Final Report

Subtidal benthic video and benthic infauna survey and Intertidal Cable Crossing survey Cobscook Bay, Maine July 14-15, 2011

Prepared for

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Introduction

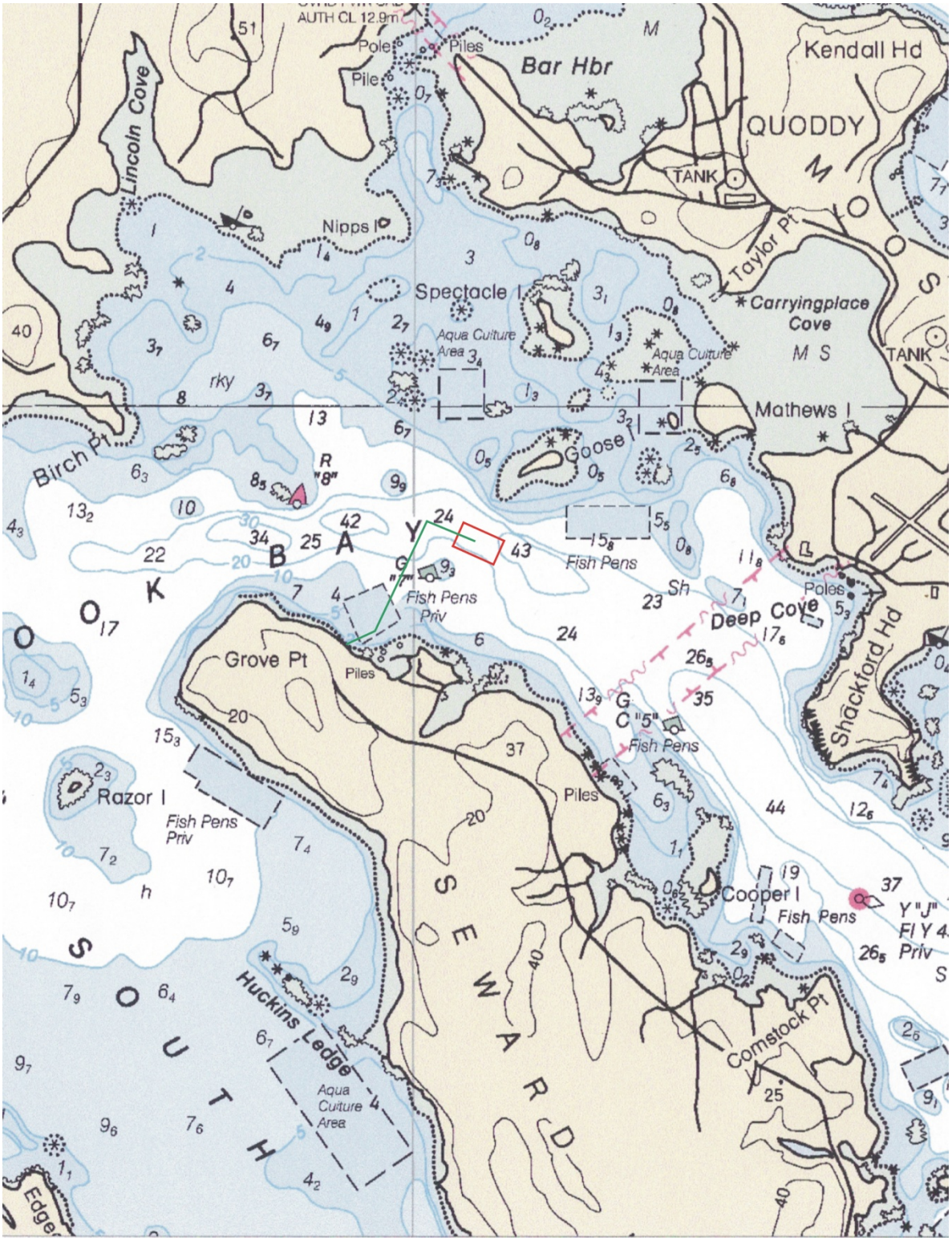
Ocean Renewable Power Company LLC (ORPC) is proposing to deploy its TidGen™ Power System in a section of Cobscook Bay (CB) in the vicinity of Grove (Gove) Point, North Lubec, Maine in an area shown in Figures 1 and 2. MER Assessment Corporation (MER) was requested to assist with habitat characterizations of the deployment areas and the subsea cable routes.

The full project deployment and subsea cable route area baseline survey and habitat characterization effort includes both subtidal and intertidal habitats. MER conducted the subtidal habitats portion of the survey in collaboration with Pepperell Cove Marine (PCM), Portsmouth, New Hampshire (photo below), on July 14 and 15, 2011, during a period of three daylight hours slack-tides (two low tides and one high tide) and moderate to large amplitude tides of 4.5m to 5.5m (18.6 ft. to 20.2 ft.). The intertidal habitat characterization was completed on July 15, 2011. This report summarizes the results of the subtidal video and benthic infauna survey and the intertidal sampling along the intertidal cable crossing area.

Cobscook Bay is characterized by large amplitude tides and very strong tidal currents. The selected deployment area is subject to some of the strongest tidal currents in the region. These strong currents present constraints on both the timing and duration of survey events (extremely short slack water period). Video recording of the bottom and grab sampling using remote equipment was considered difficult, if not impossible, throughout most of the area, particularly along the cross-current transect leading from the deployment area to the intertidal crossing area. Furthermore, use of SCUBA was considered impractical and unsafe due to the extremely strong currents. Consequently, tethered, surface-supply air divers were used to record video and collect benthic samples.

Video recording was accomplished using diver helmet-mounted cameras and lights with the divers following stainless steel cables attached to 4,000 lb mooring stones pre-set by CPM Contractors (CPM), Freeport, Maine. Benthic sampling was conducted *in situ* by the divers. The transects layout and benthic sampling stations for the CB deployment area and subsea cable route are shown in Figures 1-3.

Figure 1. Site location map of Cobscook Bay Deployment Area



Source: SeaClear II

Figure 2. Cobscook Bay deployment area, subsea cable route, transects layout, and subtidal sampling station locations

Part I - Subtidal Survey

Methods

Video and benthic sampling transect cable deployment

A decision was made at a meeting between PCM, CPM, and MER on June 9, 2011 that deployment of measured rope transect lines and video recording using SCUBA would be impractical to impossible and unsafe due to the short duration of the slack water period (<20 minutes) and the extremely strong currents in the deployment area and along the subtidal cable crossing. An alternative approach to SCUBA video recording and benthic sampling was developed according to which heavy mooring blocks would be set at the ends of each transect for attachment of stainless steel cables that would serve as guides for PCM's tethered, surface-air-supplied divers to follow and move against the current.

CPM set the 4,000 lb mooring blocks at three pre-determined points, indicated as Mooring 1, 2 and 3 in Figures 2 and 3, during the week of July 4, 2011. PCM divers attached the stainless steel cables between the moorings on July 12 and 13, 2011. The cable for Transect 1, running between Mooring 3 adjacent to Station 2 near shore to Station 8 (a distance of 700m), extended approximately 100m beyond Station 8 for a total run of approximately 800m (the extension is shown as the red line between Station 8 and Mooring 1 in Figure 2); a rope extending at a southwest angle from Station 2 to the high water mark onshore was used to establish Station 1 100m from Station 2. The cable for Transect 2, running between Station 9 and Station 11 (a distance of 200m), extended approximately 82m to the north beyond Station 9 (shown as the red line between Mooring 1 and Station 9 in Figure 2) and approximately 8m to the south of Mooring 2 for a total run of approximately 285m.

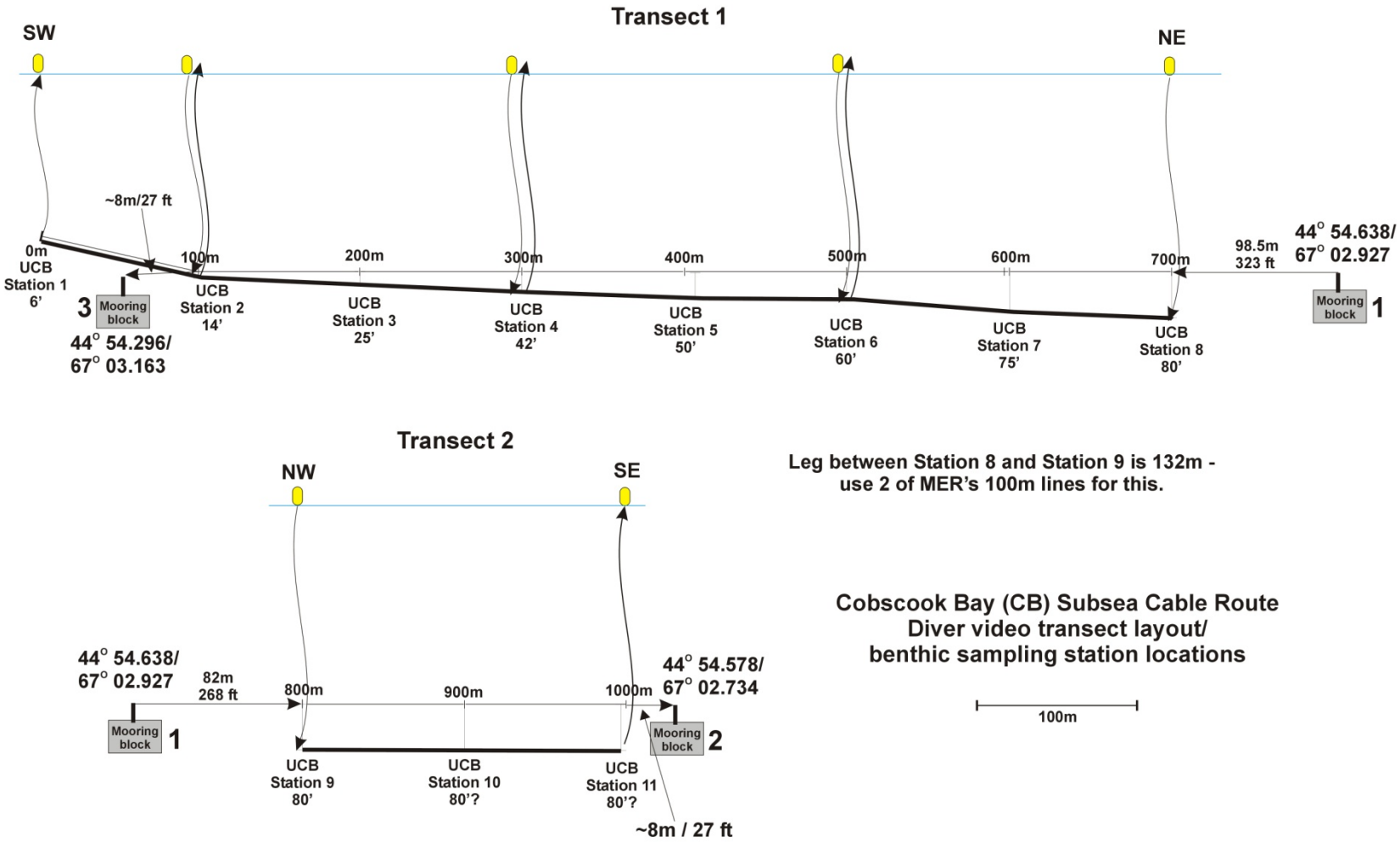
The stainless steel cables were assembled from 200m sections of cable. Following deployment and tensioning of the cable, lines with marker buoys were attached to the cable at each connection point of the 200-meter sections and at the 100-meter mark between connections to mark the 100-meter interval sampling stations. A nylon rope was finally attached between the Transect 1 cable and Transect 2 cable connecting Stations 8 and 9 to allow the divers to transition between transects. The predetermined GPS locations of the moorings and stations were verified on-site using a Garmin 4208 Chartplotter.

Subtidal video recording

Video recordings were made on July 14 and 15, 2011 using helmet-mounted cameras with direct live feed to the surface. Transect 2 between Station 11 and 9 and the connection between Station 9 and Station 8 were video recorded on July 14; Transect 1 between Stations 6 and 8 and between Station 6 and Station 1 was filmed on the morning of July 15.

Video recording by the diver was monitored aboard the diver support vessel on a 26-inch video monitor. Real time communication with the diver allowed the diver to be directed to move the camera closer to or further away from the bottom or to pan from side to side. The video was recorded on a video recorder onboard the support vessel in AVCHD format. The video recordings were transmitted to MER on a SD card and transcribed onto standard DVD disks for uploading to a Panasonic Model DMR-T3040 DVD Video Recorder for analysis and copying. DVD copies of all of the video recordings have been provided to ORPC.

Figure 3. Video/benthic sampling transects in Cobscook Bay, 07/14-15/11



Subtidal benthic infauna sampling

Benthic infauna samples were collected in triplicate at eleven (11) stations along the transect lines (33 samples total). Sediment cores were taken using 4 in. diameter PVC pipe coring devices that were inserted to a depth of 10 cm or full resistance. The contents of the cores were washed through a U.S. Standard No. 35 sieve (500µm mesh). All material retained on the screen was transferred into plastic sample jars and the jars filled with 10% buffered formalin. Several drops of a 1% Rose Bengal staining solution were added to each sample to assist in the sorting of organisms. After several days of fixing, the formalin solution was decanted from the sample jars through a 500µm mesh sieve and the formalin volume replaced with 70% ethanol to insure preservation of the organisms' integrity, particularly the bivalves and other calcareous forms.

During processing, all organisms are sorted from the sediment under lighted magnification lenses and/or binocular dissecting microscopes. Organisms collected from the samples are identified to the lowest practical taxonomic level and enumerated under a stereoscopic dissecting scope to 63x power. Data resulting from the sample processing are entered into an Excel® spreadsheet developed by MER that calculates statistics for abundance, taxa richness, and relative diversity (Shannon-Weiner Index, H'). Standard operating procedures for the collection and processing of benthic infauna samples are attached as Appendix I.

Results

Subtidal video

The first video segment recorded on July 14, 2011 began at Station 11 at the southeast end of Transect 2 and proceeded northwestward through Station 10 to Station 9; benthic infauna samples were taken simultaneously while recording video to minimize the number of ascents and descents to which the divers were subjected. The bottom between Station 11 and Station 9 consists of large cobble, stones, abundant mussel shells, and shell hash. In the area between Station 10 and Station 9 the diver reported numerous up and down slopes or cobble mounding measuring 4 to 5 feet in depth/height, later describing these as cobble "waves" along the bottom.

Epifauna along Transect 2 include sea stars, *Asterias* sp., possibly *Henricia* sp. and/or *Pontaster* sp., bulbous sponges, *Suberites ficus* and/or *Isodictya* sp., abundant sea potatoes, *Boltenia ovifera*, northern sea cucumbers, *Cucumaria frondosa*, red northern anemones, *Urticina* (*Tealia*) *felina*, sea scallops, *Placopecten magellanicus*, green sea urchins, *Strongylocentrotus droebachiensis*, juvenile sculpins, *Myoxocephalus* sp., and hermit crabs, *Pagurus* sp.

The second video segment begins at Station 9 and proceeds westward through a boulder field nearly to Station 8. Some of the boulders are very large, one estimated at 12 feet high by the diver. The bottom around the boulders appears similar to that found between Stations 11 and 9, consisting primarily of cobble and relic mussel shells. Epifauna is also similar to that found between Stations 11 and 9, with *Boltenia ovifera* being the dominant epibenthic species, commonly occurring in "meadows", particularly on the vertical sides of boulders. Other observed species include sea cucumbers, bread crumb sponge, *Halichondria panicea*, other unidentified sponges, and red northern anemones. The dive had to be terminated just short of

Station 8 due to the diver's umbilical potentially becoming entangled in the boulders as the tidal currents increased.

Transect 1 was filmed early on the morning of July 15, 2011. The first segment ran from Station 6 northeastward to Station 8 to take advantage of the slack tide period to film the deeper areas. The bottom between Station 6 and 7 is hard, generally barren, tide-swept cobble with relic mussel shells and packed shell hash in the interstitial spaces. Epifauna include numerous sea scallops, northern sea cucumbers, hermit crabs, red northern anemones and small sea stars; one large lobster, *Homarus americanus*, was observed under a small boulder. Between Station 7 and Station 8 the bottom remains similar with a large amount of relic mussel shells. The epifauna also remain consistent with that of the previous segment with *Boltenia ovifera* and sea scallops being the dominant species. Other species include bulbous sponges, northern sea cucumbers, red northern anemones, and an ocean pout, *Macrozoarces americanus*, seen curled up on the bottom. Following video recording the diver sampled Station 8 before returning to the surface.

The remainder of Transect 1 was filmed as a single dive beginning at Station 6 and continuing uninterrupted through Station 1. Initially upon descending along the Station 6 ascent/descent line the diver inadvertently headed toward Station 7 before being alerted that he was headed in the wrong direction; the diver reversed direction, returned to Station 6 and continued toward Station 5 continuously filming.

The bottom between Station 6 and Station 5 is hard-packed cobble with interstitial shell hash. Epifauna include green sea urchins, sea stars, mostly *Asterias* spp., sea scallops, hermit crabs, red northern anemones, sea potatoes, sea cucumbers, and sponges. Between Stations 5 and 4 the bottom remains similar with occasional large rocks or small boulders. The epifauna remain generally similar, increasing in abundance and also including sea peaches, *Halocynthia pyriformis*, sunstars, *Solaster (Crossaster) papposus*, and 'pancake batter' tunicate, *Didemnum vexillum*, with green sea urchins, red northern anemones, sea cucumbers, and sea peaches being the dominant species.

Similarly, the section between Station 4 and Station 3 has a hard, cobble-paved bottom with interstitial shell hash and occasional rocks. Epifauna is similar to that seen in the previous section with green sea urchins, sea cucumbers, red northern anemones and sea peaches dominating. Additional species observed as the depth shallows include Jonah crab, *Cancer borealis*, purple sunstar, *Solaster endeca*, and the scarlet sea cucumber, *Psolus* sp.

The bottom begins hard, consisting of gravel, coarse sand, shells and stones at Station 3 but softens to sand-silt with stones, then sand-silt with shells towards Station 2 as the strength of the current clearly declines closer to the shore. The same species seen previously continue to persist, but green sea urchins dominate. Additional species seen over the softening bottom include the common waved whelk, *Buccinum undatum*, which increase in number in proximity to the shore, burrowing anemones, *Cerianthus borealis*, and glass or silky cucumbers, *Chiridota laevis*.

The bottom remains soft, consisting of silty sand for much of the distance between Station 2 and Station 1, but begins to harden with stones in the shallow subtidal area leading to the hard, rocky substrate of the lower intertidal area. Sections of the bottom along this segment are barren sand and silt, but green sea urchins are generally common or abundant. Other species include common waved whelks, sponges (drifting), burrowing cerianthid anemones, hermit crabs (generally small), sea cucumbers, both *Cucumaria* and *Psolus*, and sea peaches in small clusters.

Some pieces of net and a few black concrete-filled plastic balls (referred to as "cannonballs" in the aquaculture industry), a few plastic containers and bags, and a section of chain were seen in the vicinity of the former salmon aquaculture lease site, probably remnants of the former operations in the area.

Video observation of sediment composition and the predominant organisms along the video transect segments and at each station, along with the associated location coordinates, are summarized in Table 1, below. Still captures taken from the video at each station and along the transect between stations are included in Appendix II. Graphic representations of observations made during review and analysis of the video recordings are included in Appendix III.

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Table 1. Cobscook Bay video transect and benthic sampling station coordinates, sediment type, and predominant organism(s)

CB	Latitude	Longitude	Sediment	Predominant organism(s)/relative abundance*
Video T1 Start (NE T1)	44 54.590	-67 2.960	relic mussel shell, cobble, stones	sea potatoes (A), sea stars (C), sea cucumbers (C), anemones (C), sea scallops (C)
Video T1 End (SW T1)	44 54.264	-67 3.217	sand, clay, relic shell	green sea urchin (A), whelks (A), sea peaches (O/C)
Video Sta 9 to St 8 Start	44 54.620	-67 2.870	gravel/sand/shell hash/boulders	sea potatoes (A), anemones (C/A), sponges (C)
Video Sta 9 to St 8 End	44 54.590	-67 2.960	relic shell, cobble, stones	sea potatoes (A), anemones (C/A), sponges (C)
Video T2 Start (SE T2)	44 54.580	-67 2.740	cobble, stones, relic shell, shell hash	sea potatoes (A), anemones (C/A), sea stars (C), sea cucumbers (C), sea urchins (C), sea scallops (O)
Video T2 End (NW T2)	44 54.620	-67 2.870	rocks/coarse sand/shell hash/clay/mussel shell	sea potatoes (A), sea stars (C), sea cucumbers (C), sea urchins (C), sea scallops (O), hermit crab (R)
Station 1 (T1)	44 54.264	-67 3.217	sand, clay, relic shell	sea urchins (A), sea cucumbers (C), waved whelk (C)
Station 2 (T1)	44 54.300	-67 3.160	sand, clay, relic shell, shell hash	sea urchins (A), sea cucumbers (C), waved whelk (C), sea peaches (C)
Station 3 (T1)	44 54.347	-67 3.128	gravel, shell hash, sand, hard-pan clay	sea urchins (A), sea peaches (A), sea cucumbers (C), sea scallops (C)
Station 4 (T1)	44 54.396	-67 3.094	cobble, sand, mussel shell hash, rocks, clay base	sea urchins (A), sea peaches (A), sea cucumbers (C), sea scallops (C)
Station 5 (T1)	44 54.444	-67 3.060	cobble, gravel, sand, mussel shell hash	sea urchins (A), sea stars (C), sea scallops (C), sea potatoes (C/A), sea peaches (C)
Station 6 (T1)	44 54.493	-67 3.027	cobble, gravel, relic mussel shell	sea scallops (C/A), sea cucumbers (C), anemones (C); hermit crab (R); lobster (R),
Station 7 (T1)	44 54.541	-67 2.994	relic mussel shells, cobble	sea scallops (C/A), sea cucumbers (C), anemones (C)
Station 8 (T1)	44 54.590	-67 2.960	relic mussel shell, cobble, stones, boulders	sea potatoes (A), sea cucumbers (C), anemones (C)
Station 9 (T2)	44 54.620	-67 2.870	cobble, relic mussel shell, shell hash	sea potatoes (A), sea cucumbers (C), sea urchins (C), sea scallops (O)
Station 10 (T2)	44 54.601	-67 2.809	cobble, relic mussel shell, shell hash	sea potatoes (A), sea stars (C), sea cucumbers (C), sea urchins (C), sea scallops (O)
Station 11 (T2)	44 54.580	-67 2.740	cobble, relic mussel shell, shell hash	sea potatoes (A), anemones (C/A), sea stars (C), sea cucumbers (C), sea urchins (C), sea scallops (O)

Benthic infauna analysis results

The results of the benthic infauna analyses for each station, based on the three replicates taken at each station, are summarized below in Table 2 and include total organisms found in the sample, abundance as organisms/0.1m^2, taxa richness (at species and family levels), distance along the transect, and relative diversity (Shannon-Wiener). Detailed information on infauna composition at each station by replicate is included in Appendix IV. Photos of the sediment composition at each station are included in Appendix V.

Table 2. Summary of benthic infauna analysis for subtidal samples collected at Cobscook Bay

	Total organisms			Abundance (#/0.1m^2)		Species Richness			Species Rel. Div.		Family Richness			Family Rel. Div.	
Station	Total	Mean	Var.	Mean	Var.	Total	Mean	Var.	Mean	Var.	Total	Mean	Var.	Mean	Var.
CB-1	238	79.3	1601.6	979.4	244075.5	39	23.0	38.0	0.888	0.002	26	16.7	21.6	0.873	0.001
CB-2	174	58.0	280.7	716.0	42773.3	30	17.3	16.9	0.825	0.004	23	13.7	6.2	0.848	0.003
CB-3	281	93.7	374.9	1156.3	57132.7	50	28.7	14.9	0.854	0.000	40	23.3	17.6	0.816	0.000
CB-4	285	95.0	280.7	1172.8	42773.3	48	27.0	42.0	0.823	0.002	42	22.7	30.9	0.797	0.001
CB-5	207	69.0	86.0	851.8	13106.3	58	34.3	46.2	0.934	0.000	48	29.7	24.9	0.911	0.000
CB-6	28	9.3	16.9	115.2	2573.9	16	8.0	8.0	0.986	0.000	13	7.0	4.7	0.983	0.000
CB-7	56	18.7	33.6	230.4	5113.8	22	11.7	4.2	0.938	0.001	19	10.0	2.0	0.921	0.002
CB-8	114	38.0	366.0	469.1	55778.0	39	18.3	77.6	0.851	0.000	35	16.7	57.6	0.847	0.000
CB-9	17	5.7	9.6	70.0	1456.3	12	5.3	10.9	0.982	0.001	11	5.0	8.0	0.977	0.001
CB-10	64	21.3	90.9	263.4	13851.4	31	12.3	33.6	0.917	0.000	23	12.0	28.7	0.916	0.000
CB-11	208	69.3	38.9	855.9	5926.6	31	16.0	14.0	0.780	0.010	23	14.3	6.2	0.772	0.009

Part II - Intertidal Cable Crossing Area Sampling

Methods

Sampling of the intertidal cable crossing area was conducted on July 15, 2011 between 1:00PM, shortly after high water, and the 6:00PM -0.3 ft low tide (05:34AM LDT -1.0 L 11:35AM LDT 18.8 H 05:51PM LDT 0.3 L – NOAA Tide Prediction Station at Eastport, Maine).

Sampling was conducted at three levels within the intertidal zone: 1) upper intertidal (H), 2) mid-intertidal (M), and 3) lower intertidal (L). Three subsets with three replicates each were sampled within each level, thus nine (9) samples were collected within each level for a total of twenty-seven (27) and labeled as shown in Figure 4. A panoramic overview photo and photos of the various intertidal sampling levels of the CB intertidal cable crossing area are shown in Figures 5-8.

