High-Resolution Geologic Mapping of the Inner Continental Shelf: Boston Harbor and Approaches, Massachusetts

By Seth D. Ackerman, Bradford Butman, Walter A. Barnhardt, William W. Danforth and James M. Crocker

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Conversion Factors

Multiply	By	To obtain
	Length	
kilometer (km)	0.6214	mile (mi)
knot (nautical mile per hour nm/h)	1.852	kilometers per hour (km/h)
meter (m)	1.094	yard (yd)
	Area	
square kilometer (km^2)	0.3816	square mile (mi^2)
	Frequency	
kilohertz (kHz)	1000	cycles per second

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Figure 4.16b. Backscatter intensity from sidescan-sonar showing outcropping ledges east of the Brewster Islands (see fig. 4.2 for map location). These ENE-WSW-trending features exhibit the largest topographic variability in the study area and are characterized by moderate backscatter intensity. Red dots show location of bottom photographs (see Appendix 3 to view all photographs at these locations); yellow dot is location of bottom sediment sample (Appendix 2); number is station identifier. See figure 4.16a for companion shaded-relief map.

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Figure 4.18. Photographs of the sea floor in areas of elevated topography, rough sea floor, and high backscatter intensity (stations 8 and 10, 11.0 and 11.5 m water depth respectively) east of Nantasket. The pink on the boulders is calcareous algae. The sea floor between these features is sand (stations 5, 6, 13.4 and 16.0 m water depth

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Section 1 - Introduction

This report presents the surficial geologic framework data and information for the sea floor of Boston Harbor and Approaches, Massachusetts (fig. 1.1). This mapping was conducted as part of a cooperative program between the U.S. Geological Survey (USGS), the Massachusetts Office of Coastal Zone Management (CZM), and the National Oceanic and Atmospheric Administration (NOAA). The primary objective of this project was to provide sea floor geologic information and maps of Boston Harbor to aid resource management, scientific research, industry and the public. A secondary objective was to test the feasibility of using NOAA hydrographic survey data, normally collected to update navigation charts, to create maps of the sea floor suitable for geologic and habitat interpretations. Defining sea-floor geology is the first steps toward managing ocean resources and assessing environmental changes due to natural or human activity. The geophysical data for these maps were collected as part of hydrographic surveys carried out by NOAA in 2000 and 2001 (fig. 1.2). Bottom photographs, video, and samples of the sediments were collected in September 2004 to help in the interpretation of the geophysical data. Included in this report are high-resolution maps of the sea floor, at a scale of 1:25,000; the data used to create these maps in Geographic Information Systems (GIS) format; a GIS project; and a gallery of photographs of the sea floor.

Companion maps of sea floor to the north Boston Harbor and Approaches are presented by Barnhardt and others (2006) and to the east by Butman and others (2003a,b,c). See Butman and others (2004) for a map of Massachusetts Bay at a scale of 1:125,000.

The sections of this report are listed in the navigation bar along the left-hand margin of this page. Section 1 (this section) introduces the report. Section 2 presents the large-format map sheets. Section 3 describes data collection, processing, and analysis. Section 4 summarizes the geologic history of the region and discusses geomorphic and anthropogenic features within the study area. Section 4 also provides references that contain additional information about the region. Appendix 1 provides GIS layers of all the data collected in this study, Appendix 2 contains the grain size textural analyses of sediment samples, and Appendix 3 contains bottom photographs of the sea floor in JPG format.

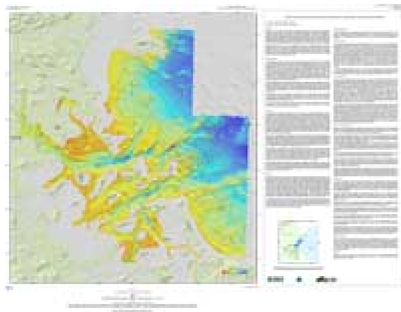
Section 2 - Maps

Five maps have been compiled showing the sea floor of Boston Harbor and Approaches. Text on the map sheets briefly describes the data and methodologies, and summarizes key geomorphic features. Section 3 (Data Collection and Processing) and Section 4 (Geologic Interpretation) in this report provide additional information to that presented on the map sheets. Links to the map text and the map sheets are provided below. The text is the same on all map sheets.

Map Sheet Text (PDF)

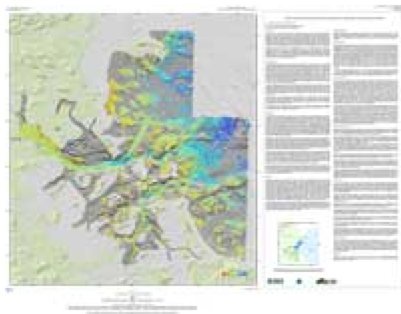
Map Sheet 1 (PDF): Shaded-relief topography of sea floor (colored by water depth)

Map (page size PDF)



Map Sheet 2 (PDF): Shaded-relief topography of sea floor (gray scale)

Map (page size PDF)

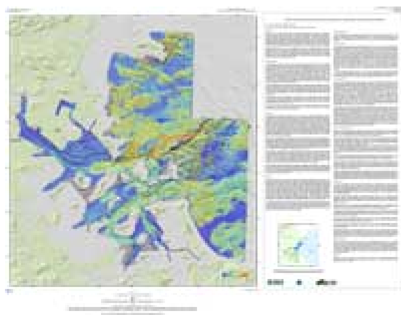


Map Sheet 3 (PDF): Backscatter intensity of sea floor (gray scale)

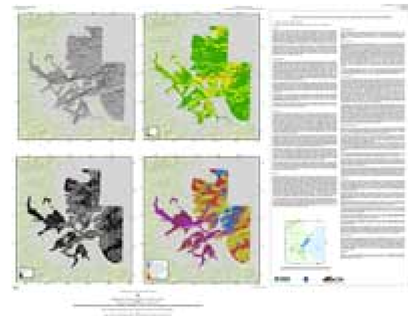
Map (page size PDF)

Map Sheet 4 (PDF): Shaded-relief topography of sea floor (colored by backscatter intensity)

Map (page size PDF)



Map Sheet 5 (PDF): Descriptive map of the sea floor geology
Map (page size PDF)



Section 3 - Data Collection and Processing

Field program

The NOAA Ship Whiting (fig. 3.1) and its launches conducted four hydrographic surveys (table 3.1) of the navigable areas within Boston Harbor and its approaches in 2000 and 2001. These cruises acquired sidescan-sonar data over an area of 155 km2 and single-beam bathymetric data over an area of approximately 170 km2. In addition, multibeam echosounder data were acquired over 65 km2 (approximately 37% of the full survey area). The multibeam echosounder data were collected primarily in the navigation channels between the Harbor Islands and in areas of potential hazards to navigation and do not provide seamless coverage of the entire region. All geophysical data were collected by the NOAA National Ocean Service (NOS) and provided to CZM and the USGS in 2003. No new geophysical data were collected as part of this project.

Table 3.1. NOAA Hydrographic Survey areas

NOAA Hydrographic Survey ID	Location	Area Surveyed	Survey Dates
H10990	Boston Inner Harbor	15 km2	8/01 - 11/01
H10991	Boston North Channel to Weymouth Fore River	43 km2	9/00 - 11/00
H10992	The Graves to Cohasset Harbor	69 km2	7/01 - 10/01
H10994	Broad Sound	44 km2	9/00 - 10/01

NOAA provided raw sidescan-sonar datasets in XTF format for all four surveys, and the CARIS HIPS/SIPS (Hydrographic Information Processing System/Sonar Information Processing System) database. Additional information about the NOAA hydrographic acquisition systems, including standard configurations and typical operating procedures, can be found in the NOAA Data Acquisition and Processing Report (NOAA DAPR, 2001) for project OPR-A397-WH and in the individual Descriptive Reports for surveys H10990, H10991, H10992 and H10994 (NOAA 2001a,b,c,d).

In order to ground-truth, or validate, the geophysical data, direct sampling and photographic observations were collected during a 4-day cruise aboard the USGS R/V Rafael (fig. 3.2) in 2004. Bottom video, high-resolution digital bottom photographs and sediment samples were collected using the USGS mini-SEABOSS (SEABed Observation and Sampling System (fig. 3.3).

Sidescan-Sonar

The NOAA hydrographic surveys were designed to collect overlapping sidescan-sonar data to ensure complete coverage of the sea floor. This complete coverage, in which much of the study area was imaged at least twice by sidescan-sonar, was achieved for most of the 155 km^2 survey area in order to identify all hazards to navigation. NOAA surveys utilized either the Edgetech model 272-T (100 kHz) or the "high-speed/high-resolution" Klein T-5500 (455 kHz) sonar for sidescan-sonar acquisition. System and vessel configurations varied between and within the different surveys (table 3.2).

Table 3.2. Vessel, System and Survey Configurations

Survey	Vessel	Sonar System	Configuration
H10990	Launch 1005	Edgetech 272-T	Towed
	Launch 1014	Klein 5500	Towed

H10991	Launch 1014	Edgetech 272-T	Towed
	Launch 1014	Edgetech 272-T	Hull mounted
H10992	Launch 1005	Edgetech 272-T	Towed
	Launch 1014	Edgetech 272-T	Towed
	Whiting	Klein 5500	Towed
H10994	Launch 1005	Edgetech 272-T	Towed
	Launch 1014	Klein 5500	Hull mounted
	Launch 1014	Edgetech 272-T	Towed
	Whiting	Klein 5500	Towed

Triton Elics ISIS acquisition software (version 5.0), was used to record sidescan-sonar data in XTF format. Data were archived by the NOAA Office of Coast Surveys. Adjustments to the survey design, including changes to line spacing, sonar range and gain were made as necessary during acquisition and are reflected in the raw sidescan-sonar data.

Raw sidescan-sonar data were initially examined using Chesapeake Technology's SonarWeb and SonarWiz.Map software (http://www.chesapeaketech.com/) to determine acquisition parameters. The CARIS database also provided necessary information to process the sonar data. After acquisition parameters were established the Linux-based software Xsonar/ShowImage (Danforth, 1997) was used to import and process 1682 files (or 2296 linear km) of the sidescan-sonar data. The following processing routines were applied to correct for radiometric and geometric distortions in the sidescan-sonar data. The data XTF data were demultiplexed, eliminating speckle noise by applying a user-specified median filter (Danforth, 1997). Navigation data were extracted from the sonar file, checked for erroneous fixes, edited and remerged with the data file. Corrections to tow-fish altitude were performed manually on a line-by-line basis to delineate the seafloor-water interface. A slant-range correction was applied, converting slant-range distances to true ground range. A beam-pattern routine was used to correct for beam attenuation and spreading loss with range. Raw image files of each trackline were exported from Xsonar and towfish layback was applied where necessary. Sidescan-sonar data were mosaicked using PCI Geomatics (version 8.2), and exported as georeferenced TIFF image files (1 meter/pixel resolution, fig 3.4). Due to gain changes and internal inconsistencies, the dynamic range of surveys varied. Thus, tone-matching was applied in order to generate a final mosaic.

Multibeam Echosounder Bathymetry

The multibeam echosounder bathymetric data were collected in the navigation channels and at numerous site specific locations in Boston Harbor and the harbor approaches (fig. 3.5). Multibeam echosounder data from the Boston Harbor hydrographic surveys cover an area of approximately 64 km2, with the most dense multibeam echosounder coverage in the navigation channels (President Roads, North Channel, South Channel, Nantasket Roads, and Hypocrite Channel), Boston Inner Harbor, and east of the outer Boston Harbor Islands (covering Boston Ledge and Martin Ledge). Multibeam echosounder data cover approximately 37% of the area mapped by the single-beam echosounder system.

A hull-mounted Reson SeaBat 8101 was used to acquire the multibeam echosounder data. The Reson SeaBat 8101 is a 1.5° beam angle system which operates at a frequency of 240 kHz and a maximum vessel speed of 6 knots. The system is designed for operation in water depths of 5 to 125 m, and has a horizontal range of 75 to 500 m, depending on water depth. The system collects 101 individual soundings in a swath oriented perpendicular to the vessel track. Acquisition was monitored in real time with the Triton Elics ISIS software (version 5.29) and recorded in XTF format. NOAA Office of Coast Survey converted the XTF data to CARIS HDCS (Hydrographic Data Cleaning System) format, then processed and tide-corrected the data with CARIS HIPS (Hydrographic Information Processing System) software. The soundings were reduced to Mean Lower-Low Water (MLLW) using tide data from the Boston, MA station 844-3970.

Tide-corrected multibeam echosounder soundings were exported from CARIS HIPS at a 2-meter grid interval and reformatted for input into the SwathEd processing software (University of New Brunswick Ocean Mapping Group, 2005). Soundings were gridded using the “weigh_grid” routine creating 2-meter bathymetry grids. The OMG (Ocean Mapping Group) grid format was converted to ASCII raster format, imported to ESRI ArcGIS 9.0 and merged to create a master grid of multibeam echosounder bathymetry (fig. 3.5).

Single-beam Echosounder Bathymetry

The NOAA survey vessels were equipped with Odom Echotrac DF3200 MKII echosounders that logged high-frequency (100 kHz) single-beam soundings throughout the sidescan-sonar and multibeam echosounder operations. Single-beam soundings were recorded in Hypack format and later converted to CARIS HDCS format. The NOAA Office of Coast Survey cleaned and merged the data and performed tide corrections using CARIS HIPS. The soundings were reduced to Mean Lower-Low Water (MLLW) using tide data from the Boston, MA station 844-3970.

Combined Bathymetry

The single-beam and multibeam echosounder data were used to create a composite bathymetry grid (fig. 3.6). Multibeam echosounder data were exported from CARIS HIPS at a 2-meter grid interval; single-beam soundings were exported at a 5-meter grid interval. The single-beam data from survey H10991 were processed by NOAA prior to their use of CARIS and a separate xyz file was provided for these soundings. The eight soundings files were merged to create a master file of over 17 million soundings within the survey areas. GMT (Generic Mapping Tools - http://gmt.soest.hawaii.edu/) was used to create an interpolated grid of the bathymetry for the entire region. Bathymetry data were formatted for input into GMT and then filtered through the GMT block median routine in order to increase processing speeds. An interpolated grid was created using the GMT “surface” routine with a grid cell size of 30 m and a tension parameter of 0.5. The GMT grid was converted to a 32-bit TIFF image using the Gdal utility “gdal_translate” (FWTools, version 1.0.0a7 and Gdal, version 1.3.1). The TIFF image was converted to a bathymetry grid with cell size of 30 m within ESRI ArcGIS. A depth-colored shaded relief grid (fig. 3.6) shows the sea-floor topography based on the combined single-beam and multibeam echosounder data.

The composite bathymetry grid was created at a 30 meter/pixel resolution due to the widely-spaced soundings from the vertical-beam survey. Other historical soundings are available for the area (e.g. NOAA Coastal Relief Model from the National Geophysical Data Center (http://www.ngdc.noaa.gov/) and the NOAA Estuarine Bathymetric Datasets (http://spo.nos.noaa.gov/bathy/)).

Sampling, Bottom Photographs and Video

Surficial sediment samples and photographs of the sea floor were obtained on a cruise conducted by the USGS and CZM September 14-17, 2004 (USGS cruise #04019). One hundred-thirteen stations were identified for sampling and photography with the mini-SEABOSS sampler (fig. 3.3). These stations were selected based on backscatter variations within the sidescan-sonar imagery in order to identify the surface sediment within these varying backscatter regions (fig. 3.7). Additionally, samples were collected across transition zones, where abrupt changes in backscatter intensity suggested changes in the character of the sea floor. The station procedure was to position the vessel within about 10 m of the target location, deploy the mini SEABOSS to about 1 m above the sea floor, and then drift with the current, typically at speeds of 1-3 knots. Continuous video data were collected while the camera was within sight of the bottom and still photographs were obtained from a high-resolution digital camera at operator-selected locations along the drift transect. At each station about 5-10 minutes of video and 5-15 bottom photographs were obtained.

Sediment samples were typically collected at the end of the drift transect using a modified VanVeen grab sampler. The sample was photographed in the grab sampler after recovery (Appendix 2) and the upper 2 cm of sediment were scraped from the surface of the grab for textural analysis. The sediment samples could only be obtained at locations with relatively soft sediment (sand or mud) with the mini-SEABOSS; samples could not be collected from cobble or rocky bottoms. Samples were analyzed (table 4.1) for grain size at the USGS Woods Hole Science Center (WHSC) Sediment Lab using standard procedures described by Poppe and Polloni (2000) (fig. 3.8). Qualitative visual interpretations of the sediment in the bottom photographs were compared with the sediment texture analyses.

Navigation

NOAA survey vessels used in the 2000-2001 surveys of Boston Harbor were equipped with Trimble DSM212L Differential Global Positioning System (DGPS) receivers. Launch 1005, which collected all of the multibeam echosounder bathymetry, was also equipped with a TSS POS/MV Model 320 (Position and Orientation System for Marine Vessels). Standard bathymetric processing, including tide corrections, accuracy, and quality control were conducted by NOAA Office of Coast Survey (NOAA Data Acquisition and Processing Report: OPR-A397-WH).

Navigation for the sampling survey on the R/V *Rafael* used DGPS. Navigation was logged every 1 second with Hypack Inc. HypackMax software (version 4.3a) and the navigation fixes were later parsed and merged into a GIS shapefile for mapping the location of bottom photographs and the video transects.

Section 4: Discussion

Setting

The study area for the Boston Harbor and Approaches project lies within the structurally complex Boston Basin of late Precambrian age (Kaye, 1982). The bedrock within and surrounding Boston Harbor is part of the Avalon terrane, a Precambrian island arc terrane comprised of volcanic and plutonic rocks that formed approximately 600 million years ago. Rifting towards the end of the Precambrian (>540 Ma) created what would become the Boston Basin, and eventually lead to the separation of Avalon and other exotic terranes from the ancient supercontinent of Gondwana. The Avalon terrane was later accreted to the Laurentia supercontinent during the Acadian Orogeny (Skehan 2001, Rankin and others 1989, Williams and Hatcher 1983). The Alleghanian Orogeny, the final major mountain building event along eastern North America (290-250 Ma), is probably responsible for much of the structural framework of the eastern continental margin as it exists today (Hatcher 1989, Hatcher and Goldberg 1991). Compression from the Alleghanian Orogeny is thought to overprint most compressional signatures of the Acadian Orogeny in the northeastern U.S. (Osberg and others 1989, Rast 1989). The last major tectonic event in the region was the formation of numerous rift basins and basalt intrusions in eastern Massachusetts as a result of the opening of the Atlantic Ocean (~200 Ma; Skehan 2001).

The Boston Harbor area has been sculpted by multiple glaciations during the Quaternary Period, the last 1.8 million years. The most recent Ice Age reached its maximum extent south of Cape Cod about 21,000 years ago. Glaciers retreated northward across the study area as the climate warmed, passing the present coast about 14,500 years ago (Kaye and Barghoorn, 1964). Most of the islands in the inner harbor are drumlins, oblong hills of glacial till that formed beneath the ice sheets. Numerous other drumlins, eskers, kettle lakes and moraines are found around the Boston area (Newman and others 1990) and in submerged areas of Massachusetts Bay (Oldale and others, 1994). The retreating glaciers left behind two drifts of glacial sediment in Massachusetts Bay, the older described as a compacted till of cobbles and boulders, and the younger consists of till, outwash sand, gravel, and glacial-marine mud (Knebel and Circe 1995). The glacial-marine sediment was deposited contemporaneously with ice retreat, blanketing wide areas of the coast and inner shelf in northeastern Massachusetts. Known as the "Boston Blue Clay" (Kaye and Barghoorn, 1964), this glacial-marine sediment unconformably overlies older glacial deposits and bedrock. It typically consists of well stratified sand and mud with scattered dropstones of ice-rafted material, and constitutes much of the harbor bottom (Knebel and others, 1992).

Relative sea-level change has influenced the geologic evolution of Boston Harbor. As the glaciers retreated northward, the sea migrated in contact with the ice margin and inundated the harbor area. Relative sea level rose to about 12 m above present sea level in this initial transgression, and then fell to a depth of at least -22 m (Kaye and Barghoorn, 1964) due to isostatic rebound of the coast. Studies by Oldale and others (1993), suggest that sea level fell as far as -50 m, exposing the harbor bottom and inner continental shelf. As glacial-isostatic rebound decreased, sea level rose at varying rates, causing a second transgression of the coast that continues today. These shoreline migrations have allowed marine processes to rework wide areas of the harbor and adjacent Massachusetts Bay. Erosion of drumlins and other glacial deposits have provided sand for construction of beaches, spits, and tombolos and left behind lags of coarse sediment on the sea floor including cobbles and boulders.

Knebel and others (1991) identified four distinct backscatter patterns within Boston Harbor, based on isolated sidescan-sonar surveys. These data were used to show the distribution of sedimentary environments within Boston Harbor and the approaches. These maps encompassed an area of 140 km2 in the Outer Harbor and the harbor approaches; extending to the eastern-most harbor island. Additional data including bathymetric data, sediment samples, cores, bottom photographs and seismic reflection data, were used to define the sedimentary environments and to extrapolate the surficial distributions where sidescan-sonar data were unavailable.

Sea-Floor Character of Boston Harbor and Approaches

Boston Harbor is an urban estuary located at the western-most extent of Massachusetts Bay (Knebel and others, 1991) and is home to one of the oldest and most active maritime ports along the U.S. Atlantic Coast (fig. 1.1). This study encompasses Boston Inner Harbor, Boston Outer Harbor, the northern approaches to Boston Harbor (Broad Sound; north of the Harbor Islands to Nahant), and the southern approaches to Boston Harbor (outer Harbor Islands and nearshore east of Nantasket Beach) (fig. 4.1). The seaward limit of Boston Harbor is defined by a line between Deer Island and Point Allerton on the Hull peninsula; "the approaches" extend 6 km eastward into Massachusetts Bay (Knebel and others, 1991). Castle Island and the southern end of Logan Airport separate the Inner and Outer Harbor. The Inner Harbor contains the main shipping channel and the Port of Boston, as well as the mouths of the Charles and Mystic Rivers. The Outer Harbor consists of Hingham, Quincy and Dorchester Bays and most of the 34 islands maintained by the Boston Harbor Islands Partnership, a cooperative of federal, state, local and private organizations lead by the National Parks Service (BHI 2002). Marine traffic passes in and out of Boston Harbor through two primary shipping lanes: (1) President Roads, lying south of Deer Island, connects the North and South Channels to Boston Inner Harbor and Dorchester Bay, and (2) Nantasket Roads, lying south of George's Island, services Quincy and Hingham Bays (fig. 4.1).

Features

The bathymetry and sidescan-sonar data show natural features and sea floor modification from anthropogenic activities. Dredging and other anthropogenic activities are generally focused in the shipping channels. Evidence of dredging is visible within the imagery as straight-sided channels, unnatural-appearing roughness and/or linear features on the sea floor that are typically oriented parallel to a channel. Disposal of dredged material is clearly displayed within the multibeam echosounder data as rounded mounds; often occurring in a straight line, some have a central high and a surrounding moat thought to be created as the material was deposited on the sea floor. The mounds sometimes are identified in the sidescan-sonar by high backscatter intensity, but are not always resolved. Other anthropogenic features on the sea floor include wrecks of small boats and barges, pipelines, and piles of debris. Almost all of the Inner Harbor from Castle Island to Long Wharf was mapped by multibeam echosounder. In the Outer Harbor and the Harbor Approaches, the 2-m resolution multibeam echosounder data are displayed with the 30-m resolution single-beam echosounder data; interpretation of features and their spatial extent is limited by these mixed observations.

The sea-floor landscape varies from gently sloping sub-tidal flats to areas of rugged elevation exhibiting as much as 7 m of local relief (sheet 1, fig. 3.6). The acoustic backscatter intensity (sheet 3, fig. 3.7) illustrates the general distribution of surficial sediment. The approaches to Boston Harbor and the dredged navigation channels around the Harbor Islands are generally characterized by high backscatter, bedrock, boulder, cobbles, or dense shell beds. The Inner and Outer Harbor are primarily composed of fine-grained sediments, such as fine sand or mud, which displays as low backscatter within the sidescan-sonar imagery (fig. 4.3).

Sea-floor topography and surficial character in the study area vary at scales of several meters and less. For example, high relief bedrock and bouldery glacial deposits (till) are commonly exposed on the sea floor in close proximity to flat-lying deposits of finer sediment (sand, mud). Rocky areas sometimes contain isolated accumulations of shelly sediment that are ponded in small cracks or low-lying areas between rock outcrops.

Boston Inner Harbor

The bathymetry and surficial character of the sea floor within the Inner Harbor reflect a long history of dredging in the study area (for example, see the circular features near 42° 20' 51", 71° 0' 40.8" W and the trapezoidal area centered near 42° 20' 40.2", 71° 0' 45" W, sheet 1, fig. 4.4). The north side of the main navigation channel south of Logan Airport is dredged to a depth of 35' (about 10.7 m) and the south side to a depth of 40' (about 12 m) (NOS Chart 13272). The Ted Williams Tunnel runs under the navigation channel between South Boston and Logan Airport (fig. 4.5). On the sea floor, the tunnel is marked by a depression about 50 m wide that is a few m deeper than the navigation channel; on the northern side of the channel, the tunnel depression has a central high and channels about 2-4 m deeper along the western and eastern edges. The multibeam echosounder data do not extend over the Callahan or Sumner Tunnel. The sea floor of the Reserved Channel and a trapezoidal area across the main channel to the east of the Reserved Channel (centered near 42° 20' 40.2" N, 71° 0' 45" W, dredged to 40') have a rough appearance, in contrast to the relatively smooth main channel (fig. 4.4). A linear feature about 5 m wide and less than 1 m deep runs east-west across the main channel near 42° 20' 33" N, 71° 0' 30" W; this feature is in a cable area (NOS Chart 13272) (fig. 4.4). Throughout the inner harbor the sea floor is marked by numerous linear features, presumably scours from wire and anchor drags (fig. 4.4). There are also some depressions (for example near 42° 21' 34.8' N, 71° 2' 25.8" W), typically less than 20 meters in spatial extent and a few m deep, thought to be caused by dredging.

Low backscatter intensity material covers most of the Inner Harbor, representing fine-grained sediments (sheets 3, 4 and 5, fig. 4.3). Moderate backscatter intensity occurs in the shipping channel east of Castle Island and in the northern part of the Inner Harbor east of Boston. The cover of the Ted Williams tunnel shows moderate backscatter. The finest sediments sampled in this survey, at the mouth of the Mystic River, contained over 40% clay. Photographs (stations 104, 103, 105, 106; fig. 4.6) show a soft, muddy sea floor.

Boston Outer Harbor

The Outer Harbor contains the Harbor Islands and major shipping channels that provide access to the Port of Boston and the communities of Quincy, Weymouth, and Hingham. The northern part of the Outer Harbor contains the sub-tidal Governors Island Flats and Deer Island Flats (east of Logan Airport), bounded to the south by President Roads and the President Roads Anchorage. The sediments on the flats are characterized by low backscatter intensity. A series of irregularly-shaped dredged areas with linear edges are located south and east of Logan Airport and continue to the north into Winthrop Bay (sheet 1, fig. 3.6). The area centered near 42° 20' 45.6" N, 70° 59' 57.6" W is 4-6 m deep with an irregular sea floor; the area centered near 42° 21' 10.8" N, 70° 59' 3.6" is about 6 m deep with a nearly flat sea floor. The deepest water in Boston

Harbor, about 28 m deep, occurs in a depression about 2 km long and 200 m wide located south of Deer Island (sheet 1, fig. 4.7). Along the northern side of this depression, the sea floor is covered by a series of sand waves about 10 m in wavelength and less than a meter high (fig. 4.8). These sand waves coalesce into a single high and disappear at about 14-15 m water depth. Three additional depressions, with water depths in excess of 20 m, trend east-northeast from the low south of Deer Island along the axis of the south Channel. Backscatter intensity changes from low in the inner harbor to high over a distance of about 1 km near 42° 20' 0" N, 70° 58' 48" W (south of the western end of the anchorage) where the water begins to deepen at about 15 m depth (sheet 3, fig. 3.4). Backscatter intensity of the sea floor is high from this point eastward in the north and south channels and into the Approaches. Photographs of the sea floor along the navigation channel show a transition from a muddy sea floor in the Inner Harbor to a gravel pavement in the outer Harbor (stations 101, 70, 53, 54, 44, fig. 4.9, Appendix 3).

In the southern part of the Outer Harbor, bathymetric and sidescan-sonar mapping were conducted mostly in water depths greater than 6 meters and focused in Nantasket Roads and the smaller navigation channels around the Harbor Islands and those leading into Quincy and Hingham and Hull Bays. The deepest water occurs in two natural lows, one in Nantasket Roads north of Hull and centered near 42° 18' 48" N, 70° 55' 6" W, 22 m deep, and one south of Hull and centered near 42° 17' 36" N, 70° 55' 6" W, 18 m deep (sheet 1, fig. 3.6). Individual dumps of material are found in the topographic lows north of Hull (fig. 4.10a) and north of Peddocks Island (fig. 4.10b). High backscatter intensity material is found in Nantasket Roads, on the topographic high (Hospital Shoal) east of Rainsford Island, in the channel between Rainsford and Long Island, to the west and southwest of Peddocks Island, and in the low south of Hull (sheet 3, fig. 3.4). Bottom photographs in these areas (stations 62, 58, 65, 67, fig. 4.11) show a gravel pavement on the sea floor. The areas south of Long Island, in the entrance to Quincy Bay (station 63) and southeast of Peddocks Island (station 61) in the entrance to Hingham Bay, show low backscatter intensity and bottom photographs show a muddy sea floor (fig. 4.12). On the margins of the navigation channels and where the surveys extend into the sub-tidal flats of Hull, Hingham, Quincy Bays, the sea floor is covered with fine muddy sediment that shows low backscatter intensity.

Approaches to Boston Harbor

The Approaches to Boston Harbor are characterized by areas with rough topography (sheet 1 and 2), elevated sea floor and high backscatter intensity (sheet 3 and 4) and areas of smooth topography and low backscatter intensity. The high-backscatter intensity areas are typically covered by outcropping rock, boulders, cobbles and gravel; the low backscatter intensity areas are typically covered by sandy sediments (sheets 1, 3, 5, fig. 4.3).

The sea floor in President Roads and in the North and South channels is characterized by high backscatter (sheet 3, fig. 4.3). Bottom photographs and video at stations 44, 53, 54 (sheet 5, fig. 4.9, Appendix 3) show mostly cobbles that were too coarse for retrieval; no sediment samples were collected in these areas. At station 50 in the South Channel the sea floor was a dense bed of mussel shells (fig. 4.13). Rippled sands are found within a low backscatter region at station 45, southeast of Deer Island and north of the navigation channel (fig. 4.13).

In Broad Sound there are features elevated 4-5 m from the surrounding sea floor, characterized by rough topography and high backscatter (e.g. centered near 42° 23' 6" N, 70° 55' 18" W and near 42° 24' 30" N, 70° 55' 6" W, fig. 4.14a, 4.14b). The north or northeast facing side of these features rises abruptly about 3 m above the surrounding sea floor. Photographs show these features to be covered by gravel, cobbles and boulders (stations 73, 84, fig. 4.15). These features are most likely drumlins that were eroded and reworked during the last rise in sea level, leaving behind the coarse sediments. The low backscatter sea floor between these elevated areas is sand (fig. 4.3, fig. 4.15).

A series of high backscatter outcropping ledges lie east of the Brewster Islands, for example near 42° 20' 6" N, 70° 52' 36" W (fig. 4.16a, 4.16b). These ledges are bounded to the north by the Graves and to the south by Nantasket Roads and cover approximately 15 km2. The ledges trend east-northeast – west-southwest and have 4-7 m of local relief.

East of Nantasket there are two areas characterized by variable topography (up to 4 m of local relief) and high backscatter intensity (fig. 4.17a, 4.17b). Based on bottom photographs and video, the local highs show with algae-covered rock outcrops and boulder- to cobble-sized sediment (fig. 4.18). These outcrop areas are separated by an approximately 700-m wide band characterized by uniformly low backscatter; sediment samples and bottom photographs obtained show the area is composed of well-sorted fine sand (fig. 4.18).

Numerous individual high backscatter targets in the Approaches, 4-6 m in length and less than a meter high, are interpreted to be individual boulders and are observed in nearly all of the areas outside the harbor with rough sea floor topography (fig. 4.19). Although the multibeam echosounder data resolves individual boulders in the Harbor Approaches, the boulders are not observed in the sandy sediments immediately adjacent to these areas. The boulders are likely to be associated with glacial deposits. There are feweer similar targets within the Harbor, however, additional sampling is needed in order to assess similarities with targets within the Harbor Approaches.

Several sunken barges and disposal mounds are observed in the area west of Great Brewster and Calf Islands (fig. 4.20).

Sea-floor units

Six sea-floor units defined by bottom slope, backscatter intensity, surficial sediment texture and anthropogenic activity were distinguished within the study area (sheet 5, fig. 4.21): High-relief bedrock and boulder, Medium-relief boulder and cobble, Low-relief gravel and sand, Low-relief mud, Low-relief sand, and Anthropogenic modification areas. These zones were delineated qualitatively at a scale of 1:30,000 in areas where both new sidescan sonar and bathymetric data are available (about 155 km2). Bottom slope was calculated from the 30-m gridded bathymetry as the average slope between the central pixel and the surrounding 8 pixels. Areas smaller than about 200 meters were not delineated.

High-relief bedrock and boulder areas are characterized by local slopes of 4 to 30 degrees and high backscatter intensity. Bottom photographs and video in these areas show the sea floor covered by cobbles, boulders or outcropping bedrock; no sediment samples could be obtained in these rocky areas. Most of the high-relief bedrock and boulder area occur between the outermost Harbor Islands and the rocky ledges farther offshore to the east.

Medium-relief boulder and cobble areas are characterized by local slopes of 1 to 4 degrees and high backscatter intensity. Bottom photos and video in these areas show the sea floor covered by gravel, cobbles and boulders. Most of the medium-relief boulder and cobble area occurs in the harbor approaches.

Low-relief gravel and sand areas are characterized by a local slope of less than 1 degree and either high or mottled (patches of high/low) backscatter intensity and sandy sediments (e.g. stations 14, 15 and 92; see sheet 5). Bottom photographs and video obtained in areas near these sandy samples show gravel and cobble-sized sediment on a sandy or muddy substrate.

Low-relief sand areas are characterized by local slope of less than 1 degree, predominately low backscatter intensity and uniform sandy sediments, confirmed by the sampling survey. Low-relief, low-backscatter sandy environments dominate the approaches to Boston Harbor.

Low-relief mud areas are characterized by local slope of less than 1 degree, predominately low backscatter intensity, and fine-grained muddy sediments, confirmed by the sampling survey. Low-relief muddy environments lie within Boston Harbor.

Anthropogenic modification areas have been altered by human activity. The most easily identified man-made artifacts are dredged channels and anchorage areas. The sea floor of Boston Harbor has been influenced by other activities, including the disposal of dredge spoils, placement of artificial reefs, construction of piers, laying of pipelines, and submerged wrecks. Areas of Anthropogenic Modification comprise all five sea-floor environments described above; however, the overprint of man-made artifacts dominates the other natural characteristics.

Using NOAA Hydrographic Data for Geologic Mapping

NOAA carries out hydrographic surveys in navigable waters in selected areas throughout the country; using these data for geologic characterization is an opportunity to map the geology of new areas with modest additional field work. The experience of this project in obtaining, reprocessing, archiving, and interpreting the hydrographic data from Boston Harbor and Approaches provides some guidance for future efforts to utilize NOAA hydrographic data for geologic mapping.

Multibeam and single-beam echosounder bathymetry

The multibeam echosounder bathymetry were provided by NOAA as depth and location points and used without reprocessing. The data were easily incorporated into the GIS and were extremely useful in interpreting the sea floor geology. The data were gridded at 2 m resolution, a large improvement over previously available bathymetry at 30 m resolution (NOAA. 1998). In addition, the data were collected at one time, rather than an average of data collected over many years. The major limitation of these data is that they were collected only in the navigation channels and over potential hazards to navigation, and thus did not provide continuous coverage over the entire area. Combining the widely-spaced single-beam bathymetry with the high-resolution multibeam echosounder bathymetry was difficult. It was important to identify the spatial resolution of the data to facilitate interpretation of data collected at an uneven resolution (2 m for multibeam echosounder and 30 m for the combined single-beam/multibeam echosounder data).

Sidescan-sonar

This project reprocessed the NOAA sidescan-sonar data set that contained more than 230 Gbytes of data organized in over 1800 separate files. The data were filed by survey, vessel, system and survey day and often two or three of the NOAA vessels acquired data concurrently. The directory structure was extensive and file names had to be checked for duplicates. Use of the CARIS data base facilitated the data management.

The sidescan-sonar data was collected to identify potential navigation hazards; identified targets were further investigated using the multibeam echosounder, or by divers. The gain of the sidescan system was adjusted in the field to provide the best target identification in the operating area, yielding data collected with different systems operating at different gains. The individual mosaics for each system and vessel configuration (see table 3.2 in Data Collection and

Processing) were merged with relative ease as the range of backscatter intensities had little local variation within each survey area. Each individual survey (e.g. H10990, H10991, etc.) was made internally consistent and then normalized to create the complete mosaic for the entire project area.

After reprocessing, the sidescan-sonar mosaic produced in the field was qualitatively similar to the reprocessed data when viewed at a scale of 1:25,000 (fig. 22). The major improvement in the reprocessed mosaic is a more consistent intensity as a result of tone-matching. However, some tonal artifacts remain in the final gray-scale backscatter mosaic (map sheet 3) that are visible in the colored backscatter intensity mosaic (map sheet 4). Other artifacts of data collection and environmental conditions also appear in the imagery that could not be rectified by reprocessing. The sidescan-sonar is useful as it is the data set with continuous high-resolution coverage over the entire survey area.

References Cited

Barnhardt, W.A., Andrews, B.D., and Butman, Bradford, 2006, High-Resolution Geologic Mapping of the Inner Continental Shelf; Nahant to Gloucester, Massachusetts: U.S. Geological Survey Open-File Report 2005-1293, DVD-ROM. also available online at http://woodshole.er.usgs.gov/pubs/of2005-1293/index.html

BHI, 2002, Boston Harbor Islands, A national park area; general management plan: Boston Support office of the Northeast Region National Parks Service for the Boston Harbor Islands Partnership, 97 p.

Butman, Bradford, Hayes, L., Danforth, W.W. and Valentine, P.C., 2003a, Sea floor topography of Quadrangle 2 in western Massachusetts Bay offshore of Boston, Massachusetts: U.S. Geological Survey Investigations Series Map I-2732-A, Scale 1:25,000.

Butman, Bradford, Hayes, L., Danforth, W.W. and Valentine, P.C., 2003b, Shaded relief and sea floor topography of Quadrangle 2 in western Massachusetts Bay offshore of Boston, Massachusetts: U.S. Geological Survey Geologic Investigations Series Map I-2732-B, Scale 1:25,000.

Butman, Bradford, Hayes, L., Danforth, W.W. and Valentine, P.C., 2003c, Backscatter intensity and shaded relief of Quadrangle 2 in western Massachusetts Bay offshore of Boston, Massachusetts: U.S. Geological Survey Geologic Investigations Series Map I-2732-C, Scale 1:25,000.

Butman, Bradford, Valentine, P.C., Danforth, W.W., Hayes, Laura, Serrett, L.A., and Middleton, T.J., 2004, Shaded relief, backscatter intensity and sea floor topography of Massachusetts Bay and the Stellwagen Bank region, offshore of Boston, Massachusetts: U.S. Geological Survey Geologic Investigation Map I-2734, scale 1:125,000, 2 sheets. Also available online at http://pubs.usgs.gov/imap/i2734/

Danforth, W.W., 1997, Xsonar/ShowImage; a complete system for rapid sidescan-sonar processing and display: U.S. Geological Survey Open-File Report 97-686, 77 p.

Hastings, M.E., Poppe, L.J., and Hathaway, J.C., 2000, USGS east-coast sediment database, chapter 2, in Poppe, L.J., and Polloni, C.F., eds., USGS East-Coast Sediment Analysis; Procedures, Database and Georeferenced Displays: U.S. Geological Survey Open-file Report 00-358, DVD-ROM. Available online at http://pubs.usgs.gov/of/of00-358/

Hatcher, R.D. Jr. 1989, Tectonic synthesis of the U.S. Appalachians, in Hatcher, R.D., Jr., W.A. Thomas, and G.W. Viele, eds., The Appalachian -- Ouachita Orogen in the United States: Geological Society of America Decade of North American Geology, v. F2, 29-41.

Hatcher, R.D., Jr., and Goldberg, S.A., 1991, The Blue Ridge Geologic Province, in Horton, J.W. and Zullo, V.A., The Geology of the Carolinas: Carolina Geological Society 50th Anniversary Volume, Knoxville, University of Tennessee Press, p. 11-35.

Kaye, C.A., 1982, Bedrock and Quarternary geology of the Boston area, Massachusetts: Geological Society of America, Reviews of Engineering Geology, v. 5, p. 25-40.

Kaye, C.A. and Barghoorn, E.S., 1964, Late Quaternary sea-level change and crustal rise at Boston, Massachusetts, with a note on the autocompaction of peat: Geological Society of America Bulletin, v. 75, p. 63-80.

Knebel, H.J., 1993, Sedimentary Environments within a glaciated estuarine-inner shelf system; Boston Harbor and Massachusetts Bay: Maine Geology, v. 110, p. 7-30.

Knebel, H.J. and Circe, R.C., 1995, Sea-floor environments within the Boston Harbor-Massachusetts Bay sedimentary system; A Regional Synthesis: Journal of Coastal Research, v. 11, p. 230-351.

Knebel, H.J., Rendigs, R.R., and Bothner, M.H., 1991, Modern sedimentary environments in Boston Harbor, Massachusetts: Journal of Sedimentary Petrology, v. 61, p. 791-804.

Knebel H.J., Rendigs, R.R, Oldale, R.N. and Bothner, M.H., 1992, Sedimentary framework of Boston Harbor, Massachusetts, in Fletcher, C.H., and Wehmiller, J. W., eds., Quaternary Coasts of the United States; Marine and Lacustrine Systems: Society for Sedimentary Geology Special Publication, no. 48, p. 35-43.

Newman, W., Berg, R.C., Rosen, P., and Glass, H.D., 1990, Pleistocene stratigraphy of the Boston Harbor drumlins, Massachusetts USA: Quaternary Research, v. 34, p. 148-159.

