2017 Seafloor Sediment Sampling: Southport Island to Monhegan Island, Gulf of Maine

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Disclaimer

This report is preliminary, but data and information published herein are accurate to the best of our knowledge. Data synthesis, summaries and related conclusions may be subject to change as additional data are collected and evaluated. While the Maine Coastal Program makes every effort to provide useful and accurate information, investigations are site-specific and applicability of results to other regions in the state is not yet warranted. The Maine Coastal Program does not endorse conclusions based on subsequent use of the data by individuals not under their employment. The Maine Coastal Program disclaims any liability, incurred as a consequence, directly or indirectly, resulting from the use and application of any of the data and reports produced by staff. Any use of trade names is for descriptive purposes only and does not imply endorsement by The State of Maine.

For an overview of the Maine Coastal Mapping Initiative (MCMI) information products, including maps, data, imagery, and reports visit http://www.maine.gov/dacf/mcp/planning/mcmi/index.htm.

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ABSTRACT

As part of a multi-year, multi-agency cooperative, the Maine Coastal Mapping Initiative (MCMI) has been addressing the need for comprehensive resource assessment through high-resolution seafloor mapping using a multibeam echosounder (MBES) and by collecting seafloor substrate data. The purpose of this investigation was to collect seafloor substrate data within the 2017 focus area and combined with existing data will help accomplish the following objectives: benthic habitat classification, modeling and mapping via the federally-approved Coastal and Marine Ecological Classification Standard (CMECS) (FGDC, 2012), generation of generalized seafloor sediment maps, build upon existing knowledge of local and regional geologic framework, and assess potential sand and gravel reservoirs. This report presents summarized bottom sample (69 sites) data collected by the MCMI during the 2017 field season (April to September), generalized descriptions of sand and gravel deposits, and preliminary sediment mapping of the approximately 125 mi^2 (325 km^2) survey area offshore of midcoast Maine between Southport Island and Monhegan Island.

Introduction

The collection and analysis of geophysical and geological data allow state and federal agencies to proactively identify resources available to enhance resiliency, improve management of resources within their jurisdiction, and develop a more comprehensive understanding of potential marine resources. A key component of coastal resiliency and conservation efforts in Maine's coastal zone is access to high-quality, near-shore and off-shore sand and gravel resources. The Bureau of Ocean Energy Management (BOEM) has recognized the need to identify additional outer continental shelf (OCS) sand resources for beach nourishment and coastal restoration projects because sand resources in state waters of most U.S. states are either diminishing, of poor quality, or otherwise unavailable (U.S. Department of the Interior, 2014). In Maine, quantitative assessments for these resources have only been conducted within select nearshore waters of state jurisdiction (e.g. waters landward of 3-nautical mile line) (Kelley et al., 1997; 1998; 2003). Although spatially extensive, geological and geophysical (G&G) data (e.g. cores and seismic reflection profiles) in the region has low resolution overall, and seldom extends into federal waters. When supplemented with high-resolution multibeam echosounder (MBES) data (e.g. bathymetry and backscatter intensity) and additional information about seafloor substrate (e.g. sediment samples, video, benthic fauna, etc.), these data can be synthesized to develop a more thorough assessment of marine resources.

As part of a multi-year, multi-agency cooperative, the Maine Coastal Mapping Initiative (MCMI) has been addressing the need for comprehensive resource assessment through high-resolution seafloor mapping using a MBES and by collecting seafloor substrate data. This report presents summarized bottom sample (69 sites) data collected by the MCMI during the 2017 field season (April to September), generalized descriptions of sand and gravel deposits, and preliminary sediment mapping of the approximately 125 mi^2 (325 km^2) survey area offshore of midcoast Maine between Southport Island and Monhegan Island. Descriptions and summaries of previous year's efforts within the midcoast region area are outlined in separate reports.

Purpose

The purpose of this investigation was to collect seafloor substrate data to supplement MBES data collected within the 2017 focus area (Figure 1), which when combined with new and existing G&G data will help accomplish the following objectives: perform benthic habitat classification, modeling and mapping via the federally-approved Coastal and Marine Ecological Classification Standard (CMECS) (FGDC, 2012), generate generalized seafloor sediment maps, build upon existing knowledge of local and regional geologic framework, and locate potential sand and gravel reservoirs.

Focus Area and Previous Work

The 2017 focus area (Figure 1) was located in Maine's mid-coast region in waters offshore of and between Southport Island and Monhegan Island, Maine. The general outline of the coast is largely controlled by the structural framework of bedrock, where numerous elongate bedrock peninsulas separate narrow estuaries. Late Quaternary deglaciation and relative sea-level changes caused by widespread isostatic adjustments have resulted in extensive reworking of glaciomarine sediments (Kelley et al., 1987; Kelley and Belknap, 1988). Because of these dynamic processes, major sand and gravel repositories along the inner/outer continental shelf are not widespread in the midcoast region, and localized occurrences are limited to the nearshore areas adjacent to major mid-coast beaches, submerged paleodeltas, lowstand shorelines, and stratified moraines (Barnhardt, 1994; Kelley et al., 1987; 1997; 2003; 2007).

Previous work in the immediate vicinity of the focus area suggests that potential sand and gravel deposits are of limited extent (laterally and vertically) and likely of exclusive association with reworked, subaqueous glacial outwash, stratified moraine sediments, and the subsequent concentration of those sediments around lowstand shorelines (Kelley and Belknap, 1988; Smith, 1982, 1985). Although G&G data previously collected by the Maine Geological Survey is spatially extensive (Figure 1) within the focus area, it is absent in many areas and not of sufficient resolution to fully describe or assess small, localized potential resource areas.

Methods

Field methods used during this investigation consisted of collecting high-resolution MBES (e.g. bathymetry and backscatter) data and bottom sampling.

Multibeam surveys/bathymetry and backscatter collection

MBES data (bathymetry and backscatter) were acquired aboard the R/V Amy Gale with a Kongsberg EM2040c set to a survey frequency of 300 kHz and high-density beam forming with 400 beams per ping. Parallel lines with consistent spacing (based on depth) were run at 6 - 6.5 knots throughout the survey area. Data acquisition was performed using the Quality Positioning Services (QPS) QINSy (Quality Integrated Navigation System; v.8.16) acquisition software. The modules within QINSy integrated all systems and were used for real-time navigation, survey line planning, data time tagging, data logging, and visualization. Bathymetric data were processed (e.g. data cleaning, vertical referencing, etc.) using Qimera (v.1.5.4) and backscatter data were processed using QPS' Fledermaus Geocoder Tool (FMGT; v.7.7.7) software. For complete details pertaining to the multibeam data collection, data processing, and MBES data products refer to the survey descriptive report (Dobbs, 2017).

Bottom sampling

Sampling locations were generally distributed in an attempt to obtain samples from a broad range of benthic habitat types (e.g. variety of substrates, depths, morphologies, etc.; inferred from a review of MBES data), to fill in spatial data gaps in the pre-existing data sets, and were concentrated in select areas where preliminary analyses of multibeam backscatter intensity data suggested the presence of a potential sediment resource (e.g. predominantly sand and gravel).

The bottom sampler was a single platform rig (Figure 2) outfitted with a clamshell style Ponar grab sampler, GoPro Hero 3+ digital video camera inside a Group B Inc. dive housing, Keldan underwater dive light, dive lasers spaced at 10 cm for scale, and a Xylem Exo 1 to collect water column data (salinity, temperature, pH, dissolved oxygen, and chlorophyll concentrations; see Ozmon, 2017 for details). The 23 x 23 cm Ponar grab had a maximum retrieval volume of 8.2 liters of unconsolidated material per sampling attempt. Immediately upon retrieval, the sediment surface was photographed and partitioned into two subsamples; a minimum of 100 cm^3 was set aside for grain-size analysis and the remainder was processed to collect infauna samples (see Ozmon, 2017 for details related to infauna). Unless distinctly stratified, sub-samples contained portions of the entire penetration depth of the original sample. Sediment subsamples were then bagged, labeled, transported in coolers, and held in refrigerators until being processed at the sedimentology laboratory at the University of Maine (UMaine). At each location where the sampler returned empty after three attempts, a hard substrate (e.g. bedrock, boulders, etc.) was inferred and confirmed later with video footage captured during each sampling attempt. Coordinates (WGS84 UTM Zone 19N meters; GPS horizontal accuracy at surface ±3 m) were recorded when the sampler reached bottom and when the wench tether was visually confirmed to have a vertical/near-vertical orientation relative to a flat sea surface. The real-time depth for each location was determined using a hull-mounted single-beam fathometer and was not referenced to a specific vertical datum (e.g. mean lower low water, MLLW). As a result, the vertical uncertainty associated with real-time depths

recorded in field notes for each site was as much ±3 m (approximate mean tidal range). However, true depth (referenced to MLLW in meters) at each sample site was extracted from the final bathymetric surface (4-m grid) and was included with the data in this report.

Sediment samples were analyzed using standard laboratory techniques for the textural analyses of marine sediments (Poppe et al., 2014) by the sedimentology laboratory at the University of Maine. The proportion of gravel-, sand-, silt-, and clay-sized particles were used to classify the overall sample using Folk (1974). The Wentworth (1922) grain-size scale was the basis for major textural splits, and in instances where the silt/clay ratio could not be determined accurately (e.g. mud-sized (silt + clay) portion was less than 5% of total weight) total mud was divided evenly between silt (phi size 4 - 8) and clay (phi size 8 - 12) fractions.

As of the date of this report's completion (November 27, 2017), data/results of sediment sample laboratory analyses (e.g. grain-size analyses results) had not been received by the MCMI, and thus were not included or discussed in this report. Once received, these data will be attached as addendum to this report. However, interpretations of seafloor characteristics and sediment distribution based on textural field descriptions, video analysis, MBES data, and 1st-order bathymetry derivatives (e.g. slope) are of sufficient quality to present and discuss seafloor character and general distribution of seafloor sediment within the focus area.

Results and Discussion

Overview
A total of 69 sites, 44 in state water and 25 in federal water, were sampled within the surveyed area (Figure 3). Unconsolidated sediment samples (or loose, individual cobbles) were retrieved from 50 sites and bedrock outcrops were observed at 19 sites (e.g. no physical sample was retrieved). A summary of sample attributes derived from textural field descriptions and video analysis are provided in Appendix A. Sample field pictures (if applicable) and bottom photographs are provided in Appendix B.

Seafloor bathymetry was characterized by broad, gentle slopes punctuated by a series of rugged bedrock outcrops. Depths ranged from -1 m to -153 m below mean lower low water (MLLW), where the highest local relief (up to 40 meters near 457943 E 4842200 N) occurred adjacent to outcrops along the western margin of a north-northeast south-southwest-trending valley that bisects the survey area; local fisherman refer to this area as 'the wall'. Backscatter intensity data generally served as a proxy for seafloor substrate, where bedrock and coarse unconsolidated material was represented by high intensity (light grey/white areas in Figure 4) and predominantly fine-grained material was represented by low intensity (darkest tones in Figure 4). In many areas, the heterogeneity of bedrock outcrop surfaces (e.g. irregular, fractured surfaces with variable local relief, sediment-filled fractures and sediment veneering, dense communities of attached fauna, etc.) caused them to appear as irregular-shaped zones with a mixture of high and low or intermediate backscatter intensity.

Sand and Gravel Deposits Associated with Glacial Deposits
Quite expectedly, preliminary analyses of MBES (bathymetry and backscatter) data indicated that laterally extensive sand and gravel deposits were scarce. Likewise, the occurrence of these deposits was mainly limited to four isolated areas near lowstand shoreline positions, suspected glacial moraine segments and/or presumably reworked glacial outwash. Three of the four areas were previously mapped by Barnhardt et al. (1996a; 1996b) using side-scan sonar. However, side-scan sonar coverage was incomplete and no bottom samples were collected. Thus, these areas and select areas in between were targeted for bottom sampling. Three of the four targeted areas occurred in areas south-southwest of Pemaquid Point. The fourth target area was located approximately half way between Pemaquid Point and

Monhegan Island, and straddled the 3-nautical mile line south of Muscongus Bay. The relationship between seabed morphology and sediment distribution within these four zones, described in greater detail below, is well-illustrated in Figure 5 where transparent backscatter data is overlain on shaded-relief bathymetric data.

Zone A (inset A in Figure 5)
This zone is referred to as the 'hump sands' by local fisherman and appears a north-south-trending elliptical zone (0.3 km^2) with a series of sinuous ridges (3-5 m vertical relief) trending roughly east-west, east-northeast-west-southwest, or northwest-southeast. Ridge crests occurring at depths between -50 and -65 m, placing them at the approximate elevation of the late Pleistocene-early Holocene lowstand shoreline (-55 m) noted by Barnhardt et al. (1995). The attributes of these features are consistent with those of recessional 'washboard' moraine segments described throughout central and southern Maine (Smith, 1982). Bottom samples (M0173 through M0177) collected in this area corroborated this interpretation, with video revealing semi-linear ridges composed of cobble-boulder-sized material (M0175) and the surrounding flats and slopes draped in sub-angular to sub-round sand and gravel, presumably reworked from the nearby moraines and glacial outwash. Seismic profile data in this zone suggest unconsolidated sediments (excluding cobble-boulder size) are relatively thin (<2 m) and overlie bedrock.

Zone B (inset B in Figure 5)
Zone B was located approximately 8.4 km north-northeast of zone A, and with relatively subdued relief compared to the surrounding outcrops was punctuated by a series of southwest-northeast-trending, linear or chevron-shaped moraial ridges (3-5 m vertical relief). Depths of ridge crests increased to the northwest and ranged from -25 m to -40 m. Similar to zone A, the attributes of these features are consistent with those of recessional 'washboard' moraine segments and reworked outwash. The chevron-shaped accumulations of cobble-boulder-sized material and considerable proportion of coarse shell fragments in bottom samples (M0188 through M0192) suggest this zone has experienced a greater degree of reworking due to shallower depths, possibly exposing this portion to shoreface and nearshore process for a longer duration than deposits in zone A. Although sand and gravel deposits in this zone are presumably thin (<2 m), they are the most laterally extensive of the four zones highlighted in this report. Interpretations of MBES suggest contiguous sand and gravel deposits of variable thickness covered approximately 0.9 km^2 (0.35 mi^2) in this zone, which was bound to the northwest by mud and to the southeast by outcropping rock.

Zone C (inset C in Figure 5)
Zone C was located approximately 2 km northeast of zone B and 2 km due south of Pemaquid Point. This zone contained two southwest-northeast-trending moraial ridges composed of cobble-boulder material (observed at sample sites M0183 and M0184); both ridge crests were at a depth of -32 m. The chevron shape of the southern-most ridge suggests considerable reworking of material through wave action. Accumulations of material winnowed from these deposits lie within a trough (-40 m to -50 m depth) immediately to the west, where the relative textural maturity of sediment (sites M0182 and M0185; moderate to moderately well-sorted medium-coarse sand) suggests an extended period of reworking in a nearshore environment. The lack of nearby deposits of similar maturity and composition support the interpretation that these sediments were derived from a nearby source (e.g. adjacent moraines and associated outwash) that likely experienced a greater degree of wave action due to local bathymetry (e.g. bound by outcrops to east and west).   Of the four zones described in this report, this zone contains the most suitable grain-size attributes for sand-and-gravel resource extraction. However, these deposits are of the most limited areal extent (0.09 km^2).

Zone D (inset D in Figure 5)
Zone D was located at the northeastern extent of MBES coverage; approximately half way between Pemaquid Point and Monhegan Island, and straddling the 3-nautical mile line south of Muscongus Bay. This zone contained a series of suspected moraine segments surrounded by muddy sand and gravel with depths ranging from -45 m to -55 m. The crests of moraine segments in this zone were less pronounced than those observed in zones A – C, and surrounding material at comparable depths contained a much larger proportion of mud (sample sites M0159 through M0163). MBES coverage was insufficient to fully map the areal extent of this zone but appears to continue north towards Muscongus Bay.

Seafloor Sediment Distribution
A preliminary, generalized quantitative characterization of seafloor substrate throughout the entire survey area was possible through supervised classification and experienced interpretations of high-resolution MBES (bathymetry and backscatter) data, 1st-order bathymetric derivatives (slope and terrain ruggedness), and bottom sample data (field descriptions of sediment and video review). A summary of the areal distribution of 7 generalized textural classes is shown in Table 1. The generalized distribution of seafloor substrate illustrated in Figure 6 is considered preliminary and for conceptual purposes only; scale of mapped sediment types is unspecified and classes were based on predominant grain-size components described in the field. Thus, do not strictly adhere to a specific classification system (e.g. Folk, 1974).

Table 1 – Areal distribution of generalized substrate types within surveyed area

Class	Area (mi^2)	Area (km^2)	% of total area
Bedrock/Rocky (includes cobble-boulder)	47.6	123.4	38.0%
Mud	59.1	152.9	47.1%
Muddy Sand	3.6	9.4	2.9%
Medium-Coarse Sand and Gravel	1.2	3.2	1.0%
Gravel	1.8	4.7	1.4%
Very-fine to Medium Sand	0.4	0.9	0.3%
Muddy Mixtures	11.7	30.4	9.4%
Total	125.5	325.0	100.0%

Anthropogenic Features
A large, uncharted wreck was found in federal waters approximately 16.3 km due south of Pemaquid Point (Figure 7). The object was identified in real-time by the hydrographer on July 26, 2017. The depth of this feature was approximately -86 m. Coordinates and additional attributes are listed with sample site attributes in Appendix A. The suspected wreck is oriented southwest (bow)-northeast (stern), and appears to be upright but slightly listing to port (southeast). The vessel was approximately 70 m long, 10 m wide, with a stern height of 5 m and a 10 m raised bow. Several attempts were made by the MCMI crew to obtain video and/or grab samples of the feature. Sediment retrieved from each sampling attempt contained an abundance of coarse (2mm – 30mm length), partially decomposed wood fragments and small (2mm – 10mm length), blocky coal chips. A review of underwater videos did not reveal the wreck itself due to a combination of turbid water and the difficultly of precise sampler deployment in such a dynamic environment. The wreck was presumed as uncharted/undocumented for the following reasons: (2) lack of inclusion in the Automated Wreck and Obstruction Information System (AWOIS) maintained

and distributed by the National Ocean Service's Office of Coast Survey and (2) attributes inconsistent with those of charted wrecks within 5 nautical miles.

Summary

During the 2017 field season, the MCMI mapped approximately 125 mi^2 (325 km^2) of seafloor offshore of midcoast Maine between Southport Island and Monhegan Island. A total of 69 sites, 44 in state water and 25 in federal water, were sampled within the surveyed area. Preliminary analyses indicated that laterally extensive sand and gravel deposits were scarce, of poor quality, and limited to four isolated areas near lowstand shoreline positions, suspected glacial moraine segments and/or presumably reworked glacial outwash. Analysis and interpretation of these and pre-existing G&G data collected in the vicinity allowed the MCMI examine the relationship between seabed morphology and generate preliminary seafloor sediment maps, adding insight to the extensively studied seafloor sediment in the region. In addition, an uncharted wreck was discovered in federal waters approximately 8.5 nautical miles south of Pemaquid Point.