Within each subset of each sampling level a 0.25m^2 (0.5m/side) ½-inch PVC pipe frame was randomly tossed "behind the back" to avoid visual bias of the area to be sampled. Prior to sampling, a pre-sampling photo was taken of all sampling stations with frame and station label in place. Where present, all flora (rockweeds) within the frame were removed by cutting down to the base of the holdfast with either scissors or a knife and the collected material placed in a pre-labeled plastic bag. On hard substrate, following removal of the rockweed, all organisms within the frame were removed either by picking with forceps or scraping with a narrow paint scrapper or knife. In softer sediment where coring was allowed, similar to subtidal sediment sampling, core samples were collected using 10cm (4 in.) diameter PVC pipe coring devices and samples processed as described above under Subtidal Benthic Infauna Sampling. All removed material, picked, scraped, or sieved, was placed in one or more pre-labeled 1000ml Nalgene containers and 10% buffered formalin added to cover the organisms. Following collection of all flora and fauna, a post-sampling photo was taken of each station with frame and station label in place.

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Figure 4. Intertidal sampling scheme and station labeling

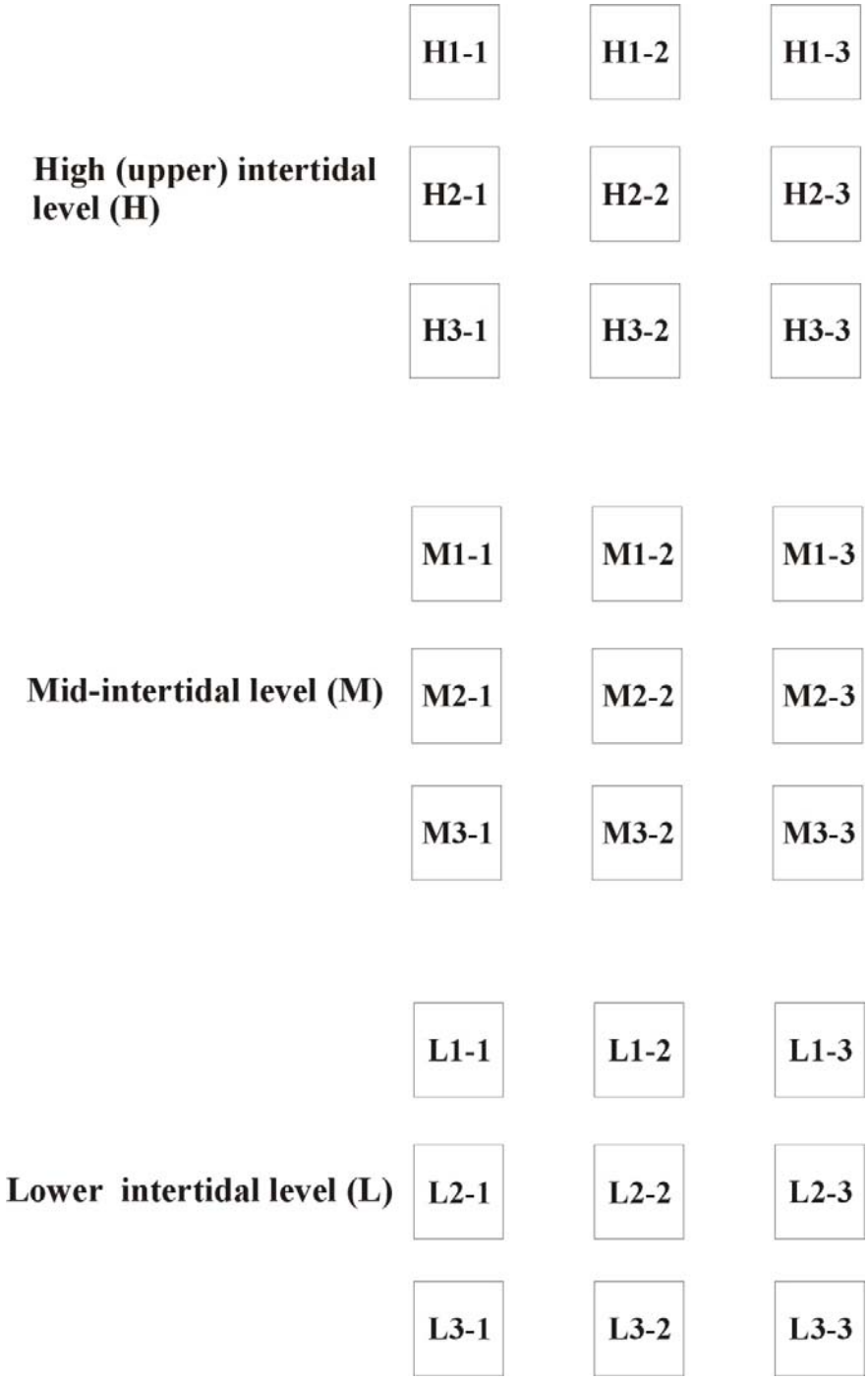

Figure 5. Panoramic view of intertidal cable crossing area

Figure 6. Upper (H) intertidal sampling level

Figure 7. Middle (M) intertidal sampling level

Figure 8. Lower (L) intertidal sampling level

At the completion of on-site sampling, wet-weight of all rockweed samples (including associated fauna, *e.g.* periwinkles) was measured using a Mettler Toledo BD601scale (600g ± 0.01g) tared for a 8 inch aluminum pie pan; some samples required multiple partial weighing. Following weight measurement and recording, the rockweed was placed in an 80cm by 46cm by 29cm fish tote partially filled with freshwater and swirled and agitated to remove all associated organisms. The rockweed was then removed and discarded and the contents of the fish tote poured through a 500µm mesh screen; material retained on the screen was then transferred to the Nalgene container corresponding to the station and replicate. All collected material was placed in one or more pre-labeled 1000ml Nalgene containers and 10% buffered formalin added to cover the organisms.

Once at the lab, each sample was poured onto a 500µm mesh screen and rinsed. All large organisms, *e.g.* mussels and snails, were removed, identified, enumerated, and transferred back into the Nalgene container with 70% ethanol (ETOH) for archiving. The remaining small organisms were transferred into smaller Nalgene containers for subsequent microscopic identification and enumeration. Organisms collected from the samples have been identified to the lowest practical taxonomic level and enumerated under an Olympus SZ-60 stereoscopic dissecting scope to 63x power. Data resulting from the sample processing have been entered into an Excel® spreadsheet developed by MER that calculates statistics for abundance, taxa richness, and relative diversity (Shannon-Weiner Index, H'). Standard operating procedures for the collection and processing of intertidal benthic infauna samples is the same as that for the subtidal benthic infauna samples (refer to Appendix I).

Results

The upper (high) intertidal area (H) is composed of loose rocks overlying pebbles (see Figure 6). The rocks and pebbles at this upper level of the intertidal area appear subject to shifting, either from currents or waves affecting the area. No flora (other than dead/drifting) or fauna were observed in any of the three sub-sampling levels (H1, H2, and H3) within this area.

The mid-intertidal area (M) consists of a shallow layer of rocks, pebbles, and very coarse sand over a sticky marine clay base. The clay appears to provide some sediment stability within this level compared to the upper level, thus allowing it to support flora and fauna, albeit still limited and patchy (see Figure 7). The flora is rockweeds, *Fucus* spp. and *Ascophyllum nodosum*. Epifauna observed during field sampling include barnacles, *Balanus balanoides*, blue mussels, *Mytilus edulis*, and common periwinkle, *Littorina littorea*.

The lower intertidal area (L) has a sediment composition similar to that of the mid-level area, but with slightly softer silt, *i.e.* mud layer, as is evident from the post-sampling photographs (refer to Appendix III). Flora is restricted to rockweed, *Fucus* spp., and is present at the L-1 and L-2 sublevels although it remains patchy and short, but is absent from all three frames in the lowest L-3 sublevel. The epifauna is dominated by blue mussels, *Mytilus edulis*, which are abundant except at the lowest sublevel (L-3) where they are absent, likely due to greater predation. Other fauna include common periwinkles, *Littorina littorea*, dog whelks, *Thais lapillus*, barnacles, and slipper shells, *Crepidula fornicata*.

Due to the coarseness of sediments in the upper (H), no benthic cores were taken. Benthic cores were taken at all of the nine stations in the middle level (M); however, the sticky clay did not allow deep penetration of the corer. In the lower level (L) a superficial covering of soft mud overlaid a hard stone base and no benthic cores could be taken; however, benthic infauna were collected during the washing of the rockweed collected from the L-1 and L-2 level stations. Where taken, benthic infauna core samples were collected using the same methods for collection and preservation described above for the subtidal benthic cores.

A summary of observations of the intertidal habitat and associated flora and epifauna is included in Table 3, below. Table 4, below, summarizes the *Fucus* spp. and *Ascophyllum nodosum* biomass data for the rockweed collected from the intertidal samples. Pre- and post-sampling photos of each intertidal sampling station are included here as Appendix VI. Table 5 shows a summary of the intertidal epibenthic fauna collected during the survey, details of which are included as Appendix VII. Table 6 shows a summary of the intertidal benthic infauna collected during the survey from cores and rockweed washing, details of which are included as Appendix VIII.

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Table 3. Cobscook Bay intertidal habitat and epifauna community

Tide level	Photo #	Sediment type	Latitude/Longitude	Common name	Scientific name	Relative abundance
Upper (H)	**Append. VI**	**Loose stone**	**44 54.227N/67 03.275W**	**Flora** No flora **Fauna** No discernable fauna	 None None	 None None

Tide level	Photo #	Sediment type	Latitude/Longitude	Common name	Scientific name	Relative abundance
Mid (M)	**Append. VI**	**Stone, gravel, coarse sand over "sticky" clay base**	**44 54.236N/67 03.266W**	**Flora** Rockweed **Fauna** Common periwinkle Blue mussel Barnacle	 *Fucus* spp. *Ascophyllum nodosum* *Littorina littorea* *Mytilus edulis* *Balanus balanoides*	 common (M1, M2/occ./rare (M3) abundant/rare (M3)/rare (M2, M3) rare (M2), absent (M1, M3) abundant/rare (M1, M3)/rare (M2) rare (M1, M2, M3)

Tide level	Photo #	Sediment type	Latitude/Longitude	Common name	Scientific name	Relative abundance
Lower (L)	**Append. VI**	**Stone, gravel, clay, silt**	**44 54.246N/67 03.251W**	**Flora** Rockweed **Fauna** Common periwinkle Slipper shell Dog whelk Blue mussel Barnacle	 *Fucus* spp. *Littorina littorea* *Crepidula fornicata* *Thais lapillus* *Mytilus edulis* *Balanus balanoides*	 common/abundant (L1, L2)/rare (L3) common (L1, L2, L3) rare (L2), absent (L1, L3) rare (L3, L3), absent (L3) abundant (L1, L2, L3) rare (L1), absent (L2, L3)

Table 4. CB Grove (Gove) Point *Ascophyllum/Fucus* biomass measurements

Station/Rep	Biomass (kg)	Comments
H-1-1	0.00	No organisms removed
H-1-2	0.00	No organisms removed
H-1-3	0.00	No organisms removed
Mean	**0.00**	
S.D.	**0.00**	
Variance	**0.00**	
H-2-1	0.00	No organisms removed
H-2-2	0.00	No organisms removed
H-2-3	0.00	No organisms removed
Mean	**0.00**	
S.D.	**0.00**	
Variance	**0.00**	
H-3-1	0.00	No organisms removed
H-3-2	0.00	No organisms removed
H-3-3	0.00	No organisms removed
Mean	**0.00**	
S.D.	**0.00**	
Variance	**0.00**	
M-1-1	0.54	No organisms removed
M-1-2	1.51	No organisms removed
M-1-3	1.01	No organisms removed
Mean	**1.02**	
S.D.	**0.49**	
Variance	**0.24**	
M-2-1	0.00	No organisms removed
M-2-2	1.02	No organisms removed
M-2-3	0.29	No organisms removed
Mean	**0.44**	
S.D.	**0.53**	
Variance	**0.28**	

Station/Rep	Biomass (kg)	Comments
M-3-1	0.31	No organisms removed
M-3-2	0.07	No organisms removed
M-3-3	0.05	No organisms removed
Mean	**0.15**	
S.D.	**0.14**	
Variance	**0.02**	
L-1-1	0.23	No organisms removed
L-1-2	0.16	No organisms removed
L-1-3	0.05	No organisms removed
Mean	**0.15**	
S.D.	**0.09**	
Variance	**0.01**	
L-2-1	0.06	No organisms removed
L-2-2	3.01	No organisms removed
L-2-3	0.36	No organisms removed
Mean	**1.14**	
S.D.	**1.63**	
Variance	**2.65**	
L-3-1	0.00	No organisms removed
L-3-2	0.00	No organisms removed
L-3-3	0.33	No organisms removed
Mean	**0.11**	
S.D.	**0.19**	
Variance	**0.04**	

Table 5. Summary of intertidal epibenthic fauna analysis Cobscook Bay (Refer to Appendix VII)

	Total organisms			Abundance (#/m^2)		Species Richness			Species Rel. Div.		Family Richness			Family Rel. Div.	
Station	Total	Mean	Var.	Mean	Var.	Total	Mean	Var.	Mean	Var.	Total	Mean	Var.	Mean	Var.
CB-H-1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
CB-H-2	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
CB-H-3	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
CB-M-1	1550	516.7	25598	2067	415961	9	6.7	0.2	0.538	0.001	9	6.7	0.2	0.538	0.001
CB-M-2	1247	415.7	8116	1663	129860	9	6.7	1.6	0.382	0.073	9	6.7	1.6	0.382	0.073
CB-M-3	588	196.0	7059	784	112939	4	3.7	0.2	0.647	0.001	4	3.7	0.2	0.647	0.001
CB-L-1	1646	548.7	22348	2195	357572	6	4.0	0.7	0.363	0.009	5	3.7	0.2	0.371	0.007
CB-L-2	2530	843.3	407843	3373	6525486	9	5.7	2.9	0.306	0.023	8	5.3	4.2	0.325	0.021
CB-L-3	260	86.7	4321	347	69134	5	3.3	0.2	0.699	0.010	4	2.7	0.22	0.749	0.031

Table 6. Summary of intertidal benthic infauna analysis for cores taken at Cobscook Bay (Refer to Appendix VIII)

	Total organisms			Abundance (#/m^2)		Species Richness			Species Rel. Div.		Family Richness			Family Rel. Div.	
Station	Total	Mean	Var.	Mean	Var.	Total	Mean	Var.	Mean	Var.	Total	Mean	Var.	Mean	Var.
CB-H-1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
CB-H-2	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
CB-H-3	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
CB-M-1	268	89.3	851	1103	129675	5	3.7	1.6	0.702	0.048	5	3.7	1.6	0.702	0.048
CB-M-2	182	60.7	20.2	749	3082	4	3.3	0.2	0.668	0.031	4	3.3	0.2	0.668	0.031
CB-M-3	263	87.7	1918	1082	292234	4	3.0	0.7	0.531	0.062	4	3.0	0.7	0.531	0.062
CB-L-1[1,2]	2038	1019	330625	12580	$6.8\ 10^7$	6	5.5	0.3	0.223	0.000	6	5.5	0.3	0.223	0.000
CB-L-2	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
CB-L-3[2]	5	1.7	1.6	20.6	237	3	1.0	0.7	0.500	0.250	3	1.0	0.7	0.500	0.250

[1] CB-L-1 Reps 1 and 2 combined include 1,809 oligochaetes explaining the apparently anomalously large number of Total Organisms
[2] Only duplicate samples processed, not triplicate

Discussion

By design, the deployment area and adjacent subsea cable crossing area of the ORPC CB site are subject to extremely strong tides, indeed, some of the strongest tides in the world. Consequently, the bottom throughout most of the area, with the exception of the nearshore area where currents are generally weaker, is hard and consists predominantly of cobble, gravel, and hard-packed shell hash with occasional large rocks or boulders. The epibenthic community found in the strongest current area is restricted to forms that are either capable of anchoring themselves to the bottom, *i.e.* echinoderms such as sea urchins, sea cucumbers and star fish, or those that are firmly attached or encrusting, *i.e. Boltenia ovifera*, the stalked tunicate attached by a holdfast, anemones, and encrusting sponges. This community structure is typical of high current areas in Cobscook Bay and is essentially the same as that previously observed in lower Cobscook Bay and Western Passage.

The remarkable difference between the Cobscook Bay site and other high current areas previously studied within the region is the existence of what one of the divers described as "cobble waves" found along Transect 2 between stations 11 and 9. These appear to be similar to sand waves often seen on beaches, the difference being the coarseness of the sediment, here measured in centimeters compared to millimeters at a beach, and the amplitude of the waves, here measured in meters (feet) rather than centimeters (inches). These reported observations are consistent with differences seen in bathymetric studies conducted by CR Environmental comparing depths across the site between December 2010 and October 2011 (Christopher Wright, pers. comm.). The sediment within these wave areas apparently shifts rather frequently, thus making attachment on all but the largest structures, *i.e.* large rocks and boulders, temporary, if not impossible. Indeed, the attached fauna, particularly *Boltenia* and the red northern anemone, *Urticina* (*Tealia*), are often seen to occur in dense clusters resembling meadows on the vertical sides of permanent structures, such as large rocks and boulders.

In the subsea cable crossing areas that are subject to moderately strong currents the bottom remains hard with coarse sediment and the epibenthic community is still composed primarily of echinoderms and fixed tunicates. However, the species change slightly with reduced current velocity; for example sea peaches, *Halocynthia pyriformis*, become progressively more prevalent, eventually replacing *Boltenia* in the shallower and weaker current areas. Similarly, spiny sunstars, *Solaster* (*Crossaster) papposus*, and the purple sunstar, *Solaster endeca*, begin to mix with the large sea stars, *Asterias* spp., and smaller *Henricia* sp. and/or *Pontaster* sp. and green sea urchins become common where currents moderate.

Soft sand and silt bottom is confined to within 200 to 300 meters of the low water mark in the area where currents are generally weaker and deposition can occur. Green sea urchins and sea cucumbers remain common to abundant over this area but the soft sediment layer is deep enough to allow burrowing cerianthid anemones, *Cerianthus borealis*, to become established. Waved whelks, *Buccinum undatum*, also become common over the softer bottom.

With the exception of this softer, nearshore bottom, the sediment composition over much of the sampling area made collection of accurate benthic cores difficult to near impossible with some being "scooped" into the corer by hand by the diver. The benthic infauna data from these cores therefore need to be treated as semi-quantitative and generally characterizing the benthic infauna community rather than strictly quantitative.

The benthic infauna samples collected along the subtidal cable routes in Cobscook Bay contain 127 species representing 90 families, which compares closely to the 131 species representing 78 families found in a similar study in lower Cobscook Bay and Deep Cove in 2009 and is again indicative of the biological and functional diversity for which Cobscook Bay and the region is renowned. As found elsewhere in Cobscook Bay, the subtidal benthic infaunal community is numerically dominated by polychaetes which represent 51% of the organisms found; most represent, in rank order, the families Cirratulidae, Paraonidae, Spionidae, Syllidae, Lumbrineridae, Ampharetidae, and Opheliidae, all families normally found in clean environments with sandy to coarse sediments. Other polychaete families represented include Capitellidae, Phyllodocidae, Polynoidea, Sigalionidae, Nephtyidae, Terebellidae, and Orbiniidae. Molluscs, dominated by *Mytilus edulis*, represent 13.1% of the organisms. Crustaceans account for 11.9% of all organisms and are dominated by amphipods which represent 8.0% of the organisms found; these belong, in rank order, to the families Corophiidae, Phoxocephalidae, Aoridae, Ampeliscidae, and Haustoriidae. Oligochaetes represent 3.1% of the organisms. Combined, these taxa represent 1,449 of the 1,672, or 86.7% of the organisms found in the samples.

The intertidal cable crossing area is hard, generally consisting of small rocks, cobble, gravel and small pebbles and rock fragments (see photos in Appendix VI). The upper intertidal level consists entirely of small rocks overlaying a layer of small rock fragments indicative of an area subject to dynamic conditions, specifically wave action; this upper level is exposed for prolonged periods and is therefore subject to desiccation, explaining the lack of flora and fauna. Sediment composition in the middle intertidal level is similar to the upper level, consisting of small rocks over a layer of small rock fragments in turn over a sticky marine clay base. Being submerged for half of the tide cycle, the area supports limited flora in the form of rockweed, both *Fucus* sp. and *Ascophyllum* sp., that provides habitat and protection from desiccation for a limited epibenthic faunal community consisting of small blue mussels and small periwinkles (most of which are not of commercial size) and amphipods. The eighteen (18) ¼m^2 frame samples contain 7,821 organisms representing 19 species and 16 families. These are dominated by 4,039 periwinkles, *Littorina* spp., (many as recent recruits [L-2-2] measuring 1 to 2 mm in size) and 2,118 blue mussels, *Mytilus edulis*, (including numerous recent recruits were also found in the 2 to 3 mm size range) representing 51.3% and 27.1% of the organisms found, respectively. Other epifauna include the amphipod *Hyale* sp., 9.6% and the isopod, *Idotea* sp., 6.6%. Combined, these species represent 94.6% of all intertidal epifauna found in the samples.

The benthic infaunal community is also limited with only 7 taxa represented, almost entirely dominated by oligochaetes representing 84.7% of the 2,756 infauna organisms found in the 15 core samples. Other infauna include nematodes, 7.4%; nemerteans, 5.9%; bivalves, Myidae, 1.3%; and polychaetes, Capitellidae, <1%.

Potential impacts to habitat and communities

The placement of permanent or semi-permanent support structures for hydrokinetic devices in or on the bottom within the deployment area will result in permanent or long-term temporary loss of the existing habitat and the associated community within the structures' footprint. The epibenthic community, with the exception of the sessile forms permanently attached to larger structures, *i.e.* boulders, is composed primarily of mobile, albeit slow moving, echinoderms, *i.e*. sea stars, sea cucumbers, sea urchins. These organisms are unlikely to be able to move quickly enough to avoid disturbance or crushing by structures placed on the bottom and some loss can be expected. However, based on the observation that all large, fixed surfaces, especially those in deep water, are covered by attached forms including *Boltenia*, *Halocynthia*, *Urticina* (*Tealia*) and encrusting sponges, *Halichondria*, it is doubtless that these forms will quickly cover any and all exposed surfaces of structures installed in the area unless treated with antifoulants. Consequently, while there may be some loss of coarse sediment habitat within the immediate footprint of the support structures, the exposed, untreated portion of the structures will represent additional habitat for colonization by these sessile forms.

The installation of the power and data transmission cable will result in disturbance to the bottom along the cable route that will result in displacement and/or burial of sediments and their associated epibenthic and benthic infauna communities. However, given the coarseness of most of the bottom and the nature of the epibenthic and benthic infauna community structure, these impacts should be limited and of relatively short duration. In fact, portions of the bottom, and particularly those subject to the strongest currents, appear to shift naturally with the currents, therefore any shifting resulting from mechanical disturbances associated with installations are not an uncommon occurrence. As in the deployment area, the epibenthic community along the cable route, with the exception of the sessile forms permanently attached to larger structures, *i.e.* boulders, is composed of mobile, albeit slow moving, echinoderms. As with placement of support structures on the bottom, these organisms are unlikely to avoid disturbance, crushing or burial by a cable-laying plow moving through and over the bottom but, once the disturbance ceases, the bottom should quickly stabilize and these species will quickly recolonize the disturbance area since they are ubiquitous in Cobscook Bay, including the immediately surrounding area.

Within the intertidal area sediments are generally coarse, consisting primary of small rocks overlying pebbles and coarse sand in the upper levels or sticky marine clay in the middle and lower levels. This intertidal habitat supports only sparse flora consisting of patchy rockweed, *Fucus* sp. and *Ascophyllum nodosum*. Similarly, the epifauna is sparse, consisting predominantly of small, apparently stunted, blue mussels, *Mytilus edulis*, and snails, the periwinkle, *Littorina littorea*, and dog whelks, *Thais lapillus*. As with the subtidal species, these species are either fixed or slow-moving and will therefore likely be damaged or lost during substrate disturbances associated with the burial of the cable through the intertidal area. However, these are extremely common species within Cobscook Bay, as well as regionally, and an abundant source of organisms exists within the immediate area to provide recruits to quickly recolonize the area, either through immigration from nearby surrounding areas or recruitment as suggested by the large number of small recent recruits found in the lower subtidal areas. It therefore seems

reasonable to assume that any impacts to the benthic community within the intertidal area should also be limited and temporary.

No endangered, threatened, or unusual species were observed within the project area. The only invasive species observed is the "pancake batter" tunicate, *Didemnum vexillum*, which is quickly becoming widespread within Cobscook Bay (pers. observation).

Existing uses and impacts

As elsewhere in Cobscook Bay, existing uses of the CB site and the surrounding area include commercial fishing for sea urchins, scallops, and sea cucumbers using bottom drags, or dredges. Dragging is usually prohibited in designated cable areas such as those through which the ORPC cable will be routed; agreements regarding such restrictions or prohibitions have already been reached with local area fishermen. However, intensive dragging does occur seasonally in the area of Birch Point and Moose Island, just to the north and east of the CB site and in South Bay to the west, just around Grove (Gove) Point and the North Lubec peninsula. This dragging activity results in substantial direct disturbance of the seafloor surface that leads to resuspension and redistribution of softer sediments (Trott, 2004); (see Figure 9). As previously reported, MER's experience with the monitoring of the salmon aquaculture industry over the past 20+ years has shown that video recording of the bottom within Cobscook Bay is rendered nearly unfeasible once dragging season begins due to decreased visibility resulting from the elevated turbidity. As the resuspended sediments and benthic infauna settle back onto the bottom, some localized change in sediment composition and benthic organism distribution is inevitable.

Figure 9. Aerial photo of South Bay showing scallop draggers and associated sediment plume

(Source: Laurice Churchill, Maine Dept. of Marine Resources)

Two salmon aquaculture sites previously existed between the Lubec shoreline and the ORPC deployment area. These were designated Gove North 1, located just south of the cable crossing area leading to the shore, and Gove North 2 (GN2), located just north of the cable crossing area. Operations at these sites ceased in 2000 and the sites are no longer listed in the Maine Department of Marine Resources Cobscook Bay Aquaculture Lease Inventory www.maine.gov/dmr/aquaculture/leaseinventory/cobscookbay.htm. Another inactive, but listed, salmon net-pen aquaculture site exists just to the south of the CB site and is designated COB GS; however, no information is available for the site. An active salmon net-pen site currently exists off Birch Point (COB BE) but is not currently stocked with fish. None of the net-pen aquaculture sites are likely to be affected by either the installation or operation of the ORPC CB site and, conversely, none are likely to affect the CB site.

