33	618462.47	4489355.04	40.54648682 N	73.60100213 W	45
SPI_PV	119	D	7/12/2019	11:37:13	618459.42	4489354.89	40.54648589 N	73.60103813 W	45
SPI_PV	120	A	7/12/2019	12:59:51	617461.22	4490804.66	40.55968504 N	73.61255368 W	36
SPI_PV	120	B	7/12/2019	13:01:44	617459.48	4490800.55	40.55964828 N	73.612575 W	36
SPI_PV	120	C	7/12/2019	13:03:13	617462.62	4490802.98	40.5596697 N	73.61253743 W	36
SPI_PV	120	D	7/12/2019	13:05:03	617460.56	4490802.64	40.55966692 N	73.61256181 W	36
SPI_PV	121	A	7/12/2019	13:26:45	616916.77	4492202.38	40.57235036 N	73.61872407 W	27
SPI_PV	121	B	7/12/2019	13:28:22	616914.16	4492199.18	40.57232188 N	73.61875554 W	27
SPI_PV	121	C	7/12/2019	13:29:46	616913.49	4492203.04	40.57235682 N	73.61876269 W	27
SPI_PV	121	D	7/12/2019	13:31:25	616915.69	4492195.68	40.5722902 N	73.61873813 W	27
SPI_PV	122	A	7/12/2019	15:53:52	615497.02	4489794.96	40.55086756 N	73.63593297 W	44
SPI_PV	122	B	7/12/2019	15:55:34	615501.67	4489793.45	40.55085333 N	73.6358784 W	44
SPI_PV	122	C	7/12/2019	15:57:09	615504.83	4489792.89	40.55084783 N	73.63584121 W	44

SampleType	StationID	Replicate	Date	Time	X_UTM_18N_m	Y_UTM_18N_m	Latitude_WGS84	Longitude_WGS84	Depth_ft
SPI_PV	122	D	7/12/2019	15:58:35	615500.01	4489793.56	40.55085453 N	73.63589797 W	44
SPI_PV	123	A	7/12/2019	15:17:32	613654.7	4489953.16	40.55254725 N	73.65765744 W	45
SPI_PV	123	B	7/12/2019	15:19:27	613652.42	4489950.25	40.55252136 N	73.65768483 W	45
SPI_PV	123	C	7/12/2019	15:21:05	613654.12	4489949.83	40.55251727 N	73.6576648 W	45
SPI_PV	123	D	7/12/2019	15:22:55	613654.04	4489943.98	40.55246466 N	73.65766679 W	45
SPI_PV	124	A	7/12/2019	15:03:17	613193.39	4490836.12	40.56056272 N	73.66294618 W	41
SPI_PV	124	B	7/12/2019	15:04:51	613193.74	4490832.8	40.56053281 N	73.66294257 W	41
SPI_PV	124	C	7/12/2019	15:06:18	613195.25	4490831.29	40.56051899 N	73.66292502 W	41
SPI_PV	124	D	7/12/2019	15:07:49	613195.42	4490827.57	40.56048542 N	73.66292377 W	41
SPI_PV	125	A	7/12/2019	15:31:56	614701.26	4490036.49	40.55315348 N	73.64528492 W	43
SPI_PV	125	B	7/12/2019	15:33:30	614696.59	4490037.95	40.5531673 N	73.64533979 W	43
SPI_PV	125	C	7/12/2019	15:35:06	614698.39	4490035.88	40.55314835 N	73.64531897 W	43
SPI_PV	125	D	7/12/2019	15:36:40	614700.06	4490036.01	40.55314929 N	73.64529919 W	43
SPI_PV	126	A	7/12/2019	14:51:47	613340.01	4491191.57	40.56374401 N	73.66115093 W	37
SPI_PV	126	B	7/12/2019	14:53:25	613338.1	4491188.65	40.56371799 N	73.66117406 W	37
SPI_PV	126	C	7/12/2019	14:55:06	613339.46	4491189.77	40.56372792 N	73.66115776 W	37
SPI_PV	126	D	7/12/2019	14:56:33	613339.5	4491193.92	40.56376525 N	73.66115656 W	37
SPI_PV	127	A	7/12/2019	15:42:02	615239.18	4490216.37	40.55469887 N	73.63890059 W	43
SPI_PV	127	B	7/12/2019	15:43:42	615233.76	4490217.65	40.55471119 N	73.63896426 W	43
SPI_PV	127	C	7/12/2019	15:45:21	615235.75	4490214.41	40.55468167 N	73.63894134 W	43
SPI_PV	127	D	7/12/2019	15:46:51	615232.03	4490212.89	40.55466854 N	73.63898558 W	43
SPI_PV	128	A	7/12/2019	14:32:22	614717.67	4491411.92	40.56553888 N	73.64484132 W	44
SPI_PV	128	B	7/12/2019	14:34:04	614711.52	4491411.37	40.56553478 N	73.64491404 W	44
SPI_PV	128	C	7/12/2019	14:35:37	614716.98	4491411.75	40.56553744 N	73.64484947 W	44
SPI_PV	128	D	7/12/2019	14:37:22	614715.78	4491414.74	40.56556457 N	73.64486319 W	44
SPI_PV	129	A	7/12/2019	13:50:03	614324.05	4492128.6	40.57204804 N	73.6493602 W	40
SPI_PV	129	B	7/12/2019	13:51:52	614322.82	4492130.1	40.57206174 N	73.64937446 W	40
SPI_PV	129	C	7/12/2019	13:53:33	614325.76	4492126.25	40.57202664 N	73.6493404 W	40
SPI_PV	129	D	7/12/2019	13:55:19	614328.08	4492125.87	40.57202289 N	73.64931307 W	40
SPI_PV	130	A	7/12/2019	14:12:05	612857.52	4492212.81	40.57300769 N	73.66666641 W	31
SPI_PV	130	B	7/12/2019	14:13:48	612850.3	4492214.69	40.57302567 N	73.66675132 W	31
SPI_PV	130	C	7/12/2019	14:15:10	612855.32	4492219.98	40.57307255 N	73.66669109 W	31
SPI_PV	130	D	7/12/2019	14:16:44	612857.63	4492218.27	40.57305691 N	73.66666407 W	31

SampleType	StationID	Replicate	Date	Time	X_UTM_18N_m	Y_UTM_18N_m	Latitude_WGS84	Longitude_WGS84	Depth_ft
SPI_PV	131	A	7/11/2019	15:22:57	616727.09	4481632.25	40.47717865 N	73.62291447 W	69
SPI_PV	131	B	7/11/2019	15:24:15	616724.86	4481635.5	40.47720817 N	73.62294017 W	69
SPI_PV	131	C	7/11/2019	15:25:25	616727.81	4481636.97	40.47722104 N	73.62290513 W	69
SPI_PV	131	D	7/11/2019	15:26:40	616729.82	4481633.01	40.47718511 N	73.62288215 W	69
SPI_PV	132	A	7/11/2019	15:03:40	618383.72	4480612.96	40.46776403 N	73.60356615 W	75
SPI_PV	132	B	7/11/2019	15:04:54	618383.18	4480609.3	40.46773117 N	73.60357316 W	75
SPI_PV	132	C	7/11/2019	15:06:09	618380.33	4480611.22	40.46774883 N	73.60360637 W	75
SPI_PV	132	D	7/11/2019	15:07:37	618383.12	4480613.08	40.46776518 N	73.60357314 W	75
SPI_PV	133	A	7/11/2019	14:45:48	619412.58	4478922.93	40.45239572 N	73.5917512 W	79
Grab	133	A	7/13/2019	15:57:58	619409.76	4478925.84	40.45242238 N	73.59178398 W	79
SPI_PV	133	B	7/11/2019	14:47:05	619410.41	4478923.95	40.45240522 N	73.59177661 W	79
SPI_PV	133	C	7/11/2019	14:48:23	619411.8	4478927.41	40.45243625 N	73.5917596 W	79
SPI_PV	133	D	7/11/2019	14:49:34	619412.42	4478919.99	40.45236929 N	73.59175374 W	79
SPI_PV	134	A	7/11/2019	14:26:08	620095.61	4477065.07	40.4355648 N	73.5840497 W	80
SPI_PV	134	B	7/11/2019	14:27:29	620095.25	4477062.8	40.43554443 N	73.58405438 W	80
SPI_PV	134	C	7/11/2019	14:28:48	620097.44	4477061.73	40.43553444 N	73.58402878 W	80
SPI_PV	134	D	7/11/2019	14:30:02	620093.85	4477063.71	40.43555282 N	73.58407068 W	80
SPI_PV	135	A	7/11/2019	4:37:16	620538.91	4475120.09	40.41798353 N	73.57919335 W	76
SPI_PV	135	B	7/11/2019	4:38:08	620542.6	4475120.77	40.41798909 N	73.57914973 W	76
SPI_PV	135	C	7/11/2019	4:38:56	620547.5	4475115.87	40.41794426 N	73.57909292 W	76
SPI_PV	135	D	7/11/2019	4:40:53	620530.9	4475117.97	40.41796558 N	73.57928814 W	76
SPI_PV	135	E	7/11/2019	4:41:50	620531.26	4475126.14	40.41803913 N	73.57928241 W	76
SPI_PV	135	F	7/11/2019	8:07:25	620537.53	4475114.19	40.41793061 N	73.57921071 W	74
SPI_PV	135	G	7/11/2019	8:07:55	620538.47	4475114.82	40.41793615 N	73.57919959 W	74
SPI_PV	135	H	7/11/2019	8:08:18	620539.45	4475119.39	40.4179771 N	73.57918717 W	74
SPI_PV	135	I	7/11/2019	8:08:42	620540.33	4475120.75	40.41798922 N	73.57917647 W	74
SPI_PV	136	A	7/11/2019	4:16:19	620953.51	4473174.49	40.40040054 N	73.5746777 W	83
Grab	136	A	7/13/2019	16:32:29	620956.22	4473174.42	40.40039957 N	73.57464573 W	83
SPI_PV	136	B	7/11/2019	4:17:21	620963.02	4473174.97	40.40040353 N	73.57456556 W	83
SPI_PV	136	C	7/11/2019	4:18:51	620954.64	4473170.12	40.400361 N	73.57466522 W	83
SPI_PV	136	D	7/11/2019	4:19:45	620956.21	4473172.71	40.40038414 N	73.57464616 W	83
SPI_PV	136	E	7/11/2019	8:26:35	620954.78	4473183.18	40.4004786 N	73.57466107 W	80
SPI_PV	136	F	7/11/2019	8:27:42	620956.03	4473170.41	40.40036346 N	73.57464874 W	80

SampleType	StationID	Replicate	Date	Time	X_UTM_18N_m	Y_UTM_18N_m	Latitude_WGS84	Longitude_WGS84	Depth_ft
SPI_PV	136	G	7/11/2019	8:28:16	620954.88	4473173.75	40.40039374 N	73.57466168 W	80
SPI_PV	136	H	7/11/2019	8:28:42	620955.18	4473173.92	40.40039517 N	73.57465809 W	80
SPI_PV	137	A	7/11/2019	3:56:27	621693.43	4471339.35	40.38376487 N	73.56631159 W	91
SPI_PV	137	B	7/11/2019	3:57:11	621692.42	4471338.17	40.38375439 N	73.56632371 W	91
SPI_PV	137	C	7/11/2019	3:57:56	621696.22	4471345.41	40.38381896 N	73.5662776 W	91
SPI_PV	137	D	7/11/2019	3:58:42	621692.16	4471339.48	40.38376618 N	73.56632654 W	91
SPI_PV	137	E	7/11/2019	8:46:07	621691.18	4471347.31	40.38383688 N	73.5663366 W	90
SPI_PV	137	F	7/11/2019	8:46:40	621691.85	4471347.98	40.38384279 N	73.56632861 W	90
SPI_PV	137	G	7/11/2019	8:47:02	621692.99	4471347.17	40.38383534 N	73.56631535 W	90
SPI_PV	137	H	7/11/2019	8:47:32	621693.44	4471343.07	40.38379836 N	73.56631084 W	90
SPI_PV	138	A	7/11/2019	3:35:55	623212.23	4470093.98	40.37232548 N	73.5486645 W	90
SPI_PV	138	B	7/11/2019	3:36:41	623214.7	4470096.81	40.37235052 N	73.54863489 W	90
SPI_PV	138	C	7/11/2019	3:37:27	623217.87	4470094.94	40.37233327 N	73.54859801 W	90
SPI_PV	138	D	7/11/2019	3:38:06	623220.99	4470095.66	40.37233932 N	73.54856112 W	90
SPI_PV	138	E	7/11/2019	9:07:59	623218.85	4470101.41	40.37239142 N	73.5485852 W	86
SPI_PV	138	F	7/11/2019	9:08:27	623215.54	4470097.65	40.37235798 N	73.54862486 W	86
SPI_PV	138	G	7/11/2019	9:08:52	623213.53	4470092.79	40.37231451 N	73.54864949 W	86
SPI_PV	138	H	7/11/2019	9:09:19	623213.58	4470090.47	40.37229367 N	73.54864933 W	86
SPI_PV	139	A	7/11/2019	3:14:40	624927.35	4469075.16	40.36289441 N	73.52866781 W	88
SPI_PV	139	B	7/11/2019	3:15:28	624929.91	4469074.06	40.3628841 N	73.52863784 W	88
SPI_PV	139	C	7/11/2019	3:16:14	624930.2	4469067.17	40.36282207 N	73.52863577 W	88
SPI_PV	139	D	7/11/2019	3:17:01	624929.41	4469073.78	40.36288168 N	73.52864382 W	88
SPI_PV	139	E	7/11/2019	9:29:03	624920.5	4469065.99	40.36281286 N	73.52875015 W	85
SPI_PV	139	F	7/11/2019	9:29:29	624920.43	4469070.6	40.36285435 N	73.52875017 W	85
SPI_PV	139	G	7/11/2019	9:29:55	624922.68	4469074.84	40.36289221 N	73.52872275 W	85
SPI_PV	139	H	7/11/2019	9:30:22	624925.65	4469075.53	40.36289797 N	73.52868768 W	85
SPI_PV	140	A	7/11/2019	2:52:08	626634.46	4468046.81	40.35337545 N	73.50877276 W	93
SPI_PV	140	B	7/11/2019	2:52:52	626638.44	4468052.85	40.35342917 N	73.50872467 W	93
SPI_PV	140	C	7/11/2019	2:53:40	626629.66	4468046.82	40.35337627 N	73.50882925 W	93
SPI_PV	140	D	7/11/2019	2:54:28	626629.81	4468044.83	40.3533583 N	73.50882795 W	93
SPI_PV	140	E	7/11/2019	9:49:51	626634.48	4468047.43	40.35338103 N	73.50877243 W	89
SPI_PV	140	F	7/11/2019	9:50:32	626636.23	4468049.51	40.35339943 N	73.50875146 W	89
SPI_PV	140	G	7/11/2019	9:50:54	626637.72	4468049.72	40.3534011 N	73.50873384 W	89

SampleType	StationID	Replicate	Date	Time	X_UTM_18N_m	Y_UTM_18N_m	Latitude_WGS84	Longitude_WGS84	Depth_ft
SPI_PV	140	H	7/11/2019	9:51:16	626638.58	4468049.96	40.35340316 N	73.50872369 W	89
SPI_PV	141	A	7/10/2019	19:25:16	615401	4454771.33	40.23543553 N	73.6434129 W	96
SPI_PV	141	B	7/10/2019	19:26:41	615402.85	4454776.65	40.23548315 N	73.64339016 W	96
SPI_PV	141	C	7/10/2019	19:27:55	615402.87	4454774.9	40.23546745 N	73.64339024 W	96
SPI_PV	141	D	7/10/2019	19:29:09	615405.04	4454776.33	40.23547998 N	73.64336452 W	96
SPI_PV	142	A	7/10/2019	19:57:26	617292.27	4455129.91	40.23840245 N	73.62112077 W	95
SPI_PV	142	B	7/10/2019	19:58:52	617286.53	4455134.81	40.23844744 N	73.62118737 W	95
SPI_PV	142	C	7/10/2019	20:00:18	617288.86	4455132.87	40.23842962 N	73.62116029 W	95
SPI_PV	142	D	7/10/2019	20:01:38	617292.79	4455132.72	40.23842767 N	73.62111419 W	95
SPI_PV	142	E	7/10/2019	20:03:19	617304.02	4455141.35	40.23850389 N	73.62098056 W	95
SPI_PV	143	A	7/10/2019	20:40:28	619176.42	4455488.44	40.24136569 N	73.59891042 W	93
SPI_PV	143	B	7/10/2019	20:41:43	619177.25	4455489.73	40.24137716 N	73.59890053 W	93
SPI_PV	143	C	7/10/2019	20:43:24	619172.88	4455484.11	40.24132717 N	73.59895285 W	93
SPI_PV	143	D	7/10/2019	20:44:45	619182.66	4455489.59	40.24137518 N	73.59883691 W	93
SPI_PV	144	A	7/10/2019	21:01:39	621062.28	4455845.22	40.24430852 N	73.57667864 W	94
SPI_PV	144	B	7/10/2019	21:03:00	621062.37	4455842.59	40.24428488 N	73.57667801 W	94
SPI_PV	144	C	7/10/2019	21:04:27	621062.51	4455841.05	40.24427096 N	73.57667664 W	94
SPI_PV	144	D	7/10/2019	21:05:43	621063.72	4455845.47	40.2443106 N	73.57666158 W	94
SPI_PV	145	A	7/10/2019	21:23:43	622946.25	4456193.98	40.2471752 N	73.55446865 W	99
SPI_PV	145	B	7/10/2019	21:24:59	622950.88	4456195.82	40.24719104 N	73.55441389 W	99
SPI_PV	145	C	7/10/2019	21:26:30	622947.13	4456194.66	40.24718119 N	73.55445821 W	99
SPI_PV	145	D	7/10/2019	21:27:47	622946.39	4456193.67	40.24717237 N	73.55446713 W	99
SPI_PV	146	A	7/10/2019	21:43:55	624840.69	4456553.37	40.25013165 N	73.53213182 W	100
SPI_PV	146	B	7/10/2019	21:45:08	624832.86	4456550.58	40.2501077 N	73.53222442 W	100
SPI_PV	146	C	7/10/2019	21:46:19	624835.32	4456552.06	40.25012072 N	73.53219529 W	100
SPI_PV	146	D	7/10/2019	21:47:33	624839.29	4456550.22	40.25010355 N	73.53214897 W	100
SPI_PV	147	A	7/10/2019	16:01:10	626718.96	4456907.51	40.25303904 N	73.50998435 W	103
Grab	147	A	7/10/2019	16:24:04	626714.09	4456908.12	40.25304525 N	73.51004153 W	102
SPI_PV	147	B	7/10/2019	16:02:22	626720.04	4456910.43	40.25306516 N	73.50997108 W	103
SPI_PV	147	C	7/10/2019	16:03:42	626720.29	4456912.98	40.25308806 N	73.5099677 W	103
SPI_PV	147	D	7/10/2019	16:04:46	626721.31	4456913.69	40.25309433 N	73.50995553 W	103
SPI_PV	148	A	7/10/2019	15:41:20	628603.3	4457263.26	40.25595562 N	73.48776335 W	115
SPI_PV	148	B	7/10/2019	15:42:33	628604.17	4457262.77	40.25595105 N	73.48775323 W	115

SampleType	StationID	Replicate	Date	Time	X_UTM_18N_m	Y_UTM_18N_m	Latitude_WGS84	Longitude_WGS84	Depth_ft
SPI_PV	148	C	7/10/2019	15:43:42	628605.4	4457265.89	40.25597901 N	73.48773823 W	115
SPI_PV	148	D	7/10/2019	15:44:54	628605.08	4457266.07	40.25598067 N	73.48774192 W	115
SPI_PV	149	A	7/10/2019	15:22:25	630493.89	4457620.02	40.25887609 N	73.46546693 W	111
SPI_PV	149	B	7/10/2019	15:23:33	630495.33	4457620.66	40.25888163 N	73.46544998 W	111
SPI_PV	149	C	7/10/2019	15:25:04	630495.34	4457621.48	40.25888896 N	73.46544969 W	111
SPI_PV	149	D	7/10/2019	15:26:13	630498.1	4457623.65	40.25890811 N	73.46541674 W	111
SPI_PV	150	A	7/10/2019	14:50:46	632388.23	4457975.55	40.26178044 N	73.44312491 W	111
SPI_PV	150	B	7/10/2019	14:51:55	632380.76	4457973.29	40.2617613 N	73.44321319 W	111
SPI_PV	150	C	7/10/2019	14:53:05	632378.1	4457973.12	40.26176016 N	73.44324451 W	111
SPI_PV	150	D	7/10/2019	14:54:16	632379.09	4457977.53	40.26179972 N	73.44323201 W	111
SPI_PV	151	A	7/10/2019	14:30:47	634275.3	4458331.22	40.26468295 N	73.42086661 W	112
SPI_PV	151	B	7/10/2019	14:32:11	634269.74	4458329.22	40.2646659 N	73.42093235 W	112
SPI_PV	151	C	7/10/2019	14:33:31	634269.35	4458328.96	40.26466363 N	73.42093706 W	112
SPI_PV	151	D	7/10/2019	14:34:45	634270.18	4458333.17	40.26470135 N	73.42092641 W	112
SPI_PV	152	A	7/10/2019	14:12:31	636163.37	4458686.22	40.26757499 N	73.39859486 W	113
SPI_PV	152	B	7/10/2019	14:13:46	636155.95	4458687.43	40.26758706 N	73.39868185 W	113
SPI_PV	152	C	7/10/2019	14:15:09	636158.12	4458684.63	40.26756146 N	73.39865696 W	113
SPI_PV	152	D	7/10/2019	14:16:26	636159.02	4458683.63	40.26755236 N	73.39864655 W	113
SPI_PV	153	A	7/10/2019	13:50:13	638047.21	4459037.89	40.27043334 N	73.37637178 W	117
SPI_PV	153	B	7/10/2019	13:51:24	638043	4459038.84	40.27044254 N	73.3764211 W	117
SPI_PV	153	C	7/10/2019	13:52:43	638040.54	4459037.63	40.27043206 N	73.37645031 W	117
SPI_PV	153	D	7/10/2019	13:53:58	638040.58	4459041.23	40.27046447 N	73.376449 W	117
SPI_PV	154	A	7/10/2019	13:29:08	639926.85	4459395.14	40.27333837 N	73.35419518 W	121
SPI_PV	154	B	7/10/2019	13:30:22	639930.68	4459392.45	40.27331345 N	73.35415067 W	121
SPI_PV	154	C	7/10/2019	13:31:45	639933.95	4459395.38	40.27333935 N	73.35411168 W	121
SPI_PV	154	D	7/10/2019	13:32:53	639931.74	4459398.72	40.27336974 N	73.35413689 W	121
SPI_PV	155	A	7/10/2019	13:08:33	641816.05	4459749.46	40.27621109 N	73.33190497 W	120
SPI_PV	155	B	7/10/2019	13:09:32	641817.18	4459749.87	40.27621453 N	73.33189159 W	120
SPI_PV	155	C	7/10/2019	13:10:37	641815.58	4459752.78	40.27624099 N	73.33190986 W	120
SPI_PV	155	D	7/10/2019	13:11:43	641811.96	4459752.14	40.27623584 N	73.33195247 W	120
SPI_PV	156	A	7/10/2019	12:47:31	643704.06	4460109.16	40.27912809 N	73.30962587 W	119
SPI_PV	156	B	7/10/2019	12:48:47	643707.22	4460106.14	40.27910031 N	73.3095895 W	119
SPI_PV	156	C	7/10/2019	12:49:49	643703.4	4460110.2	40.27913755 N	73.3096335 W	119

SampleType	StationID	Replicate	Date	Time	X_UTM_18N_m	Y_UTM_18N_m	Latitude_WGS84	Longitude_WGS84	Depth_ft
SPI_PV	156	D	7/10/2019	12:50:49	643700.56	4460112.05	40.2791547 N	73.30966648 W	119
Grab	157	A	7/10/2019	11:51:11	645586.62	4460466.8	40.28202316 N	73.28740956 W	121
SPI_PV	157	A	7/10/2019	12:22:13	645588.59	4460463.65	40.28199444 N	73.28738719 W	121
SPI_PV	157	B	7/10/2019	12:23:15	645584.2	4460463.25	40.28199159 N	73.28743887 W	121
SPI_PV	157	C	7/10/2019	12:24:31	645580.18	4460468.07	40.28203573 N	73.28748499 W	121
SPI_PV	157	D	7/10/2019	12:25:54	645588.13	4460467.03	40.28202499 N	73.28739185 W	121
SPI_PV	REFA_01	A	7/13/2019	22:16:07	601934.25	4455103.99	40.24017915 N	73.80163239 W	94
SPI_PV	REFA_01	B	7/13/2019	22:17:35	601932.79	4455107.13	40.2402076 N	73.80164905 W	94
SPI_PV	REFA_01	C	7/13/2019	22:18:58	601930.84	4455107.8	40.24021384 N	73.80167195 W	94
SPI_PV	REFA_01	D	7/13/2019	22:20:23	601931.68	4455108.33	40.24021854 N	73.80166192 W	94
SPI_PV	REFA_02	A	7/13/2019	21:21:45	602319.76	4455715.38	40.24563918 N	73.79700374 W	105
SPI_PV	REFA_02	B	7/13/2019	21:23:22	602319.57	4455717.7	40.24566005 N	73.7970056 W	105
SPI_PV	REFA_02	C	7/13/2019	21:24:46	602319.71	4455713.41	40.24562142 N	73.7970046 W	105
SPI_PV	REFA_02	D	7/13/2019	21:26:20	602322.88	4455720.49	40.24568479 N	73.79696629 W	105
SPI_PV	REFA_03	A	7/13/2019	21:48:49	602233.92	4455323.91	40.24212349 N	73.79807515 W	101
SPI_PV	REFA_03	B	7/13/2019	21:50:18	602239.79	4455324.29	40.24212623 N	73.79800602 W	101
SPI_PV	REFA_03	C	7/13/2019	21:51:40	602236.86	4455318.1	40.24207085 N	73.79804145 W	101
SPI_PV	REFA_03	D	7/13/2019	21:53:04	602240.08	4455324.98	40.24213236 N	73.79800253 W	101
SPI_PV	REFA_04	A	7/13/2019	21:38:01	602050.56	4455411.69	40.24293652 N	73.80021636 W	100
SPI_PV	REFA_04	B	7/13/2019	21:40:14	602050.87	4455413.3	40.242951 N	73.80021249 W	100
SPI_PV	REFA_04	C	7/13/2019	21:41:37	602048.53	4455410.8	40.24292876 N	73.80024046 W	100
SPI_PV	REFA_04	D	7/13/2019	21:43:09	602051.84	4455413.46	40.24295229 N	73.80020105 W	100
SPI_PV	REFA_05	A	7/13/2019	22:00:35	602538.03	4455341.25	40.2422425 N	73.79449779 W	109
SPI_PV	REFA_05	B	7/13/2019	22:02:00	602540.25	4455350.27	40.24232347 N	73.79447023 W	109
SPI_PV	REFA_05	C	7/13/2019	22:03:26	602537.4	4455350.43	40.24232532 N	73.79450374 W	109
SPI_PV	REFA_05	D	7/13/2019	22:04:47	602537.79	4455348.55	40.24230834 N	73.7944995 W	109
SPI_PV	REFB_01	A	7/11/2019	5:39:25	617852.3	4475428.54	40.42114637 N	73.61079464 W	77
SPI_PV	REFB_01	B	7/11/2019	5:40:15	617851.56	4475424.44	40.4211095 N	73.61080412 W	77
SPI_PV	REFB_01	C	7/11/2019	5:41:41	617853.82	4475430.61	40.42116478 N	73.61077635 W	77
SPI_PV	REFB_01	D	7/11/2019	5:42:28	617852.02	4475431.31	40.42117132 N	73.61079745 W	77
SPI_PV	REFB_01	E	7/11/2019	7:42:14	617851.04	4475432.1	40.42117861 N	73.61080893 W	77
SPI_PV	REFB_01	F	7/11/2019	7:42:56	617848.9	4475434.02	40.42119616 N	73.61083375 W	77
SPI_PV	REFB_01	G	7/11/2019	7:43:27	617849.32	4475437.49	40.42122738 N	73.61082812 W	77

SampleType	StationID	Replicate	Date	Time	X_UTM_18N_m	Y_UTM_18N_m	Latitude_WGS84	Longitude_WGS84	Depth_ft
SPI_PV	REFB_01	H	7/11/2019	7:43:58	617852.46	4475434.86	40.42120327 N	73.61079167 W	77
SPI_PV	REFB_02	A	7/11/2019	5:06:07	618151.12	4475611.33	40.42275024 N	73.60723935 W	75
SPI_PV	REFB_02	B	7/11/2019	5:06:47	618150.64	4475619.76	40.42282621 N	73.60724339 W	75
SPI_PV	REFB_02	C	7/11/2019	5:08:05	618150.37	4475621.5	40.42284194 N	73.60724625 W	75
SPI_PV	REFB_02	D	7/11/2019	5:09:00	618151.46	4475615.92	40.42279154 N	73.60723449 W	75
SPI_PV	REFB_02	E	7/11/2019	5:10:26	618140.2	4475620.66	40.42283588 N	73.60736627 W	75
SPI_PV	REFB_02	F	7/11/2019	5:11:12	618142.88	4475626.15	40.42288492 N	73.60733374 W	75
SPI_PV	REFB_02	G	7/11/2019	6:58:40	618138.52	4475625.83	40.42288264 N	73.60738507 W	75
SPI_PV	REFB_02	H	7/11/2019	6:59:11	618137.15	4475621.15	40.42284068 N	73.60740212 W	75
SPI_PV	REFB_02	I	7/11/2019	6:59:39	618140.82	4475619.64	40.42282654 N	73.60735922 W	75
SPI_PV	REFB_02	J	7/11/2019	7:00:15	618146.86	4475620.94	40.42283745 N	73.6072877 W	75
SPI_PV	REFB_03	A	7/11/2019	5:18:36	618032.76	4475720.05	40.42374628 N	73.60861404 W	75
SPI_PV	REFB_03	B	7/11/2019	5:19:22	618030.82	4475720.58	40.42375131 N	73.60863676 W	75
SPI_PV	REFB_03	C	7/11/2019	5:20:11	618029.43	4475721.61	40.42376078 N	73.60865295 W	75
SPI_PV	REFB_03	D	7/11/2019	5:20:55	618028.03	4475717.87	40.42372729 N	73.60867009 W	75
SPI_PV	REFB_03	E	7/11/2019	7:25:45	618021.87	4475720.13	40.42374846 N	73.6087423 W	75
SPI_PV	REFB_03	F	7/11/2019	7:26:16	618018.36	4475717.28	40.42372337 N	73.60878424 W	75
SPI_PV	REFB_03	G	7/11/2019	7:26:40	618020.59	4475717.15	40.42372186 N	73.60875799 W	75
SPI_PV	REFB_03	H	7/11/2019	7:27:08	618026.42	4475717.1	40.42372058 N	73.60868928 W	75
SPI_PV	REFB_04	A	7/11/2019	5:28:33	617855.87	4475707.25	40.42365603 N	73.61070097 W	76
SPI_PV	REFB_04	B	7/11/2019	5:29:19	617859.24	4475713.24	40.42370952 N	73.61066019 W	76
SPI_PV	REFB_04	C	7/11/2019	5:30:06	617859.83	4475707.18	40.42365481 N	73.61065436 W	76
SPI_PV	REFB_04	D	7/11/2019	5:31:21	617845.69	4475705.37	40.42364054 N	73.61082125 W	76
SPI_PV	REFB_04	E	7/11/2019	5:32:17	617850.8	4475717.06	40.42374513 N	73.6107589 W	76
SPI_PV	REFB_04	F	7/11/2019	7:34:06	617856.01	4475717.03	40.42374405 N	73.61069757 W	76
SPI_PV	REFB_04	G	7/11/2019	7:34:42	617859.02	4475714.82	40.42372375 N	73.61066251 W	76
SPI_PV	REFB_04	H	7/11/2019	7:35:14	617859.85	4475707.64	40.42365901 N	73.610654 W	76
SPI_PV	REFB_04	I	7/11/2019	7:35:56	617856.05	4475708.17	40.42366428 N	73.61069873 W	76
SPI_PV	REFB_05	A	7/11/2019	5:47:28	618046.86	4475325.74	40.42019292 N	73.60852103 W	79
SPI_PV	REFB_05	B	7/11/2019	5:48:28	618046.19	4475328.95	40.42022186 N	73.60852827 W	79
SPI_PV	REFB_05	C	7/11/2019	5:49:15	618050.75	4475329.46	40.42022587 N	73.60847445 W	79
SPI_PV	REFB_05	D	7/11/2019	5:50:10	618048.1	4475327.02	40.42020426 N	73.60850614 W	79
SPI_PV	REFB_05	E	7/11/2019	7:48:52	618037.3	4475323.92	40.42017782 N	73.60863403 W	79

SampleType	StationID	Replicate	Date	Time	X_UTM_18N_m	Y_UTM_18N_m	Latitude_WGS84	Longitude_WGS84	Depth_ft
SPI_PV	REFB_05	F	7/11/2019	7:49:22	618033.46	4475323.96	40.4201788 N	73.60867919 W	79
SPI_PV	REFB_05	G	7/11/2019	7:49:53	618036.43	4475326.63	40.42020238 N	73.60864377 W	79
SPI_PV	REFB_05	H	7/11/2019	7:50:22	618041.21	4475328	40.42021403 N	73.60858715 W	79
SPI_PV	REFC_01	A	7/13/2019	20:24:27	606643.44	4456040.06	40.24802412 N	73.74612663 W	117
SPI_PV	REFC_01	B	7/13/2019	20:26:13	606643.55	4456037.34	40.24799957 N	73.74612579 W	117
SPI_PV	REFC_01	C	7/13/2019	20:27:36	606642.46	4456042.13	40.24804292 N	73.7461378 W	117
SPI_PV	REFC_01	D	7/13/2019	20:29:06	606642.63	4456040.73	40.24803027 N	73.74613601 W	117
SPI_PV	REFC_02	A	7/13/2019	20:32:45	606743.76	4456133.97	40.24885724 N	73.74493164 W	117
SPI_PV	REFC_02	B	7/13/2019	20:34:06	606740.41	4456135.43	40.24887075 N	73.74497084 W	117
SPI_PV	REFC_02	C	7/13/2019	20:35:35	606738.88	4456132.33	40.24884307 N	73.74498936 W	117
SPI_PV	REFC_02	D	7/13/2019	20:37:08	606739.27	4456131.51	40.24883557 N	73.74498487 W	117
SPI_PV	REFC_03	A	7/13/2019	19:54:21	606526.43	4455533.98	40.24348065 N	73.74758601 W	119
SPI_PV	REFC_03	B	7/13/2019	19:55:48	606526.66	4455536.31	40.24350157 N	73.74758291 W	119
SPI_PV	REFC_03	C	7/13/2019	19:57:11	606527.34	4455535.63	40.24349539 N	73.74757511 W	119
SPI_PV	REFC_03	D	7/13/2019	19:58:33	606529.18	4455530.15	40.24344577 N	73.74755438 W	119
SPI_PV	REFC_04	A	7/13/2019	20:12:59	606944.43	4455634.59	40.24433354 N	73.74265609 W	114
SPI_PV	REFC_04	B	7/13/2019	20:14:31	606940.24	4455630.05	40.2442932 N	73.74270606 W	114
SPI_PV	REFC_04	C	7/13/2019	20:15:52	606938.47	4455631.8	40.24430919 N	73.7427266 W	114
SPI_PV	REFC_04	D	7/13/2019	20:17:20	606940.43	4455635.33	40.24434077 N	73.74270295 W	114
SPI_PV	REFC_05	A	7/13/2019	20:04:14	606813.93	4455573.24	40.24379758 N	73.7442002 W	115
SPI_PV	REFC_05	B	7/13/2019	20:05:39	606814.63	4455573.01	40.24379541 N	73.74419204 W	115
SPI_PV	REFC_05	C	7/13/2019	20:07:15	606815.87	4455579.42	40.24385305 N	73.74417636 W	115
SPI_PV	REFC_05	D	7/13/2019	20:08:39	606810.73	4455570.74	40.24377551 N	73.74423826 W	115

APPENDIX B

SPI/PV and Sediment Grab Field Log

Notes:

FC = Frame Count

SampleType	StationID	Replicate	Date	Time	Frame	SPI_StopCollar_in	SPI_Weights_perSide_num	Depth_ft	Comments
SPI_PV	030	A	7/10/2019	3:03:29	13	16	4	114	02:15 arrive at station to commence sampling.
SPI_PV	030	B	7/10/2019	3:06:00	14	16	4	114	SPI: ISO 640, f/11, 1/250s; PV: ISO 800, f/8, 1/15s.
SPI_PV	030	C	7/10/2019	3:08:00	15	16	4	114	
SPI_PV	030	D	7/10/2019	3:09:45	16	16	4	114	
SPI_PV	030	E	7/10/2019	3:11:05	17	16	4	114	
SPI_PV	031	A	7/10/2019	4:07:26	20	18	5	108	Download, FC 19. PV camera settings changed to ISO-640 and f/10.
SPI_PV	031	B	7/10/2019	4:08:37	21	18	5	108	
SPI_PV	031	C	7/10/2019	4:09:40	22	18	5	108	
SPI_PV	031	D	7/10/2019	4:10:43	23	18	5	108	On deck, download FC 24.
SPI_PV	032	A	7/10/2019	4:43:02	25	18	5	111	
SPI_PV	032	B	7/10/2019	4:43:56	26	18	5	111	
SPI_PV	032	C	7/10/2019	4:45:17	27	18	5	111	
SPI_PV	032	D	7/10/2019	4:46:17	28	18	5	111	
SPI_PV	032	E	7/10/2019	4:52:09	29	18	5	111	
SPI_PV	033	A	7/10/2019	5:34:11	30	18	5	105	
SPI_PV	033	B	7/10/2019	5:35:05	31	18	5	105	
SPI_PV	033	C	7/10/2019	5:36:23	32	18	5	105	
SPI_PV	033	D	7/10/2019	5:37:30	33	18	5	105	
SPI_PV	033	E	7/10/2019	5:38:36	34	18	5	105	
SPI_PV	034	A	7/10/2019	6:01:51	35	18	5	100	
SPI_PV	034	B	7/10/2019	6:02:49	36	18	5	100	
SPI_PV	034	C	7/10/2019	6:06:00	37	18	5	100	
SPI_PV	034	D	7/10/2019	6:06:46	38	18	5	100	
SPI_PV	035	A	7/10/2019	6:34:17	39	18	5	100	
SPI_PV	035	B	7/10/2019	6:35:10	40	18	5	100	
SPI_PV	035	C	7/10/2019	6:37:26	41	18	5	100	
SPI_PV	035	D	7/10/2019	6:38:37	42	18	5	100	
SPI_PV	035	E	7/10/2019	6:40:19	43	18	5	100	
SPI_PV	036	A	7/10/2019	6:58:39	44	18	5	91	
SPI_PV	036	B	7/10/2019	6:59:39	45	18	5	91	
SPI_PV	036	C	7/10/2019	7:00:34	46	18	5	91	
SPI_PV	036	D	7/10/2019	7:01:28	47	18	5	91	
SPI_PV	037	A	7/10/2019	7:19:56	48	18	5	97	
SPI_PV	037	B	7/10/2019	7:20:43	49	18	5	97	
SPI_PV	037	C	7/10/2019	7:21:42	50	18	5	97	
SPI_PV	037	D	7/10/2019	7:23:04	51	18	5	97	
SPI_PV	038	A	7/10/2019	7:44:00	52	18	5	92	
SPI_PV	038	B	7/10/2019	7:44:50	53	18	5	92	
SPI_PV	038	C	7/10/2019	7:45:43	54	18	5	92	
SPI_PV	038	D	7/10/2019	7:46:37	55	18	5	92	
SPI_PV	039	A	7/10/2019	8:08:26	56	18	5	90	
SPI_PV	039	B	7/10/2019	8:10:00	57	18	5	90	
SPI_PV	039	C	7/10/2019	8:10:57	58	18	5	90	

SampleType	StationID	Replicate	Date	Time	Frame	SPI_StopCollar_in	SPI_Weights_perSide_num	Depth_ft	Comments
SPI_PV	039	D	7/10/2019	8:11:52	59	18	5	90	
SPI_PV	040	A	7/10/2019	8:31:41	60	18	5	89	
SPI_PV	040	B	7/10/2019	8:32:31	61	18	5	89	
SPI_PV	040	C	7/10/2019	8:33:19	62	18	5	89	
SPI_PV	040	D	7/10/2019	8:35:34	63	18	5	89	
SPI_PV	041	A	7/10/2019	8:53:43	64	18	5	85	
SPI_PV	041	B	7/10/2019	8:54:25	65	18	5	85	
SPI_PV	041	C	7/10/2019	8:55:12	66	18	5	85	
SPI_PV	041	D	7/10/2019	8:55:59	67	18	5	85	
SPI_PV	041	E	7/10/2019	8:56:44	68	18	5	85	
SPI_PV	042	A	7/10/2019	9:16:34	69	18	5	85	
SPI_PV	042	B	7/10/2019	9:18:18	70	18	5	85	
SPI_PV	042	C	7/10/2019	9:19:03	71	18	5	85	
SPI_PV	042	D	7/10/2019	9:19:54	72	18	5	85	Download, FC 75. Shift change. Collect grab samples at stations 38 and 157, switching back to SPI.
SPI_PV	157	A	7/10/2019	12:22:13	77	18	5	123	
SPI_PV	157	B	7/10/2019	12:23:15	78	18	5	123	
SPI_PV	157	C	7/10/2019	12:24:31	79	18	5	123	
SPI_PV	157	D	7/10/2019	12:25:54	80	18	5	123	
SPI_PV	156	A	7/10/2019	12:47:01	81	18	5	120	
SPI_PV	156	B	7/10/2019	12:48:20	82	18	5	120	
SPI_PV	156	C	7/10/2019	12:49:20	83	18	5	120	
SPI_PV	156	D	7/10/2019	12:50:21	84	18	5	120	
SPI_PV	155	A	7/10/2019	13:08:01	85	18	5	119	
SPI_PV	155	B	7/10/2019	13:09:02	86	18	5	119	
SPI_PV	155	C	7/10/2019	13:10:05	87	18	5	119	
SPI_PV	155	D	7/10/2019	13:11:12	88	18	5	119	
SPI_PV	154	A	7/10/2019	13:28:35	89	18	5	119	
SPI_PV	154	B	7/10/2019	13:29:52	90	18	5	119	
SPI_PV	154	C	7/10/2019	13:31:15	91	18	5	119	
SPI_PV	154	D	7/10/2019	13:32:21	92	18	5	119	
SPI_PV	153	A	7/10/2019	13:49:42	93	18	5	117	
SPI_PV	153	B	7/10/2019	13:50:52	94	18	5	117	
SPI_PV	153	C	7/10/2019	13:52:38	95	18	5	117	
SPI_PV	153	D	7/10/2019	13:53:26	96	18	5	117	
SPI_PV	152	A	7/10/2019	14:12:01	97	18	5	113	
SPI_PV	152	B	7/10/2019	14:13:15	98	18	5	113	
SPI_PV	152	C	7/10/2019	14:14:42	99	18	5	113	
SPI_PV	152	D	7/10/2019	14:15:56	100	18	5	113	
SPI_PV	151	A	7/10/2019	14:30:25	101	18	5	112	
SPI_PV	151	B	7/10/2019	14:31:50	102	18	5	112	
SPI_PV	151	C	7/10/2019	14:33:03	103	18	5	112	
SPI_PV	151	D	7/10/2019	14:34:16	104	18	5	112	

SampleType	StationID	Replicate	Date	Time	Frame	SPI_StopCollar_in	SPI_Weights_perSide_num	Depth_ft	Comments
SPI_PV	150	A	7/10/2019	14:50:15	105	18	5	111	
SPI_PV	150	B	7/10/2019	14:51:24	106	18	5	111	
SPI_PV	150	C	7/10/2019	14:52:34	107	18	5	111	
SPI_PV	150	D	7/10/2019	14:53:47	108	18	5	111	Shackle jammed, unstuck. Download.
SPI_PV	149	A	7/10/2019	15:21:54	110	18	5	111	
SPI_PV	149	B	7/10/2019	15:23:04	111	18	5	111	PV image missing.
SPI_PV	149	C	7/10/2019	15:24:31	112	18	5	111	
SPI_PV	149	D	7/10/2019	15:25:41	113	18	5	111	
SPI_PV	148	A	7/10/2019	15:40:50	114	18	5	115	
SPI_PV	148	B	7/10/2019	15:42:02	115	18	5	115	
SPI_PV	148	C	7/10/2019	15:43:13	116	18	5	115	
SPI_PV	148	D	7/10/2019	15:44:23	117	18	5	115	
SPI_PV	147	A	7/10/2019	16:00:42	118	18	5	103	
SPI_PV	147	B	7/10/2019	16:01:54	119	18	5	103	
SPI_PV	147	C	7/10/2019	16:03:07	120	18	5	103	
SPI_PV	147	D	7/10/2019	16:04:15	121	18	5	103	Grab at station 147 at 16:24:04; Grab station 20 at 16:57:44.
SPI_PV	020	A	7/10/2019	17:42:50	122	18	5	91	
SPI_PV	020	B	7/10/2019	17:44:25	123	18	5	91	
SPI_PV	020	C	7/10/2019	17:45:30	124	18	5	91	
SPI_PV	020	D	7/10/2019	17:46:46	125	18	5	91	
SPI_PV	019	A	7/10/2019	18:02:50	126	18	5	97	
SPI_PV	019	B	7/10/2019	18:03:56	127	18	5	97	
SPI_PV	019	C	7/10/2019	18:05:06	128	18	5	97	
SPI_PV	019	D	7/10/2019	18:06:17	129	18	5	97	
SPI_PV	018	A	7/10/2019	18:24:56	130	18	5	90	
SPI_PV	018	B	7/10/2019	18:26:23	131	18	5	90	
SPI_PV	018	C	7/10/2019	18:27:37	132	18	5	90	
SPI_PV	018	D	7/10/2019	18:28:51	133	18	5	90	
SPI_PV	017	A	7/10/2019	18:46:19	134	18	5	93	
SPI_PV	017	B	7/10/2019	18:47:31	135	18	5	93	
SPI_PV	017	C	7/10/2019	18:48:45	136	18	5	93	
SPI_PV	017	D	7/10/2019	18:49:58	137	18	5	93	
SPI_PV	016	A	7/10/2019	19:06:30	139	18	5	95	
SPI_PV	016	B	7/10/2019	19:07:52	140	18	5	95	
SPI_PV	016	C	7/10/2019	19:09:03	141	18	5	95	
SPI_PV	016	D	7/10/2019	19:10:14	142	18	5	95	
SPI_PV	141	A	7/10/2019	19:24:48	143	18	5	96	
SPI_PV	141	B	7/10/2019	19:26:09	144	18	5	96	
SPI_PV	141	C	7/10/2019	19:27:21	145	18	5	96	
SPI_PV	141	D	7/10/2019	19:28:39	146	18	5	96	
SPI_PV	142	A	7/10/2019	19:57:26	147	18	5	95	
SPI_PV	142	B	7/10/2019	19:58:26	148	18	5	95	
SPI_PV	142	C	7/10/2019	19:59:48	149	18	5	95	

SampleType	StationID	Replicate	Date	Time	Frame	SPI_StopCollar_in	SPI_Weights_perSide_num	Depth_ft	Comments
SPI_PV	142	D	7/10/2019	20:01:08	150	18	5	95	
SPI_PV	142	E	7/10/2019	20:03:19	151	18	5	95	Download, FC 155.
SPI_PV	143	A	7/10/2019	20:39:55	156	18	5	93	
SPI_PV	143	B	7/10/2019	20:41:11	157	18	5	93	
SPI_PV	143	C	7/10/2019	20:42:54	158	18	5	93	
SPI_PV	143	D	7/10/2019	20:44:14	159	18	5	93	
SPI_PV	144	A	7/10/2019	21:01:07	160	18	5	94	
SPI_PV	144	B	7/10/2019	21:02:29	161	18	5	94	
SPI_PV	144	C	7/10/2019	21:03:56	162	18	5	94	
SPI_PV	144	D	7/10/2019	21:05:12	163	18	5	94	
SPI_PV	145	A	7/10/2019	21:23:13	164	18	5	99	
SPI_PV	145	B	7/10/2019	21:24:29	165	18	5	99	
SPI_PV	145	C	7/10/2019	21:26:00	166	18	5	99	
SPI_PV	145	D	7/10/2019	21:27:17	167	18	5	99	
SPI_PV	146	A	7/10/2019	21:43:25	168	18	5	100	
SPI_PV	146	B	7/10/2019	21:44:36	169	18	5	100	
SPI_PV	146	C	7/10/2019	21:45:48	170	18	5	100	
SPI_PV	146	D	7/10/2019	21:47:03	171	18	5	100	
SPI_PV	021	A	7/10/2019	22:18:00	172	18	5	97	
SPI_PV	021	B	7/10/2019	22:19:18	173	18	5	97	
SPI_PV	021	C	7/10/2019	22:20:32	174	18	5	97	
SPI_PV	021	D	7/10/2019	22:21:51	175	18	5	97	
SPI_PV	022	A	7/10/2019	22:37:16	176	18	5	95	
SPI_PV	022	B	7/10/2019	22:38:31	177	18	5	95	
SPI_PV	022	C	7/10/2019	22:39:46	178	18	5	95	
SPI_PV	022	D	7/10/2019	22:41:02	179	18	5	95	
SPI_PV	023	A	7/10/2019	22:57:10	180	18	5	91	
SPI_PV	023	B	7/10/2019	22:58:30	181	18	5	91	
SPI_PV	023	C	7/10/2019	22:59:44	182	18	5	91	
SPI_PV	023	D	7/10/2019	23:01:00	183	18	5	91	
SPI_PV	024	A	7/10/2019	23:16:35	184	18	5	97	
SPI_PV	024	B	7/10/2019	23:18:01	185	18	5	97	
SPI_PV	024	C	7/10/2019	23:19:20	186	18	5	97	
SPI_PV	024	D	7/10/2019	23:20:47	187	18	5	97	Download images, FC 139.
SPI_PV	025	A	7/11/2019	0:56:21	190	18	5	92	Shift change, change PV battery. PV camera adjusted to 4 ft trigger due to increasing turbidity.
SPI_PV	025	B	7/11/2019	0:57:15	191	18	5	92	
SPI_PV	025	C	7/11/2019	0:58:01	192	18	5	92	
SPI_PV	025	D	7/11/2019	0:58:50	193	18	5	92	Download, FC 194. PV f-stop changed to f16. Cable shortened an inch.
SPI_PV	025	E	7/11/2019	1:46:40		18	5	92	PV Only
SPI_PV	025	F	7/11/2019	1:47:07		18	5	92	PV Only
SPI_PV	025	G	7/11/2019	1:48:05		18	5	92	PV Only

SampleType	StationID	Replicate	Date	Time	Frame	SPI_StopCollar_in	SPI_Weights_perSide_num	Depth_ft	Comments
SPI_PV	025	H	7/11/2019	1:49:05		18	5	92	PV Only
SPI_PV	026	A	7/11/2019	2:18:03	195	18	5	89	SPI Only
SPI_PV	026	B	7/11/2019	2:18:48	196	18	5	89	SPI Only
SPI_PV	026	C	7/11/2019	2:19:31	197	18	5	89	SPI Only
SPI_PV	026	E	7/11/2019	2:20:35	199	18	5	89	No image
SPI_PV	026	F	7/11/2019	2:21:56	200	18	5	89	SPI Only
SPI_PV	026	G	7/11/2019	2:22:46	201	18	5	89	SPI Only
SPI_PV	140	A	7/11/2019	2:51:30	202	18	5	94	SPI Only
SPI_PV	140	B	7/11/2019	2:52:13	203	18	5	94	SPI Only
SPI_PV	140	C	7/11/2019	2:53:03	204	18	5	94	SPI Only
SPI_PV	140	D	7/11/2019	2:53:55	205	18	5	94	SPI Only
SPI_PV	139	A	7/11/2019	3:14:07	206	18	5	87	SPI Only
SPI_PV	139	B	7/11/2019	3:14:52	207	18	5	87	SPI Only
SPI_PV	139	C	7/11/2019	3:15:36	208	18	5	87	SPI Only
SPI_PV	139	D	7/11/2019	3:16:24	209	18	5	87	SPI Only
SPI_PV	138	A	7/11/2019	3:35:19	210	18	5	90	SPI Only
SPI_PV	138	B	7/11/2019	3:36:05	211	18	5	90	SPI Only
SPI_PV	138	C	7/11/2019	3:36:52	212	18	5	90	SPI Only
SPI_PV	138	D	7/11/2019	3:37:32	213	18	5	90	SPI Only
SPI_PV	137	A	7/11/2019	3:55:55	214	18	5	91	SPI Only
SPI_PV	137	B	7/11/2019	3:56:35	215	18	5	91	SPI Only
SPI_PV	137	C	7/11/2019	3:57:22	216	18	5	91	SPI Only
SPI_PV	137	D	7/11/2019	3:58:09	217	18	5	91	SPI Only
SPI_PV	136	A	7/11/2019	4:15:45	218	18	5	83	SPI Only
SPI_PV	136	B	7/11/2019	4:16:46	219	18	5	83	SPI Only
SPI_PV	136	C	7/11/2019	4:18:20	220	18	5	83	SPI Only
SPI_PV	136	D	7/11/2019	4:19:05	221	18	5	83	SPI Only
SPI_PV	135	A	7/11/2019	4:36:48	222	18	5	76	SPI Only
SPI_PV	135	B	7/11/2019	4:37:35	223	18	5	76	SPI Only
SPI_PV	135	C	7/11/2019	4:38:22	224	18	5	76	SPI Only
SPI_PV	135	D	7/11/2019	4:40:22	225	18	5	76	SPI Only
SPI_PV	135	E	7/11/2019	4:41:07	226	18	5	76	SPI Only
SPI_PV	REFB_02	A	7/11/2019	5:05:29	227	18	5	75	SPI Only
SPI_PV	REFB_02	B	7/11/2019	5:06:11	228	18	5	75	SPI Only
SPI_PV	REFB_02	C	7/11/2019	5:07:31	229	18	5	75	SPI Only
SPI_PV	REFB_02	D	7/11/2019	5:08:27	230	18	5	75	SPI Only
SPI_PV	REFB_02	E	7/11/2019	5:09:55	231	18	5	75	SPI Only
SPI_PV	REFB_02	F	7/11/2019	5:10:39	232	18	5	75	SPI Only
SPI_PV	REFB_03	A	7/11/2019	5:18:04	233	18	5	74	SPI Only
SPI_PV	REFB_03	B	7/11/2019	5:18:50	234	18	5	74	SPI Only
SPI_PV	REFB_03	C	7/11/2019	5:19:36	235	18	5	74	SPI Only
SPI_PV	REFB_03	D	7/11/2019	5:20:19	236	18	5	74	SPI Only
SPI_PV	REFB_04	A	7/11/2019	5:28:00	237	18	5	76	SPI Only

SampleType	StationID	Replicate	Date	Time	Frame	SPI_StopCollar_in	SPI_Weights_perSide_num	Depth_ft	Comments
SPI_PV	REFB_04	B	7/11/2019	5:28:43	238	18	5	76	SPI Only
SPI_PV	REFB_04	C	7/11/2019	5:29:32	239	18	5	76	No image
SPI_PV	REFB_04	D	7/11/2019	5:30:47	240	18	5	76	SPI Only
SPI_PV	REFB_04	E	7/11/2019	5:31:44	241	18	5	76	SPI Only
SPI_PV	REFB_01	A	7/11/2019	5:38:55	242	18	5	76	SPI Only
SPI_PV	REFB_01	B	7/11/2019	5:39:40	243	18	5	76	SPI Only
SPI_PV	REFB_01	C	7/11/2019	5:41:09	244	18	5	76	SPI Only
SPI_PV	REFB_01	D	7/11/2019	5:41:55	245	18	5	76	SPI Only
SPI_PV	REFB_05	A	7/11/2019	5:46:57	246	18	5	79	SPI Only
SPI_PV	REFB_05	B	7/11/2019	5:47:51	247	18	5	79	SPI Only
SPI_PV	REFB_05	C	7/11/2019	5:48:40	248	18	5	79	SPI Only
SPI_PV	REFB_05	D	7/11/2019	5:49:38	249	18	5	79	SPI Only
SPI_PV	REFB_02	G	7/11/2019	6:58:08		18	5	75	PV Only
SPI_PV	REFB_02	H	7/11/2019	6:58:34		18	5	75	PV Only
SPI_PV	REFB_02	I	7/11/2019	6:59:05		18	5	75	PV Only
SPI_PV	REFB_02	J	7/11/2019	6:59:40		18	5	75	PV Only
SPI_PV	REFB_03	E	7/11/2019	7:25:13		18	5	75	PV Only
SPI_PV	REFB_03	F	7/11/2019	7:25:40		18	5	75	PV Only
SPI_PV	REFB_03	G	7/11/2019	7:26:04		18	5	75	PV Only
SPI_PV	REFB_03	H	7/11/2019	7:26:30		18	5	75	PV Only
SPI_PV	REFB_04	F	7/11/2019	7:33:33		18	5	76	PV Only
SPI_PV	REFB_04	G	7/11/2019	7:34:10		18	5	76	PV Only
SPI_PV	REFB_04	H	7/11/2019	7:34:37		18	5	76	PV Only
SPI_PV	REFB_04	I	7/11/2019	7:35:25		18	5	76	PV Only
SPI_PV	REFB_01	E	7/11/2019	7:41:43		18	5	76	PV Only
SPI_PV	REFB_01	F	7/11/2019	7:42:25		18	5	76	PV Only
SPI_PV	REFB_01	G	7/11/2019	7:42:55		18	5	76	PV Only
SPI_PV	REFB_01	H	7/11/2019	7:43:21		18	5	76	PV Only
SPI_PV	REFB_05	E	7/11/2019	7:48:23		18	5	79	PV Only
SPI_PV	REFB_05	F	7/11/2019	7:48:45		18	5	79	PV Only
SPI_PV	REFB_05	G	7/11/2019	7:49:18		18	5	79	PV Only
SPI_PV	REFB_05	H	7/11/2019	7:49:46		18	5	79	PV Only
SPI_PV	135	F	7/11/2019	8:06:54		18	5	76	PV Only
SPI_PV	135	G	7/11/2019	8:07:18		18	5	76	PV Only
SPI_PV	135	H	7/11/2019	8:07:43		18	5	76	PV Only
SPI_PV	135	I	7/11/2019	8:08:08		18	5	76	PV Only
SPI_PV	136	E	7/11/2019	8:26:00		18	5	79	PV Only
SPI_PV	136	F	7/11/2019	8:27:08		18	5	79	PV Only
SPI_PV	136	G	7/11/2019	8:27:39		18	5	79	PV Only
SPI_PV	136	H	7/11/2019	8:28:07		18	5	79	PV Only
SPI_PV	137	E	7/11/2019	8:45:37		18	5	91	PV Only
SPI_PV	137	F	7/11/2019	8:46:05		18	5	91	PV Only
SPI_PV	137	G	7/11/2019	8:46:26		18	5	91	PV Only

SampleType	StationID	Replicate	Date	Time	Frame	SPI_StopCollar_in	SPI_Weights_perSide_num	Depth_ft	Comments
SPI_PV	137	H	7/11/2019	8:46:59		18	5	91	PV Only
SPI_PV	138	E	7/11/2019	9:07:28		18	5	91	PV Only
SPI_PV	138	F	7/11/2019	9:07:53		18	5	91	PV Only
SPI_PV	138	G	7/11/2019	9:08:20		18	5	91	PV Only
SPI_PV	138	H	7/11/2019	9:08:47		18	5	91	PV Only
SPI_PV	139	E	7/11/2019	9:28:30		18	5	87	PV Only
SPI_PV	139	F	7/11/2019	9:28:58		18	5	87	PV Only
SPI_PV	139	G	7/11/2019	9:29:23		18	5	87	PV Only
SPI_PV	139	H	7/11/2019	9:29:50		18	5	87	PV Only
SPI_PV	140	E	7/11/2019	9:49:32		18	5	89	PV Only
SPI_PV	140	F	7/11/2019	9:49:54		18	5	89	PV Only
SPI_PV	140	G	7/11/2019	9:50:14		18	5	89	PV Only
SPI_PV	140	H	7/11/2019	9:50:39		18	5	89	PV Only
SPI_PV	026	H	7/11/2019	10:09:17		18	5	89	PV Only
SPI_PV	026	I	7/11/2019	10:09:55		18	5	89	PV Only
SPI_PV	026	J	7/11/2019	10:10:23		18	5	89	PV Only
SPI_PV	026	K	7/11/2019	10:10:56		18	5	89	PV Only
SPI_PV	027	A	7/11/2019	10:38:30	250	18	5	97	
SPI_PV	027	B	7/11/2019	10:39:14	251	18	5	97	
SPI_PV	027	C	7/11/2019	10:40:00	252	18	5	97	
SPI_PV	027	D	7/11/2019	10:40:45	253	18	5	97	
SPI_PV	028	A	7/11/2019	10:56:03	255	18	5	89	
SPI_PV	028	B	7/11/2019	10:56:57	256	18	5	89	
SPI_PV	028	C	7/11/2019	10:57:40	257	18	5	89	
SPI_PV	028	D	7/11/2019	10:58:22	258	18	5	89	
SPI_PV	029	A	7/11/2019	11:14:30	259	18	5	89	
SPI_PV	029	B	7/11/2019	11:15:10	260	18	5	89	
SPI_PV	029	C	7/11/2019	11:15:53	261	18	5	89	
SPI_PV	029	D	7/11/2019	11:16:32	262	18	5	89	
SPI_PV	043	A	7/11/2019	11:28:54	263	18	5	89	
SPI_PV	043	B	7/11/2019	11:29:45	264	18	5	89	
SPI_PV	043	C	7/11/2019	11:30:35	265	18	5	89	
SPI_PV	043	D	7/11/2019	11:31:43	266	18	5	89	
SPI_PV	044	A	7/11/2019	11:46:44	267	18	5	87	
SPI_PV	044	B	7/11/2019	11:47:30	268	18	5	87	
SPI_PV	044	C	7/11/2019	11:48:47	269	18	5	87	
SPI_PV	044	D	7/11/2019	11:49:32	270	18	5	87	
SPI_PV	044	E	7/11/2019	11:50:12	271	18	5	87	
SPI_PV	045	A	7/11/2019	12:07:08	272	18	5	83	Shift change
SPI_PV	045	B	7/11/2019	12:08:36	273	18	5	83	
SPI_PV	045	C	7/11/2019	12:09:46	274	18	5	83	
SPI_PV	045	D	7/11/2019	12:10:58	275	18	5	83	
SPI_PV	048	A	7/11/2019	12:24:04	276	18	5	77	

SampleType	StationID	Replicate	Date	Time	Frame	SPI_StopCollar_in	SPI_Weights_perSide_num	Depth_ft	Comments
SPI_PV	048	B	7/11/2019	12:25:15	277	18	5	77	
SPI_PV	048	C	7/11/2019	12:26:34	278	18	5	77	
SPI_PV	048	D	7/11/2019	12:27:46	279	18	5	77	
SPI_PV	049	A	7/11/2019	12:41:28	280	18	5	87	
SPI_PV	049	B	7/11/2019	12:42:43	281	18	5	87	
SPI_PV	049	C	7/11/2019	12:43:53	282	18	5	87	
SPI_PV	049	D	7/11/2019	12:45:07	283	18	5	87	
SPI_PV	050	A	7/11/2019	12:59:17	284	18	5	87	Hard Bottom station 50; no penetration.
SPI_PV	050	B	7/11/2019	13:00:32	285	18	5	87	No penetration
SPI_PV	050	C	7/11/2019	13:01:43	286	18	5	87	
SPI_PV	050	D	7/11/2019	13:02:51	287	18	5	87	No SPI image
SPI_PV	051	A	7/11/2019	13:17:56	288	18	5	87	Hard bottom station 51.
SPI_PV	051	B	7/11/2019	13:19:10	289	18	5	87	
SPI_PV	051	C	7/11/2019	13:20:20	290	18	5	87	
SPI_PV	051	D	7/11/2019	13:21:35	291	18	5	87	Download images, FC 291.
SPI_PV	052	A	7/11/2019	14:06:00	292	18	5	77	
SPI_PV	052	B	7/11/2019	14:07:26	293	18	5	77	
SPI_PV	052	C	7/11/2019	14:08:39	294	18	5	77	
SPI_PV	052	D	7/11/2019	14:09:50	295	18	5	77	
SPI_PV	134	A	7/11/2019	14:25:35	296	18	5	80	Gravel station 134.
SPI_PV	134	B	7/11/2019	14:26:59	297	18	5	80	
SPI_PV	134	C	7/11/2019	14:28:16	298	18	5	80	No PV image
SPI_PV	134	D	7/11/2019	14:29:30	299	18	5	80	
SPI_PV	133	A	7/11/2019	14:45:17	300	18	5	79	Gravel station 133.
SPI_PV	133	B	7/11/2019	14:46:33	301	18	5	79	
SPI_PV	133	C	7/11/2019	14:47:50	302	18	5	79	
SPI_PV	133	D	7/11/2019	14:49:02	303	18	5	79	
SPI_PV	132	A	7/11/2019	15:03:05	304	18	5	75	Hard bottom? Station 132.
SPI_PV	132	B	7/11/2019	15:04:22	305	18	5	75	
SPI_PV	132	C	7/11/2019	15:05:36	306	18	5	75	
SPI_PV	132	D	7/11/2019	15:07:07	307	18	5	75	
SPI_PV	131	A	7/11/2019	15:22:57	308	18	5	69	Hard bottom station 131.
SPI_PV	131	B	7/11/2019	15:23:43	309	18	5	69	
SPI_PV	131	C	7/11/2019	15:24:53	310	18	5	69	
SPI_PV	131	D	7/11/2019	15:26:09	311	18	5	69	
SPI_PV	069	A	7/11/2019	15:40:55	312	18	5	70	Minimal gravel station 69.
SPI_PV	069	B	7/11/2019	15:42:23	313	18	5	70	
SPI_PV	069	C	7/11/2019	15:43:39	314	18	5	70	
SPI_PV	069	D	7/11/2019	15:44:59	315	18	5	70	
SPI_PV	068	A	7/11/2019	16:00:18	316	18	5	70	Hard bottom or gravel station 68.
SPI_PV	068	B	7/11/2019	16:01:38	317	18	5	70	
SPI_PV	068	C	7/11/2019	16:02:46	318	18	5	70	
SPI_PV	068	D	7/11/2019	16:04:01	319	18	5	70	

SampleType	StationID	Replicate	Date	Time	Frame	SPI_StopCollar_in	SPI_Weights_perSide_num	Depth_ft	Comments
SPI_PV	067	A	7/11/2019	16:18:30	320	18	5	77	
SPI_PV	067	B	7/11/2019	16:19:47	321	18	5	77	
SPI_PV	067	C	7/11/2019	16:21:09	322	18	5	77	
SPI_PV	067	D	7/11/2019	16:22:22	323	18	5	77	
SPI_PV	066	A	7/11/2019	16:37:56	324	18	5	82	
SPI_PV	066	B	7/11/2019	16:39:27	325	18	5	82	
SPI_PV	066	C	7/11/2019	16:40:50	326	18	5	82	
SPI_PV	066	D	7/11/2019	16:42:07	327	18	5	82	
SPI_PV	065	A	7/11/2019	16:58:56	328	18	5	77	
SPI_PV	065	B	7/11/2019	17:00:13	329	18	5	77	
SPI_PV	065	C	7/11/2019	17:01:22	330	18	5	77	
SPI_PV	065	D	7/11/2019	17:02:43	331	18	5	77	Download images, FC 332.
SPI_PV	064	A	7/11/2019	17:43:30	333	18	5	72	
SPI_PV	064	B	7/11/2019	17:45:05	334	18	5	72	
SPI_PV	064	C	7/11/2019	17:46:20	335	18	5	72	
SPI_PV	064	D	7/11/2019	17:47:35	336	18	5	72	
SPI_PV	063	A	7/11/2019	18:30:30	337	18	5	74	
SPI_PV	063	B	7/11/2019	18:31:53	338	18	5	74	
SPI_PV	063	C	7/11/2019	18:33:02	339	18	5	74	
SPI_PV	063	D	7/11/2019	18:34:12	340	18	5	74	
SPI_PV	078	A	7/11/2019	18:45:18	341	18	5	77	
SPI_PV	078	B	7/11/2019	18:46:50	342	18	5	77	
SPI_PV	078	C	7/11/2019	18:48:01	343	18	5	77	
SPI_PV	078	D	7/11/2019	18:49:25	344	18	5	77	
SPI_PV	081	A	7/11/2019	19:02:16	345	18	5	83	
SPI_PV	081	B	7/11/2019	19:03:53	346	18	5	83	
SPI_PV	081	C	7/11/2019	19:05:04	347	18	5	83	
SPI_PV	081	D	7/11/2019	19:06:15	348	18	5	83	
SPI_PV	047	A	7/11/2019	19:22:28	349	18	5	81	
SPI_PV	047	B	7/11/2019	19:23:39	350	18	5	81	No nav fix for rep B.
SPI_PV	047	C	7/11/2019	19:24:55	351	18	5	81	No nav fix for rep C.
SPI_PV	047	D	7/11/2019	19:26:18	352	18	5	81	
SPI_PV	047	E	7/11/2019	19:30:55	353	18	5	81	
SPI_PV	047	F	7/11/2019	19:32:10	354	18	5	81	
SPI_PV	046	A	7/11/2019	19:50:28	355	18	5	84	
SPI_PV	046	B	7/11/2019	19:51:45	356	18	5	84	
SPI_PV	046	C	7/11/2019	19:52:58	357	18	5	84	PV images poor quality, redo. FC 362
SPI_PV	046	D	7/11/2019	19:54:11	358	18	5	84	Sampling stopped for lighting at 20:25, PV battery swap.
SPI_PV	026	D	7/11/2019		198	18	5	89	No image
SPI_PV	055	C	7/12/2019	0:01:20	559	13	5	73	
SPI_PV	055	D	7/12/2019	0:02:47	560	13	5	73	
SPI_PV	082	A	7/12/2019	4:18:11	363	18	5	76	3:00 on deck download, adjust PV wire to improve focus. 4:00 commence resampling at station 82.

SampleType	StationID	Replicate	Date	Time	Frame	SPI_StopCollar_in	SPI_Weights_perSide_num	Depth_ft	Comments
SPI_PV	082	B	7/12/2019	4:19:11	364	18	5	76	
SPI_PV	082	C	7/12/2019	4:19:58	365	18	5	76	
SPI_PV	082	D	7/12/2019	4:21:00	366	18	5	76	Download to check PV, FC 367. Shortened PV wire.
SPI_PV	079	A	7/12/2019	4:58:06	368	18	5	80	
SPI_PV	079	B	7/12/2019	4:59:02	369	18	5	80	
SPI_PV	079	C	7/12/2019	4:59:47	370	18	5	80	
SPI_PV	079	D	7/12/2019	5:00:25	371	18	5	80	
SPI_PV	083	A	7/12/2019	5:25:53	372	18	5	76	
SPI_PV	083	B	7/12/2019	5:26:38	373	18	5	76	
SPI_PV	083	C	7/12/2019	5:27:22	374	18	5	76	
SPI_PV	083	D	7/12/2019	5:28:14	375	18	5	76	May need PV redo.
SPI_PV	080	A	7/12/2019	5:40:35	376	18	5	69	
SPI_PV	080	B	7/12/2019	5:41:21	377	18	5	69	
SPI_PV	080	C	7/12/2019	5:42:01	378	18	5	69	
SPI_PV	080	D	7/12/2019	5:42:57	379	18	5	69	
SPI_PV	084	A	7/12/2019	6:00:19	380	18	5	62	
SPI_PV	084	B	7/12/2019	6:01:05	381	18	5	62	
SPI_PV	084	C	7/12/2019	6:01:50	382	18	5	62	
SPI_PV	084	D	7/12/2019	6:02:30	383	18	5	62	
SPI_PV	098	A	7/12/2019	6:15:27	384	18	5	58	
SPI_PV	098	B	7/12/2019	6:16:02	385	18	5	58	
SPI_PV	098	C	7/12/2019	6:16:56	386	18	5	58	
SPI_PV	098	D	7/12/2019	6:17:38	387	18	5	58	
SPI_PV	102	A	7/12/2019	6:27:48	388	18	5	57	
SPI_PV	102	B	7/12/2019	6:28:45	389	18	5	57	
SPI_PV	102	C	7/12/2019	6:29:30	390	18	5	57	
SPI_PV	102	D	7/12/2019	6:30:33	391	18	5	57	FC 392
SPI_PV	085	A	7/12/2019	6:43:03	393	18	5	66	
SPI_PV	085	B	7/12/2019	6:43:56	394	18	5	66	
SPI_PV	085	C	7/12/2019	6:44:37	395	18	5	66	
SPI_PV	085	D	7/12/2019	6:45:22	396	18	5	66	FC 398
SPI_PV	103	A	7/12/2019	7:03:18	399	18	5	56	
SPI_PV	103	B	7/12/2019	7:04:00	400	18	5	56	
SPI_PV	103	C	7/12/2019	7:04:42	401	18	5	56	
SPI_PV	103	D	7/12/2019	7:05:26	402	18	5	56	
SPI_PV	086	A	7/12/2019	7:17:30	403	18	5	51	
SPI_PV	086	B	7/12/2019	7:18:24	404	18	5	51	
SPI_PV	086	C	7/12/2019	7:19:16	405	18	5	51	
SPI_PV	086	D	7/12/2019	7:20:08	406	18	5	51	
SPI_PV	087	A	7/12/2019	7:36:16	407	18	5	44	
SPI_PV	087	B	7/12/2019	7:37:33	408	18	5	44	
SPI_PV	087	C	7/12/2019	7:38:13	409	18	5	44	
SPI_PV	087	D	7/12/2019	7:39:02	410	18	5	44	FC 411

SampleType	StationID	Replicate	Date	Time	Frame	SPI_StopCollar_in	SPI_Weights_perSide_num	Depth_ft	Comments
SPI_PV	088	A	7/12/2019	7:56:50	412	18	5	36	
SPI_PV	088	B	7/12/2019	7:57:41	413	18	5	36	
SPI_PV	088	C	7/12/2019	7:58:28	414	18	5	36	
SPI_PV	088	D	7/12/2019	7:59:09	415	18	5	36	Download, FC 415.
SPI_PV	106	A	7/12/2019	8:47:33	416	18	5	32	
SPI_PV	106	B	7/12/2019	8:48:23	417	18	5	32	
SPI_PV	106	C	7/12/2019	8:49:12	418	18	5	32	
SPI_PV	106	D	7/12/2019	8:50:22	419	18	5	32	
SPI_PV	106	E	7/12/2019	8:51:02	420	18	5	32	FC 421
SPI_PV	105	X	7/12/2019	9:05:17	422	18	5	37	
SPI_PV	105	Y	7/12/2019	9:07:03	423	18	5	37	
SPI_PV	105	Z	7/12/2019	9:07:55	424	18	5	37	Nav CPU crashed, redo station.
SPI_PV	105	A	7/12/2019	9:18:00	425	18	5	37	
SPI_PV	105	B	7/12/2019	9:19:06	426	18	5	37	
SPI_PV	105	C	7/12/2019	9:19:54	427	18	5	37	
SPI_PV	105	D	7/12/2019	9:20:39	428	18	5	37	
SPI_PV	104	A	7/12/2019	9:36:52	429	18	5	45	
SPI_PV	104	B	7/12/2019	9:39:00	430	18	5	45	
SPI_PV	104	C	7/12/2019	9:39:53	431	18	5	45	
SPI_PV	104	D	7/12/2019	9:40:40	432	18	5	45	
SPI_PV	099	A	7/12/2019	10:08:21	433	18	5	58	
SPI_PV	099	B	7/12/2019	10:09:00	434	18	5	58	
SPI_PV	099	C	7/12/2019	10:10:26	435	18	5	58	
SPI_PV	099	D	7/12/2019	10:11:08	436	18	5	58	
SPI_PV	100	A	7/12/2019	10:30:33	437	18	5	50	
SPI_PV	100	B	7/12/2019	10:31:20	438	18	5	50	
SPI_PV	100	C	7/12/2019	10:32:09	439	18	5	50	
SPI_PV	100	D	7/12/2019	10:32:54	440	18	5	50	FC 441
SPI_PV	101	A	7/12/2019	10:51:28	442	18	5	48	
SPI_PV	101	B	7/12/2019	10:52:35	443	18	5	48	
SPI_PV	101	C	7/12/2019	10:53:17	444	18	5	48	
SPI_PV	101	D	7/12/2019	10:54:03	445	18	5	48	
SPI_PV	116	A	7/12/2019	11:14:57	446	18	5	45	
SPI_PV	116	B	7/12/2019	11:16:55	447	18	5	45	
SPI_PV	116	C	7/12/2019	11:17:35	448	18	5	45	
SPI_PV	116	D	7/12/2019	11:18:17	449	18	5	45	
SPI_PV	116	E	7/12/2019	11:18:58	450	18	5	45	
SPI_PV	119	A	7/12/2019	11:34:30	451	18	5	45	
SPI_PV	119	B	7/12/2019	11:35:11	452	18	5	45	
SPI_PV	119	C	7/12/2019	11:36:00	453	18	5	45	
SPI_PV	119	D	7/12/2019	11:36:40	454	18	5	45	
SPI_PV	117	A	7/12/2019	11:47:00	455	18	5	46	
SPI_PV	117	B	7/12/2019	11:47:40	456	18	5	46	

SampleType	StationID	Replicate	Date	Time	Frame	SPI_StopCollar_in	SPI_Weights_perSide_num	Depth_ft	Comments
SPI_PV	117	C	7/12/2019	11:48:20	457	18	5	46	
SPI_PV	117	D	7/12/2019	11:48:57	458	18	5	46	Download, FC 460. Changed SPI battery.
SPI_PV	120	A	7/12/2019	12:59:51	461	18	5	36	
SPI_PV	120	B	7/12/2019	13:01:16	462	18	5	36	
SPI_PV	120	C	7/12/2019	13:02:46	463	18	5	36	
SPI_PV	120	D	7/12/2019	13:04:33	464	18	5	36	
SPI_PV	121	A	7/12/2019	13:26:25	465	18	5	27	Poor PV quality station 121.
SPI_PV	121	B	7/12/2019	13:27:50	466	18	5	27	
SPI_PV	121	C	7/12/2019	13:29:18	467	18	5	27	
SPI_PV	121	D	7/12/2019	13:30:54	468	18	5	27	
SPI_PV	129	A	7/12/2019	13:49:34	469	18	5	40	Poor PV quality station 129.
SPI_PV	129	B	7/12/2019	13:51:23	470	18	5	40	
SPI_PV	129	C	7/12/2019	13:53:05	471	18	5	40	
SPI_PV	129	D	7/12/2019	13:54:51	472	18	5	40	Over penetrated SPI.
SPI_PV	130	A	7/12/2019	14:11:36	473	18	5	31	Gravel bottom station 130.
SPI_PV	130	B	7/12/2019	14:13:18	474	18	5	31	
SPI_PV	130	C	7/12/2019	14:14:49	475	18	5	31	
SPI_PV	130	D	7/12/2019	14:16:16	476	18	5	31	
SPI_PV	128	A	7/12/2019	14:31:55	477	18	5	44	
SPI_PV	128	B	7/12/2019	14:33:35	478	18	5	44	
SPI_PV	128	C	7/12/2019	14:35:09	479	18	5	44	
SPI_PV	128	D	7/12/2019	14:36:49	480	18	5	44	2 good PV, over penetrated SPI.
SPI_PV	126	A	7/12/2019	14:51:17	481	18	5	37	Gravel bottom station 126.
SPI_PV	126	B	7/12/2019	14:52:54	482	18	5	37	
SPI_PV	126	C	7/12/2019	14:54:35	483	18	5	37	
SPI_PV	126	D	7/12/2019	14:56:02	484	18	5	37	Low PV quality station 126.
SPI_PV	124	A	7/12/2019	15:02:44	485	18	5	41	
SPI_PV	124	B	7/12/2019	15:04:19	486	18	5	41	
SPI_PV	124	C	7/12/2019	15:05:46	487	18	5	41	
SPI_PV	124	D	7/12/2019	15:07:17	488	18	5	41	
SPI_PV	123	A	7/12/2019	15:17:00	489	18	5	45	
SPI_PV	123	B	7/12/2019	15:18:55	490	18	5	45	
SPI_PV	123	C	7/12/2019	15:20:34	491	18	5	45	
SPI_PV	123	D	7/12/2019	15:22:24	492	18	5	45	
SPI_PV	125	A	7/12/2019	15:31:27	493	18	5	43	
SPI_PV	125	B	7/12/2019	15:32:59	494	18	5	43	
SPI_PV	125	C	7/12/2019	15:34:35	495	18	5	43	
SPI_PV	125	D	7/12/2019	15:36:09	496	18	5	43	
SPI_PV	127	A	7/12/2019	15:41:30	497	18	5	43	Grave/sand bottom station 127.
SPI_PV	127	B	7/12/2019	15:43:10	498	18	5	43	
SPI_PV	127	C	7/12/2019	15:44:49	499	18	5	43	
SPI_PV	127	D	7/12/2019	15:46:20	500	18	5	43	
SPI_PV	122	A	7/12/2019	15:53:19	501	18	5	44	

SampleType	StationID	Replicate	Date	Time	Frame	SPI_StopCollar_in	SPI_Weights_perSide_num	Depth_ft	Comments
SPI_PV	122	B	7/12/2019	15:55:04	502	18	5	44	
SPI_PV	122	C	7/12/2019	15:56:37	503	18	5	44	
SPI_PV	122	D	7/12/2019	15:58:05	504	18	5	44	
SPI_PV	118	A	7/12/2019	16:05:38	505	18	5	47	
SPI_PV	118	B	7/12/2019	16:07:10	506	18	5	47	
SPI_PV	118	C	7/12/2019	16:08:40	507	18	5	47	
SPI_PV	118	D	7/12/2019	16:10:09	508	18	5	47	Images downloaded, FC 509. Adjusted stops to 12.5"
SPI_PV	077	A	7/12/2019	17:32:32	510	13	5	86	
SPI_PV	077	B	7/12/2019	17:34:06	511	13	5	86	
SPI_PV	077	C	7/12/2019	17:35:32	512	13	5	86	
SPI_PV	077	D	7/12/2019	17:37:08	513	13	5	86	
SPI_PV	076	A	7/12/2019	17:52:26	514	13	5	90	
SPI_PV	076	B	7/12/2019	17:54:04	515	13	5	90	
SPI_PV	076	C	7/12/2019	17:55:40	516	13	5	90	
SPI_PV	076	D	7/12/2019	17:57:06	517	13	5	90	
SPI_PV	075	A	7/12/2019	18:25:18	518	13	5	91	
SPI_PV	075	B	7/12/2019	18:26:47	519	13	5	91	
SPI_PV	075	C	7/12/2019	18:28:26	520	13	5	91	
SPI_PV	075	D	7/12/2019	18:29:55	521	13	5	91	
SPI_PV	074	A	7/12/2019	18:45:25	522	13	5	86	SPI Only
SPI_PV	074	B	7/12/2019	18:47:02	523	13	5	86	SPI Only
SPI_PV	074	C	7/12/2019	18:48:26	524	13	5	86	SPI Only
SPI_PV	074	D	7/12/2019	18:49:59	525	13	5	86	SPI Only
SPI_PV	074	E	7/12/2019	18:59:58	526	13	5	86	
SPI_PV	074	F	7/12/2019	19:01:11	527	13	5	86	
SPI_PV	074	G	7/12/2019	19:03:01	528	13	5	86	
SPI_PV	074	H	7/12/2019	19:04:40	529	13	5	86	
SPI_PV	073	A	7/12/2019	19:17:56	530	13	5	81	
SPI_PV	073	B	7/12/2019	19:19:21	531	13	5	81	
SPI_PV	073	C	7/12/2019	19:20:51	532	13	5	81	
SPI_PV	073	D	7/12/2019	19:22:25	533	13	5	81	
SPI_PV	072	A	7/12/2019	19:34:54	534	13	5	74	
SPI_PV	072	B	7/12/2019	19:36:29	535	13	5	74	
SPI_PV	072	C	7/12/2019	19:38:00	536	13	5	74	
SPI_PV	072	D	7/12/2019	19:39:36	537	13	5	74	FC 538
SPI_PV	071	A	7/12/2019	19:52:46	539	13	5	71	
SPI_PV	071	B	7/12/2019	19:54:15	540	13	5	71	
SPI_PV	071	C	7/12/2019	19:55:48	541	13	5	71	
SPI_PV	071	D	7/12/2019	19:57:17	542	13	5	71	
SPI_PV	070	A	7/12/2019	20:10:52	543	13	5	76	
SPI_PV	070	B	7/12/2019	20:12:20	544	13	5	76	
SPI_PV	070	C	7/12/2019	20:13:51	545	13	5	76	
SPI_PV	070	D	7/12/2019	20:15:42	546	13	5	76	Download images, FC 546.

SampleType	StationID	Replicate	Date	Time	Frame	SPI_StopCollar_in	SPI_Weights_perSide_num	Depth_ft	Comments
SPI_PV	053	A	7/12/2019	20:56:17	547	13	5	72	
SPI_PV	053	B	7/12/2019	20:58:04	548	13	5	72	
SPI_PV	053	C	7/12/2019	20:59:30	549	13	5	72	
SPI_PV	053	D	7/12/2019	21:00:58	550	13	5	72	
SPI_PV	054	A	7/12/2019	21:18:56	551	13	5	72	
SPI_PV	054	B	7/12/2019	21:20:06	552	13	5	72	
SPI_PV	054	C	7/12/2019	21:22:00	553	13	5	72	
SPI_PV	054	D	7/12/2019	21:23:30	554	13	5	72	Bent frame caught on stern, winch cable off spool.
SPI_PV	055	A	7/12/2019	23:58:19	557	13	5	73	
SPI_PV	055	B	7/12/2019	23:59:49	558	13	5	73	
SPI_PV	056	A	7/13/2019	0:21:39	561	13	5	81	
SPI_PV	056	B	7/13/2019	0:22:42	562	13	5	81	
SPI_PV	056	C	7/13/2019	0:23:25	563	13	5	81	
SPI_PV	056	D	7/13/2019	0:24:03	564	13	5	81	Shift change
SPI_PV	057	A	7/13/2019	0:43:52	565	13	5	86	
SPI_PV	057	B	7/13/2019	0:44:34	566	13	5	86	
SPI_PV	057	C	7/13/2019	0:45:17	567	13	5	86	
SPI_PV	057	D	7/13/2019	0:45:56	568	13	5	86	
SPI_PV	058	A	7/13/2019	1:07:41	569	13	5	91	
SPI_PV	058	B	7/13/2019	1:08:25	570	13	5	91	
SPI_PV	058	C	7/13/2019	1:09:04	571	13	5	91	
SPI_PV	058	D	7/13/2019	1:09:43	572	13	5	91	
SPI_PV	059	A	7/13/2019	1:29:21	573	13	5	95	
SPI_PV	059	B	7/13/2019	1:30:05	574	13	5	95	
SPI_PV	059	C	7/13/2019	1:30:45	575	13	5	95	
SPI_PV	059	D	7/13/2019	1:31:21	576	13	5	95	
SPI_PV	060	A	7/13/2019	1:54:09	577	13	5	95	
SPI_PV	060	B	7/13/2019	1:54:48	578	13	5	95	
SPI_PV	060	C	7/13/2019	1:55:28	579	13	5	95	
SPI_PV	060	D	7/13/2019	1:56:10	580	13	5	95	
SPI_PV	061	A	7/13/2019	2:18:20	581	13	5	91	
SPI_PV	061	B	7/13/2019	2:19:00	582	13	5	91	
SPI_PV	061	C	7/13/2019	2:19:44	583	13	5	91	
SPI_PV	061	D	7/13/2019	2:20:25	584	13	5	91	
SPI_PV	062	A	7/13/2019	2:40:00	585	13	5	87	
SPI_PV	062	B	7/13/2019	2:40:46	586	13	5	87	
SPI_PV	062	C	7/13/2019	2:41:31	587	13	5	87	
SPI_PV	062	D	7/13/2019	2:42:11	588	13	5	87	Download, FC 590. Stops raised to 14", SPI download malfunction camera still taking photos.
SPI_PV	089	A	7/13/2019	3:51:44	591	14	5	80	
SPI_PV	089	B	7/13/2019	3:53:11	592	14	5	80	
SPI_PV	089	C	7/13/2019	3:54:02	593	14	5	80	
SPI_PV	089	D	7/13/2019	3:54:36	594	14	5	80	

SampleType	StationID	Replicate	Date	Time	Frame	SPI_StopCollar_in	SPI_Weights_perSide_num	Depth_ft	Comments
SPI_PV	090	A	7/13/2019	4:14:20	595	14	5	70	
SPI_PV	090	B	7/13/2019	4:15:00	596	14	5	70	
SPI_PV	090	C	7/13/2019	4:15:46	597	14	5	70	
SPI_PV	090	D	7/13/2019	4:16:25	598	14	5	70	
SPI_PV	091	A	7/13/2019	4:36:39	599	14	5	60	
SPI_PV	091	B	7/13/2019	4:37:19	600	14	5	60	
SPI_PV	091	C	7/13/2019	4:38:08	601	14	5	60	
SPI_PV	091	D	7/13/2019	4:38:49	602	14	5	60	
SPI_PV	092	A	7/13/2019	4:56:27	603	14	5	55	
SPI_PV	092	B	7/13/2019	4:57:08	604	14	5	55	
SPI_PV	092	C	7/13/2019	4:57:48	605	14	5	55	
SPI_PV	092	D	7/13/2019	4:58:37	606	14	5	55	
SPI_PV	093	A	7/13/2019	5:19:36	607	14	5	44	
SPI_PV	093	B	7/13/2019	5:20:15	608	14	5	44	
SPI_PV	093	C	7/13/2019	5:21:00	609	14	5	44	
SPI_PV	093	D	7/13/2019	5:21:52	610	14	5	44	
SPI_PV	094	A	7/13/2019	5:39:16	611	14	5	44	
SPI_PV	094	B	7/13/2019	5:40:02	612	14	5	44	
SPI_PV	094	C	7/13/2019	5:40:49	613	14	5	44	
SPI_PV	094	D	7/13/2019	5:41:30	614	14	5	44	
SPI_PV	094	E	7/13/2019	5:42:09	615	14	5	44	
SPI_PV	095	A	7/13/2019	6:00:52	616	14	5	30	
SPI_PV	095	B	7/13/2019	6:01:35	617	14	5	30	
SPI_PV	095	C	7/13/2019	6:02:14	618	14	5	30	
SPI_PV	095	D	7/13/2019	6:02:51	619	14	5	30	
SPI_PV	096	A	7/13/2019	6:17:17	620	14	5	23	
SPI_PV	096	B	7/13/2019	6:18:05	621	14	5	23	
SPI_PV	096	C	7/13/2019	6:18:45	622	14	5	23	
SPI_PV	096	D	7/13/2019	6:19:25	623	14	5	23	
SPI_PV	097	A	7/13/2019	6:36:31	624	14	5	33	
SPI_PV	097	B	7/13/2019	6:37:07	625	14	5	33	
SPI_PV	097	C	7/13/2019	6:37:45	626	14	5	33	
SPI_PV	097	D	7/13/2019	6:38:27	627	14	5	33	
SPI_PV	097	E	7/13/2019	6:40:49	628	14	5	33	
SPI_PV	107	A	7/13/2019	7:01:30	629	14	5	52	
SPI_PV	107	B	7/13/2019	7:02:07	630	14	5	52	
SPI_PV	107	C	7/13/2019	7:02:48	631	14	5	52	
SPI_PV	107	D	7/13/2019	7:03:31	632	14	5	52	Download, FC 632.
SPI_PV	108	A	7/13/2019	7:35:43	633	14	5	48	
SPI_PV	108	B	7/13/2019	7:36:23	634	14	5	48	
SPI_PV	108	C	7/13/2019	7:37:00	635	14	5	48	
SPI_PV	108	D	7/13/2019	7:37:41	636	14	5	48	
SPI_PV	108	E	7/13/2019	7:38:20	637	14	5	48	

SampleType	StationID	Replicate	Date	Time	Frame	SPI_StopCollar_in	SPI_Weights_perSide_num	Depth_ft	Comments
SPI_PV	108	F	7/13/2019	7:38:58	638	14	5	48	
SPI_PV	109	A	7/13/2019	7:58:01	639	14	5	36	
SPI_PV	109	B	7/13/2019	7:58:45	640	14	5	36	
SPI_PV	109	C	7/13/2019	7:59:23	641	14	5	36	
SPI_PV	109	D	7/13/2019	7:59:56	642	14	5	36	
SPI_PV	110	A	7/13/2019	8:17:27	643	14	5	53	
SPI_PV	110	B	7/13/2019	8:19:13	644	14	5	53	
SPI_PV	110	C	7/13/2019	8:19:59	645	14	5	53	
SPI_PV	110	D	7/13/2019	8:20:36	646	14	5	53	
SPI_PV	110	E	7/13/2019	8:21:19	647	14	5	53	
SPI_PV	111	A	7/13/2019	8:41:15	648	14	5	86	
SPI_PV	111	B	7/13/2019	8:42:05	649	14	5	86	
SPI_PV	111	C	7/13/2019	8:42:48	650	14	5	86	
SPI_PV	111	D	7/13/2019	8:43:28	651	14	5	86	
SPI_PV	112	A	7/13/2019	9:05:48	652	14	5	64	
SPI_PV	112	B	7/13/2019	9:08:32	653	14	5	64	
SPI_PV	112	C	7/13/2019	9:10:30	654	14	5	64	
SPI_PV	112	D	7/13/2019	9:11:19	655	14	5	64	
SPI_PV	113	A	7/13/2019	9:42:28	656	14	5	47	
SPI_PV	113	B	7/13/2019	9:43:16	657	14	5	47	
SPI_PV	113	C	7/13/2019	9:44:27	658	14	5	47	
SPI_PV	113	D	7/13/2019	9:45:27	659	14	5	47	
SPI_PV	114	A	7/13/2019	10:07:01	660	14	5	50	
SPI_PV	114	B	7/13/2019	10:07:50	661	14	5	50	
SPI_PV	114	C	7/13/2019	10:08:30	662	14	5	50	
SPI_PV	114	D	7/13/2019	10:09:10	663	14	5	50	
SPI_PV	114	E	7/13/2019	10:10:04	664	14	5	50	
SPI_PV	115	A	7/13/2019	10:28:12	665	14	5	50	
SPI_PV	115	B	7/13/2019	10:29:01	666	14	5	50	
SPI_PV	115	C	7/13/2019	10:29:56	667	14	5	50	
SPI_PV	115	D	7/13/2019	10:31:08	668	14	5	50	Download, shift change. Grabs 12:22-16:31 at stations 108, 95, 91, 76, 60, 57, 133, 136.
SPI_PV	015	D	7/13/2019	18:14:00	672	14	5	109	
SPI_PV	015	A	7/13/2019	18:14:18	669	14	5	109	
SPI_PV	015	B	7/13/2019	18:15:54	670	14	5	109	
SPI_PV	015	C	7/13/2019	18:17:40	671	14	5	109	
SPI_PV	014	A	7/13/2019	18:40:20	673	14	5	117	
SPI_PV	014	B	7/13/2019	18:41:53	674	14	5	117	
SPI_PV	014	C	7/13/2019	18:43:23	675	14	5	117	
SPI_PV	014	D	7/13/2019	18:44:46	676	14	5	117	
SPI_PV	013	A	7/13/2019	19:04:45	677	14	5	111	
SPI_PV	013	B	7/13/2019	19:06:26	678	14	5	111	
SPI_PV	013	C	7/13/2019	19:07:58	679	14	5	111	

SampleType	StationID	Replicate	Date	Time	Frame	SPI_StopCollar_in	SPI_Weights_perSide_num	Depth_ft	Comments
SPI_PV	013	D	7/13/2019	19:09:25	680	14	5	111	
SPI_PV	012	A	7/13/2019	19:29:17	681	14	5	127	
SPI_PV	012	B	7/13/2019	19:30:51	682	14	5	127	
SPI_PV	012	C	7/13/2019	19:32:14	683	14	5	127	
SPI_PV	012	D	7/13/2019	19:33:42	684	14	5	127	
SPI_PV	REFC_03	A	7/13/2019	19:53:50	685	14	5	119	
SPI_PV	REFC_03	B	7/13/2019	19:55:18	686	14	5	119	
SPI_PV	REFC_03	C	7/13/2019	19:56:39	687	14	5	119	
SPI_PV	REFC_03	D	7/13/2019	19:58:02	688	14	5	119	
SPI_PV	REFC_05	A	7/13/2019	20:03:43	689	14	5	115	
SPI_PV	REFC_05	B	7/13/2019	20:05:07	690	14	5	115	
SPI_PV	REFC_05	C	7/13/2019	20:06:44	691	14	5	115	
SPI_PV	REFC_05	D	7/13/2019	20:08:06	692	14	5	115	
SPI_PV	REFC_04	A	7/13/2019	20:12:27	693	14	5	114	
SPI_PV	REFC_04	B	7/13/2019	20:13:58	694	14	5	114	
SPI_PV	REFC_04	C	7/13/2019	20:15:20	695	14	5	114	
SPI_PV	REFC_04	D	7/13/2019	20:16:57	696	14	5	114	
SPI_PV	REFC_01	A	7/13/2019	20:23:55	697	14	5	117	
SPI_PV	REFC_01	B	7/13/2019	20:25:42	698	14	5	117	
SPI_PV	REFC_01	C	7/13/2019	20:27:04	699	14	5	117	
SPI_PV	REFC_01	D	7/13/2019	20:28:34	700	14	5	117	
SPI_PV	REFC_02	A	7/13/2019	20:32:12	701	14	5	117	
SPI_PV	REFC_02	B	7/13/2019	20:33:34	702	14	5	117	
SPI_PV	REFC_02	C	7/13/2019	20:35:04	703	14	5	117	
SPI_PV	REFC_02	D	7/13/2019	20:36:35	704	14	5	117	Download images, FC 705. Deck test 706.
SPI_PV	REFA_02	A	7/13/2019	21:21:16	707	14	5	105	Gravel station REFA_02.
SPI_PV	REFA_02	B	7/13/2019	21:22:50	708	14	5	105	
SPI_PV	REFA_02	C	7/13/2019	21:24:14	709	14	5	105	
SPI_PV	REFA_02	D	7/13/2019	21:25:47	710	14	5	105	
SPI_PV	REFA_04	A	7/13/2019	21:37:30	711	14	5	100	Gravel station REFA_04.
SPI_PV	REFA_04	B	7/13/2019	21:39:40	712	14	5	100	
SPI_PV	REFA_04	C	7/13/2019	21:41:05	713	14	5	100	
SPI_PV	REFA_04	D	7/13/2019	21:42:36	714	14	5	100	
SPI_PV	REFA_03	A	7/13/2019	21:48:20	715	14	5	101	Gravel station REFA_03.
SPI_PV	REFA_03	B	7/13/2019	21:49:45	716	14	5	101	
SPI_PV	REFA_03	C	7/13/2019	21:51:10	717	14	5	101	
SPI_PV	REFA_03	D	7/13/2019	21:52:32	718	14	5	101	
SPI_PV	REFA_05	A	7/13/2019	22:00:03	719	14	5	109	Gravel station REFA_05.
SPI_PV	REFA_05	B	7/13/2019	22:01:27	720	14	5	109	
SPI_PV	REFA_05	C	7/13/2019	22:02:54	721	14	5	109	
SPI_PV	REFA_05	D	7/13/2019	22:04:14	722	14	5	109	
SPI_PV	REFA_01	A	7/13/2019	22:15:36	723	14	5	94	Gravel station REFA_01.
SPI_PV	REFA_01	B	7/13/2019	22:17:03	724	14	5	94	

SampleType	StationID	Replicate	Date	Time	Frame	SPI_StopCollar_in	SPI_Weights_perSide_num	Depth_ft	Comments
SPI_PV	REFA_01	C	7/13/2019	22:18:26	725	14	5	94	
SPI_PV	REFA_01	D	7/13/2019	22:19:51	726	14	5	94	
SPI_PV	011	A	7/13/2019	22:56:28	727	14	5	224	
SPI_PV	011	B	7/13/2019	22:57:56	728	14	5	224	
SPI_PV	011	C	7/13/2019	22:59:28	729	14	5	224	
SPI_PV	011	D	7/13/2019	23:00:55	730	14	5	224	
SPI_PV	010	A	7/13/2019	23:25:00	731	14	5	116	Minimal gravel station 10.
SPI_PV	010	B	7/13/2019	23:26:35	732	14	5	116	
SPI_PV	010	C	7/13/2019	23:27:59	733	14	5	116	
SPI_PV	010	D	7/13/2019	23:29:30	734	14	5	116	
SPI_PV	009	A	7/13/2019	23:49:58	735	14	5	95	Gravel station 9.
SPI_PV	009	B	7/13/2019	23:51:20	736	14	5	95	
SPI_PV	009	C	7/13/2019	23:52:47	737	14	5	95	
SPI_PV	009	D	7/13/2019	23:54:04	738	14	5	95	FC 738, shift change.
SPI_PV	008	A	7/14/2019	0:17:51	739	14	5	85	
SPI_PV	008	B	7/14/2019	0:18:55	740	14	5	85	
SPI_PV	008	C	7/14/2019	0:19:39	741	14	5	85	
SPI_PV	008	D	7/14/2019	0:20:25	742	14	5	85	
SPI_PV	008	E	7/14/2019	0:21:13	743	14	5	85	Download, FC 744.
SPI_PV	007	A	7/14/2019	1:24:08	745	14	5	77	
SPI_PV	007	B	7/14/2019	1:24:48	746	14	5	77	
SPI_PV	007	C	7/14/2019	1:25:30	747	14	5	77	
SPI_PV	007	D	7/14/2019	1:26:11	748	14	5	77	
SPI_PV	006	A	7/14/2019	1:46:53	749	14	5	68	
SPI_PV	006	B	7/14/2019	1:47:37	750	14	5	68	Gravelly sand station 6.
SPI_PV	006	C	7/14/2019	1:48:21	751	14	5	68	
SPI_PV	006	D	7/14/2019	1:49:09	752	14	5	68	
SPI_PV	005	A	7/14/2019	2:07:04	753	14	5	77	Gravel station 5.
SPI_PV	005	B	7/14/2019	2:08:15	754	14	5	77	
SPI_PV	005	C	7/14/2019	2:08:54	755	14	5	77	
SPI_PV	005	D	7/14/2019	2:09:39	756	14	5	77	
SPI_PV	004	A	7/14/2019	2:28:31	757	14	5	73	
SPI_PV	004	B	7/14/2019	2:29:18	758	14	5	73	
SPI_PV	004	C	7/14/2019	2:29:57	759	14	5	73	
SPI_PV	004	D	7/14/2019	2:30:36	760	14	5	73	
SPI_PV	003	A	7/14/2019	2:50:10	761	14	5	70	
SPI_PV	003	B	7/14/2019	2:50:51	762	14	5	70	
SPI_PV	003	C	7/14/2019	2:51:27	763	14	5	70	
SPI_PV	003	D	7/14/2019	2:52:11	764	14	5	70	
SPI_PV	002	A	7/14/2019	3:13:01	765	14	5	64	Gravel station 2.
SPI_PV	002	B	7/14/2019	3:13:42	766	14	5	64	
SPI_PV	002	C	7/14/2019	3:14:21	767	14	5	64	
SPI_PV	002	D	7/14/2019	3:15:05	768	14	5	64	

SampleType	StationID	Replicate	Date	Time	Frame	SPI_StopCollar_in	SPI_Weights_perSide_num	Depth_ft	Comments
SPI_PV	001	A	7/14/2019	3:34:52	769	14	5	53	Minimal gravel station 1.
SPI_PV	001	B	7/14/2019	3:35:36	770	14	5	53	
SPI_PV	001	C	7/14/2019	3:36:20	771	14	5	53	
SPI_PV	001	D	7/14/2019	3:36:58	772	14	5	53	Download, FC 772. 3:40 SPI/PV sampling completed. Commence final grab sampling. Grabs 4:26-6:51 at stations 3, 6, 10, 11.

APPENDIX C

Sediment Profile Image Analysis Results

Notes:

IND=Indeterminate

Grain Size: “/” indicates layer of one phi size range over another.

Successional Stage: “on” indicates one Stage is found on top of another Stage (i.e., 1 on 3); “->” indicates one Stage is progressing to another Stage (i.e., 2 -> 3).

StationID	Replicate	Water Depth (ft)	Date	Time	Stop Collar Setting (in)	# of Weights (per side)	Image Width (cm)	Grain Size Major Mode (phi)	Grain Size Minimum (phi)	Grain Size Maximum (phi)	Grain Size Range (phi)	Penetration Mean (cm)
001	A	53	7/14/2019	3:35:07	14	5	14.49	4-3	1	>4	1 to >4	1.31
001	B	53	7/14/2019	3:35:52	14	5	14.49	4-3	1	>4	1 to >4	2.26
001	C	53	7/14/2019	3:36:37	14	5	14.49	4-3	0	>4	0 to >4	2.53
002	A	64	7/14/2019	3:13:17	14	5	14.49	-1 to -2/4-3	-3	>4	-3 to >4	5.05
002	B	64	7/14/2019	3:13:59	14	5	14.49	-1 to -2/4-3	-5	>4	-5 to >4	5.86
002	C	64	7/14/2019	3:14:39	14	5	14.49	-1 to -2/2-1	-3	>4	-3 to >4	5.96
003	A	70	7/14/2019	2:50:26	14	5	14.49	4-3	1	>4	1 to >4	5.04
003	B	70	7/14/2019	2:51:09	14	5	14.49	4-3	1	>4	1 to >4	5.31
003	C	70	7/14/2019	2:51:44	14	5	14.49	4-3	1	>4	1 to >4	5.78
004	A	73	7/14/2019	2:28:48	14	5	14.49	4-3	1	>4	1 to >4	5.29
004	B	73	7/14/2019	2:29:34	14	5	14.49	4-3	-1	>4	-1 to >4	5.06
004	C	73	7/14/2019	2:30:15	14	5	14.49	4-3/>4	1	>4	1 to >4	8.13
005	A	77	7/14/2019	2:07:20	14	5	14.49	2-1	-2	>4	-2 to >4	8.38
005	B	77	7/14/2019	2:08:33	14	5	14.49	-1 to -2/2-1	-2	>4	-2 to >4	6.01
005	C	77	7/14/2019	2:09:11	14	5	14.49	-1 to -2/2-1	-2	>4	-2 to >4	7.40
006	A	68	7/14/2019	1:47:08	14	5	14.49	-1 to -2/2-1	-1	>4	-1 to >4	5.88
006	B	68	7/14/2019	1:47:54	14	5	14.49	-1 to -2/2-1	-1	>4	-1 to >4	6.89
006	C	68	7/14/2019	1:48:37	14	5	14.49	2-1	0	>4	0 to >4	7.12
007	A	77	7/14/2019	1:24:24	14	5	14.49	IND	IND	IND	IND to IND	4.89
007	B	77	7/14/2019	1:25:05	14	5	14.49	IND	IND	IND	IND to IND	5.98
007	C	77	7/14/2019	1:25:47	14	5	14.49	IND	IND	IND	IND to IND	6.29
008	B	85	7/14/2019	0:19:10	14	5	14.49	2-1	-1	>4	-1 to >4	7.21
008	C	85	7/14/2019	0:19:56	14	5	14.49	2-1	-2	>4	-2 to >4	5.81
008	D	85	7/14/2019	0:20:41	14	5	14.49	2-1	-1	>4	-1 to >4	5.76
009	A	95	7/13/2019	23:50:13	14	5	14.49	-1 to -2/2-1	-3	>4	-3 to >4	6.67
009	B	95	7/13/2019	23:51:37	14	5	14.49	-1 to -2/2-1	-2	>4	-2 to >4	7.07

StationID	Replicate	Water Depth (ft)	Date	Time	Stop Collar Setting (in)	# of Weights (per side)	Image Width (cm)	Grain Size Major Mode (phi)	Grain Size Minimum (phi)	Grain Size Maximum (phi)	Grain Size Range (phi)	Penetration Mean (cm)
009	C	95	7/13/2019	23:53:04	14	5	14.49	-1 to -2/2-1	-3	>4	-3 to >4	6.45
010	B	116	7/13/2019	23:26:52	14	5	14.49	3-2/>4	-4	>4	-4 to >4	7.38
010	C	116	7/13/2019	23:28:16	14	5	14.49	>4	-1	>4	-1 to >4	3.08
010	D	116	7/13/2019	23:29:47	14	5	14.49	3-2/>4	-1	>4	-1 to >4	8.83
011	A	224	7/13/2019	22:56:37	14	5	14.49	>4	0	>4	0 to >4	20.15
011	B	224	7/13/2019	22:58:11	14	5	14.49	>4	0	>4	0 to >4	18.98
011	C	224	7/13/2019	22:59:48	14	5	14.49	>4	0	>4	0 to >4	20.28
012	A	127	7/13/2019	19:29:31	14	5	14.49	4-3	2	>4	2 to >4	7.38
012	B	127	7/13/2019	19:31:08	14	5	14.49	4-3	0	>4	0 to >4	10.02
012	C	127	7/13/2019	19:32:27	14	5	14.49	4-3	0	>4	0 to >4	9.92
013	A	111	7/13/2019	19:05:00	14	5	14.49	2-1	0	>4	0 to >4	8.92
013	B	111	7/13/2019	19:06:42	14	5	14.49	2-1	-1	>4	-1 to >4	7.16
013	C	111	7/13/2019	19:08:11	14	5	14.49	2-1	-1	>4	-1 to >4	4.77
014	A	117	7/13/2019	18:40:36	14	5	14.49	2-1	-1	>4	-1 to >4	6.07
014	B	117	7/13/2019	18:42:09	14	5	14.49	2-1	-1	>4	-1 to >4	6.41
014	D	117	7/13/2019	18:45:03	14	5	14.49	2-1/>4	0	>4	0 to >4	7.01
015	A	109	7/13/2019	18:14:33	14	5	14.49	4-3	1	>4	1 to >4	6.63
015	B	109	7/13/2019	18:16:12	14	5	14.49	4-3	1	>4	1 to >4	6.69
015	C	109	7/13/2019	18:17:53	14	5	14.49	4-3	1	>4	1 to >4	6.01
016	A	95	7/10/2019	19:06:41	18	5	14.49	4-3	1	>4	1 to >4	3.66
016	B	95	7/10/2019	19:07:59	18	5	14.49	4-3	1	>4	1 to >4	4.93
016	C	95	7/10/2019	19:09:18	18	5	14.49	4-3	0	>4	0 to >4	4.36
017	A	93	7/10/2019	18:46:29	18	5	14.49	4-3	0	>4	0 to >4	7.15
017	B	93	7/10/2019	18:47:44	18	5	14.49	4-3	1	>4	1 to >4	5.14
017	D	93	7/10/2019	18:50:11	18	5	14.49	4-3	0	>4	0 to >4	3.92
018	A	90	7/10/2019	18:25:08	18	5	14.49	4-3	0	>4	0 to >4	6.13
018	B	90	7/10/2019	18:26:34	18	5	14.49	4-3	1	>4	1 to >4	3.89
018	C	90	7/10/2019	18:27:53	18	5	14.49	4-3	0	>4	0 to >4	4.56
019	A	97	7/10/2019	18:03:03	18	5	14.49	4-3	1	>4	1 to >4	5.53

StationID	Replicate	Water Depth (ft)	Date	Time	Stop Collar Setting (in)	# of Weights (per side)	Image Width (cm)	Grain Size Major Mode (phi)	Grain Size Minimum (phi)	Grain Size Maximum (phi)	Grain Size Range (phi)	Penetration Mean (cm)
019	B	97	7/10/2019	18:04:10	18	5	14.49	4-3	2	>4	2 to >4	4.74
019	C	97	7/10/2019	18:05:19	18	5	14.49	4-3/3-2	0	>4	0 to >4	15.69
020	A	92	7/10/2019	17:42:53	18	5	14.49	4-3	0	>4	0 to >4	3.72
020	B	92	7/10/2019	17:44:34	18	5	14.49	4-3	1	>4	1 to >4	3.66
020	C	92	7/10/2019	17:45:55	18	5	14.49	4-3	-1	>4	-1 to >4	4.34
021	A	97	7/10/2019	22:18:09	18	5	14.49	2-1	0	>4	0 to >4	5.43
021	B	97	7/10/2019	22:19:30	18	5	14.49	2-1	1	>4	1 to >4	5.27
021	D	97	7/10/2019	22:22:06	18	5	14.49	2-1	0	>4	0 to >4	5.33
022	A	95	7/10/2019	22:37:29	18	5	14.49	3-2	0	>4	0 to >4	3.93
022	B	95	7/10/2019	22:38:46	18	5	14.49	3-2	-1	>4	-1 to >4	6.59
022	C	95	7/10/2019	22:40:01	18	5	14.49	3-2	0	>4	0 to >4	3.57
023	A	91	7/10/2019	22:57:17	18	5	14.49	2-1	-2	>4	-2 to >4	4.81
023	B	91	7/10/2019	22:58:43	18	5	14.49	2-1	-1	>4	-1 to >4	6.19
023	D	91	7/10/2019	23:01:14	18	5	14.49	2-1	-1	>4	-1 to >4	5.11
024	A	97	7/10/2019	23:16:48	18	5	14.49	2-1	-1	>4	-1 to >4	4.74
024	B	97	7/10/2019	23:18:16	18	5	14.49	2-1	-1	>4	-1 to >4	5.27
024	C	97	7/10/2019	23:19:35	18	5	14.49	2-1	0	>4	0 to >4	5.16
025	A	102	7/11/2019	0:56:36	18	5	14.49	2-1	0	>4	0 to >4	5.02
025	B	102	7/11/2019	0:57:20	18	5	14.49	2-1	0	>4	0 to >4	5.13
025	D	102	7/11/2019	0:59:04	18	5	14.49	2-1	0	>4	0 to >4	5.62
026	C	98	7/11/2019	2:19:45	18	5	14.49	3-2	1	>4	1 to >4	4.34
026	F	98	7/11/2019	2:22:09	18	5	14.49	3-2	2	>4	2 to >4	4.13
026	G	98	7/11/2019	2:23:01	18	5	14.49	3-2	0	>4	0 to >4	5.82
027	A	97	7/11/2019	10:38:45	18	5	14.49	3-2	1	>4	1 to >4	4.26
027	B	97	7/11/2019	10:39:29	18	5	14.49	3-2	0	>4	0 to >4	4.20
027	C	97	7/11/2019	10:40:15	18	5	14.49	3-2	0	>4	0 to >4	3.86
028	A	88	7/11/2019	10:56:17	18	5	14.49	3-2	0	>4	0 to >4	4.83
028	B	88	7/11/2019	10:57:12	18	5	14.49	3-2	0	>4	0 to >4	4.85
028	C	88	7/11/2019	10:57:55	18	5	14.49	3-2	0	>4	0 to >4	4.35
029	A	89	7/11/2019	11:14:45	18	5	14.49	3-2	0	>4	0 to >4	4.91
029	B	89	7/11/2019	11:15:25	18	5	14.49	3-2	0	>4	0 to >4	3.86
029	C	89	7/11/2019	11:16:09	18	5	14.49	3-2	0	>4	0 to >4	4.95
030	A	123	7/10/2019	3:03:41	16	4	14.49	3-2	-1	>4	-1 to >4	5.97

StationID	Replicate	Water Depth (ft)	Date	Time	Stop Collar Setting (in)	# of Weights (per side)	Image Width (cm)	Grain Size Major Mode (phi)	Grain Size Minimum (phi)	Grain Size Maximum (phi)	Grain Size Range (phi)	Penetration Mean (cm)
030	C	123	7/10/2019	3:08:14	16	4	14.49	3-2	-1	>4	-1 to >4	5.43
030	D	123	7/10/2019	3:10:00	16	4	14.49	3-2	-1	>4	-1 to >4	5.74
031	A	117	7/10/2019	4:07:40	18	5	14.49	3-2	0	>4	0 to >4	6.43
031	B	117	7/10/2019	4:08:49	18	5	14.49	3-2	0	>4	0 to >4	5.73
031	C	117	7/10/2019	4:09:53	18	5	14.49	3-2	1	>4	1 to >4	5.89
032	A	118	7/10/2019	4:43:15	18	5	14.49	3-2	-1	>4	-1 to >4	5.25
032	B	118	7/10/2019	4:44:10	18	5	14.49	3-2	-1	>4	-1 to >4	5.92
032	D	118	7/10/2019	4:46:32	18	5	14.49	3-2	-1	>4	-1 to >4	6.67
033	A	110	7/10/2019	5:34:24	18	5	14.49	3-2	0	>4	0 to >4	6.90
033	B	110	7/10/2019	5:35:18	18	5	14.49	3-2	-1	>4	-1 to >4	4.88
033	C	110	7/10/2019	5:36:36	18	5	14.49	3-2	-1	>4	-1 to >4	5.98
034	A	109	7/10/2019	6:02:04	18	5	14.49	3-2	0	>4	0 to >4	6.12
034	B	109	7/10/2019	6:03:02	18	5	14.49	3-2	0	>4	0 to >4	5.45
034	C	109	7/10/2019	6:06:15	18	5	14.49	3-2	0	>4	0 to >4	5.31
035	A	110	7/10/2019	6:34:32	18	5	14.49	3-2	-2	>4	-2 to >4	5.91
035	B	110	7/10/2019	6:35:21	18	5	14.49	3-2	0	>4	0 to >4	6.45
035	C	110	7/10/2019	6:37:41	18	5	14.49	3-2	-1	>4	-1 to >4	5.93
036	A	100	7/10/2019	6:58:52	18	5	14.49	2-1	-1	>4	-1 to >4	7.22
036	B	100	7/10/2019	6:59:53	18	5	14.49	2-1	0	>4	0 to >4	5.09
036	C	100	7/10/2019	7:00:48	18	5	14.49	2-1	1	>4	1 to >4	6.69
037	A	105	7/10/2019	7:20:11	18	5	14.49	-1 to 0/2-1	-3	>4	-3 to >4	5.82
037	C	105	7/10/2019	7:21:57	18	5	14.49	-1 to 0/2-1	-3	>4	-3 to >4	5.89
037	D	105	7/10/2019	7:23:19	18	5	14.49	-1 to 0/2-1	-2	>4	-2 to >4	6.25
038	A	100	7/10/2019	7:44:15	18	5	14.49	3-2	-1	>4	-1 to >4	6.23
038	B	100	7/10/2019	7:45:05	18	5	14.49	3-2	-2	>4	-2 to >4	6.12
038	C	100	7/10/2019	7:45:58	18	5	14.49	3-2	-1	>4	-1 to >4	6.74
039	A	98	7/10/2019	8:08:38	18	5	14.49	3-2	0	>4	0 to >4	4.18
039	B	98	7/10/2019	8:10:15	18	5	14.49	3-2	-1	>4	-1 to >4	5.34
039	C	98	7/10/2019	8:11:11	18	5	14.49	3-2	-1	>4	-1 to >4	6.55
040	A	98	7/10/2019	8:31:56	18	5	14.49	2-1	0	>4	0 to >4	6.87

StationID	Replicate	Water Depth (ft)	Date	Time	Stop Collar Setting (in)	# of Weights (per side)	Image Width (cm)	Grain Size Major Mode (phi)	Grain Size Minimum (phi)	Grain Size Maximum (phi)	Grain Size Range (phi)	Penetration Mean (cm)
040	B	98	7/10/2019	8:32:46	18	5	14.49	2-1	1	>4	1 to >4	6.12
040	C	98	7/10/2019	8:33:34	18	5	14.49	2-1	0	>4	0 to >4	5.91
041	A	96	7/10/2019	8:53:58	18	5	14.49	2-1	1	>4	1 to >4	6.27
041	B	96	7/10/2019	8:54:40	18	5	14.49	2-1	0	>4	0 to >4	5.64
041	C	96	7/10/2019	8:55:27	18	5	14.49	2-1	0	>4	0 to >4	5.76
042	A	94	7/10/2019	9:16:46	18	5	14.49	3-2	0	>4	0 to >4	8.98
042	B	94	7/10/2019	9:18:32	18	5	14.49	3-2	-1	>4	-1 to >4	5.28
042	C	94	7/10/2019	9:19:18	18	5	14.49	3-2/4-3	0	>4	0 to >4	11.03
043	A	88	7/11/2019	11:29:09	18	5	14.49	2-1	-1	>4	-1 to >4	4.45
043	B	88	7/11/2019	11:30:01	18	5	14.49	2-1	-1	>4	-1 to >4	4.24
043	C	88	7/11/2019	11:30:49	18	5	14.49	2-1	0	>4	0 to >4	4.18
044	A	87	7/11/2019	11:46:59	18	5	14.49	2-1	0	>4	0 to >4	5.35
044	B	87	7/11/2019	11:47:46	18	5	14.49	2-1	-1	>4	-1 to >4	4.71
044	C	87	7/11/2019	11:49:02	18	5	14.49	2-1	-1	>4	-1 to >4	5.08
045	A	83	7/11/2019	12:07:17	18	5	14.49	2-1	0	>4	0 to >4	4.80
045	B	83	7/11/2019	12:08:50	18	5	14.49	2-1	0	>4	0 to >4	4.54
045	C	83	7/11/2019	12:10:01	18	5	14.49	2-1	1	>4	1 to >4	3.93
046	A	84	7/11/2019	19:50:44	18	5	14.49	-3 to -4/2-1	-4	>4	-4 to >4	3.48
046	B	84	7/11/2019	19:52:00	18	5	14.49	2-1	0	>4	0 to >4	4.88
046	D	84	7/11/2019	19:54:26	18	5	14.49	2-1	-3	>4	-3 to >4	4.63
047	A	81	7/11/2019	19:22:37	18	5	14.49	3-2	0	>4	0 to >4	3.60
047	D	81	7/11/2019	19:26:29	18	5	14.49	3-2	0	>4	0 to >4	4.79
047	E	81	7/11/2019	19:30:59	18	5	14.49	3-2	0	>4	0 to >4	4.71
048	A	77	7/11/2019	12:24:14	18	5	14.49	2-1	-1	>4	-1 to >4	3.82
048	B	77	7/11/2019	12:25:30	18	5	14.49	2-1	-1	>4	-1 to >4	3.79
048	C	77	7/11/2019	12:26:48	18	5	14.49	2-1	-1	>4	-1 to >4	4.18
049	A	87	7/11/2019	12:41:42	18	5	14.49	4-3	0	>4	0 to >4	6.18
049	B	87	7/11/2019	12:42:56	18	5	14.49	4-3	1	>4	1 to >4	12.08
049	D	87	7/11/2019	12:45:22	18	5	14.49	4-3	-1	>4	-1 to >4	12.85
050	A	87	7/11/2019	12:59:30	18	5	14.49	IND	IND	IND	IND to IND	0.00
050	B	87	7/11/2019	13:00:47	18	5	14.49	IND	IND	IND	IND to IND	0.00

StationID	Replicate	Water Depth (ft)	Date	Time	Stop Collar Setting (in)	# of Weights (per side)	Image Width (cm)	Grain Size Major Mode (phi)	Grain Size Minimum (phi)	Grain Size Maximum (phi)	Grain Size Range (phi)	Penetration Mean (cm)
050	C	87	7/11/2019	13:01:55	18	5	14.49	3-2	-2	>4	-2 to >4	7.03
051	A	84	7/11/2019	13:18:11	18	5	14.49	-2 to -3	-4	>4	-4 to >4	7.23
051	C	84	7/11/2019	13:20:36	18	5	14.49	-3 to -4/-2 to -1	-4	>4	-4 to >4	9.02
051	D	84	7/11/2019	13:21:50	18	5	14.49	-2 to -1	-3	>4	-3 to >4	7.35
052	B	77	7/11/2019	14:07:38	18	5	14.49	3-2	1	>4	1 to >4	5.10
052	C	77	7/11/2019	14:08:53	18	5	14.49	3-2	1	>4	1 to >4	5.48
052	D	77	7/11/2019	14:10:04	18	5	14.49	3-2	1	>4	1 to >4	3.89
053	A	72	7/12/2019	20:56:30	12.5	5	14.49	3-2	-1	>4	-1 to >4	5.21
053	B	72	7/12/2019	20:58:18	12.5	5	14.49	3-2	0	>4	0 to >4	4.44
053	D	72	7/12/2019	21:01:13	12.5	5	14.49	3-2	0	>4	0 to >4	4.45
054	A	72	7/12/2019	21:19:09	12.5	5	14.49	1-0	0	>4	0 to >4	2.68
054	B	72	7/12/2019	21:20:18	12.5	5	14.49	1-0	-2	>4	-2 to >4	4.42
054	C	72	7/12/2019	21:22:01	12.5	5	14.49	1-0/2-1	-1	>4	-1 to >4	6.47
055	A	73	7/12/2019	23:58:30	12.5	5	14.49	3-2	1	>4	1 to >4	7.40
055	B	73	7/13/2019	0:00:04	12.5	5	14.49	3-2	-1	>4	-1 to >4	5.11
055	C	73	7/13/2019	0:01:35	12.5	5	14.49	3-2	0	>4	0 to >4	4.51
056	A	81	7/13/2019	0:21:54	12.5	5	14.49	4-3	1	>4	1 to >4	5.61
056	B	81	7/13/2019	0:22:57	12.5	5	14.49	4-3	0	>4	0 to >4	6.27
056	C	81	7/13/2019	0:23:37	12.5	5	14.49	4-3	0	>4	0 to >4	5.25
057	A	86	7/13/2019	0:44:08	12.5	5	14.49	4-3	1	>4	1 to >4	6.65
057	B	86	7/13/2019	0:44:50	12.5	5	14.49	4-3	1	>4	1 to >4	9.16
057	C	86	7/13/2019	0:45:32	12.5	5	14.49	4-3	0	>4	0 to >4	6.17
058	A	91	7/13/2019	1:07:56	12.5	5	14.49	4-3	1	>4	1 to >4	6.52
058	C	91	7/13/2019	1:09:21	12.5	5	14.49	4-3	0	>4	0 to >4	7.63
058	D	91	7/13/2019	1:09:58	12.5	5	14.49	4-3	1	>4	1 to >4	7.48
059	A	95	7/13/2019	1:29:36	12.5	5	14.49	4-3/>4	0	>4	0 to >4	8.91
059	B	95	7/13/2019	1:30:21	12.5	5	14.49	4-3/>4	1	>4	1 to >4	9.72
059	C	95	7/13/2019	1:31:00	12.5	5	14.49	4-3/>4	0	>4	0 to >4	8.61
060	A	95	7/13/2019	1:54:25	12.5	5	14.49	4-3	0	>4	0 to >4	5.32
060	B	95	7/13/2019	1:55:03	12.5	5	14.49	4-3/>4	1	>4	1 to >4	7.95

StationID	Replicate	Water Depth (ft)	Date	Time	Stop Collar Setting (in)	# of Weights (per side)	Image Width (cm)	Grain Size Major Mode (phi)	Grain Size Minimum (phi)	Grain Size Maximum (phi)	Grain Size Range (phi)	Penetration Mean (cm)
060	C	95	7/13/2019	1:55:45	12.5	5	14.49	4-3/>4	0	>4	0 to >4	8.40
061	A	91	7/13/2019	2:18:35	12.5	5	14.49	4-3/>4	0	>4	0 to >4	9.09
061	B	91	7/13/2019	2:19:17	12.5	5	14.49	4-3/>4	0	>4	0 to >4	8.21
061	C	91	7/13/2019	2:20:00	12.5	5	14.49	4-3/>4	0	>4	0 to >4	8.16
062	A	87	7/13/2019	2:40:14	12.5	5	14.49	4-3/>4	1	>4	1 to >4	6.53
062	B	87	7/13/2019	2:41:00	12.5	5	14.49	4-3/>4	1	>4	1 to >4	5.61
062	D	87	7/13/2019	2:42:24	12.5	5	14.49	4-3/>4	1	>4	1 to >4	6.53
063	B	74	7/11/2019	18:32:06	18	5	14.49	4-3	0	>4	0 to >4	3.80
063	C	74	7/11/2019	18:33:16	18	5	14.49	4-3	0	>4	0 to >4	4.49
063	D	74	7/11/2019	18:34:28	18	5	14.49	4-3	1	>4	1 to >4	2.95
064	A	72	7/11/2019	17:43:40	18	5	14.49	4-3	0	>4	0 to >4	3.68
064	B	72	7/11/2019	17:45:19	18	5	14.49	4-3	0	>4	0 to >4	3.52
064	C	72	7/11/2019	17:46:35	18	5	14.49	4-3	1	>4	1 to >4	3.07
065	A	77	7/11/2019	16:59:10	18	5	14.49	4-3	1	>4	1 to >4	4.61
065	B	77	7/11/2019	17:00:25	18	5	14.49	4-3	1	>4	1 to >4	4.09
065	C	77	7/11/2019	17:01:35	18	5	14.49	4-3	1	>4	1 to >4	4.09
066	A	82	7/11/2019	16:38:10	18	5	14.49	3-2	-1	>4	-1 to >4	3.77
066	B	82	7/11/2019	16:39:40	18	5	14.49	3-2	0	>4	0 to >4	2.91
066	C	82	7/11/2019	16:41:02	18	5	14.49	3-2	-1	>4	-1 to >4	4.37
067	A	77	7/11/2019	16:18:44	18	5	14.49	3-2	1	>4	1 to >4	5.06
067	B	77	7/11/2019	16:20:01	18	5	14.49	3-2	0	>4	0 to >4	6.11
067	D	77	7/11/2019	16:22:36	18	5	14.49	3-2	0	>4	0 to >4	4.78
068	A	70	7/11/2019	16:00:31	18	5	14.49	-2 to -3/2-1	-6	>4	-6 to >4	7.28
068	B	70	7/11/2019	16:01:52	18	5	14.49	-2 to -3/2-1	-4	>4	-4 to >4	5.45
068	C	70	7/11/2019	16:03:01	18	5	14.49	0 to -1/2-1	-3	>4	-3 to >4	7.09
069	A	70	7/11/2019	15:41:06	18	5	14.49	0 to -1/2-1	-1	>4	-1 to >4	4.71
069	B	70	7/11/2019	15:42:37	18	5	14.49	1-0/2-1	-2	>4	-2 to >4	6.13
069	C	70	7/11/2019	15:43:54	18	5	14.49	2-1	-1	>4	-1 to >4	5.22
070	A	76	7/12/2019	20:11:06	12.5	5	14.49	3-2	0	>4	0 to >4	6.56
070	B	76	7/12/2019	20:12:35	12.5	5	14.49	3-2	1	>4	1 to >4	5.68
070	C	76	7/12/2019	20:14:05	12.5	5	14.49	3-2	1	>4	1 to >4	3.67

StationID	Replicate	Water Depth (ft)	Date	Time	Stop Collar Setting (in)	# of Weights (per side)	Image Width (cm)	Grain Size Major Mode (phi)	Grain Size Minimum (phi)	Grain Size Maximum (phi)	Grain Size Range (phi)	Penetration Mean (cm)
071	A	71	7/12/2019	19:52:58	12.5	5	14.49	2-1	1	>4	1 to >4	5.58
071	B	71	7/12/2019	19:54:29	12.5	5	14.49	2-1	0	>4	0 to >4	6.39
071	C	71	7/12/2019	19:55:58	12.5	5	14.49	2-1	-1	>4	-1 to >4	6.12
072	A	74	7/12/2019	19:35:07	12.5	5	14.49	4-3	1	>4	1 to >4	3.49
072	C	74	7/12/2019	19:38:13	12.5	5	14.49	4-3	0	>4	0 to >4	3.47
072	D	74	7/12/2019	19:39:50	12.5	5	14.49	4-3	1	>4	1 to >4	3.12
073	A	81	7/12/2019	19:18:07	12.5	5	14.49	4-3	1	>4	1 to >4	4.71
073	B	81	7/12/2019	19:19:37	12.5	5	14.49	4-3	0	>4	0 to >4	4.23
073	C	81	7/12/2019	19:21:06	12.5	5	14.49	4-3	0	>4	0 to >4	4.75
074	E	86	7/12/2019	18:59:48	12.5	5	14.49	4-3	1	>4	1 to >4	5.84
074	F	86	7/12/2019	19:01:27	12.5	5	14.49	4-3	0	>4	0 to >4	5.95
074	G	86	7/12/2019	19:03:13	12.5	5	14.49	4-3	0	>4	0 to >4	5.51
075	A	91	7/12/2019	18:25:31	12.5	5	14.49	4-3/>4	0	>4	0 to >4	10.33
075	B	91	7/12/2019	18:27:03	12.5	5	14.49	4-3/>4	1	>4	1 to >4	11.22
075	D	91	7/12/2019	18:30:09	12.5	5	14.49	4-3/>4	1	>4	1 to >4	10.03
076	A	90	7/12/2019	17:52:40	12.5	5	14.49	4-3/>4	0	>4	0 to >4	5.42
076	B	90	7/12/2019	17:54:19	12.5	5	14.49	4-3	0	>4	0 to >4	5.58
076	C	90	7/12/2019	17:55:52	12.5	5	14.49	4-3	0	>4	0 to >4	5.22
077	A	86	7/12/2019	17:32:45	12.5	5	14.49	4-3/>4	0	>4	0 to >4	8.31
077	C	86	7/12/2019	17:35:47	12.5	5	14.49	4-3/>4	1	>4	1 to >4	9.28
077	D	86	7/12/2019	17:37:23	12.5	5	14.49	4-3/>4	0	>4	0 to >4	9.67
078	A	77	7/11/2019	18:45:32	18	5	14.49	4-3	1	>4	1 to >4	4.43
078	B	77	7/11/2019	18:47:03	18	5	14.49	4-3	0	>4	0 to >4	5.52
078	C	77	7/11/2019	18:48:15	18	5	14.49	4-3	0	>4	0 to >4	4.39
079	A	80	7/12/2019	4:58:21	18	5	14.49	3-2	0	>4	0 to >4	4.49
079	C	80	7/12/2019	5:00:02	18	5	14.49	3-2	0	>4	0 to >4	3.80
079	D	80	7/12/2019	5:00:41	18	5	14.49	3-2	0	>4	0 to >4	3.90
080	A	69	7/12/2019	5:40:46	18	5	14.49	2-1	0	>4	0 to >4	4.37
080	B	69	7/12/2019	5:41:36	18	5	14.49	2-1	-1	>4	-1 to >4	5.52
080	C	69	7/12/2019	5:42:16	18	5	14.49	2-1	-1	>4	-1 to >4	5.71
081	A	83	7/11/2019	19:02:31	18	5	14.49	4-3	1	>4	1 to >4	5.33
081	B	83	7/11/2019	19:04:06	18	5	14.49	4-3	1	>4	1 to >4	5.62
081	C	83	7/11/2019	19:05:18	18	5	14.49	4-3	0	>4	0 to >4	9.17

StationID	Replicate	Water Depth (ft)	Date	Time	Stop Collar Setting (in)	# of Weights (per side)	Image Width (cm)	Grain Size Major Mode (phi)	Grain Size Minimum (phi)	Grain Size Maximum (phi)	Grain Size Range (phi)	Penetration Mean (cm)
082	A	76	7/12/2019	4:18:26	18	5	14.49	2-1	-1	>4	-1 to >4	6.20
082	B	76	7/12/2019	4:19:26	18	5	14.49	2-1	0	>4	0 to >4	5.14
082	C	76	7/12/2019	4:20:13	18	5	14.49	2-1	0	>4	0 to >4	4.51
083	A	76	7/12/2019	5:26:07	18	5	14.49	4-3/>4	1	>4	1 to >4	7.65
083	B	76	7/12/2019	5:26:53	18	5	14.49	4-3/>4	1	>4	1 to >4	7.74
083	C	76	7/12/2019	5:27:38	18	5	14.49	4-3/>4	1	>4	1 to >4	8.61
084	A	62	7/12/2019	6:00:34	18	5	14.49	3-2	1	>4	1 to >4	5.20
084	B	62	7/12/2019	6:01:18	18	5	14.49	3-2	0	>4	0 to >4	3.68
084	D	62	7/12/2019	6:02:46	18	5	14.49	3-2	1	>4	1 to >4	3.60
085	A	66	7/12/2019	6:43:18	18	5	14.49	3-2	1	>4	1 to >4	6.20
085	B	66	7/12/2019	6:44:11	18	5	14.49	3-2	0	>4	0 to >4	5.38
085	C	66	7/12/2019	6:44:52	18	5	14.49	3-2	0	>4	0 to >4	5.59
086	A	51	7/12/2019	7:17:44	18	5	14.49	3-2	-1	>4	-1 to >4	5.00
086	B	51	7/12/2019	7:18:40	18	5	14.49	3-2	0	>4	0 to >4	4.77
086	C	51	7/12/2019	7:19:32	18	5	14.49	3-2	0	>4	0 to >4	5.29
087	A	43	7/12/2019	7:36:28	18	5	14.49	3-2	-1	>4	-1 to >4	4.76
087	B	43	7/12/2019	7:37:49	18	5	14.49	3-2	0	>4	0 to >4	3.60
087	C	43	7/12/2019	7:38:29	18	5	14.49	3-2	1	>4	1 to >4	3.14
088	A	36	7/12/2019	7:57:05	18	5	14.49	2-1	0	>4	0 to >4	4.69
088	B	36	7/12/2019	7:57:56	18	5	14.49	2-1	-1	>4	-1 to >4	6.90
088	C	36	7/12/2019	7:58:42	18	5	14.49	2-1	-1	>4	-1 to >4	5.77
089	A	80	7/13/2019	3:52:00	14	5	14.49	4-3	0	>4	0 to >4	8.03
089	B	80	7/13/2019	3:53:27	14	5	14.49	4-3	0	>4	0 to >4	4.94
089	C	80	7/13/2019	3:54:15	14	5	14.49	4-3	0	>4	0 to >4	7.03
090	A	70	7/13/2019	4:14:36	14	5	14.49	4-3	0	>4	0 to >4	5.91
090	B	70	7/13/2019	4:15:15	14	5	14.49	4-3	0	>4	0 to >4	4.83
090	D	70	7/13/2019	4:16:41	14	5	14.49	4-3	1	>4	1 to >4	5.05
091	A	60	7/13/2019	4:36:55	14	5	14.49	3-2	0	>4	0 to >4	4.24
091	B	60	7/13/2019	4:37:35	14	5	14.49	3-2	0	>4	0 to >4	4.67
091	C	60	7/13/2019	4:38:24	14	5	14.49	3-2	0	>4	0 to >4	4.43
092	A	55	7/13/2019	4:56:43	14	5	14.49	4-3	1	>4	1 to >4	3.20
092	C	55	7/13/2019	4:58:05	14	5	14.49	4-3	-1	>4	-1 to >4	3.66
092	D	55	7/13/2019	4:58:53	14	5	14.49	4-3	0	>4	0 to >4	3.71
093	B	44	7/13/2019	5:20:32	14	5	14.49	4-3	0	>4	0 to >4	4.58
093	C	44	7/13/2019	5:21:16	14	5	14.49	4-3	0	>4	0 to >4	4.23

StationID	Replicate	Water Depth (ft)	Date	Time	Stop Collar Setting (in)	# of Weights (per side)	Image Width (cm)	Grain Size Major Mode (phi)	Grain Size Minimum (phi)	Grain Size Maximum (phi)	Grain Size Range (phi)	Penetration Mean (cm)
093	D	44	7/13/2019	5:22:08	14	5	14.49	4-3	1	>4	1 to >4	2.36
094	B	44	7/13/2019	5:40:18	14	5	14.49	4-3	0	>4	0 to >4	4.12
094	C	44	7/13/2019	5:41:05	14	5	14.49	4-3	0	>4	0 to >4	4.91
094	D	44	7/13/2019	5:41:45	14	5	14.49	4-3	0	>4	0 to >4	4.55
095	A	30	7/13/2019	6:01:06	14	5	14.49	2-1	0	>4	0 to >4	5.98
095	B	30	7/13/2019	6:01:48	14	5	14.49	2-1	0	>4	0 to >4	6.60
095	C	30	7/13/2019	6:02:29	14	5	14.49	2-1	-1	>4	-1 to >4	5.76
096	A	23	7/13/2019	6:17:32	14	5	14.49	-1 to 0/3-2	-2	>4	-2 to >4	4.80
096	B	23	7/13/2019	6:18:21	14	5	14.49	-1 to 0/3-2	-2	>4	-2 to >4	5.33
096	D	23	7/13/2019	6:19:41	14	5	14.49	3-2	-2	>4	-2 to >4	5.48
097	A	33	7/13/2019	6:36:47	14	5	14.49	3-2	-1	>4	-1 to >4	3.09
097	B	33	7/13/2019	6:37:24	14	5	14.49	3-2	0	>4	0 to >4	6.21
097	C	33	7/13/2019	6:38:01	14	5	14.49	3-2	-1	>4	-1 to >4	5.66
098	A	58	7/12/2019	6:15:43	18	5	14.49	4-3	1	>4	1 to >4	4.54
098	B	58	7/12/2019	6:16:17	18	5	14.49	4-3	0	>4	0 to >4	3.31
098	C	58	7/12/2019	6:17:11	18	5	14.49	4-3	1	>4	1 to >4	4.84
099	A	58	7/12/2019	10:08:35	18	5	14.49	3-2	0	>4	0 to >4	4.67
099	B	58	7/12/2019	10:09:14	18	5	14.49	2-1/3-2	-1	>4	-1 to >4	4.38
099	C	58	7/12/2019	10:10:41	18	5	14.49	2-1/3-2	0	>4	0 to >4	5.36
100	A	50	7/12/2019	10:30:47	18	5	14.49	4-3	0	>4	0 to >4	5.24
100	B	50	7/12/2019	10:31:36	18	5	14.49	4-3	1	>4	1 to >4	3.60
100	C	50	7/12/2019	10:32:24	18	5	14.49	4-3	1	>4	1 to >4	4.73
101	A	48	7/12/2019	10:51:43	18	5	14.49	4-3	1	>4	1 to >4	3.41
101	B	48	7/12/2019	10:52:49	18	5	14.49	4-3	0	>4	0 to >4	4.59
101	C	48	7/12/2019	10:53:31	18	5	14.49	4-3	1	>4	1 to >4	3.44
102	A	57	7/12/2019	6:28:02	18	5	14.49	3-2	0	>4	0 to >4	6.03
102	B	57	7/12/2019	6:28:59	18	5	14.49	3-2	0	>4	0 to >4	5.14
102	C	57	7/12/2019	6:29:45	18	5	14.49	3-2	0	>4	0 to >4	5.49
103	A	56	7/12/2019	7:03:33	18	5	14.49	4-3	1	>4	1 to >4	4.24

StationID	Replicate	Water Depth (ft)	Date	Time	Stop Collar Setting (in)	# of Weights (per side)	Image Width (cm)	Grain Size Major Mode (phi)	Grain Size Minimum (phi)	Grain Size Maximum (phi)	Grain Size Range (phi)	Penetration Mean (cm)
103	B	56	7/12/2019	7:04:15	18	5	14.49	4-3	0	>4	0 to >4	3.45
103	C	56	7/12/2019	7:04:58	18	5	14.49	4-3	0	>4	0 to >4	3.00
104	A	45	7/12/2019	9:37:06	18	5	14.49	4-3	-1	>4	-1 to >4	5.47
104	B	45	7/12/2019	9:39:14	18	5	14.49	4-3	1	>4	1 to >4	3.68
104	C	45	7/12/2019	9:40:07	18	5	14.49	4-3	0	>4	0 to >4	4.51
105	A	37	7/12/2019	9:18:13	18	5	14.49	3-2	2	>4	2 to >4	2.57
105	B	37	7/12/2019	9:19:20	18	5	14.49	3-2	1	>4	1 to >4	4.08
105	C	37	7/12/2019	9:20:09	18	5	14.49	3-2	1	>4	1 to >4	4.00
106	A	32	7/12/2019	8:47:48	18	5	14.49	2-1	0	>4	0 to >4	7.58
106	B	32	7/12/2019	8:48:38	18	5	14.49	2-1	-1	>4	-1 to >4	4.86
106	C	32	7/12/2019	8:49:27	18	5	14.49	2-1	-2	>4	-2 to >4	4.32
107	A	52	7/13/2019	7:01:44	14	5	14.49	3-2	-1	>4	-1 to >4	6.05
107	B	52	7/13/2019	7:02:23	14	5	14.49	3-2	-1	>4	-1 to >4	5.80
107	C	52	7/13/2019	7:03:04	14	5	14.49	3-2	-1	>4	-1 to >4	9.28
108	A	48	7/13/2019	7:35:59	14	5	14.49	>4	1	>4	1 to >4	11.32
108	B	48	7/13/2019	7:36:40	14	5	14.49	>4	2	>4	2 to >4	8.02
108	F	48	7/13/2019	7:39:14	14	5	14.49	>4	1	>4	1 to >4	10.52
109	A	36	7/13/2019	7:58:17	14	5	14.49	>4	-2	>4	-2 to >4	9.85
109	C	36	7/13/2019	7:59:39	14	5	14.49	4-3/>4	0	>4	0 to >4	9.89
109	D	36	7/13/2019	8:00:11	14	5	14.49	4-3/>4	-1	>4	-1 to >4	10.71
110	B	53	7/13/2019	8:19:29	14	5	14.49	>4	0	>4	0 to >4	13.16
110	C	53	7/13/2019	8:20:14	14	5	14.49	>4	0	>4	0 to >4	15.08
110	D	53	7/13/2019	8:20:52	14	5	14.49	>4	1	>4	1 to >4	8.98
111	A	86	7/13/2019	8:41:30	14	5	14.49	4-3	-1	>4	-1 to >4	7.92
111	B	86	7/13/2019	8:42:21	14	5	14.49	4-3/>4	-1	>4	-1 to >4	11.57
111	C	86	7/13/2019	8:43:00	14	5	14.49	4-3	0	>4	0 to >4	4.86
112	A	64	7/13/2019	9:06:04	14	5	14.49	4-3	-1	>4	-1 to >4	4.98

StationID	Replicate	Water Depth (ft)	Date	Time	Stop Collar Setting (in)	# of Weights (per side)	Image Width (cm)	Grain Size Major Mode (phi)	Grain Size Minimum (phi)	Grain Size Maximum (phi)	Grain Size Range (phi)	Penetration Mean (cm)
112	B	64	7/13/2019	9:08:46	14	5	14.49	4-3	-1	>4	-1 to >4	6.70
112	C	64	7/13/2019	9:10:44	14	5	14.49	4-3	-1	>4	-1 to >4	6.65
113	A	47	7/13/2019	9:42:44	14	5	14.49	4-3	0	>4	0 to >4	4.16
113	B	47	7/13/2019	9:43:32	14	5	14.49	4-3	-1	>4	-1 to >4	9.61
113	C	47	7/13/2019	9:44:43	14	5	14.49	4-3	0	>4	0 to >4	5.54
114	A	50	7/13/2019	10:07:17	14	5	14.49	4-3/>4	-1	>4	-1 to >4	13.11
114	B	50	7/13/2019	10:08:06	14	5	14.49	4-3/>4	-1	>4	-1 to >4	16.34
114	D	50	7/13/2019	10:09:27	14	5	14.49	4-3/>4	0	>4	0 to >4	13.52
115	A	43	7/13/2019	10:28:29	14	5	14.49	>4	0	>4	0 to >4	19.13
115	B	43	7/13/2019	10:29:18	14	5	14.49	>4	0	>4	0 to >4	18.71
115	C	43	7/13/2019	10:30:12	14	5	14.49	>4	-1	>4	-1 to >4	18.91
116	A	45	7/12/2019	11:15:11	18	5	14.49	2-1	0	>4	0 to >4	5.63
116	B	45	7/12/2019	11:17:10	18	5	14.49	2-1	0	>4	0 to >4	5.04
116	D	45	7/12/2019	11:18:32	18	5	14.49	2-1	0	>4	0 to >4	5.66
117	A	46	7/12/2019	11:47:13	18	5	14.49	4-3	0	>4	0 to >4	3.84
117	C	46	7/12/2019	11:48:34	18	5	14.49	4-3	-1	>4	-1 to >4	4.64
117	D	46	7/12/2019	11:49:12	18	5	14.49	4-3	0	>4	0 to >4	4.12
118	A	47	7/12/2019	16:05:52	18	5	14.49	3-2	0	>4	0 to >4	5.15
118	B	47	7/12/2019	16:07:23	18	5	14.49	3-2	1	>4	1 to >4	4.57
118	C	47	7/12/2019	16:08:53	18	5	14.49	3-2	0	>4	0 to >4	4.35
119	A	45	7/12/2019	11:34:44	18	5	14.49	3-2	0	>4	0 to >4	5.15
119	B	45	7/12/2019	11:35:25	18	5	14.49	3-2	0	>4	0 to >4	5.00
119	C	45	7/12/2019	11:36:15	18	5	14.49	3-2	-1	>4	-1 to >4	4.41
120	A	36	7/12/2019	12:59:28	18	5	14.49	4-3	1	>4	1 to >4	4.78
120	B	36	7/12/2019	13:01:28	18	5	14.49	4-3	0	>4	0 to >4	4.18
120	C	36	7/12/2019	13:02:59	18	5	14.49	4-3	1	>4	1 to >4	2.94
121	A	27	7/12/2019	13:26:29	18	5	14.49	4-3	1	>4	1 to >4	8.95
121	B	27	7/12/2019	13:28:05	18	5	14.49	4-3	1	>4	1 to >4	3.94
121	C	27	7/12/2019	13:29:31	18	5	14.49	4-3	1	>4	1 to >4	3.91
122	A	44	7/12/2019	15:53:33	18	5	14.49	3-2	1	>4	1 to >4	3.93
122	B	44	7/12/2019	15:55:18	18	5	14.49	3-2	0	>4	0 to >4	4.55

StationID	Replicate	Water Depth (ft)	Date	Time	Stop Collar Setting (in)	# of Weights (per side)	Image Width (cm)	Grain Size Major Mode (phi)	Grain Size Minimum (phi)	Grain Size Maximum (phi)	Grain Size Range (phi)	Penetration Mean (cm)
122	C	44	7/12/2019	15:56:52	18	5	14.49	3-2	0	>4	0 to >4	5.16
123	A	45	7/12/2019	15:17:15	18	5	14.49	2-1	0	>4	0 to >4	5.71
123	B	45	7/12/2019	15:19:07	18	5	14.49	2-1	-1	>4	-1 to >4	5.97
123	C	45	7/12/2019	15:20:45	18	5	14.49	2-1	0	>4	0 to >4	4.37
124	A	41	7/12/2019	15:02:59	18	5	14.49	3-2	0	>4	0 to >4	5.03
124	B	41	7/12/2019	15:04:34	18	5	14.49	3-2	0	>4	0 to >4	7.13
124	C	41	7/12/2019	15:06:01	18	5	14.49	3-2	0	>4	0 to >4	4.53
125	A	43	7/12/2019	15:31:40	18	5	14.49	4-3	0	>4	0 to >4	5.40
125	B	43	7/12/2019	15:33:14	18	5	14.49	4-3	1	>4	1 to >4	4.35
125	C	43	7/12/2019	15:34:50	18	5	14.49	4-3	1	>4	1 to >4	6.25
126	A	37	7/12/2019	14:51:31	18	5	14.49	-3 to -2/4-3	-4	>4	-4 to >4	5.84
126	C	37	7/12/2019	14:54:48	18	5	14.49	-4 to -3/4-3	-5	>4	-5 to >4	6.33
126	D	37	7/12/2019	14:56:17	18	5	14.49	-3 to -2/4-3	-3	>4	-3 to >4	6.81
127	A	43	7/12/2019	15:41:45	18	5	14.49	-3 to -2/3-2	-3	>4	-3 to >4	4.84
127	B	43	7/12/2019	15:43:25	18	5	14.49	3-2	-2	>4	-2 to >4	7.04
127	C	43	7/12/2019	15:45:03	18	5	14.49	-2 to -1/3-2	-2	>4	-2 to >4	5.75
128	A	44	7/12/2019	14:32:02	18	5	14.49	>4	2	>4	2 to >4	IND
128	B	44	7/12/2019	14:33:47	18	5	14.49	>4	2	>4	2 to >4	IND
128	C	44	7/12/2019	14:35:19	18	5	14.49	>4	2	>4	2 to >4	IND
129	A	40	7/12/2019	13:49:47	18	5	14.49	>4/4-3	1	>4	1 to >4	14.59
129	B	40	7/12/2019	13:51:37	18	5	14.49	>4/4-3	1	>4	1 to >4	17.69
129	C	40	7/12/2019	13:53:18	18	5	14.49	4-3/>4	1	>4	1 to >4	9.24
130	A	31	7/12/2019	14:11:48	18	5	14.49	-3 to -2/4-3	-3	>4	-3 to >4	5.42
130	B	31	7/12/2019	14:13:30	18	5	14.49	-3 to -2/4-3	-4	>4	-4 to >4	5.83
130	C	31	7/12/2019	14:14:55	18	5	14.49	-3 to -2/4-3	-3	>4	-3 to >4	5.16
131	A	69	7/11/2019	15:22:35	18	5	14.49	2-1	-3	>4	-3 to >4	7.18
131	B	69	7/11/2019	15:23:59	18	5	14.49	-2 to -1/2-1	-3	>4	-3 to >4	5.97
131	C	69	7/11/2019	15:25:09	18	5	14.49	-2 to -1/2-1	-2	>4	-2 to >4	5.15
132	A	75	7/11/2019	15:03:19	18	5	14.49	-3 to -2/2-1	-4	>4	-4 to >4	5.45
132	B	75	7/11/2019	15:04:38	18	5	14.49	2-1	-4	>4	-4 to >4	6.47