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Figures
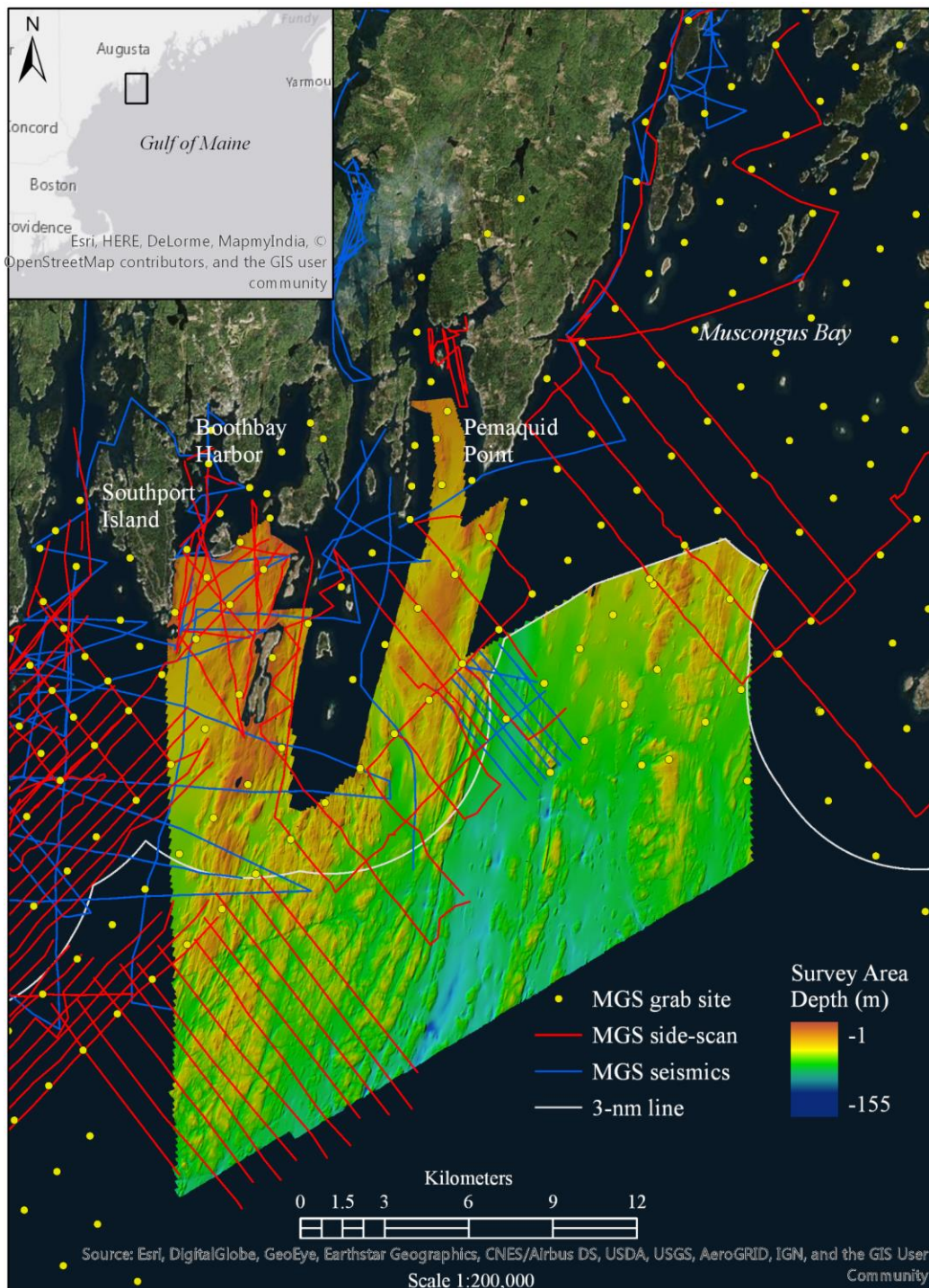
Figure 1 – Overview of survey (focus) area and geological (e.g. grab samples) and geophysical (e.g. seismic reflection profiles and side-scan sonar) data collected in the vicinity by the Maine Geological Survey; vertical datum is mean lower low water
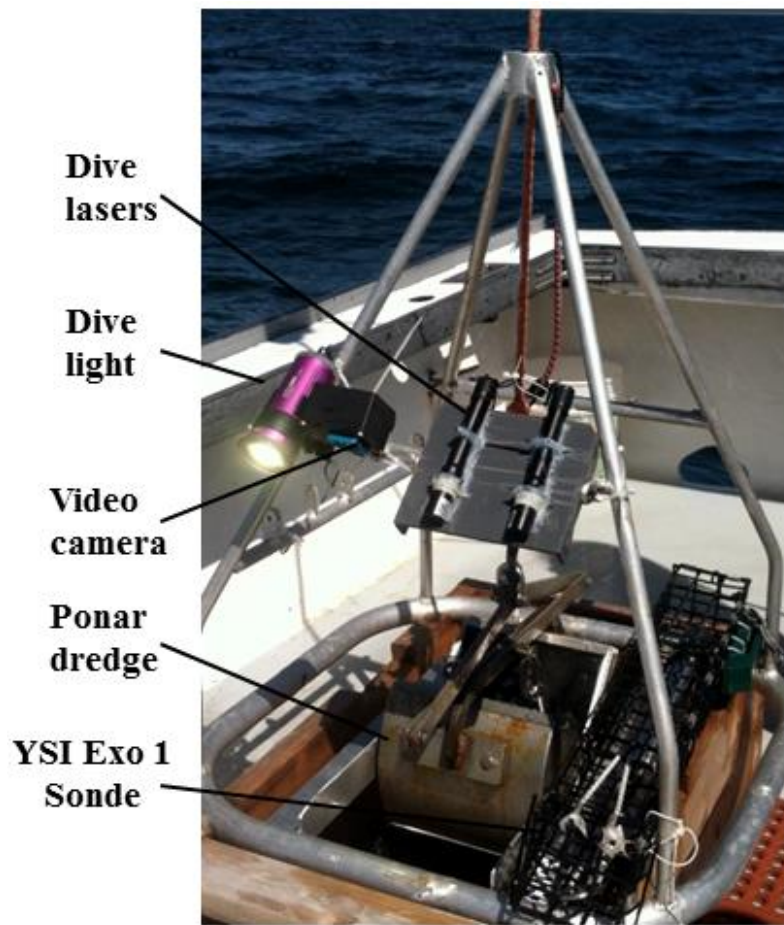
Figure 2 – MCMI grab sampling platform
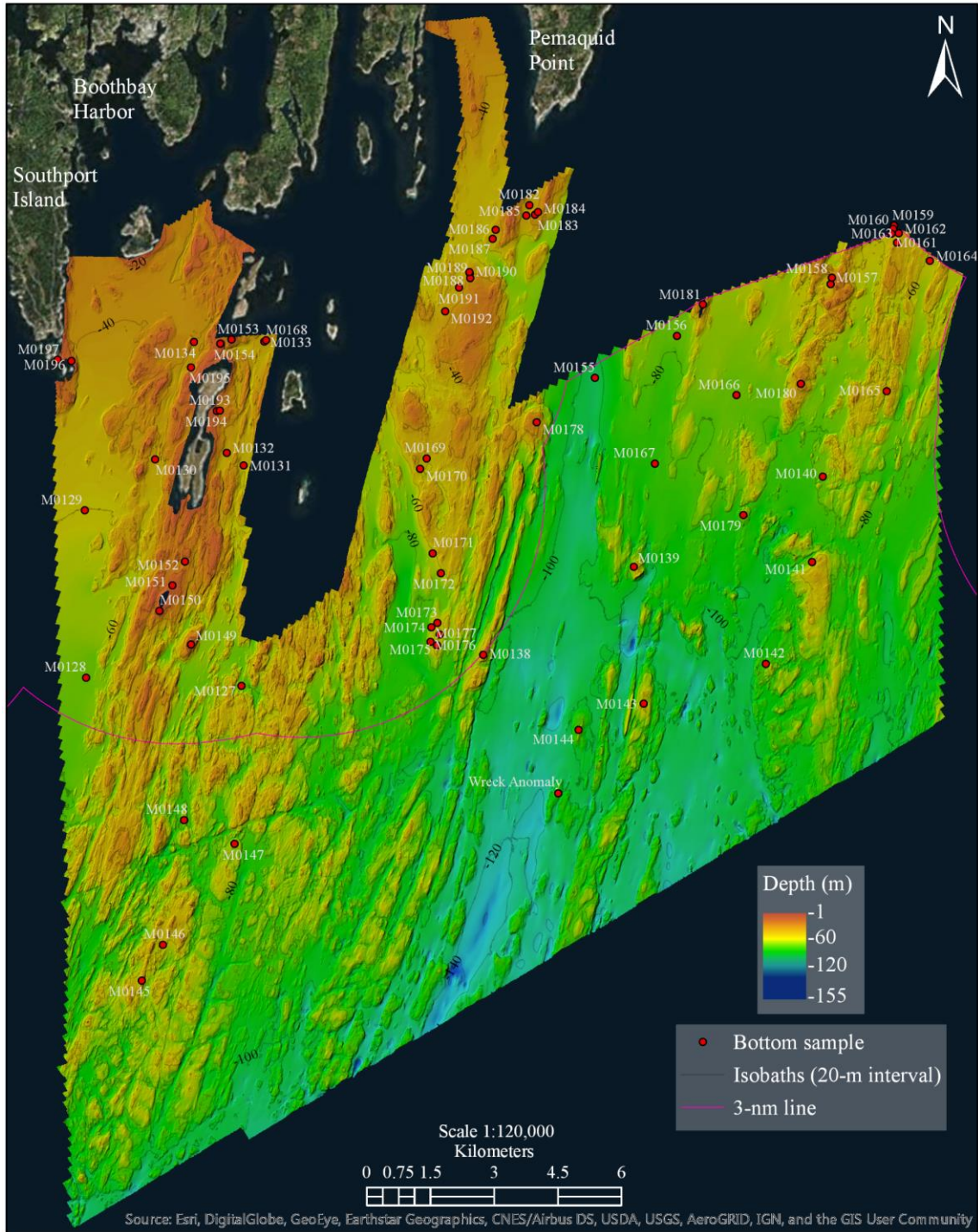
Figure 3 – 2017 sample sites (red circles), survey area bathymetry (4-meter grid with shaded relief), and 20-m interval isobaths (transparent gray lines)
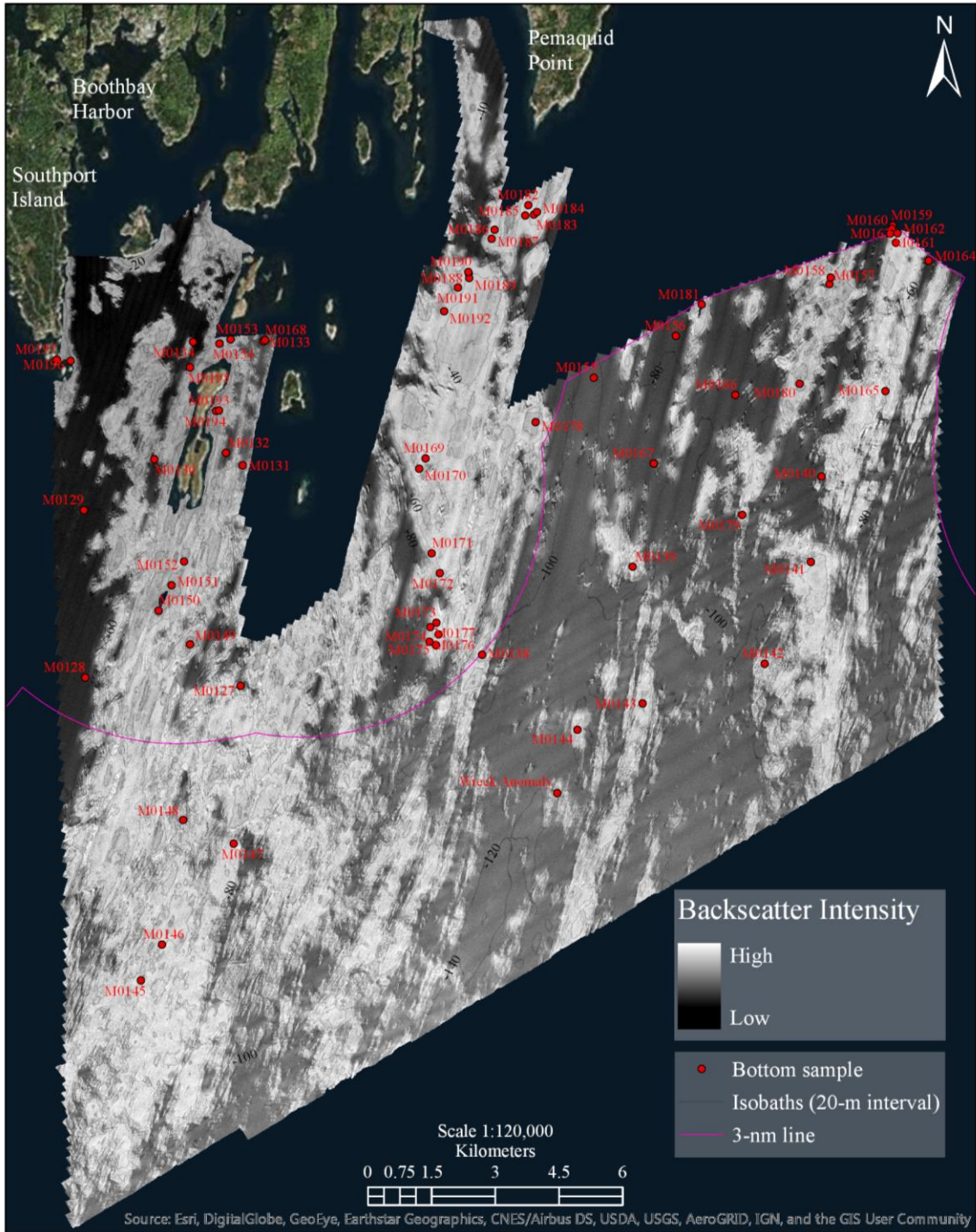
Figure 4 – 2017 sample sites (red circles), survey area backscatter intensity (4-meter pixel mosaic), and 20-m interval isobaths (transparent gray lines); high intensity (lighter tones) backscatter generally corresponds with coarse unconsolidated material, low intensity (darker tones) for fine muddy material, irregular bedrock surfaces typically appear as a heterogeneous mix of dark and light tones
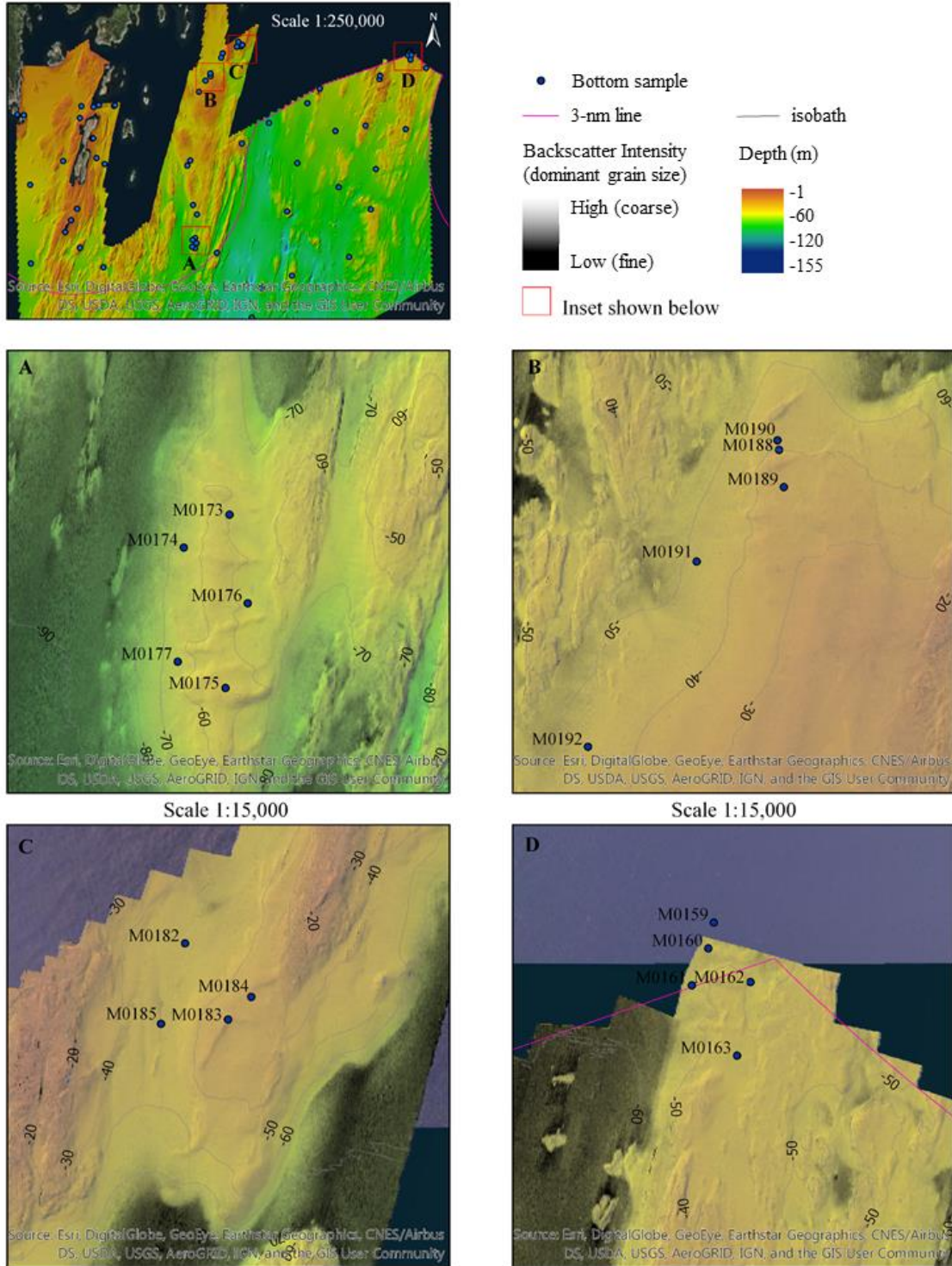
Figure 5 – Sand and gravel zones shown with transparent backscatter intensity overlain on shaded-relief bathymetry with 10-m interval isobaths (gray lines); inset ID corresponds to zone IDs in text; bottom sample data and images are located in Appendices A and B, respectively
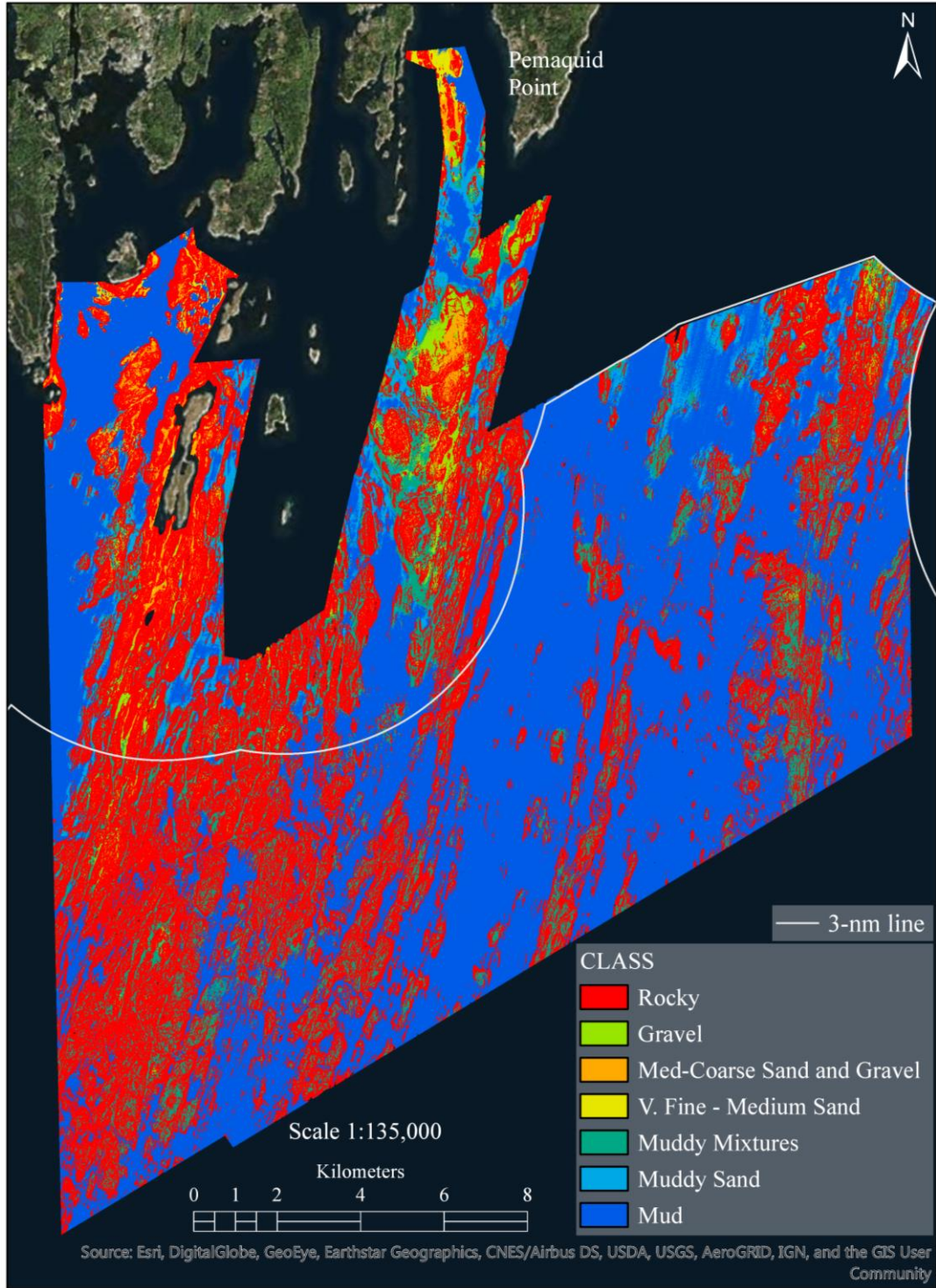
Figure 6 – Generalized seafloor substrate map of survey area; this map is considered preliminary and for conceptual purposes only; scale of mapped sediment types is unspecified; sediment classes were based on predominant grain-size components described in the field and do not strictly adhere to a specific classification system (e.g. Folk, 1974); areas classified as rocky include cobble-boulder areas
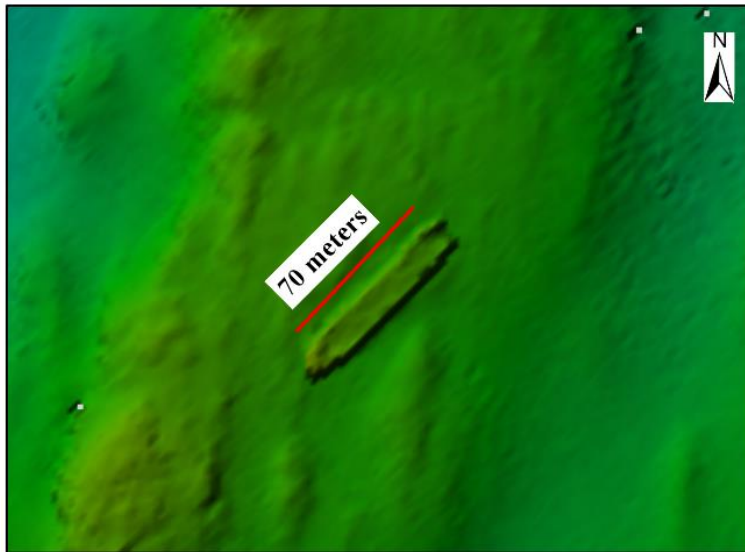
(a) plan view of feature (2-meter surface)
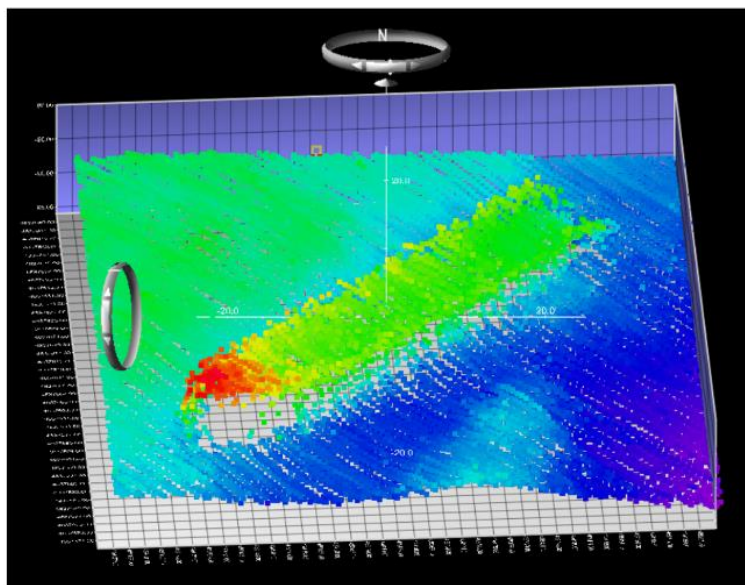
(b) oblique view of feature soundings

