W00505

U.S. Department of Commerce
National Oceanic and Atmospheric Administration
National Ocean Service

DESCRIPTIVE REPORT

Type of Survey:	Navigable Area
Registry Number:	W00505

LOCALITY

State(s):	Maine
General Locality:	Atlantic Ocean
Sub-locality:	Coastal Waters of York Harbor, Maine

2017

CHIEF OF PARTY
Semme Dijkstra

LIBRARY & ARCHIVES

Date:

U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION	REGISTRY NUMBER:
HYDROGRAPHIC TITLE SHEET	**W00505**

INSTRUCTIONS: The Hydrographic Sheet should be accompanied by this form, filled in as completely as possible, when the sheet is forwarded to the Office.

State(s):	**Maine**
General Locality:	**Atlantic Ocean**
Sub-Locality:	**Coastal Waters of York Harbor, Maine**
Scale:	**20000**
Dates of Survey:	**06/05/2017 to 07/05/2017**
Instructions Dated:	**06/05/2017**
Project Number:	**ESD-PHB-20**
Field Unit:	**University of New Hampshire**
Chief of Party:	**Semme Dijkstra**
Soundings by:	**Kongsberg Maritime EM 2040** (**MBES**)
Imagery by:	**Kongsberg Maritime EM 2040** (**MBES Backscatter**)
Verification by:	**Pacific Hydrographic Branch**
Soundings Acquired in:	**meters at Mean Lower Low Water**

Remarks:

Any revisions to the Descriptive Report (DR) applied during office processing are shown in red italic text. The DR is maintained as a field unit product, therefore all information and recommendations within this report are considered preliminary unless otherwise noted. The final disposition of survey data is represented in the NOAA nautical chart products. All pertinent records for this survey are archived at the National Centers for Environmental Information (NCEI) and can be retrieved via https://www.ncei.noaa.gov/. Products created during office processing were generated in WGS84 UTM 19N, Mean Lower Low Water. All references to other horizontal or vertical datums in this report are applicable to the processed hydrographic data provided by the field unit.

DESCRIPTIVE REPORT MEMO

May 06, 2020

MEMORANDUM FOR: Pacific Hydrographic Branch

FROM: Report prepared by PHB on behalf of field unit
Colin Stewart
Physical Scientist, Pacific Hydrographic Branch

SUBJECT: Submission of Survey W00505

Data were acquired by the University of New Hampshire's (UNH) Center for Coastal and Ocean Mapping (CCOM) Summer Hydrographic Surveying course. These data were collected to fill a gap in coverage off the southern coast of Maine with complete multibeam coverage to meet IHO Special Order specifications and to update nautical charts in this region with current data.

Included products are a processed bathymetric grid, MBES backscatter mosaic and report documentation for archive at NCEI.

All soundings were reduced to Mean Lower Low Water using Constant Separation. The horizontal datum for this project is World Geodetic System (WGS) 1984. The projection used for this project is Universal Transverse Mercator (UTM) Zone 19.

Further horizontal and vertical control information can be found in the Descriptive Report and Horizontal and Vertical Control Report.

All survey systems and methods utilized during this survey were as described in the Data Acquisition and Processing Report.

Three (3) DTONs were submitted to NDB during the prioritization phase of the review at the Pacific Hydrographic Branch.

University of New Hampshire, Center for Coastal and Ocean Mapping, Joint Hydrographic Center acquired the data outlined in this report.

Significant findings can be found in the field provided Descriptive Report attached.

This survey does meet charting specifications and is adequate to supersede prior data.

University of New Hampshire
Center for Coastal and Ocean Mapping
Joint Hydrographic Center

Descriptive Report

University of New Hampshire

Type of Survey:	Navigable Area

LOCALITY

States(s):	Maine
General Locality:	Atlantic Ocean
Sub-Locality:	Coastal Waters of York Harbor (Maine), Great Boars Head to Salisbury Beach

2017

Group Members:

Masanao Sumiyoshi	Sattiabaruth Seeboruth
Jose M. Cordero Ros	Mohamed Eisaied
Tinah Martin	Daniel Tauriello
Pichet Puahengsup	Cassandra Bongiovanni
Michael Smith	Kevin Rychert
Coral Moreno	Ivan Ryzhov

Chief of Party: Semme Dijkstra and Andy Armstrong

Survey

Dates:	June 13th – June 30th 2017

UNIVERSITY OF NEW HAMPSHIRE CENTER FOR COASTAL AND OCEAN MAPPING JOINT HYDROGRAPHIC CENTER	GROUP NAME:

HYDROGRAPHIC TITLE SHEET	GROUP NAME

INSTRUCTIONS: The hydrographic sheet should be accompanied by this form, filled in as completely as possible when it is forwarded to the office

State(s):	Maine
General Locality	Atlantic Ocean
Sub-Locality:	Coastal Waters of York Harbor (Maine), Great Boars Head to Salisbury Beach
Scale:	1:20,000
Dates of Survey:	05 June – 05 July
Instructions Date:	5 June 2017
Field Unit:	CCOM *R/V Gulf Surveyor*
Soundings by:	Kongsberg EM2040 Multibeam Echo Sounder
Imagery by:	Kongsberg EM2040 Backscatter Imagery
Soundings Acquired in :	Meters at WGS84

Remarks:

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Survey Area Described

I. Area Surveyed

a) Survey limits

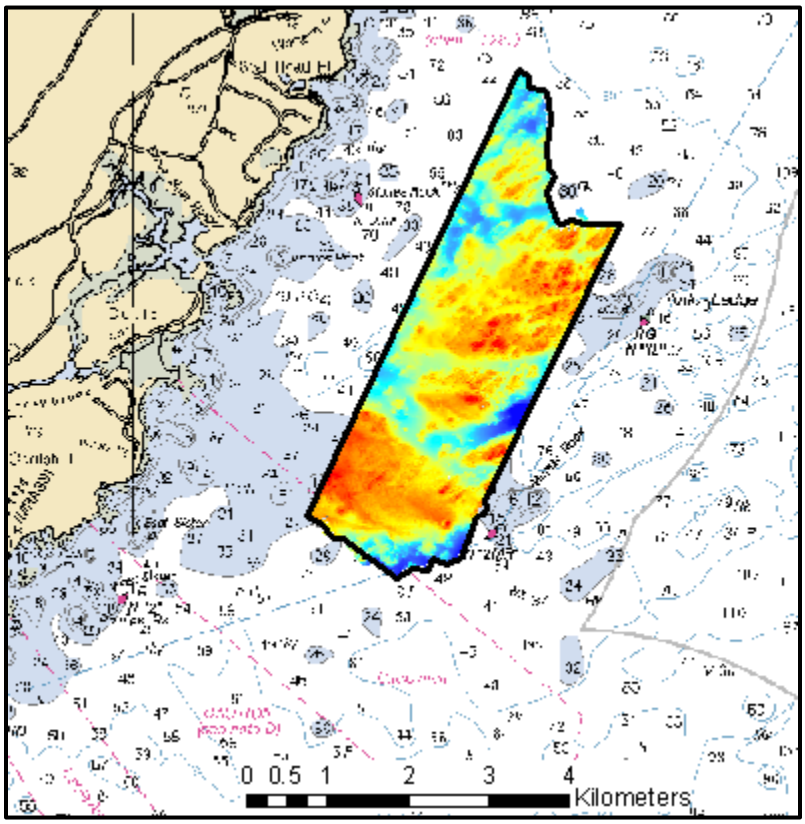

Figure 1: Survey Area.

The Gulf of Maine Survey (Figure 1) was surveyed with a strut-mounted Kongsberg EM2040 and a stern-mounted Rolls-Royce MVP30 onboard the 48-foot catamaran R/V Gulf Surveyor. The survey area was covered over the course of three weeks, June 14-June 30, 2017. The data were collected in accordance to NOS HSSD specifications and meet IHO Special Order standards.

The Gulf of Maine Survey is within the following limits:

Northeast Limit	Southwest Limit

43° 7' 12.36" N	43° 3' 46.44" N
70° 35' 25.08"W	70° 38' 27.6" W

Table 1: Survey limits

b) Survey purpose

Data were acquired by the University of New Hampshire's (UNH) Center for Coastal and Ocean Mapping (CCOM) Summer Hydrographic Surveying course. These data were collected to fill a gap in coverage off the southern coast of Maine with complete multibeam coverage to meet IHO Special Order specifications and to update nautical charts in this region with current data.

c) Survey quality

These data are adequate to supersede prior data and are intended for chart compilation.

d) Survey coverage

The survey contains 11 data holidays due to lobster pot avoidance and acoustic shadowing in regions of rocky seafloor. These holidays meet the NOAA specification for holiday: a holiday is defined as three or more collinear nodes sharing adjacent sides in the surface created at the required resolution.

FEATURE ID	LATITUDE	LONGITUDE
4U 0000000001 00001	43.065536N	070.631405W
4U 0000010002 00001	43.069561N	070.637064W
4U 0000020003 00001	43.074352N	070.618693W
4U 0000030004 00001	43.070222N	070.638064W
4U 0000040005 00001	43.088980N	070.606251W
4U 0000050006 00001	43.081938N	070.631067W
4U 0000060007 00001	43.076443N	070.613490W
4U 0000070008 00001	43.083366N	070.614864W
4U 0000080009 00001	43.101719N	070.600674W
4U 0000090010 00001	43.102326N	070.599104W
4U 0000100011 00001	43.102417N	070.593872W

Table 2. Locations of Holidays in the Summer Hydrography 2017 final surface (1 meter resolution).

e) Survey statisticss

The following table lists the mainscheme and crossline acquisition mileage for this survey:

	Vessel	*Total*
LNM	**SBES Mainscheme**	**0**
	MBES Mainscheme	**204**
	SBES/MBES Combo Mainscheme	**0**
	MBES Crosslines	**22**
	Lidar Crosslines	**0**
Number of Bottom Samples		**10**
Number of AWOIS Items Investigated		**0**
Number of Maritime Boundary Points Investigated		**0**
Number of DPs		**0**
Number of Items Investigated by Dive Ops		**0**
Survey Area (LNM^2)		**3.01**

Table 3: Hydrographic Survey Statistics

The following table lists the specific dates of data acquisition for this survey:

Survey Dates	Julian Day
06/13/17	164
06/14/17	165
06/15/17	166
06/16/17	167
06/19/17	170
06/20/17	171
06/21/17	172
06/22/17	173
06/23/17	174
06/26/17	177
06/27/17	178
06/28/17	179
06/29/17	180

Table 4: Dates of Hydrographic Survey

Survey lines were run with a 300 kHz multibeam echosounder and an interferometric (or phase measuring system PMBS) system. Linear nautical miles for the system were calculated using statistics from HYPACK.