StationID	Replicate	Water Depth (ft)	Date	Time	Stop Collar Setting (in)	# of Weights (per side)	Image Width (cm)	Grain Size Major Mode (phi)	Grain Size Minimum (phi)	Grain Size Maximum (phi)	Grain Size Range (phi)	Penetration Mean (cm)
132	C	75	7/11/2019	15:05:52	18	5	14.49	2-1	-3	>4	-3 to >4	6.42
133	A	79	7/11/2019	14:45:31	18	5	14.49	0-1	-1	>4	-1 to >4	7.21
133	B	79	7/11/2019	14:46:49	18	5	14.49	2-1	-2	>4	-2 to >4	6.44
133	C	79	7/11/2019	14:48:06	18	5	14.49	2-1	-2	>4	-2 to >4	6.43
134	A	80	7/11/2019	14:25:50	18	5	14.49	3-2	-1	>4	-1 to >4	10.65
134	B	80	7/11/2019	14:27:13	18	5	14.49	-1 to 0/3-2	-2	>4	-2 to >4	7.02
134	D	80	7/11/2019	14:29:45	18	5	14.49	-1 to 0/3-2	-1	>4	-1 to >4	7.40
135	A	76	7/11/2019	4:37:00	18	5	14.49	4-3	0	>4	0 to >4	5.08
135	B	76	7/11/2019	4:37:50	18	5	14.49	4-3	2	>4	2 to >4	5.07
135	D	76	7/11/2019	4:40:33	18	5	14.49	4-3	2	>4	2 to >4	6.73
136	A	83	7/11/2019	4:16:12	18	5	14.49	3-2	0	>4	0 to >4	6.09
136	B	83	7/11/2019	4:17:01	18	5	14.49	3-2	0	>4	0 to >4	6.75
136	C	83	7/11/2019	4:18:34	18	5	14.49	3-2	-2	>4	-2 to >4	6.57
137	A	91	7/11/2019	3:56:08	18	5	14.49	3-2	-1	>4	-1 to >4	4.79
137	B	91	7/11/2019	3:56:49	18	5	14.49	3-2	-1	>4	-1 to >4	4.85
137	C	91	7/11/2019	3:57:37	18	5	14.49	3-2	1	>4	1 to >4	4.25
138	A	90	7/11/2019	3:35:33	18	5	14.49	3-2	0	>4	0 to >4	4.94
138	B	90	7/11/2019	3:36:20	18	5	14.49	3-2	0	>4	0 to >4	4.16
138	C	90	7/11/2019	3:37:07	18	5	14.49	3-2	0	>4	0 to >4	5.74
139	A	88	7/11/2019	3:14:21	18	5	14.49	4-3	1	>4	1 to >4	4.69
139	B	88	7/11/2019	3:15:08	18	5	14.49	4-3	1	>4	1 to >4	4.15
139	C	88	7/11/2019	3:15:52	18	5	14.49	4-3	1	>4	1 to >4	4.15
140	A	93	7/11/2019	2:51:45	18	5	14.49	3-2	0	>4	0 to >4	5.77
140	B	93	7/11/2019	2:52:27	18	5	14.49	3-2	0	>4	0 to >4	6.26
140	C	93	7/11/2019	2:53:18	18	5	14.49	3-2	1	>4	1 to >4	5.75
141	A	96	7/10/2019	19:24:58	18	5	14.49	4-3	1	>4	1 to >4	4.73
141	B	96	7/10/2019	19:26:17	18	5	14.49	4-3	1	>4	1 to >4	8.93
141	C	96	7/10/2019	19:27:36	18	5	14.49	4-3	0	>4	0 to >4	6.07
142	A	95	7/10/2019	19:57:04	18	5	14.49	4-3	1	>4	1 to >4	5.07
142	B	95	7/10/2019	19:58:33	18	5	14.49	4-3	0	>4	0 to >4	4.50
142	C	95	7/10/2019	20:00:01	18	5	14.49	4-3	0	>4	0 to >4	4.36
143	A	93	7/10/2019	20:40:07	18	5	14.49	4-3	1	>4	1 to >4	4.96
143	C	93	7/10/2019	20:43:07	18	5	14.49	4-3	1	>4	1 to >4	3.77
143	D	93	7/10/2019	20:44:28	18	5	14.49	4-3	1	>4	1 to >4	4.22
144	A	94	7/10/2019	21:01:21	18	5	14.49	4-3	2	>4	2 to >4	4.68
144	B	94	7/10/2019	21:02:44	18	5	14.49	4-3	2	>4	2 to >4	4.05
144	D	94	7/10/2019	21:05:26	18	5	14.49	4-3	1	>4	1 to >4	3.83
145	A	99	7/10/2019	21:23:25	18	5	14.49	4-3	2	>4	2 to >4	5.92
145	B	99	7/10/2019	21:24:42	18	5	14.49	4-3	-1	>4	-1 to >4	5.07
145	C	99	7/10/2019	21:26:12	18	5	14.49	4-3	1	>4	1 to >4	5.41

StationID	Replicate	Water Depth (ft)	Date	Time	Stop Collar Setting (in)	# of Weights (per side)	Image Width (cm)	Grain Size Major Mode (phi)	Grain Size Minimum (phi)	Grain Size Maximum (phi)	Grain Size Range (phi)	Penetration Mean (cm)
146	A	100	7/10/2019	21:43:36	18	5	14.49	4-3	0	>4	0 to >4	4.32
146	B	100	7/10/2019	21:44:51	18	5	14.49	4-3	0	>4	0 to >4	4.32
146	C	100	7/10/2019	21:46:03	18	5	14.49	4-3	0	>4	0 to >4	4.39
147	A	103	7/10/2019	16:00:51	18	5	14.49	3-2	0	>4	0 to >4	3.69
147	B	103	7/10/2019	16:02:02	18	5	14.49	3-2	-1	>4	-1 to >4	4.27
147	C	103	7/10/2019	16:03:17	18	5	14.49	3-2	-1	>4	-1 to >4	5.83
148	A	115	7/10/2019	15:41:02	18	5	14.49	3-2	0	>4	0 to >4	5.88
148	B	115	7/10/2019	15:42:16	18	5	14.49	3-2	-1	>4	-1 to >4	5.53
148	C	115	7/10/2019	15:43:25	18	5	14.49	3-2	-1	>4	-1 to >4	4.32
149	A	111	7/10/2019	15:22:07	18	5	14.49	3-2	0	>4	0 to >4	6.16
149	B	111	7/10/2019	15:23:16	18	5	14.49	3-2	0	>4	0 to >4	6.62
149	D	111	7/10/2019	15:25:55	18	5	14.49	3-2	0	>4	0 to >4	5.25
150	A	111	7/10/2019	14:50:28	18	5	14.49	3-2	-1	>4	-1 to >4	5.49
150	B	111	7/10/2019	14:51:38	18	5	14.49	3-2	0	>4	0 to >4	4.53
150	C	111	7/10/2019	14:52:48	18	5	14.49	3-2	-1	>4	-1 to >4	6.22
151	A	112	7/10/2019	14:30:28	18	5	14.49	2-1	1	>4	1 to >4	5.06
151	B	112	7/10/2019	14:31:55	18	5	14.49	2-1	-1	>4	-1 to >4	5.26
151	D	112	7/10/2019	14:34:25	18	5	14.49	3-2	-1	>4	-1 to >4	4.17
152	A	113	7/10/2019	14:12:10	18	5	14.49	2-1	-1	>4	-1 to >4	5.04
152	B	113	7/10/2019	14:13:28	18	5	14.49	2-1	0	>4	0 to >4	3.75
152	D	113	7/10/2019	14:16:09	18	5	14.49	2-1	-1	>4	-1 to >4	8.08
153	A	117	7/10/2019	13:49:55	18	5	14.49	2-1	0	>4	0 to >4	6.09
153	B	117	7/10/2019	13:51:04	18	5	14.49	2-1	0	>4	0 to >4	4.89
153	C	117	7/10/2019	13:52:15	18	5	14.49	2-1	0	>4	0 to >4	5.95
154	A	121	7/10/2019	13:28:49	18	5	14.49	3-2	0	>4	0 to >4	5.21
154	B	121	7/10/2019	13:30:04	18	5	14.49	3-2	0	>4	0 to >4	5.32
154	C	121	7/10/2019	13:31:28	18	5	14.49	3-2	-1	>4	-1 to >4	6.15
155	A	120	7/10/2019	13:08:12	18	5	14.49	3-2	0	>4	0 to >4	5.20
155	B	120	7/10/2019	13:09:15	18	5	14.49	3-2	0	>4	0 to >4	5.84
155	D	120	7/10/2019	13:11:26	18	5	14.49	3-2	-1	>4	-1 to >4	6.28
156	A	119	7/10/2019	12:47:15	18	5	14.49	3-2	1	>4	1 to >4	5.09
156	B	119	7/10/2019	12:48:21	18	5	14.49	3-2	0	>4	0 to >4	5.06
156	D	119	7/10/2019	12:50:32	18	5	14.49	3-2	0	>4	0 to >4	5.44
157	A	121	7/10/2019	12:21:56	18	5	14.49	2-1	1	>4	1 to >4	6.41

StationID	Replicate	Water Depth (ft)	Date	Time	Stop Collar Setting (in)	# of Weights (per side)	Image Width (cm)	Grain Size Major Mode (phi)	Grain Size Minimum (phi)	Grain Size Maximum (phi)	Grain Size Range (phi)	Penetration Mean (cm)
157	B	121	7/10/2019	12:22:57	18	5	14.49	2-1	-2	>4	-2 to >4	6.31
157	C	121	7/10/2019	12:24:00	18	5	14.49	2-1	-1	>4	-1 to >4	5.79
REFA_01	A	94	7/13/2019	22:15:50	14	5	14.49	-3 to -2/3-2	-5	>4	-5 to >4	5.72
REFA_01	B	94	7/13/2019	22:17:20	14	5	14.49	-3 to -2/2-1	-4	>4	-4 to >4	6.65
REFA_01	C	94	7/13/2019	22:18:43	14	5	14.49	2-1	-4	>4	-4 to >4	7.26
REFA_02	A	105	7/13/2019	21:21:27	14	5	14.49	2-1/3-2	-4	>4	-4 to >4	6.34
REFA_02	B	105	7/13/2019	21:23:07	14	5	14.49	1-0/2-1	-3	>4	-3 to >4	7.99
REFA_02	D	105	7/13/2019	21:26:05	14	5	14.49	1-0/2-1	-5	>4	-5 to >4	7.01
REFA_03	A	101	7/13/2019	21:48:32	14	5	14.49	2-1	-3	>4	-3 to >4	6.36
REFA_03	B	101	7/13/2019	21:50:02	14	5	14.49	-1 to 0/2-1	-3	>4	-3 to >4	7.49
REFA_03	D	101	7/13/2019	21:52:50	14	5	14.49	-3 to -2/2-1	-5	>4	-5 to >4	7.86
REFA_04	A	100	7/13/2019	21:37:46	14	5	14.49	-3 to -2/2-1	-4	>4	-4 to >4	7.81
REFA_04	C	100	7/13/2019	21:41:22	14	5	14.49	2-1	-3	>4	-3 to >4	8.82
REFA_04	D	100	7/13/2019	21:42:54	14	5	14.49	-3 to -2/2-1	-5	>4	-5 to >4	7.51
REFA_05	A	109	7/13/2019	22:00:17	14	5	14.49	-3 to -2/2-1	-4	>4	-4 to >4	8.40
REFA_05	B	109	7/13/2019	22:01:44	14	5	14.49	-3 to -2/2-1	-4	>4	-4 to >4	5.11
REFA_05	C	109	7/13/2019	22:03:11	14	5	14.49	2-1/>4	-3	>4	-3 to >4	8.44
REFB_01	A	77	7/11/2019	5:39:10	18	5	14.49	3-2	1	>4	1 to >4	4.98
REFB_01	B	77	7/11/2019	5:39:55	18	5	14.49	3-2	0	>4	0 to >4	6.37
REFB_01	C	77	7/11/2019	5:41:23	18	5	14.49	3-2	1	>4	1 to >4	5.50
REFB_02	A	75	7/11/2019	5:05:43	18	5	14.49	3-2	0	>4	0 to >4	9.55
REFB_02	B	75	7/11/2019	5:06:26	18	5	14.49	3-2	1	>4	1 to >4	4.94
REFB_02	C	75	7/11/2019	5:07:45	18	5	14.49	3-2	1	>4	1 to >4	4.18
REFB_03	A	75	7/11/2019	5:18:19	18	5	14.49	3-2	1	>4	1 to >4	7.18
REFB_03	B	75	7/11/2019	5:19:01	18	5	14.49	3-2	1	>4	1 to >4	4.99
REFB_03	C	75	7/11/2019	5:19:51	18	5	14.49	3-2	0	>4	0 to >4	6.04
REFB_04	A	76	7/11/2019	5:28:14	18	5	14.49	2-1	0	>4	0 to >4	4.77
REFB_04	D	76	7/11/2019	5:31:01	18	5	14.49	2-1	-3	>4	-3 to >4	4.17
REFB_04	E	76	7/11/2019	5:31:59	18	5	14.49	2-1	-2	>4	-2 to >4	4.31
REFB_05	A	79	7/11/2019	5:47:11	18	5	14.49	3-2	1	>4	1 to >4	4.26
REFB_05	B	79	7/11/2019	5:48:06	18	5	14.49	3-2	0	>4	0 to >4	5.10
REFB_05	C	79	7/11/2019	5:48:55	18	5	14.49	3-2	0	>4	0 to >4	3.97
REFC_01	A	117	7/13/2019	20:24:09	14	5	14.49	3-2	1	>4	1 to >4	5.16
REFC_01	B	117	7/13/2019	20:25:59	14	5	14.49	3-2	1	>4	1 to >4	6.06
REFC_01	D	117	7/13/2019	20:28:51	14	5	14.49	3-2	1	>4	1 to >4	4.70

StationID	Replicate	Water Depth (ft)	Date	Time	Stop Collar Setting (in)	# of Weights (per side)	Image Width (cm)	Grain Size Major Mode (phi)	Grain Size Minimum (phi)	Grain Size Maximum (phi)	Grain Size Range (phi)	Penetration Mean (cm)
REFC_02	A	117	7/13/2019	20:32:29	14	5	14.49	3-2	0	>4	0 to >4	6.13
REFC_02	B	117	7/13/2019	20:33:51	14	5	14.49	3-2	0	>4	0 to >4	6.01
REFC_02	C	117	7/13/2019	20:35:19	14	5	14.49	3-2	0	>4	0 to >4	5.34
REFC_03	A	119	7/13/2019	19:54:06	14	5	14.49	3-2	0	>4	0 to >4	5.29
REFC_03	B	119	7/13/2019	19:55:33	14	5	14.49	3-2	0	>4	0 to >4	4.41
REFC_03	D	119	7/13/2019	19:58:19	14	5	14.49	3-2	1	>4	1 to >4	5.73
REFC_04	A	114	7/13/2019	20:12:44	14	5	14.49	3-2	1	>4	1 to >4	7.13
REFC_04	B	114	7/13/2019	20:14:14	14	5	14.49	3-2	2	>4	2 to >4	8.14
REFC_04	C	114	7/13/2019	20:15:36	14	5	14.49	3-2/4-3	1	>4	1 to >4	6.83
REFC_05	A	115	7/13/2019	20:03:58	14	5	14.49	3-2	0	>4	0 to >4	7.12
REFC_05	B	115	7/13/2019	20:05:24	14	5	14.49	3-2	1	>4	1 to >4	6.47
REFC_05	C	115	7/13/2019	20:06:57	14	5	14.49	3-2	1	>4	1 to >4	7.18

StationID	Replicate	Water Depth (ft)	Date	Time	Penetration Minimum (cm)	Penetration Maximum (cm)	Over-penetration?	Boundary Roughness (cm)	aRPD Mean (cm)	aRPD > Pen	Methane Present?	Low DO Present?	Sediment Oxygen Demand	Beggiatoa Present?
001	A	53	7/14/2019	3:35:07	1.02	1.80	No	0.78	IND	FALSE	No	No	Low	No
001	B	53	7/14/2019	3:35:52	1.44	3.06	No	1.62	IND	FALSE	No	No	Low	No
001	C	53	7/14/2019	3:36:37	1.35	3.55	No	2.21	IND	FALSE	No	No	Low	No
002	A	64	7/14/2019	3:13:17	4.53	5.57	No	1.04	IND	FALSE	No	No	Low	No
002	B	64	7/14/2019	3:13:59	4.91	6.60	No	1.70	IND	FALSE	No	No	Low	No
002	C	64	7/14/2019	3:14:39	5.35	6.28	No	0.93	IND	FALSE	No	No	Low	No
003	A	70	7/14/2019	2:50:26	4.76	5.34	No	0.58	IND	FALSE	No	No	Low	No
003	B	70	7/14/2019	2:51:09	4.98	5.62	No	0.64	IND	FALSE	No	No	Low	No
003	C	70	7/14/2019	2:51:44	4.65	6.40	No	1.75	IND	FALSE	No	No	Low	No
004	A	73	7/14/2019	2:28:48	4.74	5.97	No	1.23	IND	FALSE	No	No	Low	No
004	B	73	7/14/2019	2:29:34	4.47	5.50	No	1.02	IND	FALSE	No	No	Low	No
004	C	73	7/14/2019	2:30:15	6.54	8.79	No	2.25	1.38	FALSE	No	No	Low	No
005	A	77	7/14/2019	2:07:20	7.00	10.34	No	3.34	IND	FALSE	No	No	Low	No
005	B	77	7/14/2019	2:08:33	4.94	6.82	No	1.88	IND	FALSE	No	No	Low	No
005	C	77	7/14/2019	2:09:11	7.09	7.76	No	0.67	IND	FALSE	No	No	Low	No
006	A	68	7/14/2019	1:47:08	5.38	6.30	No	0.92	IND	FALSE	No	No	Low	No
006	B	68	7/14/2019	1:47:54	6.30	7.39	No	1.09	IND	FALSE	No	No	Low	No
006	C	68	7/14/2019	1:48:37	6.60	7.55	No	0.95	IND	FALSE	No	No	Low	No
007	A	77	7/14/2019	1:24:24	3.71	5.75	No	2.03	IND	FALSE	No	IND	IND	No
007	B	77	7/14/2019	1:25:05	5.13	6.75	No	1.62	IND	FALSE	No	IND	IND	No
007	C	77	7/14/2019	1:25:47	5.31	6.85	No	1.54	IND	FALSE	No	IND	IND	No
008	B	85	7/14/2019	0:19:10	6.68	7.76	No	1.08	IND	FALSE	No	No	Low	No
008	C	85	7/14/2019	0:19:56	5.18	6.21	No	1.03	IND	FALSE	No	No	Low	No
008	D	85	7/14/2019	0:20:41	5.14	6.66	No	1.51	IND	FALSE	No	No	Low	No
009	A	95	7/13/2019	23:50:13	5.79	7.42	No	1.63	IND	FALSE	No	No	Low	No
009	B	95	7/13/2019	23:51:37	6.20	7.46	No	1.25	IND	FALSE	No	No	Low	No

StationID	Replicate	Water Depth (ft)	Date	Time	Penetration Minimum (cm)	Penetration Maximum (cm)	Over-penetration?	Boundary Roughness (cm)	aRPD Mean (cm)	aRPD > Pen	Methane Present?	Low DO Present?	Sediment Oxygen Demand	Beggiatoa Present?
009	C	95	7/13/2019	23:53:04	5.97	6.91	No	0.93	IND	FALSE	No	No	Low	No
010	B	116	7/13/2019	23:26:52	6.12	7.93	No	1.82	IND	FALSE	No	No	Low	No
010	C	116	7/13/2019	23:28:16	1.12	4.17	No	3.04	IND	FALSE	No	No	Low	No
010	D	116	7/13/2019	23:29:47	8.30	9.20	No	0.89	1.59	FALSE	No	No	Low	No
011	A	224	7/13/2019	22:56:37	19.74	20.53	No	0.79	1.11	FALSE	No	No	Low	No
011	B	224	7/13/2019	22:58:11	18.75	19.75	No	1.00	1.03	FALSE	No	No	Low	No
011	C	224	7/13/2019	22:59:48	19.64	20.72	No	1.09	1.10	FALSE	No	No	Low	No
012	A	127	7/13/2019	19:29:31	6.59	7.79	No	1.21	1.15	FALSE	No	No	Low	No
012	B	127	7/13/2019	19:31:08	8.28	11.17	No	2.89	1.31	FALSE	No	No	Low	No
012	C	127	7/13/2019	19:32:27	8.68	11.86	No	3.17	IND	FALSE	No	No	Low	No
013	A	111	7/13/2019	19:05:00	7.21	10.98	No	3.77	IND	FALSE	No	No	Low	No
013	B	111	7/13/2019	19:06:42	6.06	7.74	No	1.68	IND	FALSE	No	No	Low	No
013	C	111	7/13/2019	19:08:11	3.81	5.46	No	1.65	IND	FALSE	No	No	Low	No
014	A	117	7/13/2019	18:40:36	5.50	7.18	No	1.67	1.49	FALSE	No	No	Low	No
014	B	117	7/13/2019	18:42:09	4.75	7.70	No	2.95	1.42	FALSE	No	No	Low	No
014	D	117	7/13/2019	18:45:03	5.93	8.14	No	2.21	1.40	FALSE	No	No	Low	No
015	A	109	7/13/2019	18:14:33	5.03	10.15	No	5.12	0.62	FALSE	No	No	Low	No
015	B	109	7/13/2019	18:16:12	6.03	7.16	No	1.13	1.12	FALSE	No	No	Low	No
015	C	109	7/13/2019	18:17:53	5.55	6.44	No	0.89	0.65	FALSE	No	No	Low	No
016	A	95	7/10/2019	19:06:41	3.01	4.00	No	0.99	1.12	FALSE	No	No	Low	No
016	B	95	7/10/2019	19:07:59	4.28	5.41	No	1.13	1.46	FALSE	No	No	Low	No
016	C	95	7/10/2019	19:09:18	4.13	4.58	No	0.45	1.12	FALSE	No	No	Low	No
017	A	93	7/10/2019	18:46:29	6.69	7.40	No	0.71	1.22	FALSE	No	No	Low	No
017	B	93	7/10/2019	18:47:44	4.86	5.54	No	0.68	1.30	FALSE	No	No	Low	No
017	D	93	7/10/2019	18:50:11	3.66	4.24	No	0.59	1.03	FALSE	No	No	Low	No
018	A	90	7/10/2019	18:25:08	5.71	6.73	No	1.02	0.96	FALSE	No	No	Low	No
018	B	90	7/10/2019	18:26:34	3.57	4.15	No	0.58	0.95	FALSE	No	No	Low	No
018	C	90	7/10/2019	18:27:53	4.28	4.82	No	0.54	1.27	FALSE	No	No	Low	No
019	A	97	7/10/2019	18:03:03	5.30	5.72	No	0.42	1.28	FALSE	No	No	Low	No

StationID	Replicate	Water Depth (ft)	Date	Time	Penetration Minimum (cm)	Penetration Maximum (cm)	Over-penetration?	Boundary Roughness (cm)	aRPD Mean (cm)	aRPD > Pen	Methane Present?	Low DO Present?	Sediment Oxygen Demand	Beggiatoa Present?
019	B	97	7/10/2019	18:04:10	2.96	5.54	No	2.59	0.36	FALSE	No	No	Low	No
019	C	97	7/10/2019	18:05:19	15.40	15.80	No	0.40	0.92	FALSE	No	No	Low	No
020	A	92	7/10/2019	17:42:53	1.07	6.00	No	4.93	1.92	TRUE	No	No	Low	No
020	B	92	7/10/2019	17:44:34	3.45	4.07	No	0.62	0.81	FALSE	No	No	Low	No
020	C	92	7/10/2019	17:45:55	3.93	4.60	No	0.67	0.85	FALSE	No	No	Low	No
021	A	97	7/10/2019	22:18:09	5.24	5.62	No	0.38	0.75	FALSE	No	No	Low	No
021	B	97	7/10/2019	22:19:30	4.65	5.90	No	1.25	1.01	FALSE	No	No	Low	No
021	D	97	7/10/2019	22:22:06	4.97	5.89	No	0.92	1.23	FALSE	No	No	Low	No
022	A	95	7/10/2019	22:37:29	3.33	4.75	No	1.42	0.64	FALSE	No	No	Low	No
022	B	95	7/10/2019	22:38:46	6.27	6.76	No	0.49	1.11	FALSE	No	No	Low	No
022	C	95	7/10/2019	22:40:01	0.00	7.56	No	7.56	IND	FALSE	No	No	Low	No
023	A	91	7/10/2019	22:57:17	4.39	5.24	No	0.85	0.62	FALSE	No	No	Low	No
023	B	91	7/10/2019	22:58:43	5.53	6.91	No	1.38	0.91	FALSE	No	No	Low	No
023	D	91	7/10/2019	23:01:14	3.94	6.53	No	2.59	0.94	FALSE	No	No	Low	No
024	A	97	7/10/2019	23:16:48	4.52	5.01	No	0.49	0.31	FALSE	No	No	Low	No
024	B	97	7/10/2019	23:18:16	4.45	6.48	No	2.03	0.91	FALSE	No	No	Low	No
024	C	97	7/10/2019	23:19:35	4.94	5.49	No	0.54	0.95	FALSE	No	No	Low	No
025	A	102	7/11/2019	0:56:36	4.68	5.41	No	0.73	IND	FALSE	No	No	Low	No
025	B	102	7/11/2019	0:57:20	4.88	5.41	No	0.53	0.81	FALSE	No	No	Low	No
025	D	102	7/11/2019	0:59:04	4.74	6.17	No	1.42	2.18	FALSE	No	No	Low	No
026	C	98	7/11/2019	2:19:45	4.18	4.61	No	0.42	1.04	FALSE	No	No	Low	No
026	F	98	7/11/2019	2:22:09	2.71	4.55	No	1.84	1.12	FALSE	No	No	Low	No
026	G	98	7/11/2019	2:23:01	5.46	6.36	No	0.90	1.12	FALSE	No	No	Low	No
027	A	97	7/11/2019	10:38:45	4.03	4.53	No	0.50	0.89	FALSE	No	No	Low	No
027	B	97	7/11/2019	10:39:29	3.57	5.02	No	1.46	0.44	FALSE	No	No	Low	No
027	C	97	7/11/2019	10:40:15	3.47	4.26	No	0.79	0.85	FALSE	No	No	Low	No
028	A	88	7/11/2019	10:56:17	3.62	5.96	No	2.34	0.97	FALSE	No	No	Low	No
028	B	88	7/11/2019	10:57:12	4.58	5.22	No	0.64	0.81	FALSE	No	No	Low	No
028	C	88	7/11/2019	10:57:55	4.04	4.58	No	0.53	0.77	FALSE	No	No	Low	No
029	A	89	7/11/2019	11:14:45	4.38	5.54	No	1.16	0.53	FALSE	No	No	Low	No
029	B	89	7/11/2019	11:15:25	3.67	4.03	No	0.36	1.02	FALSE	No	No	Low	No
029	C	89	7/11/2019	11:16:09	4.53	5.53	No	1.00	1.14	FALSE	No	No	Low	No
030	A	123	7/10/2019	3:03:41	5.58	6.38	No	0.80	1.15	FALSE	No	No	Low	No

StationID	Replicate	Water Depth (ft)	Date	Time	Penetration Minimum (cm)	Penetration Maximum (cm)	Over-penetration?	Boundary Roughness (cm)	aRPD Mean (cm)	aRPD > Pen	Methane Present?	Low DO Present?	Sediment Oxygen Demand	Beggiatoa Present?
030	C	123	7/10/2019	3:08:14	4.78	6.63	No	1.85	0.70	FALSE	No	No	Low	No
030	D	123	7/10/2019	3:10:00	5.25	6.32	No	1.07	1.30	FALSE	No	No	Low	No
031	A	117	7/10/2019	4:07:40	5.96	7.28	No	1.32	0.85	FALSE	No	No	Low	No
031	B	117	7/10/2019	4:08:49	5.49	6.01	No	0.52	0.82	FALSE	No	No	Low	No
031	C	117	7/10/2019	4:09:53	5.19	6.26	No	1.07	IND	FALSE	No	No	Low	No
032	A	118	7/10/2019	4:43:15	4.94	5.47	No	0.53	0.78	FALSE	No	No	Low	No
032	B	118	7/10/2019	4:44:10	5.30	6.10	No	0.80	0.99	FALSE	No	No	Low	No
032	D	118	7/10/2019	4:46:32	6.13	7.16	No	1.02	0.63	FALSE	No	No	Low	No
033	A	110	7/10/2019	5:34:24	6.79	7.05	No	0.26	0.87	FALSE	No	No	Low	No
033	B	110	7/10/2019	5:35:18	4.46	5.14	No	0.68	0.42	FALSE	No	No	Low	No
033	C	110	7/10/2019	5:36:36	5.37	6.84	No	1.47	0.86	FALSE	No	No	Low	No
034	A	109	7/10/2019	6:02:04	5.70	6.38	No	0.68	1.40	FALSE	No	No	Low	No
034	B	109	7/10/2019	6:03:02	4.98	6.02	No	1.04	0.93	FALSE	No	No	Low	No
034	C	109	7/10/2019	6:06:15	5.10	5.50	No	0.40	0.69	FALSE	No	No	Low	No
035	A	110	7/10/2019	6:34:32	4.86	6.91	No	2.05	0.79	FALSE	No	No	Low	No
035	B	110	7/10/2019	6:35:21	6.26	6.57	No	0.32	1.05	FALSE	No	No	Low	No
035	C	110	7/10/2019	6:37:41	5.71	6.20	No	0.49	1.31	FALSE	No	No	Low	No
036	A	100	7/10/2019	6:58:52	6.52	7.51	No	0.99	IND	FALSE	No	No	Low	No
036	B	100	7/10/2019	6:59:53	4.62	5.59	No	0.97	IND	FALSE	No	No	Low	No
036	C	100	7/10/2019	7:00:48	6.53	6.79	No	0.26	IND	FALSE	No	No	Low	No
037	A	105	7/10/2019	7:20:11	5.52	6.19	No	0.67	IND	FALSE	No	No	Low	No
037	C	105	7/10/2019	7:21:57	5.71	6.21	No	0.50	IND	FALSE	No	No	Low	No
037	D	105	7/10/2019	7:23:19	6.00	6.76	No	0.76	IND	FALSE	No	No	Low	No
038	A	100	7/10/2019	7:44:15	5.88	6.41	No	0.52	0.86	FALSE	No	No	Low	No
038	B	100	7/10/2019	7:45:05	5.96	6.28	No	0.32	1.04	FALSE	No	No	Low	No
038	C	100	7/10/2019	7:45:58	6.42	7.12	No	0.70	0.68	FALSE	No	No	Low	No
039	A	98	7/10/2019	8:08:38	3.89	4.50	No	0.61	0.52	FALSE	No	No	Low	No
039	B	98	7/10/2019	8:10:15	5.04	5.99	No	0.94	1.07	FALSE	No	No	Low	No
039	C	98	7/10/2019	8:11:11	5.70	6.96	No	1.26	0.83	FALSE	No	No	Low	No
040	A	98	7/10/2019	8:31:56	6.43	7.10	No	0.66	1.37	FALSE	No	No	Low	No

StationID	Replicate	Water Depth (ft)	Date	Time	Penetration Minimum (cm)	Penetration Maximum (cm)	Over-penetration?	Boundary Roughness (cm)	aRPD Mean (cm)	aRPD > Pen	Methane Present?	Low DO Present?	Sediment Oxygen Demand	Beggiatoa Present?
040	B	98	7/10/2019	8:32:46	4.82	7.34	No	2.52	0.41	FALSE	No	No	Low	No
040	C	98	7/10/2019	8:33:34	5.54	6.42	No	0.88	0.32	FALSE	No	No	Low	No
041	A	96	7/10/2019	8:53:58	5.92	6.50	No	0.58	0.97	FALSE	No	No	Low	No
041	B	96	7/10/2019	8:54:40	5.21	5.92	No	0.72	1.14	FALSE	No	No	Low	No
041	C	96	7/10/2019	8:55:27	5.56	5.95	No	0.39	0.75	FALSE	No	No	Low	No
042	A	94	7/10/2019	9:16:46	7.39	9.64	No	2.25	0.96	FALSE	No	No	Low	No
042	B	94	7/10/2019	9:18:32	5.01	5.63	No	0.62	1.04	FALSE	No	No	Low	No
042	C	94	7/10/2019	9:19:18	9.88	11.77	No	1.89	0.74	FALSE	No	No	Low	No
043	A	88	7/11/2019	11:29:09	4.00	5.04	No	1.04	1.24	FALSE	No	No	Low	No
043	B	88	7/11/2019	11:30:01	3.34	5.36	No	2.02	0.92	FALSE	No	No	Low	No
043	C	88	7/11/2019	11:30:49	3.97	4.60	No	0.63	0.45	FALSE	No	No	Low	No
044	A	87	7/11/2019	11:46:59	5.15	5.47	No	0.32	IND	FALSE	No	No	Low	No
044	B	87	7/11/2019	11:47:46	3.57	5.54	No	1.97	IND	FALSE	No	No	Low	No
044	C	87	7/11/2019	11:49:02	4.80	5.34	No	0.54	1.08	FALSE	No	No	Low	No
045	A	83	7/11/2019	12:07:17	4.21	5.66	No	1.46	0.93	FALSE	No	No	Low	No
045	B	83	7/11/2019	12:08:50	3.42	5.52	No	2.10	IND	FALSE	No	No	Low	No
045	C	83	7/11/2019	12:10:01	3.50	4.51	No	1.01	IND	FALSE	No	No	Low	No
046	A	84	7/11/2019	19:50:44	2.95	4.10	No	1.15	IND	FALSE	No	No	Low	No
046	B	84	7/11/2019	19:52:00	4.57	5.24	No	0.66	IND	FALSE	No	No	Low	No
046	D	84	7/11/2019	19:54:26	3.88	4.99	No	1.11	IND	FALSE	No	No	Low	No
047	A	81	7/11/2019	19:22:37	3.23	3.93	No	0.70	0.64	FALSE	No	No	Low	No
047	D	81	7/11/2019	19:26:29	4.24	5.12	No	0.88	1.27	FALSE	No	No	Low	No
047	E	81	7/11/2019	19:30:59	3.62	5.14	No	1.52	1.14	FALSE	No	No	Low	No
048	A	77	7/11/2019	12:24:14	3.69	4.02	No	0.33	IND	FALSE	No	No	Low	No
048	B	77	7/11/2019	12:25:30	3.39	4.48	No	1.09	IND	FALSE	No	No	Low	No
048	C	77	7/11/2019	12:26:48	3.77	4.97	No	1.20	0.58	FALSE	No	No	Low	No
049	A	87	7/11/2019	12:41:42	5.47	6.62	No	1.15	0.73	FALSE	No	No	Low	No
049	B	87	7/11/2019	12:42:56	11.81	12.28	No	0.47	0.76	FALSE	No	No	Low	No
049	D	87	7/11/2019	12:45:22	12.24	13.27	No	1.03	0.78	FALSE	No	No	Low	No
050	A	87	7/11/2019	12:59:30	0.00	0.00	No	IND	IND	FALSE	IND	IND	IND	IND
050	B	87	7/11/2019	13:00:47	0.00	0.00	No	IND	IND	FALSE	IND	IND	IND	IND

StationID	Replicate	Water Depth (ft)	Date	Time	Penetration Minimum (cm)	Penetration Maximum (cm)	Over-penetration?	Boundary Roughness (cm)	aRPD Mean (cm)	aRPD > Pen	Methane Present?	Low DO Present?	Sediment Oxygen Demand	Beggiatoa Present?
050	C	87	7/11/2019	13:01:55	6.61	7.59	No	0.98	IND	FALSE	No	No	Low	No
051	A	84	7/11/2019	13:18:11	6.86	7.45	No	0.59	IND	FALSE	No	No	Low	No
051	C	84	7/11/2019	13:20:36	8.37	9.54	No	1.17	IND	FALSE	No	No	Low	No
051	D	84	7/11/2019	13:21:50	6.15	7.82	No	1.67	IND	FALSE	No	No	Low	No
052	B	77	7/11/2019	14:07:38	4.80	5.42	No	0.62	IND	FALSE	No	No	Low	No
052	C	77	7/11/2019	14:08:53	5.29	5.79	No	0.49	0.75	FALSE	No	No	Low	No
052	D	77	7/11/2019	14:10:04	3.36	4.46	No	1.11	IND	FALSE	No	No	Low	No
053	A	72	7/12/2019	20:56:30	4.36	5.55	No	1.20	1.06	FALSE	No	No	Low	No
053	B	72	7/12/2019	20:58:18	3.70	5.21	No	1.51	0.56	FALSE	No	No	Low	No
053	D	72	7/12/2019	21:01:13	4.16	4.69	No	0.53	0.80	FALSE	No	No	Low	No
054	A	72	7/12/2019	21:19:09	2.19	3.08	No	0.89	IND	FALSE	No	No	Low	No
054	B	72	7/12/2019	21:20:18	4.07	5.24	No	1.16	IND	FALSE	No	No	Low	No
054	C	72	7/12/2019	21:22:01	6.09	7.21	No	1.12	IND	FALSE	No	No	Low	No
055	A	73	7/12/2019	23:58:30	6.83	7.84	No	1.01	IND	FALSE	No	No	Low	No
055	B	73	7/13/2019	0:00:04	3.99	5.64	No	1.65	IND	FALSE	No	No	Low	No
055	C	73	7/13/2019	0:01:35	4.06	5.13	No	1.08	IND	FALSE	No	No	Low	No
056	A	81	7/13/2019	0:21:54	4.73	6.05	No	1.32	1.38	FALSE	No	No	Low	No
056	B	81	7/13/2019	0:22:57	5.76	6.62	No	0.86	0.85	FALSE	No	No	Low	No
056	C	81	7/13/2019	0:23:37	4.89	6.07	No	1.17	0.86	FALSE	No	No	Low	No
057	A	86	7/13/2019	0:44:08	6.40	7.03	No	0.63	1.05	FALSE	No	No	Low	No
057	B	86	7/13/2019	0:44:50	8.92	9.43	No	0.51	0.96	FALSE	No	No	Low	No
057	C	86	7/13/2019	0:45:32	5.64	6.84	No	1.20	1.01	FALSE	No	No	Low	No
058	A	91	7/13/2019	1:07:56	6.17	6.91	No	0.74	1.12	FALSE	No	No	Low	No
058	C	91	7/13/2019	1:09:21	7.18	8.09	No	0.90	0.93	FALSE	No	No	Low	No
058	D	91	7/13/2019	1:09:58	5.21	8.53	No	3.32	IND	FALSE	No	No	Low	No
059	A	95	7/13/2019	1:29:36	8.22	9.43	No	1.22	0.69	FALSE	No	No	Low	No
059	B	95	7/13/2019	1:30:21	9.29	10.22	No	0.92	0.97	FALSE	No	No	Low	No
059	C	95	7/13/2019	1:31:00	7.91	9.09	No	1.17	1.17	FALSE	No	No	Low	No
060	A	95	7/13/2019	1:54:25	4.99	6.62	No	1.63	0.66	FALSE	No	No	Low	No
060	B	95	7/13/2019	1:55:03	7.27	8.52	No	1.25	1.36	FALSE	No	No	Low	No

StationID	Replicate	Water Depth (ft)	Date	Time	Penetration Minimum (cm)	Penetration Maximum (cm)	Over-penetration?	Boundary Roughness (cm)	aRPD Mean (cm)	aRPD > Pen	Methane Present?	Low DO Present?	Sediment Oxygen Demand	Beggiatoa Present?
060	C	95	7/13/2019	1:55:45	7.39	9.69	No	2.30	1.22	FALSE	No	No	Low	No
061	A	91	7/13/2019	2:18:35	7.82	10.29	No	2.48	0.92	FALSE	No	No	Low	No
061	B	91	7/13/2019	2:19:17	7.57	8.55	No	0.99	0.93	FALSE	No	No	Low	No
061	C	91	7/13/2019	2:20:00	7.81	8.52	No	0.71	0.89	FALSE	No	No	Low	No
062	A	87	7/13/2019	2:40:14	5.70	7.64	No	1.95	1.58	FALSE	No	No	Low	No
062	B	87	7/13/2019	2:41:00	2.75	7.11	No	4.36	0.98	FALSE	No	No	Low	No
062	D	87	7/13/2019	2:42:24	5.97	7.68	No	1.71	0.88	FALSE	No	No	Low	No
063	B	74	7/11/2019	18:32:06	3.61	3.95	No	0.34	0.97	FALSE	No	No	Low	No
063	C	74	7/11/2019	18:33:16	4.17	4.76	No	0.59	1.67	FALSE	No	No	Low	No
063	D	74	7/11/2019	18:34:28	2.47	3.62	No	1.15	0.44	FALSE	No	No	Low	No
064	A	72	7/11/2019	17:43:40	3.51	3.91	No	0.39	0.93	FALSE	No	No	Low	No
064	B	72	7/11/2019	17:45:19	3.15	3.86	No	0.71	0.75	FALSE	No	No	Low	No
064	C	72	7/11/2019	17:46:35	2.65	3.31	No	0.66	0.76	FALSE	No	No	Low	No
065	A	77	7/11/2019	16:59:10	4.26	4.93	No	0.67	0.92	FALSE	No	No	Low	No
065	B	77	7/11/2019	17:00:25	3.64	4.66	No	1.01	1.01	FALSE	No	No	Low	No
065	C	77	7/11/2019	17:01:35	3.58	4.41	No	0.83	1.27	FALSE	No	No	Low	No
066	A	82	7/11/2019	16:38:10	3.09	4.28	No	1.20	1.14	FALSE	No	No	Low	No
066	B	82	7/11/2019	16:39:40	2.51	3.42	No	0.91	0.83	FALSE	No	No	Low	No
066	C	82	7/11/2019	16:41:02	4.07	4.53	No	0.46	IND	FALSE	No	No	Low	No
067	A	77	7/11/2019	16:18:44	4.68	5.62	No	0.93	0.95	FALSE	No	No	Low	No
067	B	77	7/11/2019	16:20:01	5.78	6.32	No	0.53	0.97	FALSE	No	No	Low	No
067	D	77	7/11/2019	16:22:36	4.35	5.34	No	0.99	0.94	FALSE	No	No	Low	No
068	A	70	7/11/2019	16:00:31	6.42	7.96	No	1.54	IND	FALSE	No	No	Low	No
068	B	70	7/11/2019	16:01:52	4.92	6.05	No	1.13	IND	FALSE	No	No	Low	No
068	C	70	7/11/2019	16:03:01	6.42	7.47	No	1.05	IND	FALSE	No	No	Low	No
069	A	70	7/11/2019	15:41:06	4.11	5.05	No	0.93	IND	FALSE	No	No	Low	No
069	B	70	7/11/2019	15:42:37	5.33	6.55	No	1.22	IND	FALSE	No	No	Low	No
069	C	70	7/11/2019	15:43:54	4.91	5.60	No	0.70	IND	FALSE	No	No	Low	No
070	A	76	7/12/2019	20:11:06	5.84	7.12	No	1.28	IND	FALSE	No	No	Low	No
070	B	76	7/12/2019	20:12:35	4.94	6.45	No	1.51	1.01	FALSE	No	No	Low	No
070	C	76	7/12/2019	20:14:05	3.39	4.12	No	0.73	0.94	FALSE	No	No	Low	No

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071	A	71	7/12/2019	19:52:58	5.12	5.87	No	0.75	1.03	FALSE	No	No	Low	No
071	B	71	7/12/2019	19:54:29	4.96	7.46	No	2.50	1.35	FALSE	No	No	Low	No
071	C	71	7/12/2019	19:55:58	5.76	6.50	No	0.74	1.27	FALSE	No	No	Low	No
072	A	74	7/12/2019	19:35:07	3.00	3.72	No	0.72	1.35	FALSE	No	No	Low	No
072	C	74	7/12/2019	19:38:13	2.58	4.25	No	1.67	1.18	FALSE	No	No	Low	No
072	D	74	7/12/2019	19:39:50	2.17	3.99	No	1.82	0.81	FALSE	No	No	Low	No
073	A	81	7/12/2019	19:18:07	4.23	5.24	No	1.01	1.22	FALSE	No	No	Low	No
073	B	81	7/12/2019	19:19:37	3.92	4.59	No	0.67	0.54	FALSE	No	No	Low	No
073	C	81	7/12/2019	19:21:06	4.23	5.12	No	0.89	0.91	FALSE	No	No	Low	No
074	E	86	7/12/2019	18:59:48	5.01	6.32	No	1.32	0.97	FALSE	No	No	Low	No
074	F	86	7/12/2019	19:01:27	5.31	6.35	No	1.04	0.42	FALSE	No	No	Low	No
074	G	86	7/12/2019	19:03:13	5.30	5.68	No	0.38	0.56	FALSE	No	No	Low	No
075	A	91	7/12/2019	18:25:31	10.05	10.54	No	0.49	1.33	FALSE	No	No	Low	No
075	B	91	7/12/2019	18:27:03	11.00	11.57	No	0.57	0.98	FALSE	No	No	Low	No
075	D	91	7/12/2019	18:30:09	9.59	10.75	No	1.17	0.89	FALSE	No	No	Low	No
076	A	90	7/12/2019	17:52:40	5.14	5.90	No	0.76	0.69	FALSE	No	No	Low	No
076	B	90	7/12/2019	17:54:19	4.36	6.80	No	2.45	0.96	FALSE	No	No	Low	No
076	C	90	7/12/2019	17:55:52	4.89	5.54	No	0.65	1.03	FALSE	No	No	Low	No
077	A	86	7/12/2019	17:32:45	8.07	8.57	No	0.50	0.94	FALSE	No	No	Low	No
077	C	86	7/12/2019	17:35:47	8.76	9.55	No	0.79	0.92	FALSE	No	No	Low	No
077	D	86	7/12/2019	17:37:23	8.27	10.30	No	2.03	0.86	FALSE	No	No	Low	No
078	A	77	7/11/2019	18:45:32	3.89	5.08	No	1.20	IND	FALSE	No	No	Low	No
078	B	77	7/11/2019	18:47:03	4.61	6.24	No	1.63	0.88	FALSE	No	No	Low	No
078	C	77	7/11/2019	18:48:15	3.75	4.70	No	0.95	0.45	FALSE	No	No	Low	No
079	A	80	7/12/2019	4:58:21	3.70	5.53	No	1.83	IND	FALSE	No	No	Low	No
079	C	80	7/12/2019	5:00:02	3.36	4.65	No	1.29	1.45	FALSE	No	No	Low	No
079	D	80	7/12/2019	5:00:41	3.12	4.41	No	1.29	IND	FALSE	No	No	Low	No
080	A	69	7/12/2019	5:40:46	3.81	4.87	No	1.05	IND	FALSE	No	No	Low	No
080	B	69	7/12/2019	5:41:36	5.03	6.06	No	1.03	IND	FALSE	No	No	Low	No
080	C	69	7/12/2019	5:42:16	5.43	5.96	No	0.52	1.21	FALSE	No	No	Low	No
081	A	83	7/11/2019	19:02:31	4.94	5.79	No	0.85	1.70	FALSE	No	No	Low	No
081	B	83	7/11/2019	19:04:06	4.80	5.97	No	1.17	1.49	FALSE	No	No	Low	No
081	C	83	7/11/2019	19:05:18	8.59	9.49	No	0.90	2.41	FALSE	No	No	Low	No

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082	A	76	7/12/2019	4:18:26	5.23	6.87	No	1.63	1.47	FALSE	No	No	Low	No
082	B	76	7/12/2019	4:19:26	4.77	5.45	No	0.67	IND	FALSE	No	No	Low	No
082	C	76	7/12/2019	4:20:13	4.12	4.84	No	0.73	0.61	FALSE	No	No	Low	No
083	A	76	7/12/2019	5:26:07	7.26	8.22	No	0.96	1.35	FALSE	No	No	Low	No
083	B	76	7/12/2019	5:26:53	7.30	8.10	No	0.79	0.92	FALSE	No	No	Low	No
083	C	76	7/12/2019	5:27:38	8.07	9.32	No	1.25	0.54	FALSE	No	No	Low	No
084	A	62	7/12/2019	6:00:34	4.80	5.66	No	0.86	IND	FALSE	No	No	Low	No
084	B	62	7/12/2019	6:01:18	3.21	4.17	No	0.97	0.89	FALSE	No	No	Low	No
084	D	62	7/12/2019	6:02:46	3.26	3.78	No	0.52	1.03	FALSE	No	No	Low	No
085	A	66	7/12/2019	6:43:18	5.67	6.60	No	0.92	0.79	FALSE	No	No	Low	No
085	B	66	7/12/2019	6:44:11	4.98	5.79	No	0.80	1.13	FALSE	No	No	Low	No
085	C	66	7/12/2019	6:44:52	5.20	5.96	No	0.76	0.55	FALSE	No	No	Low	No
086	A	51	7/12/2019	7:17:44	4.58	5.37	No	0.79	0.91	FALSE	No	No	Low	No
086	B	51	7/12/2019	7:18:40	4.50	5.05	No	0.54	1.64	FALSE	No	No	Low	No
086	C	51	7/12/2019	7:19:32	4.88	5.87	No	0.99	1.41	FALSE	No	No	Low	No
087	A	43	7/12/2019	7:36:28	3.94	6.18	No	2.24	1.54	FALSE	No	No	Low	No
087	B	43	7/12/2019	7:37:49	1.91	5.29	No	3.38	IND	FALSE	No	No	Low	No
087	C	43	7/12/2019	7:38:29	2.64	4.63	No	1.99	0.80	FALSE	No	No	Low	No
088	A	36	7/12/2019	7:57:05	2.91	6.33	No	3.42	IND	FALSE	No	No	Low	No
088	B	36	7/12/2019	7:57:56	5.79	7.41	No	1.62	IND	FALSE	No	No	Low	No
088	C	36	7/12/2019	7:58:42	4.51	7.82	No	3.32	IND	FALSE	No	No	Low	No
089	A	80	7/13/2019	3:52:00	6.52	9.49	No	2.97	1.40	FALSE	No	No	Low	No
089	B	80	7/13/2019	3:53:27	4.14	5.64	No	1.50	0.79	FALSE	No	No	Low	No
089	C	80	7/13/2019	3:54:15	6.63	7.43	No	0.80	1.07	FALSE	No	No	Low	No
090	A	70	7/13/2019	4:14:36	5.63	6.28	No	0.66	0.77	FALSE	No	No	Low	No
090	B	70	7/13/2019	4:15:15	3.96	5.76	No	1.80	0.86	FALSE	No	No	Low	No
090	D	70	7/13/2019	4:16:41	4.57	5.53	No	0.96	0.97	FALSE	No	No	Low	No
091	A	60	7/13/2019	4:36:55	3.35	4.90	No	1.55	1.12	FALSE	No	No	Low	No
091	B	60	7/13/2019	4:37:35	4.26	5.27	No	1.01	0.94	FALSE	No	No	Low	No
091	C	60	7/13/2019	4:38:24	3.64	5.11	No	1.47	0.98	FALSE	No	No	Low	No
092	A	55	7/13/2019	4:56:43	2.50	3.71	No	1.21	0.97	FALSE	No	No	Low	No
092	C	55	7/13/2019	4:58:05	3.54	4.21	No	0.67	0.98	FALSE	No	No	Low	No
092	D	55	7/13/2019	4:58:53	3.11	4.60	No	1.49	0.94	FALSE	No	No	Low	No
093	B	44	7/13/2019	5:20:32	3.24	5.36	No	2.12	1.28	FALSE	No	No	Low	No
093	C	44	7/13/2019	5:21:16	2.78	5.02	No	2.24	2.15	FALSE	No	No	Low	No

StationID	Replicate	Water Depth (ft)	Date	Time	Penetration Minimum (cm)	Penetration Maximum (cm)	Over-penetration?	Boundary Roughness (cm)	aRPD Mean (cm)	aRPD > Pen	Methane Present?	Low DO Present?	Sediment Oxygen Demand	Beggiatoa Present?
093	D	44	7/13/2019	5:22:08	1.83	2.99	No	1.16	1.50	FALSE	No	No	Low	No
094	B	44	7/13/2019	5:40:18	3.39	4.99	No	1.60	IND	FALSE	No	No	Low	No
094	C	44	7/13/2019	5:41:05	3.30	7.26	No	3.97	IND	FALSE	No	No	Low	No
094	D	44	7/13/2019	5:41:45	3.89	5.32	No	1.42	IND	FALSE	No	No	Low	No
095	A	30	7/13/2019	6:01:06	4.78	6.65	No	1.87	IND	FALSE	No	No	Low	No
095	B	30	7/13/2019	6:01:48	6.10	6.90	No	0.80	IND	FALSE	No	No	Low	No
095	C	30	7/13/2019	6:02:29	5.17	6.34	No	1.16	IND	FALSE	No	No	Low	No
096	A	23	7/13/2019	6:17:32	3.88	5.52	No	1.64	IND	FALSE	No	No	Low	No
096	B	23	7/13/2019	6:18:21	4.22	7.32	No	3.10	IND	FALSE	No	No	Low	No
096	D	23	7/13/2019	6:19:41	4.84	5.98	No	1.14	IND	FALSE	No	No	Low	No
097	A	33	7/13/2019	6:36:47	1.92	5.17	No	3.25	IND	FALSE	No	No	Low	No
097	B	33	7/13/2019	6:37:24	5.33	6.49	No	1.15	IND	FALSE	No	No	Low	No
097	C	33	7/13/2019	6:38:01	4.23	6.25	No	2.02	IND	FALSE	No	No	Low	No
098	A	58	7/12/2019	6:15:43	4.11	5.05	No	0.93	1.02	FALSE	No	No	Low	No
098	B	58	7/12/2019	6:16:17	2.93	3.64	No	0.72	0.99	FALSE	No	No	Low	No
098	C	58	7/12/2019	6:17:11	4.09	5.50	No	1.41	0.34	FALSE	No	No	Low	No
099	A	58	7/12/2019	10:08:35	4.43	5.17	No	0.74	IND	TRUE	No	No	Low	No
099	B	58	7/12/2019	10:09:14	3.36	5.13	No	1.77	IND	TRUE	No	No	Low	No
099	C	58	7/12/2019	10:10:41	4.69	5.53	No	0.84	4.24	FALSE	No	No	Low	No
100	A	50	7/12/2019	10:30:47	4.60	6.24	No	1.64	4.01	FALSE	No	No	Low	No
100	B	50	7/12/2019	10:31:36	3.04	4.08	No	1.03	2.05	FALSE	No	No	Low	No
100	C	50	7/12/2019	10:32:24	3.98	5.49	No	1.51	2.75	FALSE	No	No	Low	No
101	A	48	7/12/2019	10:51:43	2.22	4.66	No	2.45	2.56	FALSE	No	No	Low	No
101	B	48	7/12/2019	10:52:49	3.76	5.23	No	1.47	3.09	FALSE	No	No	Low	No
101	C	48	7/12/2019	10:53:31	3.05	4.20	No	1.15	1.99	FALSE	No	No	Low	No
102	A	57	7/12/2019	6:28:02	5.57	6.29	No	0.72	3.01	FALSE	No	No	Low	No
102	B	57	7/12/2019	6:28:59	4.42	6.20	No	1.78	2.69	FALSE	No	No	Low	No
102	C	57	7/12/2019	6:29:45	5.11	6.18	No	1.08	3.46	FALSE	No	No	Low	No
103	A	56	7/12/2019	7:03:33	3.55	5.11	No	1.57	2.17	FALSE	No	No	Low	No

StationID	Replicate	Water Depth (ft)	Date	Time	Penetration Minimum (cm)	Penetration Maximum (cm)	Over-penetration?	Boundary Roughness (cm)	aRPD Mean (cm)	aRPD > Pen	Methane Present?	Low DO Present?	Sediment Oxygen Demand	Beggiatoa Present?
103	B	56	7/12/2019	7:04:15	2.53	4.23	No	1.71	1.91	FALSE	No	No	Low	No
103	C	56	7/12/2019	7:04:58	2.74	3.25	No	0.51	1.62	FALSE	No	No	Low	No
104	A	45	7/12/2019	9:37:06	4.76	6.20	No	1.43	2.94	FALSE	No	No	Low	No
104	B	45	7/12/2019	9:39:14	2.28	4.88	No	2.60	1.75	FALSE	No	No	Low	No
104	C	45	7/12/2019	9:40:07	3.37	5.92	No	2.55	2.12	FALSE	No	No	Low	No
105	A	37	7/12/2019	9:18:13	1.92	2.84	No	0.92	IND	TRUE	No	No	Low	No
105	B	37	7/12/2019	9:19:20	3.32	4.68	No	1.36	IND	TRUE	No	No	Low	No
105	C	37	7/12/2019	9:20:09	2.91	4.79	No	1.88	IND	TRUE	No	No	Low	No
106	A	32	7/12/2019	8:47:48	4.88	8.96	No	4.08	5.28	FALSE	No	No	Low	No
106	B	32	7/12/2019	8:48:38	4.57	5.04	No	0.47	3.69	FALSE	No	No	Low	No
106	C	32	7/12/2019	8:49:27	3.47	4.85	No	1.38	2.64	FALSE	No	No	Low	No
107	A	52	7/13/2019	7:01:44	5.38	6.54	No	1.16	IND	TRUE	No	No	Low	No
107	B	52	7/13/2019	7:02:23	4.82	6.80	No	1.98	IND	TRUE	No	No	Low	No
107	C	52	7/13/2019	7:03:04	8.53	9.73	No	1.21	5.69	FALSE	No	No	Low	No
108	A	48	7/13/2019	7:35:59	8.39	12.34	No	3.95	IND	FALSE	No	No	High	No
108	B	48	7/13/2019	7:36:40	6.92	9.14	No	2.22	IND	FALSE	No	No	High	No
108	F	48	7/13/2019	7:39:14	9.62	11.78	No	2.16	IND	FALSE	No	No	High	No
109	A	36	7/13/2019	7:58:17	9.15	10.53	No	1.38	IND	FALSE	No	No	High	No
109	C	36	7/13/2019	7:59:39	8.97	10.48	No	1.51	IND	FALSE	No	No	High	No
109	D	36	7/13/2019	8:00:11	9.82	11.63	No	1.81	IND	FALSE	No	No	High	No
110	B	53	7/13/2019	8:19:29	11.71	14.83	No	3.12	IND	FALSE	No	No	High	No
110	C	53	7/13/2019	8:20:14	13.25	15.87	No	2.62	IND	FALSE	No	No	High	No
110	D	53	7/13/2019	8:20:52	7.80	9.97	No	2.16	IND	FALSE	No	No	High	No
111	A	86	7/13/2019	8:41:30	7.51	8.34	No	0.83	3.24	FALSE	No	No	Medium	No
111	B	86	7/13/2019	8:42:21	10.94	12.21	No	1.27	3.02	FALSE	No	No	High	No
111	C	86	7/13/2019	8:43:00	4.59	5.20	No	0.61	2.10	FALSE	No	No	Medium	No
112	A	64	7/13/2019	9:06:04	3.22	6.49	No	3.27	IND	TRUE	No	No	Low	No

StationID	Replicate	Water Depth (ft)	Date	Time	Penetration Minimum (cm)	Penetration Maximum (cm)	Over-penetration?	Boundary Roughness (cm)	aRPD Mean (cm)	aRPD > Pen	Methane Present?	Low DO Present?	Sediment Oxygen Demand	Beggiatoa Present?
112	B	64	7/13/2019	9:08:46	5.65	7.83	No	2.17	IND	FALSE	No	No	Low	No
112	C	64	7/13/2019	9:10:44	6.05	7.47	No	1.41	IND	FALSE	No	No	Low	No
113	A	47	7/13/2019	9:42:44	3.89	4.87	No	0.97	1.59	FALSE	No	No	Low	No
113	B	47	7/13/2019	9:43:32	8.87	10.30	No	1.43	3.14	FALSE	No	No	Low	No
113	C	47	7/13/2019	9:44:43	4.46	6.54	No	2.08	IND	TRUE	No	No	Low	No
114	A	50	7/13/2019	10:07:17	12.66	13.67	No	1.01	1.68	FALSE	No	No	High	No
114	B	50	7/13/2019	10:08:06	15.10	16.99	No	1.89	2.85	FALSE	No	No	High	No
114	D	50	7/13/2019	10:09:27	13.42	13.77	No	0.35	0.64	FALSE	No	No	High	No
115	A	43	7/13/2019	10:28:29	18.89	19.46	No	0.57	1.90	FALSE	No	No	High	No
115	B	43	7/13/2019	10:29:18	17.74	19.17	No	1.43	IND	FALSE	No	No	High	No
115	C	43	7/13/2019	10:30:12	18.10	19.45	No	1.35	IND	FALSE	No	No	High	No
116	A	45	7/12/2019	11:15:11	4.99	6.41	No	1.41	3.75	FALSE	No	No	Low	No
116	B	45	7/12/2019	11:17:10	4.51	5.43	No	0.92	3.47	FALSE	No	No	Low	No
116	D	45	7/12/2019	11:18:32	4.86	6.15	No	1.29	4.15	FALSE	No	No	Low	No
117	A	46	7/12/2019	11:47:13	3.02	5.21	No	2.18	2.62	FALSE	No	No	Low	No
117	C	46	7/12/2019	11:48:34	4.25	5.03	No	0.78	2.08	FALSE	No	No	Low	No
117	D	46	7/12/2019	11:49:12	3.78	4.57	No	0.79	2.22	FALSE	No	No	Low	No
118	A	47	7/12/2019	16:05:52	4.53	5.69	No	1.16	1.52	FALSE	No	No	Low	No
118	B	47	7/12/2019	16:07:23	4.29	4.85	No	0.55	1.28	FALSE	No	No	Low	No
118	C	47	7/12/2019	16:08:53	2.66	5.95	No	3.29	1.79	FALSE	No	No	Low	No
119	A	45	7/12/2019	11:34:44	4.61	5.78	No	1.17	2.51	FALSE	No	No	Low	No
119	B	45	7/12/2019	11:35:25	4.77	5.33	No	0.57	2.04	FALSE	No	No	Low	No
119	C	45	7/12/2019	11:36:15	3.67	5.57	No	1.90	2.03	FALSE	No	No	Low	No
120	A	36	7/12/2019	12:59:28	3.78	6.97	No	3.20	3.08	FALSE	No	No	Low	No
120	B	36	7/12/2019	13:01:28	2.77	6.11	No	3.34	2.91	FALSE	No	No	Low	No
120	C	36	7/12/2019	13:02:59	2.41	3.15	No	0.74	IND	TRUE	No	No	Low	No
121	A	27	7/12/2019	13:26:29	8.74	9.17	No	0.43	5.92	FALSE	No	No	Low	No
121	B	27	7/12/2019	13:28:05	3.21	4.42	No	1.21	IND	TRUE	No	No	Low	No
121	C	27	7/12/2019	13:29:31	3.73	4.24	No	0.51	IND	TRUE	No	No	Low	No
122	A	44	7/12/2019	15:53:33	2.63	4.91	No	2.28	2.64	FALSE	No	No	Low	No
122	B	44	7/12/2019	15:55:18	4.06	5.07	No	1.01	1.95	FALSE	No	No	Low	No

StationID	Replicate	Water Depth (ft)	Date	Time	Penetration Minimum (cm)	Penetration Maximum (cm)	Over-penetration?	Boundary Roughness (cm)	aRPD Mean (cm)	aRPD > Pen	Methane Present?	Low DO Present?	Sediment Oxygen Demand	Beggiatoa Present?
122	C	44	7/12/2019	15:56:52	3.50	6.56	No	3.07	2.71	FALSE	No	No	Low	No
123	A	45	7/12/2019	15:17:15	5.22	6.41	No	1.18	3.54	FALSE	No	No	Low	No
123	B	45	7/12/2019	15:19:07	4.50	7.11	No	2.61	2.73	FALSE	No	No	Low	No
123	C	45	7/12/2019	15:20:45	3.57	5.10	No	1.53	3.03	FALSE	No	No	Low	No
124	A	41	7/12/2019	15:02:59	4.11	6.71	No	2.61	2.64	FALSE	No	No	Low	No
124	B	41	7/12/2019	15:04:34	6.62	8.18	No	1.57	4.44	FALSE	No	No	Low	No
124	C	41	7/12/2019	15:06:01	4.21	4.94	No	0.73	3.17	FALSE	No	No	Low	No
125	A	43	7/12/2019	15:31:40	4.55	6.68	No	2.13	3.89	FALSE	No	No	Low	No
125	B	43	7/12/2019	15:33:14	3.84	4.96	No	1.12	2.41	FALSE	No	No	Low	No
125	C	43	7/12/2019	15:34:50	4.95	7.73	No	2.78	2.93	FALSE	No	No	Low	No
126	A	37	7/12/2019	14:51:31	5.29	6.32	No	1.03	IND	FALSE	No	No	Low	No
126	C	37	7/12/2019	14:54:48	5.70	7.20	No	1.50	IND	FALSE	No	No	Low	No
126	D	37	7/12/2019	14:56:17	6.01	7.37	No	1.36	IND	FALSE	No	No	Low	No
127	A	43	7/12/2019	15:41:45	4.01	5.41	No	1.40	IND	FALSE	No	No	Low	No
127	B	43	7/12/2019	15:43:25	6.49	7.79	No	1.29	IND	FALSE	No	No	Low	No
127	C	43	7/12/2019	15:45:03	5.25	6.00	No	0.75	IND	FALSE	No	No	Low	No
128	A	44	7/12/2019	14:32:02	IND	IND	Yes	IND	IND	FALSE	No	No	High	No
128	B	44	7/12/2019	14:33:47	IND	IND	Yes	IND	IND	FALSE	Yes	No	High	No
128	C	44	7/12/2019	14:35:19	IND	IND	Yes	IND	IND	FALSE	No	No	High	No
129	A	40	7/12/2019	13:49:47	13.77	15.39	No	1.62	2.77	FALSE	No	No	Medium	No
129	B	40	7/12/2019	13:51:37	17.42	17.90	No	0.48	1.99	FALSE	No	No	Medium	No
129	C	40	7/12/2019	13:53:18	8.20	10.07	No	1.87	0.44	FALSE	No	No	High	No
130	A	31	7/12/2019	14:11:48	4.82	6.12	No	1.29	IND	FALSE	No	No	Low	No
130	B	31	7/12/2019	14:13:30	5.23	6.22	No	0.99	IND	FALSE	No	No	Low	No
130	C	31	7/12/2019	14:14:55	4.76	5.63	No	0.87	IND	FALSE	No	No	Low	No
131	A	69	7/11/2019	15:22:35	6.50	7.59	No	1.09	IND	FALSE	No	No	Low	No
131	B	69	7/11/2019	15:23:59	5.23	6.33	No	1.10	IND	FALSE	No	No	Low	No
131	C	69	7/11/2019	15:25:09	4.88	5.38	No	0.50	IND	FALSE	No	No	Low	No
132	A	75	7/11/2019	15:03:19	5.29	5.71	No	0.43	IND	FALSE	No	No	Low	No
132	B	75	7/11/2019	15:04:38	5.68	7.00	No	1.32	IND	FALSE	No	No	Low	No

StationID	Replicate	Water Depth (ft)	Date	Time	Penetration Minimum (cm)	Penetration Maximum (cm)	Over-penetration?	Boundary Roughness (cm)	aRPD Mean (cm)	aRPD > Pen	Methane Present?	Low DO Present?	Sediment Oxygen Demand	Beggiatoa Present?
132	C	75	7/11/2019	15:05:52	6.02	7.09	No	1.08	2.66	FALSE	No	No	Low	No
133	A	79	7/11/2019	14:45:31	6.75	7.56	No	0.82	IND	FALSE	No	No	Low	No
133	B	79	7/11/2019	14:46:49	6.09	6.65	No	0.57	3.39	FALSE	No	No	Low	No
133	C	79	7/11/2019	14:48:06	6.16	6.82	No	0.65	4.24	FALSE	No	No	Low	No
134	A	80	7/11/2019	14:25:50	10.30	10.79	No	0.49	IND	FALSE	No	No	Low	No
134	B	80	7/11/2019	14:27:13	6.07	7.52	No	1.46	4.97	FALSE	No	No	Low	No
134	D	80	7/11/2019	14:29:45	7.12	7.97	No	0.85	4.16	FALSE	No	No	Low	No
135	A	76	7/11/2019	4:37:00	4.28	5.76	No	1.48	2.62	FALSE	No	No	Low	No
135	B	76	7/11/2019	4:37:50	4.80	5.39	No	0.59	2.06	FALSE	No	No	Low	No
135	D	76	7/11/2019	4:40:33	6.45	7.05	No	0.60	3.73	FALSE	No	No	Low	No
136	A	83	7/11/2019	4:16:12	5.37	6.35	No	0.98	3.43	FALSE	No	No	Low	No
136	B	83	7/11/2019	4:17:01	6.37	7.79	No	1.42	3.71	FALSE	No	No	Low	No
136	C	83	7/11/2019	4:18:34	6.17	6.93	No	0.76	2.74	FALSE	No	No	Low	No
137	A	91	7/11/2019	3:56:08	4.24	5.20	No	0.97	2.15	FALSE	No	No	Low	No
137	B	91	7/11/2019	3:56:49	4.04	5.92	No	1.88	2.74	FALSE	No	No	Low	No
137	C	91	7/11/2019	3:57:37	3.77	4.52	No	0.75	1.97	FALSE	No	No	Low	No
138	A	90	7/11/2019	3:35:33	4.67	5.12	No	0.45	1.27	FALSE	No	No	Low	No
138	B	90	7/11/2019	3:36:20	3.91	4.38	No	0.47	0.91	FALSE	No	No	Low	No
138	C	90	7/11/2019	3:37:07	5.50	6.07	No	0.57	1.39	FALSE	No	No	Low	No
139	A	88	7/11/2019	3:14:21	4.48	4.97	No	0.49	2.97	FALSE	No	No	Low	No
139	B	88	7/11/2019	3:15:08	3.74	4.35	No	0.61	1.90	FALSE	No	No	Low	No
139	C	88	7/11/2019	3:15:52	3.75	4.49	No	0.74	2.44	FALSE	No	No	Low	No
140	A	93	7/11/2019	2:51:45	5.37	6.07	No	0.70	3.17	FALSE	No	No	Low	No
140	B	93	7/11/2019	2:52:27	5.83	6.71	No	0.88	3.87	FALSE	No	No	Low	No
140	C	93	7/11/2019	2:53:18	5.54	6.09	No	0.55	3.07	FALSE	No	No	Low	No
141	A	96	7/10/2019	19:24:58	3.30	6.61	No	3.31	1.92	FALSE	No	No	Low	No
141	B	96	7/10/2019	19:26:17	8.58	9.21	No	0.63	4.31	FALSE	No	No	Low	No
141	C	96	7/10/2019	19:27:36	5.79	6.30	No	0.51	4.57	FALSE	No	No	Low	No
142	A	95	7/10/2019	19:57:04	3.56	5.75	No	2.18	3.71	FALSE	No	No	Low	No
142	B	95	7/10/2019	19:58:33	4.07	4.87	No	0.80	1.40	FALSE	No	No	Low	No
142	C	95	7/10/2019	20:00:01	4.08	4.80	No	0.73	2.85	FALSE	No	No	Low	No
143	A	93	7/10/2019	20:40:07	4.65	5.23	No	0.58	1.39	FALSE	No	No	Low	No
143	C	93	7/10/2019	20:43:07	3.42	3.98	No	0.55	1.80	FALSE	No	No	Low	No
143	D	93	7/10/2019	20:44:28	3.83	4.50	No	0.67	1.54	FALSE	No	No	Low	No
144	A	94	7/10/2019	21:01:21	4.42	4.85	No	0.43	IND	FALSE	No	No	Low	No
144	B	94	7/10/2019	21:02:44	3.54	4.45	No	0.91	2.21	FALSE	No	No	Low	No
144	D	94	7/10/2019	21:05:26	3.54	4.29	No	0.75	1.62	FALSE	No	No	Low	No
145	A	99	7/10/2019	21:23:25	5.70	6.18	No	0.49	2.49	FALSE	No	No	Low	No
145	B	99	7/10/2019	21:24:42	4.66	5.32	No	0.66	2.53	FALSE	No	No	Low	No
145	C	99	7/10/2019	21:26:12	5.16	5.80	No	0.64	2.29	FALSE	No	No	Low	No

StationID	Replicate	Water Depth (ft)	Date	Time	Penetration Minimum (cm)	Penetration Maximum (cm)	Over-penetration?	Boundary Roughness (cm)	aRPD Mean (cm)	aRPD > Pen	Methane Present?	Low DO Present?	Sediment Oxygen Demand	Beggiatoa Present?
146	A	100	7/10/2019	21:43:36	3.98	4.62	No	0.64	2.15	FALSE	No	No	Low	No
146	B	100	7/10/2019	21:44:51	3.93	4.70	No	0.77	2.26	FALSE	No	No	Low	No
146	C	100	7/10/2019	21:46:03	4.08	4.56	No	0.48	2.28	FALSE	No	No	Low	No
147	A	103	7/10/2019	16:00:51	3.08	4.72	No	1.64	IND	TRUE	No	No	Low	No
147	B	103	7/10/2019	16:02:02	3.54	5.57	No	2.03	2.37	FALSE	No	No	Low	No
147	C	103	7/10/2019	16:03:17	5.67	5.98	No	0.32	3.15	FALSE	No	No	Low	No
148	A	115	7/10/2019	15:41:02	4.91	6.87	No	1.96	2.21	FALSE	No	No	Low	No
148	B	115	7/10/2019	15:42:16	5.06	6.18	No	1.12	3.47	FALSE	No	No	Low	No
148	C	115	7/10/2019	15:43:25	3.90	4.99	No	1.09	2.24	FALSE	No	No	Low	No
149	A	111	7/10/2019	15:22:07	5.88	6.38	No	0.50	2.49	FALSE	No	No	Low	No
149	B	111	7/10/2019	15:23:16	6.30	7.08	No	0.78	3.18	FALSE	No	No	Low	No
149	D	111	7/10/2019	15:25:55	4.45	5.87	No	1.42	2.77	FALSE	No	No	Low	No
150	A	111	7/10/2019	14:50:28	5.09	5.75	No	0.66	2.60	FALSE	No	No	Low	No
150	B	111	7/10/2019	14:51:38	4.30	4.71	No	0.41	2.40	FALSE	No	No	Low	No
150	C	111	7/10/2019	14:52:48	5.80	6.57	No	0.77	3.60	FALSE	No	No	Low	No
151	A	112	7/10/2019	14:30:28	4.38	5.38	No	1.00	3.36	FALSE	No	No	Low	No
151	B	112	7/10/2019	14:31:55	4.73	5.67	No	0.95	3.08	FALSE	No	No	Low	No
151	D	112	7/10/2019	14:34:25	3.90	4.60	No	0.70	2.52	FALSE	No	No	Low	No
152	A	113	7/10/2019	14:12:10	4.67	5.75	No	1.08	IND	TRUE	No	No	Low	No
152	B	113	7/10/2019	14:13:28	3.12	4.68	No	1.55	IND	TRUE	No	No	Low	No
152	D	113	7/10/2019	14:16:09	7.63	8.41	No	0.77	IND	FALSE	No	No	Low	No
153	A	117	7/10/2019	13:49:55	5.51	6.55	No	1.03	3.65	FALSE	No	No	Low	No
153	B	117	7/10/2019	13:51:04	4.68	5.17	No	0.49	2.30	FALSE	No	No	Low	No
153	C	117	7/10/2019	13:52:15	4.67	7.40	No	2.73	2.92	FALSE	No	No	Low	No
154	A	121	7/10/2019	13:28:49	4.19	6.33	No	2.14	1.54	FALSE	No	No	Low	No
154	B	121	7/10/2019	13:30:04	4.78	6.23	No	1.45	2.32	FALSE	No	No	Low	No
154	C	121	7/10/2019	13:31:28	5.12	7.14	No	2.02	3.93	FALSE	No	No	Low	No
155	A	120	7/10/2019	13:08:12	4.90	5.81	No	0.91	2.19	FALSE	No	No	Low	No
155	B	120	7/10/2019	13:09:15	4.81	6.34	No	1.53	3.39	FALSE	No	No	Low	No
155	D	120	7/10/2019	13:11:26	5.80	6.58	No	0.78	3.25	FALSE	No	No	Low	No
156	A	119	7/10/2019	12:47:15	4.66	6.00	No	1.34	2.42	FALSE	No	No	Low	No
156	B	119	7/10/2019	12:48:21	4.89	5.45	No	0.55	2.08	FALSE	No	No	Low	No
156	D	119	7/10/2019	12:50:32	5.21	6.11	No	0.90	3.56	FALSE	No	No	Low	No
157	A	121	7/10/2019	12:21:56	6.03	6.61	No	0.59	3.86	FALSE	No	No	Low	No

StationID	Replicate	Water Depth (ft)	Date	Time	Penetration Minimum (cm)	Penetration Maximum (cm)	Over-penetration?	Boundary Roughness (cm)	aRPD Mean (cm)	aRPD > Pen	Methane Present?	Low DO Present?	Sediment Oxygen Demand	Beggiatoa Present?
157	B	121	7/10/2019	12:22:57	5.89	6.80	No	0.90	3.60	FALSE	No	No	Low	No
157	C	121	7/10/2019	12:24:00	4.56	6.56	No	2.00	3.86	FALSE	No	No	Low	No
REFA_01	A	94	7/13/2019	22:15:50	4.54	6.43	No	1.89	IND	FALSE	No	No	Low	No
REFA_01	B	94	7/13/2019	22:17:20	5.97	7.32	No	1.35	IND	FALSE	No	No	Low	No
REFA_01	C	94	7/13/2019	22:18:43	5.89	7.88	No	1.99	IND	FALSE	No	No	Low	No
REFA_02	A	105	7/13/2019	21:21:27	5.11	7.52	No	2.41	4.62	FALSE	No	No	Low	No
REFA_02	B	105	7/13/2019	21:23:07	7.09	8.46	No	1.37	2.81	FALSE	No	No	Low	No
REFA_02	D	105	7/13/2019	21:26:05	5.89	7.82	No	1.93	3.57	FALSE	No	No	Low	No
REFA_03	A	101	7/13/2019	21:48:32	4.78	7.87	No	3.10	3.35	FALSE	No	No	Low	No
REFA_03	B	101	7/13/2019	21:50:02	6.57	8.28	No	1.71	IND	FALSE	No	No	Low	No
REFA_03	D	101	7/13/2019	21:52:50	7.01	8.40	No	1.39	IND	FALSE	No	No	Low	No
REFA_04	A	100	7/13/2019	21:37:46	7.01	8.71	No	1.70	5.91	FALSE	No	No	Low	No
REFA_04	C	100	7/13/2019	21:41:22	7.36	10.30	No	2.95	5.46	FALSE	No	No	Low	No
REFA_04	D	100	7/13/2019	21:42:54	7.04	7.91	No	0.87	IND	FALSE	No	No	Low	No
REFA_05	A	109	7/13/2019	22:00:17	7.86	9.29	No	1.43	IND	FALSE	No	No	Low	No
REFA_05	B	109	7/13/2019	22:01:44	4.42	6.34	No	1.92	IND	FALSE	No	No	Low	No
REFA_05	C	109	7/13/2019	22:03:11	6.80	9.71	No	2.91	2.84	FALSE	No	No	Low	No
REFB_01	A	77	7/11/2019	5:39:10	4.24	5.50	No	1.26	2.67	FALSE	No	No	Low	No
REFB_01	B	77	7/11/2019	5:39:55	6.09	6.91	No	0.82	4.10	FALSE	No	No	Low	No
REFB_01	C	77	7/11/2019	5:41:23	5.08	5.76	No	0.68	3.36	FALSE	No	No	Low	No
REFB_02	A	75	7/11/2019	5:05:43	9.43	9.67	No	0.24	IND	TRUE	No	No	Low	No
REFB_02	B	75	7/11/2019	5:06:26	4.64	5.28	No	0.64	IND	TRUE	No	No	Low	No
REFB_02	C	75	7/11/2019	5:07:45	3.74	4.66	No	0.91	IND	TRUE	No	No	Low	No
REFB_03	A	75	7/11/2019	5:18:19	5.87	8.21	No	2.35	4.97	FALSE	No	No	Low	No
REFB_03	B	75	7/11/2019	5:19:01	4.48	6.11	No	1.63	2.98	FALSE	No	No	Low	No
REFB_03	C	75	7/11/2019	5:19:51	5.23	6.72	No	1.49	3.72	FALSE	No	No	Low	No
REFB_04	A	76	7/11/2019	5:28:14	4.18	5.19	No	1.01	IND	TRUE	No	No	Low	No
REFB_04	D	76	7/11/2019	5:31:01	3.72	4.56	No	0.84	IND	TRUE	No	No	Low	No
REFB_04	E	76	7/11/2019	5:31:59	3.84	4.83	No	0.99	IND	TRUE	No	No	Low	No
REFB_05	A	79	7/11/2019	5:47:11	3.69	4.84	No	1.15	2.71	FALSE	No	No	Low	No
REFB_05	B	79	7/11/2019	5:48:06	4.77	5.63	No	0.86	2.81	FALSE	No	No	Low	No
REFB_05	C	79	7/11/2019	5:48:55	3.61	4.26	No	0.65	1.73	FALSE	No	No	Low	No
REFC_01	A	117	7/13/2019	20:24:09	4.79	5.91	No	1.13	IND	FALSE	No	No	Low	No
REFC_01	B	117	7/13/2019	20:25:59	5.50	6.51	No	1.01	IND	FALSE	No	No	Low	No
REFC_01	D	117	7/13/2019	20:28:51	4.43	5.50	No	1.07	IND	FALSE	No	No	Low	No

StationID	Replicate	Water Depth (ft)	Date	Time	Penetration Minimum (cm)	Penetration Maximum (cm)	Over-penetration?	Boundary Roughness (cm)	aRPD Mean (cm)	aRPD > Pen	Methane Present?	Low DO Present?	Sediment Oxygen Demand	Beggiatoa Present?
REFC_02	A	117	7/13/2019	20:32:29	5.78	6.49	No	0.72	IND	FALSE	No	No	Low	No
REFC_02	B	117	7/13/2019	20:33:51	5.61	6.53	No	0.92	IND	FALSE	No	No	Low	No
REFC_02	C	117	7/13/2019	20:35:19	4.29	6.98	No	2.69	IND	FALSE	No	No	Low	No
REFC_03	A	119	7/13/2019	19:54:06	4.90	5.84	No	0.95	IND	FALSE	No	No	Low	No
REFC_03	B	119	7/13/2019	19:55:33	3.51	5.42	No	1.91	IND	FALSE	No	No	Low	No
REFC_03	D	119	7/13/2019	19:58:19	5.22	6.39	No	1.17	IND	FALSE	No	No	Low	No
REFC_04	A	114	7/13/2019	20:12:44	6.53	7.42	No	0.89	IND	FALSE	No	No	Low	No
REFC_04	B	114	7/13/2019	20:14:14	7.73	8.65	No	0.92	IND	FALSE	No	No	Low	No
REFC_04	C	114	7/13/2019	20:15:36	6.12	7.54	No	1.42	4.79	FALSE	No	No	Low	No
REFC_05	A	115	7/13/2019	20:03:58	5.96	7.97	No	2.01	6.76	FALSE	No	No	Low	No
REFC_05	B	115	7/13/2019	20:05:24	5.04	7.54	No	2.50	IND	TRUE	No	No	Low	No
REFC_05	C	115	7/13/2019	20:06:57	5.57	8.04	No	2.47	IND	TRUE	No	No	Low	No

StationID	Replicate	Water Depth (ft)	Date	Time	Sensitive Taxa Present?	Type of Sensitive Taxa	Type of Species of Concern	Invasive Taxa Present?	Type of Invasive Taxa	Tubes Present?	Epifauna	Voids Present?	Successional Stage
001	A	53	7/14/2019	3:35:07	No	None	None	No	None	No	None	No	IND
001	B	53	7/14/2019	3:35:52	No	None	None	No	None	No	None	No	IND
001	C	53	7/14/2019	3:36:37	No	None	None	No	None	No	None	No	IND
002	A	64	7/14/2019	3:13:17	No	None	None	No	None	Yes	None	No	2
002	B	64	7/14/2019	3:13:59	No	None	None	No	None	Yes	None	No	2
002	C	64	7/14/2019	3:14:39	No	None	None	No	None	No	None	No	IND
003	A	70	7/14/2019	2:50:26	No	None	None	No	None	Yes	None	No	2
003	B	70	7/14/2019	2:51:09	No	None	None	No	None	Yes	Gastropods	No	2
003	C	70	7/14/2019	2:51:44	No	None	None	No	None	No	None	No	IND
004	A	73	7/14/2019	2:28:48	No	None	None	No	None	Yes	None	No	2
004	B	73	7/14/2019	2:29:34	No	None	None	No	None	Yes	Gastropods	No	2
004	C	73	7/14/2019	2:30:15	No	None	None	No	None	Yes	None	No	2
005	A	77	7/14/2019	2:07:20	No	None	None	No	None	No	None	No	IND
005	B	77	7/14/2019	2:08:33	No	None	None	No	None	No	Hermit Crab	No	IND
005	C	77	7/14/2019	2:09:11	No	None	None	No	None	No	None	No	IND
006	A	68	7/14/2019	1:47:08	No	None	None	No	None	No	None	No	IND
006	B	68	7/14/2019	1:47:54	No	None	None	No	None	No	None	No	IND
006	C	68	7/14/2019	1:48:37	No	None	None	No	None	Yes	None	No	2
007	A	77	7/14/2019	1:24:24	No	None	None	No	None	No	None	No	IND
007	B	77	7/14/2019	1:25:05	No	None	None	No	None	IND	None	No	IND
007	C	77	7/14/2019	1:25:47	No	None	None	No	None	No	None	No	IND
008	B	85	7/14/2019	0:19:10	No	None	None	No	None	Yes	None	No	2
008	C	85	7/14/2019	0:19:56	No	None	None	No	None	Yes	None	No	2
008	D	85	7/14/2019	0:20:41	No	None	None	No	None	No	None	No	IND
009	A	95	7/13/2019	23:50:13	No	None	None	No	None	No	None	No	IND
009	B	95	7/13/2019	23:51:37	No	None	None	No	None	No	None	No	IND

StationID	Replicate	Water Depth (ft)	Date	Time	Sensitive Taxa Present?	Type of Sensitive Taxa	Type of Species of Concern	Invasive Taxa Present?	Type of Invasive Taxa	Tubes Present?	Epifauna	Voids Present?	Successional Stage
009	C	95	7/13/2019	23:53:04	No	None	None	No	None	No	None	No	IND
010	B	116	7/13/2019	23:26:52	No	None	None	No	None	Yes	None	Yes	2 on 3
010	C	116	7/13/2019	23:28:16	No	None	None	No	None	Yes	None	No	2
010	D	116	7/13/2019	23:29:47	No	None	None	No	None	Yes	None	No	2 -> 3
011	A	224	7/13/2019	22:56:37	No	None	None	No	None	Yes	None	Yes	2 on 3
011	B	224	7/13/2019	22:58:11	No	None	None	No	None	Yes	None	Yes	2 on 3
011	C	224	7/13/2019	22:59:48	No	None	None	No	None	Yes	None	Yes	2 on 3
012	A	127	7/13/2019	19:29:31	No	None	None	No	None	Yes	None	No	2
012	B	127	7/13/2019	19:31:08	No	None	None	No	None	Yes	None	Yes	2 on 3
012	C	127	7/13/2019	19:32:27	No	None	None	No	None	Yes	None	No	2 on 3
013	A	111	7/13/2019	19:05:00	No	None	None	No	None	Yes	None	No	2
013	B	111	7/13/2019	19:06:42	No	None	None	No	None	Yes	None	No	2
013	C	111	7/13/2019	19:08:11	No	None	None	No	None	Yes	None	No	2
014	A	117	7/13/2019	18:40:36	No	None	None	No	None	Yes	None	No	2
014	B	117	7/13/2019	18:42:09	No	None	None	No	None	Yes	None	No	2
014	D	117	7/13/2019	18:45:03	No	None	None	No	None	Yes	None	No	2
015	A	109	7/13/2019	18:14:33	No	None	None	No	None	Yes	None	No	2
015	B	109	7/13/2019	18:16:12	No	None	None	No	None	Yes	None	No	2
015	C	109	7/13/2019	18:17:53	No	None	None	No	None	Yes	None	No	2
016	A	95	7/10/2019	19:06:41	No	None	None	No	None	Yes	Sand Dollars	No	2
016	B	95	7/10/2019	19:07:59	No	None	None	No	None	Yes	Gastropod, Sand Dollar	No	2 -> 3
016	C	95	7/10/2019	19:09:18	No	None	None	No	None	Yes	None	No	2 -> 3
017	A	93	7/10/2019	18:46:29	No	None	None	No	None	Yes	Sand Dollars	No	2
017	B	93	7/10/2019	18:47:44	No	None	None	No	None	Yes	Sand Dollars	No	2
017	D	93	7/10/2019	18:50:11	No	None	None	No	None	Yes	Sand Dollar	No	2 -> 3
018	A	90	7/10/2019	18:25:08	No	None	None	No	None	Yes	Hermit Crab	No	2
018	B	90	7/10/2019	18:26:34	No	None	None	No	None	Yes	None	No	2
018	C	90	7/10/2019	18:27:53	No	None	None	No	None	No	Fish, Hermit Crabs	No	2
019	A	97	7/10/2019	18:03:03	No	None	None	No	None	Yes	None	No	2 -> 3

StationID	Replicate	Water Depth (ft)	Date	Time	Sensitive Taxa Present?	Type of Sensitive Taxa	Type of Species of Concern	Invasive Taxa Present?	Type of Invasive Taxa	Tubes Present?	Epifauna	Voids Present?	Successional Stage
019	B	97	7/10/2019	18:04:10	No	None	None	No	None	No	None	No	2
019	C	97	7/10/2019	18:05:19	No	None	None	No	None	Yes	None	No	2 -> 3
020	A	92	7/10/2019	17:42:53	No	None	None	No	None	No	Sand Dollars	No	2
020	B	92	7/10/2019	17:44:34	No	None	None	No	None	No	None	No	2
020	C	92	7/10/2019	17:45:55	No	None	None	No	None	Yes	Sand Dollar	No	2
021	A	97	7/10/2019	22:18:09	No	None	None	No	None	No	None	No	IND
021	B	97	7/10/2019	22:19:30	No	None	None	No	None	No	Sand Dollar	No	IND
021	D	97	7/10/2019	22:22:06	No	None	None	No	None	No	None	No	IND
022	A	95	7/10/2019	22:37:29	No	None	None	No	None	Yes	None	No	2
022	B	95	7/10/2019	22:38:46	No	None	None	No	None	Yes	Hermit Crab	No	2
022	C	95	7/10/2019	22:40:01	No	None	None	No	None	Yes	None	No	2
023	A	91	7/10/2019	22:57:17	No	None	None	No	None	No	None	No	IND
023	B	91	7/10/2019	22:58:43	No	None	None	No	None	No	None	No	IND
023	D	91	7/10/2019	23:01:14	No	None	None	No	None	No	None	No	IND
024	A	97	7/10/2019	23:16:48	No	None	None	No	None	Yes	None	No	2
024	B	97	7/10/2019	23:18:16	No	None	None	No	None	Yes	Hermit Crab, Sand Dollars	No	2
024	C	97	7/10/2019	23:19:35	No	None	None	No	None	Yes	Sand Dollar	No	2
025	A	102	7/11/2019	0:56:36	No	None	None	No	None	No	None	No	2
025	B	102	7/11/2019	0:57:20	No	None	None	No	None	Yes	Hermit Crab	No	2
025	D	102	7/11/2019	0:59:04	No	None	None	No	None	No	Hermit Crab, Sand Dollars	No	2 -> 3
026	C	98	7/11/2019	2:19:45	No	None	None	No	None	Yes	None	No	2
026	F	98	7/11/2019	2:22:09	No	None	None	No	None	Yes	Sand Dollars	No	2
026	G	98	7/11/2019	2:23:01	No	None	None	No	None	No	None	No	2
027	A	97	7/11/2019	10:38:45	No	None	None	No	None	Yes	None	No	2
027	B	97	7/11/2019	10:39:29	No	None	None	No	None	No	Sand Dollar	No	2
027	C	97	7/11/2019	10:40:15	No	None	None	No	None	Yes	None	No	2
028	A	88	7/11/2019	10:56:17	No	None	None	No	None	Yes	Gastropod, Sand Dollar	No	2
028	B	88	7/11/2019	10:57:12	No	None	None	No	None	Yes	None	No	2
028	C	88	7/11/2019	10:57:55	No	None	None	No	None	No	Sand Dollar	No	2
029	A	89	7/11/2019	11:14:45	No	None	None	No	None	Yes	None	No	2
029	B	89	7/11/2019	11:15:25	No	None	None	No	None	Yes	Sand Dollar	No	2 -> 3
029	C	89	7/11/2019	11:16:09	No	None	None	No	None	Yes	Sand Dollars	No	2
030	A	123	7/10/2019	3:03:41	No	None	None	No	None	Yes	Sand Dollar	No	2

StationID	Replicate	Water Depth (ft)	Date	Time	Sensitive Taxa Present?	Type of Sensitive Taxa	Type of Species of Concern	Invasive Taxa Present?	Type of Invasive Taxa	Tubes Present?	Epifauna	Voids Present?	Successional Stage
030	C	123	7/10/2019	3:08:14	No	None	None	No	None	Yes	None	No	2
030	D	123	7/10/2019	3:10:00	No	None	None	No	None	Yes	None	No	2
031	A	117	7/10/2019	4:07:40	No	None	None	No	None	No	Sand Dollars	No	IND
031	B	117	7/10/2019	4:08:49	No	None	None	No	None	No	None	No	IND
031	C	117	7/10/2019	4:09:53	No	None	None	No	None	No	None	No	IND
032	A	118	7/10/2019	4:43:15	No	None	None	No	None	Yes	None	No	1 -> 2
032	B	118	7/10/2019	4:44:10	No	None	None	No	None	No	Sand Dollars	No	2 -> 3
032	D	118	7/10/2019	4:46:32	No	None	None	No	None	Yes	None	No	2
033	A	110	7/10/2019	5:34:24	No	None	None	No	None	Yes	None	No	1 -> 2
033	B	110	7/10/2019	5:35:18	No	None	None	No	None	Yes	Sand Dollar	No	1 -> 2
033	C	110	7/10/2019	5:36:36	No	None	None	No	None	Yes	Sand Dollars	No	2
034	A	109	7/10/2019	6:02:04	No	None	None	No	None	No	Sand Dollars	No	2
034	B	109	7/10/2019	6:03:02	No	None	None	No	None	Yes	None	No	2
034	C	109	7/10/2019	6:06:15	No	None	None	No	None	No	Sand Dollars	No	2
035	A	110	7/10/2019	6:34:32	No	None	None	No	None	No	Sand Dollar	No	2
035	B	110	7/10/2019	6:35:21	No	None	None	No	None	Yes	None	No	2
035	C	110	7/10/2019	6:37:41	No	None	None	No	None	Yes	Sand Dollars	No	2
036	A	100	7/10/2019	6:58:52	No	None	None	No	None	Yes	None	No	2
036	B	100	7/10/2019	6:59:53	No	None	None	No	None	Yes	Gastropods, Sand Dollar	No	2
036	C	100	7/10/2019	7:00:48	No	None	None	No	None	Yes	Sand Dollar	No	2
037	A	105	7/10/2019	7:20:11	No	None	None	No	None	Yes	None	No	2 -> 3
037	C	105	7/10/2019	7:21:57	No	None	None	No	None	No	Hermit Crab	No	IND
037	D	105	7/10/2019	7:23:19	No	None	None	No	None	No	None	No	2 -> 3
038	A	100	7/10/2019	7:44:15	No	None	None	No	None	Yes	Gastropod	No	2
038	B	100	7/10/2019	7:45:05	No	None	None	No	None	Yes	Sand Dollar	No	2
038	C	100	7/10/2019	7:45:58	No	None	None	No	None	Yes	None	No	2
039	A	98	7/10/2019	8:08:38	No	None	None	No	None	Yes	Sand Dollar	No	2
039	B	98	7/10/2019	8:10:15	No	None	None	No	None	Yes	Hermit Crab, Sand Dollar	No	2
039	C	98	7/10/2019	8:11:11	No	None	None	No	None	Yes	Sand Dollars	No	2
040	A	98	7/10/2019	8:31:56	No	None	None	No	None	No	None	No	2

StationID	Replicate	Water Depth (ft)	Date	Time	Sensitive Taxa Present?	Type of Sensitive Taxa	Type of Species of Concern	Invasive Taxa Present?	Type of Invasive Taxa	Tubes Present?	Epifauna	Voids Present?	Successional Stage
040	B	98	7/10/2019	8:32:46	No	None	None	No	None	Yes	None	No	2
040	C	98	7/10/2019	8:33:34	No	None	None	No	None	No	Sand Dollars	No	IND
041	A	96	7/10/2019	8:53:58	No	None	None	No	None	Yes	None	No	2
041	B	96	7/10/2019	8:54:40	No	None	None	No	None	Yes	None	No	2
041	C	96	7/10/2019	8:55:27	No	None	None	No	None	Yes	Sand Dollar	No	2 -> 3
042	A	94	7/10/2019	9:16:46	No	None	None	No	None	Yes	None	No	2 -> 3
042	B	94	7/10/2019	9:18:32	No	None	None	No	None	No	None	No	2
042	C	94	7/10/2019	9:19:18	No	None	None	No	None	Yes	None	No	2
043	A	88	7/11/2019	11:29:09	No	None	None	No	None	Yes	None	No	2
043	B	88	7/11/2019	11:30:01	No	None	None	No	None	Yes	None	No	2
043	C	88	7/11/2019	11:30:49	No	None	None	No	None	Yes	Sand Dollar	No	2
044	A	87	7/11/2019	11:46:59	No	None	None	No	None	No	None	No	IND
044	B	87	7/11/2019	11:47:46	No	None	None	No	None	Yes	Sand Dollar	No	2
044	C	87	7/11/2019	11:49:02	No	None	None	No	None	Yes	None	No	2
045	A	83	7/11/2019	12:07:17	No	None	None	No	None	Yes	Gastropod	No	2
045	B	83	7/11/2019	12:08:50	No	None	None	No	None	No	None	No	IND
045	C	83	7/11/2019	12:10:01	No	None	None	No	None	Yes	None	No	1 -> 2
046	A	84	7/11/2019	19:50:44	No	None	None	No	None	No	None	No	IND
046	B	84	7/11/2019	19:52:00	No	None	None	No	None	No	None	No	2
046	D	84	7/11/2019	19:54:26	No	None	None	No	None	No	None	No	2
047	A	81	7/11/2019	19:22:37	No	None	None	No	None	No	None	No	IND
047	D	81	7/11/2019	19:26:29	No	None	None	No	None	No	Sand Dollars	No	IND
047	E	81	7/11/2019	19:30:59	No	None	None	No	None	Yes	Sand Dollar	No	2
048	A	77	7/11/2019	12:24:14	No	None	None	No	None	Yes	None	No	2
048	B	77	7/11/2019	12:25:30	No	None	None	No	None	No	None	No	IND
048	C	77	7/11/2019	12:26:48	No	None	None	No	None	Yes	None	No	2
049	A	87	7/11/2019	12:41:42	No	None	None	No	None	Yes	None	No	2
049	B	87	7/11/2019	12:42:56	No	None	None	No	None	Yes	None	No	2 -> 3
049	D	87	7/11/2019	12:45:22	No	None	None	No	None	Yes	None	No	2 on 3
050	A	87	7/11/2019	12:59:30	IND	None	None	No	None	IND	Ind	IND	IND
050	B	87	7/11/2019	13:00:47	IND	None	None	No	None	IND	Ind	IND	IND

StationID	Replicate	Water Depth (ft)	Date	Time	Sensitive Taxa Present?	Type of Sensitive Taxa	Type of Species of Concern	Invasive Taxa Present?	Type of Invasive Taxa	Tubes Present?	Epifauna	Voids Present?	Successional Stage
050	C	87	7/11/2019	13:01:55	No	None	None	No	None	Yes	None	No	2
051	A	84	7/11/2019	13:18:11	No	None	None	No	None	No	None	No	IND
051	C	84	7/11/2019	13:20:36	No	None	None	No	None	No	None	No	IND
051	D	84	7/11/2019	13:21:50	No	None	None	No	None	No	None	No	IND
052	B	77	7/11/2019	14:07:38	No	None	None	No	None	Yes	None	No	2
052	C	77	7/11/2019	14:08:53	No	None	None	No	None	Yes	None	No	2
052	D	77	7/11/2019	14:10:04	No	None	None	No	None	Yes	None	No	2
053	A	72	7/12/2019	20:56:30	No	None	None	No	None	Yes	None	No	2
053	B	72	7/12/2019	20:58:18	No	None	None	No	None	No	None	No	1 -> 2
053	D	72	7/12/2019	21:01:13	No	None	None	No	None	No	None	No	1 -> 2
054	A	72	7/12/2019	21:19:09	No	None	None	No	None	Yes	None	No	2
054	B	72	7/12/2019	21:20:18	No	None	None	No	None	No	None	No	IND
054	C	72	7/12/2019	21:22:01	No	None	None	No	None	No	None	No	IND
055	A	73	7/12/2019	23:58:30	No	None	None	No	None	Yes	None	No	2
055	B	73	7/13/2019	0:00:04	No	None	None	No	None	Yes	None	No	2
055	C	73	7/13/2019	0:01:35	No	None	None	No	None	No	Gastropod	No	2
056	A	81	7/13/2019	0:21:54	No	None	None	No	None	Yes	Gastropod	No	2 -> 3
056	B	81	7/13/2019	0:22:57	No	None	None	No	None	Yes	None	No	2 -> 3
056	C	81	7/13/2019	0:23:37	No	None	None	No	None	Yes	Crab	No	2 -> 3
057	A	86	7/13/2019	0:44:08	No	None	None	No	None	Yes	None	No	2 -> 3
057	B	86	7/13/2019	0:44:50	No	None	None	No	None	Yes	None	No	2 -> 3
057	C	86	7/13/2019	0:45:32	No	None	None	No	None	Yes	Gastropod	No	2 -> 3
058	A	91	7/13/2019	1:07:56	No	None	None	No	None	Yes	None	No	2
058	C	91	7/13/2019	1:09:21	No	None	None	No	None	Yes	Gastropod, Sand Dollars	No	2
058	D	91	7/13/2019	1:09:58	No	None	None	No	None	No	Gastropod, Sand Dollar	No	2
059	A	95	7/13/2019	1:29:36	No	None	None	No	None	No	Gastropod	No	2
059	B	95	7/13/2019	1:30:21	No	None	None	No	None	Yes	None	No	2
059	C	95	7/13/2019	1:31:00	No	None	None	No	None	Yes	None	Yes	2 on 3
060	A	95	7/13/2019	1:54:25	No	None	None	No	None	Yes	Clams	No	2 -> 3
060	B	95	7/13/2019	1:55:03	No	None	None	No	None	Yes	None	No	2 -> 3

StationID	Replicate	Water Depth (ft)	Date	Time	Sensitive Taxa Present?	Type of Sensitive Taxa	Type of Species of Concern	Invasive Taxa Present?	Type of Invasive Taxa	Tubes Present?	Epifauna	Voids Present?	Successional Stage
060	C	95	7/13/2019	1:55:45	No	None	None	No	None	Yes	None	No	2 -> 3
061	A	91	7/13/2019	2:18:35	No	None	None	No	None	Yes	None	No	2 -> 3
061	B	91	7/13/2019	2:19:17	No	None	None	No	None	Yes	None	No	2 -> 3
061	C	91	7/13/2019	2:20:00	No	None	None	No	None	Yes	Gastropod	No	2
062	A	87	7/13/2019	2:40:14	No	None	None	No	None	Yes	None	No	2 -> 3
062	B	87	7/13/2019	2:41:00	No	None	None	No	None	Yes	Gastropods	No	2 -> 3
062	D	87	7/13/2019	2:42:24	No	None	None	No	None	Yes	None	No	2 -> 3
063	B	74	7/11/2019	18:32:06	No	None	None	No	None	Yes	None	No	2
063	C	74	7/11/2019	18:33:16	No	None	None	No	None	Yes	Gastropods	No	2
063	D	74	7/11/2019	18:34:28	No	None	None	No	None	No	Sand Dollars	No	2
064	A	72	7/11/2019	17:43:40	No	None	None	No	None	Yes	Gastropod, Sand Dollars	No	2
064	B	72	7/11/2019	17:45:19	No	None	None	No	None	No	Sand Dollars	No	2
064	C	72	7/11/2019	17:46:35	No	None	None	No	None	Yes	Sand Dollar	No	2
065	A	77	7/11/2019	16:59:10	No	None	None	No	None	Yes	Gastropod	No	2
065	B	77	7/11/2019	17:00:25	No	None	None	No	None	Yes	None	No	2
065	C	77	7/11/2019	17:01:35	No	None	None	No	None	Yes	Gastropod	No	2
066	A	82	7/11/2019	16:38:10	No	None	None	No	None	Yes	Gastropod	No	2
066	B	82	7/11/2019	16:39:40	No	None	None	No	None	No	Sand Dollar	No	IND
066	C	82	7/11/2019	16:41:02	No	None	None	No	None	Yes	None	No	2
067	A	77	7/11/2019	16:18:44	No	None	None	No	None	Yes	Sand Dollar	No	2
067	B	77	7/11/2019	16:20:01	No	None	None	No	None	No	Sand Dollars	No	2
067	D	77	7/11/2019	16:22:36	No	None	None	No	None	No	Sand Dollars	No	2
068	A	70	7/11/2019	16:00:31	No	None	None	No	None	No	None	No	IND
068	B	70	7/11/2019	16:01:52	No	None	None	No	None	No	None	No	IND
068	C	70	7/11/2019	16:03:01	No	None	None	No	None	No	None	No	IND
069	A	70	7/11/2019	15:41:06	No	None	None	No	None	Yes	None	No	2
069	B	70	7/11/2019	15:42:37	No	None	None	No	None	No	None	No	IND
069	C	70	7/11/2019	15:43:54	No	None	None	No	None	Yes	None	No	2
070	A	76	7/12/2019	20:11:06	No	None	None	No	None	Yes	None	No	2
070	B	76	7/12/2019	20:12:35	No	None	None	No	None	Yes	None	No	2
070	C	76	7/12/2019	20:14:05	No	None	None	No	None	Yes	None	No	2

StationID	Replicate	Water Depth (ft)	Date	Time	Sensitive Taxa Present?	Type of Sensitive Taxa	Type of Species of Concern	Invasive Taxa Present?	Type of Invasive Taxa	Tubes Present?	Epifauna	Voids Present?	Successional Stage
071	A	71	7/12/2019	19:52:58	No	None	None	No	None	Yes	None	No	2
071	B	71	7/12/2019	19:54:29	No	None	None	No	None	No	Gastropod, Sand Dollars	No	IND
071	C	71	7/12/2019	19:55:58	No	None	None	No	None	Yes	None	No	2
072	A	74	7/12/2019	19:35:07	No	None	None	No	None	Yes	None	No	2
072	C	74	7/12/2019	19:38:13	No	None	None	No	None	Yes	None	No	2
072	D	74	7/12/2019	19:39:50	No	None	None	No	None	Yes	Hermit Crab, Sand Dollar	No	2
073	A	81	7/12/2019	19:18:07	No	None	None	No	None	Yes	Gastropod	No	2
073	B	81	7/12/2019	19:19:37	No	None	None	No	None	Yes	None	No	2
073	C	81	7/12/2019	19:21:06	No	None	None	No	None	Yes	Gastropod	No	2 -> 3
074	E	86	7/12/2019	18:59:48	No	None	None	No	None	Yes	None	No	2 -> 3
074	F	86	7/12/2019	19:01:27	No	None	None	No	None	Yes	None	No	2
074	G	86	7/12/2019	19:03:13	No	None	None	No	None	Yes	None	No	2
075	A	91	7/12/2019	18:25:31	No	None	None	No	None	Yes	None	No	2
075	B	91	7/12/2019	18:27:03	No	None	None	No	None	Yes	Unknown Organism	No	2 -> 3
075	D	91	7/12/2019	18:30:09	No	None	None	No	None	Yes	Gastropod	No	2
076	A	90	7/12/2019	17:52:40	No	None	None	No	None	Yes	None	No	2
076	B	90	7/12/2019	17:54:19	No	None	None	No	None	Yes	None	No	2
076	C	90	7/12/2019	17:55:52	No	None	None	No	None	Yes	None	No	2
077	A	86	7/12/2019	17:32:45	No	None	None	No	None	Yes	None	No	2
077	C	86	7/12/2019	17:35:47	No	None	None	No	None	Yes	Gastropod	No	2
077	D	86	7/12/2019	17:37:23	No	None	None	No	None	Yes	None	Yes	2 on 3
078	A	77	7/11/2019	18:45:32	No	None	None	No	None	Yes	None	No	2
078	B	77	7/11/2019	18:47:03	No	None	None	No	None	Yes	None	No	2
078	C	77	7/11/2019	18:48:15	No	None	None	No	None	Yes	Sand Dollars	No	2
079	A	80	7/12/2019	4:58:21	No	None	None	No	None	Yes	None	No	2
079	C	80	7/12/2019	5:00:02	No	None	None	No	None	Yes	None	No	2
079	D	80	7/12/2019	5:00:41	No	None	None	No	None	Yes	Gastropod	No	2
080	A	69	7/12/2019	5:40:46	No	None	None	No	None	Yes	None	No	2
080	B	69	7/12/2019	5:41:36	No	None	None	No	None	Yes	Gastropod, Hermit Crabs, Sponge	No	2
080	C	69	7/12/2019	5:42:16	No	None	None	No	None	Yes	None	No	2
081	A	83	7/11/2019	19:02:31	No	None	None	No	None	Yes	None	No	2 -> 3
081	B	83	7/11/2019	19:04:06	No	None	None	No	None	Yes	Gastropods	No	2 -> 3
081	C	83	7/11/2019	19:05:18	No	None	None	No	None	Yes	None	No	2 -> 3

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082	A	76	7/12/2019	4:18:26	No	None	None	No	None	No	None	No	2
082	B	76	7/12/2019	4:19:26	No	None	None	No	None	No	None	No	IND
082	C	76	7/12/2019	4:20:13	No	None	None	No	None	Yes	None	No	2
083	A	76	7/12/2019	5:26:07	No	None	None	No	None	Yes	None	No	2 -> 3
083	B	76	7/12/2019	5:26:53	No	None	None	No	None	Yes	None	No	2 -> 3
083	C	76	7/12/2019	5:27:38	No	None	None	No	None	No	None	Yes	2 on 3
084	A	62	7/12/2019	6:00:34	No	None	None	No	None	No	Sand Dollar	No	IND
084	B	62	7/12/2019	6:01:18	No	None	None	No	None	No	Sand Dollars	No	IND
084	D	62	7/12/2019	6:02:46	No	None	None	No	None	No	Sand Dollars	No	IND
085	A	66	7/12/2019	6:43:18	No	None	None	No	None	Yes	None	No	2
085	B	66	7/12/2019	6:44:11	No	None	None	No	None	Yes	None	No	2
085	C	66	7/12/2019	6:44:52	No	None	None	No	None	No	None	No	IND
086	A	51	7/12/2019	7:17:44	No	None	None	No	None	Yes	None	No	2
086	B	51	7/12/2019	7:18:40	No	None	None	No	None	Yes	None	No	2
086	C	51	7/12/2019	7:19:32	No	None	None	No	None	Yes	None	No	2 -> 3
087	A	43	7/12/2019	7:36:28	No	None	None	No	None	No	None	No	IND
087	B	43	7/12/2019	7:37:49	No	None	None	No	None	Yes	None	No	2
087	C	43	7/12/2019	7:38:29	No	None	None	No	None	Yes	None	No	2
088	A	36	7/12/2019	7:57:05	No	None	None	No	None	No	None	No	IND
088	B	36	7/12/2019	7:57:56	No	None	None	No	None	No	None	No	IND
088	C	36	7/12/2019	7:58:42	No	None	None	No	None	No	None	No	IND
089	A	80	7/13/2019	3:52:00	No	None	None	No	None	Yes	None	No	2 -> 3
089	B	80	7/13/2019	3:53:27	No	None	None	No	None	Yes	None	No	2
089	C	80	7/13/2019	3:54:15	No	None	None	No	None	Yes	None	No	2 -> 3
090	A	70	7/13/2019	4:14:36	No	None	None	No	None	Yes	None	No	2
090	B	70	7/13/2019	4:15:15	No	None	None	No	None	Yes	None	No	2
090	D	70	7/13/2019	4:16:41	No	None	None	No	None	Yes	None	No	2 -> 3
091	A	60	7/13/2019	4:36:55	No	None	None	No	None	Yes	None	No	2
091	B	60	7/13/2019	4:37:35	No	None	None	No	None	No	None	No	IND
091	C	60	7/13/2019	4:38:24	No	None	None	No	None	Yes	None	No	2
092	A	55	7/13/2019	4:56:43	No	None	None	No	None	No	Gastropod	No	2
092	C	55	7/13/2019	4:58:05	No	None	None	No	None	Yes	None	No	2
092	D	55	7/13/2019	4:58:53	No	None	None	No	None	No	None	No	2
093	B	44	7/13/2019	5:20:32	No	None	None	No	None	No	None	No	IND
093	C	44	7/13/2019	5:21:16	No	None	None	No	None	No	None	No	IND

StationID	Replicate	Water Depth (ft)	Date	Time	Sensitive Taxa Present?	Type of Sensitive Taxa	Type of Species of Concern	Invasive Taxa Present?	Type of Invasive Taxa	Tubes Present?	Epifauna	Voids Present?	Successional Stage
093	D	44	7/13/2019	5:22:08	No	None	None	No	None	Yes	None	No	2
094	B	44	7/13/2019	5:40:18	No	None	None	No	None	Yes	None	No	2
094	C	44	7/13/2019	5:41:05	No	None	None	No	None	No	None	No	IND
094	D	44	7/13/2019	5:41:45	No	None	None	No	None	Yes	None	No	2 -> 3
095	A	30	7/13/2019	6:01:06	No	None	None	No	None	Yes	None	No	2
095	B	30	7/13/2019	6:01:48	No	None	None	No	None	No	None	No	IND
095	C	30	7/13/2019	6:02:29	No	None	None	No	None	No	None	No	IND
096	A	23	7/13/2019	6:17:32	No	None	None	No	None	No	None	No	IND
096	B	23	7/13/2019	6:18:21	No	None	None	No	None	No	None	No	IND
096	D	23	7/13/2019	6:19:41	No	None	None	No	None	No	None	No	IND
097	A	33	7/13/2019	6:36:47	No	None	None	No	None	No	None	No	IND
097	B	33	7/13/2019	6:37:24	No	None	None	No	None	No	None	No	IND
097	C	33	7/13/2019	6:38:01	No	None	None	No	None	No	None	No	IND
098	A	58	7/12/2019	6:15:43	No	None	None	No	None	Yes	Sand Dollar	No	2
098	B	58	7/12/2019	6:16:17	No	None	None	No	None	No	Sand Dollars	No	2
098	C	58	7/12/2019	6:17:11	No	None	None	No	None	No	Sand Dollars	No	IND
099	A	58	7/12/2019	10:08:35	No	None	None	No	None	Yes	None	No	2
099	B	58	7/12/2019	10:09:14	No	None	None	No	None	Yes	None	No	2
099	C	58	7/12/2019	10:10:41	No	None	None	No	None	Yes	None	No	2
100	A	50	7/12/2019	10:30:47	No	None	None	No	None	Yes	None	No	2 -> 3
100	B	50	7/12/2019	10:31:36	No	None	None	No	None	Yes	None	No	2 -> 3
100	C	50	7/12/2019	10:32:24	No	None	None	No	None	Yes	Sand Dollar	No	2 -> 3
101	A	48	7/12/2019	10:51:43	No	None	None	No	None	No	Sand Dollar	No	IND
101	B	48	7/12/2019	10:52:49	No	None	None	No	None	Yes	Sand Dollar	No	2 -> 3
101	C	48	7/12/2019	10:53:31	No	None	None	No	None	No	None	No	2 -> 3
102	A	57	7/12/2019	6:28:02	No	None	None	No	None	Yes	None	No	2
102	B	57	7/12/2019	6:28:59	No	None	None	No	None	Yes	Sand Dollar	No	2
102	C	57	7/12/2019	6:29:45	No	None	None	No	None	Yes	None	No	2
103	A	56	7/12/2019	7:03:33	No	None	None	No	None	No	None	No	2

StationID	Replicate	Water Depth (ft)	Date	Time	Sensitive Taxa Present?	Type of Sensitive Taxa	Type of Species of Concern	Invasive Taxa Present?	Type of Invasive Taxa	Tubes Present?	Epifauna	Voids Present?	Successional Stage
103	B	56	7/12/2019	7:04:15	No	None	None	No	None	No	None	No	2 -> 3
103	C	56	7/12/2019	7:04:58	No	None	None	No	None	No	Hermit Crab, Sand Dollars	No	2
104	A	45	7/12/2019	9:37:06	No	None	None	No	None	No	None	No	2
104	B	45	7/12/2019	9:39:14	No	None	None	No	None	No	None	No	IND
104	C	45	7/12/2019	9:40:07	No	None	None	No	None	No	None	No	2
105	A	37	7/12/2019	9:18:13	No	None	None	No	None	No	None	No	IND
105	B	37	7/12/2019	9:19:20	No	None	None	No	None	No	None	No	IND
105	C	37	7/12/2019	9:20:09	No	None	None	No	None	No	None	No	IND
106	A	32	7/12/2019	8:47:48	No	None	None	No	None	Yes	None	No	2
106	B	32	7/12/2019	8:48:38	No	None	None	No	None	Yes	Hermit Crab	No	2
106	C	32	7/12/2019	8:49:27	No	None	None	No	None	No	None	No	IND
107	A	52	7/13/2019	7:01:44	No	None	None	No	None	No	Hermit Crab	No	IND
107	B	52	7/13/2019	7:02:23	No	None	None	No	None	No	None	No	IND
107	C	52	7/13/2019	7:03:04	No	None	None	No	None	No	Hermit Crab	No	2
108	A	48	7/13/2019	7:35:59	No	None	None	No	None	Yes	Hydroids	Yes	2 on 3
108	B	48	7/13/2019	7:36:40	No	None	None	No	None	No	Hydroids	Yes	2 on 3
108	F	48	7/13/2019	7:39:14	No	None	None	No	None	No	Hydroids	No	IND
109	A	36	7/13/2019	7:58:17	No	None	None	No	None	Yes	None	Yes	2 on 3
109	C	36	7/13/2019	7:59:39	No	None	None	No	None	No	None	IND	IND
109	D	36	7/13/2019	8:00:11	No	None	None	No	None	Yes	Hydroids	Yes	2 on 3
110	B	53	7/13/2019	8:19:29	No	None	None	No	None	No	Hydroids	Yes	2 on 3
110	C	53	7/13/2019	8:20:14	No	None	None	No	None	No	Hydroids	Yes	2 on 3
110	D	53	7/13/2019	8:20:52	No	None	None	No	None	No	Hydroids	Yes	2 on 3
111	A	86	7/13/2019	8:41:30	No	None	None	No	None	Yes	None	IND	2
111	B	86	7/13/2019	8:42:21	No	None	None	No	None	No	None	No	IND
111	C	86	7/13/2019	8:43:00	No	None	None	No	None	No	None	No	IND
112	A	64	7/13/2019	9:06:04	No	None	None	No	None	No	Hermit Crab	Yes	2 on 3

StationID	Replicate	Water Depth (ft)	Date	Time	Sensitive Taxa Present?	Type of Sensitive Taxa	Type of Species of Concern	Invasive Taxa Present?	Type of Invasive Taxa	Tubes Present?	Epifauna	Voids Present?	Successional Stage
112	B	64	7/13/2019	9:08:46	No	None	None	No	None	Yes	None	No	2
112	C	64	7/13/2019	9:10:44	No	None	None	No	None	Yes	None	No	2
113	A	47	7/13/2019	9:42:44	No	None	None	No	None	No	None	No	2
113	B	47	7/13/2019	9:43:32	No	None	None	No	None	No	None	No	2
113	C	47	7/13/2019	9:44:43	No	None	None	No	None	No	None	No	IND
114	A	50	7/13/2019	10:07:17	No	None	None	No	None	Yes	None	No	2 -> 3
114	B	50	7/13/2019	10:08:06	No	None	None	No	None	Yes	None	Yes	2 on 3
114	D	50	7/13/2019	10:09:27	No	None	None	No	None	Yes	None	Yes	2 on 3
115	A	43	7/13/2019	10:28:29	No	None	None	No	None	Yes	None	Yes	2 on 3
115	B	43	7/13/2019	10:29:18	No	None	None	No	None	Yes	None	Yes	2 on 3
115	C	43	7/13/2019	10:30:12	No	None	None	No	None	Yes	None	Yes	2 on 3
116	A	45	7/12/2019	11:15:11	No	None	None	No	None	No	None	No	IND
116	B	45	7/12/2019	11:17:10	No	None	None	No	None	No	None	No	1 -> 2
116	D	45	7/12/2019	11:18:32	No	None	None	No	None	Yes	None	No	1 -> 2
117	A	46	7/12/2019	11:47:13	No	None	None	No	None	No	None	No	IND
117	C	46	7/12/2019	11:48:34	No	None	None	No	None	Yes	Hermit Crab	No	2
117	D	46	7/12/2019	11:49:12	No	None	None	No	None	No	Sand Dollar	No	2
118	A	47	7/12/2019	16:05:52	No	None	None	No	None	Yes	None	No	2
118	B	47	7/12/2019	16:07:23	No	None	None	No	None	Yes	None	No	2
118	C	47	7/12/2019	16:08:53	No	None	None	No	None	Yes	None	No	2
119	A	45	7/12/2019	11:34:44	No	None	None	No	None	Yes	None	No	2
119	B	45	7/12/2019	11:35:25	No	None	None	No	None	Yes	None	No	2
119	C	45	7/12/2019	11:36:15	No	None	None	No	None	Yes	None	No	2
120	A	36	7/12/2019	12:59:28	No	None	None	No	None	No	None	No	2
120	B	36	7/12/2019	13:01:28	No	None	None	No	None	No	None	No	IND
120	C	36	7/12/2019	13:02:59	No	None	None	No	None	Yes	None	No	2
121	A	27	7/12/2019	13:26:29	No	None	None	No	None	No	None	No	2 -> 3
121	B	27	7/12/2019	13:28:05	No	None	None	No	None	No	None	No	IND
121	C	27	7/12/2019	13:29:31	No	None	None	No	None	Yes	None	No	2
122	A	44	7/12/2019	15:53:33	No	None	None	No	None	Yes	None	No	2
122	B	44	7/12/2019	15:55:18	No	None	None	No	None	Yes	Hermit Crab	No	2

StationID	Replicate	Water Depth (ft)	Date	Time	Sensitive Taxa Present?	Type of Sensitive Taxa	Type of Species of Concern	Invasive Taxa Present?	Type of Invasive Taxa	Tubes Present?	Epifauna	Voids Present?	Successional Stage
122	C	44	7/12/2019	15:56:52	No	None	None	No	None	Yes	None	No	2
123	A	45	7/12/2019	15:17:15	No	None	None	No	None	No	None	No	2
123	B	45	7/12/2019	15:19:07	No	None	None	No	None	Yes	None	No	2
123	C	45	7/12/2019	15:20:45	No	None	None	No	None	Yes	None	No	2
124	A	41	7/12/2019	15:02:59	No	None	None	No	None	Yes	Mollusc	No	2
124	B	41	7/12/2019	15:04:34	No	None	None	No	None	No	None	No	2
124	C	41	7/12/2019	15:06:01	No	None	None	No	None	No	None	No	2
125	A	43	7/12/2019	15:31:40	No	None	None	No	None	Yes	None	No	2
125	B	43	7/12/2019	15:33:14	No	None	None	No	None	No	None	No	2
125	C	43	7/12/2019	15:34:50	No	None	None	No	None	Yes	Sand Dollar	No	2
126	A	37	7/12/2019	14:51:31	No	None	None	No	None	No	None	No	IND
126	C	37	7/12/2019	14:54:48	No	None	None	No	None	No	Hydroids	No	2 -> 3
126	D	37	7/12/2019	14:56:17	No	None	None	No	None	No	None	No	2
127	A	43	7/12/2019	15:41:45	No	None	None	No	None	No	None	No	IND
127	B	43	7/12/2019	15:43:25	No	None	None	No	None	No	None	No	IND
127	C	43	7/12/2019	15:45:03	No	None	None	No	None	No	None	No	IND
128	A	44	7/12/2019	14:32:02	No	None	None	No	None	IND	None	No	IND
128	B	44	7/12/2019	14:33:47	No	None	None	No	None	IND	None	No	IND
128	C	44	7/12/2019	14:35:19	No	None	None	No	None	IND	None	No	IND
129	A	40	7/12/2019	13:49:47	No	None	None	No	None	No	None	No	2
129	B	40	7/12/2019	13:51:37	No	None	None	No	None	Yes	None	No	2
129	C	40	7/12/2019	13:53:18	No	None	None	No	None	Yes	None	No	2
130	A	31	7/12/2019	14:11:48	No	None	None	No	None	No	None	No	IND
130	B	31	7/12/2019	14:13:30	No	None	None	No	None	No	None	No	IND
130	C	31	7/12/2019	14:14:55	No	None	None	No	None	No	None	No	IND
131	A	69	7/11/2019	15:22:35	No	None	None	No	None	Yes	None	No	2
131	B	69	7/11/2019	15:23:59	No	None	None	No	None	Yes	None	No	2
131	C	69	7/11/2019	15:25:09	No	None	None	No	None	No	Hermit Crab	No	IND
132	A	75	7/11/2019	15:03:19	No	None	None	No	None	Yes	None	No	2
132	B	75	7/11/2019	15:04:38	No	None	None	No	None	Yes	None	No	2

StationID	Replicate	Water Depth (ft)	Date	Time	Sensitive Taxa Present?	Type of Sensitive Taxa	Type of Species of Concern	Invasive Taxa Present?	Type of Invasive Taxa	Tubes Present?	Epifauna	Voids Present?	Successional Stage
132	C	75	7/11/2019	15:05:52	No	None	None	No	None	No	None	No	2
133	A	79	7/11/2019	14:45:31	No	None	None	No	None	Yes	None	No	2
133	B	79	7/11/2019	14:46:49	No	None	None	No	None	No	Sand Dollars	No	IND
133	C	79	7/11/2019	14:48:06	No	None	None	No	None	Yes	None	No	2
134	A	80	7/11/2019	14:25:50	No	None	None	No	None	No	None	No	IND
134	B	80	7/11/2019	14:27:13	No	None	None	No	None	Yes	None	No	2
134	D	80	7/11/2019	14:29:45	No	None	None	No	None	No	None	No	IND
135	A	76	7/11/2019	4:37:00	No	None	None	No	None	No	None	No	IND
135	B	76	7/11/2019	4:37:50	No	None	None	No	None	Yes	None	No	2
135	D	76	7/11/2019	4:40:33	No	None	None	No	None	Yes	Sand Dollars	No	2
136	A	83	7/11/2019	4:16:12	No	None	None	No	None	Yes	None	No	2
136	B	83	7/11/2019	4:17:01	No	None	None	No	None	Yes	Gastropod	No	2
136	C	83	7/11/2019	4:18:34	No	None	None	No	None	No	None	No	IND
137	A	91	7/11/2019	3:56:08	No	None	None	No	None	Yes	None	No	2
137	B	91	7/11/2019	3:56:49	No	None	None	No	None	Yes	None	No	2
137	C	91	7/11/2019	3:57:37	No	None	None	No	None	Yes	None	No	2
138	A	90	7/11/2019	3:35:33	No	None	None	No	None	No	Sand Dollars	No	IND
138	B	90	7/11/2019	3:36:20	No	None	None	No	None	Yes	Sand Dollars	No	2
138	C	90	7/11/2019	3:37:07	No	None	None	No	None	No	Sand Dollars	No	IND
139	A	88	7/11/2019	3:14:21	No	None	None	No	None	Yes	None	No	2 -> 3
139	B	88	7/11/2019	3:15:08	No	None	None	No	None	Yes	Sand Dollars	No	2
139	C	88	7/11/2019	3:15:52	No	None	None	No	None	Yes	Sand Dollars	No	2
140	A	93	7/11/2019	2:51:45	No	None	None	No	None	Yes	None	No	2 -> 3
140	B	93	7/11/2019	2:52:27	No	None	None	No	None	Yes	Sand Dollars	No	2
140	C	93	7/11/2019	2:53:18	No	None	None	No	None	Yes	None	No	2
141	A	96	7/10/2019	19:24:58	No	None	None	No	None	Yes	None	No	2
141	B	96	7/10/2019	19:26:17	No	None	None	No	None	Yes	Sand Dollar	No	2
141	C	96	7/10/2019	19:27:36	No	None	None	No	None	Yes	Gastropod	No	2
142	A	95	7/10/2019	19:57:04	No	None	None	No	None	Yes	None	No	2
142	B	95	7/10/2019	19:58:33	No	None	None	No	None	Yes	Sand Dollar	No	2
142	C	95	7/10/2019	20:00:01	No	None	None	No	None	Yes	Sand Dollar	No	2
143	A	93	7/10/2019	20:40:07	No	None	None	No	None	Yes	Sand Dollar	No	2 -> 3
143	C	93	7/10/2019	20:43:07	No	None	None	No	None	Yes	None	No	2
143	D	93	7/10/2019	20:44:28	No	None	None	No	None	Yes	None	No	2
144	A	94	7/10/2019	21:01:21	No	None	None	No	None	Yes	Hermit Crab, Sand Dollars	No	2
144	B	94	7/10/2019	21:02:44	No	None	None	No	None	Yes	Sand Dollar	No	2
144	D	94	7/10/2019	21:05:26	No	None	None	No	None	Yes	None	No	2
145	A	99	7/10/2019	21:23:25	No	None	None	No	None	Yes	None	No	2 -> 3
145	B	99	7/10/2019	21:24:42	No	None	None	No	None	Yes	None	No	2
145	C	99	7/10/2019	21:26:12	No	None	None	No	None	Yes	Hermit Crab	No	2

StationID	Replicate	Water Depth (ft)	Date	Time	Sensitive Taxa Present?	Type of Sensitive Taxa	Type of Species of Concern	Invasive Taxa Present?	Type of Invasive Taxa	Tubes Present?	Epifauna	Voids Present?	Successional Stage
146	A	100	7/10/2019	21:43:36	No	None	None	No	None	Yes	None	No	2
146	B	100	7/10/2019	21:44:51	No	None	None	No	None	Yes	Sand Dollars	No	2
146	C	100	7/10/2019	21:46:03	No	None	None	No	None	Yes	None	No	2
147	A	103	7/10/2019	16:00:51	No	None	None	No	None	No	Sand Dollars	No	IND
147	B	103	7/10/2019	16:02:02	No	None	None	No	None	No	Gastropods	No	IND
147	C	103	7/10/2019	16:03:17	No	None	None	No	None	No	Gastropod, Sand Dollar	No	IND
148	A	115	7/10/2019	15:41:02	No	None	None	No	None	Yes	Sand Dollar	No	2 -> 3
148	B	115	7/10/2019	15:42:16	No	None	None	No	None	Yes	None	No	2
148	C	115	7/10/2019	15:43:25	No	None	None	No	None	Yes	Sand Dollar	No	2
149	A	111	7/10/2019	15:22:07	No	None	None	No	None	Yes	Sand Dollar	No	2
149	B	111	7/10/2019	15:23:16	No	None	None	No	None	No	Gastropod	No	2
149	D	111	7/10/2019	15:25:55	No	None	None	No	None	Yes	Sand Dollars	No	2
150	A	111	7/10/2019	14:50:28	No	None	None	No	None	No	Gastropod, Sand Dollars	No	2
150	B	111	7/10/2019	14:51:38	No	None	None	No	None	No	Sand Dollars	No	IND
150	C	111	7/10/2019	14:52:48	No	None	None	No	None	Yes	Sand Dollars	No	2
151	A	112	7/10/2019	14:30:28	No	None	None	No	None	Yes	None	No	2
151	B	112	7/10/2019	14:31:55	No	None	None	No	None	Yes	None	No	2 -> 3
151	D	112	7/10/2019	14:34:25	No	None	None	No	None	No	Sand Dollar	No	IND
152	A	113	7/10/2019	14:12:10	No	None	None	No	None	Yes	Sand Dollars	No	2
152	B	113	7/10/2019	14:13:28	No	None	None	No	None	Yes	None	No	2
152	D	113	7/10/2019	14:16:09	No	None	None	No	None	Yes	Gastropod	No	2
153	A	117	7/10/2019	13:49:55	No	None	None	No	None	Yes	Sand Dollar	No	2
153	B	117	7/10/2019	13:51:04	No	None	None	No	None	Yes	Sand Dollar	No	2
153	C	117	7/10/2019	13:52:15	No	None	None	No	None	Yes	None	No	2
154	A	121	7/10/2019	13:28:49	No	None	None	No	None	Yes	Sand Dollars	No	2
154	B	121	7/10/2019	13:30:04	No	None	None	No	None	Yes	None	No	2
154	C	121	7/10/2019	13:31:28	No	None	None	No	None	No	None	No	2
155	A	120	7/10/2019	13:08:12	No	None	None	No	None	Yes	None	No	2
155	B	120	7/10/2019	13:09:15	No	None	None	No	None	Yes	Sand Dollar	No	2
155	D	120	7/10/2019	13:11:26	No	None	None	No	None	Yes	None	No	2
156	A	119	7/10/2019	12:47:15	No	None	None	No	None	Yes	None	No	2
156	B	119	7/10/2019	12:48:21	No	None	None	No	None	No	None	No	IND
156	D	119	7/10/2019	12:50:32	No	None	None	No	None	Yes	Sand Dollar	No	2
157	A	121	7/10/2019	12:21:56	No	None	None	No	None	Yes	None	No	1 -> 2

StationID	Replicate	Water Depth (ft)	Date	Time	Sensitive Taxa Present?	Type of Sensitive Taxa	Type of Species of Concern	Invasive Taxa Present?	Type of Invasive Taxa	Tubes Present?	Epifauna	Voids Present?	Successional Stage
157	B	121	7/10/2019	12:22:57	No	None	None	No	None	Yes	None	No	2
157	C	121	7/10/2019	12:24:00	No	None	None	No	None	Yes	Sand Dollar	No	2
REFA_01	A	94	7/13/2019	22:15:50	No	None	None	No	None	No	None	No	IND
REFA_01	B	94	7/13/2019	22:17:20	No	None	None	No	None	Yes	None	No	2
REFA_01	C	94	7/13/2019	22:18:43	No	None	None	No	None	Yes	None	No	2
REFA_02	A	105	7/13/2019	21:21:27	No	None	None	No	None	Yes	None	No	2
REFA_02	B	105	7/13/2019	21:23:07	No	None	None	No	None	Yes	None	No	2
REFA_02	D	105	7/13/2019	21:26:05	No	None	None	No	None	Yes	None	No	2
REFA_03	A	101	7/13/2019	21:48:32	No	None	None	No	None	No	None	No	2
REFA_03	B	101	7/13/2019	21:50:02	No	None	None	No	None	Yes	None	No	2
REFA_03	D	101	7/13/2019	21:52:50	No	None	None	No	None	No	Hermit Crab	No	IND
REFA_04	A	100	7/13/2019	21:37:46	No	None	None	No	None	No	None	No	IND
REFA_04	C	100	7/13/2019	21:41:22	No	None	None	No	None	Yes	None	No	2
REFA_04	D	100	7/13/2019	21:42:54	No	None	None	No	None	Yes	None	No	2
REFA_05	A	109	7/13/2019	22:00:17	No	None	None	No	None	Yes	None	No	2
REFA_05	B	109	7/13/2019	22:01:44	No	None	None	No	None	Yes	Hermit Crab	No	2
REFA_05	C	109	7/13/2019	22:03:11	No	None	None	No	None	Yes	None	No	2
REFB_01	A	77	7/11/2019	5:39:10	No	None	None	No	None	Yes	Sand Dollar	No	2
REFB_01	B	77	7/11/2019	5:39:55	No	None	None	No	None	Yes	None	No	2
REFB_01	C	77	7/11/2019	5:41:23	No	None	None	No	None	Yes	None	No	2
REFB_02	A	75	7/11/2019	5:05:43	No	None	None	No	None	No	None	No	IND
REFB_02	B	75	7/11/2019	5:06:26	No	None	None	No	None	Yes	None	No	2
REFB_02	C	75	7/11/2019	5:07:45	No	None	None	No	None	Yes	None	No	2
REFB_03	A	75	7/11/2019	5:18:19	No	None	None	No	None	No	None	No	IND
REFB_03	B	75	7/11/2019	5:19:01	No	None	None	No	None	Yes	None	No	2
REFB_03	C	75	7/11/2019	5:19:51	No	None	None	No	None	Yes	None	No	2
REFB_04	A	76	7/11/2019	5:28:14	No	None	None	No	None	Yes	None	No	2
REFB_04	D	76	7/11/2019	5:31:01	No	None	None	No	None	No	None	No	IND
REFB_04	E	76	7/11/2019	5:31:59	No	None	None	No	None	No	Hydroids	No	IND
REFB_05	A	79	7/11/2019	5:47:11	No	None	None	No	None	Yes	Sand Dollars	No	1 -> 2
REFB_05	B	79	7/11/2019	5:48:06	No	None	None	No	None	Yes	Sand Dollars	No	1 -> 2
REFB_05	C	79	7/11/2019	5:48:55	No	None	None	No	None	No	Gastropod, Sand Dollars	No	2
REFC_01	A	117	7/13/2019	20:24:09	No	None	None	No	None	Yes	None	No	2
REFC_01	B	117	7/13/2019	20:25:59	No	None	None	No	None	Yes	None	No	2
REFC_01	D	117	7/13/2019	20:28:51	No	None	None	No	None	Yes	Shrimp	No	2

StationID	Replicate	Water Depth (ft)	Date	Time	Sensitive Taxa Present?	Type of Sensitive Taxa	Type of Species of Concern	Invasive Taxa Present?	Type of Invasive Taxa	Tubes Present?	Epifauna	Voids Present?	Successional Stage
REFC_02	A	117	7/13/2019	20:32:29	No	None	None	No	None	Yes	None	No	2
REFC_02	B	117	7/13/2019	20:33:51	No	None	None	No	None	Yes	None	No	2
REFC_02	C	117	7/13/2019	20:35:19	No	None	None	No	None	Yes	None	No	2
REFC_03	A	119	7/13/2019	19:54:06	No	None	None	No	None	Yes	None	No	2
REFC_03	B	119	7/13/2019	19:55:33	No	None	None	No	None	Yes	None	No	2
REFC_03	D	119	7/13/2019	19:58:19	No	None	None	No	None	Yes	None	No	2
REFC_04	A	114	7/13/2019	20:12:44	No	None	None	No	None	Yes	None	No	2
REFC_04	B	114	7/13/2019	20:14:14	No	None	None	No	None	Yes	None	No	2
REFC_04	C	114	7/13/2019	20:15:36	No	None	None	No	None	Yes	None	No	2 -> 3
REFC_05	A	115	7/13/2019	20:03:58	No	None	None	No	None	Yes	None	No	2
REFC_05	B	115	7/13/2019	20:05:24	No	None	None	No	None	Yes	None	No	2
REFC_05	C	115	7/13/2019	20:06:57	No	None	None	No	None	Yes	None	No	2 -> 3

StationID	Replicate	Water Depth (ft)	Date	Time	Comment
001	A	53	7/14/2019	3:35:07	Limited penetration. Very fine sand with some shell hash at surface in background of image. Lack of discernible aRPD or fauna makes SS determination difficult.
001	B	53	7/14/2019	3:35:52	Limited penetration. Very fine sand with a couple of clay clasts visible in upper centimeters of sediment. Some shell hash at surface in background of image. Lack of discernible aRPD or fauna makes SS determination difficult.
001	C	53	7/14/2019	3:36:37	Very fine sand with a few clasts of reduced clay at surface that are likely camera artefacts. Some shell hash in background of image. Lack of discernable aRPD or fauna makes SS determination difficult.
002	A	64	7/14/2019	3:13:17	Very fine pebbles over very fine sand. Some pebbles have been dragged down in to very fine sand by prism penetration. Stage 2 tubes visible at sediment surface in background of image.
002	B	64	7/14/2019	3:13:59	Very fine pebbles over very fine sand. Some pebbles have been dragged down in to very fine sand by prism penetration. Scattered very coarse pebbles in background of image at sediment surface. Stage 2 tubes visible at sediment surface in background of image.
002	C	64	7/14/2019	3:14:39	Very fine pebbles over medium sand. Some shell hash intermixed with very fine pebbles. No discernable aRPD or evidence of fauna makes SS difficult to determine.
003	A	70	7/14/2019	2:50:26	Very fine sand with a couple of Stage 2 tubes in the background of the image at the SWI.
003	B	70	7/14/2019	2:51:09	Very fine sand with worm and amphipod tubes at SWI. Small gastropods attached to worm tubes visible.
003	C	70	7/14/2019	2:51:44	Very fine sand with no discernable aRPD boundary or visible fauna to accurately designate SS.
004	A	73	7/14/2019	2:28:48	Very fine sand with a few Stage 2 tubes in background of image at SWI.
004	B	73	7/14/2019	2:29:34	Very fine sand with Stage 2 tubes, amphipods, and gastropods in background of image at SWI. A few scattered shell fragments also present.
004	C	73	7/14/2019	2:30:15	Very fine sand with a pocket of silt-clay ranging from approximately 1.5 cm depth to 6 cm depth. Some Stage 2 tubes and amphipod tubes visible at SWI.
005	A	77	7/14/2019	2:07:20	Medium sand with many shell fragments and a couple of very small pebbles present. Large boundary roughness but does not appear to have been caused by sediment ripples. No visible evidence of fauna or aRPD makes SS determination difficult.
005	B	77	7/14/2019	2:08:33	Very fine pebbles and large shell fragments over medium sand. A hermit crab at SWI. No evidence (aRPD or fauna) to determine SS.
005	C	77	7/14/2019	2:09:11	Very fine pebbles and large shell fragments over medium sand. No evidence (aRPD or fauna) to determine SS.
006	A	68	7/14/2019	1:47:08	Very fine pebbles and large shell fragments over medium sand. No evidence (aRPD or fauna) to determine SS.
006	B	68	7/14/2019	1:47:54	Very fine pebbles and large shell fragments over medium sand. No evidence (aRPD or fauna) to determine SS.
006	C	68	7/14/2019	1:48:37	Medium sand with some very fine pebbles intermixed. A Stage 2 tube at SWI.
007	A	77	7/14/2019	1:24:24	Poor image does not reveal much about sediment except boundary roughness.
007	B	77	7/14/2019	1:25:05	Poor image does not reveal much about sediment except boundary roughness. Something in background of image at SWI but difficult to tell what it is.
007	C	77	7/14/2019	1:25:47	Poor image does not reveal much about sediment except boundary roughness.
008	B	85	7/14/2019	0:19:10	Medium sand with very fine pebbles intermixed and at sediment surface. Amphipod structures at SWI.
008	C	85	7/14/2019	0:19:56	Medium sand with intermixed very fine pebbles, some larger. Some shell hash at sediment surface, along with Stage 2 tubes and amphipod structures.
008	D	85	7/14/2019	0:20:41	Medium sand with intermixed very fine pebbles. No evidence (aRPD or fauna) to determine SS.
009	A	95	7/13/2019	23:50:13	Very fine pebbles with a couple intermixed fine pebbles over and intermixed with medium sand. No evidence (aRPD or fauna) to determine SS.
009	B	95	7/13/2019	23:51:37	Very fine pebbles with a couple intermixed fine pebbles over and intermixed with medium sand. No evidence (aRPD or fauna) to determine SS.

StationID	Replicate	Water Depth (ft)	Date	Time	Comment
009	C	95	7/13/2019	23:53:04	Very fine pebbles over medium sand. A few fine pebbles at SWI with large shell fragments. No evidence (aRPD or fauna) to determine SS.
010	B	116	7/13/2019	23:26:52	Fine sand over silt-clay. Dense amphipod tubes at SWI with a few very fine pebbles and a coarse pebble also at SWI. Open voids and a visible worm in a burrow at depth.
010	C	116	7/13/2019	23:28:16	Silt-clay with a high density of amphipod tubes at SWI along with some shell hash. Drag-down from tubes has obscured aRPD depth.
010	D	116	7/13/2019	23:29:47	Fine sand over silt-clay. Dense amphipod tubes at SWI with a few very fine pebbles also at SWI. Evidence of deep burrowing present but no visible evidence of Stage 3 fauna.
011	A	224	7/13/2019	22:56:37	High penetration. Silt-clay with Stage 2 tubes at SWI, visible worms in burrows, and multiple open and partially filled voids.
011	B	224	7/13/2019	22:58:11	High penetration. Silt-clay with Stage 2 tubes at SWI, visible worms in burrows, and partially filled and infilled voids
011	C	224	7/13/2019	22:59:48	High penetration. Silt-clay with Stage 2 tubes at SWI, visible worms in burrows, and partially filled and infilled voids
012	A	127	7/13/2019	19:29:31	Very fine sand with dense amphipod tubes at SWI.
012	B	127	7/13/2019	19:31:08	Very fine sand with dense amphipod tubes at SWI. Infilled voids present.
012	C	127	7/13/2019	19:32:27	Very fine sand with dense amphipod tubes at SWI. Two large worms at depth against faceplate.
013	A	111	7/13/2019	19:05:00	Medium sand with possible rippling at SWI. Amphipod structures at SWI.
013	B	111	7/13/2019	19:06:42	Medium sand with possible rippling at SWI. Amphipod structures and a few Stage 2 tubes at SWI.
013	C	111	7/13/2019	19:08:11	Medium sand with some shell fragments intermixed. Amphipod tubes at SWI.
014	A	117	7/13/2019	18:40:36	Medium sand with occasional shell fragments intermixed. Amphipod tubes at SWI.
014	B	117	7/13/2019	18:42:09	Medium sand with occasional shell fragments intermixed. Amphipod tubes and structures at SWI.
014	D	117	7/13/2019	18:45:03	Medium sand with a layer of reduced fines at the maximum penetration of the prism. Occasional shell fragments intermixed in the sand layer. Amphipod tubes and structures at SWI.
015	A	109	7/13/2019	18:14:33	Very fine sand with rippling at the sediment surface. Amphipod structures and Stage 2 worm tubes at SWI.
015	B	109	7/13/2019	18:16:12	Very fine sand with rippling at the sediment surface. Amphipod and Stage 2 worm tubes at SWI.
015	C	109	7/13/2019	18:17:53	Very fine sand with many amphipod tubes at SWI and some evidence of burrowing in the sediment column.
016	A	95	7/10/2019	19:06:41	Very fine sand with Stage 2 tubes at SWI. Sand dollars present on sediment surface.
016	B	95	7/10/2019	19:07:59	Very fine sand with evidence of burrowing moving the aRPD boundary deeper in to sediment. A sand dollar against the faceplate. A few Stage 2 tubes and small gastropods at the SWI in background of image.
016	C	95	7/10/2019	19:09:18	Very fine sand with Stage 2 tubes and amphipod structures at SWI in background of image. Large worm visible in burrow beneath aRPD boundary.
017	A	93	7/10/2019	18:46:29	Very fine sand with amphipod structures and sand dollars at SWI.
017	B	93	7/10/2019	18:47:44	Very fine sand with amphipod structures, sand dollars, and Stage 2 tubes at SWI in background of image.
017	D	93	7/10/2019	18:50:11	Very fine sand with many Stage 2 tubes and amphipod structures at SWI. A sand dollar against the faceplate. A worm in a burrow beneath aRPD boundary.
018	A	90	7/10/2019	18:25:08	Very fine sand with many Stage 2 tubes and amphipod structures at SWI. Shell hash and a hermit crab on sediment surface.
018	B	90	7/10/2019	18:26:34	Very fine sand with a few Stage 2 tubes and amphipod structures at the SWI.
018	C	90	7/10/2019	18:27:53	Very fine sand with many hermit crabs in background of image along with a fish just in frame. Shell hash present on sediment surface.
019	A	97	7/10/2019	18:03:03	Very fine sediment with many Stage 2 tubes at SWI. Evidence of burrowing bringing aRPD boundary deeper in to sediment.