Figure 7 – Uncharted wreck discovered approximately 8.5 nautical miles south of Pemaquid Point, Maine; see Figure 3 for overview map showing location

Appendix A – Summary of sample site attributes

Site ID	Date	Time (EST)	Easting * (m)	Northing * (m)	Depth ** (m)	Sample thickness (cm)	Textural Description (made in field or video analysis)	Color (field observation)	Sediment analysis submission date
M0127	07/17/17	6:34	451704	4840105	76.2	13	mud	10 YR 4/2 at surface, 10 YR 4/1 at depth	9/12/2017
M0128	07/17/17	7:12	448048	4840299	75.9	13	mud; very soft	10 YR 4/2 at surface, 10 YR 4/1 at depth	9/12/2017
M0129	07/17/17	7:49	448014	4844242	60.1	13	mud	10 YR 4/2 at surface, 10 YR 4/1 at depth	9/12/2017
M0130	07/17/17	8:12	449674	4845440	49.7	13	mud; trace fine shell hash	10 YR 4/1	9/12/2017
M0131	07/17/17	8:35	451758	4845292	56.8	12	muddy, fine to medium sand-sized shell hash; some quartz sand; trace fine gravel	2.5 Y 4/2 at surface; 10 YR 4/1 at depth	9/12/2017
M0132	07/17/17	8:54	451357	4845594	49.9	13	mud with fine shell hash	2.5 Y 4/2 at surface; 2.5 Y 3/1 at depth	9/12/2017
M0133	07/17/17	9:18	452237	4848209	45.7	13	mud with very fine shell hash; trace very fine sand	5Y 4/1	9/12/2017
M0134	07/17/17	9:38	450588	4848199	40.7	13	mud with very fine shell hash; trace very fine sand	5Y 4/2	9/12/2017
M0138	08/02/17	6:43	457396	4840833	38.2	-	bedrock	-	-
M0139	08/02/17	7:01	460937	4842910	36.3	-	bedrock	-	-
M0140	08/02/17	7:24	465385	4845029	73.7	-	bedrock	-	-
M0141	08/02/17	7:40	465133	4843020	68.1	8	muddy, angular fine-medium gravel and shell hash	10YR 4/2	9/12/2017
M0142	08/02/17	8:30	464049	4840627	86.1	8	muddy coarse angular sand and fine gravel; trace fine shell has	10 YR 4/2	9/12/2017
M0143	08/02/17	9:19	461168	4839688	61.1	8	muddy fine to coarse subangular gravel with very coarse sand and shell hash	10 YR 4/2	9/12/2017

M0144	08/02/17	9:42	459633	4839064	81.5	8.5	muddy fine to medium angular gravel; trace shell hash; very dense	10 YR 4/2	9/12/2017
M0145	08/02/17	11:17	449355	4833170	32.9	-	bedrock	-	-
M0146	08/02/17	11:41	449854	4834010	49.4	-	bedrock	-	-
M0147	08/02/17	12:02	451540	4836386	68.6	-	bedrock	-	-
M0148	08/02/17	12:13	450351	4836950	72.8	-	bedrock	-	-
M0149	08/02/17	12:33	450519	4841080	13.9	-	bedrock	-	-
M0150	08/02/17	12:44	449776	4841874	10.0	-	bedrock	-	-
M0151	08/02/17	12:53	450078	4842472	10.3	-	bedrock	-	-
M0152	08/02/17	13:02	450372	4843036	23.9	-	bedrock	-	-
M0153	08/02/17	13:30	451465	4848259	9.3	-	bedrock	-	-
M0154	08/02/17	13:36	451207	4848161	7.8	-	bedrock	-	-
M0155	08/28/17	6:29	460021	4847358	105.2	13	mud	10 YR 4/2	9/12/2017
M0156	08/28/17	6:52	461950	4848347	76.9	13	mud	10 YR 4/2	9/12/2017
M0157	08/28/17	7:28	465569	4849560	47.5	5.5	coarse angular to sub-angular sandy gravel with mud and shell hash	10 YR 4/2	9/12/2017
M0158	08/28/17	7:53	465602	4849715	36.5	-	bedrock	-	-
M0159	08/28/17	8:18	467065	4850941		7.5	muddy angular to sub-angular gravel with trace shell hash	10 YR 4/2	9/12/2017
M0160	08/28/17	8:32	467048	4850863	52.6	7	muddy medium to coarse subangular to subround sand and fine gravel; trace shll hash	10 YR 4/2	9/12/2017
M0161	08/28/17	8:49	466999	4850752	54.0	10	muddy fine to coarse sand and fine gravel; trace shell hash	10 YR 4/1	9/12/2017
M0162	08/28/17	9:10	467176	4850762	52.2	1	subangular-subround cobbles and boulders	-	-
M0163	08/28/17	9:17	467135	4850540	49.2	10	slightly muddy, very fine to fine subround gravelly sand (fine to coarse); trace very fine shell hash	10 YR 4/1	9/12/2017
M0164	08/28/17	9:47	467913	4850115	62.5	13	mud; very loose	10 YR 4/2	9/12/2017

M0165	08/28/17	10:33	466892	4847043	61.2	6	muddy fine to coarse gravel and fine to coarse shell hash; becomes much denser below top 1-3cm (and less shelly)	10 YR 4/2	9/12/2017
M0166	08/28/17	10:52	463359	4846950	75.9	13	mud; dense; slightly sticky; top 1-2cm very soupy and loose	10 YR 4/2	9/12/2017
M0167	08/28/17	11:15	461434	4845340	86.2	13	mud; top 1 cm is loose muck	10 YR 4/2	9/12/2017
M0168	09/13/17	6:33	452278	4848242	45.1	13	Slightly sandy mud; trace very fine shell has; dense	10 YR 4/2	10/17/2017
M0169	09/13/17	7:11	456066	4845462	53.9	7.5	coarse to very coarse sand; sub-rounded; trace mud and very fine gravel; trace coarse shell hash	10 YR 4/1	10/17/2017
M0170	09/13/17	7:34	455911	4845218	55.8	7	sandy fine to medium sub-round/sub-angular gravel; trace mud and coarse shell fragments	10 YR 4/2	10/17/2017
M0171	09/13/17	7:58	456204	4843228	63.2	10	slightly gravelly and muddy medium sand	10 YR 4/1	10/17/2017
M0172	09/13/17	8:22	456394	4842761	66.9	11	muddy gravely sand, sub-angular/sub-round; trace coarse shells and shell fragments; gravel is very fine to pea to pebble size	10 YR 4/1	10/17/2017
M0173	09/13/17	8:45	456314	4841584	61.3	6	gravelly sand, angular to sub-angular; gravel very fine to stone size; trace mud	10 YR 4/2	10/17/2017
M0174	09/13/17	9:06	456176	4841485	66.8	6	slightly muddy gravelly sand; gravel very fine to pea size, sub-angular; fairly dense	10 YR 4/2	10/17/2017
M0175	09/13/17	9:37	456302	4841062	51.9	NA	subangular-subround cobbles and boulders	-	-

M0176	09/13/17	9:59	456369	4841317	63.7	6.5	muddy mixed gravel; gravel very fine to cobble size; angular-subangular; trace coarse shell fragments and whole shells	10 YR 4/2	10/17/2017
M0177	09/13/17	10:26	456158	4841141	64.6	5	muddy mixed gravel; gravel very fine to stone size, sub angular; trace coarse shell fragments	10 YR 4/2	10/17/2017
M0178	09/13/17	11:00	458655	4846312	29.2	-	Bedrock	-	-
M0179	09/13/17	11:16	463520	4844129	70.6	-	Bedrock	-	-
M0180	09/13/17	11:32	464873	4847220	22.6	-	Bedrock	-	-
M0181	09/13/17	11:45	462566	4849087	~ 40	-	Bedrock	-	-
M0182	10/02/17	6:54	458482	4851426	47.0	8	medium sand; subround-round; trace fine gravel; trace shell fragments	10 YR 4/2	10/17/2017
M0183	10/02/17	7:10	458612	4851197	32.7	-	subangular-subround cobbles and boulders	-	-
M0184	10/02/17	7:25	458682	4851265	32.7	-	subangular-subround cobbles and boulders	-	-
M0185	10/02/17	7:38	458410	4851184	46.8	5	coarse sand; sub-round; moderately well sorted; 10-15% very fine to fine gravel; trace shell fragments	10 YR 4/2	10/17/2017
M0186	10/02/17	7:59	457691	4850849	47.0	4	sandy very fine to fine gravel; trace mud; trace shell fragments; rip up clasts common	10 YR 4/2	10/17/2017
M0187	10/02/17	8:18	457612	4850635	51.2	?	muddy gravelly sand; trace shell fragments; very sticky; dense	10 YR 4/1	10/17/2017
M0188	10/02/17	8:37	457073	4849817	40.2	2	Sand-gravel-shell hash mixture	10 YR 4/2	10/17/2017
M0189	10/02/17	8:53	457087	4849705	37.0	8	muddy sandy, fine to medium gravel; sub-angular to sub-round; trace fine shell hash and coarse shell fragments; Many polished well-rounded pebble size gravel	10 YR 4/2	10/17/2017
M0190	10/02/17	9:10	457068	4849846	40.5	-	subangular-subround cobbles and boulders	-	-

M0191	10/02/17	9:35	456824	4849481	48.2	9	medium to coarse gravelly sand; trace sand-sized shell hash; trace mud	10 YR 4/2	10/17/2017
M0192	10/02/17	10:07	456497	4848923	46.2	-	medium to coarse gravelly sand and sand sized shell hash; trace mud; abundant coarse shells and shell fragments	10 YR 4/2	10/17/2017
M0193	10/02/17	10:39	451126	4846579	18.9	-	100% sand-sized shell hash and urchin spines	-	10/17/2017
M0194	10/02/17	10:51	451193	4846582	23.3	-	sand and gravel sized shell fragments and shell hash	-	10/17/2017
M0195	10/02/17	11:10	450514	4847604	40.8	14	very fine shell hash and mud; abundant coarse organic detritus; STRONGLY sulfidic	10 YR 4/2	10/17/2017
M0196	10/02/17	11:33	447698	4847755	14.4	-	coarse shell hash	-	10/17/2017
M0197	10/02/17	11:52	447370	4847781	13.3	-	bedrock	-	-
Wreck Anomaly	08/02/17	10:29	459159	4837575	86.0	13	muddy sand with fine angular gravel; small coal chips and decomposed wood fragments; looser mud	-	-

*WGS84 UTM Zone 19N meters
**Depths are referenced to mean lower low water in meters

Appendix B – Grab sample field pictures and/or bottom photographs

Overview map

Bottom sample (2017 MCMI)

Depth (m)

0

-155

0   0.75 1.5   3   4.5   6

Kilometers

Still Image from Video	Field Picture

EXAMPLE LAYOUT
DESCRIPTIONS

Image of seafloor extracted from video file. Green lasers are spaced 10 cm apart for scale. Scale is approximate for images/video lacking true reference scale (e.g. lasers).

Note: *Lasers are obscured in some images as a result of turbidity.*

Field picture of sediment sample taken immediately upon retrieval. This block will appear as NO SAMPLE RECOVERED for sites where no physical sample was recovered; typically rocky or gravelly sites too coarse for retrieval with sampler.

Substrate Type: Sediment textural class based on field description; subject to change pending results of grain-size analyses

Sample ID:	M0000 (sample identification number)
Date/Time (EST) of sampling event:	mm/dd/yy 00:00 (eastern-standard time, 24-hr)
Depth (real-time, m):	Real-time depth (meters) observed by hull-mounted, single-beam fathometer
Easting (WGS84 UTM Zone 19N, m):	Approximate horizontal position uncertainty ± 10 meters
Northing (WGS84 UTM Zone 19N, m):	Approximate horizontal position uncertainty ± 10 meters

Maine Coastal Mapping Initiative

Still Image from Video	Field Picture

Laser spacing = 10 cm

Substrate Type: mud

Sample ID:	M0127
Date/Time (EST):	07/07/17 06:34
Depth (real-time, m):	79.6
Easting (WGS84 UTM Zone 19N, m):	451704
Northing (WGS84 UTM Zone 19N, m):	4840105

Still Image from Video	Field Picture

Laser spacing = 10 cm

Substrate Type: mud

Sample ID:	M0128
Date/Time (EST):	07/07/17 07:12
Depth (real-time, m):	79.1
Easting (WGS84 UTM Zone 19N, m):	448048
Northing (WGS84 UTM Zone 19N, m):	4840299

Still Image from Video	Field Picture
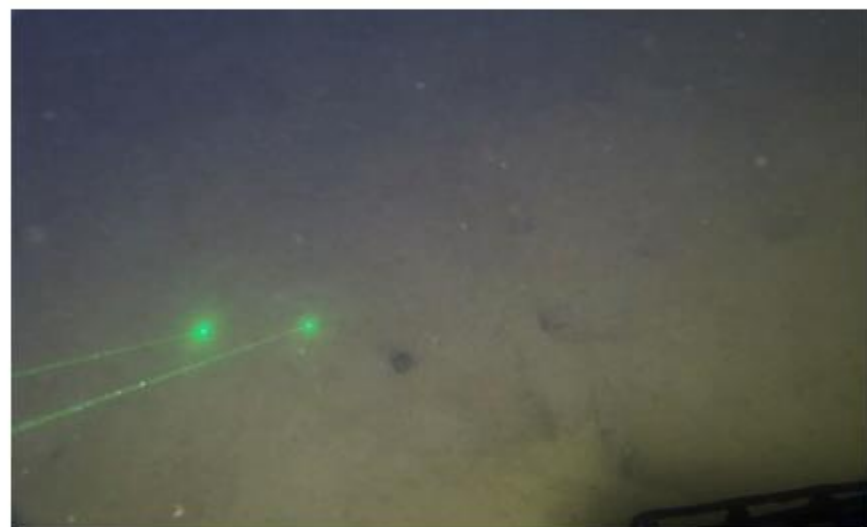
Laser spacing = 10 cm

Substrate Type: mud

Sample ID:	M0129
Date/Time (EST):	07/07/17 07:49
Depth (real-time, m):	62.7
Easting (WGS84 UTM Zone 19N, m):	448014
Northing (WGS84 UTM Zone 19N, m):	4844242

Still Image from Video	Field Picture

Laser spacing = 10 cm

Substrate Type: mud

Sample ID:	M0130
Date/Time (EST):	07/07/17 08:32
Depth (real-time, m):	51.8
Easting (WGS84 UTM Zone 19N, m):	449674
Northing (WGS84 UTM Zone 19N, m):	4845440

Still Image from Video	Field Picture
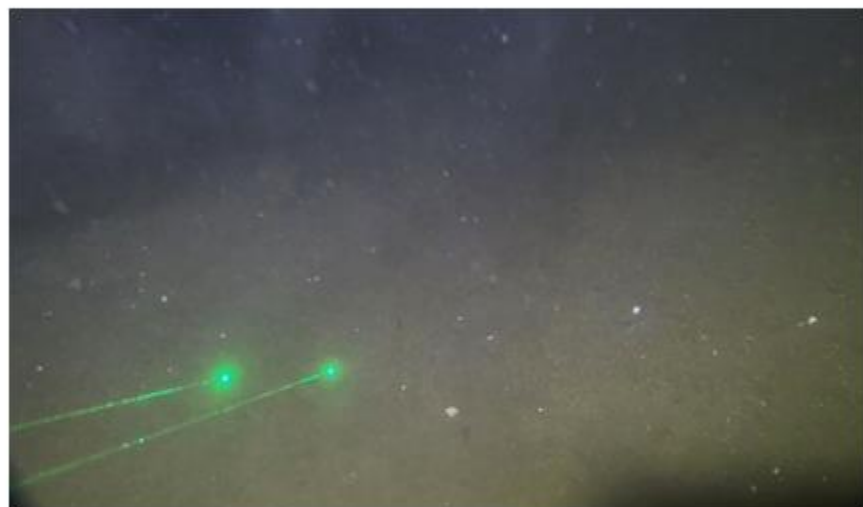
Laser spacing = 10 cm

Substrate Type: muddy fine shell hash

Sample ID:	M0131
Date/Time (EST):	07/07/17 08:35
Depth (real-time, m):	58.8
Easting (WGS84 UTM Zone 19N, m):	451758
Northing (WGS84 UTM Zone 19N, m):	4845292

Still Image from Video	Field Picture
 Laser spacing = 10 cm **Substrate Type:** muddy fine shell hash	
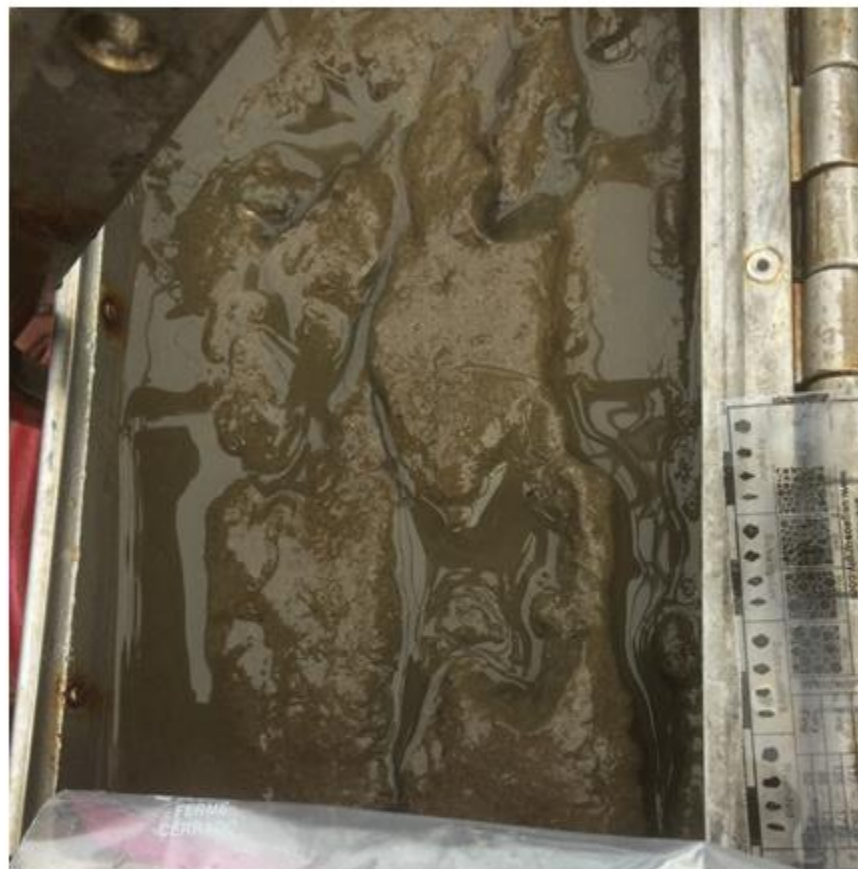
Sample ID:	M0132
Date/Time (EST):	07/07/17 08:54
Depth (real-time, m):	51.2
Easting (WGS84 UTM Zone 19N, m):	451357
Northing (WGS84 UTM Zone 19N, m):	4845594