NOAA, 1998, National Oceanic and Atmospheric Administration, national ocean survey, special Projects office, 1998, estuarine bathymetry: NOS Special Projects Web site at http://sposerver.nos.noaa.gov:16080/bathy/index.html.

NOAA DAPR, 2001, Data acquisition and processing report, Project No. OPR-A397-WH, Massachusetts Bay, Massachusetts: National Oceanic & Atmospheric Administration (NOAA) National Ocean Service (NOS), Norfolk, VA.

NOAA, 2001a, Descriptive Report, Basic Hydrographic Survey H10990, Boston Inner Harbor, Massachusetts Bay, Massachusetts: National Oceanic & Atmospheric Administration (NOAA) National Ocean Service (NOS), Norfolk, VA. http://surveys.ngdc.noaa.gov/mgg/MB/DRs/H10001-H12000/H10990.pdf

NOAA, 2001b, Descriptive Report, Basic Hydrographic Survey H10991, Boston North Channel to Weymouth Fore River, Massachusetts Bay, Massachusetts: National Oceanic & Atmospheric Administration (NOAA) National Ocean Service (NOS), Norfolk, VA. http://surveys.ngdc.noaa.gov/mgg/MB/DRs/H10001-H12000/H10991.pdf

NOAA, 2001c, Descriptive Report, Basic Hydrographic Survey H10992, The Graves to Cohasset Harbor, Massachusetts Bay, Massachusetts: National Oceanic & Atmospheric Administration (NOAA) National Ocean Service (NOS), Norfolk, VA. http://surveys.ngdc.noaa.gov/mgg/MB/DRs/H10001-H12000/H10992.pdf

NOAA, 2001d, Descriptive Report, Basic Hydrographic Survey H10994, Broad Sound, Massachusetts Bay, Massachusetts: National Oceanic & Atmospheric Administration (NOAA) National Ocean Service (NOS), Norfolk, VA. http://surveys.ngdc.noaa.gov/mgg/MB/DRs/H10001-H12000/H10994.pdf

NOS CO-OPS, 2006, National Oceanic and Atmospheric Administration, National Ocean Service, Center for Operational Oceanographic Products and Services: Tidal benchmark for Boston Harbor. Available online at http://co-ops.nos.noaa.gov/benchmarks/8443970.html

NOS AWOIS, 2006, National Oceanic and Atmospheric Administration, National Ocean Service: Automated Wreck and Obstruction Information System. Available online at http://chartmaker.ncd.noaa.gov/hsd/hsd-3.html

Osberg, P.H., Tull, J.F., Robinson, P., Hon, R., and Butler, J.R., 1989, The Acadian orogen, in Hatcher, R. D., Jr., W. A. Thomas, and G. W. Viele, eds., The Appalachian -- Ouachita Orogen in the United States: Geological Society of America Decade of North American Geology, v. F2, 29-41.

Oldale, R.N., Colman, S.M. and Jones, G.A., 1993, Radiocarbon ages from two submerged strandline features in the western Gulf of Maine and a sea-level curve for the northeastern Massachusetts coastal region: Quaternary Research, v. 40, p. 38-45.

Oldale, R.N., Knebel, H.J., and Bothner, M.H., 1994, Submerged and eroded drumlins off northeastern Massachusetts: Geomorphology, v. 9, p. 301-309.

Poppe, L. and Polloni, C., eds., 2000, USGS east-coast sediment analysis; procedures, database, and georeferenced displays: U.S. Geological Survey Open-file Report 00-348, DVD ROM. Also available online at http://pubs.usgs.gov/openfile/of00-358/

Poppe, L., Paskevich, V.F., Williams, S.J., Hastings, M.E., Kelley, J.T., Belknap, D.F., Ward, L.G., FitzGerald, D.M. and Larsen, P. F., 2003, Surficial sediment data from the Gulf of Maine, Georges Bank, and vicinity; a GIS compilation: U.S. Geological Survey Open-File Report 03-001, CD-ROM. Also available online at http://pubs.usgs.gov/of/2003/of03-001/

Rankin, D.W., Drake, A.A., Jr., Glover, L.I., Goldsmith, R., Hall, L.M., Murray, D.P., Ratcliffe, N.M., Read, J.F., Secor, D.R., Jr., and Stanley, R.S., 1989, Pre- orogenic terranes, in Hatcher, R.D., Jr., W.A. Thomas, and G.W. Viele, eds., The Appalachian -- Ouachita Orogen in the United States: Geological Society of America Decade of North American Geology, v. F2, p. 29-41.

Rast, Nicholas, 1989, The evolution of the Appalachian chain, in Bally, A.W., and Palmer, A.R., eds., The geology of North America---An overview; The geology of North America: Geological Society of America Decade of North American Geology, v. A, p. 323-348.

Skehan, J.W., 2001, Roadside Geology of Massachusetts: Mountain Press, Missoula, Mont., 392 p.

University of New Brunswick, 2005, SwathEd, software developed by John Hughes Clarke and the Ocean Mapping Group: University of New Brunswick. Online at http://www.omg.unb.ca/~jhc/SwathEd.html

Valentine, P.C., Blackwood, D.B. and Parolski, K.F., 2000, Seabed observation and sampling system: U.S. Geological Survey Fact Sheet FS-142-00. Available online at http://pubs.usgs.gov/fs/fs142-00/fs142-00.pdf

Williams, H., and Hatcher, R.D., Jr., 1983, Appalachian suspect terranes, in Hatcher, R.D., Jr., Williams, H., Zietz, I., eds., Contributions to the tectonics and geophysics of mountain chains: Geological Society of America Memoir, v. 158, p. 33-54.

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Appendix 1 - Geographic Information System

A1.1. Data Access

The spatial data on this DVD are delivered as:

- individual vector and raster datasets.
- part of a pre-assembled ArcMap or ArcReader project.

All spatial data can be accessed individually using the table below (link) or by viewing the GIS directory (link) using Windows Explorer or ArcCatalog. Note, all raster data including ESRI grids (bathymetry), ESRI georeferenced tiffs (backscatter), and hyperlinked images (bottom photos and sediment grab photos) are in their native form. Refer to section A1.2 below for more details on where they are located on the DVD.

Projection:

All data are in Universal Transverse Mercator (UTM) Meters, Zone 19, WGS84 Datum.

Viewing the data:

- The complete data sets from this project can be accessed in four different ways depending on the software availability.
- If you have ArcGIS 9.0 or higher - view and manipulate all data
- If you do not have any GIS software - view all data (free software, ArcReader download required, see below for details)
- If you have ArcView 3.x - view all data (bathymetry, sidescan sonar mosaic, shapefiles of the bottom photograph and sediment sample locations. Note: Users will need to have Spatial Analyst to view any data in ESRI Grid format).
- Web pages - view some data (bottom photos, surface sample photos, and maps of bathymetry and sidescan sonar mosaic) as images throughout this report.

If you have ArcGIS 9.0 or higher:

Copy the following folder gis/OFR_2006_1008 to your computer and open the ArcMap document ofr2006_1008.mxd. This will open up an ArcMap document with most of the data layers loaded in the table of contents. The ArcMap project is saved with relative links so there is no need to change any drive letters or pathways as long as you keep all the folders under the parent directory (OFR_2006_1008) the same. You can also view the ArcGIS project directly from the DVD in read only mode by opening up pathway/USGS_1008.mxd. Requirements: you will need approximately 3 gigabytes of free space on your computer if you copy the data to your local drive.

If you do not have any GIS software:

You can still view all the data via ArcReader, a free mapping application distributed by ESRI Inc. You will need to download ArcReader and install it on your computer. Go to the ESRI Web site at http://www.esri.com/software/arcgis/arcreader/download.html and follow the directions for downloading and installing the free software. Once ArcReader is installed on your computer, you can either view the ArcReader project directly from the DVD by opening up [Your_DVD_drive]/gis/OFR_2006_1008/ofr2006_1008.pmf or copy the parent folder gis/OFR_2006_1008 to your local computer as described in the section above.

If you have ArcView 3.x:

If you ArcView 3.x and the spatial analyst extension you can access the shapefiles, grids and image layers (in ESRI grid or tif format) for this project. A description of the rasters and their location on the DVD are provided below in section A1.2. You can also download the locations of sediment samples and bottom photographs in Excel spreadsheet format. These can be added to ArcView as and event theme.

Web Pages:

The JPG images of the bottom photographs and seismic reflection profiles can be accessed and viewed directly from the DVD or via the Web page. They are located in the following folder: Your_DVD_drive]/gis/OFR_2006_1008/images/hotlinked_photos/.

A1.2 Data Structure on DVD.

This section describes the location of the GIS datasets on this open-file report.

OFR_2006_1008 folder

This folder contains...

Grids-

1. ***bh_2mbath*** - bathymetry (multibeam echosounder data only)
2. ***bh_2mhs*** - shaded relief bathymetry (multibeam echosounder data only)
3. ***bh_30mbath*** - bathymetry grid (combined multibeam and vertical-beam echosounder data)
4. ***bh_30mhs*** - shaded relief bathymetry grid (combined multibeam and vertical-beam echosounder data)

Images

backscatter

1. ***bh_1mBS.tif*** - sidescan-sonar mosaic (1 meter/pixel resolution)

2. ***bh_5mBS.tif*** - sidescan-sonar mosaic (5 meter/pixel resolution)

hotlinked_images-

This folder contains jpeg images of bottom photographs and sediment samples that are hotlinked to the bottomphotos and sedsamp shapefiles.

If you have ArcGIS 9.0 or higher: Use the hotlink feature. The locations of bottom photos and sediment samples are already linked in the ArcMap document OFR_2006_1008.mxd

1. Open up OFR_2006_1008.mxd
2. Select the Bottom Photos or Sediment Samples in the table of contents
3. Select the lightning bolt tool - Images beginning with "22...." are bottom photographs. Images beginning with "BH" are the sediment sample images named by station number. The ArcMap project file document below is already set up with hotlinks.

If you do not have ArcGIS 9.0 or higher:

Use table A3_1 (Excel format) to create an event theme in ArcView 3.x and edi the image pathway to set up hotlinks for the photographs. Table A3_1 has a list of all bottom photographs grouped by station. The photographs are named sequentially, starting with "22356145.jpg" through "22626197.jpg".

Layers-

This folder contains are ArcGIS layer files that store user-defined symbology, labeling, and other display parameters by pointing to the original feature class, grid or tif.

1. *BathymetryGrids.lyr* - Depth-colored hillshade bathymetry of both the multibeam echosounder and combined bathymetric datasets.
2. *Bottom Type.lyr* - Generalized bottom type derived from slope, backscatter and the ground-validation datasets.

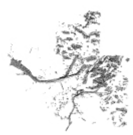
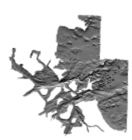
3. *Ground Validation.lyr* - Locations of bottom photographs, sediment samples and video transects.

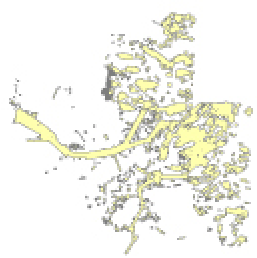
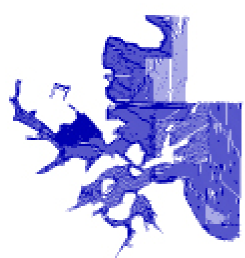
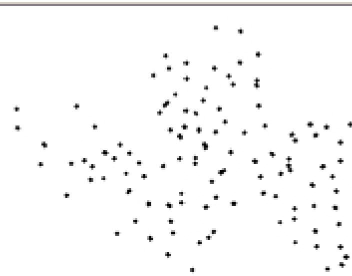
Project Files:

ofr2006_1008.mxd - ArcMap document with all data layers loaded in the table of contents and symbolized as in the report figures. The ArcMap document is saved with relative links so that the hotlink tool will work for the bottom photographs and sediment samples.

ofr2006_1008.pmf - ArcReader file that will enable users without ArcGIS 9.0 to view all the spatial data in the project with a free data viewer (download free ArcReader here).

Table A1. Data Catalog.

file description (metadata	file name	view	file format	file	file size (zipped)
Bathymetry (Multibeam 2m/pixel)	bh_2mmbbath		ESRI Grid 32 bit fp	mbbath.zip	58 MB
Bathymetric Hillshade (Multibeam 2m/pixel)	bh_2mmbhs		ESRI Grid 16 bit integer	mbbath.zip	58 MB
Bathymetry (Combined 30m/pixel)	bh_30mbath		ESRI Grid 32 bit fp	cbath.zip	< 1MB
Bathymetric Hillshade (Combined 30m/pixel	bh_30mhs		ESRI Grid 16 bit integer	cbath.zip	< 1 MB
Sidescan Mosaic (1 meter/pixel)	bh_1mbs		TIFF 8 bit integer	bh_1mbs.zip	128 MB

Sidescan Mosaic (5 meters/pixel)	bh_5mbs		TIFF 8 bit integer	bh_5mbs.zip	5 MB
Bottom Types	bottomtype		ESRI Shapefile (polygon)	bottomtype zip	< 1MB
Bathymetry Bounds (Multibeam)	multibeambathybnds		ESRI Shapefile (polygon)	mbbathybnds zip	< 1MB
Bathymetry Bounds (Combined)	compbathybnds		ESRI Shapefile (polygon)	compbathybnds.zip	< 1MB
Survey Lines (Sidescan Sonar)	surveylines_sss		ESRI Shapefile (lines)	surveylines_sss.zip	< 1MB
Survey Lines (Video & Bottom Photos)	surveylines_vid		ESRI Shapefile (lines)	surveylines_vid.zip	< 1MB
Bottom Photos (Shapefile)	bottomphotos		ESRI Shapefile (points)	bottomphotos.zip	< 1MB

Sediment Samples (Shapefile)	sedgrabs		ESRI Shapefile (points)	sedgrabs.zip	< 1MB
Bottom Photos*** (Hotlinkable JPEG)	bottomjpgs.zip		jpeg	bottomjpgs.zip	215 MB
Sediment Samples (Hotlinkable JPEG)	grabjpgs.zip		jpeg	grabjpgs.zip	3.5

***Note: The data directory and zipped file of Bottom Photo JPEGs on the online version of this report contain full-sized but reduced resolution version of the seabed photographs. The highest resolution JPEG photographs can be accessed through the Photo Gallery (in Appendix 3) or on DVD version of this report.

Appendix 2- Sediment Texture

Sediment texture analyses for all samples obtained in this study are presented in a summary table (below) and in table A2.1. The location of these samples and the texture data is also available in the Geographic Information System (see Appendix 1) where they can be viewed with other geologic data. See Figure 3.7 for the location of sediment samples superimposed on a map of backscatter intensity. Photographs of the sea floor obtained at these stations and at sites where grab samples could not be obtained are available in Appendix 3.

See Poppe and others (2000) for a description of the procedures for sediment texture analysis. Hastings and others (2000) provide a data dictionary describing the column headings in the Excel spreadsheet.

Table A2.1. Summary textural classification of bottom sediment samples from Boston Harbor and Approaches, Massachusetts. Click on the Station number to view the sediment sample in the SEABOSS sampler following recovery and a summary of the sediment texture. Click the Photo name to view the sample photo. The complete sediment texture analysis is in table A2.1.

Station	Depth (m)	Shepard (1974) Classification	Photo
1	7.1	SAND	BH001.jpg
3	14.9	SAND	BH003.jpg
4	10.6	SAND	BH004.jpg
5	13.3	SAND	BH005.jpg
6	16.0	SAND	BH006.jpg
14	22.7	SAND	BH014.jpg
15	27.9	SAND	BH015.jpg
18	13.6	SAND	BH018.jpg
19	21.7	SILTY SAND	BH019.jpg
20	22.6	SAND	BH020.jpg
25	23.1	SANDY SILT	BH025.jpg
27	19.9	SANDY SILT	BH027.jpg
29	29.8	SILTY SAND	BH029.jpg
30	29.0	SILTY SAND	BH030.jpg
33	24.8	SAND	BH033.jpg
36	17.6	SAND	BH036.jpg
39	13.8	SAND SILT CLAY	BH039.jpg
41	6.9	SAND	BH041.jpg
45	8.9	SAND	BH045.jpg
48	9.7	SAND	BH048.jpg
52	12.5	SAND SILT CLAY	BH052.jpg
55	7.9	SAND SILT CLAY	BH055.jpg
56	6.9	GRAVELLY SEDIMENT	BH056.jpg
58	12.8	GRAVEL	BH058.jpg
60	6.6	SANDY SILT	BH060.jpg
61	7.0	SAND SILT CLAY	BH061.jpg
62	16.7	GRAVELLY SEDIMENT	BH062.jpg
63	5.7	CLAYEY SILT	BH063.jpg
64	6.6	SILTY SAND	BH064.jpg
65	8.5	GRAVEL	BH065.jpg
66	6.5	SAND SILT CLAY	BH066.jpg
68	5.3	GRAVELLY SEDIMENT	BH068.jpg

69	5.0	SILTY SAND	BH069.jpg
70	12.8	GRAVELLY SEDIMENT	BH070.jpg
71	7.1	SAND SILT CLAY	BH071.jpg
72	17.8	SAND	BH072.jpg
74	13.9	SAND	BH074.jpg
76	13.2	SILTY SAND	BH076.jpg
77	19.3	SILTY SAND	BH077.jpg
78	24.2	SANDY SILT	BH078.jpg
79	27.0	CLAYEY SILT	BH079.jpg
85	25.9	SILTY SAND	BH085.jpg
87	9.5	SAND	BH087.jpg
88	27.1	SAND	BH088.jpg
90	9.8	SAND	BH090.jpg
91	8.2	SAND	BH091.jpg
92	23.6	SAND	BH092.jpg
93	15.4	SAND	BH093.jpg
94	14.2	SAND	BH094.jpg
95	2.9	SILTY SAND	BH095.jpg
96	5.8	SAND SILT CLAY	BH096.jpg
97	5.4	CLAYEY SAND	BH097.jpg
98	4.8	SAND SILT CLAY	BH098.jpg
99	7.1	CLAYEY SILT	BH099.jpg
100	4.2	SAND SILT CLAY	BH100.jpg
101	10.2	SAND SILT CLAY	BH101.jpg
103	13.0	SILTY CLAY	BH103.jpg
104	13.1	SILTY SAND	BH104.jpg
105	12.9	SILTY CLAY	BH105.jpg
106	5.1	SILTY SAND	BH106.jpg
110	6.2	SAND SILT CLAY	BH110.jpg
111	13.0	CLAYEY SILT	BH111.jpg
112	5.7	CLAYEY SILT	BH112.jpg
113	6.7	CLAYEY SILT	BH113.jpg

Station	Depth (m)	Lat	Long	Gravel %	Sand %	Silt %	Clay %	Shepard (1974) Classification
1	7.1	42.27	-70.84	0	98.65	0.89	0.45	SAND
3	14.9	42.28	-70.83	0	84.17	12.94	2.89	SAND
4	10.6	42.29	-70.86	0	97.28	1.96	0.77	SAND
5	13.3	42.3	-70.85	0	96.15	2.3	1.56	SAND
6	16.0	42.3	-70.83	0	94.99	3.29	1.72	SAND
14	22.7	42.34	-70.84	2.52	91.88	4.03	1.57	SAND
15	27.9	42.34	-70.83	0.06	84.43	11.64	3.86	SAND
18	13.6	42.32	-70.87	3.93	81.24	8.66	6.17	SAND
19	21.7	42.34	-70.86	0	67.28	24.9	7.82	SILTY SAND
20	22.6	42.35	-70.86	1.44	83.39	9.17	5.99	SAND
25	23.1	42.33	-70.85	0	32.39	54.64	12.97	SANDY SILT
27	19.9	42.31	-70.83	0	41.77	48.63	9.59	SANDY SILT
29	29.8	42.37	-70.84	0.03	49.87	37.38	12.72	SILTY SAND

30	29.0	42.36	-70.85	0.5	58.76	32.91	7.83	SILTY SAND
33	24.8	42.36	-70.86	1.37	75.83	19.12	3.68	SAND
36	17.6	42.37	-70.91	0	87.24	9.31	3.45	SAND
39	13.8	42.34	-70.91	0	31.09	43.19	25.72	SAND SILT CLAY
41	6.9	42.35	-70.92	0.29	98.89	0.43	0.39	SAND
45	8.9	42.34	-70.95	0	96.29	1.71	2	SAND
48	9.7	42.36	-70.94	0	97.89	1.32	0.79	SAND
52	12.5	42.34	-70.96	0	44.73	27.56	27.71	SAND SILT CLAY
55	7.9	42.32	-70.94	0.1	40.74	32.67	26.49	SAND SILT CLAY
56	6.9	42.32	-70.96	10.19	74.17	10.32	5.32	GRAVELLY SEDIMENT
58	12.8	42.3	-70.94	55.87	39.49	3.1	1.54	GRAVEL
60	6.6	42.3	-70.91	0	31.96	50.71	17.33	SANDY SILT
61	7.0	42.29	-70.92	0	31.33	42.57	26.1	SAND SILT CLAY
62	16.7	42.31	-70.92	23.23	66.33	5.46	4.97	GRAVELLY SEDIMENT
63	5.7	42.3	-70.97	0	15.25	49.67	35.08	CLAYEY SILT
64	6.6	42.32	-70.94	0	66.41	19.98	13.61	SILTY SAND
65	8.5	42.29	-70.96	67.41	39.72	0	0	GRAVEL
66	6.5	42.3	-70.94	0	28.71	33.6	37.69	SAND SILT CLAY
68	5.3	42.3	-70.98	19.39	16.2	32.02	32.4	GRAVELLY SEDIMENT
69	5.0	42.27	-70.93	0.04	69.8	19.35	10.81	SILTY SAND
70	12.8	42.33	-70.99	10.4	45.13	18.52	25.95	GRAVELLY SEDIMENT
71	7.1	42.33	-71	0	42.01	36.15	21.84	SAND SILT CLAY
72	17.8	42.38	-70.91	0.03	83.17	13.83	2.97	SAND
74	13.9	42.38	-70.93	0	90.41	8.36	1.22	SAND
76	13.2	42.38	-70.95	0	68.1	30.48	1.42	SILTY SAND
77	19.3	42.39	-70.92	0	54.89	33.5	11.61	SILTY SAND
78	24.2	42.4	-70.9	0	37.92	56.76	5.32	SANDY SILT
79	27.0	42.4	-70.89	0	13.22	64.19	22.59	CLAYEY SILT
85	25.9	42.41	-70.9	0	56.31	37.24	6.45	SILTY SAND
87	9.5	42.41	-70.95	0.26	89.9	9.06	0.77	SAND
88	27.1	42.42	-70.89	0.59	75.2	19.7	4.51	SAND
90	9.8	42.43	-70.91	0	95.21	2.16	2.63	SAND
91	8.2	42.4	-70.95	0.03	92.75	4.31	2.91	SAND
92	23.6	42.38	-70.88	0.35	75.9	10.16	13.59	SAND
93	15.4	42.4	-70.93	0.25	85.11	11.51	3.13	SAND
94	14.2	42.38	-70.93	0	87.73	9.69	2.58	SAND
95	2.9	42.35	-70.97	0	66.49	22.82	10.68	SILTY SAND
96	5.8	42.35	-70.98	0	25.61	49.58	24.81	SAND SILT CLAY

97	5.4	42.34	-70.99	1.59	58.92	18.63	20.86	CLAYEY SAND
98	4.8	42.35	-71	0	33.24	36.85	29.91	SAND SILT CLAY
99	7.1	42.35	-70.99	0	17.49	42.13	40.38	CLAYEY SILT
100	4.2	42.36	-70.98	0	21	50.06	28.93	SAND SILT CLAY
101	10.2	42.34	-71.01	0	21.91	49.13	28.95	SAND SILT CLAY
103	13.0	42.37	-71.04	0.11	15.21	38.47	46.21	SILTY CLAY
104	13.1	42.38	-71.05	2.24	64.92	21.63	11.22	SILTY SAND
105	12.9	42.36	-71.03	0.32	2.95	46.55	50.18	SILTY CLAY
106	5.1	42.32	-71.01	6.32	56.78	18.92	17.98	SILTY SAND
110	6.2	42.33	-70.97	1.07	50.79	25.28	22.86	SAND SILT CLAY
111	13.0	42.34	-71.03	0	6.8	53.67	39.54	CLAYEY SILT
112	5.7	42.37	-70.99	0.1	17.38	47.26	35.26	CLAYEY SILT
113	6.7	42.38	-71.01	0	6.73	63.3	29.97	CLAYEY SILT

Appendix 3- Bottom Photographs

A total of 880 bottom photographs were obtained at 113 locations as part of this study (see Ground Validation in Section 4 of this report). Typically 5-10 still photographs were obtained at each station with the SEABOSS system as the ship drifted over the sea floor. The location of the stations are shown in figure A3.1. The field of view of each image is approximately 50 cm wide (SEABOSS 50 cm above the bottom).

The images may be viewed by browsing the thumbnails in the Photo Gallery. Alternatively, the images may be accessed from disk using the image names in table A3.1.

The location of these images and links to the photographs are also available in the Geographic Information System (see Appendix 1) where they can be viewed with other geologic data. Texture analysis of samples obtained at these stations, where possible, are available in Appendix 2.

Photo Gallery:

Bottom Photographs:

Table A3.1. Location of bottom photographs collected as part of the Boston Harbor and Approaches mapping project. Click here for the directory containing all the bottom photographs. **Note**: This folder contains hyperlink images of the bottom photos and sediment samples. Bottom photos have a numeric nomenclature (e.g. 22....jpg).

Station	Image Name	Depth (m)	Station	Image Name	Depth (m)
1	22430969.jpg	7.2	61	22626197.jpg	7.0
1	22431041.jpg	7.0	62	22361234.jpg	17.8
1	22431112.jpg	7.0	62	22361248.jpg	18.0
2	22431765.jpg	9.9	62	22361360.jpg	17.9
2	22431804.jpg	9.9	62	22361405.jpg	18.0
2	22431879.jpg	9.8	62	22361456.jpg	17.4
2	22432009.jpg	10.2	62	22361481.jpg	17.4
3	22432706.jpg	14.3	62	22361495.jpg	17.2
3	22432760.jpg	14.7	62	22361559.jpg	16.7
3	22432812.jpg	14.8	63	22367382.jpg	5.5
3	22432829.jpg	14.8	63	22367412.jpg	5.5
3	22432889.jpg	14.8	63	22367466.jpg	5.5
3	22432942.jpg	14.9	63	22367599.jpg	5.7
3	22433006.jpg	14.9	64	22364865.jpg	3.1
4	22428863.jpg	10.8	64	22364920.jpg	3.2
4	22428921.jpg	10.8	64	22364960.jpg	3.3
4	22428973.jpg	10.8	64	22364987.jpg	3.4
4	22429117.jpg	10.6	64	22365017.jpg	3.5
5	22434684.jpg	13.4	64	22365050.jpg	3.7
5	22434730.jpg	13.4	64	22365159.jpg	4.8
5	22434800.jpg	13.4	64	22365251.jpg	6.4
5	22434869.jpg	13.3	64	22365274.jpg	6.6
5	22434909.jpg	13.3	64	22365306.jpg	6.6
6	22435936.jpg	16.2	64	22365330.jpg	6.6
6	22435989.jpg	16.2	65	22369878.jpg	10.1
6	22436057.jpg	16.2	65	22369929.jpg	9.8
6	22436072.jpg	16.2	65	22369953.jpg	9.7
6	22436131.jpg	16.1	65	22369993.jpg	9.4
6	22436182.jpg	16.0	65	22370014.jpg	9.2
7	22430020.jpg	9.1	65	22370128.jpg	8.9
7	22430045.jpg	9.1	65	22370198.jpg	8.6
7	22430191.jpg	8.8	65	22370255.jpg	8.5
7	22430291.jpg	9.2	66	22370968.jpg	6.4
8	22433666.jpg	11.5	66	22370983.jpg	6.4
8	22433701.jpg	11.7	66	22371032.jpg	6.5
8	22433720.jpg	11.7	67	22624472.jpg	8.8
8	22433768.jpg	10.6	67	22624486.jpg	8.8
8	22433801.jpg	10.4	67	22624508.jpg	8.8
8	22433907.jpg	10.1	67	22624540.jpg	8.9

9	22427104.jpg	10.8
9	22427133.jpg	10.8
9	22427229.jpg	10.8
9	22427347.jpg	10.7
10	22426175.jpg	12.4
10	22426206.jpg	12.4
10	22426315.jpg	11.5
10	22426351.jpg	11.6
10	22426476.jpg	11.6
11	22438161.jpg	14.3
11	22438181.jpg	14.6
11	22438211.jpg	14.8
11	22438270.jpg	14.9
11	22438302.jpg	15.0
11	22438363.jpg	15.0
11	22438407.jpg	14.8
12	22439582.jpg	11.3
12	22439621.jpg	11.1
12	22439672.jpg	11.0
12	22439701.jpg	11.5
12	22439770.jpg	11.8
12	22439804.jpg	11.8
13	22440780.jpg	24.1
13	22440795.jpg	24.1
13	22440851.jpg	24.1
13	22440907.jpg	24.1
14	22512844.jpg	23.3
14	22512864.jpg	23.3
14	22512895.jpg	23.2
14	22512908.jpg	23.1
14	22512928.jpg	23.1
14	22512947.jpg	23.1
14	22512969.jpg	23.0
14	22513015.jpg	23.0
14	22513074.jpg	23.0
14	22513107.jpg	22.9
14	22513165.jpg	22.9
14	22513199.jpg	22.8
14	22513210.jpg	22.8
14	22513282.jpg	22.7
15	22514165.jpg	28.2
15	22514180.jpg	28.2
15	22514201.jpg	28.2
15	22514214.jpg	28.1
15	22514243.jpg	28.1
15	22514277.jpg	28.1
15	22514309.jpg	28.0
15	22514360.jpg	27.9
15	22514384.jpg	27.9
15	22514429.jpg	27.9
15	22514468.jpg	27.9

67	22624564.jpg	8.9
67	22624593.jpg	8.9
67	22624632.jpg	8.9
67	22624652.jpg	8.9
68	22368644.jpg	5.3
68	22368748.jpg	5.3
68	22368789.jpg	5.2
68	22368840.jpg	5.3
69	22625300.jpg	5.1
69	22625314.jpg	5.1
69	22625334.jpg	5.1
69	22625347.jpg	5.2
69	22625360.jpg	5.2
69	22625392.jpg	4.8
69	22625407.jpg	4.8
69	22625421.jpg	5.0
69	22625432.jpg	5.0
69	22625450.jpg	5.0
70	22614732.jpg	13.2
70	22614763.jpg	13.2
70	22614780.jpg	13.2
70	22614812.jpg	12.8
70	22614831.jpg	12.8
70	22614872.jpg	12.9
70	22614887.jpg	12.9
70	22614911.jpg	13.0
70	22614932.jpg	12.8
71	22615467.jpg	7.9
71	22615486.jpg	7.9
71	22615505.jpg	7.7
71	22615526.jpg	7.8
71	22615595.jpg	7.1
71	22615621.jpg	7.1
72	22543792.jpg	17.7
72	22543806.jpg	17.7
72	22543825.jpg	17.7
72	22543867.jpg	17.8
72	22543882.jpg	17.8
72	22543904.jpg	17.8
72	22543933.jpg	17.8
73	22543109.jpg	12.0
73	22543148.jpg	12.0
73	22543171.jpg	12.0
73	22543189.jpg	12.0
73	22543214.jpg	12.3
73	22543247.jpg	12.3
73	22543268.jpg	12.3
73	22543287.jpg	12.3
74	22454561.jpg	13.8
74	22454586.jpg	13.8
74	22454648.jpg	13.8

15	22514489.jpg	27.9
16	22423169.jpg	11.9
16	22423218.jpg	11.8
16	22423232.jpg	11.8
16	22423267.jpg	11.4
16	22423336.jpg	11.5
16	22423353.jpg	11.3
16	22423367.jpg	11.3
16	22423422.jpg	11.4
16	22423461.jpg	11.2
16	22423518.jpg	11.0
17	22424314.jpg	12.4
17	22424372.jpg	12.4
17	22424431.jpg	12.5
17	22424537.jpg	12.5
18	22425136.jpg	13.5
18	22425309.jpg	13.6
19	22443654.jpg	21.6
19	22443679.jpg	21.6
19	22443765.jpg	21.7
19	22443784.jpg	21.7
20	22511556.jpg	22.8
20	22511581.jpg	22.8
20	22511605.jpg	22.7
20	22511650.jpg	22.7
20	22511669.jpg	22.7
20	22511732.jpg	22.6
20	22511745.jpg	22.6
21	22510714.jpg	21.8
21	22510727.jpg	21.2
21	22510740.jpg	21.2
21	22510753.jpg	21.2
21	22510774.jpg	21.2
21	22510829.jpg	20.5
21	22510918.jpg	20.1
21	22510932.jpg	19.7
21	22510961.jpg	19.7
21	22511014.jpg	19.6
21	22511028.jpg	20.2
22	22509828.jpg	17.8
22	22509860.jpg	17.5
22	22509871.jpg	17.5
22	22509952.jpg	17.6
22	22509969.jpg	16.7
22	22509985.jpg	16.7
22	22510014.jpg	16.9
22	22510077.jpg	16.9
22	22510103.jpg	15.5
22	22510151.jpg	15.5
23	22445708.jpg	6.0
23	22445722.jpg	6.0

74	22454672.jpg	13.8
74	22454687.jpg	13.8
74	22454712.jpg	13.8
74	22454932.jpg	13.9
75	22455661.jpg	10.5
75	22455679.jpg	10.5
75	22455698.jpg	10.5
75	22455743.jpg	10.6
75	22455770.jpg	10.6
75	22455844.jpg	10.9
75	22455866.jpg	10.9
75	22455886.jpg	10.9
75	22455930.jpg	11.1
75	22455954.jpg	11.2
75	22455971.jpg	11.2
75	22455994.jpg	11.3
75	22456007.jpg	11.3
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Stations 1-20


22430969.jpg
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Time(UTC) 15:03:24


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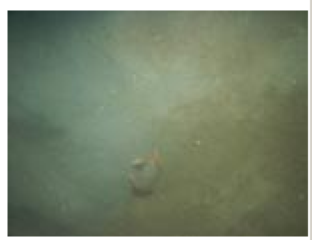
 22434800.jpg Station # 5	 22434869.jpg Station # 5	 22434909.jpg Station # 5	 22435936.jpg Station # 6	 22435989.jpg Station # 6

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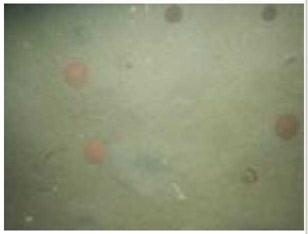
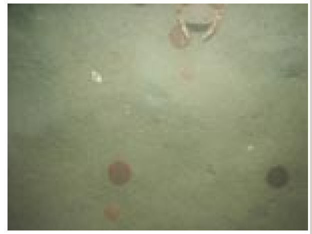
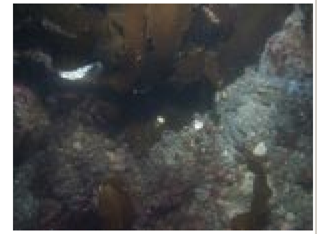
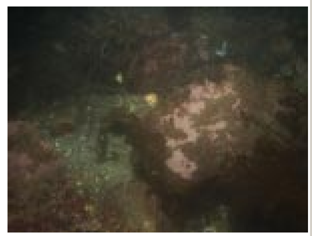
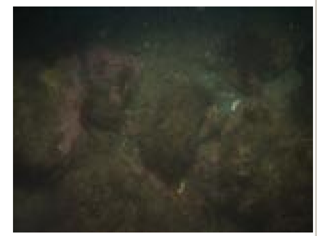
 22436057.jpg Station # 6 Lat 42.302705 Long -70.830635 Time(UTC) 16:14:17	 22436072.jpg Station # 6 Lat 42.30267 Long -70.8306717 Time(UTC) 16:14:32	 22436131.jpg Station # 6 Lat 42.302445 Long -70.8309233 Time(UTC) 16:15:31	 22436182.jpg Station # 6 Lat 42.30252 Long -70.8311983 Time(UTC) 16:16:22	 22430020.jpg Station # 7 Lat 42.2876133 Long -70.84548 Time(UTC) 14:33:40
 22430045.jpg Station # 7 Lat 42.2876067 Long -70.8455233 Time(UTC) 14:34:05	 22430191.jpg Station # 7 Lat 42.28755 Long -70.845755 Time(UTC) 14:36:31	 22430291.jpg Station # 7 Lat 42.2875017 Long -70.8458917 Time(UTC) 14:38:11	 22433666.jpg Station # 8 Lat 42.287495 Long -70.82947 Time(UTC) 15:34:26	 22433701.jpg Station # 8 Lat 42.2875067 Long -70.82935 Time(UTC) 15:35:01

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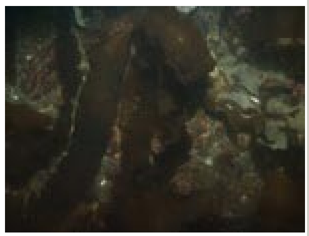

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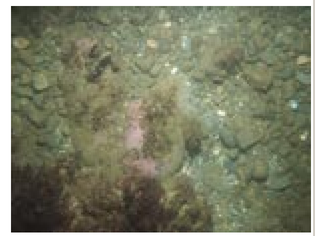

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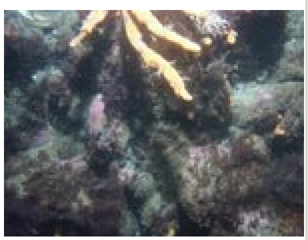

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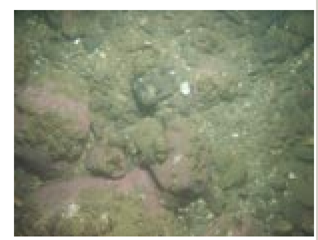

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Station # 11

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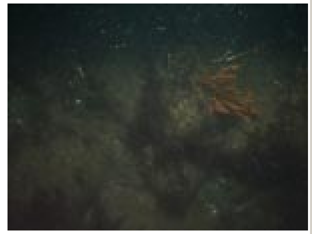
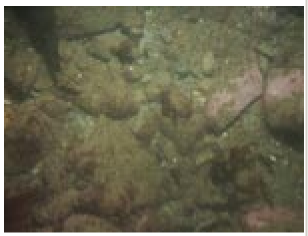
 22438211.jpg Station # 11 Lat 42.31454 Long -70.8475783 Time(UTC) 16:50:11	 22438270.jpg Station # 11 Lat 42.3147067 Long -70.8475583 Time(UTC) 16:51:10	 22438302.jpg Station # 11 Lat 42.3147583 Long -70.8476083 Time(UTC) 16:51:42	 22438363.jpg Station # 11 Lat 42.3147567 Long -70.8475967 Time(UTC) 16:52:43	 22438407.jpg Station # 11 Lat 42.314615 Long -70.8476367 Time(UTC) 16:53:27

 22439582.jpg Station # 12 Lat 42.3243967 Long -70.8325033 Time(UTC) 17:13:02	 22439621.jpg Station # 12 Lat 42.3244883 Long -70.83258 Time(UTC) 17:13:41	 22439672.jpg Station # 12 Lat 42.3246183 Long -70.83266 Time(UTC) 17:14:32	 22439701.jpg Station # 12 Lat 42.3247083 Long -70.8326883 Time(UTC) 17:15:01	 22439770.jpg Station # 12 Lat 42.3248383 Long -70.83286 Time(UTC) 17:16:10
 22439804.jpg Station # 12 Lat 42.3248983 Long -70.83295 Time(UTC) 17:16:44	 22440780.jpg Station # 13 Lat 42.334045 Long -70.8349617 Time(UTC) 17:33:00	 22440795.jpg Station # 13 Lat 42.3340817 Long -70.83499 Time(UTC) 17:33:15	 22440851.jpg Station # 13 Lat 42.334205 Long -70.835115 Time(UTC) 17:34:11	 22440907.jpg Station # 13 Lat 42.3343333 Long -70.8352367 Time(UTC) 17:35:07
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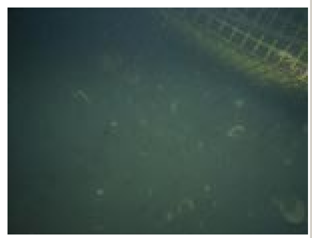
 22513165.jpg Station # 14 Lat 42.3408467 Long -70.8418283 Time(UTC) 13:39:25	 22513199.jpg Station # 14 Lat 42.3408233 Long -70.84192 Time(UTC) 13:39:59	 22513210.jpg Station # 14 Lat 42.340815 Long -70.8419483 Time(UTC) 13:40:10	 22513282.jpg Station # 14 Lat 42.3407583 Long -70.84214 Time(UTC) 13:41:22	 22514165.jpg Station # 15 Lat 42.3447083 Long -70.8292833 Time(UTC) 13:56:05

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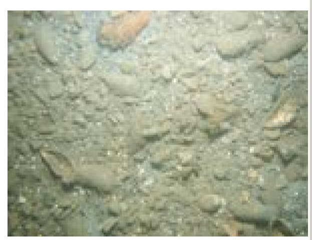
 22514489.jpg Station # 15	 22423169.jpg Station # 16	 22423218.jpg Station # 16	 22423232.jpg Station # 16	 22423267.jpg Station # 16

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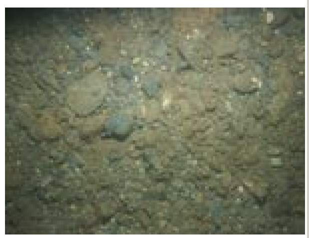
 22423518.jpg Station # 16 Lat 42.3161083 Long -70.901745 Time(UTC) 12:45:18	 22424314.jpg Station # 17 Lat 42.32322 Long -70.8808883 Time(UTC) 12:58:34	 22424372.jpg Station # 17 Lat 42.3231767 Long -70.8811133 Time(UTC) 12:59:32	 22424431.jpg Station # 17 Lat 42.3231483 Long -70.88136 Time(UTC) 13:00:31	 22424537.jpg Station # 17 Lat 42.32312 Long -70.8818333 Time(UTC) 13:02:17