StationID	Replicate	Water Depth (ft)	Date	Time	Comment
019	B	97	7/10/2019	18:04:10	Very fine sediment with an amphipod structure at SWI. Apparent rippling of sediment occurring.
019	C	97	7/10/2019	18:05:19	Very fine sand over fine sand with very high penetration. Multiple layers of sediment at depth, possible relic aRPD. Stage 2 tubes at SWI. Burrowing evident throughout sediment column but no visible evidence of Stage 3 fauna.
020	A	92	7/10/2019	17:42:53	Very fine sand with multiple sand dollars and an amphipod structure at SWI. Rippling of sediment evident. Portion of image has aRPD greater than penetration because of rippling.
020	B	92	7/10/2019	17:44:34	Very fine sand with a thin aRPD. Some shell hash on sediment surface in background.
020	C	92	7/10/2019	17:45:55	Very fine sand with a few small Stage 2 tubes and a sand dollar against the faceplate. A few shell fragments present near sediment surface.
021	A	97	7/10/2019	22:18:09	Medium sand with no visible fauna to determine SS.
021	B	97	7/10/2019	22:19:30	Medium sand with no visible fauna to determine SS. A sand dollar on sediment surface in background of image.
021	D	97	7/10/2019	22:22:06	Medium sand with no visible fauna to determine SS.
022	A	95	7/10/2019	22:37:29	Fine sand with a Stage 2 tube at SWI. Shell hash at SWI and within upper sediment.
022	B	95	7/10/2019	22:38:46	Fine sand with many Stage 2 tubes and amphipod structures at SWI. A hermit crab on sediment surface. Some shell fragments intermixed with sediment.
022	C	95	7/10/2019	22:40:01	Fine sand with a large sediment ripple captured in image. Stage 2 tubes at sediment surface in background of image.
023	A	91	7/10/2019	22:57:17	Medium sand with intermixed shell fragments. No visible fauna to help determine SS.
023	B	91	7/10/2019	22:58:43	Medium sand with intermixed shell fragments. No visible fauna to help determine SS. Worm at sediment surface.
023	D	91	7/10/2019	23:01:14	Medium sand with intermixed shell fragments. No visible fauna to help determine SS. Large shell against face plate.
024	A	97	7/10/2019	23:16:48	Medium sand with a few Stage 2 tubes in background of image at SWI.
024	B	97	7/10/2019	23:18:16	Medium sand with intermixed shell fragments. Sand dollars, a hermit crab, and Stage 2 tubes at SWI in background of image.
024	C	97	7/10/2019	23:19:35	Medium sand with intermixed shell hash. Stage 2 tubes and a sand dollar at the sediment surface.
025	A	102	7/11/2019	0:56:36	Medium sand with a few amphipod structures at SWI in background of image at sediment surface.
025	B	102	7/11/2019	0:57:20	Medium sand with a few Stage 2 tubes and a hermit crab at SWI.
025	D	102	7/11/2019	0:59:04	Medium sand with intermixed shell hash at depth. Well-developed aRPD with a large burrow bringing aRPD boundary deeper. A hermit crab and multiple sand dollars at sediment surface.
026	C	98	7/11/2019	2:19:45	Fine sand with many Stage 2 tubes at SWI.
026	F	98	7/11/2019	2:22:09	Fine sand with Stage 2 tubes, amphipod structures, and sand dollars at SWI.
026	G	98	7/11/2019	2:23:01	Fine sand with some turbidity in the water column. Evidence of burrowing beneath aRPD boundary.
027	A	97	7/11/2019	10:38:45	Fine sand with a few tubes at SWI and evidence of shallow burrowing.
027	B	97	7/11/2019	10:39:29	Fine sand with a sand dollar and amphipod structures at SWI.
027	C	97	7/11/2019	10:40:15	Fine sand with many Stage 2 tubes and amphipod tubes in background of image at SWI.
028	A	88	7/11/2019	10:56:17	Fine sand with a gastropod against the faceplate. A sand dollar and Stage 2 tube in background of image.
028	B	88	7/11/2019	10:57:12	Fine sand with amphipod structures and small tubes in background of image at SWI.
028	C	88	7/11/2019	10:57:55	Fine sand with intermixed shell fragments. Sand dollars at SWI.
029	A	89	7/11/2019	11:14:45	Fine sand with Stage 2 tubes and shell hash at sediment surface in background of image.
029	B	89	7/11/2019	11:15:25	Fine sand with small Stage 1 tubes and a sand dollar at SWI. A large worm in a burrow visible beneath aRPD boundary.
029	C	89	7/11/2019	11:16:09	Fine sand with Stage 2 tubes and sand dollars at sediment surface in background of image.
030	A	123	7/10/2019	3:03:41	Fine sand with intermixed shell fragments and a sand dollar against the faceplate. Stage 2 tubes and amphipod structures in background of image.

StationID	Replicate	Water Depth (ft)	Date	Time	Comment
030	C	123	7/10/2019	3:08:14	Fine sand with intermixed shell fragments. Stage 2 tubes in background of image at sediment surface.
030	D	123	7/10/2019	3:10:00	Fine sand with intermixed shell fragments. Stage 2 tubes in background of image at sediment surface.
031	A	117	7/10/2019	4:07:40	Fine sand with many sand dollars at sediment surface. No visible evidence of fauna to aid in SS determination.
031	B	117	7/10/2019	4:08:49	Fine sand with some intermixed shell hash. No visible evidence of fauna to aid in SS determination.
031	C	117	7/10/2019	4:09:53	Fine sand with medium sand intermixed. Some rippling apparent in background of image. Unable to determine aRPD or SS.
032	A	118	7/10/2019	4:43:15	Fine sand with intermixed shell hash. Shallow aRPD with Stage 1 tubes at SWI.
032	B	118	7/10/2019	4:44:10	Fine sand with intermixed shell hash. Sand dollars at sediment surface. A worm in a burrow beneath the aRPD boundary.
032	D	118	7/10/2019	4:46:32	Fine sand with intermixed shell hash. Stage 2 and Stage 1 tubes at SWI.
033	A	110	7/10/2019	5:34:24	Fine sand with Stage 1 tubes at SWI. Evidence of burrowing moving the aRPD boundary deeper in to sediment.
033	B	110	7/10/2019	5:35:18	Fine sand with some intermixed shell hash and Stage 1 tubes at SWI. Partial aRPD and a sand dollar in background of image on sediment surface.
033	C	110	7/10/2019	5:36:36	Fine sand with intermixed shell hash. A sand dollar against face plate and another in background of image on sediment surface. Stage 2 tubes visible in background of image.
034	A	109	7/10/2019	6:02:04	Fine sand with many sand dollars both against the face plate and in background of image. Well-developed aRPD.
034	B	109	7/10/2019	6:03:02	Fine sand with intermixed shell hash. Amphipod tubes at SWI.
034	C	109	7/10/2019	6:06:15	Fine sand with shell hash and many sand dollars at SWI. A burrow moving aRPD boundary deeper in to sediment visible.
035	A	110	7/10/2019	6:34:32	Fine sand with shell hash intermixed. Sand dollar and amphipod structures at SWI. Evidence of sediment rippling.
035	B	110	7/10/2019	6:35:21	Fine sand with some intermixed shell hash. Stage 2 tubes at sediment surface in background of image.
035	C	110	7/10/2019	6:37:41	Fine sand with intermixed shell hash and surficial shell hash. Amphipod structures and Stage 2 tubes at SWI, as well as sand dollars in background of image.
036	A	100	7/10/2019	6:58:52	Medium sand with intermixed and surficial shell hash. Stage 2 tubes and amphipod structures in the background of image.
036	B	100	7/10/2019	6:59:53	Medium sand with intermixed shell hash. Stage 2 tubes, multiple gastropods, and a sand dollar on the sediment surface.
036	C	100	7/10/2019	7:00:48	Medium sand with a sand dollar against the face plate. Amphipod tubes in background of image.
037	A	105	7/10/2019	7:20:11	Very coarse sand with a variety of pebble sizes over medium sand. Stage 2 tubes in background of image. A large worm in a burrow against the faceplate at depth.
037	C	105	7/10/2019	7:21:57	Very coarse sand with a variety of pebble sizes at the surface and intermixed with a layer of medium sand beneath the very coarse sand. A hermit crab at sediment surface. No evidence (aRPD or fauna) visible to determine SS.
037	D	105	7/10/2019	7:23:19	Very coarse sand over medium sand with intermixed small pebbles. Amphipod structures in background of image at SWI and a large worm in a burrow against the face plate.
038	A	100	7/10/2019	7:44:15	Fine sand with Stage 2 tubes and a gastropod at sediment surface in the background of the image.
038	B	100	7/10/2019	7:45:05	Fine sand with Stage 2 tubes and a sand dollar in background of image. Shell hash intermixed with fine sand.
038	C	100	7/10/2019	7:45:58	Fine sand with intermixed and surficial shell hash. Stage 2 tubes and possible amphipod structures in background of image.
039	A	98	7/10/2019	8:08:38	Fine sand with amphipod structures, Stage 2 tubes, and a sand dollar at SWI.
039	B	98	7/10/2019	8:10:15	Fine sand with Stage 2 tubes, a sand dollar, and a hermit crab at sediment surface.
039	C	98	7/10/2019	8:11:11	Fine sand with a Stage 2 tube and sand dollars on sediment surface.
040	A	98	7/10/2019	8:31:56	Medium sand with a developed aRPD and evidence of burrows moving the aRPD deeper, despite no visible fauna.

StationID	Replicate	Water Depth (ft)	Date	Time	Comment
040	B	98	7/10/2019	8:32:46	Medium sand with many amphipod and Stage 2 tubes at SWI. Possible worm in burrow at depth.
040	C	98	7/10/2019	8:33:34	Medium sand with some rippling, partial aRPD, and a couple of sand dollars at SWI.
041	A	96	7/10/2019	8:53:58	Medium sand with Stage 2 tubes, amphipod tubes, and amphipod structures at the SWI.
041	B	96	7/10/2019	8:54:40	Medium sand with Stage 2 tubes and possible amphipod tubes at SWI.
041	C	96	7/10/2019	8:55:27	Medium sand with Stage 2 tubes at SWI, a sand dollar against the faceplate, and a burrow moving the aRPD boundary deeper in to sediment.
042	A	94	7/10/2019	9:16:46	Fine sand with amphipod structures at SWI and Stage 2 tubes visible in background of image. PV trigger weight and associated line visible at sediment surface. Large worm in burrow and many other worms visible in burrows all beneath aRPD boundary. Possible rippling at sediment surface.
042	B	94	7/10/2019	9:18:32	Fine sand with an amphipod structure at SWI. Rippling of sediment surface evident in background of image.
042	C	94	7/10/2019	9:19:18	Fine sand with a reduced layer of very fine sand at depth, as well as a patch of reduced sediment near SWI. Some reduced small sediment clasts at SWI along with Stage 2 tubes. Evidence of rippling in background of image.
043	A	88	7/11/2019	11:29:09	Medium sand with shell hash at SWI and some intermixed. Stage 2 tubes in background of image at sediment surface.
043	B	88	7/11/2019	11:30:01	Medium sand with scattered shell hash intermixed in upper cms of sediment. Tubes in background of image.
043	C	88	7/11/2019	11:30:49	Medium sand with Stage 2 tubes in background of image and a sand dollar against the faceplate.
044	A	87	7/11/2019	11:46:59	Medium sand with an indistinct aRPD and shell hash at SWI.
044	B	87	7/11/2019	11:47:46	Medium sand with intermixed shell hash near sediment surface. Stage 2 tube at SWI and a sand dollar against the faceplate.
044	C	87	7/11/2019	11:49:02	Medium sand with intermixed shell hash. Tubes visible in far background of image.
045	A	83	7/11/2019	12:07:17	Medium sand with a gastropod and Stage 2 tubes at SWI.
045	B	83	7/11/2019	12:08:50	Medium sand with no visual evidence (aRPD boundary or fauna) to aid with SS determination.
045	C	83	7/11/2019	12:10:01	Medium sand with small Stage 1 tubes visible at SWI. Shell hash at SWI.
046	A	84	7/11/2019	19:50:44	Medium pebbles overlaying medium sand. Coarseness of sediment makes aRPD determination difficult and no visible fauna to aid with SS determination.
046	B	84	7/11/2019	19:52:00	Medium sand with some reduced clay clasts within sediment column. Many hydroids in background of image.
046	D	84	7/11/2019	19:54:26	Medium sand with a few fine pebbles at SWI. Some reduced clay clasts within sediment column. Many hydroids in background of image.
047	A	81	7/11/2019	19:22:37	Fine sand with no visible fauna to aid with determination of SS.
047	D	81	7/11/2019	19:26:29	Fine sand with a large number of sand dollars both against the faceplate and in the background of the image.
047	E	81	7/11/2019	19:30:59	Fine sand with Stage 2 structures at SWI, as well as a sand dollar. Shell hash on sediment surface.
048	A	77	7/11/2019	12:24:14	Medium sand with shell hash at sediment surface and intermixed in top cms of sediment. Stage 2 tubes visible in background of image.
048	B	77	7/11/2019	12:25:30	Medium sand with scattered shell fragments on surface and intermixed. No visible evidence (aRPD or fauna) to determine SS.
048	C	77	7/11/2019	12:26:48	Medium sand with multiple Stage 2 tubes at SWI. Shell hash intermixed in sediment column.
049	A	87	7/11/2019	12:41:42	Very fine sand with many amphipod structures at the SWI.
049	B	87	7/11/2019	12:42:56	Very fine sand with many Stage 2 tubes and amphipod structures at SWI. Multiple visible burrows moving aRPD boundary deeper in to sediment with a worm visible in a burrow near aRPD boundary.
049	D	87	7/11/2019	12:45:22	Very fine sand with many amphipod structures at the SWI. Burrowing bringing aRPD boundary deeper and multiple very large worm visible at depth.
050	A	87	7/11/2019	12:59:30	No penetration.
050	B	87	7/11/2019	13:00:47	No penetration.

StationID	Replicate	Water Depth (ft)	Date	Time	Comment
050	C	87	7/11/2019	13:01:55	Fine sand with large shell hash at both the surface and intermixed in the sediment. Stage 2 tubes and a very fine pebble at SWI.
051	A	84	7/11/2019	13:18:11	Very fine to medium pebbles with a patch of silt-clay. Unable to determine aRPD or SS from coarse material.
051	C	84	7/11/2019	13:20:36	Medium pebbles overlaying very fine pebbles and very coarse sand. Unable to determine aRPD or SS from coarse material.
051	D	84	7/11/2019	13:21:50	Very fine pebbles and very coarse sand with a few fine pebbles at SWI. Unable to determine aRPD or SS from coarse material.
052	B	77	7/11/2019	14:07:38	Fine sand with sand dollars against the faceplate and in background of image along with Stage 2 tubes.
052	C	77	7/11/2019	14:08:53	Fine sand with Stage 2 tubes in background of image at sediment surface.
052	D	77	7/11/2019	14:10:04	Fine sand with Stage 2 tubes in background of image at sediment surface.
053	A	72	7/12/2019	20:56:30	Fine sand with Stage 2 tubes and shell hash at the sediment surface. Some shell hash intermixed in sediment.
053	B	72	7/12/2019	20:58:18	Fine sand with burrowing moving aRPD boundary deeper in to sediment.
053	D	72	7/12/2019	21:01:13	Fine sand with burrowing moving aRPD boundary deeper in to sediment. Shell hash at sediment surface and intermixed with sediment.
054	A	72	7/12/2019	21:19:09	Coarse sand with a Stage 2 tube in the background of image at sediment surface.
054	B	72	7/12/2019	21:20:18	Coarse sand with intermixed very fine pebbles. No fauna or discernable aRPD visible to determine SS.
054	C	72	7/12/2019	21:22:01	Coarse sand overlaying medium sand with no fauna or discernible aRPD visible to determine SS.
055	A	73	7/12/2019	23:58:30	Fine sand with shell hash at the sediment surface. A Stage 2 tube visible in background of image.
055	B	73	7/13/2019	0:00:04	Fine sand with shell hash and Stage 2 tubes at SWI and some shell hash intermixed with sediment.
055	C	73	7/13/2019	0:01:35	Fine sand with shell hash at the SWI. A gastropod visible at sediment surface in background of image.
056	A	81	7/13/2019	0:21:54	Very fine sand with Stage 2 tubes at SWI. Possible gastropod in background of image at sediment surface. Worms in burrows beneath aRPD boundary moving boundary deeper.
056	B	81	7/13/2019	0:22:57	Very fine sand with many Stage 2 tubes at SWI. Burrows in sediment moving aRPD boundary deeper.
056	C	81	7/13/2019	0:23:37	Very fine sand with many Stage 2 tubes at SWI along with a crab. Burrows in sediment moving aRPD boundary deeper.
057	A	86	7/13/2019	0:44:08	Very fine sand with Stage 2 tubes and amphipod structures at SWI. Polychaetes visible on tubes, on sediment surface, and within burrows in sediment.
057	B	86	7/13/2019	0:44:50	Very fine sand with tubes and amphipod structures at SWI. Worms in burrows visible beneath aRPD boundary.
057	C	86	7/13/2019	0:45:32	Very fine sand with tubes and amphipod structures at SWI. A gastropod on sediment surface. Burrowing bringing aRPD boundary deeper.
058	A	91	7/13/2019	1:07:56	Very fine sand with Stage 2 tubes and amphipod structures at SWI.
058	C	91	7/13/2019	1:09:21	Very fine sand with many amphipod structures at SWI along with a few sand dollars and a gastropod on sediment surface.
058	D	91	7/13/2019	1:09:58	Very fine sand with small-scale mounding occurring, possibly due to sediment transport. Sand dollar against faceplate and gastropod at sediment surface in background of image.
059	A	95	7/13/2019	1:29:36	Very fine sand with many amphipod structures and Stage 2 tubes at SWI. A gastropod at the sediment surface in the background of the image.
059	B	95	7/13/2019	1:30:21	Very fine sand over silt-clay. Stage 2 tubes and amphipod structures at SWI. Some small reduced clasts at SWI.
059	C	95	7/13/2019	1:31:00	Very fine sand over silt-clay. Amphipod structures at SWI and a partially infilled void at depth.
060	A	95	7/13/2019	1:54:25	Very fine sand with a Stage 2 tube and many clam shells at SWI. Amphipod structures visible in background of image. Burrowing evident beneath aRPD boundary.
060	B	95	7/13/2019	1:55:03	Very fine sand over silt-clay with Stage 2 tubes and amphipod structures at SWI. Burrows visible beneath aRPD boundary.

StationID	Replicate	Water Depth (ft)	Date	Time	Comment
060	C	95	7/13/2019	1:55:45	Very fine sand over silt-clay with a Stage 2 tube visible at SWI. Burrowing evident beneath aRPD boundary.
061	A	91	7/13/2019	2:18:35	Very fine sand over silt-clay. Stage 2 tubes and amphipod structures at SWI. Large burrows visibly moving aRPD boundary deeper.
061	B	91	7/13/2019	2:19:17	Very fine sand over silt-clay. Stage 2 tubes and amphipod structures at SWI. Large burrows visibly moving aRPD boundary deeper. Shell hash in silt-clay layer of sediment.
061	C	91	7/13/2019	2:20:00	Very fine sand over silt-clay. Stage 2 tubes and amphipod structures at SWI. A sediment mound in background of image.
062	A	87	7/13/2019	2:40:14	Very fine sand over silt-clay. Stage 2 tubes and amphipod structures at SWI. A large burrow present in image.
062	B	87	7/13/2019	2:41:00	Very fine sand over silt-clay with a transected mound or ripple creating large small-scale boundary roughness. Many gastropods in background of image along with Stage 2 tubes and amphipod structures. Visible burrows beneath aRPD boundary.
062	D	87	7/13/2019	2:42:24	Very fine sand over silt-clay. Stage 2 tubes at SWI and worms visible in burrows beneath aRPD boundary.
063	B	74	7/11/2019	18:32:06	Very fine sand with Stage 2 tubes at SWI.
063	C	74	7/11/2019	18:33:16	Very fine sand with Stage 2 tubes and a couple of gastropods at SWI. Shell hash at depth.
063	D	74	7/11/2019	18:34:28	Very fine sand with sand dollars at SWI. A moon snail egg casing has been transected by prism and partially obscures aRPD depth.
064	A	72	7/11/2019	17:43:40	Very fine sand with Stage 2 tubes, a gastropod, and multiple sand dollars at SWI in background of image. A sand dollar also against the face plate.
064	B	72	7/11/2019	17:45:19	Very fine sand with some shell hash at SWI, as well as a sand dollar. Another sand dollar against face plate.
064	C	72	7/11/2019	17:46:35	Very fine sand with a small mound a Stage 2 tube, and a sand dollar in the background of the image.
065	A	77	7/11/2019	16:59:10	Very fine sand with Stage 2 tubes, amphipod structures, and a gastropod at sediment surface.
065	B	77	7/11/2019	17:00:25	Very fine sand with Stage 2 tubes and amphipod structures at sediment surface. A small mound in background of image.
065	C	77	7/11/2019	17:01:35	Very fine sand with Stage 2 tubes, an amphipod structure, and a gastropod visible at sediment surface.
066	A	82	7/11/2019	16:38:10	Fine sand with intermixed shell hash. Tubes and a gastropod in background of image.
066	B	82	7/11/2019	16:39:40	Fine sand with intermixed and surficial shell hash. A sand dollar at sediment surface in background of image.
066	C	82	7/11/2019	16:41:02	Fine sand with intermixed shell hash. Stage 2 and Stage 1 tubes at SWI.
067	A	77	7/11/2019	16:18:44	Fine sand with a sand dollar against the face plate and Stage 2 tubes in background of image.
067	B	77	7/11/2019	16:20:01	Fine sand with sand dollars in background of image along with shell hash. Burrowing evident in upper sediment.
067	D	77	7/11/2019	16:22:36	Fine sand with some surficial shell hash and sand dollars in background of image.
068	A	70	7/11/2019	16:00:31	Fine pebbles with some coarse and very coarse pebbles overlaying medium sand. No visible fauna or aRPD in coarse material.
068	B	70	7/11/2019	16:01:52	Fine pebbles with some coarse pebbles overlaying medium sand. Pebbles also intermixed in sand matrix. No visible fauna or aRPD in coarse material.
068	C	70	7/11/2019	16:03:01	Very coarse sand with some fine pebbles at sediment surface overlaying medium sand. Shell hash and very fine pebbles intermixed in sand matrix
069	A	70	7/11/2019	15:41:06	Very coarse sand over medium sand with intermixed very fine pebbles. Stage 2 tubes at sediment surface in background of image.
069	B	70	7/11/2019	15:42:37	Coarse sand over medium sand with some scattered very fine pebbles. No visible aRPD or fauna.
069	C	70	7/11/2019	15:43:54	Medium sand with a few intermixed very fine pebbles. Stage 2 tube in background of image.
070	A	76	7/12/2019	20:11:06	Fine sand with Stage 2 tubes in background of image at sediment surface.
070	B	76	7/12/2019	20:12:35	Fine sand with Stage 2 tubes and amphipod structures at sediment surface in background of image.
070	C	76	7/12/2019	20:14:05	Fine sand with amphipod structures at SWI.

StationID	Replicate	Water Depth (ft)	Date	Time	Comment
071	A	71	7/12/2019	19:52:58	Medium sand with Stage 2 tubes at sediment surface in background of image
071	B	71	7/12/2019	19:54:29	Medium sand with sand dollars and gastropods in background of image. A sand dollar against the faceplate.
071	C	71	7/12/2019	19:55:58	Medium sand with patches of broken shell intermixed. Stage 2 tubes at SWI.
072	A	74	7/12/2019	19:35:07	Very fine sand with amphipod structures and Stage 2 tubes at SWI.
072	C	74	7/12/2019	19:38:13	Very fine sand with amphipod structures and Stage 2 tubes at SWI.
072	D	74	7/12/2019	19:39:50	Very fine sand with Stage 2 tubes at SWI as well as a sand dollar and a hermit crab at sediment surface.
073	A	81	7/12/2019	19:18:07	Very fine sand with Stage 2 tubes, amphipod structures, and a gastropod at sediment surface.
073	B	81	7/12/2019	19:19:37	Very fine sand with many Stage 2 and amphipod tubes at sediment surface.
073	C	81	7/12/2019	19:21:06	Very fine sand with many Stage 2 and amphipod tubes at sediment surface. A gastropod in background of image and visible burrows moving aRPD boundary deeper.
074	E	86	7/12/2019	18:59:48	Very fine sand with Stage 2 tubes and amphipod structures at SWI. Mound in background of image. Visible worm in burrow beneath aRPD boundary.
074	F	86	7/12/2019	19:01:27	Very fine sand with many Stage 2 tubes and amphipod structures at SWI.
074	G	86	7/12/2019	19:03:13	Very fine sand with many Stage 2 tubes and amphipod structures at SWI.
075	A	91	7/12/2019	18:25:31	Very fine sand over reduced silt-clay. Many amphipod structures at SWI.
075	B	91	7/12/2019	18:27:03	Very fine sand over reduced silt-clay. Amphipod structures and unknown organism at SWI. Worm visible in burrow at depth.
075	D	91	7/12/2019	18:30:09	Very fine sand over reduced silt-clay. Stage 2 tubes at SWI and a gastropod's proboscis just in frame at sediment surface.
076	A	90	7/12/2019	17:52:40	Very fine sand over silt-clay with many Stage 2 tubes and amphipod structures at SWI.
076	B	90	7/12/2019	17:54:19	Very fine sand with many Stage 2 tubes and amphipod structures at SWI.
076	C	90	7/12/2019	17:55:52	Very fine sand with many Stage 2 tubes and amphipod structures at SWI.
077	A	86	7/12/2019	17:32:45	Very fine sand over silt-clay. Amphipod structure at SWI and worms visible in burrows above aRPD boundary.
077	C	86	7/12/2019	17:35:47	Very fine sand over silt-clay. Amphipod structures, Stage 2 tubes, and a large gastropod visible at sediment surface. A mound in the background.
077	D	86	7/12/2019	17:37:23	Very fine sand over silt-clay. Amphipod structures at SWI along with some sediment rippling. Large worm in burrow visible moving aRPD boundary deeper. Open voids at depth.
078	A	77	7/11/2019	18:45:32	Very fine sand with Stage 2 tubes in background of image.
078	B	77	7/11/2019	18:47:03	Very fine sand with Stage 2 tubes in background of image.
078	C	77	7/11/2019	18:48:15	Very fine sand with a small tube at SWI. Sand dollars on sediment surface and against face plate.
079	A	80	7/12/2019	4:58:21	Fine sand with many Stage 1 and Stage 2 tubes at sediment surface. Large cluster of shell at background of image.
079	C	80	7/12/2019	5:00:02	Fine sand with Shell hash and Stage 2 tubes at SWI.
079	D	80	7/12/2019	5:00:41	Fine sand with Stage 2 tubes and a gastropod at sediment surface in the background of the image.
080	A	69	7/12/2019	5:40:46	Medium sand with Stage 2 tubes and a large amount of shell hash at SWI. Large shell cluster in background of image.
080	B	69	7/12/2019	5:41:36	Medium sand with shell hash at SWI and intermixed in upper sediment. Many hermit crabs and a gastropod visible at sediment surface and on shell hash. Possible orange sponge against faceplate.
080	C	69	7/12/2019	5:42:16	Medium sand with shell hash at SWI and intermixed in sediment. Stage 2 tubes at SWI.
081	A	83	7/11/2019	19:02:31	Very fine sand with Stage 2 tube and amphipod structure at SWI. Burrowing visible moving aRPD boundary deeper.
081	B	83	7/11/2019	19:04:06	Very fine sand with Stage 2 tubes, amphipod structures, and multiple gastropods at SWI. Burrowing visible moving aRPD boundary deeper.
081	C	83	7/11/2019	19:05:18	Very fine sand with reduced very fine sand at depth. A Stage 2 tube at SWI.

StationID	Replicate	Water Depth (ft)	Date	Time	Comment
082	A	76	7/12/2019	4:18:26	Medium sand with intermixed shell hash. A clam shell at sediment surface. A burrow creating small-scale boundary roughness.
082	B	76	7/12/2019	4:19:26	Medium sand with intermixed shell hash. Unable to determine aRPD boundary and no visible evidence of fauna. Possible burrow within sediment.
082	C	76	7/12/2019	4:20:13	Medium sand with surficial and intermixed shell hash. A Stage 2 tube visible in background of image.
083	A	76	7/12/2019	5:26:07	Very fine sand over silt-clay material that was likely deposited. A clast of this material at SWI. Stage 2 tubes at SWI and a visible worm in a burrow beyond aRPD boundary.
083	B	76	7/12/2019	5:26:53	Very fine sand over silt-clay material that was likely deposited. Stage 2 tubes at SWI and visible worms in burrows beyond aRPD boundary.
083	C	76	7/12/2019	5:27:38	Very fine sand over silt-clay material that was likely deposited. Visible worms in burrows beyond aRPD boundary and partially infilled voids present.
084	A	62	7/12/2019	6:00:34	Fine sand with turbidity in water column. A sand dollar visible in background of image. No discernible aRPD.
084	B	62	7/12/2019	6:01:18	Fine sand with many sand dollars at sediment surface and one against faceplate.
084	D	62	7/12/2019	6:02:46	Fine sand with many sand dollars at sediment surface and one against faceplate.
085	A	66	7/12/2019	6:43:18	Fine sand with Stage 2 tubes in background of image at sediment surface.
085	B	66	7/12/2019	6:44:11	Fine sand with surficial shell hash and Stage 2 tubes in background of image at sediment surface.
085	C	66	7/12/2019	6:44:52	Fine sand with no visible fauna to aid with SS determination.
086	A	51	7/12/2019	7:17:44	Fine sand with Stage 2 tubes and some surficial shell hash.
086	B	51	7/12/2019	7:18:40	Fine sand with Stage 2 tubes at SWI.
086	C	51	7/12/2019	7:19:32	Fine sand with Stage 2 tubes at SWI and burrows moving beyond aRPD boundary.
087	A	43	7/12/2019	7:36:28	Fine sand with evidence of rippling at sediment surface. No visible evidence of fauna to aid with SS.
087	B	43	7/12/2019	7:37:49	Fine sand with Stage 2 tubes, shell hash, and rippling at sediment surface.
087	C	43	7/12/2019	7:38:29	Fine sand with Stage 2 tubes, shell hash, and rippling at sediment surface.
088	A	36	7/12/2019	7:57:05	Medium sand with shell hash at SWI and rippling at surface.
088	B	36	7/12/2019	7:57:56	Medium sand with shell hash at SWI and intermixed in sediment. Rippling at surface.
088	C	36	7/12/2019	7:58:42	Medium sand with shell hash at SWI and intermixed in sediment. Rippling at surface.
089	A	80	7/13/2019	3:52:00	Very fine sand with Stage 2 tubes and amphipod structures at SWI. A large worm in a burrow at depth. Rippling at sediment surface.
089	B	80	7/13/2019	3:53:27	Very fine sand with Stage 2 tubes and amphipod structures at SWI. Rippling at sediment surface.
089	C	80	7/13/2019	3:54:15	Very fine sand with Stage 2 tubes and amphipod structures at SWI. A burrow moving beyond aRPD boundary. Rippling at sediment surface.
090	A	70	7/13/2019	4:14:36	Very fine sand with many Stage 2 tubes at SWI.
090	B	70	7/13/2019	4:15:15	Very fine sand with many Stage 2 tubes and amphipod structures at SWI.
090	D	70	7/13/2019	4:16:41	Very fine sand with many Stage 2 tubes and amphipod structures at SWI. Worms in burrows at depth, including a very large worm.
091	A	60	7/13/2019	4:36:55	Fine sand with Stage 2 tubes and shell hash at SWI.
091	B	60	7/13/2019	4:37:35	Fine sand with shell hash at SWI.
091	C	60	7/13/2019	4:38:24	Fine sand with Stage 2 tubes and shell hash at SWI.
092	A	55	7/13/2019	4:56:43	Very fine sand with a gastropod at sediment surface.
092	C	55	7/13/2019	4:58:05	Very fine sand with a Stage 2 tube in background of image at SWI.
092	D	55	7/13/2019	4:58:53	Very fine sand with some shell intermixed.
093	B	44	7/13/2019	5:20:32	Very fine sand with rippling at surface evident.
093	C	44	7/13/2019	5:21:16	Very fine sand with rippling at surface evident.

StationID	Replicate	Water Depth (ft)	Date	Time	Comment
093	D	44	7/13/2019	5:22:08	Very fine sand with rippling at surface evident in background of image. A Stage 2 tube present at SWI.
094	B	44	7/13/2019	5:40:18	Very fine sand with rippling at surface evident in background of image. A Stage 2 tube present at SWI.
094	C	44	7/13/2019	5:41:05	Very fine sand with rippling at surface evident.
094	D	44	7/13/2019	5:41:45	Very fine sand with rippling at surface evident in background of image. A Stage 2 tube present at SWI. A large worm in a burrow at depth.
095	A	30	7/13/2019	6:01:06	Medium sand with Stage 2 tubes in background of image and some small rippling of sediment.
095	B	30	7/13/2019	6:01:48	Medium sand with rippling of sediment at sediment surface. Coarse material makes aRPD difficult to determine and lack of faunal evidence makes SS difficult.
095	C	30	7/13/2019	6:02:29	Medium sand with rippling of sediment at sediment surface. Coarse material makes aRPD difficult to determine and lack of faunal evidence makes SS difficult. Large patch of live mussels in background of image.
096	A	23	7/13/2019	6:17:32	Very coarse sand to very fine pebbles partially overlaying and partially intermixed with fine sand. Coarse material makes SS determination difficult.
096	B	23	7/13/2019	6:18:21	Very coarse sand to very fine pebbles partially overlaying and partially intermixed with fine sand. Coarse material makes SS determination difficult. Rippling at sediment surface.
096	D	23	7/13/2019	6:19:41	Fine sand with densely intermixed very coarse sand and very fine pebbles. Minor rippling at sediment surface. Intermixed coarse material makes SS determination difficult.
097	A	33	7/13/2019	6:36:47	Fine sand with some shell hash at sediment surface and rippling evident.
097	B	33	7/13/2019	6:37:24	Fine sand with some shell hash at sediment surface and rippling evident.
097	C	33	7/13/2019	6:38:01	Fine sand with some shell hash at sediment surface and rippling evident.
098	A	58	7/12/2019	6:15:43	Very fine sand with evidence of shallow burrowing and a sand dollar against the faceplate
098	B	58	7/12/2019	6:16:17	Very fine sand with evidence of shallow burrowing and many sand dollars at sediment surface.
098	C	58	7/12/2019	6:17:11	Very fine sand with many sand dollars at sediment surface.
099	A	58	7/12/2019	10:08:35	Fine sand with surficial shell hash and Stage 2 tubes in background of image at sediment surface.
099	B	58	7/12/2019	10:09:14	Medium sand overlaying fine sand with surficial shell hash and Stage 2 tubes in background of image at sediment surface. Shell hash dragged down by prism penetration.
099	C	58	7/12/2019	10:10:41	Medium sand overlaying fine sand with surficial shell hash and Stage 2 tubes in background of image at sediment surface.
100	A	50	7/12/2019	10:30:47	Very fine sand with Stage 2 tubes, clasts of sand, and small rippling at sediment surface. Burrows visually moving beyond aRPD boundary.
100	B	50	7/12/2019	10:31:36	Very fine sand with Stage 2 tubes and small rippling at sediment surface. Burrows visually moving beyond aRPD boundary.
100	C	50	7/12/2019	10:32:24	Very fine sand with Stage 2 tubes, clasts of sand, and small rippling at sediment surface. Burrows visually moving beyond aRPD boundary. A sand dollar within sediment against face plate.
101	A	48	7/12/2019	10:51:43	Very fine sand with a sand dollar against the face plate. Shell hash and small ripples at sediment surface.
101	B	48	7/12/2019	10:52:49	Very fine sand with a sand dollar against the face plate and Stage 2 tubes in the background of the image. Surficial shell hash and some intermixed shell hash present. Small ripples at sediment surface. Visible burrow moving beyond aRPD boundary.
101	C	48	7/12/2019	10:53:31	Very fine sand with surficial shell hash and a visible worm in a burrow moving beyond the aRPD boundary.
102	A	57	7/12/2019	6:28:02	Fine sand with Stage 2 tubes in background of image at sediment surface.
102	B	57	7/12/2019	6:28:59	Fine sand with shell hash and sand clumps at SWI. Sand dollar within sediment against faceplate. Stage 2 tubes in background of image.
102	C	57	7/12/2019	6:29:45	Fine sand with Stage 2 tubes in background of image at sediment surface.
103	A	56	7/12/2019	7:03:33	Very fine sand with surficial shell hash and an amphipod structure at sediment surface.

StationID	Replicate	Water Depth (ft)	Date	Time	Comment
103	B	56	7/12/2019	7:04:15	Very fine sand with surficial shell hash and rippling at sediment surface. Burrows affecting boundary roughness and moving beyond aRPD boundary.
103	C	56	7/12/2019	7:04:58	Very fine sand with sand dollars and a hermit crab at sediment surface. Some surficial shell hash.
104	A	45	7/12/2019	9:37:06	Very fine sand with a well-developed aRPD.
104	B	45	7/12/2019	9:39:14	Very fine sand with small-scale rippling at surface.
104	C	45	7/12/2019	9:40:07	Very fine sand with rippling at surface. Shell hash in background of image at surface and well-developed aRPD with burrowing visible.
105	A	37	7/12/2019	9:18:13	Fine sand with rippling visible in background of image.
105	B	37	7/12/2019	9:19:20	Fine sand with rippling visible in background of image.
105	C	37	7/12/2019	9:20:09	Fine sand with rippling visible in background of image. Possible Stage 2 tube structure in background of image.
106	A	32	7/12/2019	8:47:48	Medium sand with some coarse sand intermixed near SWI. A large sediment ripple transected. Stage 2 tubes present in background of image.
106	B	32	7/12/2019	8:48:38	Medium sand with some coarse sand intermixed near SWI. Stage 2 tubes present and a hermit crab at sediment surface. Shell hash at sediment surface.
106	C	32	7/12/2019	8:49:27	Medium sand with some intermixed shell hash. No visible aRPD boundary or evidence of fauna.
107	A	52	7/13/2019	7:01:44	Fine sand with many dead mussel shells and a hermit crab at sediment surface. Dense shell hash intermixed with sediment.
107	B	52	7/13/2019	7:02:23	Fine sand with many dead mussel shells at sediment surface. Dense shell hash intermixed with sediment.
107	C	52	7/13/2019	7:03:04	Fine sand with dead mussel shells, live mussels, and a hermit crab at sediment surface. Dense shell hash intermixed with sediment.
108	A	48	7/13/2019	7:35:59	Silt-clay with dense shells containing hydroids, including live mussels, at SWI. Infilled void at depth. Shells affecting aRPD and boundary roughness through drag-down
108	B	48	7/13/2019	7:36:40	Silt-clay with dense shells containing hydroids, including live mussels, at SWI. Open void near surface and infilled void at depth. Shells affecting aRPD and boundary roughness through drag-down
108	F	48	7/13/2019	7:39:14	Silt-clay with dense shells containing hydroids, including live mussels, at SWI. Open void near surface and infilled void at depth. Shells affecting aRPD and boundary roughness through drag-down
109	A	36	7/13/2019	7:58:17	Silt-clay with dense shell hash at SWI and intermixed in upper sediment. Infilled voids at depth. Stage 2 tubes within shell hash matrix.
109	C	36	7/13/2019	7:59:39	Very fine sand overlaying silt-clay. Dense shell hash at SWI dragged down in to sediment and obscured many variables.
109	D	36	7/13/2019	8:00:11	Very fine sand over silt-clay. Dense shell hash at SWI and intermixed in sediment matrix. Stage 2 tubes among shell hash at sediment surface and open voids present.
110	B	53	7/13/2019	8:19:29	Very fine sand over silt-clay. Dense shell hash at SWI and intermixed in sediment matrix. Large burrow moving to depth and a void present.
110	C	53	7/13/2019	8:20:14	Silt-clay with dense shells containing hydroids, including live mussels, at SWI. Infilled void at depth. Shells affecting aRPD and boundary roughness through drag-down
110	D	53	7/13/2019	8:20:52	Silt-clay with dense shells containing hydroids, including live mussels, at SWI. Infilled void at depth. Shells affecting aRPD and boundary roughness through drag-down
111	A	86	7/13/2019	8:41:30	Very fine sand with shell hash and Stage 2 tubes at SWI. Shell hash densely intermixed with sediment matrix
111	B	86	7/13/2019	8:42:21	Very fine sand overlaying silt-clay. Dense shell hash at SWI and intermixed in very fine sand layer.
111	C	86	7/13/2019	8:43:00	Very fine sand with shell hash at SWI. Shell hash densely intermixed with sediment matrix
112	A	64	7/13/2019	9:06:04	Very fine sand with dense shell hash and a hermit crab at SWI. Partially infilled void visible in sediment.

StationID	Replicate	Water Depth (ft)	Date	Time	Comment
112	B	64	7/13/2019	9:08:46	Very fine sand with shell hash and Stage 2 tubes at SWI. Shell hash intermixed with sediment matrix. Burrows visible in sediment.
112	C	64	7/13/2019	9:10:44	Very fine sand with shell hash and Stage 2 tubes at SWI. Shell hash intermixed with sediment matrix. Burrows visible in sediment.
113	A	47	7/13/2019	9:42:44	Very fine sand with intermixed fine shell hash. Visible worm in burrow near aRPD boundary.
113	B	47	7/13/2019	9:43:32	Very fine sand with intermixed fine shell hash. Evidence of burrowing above and near aRPD boundary.
113	C	47	7/13/2019	9:44:43	Very fine sand with intermixed fine shell hash. Unable to distinguish aRPD or faunal evidence. Small rippling at sediment surface.
114	A	50	7/13/2019	10:07:17	Very fine sand over silt-clay. Shell hash and Stage 2 tubes at SWI. Burrows moving beyond aRPD boundary, including one with a visible worm present.
114	B	50	7/13/2019	10:08:06	Very fine sand over silt-clay. Shell hash and Stage 2 tubes at SWI. Large burrow moving from SWI down to partially infilled void.
114	D	50	7/13/2019	10:09:27	Very fine sand over silt-clay. Shell hash and Stage 2 tubes at SWI. Burrows moving beyond aRPD boundary and a partially infilled void near depth.
115	A	43	7/13/2019	10:28:29	Silt-clay with very high penetration. Stage 2 tubes at SWI and burrows well beyond aRPD boundary and infilled voids at depth.
115	B	43	7/13/2019	10:29:18	Silt-clay with very high penetration. Stage 2 tubes at SWI and burrows well beyond aRPD boundary. Large worm in a burrow and infilled voids at depth.
115	C	43	7/13/2019	10:30:12	Silt-clay with very high penetration. Stage 2 tubes at SWI and burrows well beyond aRPD boundary. Open voids near SWI and infilled voids at depth.
116	A	45	7/12/2019	11:15:11	Medium sand with rippling of sediment at SWI.
116	B	45	7/12/2019	11:17:10	Medium sand with a few small, visible burrows in the sediment.
116	D	45	7/12/2019	11:18:32	Medium sand with burrowing present. Stage 1 tubes at sediment surface.
117	A	46	7/12/2019	11:47:13	Very fine sand with shell hash and rippling at the surface.
117	C	46	7/12/2019	11:48:34	Very fine sand with rippling in background of image. Hermit crab at sediment surface with Stage 2 tube. Shallow burrowing visible.
117	D	46	7/12/2019	11:49:12	Very fine sand with sand dollar at the sediment surface. Shallow burrowing visible.
118	A	47	7/12/2019	16:05:52	Fine sand with Stage 2 tubes in background of image at sediment surface. Rippling of surficial sediment present.
118	B	47	7/12/2019	16:07:23	Fine sand with Stage 2 tubes in background of image at sediment surface. Rippling of surficial sediment present.
118	C	47	7/12/2019	16:08:53	Fine sand with Stage 2 tubes in background of image at sediment surface. Rippling of surficial sediment present.
119	A	45	7/12/2019	11:34:44	Fine sand with Stage 2 tubes in background of image at sediment surface. Shell hash at surface and intermixed with sediment.
119	B	45	7/12/2019	11:35:25	Fine sand with Stage 2 tubes in background of image at sediment surface. Shell hash at surface and intermixed with sediment.
119	C	45	7/12/2019	11:36:15	Fine sand with Stage 2 tubes in background of image at sediment surface. Rippling of surficial sediment present.
120	A	36	7/12/2019	12:59:28	Very fine sand with rippling at surface. Well-developed aRPD with shallow burrowing evident.
120	B	36	7/12/2019	13:01:28	Very fine sand with rippling at sediment surface.
120	C	36	7/12/2019	13:02:59	Very fine sand with Stage 2 tubes at sediment surface.
121	A	27	7/12/2019	13:26:29	Very fine sand with a well-developed aRPD and a burrow moving beyond aRPD boundary.
121	B	27	7/12/2019	13:28:05	Very fine sand with some rippling at sediment surface.
121	C	27	7/12/2019	13:29:31	Very fine sand with a Stage 2 tube visible at sediment surface. Rippling present in background of image.
122	A	44	7/12/2019	15:53:33	Fine sand with Stage 2 tubes in background of image and rippling at sediment surface.
122	B	44	7/12/2019	15:55:18	Fine sand with Stage 2 tubes in background of image and a hermit crab on sediment surface.

StationID	Replicate	Water Depth (ft)	Date	Time	Comment
122	C	44	7/12/2019	15:56:52	Fine sand with small tubes at SWI and evidence of burrowing near aRPD boundary. Rippling at SWI.
123	A	45	7/12/2019	15:17:15	Medium sand with rippling at SWI and burrows present in sediment.
123	B	45	7/12/2019	15:19:07	Medium sand with a ripple at SWI and small tubes in background of image. Well-developed aRPD.
123	C	45	7/12/2019	15:20:45	Medium sand with coarse sand intermixed and Stage 2 tubes in background of image.
124	A	41	7/12/2019	15:02:59	Fine sand with rippling, a Stage 2 tube, and a mollusc at sediment surface.
124	B	41	7/12/2019	15:04:34	Fine sand with some rippling at sediment surface and a well-developed aRPD.
124	C	41	7/12/2019	15:06:01	Fine sand with a well-developed aRPD and shallow burrowing.
125	A	43	7/12/2019	15:31:40	Very fine sand with a Stage 2 tube structure laying at SWI.
125	B	43	7/12/2019	15:33:14	Very fine sand with evidence of shallow burrowing.
125	C	43	7/12/2019	15:34:50	Very fine sand with a ripple at SWI, a buried sand dollar against the faceplate, and a Stage 2 tube in background of image.
126	A	37	7/12/2019	14:51:31	Fine pebbles with intermixed coarse pebbles overlaying very fine sand. Coarse material makes aRPD and SS determination difficult
126	C	37	7/12/2019	14:54:48	Medium pebbles with intermixed coarse pebbles overlaying very fine sand. Hydroids growing on a shell fragment at SWI. Visible worms in burrows beneath pebble layer.
126	D	37	7/12/2019	14:56:17	Fine pebbles overlaying very fine sand. Burrowing, some with small worms visible in sediment beneath pebble layer.
127	A	43	7/12/2019	15:41:45	Fine pebbles overlaying and intermixed with fine sand. Coarse material makes aRPD and SS determination difficult.
127	B	43	7/12/2019	15:43:25	Fine sand with densely intermixed very coarse sand and very fine pebbles. Minor rippling at sediment surface. Intermixed coarse material makes SS determination difficult.
127	C	43	7/12/2019	15:45:03	Very fine pebbles overlaying/intermixed with fine sand. Coarse material makes SS determination difficult.
128	A	44	7/12/2019	14:32:02	Silt-clay with overpenetration. Some burrowing evident.
128	B	44	7/12/2019	14:33:47	Silt-clay with overpenetration. Methane present. Large worm in burrow visible.
128	C	44	7/12/2019	14:35:19	Silt-clay with overpenetration. Some burrowing evident.
129	A	40	7/12/2019	13:49:47	Silt-clay overlaying very fine sand. Layering within sediment evident. Burrows at SWI moving a few cms in to sediment.
129	B	40	7/12/2019	13:51:37	Silt-clay overlaying very fine sand. Layering within sediment evident. Stage 2 tube and amphipod structure at SWI and burrows at SWI moving a few cms in to sediment.
129	C	40	7/12/2019	13:53:18	Very fine sand over silt-clay. Stage 2 tubes at SWI.
130	A	31	7/12/2019	14:11:48	Fine pebbles overlaying and intermixed with very fine sand. Coarse material makes aRPD and SS determination difficult.
130	B	31	7/12/2019	14:13:30	Fine pebbles overlaying and intermixed with very fine sand. Coarse material makes aRPD and SS determination difficult.
130	C	31	7/12/2019	14:14:55	Fine pebbles overlaying and intermixed with very fine sand. Coarse material makes aRPD and SS determination difficult.
131	A	69	7/11/2019	15:22:35	Medium sand with intermixed very fine pebbles. Stage 2 tube and possible mussel shells at SWI.
131	B	69	7/11/2019	15:23:59	Thin layer of very fine pebbles overlaying and intermixed with medium sand. Stage 2 tubes at SWI.
131	C	69	7/11/2019	15:25:09	Thin layer of very fine pebbles overlaying and intermixed with medium sand. A hermit crab and unknown object/organism in background of image.
132	A	75	7/11/2019	15:03:19	Thin layer of fine pebbles with some coarse pebbles and shell hash overlaying medium sand. A Stage 2 tube at SWI.
132	B	75	7/11/2019	15:04:38	Medium sand with some intermixed and surficial very coarse sand and fine pebbles. Stage 2 structures at SWI.

StationID	Replicate	Water Depth (ft)	Date	Time	Comment
132	C	75	7/11/2019	15:05:52	Medium sand with some intermixed and surficial very coarse sand and very fine pebbles.
133	A	79	7/11/2019	14:45:31	Coarse sand with intermixed very fine pebbles. Stage 2 structures at SWI.
133	B	79	7/11/2019	14:46:49	Medium sand with intermixed and surficial very fine pebbles. Sand dollars against faceplate and SWI.
133	C	79	7/11/2019	14:48:06	Medium sand with intermixed and surficial very fine pebbles. Many Stage 2 structures at SWI.
134	A	80	7/11/2019	14:25:50	Fine sand with intermixed very fine pebbles/very coarse sand. Very high water content within sediment matrix obscures variables.
134	B	80	7/11/2019	14:27:13	Very coarse sand over fine sand with Stage 2 structures at SWI.
134	D	80	7/11/2019	14:29:45	Very coarse sand over fine sand. Coarse material makes aRPD and SS determination difficult.
135	A	76	7/11/2019	4:37:00	Very fine sand with rippling at SWI.
135	B	76	7/11/2019	4:37:50	Very fine sand with a Stage 2 tube at SWI.
135	D	76	7/11/2019	4:40:33	Very fine sand with a sand dollar against the faceplate and sand dollars and Stage 2 tubes in background of image.
136	A	83	7/11/2019	4:16:12	Fine sand with evidence of burrowing near aRPD boundary.
136	B	83	7/11/2019	4:17:01	Fine sand with Stage 2 tubes and a gastropod at sediment surface in the background of the image.
136	C	83	7/11/2019	4:18:34	Fine sand with a few very fine pebbles at SWI.
137	A	91	7/11/2019	3:56:08	Fine sand with a couple of Stage 2 structures at sediment surface.
137	B	91	7/11/2019	3:56:49	Fine sand with multiple Stage 2 tubes and amphipod structures at SWI.
137	C	91	7/11/2019	3:57:37	Fine sand with a Stage 2 tube at sediment surface.
138	A	90	7/11/2019	3:35:33	Fine sand with multiple sand dollars against faceplate.
138	B	90	7/11/2019	3:36:20	Fine sand with many sand dollars at sediment surface and a Stage 2 tube at SWI.
138	C	90	7/11/2019	3:37:07	Fine sand with multiple sand dollars visible.
139	A	88	7/11/2019	3:14:21	Very fine sand with Stage 2 tubes at sediment surface and a large worm in a burrow beyond aRPD boundary.
139	B	88	7/11/2019	3:15:08	Very fine sand with Stage 2 tubes and sand dollars at the sediment surface.
139	C	88	7/11/2019	3:15:52	Very fine sand with Stage 2 tubes and sand dollars at the sediment surface.
140	A	93	7/11/2019	2:51:45	Fine sand with Stage 2 tubes at SWI and a large worm in a burrow beyond the aRPD boundary.
140	B	93	7/11/2019	2:52:27	Fine sand with Stage 2 tubes at SWI and sand dollars at sediment surface in the background of the image.
140	C	93	7/11/2019	2:53:18	Fine sand with Stage 2 tubes and amphipod structures at the sediment surface.
141	A	96	7/10/2019	19:24:58	Very fine sand with Stage 2 tubes at SWI and large rippling occurring at sediment surface.
141	B	96	7/10/2019	19:26:17	Very fine sand with Stage 2 tubes at SWI and sand dollars at sediment surface in the background of the image.
141	C	96	7/10/2019	19:27:36	Very fine sand with Stage 2 tubes and a gastropod in background of image.
142	A	95	7/10/2019	19:57:04	Very fine sand with a Stage 2 tube in background of image at SWI.
142	B	95	7/10/2019	19:58:33	Very fine sand with a sand dollar against the faceplate and a Stage 2 tube in the background of image.
142	C	95	7/10/2019	20:00:01	Very fine sand with many Stage 2 tubes and amphipod structures at SWI.
143	A	93	7/10/2019	20:40:07	Very fine sand with an amphipod structure and sand dollar at SWI. A worm in a burrow beyond aRPD boundary visible.
143	C	93	7/10/2019	20:43:07	Very fine sand with many Stage 2 tubes and amphipod structures at SWI.
143	D	93	7/10/2019	20:44:28	Very fine sand with Stage 2 tubes at SWI.
144	A	94	7/10/2019	21:01:21	Very fine sand with Stage 2 tubes, sand dollars, and a hermit crab at SWI.
144	B	94	7/10/2019	21:02:44	Very fine sand with Stage 2 tubes at SWI and a sand dollar in background of image.
144	D	94	7/10/2019	21:05:26	Very fine sand with Stage 2 tubes at SWI.
145	A	99	7/10/2019	21:23:25	Very fine sand with Stage 2 tubes, amphipod structures, and a large worm in a burrow beneath aRPD boundary.
145	B	99	7/10/2019	21:24:42	Very fine sand with multiple Stage 2 tubes in background of image.
145	C	99	7/10/2019	21:26:12	Very fine sand with Stage 2 tubes and amphipod structures in background of image. A small hermit crab present at sediment surface.

StationID	Replicate	Water Depth (ft)	Date	Time	Comment
146	A	100	7/10/2019	21:43:36	Very fine sand with a few Stage 2 tubes at SWI.
146	B	100	7/10/2019	21:44:51	Very fine sand with a Stage 2 tube against the faceplate and many sand dollars in background of image.
146	C	100	7/10/2019	21:46:03	Very fine sand with Stage 2 tubes in background of image. Small unknown organism against faceplate. Possible gastropod in far background of image.
147	A	103	7/10/2019	16:00:51	Fine sand with a couple of sand dollars against the faceplate.
147	B	103	7/10/2019	16:02:02	Fine sand with surficial shell hash. Multiple gastropods at sediment surface.
147	C	103	7/10/2019	16:03:17	Fine sand with surficial shell hash, a gastropod, and a sand dollar at sediment surface.
148	A	115	7/10/2019	15:41:02	Fine sand with surficial shell hash. Stage 2 tube and a sand dollar at SWI. Burrow visible in sediment moving beyond aRPD boundary.
148	B	115	7/10/2019	15:42:16	Fine sand with some surficial shell hash and amphipod structures in background of the image.
148	C	115	7/10/2019	15:43:25	Fine sand with a Stage 2 tube and sand dollar on the sediment surface.
149	A	111	7/10/2019	15:22:07	Fine sand with surficial shell hash, Stage 2 tubes, and a sand dollar at SWI.
149	B	111	7/10/2019	15:23:16	Fine sand with some surficial shell hash and a gastropod at sediment surface.
149	D	111	7/10/2019	15:25:55	Fine sand with Stage 2 tube, amphipod structure, and multiple sand dollars at sediment surface, including one against the faceplate.
150	A	111	7/10/2019	14:50:28	Fine sand with some intermixed shell hash. Sand dollars and gastropod at sediment surface. Sand dollar against face plate. Shallow burrowing evident.
150	B	111	7/10/2019	14:51:38	Fine sand with surficial shell hash and many sand dollars at sediment surface.
150	C	111	7/10/2019	14:52:48	Fine sand with sand dollars and amphipod structures at SWI.
151	A	112	7/10/2019	14:30:28	Medium sand with Stage 2 tubes and amphipod structures in background of image.
151	B	112	7/10/2019	14:31:55	Medium sand with Stage 2 tubes in background of image. Intermixed shell hash and a large worm in a burrow moving beyond aRPD boundary.
151	D	112	7/10/2019	14:34:25	Fine sand with surficial shell hash, some intermixed, and a sand dollar in background of image.
152	A	113	7/10/2019	14:12:10	Medium sand with surficial and intermixed shell hash. Stage 2 tubes and sand dollars visible in background of image.
152	B	113	7/10/2019	14:13:28	Medium sand with surficial and intermixed shell hash. Stage 2 tubes visible in background of image.
152	D	113	7/10/2019	14:16:09	Medium sand with an amphipod structure and a gastropod at the SWI. Shallow burrowing evident.
153	A	117	7/10/2019	13:49:55	Medium sand with Stage 2 tubes and a sand dollar in background of image.
153	B	117	7/10/2019	13:51:04	Medium sand with some surficial shell hash. A Stage 2 tube and sand dollar in background of image.
153	C	117	7/10/2019	13:52:15	Medium sand with intermixed shell hash. Many Stage 2 tubes at SWI. Ripple or mound transected.
154	A	121	7/10/2019	13:28:49	Fine sand with some surficial shell hash. A sand dollar against faceplate, another in background, and a Stage 2 tube at SWI.
154	B	121	7/10/2019	13:30:04	Fine sand with some surficial shell hash and a Stage 2 tube in the background of the image.
154	C	121	7/10/2019	13:31:28	Fine sand with surficial shell hash. Burrows visible moving beyond aRPD boundary.
155	A	120	7/10/2019	13:08:12	Fine sand with Stage 2 structures at SWI.
155	B	120	7/10/2019	13:09:15	Fine sand with Stage 2 structures and a sand dollar at SWI. Rippling and surficial shell hash in background of image.
155	D	120	7/10/2019	13:11:26	Fine sand with Stage 2 tubes in background of image.
156	A	119	7/10/2019	12:47:15	Fine sand with Stage 2 tubes in background of image.
156	B	119	7/10/2019	12:48:21	Fine sand with surficial and intermixed shell hash.
156	D	119	7/10/2019	12:50:32	Fine sand with Stage 2 tubes and a sand dollar in background of image.
157	A	121	7/10/2019	12:21:56	Medium sand with small tubes at SWI. Some shallow burrowing visible.

StationID	Replicate	Water Depth (ft)	Date	Time	Comment
157	B	121	7/10/2019	12:22:57	Medium sand with Stage 2 tubes at SWI. A worm in a burrow beyond aRPD boundary. Large shell hash pieces within sediment column.
157	C	121	7/10/2019	12:24:00	Medium sand with some intermixed shell hash. Stage 2 structures and a sand dollar at SWI.
REFA_01	A	94	7/13/2019	22:15:50	Fine pebbles overlaying and intermixed with fine sand. Coarse material makes aRPD and SS determination difficult.
REFA_01	B	94	7/13/2019	22:17:20	Fine pebbles with a few scattered more coarse pebbles overlaying and intermixed with medium sand. A Stage 2 tube at SWI.
REFA_01	C	94	7/13/2019	22:18:43	Medium sand with a few coarse pebbles and fine pebbles at SWI and intermixed. A Stage 2 tube a SWI.
REFA_02	A	105	7/13/2019	21:21:27	Medium sand over fine sand with medium and fine pebbles scattered at surface. Stage 2 tubes visible at SWI.
REFA_02	B	105	7/13/2019	21:23:07	Coarse sand over medium sand with some scattered very fine and fine pebbles. Amphipod structures at SWI.
REFA_02	D	105	7/13/2019	21:26:05	Coarse sand over medium sand with some scattered fine and coarse pebbles. Amphipod structures at SWI.
REFA_03	A	101	7/13/2019	21:48:32	Many fine pebbles scattered at surface over medium sand. A worm in a burrow visible.
REFA_03	B	101	7/13/2019	21:50:02	Very fine pebbles and very coarse sand overlaying medium sand. Some fine pebbles at SWI. A Stage 2 tube at SWI.
REFA_03	D	101	7/13/2019	21:52:50	A thick layer of fine pebbles overlaying medium sand. A hermit crab against the faceplate.
REFA_04	A	100	7/13/2019	21:37:46	Fine pebbles overlaying and intermixed with medium sand. Coarse material makes SS and aRPD determination difficult.
REFA_04	C	100	7/13/2019	21:41:22	Medium sand with fine and very fine pebbles at SWI and intermixed. Amphipod structures present at SWI.
REFA_04	D	100	7/13/2019	21:42:54	Fine pebbles overlaying and intermixed with medium sand. Stage 2 structures at SWI.
REFA_05	A	109	7/13/2019	22:00:17	Fine pebbles overlaying and intermixed with medium sand. Stage 2 structures at SWI.
REFA_05	B	109	7/13/2019	22:01:44	Fine pebbles overlaying and intermixed with medium sand. Stage 2 tubes and a hermit crab at SWI.
REFA_05	C	109	7/13/2019	22:03:11	Medium sand with surficial and intermixed fine pebbles and coarse sand overlaying a layer of reduced silt-clay. Stage 2 tubes and amphipod structures at SWI.
REFB_01	A	77	7/11/2019	5:39:10	Fine sand with Stage 1 and Stage 2 tubes at SWI. Sand dollar buried at sediment surface.
REFB_01	B	77	7/11/2019	5:39:55	Fine sand with Stage 1 and Stage 2 tubes at SWI. Shallow burrowing visible.
REFB_01	C	77	7/11/2019	5:41:23	Fine sand with Stage 1 and Stage 2 tubes at SWI. Shallow burrowing visible.
REFB_02	A	75	7/11/2019	5:05:43	Fine sand with a few pieces of shell intermixed. Unable to determine aRPD or SS.
REFB_02	B	75	7/11/2019	5:06:26	Fine sand with Stage 2 tubes present at sediment surface.
REFB_02	C	75	7/11/2019	5:07:45	Fine sand with Stage 2 tubes present at sediment surface.
REFB_03	A	75	7/11/2019	5:18:19	Fine sand with no visual fauna.
REFB_03	B	75	7/11/2019	5:19:01	Fine sand with rippling at SWI and Stage 2 tubes in background of image.
REFB_03	C	75	7/11/2019	5:19:51	Fine sand with many Stage 2 tubes in background of image.
REFB_04	A	76	7/11/2019	5:28:14	Medium sand with a few Stage 2 tubes at sediment surface.
REFB_04	D	76	7/11/2019	5:31:01	Medium sand with shell hash and a few scattered fine pebbles at sediment surface.
REFB_04	E	76	7/11/2019	5:31:59	Medium sand with shell hash and a few scattered fine pebbles at sediment surface. Many hydroids present at sediment surface.
REFB_05	A	79	7/11/2019	5:47:11	Fine sand with Stage 1 tubes at SWI. Evidence of burrowing moving the aRPD boundary deeper in to sediment. Sand dollars in background and against faceplate.
REFB_05	B	79	7/11/2019	5:48:06	Fine sand with Stage 1 tubes at SWI. Evidence of burrowing moving the aRPD boundary deeper in to sediment. Sand dollars in background and against faceplate.
REFB_05	C	79	7/11/2019	5:48:55	Fine sand with a gastropod and multiple sand dollars in background of image. Shallow burrowing evident.
REFC_01	A	117	7/13/2019	20:24:09	Fine sand with dense amphipod tubes at SWI.
REFC_01	B	117	7/13/2019	20:25:59	Fine sand with dense amphipod tubes at SWI, as well as amphipod structures at SWI.
REFC_01	D	117	7/13/2019	20:28:51	Fine sand with dense amphipod tubes at SWI. Shrimp present on sediment surface.

StationID	Replicate	Water Depth (ft)	Date	Time	Comment
REFC_02	A	117	7/13/2019	20:32:29	Fine sand with dense amphipod tubes at SWI.
REFC_02	B	117	7/13/2019	20:33:51	Fine sand with dense amphipod tubes at SWI.
REFC_02	C	117	7/13/2019	20:35:19	Fine sand with intermixed shell hash. Amphipod tubes and rippling at SWI.
REFC_03	A	119	7/13/2019	19:54:06	Fine sand with dense amphipod tubes at SWI.
REFC_03	B	119	7/13/2019	19:55:33	Fine sand with amphipod tubes and shell hash at SWI. A large mound in background of image.
REFC_03	D	119	7/13/2019	19:58:19	Fine sand with amphipod tubes in background of image. Rippling at sediment surface present in background of image.
REFC_04	A	114	7/13/2019	20:12:44	Fine sand with amphipod tubes at SWI.
REFC_04	B	114	7/13/2019	20:14:14	Fine sand with amphipod tubes at SWI.
REFC_04	C	114	7/13/2019	20:15:36	Fine sand over a layer of reduced very fine sand. Dense amphipod tubes at SWI and a large worm in a burrow at depth.
REFC_05	A	115	7/13/2019	20:03:58	Fine sand with amphipod tubes at SWI. Patches of reduced very fine sand near depth.
REFC_05	B	115	7/13/2019	20:05:24	Fine sand with amphipod tubes and structures at SWI.
REFC_05	C	115	7/13/2019	20:06:57	Fine sand. Dense amphipod tubes at SWI and a large worm in a burrow at depth.

APPENDIX D

Plan View Image Analysis Results

Notes:

IND=Indeterminate

Bedform Size Measurement: "-" indicates variable is not measured for the replicate

StationID	Replicate	Date	Time	Image Width (cm)	Image Height (cm)	Field of View (m^2)	Habitat Type	Substrate Group	Substrate Subgroup	Gravel Mode (mm)	Boulders	Bedforms
001	A	7/14/2019	3:34:45	100.58	67.05	0.67	Sand with Mobile Gravel	Gravelly	Gravelly Sand	15.93	No	None
001	B	7/14/2019	3:35:30	96.77	64.52	0.62	Sand with Mobile Gravel	Gravelly	Gravelly Sand	14.52	No	None
001	C	7/14/2019	3:36:14	97.56	65.04	0.63	Sand with Mobile Gravel	Gravelly	Gravelly Sand	16.26	No	None
002	A	7/14/2019	3:12:55	94.60	63.07	0.60	Sand with Mobile Gravel	Gravel Mixes	Sandy Gravel	19.71	No	None
002	B	7/14/2019	3:13:37	92.42	61.61	0.57	Sand with Mobile Gravel	Gravel Mixes	Sandy Gravel	12.32	No	None
002	C	7/14/2019	3:14:17	IND	IND	IND	Sand with Mobile Gravel	Gravel Mixes	Sandy Gravel	IND	No	None
003	A	7/14/2019	2:50:05	99.30	66.20	0.66	Sand Sheet	Sand	Sand or Finer	IND	No	None
003	B	7/14/2019	2:50:47	IND	IND	IND	IND	IND	IND	IND	No	None
003	C	7/14/2019	2:51:22	IND	IND	IND	IND	IND	IND	IND	No	None
004	A	7/14/2019	2:28:26	94.83	63.22	0.60	Sand Sheet	Sand	Sand or Finer	IND	No	None
004	B	7/14/2019	2:29:13	94.95	63.30	0.60	Sand Sheet	Sand	Sand or Finer	IND	No	None
004	C	7/14/2019	2:29:53	98.05	65.37	0.64	Sand Sheet	Sand	Sand or Finer	IND	No	None
005	A	7/14/2019	2:06:58	99.81	66.54	0.66	Sand with Mobile Gravel	Gravelly	Gravelly Sand	8.32	No	None
005	B	7/14/2019	2:08:11	100.52	67.01	0.67	Sand with Mobile Gravel	Gravel Mixes	Sandy Gravel	4.19	No	None
005	C	7/14/2019	2:08:49	97.99	65.33	0.64	Sand with Mobile Gravel	Gravelly	Gravelly Sand	5.72	No	None
006	A	7/14/2019	1:46:47	94.03	62.69	0.59	Sand with Mobile Gravel	Gravelly	Gravelly Sand	3.13	No	None
006	B	7/14/2019	1:47:33	92.20	61.47	0.57	Sand with Mobile Gravel	Gravelly	Gravelly Sand	1.54	No	None
006	C	7/14/2019	1:48:16	95.88	63.92	0.61	Sand with Mobile Gravel	Gravelly	Gravelly Sand	1.60	No	None
007	A	7/14/2019	1:24:03	93.86	62.58	0.59	Sand Sheet	Sand	Sand or Finer	IND	No	None
007	B	7/14/2019	1:24:44	96.18	64.12	0.62	Sand Sheet	Sand	Sand or Finer	IND	No	None
007	C	7/14/2019	1:25:25	99.17	66.12	0.66	Sand Sheet	Sand	Sand or Finer	IND	No	None
008	B	7/14/2019	0:18:18	94.20	62.80	0.59	Sand with Mobile Gravel	Gravelly	Gravelly Sand	IND	No	None
008	C	7/14/2019	0:18:49	93.86	62.58	0.59	Sand with Mobile Gravel	Gravelly	Gravelly Sand	2.35	No	None
008	D	7/14/2019	0:19:34	100.58	67.05	0.67	Sand with Mobile Gravel	Gravelly	Gravelly Sand	1.68	No	None
009	A	7/13/2019	23:49:52	96.06	64.04	0.62	Sand with Mobile Gravel	Gravel Mixes	Sandy Gravel	16.01	No	None
009	B	7/13/2019	23:50:23	102.63	68.42	0.70	Sand with Mobile Gravel	Gravel Mixes	Sandy Gravel	17.11	No	None
009	C	7/13/2019	23:52:43	90.28	60.19	0.54	Sand with Mobile Gravel	Gravel Mixes	Sandy Gravel	15.05	No	None
010	B	7/13/2019	23:26:30	105.62	70.41	0.74	Patchy Cobbles & Boulders on Sand	Gravelly	Gravelly Muddy Sand	13.20	No	None
010	C	7/13/2019	23:27:53	98.55	65.70	0.65	Patchy Cobbles & Boulders on Sand	Gravelly	Gravelly Muddy Sand	14.78	Yes	None
010	D	7/13/2019	23:29:25	90.12	60.08	0.54	Sand Sheet	Gravelly	Gravelly Muddy Sand	14.27	No	None
011	A	7/13/2019	22:56:14	99.43	66.28	0.66	Sand Sheet	Sand	Sand or Finer	IND	No	None
011	B	7/13/2019	22:57:48	88.94	59.29	0.53	Sand Sheet	Sand	Sand or Finer	IND	No	None
011	C	7/13/2019	22:59:24	79.19	52.79	0.42	Sand Sheet	Sand	Sand or Finer	IND	No	None
012	A	7/13/2019	19:29:09	98.05	65.37	0.64	Sand Sheet	Sand	Sand or Finer	IND	No	None
012	B	7/13/2019	19:29:52	91.17	60.78	0.55	Sand Sheet	Sand	Sand or Finer	IND	No	None
012	C	7/13/2019	19:30:46	97.38	64.92	0.63	Sand Sheet	Sand	Sand or Finer	IND	No	None
013	A	7/13/2019	19:04:38	90.91	60.61	0.55	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples

StationID	Replicate	Date	Time	Image Width (cm)	Image Height (cm)	Field of View (m^2)	Habitat Type	Substrate Group	Substrate Subgroup	Gravel Mode (mm)	Boulders	Bedforms
013	B	7/13/2019	19:06:21	96.59	64.40	0.62	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
013	C	7/13/2019	19:07:48	94.15	62.76	0.59	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
014	A	7/13/2019	18:40:15	93.13	62.09	0.58	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
014	B	7/13/2019	18:41:46	100.06	66.71	0.67	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
014	D	7/13/2019	18:44:41	98.92	65.95	0.65	Sand Sheet	Sand	Sand or Finer	IND	No	None
015	A	7/13/2019	18:14:11	97.56	65.04	0.63	Sand Sheet	Sand	Sand or Finer	IND	No	None
015	B	7/13/2019	18:15:50	94.20	62.80	0.59	Sand Sheet	Sand	Sand or Finer	IND	No	None
015	C	7/13/2019	18:17:31	97.62	65.08	0.64	Sand Sheet	Sand	Sand or Finer	IND	No	None
016	A	7/10/2019	19:06:20	184.62	123.08	2.27	Sand Sheet	Sand	Sand or Finer	IND	No	None
016	B	7/10/2019	19:07:38	181.40	120.93	2.19	Sand Sheet	Sand	Sand or Finer	IND	No	None
016	C	7/10/2019	19:08:58	193.55	129.03	2.50	Sand Sheet	Sand	Sand or Finer	IND	No	None
017	A	7/10/2019	18:46:07	184.83	123.22	2.28	Sand Sheet	Sand	Sand or Finer	IND	No	None
017	B	7/10/2019	18:47:24	185.94	123.96	2.30	Sand Sheet	Sand	Sand or Finer	IND	No	None
017	D	7/10/2019	18:49:51	183.75	122.50	2.25	Sand Sheet	Sand	Sand or Finer	IND	No	None
018	A	7/10/2019	18:24:47	182.67	121.78	2.22	Sand Sheet	Sand	Sand or Finer	IND	No	None
018	B	7/10/2019	18:26:13	184.83	123.22	2.28	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
018	C	7/10/2019	18:27:33	187.50	125.00	2.34	Sand Sheet	Sand	Sand or Finer	IND	No	None
019	A	7/10/2019	18:02:41	185.49	123.66	2.29	Sand Sheet	Sand	Sand or Finer	IND	No	None
019	B	7/10/2019	18:03:50	185.05	123.37	2.28	Sand Sheet	Sand	Sand or Finer	IND	No	None
019	C	7/10/2019	18:04:59	181.40	120.93	2.19	Sand Sheet	Sand	Sand or Finer	IND	No	None
020	A	7/10/2019	17:42:33	182.03	121.35	2.21	Sand Sheet	Sand	Sand or Finer	IND	No	None
020	B	7/10/2019	17:44:13	194.76	129.84	2.53	Sand Sheet	Sand	Sand or Finer	IND	No	None
020	C	7/10/2019	17:45:35	186.60	124.40	2.32	Sand Sheet	Sand	Sand or Finer	IND	No	None
021	A	7/10/2019	22:17:49	178.29	118.86	2.12	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
021	B	7/10/2019	22:19:08	177.88	118.59	2.11	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
021	D	7/10/2019	22:21:45	179.52	119.68	2.15	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
022	A	7/10/2019	22:37:07	169.20	112.80	1.91	Sand Sheet	Sand	Sand or Finer	IND	No	None
022	B	7/10/2019	22:38:25	185.27	123.52	2.29	Sand Sheet	Sand	Sand or Finer	IND	No	None
022	C	7/10/2019	22:39:40	177.07	118.05	2.09	Sand Sheet	Sand	Sand or Finer	IND	No	None
023	A	7/10/2019	22:56:56	172.00	114.66	1.97	Sand Sheet	Sand	Sand or Finer	IND	No	Uneven ripples
023	B	7/10/2019	22:58:21	176.07	117.38	2.07	Sand Sheet	Sand	Sand or Finer	IND	No	Uneven ripples
023	D	7/10/2019	23:00:53	175.68	117.12	2.06	Sand Sheet	Sand	Sand or Finer	IND	No	Uneven ripples

StationID	Replicate	Date	Time	Image Width (cm)	Image Height (cm)	Field of View (m^2)	Habitat Type	Substrate Group	Substrate Subgroup	Gravel Mode (mm)	Boulders	Bedforms
024	A	7/10/2019	23:16:29	176.47	117.65	2.08	Sand Sheet	Sand	Sand or Finer	IND	No	None
024	B	7/10/2019	23:17:55	IND	IND	IND	Sand Sheet	Sand	Sand or Finer	IND	No	None
024	C	7/10/2019	23:19:13	172.95	115.30	1.99	Sand Sheet	Sand	Sand or Finer	IND	No	None
025	A	7/11/2019	0:56:16	135.42	90.28	1.22	Sand Sheet	Sand	Sand or Finer	IND	No	None
025	B	7/11/2019	0:57:00	133.33	88.89	1.19	Sand Sheet	Sand	Sand or Finer	IND	No	None
025	D	7/11/2019	0:58:36	139.04	92.69	1.29	Sand Sheet	Sand	Sand or Finer	IND	No	None
026	H	7/11/2019	10:09:11	113.95	75.97	0.87	Sand Sheet	Sand	Sand or Finer	IND	No	None
026	J	7/11/2019	10:10:19	112.07	74.71	0.84	Sand Sheet	Sand	Sand or Finer	IND	No	None
026	K	7/11/2019	10:10:51	111.91	74.61	0.83	Sand Sheet	Sand	Sand or Finer	IND	No	None
027	A	7/11/2019	10:38:25	115.47	76.98	0.89	Sand Sheet	Sand	Sand or Finer	IND	No	None
027	B	7/11/2019	10:39:09	112.88	75.25	0.85	Sand Sheet	Sand	Sand or Finer	IND	No	None
027	C	7/11/2019	10:39:55	118.18	78.79	0.93	Sand Sheet	Sand	Sand or Finer	IND	No	None
028	A	7/11/2019	10:55:58	108.11	72.07	0.78	Sand Sheet	Sand	Sand or Finer	IND	No	None
028	B	7/11/2019	10:56:51	107.00	71.33	0.76	Sand Sheet	Sand	Sand or Finer	IND	No	None
028	C	7/11/2019	10:57:35	111.59	74.39	0.83	Sand Sheet	Sand	Sand or Finer	IND	No	None
029	A	7/11/2019	11:14:25	104.14	69.43	0.72	Sand Sheet	Sand	Sand or Finer	IND	No	None
029	B	7/11/2019	11:15:05	114.45	76.30	0.87	Sand Sheet	Sand	Sand or Finer	IND	No	None
029	C	7/11/2019	11:15:49	108.18	72.12	0.78	Sand Sheet	Sand	Sand or Finer	IND	No	None
030	A	7/10/2019	3:03:22	178.08	118.72	2.11	Sand Sheet	Sand	Sand or Finer	IND	No	Uneven ripples
030	C	7/10/2019	3:07:54	183.31	122.21	2.24	Sand Sheet	Sand	Sand or Finer	IND	No	Uneven ripples
030	D	7/10/2019	3:09:40	180.14	120.09	2.16	Sand Sheet	Sand	Sand or Finer	IND	No	None
031	A	7/10/2019	4:07:21	175.48	116.99	2.05	Sand Sheet	Sand	Sand or Finer	IND	No	Uneven ripples
031	B	7/10/2019	4:08:30	179.72	119.82	2.15	Sand Sheet	Sand	Sand or Finer	IND	No	Uneven ripples
031	C	7/10/2019	4:09:35	IND	IND	IND	Sand Sheet	Sand	Sand or Finer	IND	No	None
032	A	7/10/2019	4:42:57	177.68	118.45	2.10	Sand Sheet	Sand	Sand or Finer	IND	No	None
032	B	7/10/2019	4:43:51	186.16	124.11	2.31	Sand Sheet	Sand	Sand or Finer	IND	No	None
032	D	7/10/2019	4:46:13	185.94	123.96	2.30	Sand Sheet	Sand	Sand or Finer	IND	No	None
033	A	7/10/2019	5:34:06	182.88	121.92	2.23	Sand Sheet	Sand	Sand or Finer	IND	No	None
033	B	7/10/2019	5:35:00	179.31	119.54	2.14	Sand Sheet	Sand	Sand or Finer	IND	No	None
033	C	7/10/2019	5:36:18	182.67	121.78	2.22	Sand Sheet	Sand	Sand or Finer	IND	No	None
034	A	7/10/2019	6:01:46	184.62	123.08	2.27	Sand Sheet	Sand	Sand or Finer	IND	No	None
034	B	7/10/2019	6:02:43	184.83	123.22	2.28	Sand Sheet	Sand	Sand or Finer	IND	No	None

StationID	Replicate	Date	Time	Image Width (cm)	Image Height (cm)	Field of View (m^2)	Habitat Type	Substrate Group	Substrate Subgroup	Gravel Mode (mm)	Boulders	Bedforms
034	C	7/10/2019	6:05:56	187.05	124.70	2.33	Sand Sheet	Sand	Sand or Finer	IND	No	None
035	A	7/10/2019	6:34:12	192.36	128.24	2.47	Sand Sheet	Sand	Sand or Finer	IND	No	None
035	B	7/10/2019	6:35:01	189.32	126.21	2.39	Sand Sheet	Sand	Sand or Finer	IND	No	None
035	C	7/10/2019	6:37:21	181.82	121.21	2.20	Sand Sheet	Sand	Sand or Finer	IND	No	None
036	A	7/10/2019	6:58:34	181.40	120.93	2.19	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
036	B	7/10/2019	6:59:33	190.94	127.29	2.43	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
036	C	7/10/2019	7:00:29	196.47	130.98	2.57	Sand Sheet	Sand	Sand or Finer	IND	No	None
037	A	7/10/2019	7:19:52	182.67	121.78	2.22	Sand with Mobile Gravel	Gravelly	Gravelly Sand	3.04	No	None
037	C	7/10/2019	7:21:38	IND	IND	IND	IND	IND	IND	IND	No	IND
037	D	7/10/2019	7:23:00	183.31	122.21	2.24	Sand with Mobile Gravel	Gravelly	Gravelly Sand	3.06	No	None
038	A	7/10/2019	7:43:56	182.03	121.35	2.21	Sand Sheet	Sand	Sand or Finer	IND	No	None
038	B	7/10/2019	7:44:45	182.46	121.64	2.22	Sand Sheet	Sand	Sand or Finer	IND	No	None
038	C	7/10/2019	7:45:38	187.50	125.00	2.34	Sand Sheet	Sand	Sand or Finer	IND	No	None
039	A	7/10/2019	8:08:18	185.94	123.96	2.30	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
039	B	7/10/2019	8:09:56	183.10	122.07	2.24	Sand Sheet	Sand	Sand or Finer	IND	No	None
039	C	7/10/2019	8:10:53	174.11	116.07	2.02	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
040	A	7/10/2019	8:31:37	180.76	120.51	2.18	Sand Sheet	Sand	Sand or Finer	IND	No	None
040	B	7/10/2019	8:32:26	178.29	118.86	2.12	Sand Sheet	Sand	Sand or Finer	IND	No	None
040	C	7/10/2019	8:33:15	186.60	124.40	2.32	Sand Sheet	Sand	Sand or Finer	IND	No	None
041	A	7/10/2019	8:53:38	190.71	127.14	2.42	Sand Sheet	Sand	Sand or Finer	IND	No	None
041	B	7/10/2019	8:54:21	177.27	118.18	2.10	Sand Sheet	Sand	Sand or Finer	IND	No	None
041	C	7/10/2019	8:55:07	182.46	121.64	2.22	Sand Sheet	Sand	Sand or Finer	IND	No	None
042	A	7/10/2019	9:16:27	191.18	127.45	2.44	Sand Sheet	Sand	Sand or Finer	IND	No	None
042	B	7/10/2019	9:18:13	183.53	122.35	2.25	Sand Sheet	Sand	Sand or Finer	IND	No	None
042	C	7/10/2019	9:18:59	175.48	116.99	2.05	Sand Sheet	Sand	Sand or Finer	IND	No	None
043	A	7/11/2019	11:28:49	116.68	77.79	0.91	Sand Sheet	Sand	Sand or Finer	IND	No	None
043	B	7/11/2019	11:29:41	117.82	78.55	0.93	Sand Sheet	Sand	Sand or Finer	IND	No	None
043	C	7/11/2019	11:30:30	111.59	74.39	0.83	Sand Sheet	Sand	Sand or Finer	IND	No	None
044	A	7/11/2019	11:46:39	104.91	69.94	0.73	Sand Sheet	Sand	Sand or Finer	IND	No	None
044	B	7/11/2019	11:47:26	125.10	83.40	1.04	Sand Sheet	Sand	Sand or Finer	IND	No	None
044	C	7/11/2019	11:48:41	111.03	74.02	0.82	Sand Sheet	Sand	Sand or Finer	IND	No	None
045	A	7/11/2019	12:06:54	114.62	76.41	0.88	Sand Sheet	Sand	Sand or Finer	IND	No	None
045	B	7/11/2019	12:08:30	114.54	76.36	0.87	Sand Sheet	Sand	Sand or Finer	IND	No	None

StationID	Replicate	Date	Time	Image Width (cm)	Image Height (cm)	Field of View (m^2)	Habitat Type	Substrate Group	Substrate Subgroup	Gravel Mode (mm)	Boulders	Bedforms
045	C	7/11/2019	12:09:39	116.24	77.50	0.90	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
046	A	7/11/2019	19:50:23	113.37	75.58	0.86	Sand with Mobile Gravel	Gravelly	Gravelly Sand	9.83	No	None
046	B	7/11/2019	19:51:38	103.24	68.83	0.71	Sand with Mobile Gravel	Gravelly	Gravelly Sand	15.14	No	None
046	D	7/11/2019	19:54:07	IND	IND	IND	IND	IND	IND	IND	No	None
047	A	7/11/2019	19:22:18	112.88	75.25	0.85	Sand Sheet	Sand	Sand or Finer	IND	No	None
047	D	7/11/2019	19:26:07	118.63	79.09	0.94	Sand Sheet	Sand	Sand or Finer	IND	No	None
047	E	7/11/2019	19:30:39	117.56	78.37	0.92	Sand Sheet	Sand	Sand or Finer	IND	No	None
048	A	7/11/2019	12:23:53	117.56	78.37	0.92	Sand Sheet	Sand	Sand or Finer	IND	No	None
048	B	7/11/2019	12:25:10	115.73	77.15	0.89	Sand Sheet	Sand	Sand or Finer	IND	No	None
048	C	7/11/2019	12:26:27	114.96	76.64	0.88	Sand Sheet	Sand	Sand or Finer	IND	No	None
049	A	7/11/2019	12:41:20	118.81	79.21	0.94	Sand Sheet	Sand	Sand or Finer	IND	No	None
049	B	7/11/2019	12:42:36	107.44	71.63	0.77	Sand Sheet	Sand	Sand or Finer	IND	No	None
049	D	7/11/2019	12:45:02	110.56	73.71	0.81	Sand Sheet	Sand	Sand or Finer	IND	No	None
050	A	7/11/2019	12:59:07	111.59	74.39	0.83	Patchy Cobbles & Boulders on Sand	Gravel Mixes	Sandy Gravel	225.97	Yes	None
050	B	7/11/2019	13:00:27	112.15	74.77	0.84	Patchy Cobbles & Boulders on Sand	Gravel Mixes	Sandy Gravel	162.62	Yes	None
050	C	7/11/2019	13:01:35	110.01	73.34	0.81	Patchy Cobbles & Boulders on Sand	Gravelly	Gravelly Sand	198.94	Yes	None
051	A	7/11/2019	13:17:49	110.56	73.71	0.81	Sand with Mobile Gravel	Gravel Mixes	Sandy Gravel	5.90	No	None
051	B	7/11/2019	13:19:05	116.77	77.84	0.91	Sand with Mobile Gravel	Gravel Mixes	Sandy Gravel	2.92	No	None
051	C	7/11/2019	13:21:30	IND	IND	IND	Sand with Mobile Gravel	Gravel Mixes	Sandy Gravel	IND	No	None
052	B	7/11/2019	14:07:18	111.35	74.23	0.83	Sand Sheet	Sand	Sand or Finer	IND	No	None
052	C	7/11/2019	14:08:33	110.33	73.55	0.81	Sand Sheet	Sand	Sand or Finer	IND	No	None
052	D	7/11/2019	14:09:44	110.17	73.45	0.81	Sand Sheet	Sand	Sand or Finer	IND	No	None
053	A	7/12/2019	20:56:09	105.76	70.51	0.75	Sand Sheet	Sand	Sand or Finer	IND	No	None
053	B	7/12/2019	20:57:57	110.17	73.45	0.81	Sand Sheet	Sand	Sand or Finer	IND	No	None
053	D	7/12/2019	21:00:52	112.23	74.82	0.84	Sand Sheet	Sand	Sand or Finer	IND	No	None
054	A	7/12/2019	21:18:48	112.55	75.04	0.84	Sand with Mobile Gravel	Slightly Gravelly	Slightly Gravelly Sand	1.88	No	None
054	B	7/12/2019	21:19:58	106.92	71.28	0.76	Sand with Mobile Gravel	Slightly Gravelly	Slightly Gravelly Sand	1.78	No	None
054	C	7/12/2019	21:21:41	104.42	69.61	0.73	Sand Sheet	Slightly Gravelly	Slightly Gravelly Sand	1.91	No	None
055	A	7/12/2019	23:58:10	105.83	70.56	0.75	Sand Sheet	Sand	Sand or Finer	IND	No	None
055	B	7/12/2019	23:59:43	107.07	71.38	0.76	Sand Sheet	Sand	Sand or Finer	IND	No	None
055	C	7/13/2019	0:01:14	112.47	74.98	0.84	Sand Sheet	Sand	Sand or Finer	IND	No	None
056	A	7/13/2019	0:21:34	108.56	72.37	0.79	Sand Sheet	Sand	Sand or Finer	IND	No	None
056	B	7/13/2019	0:22:35	113.21	75.47	0.85	Sand Sheet	Sand	Sand or Finer	IND	No	None

StationID	Replicate	Date	Time	Image Width (cm)	Image Height (cm)	Field of View (m^2)	Habitat Type	Substrate Group	Substrate Subgroup	Gravel Mode (mm)	Boulders	Bedforms
056	C	7/13/2019	0:23:16	109.86	73.24	0.80	Sand Sheet	Sand	Sand or Finer	IND	No	None
057	A	7/13/2019	0:43:48	108.56	72.37	0.79	Sand Sheet	Sand	Sand or Finer	IND	No	None
057	B	7/13/2019	0:44:28	112.96	75.31	0.85	Sand Sheet	Sand	Sand or Finer	IND	No	None
057	C	7/13/2019	0:45:12	107.88	71.92	0.78	Sand Sheet	Sand	Sand or Finer	IND	No	None
058	A	7/13/2019	1:07:35	110.17	73.45	0.81	Sand Sheet	Sand	Sand or Finer	IND	No	None
058	B	7/13/2019	1:08:20	100.19	66.80	0.67	Sand Sheet	Sand	Sand or Finer	IND	No	None
058	D	7/13/2019	1:09:38	106.19	70.80	0.75	Sand Sheet	Sand	Sand or Finer	IND	No	None
059	A	7/13/2019	1:29:15	110.33	73.55	0.81	Sand Sheet	Sand	Sand or Finer	IND	No	None
060	A	7/13/2019	1:54:04	109.17	72.78	0.79	Sand Sheet	Sand	Sand or Finer	IND	No	None
060	B	7/13/2019	1:54:42	IND	IND	IND	Sand Sheet	Sand	Sand or Finer	IND	No	None
060	C	7/13/2019	1:55:24	107.22	71.48	0.77	Sand Sheet	Sand	Sand or Finer	IND	No	None
061	A	7/13/2019	2:18:14	107.44	71.63	0.77	Sand Sheet	Sand	Sand or Finer	IND	No	None
061	C	7/13/2019	2:19:38	109.40	72.93	0.80	Sand Sheet	Sand	Sand or Finer	IND	No	None
061	D	7/13/2019	2:20:20	106.78	71.18	0.76	Sand Sheet	Sand	Sand or Finer	IND	No	None
062	A	7/13/2019	2:39:53	110.80	73.86	0.82	Sand Sheet	Sand	Sand or Finer	IND	No	None
062	B	7/13/2019	2:40:39	IND	IND	IND	IND	IND	IND	IND	No	IND
062	D	7/13/2019	2:42:02	115.21	76.81	0.88	Sand Sheet	Sand	Sand or Finer	IND	No	None
063	A	7/11/2019	18:30:21	116.94	77.96	0.91	Sand Sheet	Sand	Sand or Finer	IND	No	None
063	B	7/11/2019	18:31:45	116.42	77.61	0.90	Sand Sheet	Sand	Sand or Finer	IND	No	None
063	D	7/11/2019	18:34:07	115.81	77.21	0.89	Sand Sheet	Sand	Sand or Finer	IND	No	None
064	A	7/11/2019	17:43:20	117.47	78.31	0.92	Sand Sheet	Sand	Sand or Finer	IND	No	None
064	B	7/11/2019	17:44:57	118.18	78.79	0.93	Sand Sheet	Sand	Sand or Finer	IND	No	None
064	C	7/11/2019	17:46:13	115.21	76.81	0.88	Sand Sheet	Sand	Sand or Finer	IND	No	None
065	A	7/11/2019	16:58:49	121.88	81.25	0.99	Sand Sheet	Sand	Sand or Finer	IND	No	None
065	B	7/11/2019	17:00:05	107.73	71.82	0.77	Sand Sheet	Sand	Sand or Finer	IND	No	None
065	C	7/11/2019	17:01:14	117.03	78.02	0.91	Sand Sheet	Sand	Sand or Finer	IND	No	IND
066	A	7/11/2019	16:37:46	116.94	77.96	0.91	Sand Sheet	Sand	Sand or Finer	IND	No	None
066	B	7/11/2019	16:39:20	111.19	74.13	0.82	Sand Sheet	Sand	Sand or Finer	IND	No	None
066	C	7/11/2019	16:40:42	109.94	73.29	0.81	Sand Sheet	Sand	Sand or Finer	IND	No	None
067	A	7/11/2019	16:18:21	120.00	80.00	0.96	Sand Sheet	Sand	Sand or Finer	IND	No	None
067	B	7/11/2019	16:19:40	106.78	71.18	0.76	Sand Sheet	Sand	Sand or Finer	IND	No	None
067	D	7/11/2019	16:22:16	117.21	78.14	0.92	Sand Sheet	Sand	Sand or Finer	IND	No	None
068	A	7/11/2019	16:00:10	117.47	78.31	0.92	Sand with Mobile Gravel	Gravel Mixes	Sandy Gravel	11.75	No	None

StationID	Replicate	Date	Time	Image Width (cm)	Image Height (cm)	Field of View (m^2)	Habitat Type	Substrate Group	Substrate Subgroup	Gravel Mode (mm)	Boulders	Bedforms
068	B	7/11/2019	16:01:32	110.87	73.92	0.82	Sand with Mobile Gravel	Gravel Mixes	Sandy Gravel	7.39	No	None
068	C	7/11/2019	16:02:41	113.70	75.80	0.86	Sand with Mobile Gravel	Gravel Mixes	Sandy Gravel	6.63	No	None
069	A	7/11/2019	15:40:43	115.99	77.32	0.90	Sand with Mobile Gravel	Slightly Gravelly	Slightly Gravelly Sand	2.90	No	None
069	B	7/11/2019	15:42:16	116.85	77.90	0.91	Sand with Mobile Gravel	Slightly Gravelly	Slightly Gravelly Sand	1.95	No	None
069	C	7/11/2019	15:43:34	108.86	72.58	0.79	Sand with Mobile Gravel	Slightly Gravelly	Slightly Gravelly Sand	2.72	No	Ripples
070	A	7/12/2019	20:10:46	104.00	69.33	0.72	Sand Sheet	Sand	Sand or Finer	IND	No	None
070	B	7/12/2019	20:12:15	107.59	71.72	0.77	Sand Sheet	Sand	Sand or Finer	IND	No	None
070	C	7/12/2019	20:13:44	106.78	71.18	0.76	Sand Sheet	Sand	Sand or Finer	IND	No	None
071	A	7/12/2019	19:52:38	107.66	71.77	0.77	Sand Sheet	Sand	Sand or Finer	IND	No	None
071	B	7/12/2019	19:54:09	108.41	72.27	0.78	Sand Sheet	Sand	Sand or Finer	IND	No	None
071	C	7/12/2019	19:55:37	104.07	69.38	0.72	Sand Sheet	Sand	Sand or Finer	IND	No	Uneven ripples
072	A	7/12/2019	19:34:47	110.64	73.76	0.82	Sand Sheet	Sand	Sand or Finer	IND	No	None
072	C	7/12/2019	19:37:52	108.33	72.22	0.78	Sand Sheet	Sand	Sand or Finer	IND	No	Uneven ripples
072	D	7/12/2019	19:39:29	110.09	73.39	0.81	Sand Sheet	Sand	Sand or Finer	IND	No	None
073	A	7/12/2019	19:17:47	108.18	72.12	0.78	Sand Sheet	Sand	Sand or Finer	IND	No	None
073	B	7/12/2019	19:19:16	104.84	69.89	0.73	Sand Sheet	Sand	Sand or Finer	IND	No	None
073	C	7/12/2019	19:20:45	105.91	70.60	0.75	Sand Sheet	Sand	Sand or Finer	IND	No	None
074	E	7/12/2019	18:59:27	112.64	75.09	0.85	Sand Sheet	Sand	Sand or Finer	IND	No	None
075	A	7/12/2019	18:25:10	102.23	68.15	0.70	Sand Sheet	Sand	Sand or Finer	IND	No	None
075	B	7/12/2019	18:26:43	108.64	72.42	0.79	Sand Sheet	Sand	Sand or Finer	IND	No	None
075	D	7/12/2019	18:28:19	103.93	69.29	0.72	Sand Sheet	Sand	Sand or Finer	IND	No	None
076	A	7/12/2019	17:52:20	102.63	68.42	0.70	Sand Sheet	Sand	Sand or Finer	IND	No	None
076	B	7/12/2019	17:53:58	110.64	73.76	0.82	Sand Sheet	Sand	Sand or Finer	IND	No	None
076	C	7/12/2019	17:55:32	104.35	69.57	0.73	Sand Sheet	Sand	Sand or Finer	IND	No	None
077	A	7/12/2019	17:32:25	105.62	70.41	0.74	Sand Sheet	Sand	Sand or Finer	IND	No	None
077	C	7/12/2019	17:35:25	IND	IND	IND	IND	IND	IND	IND	No	None

StationID	Replicate	Date	Time	Image Width (cm)	Image Height (cm)	Field of View (m^2)	Habitat Type	Substrate Group	Substrate Subgroup	Gravel Mode (mm)	Boulders	Bedforms
077	D	7/12/2019	17:37:02	105.62	70.41	0.74	Sand Sheet	Sand	Sand or Finer	IND	No	None
078	A	7/11/2019	18:45:12	115.38	76.92	0.89	Sand Sheet	Sand	Sand or Finer	IND	No	None
078	B	7/11/2019	18:47:54	103.38	68.92	0.71	Sand Sheet	Sand	Sand or Finer	IND	No	None
078	C	7/11/2019	18:48:39	38.80	25.86	0.10	Sand Sheet	Sand	Sand or Finer	IND	No	None
079	A	7/12/2019	4:58:00	107.73	71.82	0.77	Sand Sheet	Sand	Sand or Finer	IND	No	None
079	C	7/12/2019	4:59:39	105.19	70.13	0.74	Sand Sheet	Sand	Sand or Finer	IND	No	None
079	D	7/12/2019	5:00:20	IND	IND	IND	IND	IND	IND	IND	No	None
080	A	7/12/2019	5:40:25	110.01	73.34	0.81	Sand Sheet	Sand	Sand or Finer	IND	No	None
080	B	7/12/2019	5:41:16	103.72	69.15	0.72	Sand Sheet	Sand	Sand or Finer	IND	No	None
080	C	7/12/2019	5:41:56	106.12	70.75	0.75	Sand Sheet	Sand	Sand or Finer	IND	No	None
081	A	7/11/2019	19:02:09	109.40	72.93	0.80	Sand Sheet	Sand	Sand or Finer	IND	No	None
081	B	7/11/2019	19:03:44	109.47	72.98	0.80	Sand Sheet	Sand	Sand or Finer	IND	No	None
081	C	7/11/2019	19:04:57	107.88	71.92	0.78	Sand Sheet	Sand	Sand or Finer	IND	No	Uneven ripples
082	A	7/12/2019	4:18:05	117.03	78.02	0.91	Sand Sheet	Sand	Sand or Finer	IND	No	None
082	B	7/12/2019	4:19:50	IND	IND	IND	IND	IND	IND	IND	No	None
082	C	7/12/2019	4:20:54	111.99	74.66	0.84	Sand Sheet	Sand	Sand or Finer	IND	No	None
083	A	7/12/2019	5:25:46	109.09	72.73	0.79	Sand Sheet	Sand	Sand or Finer	IND	No	None
084	A	7/12/2019	6:00:13	114.71	76.47	0.88	Sand Sheet	Sand	Sand or Finer	IND	No	None
084	C	7/12/2019	6:01:44	110.80	73.86	0.82	Sand Sheet	Sand	Sand or Finer	IND	No	None
084	D	7/12/2019	6:02:25	102.97	68.65	0.71	Sand Sheet	Sand	Sand or Finer	IND	No	Uneven ripples
085	A	7/12/2019	6:42:57	117.03	78.02	0.91	Sand Sheet	Sand	Sand or Finer	IND	No	None
085	B	7/12/2019	6:43:51	IND	IND	IND	IND	IND	IND	IND	No	None
085	C	7/12/2019	6:44:32	105.76	70.51	0.75	Sand Sheet	Sand	Sand or Finer	IND	No	None
086	A	7/12/2019	7:17:24	109.32	72.88	0.80	Sand Sheet	Sand	Sand or Finer	IND	No	Uneven ripples
086	B	7/12/2019	7:18:19	103.24	68.83	0.71	Sand Sheet	Sand	Sand or Finer	IND	No	Uneven ripples
086	C	7/12/2019	7:19:11	104.70	69.80	0.73	Sand Sheet	Sand	Sand or Finer	IND	No	None
087	A	7/12/2019	7:36:08	109.63	73.09	0.80	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
087	B	7/12/2019	7:37:29	105.48	70.32	0.74	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
087	C	7/12/2019	7:38:08	108.26	72.17	0.78	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
088	A	7/12/2019	7:56:44	IND	IND	IND	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
088	B	7/12/2019	7:57:36	IND	IND	IND	IND	IND	IND	IND	No	None
088	C	7/12/2019	7:58:22	IND	IND	IND	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
089	A	7/13/2019	3:51:40	94.03	62.69	0.59	Sand Sheet	Sand	Sand or Finer	IND	No	None

StationID	Replicate	Date	Time	Image Width (cm)	Image Height (cm)	Field of View (m^2)	Habitat Type	Substrate Group	Substrate Subgroup	Gravel Mode (mm)	Boulders	Bedforms
089	B	7/13/2019	3:53:06	97.62	65.08	0.64	Sand Sheet	Sand	Sand or Finer	IND	No	None
089	C	7/13/2019	3:53:54	101.23	67.49	0.68	Sand Sheet	Sand	Sand or Finer	IND	No	None
090	A	7/13/2019	4:14:15	92.36	61.57	0.57	Sand Sheet	Sand	Sand or Finer	IND	No	None
090	B	7/13/2019	4:14:55	97.20	64.80	0.63	Sand Sheet	Sand	Sand or Finer	IND	No	None
090	D	7/13/2019	4:16:20	94.26	62.84	0.59	Sand Sheet	Sand	Sand or Finer	IND	No	None
091	A	7/13/2019	4:36:34	95.35	63.57	0.61	Sand Sheet	Sand	Sand or Finer	IND	No	None
091	B	7/13/2019	4:37:14	98.42	65.62	0.65	Sand Sheet	Sand	Sand or Finer	IND	No	None
091	C	7/13/2019	4:38:03	95.65	63.76	0.61	Sand Sheet	Sand	Sand or Finer	IND	No	None
092	A	7/13/2019	4:56:22	93.08	62.05	0.58	Sand Sheet	Sand	Sand or Finer	IND	No	Uneven ripples
092	C	7/13/2019	4:57:44	93.30	62.20	0.58	Sand Sheet	Sand	Sand or Finer	IND	No	Uneven ripples
092	D	7/13/2019	4:58:31	98.30	65.53	0.64	Sand Sheet	Sand	Sand or Finer	IND	No	Uneven ripples
093	A	7/13/2019	5:19:31	99.36	66.24	0.66	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
093	C	7/13/2019	5:20:49	100.00	66.67	0.67	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
093	D	7/13/2019	5:21:24	99.30	66.20	0.66	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
094	B	7/13/2019	5:39:57	103.38	68.92	0.71	Sand Sheet	Sand	Sand or Finer	IND	No	Uneven ripples
094	C	7/13/2019	5:40:43	96.53	64.36	0.62	Sand Sheet	Sand	Sand or Finer	IND	No	Uneven ripples
094	D	7/13/2019	5:42:00	89.55	59.70	0.53	Sand Sheet	Sand	Sand or Finer	IND	No	Uneven ripples
095	A	7/13/2019	6:00:44	104.28	69.52	0.72	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
095	B	7/13/2019	6:01:27	100.19	66.80	0.67	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
095	C	7/13/2019	6:02:09	93.41	62.28	0.58	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
096	A	7/13/2019	6:17:10	95.35	63.57	0.61	Sand with Mobile Gravel	Gravelly	Gravelly Sand	1.59	No	None
096	B	7/13/2019	6:17:59	104.56	69.71	0.73	Sand with Mobile Gravel	Gravelly	Gravelly Sand	1.39	No	None
096	D	7/13/2019	6:19:20	99.11	66.07	0.65	Sand with Mobile Gravel	Gravelly	Gravelly Sand	3.30	No	Ripples
097	A	7/13/2019	6:36:26	100.65	67.10	0.68	Sand Sheet	Sand	Sand or Finer	IND	No	Uneven ripples
097	B	7/13/2019	6:37:03	99.68	66.45	0.66	Sand Sheet	Sand	Sand or Finer	IND	No	Uneven ripples
097	C	7/13/2019	6:38:22	99.11	66.07	0.65	Sand Sheet	Sand	Sand or Finer	IND	No	Uneven ripples
098	A	7/12/2019	6:15:22	107.66	71.77	0.77	Sand Sheet	Sand	Sand or Finer	IND	No	Uneven ripples
098	B	7/12/2019	6:15:57	111.19	74.13	0.82	Sand Sheet	Sand	Sand or Finer	IND	No	Uneven ripples

StationID	Replicate	Date	Time	Image Width (cm)	Image Height (cm)	Field of View (m^2)	Habitat Type	Substrate Group	Substrate Subgroup	Gravel Mode (mm)	Boulders	Bedforms
098	C	7/12/2019	6:16:49	110.33	73.55	0.81	Sand Sheet	Sand	Sand or Finer	IND	No	Uneven ripples
099	A	7/12/2019	10:08:15	102.36	68.24	0.70	Sand with Mobile Gravel	Slightly Gravelly	Slightly Gravelly Sand	1.71	No	None
099	B	7/12/2019	10:08:53	105.91	70.60	0.75	Sand with Mobile Gravel	Slightly Gravelly	Slightly Gravelly Sand	1.77	No	None
099	C	7/12/2019	10:10:19	104.91	69.94	0.73	Sand with Mobile Gravel	Slightly Gravelly	Slightly Gravelly Sand	2.62	No	None
100	A	7/12/2019	10:30:26	105.41	70.27	0.74	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
100	B	7/12/2019	10:31:15	109.47	72.98	0.80	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
100	C	7/12/2019	10:32:04	111.59	74.39	0.83	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
101	A	7/12/2019	10:51:23	99.43	66.28	0.66	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
101	B	7/12/2019	10:52:28	105.55	70.37	0.74	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
101	C	7/12/2019	10:53:11	99.30	66.20	0.66	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
102	A	7/12/2019	6:27:40	105.98	70.65	0.75	Sand Sheet	Sand	Sand or Finer	IND	No	None
102	B	7/12/2019	6:28:37	103.93	69.29	0.72	Sand Sheet	Sand	Sand or Finer	IND	No	None
102	C	7/12/2019	6:29:24	109.47	72.98	0.80	Sand Sheet	Sand	Sand or Finer	IND	No	None
103	A	7/12/2019	7:03:13	104.56	69.71	0.73	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
103	B	7/12/2019	7:03:53	109.55	73.03	0.80	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
103	C	7/12/2019	7:04:37	104.14	69.43	0.72	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
104	A	7/12/2019	9:36:45	110.72	73.81	0.82	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
104	B	7/12/2019	9:38:52	105.69	70.46	0.74	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
104	C	7/12/2019	9:39:46	103.79	69.19	0.72	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
105	A	7/12/2019	9:17:52	115.81	77.21	0.89	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
105	B	7/12/2019	9:18:58	97.26	64.84	0.63	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
105	C	7/12/2019	9:19:36	103.72	69.15	0.72	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
106	A	7/12/2019	8:47:28	IND	IND	IND	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
106	B	7/12/2019	8:48:18	IND	IND	IND	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples

StationID	Replicate	Date	Time	Image Width (cm)	Image Height (cm)	Field of View (m^2)	Habitat Type	Substrate Group	Substrate Subgroup	Gravel Mode (mm)	Boulders	Bedforms
106	C	7/12/2019	8:49:06	IND	IND	IND	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
107	A	7/13/2019	7:01:23	94.15	62.76	0.59	Sand Sheet	Sand	Sand or Finer	IND	No	None
107	B	7/13/2019	7:02:02	90.70	60.47	0.55	Sand Sheet	Sand	Sand or Finer	IND	No	None
107	C	7/13/2019	7:02:43	86.05	57.36	0.49	Sand Sheet	Sand	Sand or Finer	IND	No	None
108	A	7/13/2019	7:35:38	96.83	64.56	0.63	IND	IND	IND	IND	No	None
108	B	7/13/2019	7:36:19	IND	IND	IND	IND	IND	IND	IND	No	None
108	F	7/13/2019	7:38:53	94.72	63.15	0.60	IND	IND	IND	IND	No	None
109	A	7/13/2019	7:57:56	94.15	62.76	0.59	IND	IND	IND	IND	No	None
109	C	7/13/2019	7:59:17	IND	IND	IND	IND	IND	IND	IND	No	None
109	D	7/13/2019	7:59:50	IND	IND	IND	IND	IND	IND	IND	No	None
110	B	7/13/2019	8:19:08	88.59	59.06	0.52	IND	IND	IND	IND	No	None
110	C	7/13/2019	8:19:53	96.89	64.60	0.63	IND	IND	IND	IND	No	None
110	D	7/13/2019	8:20:31	111.59	74.39	0.83	Sand Sheet	Sand	Sand or Finer	IND	No	None
111	A	7/13/2019	8:41:09	97.14	64.76	0.63	IND	IND	IND	IND	No	None
111	B	7/13/2019	8:42:00	91.87	61.25	0.56	IND	IND	IND	IND	No	None
111	C	7/13/2019	8:42:39	85.86	57.24	0.49	Sand Sheet	Sand	Sand or Finer	IND	No	None
112	A	7/13/2019	9:05:43	IND	IND	IND	IND	IND	IND	IND	No	None
112	B	7/13/2019	9:08:25	IND	IND	IND	IND	IND	IND	IND	No	None
112	C	7/13/2019	9:10:23	IND	IND	IND	IND	IND	IND	IND	No	None
113	A	7/13/2019	9:42:23	IND	IND	IND	Sand Sheet	Sand	Sand or Finer	IND	No	Uneven ripples
113	B	7/13/2019	9:43:11	IND	IND	IND	Sand Sheet	Sand	Sand or Finer	IND	No	Uneven ripples
113	C	7/13/2019	9:44:22	IND	IND	IND	Sand Sheet	Sand	Sand or Finer	IND	No	Uneven ripples
116	A	7/12/2019	11:14:51	111.59	74.39	0.83	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
116	B	7/12/2019	11:16:50	100.39	66.92	0.67	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
116	D	7/12/2019	11:18:11	113.29	75.53	0.86	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
117	A	7/12/2019	11:46:52	104.70	69.80	0.73	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
117	C	7/12/2019	11:48:14	108.86	72.58	0.79	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
117	D	7/12/2019	11:48:50	109.94	73.29	0.81	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
118	A	7/12/2019	16:05:32	112.55	75.04	0.84	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
118	B	7/12/2019	16:07:03	100.26	66.84	0.67	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
118	C	7/12/2019	16:08:32	106.56	71.04	0.76	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
119	A	7/12/2019	11:34:24	106.56	71.04	0.76	Sand Sheet	Sand	Sand or Finer	IND	No	None
119	B	7/12/2019	11:35:04	112.64	75.09	0.85	Sand Sheet	Sand	Sand or Finer	IND	No	None
119	C	7/12/2019	11:35:54	109.86	73.24	0.80	Sand Sheet	Sand	Sand or Finer	IND	No	None
120	A	7/12/2019	12:59:13	31.73	21.16	0.07	Sand Sheet	Sand	Sand or Finer	IND	No	None

StationID	Replicate	Date	Time	Image Width (cm)	Image Height (cm)	Field of View (m^2)	Habitat Type	Substrate Group	Substrate Subgroup	Gravel Mode (mm)	Boulders	Bedforms
120	B	7/12/2019	13:01:08	105.48	70.32	0.74	Sand Sheet	Sand	Sand or Finer	IND	No	None
120	C	7/12/2019	13:02:38	IND	IND	IND	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
122	A	7/12/2019	15:53:13	107.59	71.72	0.77	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
122	B	7/12/2019	15:54:58	109.01	72.68	0.79	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
122	C	7/12/2019	15:56:32	107.59	71.72	0.77	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
123	A	7/12/2019	15:16:55	109.24	72.83	0.80	Sand with Mobile Gravel	Slightly Gravelly	Slightly Gravelly Sand	1.82	No	Ripples
123	B	7/12/2019	15:18:47	105.98	70.65	0.75	Sand with Mobile Gravel	Slightly Gravelly	Slightly Gravelly Sand	2.65	No	Uneven ripples
123	C	7/12/2019	15:20:25	107.44	71.63	0.77	Sand with Mobile Gravel	Slightly Gravelly	Slightly Gravelly Sand	1.79	No	Ripples
124	A	7/12/2019	15:02:38	110.87	73.92	0.82	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
124	B	7/12/2019	15:04:14	109.17	72.78	0.79	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
124	C	7/12/2019	15:05:41	108.86	72.58	0.79	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
125	A	7/12/2019	15:31:20	105.12	70.08	0.74	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
125	B	7/12/2019	15:32:53	103.93	69.29	0.72	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
125	C	7/12/2019	15:34:29	110.64	73.76	0.82	Sand with Mobile Gravel	Slightly Gravelly	Slightly Gravelly Sand	IND	No	Ripples
126	A	7/12/2019	14:51:11	IND	IND	IND	Sand with Mobile Gravel	Gravel Mixes	Sandy Gravel	IND	No	None
126	C	7/12/2019	14:54:28	IND	IND	IND	Sand with Mobile Gravel	Gravel Mixes	Sandy Gravel	IND	No	None
126	D	7/12/2019	14:55:57	IND	IND	IND	Sand with Mobile Gravel	Gravel Mixes	Sandy Gravel	IND	No	None
127	A	7/12/2019	15:41:25	112.64	75.09	0.85	Sand with Mobile Gravel	Gravel Mixes	Sandy Gravel	6.57	No	None
127	B	7/12/2019	15:43:05	108.64	72.42	0.79	Sand with Mobile Gravel	Gravelly	Gravelly Sand	5.43	No	Ripples
127	C	7/12/2019	15:44:43	IND	IND	IND	Sand with Mobile Gravel	Gravelly	Gravelly Sand	IND	No	None
128	A	7/12/2019	14:31:42	IND	IND	IND	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
128	B	7/12/2019	14:33:26	106.27	70.84	0.75	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
130	A	7/12/2019	14:11:26	IND	IND	IND	Sand with Mobile Gravel	Gravel Mixes	Sandy Gravel	IND	No	None
130	B	7/12/2019	14:13:10	IND	IND	IND	Sand with Mobile Gravel	Gravel Mixes	Sandy Gravel	IND	No	None
130	C	7/12/2019	14:14:33	IND	IND	IND	Sand with Mobile Gravel	Gravel Mixes	Sandy Gravel	IND	No	None
131	A	7/11/2019	15:22:12	110.33	73.55	0.81	Sand with Mobile Gravel	Gravelly	Gravelly Sand	4.60	No	None
131	B	7/11/2019	15:23:39	115.90	77.27	0.90	Sand with Mobile Gravel	Gravelly	Gravelly Sand	6.76	No	None
131	C	7/11/2019	15:24:49	113.95	75.97	0.87	Sand with Mobile Gravel	Gravelly	Gravelly Sand	3.80	No	None
132	A	7/11/2019	15:02:57	115.56	77.04	0.89	Sand with Mobile Gravel	Gravelly	Gravelly Sand	9.63	No	None
132	B	7/11/2019	15:04:17	110.56	73.71	0.81	Sand with Mobile Gravel	Gravelly	Gravelly Sand	10.13	No	None
132	C	7/11/2019	15:05:31	119.82	79.88	0.96	Sand with Mobile Gravel	Gravelly	Gravelly Sand	6.99	No	None

StationID	Replicate	Date	Time	Image Width (cm)	Image Height (cm)	Field of View (m^2)	Habitat Type	Substrate Group	Substrate Subgroup	Gravel Mode (mm)	Boulders	Bedforms
133	A	7/11/2019	14:45:10	116.94	77.96	0.91	Sand with Mobile Gravel	Gravelly	Gravelly Sand	2.92	No	None
133	B	7/11/2019	14:46:28	114.20	76.13	0.87	Sand with Mobile Gravel	Gravelly	Gravelly Sand	1.90	No	None
133	C	7/11/2019	14:47:46	115.38	76.92	0.89	Sand with Mobile Gravel	Gravelly	Gravelly Sand	3.85	No	None
134	A	7/11/2019	14:25:27	118.27	78.85	0.93	Sand with Mobile Gravel	Gravel Mixes	Sandy Gravel	1.97	No	None
134	B	7/11/2019	14:26:52	IND	IND	IND	IND	Gravel Mixes	Sandy Gravel	IND	No	None
134	D	7/11/2019	14:29:24	109.86	73.24	0.80	Sand with Mobile Gravel	Gravel Mixes	Sandy Gravel	9.15	No	None
135	F	7/11/2019	8:06:50	114.04	76.02	0.87	Sand Sheet	Sand	Sand or Finer	IND	No	None
135	G	7/11/2019	8:07:12	113.13	75.42	0.85	Sand Sheet	Sand	Sand or Finer	IND	No	None
135	H	7/11/2019	8:07:38	110.95	73.97	0.82	Sand Sheet	Sand	Sand or Finer	IND	No	None
136	E	7/11/2019	8:25:55	117.12	78.08	0.91	Sand with Mobile Gravel	Gravelly	Gravelly Sand	3.90	No	None
136	F	7/11/2019	8:27:03	115.90	77.27	0.90	Sand with Mobile Gravel	Gravelly	Gravelly Sand	3.86	No	None
136	H	7/11/2019	8:28:02	111.91	74.61	0.83	Sand with Mobile Gravel	Gravelly	Gravelly Sand	4.66	No	None
137	E	7/11/2019	8:45:32	112.64	75.09	0.85	Sand Sheet	Sand	Sand or Finer	IND	No	None
137	G	7/11/2019	8:46:21	112.07	74.71	0.84	Sand Sheet	Sand	Sand or Finer	IND	No	None
137	H	7/11/2019	8:46:54	119.72	79.82	0.96	Sand Sheet	Sand	Sand or Finer	IND	No	None
138	E	7/11/2019	9:07:24	107.96	71.97	0.78	Sand Sheet	Sand	Sand or Finer	IND	No	None
138	F	7/11/2019	9:07:47	105.76	70.51	0.75	Sand Sheet	Sand	Sand or Finer	IND	No	None
138	G	7/11/2019	9:08:15	109.47	72.98	0.80	Sand Sheet	Sand	Sand or Finer	IND	No	None
139	E	7/11/2019	9:28:25	113.87	75.91	0.86	Sand Sheet	Sand	Sand or Finer	IND	No	None
139	F	7/11/2019	9:28:52	108.86	72.58	0.79	Sand Sheet	Sand	Sand or Finer	IND	No	None
139	G	7/11/2019	9:29:19	113.79	75.86	0.86	Sand Sheet	Sand	Sand or Finer	IND	No	None
140	E	7/11/2019	9:49:27	108.71	72.47	0.79	Sand Sheet	Sand	Sand or Finer	IND	No	None
140	F	7/11/2019	9:49:49	107.51	71.67	0.77	Sand Sheet	Sand	Sand or Finer	IND	No	None
140	H	7/11/2019	9:50:33	116.59	77.73	0.91	Sand Sheet	Sand	Sand or Finer	IND	No	None
141	B	7/10/2019	19:25:56	192.12	128.08	2.46	Sand Sheet	Sand	Sand or Finer	IND	No	None
142	A	7/10/2019	19:56:42	190.24	126.83	2.41	Sand Sheet	Sand	Sand or Finer	IND	No	None
142	B	7/10/2019	19:57:38	197.22	131.48	2.59	Sand Sheet	Sand	Sand or Finer	IND	No	None
142	C	7/10/2019	19:58:14	187.27	124.85	2.34	Sand Sheet	Sand	Sand or Finer	IND	No	None
143	A	7/10/2019	20:39:46	183.31	122.21	2.24	Sand Sheet	Sand	Sand or Finer	IND	No	None
143	C	7/10/2019	20:42:45	182.46	121.64	2.22	Sand Sheet	Sand	Sand or Finer	IND	No	None

StationID	Replicate	Date	Time	Image Width (cm)	Image Height (cm)	Field of View (m^2)	Habitat Type	Substrate Group	Substrate Subgroup	Gravel Mode (mm)	Boulders	Bedforms
143	D	7/10/2019	20:44:08	179.10	119.40	2.14	Sand Sheet	Sand	Sand or Finer	IND	No	None
144	A	7/10/2019	21:01:00	171.62	114.41	1.96	Sand Sheet	Sand	Sand or Finer	IND	No	None
144	B	7/10/2019	21:02:24	IND	IND	IND	Sand Sheet	Sand	Sand or Finer	IND	No	None
144	C	7/10/2019	21:03:50	177.88	118.59	2.11	Sand Sheet	Sand	Sand or Finer	IND	No	None
145	A	7/10/2019	21:23:05	179.93	119.95	2.16	Sand Sheet	Sand	Sand or Finer	IND	No	None
145	C	7/10/2019	21:25:51	166.84	111.23	1.86	Sand Sheet	Sand	Sand or Finer	IND	No	None
146	A	7/10/2019	21:43:16	180.76	120.51	2.18	Sand Sheet	Sand	Sand or Finer	IND	No	None
146	B	7/10/2019	21:44:30	177.27	118.18	2.10	Sand Sheet	Sand	Sand or Finer	IND	No	None
146	C	7/10/2019	21:45:43	182.88	121.92	2.23	Sand Sheet	Sand	Sand or Finer	IND	No	None
147	A	7/10/2019	16:00:30	182.03	121.35	2.21	Sand Sheet	Sand	Sand or Finer	IND	No	None
147	B	7/10/2019	16:01:42	179.10	119.40	2.14	Sand Sheet	Sand	Sand or Finer	IND	No	None
147	C	7/10/2019	16:02:58	177.47	118.32	2.10	Sand Sheet	Sand	Sand or Finer	IND	No	None
148	A	7/10/2019	15:40:42	182.46	121.64	2.22	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
148	B	7/10/2019	15:41:56	190.48	126.98	2.42	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
148	C	7/10/2019	15:43:06	185.05	123.37	2.28	Sand Sheet	Sand	Sand or Finer	IND	No	None
149	A	7/10/2019	15:21:48	182.46	121.64	2.22	Sand Sheet	Sand	Sand or Finer	IND	No	None
149	D	7/10/2019	15:25:36	184.40	122.93	2.27	Sand Sheet	Sand	Sand or Finer	IND	No	None
150	A	7/10/2019	14:50:09	183.96	122.64	2.26	Sand Sheet	Sand	Sand or Finer	IND	No	None
150	B	7/10/2019	14:51:18	184.83	123.22	2.28	Sand Sheet	Sand	Sand or Finer	IND	No	None
150	C	7/10/2019	14:52:27	183.31	122.21	2.24	Sand Sheet	Sand	Sand or Finer	IND	No	None
151	A	7/10/2019	14:30:06	183.75	122.50	2.25	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
151	B	7/10/2019	14:31:36	178.49	118.99	2.12	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
151	D	7/10/2019	14:34:05	189.32	126.21	2.39	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
152	A	7/10/2019	14:11:51	180.14	120.09	2.16	Sand Sheet	Sand	Sand or Finer	IND	No	None
152	B	7/10/2019	14:13:09	185.49	123.66	2.29	Sand Sheet	Sand	Sand or Finer	IND	No	None
152	D	7/10/2019	14:15:50	180.97	120.65	2.18	Sand Sheet	Sand	Sand or Finer	IND	No	None
153	A	7/10/2019	13:49:37	179.31	119.54	2.14	Sand Sheet	Sand	Sand or Finer	IND	No	None
153	B	7/10/2019	13:50:44	181.61	121.07	2.20	Sand Sheet	Sand	Sand or Finer	IND	No	None
153	C	7/10/2019	13:51:56	179.52	119.68	2.15	Sand Sheet	Sand	Sand or Finer	IND	No	None
154	A	7/10/2019	13:28:30	182.03	121.35	2.21	Sand Sheet	Sand	Sand or Finer	IND	No	None
154	B	7/10/2019	13:29:45	186.60	124.40	2.32	Sand Sheet	Sand	Sand or Finer	IND	No	None

StationID	Replicate	Date	Time	Image Width (cm)	Image Height (cm)	Field of View (m^2)	Habitat Type	Substrate Group	Substrate Subgroup	Gravel Mode (mm)	Boulders	Bedforms
154	C	7/10/2019	13:31:08	189.32	126.21	2.39	Sand Sheet	Sand	Sand or Finer	IND	No	None
155	A	7/10/2019	13:07:53	181.82	121.21	2.20	Sand Sheet	Sand	Sand or Finer	IND	No	None
155	B	7/10/2019	13:08:55	180.14	120.09	2.16	Sand Sheet	Sand	Sand or Finer	IND	No	None
155	D	7/10/2019	13:11:06	182.67	121.78	2.22	Sand Sheet	Sand	Sand or Finer	IND	No	None
156	A	7/10/2019	12:46:55	179.31	119.54	2.14	Sand Sheet	Sand	Sand or Finer	IND	No	None
156	B	7/10/2019	12:48:02	184.62	123.08	2.27	Sand Sheet	Sand	Sand or Finer	IND	No	None
156	D	7/10/2019	12:50:13	187.27	124.85	2.34	Sand Sheet	Sand	Sand or Finer	IND	No	None
157	A	7/10/2019	12:21:37	177.27	118.18	2.10	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
157	B	7/10/2019	12:22:36	179.52	119.68	2.15	Sand Sheet	Sand	Sand or Finer	IND	No	Ripples
157	C	7/10/2019	12:23:41	181.61	121.07	2.20	Sand Sheet	Sand	Sand or Finer	IND	No	None
REFA_01	A	7/13/2019	22:15:28	99.05	66.03	0.65	Sand with Mobile Gravel	Gravel Mixes	Sandy Gravel	10.73	No	None
REFA_01	B	7/13/2019	22:16:58	95.12	63.41	0.60	Sand with Mobile Gravel	Gravel Mixes	Sandy Gravel	11.10	No	None
REFA_01	C	7/13/2019	22:18:20	92.91	61.94	0.58	Sand with Mobile Gravel	Gravel Mixes	Sandy Gravel	10.07	No	None
REFA_02	A	7/13/2019	21:21:05	78.00	52.00	0.41	Sand with Mobile Gravel	Gravel Mixes	Sandy Gravel	5.20	No	None
REFA_02	B	7/13/2019	21:22:45	89.97	59.98	0.54	Sand with Mobile Gravel	Gravel Mixes	Sandy Gravel	4.50	No	None
REFA_02	D	7/13/2019	21:25:43	85.95	57.30	0.49	Sand with Mobile Gravel	Gravel Mixes	Sandy Gravel	10.03	No	None
REFA_03	A	7/13/2019	21:48:09	100.13	66.75	0.67	Sand with Mobile Gravel	Gravel Mixes	Sandy Gravel	9.18	No	None
REFA_03	B	7/13/2019	21:49:40	104.63	69.75	0.73	Sand with Mobile Gravel	Gravel Mixes	Sandy Gravel	6.98	No	None
REFA_03	D	7/13/2019	21:52:28	98.92	65.95	0.65	Sand with Mobile Gravel	Gravel Mixes	Sandy Gravel	9.89	No	None
REFA_04	A	7/13/2019	21:37:24	105.69	70.46	0.74	Sand with Mobile Gravel	Gravel Mixes	Sandy Gravel	7.05	No	None
REFA_04	C	7/13/2019	21:41:01	94.83	63.22	0.60	Sand with Mobile Gravel	Gravel Mixes	Sandy Gravel	8.69	No	None
REFA_04	D	7/13/2019	21:42:31	94.20	62.80	0.59	Sand with Mobile Gravel	Gravel Mixes	Sandy Gravel	10.99	No	None
REFA_05	A	7/13/2019	21:59:55	90.91	60.61	0.55	Sand with Mobile Gravel	Gravel Mixes	Sandy Gravel	7.58	No	None
REFA_05	B	7/13/2019	22:01:20	99.68	66.45	0.66	Sand with Mobile Gravel	Gravel Mixes	Sandy Gravel	7.48	No	None
REFA_05	C	7/13/2019	22:02:49	97.01	64.68	0.63	Sand with Mobile Gravel	Gravel Mixes	Sandy Gravel	9.70	No	None
REFB_01	E	7/11/2019	7:41:38	115.21	76.81	0.88	Sand Sheet	Sand	Sand or Finer	IND	No	None
REFB_01	F	7/11/2019	7:42:21	108.18	72.12	0.78	Sand Sheet	Sand	Sand or Finer	IND	No	None

StationID	Replicate	Date	Time	Image Width (cm)	Image Height (cm)	Field of View (m^2)	Habitat Type	Substrate Group	Substrate Subgroup	Gravel Mode (mm)	Boulders	Bedforms
REFB_01	G	7/11/2019	7:42:50	113.45	75.64	0.86	Sand Sheet	Sand	Sand or Finer	IND	No	None
REFB_02	H	7/11/2019	6:58:29	105.98	70.65	0.75	Sand Sheet	Sand	Sand or Finer	IND	No	None
REFB_02	I	7/11/2019	6:59:00	111.67	74.45	0.83	Sand Sheet	Sand	Sand or Finer	IND	No	None
REFB_02	J	7/11/2019	6:59:34	110.40	73.60	0.81	Sand Sheet	Sand	Sand or Finer	IND	No	None
REFB_03	E	7/11/2019	7:25:05	120.65	80.43	0.97	Sand Sheet	Sand	Sand or Finer	IND	No	None
REFB_03	F	7/11/2019	7:25:34	113.70	75.80	0.86	Sand Sheet	Sand	Sand or Finer	IND	No	None
REFB_03	G	7/11/2019	7:25:58	111.59	74.39	0.83	Sand Sheet	Sand	Sand or Finer	IND	No	None
REFB_04	F	7/11/2019	7:33:29	115.47	76.98	0.89	Sand Sheet	Sand	Sand or Finer	IND	No	None
REFB_04	G	7/11/2019	7:34:06	106.85	71.23	0.76	Sand Sheet	Sand	Sand or Finer	IND	No	Uneven ripples
REFB_04	H	7/11/2019	7:34:33	114.79	76.53	0.88	Sand Sheet	Sand	Sand or Finer	IND	No	None
REFB_05	E	7/11/2019	7:48:17	115.99	77.32	0.90	Sand Sheet	Sand	Sand or Finer	IND	No	None
REFB_05	F	7/11/2019	7:48:40	IND	IND	IND	Sand Sheet	Sand	Sand or Finer	IND	No	None
REFB_05	H	7/11/2019	7:49:38	115.13	76.75	0.88	Sand Sheet	Sand	Sand or Finer	IND	No	None
REFC_01	A	7/13/2019	20:23:47	98.98	65.99	0.65	Sand Sheet	Sand	Sand or Finer	IND	No	None
REFC_01	B	7/13/2019	20:25:36	97.50	65.00	0.63	Sand Sheet	Sand	Sand or Finer	IND	No	None
REFC_01	D	7/13/2019	20:28:30	IND	IND	IND	Sand Sheet	Sand	Sand or Finer	IND	No	None
REFC_02	A	7/13/2019	20:32:07	93.25	62.16	0.58	Sand Sheet	Sand	Sand or Finer	IND	No	None
REFC_02	B	7/13/2019	20:33:28	96.59	64.40	0.62	Sand Sheet	Sand	Sand or Finer	IND	No	None
REFC_02	C	7/13/2019	20:34:57	98.86	65.91	0.65	Sand Sheet	Sand	Sand or Finer	IND	No	None
REFC_03	A	7/13/2019	19:53:45	94.32	62.88	0.59	Sand Sheet	Sand	Sand or Finer	IND	No	None
REFC_03	B	7/13/2019	19:55:11	91.02	60.68	0.55	Sand Sheet	Sand	Sand or Finer	IND	No	None
REFC_03	D	7/13/2019	19:57:55	94.66	63.11	0.60	Sand Sheet	Sand	Sand or Finer	IND	No	None
REFC_04	A	7/13/2019	20:12:23	90.54	60.36	0.55	Sand Sheet	Sand	Sand or Finer	IND	No	None
REFC_04	B	7/13/2019	20:13:52	98.55	65.70	0.65	Sand Sheet	Sand	Sand or Finer	IND	No	None
REFC_04	D	7/13/2019	20:16:51	94.32	62.88	0.59	Sand Sheet	Sand	Sand or Finer	IND	No	None
REFC_05	A	7/13/2019	20:03:36	92.91	61.94	0.58	Sand Sheet	Sand	Sand or Finer	IND	No	None
REFC_05	B	7/13/2019	20:05:02	96.59	64.40	0.62	Sand Sheet	Sand	Sand or Finer	IND	No	None
REFC_05	C	7/13/2019	20:06:35	90.64	60.43	0.55	Sand Sheet	Sand	Sand or Finer	IND	No	None

StationID	Replicate	Bedform Size Measurement (cm)	Debris	Biotic Subclass	Co-occurring Biotic Subclass	Sensitive Taxa Present?	Type of Sensitive Taxa	Type of Species of Concern Observed
001	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
001	B	-	Shell hash	Soft Sediment Fauna	None	No	None	None
001	C	-	Shell hash	Soft Sediment Fauna	None	No	None	None
002	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
002	B	-	Shell hash	Soft Sediment Fauna	None	No	None	None
002	C	IND	Shell hash	Soft Sediment Fauna	None	No	None	None
003	A	-	None	Soft Sediment Fauna	None	No	None	None
003	B	IND	IND	IND	IND	No	None	IND
003	C	IND	IND	IND	IND	No	None	IND
004	A	-	None	Soft Sediment Fauna	Inferred Fauna	No	None	None
004	B	-	None	Soft Sediment Fauna	None	No	None	None
004	C	-	Shell hash	Soft Sediment Fauna	None	No	None	None
005	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
005	B	-	Shell hash	Soft Sediment Fauna	None	No	None	None
005	C	-	Shell hash	Soft Sediment Fauna	None	No	None	Sea scallop
006	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
006	B	-	Shell hash	Soft Sediment Fauna	None	No	None	None
006	C	-	Shell hash	Soft Sediment Fauna	None	No	None	None
007	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
007	B	-	Shell hash	Soft Sediment Fauna	None	No	None	None
007	C	-	Shell hash	Soft Sediment Fauna	None	No	None	None
008	B	-	Shell hash	Soft Sediment Fauna	None	No	None	None
008	C	-	Shell hash	Soft Sediment Fauna	None	No	None	None
008	D	-	Shell hash	Soft Sediment Fauna	None	No	None	None
009	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
009	B	-	Shell hash	Soft Sediment Fauna	None	No	None	None
009	C	-	Shell hash	Soft Sediment Fauna	None	No	None	None
010	B	-	Shell hash	Soft Sediment Fauna	Attached Fauna	No	None	Sea scallop
010	C	-	Shell hash	Soft Sediment Fauna	Attached Fauna	No	None	None
010	D	-	Shell hash	Soft Sediment Fauna	None	No	None	Sea scallop
011	A	-	None	Soft Sediment Fauna	None	No	None	None
011	B	-	None	Soft Sediment Fauna	None	No	None	None
011	C	-	None	Soft Sediment Fauna	None	No	None	None
012	A	-	None	Soft Sediment Fauna	None	No	None	None
012	B	-	None	Soft Sediment Fauna	None	No	None	None
012	C	-	None	Soft Sediment Fauna	None	No	None	None
013	A	52.76	Shell hash	Soft Sediment Fauna	None	No	None	None

StationID	Replicate	Bedform Size Measurement (cm)	Debris	Biotic Subclass	Co-occurring Biotic Subclass	Sensitive Taxa Present?	Type of Sensitive Taxa	Type of Species of Concern Observed
013	B	35.40	Shell hash	Soft Sediment Fauna	None	No	None	None
013	C	45.10	Shell hash	Soft Sediment Fauna	None	No	None	None
014	A	18.74	Shell hash	Soft Sediment Fauna	None	No	None	None
014	B	31.59	Shell hash	Soft Sediment Fauna	None	No	None	None
014	D	-	Shell hash	Soft Sediment Fauna	None	No	None	None
015	A	-	None	Soft Sediment Fauna	None	No	None	None
015	B	-	None	Soft Sediment Fauna	None	No	None	None
015	C	-	None	Soft Sediment Fauna	None	No	None	None
016	A	-	None	Soft Sediment Fauna	None	No	None	None
016	B	-	None	Soft Sediment Fauna	None	No	None	None
016	C	-	None	Soft Sediment Fauna	None	No	None	None
017	A	-	None	Soft Sediment Fauna	None	No	None	None
017	B	-	None	Soft Sediment Fauna	None	No	None	None
017	D	-	None	Soft Sediment Fauna	None	No	None	None
018	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
018	B	23.20	Shell hash	Soft Sediment Fauna	None	No	None	None
018	C	-	Shell hash	Soft Sediment Fauna	None	No	None	None
019	A	-	None	Soft Sediment Fauna	None	No	None	None
019	B	-	None	Soft Sediment Fauna	None	No	None	None
019	C	-	None	Soft Sediment Fauna	None	No	None	None
020	A	-	None	Soft Sediment Fauna	None	No	None	None
020	B	-	None	Soft Sediment Fauna	None	No	None	None
020	C	-	None	Soft Sediment Fauna	None	No	None	None
021	A	51.20	Shell hash	Soft Sediment Fauna	None	No	None	None
021	B	46.87	Shell hash	Soft Sediment Fauna	None	No	None	None
021	D	48.74	Shell hash	Soft Sediment Fauna	None	No	None	None
022	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
022	B	-	Shell hash	Soft Sediment Fauna	None	No	None	None
022	C	-	Shell hash	Soft Sediment Fauna	None	No	None	None
023	A	IND	Shell hash	Soft Sediment Fauna	None	No	None	None
023	B	IND	Shell hash	Soft Sediment Fauna	None	No	None	None
023	D	IND	Shell hash	Soft Sediment Fauna	None	No	None	None

StationID	Replicate	Bedform Size Measurement (cm)	Debris	Biotic Subclass	Co-occurring Biotic Subclass	Sensitive Taxa Present?	Type of Sensitive Taxa	Type of Species of Concern Observed
024	A	-	Shell hash	Soft Sediment Fauna	None	No	None	Ocean quahog
024	B	IND	Shell hash	Soft Sediment Fauna	IND	No	None	IND
024	C	-	Shell hash	Soft Sediment Fauna	None	No	None	None
025	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
025	B	-	Shell hash	Soft Sediment Fauna	IND	No	None	IND
025	D	-	Shell hash	Soft Sediment Fauna	IND	No	None	IND
026	H	-	None	Soft Sediment Fauna	None	No	None	None
026	J	-	None	Soft Sediment Fauna	None	No	None	None
026	K	-	None	Soft Sediment Fauna	None	No	None	None
027	A	-	None	Soft Sediment Fauna	None	No	None	None
027	B	-	None	Soft Sediment Fauna	None	No	None	None
027	C	-	None	Soft Sediment Fauna	None	No	None	None
028	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
028	B	-	Shell hash	Soft Sediment Fauna	None	No	None	None
028	C	-	Shell hash	Soft Sediment Fauna	None	No	None	None
029	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
029	B	-	Shell hash	Soft Sediment Fauna	None	No	None	None
029	C	-	Shell hash	Soft Sediment Fauna	None	No	None	None
030	A	IND	Shell hash	Soft Sediment Fauna	None	No	None	None
030	C	IND	Shell hash	Soft Sediment Fauna	None	No	None	None
030	D	-	Shell hash	Soft Sediment Fauna	None	No	None	Ocean quahog
031	A	IND	Shell hash	Soft Sediment Fauna	None	No	None	None
031	B	IND	Shell hash	Soft Sediment Fauna	None	No	None	None
031	C	IND	Shell hash	Soft Sediment Fauna	None	No	None	None
032	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
032	B	-	Shell hash	Soft Sediment Fauna	None	No	None	IND
032	D	-	Shell hash	Soft Sediment Fauna	None	No	None	None
033	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
033	B	-	Shell hash	Soft Sediment Fauna	None	No	None	None
033	C	-	Shell hash	Soft Sediment Fauna	None	No	None	None
034	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
034	B	-	Shell hash	Soft Sediment Fauna	None	No	None	None

StationID	Replicate	Bedform Size Measurement (cm)	Debris	Biotic Subclass	Co-occurring Biotic Subclass	Sensitive Taxa Present?	Type of Sensitive Taxa	Type of Species of Concern Observed
034	C	-	Shell hash	Soft Sediment Fauna	None	No	None	Ocean quahog
035	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
035	B	-	Shell hash	Soft Sediment Fauna	None	No	None	None
035	C	-	Shell hash	Soft Sediment Fauna	None	No	None	None
036	A	32.59	Shell hash	Soft Sediment Fauna	None	No	None	None
036	B	46.18	Shell hash	Soft Sediment Fauna	None	No	None	None
036	C	-	Shell hash	Soft Sediment Fauna	None	No	None	None
037	A	-	None	Soft Sediment Fauna	None	No	None	None
037	C	IND	Shell hash	IND	IND	No	None	IND
037	D	-	Shell hash	Soft Sediment Fauna	None	No	None	None
038	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
038	B	-	Shell hash	Soft Sediment Fauna	None	No	None	IND
038	C	-	Shell hash	Soft Sediment Fauna	None	No	None	None
039	A	40.60	Shell hash	Soft Sediment Fauna	None	No	None	None
039	B	-	Shell hash	Soft Sediment Fauna	None	No	None	None
039	C	42.28	Shell hash	Soft Sediment Fauna	None	No	None	None
040	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
040	B	-	Shell hash	Soft Sediment Fauna	None	No	None	None
040	C	-	Shell hash	Soft Sediment Fauna	None	No	None	None
041	A	-	None	Soft Sediment Fauna	None	No	None	None
041	B	-	None	Soft Sediment Fauna	None	No	None	None
041	C	-	None	Soft Sediment Fauna	None	No	None	None
042	A	-	None	Soft Sediment Fauna	None	No	None	None
042	B	-	Shell hash	Soft Sediment Fauna	None	No	None	None
042	C	-	None	Soft Sediment Fauna	None	No	None	None
043	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
043	B	-	Shell hash	Soft Sediment Fauna	None	No	None	None
043	C	-	Shell hash	Soft Sediment Fauna	None	No	None	None
044	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
044	B	-	Shell hash	Soft Sediment Fauna	None	No	None	None
044	C	-	Shell hash	Soft Sediment Fauna	None	No	None	None
045	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
045	B	-	Shell hash	Soft Sediment Fauna	None	No	None	None

StationID	Replicate	Bedform Size Measurement (cm)	Debris	Biotic Subclass	Co-occurring Biotic Subclass	Sensitive Taxa Present?	Type of Sensitive Taxa	Type of Species of Concern Observed
045	C	4.49	Shell hash	Soft Sediment Fauna	None	No	None	None
046	A	-	None	Soft Sediment Fauna	Attached Fauna	No	None	None
046	B	-	None	Soft Sediment Fauna	None	No	None	None
046	D	IND	IND	IND	IND	No	None	IND
047	A	-	None	Soft Sediment Fauna	None	No	None	None
047	D	-	None	Soft Sediment Fauna	None	No	None	None
047	E	-	None	Soft Sediment Fauna	None	No	None	None
048	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
048	B	-	Shell hash	Soft Sediment Fauna	None	No	None	None
048	C	-	Shell hash	Soft Sediment Fauna	None	No	None	None
049	A	-	None	Soft Sediment Fauna	None	No	None	None
049	B	-	None	Soft Sediment Fauna	None	No	None	None
049	D	-	None	Soft Sediment Fauna	None	No	None	None
050	A	-	Shell hash	Attached Fauna	None	Yes	Non-Reef Building Hard Coral	None
050	B	-	Shell hash	Attached Fauna	None	Yes	Non-Reef Building Hard Coral	None
050	C	-	Shell hash	Attached Fauna	Soft Sediment Fauna	Yes	Non-Reef Building Hard Coral	None
051	A	-	None	IND	IND	No	None	None
051	B	-	None	IND	IND	No	None	None
051	C	IND	None	IND	IND	No	None	None
052	B	-	None	Soft Sediment Fauna	None	No	None	None
052	C	-	None	Soft Sediment Fauna	None	No	None	None
052	D	-	None	Soft Sediment Fauna	None	No	None	None
053	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
053	B	-	Shell hash	Soft Sediment Fauna	None	No	None	None
053	D	-	Shell hash	Soft Sediment Fauna	None	No	None	None
054	A	-	None	Soft Sediment Fauna	None	No	None	None
054	B	-	None	Soft Sediment Fauna	None	No	None	None
054	C	-	None	Soft Sediment Fauna	None	No	None	None
055	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
055	B	-	Shell hash	Soft Sediment Fauna	None	No	None	None
055	C	-	Shell hash	Soft Sediment Fauna	None	No	None	None
056	A	-	None	Soft Sediment Fauna	None	No	None	None
056	B	-	None	Soft Sediment Fauna	None	No	None	None

StationID	Replicate	Bedform Size Measurement (cm)	Debris	Biotic Subclass	Co-occurring Biotic Subclass	Sensitive Taxa Present?	Type of Sensitive Taxa	Type of Species of Concern Observed
056	C	-	None	Soft Sediment Fauna	None	No	None	None
057	A	-	None	Soft Sediment Fauna	None	No	None	None
057	B	-	None	Soft Sediment Fauna	None	No	None	Sea scallop
057	C	-	None	Soft Sediment Fauna	None	No	None	None
058	A	-	None	Soft Sediment Fauna	None	No	None	None
058	B	-	None	IND	IND	No	None	IND
058	D	-	None	Soft Sediment Fauna	None	No	None	Sea scallop
059	A	-	None	Soft Sediment Fauna	None	No	None	None
060	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
060	B	IND	None	Soft Sediment Fauna	None	No	None	None
060	C	-	None	Soft Sediment Fauna	None	No	None	None
061	A	-	None	Soft Sediment Fauna	None	No	None	None
061	C	-	None	Soft Sediment Fauna	None	No	None	None
061	D	-	None	Soft Sediment Fauna	None	No	None	None
062	A	-	None	Soft Sediment Fauna	None	No	None	None
062	B	IND	IND	IND	IND	No	None	IND
062	D	-	None	Soft Sediment Fauna	None	No	None	None
063	A	-	None	Soft Sediment Fauna	None	No	None	None
063	B	-	None	Soft Sediment Fauna	None	No	None	None
063	D	-	None	Soft Sediment Fauna	None	No	None	None
064	A	-	None	Soft Sediment Fauna	None	No	None	None
064	B	-	None	Soft Sediment Fauna	None	No	None	None
064	C	-	None	Soft Sediment Fauna	None	No	None	None
065	A	-	None	Soft Sediment Fauna	None	No	None	None
065	B	-	None	Soft Sediment Fauna	None	No	None	None
065	C	-	IND	IND	IND	No	None	IND
066	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
066	B	-	Shell hash	Soft Sediment Fauna	None	No	None	None
066	C	-	Shell hash	Soft Sediment Fauna	None	No	None	None
067	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
067	B	-	Shell hash	Soft Sediment Fauna	None	No	None	None
067	D	-	Shell hash	Soft Sediment Fauna	None	No	None	None
068	A	-	Shell hash	Soft Sediment Fauna	Attached Fauna	No	None	None

StationID	Replicate	Bedform Size Measurement (cm)	Debris	Biotic Subclass	Co-occurring Biotic Subclass	Sensitive Taxa Present?	Type of Sensitive Taxa	Type of Species of Concern Observed
068	B	-	None	Soft Sediment Fauna	Attached Fauna	No	None	None
068	C	-	Shell hash	Attached Fauna	None	No	None	None
069	A	-	None	Soft Sediment Fauna	None	No	None	None
069	B	-	Shell hash	Soft Sediment Fauna	None	No	None	None
069	C	54.43	Shell hash	Soft Sediment Fauna	None	No	None	None
070	A	-	None	Soft Sediment Fauna	None	No	None	None
070	B	-	None	Soft Sediment Fauna	None	No	None	None
070	C	-	None	Soft Sediment Fauna	None	No	None	None
071	A	-	None	Soft Sediment Fauna	None	No	None	None
071	B	-	None	Soft Sediment Fauna	None	No	None	None
071	C	IND	None	Soft Sediment Fauna	None	No	None	None
072	A	-	None	Soft Sediment Fauna	None	No	None	None
072	C	IND	None	Soft Sediment Fauna	None	No	None	None
072	D	-	None	Soft Sediment Fauna	None	No	None	None
073	A	-	None	Soft Sediment Fauna	None	No	None	None
073	B	-	None	Soft Sediment Fauna	None	No	None	None
073	C	-	None	Soft Sediment Fauna	None	No	None	None
074	E	-	None	Soft Sediment Fauna	None	No	None	None
075	A	-	None	Soft Sediment Fauna	None	No	None	None
075	B	-	None	Soft Sediment Fauna	None	No	None	None
075	D	-	None	Soft Sediment Fauna	None	No	None	None
076	A	-	None	Soft Sediment Fauna	None	No	None	None
076	B	-	None	Soft Sediment Fauna	None	No	None	None
076	C	-	None	Soft Sediment Fauna	None	No	None	None
077	A	-	None	Soft Sediment Fauna	None	No	None	None
077	C	IND	None	IND	IND	No	None	IND

StationID	Replicate	Bedform Size Measurement (cm)	Debris	Biotic Subclass	Co-occurring Biotic Subclass	Sensitive Taxa Present?	Type of Sensitive Taxa	Type of Species of Concern Observed
077	D	-	None	Soft Sediment Fauna	None	No	None	None
078	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
078	B	-	None	Soft Sediment Fauna	None	No	None	None
078	C	-	Shell hash	Soft Sediment Fauna	None	No	None	None
079	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
079	C	-	None	Soft Sediment Fauna	None	No	None	None
079	D	IND	IND	IND	IND	No	None	IND
080	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
080	B	-	Shell hash	Soft Sediment Fauna	None	No	None	None
080	C	-	Shell hash	Soft Sediment Fauna	None	No	None	None
081	A	-	None	Soft Sediment Fauna	None	No	None	None
081	B	-	None	Soft Sediment Fauna	None	No	None	None
081	C	IND	None	Soft Sediment Fauna	None	No	None	None
082	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
082	B	IND	None	Soft Sediment Fauna	IND	No	None	IND
082	C	-	None	Soft Sediment Fauna	None	No	None	None
083	A	-	None	Soft Sediment Fauna	None	No	None	None
084	A	-	None	Soft Sediment Fauna	None	No	None	None
084	C	-	None	Soft Sediment Fauna	None	No	None	None
084	D	IND	None	Soft Sediment Fauna	None	No	None	None
085	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
085	B	IND	None	Soft Sediment Fauna	None	No	None	None
085	C	-	None	Soft Sediment Fauna	None	No	None	None
086	A	IND	Shell hash	Soft Sediment Fauna	None	No	None	None
086	B	IND	Shell hash	Soft Sediment Fauna	None	No	None	None
086	C	-	Shell hash	Soft Sediment Fauna	None	No	None	None
087	A	20.24	Shell hash	Soft Sediment Fauna	None	No	None	None
087	B	25.53	Shell hash	Soft Sediment Fauna	None	No	None	None
087	C	17.38	Shell hash	Soft Sediment Fauna	None	No	None	None
088	A	IND	Shell hash	IND	IND	No	None	IND
088	B	IND	None	IND	IND	No	None	IND
088	C	IND	Shell hash	IND	IND	No	None	IND
089	A	-	None	Soft Sediment Fauna	None	No	None	None

StationID	Replicate	Bedform Size Measurement (cm)	Debris	Biotic Subclass	Co-occurring Biotic Subclass	Sensitive Taxa Present?	Type of Sensitive Taxa	Type of Species of Concern Observed
089	B	-	None	Soft Sediment Fauna	None	No	None	None
089	C	-	None	Soft Sediment Fauna	None	No	None	None
090	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
090	B	-	Shell hash	Soft Sediment Fauna	None	No	None	None
090	D	-	Shell hash	Soft Sediment Fauna	None	No	None	None
091	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
091	B	-	Shell hash	Soft Sediment Fauna	None	No	None	None
091	C	-	Shell hash	Soft Sediment Fauna	None	No	None	Sea scallop
092	A	IND	Shell hash	Soft Sediment Fauna	None	No	None	None
092	C	IND	Shell hash	Soft Sediment Fauna	None	No	None	None
092	D	IND	Shell hash	Soft Sediment Fauna	None	No	None	None
093	A	18.42	Shell hash	Soft Sediment Fauna	None	No	None	None
093	C	13.33	Shell hash	Soft Sediment Fauna	None	No	None	None
093	D	14.40	Shell hash	IND	IND	No	None	IND
094	B	IND	None	Soft Sediment Fauna	None	No	None	None
094	C	IND	None	Soft Sediment Fauna	None	No	None	None
094	D	IND	None	Soft Sediment Fauna	None	No	None	None
095	A	10.13	None	Soft Sediment Fauna	Attached Fauna	No	None	None
095	B	21.79	None	Soft Sediment Fauna	Attached Fauna	No	None	None
095	C	11.13	None	Soft Sediment Fauna	Attached Fauna	No	None	None
096	A	-	Shell hash	Soft Sediment Fauna	Attached Fauna	No	None	None
096	B	-	Shell hash	Soft Sediment Fauna	None	No	None	None
096	D	18.01	Shell hash	Soft Sediment Fauna	Attached Fauna	No	None	None
097	A	IND	Shell hash	Soft Sediment Fauna	None	No	None	None
097	B	IND	Shell hash	Soft Sediment Fauna	None	No	None	None
097	C	IND	Shell hash	IND	IND	No	None	IND
098	A	IND	Shell hash	Soft Sediment Fauna	None	No	None	None
098	B	IND	Shell hash	Soft Sediment Fauna	None	No	None	None