Still Image from Video	Field Picture

Lighting malfunction

Laser spacing = 10 cm

Substrate Type: muddy fine shell hash

Sample ID:	M0133
Date/Time (EST):	07/07/17 09:18
Depth (real-time, m):	46.7
Easting (WGS84 UTM Zone 19N, m):	452237
Northing (WGS84 UTM Zone 19N, m):	4848209

Still Image from Video	Field Picture
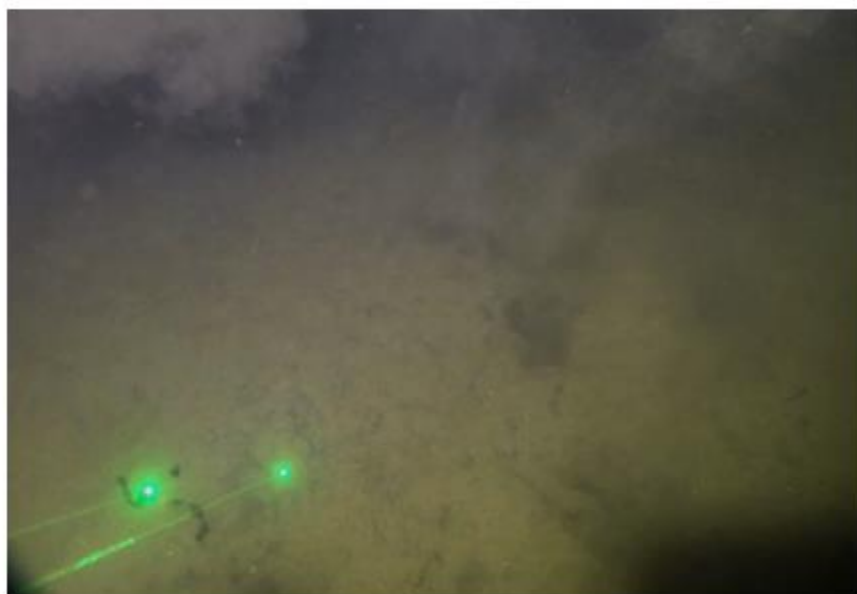
Laser spacing = 10 cm

Substrate Type: muddy fine shell hash

Sample ID:	M0134
Date/Time (EST):	07/07/17 09:38
Depth (real-time, m):	41.7
Easting (WGS84 UTM Zone 19N, m):	450588
Northing (WGS84 UTM Zone 19N, m):	4848199

Still Image from Video	Field Picture
Laser spacing = 10 cm	**NO SAMPLE RECOVERED**
Substrate Type: bedrock	
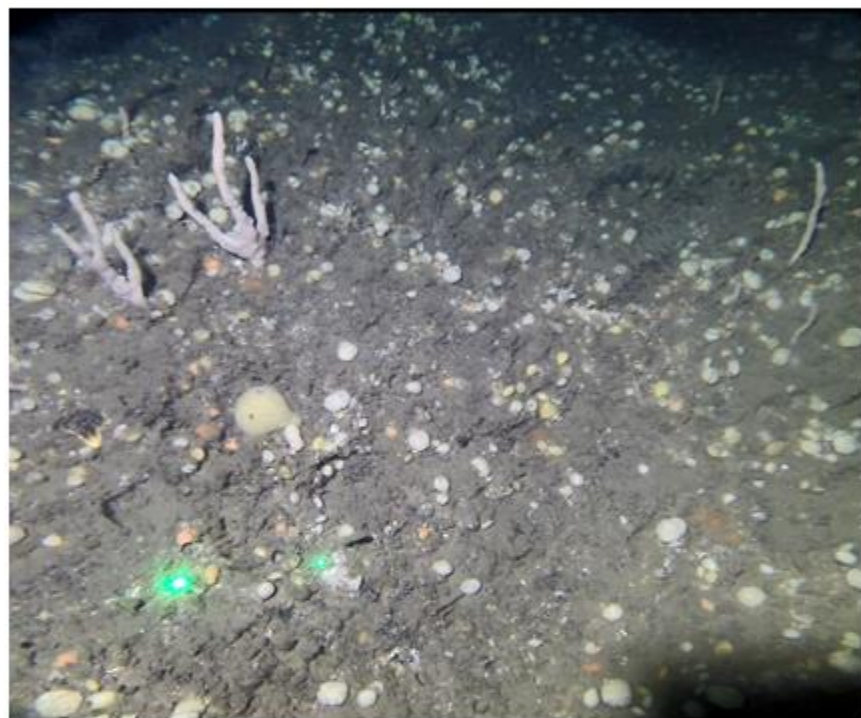
Sample ID:	M0138
Date/Time (EST):	08/02/17 06:43
Depth (real-time, m):	39.7
Easting (WGS84 UTM Zone 19N, m):	457396
Northing (WGS84 UTM Zone 19N, m):	4840833
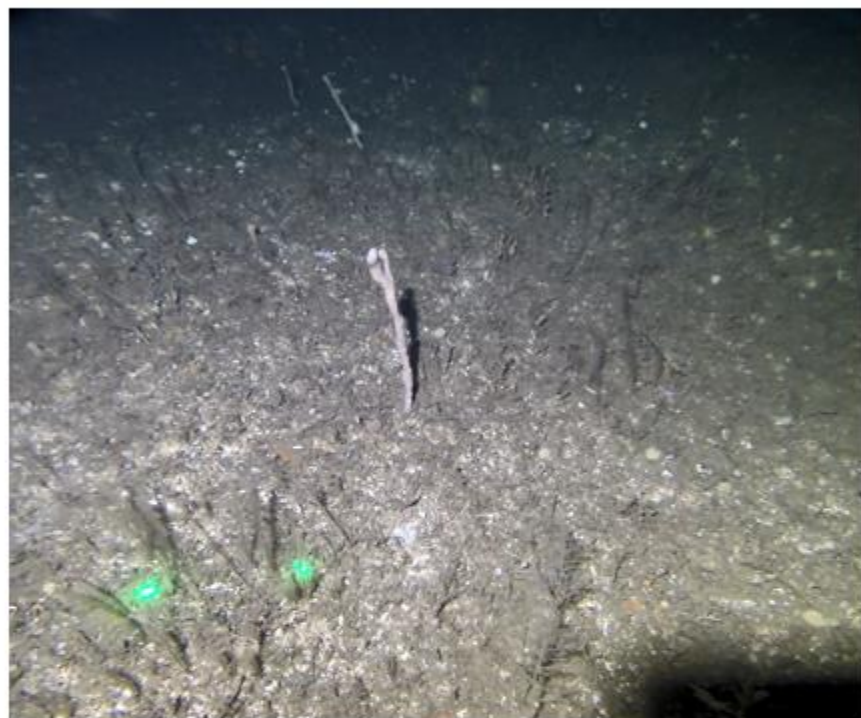
Still Image from Video	Field Picture
 Laser spacing = 10 cm **Substrate Type:** bedrock	**NO SAMPLE RECOVERED**

Sample ID:	M0139
Date/Time (EST):	08/02/17 07:01
Depth (real-time, m):	38.8
Easting (WGS84 UTM Zone 19N, m):	460937
Northing (WGS84 UTM Zone 19N, m):	4842910
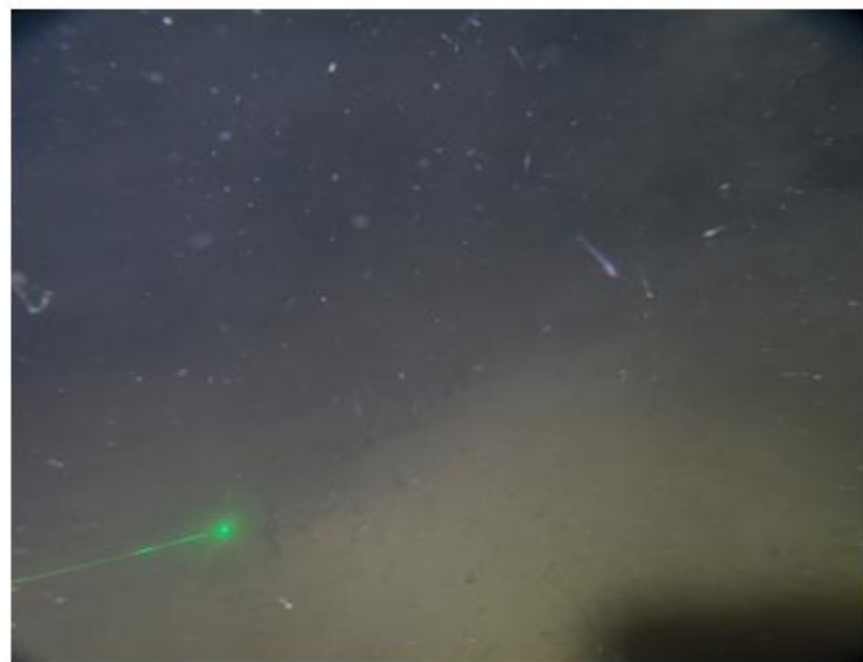
Still Image from Video	Field Picture
Laser spacing = 10 cm **Substrate Type:** bedrock (thin sediment veneer)	**NO SAMPLE RECOVERED**

Sample ID:	M0140
Date/Time (EST):	08/02/17 07:24
Depth (real-time, m):	76.9
Easting (WGS84 UTM Zone 19N, m):	465385
Northing (WGS84 UTM Zone 19N, m):	4845029

Still Image from Video	Field Picture
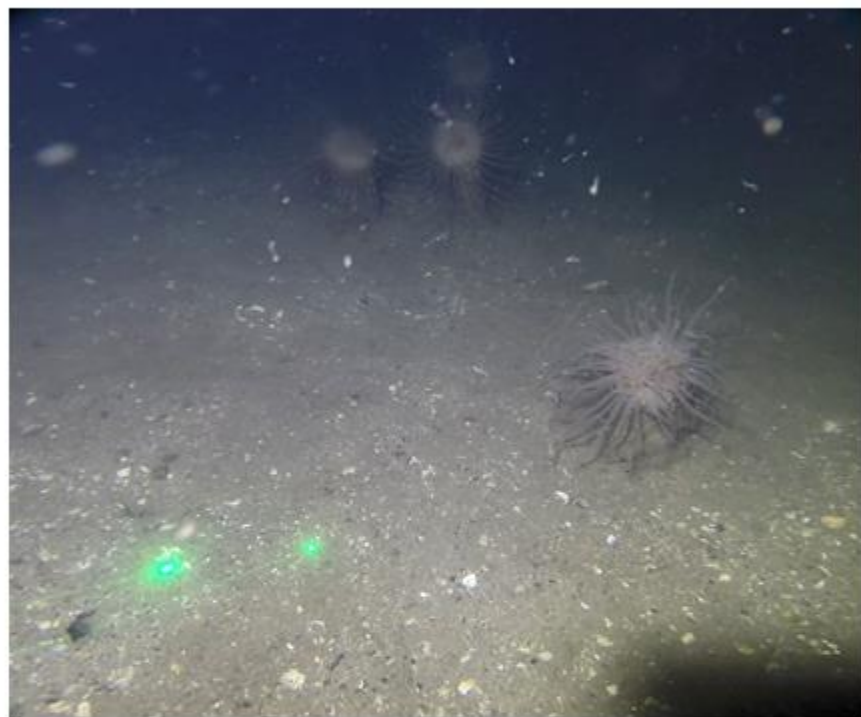
Laser spacing = 10 cm

Substrate Type: muddy shelly gravel

Sample ID:	M0141
Date/Time (EST):	08/02/17 07:40
Depth (real-time, m):	70.3
Easting (WGS84 UTM Zone 19N, m):	465133
Northing (WGS84 UTM Zone 19N, m):	4843020

Still Image from Video	Field Picture
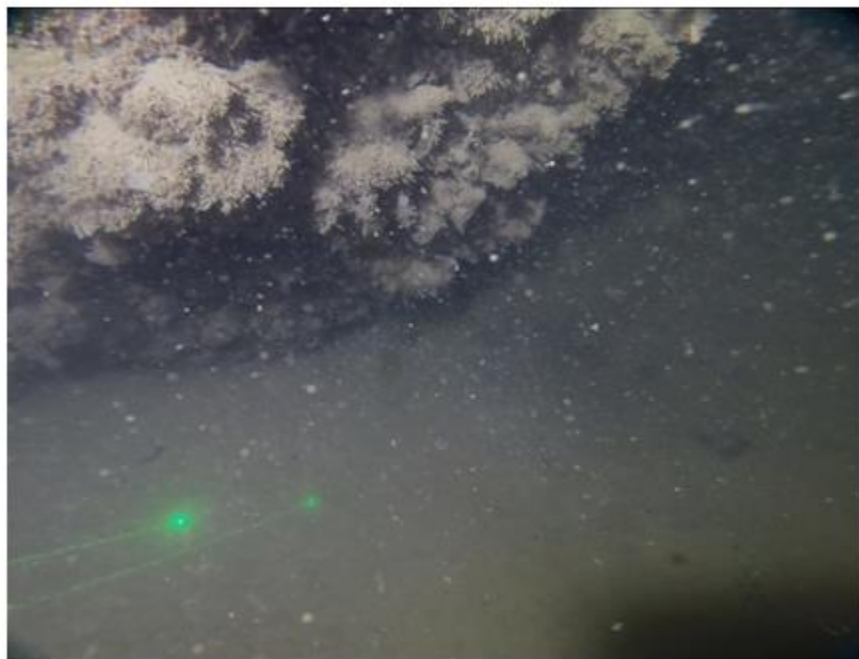
Laser spacing = 10 cm

Substrate Type: muddy sand and gravel

Sample ID:	M0142
Date/Time (EST):	08/02/17 08:30
Depth (real-time, m):	88.0
Easting (WGS84 UTM Zone 19N, m):	464049
Northing (WGS84 UTM Zone 19N, m):	4840627

Still Image from Video	Field Picture
Laser spacing = 10 cm	
Substrate Type: muddy shelly gravel	

Sample ID:	M0143
Date/Time (EST):	08/02/17 09:19
Depth (real-time, m):	64.1
Easting (WGS84 UTM Zone 19N, m):	461168
Northing (WGS84 UTM Zone 19N, m):	4839688

Still Image from Video	Field Picture
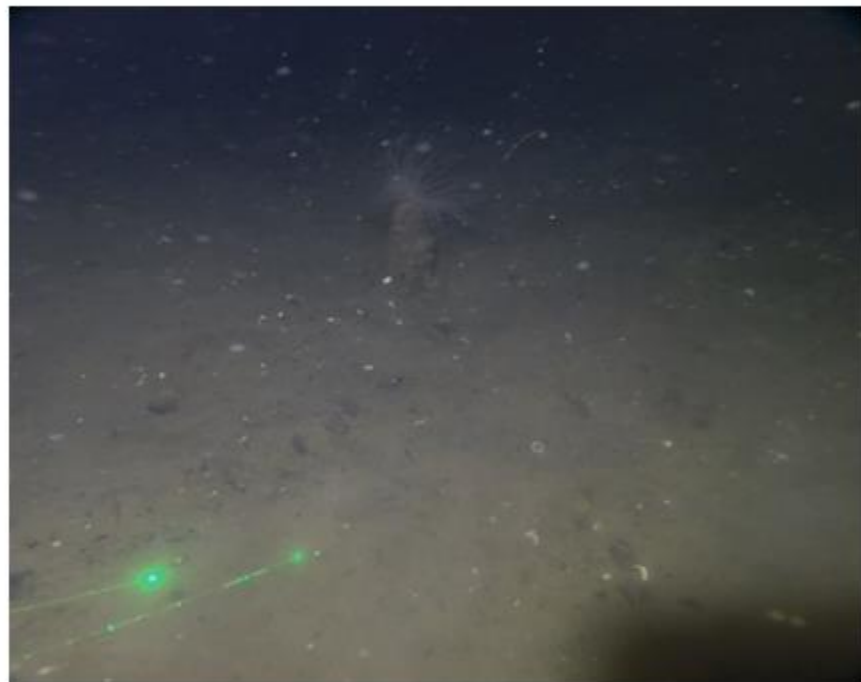
Laser spacing = 10 cm

Substrate Type: muddy gravel

Sample ID:	M0144
Date/Time (EST):	08/02/17 09:42
Depth (real-time, m):	83.6
Easting (WGS84 UTM Zone 19N, m):	459633
Northing (WGS84 UTM Zone 19N, m):	4839064

Still Image from Video	Field Picture
Laser spacing = 10 cm **Substrate Type:** bedrock	**NO SAMPLE RECOVERED**

Sample ID:	M0145
Date/Time (EST):	08/02/17 11:17
Depth (real-time, m):	33.8
Easting (WGS84 UTM Zone 19N, m):	449355
Northing (WGS84 UTM Zone 19N, m):	4833170

Still Image from Video	Field Picture
Laser spacing = 10 cm	

Substrate Type: bedrock / boulder-cobble

Sample ID:	M0146
Date/Time (EST):	08/02/17 11:41
Depth (real-time, m):	51.2
Easting (WGS84 UTM Zone 19N, m):	449854
Northing (WGS84 UTM Zone 19N, m):	4834010

Still Image from Video	Field Picture
Laser spacing = 10 cm **Substrate Type:** bedrock (thin sediment veneer)	**NO SAMPLE RECOVERED**

Sample ID:	M0147
Date/Time (EST):	08/02/17 12:02
Depth (real-time, m):	69.0
Easting (WGS84 UTM Zone 19N, m):	451540
Northing (WGS84 UTM Zone 19N, m):	4836386

Still Image from Video	Field Picture
Laser spacing = 10 cm	**NO SAMPLE RECOVERED**
Substrate Type: bedrock	

Sample ID:	M0148
Date/Time (EST):	08/02/17 12:13
Depth (real-time, m):	36.6
Easting (WGS84 UTM Zone 19N, m):	450351
Northing (WGS84 UTM Zone 19N, m):	4839650
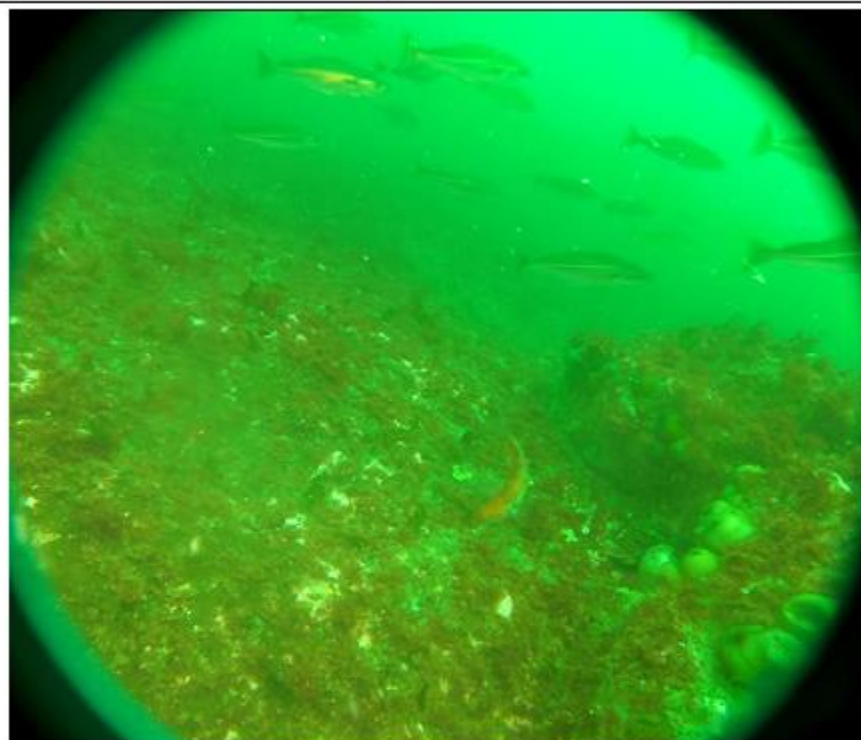
Still Image from Video	Field Picture
 Laser spacing = 10 cm **Substrate Type:** bedrock	**NO SAMPLE RECOVERED**

Sample ID:	M0149
Date/Time (EST):	08/02/17 12:33
Depth (real-time, m):	13.5
Easting (WGS84 UTM Zone 19N, m):	450519
Northing (WGS84 UTM Zone 19N, m):	4841080

Still Image from Video	Field Picture
Laser spacing = 10 cm **Substrate Type:** bedrock	**NO SAMPLE RECOVERED**