As previously suggested for other similar proposed installations in Cobscook Bay, changes in the benthic community could occur within the deployment and cable crossing area that would be unrelated and unattributable to either the installation or operation of the ORPC project. Indeed, the impacts or changes attributable to the surrounding activities, *e.g.* dragging activity, could be orders of magnitude greater than those attributable to the installation and operation of tidal power generation units and the cable. Furthermore, designated Cable Areas exist all along the coast of Maine, including just south of the CB site between Deep Cove in Eastport and the eastern shore of the North Lubec peninsula; we are not aware of any reports of long-term habitat degradation or benthic community disturbances associated with them. Indeed, in certain cases, Cable Areas reportedly serve as sanctuaries or conservation zones, particularly for scallops, as a result of the prohibition on dragging in these areas.

Conclusions

The placement of support frames and other structures on the bottom within the deployment area will result in loss of habitat within the specific footprint of the structures; this loss of habitat will persist as long as the structures remain in place. However, the exposed surfaces of fixed structures that are not treated with antifoulants will provide hard substrate replacement habitat for colonization by epibenthic forms which are common to abundant in the area; the created habitat will likely more than compensating for the lost habitat. There will also be some loss of organisms to crushing or burial within the footprint area at the time of structure placement; however, again, colonization of the exposed surfaces of the structures will likely more than compensate for these losses. Indeed, any losses of habitat and organisms associated with the placement of project-related structures will involve a comparatively small area relative to similar habitat and community structure in the broader surrounding area within Cobscook Bay.

Disturbance to the bottom sediments during installation of the power and data transmission cable will result in displacement and possible loss of both epibenthic and benthic infauna organisms. However, since exceptionally dynamic conditions exist naturally within much of the site due to the strong tidal currents, disturbances to surface sediments appear normal and the disturbed area will likely recover quickly and reestablishment of the benthic community should also occur quickly by immigration and recruitment from the immediate, unaffected surrounding area since the species subject to disturbance are generally ubiquitous and plentiful

within the area. Recovery within the nearshore area where sediments are softer may take slightly longer, but should nevertheless occur rather quickly. Reestablishment of certain species that reproduce and recruit only at specific times of the year may be delayed depending on the time of year when the disturbance occurs.

Given the sparse flora and fauna over most of the intertidal area, loss of habitat and fauna should be minimal and there should be no loss of either in the upper intertidal area. In view of the generally small size of both the periwinkles and mussels in the middle and lower intertidal area, any temporary loss of these resources will have little, if any, impact to the commercial fisheries of the area; loss of biological function should similarly be small and temporary given the large number of small recruits of both *Mytilus edulis* and *Littorina* found at the site.

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http://woodshole.er.usgs.gov/project-pages/stellwagen/didemnum/

Appendix I

MER Assessment Corporation Standard Operating Procedures (SOP)s for benthic sampling and processing

MER Assessment Corporation
Standard Operating Procedure (SOP) 001-D
Benthic core collection by Diver
Revision 0, 9 January 2006

1. Once the diver has selected the location for replicate, *e.g.* 5m Rep #2, all three cores marked #2 are removed from the vinyl-clad wire sampler carrier basket and placed open end down onto the sea floor;
2. Once aligned, all three samplers are pushed into the sediment to either full depth or full resistance, whichever is reached first.
3. Once inserted, the diver slides a gloved hand along the side of the PVC corer until he reaches the bottom at which point the corer is tipped within the sediment to allow the gloved hand to be inserted under the corer, thus maintaining the contents in the corer. With hand in place, the corer is removed from the sediment and the tethered end cap placed over the open end of the corer.
4. The corer is always maintained in the upright position (permanently fixed cap up) and placed back into the vinyl-clad wire carrier.
5. The sequence is continued until all samples at all replicate locations are collected and placed in the carriers.
6. When only sediment chemistry sampling is required, consisting of simply three corers, one taken at each of the replicate locations, the diver can easily return the carrier to the surface himself. If, on the other hand, full sampling is carried out requiring a total of nine (9) cores, the carrier baskets are clipped either into the thimble at the end of the transect line along with the tag line, or into the loop tied into the transect line;
7. The carriers are then gently hauled to the surface as the transect line is retrieved off the bottom.

Note: Except in extremely soft, nearly flocculent, bottom conditions it is difficult to obtain a full 10-15 cm sediment core due to water pressure build up within the corer as it is inserted into the bottom, even if slightly vented and inserted slowly, and due to friction of the soft sediment against the inner wall of the PVC corer. It is more common to obtain 5-6 cm of sediment. On hard-packed or coarse bottom types, direct, vertical insertion of the corers is virtually impossible, and a slightly oblique angle toward the bottom is taken to insure collection of at least the top 4-5 cm of bottom surface material; in gravel conditions coring is essentially impossible and surface scrapings of the top 3-4 cm of bottom material. It should be noted that the DEP has now recognized the difficulty posed by such coarse bottom conditions and, in conjunction with the DMR is now reviewing all sites to determine which site might be exempted from sediment chemistry measurements; to date at least three sites have received such exemption.

Revision 0
Date: 9 January 2006

MER Assessment Corporation
Standard Operating Procedure (SOP) 001-R
Benthic core collection by Remote PONAR Drop
Revision 0, 9 January 2006

1. Prior to deployment the swivel shackle connecting the Ponar sampler to the retrieval line must be verified to be straight and not cocked, which would result in improper, oblique contact with the bottom, and the sample securing screens verified as being securely in place.
2. In soft bottom conditions, when properly deployed in a near vertical drop through the water column onto the bottom, the Ponar sampler collects a complete bottom sample that reaches fully to the covering screens. In such case, as many as three full cores can be recovered from the single sample collection, the ideal situation since the full triplicate set comes from a single location.
3. a) If the sampling calls only for redox and sulfide measurement, a 4 in. diameter core imprint is made on the sediment surface and half the circle is scooped out to a depth of approx. 2 cm with a plastic spoon and placed in a 125 ml mixing container for redox measurement and extraction of the sulfide subsample;
   b) If additional sediment chemistry analyses are required, the second half of the circle is partly collected for metal analysis and placed in a pre-labeled *Whirl-Pak*® and the other portion scooped out to a depth of 2 cm for TOC/TON analyses placed in a pre-labeled *Whirl-Pak*® (refer to MER LW-728 (LB-12 Chain of Custody and Labeling techniques Page 34/208);
   c) If additional full cores are required for benthic infauna and granulometry, two corers are set on the sediment surface within the Ponar, either two on one side and one on either side, thus leaving one area open in addition to the area already sampled for sediment chemistry.
4. The plastic corers are inserted into the bottom at a slight oblique angle due to the curve of the Ponar clam shell walls; a gloved hand is inserted into the open slot and slip under the first corer and sediment pushed up into the corer as fully as possible and the corer removed with hand in place.
5. The same procedure is repeated for the other corer, excepting that the gloved hand must be inserted under the center support bar of the Ponar making removal of the corer somewhat more difficult.
6. As with diver collected cores, the corers are always maintained in the upright position to avoid sloughing or mixing of the sediment core.

Note 1: In hard-packed bottoms it is sometimes difficult to collect sufficient material to allow collection of a single core imprint and two full cores; it is therefore sometimes necessary to make repeated drops in order to secure sufficient material for full sample collection. Although re-sampling the same hole previously sampled is to be avoided (and is rather unlikely), every effort is made during repeated sampling of a replicate location to maintain the boat as close to station as possible based on GPS position or a weighted tag line making the location, or both.

MER Assessment Corporation
Standard Operating Procedure (SOP) 003
Benthic Sample Tracking, Sorting, and Identification
Revision 0, 9 January 2006

Sample Tracking

1. All sample containers carry the following identification label:

   Project: _____ Sample I.D. No. _____
   Sampling Date: _____ Site: _____
   Station: _____ Rep. No. _____
   Preservative: _____ Transfer Date: _____

   One ***external*** label will appear on the exterior of the sample container and a second ***internal*** label will be placed inside the container along with the sample.

2. In the initial sorting process, the container into which sorted organisms are placed will carry both an ***external*** and ***internal*** label identical to the one appearing on the original sample container. Any subsequent containers will likewise carry these labels. ***The internal label will remain with the sample at all times.***

3. If the project calls for separation of taxa, in the identification process, each vial or container representing a specific taxonomic group will contain the following label:

   Project: _____ Sample I.D. No. _____
   Sampling Date: _____ Site: _____
   Station: _____ Rep. No. _____
   Taxon: _____

All vials from a specific sample will be maintained together and placed in a container(s) bearing external and internal labels identical to those of the original sample container.

Benthic Collection

Samples are taken with a PVC pipe coring devices, which are inserted to a depth of 10 cm or full resistance whichever is greater. The contents of the cores are then washed through a U.S. Standard No. 35 sieve (500µ mesh), all material retained on the screen is transferred into pre-labeled plastic sample jars, and filled with 10% buffered formalin. Several drops of a 1% Rose Bengal staining solution are added to each sample to assist in the sorting of organisms. After 5 days of fixing in 10% Formalin, the formalin solution is decanted from the sample jars through a 1 mm mesh sieve and the formalin volume replaced with 70% ethanol to insure preservation of the organisms' integrity, particularly the bivalves and other calcareous forms. If a loss of stain occurs after transfer to 70% ETOH, samples will be re-stained prior to sorting.

Sample sorting

1. To ensure complete picking/sorting, samples are to be picked and scanned until no organisms have been found after two or three scannings, depending on the amount of detritus. Samples are magnified to aid the sorting process.

2. To prevent confusion and/or mixing of samples, only ***one (1)*** sample will be open at any given time. Samples are also processed by site.

3. All material from the original sample will be retained in the original container and archived for one year after the sampling date unless other arrangements are made.

Identification

1. Organisms present in sorted samples, are identified to the lowest practical taxonomic level. All samples are examined using a binocular microscope.

2. To prevent confusion and/or mixing of samples, only ***one (1)*** sample will be open at any given time. Samples are also processed by site.

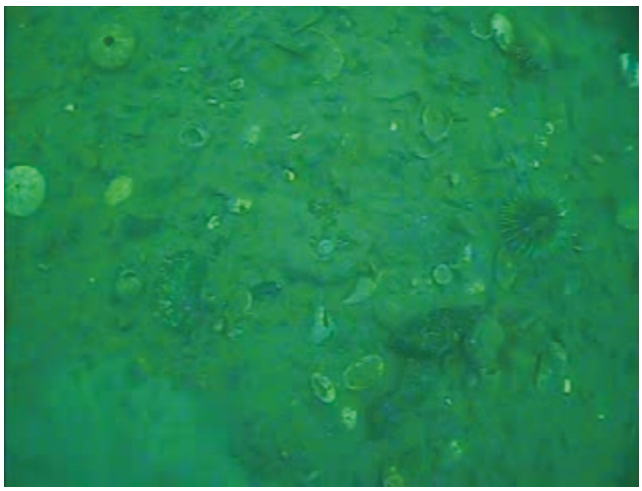
3. All organisms are returned to sample container and archived for future reference.

4. A minimum of 10% of the total samples collected, sorted and identified during a specific project will be checked for thoroughness of picking/sorting, and accuracy of enumeration and identification by the person responsible for QA/QC. If an error exceeds 5%, additional samples will be checked until an accuracy level of 95% is achieved

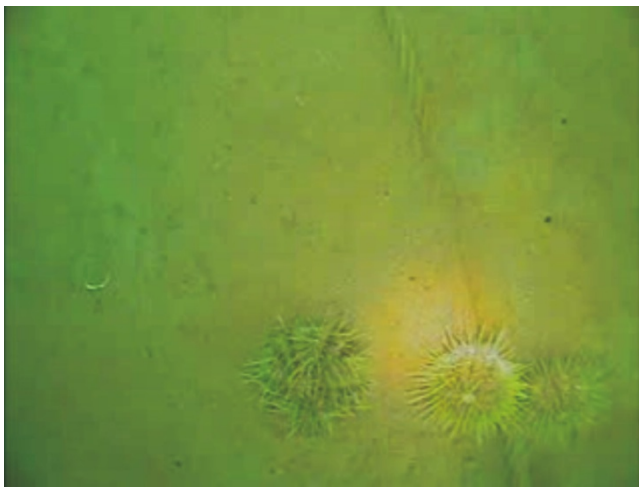
Revision 0
Date: 9 January 2006

Appendix II

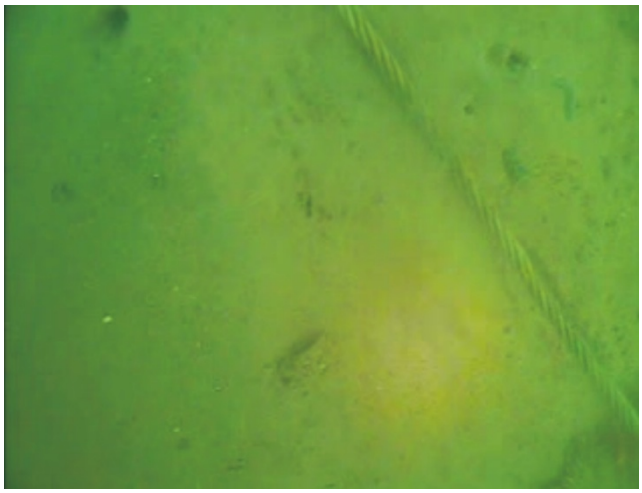
Still captures from video showing sediment type at specific locations along each transect in Cobscook Bay (CB)