StationID	Replicate	Bedform Size Measurement (cm)	Debris	Biotic Subclass	Co-occurring Biotic Subclass	Sensitive Taxa Present?	Type of Sensitive Taxa	Type of Species of Concern Observed
098	C	IND	Shell hash	Soft Sediment Fauna	None	No	None	None
099	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
099	B	-	Shell hash	Soft Sediment Fauna	None	No	None	None
099	C	-	Shell hash	Soft Sediment Fauna	None	No	None	None
100	A	11.24	None	Soft Sediment Fauna	None	No	None	None
100	B	11.22	None	Soft Sediment Fauna	None	No	None	None
100	C	10.79	None	Soft Sediment Fauna	None	No	None	None
101	A	21.21	Shell hash	Soft Sediment Fauna	None	No	None	None
101	B	16.57	Shell hash	Soft Sediment Fauna	None	No	None	None
101	C	12.91	Shell hash	Soft Sediment Fauna	None	No	None	None
102	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
102	B	-	Shell hash	Soft Sediment Fauna	None	No	None	None
102	C	-	Shell hash	Soft Sediment Fauna	IND	No	None	IND
103	A	10.28	Shell hash	Soft Sediment Fauna	None	No	None	None
103	B	8.03	Shell hash	Soft Sediment Fauna	None	No	None	None
103	C	7.46	Shell hash	Soft Sediment Fauna	None	No	None	None
104	A	7.66	Shell hash	Soft Sediment Fauna	None	No	None	None
104	B	19.91	Shell hash	Soft Sediment Fauna	None	No	None	None
104	C	13.15	Shell hash	Soft Sediment Fauna	None	No	None	None
105	A	26.75	None	Soft Sediment Fauna	None	No	None	None
105	B	31.61	None	Soft Sediment Fauna	None	No	None	None
105	C	29.39	Shell hash	Soft Sediment Fauna	None	No	None	None
106	A	IND	Shell hash	Soft Sediment Fauna	None	No	None	None
106	B	IND	Shell hash	Soft Sediment Fauna	None	No	None	None

StationID	Replicate	Bedform Size Measurement (cm)	Debris	Biotic Subclass	Co-occurring Biotic Subclass	Sensitive Taxa Present?	Type of Sensitive Taxa	Type of Species of Concern Observed
106	C	IND	Shell hash	Soft Sediment Fauna	None	No	None	None
107	A	-	Shell hash	Attached Fauna	Soft Sediment Fauna	No	None	None
107	B	-	Shell hash	Attached Fauna	Soft Sediment Fauna	No	None	None
107	C	-	Shell hash	Attached Fauna	Soft Sediment Fauna	No	None	None
108	A	-	Shell hash	Attached Fauna	None	No	None	None
108	B	IND	Shell hash	Attached Fauna	None	No	None	None
108	F	-	Shell hash	Attached Fauna	None	No	None	None
109	A	-	Shell hash	Attached Fauna	None	No	None	None
109	C	IND	Shell hash	IND	IND	No	None	IND
109	D	IND	Shell hash	IND	IND	No	None	IND
110	B	-	Shell hash	Attached Fauna	None	No	None	None
110	C	-	Shell hash	Attached Fauna	None	No	None	None
110	D	-	Shell hash	Attached Fauna	Soft Sediment Fauna	No	None	None
111	A	-	Shell hash	IND	IND	No	None	None
111	B	-	Shell hash	IND	IND	No	None	None
111	C	-	Shell hash	Soft Sediment Fauna	Attached Fauna	No	None	None
112	A	IND	IND	IND	IND	No	None	IND
112	B	IND	IND	IND	IND	No	None	IND
112	C	IND	Shell hash	IND	IND	No	None	IND
113	A	IND	None	IND	IND	No	None	IND
113	B	IND	None	IND	IND	No	None	IND
113	C	IND	None	IND	IND	No	None	IND
116	A	9.30	Shell hash	Soft Sediment Fauna	None	No	None	None
116	B	5.86	Shell hash	Soft Sediment Fauna	None	No	None	None
116	D	9.55	Shell hash	Soft Sediment Fauna	None	No	None	None
117	A	7.15	Shell hash	Soft Sediment Fauna	None	No	None	None
117	C	14.52	Shell hash	Soft Sediment Fauna	None	No	None	None
117	D	15.39	Shell hash	Soft Sediment Fauna	None	No	None	None
118	A	9.66	None	Soft Sediment Fauna	None	No	None	None
118	B	7.10	None	Soft Sediment Fauna	None	No	None	None
118	C	10.21	None	Soft Sediment Fauna	None	No	None	None
119	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
119	B	-	Shell hash	Soft Sediment Fauna	None	No	None	None
119	C	-	Shell hash	Soft Sediment Fauna	None	No	None	None
120	A	-	None	Soft Sediment Fauna	IND	No	None	None

StationID	Replicate	Bedform Size Measurement (cm)	Debris	Biotic Subclass	Co-occurring Biotic Subclass	Sensitive Taxa Present?	Type of Sensitive Taxa	Type of Species of Concern Observed
120	B	-	None	Soft Sediment Fauna	None	No	None	None
120	C	IND	None	Soft Sediment Fauna	None	No	None	None
122	A	9.77	Shell hash	Soft Sediment Fauna	None	No	None	None
122	B	10.90	Shell hash	Soft Sediment Fauna	None	No	None	None
122	C	10.94	Shell hash	Soft Sediment Fauna	None	No	None	None
123	A	12.75	Shell hash	Soft Sediment Fauna	None	No	None	None
123	B	IND	Shell hash	Soft Sediment Fauna	None	No	None	None
123	C	11.28	Shell hash	Soft Sediment Fauna	None	No	None	None
124	A	33.08	Shell hash	Soft Sediment Fauna	None	No	None	None
124	B	13.28	Shell hash	Soft Sediment Fauna	None	No	None	None
124	C	13.24	Shell hash	Soft Sediment Fauna	None	No	None	None
125	A	17.17	None	Soft Sediment Fauna	None	No	None	None
125	B	13.51	None	Soft Sediment Fauna	None	No	None	None
125	C	17.43	None	Soft Sediment Fauna	None	No	None	None
126	A	IND	None	IND	IND	No	None	None
126	C	IND	None	Soft Sediment Fauna	IND	No	None	None
126	D	IND	None	IND	IND	No	None	None
127	A	-	None	Soft Sediment Fauna	None	No	None	None
127	B	15.39	None	Soft Sediment Fauna	None	No	None	None
127	C	IND	None	Soft Sediment Fauna	None	No	None	None
128	A	IND	None	Soft Sediment Fauna	None	No	None	None
128	B	11.51	None	Soft Sediment Fauna	None	No	None	None
130	A	IND	None	IND	IND	No	None	None
130	B	IND	None	IND	IND	No	None	None
130	C	IND	None	IND	IND	No	None	None
131	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
131	B	-	Shell hash	Soft Sediment Fauna	None	No	None	None
131	C	-	Shell hash	Soft Sediment Fauna	None	No	None	None
132	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
132	B	-	Shell hash	Soft Sediment Fauna	None	No	None	None
132	C	-	Shell hash	Soft Sediment Fauna	None	No	None	None

StationID	Replicate	Bedform Size Measurement (cm)	Debris	Biotic Subclass	Co-occurring Biotic Subclass	Sensitive Taxa Present?	Type of Sensitive Taxa	Type of Species of Concern Observed
133	A	-	None	Soft Sediment Fauna	Attached Fauna	No	None	None
133	B	-	None	Soft Sediment Fauna	None	No	None	None
133	C	-	None	Soft Sediment Fauna	None	No	None	None
134	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
134	B	IND	Shell hash	IND	IND	No	None	IND
134	D	-	Shell hash	Soft Sediment Fauna	None	No	None	None
135	F	-	None	Soft Sediment Fauna	None	No	None	None
135	G	-	None	Soft Sediment Fauna	None	No	None	None
135	H	-	None	Soft Sediment Fauna	None	No	None	None
136	E	-	Shell hash	Soft Sediment Fauna	None	No	None	None
136	F	-	Shell hash	Soft Sediment Fauna	None	No	None	None
136	H	-	Shell hash	Soft Sediment Fauna	None	No	None	None
137	E	-	None	Soft Sediment Fauna	None	No	None	None
137	G	-	None	Soft Sediment Fauna	None	No	None	None
137	H	-	None	Soft Sediment Fauna	None	No	None	None
138	E	-	Shell hash	Soft Sediment Fauna	None	No	None	None
138	F	-	Shell hash	Soft Sediment Fauna	None	No	None	None
138	G	-	Shell hash	Soft Sediment Fauna	None	No	None	None
139	E	-	Shell hash	Soft Sediment Fauna	None	No	None	None
139	F	-	None	Soft Sediment Fauna	None	No	None	None
139	G	-	None	Soft Sediment Fauna	None	No	None	None
140	E	-	None	Soft Sediment Fauna	None	No	None	None
140	F	-	None	Soft Sediment Fauna	None	No	None	None
140	H	-	None	Soft Sediment Fauna	None	No	None	None
141	B	-	None	Soft Sediment Fauna	None	No	None	None
142	A	-	None	Soft Sediment Fauna	None	No	None	None
142	B	-	None	Soft Sediment Fauna	None	No	None	None
142	C	-	None	Soft Sediment Fauna	None	No	None	None
143	A	-	None	Soft Sediment Fauna	None	No	None	None
143	C	-	None	Soft Sediment Fauna	None	No	None	None

StationID	Replicate	Bedform Size Measurement (cm)	Debris	Biotic Subclass	Co-occurring Biotic Subclass	Sensitive Taxa Present?	Type of Sensitive Taxa	Type of Species of Concern Observed
143	D	-	None	Soft Sediment Fauna	None	No	None	None
144	A	-	None	Soft Sediment Fauna	None	No	None	None
144	B	IND	None	Soft Sediment Fauna	None	No	None	None
144	C	-	None	Soft Sediment Fauna	None	No	None	None
145	A	-	None	Soft Sediment Fauna	None	No	None	None
145	C	-	None	Soft Sediment Fauna	None	No	None	None
146	A	-	None	Soft Sediment Fauna	None	No	None	None
146	B	-	None	Soft Sediment Fauna	None	No	None	None
146	C	-	None	Soft Sediment Fauna	None	No	None	None
147	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
147	B	-	Shell hash	Soft Sediment Fauna	None	No	None	None
147	C	-	Shell hash	Soft Sediment Fauna	None	No	None	None
148	A	35.27	Shell hash	Soft Sediment Fauna	None	No	None	None
148	B	42.86	Shell hash	Soft Sediment Fauna	None	No	None	None
148	C	-	Shell hash	Soft Sediment Fauna	None	No	None	None
149	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
149	D	-	Shell hash	Soft Sediment Fauna	None	No	None	None
150	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
150	B	-	Shell hash	Soft Sediment Fauna	None	No	None	None
150	C	-	Shell hash	Soft Sediment Fauna	None	No	None	None
151	A	28.79	Shell hash	Soft Sediment Fauna	None	No	None	None
151	B	31.53	Shell hash	Soft Sediment Fauna	None	No	None	None
151	D	35.02	Shell hash	Soft Sediment Fauna	None	No	None	None
152	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
152	B	-	Shell hash	Soft Sediment Fauna	None	No	None	None
152	D	-	Shell hash	Soft Sediment Fauna	None	No	None	None
153	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
153	B	-	Shell hash	Soft Sediment Fauna	None	No	None	None
153	C	-	Shell hash	Soft Sediment Fauna	None	No	None	None
154	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
154	B	-	Shell hash	Soft Sediment Fauna	None	No	None	None

StationID	Replicate	Bedform Size Measurement (cm)	Debris	Biotic Subclass	Co-occurring Biotic Subclass	Sensitive Taxa Present?	Type of Sensitive Taxa	Type of Species of Concern Observed
154	C	-	Shell hash	Soft Sediment Fauna	None	No	None	None
155	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
155	B	-	Shell hash	Soft Sediment Fauna	None	No	None	None
155	D	-	Shell hash	Soft Sediment Fauna	None	No	None	None
156	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
156	B	-	Shell hash	Soft Sediment Fauna	None	No	None	None
156	D	-	Shell hash	Soft Sediment Fauna	None	No	None	None
157	A	30.23	Shell hash	Soft Sediment Fauna	None	No	None	None
157	B	31.54	Shell hash	Soft Sediment Fauna	None	No	None	None
157	C	-	Shell hash	Soft Sediment Fauna	None	No	None	None
REFA_01	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
REFA_01	B	-	Shell hash	Soft Sediment Fauna	None	No	None	None
REFA_01	C	-	Shell hash	Soft Sediment Fauna	None	No	None	None
REFA_02	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
REFA_02	B	-	None	Soft Sediment Fauna	None	No	None	None
REFA_02	D	-	Shell hash	Soft Sediment Fauna	None	No	None	None
REFA_03	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
REFA_03	B	-	None	Soft Sediment Fauna	None	No	None	None
REFA_03	D	-	Shell hash	Soft Sediment Fauna	None	No	None	None
REFA_04	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
REFA_04	C	-	Shell hash	Soft Sediment Fauna	None	No	None	None
REFA_04	D	-	Shell hash	Soft Sediment Fauna	None	No	None	None
REFA_05	A	-	None	Soft Sediment Fauna	None	No	None	None
REFA_05	B	-	None	Soft Sediment Fauna	None	No	None	None
REFA_05	C	-	None	Soft Sediment Fauna	None	No	None	None
REFB_01	E	-	Shell hash	Soft Sediment Fauna	None	No	None	None
REFB_01	F	-	Shell hash	Soft Sediment Fauna	None	No	None	None

StationID	Replicate	Bedform Size Measurement (cm)	Debris	Biotic Subclass	Co-occurring Biotic Subclass	Sensitive Taxa Present?	Type of Sensitive Taxa	Type of Species of Concern Observed
REFB_01	G	-	Shell hash	Soft Sediment Fauna	None	No	None	None
REFB_02	H	-	None	Soft Sediment Fauna	None	No	None	None
REFB_02	I	-	None	Soft Sediment Fauna	None	No	None	None
REFB_02	J	-	None	Soft Sediment Fauna	None	No	None	None
REFB_03	E	-	None	Soft Sediment Fauna	None	No	None	None
REFB_03	F	-	None	Soft Sediment Fauna	None	No	None	None
REFB_03	G	-	None	Soft Sediment Fauna	None	No	None	None
REFB_04	F	-	Shell hash	Soft Sediment Fauna	None	No	None	None
REFB_04	G	IND	Shell hash	Soft Sediment Fauna	None	No	None	None
REFB_04	H	-	Shell hash	Soft Sediment Fauna	None	No	None	None
REFB_05	E	-	None	Soft Sediment Fauna	None	No	None	None
REFB_05	F	IND	None	Soft Sediment Fauna	None	No	None	None
REFB_05	H	-	None	Soft Sediment Fauna	None	No	None	None
REFC_01	A	-	None	Soft Sediment Fauna	None	No	None	None
REFC_01	B	-	Shell hash	Soft Sediment Fauna	None	No	None	None
REFC_01	D	IND	None	Soft Sediment Fauna	IND	No	None	IND
REFC_02	A	-	Shell hash	Soft Sediment Fauna	None	No	None	None
REFC_02	B	-	Shell hash	Soft Sediment Fauna	None	No	None	None
REFC_02	C	-	Shell hash	Soft Sediment Fauna	None	No	None	None
REFC_03	A	-	None	Soft Sediment Fauna	None	No	None	None
REFC_03	B	-	None	Soft Sediment Fauna	None	No	None	None
REFC_03	D	-	None	Soft Sediment Fauna	None	No	None	None
REFC_04	A	-	None	Soft Sediment Fauna	None	No	None	None
REFC_04	B	-	None	Soft Sediment Fauna	None	No	None	None
REFC_04	D	-	None	Soft Sediment Fauna	None	No	None	None
REFC_05	A	-	None	Soft Sediment Fauna	None	No	None	None
REFC_05	B	-	None	Soft Sediment Fauna	None	No	None	None
REFC_05	C	-	None	Soft Sediment Fauna	None	No	None	None

StationID	Replicate	Biotic Group	Co-occurring Biotic Group	Percent Cover of All Attached Fauna	Invasive Taxa Present?	Type of Invasive Taxa	Tubes	Burrows	Tracks
001	A	Larger Tube-Building Fauna	Small Tube-Building Fauna	None	No	None	Yes	No	No
001	B	Larger Tube-Building Fauna	Small Tube-Building Fauna	None	No	None	Yes	No	No
001	C	Larger Tube-Building Fauna	Small Tube-Building Fauna	None	No	None	Yes	No	No
002	A	Mobile Crustaceans on Hard or Mixed Substrates	Burrowing Anemones	None	No	None	No	No	No
002	B	IND	IND	None	No	None	No	No	No
002	C	IND	IND	None	No	None	No	No	No
003	A	Small Tube-Building Fauna	Burrowing Anemones	None	No	None	Yes	No	Yes
003	B	IND	IND	None	IND	None	IND	IND	IND
003	C	IND	IND	None	IND	None	IND	IND	IND
004	A	Small Tube-Building Fauna	Burrowing Anemones	None	No	None	Yes	No	Yes
004	B	Small Tube-Building Fauna	None	None	No	None	Yes	No	No
004	C	Small Tube-Building Fauna	Burrowing Anemones	None	No	None	Yes	No	Yes
005	A	Small Surface-Burrowing Fauna	Sand Dollar Bed	None	No	None	No	No	No
005	B	Mobile Crustaceans on Hard or Mixed Substrates	None	None	No	None	No	No	No
005	C	Mobile Crustaceans on Hard or Mixed Substrates	None	None	No	None	No	No	No
006	A	Mobile Crustaceans on Hard or Mixed Substrates	None	None	No	None	Yes	No	No
006	B	Mobile Crustaceans on Hard or Mixed Substrates	Burrowing Anemones	None	No	None	No	No	No
006	C	Mobile Crustaceans on Hard or Mixed Substrates	None	None	No	None	No	No	No
007	A	Sand Dollar Bed	Small Tube-Building Fauna	None	No	None	Yes	Yes	Yes
007	B	Small Surface-Burrowing Fauna	Sand Dollar Bed	None	No	None	Yes	No	No
007	C	Small Tube-Building Fauna	Sand Dollar Bed	None	No	None	Yes	No	Yes
008	B	IND	IND	None	No	None	Yes	No	No
008	C	Small Tube-Building Fauna	Mobile Crustaceans on Hard or Mixed Substrates	None	No	None	No	No	No
008	D	Small Surface-Burrowing Fauna	Sand Dollar Bed	None	No	None	Yes	Yes	No
009	A	Small Surface-Burrowing Fauna	Egg Masses	None	No	None	No	No	No
009	B	Small Surface-Burrowing Fauna	Burrowing Anemones	None	No	None	No	No	No
009	C	Small Surface-Burrowing Fauna	Burrowing Anemones	None	No	None	No	No	No
010	B	Small Tube-Building Fauna	Diverse Soft Sediment Epifauna	Sparse (1 to <30%)	No	None	Yes	No	No
010	C	Small Tube-Building Fauna	IND	Sparse (1 to <30%)	No	None	Yes	No	No
010	D	Small Tube-Building Fauna	None	None	No	None	Yes	Yes	No
011	A	Small Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	Yes	No
011	B	Small Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	Yes	Yes
011	C	Small Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	Yes	Yes
012	A	Small Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	Yes	No
012	B	Small Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	No	No
012	C	Small Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	Yes	No
013	A	Small Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	No	No

StationID	Replicate	Biotic Group	Co-occurring Biotic Group	Percent Cover of All Attached Fauna	Invasive Taxa Present?	Type of Invasive Taxa	Tubes	Burrows	Tracks
013	B	Small Tube-Building Fauna	Mobile Crustaceans on Soft Sediments	None	No	None	Yes	No	No
013	C	Small Tube-Building Fauna	Burrowing Anemones	None	No	None	Yes	No	No
014	A	Small Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	No	No
014	B	Small Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	No	No
014	D	Small Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	No	No
015	A	Small Tube-Building Fauna	Mobile Crustaceans on Soft Sediments	None	No	None	Yes	Yes	Yes
015	B	Small Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	Yes	No
015	C	Small Tube-Building Fauna	Sessile Gastropods	None	No	None	Yes	Yes	Yes
016	A	Sand Dollar Bed	Small Tube-Building Fauna	None	No	None	Yes	Yes	No
016	B	Sand Dollar Bed	Small Tube-Building Fauna	None	No	None	Yes	Yes	No
016	C	Sand Dollar Bed	Small Tube-Building Fauna	None	No	None	Yes	Yes	No
017	A	Small Tube-Building Fauna	Sand Dollar Bed	None	No	None	Yes	No	No
017	B	Small Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	No	Yes
017	D	Small Tube-Building Fauna	Sand Dollar Bed	None	No	None	Yes	Yes	Yes
018	A	Small Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	No	Yes
018	B	Small Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	No	No
018	C	Small Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	Yes	Yes
019	A	Small Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	Yes	No
019	B	Small Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	Yes	No
019	C	Small Tube-Building Fauna	None	None	No	None	Yes	No	No
020	A	Sand Dollar Bed	Larger Tube-Building Fauna	None	No	None	Yes	Yes	Yes
020	B	Sand Dollar Bed	Larger Tube-Building Fauna	None	No	None	Yes	Yes	No
020	C	Sand Dollar Bed	Larger Tube-Building Fauna	None	No	None	Yes	Yes	No
021	A	Sand Dollar Bed	Diverse Soft Sediment Epifauna	None	No	None	No	No	No
021	B	Sand Dollar Bed	Diverse Soft Sediment Epifauna	None	No	None	Yes	No	No
021	D	Sand Dollar Bed	Diverse Soft Sediment Epifauna	None	No	None	Yes	No	No
022	A	Small Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	Yes	Yes
022	B	Small Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	Yes	Yes
022	C	Small Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	Yes	Yes
023	A	Diverse Soft Sediment Epifauna	Larger Tube-Building Fauna	None	No	None	Yes	No	Yes
023	B	Diverse Soft Sediment Epifauna	None	None	No	None	No	No	Yes
023	D	Diverse Soft Sediment Epifauna	Small Tube-Building Fauna	None	No	None	Yes	Yes	No

StationID	Replicate	Biotic Group	Co-occurring Biotic Group	Percent Cover of All Attached Fauna	Invasive Taxa Present?	Type of Invasive Taxa	Tubes	Burrows	Tracks
024	A	Small Surface-Burrowing Fauna	Sand Dollar Bed	None	No	None	Yes	No	Yes
024	B	Sand Dollar Bed	IND	None	IND	None	Yes	IND	IND
024	C	Sand Dollar Bed	Diverse Soft Sediment Epifauna	None	No	None	Yes	No	No
025	A	Sand Dollar Bed	None	None	No	None	Yes	No	No
025	B	Sand Dollar Bed	IND	None	IND	None	IND	IND	IND
025	D	Sand Dollar Bed	IND	None	IND	None	IND	IND	IND
026	H	Small Tube-Building Fauna	Sand Dollar Bed	None	No	None	Yes	Yes	Yes
026	J	Small Tube-Building Fauna	Sand Dollar Bed	None	No	None	Yes	Yes	No
026	K	Small Tube-Building Fauna	Sand Dollar Bed	None	No	None	Yes	Yes	No
027	A	Small Tube-Building Fauna	Sand Dollar Bed	None	No	None	Yes	Yes	Yes
027	B	Small Tube-Building Fauna	Sand Dollar Bed	None	No	None	Yes	No	Yes
027	C	Small Tube-Building Fauna	Sand Dollar Bed	None	No	None	Yes	No	No
028	A	Larger Tube-Building Fauna	Sand Dollar Bed	None	No	None	Yes	Yes	Yes
028	B	Larger Tube-Building Fauna	Sand Dollar Bed	None	No	None	Yes	Yes	Yes
028	C	Small Tube-Building Fauna	Sand Dollar Bed	None	No	None	Yes	Yes	Yes
029	A	Larger Tube-Building Fauna	Sand Dollar Bed	None	No	None	Yes	No	Yes
029	B	Larger Tube-Building Fauna	Sand Dollar Bed	None	No	None	Yes	Yes	No
029	C	Larger Tube-Building Fauna	Sand Dollar Bed	None	No	None	Yes	Yes	Yes
030	A	Small Tube-Building Fauna	Sand Dollar Bed	None	No	None	Yes	No	No
030	C	Small Tube-Building Fauna	Sand Dollar Bed	None	No	None	Yes	Yes	No
030	D	Diverse Soft Sediment Epifauna	Sand Dollar Bed	None	No	None	Yes	No	Yes
031	A	Sand Dollar Bed	Diverse Soft Sediment Epifauna	None	No	None	Yes	No	Yes
031	B	Sand Dollar Bed	None	None	No	None	Yes	No	No
031	C	Sand Dollar Bed	Diverse Soft Sediment Epifauna	None	No	None	Yes	No	No
032	A	Sand Dollar Bed	Small Tube-Building Fauna	None	No	None	Yes	No	No
032	B	Sand Dollar Bed	Small Tube-Building Fauna	None	IND	None	IND	No	No
032	D	Sand Dollar Bed	Small Tube-Building Fauna	None	No	None	Yes	No	Yes
033	A	Sand Dollar Bed	Small Tube-Building Fauna	None	No	None	Yes	No	No
033	B	Sand Dollar Bed	Small Tube-Building Fauna	None	No	None	Yes	No	No
033	C	Sand Dollar Bed	Diverse Soft Sediment Epifauna	None	No	None	Yes	No	No
034	A	Sand Dollar Bed	Small Tube-Building Fauna	None	No	None	Yes	Yes	No
034	B	Sand Dollar Bed	Small Tube-Building Fauna	None	No	None	Yes	Yes	No

StationID	Replicate	Biotic Group	Co-occurring Biotic Group	Percent Cover of All Attached Fauna	Invasive Taxa Present?	Type of Invasive Taxa	Tubes	Burrows	Tracks
034	C	Sand Dollar Bed	Small Tube-Building Fauna	None	No	None	Yes	No	No
035	A	Sand Dollar Bed	Small Tube-Building Fauna	None	No	None	Yes	Yes	No
035	B	Sand Dollar Bed	Small Tube-Building Fauna	None	No	None	Yes	Yes	No
035	C	Sand Dollar Bed	Diverse Soft Sediment Epifauna	None	No	None	Yes	No	No
036	A	Diverse Soft Sediment Epifauna	Sand Dollar Bed	None	No	None	Yes	No	No
036	B	Sand Dollar Bed	Diverse Soft Sediment Epifauna	None	No	None	Yes	No	No
036	C	Sand Dollar Bed	Diverse Soft Sediment Epifauna	None	No	None	Yes	No	No
037	A	Small Surface-Burrowing Fauna	Burrowing Anemones	None	No	None	Yes	No	Yes
037	C	IND	IND	None	IND	None	IND	IND	IND
037	D	Small Surface-Burrowing Fauna	Burrowing Anemones	None	No	None	No	Yes	No
038	A	Sand Dollar Bed	Diverse Soft Sediment Epifauna	None	No	None	Yes	No	Yes
038	B	Sand Dollar Bed	Diverse Soft Sediment Epifauna	None	IND	None	IND	IND	IND
038	C	Sand Dollar Bed	IND	None	No	None	Yes	No	Yes
039	A	Sand Dollar Bed	Larger Tube-Building Fauna	None	No	None	Yes	No	No
039	B	Larger Tube-Building Fauna	Sand Dollar Bed	None	No	None	Yes	No	No
039	C	Sand Dollar Bed	Larger Tube-Building Fauna	None	No	None	Yes	No	No
040	A	Small Surface-Burrowing Fauna	Small Tube-Building Fauna	None	No	None	Yes	Yes	No
040	B	Small Surface-Burrowing Fauna	Small Tube-Building Fauna	None	No	None	Yes	No	No
040	C	Small Surface-Burrowing Fauna	Small Tube-Building Fauna	None	No	None	Yes	No	No
041	A	Small Surface-Burrowing Fauna	Sand Dollar Bed	None	No	None	Yes	No	No
041	B	Small Tube-Building Fauna	Sand Dollar Bed	None	No	None	Yes	No	No
041	C	Sand Dollar Bed	Small Surface-Burrowing Fauna	None	No	None	Yes	No	No
042	A	Small Surface-Burrowing Fauna	Tracks and Trails	None	No	None	Yes	Yes	Yes
042	B	Burrowing Anemones	Tracks and Trails	None	No	None	Yes	No	Yes
042	C	Small Surface-Burrowing Fauna	Tracks and Trails	None	No	None	Yes	Yes	Yes
043	A	Larger Tube-Building Fauna	Tracks and Trails	None	No	None	Yes	Yes	Yes
043	B	Larger Tube-Building Fauna	Tracks and Trails	None	No	None	Yes	Yes	Yes
043	C	Small Tube-Building Fauna	Sand Dollar Bed	None	No	None	Yes	Yes	No
044	A	Larger Tube-Building Fauna	Burrowing Anemones	None	No	None	Yes	Yes	Yes
044	B	Larger Tube-Building Fauna	Sand Dollar Bed	None	No	None	Yes	Yes	No
044	C	Mobile Crustaceans on Soft Sediments	Tracks and Trails	None	No	None	Yes	No	Yes
045	A	Larger Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	Yes	No
045	B	Larger Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	Yes	No

StationID	Replicate	Biotic Group	Co-occurring Biotic Group	Percent Cover of All Attached Fauna	Invasive Taxa Present?	Type of Invasive Taxa	Tubes	Burrows	Tracks
045	C	Larger Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	No	No
046	A	Small Surface-Burrowing Fauna	Attached Hydroids	Sparse (1 to <30%)	No	None	No	No	No
046	B	Small Surface-Burrowing Fauna	None	None	No	None	No	No	Yes
046	D	IND	IND	None	IND	None	IND	IND	IND
047	A	Sand Dollar Bed	Larger Tube-Building Fauna	None	No	None	Yes	No	Yes
047	D	Sand Dollar Bed	Larger Tube-Building Fauna	None	No	None	Yes	Yes	No
047	E	Larger Tube-Building Fauna	Sand Dollar Bed	None	No	None	Yes	Yes	No
048	A	Larger Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	No	Yes
048	B	Larger Tube-Building Fauna	Sand Dollar Bed	None	No	None	Yes	No	Yes
048	C	Larger Tube-Building Fauna	Sand Dollar Bed	None	No	None	Yes	Yes	No
049	A	Larger Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	Yes	No
049	B	Larger Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	Yes	No
049	D	Larger Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	Yes	No
050	A	Attached Hydroids	Attached Bryozoans	Dense (70 to < 90%)	No	None	Yes	No	No
050	B	Attached Hydroids	Attached Sponges	Moderate (30 to < 70%)	No	None	Yes	No	No
050	C	Attached Hydroids	Attached Sponges	Moderate (30 to < 70%)	No	None	Yes	No	No
051	A	Mobile Crustaceans on Hard or Mixed Substrates	Burrowing Anemones	None	No	None	No	No	No
051	B	IND	IND	None	No	None	No	No	No
051	C	Mobile Crustaceans on Hard or Mixed Substrates	IND	None	No	None	No	No	No
052	B	Sand Dollar Bed	Mobile Crustaceans on Soft Sediments	None	No	None	Yes	Yes	Yes
052	C	Small Tube-Building Fauna	Sand Dollar Bed	None	No	None	Yes	Yes	No
052	D	Small Surface-Burrowing Fauna	Sand Dollar Bed	None	No	None	Yes	Yes	No
053	A	Sand Dollar Bed	Mobile Crustaceans on Soft Sediments	None	No	None	Yes	Yes	Yes
053	B	Larger Tube-Building Fauna	Mobile Crustaceans on Soft Sediments	None	No	None	Yes	Yes	No
053	D	Small Surface-Burrowing Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	Yes	Yes
054	A	Small Tube-Building Fauna	Small Tube-Building Fauna	None	No	None	Yes	Yes	No
054	B	Small Tube-Building Fauna	Small Tube-Building Fauna	None	No	None	Yes	No	No
054	C	Small Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	No	No
055	A	Larger Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	No	No
055	B	Larger Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	No	No
055	C	Larger Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	No	No
056	A	Larger Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	No	Yes
056	B	Larger Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	No	No

StationID	Replicate	Biotic Group	Co-occurring Biotic Group	Percent Cover of All Attached Fauna	Invasive Taxa Present?	Type of Invasive Taxa	Tubes	Burrows	Tracks
056	C	Larger Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	No	Yes
057	A	Larger Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	Yes	Yes
057	B	Larger Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	Yes	Yes
057	C	Larger Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	Yes	No
058	A	Larger Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	Yes	Yes
058	B	Larger Tube-Building Fauna	Sand Dollar Bed	None	IND	None	IND	IND	IND
058	D	Diverse Soft Sediment Epifauna	Small Tube-Building Fauna	None	No	None	Yes	Yes	No
059	A	Small Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	Yes	Yes
060	A	Diverse Soft Sediment Epifauna	Burrowing Anemones	None	No	None	Yes	Yes	Yes
060	B	Small Surface-Burrowing Fauna	Burrowing Anemones	None	No	None	Yes	Yes	No
060	C	Burrowing Anemones	Small Surface-Burrowing Fauna	None	No	None	Yes	Yes	Yes
061	A	Small Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	Yes	No
061	C	Small Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	Yes	No
061	D	Small Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	Yes	No
062	A	Small Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	Yes	No
062	B	IND	IND	None	IND	None	IND	IND	IND
062	D	Small Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	Yes	No
063	A	Sand Dollar Bed	Small Tube-Building Fauna	None	No	None	Yes	No	Yes
063	B	Small Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	No	Yes
063	D	Diverse Soft Sediment Epifauna	Small Surface-Burrowing Fauna	None	No	None	Yes	Yes	Yes
064	A	Sand Dollar Bed	Burrowing Anemones	None	No	None	No	No	Yes
064	B	Sand Dollar Bed	Small Tube-Building Fauna	None	No	None	Yes	No	Yes
064	C	Sand Dollar Bed	Small Surface-Burrowing Fauna	None	No	None	Yes	Yes	Yes
065	A	Diverse Soft Sediment Epifauna	Small Surface-Burrowing Fauna	None	No	None	Yes	No	Yes
065	B	Small Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	Yes	No
065	C	Small Surface-Burrowing Fauna	Tracks and Trails	None	IND	None	IND	Yes	Yes
066	A	Larger Tube-Building Fauna	Sand Dollar Bed	None	No	None	Yes	Yes	No
066	B	Larger Tube-Building Fauna	Sand Dollar Bed	None	No	None	Yes	Yes	No
066	C	Larger Tube-Building Fauna	Sand Dollar Bed	None	No	None	Yes	No	No
067	A	Sand Dollar Bed	Larger Tube-Building Fauna	None	No	None	Yes	No	No
067	B	Sand Dollar Bed	Larger Tube-Building Fauna	None	No	None	Yes	Yes	No
067	D	Sand Dollar Bed	IND	None	No	None	No	Yes	No
068	A	Mobile Crustaceans on Hard or Mixed Substrates	Attached Mussels	Sparse (1 to <30%)	No	None	No	No	No

StationID	Replicate	Biotic Group	Co-occurring Biotic Group	Percent Cover of All Attached Fauna	Invasive Taxa Present?	Type of Invasive Taxa	Tubes	Burrows	Tracks
068	B	Attached Mussels	Diverse Soft Sediment Epifauna	Sparse (1 to <30%)	No	None	Yes	No	No
068	C	Mobile Crustaceans on Hard or Mixed Substrates	Attached Mussels	Sparse (1 to <30%)	No	None	No	No	No
069	A	Small Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	Yes	No
069	B	Small Tube-Building Fauna	Mobile Crustaceans on Hard or Mixed Substrates	None	No	None	Yes	No	Yes
069	C	Small Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	Yes	No
070	A	Small Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	Yes	Yes
070	B	Small Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	IND	IND
070	C	Small Tube-Building Fauna	Burrowing Anemones	None	No	None	Yes	Yes	No
071	A	Sand Dollar Bed	Larger Tube-Building Fauna	None	No	None	Yes	No	Yes
071	B	Sand Dollar Bed	Larger Tube-Building Fauna	None	No	None	Yes	No	No
071	C	Sand Dollar Bed	Small Tube-Building Fauna	None	No	None	Yes	No	No
072	A	Small Tube-Building Fauna	Tracks and Trails	None	No	None	Yes	Yes	Yes
072	C	Small Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	No	No
072	D	Small Tube-Building Fauna	Tracks and Trails	None	No	None	Yes	Yes	Yes
073	A	Small Tube-Building Fauna	Mobile Mollusks on Soft Sediments	None	No	None	Yes	Yes	Yes
073	B	Small Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	Yes	Yes
073	C	Small Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	Yes	No
074	E	Small Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	Yes	No
075	A	Small Tube-Building Fauna	Burrowing Anemones	None	No	None	Yes	Yes	Yes
075	B	Small Tube-Building Fauna	Burrowing Anemones	None	No	None	Yes	Yes	Yes
075	D	Small Tube-Building Fauna	Burrowing Anemones	None	No	None	Yes	Yes	No
076	A	Larger Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	Yes	Yes
076	B	Larger Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	Yes	No
076	C	Larger Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	No	No
077	A	Burrowing Anemones	Small Tube-Building Fauna	None	No	None	Yes	Yes	Yes
077	C	IND	IND	None	IND	None	IND	IND	IND

StationID	Replicate	Biotic Group	Co-occurring Biotic Group	Percent Cover of All Attached Fauna	Invasive Taxa Present?	Type of Invasive Taxa	Tubes	Burrows	Tracks
077	D	Burrowing Anemones	Small Tube-Building Fauna	None	No	None	Yes	Yes	No
078	A	Larger Tube-Building Fauna	Burrowing Anemones	None	No	None	Yes	No	Yes
078	B	Larger Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	No	Yes
078	C	Larger Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	No	Yes
079	A	Small Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	Yes	Yes
079	C	Small Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	Yes	No
079	D	IND	IND	None	IND	None	IND	IND	IND
080	A	Larger Tube-Building Fauna	IND	None	No	None	Yes	Yes	No
080	B	Larger Tube-Building Fauna	IND	None	No	None	Yes	Yes	No
080	C	Larger Tube-Building Fauna	Mobile Crustaceans on Soft Sediments	None	No	None	Yes	Yes	Yes
081	A	Larger Tube-Building Fauna	Burrowing Anemones	None	No	None	Yes	Yes	Yes
081	B	Larger Tube-Building Fauna	Tracks and Trails	None	No	None	Yes	Yes	Yes
081	C	Larger Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	Yes	No
082	A	Small Tube-Building Fauna	Sand Dollar Bed	None	No	None	Yes	Yes	Yes
082	B	IND	IND	None	IND	None	IND	IND	IND
082	C	Sand Dollar Bed	Larger Tube-Building Fauna	None	No	None	Yes	Yes	No
083	A	Burrowing Anemones	Small Surface-Burrowing Fauna	None	No	None	Yes	Yes	No
084	A	Sand Dollar Bed	Burrowing Anemones	None	No	None	Yes	Yes	Yes
084	C	Sand Dollar Bed	Mobile Crustaceans on Soft Sediments	None	No	None	Yes	Yes	Yes
084	D	Sand Dollar Bed	Mobile Crustaceans on Soft Sediments	None	No	None	Yes	Yes	No
085	A	Small Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	Yes	Yes
085	B	Larger Tube-Building Fauna	IND	None	No	None	Yes	IND	IND
085	C	Small Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	Yes	No
086	A	Larger Tube-Building Fauna	Mobile Crustaceans on Soft Sediments	None	No	None	Yes	Yes	No
086	B	Larger Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	Yes	No
086	C	Larger Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	Yes	IND
087	A	Larger Tube-Building Fauna	Small Tube-Building Fauna	None	No	None	Yes	No	No
087	B	Larger Tube-Building Fauna	Small Tube-Building Fauna	None	No	None	Yes	Yes	Yes
087	C	Larger Tube-Building Fauna	Small Tube-Building Fauna	None	No	None	Yes	Yes	No
088	A	Mobile Crustaceans on Soft Sediments	IND	None	No	None	IND	IND	IND
088	B	IND	IND	None	IND	None	IND	IND	IND
088	C	IND	IND	None	IND	None	IND	IND	IND
089	A	Larger Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	Yes	No

StationID	Replicate	Biotic Group	Co-occurring Biotic Group	Percent Cover of All Attached Fauna	Invasive Taxa Present?	Type of Invasive Taxa	Tubes	Burrows	Tracks
089	B	Larger Tube-Building Fauna	Small Tube-Building Fauna	None	No	None	Yes	Yes	No
089	C	Larger Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	Yes	No
090	A	Larger Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	Yes	No
090	B	Larger Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	Yes	No
090	D	Larger Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	Yes	No
091	A	Larger Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	Yes	No
091	B	Larger Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	Yes	Yes
091	C	Larger Tube-Building Fauna	Sand Dollar Bed	None	No	None	Yes	Yes	Yes
092	A	Small Tube-Building Fauna	Mobile Mollusks on Soft Sediments	None	No	None	Yes	Yes	No
092	C	Small Tube-Building Fauna	Mobile Mollusks on Soft Sediments	None	No	None	Yes	Yes	No
092	D	Small Tube-Building Fauna	Mobile Mollusks on Soft Sediments	None	No	None	Yes	Yes	No
093	A	Larger Tube-Building Fauna	Small Tube-Building Fauna	None	No	None	Yes	Yes	No
093	C	Larger Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	Yes	No
093	D	IND	IND	None	IND	None	IND	IND	IND
094	B	Small Tube-Building Fauna	Mobile Mollusks on Soft Sediments	None	No	None	Yes	Yes	No
094	C	Small Tube-Building Fauna	Larger Tube-Building Fauna	None	No	None	Yes	Yes	No
094	D	Small Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	Yes	No
095	A	Tracks and Trails	Attached Mussels	Sparse (1 to <30%)	No	None	Yes	Yes	Yes
095	B	Attached Mussels	Tracks and Trails	Sparse (1 to <30%)	No	None	Yes	Yes	Yes
095	C	Attached Mussels	Attached Mussels	Moderate (30 to < 70%)	No	None	Yes	Yes	Yes
096	A	Attached Mussels	None	Trace (<1%)	No	None	No	Yes	No
096	B	Small Tube-Building Fauna	None	None	No	None	No	Yes	No
096	D	Attached Mussels	None	Trace (<1%)	No	None	Yes	Yes	No
097	A	Small Surface-Burrowing Fauna	Mobile Crustaceans on Soft Sediments	None	No	None	Yes	Yes	No
097	B	Tracks and Trails	None	None	No	None	No	No	No
097	C	IND	IND	None	IND	None	IND	IND	IND
098	A	Sand Dollar Bed	Mobile Crustaceans on Soft Sediments	None	No	None	Yes	Yes	Yes
098	B	Sand Dollar Bed	Larger Tube-Building Fauna	None	No	None	Yes	Yes	Yes

StationID	Replicate	Biotic Group	Co-occurring Biotic Group	Percent Cover of All Attached Fauna	Invasive Taxa Present?	Type of Invasive Taxa	Tubes	Burrows	Tracks
098	C	Sand Dollar Bed	Burrowing Anemones	None	No	None	Yes	Yes	Yes
099	A	Larger Tube-Building Fauna	Mobile Crustaceans on Soft Sediments	None	No	None	Yes	Yes	No
099	B	Small Tube-Building Fauna	Mobile Crustaceans on Soft Sediments	None	No	None	Yes	Yes	No
099	C	Small Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	Yes	No
100	A	Small Surface-Burrowing Fauna	Mobile Crustaceans on Soft Sediments	None	No	None	Yes	Yes	No
100	B	Small Surface-Burrowing Fauna	Small Tube-Building Fauna	None	No	None	Yes	Yes	No
100	C	Small Surface-Burrowing Fauna	Small Tube-Building Fauna	None	No	None	Yes	Yes	No
101	A	Diverse Soft Sediment Epifauna	Small Surface-Burrowing Fauna	None	No	None	Yes	Yes	No
101	B	Diverse Soft Sediment Epifauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	Yes	No
101	C	Diverse Soft Sediment Epifauna	None	None	No	None	Yes	Yes	No
102	A	Small Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	Yes	Yes
102	B	Small Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	Yes	Yes
102	C	Sand Dollar Bed	IND	None	IND	None	IND	IND	IND
103	A	Small Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	Yes	Yes
103	B	Small Tube-Building Fauna	Sand Dollar Bed	None	No	None	Yes	Yes	No
103	C	Small Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	Yes	Yes
104	A	Small Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	Yes	No
104	B	Small Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	Yes	No
104	C	Small Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	Yes	No
105	A	Mobile Crustaceans on Soft Sediments	Larger Tube-Building Fauna	None	No	None	Yes	Yes	No
105	B	Mobile Crustaceans on Soft Sediments	None	None	No	None	Yes	Yes	No
105	C	Mobile Crustaceans on Soft Sediments	Larger Tube-Building Fauna	None	No	None	Yes	Yes	No
106	A	Larger Tube-Building Fauna	IND	None	No	None	Yes	IND	IND
106	B	Larger Tube-Building Fauna	Mobile Crustaceans on Soft Sediments	None	No	None	Yes	No	No

StationID	Replicate	Biotic Group	Co-occurring Biotic Group	Percent Cover of All Attached Fauna	Invasive Taxa Present?	Type of Invasive Taxa	Tubes	Burrows	Tracks
106	C	Larger Tube-Building Fauna	None	None	No	None	Yes	No	No
107	A	Mussel Bed	Mobile Crustaceans on Soft Sediments	Sparse (1 to <30%)	No	None	Yes	Yes	No
107	B	Mussel Bed	Mobile Crustaceans on Soft Sediments	Moderate (30 to < 70%)	No	None	Yes	Yes	No
107	C	Mussel Bed	None	Moderate (30 to < 70%)	No	None	Yes	Yes	No
108	A	Mussel Bed	Attached Hydroids	Sparse (1 to <30%)	No	None	IND	IND	IND
108	B	Mussel Bed	Attached Sea Urchins	Sparse (1 to <30%)	No	None	IND	IND	IND
108	F	Mussel Bed	Attached Hydroids	Sparse (1 to <30%)	No	None	IND	IND	IND
109	A	Mussel Bed	Attached Hydroids	Moderate (30 to < 70%)	No	None	IND	IND	IND
109	C	Mussel Bed	IND	None	IND	None	IND	IND	IND
109	D	Mussel Bed	IND	None	IND	None	IND	IND	IND
110	B	Mussel Bed	Attached Hydroids	Moderate (30 to < 70%)	No	None	IND	IND	IND
110	C	Mussel Bed	Attached Hydroids	Moderate (30 to < 70%)	No	None	IND	IND	IND
110	D	Mussel Bed	Attached Hydroids	Moderate (30 to < 70%)	No	None	Yes	Yes	No
111	A	IND	IND	None	No	None	IND	IND	IND
111	B	IND	IND	None	No	None	IND	IND	IND
111	C	Mobile Crustaceans on Soft Sediments	Attached Hydroids	Sparse (1 to <30%)	No	None	Yes	Yes	No
112	A	IND	IND	None	IND	None	IND	IND	IND
112	B	IND	IND	None	IND	None	IND	IND	IND
112	C	IND	IND	None	IND	None	IND	IND	IND
113	A	IND	IND	None	IND	None	IND	IND	IND
113	B	IND	IND	None	IND	None	IND	IND	IND
113	C	IND	IND	None	IND	None	IND	IND	IND
116	A	Larger Tube-Building Fauna	Tracks and Trails	None	No	None	Yes	Yes	Yes
116	B	Larger Tube-Building Fauna	Mobile Crustaceans on Soft Sediments	None	No	None	Yes	Yes	No
116	D	Mobile Crustaceans on Soft Sediments	None	None	No	None	No	No	No
117	A	Larger Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	Yes	No
117	C	Larger Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	Yes	No
117	D	Small Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	Yes	No
118	A	Small Tube-Building Fauna	Mobile Crustaceans on Soft Sediments	None	No	None	Yes	Yes	No
118	B	Small Tube-Building Fauna	Mobile Crustaceans on Soft Sediments	None	No	None	Yes	Yes	No
118	C	Small Tube-Building Fauna	None	None	No	None	Yes	Yes	No
119	A	Larger Tube-Building Fauna	Mobile Crustaceans on Soft Sediments	None	No	None	Yes	Yes	No
119	B	Small Tube-Building Fauna	Mobile Crustaceans on Soft Sediments	None	No	None	Yes	Yes	No
119	C	Small Tube-Building Fauna	Mobile Crustaceans on Soft Sediments	None	No	None	Yes	Yes	No
120	A	Larger Tube-Building Fauna	IND	None	IND	None	Yes	IND	IND

StationID	Replicate	Biotic Group	Co-occurring Biotic Group	Percent Cover of All Attached Fauna	Invasive Taxa Present?	Type of Invasive Taxa	Tubes	Burrows	Tracks
120	B	Larger Tube-Building Fauna	Mobile Crustaceans on Soft Sediments	None	No	None	Yes	Yes	No
120	C	Larger Tube-Building Fauna	IND	None	No	None	Yes	IND	No
122	A	Small Tube-Building Fauna	Mobile Crustaceans on Soft Sediments	None	No	None	Yes	Yes	No
122	B	Small Tube-Building Fauna	Larger Tube-Building Fauna	None	No	None	Yes	Yes	No
122	C	Small Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	Yes	No
123	A	Small Tube-Building Fauna	Larger Tube-Building Fauna	None	No	None	Yes	Yes	No
123	B	Small Tube-Building Fauna	Mobile Crustaceans on Soft Sediments	None	No	None	Yes	Yes	No
123	C	Small Tube-Building Fauna	Larger Tube-Building Fauna	None	No	None	Yes	Yes	No
124	A	Mobile Crustaceans on Soft Sediments	Small Surface-Burrowing Fauna	None	No	None	Yes	Yes	No
124	B	Mobile Crustaceans on Soft Sediments	None	None	No	None	Yes	Yes	No
124	C	Small Tube-Building Fauna	Mobile Crustaceans on Soft Sediments	None	No	None	Yes	Yes	No
125	A	Small Tube-Building Fauna	Mobile Crustaceans on Soft Sediments	None	No	None	Yes	Yes	No
125	B	Small Tube-Building Fauna	Mobile Crustaceans on Soft Sediments	None	No	None	Yes	IND	IND
125	C	Small Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	Yes	No
126	A	IND	IND	None	No	None	No	No	No
126	C	Mobile Crustaceans on Hard or Mixed Substrates	IND	None	No	None	No	No	No
126	D	IND	IND	None	No	None	No	No	No
127	A	Mobile Crustaceans on Hard or Mixed Substrates	Larger Tube-Building Fauna	None	No	None	Yes	No	No
127	B	None	None	None	No	None	Yes	Yes	Yes
127	C	Larger Tube-Building Fauna	None	None	No	None	Yes	Yes	No
128	A	Small Tube-Building Fauna	Mobile Crustaceans on Soft Sediments	None	No	None	Yes	Yes	No
128	B	Small Tube-Building Fauna	Mobile Crustaceans on Soft Sediments	None	No	None	Yes	Yes	No
130	A	IND	IND	None	No	None	IND	IND	IND
130	B	IND	IND	None	No	None	IND	IND	IND
130	C	IND	IND	None	No	None	IND	IND	IND
131	A	Small Surface-Burrowing Fauna	None	None	No	None	Yes	Yes	No
131	B	Small Surface-Burrowing Fauna	None	None	No	None	Yes	Yes	No
131	C	Small Surface-Burrowing Fauna	Larger Tube-Building Fauna	None	No	None	Yes	Yes	No
132	A	Small Tube-Building Fauna	Barnacles	None	No	None	Yes	Yes	No
132	B	Small Tube-Building Fauna	Larger Tube-Building Fauna	None	No	None	Yes	Yes	No
132	C	Small Tube-Building Fauna	Mobile Crustaceans on Hard or Mixed Substrates	None	No	None	Yes	Yes	No

StationID	Replicate	Biotic Group	Co-occurring Biotic Group	Percent Cover of All Attached Fauna	Invasive Taxa Present?	Type of Invasive Taxa	Tubes	Burrows	Tracks
133	A	Small Tube-Building Fauna	Diverse Soft Sediment Epifauna	Trace (<1%)	No	None	Yes	Yes	Yes
133	B	Sand Dollar Bed	Mobile Crustaceans on Hard or Mixed Substrates	None	No	None	Yes	Yes	No
133	C	Small Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	Yes	No
134	A	Mobile Crustaceans on Hard or Mixed Substrates	Burrowing Anemones	None	No	None	Yes	Yes	No
134	B	IND	IND	None	IND	None	IND	IND	IND
134	D	Small Tube-Building Fauna	Mobile Crustaceans on Hard or Mixed Substrates	None	No	None	Yes	Yes	No
135	F	Larger Tube-Building Fauna	Sand Dollar Bed	None	No	None	Yes	Yes	Yes
135	G	Larger Tube-Building Fauna	Sand Dollar Bed	None	No	None	Yes	Yes	No
135	H	Larger Tube-Building Fauna	Sand Dollar Bed	None	No	None	Yes	Yes	Yes
136	E	Burrowing Anemones	Mobile Crustaceans on Soft Sediments	None	No	None	Yes	Yes	No
136	F	Burrowing Anemones	Mobile Crustaceans on Soft Sediments	None	No	None	Yes	Yes	No
136	H	Mobile Crustaceans on Soft Sediments	Burrowing Anemones	None	No	None	Yes	Yes	No
137	E	Larger Tube-Building Fauna	Sand Dollar Bed	None	No	None	Yes	Yes	Yes
137	G	Sand Dollar Bed	Larger Tube-Building Fauna	None	No	None	Yes	Yes	No
137	H	Larger Tube-Building Fauna	Sand Dollar Bed	None	No	None	Yes	Yes	No
138	E	Sand Dollar Bed	Small Tube-Building Fauna	None	No	None	Yes	Yes	Yes
138	F	Sand Dollar Bed	Larger Tube-Building Fauna	None	No	None	Yes	Yes	Yes
138	G	Sand Dollar Bed	Larger Tube-Building Fauna	None	No	None	Yes	Yes	Yes
139	E	Sand Dollar Bed	Larger Tube-Building Fauna	None	No	None	Yes	Yes	Yes
139	F	Sand Dollar Bed	Larger Tube-Building Fauna	None	No	None	Yes	Yes	Yes
139	G	Sand Dollar Bed	Larger Tube-Building Fauna	None	No	None	Yes	Yes	Yes
140	E	Sand Dollar Bed	Small Tube-Building Fauna	None	No	None	Yes	Yes	Yes
140	F	Sand Dollar Bed	Small Tube-Building Fauna	None	No	None	Yes	Yes	No
140	H	Sand Dollar Bed	Small Tube-Building Fauna	None	No	None	Yes	Yes	No
141	B	Sand Dollar Bed	Larger Deep-Burrowing Fauna	None	No	None	Yes	Yes	No
142	A	Small Tube-Building Fauna	Larger Deep-Burrowing Fauna	None	No	None	Yes	Yes	Yes
142	B	Small Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	Yes	Yes
142	C	Small Tube-Building Fauna	Larger Deep-Burrowing Fauna	None	No	None	Yes	Yes	Yes
143	A	Larger Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	Yes	Yes
143	C	Larger Tube-Building Fauna	Larger Deep-Burrowing Fauna	None	No	None	Yes	Yes	Yes

StationID	Replicate	Biotic Group	Co-occurring Biotic Group	Percent Cover of All Attached Fauna	Invasive Taxa Present?	Type of Invasive Taxa	Tubes	Burrows	Tracks
143	D	Larger Tube-Building Fauna	Larger Deep-Burrowing Fauna	None	No	None	Yes	Yes	Yes
144	A	Larger Tube-Building Fauna	Sand Dollar Bed	None	No	None	Yes	Yes	No
144	B	Larger Tube-Building Fauna	Sand Dollar Bed	None	No	None	Yes	Yes	No
144	C	Larger Tube-Building Fauna	Sand Dollar Bed	None	No	None	Yes	Yes	No
145	A	Larger Tube-Building Fauna	Sand Dollar Bed	None	No	None	Yes	Yes	Yes
145	C	Larger Tube-Building Fauna	Sand Dollar Bed	None	No	None	Yes	Yes	No
146	A	Sand Dollar Bed	Larger Deep-Burrowing Fauna	None	No	None	Yes	Yes	Yes
146	B	Sand Dollar Bed	Larger Tube-Building Fauna	None	No	None	Yes	Yes	No
146	C	Sand Dollar Bed	Larger Tube-Building Fauna	None	No	None	Yes	Yes	Yes
147	A	Sand Dollar Bed	Small Tube-Building Fauna	None	No	None	Yes	Yes	Yes
147	B	Sand Dollar Bed	Mobile Mollusks on Soft Sediments	None	No	None	Yes	Yes	Yes
147	C	Sand Dollar Bed	Mobile Mollusks on Soft Sediments	None	No	None	Yes	Yes	Yes
148	A	Larger Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	Yes	Yes
148	B	Larger Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	Yes	Yes
148	C	Larger Tube-Building Fauna	Small Surface-Burrowing Fauna	None	No	None	Yes	Yes	No
149	A	Sand Dollar Bed	Mobile Mollusks on Soft Sediments	None	No	None	Yes	Yes	No
149	D	Sand Dollar Bed	Mobile Mollusks on Soft Sediments	None	No	None	Yes	Yes	No
150	A	Sand Dollar Bed	Small Tube-Building Fauna	None	No	None	Yes	Yes	No
150	B	Sand Dollar Bed	Small Tube-Building Fauna	None	No	None	Yes	Yes	No
150	C	Sand Dollar Bed	Mobile Mollusks on Soft Sediments	None	No	None	Yes	Yes	Yes
151	A	Sand Dollar Bed	Larger Deep-Burrowing Fauna	None	No	None	Yes	Yes	No
151	B	Sand Dollar Bed	Small Tube-Building Fauna	None	No	None	Yes	Yes	No
151	D	Sand Dollar Bed	Small Tube-Building Fauna	None	No	None	Yes	Yes	No
152	A	Small Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	Yes	Yes
152	B	Small Surface-Burrowing Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	Yes	Yes
152	D	Small Surface-Burrowing Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	Yes	Yes
153	A	Small Tube-Building Fauna	Sand Dollar Bed	None	No	None	Yes	Yes	Yes
153	B	Sand Dollar Bed	IND	None	No	None	IND	IND	IND
153	C	Small Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	Yes	No
154	A	Sand Dollar Bed	Small Tube-Building Fauna	None	No	None	Yes	Yes	Yes
154	B	Small Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	Yes	Yes

StationID	Replicate	Biotic Group	Co-occurring Biotic Group	Percent Cover of All Attached Fauna	Invasive Taxa Present?	Type of Invasive Taxa	Tubes	Burrows	Tracks
154	C	Small Tube-Building Fauna	Sand Dollar Bed	None	No	None	Yes	Yes	Yes
155	A	Small Tube-Building Fauna	Larger Deep-Burrowing Fauna	None	No	None	Yes	Yes	Yes
155	B	Small Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	Yes	No
155	D	Small Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	Yes	No
156	A	Small Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	Yes	Yes
156	B	Small Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	Yes	Yes
156	D	Small Tube-Building Fauna	Sand Dollar Bed	None	No	None	Yes	Yes	Yes
157	A	Small Tube-Building Fauna	Sand Dollar Bed	None	No	None	Yes	Yes	No
157	B	Sand Dollar Bed	Small Surface-Burrowing Fauna	None	No	None	Yes	Yes	No
157	C	Small Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	Yes	Yes
REFA_01	A	Burrowing Anemones	None	None	No	None	Yes	Yes	No
REFA_01	B	Burrowing Anemones	None	None	No	None	Yes	Yes	No
REFA_01	C	Burrowing Anemones	None	None	No	None	Yes	Yes	No
REFA_02	A	Burrowing Anemones	Small Tube-Building Fauna	None	No	None	Yes	Yes	No
REFA_02	B	Burrowing Anemones	IND	None	No	None	IND	IND	IND
REFA_02	D	Burrowing Anemones	Small Tube-Building Fauna	None	No	None	Yes	Yes	No
REFA_03	A	Burrowing Anemones	Mobile Crustaceans on Hard or Mixed Substrates	None	No	None	Yes	Yes	No
REFA_03	B	Burrowing Anemones	Small Tube-Building Fauna	None	No	None	Yes	Yes	No
REFA_03	D	Burrowing Anemones	Mobile Crustaceans on Hard or Mixed Substrates	None	No	None	Yes	Yes	No
REFA_04	A	Burrowing Anemones	Mobile Crustaceans on Hard or Mixed Substrates	None	No	None	Yes	Yes	No
REFA_04	C	Burrowing Anemones	Mobile Crustaceans on Hard or Mixed Substrates	None	No	None	Yes	Yes	No
REFA_04	D	Burrowing Anemones	Mobile Crustaceans on Hard or Mixed Substrates	None	No	None	Yes	Yes	No
REFA_05	A	Burrowing Anemones	Small Tube-Building Fauna	None	No	None	Yes	Yes	No
REFA_05	B	Burrowing Anemones	Small Tube-Building Fauna	None	No	None	Yes	Yes	No
REFA_05	C	Small Tube-Building Fauna	Mobile Crustaceans on Hard or Mixed Substrates	None	No	None	Yes	Yes	No
REFB_01	E	Larger Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	Yes	Yes
REFB_01	F	Larger Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	Yes	Yes

StationID	Replicate	Biotic Group	Co-occurring Biotic Group	Percent Cover of All Attached Fauna	Invasive Taxa Present?	Type of Invasive Taxa	Tubes	Burrows	Tracks
REFB_01	G	Larger Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	Yes	Yes
REFB_02	H	Larger Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	Yes	Yes
REFB_02	I	Larger Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	Yes	Yes
REFB_02	J	Larger Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	Yes	Yes
REFB_03	E	Larger Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	Yes	Yes
REFB_03	F	Diverse Soft Sediment Epifauna	Larger Tube-Building Fauna	None	No	None	Yes	Yes	Yes
REFB_03	G	Diverse Soft Sediment Epifauna	Larger Tube-Building Fauna	None	No	None	Yes	Yes	Yes
REFB_04	F	Diverse Soft Sediment Epifauna	Larger Tube-Building Fauna	None	No	None	Yes	Yes	Yes
REFB_04	G	Sand Dollar Bed	Mobile Crustaceans on Soft Sediments	None	No	None	IND	IND	IND
REFB_04	H	Diverse Soft Sediment Epifauna	Larger Tube-Building Fauna	None	No	None	Yes	Yes	Yes
REFB_05	E	Sand Dollar Bed	Larger Deep-Burrowing Fauna	None	No	None	Yes	Yes	Yes
REFB_05	F	Sand Dollar Bed	Mobile Crustaceans on Soft Sediments	None	No	None	Yes	Yes	No
REFB_05	H	Sand Dollar Bed	Larger Tube-Building Fauna	None	No	None	Yes	Yes	Yes
REFC_01	A	Larger Tube-Building Fauna	None	None	No	None	Yes	Yes	No
REFC_01	B	Larger Tube-Building Fauna	Mobile Crustaceans on Soft Sediments	None	No	None	Yes	Yes	No
REFC_01	D	Larger Tube-Building Fauna	IND	None	IND	None	Yes	Yes	IND
REFC_02	A	Larger Tube-Building Fauna	None	None	No	None	Yes	Yes	No
REFC_02	B	Larger Tube-Building Fauna	Mobile Crustaceans on Soft Sediments	None	No	None	Yes	Yes	No
REFC_02	C	Larger Tube-Building Fauna	None	None	No	None	Yes	Yes	No
REFC_03	A	Larger Tube-Building Fauna	Starfish Bed	None	No	None	Yes	Yes	No
REFC_03	B	Larger Tube-Building Fauna	Larger Deep-Burrowing Fauna	None	No	None	Yes	Yes	No
REFC_03	D	Larger Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	Yes	No
REFC_04	A	Larger Tube-Building Fauna	Mobile Crustaceans on Soft Sediments	None	No	None	Yes	Yes	No
REFC_04	B	Larger Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	Yes	No
REFC_04	D	Larger Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	Yes	No
REFC_05	A	Larger Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	Yes	No
REFC_05	B	Larger Tube-Building Fauna	Mobile Crustaceans on Soft Sediments	None	No	None	Yes	Yes	No
REFC_05	C	Larger Tube-Building Fauna	Diverse Soft Sediment Epifauna	None	No	None	Yes	Yes	No

StationID	Replicate	Infauna	Epifauna	Flora	Fish Type
001	A	None	Crab	None	None
001	B	None	None	None	None
001	C	None	Crab	None	None
002	A	None	Hermit Crabs, Anemones	None	Sea Robin
002	B	None	None	None	None
002	C	None	None	None	None
003	A	None	Anemone	None	None
003	B	IND	Ind	IND	IND
003	C	IND	Ind	IND	IND
004	A	None	Anemone, Sand Dollars	None	None
004	B	None	Sand Dollars	None	None
004	C	None	Anemone, Sand Dollars	None	None
005	A	None	Sand Dollars	None	None
005	B	None	Hermit Crabs, Crabs	None	Sea Robin
005	C	None	Hermit Crabs, Scallop	None	None
006	A	None	Hermit Crab	None	None
006	B	None	Anemone, Hermit Crabs	None	None
006	C	None	Hermit Crab, Gastropod	None	None
007	A	None	Hermit Crabs, Sand Dollars	None	None
007	B	None	Sand Dollars	None	None
007	C	None	Gastropod, Hermit Crab, Sand Dollars	None	None
008	B	None	Hermit Crabs, Sand Dollars	None	None
008	C	None	Gastropod, Hermit Crabs, Sand Dollar	None	None
008	D	None	Sand Dollars	None	None
009	A	None	Anemone	None	None
009	B	None	Anemone	None	None
009	C	None	Anemones	None	None
010	B	None	Crab, Hermit Crab, Scallops, Sponge	None	None
010	C	None	Sponge	None	None
010	D	None	Scallop	None	None
011	A	None	None	None	None
011	B	None	None	None	None
011	C	None	Anemone	None	None
012	A	None	Crab, Penaeid Shrimp	None	None
012	B	None	None	None	None
012	C	None	None	None	None
013	A	None	None	None	None

StationID	Replicate	Infauna	Epifauna	Flora	Fish Type
013	B	None	None	None	None
013	C	None	Anemone, Gastropod, Crab, Urchin	None	None
014	A	None	None	None	None
014	B	None	None	None	None
014	D	None	None	None	None
015	A	None	Gastropods	None	None
015	B	None	Gastropod	None	None
015	C	None	Crab, Gastropods	None	None
016	A	None	Sand Dollars	None	None
016	B	None	Sand Dollars	None	None
016	C	None	Sand Dollars	None	None
017	A	None	Sand Dollars	None	None
017	B	None	Hermit Crabs, Sand Dollars, Sea Star	None	None
017	D	None	Gastropods, Hermit Crabs, Sand Dollars	None	None
018	A	None	Crab, Sea Star	None	None
018	B	None	Gastropods, Sand Dollar	None	None
018	C	None	Sand Dollars	None	None
019	A	None	None	None	None
019	B	None	Crab, Gastropod	None	None
019	C	None	None	None	None
020	A	None	Hermit Crab, Sand Dollars	None	None
020	B	None	Sand Dollars	None	None
020	C	None	Gastropods, Sand Dollars	None	None
021	A	None	Hermit Crab, Sand Dollars	None	None
021	B	None	Hermit Crabs, Sand Dollars	None	None
021	D	None	Hermit Crabs, Sand Dollars	None	None
022	A	None	Gastropods, Sand Dollars	None	None
022	B	None	Gastropods, Hermit Crab, Sand Dollars	None	None
022	C	None	Sand Dollars	None	None
023	A	None	Gastropod, Hermit Crabs, Sand Dollars	None	None
023	B	None	Gastropods, Hermit Crabs	None	None
023	D	None	Gastropods, Hermit Crabs, Sand Dollar	None	None

StationID	Replicate	Infauna	Epifauna	Flora	Fish Type
024	A	None	Gastropods, Sand Dollars	None	None
024	B	None	Sand Dollars	None	None
024	C	None	Gastropod, Hermit Crabs, Sand Dollars	None	None
025	A	None	Sand Dollars	None	None
025	B	None	Sand Dollars	None	None
025	D	None	Sand Dollars	None	None
026	H	None	Sand Dollars	None	None
026	J	None	Sand Dollars	None	None
026	K	None	Sand Dollars	None	None
027	A	None	Sand Dollars	None	None
027	B	None	Hermit Crab, Sand Dollars	None	None
027	C	None	Anemone, Hermit Crab, Sand Dollars	None	None
028	A	None	Hermit Crab, Sand Dollars	None	None
028	B	None	Sand Dollars	None	None
028	C	None	Sand Dollars	None	None
029	A	None	Sand Dollars	None	None
029	B	None	Sand Dollars	None	None
029	C	None	Sand Dollars	None	None
030	A	None	Sand Dollars	None	None
030	C	None	Hermit Crab, Sand Dollars	None	None
030	D	None	Gastropods, Ocean Quahog, Sand Dollars	None	None
031	A	None	Hermit Crab, Sand Dollars	None	None
031	B	None	Sand Dollars	None	None
031	C	None	Sand Dollars	None	None
032	A	None	Sand Dollars	None	None
032	B	None	Sand Dollars	None	None
032	D	None	Sand Dollars	None	Skate
033	A	None	Sand Dollars	None	Skate
033	B	None	Sand Dollars	None	Skate
033	C	None	Gastropods, Sand Dollars	None	None
034	A	None	Sand Dollars	None	None
034	B	None	Sand Dollars	None	None

StationID	Replicate	Infauna	Epifauna	Flora	Fish Type
034	C	None	Ocean Quahog, Sand Dollars	None	None
035	A	None	Sand Dollars	None	None
035	B	None	Sand Dollars	None	None
035	C	None	Gastropods, Sand Dollars	None	None
036	A	None	Crab, Sand Dollars	None	None
036	B	None	Gastropods, Sand Dollars	None	None
036	C	None	Sand Dollars	None	None
037	A	None	Anemones	None	None
037	C	IND	Ind	IND	IND
037	D	None	Anemones, Hermit Crab, Sand Dollars	None	None
038	A	None	Sand Dollars	None	None
038	B	IND	Sand Dollars, Sea Stars	IND	IND
038	C	None	Sand Dollars	None	None
039	A	None	Sand Dollars	None	None
039	B	None	Gastropod, Sand Dollars	None	None
039	C	None	Sand Dollars	None	None
040	A	None	Sand Dollars	None	None
040	B	None	Sand Dollars	None	None
040	C	None	Sand Dollars	None	None
041	A	None	Sand Dollars	None	None
041	B	None	Sand Dollars	None	None
041	C	None	Sand Dollars	None	None
042	A	None	Anemones, Gastropods, Sand Dollars	None	None
042	B	None	Gastropods, Sand Dollars	None	None
042	C	None	Anemones, Gastropods	None	None
043	A	None	Sand Dollars	None	None
043	B	None	Sand Dollars	None	None
043	C	None	Gastropod, Sand Dollars	None	None
044	A	None	Anemone, Hermit Crabs, Sand Dollars	None	None
044	B	None	Sand Dollars	None	None
044	C	None	Anemone, Crab, Hermit Crabs, Sand Dollars	None	None
045	A	None	Hermit Crab, Sand Dollars	None	None
045	B	None	Sand Dollars	None	None

StationID	Replicate	Infauna	Epifauna	Flora	Fish Type
045	C	None	Sand Dollars	None	None
046	A	None	Hydroids	None	None
046	B	None	None	None	None
046	D	IND	Ind	IND	IND
047	A	None	Hydroids, Sand Dollars	None	None
047	D	None	Anemone, Sand Dollars	None	None
047	E	None	Anemone, Sand Dollars	None	None
048	A	None	Gastropod, Sand Dollars	None	None
048	B	None	Sand Dollars	None	None
048	C	None	Sand Dollars	None	None
049	A	None	Anemones, Hermit Crab	None	None
049	B	None	Anemone, Hermit Crabs	None	None
049	D	None	Anemones	None	None
050	A	None	Corals, Hydroids, Sea Star, Sponges	None	None
050	B	None	Corals, Hydroids, Sponges	None	None
050	C	None	Corals, Hydroids, Sponges	None	None
051	A	None	None	None	None
051	B	None	Hermit Crabs, Anemone	None	None
051	C	None	Hermit Crab	None	None
052	B	None	Hermit Crabs, Sand Dollars	None	None
052	C	None	Sand Dollars	None	None
052	D	None	Gastropod, Hermit Crab, Sand Dollars	None	None
053	A	None	Hermit Crab, Sand Dollars	None	None
053	B	None	Hermit Crabs, Sand Dollars	None	None
053	D	None	Gastropod, Hermit Crabs, Sand Dollars	None	None
054	A	None	Hermit Crabs, Sand Dollar	None	None
054	B	None	Gastropods, Hermit Crabs	None	None
054	C	None	Gastropods, Hermit Crabs	None	None
055	A	None	Hermit Crab, Sand Dollar	None	None
055	B	None	Hermit Crab	None	None
055	C	None	Gastropods	None	None
056	A	None	Gastropod, Hermit Crabs, Sand Dollar	None	None
056	B	None	None	None	None

StationID	Replicate	Infauna	Epifauna	Flora	Fish Type
056	C	None	Sand Dollar	None	None
057	A	None	Gastropod, Hermit Crab	None	None
057	B	None	Gastropod, Hermit Crabs, Sea Scallop	None	None
057	C	None	None	None	None
058	A	None	Hermit Crabs, Sand Dollars	None	None
058	B	IND	Sand Dollars	IND	IND
058	D	None	Aphrodita, Sand Dollars, Sea Scallop	None	None
059	A	None	Anemones, Gastropods, Hermit Crab	None	None
060	A	None	Anemones, Gastropod, Hermit Crabs	None	None
060	B	None	Anemones	None	None
060	C	None	Anemones, Aphrodita, Gastropods, Hermit Crab	None	None
061	A	None	Anemones, Gastropod	None	None
061	C	None	Gastropods	None	None
061	D	None	None	None	None
062	A	None	Anemones	None	None
062	B	IND	Ind	IND	IND
062	D	None	Anemones	None	None
063	A	None	Anemone, Sand Dollars	None	None
063	B	None	Anemone, Gastropod, Sand Dollars	None	None
063	D	None	Anemone, Gastropod, Hermit Crab, Sand Dollars	None	None
064	A	None	Anemone, Gastropod, Hermit Crab, Sand Dollars	None	None
064	B	None	Sand Dollars	None	None
064	C	None	Hermit Crabs, Sand Dollars	None	None
065	A	None	Anemones, Gastropods, Hermit Crab, Sand Dollars	None	None
065	B	None	Anemones, Gastropods, Hermit Crab, Sand Dollars	None	None
065	C	IND	Anemone, Sand Dollars	IND	IND
066	A	None	Sand Dollars	None	None
066	B	None	Sand Dollars	None	None
066	C	None	Hermit Crabs, Sand Dollars	None	None
067	A	None	Sand Dollars	None	None
067	B	None	Sand Dollars	None	None
067	D	None	Sand Dollars	None	None
068	A	None	Hermit Crab, Mussels	None	None

StationID	Replicate	Infauna	Epifauna	Flora	Fish Type
068	B	None	Hermit Crabs, Mussels, Sand Dollars	None	None
068	C	None	Hermit Crab, Mussels	None	None
069	A	None	Gastropod	None	None
069	B	None	Gastropods, Hermit Crab	None	None
069	C	None	Gastropod, Sand Dollars	None	None
070	A	None	Anemones, Gastropod, Hermit Crab	None	None
070	B	None	Anemone	None	None
070	C	None	Anemones	None	None
071	A	None	Gastropod, Sand Dollars	None	None
071	B	None	Gastropod, Sand Dollars	None	None
071	C	None	Sand Dollars	None	None
072	A	None	Hermit Crab, Sand Dollars	None	None
072	C	None	Sand Dollars	None	None
072	D	None	Gastropods, Hermit Crab, Sand Dollar	None	None
073	A	None	Gastropods, Hermit Crab	None	Unknown
073	B	None	Anemones, Gastropods, Hermit Crabs	None	None
073	C	None	Anemones, Gastropods, Hermit Crabs	None	None
074	E	None	None	None	None
075	A	None	Anemones, Gastropod	None	None
075	B	None	Anemones, Gastropods, Hermit Crabs	None	None
075	D	None	Anemones, Gastropod	None	None
076	A	None	Gastropods, Hermit Crabs, Sand Dollars	None	None
076	B	None	Gastropods, Hermit Crabs, Sand Dollars	None	None
076	C	None	Gastropods, Hermit Crabs, Sand Dollars	None	None
077	A	None	Anemones, Gastropods	None	None
077	C	IND	Ind	IND	IND

StationID	Replicate	Infauna	Epifauna	Flora	Fish Type
077	D	None	Gastropods	None	None
078	A	None	Anemones, Sand Dollars	None	None
078	B	None	Gastropods, Sand Dollars	None	None
078	C	None	Gastropods	None	None
079	A	None	Anemones, Hermit Crab, Sand Dollars	None	None
079	C	None	Anemones, Hermit Crabs, Urchin	None	None
079	D	IND	Ind	IND	IND
080	A	None	Anemone, Hermit Crab	None	None
080	B	None	Sponge	None	None
080	C	None	Hermit Crabs	None	None
081	A	None	Anemone	None	None
081	B	None	Gastropods, Hermit Crabs	None	None
081	C	None	None	None	None
082	A	None	Hermit Crab, Sand Dollars	None	None
082	B	IND	Sand Dollars	IND	IND
082	C	None	Anemone, Gastropods, Sand Dollars	None	None
083	A	None	Anemones	None	None
084	A	None	Anemones, Hermit Crabs, Sand Dollars	None	None
084	C	None	Anemones, Hermit Crabs, Sand Dollars	None	None
084	D	None	Hermit Crabs, Sand Dollars	None	None
085	A	None	Hermit Crab, Sand Dollars	None	None
085	B	IND	Sand Dollars	IND	IND
085	C	None	Hermit Crabs, Sand Dollars	None	None
086	A	None	Hermit Crabs	None	None
086	B	None	Hermit Crabs, Sand Dollars	None	None
086	C	None	Hermit Crab, Sand Dollars	None	None
087	A	None	Hermit Crab	None	None
087	B	None	Hermit Crab, Sand Dollar	None	None
087	C	None	Gastropod, Hermit Crab, Sand Dollar	None	None
088	A	None	None	None	None
088	B	IND	Ind	IND	IND
088	C	None	None	None	None
089	A	None	Hermit Crab	None	None

StationID	Replicate	Infauna	Epifauna	Flora	Fish Type
089	B	None	Anemone	None	None
089	C	None	Anemone, Hermit Crab	None	None
090	A	None	Gastropod	None	None
090	B	None	None	None	None
090	D	None	Anemone	None	None
091	A	None	None	None	None
091	B	None	Sand Dollars	None	None
091	C	None	Moon Snail, Sand Dollars, Sea Scallop	None	None
092	A	None	Hermit Crab	None	None
092	C	None	None	None	None
092	D	None	Anemone, Gastropods	None	None
093	A	None	Unknown Organism	None	None
093	C	None	None	None	None
093	D	IND	Ind	IND	IND
094	B	None	Moon Snail, Sand Dollar	None	None
094	C	None	Hermit Crab	None	None
094	D	None	None	None	None
095	A	None	Mussels	None	None
095	B	None	Mussels	None	None
095	C	None	Hermit Crabs, Mussels	None	None
096	A	None	Mussels	None	None
096	B	None	None	None	None
096	D	None	Mussels	None	None
097	A	None	None	None	None
097	B	None	None	None	None
097	C	IND	Ind	IND	IND
098	A	None	Hermit Crabs, Sand Dollars	None	None
098	B	None	Sand Dollars	None	None

StationID	Replicate	Infauna	Epifauna	Flora	Fish Type
098	C	None	Anemones, Hermit Crabs, Sand Dollars	None	None
099	A	None	Hermit Crabs, Sponges	None	None
099	B	None	Gastropods	None	None
099	C	None	Gastropods, Hermit Crabs, Sand Dollars	None	None
100	A	None	None	None	None
100	B	None	Gastropod	None	None
100	C	None	None	None	None
101	A	None	Anemone, Hermit Crabs, Sand Dollars	None	None
101	B	None	Gastropod, Sand Dollars	None	None
101	C	None	Hermit Crab, Sand Dollars	None	None
102	A	None	Hermit Crabs, Sand Dollars	None	None
102	B	None	Hermit Crabs, Sand Dollars	None	None
102	C	IND	Sand Dollars	IND	IND
103	A	None	Hermit Crabs, Sand Dollars	None	None
103	B	None	Hermit Crabs, Sand Dollars	None	None
103	C	None	Hermit Crabs, Sand Dollars	None	None
104	A	None	Anemones, Hermit Crabs, Sand Dollars	None	None
104	B	None	Sand Dollar	None	None
104	C	None	Anemone, Hermit Crab, Sand Dollars	None	None
105	A	None	Hermit Crabs	None	None
105	B	None	Hermit Crabs	None	None
105	C	None	Hermit Crabs	None	None
106	A	None	None	None	None
106	B	None	None	None	None

StationID	Replicate	Infauna	Epifauna	Flora	Fish Type
106	C	None	None	None	None
107	A	None	Mussels	None	None
107	B	None	Mussels	None	None
107	C	None	Mussels	None	None
108	A	None	Hydroids, Spider Crabs, Sea Urchin	None	None
108	B	None	Hydroids, Spider Crab, Sea Urchins	None	None
108	F	None	Hydroids, Sea Urchins	None	None
109	A	None	Hydroids, Mussels	None	None
109	C	IND	Mussels	IND	IND
109	D	IND	Mussels	IND	IND
110	B	None	Hydroids	None	None
110	C	None	Hydroids	None	None
110	D	None	Hydroids	None	None
111	A	None	None	None	None
111	B	None	None	None	None
111	C	None	Hermit Crabs, Hydroids	None	None
112	A	IND	Ind	IND	IND
112	B	IND	Ind	IND	IND
112	C	IND	Ind	IND	IND
113	A	IND	Ind	IND	IND
113	B	IND	Ind	IND	IND
113	C	IND	Ind	IND	IND
116	A	None	None	None	None
116	B	None	Hermit Crabs	None	None
116	D	None	None	None	None
117	A	None	Gastropods, Sand Dollars	None	None
117	C	None	Gastropods, Hermit Crabs, Sand Dollars	None	None
117	D	None	Sand Dollars	None	None
118	A	None	Hermit Crabs	None	None
118	B	None	Hermit Crabs	None	None
118	C	None	None	None	None
119	A	None	Hermit Crab	None	None
119	B	None	Hermit Crabs	None	None
119	C	None	Hermit Crabs	None	None
120	A	None	None	None	None

StationID	Replicate	Infauna	Epifauna	Flora	Fish Type
120	B	None	Hermit Crab	None	None
120	C	None	None	None	None
122	A	None	Hermit Crab	None	None
122	B	None	Hermit Crabs	None	None
122	C	None	Hermit Crabs	None	None
123	A	None	Hermit Crab	None	None
123	B	None	Hermit Crabs	None	None
123	C	None	None	None	None
124	A	None	Gastropods, Hermit Crabs	None	None
124	B	None	Gastropods, Hermit Crabs	None	None
124	C	None	Hermit Crab	None	None
125	A	None	Hermit Crab	None	None
125	B	None	Hermit Crab	None	None
125	C	None	Sand Dollar	None	None
126	A	None	None	None	None
126	C	None	Hermit Crabs	None	None
126	D	None	None	None	None
127	A	None	Hermit Crabs	None	None
127	B	None	Gastropod	None	None
127	C	None	None	None	None
128	A	None	Gastropod, Hermit Crabs	None	None
128	B	None	Hermit Crab	None	None
130	A	None	None	None	None
130	B	None	None	None	None
130	C	None	None	None	None
131	A	None	Gastropods	None	None
131	B	None	Gastropods	None	Sea Robin
131	C	None	None	None	None
132	A	None	Barnacles	None	None
132	B	None	None	None	None
132	C	None	None	None	Sea Robin

StationID	Replicate	Infauna	Epifauna	Flora	Fish Type
133	A	None	Anemones, Barnacles, Hermit Crabs, Sand Dollars	None	None
133	B	None	Hermit Crabs, Sand Dollars	None	None
133	C	None	Gastropods, Hermit Crabs, Sand Dollars	None	None
134	A	None	Anemone, Hermit Crabs	None	None
134	B	IND	Ind	IND	IND
134	D	None	Hermit Crabs	None	None
135	F	None	Hermit Crab, Sand Dollars	None	None
135	G	None	Hermit Crab, Sand Dollars	None	None
135	H	None	Gastropods	None	None
136	E	None	Anemones, Hermit Crabs	None	None
136	F	None	Anemones, Hermit Crabs	None	None
136	H	None	Anemones, Hermit Crab	None	None
137	E	None	Anemones, Hermit Crabs, Sand Dollars	None	None
137	G	None	Sand Dollars	None	None
137	H	None	Gastropod, Hermit Crab, Sand Dollars	None	None
138	E	None	Sand Dollars	None	None
138	F	None	Sand Dollars	None	None
138	G	None	Sand Dollars	None	None
139	E	None	Anemones, Sand Dollars	None	None
139	F	None	Gastropod, Sand Dollars	None	None
139	G	None	Gastropods, Hermit Crabs, Sand Dollars	None	None
140	E	None	Anemone, Sand Dollars	None	None
140	F	None	Sand Dollars	None	None
140	H	None	Hermit Crab, Sand Dollars	None	None
141	B	None	Sand Dollars	None	None
142	A	None	Sand Dollars	None	None
142	B	None	Gastropods, Sand Dollars, Sea Stars	None	None
142	C	None	Sand Dollars	None	None
143	A	None	Gastropod, Hermit Crab, Sand Dollars	None	None
143	C	None	Gastropods, Sand Dollars	None	None

StationID	Replicate	Infauna	Epifauna	Flora	Fish Type
143	D	None	Anemones, Sand Dollars	None	None
144	A	None	Gastropods, Sand Dollars	None	None
144	B	None	Sand Dollars	None	None
144	C	None	Gastropods, Sand Dollars	None	None
145	A	None	Gastropods, Hermit Crab, Sand Dollars	None	None
145	C	None	Gastropods, Sand Dollars	None	Skate
146	A	None	Sand Dollars	None	None
146	B	None	Sand Dollars	None	None
146	C	None	Gastropods, Sand Dollars	None	None
147	A	None	Gastropods, Sand Dollars	None	None
147	B	None	Gastropods, Sand Dollars	None	None
147	C	None	Gastropods, Sand Dollars	None	None
148	A	None	Gastropods, Sand Dollars	None	None
148	B	None	Gastropods, Sand Dollars	None	None
148	C	None	Gastropods, Sand Dollars	None	None
149	A	None	Gastropods, Hermit Crab, Sand Dollars	None	None
149	D	None	Gastropods, Sand Dollars	None	None
150	A	None	Gastropods, Sand Dollars	None	None
150	B	None	Gastropods, Sand Dollars	None	None
150	C	None	Gastropods, Sand Dollars	None	None
151	A	None	Sand Dollars	None	None
151	B	None	Gastropods, Sand Dollars	None	None
151	D	None	Gastropods, Sand Dollars	None	None
152	A	None	Gastropods, Hermit Crab, Sand Dollars	None	None
152	B	None	Gastropods, Sand Dollars	None	None
152	D	None	Gastropods, Sand Dollars	None	None
153	A	None	Sand Dollars	None	None
153	B	None	Sand Dollars	None	None
153	C	None	Gastropods, Sand Dollars	None	None
154	A	None	Sand Dollars	None	None
154	B	None	Hermit Crabs, Sand Dollars	None	None

StationID	Replicate	Infauna	Epifauna	Flora	Fish Type
154	C	None	Sand Dollars	None	None
155	A	None	Hermit Crabs, Sand Dollars	None	None
155	B	None	Hermit Crabs, Sand Dollars	None	None
155	D	None	Hermit Crabs, Sand Dollars	None	None
156	A	None	Gastropods, Sand Dollars	None	None
156	B	None	Gastropods, Sand Dollars, Unknown Organism	None	None
156	D	None	Gastropods, Sand Dollars	None	None
157	A	None	Gastropods, Sand Dollars	None	None
157	B	None	Sand Dollars	None	None
157	C	None	Anemone, Gastropods, Sand Dollars	None	None
REFA_01	A	None	Anemones	None	Sea Robin
REFA_01	B	None	Anemones	None	None
REFA_01	C	None	Anemones	None	None
REFA_02	A	None	Anemones	None	None
REFA_02	B	None	Anemones	None	None
REFA_02	D	None	None	None	None
REFA_03	A	None	Anemones, Hermit Crabs	None	None
REFA_03	B	None	Anemones, Hermit Crabs	None	None
REFA_03	D	None	Anemones, Hermit Crabs	None	None
REFA_04	A	None	Anemones, Hermit Crabs	None	None
REFA_04	C	None	Anemones, Hermit Crabs	None	None
REFA_04	D	None	Anemones, Hermit Crabs	None	None
REFA_05	A	None	Anemones, Hermit Crabs	None	Skate
REFA_05	B	None	Anemones, Hermit Crabs	None	None
REFA_05	C	None	Anemones, Hermit Crabs	None	Flounder
REFB_01	E	None	Gastropods, Hermit Crabs, Sand Dollars	None	None
REFB_01	F	None	Gastropods, Hermit Crabs, Sand Dollars	None	None

StationID	Replicate	Infauna	Epifauna	Flora	Fish Type
REFB_01	G	None	Gastropods, Hermit Crabs, Sand Dollars	None	None
REFB_02	H	None	Gastropods, Hermit Crabs, Sand Dollar	None	None
REFB_02	I	None	Gastropods, Hermit Crabs, Sand Dollars	None	None
REFB_02	J	None	Gastropod, Hermit Crabs, Sand Dollars	None	Flounder
REFB_03	E	None	Gastropods, Hermit Crabs, Sand Dollars	None	None
REFB_03	F	None	Gastropods, Hermit Crabs, Sand Dollars	None	None
REFB_03	G	None	Gastropods, Hermit Crabs, Sand Dollars	None	None
REFB_04	F	None	Hermit Crabs, Sand Dollars	None	None
REFB_04	G	None	Hermit Crabs, Sand Dollars	None	None
REFB_04	H	None	Gastropods, Hermit Crab, Sand Dollars	None	None
REFB_05	E	None	Hermit Crab, Sand Dollars	None	None
REFB_05	F	None	Hermit Crab, Sand Dollars	None	None
REFB_05	H	None	Hermit Crabs, Sand Dollars	None	None
REFC_01	A	None	None	None	None
REFC_01	B	None	Shrimp	None	None
REFC_01	D	IND	Ind	IND	IND
REFC_02	A	None	None	None	None
REFC_02	B	None	Shrimp	None	None
REFC_02	C	None	None	None	None
REFC_03	A	None	Sea Stars	None	None
REFC_03	B	None	None	None	None
REFC_03	D	None	Sea Star	None	None
REFC_04	A	None	Shrimp	None	None
REFC_04	B	None	Sea Star, Shrimp	None	None
REFC_04	D	None	Sea Stars	None	None
REFC_05	A	None	Clam, Gastropod, Sea Star, Shrimp	None	None
REFC_05	B	None	Shrimp	None	None
REFC_05	C	None	Sea Star	None	None

StationID	Replicate	Comments
001	A	Sand with surficial small pebbles, Stage 2 tubes, shell hash, and a crab
001	B	Sand with surficial small pebbles, Stage 2 tubes, and shell hash.
001	C	Sand with surficial small pebbles, Stage 2 tubes, shell hash, and a crab in upper left corner
002	A	Sand with surficial small pebbles and dense shell hash coverage. A sea robin and two anemones at sediment surface
002	B	Sand with very small pebbles and shell hash at surface.
002	C	Sand with very small pebbles and shell hash at surface.
003	A	Sand with an anemone in upper right, a few tubes, and multiple gastropod tracks in image
003	B	Turbid water column shot.
003	C	Turbid water column shot.
004	A	Sand with a couple of sand dollars and an anemone at sediment surface. Tubes and gastropod tracks visible
004	B	Sand with a slightly turbid water column. Tubes and sand dollars visible at sediment surface
004	C	Sand with shell hash, a couple of sand dollars, and an anemone at sediment surface. Tubes and gastropod tracks visible
005	A	Sand with very fine pebbles, shell hash, and a couple of sand dollars at sediment surface
005	B	Very fine pebbles to very coarse sand and intermixed shell hash at sediment surface. A sea robin present
005	C	Sand with a high amount of very fine pebbles and intermixed shell hash. A very small scallop visible in upper right quadrant of image.
006	A	Sand and very coarse sand with some very fine pebbles and shell hash also present
006	B	Sand and very coarse sand with some very fine pebbles and shell hash also present
006	C	Sand and very coarse sand with some very fine pebbles and shell hash also present. A very small gastropod shell in upper right quadrant of image.
007	A	Sand with intermixed shell hash. Many sand dollars and gastropod tracks at sediment surface. A few visible tubes and burrows
007	B	Sand with high turbidity in water column. Visible portion of sediment surface contains tubes and many sand dollars
007	C	Sand with many sand dollars and shell hash at surface. A small gastropod (upper left center with proboscis extended) and a very smal hermit crab visible (lower left center).
008	B	Sand, coarse sand, and very fine pebbles with shell hash, a few very fine pebbles, and multiple sand dollars at the sediment surface.
008	C	Sand with very fine pebbles, shell hash, a sand dollar, and a gastropod (upper left corner) at sediment surface
008	D	Sand with very fine pebbles, shell hash, and many sand dollars at sediment surface. A burrow present in center of image
009	A	Dense fine pebbles and sand with intermixed shell hash. An anemone in upper center of image
009	B	Dense fine pebbles and sand with intermixed shell hash. An anemone in right of image
009	C	Dense fine pebbles and sand with intermixed shell hash. A pair of anemones in left center and left bottom of image
010	B	Sand with dense tubes, some shell hash, and a sponge. A small hermit crab on sponge, a pair of scallops in upper left and lower left of image. A crab just visible in left bottom.
010	C	Sand with dense tubes, scattered shell hash, and some very fine pebbles at sediment surface. A possible large sponge in upper right of image.
010	D	Sand with dense tubes, some shell hash and very fine pebbles. A scallop on sediment surface. A few small burrows with associated reduced sediment.
011	A	Sand with dense tubes and a few large burrows at sediment surface
011	B	Sand with dense tubes, some tracks, and a few large burrows at sediment surface
011	C	Sand with dense tubes, some tracks, and a few large burrows at sediment surface. An anemone present in dead center of image
012	A	Sand with dense tubes, a few reduced mounds from burrowing, and a crab at sediment surface
012	B	Sand with dense tubes. Turbidity obscures bottom half of image
012	C	Sand with dense tubes and a few reduced mounds from burrowing
013	A	Sand with some rippling evident. Shell hash has gathered in trough between waveforms. Many small tubes at surface

StationID	Replicate	Comments
013	B	Sand with some rippling evident. Shell hash has gathered in trough between waveforms. Many small tubes at surface
013	C	Sand with apparent rippling as evidenced by shell hash collected in troughs. A crab in lower right quadrant, a gastropod in lower left, and an urchin in upper left.
014	A	Sand with dense tubes and shell hash within very minor ripples
014	B	Sand with dense tubes and shell hash within very minor ripples
014	D	Sand with dense tubes and some shell hash that seems scattered rather than organized in troughs
015	A	Sand with a high density of tubes. A large burrow and associated reduced mound. A couple of gastropods in upper left corner
015	B	Sand with a high density of tubes. Artefact track straight through image. A gastropod in upper left quadrant on tubes. A few burrows with associated reduced sediment.
015	C	Sand with at least 3 gastropods in upper left quadrant, high density of tubes, and a crab in lower right quadrant. A few mounds/burrows and gastropod tracks at sediment surface.
016	A	Sand with a large number of tubes and sand dollars at sediment surface. A few very small burrows
016	B	Sand with a large number of tubes and sand dollars at sediment surface. A few very small burrows
016	C	Sand with a large number of tubes and sand dollars at sediment surface. A few very small burrows
017	A	Sand with many tubes and sand dollars at sediment surface.
017	B	Sand with small tubes and sand dollars at sediment surface. A sea star surrounded by hermit crabs near center of image
017	D	Sand with tubes and sand dollars at sediment surface. A few gastropods and hermit crabs present. A few burrows with associated reduced mounds.
018	A	Sand with greenish hue visible in majority of coverage. Fine shell hash, a crab, a sea star, and some tubes present
018	B	Sand with very small wave height ripples. Fine shell hash throughout. Many small tubes. A partially buried sand dollar and many very small gastropods at sediment surface.
018	C	Sand with greenish hue visible in majority of coverage. Fine shell hash, multiple sand dollars, some burrowing and associated reduced sediments present.
019	A	Sand with greenish hue visible in majority of coverage. Many small tubes and burrows at surface. A burrow with associated reduced sediment at top of image.
019	B	Sand with greenish hue visible in majority of coverage. Many small tubes and burrows at surface. Burrows with associated reduced sediment in image.
019	C	Sand with many small tubes at sediment surface.
020	A	Sand with many tubes and sand dollars at sediment surface. A hermit crab and associated track in upper right corner of image
020	B	Sand with many tubes and sand dollars at sediment surface. A couple of burrows with associated reduced sediment mounds
020	C	Sand with tubes and many sand dollars at sediment surface. A couple of very small gastropods in upper center of image. A skate egg casing in lower right of image. Burrows with associated reduced sediment mounds present.
021	A	Sand with rippling at surface. Sand dollars on peaks of waveforms and shell hash in troughs. A hermit crab in upper left of image
021	B	Sand with rippling at surface. Sand dollars and hermit crabs prevalent across image. Shell hash in troughs of waveforms
021	D	Sand with rippling at surface. Sand dollars and hermit crabs prevalent across image. Shell hash in troughs of waveforms
022	A	Sand with many small tubes and a group of sand dollars at sediment surface. Burrows and some associated reduced sediment mounds present. A few small gastropods present.
022	B	Sand with sand dollars, a hermit crab in the center of image, and a pair of small gastropods in upper center of image. A burrow with associated reduced sediment mound.
022	C	Sand with sand dollars, small tubes, and many burrows at sediment surface
023	A	Sand with rippling that is not in a waveform distribution. Shell hash in troughs. A few sand dollars present and a gastropod near top center of image.
023	B	Sand with rippling that is not in a waveform distribution. Shell hash in troughs. Many gastropods present
023	D	Sand with rippling that is not in a waveform distribution. Shell hash in troughs. Many gastropods and a sand dollar present

StationID	Replicate	Comments
024	A	Sand with very fine shell hash throughout image. Many sand dollars, tubes, and small gastropods present at surface. Possible ocean quahog in lower portion of image.
024	B	Sand with high turbidity in water column. Visible portion of sediment surface contains tubes, fine shell hash, and many sand dollars.
024	C	Sand with very fine shell hash throughout image. Many sand dollars, tubes, and a small gastropod present
025	A	Sand with shell hash and sand dollars across entire image.
025	B	Sand with high turbidity in the water column. Shell hash and sand dollars visible
025	D	Sand with high turbidity in the water column. Shell hash and sand dollars visible
026	H	Sand with many sand dollars and small tubes present. Tracks and a few burrows present
026	J	Sand with many sand dollars and small tubes present. A few burrows with associated reduced sediment at surface
026	K	Sand with many sand dollars and small tubes present. A few burrows with associated reduced sediment at surface
027	A	Sand with sand dollars at sediment surface and buried across most of image. Tubes, tracks, and burrows with reduced sediment also present.
027	B	Sand with sand dollars at sediment surface and buried across most of image. Tubes, tracks, and a hermit crab in upper left of image present.
027	C	Sand with some minor turbidity in upper portion of image. Many sand dollars, a hermit crab, and an anemone at sediment surface.
028	A	Sand with many sand dollars, tubes, and burrows present. A hermit crab in lower right of image
028	B	Sand with many sand dollars, tubes, and burrows present among fine shell hash
028	C	Sand with many sand dollars, tubes, and burrows present among fine shell hash
029	A	Sand with many sand dollars and tubes at sediment surface among fine shell hash
029	B	Sand with many sand dollars and tubes at sediment surface among fine shell hash
029	C	Sand with many tubes at sediment surface among fine shell hash. Sand dollars present in large numbers as well
030	A	Sand with unevenly distributed ripples. Fine shell hash has gathered in troughs. Sand dollars appear on peaks
030	C	Sand with a few unevenly distributed ripples. Fine shell hash and sand dollars at sediment surface. A few small burrows, some with reduced sediment associated. Possible hermit crab in upper center of image.
030	D	Sand with many sand dollars and very small gastropods at sediment surface. Possible ocean quahog in upper center of image. Small tubes also present.
031	A	Sand with unevenly distributed ripples with fine shell hash collected in the troughs. Dense sand dollars in image. A hermit crab on a sand dollar in upper left of image.
031	B	Sand with unevenly distributed ripples with fine shell hash collected in the troughs. Sand dollars throughout image. A skate egg casing visible beneath a sand dollar in upper center of image.
031	C	Sand with some turbidity in center of image and fine shell hash at surface. Sand dollars throughout image. A skate egg casing visible in upper right of image.
032	A	Sand with fine shell hash and dense sand dollars present. A skate egg casing in center of image
032	B	Turbid water column with fine shell hash and sand dollars visible on soft bottom
032	D	Sand with fine shell hash and dense sand dollars present. A skate present at sediment surface in center left of image
033	A	Sand with dense sand dollars at surface. A mostly buried large skate in the right of image. Fine shell hash at surface
033	B	Sand with many sand dollars at sediment surface. Fine shell hash present at surface. A skate swimming out of frame. Some possible reduced sediment clasts at surface near where skate is imaged.
033	C	Sand with dense sand dollars at surface. Fine shell hash and a few very small gastropods also at surface
034	A	Sand with very dense sand dollars at sediment surface. Burrows with associated reduced sediment mounds present. Fine shell hash at surface.
034	B	Sand with a dense covering of fine shell hash and many sand dollars at surface. Tubes also visible

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034	C	Sand with fine shell hash and very dense sand dollars at surface. An ocean quahog in upper central of image
035	A	Sand with dense coverage of fine shell hash and sand dollars. A few mounds related to burrowing present
035	B	Sand with dense coverage of fine shell hash and sand dollars. A few mounds related to burrowing present
035	C	Sand with many sand dollars and a large number of very small gastropods scattered across entire image.
036	A	Sand with ripples containing shell hash within their troughs. A crab in upper right of image. Sand dollars at sediment surface throughout.
036	B	Sand with ripples containing shell hash within their troughs. Sand dollars at sediment surface throughout. Multiple small gastropods at sediment surface. Trigger weight imaged at bottom center.
036	C	Sand with shell hash and sand dollars across entire image. A skate egg casing in bottom left of image
037	A	Very fine pebbles to very coarse sand overlaying finer sands. Some tubes visible. Two anemones present in lower center of image.
037	C	Turbid water shot. Some larger shell fragments visible through turbidity
037	D	Very fine pebbles to very coarse sand overlaying finer sands. Anemones present across center of image. A hermit crab present in left center of image. A skate egg casing in lower portion of image. Small burrows present in upper left of image.
038	A	Sand with fine shell hash and dense sand dollars at SWI. Some tracks and tubes present at sediment surface
038	B	Turbid water shows a sandy bottom with shell hash, dense sand dollars, and a pair of large sea stars.
038	C	Sand with fine shell hash and dense sand dollars at SWI. Some tracks and tubes present at sediment surface
039	A	Sand with rippling at surface. Fine shell hash gathered in troughs. Sand dollars and tubes across entire image
039	B	Sand with fine shell hash at surface. Sand dollars and tubes across entire image. A small gastropod in lower right of image
039	C	Sand with rippling at surface. Fine shell hash gathered in troughs. Sand dollars and tubes across entire image. Left side of image partially obscured by turbidity
040	A	Sand with scattered shell hash, many small tubes, and a few sand dollars at sediment surface. A burrow with reduced sediment at top of image.
040	B	Sand with scattered shell hash, many small tubes, and a few sand dollars at sediment surface
040	C	Sand with scattered shell hash, many small tubes, and a few sand dollars at sediment surface. Water column turbidity does not obscure most variables.
041	A	Sand with many sand dollars and small tubes at sediment surface.
041	B	Sand with many sand dollars and small tubes at sediment surface.
041	C	Sand with many sand dollars and small tubes at sediment surface. Minor turbidity in water column
042	A	Sand with many pock-marked burrows. A few tubes, at least 3 anemones visible. A few sand dollars and very small gastropods and their associated tracks at surface.
042	B	Sand with some shell hash at surface. A few sand dollars and very small gastropods and their associated tracks at surface.
042	C	Sand with pock-marked burrows. A few tubes. At least six anemones visible. Small gastropods and their tracks at surface
043	A	Sand with shell hash and tubes at surface. A track running diagonally through image. A few sand dollars partially buried in sediment and a few burrows visible.
043	B	Sand with shell hash and tubes at surface. A few sand dollars partially buried in sediment and a few burrows visible
043	C	Sand with shell hash and tubes at surface. A few sand dollars partially buried in sediment and a few burrows visible. A small gastropod in upper left of image.
044	A	Sand with shell hash at surface. Tubes, anemones, sand dollars, and a few small hermit crabs in image
044	B	Sand with right side of image affected by turbidity in water column. Shell hash and a few sand dollars in visible portion of image
044	C	Sand with partially buried sand dollars, shell hash, multiple hermit crabs, and an anemone at surface. A crab partially under a sand dollar husk.
045	A	Sand with fine shell hash. A few tubes, sand dollars, and a hermit crab at surface
045	B	Sand with fine shell hash. A few tubes and sand dollars at surface. Artefact of previous camera drop in frame

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045	C	Sand with very short period rippling at surface and some turbidity in water column. Fine shell hash and a few partially buried sand dollars at surface.
046	A	Sand with fine and very fine pebbles at sediment surface. Attached hydroids present in center of image
046	B	Sand with fine and very fine pebbles at sediment surface. Larger pebble partially in frame in upper portion of image
046	D	High water column turbidity has obscured view of sediment surface
047	A	Sand with dense sand dollar coverage. Tubes and a very small patch of hydroids in the center of image. A partially buried skate egg casing in center left of image.
047	D	Sand with tubes and dense coverage of sand dollars at sediment surface. An anemone in upper right of image
047	E	Sand with tubes and dense coverage of sand dollars at sediment surface. An anemone in lower left of image
048	A	Sand with fine shell hash, a few sand dollars, tubes, and a gastropod at sediment surface
048	B	Sand with fine shell hash, a few sand dollars, and tubes at the sediment surface
048	C	Sand with fine shell hash, a few sand dollars, and tubes at the sediment surface.
049	A	Sand with many tubes at sediment surface. A few small burrows, a hermit crab, and a pair of anemones also present
049	B	Sand with many tubes and small burrows. A pair of hermit crabs and an anemone at sediment surface
049	D	Sand with many tubes at sediment surface. A few small burrows and three anemones also present
050	A	Large cobbles with sand and shell hash coverage. Cobble structures full of attached fauna including hydroids, sponges, and non-reef building hard corals.
050	B	Large cobbles with sand and shell hash coverage. Cobble structures full of attached fauna including hydroids, sponges, and non-reef building hard corals.
050	C	Large cobbles with sand and shell hash coverage. Cobble structures full of attached fauna including hydroids, sponges, and non-reef building hard corals. Area between cobbles full of small tubes.
051	A	Very fine and fine pebbles covering majority of sediment surface. No visible fauna
051	B	Very fine and fine pebbles covering majority of sediment surface. No visible fauna
051	C	Very fine and fine pebbles covering majority of sediment surface. No visible fauna
052	B	Sand with many small tubes, small burrows, sand dollars, and hermit crabs present
052	C	Sand with many small tubes, small burrows and sand dollars present. Minor turbidity in water column
052	D	Sand with many sand dollars and tubes present. A few hermit crabs and a small gastropod also visible. Imprint of camera frame from a previous drop in majority of image.
053	A	Sand with fine shell hash throughout. Many burrows and associated reduced sediments. Tubes, sand dollars, and a hermit crab all present.
053	B	Sand with fine shell hash throughout. Sand dollars and hermit crabs scattered across entire image. Small tubes and burrows with reduced sediment also present.
053	D	Sand with fine shell hash throughout. Sand dollars, hermit crabs, and a gastropod present at sediment surface. Tubes and burrows scattered throughout.
054	A	Sand with coarse sand and vey fine pebbles at sediment surface. A couple of hermit crabs and a sand dollar also present
054	B	Sand with coarse sand and vey fine pebbles at sediment surface. A couple of hermit crabs and tubes also present
054	C	Sand and coarse sand with a pair of hermit crabs at sediment surface
055	A	Sand with fine shell hash intermixed. A sand dollar and hermit crab in upper left of image. Tubes prevalent in upper portion of image.
055	B	Sand with fine shell hash intermixed. Tubes present in right portion of image and a hermit crab in upper left
055	C	Sand with some evidence of sediment transport at surface. A few tubes in image. A pair of gastropods in center of image
056	A	Sand with patches of reduced sediment at surface. Many small tubes and tracks at sediment surface. Upper left of image contains hermit crabs and a small gastropod.
056	B	Sand with turbidity obscuring left half of image. Many tubes present at visible portion of sediment

StationID	Replicate	Comments
056	C	Sand with turbidity obscuring left portion of image. Many tubes and small tracks present at visible portion of sediment
057	A	Sand with large burrows and associated reduced sediment. Small tubes throughout image. A gastropod and associated track in the upper left of image. A hermit crab in upper right.
057	B	Sand with many small tubes throughout image. Multiple hermit crabs, a small gastropod, and a sea scallop on sediment surface
057	C	Sand with some turbidity across entire image. Tubes and burrows visible through turbidity
058	A	Sand with many small tubes throughout image. Multiple hermit crabs and sand dollars at sediment surface
058	B	Major turbidity obscured entire bottom. Pink color of sand dollars only thing visible through turbidity
058	D	Sand with small tubes present throughout. A few sand dollars and a sea scallop at sediment surface
059	A	Sand with small tubes and small burrows throughout. A couple of larger burrows with reduced sediment also present. Many gastropods and a couple of anemones in lower half of image.
060	A	Sand with many anemones. Clam shell hash prevalent in image. A gastropod with associated trail in bottom of image.
060	B	Sand with turbidity affecting visibility of half of the image. Visible portion of sediment contains multiple anemones and a few large burrows.
060	C	Sand with numerous anemones. A few gastropods and their associated tracks as well as a hermit crab present. Small tubes and burrows present.
061	A	Sand with a few anemones and a small gastropod present. Many larger burrows with reduced sediment associated and small tubes throughout image.
061	C	Sand with some large burrows. Small tubes throughout image.
061	D	Sand with some large burrows and small tubes throughout image. Minor turbidity in water column
062	A	Sand with burrows and small tubes throughout image. A few anemones in the center of the image
062	B	High water column turbidity has obscured view of sediment surface
062	D	Sand with many burrows, multiple anemones, and small tubes throughout image
063	A	Sand with many sand dollars, tracks, and small tubes. An anemone also present at sediment surface
063	B	Sand with some sand dollars and an anemone. A small gastropod with associated track also present
063	D	Sand with sand dollars and gastropods creating tracks. An anemone and some tubes also at sediment surface
064	A	Sand with a large number of sand dollars. A gastropod, hermit crab, and anemone amongst the sand dollars
064	B	Sand with a large number of sand dollars and a few tubes intermixed
064	C	Sand with a large number of sand dollars and a few tubes intermixed. A pair of hermit crabs present
065	A	Sand with multiple anemones and sand dollars at sediment surface. A few gastropods and their associated tracks also present. Smal tubes scattered across surface.
065	B	Sand with a few large burrows and associated reduced sediment mounds. An anemone, small gastropods, a hermit crab, and a few sand dollars present.
065	C	Sand with high amount of turbidity. Only a few large tracks visible through turbidity
066	A	Sand with fine shell hash scattered throughout. Many tubes and sand dollars at sediment surface. A few small burrows also visible.
066	B	Sand with fine shell hash scattered throughout. Many tubes and sand dollars at sediment surface. A few small burrows also visible.
066	C	Sand with fine shell hash across sediment surface. Many sand dollars and tubes present. A hermit crab in both the upper left and upper right quadrants of image.
067	A	Sand with some shell hash at surface. Many sand dollars and some tubes in image
067	B	Sand with some shell hash at surface. Many sand dollars and some tubes in image
067	D	Some turbidity in water column. Visible sediment shows many sand dollars and scattered shell hash
068	A	Medium and fine pebbles overlaying sand. Coarse material with no visible fauna. A skate egg casing in center of image laying on top of a mussel.

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068	B	Fine and very fine pebbles with a few medium pebbles overlaying sand. Small tubes visible in sandy spots in image. A cluster of mussels in upper center of image. Burrowing sand dollar in lower right of image. A couple hermit crabs scattered amongst the gravel.
068	C	Fine and very fine pebbles overlaying sand. Attached mussels in upper left of image. Some large shell hash scattered amongst pebbles.
069	A	Sand with very fine pebbles scattered about. Some burrows and associated reduced sediments present. A small gastropod in center of image.
069	B	Sand with very fine pebbles scattered about. Tubes scattered throughout. Hermit crabs and small gastropods on sediment surface.
069	C	Sand with very fine pebbles gathered in the troughs of some surficial waveforms. A small gastropod in center of image, burrowed sand dollars in upper left of image.
070	A	Sand with clusters of tubes, multiple anemones, and small gastropod tracks across sediment surface. A hermit crab central
070	B	Water column turbidity obscures many variables. Visible through turbidity is an anemone at top of image and a few tube clusters scattered about.
070	C	Sand with multiple anemones across center of image. Many tubes at sediment surface
071	A	Sand with many sand dollars and tubes scattered across surface. A very small gastropod in center of image
071	B	Sand with many sand dollars and tubes scattered across surface. A gastropod in center right of image
071	C	Sand with very small, uneven rippling evident of minor hydrodynamic forcing at sediment surface. Scattered sand dollars and a few tubes also present.
072	A	Sand with many different types of tracks running through image. A few tubes present, a large burrow and associated mound in upper right of image, a hermit crab in left of image, and a few sand dollars at top of image.
072	C	Sand with very small, uneven rippling evident of minor hydrodynamic forcing at sediment surface. Scattered tubes and a few sand dollars at surface.
072	D	Sand with multiple gastropods and their associated tracks. A small hermit crab near a sand dollar. Many small tubes across imaged surface.
073	A	Sand with dense patches of tube clusters. Area of reduced sediment diagonally through image. The tail of a fish in frame in lower left of image. Numerous gastropods throughout image.
073	B	Sand with dense coverage of tube clusters. Multiple gastropods and hermit crabs at sediment surface. Small sand dollars in upper right of image, some partially burrowed. A couple burrowing anemones.
073	C	Sand with dense coverage of tube clusters. Minor turbidity in the water column. Multiple gastropods and hermit crabs at sediment surface. Small sand dollars.
074	E	Sand with many tubes at sediment surface. Surface is pocked with burrows
075	A	Sand with at least 10 anemones at surface along with many tubes. A few burrows and a large trail cutting diagonally across image.
075	B	Sand with many anemones and tubes at sediment surface. A few burrows, multiple gastropods with associated tracks, and multiple hermit crabs at sediment surface.
075	D	Turbidity in water obscures left side of image. Multiple anemones, burrows, tubes, and a gastropod visible in right portion of image.
076	A	Sand with dense tubes across entire image. A pair of sand dollars also visible
076	B	Turbidity in water column affects visibility of portions of image. Visible portions contain sand with dense tubes and multiple sand dollars.
076	C	Turbidity in water column affects visibility of portions of image. Visible portions contain sand with dense tubes
077	A	Sand with many gastropod tracks running throughout. A few anemones and some burrows. Tubes scattered across entire image
077	C	High water column turbidity has obscured view of sediment surface

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077	D	Turbidity obscures bottom right of image. Visible sediment is sand with many tubes, small burrows, and gastropods
078	A	Sand with some anemones and sand dollars at sediment surface. Some tubes and tracks in image
078	B	Sand with tubes, sand dollars, and gastropods with associated tracks visible
078	C	Image captured very close to sediment surface. Tubes, gastropods and associated tracks, on sandy bottom
079	A	Sand with small tubes and burrows throughout. A few anemones and sand dollars at sediment surface.
079	C	Sand with a few scattered very fine pebbles at surface. Small tubes and burrows throughout. A few anemones and small hermit crab in lower left of image.
079	D	High water column turbidity has obscured view of sediment surface
080	A	Sand with dense shell hash. Much shell hash has been used in fortifying tube structures present throughout image
080	B	Sand with dense shell hash. Much shell hash has been used in fortifying tube structures present throughout image
080	C	Sand with dense shell hash. Much shell hash has been used in fortifying tube structures present throughout image. Multiple large tracks moving across the image.
081	A	Sand with small tubes and tracks throughout. An anemone central in image
081	B	Sand with small tubes and many tracks across imaged surface. A few small gastropods and hermit crabs at sediment surface
081	C	Sand with very short period rippling at the surface. Small tubes across imaged surface
082	A	Sand with fine shell hash throughout. Many sand dollars and a small hermit crab at sediment surface
082	B	Turbidity has obscured image surface. Multiple sand dollars visible through turbidity
082	C	Sand with many shell-fortified tubes and sand dollars at surface. An anemone and a few small gastropods also at sediment surface.
083	A	Sand with what appears to be clastic clay material at the surface. A large number of anemones present throughout image.
084	A	Sand with a dense covering of sand dollars. Multiple anemones and a couple small hermit crabs also at sediment surface
084	C	Sand with a dense covering of sand dollars. Multiple anemones and a couple small hermit crabs also at sediment surface
084	D	Sand with very short period ripples at surface. Many sand dollars and a few scattered hermit crabs present
085	A	Sand with a few sand dollar and a hermit crab at sediment surface. Unknown object/fauna in upper right of image
085	B	Turbid water with a large, shell-fortified tube and a pair of sand dollars visible through turbidity
085	C	Sand with a few large, shell-fortified tubes at surface. A grouping of small hermit crabs in the center of image.
086	A	Sand with many large, shell-fortified tubes at surface. Small burrows also present. A few small hermit crabs scattered across imaged surface.
086	B	Sand with many large, shell-fortified tubes at surface. Small burrows also present. A few small hermit crabs scattered across imaged surface.
086	C	Turbid conditions allow for only a portion of sediment surface to be visible. Visible sediment contains large, shell-fortified tubes, a hermit crab, and a few sand dollars.
087	A	Ripples apparent at sediment surface. Shell hash present within troughs of ripples. Large and small tubes present
087	B	Ripples at sandy surface. Shell hash within the troughs of ripples. Many small tubes present. A hermit crab and sand dollar in the trough of ripple in far left of image.
087	C	Ripples at sandy surface. Shell hash within the troughs of ripples. Many small tubes present. A hermit crab, a small gastropod, and a sand dollar at sediment surface.
088	A	Minor water column turbidity makes some variables difficult to determine. Ripples at sandy surface with shell hash in the troughs.
088	B	High water column turbidity has obscured view of sediment surface
088	C	Minor water column turbidity makes some variables difficult to determine. Ripples at sandy surface with shell hash in the troughs.
089	A	Sand with many small tubes and very small burrows across entire imaged surface. A few larger burrows with associated reduced sediment. A hermit crab in upper left corner of image.

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089	B	Sand with many small tubes and burrows, some larger burrows with associated reduced sediment, at sediment surface. An anemone in the center of image.
089	C	Sand with many small tubes and very small burrows across entire imaged surface. A few larger burrows with associated reduced sediment. A hermit crab in upper right corner of image and an anemone in the upper left.
090	A	Sand with fine shell hash at surface. Dense coverage of shell-fortified tubes. Small burrows, some with reduced sediment associated. A gastropod in top center of image.
090	B	Sand with fine shell hash at surface. Dense coverage of shell-fortified tubes. Small burrows, some with reduced sediment associated.
090	D	Sand with fine shell hash at surface. Dense coverage of shell-fortified tubes. Small burrows, some with reduced sediment associated. An anemone in bottom right of image.
091	A	Sand with fine shell hash at sediment surface. Large, shell-fortified tubes present
091	B	Sand with fine shell hash at sediment surface. Large, shell-fortified tubes present. A pair of sand dollars also at surface
091	C	Sand with fine shell hash at sediment surface. Large, shell-fortified tubes present. Many sand dollars also at surface. A scallop on top of a large shell in upper right of image.
092	A	Sand with short period uneven rippling. Some small tubes and burrows scattered about surface
092	C	Sand with short period uneven rippling. Some small tubes and burrows scattered about surface
092	D	Sand with minor short period uneven rippling. Some small tubes and burrows scattered about surface. An anemone in left of image and many small gastropods at surface.
093	A	Sand with ripples at surface. Shell hash that doesn't seem to be distributed only in ripple troughs. Some tubes with shell-fortification Unknown organism/object in upper left corner.
093	C	Sand with ripples at surface. Shell hash distributed mostly in ripple troughs. Small tubes and a few small burrows present in image.
093	D	Water column turbidity obscures many variables. Visible through turbidity are ripples and shell hash at sandy surface
094	B	Sand with uneven short-period rippling at sediment surface. Small tubes, burrows, and a sand-covered sand dollar present in image.
094	C	Sand with uneven short-period rippling at sediment surface. Small tubes and burrows visible through minor water turbidity
094	D	Sand with uneven short-period rippling at sediment surface. Small tubes and burrows, some with associated reduced sediment, visible at sediment surface.
095	A	Sand with short-period ripples at surface. A grouping of mussels and many tracks and small burrows at sediment surface
095	B	Sand with ripples at surface. A grouping of mussels and many tracks and small burrows at sediment surface
095	C	Sand with short-period ripples at surface. A large grouping of mussels and smaller groupings nearby. Tracks and small burrows at sediment surface. A few hermit crabs on mussels.
096	A	Sand with very fine pebbles and very coarse sand at sediment surface. A small patch of juvenile mussels in lower right corner
096	B	Sand with very fine pebbles and very coarse sand at sediment surface.
096	D	Sand with some rippling evident. Shell hash and very fine pebbles have gathered in the ripple troughs. A small patch of mussels present in upper left of image.
097	A	Sand with uneven rippling at surface. Finer shell hash distributed within the troughs of ripples. Small tubes and burrows visible
097	B	Sand with uneven rippling at surface. Finer shell hash distributed within the troughs of ripples. Small tubes and burrows visible. A few mussels shells in upper right corner of image that do not appear to be living.
097	C	Turbidity in water has obscured many variables. Visible through turbidity is a sandy bottom with uneven rippling and shell hash
098	A	Sand with fine shell hash. Many sand dollars and their associated tracks. Uneven rippling of sediment also present. A few hermit crabs in left side of image.
098	B	Sand with fine shell hash. Many sand dollars and their associated tracks. Uneven rippling of sediment also present. Shell-fortified tubes present amongst sand dollars.

StationID	Replicate	Comments
098	C	Sand with fine shell hash. Many sand dollars and their associated tracks. Uneven rippling of sediment also present. Many anemones anc sand dollars at sediment surface.
099	A	Sand with some scattered very fine pebbles and very coarse sand at surface. Possible orange sponges or just debris in bottom half o image. A large hermit crab and many shell-fortified tubes present.
099	B	Sand with some scattered very fine pebbles and very coarse sand at surface. Shell-fortified tubes and many small gastropods present ir image.
099	C	Sand with a lot of shell hash and some very fine pebbles and very coarse sand. Small tubes and multiple small gastropods and hermit crabs at surface. A pair of sand dollars also imaged.
100	A	Sand with rippling at surface. Many clasts of material at sediment surface. Possibly clay. Small burrows and very small tubes at surface.
100	B	Sand with rippling at surface. Many clasts of material at sediment surface. Possibly clay. Small burrows and very small tubes at surface. A gastropod in top center of image.
100	C	Sand with rippling at surface. Many clasts of material at sediment surface. Possibly clay. Small burrows and very small tubes at surface.
101	A	Sand with rippling at surface. Shell hash gathered in ripple troughs. An anemone in lower right corner. A few hermit crabs and a pair o sand dollars also imaged.
101	B	Minor turbidity in water has obscured finer details of sediment surface. Sand with rippling at surface. Shell hash gathered in ripple troughs. A few tubes and small burrows visible. A few sand dollars and a gastropod in lower portion of image.
101	C	Sand with rippling at surface. Shell hash gathered in ripple troughs. A hermit crab in lower right of image. Many sand dollars also imaged in right side of image.
102	A	Sandy bottom with fine shell hash scattered throughout. A few shell-fortified tubes present in lower portion of image. Many sand dollars and hermit crabs in right portion of image.
102	B	Sandy bottom with fine shell hash scattered throughout. A shell-fortified tubes present. A few sand dollars and hermit crabs imaged.
102	C	Water column turbidity obscures most variables. Visible through turbidity is many sand dollars and a sandy bottom with scattered shel hash.
103	A	Sandy bottom with rippling at surface. A few burrows with associated reduced sediment. Sand dollars and a few hermit crabs present at sediment surface.
103	B	Sandy bottom with rippling at surface. Right portion of image obscured by turbidity. Sand dollars and a few hermit crabs present at visibl sediment surface.
103	C	Sandy bottom with rippling at surface. A few burrows with associated reduced sediment. Sand dollars and a few hermit crabs present at sediment surface.
104	A	Sandy bottom with rippling at surface. A few anemones and hermit crabs present. Shell hash within ripple troughs.
104	B	Sandy bottom with rippling at surface. A couple of shell-fortified tubes present. Shell hash gathered in ripple troughs
104	C	Sandy bottom with rippling at surface. Shell hash gathered in ripple troughs. Many tubes present across image. An anemone in lower right corner.
105	A	Sand with rippling at surface. Many hermit crabs in upper half of image
105	B	Sand with rippling at surface. Many hermit crabs scattered across imaged sediment surface
105	C	Sand with rippling at surface. Many hermit crabs scattered across imaged sediment surface. A shell-fortified tube present in lower righ corner.
106	A	Sand with rippling at surface and shell hash within ripple troughs. Water column turbidity makes finer details difficult to determine. A large, shell-fortified tube visible.
106	B	Sand with rippling at surface and shell hash within ripple troughs. Water column turbidity makes finer details difficult to determine. A few large, shell-fortified tube visible.

StationID	Replicate	Comments
106	C	Sand with rippling at surface and shell hash within ripple troughs. Water column turbidity makes finer details difficult to determine. A few large, shell-fortified tube visible.
107	A	Sand with shell hash, much being dead mussel shells. Patches of live mussels scattered about sediment
107	B	Sand with shell hash, much being dead mussel shells. Patches of live mussels scattered about sediment
107	C	Sand with shell hash. Patches of live mussels scattered about sediment
108	A	Dense shells covering nearly entire sediment surface. A few spider crabs and an urchin on shells. Many shells have attached hydroids.
108	B	Dense shells covering nearly entire sediment surface. A spider crab and a few urchin on shells. Many shells have attached hydroids.
108	F	Dense shells covering nearly entire sediment surface. Multiples urchins on shells. Many shells have attached hydroids
109	A	Dense shells covering nearly entire sediment surface. A few patches of live mussels. Many shells have attached hydroids
109	C	Turbidity in water has obscured many variables. Visible through turbidity is dense bivalves
109	D	Turbidity in water has obscured many variables. Visible through turbidity is dense bivalves
110	B	Dense shells covering nearly entire sediment surface. Most shells have attached hydroids
110	C	Dense shells covering nearly entire sediment surface. Most shells have attached hydroids
110	D	Dense shells covering nearly entire sediment surface. Most shells have attached hydroids. Small patches of sand in upper right corner of image have small tubes and burrows.
111	A	Dense shells and shell hash covering seabed. No visual evidence of fauna
111	B	Dense shells and shell hash covering seabed. No visual evidence of fauna
111	C	Shells covering large portion of imaged sediment. Many shells have attached hydroids. Sediment not covered in shells is sand and has multiple hermit crabs imaged.
112	A	High water column turbidity has obscured view of sediment surface
112	B	High water column turbidity has obscured view of sediment surface
112	C	High water column turbidity has obscured view of sediment surface. Dense shell hash partially visible through turbidity
113	A	High water column turbidity has obscured view of sediment surface. Uneven rippling just visible through turbidity
113	B	High water column turbidity has obscured view of sediment surface. Uneven rippling just visible through turbidity
113	C	High water column turbidity has obscured view of sediment surface. Uneven rippling just visible through turbidity
116	A	Sandy bottom with shell hash and rippling at surface. A large, shell-fortified tube in center of image. Small burrows and some tracks in image.
116	B	Sandy bottom with shell hash and rippling at surface. A shell-fortified tube in bottom of image. Small burrows in image
116	D	Sandy bottom with shell hash and rippling at surface. A shell-fortified tube in top left of image. Small burrows in image
117	A	Sand with minor short period ripples. Shell hash and larger tubes scattered throughout imaged surface. A few sand dollars and small gastropods also present.
117	C	Sand with minor short period ripples. Shell hash and larger tubes scattered throughout imaged surface. A few sand dollars, hermit crabs, and small gastropods also present.
117	D	Sand with ripples at surface. Scattered shell hash and a number of sand dollar at surface
118	A	Sand with ripples at surface. A pair of hermit crabs at sediment surface and small tubes and burrows throughout
118	B	Sand with ripples at surface. A pair of hermit crabs at sediment surface and small tubes and burrows throughout
118	C	Sand with ripples at surface. Small tubes and burrows throughout
119	A	Sand with shell hash at sediment surface. A few shell-fortified tubes and a hermit crab imaged
119	B	Sand with shell hash at sediment surface. A pair of hermit crabs imaged. Small tubes and burrows present
119	C	Sand with shell hash at sediment surface. A few hermit crabs imaged. Small tubes and burrows present
120	A	Image captured very close to sediment surface. A few shell-fortified tubes on a sandy bottom visible

StationID	Replicate	Comments
120	B	Turbidity in water makes some finer detail difficult to distinguish. Shell-fortified tubes throughout sandy bottom with a hermit crab alsc visible.
120	C	Shell-fortified tubes throughout sandy bottom with rippling at surface
122	A	Sand with rippling at sediment surface. Small burrows and tubes imaged. A hermit crab in left of image
122	B	Sand with rippling at surface. A shell fortified tube and many small tubes present. A pair of hermit crabs imaged
122	C	Sand with rippling at surface. Many small burrows present throughout image. A pair of hermit crabs imaged
123	A	Sand with scattered very fine pebbles and very coarse sand at surface. Shell hash and pebbles have gathered in ripple troughs. Many shel fortified tubes imaged. A hermit crab center of image.
123	B	Sand with shell hash and very fine pebbles at surface. Multiple hermit crabs at sediment surface
123	C	Sand with scattered very fine pebbles and very coarse sand at surface. Shell hash and pebbles have gathered in ripple troughs. Many shel fortified tubes imaged in a cluster.
124	A	Sand with ripples at surface. Shell hash gathered in ripple troughs. Multiple hermit crabs and gastropods at sediment surface
124	B	Sand with ripples at surface. Shell hash gathered in ripple troughs. Multiple hermit crabs and gastropods at sediment surface
124	C	Sand with ripples at surface. Shell hash gathered in ripple troughs. A hermit crab at top of image
125	A	Sand with ripples. Small tubes and burrow present. A hermit crab in upper left
125	B	Turbidity obscures finer details of image. Sandy bottom with ripples and a hermit crab visible through turbidity
125	C	Sand with ripples at surface. A patch of very fine pebbles in center of image. Small tubes and burrows throughout. A sand dollar in uppei left.
126	A	Very fine and fine pebbles covering majority of sediment surface. No visible fauna
126	C	Very fine and fine pebbles covering majority of sediment surface. Hermit crabs visible on pebble surface
126	D	Very fine and fine pebbles covering majority of sediment surface. No visible fauna
127	A	Very fine and fine pebbles on large portions of sediment surface with sandy patches scattered about. Hermit crabs visible on pebble surface.
127	B	Very fine and fine pebbles gathered in the troughs of sand ripples. Small burrows and a gastropod and associated trail imaged
127	C	Very fine and fine pebbles on large portions of sediment surface with sandy patches scattered about. Large, shell-fortified tubes in uppei right corner of image.
128	A	Sandy bottom with ripples at surface. Many small tubes and burrows present throughout image. A gastropod and a pair of hermit crabs at surface.
128	B	Sandy bottom with ripples at surface. Many small tubes and burrows present throughout image. A hermit crab in top of image
130	A	Sediment surface covered in fine and very fine pebbles. No visible fauna
130	B	Sediment surface covered in fine and very fine pebbles. Some coarse and very coarse pebbles also visible. No visible fauna
130	C	Sediment surface covered in fine and very fine pebbles. No visible fauna
131	A	Sandy bottom with high proportion of sediment surface covered by fine and very fine pebbles. A few large shell-fortified tubes and a large gastropod in image. Many skate egg casings in lower right corner.
131	B	Sandy bottom with high proportion of sediment surface covered by fine and very fine pebbles. A large shell-fortified tube few smal gastropods imaged. A sea robin in upper center of image.
131	C	Sandy bottom with high proportion of sediment surface covered by fine and very fine pebbles. A couple of large shell-fortified tubes ir upper center of image. Large shell hash present.
132	A	Sandy bottom with high proportion of sediment surface covered by fine and very fine pebbles. A couple of large shell-fortified tubes imaged. Large shell hash present. A few pebbles in the coarse to very coarse size range. Barnacles attached to large gravel piece in upper right.
132	B	Sandy bottom with high proportion of sediment surface covered by fine and very fine pebbles. Large shell hash present
132	C	Sandy bottom with high proportion of sediment surface covered by fine and very fine pebbles. Large shell hash present. A sea robin ir center of image.

StationID	Replicate	Comments
133	A	Sandy bottom with very fine pebbles and coarse sand present at surface. Many small tubes and sand dollars throughout imaged surface A coarse pebble with attached barnacles in upper left corner. Multiple hermit crabs at sediment surface.
133	B	Sandy bottom with very fine pebbles and coarse sand present at surface. A few shell-fortified tubes and sand dollars throughout imagec surface. Multiple hermit crabs at sediment surface. A few large burrows in upper portion of image.
133	C	Sandy bottom with very fine pebbles and coarse sand present at surface. A small tubes throughout imaged surface. A few sand dollars and hermit crabs at sediment surface. A couple of small gastropods in upper right of image.
134	A	Sandy bottom with very fine pebbles and coarse sand present at surface. Small tubes throughout image. A few sand dollars in lower left of image.
134	B	Turbidity in water obscures most variables. Visible through turbidity are large chunks of shell hash
134	D	Sandy bottom with some fine pebbles scattered about surface. A few hermit crabs imaged. A large burrow in upper left of image
135	F	Sand with many hermit crabs, shell-fortified tubes, and sand dollars at sediment surface
135	G	Some turbidity in water. Visible are sand with many hermit crabs, shell-fortified tubes, and sand dollars at sediment surface
135	H	Sand with many shell-fortified tubes and sand dollars at sediment surface. A few small gastropods scattered about sediment surface.
136	E	Sand with very fine pebbles scattered across sediment surface. Small burrows and many burrowing anemones present in image
136	F	Sand with very fine pebbles scattered across sediment surface. Small burrows and many burrowing anemones present in image
136	H	Sand with very fine pebbles scattered across sediment surface. Small burrows and many burrowing anemones present in image
137	E	Sand with sand dollars throughout imaged surface. Many shell-fortified tubes and a few hermit crabs at surface
137	G	Turbidity obscures finer variables. Sand with sand dollars and shell-fortified tubes imaged at surface
137	H	Sand with sand dollars throughout imaged surface. Many shell-fortified tubes and a hermit crab at surface. Burrows visible throughout.
138	E	Sand with sand dollars and shell hash throughout imaged surface. Burrows visible throughout. A shell-fortified tube at bottom of image.
138	F	Sand with sand dollars and shell hash throughout imaged surface. Burrows visible throughout. A shell-fortified tube at top right of image Possible fecal pellets near top center of image.
138	G	Sand with sand dollars, shell-fortified tubes, and shell hash throughout imaged surface
139	E	Sand with many sand dollars and shell-fortified tubes at surface. A few anemones also present. Many burrows and trails as well
139	F	Sand with sand dollars and shell-fortified tubes imaged surface. A small gastropod in center of image
139	G	Sand with sand dollars and many small burrows with associated sediments at surface. Small tubes also throughout. Many small gastropods and hermit crabs imaged.
140	E	Sand with many small tubes and burrows. Sand dollars throughout image. An anemone present. A shell-fortified tube in both the top and bottom of image.
140	F	Sand with many small tubes and burrows. Sand dollars throughout image.
140	H	Turbidity obscuring the edges of image. Visible seabed is sand with many small tubes and burrows. Sand dollars throughout image. Hermit crab in upper right portion of image.
141	B	Sand with large burrows and associated reduced sediment. Small tubes throughout image. Sand dollars throughout seabed
142	A	Sand with small tubes throughout. A few large burrows and associated reduced sediment. A few sand dollars also visible
142	B	Sand with many sand dollars and small tubes throughout image. A cluster of small gastropods in upper right corner of image. A pair of sea stars also at sediment surface.
142	C	Sand with small tubes throughout. A few large burrows and associated reduced sediment. A few sand dollars also visible
143	A	Sand with small tubes and burrows throughout. A few sand dollars also visible
143	C	Sand with small tubes throughout. A few large burrows and associated reduced sediment. A few sand dollars also visible. A couple smal gastropods in upper left of image.

StationID	Replicate	Comments
143	D	Sand with small tubes throughout. A few large burrows and associated reduced sediment. A few sand dollars also visible. A few small anemones present in upper portion of image.
144	A	Sand with small tubes throughout. Many sand dollars throughout and a few small gastropods in center of image. Larger burrows with associated reduced sediment present.
144	B	Right half of image obscured by turbidity. Visible sediment surface contains a large burrow, many small tubes, and a few sand dollars.
144	C	Bottom half of image obscured by turbidity. Visible sediment surface contains large burrows, many small tubes, and a few small gastropods and sand dollars.
145	A	Sand surface contains large burrows, many small tubes, and a few small gastropods and sand dollars. A hermit crab also visible in top canter of image.
145	C	Sand with many small tubes throughout. A few sand dollars and small gastropods present. A skate in upper left of image
146	A	Sand with high coverage of sand dollars and burrows/mounds. Small tubes also present throughout
146	B	Minor turbidity in the water. Dense sand dollars with small tubes also visible
146	C	Sand with dense sand dollar and small tube coverage. A few small gastropods also present
147	A	Sand with fine shell hash and sand dollars throughout imaged surface. A few small gastropods also present
147	B	Sand with fine shell hash and sand dollars throughout imaged surface. Many small gastropods also present
147	C	Sand with fine shell hash and sand dollars throughout imaged surface. Many small gastropods also present. A few shell-fortified tubes present.
148	A	Sand with fine shell hash gathered in the troughs of ripples. Shell-fortified tubes and sand dollars scattered about. A few small gastropods imaged.
148	B	Sand with fine shell hash gathered in the troughs of ripples. Shell-fortified tubes and sand dollars scattered about. A few small gastropods imaged.
148	C	Sand with fine shell hash at surface. Shell-fortified tubes and sand dollars at sediment surface. A skate egg casing in center of image.
149	A	Sand with fine shell hash and dense sand dollars at sediment surface. A few small tubes and burrows also visible
149	D	Sand with fine shell hash and dense sand dollars at sediment surface. A few small tubes and burrows also visible
150	A	Sand with fine shell hash and dense sand dollars at sediment surface. A few small tubes and burrows also visible
150	B	Sand with fine shell hash and dense sand dollars at sediment surface. A few small tubes and burrows also visible
150	C	Sand with fine shell hash and dense sand dollars at sediment surface. A few small tubes, gastropods, and burrows also visible
151	A	Sand with fine shell hash in ripple troughs. Dense sand dollar coverage. A large burrow with reduced sediment in center of image.
151	B	Sand with fine shell hash in ripple troughs. Dense sand dollar coverage. A few large burrows and many small gastropods present
151	D	Sand with fine shell hash in ripple troughs. Dense sand dollar coverage. Many small tubes and small gastropods present
152	A	Sand with fine shell hash. Scattered sand dollars. A large number of small gastropods throughout. A small hermit crab also present.
152	B	Sand with fine shell hash. Scattered sand dollars. A large number of small gastropods throughout.
152	D	Sand with fine shell hash. A few scattered sand dollars. A large number of small gastropods throughout.
153	A	Sand with fine shell hash, many small burrows, and sand dollars throughout.
153	B	Turbidity in water has obscured many variables. Sand with fine shell hash and sand dollars throughout visible through turbidity
153	C	Sand with fine shell hash, many small burrows, and sand dollars throughout. A few small gastropods also present
154	A	Sand with fine shell hash distributed in low portions of sediment surface. Suggests some transport occurring. Sand dollars throughout image. Small burrows and tubes also present.
154	B	Sand with fine shell hash distributed in low portions of sediment surface. Suggests some transport occurring. Sand dollars throughout image. Small burrows and tubes also present. A large hermit crab present in center of image.