Sample ID:	M0150
Date/Time (EST):	08/02/17 12:44
Depth (real-time, m):	11.0
Easting (WGS84 UTM Zone 19N, m):	449776
Northing (WGS84 UTM Zone 19N, m):	4841874
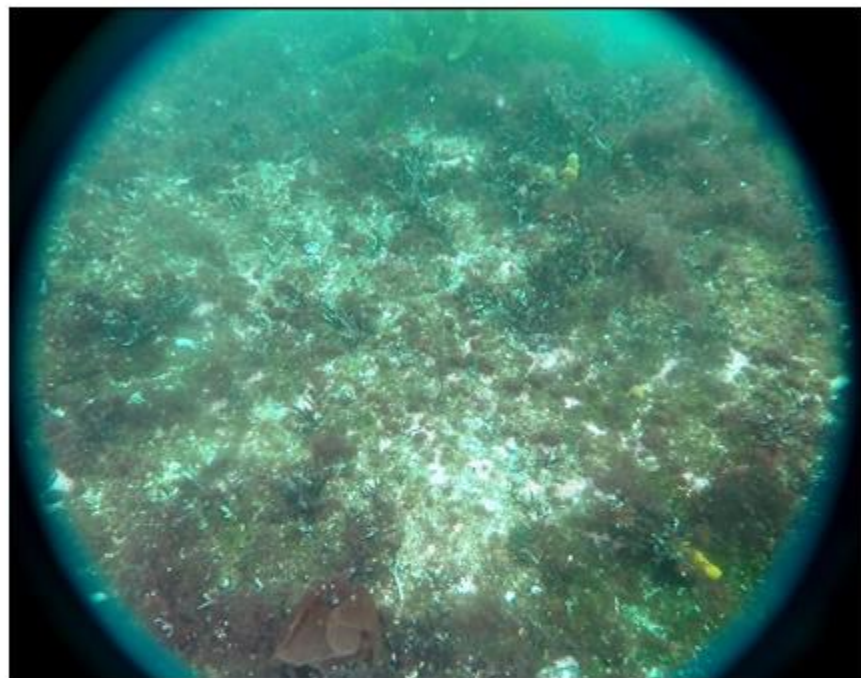
Still Image from Video	Field Picture
Laser spacing = 10 cm **Substrate Type:** bedrock	**NO SAMPLE RECOVERED**

Sample ID:	M0151
Date/Time (EST):	08/02/17 12:53
Depth (real-time, m):	11.0
Easting (WGS84 UTM Zone 19N, m):	450078
Northing (WGS84 UTM Zone 19N, m):	4842472

Still Image from Video	Field Picture
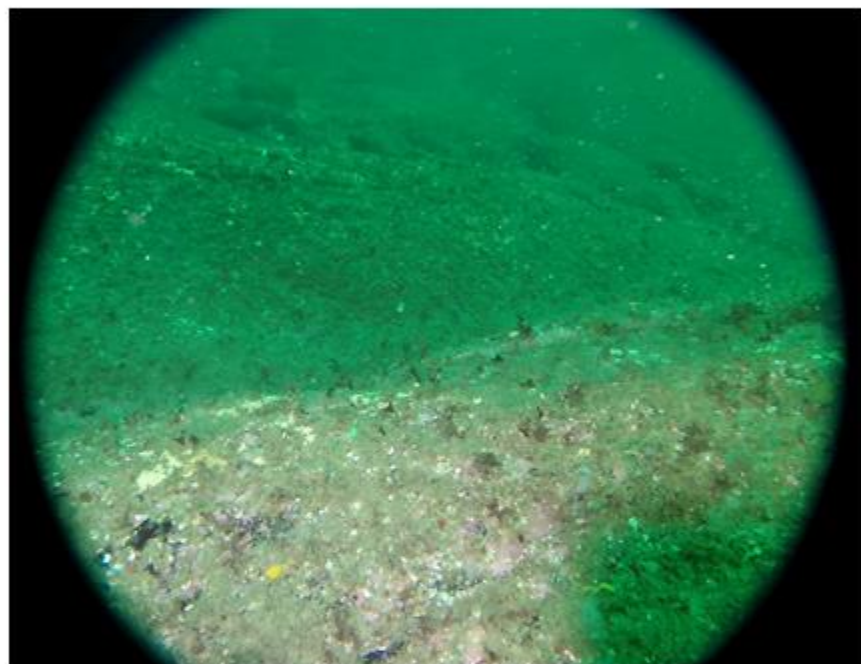
Laser spacing = 10 cm

Substrate Type: bedrock

NO SAMPLE RECOVERED

Sample ID:	M0152
Date/Time (EST):	08/02/17 13:02
Depth (real-time, m):	23.6
Easting (WGS84 UTM Zone 19N, m):	450372
Northing (WGS84 UTM Zone 19N, m):	4843036

Still Image from Video	Field Picture

Laser spacing = 10 cm

Substrate Type: bedrock

NO SAMPLE RECOVERED

Sample ID:	M0153
Date/Time (EST):	08/02/17 13:30
Depth (real-time, m):	9.4
Easting (WGS84 UTM Zone 19N, m):	451465
Northing (WGS84 UTM Zone 19N, m):	4848259

Still Image from Video	Field Picture

Laser spacing = 10 cm

Substrate Type: bedrock

NO SAMPLE RECOVERED

Sample ID:	M0154
Date/Time (EST):	08/02/17 13:36
Depth (real-time, m):	7.9
Easting (WGS84 UTM Zone 19N, m):	451207
Northing (WGS84 UTM Zone 19N, m):	4848161

Still Image from Video	Field Picture
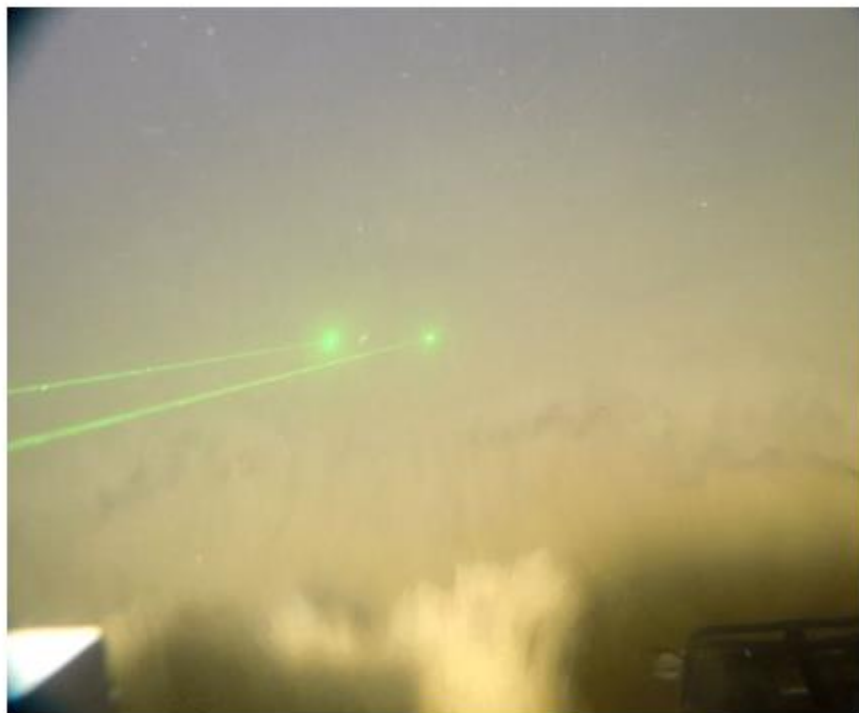
Laser spacing = 10 cm

Substrate Type: mud

Sample ID:	M0155
Date/Time (EST):	08/28/17 06:29
Depth (real-time, m):	108.0
Easting (WGS84 UTM Zone 19N, m):	460021
Northing (WGS84 UTM Zone 19N, m):	4847358

Still Image from Video	Field Picture
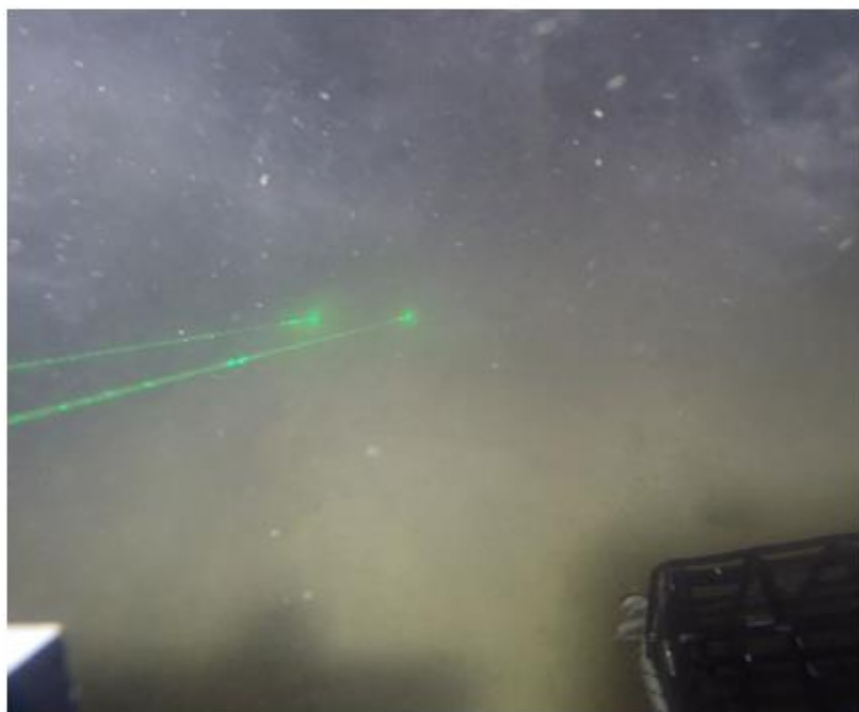
Laser spacing = 10 cm

Substrate Type: mud

Sample ID:	M0156
Date/Time (EST):	08/28/17 06:52
Depth (real-time, m):	79.3
Easting (WGS84 UTM Zone 19N, m):	461950
Northing (WGS84 UTM Zone 19N, m):	4848347

Still Image from Video	Field Picture
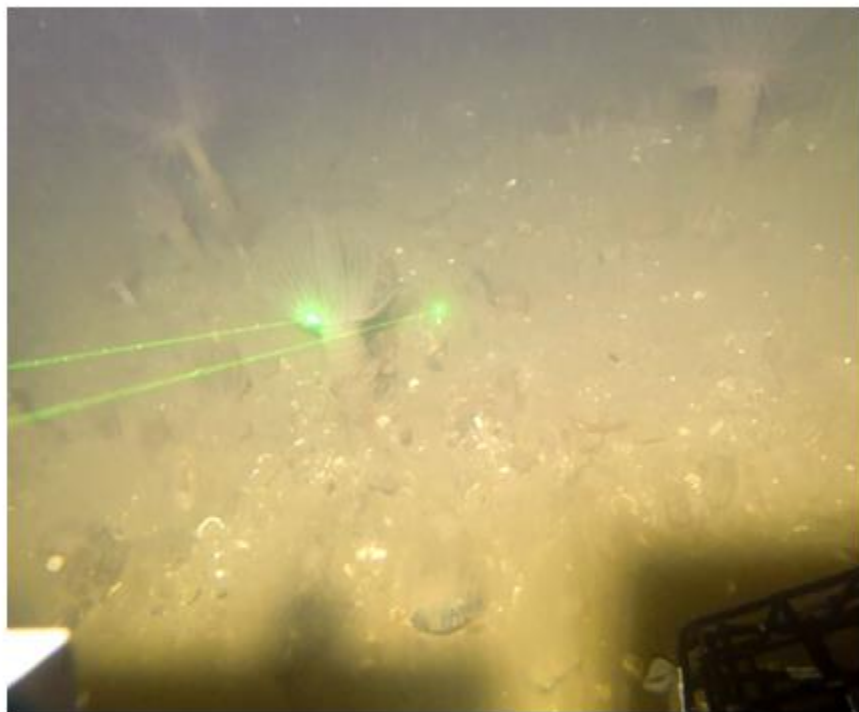
Laser spacing = 10 cm

Substrate Type: muddy shelly gravel

Sample ID:	M0157
Date/Time (EST):	08/28/17 07:28
Depth (real-time, m):	48.9
Easting (WGS84 UTM Zone 19N, m):	465569
Northing (WGS84 UTM Zone 19N, m):	4849560

Still Image from Video	Field Picture
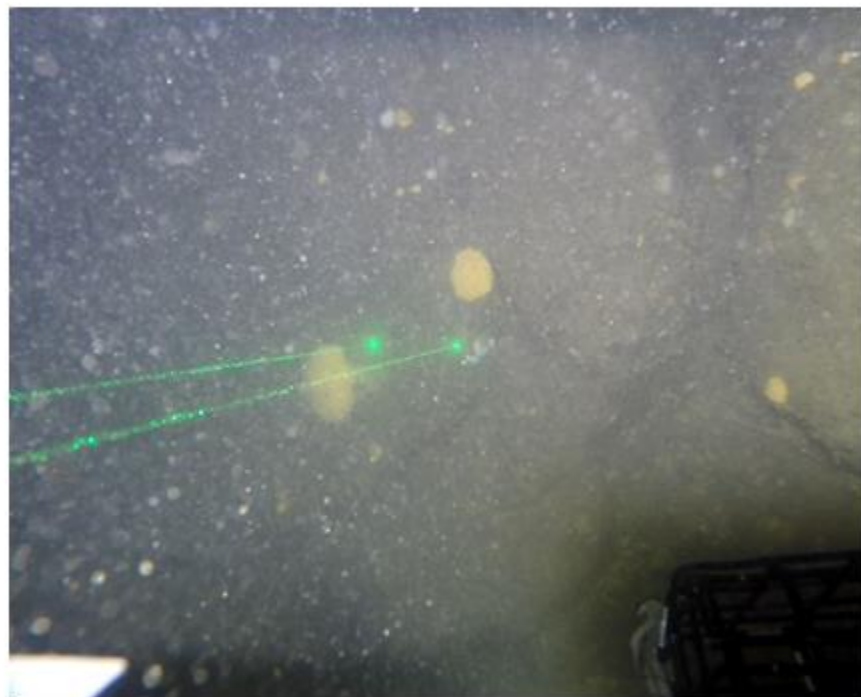
Laser spacing = 10 cm

Substrate Type: bedrock

NO SAMPLE RECOVERED

Sample ID:	M0158
Date/Time (EST):	08/28/17 07:53
Depth (real-time, m):	37.4
Easting (WGS84 UTM Zone 19N, m):	465602
Northing (WGS84 UTM Zone 19N, m):	4849715

Still Image from Video	Field Picture
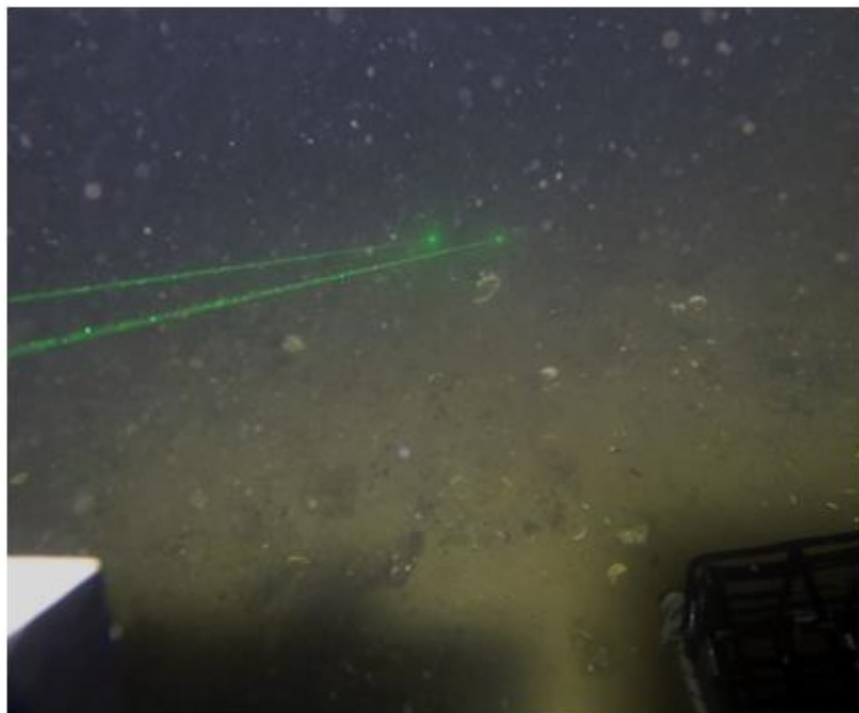
Laser spacing = 10 cm

Substrate Type: muddy gravel

Sample ID:	M0159
Date/Time (EST):	08/28/17 08:18
Depth (real-time, m):	53.1
Easting (WGS84 UTM Zone 19N, m):	467065
Northing (WGS84 UTM Zone 19N, m):	4850941

Still Image from Video	Field Picture
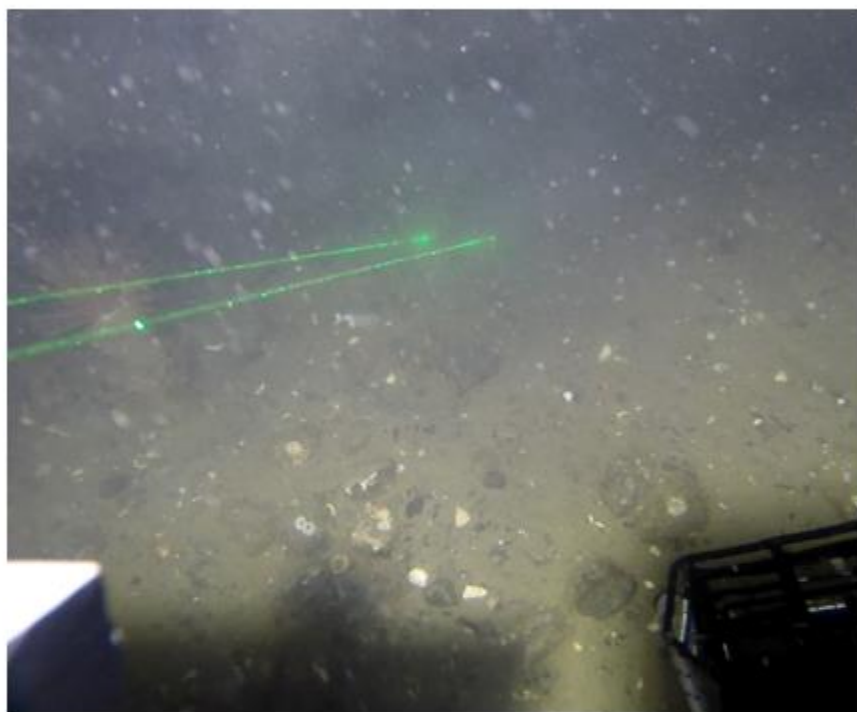
Laser spacing = 10 cm

Substrate Type: muddy sand and gravel

Sample ID:	M0160
Date/Time (EST):	08/28/17 08:32
Depth (real-time, m):	53.6
Easting (WGS84 UTM Zone 19N, m):	467048
Northing (WGS84 UTM Zone 19N, m):	4850863

Still Image from Video	Field Picture
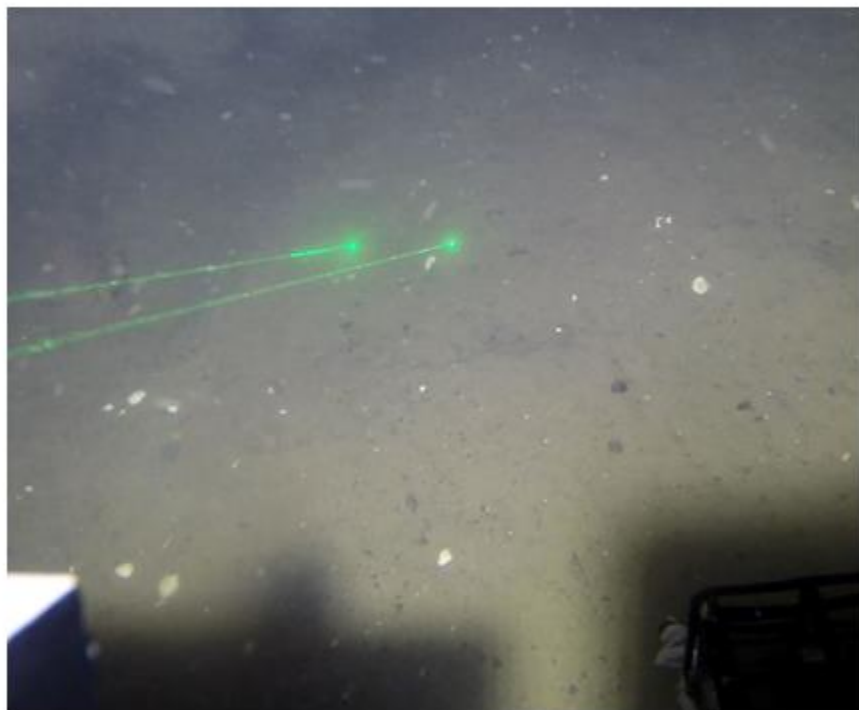
Laser spacing = 10 cm