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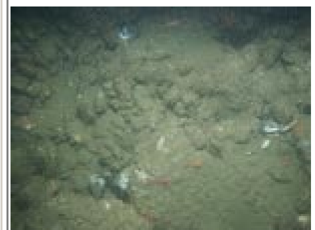
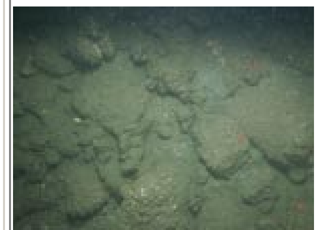
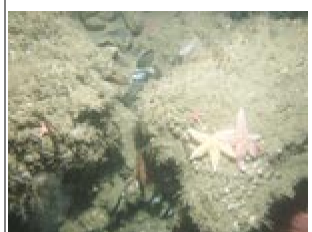
Stations 21-40

 22510714.jpg Station # 21 Lat 42.341655 Long -70.8642583 Time(UTC) 12:58:34	 22510727.jpg Station # 21 Lat 42.341645 Long -70.8642833 Time(UTC) 12:58:47	 22510740.jpg Station # 21 Lat 42.3416333 Long -70.8643117 Time(UTC) 12:59:00	 22510753.jpg Station # 21 Lat 42.3416217 Long -70.8643383 Time(UTC) 12:59:13	 22510774.jpg Station # 21 Lat 42.341605 Long -70.8643783 Time(UTC) 12:59:34
 22510829.jpg Station # 21 Lat 42.3415667 Long -70.8644933 Time(UTC) 13:00:29	 22510918.jpg Station # 21 Lat 42.3415033 Long -70.8647217 Time(UTC) 13:01:58	 22510932.jpg Station # 21 Lat 42.34149 Long -70.8647533 Time(UTC) 13:02:12	 22510961.jpg Station # 21 Lat 42.34146 Long -70.8648217 Time(UTC) 13:02:41	 22511014.jpg Station # 21 Lat 42.3414 Long -70.8649433 Time(UTC) 13:03:34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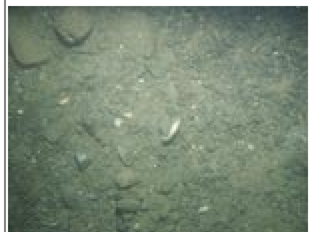
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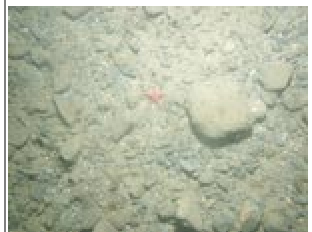
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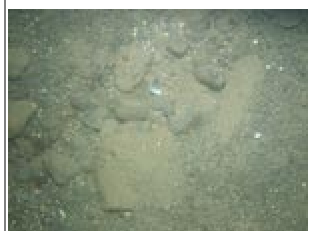
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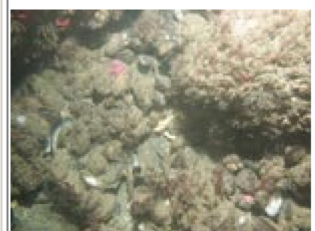
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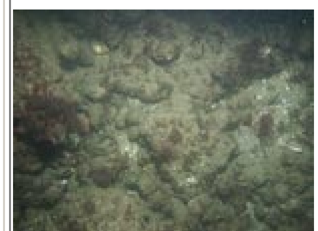
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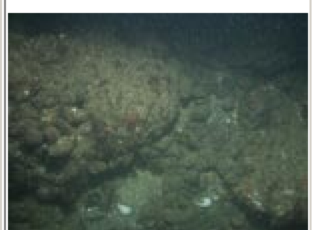
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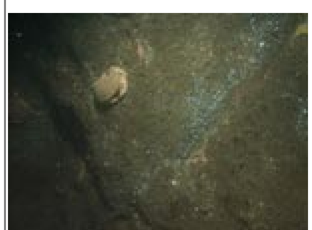
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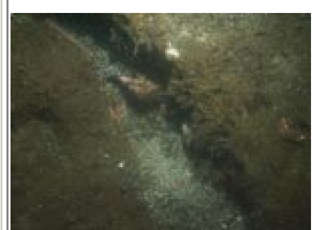
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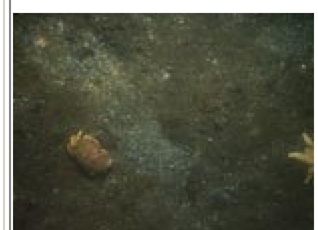
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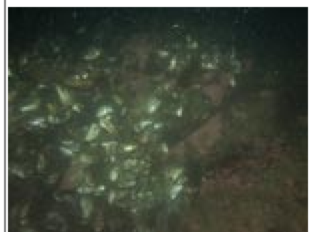
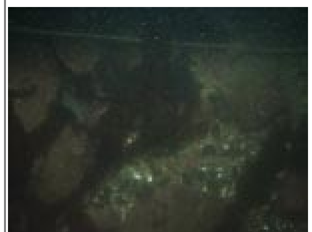
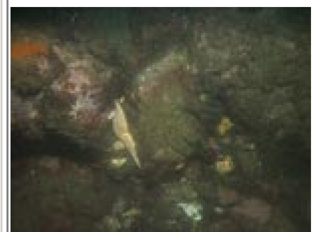
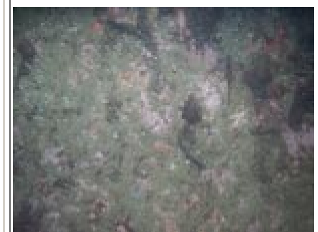
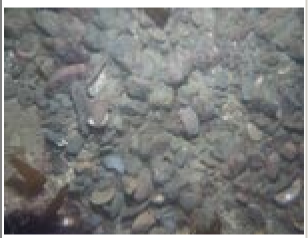
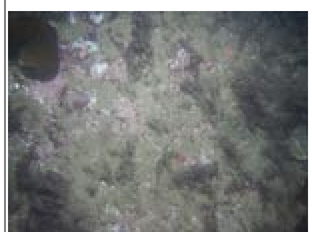
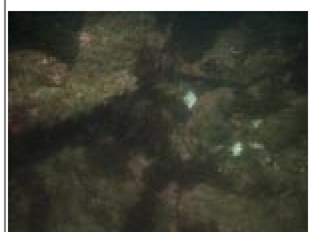
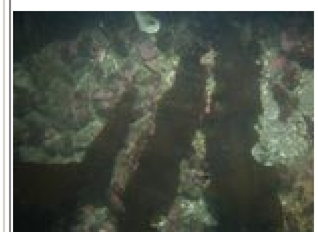
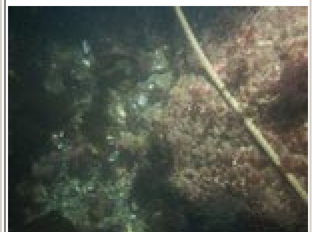
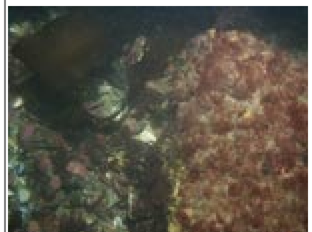
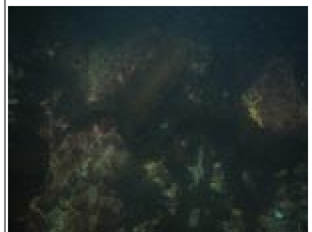
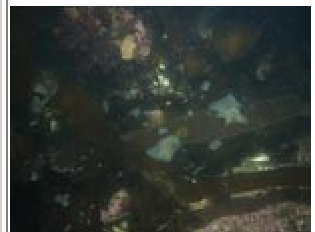
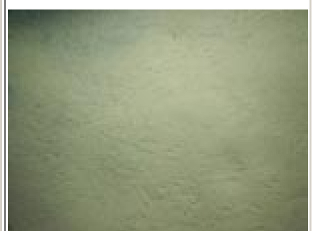
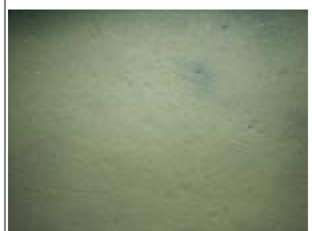
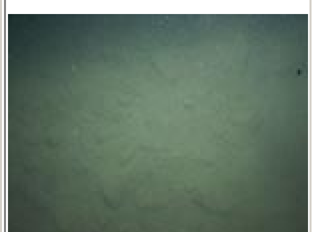
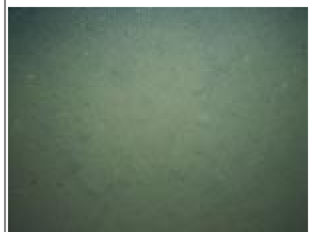
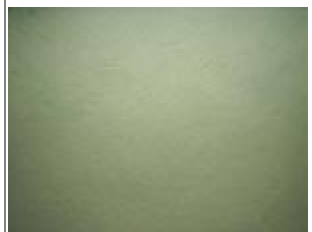
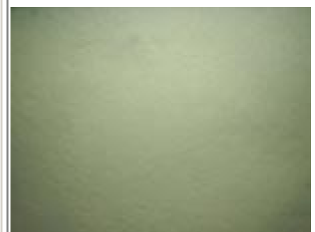
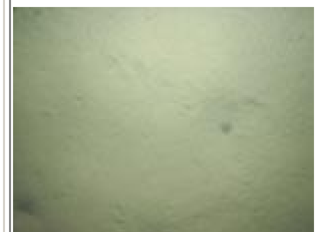
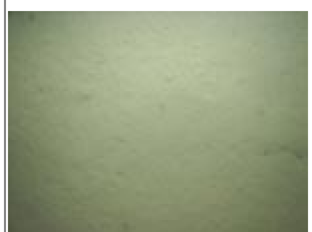
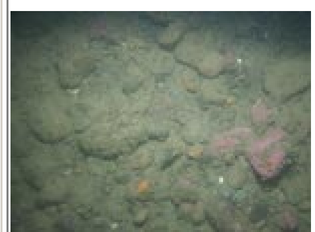
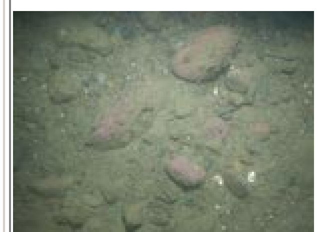
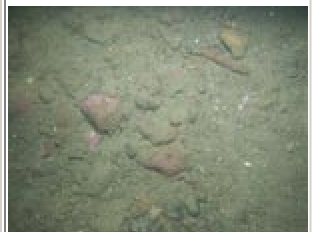
Lat 42.3360167 Long -70.8697 Time(UTC) 12:49:11	Lat 42.3441083 Long -70.8861 Time(UTC) 18:55:08	Lat 42.3441133 Long -70.8861567 Time(UTC) 18:55:22	Lat 42.34415 Long -70.8862933 Time(UTC) 18:55:57	Lat 42.3441667 Long -70.88635 Time(UTC) 18:56:11
 22445797.jpg Station # 23 Lat 42.3441983 Long -70.8864633 Time(UTC) 18:56:37	 22445814.jpg Station # 23 Lat 42.3442217 Long -70.8865383 Time(UTC) 18:56:54	 22445892.jpg Station # 23 Lat 42.3443283 Long -70.8868383 Time(UTC) 18:58:12	 22445967.jpg Station # 23 Lat 42.3444567 Long -70.8871083 Time(UTC) 18:59:27	 22446000.jpg Station # 23 Lat 42.3445083 Long -70.8872317 Time(UTC) 19:00:00
 22446048.jpg Station # 23 Lat 42.3446 Long -70.8874067 Time(UTC) 19:00:48	 22446123.jpg Station # 23 Lat 42.34472 Long -70.8876733 Time(UTC) 19:02:03	 22446145.jpg Station # 23 Lat 42.3447783 Long -70.8877367 Time(UTC) 19:02:25	 22509001.jpg Station # 24 Lat 42.334265 Long -70.883155 Time(UTC) 12:30:01	 22509017.jpg Station # 24 Lat 42.334255 Long -70.8831483 Time(UTC) 12:30:17

 22509069.jpg Station # 24 Lat 42.3342267 Long -70.8831717 Time(UTC) 12:31:09	 22509168.jpg Station # 24 Lat 42.3341817 Long -70.8832783 Time(UTC) 12:32:48	 22509203.jpg Station # 24 Lat 42.3341667 Long -70.8833283 Time(UTC) 12:33:23	 22509262.jpg Station # 24 Lat 42.3341383 Long -70.8834183 Time(UTC) 12:34:22	 22442193.jpg Station # 25 Lat 42.3288633 Long -70.8489967 Time(UTC) 17:56:33
 22442212.jpg Station # 25 Lat 42.32891 Long -70.8490183 Time(UTC) 17:56:52	 22442260.jpg Station # 25 Lat 42.329015 Long -70.849095 Time(UTC) 17:57:40	 22442732.jpg Station # 25 Lat 42.3280833 Long -70.8479817 Time(UTC) 18:05:32	 22442764.jpg Station # 25 Lat 42.328025 Long -70.84797 Time(UTC) 18:06:04	 22444667.jpg Station # 26 Lat 42.3490483 Long -70.875 Time(UTC) 18:37:47
 22444699.jpg Station # 26	 22444723.jpg Station # 26	 22444750.jpg Station # 26	 22444785.jpg Station # 26	 22444831.jpg Station # 26

Lat 42.3490583 Long -70.87494 Time(UTC) 18:38:19	Lat 42.3489917 Long -70.8750017 Time(UTC) 18:38:43	Lat 42.348905 Long -70.875095 Time(UTC) 18:39:10	Lat 42.3488683 Long -70.87529 Time(UTC) 18:39:45	Lat 42.3489783 Long -70.875445 Time(UTC) 18:40:31
 22445021.jpg Station # 26 Lat 42.3496733 Long -70.875955 Time(UTC) 18:43:41	 22445050.jpg Station # 26 Lat 42.3498 Long -70.8760567 Time(UTC) 18:44:10	 22436979.jpg Station # 27 Lat 42.3132917 Long -70.8327 Time(UTC) 16:29:39	 22437032.jpg Station # 27 Lat 42.313395 Long -70.8328783 Time(UTC) 16:30:32	 22437080.jpg Station # 27 Lat 42.3134567 Long -70.8330483 Time(UTC) 16:31:20
 22437133.jpg Station # 27 Lat 42.3135617 Long -70.8332367 Time(UTC) 16:32:13	 22437206.jpg Station # 27 Lat 42.3137 Long -70.8334833 Time(UTC) 16:33:26	 22437231.jpg Station # 27 Lat 42.313745 Long -70.83357 Time(UTC) 16:33:51	 22515596.jpg Station # 28 Lat 42.3566683 Long -70.8292917 Time(UTC) 14:19:56	 22515613.jpg Station # 28 Lat 42.3566617 Long -70.829355 Time(UTC) 14:20:13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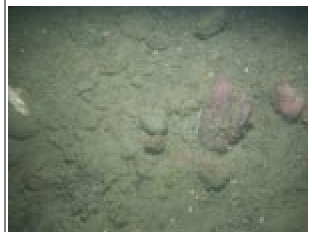
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Time(UTC) 14:21:27


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Time(UTC) 14:22:58


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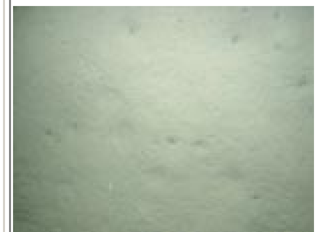
Time(UTC) 14:23:55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Time(UTC) 14:52:02


22517555.jpg
Station # 29
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Long -70.8387717
Time(UTC) 14:52:35


22517583.jpg
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Lat 42.3670267
Long -70.8388517
Time(UTC) 14:53:03


22517618.jpg
Station # 29
Lat 42.367025
Long -70.838945
Time(UTC) 14:53:38


22517654.jpg
Station # 29
Lat 42.367025
Long -70.8390417
Time(UTC) 14:54:14


22517725.jpg
Station # 29
Lat 42.3670167
Long -70.8392483
Time(UTC) 14:55:25

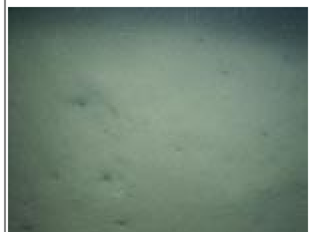
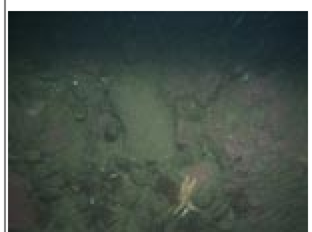
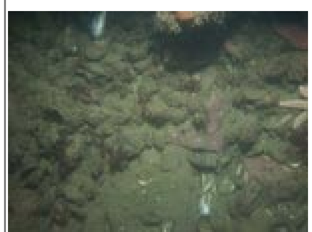
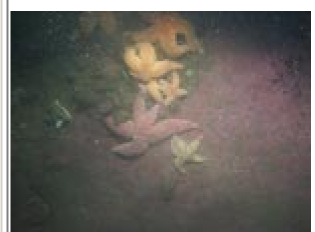
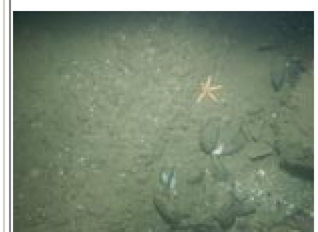

22517767.jpg
Station # 29

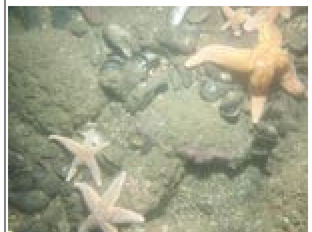
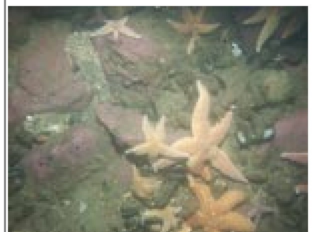
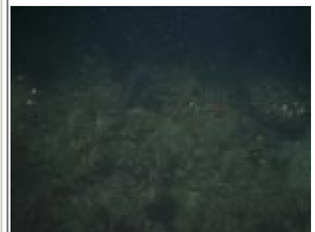
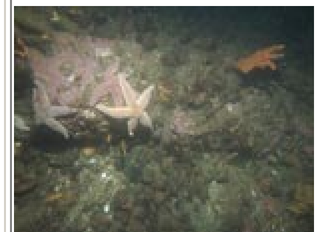
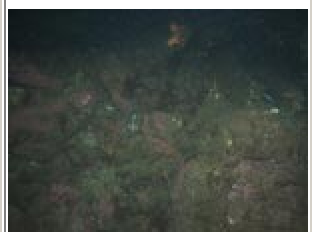
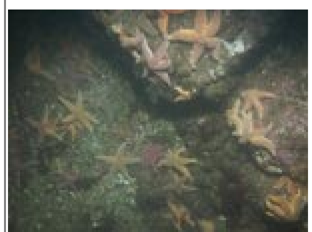
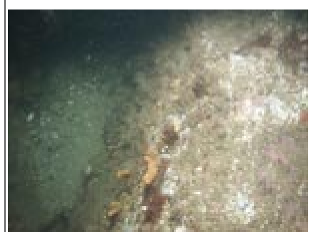
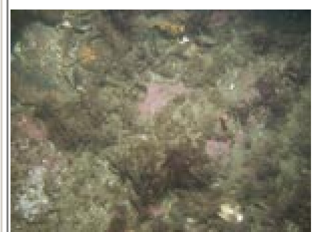
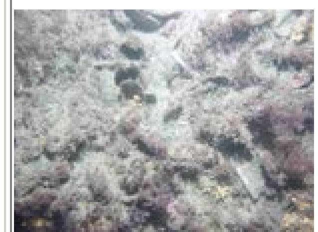
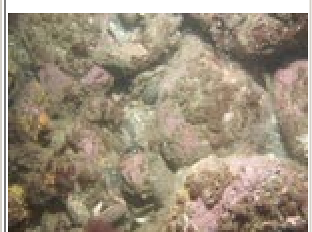
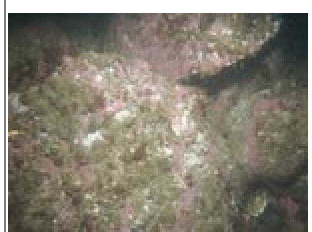

22519469.jpg
Station # 30

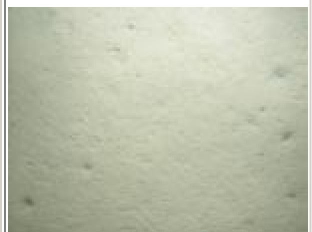

22519507.jpg
Station # 30

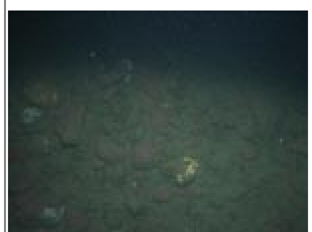
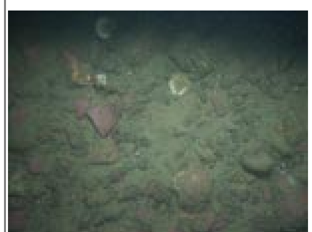
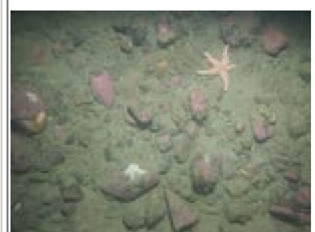
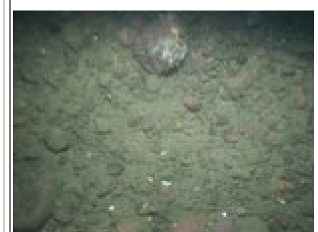
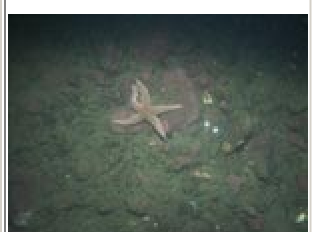
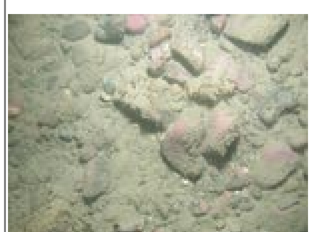
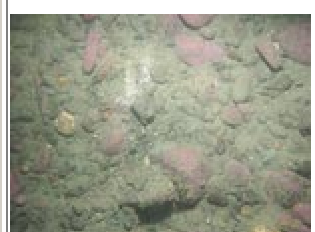

22519545.jpg
Station # 30

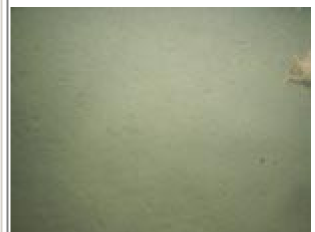
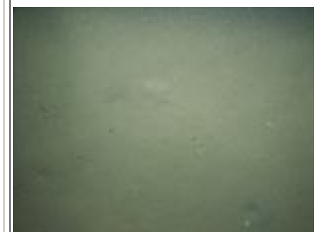
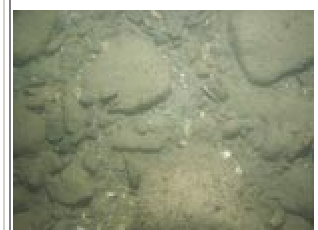

22519590.jpg
Station # 30

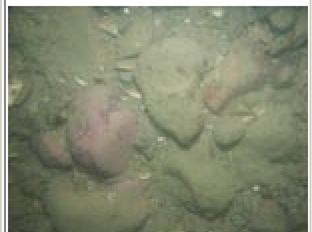
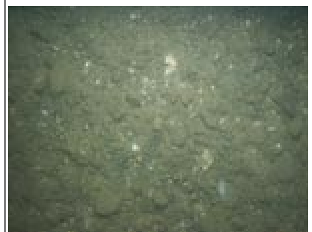
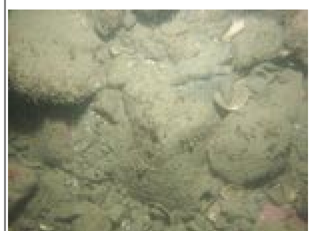
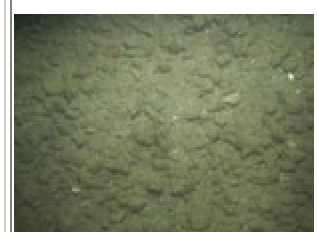
Lat 42.3670167 Long -70.8393667 Time(UTC) 14:56:07	Lat 42.3615333 Long -70.8460217 Time(UTC) 15:24:29	Lat 42.3615267 Long -70.8461483 Time(UTC) 15:25:07	Lat 42.36151 Long -70.846255 Time(UTC) 15:25:45	Lat 42.36149 Long -70.8463867 Time(UTC) 15:26:30
 22519613.jpg Station # 30 Lat 42.3614783 Long -70.846455 Time(UTC) 15:26:53	 22519644.jpg Station # 30 Lat 42.3614617 Long -70.84655 Time(UTC) 15:27:24	 22519680.jpg Station # 30 Lat 42.3614383 Long -70.8466583 Time(UTC) 15:28:00	 22519731.jpg Station # 30 Lat 42.3613917 Long -70.8467983 Time(UTC) 15:28:51	 22519750.jpg Station # 30 Lat 42.3613717 Long -70.8468417 Time(UTC) 15:29:10
 22518545.jpg Station # 31 Lat 42.36858 Long -70.849495 Time(UTC) 15:09:05	 22518600.jpg Station # 31 Lat 42.3686133 Long -70.8497017 Time(UTC) 15:10:00	 22518615.jpg Station # 31 Lat 42.3686217 Long -70.8497483 Time(UTC) 15:10:15	 22518648.jpg Station # 31 Lat 42.3686383 Long -70.84985 Time(UTC) 15:10:48	 22518692.jpg Station # 31 Lat 42.3686533 Long -70.8499967 Time(UTC) 15:11:32

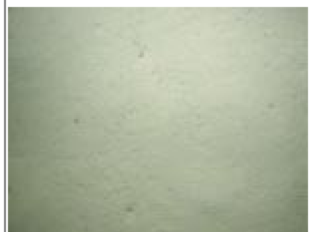
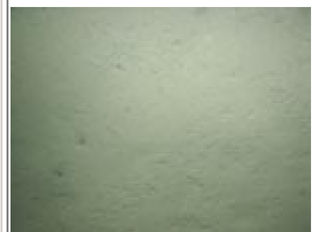
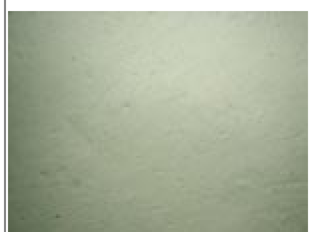
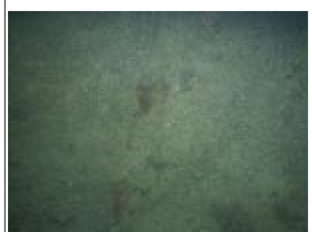
 22518755.jpg Station # 31 Lat 42.3686767 Long -70.8501883 Time(UTC) 15:12:35	 22518799.jpg Station # 31 Lat 42.3686983 Long -70.8503233 Time(UTC) 15:13:19	 22518862.jpg Station # 31 Lat 42.3687233 Long -70.8505233 Time(UTC) 15:14:22	 22520559.jpg Station # 32 Lat 42.357995 Long -70.8595483 Time(UTC) 15:42:39	 22520576.jpg Station # 32 Lat 42.358005 Long -70.85961 Time(UTC) 15:42:56
 22520591.jpg Station # 32 Lat 42.3580067 Long -70.8596633 Time(UTC) 15:43:11	 22520609.jpg Station # 32 Lat 42.3580117 Long -70.8597283 Time(UTC) 15:43:29	 22520645.jpg Station # 32 Lat 42.3580117 Long -70.85984 Time(UTC) 15:44:05	 22520673.jpg Station # 32 Lat 42.35801 Long -70.859935 Time(UTC) 15:44:33	 22520720.jpg Station # 32 Lat 42.3580017 Long -70.8600783 Time(UTC) 15:45:20
 22520735.jpg Station # 32	 22520784.jpg Station # 32	 22520803.jpg Station # 32	 22521212.jpg Station # 33	 22521241.jpg Station # 33

Lat 42.3579967 Long -70.8601283 Time(UTC) 15:45:35	Lat 42.35798 Long -70.86028 Time(UTC) 15:46:24	Lat 42.35797 Long -70.860335 Time(UTC) 15:46:43	Lat 42.3618717 Long -70.8618083 Time(UTC) 15:53:32	Lat 42.36187 Long -70.861895 Time(UTC) 15:54:01
 22521257.jpg Station # 33 Lat 42.36189 Long -70.8619417 Time(UTC) 15:54:17	 22521305.jpg Station # 33 Lat 42.361905 Long -70.8620867 Time(UTC) 15:55:05	 22521418.jpg Station # 33 Lat 42.3618517 Long -70.862415 Time(UTC) 15:56:58	 22521465.jpg Station # 33 Lat 42.3618217 Long -70.8625583 Time(UTC) 15:57:45	 22521503.jpg Station # 33 Lat 42.3617983 Long -70.8626733 Time(UTC) 15:58:23
 22521518.jpg Station # 33 Lat 42.3617883 Long -70.8627183 Time(UTC) 15:58:38	 22521536.jpg Station # 33 Lat 42.3617783 Long -70.8627683 Time(UTC) 15:58:56	 22521552.jpg Station # 33 Lat 42.3617683 Long -70.8628133 Time(UTC) 15:59:12	 22521578.jpg Station # 33 Lat 42.3617533 Long -70.8628833 Time(UTC) 15:59:38	 22522535.jpg Station # 34 Lat 42.3678533 Long -70.8800683 Time(UTC) 16:15:35

 22522604.jpg Station # 34 Lat 42.367805 Long -70.8802417 Time(UTC) 16:16:44	 22522641.jpg Station # 34 Lat 42.367765 Long -70.880325 Time(UTC) 16:17:21	 22522673.jpg Station # 34 Lat 42.3677317 Long -70.8804017 Time(UTC) 16:17:53	 22522707.jpg Station # 34 Lat 42.367695 Long -70.880485 Time(UTC) 16:18:27	 22522742.jpg Station # 34 Lat 42.36766 Long -70.8805733 Time(UTC) 16:19:02
 22522764.jpg Station # 34 Lat 42.3676383 Long -70.8806317 Time(UTC) 16:19:24	 22516569.jpg Station # 35 Lat 42.368795 Long -70.82281 Time(UTC) 14:36:09	 22516589.jpg Station # 35 Lat 42.3688017 Long -70.822865 Time(UTC) 14:36:29	 22516621.jpg Station # 35 Lat 42.3688067 Long -70.8229533 Time(UTC) 14:37:01	 22516672.jpg Station # 35 Lat 42.3687983 Long -70.8230933 Time(UTC) 14:37:52
 22516689.jpg Station # 35	 22516714.jpg Station # 35	 22516754.jpg Station # 35	 22516812.jpg Station # 35	 22544477.jpg Station # 36

Lat 42.3687983 Long -70.8231417 Time(UTC) 14:38:09	Lat 42.36879 Long -70.8232083 Time(UTC) 14:38:34	Lat 42.368775 Long -70.8233117 Time(UTC) 14:39:14	Lat 42.3687483 Long -70.8234683 Time(UTC) 14:40:12	Lat 42.3704533 Long -70.9069867 Time(UTC) 22:21:17
 22544498.jpg Station # 36 Lat 42.3704617 Long -70.9069533 Time(UTC) 22:21:38	 22544529.jpg Station # 36 Lat 42.370475 Long -70.906905 Time(UTC) 22:22:09	 22544552.jpg Station # 36 Lat 42.3704867 Long -70.9068633 Time(UTC) 22:22:32	 22544565.jpg Station # 36 Lat 42.3704933 Long -70.9068417 Time(UTC) 22:22:45	 22544581.jpg Station # 36 Lat 42.3705033 Long -70.90681 Time(UTC) 22:23:01
 22544627.jpg Station # 36 Lat 42.3705417 Long -70.9067167 Time(UTC) 22:23:47	 22545456.jpg Station # 37 Lat 42.3628917 Long -70.8944967 Time(UTC) 22:37:36	 22545470.jpg Station # 37 Lat 42.3629067 Long -70.894465 Time(UTC) 22:37:50	 22545499.jpg Station # 37 Lat 42.3629317 Long -70.8943967 Time(UTC) 22:38:19	 22545516.jpg Station # 37 Lat 42.3629467 Long -70.8943583 Time(UTC) 22:38:36

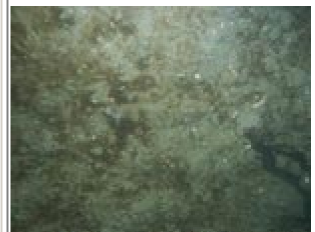
 22545536.jpg Station # 37 Lat 42.3629667 Long -70.8943117 Time(UTC) 22:38:56	 22545551.jpg Station # 37 Lat 42.3629833 Long -70.89428 Time(UTC) 22:39:11	 22545568.jpg Station # 37 Lat 42.3630067 Long -70.8942483 Time(UTC) 22:39:28	 22545583.jpg Station # 37 Lat 42.363025 Long -70.8942233 Time(UTC) 22:39:43	 22545613.jpg Station # 37 Lat 42.3630683 Long -70.89418 Time(UTC) 22:40:13
 22545647.jpg Station # 37 Lat 42.363115 Long -70.89412 Time(UTC) 22:40:47	 22545664.jpg Station # 37 Lat 42.3631367 Long -70.89409 Time(UTC) 22:41:04	 22545699.jpg Station # 37 Lat 42.3631833 Long -70.8940333 Time(UTC) 22:41:39	 22446886.jpg Station # 38 Lat 42.3501583 Long -70.9031033 Time(UTC) 19:14:46	 22446907.jpg Station # 38 Lat 42.350205 Long -70.903115 Time(UTC) 19:15:07
 22446919.jpg Station # 38	 22446958.jpg Station # 38	 22447008.jpg Station # 38	 22447036.jpg Station # 38	 22447081.jpg Station # 38

Lat 42.350235 Long -70.903125 Time(UTC) 19:15:19	Lat 42.3503283 Long -70.9031533 Time(UTC) 19:15:58	Lat 42.3504633 Long -70.9031833 Time(UTC) 19:16:48	Lat 42.35054 Long -70.9032 Time(UTC) 19:17:16	Lat 42.35066 Long -70.9031983 Time(UTC) 19:18:01
 22447127.jpg Station # 38 Lat 42.3507867 Long -70.90319 Time(UTC) 19:18:47	 22447162.jpg Station # 38 Lat 42.3508933 Long -70.9031883 Time(UTC) 19:19:22	 22596243.jpg Station # 39 Lat 42.3384633 Long -70.9075883 Time(UTC) 12:44:03	 22596267.jpg Station # 39 Lat 42.3384417 Long -70.9075617 Time(UTC) 12:44:27	 22596301.jpg Station # 39 Lat 42.3384083 Long -70.907535 Time(UTC) 12:45:01
 22596316.jpg Station # 39 Lat 42.3383983 Long -70.907525 Time(UTC) 12:45:16	 22596374.jpg Station # 39 Lat 42.3383617 Long -70.9074883 Time(UTC) 12:46:14	 22595440.jpg Station # 40 Lat 42.3368583 Long -70.9095033 Time(UTC) 12:30:40	 22595454.jpg Station # 40 Lat 42.3368617 Long -70.9095 Time(UTC) 12:30:54	 22595579.jpg Station # 40 Lat 42.3368733 Long -70.909475 Time(UTC) 12:32:59

22595604.jpg
Station # 40
Lat 42.3369967
Long -70.9094683
Time(UTC) 12:33:24

22595635.jpg
Station # 40
Lat 42.3371317
Long -70.909485
Time(UTC) 12:33:55

22595677.jpg
Station # 40
Lat 42.3372733
Long -70.9097033
Time(UTC) 12:34:37



22595722.jpg
Station # 40
Lat 42.3371633
Long -70.9101067
Time(UTC) 12:35:22

22595759.jpg
Station # 40
Lat 42.3369267
Long -70.9100883
Time(UTC) 12:35:59

22595775.jpg
Station # 40
Lat 42.33686
Long -70.9099817
Time(UTC) 12:36:15

22595796.jpg
Station # 40
Lat 42.3367983
Long -70.9098033
Time(UTC) 12:36:36

22595831.jpg
Station # 40
Lat 42.3367467
Long -70.9095517
Time(UTC) 12:37:11

22595860.jpg
Station # 40
Lat 42.3367033
Long -70.9095017
Time(UTC) 12:37:40

22595876.jpg
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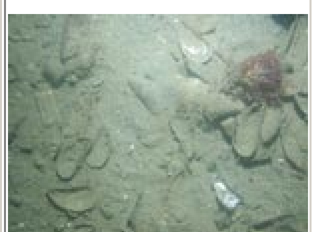
Long -70.90947
Time(UTC) 12:37:56



22595904.jpg
Station # 40

22595916.jpg
Station # 40

Lat 42.336615 Long -70.9094167 Time(UTC) 12:38:24	Lat 42.33659 Long -70.90938 Time(UTC) 12:38:36

Stations 41-60


22448117.jpg
Station # 41
Lat 42.35327
Long -70.9201717
Time(UTC) 19:35:17


22448135.jpg
Station # 41
Lat 42.3533167
Long -70.9201633
Time(UTC) 19:35:35


22448161.jpg
Station # 41
Lat 42.3534067
Long -70.920135
Time(UTC) 19:36:01


22448186.jpg
Station # 41
Lat 42.3534917
Long -70.9201067
Time(UTC) 19:36:26


22448271.jpg
Station # 41
Lat 42.353775
Long -70.9199767
Time(UTC) 19:37:51


22448356.jpg
Station # 41
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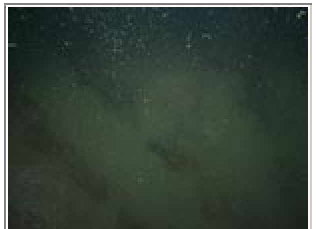
Long -70.9198333
Time(UTC) 19:39:16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Station # 41
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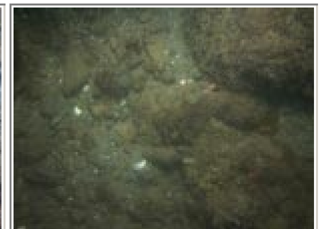
Time(UTC) 19:40:22


22448494.jpg
Station # 41
Lat 42.35476
Long -70.9199317
Time(UTC) 19:41:34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Long -70.9199917
Time(UTC) 19:41:47


22448534.jpg
Station # 41
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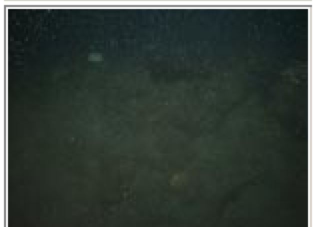
Long -70.9201283
Time(UTC) 19:42:14


22448553.jpg
Station # 41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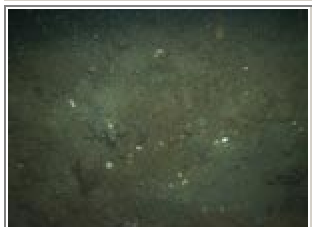
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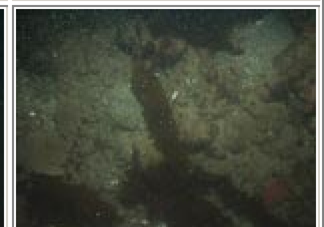
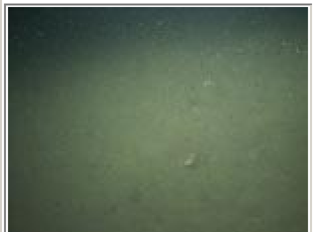
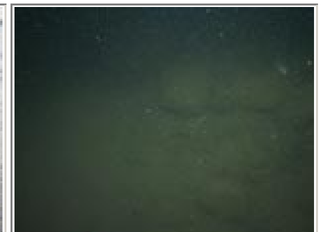
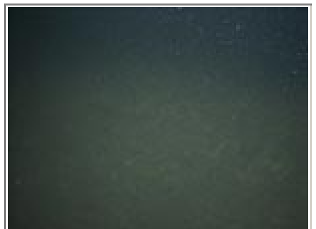
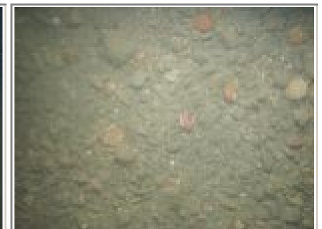
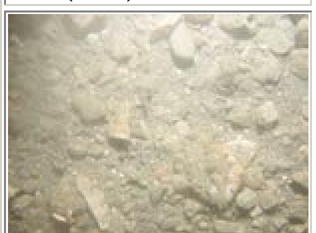
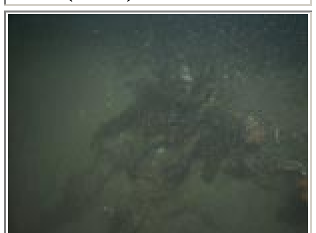
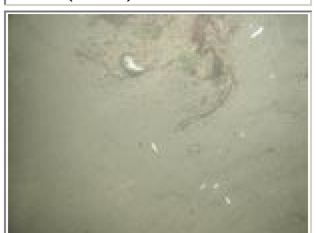
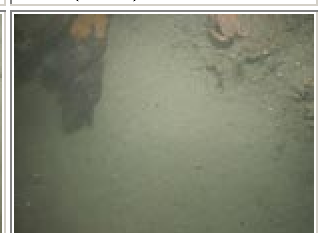
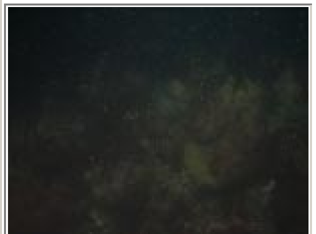
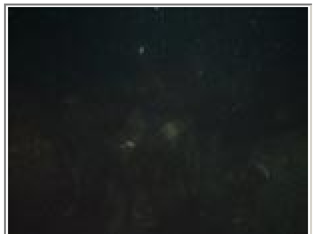
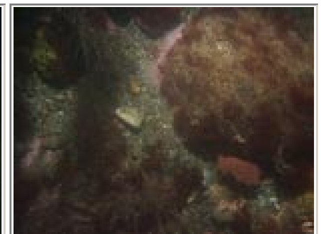
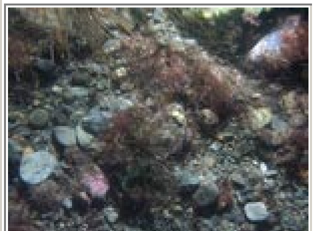
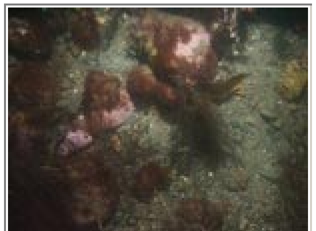
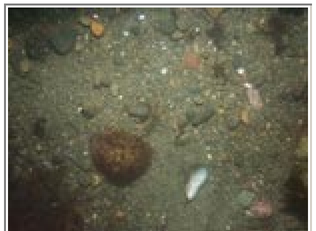
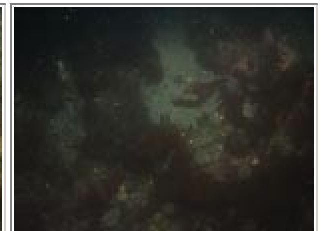
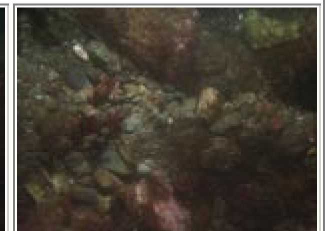
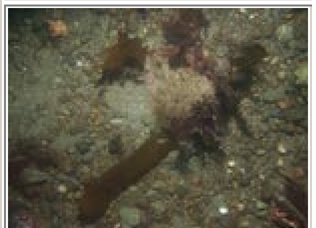
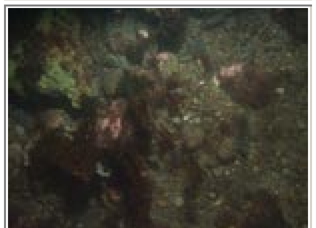
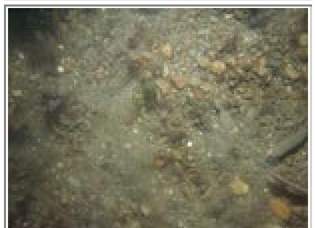
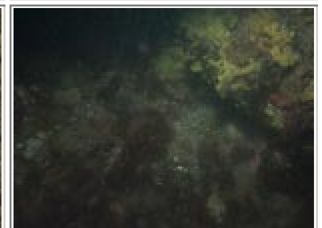
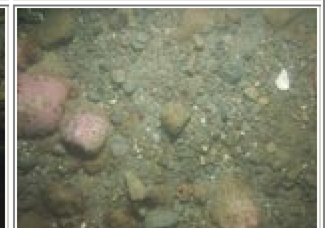
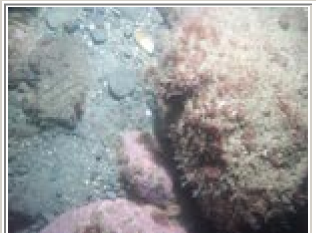
Station # 41