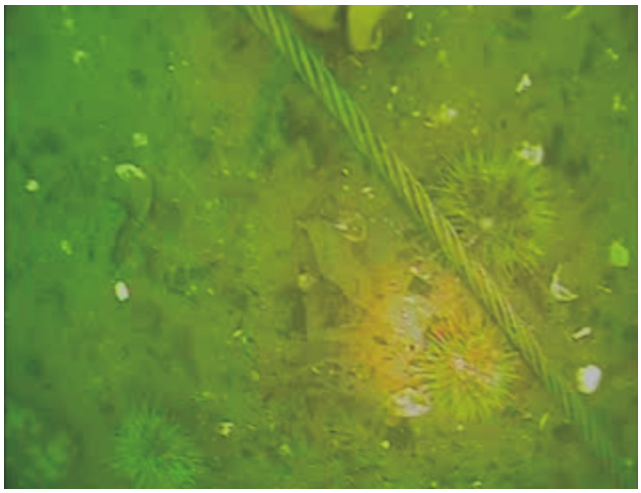
Station 1



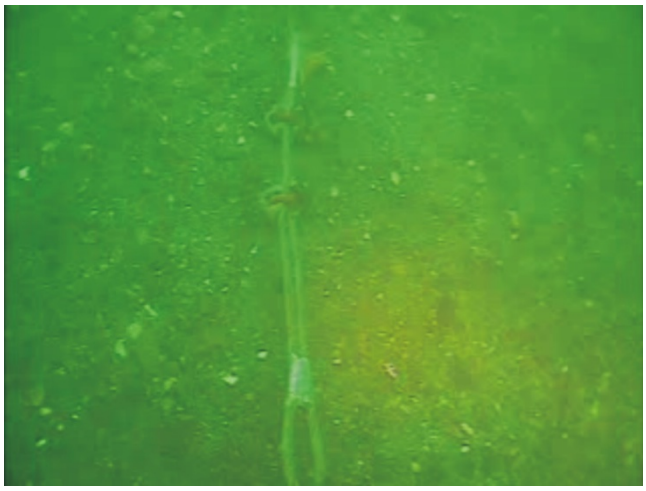
Between Stations 1 and 2



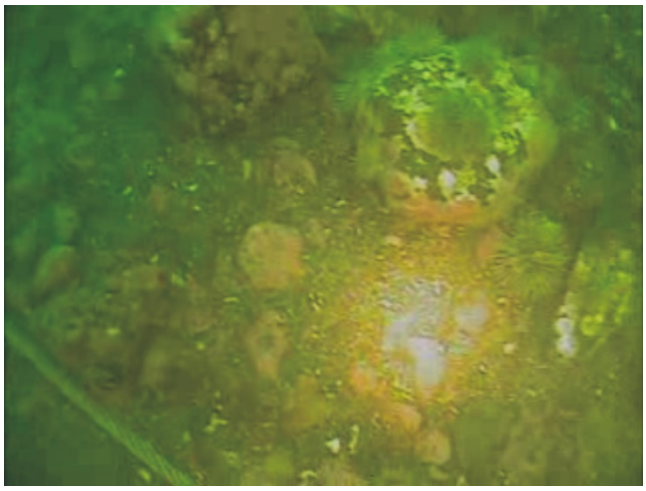
Station 2



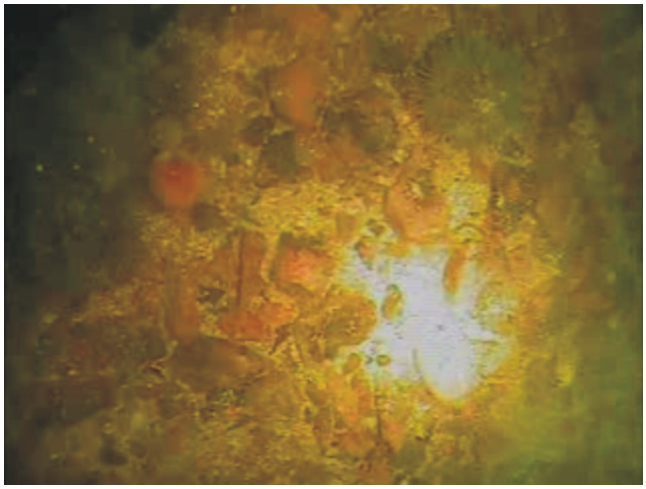
Between Stations 2 and 3



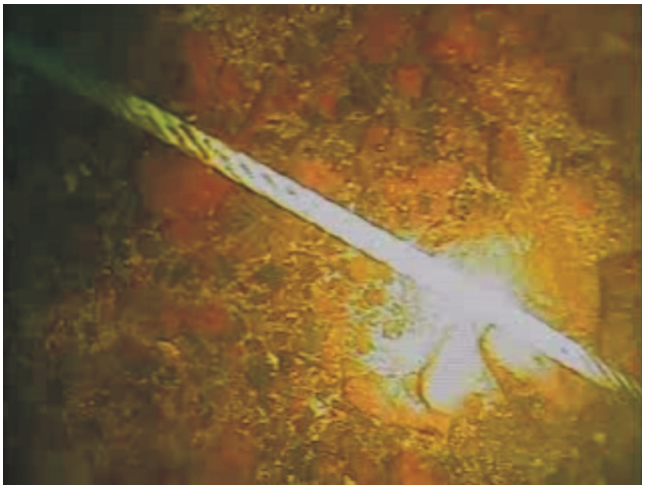
Station 3



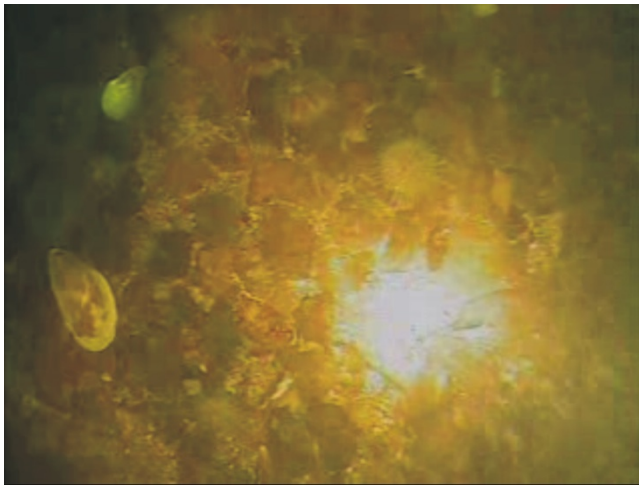
Between Stations 3 and 4



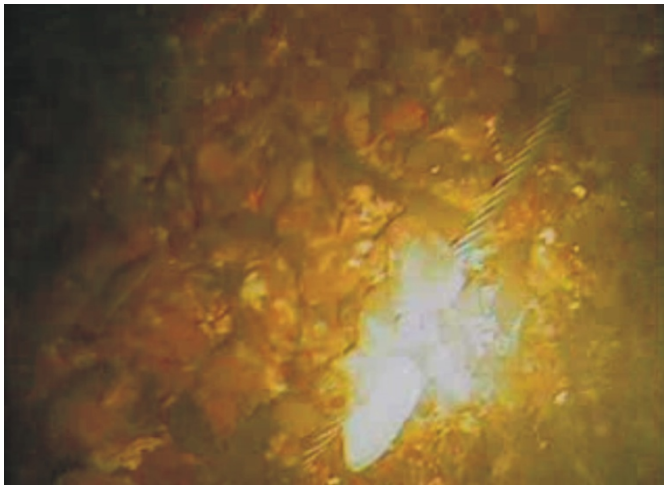
Station 4



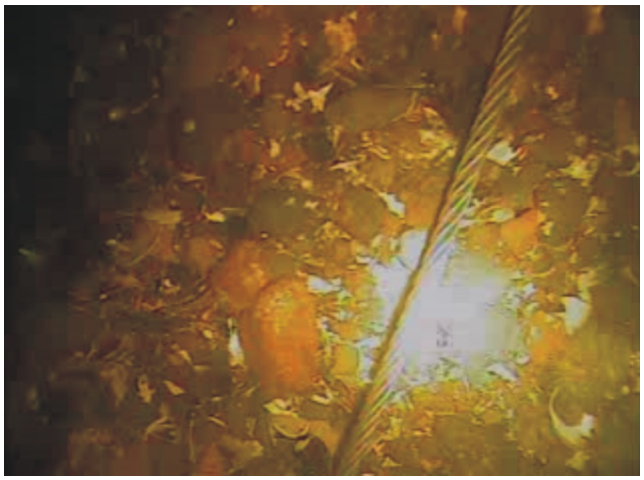
Between Stations 4 and 5



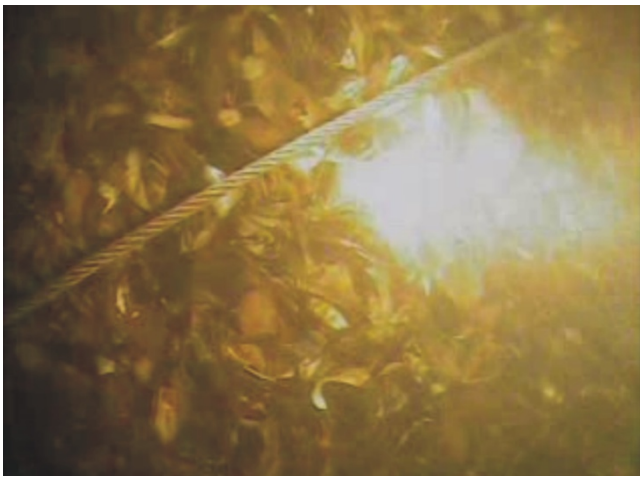
Station 5



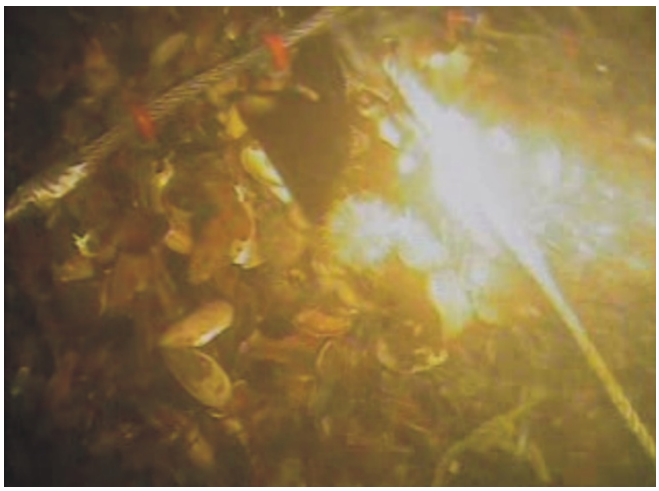
Between Stations 5 and 6



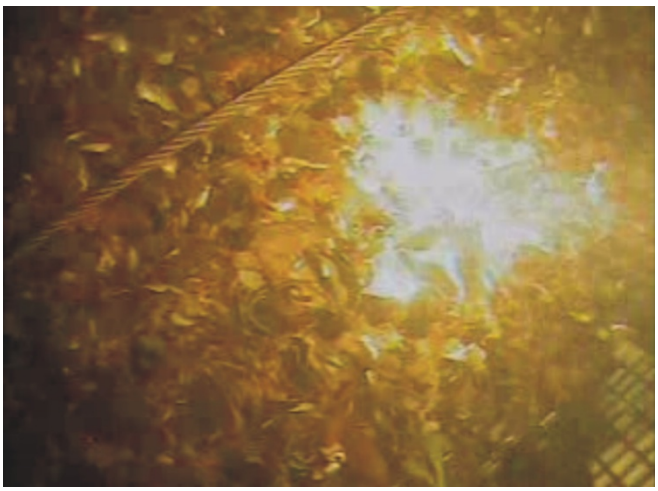
Station 6



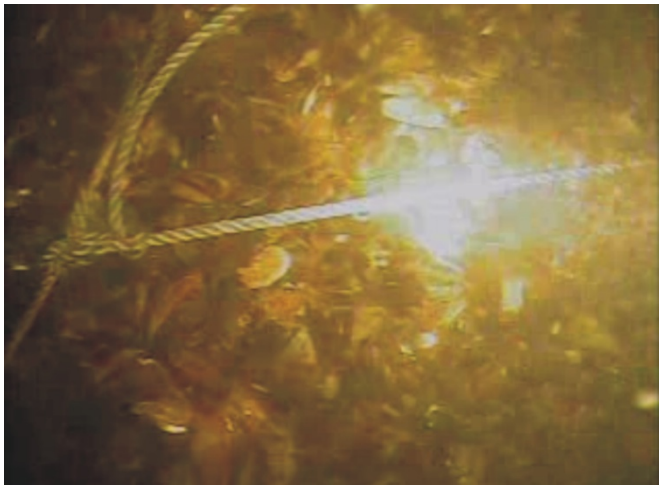
Between Stations 6 and 7



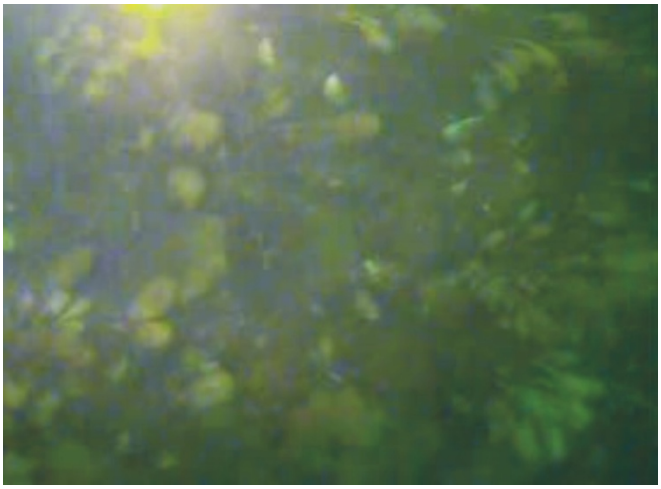
Station 7



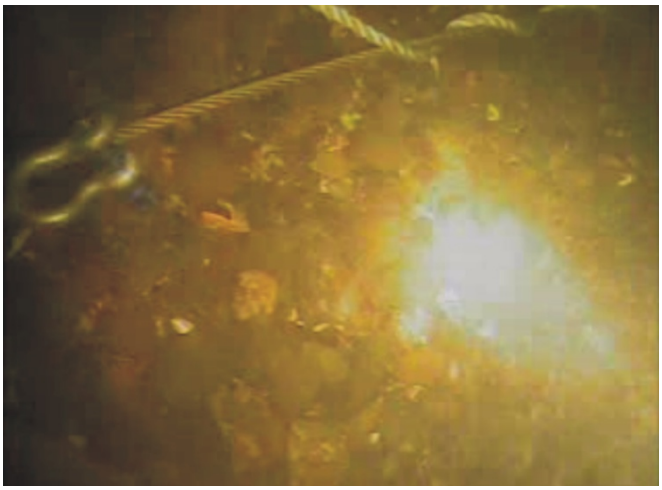
Between Stations 7 and 8



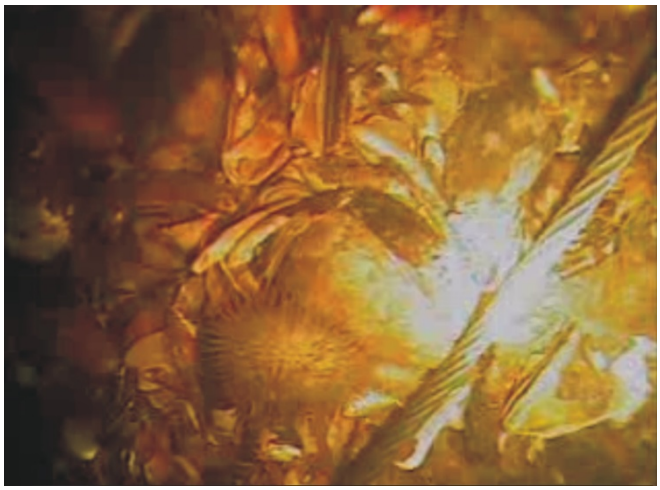
Station 8



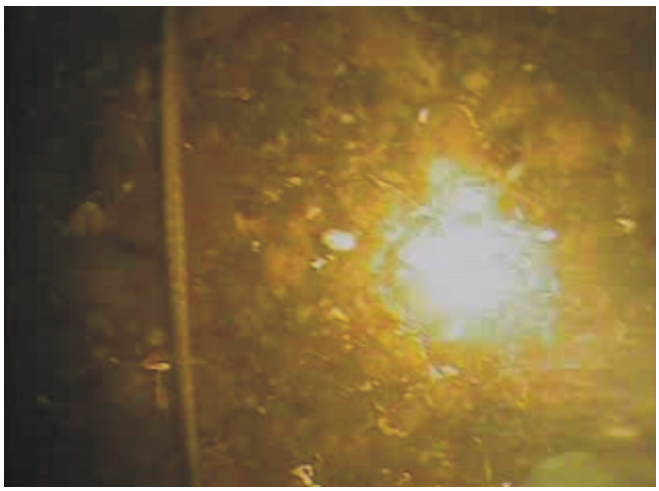
Between Stations 8 and 9



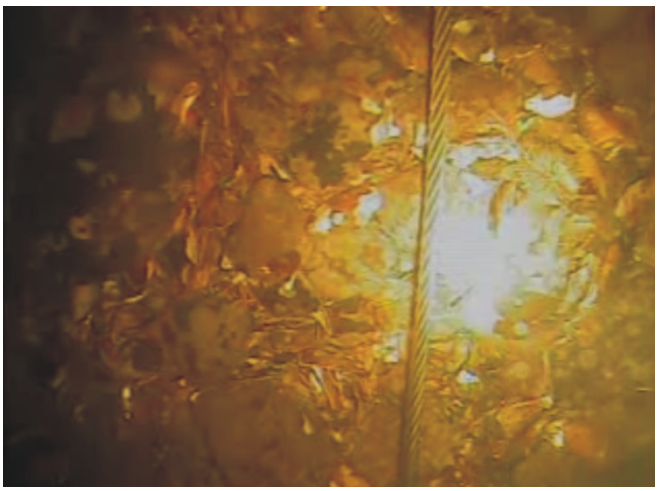
Station 9



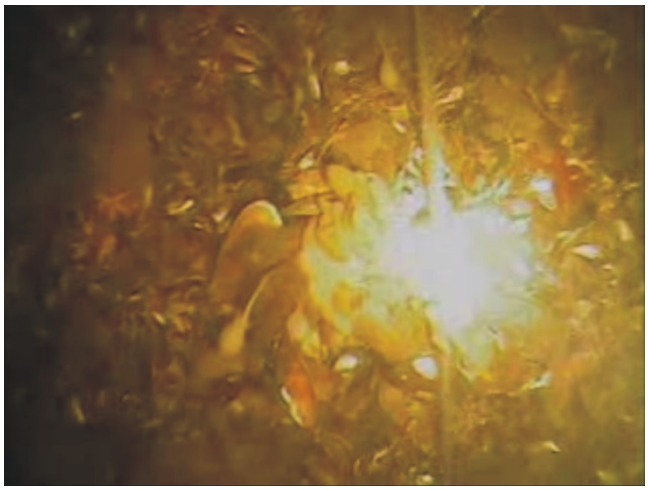
Between Stations 9 and 10



Station 10



Between Stations 10 and 11



Station 11

Appendix III

Graphic icon representation of video recordings along each transect segment

Video Graphic Icon Legend

CNIDARIANS

- Frilled anemone *-Metridium senile*
- Northern Red anemone *-Tealia felina*
- Burrowing anemone *-Cerianthus borealis*
- Silver-spotted anemone *-Bunodactis stella*

FISH

- Sculpin *-Myoxocephalus sp.*
- Flounder *-Family Pleuronectidae*
- Sea Raven *-Hemitripterus americanus*

SEA SQUIRTS

- Sea peach *-Halocynthia sp.*
- Stalked sea squirt *-Boltenia ovifera*
- White Tunicate *- Didemnum spp.*
- Sea vase *-Ciona intestinalis*

GEAR & DEBRIS

- Tire
- Chain
- Can / trash
- Burrows
- Ghost trap

CRUSTACEANS

- Jonah crab *-Cancer borealis*
- Rock crab *-Cancer irroratus*
- Sea Flea *- Amphipod*
- Hermit crab *-Pagurus* sp
- Mysid shrimp *- Neomysis americanus*
- Toad Crab *-Hyas* sp.

SPONGES

- Bulbous sponge *Cliona celata*
- Finger sponge *-Haliclona oculata*
- Crumb of Bread Sponge *-Halichondria panicea*
- Palmate sponge *-Isodictya* spp.
- Nipple sponge *-Polymastia sp.*

FLORA

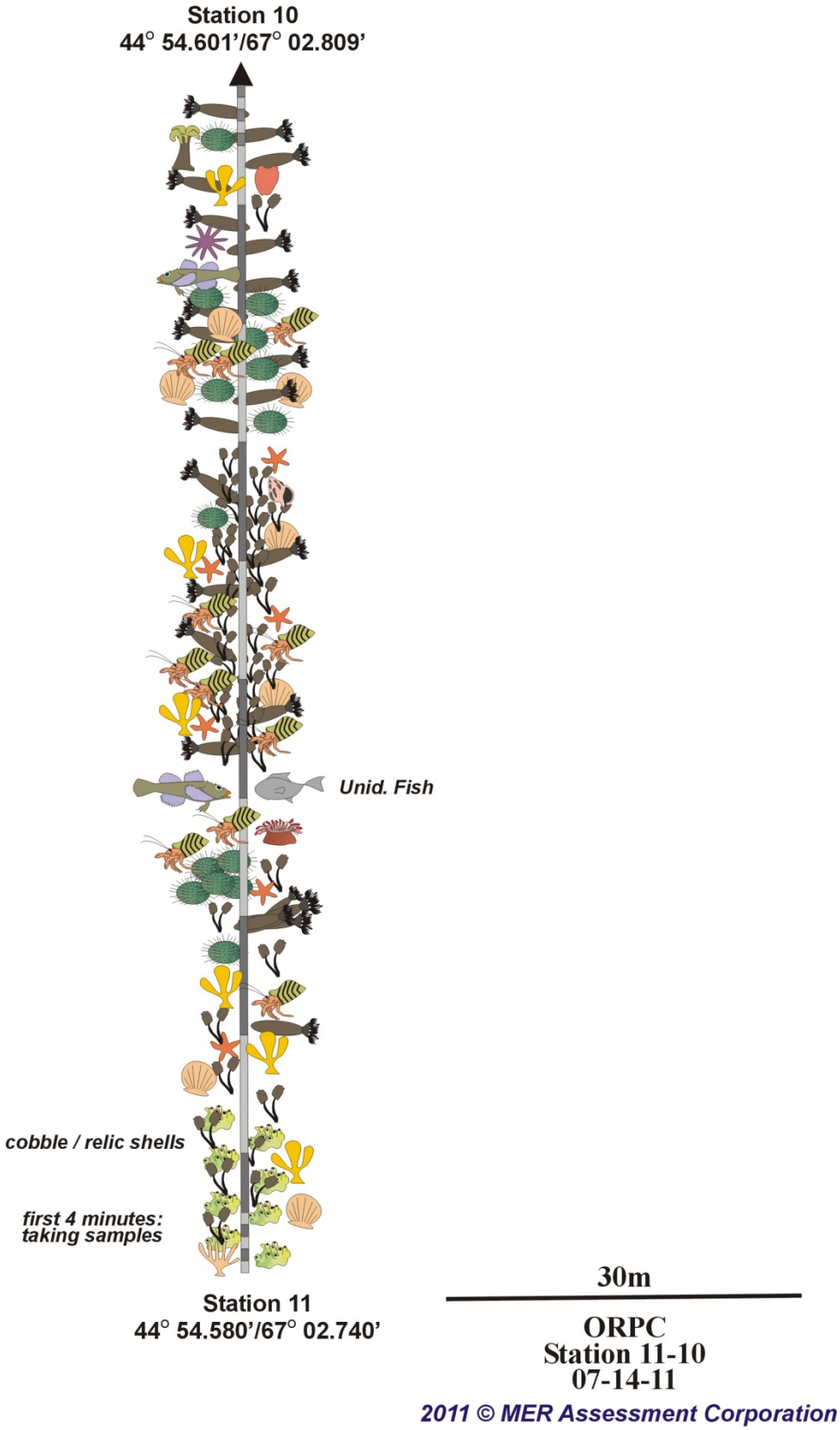
- Rockweeds *-Ascophyllum* sp.
- Dulse Graphic *-Rhodymenia palmata*
- Kelp *-Laminaria* sp.
- Sea lettuce *-Ulva* sp.
- Mermaid's hair *-Desmarestia* sp.
- Chenille Weed *-Dasya pedicellata*
- Filamentous algae

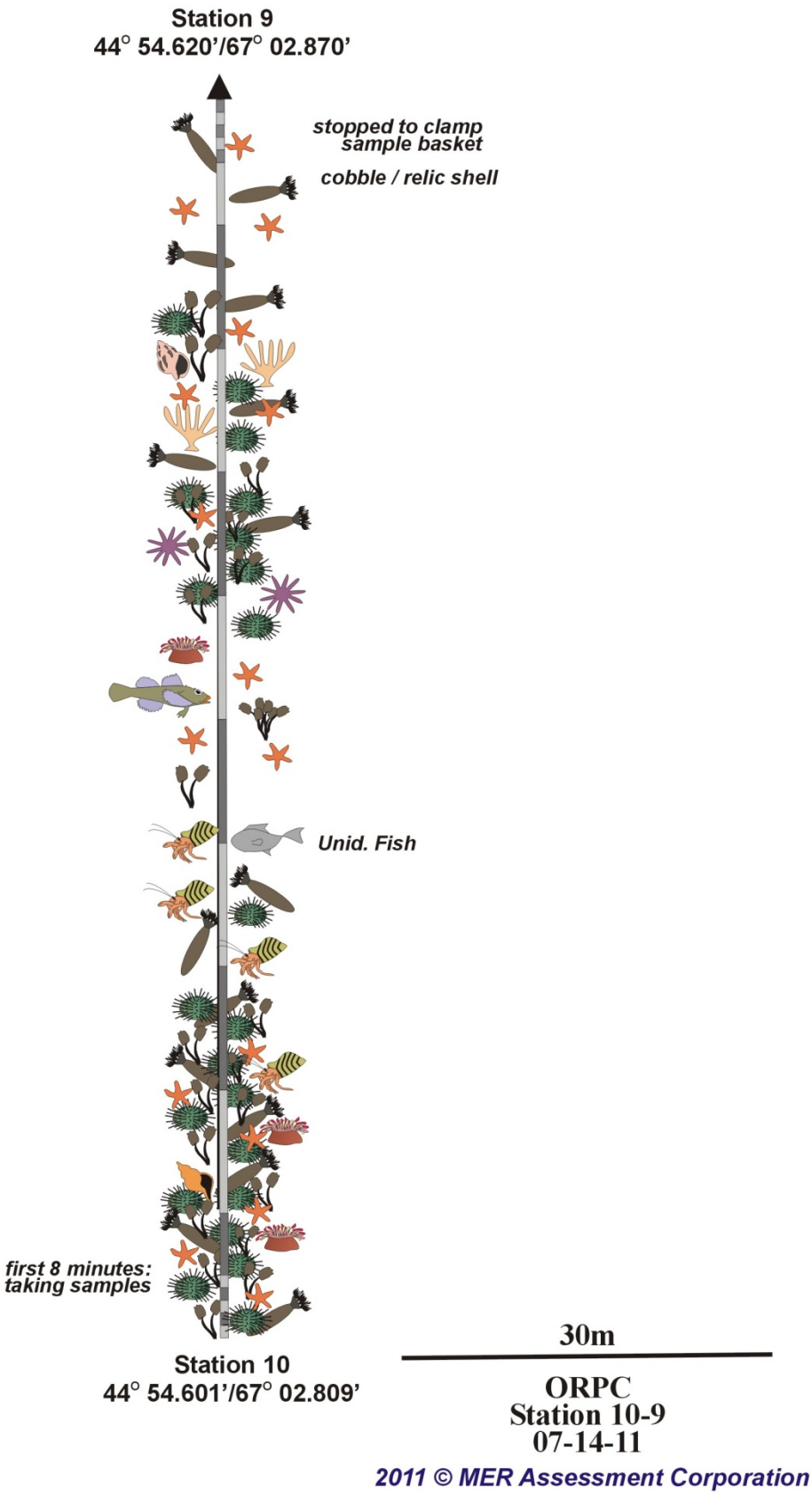
ECHINODERMS

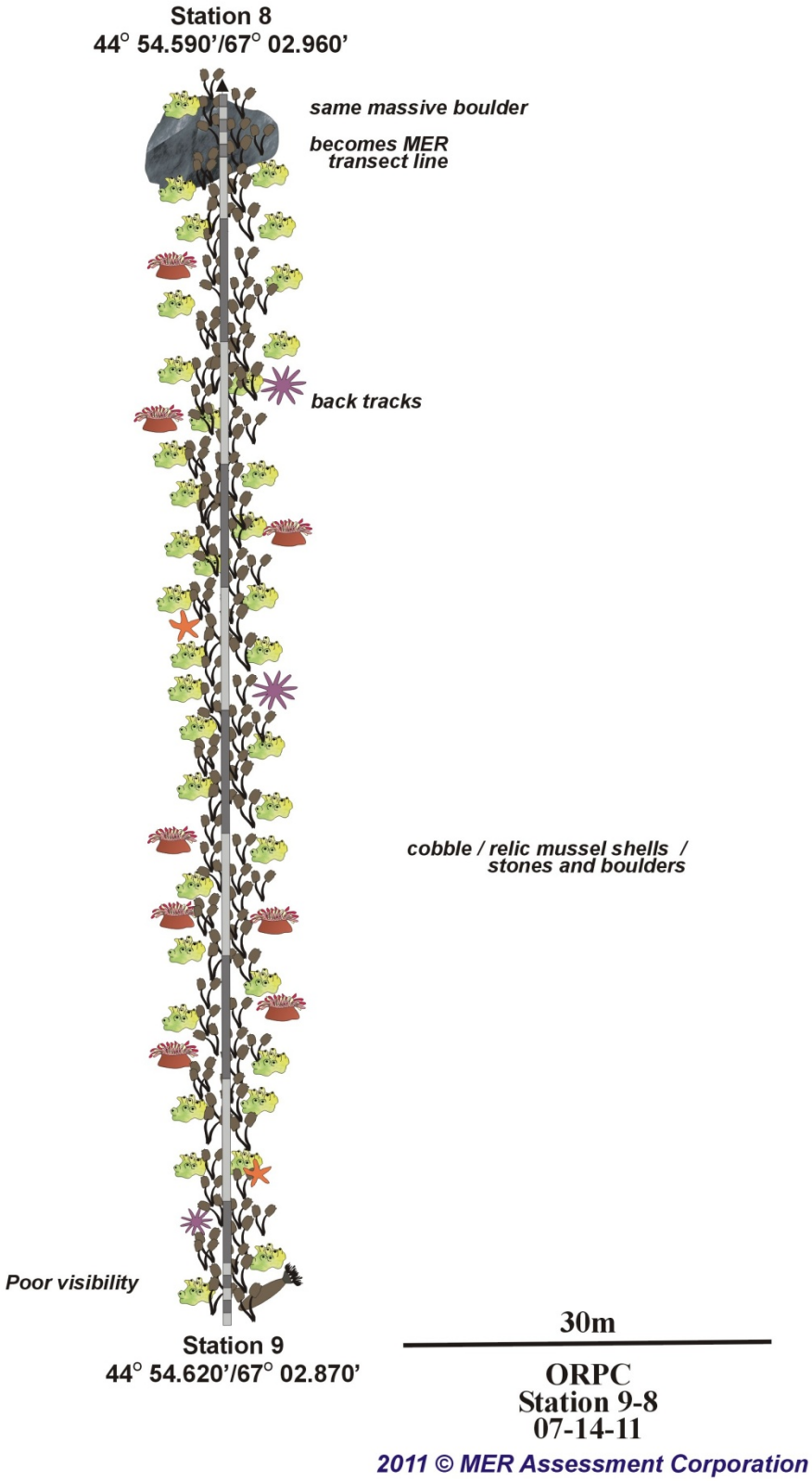
- Common Sea Star *-Asterias* sp.
- Purple Sunstar *-Solaster endeca*
- Sand dollar *-Echinarachnius parma*
- Sea urchin *-Strongylocentrotus droebachiensis*
- Spiny Sunstar *-Crossaster papposus*
- Scarlet Psolus *-Psolus fabricii*
- Large northern sea cucumber *-Cucumaria frondosa*

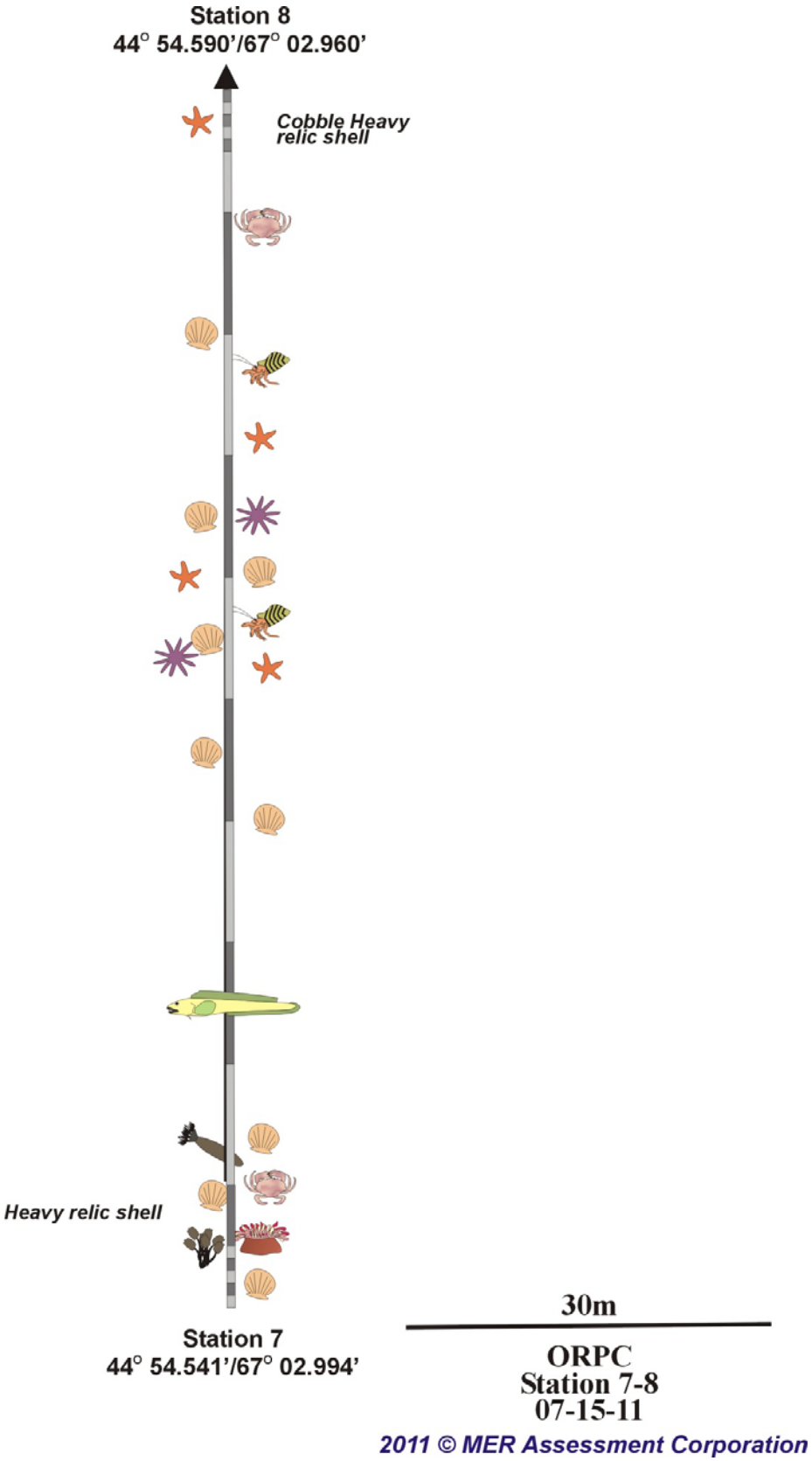
MOLLUSCS

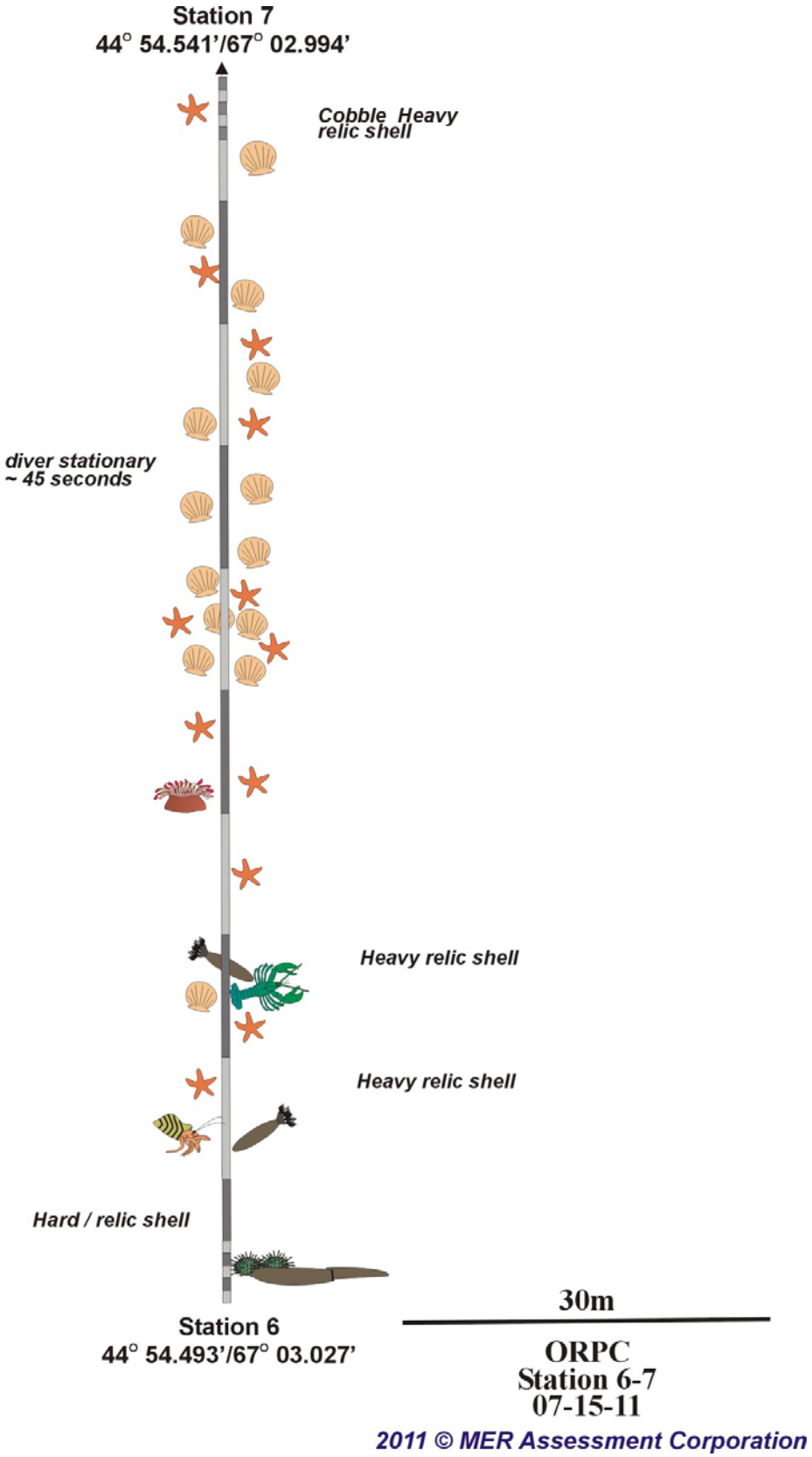
- Sea scallop *-Placopecten magellanicus*
- Blue mussel *-Mytilus edulis*
- Common Periwinkle *-Littorina littorea*
- Waved whelk *-Buccinum undatum*
- Ten-ridged Whelk *-Neptunea desemcostata*
- Moon snail *-Polinicies heros*
- Stimpson's Whelk *-Colus stimpsoni*