Substrate Type: muddy sand and gravel

Sample ID:	M0161
Date/Time (EST):	08/28/17 08:49
Depth (real-time, m):	54.3
Easting (WGS84 UTM Zone 19N, m):	466999
Northing (WGS84 UTM Zone 19N, m):	4850752

Still Image from Video	Field Picture
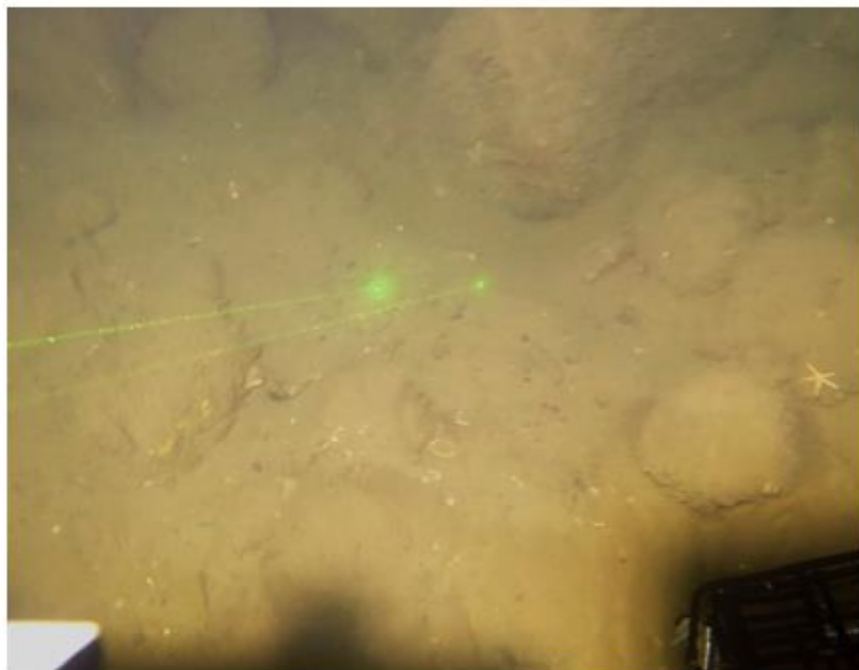
Laser spacing = 10 cm

Substrate Type: muddy cobble-boulder

Sample ID:	M0162
Date/Time (EST):	08/28/17 09:10
Depth (real-time, m):	49.4
Easting (WGS84 UTM Zone 19N, m):	467176
Northing (WGS84 UTM Zone 19N, m):	4850762

Still Image from Video	Field Picture
 Laser spacing = 10 cm **Substrate Type:** gravelly sand	
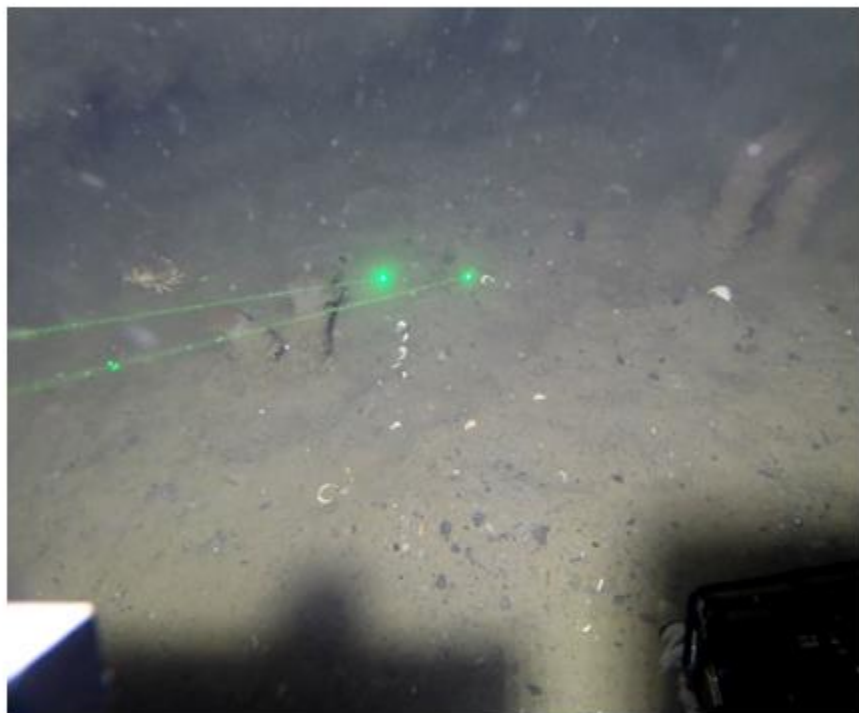
Sample ID:	M0163
Date/Time (EST):	08/28/17 09:17
Depth (real-time, m):	49.5
Easting (WGS84 UTM Zone 19N, m):	467135
Northing (WGS84 UTM Zone 19N, m):	4850540

Still Image from Video	Field Picture
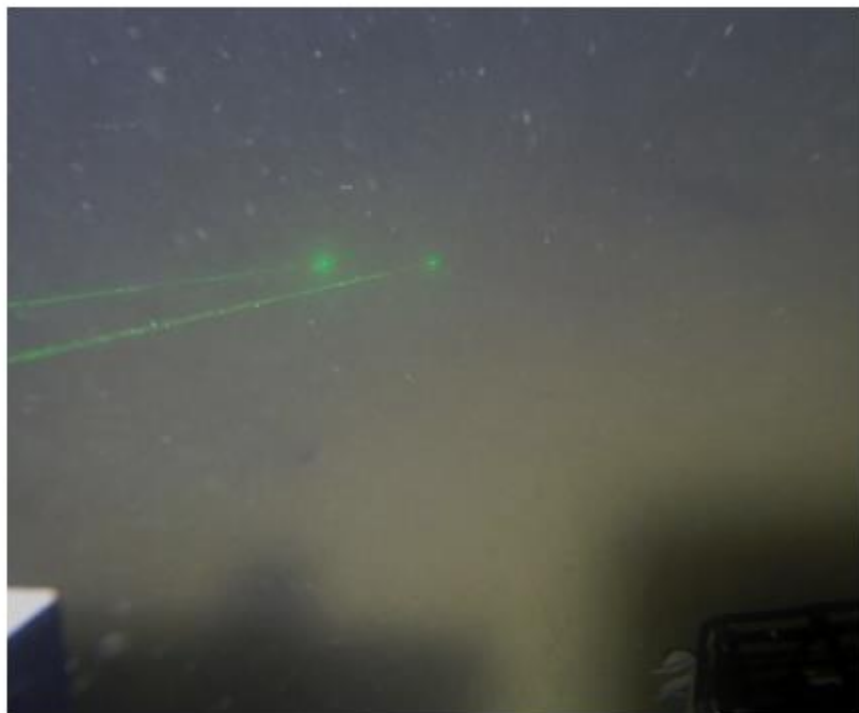
Laser spacing = 10 cm

Substrate Type: mud

Sample ID:	M0164
Date/Time (EST):	08/28/17 09:47
Depth (real-time, m):	62.9
Easting (WGS84 UTM Zone 19N, m):	467913
Northing (WGS84 UTM Zone 19N, m):	4850115

Still Image from Video	Field Picture
Laser spacing = 10 cm **Substrate Type:** muddy shelly gravel	
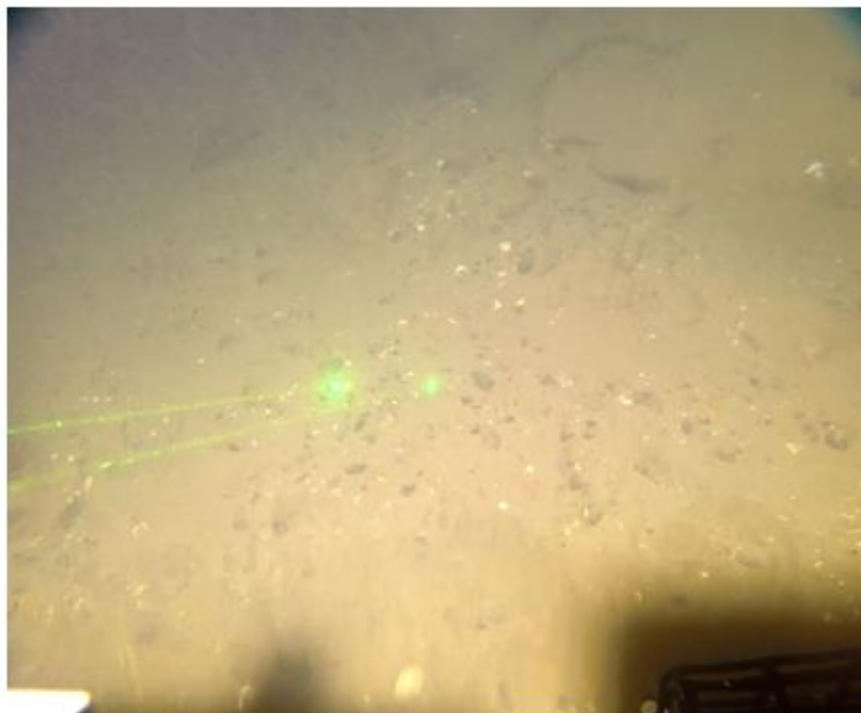
Sample ID:	M0165
Date/Time (EST):	08/28/17 10:33
Depth (real-time, m):	60.3
Easting (WGS84 UTM Zone 19N, m):	466892
Northing (WGS84 UTM Zone 19N, m):	4847043

Still Image from Video	Field Picture
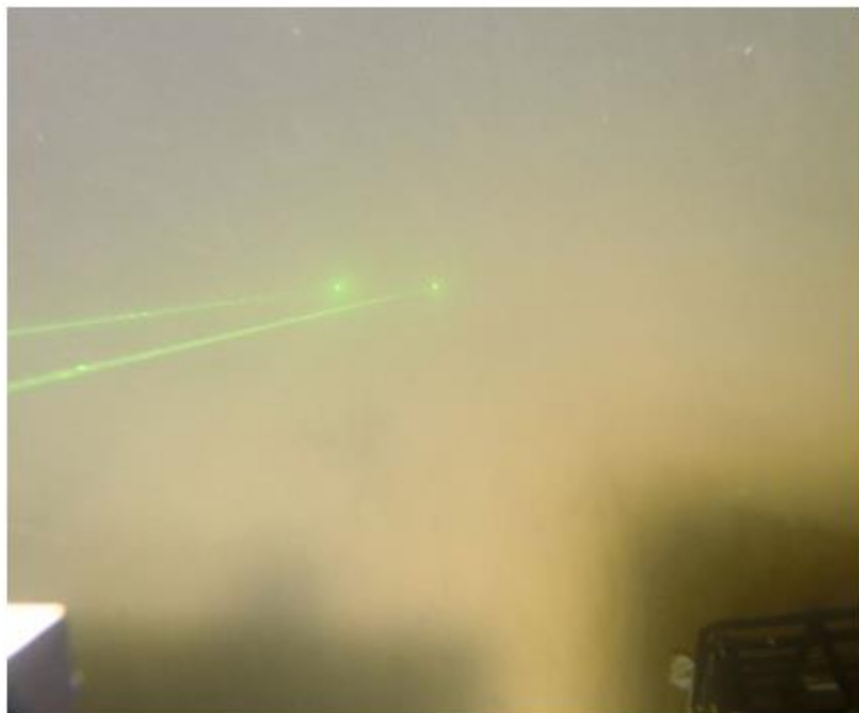
Laser spacing = 10 cm

Substrate Type: mud

Sample ID:	M0166
Date/Time (EST):	08/28/17 10:52
Depth (real-time, m):	76.5
Easting (WGS84 UTM Zone 19N, m):	463359
Northing (WGS84 UTM Zone 19N, m):	4846950

Still Image from Video	Field Picture

Laser spacing = 10 cm
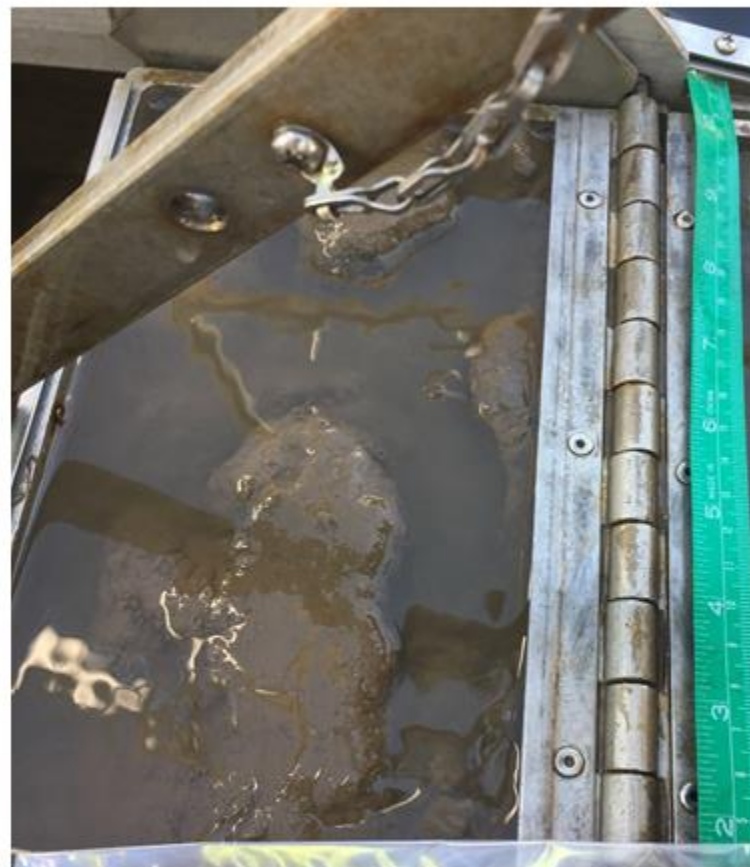
Substrate Type: mud

Sample ID:	M0167
Date/Time (EST):	08/28/17 11:15
Depth (real-time, m):	87.5
Easting (WGS84 UTM Zone 19N, m):	461434
Northing (WGS84 UTM Zone 19N, m):	4845340

Still Image from Video	Field Picture
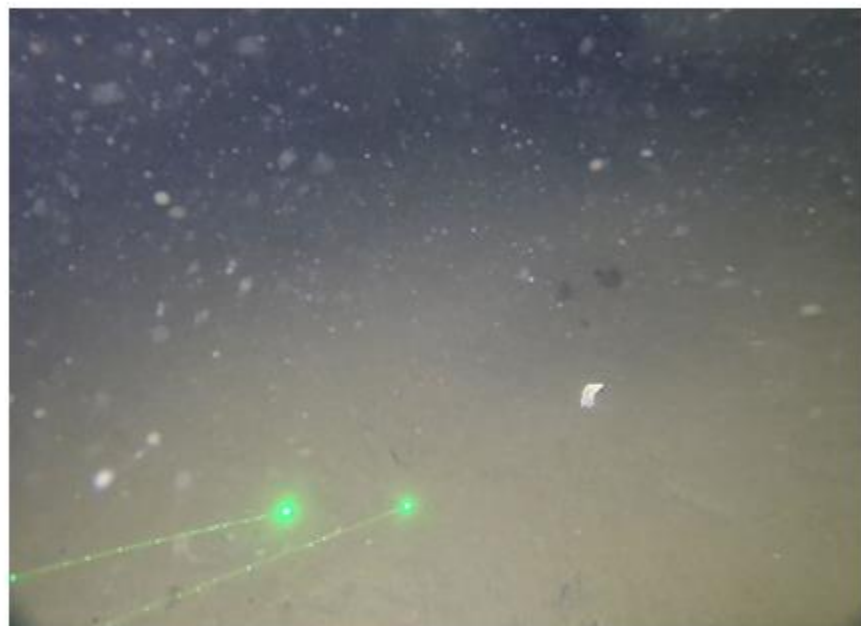
Laser spacing = 10 cm

Substrate Type: sandy mud

Sample ID:	M0168
Date/Time (EST):	09/13/17 06:33
Depth (real-time, m):	47.4
Easting (WGS84 UTM Zone 19N, m):	452278
Northing (WGS84 UTM Zone 19N, m):	4848242

Still Image from Video	Field Picture

Laser spacing = 10 cm

Substrate Type: sand

Sample ID:	M0169
Date/Time (EST):	09/13/17 07:11
Depth (real-time, m):	56.2
Easting (WGS84 UTM Zone 19N, m):	456066
Northing (WGS84 UTM Zone 19N, m):	4845462

Still Image from Video	Field Picture
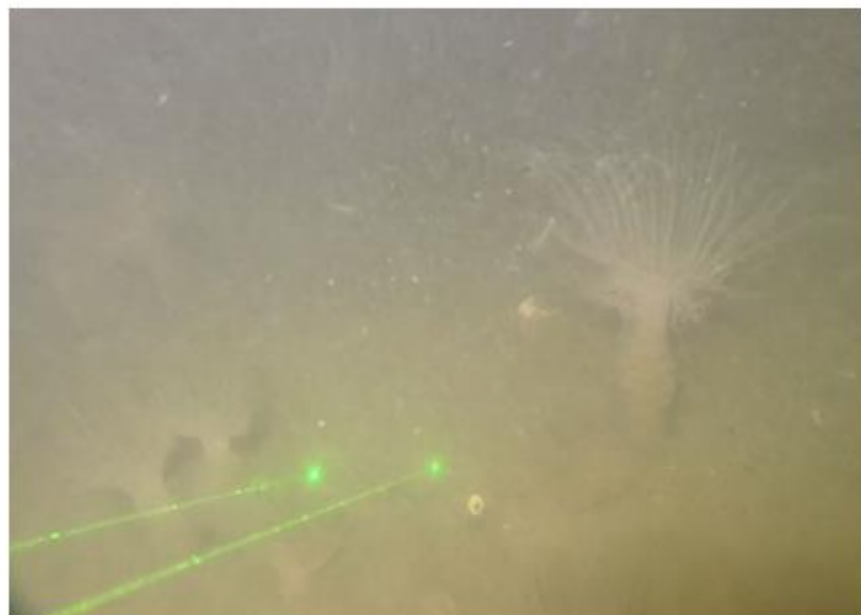
Laser spacing = 10 cm

Substrate Type: sandy gravel

Sample ID:	M0170
Date/Time (EST):	09/13/17 07:34
Depth (real-time, m):	58.4
Easting (WGS84 UTM Zone 19N, m):	455911
Northing (WGS84 UTM Zone 19N, m):	4845218

Still Image from Video	Field Picture
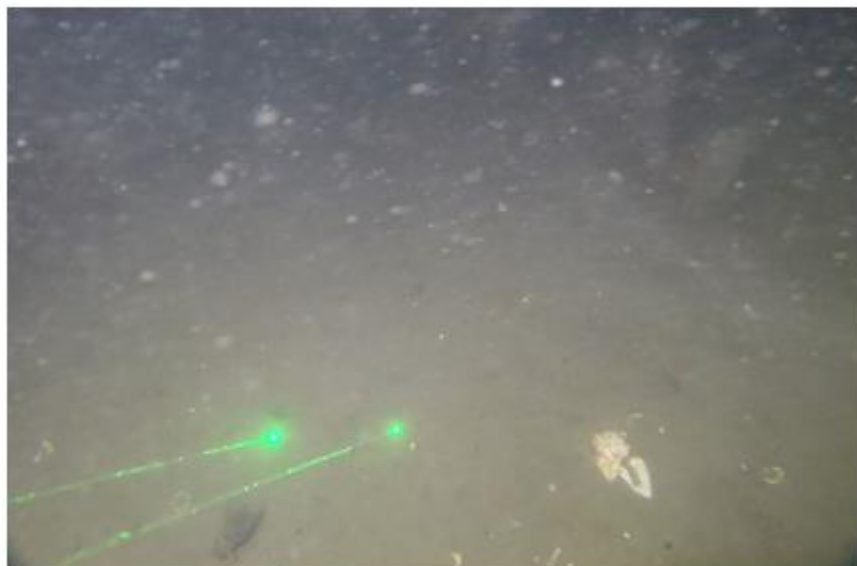
Laser spacing = 10 cm

Substrate Type: muddy gravelly sand

Sample ID:	M0171
Date/Time (EST):	09/13/17 07:58
Depth (real-time, m):	64.4
Easting (WGS84 UTM Zone 19N, m):	456204
Northing (WGS84 UTM Zone 19N, m):	4843228