22448680.jpg
Station # 41


22448714.jpg
Station # 41

Lat 42.3549467 Long -70.9202467 Time(UTC) 19:42:33	Lat 42.35509 Long -70.9204267 Time(UTC) 19:43:05	Lat 42.3552783 Long -70.920555 Time(UTC) 19:43:37	Lat 42.35549 Long -70.9208967 Time(UTC) 19:44:40	Lat 42.3556283 Long -70.9210867 Time(UTC) 19:45:14
 22450103.jpg Station # 43 Lat 42.3641083 Long -70.924725 Time(UTC) 20:08:23	 22450116.jpg Station # 43 Lat 42.364175 Long -70.924725 Time(UTC) 20:08:36	 22450174.jpg Station # 43 Lat 42.3644633 Long -70.9247067 Time(UTC) 20:09:34	 22450205.jpg Station # 43 Lat 42.3646233 Long -70.924695 Time(UTC) 20:10:05	 22450355.jpg Station # 43 Lat 42.365465 Long -70.92462 Time(UTC) 20:12:35
 22450367.jpg Station # 43 Lat 42.3655383 Long -70.9246183 Time(UTC) 20:12:47	 22450411.jpg Station # 43 Lat 42.3657933 Long -70.9245717 Time(UTC) 20:13:31	 22598231.jpg Station # 44 Lat 42.3465317 Long -70.936735 Time(UTC) 13:17:11	 22598301.jpg Station # 44 Lat 42.3462267 Long -70.936865 Time(UTC) 13:18:21	 22598340.jpg Station # 44 Lat 42.3460667 Long -70.9369533 Time(UTC) 13:19:00
 22598364.jpg Station # 44 Lat 42.34597 Long -70.9370133	 22598813.jpg Station # 45 Lat 42.34138 Long -70.9474833	 22598843.jpg Station # 45 Lat 42.3413433 Long -70.9475733	 22598871.jpg Station # 45 Lat 42.3413083 Long -70.947655	 22598957.jpg Station # 45 Lat 42.3412317 Long -70.9479083

Time(UTC) 13:19:24	Time(UTC) 13:26:53	Time(UTC) 13:27:23	Time(UTC) 13:27:51	Time(UTC) 13:29:17
 22452026.jpg Station # 46 Lat 42.3647967 Long -70.9427883 Time(UTC) 20:40:26	 22452054.jpg Station # 46 Lat 42.3648567 Long -70.9428267 Time(UTC) 20:40:54	 22452083.jpg Station # 46 Lat 42.3649133 Long -70.9428533 Time(UTC) 20:41:23	 22452109.jpg Station # 46 Lat 42.3649583 Long -70.94288 Time(UTC) 20:41:49	 22452131.jpg Station # 46 Lat 42.364985 Long -70.9429083 Time(UTC) 20:42:11
 22452163.jpg Station # 46 Lat 42.3650183 Long -70.94295 Time(UTC) 20:42:43	 22452210.jpg Station # 46 Lat 42.365065 Long -70.9429833 Time(UTC) 20:43:30	 22452237.jpg Station # 46 Lat 42.3650883 Long -70.9429717 Time(UTC) 20:43:57	 22452299.jpg Station # 46 Lat 42.365145 Long -70.943055 Time(UTC) 20:44:59	 22452315.jpg Station # 46 Lat 42.3651667 Long -70.9430783 Time(UTC) 20:45:15
 22452356.jpg Station # 46 Lat 42.3652117 Long -70.943145 Time(UTC) 20:45:56	 22452381.jpg Station # 46 Lat 42.3652383 Long -70.9431817 Time(UTC) 20:46:21	 22452410.jpg Station # 46 Lat 42.3652683 Long -70.9432267 Time(UTC) 20:46:50	 22452475.jpg Station # 46 Lat 42.3653433 Long -70.9433333 Time(UTC) 20:47:55	 22452892.jpg Station # 47 Lat 42.3668667 Long -70.9335417 Time(UTC) 20:54:52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Time(UTC) 20:55:17


22452945.jpg
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22452965.jpg
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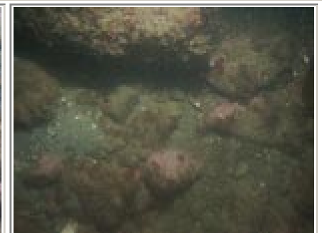
Time(UTC) 20:56:05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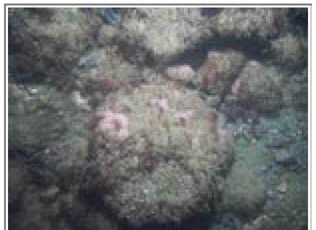
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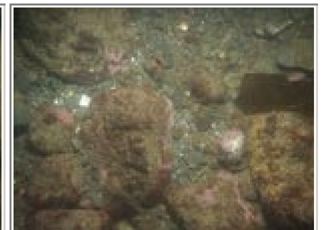
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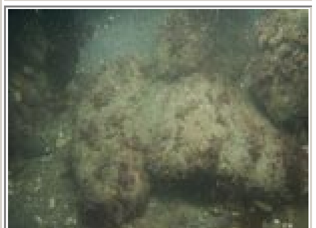
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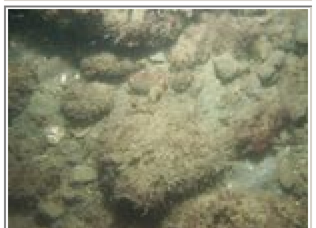
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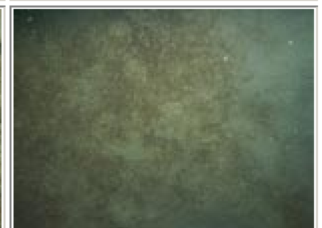
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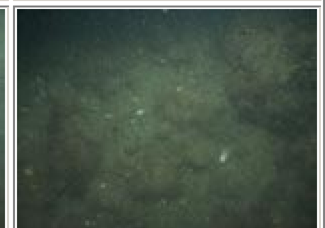
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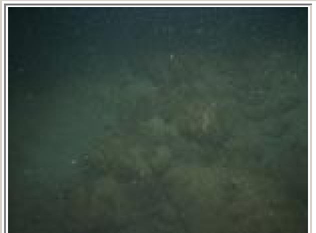

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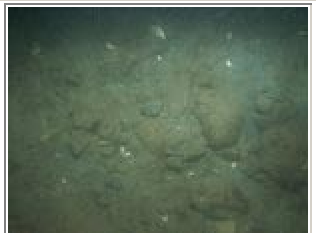

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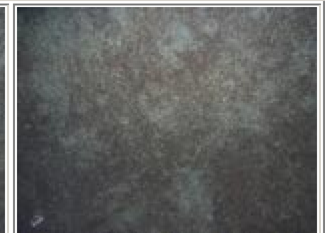

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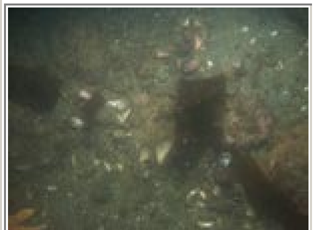

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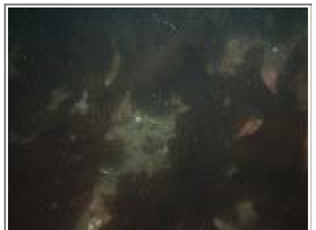

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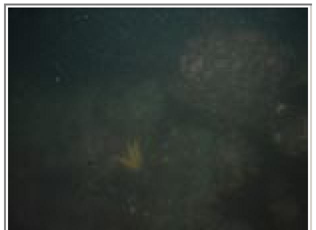

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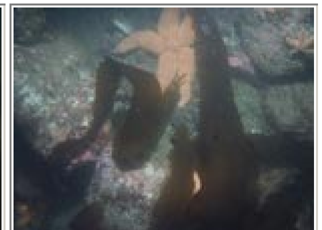

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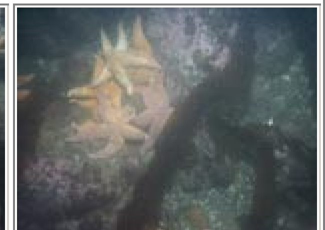
Time(UTC) 19:57:24



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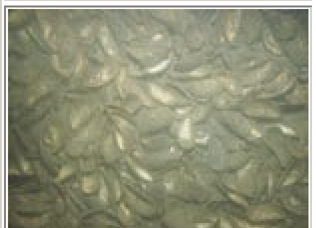

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Time(UTC) 13:02:05

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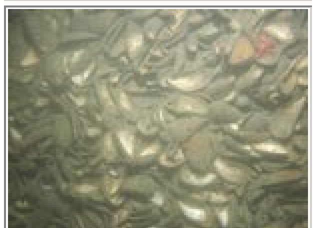

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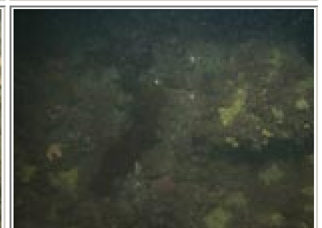

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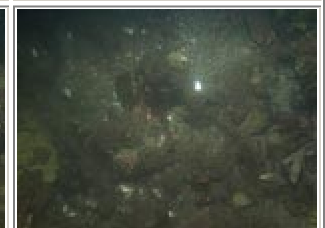

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Time(UTC) 13:08:15

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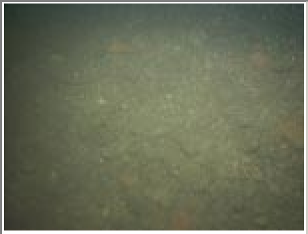
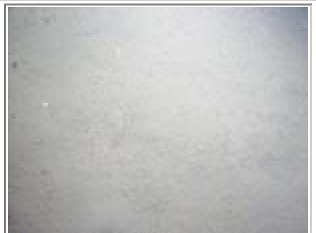
 22600447.jpg Station # 53 Lat 42.336215 Long -70.97274 Time(UTC) 13:54:07	 22599674.jpg Station # 54 Lat 42.33439 Long -70.9600583 Time(UTC) 13:41:14	 22599744.jpg Station # 54 Lat 42.33435 Long -70.9605233 Time(UTC) 13:42:24	 22599779.jpg Station # 54 Lat 42.3343267 Long -70.96075 Time(UTC) 13:42:59	 22599834.jpg Station # 54 Lat 42.3342917 Long -70.9611117 Time(UTC) 13:43:54

 22362410.jpg Station # 55 Lat 42.316715 Long -70.93544 Time(UTC) 19:46:50	 22362451.jpg Station # 55 Lat 42.31679 Long -70.9355017 Time(UTC) 19:47:31	 22362473.jpg Station # 55 Lat 42.31683 Long -70.935535 Time(UTC) 19:47:53	 22362487.jpg Station # 55 Lat 42.3168533 Long -70.93555 Time(UTC) 19:48:07	 22362548.jpg Station # 55 Lat 42.3169583 Long -70.9356 Time(UTC) 19:49:08
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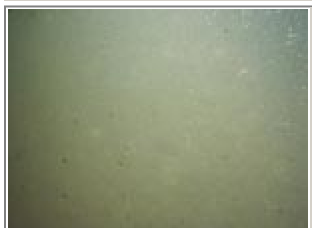
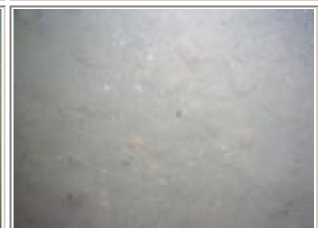
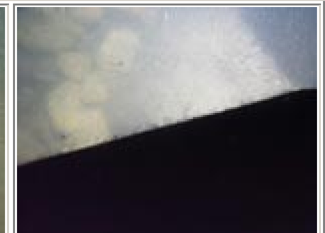
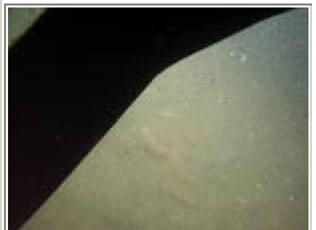
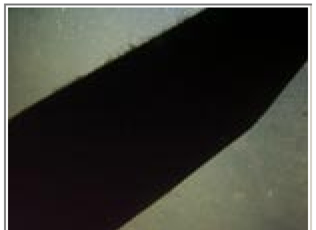
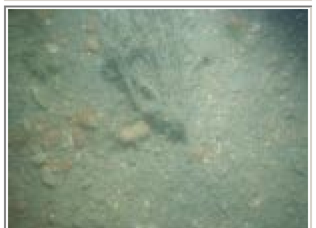
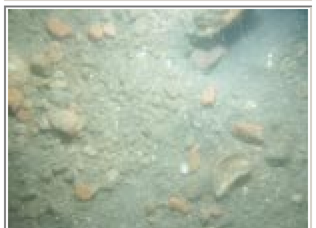
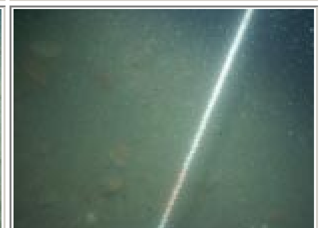
 22366192.jpg Station # 56 Lat 42.315435 Long -70.9575717 Time(UTC) 20:49:52	 22366211.jpg Station # 56 Lat 42.31549 Long -70.9575717 Time(UTC) 20:50:11	 22366264.jpg Station # 56 Lat 42.3156667 Long -70.9575733 Time(UTC) 20:51:04	 22366295.jpg Station # 56 Lat 42.3157683 Long -70.9575683 Time(UTC) 20:51:35	 22366338.jpg Station # 56 Lat 42.315925 Long -70.9575533 Time(UTC) 20:52:18

 22366452.jpg Station # 56 Lat 42.3163 Long -70.9574217 Time(UTC) 20:54:12	 22366541.jpg Station # 56 Lat 42.3165083 Long -70.9573017 Time(UTC) 20:55:41	 22363448.jpg Station # 57 Lat 42.3229317 Long -70.93587 Time(UTC) 20:04:08	 22363495.jpg Station # 57 Lat 42.3229733 Long -70.935775 Time(UTC) 20:04:55	 22363525.jpg Station # 57 Lat 42.3230017 Long -70.9357217 Time(UTC) 20:05:25
 22363559.jpg Station # 57 Lat 42.3230417 Long -70.9356633 Time(UTC) 20:05:59	 22363591.jpg Station # 57 Lat 42.3230767 Long -70.9356133 Time(UTC) 20:06:31	 22363608.jpg Station # 57 Lat 42.323095 Long -70.935585 Time(UTC) 20:06:48	 22371593.jpg Station # 58 Lat 42.304005 Long -70.9425333 Time(UTC) 22:19:53	 22371623.jpg Station # 58 Lat 42.3040633 Long -70.9425483 Time(UTC) 22:20:23
 22371650.jpg Station # 58 Lat 42.304095 Long -70.9425717 Time(UTC) 22:20:50	 22371678.jpg Station # 58 Lat 42.3041467 Long -70.9425917 Time(UTC) 22:21:18	 22371727.jpg Station # 58 Lat 42.3042133 Long -70.94264 Time(UTC) 22:22:07	 22371769.jpg Station # 58 Lat 42.3042983 Long -70.9426667 Time(UTC) 22:22:49	 22371801.jpg Station # 58 Lat 42.3043417 Long -70.94271 Time(UTC) 22:23:21

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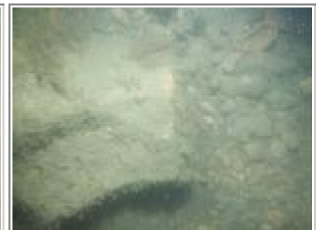
 22373997.jpg Station # 59 Lat 42.29364 Long -70.91803 Time(UTC) 22:59:57	 22374063.jpg Station # 59 Lat 42.2936683 Long -70.9181883 Time(UTC) 23:01:03	 22374153.jpg Station # 59 Lat 42.2937017 Long -70.9183633 Time(UTC) 23:02:33	 22374185.jpg Station # 59 Lat 42.2937233 Long -70.918425 Time(UTC) 23:03:05	 22374203.jpg Station # 59 Lat 42.2937333 Long -70.918455 Time(UTC) 23:03:23
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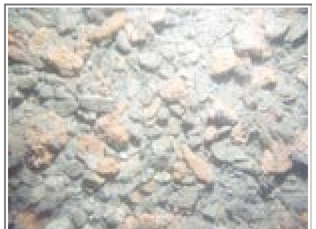
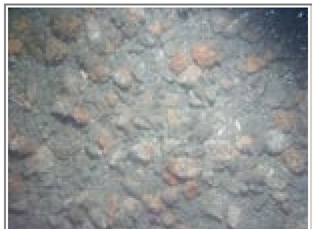
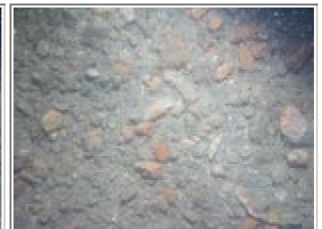
22373158.jpg Station # 60 Lat 42.2973833 Long -70.9146533 Time(UTC) 22:45:58	22373189.jpg Station # 60 Lat 42.2974467 Long -70.9145617 Time(UTC) 22:46:29	22373223.jpg Station # 60 Lat 42.2975 Long -70.9144667 Time(UTC) 22:47:03	22373248.jpg Station # 60 Lat 42.2975283 Long -70.9143933 Time(UTC) 22:47:28	22373288.jpg Station # 60 Lat 42.2975717 Long -70.9143383 Time(UTC) 22:48:08

Stations 61-80

 22626089.jpg Station # 61 Lat 42.290215 Long -70.92409 Time(UTC) 21:01:29	 22626103.jpg Station # 61 Lat 42.2902267 Long -70.9241133 Time(UTC) 21:01:43	 22626136.jpg Station # 61 Lat 42.2902617 Long -70.9241633 Time(UTC) 21:02:16	 22626159.jpg Station # 61 Lat 42.29029 Long -70.9241933 Time(UTC) 21:02:39	 22626181.jpg Station # 61 Lat 42.2903233 Long -70.9242167 Time(UTC) 21:03:01
 22626197.jpg Station # 61 Lat 42.2903467 Long -70.9242317 Time(UTC) 21:03:17	 22361234.jpg Station # 62 Lat 42.3136117 Long -70.9202317 Time(UTC) 19:27:14	 22361248.jpg Station # 62 Lat 42.3136367 Long -70.9201983 Time(UTC) 19:27:28	 22361360.jpg Station # 62 Lat 42.3137933 Long -70.91992 Time(UTC) 19:29:20	 22361405.jpg Station # 62 Lat 42.31384 Long -70.9197883 Time(UTC) 19:30:05
 22361456.jpg Station # 62	 22361481.jpg Station # 62	 22361495.jpg Station # 62	 22361559.jpg Station # 62	 22367382.jpg Station # 63

Lat 42.31388 Long -70.9195983 Time(UTC) 19:30:56	Lat 42.313895 Long -70.9195133 Time(UTC) 19:31:21	Lat 42.31391 Long -70.9194633 Time(UTC) 19:31:35	Lat 42.3139733 Long -70.9193083 Time(UTC) 19:32:39	Lat 42.304285 Long -70.9662233 Time(UTC) 21:09:42
 22367412.jpg Station # 63 Lat 42.3043267 Long -70.9662783 Time(UTC) 21:10:12	 22367466.jpg Station # 63 Lat 42.3044317 Long -70.9663467 Time(UTC) 21:11:06	 22367599.jpg Station # 63 Lat 42.3047617 Long -70.96649 Time(UTC) 21:13:19	 22364865.jpg Station # 64 Lat 42.314575 Long -70.9430833 Time(UTC) 20:27:45	 22364920.jpg Station # 64 Lat 42.3146333 Long -70.943245 Time(UTC) 20:28:40
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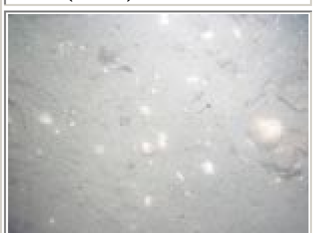
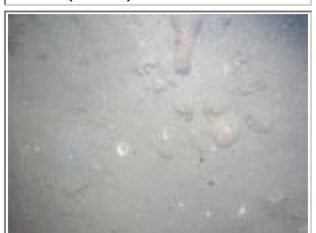
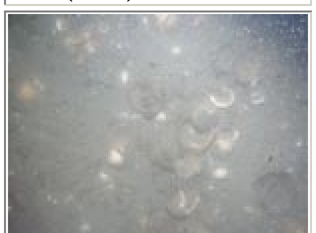
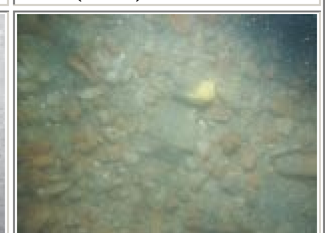
 22365251.jpg Station # 64 Lat 42.3155067 Long -70.944165	 22365274.jpg Station # 64 Lat 42.3155317 Long -70.9442167	 22365306.jpg Station # 64 Lat 42.3155517 Long -70.9442967	 22365330.jpg Station # 64 Lat 42.3155583 Long -70.9443717	 22369878.jpg Station # 65 Lat 42.29252 Long -70.9564267

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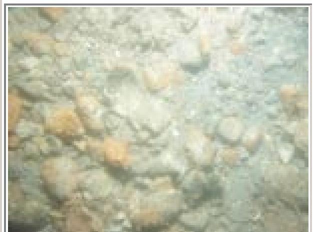
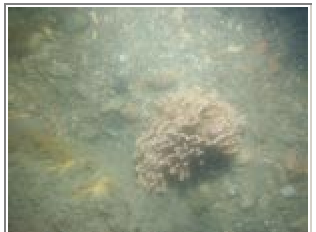
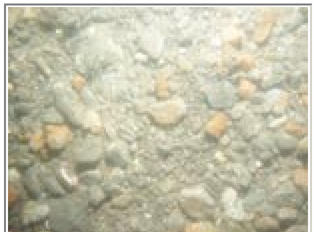
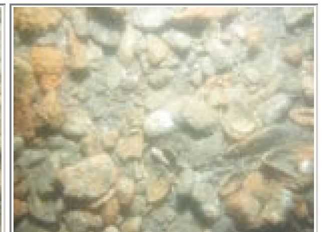
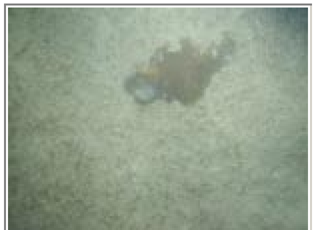
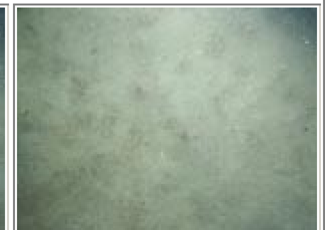
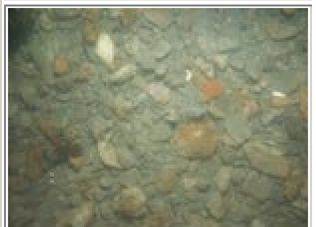
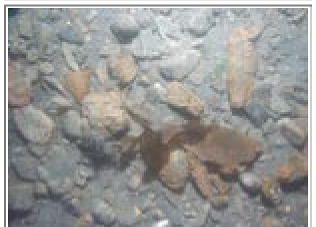
 22369929.jpg Station # 65 Lat 42.2927283 Long -70.95635 Time(UTC) 21:52:09	 22369953.jpg Station # 65 Lat 42.2928367 Long -70.9563017 Time(UTC) 21:52:33	 22369993.jpg Station # 65 Lat 42.2929767 Long -70.95625 Time(UTC) 21:53:13	 22370014.jpg Station # 65 Lat 42.2930267 Long -70.9562533 Time(UTC) 21:53:34	 22370128.jpg Station # 65 Lat 42.2932533 Long -70.95631 Time(UTC) 21:55:28
 22370198.jpg Station # 65 Lat 42.2933717 Long -70.95637 Time(UTC) 21:56:38	 22370255.jpg Station # 65 Lat 42.2934667 Long -70.9564267 Time(UTC) 21:57:35	 22370968.jpg Station # 66 Lat 42.2966467 Long -70.9409783 Time(UTC) 22:09:28	 22370983.jpg Station # 66 Lat 42.2966333 Long -70.9410417 Time(UTC) 22:09:43	 22371032.jpg Station # 66 Lat 42.2965733 Long -70.9412517 Time(UTC) 22:10:32
 22624472.jpg Station # 67 Lat 42.2821483 Long -70.94431 Time(UTC) 20:34:32	 22624486.jpg Station # 67 Lat 42.2821633 Long -70.9443517 Time(UTC) 20:34:46	 22624508.jpg Station # 67 Lat 42.28219 Long -70.9444167 Time(UTC) 20:35:08	 22624540.jpg Station # 67 Lat 42.2822317 Long -70.944515 Time(UTC) 20:35:40	 22624564.jpg Station # 67 Lat 42.2822667 Long -70.9445917 Time(UTC) 20:36:04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Time(UTC) 20:36:33


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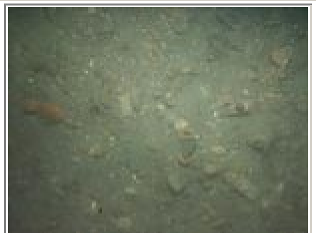
Time(UTC) 20:37:12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Time(UTC) 21:30:44


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Time(UTC) 21:32:28


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Time(UTC) 21:33:09


22368840.jpg
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Time(UTC) 21:34:00


22625300.jpg
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Time(UTC) 20:48:20


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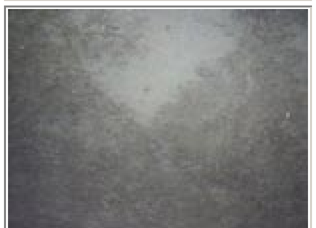
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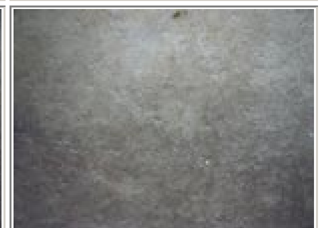
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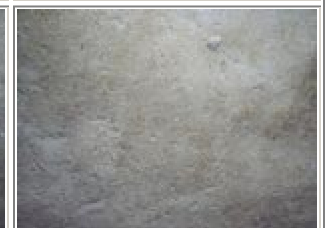
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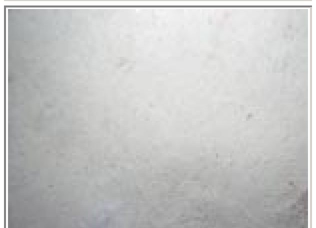
 22614812.jpg Station # 70 Lat 42.3330667 Long -70.98763 Time(UTC) 17:53:32	 22614831.jpg Station # 70 Lat 42.3330783 Long -70.9876667 Time(UTC) 17:53:51	 22614872.jpg Station # 70 Lat 42.333105 Long -70.98775 Time(UTC) 17:54:32	 22614887.jpg Station # 70 Lat 42.33312 Long -70.98778 Time(UTC) 17:54:47	 22614911.jpg Station # 70 Lat 42.3331433 Long -70.9878283 Time(UTC) 17:55:11
 22614932.jpg Station # 70 Lat 42.3331667 Long -70.9878683 Time(UTC) 17:55:32	 22615467.jpg Station # 71 Lat 42.3319583 Long -70.9962483 Time(UTC) 18:04:27	 22615486.jpg Station # 71 Lat 42.3319817 Long -70.996265 Time(UTC) 18:04:46	 22615505.jpg Station # 71 Lat 42.3320017 Long -70.996285 Time(UTC) 18:05:05	 22615526.jpg Station # 71 Lat 42.332025 Long -70.99631 Time(UTC) 18:05:26


22615595.jpg
Station # 71
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Long -70.9964333
Time(UTC) 18:06:35


22615621.jpg
Station # 71
Lat 42.332165
Long -70.9964733
Time(UTC) 18:07:01


22543792.jpg
Station # 72
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Long -70.9110733
Time(UTC) 22:09:52


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Time(UTC) 22:10:06


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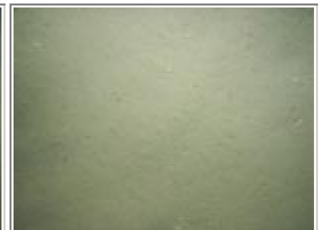
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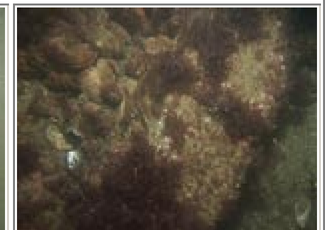
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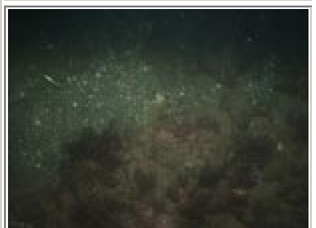
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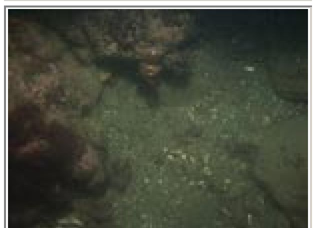
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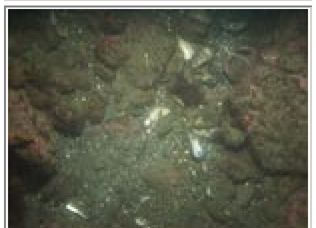
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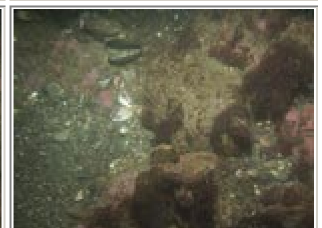
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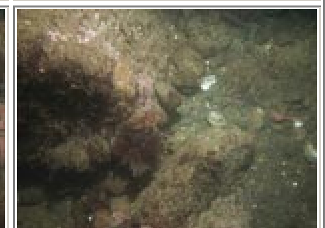
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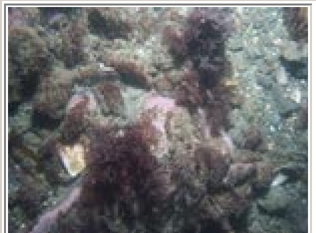
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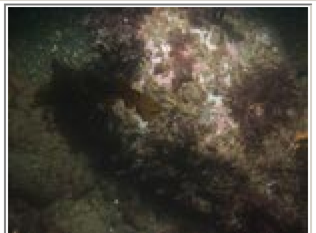
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22454586.jpg
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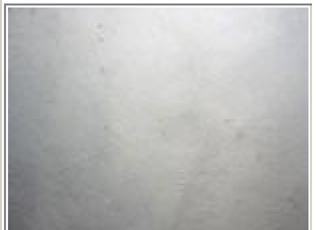
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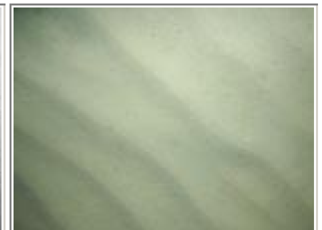
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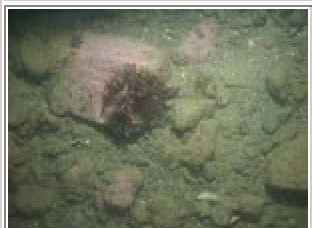
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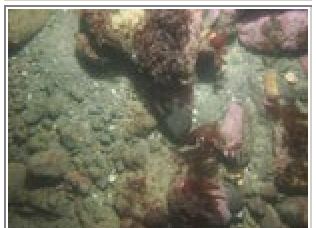
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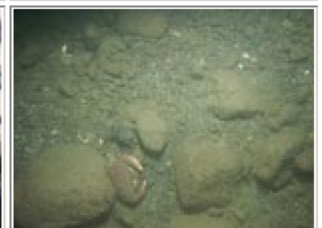
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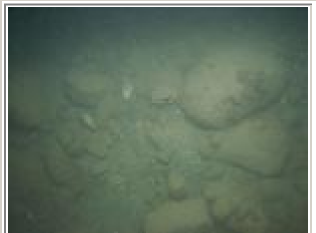
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22455930.jpg
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Time(UTC) 21:45:30


22455954.jpg
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Time(UTC) 21:45:54


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Time(UTC) 21:47:44


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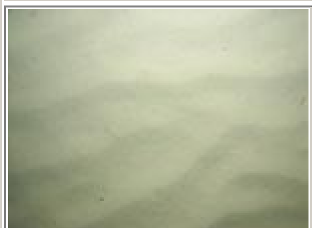
Time(UTC) 21:53:50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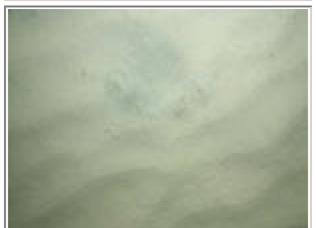
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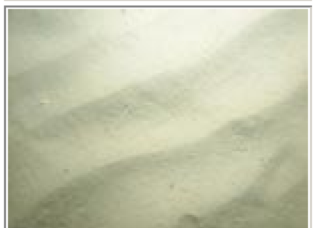
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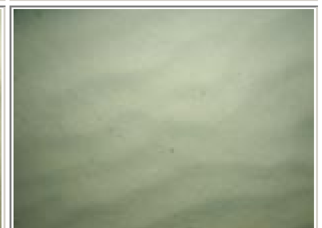
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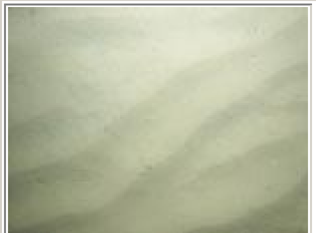
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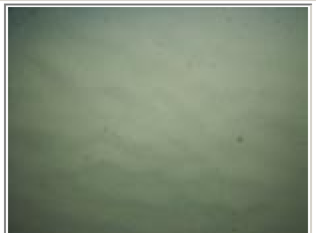
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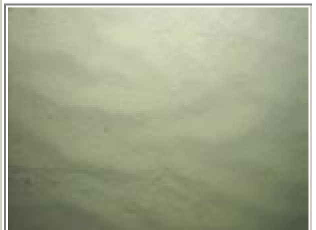
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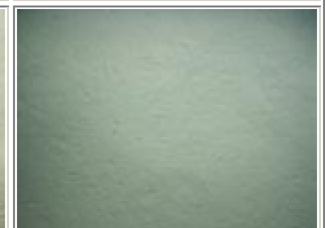
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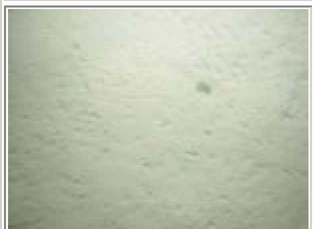
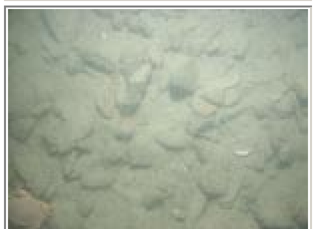
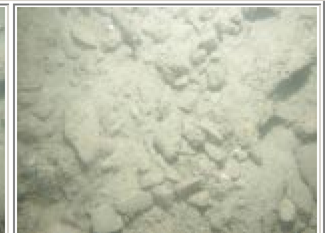
 22525616.jpg Station # 79 Lat 42.3981617 Long -70.8859567 Time(UTC) 17:06:56	 22524749.jpg Station # 80 Lat 42.3946017 Long -70.8853267 Time(UTC) 16:52:29	 22524769.jpg Station # 80 Lat 42.394615 Long -70.8853817 Time(UTC) 16:52:49	 22524814.jpg Station # 80 Lat 42.3946567 Long -70.8855 Time(UTC) 16:53:34	 22524829.jpg Station # 80 Lat 42.3946667 Long -70.8855417 Time(UTC) 16:53:49

 22524847.jpg Station # 80 Lat 42.3946783 Long -70.8855917 Time(UTC) 16:54:07	 22524867.jpg Station # 80 Lat 42.3946983 Long -70.88564 Time(UTC) 16:54:27	 22524918.jpg Station # 80 Lat 42.3947567 Long -70.8857783 Time(UTC) 16:55:18	 22524951.jpg Station # 80 Lat 42.3947867 Long -70.88587 Time(UTC) 16:55:51	 22524974.jpg Station # 80 Lat 42.394805 Long -70.8859333 Time(UTC) 16:56:14
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Stations 81-100


22457644.jpg
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Time(UTC) 22:14:04


22457656.jpg
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Lat 42.3886517
Long -70.9397717
Time(UTC) 22:14:16


22457707.jpg
Station # 81
Lat 42.3887
Long -70.93974
Time(UTC) 22:15:07


22457735.jpg
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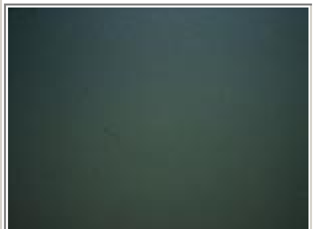
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Time(UTC) 22:17:03