II. Data Acquisition & Processing

a) Equipment and vessel

Refer to the Data Acquisition and Processing Report (DAPR) for a complete description of data acquisition and processing systems, survey vessels, quality control procedures, and processing methods. Additional information will be discussed in the following sections.

The following vessels were used for data acquisition during this survey:

Vessel	**R/V Gulf Surveyor**
Length (LOA)	**14.6 meters**
Maximum Draft	**1.5 meters**

Table 5: Vessel Used

The following systems were used for data acquisition during this survey:

Manufacturer	**Model**	**Type**
Kongsberg	EM 2040	MBES
Applanix	POS M/V	Positioning and Attitude System
AML Rolls Royce	MVP 30	Sound Speed System
Kongsberg	SeaPath 330+	Positioning and Attitude System
Trimble	Trimmark 3	GPS Receiver Modem
AML	Smart SV&P	Sound Speed/CTD System
Teledyne Odom	Echotrac CV 200/300	SBES

Table 6: Systems used during data acquisition

The Echotrac CV was turned off during data acquisition as interference artifacts became visible on the port side of the MBES swath due to the frequency of the two signals. The Kongsberg SeaPath was not integrated until 7/26/2017.

b) Crosslines

Crosslines totaled 10% of the mainscheme data acquired for this survey and were run perpendicular to the coastline and mainscheme lines.

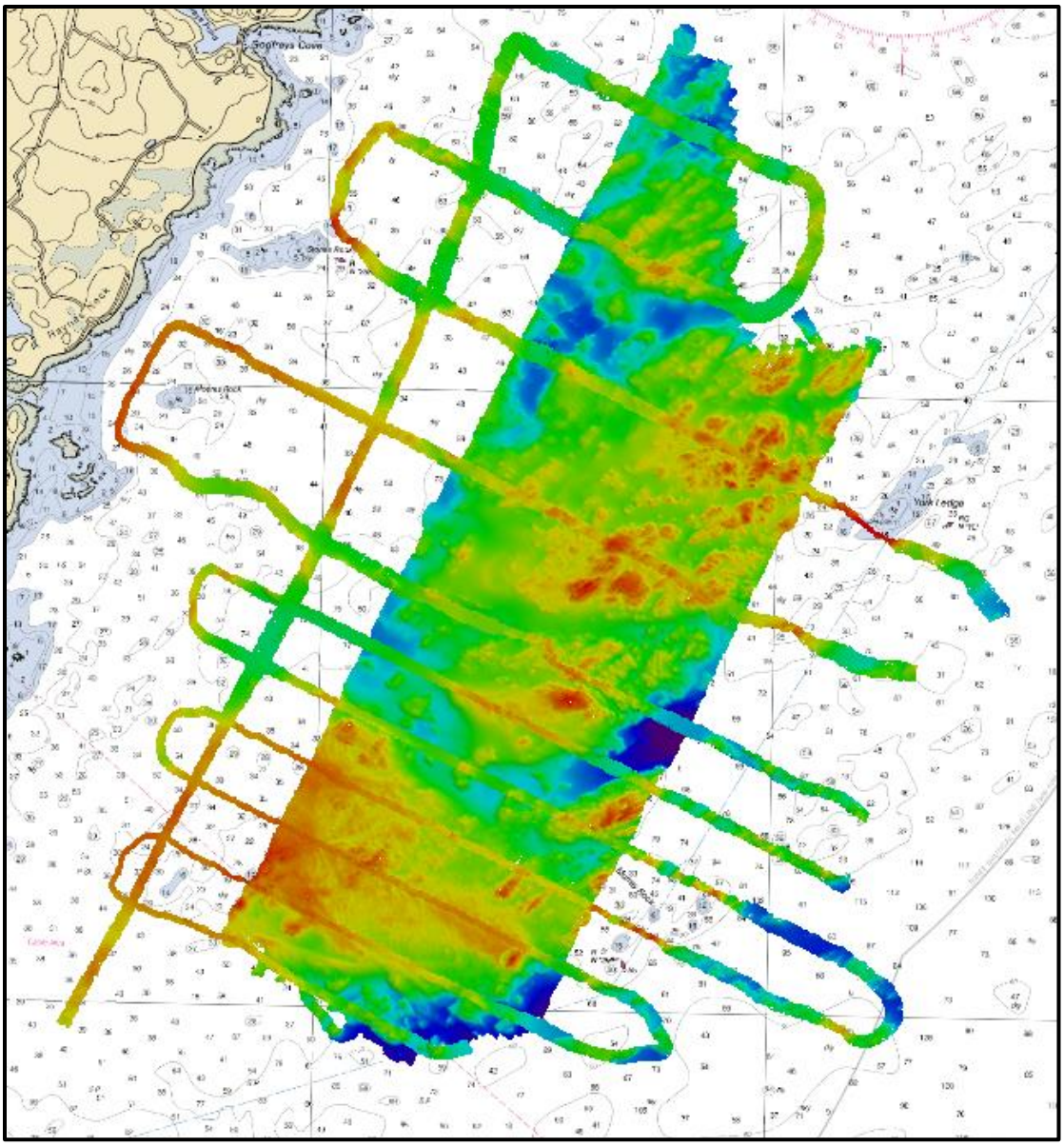

Figure 2: Crosslines over mainscheme survey.

Approximately 22 linear nautical miles of crosslines were acquired for this survey area. This percentage satisfies the NOS Hydrographic Survey Specifications and Deliverables document (HSSD 2014). A 1m surface of the mainscheme soundings was compared to a 1m surface of the crossline soundings. These two surfaces were differenced using CARIS Base Editor after a static offset of 2.52m was applied to the crosslines (see MBES Report submitted with the DAPR). The statistical analysis of the difference between the two surfaces is shown below.

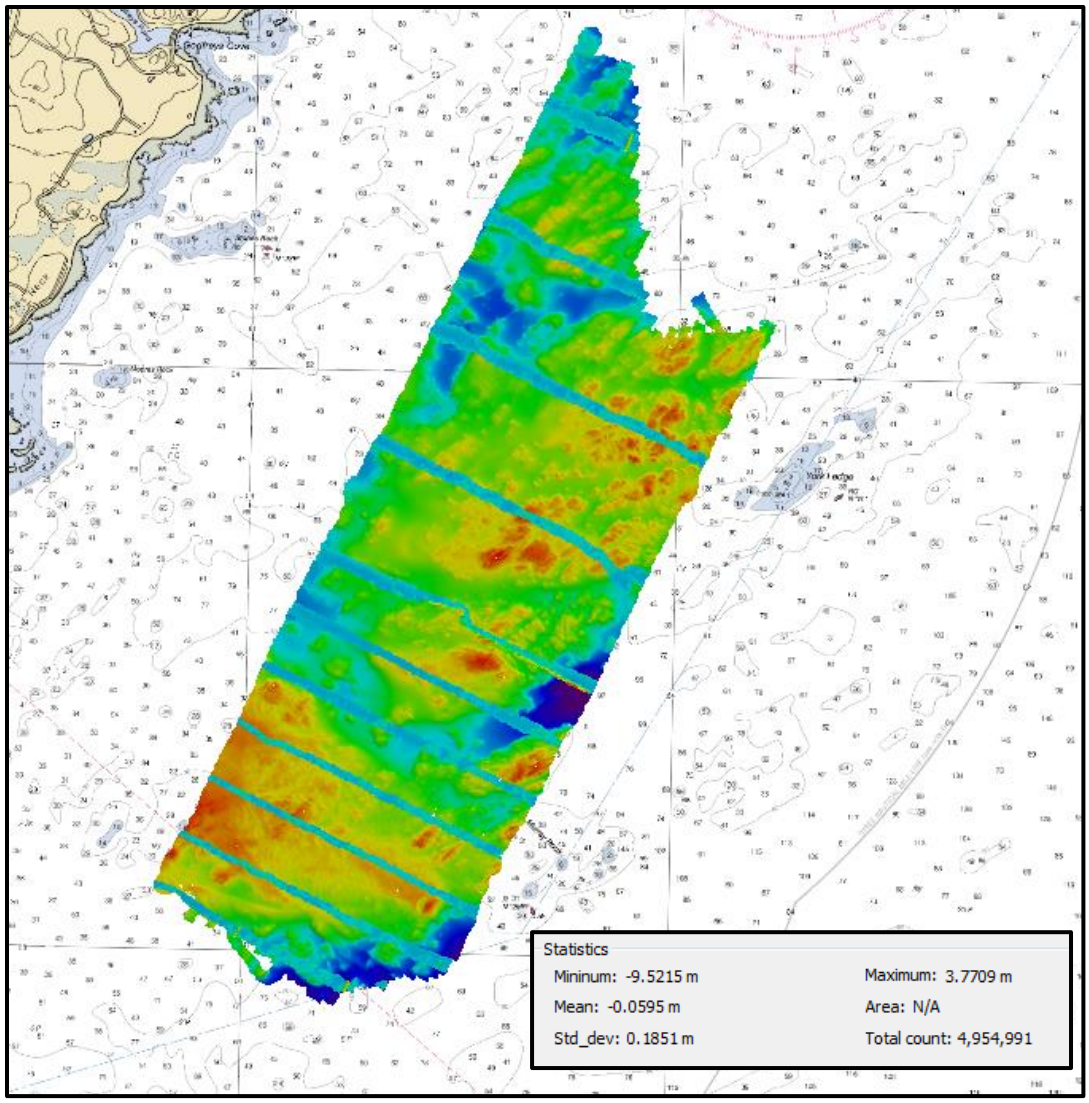

Figure 3: Crossline difference surface and statistics from CARIS.