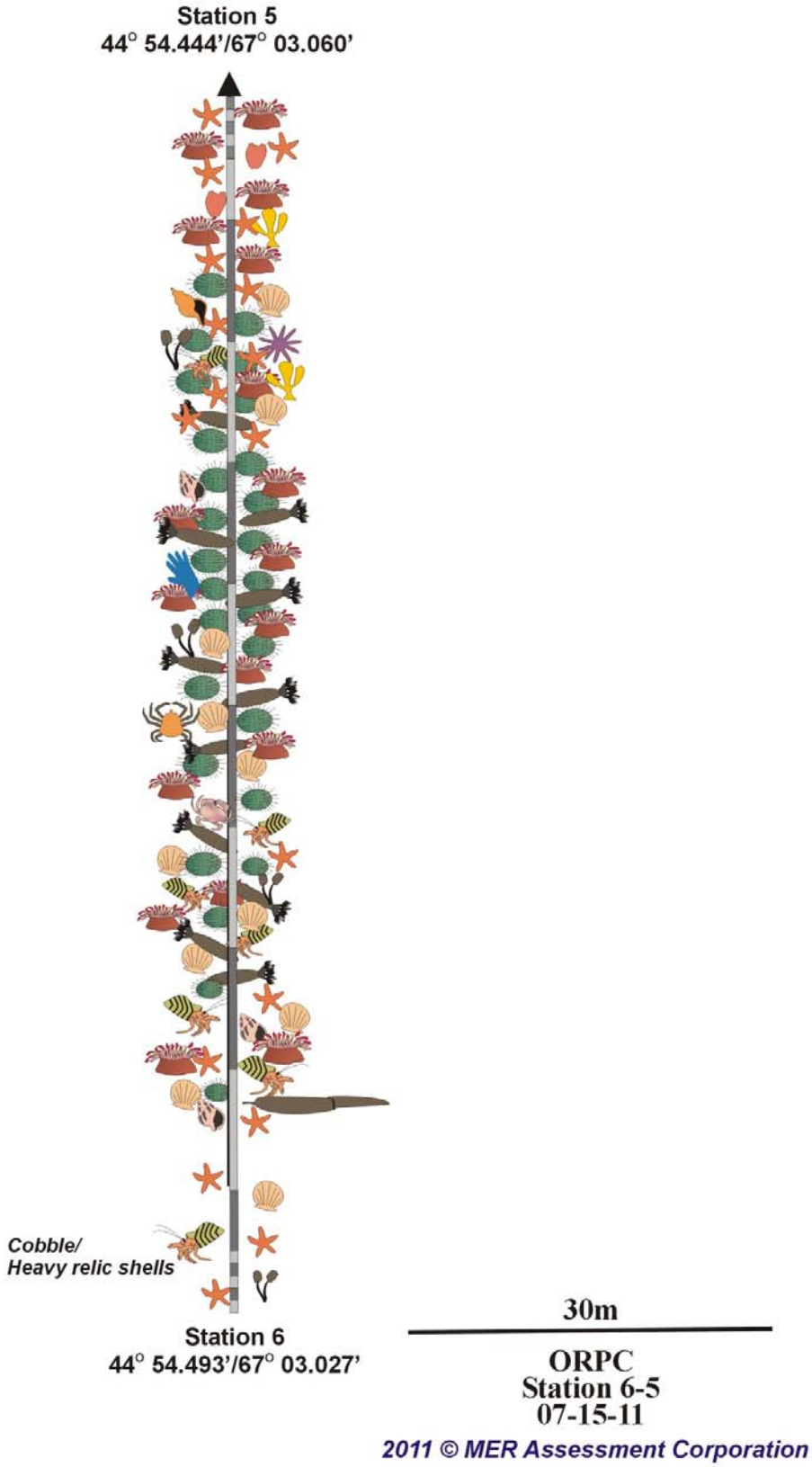

Station 10
44° 54.601'/67° 02.809'
Unid. Fish
cobble / relic shells
first 4 minutes:
taking samples
Station 11
44° 54.580'/67° 02.740'
30m
ORPC
Station 11-10
07-14-11
2011 © MER Assessment Corporation

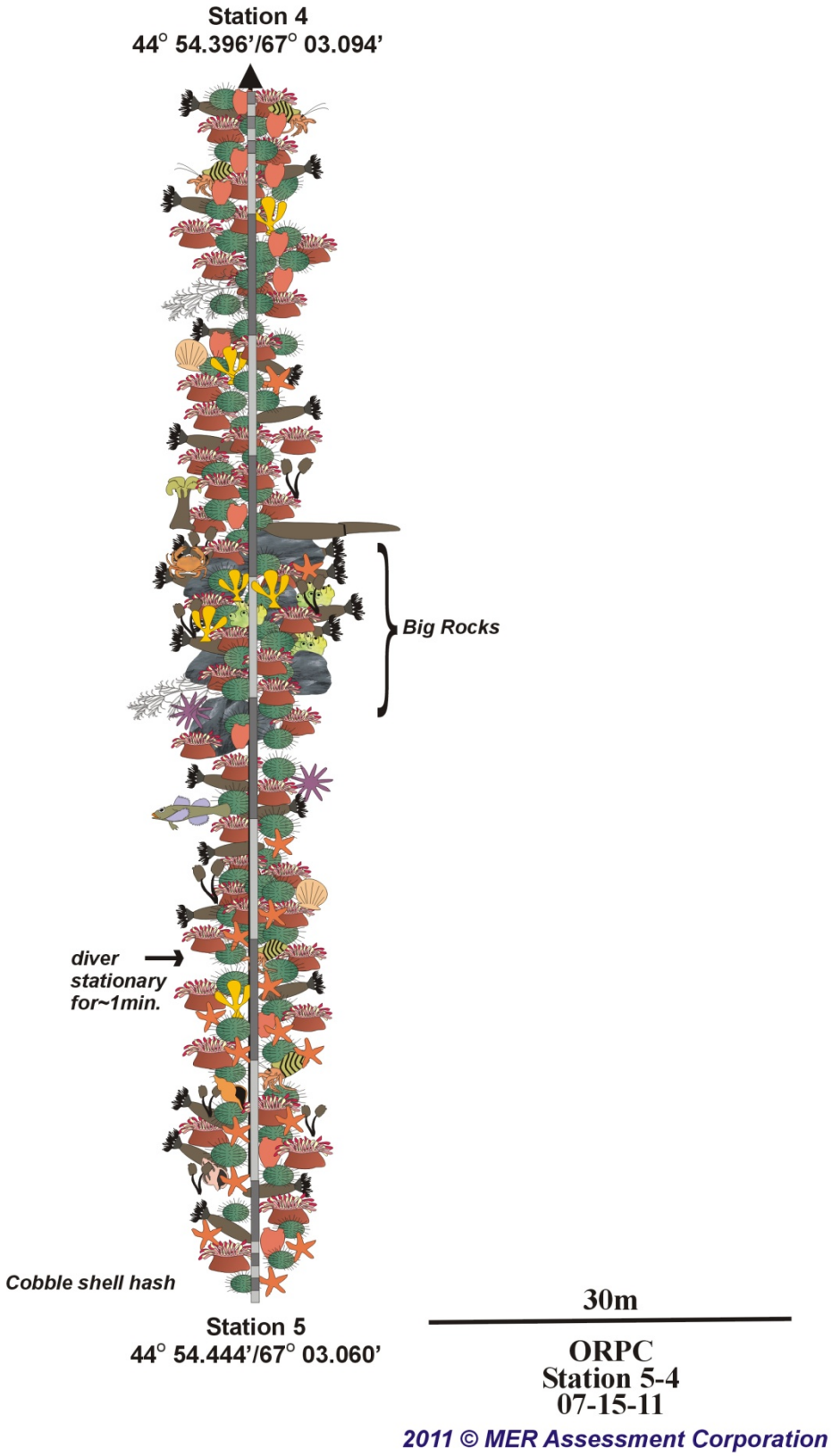

Station 9
44° 54.620'/67° 02.870'
stopped to clamp sample basket
cobble / relic shell
Unid. Fish
first 8 minutes: taking samples
Station 10
44° 54.601'/67° 02.809'
30m
ORPC
Station 10-9
07-14-11
2011 © MER Assessment Corporation

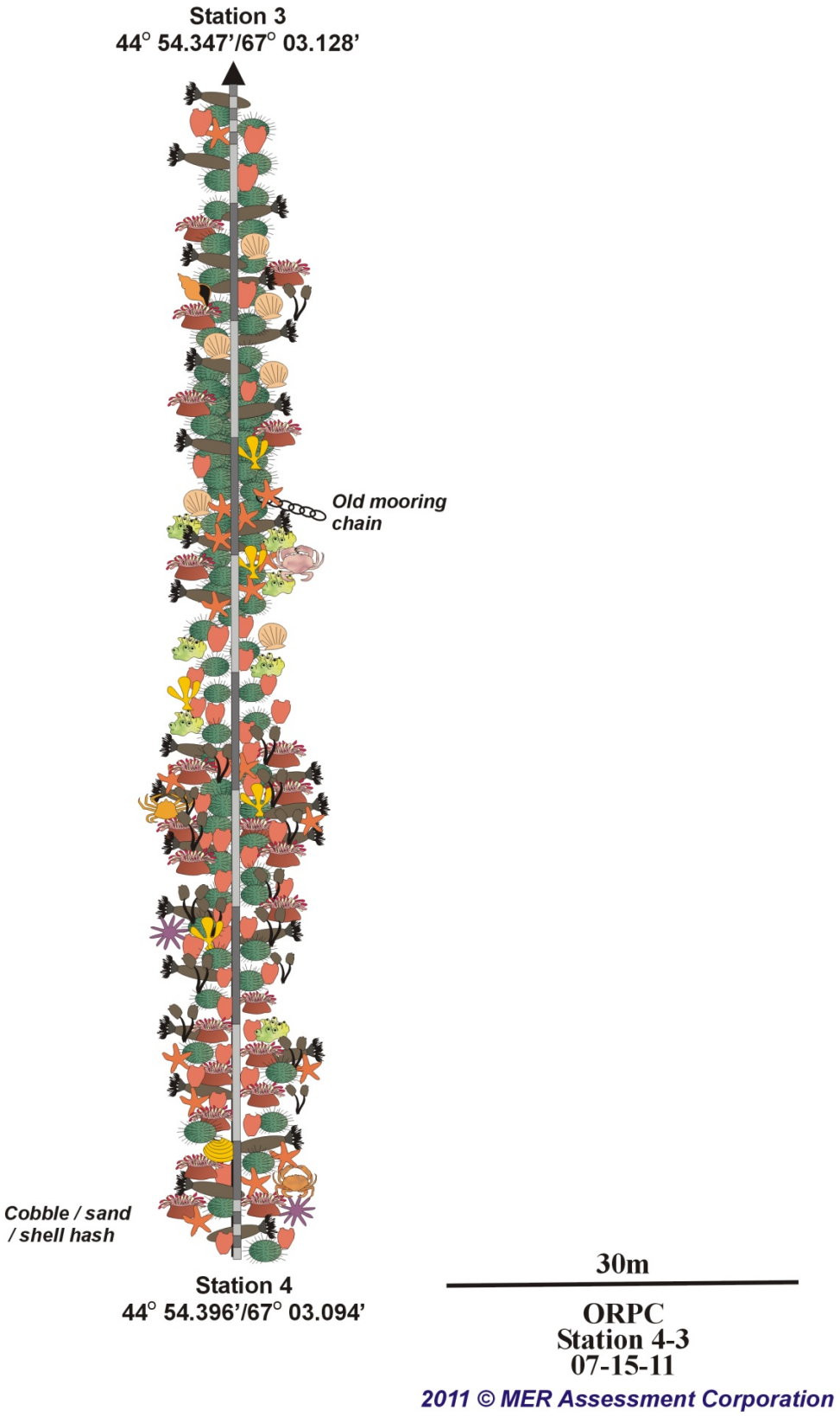

Station 8
44° 54.590'/67° 02.960'
same massive boulder
becomes MER transect line
back tracks
cobble / relic mussel shells / stones and boulders
Poor visibility
Station 9
44° 54.620'/67° 02.870'
30m
ORPC
Station 9-8
07-14-11
2011 © MER Assessment Corporation

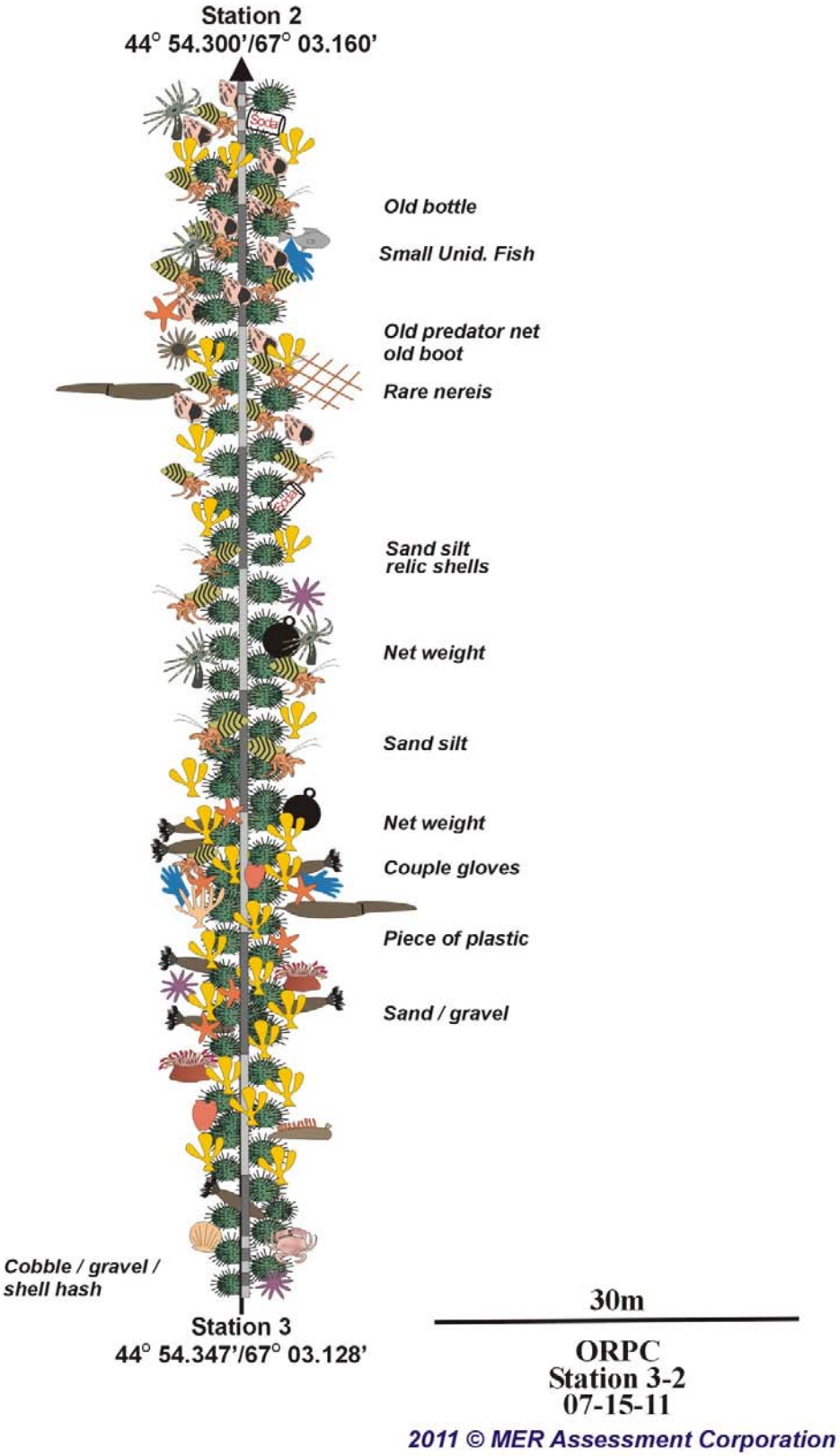

Station 8
44° 54.590'/67° 02.960'
Cobble Heavy relic shell
Heavy relic shell
Station 7
44° 54.541'/67° 02.994'
30m
ORPC
Station 7-8
07-15-11
2011 © MER Assessment Corporation

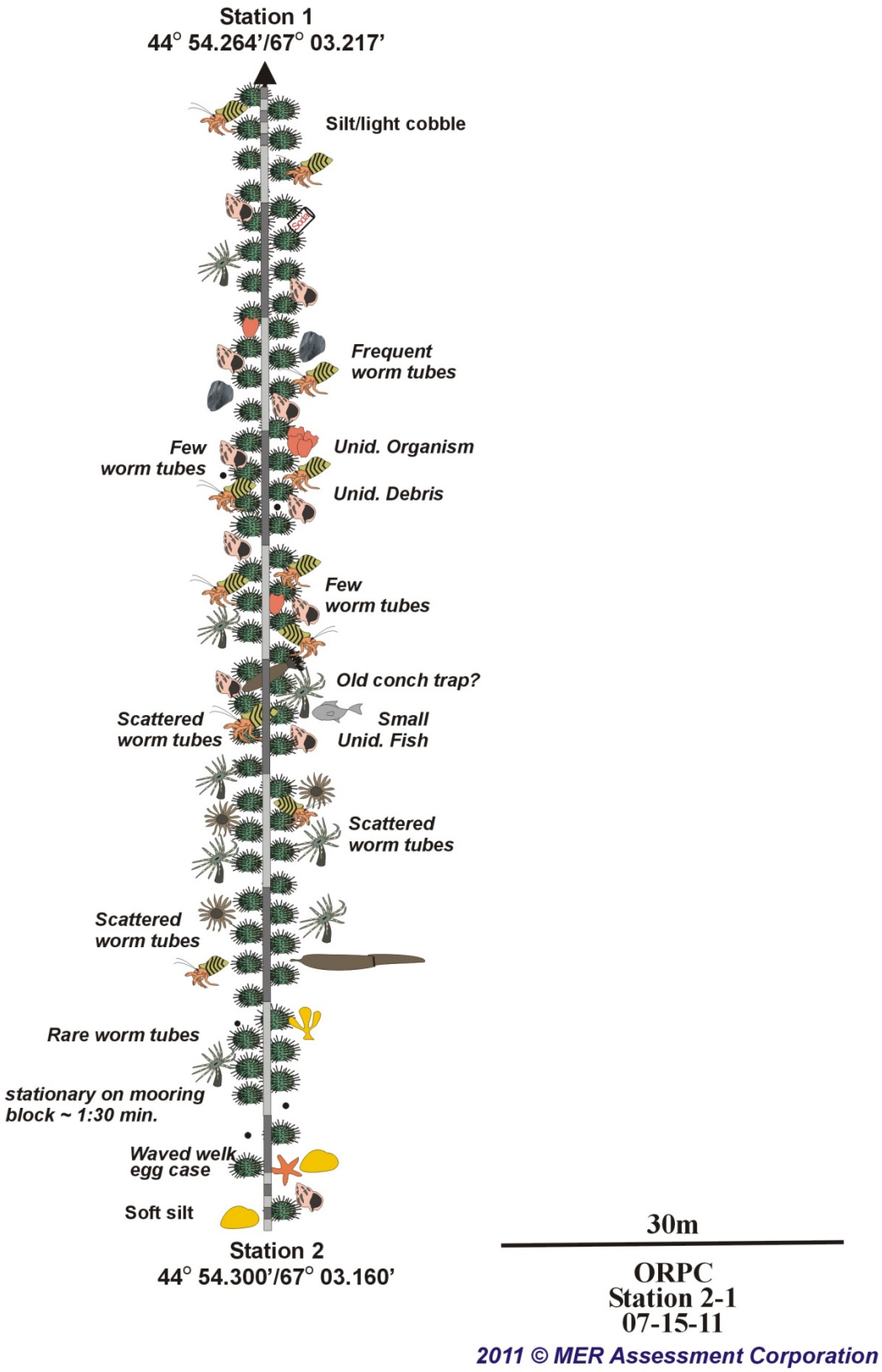

Station 7
44° 54.541'/67° 02.994'
Cobble Heavy relic shell
diver stationary ~ 45 seconds
Heavy relic shell
Heavy relic shell
Hard / relic shell
30m
Station 6
44° 54.493'/67° 03.027'
ORPC
Station 6-7
07-15-11
2011 © MER Assessment Corporation


Station 5
44° 54.444'/67° 03.060'
Cobble/
Heavy relic shells
Station 6
44° 54.493'/67° 03.027'
30m
ORPC
Station 6-5
07-15-11
2011 © MER Assessment Corporation


Station 4
44° 54.396'/67° 03.094'
Big Rocks
diver stationary for~1min.
Cobble shell hash
Station 5
44° 54.444'/67° 03.060'
30m
ORPC
Station 5-4
07-15-11
2011 © MER Assessment Corporation


Station 3
44° 54.347'/67° 03.128'
Old mooring chain
Cobble / sand / shell hash
Station 4
44° 54.396'/67° 03.094'
30m
ORPC
Station 4-3
07-15-11
2011 © MER Assessment Corporation


Station 2
44° 54.300'/67° 03.160'
Old bottle
Small Unid. Fish
Old predator net
old boot
Rare nereis
Sand silt
relic shells
Net weight
Sand silt
Net weight
Couple gloves
Piece of plastic
Sand / gravel
Cobble / gravel /
shell hash
Station 3
44° 54.347'/67° 03.128'
30m
ORPC
Station 3-2
07-15-11
2011 © MER Assessment Corporation


Station 1
44° 54.264'/67° 03.217'
Silt/light cobble
Frequent worm tubes
Few worm tubes
Unid. Organism
Unid. Debris
Few worm tubes
Old conch trap?
Scattered worm tubes
Small Unid. Fish
Scattered worm tubes
Scattered worm tubes
Rare worm tubes
stationary on mooring block ~ 1:30 min.
Waved welk egg case
Soft silt
Station 2
44° 54.300'/67° 03.160'
30m
ORPC
Station 2-1
07-15-11
2011 © MER Assessment Corporation

Appendix IV

Detailed benthic infauna data for subtidal core samples collected at Cobscook Bay (CB)

Station 1

	Sta 1-1		Sta 1-2		Sta 1-3	
Scientific Name	**Species**	**Family**	**Species**	**Family**	**Species**	**Family**
ANNELIDA						
CLASS POLYCHAETA						
ORDER Phyllodocida						
Phyllodocidae		3		0		0
Eteone spp.	3					
Sigalionidae		1		0		0
Pholoe minuta	1					
Nephtyidae		3		1		2
Aglaophamus neotenus	1					
Nephtys sp.	2		1		2	
Syllidae		3		1		1
Exogone spp.			1		1	
Syllis cornuta	3					
ORDER Capitellida						
Capitellidae		5		2		4
Capitella capitata	1		2		1	
Mediomastus ambiseta	4				3	
Maldanidae		5		0		0
Clymenella torquata	1					
Praxillella praetermisa	1					
Praxillela spp.	3					
Opheliidae		21		1		9
Ophelina acuminata	21		1		9	
ORDER Spionida						
Spionidae		18		6		9
Polydora spp.	6		3		2	
Prionospio steenstrupi	12		3		6	
Spio setosa					1	
Paraonidae		2		3		8
Aricidea catherinae	1		3		7	
Aricidea suecica	1				1	
ORDER Eunicida						
Lumbrineridae		19		4		15
Lumbrineris spp.	19		2		14	
Ninoe nigripes			2		1	
ORDER Ariciida						
Orbiniidae		7		0		4
Scoloplos sp.	7				4	

	Sta 1-1		Sta 1-2		Sta 1-3	
Scientific Name	**Species**	**Family**	**Species**	**Family**	**Species**	**Family**
ORDER Cirratulida						
Cirratulidae		2		5		6
Tharyx spp.	2		5		6	
ORDER Terebellida						
Ampharetidae		19		4		13
Ampharete sp.	9		1		9	
Asabellides oculata	2					
Anobothrus gracilis	8		3		4	
Terebellidae		2		0		0
Terebellides stroemi	2					
ORDER Sabellida						
Sabellidae		0		0		2
Potamilla spp.					1	
Psuedopotamilla (Potamilla) neglecta					1	
Serpulidae		0		0		0
Spirorbis spp.						
		4		0		0
CLASS OLIGOCHATEA	4					
ARTHROPODA						
CLASS CRUSTACEA						
Order Amphipoda						
Aoridae		0		1		0
Leptocheirus sp.			1			
Corophiidae		1		0		1
Corophium spp.	1				1	
Phoxocephalidae		0		1		1
Harpinia propinqua			1		1	
SUB CLASS COPEPODS		0		0		0
Order Thoracica						
Leuconidae		2		0		0
Eudorella spp.	2					