22457868.jpg
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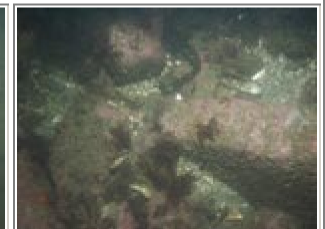
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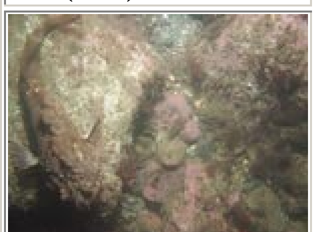
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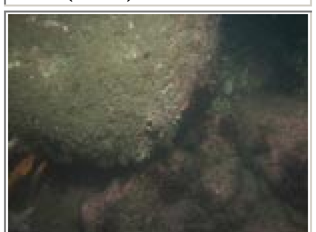
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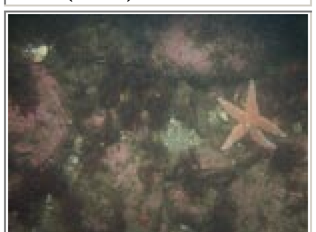
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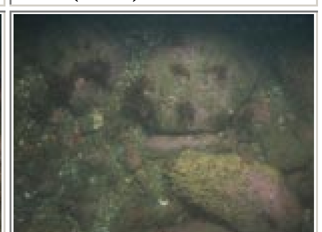
Lat 42.4061067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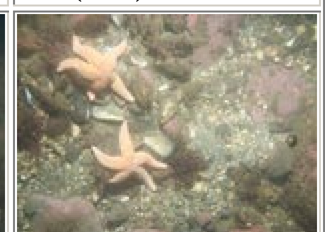
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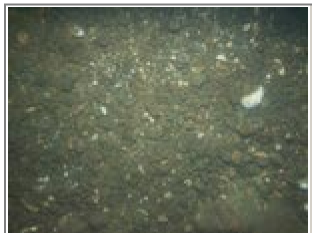
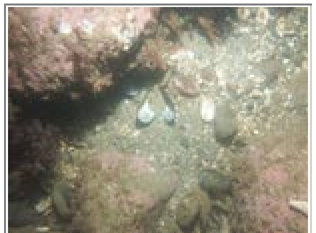
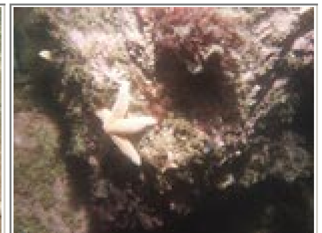
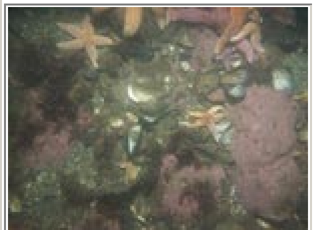
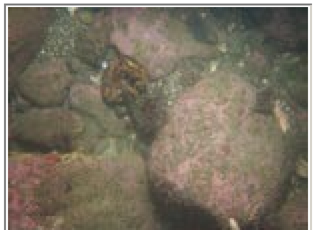
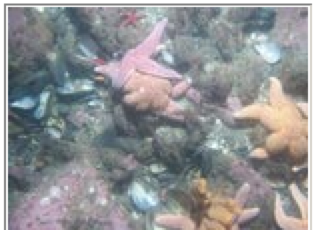
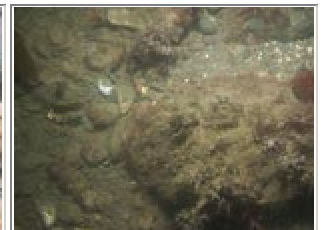
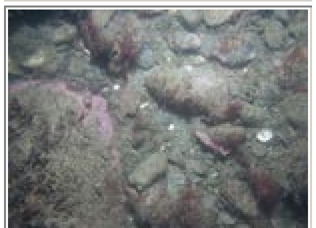
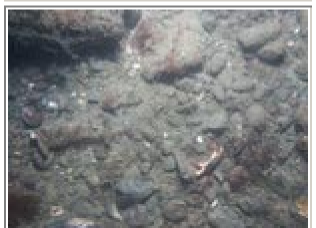
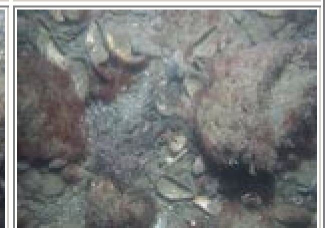
Long -70.9140133 Time(UTC) 17:46:30	Long -70.9140333 Time(UTC) 17:46:41	Long -70.9141017 Time(UTC) 17:47:29	Long -70.9141633 Time(UTC) 17:48:22	Long -70.9142367 Time(UTC) 17:49:12
 22528170.jpg Station # 82 Lat 42.4062983 Long -70.9142633 Time(UTC) 17:49:30	 22528196.jpg Station # 82 Lat 42.4063333 Long -70.9143 Time(UTC) 17:49:56	 22528227.jpg Station # 82 Lat 42.4063733 Long -70.9143467 Time(UTC) 17:50:27	 22528247.jpg Station # 82 Lat 42.4064017 Long -70.9143767 Time(UTC) 17:50:47	 22528268.jpg Station # 82 Lat 42.4064267 Long -70.9144083 Time(UTC) 17:51:08
 22528290.jpg Station # 82 Lat 42.4064533 Long -70.91444 Time(UTC) 17:51:30	 22528312.jpg Station # 82 Lat 42.4064817 Long -70.9144683 Time(UTC) 17:51:52	 22528329.jpg Station # 82 Lat 42.4065033 Long -70.91449 Time(UTC) 17:52:09	 22539629.jpg Station # 83 Lat 42.4060133 Long -70.94394 Time(UTC) 21:00:29	 22539651.jpg Station # 83 Lat 42.4060383 Long -70.9439483 Time(UTC) 21:00:51
 22539675.jpg Station # 83 Lat 42.4060633 Long -70.9439367 Time(UTC) 21:01:15	 22539698.jpg Station # 83 Lat 42.406085 Long -70.94392 Time(UTC) 21:01:38	 22539729.jpg Station # 83 Lat 42.4061083 Long -70.9438933 Time(UTC) 21:02:09	 22539771.jpg Station # 83 Lat 42.4061283 Long -70.9438533 Time(UTC) 21:02:51	 22539807.jpg Station # 83 Lat 42.4061367 Long -70.9438233 Time(UTC) 21:03:27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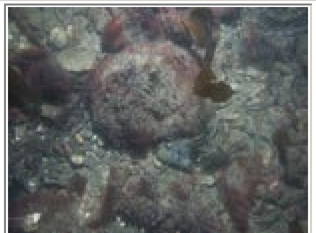
Time(UTC) 21:04:00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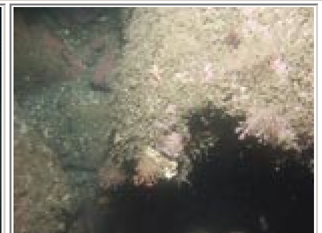
Time(UTC) 17:34:00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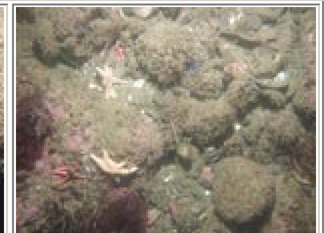
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Time(UTC) 17:34:44


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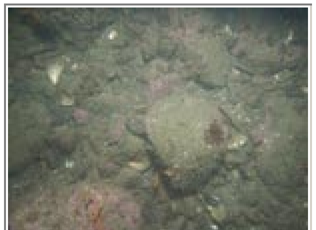
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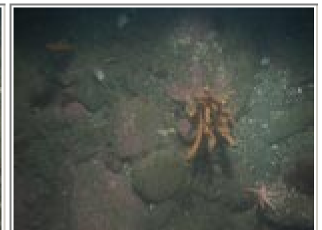
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22528986.jpg
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Time(UTC) 18:03:06


22529033.jpg
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Time(UTC) 18:03:53


22529055.jpg
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Time(UTC) 18:04:15


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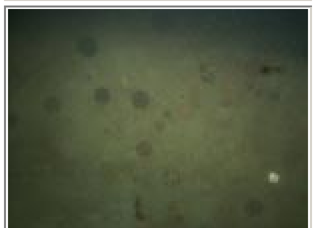
 22538974.jpg Station # 86 Lat 42.4097967 Long -70.9328283 Time(UTC) 20:49:34	 22538992.jpg Station # 86 Lat 42.4098 Long -70.9327933 Time(UTC) 20:49:52	 22539031.jpg Station # 86 Lat 42.4098133 Long -70.9327283 Time(UTC) 20:50:31	 22539050.jpg Station # 86 Lat 42.4098233 Long -70.9327017 Time(UTC) 20:50:50	 22539092.jpg Station # 86 Lat 42.409845 Long -70.93264 Time(UTC) 20:51:32
 22539127.jpg Station # 86 Lat 42.4098633 Long -70.9325933 Time(UTC) 20:52:07	 22538062.jpg Station # 87 Lat 42.4145133 Long -70.9461383 Time(UTC) 20:34:22	 22538081.jpg Station # 87 Lat 42.4145 Long -70.9460717 Time(UTC) 20:34:41	 22538101.jpg Station # 87 Lat 42.4144867 Long -70.9460033 Time(UTC) 20:35:01	 22538121.jpg Station # 87 Lat 42.4144767 Long -70.9459483 Time(UTC) 20:35:21

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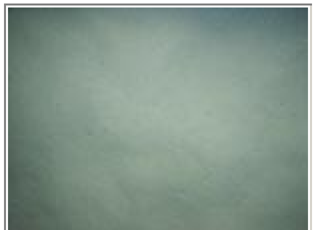
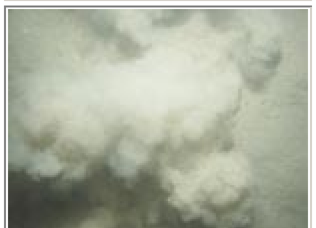
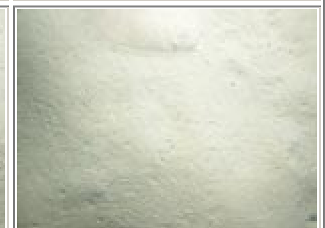
 22538236.jpg Station # 87 Lat 42.41445 Long -70.9457233 Time(UTC) 20:37:16	 22538249.jpg Station # 87 Lat 42.4144467 Long -70.9457067 Time(UTC) 20:37:29	 22530032.jpg Station # 88 Lat 42.4152017 Long -70.8849017 Time(UTC) 18:20:32	 22530043.jpg Station # 88 Lat 42.4152233 Long -70.8849133 Time(UTC) 18:20:43	 22530062.jpg Station # 88 Lat 42.4152617 Long -70.88493 Time(UTC) 18:21:02
 22530086.jpg Station # 88 Lat 42.4153083 Long -70.8849533 Time(UTC) 18:21:26	 22530104.jpg Station # 88 Lat 42.4153417 Long -70.88497 Time(UTC) 18:21:44	 22530150.jpg Station # 88 Lat 42.4154317 Long -70.88501 Time(UTC) 18:22:30	 22530198.jpg Station # 88 Lat 42.415535 Long -70.8850517 Time(UTC) 18:23:18	 22530224.jpg Station # 88 Lat 42.4155917 Long -70.8850683 Time(UTC) 18:23:44

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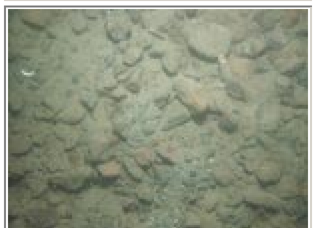
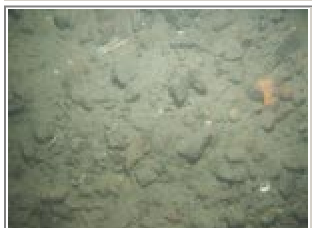
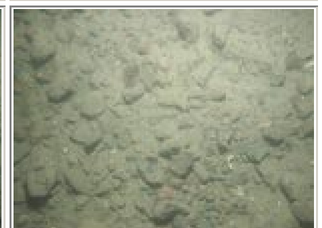
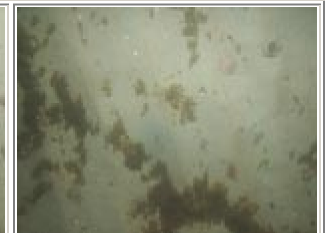
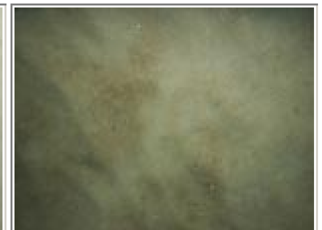
 22531349.jpg Station # 89 Lat 42.430935 Long -70.89666 Time(UTC) 18:42:29	 22531362.jpg Station # 89 Lat 42.4309517 Long -70.8966683 Time(UTC) 18:42:42	 22531405.jpg Station # 89 Lat 42.4310067 Long -70.8966917 Time(UTC) 18:43:25	 22531425.jpg Station # 89 Lat 42.43103 Long -70.8967033 Time(UTC) 18:43:45	 22531471.jpg Station # 89 Lat 42.4310917 Long -70.89673 Time(UTC) 18:44:31

 22531516.jpg Station # 89 Lat 42.43115 Long -70.896755 Time(UTC) 18:45:16	 22532106.jpg Station # 90 Lat 42.4330117 Long -70.9129 Time(UTC) 18:55:06	 22532122.jpg Station # 90 Lat 42.4330267 Long -70.912935 Time(UTC) 18:55:22	 22532188.jpg Station # 90 Lat 42.4330883 Long -70.9130183 Time(UTC) 18:56:28	 22532215.jpg Station # 90 Lat 42.433105 Long -70.913045 Time(UTC) 18:56:55
 22532227.jpg Station # 90 Lat 42.4331133 Long -70.91306 Time(UTC) 18:57:07	 22532279.jpg Station # 90 Lat 42.433135 Long -70.9131167 Time(UTC) 18:57:59	 22532360.jpg Station # 90 Lat 42.4331583 Long -70.9132117 Time(UTC) 18:59:20	 22540325.jpg Station # 91 Lat 42.4014433 Long -70.9542667 Time(UTC) 21:12:05	 22540351.jpg Station # 91 Lat 42.4014 Long -70.9542717 Time(UTC) 21:12:31
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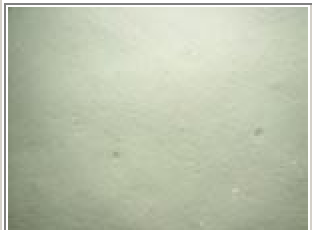
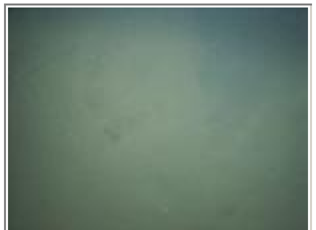
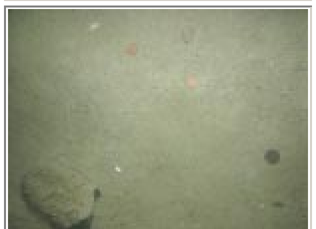
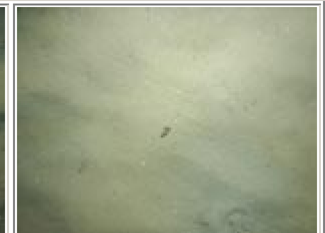
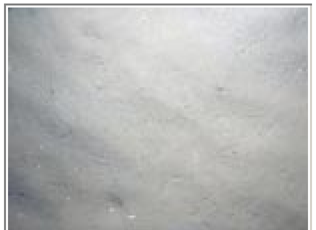
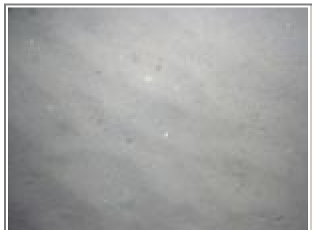
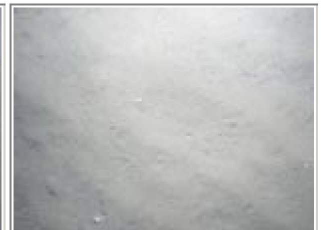
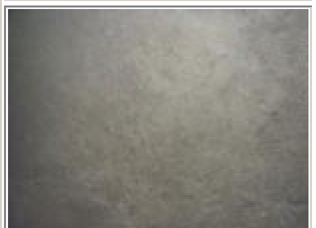
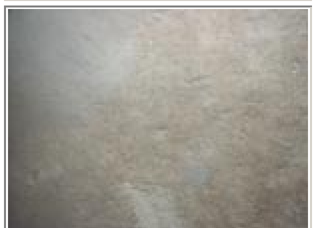
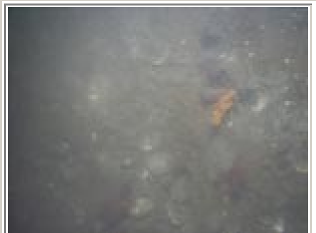
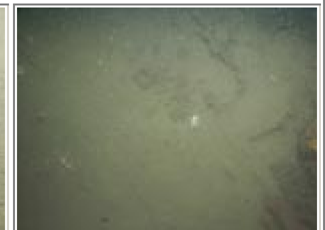
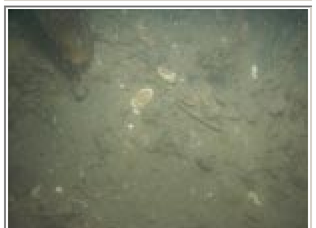
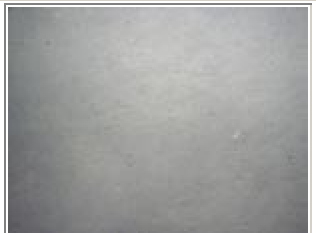
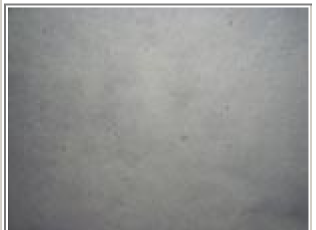
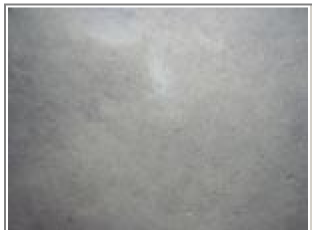
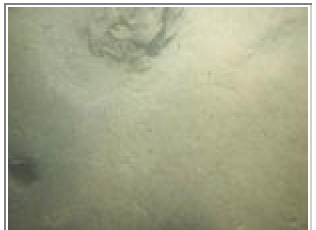
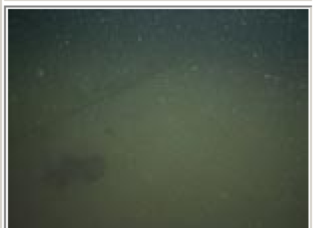
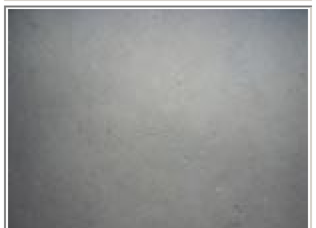
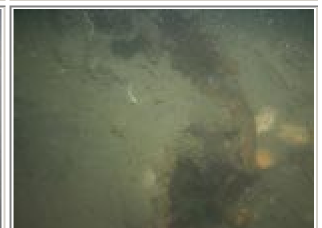
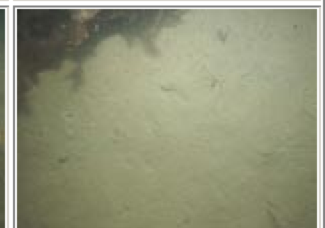
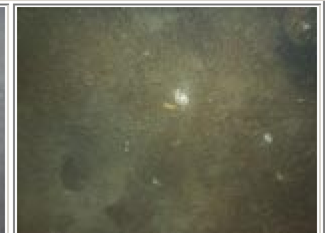
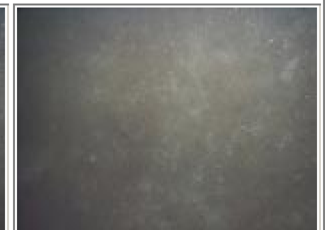
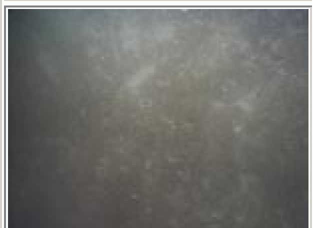
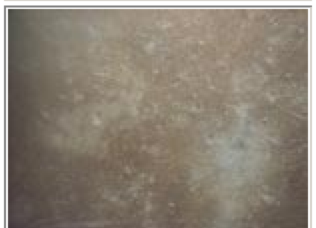
 22523748.jpg Station # 92 Lat 42.3811867 Long -70.8847183 Time(UTC) 16:35:48	 22523760.jpg Station # 92 Lat 42.381185 Long -70.88475 Time(UTC) 16:36:00	 22523776.jpg Station # 92 Lat 42.381185 Long -70.8847933 Time(UTC) 16:36:16	 22541281.jpg Station # 93 Lat 42.3990133 Long -70.9327117 Time(UTC) 21:28:01	 22541302.jpg Station # 93 Lat 42.3990367 Long -70.9326683 Time(UTC) 21:28:22
 22541323.jpg Station # 93 Lat 42.3990617 Long -70.9326467 Time(UTC) 21:28:43	 22541346.jpg Station # 93 Lat 42.3990867 Long -70.9326333 Time(UTC) 21:29:06	 22541362.jpg Station # 93 Lat 42.3991 Long -70.9326233 Time(UTC) 21:29:22	 22541407.jpg Station # 93 Lat 42.3991367 Long -70.9325933 Time(UTC) 21:30:07	 22541464.jpg Station # 93 Lat 42.3991767 Long -70.9325667 Time(UTC) 21:31:04

 22541499.jpg Station # 93 Lat 42.3992017 Long -70.9325583 Time(UTC) 21:31:39	 22453733.jpg Station # 94 Lat 42.3758383 Long -70.9264617 Time(UTC) 21:08:53	 22453765.jpg Station # 94 Lat 42.3759017 Long -70.926455 Time(UTC) 21:09:25	 22453801.jpg Station # 94 Lat 42.3759617 Long -70.9264733 Time(UTC) 21:10:01	 22453826.jpg Station # 94 Lat 42.375995 Long -70.9264917 Time(UTC) 21:10:26
 22453839.jpg Station # 94 Lat 42.3760117 Long -70.9265033 Time(UTC) 21:10:39	 22453875.jpg Station # 94 Lat 42.3760567 Long -70.926525 Time(UTC) 21:11:15	 22453897.jpg Station # 94 Lat 42.3760833 Long -70.9265417 Time(UTC) 21:11:37	 22453918.jpg Station # 94 Lat 42.376105 Long -70.926555 Time(UTC) 21:11:58	 22601919.jpg Station # 95 Lat 42.3494433 Long -70.9705017 Time(UTC) 14:18:39
 22601948.jpg Station # 95 Lat 42.34954 Long -70.9705417 Time(UTC) 14:19:08	 22601978.jpg Station # 95 Lat 42.3496417 Long -70.9705317 Time(UTC) 14:19:38	 22602016.jpg Station # 95 Lat 42.34976 Long -70.9704817 Time(UTC) 14:20:16	 22602041.jpg Station # 95 Lat 42.3498333 Long -70.9704417 Time(UTC) 14:20:41	 22602075.jpg Station # 95 Lat 42.3499317 Long -70.97038 Time(UTC) 14:21:15

 22602096.jpg Station # 95 Lat 42.34999 Long -70.9703367 Time(UTC) 14:21:36	 22610962.jpg Station # 96 Lat 42.346115 Long -70.9807983 Time(UTC) 16:49:22	 22610993.jpg Station # 96 Lat 42.3461433 Long -70.9807067 Time(UTC) 16:49:53	 22611031.jpg Station # 96 Lat 42.3461967 Long -70.98061 Time(UTC) 16:50:31	 22611056.jpg Station # 96 Lat 42.34624 Long -70.98054 Time(UTC) 16:50:56
 22611071.jpg Station # 96 Lat 42.34627 Long -70.9804967 Time(UTC) 16:51:11	 22611083.jpg Station # 96 Lat 42.3462917 Long -70.980465 Time(UTC) 16:51:23	 22611103.jpg Station # 96 Lat 42.3463283 Long -70.9804133 Time(UTC) 16:51:43	 22611170.jpg Station # 96 Lat 42.3464417 Long -70.9802483 Time(UTC) 16:52:50	 22613931.jpg Station # 97 Lat 42.34083 Long -70.9951883 Time(UTC) 17:38:51
 22613948.jpg Station # 97 Lat 42.3408767 Long -70.9951667 Time(UTC) 17:39:08	 22613978.jpg Station # 97 Lat 42.3409683 Long -70.99512 Time(UTC) 17:39:38	 22613993.jpg Station # 97 Lat 42.341 Long -70.9950933 Time(UTC) 17:39:53	 22614041.jpg Station # 97 Lat 42.3410883 Long -70.9949967 Time(UTC) 17:40:41	 22614063.jpg Station # 97 Lat 42.3411283 Long -70.994955 Time(UTC) 17:41:03

 22614109.jpg Station # 97 Lat 42.341205 Long -70.994865 Time(UTC) 17:41:49	 22613003.jpg Station # 98 Lat 42.3447417 Long -71.0007283 Time(UTC) 17:23:23	 22613024.jpg Station # 98 Lat 42.3448 Long -71.000695 Time(UTC) 17:23:44	 22613040.jpg Station # 98 Lat 42.3448433 Long -71.0006583 Time(UTC) 17:24:00	 22613081.jpg Station # 98 Lat 42.3449433 Long -71.0005417 Time(UTC) 17:24:41
 22613097.jpg Station # 98 Lat 42.3449783 Long -71.0004917 Time(UTC) 17:24:57	 22613129.jpg Station # 98 Lat 42.3450433 Long -71.0003783 Time(UTC) 17:25:29	 22613144.jpg Station # 98 Lat 42.3450767 Long -71.0003267 Time(UTC) 17:25:44	 22613159.jpg Station # 98 Lat 42.34511 Long -71.0002733 Time(UTC) 17:25:59	 22611918.jpg Station # 99 Lat 42.3500933 Long -70.987335 Time(UTC) 17:05:18
 22611944.jpg Station # 99 Lat 42.3501267 Long -70.98729 Time(UTC) 17:05:44	 22611957.jpg Station # 99 Lat 42.350145 Long -70.9872633 Time(UTC) 17:05:57	 22612034.jpg Station # 99 Lat 42.3502667 Long -70.9870933 Time(UTC) 17:07:14	 22612051.jpg Station # 99 Lat 42.3502933 Long -70.9870583 Time(UTC) 17:07:31	 22612067.jpg Station # 99 Lat 42.3503167 Long -70.98703 Time(UTC) 17:07:47

 22612155.jpg Station # 99 Lat 42.3503817 Long -70.9866383 Time(UTC) 17:09:15	 22612177.jpg Station # 99 Lat 42.3503117 Long -70.9864717 Time(UTC) 17:09:37	 22612188.jpg Station # 99 Lat 42.35027 Long -70.986395 Time(UTC) 17:09:48	 22612210.jpg Station # 99 Lat 42.3501917 Long -70.9862467 Time(UTC) 17:10:10	 22612231.jpg Station # 99 Lat 42.3501483 Long -70.9861267 Time(UTC) 17:10:31
 22612253.jpg Station # 99 Lat 42.35013 Long -70.9860417 Time(UTC) 17:10:53	 22612268.jpg Station # 99 Lat 42.3500867 Long -70.9859617 Time(UTC) 17:11:08	 22612280.jpg Station # 99 Lat 42.3500483 Long -70.985915 Time(UTC) 17:11:20	 22602604.jpg Station # 100 Lat 42.3551133 Long -70.9764667 Time(UTC) 14:30:04	 22602649.jpg Station # 100 Lat 42.3552717 Long -70.9765417 Time(UTC) 14:30:49
 22602701.jpg Station # 100 Lat 42.3554517 Long -70.9765167 Time(UTC) 14:31:41	 22602740.jpg Station # 100 Lat 42.3555683 Long -70.9764733 Time(UTC) 14:32:20			

Stations 101-113

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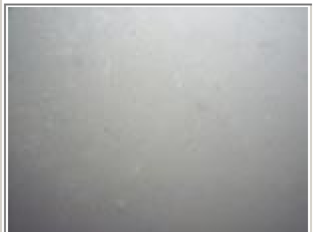
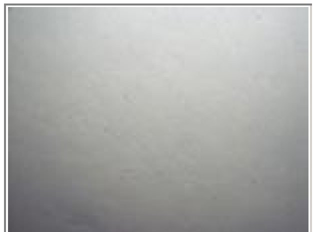
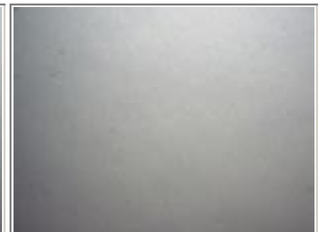
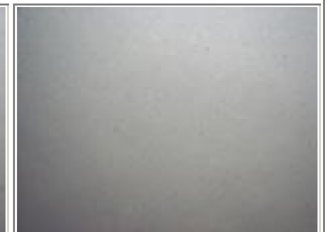
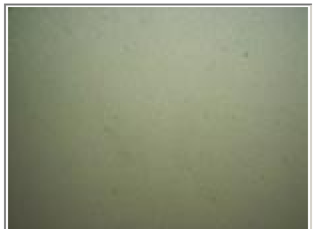
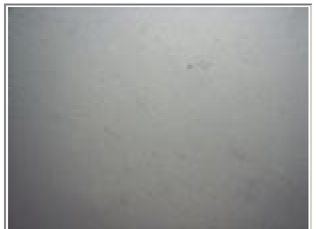
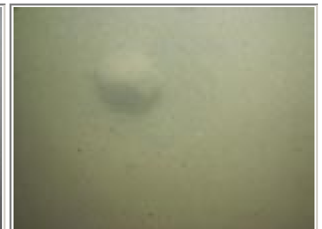
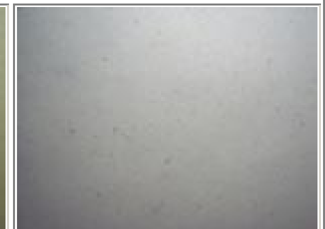
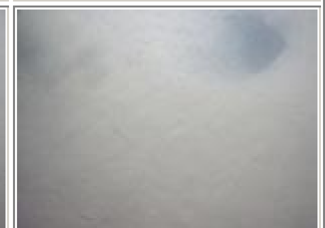
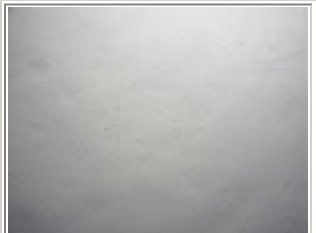
Long -71.045595 Time(UTC) 19:31:25	Long -71.04555 Time(UTC) 19:31:37	Long -71.0454783 Time(UTC) 19:31:55	Long -71.04543 Time(UTC) 19:32:08	Long -71.0453717 Time(UTC) 19:32:25
 22620758.jpg Station # 103 Lat 42.3663717 Long -71.0453333 Time(UTC) 19:32:38	 22620780.jpg Station # 103 Lat 42.3663333 Long -71.0452717 Time(UTC) 19:33:00	 22620811.jpg Station # 103 Lat 42.3663 Long -71.0451917 Time(UTC) 19:33:31	 22620848.jpg Station # 103 Lat 42.36626 Long -71.0450917 Time(UTC) 19:34:08	 22620882.jpg Station # 103 Lat 42.36622 Long -71.0449983 Time(UTC) 19:34:42
 22621654.jpg Station # 104 Lat 42.37887 Long -71.0458367 Time(UTC) 19:47:34	 22621709.jpg Station # 104 Lat 42.37889 Long -71.0457233 Time(UTC) 19:48:29	 22621723.jpg Station # 104 Lat 42.378895 Long -71.0456967 Time(UTC) 19:48:43	 22621739.jpg Station # 104 Lat 42.3788983 Long -71.0456683 Time(UTC) 19:48:59	 22621767.jpg Station # 104 Lat 42.3789067 Long -71.045615 Time(UTC) 19:49:27
 22621789.jpg Station # 104 Lat 42.3789133 Long -71.0455883 Time(UTC) 19:49:49	 22621808.jpg Station # 104 Lat 42.3789183 Long -71.04557 Time(UTC) 19:50:08	 22619357.jpg Station # 105 Lat 42.3544833 Long -71.027 Time(UTC) 19:09:17	 22619374.jpg Station # 105 Lat 42.3544889 Long -71.0269389 Time(UTC) 19:09:34	 22619394.jpg Station # 105 Lat 42.3544954 Long -71.0268722 Time(UTC) 19:09:54



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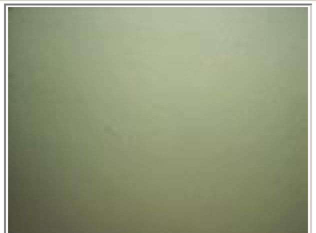

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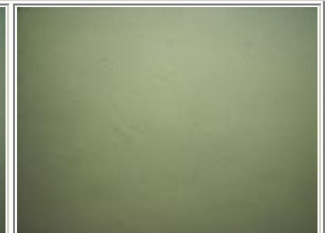

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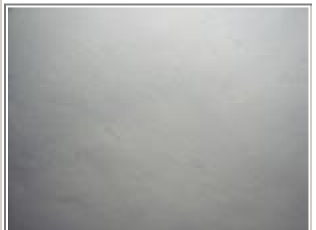

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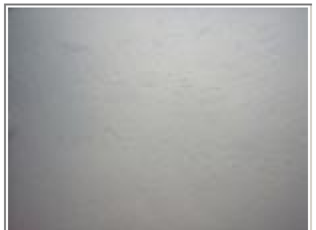

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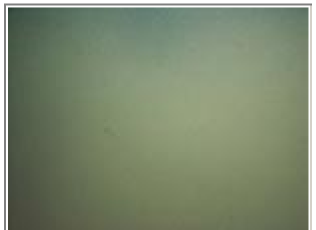

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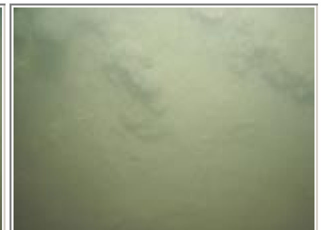

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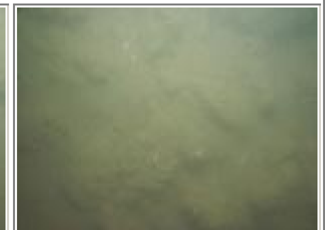

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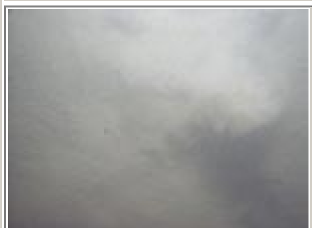

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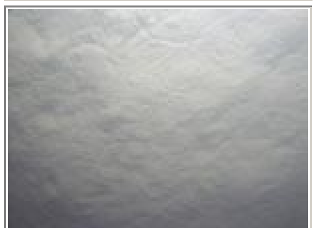

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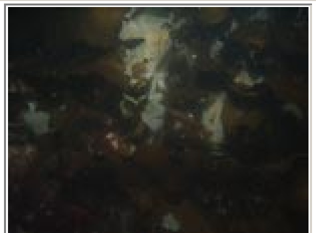
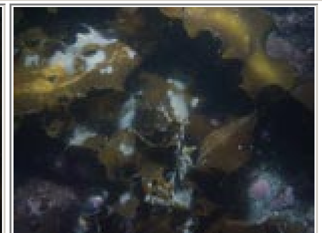
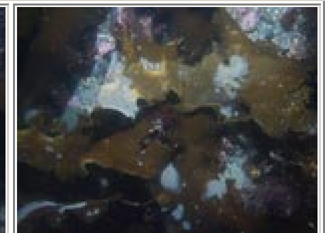
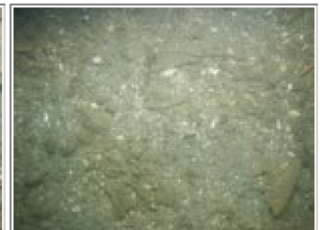
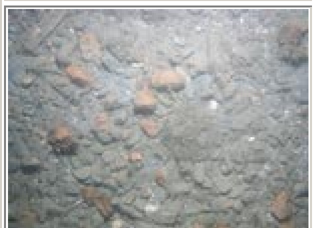
 22616563.jpg Station # 106 Lat 42.3218383 Long -71.0122333 Time(UTC) 18:22:43	 22616580.jpg Station # 106 Lat 42.3218517 Long -71.0122183 Time(UTC) 18:23:00	 22427894.jpg Station # 107 Lat 42.3035517 Long -70.8703267 Time(UTC) 13:58:14	 22427973.jpg Station # 107 Lat 42.3036883 Long -70.8703767 Time(UTC) 13:59:33	 22428019.jpg Station # 107 Lat 42.3037533 Long -70.8704133 Time(UTC) 14:00:19
 22422201.jpg Station # 108 Lat 42.320765 Long -70.9130017 Time(UTC) 12:23:21	 22422251.jpg Station # 108 Lat 42.320585 Long -70.91285 Time(UTC) 12:24:11	 22422267.jpg Station # 108 Lat 42.3205233 Long -70.912815 Time(UTC) 12:24:27	 22422327.jpg Station # 108 Lat 42.320375 Long -70.9129583 Time(UTC) 12:25:27	 22422371.jpg Station # 108 Lat 42.320305 Long -70.9131117 Time(UTC) 12:26:11
 22422443.jpg Station # 108 Lat 42.3202067 Long -70.9134017 Time(UTC) 12:27:23	 22594642.jpg Station # 109 Lat 42.3308983 Long -70.9159217 Time(UTC) 12:17:22	 22594662.jpg Station # 109 Lat 42.3308833 Long -70.9158883 Time(UTC) 12:17:42	 22594700.jpg Station # 109 Lat 42.3308483 Long -70.9158517 Time(UTC) 12:18:20	 22594732.jpg Station # 109 Lat 42.3308233 Long -70.9158333 Time(UTC) 12:18:52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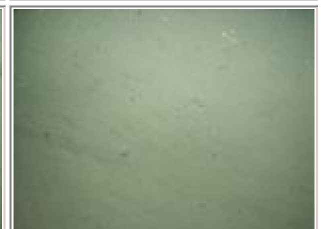
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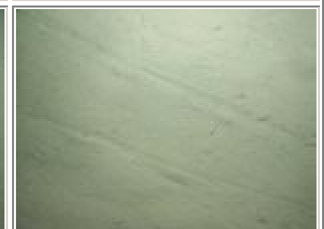
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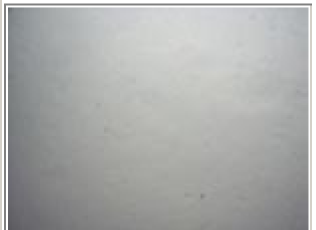				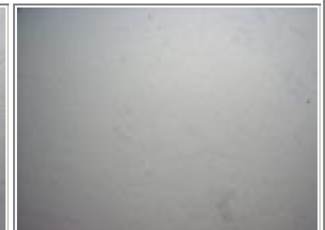
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	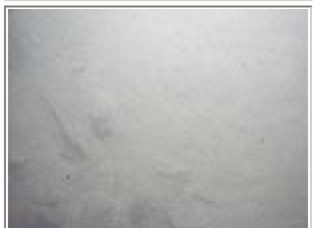	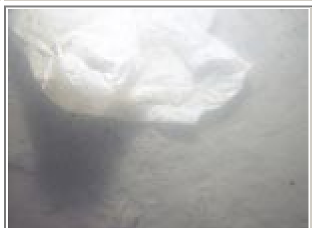	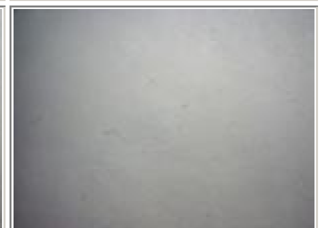	
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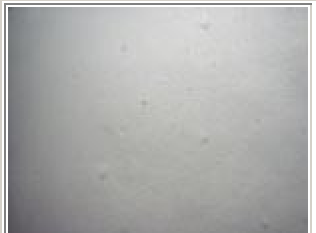
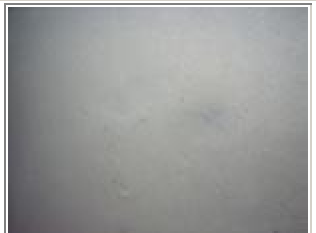
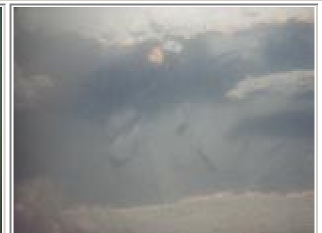
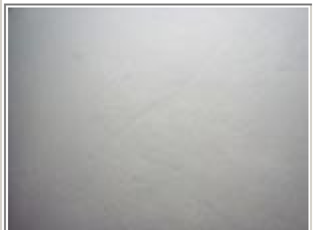
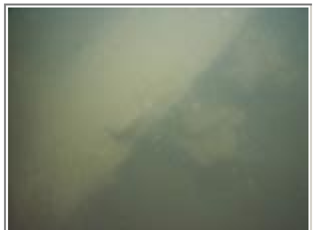
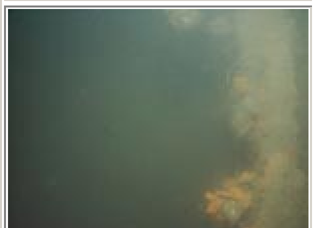
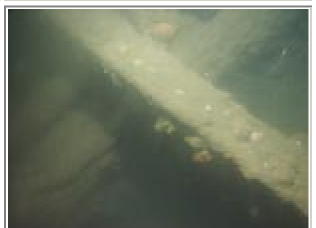
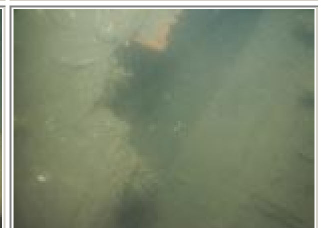
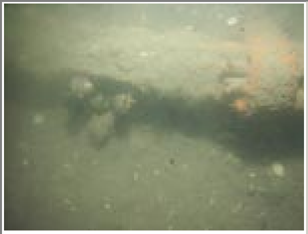
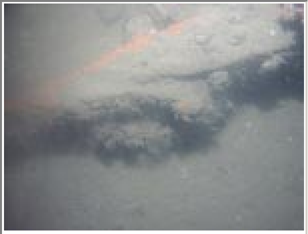
 22604064.jpg Station # 112 Lat 42.3672983 Long -70.99335 Time(UTC) 14:54:24	 22604159.jpg Station # 112 Lat 42.3674017 Long -70.9933067 Time(UTC) 14:55:59	 22605177.jpg Station # 113 Lat 42.3809183 Long -71.0057167 Time(UTC) 15:12:57	 22605194.jpg Station # 113 Lat 42.3809383 Long -71.0057283 Time(UTC) 15:13:14	 22605221.jpg Station # 113 Lat 42.3809667 Long -71.00571 Time(UTC) 15:13:41
 22605246.jpg Station # 113 Lat 42.3809917 Long -71.0056733 Time(UTC) 15:14:06	 22605267.jpg Station # 113 Lat 42.3810067 Long -71.005645 Time(UTC) 15:14:27	 22605936.jpg Station # 113 Lat 42.380885 Long -71.0058533 Time(UTC) 15:25:36	 22605953.jpg Station # 113 Lat 42.3808917 Long -71.005835 Time(UTC) 15:25:53	 22605967.jpg Station # 113 Lat 42.380895 Long -71.0058117 Time(UTC) 15:26:07
 22606001.jpg Station # 113 Lat 42.3809033 Long -71.0057567 Time(UTC) 15:26:41	 22606039.jpg Station # 113 Lat 42.3809083 Long -71.0056817 Time(UTC) 15:27:19	 22606056.jpg Station # 113 Lat 42.3809117 Long -71.0056467 Time(UTC) 15:27:36	 22606082.jpg Station # 113 Lat 42.38091 Long -71.005595 Time(UTC) 15:28:02	 22606099.jpg Station # 113 Lat 42.3809067 Long -71.0055667 Time(UTC) 15:28:19

 22606119.jpg Station # 113 Lat 42.3809067 Long -71.00554 Time(UTC) 15:28:39	 22606138.jpg Station # 113 Lat 42.3809033 Long -71.0055133 Time(UTC) 15:28:58

Figures

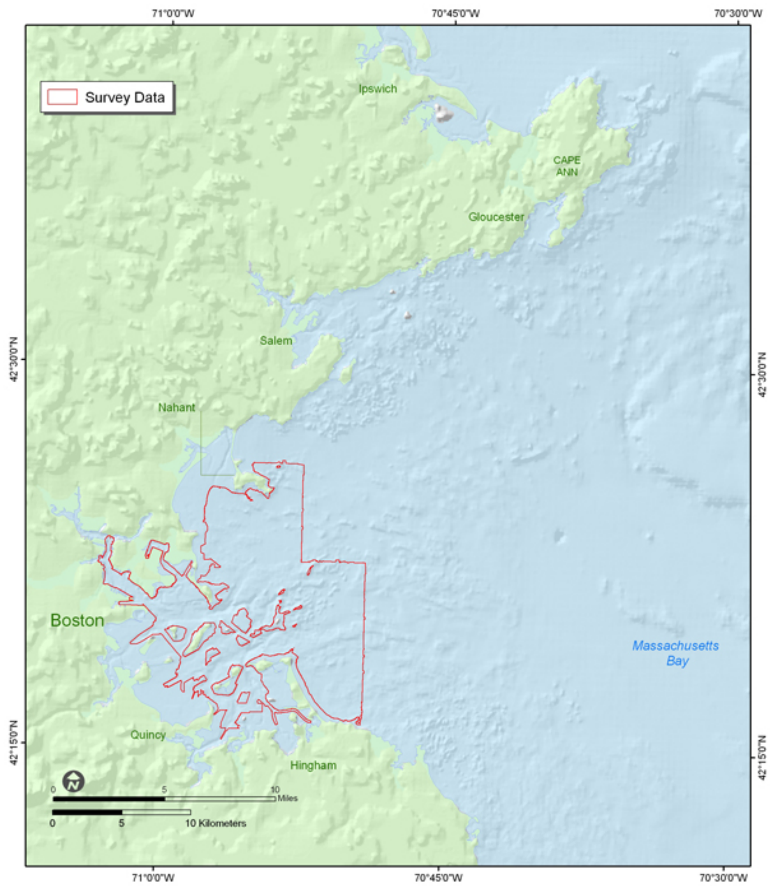


Figure 1.1. Map showing the location of the Boston Harbor and Approaches area, offshore of Massachusetts. The geophysical data used in this report are from four NOAA hydrographic surveys (H10990, H10991, H10992, and H0994) carried out in 2000 and 2001 (outlined in red).