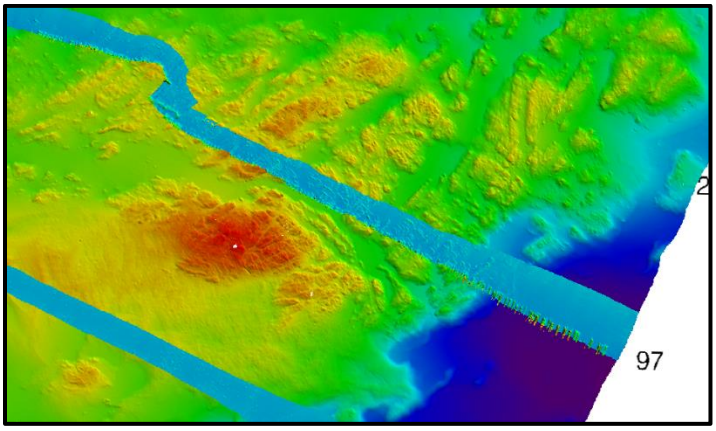

Figure 4: Zoom in of crossline difference surface.

The areas with the most significant differences are along the outer edges of the swath of the crosslines. This is likely a result of the rough weather had during data collection. However, the majority of the surface experiences an average difference of 0.0595 m.

c) Uncertainty

Total propagated uncertainty values were derived from fixed values associated with the instrumentation detailed in the DAPR, vessel characteristics, and uncertainty associated with sound speed measurement (Table 6). The MVP 30 derived sound velocity from temperature and conductivity sensors.

Instrument	Parameter	Uncertainty
MVP 30	Temperature	+/- 0.005°C
	Conductivity	+/- 0.01 mS/cm
AML Smart SV&P	Sound Velocity	+/- 0.05 m/s

Table 7: Uncertainty associated with sound velocity measurement.

For Special Order surveys, the maximum allowable horizontal uncertainty is 2m at 95% confidence while the maximum allowable vertical uncertainty is $+/-\sqrt{(0.25)^2 + (0.0075 * d)^2}$ of a given depth (*d*) at 95% confidence.

The Gulf of Maine survey area has a reported charted depth range of 4.22-29.5m (14-96 feet). With these values, the range of allowable TVU is **+/- 0.25-0.33m** at 95% confidence.

TPU statistics were generated for the Qimera final CUBE surface in CARIS Base Editor. These statistics were generated based on the IHO Special Order specifications indicated in CUBE surface generation in Qimera.

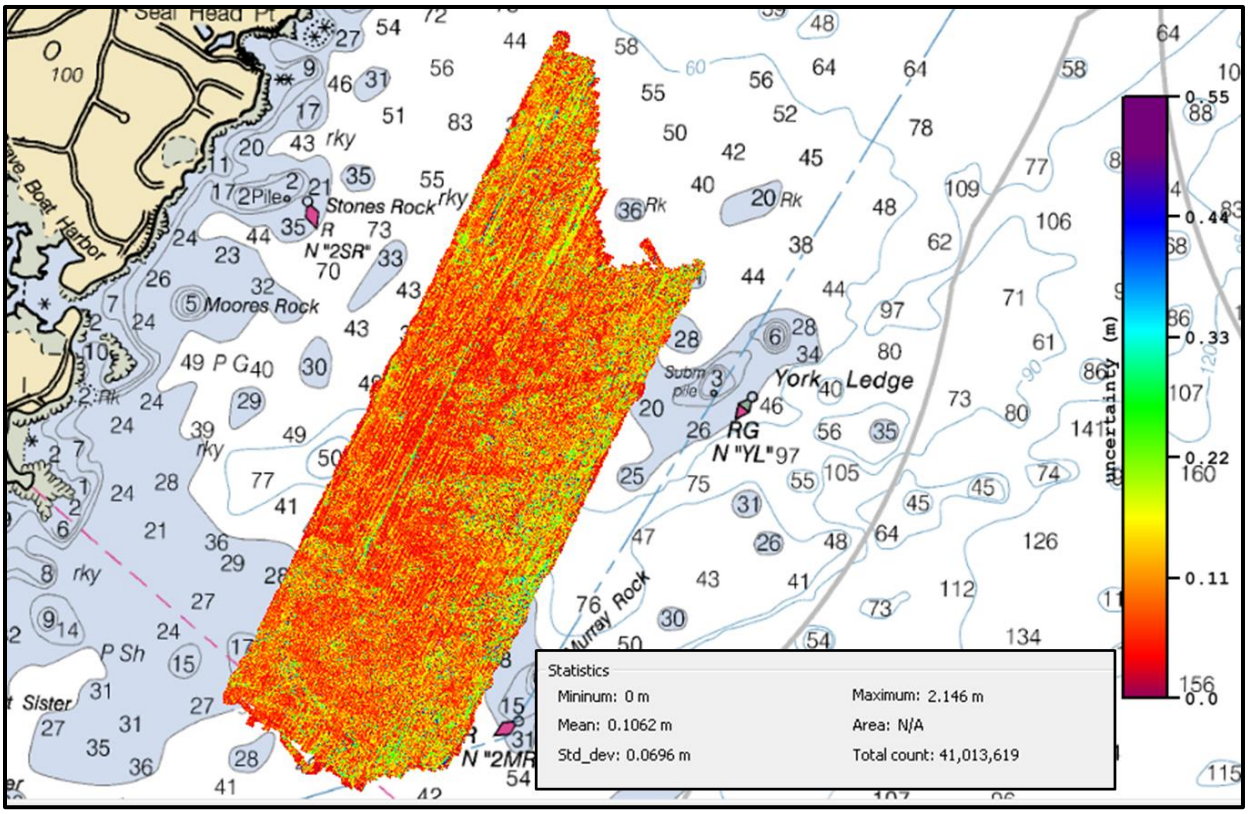

Figure 5: CARIS Base Editor TPU Uncertainty statistics with a forced color range of 0-0.5m.

The average estimated uncertainty for the Gulf of Maine survey area is 0.106m. This is an acceptable value for the survey based on the TPU estimates for the depth range. Figure 4 shows the uncertainty surface mapped to a color range with a minimum of 30cm. With some additional cleaning beyond the CUBE filter, the uncertainty associated with noise in the outer beams can be removed, allowing the entire surface to meet IHO Special Order specification.

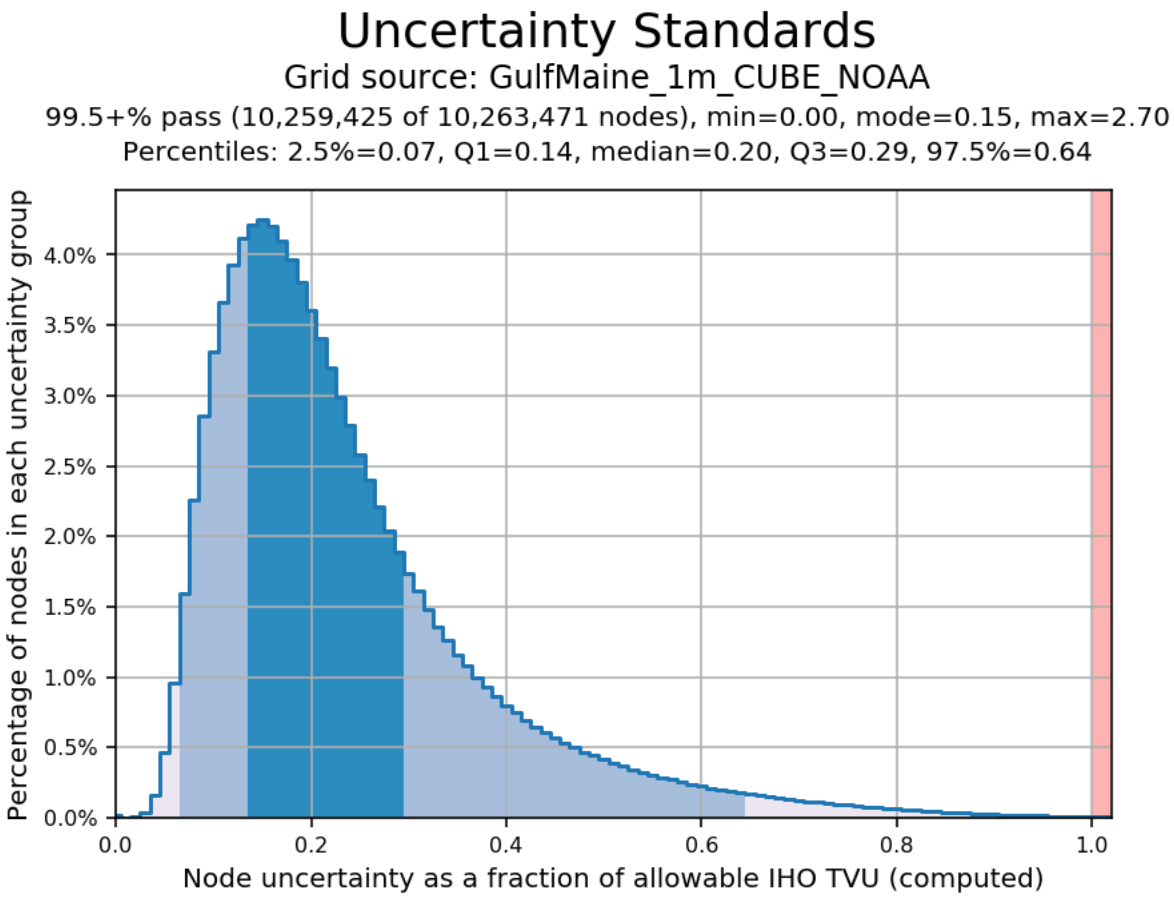

Figure 6: TPU Uncertainty 1m Grid Statistics from QC Tools.

Figure 7: CUBE surface colored by uncertainty values. Values below 0.3m are in red (within Special Order Maximum Uncertainty).

d) Junctioning surveys

The following surveys junction the Gulf of Maine survey area and were identified on NCEI's (National Centers for Environmental Information) Bathymetric Data Viewer (can be found here: https://maps.ngdc.noaa.gov/viewers/bathymetry/).