StationID	Replicate	Comments
154	C	Sand with fine shell hash distributed throughout sediment surface. Sand dollars throughout image. Small burrows and tubes also present A shell-fortified tube at top of image.
155	A	Sand with fine shell hash throughout. A few sand dollars and hermit crabs present. Many larger burrows with associated reducec sediment and small tubes present throughout.
155	B	Sand with fine shell hash throughout. A few sand dollars and hermit crabs present. Many larger burrows with associated reducec sediment and small tubes present throughout.
155	D	Sand with fine shell hash throughout. Sediment surface contains many small tubes and burrows throughout. A scattering of sand dollars and the occasional hermit crab visible.
156	A	Sand with fine shell hash throughout. Multiple sand dollars and small gastropods at sediment surface. Many small tubes and burrows throughout.
156	B	Sand with sand dollars, burrows, and small tubes throughout. A few small gastropods and shell hash also present. An unknown organism visible in center bottom of image.
156	D	Sand with sand dollars, burrows, and small tubes throughout. A few small gastropods and shell hash also present.
157	A	Sand with sand dollars, burrows, and small tubes throughout. A few small gastropods also present. Shell hash has gathered in ripple troughs.
157	B	Sand with minor rippling. Sand dollars and fine shell hash throughout image. Small tubes and burrows also throughout
157	C	Sand with fine shell hash throughout. A high density of both sand dollars and very small gastropods at sediment surface. Burrows and tubes also present throughout.
REFA_01	A	Medium and fine pebbles overlaying sand. Multiple anemones and a sea robin just within frame visible
REFA_01	B	Medium and fine pebbles overlaying sand. Multiple anemones visible
REFA_01	C	Medium and fine pebbles overlaying sand. Large shell hash present in upper portion of image. Multiple anemones visible
REFA_02	A	Fine pebbles with medium and very fine pebbles intermixed overlaying sand. Many burrowing anemones present throughout image. Shell hash also present.
REFA_02	B	Turbidity in water column has obscured fine variables. Fine pebbles with medium and very fine pebbles intermixed overlaying sand. A few burrowing anemones visible.
REFA_02	D	Some turbidity. Fine, medium, and very fine pebbles overlaying sand. Small tubes and burrows visible. No obvious fauna present
REFA_03	A	Fine, medium, and very fine pebbles overlaying sand. Shell hash throughout. Anemones and hermit crabs also present throughout.
REFA_03	B	Fine, medium, and very fine pebbles overlaying sand. Anemones and hermit crabs also present throughout.
REFA_03	D	Fine, medium, and very fine pebbles overlaying sand. Shell hash throughout. Anemones and hermit crabs also present throughout.
REFA_04	A	Fine, medium, and very fine pebbles overlaying sand. Shell hash throughout. Anemones and hermit crabs also present throughout.
REFA_04	C	Fine, medium, and very fine pebbles overlaying sand. Shell hash throughout. Anemones and hermit crabs also present throughout.
REFA_04	D	Fine, medium, and very fine pebbles overlaying sand. Shell hash throughout. Anemones and hermit crabs also present throughout. A scallop shell present but appears dead.
REFA_05	A	Fine, medium, and very fine pebbles overlaying sand. Hermit crabs present throughout. An anemone also visible. Large skate in image.
REFA_05	B	Fine, medium, and very fine pebbles overlaying sand. Anemones and hermit crabs present throughout
REFA_05	C	Fine, medium, and very fine pebbles overlaying sand. Hermit crabs present throughout. An anemone also visible. A flatfish present in lower right of image. A scallop shell that appears dead in upper left of image.
REFB_01	E	Sand with many hermit crabs, shell-fortified tubes, small gastropods, and sand dollars at sediment surface
REFB_01	F	Sand with many hermit crabs, shell-fortified tubes, small gastropods, and sand dollars at sediment surface

StationID	Replicate	Comments
REFB_01	G	Some turbidity around edges of image. Sand with sand dollars, hermit crabs, small gastropods, and shell-fortified tubes
REFB_02	H	Sand with many shell-fortified tubes in a cluster. Small burrows throughout. A sand dollar, a few small gastropods, and a pair of hermit crabs also present.
REFB_02	I	Sand with many hermit crabs, shell-fortified tubes, small gastropods, and sand dollars at sediment surface. Small burrows and tubes throughout.
REFB_02	J	Sand with many hermit crabs and shell-fortified tubes. Small burrows and tubes also throughout. A small flounder and associated trail in sediment in upper left quadrant of image.
REFB_03	E	Sand with many hermit crabs, gastropods, and shell-fortified tubes. Larger burrows with associated reduced sediment also present.
REFB_03	F	Sand with many hermit crabs, gastropods, and shell-fortified tubes. Larger burrows with associated reduced sediment also present.
REFB_03	G	Sand with many hermit crabs across entire imaged surface. A few sand dollars, gastropods, and shell-fortified tubes also visible
REFB_04	F	Sand with shell-fortified tubes and shell hash. A few sand dollars and hermit crabs also present
REFB_04	G	Sand with short period uneven rippling. Sand dollars and hermit crabs at surface. Minor turbidity obscures fine variables
REFB_04	H	Sand with many shell-fortified tubes, small burrows, and tracks at sediment surface. A few small gastropods, hermit crabs, and sand dollars also present.
REFB_05	E	Sand with dense sand dollar coverage. Larger burrows and associated reduced sediment also present. A shell-fortified tube and hermit crab also present.
REFB_05	F	Turbidity obscures right portion of image. Sand with dense sand dollar coverage. Larger burrows and associated reduced sediment also present. A hermit crab also present.
REFB_05	H	Sand with dense sand dollar coverage. Shell-fortified tubes present throughout. Burrows and hermit crabs also present,
REFC_01	A	Sand with almost complete surficial coverage of small tubes.
REFC_01	B	Sand with dense small tubes in clusters. Small burrows and fine shell hash also present
REFC_01	D	Most of image obscured by turbidity. Visible sediment surface has dense coverage of tube clusters and small burrows
REFC_02	A	Sand with dense small tubes in clusters. Small burrows and fine shell hash also present
REFC_02	B	Sand with dense small tubes in clusters. Small burrows and fine shell hash also present
REFC_02	C	Sand with dense small tubes in clusters. Small burrows and fine shell hash also present
REFC_03	A	Sand with almost complete surficial coverage of small tubes. A pair of sea stars present
REFC_03	B	Sand with dense small tubes and a few large burrows present.
REFC_03	D	Sand with dense small tubes and many small burrows present. A sea star partially in image in left side. A dead crab in lower left of image.
REFC_04	A	Sand with dense small tubes and small burrows throughout.
REFC_04	B	Sand with dense small tubes and small burrows throughout. A sea star partially in image in lower left corner. A shrimp barely visible in center lower portion of image.
REFC_04	D	Sand with dense small tubes and small burrows throughout. A pair of sea stars in right of image
REFC_05	A	Sand with dense small tubes and small burrows throughout. A sea star also imaged
REFC_05	B	Sand with dense small tubes in the left portion and more spread out tubes and small burrows in the right.
REFC_05	C	Sand with dense small tubes and small burrows throughout. A sea star partially buried in upper portion of image

APPENDIX E

Sediment Grab Log Forms

INSPIRE ENVIRONMENTAL

Sediment Log Form –Sampling for Particle Size

INSPIRE Project Number:	Project Name: Empire Wind Benthic Survey	Vessel: R/V Northstar Commander	Date: 10 Jul 2019
Station ID: 038	Water depth (m): 28	Time On Station (local): 10:28	Time Off Station (local): 10:58
Latitude (N; NAD83):	Longitude (W; NAD83):	Photograph (Y/N – file) Yes	
Sampling Staff: Kersey Sturdivant + Chuck Holloway			
Sampling Gear (circle one and size): Double van Veen Single van Veen	Penetration (cm): 11.5	Sample Time: (local) N: 38	

Sample Description

Color: Light Brown Tannish Orange Greenish Gray Olive Gray Light Gray Dark Gray Black
Other:

Type: Cobble Gravel Sand (coarse med fine) Silt Clay Wood chips Shells or Shell Hash
Other:

Odor: None Slight Strong Petroleum H_2S Other:

Density: Hard Solid Firm Soft Loose Other:

Debris Present: Yes No Type:

Overlying Water Present: Yes No

Misc: Biota Sand dollar, Nereid worm Detritus None

Sediment Sample – Particle Size (500 gram sample, 250 grams minimum)

Sample Interval Range *(i.e. 0-5 cm or 0-10 cm):*

Sample ID:

Grab Number (A= Accepted; R = Rejected)

***Codes: DB** = Debris Interference; **DS** = Disturbed Surface; **NS** = No Sediment in sampler; **OP** = Over Penetration; **OT** = Other*

1	2	3	4	Notes
A				

Field Activities / Comments / Observations:

Field Team Leader Signature and Approval [signature]

Page ____ of ____

INSPIRE ENVIRONMENTAL

Sediment Log Form –Sampling for Particle Size

INSPIRE Project Number:	Project Name: Empire Wind Benthic Survey	Vessel: N.Star Commander	Date: 10 Jul 2019
Station ID: 157	Water depth (m):	Time On Station (local): 11:47	Time Off Station (local): 11:56

Latitude (N; NAD83):	Longitude (W; NAD83):	Photograph (Y/N – file) Yes

Sampling Staff:

Sampling Gear (circle one and size): Double van Veen Single van Veen	Penetration (cm): 12 1/2	Sample Time: (local) 11:51

Sample Description

Color: Light Brown Tannish Orange Greenish Gray Olive Gray Light Gray Dark Gray Black
Other:

Type: Cobble Gravel Sand (coarse med fine) Silt Clay Wood chips Shells or Shell Hash
Other:

Odor: None Slight Strong Petroleum H_2S Other:

Density: Hard Solid Firm Soft Loose Other:

Debris Present: Yes No Type:

Overlying Water Present: Yes No

Misc: Biota Amphipod, worm, hermit crab, sand dollar Detritus _____

Sediment Sample – Particle Size (500 gram sample, 250 grams minimum)

Sample Interval Range *(i.e. 0-5 cm or 0-10 cm):*

Sample ID:

Grab Number (A= Accepted; R = Rejected)
***Codes: DB** = Debris Interference; **DS** = Disturbed Surface; **NS** = No Sediment in sampler; **OP** = Over Penetration; **OT** = Other*

1	2	3	4	Notes
A				

Field Activities / Comments / Observations:

Field Team Leader Signature and Approval _____

Page ____ of ____

INSPIRE ENVIRONMENTAL

Sediment Log Form –Sampling for Particle Size

INSPIRE Project Number:	Project Name: Empire Wind Benthic	Vessel: Northstar Commander	Date: 7/10/19
Station ID: 147	Water depth (m):	Time On Station (local):	Time Off Station (local):

Latitude (N; NAD83):	Longitude (W; NAD83):	Photograph (Y/N – file) yes

Sampling Staff: John Hardin, Brian Gervelis, Dan Jackson

Sampling Gear (circle one and size): Double van Veen Single van Veen	Penetration (cm): 10	Sample Time: (local) 16:24

Sample Description

Color: Light Brown Tannish Orange Greenish Gray Olive Gray Light Gray Dark Gray Black
Other:

Type: Cobble Gravel Sand (coarse med fine) Silt Clay Wood chips Shells or Shell Hash
Other:

Odor: None Slight Strong Petroleum H_2S Other:

Density: Hard Solid Firm Soft Loose Other:

Debris Present: Yes No Type:

Overlying Water Present: Yes No

Misc: Biota Sand Dollar, worm Detritus None

Sediment Sample – Particle Size (500 gram sample, 250 grams minimum)

Sample Interval Range *(i.e. 0-5 cm or 0-10 cm):*

Sample ID:

Grab Number (A= Accepted; R = Rejected)

Codes: DB *= Debris Interference;* ***DS*** *= Disturbed Surface;* ***NS*** *= No Sediment in sampler;* ***OP*** *= Over Penetration;* ***OT*** *= Other*

1	2	3	4	Notes
A				

Field Activities / Comments / Observations:

Field Team Leader Signature and Approval _____

Page ____ of ____

INSPIRE ENVIRONMENTAL

Sediment Log Form –Sampling for Particle Size

INSPIRE Project Number:	Project Name: Empire Wind Benthic Survey	Vessel: NorthStar Commander	Date: 7/10/19
Station ID: 020	Water depth (m):	Time On Station (local):	Time Off Station (local):

Latitude (N; NAD83):	Longitude (W; NAD83):	Photograph (Y/N – file) YES

Sampling Staff: John Hardin, Brian Gervelis, Dan Jackson

Sampling Gear (circle one and size): Double van Veen Single van Veen	Penetration (cm): 10	Sample Time: (local) 16:57

Sample Description

Color: Light Brown Tannish Orange Greenish Gray Olive Gray Light Gray Dark Gray Black
Other:

Type: Cobble Gravel Sand (coarse med fine) Silt Clay Wood chips Shells or Shell Hash
Other:

Odor: None Slight Strong Petroleum H_2S Other:

Density: Hard Solid Firm Soft Loose Other:

Debris Present: Yes No Type:

Overlying Water Present: Yes No

Misc: Biota Amphipod, Sand Dollar, Worm Detritus _____

Sediment Sample – Particle Size (500 gram sample, 250 grams minimum)

Sample Interval Range *(i.e. 0-5 cm or 0-10 cm):*

Sample ID:

Grab Number (A= Accepted; R = Rejected)
***Codes: DB** = Debris Interference; **DS** = Disturbed Surface; **NS** = No Sediment in sampler; **OP** = Over Penetration; **OT** = Other*

1	2	3	4	Notes
A				

Field Activities / Comments / Observations:
~~After 2cm, anoxic~~

Field Team Leader Signature and Approval _____

Page ____ of ____

INSPIRE ENVIRONMENTAL

Sediment Log Form –Sampling for Particle Size

INSPIRE Project Number:	Project Name: Empire Wind Benthic Survey	Vessel: Northstar Commander	Date: 7-13-19
Station ID: 108	Water depth (m):	Time On Station (local):	Time Off Station (local):

Latitude (N; NAD83):	Longitude (W; NAD83):	Photograph (Y/N – file) Yes

Sampling Staff: John Hardin, Brian Gervelis, Dan Jackson

Sampling Gear (circle one and size): Double van Veen Single van Veen	Penetration (cm): 12.5	Sample Time: (local) 12:22:52

Sample Description

Color: Light Brown Tannish Orange Greenish Gray Olive Gray Light Gray Dark Gray Black
Other:

Type: Cobble Gravel Sand (coarse med fine) Silt Clay Wood chips Shells or Shell Hash
Other:

Odor: None Slight Strong Petroleum H_2S Other: Sulfur

Density: Hard Solid Firm Soft Loose Other:

Debris Present: Yes No Type:

Overlying Water Present: Yes No

Misc: Biota Muscles, Hermit Crab, Gastropod Detritus _____

Sediment Sample – Particle Size (500 gram sample, 250 grams minimum)

Sample Interval Range *(i.e. 0-5 cm or 0-10 cm):*

Sample ID:

Grab Number (A= Accepted; R = Rejected)
***Codes: DB** = Debris Interference; **DS** = Disturbed Surface; **NS** = No Sediment in sampler; **OP** = Over Penetration; **OT** = Other*

1	2	3	4	Notes
A				

Field Activities / Comments / Observations:
After 2cm - anoxic silt/fine sand, stronger odor of sulfur

Field Team Leader Signature and Approval _____

Page ____ of ____

INSPIRE ENVIRONMENTAL

Sediment Log Form –Sampling for Particle Size

INSPIRE Project Number:	Project Name: Empire Wind Benthic 2019	Vessel: Northstar Commander	Date: 7-13-19
Station ID: 095	Water depth (m):	Time On Station (local):	Time Off Station (local):

Latitude (N; NAD83):	Longitude (W; NAD83):	Photograph (Y/N – file) Yes

Sampling Staff: Dan Jackson, Brian Gervelis, John Hasdin

Sampling Gear (circle one and size): Double van Veen Single van Veen	Penetration (cm): 11.5	Sample Time: (local) 13:00:56

Sample Description

Color: Light Brown Tannish Orange Greenish Gray Olive Gray Light Gray Dark Gray Black
Other:

Type: Cobble Gravel Sand (coarse med fine) Silt Clay Wood chips Shells or Shell Hash
Other:

Odor: None Slight Strong Petroleum H_2S Other:

Density: Hard Solid Firm Soft Loose Other:

Debris Present: Yes No Type:

Overlying Water Present: Yes No

Misc: Biota Hermit Crab Detritus _____

Sediment Sample – Particle Size (500 gram sample, 250 grams minimum)

Sample Interval Range *(i.e. 0-5 cm or 0-10 cm):*

Sample ID:

Grab Number (A= Accepted; R = Rejected)
***Codes: DB** = Debris Interference; **DS** = Disturbed Surface; **NS** = No Sediment in sampler; **OP** = Over Penetration; **OT** = Other*

1	2	3	4	Notes
A				

Field Activities / Comments / Observations:

Field Team Leader Signature and Approval _____

Page ____ of ____

INSPIRE ENVIRONMENTAL

Sediment Log Form –Sampling for Particle Size

INSPIRE Project Number:	Project Name: Empire Wind Benthic 2019	Vessel: Northstar Commander	Date: 7-13-19
Station ID: 091	Water depth (m):	Time On Station (local):	Time Off Station (local):

Latitude (N; NAD83):	Longitude (W; NAD83):	Photograph (Y/N – file) YES

Sampling Staff: John Hardin, Brian Gervelis, Dan Jackson

Sampling Gear (circle one and size): Double van Veen Single van Veen	Penetration (cm): 11	Sample Time: (local) 13:40:36

Sample Description

Color: Light Brown Tannish Orange Greenish Gray Olive Gray Light Gray Dark Gray Black
Other:

Type: Cobble Gravel Sand (coarse med fine) Silt Clay Wood chips Shells or Shell Hash
Other:

Odor: None Slight Strong Petroleum H_2S Other:

Density: Hard Solid Firm Soft Loose Other:

Debris Present: Yes No Type:

Overlying Water Present: Yes No

Misc: Biota Polychaete, Sand Dollar, Clam Detritus _____

Sediment Sample – Particle Size (500 gram sample, 250 grams minimum)

Sample Interval Range *(i.e. 0-5 cm or 0-10 cm):*

Sample ID:

Grab Number (A= Accepted; R = Rejected)
***Codes: DB** = Debris Interference; **DS** = Disturbed Surface; **NS** = No Sediment in sampler; **OP** = Over Penetration; **OT** = Other*

1	2	3	4	Notes
A				

Field Activities / Comments / Observations:
Mix of med/fine sand + Silt

Field Team Leader Signature and Approval _____

Page ____ of ____

INSPIRE ENVIRONMENTAL

Sediment Log Form –Sampling for Particle Size

INSPIRE Project Number:	Project Name: Empire Wind Benthic 2019	Vessel: N. Star Commander	Date: 7-13-19
Station ID: 076	Water depth (m):	Time On Station (local):	Time Off Station (local):

Latitude (N; NAD83):	Longitude (W; NAD83):	Photograph (Y/N – file) YES

Sampling Staff: John Hardin, Brian Gervelis, Dan Jackson

Sampling Gear (circle one and size): Double van Veen Single van Veen	Penetration (cm): 10	Sample Time: (local) 14:16:00

Sample Description

Color: Light Brown Tannish Orange Greenish Gray Olive Gray Light Gray Dark Gray Black
Other:

Type: Cobble Gravel Sand (coarse med fine) Silt Clay Wood chips Shells or Shell Hash
Other:

Odor: None Slight Strong Petroleum H_2S Other:

Density: Hard Solid Firm Soft Loose Other:

Debris Present: Yes No Type:

Overlying Water Present: Yes No

Misc: Biota Sand Dollar, Polychaetes, Snail Detritus _____

Sediment Sample – Particle Size (500 gram sample, 250 grams minimum)

Sample Interval Range *(i.e. 0-5 cm or 0-10 cm):*

Sample ID:

Grab Number (A= Accepted; R = Rejected)

Codes: DB *= Debris Interference;* ***DS*** *= Disturbed Surface;* ***NS*** *= No Sediment in sampler;* ***OP*** *= Over Penetration;* ***OT*** *= Other*

1	2	3	4	Notes
A				

Field Activities / Comments / Observations:

Field Team Leader Signature and Approval _____

Page ____ of ____

INSPIRE ENVIRONMENTAL

Sediment Log Form –Sampling for Particle Size

INSPIRE Project Number:	Project Name: Empire Wind Benthic 2019	Vessel: N. Star Commander	Date: 7-13-19
Station ID: 060	Water depth (m):	Time On Station (local):	Time Off Station (local):

Latitude (N; NAD83):	Longitude (W; NAD83):	Photograph (Y/N – file) YES

Sampling Staff: John Hardin, Brian Genelis, Dan Jackson

Sampling Gear (circle one and size): Double van Veen Single van Veen	Penetration (cm): 13.5	Sample Time: (local) 14:37:17

Sample Description

Color: Light Brown Tannish Orange Greenish Gray Olive Gray Light Gray Dark Gray Black
Other:

Type: Cobble Gravel Sand (coarse med fine) Silt Clay Wood chips Shells or Shell Hash
Other:

Odor: None Slight Strong Petroleum H_2S Other:

Density: Hard Solid Firm Soft Loose Other:

Debris Present: Yes No Type:

Overlying Water Present: Yes No

Misc: Biota Worms, Quahog Detritus

Sediment Sample – Particle Size (500 gram sample, 250 grams minimum)

Sample Interval Range *(i.e. 0-5 cm or 0-10 cm):*

Sample ID:

Grab Number (A= Accepted; R = Rejected)

***Codes: DB** = Debris Interference; **DS** = Disturbed Surface; **NS** = No Sediment in sampler; **OP** = Over Penetration; **OT** = Other*

1	2	3	4	Notes
A				

Field Activities / Comments / Observations:

Mainly Silty Clay, some fine sand
After 4/5 cm → anoxic silty Clay (Black)

Field Team Leader Signature and Approval

Page ____ of ____

INSPIRE ENVIRONMENTAL

Sediment Log Form –Sampling for Particle Size

INSPIRE Project Number:	Project Name: Empire Wind Benthic 2019	Vessel: N. Star Commander	Date: 7-13-19
Station ID: 057	Water depth (m):	Time On Station (local):	Time Off Station (local):

Latitude (N; NAD83):	Longitude (W; NAD83):	Photograph (Y/N – file) YES

Sampling Staff: John Hardin, Brian Genelis, Dan Jackson

Sampling Gear (circle one and size): Double van Veen Single van Veen	Penetration (cm): 12.5	Sample Time: (local) 15:12:58

Sample Description

Color: Light Brown Tannish Orange Greenish Gray Olive Gray Light Gray Dark Gray Black
Other:

Type: Cobble Gravel Sand (coarse med fine) Silt Clay Wood chips Shells or Shell Hash
Other:

Odor: None Slight Strong Petroleum H_2S Other:

Density: Hard Solid Firm Soft Loose Other:

Debris Present: Yes No Type:

Overlying Water Present: Yes No

Misc: Biota Polychaetes, Worm, crustacean, Amphipod, Snail Detritus _____

Sediment Sample – Particle Size (500 gram sample, 250 grams minimum)

Sample Interval Range *(i.e. 0-5 cm or 0-10 cm):*

Sample ID:

Grab Number (A= Accepted; R = Rejected)
***Codes: DB** = Debris Interference; **DS** = Disturbed Surface; **NS** = No Sediment in sampler; **OP** = Over Penetration; **OT** = Other*

1	2	3	4	Notes
A				

Field Activities / Comments / Observations:
Mostly silt/fine sand w/ some clay
Anoxic → 6cm down

Field Team Leader Signature and Approval _____

Page ____ of ____

INSPIRE ENVIRONMENTAL

Sediment Log Form –Sampling for Particle Size

INSPIRE Project Number:	Project Name: Empire Wind Benthic 2019	Vessel: N. Star Commander	Date: 7-13-19
Station ID: 133	Water depth (m):	Time On Station (local):	Time Off Station (local):

Latitude (N; NAD83):	Longitude (W; NAD83):	Photograph (Y/N – file) YES

Sampling Staff: John Hardin, Brian Gervelis, Dan Jackson

Sampling Gear (circle one and size): Double van Veen Single van Veen	Penetration (cm): 11	Sample Time: (local) 15:57:58

Sample Description

Color: Light Brown Tannish Orange Greenish Gray Olive Gray Light Gray Dark Gray Black
Other:

Type: Cobble Gravel Sand (coarse med fine) Silt Clay Wood chips Shells or Shell Hash
Other:

Odor: None Slight Strong Petroleum H_2S Other:

Density: Hard Solid Firm Soft Loose Other:

Debris Present: Yes No Type:

Overlying Water Present: Yes No

Misc: Biota Sand Dollar, Snail, worm, Clam Detritus _____

Sediment Sample – Particle Size (500 gram sample, 250 grams minimum)

Sample Interval Range *(i.e. 0-5 cm or 0-10 cm):*

Sample ID:

Grab Number (A= Accepted; R = Rejected)
***Codes: DB** = Debris Interference; **DS** = Disturbed Surface; **NS** = No Sediment in sampler; **OP** = Over Penetration; **OT** = Other*

1	2	3	4	Notes
A				

Field Activities / Comments / Observations:
Mainly medium/coarse sand [redacted]
Pebbles present

Field Team Leader Signature and Approval _____

Page ____ of ____

INSPIRE ENVIRONMENTAL

Sediment Log Form –Sampling for Particle Size

INSPIRE Project Number:	Project Name: Empire Wind Benthic 2019	Vessel: N. Star Commander	Date: 7-13-19
Station ID: 136	Water depth (m):	Time On Station (local):	Time Off Station (local):

Latitude (N; NAD83):	Longitude (W; NAD83):	Photograph (Y/N – file) YES

Sampling Staff: John Hardin, Brian Gervelis, Dan Jackson

Sampling Gear (circle one and size): Double van Veen Single van Veen	Penetration (cm): 11.5	Sample Time: (local) 16:32:29

Sample Description

Color: Light Brown Tannish Orange Greenish Gray Olive Gray Light Gray Dark Gray Black
Other:

Type: Cobble Gravel Sand (coarse med fine) Silt Clay Wood chips Shells or Shell Hash
Other: ✓

Odor: None Slight Strong Petroleum H_2S Other:

Density: Hard Solid Firm Soft Loose Other:

Debris Present: Yes No Type:

Overlying Water Present: Yes No

Misc: Biota Worm Detritus

Sediment Sample – Particle Size (500 gram sample, 250 grams minimum)

Sample Interval Range *(i.e. 0-5 cm or 0-10 cm):*

Sample ID:

Grab Number (A= Accepted; R = Rejected)
***Codes: DB** = Debris Interference; **DS** = Disturbed Surface; **NS** = No Sediment in sampler; **OP** = Over Penetration; **OT** = Other*

1	2	3	4	Notes
A				

Field Activities / Comments / Observations:
Medium Sand w/ Pebbles

Field Team Leader Signature and Approval

Page ____ of ____

INSPIRE ENVIRONMENTAL

Sediment Log Form –Sampling for Particle Size

INSPIRE Project Number:	Project Name: Empire Wind Benthic Survey	Vessel: N. Star Commander	Date: 14 Jul 2019
Station ID: 003	Water depth (m): 21.2 m	Time On Station (local): 04:24:04	Time Off Station (local): 04:40:11
Latitude (N; NAD83):	Longitude (W; NAD83):	Photograph (Y/N – file) Yes	
Sampling Staff: K. Sturdivant, C. Holloway			
Sampling Gear (circle one and size): Double van Veen Single van Veen		Penetration (cm): 11.5	Sample Time: (local) 04:26:53

Sample Description

Color: Light Brown Tannish Orange Greenish Gray Olive Gray Light Gray Dark Gray Black
Other:

Type: Cobble Gravel Sand (coarse med fine) Silt Clay Wood chips Shells or Shell Hash
Other:

Odor: None Slight Strong Petroleum H_2S Other:

Density: Hard Solid Firm Soft Loose Other:

Debris Present: Yes No Type:

Overlying Water Present: Yes No

Misc: Biota Worms Detritus

Sediment Sample – Particle Size (500 gram sample, 250 grams minimum)

Sample Interval Range *(i.e. 0-5 cm or 0-10 cm):*

Sample ID:

Grab Number (A= Accepted; R = Rejected)

Codes: DB *= Debris Interference;* ***DS*** *= Disturbed Surface;* ***NS*** *= No Sediment in sampler;* ***OP*** *= Over Penetration;* ***OT*** *= Other*

1	2	3	4	Notes
A				

Field Activities / Comments / Observations:

Field Team Leader Signature and Approval

Page ____ of ____

INSPIRE ENVIRONMENTAL

Sediment Log Form –Sampling for Particle Size

INSPIRE Project Number:	Project Name: Empire Wind Benthic Survey	Vessel: N. Star Commander	Date: 14 July 2019
Station ID: 006	Water depth (m): 20.6 M	Time On Station (local): 05:06:24	Time Off Station (local): 05:28:52

Latitude (N; NAD83):	Longitude (W; NAD83):	Photograph (Y/N – file) Yes

Sampling Staff: K. Sturtevant, Chuck Holloway

Sampling Gear (circle one and size): Double van Veen Single van Veen	Penetration (cm): 11.5	Sample Time: (local) 05:16:30

Sample Description

Color: Light Brown Tannish Orange Greenish Gray Olive Gray Light Gray Dark Gray Black

Other: TAN LT BRN

Type: Cobble Gravel Sand (coarse med fine) Silt Clay Wood chips Shells or Shell Hash

Other:

Odor: None Slight Strong Petroleum H_2S Other:

Density: Hard Solid Firm Soft Loose Other:

Debris Present: Yes No Type:

Overlying Water Present: Yes No

Misc: Biota _____ Detritus _____

Sediment Sample – Particle Size (500 gram sample, 250 grams minimum)

Sample Interval Range *(i.e. 0-5 cm or 0-10 cm):*

Sample ID:

Grab Number (A= Accepted; R = Rejected)

***Codes: DB** = Debris Interference; **DS** = Disturbed Surface; **NS** = No Sediment in sampler; **OP** = Over Penetration; **OT** = Other*

1	2	3	4	Notes
DB	A			

Field Activities / Comments / Observations:

Field Team Leader Signature and Approval _____

Page ____ of ____

INSPIRE ENVIRONMENTAL

Sediment Log Form –Sampling for Particle Size

INSPIRE Project Number:	Project Name: Empire Wind Benthic Survey	Vessel: N.Star Commander	Date: 14 July 2019
Station ID: 010	Water depth (m): 35.2 m	Time On Station (local): 06:01:52	Time Off Station (local): 06:14:03
Latitude (N; NAD83):	Longitude (W; NAD83):	Photograph (Y/N – file) Yes	
Sampling Staff: K. Studivant, C. Holloway			
Sampling Gear (circle one and size): Double van Veen Single van Veen		Penetration (cm): 10.0	Sample Time: (local) 06:04:10

Sample Description

Color: Light Brown Tannish Orange Greenish Gray Olive Gray Light Gray Dark Gray Black
Other: DARK BROWN

Type: Cobble Gravel Sand (coarse med fine) Silt Clay Wood chips Shells or Shell Hash
Other:

Odor: None Slight Strong Petroleum H_2S Other:

Density: Hard Solid Firm Soft Loose Other:

Debris Present: ~~Yes~~ C+ No Type: ~~Cobble~~ C+

Overlying Water Present: Yes No

Misc: Biota Amphipods, clams, worms, tunicate, scallop Detritus _____

Sediment Sample – Particle Size (500 gram sample, 250 grams minimum)

Sample Interval Range *(i.e. 0-5 cm or 0-10 cm):*

Sample ID:

Grab Number (A= Accepted; R = Rejected)

Codes: DB *= Debris Interference;* ***DS*** *= Disturbed Surface;* ***NS*** *= No Sediment in sampler;* ***OP*** *= Over Penetration;* ***OT*** *= Other*

1	2	3	4	Notes
A				

Field Activities / Comments / Observations:

Field Team Leader Signature and Approval _____

Page ____ of ____

INSPIRE ENVIRONMENTAL

Sediment Log Form –Sampling for Particle Size

INSPIRE Project Number:	Project Name: Empire Wind Benthic Survey	Vessel: N Star Commander	Date: 14 Jul 2019
Station ID: 011	Water depth (m): 67.9 m	Time On Station (local):	Time Off Station (local):

Latitude (N; NAD83):	Longitude (W; NAD83):	Photograph (Y/N – file)

Sampling Staff: K. Sturdivant, Chuck Holloway

Sampling Gear (circle one and size): Double van Veen Single van Veen	Penetration (cm): 15	Sample Time: (local)

Sample Description

Color: Light Brown Tannish Orange Greenish Gray Olive Gray Light Gray Dark Gray Black
Other:

Type: Cobble Gravel Sand (coarse med fine) Silt Clay Wood chips Shells or Shell Hash
Other:

Odor: None Slight Strong Petroleum H_2S Other:

Density: Hard Solid Firm Soft Loose Other:

Debris Present: Yes No Type:

Overlying Water Present: Yes No

Misc: Biota worms amphipods isopods caperellids Detritus _____

Sediment Sample – Particle Size (500 gram sample, 250 grams minimum)

Sample Interval Range *(i.e. 0-5 cm or 0-10 cm):*

Sample ID:

Grab Number (A= Accepted; R = Rejected)

Codes: DB *= Debris Interference;* ***DS*** *= Disturbed Surface;* ***NS*** *= No Sediment in sampler;* ***OP*** *= Over Penetration;* ***OT*** *= Other*

1	2	3	4	Notes
OP	A			

Field Activities / Comments / Observations:

Field Team Leader Signature and Approval _____

Page ____ of ____

APPENDIX F

Sediment Grab Chain of Custody Form

Chain of Custody Record & Laboratory Analysis Request

INSPIRE Environmental
513 Broadway, Suite 314
Newport, RI 02840
401-849-9236

Lab Name Aqua Survey
Lab Address 469 Point Breeze Rd.
Lab Address Flemington, NJ 08822
Lab Phone Number 908-788-5700

INSPIRE ENVIRONMENTAL

Lab Assigned Number:	Turn-around Requested: Normal	Date: 15 Jul 2019
Client Company: INSPIRE Environmental	Phone: 401-849-9236	Page: 1 of 1
Purchase Order Number:	PO-0019	
Client Contact: Equinor		No. of Coolers: 1 Cooler Temps: 2°C
Client Project Name: Empire Wind Benthic Survey		
Client Project #: 08C04-1815	Samplers:	

Sample ID	Date	Time	Matrix	No. Containers	Analysis Requested: Grain Size Sieve (ASTM D6913)	Grain Size Hydrometer (ASTM D7928)			Notes/Comments
003	14 Jul 2019	04:28:52	SED						
006	14 Jul 2019	05:16:38							
010	14 Jul 2019	06:04:04							
011	14 Jul 2019	06:58:38							
147	10 Jul 2019	16:24:04							
157	10 Jul 2019	11:51:11							
020	10 Jul 2019	16:57:44							
038	10 Jul 2019	10:38:32							
060	13 Jul 2019	14:37:17							
076	13 Jul 2019	14:16:00							
091	13 Jul 2019	13:40:36							
095	13 Jul 2019	13:00:56							
108	13 Jul 2019	12:27:52							
~~136~~ 057	13 Jul 2019	15:12:58							
133	13 Jul 2019	15:57:58							
136	13 Jul 2019	16:32:71							

Comments/Special Instructions	Relinquished by: (Signature)	Received by: (Signature)	Relinquished by: (Signature)	Received by: (Signature)
	Printed Name: Kersey Sturdivant	Printed Name: Michelle Thomas	Printed Name:	Printed Name:
	INSPIRE Environmental	Company: PSI	Company:	Company:
	Date & Time: 7/15/19 1308	Date & Time: 7/15/19 1308	Date & Time:	Date & Time:

ATTACHMENT E-2
EMPIRE WIND 2021 SURVEYS ENVIRONMENTAL CAMPAIGN – EW 2 RV SHEARWATER

Alpine

Client:	**Equinor Wind US LLC**
Project Title:	**Empire Wind 2021 Surveys Environmental Campaign – EW2 RV *Shearwater***
Project Date:	**2021 April to May**
Project No.:	**1894 / EQ21526**
Doc. Type:	**Operations Report**
Doc. Date:	**2021.07.28**
Doc. No:	**AOSS-1894-OPS-07-00**
Rev.:	**Rev. 0**

DOCUMENT SUMMARY

Compilation

Documentation	Compilation	C Miro / S Childers
Verification	Checked	K Rikson
	Approved	J Bailey

Reference

Project Number	Doc. Type	Doc. Date	Revision
1894	Operations Report	2021.07.28	Rev. 0

Distribution

Equinor Wind US LLC	PDF Copy
Suite 100, 2107 Citywest Blvd	FAO: Kevin Clements
Houston	
77042	
Texas	

Executive Summary

Alpine Ocean Seismic Survey, Inc. (Alpine) performed a high-resolution geophysical survey for Equinor US Wind LLC (Equinor) for the Empire Wind Offshore Wind Project Export Cable Route offshore New York. The project consisted of geophysical and environmental scopes of work completed on Alpine's survey vessel, RV *Shearwater*, and geophysical scopes of work completed on Alpine's survey vessel, MV William M.

The surveys were performed to support development of an export cable extending from the site of a proposed wind farm, infilling and adding to coverage of previous years' surveys. The infill areas were all designed to meet relevant BOEM specifications.

Surveys on the RV *Shearwater* which were utilized for this report took place from 30-Apr-2021 to 05-May-2021.

Ref.	Name
AOSS-1894-OPS-01	RV *Shearwater* HRG Operations Report, 2020
AOSS-1894-OPS-02	RV *Shearwater* Environmental Operations Report, 2020
AOSS-1894-OPS-03	MV William M Operations Report, 2020
AOSS-1894-INT-04	Interpretation Report, Gowanus ECR
AOSS-1894-INT-05	Seabed Mobility Report, Gowanus ECR
AOSS-1894-OPS-06	RV *Shearwater* HRG Operations Report, 2021
AOSS-1894-OPS-07	**RV *Shearwater* Environmental Operations Report, 2021**
AOSS-1894-OPS-08	MV William M Operations Report, 2021
AOSS-1894-INT-09	Interpretation Report, Barret ECR
AOSS-1894-INT-10	Seabed Mobility Report, Barret ECR

This report is the **RV *Shearwater* Environmental Operations Report, 2021**, comprising operational information and results for the environmental surveys on the Barret Route.

Service Warranty & Report Use Notice

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

Alpine Ocean Seismic Survey, Inc. (Alpine) has prepared this report for the client(s) identified on the front cover in fulfilment of its contractual obligations under the contract, and the only liabilities Alpine accept are those contained therein.

Please be aware that further distribution of this report, in whole or part, or the use of the data for a purpose not expressly stated within the contractual work scope is at the client's sole risk and Alpine recommends that this disclaimer be included in any such distribution.

ALPINE OCEAN SEISMIC SURVEY, INC.
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Telephone 1 201 768 8000 Fax 1 201 768 5750
www.alpineocean.com

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GLOSSARY OF ABBREVIATIONS

Abbreviation	Meaning
BOEM	Bureau of Ocean Energy Management
COP	Construction and Operations Plan
CORS	Continuously Operating Reference Station
DGPS	Differential Global Positioning System
DPR	Daily Progress Report
DTM	Digital Terrain Model
ECR	Export Cable Route
ECRC	Export Cable Route Corridor
ft	Feet
GAMS	GPS Azimuth Measurement System
GIS	Geographic Information System
GNSS	Global Navigation Satellite System
HRG	High Resolution Geophysical
Hz	Hertz
IMU	Inertial Measurement Unit
IVO	…in the vicinity of…
kHz	Kilohertz
KPI	Key Performance Indicator
kn	Knots
Lat	Latitude
LNM	Local Notice to Mariners
Long	Longitude
m	Meter
MARA	Marine Archaeological Assessment
MBES	Multi-Beam Echo Sounder
MV	Motor Vessel
MVP	Moving Vessel Profiler
nT	Nanotesla
N/A	Not Applicable
NAD83	North American Datum of 1983
NAVD88	North American Vertical Datum of 1988
NGS	National Geodetic Survey
NMFS	National Marine Fisheries Service
NOAA	National Oceanographic and Atmospheric Administration
PDOP	Position Dilution of Precision
PPK	Post Processing Kinematic

Abbreviation	Meaning
PPS	Pulse Per Second
PSO	Protected Species Observer
QA	Quality Assurance
QC	Quality Control
QMA	Qualified Marine Archaeologist
RTK	Real-Time Kinematic
RTN	Real-Time Network
RV	Research Vessel
S-UHRS	Single-Channel Ultra High Resolution Seismic
SBES	Single-Beam Echo Sounder
SBP	Sub-Bottom Profiler
SEG	Society of Exploration Geophysicists
SEG-Y	SEG storage format
SOW	Scope of Work
SSS	Side Scan Sonar
SVP	Sound Velocity Profile
TVG	Transverse Gradiometer
USCG	United States Coast Guard
USGS	United States Geological Survey
UTC	Coordinated Universal Time
UTM	Universal Transverse Mercator Projection
VDatum	Vertical Datum Transformation
WGS84	World Geodetic System 1984
XTF	eXtended Triton Format

Technical Terminology

Terminology	Definition
Geodetic datum	A set of constants used for calculating the coordinates of points on the Earth.
GRS80	Geodetic Reference System 1980 refers to the global reference ellipsoid that was originally used for the definition of the World Geodetic System 1984 (WGS 84), and is defined by its semi-major axis and flattening.
NAVD88	A fixed reference for elevations determined by geodetic leveling which was derived from a general adjustment of the first-order terrestrial leveling nets of the United States, Canada, and Mexico. In the adjustment, only the height of the primary tidal bench mark at Father Point, Rimouski, Quebec, Canada was held fixed, thus providing minimum constraint. NAVD88 benchmark values are given in Helmert orthometric height units.
National Tidal Datum Epoch	The specific 19-year period adopted by the National Ocean Service as the official time segment over which tide observations are taken and reduced to obtain mean values for tidal datums. It is necessary for standardization because of periodic and apparent secular trends in sea level. The present NTDE is 1983 through 2001 and is actively considered for revision every 20-25 years. Tidal datums in certain regions with anomalous sea level changes (Alaska, Gulf of Mexico) are calculated on a Modified 5-Year Epoch.
Technical terminology is referenced with respect to the organization that defines the specific concept (e.g., NOAA for “MLLW”).	

1. INTRODUCTION

Alpine Ocean Seismic Survey, Inc. (Alpine) performed a high-resolution geophysical survey for Equinor US Wind LLC (Equinor) for the Empire Wind Offshore Wind Project Export Cable Route offshore New York. The project consisted of geophysical and environmental scopes of work completed on Alpine's survey vessel, RV *Shearwater*, and geophysical scopes of work completed on Alpine's survey vessel, MV William M.

This report contains environmental data acquired in 2021 under Equinor project designation EQ21526.

The surveys were performed to support development of an export cable extending from the site of a proposed wind farm, infilling and adding to coverage of previous years' surveys. The infill areas were all designed to meet relevant BOEM specifications.

Operations were carried out on a 12 h basis, utilizing a surficial sediment grab sampler, water quality profiler, and underwater video camera. The purpose of the environmental dataset was to help benthic enumeration, document the habitats present across the survey area, and to analyze water quality.

RV *Shearwater* mobilized at Liberty Landing Marina, Jersey City, NJ, on 30-Apr-2021, and demobilized in the same port after the successful completion of the environmental survey scope on 05-May-2021.

The surveys were in line with lease requirements and according to specifications described in BOEM's "BOEM's Guidelines for Providing Benthic Habitat Survey Information for Renewable Energy Development on the Atlantic Outer Continental Shelf Pursuant to 30 CFR Part 585", dated June 2020.

Reporting for this project has been subdivided per project phases as noted in Table 1.1.

Table 1.1 Project Reporting

Ref.	Name
AOSS-1894-OPS-01	RV *Shearwater* HRG Operations Report, 2020
AOSS-1894-OPS-02	RV *Shearwater* Environmental Operations Report, 2020
AOSS-1894-OPS-03	MV William M Operations Report, 2020
AOSS-1894-INT-04	Interpretation Report, Gowanus ECR
AOSS-1894-INT-05	Seabed Mobility Report, Gowanus ECR
AOSS-1894-OPS-06	RV *Shearwater* HRG Operations Report, 2021
AOSS-1894-OPS-07	**RV *Shearwater* Environmental Operations Report, 2021**
AOSS-1894-OPS-08	MV William M Operations Report, 2021
AOSS-1894-INT-09	Interpretation Report, Barret ECR
AOSS-1894-INT-10	Seabed Mobility Report, Barret ECR

This report is the **RV *Shearwater* Environmental Operations Report, 2021**, comprising operational information and results for the environmental surveys on the Barret Route (BAR, or Empire Wind 2, or EW-2).

The environmental survey area is illustrated as Figure 1.1.

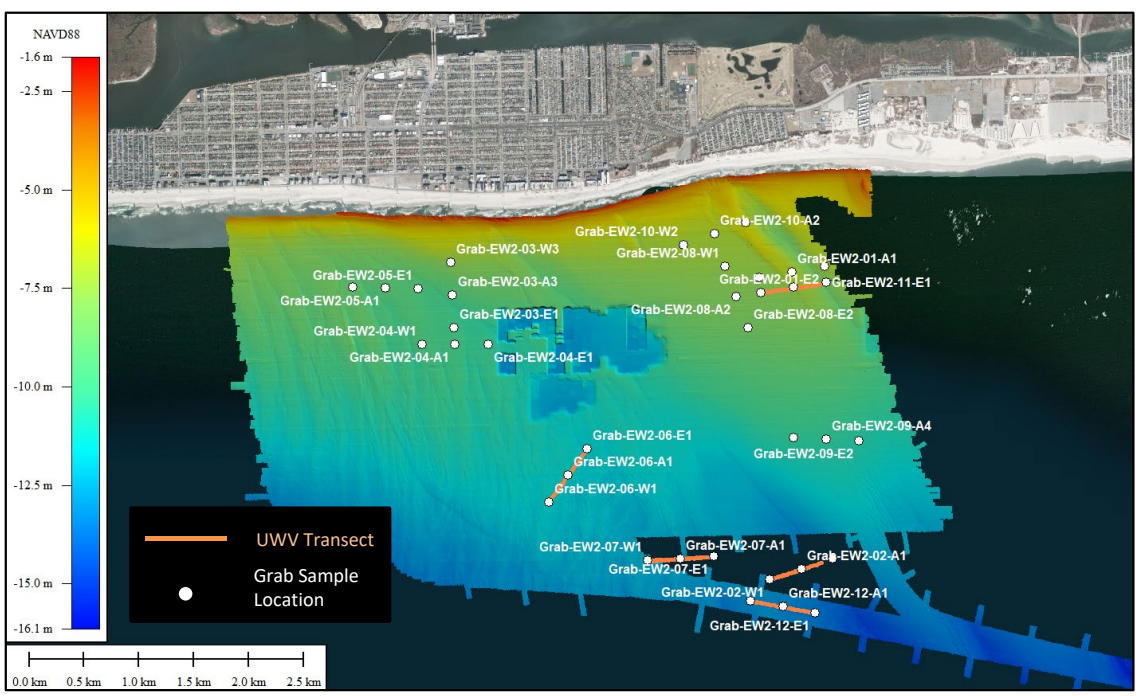


Figure 1.1 Environmental Survey Area - EW-2 Barret Landing

1.1. Survey Acquisition Plan

The RV *Shearwater* conducted environmental operations in the Barret Export Cable Route (ECR) extending from the offshore lease site OCS-A-0512 connecting to the mainland at the Jones Beach. The supplemental environmental work was conducted as an add-on to the geophysical survey previously completed. The scope of work included surficial sediment grab samples (36), water quality profiles (12), and 600-meter underwater video transects (12). Up to three attempts were authorized at each site, if needed. At 7 of the Underwater Video Transect locations, a successful image of the seabed could not be attained for benthic assessment. This resulted in a total of 5 out of a total 12 proposed transects being successful.

The survey acquisition plan for the project was based on requirements articulated by Equinor and TetraTech, including sample locations and underwater video transects provided by Equinor.

1.2. Fieldwork Summary

The mobilization for this portion of the project took place on 28 Apr-2021 alongside the dock at Liberty Landing Marina in Jersey City, NJ. This consisted of routine checks of equipment as well as a positional check, in addition to the calibrations and testing performed during the geotechnical mobilization.

Once mobilization was complete, and weather conditions were suitable, the RV *Shearwater* departed the dock and transited to Barret Landing on the morning of 02-May-2021. The entire survey consisted of 36 grab sample locations, 12 water quality profiles, and 12 underwater video transects. The environmental survey continued until 05-May-2021, when the vessel returned to the dock to start demobilization. Demobilization was completed for the environmental survey on 06-May-2021.

The fieldwork breakdown is shown in Table 1.2.

Table 1.2 Fieldwork Summary

Description	Detail
Survey Vessel	RV *Shearwater*
Mobilization	28-Apr-2021 to 30-April-2021
Survey Operations	02-May-2021 to 05-May-2021
Demobilization	05-May-2021to 06-May-2021

1.3. Time Breakdown

A breakdown of the time expenditures for the project is presented in Table 1.3 and Figure 1.2.

Table 1.3 Time Breakdown by Percentage

Activity	Project Hours	Percentage
Mob / Demob	26:15	14.34%
Operational	44:57	24.56%
Weather Standby (Port)	20:30	11.20%
Weather Standby (Offshore)	0:20	0.18%
Non-Operational (On-hire)	90:58	49.71%

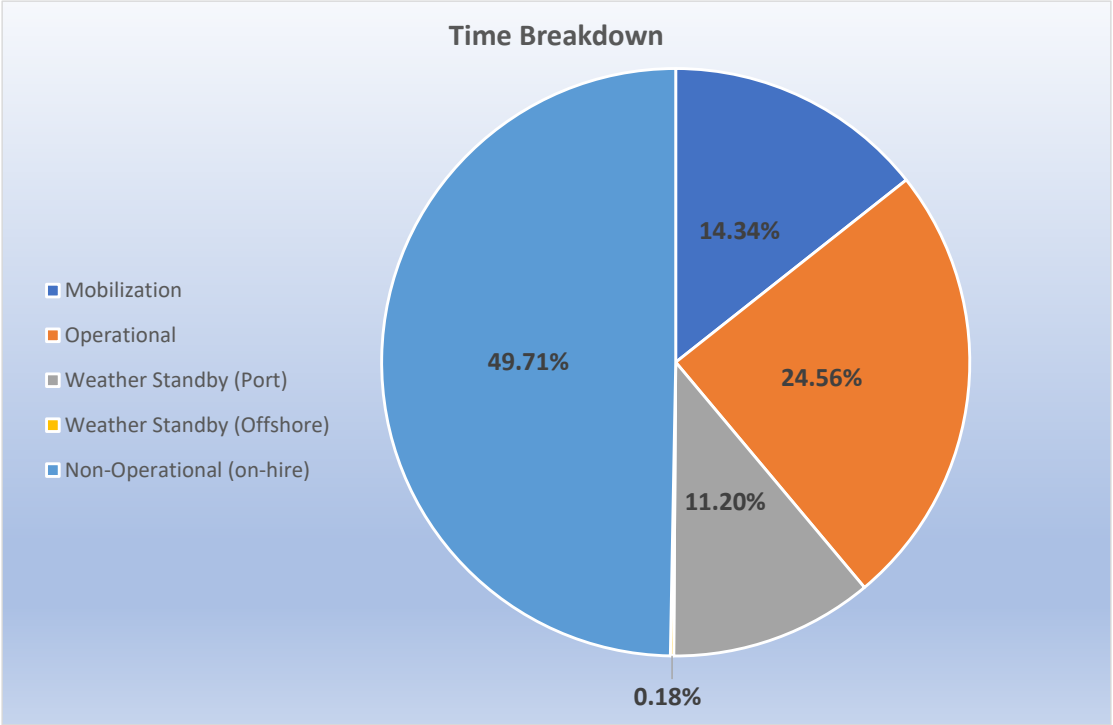


Figure 1.2 Time Breakdown by Percentage

1.4. Project Field Personnel

Table 1.4 details the key personnel who were present onboard the RV *Shearwater* during Equinor's Empire Wind 2021 Barret ECR Benthic Survey, and who participated in and contributed to day-to-day survey operations and data processing.

Table 1.4 Key Field Personnel

Personnel	Name
Party Chief	V Reale
Surveyor	S Childers J Juarez J Cunha F Zarzour
Benthic Biologist (RPS)	C Smith S Davies
Equinor Representative	Len Wang
Captain	M Porter R Worley M Afify

2. VESSEL & EQUIPMENT SUMMARY

RV *Shearwater* (Figure 2.1) is a multi-purpose survey vessel with capabilities to perform bathymetric, geophysical, geotechnical, and environmental surveys. In addition to moon pool mounted and towed sensor capability the RV *Shearwater* has two fast-action hydraulic winches and a heavy-duty crane (S.W.L. 8,000 lbs) for overhead operations. Vessel specifications are outlined in Table 2.1.

Table 2.1 RV *Shearwater* Specifications

Vessel Specifications	
Flag	United States of America
Class	Multi-Role Survey
Built	1981 (Reconfigured 2011)
Overall Length / Breadth	33.53m / 11.89m
Draft	2.74m
Gross Tonnage	198t
Main Engine	2 x 526 HP John Deere Model 6125AFM
Bow Thrust / Stern Thrust	Thrustmaster 100 HP / Hydraulically Driven “Z” Drives
Accommodation	22 berths
Nominal Endurance	14 days

Figure 2.1 RV *Shearwater*

3. HSE SUMMARY

The safety standards and procedures onboard the RV *Shearwater* adhere to company policy which is set forth in, and informed by, Alpine's Health and Safety Manual for Marine Geophysical Operations, which is, in turn, administered, maintained, and developed by the company's Health and Safety Officer. During the Barret ECR Environmental Survey, Equinor's safety policies were incorporated into the project's overall HSE framework. To maintain these standards every crew member was given a safety induction upon joining the vessel and regular safety drills were carried out during the cruise. Toolbox meetings were conducted prior to all equipment deployments and recoveries and before any deck operations were commenced.

3.1. HSE Events

Over the course of the environmental survey, a total of 5 vessel safety inductions were given and 5 vessel safety drills were conducted. The main focus of the inductions and drills, along with frequent informal crew and staff discussions, was deck operations and the implementation of Alpine's COVID-19 protocols. In addition to the preceding, discussions were also held to address significant safety observation cards that had been submitted and received, particularly if the content of the observation card was directly related to operations.

During the course of the environmental survey phase, a total of 14 toolbox meetings were held, and a total of 2 safety observation cards were submitted by the onboard personnel during operations. Additionally, there were no first aid cases, lost time incidents or hazardous occurrences during the project. Table 3.1 below presents a summary of the HSE events that occurred during Equinor's Empire Wind 2021 Barrett ECR Survey.

Table 3.1 HSE Event Summary

Item	Total Events
Vessel Safety Inductions	5
Safety Drills	5
Toolbox Talks	102
Safety Observation Cards	33

The survey and marine crew averaged 16 persons for the survey operations. The total number of man-hours worked during the environmental survey was 2904:00 hours.

4. SURVEY PARAMETERS

4.1. Project Geodetics

The geodetic and datum parameters for the survey were provided in Equinor's "RE-PM710-00002_01 EW Geodetic Note" and are summarized below in Tables 4.1 to 4.3.

Table 4.1 Project Survey Datums

Datums	
Geodetic Datum	NAD83 (2011) Epoch 2018.0
Projection	UTM Zone 18 North
Measurement Units	Meters (m)
Vertical Datum	NAVD88 (North American Vertical Datum of 1988); as determined using the USA – VDatum.

Table 4.2 Project Ellipsoid Parameters

Ellipsoid	
Ellipsoid	GRS 1980
Semi-Major Axis	a = 6378137.000 m
Semi-Minor Axis	b = 6356752.314 m
Eccentricity	e = 0.081819191043
Inverse Flattening	1/f = 298.257222101
Vertical Datum	NAVD88
EPSG Code	NAD83 (2011) UTM Zone 18 North Projected (6347) / NAD83 (2011) Geographic (6318)

Table 4.3 Survey Projection Parameters

Projection	
Projection	UTM Zone 18N
Projection Type	Transverse Mercator
EPSG Code	6347
Origin Latitude	00° 00' 00.000" North

Origin Longitude	075° 00' 00.000" West
Origin False Easting	500 000.000
Origin False Northing	0.000
Scale Factor	0.9996
Grid Unit	Meters

A datum transformation was performed real-time during survey operations within the QINSy navigation software used onboard the RV *Shearwater,* which converted positioning data from ITRF 2014 to NAD83 epoch 2018 via a seven-parameter transformative shift. (Table 4.4).

Table 4.4 Transformation Parameters – ITRF to NAD83 (2011) Epoch 2018.0

ITRF2014 to NAD83(2011), epoch 2018.0 (Position Vector transformation)		
X-axis translation (dx)	1.01162	Meter
Y-axis translation (dy)	-1.91401	Meter
Z-axis translation (dz)	-0.55309	Meter
X-axis rotation (rX)	-0.02731474	arc-second
Y-axis rotation (rY)	0.00647979	arc-second
Z-axis rotation (rZ)	-0.01052142	arc-second
Scale difference	-0.00020717	Parts per million

5. SURVEY EQUIPMENT & VESSEL CONFIGURATIONS

The Barret ECR survey was conducted using a pole-mounted MBES and USBL system, which was previously mobilized and used for the geophysical scope of work.

Table 5.1 lists all survey equipment that was mobilized and employed on RV *Shearwater* during Equinor's Empire Wind 2021 Barret ECR Survey.

Table 5.1 Project Survey Equipment

System	Equipment Model
Primary Horizontal Control	Applanix POS MV OceanMaster GPS Aided Motion Compensation System with C-Nav DGPS Corrections
Secondary Horizontal Control	Applanix POS MV OceanMaster GPS Aided Motion Compensation System with C-Nav DGPS Corrections
Integrated Navigation System	QPS QINSy Navigational and Data-logging Software
Heading Reference	Applanix POS MV OceanMaster
Multi-Beam Echo Sounder (MBES)	R2 Sonic 2024 Multi-Beam Echo Sounder
Ultra-Short Baseline (USBL)	Sonardyne Scout Pro USBL Acoustic Positioning System
Sound Velocity Profiler (MVP/SVP)	AML Moving Vessel Profiler (MVP) Sontek Castaway CTD (SVP)
Grab Sampler	Ocean Instruments Salish Grab Standard SG-20 (Modified Van Veen Sampler)
Water Quality Profiler	Sea-Bird SBE 911 plus
Underwater Camera	Deeptrekker Digital Colour 4k Camera GoPro Black 9 TLS-500 underwater camera sled
PSO Equipment	Reticule Binoculars

5.1. Survey Equipment

5.1.1. GNSS Navigation, Motion & Heading

Primary navigation for this project was supplied by an Applanix POS MV OceanMaster system receiving CNAV differential corrections. Secondary navigation for this project was supplied by another independent Applanix POS MV OceanMaster system receiving CNAV differential corrections. Dual independent receivers were used in order to give full redundancy on the navigation systems.

Heave, pitch and roll data for the vessel was provided using the inertial measurement unit (IMU) integrated with the POS MV OceanMaster. The IMU data was input with respect to the vessel's common reference point (CRP) to provide accurate motion to all necessary sensors. An additional IMU was setup for redundancy.

Additionally, each POS MV OceanMaster provided heading information by integrating data from both inertial and GNSS sensors. The systems comprised a gyro-contained, inertial measurement unit and two Trimble GNSS receivers mounted on an antenna platform with a specified separation across the centerline of the vessel. A combination of gyro calculations and a GPS azimuth measurement solution (GAMS) from the antennas provided a highly accurate heading value to the POS MV.

5.1.2. Sound Velocity Profiler

An AML Moving Velocity Profiler (MVP) was used to generate a profile of the speed of sound through the water column, which was applied in QINSy and the USBL software to correct for sound velocity temporal changes and to verify the quality and accuracy of the MBES data in real-time. The MVP was deployed approximately every 30 minutes, or as needed depending on environmental conditions, and could be acquired while the vessel was surveying online.

The MVP was mounted on the port stern corner of the vessel and was deployed through a sheave block where it could be launched from a locked position from a topside unit inside the survey lab. The operating parameters of the MVP system can be seen in Table 5.2.

Table 5.2 AML MVP Operating Parameters

Instrumentation	
Sound Velocity Probe	AML Moving Vessel Profiler
Operating Parameters	
Range	1375–1625m/s
Resolution	0.001m/s
Accuracy	±0.025m/s
Method	Chen-Millero
Temperature	
Range	-5°C to +45°C
Resolution	0.001°C
Accuracy	±0.005°C
Pressure	
Range	0–500dBar
Resolution	0.02%FS
Accuracy	±0.05%FS

5.1.3. Multi-Beam Echo Sounder

An R2 Sonic 2024 Multi-Beam Echo Sounder (MBES) was pole-mounted through a center-hull moonpool on the RV *Shearwater* and was used to provide water depths at sampling locations. The MBES settings were established during the geophysical campaign sea trials to obtain the most ideal data while meeting the project specifications.

Table 5.3 R2 Sonic MBES Operating Parameters

Instrumentation	
Multi-Beam Echo Sounder	R2 Sonic 2024
Transducer Mount	Pole mounted through moonpool
Motion Reference Unit	POS MV OceanMaster
Sound Velocity Probe	AML SVS
Operating Parameters	
Port Transducer Frequency	350kHz
Acquisition Software	QPS - QINSy
Velocity Sensor At Td	On
General Water Depths	5–35m
Angular Coverage	120°
No. of Beams	256

5.1.4. Ultra-Short Baseline Positioning System

The underwater camera was positioned using a pole mounted Sonardyne Scout Pro USBL transceiver and separate acoustic beacons to provide accurate target location. Discrete target location testing and USBL calibration parameters established during sea trials met or exceeded all of Alpine's equipment requirements.

During the geophysical mobilization, the USBL system was calibrated for pitch, roll and yaw using the QPS QINSy USBL calibration software.

Specifications of the USBL positioning system can be seen in Table 5.4.

Table 5.4 Sonardyne USBL Operating Parameters

Instrumentation	
Transceiver	Sonardyne Scout Pro
Transponder Beacons	Applied Acoustics 8190 Mini transponder
Operating Parameters	
Ping Rate	1s
Depth Rating	1,000m
Depth Aided	No
Beam Shape	Omni-directional

5.1.5. Grab Sampler

Conducted using a Salish Modified Van Veen Grab.

Three samples taken at each station resulting in 36 grab samples. 36 samples successful. Onsite description of geology as well as benthic habitat can be found in the daily log. Samples were further analyzed at a laboratory for grain size, Total Organic Carbon (Terrasense) and benthic enumeration (ESS). All benthic samples were treated with a 10% Formalin solution as well as Rose Bengal. Grain size samples were all refrigerated.

5.1.6. Water Quality Profiler

Water quality profiles were conducted using the Sea-Bird SBE 911 plus system. The Sea-Bird collected Conductivity, Temperature, Salinity, DO, and pH.

One profile was taken at the center site of each station prior to any other sampling taking place in order to be sure the sample was acquired without any bottom disturbance from sediment sampling.

5.1.7. Underwater Camera

Underwater video was collected using the TLS-500 towed underwater camera sled. 12 600 m long transects were investigated, each oriented to cross the primary grab sample location and offset locations. Five of these transects were imaged successfully. Despite multiple attempts, 7 of the transects could not provide sufficient detail of the seabed for sediment and benthic assessment. This was likely due to the are being in shallow water conditions with strong currents and seas, influences from the nearby Jones inlet or possible turbid waters following the winter season.

General benthic habitat descriptions can be found in the daily log. Final analysis for macrofaunal count and benthic habitat were performed by ESS and provided to RPS for the final Benthic Report (Appendix E).

6. PROCESSING METHODOLOGY

This section describes the processing sequences used for continuous data quality control as well as quality assurance.

6.1. Navigation

No processing of navigation data for the purposes of smoothing the track of the camera on transects was undertaken.

6.2. Grab Sampling

Grab sampling procedures are described in the Benthic Analysis Report included as Appendix E.

6.3. Water Quality Profiling

Water quality profiles were taken into SeaProc software, part of the SeaSoft software suite in order to produce ASCII format processed data files with all required data columns, including depth, pressure, density, oxygen saturation, acidity, conductivity and sound velocity.

6.4. Underwater Camera Video

Underwater camera procedures are described in the Benthic Analysis Report included as Appendix E.

7. OPERATIONAL SUMMARY

7.1. Limiting Factors

Turbid conditions in the water lead to sediment occlusion in a majority of video footage taken. After multiple attempts only 5 video transects were deemed visible. Despite multiple attempts, 7 of the transects could not provide sufficient detail of the seabed for sediment and benthic assessment. This was likely due to the are being in shallow water conditions with strong currents and seas, influences from the nearby Jones inlet or possible turbid waters following the winter season.

Appendices

APPENDIX A DAILY PROGRESS REPORTS

DAILY REPORT

Vessel:	**Shearwater**	Project No:	**1894**
Client:	**Equinor Wind US LLC**	Todays Date:	**29 April 2021**
Location:	**New York City, U.S.A.**	Report No:	**58**
Project:	**Empire Wind Gowanus ECR-NY**	Start Date:	**03 March 2021**

All times are ***EST*** *(GMT -* ***4:00*** *hrs)*

AA. VESSEL LOCATION AT 24:00 HRS:

Description: **Liberty Landing Marina, NJ** Latitude: **40º 42.65** Longitude: **74º 02.64**

BB. WEATHER:

Time	BAROM	WIND		WAVE	VISIB.	SKY	REMARKS
(Local)	mb	Speed mph	Dir	HEIGHT m	nmi	CONDS	
00:00		10	W	0.5	10	Cloudy	
08:00		8	S	0.9	10	Cloudy	
16:00		15	S	1	7	Rain	
24:00		17	SW	1	5	Rain	

CC. PERSONNEL & EQUIPMENT:

C1. Alpine OSS Personnel:

Party Chief: V Reale	Surveyor: J Juarez	Surveyor: C Smith	Captain: M Porter	AB: D Davison
Surveyor: S Childers	Surveyor: F Zarzour	Surveyor: S Davies	2nd Captain: R Worley	AB: M Budzinsky
Surveyor: J Cunha			Mate: M Afify	Chef: S Hamilton

C2. Additional Personnel

PSO: K Villegas

PSO: A Vest

C3. Client Personnel:

Client Rep. Len Wang

C4. Personnel On Board:

ALPINE:	5	CLIENT:	1	VESSEL:	6	OTHERS:	4	TOTAL 16

C5. ALPINE'S Equipment:

Environmental Camera Sled	Grab Sampler	AML MVP30		
R2 Sonic MBES 2024	2 Applanix POS MV Ocean Master	CTD caster		
USBL Sonardyne Ranger	2 x C-Nav 3050			

C6. Additional Equipment

C7. Project Variations (include notices of changes of personnel / equipment)

Off Vessel	On Vessel
Personnel:	**Personnel:**
Equipment:	**Equipment:**

DD. DIARY OF EVENTS TODAY:

From	To	hrs	Code	
00:00	7:00	7:00	NoH	Vessel at dock in Liberty Landing Marina.
7:00	19:00	12:00	M	Mobilization of equipment for environmental activities in port.
19:00	24:00	5:00	NoH	Vessel at dock in Liberty Landing Marina.

EE. PROJECT DATA:

E1. Time Summary:

Rate	Code		Previous Hours	Today Hours	Total Hours		Percent of Total
Mobilization	M		255:55	12:00	267:55		22.69
Operational	O		215:20		215:20		18.23
Infill Lines	OI		68:23		68:23		5.79
Additional Lines	OAL						
WXR Stby Port	W		72:00		72:00		6.10
WXR Stby Offshore	WO		12:04		12:04		1.02
Contractor Time	CT		19:36		19:36		1.66
Port Call	PC		40:00		40:00		3.39
Survey Downtime	SD						
Non-Operational (on-hire)	NoH		460:00	12:00	472:00		39.97
Disputed Time	DT						
PSO Downtime	PSO		13:42		13:42		1.16
		TOTAL	1157:00	24:00	1181:00		**100.00%**

Hrs. of Daily Operations 12 **Cumulative Hours Check Value=** **696.00**

E2. Survey Progress:

Description	Km Left	Area	Total Km	Km Prev	Today Km	Km To Date	% Completed
Barret Extension			414.97	414.97		414.97	100.00%
Wreck Reroute Extension			85.97	85.97		85.97	100.00%
Gravesend Bay Extension			41.64	41.64		41.64	100.00%
Coney Island Extension			132.22	132.22		132.22	100.00%
Narrows Extension			41.21	41.21		41.21	100.00%
Seabed Mobility Investigations			34.90	34.90		34.90	100.00%
Anchor Plan Survey			23.88	23.88		23.88	100.00%
TOTALS:		**TOTAL**	774.79	774.79		**774.79**	100.00%

FF. SAFETY (Details & Figures for Vessel and Survey Crews and Client Representatives)

Incidents & Drills	Previous Events	Today's Events	Events To Date
Safety Meeting	1		1
Vessel Safety Induction	5		5
Vessel Safety Drill (MOB, Fire & Abandon Ship)	5		5
Tool Box Talks	88	2	90
Permit to Work			
Safety Observation Card	31		31
Hazardous Occurrence Report			
First Aid Case (FAC)			
Medical Treatment Case (MTC)			
Lost Time Incident (LTI)			
No. of survey Man-Hours worked since start of project or LTI.	10068:00	**384:00**	**10452:00**

GG. VESSEL ROB's at 24:00hrs

	Fuel (gal)	Lube Oil (gal)	Water (gal)
ROB at 00:00 hrs			
Consumed Today			
Received today			
ROB at 24:00 hrs			

HH. EXPECTED WEATHER NEXT 24 HRS:

Increasing wind from W (20-25 knots),

II. ANTICIPATED PROGRAM NEXT 24 HRS:

Completing Mob activities

JJ. PARTY CHIEF'S COMMENTS: (Optional)

Starboard side trusther repaired, vessel fully operational since midday

KK. REPRESENTATIVE'S COMMENTS: (Optional)

For ALPINE		For **Equinor Wind US LLC**
V Reale		**Len Wang**
(Survey Party Chief)		(Client Representative)

Vessel:	**Shearwater**	Project No:	**1894**	Date:	**29 April 2021**
Client:	**Equinor Wind US LLC**	Location:	**New York City, U.S.A.**	Report No.	**058**
		Project:	**Empire Wind Gowanus ECR-NY**		

DAILY REPORT

Vessel:	**Shearwater**	Project No:	**1894**
Client:	**Equinor Wind US LLC**	Todays Date:	**30 April 2021**
Location:	**New York City, U.S.A.**	Report No:	**59**
Project:	**Empire Wind Gowanus ECR-NY**	Start Date:	**03 March 2021**

All times are ***EST*** *(GMT -* ***4:00*** *hrs)*

AA. VESSEL LOCATION AT 24:00 HRS:

Description: **Liberty Landing Marina, NJ** Latitude: **40º 42.65** Longitude: **74º 02.64**

BB. WEATHER:

Time (Local)	BAROM mb	WIND Speed mph	WIND Dir	WAVE HEIGHT m	VISIB. nmi	SKY CONDS	REMARKS
00:00		17	SW	1	5	Rain	
08:00		20	W	1.3	5	Cloudy	
16:00		20	W	1.6	10	Partly Cloudy	
24:00		27	NW	1.5	10	Partly Cloudy	

CC. PERSONNEL & EQUIPMENT:

C1. Alpine OSS Personnel:

Party Chief: V Reale	Surveyor: J Juarez	Surveyor: C Smith	Captain: M Porter	AB: D Davison
Surveyor: S Childers	Surveyor: F Zarzour	Surveyor: S Davies	2nd Captain: R Worley	AB: M Budzinsky
Surveyor: J Cunha			Mate: M Afify	Chef: S Hamilton

C2. Additional Personnel

PSO: K Villegas

PSO: A Vest

C3. Client Personnel:

Client Rep. Len Wang

C4. Personnel On Board:

ALPINE:	5	CLIENT:	1	VESSEL:	6	OTHERS:	4	TOTAL 16

C5. ALPINE'S Equipment:

Environmental Camera Sled	Grab Sampler	AML MVP30		
R2 Sonic MBES 2024	2 Applanix POS MV Ocean Master	CTD caster		
USBL Sonardyne Ranger	2 x C-Nav 3050			

C6. Additional Equipment

C7. Project Variations (include notices of changes of personnel / equipment)

Off Vessel	On Vessel
Personnel:	**Personnel:** **Steve Budge**
Equipment:	**Equipment:**

DD. DIARY OF EVENTS TODAY:

From	To	hrs	Code	
00:00	7:00	7:00	NoH	Vessel at dock in Liberty Landing Marina.
7:00	10:30	3:30	M	Mobilization of equipment for environmental activities in port.
10:30	19:00	8:30	W	Mob completed. Weather standby at Liberty Landing Marina.
19:00	24:00	5:00	NoH	Vessel at dock in Liberty Landing Marina.

EE.	PROJECT DATA:

E1. Time Summary:

Rate	Code		Previous Hours	Today Hours	Total Hours		Percent of Total
Mobilization	M		267:55	3:30	271:25		22.52
Operational	O		215:20		215:20		17.87
Infill Lines	OI		68:23		68:23		5.67
Additional Lines	OAL						
WXR Stby Port	W		72:00	8:30	80:30		6.68
WXR Stby Offshore	WO		12:04		12:04		1.00
Contractor Time	CT		19:36		19:36		1.63
Port Call	PC		40:00		40:00		3.32
Survey Downtime	SD						
Non-Operational (on-hire)	NoH		472:00	12:00	484:00		40.17
Disputed Time	DT						
PSO Downtime	PSO		13:42		13:42		1.14
		TOTAL	1181:00	24:00	1205:00		**100.00%**

Hrs. of Daily Operations 12 **Cumulative Hours Check Value=** **708.00**

E2. Survey Progress:

Description		Cores Left	Area	Total Cores	Cores Prev	Today Cores	Cores To Date	% Completed
Water Quality Profiles		12.00		12.00				
Grab Samples		36.00		36.00				
Underwater Video Transect		12.00		12.00				
	TOTALS:	60.00	**TOTAL**	60.00				

FF. SAFETY (Details & Figures for Vessel and Survey Crews and Client Representatives)

Incidents & Drills	Previous Events	Today's Events	Events To Date
Safety Meeting	1		1
Vessel Safety Induction	5		5
Vessel Safety Drill (MOB, Fire & Abandon Ship)	5		5
Tool Box Talks	90	1	91
Permit to Work			
Safety Observation Card	31		31
Hazardous Occurrence Report			
First Aid Case (FAC)			
Medical Treatment Case (MTC)			
Lost Time Incident (LTI)			
No. of survey Man-Hours worked since start of project or LTI.	10452:00	**384:00**	**10836:00**

GG. VESSEL ROB's at 24:00hrs

	Fuel (gal)	Lube Oil (gal)	Water (gal)
ROB at 00:00 hrs			
Consumed Today			
Received today			
ROB at 24:00 hrs			

HH. EXPECTED WEATHER NEXT 24 HRS:

Weather conditions improving in the afternoon.

II. ANTICIPATED PROGRAM NEXT 24 HRS:

Weather permitting, moving to survey area and start survey activities.

JJ. PARTY CHIEF'S COMMENTS: (Optional)

KK. REPRESENTATIVE'S COMMENTS: (Optional)

For ALPINE		For **Equinor Wind US LLC**
V Reale		**Len Wang**
(Survey Party Chief)		(Client Representative)

Vessel:	**Shearwater**	Project No:	**1894**	Date:	**30 April 2021**
Client:	**Equinor Wind US LLC**	Location:	**New York City, U.S.A.**	Report No.	**059**
		Project:	**Empire Wind Gowanus ECR-NY**		

DAILY REPORT

Vessel:	**Shearwater**	Project No:	**1894**
Client:	**Equinor Wind US LLC**	Todays Date:	**01 May 2021**
Location:	**New York City, U.S.A.**	Report No:	**60**
Project:	**Empire Wind Gowanus ECR-NY**	Start Date:	**03 March 2021**

All times are ***EST*** *(GMT -* ***4:00*** *hrs)*

AA. VESSEL LOCATION AT 24:00 HRS:

Description: Latitude: **40º 33' 00** Longitude: **74º 00' 00**

BB. WEATHER:

Time (Local)	BAROM mb	WIND Speed mph	WIND Dir	WAVE HEIGHT m	VISIB. nmi	SKY CONDS	REMARKS
00:00		27	NW	1.5	10	Partly Cloudy	
08:00		20	NW	1.3	10	Partly Cloudy	
16:00		10	W	0.5	10	Clear	
24:00		10	SW	0.3	10	Clear	

CC. PERSONNEL & EQUIPMENT:

C1. Alpine OSS Personnel:

Party Chief: V Reale	Surveyor: J Juarez	Surveyor: C Smith	Captain: M Porter	AB: D Davison
Surveyor: S Childers	Surveyor: F Zarzour	Surveyor: S Davies	2nd Captain: R Worley	AB: M Budzinsky
Surveyor: J Cunha			Mate: M Afify	Chef: S Hamilton

C2. Additional Personnel

PSO: K Villegas

PSO: A Vest

C3. Client Personnel:

Client Rep. Len Wang

C4. Personnel On Board:

ALPINE:	5	CLIENT:	1	VESSEL:	6	OTHERS:	4	TOTAL 16

C5. ALPINE'S Equipment:

Environmental Camera Sled	Grab Sampler	AML MVP30		
R2 Sonic MBES 2024	2 Applanix POS MV Ocean Master	CTD caster		
USBL Sonardyne Ranger	2 x C-Nav 3050			

C6. Additional Equipment

C7. Project Variations (include notices of changes of personnel / equipment)

Off Vessel	On Vessel
Personnel:	**Personnel:**
Equipment:	**Equipment:**

DD. DIARY OF EVENTS TODAY:

From	To	hrs	Code	
00:00	7:00	7:00	NoH	Vessel at dock in Liberty Landing Marina.
7:00	19:00	12:00	W	Weather standby at Liberty Landing Marina.
19:00	24:00	5:00	NoH	Vessel leaves dock at 21.00 and transits to survey area.

EE.	PROJECT DATA:

E1. Time Summary:

Rate	Code		Previous Hours	Today Hours	Total Hours		Percent of Total
Mobilization	M		271:25		271:25		22.08
Operational	O		215:20		215:20		17.52
Infill Lines	OI		68:23		68:23		5.56
Additional Lines	OAL						
WXR Stby Port	W		80:30	12:00	92:30		7.53
WXR Stby Offshore	WO		12:04		12:04		0.98
Contractor Time	CT		19:36		19:36		1.59
Port Call	PC		40:00		40:00		3.25
Survey Downtime	SD						
Non-Operational (on-hire)	NoH		484:00	12:00	496:00		40.36
Disputed Time	DT						
PSO Downtime	PSO		13:42		13:42		1.11
		TOTAL	1205:00	24:00	1229:00		**100.00%**

Hrs. of Daily Operations 12 **Cumulative Hours Check Value=** 720.00

E2. Survey Progress:

Description		Cores Left	Area	Total Cores	Cores Prev	Today Cores	Cores To Date	% Completed
Water Quality Profiles		12.00		12.00				
Grab Samples		36.00		36.00				
Underwater Video Transect		12.00		12.00				
	TOTALS:	60.00	**TOTAL**	60.00				

FF. SAFETY (Details & Figures for Vessel and Survey Crews and Client Representatives)

Incidents & Drills	Previous Events	Today's Events	Events To Date
Safety Meeting	1		1
Vessel Safety Induction	5		5
Vessel Safety Drill (MOB, Fire & Abandon Ship)	5		5
Tool Box Talks	91	1	92
Permit to Work			
Safety Observation Card	31		31
Hazardous Occurrence Report			
First Aid Case (FAC)			
Medical Treatment Case (MTC)			
Lost Time Incident (LTI)			
No. of survey Man-Hours worked since start of project or LTI.	10836:00	**384:00**	**11220:00**

GG. VESSEL ROB's at 24:00hrs

	Fuel (gal)	Lube Oil (gal)	Water (gal)
ROB at 00:00 hrs			
Consumed Today			
Received today			
ROB at 24:00 hrs			

HH. EXPECTED WEATHER NEXT 24 HRS:

Partly cloudy, wind 6 to 15 knts SW to S

II. ANTICIPATED PROGRAM NEXT 24 HRS:

Grab sampling activities at Barrett landing area.

JJ. PARTY CHIEF'S COMMENTS: (Optional)

KK. REPRESENTATIVE'S COMMENTS: (Optional)

For ALPINE		For **Equinor Wind US LLC**
V Reale		**Len Wang**
(Survey Party Chief)		(Client Representative)

Vessel:	**Shearwater**	Project No:	**1894**	Date:	**01 May 2021**
Client:	**Equinor Wind US LLC**	Location:	**New York City, U.S.A.**	Report No.	**060**
		Project:	**Empire Wind Gowanus ECR-NY**		

DAILY REPORT

Vessel:	**Shearwater**	Project No:	**1894**
Client:	**Equinor Wind US LLC**	Todays Date:	**02 May 2021**
Location:	**New York City, U.S.A.**	Report No:	**61**
Project:	**Empire Wind Gowanus ECR-NY**	Start Date:	**03 March 2021**

All times are ***EST*** *(GMT -* ***4:00*** *hrs)*

AA. VESSEL LOCATION AT 24:00 HRS:

Description: **Barrett survey area** Latitude: **40º 30' 00** Longitude: **73º 40' 00**

BB. WEATHER:

Time (Local)	BAROM mb	WIND Speed mph	WIND Dir	WAVE HEIGHT m	VISIB. nmi	SKY CONDS	REMARKS
00:00		10	SW	0.3	>5	clear	
08:00		10	S	0.6	>5	cloudy	rain showers
16:00		7	SSW	0.8	>5	partly cloudy	
24:00		15	S	1	>5	clear	

CC. PERSONNEL & EQUIPMENT:

C1. Alpine OSS Personnel:

Party Chief: V Reale	Surveyor: J Juarez	Surveyor: C Smith	Captain: M Porter	AB: D Davison
Surveyor: S Childers	Surveyor: F Zarzour	Surveyor: S Davies	2nd Captain: R Worley	AB: M Budzinsky
Surveyor: J Cunha			Mate: M Afify	Chef: S Hamilton

C2. Additional Personnel

PSO: K Villegas

PSO: A Vest

C3. Client Personnel:

Client Rep. Len Wang

C4. Personnel On Board:

ALPINE:	5	CLIENT:	1	VESSEL:	6	OTHERS:	4	TOTAL 16

C5. ALPINE'S Equipment:

Environmental Camera Sled	Grab Sampler	AML MVP30		
R2 Sonic MBES 2024	2 Applanix POS MV Ocean Master	CTD caster		
USBL Sonardyne Ranger	2 x C-Nav 3050			

C6. Additional Equipment

C7. Project Variations (include notices of changes of personnel / equipment)

Off Vessel	On Vessel
Personnel:	**Personnel:**
Equipment:	**Equipment:**

DD. DIARY OF EVENTS TODAY:

From	To	hrs	Code	
00:00	6:47	6:47	NoH	Transiting to survey area.
6:47	10:40	3:53	O	Grab sampling at stations 03-04-05
10:40	11:00	0:20	WO	Waiting on weather, storm approaching with strong winds gusts
11:00	18:49	7:49	O	Grab sampling at stations 02-06-07-08-09-12
18:49	24:00	5:11	NoH	Loitering at survey area.

EE.	PROJECT DATA:

E1. Time Summary:

Rate	Code		Previous Hours	Today Hours	Total Hours		Percent of Total
Mobilization	M		271:25		271:25		21.66
Operational	O		215:20	11:42	227:02		18.12
Infill Lines	OI		68:23		68:23		5.46
Additional Lines	OAL						
WXR Stby Port	W		92:30		92:30		7.38
WXR Stby Offshore	WO		12:04	0:20	12:24		0.99
Contractor Time	CT		19:36		19:36		1.56
Port Call	PC		40:00		40:00		3.19
Survey Downtime	SD						
Non-Operational (on-hire)	NoH		496:00	11:58	507:58		40.54
Disputed Time	DT						
PSO Downtime	PSO		13:42		13:42		1.09
		TOTAL	1229:00	24:00	1253:00		**100.00%**

Hrs. of Daily Operations 12 **Cumulative Hours Check Value=** 732.00

E2. Survey Progress:

Description		Cores Left	Area	Total Cores	Cores Prev	Today Cores	Cores To Date	% Completed
Water Quality Profiles		12.00		12.00				
Grab Samples		9.00		36.00		27.00	27.00	75.00%
Underwater Video Transect		12.00		12.00				
	TOTALS:	33.00	**TOTAL**	60.00		**27.00**	**27.00**	45.00%

FF. SAFETY (Details & Figures for Vessel and Survey Crews and Client Representatives)

Incidents & Drills	Previous Events	Today's Events	Events To Date
Safety Meeting	1		1
Vessel Safety Induction	5		5
Vessel Safety Drill (MOB, Fire & Abandon Ship)	5		5
Tool Box Talks	92	2	94
Permit to Work			
Safety Observation Card	31		31
Hazardous Occurrence Report			
First Aid Case (FAC)			
Medical Treatment Case (MTC)			
Lost Time Incident (LTI)			
No. of survey Man-Hours worked since start of project or LTI.	11220:00	**384:00**	**11604:00**

GG. VESSEL ROB's at 24:00hrs

	Fuel (gal)	Lube Oil (gal)	Water (gal)
ROB at 00:00 hrs			
Consumed Today			
Received today			
ROB at 24:00 hrs			

HH. EXPECTED WEATHER NEXT 24 HRS:

Cloudy, possible rain showers, wind E up to 15 knots

II. ANTICIPATED PROGRAM NEXT 24 HRS:

Completing sediments sampling and start Water Quality profiling.

JJ. PARTY CHIEF'S COMMENTS: (Optional)

KK. REPRESENTATIVE'S COMMENTS: (Optional)

For ALPINE		For **Equinor Wind US LLC**
V Reale		**Len Wang**
(Survey Party Chief)		(Client Representative)

Vessel:	**Shearwater**	Project No:	**1894**	Date:	**02 May 2021**
Client:	**Equinor Wind US LLC**	Location:	**New York City, U.S.A.**	Report No.	**061**
		Project:	**Empire Wind Gowanus ECR-NY**		

DAILY REPORT

Vessel:	**Shearwater**	Project No:	**1894**
Client:	**Equinor Wind US LLC**	Todays Date:	**03 May 2021**
Location:	**New York City, U.S.A.**	Report No:	**62**
Project:	**Empire Wind Gowanus ECR-NY**	Start Date:	**03 March 2021**

All times are ***EST*** *(GMT -* ***4:00*** *hrs)*

AA. VESSEL LOCATION AT 24:00 HRS:

Description: Latitude: **40º 40' 00 N** Longitude: **74º 00' 00**

BB. WEATHER:

Time (Local)	BAROM mb	WIND Speed mph	WIND Dir	WAVE HEIGHT m	VISIB. nmi	SKY CONDS	REMARKS
00:00		15	S	1	>5	clear	
08:00		10	NE	1	>5	partly cloudy	
16:00		14	ENE	0.9	>5	partly cloudy	
24:00		15	E	1	>5	cloudy	rain showers

CC. PERSONNEL & EQUIPMENT:

C1. Alpine OSS Personnel:

Party Chief: V Reale	Surveyor: J Juarez	Surveyor: C Smith	Captain: M Porter	AB: D Davison
Surveyor: S Childers	Surveyor: F Zarzour	Surveyor: S Davies	2nd Captain: R Worley	AB: M Budzinsky
Surveyor: J Cunha			Mate: M Afify	Chef: S Hamilton

C2. Additional Personnel

PSO: K Villegas

PSO: A Vest

C3. Client Personnel:

Client Rep. Len Wang

C4. Personnel On Board:

ALPINE:	5	CLIENT:	1	VESSEL:	6	OTHERS:	4	TOTAL 16

C5. ALPINE'S Equipment:

Environmental Camera Sled	Grab Sampler	AML MVP30		
R2 Sonic MBES 2024	2 Applanix POS MV Ocean Master	CTD caster		
USBL Sonardyne Ranger	2 x C-Nav 3050			

C6. Additional Equipment

C7. Project Variations (include notices of changes of personnel / equipment)

Off Vessel	On Vessel
Personnel:	**Personnel:**
Equipment:	**Equipment:**

DD. DIARY OF EVENTS TODAY:

From	To	hrs	Code	
00:00	6:45	6:45	NoH	Loitering at survey area.
6:45	11:54	5:09	O	Water Quality profiles at all stations.
11:54	16:55	5:01	O	Grab sampling at stations 01-10-11.
16:55	18:45	1:50	O	Preparation of equipment for Video transects, storage of collected grab samples.
18:45	24:00	5:15	NoH	Transiting to Liberty Landing Marina for maritime crew change.

EE.	PROJECT DATA:

E1. Time Summary:

Rate	Code		Previous Hours	Today Hours	Total Hours		Percent of Total
Mobilization	M		271:25		271:25		21.25
Operational	O		227:02	12:00	239:02		18.72
Infill Lines	OI		68:23		68:23		5.35
Additional Lines	OAL						
WXR Stby Port	W		92:30		92:30		7.24
WXR Stby Offshore	WO		12:24		12:24		0.97
Contractor Time	CT		19:36		19:36		1.53
Port Call	PC		40:00		40:00		3.13
Survey Downtime	SD						
Non-Operational (on-hire)	NoH		507:58	12:00	519:58		40.72
Disputed Time	DT						
PSO Downtime	PSO		13:42		13:42		1.07
		TOTAL	1253:00	24:00	1277:00		**100.00%**

Hrs. of Daily Operations 12 **Cumulative Hours Check Value=** **744.00**

E2. Survey Progress:

Description		Cores Left	Area	Total Cores	Cores Prev	Today Cores	Cores To Date	% Completed
Water Quality Profiles				12.00		12.00	12.00	100.00%
Grab Samples				36.00	27.00	9.00	36.00	100.00%
Underwater Video Transect		12.00		12.00				
	TOTALS:	12.00	**TOTAL**	60.00	27.00	**21.00**	**48.00**	80.00%

FF. SAFETY (Details & Figures for Vessel and Survey Crews and Client Representatives)

Incidents & Drills	Previous Events	Today's Events	Events To Date
Safety Meeting	1		1
Vessel Safety Induction	5		5
Vessel Safety Drill (MOB, Fire & Abandon Ship)	5		5
Tool Box Talks	94	3	97
Permit to Work			
Safety Observation Card	31		31
Hazardous Occurrence Report			
First Aid Case (FAC)			
Medical Treatment Case (MTC)			
Lost Time Incident (LTI)			
No. of survey Man-Hours worked since start of project or LTI.	11604:00	**384:00**	**11988:00**

GG. VESSEL ROB's at 24:00hrs

	Fuel (gal)	Lube Oil (gal)	Water (gal)
ROB at 00:00 hrs			
Consumed Today			
Received today			
ROB at 24:00 hrs			

HH. EXPECTED WEATHER NEXT 24 HRS:

Partly cloudy with rain showers, wind variable direction up to 15 knots

II. ANTICIPATED PROGRAM NEXT 24 HRS:

Weather permitting, running underwater video transects.

JJ. PARTY CHIEF'S COMMENTS: (Optional)

KK. REPRESENTATIVE'S COMMENTS: (Optional)

For ALPINE		For **Equinor Wind US LLC**
V Reale		**Len Wang**
(Survey Party Chief)		(Client Representative)

Vessel:	**Shearwater**	Project No:	**1894**	Date:	**03 May 2021**
Client:	**Equinor Wind US LLC**	Location:	**New York City, U.S.A.**	Report No.	**062**
		Project:	**Empire Wind Gowanus ECR-NY**		

DAILY REPORT

Vessel:	**Shearwater**	Project No:	**1894**
Client:	**Equinor Wind US LLC**	Todays Date:	**04 May 2021**
Location:	**New York City, U.S.A.**	Report No:	**63**
Project:	**Empire Wind Gowanus ECR-NY**	Start Date:	**03 March 2021**

All times are ***EST*** *(GMT -* ***4:00*** *hrs)*

AA. VESSEL LOCATION AT 24:00 HRS:

Description: **Barret area** Latitude: **40º 34' 00** Longitude: **73º 39' 00**

BB. WEATHER:

Time (Local)	BAROM mb	WIND Speed mph	WIND Dir	WAVE HEIGHT m	VISIB. nmi	SKY CONDS	REMARKS
00:00		15	E	1	>5	cloudy	rain showers
08:00		10	NNW	0.8	>5	partly cloudy	
16:00		8	SE	0.9	>5	partly cloudy	
24:00		15	ESE	1	>5	cloudy	rain showers

CC. PERSONNEL & EQUIPMENT:

C1. Alpine OSS Personnel:

Party Chief: V Reale	Surveyor: J Juarez	Surveyor: C Smith	Captain: M Porter	AB: D Davison
Surveyor: S Childers	Surveyor: F Zarzour	Surveyor: S Davies	2nd Captain: R Worley	AB: M Budzinsky
Surveyor: J Cunha			Mate: M Afify	Chef: S Hamilton

C2. Additional Personnel

PSO: K Villegas

PSO: A Vest

C3. Client Personnel:

Client Rep. Len Wang

C4. Personnel On Board:

ALPINE:	5	CLIENT:	1	VESSEL:	6	OTHERS:	4	TOTAL 16

C5. ALPINE'S Equipment:

Environmental Camera Sled	Grab Sampler	AML MVP30		
R2 Sonic MBES 2024	2 Applanix POS MV Ocean Master	CTD caster		
USBL Sonardyne Ranger	2 x C-Nav 3050			

C6. Additional Equipment

C7. Project Variations (include notices of changes of personnel / equipment)

Off Vessel	On Vessel
Personnel:	**Personnel:**
Equipment:	**Equipment:**

DD. DIARY OF EVENTS TODAY:

From	To	hrs	Code	
00:00	6:40	6:40	NoH	Transiting to survey area.
6:40	18:00	11:20	O	Underwater Video transects on EW-01-02-03-05-06-07-08-09-10-11-12
18:00	18:40	0:40	O	Reporting and preparation for next day activities
18:40	24:00	5:20	NoH	Loitering at survey area.

EE.	PROJECT DATA:

E1. Time Summary:

Rate	Code		Previous Hours	Today Hours	Total Hours		Percent of Total
Mobilization	M		271:25		271:25		20.86
Operational	O		239:02	12:00	251:02		19.30
Infill Lines	OI		68:23		68:23		5.26
Additional Lines	OAL						
WXR Stby Port	W		92:30		92:30		7.11
WXR Stby Offshore	WO		12:24		12:24		0.95
Contractor Time	CT		19:36		19:36		1.51
Port Call	PC		40:00		40:00		3.07
Survey Downtime	SD						
Non-Operational (on-hire)	NoH		519:58	12:00	531:58		40.89
Disputed Time	DT						
PSO Downtime	PSO		13:42		13:42		1.05
		TOTAL	1277:00	24:00	1301:00		**100.00%**

Hrs. of Daily Operations 12 **Cumulative Hours Check Value=** **756.00**

E2. Survey Progress:

Description		Cores Left	Area	Total Cores	Cores Prev	Today Cores	Cores To Date	% Completed
Water Quality Profiles				12.00	12.00		12.00	100.00%
Grab Samples				36.00	36.00		36.00	100.00%
Underwater Video Transect		7.00		12.00		5.00	5.00	41.67%
	TOTALS:	7.00	**TOTAL**	60.00	48.00	**5.00**	**53.00**	88.33%

FF. SAFETY (Details & Figures for Vessel and Survey Crews and Client Representatives)

Incidents & Drills	Previous Events	Today's Events	Events To Date
Safety Meeting	1		1
Vessel Safety Induction	5		5
Vessel Safety Drill (MOB, Fire & Abandon Ship)	5		5
Tool Box Talks	97	2	99
Permit to Work			
Safety Observation Card	31	2	33
Hazardous Occurrence Report			
First Aid Case (FAC)			
Medical Treatment Case (MTC)			
Lost Time Incident (LTI)			
No. of survey Man-Hours worked since start of project or LTI.	11988:00	**384:00**	**12372:00**

GG. VESSEL ROB's at 24:00hrs

	Fuel (gal)	Lube Oil (gal)	Water (gal)
ROB at 00:00 hrs			
Consumed Today			
Received today			
ROB at 24:00 hrs			

HH. EXPECTED WEATHER NEXT 24 HRS:

Partly cloudy with rain showers, wind variable direction up to 15 knots

II. ANTICIPATED PROGRAM NEXT 24 HRS:

Weather permitting, complete underwater video transects.

JJ. PARTY CHIEF'S COMMENTS: (Optional)

Of the 11 transects surveyed today, 5 transects (EW-02, 06, 07, 11, 12) have been accepted, while the others (EW-01, 03, 05, 08, 09, 10) have been rejected due to low visibility close to the seabed.

KK. REPRESENTATIVE'S COMMENTS: (Optional)

For ALPINE		For **Equinor Wind US LLC**
V Reale		**Len Wang**
(Survey Party Chief)		(Client Representative)

Vessel:	**Shearwater**	Project No:	**1894**	Date:	**04 May 2021**
Client:	**Equinor Wind US LLC**	Location:	**New York City, U.S.A.**	Report No.	**063**
		Project:	**Empire Wind Gowanus ECR-NY**		

DAILY REPORT

Vessel:	**Shearwater**	Project No:	**1894**
Client:	**Equinor Wind US LLC**	Todays Date:	**05 May 2021**
Location:	**New York City, U.S.A.**	Report No:	**64**
Project:	**Empire Wind Gowanus ECR-NY**	Start Date:	**03 March 2021**

All times are ***EST*** *(GMT -* ***4:00*** *hrs)*

AA. VESSEL LOCATION AT 24:00 HRS:

Description: **Liberty Landing Marina, NJ** Latitude: **40º 42.65** Longitude: **74º 02.64**

BB. WEATHER:

Time (Local)	BAROM mb	WIND Speed mph	WIND Dir	WAVE HEIGHT m	VISIB. nmi	SKY CONDS	REMARKS
00:00		15	ESE	1	<5	cloudy	rain showers
08:00		12	ENE	1.1	<5	cloudy	
16:00		8	ENE	0.9	<5	cloudy	rain
24:00		14	ESE	1	<5	cloudy	rain showers

CC. PERSONNEL & EQUIPMENT:

C1. Alpine OSS Personnel:

Party Chief: V Reale	Surveyor: J Juarez	Surveyor: C Smith	Captain: M Porter	AB: D Davison
Surveyor: S Childers	Surveyor: F Zarzour	Surveyor: S Davies	2nd Captain: R Worley	AB: M Budzinsky
Surveyor: J Cunha			Mate: M Afify	Chef: S Hamilton

C2. Additional Personnel

PSO: K Villegas

PSO: A Vest

C3. Client Personnel:

Client Rep. Len Wang

C4. Personnel On Board:

ALPINE:	5	CLIENT:	1	VESSEL:	6	OTHERS:	4	TOTAL 16

C5. ALPINE'S Equipment:

Environmental Camera Sled	Grab Sampler	AML MVP30		
R2 Sonic MBES 2024	2 Applanix POS MV Ocean Master	CTD caster		
USBL Sonardyne Ranger	2 x C-Nav 3050			

C6. Additional Equipment

C7. Project Variations (include notices of changes of personnel / equipment)

Off Vessel	On Vessel
Personnel:	**Personnel:**
Equipment:	**Equipment:**

DD. DIARY OF EVENTS TODAY:

From	To	hrs	Code	
00:00	6:45	6:45	NoH	Loitering at survey area.
6:45	10:30	3:45	O	Underwater Video transects on EW-04-06-08-09-10.
10:30	16:00	5:30	O	Survey completed, check of data and backups, transiting to port.
16:00	18:45	2:45	M	Vessel at dock in Liberty Landing Marina, demobilization of survey equipment.
18:45	24:00	5:15	NoH	Vessel at dock in Liberty Landing Marina.

EE.	PROJECT DATA:

E1. Time Summary:

Rate	Code		Previous Hours	Today Hours	Total Hours		Percent of Total
Mobilization	M		271:25	2:45	274:10		20.69
Operational	O		251:02	9:15	260:17		19.64
Infill Lines	OI		68:23		68:23		5.16
Additional Lines	OAL						
WXR Stby Port	W		92:30		92:30		6.98
WXR Stby Offshore	WO		12:24		12:24		0.94
Contractor Time	CT		19:36		19:36		1.48
Port Call	PC		40:00		40:00		3.02
Survey Downtime	SD						
Non-Operational (on-hire)	NoH		531:58	12:00	543:58		41.05
Disputed Time	DT						
PSO Downtime	PSO		13:42		13:42		1.03
		TOTAL	1301:00	24:00	1325:00		**100.00%**

Hrs. of Daily Operations 12 **Cumulative Hours Check Value=** 768.00

E2. Survey Progress:

Description		Cores Left	Area	Total Cores	Cores Prev	Today Cores	Cores To Date	% Completed
Water Quality Profiles				12.00	12.00		12.00	100.00%
Grab Samples				36.00	36.00		36.00	100.00%
Underwater Video Transect		7.00		12.00	5.00		5.00	41.67%
	TOTALS:	7.00	**TOTAL**	60.00	53.00		**53.00**	88.33%

FF. SAFETY (Details & Figures for Vessel and Survey Crews and Client Representatives)

Incidents & Drills	Previous Events	Today's Events	Events To Date
Safety Meeting	1		1
Vessel Safety Induction	5		5
Vessel Safety Drill (MOB, Fire & Abandon Ship)	5		5
Tool Box Talks	99	2	101
Permit to Work			
Safety Observation Card	33		33
Hazardous Occurrence Report			
First Aid Case (FAC)			
Medical Treatment Case (MTC)			
Lost Time Incident (LTI)			
No. of survey Man-Hours worked since start of project or LTI.	12372:00	**384:00**	**12756:00**

GG. VESSEL ROB's at 24:00hrs

	Fuel (gal)	Lube Oil (gal)	Water (gal)
ROB at 00:00 hrs			
Consumed Today			
Received today			
ROB at 24:00 hrs			

HH. EXPECTED WEATHER NEXT 24 HRS:

Sunny, variable winds from W - NW

II. ANTICIPATED PROGRAM NEXT 24 HRS:

Demobilization at dock

JJ. PARTY CHIEF'S COMMENTS: (Optional)

Of the 5 transects surveyed today, only 1 transect (EW-06) has been accepted, while the others (EW-04, 08, 09, 10) have been rejected due to low visibility close to the seabed.
The EW-06 transect has been rerun due to poor visibility on the second half of previous recorded video.

KK. REPRESENTATIVE'S COMMENTS: (Optional)

For ALPINE		For **Equinor Wind US LLC**
V Reale		**Len Wang**
(Survey Party Chief)		(Client Representative)

Vessel:	**Shearwater**	Project No:	**1894**	Date:	**05 May 2021**
Client:	**Equinor Wind US LLC**	Location:	**New York City, U.S.A.**	Report No.	**064**
		Project:	**Empire Wind Gowanus ECR-NY**		

DAILY REPORT

Vessel:	**Shearwater**	Project No:	**1894**
Client:	**Equinor Wind US LLC**	Todays Date:	**06 May 2021**
Location:	**New York City, U.S.A.**	Report No:	**65**
Project:	**Empire Wind Gowanus ECR-NY**	Start Date:	**03 March 2021**

All times are ***EST*** *(GMT -* ***4:00*** *hrs)*

AA. VESSEL LOCATION AT 24:00 HRS:

Description: **Liberty Landing Marina, NJ** Latitude: **40º 42.65** Longitude: **74º 02.64**

BB. WEATHER:

Time (Local)	BAROM mb	WIND Speed mph	WIND Dir	WAVE HEIGHT m	VISIB. nmi	SKY CONDS	REMARKS
00:00		15	WNW	1	<5	cloudy	
08:00		15	WNW	0.9	>5	clear	
16:00							
24:00							

CC. PERSONNEL & EQUIPMENT:

C1. Alpine OSS Personnel:

Party Chief: V Reale	Surveyor: J Juarez	Surveyor: C Smith	Captain: M Porter	AB: D Davison
Surveyor: S Childers	Surveyor: F Zarzour	Surveyor: S Davies	2nd Captain: R Worley	AB: M Budzinsky
Surveyor: J Cunha			Mate: M Afify	Chef: S Hamilton

C2. Additional Personnel

PSO: K Villegas

PSO: A Vest

C3. Client Personnel:

Client Rep. Len Wang

C4. Personnel On Board:

ALPINE:	5	CLIENT:	1	VESSEL:	6	OTHERS:	4	TOTAL 16

C5. ALPINE'S Equipment:

Environmental Camera Sled	Grab Sampler	AML MVP30		
R2 Sonic MBES 2024	2 Applanix POS MV Ocean Master	CTD caster		
USBL Sonardyne Ranger	2 x C-Nav 3050			

C6. Additional Equipment

C7. Project Variations (include notices of changes of personnel / equipment)

Off Vessel	On Vessel
Personnel:	**Personnel:**
Equipment:	**Equipment:**

DD. DIARY OF EVENTS TODAY:

From	To	hrs	Code	
00:00	7:00	7:00	NoH	Vessel at dock in Liberty Landing Marina.
7:00	15:00	8:00	M	Vessel at dock, demobilization of survey equipment and personnel

EE.	PROJECT DATA:

E1. Time Summary:

Rate	Code		Previous Hours	Today Hours	Total Hours		Percent of Total
Mobilization	M		274:10	8:00	282:10		21.06
Operational	O		260:17		260:17		19.42
Infill Lines	OI		68:23		68:23		5.10
Additional Lines	OAL						
WXR Stby Port	W		92:30		92:30		6.90
WXR Stby Offshore	WO		12:24		12:24		0.93
Contractor Time	CT		19:36		19:36		1.46
Port Call	PC		40:00		40:00		2.99
Survey Downtime	SD						
Non-Operational (on-hire)	NoH		543:58	7:00	550:58		41.12
Disputed Time	DT						
PSO Downtime	PSO		13:42		13:42		1.02
		TOTAL	1325:00	15:00	1340:00		**100.00%**

Hrs. of Daily Operations 12 **Cumulative Hours Check Value=** **780.00**

E2. Survey Progress:

Description		Cores Left	Area	Total Cores	Cores Prev	Today Cores	Cores To Date	% Completed
Water Quality Profiles				12.00	12.00		12.00	100.00%
Grab Samples				36.00	36.00		36.00	100.00%
Underwater Video Transect		7.00		12.00	5.00		5.00	41.67%
	TOTALS:	7.00	**TOTAL**	60.00	53.00		**53.00**	88.33%

FF. SAFETY (Details & Figures for Vessel and Survey Crews and Client Representatives)

Incidents & Drills	Previous Events	Today's Events	Events To Date
Safety Meeting	1		1
Vessel Safety Induction	5		5
Vessel Safety Drill (MOB, Fire & Abandon Ship)	5		5
Tool Box Talks	101	1	102
Permit to Work			
Safety Observation Card	33		33
Hazardous Occurrence Report			
First Aid Case (FAC)			
Medical Treatment Case (MTC)			
Lost Time Incident (LTI)			
No. of survey Man-Hours worked since start of project or LTI.	12756:00	**240:00**	**12996:00**

GG. VESSEL ROB's at 24:00hrs

	Fuel (gal)	Lube Oil (gal)	Water (gal)
ROB at 00:00 hrs			
Consumed Today			
Received today			
ROB at 24:00 hrs			

HH. EXPECTED WEATHER NEXT 24 HRS:

II. ANTICIPATED PROGRAM NEXT 24 HRS:

JJ. PARTY CHIEF'S COMMENTS: (Optional)

KK. REPRESENTATIVE'S COMMENTS: (Optional)

Survey activities completed and demobilization authorized.

For ALPINE		For **Equinor Wind US LLC**
V Reale		**Len Wang**
(Survey Party Chief)		(Client Representative)

Vessel:	**Shearwater**	Project No:	**1894**	Date:	**06 May 2021**
Client:	**Equinor Wind US LLC**	Location:	**New York City, U.S.A.**	Report No.	**065**
		Project:	**Empire Wind Gowanus ECR-NY**		

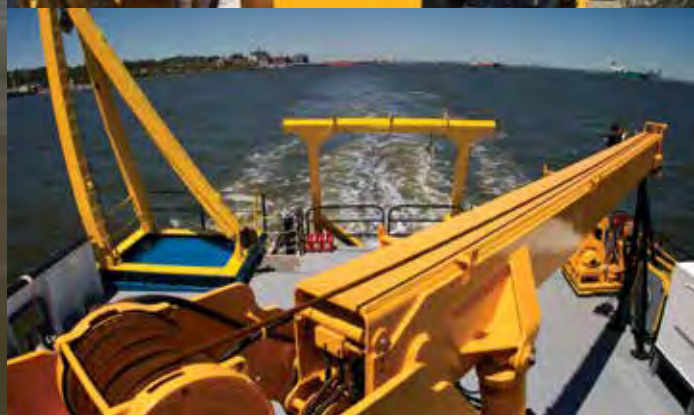
APPENDIX B VESSEL & EQUIPMENT SPECIFICATIONS

Alpine

R/V Shearwater

Multi-role Survey Vessel

R/V Shearwater – Multi-role Survey Vessel



R/V Shearwater combines superior stability and maneuverability with state-of-the art research facilities to provide a flexible, multipurpose platform for marine surveying. The vessel fills the gap between small coastal and large offshore survey platforms providing a cost effective solution for many applications. In addition, the Shearwater allows for a single vessel to complete different tasks, such as geophysical, environmental, and geotechnical surveys, thereby affording our clients the opportunity to save both time and money.

The Shearwater is designed to be flexible enabling it to provide efficient and effective configurations for the completion of its missions. The 110' x 39' aluminium trimaran boasts a hydraulic azimuth drive propulsion system which is fuel efficient while providing superior positioning and line-keeping performance (handling is further enhanced by a 100 HP Bow Thruster). In most instances, this allows the vessel to hold station without resorting to anchoring. The Shearwater also features a large back deck, two equipment moon-pools, a crane, hydraulic stern A-frame, fixed starboard A-frame, dedicated equipment winches, laboratory and office space with onboard data processing capabilities, and accommodation for up to 20 people on a 24-hour basis.

A professional crew, with extensive experience in offshore survey and construction operations, allows clients to take advantage of the full list of impressive capabilities the Shearwater can bring to a project.

R/V SHEARWATER HAS BEEN DESIGNED TO SUPPORT THE FOLLOWING KEY AREAS:

- Offshore Structure Surveys (Wind, Oil & Gas, Hydrokinetic)
- Cable and Pipeline Route Surveys
- Marine Aggregate and Mineral Surveys
- Environmental Surveys
- Oceanographic Instrument Deployment and Recovery
- Port and Breakwater Development Surveys
- ROV, AUV and Diver Support
- Offshore Construction Support and Monitoring Surveys

Vessel Details

Name: Shearwater
Type: Multi-Role Survey
Year of Build: 1981
Reconfigured, Refit and Repowered: 2011

Dimensions

Length: 110'
Beam: 39'
Draft: 9'
GRT: 198
NRT: 175
Aft Deck: 1175 sq. ft with separate stern rescue deck

Accommodation

Berths: 20 including crew
Survey Lab: 127 sq ft
Processing Office: 72 sq ft

Propulsion and Machinery

Main Engines: 2 x 526 HP John Deere Model 6125AFM
Propulsion: 2 x Hydraulically driven "Z" Drives (raise/lower/tilt with 360 degree steering)
Bow Thruster: Thrustmaster 100 HP
Generators: 2 x John Deere Model 6081AFM/Marathon (Magna Plus) 135 Kw

Capacities

Desalination System: Up to 900 gallons/day
Fresh Water Storage: 5000 gallons
Fuel Storage: 13800 gallons
Septic: Zero discharge with 2000 gallon holding tank
Endurance: 21 days

Fuel Consumption

Survey 24hrs: 300 gallons/day
Steaming: 500-600 gallons/day
Standby at Sea: 70-100 gallons/day

Navigation

Radar: Furuno 1944C/NT Furuno 1935
Charting System: Garmin 5208 GPS with Chart Plot
Auto Pilot: COMNAV
Echosounders: Furuno FCV 620 – color in each hull
AIS: Furuno FA 150
Navtex: Furuno NX700
Survey GPS, Heading and IMU: Applanix POS MV
Acoustic Positioning: Moon Pool mounted USBL

Communication

VHF: 2 x Icom IC-M504
SSB: SEA 245 HF/SSB
SART: Sevenstar Electronics S.701
Satellite (Phone/Data): Intellian v80G VSAT

Equipment Handling

Equipment Moon Pools: Port and Starboard 3 foot diameter moon pools
Hydraulic Stern A-Frame: 2 Ton Capacity Can operate as two separate davits
Fixed Starboard A-Frame: 5 Ton Capacity
Crane: 14 Ton Maximum Capacity 5 Ton w/ single part line 2 Ton at 40' Extension.
Geotechnical Winch: 5 Ton Capacity
Survey Equipment Winch: 2500m (11mm diam.) Capacity

Survey Capabilities

Hydrography and Geophysics

Multibeam and Single Beam Echosounders
Side Scan Sonars
Subbottom Profilers
Boomers
Sparkers
Mini Air Gun
Multi-Channel Streamers
Magnetometers and Gradiometers

Benthic and Oceanographic

CTD and SVPs
Water Sampling Systems
Turbidity Monitoring Systems
Benthic Grabs
Box Corers
Drop Down Cameras

Geotechnical

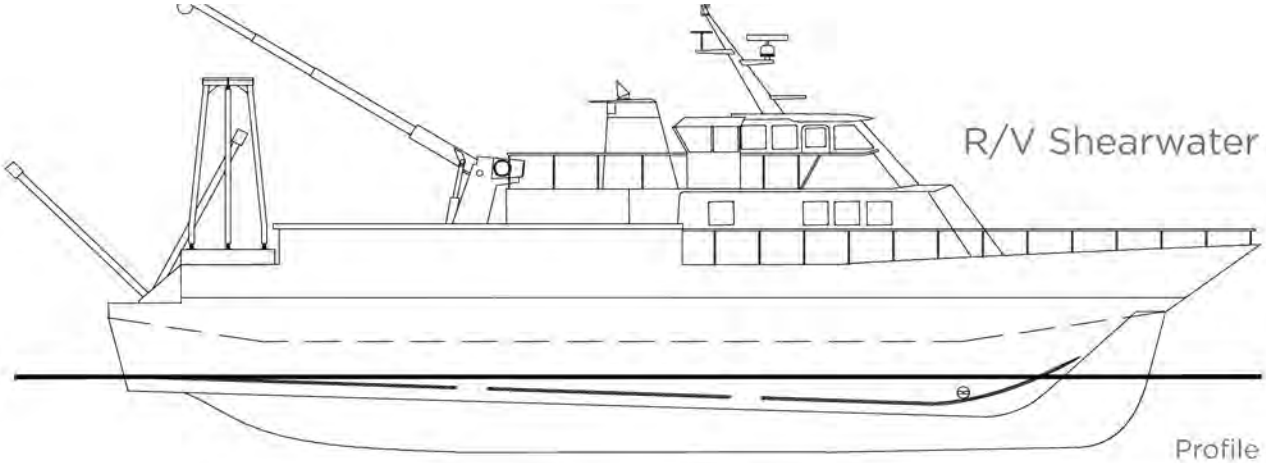
10 to 30' Pneumatic and Electric Vibracores
Mini-CPTs
Piston Corers
Drop Corers
Grab Samplers

Other

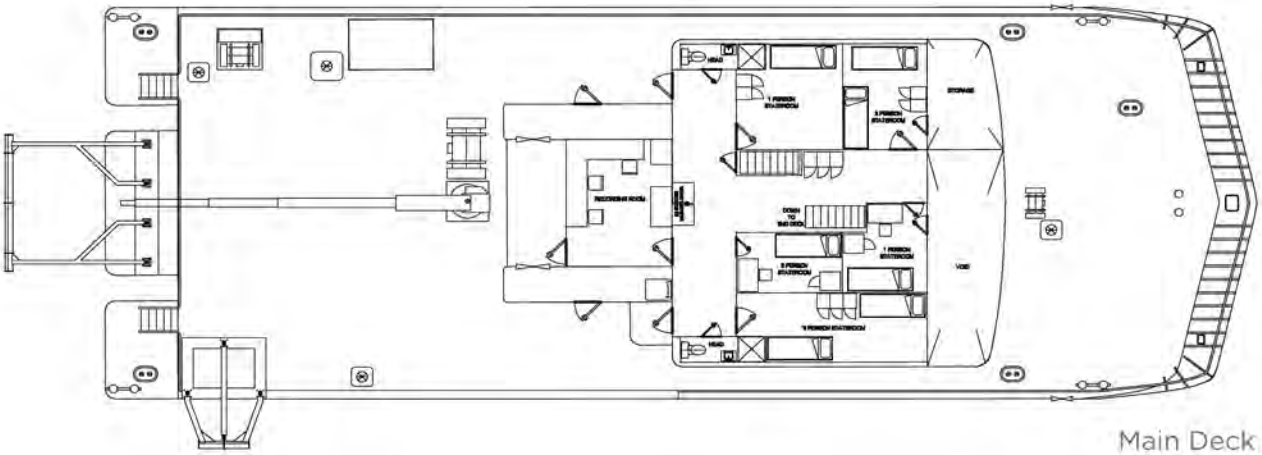
Deployment and Retrieval of Inspection Class ROVs and Compact AUVs

Dive Platform Capable

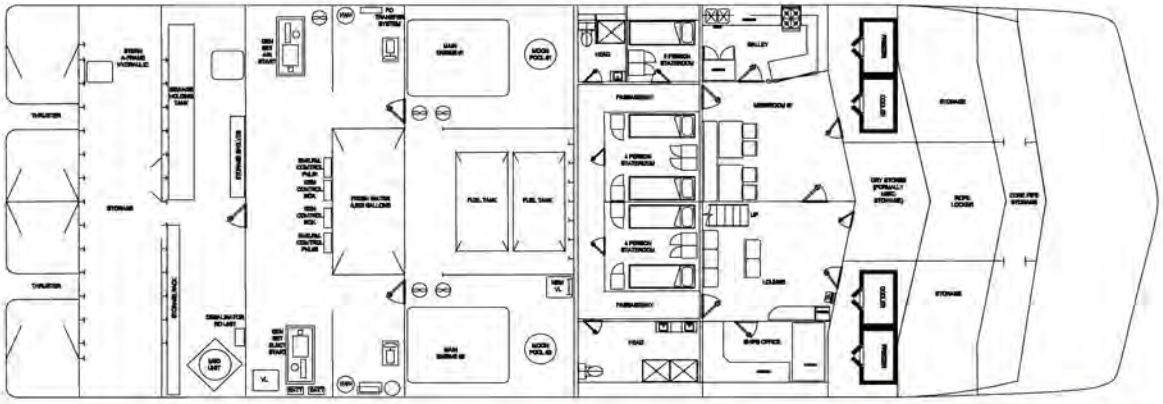
Permanently Installed Networked Server



Profile



Main Deck



Below Main Deck

Alpine Ocean Seismic Survey, Inc.
155 Hudson Avenue, Norwood, New Jersey 07648 USA
Tel: 1-201-768-8000
Email: info@alpineocean.com

www.alpineocean.com

MAXIMIZE YOUR ROI WITH POS MV OCEANMASTER

POS MV OceanMaster is a user-friendly, turnkey system designed and built to provide accurate attitude, heading, heave, position, and velocity data of your marine vessel and onboard sensors. POS MV is proven in all conditions, and is the georeferencing and motion compensation solution of choice for the hydrographic professional.

POS MV blends GNSS data with angular rate and acceleration data from an IMU and heading from the GPS Azimuth Measurement System (GAMS) to produce a robust and accurate full six degrees-of-freedom position and orientation solution.

PERFORMANCE SUMMARY - POS MV OCEANMASTER ACCURACY[1]

	DGPS	Fugro Marinestar®	IARTK	POSPac MMS PPP	POSPac MMS IAPPK	Accuracy During GNSS Outage (60 s total)
Position	0.5 - 2 m[2]	Horizontal: 10 cm 95% Vertical: 15 cm 95%	Horizontal: +/- (8 mm + 1 ppm x baseline length)[3] Vertical: +/- (15 mm + 1 ppm x baseline length)[3]	Horizontal: < 0.1 m Vertical: < 0.2 m	Horizontal: +/- (8 mm + 1 ppm x baseline length)[3] Vertical: +/- (15 mm + 1 ppm x baseline length)[3]	~ 6 m (DGPS) ~ 3 m (RTK) ~ 2 m (PPDGNSS) ~ 1 m (IAPPK)
Roll & Pitch[4]	0.02°	0.01°	0.01°	<0.01°	0.008°	0.03°
Heading[4]	0.01° (4 m baseline) 0.02° (2 m baseline)	0.01° (4 m baseline) 0.02° (2 m baseline)	0.01° (4 m baseline) 0.02° (2 m baseline)	0.01° (4 m baseline) 0.02° (2 m baseline)	0.01° (4 m baseline) 0.02° (2 m baseline)	1° per hour degradation (negligible for outages <60 s)
Heave TrueHeave™	5 cm or 5%[5] 2 cm or 2%[6]	5 cm or 5%[5] 2 cm or 2%[6]	5 cm or 5%[5] 2 cm or 2%[6]	-	-	5 cm or 5%[5] 2 cm or 2%[6]

PCS OPTIONS

COMPONENT	DIMENSIONS	WEIGHT	TEMPERATURE	HUMIDITY	POWER
Rack Mount PCS	L = 442mm, W = 356mm, H =46mm	3.9 kg	-20 °C to +70 °C	10 - 80% RH	AC 120/230 V, 50/60 Hz, auto-switching
Small Form Factor PCS	L = 167mm, W = 185mm, H = 68mm	2.5 kg	-20 °C to +60 °C	0- 100% RH	DC 10-34 V, 35 W (peak)

INERTIAL MEASUREMENT UNIT (IMU)

ENCLOSURE	DIMENSIONS	WEIGHT	TEMPERATURE	IP RATING
Between Decks	L = 158 mm, W = 158 mm, H = 124 mm	2.5 kg	-40 °C to +60 °C	IP65
Submersible	Ø100 mm X 104 mm[7] (base plate Ø132 mm)	2.7 kg	-40 °C to +60 °C	IP68

GLOBAL NAVIGATION SATELLITE SYSTEM (GNSS)

COMPONENT	DIMENSIONS	WEIGHT	TEMPERATURE	HUMIDITY
GNSS Antenna	Ø178 mm, W = 73 mm	0.45 kg	-50 °C to +70 °C	0-100% RH

[1] 1 sigma unless otherwise stated
[2] Depending on quality of differential corrections
[3] Assumes 1 m IMU-GNSS antenna offset
[4] No range limit
[5] Whichever is greater, for periods of 20 seconds or less
[6] Whichever is greater, for periods of 35 seconds or less
[7] Height excludes connector

1. ETHERNET INPUT OUTPUT

Ethernet	(10/100 base-T)
Parameters	Time tag, status, position, attitude, heave, velocity, track and speed, dynamics, performance metrics, raw IMU data, raw GNSS data
Display Port	Low rate (1 Hz) UDP protocol output
Control Port	TCP/IP input for system commands
Primary Port	Real-time (up to 200 Hz) UDP protocol output
Secondary Port	Buffered TCP/IP protocol output for data logging to external device

2. SERIAL RS232 INPUT OUTPUT

5 COM Ports	User assignable to: NMEA output (0-5), Binary output (0-5), Auxiliary GNSS input (0-2), Base GNSS correction input (0-2)

3. NMEA ASCII OUTPUT

Parameters	NMEA Standard ASCII messages: Position ($INGGA), Heading ($INHDT), Track and Speed ($INVTG), Statistics ($INGST), Attitude ($PASHR, $PRDID), Time and Date ($INZDA, $UTC)
Rate	Up to 50 Hz (user selectable)
Configuration	Output selections and rate individually configurable on each assigned com port

4. HIGH RATE ATTITUDE OUTPUT

Parameters	User selectable binary messages: attitude, heading, speed
Rate	Up to 200 Hz (user selectable)
Configuration	Output selections and rate individually configurable on each assigned com port

5. AUXILIARY GNSS INPUTS

Parameters	NMEA Standard ASCII messages: $GPGGA, $GPGST, $GPGSA, $GPGSV Uses Aux input with best quality
Rate	1 Hz

6. BASE GNSS CORRECTION INPUTS

Parameters	RTCM V2.x, RTCM V3.x, CMR and CMR+, CMRx input formats accepted. Combined with raw GNSS observables in navigation solution
Rate	1 Hz

7. DIGITAL I/O

1PPS	1 pulse-per-second Time Sync output, normally high, active low pulse
Event Input (2)	Time mark of external events. TTL pulses > 1 msec width, rising or falling edge, max rate 200 Hz

8. USER SUPPLIED EQUIPMENT

PC for POS Controller and Operator Client Software

- Atom 1.6 GHz or equivalent (minimum)
- Intel Graphics media accelerator 500 or equivalent (minimum)
- 2 GB RAM, 32 GB HDD (minimum)
- Ethernet adapter (RJ45 100 base T), USB Port
- Windows 7

PC for Mission Planning and optional POSPac Post-processing

- Pentium 4 (32 bits) at 2 GHz or equivalent (recommended min)
- 1 GB RAM, 100 GB Free disk space (recommended minimum)
- 2 X USB 2.0 ports for security keys
- Internet Access (for installation, DEM download, optional SmartBase processing)
- Windows 7

Scan the QR Code on your mobile device to access information on POS MV.

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applanix™ A TRIMBLE COMPANY

capture everything. precisely.

C-Nav™

oceaneering.com/cnav

C-Nav3050®

GNSS Receiver

FEATURES

- **Integrated GNSS/L-Band receiver**
- **Patented multipath rejection**
- **Software configurable to user requirements**

Connecting What's Needed with What's Next™

OCEANEERING®

C-Nav3050®

Technical Specifications

Features

- All-in-view parallel tracking with 66-channels
- Satellite-based augmentation system (SBAS) tracking (WAAS / EGNOS / MSAS / GAGAN)
- Built-in C-NavC1® and C-NavC2® L-Band receiver
- C-NavC2® operating mode with automatic fail-safe to C-NavC1®
- C/A, P1, P2, L2C, L5, G1, and G2 code tracking
- L1, L2, L5, G1 and G2 full wavelength carrier phase tracking
- C-Nav corrections over Internet
- High-sensitivity / low-signal level tracking
- Fast signal acquisition / re-acquisition
- Superior interference suppression (both in- and out-of-band) using custom tuned antennas
- Patented multipath rejection
- RTK Extend™
- C-Nav over-the-air activation capabilities
- Configurable as real time kinematic (RTK) base or rover
- Programmable output rates
- Event marker input / 1 pulse-per-second (PPS) output
- 2GB internal data storage
- C-Setup PC control software included

For more information: **oceaneering.com/cnav**

Dimensions/weight	
Length	6.47 in / 164 mm
Width	4.60 in / 117 mm
Height	2.37 in / 60 mm
Weight	1.1 lb / 0.5 kg

Front status indication
Power/GNSS Status, correction service status, interface status, and Bluetooth status

External power	
Input	AC / DC Adapter 110 / 220 VAC 12 VDC Nominal 0.5A (9.0 V to 32 VDC)

Connectors	
I/O ports	2 x 9 pin Positronic
DC ports	1 x 9 pin Positronic
RF connector	TNC (with 5VDC bias for antenna / LNA)

Temperature (ambient)	
Operating	-40°F to 158°F / -40°C to 70°C
Humidity	95% non-condensing

Accuracy (RMS) horizontal/vertical	
RTK (<40km)	1 cm + 0.5ppm / 2cm + 1ppm
C-Nav services (95%)	8 cm / 15 cm
Code DGNSS (<200 km)	40 cm + 3 ppm / 90 cm + 3 ppm
Velocity	0.01 ms
RTK extend (<15 mins)	3 cm + 1 ppm / 6 cm + 2 ppm

User programmable output rate	
Position/velocity/time	1, 5, 10, 25, 50, or 100 Hz
Raw data	1, 5, 10, 25, 50, or 100 Hz

Data latency	
Position/velocity/time	10 ms at all rates
Raw data	10 ms at all rates

Time-to-first-fix	
Cold/warm/hot	< 60 s / < 50 s / < 20 s (Typical values measured per ION-STD 101)

I/O connector assignments	
Data interfaces	2 x RS232 (1-changeable to RS422, 4800 -115200 baud rates) 1 x USB 2.0 (host or device) Bluetooth Ethernet (10T / 100T)

Input/output data messages	
NMEA-0183	ALM, GBS, GGA, GLL, GRS, GSA, GST, GSV, RMC, RRE, VTG, ZDA, GFA, DTM, GNS, MLA
Differential correction	RTCM 2.3 and 3.0, SBAS and C-Nav (proprietary)
RTK connection	CMR / CMR+, RTCM, NavCom Ultra RTK
Receiver control	NavCom proprietary commands (ASCII)

Compliance/Approvals
IMO performance standard for GPS: IEC 60529
IMO performance standard for GNSS: IEC 61108-1:2003
NMEA-0183 compatibility up to V4.1
FCC Part 15 Class B, CE
QC message strings comply with the recommendations in OGP 373-19 and IMCA S015 (July 2011)

MBRTK - Range and Bearing Option
High-accuracy range and bearing data between vessels
Multiple rovers can use a common base
RTK levels of accuracy for range, irrespective of differential correctors
Converter available to emulate a fanbeam output
Heading accuracy (degrees at 1 sigma) + 0.6 / baseline length in meters
Baseline horizontal accuracy + 1 cm + 1 ppm
MBRTK NMEA-0183 Outputs: HDT, TTM, ROT

OCEANEERING®

The **Moving Vessel Profiler™ (MVP)** is a multi-purpose instrument for aiding in the collection of both shallow and deep water data sets. The MVP's primary function is to allow accurate data collection **without the need to stop the vessel**.

The system includes a computer-controlled *smart winch and deployment system* that allows the free fall fish to be deployed while the vessel is underway. The system is completely autonomous and can be controlled by computer without the requirement for personnel on deck. This serves the purpose of extending operations by not relying on deck crew after normal working hours and also through the expanded *environmental* operating envelope.

The system was originally adapted to collect Sound Velocity (SV) data for shallow water (100m) hydrographic operations. The data was used to calibrate **multibeam sonar data** for the Canadian Hydrographic Service.

The Free Fall Fish designed for use with the MVP system can carry a variety of sensor packages. Each fish is specifically designed to work with an MVP system to obtain that system's maximum operating depth. The Free Fall Fish come in single- and multi-sensor models. Sensors that have been used with the MVP system to date include Sound Velocity, CTD, Laser Optical Particle Counter (LOPC) and fluorometer. Please note that not all models of free fall fish are compatible with all models of the Moving Vessel Profiler.

There are currently five configurations of the Moving Vessel Profiler in use: the MVP200™, the MVP300™, the smallest system, the MVP30™, the MVP30-350 (a variant of the MVP30) and the MVP800™. Each system is designed to collect data to a certain depth and ship speed. The largest model in the MVP line, the MVP800™, is capable of deploying the sensor-equipped towfish to a depth of

800 metres at a ship speed of 12 knots.See the chart below for detailed specifications on each of these systems.

The following shows the major components of the MVP system. The computer controls the winch using parameters set by the operator, the depth signals sent back by the free fall fish and (if the vessel is equipped with one) readings sent to the MVP controller by the ship's depth sounder. The data is collected in real time from the fish and recorded by the computer in a format that can be presented graphically. *Click on the various parts of the graphic to view larger images.*

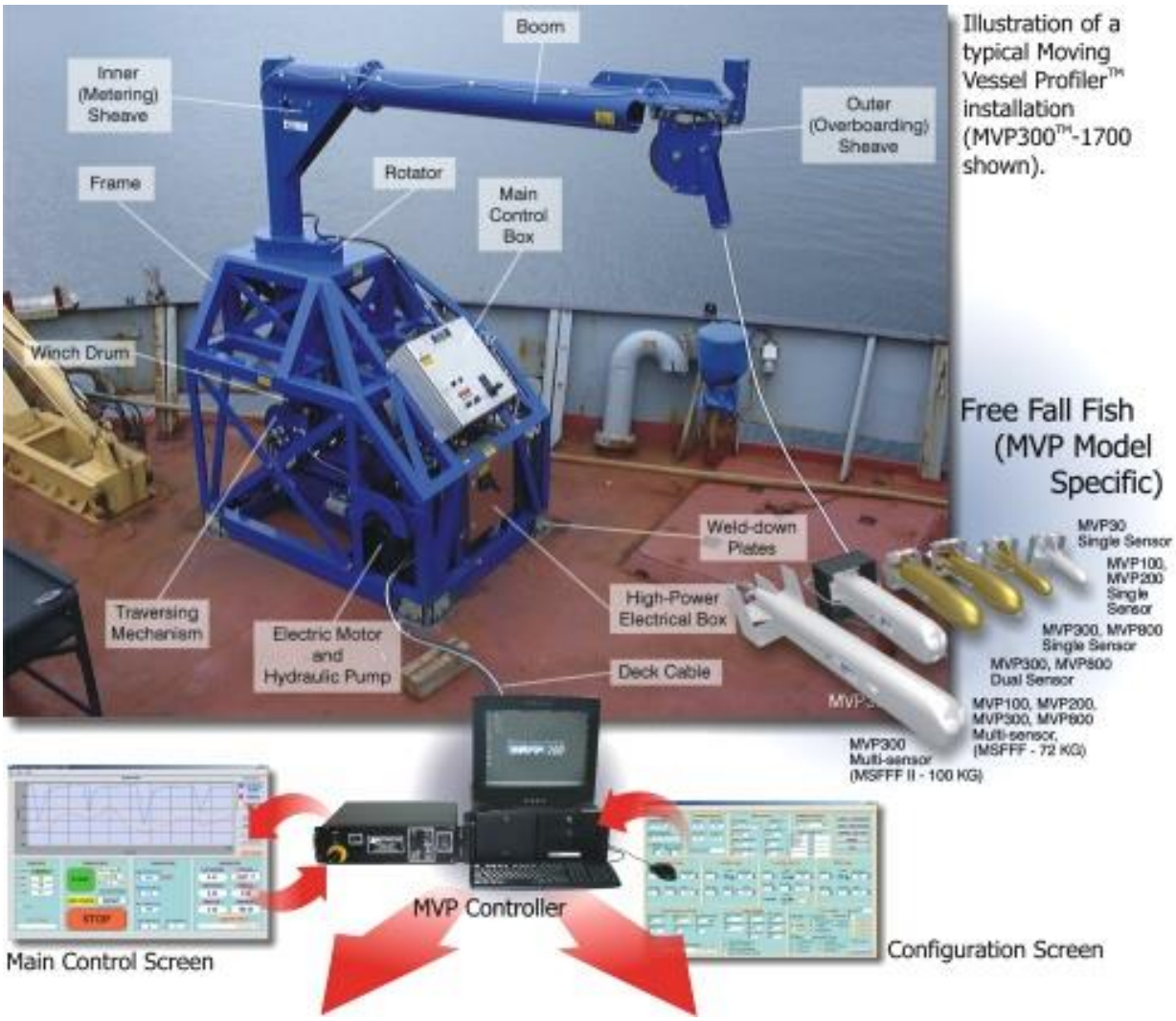


Illustration of a typical Moving Vessel Profiler™ installation (MVP300™-1700 shown).

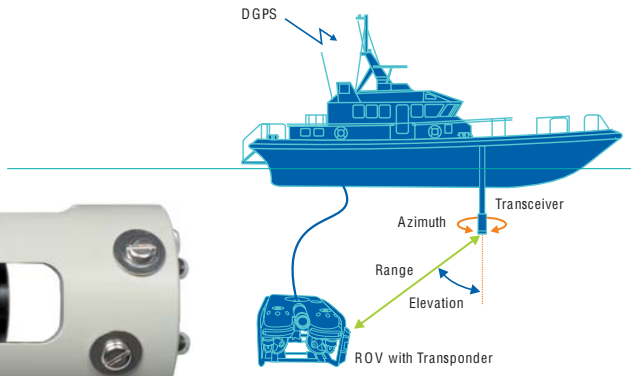
Free Fall Fish (MVP Model Specific)

Scout USBL
Subsea Positioning System

ROV and Towfish Installation
Coastal transponders are compact and rugged and can be installed directly onto ROVs or small towfish attached to the umbilical

Lightweight Release Transponder
The LRT is a versatile acoustic release transponder with a Safe Working Load (SWL) of 125kg

USBL Positioning
The Scout USBL system calculates the position of a target by measuring the range and bearing of a transponder from the vessel



Introduction

Scout USBL is a complete vessel based subsea positioning system for divers, ROVs and towfish.

Scout calculates the position of a subsea target by measuring the range and bearing from a vessel mounted transceiver to a small acoustic transponder fitted to the target; a technique known as Ultra-Short BaseLine (USBL) positioning. USBL positioning is widely used by the offshore and oceanographic industries as it offers high accuracy performance combined with ease of operation.

One of the main advantages of the technique is that no other in-water acoustic equipment has to be deployed before underwater operations can commence. Only the targets being tracked need to be equipped with a transponder. With Scout, a support boat can arrive on location and begin tracking straight away. This has particular benefits for search and salvage applications when search times are critical.

Key Features

- Easy to install and use
- Affordable and high accuracy
- All sensors, software and hardware provided
- 1,000 metre design slant range
- Upgrade path to deep water USBL systems

Scout, Scout Plus and Scout Pro

Three versions of Scout are available: Scout, Scout Plus and Scout Pro.

Scout and Scout Plus are entry level systems designed for general target tracking applications at ranges up to 500 metres. Scout can track one surface vessel and four subsea targets whilst Scout Plus can track six targets and incorporates a responder mode for fast position updates of ROVs and towfish. With both systems, all sensors and hardware are provided whilst the software is simple to learn and intuitive to use. These features make Scout and Scout Plus the ideal solution for users with little or no prior experience of acoustic systems.

Scout Pro is designed to support complex contruction survey applications through its fully featured software. It provides greater accuracy, tracking for up to 10 subsea targets and a 1,000 metre design slant range.

The advanced topside control hardware supplied with Scout Pro systems enables experienced users to operate using Sonardyne's latest Wideband signalling technology and its associated benefits that include greater immunity to noise and a ten fold improvement in measurement repeatability.

This same topside unit can also be used with Sonardyne Ranger USBL, Fusion USBL and Fusion Long BaseLine (LBL) equipment therefore providing a cost effective and versatile upgrade solution for full ocean depth subsea operations.

Scout USBL
System Overview

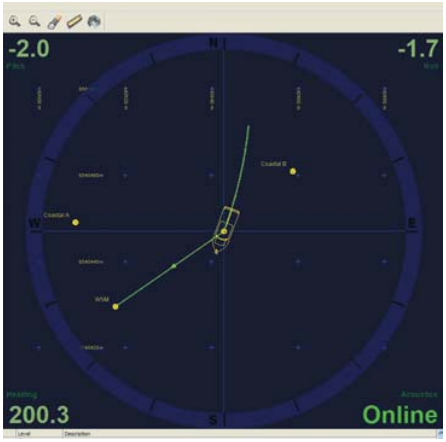
Scout Software Display
Scout's 'Simple' UI software is easy and intuitive to use and requires minimal user training

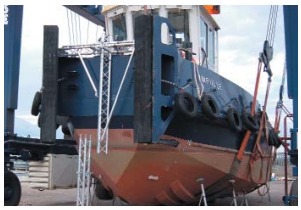
Scout Transceiver
Scout transceivers are small, easy to deploy and incorprate an internal heading, ptich and roll sensor

Surface Interface Unit
The SIU provides power and communications to the transceiver

Surface Command Unit
The SCU is a self contained PC, display and interface unit for operating Scout and Scout Plus from any type of vessel

Transceiver Deployment
For temporary vessel installations, a dedicated lightweight deployment pole is available from Sonardyne





System Overview
A Scout USBL system is comprised of four main components: control software, vessel based interface unit, acoustic transceiver and transponders.

Software
Scout and Scout Plus software is easy to use and intuitive to operate. It is designed to appeal to users who wish to arrive on location and begin tracking a target immediately.

Scout Pro software shares a common look and feel with Sonardyne's Fusion and Ranger systems and offers users a complete range of survey tools. These include: chart backdrops, industry standard output telegrams and configurable sensor displays.

Interface Unit
As standard, Scout and Scout Plus systems are supplied with a rack-mountable Surface Interface Unit (SIU) that supplies power and communications to the transceiver and is connected to the user's own computer via a serial or USB link.

For complete portability, the optional Surface Command Unit (SCU) enables Scout and Scout Plus to be operated from almost any size of boat. It comprises a PC, high brightness TFT display, sensor interface and rechargeable battery incorporated in an splashproof case.

Scout Pro systems are supplied with a Navigation Controller Unit (NCU). In addition to accurately time stamping incoming data from external devices such as GPS, Gyro and VRU's, the NCU also provides power and communications for the vessel's USBL transceiver.

Transceiver
The Scout transceiver provides a hemispherical pattern of acoustic coverage enabling tracking of targets from far below through to near surface. For this reason, it is suitable for a wide variety of tasks such as towfish tracking.

The compact design of the transceiver makes it easy to install on a simple over-the-side mount or through a gate valve. Sonardyne can supply an easy-to-assemble pole, complete with fittings and advice on installation, if required. Options include a water block protection device and tilted transducer array.

To simplify set-up, an integrated motion sensor automatically compensates for the dynamic motion of the vessel. For higher accuracy applications, external reference sensors can be used with Scout Plus and Scout Pro.

Transponders
Scout USBL is compatible with the Sonardyne's family of low cost HF frequency transponders. Scout Plus and Scout Pro both offer additional compability with the advanced Wideband Sub-Mini (WSM) transponder.

All transponders have been designed for applications where size and weight are important operational factors, such as installation on the back of a diver or ROV. For more information on transponders, turn to Pages 14 and 15.

Scout USBL
System Specifications

System Performance

General	
Design slant Range	500 metres (Scout, Scout Plus) 1,000 metres (Scout Pro)
Acoustic Coverage	±90° below transceiver
Accuracy	±2.75% of Slant Range (With internal Heading and Attitude sensor) ±0.5% of Slant Range (With external VRU and Gyro)
Tracking	Supports tracking of one surface vessel and multiple subsea targets

Transceiver

Type Number	8024
Operating Frequency	Sonardyne HF (35-55kHz)
Sensors	Heading and Attitude
Options	Tilted Array
Deployment Method	Through-hull or Over-the-Side
Mechanical Construction	Aluminium Bronze, Powder Coated
Dimensions – Without Guard (LxDia)	489mm (19.25") x 160mm (6.3")
Weight in Air	18.9kg
Weight in Water	8.9kg

Surface Command Unit (SCU)

Type Number	8039
Processor	Pentium M
Operating System	Windows XP Professional
RAM	512Mb
Hard Disk	40Gb
Ports (Front Panel)	4 x Serial Ports, 1 x USB 2.0
External Inputs	Transceiver, Responder Trigger, GPS Antenna (Optional)
Battery	Internal Li-Ion (UN Transport Approved)
Typical Battery Life	1-2 hours
Power Supply	12-16V DC
Display Panel	12.1" TFT, 1024 x 768
IP Rating	IP65
Dimensions (LxWxH)	444.5mm (17.5") x 305mm (12") x 178mm (7")
Weight	10kg

Surface Interface Unit (SIU)

Type Number	8038
Ports	4 x Serial Ports, 1 x USB 2.0
External Inputs	Transceiver, Power, Responder Trigger
Power Supply	110 / 230V AC
Dimensions (LxWxH)	432mm (17") x 305mm (12") x 51mm (2")
Weight	3kg

Navigation Controller Unit (NCU)

See separate datasheet for full specifications

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Datasheet

Wideband Sub-Mini Transponder/Responder (WSM)

Description

Sonardyne's family of Wideband Sub-Minis (WSM) are a versatile range of USBL transponder/ responders designed for positioning ROVs, towfish and other mobile targets in water depths up to 4,000 metres.

Compact and rugged, WSMs incorporate the latest Sonardyne Wideband® signal technology which offers superior ranging accuracy, operation in a mulit-user, multi-vessel environment and fast USBL position updates.

In addition to supporting new Sonardyne Wideband® signals, WSMs also support traditional Sonardyne tone and HPR 300 and HiPAP® channels. A link allows the WSM to be configured for use with all of the popular MF frequency acoustic navigation systems.

The Type 8071 WSM is equipped with an omni-directional transducer and is depth rated to 1,000 metres making it suitable for a wide ranger of general USBL tracking application.

The Type 8070 WSM is a 4,000 metre rated unit and features a high-power directional transducer with an acoustic output comparable to Sonardyne's most powerful full size seabed transponders.

Both types of WSM have a depth sensor fitted as standard to aid USBL positioning accuracy and an external On/Off switch for ease of use and storage when not in use.

Key Features

- Choice of 1,000 Metre or 4,000 Metre depth rating
- Choice of Omni-Directional or Directional beamshape with class leading acoustic power output
- Channel selection via serial data port by PC
- Transponder or Responder operating modes
- Depth sensor for improved USBL positioning performance
- Long-life NiMH battery
- Compact and rugged design
- Windows based software for test and setup
- External On/Off switch for ease of use and storage

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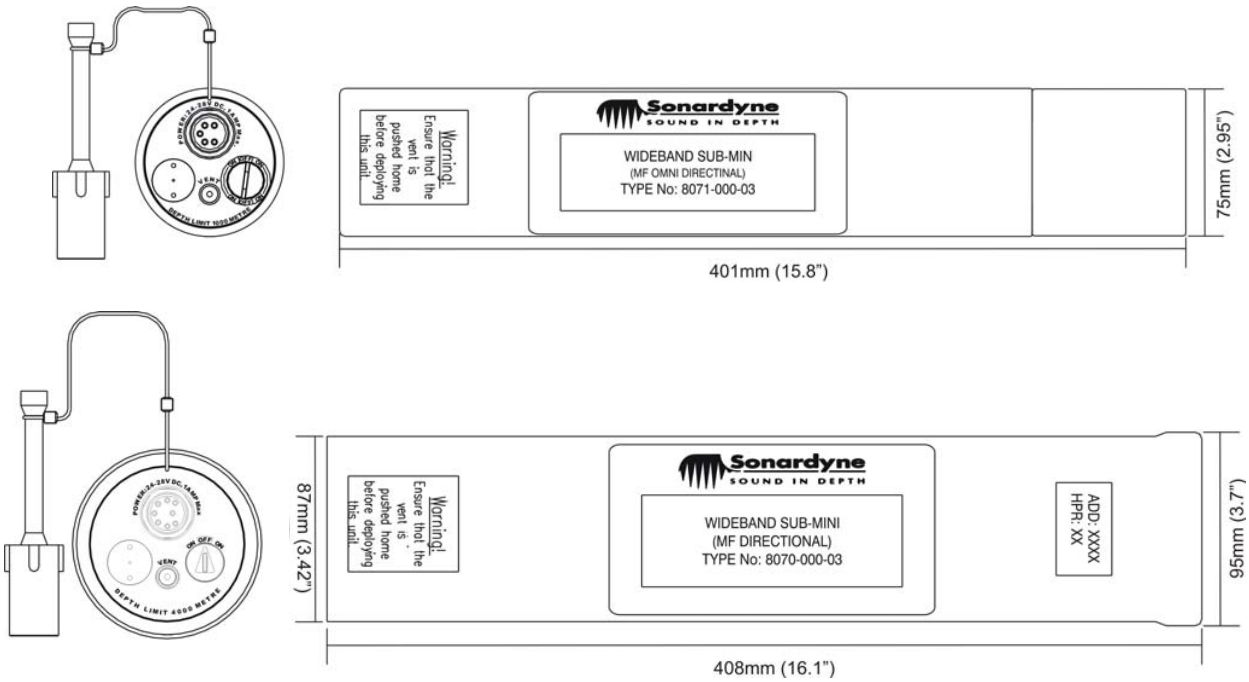
Specifications

Wideband Sub-Mini Transponder/Responder (WSM)



Feature		Type 8071	Type 8070
Depth Rating		1,000 Metres	4,000 Metres
Operating Frequency		MF (19-36kHz)	MF (19-36kHz)
Operating Channels		All Sonardyne Wideband/Tone HPR 300 & 400 Channels	All Sonardyne Wideband/Tone HPR 300 & 400 Channels
Transducer Beamshape		Omni-Directional	Directional
Transmit Source Level (dB re 1µPa @ 1m)(26-32kHz)	(External Power)	190dB	202dB
	(Battery – High Power)	188dB	199dB
	(Battery – Low Power)	185dB	196dB
Receive Sensitivity (dB re 1µPa)	High Gain	<100dB	<100dB
	Low Gain	<110dB	<110dB
Power Supply		Long-Life Ni MH battery or ext. 24V via ROV's umbilical	Long-Life Ni MH battery or ext. 24V via ROV's umbilical
Number of Replies (Responder)		Unlimited with External Power	Unlimited with External Power
Depth Sensor		Standard	Standard
Maximum Update Period		750ms	750ms
Quiescent Life		60 Days	60 Days
Mating Connector		Subconn MCIL5F	Subconn MCIL5F
Mechanical Construction		Aluminium Alloy, Anodised	Aluminium Alloy, Anodised
Dimensions (LxDia)		401mm (15.8") x 75mm (2.95")	408mm (16.1") x 95mm (3.7")
Weight in Air		2.7kg	5.0kg
Weight in Water		1.4kg	2.6kg
Battery Charger		7972-000-04	7972-000-04

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SBE 19plus V2
SeaCAT Profiler CTD

The SBE 19plus V2 SeaCAT measures conductivity, temperature, and pressure at 4 scans/sec (4 Hz) and provides high accuracy and resolution, reliability, and ease-of-use for a wide range of research, monitoring, and engineering applications. Pump-controlled, T-C ducted flow minimizes salinity spiking caused by ship heave and allows for slow descent rates without slowing sensor responses, improving dynamic accuracy and resolving small scale structure in the water column. The 19plus V2 supports numerous auxiliary sensors (dissolved oxygen, pH, turbidity, fluorescence, oil, PAR, nitrates, altimeter, etc.) with six A/D channels and one RS-232 data channel. Data is recorded in memory and can also be output in real-time in engineering units or raw HEX. Nine alkaline D-cells provide power for up to 60 hours of profiling.

The 19plus V2 is commonly used autonomously, recording data internally. It can also provide real-time acquisition and display over short cables via the RS-232 interface; a load-bearing cable for hand-hauled, real-time profiling is available. External power and communication over 10,000 m of single-core, armored cable can be provided with the SBE 36 Deck Unit and PDIM. The 19plus V2 is easily integrated with a Sea-Bird Water Sampler; both real-time and autonomous auto-fire operations are possible.

In moored mode, the 19plus V2 records data at user-programmable intervals. This is easily configured with setup commands and by removing the profiling T-C Duct and installing optional anti-foulant devices.

Shown with optional cage, SBE 5P pump, & SBE 43 DO sensor

Features

- Conductivity, Temperature, Pressure, and up to seven auxiliary sensors.
- User-programmable mode: profiling at 4 Hz, or moored sampling at user-programmable intervals.
- RS-232 interface, internal memory, and internal alkaline batteries (can be powered externally).
- Pump-controlled, T-C ducted flow to minimize salinity spiking.
- Depths to 600, 7000, or 10,500 m.
- Seasoft© V2 Windows software package (setup, data upload, real-time data acquisition, and data processing).
- Next generation of the SeaCAT family, field-proven since 1987.
- Five-year limited warranty.

Components

- Unique internal-field conductivity cell permits use of T-C Duct, minimizing salinity spiking.
- Aged and pressure-protected thermistor has a long history of exceptional accuracy and stability.
- Pressure sensor with temperature compensation is available in eight strain-gauge ranges (to 7000 m) and eleven Digiquartz® ranges (to 10,500 m). *Note: Sampling rate 2 Hz when Digiquartz installed.*
- Pump runs continuously (profiling mode), providing correlation of CTD and plumbed auxiliary sensor measurements.

www.seabird.com sales@seabird.com +1 425-643-9866

Options

- Plastic (600 m) or titanium (7000 or 10,500 m) housing; XSG/AG or wet-pluggable MCBH connectors.
- SBE 5M pump for pumped conductivity; or SBE 5P or 5T pump for pumped conductivity and auxiliary sensor(s).
- Sea-Bird Scientific auxiliary sensors — dissolved oxygen, pH, fluorescence, oil, radiance (PAR), light transmission, turbidity, nitrates (profiling only), etc.
- Auxiliary sensors from other manufacturers.
- Stainless steel protection cage.
- Rechargeable Nickel Metal Hydride (NiMH) batteries and charger.
- Moored mode conversion kit with anti-foulant device fittings.
- Load-bearing underwater cable for hand-hauled, real-time profiling.
- SBE 36 CTD Deck Unit & PDIM or SBE 33 Deck Unit & Sea-Bird water sampler (real-time operation on single-core armored cable to 10,000 m).
- Plastic shipping case.

Measurement Range

Conductivity	0 to 9 S/m
Temperature	-5 to +35 °C
Pressure	Strain-gauge 0 to 20/100/350/600/1000/2000/3500/7000 m; Quartz 20/60/130/200/270/680/1400/2000/4200/7000/10,500 m

Initial Accuracy

Conductivity	± 0.0005 S/m
Temperature	± 0.005 °C
Pressure	Strain-gauge ± 0.1% of full scale range; Quartz ± 0.02% of full scale range

Typical Stability

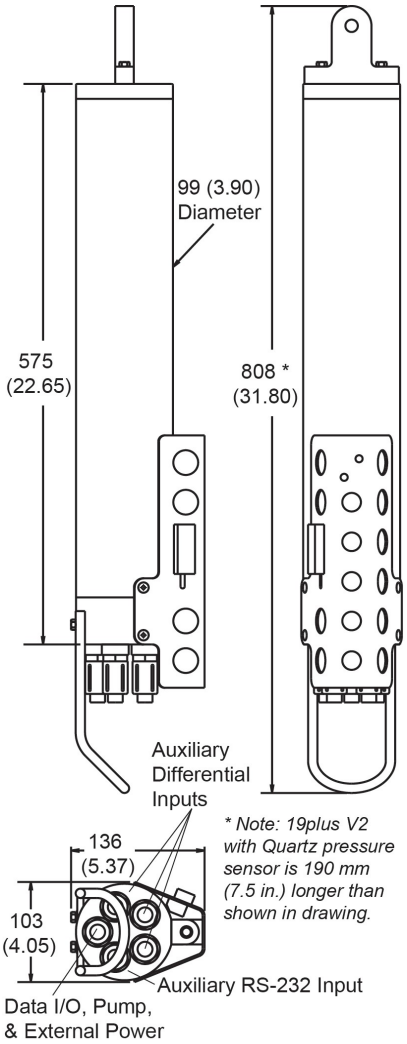
Conductivity	0.0003 S/m per month
Temperature	0.0002 °C per month
Pressure	Strain-gauge ± 0.1% of full scale range per year; Quartz ± 0.02% of full scale range per year

Resolution

Conductivity	0.00005 S/m typical
Temperature	0.0001 °C
Pressure	Strain-gauge 0.002% of full scale range; Quartz 0.0025% of full scale range

Sampling Speed	Profiling: 4 Hz (strain-gauge pressure) or 2 Hz (Quartz pressure)
Memory & Data Storage	64 Mbyte non-volatile FLASH Bytes/sample: 6 T&C; 5 pressure; 2 each external voltage; 4 date & time (RS-232 sensor is sensor dependent)
Power Supply & Consumption	9 alkaline D-cell batteries, 60 hours CTD profiling (see manual)
Optional External Power	9 - 28 VDC; consult factory for required current
Auxiliary Sensors	Power out up to 500 mA at 10.5 - 11 VDC; Voltage sensor A/D resolution 14 bits & input range 0-5 VDC
Housing, Depth Rating, & Weight (add 0.3 to 0.7 kg [in air] for pump, depending on model)	Acetal Copolymer Plastic, 600 m, in air 7.3 kg, in water 2.3 kg 3AL-2.5V Titanium, 7000 m, in air 13.7 kg, in water 8.6 kg 6AL-4V Titanium, 10,500 m
Optional Cage (weight in air)	(strain-gauge pressure version) 1016 x 241 x 279 mm, 6.3 kg

Dimensions in millimeters (inches)



** Note: 19plus V2 with Quartz pressure sensor is 190 mm (7.5 in.) longer than shown in drawing.*

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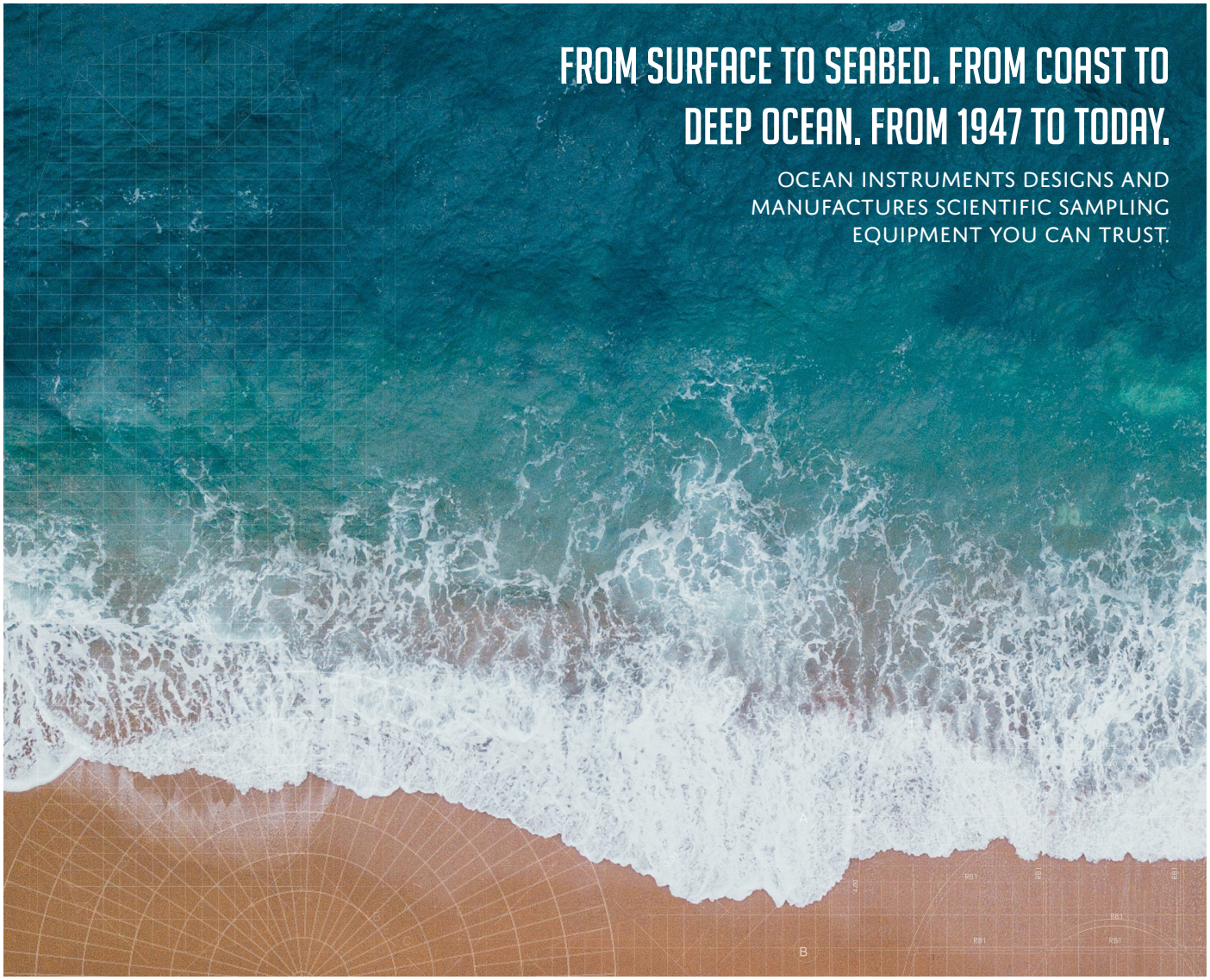
SG-20

SALISH GRAB STANDARD



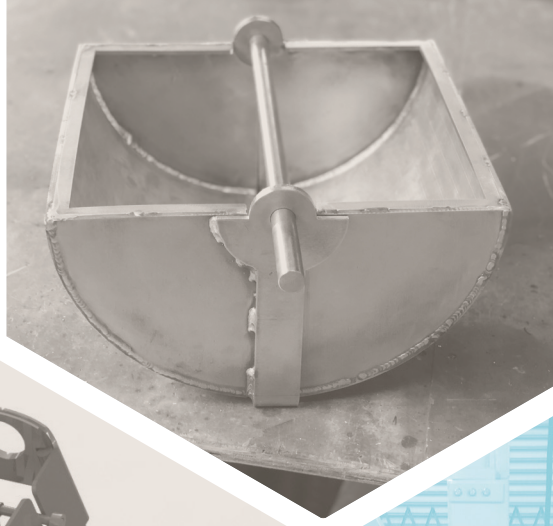
GRAB SAMPLERS ARE THE INDUSTRY STANDARD TOOL FOR THE COLLECTION OF SURFACE SEDIMENT SAMPLES. GRAB SAMPLERS ARE IDEAL FOR USE ON SEAFLOORS IN HARD OR MIXED SUBSTRATES. THE VAN VEEN GRAB SAMPLER IS A CLAMSHELL STYLE GRAB DESIGNED TO SAMPLE SEDIMENT IN WATER ENVIRONMENTS. THE SAMPLER WAS INVENTED BY JOHAN VAN VEEN (A DUTCH ENGINEER) IN 1933. THE USE OF THE VAN VEEN'S GRAB IS VERY SIMPLE WHICH HAS MADE IT INDUSTRY STANDARD FOR SURFACE SEDIMENT SAMPLING.