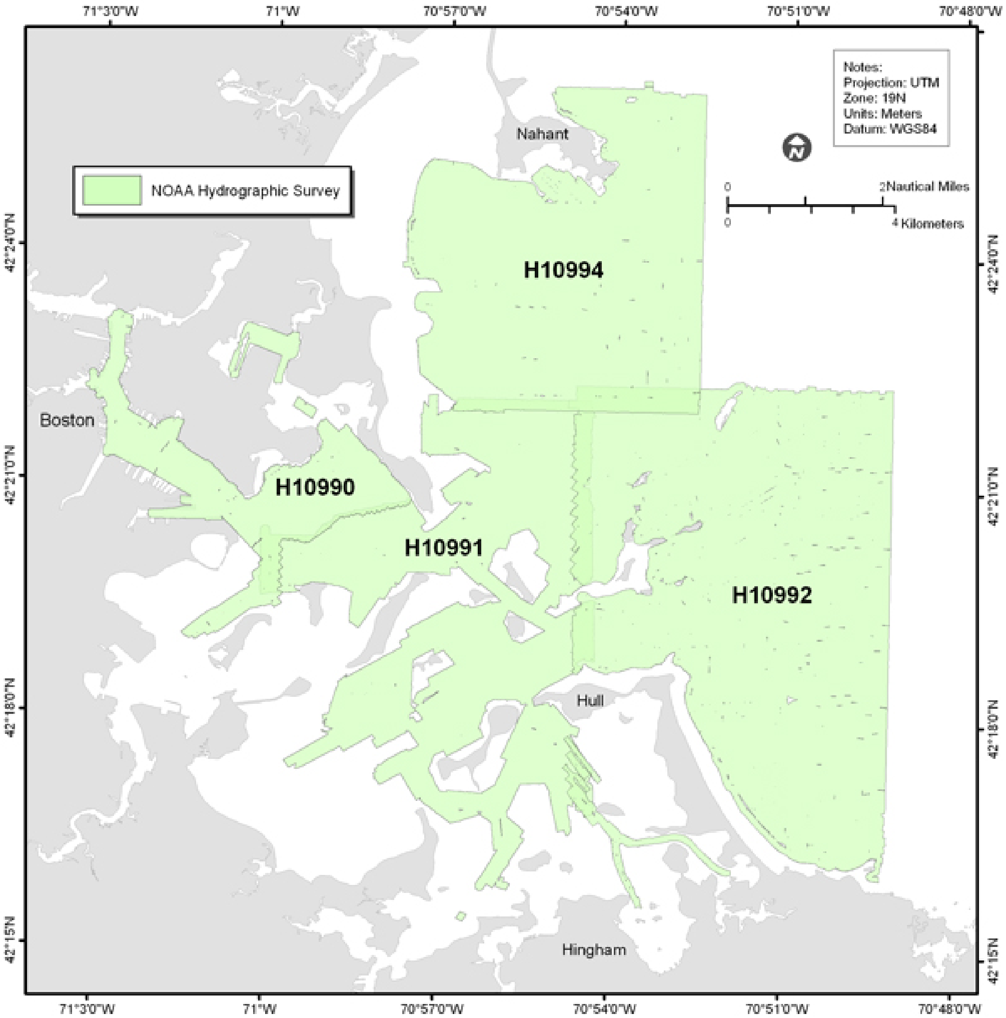


Figure 1.2. Map showing the location of the NOAA hydrographic surveys H10990, H10991, H10992, and H0994 that collected the bathymetry and sidescan-sonar data used to map the sea floor of Boston Harbor and Approaches.

Figure 3.1. Photograph of the NOAA Ship Whiting. The Whiting, 163' long and equipped with two launches to carry out hydrographic surveys, was decommissioned by NOAA in 2003.\

Figure 3.2. Photograph of the USGS research vessel Rafael. The Rafael is 25' long and used by USGS to conduct geophysical surveys in coastal areas.

Figure 3.3. TOP: Photograph of Mini SEABOSS and winch on the deck of the RV *Rafael*. On the *Rafael*, the SEABOSS sits on a frame mounted outboard of the vessel. The conducting cable that carries power and the video signal is stored on the cable spool. BOTTOM: Components of Mini SEABOSS viewed from below: A) forward video camera; B) downward video camera; C) video light; D) digital still camera and housing; E) strobe light; F) parallel laser for scale; G, laser for ranging; H) junction block; I) van Veen grab sampler; and J) multi-conducting cable.

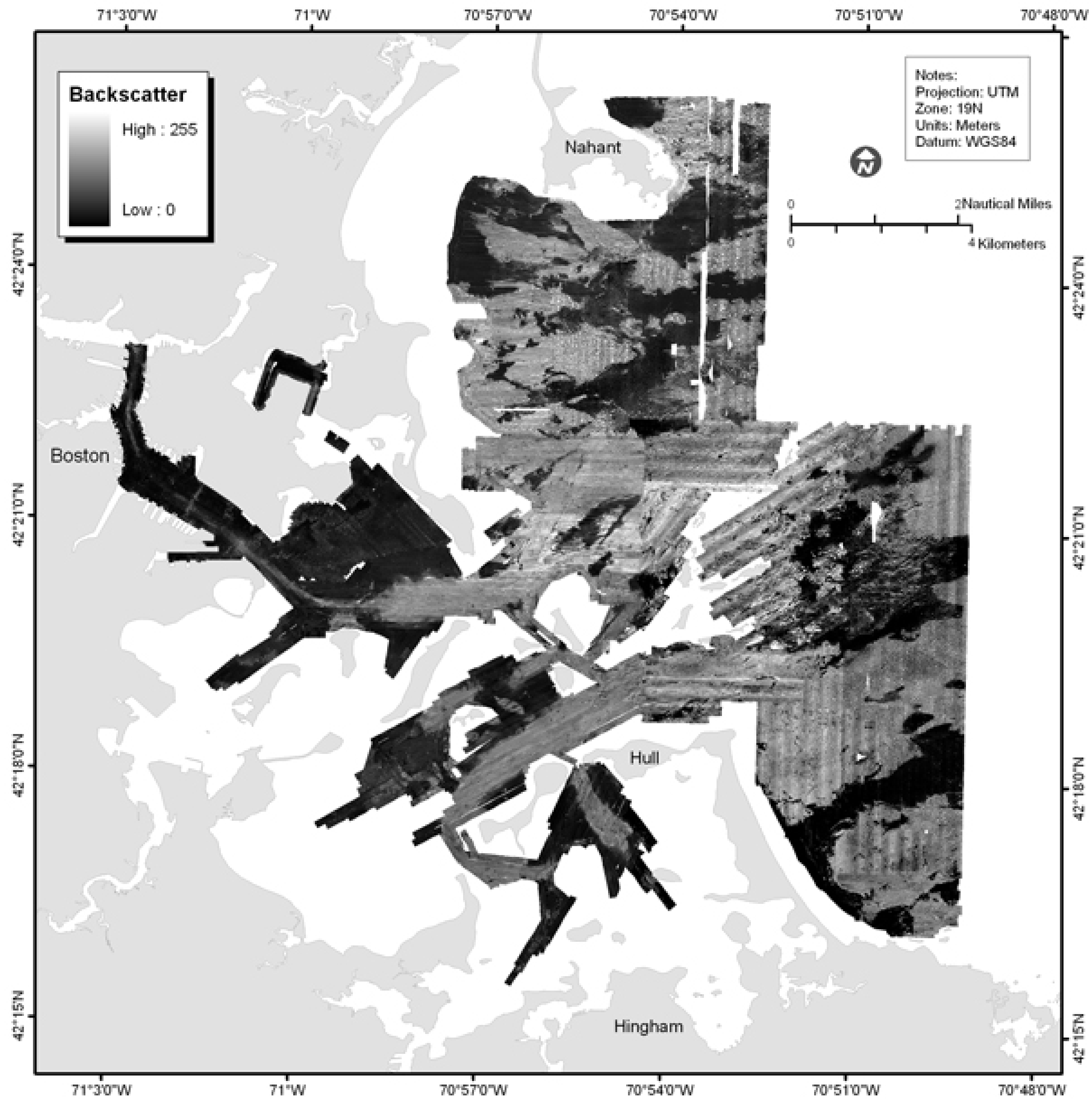


Figure 3.4. Map showing mosaic of sidescan-sonar data of the survey area Boston Harbor and Approaches, Massachusetts. Backscatter intensity, as recorded with sidescan-sonar, is an acoustic measure of the hardness and roughness of the seafloor. In general, higher values (light tones) represent rock, gravel and coarse sand. Lower values (dark tones) generally represent fine sand and muddy sediment. See map sheet 3 for data at a scale of 1:25,000.

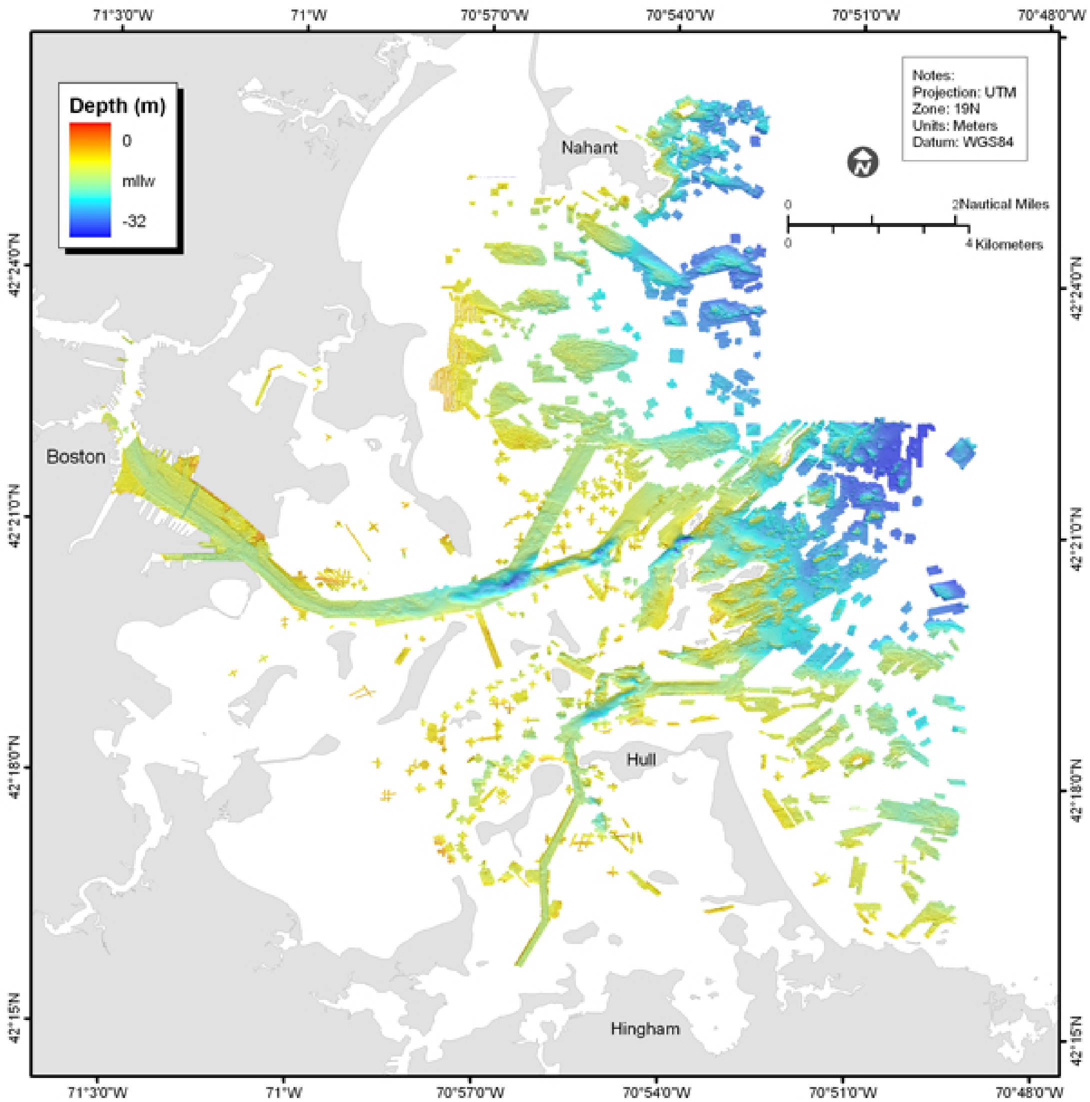


Figure 3.5. Shaded-relief bathymetric map, colored by water depth, of Boston Harbor and Approaches, Massachusetts based on the multibeam sonar data (gridded at 2 m). See map sheet 2 for date at a scale of 1:25,000.

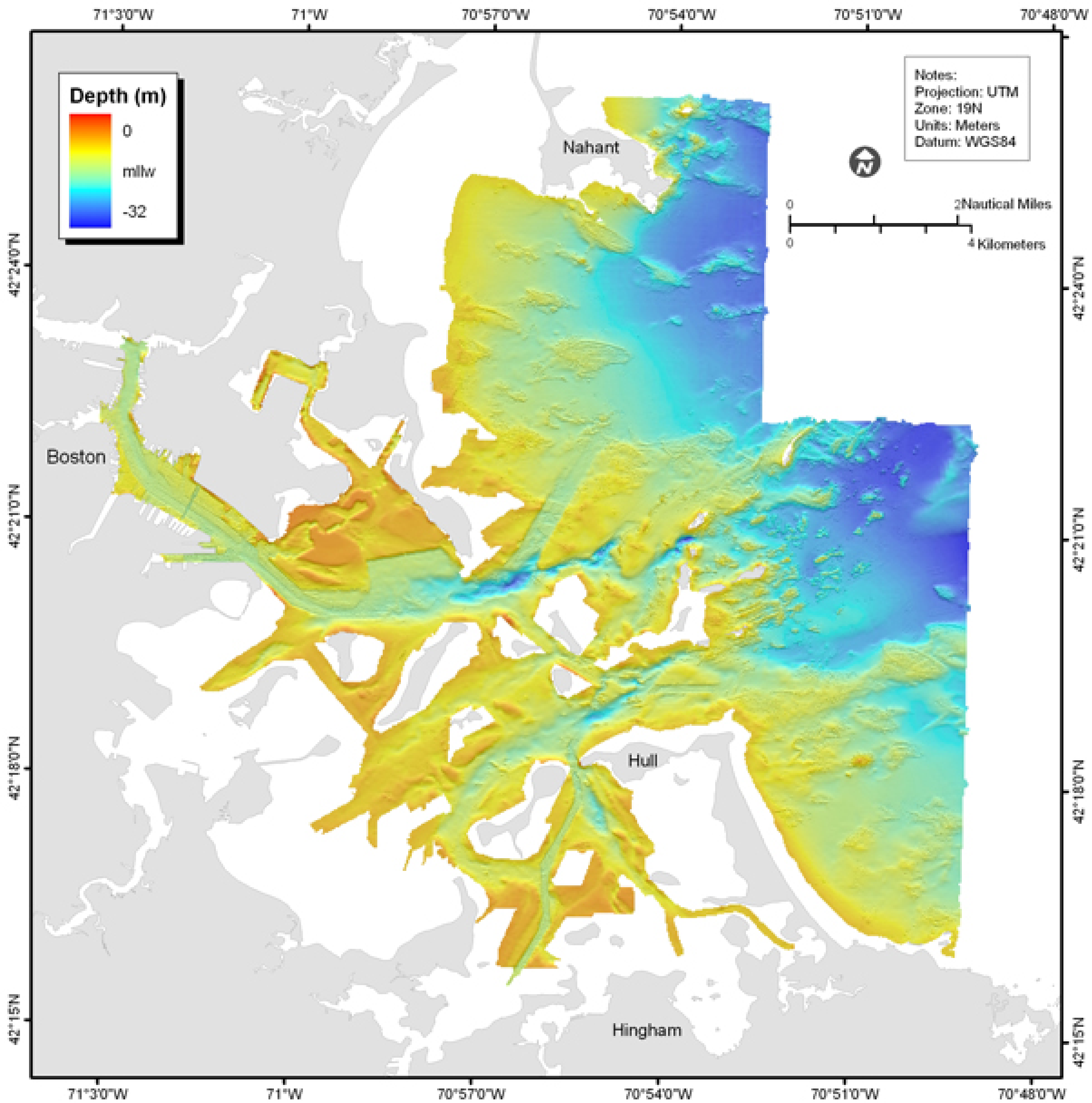


Figure 3.6. Shaded-relief bathymetric map, colored by water depth, of Boston Harbor and Approaches, Massachusetts, based on the combined multibeam and single-beam sonar bathymetric data (gridded at 30 m). See map sheet 1 for data at a scale of 1:25,000.

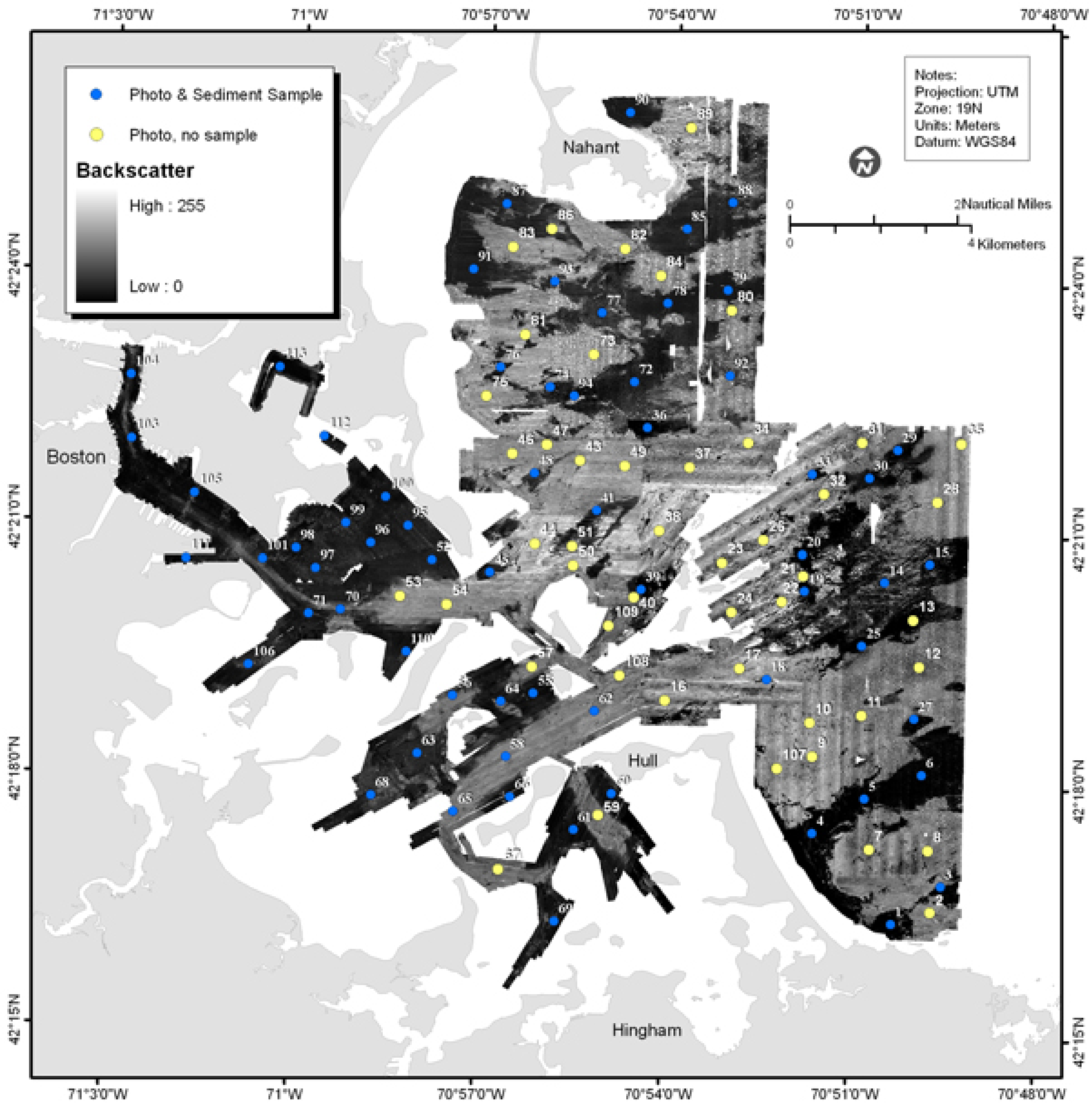


Figure 3.7. Map showing location of bottom samples on a map of acoustic backscatter intensity from sidescan sonar. Each numbered circle indicates a station where photographs, video, and/or samples were collected. See map sheet 5 for figure at a scale of 1:60,000.

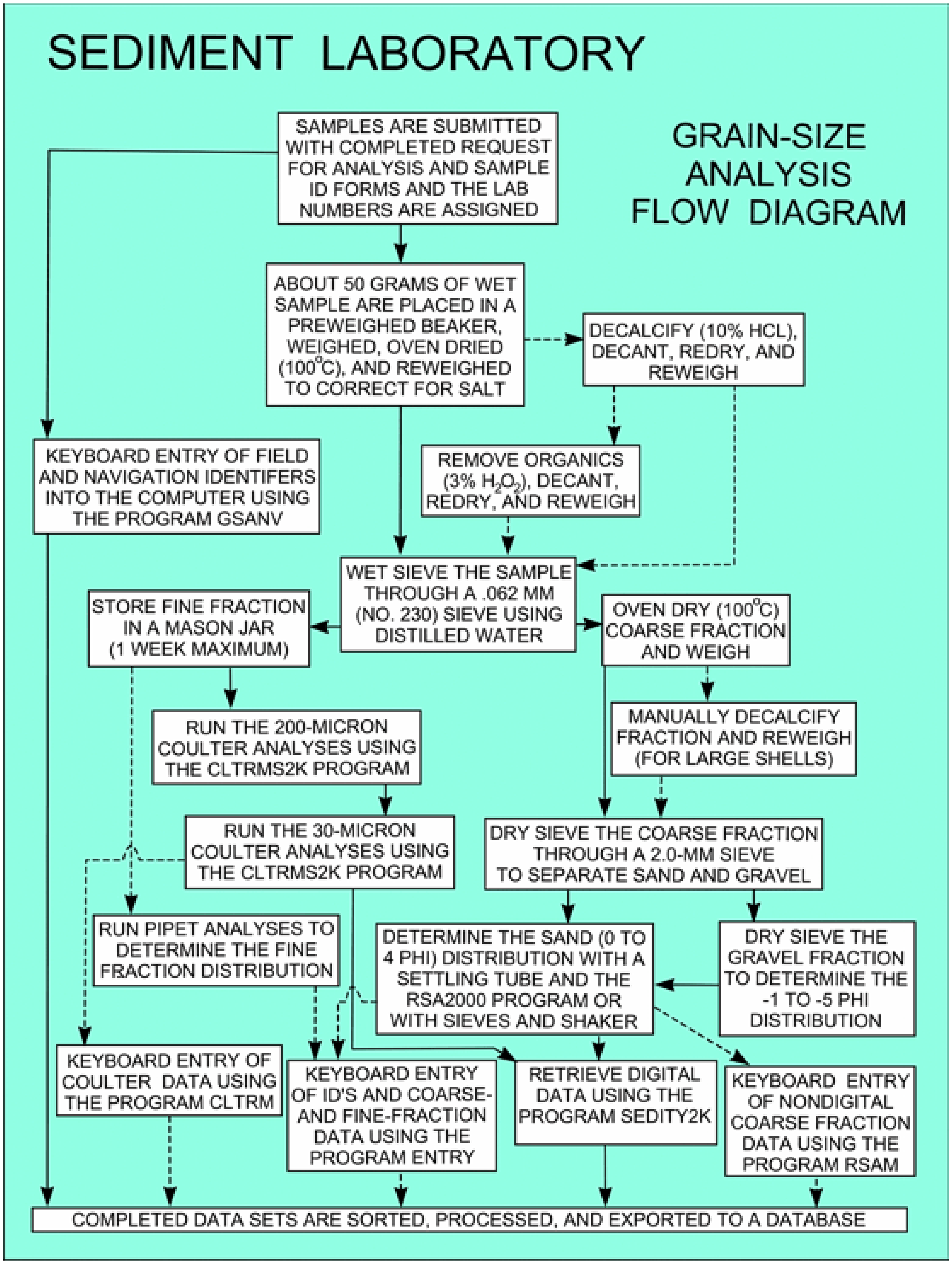


Figure 3.8. Flow diagram showing steps in laboratory analysis of sediment samples carried out at the USGS sediment laboratory at the Woods Hole Science Center (Poppe and Polloni, 2000).

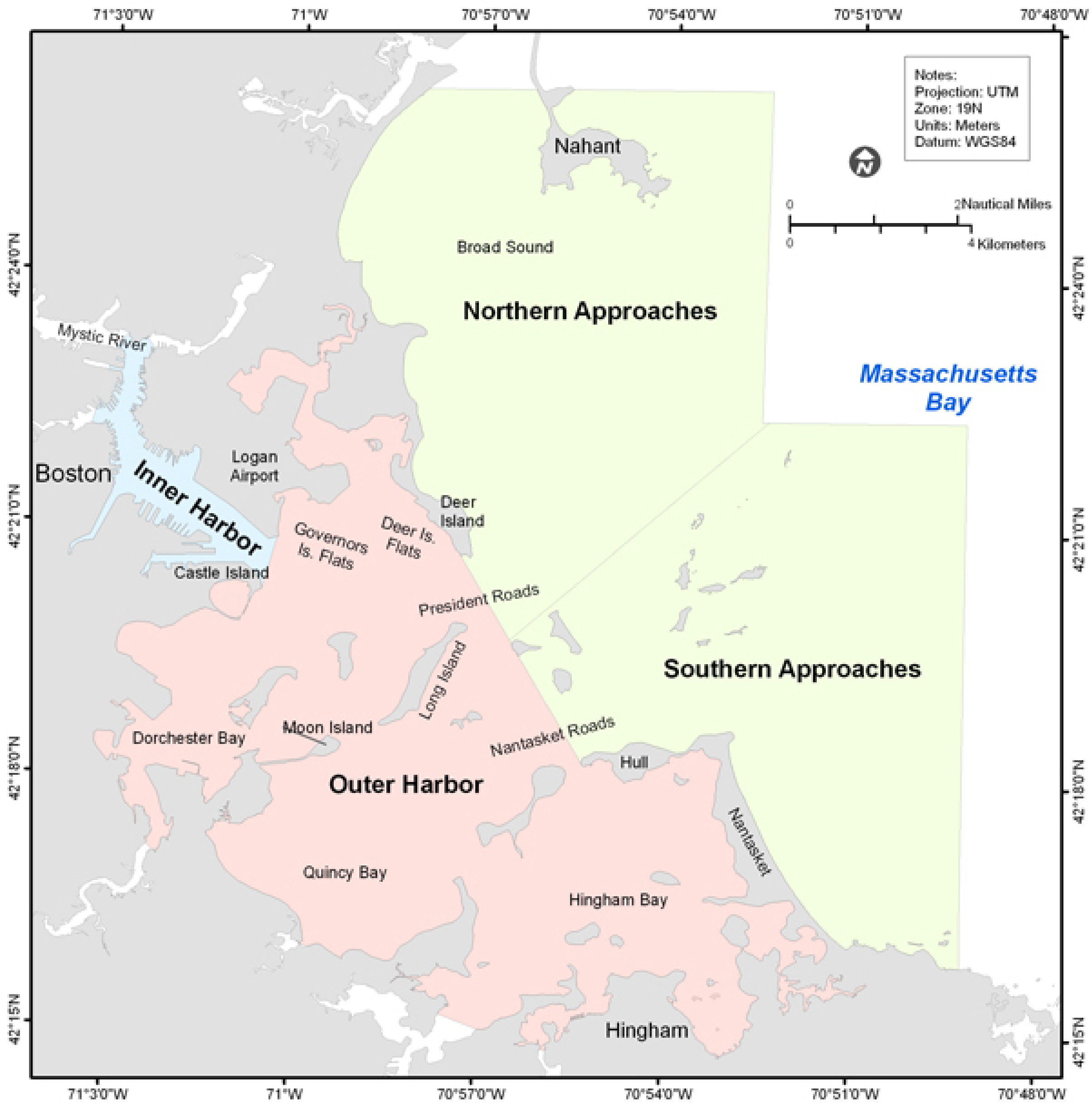


Figure 4.1. Map showing Boston Inner Harbor, Outer Harbor, and the Northern and Southern Approaches.

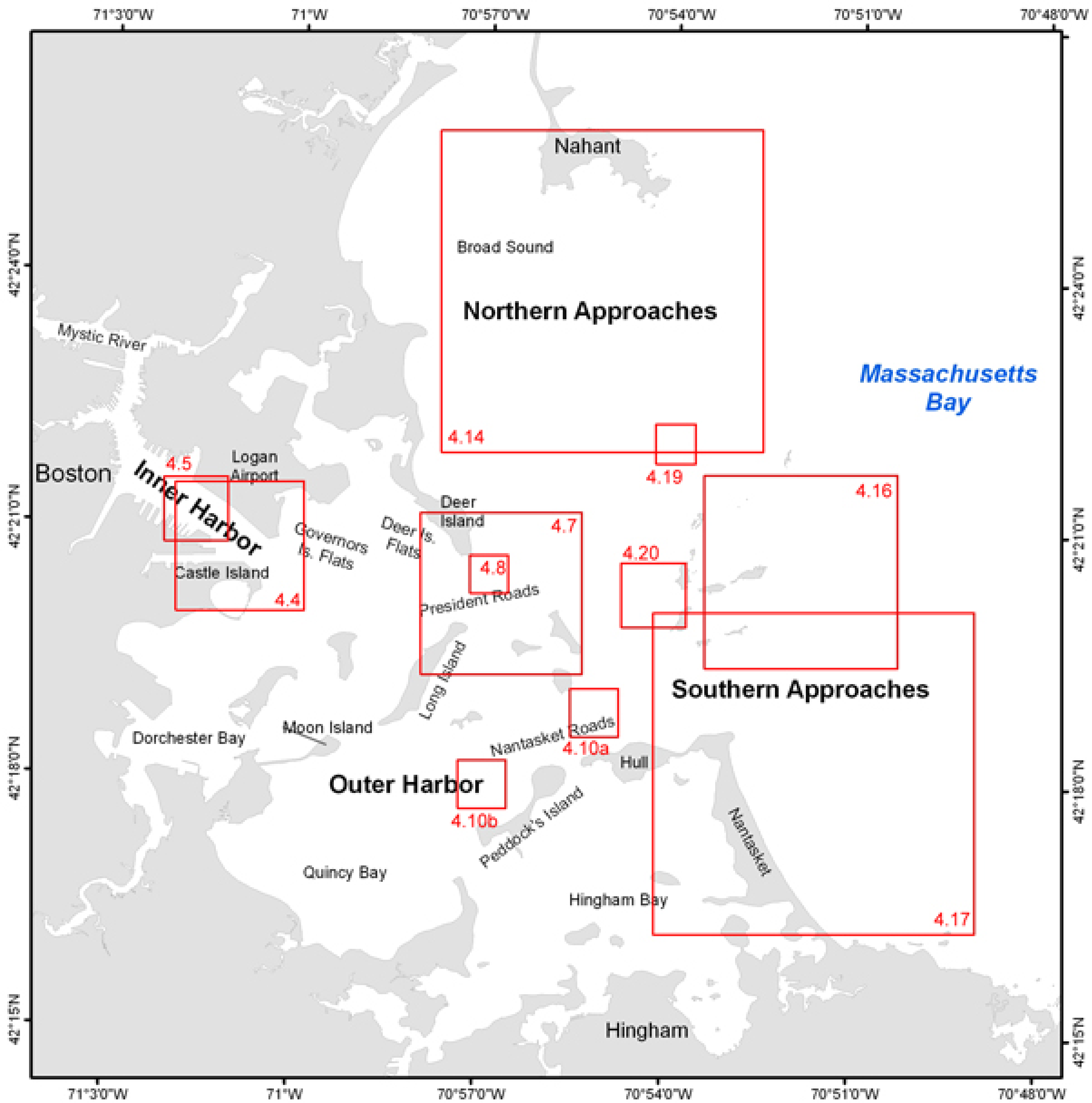


Figure 4.2. Map of Boston Harbor and Approaches showing locations of Figures 4.4 – 4.20 that illustrate selected features and characteristics of the sea floor.

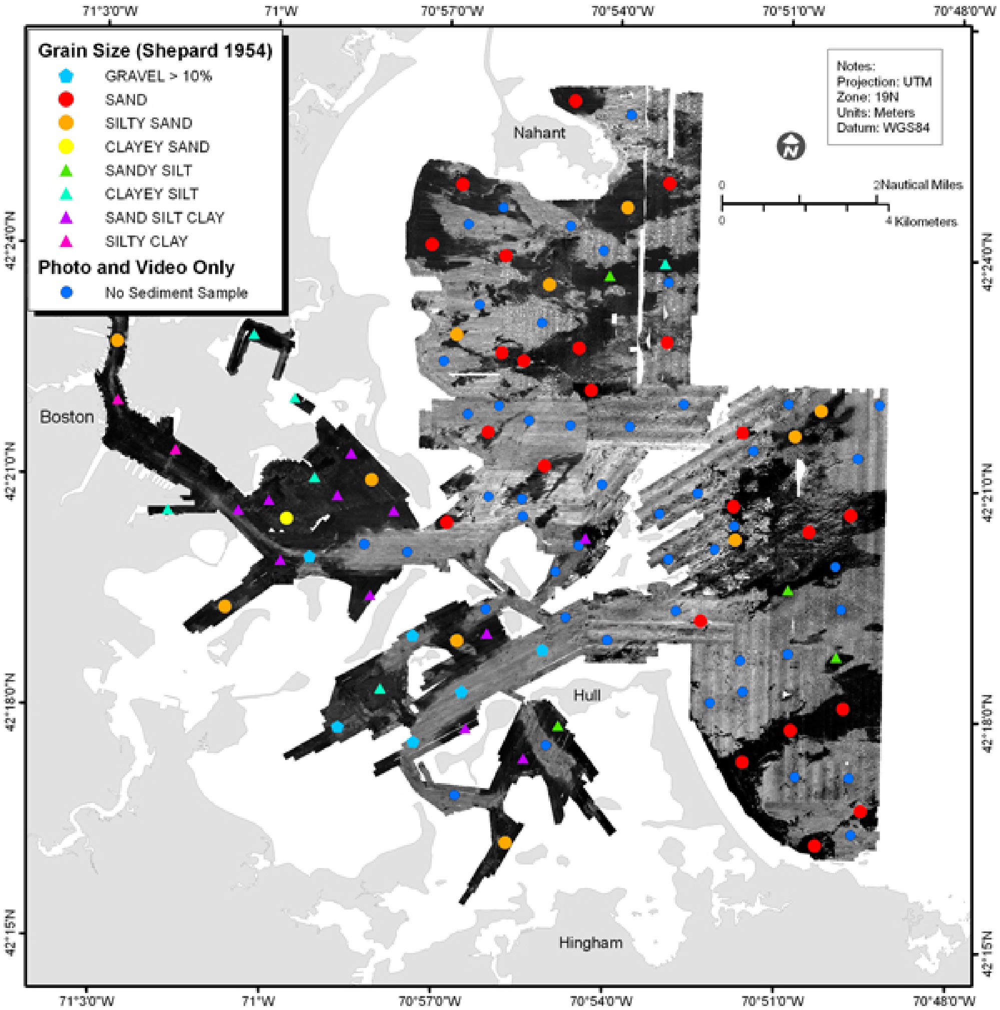


Figure 4.3. Texture of surficial sediments, based on Shepard classification, superimposed on gray-scale sidescan-sonar mosaic of Boston Harbor and Approaches. Dark blue dots indicate sites where no sample was collected and photographs show the sea floor is bedrock or covered with boulders, cobble or shells. Low backscatter intensity corresponds to areas of fine-grained sediments (silt and clay, Inner Harbor) or sandy sediments (Approaches). High backscatter intensity corresponds to areas of gravel, boulders, or outcropping bedrock (areas that could not be sampled with the grab sampler). See Appendix 2 for sediment texture and Appendix 3 for bottom photographs. See map sheet 5 for figure at a scale of 1:60,000.

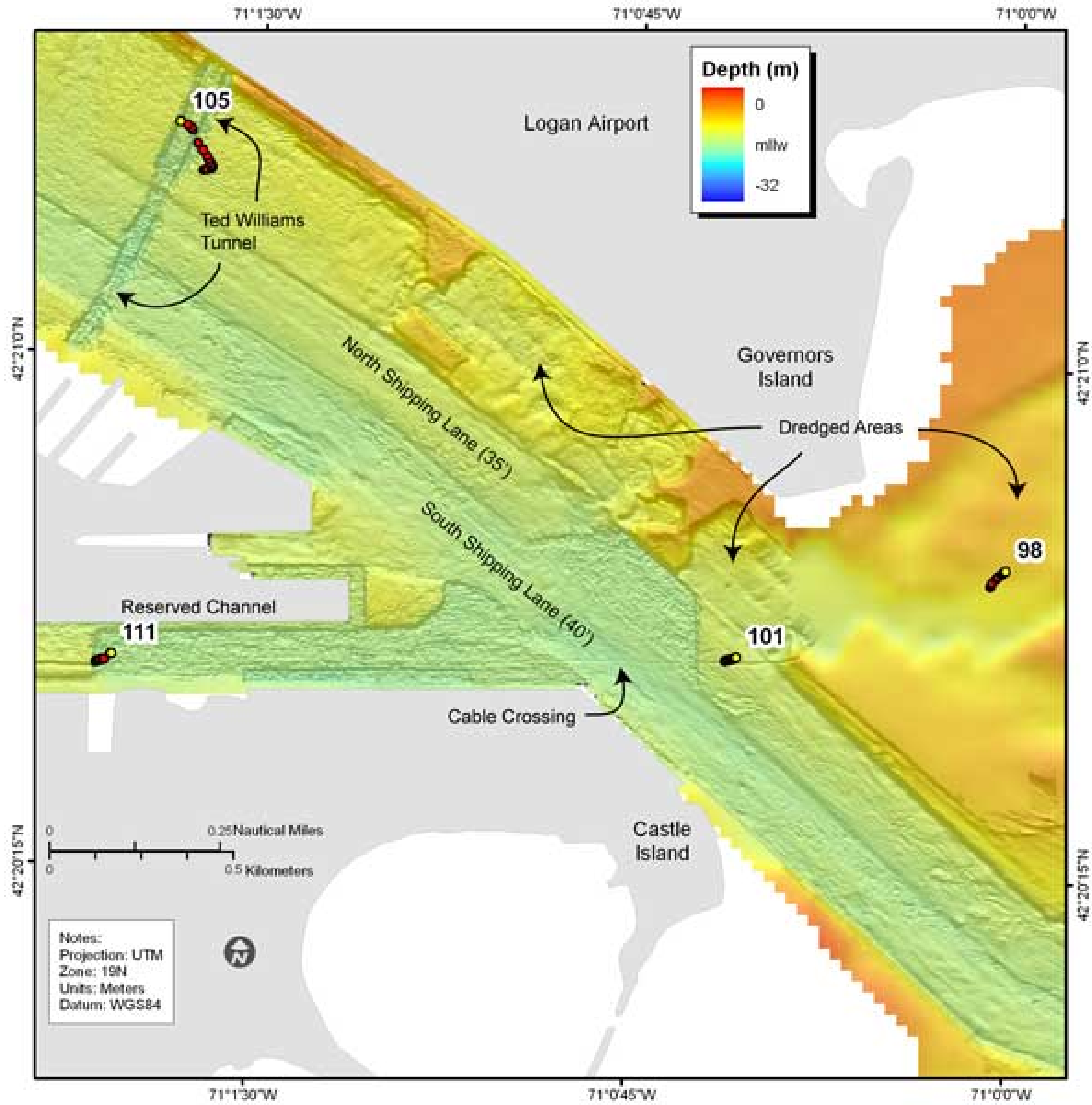


Figure 4.4. Shaded relief bathymetry, colored by water depth, of eastern portion of Boston Inner Harbor showing dredged main shipping channel, Ted Williams Tunnel, circular dredged areas south of Logan Airport, cable crossing, and linear scour marks. See figure 4.2 for map location. Red dots show location of bottom photographs (see Appendix 3 to view all photographs at these locations); yellow dot is location of bottom sediment sample (Appendix 2); number is station identifier.