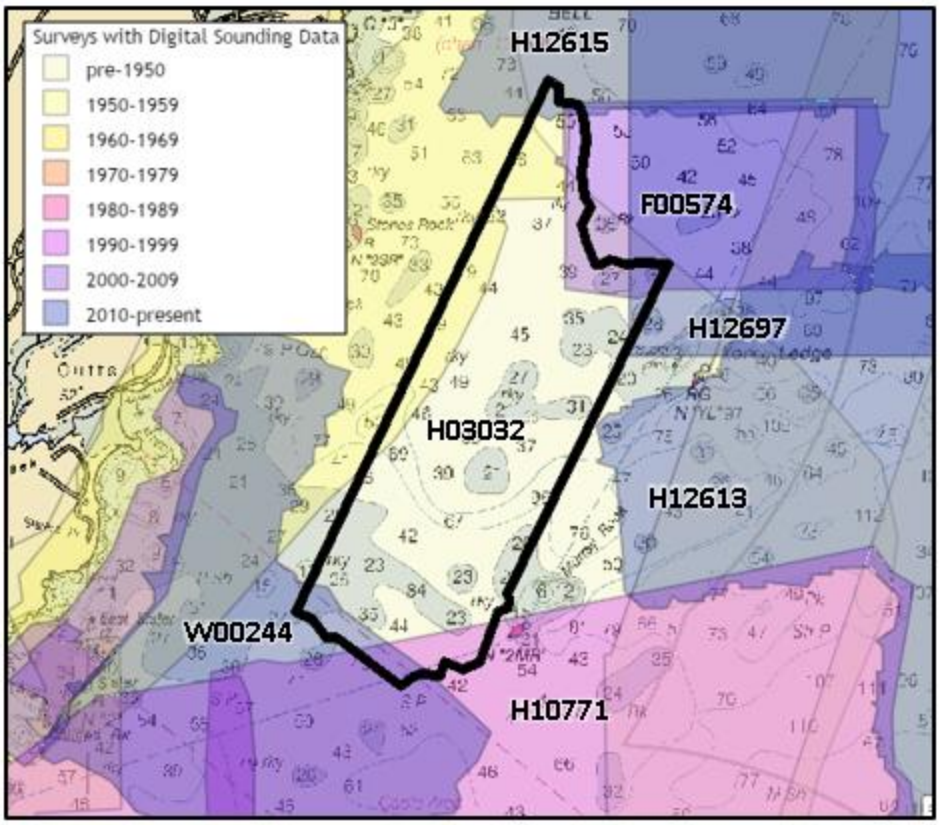

Figure 8: Junctioning NOS surveys within the survey area (black dotted line).

The following surveys junction the Gulf of Maine survey area:

Survey Name	Survey Year	Vessel	Acquisition Group
H12615	2013	NOAA Ship *Ferdinand R. Hassler*	NOAA
F00574	2009	NOAA Ship *Thomas Jefferson*	NOAA
H12613	2013	NOAA Ship *Ferdinand R. Hassler*	NOAA
H10771	1997	NOAA Ship *RUDE*	NOAA
W00244	2012	R/V Coastal Surveyor	UNH CCOM
H12697	2014	NOAA Ship *Ferdinand R. Hassler*	NOAA

Table 8: Junctioning Surveys

Surveys H03032, H12697, and H10771 were not included in junction comparisons. Instead, the charted soundings from these surveys are included in Chart comparisons (Section 4a of this document).

NOAA Survey H12615 Comparison

The Gulf of Maine survey junctions NOAA Survey H12615. These data were compared using CARIS Base Editor.

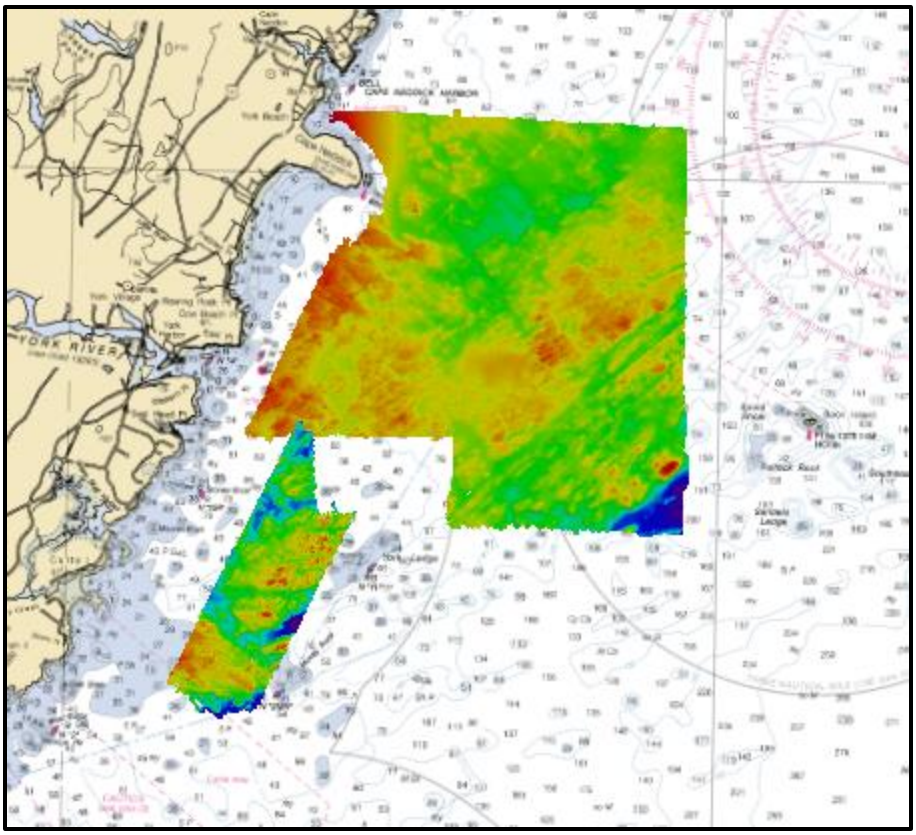

Figure 9: Gulf of Maine survey and H12615.

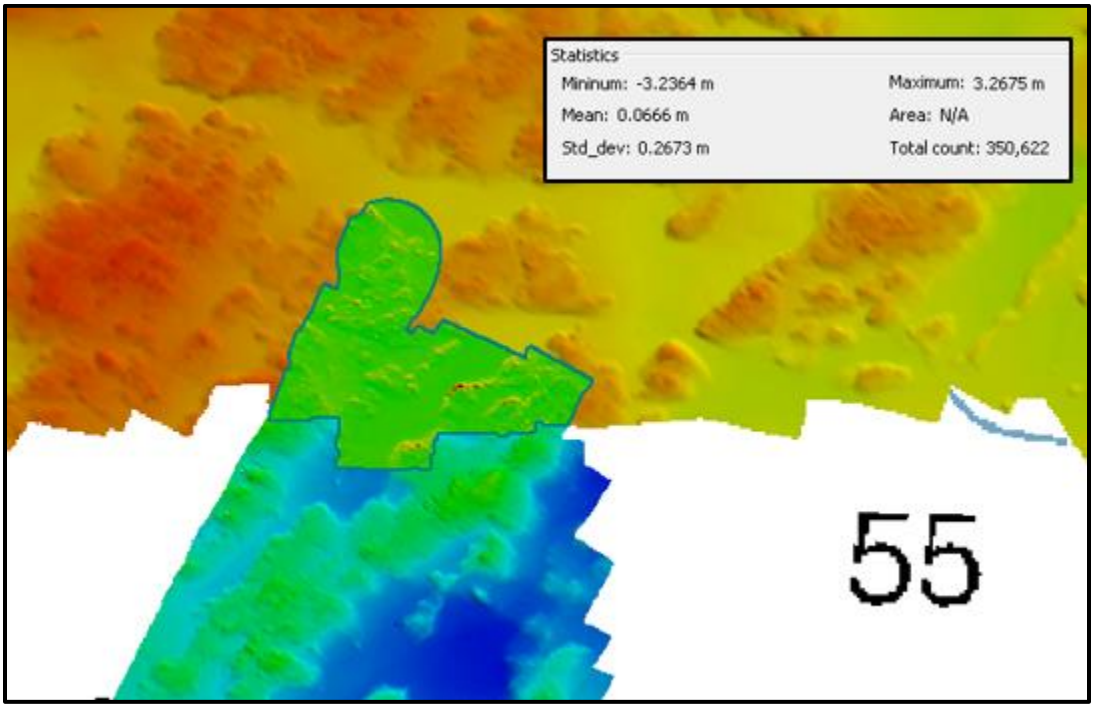

Figure 10: H12615 comparison results.

The surveys have an average difference of 0.067m with a standard deviation of 0.27m. The largest differences are observed over regions of rocky terrain.