	Sta 1-1		Sta 1-2		Sta 1-3	
Scientific Name	Species	Family	Species	Family	Species	Family
MOLLUSCA						
Class Gastropoda						
Order Mesogastropoda						
Calyptraeidae		1		0		0
Crucibulum striatum	1					
Class Bivalvia						
Order Protobranchia						
Nuculidae		5		2		2
Nucula delphinodonta			1			
Nucula proxima	5		1		2	
Order Heterodontida						
Astartidae		2		0		0
Astarte sp.	2					
Thyasiridae		1		0		1
Thyasira gouldii	1				1	
Tellinidae		1		0		0
Macoma sp.	1					
ASCHELMINTHES						
Class Nematoda		2		0		0
Unid.	2					

SPECIES Station 1	Rep 1	Rep 2	Rep 3	Total	Mean	Var.
Total organisms	129	31	78	238	79.3	1601.6
Abundance (organisms/0.1 m²)	1592.5	382.7	962.9		979.4	244075.5
Abundance (organisms/0.1 m²) minus Caps	1580.2	358.0	950.6		962.9	249020.0
Species richness (No. species)	31	16	22	39	23.0	38.0
Distance in meters						
Rel. Div. by sp.	0.853	0.943	0.870		0.888	0.002
%Caps by sp	0.8	6.5	1.3		2.8	6.6
Abundance (orgs/0.1 m²) minus Amphipods	1555.5	358.0	938.2		950.6	239063.3
Total amphipods	3	2	2			
FAMILY	**Rep 1**	**Rep 2**	**Rep 3**	**Total**	**Mean**	**Var.**
Total organisms	129	31	78	238	79.3	1601.6
Abundance (organisms/0.1 m²)	1592.5	382.7	962.9		979.4	244075.5
Abundance (organisms/0.1 m²) minus Caps	1530.8	358.0	913.5		934.1	229445.2
Family richness (No. Families)	23	12	15	26	16.7	21.6
Distance in meters						
Rel. Div. by Family	0.835	0.915	0.870		0.873	0.001
%Caps by Family	3.9	6.5	5.1		5.2	1.1
Abundance (orgs/0.1 m²) minus Amphipods	1567.8	358.0	938.2		954.7	244075.5
Total amphipods by Family	2	2	2			

Station 2

	Sta 2-1		Sta 2-2		Sta 2-3	
Scientific Name	**Species**	**Family**	**Species**	**Family**	**Species**	**Family**
ANNELIDA						
CLASS POLYCHAETA						
ORDER Phyllodocida						
Sigalionidae		0		1		0
Pholoe minuta			1			
Nephtyidae		1		2		0
Aglaophamus neotenus			1			
Nephtys sp.	1		1			
Syllidae		2		0		0
Exogone spp.	1					
Syllis gracilis	1					
ORDER Capitellida						
Capitellidae		1		3		0
Capitella capitata			1			
Mediomastus ambiseta	1		2			
Opheliidae		4		1		2
Ophelina acuminata	4		1		2	
ORDER Spionida						
Spionidae		17		17		3
Polydora spp.						
Prionospio steenstrupi	17		17		3	
Paraonidae		3		4		3
Aricidea catherinae	1		2		3	
Aricidea suecica	1		2			
Paraonis sp.	1					
ORDER Eunicida						
Lumbrineridae		14		8		6
Lumbrineris spp.	13		7		6	
Ninoe nigripes	1		1			
ORDER Ariciida						
Orbiniidae		1		0		0
Scoloplos sp.	1					

	Sta 2-1		Sta 2-2		Sta 2-3	
Scientific Name	Species	Family	Species	Family	Species	Family
ORDER Cirratulida						
Cirratulidae		0		1		0
Tharyx spp.			1			
Cossuridae		0		0		1
Cossura longicirrata					1	
ORDER Terebellida						
Ampharetidae		1		0		0
Ampharete sp.	1					
ARTHROPODA						
CLASS CRUSTACEA						
Order Amphipoda						
Aoridae		1		0		0
Leptocheirus sp.	1					
Ampeliscidae		3		4		3
Ampelisca spp.	3		4		3	
Corophiidae		1		0		0
Corophium spp.	1					
Haustoriidae		0		2		7
Pontoporeia femorata			2		7	
Phoxocephalidae		20		10		7
Harpinia propinqua	20		10		7	
SUB CLASS COPEPODS		0		0		0
Order Thoracica						
Leuconidae		5		0		3
Eudorella spp.	5				3	
MOLLUSCA						
Class Bivalvia						
Order Protobranchia						
Nuculidae		3		3		2
Nucula delphinodonta	2		2		1	
Nucula proxima	1		1		1	
Order Heterodontida						
Arcticidae		0		0		1
Arctica islandica					1	

	Sta 2-1		Sta 2-2		Sta 2-3	
Scientific Name	Species	Family	Species	Family	Species	Family
Lyonsiidae		1		0		0
Lyonsia arenosa	1					
CNIDARIA						
Class Anthozoa						
Order Actiniaria						
Edwardsiidae		1		0		0
Edwardsia elegans	1					
ASCHELMINTHES						
Class Priapulida		0		1		0
Priapulus caudatus			1			

SPECIES Station 2	Rep 1	Rep 2	Rep 3	Total	Mean	Var.
Total organisms	79	57	38	174	58.0	280.7
Abundance (organisms/0.1 m²)	975.255	703.7	469.1		716.0	42773.3
Abundance (organisms/0.1 m²) minus Caps	975.255	691.3	469.1		711.9	42908.8
Species richness (No. species)	22	18	12	30	17.3	16.9
Distance in meters						
Rel. Div. by sp.	0.759599	0.808	0.907		0.825	0.004
%Caps by sp	0	1.8	0.0		0.6	0.7
Abundance (orgs/0.1 m²) minus Amphipods	604.905	506.1	222.2		444.4	26314.2
Total amphipods	30	16	20			
FAMILY	**Rep 1**	**Rep 2**	**Rep 3**	**Total**	**Mean**	**Var.**
Total organisms	79	57	38	174	58.0	280.7
Abundance (organisms/0.1 m²)	975.3	703.7	469.1		716.0	42773.3
Abundance (organisms/0.1 m²) minus Caps	962.9	666.6	469.1		699.6	41181.6
Family richness (No. Families)	17	13	11	23	13.7	6.2
Distance in meters						
Rel. Div. by Family	0.8	0.836	0.925		0.848	0.003
%Caps by Family	1.3	5.3	0.0		2.2	5.0
Abundance (orgs/0.1 m²) minus Amphipods	913.5	666.6	419.7		666.6	40639.7
Total amphipods by Family	5	3	4			

Station 3

	Sta 3-1		Sta 3-2		Sta 3-3	
Scientific Name	**Species**	**Family**	**Species**	**Family**	**Species**	**Family**
ANNELIDA						
CLASS POLYCHAETA						
ORDER Phyllodocida						
Phyllodocidae		0		1		3
Eteone spp.			1		3	
Polynoidae		0		0		3
Harmothoe sp.					3	
Sigalionidae		0		1		0
Pholoe minuta			1			
Nephtyidae		1		1		0
Nephtys sp.	1		1			
Syllidae		7		10		6
Exogone spp.	4		8		6	
Syllis cornuta	1		1			
Syllis gracilis			1			
Sphaerosyllis erinaceus	2					
ORDER Capitellida						
Capitellidae		3		2		1
Mediomastus ambiseta	3		2		1	
Opheliidae		4		0		1
Ophelina acuminata	4				1	
ORDER Spionida						
Spionidae		7		14		10
Polydora spp.	1				1	
Prionospio steenstrupi	1		5		7	
Marenzelleria (Scolecolepedis) viridis			1			
Spio setosa	5		8		2	
Paraonidae		13		18		33
Aricidea catherinae	12		10		14	
Aricidea suecica	1		8		19	
Apistobranchidae		1		0		0
Apistobranchus tullbergi	1					
ORDER Eunicida						
Lumbrineridae		0		1		0
Lumbrineris spp.			1			

	Sta 3-1		Sta 3-2		Sta 3-3	
Scientific Name	**Species**	**Family**	**Species**	**Family**	**Species**	**Family**
ORDER Ariciida						
Orbiniidae		3		0		0
Scoloplos sp.	3					
ORDER Cirratulida						
Cirratulidae		18		6		15
Tharyx spp.	18		6		15	
ORDER Terebellida						
Pectinaridae		0		0		1
Pectinaria (Cistena) gouldii					1	
Ampharetidae		0		0		1
Ampharete sp.					1	
Terebellidae		1		1		1
Amphitrite sp.	1					
Streblosoma spiralis			1		1	
ORDER Sabellida						
Sabellidae		0		0		1
Euchone elegans					1	
Serpulidae		0		0		2
Spirorbis spp.					2	
		12		3		2
CLASS OLIGOCHATEA	12		3		2	
ARTHROPODA						
CLASS CRUSTACEA						
Order Amphipoda						
Aoridae		2		2		3
Unciola sp.	2		2		3	
Ampeliscidae		0		0		1
Ampelisca spp.					1	
Corophiidae		2		0		1
Corophium spp.	2				1	
Lysianassidae		2		1		0
Anonyx sp.	2		1			
Stenothoidae		0		0		1
Metopella angusta					1	

	Sta 3-1		Sta 3-2		Sta 3-3	
Scientific Name	**Species**	**Family**	**Species**	**Family**	**Species**	**Family**
SUB CLASS COPEPODS		0		0		0
Order Harpacticoida		0		0		2
Harpacticus sp.					2	
Order Tanaidae						
Tanaidae		2		4		2
Tanais sp.	2		4		2	
ECHINODERMATA						
Class Echinoidea						
Order Ophiurida						
Ophiactidae		1		0		2
Ophiopholis sp.	1				2	
MOLLUSCA						
Class Polyplacophora						
Order Neoloricata						
Ischnochitonidae		0		2		2
Stenosemus (Ischnochiton) albus			1		1	
Tonicella (Ischnochiton) ruba			1		1	
Class Gastropoda						
Order Neogastropoda						
Buccinidae		1		0		0
Buccinum undatum	1					
Class Bivalvia						
Order Protobranchia						
Nuculidae		1		0		3
Nucula delphinodonta					2	
Nucula proxima	1				1	
Order Pteroconchida						
Mytilidae		3		2		1
Musculus sp. (niger)	3		2		1	
Anomiidae		0		0		1
Anomia sp					1	

	Sta 3-1		Sta 3-2		Sta 3-3	
Scientific Name	**Species**	**Family**	**Species**	**Family**	**Species**	**Family**
Order Heterodontida						
Astartidae		1		0		0
Astarte sp.	1					
Cardiidae		0		1		0
Cerastoderma pinnulatum			1			
Lyonsiidae		0		0		1
Lyonsia arenosa					1	
CHORDATA						
Class Ascidiacea						
Order Pleurogona						
Mogulidae		0		1		0
Molgula sp.			1			
CNIDARIA						
Class Anthozoa						
Order Actiniaria						
Actinidae		1		0		0
Urticina (Tealia) felina	1					
ENTROPROCTA		0		0		5
Class Ectoprocta					5	
RHYNCHOCOELA		0		0		13
Unid. Nemertea					13	
ASCHELMINTHES						
Class Nematoda		1		3		2
Unid.	1		3		2	

SPECIES Station 3	Rep 1	Rep 2	Rep 3	Total	Mean	Var.
Total organisms	87	74	120	281	93.7	374.9
Abundance (organisms/0.1 m²)	1074.0	913.5	1481.4		1156.3	57132.7
Abundance (organisms/0.1 m²) minus Caps	1074.0	913.5	1481.4		1156.3	57132.7
Species richness (No. species)	27	25	34	50	28.7	14.9
Distance in meters						
Rel. Div. by sp.	0.840	0.884	0.837		0.854	0.000
%Caps by sp	0.0	0.0	0.0		0.0	0.0
Abundance (orgs/0.1 m²) minus Amphipods	975.3	827.1	1358.0		1053.4	50020.7
Total amphipods	8	7	10			
FAMILY	**Rep 1**	**Rep 2**	**Rep 3**	**Total**	**Mean**	**Var.**
Total organisms	87	74	120	281	93.7	374.9
Abundance (organisms/0.1 m²)	1074.0	913.5	1481.4		1156.3	57132.7
Abundance (organisms/0.1 m²) minus Caps	1037.0	888.8	1469.1		1131.6	60587.1
Family richness (No. Families)	22	19	29	40	23.3	17.6
Distance in meters						
Rel. Div. by Family	0.837	0.817	0.793		0.816	0.000
%Caps by Family	3.4	2.7	0.8		2.3	1.2
Abundance (orgs/0.1 m²) minus Amphipods	1024.6	876.5	1407.3		1102.8	50020.7
Total amphipods by Family	4	3	6			

Station 4

	Sta 4-1		Sta 4-2		Sta 4-3	
Scientific Name	**Species**	**Family**	**Species**	**Family**	**Species**	**Family**
ANNELIDA						
CLASS POLYCHAETA						
ORDER Phyllodocida						
Phyllodocidae		0		2		1
Eteone spp.			2		1	
Polynoidae		0		1		3
Harmothoe sp.			1		3	
Sigalionidae		0		1		10
Pholoe minuta			1		10	
Syllidae		7		7		10
Eusyllis sp.	1					
Exogone spp.	4		4		7	
Syllis cornuta	2		2		2	
Sphaerosyllis erinaceus			1		1	
ORDER Spionida						
Spionidae		0		2		2
Polydora spp.			1			
Marenzelleria (Scolecolepedis) viridis			1		1	
Spio setosa					1	
Paraonidae		11		13		15
Aricidea catherinae	4		6		4	
Aricidea suecica	7		3		9	
Paraonis sp.			4		2	
ORDER Cirratulida						
Cirratulidae		29		19		27
Tharyx spp.	29		19		27	
ORDER Terebellida						
Terebellidae		0		2		0
Polycirrus sp.			2			
ORDER Sabellida						
Serpulidae		1		0		1
Spirorbis spp.	1				1	

	Sta 4-1		Sta 4-2		Sta 4-3	
Scientific Name	**Species**	**Family**	**Species**	**Family**	**Species**	**Family**
CLASS OLIGOCHATEA	2		3		3	
ARTHROPODA						
CLASS CRUSTACEA						
Order Amphipoda						
Aoridae		0		0		2
Lembos sp.					2	
Ampeliscidae		0		0		1
Ampelisca spp.					1	
Corophiidae		0		2		1
Corophium spp.			2		1	
Pleustidae		0		1		0
Stenopleustes sp.			1			
Podoceridae		0		1		0
Dulichia porrecta			1			
Stenothoidae		0		0		1
Metopella angusta					1	
SUB CLASS COPEPODS		0		0		1
Unid.					1	
Order Tanaidae						
Tanaidae		7		6		4
Tanais sp.	7		6		4	
CLASS PANTOPODA						
ORDER						
Phoxichilidiidae		0		0		1
Phoxichilidium femoratum					1	
Pycnogonidae		0		0		2
Pycnogonum littorale					2	
ECHINODERMATA						
Class Echinoidea						
Order Echinoida						
Strongylocentrotidae		1		0		1
Strongylocentrotus droebachiensis	1				1	

	Sta 4-1		Sta 4-2		Sta 4-3	
Scientific Name	**Species**	**Family**	**Species**	**Family**	**Species**	**Family**
Order Foripultida						
Asteridae		0		1		0
Asterias sp.			1			
Order Ophiurida						
Ophiactidae		1		3		0
Ophiopholis sp.	1		3			
MOLLUSCA						
Class Polyplacophora						
Order Neoloricata						
Ischnochitonidae		1		3		3
Tonicella (Ischnochiton) ruba	1		3		3	
Class Gastropoda						
Order Mesogastropoda						
Calyptraeidae		3		0		0
Crucibulum striatum	3					
Lamellariidae		0		0		1
Lamelleria perspicua					1	
Order Neogastropoda						
Buccinidae		1		0		0
Buccinum undatum	1					
Order Nudibranchia						
Lamellidorididae		0		0		1
Onchidorus sp.					1	
Class Bivalvia						
Order Pteroconchida						
Mytilidae		0		1		0
Modiolus modiolus			1			
Anomiidae		0		0		1
Anomia sp					1	

	Sta 4-1		Sta 4-2		Sta 4-3	
Scientific Name	**Species**	**Family**	**Species**	**Family**	**Species**	**Family**
Order Heterodontida						
Astartidae		0		0		1
Astarte sp.					1	
Carditidae		0		1		0
Cyclocardia (Cardita) borealis			1			
Myidae		0		1		0
Mya arenaria			1			
CHORDATA						
Class Ascidiacea						
Order Enterogona						
Didemnidae		0		0		2
Didemnum albidum					2	
Order Pleurogona						
Pyuridae		0		2		0
Boltenia sp.			2			
Mogulidae		0		1		0
Molgula sp.			1			
ENTROPROCTA		6		10		10
Class Ectoprocta	6		10		10	
Class Ectoprocta			9		6	
SIPUNCULA		1		0		0
Phascolion strombi	1					
ECHIUROIDEA		2		0		0
Thalassema	2					
RHYNCHOCOELA		0		3		3
Unid. Nemertea			3		3	
ASCHELMINTHES						
Class Nematoda		1		1		1
Unid.	1		1		1	

SPECIES Station 4	Rep 1	Rep 2	Rep 3	Total	Mean	Var.
Total organisms	74	96	115	285	95.0	280.7
Abundance (organisms/0.1 m²)	913.5	1185.1	1419.7		1172.8	42773.3
Abundance (organisms/0.1 m²) minus Caps	913.5	1185.1	1419.7		1172.8	42773.3
Species richness (No. species)	18	30	33	48	27.0	42.0
Distance in meters						
Rel. Div. by sp.	0.768	0.868	0.834		0.823	0.002
%Caps by sp	0.0	0.0	0.0		0.0	0.0
Abundance (orgs/0.1 m²) minus Amphipods	827.1	1061.7	1259.2		1049.3	31191.0
Total amphipods	7	10	13			
FAMILY	**Rep 1**	**Rep 2**	**Rep 3**	**Total**	**Mean**	**Var.**
Total organisms	74	96	115	285	95.0	280.7
Abundance (organisms/0.1 m²)	913.5	1185.1	1419.7		1172.8	42773.3
Abundance (organisms/0.1 m²) minus Caps	913.5	1185.1	1419.7		1172.8	42773.3
Family richness (No. Families)	15	25	28	42	22.7	30.9
Distance in meters						
Rel. Div. by Family	0.751	0.838	0.803		0.797	0.001
%Caps by Family	0.0	0.0	0.0		0.0	0.0
Abundance (orgs/0.1 m²) minus Amphipods	901.2	1135.7	1320.9		1119.3	29497.7
Total amphipods by Family	1	4	8		95.0	280.7

Station 5

	Sta 5-1		Sta 5-2		Sta 5-3	
Scientific Name	**Species**	**Family**	**Species**	**Family**	**Species**	**Family**
ANNELIDA						
CLASS POLYCHAETA						
ORDER Phyllodocida						
Phyllodocidae		0		0		2
Phyllodoce sp.					2	
Polynoidae		6		1		3
Harmothoe sp.	6		1		3	
Sigalionidae		0		1		0
Pholoe minuta			1			
Nephtyidae		0		1		1
Nephtys sp.			1		1	
Syllidae		12		5		14
Exogone spp.	8		1		5	
Streptosyllis virians			2		4	
Syllis cornuta	3		2		4	
Sphaerosyllis erinaceus	1				1	
ORDER Capitellida						
Capitellidae		0		2		0
Capitella capitata			1			
Mediomastus ambiseta			1			
Maldanidae		0		0		1
Praxillela spp.					1	
Opheliidae		0		0		1
Ophelina acuminata					1	
ORDER Spionida						
Spionidae		1		1		1
Marenzelleria (Scolecolepedis) viridis			1			
Spio setosa	1				1	
Paraonidae		1		4		3
Aricidea catherinae	1				1	
Aricidea suecica			3		1	
Paraonis sp.			1		1	
ORDER Eunicida						
Eunicidae		1		0		1
Onuphis (Nothria) conchylega	1				1	

	Sta 5-1		Sta 5-2		Sta 5-3	
Scientific Name	**Species**	**Family**	**Species**	**Family**	**Species**	**Family**
Lumbrineridae		0		0		2
Lumbrineris spp.					2	
Dorvilleidae		0		1		1
Protodorvillea kefersteini			1		1	
ORDER Cirratulida						
Cirratulidae		3		2		4
Tharyx spp.	3		2		4	
ORDER Terebellida						
Ampharetidae		0		2		3
Asabellides oculata			2			
Melinna cristata					3	
Terebellidae		1		2		2
Amphitrite sp.			1			
Polycirrus sp.	1		1			
Streblosoma spiralis					2	
		4		8		6
CLASS OLIGOCHATEA	4		8		6	
ARTHROPODA						
CLASS CRUSTACEA						
Order Amphipoda						
Aoridae		1		0		0
Lembos sp.	1					
Corophiidae		0		1		2
Corophium spp.			1		2	
Lysianassidae		0		0		1
Anonyx sp.					1	
Metilidae		0		1		0
Melita sp.			1			
SUB CLASS COPEPODS		0		0		0
Order Cyclopoidea		0		0		1
Unid					1	
Order Thoracica						
Balanidae		0		2		0
Balanus sp.			2			

	Sta 5-1		Sta 5-2		Sta 5-3	
Scientific Name	Species	Family	Species	Family	Species	Family
Order Tanaidae						
Tanaidae		0		1		2
Tanais sp.			1		2	
CLASS PANTOPODA						
ORDER						
Nymphonidae		0		1		0
Nymphon sp.			1			
ECHINODERMATA						
Class Echinoidea						
Order Ophiurida						
Ophiuridae		5		0		0
Ophiura sp.	5					
Ophiactidae		0		1		1
Ophiopholis sp.			1		1	
MOLLUSCA						
Class Polyplacophora						
Order Neoloricata						
Ischnochitonidae		1		1		3
Stenosemus (Ischnochiton) albus	1		1		3	
Class Gastropoda						
Order Mesogastropoda						
Naticidae		0		1		2
Euspira (Polinices) triseriata			1		2	
Order Neogastropoda						
Buccinidae		0		0		1
Buccinum undatum					1	
Order Nudibranchia						
Lamellidorididae		0		1		0
Onchidorus sp.			1			
Class Bivalvia						
Order Protobranchia						
Nuculidae		1		0		0
Nucula proxima	1					

	Sta 5-1		Sta 5-2		Sta 5-3	
Scientific Name	**Species**	**Family**	**Species**	**Family**	**Species**	**Family**
Order Pteroconchida						
Mytilidae		2		2		3
Crenella glandula	2		1		2	
Modiolus modiolus			1		1	
Order Heterodontida						
Astartidae		2		0		1
Astarte sp.	2				1	
Carditidae		1		1		1
Cyclocardia (Cardita) borealis	1		1		1	
Cardiidae		0		1		0
Cerastoderma pinnulatum			1			
Myidae		4		1		2
Mya arenaria	4		1		2	
Hiatellidae		0		2		2
Hiatella arctica			2		2	
CHORDATA						
Class Ascidiacea						
Order Enterogona						
Didemnidae		1		0		1
Didemnum albidum	1				1	
Order Pleurogona						
Mogulidae		1		0		1
Molgula sp.	1				1	
CNIDARIA						
Class Hydrozoa						
Order Athecata						
Tubulariidae		6		0		0
Tubularia sp.	6					
ENTROPROCTA		5		3		2
Class Ectoprocta	5		3		2	
SIPUNCULA		0		0		1
Phascolion strombi					1	

	Sta 5-1		Sta 5-2		Sta 5-3	
Scientific Name	Species	Family	Species	Family	Species	Family
ECHIUROIDEA		1		3		1
Thalassema	1		3		1	
RHYNCHOCOELA		2		2		7
Unid. Nemertea	2		2		7	
PLATYHELMINTHES		0		3		0
Unid.			3			
ASCHELMINTHES						
Class Nematoda		2		3		2
Unid.	2		3		2	

SPECIES Station 5	Rep 1	Rep 2	Rep 3	Total	Mean	Var.
Total organisms	64	61	82	207	69.0	86.0
Abundance (organisms/0.1 m²)	790.1	753.0	1012.3		851.8	13106.3
Abundance (organisms/0.1 m²) minus Caps	790.1	740.7	1012.3		847.7	13953.0
Species richness (No. species)	25	37	41	58	34.3	46.2
Distance in meters						
Rel. Div. by sp.	0.916	0.944	0.943		0.934	0.000
%Caps by sp	0.0	1.6	0.0		0.5	0.6
Abundance (orgs/0.1 m²) minus Amphipods	777.7	679.0	938.2		798.3	11413.0
Total amphipods	1	6	6			
FAMILY	**Rep 1**	**Rep 2**	**Rep 3**	**Total**	**Mean**	**Var.**
Total organisms	64	61	82	207	69.0	86.0
Abundance (organisms/0.1 m²)	790.1	753.0	1012.3		851.8	13106.3
Abundance (organisms/0.1 m²) minus Caps	790.1	728.4	1012.3		843.6	14867.4
Family richness (No. Families)	23	31	35	48	29.7	24.9
Distance in meters						
Rel. Div. by Family	0.891	0.937	0.906		0.911	0.000
%Caps by Family	0.0	3.3	0.0		1.1	2.4
Abundance (orgs/0.1 m²) minus Amphipods	777.7	691.3	962.9		810.7	12835.4
Total amphipods by Family	1	5	4			

Station 6

	Sta 6-1		Sta 6-2		Sta 6-3	
Scientific Name	**Species**	**Family**	**Species**	**Family**	**Species**	**Family**
ANNELIDA						
CLASS POLYCHAETA						
ORDER Phyllodocida						
Phyllodocidae		0		1		0
Phyllodoce sp.			1			
Polynoidae		1		1		0
Harmothoe sp.	1		1			
Syllidae		2		0		0
Streptosyllis virians	1					
Syllis cornuta	1					
ORDER Cirratulida						
Cirratulidae		2		1		0
Tharyx spp.	2		1			
ARTHROPODA						
CLASS CRUSTACEA						
Order Amphipoda						
Corophiidae		0		1		1
Corophium spp.			1		1	
ECHINODERMATA						
Class Echinoidea						
Order Echinoida						
Strongylocentrotidae		0		1		1
Strongylocentrotus droebachiensis			1		1	
MOLLUSCA						
Class Gastropoda						
Order Neogastropoda						
Buccinidae		0		0		1
Buccinum undatum					1	
Class Bivalvia						
Order Pteroconchida						
Mytilidae		2		2		1
Crenella glandula	1					
Modiolus modiolus	1		1			

	Sta 6-1		Sta 6-2		Sta 6-3	
Scientific Name	**Species**	**Family**	**Species**	**Family**	**Species**	**Family**
Mytilus edulis			1		1	
Anomiidae		2		0		0
Anomia sp	2					
Order Heterodontida						
Cardiidae		0		1		0
Cerastoderma pinnulatum			1			
Myidae		1		1		0
Mya arenaria	1		1			
ENTROPROCTA		1		0		0
Class Ectoprocta	1					
RHYNCHOCOELA		3		1		0
Unid. Nemertea	3		1			

SPECIES Station 6	**Rep 1**	**Rep 2**	**Rep 3**	**Total**	**Mean**	**Var.**
Total organisms	14	10	4	28	9.3	16.9
Abundance (organisms/0.1 m²)	172.8	123.5	49.4		115.2	2573.9
Abundance (organisms/0.1 m²) minus Caps	172.8	123.5	49.4		115.2	2573.9
Species richness (No. species)	10	10	4	16	8.0	8.0
Distance in meters						
Rel. Div. by sp.	0.958	1.000	1.000		0.986	0.000
%Caps by sp	0.0	0.0	0.0		0.0	0.0
Abundance (orgs/0.1 m²) minus Amphipods	172.8	111.1	37.0		107.0	3081.8
Total amphipods	0	1	1			
FAMILY	**Rep 1**	**Rep 2**	**Rep 3**	**Total**	**Mean**	**Var.**
Total organisms	14	10	4	28	9.3	16.9
Abundance (organisms/0.1 m²)	172.8	123.5	49.4		115.2	2573.9
Abundance (organisms/0.1 m²) minus Caps	172.8	123.5	49.4		115.2	2573.9
Family richness (No. Families)	8	9	4	13	7.0	4.7
Distance in meters						
Rel. Div. by Family	0.965	0.985	1.0		0.983	0.000
%Caps by Family	0.0	0.0	0.0		0.0	0.0
Abundance (orgs/0.1 m²) minus Amphipods	172.8	111.1	37.0		107.0	3081.8
Total amphipods by Family	0	1	1			

Station 7

	Sta 7-1		Sta 7-2		Sta 6-3	
Scientific Name	**Species**	**Family**	**Species**	**Family**	**Species**	**Family**
ANNELIDA						
CLASS POLYCHAETA						
ORDER Phyllodocida						
Polynoidae		2		0		3
Harmothoe sp.	2				3	
ORDER Spionida						
Spionidae		1		0		0
Spio setosa	1					
ORDER Cirratulida						
Cirratulidae		1		2		3
Tharyx spp.	1		2		3	
Ampharetidae		4		0		0
Asabellides oculata	4					
Terebellidae		0		0		1
Polycirrus sp.					1	
ORDER Sabellida						
Serpulidae		1		0		1
Spirorbis spp.	1				1	
ARTHROPODA						
CLASS CRUSTACEA						
Order Amphipoda						
Corophiidae		1		1		2
Corophium spp.	1		1		2	
Order Tanaidae						
Tanaidae		0		0		1
Tanais sp.					1	
ECHINODERMATA						
Class Stelleroidea						
Order Foripultida						
Asterias sp.	1					
Unid.						