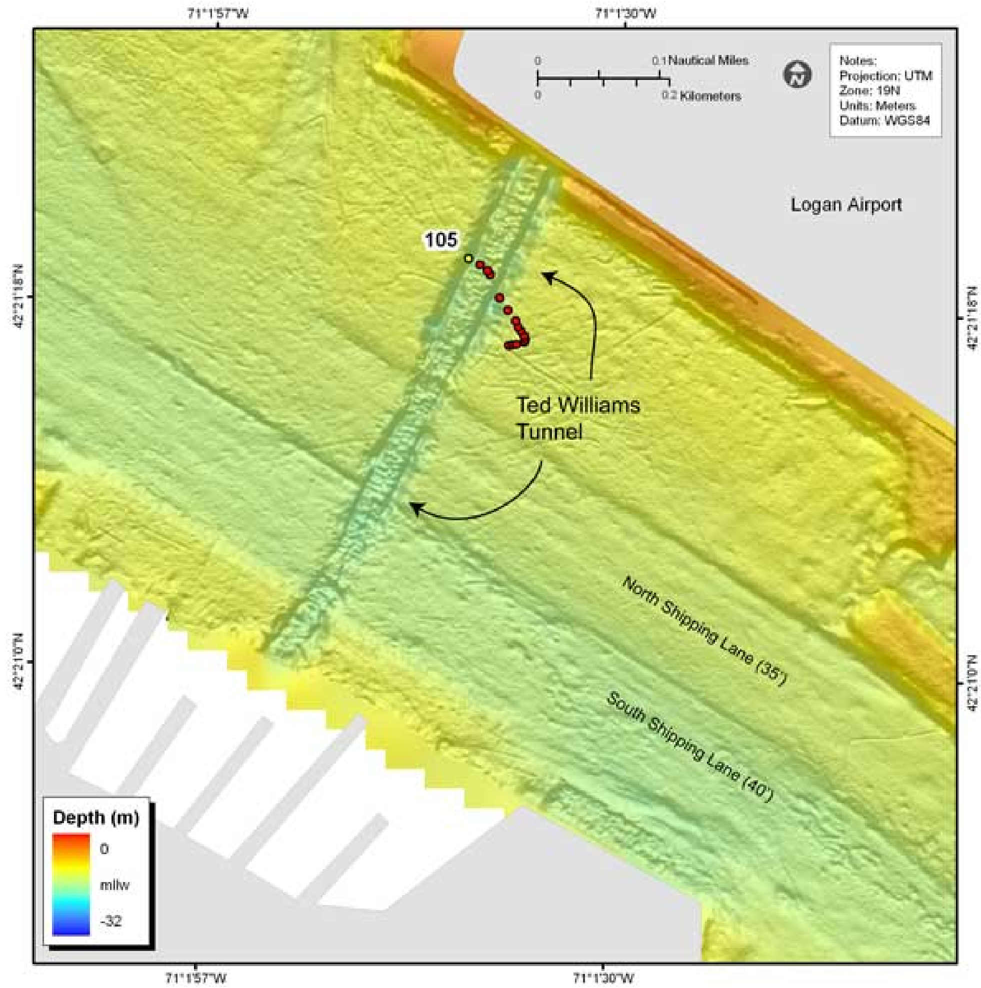


Figure 4.5. Shaded relief bathymetry, colored by water depth, showing the Ted Williams Tunnel as it crosses Boston Inner Harbor from south Boston to Logan Airport (see fig. 4.2 for map location). The tunnel is marked by a depression about 50 m wide that is a few m deeper than the navigation channel; on the northern side of the channel, the tunnel depression has a central high and channels about 2-4 m deeper along the western and eastern edges. Red dots show location of bottom photographs (see Appendix 3 to view all photographs at these locations); yellow dot is location of bottom sediment sample (Appendix 2); number is station identifier.

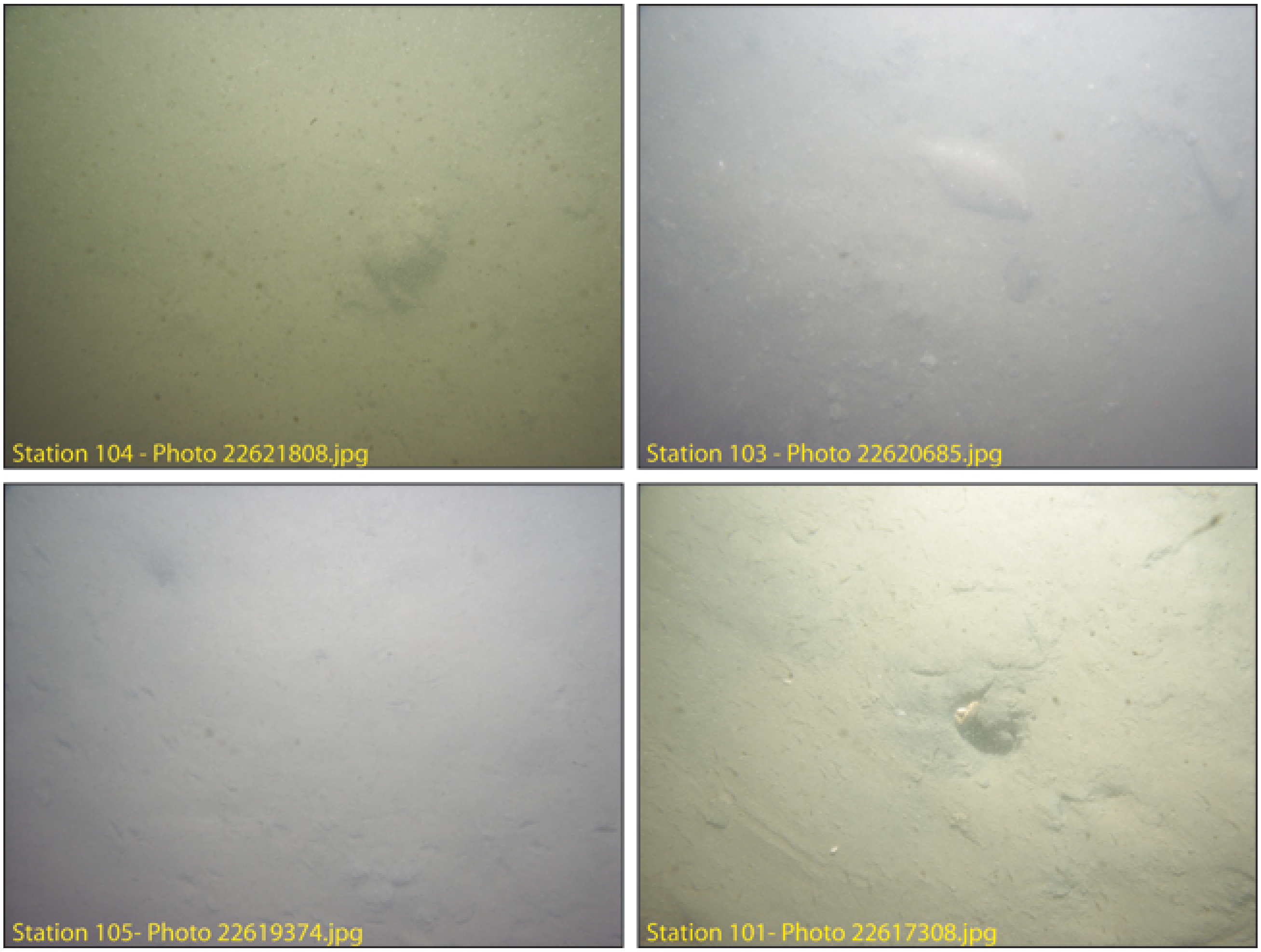


Figure 4.6. Photographs of the sea floor in Boston Inner Harbor stations 104, 103, 105, 101 showing a muddy sea floor. See figure 4.3 for station locations. See Appendix 3 for more photographs at these stations. The field of view of each image is approximately 50 cm wide.

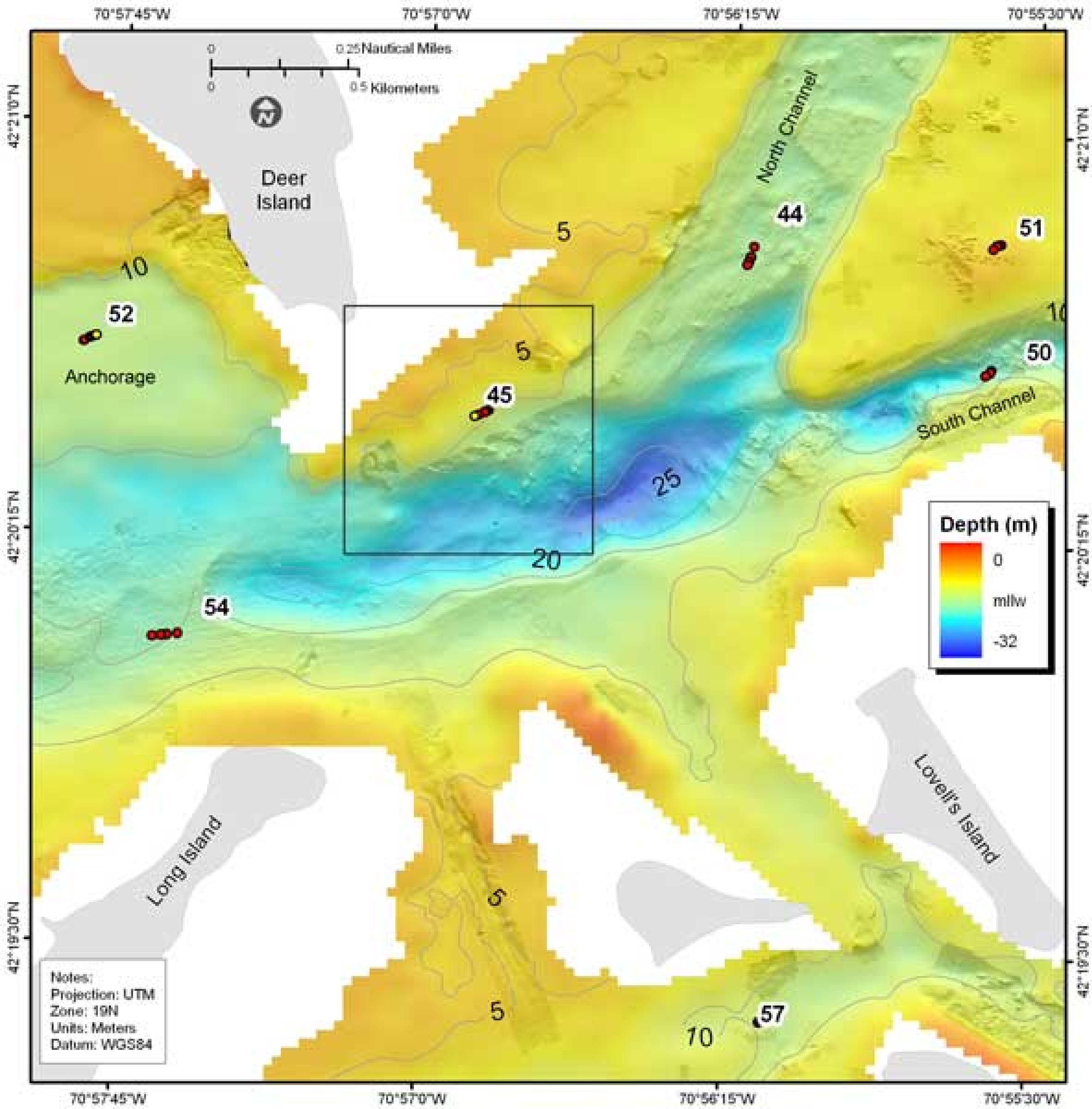


Figure 4.7. Shaded-relief bathymetry, colored by water depth, of the depression south of Deer Island where the deepest water in Boston Harbor occurs (about 28 m deep). See figure 4.2 for map location. Red dots show location of bottom photographs (see Appendix 3 to view all photographs at these locations); yellow dot is location of bottom sediment sample (Appendix 2); number is station identifier.

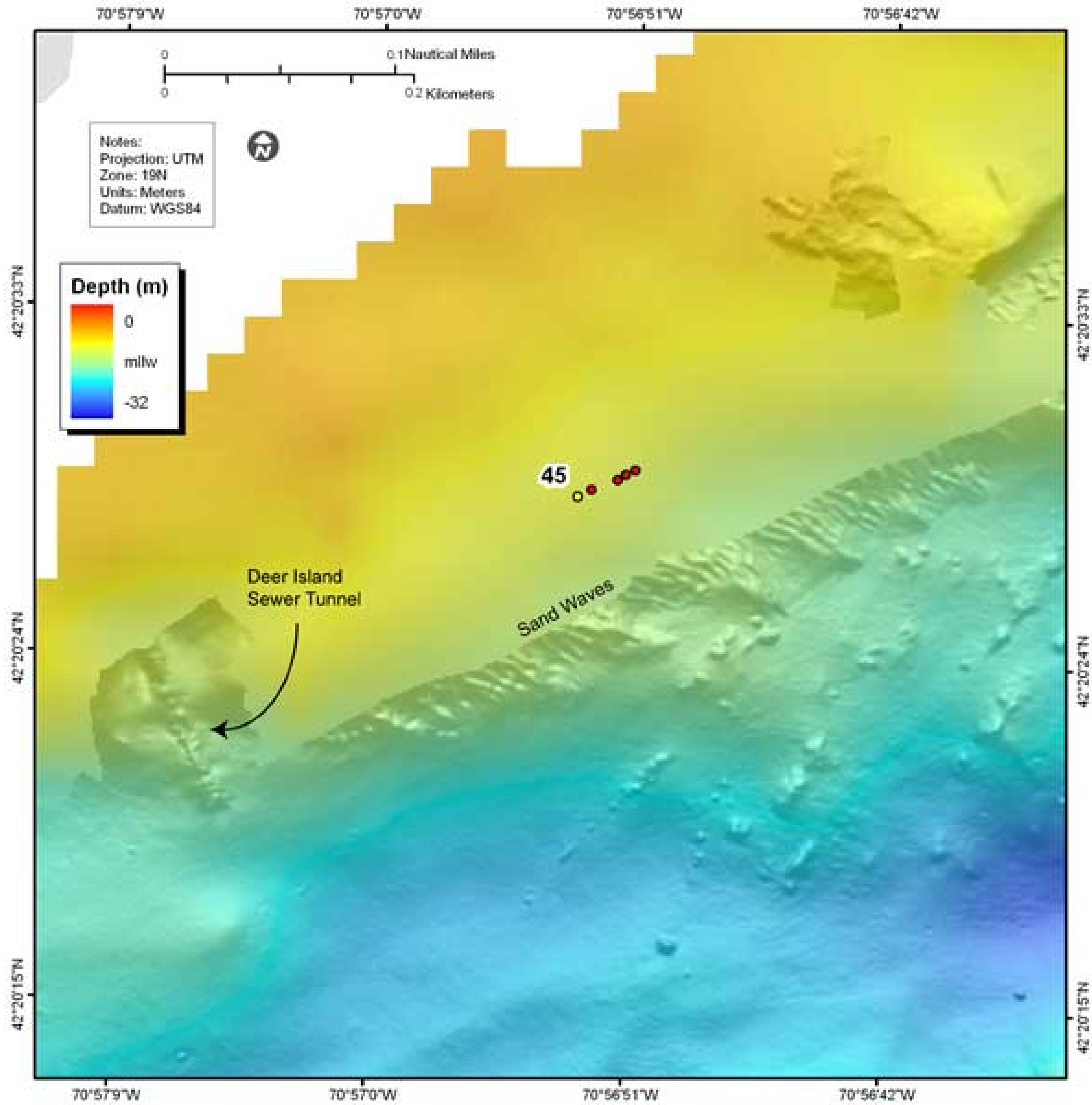


Figure 4.8. Shaded-relief bathymetry, colored by water depth, showing sand waves along the northern side of the navigation channel south of Deer Island (see fig. 4.2 for map location). The sand waves are less than a meter high and have wavelengths of about 10 m. Red dots show location of bottom photographs (see Appendix 3 to view all photographs at these locations); yellow dot is location of bottom sediment sample (Appendix 2); number is station identifier.

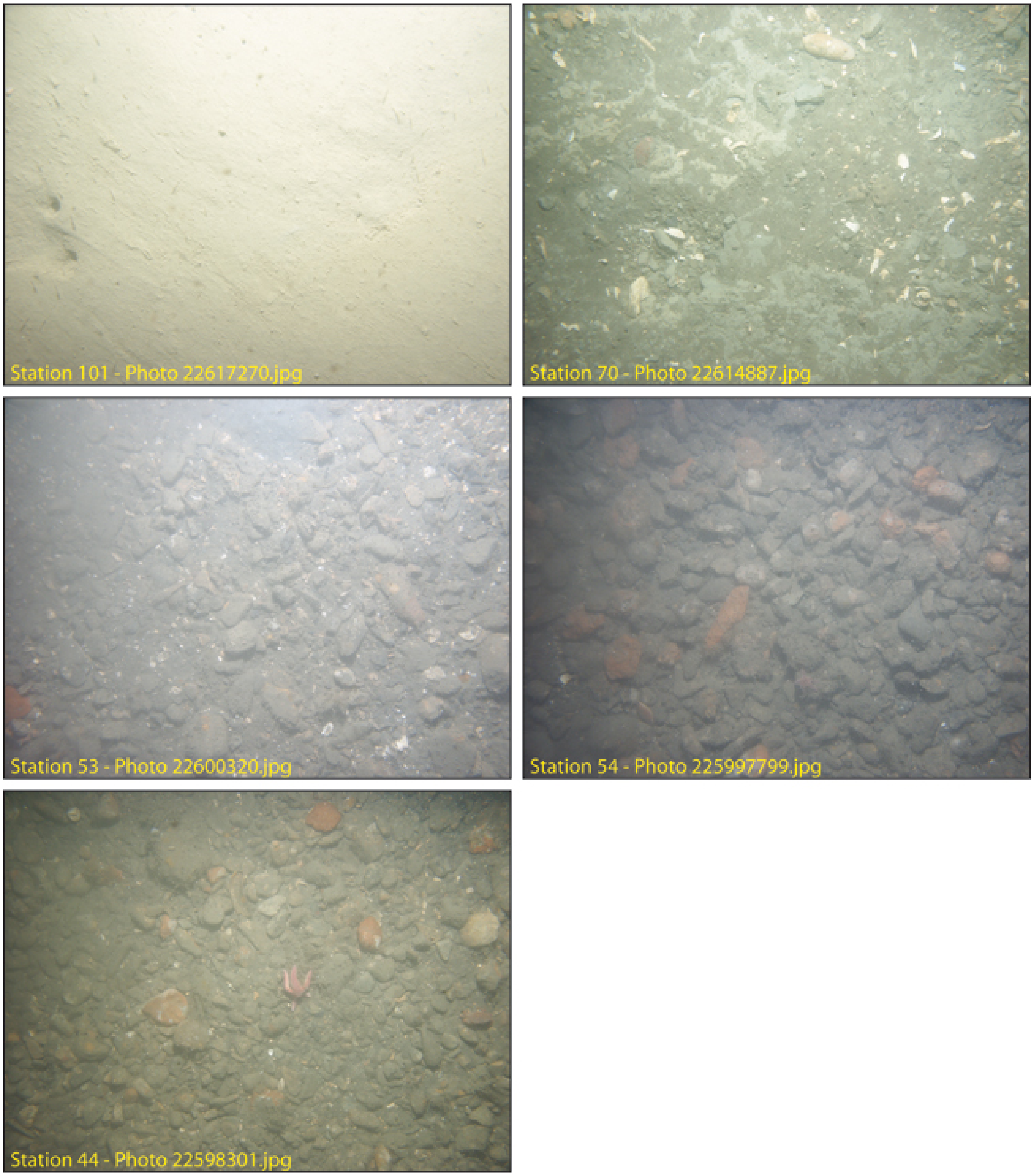


Figure 4.9. Photographs of the sea floor along the navigation channel, showing the transition for fine-grained mud in the inner harbor to a gravel pavement in the outer harbor (stations 101, 70, 53, 54, and 44). See figure 4.3 for station locations. See Appendix 3 for more photographs at these stations. The field of view of each image is approximately 50 cm wide.

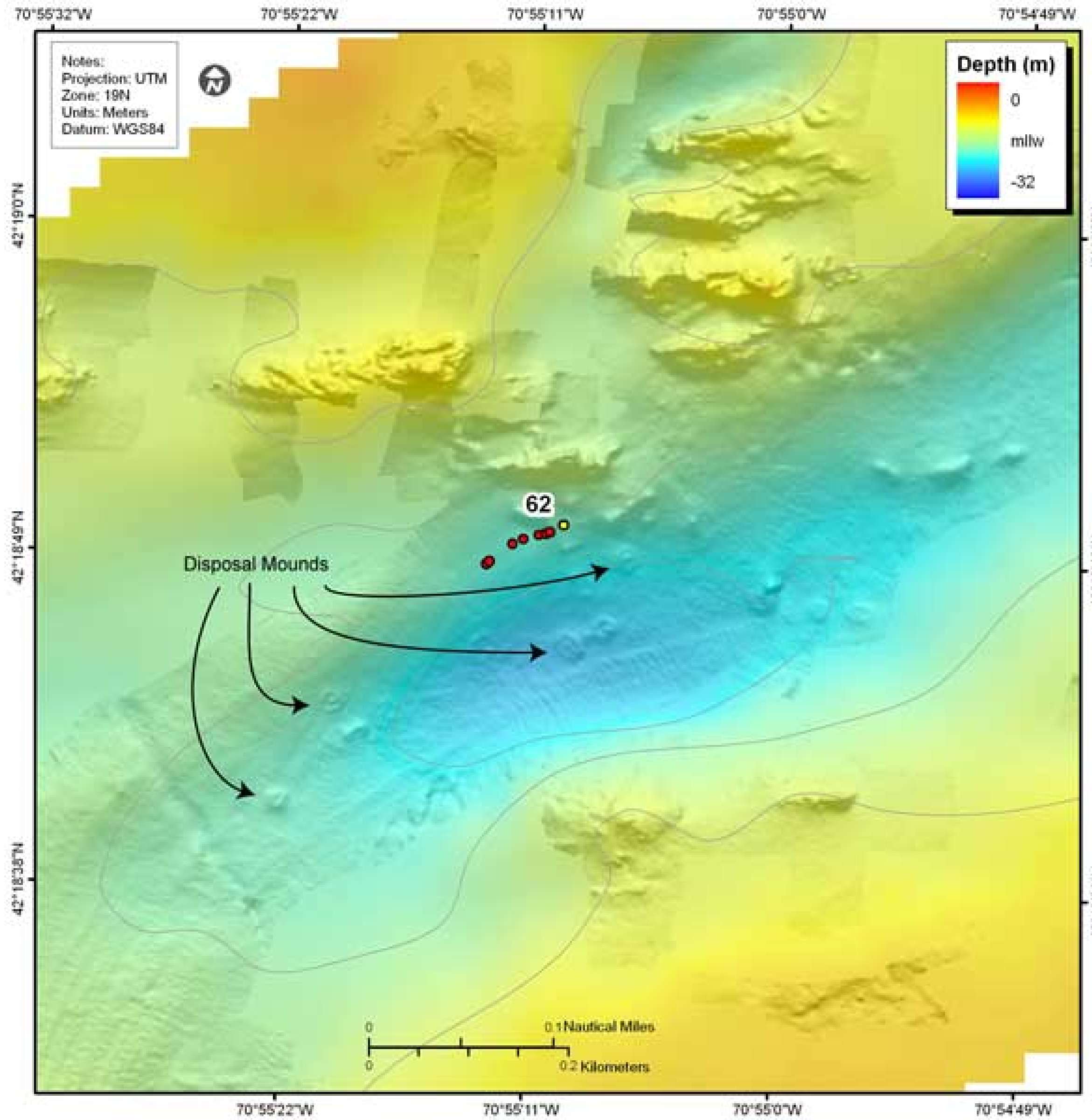


Figure 4.10a. Shaded-relief bathymetry showing disposal of dredged material in the topographic low north of Hull. See figure 4.2 for map location. See Appendix 3 for photographs at Station 62.

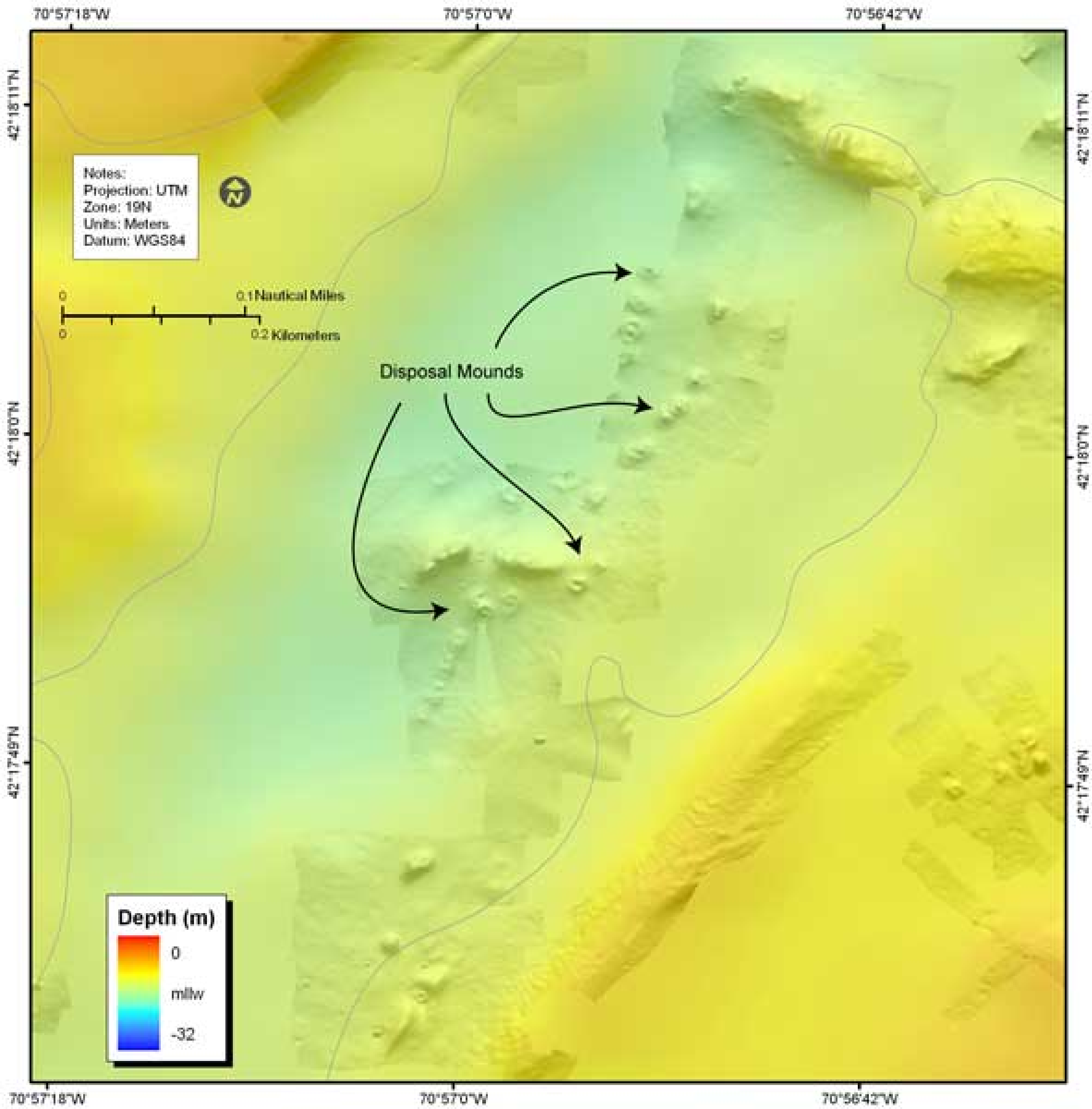


Figure 4.10b. Shaded-relief bathymetry, colored by water depth, showing disposal of dredged material in the topographic low north of Peddocks Island. See figure 4.2 for map location.

Figure 4.11. Photographs of the sea floor in areas of high backscatter intensity north, east and south of Peddocks Island (stations 62, 58, 65, and 67). See figure A3.1 for station locations. See Appendix 3 for additional photographs at these stations. The field of view of each image is approximately 50 cm wide.

Figure 4.12. Photographs of the sea floor in areas of low backscatter intensity south of Long Island and southeast of Peddocks Island (stations 63 and 61). See figure A3.1 for station locations and Figure 4.3 for sediment texture. See Appendix 3 for additional photographs at these stations. The field of view of each image is approximately 50 cm wide.

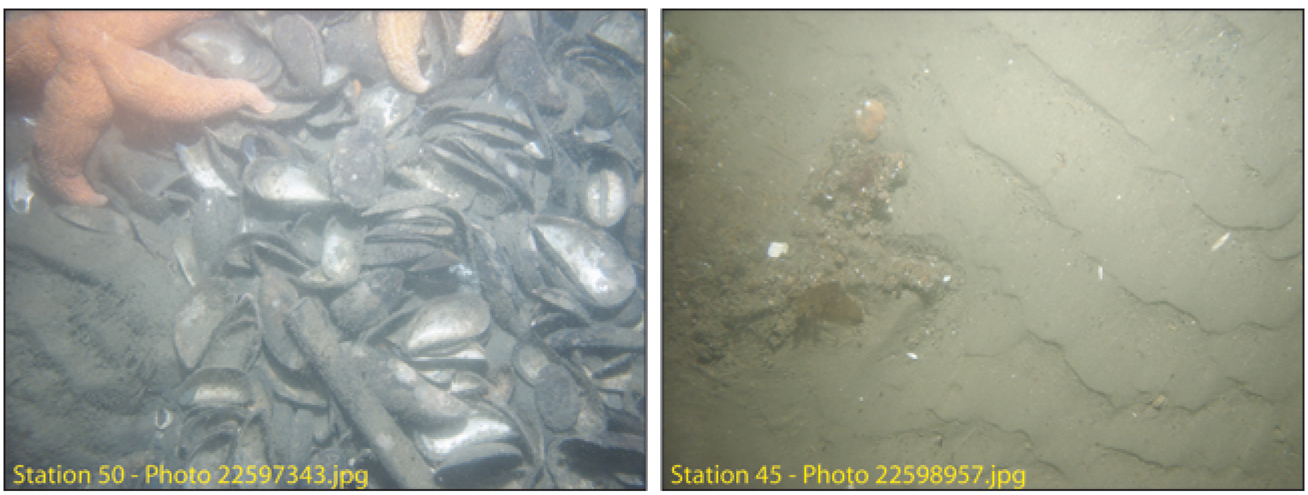


Figure 4.13. Photographs of the sea floor in the south Channel (station 50) and in a small area of low backscatter intensity southeast of Deer Island (station 45). See figure A3.1 for station locations locations. See Appendix 3 for additional photographs at these stations. The field of view of each image is approximately 50 cm wide.

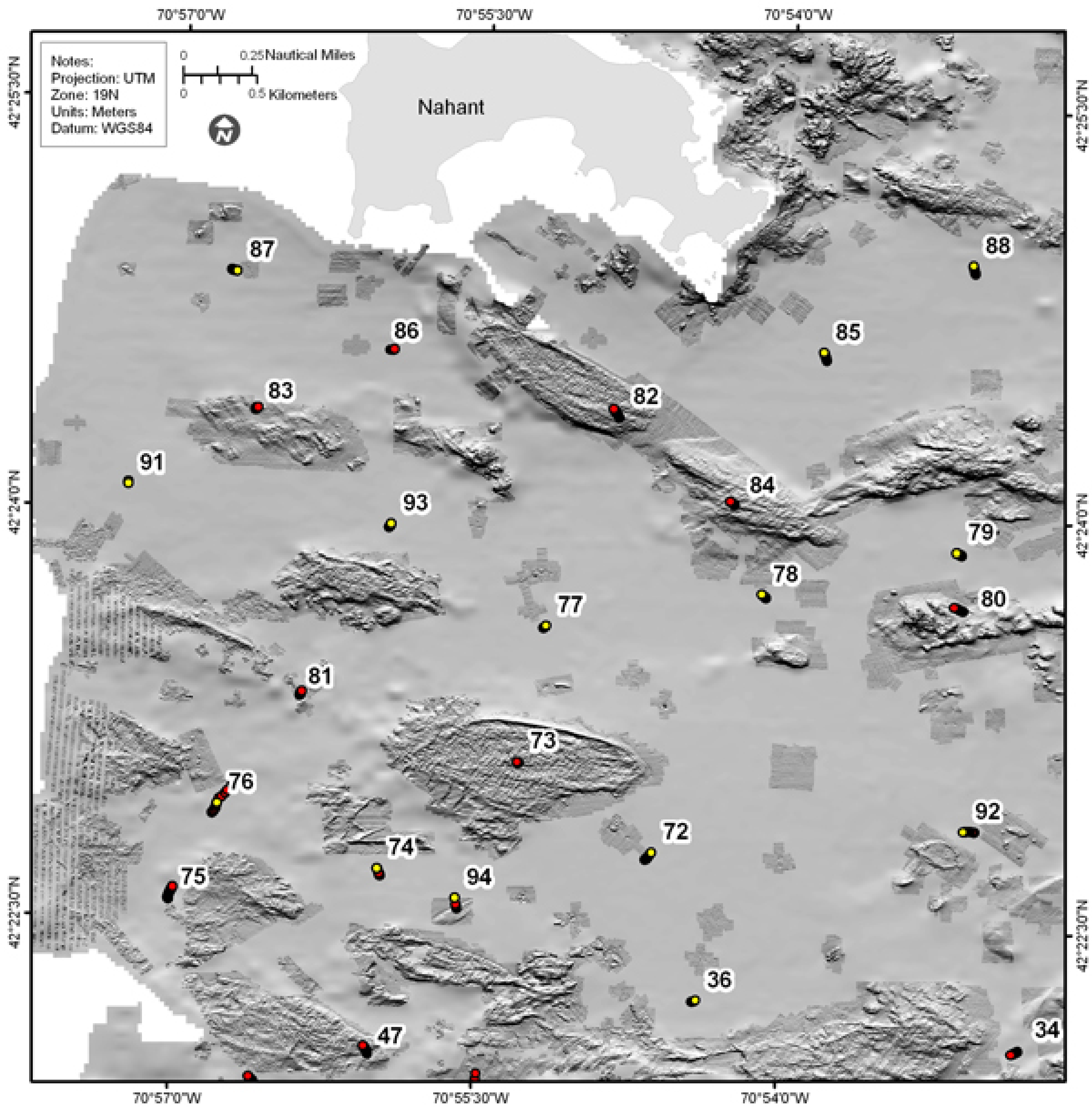


Figure 4.14a. Shaded-relied bathymetric map of the Approaches to Boston Harbor, north of the Harbor Islands and south of Nahant, including Broad Sound (see fig. 4.2 for map location). The darker patches indicate the areas where multibeam bathymetry was collected and data gridded at 2 m; the rest of the area was mapped by single-beam sonar and gridded at 30 m. The sea floor in this region is characterized by elevated rough areas, some of which are hypothesized to be drumlins reworked by rising sea level. See figure 4.15 for selected photographs at stations 72, 73, and 84. See figure 4.14b for companion sidescan-sonar image.

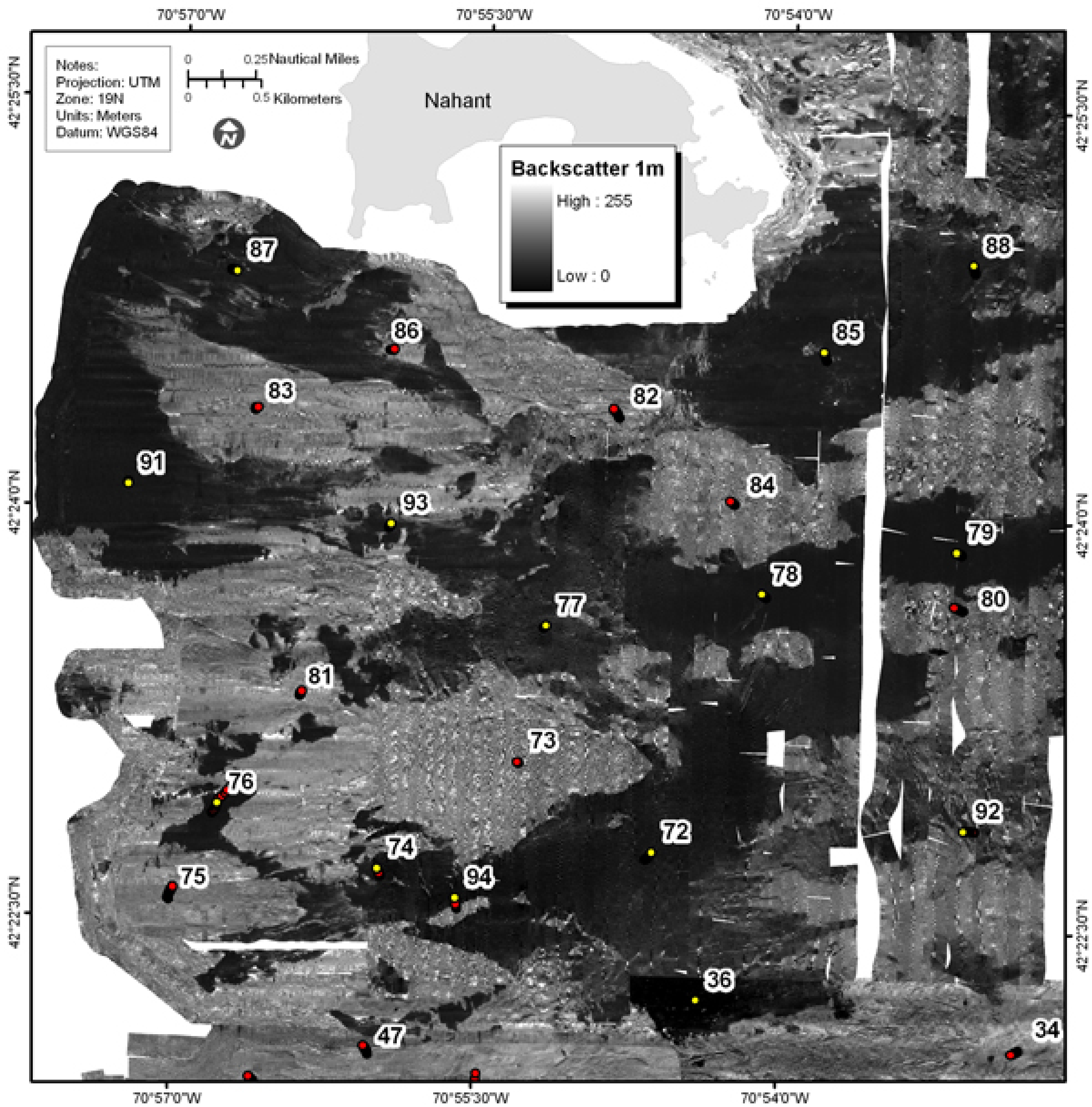


Figure 4.14b. Backscatter intensity from sidescan-sonar of the Approaches to Boston Harbor, north of the Harbor Islands and south of Nahant, including Broad Sound (see fig. 4.2 for map location). The sea floor in this region is characterized by elevated rough areas, some of which are hypothesized to be drumlins reworked by rising sea level. Red dots show location of bottom photographs (see Appendix 3 to view all photographs at these locations); yellow dot is location of bottom sediment sample (Appendix 2); number is station identifier. See figure 4.14a for companion shaded-relief map.

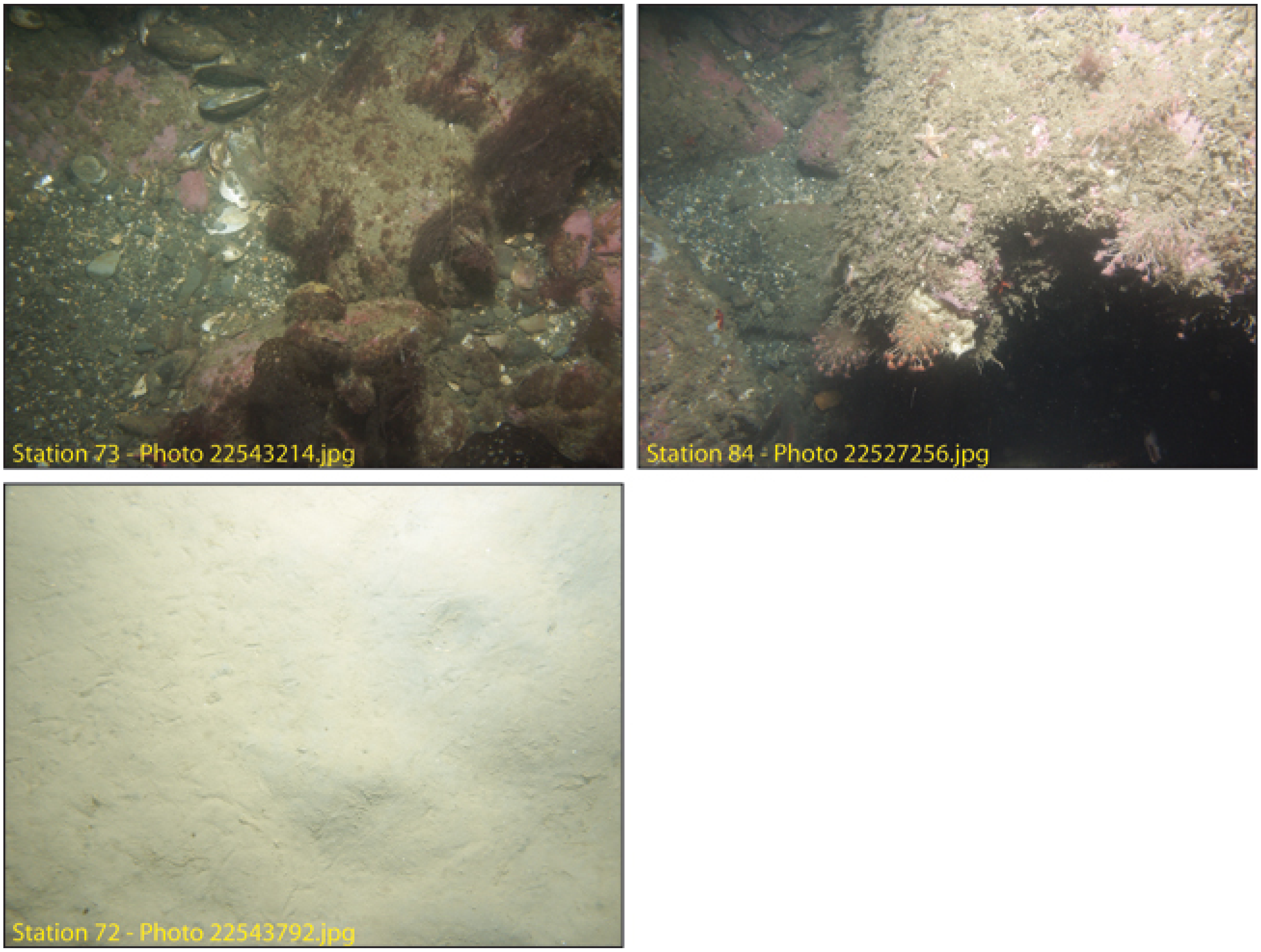


Figure 4.15. Photographs of the sea floor in areas of elevated topography, rough sea floor, and high backscatter intensity (stations 73 and 84, fig. 4.14) in Broad Sound. The boulders are covered with a pink calcerous algae. The sea floor between these features is sand (station 72). See figure 4.14b for station locations. See Appendix 3 for additional photographs at these stations. The field of view of each image is approximately 50 cm wide.