NOAA Survey F00574 Comparison

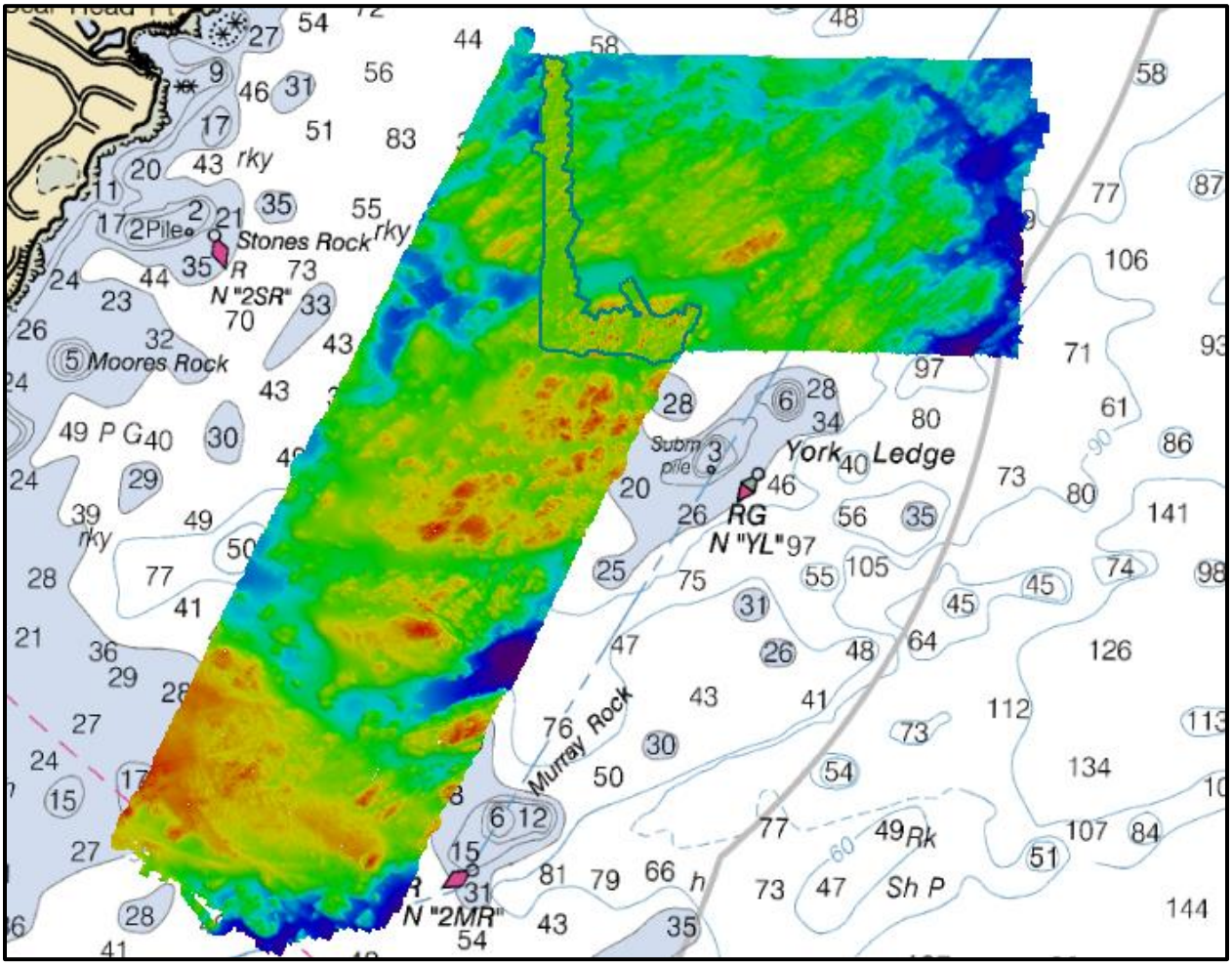

Figure 11: Gulf of Maine survey and F00574 comparison.

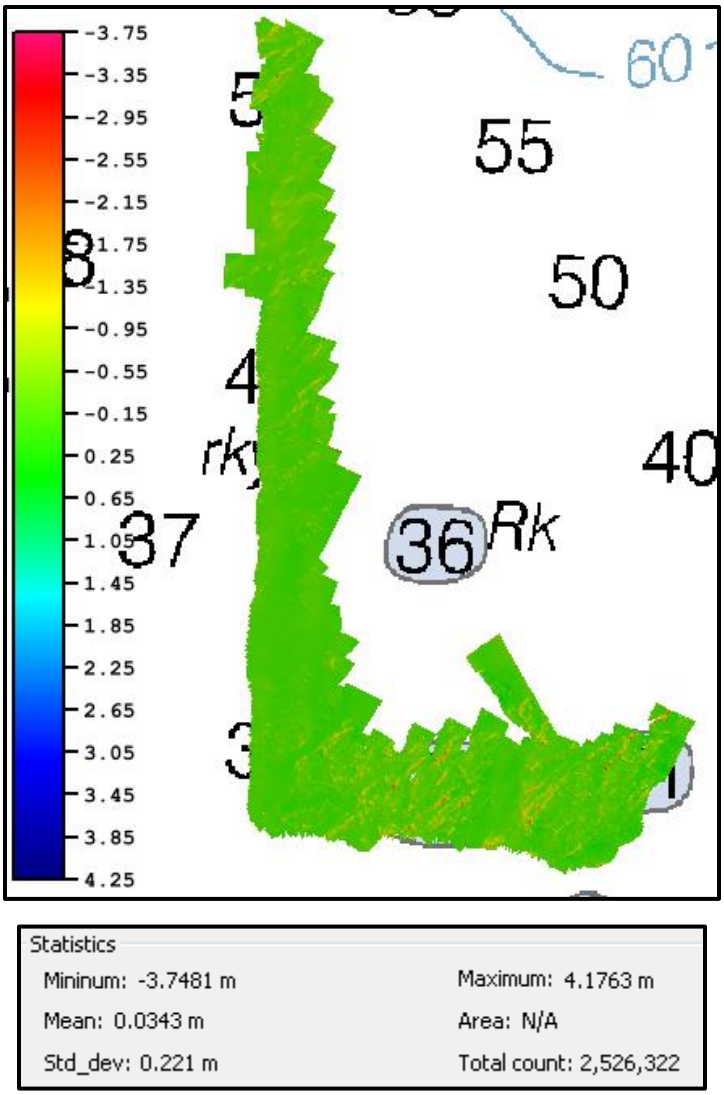

Figure 12: F00574 comparison results.

The average difference between the Gulf of Maine survey and NOAA survey F00574 is 0.0343m with a standard deviation of 0.22m. This is the smallest observed difference between the Gulf of Maine survey and the NOAA junctioning surveys.

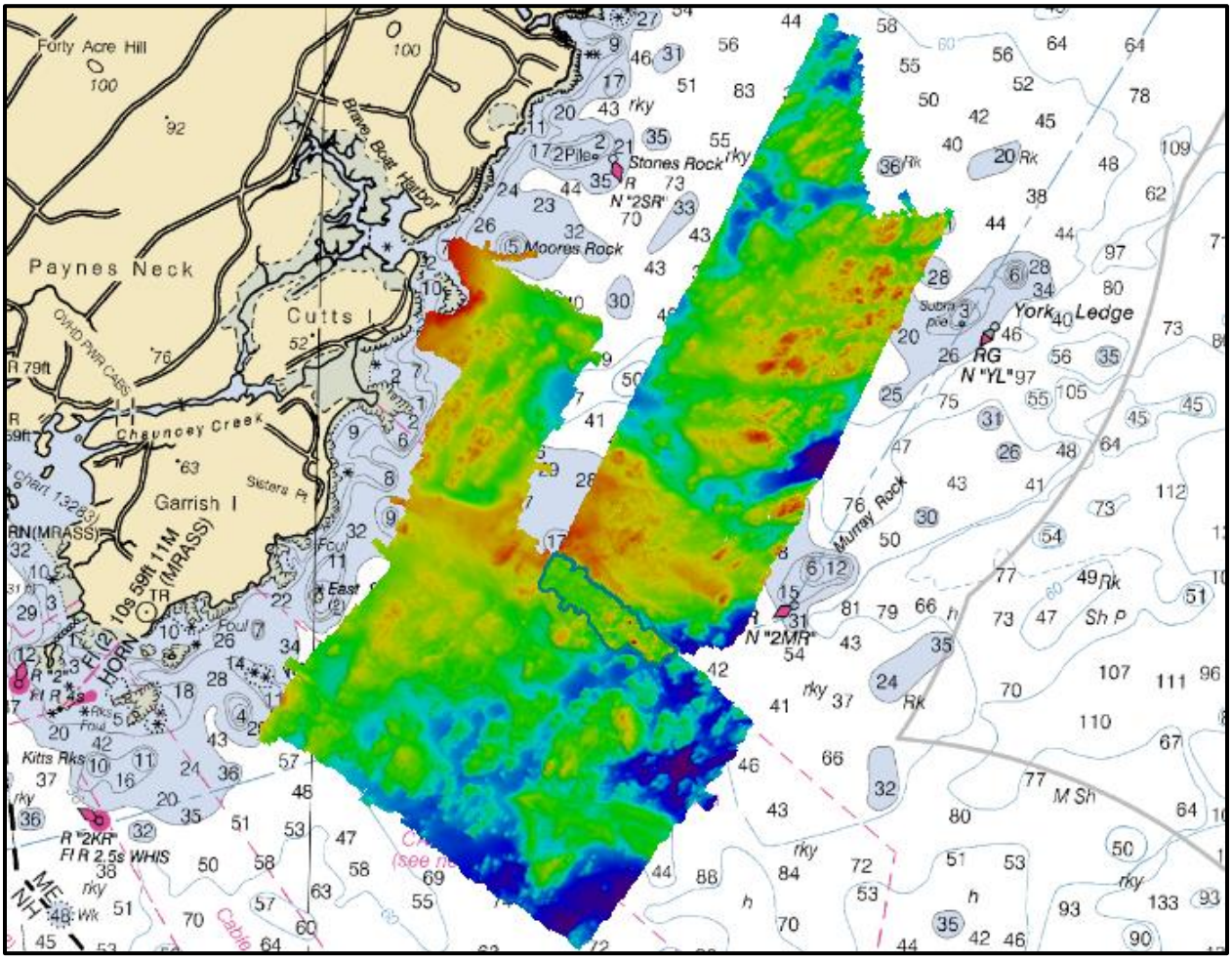

Figure 13: Gulf of Maine Survey and CCOM W00244 survey.