Still Image from Video	Field Picture
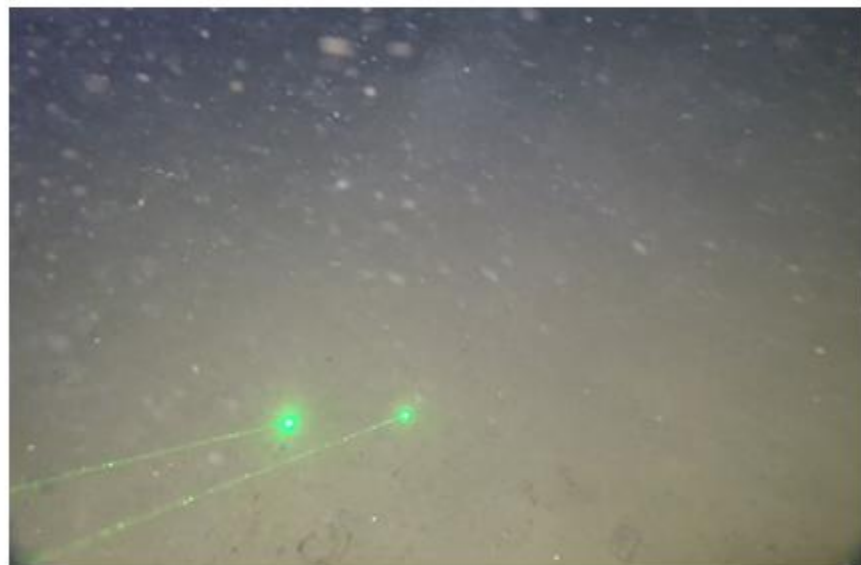
Laser spacing = 10 cm

Substrate Type: muddy gravelly sand

Sample ID:	M0172
Date/Time (EST):	09/13/17 08:22
Depth (real-time, m):	67.6
Easting (WGS84 UTM Zone 19N, m):	456394
Northing (WGS84 UTM Zone 19N, m):	4842761

Still Image from Video	Field Picture

Laser spacing = 10 cm

Substrate Type: sandy gravel

Sample ID:	M0173
Date/Time (EST):	09/13/17 08:45
Depth (real-time, m):	62.3
Easting (WGS84 UTM Zone 19N, m):	456314
Northing (WGS84 UTM Zone 19N, m):	4841584

Still Image from Video	Field Picture
Laser spacing = 10 cm **Substrate Type:** gravelly sand	
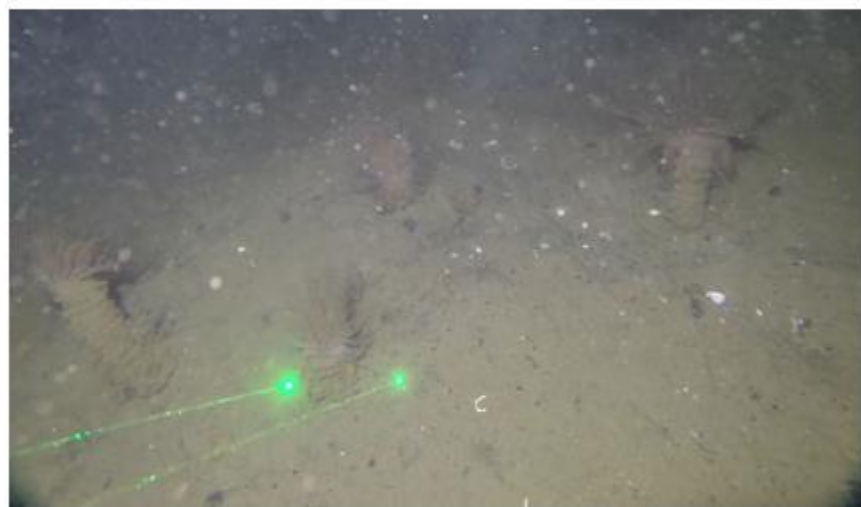
Sample ID:	M0174
Date/Time (EST):	09/13/17 09:06
Depth (real-time, m):	68.4
Easting (WGS84 UTM Zone 19N, m):	456176
Northing (WGS84 UTM Zone 19N, m):	4841485

Still Image from Video	Field Picture
Laser spacing = 10 cm **Substrate Type:** cobble-boulder	

Sample ID:	M0175
Date/Time (EST):	09/13/17 09:37
Depth (real-time, m):	52.9
Easting (WGS84 UTM Zone 19N, m):	456302
Northing (WGS84 UTM Zone 19N, m):	4841062
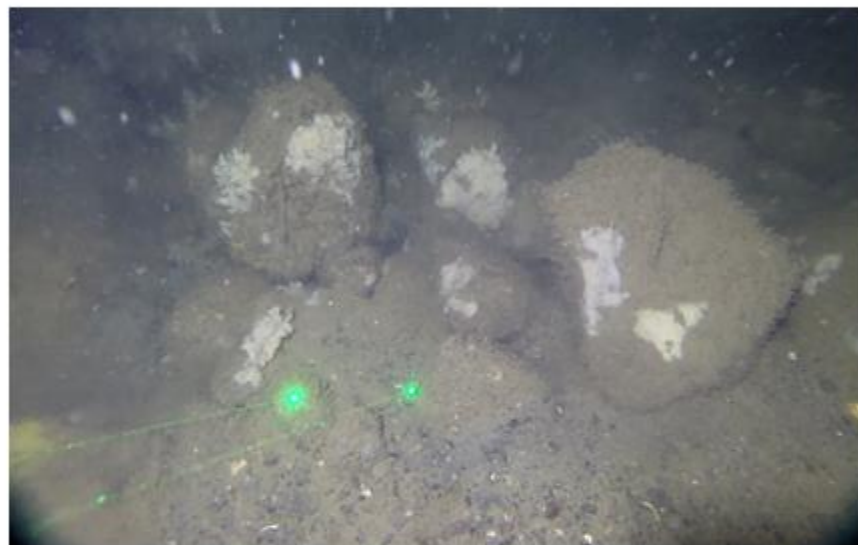
Still Image from Video	Field Picture
Laser spacing = 10 cm **Substrate Type:** muddy gravel / cobble-boulder	

Sample ID:	M0176
Date/Time (EST):	09/13/17 09:59
Depth (real-time, m):	64.1
Easting (WGS84 UTM Zone 19N, m):	456369
Northing (WGS84 UTM Zone 19N, m):	4841317

Still Image from Video	Field Picture
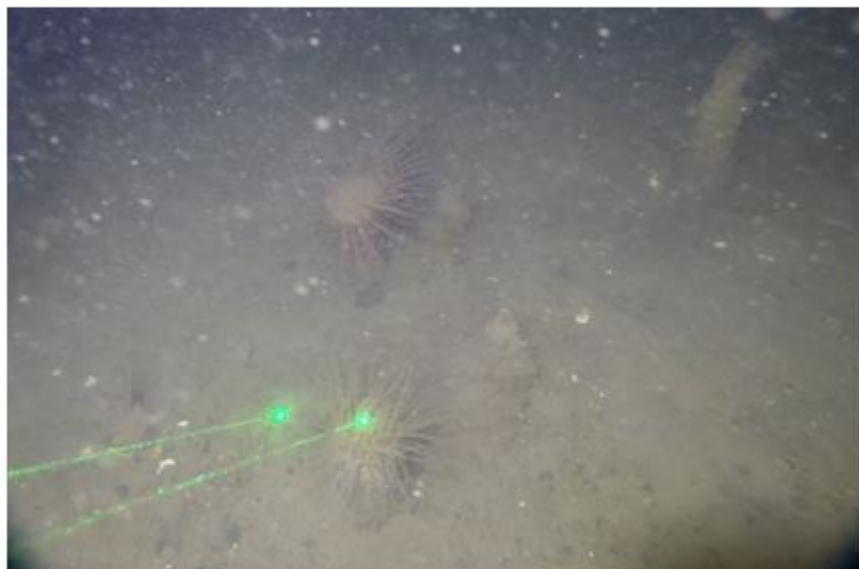
Laser spacing = 10 cm

Substrate Type: muddy gravel

Sample ID:	M0177
Date/Time (EST):	09/13/17 10:26
Depth (real-time, m):	64.5
Easting (WGS84 UTM Zone 19N, m):	456158
Northing (WGS84 UTM Zone 19N, m):	4841141

Still Image from Video	Field Picture
Laser spacing = 10 cm	**NO SAMPLE RECOVERED**
Substrate Type: bedrock	

Sample ID:	M0178
Date/Time (EST):	09/13/17 11:00
Depth (real-time, m):	29.3
Easting (WGS84 UTM Zone 19N, m):	458655
Northing (WGS84 UTM Zone 19N, m):	4846312

Still Image from Video	Field Picture
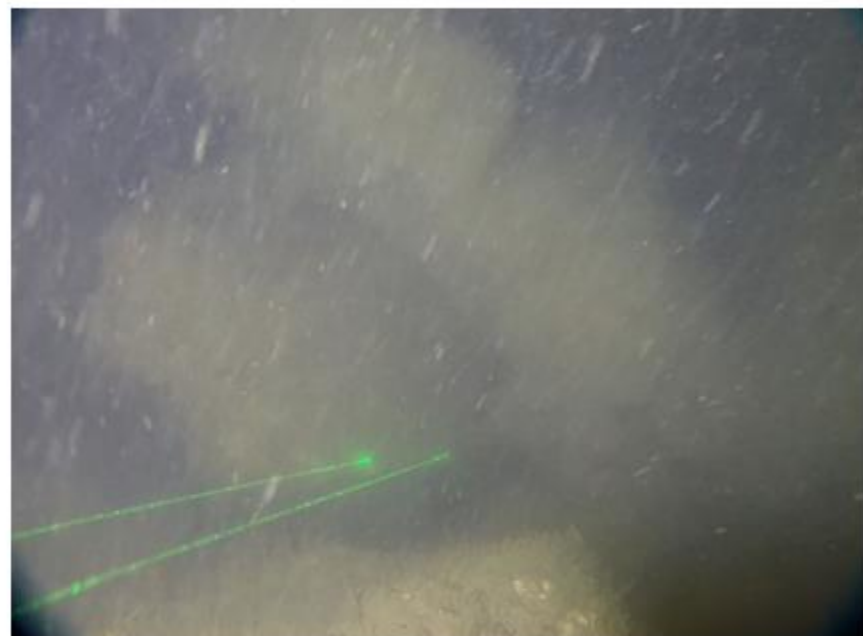
Laser spacing = 10 cm

Substrate Type: bedrock

NO SAMPLE RECOVERED

Sample ID:	M0179
Date/Time (EST):	09/13/17 11:16
Depth (real-time, m):	71.2
Easting (WGS84 UTM Zone 19N, m):	463520
Northing (WGS84 UTM Zone 19N, m):	4844129

Still Image from Video	Field Picture
Laser spacing = 10 cm **Substrate Type:** bedrock	**NO SAMPLE RECOVERED**

Sample ID:	M0180
Date/Time (EST):	09/13/17 11:32
Depth (real-time, m):	20.2
Easting (WGS84 UTM Zone 19N, m):	464873
Northing (WGS84 UTM Zone 19N, m):	4847220

Still Image from Video	Field Picture

Laser spacing = 10 cm

Substrate Type: bedrock

NO SAMPLE RECOVERED

Sample ID:	M0181
Date/Time (EST):	09/13/17 11:45
Depth (real-time, m):	35.5
Easting (WGS84 UTM Zone 19N, m):	462566
Northing (WGS84 UTM Zone 19N, m):	4849087

Still Image from Video	Field Picture
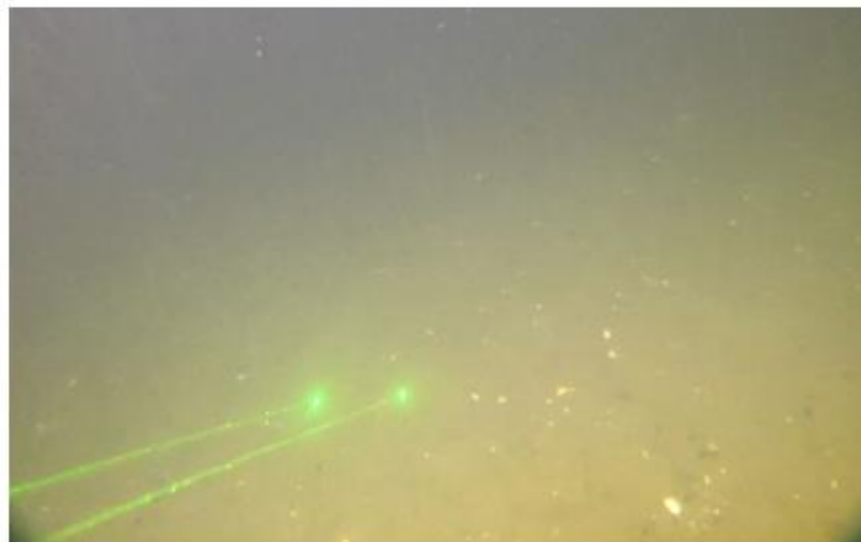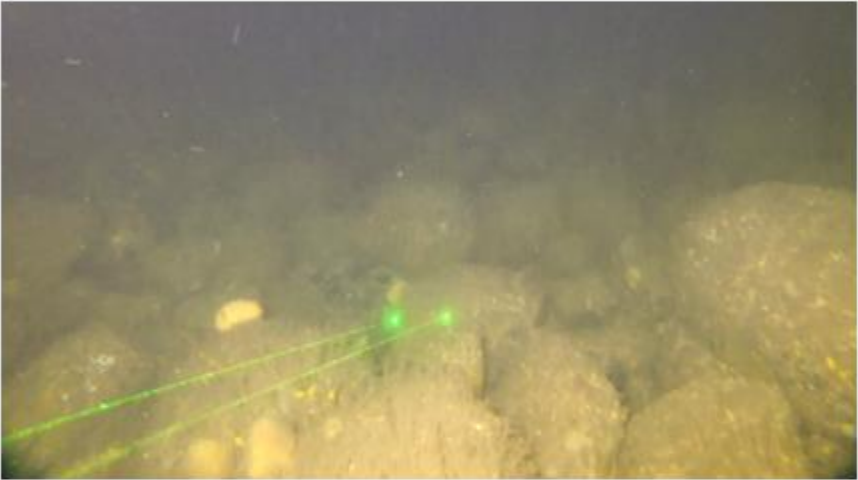
Laser spacing = 10 cm

Substrate Type: sand
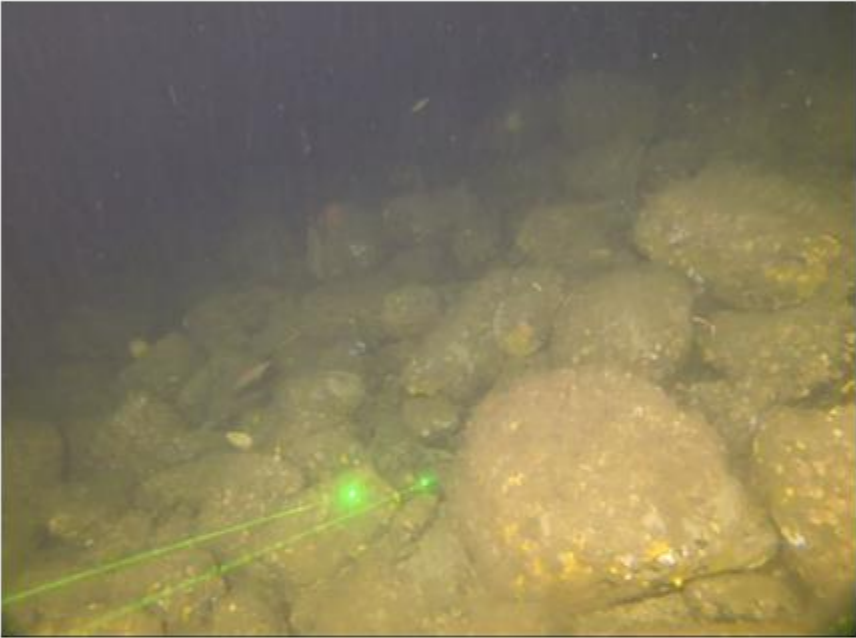
Sample ID:	M0182
Date/Time (EST):	10/02/17 6:54
Depth (real-time, m):	48.8
Easting (WGS84 UTM Zone 19N, m):	458482
Northing (WGS84 UTM Zone 19N, m):	4851426

Still Image from Video	Field Picture

Laser spacing = 10 cm

Substrate Type: cobble-boulder

NO SAMPLE RECOVERED

Sample ID:	M0183
Date/Time (EST):	10/02/17 7:10
Depth (real-time, m):	35.1
Easting (WGS84 UTM Zone 19N, m):	458612
Northing (WGS84 UTM Zone 19N, m):	4851197

Maine Coastal Mapping Initiative

Still Image from Video	Field Picture

Laser spacing = 10 cm

Substrate Type: cobble-boulder

NO SAMPLE RECOVERED

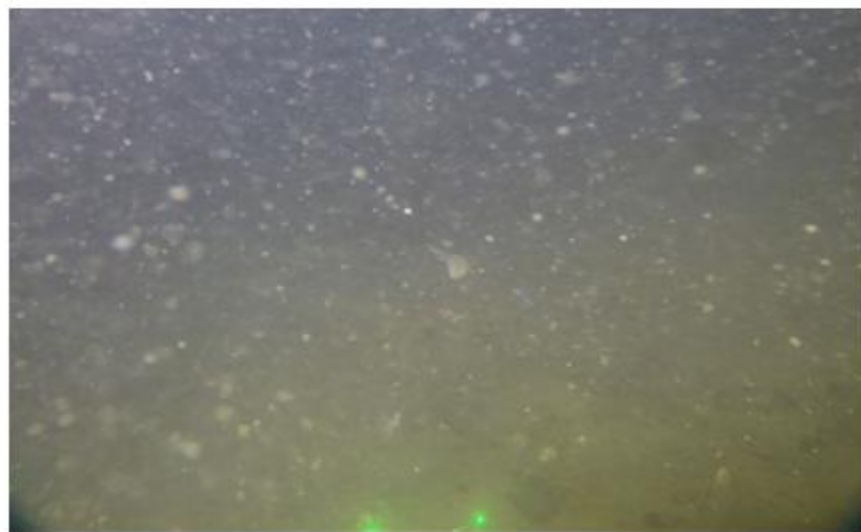|	
Sample ID:	M0184
Date/Time (EST):	10/02/17 7:25
Depth (real-time, m):	36.8
Easting (WGS84 UTM Zone 19N, m):	458682
Northing (WGS84 UTM Zone 19N, m):	4851265

Still Image from Video	Field Picture
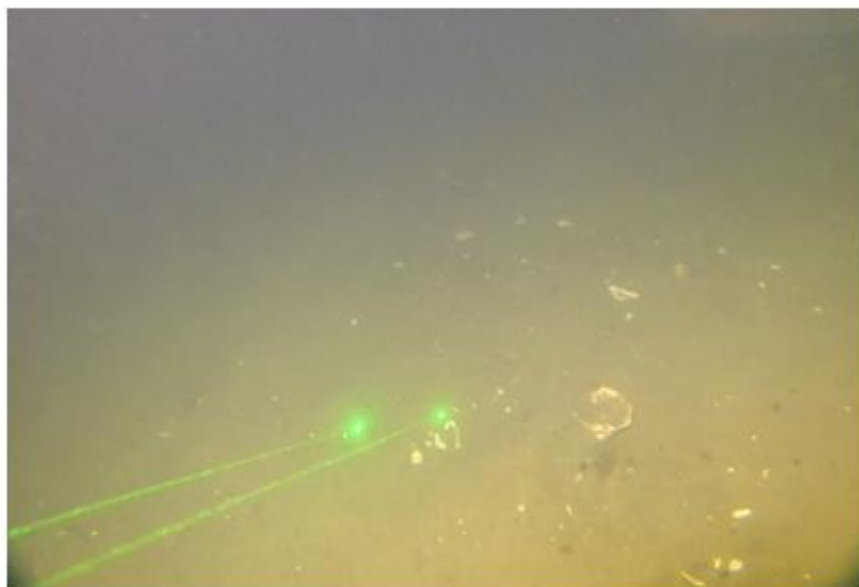
Laser spacing = 10 cm

Substrate Type: gravelly sand

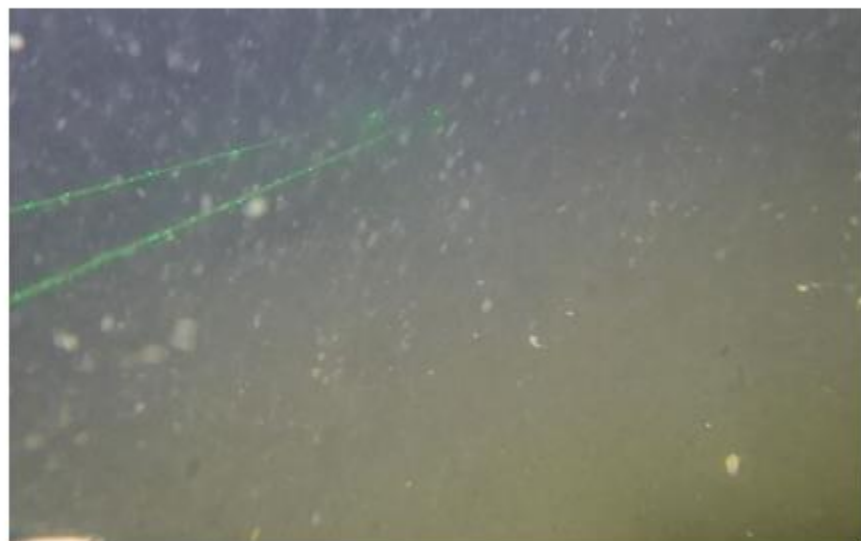|	
Sample ID:	M0185
Date/Time (EST):	10/02/17 7:38
Depth (real-time, m):	48.8
Easting (WGS84 UTM Zone 19N, m):	458410
Northing (WGS84 UTM Zone 19N, m):	4851184