GRAB SAMPLERS

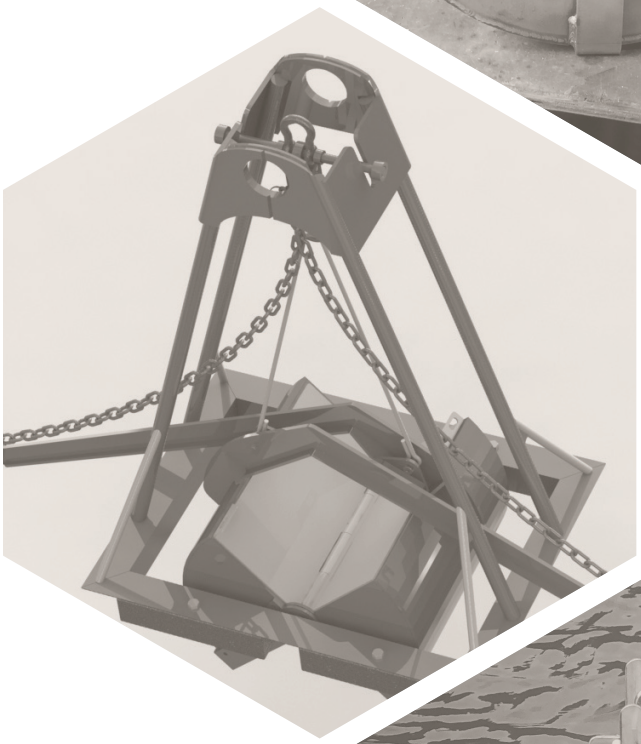
OCEANINSTRUMENTS

SG-20

SALISH GRAB STANDARD



THE SALISH GRAB IS A MODIFIED VERSION OF THE STANDARD VAN VEEN WITH WEIGHTED FRAME AND RELEASE SYSTEM IDEAL FOR COLLECTION OF SEDIMENTS IN SOFT TO HARD SUBSTRATES. THIS DESIGN WAS OPTIMIZED FOR THE CHALLENGING CONDITIONS OF THE SALISH SEAS WERE BOTTOM SUBSTRATES ARE OFTEN A COMBINATION OF CLAYS AND ROCK MIXED WITH SILTS AND SANDS. THE STANDARD MODEL IS IDEAL FOR CHEMISTRY SAMPLING WITH A PENETRATION DEPTH TO 20 CM AND AMPLE VOLUME FOR MOST SEDIMENT TESTING PROGRAMS.



SPECIFICATIONS

BUCKET DEPTH: 20 CM PENETRATION
MATERIAL: 316 STAINLESS STEEL WITH LEAD BLOCKS
SAMPLING AREA: 0.10 M^2

GRAB SAMPLERS

Top Features

20MP	4K60 5K30	33ft (10m)

Scheduled Capture | Superphoto + HDR | RAW

Specifications

Camera Features

Key Features

Built-In Mounting with Folding Fingers | HERO9 Black Mods Compatibility

Audio Features

3.5mm Audio Mic Input with Media Mod for HERO9 Black or Pro 3.5 Mic Adapter (Sold Separately) | RAW Audio Capture (.wav Format)

Connected Features

Wi-Fi + Bluetooth® | GPS Enabled | Connects to GoPro App | Auto Offload to Phone

Camera Modes + Settings

Photo

20MP

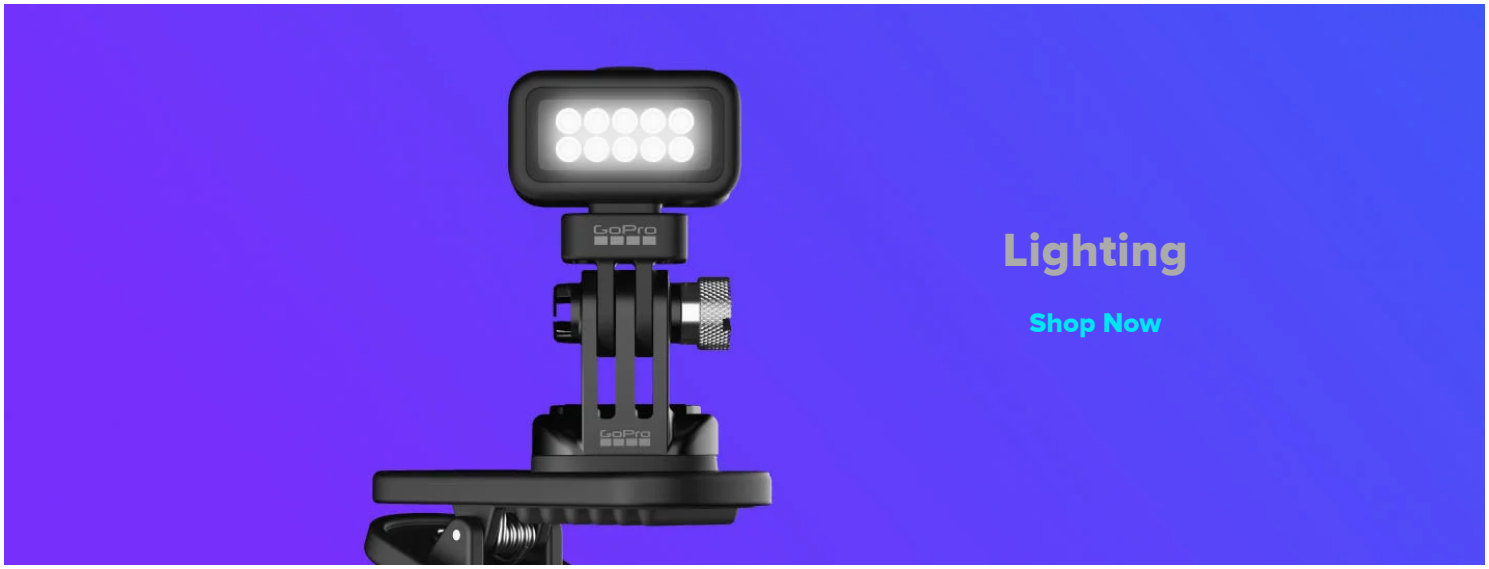
Video

Video 5K30 + 4K60, Wide FOV

Buckle | USB-C Cable | Thumb Screw | Camera Case

Compatibility

Compatible with Over 30 Accessories



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TOWED CAMERA TS-500 | IMAGING SYSTEMS

FROM SURFACE TO SEABED. FROM COAST TO DEEP OCEAN. FROM 1947 TO TODAY.

OCEAN INSTRUMENTS DESIGNS AND MANUFACTURES SCIENTIFIC SAMPLING EQUIPMENT YOU CAN TRUST.

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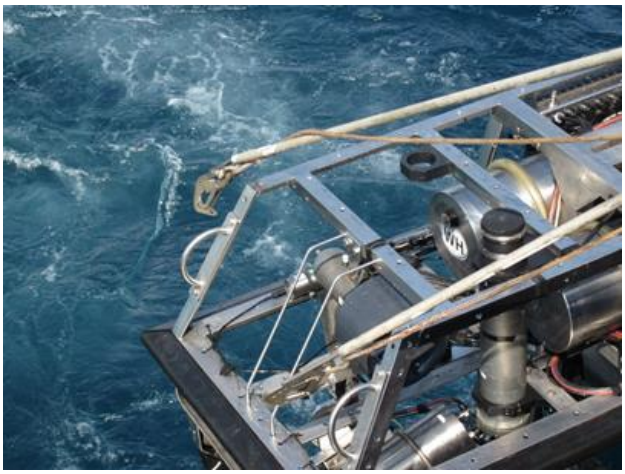
TOWED CAMERA | IMAGING SYSTEMS

TS-500 TETHERED TOW SLED

Hydrodynamic Imaging Tow Sled for up to 200-meter applications. Designed for benthic habitat mapping and sediment bed mapping. System comes standard with Machine Series DSLR cameras for wide swath imaging, laser scales, LED lights, Motion Reference system and Altimeter. Optional accessories include sonar and CTD systems for seabed mapping. Can come optional with thrusters and neutrally buoyant setup with depressor wing.

Featured in the OI Tether system series is live top-side view, telemetry and overlay of meta-data on imagery for critical analysis of seabed images. DSLR still images are captured in in optical flat plane for accurate sizing with the aid of scale lasers



SPECIFICATIONS

Size	4ft long, 2ft wide
Weight	45 kg-80 kg
Data Integrity	RAID HDD
Lights	1000 lumens (2 total)
Depth	200 meters
Camera Quality	12mp
Video Quality	4K
Time Lapse Camera	8K GP at 14mp
Positioning	Integrated USBL compatible
Swath Width	2 meters
Altimeter	Tritech Micron
MRU	Ixblue Fins compatible
Auxiliary Camera -	GoPro8

MISSIONS

- Benthic Habitat mapping
- Seabed Mapping
- Hazard Assessment
- Artefact Surveys
- Pipeline Surveys

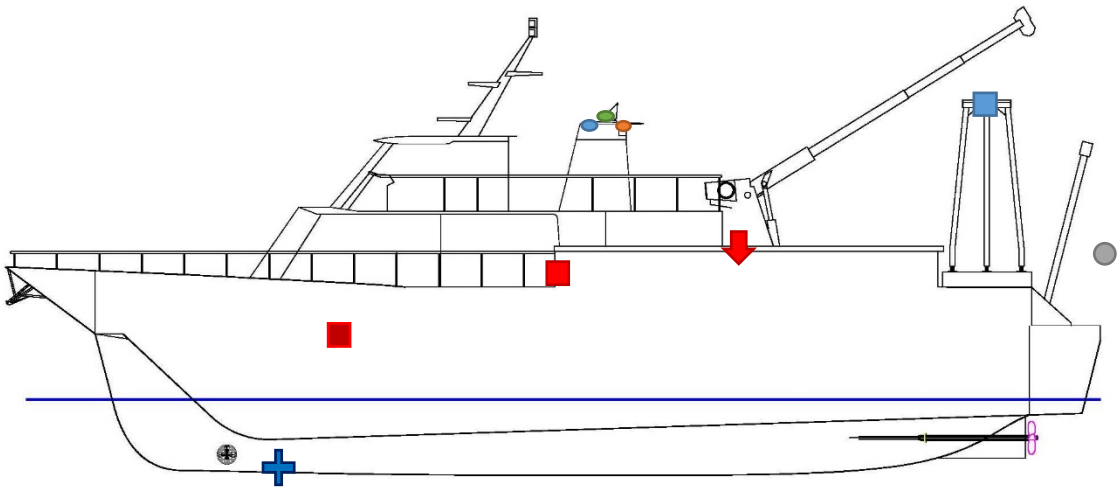
DEPLOYMENT

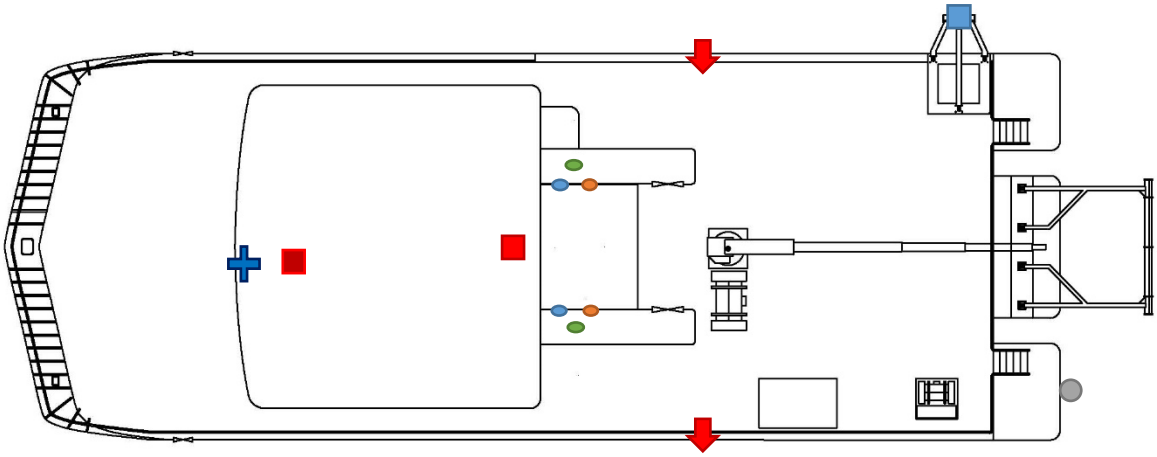
- Tethered cable
- 0.5 to 2.5 knots Speed
- Survey Height – 1-3 meters off seabed
- Control real-time from cabin
- Optional Flotation package
- Optional Acoustic Safety Release
- Optional Daughter Sled – low flight

APPENDIX C VESSEL OFFSET DIAGRAM

VESSEL OFFSET FORM

VESSEL :	R/V *Shearwater*					
OFFSET from IMU	☒ Meter	☐ Feet	+ forward/ - backward	+ right/ - left	+ up/ - down	**Notes**
POS 1 Primary GPS Antenna			-0.729	-1.661	5.246	Phase center
POS 1 Secondary GPS Antenna			-0.691	1.744	5.251	Phase center
IMU 1 (Intertial Measurement Unit)			0.000	0.000	0.115	
CNAV 1			-0.513	-1.277	4.966	Phase center
POS 2 Primary GPS Antenna			1.263	-1.277	5.081	Phase center
POS 2 Secondary GPS Antenna			-1.246	1.331	5.077	Phase center
IMU 2 (Inertial Measurement Unit)			2.639	-0.642	-3.771	
CNAV 2			-0.513	1.331	5.077	Phase center
MBES			2.665	-0.620	-6.032	Phase center
Port Measure Down			-4.164	-5.874	-0.217	
Starboard Measure Down			-4.109	5.864	0.987	
MVP Towpoint			-16.271	-4.419	0.831	
Camera Towpoint / Water Profiler Drop Point			6.946	-12.634	5.806	STBD A-Frame





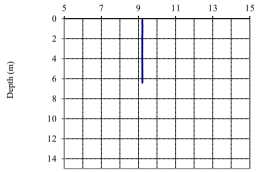
APPENDIX D WATER QUALITY PROFILES

1894 Equinor Water Quality

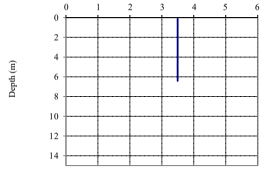
Location:	Barrett Landing	Coordinates			
Date, Time:	May 03 2021 15:31:28 UTC	NAD83 (2011) UTM Zone 18 North (m)			Lat/Lon
Station:	EQ21526-EW2-01-A1	X:	616928.48	Lat:	40;34;34.473N
		Y:	4492634.47	Lon:	073;37;06.674W

Depth (m)	Temperature (°C)	Conductivity (S/m)	Salinity (PSU)	DO (mg/L)	pH
0.11	9.2153	3.495198	32.5104	9.32902	7.969
0.253	9.2097	3.494593	32.5092	9.33025	7.966
0.43	9.2092	3.494534	32.5089	9.33037	7.971
0.641	9.2127	3.494971	32.5101	9.32957	7.966
0.701	9.2198	3.495687	32.511	9.32805	7.966
0.923	9.2159	3.495325	32.5108	9.32888	7.966
1.154	9.2125	3.494938	32.5097	9.32963	7.969
1.319	9.2132	3.495068	32.5104	9.32945	7.966
1.436	9.2102	3.494792	32.5102	9.33009	7.966
1.791	9.2061	3.494088	32.5066	9.33117	7.966
1.99	9.2057	3.494137	32.5073	9.33118	7.966
2.119	9.2065	3.494317	32.5084	9.33096	7.966
2.13	9.2058	3.494134	32.5071	9.33118	7.966
2.195	9.2061	3.494567	32.5113	9.33087	7.966
2.553	9.2049	3.493968	32.5061	9.33144	7.966
2.903	9.2044	3.493822	32.5048	9.3316	7.966
3.171	9.2045	3.493793	32.5043	9.33161	7.966
3.359	9.2044	3.493816	32.5045	9.33161	7.966
3.548	9.2037	3.493822	32.5052	9.33174	7.966
4.008	9.2048	3.494021	32.506	9.33146	7.966
4.422	9.2076	3.493705	32.5001	9.33123	7.966
4.633	9.2103	3.493829	32.4988	9.33075	7.966
4.845	9.2067	3.493536	32.4989	9.33148	7.966
5.279	9.2109	3.493705	32.4967	9.33076	7.966
5.468	9.2151	3.493848	32.4941	9.33003	7.966
5.487	9.2151	3.49381	32.4937	9.33006	7.963
5.575	9.2132	3.493754	32.4949	9.33038	7.966
5.963	9.2119	3.493683	32.4952	9.33064	7.966
6.2	9.2126	3.493676	32.4944	9.33055	7.966
6.212	9.214	3.493908	32.4955	9.33019	7.963
6.308	9.2109	3.494067	32.4999	9.33057	7.963
6.417	9.2102	3.494083	32.5007	9.33066	7.963

Temperature (°C)



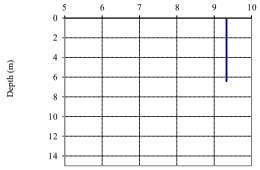
Conductivity (S/m)



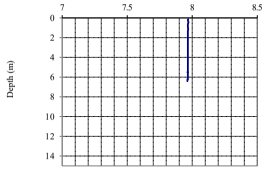
Temperature (°C)	
Mean	9.21
Min	9.20
Max	9.22

Conductivity (S/m)	
Mean	3.494
Min	3.494
Max	3.496

Disolved Oxygen (mg/L)



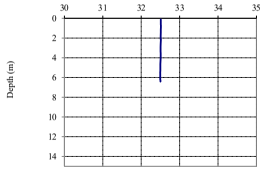
pH



DO (mg/L)	
Mean	9.3305
Min	9.3281
Max	9.3317

pH	
Mean	7.9660
Min	7.9630
Max	7.9710

Salinity (PSU)



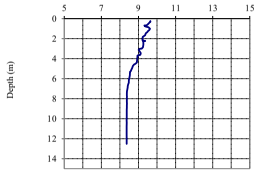
Salinity (PSU)	
Mean	32.5
Min	32.5
Max	32.5

1894 Equinor Water Quality

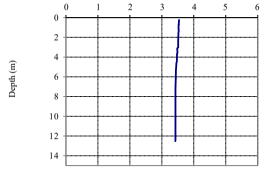
Location:	Barrett Landing	Coordinates			
Date, Time:	May 03 2021 14:33:07 UTC	NAD83 (2011) UTM Zone 18 North (m)		Lat/Lon	
Station:	EQ21526-EW2-02-A2	X:	617008.81	Lat:	40;33;06.733N
		Y:	4489933.05	Lon:	073;37;05.061W

Depth (m)	Temperature (°C)	Conductivity (S/m)	Salinity (PSU)	DO (mg/L)	pH
0.238	9.6388	3.538689	32.5723	9.23869	7.979
0.336	9.6424	3.537318	32.555	9.23899	7.974
0.381	9.6008	3.534219	32.5609	9.24708	7.974
0.472	9.5511	3.533206	32.5956	9.25511	7.974
0.619	9.4766	3.53338	32.6653	9.26614	7.974
0.679	9.42	3.533738	32.7206	9.27439	7.977
0.68	9.3193	3.528189	32.7556	9.29291	7.98
0.764	9.3546	3.526351	32.7043	9.28874	7.979
0.805	9.408	3.525438	32.6461	9.2813	7.982
0.858	9.5374	3.524316	32.517	9.26262	7.979
1.006	9.6251	3.523554	32.4295	9.24994	7.976
1.139	9.5813	3.524318	32.477	9.25605	7.979
1.263	9.5083	3.525493	32.5551	9.26625	7.976
1.346	9.4777	3.527314	32.6016	9.26972	7.979
1.384	9.4532	3.528613	32.6372	9.27259	7.979
1.467	9.3951	3.52171	32.6192	9.28554	7.982
1.664	9.3587	3.520129	32.6361	9.292	7.979
1.822	9.2297	3.518638	32.7386	9.31232	7.985
2.018	9.2119	3.516682	32.7347	9.31622	7.982
2.172	9.2174	3.514276	32.7047	9.31689	7.985
2.237	9.3666	3.511944	32.5444	9.29588	7.984
2.257	9.2623	3.511068	32.6304	9.31212	7.984
2.581	9.2676	3.512141	32.6365	9.31066	7.984
2.856	9.241	3.513127	32.6708	9.31406	7.985
2.995	9.179	3.513957	32.7362	9.32292	7.985
3.015	9.0711	3.512516	32.8206	9.34013	7.98
3.119	9.0079	3.480005	32.5411	9.37013	7.985
3.447	9.1278	3.489183	32.5265	9.34614	7.985
3.624	9.0996	3.48628	32.5221	9.35225	7.985
3.688	8.9488	3.474577	32.5386	9.3826	7.986
3.955	8.9352	3.473261	32.5371	9.38551	7.986
4.162	8.9239	3.472322	32.5377	9.38784	7.986
4.301	8.9192	3.471796	32.5365	9.3889	7.986
4.38	8.9152	3.47149	32.5369	9.38971	7.986
4.384	8.9106	3.470971	32.5357	9.39074	7.986
4.41	8.8967	3.469866	32.537	9.39358	7.986
4.508	8.8358	3.464344	32.5353	9.40643	7.986
4.591	8.7612	3.458069	32.5381	9.42188	7.986
4.741	8.6967	3.452653	32.5408	9.4353	7.986
4.933	8.6636	3.449941	32.5428	9.44215	7.987
5.087	8.6183	3.446169	32.5448	9.45158	7.982
5.248	8.5866	3.443582	32.5468	9.45816	7.977
5.32	8.5436	3.440246	32.5515	9.46698	7.978
5.392	8.5458	3.440544	32.5525	9.46645	7.978
5.425	8.5421	3.439955	32.5497	9.4674	7.976
5.447	8.5412	3.439891	32.5499	9.46759	7.976
5.636	8.5413	3.439856	32.5494	9.46761	7.973
5.876	8.5149	3.437671	32.5506	9.47312	7.976
6.101	8.4845	3.435458	32.5554	9.4793	7.978
6.263	8.4827	3.43527	32.5549	9.47968	7.973
6.293	8.482	3.435202	32.5549	9.47985	7.973
6.398	8.4773	3.434662	32.5534	9.48093	7.973
6.575	8.4432	3.431903	32.5558	9.48804	7.976
6.748	8.4215	3.430338	32.5594	9.49245	7.976
6.853	8.4187	3.430063	32.5589	9.49306	7.976
6.905	8.4136	3.429669	32.5596	9.49412	7.973
6.985	8.4098	3.429316	32.5592	9.49493	7.973
7.101	8.397	3.42826	32.56	9.49763	7.973
7.266	8.3815	3.427073	32.5617	9.50082	7.973
7.454	8.374	3.426543	32.5629	9.50234	7.973
7.585	8.3762	3.426692	32.5624	9.50191	7.971
7.653	8.3768	3.426695	32.5619	9.50182	7.971
7.657	8.3743	3.426482	32.5619	9.50233	7.973
7.705	8.3737	3.42642	32.5619	9.50248	7.971
7.781	8.3822	3.427077	32.5607	9.50071	7.971
7.905	8.3738	3.42643	32.5617	9.50246	7.973
8.115	8.3739	3.426417	32.5614	9.50247	7.969
8.33	8.375	3.426511	32.5613	9.50224	7.969
8.506	8.3787	3.426789	32.5607	9.50147	7.969
8.649	8.3739	3.426407	32.5611	9.50248	7.969
8.747	8.3734	3.426379	32.5611	9.50258	7.969
8.811	8.3717	3.426282	32.5617	9.50291	7.971
8.901	8.3729	3.426275	32.5605	9.50272	7.969
9.105	8.3674	3.425813	32.5606	9.5039	7.969
9.364	8.3659	3.425749	32.5611	9.50417	7.969
9.61	8.3682	3.425881	32.5604	9.50374	7.969
9.776	8.3666	3.425771	32.5606	9.50408	7.969
9.82	8.3693	3.426007	32.5606	9.50351	7.969
9.832	8.3692	3.425994	32.5605	9.50352	7.969
9.858	8.3686	3.425927	32.5604	9.50366	7.969
9.889	8.3659	3.425726	32.5606	9.50421	7.969
9.998	8.3653	3.425675	32.5605	9.50432	7.969
10.171	8.3653	3.425684	32.5606	9.50433	7.966
10.42	8.3655	3.425704	32.5605	9.50429	7.969
10.767	8.3653	3.425681	32.5603	9.50435	7.969
11.18	8.3654	3.425704	32.5602	9.50433	7.969
11.456	8.3654	3.425672	32.5598	9.50437	7.969
11.543	8.3649	3.425633	32.5598	9.50446	7.969
11.555	8.3648	3.425613	32.5598	9.50449	7.969
11.935	8.3644	3.425568	32.5594	9.5046	7.966
12.331	8.3644	3.425578	32.5594	9.50461	7.969
12.523	8.3644	3.423901	32.5416	9.50569	7.966

Temperature (°C)



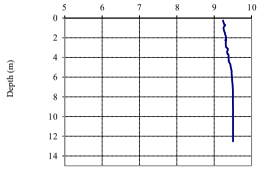
Conductivity (S/m)



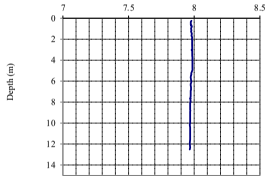
Temperature (°C)	
Mean	8.77
Min	8.36
Max	9.64

Conductivity (S/m)	
Mean	3.462
Min	3.424
Max	3.539

Disolved Oxygen (mg/L)



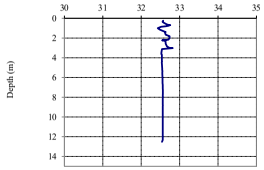
pH



DO (mg/L)	
Mean	9.4194
Min	9.2387
Max	9.5057

pH	
Mean	7.9761
Min	7.9660
Max	7.9870

Salinity (PSU)



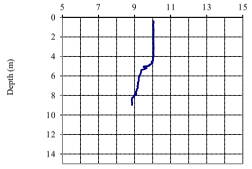
Salinity (PSU)	
Mean	32.6
Min	32.4
Max	32.8

1894 Equinor Water Quality

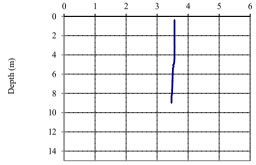
Location:	Barrett Landing	Coordinates			
Date, Time:	May 03 2021 12:18:48 UTC	NAD83 (2011) UTM Zone 18 North (m)			Lat/Lon
Station:	EQ21526-EW2-03-A1	X:	613832.75	Lat:	40;34;29.215N
		Y:	4492424.17	Lon:	073;39;18.340W

Depth (m)	Temperature (°C)	Conductivity (S/m)	Salinity (PSU)	DO (mg/L)	pH
0.383	10.0529	3.561241	32.428	9.16386	7.893
0.643	10.0547	3.561352	32.4275	9.16355	7.89
0.695	10.0431	3.560286	32.4272	9.1659	7.89
0.751	10.0308	3.559541	32.4307	9.16814	7.89
0.808	10.0365	3.559919	32.4293	9.16709	7.89
0.957	10.0435	3.560434	32.4282	9.16576	7.89
1.086	10.0462	3.560709	32.4285	9.1652	7.893
1.349	10.051	3.561133	32.4283	9.16425	7.89
1.516	10.0507	3.561103	32.4283	9.16431	7.89
1.573	10.0529	3.561306	32.4283	9.16387	7.89
1.601	10.0473	3.560815	32.4284	9.165	7.893
1.764	10.0505	3.561107	32.4283	9.16434	7.893
1.945	10.0458	3.560683	32.4282	9.1653	7.893
2.111	10.0457	3.5607	32.4284	9.16531	7.893
2.168	10.0438	3.560539	32.4284	9.16568	7.893
2.412	10.0477	3.560913	32.4287	9.16489	7.893
2.596	10.045	3.560697	32.4288	9.16542	7.893
2.657	10.047	3.560851	32.4284	9.16503	7.893
2.905	10.0549	3.561579	32.4287	9.16344	7.893
3.192	10.0583	3.561908	32.4289	9.16277	7.895
3.497	10.0452	3.560737	32.4285	9.16538	7.895
3.535	10.0426	3.56029	32.4264	9.16604	7.895
3.825	10.0534	3.561517	32.4291	9.16373	7.897
4.028	10.0517	3.561301	32.4283	9.16412	7.897
4.153	10.0256	3.559102	32.4293	9.16926	7.897
4.328	10.0269	3.559217	32.4292	9.169	7.897
4.377	10.0297	3.559434	32.429	9.16847	7.897
4.426	10.0276	3.559264	32.4292	9.16889	7.897
4.449	10.0172	3.558332	32.429	9.17096	7.897
4.483	9.9918	3.556063	32.4288	9.17605	7.898
4.526	9.9581	3.553401	32.4321	9.18262	7.898
4.56	9.9395	3.552283	32.4374	9.18603	7.898
4.61	9.9948	3.556636	32.4318	9.17527	7.898
4.674	9.9918	3.556259	32.4307	9.17594	7.898
4.773	9.9259	3.551342	32.44	9.18861	7.898
4.871	9.8087	3.542494	32.4555	9.21128	7.898
4.943	9.8298	3.544223	32.454	9.2071	7.898
4.989	9.7126	3.53447	32.4603	9.23041	7.899
5.034	9.5008	3.519152	32.4952	9.27136	7.899
5.088	9.5023	3.519515	32.4975	9.2709	7.899
5.181	9.6816	3.532532	32.4684	9.23618	7.899
5.299	9.5603	3.522146	32.4719	9.26063	7.899
5.367	9.4044	3.511576	32.5048	9.29049	7.899
5.405	9.3731	3.508738	32.504	9.29696	7.899
5.72	9.343	3.506089	32.504	9.30314	7.899
5.969	9.2818	3.501665	32.5139	9.3151	7.9
6.15	9.2447	3.498709	32.5171	9.32256	7.9
6.177	9.2258	3.497428	32.5211	9.32622	7.902
6.458	9.2329	3.497517	32.5153	9.32508	7.905
6.64	9.2023	3.494901	32.5162	9.33135	7.905
6.697	9.1775	3.492944	32.5186	9.33633	7.902
6.703	9.2002	3.494695	32.516	9.3318	7.905
6.846	9.1903	3.493806	32.5157	9.33385	7.902
6.968	9.184	3.493312	32.5163	9.33513	7.902
7.002	9.1718	3.492029	32.5141	9.33777	7.902
7.029	9.1644	3.491469	32.5151	9.33924	7.902
7.07	9.1503	3.490085	32.5136	9.34225	7.902
7.093	9.1575	3.490941	32.516	9.34064	7.902
7.146	9.1829	3.493158	32.5157	9.3354	7.905
7.23	9.184	3.492999	32.513	9.33533	7.905
7.321	9.1427	3.489324	32.5125	9.34389	7.9
7.367	9.1239	3.487811	32.5141	9.3477	7.905
7.412	9.1212	3.487589	32.5142	9.34824	7.905
7.435	9.1207	3.487515	32.5139	9.34836	7.905
7.47	9.1205	3.487462	32.5134	9.34842	7.905
7.523	9.1194	3.487348	32.5133	9.34867	7.905
7.64	9.0536	3.481636	32.5142	9.36227	7.905
7.761	9.0786	3.484258	32.5183	9.3568	7.905
7.863	9.0964	3.485292	32.5129	9.35346	7.91
7.893	9.0434	3.48092	32.516	9.36428	7.905
7.933	9.0914	3.484524	32.5094	9.3547	7.908
8.023	8.9573	3.4749	32.5322	9.38122	7.908
8.125	8.9725	3.474981	32.519	9.37885	7.908
8.175	8.9281	3.471998	32.5286	9.38753	7.906
8.216	8.8743	3.46777	32.5339	9.39844	7.906
8.299	8.8577	3.46627	32.5335	9.40193	7.901
8.395	8.845	3.465091	32.5328	9.40465	7.899
8.462	8.8441	3.464981	32.5324	9.40484	7.896
8.493	8.8481	3.465283	32.532	9.40405	7.894
8.68	8.8654	3.466043	32.5239	9.40092	7.894
8.704	8.8583	3.465127	32.5208	9.40259	7.892
8.878	8.8665	3.464384	32.5055	9.4018	7.892
8.985	8.8575	3.463345	32.5028	9.40384	7.892

Temperature (°C)



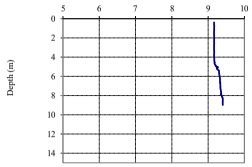
Conductivity (S/m)



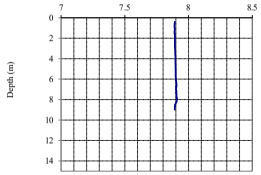
Temperature (°C)	
Mean	9.54
Min	8.84
Max	10.06

Conductivity (S/m)	
Mean	3.520
Min	3.463
Max	3.562

Disolved Oxygen (mg/L)



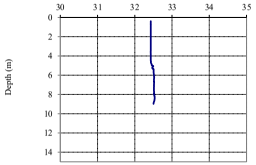
pH



DO (mg/L)	
Mean	9.2663
Min	9.1628
Max	9.4048

pH	
Mean	7.8984
Min	7.8900
Max	7.9100

Salinity (PSU)

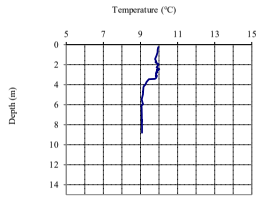


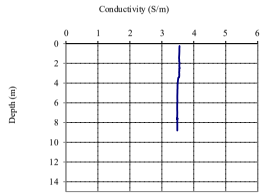
Salinity (PSU)	
Mean	32.5
Min	32.4
Max	32.5

1894 Equinor Water Quality

Location:	Barrett Landing	Coordinates			
Date, Time:	May 03 2021 12:55:11 UTC	NAD83 (2011) UTM Zone 18 North (m)			Lat/Lon
Station:	EQ21526-EW2-04-A1	X:	613855.66	Lat:	40;34;14.696N
		Y:	4491977.14	Lon:	073;39;17.621W

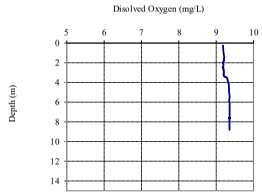
Depth (m)	Temperature (°C)	Conductivity (S/m)	Salinity (PSU)	DO (mg/L)	pH
0.24	9.9671	3.553612	32.428	9.18106	7.94
0.308	9.9504	3.552344	32.4301	9.18428	7.94
0.508	9.9261	3.550459	32.4327	9.189	7.94
0.772	9.9216	3.550072	32.4327	9.1899	7.94
1.107	9.8618	3.545326	32.4381	9.20161	7.945
1.446	9.7887	3.540355	32.4532	9.21544	7.945
1.692	9.8548	3.545027	32.4412	9.20284	7.945
1.726	9.8113	3.54193	32.4487	9.21114	7.94
1.783	9.8159	3.541926	32.4446	9.21045	7.94
1.958	9.9795	3.554609	32.4262	9.17867	7.944
2.276	9.8707	3.54664	32.4429	9.19953	7.945
2.457	10.0146	3.55738	32.4226	9.17188	7.944
2.51	9.8821	3.547062	32.4368	9.19758	7.945
2.529	9.9518	3.552925	32.4338	9.18379	7.944
2.639	9.8739	3.546564	32.4391	9.19911	7.945
2.719	9.8662	3.546073	32.4411	9.20055	7.94
2.779	9.9178	3.549758	32.432	9.19069	7.94
2.811	9.8501	3.545201	32.4467	9.20345	7.943
2.861	9.8364	3.543668	32.4433	9.20641	7.945
2.955	9.8331	3.54359	32.4455	9.20694	7.94
3.051	9.8558	3.545522	32.4446	9.20242	7.94
3.082	9.8749	3.54657	32.4382	9.19897	7.94
3.128	9.823	3.542712	32.4456	9.20897	7.943
3.155	9.8569	3.545539	32.4438	9.20226	7.945
3.167	9.8835	3.547019	32.4349	9.19742	7.94
3.255	9.856	3.544949	32.4386	9.20274	7.943
3.369	9.8226	3.541797	32.4365	9.20959	7.943
3.423	9.7718	3.539007	32.4539	9.21881	7.945
3.456	9.4544	3.513908	32.4842	9.28149	7.94
3.728	9.3327	3.50456	32.4985	9.30559	7.937
3.992	9.2638	3.499464	32.5084	9.31913	7.937
4.117	9.2024	3.49448	32.5129	9.33152	7.935
4.149	9.1814	3.492822	32.5149	9.33575	7.935
4.276	9.163	3.491507	32.518	9.33936	7.935
4.551	9.1495	3.490257	32.5172	9.34219	7.938
4.691	9.1416	3.489433	32.5159	9.34391	7.933
4.7	9.137	3.48899	32.5156	9.34489	7.933
4.944	9.1388	3.488737	32.5111	9.34478	7.928
5.292	9.0873	3.484748	32.5167	9.35513	7.931
5.492	9.0666	3.483033	32.5178	9.35936	7.931
5.501	9.0684	3.483453	32.5204	9.35881	7.931
5.594	9.0859	3.484751	32.5179	9.35534	7.931
5.859	9.1182	3.486729	32.5087	9.34919	7.928
5.942	9.1445	3.489301	32.5113	9.3436	7.933
6.063	9.054	3.481752	32.5157	9.36209	7.929
6.463	9.0646	3.482487	32.5134	9.36003	7.929
6.659	9.0679	3.482722	32.5128	9.35938	7.924
6.668	9.0665	3.482627	32.5131	9.35964	7.927
6.987	9.0728	3.483027	32.5113	9.35844	7.927
7.383	9.0709	3.482871	32.5113	9.35884	7.924
7.598	9.0764	3.483291	32.5105	9.35775	7.927
7.663	9.0783	3.483398	32.5099	9.35741	7.924
7.566	9.0763	3.483225	32.51	9.35781	7.924
7.922	9.0757	3.483239	32.5105	9.3579	7.924
8.251	9.0816	3.483583	32.5084	9.35679	7.924
8.334	9.0837	3.483678	32.5075	9.35642	7.924
8.467	9.0833	3.483658	32.5076	9.35648	7.924
8.596	9.0853	3.483643	32.5056	9.3562	7.924
8.605	9.0844	3.483646	32.5065	9.35635	7.924
8.701	9.0843	3.483665	32.5067	9.35635	7.924
8.811	9.0838	3.483652	32.5069	9.35643	7.919

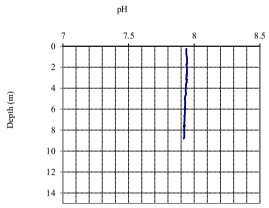




Temperature (°C)	
Mean	9.47
Min	9.05
Max	10.01

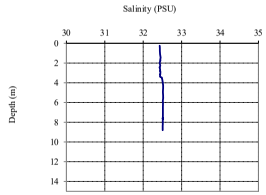
Conductivity (S/m)	
Mean	3.515
Min	3.482
Max	3.557





DO (mg/L)	
Mean	9.2797
Min	9.1719
Max	9.3621

pH	
Mean	7.9352
Min	7.9190
Max	7.9450



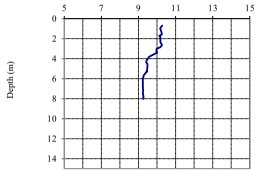
Salinity (PSU)	
Mean	32.5
Min	32.4
Max	32.5

1894 Equinor Water Quality

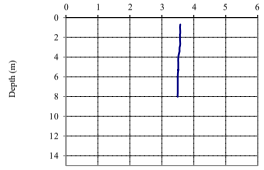
Location:	Barrett Landing	Coordinates			
Date, Time:	May 03 2021 12:36:50 UTC	NAD83 (2011) UTM Zone 18 North (m)			Lat/Lon
Station:	EQ21526-EW2-05-A1	X:	613222.99	Lat:	40;34;31.720N
		Y:	4492492.13	Lon:	073;39;44.201W

Depth (m)	Temperature (°C)	Conductivity (S/m)	Salinity (PSU)	DO (mg/L)	pH
0.691	10.2765	3.577848	32.3955	9.12132	7.925
0.748	10.2615	3.576576	32.3961	9.12427	7.925
0.823	10.2276	3.573741	32.3979	9.13089	7.925
0.974	10.1672	3.56924	32.4064	9.14238	7.925
1.385	10.2472	3.575979	32.4026	9.12672	7.925
1.574	10.2659	3.577106	32.3972	9.12334	7.927
1.687	10.1639	3.569352	32.4102	9.14282	7.925
1.722	10.1234	3.56641	32.4167	9.15049	7.925
1.845	10.1884	3.570988	32.4046	9.13827	7.925
2.297	10.1817	3.570909	32.4097	9.13931	7.925
2.434	10.1999	3.572256	32.4069	9.13586	7.925
2.476	10.226	3.574237	32.4036	9.13087	7.925
2.652	10.268	3.577205	32.3958	9.12299	7.925
2.788	10.2048	3.572582	32.4056	9.13495	7.925
2.857	10.1763	3.57004	32.4055	9.14063	7.925
3.006	9.9835	3.555784	32.434	9.17741	7.926
3.251	9.9627	3.554053	32.435	9.18151	7.924
3.375	10.0114	3.557325	32.4244	9.17239	7.926
3.399	9.9964	3.556938	32.434	9.17483	7.921
3.805	9.5842	3.523902	32.4689	9.25593	7.918
4.074	9.4786	3.516197	32.4854	9.27647	7.918
4.111	9.4569	3.515084	32.4937	9.28041	7.915
4.356	9.4113	3.51138	32.4969	9.28956	7.914
4.534	9.4825	3.515906	32.4787	9.27607	7.911
4.602	9.4901	3.516566	32.4785	9.27452	7.913
4.626	9.4863	3.516246	32.4787	9.27529	7.913
5.167	9.4641	3.514829	32.4842	9.27952	7.918
5.319	9.4451	3.513716	32.4898	9.28305	7.918
5.285	9.446	3.513739	32.4892	9.28289	7.915
5.675	9.2855	3.500954	32.5033	9.31498	7.916
6.037	9.2376	3.497307	32.5091	9.32448	7.919
6.12	9.2324	3.496816	32.5088	9.32559	7.919
6.312	9.2336	3.496513	32.5045	9.3256	7.919
6.61	9.2388	3.496836	32.503	9.32463	7.916
6.656	9.2377	3.496712	32.5027	9.32486	7.914
6.817	9.2389	3.496706	32.5014	9.32469	7.914
6.906	9.2426	3.496898	32.5	9.32401	7.912
7.055	9.2444	3.497152	32.501	9.3236	7.914
7.241	9.2541	3.497546	32.4961	9.32189	7.912
7.294	9.2454	3.497159	32.4999	9.32343	7.914
7.343	9.2426	3.496976	32.5006	9.32398	7.914
7.514	9.2448	3.497087	32.4997	9.32357	7.914
7.673	9.2577	3.496976	32.4868	9.3217	7.912
7.779	9.265	3.496116	32.4711	9.32114	7.914
7.817	9.2651	3.495904	32.4689	9.32126	7.912
7.845	9.2626	3.496278	32.475	9.3214	7.914
7.853	9.265	3.496074	32.4707	9.32117	7.914
7.972	9.2641	3.496377	32.4746	9.32111	7.912
7.992	9.2641	3.496445	32.4753	9.32108	7.909
8.027	9.2635	3.496605	32.4774	9.32107	7.909

Temperature (°C)



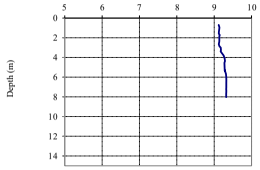
Conductivity (S/m)



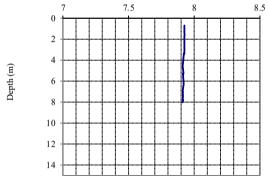
Temperature (°C)	
Mean	9.64
Min	9.23
Max	10.28

Conductivity (S/m)	
Mean	3.528
Min	3.496
Max	3.578

Disolved Oxygen (mg/L)



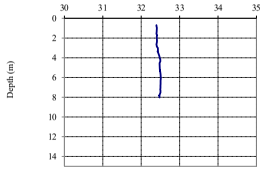
pH



DO (mg/L)	
Mean	9.2452
Min	9.1213
Max	9.3256

pH	
Mean	7.9184
Min	7.9090
Max	7.9270

Salinity (PSU)



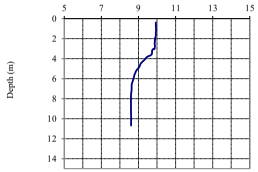
Salinity (PSU)	
Mean	32.5
Min	32.4
Max	32.5

1894 Equinor Water Quality

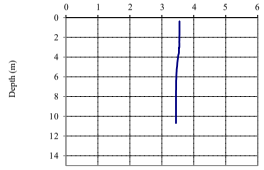
Location:	Barrett Landing	Coordinates			
Date, Time:	May 03 2021 13:17:55 UTC	NAD83 (2011) UTM Zone 18 North (m)			Lat/Lon
Station:	EQ21526-EW2-06-A1	X:	614881.91	Lat:	40;33;35.525N
		Y:	4490783.77	Lon:	073;38;34.852W

Depth (m)	Temperature (°C)	Conductivity (S/m)	Salinity (PSU)	DO (mg/L)	pH
0.376	9.9396	3.553134	32.4478	9.1854	7.963
0.488	9.9371	3.552967	32.4483	9.18587	7.963
0.552	9.9383	3.552989	32.4474	9.18567	7.963
0.62	9.9371	3.55296	32.4481	9.18587	7.961
0.767	9.9431	3.553481	32.448	9.18469	7.961
0.945	9.9466	3.55372	32.4472	9.18403	7.961
1.133	9.9481	3.553845	32.447	9.18374	7.963
1.16	9.949	3.553898	32.4467	9.18358	7.963
1.206	9.9434	3.553475	32.4474	9.18464	7.963
1.316	9.9432	3.553491	32.4477	9.18468	7.963
1.546	9.9373	3.552928	32.4472	9.1859	7.963
1.685	9.9386	3.553157	32.4482	9.18556	7.963
1.765	9.9307	3.552291	32.4466	9.18726	7.963
1.901	9.9052	3.5502	32.4483	9.19228	7.963
1.991	9.8904	3.549276	32.4521	9.19501	7.963
2.067	9.8973	3.54966	32.4498	9.19377	7.963
2.123	9.8847	3.548671	32.451	9.19623	7.964
2.203	9.8785	3.548198	32.4518	9.19743	7.964
2.252	9.8919	3.549362	32.4515	9.19476	7.963
2.301	9.8905	3.549097	32.4501	9.19512	7.963
2.354	9.8804	3.548235	32.4505	9.19714	7.964
2.461	9.8685	3.54736	32.4521	9.19942	7.964
2.615	9.8843	3.548733	32.4518	9.19626	7.964
2.796	9.8872	3.548814	32.45	9.1958	7.964
2.959	9.8757	3.547819	32.4502	9.1981	7.964
3.042	9.8647	3.547042	32.4522	9.20019	7.964
3.039	9.7889	3.541004	32.459	9.21506	7.964
3.093	9.7645	3.538856	32.459	9.21997	7.964
3.232	9.7307	3.536264	32.463	9.22657	7.964
3.357	9.7355	3.536582	32.4619	9.22566	7.969
3.546	9.726	3.53582	32.4626	9.22754	7.964
3.689	9.6442	3.528753	32.4643	9.24404	7.969
3.728	9.572	3.523401	32.4749	9.25807	7.965
3.831	9.4609	3.514143	32.4805	9.28037	7.97
4.009	9.372	3.506963	32.4873	9.29818	7.97
4.19	9.2922	3.500687	32.4952	9.31409	7.97
4.322	9.1988	3.493741	32.5084	9.33254	7.971
4.433	9.1469	3.490039	32.5175	9.34273	7.971
4.498	9.1221	3.487884	32.5178	9.34785	7.966
4.611	9.0894	3.485376	32.5216	9.35438	7.966
4.803	9.0551	3.482276	32.5207	9.36157	7.96
4.954	8.9967	3.476953	32.5188	9.37381	7.954
5.072	8.9321	3.471247	32.5186	9.38729	7.953
5.121	8.9207	3.470207	32.5182	9.3897	7.953
5.175	8.8907	3.467372	32.5161	9.3961	7.953
5.289	8.8575	3.464697	32.5186	9.40287	7.953
5.425	8.8317	3.462604	32.5203	9.40817	7.953
5.531	8.8039	3.460064	32.5194	9.41408	7.953
5.708	8.7699	3.457445	32.5232	9.42098	7.953
5.95	8.7458	3.455438	32.5242	9.42598	7.953
6.127	8.7096	3.45256	32.5273	9.43341	7.958
6.282	8.6862	3.450705	32.5293	9.4382	7.958
6.399	8.662	3.448768	32.5313	9.44319	7.958
6.438	8.6577	3.448434	32.5318	9.44407	7.958
6.606	8.6304	3.446199	32.5333	9.44973	7.963
6.915	8.6352	3.446538	32.5324	9.44877	7.96
7.255	8.6244	3.445622	32.5325	9.45105	7.963
7.429	8.6094	3.444525	32.5347	9.45408	7.96
7.524	8.6042	3.444029	32.5344	9.45522	7.96
7.701	8.5959	3.443265	32.5338	9.45699	7.963
8.026	8.5954	3.443226	32.5337	9.45711	7.963
8.324	8.5945	3.443148	32.5337	9.45731	7.963
8.465	8.5954	3.443191	32.5331	9.45714	7.963
8.514	8.5954	3.443175	32.533	9.45715	7.963
8.526	8.5952	3.443139	32.5328	9.45721	7.963
8.584	8.5948	3.44309	32.5327	9.45731	7.961
8.736	8.5955	3.443116	32.5322	9.45718	7.961
8.883	8.5952	3.4431	32.5322	9.45724	7.963
9.038	8.5962	3.443158	32.5318	9.45706	7.959
9.197	8.597	3.443198	32.5315	9.4569	7.959
9.372	8.5984	3.443314	32.5313	9.45661	7.961
9.519	8.6011	3.443492	32.5307	9.4561	7.961
9.712	8.6013	3.443509	32.5306	9.45606	7.958
9.915	8.6018	3.443547	32.5303	9.45595	7.958
10.108	8.602	3.44356	32.5302	9.45592	7.958
10.245	8.6032	3.443661	32.5301	9.45566	7.958
10.355	8.6033	3.443667	32.5301	9.45566	7.958
10.512	8.6024	3.443525	32.5293	9.45588	7.958
10.693	8.6023	3.443052	32.5243	9.45622	7.958

Temperature (°C)



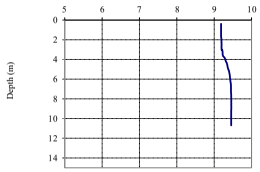
Conductivity (S/m)



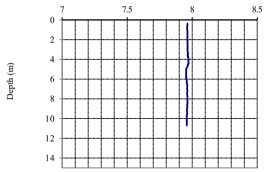
Temperature (°C)	
Mean	9.23
Min	8.59
Max	9.95

Conductivity (S/m)	
Mean	3.495
Min	3.443
Max	3.554

Disolved Oxygen (mg/L)



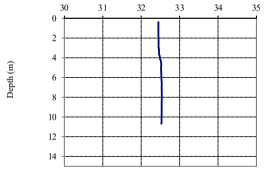
pH



DO (mg/L)	
Mean	9.3288
Min	9.1836
Max	9.4573

pH	
Mean	7.9616
Min	7.9530
Max	7.9710

Salinity (PSU)

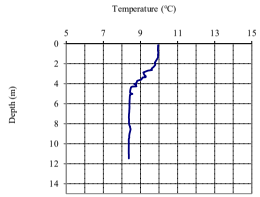


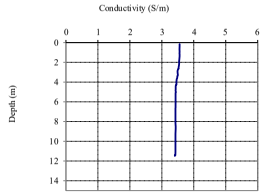
Salinity (PSU)	
Mean	32.5
Min	32.4
Max	32.5

1894 Equinor Water Quality

Location:	Barrett Landing	Coordinates			
Date, Time:	May 03 2021 13:41:33 UTC	NAD83 (2011) UTM Zone 18 North (m)		Lat/Lon	
Station:	EQ21526-EW2-07-A1	X:	615910.24	Lat:	40;33;10.428N
		Y:	4490026.95	Lon:	073;37;51.549W

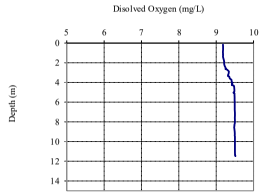
Depth (m)	Temperature (°C)	Conductivity (S/m)	Salinity (PSU)	DO (mg/L)	pH
0.145	9.955	3.555127	32.4543	9.18194	7.97
0.378	9.9458	3.554393	32.4549	9.18373	7.963
0.672	9.9404	3.55397	32.4553	9.18478	7.963
0.921	9.9643	3.556052	32.4549	9.18003	7.963
1.132	9.9432	3.554068	32.4536	9.18433	7.966
1.159	9.9527	3.554862	32.4532	9.18246	7.966
1.262	9.9463	3.554619	32.4564	9.18354	7.966
1.394	9.9482	3.554743	32.4559	9.1832	7.968
1.762	9.8202	3.54416	32.4634	9.20847	7.968
1.914	9.7708	3.540277	32.4684	9.21815	7.969
1.919	9.7866	3.541724	32.4689	9.21493	7.966
2.127	9.7978	3.542133	32.4629	9.21304	7.969
2.33	9.7125	3.535404	32.4712	9.22978	7.969
2.493	9.6067	3.526747	32.4783	9.25081	7.967
2.583	9.6027	3.526656	32.481	9.25146	7.969
2.641	9.6211	3.527945	32.4774	9.24794	7.972
2.696	9.4054	3.509802	32.4868	9.29139	7.97
2.885	9.1565	3.490556	32.5147	9.3409	7.971
3.104	9.2008	3.49419	32.5117	9.33193	7.973
3.258	9.2887	3.500644	32.4984	9.31463	7.97
3.353	9.276	3.499858	32.5017	9.31703	7.97
3.375	9.1201	3.48719	32.513	9.34855	7.971
3.446	9.0976	3.485088	32.5117	9.35329	7.971
3.597	9.0428	3.479647	32.5052	9.36508	7.971
3.71	8.835	3.46361	32.5285	9.40697	7.972
3.753	8.8159	3.462692	32.5365	9.4105	7.972
3.848	8.8044	3.461289	32.5324	9.41316	7.972
3.935	8.7804	3.458892	32.5294	9.4184	7.972
4.003	8.7392	3.455996	32.5369	9.42658	7.972
4.03	8.6614	3.450432	32.5503	9.44215	7.972
4.121	8.7689	3.457893	32.5295	9.42081	7.97
4.22	8.7501	3.455918	32.526	9.42496	7.972
4.277	8.785	3.458558	32.5216	9.4179	7.972
4.297	8.5542	3.440998	32.55	9.46484	7.973
4.361	8.4932	3.436234	32.5562	9.47737	7.973
4.444	8.4774	3.434717	32.5549	9.48082	7.97
4.599	8.4568	3.433193	32.5577	9.48503	7.973
4.732	8.444	3.432103	32.558	9.48773	7.973
4.88	8.4386	3.431654	32.5583	9.48887	7.968
4.944	8.4543	3.433229	32.5602	9.48539	7.97
5.009	8.5536	3.441234	32.5528	9.46479	7.968
5.032	8.5668	3.441396	32.5423	9.46263	7.97
5.088	8.4359	3.431301	32.5569	9.48952	7.969
5.258	8.4292	3.430709	32.5568	9.49094	7.969
5.488	8.4215	3.430063	32.557	9.49258	7.969
5.654	8.4156	3.429607	32.5575	9.4938	7.969
5.757	8.4123	3.42929	32.5573	9.49453	7.969
5.802	8.4131	3.429348	32.5572	9.49437	7.969
5.819	8.4156	3.429413	32.5554	9.49393	7.969
5.909	8.4101	3.429015	32.5564	9.49506	7.969
6.004	8.4095	3.428967	32.5563	9.49517	7.969
6.155	8.4063	3.428727	32.5568	9.49584	7.969
6.273	8.4076	3.428799	32.5562	9.4956	7.969
6.374	8.4066	3.428728	32.5563	9.4958	7.969
6.428	8.4061	3.428673	32.5562	9.49592	7.969
6.473	8.4069	3.428702	32.5557	9.49576	7.969
6.515	8.4032	3.428418	32.5562	9.49655	7.969
6.58	8.4037	3.428431	32.5557	9.49644	7.969
6.649	8.3986	3.428033	32.5563	9.49751	7.969
6.755	8.3989	3.428058	32.5562	9.49745	7.969
6.92	8.3891	3.427302	32.5572	9.49948	7.969
7.082	8.3795	3.426608	32.5587	9.50142	7.969
7.245	8.3811	3.426669	32.5578	9.50114	7.969
7.332	8.3755	3.426271	32.5588	9.50228	7.969
7.348	8.3762	3.426291	32.5583	9.50216	7.969
7.376	8.3748	3.426165	32.5583	9.50247	7.969
7.583	8.388	3.427161	32.5565	9.49977	7.966
7.866	8.3786	3.426449	32.5575	9.5017	7.969
8.137	8.3956	3.428056	32.5586	9.498	7.969
8.316	8.4453	3.431545	32.5493	9.48799	7.966
8.369	8.4329	3.430671	32.5516	9.49049	7.969
8.395	8.4471	3.431777	32.55	9.48756	7.968
8.43	8.4532	3.432004	32.5468	9.48646	7.968
8.548	8.4675	3.433689	32.5513	9.48315	7.968
8.714	8.4533	3.432356	32.5504	9.48623	7.968
9.004	8.4082	3.428806	32.5545	9.49557	7.964
9.238	8.3917	3.427591	32.5568	9.49895	7.966
9.404	8.4003	3.428125	32.5543	9.49725	7.966
9.488	8.3726	3.426036	32.558	9.50296	7.969
9.567	8.3715	3.425972	32.5582	9.50316	7.966
9.595	8.3711	3.425907	32.5579	9.50327	7.966
9.629	8.371	3.425888	32.5579	9.50331	7.966
9.776	8.3709	3.425862	32.5576	9.50335	7.966
9.931	8.3709	3.425859	32.5575	9.50335	7.966
10.184	8.3709	3.425869	32.5575	9.50334	7.969
10.648	8.371	3.425869	32.5572	9.50334	7.966
10.847	8.3712	3.425901	32.5572	9.50329	7.966
11.025	8.3712	3.425901	32.5571	9.50329	7.964
11.055	8.3713	3.425891	32.5569	9.5033	7.966
11.062	8.3715	3.425901	32.5568	9.50325	7.966
11.413	8.3734	3.42424	32.5374	9.50406	7.966
11.418	8.3729	3.409876	32.3863	9.51347	7.964
11.483	8.3725	3.406208	32.3482	9.51595	7.964

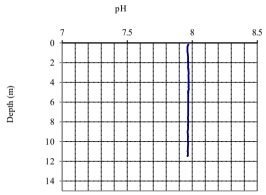




Temperature (°C)	
Mean	8.76
Min	8.37
Max	9.96

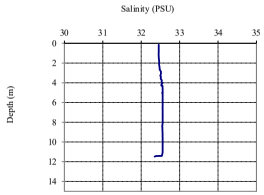
Conductivity (S/m)	
Mean	3.457
Min	3.406
Max	3.556





DO (mg/L)	
Mean	9.4241
Min	9.1800
Max	9.5160

pH	
Mean	7.9686
Min	7.9630
Max	7.9730



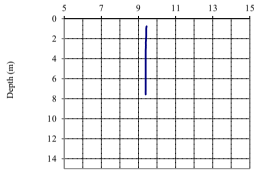
Salinity (PSU)	
Mean	32.5
Min	32.3
Max	32.6

1894 Equinor Water Quality

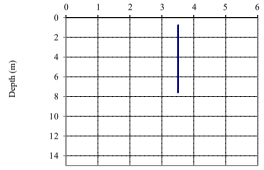
Location:	Barrett Landing	Coordinates			
Date, Time:	May 03 2021 15:09:52 UTC	NAD83 (2011) UTM Zone 18 North (m)			Lat/Lon
Station:	EQ21526-EW2-08-A1	X:	616416.16	Lat:	40;34;27.356N
		Y:	4492408.58	Lon:	073;37;28.445W

Depth (m)	Temperature (°C)	Conductivity (S/m)	Salinity (PSU)	DO (mg/L)	pH
0.762	9.4383	3.511293	32.4731	9.28543	7.958
0.976	9.4175	3.509708	32.4756	9.28955	7.958
1.327	9.4208	3.510018	32.4757	9.28887	7.958
1.625	9.4183	3.509825	32.4758	9.28938	7.958
1.776	9.4169	3.509724	32.476	9.28965	7.958
2.031	9.4053	3.508762	32.4765	9.292	7.958
2.129	9.4065	3.508863	32.4763	9.29174	7.956
2.163	9.4054	3.508785	32.4766	9.29197	7.96
2.394	9.396	3.50823	32.4793	9.29372	7.956
2.696	9.3998	3.50842	32.4776	9.29305	7.956
2.851	9.3971	3.508253	32.4783	9.29357	7.956
2.899	9.3984	3.508329	32.478	9.29332	7.956
2.963	9.3956	3.508185	32.4789	9.29382	7.956
3.189	9.3917	3.508064	32.4812	9.29451	7.956
3.449	9.3907	3.508038	32.4817	9.29467	7.956
3.596	9.391	3.508081	32.4817	9.2946	7.959
3.668	9.3909	3.508133	32.4823	9.29459	7.956
3.699	9.391	3.508117	32.4822	9.2946	7.956
3.785	9.3904	3.508078	32.4823	9.29472	7.956
4.065	9.3903	3.5081	32.4824	9.29472	7.956
4.43	9.3906	3.508124	32.4823	9.29467	7.956
4.723	9.3903	3.508163	32.4827	9.29469	7.956
4.837	9.3903	3.508173	32.4828	9.2947	7.956
4.893	9.391	3.508215	32.4825	9.29455	7.956
5.146	9.3906	3.508297	32.4836	9.29457	7.956
5.388	9.3908	3.508392	32.4843	9.2945	7.954
5.546	9.3909	3.508332	32.4836	9.29452	7.956
5.705	9.3907	3.508306	32.4834	9.29457	7.956
5.78	9.3907	3.508336	32.4836	9.29455	7.954
5.935	9.3908	3.508418	32.4844	9.2945	7.951
6.21	9.3905	3.508382	32.4841	9.29456	7.954
6.414	9.3905	3.508412	32.4843	9.29454	7.951
6.587	9.3904	3.508366	32.4839	9.29461	7.954
6.704	9.3902	3.508323	32.4836	9.29467	7.951
6.761	9.3902	3.508463	32.4851	9.29458	7.954
6.856	9.39	3.508443	32.4849	9.29462	7.956
6.943	9.389	3.508389	32.4853	9.29481	7.954
7.059	9.3888	3.508388	32.4853	9.29483	7.954
7.271	9.3868	3.506966	32.4725	9.29603	7.954
7.309	9.3848	3.505022	32.4543	9.29753	7.951
7.486	9.3868	3.506767	32.4703	9.29616	7.951
7.543	9.3862	3.505796	32.4609	9.29685	7.951
7.573	9.3867	3.507048	32.4733	9.29599	7.951
7.585	9.3868	3.507152	32.4742	9.29592	7.951

Temperature (°C)



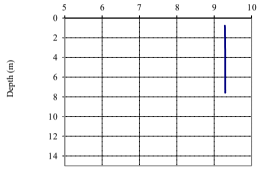
Conductivity (S/m)



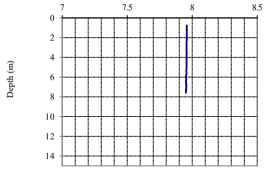
Temperature (°C)	
Mean	9.40
Min	9.38
Max	9.44

Conductivity (S/m)	
Mean	3.508
Min	3.505
Max	3.511

Disolved Oxygen (mg/L)



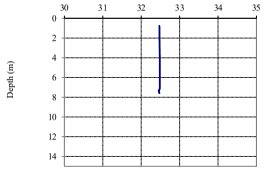
pH



DO (mg/L)	
Mean	9.2939
Min	9.2854
Max	9.2975

pH	
Mean	7.9552
Min	7.9510
Max	7.9600

Salinity (PSU)

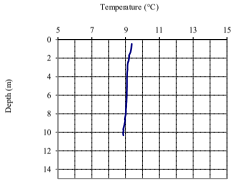


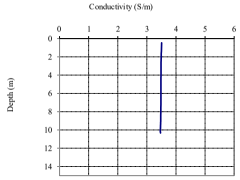
Salinity (PSU)	
Mean	32.5
Min	32.5
Max	32.5

1894 Equinor Water Quality

Depth (m)	Temperature (°C)	Conductivity (S/m)	Salinity (PSU)	DO (mg/L)	pH
0.462	9.3663	3.507411	32.4987	9.29865	7.965
0.552	9.3608	3.506834	32.4977	9.29983	7.965
0.944	9.3351	3.504665	32.4985	9.30505	7.965
1.381	9.2904	3.500836	3.25E+01	9.31E+00	7.963
1.649	9.2191	3.49501	3.25E+01	9.33E+00	7.963
1.769	9.2025	3.493805	3.25E+01	9.33E+00	7.963
1.803	9.2184	3.495004	3.25E+01	9.33E+00	7.963
2.011	9.2053	3.493893	3.25E+01	9.33E+00	7.966
2.293	9.1773	3.491568	3.25E+01	9.34E+00	7.963
2.381	9.1682	3.490728	3.25E+01	9.34E+00	7.961
2.386	9.1483	3.489104	3.25E+01	9.34E+00	7.963
2.604	9.1246	3.487359	3.25E+01	9.35E+00	7.963
2.834	9.1165	3.486754	3.25E+01	9.35E+00	7.961
3.011	9.1132	3.486494	3.25E+01	9.35E+00	7.961
3.109	9.1072	3.486139	3.25E+01	9.35E+00	7.961
3.164	9.1204	3.48706	3.25E+01	9.35E+00	7.963
3.526	9.0967	3.485482	3.25E+01	9.35E+00	7.962
3.861	9.091	3.485239	3.25E+01	9.35E+00	7.962
4.075	9.0877	3.485125	3.25E+01	9.35E+00	7.962
4.11	9.0878	3.485135	3.25E+01	9.35E+00	7.962
4.236	9.0862	3.485047	3.25E+01	9.36E+00	7.962
4.537	9.0858	3.485031	3.25E+01	9.36E+00	7.962
4.82	9.0854	3.485018	3.25E+01	9.36E+00	7.96
5.005	9.0841	3.484959	3.25E+01	9.36E+00	7.962
5.076	9.0822	3.484881	3.25E+01	9.36E+00	7.957
5.088	9.0844	3.484985	3.25E+01	9.36E+00	7.96
5.311	9.0797	3.484725	3.25E+01	9.36E+00	7.962
5.476	9.0779	3.48468	3.25E+01	9.36E+00	7.96
5.632	9.0762	3.484556	3.25E+01	9.36E+00	7.96
5.809	9.0762	3.484576	3.25E+01	9.36E+00	7.96
5.903	9.0747	3.484471	3.25E+01	9.36E+00	7.96
5.944	9.0711	3.48424	3.25E+01	9.36E+00	7.962
6.039	9.0723	3.484342	3.25E+01	9.36E+00	7.957
6.114	9.0688	3.484075	3.25E+01	9.36E+00	7.96
6.194	9.0657	3.48384	3.25E+01	9.36E+00	7.957
6.348	9.0612	3.48359	3.25E+01	9.36E+00	7.96
6.499	9.0576	3.483336	3.25E+01	9.36E+00	7.957
6.642	9.0558	3.483213	3.25E+01	9.36E+00	7.957
6.759	9.0508	3.482842	3.25E+01	9.36E+00	7.96
6.914	9.0412	3.482208	3.25E+01	9.36E+00	7.96
7.219	9.0362	3.481876	3.25E+01	9.36E+00	7.957
7.558	9.0175	3.480589	3.25E+01	9.37E+00	7.957
7.75	9.018	3.480634	3.25E+01	9.37E+00	7.957
7.848	9.0161	3.480478	3.25E+01	9.37E+00	7.96
8.093	9.0113	3.480114	3.25E+01	9.37E+00	7.96
8.369	8.9734	3.477471	3.25E+01	9.38E+00	7.957
8.545	8.9547	3.476165	3.25E+01	9.38E+00	7.957
8.613	8.9523	3.475986	32.5477	9.38E+00	7.957
8.662	8.9613	3.476626	32.5461	9.38E+00	7.955
8.712	8.9776	3.477718	32.5426	9.38E+00	7.957
8.809	8.9658	3.476812	32.5438	9.38E+00	7.955
8.922	8.9586	3.476402	32.5461	9.38E+00	7.957
9.061	8.9394	3.475063	32.5498	9.38E+00	7.957
9.186	8.93	3.474439	32.5518	9.39E+00	7.957
9.351	8.9111	3.472987	32.554	9.39E+00	7.957
9.518	8.886	3.471145	32.5577	9.39E+00	7.953
9.665	8.862	3.468212	32.5491	9.40E+00	7.953
9.691	8.8541	3.466241	32.5358	9.40E+00	7.953
9.763	8.8879	3.471011	32.5545	9.39E+00	7.948
9.989	8.861	3.463443	32.5003	9.40E+00	7.95
10.129	8.8534	3.460953	32.4812	9.41E+00	7.95
10.162	8.851	3.461511	32.4892	9.41E+00	7.95
10.333	8.8757	3.468647	32.5408	9.40E+00	7.953

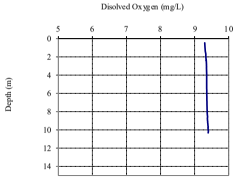
Location:	Barrett Landing	Coordinates			
Date, Time:	May 03 2021 14:53:32 UTC	NAD83 (2011) UTM Zone 18 North (m)			Lat/Lon
Station:	EQ21526-EW2-09-A1	X:	617239.9	Lat:	40;33;44.963N
		Y:	4491112.01	Lon:	073;36;54.513W

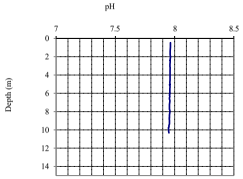




Temperature (°C)	
Mean	9.06
Min	8.85
Max	9.37

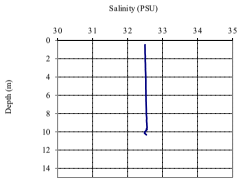
Conductivity (S/m)	
Mean	3.483
Min	3.461
Max	3.507





DO (mg/L)	
Mean	9.3609
Min	9.2987
Max	9.4060

pH	
Mean	7.9590
Min	7.9480
Max	7.9660



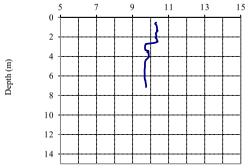
Salinity (PSU)	
Mean	32.5
Min	32.5
Max	32.6

1894 Equinor Water Quality

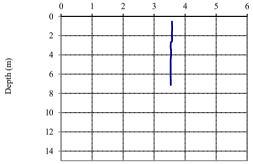
Location:	Barrett Landing	Coordinates			
Date, Time:	May 03 2021 15:51:23 UTC	NAD83 (2011) UTM Zone 18 North (m)			Lat/Lon
Station:	EQ21526-EW2-10-A1	X:	616218.99	Lat:	40;34;46.071N
		Y:	4492981.8	Lon:	073;37;36.482W

Depth (m)	Temperature (°C)	Conductivity (S/m)	Salinity (PSU)	DO (mg/L)	pH
0.533	10.3092	3.57746	32.3625	9.11678	7.939
0.54	10.2969	3.576415	32.3629	9.11918	7.94E+00
0.653	10.2487	3.57377	32.3794	9.12778	7.94E+00
0.781	10.3153	3.577677	32.3592	9.11576	7.94E+00
0.939	10.348	3.579524	32.3486	9.10993	7.94E+00
1.15	10.3591	3.580557	32.3489	9.1077	7.94E+00
1.285	10.3572	3.580471	32.3497	9.10803	7.94E+00
1.349	10.3803	3.581872	32.3431	9.10386	7.94E+00
1.353	10.3953	3.582849	32.3396	9.1011	7.94E+00
1.646	10.2832	3.574907	32.3595	9.1221	7.93E+00
1.898	10.3214	3.577773	32.3542	9.11484	7.93E+00
2.106	10.2748	3.574631	32.364	9.1235	7.94E+00
2.113	10.312	3.576359	32.3483	9.11706	7.93E+00
2.494	10.3912	3.58193	32.3336	9.10229	7.93E+00
2.614	10.2246	3.570521	32.3672	9.13326	7.93E+00
2.644	10.0888	3.560795	32.3905	9.15896	7.93E+00
2.716	9.7354	3.537109	32.4677	9.22536	7.94E+00
2.855	9.6993	3.534616	32.4748	9.23222	7.94E+00
3.021	9.6899	3.533785	32.4746	9.23412	7.94E+00
3.149	9.6883	3.533546	32.4736	9.23453	7.94E+00
3.232	9.6938	3.533755	32.4708	9.23358	7.94E+00
3.36	9.7111	3.534959	32.4674	9.23027	7.95E+00
3.42	9.8455	3.544102	32.4393	9.20481	7.95E+00
3.439	9.8916	3.546925	32.4266	9.19629	7.95E+00
3.498	9.8811	3.546315	32.4297	9.19821	7.94E+00
3.521	9.8556	3.544746	32.4367	9.20293	7.95E+00
3.559	9.8064	3.541443	32.4475	9.21222	7.95E+00
3.642	9.8905	3.547443	32.4327	9.19616	7.94E+00
3.819	9.8944	3.547374	32.4284	9.19562	7.95E+00
4.071	9.9	3.547409	32.4236	9.19477	7.95E+00
4.357	9.7371	3.536622	32.4604	9.22543	7.94E+00
4.58	9.6901	3.533458	32.4705	9.23433	7.95E+00
4.662	9.6893	3.533249	32.469	9.23459	7.95E+00
4.803	9.6912	3.533157	32.4664	9.23438	7.95E+00
5.119	9.6817	3.532444	32.4676	9.23624	7.95E+00
5.383	9.6682	3.531535	32.4703	9.23879	7.95E+00
5.53	9.6676	3.531486	32.4703	9.23891	7.95E+00
5.575	9.6669	3.531421	32.4703	9.23907	7.95E+00
5.745	9.6704	3.531604	32.4689	9.23843	7.95E+00
5.963	9.6694	3.531535	32.4689	9.23862	7.95E+00
6.166	9.6674	3.531401	32.4693	9.23901	7.95E+00
6.335	9.6819	3.532166	32.464	9.2364	7.95E+00
6.385	9.6817	3.532268	32.4651	9.23635	7.95E+00
6.434	9.6971	3.533158	32.4603	9.23353	7.95E+00
6.446	9.7111	3.534028	32.4566	9.23092	7.94E+00
6.642	9.7226	3.534538	32.4512	9.2289	7.943
6.848	9.7448	3.535438	32.4402	9.22506	7.943
6.946	9.7549	3.535143	32.4282	9.22375	7.941
7.025	9.7464	3.535159	32.4359	9.22499	7.941
7.139	9.7484	3.53536	32.4361	9.22459	7.941

Temperature (°C)



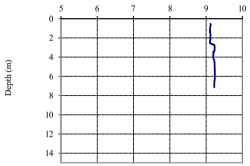
Conductivity (S/m)



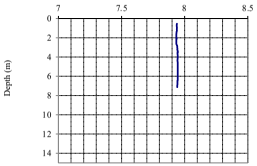
Temperature (°C)	
Mean	9.92
Min	9.67
Max	10.40

Conductivity (S/m)	
Mean	3.549
Min	3.531
Max	3.583

Disolved Oxygen (mg/L)



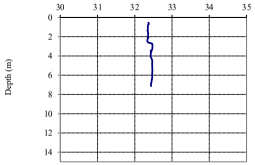
pH



DO (mg/L)	
Mean	9.1907
Min	9.1011
Max	9.2391

pH	
Mean	7.9413
Min	7.9340
Max	7.9450

Salinity (PSU)

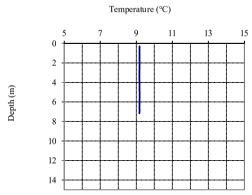


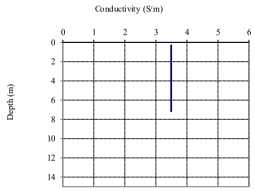
Salinity (PSU)	
Mean	32.4
Min	32.3
Max	32.5

Depth (m)	Temperature (°C)	Conductivity (S/m)	Salinity (PSU)	DO (mg/L)	pH
0.298	9.1798	3.492615	32.516	9.33602	7.966
0.332	9.1796	3.492606	32.516	9.34E+00	7.969
0.655	9.1786	3.492512	32.5159	9.34E+00	7.966
0.968	9.1778	3.492678	32.5181	9.34E+00	7.966
1.04	9.1768	3.492459	32.5168	9.34E+00	7.966
1.349	9.1771	3.492463	32.5164	9.34E+00	7.966
1.687	9.1761	3.492457	32.517	9.34E+00	7.966
2.034	9.1764	3.492561	32.5177	9.34E+00	7.966
2.24	9.1761	3.492643	32.5187	9.34E+00	7.963
2.357	9.1761	3.492519	32.5175	9.34E+00	7.966
2.538	9.1762	3.49262	32.5183	9.34E+00	7.963
2.628	9.1758	3.492646	32.5189	9.34E+00	7.966
2.779	9.1728	3.492151	32.5164	9.34E+00	7.966
3.016	9.1719	3.492138	32.517	9.34E+00	7.963
3.25	9.1725	3.492112	32.5161	9.34E+00	7.963
3.37	9.1721	3.49208	32.5161	9.34E+00	7.966
3.446	9.1717	3.492077	32.5163	9.34E+00	7.961
3.468	9.1717	3.492119	32.5167	9.34E+00	7.966
3.755	9.1742	3.492083	32.514	9.34E+00	7.966
4.034	9.1766	3.492171	32.5126	9.34E+00	7.966
4.264	9.1773	3.492167	32.5119	9.34E+00	7.961
4.402	9.1771	3.492191	32.5122	9.34E+00	7.966
4.44	9.1773	3.492194	32.5121	9.34E+00	7.961
4.773	9.1799	3.492292	32.5104	9.34E+00	7.963
5.12	9.1809	3.492357	32.5101	9.34E+00	7.966
5.285	9.1817	3.492389	32.5097	9.34E+00	7.963
5.522	9.1808	3.492374	32.5102	9.34E+00	7.963
5.835	9.1803	3.492279	32.5095	9.34E+00	7.966
6.039	9.1788	3.492283	32.5109	9.34E+00	7.966
6.095	9.1785	3.492253	32.5108	9.34E+00	7.963
6.125	9.1797	3.492273	32.51	9.34E+00	7.963
6.284	9.1794	3.49223	32.5096	9.34E+00	7.966
6.588	9.1743	3.49195	32.5113	9.34E+00	7.961
6.811	9.1789	3.492127	32.5088	9.34E+00	7.966
6.86	9.1814	3.492191	32.5071	9.34E+00	7.963
6.962	9.1786	3.492081	32.5084	9.34E+00	7.961
7.045	9.1777	3.492107	32.5096	9.34E+00	7.963
7.075	9.1717	3.491794	32.5118	9.34E+00	7.963
7.162	9.1711	3.49187	32.5131	9.34E+00	7.963

1894 Equinor Water Quality

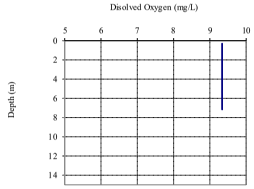
Location:	Barrett Landing	Coordinates			
Date, Time:	May 03 2021 15:24:41 UTC	NAD83 (2011) UTM Zone 18 North (m)			Lat/Lon
Station:	EQ21526-EW2-11-A1	X:	616940.66	Lat:	40;34;29.888N
		Y:	4492492.88	Lon:	073;37;06.091W

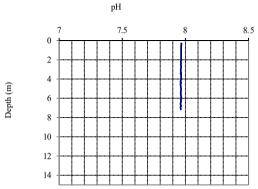




Temperature (°C)	
Mean	9.18
Min	9.17
Max	9.18

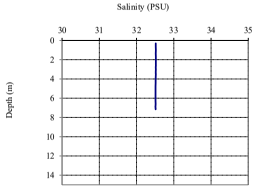
Conductivity (S/m)	
Mean	3.492
Min	3.492
Max	3.493





DO (mg/L)	
Mean	9.3368
Min	9.3360
Max	9.3380

pH	
Mean	7.9644
Min	7.9610
Max	7.9690



Salinity (PSU)	
Mean	32.5
Min	32.5
Max	32.5

1894 Equinor Water Quality

Location:	Barrett Landing	Coordinates		
Date, Time:	May 03 2021 13:58:29 UTC	NAD83 (2011) UTM Zone 18 North (m)		Lat/Lon
Station:	EQ21526-EW2-12-A1	X: 616845.54	Lat:	40;32;5.688N
		Y: 4489586.51	Lon:	073;37;12.255W

Depth (m)	Temperature (°C)	Conductivity (S/m)	Salinity (PSU)	DO (mg/L)	pH
0.519	9.4591	3.516684	32.5097	9.279	7.979
0.568	9.5564	3.522978	32.4861	9.26059	7.979
0.858	9.4449	3.51458	32.5009	9.28243	7.979
1.247	9.5827	3.525348	32.4862	9.25521	7.98E+00
1.627	9.3316	3.50569	32.512	9.30498	7.98E+00
1.838	9.3081	3.503988	32.5157	9.30959	7.98E+00
1.937	9.279	3.501657	32.5181	9.31542	7.98E+00
2.075	9.0999	3.486905	32.529	9.35176	7.98E+00
2.155	9.13	3.489713	32.5306	9.34544	7.98E+00
2.159	9.0723	3.48472	32.5316	9.35734	7.99E+00
2.299	9.0981	3.486403	32.5254	9.35236	7.99E+00
2.503	9.0447	3.482132	32.5298	9.36317	7.98E+00
2.677	8.9248	3.473235	32.547	9.38708	7.99E+00
2.726	8.9493	3.47445	32.5372	9.38257	7.99E+00
2.872	8.4563	3.433968	32.5672	9.48455	7.99E+00
3.215	8.4575	3.433697	32.5631	9.48456	7.98E+00
3.442	8.4549	3.433606	32.5644	9.48502	7.98E+00
3.529	8.5001	3.436877	32.557	9.47586	7.98E+00
3.601	8.4516	3.43292	32.5602	9.48597	7.98E+00
3.602	8.4406	3.432157	32.5622	9.48818	7.98E+00
3.894	8.4218	3.430505	32.562	9.49219	7.98E+00
4.212	8.4084	3.429551	32.5644	9.49492	7.98E+00
4.369	8.4063	3.429254	32.563	9.49544	7.97E+00
4.441	8.4063	3.429167	32.5622	9.49551	7.97E+00
4.634	8.399	3.428604	32.5628	9.49701	7.97E+00
4.804	8.4009	3.428766	32.5626	9.49661	7.98E+00
4.937	8.4047	3.429048	32.562	9.49584	7.97E+00
5.008	8.4001	3.428582	32.5614	9.49686	7.97E+00
5.035	8.3904	3.427929	32.5635	9.49882	7.97E+00
5.115	8.3892	3.427878	32.564	9.49904	7.97E+00
5.248	8.3875	3.427745	32.5641	9.49939	7.97E+00
5.394	8.3866	3.427687	32.5642	9.49956	7.97E+00
5.508	8.3855	3.427577	32.5641	9.49981	7.97E+00
5.61	8.385	3.427535	32.5641	9.49993	7.97E+00
5.792	8.3849	3.427531	32.5641	9.49995	7.97E+00
6.048	8.3802	3.427267	32.5655	9.50088	7.97E+00
6.283	8.3787	3.427202	32.5661	9.50115	7.97E+00
6.43	8.3814	3.427341	32.565	9.50064	7.97E+00
6.688	8.3752	3.42685	32.5653	9.50192	7.97E+00
7.02	8.3756	3.426863	32.565	9.50187	7.97E+00
7.231	8.3727	3.42665	32.5654	9.50249	7.97E+00
7.308	8.3713	3.426563	32.5658	9.50275	7.97E+00
7.375	8.3718	3.426575	32.5654	9.50267	7.97E+00
7.597	8.3721	3.426614	32.5653	9.50259	7.97E+00
7.805	8.3726	3.426669	32.5654	9.50249	7.97E+00
7.952	8.3724	3.426667	32.5655	9.50254	7.97E+00
8.085	8.3725	3.426666	32.5654	9.50253	7.969
8.133	8.3727	3.426666	32.5652	9.50249	7.969
8.142	8.3731	3.426702	32.5651	9.5024	7.969
8.218	8.3736	3.426709	32.5647	9.50231	7.969
8.354	8.3725	3.426646	32.565	9.50254	7.966
8.527	8.3736	3.426728	32.5648	9.50232	7.969
8.758	8.3751	3.426857	32.5647	9.50201	7.966
8.976	8.3749	3.426851	32.5647	9.50204	7.966
9.195	8.3747	3.426854	32.5648	9.50209	7.969
9.366	8.3751	3.42688	32.5646	9.502	7.969
9.43	8.3756	3.426922	32.5646	9.50191	7.969
9.59	8.3756	3.427013	32.5654	9.50185	7.969
10.04	8.3763	3.42709	32.5654	9.5017	7.969
10.435	8.3759	3.427061	32.5652	9.50179	7.966
10.684	8.3744	3.426938	32.5652	9.50211	7.969
10.804	8.3743	3.426932	32.5652	9.50215	7.966
10.821	8.374	3.426925	32.5654	9.50219	7.969
11.201	8.3742	3.426949	32.5653	9.50216	7.966
11.481	8.3737	3.426861	32.5647	9.5023	7.969
11.756	8.3738	3.426823	32.5641	9.50231	7.969
11.885	8.3738	3.426823	32.5641	9.50232	7.966
11.987	8.3737	3.426826	32.5641	9.50232	7.966
12.044	8.3739	3.426842	32.5641	9.5023	7.964
12.069	8.3737	3.426849	32.5643	9.50231	7.969
12.121	8.3738	3.426845	32.5641	9.5023	7.964
12.261	8.3739	3.426836	32.564	9.50231	7.966
12.352	8.3737	3.426807	32.5637	9.50235	7.966
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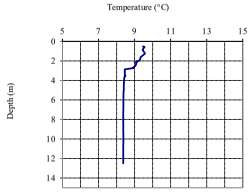
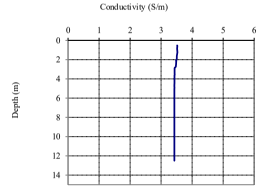
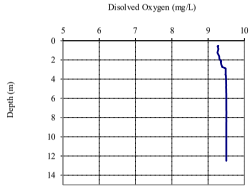
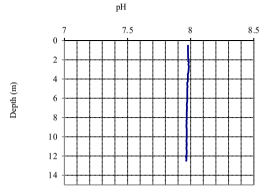




Temperature (°C)	
Mean	8.55
Min	8.37
Max	9.58

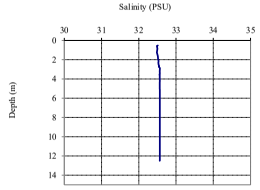
Conductivity (S/m)	
Mean	3.441
Min	3.427
Max	3.525





DO (mg/L)	
Mean	9.4666
Min	9.2552
Max	9.5028

pH	
Mean	7.9728
Min	7.9640
Max	7.9860



Salinity (PSU)	
Mean	32.6
Min	32.5
Max	32.6

APPENDIX E BENTHIC ANALYSIS REPORT

EQUINOR EMPIRE OCS A-0512

2021 Benthic Survey Report

Prepared by:

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Empire 2 Benthic Addendum

Lease Area OCS A-0512
2021 Benthic Survey Report

July 16, 2021

rpsgroup.com

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1 INTRODUCTION

RPS was contracted by Alpine to collect, process, analyze, and compile additional benthic data collected with a towed video sled and grab sampler along the Barret Export Cable Route (ECR) associated with Equinor's Lease Area OCS-A 0512, offshore of New York/New Jersey. The survey area was defined as the previously uncharacterized portions of the Empire Wind 2 (EW2) ECR that connects the offshore lease area to Long Island, New York. Sample locations were chosen by Equinor to ground-truth acoustic data, fill spatial gaps from prior surveys, and investigate known or expected complex habitat (Figure 1-1). The grab samples and video imagery data conclusions presented in this document will support interpretation of geophysical data to characterize surficial sediment conditions and classify the benthic habitat according to the Coastal and Marine Ecological Classifications Standards (CMECS; FGDC, 2012) and recent guidance for mapping fish habitat from National Marine Fisheries Service (NMFS, 2021) for inclusion in permitting documentation required by Bureau of Ocean Energy Management (BOEM). This report provides:

- A description of the benthic grab sampling methods, results, and analysis;
- The analysis of benthic grab sampling results using key statistical analyses such as taxa diversity, richness, and density;
- A description and analysis of abundance of benthic organisms observed in the video data collected; and
- CMECS classifications of each grab sample site and survey transect based on the video, grain size, and benthic community lab results.

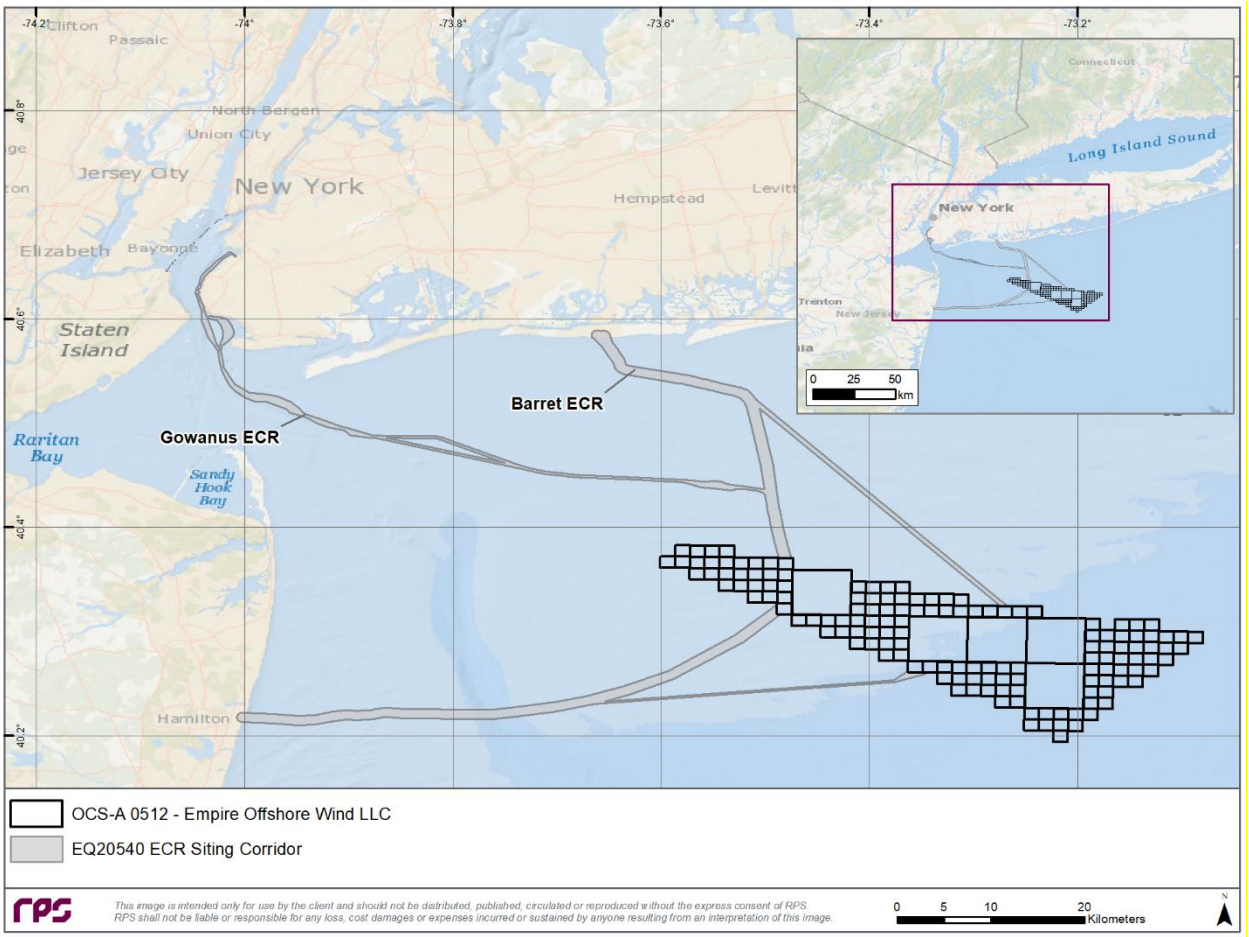


Figure 1-1. Location of the 2021 benthic survey area.

2 METHODS

2.1 Field Survey

2.1.1 Towed Camera Sled

Underwater video transects were taken in conjunction with grab samples for visual classification of the seafloor in May of 2021. The survey was completed on the Research Vessel (RV) Shearwater. The camera sled was equipped with parallel-mounted lasers 2.5 centimeters (cm) apart and a cable that transmitted real-time viewing of images to the vessel. An ultra-short baseline (USBL) beacon was fixed to the camera sled to obtain GPS coordinates in conjunction with a pole-mounted USBL system. A Deeptrekker digital color 4K high resolution camera recorded video along 600-m transects. A GoPro Hero 9 Black was also used to collect time-lapsed still images of the bottom. High turbidity limited the visibility and effectiveness of the video and stills for the majority of transects with seven of the 12 video transects failing after multiple attempts. The video sled was deployed from an A-frame located on the starboard quarter by the Alpine

crew and lowered until positioned 0.5 to 1 meters (m) above the seafloor. Distance of camera to the seafloor varied along each transect due to differences in sediment type, vessel speed, swells, and low visibility/high turbidity.

Video transects were recorded in accordance with procedures following BOEM's Guidelines for Providing Benthic Habitat Survey Information for Renewable Energy Development on the Atlantic Outer Continental Shelf Pursuant to 30 CFR Part 585 (BOEM, 2019). While recording, field notes were taken containing sample information (date, time, global positioning satellite [GPS] coordinates, station ID, depth, and video file name) and observations of sediment/seafloor characteristics of note to aid in post-processing of video data. Notes were made for the beginning and end of the transect as well as any changes in weather or visibility conditions, sediment, or species. During video recording, potentially sensitive benthic habitats (e.g., exposed hard bottom, seagrass/kelp/algal beds, coral species) were noted if present, as per BOEM's guidelines (BOEM, 2019). There were five transects successfully completed along the EW2 ECR. Failed transects were due to very high turbidity.

2.1.2 Grab Sampling

Benthic grab samples were acquired using an Ocean Instruments Salish Grab Standard SG-20 sampler. This grab is a modified version of a standard Van Veen sampler with a stainless-steel weighted frame and release system ideal for collection of sediments in soft to hard substrates with a penetration depth up to 20 cm and sampling area of 0.10 square meters (m^2). A USBL beacon was fixed to the grab sampler to obtain GPS coordinates in conjunction with a pole-mounted USBL transceiver. An attached video camera equipped with parallel-mounted scale lasers and lights provided real-time viewing of the bottom from the vessel. This video was recorded and used to collect additional information concerning the area surrounding the grab sample site.

Upon retrieval, the grab sampler was examined for sample acceptability. A sample was initially deemed acceptable if the bucket was more than 50% full or had a penetration depth > 7 cm, the sample was not over penetrated (i.e., not full to the top), and sample surface structures were undisturbed and even (i.e., not slumped). If a sample did not fulfil these requirements, the entire contents were returned to the water and another sample attempt was made. A photograph and/or results from each attempt were collected as the grab was brought on board. If more than three failed sample attempts occurred at one station, sampling moved on to the next station, and no sediment samples were sent for further analyses. 15 sites, however, consisted of a sand/clay matrix that made penetrating to >7 cm depth difficult. 12 of the 15 sites, after repeated attempts, with 4.5 to 6.5 cm penetration depth, were accepted and collected for further analyses Failed attempts due to grab sampler malfunction (not habitat/sediment related), were not included in the total count of attempts or the decision to move on from a station. The results of each attempted grab were recorded in field notes. There was a total of 36 grab samples collected from 12 stations along the EW2 ECR.

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

1. Overlying water was drained using a siphon.
2. A photograph was taken of the sample next to an identification label containing sample identification number and date.
3. Field notes were taken, including descriptions of physical features (depth of penetration, sediment color, texture, surface features) and surface megafauna; large surface fauna were returned to the water immediately.
4. The grab sample was then divided into two sections representing 40% and 60% of the sample surface area based on the bucket design which was accessed via two hinged doors divided by a central support bar.
5. The 40% sample was removed and placed into 500-µm sieving buckets to be further processed for taxonomic identification of organisms within the sediment.
6. A 200-mL subsample of the sediment was taken from the center of one side of the grab sampler bucket using a 3-inch diameter core tube. The samples were stored in double-layered plastic bags for grain size and TOC analyses.

After collection, sediment for macroinvertebrate analysis was loaded onto a processing table and material washed through a 500-µm sieve using seawater under gentle pressure.

Organisms, shell fragments, and other remaining material were placed into a plastic container using stainless steel forceps, as needed. The container was filled no more than two-thirds full of sample and seawater. If the quantity of sample exceeded this volume, it was placed in additional separate containers. The sample was fixed/preserved with 10% buffered formalin solution by filling the remaining space within the bottle with solution. Containers were tightly sealed with electrical tape and stored in a cooler at ambient temperature (not frozen or refrigerated). Prior to sieving the next sample, the sieve was cleaned by backwashing with pressurized water.

2.2 Grab Sample Analysis

2.2.1 Sediment Grain Size and Total Organic Carbon Analysis

Grain size samples were sent by Alpine to TerraSense LLC (Totowa, NJ). Particle size distribution of samples were analyzed using Wentworth/Folk.

Total Organic Carbon (TOC) samples were analyzed by TerraSense LLC (Totowa, NJ). TOC content of sediment samples was determined using ASTM D2974 with results reported as percent (%) organic content by burn-off.

2.2.1 Grab Image Analysis

The sediment grain size lab results do not discern between substrates of biogenic or geologic origin (i.e., sieves do not discern between shells vs. gravels), thus all underwater video and associated bottom images were reviewed to determine the origin of substrate. If the sample was reported by the lab as a gravel mix (≥ 30% gravel) and the grab sample images (Appendix C) appeared to have ~50% or more shell, a point count analysis was done on associated imagery in photoQuad (Trygonis and Sini, 2012). The grab sampler image was overlain with 50 points as it best represents the sediment that is sent to the lab. If over 50% of the points were confirmed as shell, then the grab sample was classified under CEMCS as biogenic shell, instead of the gravel/gravel mix as reported by the lab.

2.2.2 Benthic Macroinvertebrate Lab Analysis

The macroinvertebrate benthic samples for the survey were sent by Alpine to ESS Group (ESS; East Providence, RI). Prior to sorting, ESS emptied sample material from each sample in its entirety into a 500-µm mesh sieve. Tap water was gently run over the sieve to rinse any additional fine sediment that was not removed during the field sieving process as well as to remove the formalin solution prior to the microscope work. Rinsed samples were preserved in 70% ethanol for sorting, enumeration, and identification. Rose bengal was added to bulky samples to improve sorting efficiency.

Each benthic sample was sorted to remove organisms from residual debris. Sorted benthic organisms were subsequently identified and enumerated by a qualified taxonomist using a dissecting microscope with magnification up to 90X and readily available taxonomic keys. Some smaller organisms were temporarily slide-mounted and identified under a compound microscope with magnification to 1,000X. The target taxonomic identification level was family. If this could not be achieved, taxonomic identification was taken to the lowest practicable taxonomic level.

Enumerations of macroinvertebrates identified from each sample were recorded directly in an electronic bench sheet. Taxonomic nomenclature was checked for consistency with the World Register of Marine Species (www.marinespecies.org).

2.3 Video Data Post-Processing

2.3.1 Objectives

Post-processing and analysis of video transect data were conducted by RPS to provide:

- General characterization of substrate including bottom type, texture, micro-topography;
- Evidence of benthic activity by organisms (burrows, trails, biogenic reefs);
- Identification of epibenthic macroinvertebrates (decapod crustaceans, mollusks [including squid mops], echinoderms) and benthic habitat;

- Presence/evidence and general characterization of submerged aquatic vegetation (macroalgae, sea grass);
- Identification of organisms to the lowest practical taxonomic level (generally to Order to Family) using standard taxonomic keys for the geographic area;
- Evidence of fishing activity, such as trawl scars, pots, and working nets; and
- Presence of derelict fishing gear, military expended materials, shipwrecks, cultural artifacts, or other anthropogenic marine debris.

All still images from videos were classified according to NMFS-modified CMECS substrate component categories (FGDC, 2012; NMFS, 2021), which focuses closely on details of grain size and composition to describe benthic habitats and is being used to define complex and potentially valuable fish habitats. The BOEM Benthic Habitat Survey guidelines (BOEM, 2019) also require that the developer characterize the benthic community composition which includes documentation of abundance, diversity, percent cover, and community structure. The following were recorded when present and identifiable:

- Characterization and delineation of any submerged aquatic vegetation (seagrass or macroalgae) that occurs within the area of potential adverse effect;
- Characterization and delineation of any hard-bottom gradients of low to high relief such as coral (heads/reefs), rock or clay outcroppings, or other shelter-forming features; and
- Identification of communities of sessile and slow-moving marine invertebrates (clams, mussels, polychaete worms, anemones, sponges, echinoderms) that may be within the area of potential adverse effect.

2.3.2 Methods

Transect videos were reviewed in their entirety and any notable seafloor features or epifaunal/benthic/demersal species greater than 4 cm in size (roughly equal to 1.5 times the distance between the laser points) were recorded. When a feature or species was identified, the reviewer recorded the time, rated video visibility at that time, categorized the bottom, and recorded the lowest practical taxonomic level (LPTL) of the feature. Some features were enumerated whereas others were marked as present or absent and further quantified in the second separate step of video review (see next paragraph below). The abundances of enumerable megafauna were recorded along with presence/absence of benthic biotic activity, submerged aquatic vegetation (macroalgae, sea grass), fishing activity, derelict gear, military expended materials, shipwrecks, coral heads/reefs, rock outcroppings, other shelter features, and other marine debris. Specifically, submerged aquatic vegetation, bushy plant-like organisms (i.e., presumably hydrozoa or bryozoa but potentially macroalgae), eelgrass, blue mussels, oysters, sponges, slipper shells (i.e., *Crepidula fornicata*), encrusting organisms, northern star coral (*Astrangia poculata)*, and sand dollars (*Echinarachnius parma)* were marked as present or absent while other qualifying features were enumerated. Most portions of the videos were reviewed multiple times using slower playback speeds and replay functions.

For the first two transects completed, EW2-12 and EW2-2, The time lapse was set on the GoPro to take an image every 2 seconds, after review of the number of useable images from these transects, the time lapse was set to take an image every second. Still images were then subset by the start and end time of the transect and at an interval of every tenth image. Metadata were recorded for each still image including latitude and longitude, time, transect, and ID number. The quality of each image was assessed with a categorical scale of visibility from 0 to 4. Still images with quality scores of “moderate” (2 or greater) were considered passing and analyzed with seabed image processing software photoQuad (Trygonis and Sini, 2012). Each image was calibrated for scale using the reference laser points and the area (cm^2) of the visible portion was recorded, with poorly lit or blurry edges of passing images excluded from the area of analysis.

To inform CMECS classification of bottom habitat, 50 points were distributed uniformly across the entire visible portion of each passing still image using photoQuad. Percent cover data were recorded as the number of points under which different substrate types were visible: boulder, cobble, pebble/granule, sand/mud, or biogenic-origin shells or large worm tube structures (see size definitions in Table 2-1). In addition, other “biological elements” were recorded if present and visible in each image, including infaunal structures (e.g., small worm or amphipod tubes), larger tube structure made by decorator worms (*Diopatra cuprea*), burrows (e.g., crab depressions or clam siphon holes), mobile megafauna (e.g., Cancer crabs, hermit crabs, benthic or demersal fish), Codium or other algae, encrusting organisms (e.g., sponges), sand dollars, mussel beds, eelgrass, and bushy plant-like organisms that were grouped together for identification purposes (e.g., hydrozoa, bryozoa, branching algae).

These point counts approximated percent cover of each substrate type in the still image, which was used to assign the appropriate substrate classifications of the habitat to the furthest extent possible under a NMFS-modified (NMFS, 2021) version of CMECS (FGDC, 2012). This system discerns substrate components by origin (e.g., geologic mineral, biogenic material, or anthropogenic material) and size groups, based primarily on the percent cover of coarse, gravel-sized particles (pebble/granule, cobble, and boulder) versus fine sand/mud, or the size category of shells (reef, rubble, and hash). Some images had a substantial amount of biological element cover (also referred to as flora/fauna throughout this report) that was removed from the percent cover calculations in order to accurately determine the percent of visible substrate composing gravel, sand, shells, etc. After the main CMECS classification for the substrate component in each image was defined, a secondary or co-occurring substrate type was defined to provide further detail and delineate between habitats. For example, if the main CMECS classification defined the dominant substrate type as geologic origin, then the secondary CMECS classification would contain information about substrates of biogenic or anthropogenic origin if they were also present. These classifications were assigned for the visible surface area of each image and then summarized at the transect level.

Table 2-1. CMECS geologic sediment size, biogenic or anthropogenic size, and percent cover categories (*from FGDC, 2012).

Geologic Sediment Category	Definition	Biogenic or Anthro Size Category	Definition	Biogenic Cover Density	Adapted Definition*
Bedrock	> 4,096 mm	Reef	> 4,096 mm	Trace	≤ 2%
Boulder	256 – 4,096 mm	Rubble	64 – 4,096 mm	Sparse	> 2 – 30%
Cobble	64 – 256 mm			Moderate	30 – 70%
Pebble / Granule	2 – 64 mm	Hash	2 – 64 mm	Dense	70 – 90%
Sand / Mud	< 2 mm	Sand or Bits	< 2 mm	Complete	> 90%

The CMECS biotic component based on towed video data was determined using a combination of the still image biological element percent cover data and video review enumeration data. The percent cover data were considered first to determine the appropriate CMECS biotic classifications with enumeration data used to determine which megafauna species were most dominant when megafauna covered the first or second largest area within the transect. Large megafauna were excluded as were dominate enumerated species with fewer than three individuals per transect.

2.4 Benthic Macroinvertebrate Data Post-Processing

Benthic macroinvertebrate community statistics were calculated using family or next-lowest practical taxonomic level (NLPTL) abundance estimates in each sample, which were reported as count per 0.04 m^2 (area of benthic macroinvertebrate sample). Community composition parameters included: total abundance, number of phyla, number of taxa, Margalef's Richness Index, Shannon Diversity Index, and Pielou's Index of Evenness for each station in the sampling area.

2.4.1 Taxonomic Composition

Benthic macroinvertebrate taxonomic composition was assessed to characterize the high-level trends in taxa data. Community composition includes the relative proportions of taxonomic groups by number of identifiable taxa and number of individuals and was used to evaluate dominance of common phyla across all samples. Taxonomic composition was summarized for each station across the sampling area, aggregated at both phylum-level and family or NLPTL.

2.4.2 Richness, Diversity, and Evenness

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

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

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

Where:

S= the number of unique taxa

N= the total number of individuals in the sample

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

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

Formula 2. H'- Shannon Diversity Index.

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

Where:

p_i = the proportion of individuals belonging to the taxa I in the dataset of interest

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

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

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

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

Where:

H' = the Shannon- Weiner Diversity Index

H_{Max} = the maximum possible value of H', where each taxon occurs in equal abundances.

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

Where: s = Number of taxa

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

The Shannon-Weiner Diversity index was also applied to the enumerated species from the video review on a per-transect basis with observations recorded to the level of phylum or NLPTL.

2.4.3 Biotic Component

Data acquired from the grab samples were used to inform the CMECS biotic component, which is the classification of living flora and fauna on or within the seabed with their physical environment associations (FGDC, 2012). Taxonomic lab data were evaluated to determine the CMECS classification hierarchy for the biotic component, which includes the biotic setting, class, subclass, co-occurring subclass, group, and co-occurring group. The finer detailed biotic community and co-occurring communities were defined for some samples where possible. Unique taxa from each grab sample were sorted into broad functional groups (i.e., burrowing, tube-building, small clam, etc.), based on the biotic groups listed in CMECS and the sizes of certain organisms. The assigned classifications were based on the first and second most dominant functional group for each station, with field photos consulted in a secondary assessment to determine sizes.

3 RESULTS

3.1 Video Analysis

3.1.1 Transect Locations

The characteristics and locations of the five completed underwater video transects within the sampling area are described in Table 3-1 and shown in Figure 3-1. Due to very turbid conditions, 7 of the proposed 12 transects failed after repeat attempts to obtain passing video and still image quality.

Table 3-1. Underwater video transect locations in the sampling area.

Transect	Date	Recorded Duration (min:sec)	Start Latitude (DD)	Start Longitude (DD)	End Latitude (DD)	End Longitude (DD)	Total # Stills	# Analyzed Stills
EW2-02-UWV-1	05/04/2021	32:01	40.5511	-73.6215	40.55266	-73.6147	97	65
EW2-06-UWV-2	05/05/2021	24:13	40.55771	-73.6452	40.56206	-73.6409	146	47
EW2-07-UWV-1	05/04/2021	40:10	40.55275	-73.6345	40.55303	-73.6274	242	128
EW2-11-UWV-2	05/05/2021	22:40	40.57466	-73.6218	40.57531	-73.6148	137	65
EW2-12-UWV-1	05/04/2021	29:45	40.54934	-73.6235	40.54827	-73.6166	90	65

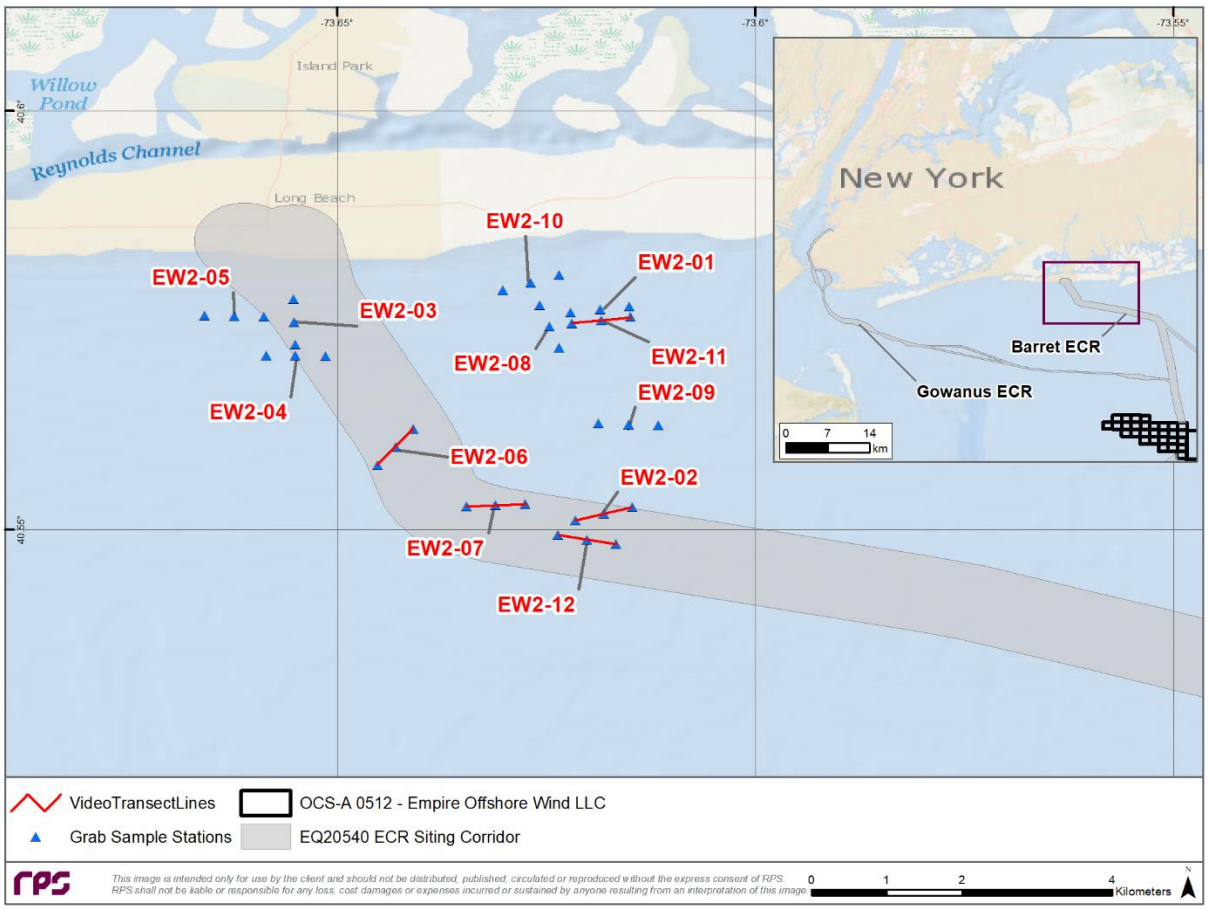


Figure 3-1. Map of video transects (red) and grab sample sites (blue) in the sampling area, labeled by transect/station number.

3.1.2 Organisms and Features

The abundance of enumerable features greater than four cm were recorded during the video review process. Organisms were identified to the LPTL, usually to order or family. A total of 142 features, including 126 organisms from 5 phyla (Table 3-2, Figure 3-2, Figure 3-3), were identified and recorded within the five transects. The most numerous organisms observed were moon snails, composing ~70% of all organism.

The total observed organisms comprised 14 vertebrates from 7 unique LPTLs in 2 orders (Figure 3-5) and 112 invertebrates from 8 unique LPTLs in five classes (Figure 3-6). An additional 16 other observations were recorded: 13 unidentified organisms, and 3 unidentified objects (unclear if living). Unidentified organisms and objects were the result of high turbidity obscuring visibility.

The presence or absence of other qualifying features (i.e., habitat features of note or species that were quantified by their percent cover of the seafloor rather than through enumeration [see Section 2.3.2 for full list]) ranged from absent in all transects (i.e., eelgrass, corals, fish) to present in all 5 transects (i.e., polychaete worms; Figure 3-7).

For representative images of some observed species see Table 3-4 and for complete reviewer notes see Appendix B.

Table 3-2. Megafauna and other enumerated features observed during review of the video transects (continued next page).

Common Name	Lowest Taxonomic Level	EW2-					
		2	6	7	11	12	**Total**
Invertebrate							
Anemone, burrowing	Anthozoa	1	2	3	-	-	6
Clam, surf	Spisula solidissima	-	-	1	1	-	2
Crab, cancer	Cancer	-	2	1	-	1	4
Crab, hermit	Pagurus		3	-	-		3
Crab, spider	Libnia	3	-	1	1	2	7
Crab, unidentified	Decapoda	-	-	-	1	-	1
Moon snail	Naticidae	15	14	27	1	31	88
Worm, unidentified	Polychaeta	-	-	1	-	-	1
Vertebrate							
fish, unidentified	Chordata	-	-	1	-	-	1
fish, unidentified (bony)	Teleostei	-	3	-	-	-	3
sea bass, black	Centropristis striata	1	-		-	-	1
skate	Rajidae	2	-	-	1	1	4
skate, egg case	Rajidae	-	-	-	1	-	1
skate, little or winter	Leucoraja	-	1	-	-	-	1
skate, winter	Leucoraja ocellata	-	-	-	-	3	3
Unidentified or Non-Living							
object, unidentified	object, unidentified	2	-	-	1	-	3
organism, unidentified	organism, unidentified	-	5	8	-	-	13
Total Organisms (Confirmed)		22	26	35	6	38	126
Total Observations		24	31	43	7	38	142

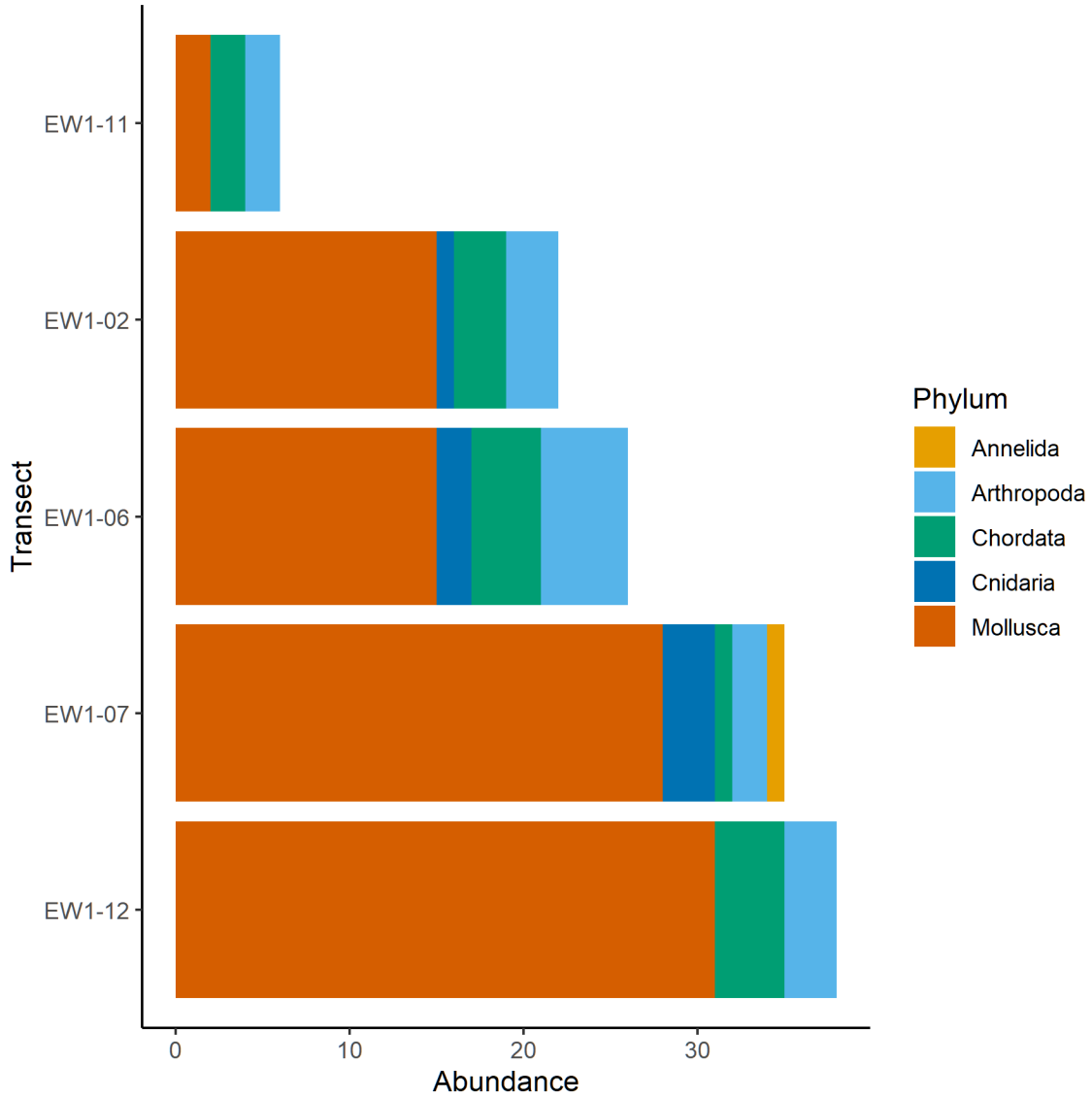


Figure 3-2. Distribution of enumerated organisms larger than 4 cm aggregated by Phylum in each video transect. Organisms not identified to the level of Phylum were excluded. These data include only enumerated species larger than 4 cm. See text for complete explanation of which species were quantified by enumeration versus by percent of bottom cover.

Table 3-3 Shannon-Weiner diversity index values for each Video transect based on observations to the level of family (or NLTPL).

Transect	Diversity
EW2-06-UWV-1	1.68
EW2-07-UWV-1	1.23
EW2-11-UWV-2	1.75
EW2-12-UWV-1	0.65

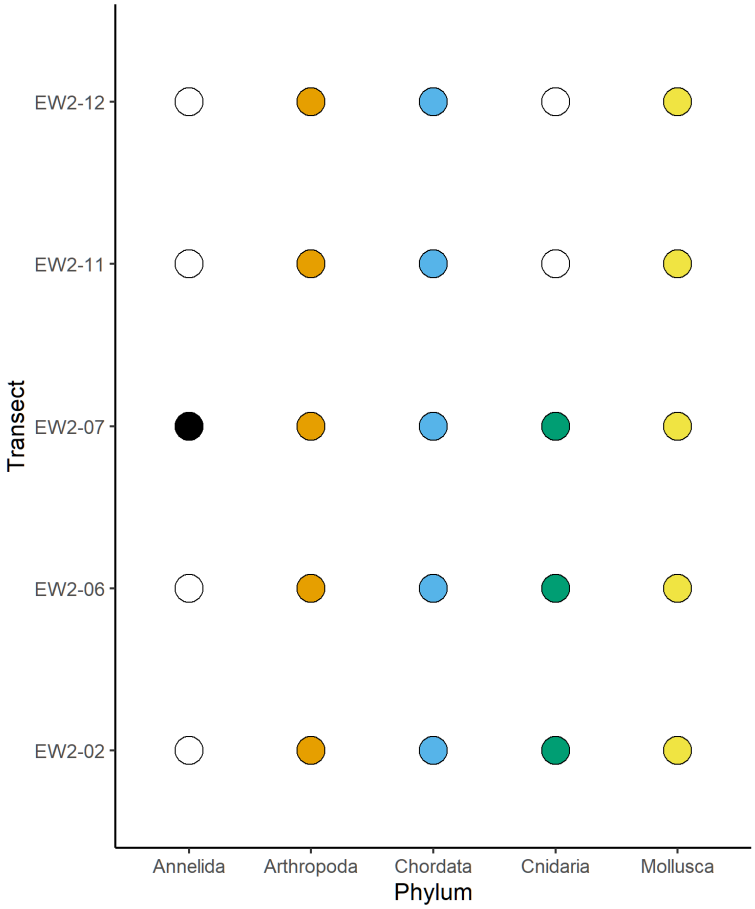


Figure 3-3. Presence (colored) or absence (white) of Phyla in each video transect. These data include only enumerated species larger than 4 cm. See text for complete explanation of which species were quantified by enumeration versus by percent of bottom cover.

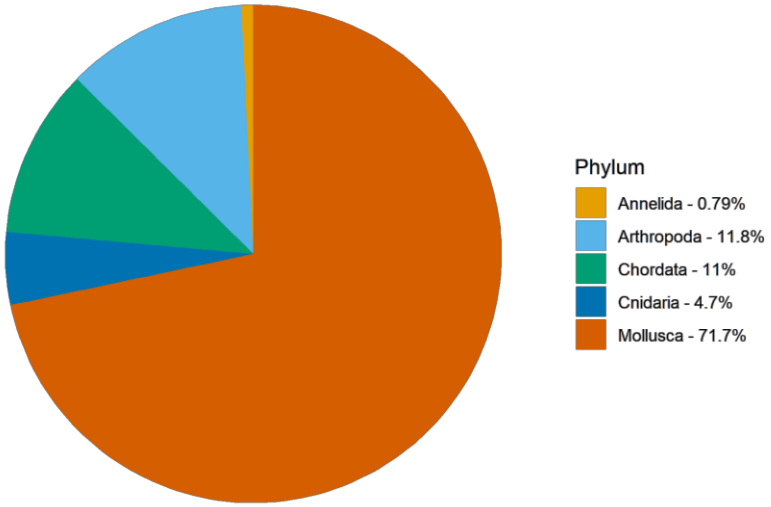


Figure 3-4. Percent composition of enumerated organisms larger than 4 cm aggregated by Phyla in all video transects. Organisms not identified to the level of Phylum were excluded.

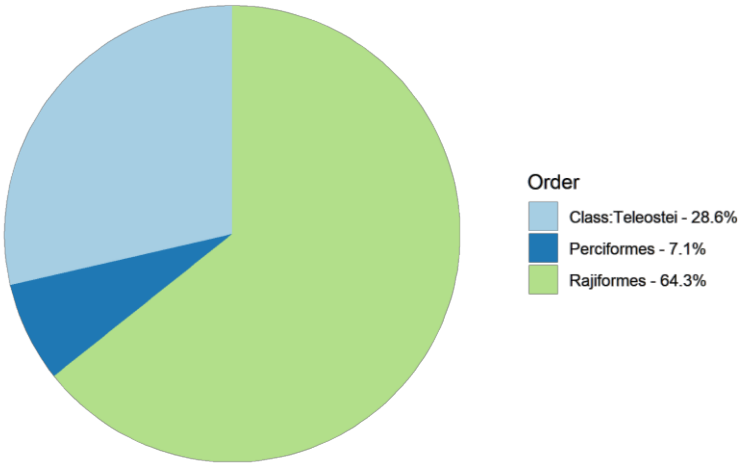


Figure 3-5. Percent composition of enumerated vertebrates (phylum Chordata) larger than 4 cm aggregated by taxonomic level “order” in all video transects. Fishes not identified to the level of order are depicted as Class: Teleostei.

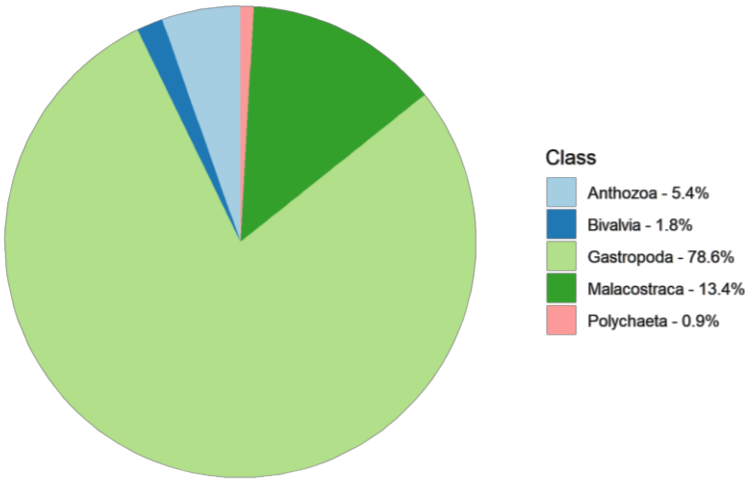


Figure 3-6. Percent composition of enumerated invertebrates larger than 4 cm aggregated by taxonomic level “class” in all video transects.

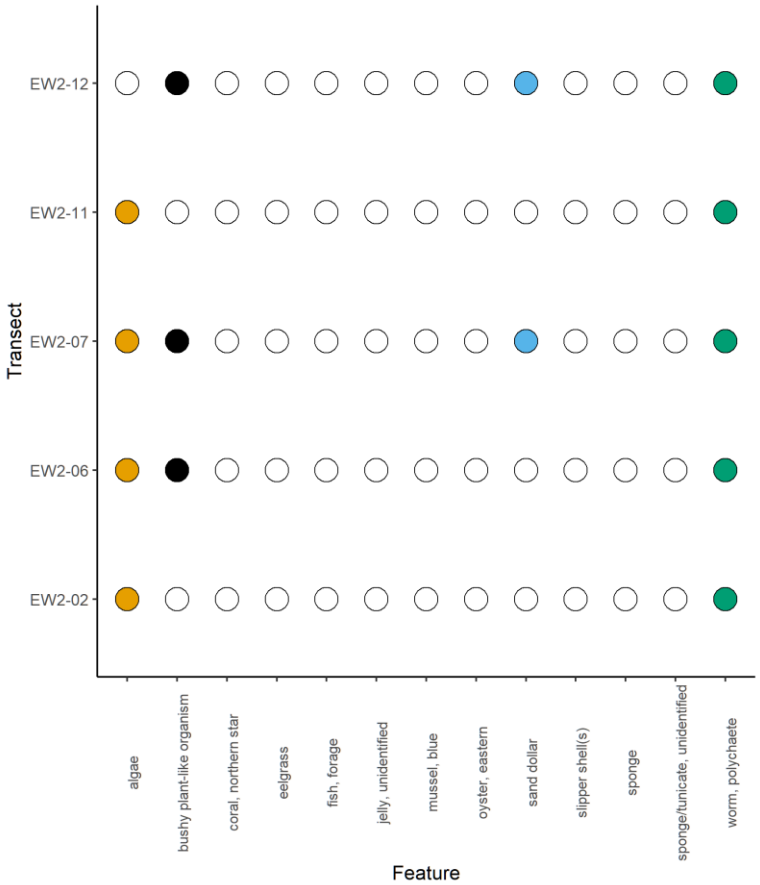
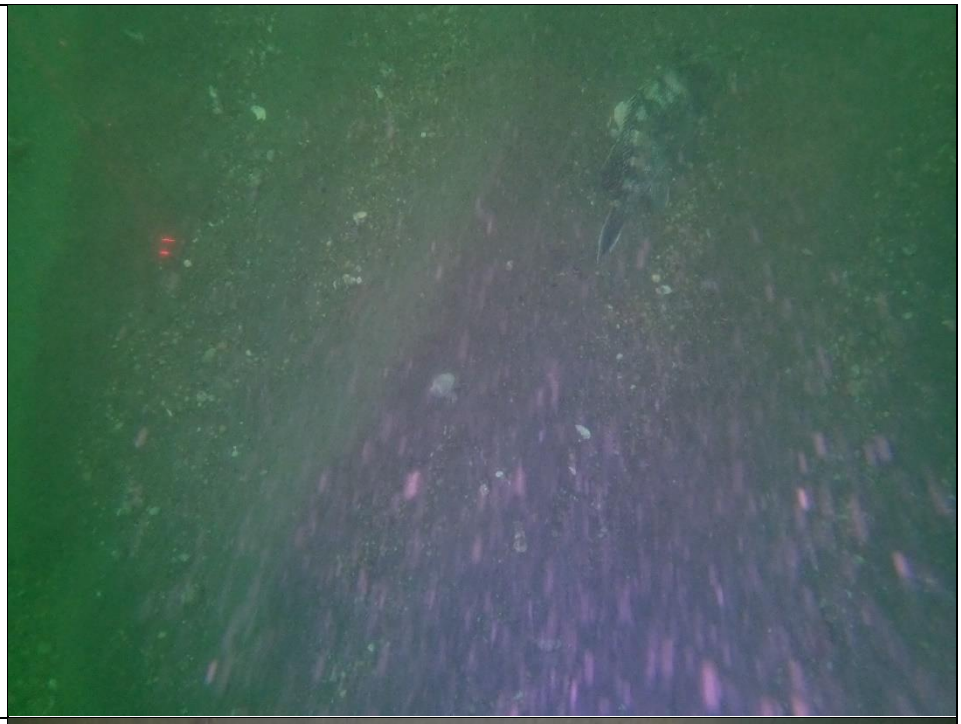
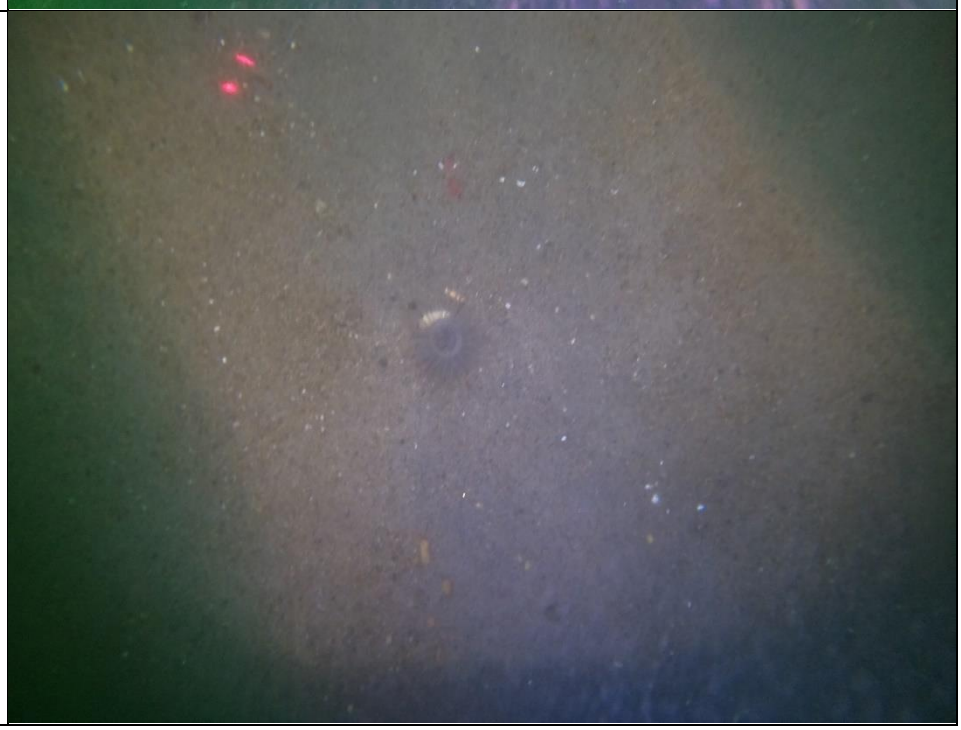
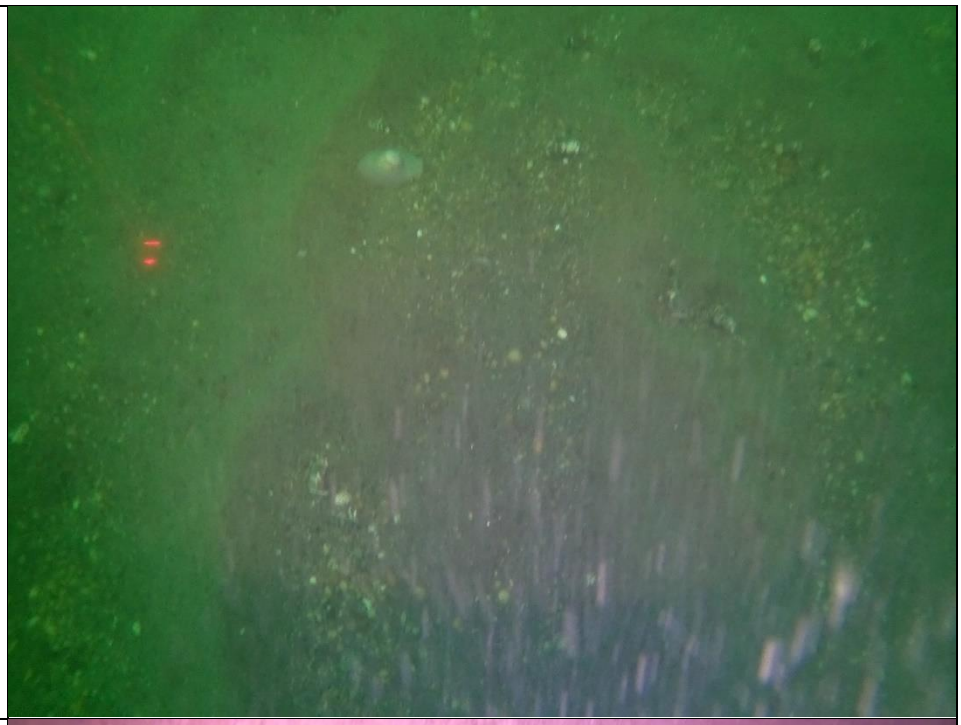
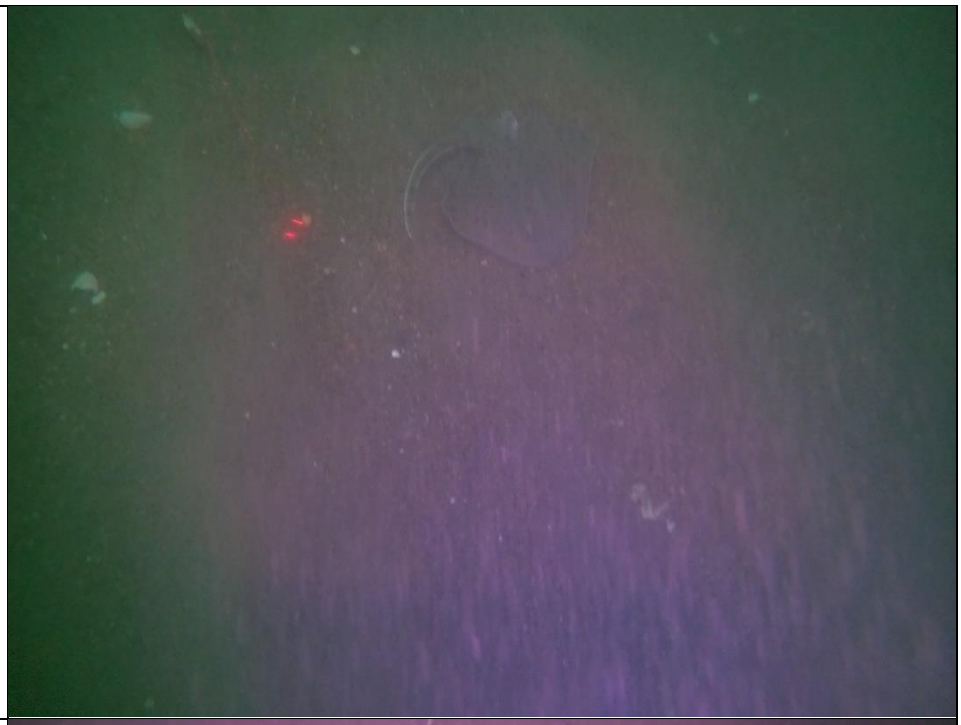


Figure 3-7. Presence (colored) or absence (white) of important features in each video transect. These data only include features that were marked as present or absent and not enumerated. See text for complete explanation of which species were quantified by enumeration versus by percent of bottom cover.

Table 3-4. Representative GoPro still images of megafauna and debris observed and identified along the video transects (continued on next pages).

Black Sea Bass (*Centropristus striata)* EW2-UWV-02-1	
Burrowing Anenomes (*Anthozoa)* EW2-UWV-07-1	

Moon Snail (*Naticidae)* EW2-UWV-02-1	
Spider crab (*Libnia spp.)* EW2-UWV-07-1	

Little or Winter Skate (Leucoraja*)* EW2-UWV-07-1	
Decorator Worm Tubes Smaller worm tubes, with smaller shell fragments, many individuals (*Diopatra spp*) EW2-UWV-07-1	

Decorator Worm Tube Larger worm tube, with larger shell fragments, solitary (*Diopatra spp.*) EW2-UWV-07-1	

3.1.3 Percent Cover

The following section summarizes the results of the percent cover analysis of still images derived from underwater video transects in the ECR project area. Percent cover of various bottom substrates and features within a measured surface area of each image were recorded and used to define the NMFS-modified (NMFS, 2021) CMECS substrate classification that was most suitable for the sampled area. In addition to percent cover of different sediment grain sizes (boulder, cobble, pebble/granule, or sand/mud), the presence of biogenic shell substrate, biogenic worm tube substrate (formed by Sabellarid or Serpulid species), anthropogenic materials, and other biological elements were also recorded. Examples of biological elements include flora (e.g., algae or seagrass), fauna (e.g., mobile megafauna, encrusting species, sand dollars, mussel beds), and evidence of biological activity (e.g., burrows, infaunal structures, decorator worm tubes). Thus, in addition to CMECS classification of the main substrate, the density of co-occurring shell and flora/fauna cover were calculated to illustrate these aspects of habitat complexity. Visual examples of habitat types defined using the still images are presented in the CMECS Classifications section (Section 3.2.2). Differences in the total area classified for each transect were a result of varying total transect lengths and visibility throughout the video.

A total of ~210 m^2 of seafloor was analyzed. The substrate group with the highest percent cover across all transects was fine sand/mud, composing 83% (~174 m^2) of the surface area analyzed through still images for the transects. No transects were less than 50% sand/mud: The average sand/mud coverage across all transects was ~85%. Gravel density >5% (boulder, cobble, and pebble/granule sizes combined) occurred

in two out of the five transects. Transect EW2-02-UWV-1 had the least sad/mud cover (~67% or 31 m^2) and the highest gravel cover (31% or 14 m^2; Table 3-5), all from the pebble/granule size range. Of the total seafloor area analyzed, 14% (30 m^2) comprised gravel substrate. All the gravel analyzed was pebble/granule sized (2 – 64 mm).

Biogenic shell cover accounted for .02% (4 m^2) of the substrate within all transects. None of the transects, had biogenic shell cover above 30% (moderate cover), with the highest at EW2-12-UWV-1 with ~3% (1.5 m^2).

The total area of biological elements (i.e., flora or fauna) sampled was 2 m^2 and accounts for less than 0.1% of the bottom cover (Table 3-6). Floating macroalgae, decorator worm tubes, and megafauna were the most common biological elements, accounting for 53% (1.05 m^2), 25% (0.49 m^2), and 17% (0.34 m^2) of the flora/fauna cover, respectively. The megafauna category contains various crab species, anemones, and fish species etc. detected in the still images. The eelgrass noted in transect EW2-11 was floating and no attached eelgrass was found in the survey. There was no biogenic worm tube substrate cover from reef-building Sabellarid or Serpulid species; however, singular sand/shell tubes created by decorator worms (*Diopatra spp.*) were found in all transects and were counted as a biological element (Table 3-6).

Table 3-5. Area and percent coverage of different substrates summarized from still images taken from each of the five video transects in the sampling area.

Transect	Total Area Analyzed (m^2)	Percent of Area – Gravel Substrates				Sand/Mud (%)	Shell Cover (%)	Organic Debris - Wood (%)	Anthrop-ogenic Debris (%)	Flora/ Fauna Cover (%)
		Boulder (%)	Cobble (%)	Pebble/ Granule (%)	All Gravel Combined (%)					
EW2-02	45.7	0	0	30.79	30.79	67.70	1.06	0	0	0.46
EW2-06	21.75	0	0	0.93	0.93	97.21	1.61	0	0	0.25
EW2-07	65.91	0	0	2.44	2.44	94.70	2.02	0	0	0.84
EW2-11	26.05	0	0	0	0	94.70	1.15	0	0	4.16
EW2-12	50.51	0	0	27.29	27.29	69.57	2.94	0	0	0.21
Total Area (m^2)	209.92	0	0	0	29.66	174.31	3.95	0	0	2

Table 3-6. Area and percent coverage of different biological elements (i.e., flora/fauna) observed within still images taken from each of the five video transects in the sampling area.

Transect	Flora/ Fauna Area (m2)	Burrows (%)	Infaunal Structures (%)	Algae (%)	Eel-grass (%)	Bushy Plant-like Orgs. (%)	Encrusting Orgs. (%)	Mega-fauna (%)	Sand Dollars (%)	Mussel Bed (%)	Decorator Worms (%)
EW2-02	0.21	0	0	0	0	0	0	0.38	0	0	0.08
EW2-06	0.05	0	0	0.02	0	0	0	0.23	0	0	0
EW2-07	0.55	0	0	0	0	0	0	0.12	0.08	0	0.64
EW2-11	1.08	0	0	3.88	0.04	0.24	0	0	0	0	0
EW2-12	0.11	0	0	0.07	0	0	0	0.07	0	0	0.07
Total Flora/Fauna Area (m^2)	**2**	**0**	**0**	**1.05**	**0.01**	**0.06**	**0**	**0.34**	**0.05**	**0**	**0.49**

3.2 Grab Samples

3.2.1 Station Locations

The characteristics and locations of the 36 grab sample stations are described in Table 3-7 and shown in Figure 3-1. Sediment samples were collected for each station; however, some samples had penetration depths below the 7 cm cutoff (as stated in the project execution plan) but were accepted on the final grab attempt with confirmation from the Client Representative.

Table 3-7. Location and characteristics of grab samples collected in the sampling area (continued on next page).

Sample	Date (UTC)	Time (UTC)	Latitude (DD)	Longitude (DD)	Water Depth (m)	Sample Penetration Depth (mm)
EW2-01-A1	5/3/2021	19:06:09	40.576252	-73.618505	8	97
EW2-01-E2	5/3/2021	19:41:24	40.576648	-73.614992	8	50
EW2-01-W2	5/3/2021	18:41:01	40.575878	-73.622015	9	60
EW2-02-A1	5/2/2021	18:57:08	40.551858	-73.618050	13	89
EW2-02-E1	5/2/2021	18:36:06	40.552670	-73.614665	14	70
EW2-02-W1	5/2/2021	19:17:31	40.551087	-73.621450	14	78
EW2-03-A3	5/2/2021	13:28:07	40.574778	-73.655098	9	45
EW2-03-E1	5/2/2021	13:44:56	40.572097	-73.654995	10	74
EW2-03-W3	5/2/2021	12:46:29	40.577490	-73.655217	8	55
EW2-04-A1	5/2/2021	14:22:30	40.570737	-73.654955	10	80
EW2-04-E1	5/2/2021	15:10:54	40.570722	-73.651337	11	90
EW2-04-W1	5/2/2021	14:03:28	40.570803	-73.658445	10	74
EW2-05-A1	5/2/2021	11:25:03	40.575460	-73.662262	9	91
EW2-05-E1*	5/2/2021	12:05:40	40.575372	-73.658735	9	127
EW2-05-W1	5/2/2021	11:00:53	40.575573	-73.665823	8	95
EW2-06-A1	5/2/2021	15:50:06	40.559877	-73.642975	12	99
EW2-06-E1	5/2/2021	15:29:09	40.562022	-73.640865	12	95

Sample	Date (UTC)	Time (UTC)	Latitude (DD)	Longitude (DD)	Water Depth (m)	Sample Penetration Depth (mm)
EW2-06-W1	5/2/2021	16:14:48	40.557682	-73.645103	13	86
EW2-07-A1	5/2/2021	16:54:13	40.552882	-73.630998	14	70
EW2-07-E1	5/2/2021	17:13:01	40.553033	-73.627443	13	70
EW2-07-W1	5/2/2021	16:36:00	40.552772	-73.634520	13	78
EW2-08-A2	5/2/2021	21:56:35	40.574278	-73.624557	8	70
EW2-08-E2	5/2/2021	21:30:54	40.571712	-73.623383	8	45
EW2-08-W1	5/2/2021	22:16:16	40.576802	-73.625745	7	70
EW2-09-A4	5/2/2021	20:35:31	40.562487	-73.615128	11	50
EW2-09-E2	5/2/2021	21:03:12	40.562428	-73.611550	11	65
EW2-09-W3	5/2/2021	19:54:00	40.562680	-73.618677	10	60
EW2-10-A2	5/3/2021	17:31:19	40.579482	-73.626782	8	60
EW2-10-E2	5/3/2021	18:03:18	40.580382	-73.623432	7	103
EW2-10-W2	5/3/2021	17:00:12	40.578613	-73.630137	8	70
EW2-11-A1	5/3/2021	20:25:29	40.574982	-73.618342	8	75
EW2-11-E1	5/3/2021	20:00:10	40.575368	-73.614848	9	60
EW2-11-W3	5/3/2021	20:46:44	40.574618	-73.621863	8	60
EW2-12-A1	5/2/2021	17:54:08	40.548805	-73.620062	14	98
EW2-12-E1	5/2/2021	18:16:35	40.548287	-73.616592	14	70
EW2-12-W1	5/2/2021	17:31:34	40.549322	-73.623563	14	85

*Navigation log says E3 due to two mechanical fails

3.2.2 Sediment Analysis

The following section presents grab sample grain size composition results from the TerraSense, LLC lab analysis. There were 36 grabs across the EW2 sampling area analyzed. The majority of sites were sandy with 58% of samples medium sand or finer (Table 3-8). There were 12 samples which contained ≥ 5% gravel (> 2 mm particles), which designates them as complex habitat under the NMFS (2021) modified CMECS guidelines. Of the samples designated as complex, 10 had ≥ 30% gravel (EW2-02-A1, EW2-02-W1, EW2-03-E1, EW2-04-A1, EW2-04-E1, EW2-05-E1, EW2-06-W1, EW2-07-A1, EW2-07-W1, EW2-12-E1). There were no cobbles or boulders in the grab samples (> 64 mm). Fine silt and clay particles (< 0.075 mm) composed 0.8 –21.9% of each sample (mean of 5.14%), with no samples containing ≥ 30% silt and clay (Figure 3-8).

Total organic carbon (TOC) percentages ranged from 0.1 – 1.6%, with an average of 0.3%. No samples were above 3% TOC. The majority of samples (34 of 36) had less than 1% TOC.

Table 3-8. Grain size composition from grab samples collected along the EW2 (continued on next page).

Station	Boulder % (256-4096 mm)	Cobble % (76-256 mm)	Pebble/ Granule % (2-76 mm	Very Coarse Sand % (1-2 mm)	Coarse Sand % (0.5-1 mm)	Medium Sand % (0.25-0.5 mm)	Fine Sand % (0.125-0.25 mm)	Very Fine Sand % (0.075-0.125 mm)	Silt/Clay % (< 0.075 mm)	d50 (mm)	Total Organic Carbon (%)
EW2-01-A1	0	0	0	0.4	20.7	69.4	4.5	3.3	1.7	0.41	0.2
EW2-01-E2	0	0	3.6	0.3	1	5.2	53.5	32.3	4.1	0.16	0.2
EW2-01-W2	0	0	0.2	0.1	2	8.8	35.5	47.7	5.7	0.12	0.2
EW2-02-A1	0	0	33.8	18.7	38.6	4.5	1.6	1	1.8	1.07	0.2
EW2-02-E1	0	0	0.6	0.2	0.6	5.1	47.8	40	5.7	0.13	0.3
EW2-02-W1	0	0	52.2	7.7	23	14	1.1	0.8	1.2	2.3	0.4
EW2-03-A3	0	0	0	0.5	1.2	1.8	27.3	59.4	9.8	0.1	0.3
EW2-03-E1	0	0	51	9.2	26.6	3.8	2	4.3	3.1	2.14	0.3
EW2-03-W3	0	0	0.1	1.8	1.9	2.1	36.8	48.4	8.9	0.11	0.3
EW2-04-A1	0	0	37.4	9	33.4	16.7	1	0.7	1.8	0.81	0.2
EW2-04-E1	0	0	47.5	14.4	29.9	4.3	1.1	0.9	1.9	1.74	0.3
EW2-04-W1	0	0	0.5	1.6	13.8	68.7	8.9	2.8	3.7	0.36	0.2
EW2-05-A1	0	0	0.2	0.9	25.9	60.5	4.8	2.9	4.8	0.41	0.2
EW2-05-E1	0	0	58.5	21.3	10.9	4.2	0.7	2.1	2.3	2.55	0.2
EW2-05-W1	0	0	4.8	4.8	37.6	44.9	2	1	4.9	0.47	0.2
EW2-06-A1	0	0	24.1	9.5	23.8	24	7.4	2.4	8.8	0.62	0.9
EW2-06-E1	0	0	0.1	0.3	1.1	9.2	41.2	26.2	21.9	0.13	1.6
EW2-06-W1	0	0	32.9	12.8	18.9	26.6	6.1	0.8	1.9	0.76	0.2
EW2-07-A1	0	0	47.3	5.3	16.7	24	4.5	1.4	0.8	1.41	0.1
EW2-07-E1	0	0	0.4	0.9	4.4	39.2	43.4	8.3	3.4	0.22	0.2
EW2-07-W1	0	0	42.5	11.2	23.4	17.4	2.7	0.8	2	1.32	0.3
EW2-08-A2	0	0	0.1	0.2	1	4.2	30.3	57.7	6.5	0.11	0.2
EW2-08-E2	0	0	0	0.2	0.9	4.6	30.3	56.9	7.1	0.11	0.3
EW2-08-W1	0	0	0.1	0.2	2.1	6.2	33.8	51.2	6.4	0.12	0.3
EW2-09-A4	0	0	0.3	0.4	2.1	20.1	38.3	33.9	4.9	0.15	0.6
EW2-09-E2	0	0	0.1	0.2	0.8	8.8	30.6	51.4	8.1	0.11	0.3
EW2-09-W3	0	0	0.3	1	4.7	13.4	34.2	40.7	5.7	0.14	0.3
EW2-10-A2	0	0	0.2	0.2	1.4	14.2	43.4	30.9	9.7	0.13	0.6
EW2-10-E2	0	0	0.3	1.3	40.4	50.6	3.8	1.7	1.9	0.44	0.1
EW2-10-W2	0	0	0.2	0.7	2.5	3.7	30.3	49	13.6	0.11	1.3
EW2-11-A1	0	0	0.2	0.2	1.2	37.6	48.6	10.1	2.1	0.22	0.2
EW2-11-E1	0	0	0.3	0.1	0.3	3.4	61.2	30	4.7	0.15	0.2
EW2-11-W3	0	0	0.3	0.2	2.3	9.1	39	43.4	5.7	0.13	0.3
EW2-12-A1	0	0	12.4	3.2	26.8	46.1	8.3	0.7	2.5	0.44	0.2
EW2-12-E1	0	0	47.4	14.2	20.7	11.7	2	0.6	3.4	1.74	0.4
EW2-12-W1	0	0	1.9	1.3	11.6	64.2	16.5	1.9	2.6	0.33	0.1

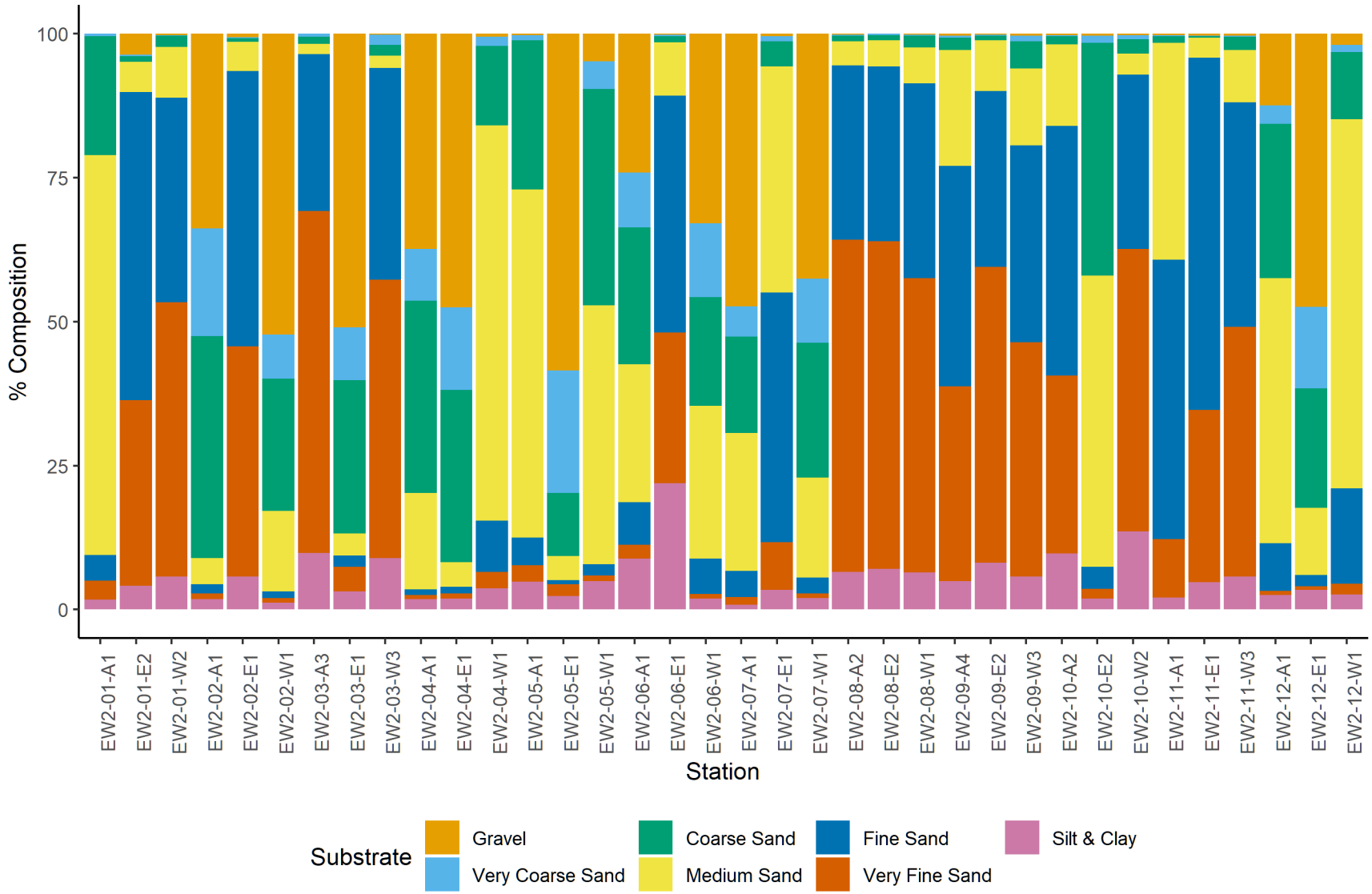


Figure 3-8. Grain size composition at each grab sample station collected along the EW2.