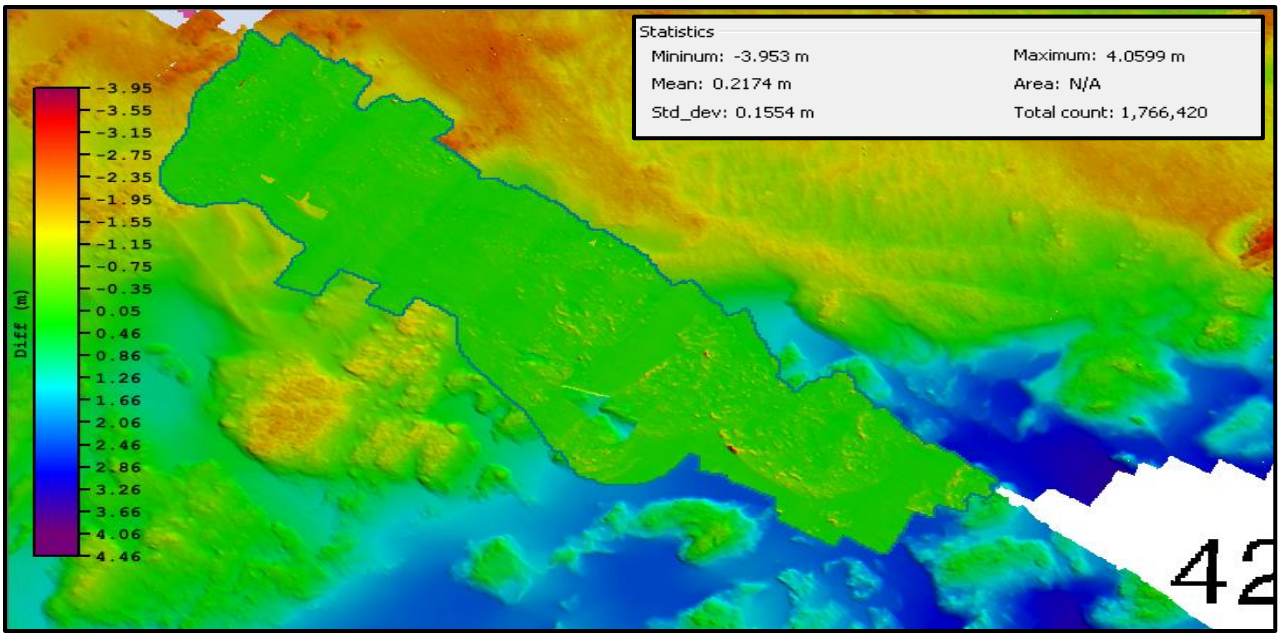

Figure 14: W00244 comparison results.

The comparison between these data yielded an average difference of 0.217m with a standard deviation of 0.155m. Similarly to the comparison with H12615, the largest differences appear over rocky terrain. This is also the largest difference between the Gulf of Maine survey and a junctioning survey.

Complete coverage requirements as dictated in the NOS HSSD were met by maintaining survey speeds and utilizing high-density equidistant operating mode on the EM2040. Finalized CUBE surfaces of 0.5m and 1m were created.

B.2.8.1 Sounding Density Analysis

The sounding density per grid node 1.0m surfaces can be seen below. Note that over 99% of the survey gridded at 1.0m meets the sounding density requirements [10242195 out of 10250658 have more than 5 nodes per cell]. On the 0.5m surface, over 95% of the surface conforms to the sounding density requirements.

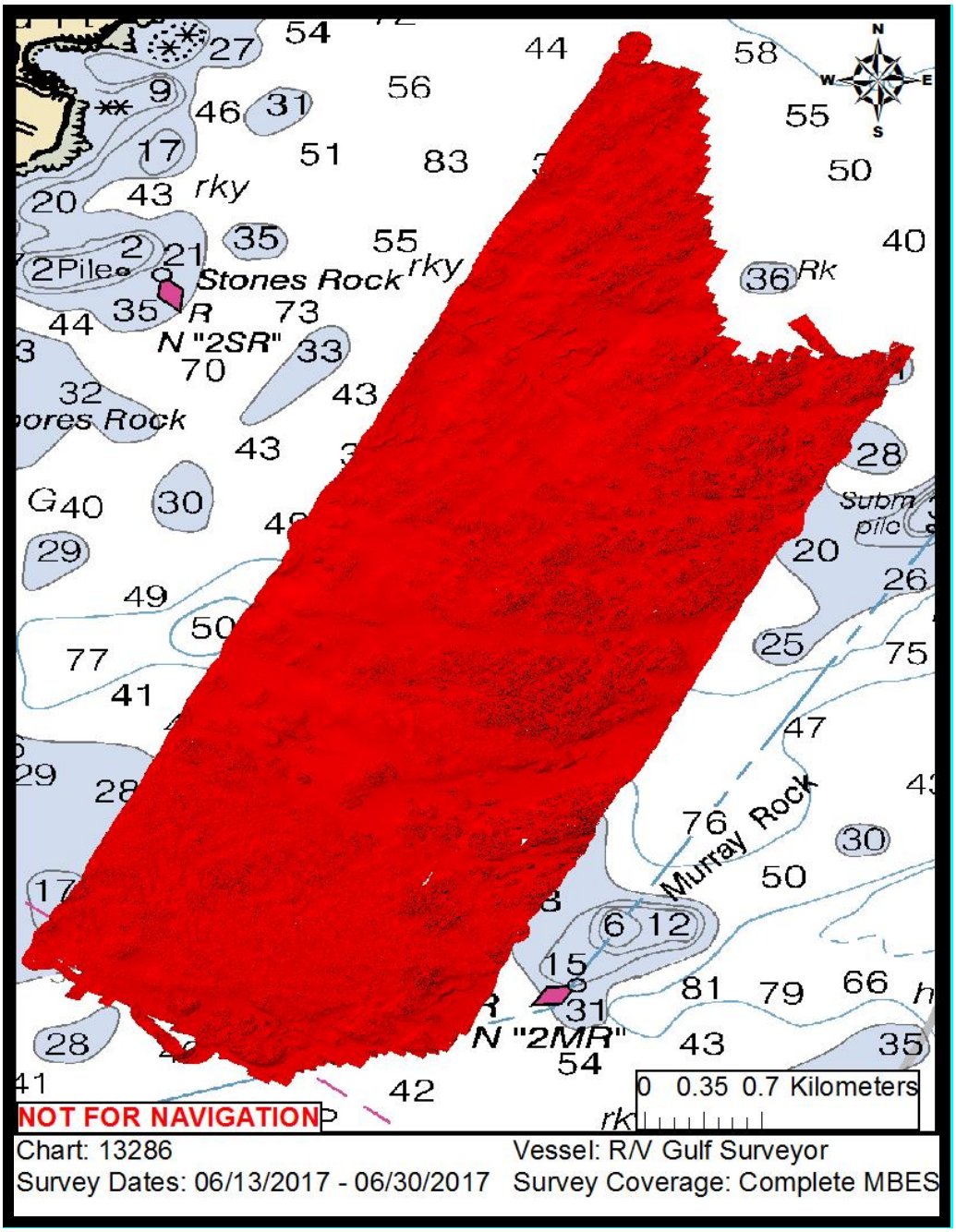

Figure 15: Map of the sounding density at 1m cell size. Red indicates the surface meets NOAA specifications of 5 nodes per cell or greater. With over 99.8% of cells with sounding densities of greater than 5 per cell.

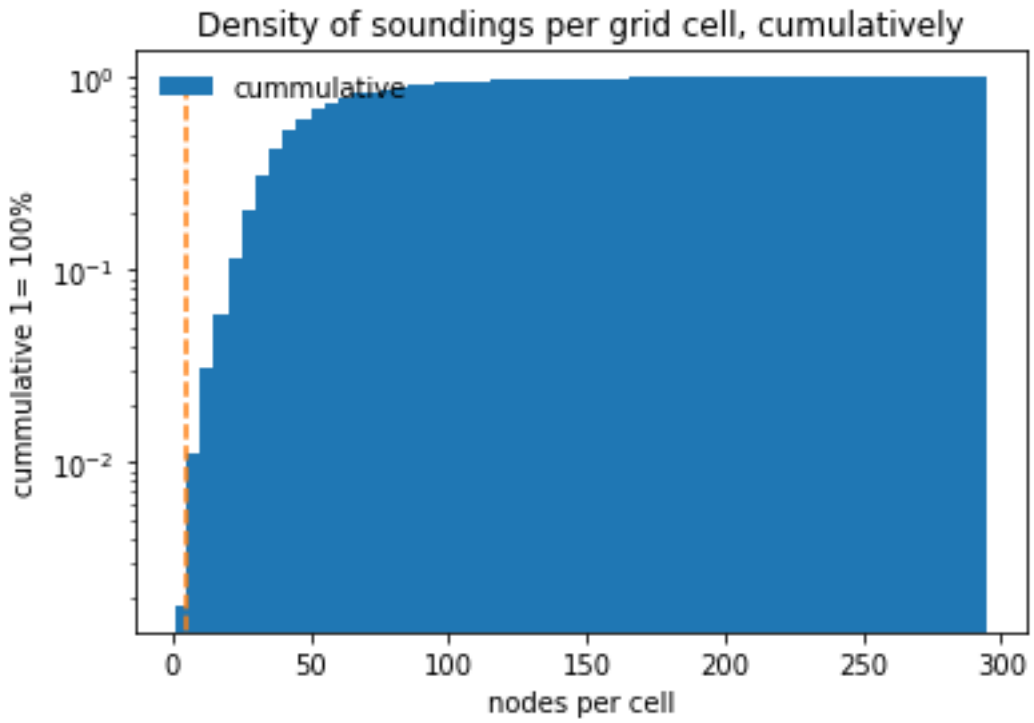

Figure 16: Histogram of nodes per cell in the 1m grid, orange dashed line marks the 5 nodes per cell level.

Cumulative % scale, where 1 or (10^{0})=100%

e) Sound Speed

Sound speed values at the transducer head were determined using an AML SV&P 200/300 sound speed probe. Sound speed profiles were collected during acquisition using a Digibar pro at the beginning of the acquisition period. Profiles were later taken using the AML Rolls-Royce MVP30 moving vessel profiler. Profiles were taking at the survey speed of ~8 knots. Occasionally, the MVP30 got caught on lobster pots in the survey area and surveying was halted. Details of these instances are recorded in the daily acquisition logs submitted with these data. Profile corrections were applied in SIS during vessel turns between lines.