Still Image from Video	Field Picture

Laser spacing = 10 cm

Substrate Type: sandy gravel

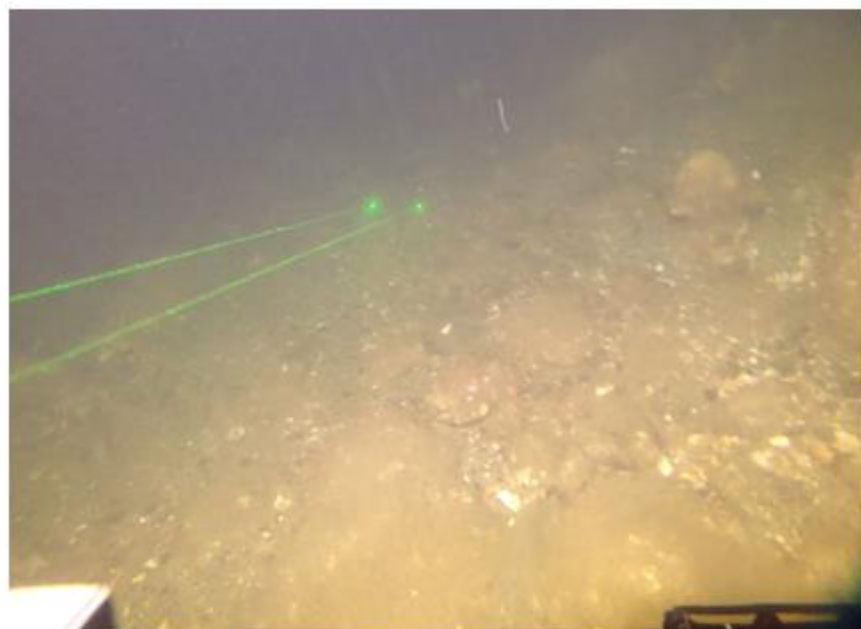|	
Sample ID:	M0186
Date/Time (EST):	10/02/17 7:59
Depth (real-time, m):	49.5
Easting (WGS84 UTM Zone 19N, m):	457691
Northing (WGS84 UTM Zone 19N, m):	4850849

Still Image from Video	Field Picture
Laser spacing = 10 cm **Substrate Type:** muddy gravelly sand	

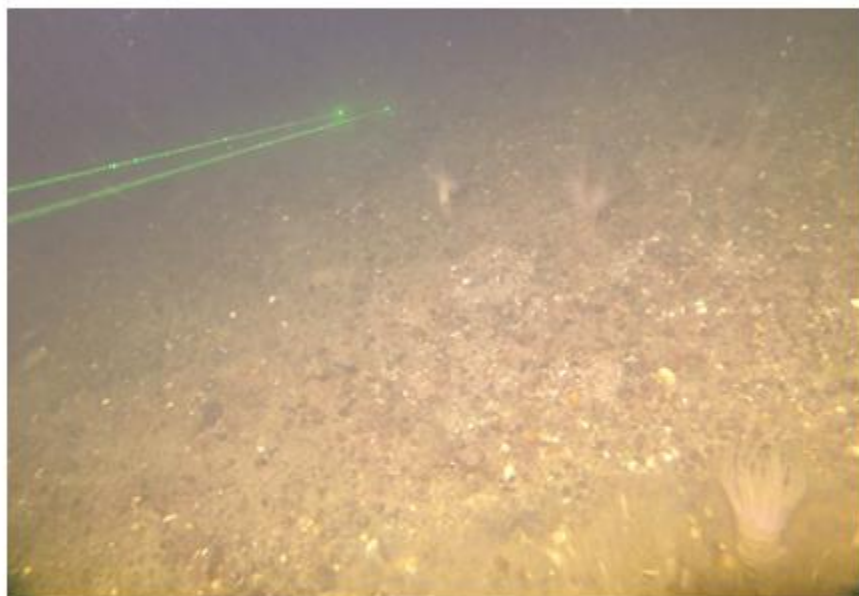|	
Sample ID:	M0187
Date/Time (EST):	10/02/17 8:18
Depth (real-time, m):	53.6
Easting (WGS84 UTM Zone 19N, m):	457612
Northing (WGS84 UTM Zone 19N, m):	4850635

Still Image from Video	Field Picture

Laser spacing = 10 cm

Substrate Type: sandy gravel w/ shell hash

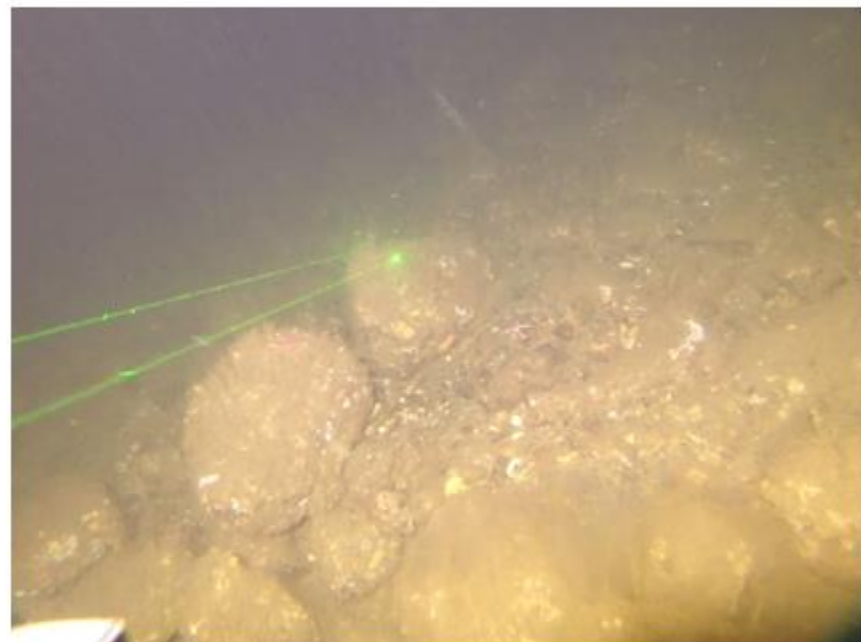|	
Sample ID:	M0188
Date/Time (EST):	10/02/17 8:37
Depth (real-time, m):	43.0
Easting (WGS84 UTM Zone 19N, m):	457073
Northing (WGS84 UTM Zone 19N, m):	4849817

Still Image from Video	Field Picture

Laser spacing = 10 cm

Substrate Type: sandy gravel

Sample ID:	M0189
Date/Time (EST):	10/02/17 8:53
Depth (real-time, m):	39.4
Easting (WGS84 UTM Zone 19N, m):	457087
Northing (WGS84 UTM Zone 19N, m):	4849705

Still Image from Video	Field Picture

Laser spacing = 10 cm

Substrate Type: cobbles-boulders / gravel

NO SAMPLE RECOVERED

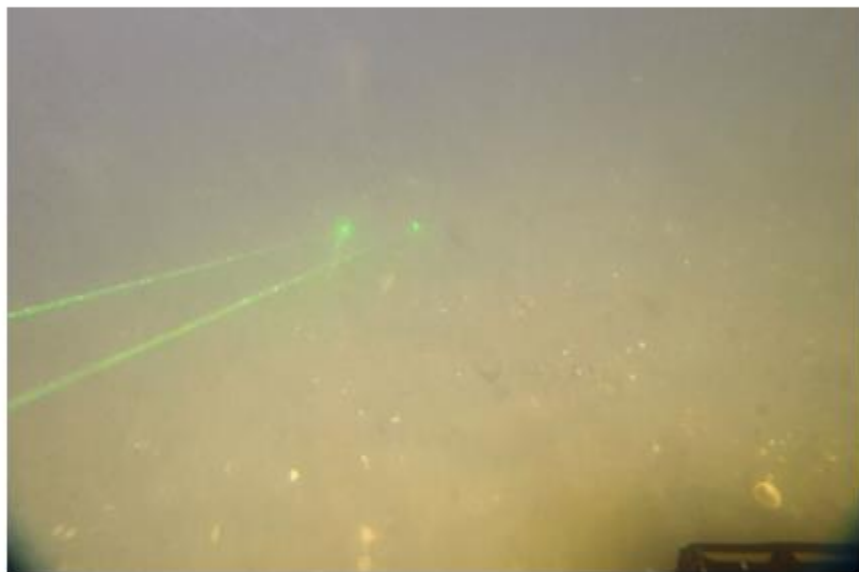|	
Sample ID:	M0190
Date/Time (EST):	10/02/17 9:10
Depth (real-time, m):	43.2
Easting (WGS84 UTM Zone 19N, m):	457068
Northing (WGS84 UTM Zone 19N, m):	4849846

Still Image from Video	Field Picture
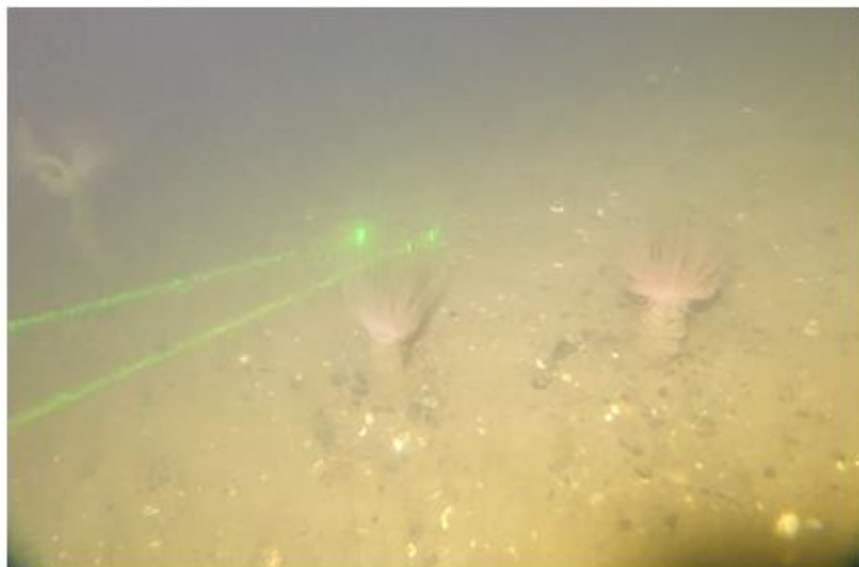
Laser spacing = 10 cm

Substrate Type: gravelly sand

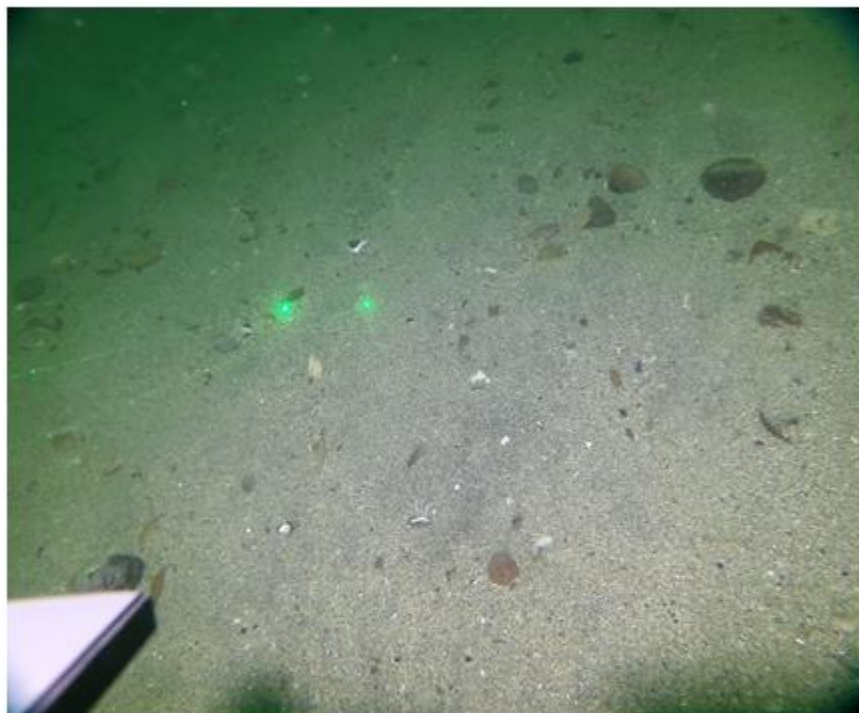|	
Sample ID:	M0191
Date/Time (EST):	10/02/17 9:35
Depth (real-time, m):	50.6
Easting (WGS84 UTM Zone 19N, m):	456824
Northing (WGS84 UTM Zone 19N, m):	4849481

Still Image from Video	Field Picture
Laser spacing = 10 cm **Substrate Type:** gravelly sand	

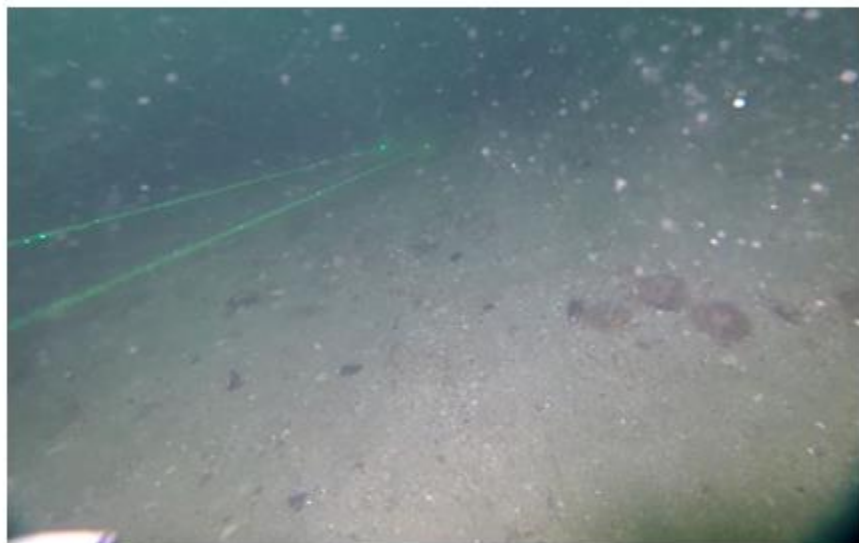|	
Sample ID:	M0192
Date/Time (EST):	10/02/17 10:07
Depth (real-time, m):	48.1
Easting (WGS84 UTM Zone 19N, m):	456497
Northing (WGS84 UTM Zone 19N, m):	4848923

Still Image from Video	Field Picture

Laser spacing = 10 cm

Substrate Type: shell hash

Sample ID:	M0193
Date/Time (EST):	10/02/17 10:39
Depth (real-time, m):	21.3
Easting (WGS84 UTM Zone 19N, m):	451126
Northing (WGS84 UTM Zone 19N, m):	4846579

Still Image from Video	Field Picture

Laser spacing = 10 cm

Substrate Type: shell hash

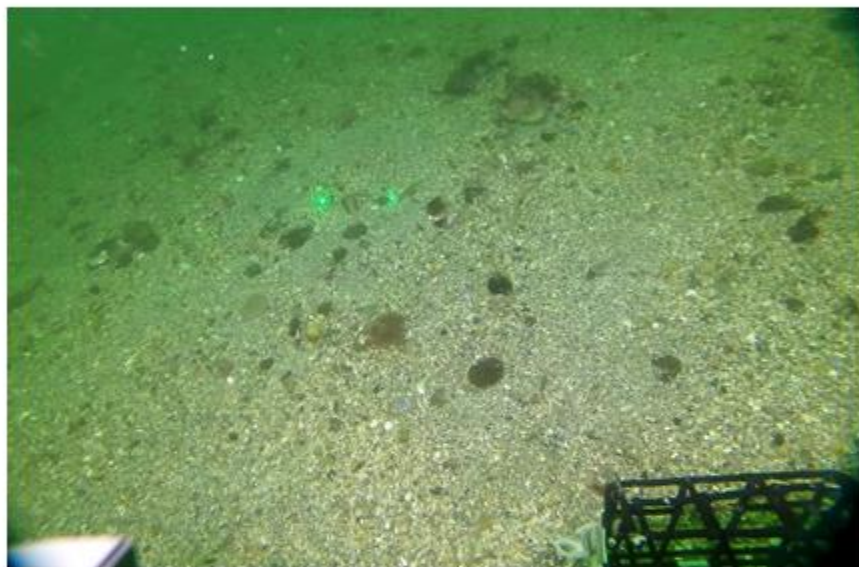|	
Sample ID:	M0194
Date/Time (EST):	10/02/17 10:51
Depth (real-time, m):	25.1
Easting (WGS84 UTM Zone 19N, m):	451193
Northing (WGS84 UTM Zone 19N, m):	4846582

Still Image from Video	Field Picture
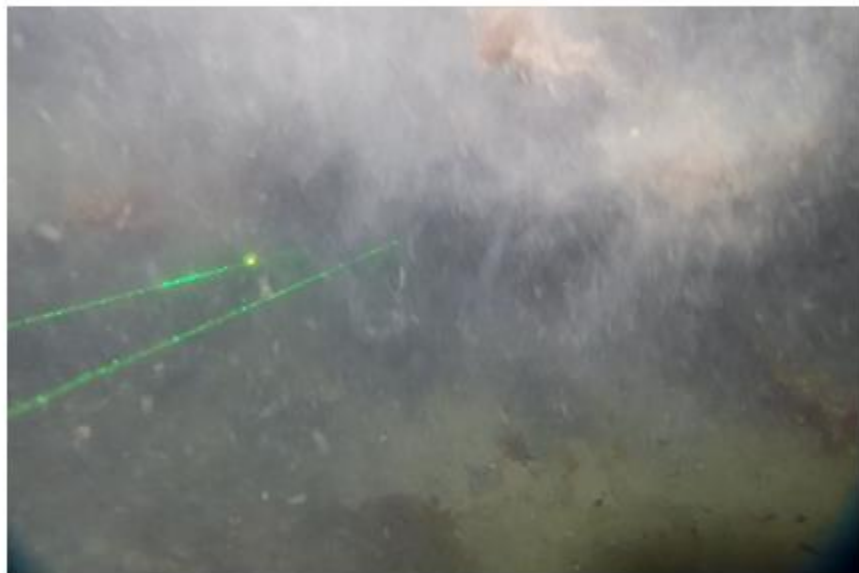
Laser spacing = 10 cm

Substrate Type: muddy fine shell hash

|	
Sample ID:	M0195
Date/Time (EST):	10/02/17 11:10
Depth (real-time, m):	42.9
Easting (WGS84 UTM Zone 19N, m):	450514
Northing (WGS84 UTM Zone 19N, m):	4847604

Still Image from Video	Field Picture

Laser spacing = 10 cm

Substrate Type: shell hash

Sample ID:	M0196
Date/Time (EST):	10/02/17 ~11:30
Depth (real-time, m):	15.9
Easting (WGS84 UTM Zone 19N, m):	447698
Northing (WGS84 UTM Zone 19N, m):	4847755

Still Image from Video	Field Picture
Laser spacing = 10 cm	
Substrate Type: bedrock	
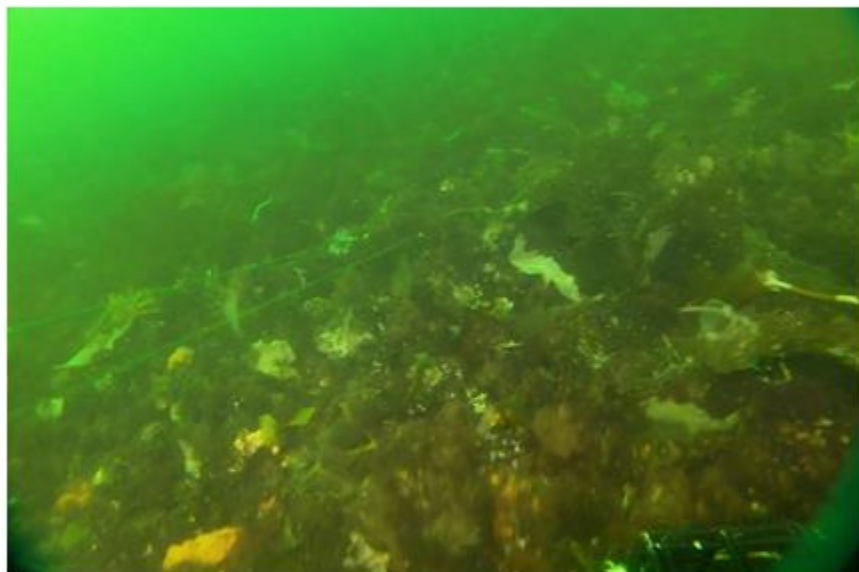
Sample ID:	M0197
Date/Time (EST):	10/02/17 11:52
Depth (real-time, m):	14.5
Easting (WGS84 UTM Zone 19N, m):	447370
Northing (WGS84 UTM Zone 19N, m):	4847781