3.2.3 Benthic Community Analysis

3.2.3.1 Taxonomic Composition

Grab samples were attempted at 12 stations, with 3 replicate grabs taken at each station for a total of 36 samples for infaunal macroinvertebrate analysis. The 36 successful grab samples yielded a total of 3,084 individual organisms (i.e., per all 36 0.04 m^2 samples). Organisms collected in this survey area were from eight unique phyla comprising 55 families or NLPTL (Table 3-9). The Phyla Annelida, Arthropoda, and Mollusca dominated both the abundance and unique taxa in samples, representing 99% of all organisms and 91% of the taxa identified (Figure 3-9).

Sample abundance across the 36 benthic grab samples ranged from 2 organisms in EW2-12-A1 to 303 in EW2-07-E1 (Table 3-10). Polychaete worms from the family Polygordiidae had the highest abundance of any organism identified, with 736 identified in 18 of the 36 samples. Amphipods from the family Aoridae and Mussels from the family Mytilidae were also numerous with a total of 616 individuals identified in 13 samples and 519 individuals identified in 18 of the 36 samples respectively. The percent composition of each sample by phyla is shown in Figure 3-10 and abundance of unique taxa is presented in Table 3-11.

Table 3-9. Phyla present in the 36 benthic grab samples collected in the sampling area. The density values represent abundance summed across all 0.04 m^2 samples.

Phylum	Abundant Taxonomic Groups (common names)	Sample Abundance	Number of Families (or NLPTL)
Annelida	Polychaetae worms	1,673	22
Arthropoda	Amphipods, isopods, hermit crabs	803	18
Mollusca	Nut Clams, pyramid shells, slipper snails, tellins	599	10
Nemertea	Ribbon worms	4	1
Chordata	Sea squirts	1	1
Cnidaria	Sea anemones	2	1
Echinodermata	Sand dollars, sea urchins, sea cucumbers	1	1
Platyhelminthes	Flat worms	1	1
Total		3,084	55

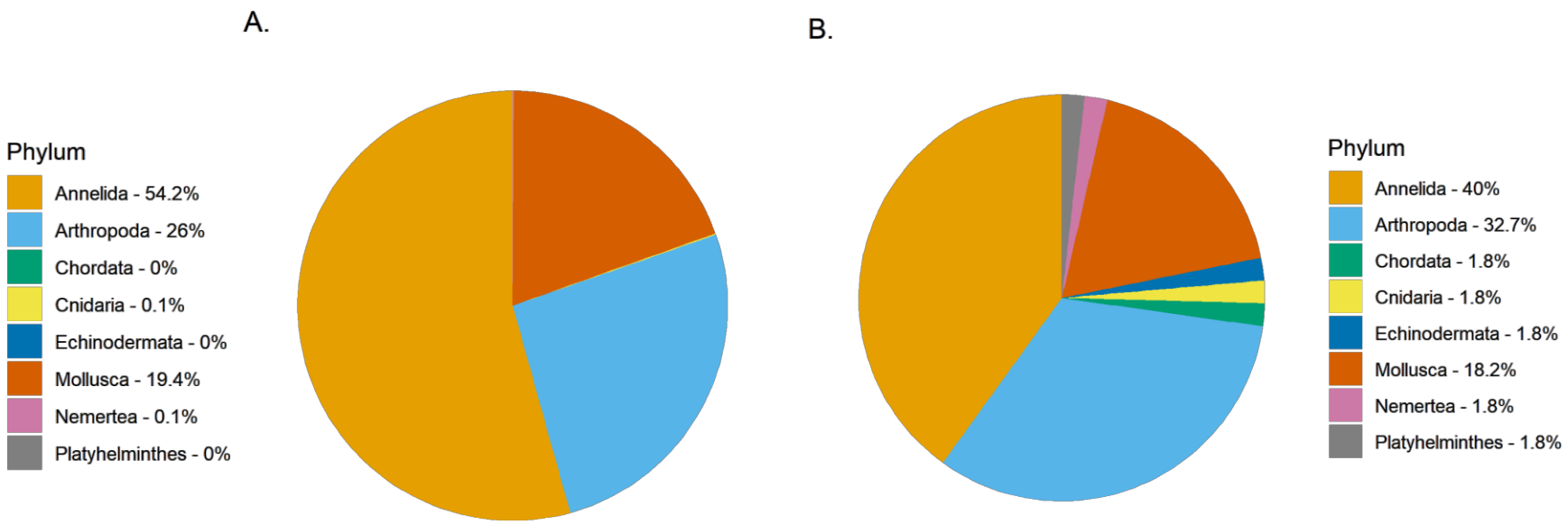


Figure 3-9. Proportional abundance (A) and proportion of unique taxa (family or NLPTL) (B) for each phylum collected in all benthic grab samples in the sampling area. Results presented as percentage of total

Table 3-10. Abundance of each Phylum counted within each grab sample collected in the sampling area (continued on next page).

Station	Annelida	Arthropoda	Chordata	Cnidaria	Echinodermata	Mollusca	Nemertea	Sipuncula	Sample Abundance (per 0.04 m^2)
EW2-01-A1	2	3	0	0	0	3	0	0	8
EW2-01-E2	4	7	0	0	0	11	2	0	24
EW2-01-W2	44	7	0	0	0	6	0	0	57
EW2-02-A1	41	2	0	0	0	1	0	0	44
EW2-02-E1	115	10	0	0	0	8	0	0	133
EW2-02-W1	41	1	0	0	0	1	0	0	43
EW2-03-A3	69	9	0	0	0	8	0	0	86
EW2-03-E1	130	0	0	0	0	0	0	0	130
EW2-03-W3	9	1	0	0	0	7	0	0	17
EW2-04-A1	100	1	0	0	0	0	0	0	101
EW2-04-E1	4	0	0	0	0	0	0	0	4
EW2-04-W1	12	48	0	0	0	1	0	0	61
EW2-05-A1	27	2	0	0	0	2	0	0	31
EW2-05-E1	224	31	0	0	0	0	0	0	255
EW2-05-W1	64	0	0	0	0	0	0	0	64
EW2-06-A1	97	64	0	0	0	4	0	0	165
EW2-06-E1	67	1	0	0	0	18	0	0	86
EW2-06-W1	24	11	1	0	0	2	0	0	38
EW2-07-A1	202	50	0	0	0	1	0	0	253
EW2-07-E1	3	300	0	0	0	0	0	0	303
EW2-07-W1	48	0	0	2	0	0	0	0	50
EW2-08-A2	52	7	0	0	1	186	0	0	246
EW2-08-E2	17	5	0	0	0	6	0	0	28
EW2-08-W1	12	2	0	0	0	25	0	0	39
EW2-09-A4	29	9	0	0	0	24	0	1	63
EW2-09-E2	48	11	0	0	0	163	0	0	222
EW2-09-W3	62	13	0	0	0	57	0	0	132
EW2-10-A2	18	2	0	0	0	6	0	0	26
EW2-10-E2	10	13	0	0	0	5	0	0	28
EW2-10-W2	45	5	0	0	0	44	0	0	94
EW2-11-A1	1	41	0	0	0	0	0	0	42
EW2-11-E1	7	6	0	0	0	5	0	0	18
EW2-11-W3	31	4	0	0	0	5	2	0	42
EW2-12-A1	0	2	0	0	0	0	0	0	2
EW2-12-E1	8	0	0	0	0	0	0	0	8
EW2-12-W1	6	135	0	0	0	0	0	0	141
Total	1,673	803	1	2	1	599	4	1	3,084

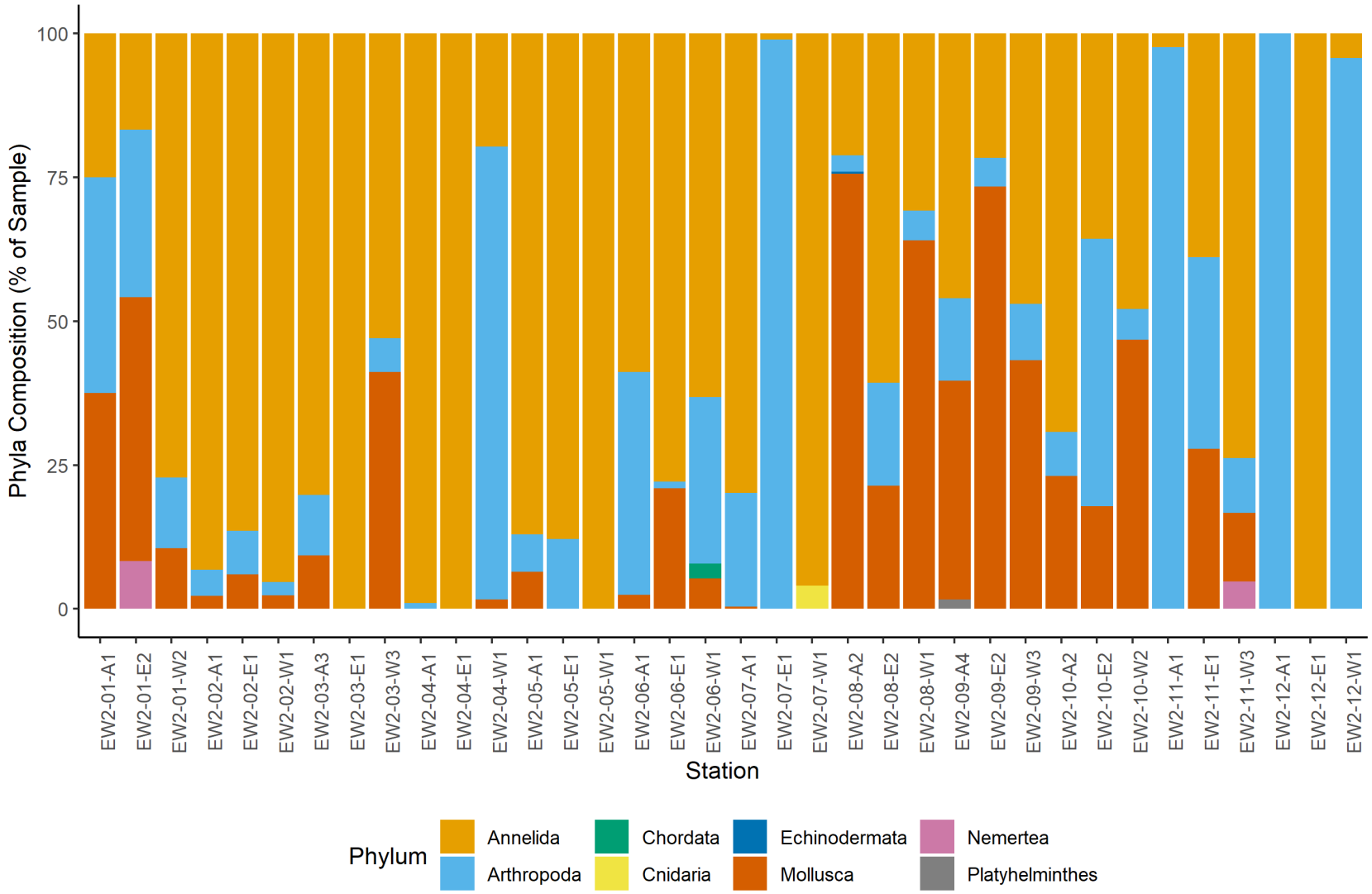


Figure 3-10. Percent composition of organisms in each represented phylum for the 36 benthic grab samples collected in the sampling area.

Table 3-11. Abundance of each phylum and taxon (family or NLPTL) across all grab samples (continued on next page).

Phylum	Family or NLPTL	Abundance Across All Samples	Mean Abundance per 0.04 m^2	Median Abundance per 0.04 m^2	Frequency of Occurrence
Annelida	Ampharetidae	49	1.4	0	11
	Capitellidae	428	11.9	0	16
	Chaetopteridae	1	0	0	1
	Cirratulidae	132	3.7	0.5	18
	Enchytraeidae	58	1.6	0	9
	Flabelligeridae	2	0.1	0	2
	Glyceridae	7	0.2	0	6
	Magelonidae	2	0.1	0	2
	Naididae	69	1.9	0	14
	Nephtyidae	40	1.1	0	15
	Oenonidae	4	0.1	0	4
	Onuphidae	16	0.4	0	7
	Orbiniidae	2	0.1	0	2
	Paraonidae	10	0.3	0	5
	Phyllodocidae	11	0.3	0	5
	Polygordiidae	736	20.4	0	15
	Polynoidae	1	0	0	1
	Sigalionidae	4	0.1	0	4
	Spionidae	58	1.6	0.5	18
	Syllidae	31	0.9	0	11
	Terebellidae	10	0.3	0	5
	Travisiidae	2	0.1	0	1
Arthropoda	Ampeliscidae	9	0.2	0	2
	Amphipoda	35	1	0	4
	Ancinidae	20	0.6	0	12
	Aoridae	616	17.1	0	13
	Bodotriidae	12	0.3	0	2
	Chaetiliidae	6	0.2	0	3
	Cirolanidae	2	0.1	0	1
	Corophiidae	1	0	0	1
	Cumacea	6	0.2	0	1
	Diastylidae	2	0.1	0	2
	Haustoriidae	42	1.2	0	9
	Idoteidae	23	0.6	0	8
	Oedicerotidae	10	0.3	0	6
	Ovalipidae	1	0	0	1
	Paguridae	1	0	0	1
	Photidae	2	0.1	0	2
	Phoxocephalidae	13	0.4	0	9
	Pinnotheridae	2	0.1	0	1
Chordata	Perophoridae	1	0	0	1
Cnidaria	Actiniaria	2	0.1	0	1
Echinodermata	Echinarachniidae	1	0	0	1
Mollusca	Bivalvia	7	0.2	0	1
	Calyptraeidae	1	0	0	5
	Donacidae	2	0.1	0	1
	Mactridae	9	0.2	0	1
	Mytilidae	519	14.4	0.5	7
	Nassariidae	4	0.1	0	18
	Naticidae	4	0.1	0	2
	Nuculidae	1	0	0	1
	Solenidae	13	0.4	0	1
	Tellinidae	39	1.1	0	8
Nemertea	Nemertea	4	0.1	0	14
Platyhelminthes	Polycladida	1	0	0	2

3.2.3.2 Richness, Diversity, and Evenness

Mean density was 86 organisms per sample, averaged across 36 sample sites in the sampling area (Table 3-12). Taxonomic richness was 1.93, on average, with individual samples ranging from 0 at EW2-05-W1 and EW2-12-A1 to 3.71 at EW2-01-W2 (Figure 3-11). Average diversity across the individual grab samples was 1.28 with a range from 0 at EW2-05-W1 and EW2-12-A1 to 2.08 at EW2-06-W1. Evenness ranged from 0 at EW2-05-W1 and EW2-12-A1 to 0.95 at EW2-01-A1, which consisted of eight organisms from four families (or NLPTL). Mean evenness across the 36 samples was 0.60. Richness, diversity, and evenness are unitless indices; however, higher values indicate greater amounts of richness, diversity, or evenness in each sample.

Table 3-12. Community composition parameters calculated for each grab sample station (continued on next page).

Station	Sample Abundance (per 0.04 m^2)	Number of Families (or NLPTL)	Ecological Indices		
			Richness	Diversity	Evenness
EW2-01-A1	8	4	1.44	1.32	0.95
EW2-01-E2	24	10	2.83	1.99	0.86
EW2-01-W2	57	16	3.71	1.80	0.65
EW2-02-A1	44	8	1.85	1.55	0.75
EW2-02-E1	133	15	2.86	1.36	0.50
EW2-02-W1	43	7	1.60	1.42	0.73
EW2-03-A3	86	14	2.92	1.48	0.56
EW2-03-E1	130	3	0.41	0.09	0.08
EW2-03-W3	17	9	2.82	2.00	0.91
EW2-04-A1	101	4	0.65	0.24	0.18
EW2-04-E1	4	2	0.72	0.56	0.81
EW2-04-W1	61	6	1.22	1.25	0.70
EW2-05-A1	31	4	0.87	0.78	0.56
EW2-05-E1	255	4	0.54	0.75	0.54
EW2-05-W1	64	1	0.00	0.00	0.00
EW2-06-A1	165	11	1.96	1.80	0.75
EW2-06-E1	86	14	2.92	1.76	0.67
EW2-06-W1	38	12	3.02	2.15	0.87
EW2-07-A1	253	10	1.63	1.26	0.55
EW2-07-E1	303	6	0.88	0.18	0.10
EW2-07-W1	50	7	1.53	1.47	0.76
EW2-08-A2	246	16	2.72	1.07	0.39
EW2-08-E2	28	11	3.00	1.93	0.81
EW2-08-W1	39	10	2.46	1.56	0.68
EW2-09-A4	63	14	3.14	1.91	0.73
EW2-09-E2	222	15	2.59	1.15	0.43
EW2-09-W3	132	13	2.46	1.59	0.62
EW2-10-A2	26	8	2.15	1.77	0.85
EW2-10-E2	28	9	2.40	1.76	0.80
EW2-10-W2	94	14	2.86	1.63	0.62
EW2-11-A1	42	6	1.34	1.07	0.60
EW2-11-E1	18	9	2.77	2.04	0.93
EW2-11-W3	42	13	3.21	1.78	0.69
EW2-12-A1	2	1	0.00	0.00	0.00
EW2-12-E1	8	4	1.44	1.21	0.88
EW2-12-W1	141	4	0.61	0.22	0.16

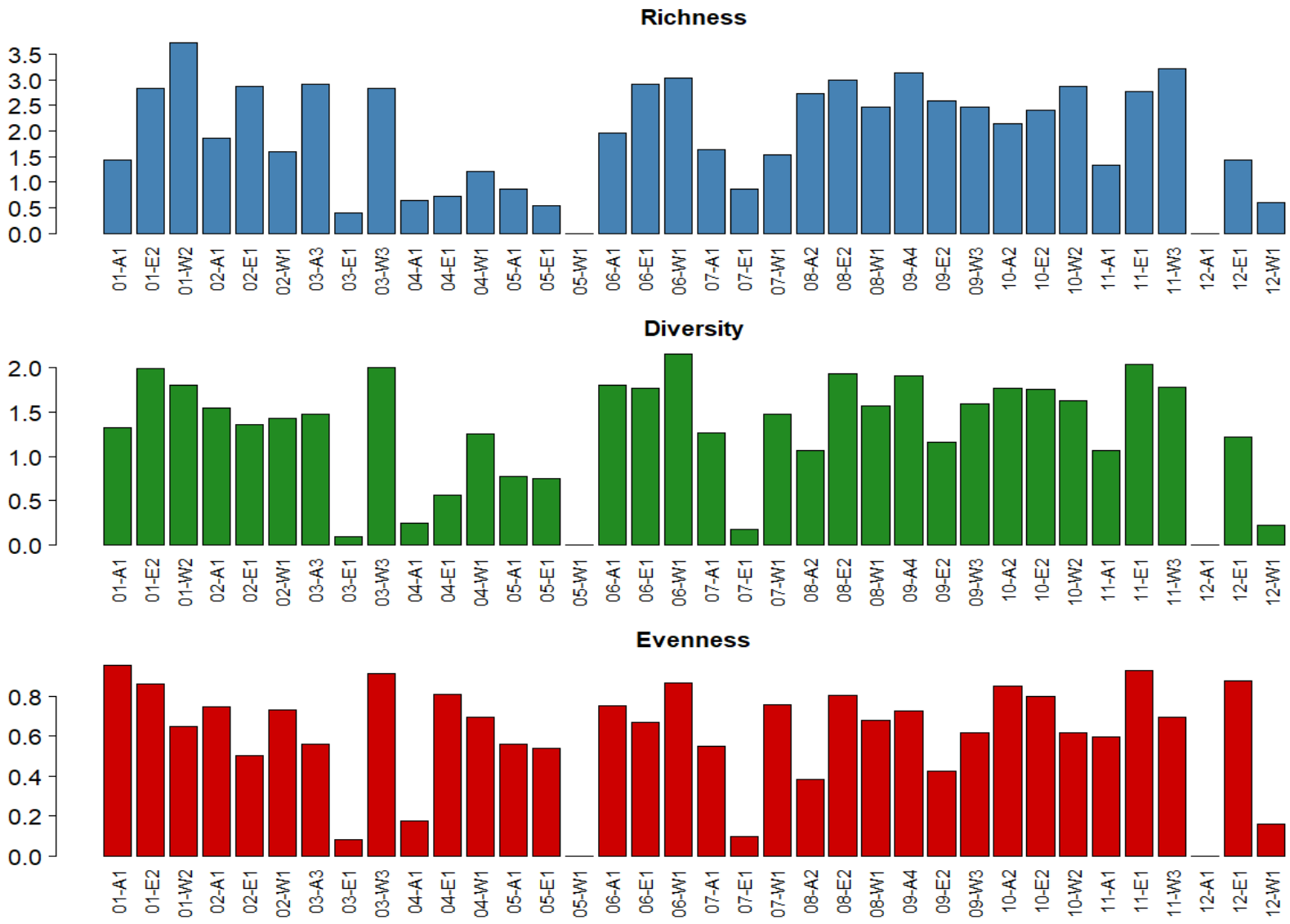


Figure 3-11. Ecological index values calculated for each sample station in the sampling area.

4 CMECS CLASSIFICATIONS

4.1 Video Transects

4.1.1 Substrate Component

For underwater video transects, each still image taken along the transect during the percent cover analysis was assigned a CMECS substrate classification following NMFS modifications (NMFS, 2021). In addition to substrate classes, the density of shell and flora/fauna cover were calculated for each still image and summarized at the transect level. Representative images of different CMECS classifications are presented in Table 4-3. Maps displaying the location and CMECS classification of each still image analyzed from the video transects are provided in Appendix D.

Across the five video transects, a total of 370 still images were assigned a CMECS classification, covering an area of ~210 m^2. The number of still images classified as geologic origin, unconsolidated, fine substrate of sand/mud size (242) was far greater than any other CMECS group, composing 117 m^2 of the analyzed area (Table 4-1, Table 4-2, Figure 4-1). Of the five transects, one was composed only of stills classified as sand/mud, indicating substrate homogeneity within that transect line. The sand/mud CMECS group is not considered complex under the NMFS guidelines (NMFS, 2021); therefore 56% of the area analyzed along the EW2 ECR is not classified as complex.

Complex habitat includes those with ≥ 5% of gravel-sized particles (> 2 mm), those dominated by biogenic origin shell substrates, or those with a substantial amount of biological activity or presence. Gravel mixes of pebble/granule and sand/mud (< 80% and ≥ 30% gravel) were classified in 73 still images for a total of 53 m^2 from 3 transects, with EW2-02 containing the most by area (27 m^2). Gravelly sand/mud (< 30% and ≥ 5% gravel) was classified in 55 images across 4 transects for a total of (40 m^2), with only a gravel type of pebble/granule.

In addition to the main CMECS substrate component, which is the substrate comprising the majority of the surface area in each still, secondary or co-occurring substrate classifications were assigned for other substrate origin types present in each image (e.g., geologic, biogenic, or anthropogenic). Biogenic shell substrate was the most frequent co-occurring substrate type, classified as a secondary CMECS group in 183 (~50%) of still images at the sparse and trace cover densities with the majority classified as shell hash 96% (Table 4-1, Table 4-2, Figure 4-2). Decorator worm tubes (small strands of sand and shell particles fused together) occurred in three transects (EW2-02, -07, -12) with the majority occurring along the EW2-07 transect line in 16 still images.

The area of the biological elements recorded in the percent cover analysis was summarized to approximate the density of flora/fauna cover for each still image along the transect. Higher densities of flora/fauna suggest the presence of potentially greater complex habitat due to greater biological activity (e.g., burrows,

megafauna) or the occurrence of additional structure in the environment (e.g., infaunal structures, encrusting organisms, algae). Nearly all of the still images analyzed across all five transects contained zero to sparse (< 30%) flora/fauna cover (Figure 4-1), and half of the flora/fauna cover was due to moderate coverage of a floating green algae (Ulva spp.) along the EW2-11 transect. Representative images of CMECS substrate types are in Table 4-3.

Table 4-1. The number of stills and total area (m^2) classified to each combination of main CMECS substrate component and secondary/co-occurring substrate groups for each of the five video transects in the sampling area. Abbreviations are as follows: S/M = Sand/Mud, B = Boulder, C = Cobble, and P/G = Pebble/Granule. All substrate component groups except sand/mud/shell mix and sand/mud are considered 'complex' habitat by NMFS (2021).

Main and Co-Occurring CMECS Substrate Group Combinations	Number of Stills per Group	Percent of Stills per Group (%)	Area of Stills Classified to Group (m^2)	Percent of Area Classified to Group (%)
Gravel Mixes – Pebble/Granule with S/M	31	8.38	19.86	9.46
Gravel Mixes – Pebble/Granule with S/M and Sparse Shell Hash	23	6.22	17.89	8.52
Gravel Mixes - Pebble/Granule with S/M and Sparse Shell Rubble	1	0.27	0.82	0.39
Gravel Mixes - Pebble/Granule with S/M and Trace Shell Hash	16	4.32	13.33	6.35
Gravel Mixes - Pebble/Granule with S/M and Trace Shell Rubble	2	0.54	0.74	0.35
Gravelly Sand/Mud with P/G	26	7.03	22.30	10.62
Gravelly Sand/Mud with P/G and Sparse Shell Hash	16	4.32	11.68	5.57
Gravelly Sand/Mud with P/G and Trace Shell Hash	12	3.24	5.26	2.50
Gravelly Sand/Mud with P/G and Trace Shell Rubble	1	0.27	0.27	0.13
Sand/Mud	130	35.14	62.74	29.89
Sand/Mud with Sparse Shell Hash	60	16.22	30.05	14.31
Sand/Mud with Trace Shell Hash	49	13.24	23.29	11.09
Sand/Mud with Trace Shell Rubble	3	0.81	1.70	0.81
Totals	**370**	**100**	**209.92**	**100**

Table 4-2. Area (m^2) classified to main CMECS substrate component groups for each of the five video transects in the sampling area. Abbreviations are as follows: S/M = Sand/Mud, B = Boulder, C = Cobble, and P/G = Pebble/Granule. All substrate component groups except sand/mud/shell mix and sand/mud are considered 'complex' habitat by NMFS (2021).

Transect	Biogenic Shell Rubble	Biogenic Shell Hash	Gravel		Gravel Mixes	Gravelly Sand/Mud			Sand/ Mud
			C	P/G	with P/G	with B	with C	with P/G	
EW2-02	0	0	0	0	26.80	0	0	15.99	2.92
EW2-06	0	0	0	0	0	0	0	1.44	20.30
EW2-07	0	0	0	0	0.51	0	0	9.43	55.97
EW2-11	0	0	0	0	0	0	0	0	26.05
EW2-12	0	0	0	0	25.3	0	0	12.65	12.53
Total Area per Main CMECS (m^2)	**0**	**0**	**0**	**0**	**52.64**	**0**	**0**	**39.51**	**117.77**

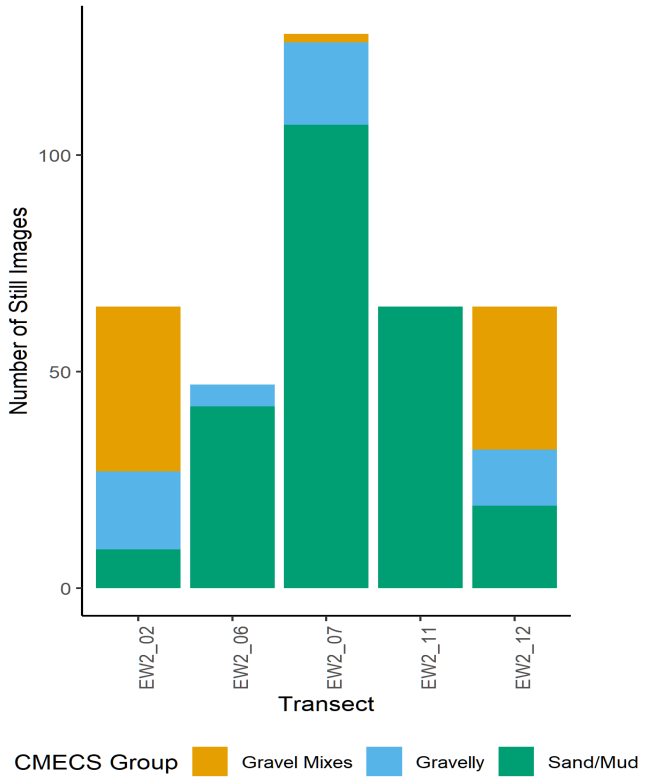


Figure 4-1. The number of still images classified to CMECS substrate component groups/classes in each transect

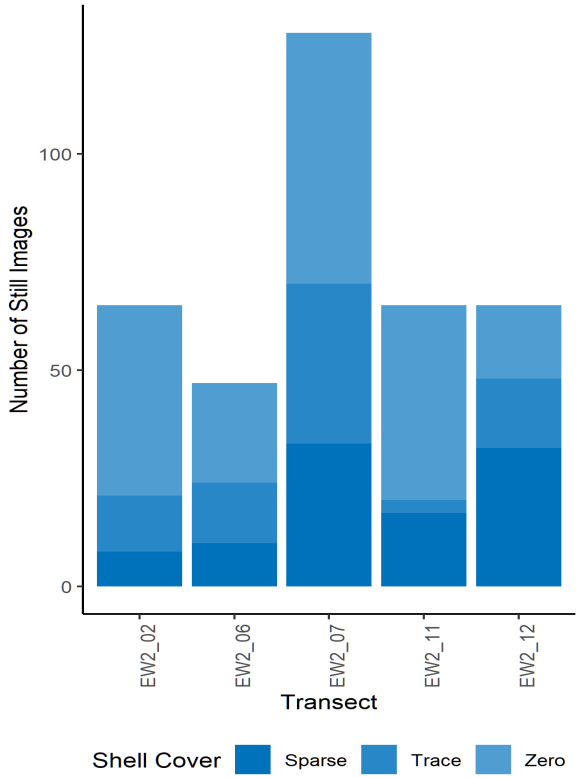


Figure 4-2. The number of still images classified to shell cover density. Trace is <2%, Sparse is 2 to <30% cover.

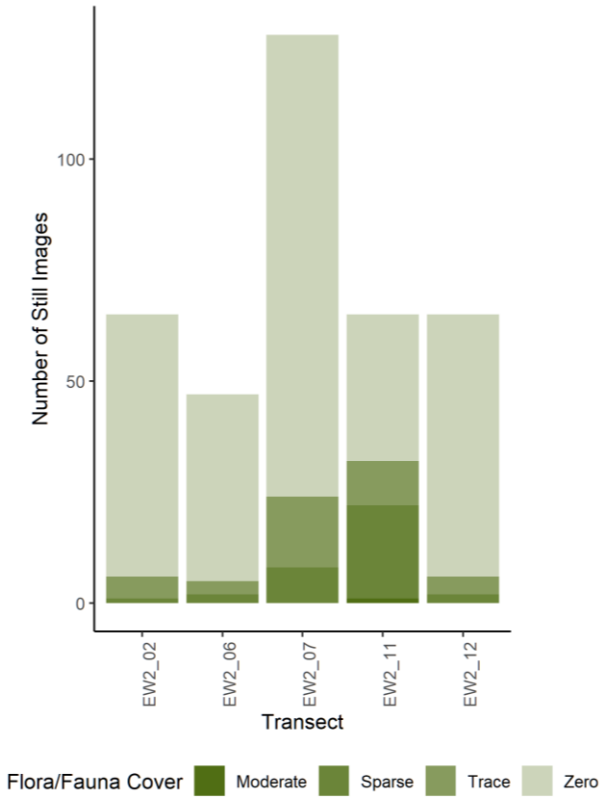
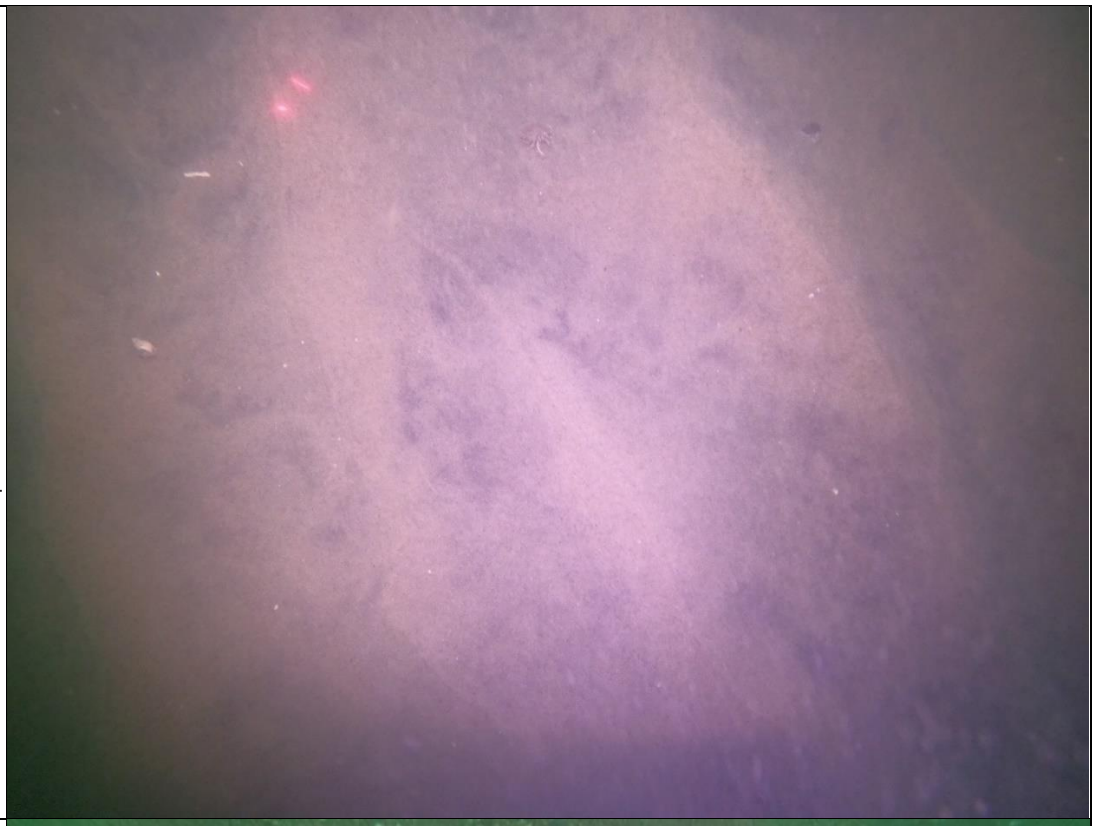
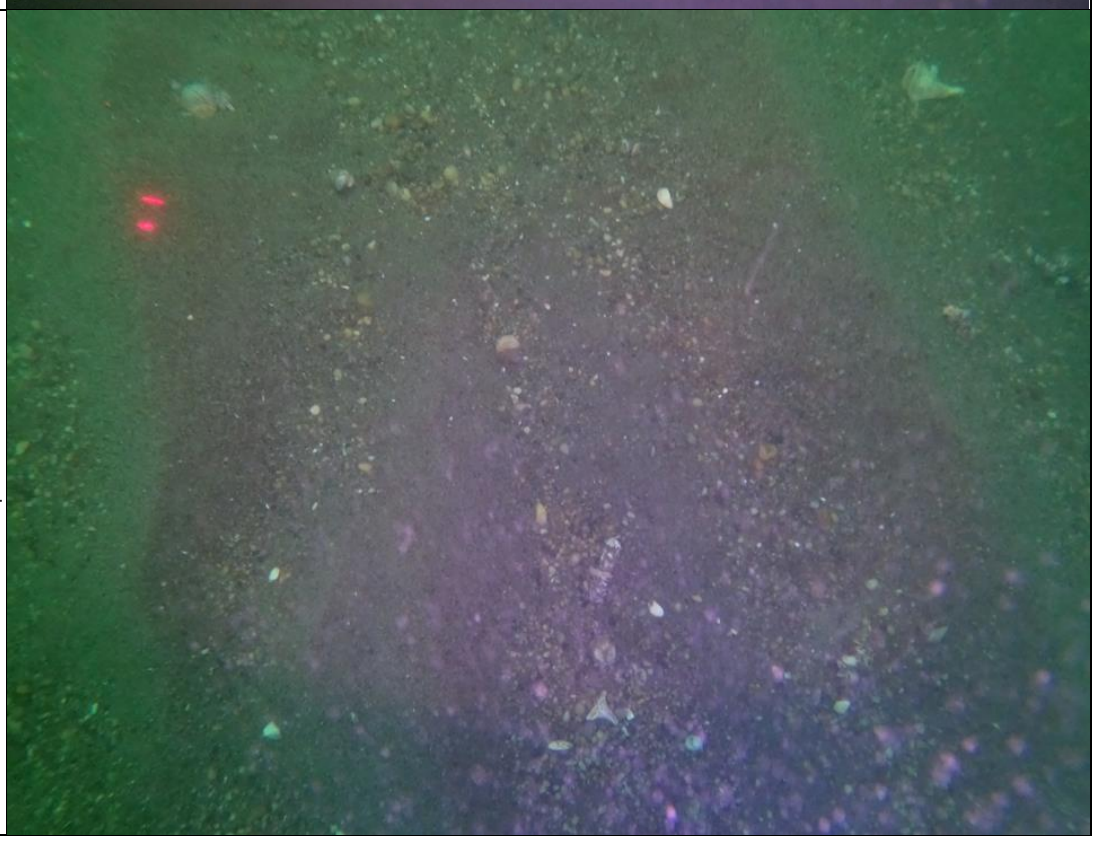
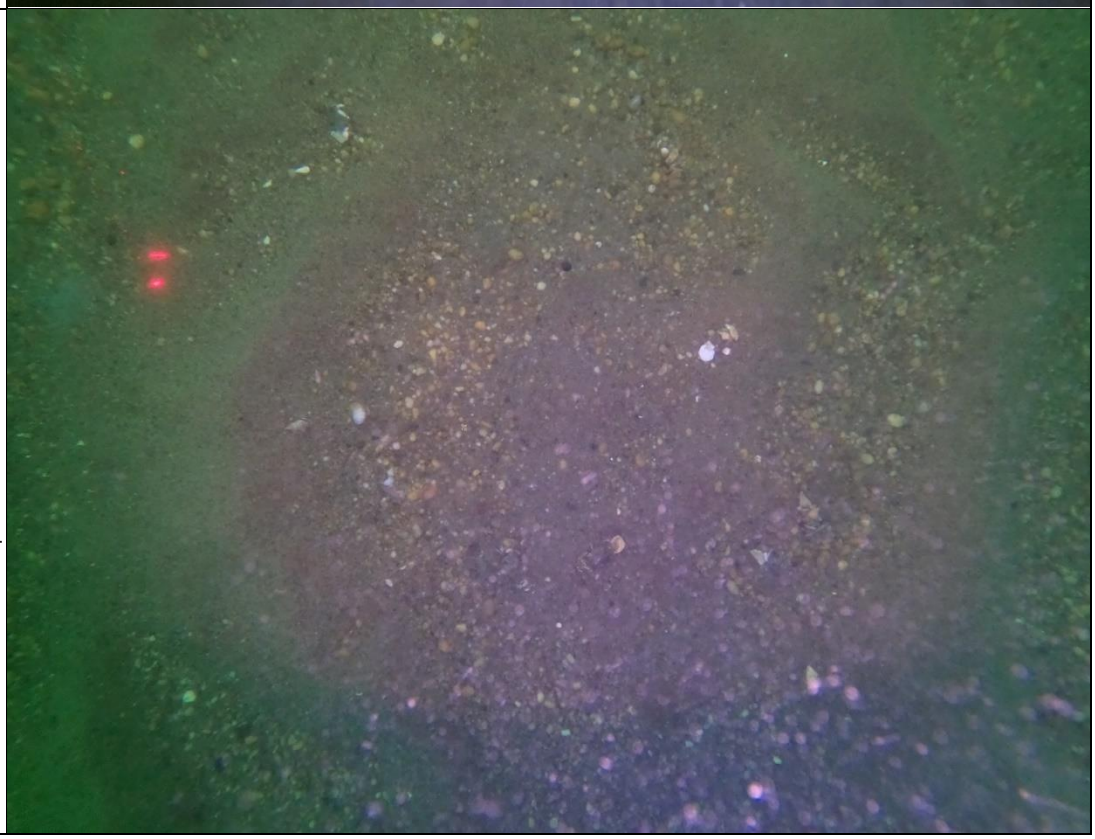
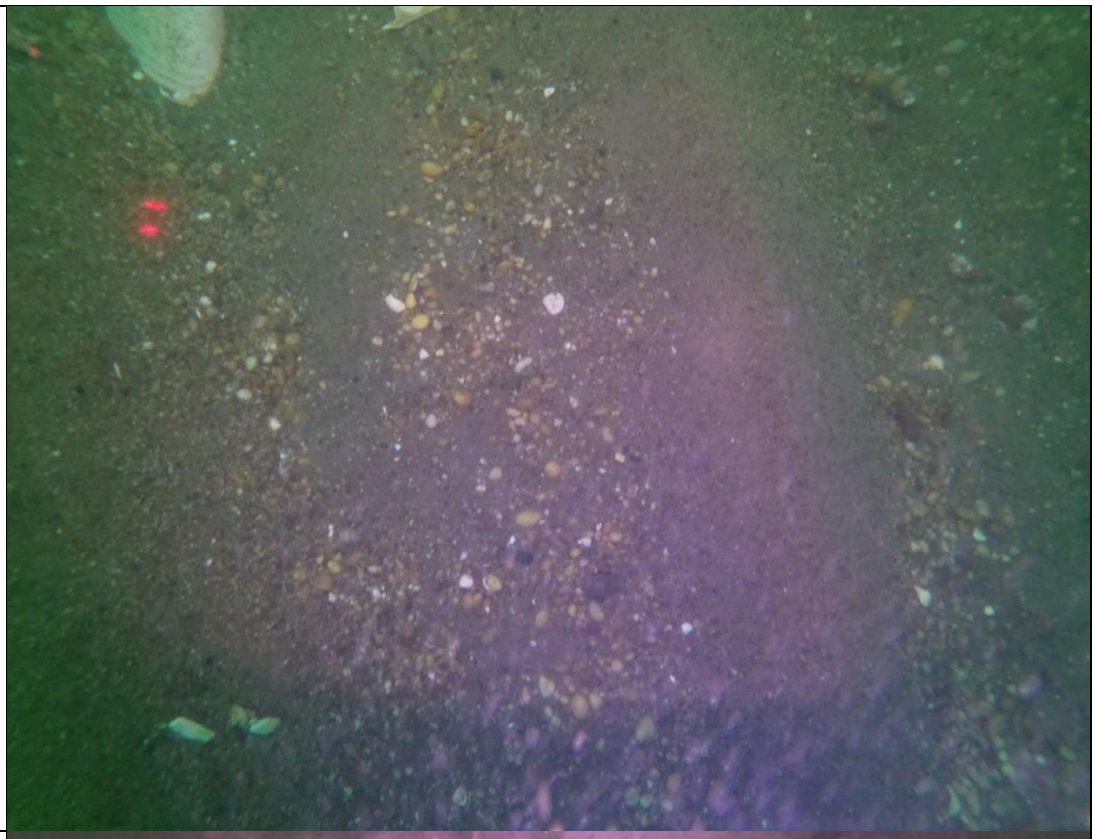


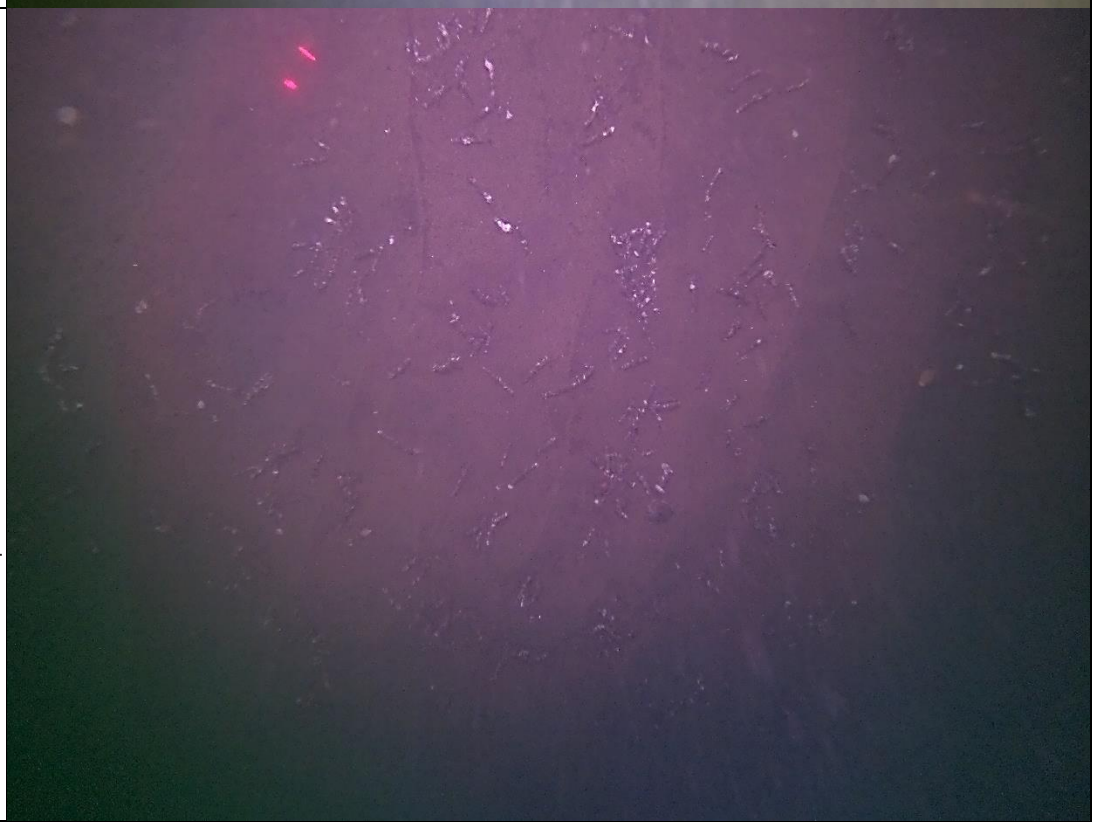
Figure 4-3. The number of still images classified to each flora/fauna density category within each video. Trace is < 2%. Sparse is 2 to < 30%, Moderate is 30 to < 70%, Dense is 70 to < 90%, and Complete is 90 to 100% cover.

Table 4-3. Representative still images of various habitat types observed in the sampling area. Still number in parenthesis. Abbreviations are as follows: S/M = Sand/Mud, B = Boulder, C = Cobble, and P/G = Pebble/Granule.

Geologic Unconsolidated Fine Sand/Mud EW2-UWV-07-1(still 101)	
Geologic Unconsolidated Coarse Gravelly Sand/Mud EW2-UWV-02-1 (still 30)	

Geologic Unconsolidated Coarse Gravelly Sand/Mud with P/G Trace Shell Hash EW2-UWV-06-2 (still 119)	
Geologic Unconsolidated Coarse Gravel Mixes Sandy/Muddy Gravel EW2-UWV-02-1 (still 3)	

Geologic Unconsolidated Coarse Gravel Mixes Sandy/Muddy Gravel Sparse Shell Rubble EW2-UWV-02-1 (still 29)	
Geologic Unconsolidated Fine Sand/Mud With >30% Cover of Algae EW2-UWV-11-2 (Still 66)	

Geologic Unconsolidated Fine Sand/Mud Sparse Shell Hash Sparse Flora/Fauna EW2-UWV-11-2 (Still 120)	
Geologic Unconsolidated Fine Sand/Mud Sparse Flora/Fauna (Decorator Worm Tubes) EW2-UWV-07-1 (Still 182)	

4.1.2 Biotic Component

The biotic component classifications all fell under the "faunal bed with soft sediment fauna" CMECS category (Table 4-4). Mobile mollusks, represented by only moon snails, defined the biotic group for all transects but EW2-07. Transect EW2-07 contained a diverse array of organisms, including moon snails, burrowing anemones, crabs, and many unidentifiable organisms. Transects EW2-02, EW2-07, and EW2-12 contained *Diopatra* beds or individuals.

Table 4-4. CMECS hierarchical biotic classifications based on percent cover analysis of still images and enumeration of flora/fauna summarized at the transect level.

Transect	Biotic Setting	Biotic Class	Biotic Subclass	Biotic Group	Co-occurring Biotic Group
EW2-UWV-02-1	Benthic Biota	Faunal Bed	Soft Sediment Fauna	Mobile Mollusks	Burrowing Anemones
EW2-UWV-06-2	Benthic Biota	Faunal Bed	Soft Sediment Fauna	Mobile Mollusks	Burrowing Anemones
EW2-UWV-07-1	Benthic Biota	Faunal Bed	Soft Sediment Fauna	Diverse Epifauna	
EW2-UWV-11-02	Benthic Biota	Faunal Bed	Soft Sediment Fauna	Mobile Mollusks	Mobile Crustaceans
EW2-UWV-12-1	Benthic Biota	Faunal Bed	Soft Sediment Fauna	Mobile Mollusks	Burrowing Anemones/ Diverse Epifauna

4.2 Grab Sample Stations

We assigned NMFS (2021) modified CMECS classifications to each benthic grab sample station based on visual inspection of the sample once on board the survey vessel, laboratory analysis of grain size, and still image point count analysis for grabs with insufficient sediment recovery and those with substantial amounts of shell cover based on the imagery collected prior to grab deployment. Substrate classification results are presented in geographic context in Figure 4-4 and as a hierarchy in Table 4-5. Biotic component classification results are presented in Table 4-6.

4.2.1 Substrate Component

Sediment grab samples were dominated by fine unconsolidated substrate of geologic origin, with 58% of samples classified as medium sand or finer (Figure 4-4 and Table 4-5). The most abundant classification was Fine/Very Fine Sand for 16 of the 36 total samples (44%), and the average d50 was 0.14 mm. There were no failed grab stations that required image analysis and all CMECS classifications were made based on the Terrasense lab data.

There were 12 samples which contained ≥ 5% gravel that designates them as complex habitat according to the NMFS (2021) modified CMECS classifications, and no cobbles or boulders were present in any samples. These samples equate to 33% of the grab samples, two samples were classified as either gravelly muddy sand or gravelly sand containing <30% gravel. The remaining ten samples were classified as sandy gravel containing ≥ 30% gravel (EW2-02-A1, EW2-02-W1, EW2-03-E1, EW2-04-A1, EW2-04-E1, EW2-05-E1, EW2-06-W1, EW2-07-A1, EW2-07-W1, EW2-12-E1). Six samples were classified as medium sand, and two samples were classified as muddy sand.

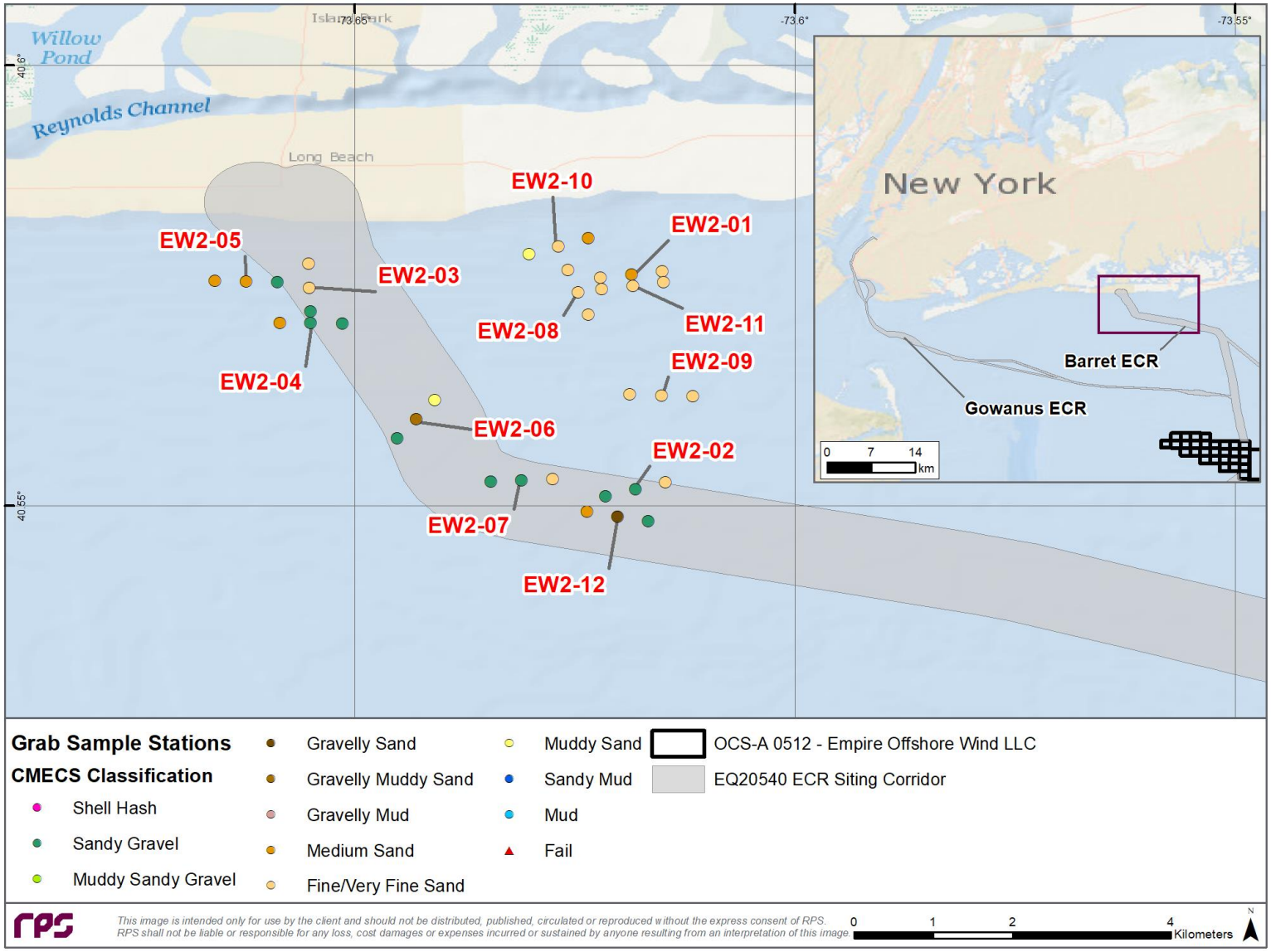
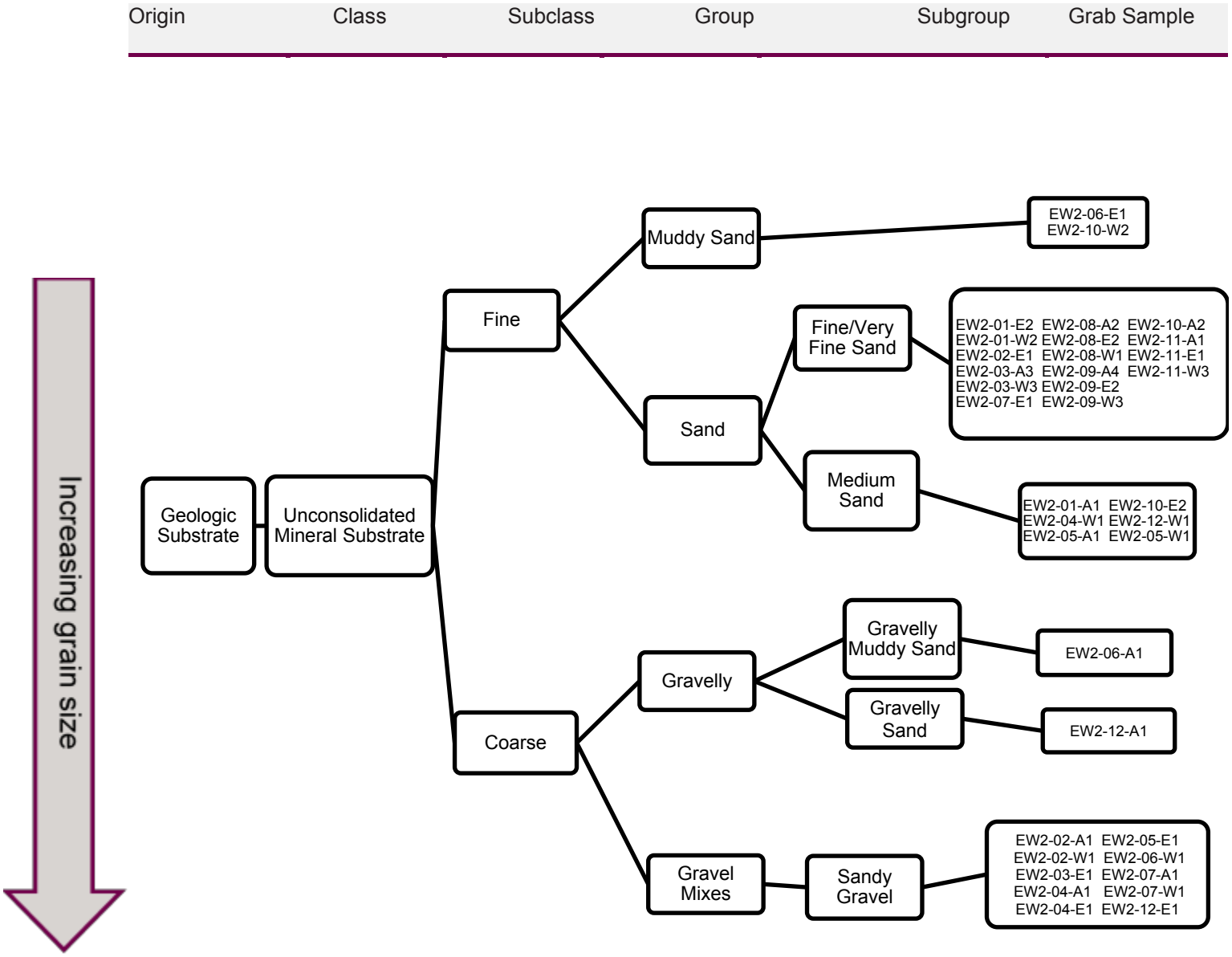


Figure 4-4. CMECS classification designated for each benthic grab sample collected in the project area. Point colors indicate different CMECS substrates.

Table 4-5. CMECS hierarchical classification of substrates collected at each grab sample along EW2.



4.2.2 Biotic Component

The CMECS biotic component classification for each successful grab sample collected in the survey area is presented in the table below (Table 4-6). The subclass was soft sediment fauna for all 36 benthic grab stations. The biotic group of most samples (69%) was small surface-burrowing fauna, which included a diverse number of annelid worms, amphipods, and isopods. Many small mussels were observed in four grab samples, which often also included a mix of surface burrowing and small-tube building organisms.

Table 4-6. CMECS classification of the biotic component of the seabed and the dominant taxa as derived from the lab analysis at each benthic grab sample.

Sample Site	Biotic Setting	Biotic Class	Biotic Subclass	Biotic Group	Co-Occurring Biotic Group	Biotic Community
EW2-01-A1	Benthic biota	Faunal bed	Soft sediment fauna			
EW2-01-E2	Benthic biota	Faunal bed	Soft sediment fauna	Small surface-burrowing fauna		
EW2-01-W2	Benthic biota	Faunal bed	Soft sediment fauna	Small surface-burrowing fauna		
EW2-02-A1	Benthic biota	Faunal bed	Soft sediment fauna	Small surface-burrowing fauna	Small tube-building fauna	
EW2-02-E1	Benthic biota	Faunal bed	Soft sediment fauna	Small surface-burrowing fauna	Small tube-building fauna	Capitellid Bed
EW2-02-W1	Benthic biota	Faunal bed	Soft sediment fauna	Small surface-burrowing fauna		
EW2-03-A3	Benthic biota	Faunal bed	Soft sediment fauna	Small surface-burrowing fauna		Capitellid Bed
EW2-03-E1	Benthic biota	Faunal bed	Soft sediment fauna	Small surface-burrowing fauna		
EW2-03-W3	Benthic biota	Faunal bed	Soft sediment fauna	Small surface-burrowing fauna		
EW2-04-A1	Benthic biota	Faunal bed	Soft sediment fauna	Small surface-burrowing fauna		
EW2-04-E1	Benthic biota	Faunal bed	Soft sediment fauna			
EW2-04-W1	Benthic biota	Faunal bed	Soft sediment fauna	Small surface-burrowing fauna		
EW2-05-A1	Benthic biota	Faunal bed	Soft sediment fauna	Small tube-building fauna		
EW2-05-E3	Benthic biota	Faunal bed	Soft sediment fauna	Small surface-burrowing fauna		
EW2-05-W1	Benthic biota	Faunal bed	Soft sediment fauna	Small surface-burrowing fauna		
EW2-06-A1	Benthic biota	Faunal bed	Soft sediment fauna	Small surface-burrowing fauna		
EW2-06-E1	Benthic biota	Faunal bed	Soft sediment fauna	Small surface-burrowing fauna	Diverse Soft Sediment Epifauna	
EW2-06-W1	Benthic biota	Faunal bed	Soft sediment fauna	Small surface-burrowing fauna		
EW2-07-A1	Benthic biota	Faunal bed	Soft sediment fauna	Small surface-burrowing fauna		
EW2-07-E1	Benthic biota	Faunal bed	Soft sediment fauna	Small surface-burrowing fauna		
EW2-07-W1	Benthic biota	Faunal bed	Soft sediment fauna	Small surface-burrowing fauna		
EW2-08-A2	Benthic biota	Faunal bed	Soft sediment fauna	Mussel bed	Diverse Soft Sediment Epifauna	
EW2-08-E2	Benthic biota	Faunal bed	Soft sediment fauna	Small surface-burrowing fauna		
EW2-08-W1	Benthic biota	Faunal bed	Soft sediment fauna	Mussel bed		
EW2-09-A4	Benthic biota	Faunal bed	Soft sediment fauna	Small surface-burrowing fauna	Mussel bed	
EW2-09-E2	Benthic biota	Faunal bed	Soft sediment fauna	Mussel bed	Diverse Soft Sediment Epifauna	
EW2-09-W3	Benthic biota	Faunal bed	Soft sediment fauna	Small surface-burrowing fauna	Mussel bed	
EW2-10-A2	Benthic biota	Faunal bed	Soft sediment fauna	Small tube-building fauna		
EW2-10-E2	Benthic biota	Faunal bed	Soft sediment fauna	Small surface-burrowing fauna		
EW2-10-W2	Benthic biota	Faunal bed	Soft sediment fauna	Mussel bed	Diverse Soft Sediment Epifauna	
EW2-11-A1	Benthic biota	Faunal bed	Soft sediment fauna	Small surface-burrowing fauna		
EW2-11-E1	Benthic biota	Faunal bed	Soft sediment fauna			
EW2-11-W3	Benthic biota	Faunal bed	Soft sediment fauna	Small surface-burrowing fauna		
EW2-12-A1	Benthic biota	Faunal bed	Soft sediment fauna			
EW2-12-E1	Benthic biota	Faunal bed	Soft sediment fauna			
EW2-12-W1	Benthic biota	Faunal bed	Soft sediment fauna	Small surface-burrowing fauna		

5 SUMMARY

RPS was contracted by Alpine to collect, process, analyze, and compile benthic data collected with a towed video sled and grab sampler in the Barret ECR associated with Equinor's Lease Area OCS-A 0512, offshore of Long Island, New York. In total, five transects were surveyed and 36 grab samples collected to classify seafloor habitats and document species abundance in the project area. The CMECS hierarchical system has classification thresholds based primarily on the percent and composition of gravel particles (> 2 mm) to identify substrates that may be considered "complex" by NMFS for the purposes of essential fish habitat mapping. CMECS classifications were generated using both visual analysis of stills taken from video transects and analysis of sediment grain size lab results.

Organism Abundances

The 2.5 hours of video from five transects were reviewed and a total of 139 organisms from 5 phyla were identified. Most organisms observed were invertebrates which totaled 112 or 81% and 14 vertebrates were also observed. The rest of the observations were unidentifiable. The most numerous organisms were moon snails at 63% of all organisms. Amongst vertebrates, the most numerous observations were 8 instances of little or winter skate.

The 36 successful grab samples yielded a total of 3,084 individual organisms per all 0.04 m^2 samples. Organisms collected in this survey area were from 8 unique phyla comprising 55 families or NLPTL. The Phyla Annelida, Arthropoda, and Mollusca, dominated both the abundance and unique taxa in samples, representing 9%% of all organisms and 91% of the taxa identified respectively. The phylum Annelida was most abundant comprising 54% of all organisms identified followed by Arthropoda with 26%. Polychaete worms from the family Polygordiidae had the highest abundance of any organism identified, with 736 identified in 18 of the 36 samples. On average, 86 organisms were identified, and 13 families were identified per sample. Average taxonomic richness was 1.94, average diversity was 1.27, and average evenness was 0.60.

CMECS Classifications

A total of 370 still images with a combined area of ~210 m^2 were analyzed for CMECS substrate component classification using point count methods. Geologic origin, unconsolidated, fine sand/mud was by far the most common classification with 65% of stills and 56% of total area analyzed. The sand/mud CMECS group is not considered complex under the NMFS guidelines (NMFS, 2021), therefore 56% of the area analyzed is not complex. Complex substrate in the form of gravelly and gravel mixes as the main CMECS classification occurred in 92 m^2 or 44% of the analyzed area. Gravel mixes with sand/mud were classified in 73 images and 52.6 m^2 from 3 transects. Gravelly sand/mud was classified in 55 images and 39.6 m^2

from 4 transects. Pebble/granule was the only gravel size throughout. Biogenic shell substrates (also considered complex) were not identified as the main substrate component in any transect.

The CMECS biotic component along the video transects was consistently classified as faunal beds across three transects. These faunal beds were soft sediment fauna. The three soft sediment fauna subclass transects were distinguished by the presence of *Diopatra* spp. One transect had instances of floating/suspended macroalgae (*Ulva lactuca*).

Sediment analysis of grab samples showed a predominance of fine unconsolidated substrate of geologic origin, with 58% of the 36 total samples classified as medium sand or finer. 12 of the 36 total grab samples, contained ≥ 5% gravel and would be designated as complex habitat according to the NMFS (2021) modified CMECS classifications (the rest being classified as varieties of sand, silt, and mud). However, no cobbles or boulders were present in any samples. Of these 12, 10 samples contained ≥ 30% gravel (classified as gravel mixes – sandy gravel). The remaining complex samples were comprised of gravelly sand (1), or gravelly muddy sand (1).

CMECS classification of the biotic component of grab samples was soft sediment fauna for all 36 benthic grab stations. In 69% of samples, the biotic group was classified as small-surface dwelling fauna, which included a diverse assemblage of annelid worms, amphipods, and isopods. The biotic group of four benthic grab sites was classified as mussel beds, which often also included with a diverse mix of surface burrowing and small-tube building organisms.

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APPENDIX A: BENTHIC GRAB FIELD NOTES

Table A - 1. Field notes and biologic information for each grab station.

Station	Grab Pass/Fail	Grab Failure Note	Sediment Characteristics	Field Description of Grab	Plant-like organisms	Anthropogenic or Terrestrial Debris/Fishing Activity
EW2-05-W1	Pass		Light brown coarse sand w/ pebbles	Trace shellhash	Not Present	Not Present
EW2-05-A1	Pass		Light brown coarse sand w/ pebbles	Trace shellhash	Not Present	Not Present
EW2-05-E1	Fail	Jaws open	N/A	N/A	Not Present	Not Present
EW2-05-E2	Fail	Jaws open	N/A	N/A	Not Present	Not Present
EW2-05-E3	Pass		Light brown coarse sand w/ pebbles	N/A	Not Present	Not Present
EW2-03-W1	Fail	<7 cm	Grey, smooth, fine, dense/compact	N/A	Not Present	Not Present
EW2-03-W2	Fail	<7 cm	Grey, smooth, fine, dense/compact	N/A	Not Present	Not Present
EW2-03-W3	Pass		Grey, smooth, fine, dense/compact	Sediment appears to have a clay component. The sediment is compact and can be shaped. Unlikely to get more than 5 to 6 cm, some sites right at 7 cm, penetration depth. No water drains through the sediment. Received the OK from Client Rep to sample.	Not Present	Not Present
EW2-03-A1	Fail	<7 cm	Grey, smooth, fine, dense/compact	N/A	Not Present	Not Present
EW2-03-A2	Fail	<7 cm	Grey, smooth, fine, dense/compact	N/A	Not Present	Not Present
EW2-03-A3	Pass		Grey, smooth, fine, dense/compact	Trace shellhash (see EW2-03-W3)	Not Present	Not Present
EW2-03-E1	Pass		Light brown coarse sand w/ pebbles	Trace shellhash	Not Present	Not Present
EW2-04-W1	Pass		Yellowish brown fine sand	Trace shellhash	Not Present	Not Present
EW2-04-A1	Pass		Yellowish brown coarse sand w/ pebbles	Trace shellhash	Not Present	Not Present
EW2-04-E1	Pass		Yellowish brown coarse sand w/ pebbles	Trace shellhash	Not Present	Not Present
EW2-06-E1	Pass		Grey muddy fine sand/silt	Trace shellhash	Not Present	Not Present
EW2-06-A1	Pass		Yellowish brown coarse sand w/ pebbles	Trace shellhash	Not Present	Not Present
EW2-06-W1	Pass		Yellowish brown medium sand w/ pebbles	Trace shellhash	Not Present	Not Present
EW2-07-W1	Pass		Yellowish brown medium sand w/ pebbles	Trace shellhash	Not Present	Not Present
EW2-07-A1	Pass		Yellowish brown coarse sand w/ pebbles	Trace shellhash	Not Present	Not Present
EW2-07-E1	Pass		Greyish brown fine soft/goopy sand/mud	N/A	Not Present	Not Present

Station	Grab Pass/Fail	Grab Failure Note	Sediment Characteristics	Field Description of Grab	Plant-like organisms	Anthropogenic or Terrestrial Debris/Fishing Activity
EW2-12-W1	Pass		Greyish brown medium/fine soft sand/mud	Trace shellhash	Not Present	Not Present
EW2-12-A1	Pass		Yellowish brown medium/fine sand w/ pebbles	Trace shellhash	Not Present	Not Present
EW2-12-E1	Pass		Yellowish brown coarse/medium sand w/ pebbles	Trace shellhash	Not Present	Not Present
EW2-02-E1	Pass		Grey fine sediment	Sparse shellhash	Not Present	Not Present
EW2-02-A1	Pass		Light brown coarse sand w/ pebbles	Trace shellhash	Not Present	Not Present
EW2-02-W1	Pass		Brown coarse sand w/ pebbles	Trace shellhash	Not Present	Not Present
EW2-09-W1	Fail	<7 cm	Grey, smooth, fine, dense/compact	N/A	Not Present	Not Present
EW2-09-W2	Fail	<7 cm	Grey, smooth, fine, dense/compact	N/A	Not Present	Not Present
EW2-09-W3	Pass		Grey, smooth, fine, dense/compact	Trace shellhash (see EW2-03-W3)	Not Present	Not Present
EW2-09-A1	Fail	<7 cm	Brown, smooth, fine, dense/compact	N/A	Not Present	Not Present
EW2-09-A2	Fail	<7 cm	Brown, smooth, fine, dense/compact	N/A	Not Present	Not Present
EW2-09-A3	Fail	Empty	N/A	N/A	Not Present	Not Present
EW2-09-A4	Pass		Brown, smooth, fine, dense/compact	Trace shellhash (see EW2-03-W3)	Present	Not Present
EW2-09-E1	Fail	<7 cm	Grey, smooth, fine, dense/compact	N/A	Not Present	Not Present
EW2-09-E2	Pass		Grey, smooth, fine, dense/compact	Trace shellhash (see EW2-03-W3)	Not Present	Not Present
EW2-08-E1	Fail	<7 cm	Grey, smooth, fine, dense/compact	N/A	Not Present	Not Present
EW2-08-E2	Pass		Grey, smooth, fine, dense/compact	Trace shellhash (see EW2-03-W3)	Not Present	Not Present
EW2-08-A1	Fail	<7 cm	Grey, smooth, fine, dense/compact	N/A	Not Present	Not Present
EW2-08-A2	Pass		Grey, smooth, fine, dense/compact	Trace shellhash (see EW2-03-W3)	Not Present	Not Present
EW2-08-W1	Pass		Grey, smooth, fine, dense/compact	Trace shellhash (see EW2-03-W3)	Not Present	Not Present
EW2-11-W1	Fail	<7 cm	Grey, smooth, fine, dense/compact	N/A	Not Present	Not Present
EW2-11-W2	Fail	<7 cm	Grey, smooth, fine, dense/compact	N/A	Not Present	Not Present
EW2-10-W1	Fail	<7 cm	Grey, smooth, fine, dense/compact	N/A	Not Present	Not Present
EW2-10-W2	Pass		Grey, smooth, fine, dense/compact	Trace shellhash (see EW2-03-W3)	Not Present	Not Present
EW2-10-A1	Fail	<7 cm	Grey, smooth, fine, dense/compact	N/A	Not Present	Not Present
EW2-10-A2	Pass		Grey, smooth, fine, dense/compact	Trace shellhash (see EW2-03-W3)	Not Present	Not Present
EW2-10-E1	Fail	Empty	N/A	N/A	Not Present	Not Present
EW2-10-E2	Pass	N/A	Light brown coarse/medium sand	Trace shellhash	Not Present	Not Present
EW2-01-W1	Fail	<7 cm	Grey, smooth, fine, dense/compact	N/A	Not Present	Not Present
EW2-01-W2	Pass		Grey, smooth, fine, dense/compact	Trace shellhash (see EW2-03-W3)	Not Present	Not Present
EW2-01-A1	Pass		Light greyish brown coarse/medium sand	Trace shellhash	Not Present	Not Present
EW2-01-E1	Fail	<7 cm	Grey, smooth, fine, dense/compact, black streaks	N/A	Not Present	Not Present
EW2-01-E2	Pass		Grey, smooth, fine, dense/compact, black streaks	Trace shellhash (see EW2-03-W3)	Not Present	Not Present

Station	Grab Pass/Fail	Grab Failure Note	Sediment Characteristics	Field Description of Grab	Plant-like organisms	Anthropogenic or Terrestrial Debris/Fishing Activity
EW2-11-E1	Pass		Grey, smooth, fine, dense/compact	Trace shellhash (see EW2-03-W3)	Not Present	Not Present
EW2-11-A1	Pass		Light greyish brown coarse/medium sand	Trace shellhash	Not Present	Not Present
EW2-11-W3	Pass		Grey, smooth, fine, dense/compact	Trace shellhash (see EW2-03-W3)	Not Present	Not Present

APPENDIX B: VIDEO TRANSECT REVIEWER NOTES

Table B - 2. Video reviewer notes while analyzing transects.

Transect	Videography	Encrusting Organisms/Macroflora	Ground Cover	Substrate	Organisms	Other
EW2-12-UWV-1	Good speed and visibility, washout occurred when camera lifts too high from seafloor.	Potential hildenbrandia red alga	Flat, little epifauna/flora	Flat/sand mud to trace/sparse/moderate granule-pebble	Sand dollars and polychaete worm tubes	N/A
EW2-02-UWV-1	Green coloration and high speeds resulted in poor visibility. Part 2 of video was in very turbid water.	N/A	N/A	Very coarse sand, shell hash, and pebble in the first half then more fine sand; sand waves present at times	N/A	decorator worm tubes present
EW2-07-UWV-1-Part1	High turbidity leading to poor visibility. Video coloration appeared mostly green. Turbidity of water column makes it difficult for the camera to focus when not close to the bottom. Laser visibility fades in and out during transect and in some instances disappears.	N/A	Thick fine sediment along the bottom, sparse occurrences of shell hash and small gravel. Troughs in the sediment were observed and a change in color of sediment to a blacker coloration. Holes were observed in the sediment, in some instances with worms coming out of them.	Substrate alternates between trace to sparse shell hash and gravel and fine sand/mud throughout transect.	Organisms below size cutoff included hermit crabs and tube worms. Sea lettuce was sparse and free floating. Sand dollars and moon snails were present throughout the entire transect. Empty surf clam, whelk, and oyster shell were present.	Sand dollars were partially buried by sediment in most occurrences.
EW2-07-UWV-1-Part2	High turbidity leading to poor visibility. Video coloration appeared mostly green. Turbidity of water column makes it difficult for the camera to focus when not close to the bottom. Laser visibility fades in and out during transect and in some instances disappears.	Small clumps of red-orange bushy plant-like organisms, likely young macroalgae attached to bottom sediment (Phylum Rhodopyhta), present throughout entire transect.	Fine sand/mud with worm tubes scattered throughout. Shell hash and gravel was sparse. Ripples in the sediment were observed as well as patches of algae along the bottom. Sediment shifted to dark/black in color. Small holes observed in sediment with worms partially inside.	Fine sand/mud	Organisms below size cutoff included hermit crabs and tube worms. Occurrences of tube worms in large groups. Sea lettuce was sparse and free floating.	Sand dollars were partially buried by sediment in most occurrences.

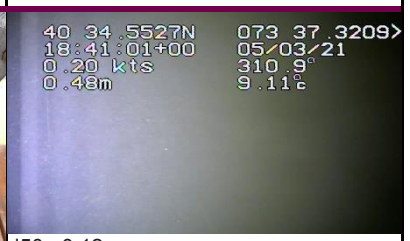
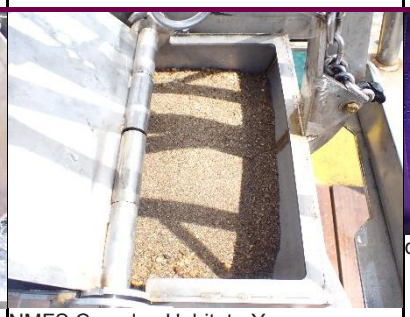
Transect	Videography	Encrusting Organisms/Macroflora	Ground Cover	Substrate	Organisms	Other
EW2-06-UWV	High turbidity leading to poor visibility. Video coloration appeared mostly green. Turbidity of water column makes it difficult for the camera to focus when not close to the bottom. Laser visibility fades in and out during transect and in some instances disappears.	Small clumps of red-orange bushy plant-like organisms, likely young macroalgae attached to bottom sediment (Phylum Rhodopyhta), present throughout entire transect.	Trace to sparse shell hash and gravel with aggregated and solitary worm tubes scattered throughout. Ripples in the sediment, patches of algae along the bottom, and a change in color of sediment to a dark coloration observed. Small holes observed in sediment, possible worm tube holes.	Substrate alternates between trace to sparse shell hash and gravel and fine sand/mud throughout transect.	Organisms below size cutoff included hermit crabs and tube worms. Occurrences of tube worms in groups of several or more and solitary. Bivalve shells observed throughout transect and more abundant near end of transect. Some partially buried in sediment. Sea lettuce was sparse and free floating.	Decorator tube worms, sediment dwelling worms and white worms on surface of sediment were observed.
EW2-11-UWV-2	Green coloration and high speeds resulted in poor visibility.	N/A	Open/flat sand with ripples and scattered shell hash	Consistent throughout transect.	Small hermit crabs, surf clam shells	Dense floating ulva and other macroalgae

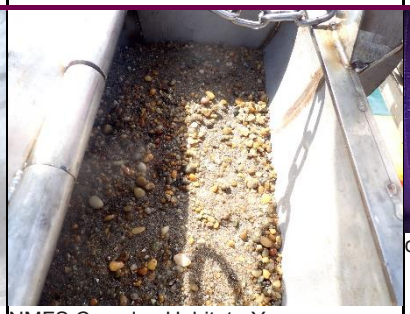
Appendix C: GRAB SAMPLE IMAGES

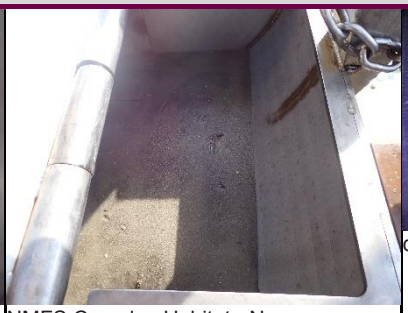
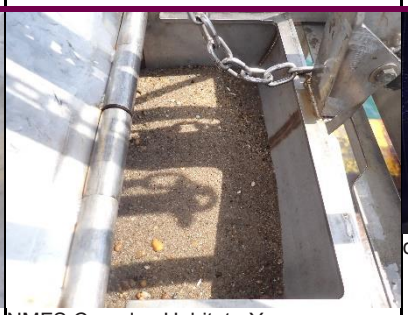
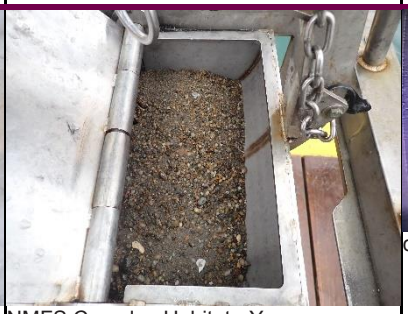
Provided in separate PDF.

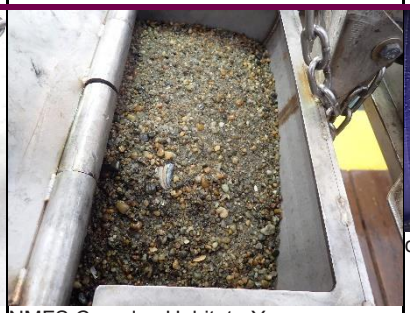
APPENDIX C: GRAB SAMPLE IMAGES

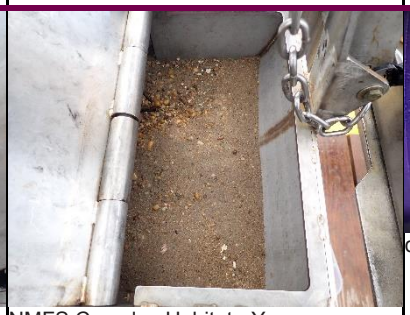
Table C-1. Images of both sides of the grab sample bucket (A and B) immediately after recovery/draining and of the bottom just prior to sampling (C). NMFS Modified CMECS (2021) and d50 (median grain size) reported below images.

Station	A	B	C
EW2-01-A1	CMECS classified= Medium Sand	NMFS Complex Habitat= No	d50= 0.41
EW2-01-E2	CMECS classified= Fine/Very Fine Sand	NMFS Complex Habitat= No	d50= 0.16
EW2-01-W2	CMECS classified= Fine/Very Fine Sand	NMFS Complex Habitat= No	 d50= 0.12
EW2-02-A1	CMECS classified= Sandy Gravel	 NMFS Complex Habitat= Yes	d50= 1.07

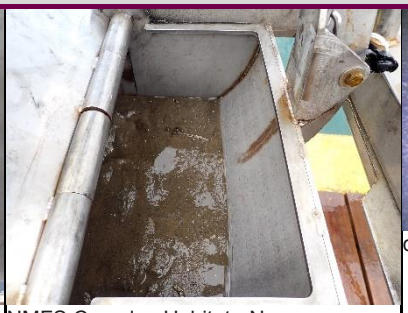
Station	A	B	C
EW2-02-E1	CMECS classified= Fine/Very Fine Sand	NMFS Complex Habitat= No	d50= 0.13
EW2-02-W1	CMECS classified= Sandy Gravel	NMFS Complex Habitat= No	d50= 2.3
EW2-03-A3	CMECS classified= Fine/Very Fine Sand	NMFS Complex Habitat= No	d50= 0.1
EW2-03-E1	CMECS classified= Sandy Gravel	 NMFS Complex Habitat= Yes	d50= 2.14

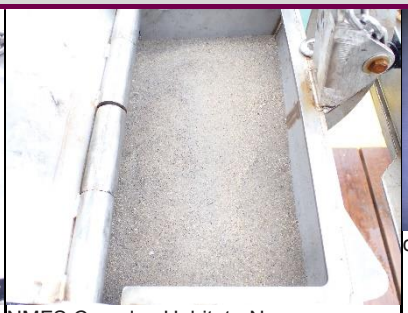
Station	A	B	C
EW2-03-W3	CMECS classified= Fine/Very Fine Sand	 NMFS Complex Habitat= No	d50= 0.11
EW2-04-A1	CMECS classified= Sandy Gravel	 NMFS Complex Habitat= Yes	d50= 0.81
EW2-04-E1	CMECS classified=Sandy Gravel	 NMFS Complex Habitat= Yes	d50= 1.74
EW2-04-W1	CMECS classified= Medium Sand	NMFS Complex Habitat= No	d50= 0.36

Station	A	B	C
EW2-05-A1	CMECS classified= Medium Sand	NMFS Complex Habitat= No	Not pictured d50= 0.41
EW2-05-E1	CMECS classified= Sandy Gravel	 NMFS Complex Habitat= Yes	 d50= 2.55
EW2-05-W1	CMECS classified= Medium	NMFS Complex Habitat= No	 d50= 0.47
EW2-06-A1	CMECS classified= Gravelly Muddy Sand	NMFS Complex Habitat= Yes	 d50= 0.62

Station	A	B	C
EW2-06-E1	CMECS classified= Muddy Sand	NMFS Complex Habitat= No	d50= 0.13
EW2-06-W1	CMECS classified= Sandy Gravel	NMFS Complex Habitat= Yes	d50= 0.76
EW2-07-A1	CMECS classified= Sandy Gravel	 NMFS Complex Habitat= Yes	d50= 1.41
EW2-07-E1	CMECS classified= Fine/Very Fine Sand	NMFS Complex Habitat= No	d50= 0.22

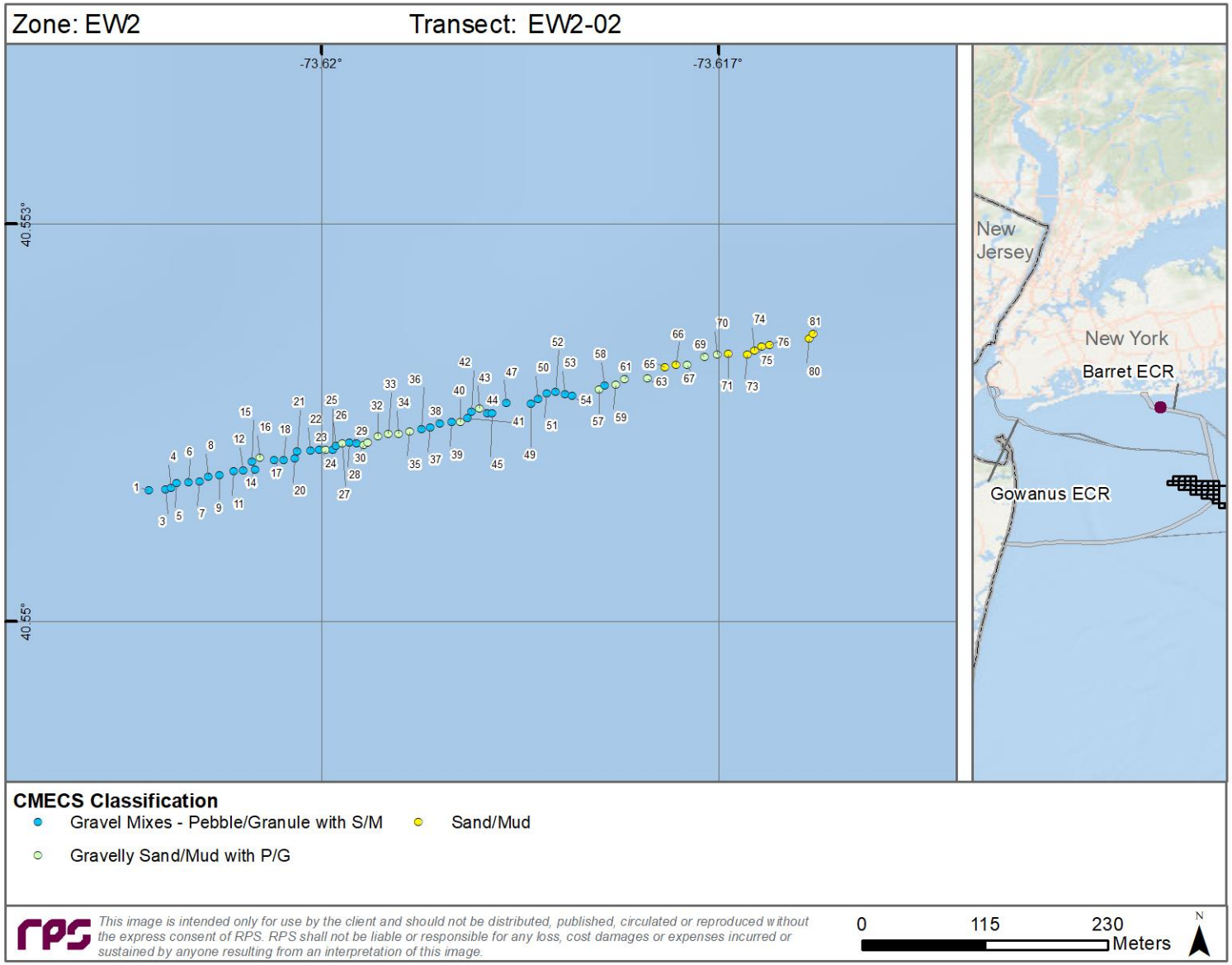
Station	A	B	C
EW2-07-W1	CMECS classified= Sandy Gravel	NMFS Complex Habitat= Yes	d50= 1.32
EW2-08-A2	CMECS classified= Fine/Very Fine Sand	NMFS Complex Habitat= No	d50= 0.11
EW2-08-E2	CMECS classified= Fine/Very Fine Sand	NMFS Complex Habitat= No	d50= 0.11
EW2-08-W1	CMECS classified= Fine/Very Fine Sand	NMFS Complex Habitat= No	d50= 0.12

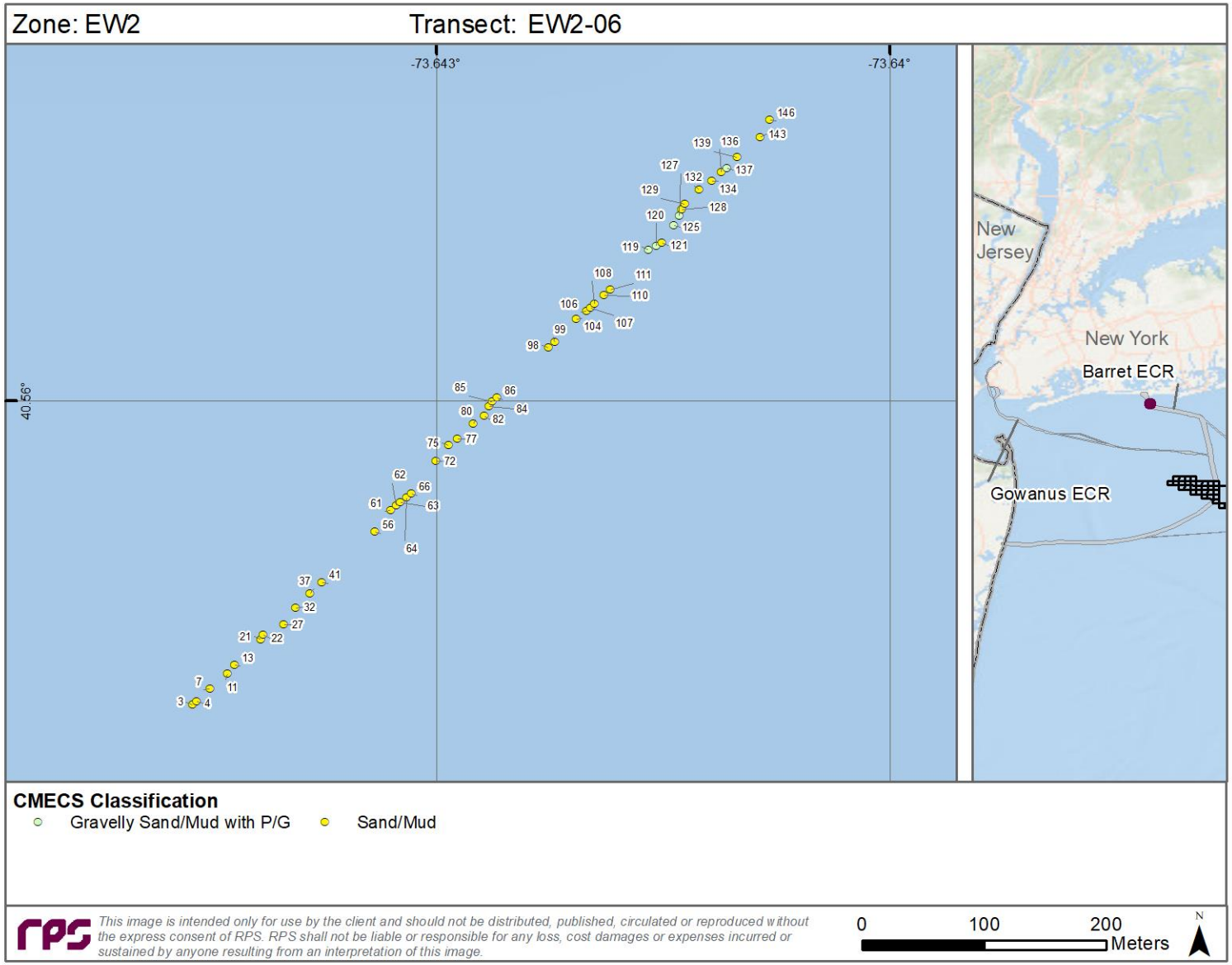
Station	A	B	C
EW2-09-A4	CMECS classified= Fine/Very Fine Sand	 NMFS Complex Habitat= No	d50= 0.15
EW2-09-E2	CMECS classified= Fine/Very Fine Sand	NMFS Complex Habitat= No	d50= 0.11
EW2-09-W3	CMECS classified= Fine/Very Fine Sand	NMFS Complex Habitat= No	d50= 0.14
EW2-10-A2	CMECS classified= Fine/ Very Fine Sand	NMFS Complex Habitat= No	d50= 0.13

Station	A	B	C
EW2-10-E2	CMECS classified= Medium Sand	 NMFS Complex Habitat= No	d50= 0.44
EW2-10-W2	CMECS classified= Muddy Sand	NMFS Complex Habitat= No	d50= 0.11
EW2-11-A1	CMECS classified= Fine/Very Fine Sand	NMFS Complex Habitat= No	d50= 0.22
EW2-11-E1	CMECS classified= Fine/Very Fine Sand	NMFS Complex Habitat= No	d50= 0.15

Station	A	B	C
EW2-11-W3	 CMECS classified= Fine/Very Fine Sand	 NMFS Complex Habitat= No	 d50= 0.13
EW2-12-A1	 CMECS classified= Gravelly Sand	 NMFS Complex Habitat= Yes	 d50= 0.44
EW2-12-E1	 CMECS classified= Sandy Gravel	 NMFS Complex Habitat= Yes	 d50= 1.74
EW2-12-W1	 CMECS classified= Medium Sand	 NMFS Complex Habitat= No	 d50= 0.33

Appendix D: CMECS CLASSIFICATIONS FOR STILL IMAGES DERIVED FROM VIDEO ANALYSIS


Zone: EW2
Transect: EW2-02
-73.62°
-73.617°
40.553°
40.55°
New Jersey
New York
Barret ECR
Gowanus ECR
CMECS Classification
Gravel Mixes - Pebble/Granule with S/M
Sand/Mud
Gravelly Sand/Mud with P/G
This image is intended only for use by the client and should not be distributed, published, circulated or reproduced without the express consent of RPS. RPS shall not be liable or responsible for any loss, cost damages or expenses incurred or sustained by anyone resulting from an interpretation of this image.
0
115
230
Meters
N


Zone: EW2
Transect: EW2-06
-73.643°
-73.64°
40.56°
146
143
139
136
137
127
132
134
129
128
120
125
119
121
108
111
110
106
104
107
99
98
85
86
80
84
82
75
77
72
62
66
61
63
56
64
37
41
32
27
21
22
13
7
11
3
4
New Jersey
New York
Barret ECR
Gowanus ECR
CMECS Classification
Gravelly Sand/Mud with P/G
Sand/Mud
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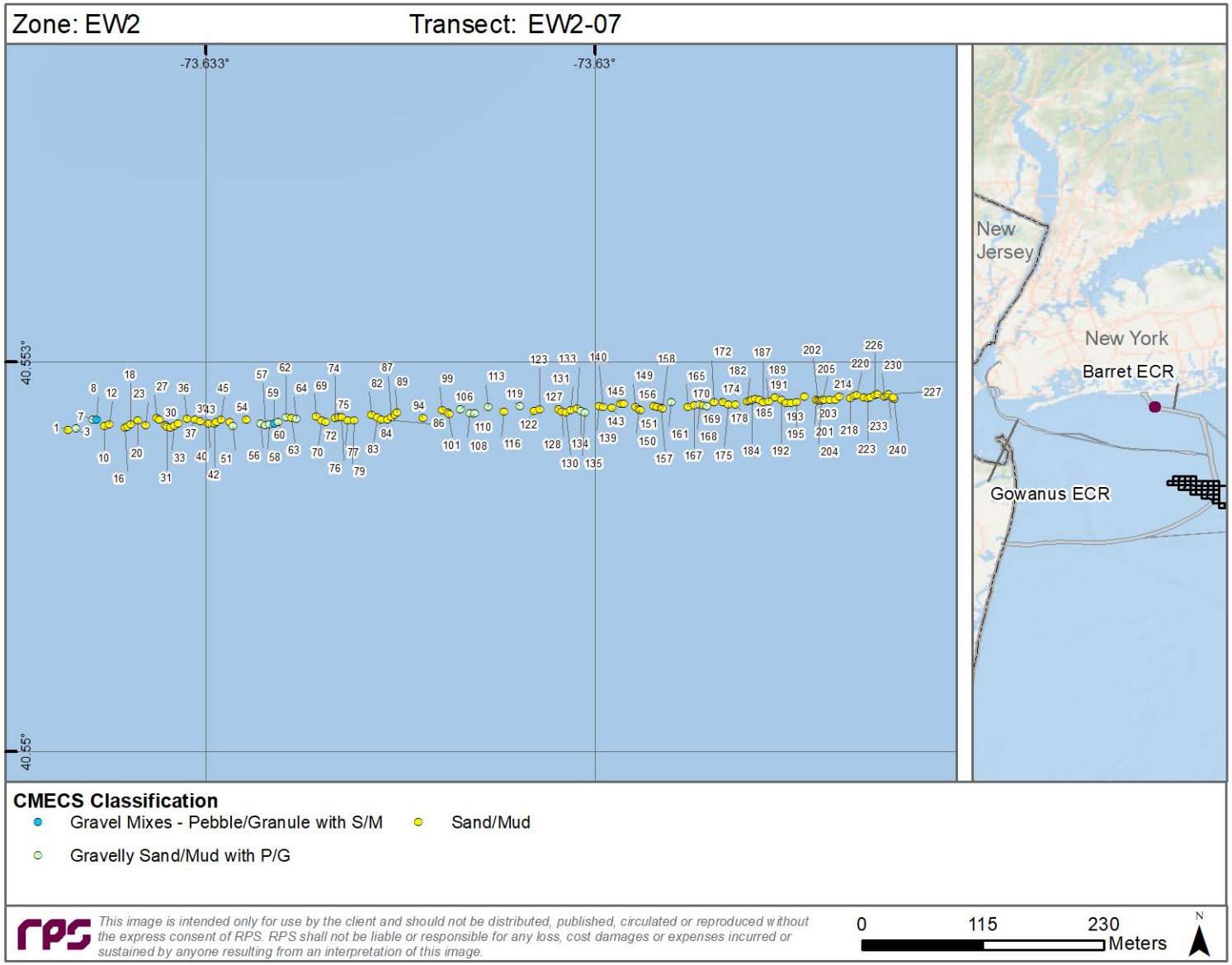
0
100
200
Meters
N


Zone: EW2
Transect: EW2-07
-73.633°
-73.63°
40.553°
40.55°
New Jersey
New York
Barret ECR
Gowanus ECR
CMECS Classification
Gravel Mixes - Pebble/Granule with S/M
Sand/Mud
Gravelly Sand/Mud with P/G
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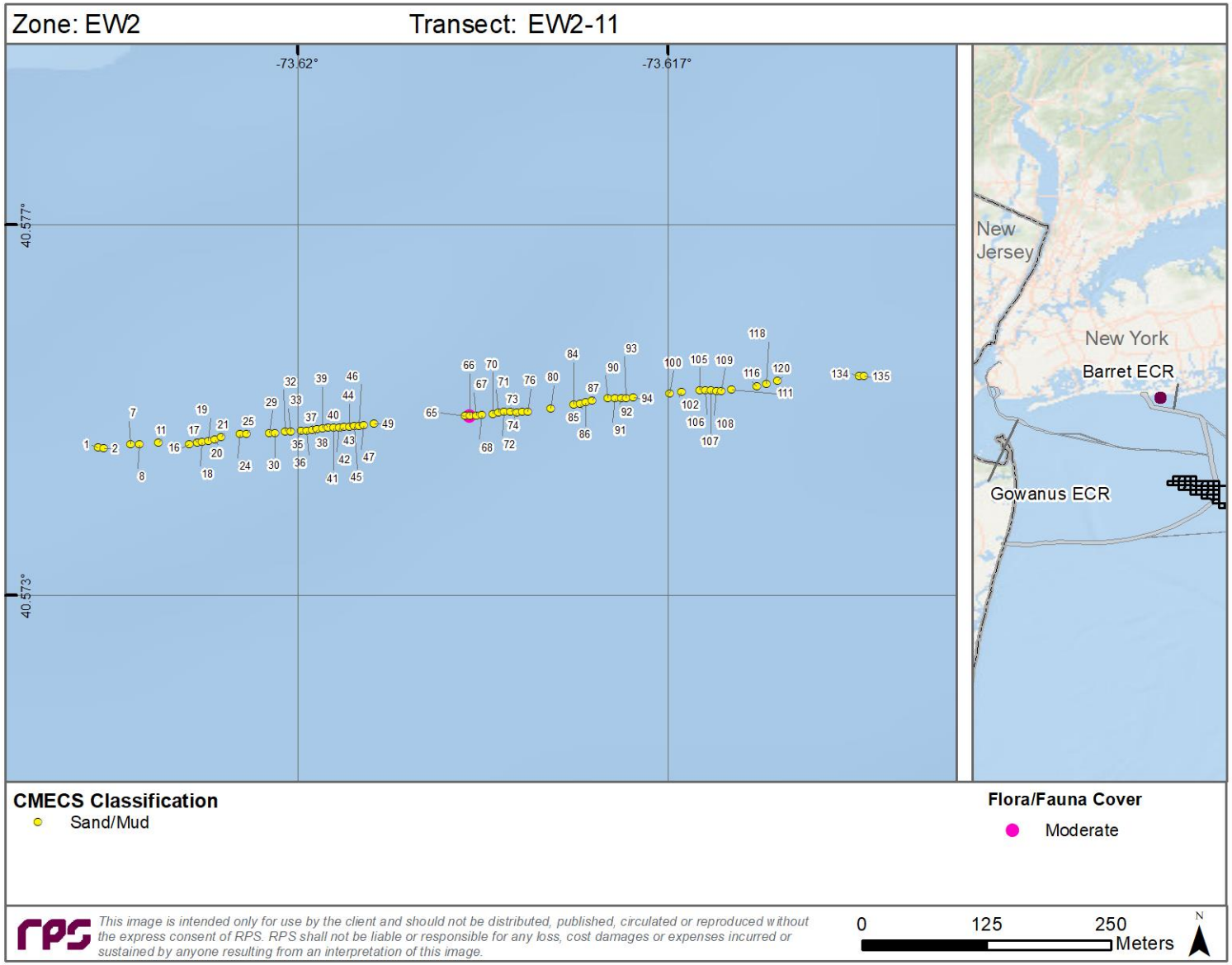
0
115
230
Meters
N



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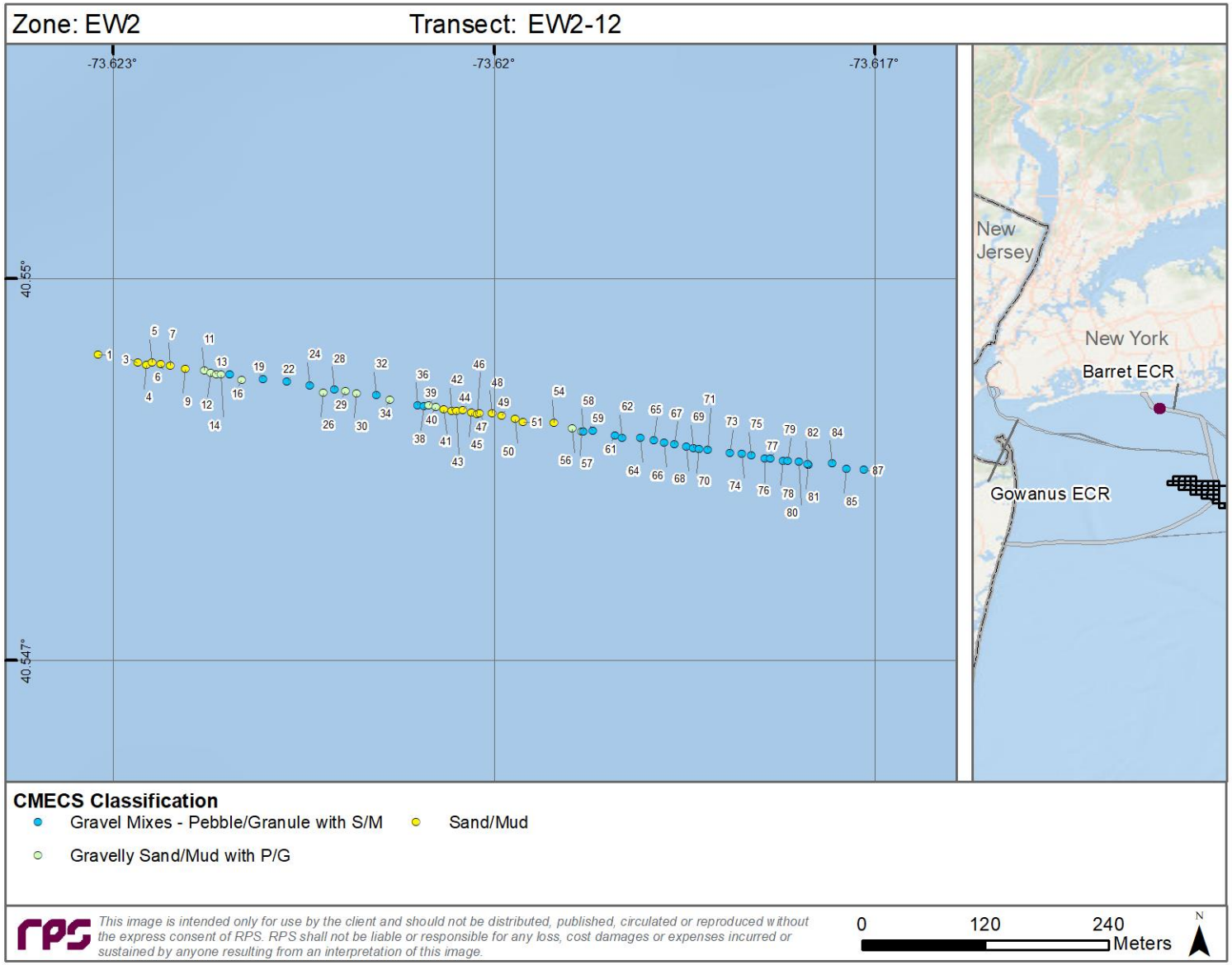
Zone: EW2
Transect: EW2-12
-73.623°
-73.62°
-73.617°
40.55°
40.547°
New Jersey
New York
Barret ECR
Gowanus ECR
CMECS Classification
Gravel Mixes - Pebble/Granule with S/M
Sand/Mud
Gravelly Sand/Mud with P/G
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0
120
240
Meters
N

APPENDIX F GRAIN SIZE ANALYSIS AND TOC

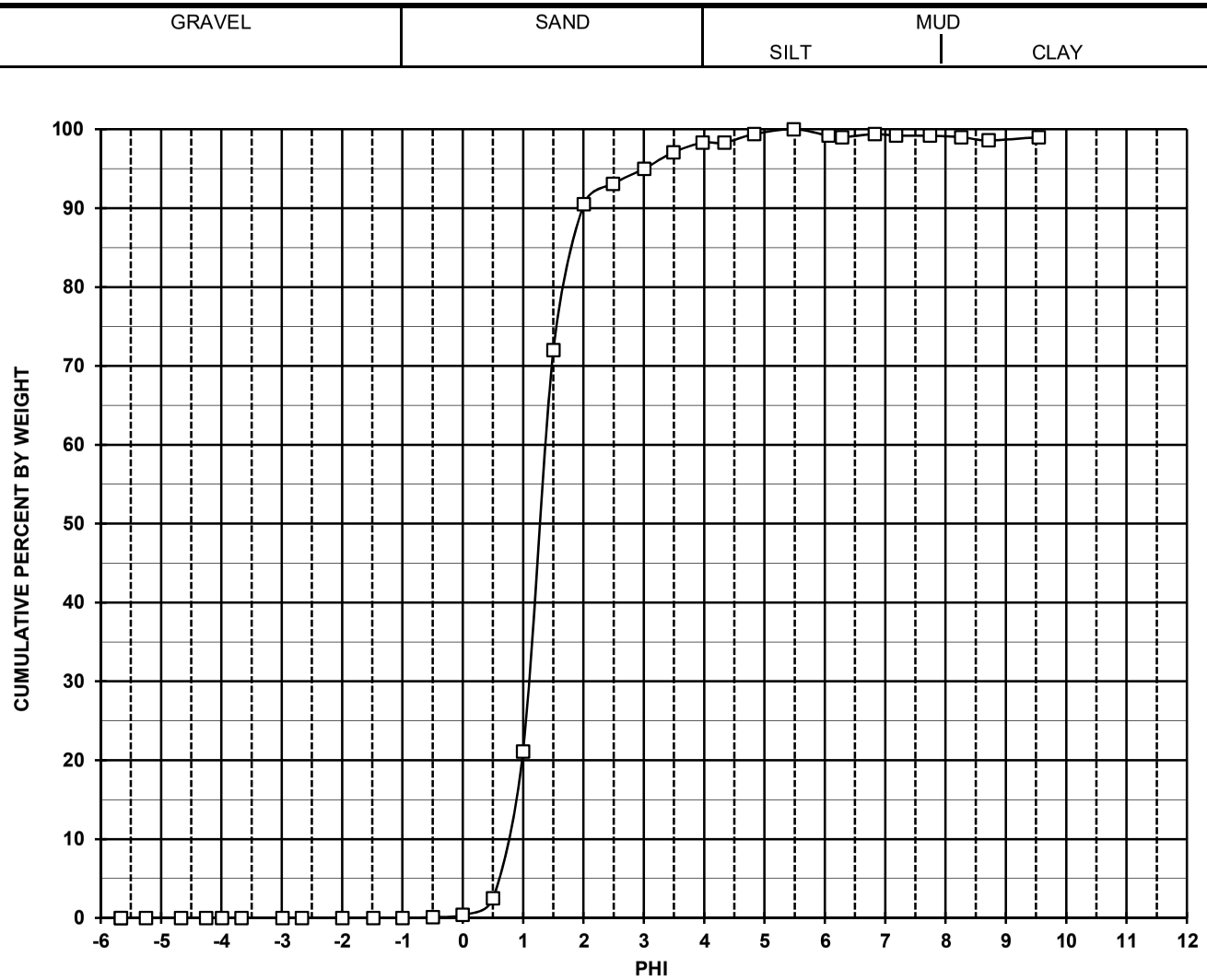
Alpine #1894
EW 2021 - Barret ECR Environmental Survey
LABORATORY TESTING DATA SUMMARY

EXPLORATION NO.	SAMPLE	IDENTIFICATION TESTS		USCS SYMB. (1)	**CMECS** Grain Size Descriptors								
		WATER CONTENT ASTM D2216 (%)	ORGANIC CONTENT (burnoff) ASTM D2974 (%)		%GRAVEL	%SAND					%Mud	% SILT	% CLAY
						VERY COARSE	COARSE	MEDIUM	FINE	VERY FINE			
EW2-01	A1	20.7	0.2	SP	0.0	0.4	20.7	69.4	4.5	3.3	1.7	1.4	0.3
EW2-01	E2	25.0	0.2	SP-SM	3.6	0.3	1.0	5.2	53.5	32.3	4.1	3.2	0.9
EW2-01	W2	24.8	0.2	SP-SM	0.2	0.1	2.0	8.8	35.5	47.7	5.7	5.2	0.5
EW2-02	A1	11.9	0.2	SP	33.8	18.7	38.6	4.5	1.6	1.0	1.8	1.0	0.8
EW2-02	E1	30.1	0.3	SP-SM	0.6	0.2	0.6	5.1	47.8	40.0	5.7	3.6	2.1
EW2-02	W1	11.9	0.4	SP	52.2	7.7	23.0	14.0	1.1	0.8	1.2	0.2	1.0
EW2-03	A3	28.0	0.3	SM	0.0	0.5	1.2	1.8	27.3	59.4	9.8	5.6	4.2
EW2-03	E1	11.1	0.3	SP	51.0	9.2	26.6	3.8	2.0	4.3	3.1	1.4	1.7
EW2-03	W3	25.7	0.3	SM	0.1	1.8	1.9	2.1	36.8	48.4	8.9	5.4	3.5
EW2-04	A1	13.7	0.2	SP	37.4	9.0	33.4	16.7	1.0	0.7	1.8	0.6	1.2
EW2-04	E1	12.1	0.3	SP	47.5	14.4	29.9	4.3	1.1	0.9	1.9	1.1	0.8
EW2-04	W1	21.7	0.2	SP	0.5	1.6	13.8	68.7	8.9	2.8	3.7	0.7	3.0
EW2-05	A1	20.6	0.2	SP-SM	0.2	0.9	25.9	60.5	4.8	2.9	4.8	2.0	2.8
EW2-05	E1	8.5	0.2	SP	58.5	21.3	10.9	4.2	0.7	2.1	2.3	0.9	1.4
EW2-05	W1	19.1	0.2	SP-SM	4.8	4.8	37.6	44.9	2.0	1.0	4.9	2.2	2.7
EW2-06	A1	28.9	0.9	SW-SC	24.1	9.5	23.8	24.0	7.4	2.4	8.8	4.3	4.5
EW2-06	E1	41.4	1.6	SC	0.1	0.3	1.1	9.2	41.2	26.2	21.9	13.1	8.8
EW2-06	W1	14.0	0.2	SP	32.9	12.8	18.9	26.6	6.1	0.8	1.9	1.3	0.6
EW2-07	A1	11.6	0.1	SP	47.3	5.3	16.7	24.0	4.5	1.4	0.8	0.1	0.7
EW2-07	E1	24.1	0.2	SP	0.4	0.9	4.4	39.2	43.4	8.3	3.4	2.5	0.9
EW2-07	W1	11.9	0.3	SP	42.5	11.2	23.4	17.4	2.7	0.8	2.0	1.5	0.5
EW2-08	A2	26.4	0.2	SP-SM	0.1	0.2	1.0	4.2	30.3	57.7	6.5	5.5	1.0
EW2-08	E2	25.6	0.3	SM	0.0	0.2	0.9	4.6	30.3	56.9	7.1	5.2	1.9
EW2-08	W1	25.2	0.3	SP-SM	0.1	0.2	2.1	6.2	33.8	51.2	6.4	4.5	1.9
EW2-09	A4	22.9	0.6	SP-SM	0.3	0.4	2.1	20.1	38.3	33.9	4.9	3.6	1.3
EW2-09	E2	28.4	0.3	SM	0.1	0.2	0.8	8.8	30.6	51.4	8.1	5.1	3.0
EW2-09	W3	24.8	0.3	SP-SM	0.3	1.0	4.7	13.4	34.2	40.7	5.7	4.1	1.6

Alpine #1894
EW 2021 - Barret ECR Environmental Survey
LABORATORY TESTING DATA SUMMARY

EXPLORATION NO.	SAMPLE	IDENTIFICATION TESTS		USCS SYMB. (1)	**CMECS** Grain Size Descriptors								
		WATER CONTENT ASTM D2216 (%)	ORGANIC CONTENT (burnoff) ASTM D2974 (%)		%GRAVEL	%SAND					%Mud	% SILT	% CLAY
						VERY COARSE	COARSE	MEDIUM	FINE	VERY FINE			
EW2-10	A2	31.4	0.6	SM	0.2	0.2	1.4	14.2	43.4	30.9	9.7	5.7	4.0
EW2-10	E2	20.3	0.1	SP	0.3	1.3	40.4	50.6	3.8	1.7	1.9	1.2	0.7
EW2-10	W2	46.3	1.3	SC	0.2	0.7	2.5	3.7	30.3	49.0	13.6	7.4	6.2
EW2-11	A1	21.1	0.2	SP	0.2	0.2	1.2	37.6	48.6	10.1	2.1	1.9	0.2
EW2-11	E1	25.2	0.2	SP-SM	0.3	0.1	0.3	3.4	61.2	30.0	4.7	4.5	0.2
EW2-11	W3	24.5	0.3	SP-SM	0.3	0.2	2.3	9.1	39.0	43.4	5.7	4.5	1.2
EW2-12	A1	19.0	0.2	SP	12.4	3.2	26.8	46.1	8.3	0.7	2.5	1.7	0.8
EW2-12	E1	18.4	0.4	SP	47.4	14.2	20.7	11.7	2.0	0.6	3.4	1.6	1.8
EW2-12	W1	21.6	0.1	SP	1.9	1.3	11.6	64.2	16.5	1.9	2.6	1.7	0.9

Notes: (1) USCS symbol based on visual observation and Sieve results reported.



Sieve No.	Sieve (mm)	Phi	Cumulative Percent by Weight
2"	50.8	-5.7	0.0
1 1/2"	38.1	-5.3	0.0
1"	25.4	-4.7	0.0
3/4"	19.1	-4.3	0.0
5/8"	15.9	-4.0	0.0
1/2"	12.7	-3.7	0.0
5/16"	7.9	-3.0	0.0
1/4"	6.4	-2.7	0.0
5	4.0	-2.0	0.0
7	2.8	-1.5	0.0
10	2.0	-1.0	0.0
14	1.4	-0.5	0.1
18	1.00	0.0	0.4
25	0.71	0.5	2.5
35	0.50	1.0	21.1
45	0.353	1.5	72.0
60	0.249	2.0	90.5
80	0.178	2.5	93.1
120	0.124	3.0	95.0
170	0.089	3.5	97.1
230	0.064	4.0	98.3
		4.5	98.7
		5.0	99.6
		5.5	99.7
		6.0	99.7
		6.5	99.7
		7.0	99.7
		7.5	99.7
		8.0	99.7
		8.5	99.7
		9.0	99.7
		9.5	99.7

TerraSense, LLC	Alpine
7901-21001	1894

EW 2021 - Barret ECR Environmental Survey

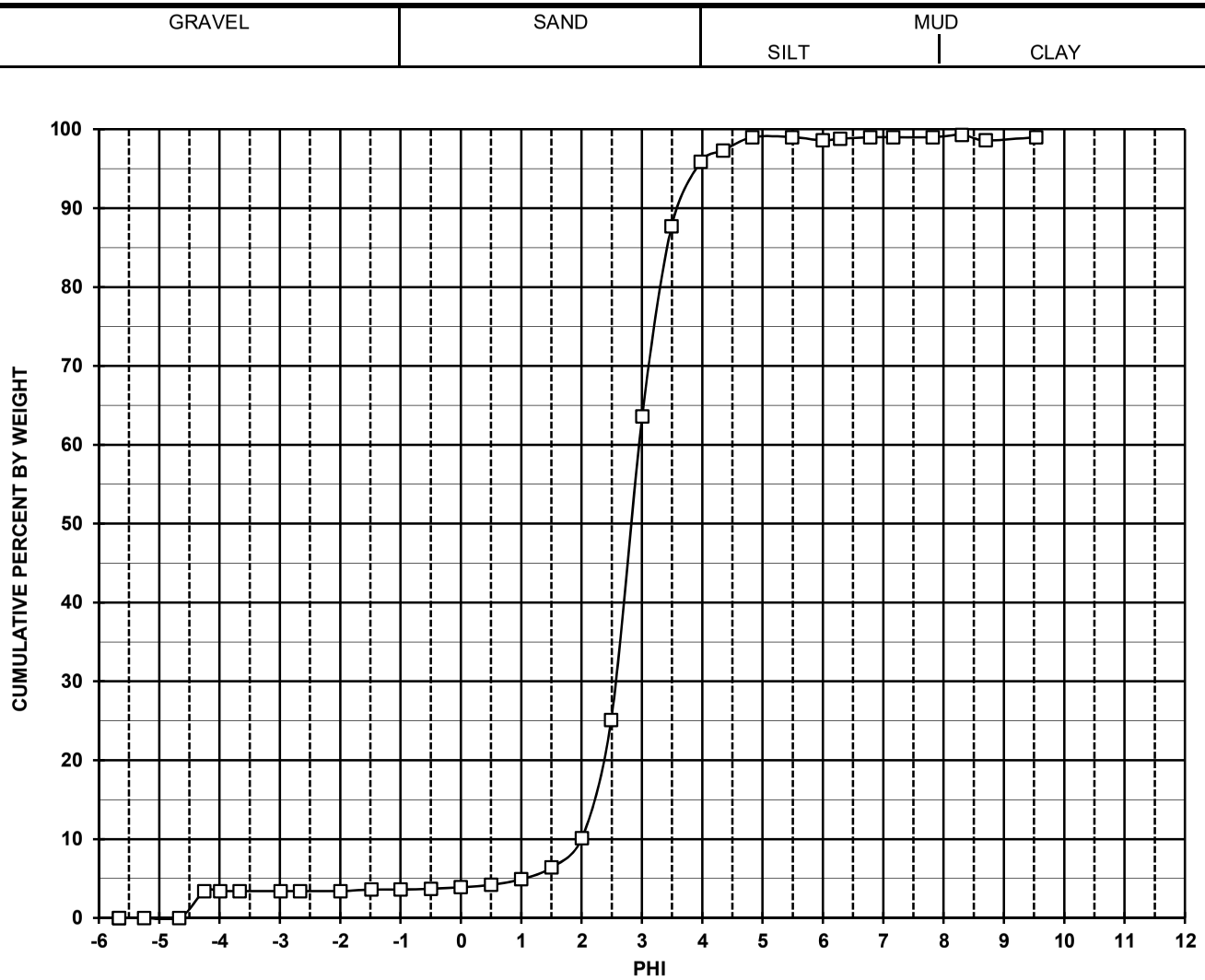
TEST SUMMARY

DESCRIPTION: Medium sand

GRAVEL (>2mm)	0.0%
SAND (2mm to .0625mm)	98.3%
SILT (>0.0625mm to 0.004mm)	1.4%
CLAY (< 0.004mm)	0.3%

PARTICLE SIZE DISTRIBUTION
(Wentworth/Folk)
Sample: EW2-01 A1

Analysis file: FolkV3 (2/15) Siev1A1.xlsx 6/24/2021



Sieve No.	Sieve (mm)	Phi	Cumulative Percent by Weight
2"	50.8	-5.7	0.0
1 1/2"	38.1	-5.3	0.0
1"	25.4	-4.7	0.0
3/4"	19.1	-4.3	3.4
5/8"	15.9	-4.0	3.4
1/2"	12.7	-3.7	3.4
5/16"	7.9	-3.0	3.4
1/4"	6.4	-2.7	3.4
5	4.0	-2.0	3.4
7	2.8	-1.5	3.6
10	2.0	-1.0	3.6
14	1.4	-0.5	3.7
18	1.00	0.0	3.9
25	0.71	0.5	4.2
35	0.50	1.0	4.9
45	0.353	1.5	6.4
60	0.249	2.0	10.1
80	0.178	2.5	25.1
120	0.124	3.0	63.6
170	0.089	3.5	87.7
230	0.064	4.0	95.9
		4.5	97.8
		5.0	99.0
		5.5	99.0
		6.0	99.0
		6.5	99.0
		7.0	99.0
		7.5	99.0
		8.0	99.1
		8.5	99.3
		9.0	99.3
		9.5	99.3

TerraSense, LLC	Alpine
7901-21001	1894

EW 2021 - Barret ECR Environmental Survey

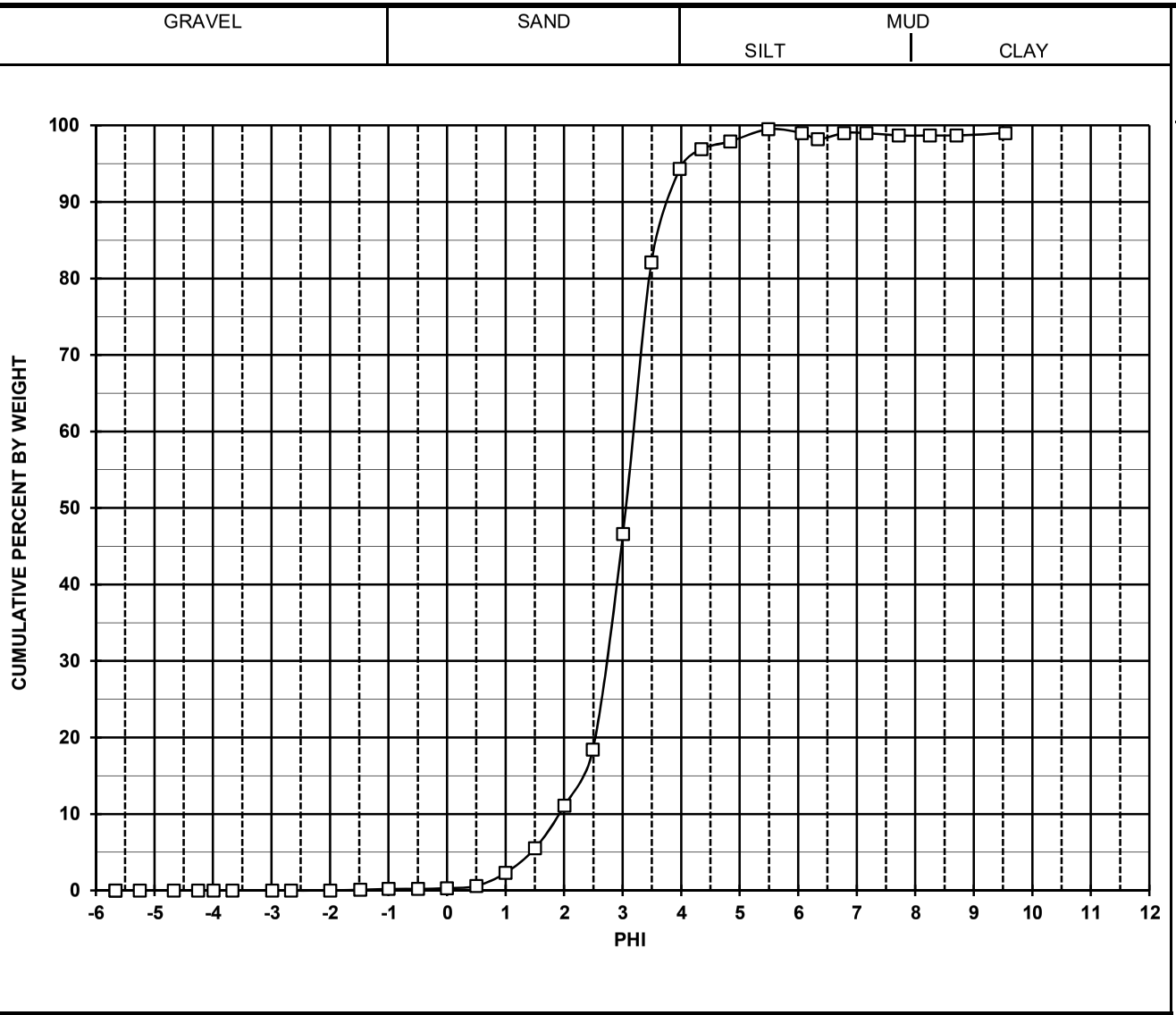
TEST SUMMARY

DESCRIPTION: Slightly gravelly fine sand

GRAVEL (>2mm)	3.6%
SAND (2mm to .0625mm)	92.3%
SILT (>0.0625mm to 0.004mm)	3.2%
CLAY (< 0.004mm)	0.9%

PARTICLE SIZE DISTRIBUTION
(Wentworth/Folk)
Sample: EW2-01 E2

Analysis file: FolkV3 (2/15) Siev1A2.xlsx 6/24/2021



Sieve No.	Sieve (mm)	Phi	Cumulative Percent by Weight
2"	50.8	-5.7	0.0
1 1/2"	38.1	-5.3	0.0
1"	25.4	-4.7	0.0
3/4"	19.1	-4.3	0.0
5/8"	15.9	-4.0	0.0
1/2"	12.7	-3.7	0.0
5/16"	7.9	-3.0	0.0
1/4"	6.4	-2.7	0.0
5	4.0	-2.0	0.0
7	2.8	-1.5	0.1
10	2.0	-1.0	0.2
14	1.4	-0.5	0.2
18	1.00	0.0	0.3
25	0.71	0.5	0.6
35	0.50	1.0	2.3
45	0.353	1.5	5.5
60	0.249	2.0	11.1
80	0.178	2.5	18.4
120	0.124	3.0	46.6
170	0.089	3.5	82.1
230	0.064	4.0	94.3
		4.5	97.4
		5.0	98.3
		5.5	99.5
		6.0	99.5
		6.5	99.5
		7.0	99.5
		7.5	99.5
		8.0	99.5
		8.5	99.5
		9.0	99.5
		9.5	99.5

TerraSense, LLC	Alpine
7901-21001	1894

EW 2021 - Barret ECR Environmental Survey

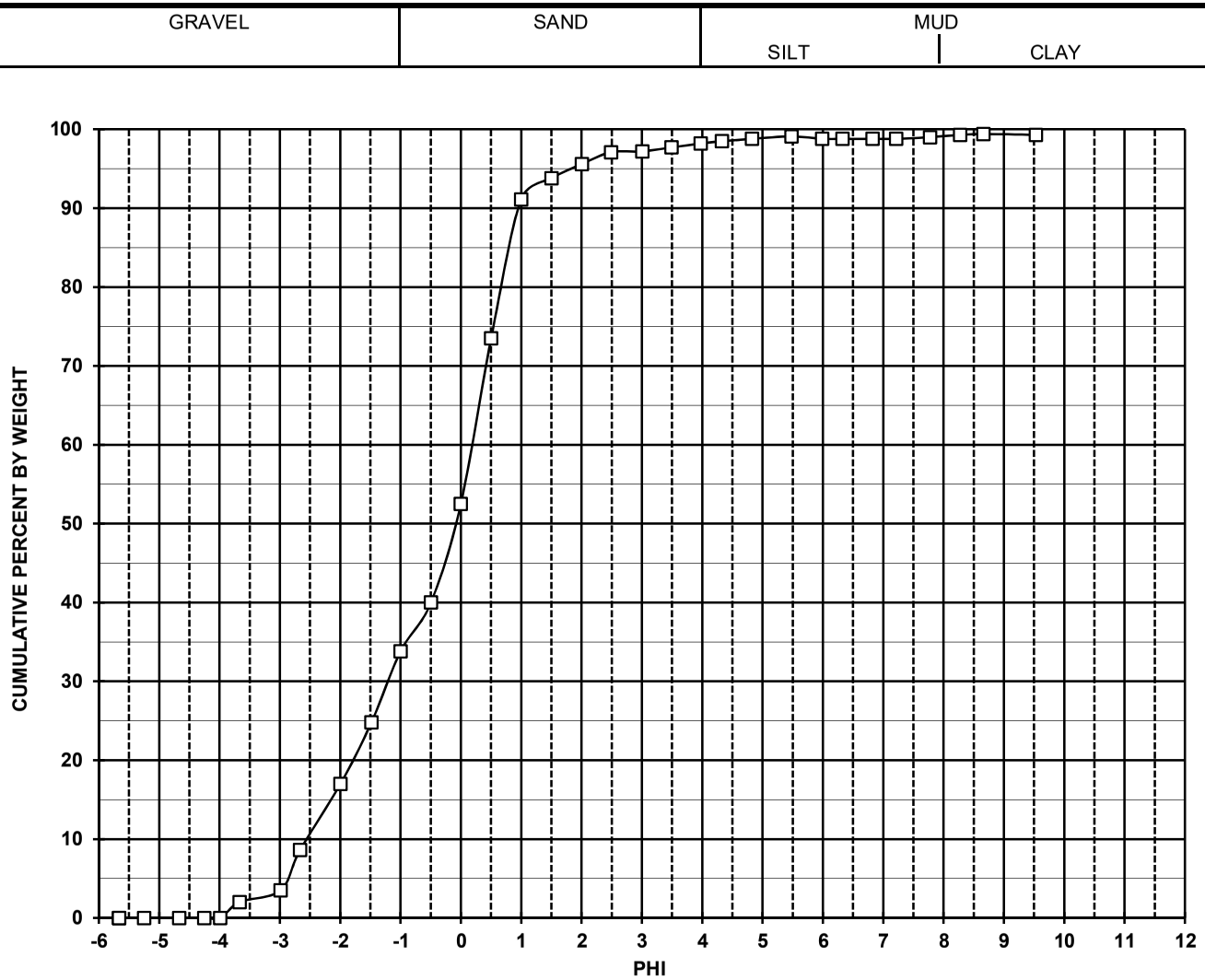
TEST SUMMARY

DESCRIPTION: Slightly gravelly very fine sand

GRAVEL (>2mm)	0.2%
SAND (2mm to .0625mm)	94.1%
SILT (>0.0625mm to 0.004mm)	5.2%
CLAY (< 0.004mm)	0.5%

PARTICLE SIZE DISTRIBUTION
(Wentworth/Folk)
Sample: EW2-01 W2

Analysis file: FolkV3 (2/15) Siev1A3.xlsx 6/24/2021



Sieve No.	Sieve (mm)	Phi	Cumulative Percent by Weight
2"	50.8	-5.7	0.0
1 1/2"	38.1	-5.3	0.0
1"	25.4	-4.7	0.0
3/4"	19.1	-4.3	0.0
5/8"	15.9	-4.0	0.0
1/2"	12.7	-3.7	2.0
5/16"	7.9	-3.0	3.5
1/4"	6.4	-2.7	8.6
5	4.0	-2.0	17.0
7	2.8	-1.5	24.8
10	2.0	-1.0	33.8
14	1.4	-0.5	40.0
18	1.00	0.0	52.5
25	0.71	0.5	73.5
35	0.50	1.0	91.1
45	0.353	1.5	93.8
60	0.249	2.0	95.6
80	0.178	2.5	97.1
120	0.124	3.0	97.2
170	0.089	3.5	97.7
230	0.064	4.0	98.2
		4.5	98.6
		5.0	98.9
		5.5	99.1
		6.0	99.1
		6.5	99.1
		7.0	99.1
		7.5	99.1
		8.0	99.2
		8.5	99.4
		9.0	99.4
		9.5	99.4

TerraSense, LLC	Alpine
7901-21001	1894

EW 2021 - Barret ECR Environmental Survey

TEST SUMMARY

DESCRIPTION: Coarse sandy Gravel

GRAVEL (>2mm)	33.8%
SAND (2mm to .0625mm)	64.4%
SILT (>0.0625mm to 0.004mm)	1.0%
CLAY (< 0.004mm)	0.8%

PARTICLE SIZE DISTRIBUTION
(Wentworth/Folk)
Sample: EW2-02 A1

Analysis file: FolkV3 (2/15) Siev1B1.xlsx 6/18/2021

Sieve No.	Sieve (mm)	Phi	Cumulative Percent by Weight
2"	50.8	-5.7	0.0
1 1/2"	38.1	-5.3	0.0
1"	25.4	-4.7	0.0
3/4"	19.1	-4.3	0.0
5/8"	15.9	-4.0	0.0
1/2"	12.7	-3.7	0.0
5/16"	7.9	-3.0	0.0
1/4"	6.4	-2.7	0.3
5	4.0	-2.0	0.4
7	2.8	-1.5	0.5
10	2.0	-1.0	0.6
14	1.4	-0.5	0.7
18	1.00	0.0	0.8
25	0.71	0.5	1.0
35	0.50	1.0	1.4
45	0.353	1.5	2.2
60	0.249	2.0	6.5
80	0.178	2.5	18.9
120	0.124	3.0	54.3
170	0.089	3.5	83.1
230	0.064	4.0	94.3
		4.5	96.3
		5.0	97.0
		5.5	97.9
		6.0	97.9
		6.5	97.9
		7.0	97.9
		7.5	97.9
		8.0	97.9
		8.5	97.9
		9.0	97.9
		9.5	97.9

TerraSense, LLC	Alpine
7901-21001	1894

EW 2021 - Barret ECR Environmental Survey

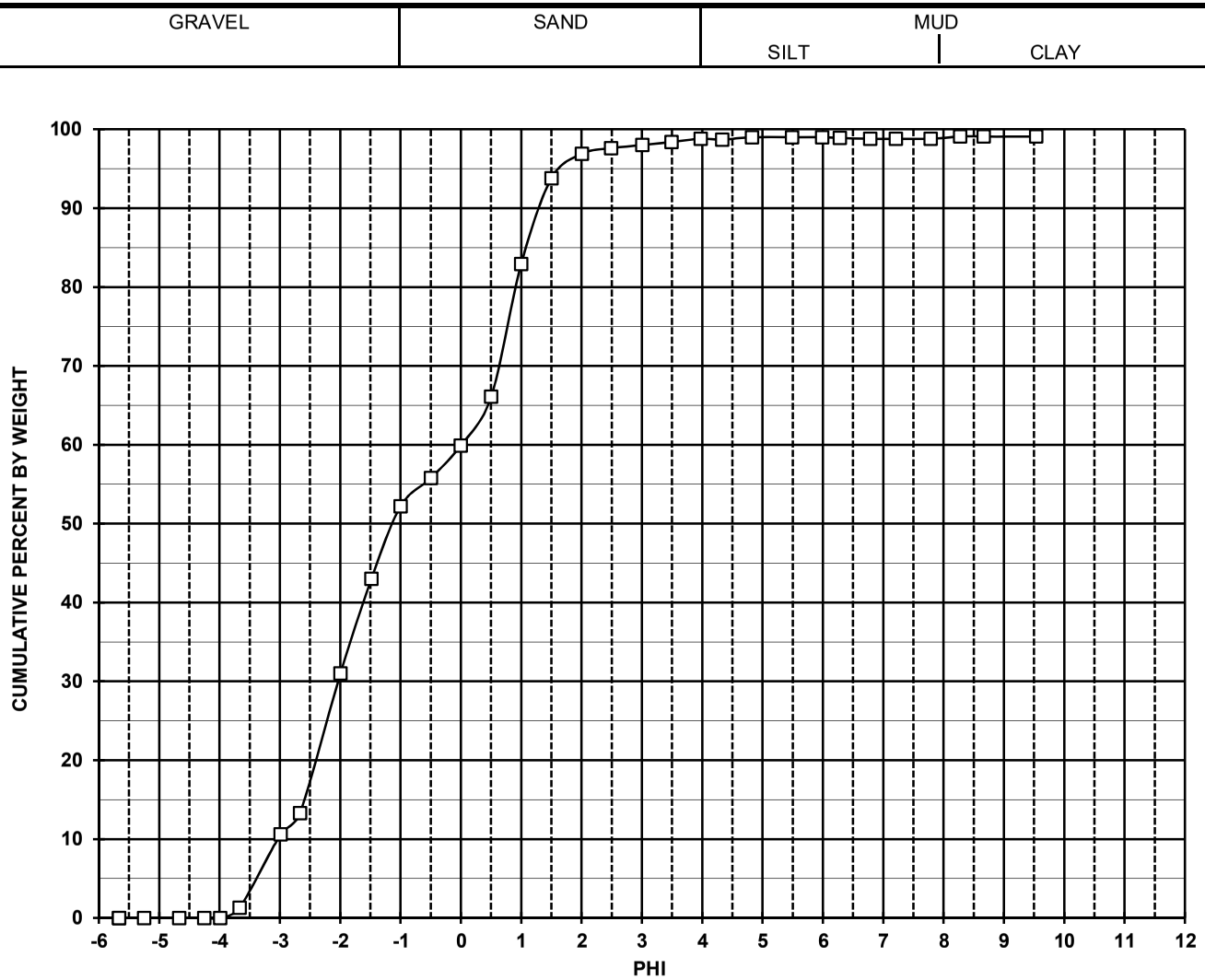
TEST SUMMARY

DESCRIPTION: Slightly gravelly fine sand

GRAVEL (>2mm)	0.6%
SAND (2mm to .0625mm)	93.7%
SILT (>0.0625mm to 0.004mm)	3.6%
CLAY (< 0.004mm)	2.1%

PARTICLE SIZE DISTRIBUTION
(Wentworth/Folk)
Sample: EW2-02 E1

Analysis file: FolkV3 (2/15) Siev1B2.xlsx 6/18/2021



Sieve No.	Sieve (mm)	Phi	Cumulative Percent by Weight
2"	50.8	-5.7	0.0
1 1/2"	38.1	-5.3	0.0
1"	25.4	-4.7	0.0
3/4"	19.1	-4.3	0.0
5/8"	15.9	-4.0	0.0
1/2"	12.7	-3.7	1.3
5/16"	7.9	-3.0	10.6
1/4"	6.4	-2.7	13.3
5	4.0	-2.0	31.0
7	2.8	-1.5	43.0
10	2.0	-1.0	52.2
14	1.4	-0.5	55.8
18	1.00	0.0	59.9
25	0.71	0.5	66.1
35	0.50	1.0	82.9
45	0.353	1.5	93.8
60	0.249	2.0	96.9
80	0.178	2.5	97.6
120	0.124	3.0	98.0
170	0.089	3.5	98.4
230	0.064	4.0	98.8
		4.5	98.8
		5.0	99.0
		5.5	99.0
		6.0	99.0
		6.5	99.0
		7.0	99.0
		7.5	99.0
		8.0	99.0
		8.5	99.1
		9.0	99.1
		9.5	99.1

TerraSense, LLC	Alpine
7901-21001	1894

EW 2021 - Barret ECR Environmental Survey

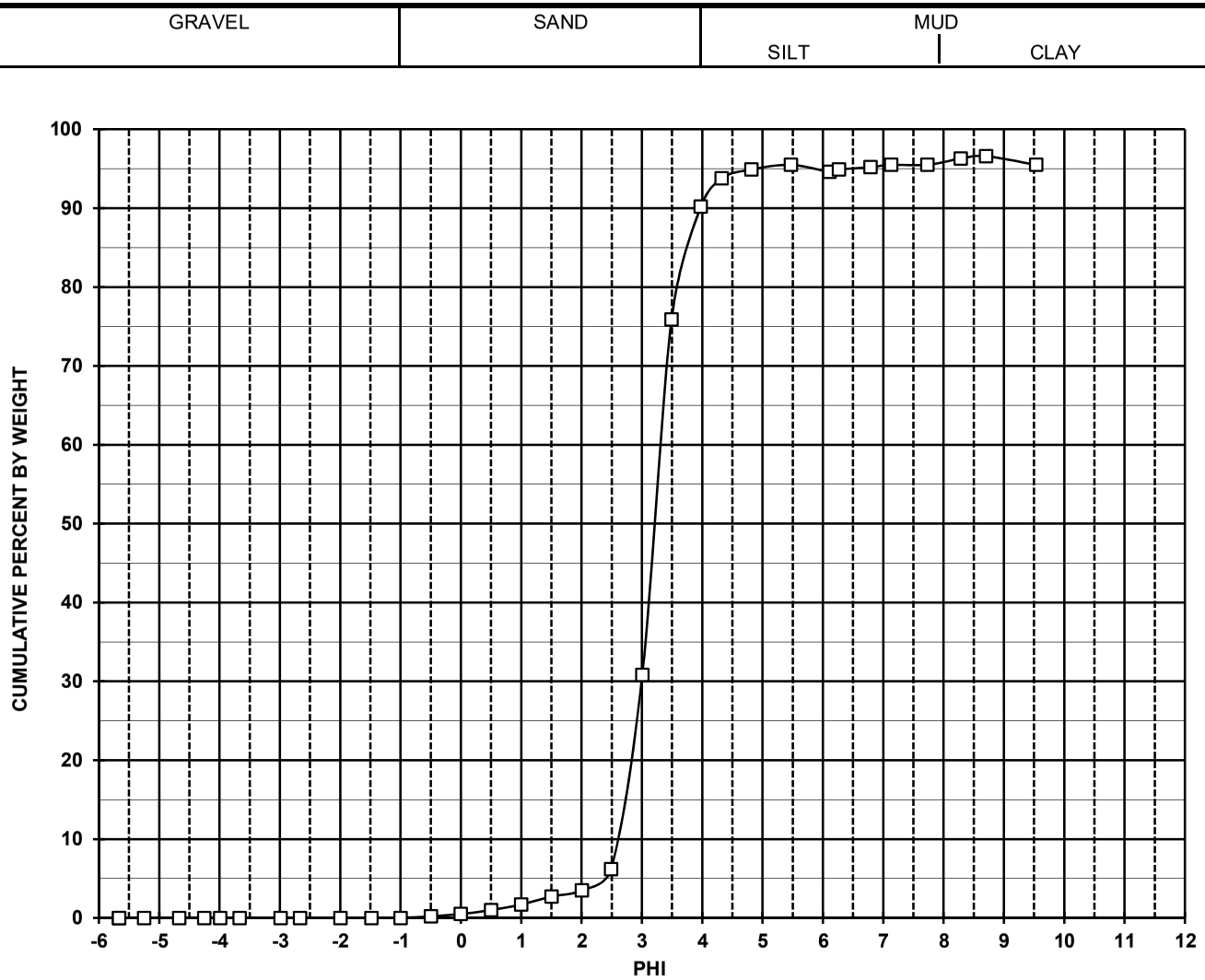
TEST SUMMARY

DESCRIPTION: Coarse sandy Gravel

GRAVEL (>2mm)	52.2%
SAND (2mm to .0625mm)	46.6%
SILT (>0.0625mm to 0.004mm)	0.2%
CLAY (< 0.004mm)	1.0%

PARTICLE SIZE DISTRIBUTION
(Wentworth/Folk)
Sample: EW2-02 W1

Analysis file: FolkV3 (2/15) Siev1B3.xlsx 6/18/2021



Sieve No.	Sieve (mm)	Phi	Cumulative Percent by Weight
2"	50.8	-5.7	0.0
1 1/2"	38.1	-5.3	0.0
1"	25.4	-4.7	0.0
3/4"	19.1	-4.3	0.0
5/8"	15.9	-4.0	0.0
1/2"	12.7	-3.7	0.0
5/16"	7.9	-3.0	0.0
1/4"	6.4	-2.7	0.0
5	4.0	-2.0	0.0
7	2.8	-1.5	0.0
10	2.0	-1.0	0.0
14	1.4	-0.5	0.2
18	1.00	0.0	0.5
25	0.71	0.5	1.0
35	0.50	1.0	1.7
45	0.353	1.5	2.7
60	0.249	2.0	3.5
80	0.178	2.5	6.2
120	0.124	3.0	30.8
170	0.089	3.5	75.9
230	0.064	4.0	90.2
		4.5	94.6
		5.0	95.1
		5.5	95.5
		6.0	95.5
		6.5	95.5
		7.0	95.5
		7.5	95.5
		8.0	95.8
		8.5	96.5
		9.0	96.6
		9.5	96.6