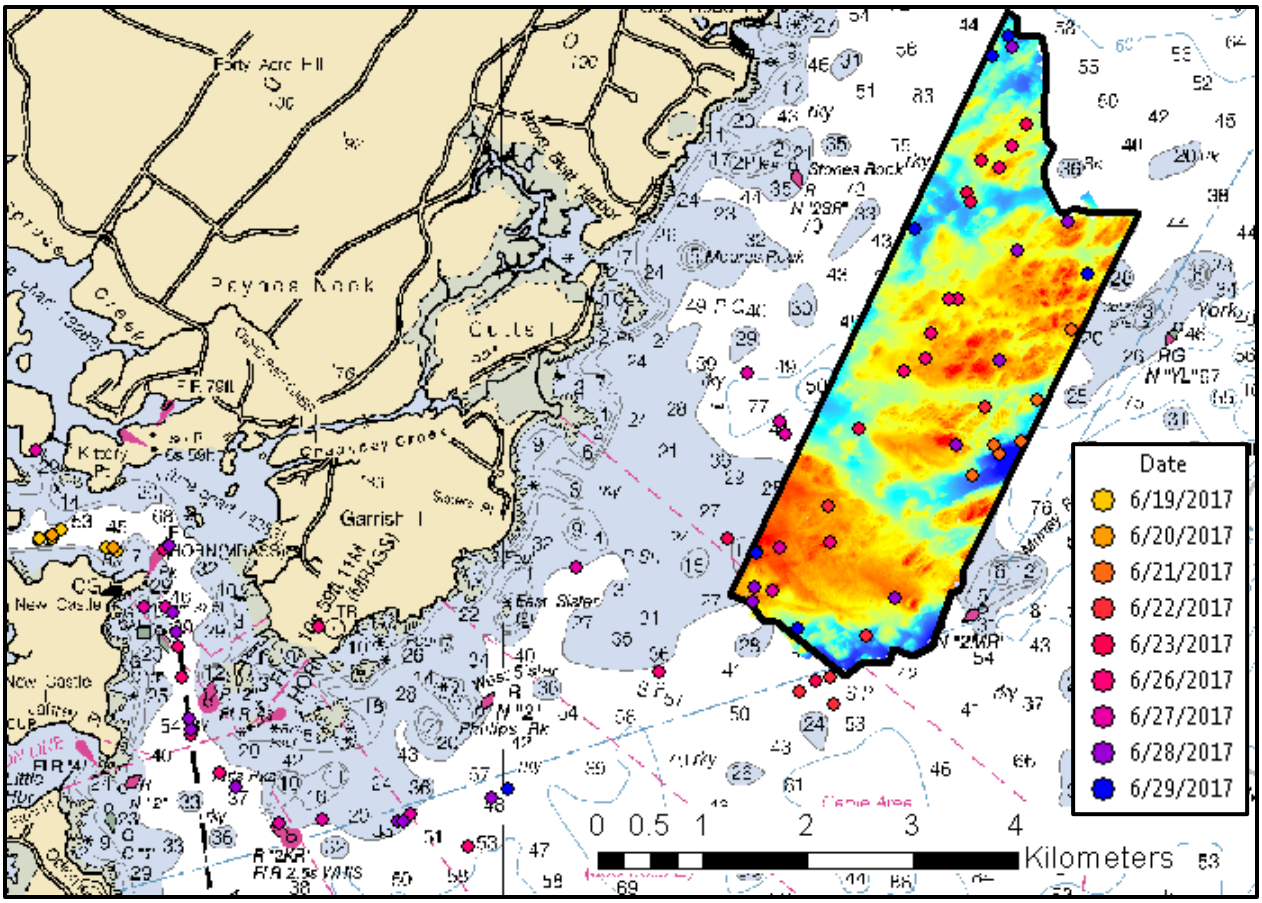

Figure 17: MVP cast locations.

f) Data corrections

All data corrections are outlined in the DAPR and supporting documents.

g) Calibrations

All data were calibrated as outlined in the DAPR and supporting documents.

h) Backscatter

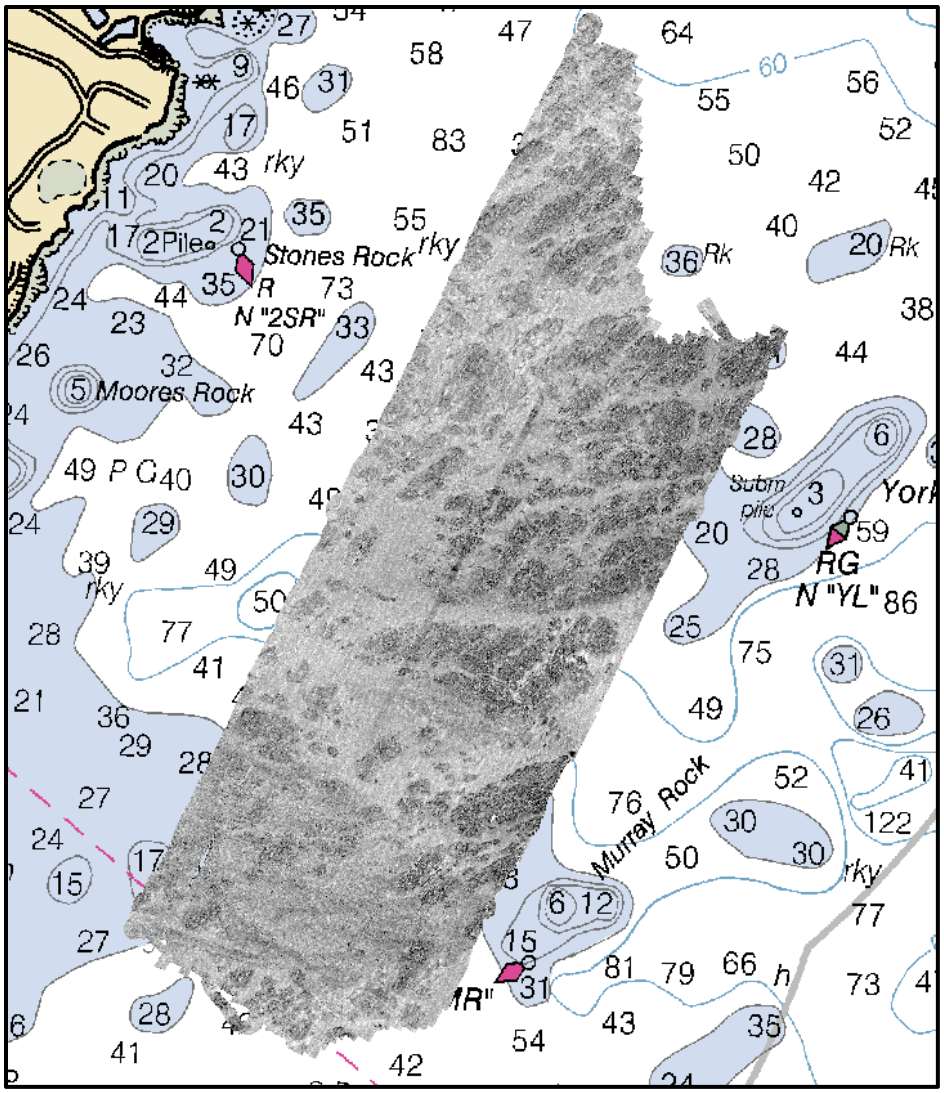

Figure 18: MBES Backscatter 1m mosaic rendered in QPS FMGT.

Backscatter data were collected from the Kongsberg EM2040 during the Gulf of Maine survey. Data were processed in QPS FMGT and a 1m mosaic was created (Figure 18). More information is in the Backscatter Report submitted with these data.

i) Processing software

All processing software configuration details are described in the DAPR and supporting documents.

j) Surfaces

The following surfaces and/or BAGs were submitted to the processing branch:

Surface Name	Surface Type	File Ext.	Resolution	Depth Range	Surface Parameter	Vertical Datum	Purpose
SH2017_0_5m_CUBE_ WGS84UTM19N_MLLW	CUBE	.bag, .sd	0.5 meters	4-30m	NOAA_0.5 m	MLLW	Object Detection
SH2017_1m_CUBE_ WGS84UTM19N_MLLW	CUBE	.bag, .sd	1 meter	4-30m	NOAA_1m	MLLW	Object Detection
SH2017_backscattter	Mosaic	.tif	1 meter	-	Backscatter	N/A	Object Detection

Table 9: Submitted surfaces

k) Designated soundings

No soundings were designated for this survey.

l) TVU analysis

Uncertainty values for instrumentation were gathered from their respective specification sheets, and entered into Qimera's TPU analysis tool.

m) Patch Test

Prior to mainscheme data collection, six patch tests were performed onboard the R/V Gulf Surveyor (set A & B). These data were processed in QPS Qimera. A set of offset values was determined and the average of these was chosen. All patch tests were performed over Cod Rock in the Piscataqua River near the UNH pier in New Castle, NH.

For more information on the processing, see the Patch Test Report Appendix submitted with the DAPR.

	A	B	Average
Latency	0.000	0.000	0.000
Roll	0.290	0.297	0.290
Pitch	-1.907	-1.860	-1.880
Heading	-0.063	-0.050	-0.06

Table 10: Summer Hydro patch test offsets.

III. Vertical and Horizontal Control

This survey was completed with respect to MLLW, WGS-84, and UTM Zone 19N. Horizontal and vertical field controls were established using a Trimble RTK base station/rover pair. More information can be found in the DAPR and HVCR submitted with these data.

a) Vertical Control

Data was acquired with respect to the WGS-84 datum and transformed to MLLW using a static offset computed using VDatum. Since the survey fell within one tide zone, NA169, the offset did not vary significantly within the region. More information can be found in the DAPR and HVCR submitted with these data.

b) Horizontal Control

A Trimble RTK base station/rover pair was utilized for positioning corrections for the entirety of the survey. Corrections were broadcast from the Seacoast Science Center in Rye, NH.

POSPac MMS 8.0 was used to post-process horizontal position and attitude for all data. SBET's were generated and applied to all files. More information can be found in the DAPR and HVCR submitted with these data.

IV. Results and Recommendations

a) Raster Chart Comparisons

Chart Name	Chart Scale	Edition	Edition Date	NM Date
RNC 13283	1:20,000	13	12/01/2017	01/12/2017
RNC 13283	1:20,000	23	12/09/2014	01/12/2017
RNC 13286	1:80,000	32	12/18/2013	03/02/2017

Table 11: Largest scale raster charts effected by the survey area

Raster Chart 13283 was compared to the Gulf of Maine 0.5m .bag CUBE surface soundings. A sounding file was created in CARIS Base Editor (Version 4.1) using a single defined radius of 10mm at a chart scale of 1:20,000.