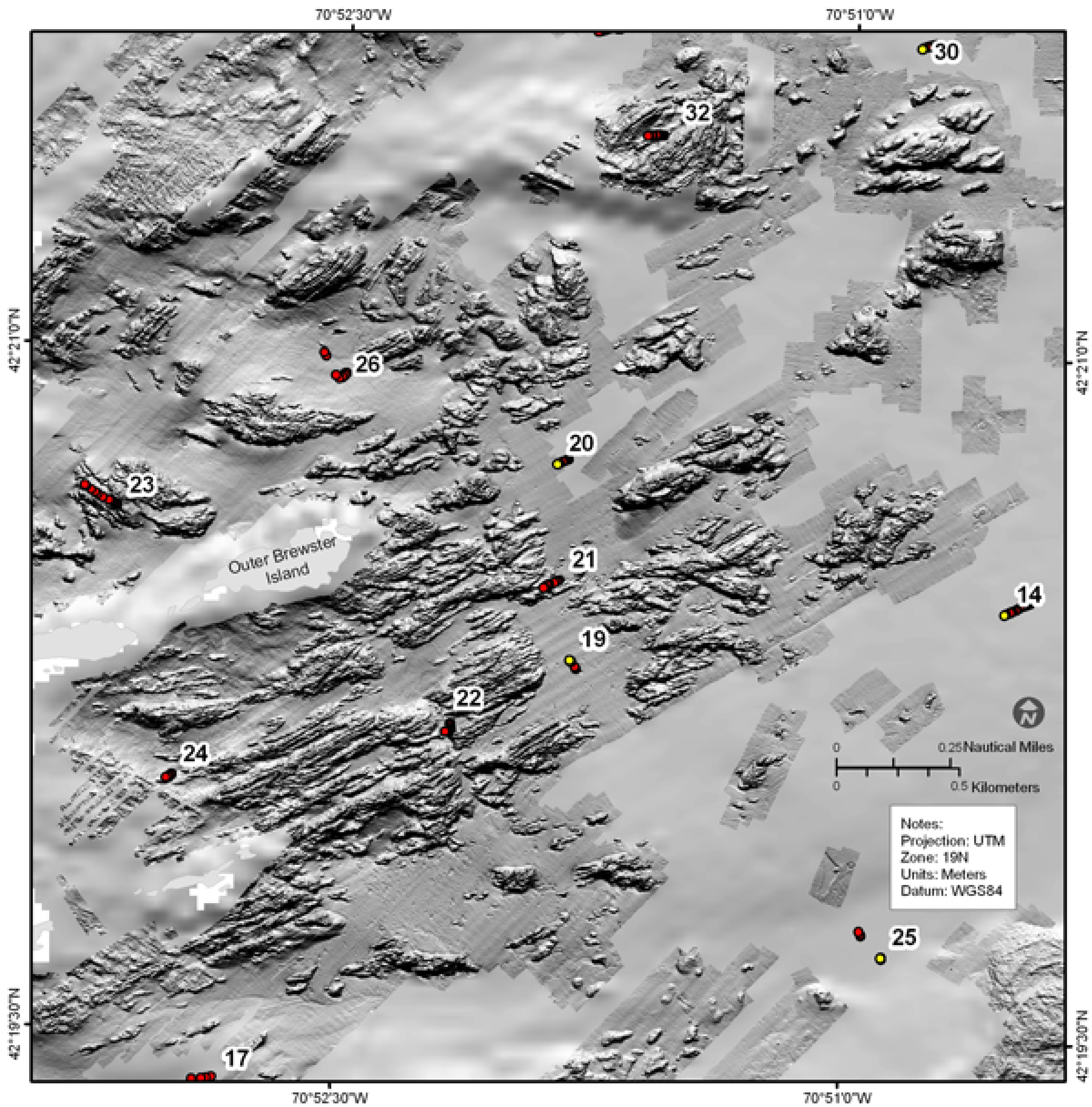


Figure 4.16a. Shaded-relief bathymetric map showing outcropping ledges east of the Brewster Islands (see fig. 4.2 for map location). The darker patches indicate the areas where multibeam bathymetry was collected and the data gridded at 2 m; the rest of the area was mapped by single-beam sonar and the data gridded at 30 m. These ENE-WSW-trending features exhibit the largest topographic variability in the study area. See figure 4.16b for companion sidescan sonar image.

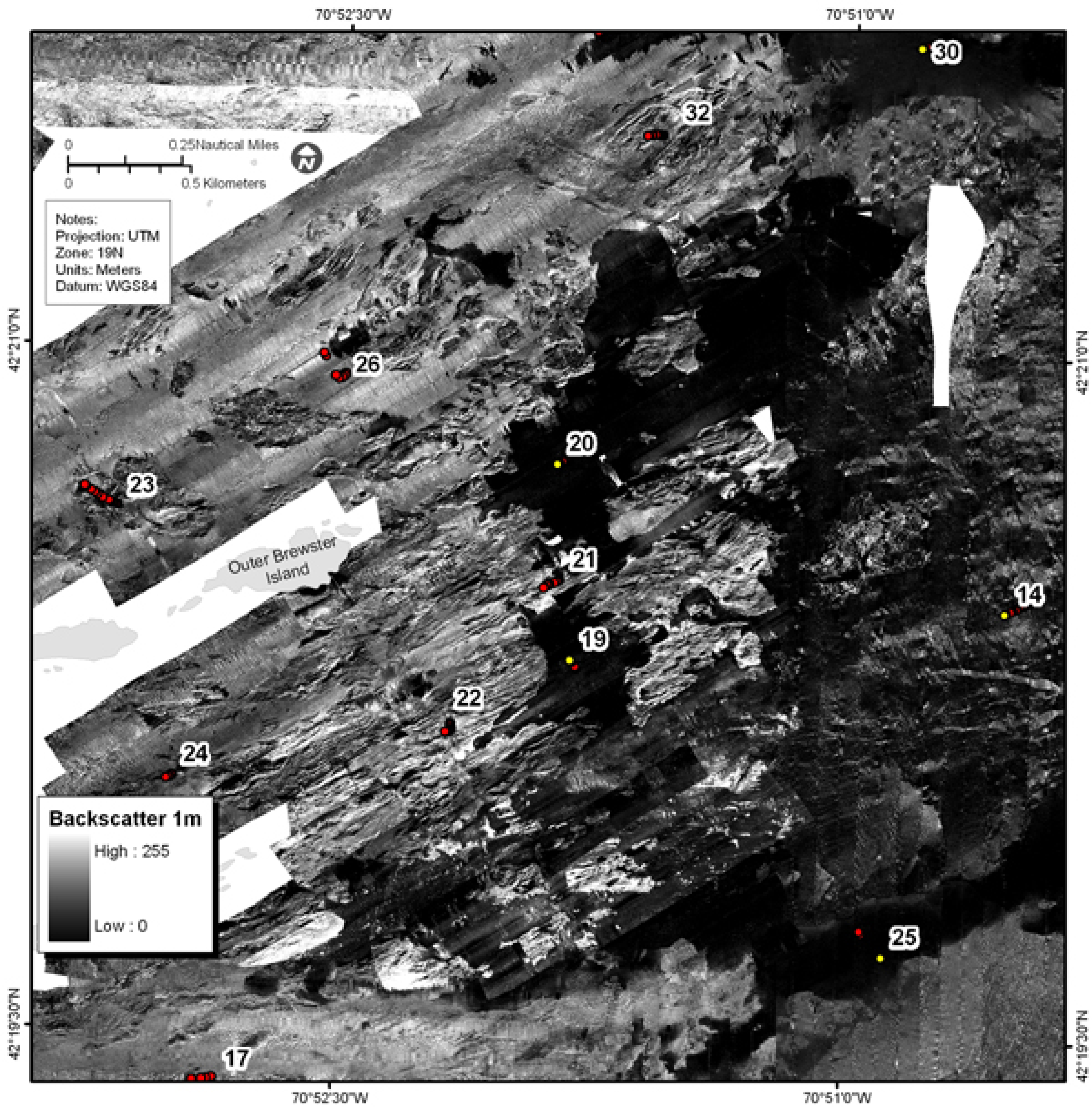


Figure 4.16b. Backscatter intensity from sidescan-sonar showing outcropping ledges east of the Brewster Islands (see fig. 4.2 for map location). These ENE-WSW-trending features exhibit the largest topographic variability in the study area and are characterized by moderate backscatter intensity. Red dots show location of bottom photographs (see Appendix 3 to view all photographs at these locations); yellow dot is location of bottom sediment sample (Appendix 2); number is station identifier. See figure 4.16a for companion shaded-relief map.

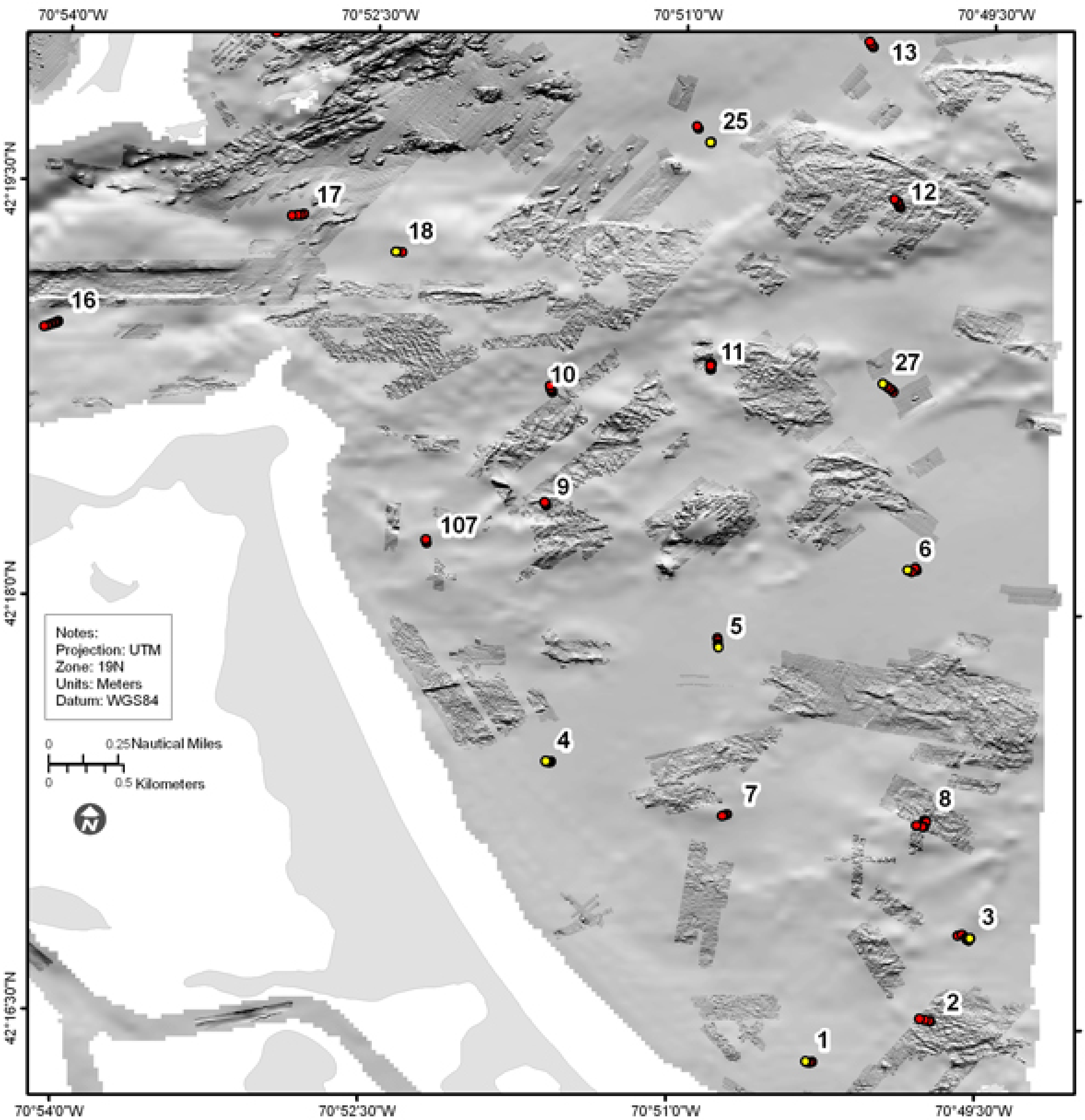


Figure 4.17a. Shaded-relief bathymetric map, colored by water depth, showing elevated areas and sand ribbon, east of Nantasket Beach (see fig. 4.2 for map location). The darker patches indicate the areas where multibeam bathymetry was collected and the data gridded at 2 m; the rest of the area was mapped by single-beam sonar and the data gridded at 30 m. See figure 4.17b for companion sidescan-sonar image. See figure 4.18 for selected photographs at stations 5, 6, 8, and 10.

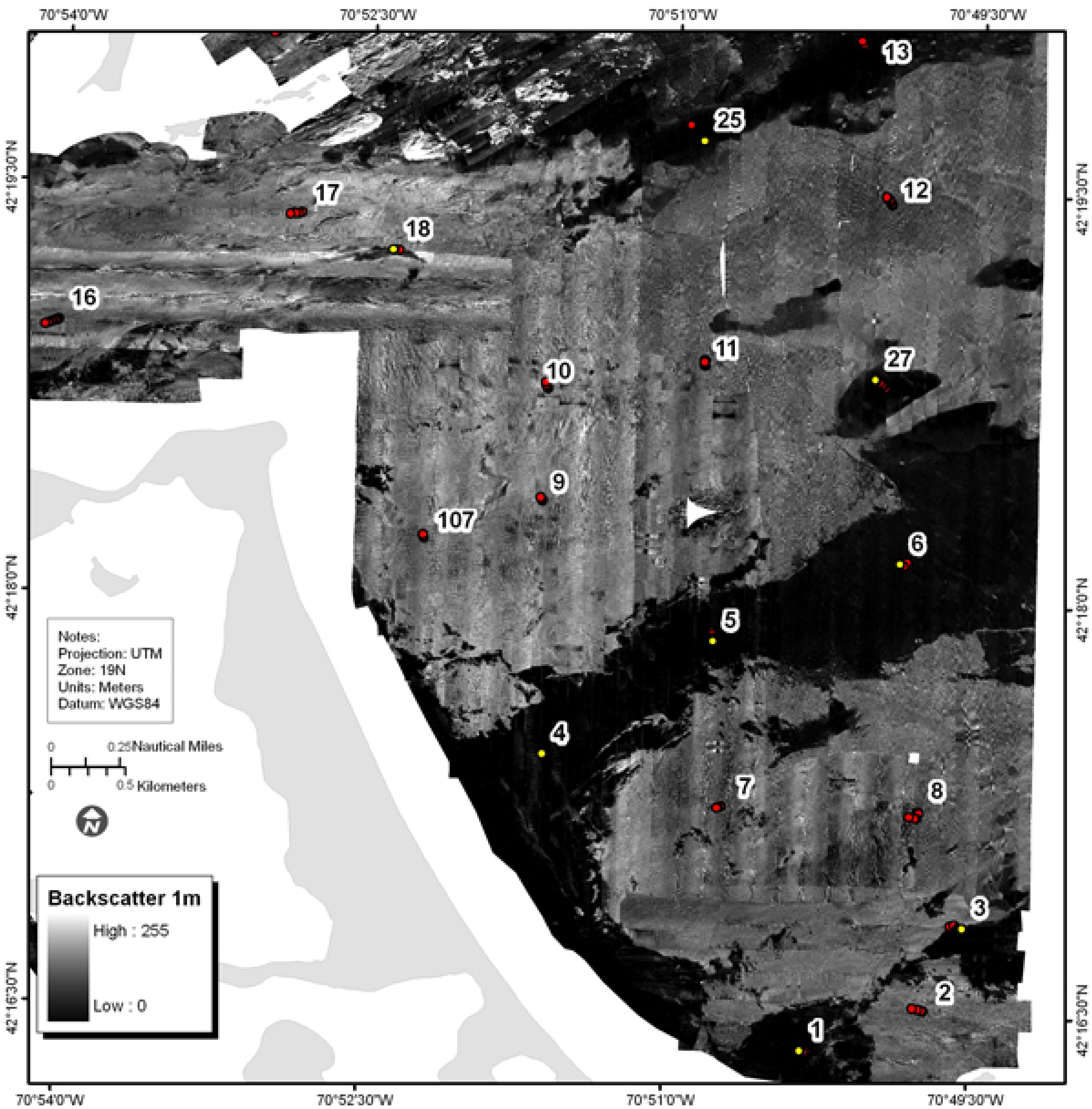


Figure 4.17b. Backscatter intensity from sidescan-sonar of area east of Nantasket Beach (see fig. 4.2 for location). The elevated areas are characterized by high backscatter intensity and the sand ribbon by low backscatter intensity. Red dots show location of bottom photographs (see Appendix 3 to view all photographs at these locations); yellow dot is location of bottom sediment sample (Appendix 2); number is station identifier. See figure 4.17a for companion shaded-relief map.

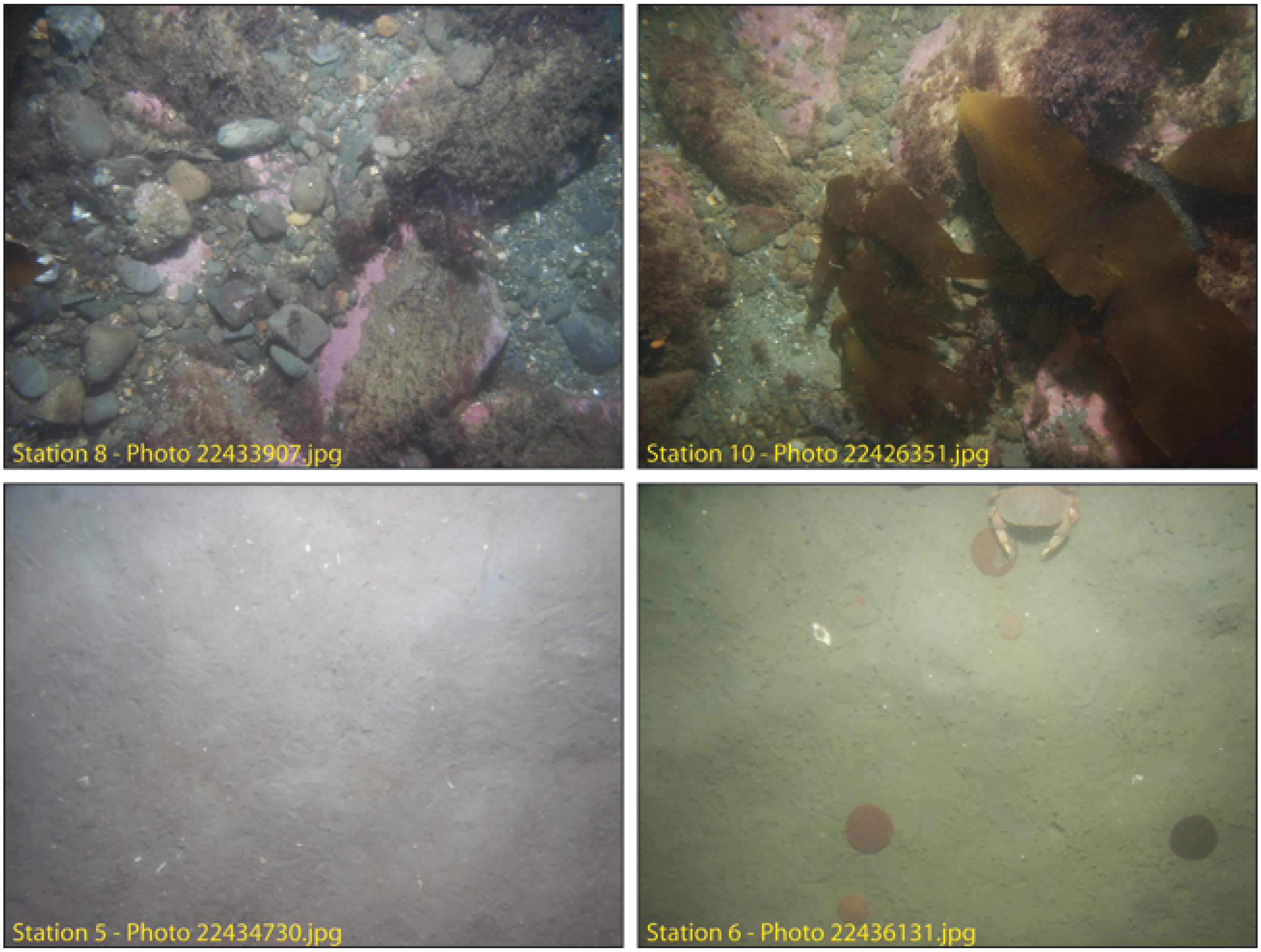


Figure 4.18. Photographs of the sea floor in areas of elevated topography, rough sea floor, and high backscatter intensity (stations 8 and 10, 11.0 and 11.5 m water depth respectively) east of Nantasket. The pink on the boulders is calcareous algae. The sea floor between these features is sand (stations 5, 6, 13.4 and 16.0 m water depth respectively). See figure 4.17b for station locations. See Appendix 3 for additional photographs at these stations. The field of view of each image is approximately 50 cm wide.

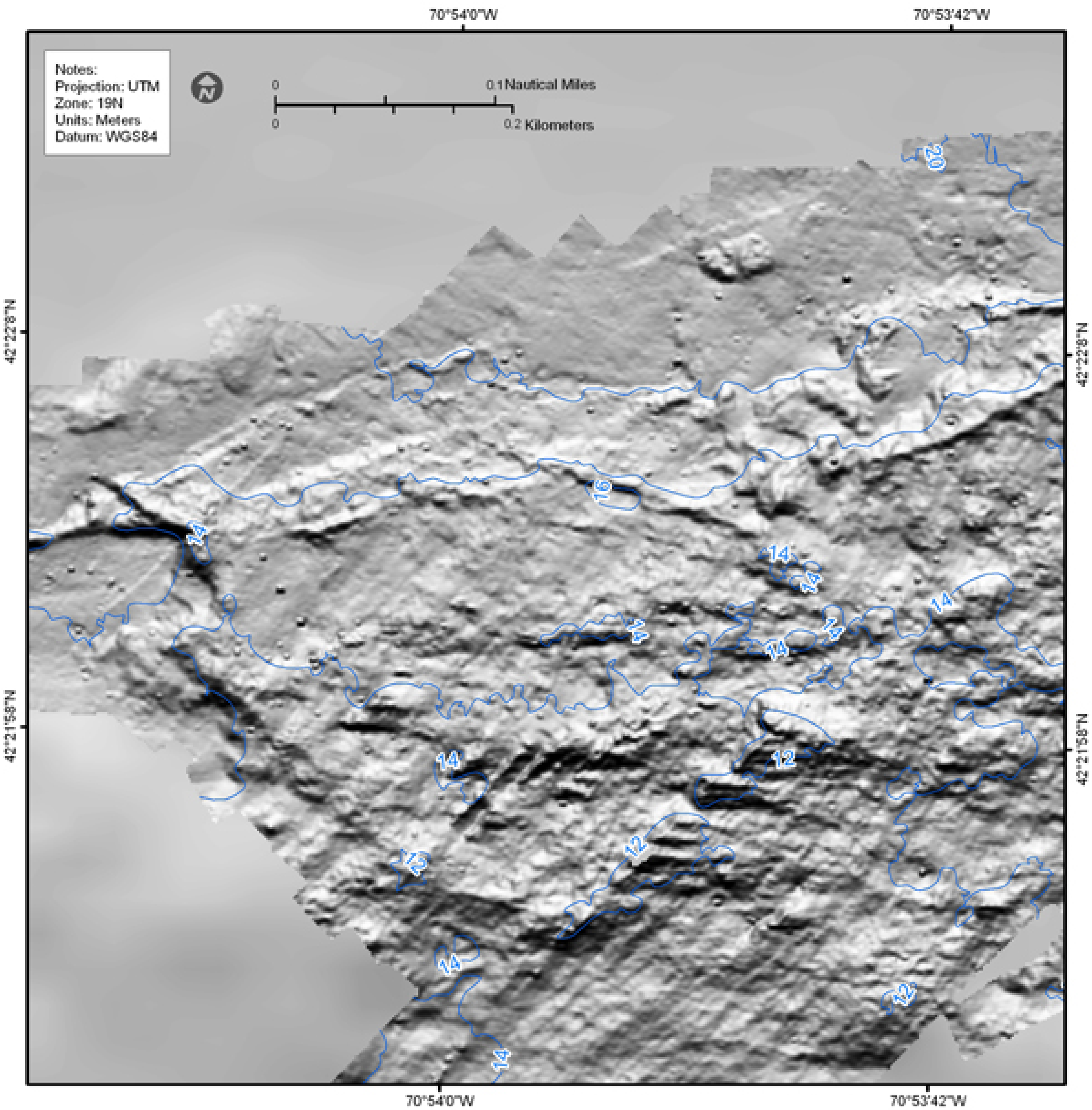


Figure 4.19. Shaded-relief bathymetric map showing numerous individual targets 4-6 m on a side and less than a meter high that are interpreted to be individual boulders. Similar targets are observed in the 2-m multibeam bathymetry in nearly all of the areas with a rough sea floor. See figure 4.2 for map location.

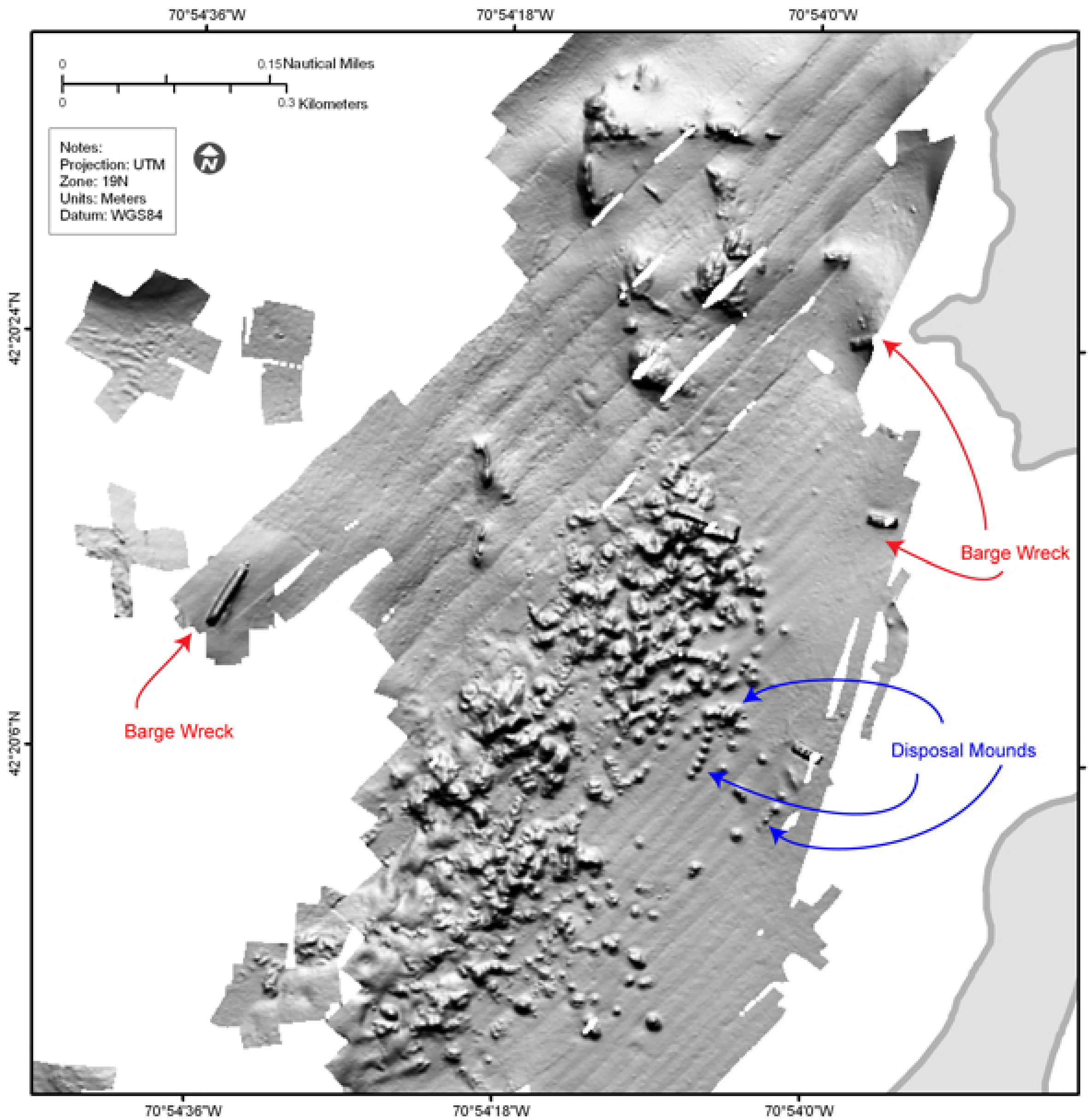


Figure 4.20. Shaded-relief bathymetry bathymetric map of the area west of Great Brewster and Calf Island showing barge wrecks and mounds of dredged material on the sea floor. See figure 4.2 for map location.

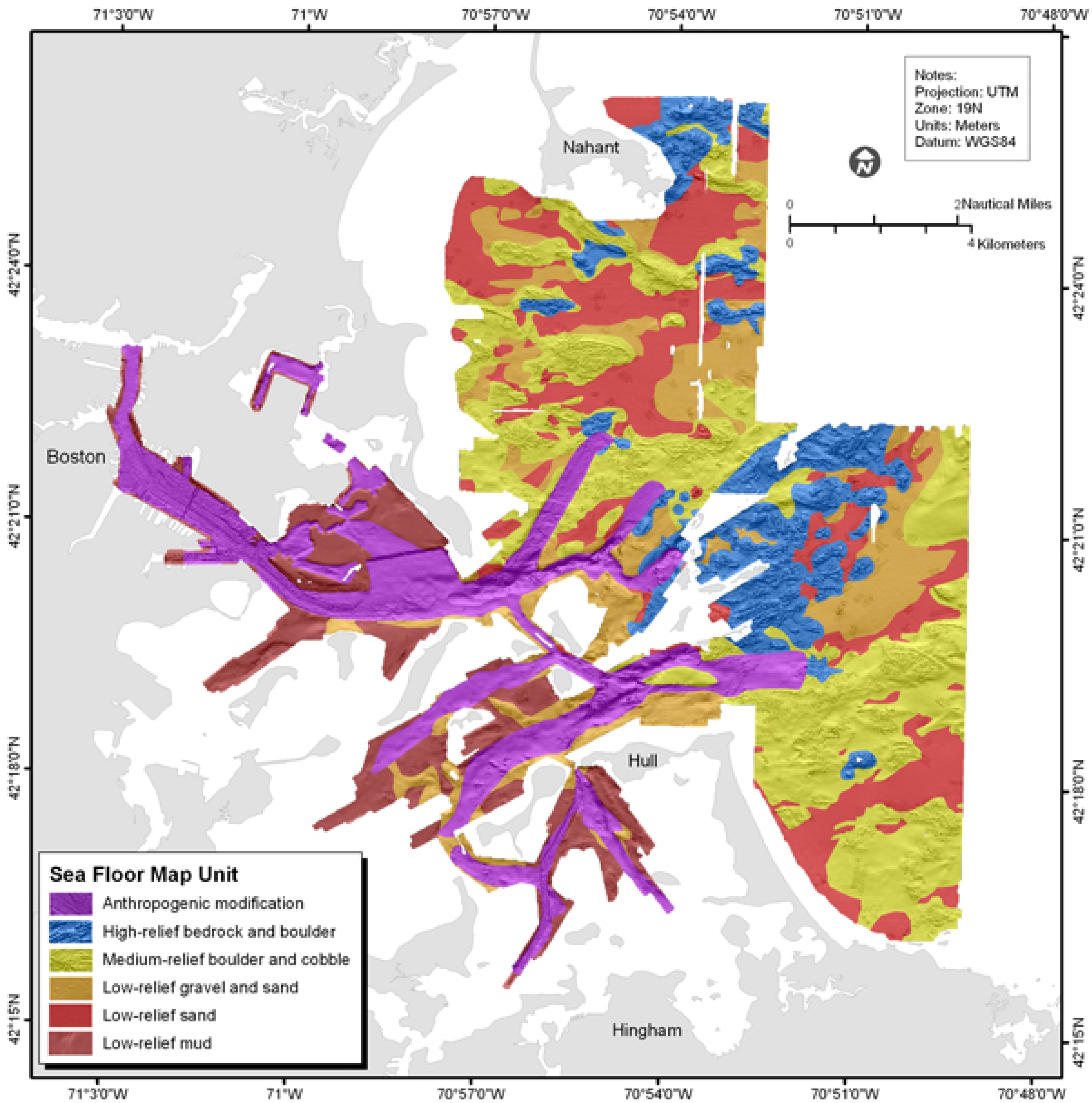


Figure 4.21. Physiographic units of the sea floor of Boston Harbor and Approaches, based on bottom roughness, backscatter intensity, and sediment texture.

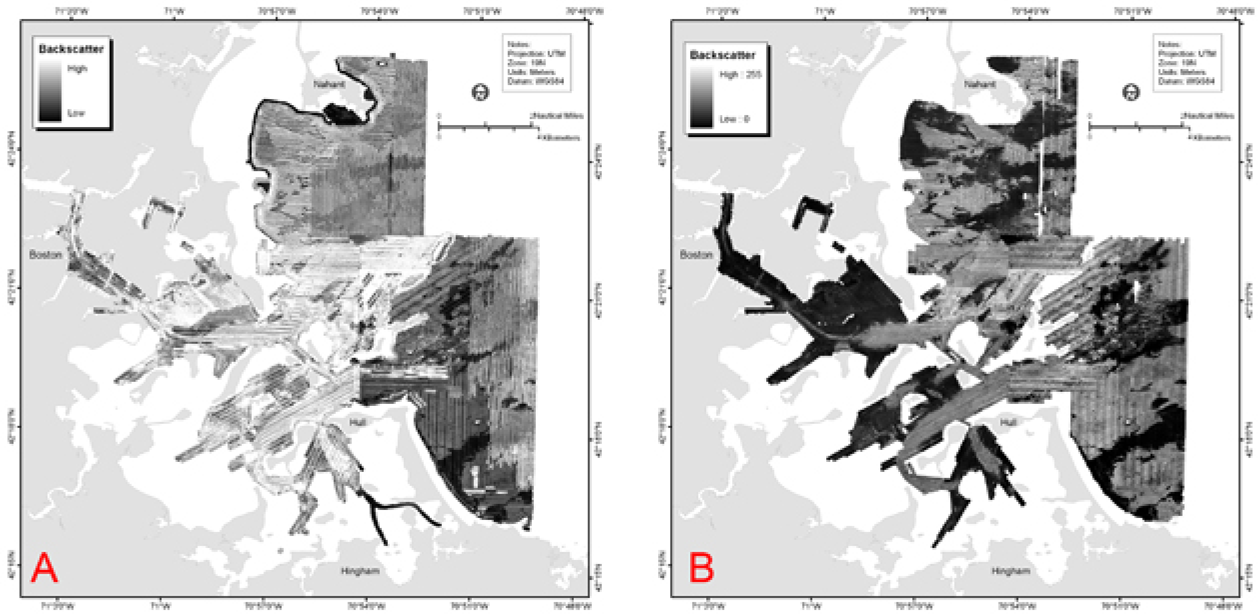


Figure 4.22. Sidescan sonar mosaic (A) assembled in the field during the hydrographic surveys and (B) the mosaic assembled from reprocessed sidescan-sonar data. The mosaics are qualitatively similar, but the reprocessed mosaic has more uniform intensity and improved resolution.

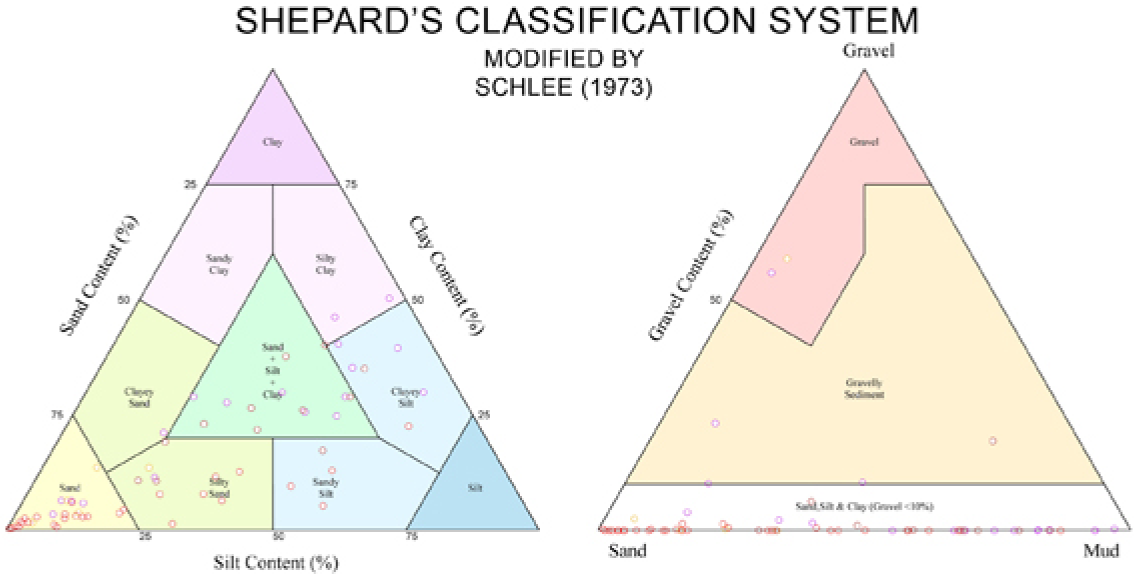


Figure A2.1. Texture of surficial sediment collected in grab samples shown on ternary diagrams. The stations are keyed to the map units (see fig. 4.21). Texture of the rough sea-floor zones is not represented, as samples could not be collected in areas of boulders or gravel pavement.

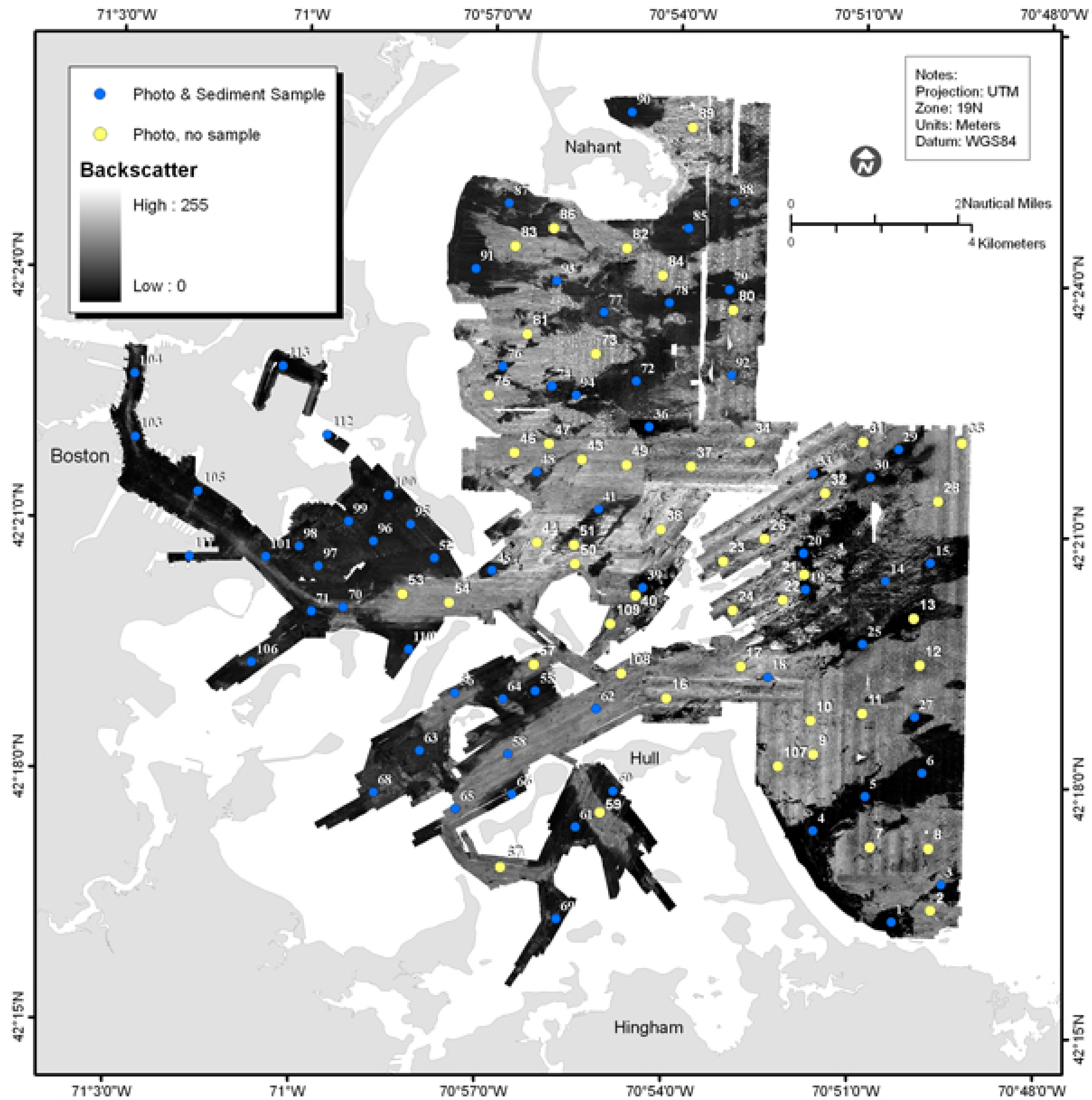


Figure A3.1. Map showing bottom sample locations and bottom photo locations overlain on the sidescan-sonar imagery. Photographs and video were obtained at all sites. Samples could not be collected at sites where the bottom was cobble or rocky (yellow dots). See Appendix 3 for a photo gallery of the images from the ground-truth survey.