TerraSense, LLC	Alpine
7901-21001	1894

EW 2021 - Barret ECR Environmental Survey

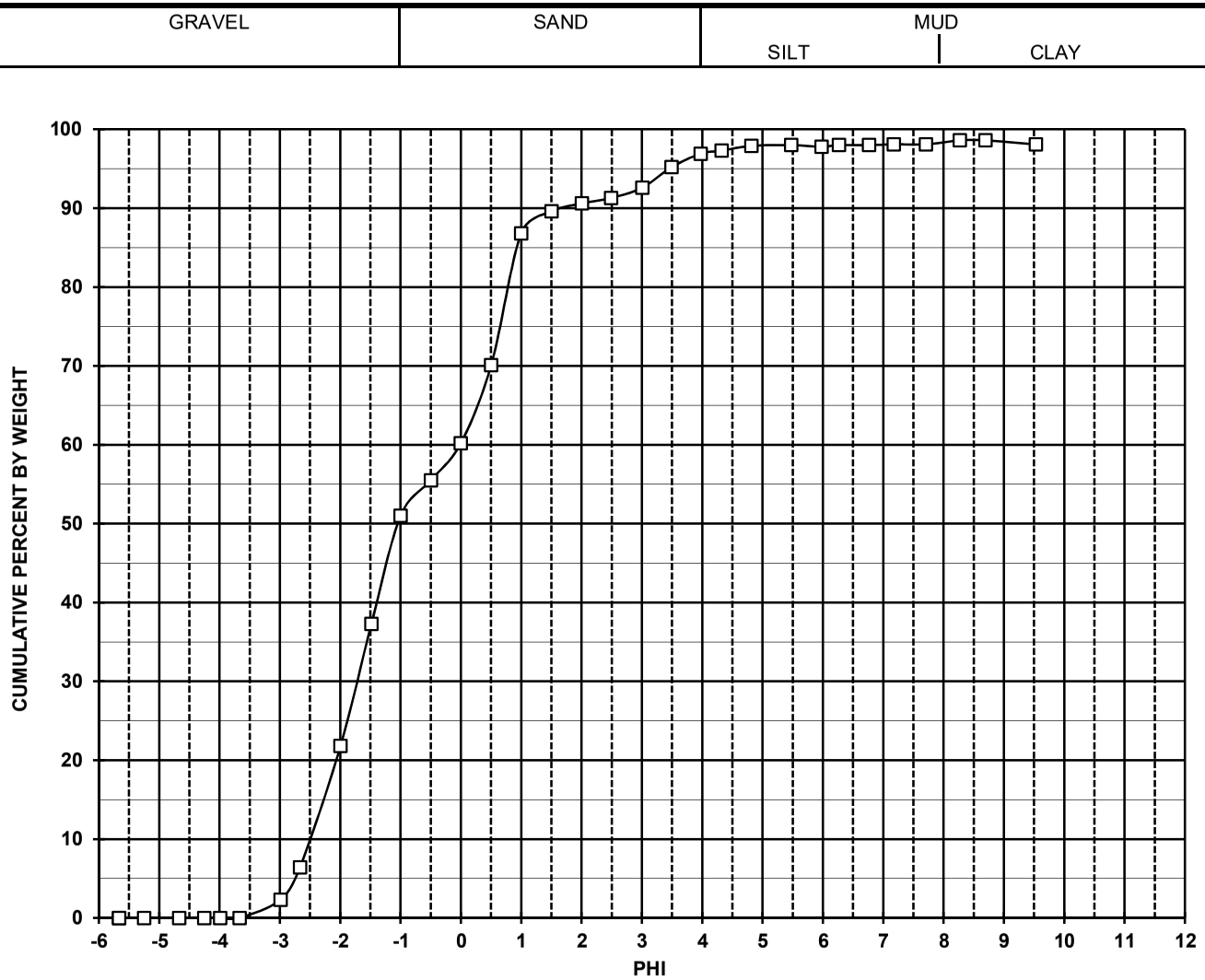
TEST SUMMARY

DESCRIPTION: Very fine sand

GRAVEL (>2mm)	0.0%
SAND (2mm to .0625mm)	90.2%
SILT (>0.0625mm to 0.004mm)	5.6%
CLAY (< 0.004mm)	4.2%

PARTICLE SIZE DISTRIBUTION
(Wentworth/Folk)
Sample: EW2-03 A3

Analysis file: FolkV3 (2/15) Siev1C1.xlsx 6/18/2021



Sieve No.	Sieve (mm)	Phi	Cumulative Percent by Weight
2"	50.8	-5.7	0.0
1 1/2"	38.1	-5.3	0.0
1"	25.4	-4.7	0.0
3/4"	19.1	-4.3	0.0
5/8"	15.9	-4.0	0.0
1/2"	12.7	-3.7	0.0
5/16"	7.9	-3.0	2.3
1/4"	6.4	-2.7	6.4
5	4.0	-2.0	21.8
7	2.8	-1.5	37.3
10	2.0	-1.0	51.0
14	1.4	-0.5	55.5
18	1.00	0.0	60.2
25	0.71	0.5	70.1
35	0.50	1.0	86.8
45	0.353	1.5	89.6
60	0.249	2.0	90.6
80	0.178	2.5	91.3
120	0.124	3.0	92.6
170	0.089	3.5	95.2
230	0.064	4.0	96.9
		4.5	97.5
		5.0	98.0
		5.5	98.0
		6.0	98.0
		6.5	98.0
		7.0	98.0
		7.5	98.1
		8.0	98.3
		8.5	98.6
		9.0	98.6
		9.5	98.6

TerraSense, LLC	Alpine
7901-21001	1894

EW 2021 - Barret ECR Environmental Survey

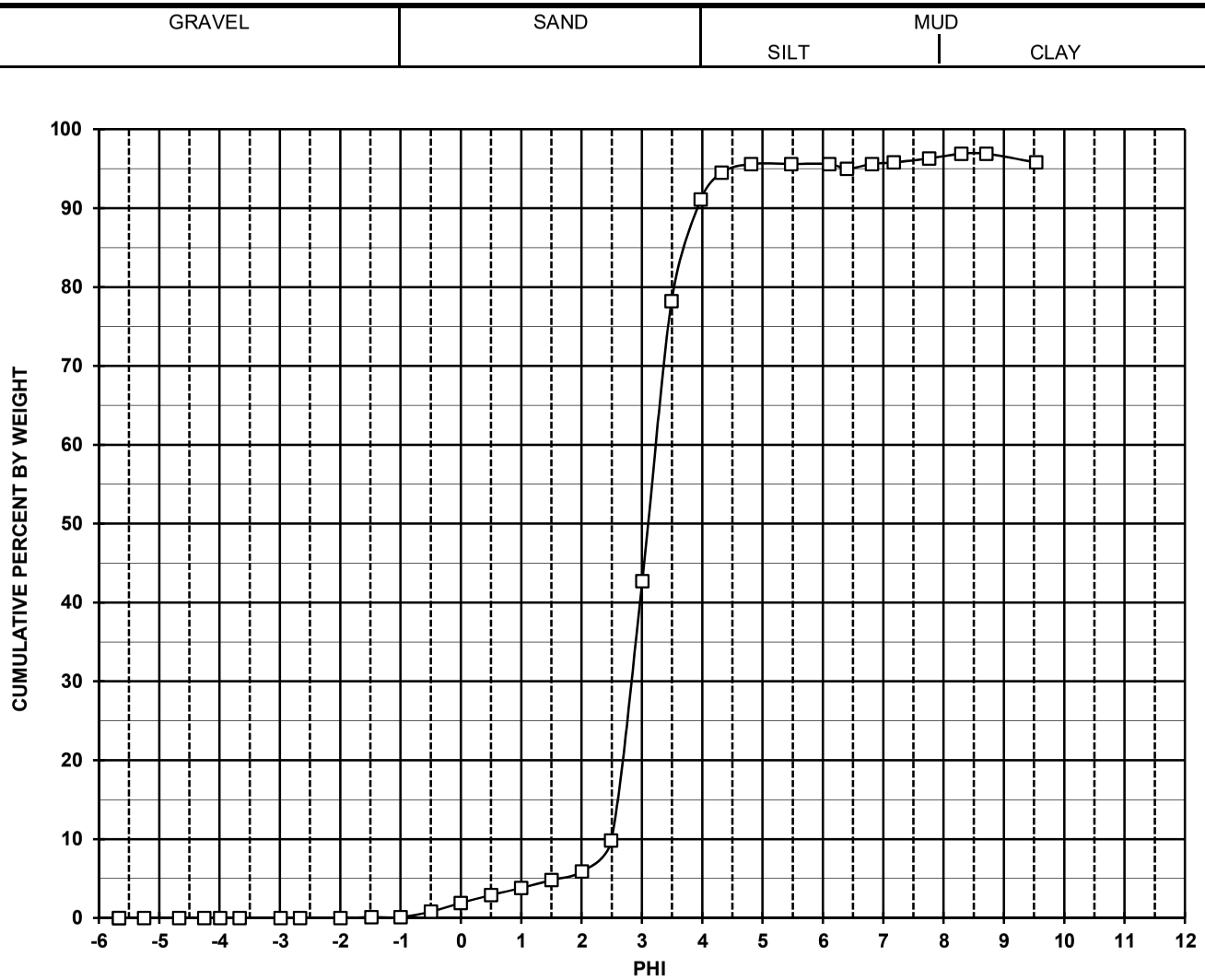
TEST SUMMARY

DESCRIPTION: Coarse sandy Gravel

GRAVEL (>2mm)	51.0%
SAND (2mm to .0625mm)	45.9%
SILT (>0.0625mm to 0.004mm)	1.4%
CLAY (< 0.004mm)	1.7%

PARTICLE SIZE DISTRIBUTION
(Wentworth/Folk)
Sample: EW2-03 E1

Analysis file: FolkV3 (2/15) Siev1C2.xlsx 6/18/2021



Sieve No.	Sieve (mm)	Phi	Cumulative Percent by Weight
2"	50.8	-5.7	0.0
1 1/2"	38.1	-5.3	0.0
1"	25.4	-4.7	0.0
3/4"	19.1	-4.3	0.0
5/8"	15.9	-4.0	0.0
1/2"	12.7	-3.7	0.0
5/16"	7.9	-3.0	0.0
1/4"	6.4	-2.7	0.0
5	4.0	-2.0	0.0
7	2.8	-1.5	0.1
10	2.0	-1.0	0.1
14	1.4	-0.5	0.8
18	1.00	0.0	1.9
25	0.71	0.5	2.9
35	0.50	1.0	3.8
45	0.353	1.5	4.8
60	0.249	2.0	5.9
80	0.178	2.5	9.8
120	0.124	3.0	42.7
170	0.089	3.5	78.2
230	0.064	4.0	91.1
		4.5	95.3
		5.0	95.6
		5.5	95.6
		6.0	95.6
		6.5	95.6
		7.0	95.7
		7.5	96.0
		8.0	96.5
		8.5	96.9
		9.0	96.9
		9.5	96.9

TerraSense, LLC	Alpine
7901-21001	1894

EW 2021 - Barret ECR Environmental Survey

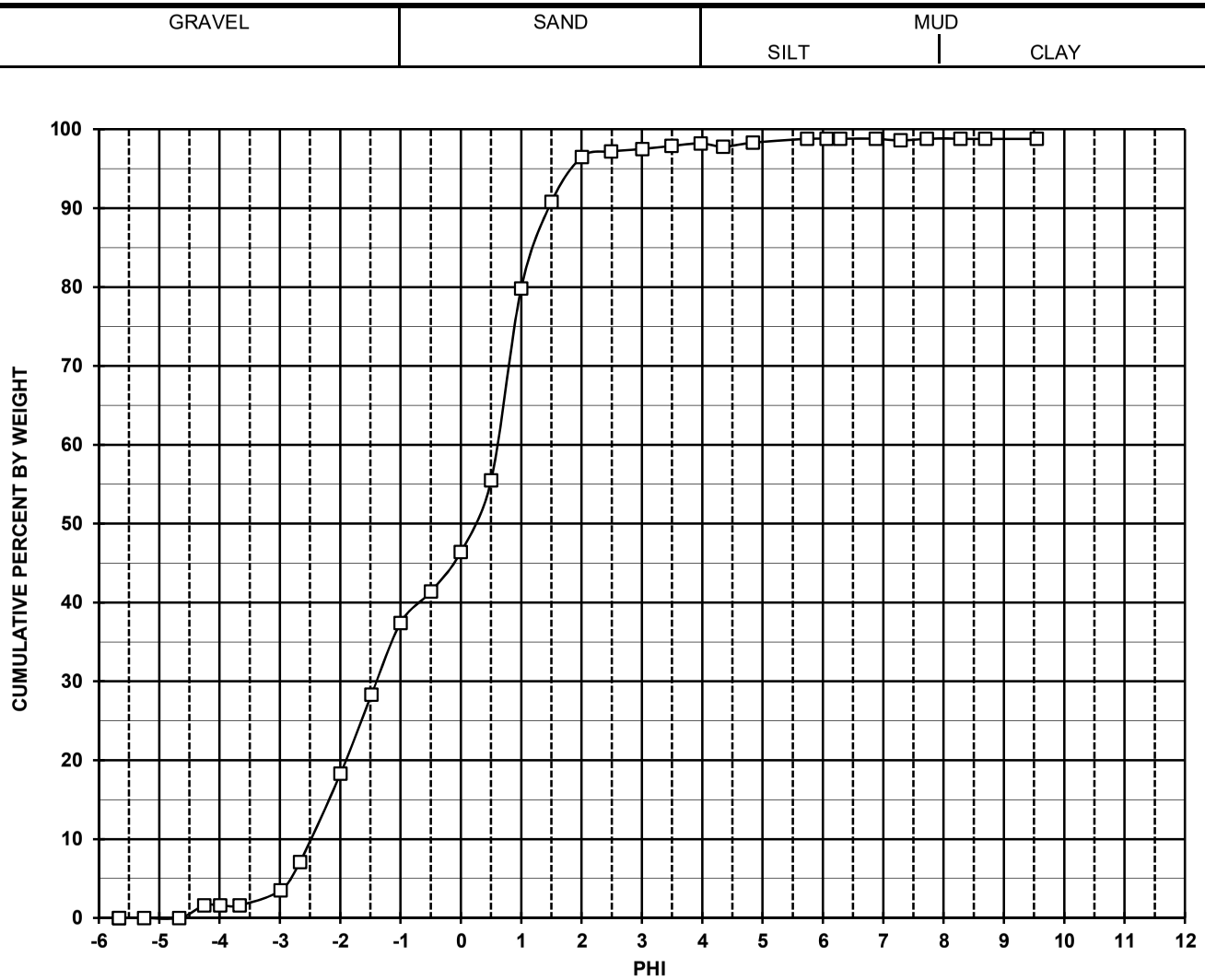
TEST SUMMARY

DESCRIPTION: Slightly gravelly very fine sand

GRAVEL (>2mm)	0.1%
SAND (2mm to .0625mm)	91.0%
SILT (>0.0625mm to 0.004mm)	5.4%
CLAY (< 0.004mm)	3.5%

PARTICLE SIZE DISTRIBUTION
(Wentworth/Folk)
Sample: EW2-03 W3

Analysis file: FolkV3 (2/15) Siev1C3.xlsx 6/18/2021



Sieve No.	Sieve (mm)	Phi	Cumulative Percent by Weight
2"	50.8	-5.7	0.0
1 1/2"	38.1	-5.3	0.0
1"	25.4	-4.7	0.0
3/4"	19.1	-4.3	1.6
5/8"	15.9	-4.0	1.6
1/2"	12.7	-3.7	1.6
5/16"	7.9	-3.0	3.5
1/4"	6.4	-2.7	7.1
5	4.0	-2.0	18.3
7	2.8	-1.5	28.3
10	2.0	-1.0	37.4
14	1.4	-0.5	41.4
18	1.00	0.0	46.4
25	0.71	0.5	55.5
35	0.50	1.0	79.8
45	0.353	1.5	90.8
60	0.249	2.0	96.5
80	0.178	2.5	97.2
120	0.124	3.0	97.5
170	0.089	3.5	97.9
230	0.064	4.0	98.2
		4.5	98.2
		5.0	98.4
		5.5	98.6
		6.0	98.8
		6.5	98.8
		7.0	98.8
		7.5	98.8
		8.0	98.8
		8.5	98.8
		9.0	98.8
		9.5	98.8

TerraSense, LLC	Alpine
7901-21001	1894

EW 2021 - Barret ECR Environmental Survey

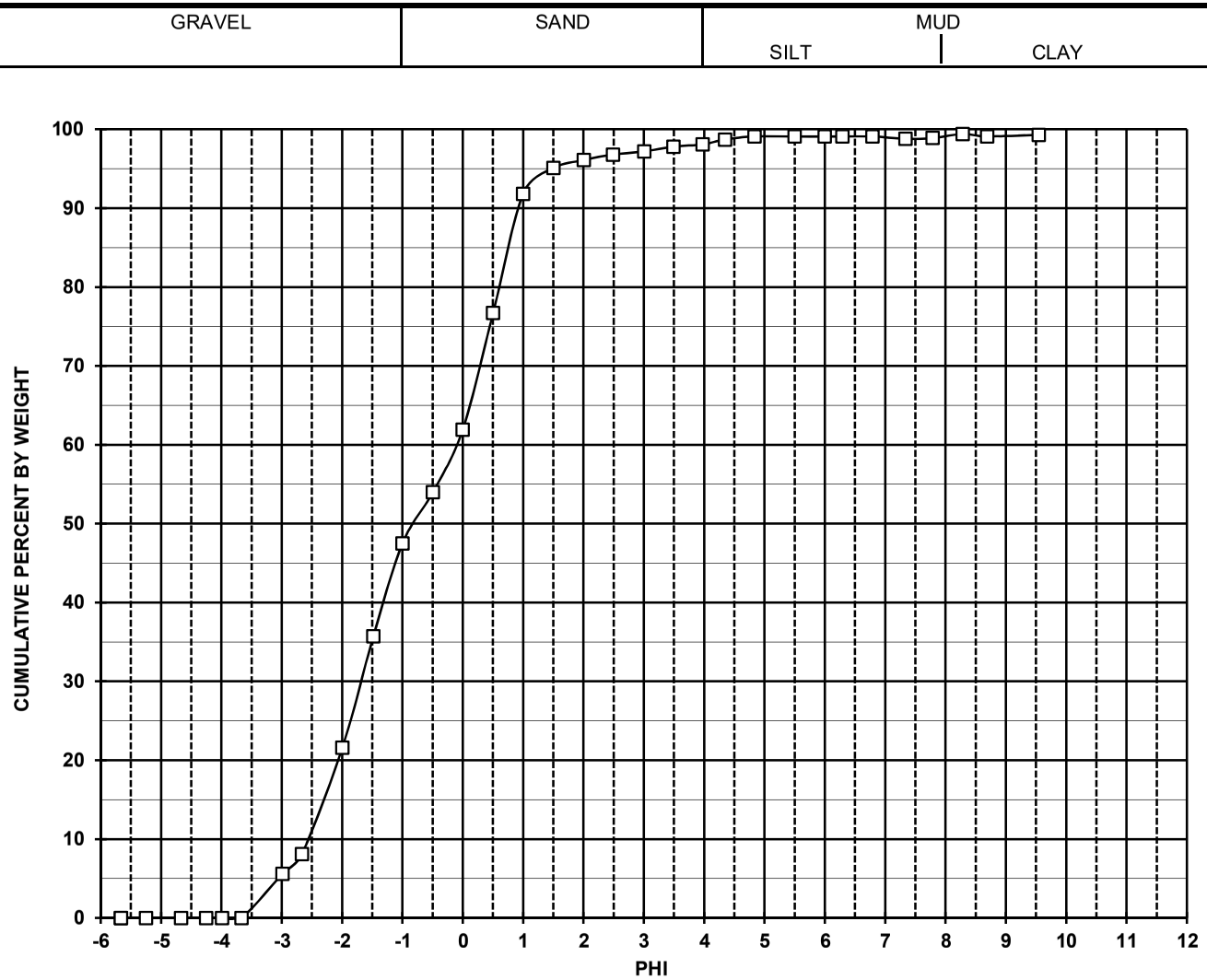
TEST SUMMARY

DESCRIPTION: Coarse sandy Gravel

GRAVEL (>2mm)	37.4%
SAND (2mm to .0625mm)	60.8%
SILT (>0.0625mm to 0.004mm)	0.6%
CLAY (< 0.004mm)	1.2%

PARTICLE SIZE DISTRIBUTION
(Wentworth/Folk)
Sample: EW2-04 A1

Analysis file: FolkV3 (2/15) Siev1D1.xlsx 6/18/2021



Sieve No.	Sieve (mm)	Phi	Cumulative Percent by Weight
2"	50.8	-5.7	0.0
1 1/2"	38.1	-5.3	0.0
1"	25.4	-4.7	0.0
3/4"	19.1	-4.3	0.0
5/8"	15.9	-4.0	0.0
1/2"	12.7	-3.7	0.0
5/16"	7.9	-3.0	5.6
1/4"	6.4	-2.7	8.1
5	4.0	-2.0	21.6
7	2.8	-1.5	35.7
10	2.0	-1.0	47.5
14	1.4	-0.5	54.0
18	1.00	0.0	61.9
25	0.71	0.5	76.7
35	0.50	1.0	91.8
45	0.353	1.5	95.1
60	0.249	2.0	96.1
80	0.178	2.5	96.8
120	0.124	3.0	97.2
170	0.089	3.5	97.8
230	0.064	4.0	98.1
		4.5	98.9
		5.0	99.1
		5.5	99.1
		6.0	99.1
		6.5	99.1
		7.0	99.1
		7.5	99.1
		8.0	99.2
		8.5	99.4
		9.0	99.4
		9.5	99.4

TerraSense, LLC	Alpine
7901-21001	1894

EW 2021 - Barret ECR Environmental Survey

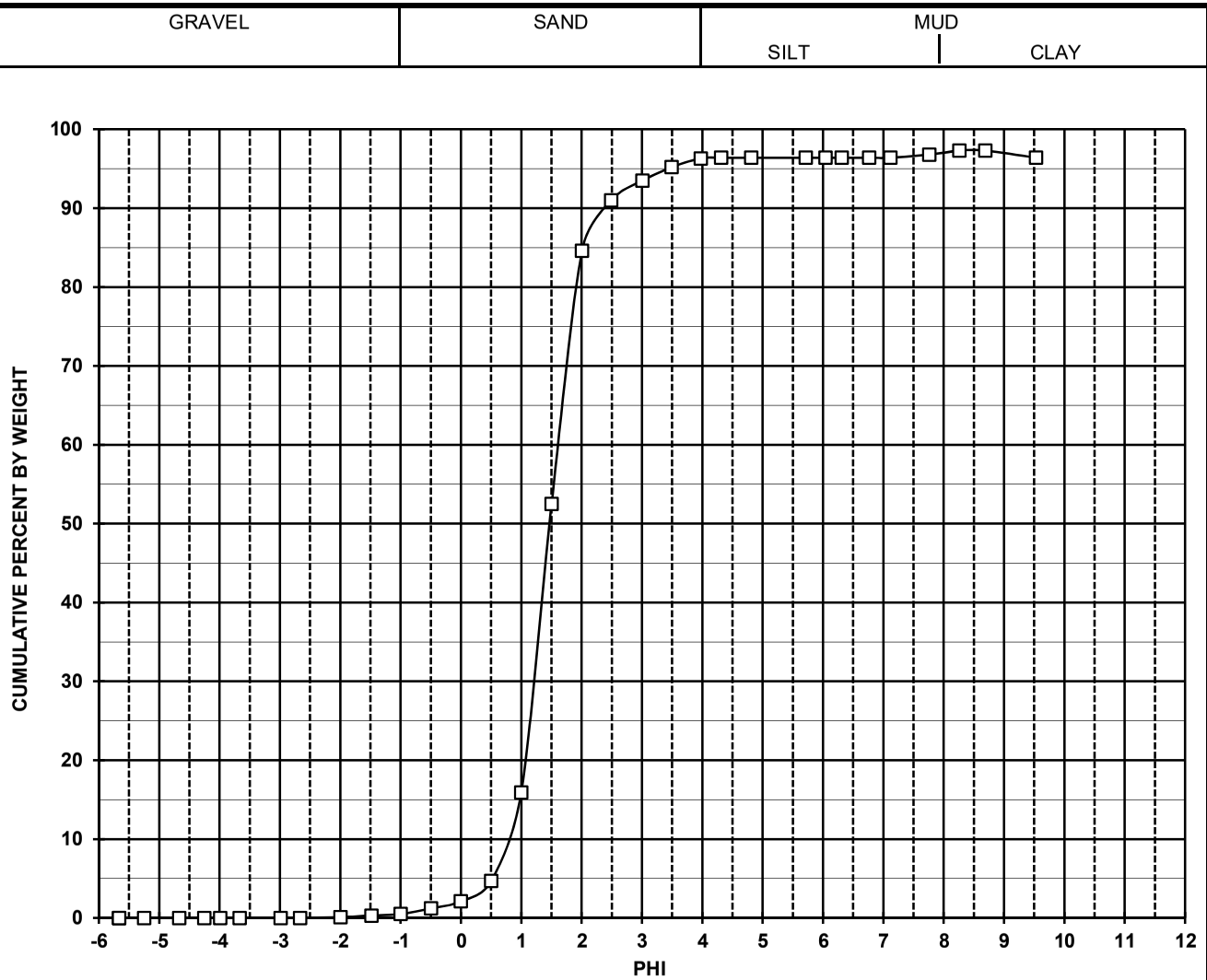
TEST SUMMARY

DESCRIPTION: Coarse sandy Gravel

GRAVEL (>2mm)	47.5%
SAND (2mm to .0625mm)	50.6%
SILT (>0.0625mm to 0.004mm)	1.1%
CLAY (< 0.004mm)	0.8%

PARTICLE SIZE DISTRIBUTION
(Wentworth/Folk)
Sample: EW2-04 E1

Analysis file: FolkV3 (2/15) Siev1D2.xlsx 6/18/2021



Sieve No.	Sieve (mm)	Phi	Cumulative Percent by Weight
2"	50.8	-5.7	0.0
1 1/2"	38.1	-5.3	0.0
1"	25.4	-4.7	0.0
3/4"	19.1	-4.3	0.0
5/8"	15.9	-4.0	0.0
1/2"	12.7	-3.7	0.0
5/16"	7.9	-3.0	0.0
1/4"	6.4	-2.7	0.0
5	4.0	-2.0	0.1
7	2.8	-1.5	0.3
10	2.0	-1.0	0.5
14	1.4	-0.5	1.2
18	1.00	0.0	2.1
25	0.71	0.5	4.7
35	0.50	1.0	15.9
45	0.353	1.5	52.5
60	0.249	2.0	84.6
80	0.178	2.5	91.0
120	0.124	3.0	93.5
170	0.089	3.5	95.2
230	0.064	4.0	96.3
		4.5	96.4
		5.0	96.4
		5.5	96.4
		6.0	96.4
		6.5	96.4
		7.0	96.4
		7.5	96.6
		8.0	97.0
		8.5	97.3
		9.0	97.3
		9.5	97.3

TerraSense, LLC	Alpine
7901-21001	1894

EW 2021 - Barret ECR Environmental Survey

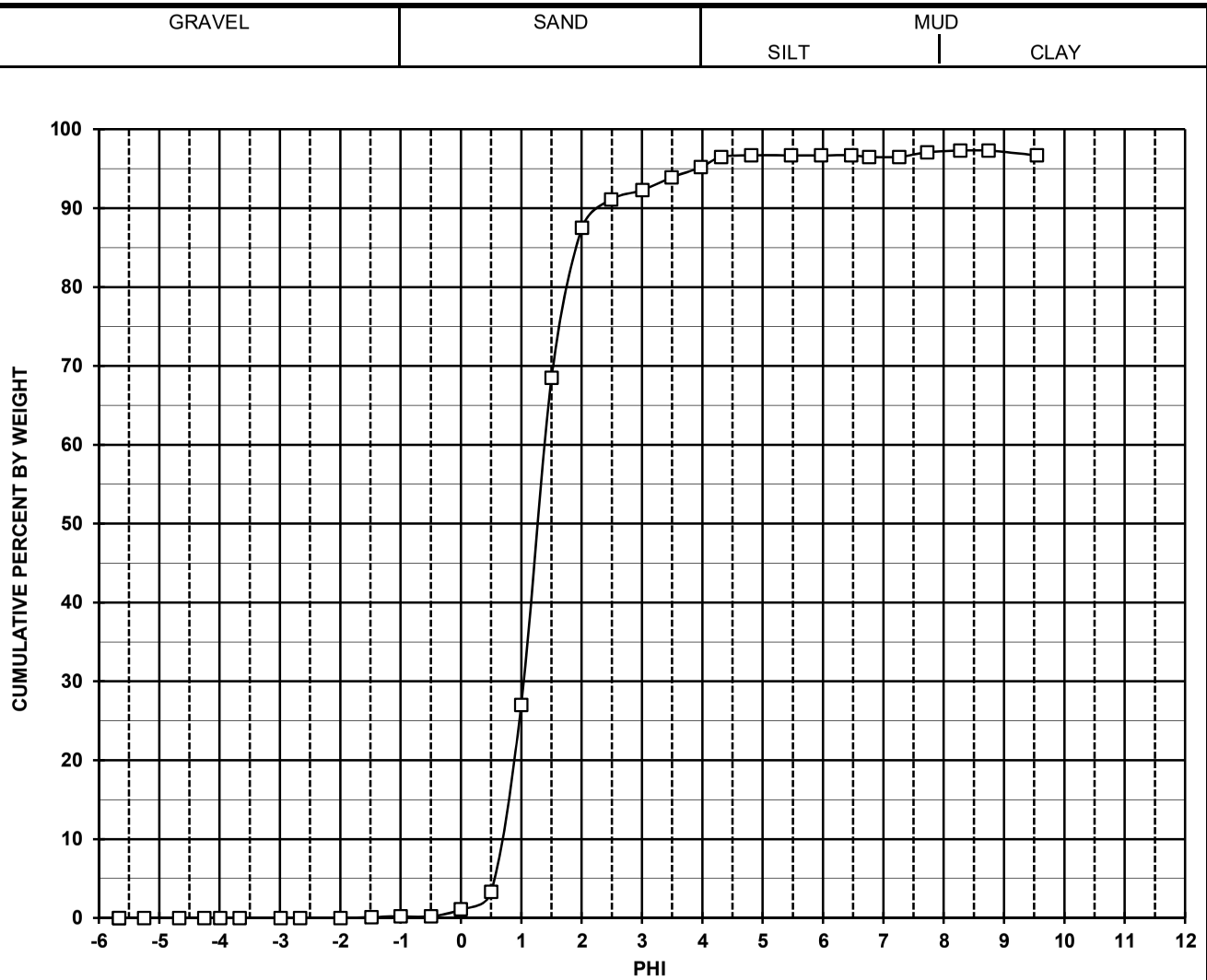
TEST SUMMARY

DESCRIPTION: Slightly gravelly medium sand

GRAVEL (>2mm)	0.5%
SAND (2mm to .0625mm)	95.8%
SILT (>0.0625mm to 0.004mm)	0.7%
CLAY (< 0.004mm)	3.0%

PARTICLE SIZE DISTRIBUTION
(Wentworth/Folk)
Sample: EW2-04 W1

Analysis file: FolkV3 (2/15) Siev1D3.xlsx 6/18/2021



Sieve No.	Sieve (mm)	Phi	Cumulative Percent by Weight
2"	50.8	-5.7	0.0
1 1/2"	38.1	-5.3	0.0
1"	25.4	-4.7	0.0
3/4"	19.1	-4.3	0.0
5/8"	15.9	-4.0	0.0
1/2"	12.7	-3.7	0.0
5/16"	7.9	-3.0	0.0
1/4"	6.4	-2.7	0.0
5	4.0	-2.0	0.0
7	2.8	-1.5	0.1
10	2.0	-1.0	0.2
14	1.4	-0.5	0.2
18	1.00	0.0	1.1
25	0.71	0.5	3.3
35	0.50	1.0	27.0
45	0.353	1.5	68.5
60	0.249	2.0	87.5
80	0.178	2.5	91.1
120	0.124	3.0	92.3
170	0.089	3.5	93.9
230	0.064	4.0	95.2
		4.5	96.8
		5.0	96.7
		5.5	96.7
		6.0	96.7
		6.5	96.7
		7.0	96.7
		7.5	96.8
		8.0	97.2
		8.5	97.3
		9.0	97.3
		9.5	97.3

TerraSense, LLC	Alpine
7901-21001	1894

EW 2021 - Barret ECR Environmental Survey

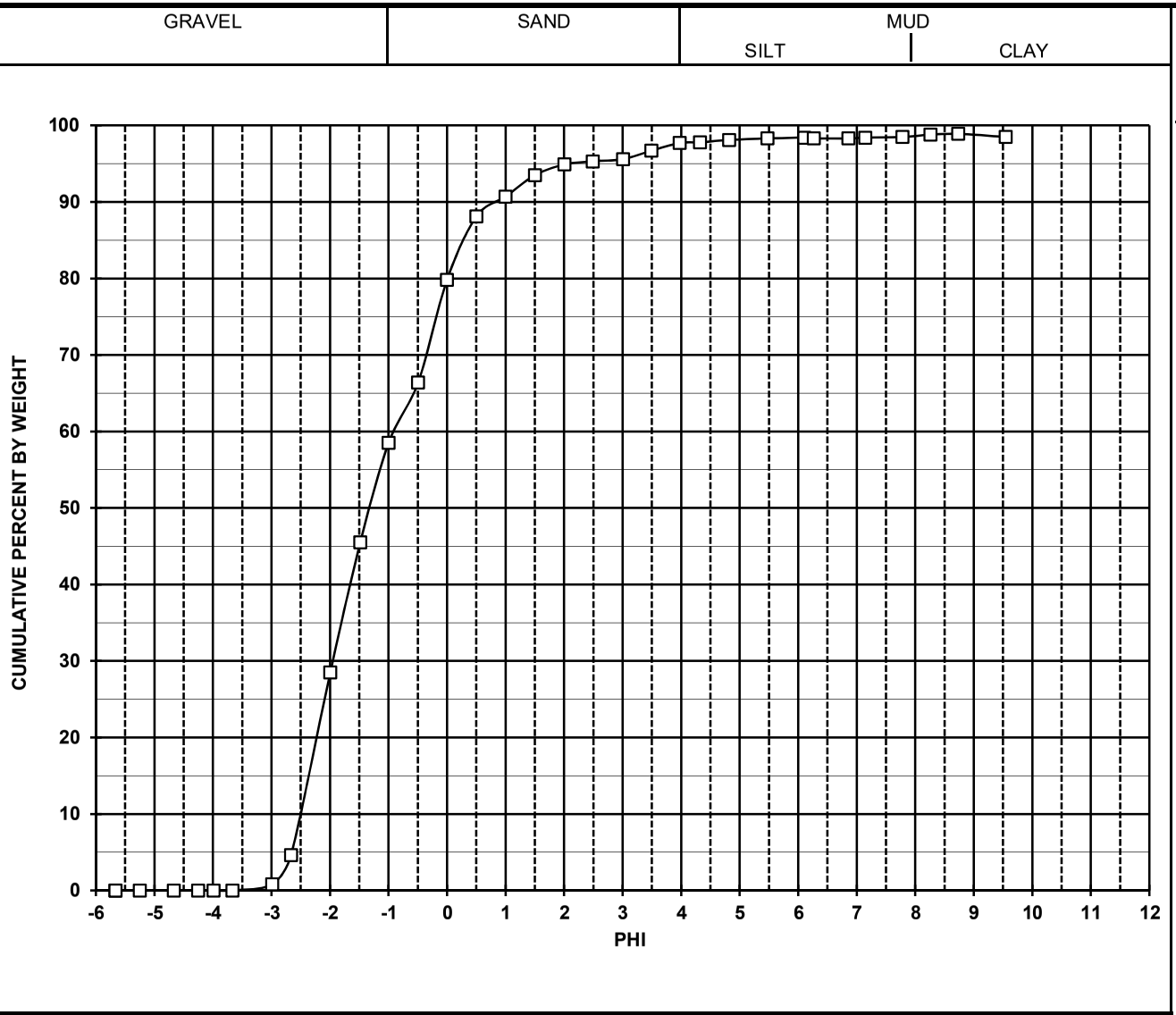
TEST SUMMARY

DESCRIPTION: Slightly gravelly medium sand

GRAVEL (>2mm)	0.2%
SAND (2mm to .0625mm)	95.0%
SILT (>0.0625mm to 0.004mm)	2.0%
CLAY (< 0.004mm)	2.8%

PARTICLE SIZE DISTRIBUTION
(Wentworth/Folk)
Sample: EW2-05 A1

Analysis file: FolkV3 (2/15) Siev1E1.xlsx 6/18/2021



Sieve No.	Sieve (mm)	Phi	Cumulative Percent by Weight
2"	50.8	-5.7	0.0
1 1/2"	38.1	-5.3	0.0
1"	25.4	-4.7	0.0
3/4"	19.1	-4.3	0.0
5/8"	15.9	-4.0	0.0
1/2"	12.7	-3.7	0.0
5/16"	7.9	-3.0	0.8
1/4"	6.4	-2.7	4.6
5	4.0	-2.0	28.5
7	2.8	-1.5	45.5
10	2.0	-1.0	58.5
14	1.4	-0.5	66.4
18	1.00	0.0	79.8
25	0.71	0.5	88.1
35	0.50	1.0	90.7
45	0.353	1.5	93.5
60	0.249	2.0	94.9
80	0.178	2.5	95.3
120	0.124	3.0	95.6
170	0.089	3.5	96.7
230	0.064	4.0	97.7
		4.5	97.9
		5.0	98.2
		5.5	98.3
		6.0	98.4
		6.5	98.4
		7.0	98.4
		7.5	98.4
		8.0	98.6
		8.5	98.9
		9.0	98.9
		9.5	98.9

TerraSense, LLC	Alpine
7901-21001	1894

EW 2021 - Barret ECR Environmental Survey

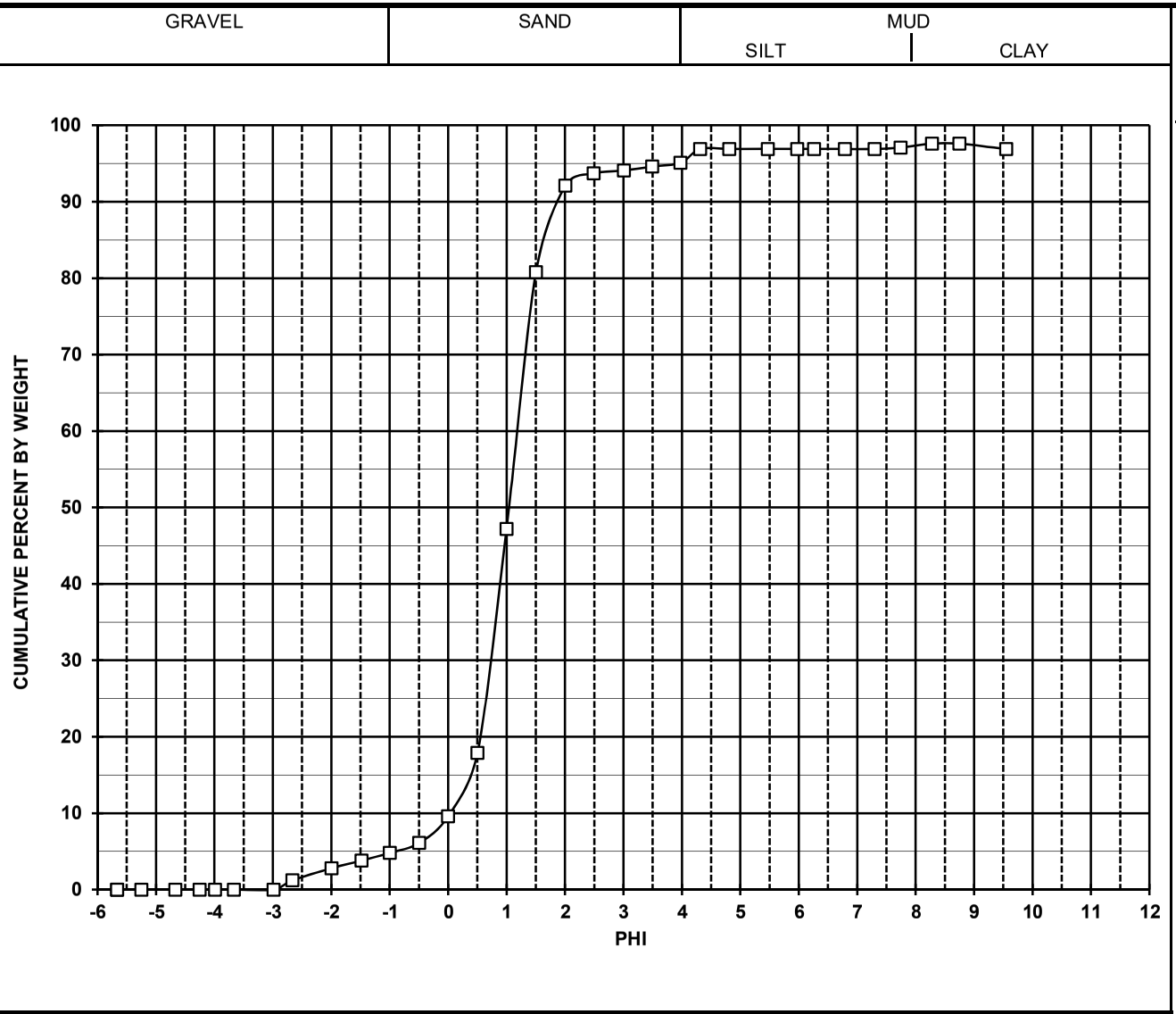
TEST SUMMARY

DESCRIPTION: Very coarse sandy Gravel

GRAVEL (>2mm)	58.5%
SAND (2mm to .0625mm)	39.2%
SILT (>0.0625mm to 0.004mm)	0.9%
CLAY (< 0.004mm)	1.4%

PARTICLE SIZE DISTRIBUTION
(Wentworth/Folk)
Sample: EW2-05 E1

Analysis file: FolkV3 (2/15) Siev1E2.xlsx 6/18/2021



Sieve No.	Sieve (mm)	Phi	Cumulative Percent by Weight
2"	50.8	-5.7	0.0
1 1/2"	38.1	-5.3	0.0
1"	25.4	-4.7	0.0
3/4"	19.1	-4.3	0.0
5/8"	15.9	-4.0	0.0
1/2"	12.7	-3.7	0.0
5/16"	7.9	-3.0	0.0
1/4"	6.4	-2.7	1.2
5	4.0	-2.0	2.8
7	2.8	-1.5	3.8
10	2.0	-1.0	4.8
14	1.4	-0.5	6.1
18	1.00	0.0	9.6
25	0.71	0.5	17.9
35	0.50	1.0	47.2
45	0.353	1.5	80.8
60	0.249	2.0	92.1
80	0.178	2.5	93.7
120	0.124	3.0	94.1
170	0.089	3.5	94.6
230	0.064	4.0	95.1
		4.5	96.9
		5.0	96.9
		5.5	96.9
		6.0	96.9
		6.5	96.9
		7.0	96.9
		7.5	97.0
		8.0	97.3
		8.5	97.6
		9.0	97.6
		9.5	97.6

TerraSense, LLC	Alpine
7901-21001	1894

EW 2021 - Barret ECR Environmental Survey

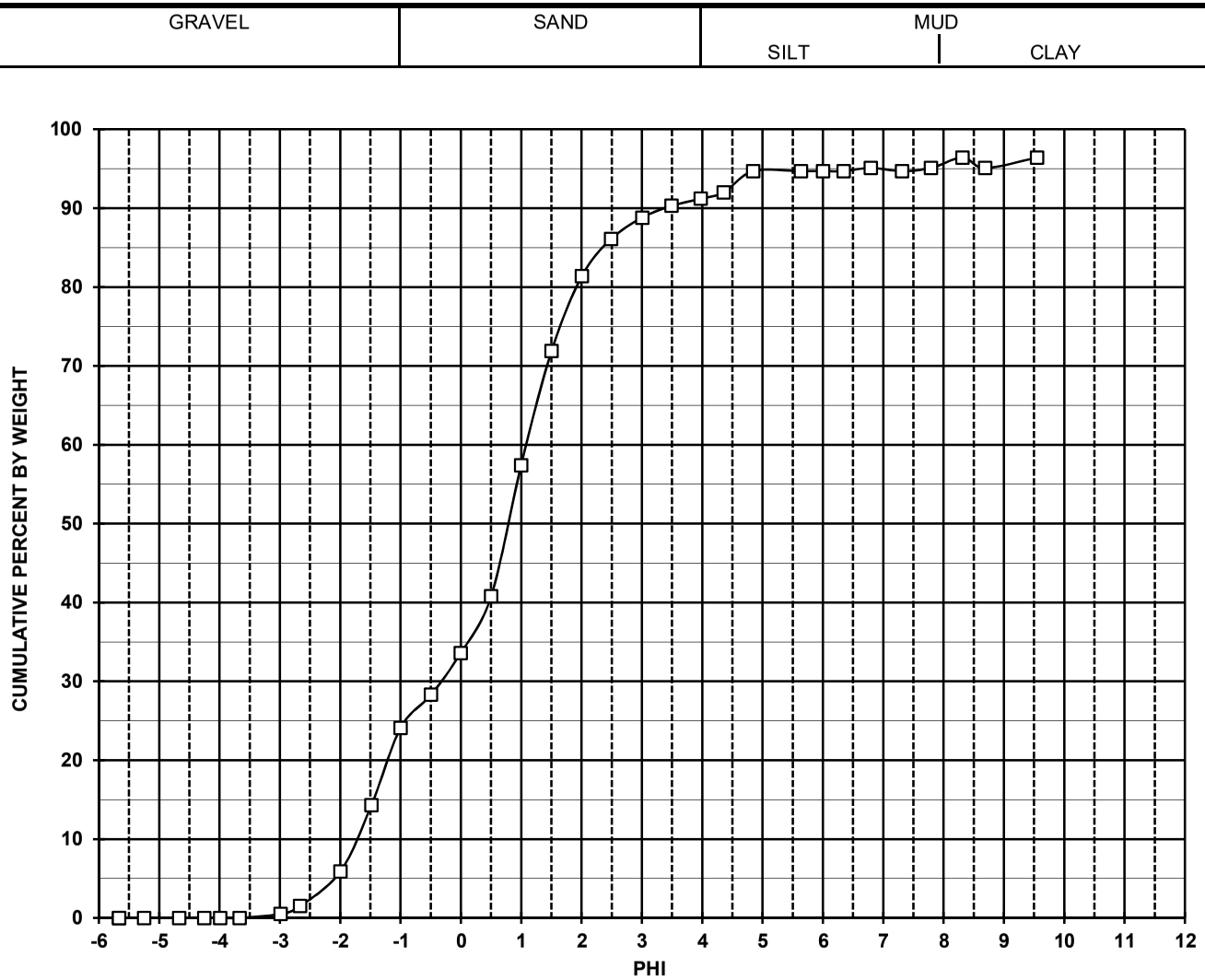
TEST SUMMARY

DESCRIPTION: Slightly gravelly medium sand

GRAVEL (>2mm)	4.8%
SAND (2mm to .0625mm)	90.3%
SILT (>0.0625mm to 0.004mm)	2.2%
CLAY (< 0.004mm)	2.7%

PARTICLE SIZE DISTRIBUTION
(Wentworth/Folk)
Sample: EW2-05 W1

Analysis file: FolkV3 (2/15) Siev1E3.xlsx 6/18/2021



Sieve No.	Sieve (mm)	Phi	Cumulative Percent by Weight
2"	50.8	-5.7	0.0
1 1/2"	38.1	-5.3	0.0
1"	25.4	-4.7	0.0
3/4"	19.1	-4.3	0.0
5/8"	15.9	-4.0	0.0
1/2"	12.7	-3.7	0.0
5/16"	7.9	-3.0	0.5
1/4"	6.4	-2.7	1.5
5	4.0	-2.0	5.9
7	2.8	-1.5	14.3
10	2.0	-1.0	24.1
14	1.4	-0.5	28.3
18	1.00	0.0	33.6
25	0.71	0.5	40.8
35	0.50	1.0	57.4
45	0.353	1.5	71.9
60	0.249	2.0	81.4
80	0.178	2.5	86.1
120	0.124	3.0	88.8
170	0.089	3.5	90.3
230	0.064	4.0	91.2
		4.5	92.8
		5.0	94.7
		5.5	94.7
		6.0	94.7
		6.5	94.8
		7.0	95.1
		7.5	95.1
		8.0	95.5
		8.5	96.4
		9.0	96.4
		9.5	96.4

TerraSense, LLC	Alpine
7901-21001	1894

EW 2021 - Barret ECR Environmental Survey

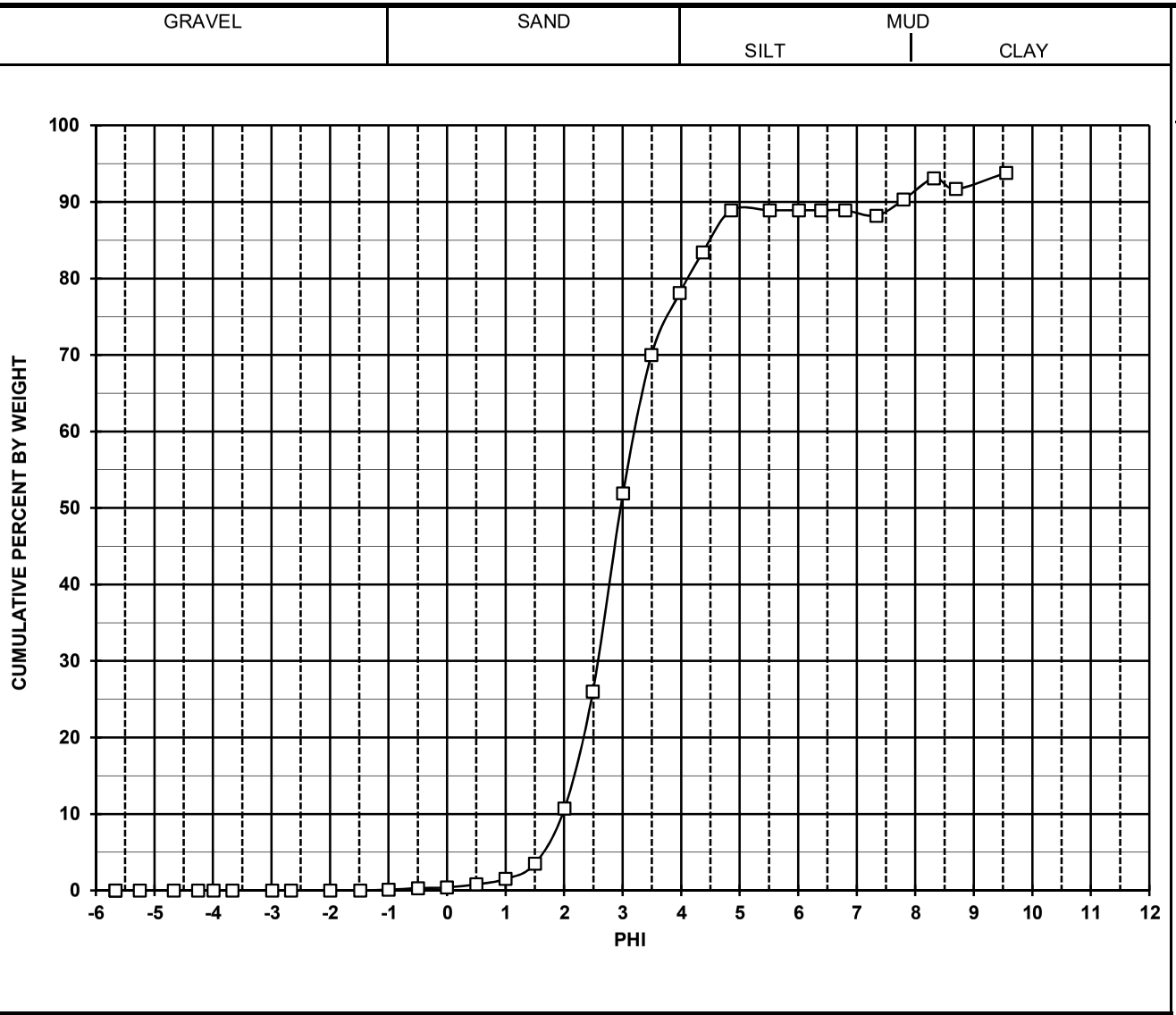
TEST SUMMARY

DESCRIPTION: Gravelly muddy medium sand

GRAVEL (>2mm)	24.1%
SAND (2mm to .0625mm)	67.1%
SILT (>0.0625mm to 0.004mm)	4.3%
CLAY (< 0.004mm)	4.5%

PARTICLE SIZE DISTRIBUTION
(Wentworth/Folk)
Sample: EW2-06 A1

Analysis file: FolkV3 (2/15) Siev1F1.xlsx 6/18/2021



Sieve No.	Sieve (mm)	Phi	Cumulative Percent by Weight
2"	50.8	-5.7	0.0
1 1/2"	38.1	-5.3	0.0
1"	25.4	-4.7	0.0
3/4"	19.1	-4.3	0.0
5/8"	15.9	-4.0	0.0
1/2"	12.7	-3.7	0.0
5/16"	7.9	-3.0	0.0
1/4"	6.4	-2.7	0.0
5	4.0	-2.0	0.0
7	2.8	-1.5	0.0
10	2.0	-1.0	0.1
14	1.4	-0.5	0.3
18	1.00	0.0	0.4
25	0.71	0.5	0.8
35	0.50	1.0	1.5
45	0.353	1.5	3.5
60	0.249	2.0	10.7
80	0.178	2.5	26.0
120	0.124	3.0	51.9
170	0.089	3.5	70.0
230	0.064	4.0	78.1
		4.5	85.0
		5.0	88.9
		5.5	88.9
		6.0	88.9
		6.5	88.9
		7.0	88.9
		7.5	89.2
		8.0	91.2
		8.5	93.1
		9.0	93.3
		9.5	93.7

TerraSense, LLC	Alpine
7901-21001	1894

EW 2021 - Barret ECR Environmental Survey

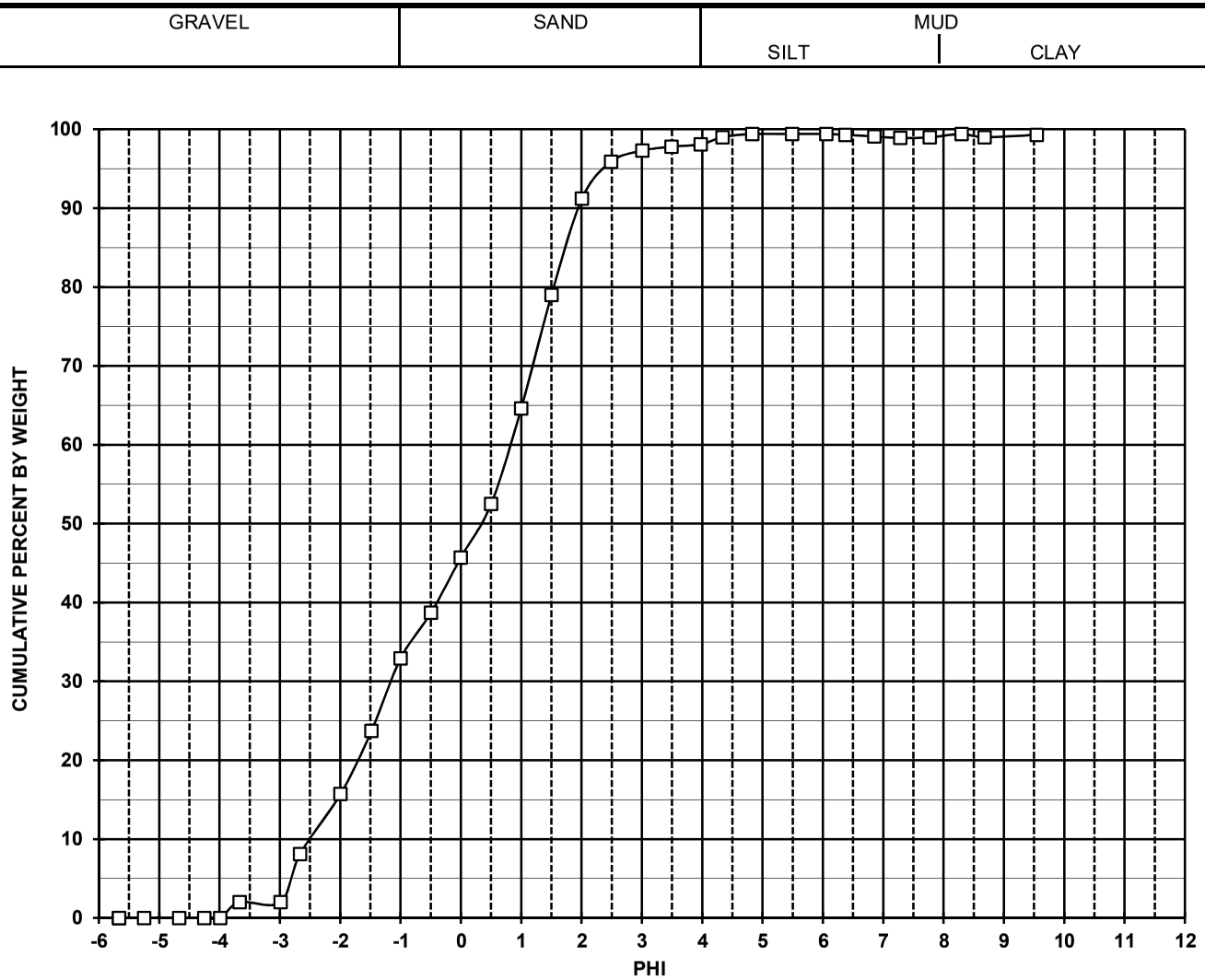
TEST SUMMARY

DESCRIPTION: Slightly gravelly muddy fine sand

GRAVEL (>2mm)	0.1%
SAND (2mm to .0625mm)	78.0%
SILT (>0.0625mm to 0.004mm)	13.1%
CLAY (< 0.004mm)	8.8%

PARTICLE SIZE DISTRIBUTION
(Wentworth/Folk)
Sample: EW2-06 E1

Analysis file: FolkV3 (2/15) Siev1F2.xlsx 6/18/2021



Sieve No.	Sieve (mm)	Phi	Cumulative Percent by Weight
2"	50.8	-5.7	0.0
1 1/2"	38.1	-5.3	0.0
1"	25.4	-4.7	0.0
3/4"	19.1	-4.3	0.0
5/8"	15.9	-4.0	0.0
1/2"	12.7	-3.7	2.0
5/16"	7.9	-3.0	2.0
1/4"	6.4	-2.7	8.1
5	4.0	-2.0	15.7
7	2.8	-1.5	23.7
10	2.0	-1.0	32.9
14	1.4	-0.5	38.7
18	1.00	0.0	45.7
25	0.71	0.5	52.5
35	0.50	1.0	64.6
45	0.353	1.5	79.0
60	0.249	2.0	91.2
80	0.178	2.5	95.9
120	0.124	3.0	97.3
170	0.089	3.5	97.8
230	0.064	4.0	98.1
		4.5	99.2
		5.0	99.4
		5.5	99.4
		6.0	99.4
		6.5	99.4
		7.0	99.4
		7.5	99.4
		8.0	99.4
		8.5	99.4
		9.0	99.4
		9.5	99.4

TerraSense, LLC	Alpine
7901-21001	1894

EW 2021 - Barret ECR Environmental Survey

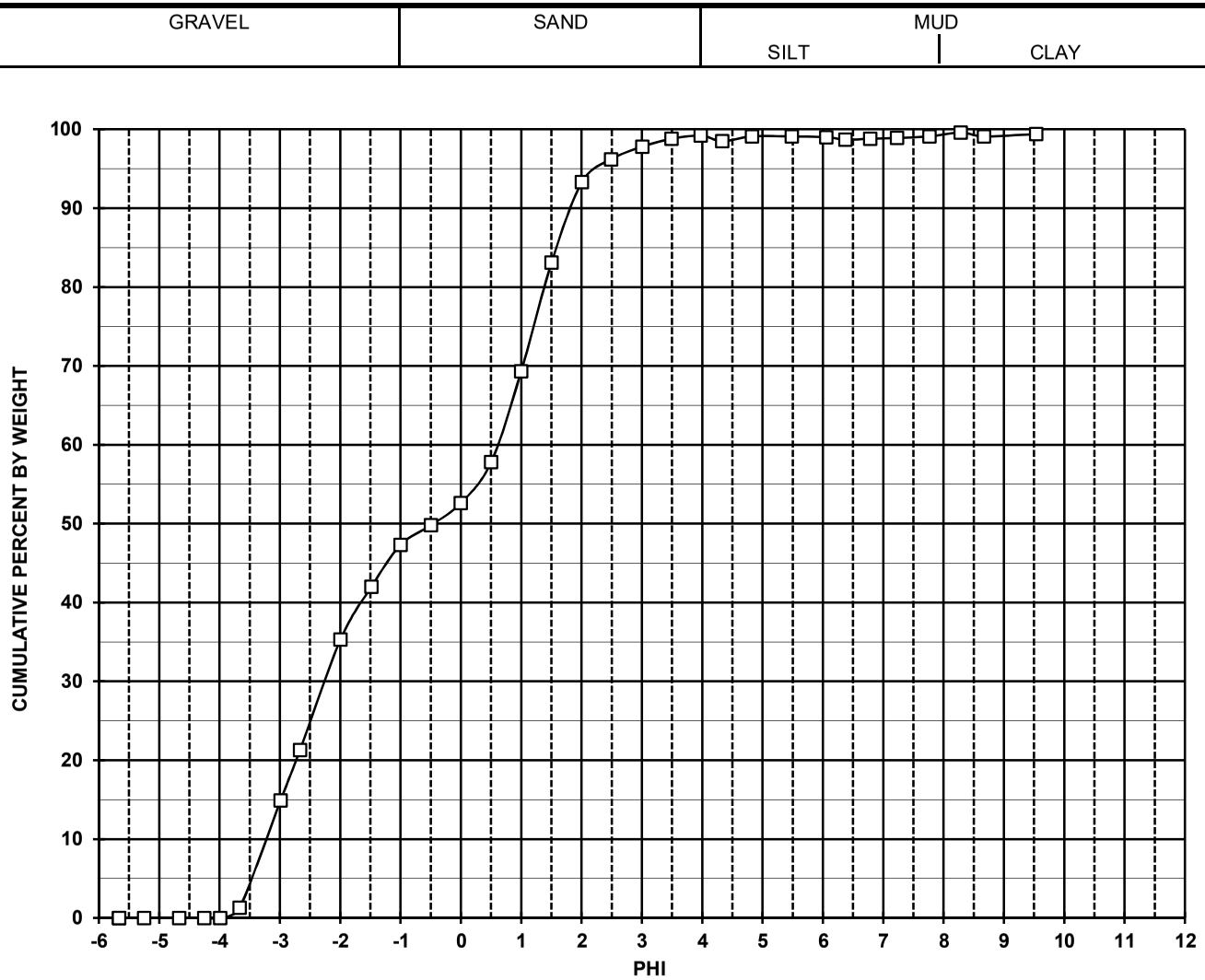
TEST SUMMARY

DESCRIPTION: Medium sandy Gravel

GRAVEL (>2mm)	32.9%
SAND (2mm to .0625mm)	65.2%
SILT (>0.0625mm to 0.004mm)	1.3%
CLAY (< 0.004mm)	0.6%

PARTICLE SIZE DISTRIBUTION
(Wentworth/Folk)
Sample: EW2-06 W1

Analysis file: FolkV3 (2/15) Siev1F3.xlsx 6/18/2021



Sieve No.	Sieve (mm)	Phi	Cumulative Percent by Weight
2"	50.8	-5.7	0.0
1 1/2"	38.1	-5.3	0.0
1"	25.4	-4.7	0.0
3/4"	19.1	-4.3	0.0
5/8"	15.9	-4.0	0.0
1/2"	12.7	-3.7	1.3
5/16"	7.9	-3.0	14.9
1/4"	6.4	-2.7	21.3
5	4.0	-2.0	35.3
7	2.8	-1.5	42.0
10	2.0	-1.0	47.3
14	1.4	-0.5	49.8
18	1.00	0.0	52.6
25	0.71	0.5	57.8
35	0.50	1.0	69.3
45	0.353	1.5	83.1
60	0.249	2.0	93.3
80	0.178	2.5	96.2
120	0.124	3.0	97.8
170	0.089	3.5	98.8
230	0.064	4.0	99.2
		4.5	99.2
		5.0	99.2
		5.5	99.2
		6.0	99.2
		6.5	99.2
		7.0	99.2
		7.5	99.2
		8.0	99.3
		8.5	99.6
		9.0	99.6
		9.5	99.6

TerraSense, LLC	Alpine
7901-21001	1894

EW 2021 - Barret ECR Environmental Survey

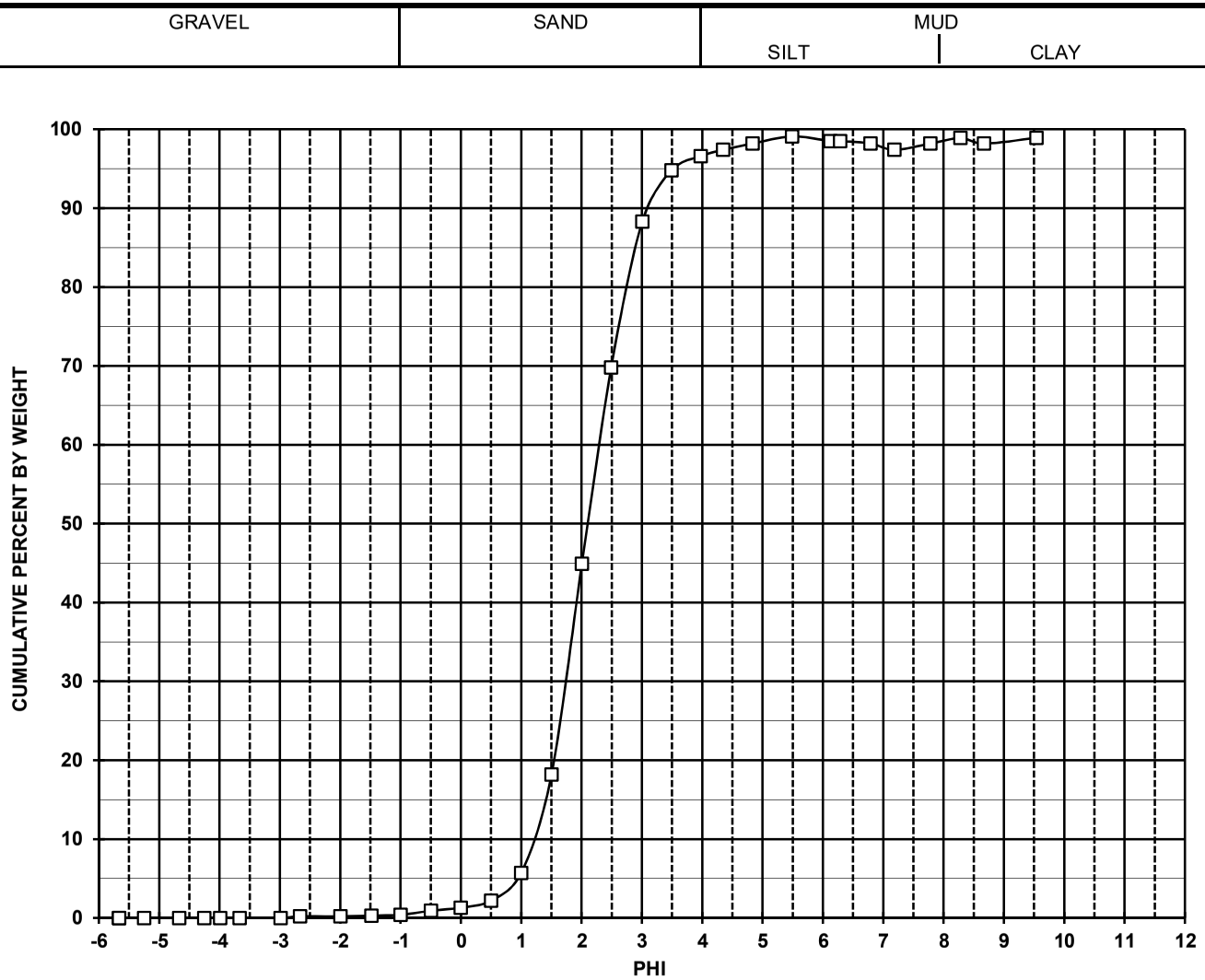
TEST SUMMARY

DESCRIPTION: Medium sandy Gravel

GRAVEL (>2mm)	47.3%
SAND (2mm to .0625mm)	51.9%
SILT (>0.0625mm to 0.004mm)	0.1%
CLAY (< 0.004mm)	0.7%

PARTICLE SIZE DISTRIBUTION
(Wentworth/Folk)
Sample: EW2-07 A1

Analysis file: FolkV3 (2/15) Siev1G1.xlsx 6/18/2021



Sieve No.	Sieve (mm)	Phi	Cumulative Percent by Weight
2"	50.8	-5.7	0.0
1 1/2"	38.1	-5.3	0.0
1"	25.4	-4.7	0.0
3/4"	19.1	-4.3	0.0
5/8"	15.9	-4.0	0.0
1/2"	12.7	-3.7	0.0
5/16"	7.9	-3.0	0.0
1/4"	6.4	-2.7	0.2
5	4.0	-2.0	0.2
7	2.8	-1.5	0.3
10	2.0	-1.0	0.4
14	1.4	-0.5	0.9
18	1.00	0.0	1.3
25	0.71	0.5	2.2
35	0.50	1.0	5.7
45	0.353	1.5	18.2
60	0.249	2.0	44.9
80	0.178	2.5	69.8
120	0.124	3.0	88.3
170	0.089	3.5	94.8
230	0.064	4.0	96.6
		4.5	97.7
		5.0	98.4
		5.5	99.1
		6.0	99.1
		6.5	99.1
		7.0	99.1
		7.5	99.1
		8.0	99.1
		8.5	99.1
		9.0	99.1
		9.5	99.1

TerraSense, LLC	Alpine
7901-21001	1894

EW 2021 - Barret ECR Environmental Survey

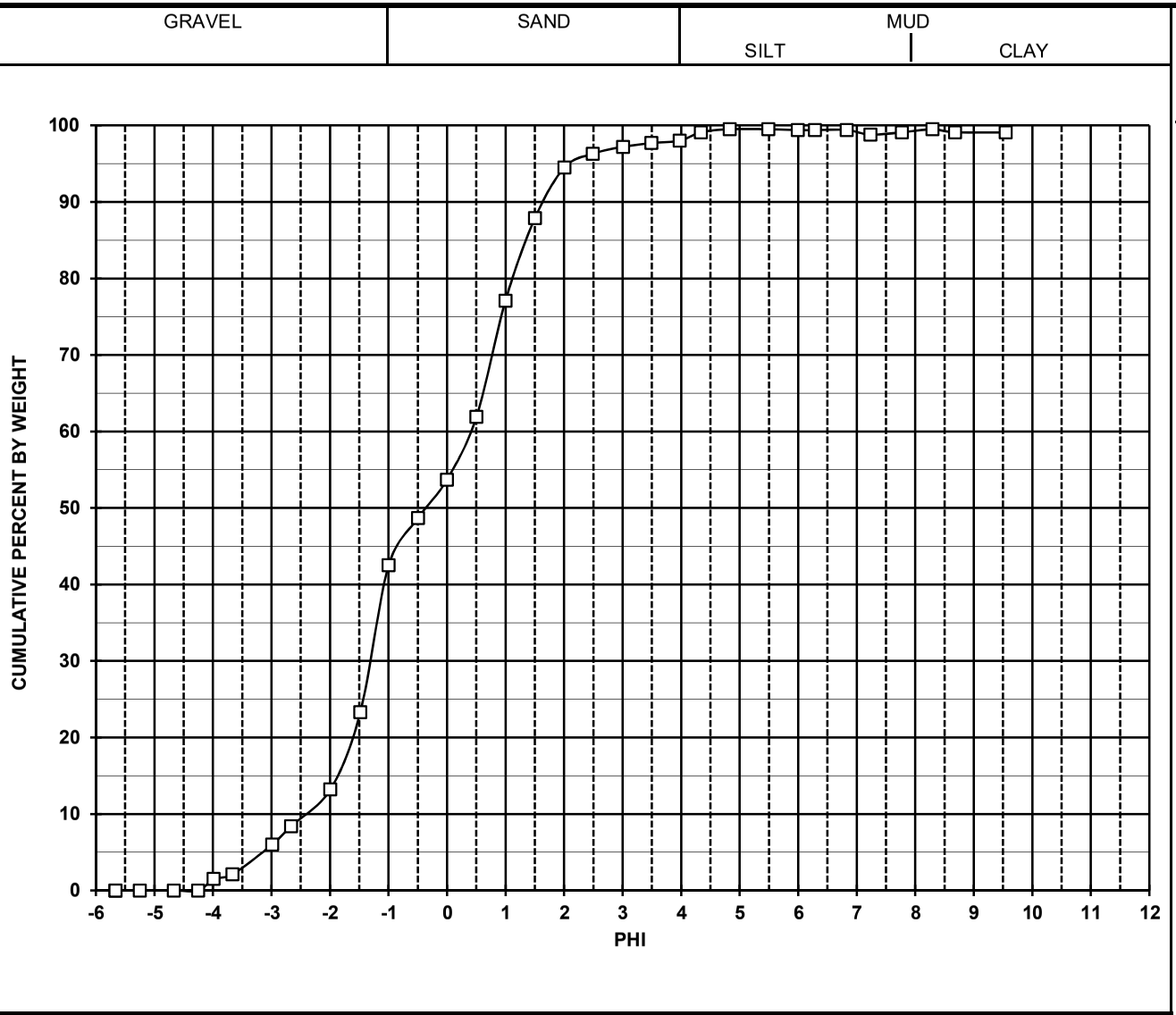
TEST SUMMARY

DESCRIPTION: Slightly gravelly fine sand

GRAVEL (>2mm)	0.4%
SAND (2mm to .0625mm)	96.2%
SILT (>0.0625mm to 0.004mm)	2.5%
CLAY (< 0.004mm)	0.9%

PARTICLE SIZE DISTRIBUTION
(Wentworth/Folk)
Sample: EW2-07 E1

Analysis file: FolkV3 (2/15) Siev1G2.xlsx 6/18/2021



Sieve No.	Sieve (mm)	Phi	Cumulative Percent by Weight
2"	50.8	-5.7	0.0
1 1/2"	38.1	-5.3	0.0
1"	25.4	-4.7	0.0
3/4"	19.1	-4.3	0.0
5/8"	15.9	-4.0	1.5
1/2"	12.7	-3.7	2.1
5/16"	7.9	-3.0	6.0
1/4"	6.4	-2.7	8.4
5	4.0	-2.0	13.2
7	2.8	-1.5	23.3
10	2.0	-1.0	42.5
14	1.4	-0.5	48.7
18	1.00	0.0	53.7
25	0.71	0.5	61.9
35	0.50	1.0	77.1
45	0.353	1.5	87.9
60	0.249	2.0	94.5
80	0.178	2.5	96.3
120	0.124	3.0	97.2
170	0.089	3.5	97.7
230	0.064	4.0	98.0
		4.5	99.3
		5.0	99.5
		5.5	99.5
		6.0	99.5
		6.5	99.5
		7.0	99.5
		7.5	99.5
		8.0	99.5
		8.5	99.5
		9.0	99.5
		9.5	99.5

TerraSense, LLC	Alpine
7901-21001	1894

EW 2021 - Barret ECR Environmental Survey

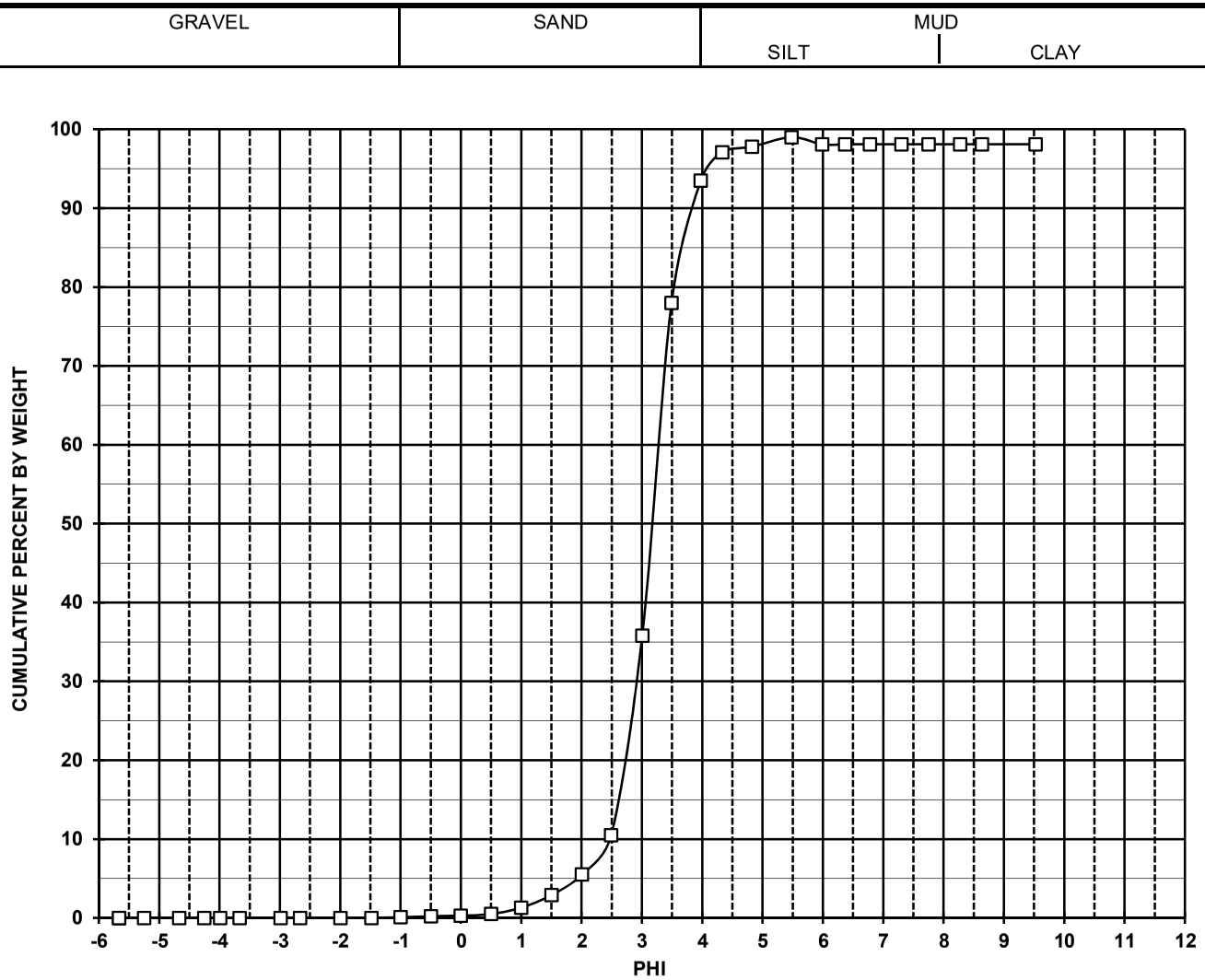
TEST SUMMARY

DESCRIPTION: Coarse sandy Gravel

GRAVEL (>2mm)	42.5%
SAND (2mm to .0625mm)	55.5%
SILT (>0.0625mm to 0.004mm)	1.5%
CLAY (< 0.004mm)	0.5%

PARTICLE SIZE DISTRIBUTION
(Wentworth/Folk)
Sample: EW2-07 W1

Analysis file: FolkV3 (2/15) Siev1G3.xlsx 6/18/2021



Sieve No.	Sieve (mm)	Phi	Cumulative Percent by Weight
2"	50.8	-5.7	0.0
1 1/2"	38.1	-5.3	0.0
1"	25.4	-4.7	0.0
3/4"	19.1	-4.3	0.0
5/8"	15.9	-4.0	0.0
1/2"	12.7	-3.7	0.0
5/16"	7.9	-3.0	0.0
1/4"	6.4	-2.7	0.0
5	4.0	-2.0	0.0
7	2.8	-1.5	0.0
10	2.0	-1.0	0.1
14	1.4	-0.5	0.2
18	1.00	0.0	0.3
25	0.71	0.5	0.5
35	0.50	1.0	1.3
45	0.353	1.5	2.9
60	0.249	2.0	5.5
80	0.178	2.5	10.5
120	0.124	3.0	35.8
170	0.089	3.5	78.0
230	0.064	4.0	93.5
		4.5	97.7
		5.0	98.1
		5.5	99.0
		6.0	99.0
		6.5	99.0
		7.0	99.0
		7.5	99.0
		8.0	99.0
		8.5	99.0
		9.0	99.0
		9.5	99.0

TerraSense, LLC	Alpine
7901-21001	1894

EW 2021 - Barret ECR Environmental Survey

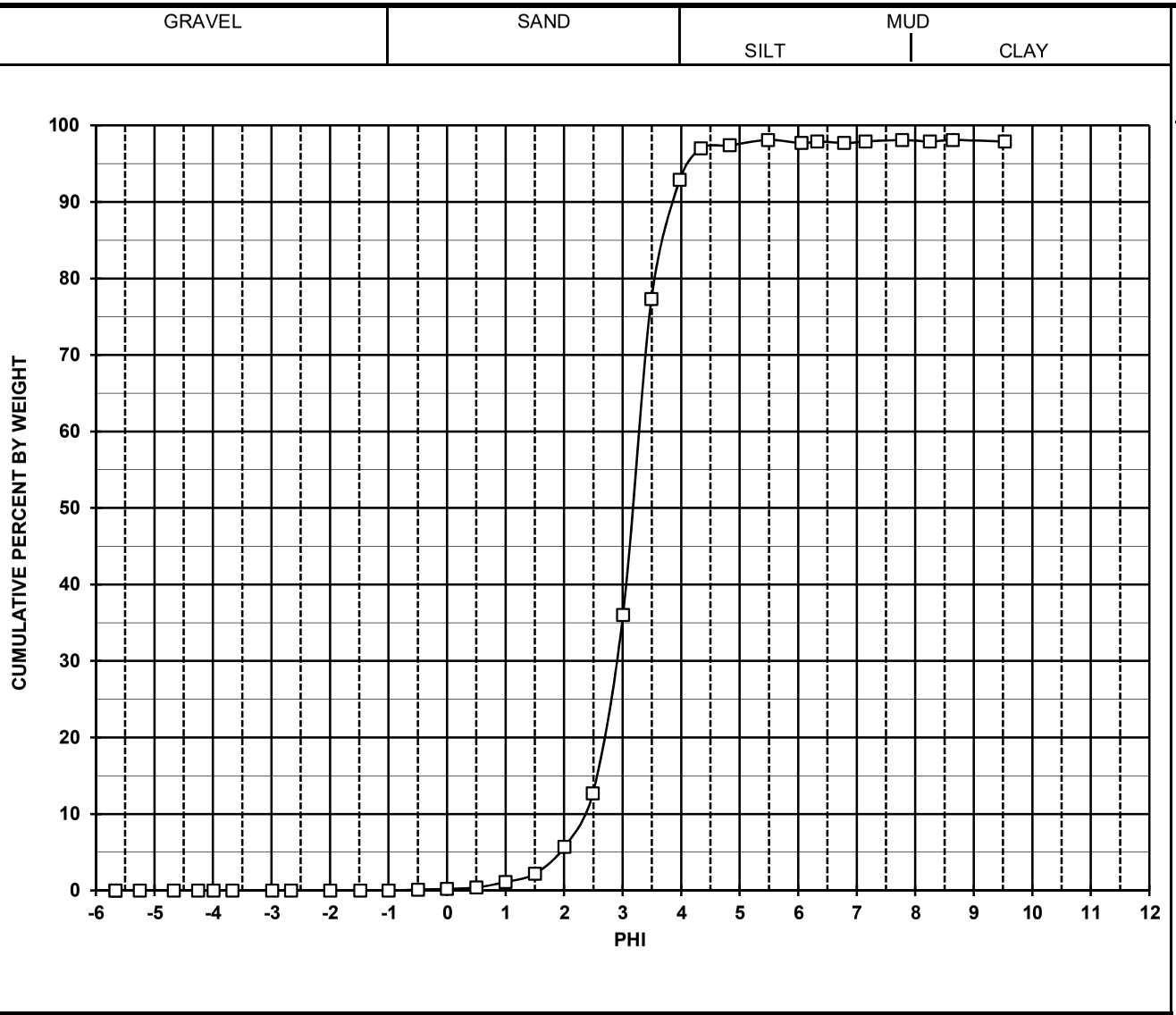
TEST SUMMARY

DESCRIPTION: Slightly gravelly very fine sand

GRAVEL (>2mm)	0.1%
SAND (2mm to .0625mm)	93.4%
SILT (>0.0625mm to 0.004mm)	5.5%
CLAY (< 0.004mm)	1.0%

PARTICLE SIZE DISTRIBUTION
(Wentworth/Folk)
Sample: EW2-08 A2

Analysis file: FolkV3 (2/15) Siev1H1.xlsx 6/18/2021



Sieve No.	Sieve (mm)	Phi	Cumulative Percent by Weight
2"	50.8	-5.7	0.0
1 1/2"	38.1	-5.3	0.0
1"	25.4	-4.7	0.0
3/4"	19.1	-4.3	0.0
5/8"	15.9	-4.0	0.0
1/2"	12.7	-3.7	0.0
5/16"	7.9	-3.0	0.0
1/4"	6.4	-2.7	0.0
5	4.0	-2.0	0.0
7	2.8	-1.5	0.0
10	2.0	-1.0	0.0
14	1.4	-0.5	0.1
18	1.00	0.0	0.2
25	0.71	0.5	0.4
35	0.50	1.0	1.1
45	0.353	1.5	2.2
60	0.249	2.0	5.7
80	0.178	2.5	12.7
120	0.124	3.0	36.0
170	0.089	3.5	77.3
230	0.064	4.0	92.9
		4.5	97.6
		5.0	97.6
		5.5	98.1
		6.0	98.1
		6.5	98.1
		7.0	98.1
		7.5	98.1
		8.0	98.1
		8.5	98.1
		9.0	98.1
		9.5	98.1

TerraSense, LLC	Alpine
7901-21001	1894

EW 2021 - Barret ECR Environmental Survey

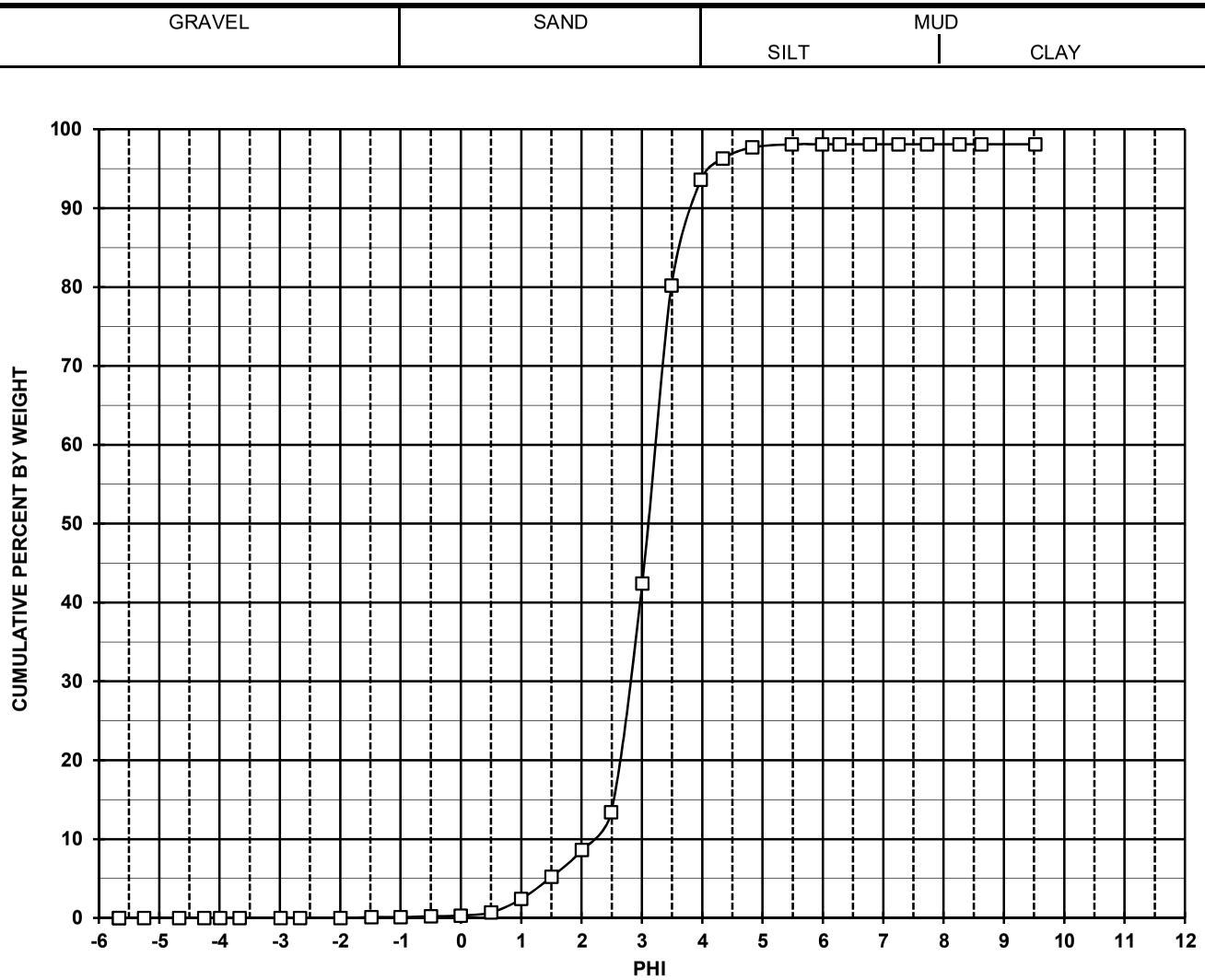
TEST SUMMARY

DESCRIPTION: Very fine sand

GRAVEL (>2mm)	0.0%
SAND (2mm to .0625mm)	92.9%
SILT (>0.0625mm to 0.004mm)	5.2%
CLAY (< 0.004mm)	1.9%

PARTICLE SIZE DISTRIBUTION
(Wentworth/Folk)
Sample: EW2-08 E2

Analysis file: FolkV3 (2/15) Siev1H2.xlsx 6/18/2021



Sieve No.	Sieve (mm)	Phi	Cumulative Percent by Weight
2"	50.8	-5.7	0.0
1 1/2"	38.1	-5.3	0.0
1"	25.4	-4.7	0.0
3/4"	19.1	-4.3	0.0
5/8"	15.9	-4.0	0.0
1/2"	12.7	-3.7	0.0
5/16"	7.9	-3.0	0.0
1/4"	6.4	-2.7	0.0
5	4.0	-2.0	0.0
7	2.8	-1.5	0.1
10	2.0	-1.0	0.1
14	1.4	-0.5	0.2
18	1.00	0.0	0.3
25	0.71	0.5	0.7
35	0.50	1.0	2.4
45	0.353	1.5	5.2
60	0.249	2.0	8.6
80	0.178	2.5	13.4
120	0.124	3.0	42.4
170	0.089	3.5	80.2
230	0.064	4.0	93.6
		4.5	97.0
		5.0	97.9
		5.5	98.1
		6.0	98.1
		6.5	98.1
		7.0	98.1
		7.5	98.1
		8.0	98.1
		8.5	98.1
		9.0	98.1
		9.5	98.1

TerraSense, LLC	Alpine
7901-21001	1894

EW 2021 - Barret ECR Environmental Survey

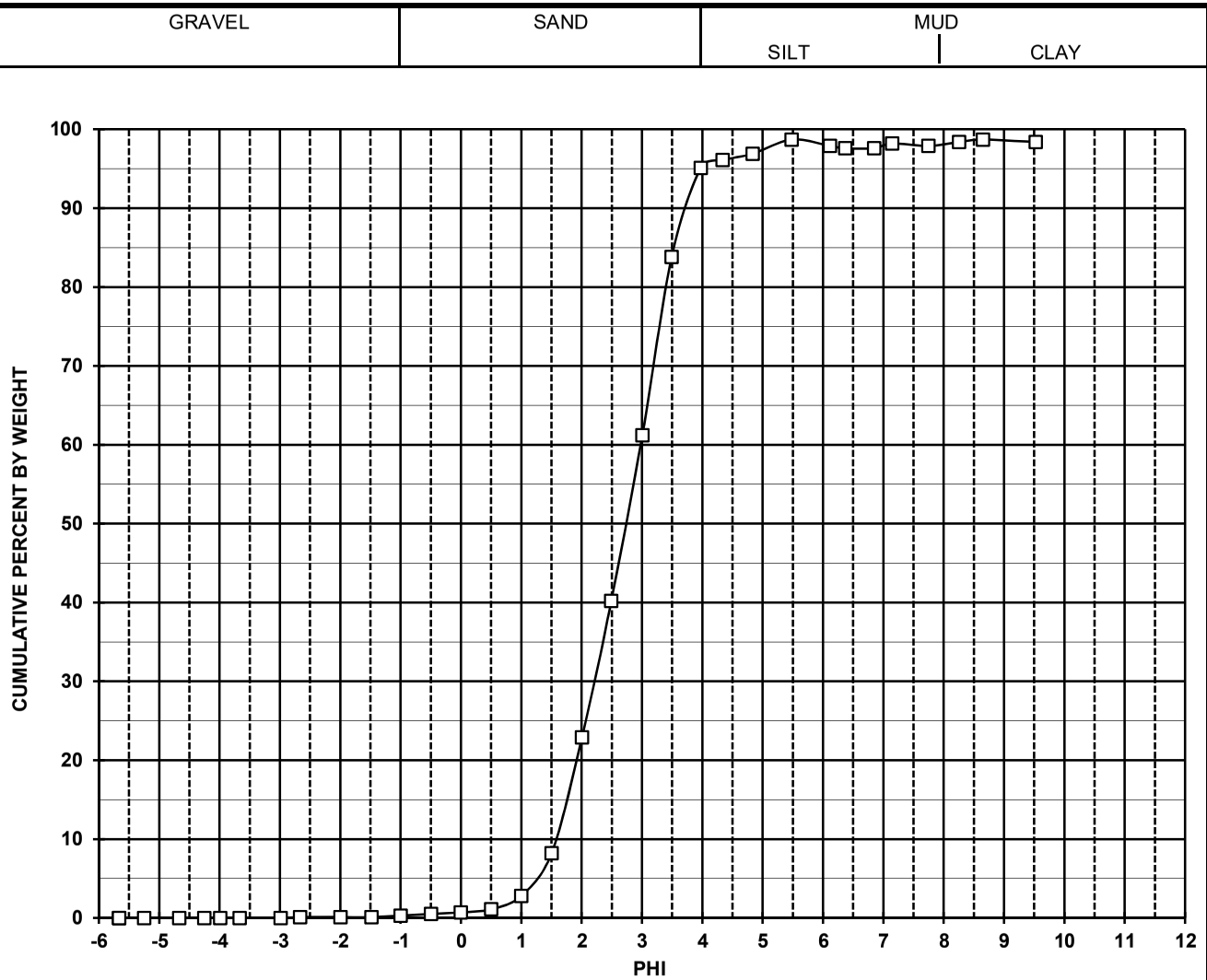
TEST SUMMARY

DESCRIPTION: Slightly gravelly very fine sand

GRAVEL (>2mm)	0.1%
SAND (2mm to .0625mm)	93.5%
SILT (>0.0625mm to 0.004mm)	4.5%
CLAY (< 0.004mm)	1.9%

PARTICLE SIZE DISTRIBUTION
(Wentworth/Folk)
Sample: EW2-08 W1

Analysis file: FolkV3 (2/15) Siev1H3.xlsx 6/18/2021



Sieve No.	Sieve (mm)	Phi	Cumulative Percent by Weight
2"	50.8	-5.7	0.0
1 1/2"	38.1	-5.3	0.0
1"	25.4	-4.7	0.0
3/4"	19.1	-4.3	0.0
5/8"	15.9	-4.0	0.0
1/2"	12.7	-3.7	0.0
5/16"	7.9	-3.0	0.0
1/4"	6.4	-2.7	0.1
5	4.0	-2.0	0.1
7	2.8	-1.5	0.1
10	2.0	-1.0	0.3
14	1.4	-0.5	0.5
18	1.00	0.0	0.7
25	0.71	0.5	1.1
35	0.50	1.0	2.8
45	0.353	1.5	8.2
60	0.249	2.0	22.9
80	0.178	2.5	40.2
120	0.124	3.0	61.2
170	0.089	3.5	83.8
230	0.064	4.0	95.1
		4.5	96.4
		5.0	97.3
		5.5	98.7
		6.0	98.7
		6.5	98.7
		7.0	98.7
		7.5	98.7
		8.0	98.7
		8.5	98.7
		9.0	98.7
		9.5	98.7

TerraSense, LLC	Alpine
7901-21001	1894

EW 2021 - Barret ECR Environmental Survey

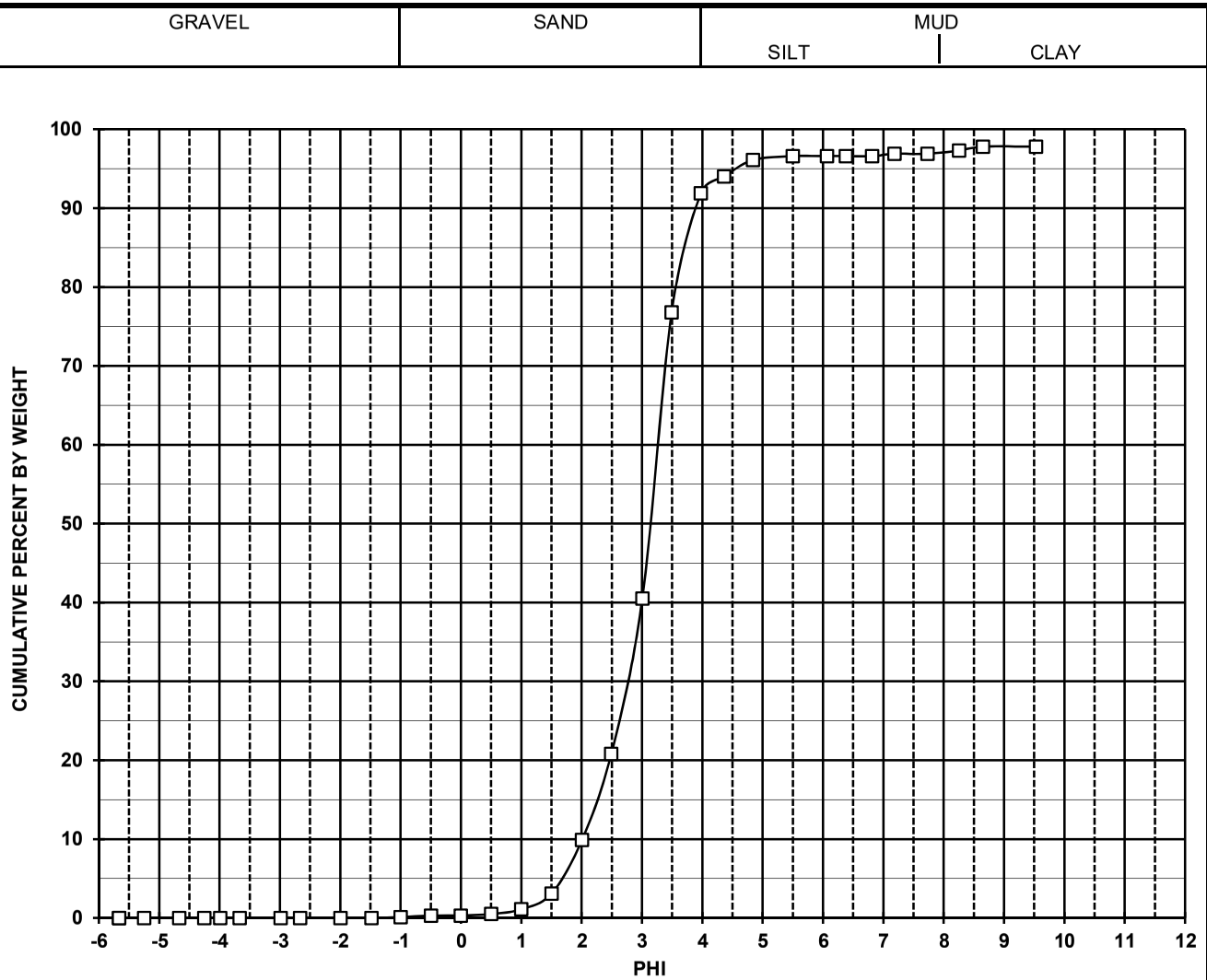
TEST SUMMARY

DESCRIPTION: Slightly gravelly fine sand

GRAVEL (>2mm)	0.3%
SAND (2mm to .0625mm)	94.8%
SILT (>0.0625mm to 0.004mm)	3.6%
CLAY (< 0.004mm)	1.3%

PARTICLE SIZE DISTRIBUTION
(Wentworth/Folk)
Sample: EW2-09 A4

Analysis file: FolkV3 (2/15) Siev1I1.xlsx 6/18/2021



Sieve No.	Sieve (mm)	Phi	Cumulative Percent by Weight
2"	50.8	-5.7	0.0
1 1/2"	38.1	-5.3	0.0
1"	25.4	-4.7	0.0
3/4"	19.1	-4.3	0.0
5/8"	15.9	-4.0	0.0
1/2"	12.7	-3.7	0.0
5/16"	7.9	-3.0	0.0
1/4"	6.4	-2.7	0.0
5	4.0	-2.0	0.0
7	2.8	-1.5	0.0
10	2.0	-1.0	0.1
14	1.4	-0.5	0.3
18	1.00	0.0	0.3
25	0.71	0.5	0.5
35	0.50	1.0	1.1
45	0.353	1.5	3.1
60	0.249	2.0	9.9
80	0.178	2.5	20.8
120	0.124	3.0	40.5
170	0.089	3.5	76.8
230	0.064	4.0	91.9
		4.5	94.7
		5.0	96.4
		5.5	96.6
		6.0	96.6
		6.5	96.6
		7.0	96.7
		7.5	96.9
		8.0	97.0
		8.5	97.6
		9.0	97.8
		9.5	97.8

TerraSense, LLC	Alpine
7901-21001	1894

EW 2021 - Barret ECR Environmental Survey

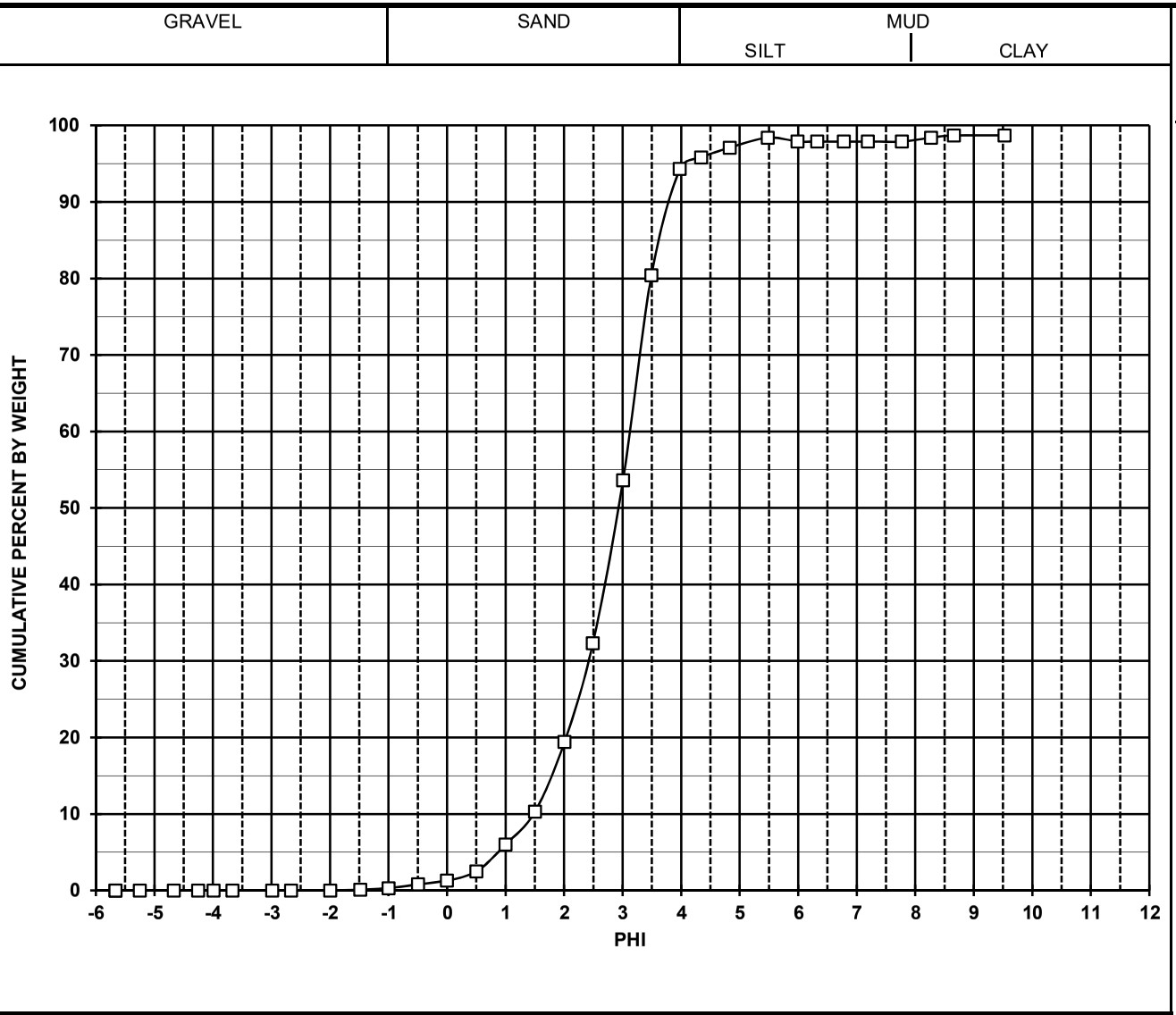
TEST SUMMARY

DESCRIPTION: Slightly gravelly very fine sand

GRAVEL (>2mm)	0.1%
SAND (2mm to .0625mm)	91.8%
SILT (>0.0625mm to 0.004mm)	5.1%
CLAY (< 0.004mm)	3.0%

PARTICLE SIZE DISTRIBUTION
(Wentworth/Folk)
Sample: EW2-09 E2

Analysis file: FolkV3 (2/15) Siev1I2.xlsx 6/18/2021



Sieve No.	Sieve (mm)	Phi	Cumulative Percent by Weight
2"	50.8	-5.7	0.0
1 1/2"	38.1	-5.3	0.0
1"	25.4	-4.7	0.0
3/4"	19.1	-4.3	0.0
5/8"	15.9	-4.0	0.0
1/2"	12.7	-3.7	0.0
5/16"	7.9	-3.0	0.0
1/4"	6.4	-2.7	0.0
5	4.0	-2.0	0.0
7	2.8	-1.5	0.1
10	2.0	-1.0	0.3
14	1.4	-0.5	0.8
18	1.00	0.0	1.3
25	0.71	0.5	2.5
35	0.50	1.0	6.0
45	0.353	1.5	10.3
60	0.249	2.0	19.4
80	0.178	2.5	32.3
120	0.124	3.0	53.6
170	0.089	3.5	80.4
230	0.064	4.0	94.3
		4.5	96.3
		5.0	97.5
		5.5	98.4
		6.0	98.4
		6.5	98.4
		7.0	98.4
		7.5	98.4
		8.0	98.4
		8.5	98.5
		9.0	98.7
		9.5	98.7

TerraSense, LLC	Alpine
7901-21001	1894

EW 2021 - Barret ECR Environmental Survey

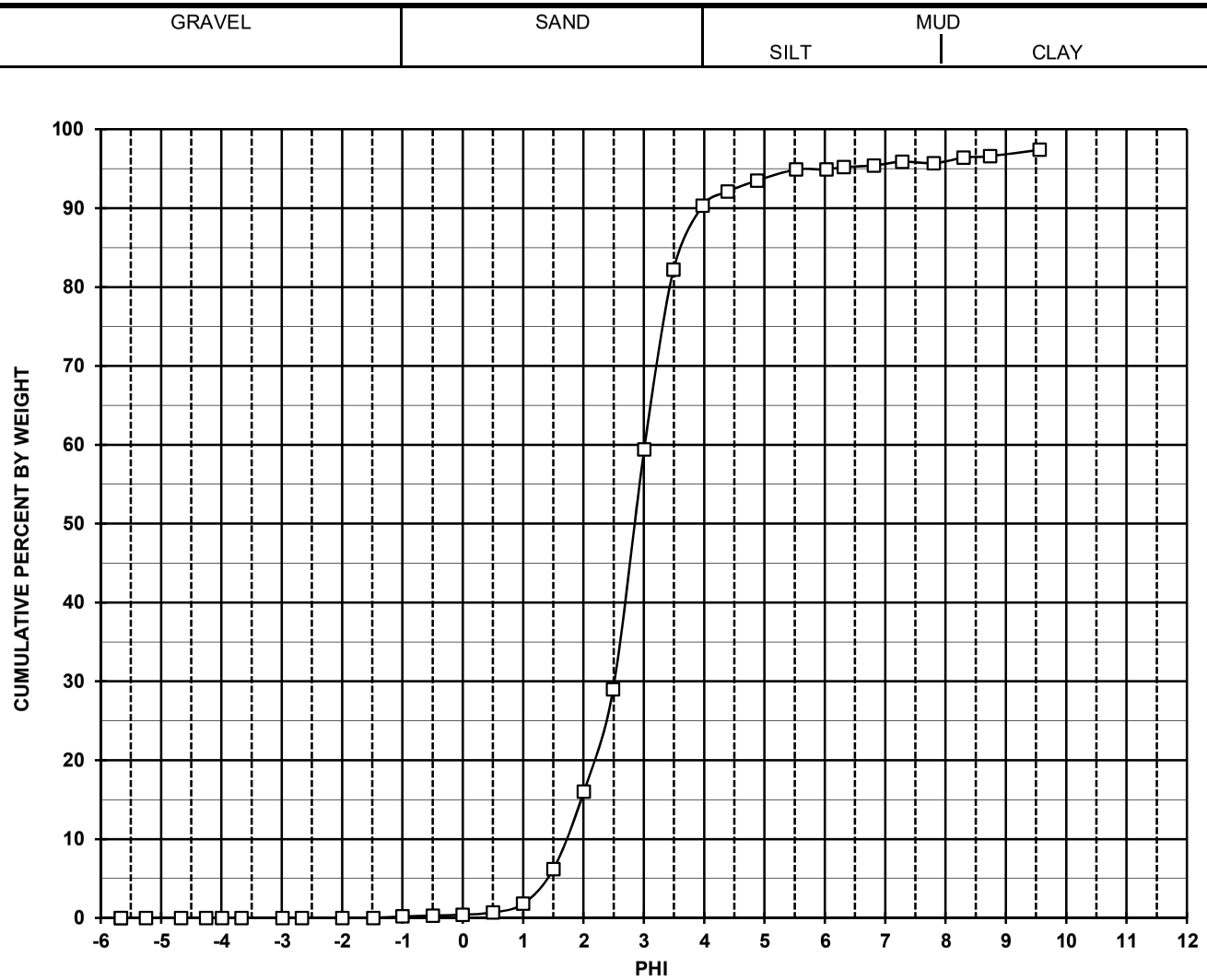
TEST SUMMARY

DESCRIPTION: Slightly gravelly very fine sand

GRAVEL (>2mm)	0.3%
SAND (2mm to .0625mm)	94.0%
SILT (>0.0625mm to 0.004mm)	4.1%
CLAY (< 0.004mm)	1.6%

PARTICLE SIZE DISTRIBUTION
(Wentworth/Folk)
Sample: EW2-09 W3

Analysis file: FolkV3 (2/15) Siev1I3.xlsx 6/18/2021



Sieve No.	Sieve (mm)	Phi	Cumulative Percent by Weight
2"	50.8	-5.7	0.0
1 1/2"	38.1	-5.3	0.0
1"	25.4	-4.7	0.0
3/4"	19.1	-4.3	0.0
5/8"	15.9	-4.0	0.0
1/2"	12.7	-3.7	0.0
5/16"	7.9	-3.0	0.0
1/4"	6.4	-2.7	0.0
5	4.0	-2.0	0.0
7	2.8	-1.5	0.0
10	2.0	-1.0	0.2
14	1.4	-0.5	0.3
18	1.00	0.0	0.4
25	0.71	0.5	0.7
35	0.50	1.0	1.8
45	0.353	1.5	6.2
60	0.249	2.0	16.0
80	0.178	2.5	29.0
120	0.124	3.0	59.4
170	0.089	3.5	82.2
230	0.064	4.0	90.3
		4.5	92.5
		5.0	93.8
		5.5	94.8
		6.0	94.9
		6.5	95.3
		7.0	95.6
		7.5	95.9
		8.0	96.0
		8.5	96.5
		9.0	96.8
		9.5	97.3

TerraSense, LLC	Alpine
7901-21001	1894

EW 2021 - Barret ECR Environmental Survey

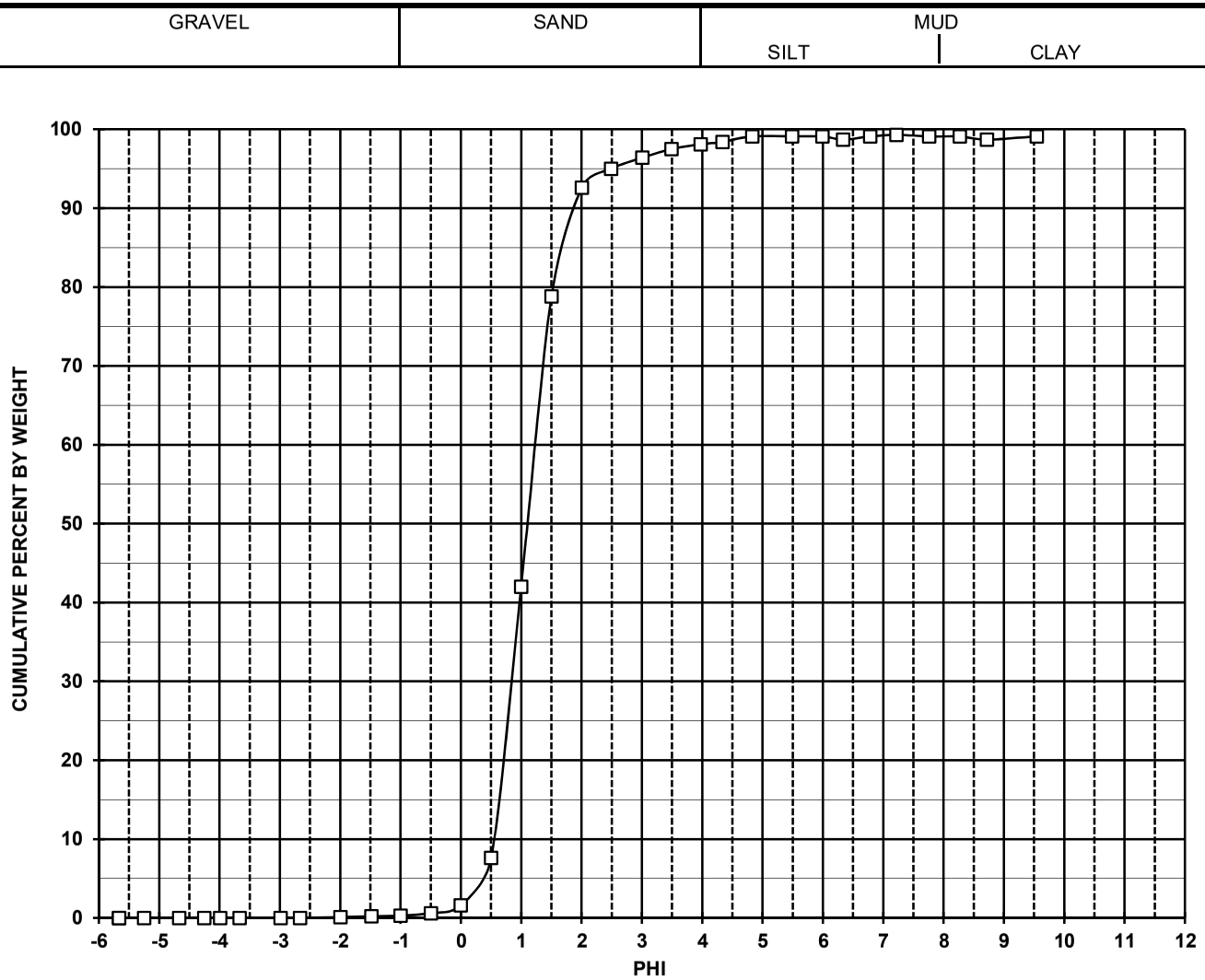
TEST SUMMARY

DESCRIPTION: Slightly gravelly fine sand

GRAVEL (>2mm)	0.2%
SAND (2mm to .0625mm)	90.1%
SILT (>0.0625mm to 0.004mm)	5.7%
CLAY (< 0.004mm)	4.0%

PARTICLE SIZE DISTRIBUTION
(Wentworth/Folk)
Sample: EW2-10 A2

Analysis file: FolkV3 (2/15) Siev1J1.xlsx 6/24/2021



Sieve No.	Sieve (mm)	Phi	Cumulative Percent by Weight
2"	50.8	-5.7	0.0
1 1/2"	38.1	-5.3	0.0
1"	25.4	-4.7	0.0
3/4"	19.1	-4.3	0.0
5/8"	15.9	-4.0	0.0
1/2"	12.7	-3.7	0.0
5/16"	7.9	-3.0	0.0
1/4"	6.4	-2.7	0.0
5	4.0	-2.0	0.1
7	2.8	-1.5	0.2
10	2.0	-1.0	0.3
14	1.4	-0.5	0.6
18	1.00	0.0	1.6
25	0.71	0.5	7.6
35	0.50	1.0	42.0
45	0.353	1.5	78.8
60	0.249	2.0	92.6
80	0.178	2.5	95.0
120	0.124	3.0	96.4
170	0.089	3.5	97.5
230	0.064	4.0	98.1
		4.5	98.6
		5.0	99.1
		5.5	99.1
		6.0	99.1
		6.5	99.1
		7.0	99.2
		7.5	99.3
		8.0	99.3
		8.5	99.3
		9.0	99.3
		9.5	99.3

TerraSense, LLC	Alpine
7901-21001	1894

EW 2021 - Barret ECR Environmental Survey

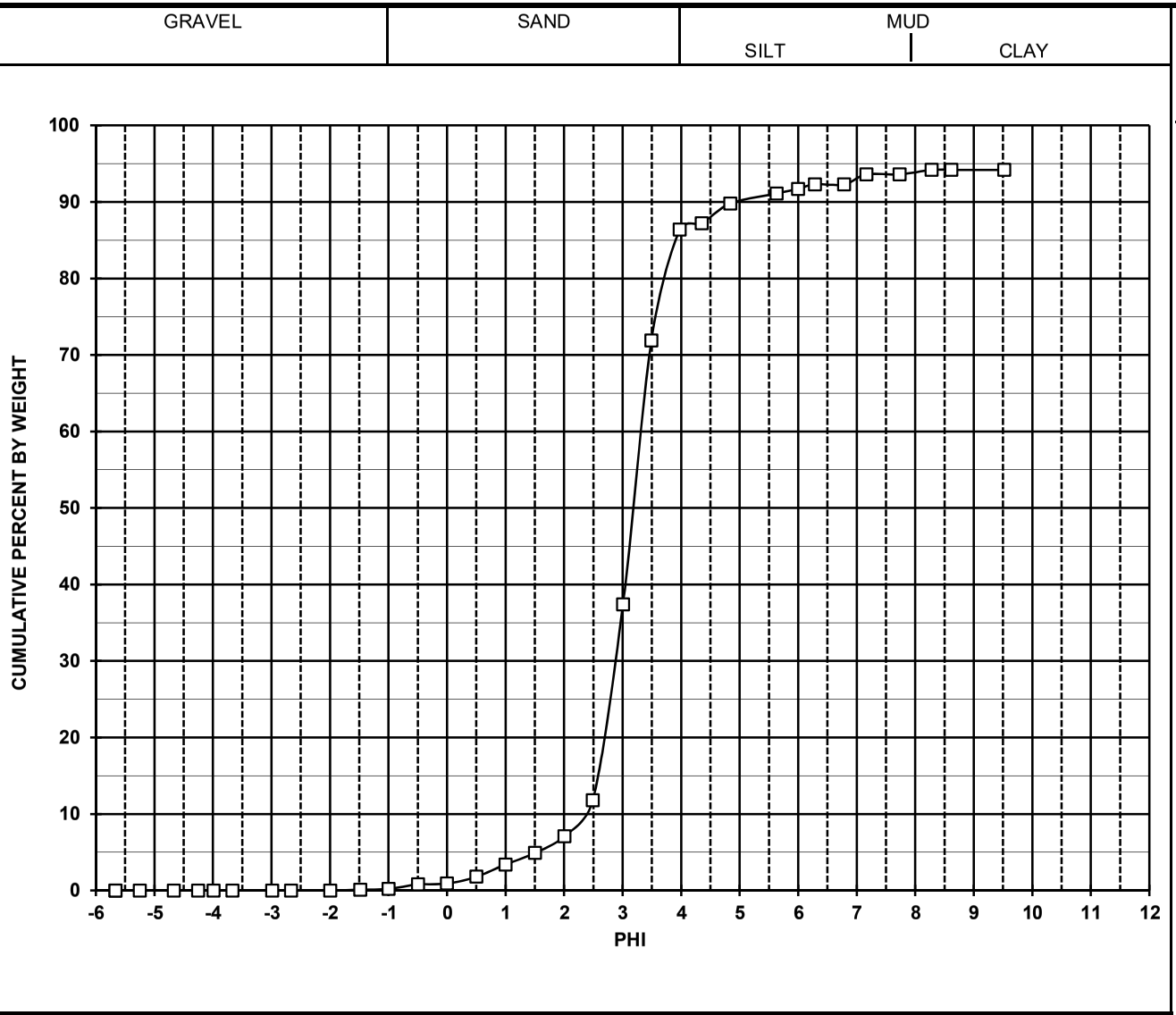
TEST SUMMARY

DESCRIPTION: Slightly gravelly medium sand

GRAVEL (>2mm)	0.3%
SAND (2mm to .0625mm)	97.8%
SILT (>0.0625mm to 0.004mm)	1.2%
CLAY (< 0.004mm)	0.7%

PARTICLE SIZE DISTRIBUTION
(Wentworth/Folk)
Sample: EW2-10 E2

Analysis file: FolkV3 (2/15) Siev1J2.xlsx 6/24/2021



Sieve No.	Sieve (mm)	Phi	Cumulative Percent by Weight
2"	50.8	-5.7	0.0
1 1/2"	38.1	-5.3	0.0
1"	25.4	-4.7	0.0
3/4"	19.1	-4.3	0.0
5/8"	15.9	-4.0	0.0
1/2"	12.7	-3.7	0.0
5/16"	7.9	-3.0	0.0
1/4"	6.4	-2.7	0.0
5	4.0	-2.0	0.0
7	2.8	-1.5	0.1
10	2.0	-1.0	0.2
14	1.4	-0.5	0.8
18	1.00	0.0	0.9
25	0.71	0.5	1.8
35	0.50	1.0	3.4
45	0.353	1.5	4.9
60	0.249	2.0	7.1
80	0.178	2.5	11.8
120	0.124	3.0	37.4
170	0.089	3.5	71.9
230	0.064	4.0	86.4
		4.5	88.0
		5.0	90.2
		5.5	91.3
		6.0	91.7
		6.5	92.3
		7.0	92.8
		7.5	93.6
		8.0	93.8
		8.5	94.2
		9.0	94.2
		9.5	94.2

TerraSense, LLC	Alpine
7901-21001	1894

EW 2021 - Barret ECR Environmental Survey

TEST SUMMARY

DESCRIPTION: Slightly gravelly muddy very fine sand

GRAVEL (>2mm)	0.2%
SAND (2mm to .0625mm)	86.2%
SILT (>0.0625mm to 0.004mm)	7.4%
CLAY (< 0.004mm)	6.2%

PARTICLE SIZE DISTRIBUTION
(Wentworth/Folk)
Sample: EW2-10 W2

Analysis file: FolkV3 (2/15) Siev1J3.xlsx 6/18/2021

Sieve No.	Sieve (mm)	Phi	Cumulative Percent by Weight
2"	50.8	-5.7	0.0
1 1/2"	38.1	-5.3	0.0
1"	25.4	-4.7	0.0
3/4"	19.1	-4.3	0.0
5/8"	15.9	-4.0	0.0
1/2"	12.7	-3.7	0.0
5/16"	7.9	-3.0	0.0
1/4"	6.4	-2.7	0.0
5	4.0	-2.0	0.0
7	2.8	-1.5	0.1
10	2.0	-1.0	0.2
14	1.4	-0.5	0.2
18	1.00	0.0	0.4
25	0.71	0.5	0.5
35	0.50	1.0	1.6
45	0.353	1.5	9.0
60	0.249	2.0	39.2
80	0.178	2.5	64.5
120	0.124	3.0	87.8
170	0.089	3.5	95.5
230	0.064	4.0	97.9
		4.5	98.4
		5.0	99.1
		5.5	99.6
		6.0	99.6
		6.5	99.7
		7.0	99.8
		7.5	99.8
		8.0	99.8
		8.5	99.8
		9.0	99.8
		9.5	99.8

TerraSense, LLC	Alpine
7901-21001	1894

EW 2021 - Barret ECR Environmental Survey

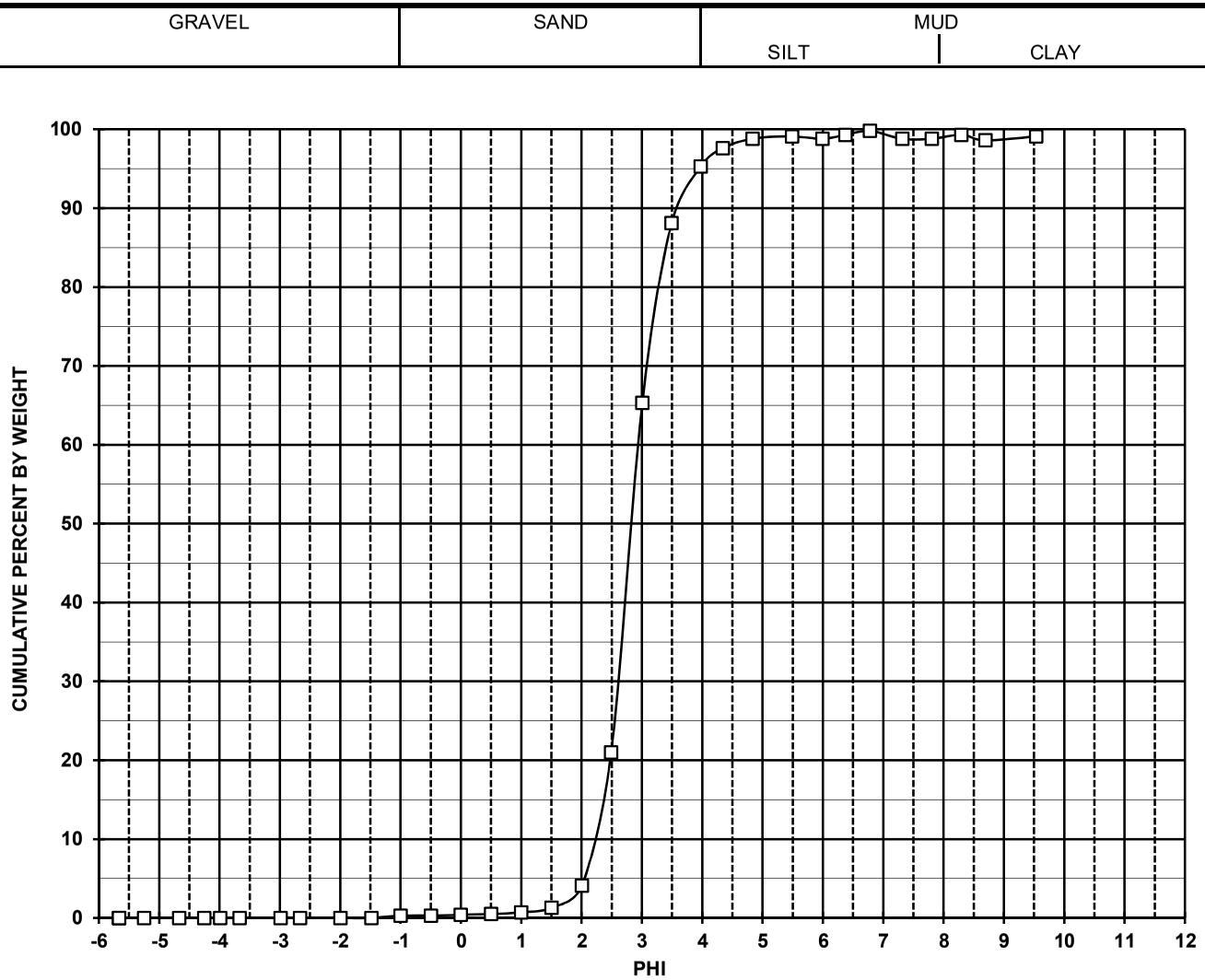
TEST SUMMARY

DESCRIPTION: Slightly gravelly fine sand

GRAVEL (>2mm)	0.2%
SAND (2mm to .0625mm)	97.7%
SILT (>0.0625mm to 0.004mm)	1.9%
CLAY (< 0.004mm)	0.2%

PARTICLE SIZE DISTRIBUTION
(Wentworth/Folk)
Sample: EW2-11 A1

Analysis file: FolkV3 (2/15) Siev1K1.xlsx 6/24/2021



Sieve No.	Sieve (mm)	Phi	Cumulative Percent by Weight
2"	50.8	-5.7	0.0
1 1/2"	38.1	-5.3	0.0
1"	25.4	-4.7	0.0
3/4"	19.1	-4.3	0.0
5/8"	15.9	-4.0	0.0
1/2"	12.7	-3.7	0.0
5/16"	7.9	-3.0	0.0
1/4"	6.4	-2.7	0.0
5	4.0	-2.0	0.0
7	2.8	-1.5	0.0
10	2.0	-1.0	0.3
14	1.4	-0.5	0.3
18	1.00	0.0	0.4
25	0.71	0.5	0.5
35	0.50	1.0	0.7
45	0.353	1.5	1.3
60	0.249	2.0	4.1
80	0.178	2.5	21.0
120	0.124	3.0	65.3
170	0.089	3.5	88.1
230	0.064	4.0	95.3
		4.5	98.1
		5.0	99.0
		5.5	99.1
		6.0	99.1
		6.5	99.4
		7.0	99.8
		7.5	99.8
		8.0	99.8
		8.5	99.8
		9.0	99.8
		9.5	99.8

TerraSense, LLC	Alpine
7901-21001	1894

EW 2021 - Barret ECR Environmental Survey

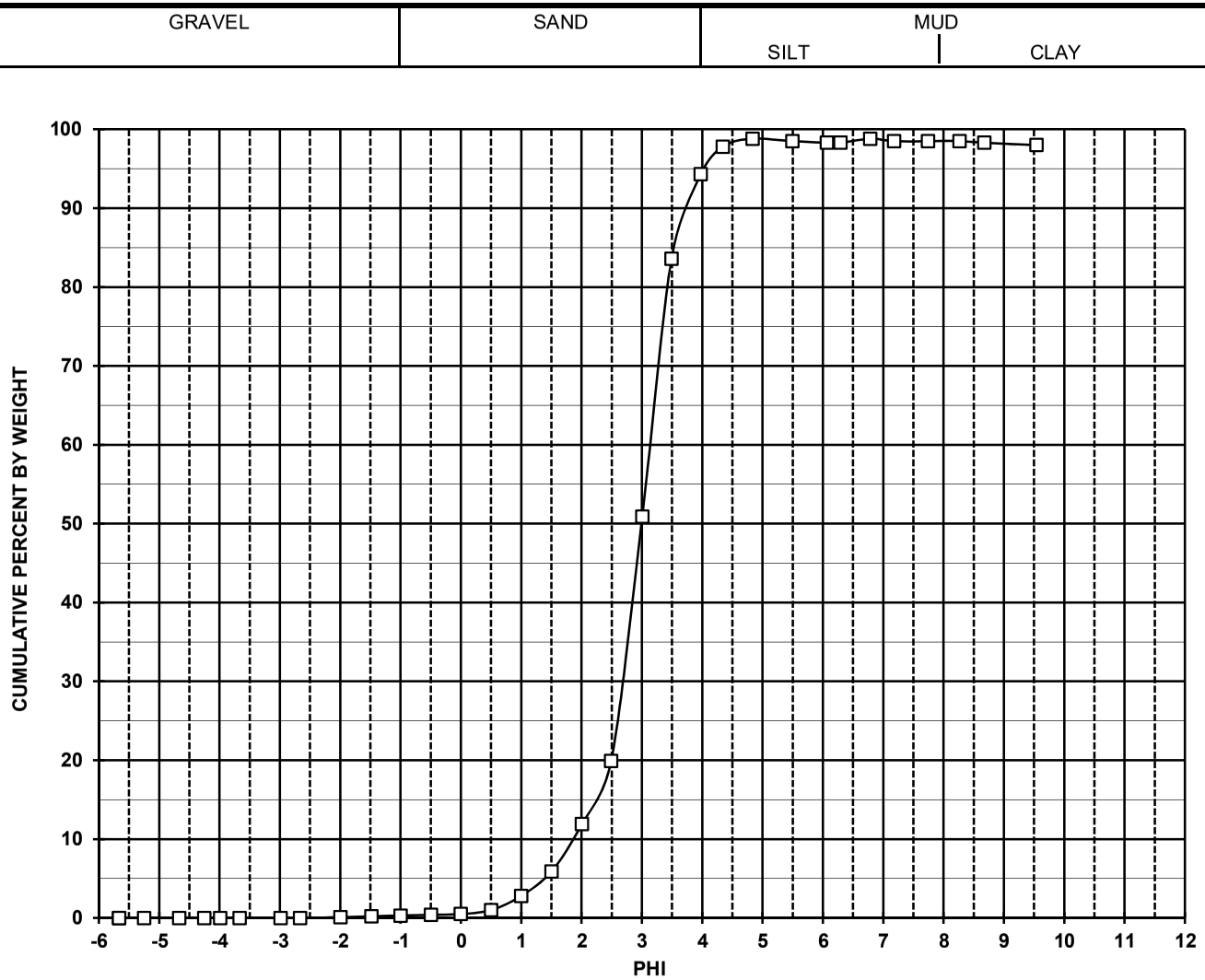
TEST SUMMARY

DESCRIPTION: Slightly gravelly fine sand

GRAVEL (>2mm)	0.3%
SAND (2mm to .0625mm)	95.0%
SILT (>0.0625mm to 0.004mm)	4.5%
CLAY (< 0.004mm)	0.2%

PARTICLE SIZE DISTRIBUTION
(Wentworth/Folk)
Sample: EW2-11 E1

Analysis file: FolkV3 (2/15) Siev1K2.xlsx 6/24/2021



Sieve No.	Sieve (mm)	Phi	Cumulative Percent by Weight
2"	50.8	-5.7	0.0
1 1/2"	38.1	-5.3	0.0
1"	25.4	-4.7	0.0
3/4"	19.1	-4.3	0.0
5/8"	15.9	-4.0	0.0
1/2"	12.7	-3.7	0.0
5/16"	7.9	-3.0	0.0
1/4"	6.4	-2.7	0.0
5	4.0	-2.0	0.1
7	2.8	-1.5	0.2
10	2.0	-1.0	0.3
14	1.4	-0.5	0.4
18	1.00	0.0	0.5
25	0.71	0.5	1.0
35	0.50	1.0	2.8
45	0.353	1.5	5.9
60	0.249	2.0	11.9
80	0.178	2.5	19.9
120	0.124	3.0	50.9
170	0.089	3.5	83.6
230	0.064	4.0	94.3
		4.5	98.5
		5.0	98.8
		5.5	98.8
		6.0	98.8
		6.5	98.8
		7.0	98.8
		7.5	98.8
		8.0	98.8
		8.5	98.8
		9.0	98.8
		9.5	98.8

TerraSense, LLC	Alpine
7901-21001	1894

EW 2021 - Barret ECR Environmental Survey

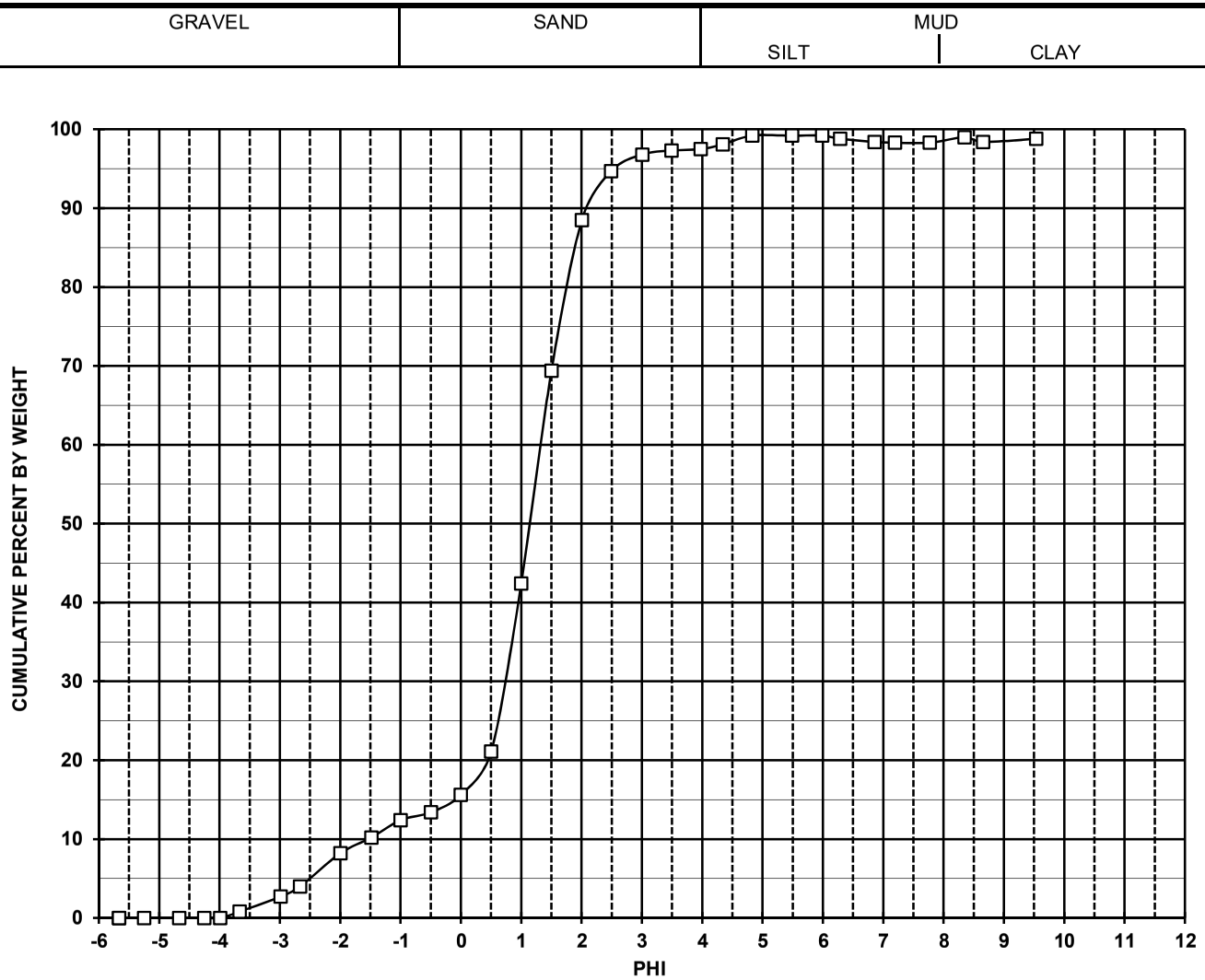
TEST SUMMARY

DESCRIPTION: Slightly gravelly very fine sand

GRAVEL (>2mm)	0.3%
SAND (2mm to .0625mm)	94.0%
SILT (>0.0625mm to 0.004mm)	4.5%
CLAY (< 0.004mm)	1.2%

PARTICLE SIZE DISTRIBUTION
(Wentworth/Folk)
Sample: EW2-11 W3

Analysis file: FolkV3 (2/15) Siev1K3.xlsx 6/24/2021



Sieve No.	Sieve (mm)	Phi	Cumulative Percent by Weight
2"	50.8	-5.7	0.0
1 1/2"	38.1	-5.3	0.0
1"	25.4	-4.7	0.0
3/4"	19.1	-4.3	0.0
5/8"	15.9	-4.0	0.0
1/2"	12.7	-3.7	0.8
5/16"	7.9	-3.0	2.7
1/4"	6.4	-2.7	4.0
5	4.0	-2.0	8.2
7	2.8	-1.5	10.2
10	2.0	-1.0	12.4
14	1.4	-0.5	13.4
18	1.00	0.0	15.6
25	0.71	0.5	21.1
35	0.50	1.0	42.4
45	0.353	1.5	69.4
60	0.249	2.0	88.5
80	0.178	2.5	94.7
120	0.124	3.0	96.8
170	0.089	3.5	97.3
230	0.064	4.0	97.5
		4.5	98.5
		5.0	99.2
		5.5	99.2
		6.0	99.2
		6.5	99.2
		7.0	99.2
		7.5	99.2
		8.0	99.2
		8.5	99.2
		9.0	99.2
		9.5	99.2

TerraSense, LLC	Alpine
7901-21001	1894

EW 2021 - Barret ECR Environmental Survey

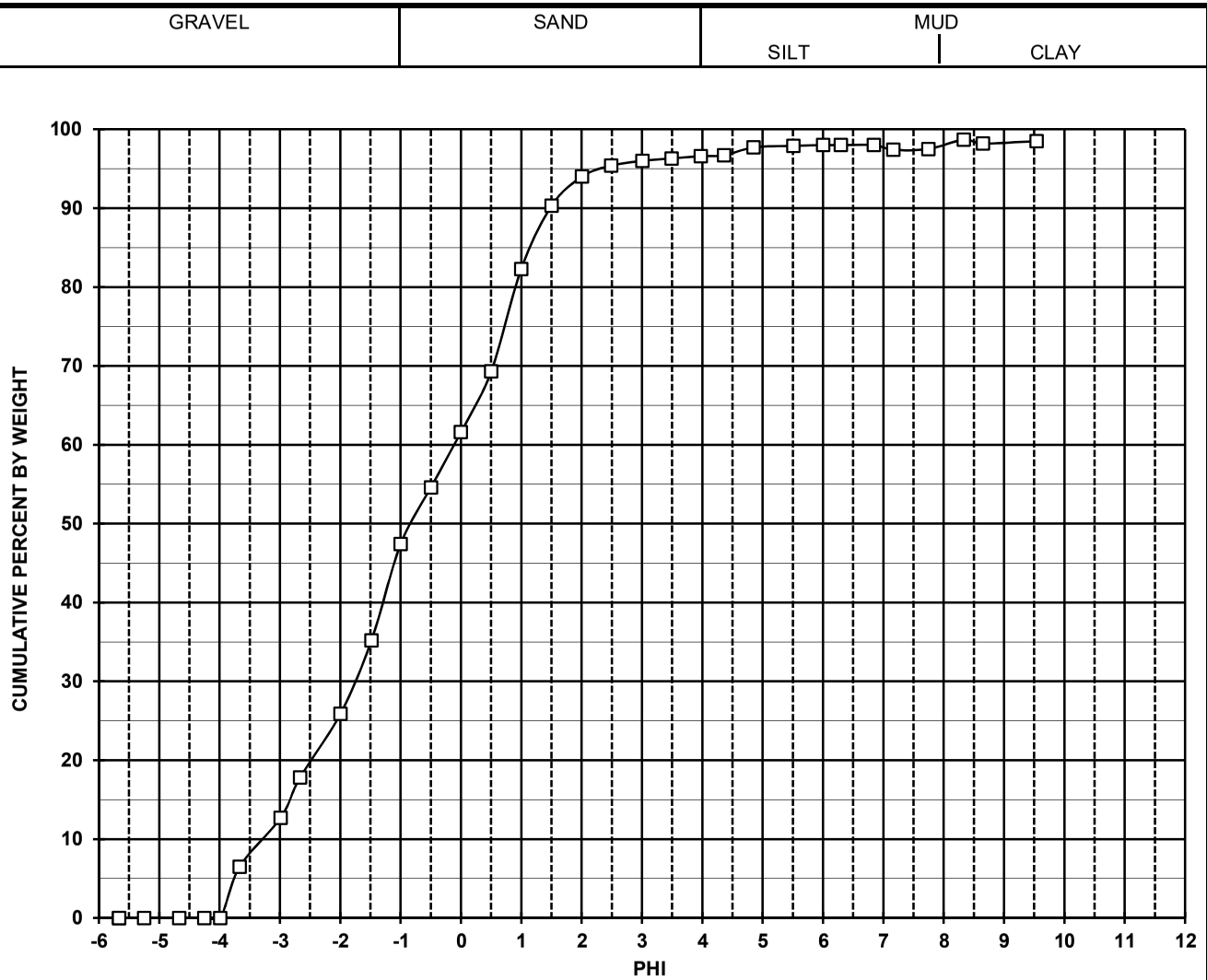
TEST SUMMARY

DESCRIPTION: Gravelly medium sand

GRAVEL (>2mm)	12.4%
SAND (2mm to .0625mm)	85.1%
SILT (>0.0625mm to 0.004mm)	1.7%
CLAY (< 0.004mm)	0.8%

PARTICLE SIZE DISTRIBUTION
(Wentworth/Folk)
Sample: EW2-12 A1

Analysis file: FolkV3 (2/15) Siev1L1.xlsx 6/18/2021



Sieve No.	Sieve (mm)	Phi	Cumulative Percent by Weight
2"	50.8	-5.7	0.0
1 1/2"	38.1	-5.3	0.0
1"	25.4	-4.7	0.0
3/4"	19.1	-4.3	0.0
5/8"	15.9	-4.0	0.0
1/2"	12.7	-3.7	6.5
5/16"	7.9	-3.0	12.7
1/4"	6.4	-2.7	17.8
5	4.0	-2.0	25.9
7	2.8	-1.5	35.2
10	2.0	-1.0	47.4
14	1.4	-0.5	54.6
18	1.00	0.0	61.6
25	0.71	0.5	69.3
35	0.50	1.0	82.3
45	0.353	1.5	90.3
60	0.249	2.0	94.0
80	0.178	2.5	95.4
120	0.124	3.0	96.0
170	0.089	3.5	96.3
230	0.064	4.0	96.6
		4.5	97.0
		5.0	97.8
		5.5	98.1
		6.0	98.0
		6.5	98.0
		7.0	98.0
		7.5	98.0
		8.0	98.2
		8.5	98.7
		9.0	98.7
		9.5	98.7

TerraSense, LLC	Alpine
7901-21001	1894

EW 2021 - Barret ECR Environmental Survey

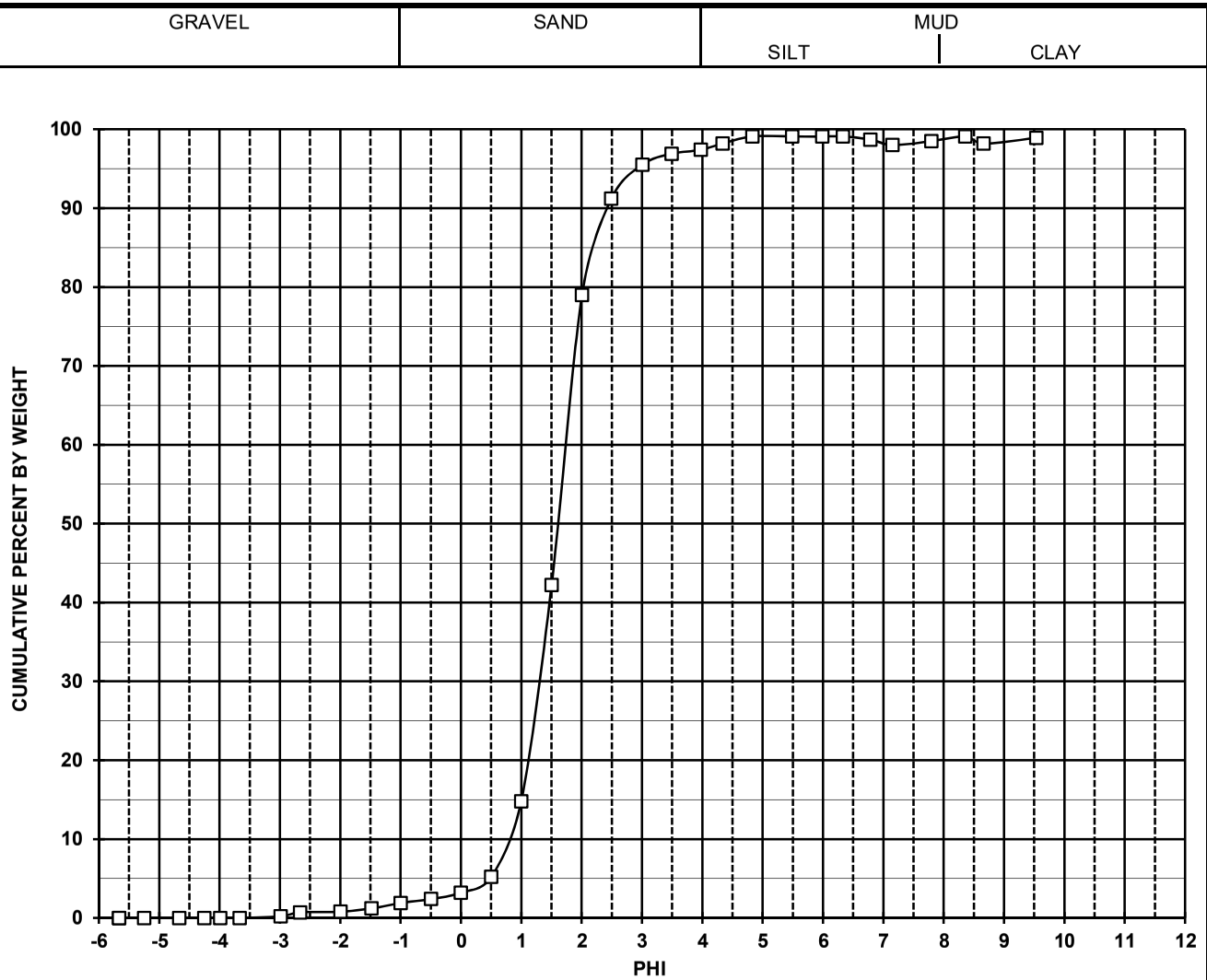
TEST SUMMARY

DESCRIPTION: Coarse sandy Gravel

GRAVEL (>2mm)	47.4%
SAND (2mm to .0625mm)	49.2%
SILT (>0.0625mm to 0.004mm)	1.6%
CLAY (< 0.004mm)	1.8%

PARTICLE SIZE DISTRIBUTION
(Wentworth/Folk)
Sample: EW2-12 E1

Analysis file: FolkV3 (2/15) Siev1L2.xlsx 6/18/2021



Sieve No.	Sieve (mm)	Phi	Cumulative Percent by Weight
2"	50.8	-5.7	0.0
1 1/2"	38.1	-5.3	0.0
1"	25.4	-4.7	0.0
3/4"	19.1	-4.3	0.0
5/8"	15.9	-4.0	0.0
1/2"	12.7	-3.7	0.0
5/16"	7.9	-3.0	0.2
1/4"	6.4	-2.7	0.7
5	4.0	-2.0	0.8
7	2.8	-1.5	1.2
10	2.0	-1.0	1.9
14	1.4	-0.5	2.4
18	1.00	0.0	3.2
25	0.71	0.5	5.2
35	0.50	1.0	14.8
45	0.353	1.5	42.2
60	0.249	2.0	79.0
80	0.178	2.5	91.2
120	0.124	3.0	95.5
170	0.089	3.5	96.9
230	0.064	4.0	97.4
		4.5	98.5
		5.0	99.1
		5.5	99.1
		6.0	99.1
		6.5	99.1
		7.0	99.1
		7.5	99.1
		8.0	99.1
		8.5	99.1
		9.0	99.1
		9.5	99.1

TerraSense, LLC	Alpine
7901-21001	1894

EW 2021 - Barret ECR Environmental Survey

TEST SUMMARY

DESCRIPTION: Slightly gravelly medium sand

GRAVEL (>2mm)	1.9%
SAND (2mm to .0625mm)	95.5%
SILT (>0.0625mm to 0.004mm)	1.7%
CLAY (< 0.004mm)	0.9%

PARTICLE SIZE DISTRIBUTION
(Wentworth/Folk)
Sample: EW2-12 W1

Analysis file: FolkV3 (2/15) Siev1L3.xlsx 6/18/2021