	Sta 7-1		Sta 7-2		Sta 6-3	
Scientific Name	**Species**	**Family**	**Species**	**Family**	**Species**	**Family**
Order Ophiurida						
Ophiactidae		1		0		1
Ophiopholis sp.	1				1	
MOLLUSCA						
Class Polyplacophora						
Order Neoloricata						
Ischnochitonidae		0		1		0
Stenosemus (Ischnochiton) albus			1			
Class Bivalvia						
Order Protobranchia						
Nuculidae		1		1		0
Nucula proxima	1		1			
Order Pteroconchida						
Mytilidae		3		3		2
Crenella glandula	2		1			
Modiolus modiolus	1		2		1	
Mytilus edulis					1	
Order Heterodontida						
Cardiidae		0		1		0
Cerastoderma pinnulatum			1			
Myidae		8		0		0
Mya arenaria	7					
Mya truncata	1					
Hiatellidae		1		0		0
Hiatella arctica	1					
CHORDATA						
Class Ascidiacea						
Order Pleurogona						
Mogulidae		0		1		2
Molgula sp.			1		2	

	Sta 7-1		Sta 7-2		Sta 6-3	
Scientific Name	**Species**	**Family**	**Species**	**Family**	**Species**	**Family**
CNIDARIA						
Class Anthozoa						
Order Actiniaria						
Actinidae		0		0		1
Urticina (Tealia) felina					1	
RHYNCHOCOELA		0		1		3
Unid. Nemertea			1		3	

SPECIES Station 7	**Rep 1**	**Rep 2**	**Rep 3**	**Total**	**Mean**	**Var.**
Total organisms	25	11	20	56	18.7	33.6
Abundance (organisms/0.1 m²)	308.6	135.8	246.9		230.4	5113.8
Abundance (organisms/0.1 m²) minus Caps	308.6	135.8	246.9		230.4	5113.8
Species richness (No. species)	14	9	12	22	11.7	4.2
Distance in meters						
Rel. Div. by sp.	0.887	0.977	0.951		0.938	0.001
%Caps by sp	0.0	0.0	0.0		0.0	0.0
Abundance (orgs/0.1 m²) minus Amphipods	296.3	123.5	209.9		209.9	4978.4
Total amphipods	1	1	3			
FAMILY	**Rep 1**	**Rep 2**	**Rep 3**	**Total**	**Mean**	**Var.**
Total organisms	25	11	20	56	18.7	33.6
Abundance (organisms/0.1 m²)	308.6	135.8	246.9		230.4	5113.8
Abundance (organisms/0.1 m²) minus Caps	308.6	135.8	246.9		230.4	5113.8
Family richness (No. Families)	11	8	11	19	10.0	2.0
Distance in meters						
Rel. Div. by Family	0.859	0.948	0.956		0.921	0.002
%Caps by Family	0.0	0.0	0.0		0.0	0.0
Abundance (orgs/0.1 m²) minus Amphipods	296.3	123.5	222.2		214.0	5012.2
Total amphipods by Family	1	1	2			

Station 8

	Sta 8-1		Sta 8-2		Sta 8-3	
Scientific Name	**Species**	**Family**	**Species**	**Family**	**Species**	**Family**
ANNELIDA						
CLASS POLYCHAETA						
ORDER Phyllodocida						
Phyllodocidae		0		1		0
Phyllodoce sp.			1			
Polynoidae		2		7		0
Harmothoe sp.	2		7			
Sigalionidae		1		1		0
Pholoe minuta	1		1			
Syllidae		5		3		0
Exogone spp.	2					
Streptosyllis virians	3		3			
Nereidae		0		2		0
Nereis spp.			2			
ORDER Spionida						
Spionidae		0		1		0
Polydora spp.			1			
ORDER Eunicida						
Eunicidae		1		1		0
Onuphis (Nothria) conchylega	1		1			
ORDER Cirratulida						
Cirratulidae		0		1		5
Tharyx spp.			1		5	
Ampharetidae		0		1		0
Asabellides oculata			1			
Terebellidae		1		3		0
Polycirrus sp.	1		1			
Streblosoma spiralis			2			
ORDER Flabelligerida						
Flabelligeridae		2		0		0
Pherusa spp.	2					
ORDER Sabellida						
Sabellidae		0		1		0
Myxicola infundibulum			1			

	Sta 8-1		Sta 8-2		Sta 8-3	
Scientific Name	Species	Family	Species	Family	Species	Family
ARTHROPODA						
CLASS CRUSTACEA						
Order Amphipoda						
Corophiidae		14		15		1
Corophium spp.	14		15		1	
Ischyroceridae		1		0		0
Ischyroceros anguipes	1					
Pleustidae		0		2		0
Stenopleustes sp.			2			
Order Tanaidae						
Tanaidae		1		0		0
Tanais sp.	1					
Order Decapoda						
Hippolytidae		1		0		0
Eualus sp.	1					
ECHINODERMATA						
Class Holothuroidea						
Order Dendrochirotida						
Cucumariidae		1		0		0
Cucumaria frondosa	1					
Class Echinoidea						
Order Echinoida						
Strongylocentrotidae		1		0		1
Strongylocentrotus droebachiensis	1				1	
Class Stelleroidea						
Order Foripultida						
Asterias sp.	1					
Order Ophiurida						
Ophiuridae		1		1		0
Ophiura sp.	1		1			
Ophiactidae		2		1		0
Ophiopholis sp.	2		1			
MOLLUSCA						
Class Polyplacophora						
Order Neoloricata						
Ischnochitonidae		1		1		0
Stenosemus (Ischnochiton) albus	1		1			

	Sta 8-1		Sta 8-2		Sta 8-3	
Scientific Name	**Species**	**Family**	**Species**	**Species**	**Family**	**Species**
Class Gastropoda						
Order Archaeogastropoda						
Fissurellidae		1		0		0
Puncturella noachina	1					
Class Bivalvia						
Order Pteroconchida						
Mytilidae		1		2		0
Crenella glandula	1		1			
Modiolus modiolus			1			
Anomiidae		0		2		0
Anomia sp			2			
Order Heterodontida						
Mesodesmatidae		0		1		0
Mesodesma arctatum			1			
Hiatellidae		1		3		1
Hiatella arctica	1		1		1	
Hiatella striata			2			
CHORDATA						
Class Ascidiacea						
Order Pleurogona						
Pyuridae		0		1		0
Boltenia sp.			1			
Mogulidae		1		0		0
Molgula sp.	1					
CNIDARIA						
Class Anthozoa						
Order Actiniaria						
Actinidae		7		1		0
Urticina (Tealia) felina	7		1			

	Sta 8-1		Sta 8-2		Sta 8-3	
Scientific Name	Species	Family	Species	Family	Species	Family
ENTROPROCTA		0		0		1
Class Ectoprocta					1	
ECHIUROIDEA		3		0		0
Thalassema	3					
RHYNCHOCOELA		0		0		2
Unid. Nemertea					2	
ASCHELMINTHES						
Class Nematoda		0		1		0
Unid.			1			

SPECIES Station 8	Rep 1	Rep 2	Rep 3	Total	Mean	Var.
Total organisms	50	53	11	114	38.0	366.0
Abundance (organisms/0.1 m²)	617.25	654.3	135.8		469.1	55778.0
Abundance (organisms/0.1 m²) minus Caps	617.25	654.3	135.8		469.1	55778.0
Species richness (No. species)	23	26	6	39	18.3	77.6
Distance in meters						
Rel. Div. by sp.	0.848	0.845	0.860		0.851	0.000
%Caps by sp	0	0.0	0.0		0.0	0.0
Abundance (orgs/0.1 m²) minus Amphipods	407.385	444.4	123.5		325.1	20556.9
Total amphipods	17	17	1			
FAMILY	**Rep 1**	**Rep 2**	**Rep 3**	**Total**	**Mean**	**Var.**
Total organisms	50	53	11	114	38.0	366.0
Abundance (organisms/0.1 m²)	617.3	654.3	135.8		469.1	55778.0
Abundance (organisms/0.1 m²) minus Caps	617.3	654.3	135.8		469.1	55778.0
Family richness (No. Families)	21	23	6	35	16.7	57.6
Distance in meters						
Rel. Div. by Family	0.8	0.847	0.860		0.847	0.000
%Caps by Family	0.0	0.0	0.0		0.0	0.0
Abundance (orgs/0.1 m²) minus Amphipods	567.9	629.6	123.5		440.3	50833.5
Total amphipods by Family	4	2	1			

Station 9

	Sta 9-1		Sta 9-2		Sta 9-3	
Scientific Name	**Species**	**Family**	**Species**	**Family**	**Species**	**Family**
ANNELIDA						
CLASS POLYCHAETA						
ORDER Phyllodocida						
Polynoidae		0		0		1
Harmothoe sp.					1	
Syllidae		1		0		0
Autolytus sp.	1					
ORDER Spionida						
Spionidae		1		0		0
Spio setosa	1					
ORDER Ariciida						
Orbiniidae		1		1		0
Naineris quadricuspida	1		1			
ORDER Cirratulida						
Cirratulidae		1		0		0
Tharyx spp.	1					
ARTHROPODA						
CLASS CRUSTACEA						
Order Amphipoda						
Aoridae		1		0		0
Unciola sp.	1					
Order Tanaidae						
Tanaidae		1		0		0
Tanais sp.	1					
ECHINODERMATA						
Class Stelleroidea						
Order Ophiurida						
Ophiactidae		0		2		0
Ophiopholis sp.			2			

	Sta 9-1		Sta 9-2		Sta 9-3	
Scientific Name	Species	Family	Species	Family	Species	Family
MOLLUSCA						
Class Polyplacophora						
Order Neoloricata						
Ischnochitonidae		1		1		1
Stenosemus (Ischnochiton) albus	1		1		1	
Class Bivalvia						
Order Pteroconchida						
Mytilidae		2		0		1
Crenella glandula	1				1	
Modiolus modiolus	1					
ASCHELMINTHES						
Class Nematoda		1		0		0
Unid.	1					

SPECIES Station 9	Rep 1	Rep 2	Rep 3	Total	Mean	Var.
Total organisms	10	4	3	17	5.7	9.6
Abundance (organisms/0.1 m²)	123.5	49.4	37.0		70.0	1456.3
Abundance (organisms/0.1 m²) minus Caps	123.5	49.4	37.0		70.0	1456.3
Species richness (No. species)	10	3	3	12	5.3	10.9
Distance in meters						
Rel. Div. by sp.	1.000	0.946	1.000		0.982	0.001
%Caps by sp	0.0	0.0	0.0		0.0	0.0
Abundance (orgs/0.1 m²) minus Amphipods	98.8	49.4	37.0		61.7	711.2
Total amphipods	2	0	0			
FAMILY	**Rep 1**	**Rep 2**	**Rep 3**	**Total**	**Mean**	**Var.**
Total organisms	10	4	3	17	5.7	9.6
Abundance (organisms/0.1 m²)	123.5	49.4	37.0		70.0	1456.3
Abundance (organisms/0.1 m²) minus Caps	123.5	49.4	37.0		70.0	1456.3
Family richness (No. Families)	9	3	3	11	5.0	8.0
Distance in meters						
Rel. Div. by Family	0.985	0.946	1.000		0.977	0.001
%Caps by Family	0.0	0.0	0.0		0.0	0.0
Abundance (orgs/0.1 m²) minus Amphipods	98.8	49.4	37.0		61.7	711.2
Total amphipods by Family	2	0	0		5.7	9.6

Station 10

	Sta 10-1		Sta 10-2		Sta 10-3	
Scientific Name	**Species**	**Family**	**Species**	**Family**	**Species**	**Family**
ANNELIDA						
CLASS POLYCHAETA						
ORDER Phyllodocida						
Phyllodocidae		0		1		0
Eteone spp.			1			
Polynoidae		0		1		0
Harmothoe sp.			1			
Syllidae		0		3		0
Autolytus sp.			1			
Exogone spp.			2			
ORDER Capitellida						
Capitellidae		0		2		1
Mediomastus ambiseta			2		1	
ORDER Spionida						
Paraonidae		1		0		0
Tauberia gracilis	1					
ORDER Eunicida						
Lumbrineridae		0		1		0
Ninoe nigripes			1			
ORDER Cirratulida						
Cirratulidae		0		1		0
Tharyx spp.			1			
Terebellidae		0		1		1
Streblosoma spiralis			1		1	
		0		1		3
CLASS OLIGOCHATEA			1		3	
ARTHROPODA						
CLASS CRUSTACEA						
Order Amphipoda						
Oedicerotidae		0		1		0
Monoculodes spp.			1			
Pleustidae		0		0		0
Stenopleustes sp.						

	Sta 10-1		Sta 10-2		Sta 10-3	
Scientific Name	**Species**	**Family**	**Species**	**Family**	**Species**	**Family**
Order Tanaidae						
Tanaidae		0		0		1
Tanais sp.					1	
Order Caprellidea						
Caprellidae		1		0		0
Aeginina longicornis	1					
CLASS PANTOPODA						
ORDER						
Ammotheidae		0		1		0
Achelia sp.			1			
Phoxichilidiidae		0		1		0
Phoxichilidium femoratum			1			
ECHINODERMATA						
Class Echinoidea						
Order Echinoida						
Strongylocentrotidae		1		0		0
Strongylocentrotus droebachiensis	1					
Order Ophiurida						
Ophiactidae		1		0		0
Ophiopholis sp.	1					
MOLLUSCA						
Class Gastropoda						
Order Nudibranchia						
Dotonidae		3		0		0
Doto coronata	3					
Class Bivalvia						
Order Protobranchia						
Nuculidae		0		1		0
Nucula proxima			1			
Order Pteroconchida						
Mytilidae		1		1		0
Crenella glandula			1			
Modiolus modiolus	1					

	Sta 10-1		Sta 10-2		Sta 10-3	
Scientific Name	**Species**	**Family**	**Species**	**Family**	**Species**	**Family**
Mytilus edulis						
Anomiidae		2		5		4
Anomia sp	2		5		4	
CHORDATA						
Class Ascidiacea						
Order Pleurogona						
Mogulidae		0		4		0
Molgula sp.			4			
CNIDARIA						
Class Hydrozoa						
Order Athecata						
Tubulariidae		1		0		0
Tubularia sp.	1					
Class Anthozoa						
Order Actiniaria						
Actinidae		0		1		0
Urticina (Tealia) felina			1			
ECHIUROIDEA		4		1		0
Thalassema	4		1			
RHYNCHOCOELA		3		3		1
Unid. Nemertea	3		3		1	
ASCHELMINTHES						
Class Nematoda		1		4		0
Unid.	1		4			

SPECIES Station 10	Rep 1	Rep 2	Rep 3	Total	Mean	Var.
Total organisms	19	34	11	64	21.3	90.9
Abundance (organisms/0.1 m²)	234.6	419.7	135.8		263.4	13851.4
Abundance (organisms/0.1 m²) minus Caps	234.6	419.7	135.8		263.4	13851.4
Species richness (No. species)	11	20	6	31	12.3	33.6
Distance in meters						
Rel. Div. by sp.	0.931	0.930	0.890		0.917	0.000
%Caps by sp	0.0	0.0	9.1		3.0	18.4
Abundance (orgs/0.1 m²) minus Amphipods	222.2	382.7	123.5		242.8	11413.0
Total amphipods	1	3	1			
FAMILY	**Rep 1**	**Rep 2**	**Rep 3**	**Total**	**Mean**	**Var.**
Total organisms	19	34	11	64	21.3	90.9
Abundance (organisms/0.1 m²)	234.6	419.7	135.8		263.4	13851.4
Abundance (organisms/0.1 m²) minus Caps	234.6	395.0	123.5		251.0	12429.0
Family richness (No. Families)	11	19	6	23	12.0	28.7
Distance in meters						
Rel. Div. by Family	0.931	0.927	0.890		0.916	0.000
%Caps by Family	0.0	5.9	9.1		5.0	14.2
Abundance (orgs/0.1 m²) minus Amphipods	222.2	382.7	123.5		242.8	11413.0
Total amphipods by Family	1	3	1			

Station 11

	Sta 11-1		Sta 11-2		Sta 11-3	
Scientific Name	**Species**	**Family**	**Species**	**Family**	**Species**	**Family**
ANNELIDA						
CLASS POLYCHAETA						
ORDER Phyllodocida						
Polynoidae		0		1		0
Harmothoe sp.			1			
Sigalionidae		0		0		2
Pholoe minuta					2	
Syllidae		1		2		0
Exogone spp.	1					
Streptosyllis virians			1			
Sphaerosyllis erinaceus			1			
ORDER Capitellida						
Capitellidae		0		1		3
Capitella capitata					3	
Mediomastus ambiseta			1			
Scalibregmidae		1		0		0
Polyphysia crassa	1					
ORDER Spionida						
Paraonidae		0		1		0
Aricidea suecica			1			
ORDER Eunicida						
Eunicidae		0		1		0
Onuphis (Nothria) conchylega			1			
ORDER Cirratulida						
Cirratulidae		0		0		1
Tharyx spp.					1	
Terebellidae		1		6		3
Polycirrus sp.	1		1			
Streblosoma spiralis			5		3	

	Sta 11-1		Sta 11-2		Sta 11-3	
Scientific Name	**Species**	**Family**	**Species**	**Family**	**Species**	**Family**
ARTHROPODA						
CLASS CRUSTACEA						
Order Tanaidae						
Tanaidae		1		7		1
Tanais sp.	1		7		1	
ECHINODERMATA						
Class Stelleroidea						
Order Foripultida						
Asteridae						1
Asterias sp.					1	
Order Ophiurida						
Ophiactidae		0		3		2
Ophiopholis sp.			3		2	
MOLLUSCA						
Class Polyplacophora						
Order Neoloricata						
Ischnochitonidae		5		1		5
Stenosemus (Ischnochiton) albus	5		1		5	
Class Bivalvia						
Order Pteroconchida						
Mytilidae		7		17		9
Crenella glandula	7		14		6	
Modiolus modiolus			2		3	
Mytilus edulis			1			
Anomiidae		0		1		1
Anomia sp			1		1	
Order Heterodontida						
Myidae		2		2		1
Mya arenaria	2		2			
Mya truncata					1	
Hiatellidae		0		1		0
Hiatella arctica			1			

	Sta 11-1		Sta 11-2		Sta 11-3	
Scientific Name	Species	Family	Species	Family	Species	Family
CHORDATA						
Class Ascidiacea						
Order Pleurogona						
Mogulidae		0		0		2
Molgula sp.					2	
ENTROPROCTA		42		0		5
Class Ectoprocta	42				5	
Class Ectoprocta			1			
ECHIUROIDEA		4		12		18
Thalassema	4		12		18	
RHYNCHOCOELA		4		9		4
Unid. Nemertea	4		9		4	
ASCHELMINTHES						
Class Nematoda		3		10		3
Unid.	3		10		3	

SPECIES Station 11	Rep 1	Rep 2	Rep 3	Total	Mean	Var.
Total organisms	71	76	61	208	69.3	38.9
Abundance (organisms/0.1 m²)	876.5	938.2	753.0		855.9	5926.6
Abundance (organisms/0.1 m²) minus Caps	876.5	938.2	716.0		843.6	8771.4
Species richness (No. species)	11	20	17	31	16.0	14.0
Distance in meters						
Rel. Div. by sp.	0.636	0.843	0.862		0.780	0.010
%Caps by sp	0.0	0.0	4.9		1.6	5.4
Abundance (orgs/0.1 m²) minus Amphipods	864.2	851.8	740.7		818.9	3081.8
Total amphipods	1	7	1			
FAMILY	**Rep 1**	**Rep 2**	**Rep 3**	**Total**	**Mean**	**Var.**
Total organisms	71	76	61	208	69.3	38.9
Abundance (organisms/0.1 m²)	876.5	938.2	753.0		855.9	5926.6
Abundance (organisms/0.1 m²) minus Caps	876.5	925.9	716.0		839.5	8026.3
Family richness (No. Families)	11	17	15	23	14.3	6.2
Distance in meters						
Rel. Div. by Family	0.636	0.830	0.850		0.772	0.009
%Caps by Family	0.0	1.3	4.9		2.1	4.3
Abundance (orgs/0.1 m²) minus Amphipods	864.2	925.9	740.7		843.6	5926.6
Total amphipods by Family	1	1	1			

Appendix V

Granulometry photos of subtidal benthic infauna samples from Cobscook Bay (CB) site, Grover (Gove Point), Cobscook Bay

ORPC Granulometry Images

CB 1-1

CB 1-2 (No photo)

CB 1-3

CB 2-1

CB 2-2

CB 2-3

ORPC Granulometry Images

CB 3-1

CB 3-2 1 of 2

CB 3- 2 of 2

CB 3-3 1 of 2

CB 3-3 2 0f 2

CB 4-1

ORPC Granulometry Images

CB 4-2 1 of 2

CB 4-2 2 of 2

CB 4-3

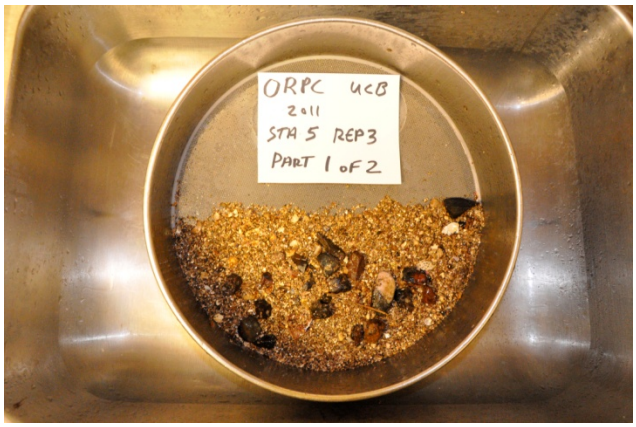
CB 5-1 1 of 2

CB 5-1 2 of 2

CB 5-2 1 of 2

ORPC Granulometry Images

CB 5-2 2 of 2



CB 5-3 1 of 2

CB 5-3 2 of 2

CB 6-1 1 of 1

CB 6-1 2 of 2

CB 6-2

ORPC Granulometry Images

CB 6-3 1 of 1

CB 6-3 2 of 2

CB 7-1

CB 7-2 1 of 2

CB 7-2 2 of 2

CB 7-3

ORPC Granulometry Images

CB 8-1 1 of 2

CB 8-1 2 of 2

CB 8-2 1 of 2

CB 8-2 2 of 2

CB 8-3 1 of 2

CB 8-3 2 of 2

ORPC Granulometry Images

CB 9-1 1 of 2

CB 9-1 2 of 2

CB 9-2 1 of 2

CB 9-2 2 of 2

CB 9-3 1 of 2

CB 9-3 2 of 2

ORPC Granulometry Images

CB 10-1 1 of 2

CB 10-1 2 of 2

CB 10-2 1 of 2

CB 10-2 2 of 2

CB 10-3 1 of 2

CB 11-1

ORPC Granulometry Images

CB 11-2 1 of 2

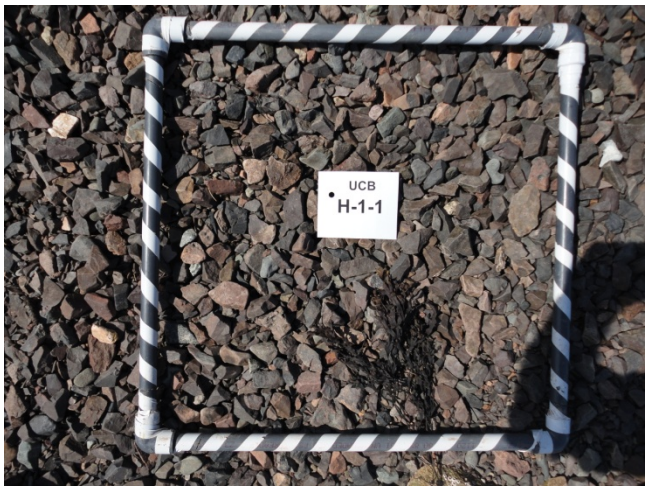
CB 11-2 2 of 2

CB 11-3 1 of 2

CB 11-3 2 of 2

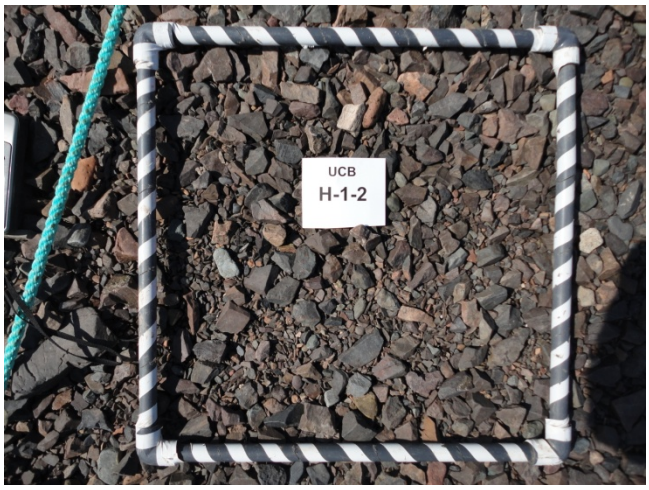
Appendix VI

Pre- and post-sampling photographs of stations at Cobscook Bay (CB) intertidal cable crossing area



H-1-1 before sampling

H-1-1 after sampling

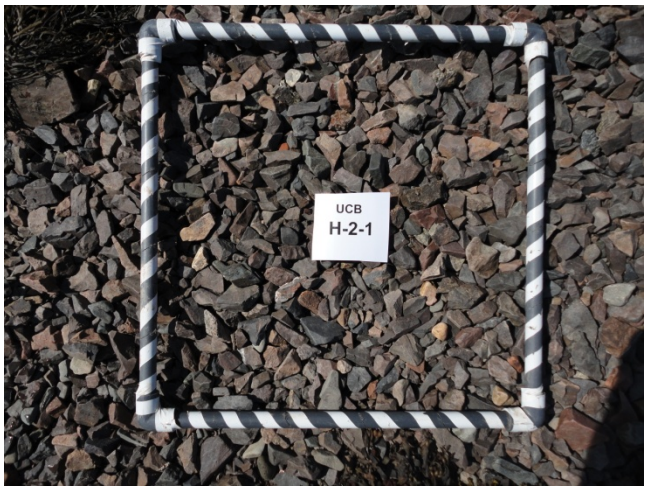


H-1-2 before sampling

H-1-2 after sampling

H-1-3 before sampling

H-1-3 after sampling



H-2-1 before sampling

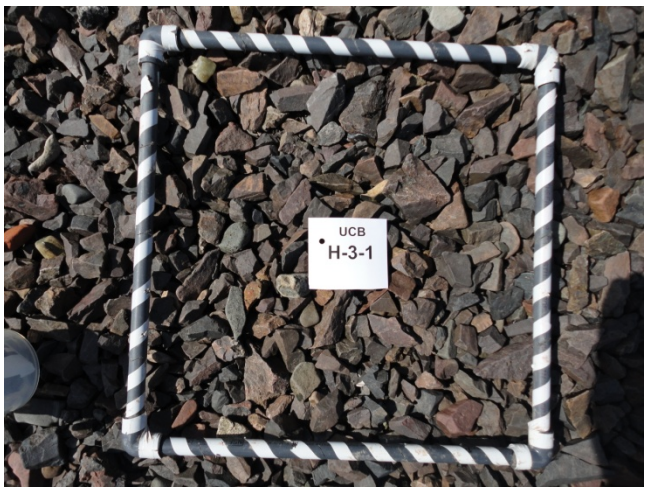
H-2-1 after sampling

H-2-2 before sampling

H-2-2 after sampling

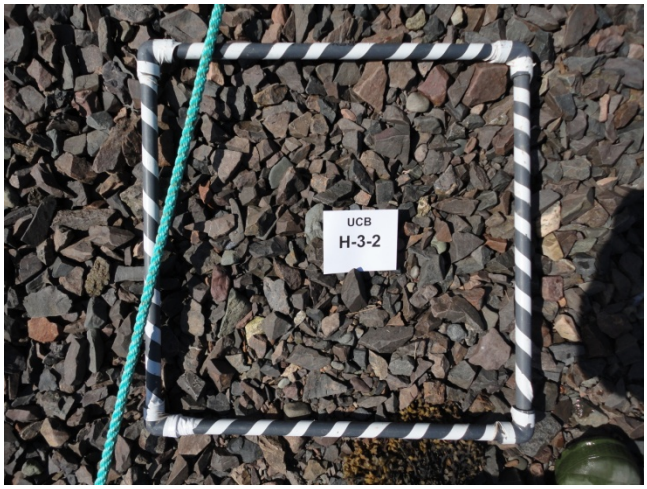
H-2-3 before sampling

H-2-3 after sampling

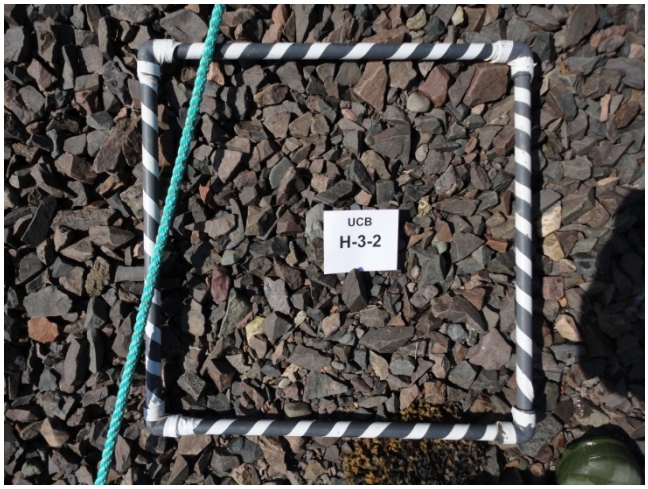


H-3-1 before sampling

H-3-1 after sampling



H-3-2 before sampling



H-3-2 after sampling

H-3-3 before sampling

H-3-3 after sampling

M-1-1 before sampling

M-1-1 after sampling

M-1-2 before sampling

M-1-2 after sampling

M-1-3 before sampling

M-1-3 after sampling

M-2-1 before sampling

M-2-1 after sampling

M-2-2 before sampling

M-2-2 after sampling

M-2-3 before sampling

M-2-3 after sampling

M-3-1 before sampling

M-3-1 after sampling

M-3-2 before sampling

M-3-2 after sampling

M-3-3 before sampling

M-3-3 after sampling

L-1-1 before sampling

L-1-1 after sampling

L-1-2 before sampling

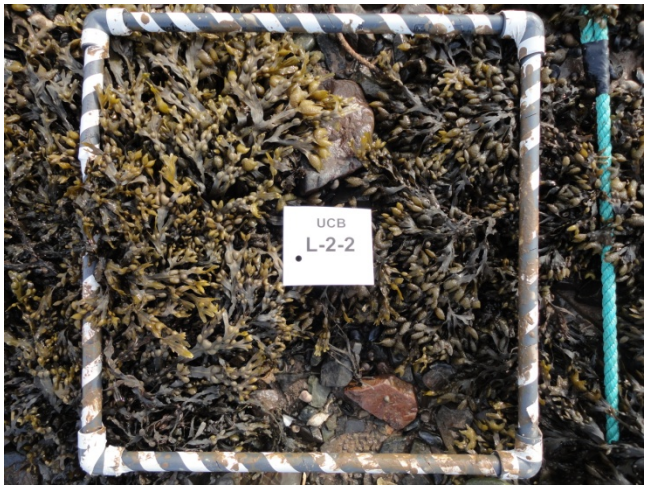
L-1-2 after sampling

L-1-3 before sampling

L-1-3 after sampling

L-2-1 before sampling

L-2-1 after sampling



L-2-2 before sampling

L-2-2 after sampling

L-2-3 before sampling

L-2-3 after sampling

L-3-1 before sampling

L-3-1 after sampling

L-3-2 before sampling

L-3-2 after sampling

L-3-3 before sampling

L-3-3 after sampling

Appendix VII

Detailed epibenthic fauna data for intertidal scrape samples collected at the Cobscook Bay (CB) site

H-1, H-2, H-3 SAMPLES: NO EPIBENTHIC INFAUNA IDENTIFIED

Benthic Infauna Analysis **M-1 INTERTIDAL EPIBENTHIC SAMPLES** **07/15/2011**

Scientific Name	M 1-1		M 1-2		M 1-3	
	Species	Family	Species	Family	Species	Family
CRUSTACEA						
SUB CLASS MALACOSTRACA						
Order Amphipoda						
Balanidae		4		5		1
Balanus sp.	4		5		1	
Hyalidae		181		91		278
Hyale sp.	181		91		278	
Talitridae		0		0		2
Talochestia sp.	0		0		2	
Order Mysidicacea		1		0		0
Mysids	1		0		0	
Order Isopoda						
Idoteidae		22		42		183
Idotea sp.	22		42		183	
Halacaridae		2		2		0
Halacarus sp	2		2		0	
Order Harpacticoida		0		0		1
Harpacticus sp.	0		0		1	
MOLLUSCA						
Class Bivalvia						
Mytilidae		6		2		1
Mytilus edulis	6		2		1	
Class Gastropoda						
Order Mesogastropoda						
Littoridae		137		319		270
Littorina littorea	137		319		270	
SPECIES						
Total organisms	**353**		**461**		**736**	
Abundance (organisms/m²)	**1412**		**1844**		**2944**	
Species richness (No. species)	**7**		**6**		**7**	
Rel. Diversity	**0.539**		**0.497**		**0.578**	
FAMILY						
Total organisms		**353**		**461**		**736**
Abundance (organisms/m²)		**1412**		**1844**		**2944**
Family richness (No. families)		**7**		**6**		**7**
Rel. Diversity		**0.539**		**0.497**		**0.578**

Benthic Infauna Analysis **M-2 INTERTIDAL EPIBENTHIC SAMPLES** **07/15/2011**

Scientific Name	M 2-1		M 2-2		M 2-3	
	Species	Family	Species	Family	Species	Family
CRUSTACEA						
SUB CLASS MALACOSTRACA						
Order Amphipoda						
Balanidae		1		5		54
Balanus sp.	1		5		54	
Caprellidae		0		0		1
Aeginina longicornis	0		0		1	
Gammaridae		0		2		1
Gammarus sp.	0		2		1	
Hyalidae		33		131		34
Hyale sp.	33		131		34	
Talitridae		0		1		0
Talochestia sp.	0		1		0	
Order Isopoda						
Idoteidae		1		58		90
Idotea sp.	1		58		90	
Halacaridae		0		1		0
Halacarus sp	0		1		0	
MOLLUSCA						
Class Bivalvia						
Mytilidae		6		11		11
Mytilus edulis	6		11		11	
Class Gastropoda						
Order Mesogastropoda						
Littoridae		273		191		342
Littorina littorea	273		191		342	
SPECIES						
Total organisms	**314**		**400**		**533**	
Abundance (organisms/m²)	**1256**		**1600**		**2132**	
Species richness (No. species)	**5**		**8**		**7**	
Rel. Diversity	**0.000**		**0.581**		**0.563**	
FAMILY						
Total organisms		**314**		**400**		**533**
Abundance (organisms/m²)		**1256**		**1600**		**2132**
Family richness (No. families)		**5**		**8**		**7**
Rel. Diversity		**0.000**		**0.581**		**0.563**

Benthic Infauna Analysis **M-3 INTERTIDAL EPIBENTHIC SAMPLES** **07/15/2011**

Scientific Name	M 3-1		M 3-2		M 3-3	
	Species	Family	Species	Family	Species	Family
CRUSTACEA						
SUB CLASS MALACOSTRACA						
Order Amphipoda						
Balanidae		0		75		3
Balanus sp.	0		75		3	
Order Isopoda						
Idoteidae		10		16		67
Idotea sp.	10		16		67	
MOLLUSCA						
Class Bivalvia						
Mytilidae		12		4		13
Mytilus edulis	12		4		13	
Class Gastropoda						
Order Mesogastropoda						
Littoridae		60		187		141
Littorina littorea	60		187		141	
SPECIES						
Total organisms	**82**		**282**		**224**	
Abundance (organisms/m²)	**328**		**1128**		**896**	
Species richness (No. species)	**3**		**4**		**4**	
Rel. Diversity	**0.698**		**0.612**		**0.631**	
FAMILY						
Total organisms		**82**		**282**		**224**
Abundance (organisms/m²)		**328**		**1128**		**896**
Family richness (No. families)		**3**		**4**		**4**
Rel. Diversity		**0.698**		**0.612**		**0.631**

Benthic Infauna Analysis **L-1 INTERTIDAL EPIBENTHIC SAMPLES** **07/15/2011**

Scientific Name	L 1-1		L 1-2		L 1-3	
	Species	Family	Species	Family	Species	Family
CRUSTACEA						
SUB CLASS MALACOSTRACA						
Order Amphipoda						
Balanidae		7		7		4
Balanus sp.	7		7		4	
Order Isopoda						
Idoteidae		0		2		0
Idotea sp.	0		2		0	
MOLLUSCA						
Class Bivalvia						
Mytilidae		307		560		508
Modiolus modiolus	1		0		0	
Mytilus edulis	306		560		508	
Class Gastropoda						
Order Mesogastropoda						
Littoridae		24		108		118
Littorina littorea	24		108		118	
Order Neogastropoda						
Buccinidae		1		0		0
Colus sp.	1		0		0	
SPECIES						
Total organisms	**339**		**677**		**630**	
Abundance (organisms/m²)	**1356**		**2708**		**2520**	
Species richness (No. species)	**5**		**4**		**3**	
Rel. Diversity	**0.245**		**0.371**		**0.473**	
FAMILY						
Total organisms		**339**		**677**		**630**
Abundance (organisms/m²)		**1356**		**2708**		**2520**
Family richness (No. families)		**4**		**4**		**3**
Rel. Diversity		**0.270**		**0.371**		**0.473**

Benthic Infauna Analysis **L-2 INTERTIDAL EPIBENTHIC SAMPLES** **07/15/2011**

Scientific Name	L 2-1		L 2-2		L 2-3	
	Species	Family	Species	Family	Species	Family
CRUSTACEA						
SUB CLASS MALACOSTRACA						
Order Amphipoda						
Gammaridae		0		1		0
Gammarus sp.	0		1		0	
Metilidae		0		1		0
Casco bigelowi	0		1		0	
Order Isopoda						
Idoteidae		0		21		1
Idotea sp.	0		21		1	
MOLLUSCA						
Class Bivalvia						
Mytilidae		453		75		149
Mytilus edulis	453		75		149	
Class Gastropoda						
Acmaeidae		0		1		3
Tectura (Acmea) testudinalis	0		1		3	
Order Archaeogastropoda						
Trochidae		0		2		0
Margarites spp.	0		2		0	
Order Mesogastropoda						
Littoridae		36		1617		138
Littorina littorea	36		1617		138	
Order Neogastropoda						
Buccinidae		7		21		4
Buccinum undatum	3		0		0	
Colus sp.	4		21		4	
SPECIES						
Total organisms	**496**		**1739**		**295**	
Abundance (organisms/m²)	**1984**		**6956**		**1180**	
Species richness (No. species)	**4**		**8**		**5**	
Rel. Diversity	**0.247**		**0.159**		**0.512**	
FAMILY						
Total organisms		**496**		**1739**		**295**	
Abundance (organisms/m²)		**1984**		**6956**		**1180**	
Family richness (No. families)		**3**		**8**		**5**	
Rel. Diversity		**0.303**		**0.159**		**0.512**	

Benthic Infauna Analysis **L-3 INTERTIDAL EPIBENTHIC SAMPLES** **07/15/2011**

Scientific Name	L 3-1		L 3-2		L 3-3	
	Species	Family	Species	Family	Species	Family
CNIDARIA						
Hydrozoa		1		0		0
Urticina (Tealia) felina	1		0		0	
MOLLUSCA						
Class Gastropoda						
Acmaeidae		16		131		33
Tectura (Acmea) testudinalis	16		131		33	
Order Mesogastropoda						
Littoridae		9		46		23
Littorina littorea	9		25		18	
Littorina saxitalis	0		21		5	
Order Neogastropoda						
Buccinidae		0		1		0
Colus sp.	0		1		0	
SPECIES						
Total organisms	**26**		**178**		**56**	
Abundance (organisms/m²)	**104**		**712**		**224**	
Species richness (No. species)	**3**		**4**		**3**	
Rel. Diversity	**0.720**		**0.565**		**0.812**	
FAMILY						
Total organisms		**26**		**178**		**56**
Abundance (organisms/m²)		**104**		**712**		**224**
Family richness (No. families)		**3**		**3**		**2**
Rel. Diversity		**0.720**		**0.550**		**0.977**

Appendix VIII

Detailed benthic infauna data for intertidal core samples collected at Cobscook Bay (CB) site

No Infauna found

No Infauna found

No Infauna found

Benthic Infauna Analysis **UCB M-1 INTERTIDAL CORE SAMPLES** **07/16/2011**

	REP 1		REP 2		REP 3	
	Species	Family	Species	Family	Species	Family
ANNELIDA						
CLASS POLYCHAETA						
Capitellidae		0		1		0
Capitella capitata	0		1		0	
CLASS OLIGOCHAETA		67		32		83
Unid.	67		32		83	
NEMATODA		50		6		13
Unid.	50		6		13	
NEMERTEA		0		5		5
Unid.	0		5		5	
PLATYHELMINTHES		0		5		1
Unid.	0		5		1	
SPECIES						
Total organisms	**117**		**49**		**102**	
Abundance (organisms/0.1 m²)	**1444**		**605**		**1259**	
Species richness (No. species)	**2**		**5**		**4**	
Rel. Diversity	**0.985**		**0.671**		**0.450**	
FAMILY						
Total organisms		**117**		**49**		**102**
Abundance (organisms/0.1 m²)		**1444**		**605**		**1259**
Family richness (No. families)		**2**		**5**		**4**
Rel. Diversity		**0.985**		**0.671**		**0.450**

	Species			Family		
	Total	Mean	Variance	Total	Mean	Variance
Total organisms	**268**	**89.3**	**850.9**			
Abundance (organisms/0.1 m²)	**3308.46**	**1102.8**	**129674.6**			
Species richness (No. species)	**5**	**3.7**	**1.6**			
Rel. Diversity		**0.702**	**0.048**			
FAMILY						
Total organisms				**268**	**89.3**	**850.9**
Abundance (organisms/0.1 m²)				**3308.46**	**1102.8**	**129674.6**
Family richness (No. families)				**5**	**3.7**	**1.6**
Rel. Diversity					**0.702**	**0.048**

Benthic Infauna Analysis **UCB M-2 INTERTIDAL CORE SAMPLES** **07/16/2011**

	REP 1		REP 2		REP 3	
	Species	Family	Species	Family	Species	Family
CLASS OLIGOCHAETA		32		53		41
Unid.	32		53		41	
NEMATODA		20		9		11
Unid.	20		9		11	
NEMERTEA		9		3		3
Unid.	9		3		3	
PLATYHELMINTHES		0		1		0
Unid.	0		1		0	
SPECIES						
Total organisms	**61**		**66**		**55**	
Abundance (organisms/0.1 m²)	**753**		**815**		**679**	
Species richness (No. species)	**3**		**4**		**3**	
Rel. Diversity	**0.898**		**0.470**		**0.637**	
FAMILY						
Total organisms		**61**		**66**		**55**
Abundance (organisms/0.1 m²)		**753**		**815**		**679**
Family richness (No. families)		**3**		**4**		**3**
Rel. Diversity		**0.898**		**0.470**		**0.637**

	Species			Family		
	Total	Mean	Total	Mean	Total	Mean
Total organisms	**182**	**60.7**	**20.2**			
Abundance (organisms/0.1 m²)	**2246.79**	**748.9**	**3081.8**			
Species richness (No. species)	**4**	**3.3**	**0.2**			
Rel. Diversity		**0.668**	**0.031**			
FAMILY						
Total organisms				**182**	**60.7**	**20.2**
Abundance (organisms/0.1 m²)				**2246.79**	**748.9**	**3081.8**
Family richness (No. families)				**4**	**3.3**	**0.2**
Rel. Diversity					**0.668**	**0.031**

Benthic Infauna Analysis **UCB M-3 INTERTIDAL CORE SAMPLES** **07/16/2011**

	REP 1		REP 2		REP 3	
	Species	Family	Species	Family	Species	Family
CLASS OLIGOCHAETA		58		64		31
Unid.	58		64		31	
NEMATODA		9		21		0
Unid.	9		21		0	
NEMERTEA		72		6		1
Unid.	72		6		1	
PLATYHELMINTHES		0		1		0
Unid.	0		1		0	
SPECIES						
Total organisms	**139**		**92**		**32**	
Abundance (organisms/0.1 m²)	**1716**		**1136**		**395**	
Species richness (No. species)	**3**		**4**		**2**	
Rel. Diversity	**0.803**		**0.589**		**0.201**	
FAMILY						
Total organisms		**139**		**92**		**32**
Abundance (organisms/0.1 m²)		**1716**		**1136**		**395**
Family richness (No. families)		**3**		**4**		**2**
Rel. Diversity		**0.803**		**0.589**		**0.201**

	Species			Family		
	Total	Mean	Total	Mean	Total	Mean
Total organisms	**263**	**87.7**	**1918**			
Abundance (organisms/0.1 m²)	**3247**	**1082.2**	**292234**			
Species richness (No. species)	**4**	**3.0**	**0.7**			
Rel. Diversity		**0.531**	**0.062**			
FAMILY						
Total organisms				**263**	**87.7**	**1918**
Abundance (organisms/0.1 m²)				**3247**	**1082.2**	**292234**
Family richness (No. families)				**4**	**3.0**	**0.7**
Rel. Diversity					**0.531**	**0.062**

Benthic Infauna Analysis **UCB L-1 INTERTIDAL CORE SAMPLES** **07/16/2011**

	REP 1		REP 2		REP 3	
ANNELIDA	**Species**	**Family**	**Species**	**Family**	**Species**	**Family**
CLASS POLYCHAETA						
Capitellidae		3		8		0
Capitella capitata	3		8		0	
Cirratulidae		0		1		0
Tharyx spp.	0		1		0	
CLASS OLIGOCHAETA		409		1460		0
Unid.	409		1460		0	
MOLLUSCA						
Class Bivalvia						
Myidae		12		22		0
Mya arenaria	12		22		0	
NEMATODA		3		61		0
Unid.	3		61		0	
NEMERTEA		17		42		0
Unid.	17		42		0	
PLATYHELMINTHES		0		0		0
Unid.	0		0		0	
SPECIES						
Total organisms	**444**		**1594**		**0**	
Abundance (organisms/0.1 m²)	**5481**		**19678**		**0**	
Species richness (No. species)	**5**		**6**		**0**	
Rel. Diversity	**0.227**		**0.218**		**----**	
FAMILY						
Total organisms		**444**		**1594**		**0**
Abundance (organisms/0.1 m²)		**5481**		**19678**		**0**
Family richness (No. families)		**5**		**6**		**0**
Rel. Diversity		**0.227**		**0.218**		**----**

	Species			Family		
	Total	Mean	Total	Mean	Total	Mean
Total organisms	2038	1019.0	330625			
Abundance (organisms/0.1 m²)	25159	12579.6	50386928			
Species richness (No. species)	6	5.5	0.3			
Rel. Diversity		0.223	0.000			
FAMILY						
Total organisms				2038	1019.0	330625
Abundance (organisms/0.1 m²)				25159.11	12579.6	50386928
Family richness (No. families)				6	5.5	0.3
Rel. Diversity					0.223	0.000
% CAPITELLIDAE					0.589	0.008

Benthic Infauna Analysis **UCB L-2 INTERTIDAL CORE SAMPLES** **07/16/2011**

No benthic infauna cores taken

Benthic Infauna Analysis **UCB L-3 INTERTIDAL CORE SAMPLES** **07/16/2011**

	REP 1		REP 2		REP 3	
	Species	Family	Species	Family	Species	Family
		0		3		0
CLASS OLIGOCHAETA	0		3		0	
Unid.						
MOLLUSCA						
Class Bivalvia		1		0		0
Myidae	1		0		0	
Mya arenaria						
		1		0		0
NEMATODA	1		0		0	
Unid.						
SPECIES						
Total organisms	**2**		**3**		**0**	
Abundance (organisms/0.1 m²)	**25**		**37**		**0**	
Species richness (No. species)	**2**		**1**		**0**	
Rel. Diversity	**1.000**		**0.000**		**----**	
FAMILY						
Total organisms		**2**		**3**		**0**
Abundance (organisms/0.1 m²)		**25**		**37**		**0**
Family richness (No. families)		**2**		**1**		**0**
Rel. Diversity		**1.000**		**0.000**		**----**

	Species			Family		
	Total	Mean	Total	Mean	Total	Mean
Total organisms	**5**	**1.7**	**1.6**			
Abundance (organisms/0.1 m²)	**62**	**20.6**	**237.1**			
Species richness (No. species)	**3**	**1.0**	**0.7**			
Rel. Diversity		**0.500**	**0.250**			
FAMILY						
Total organisms				**5**	**1.7**	**1.6**
Abundance (organisms/0.1 m²)				**61.725**	**20.6**	**237.1**
Family richness (No. families)				**3**	**1.0**	**0.7**
Rel. Diversity					**0.500**	**0.250**