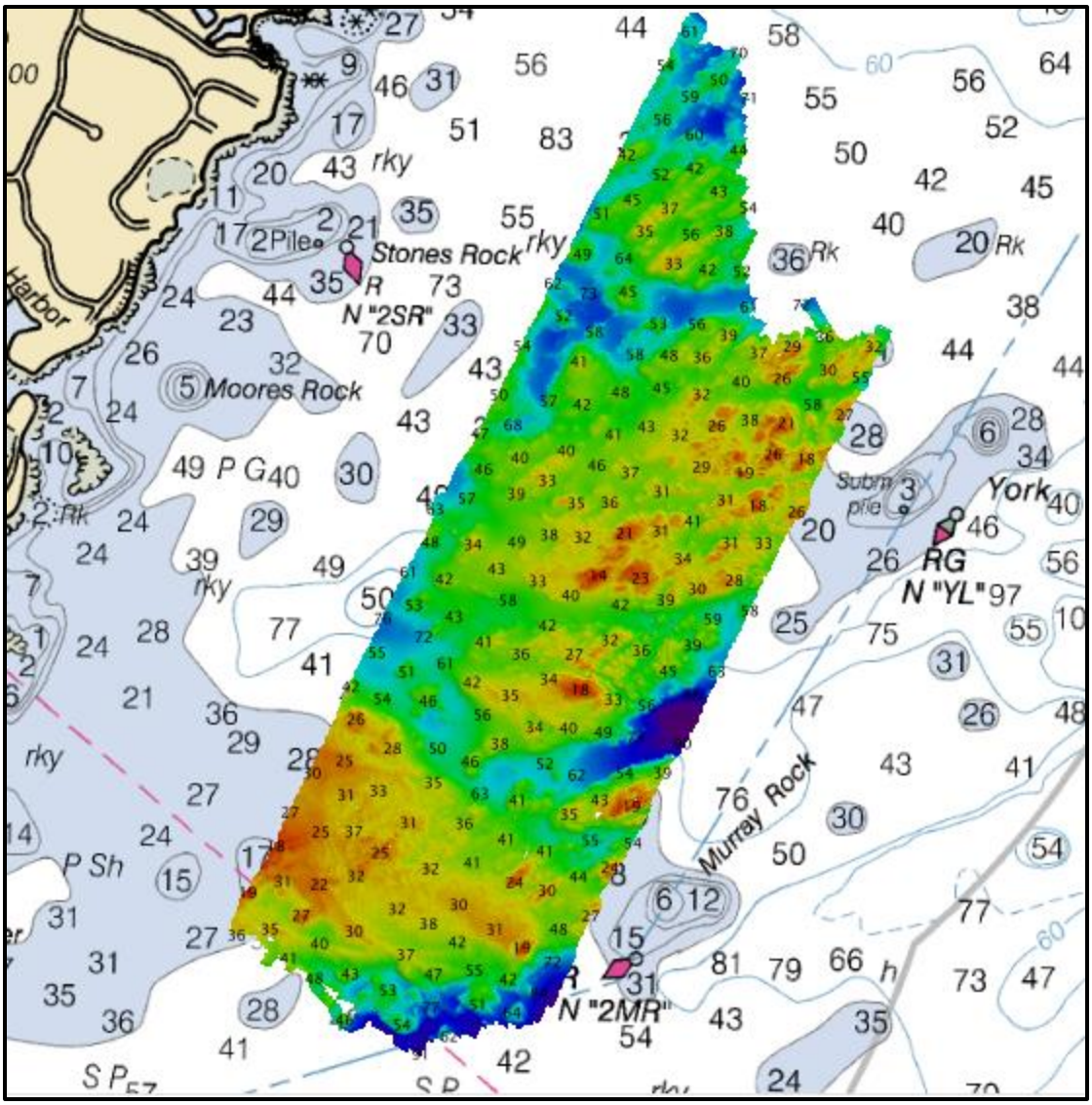

Figure 19: S-57 Soundings from 1m CUBE surface.

The soundings created from this survey are shown in red in the following figures and are all compared to NOAA Chart 13283 as it is the largest scale chart for the area. All soundings are in Feet.

The Northernmost portion of the survey area aligns closely with currently charted soundings. However, there are clear areas of fluctuation heading south and are identified by blue circles in the following figure.

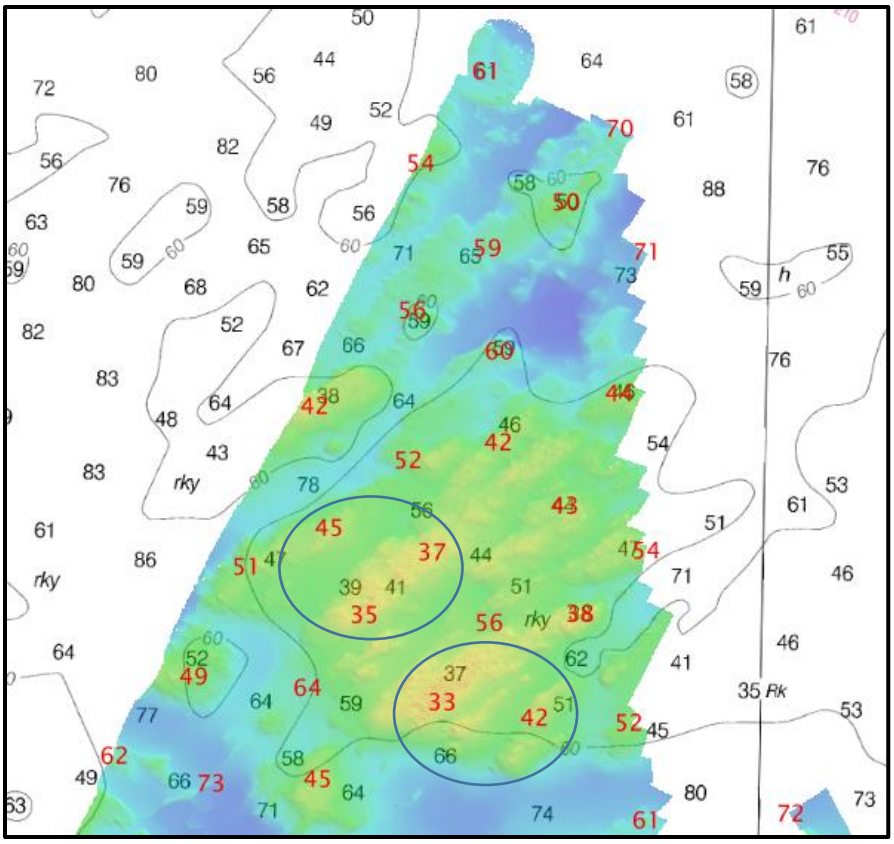

Figure 20: Northern sounding comparison.

The Northern middle section comparison yields an overall shoaler result for the Gulf of Maine survey than with currently charted soundings. In particular, most of the rocks and rocky outcrops show a shoaler depth than currently charted.

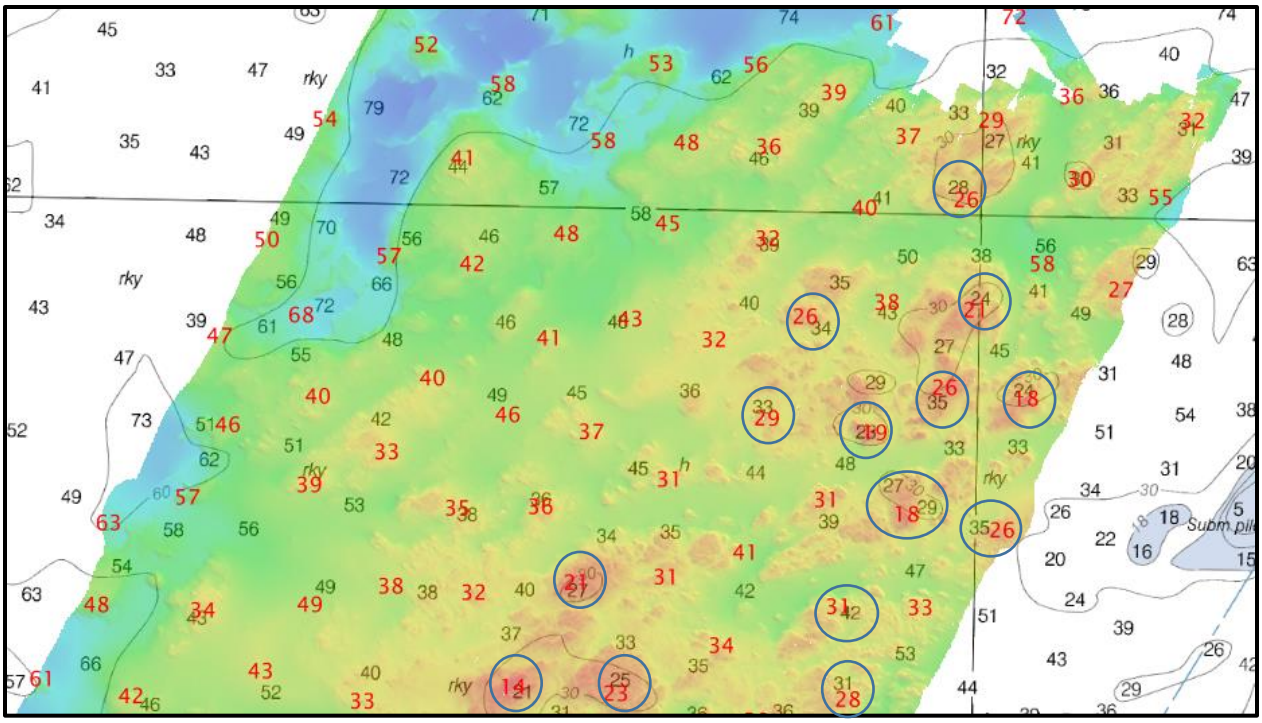

Figure 21: Sounding comparison northern middle section.

The southern middle and the southernmost sections of the survey shows similar results to the northern middle section; overall a shoaler tendency with the Gulf of Maine survey soundings than those currently charted and particularly consistent differences over rocky areas.

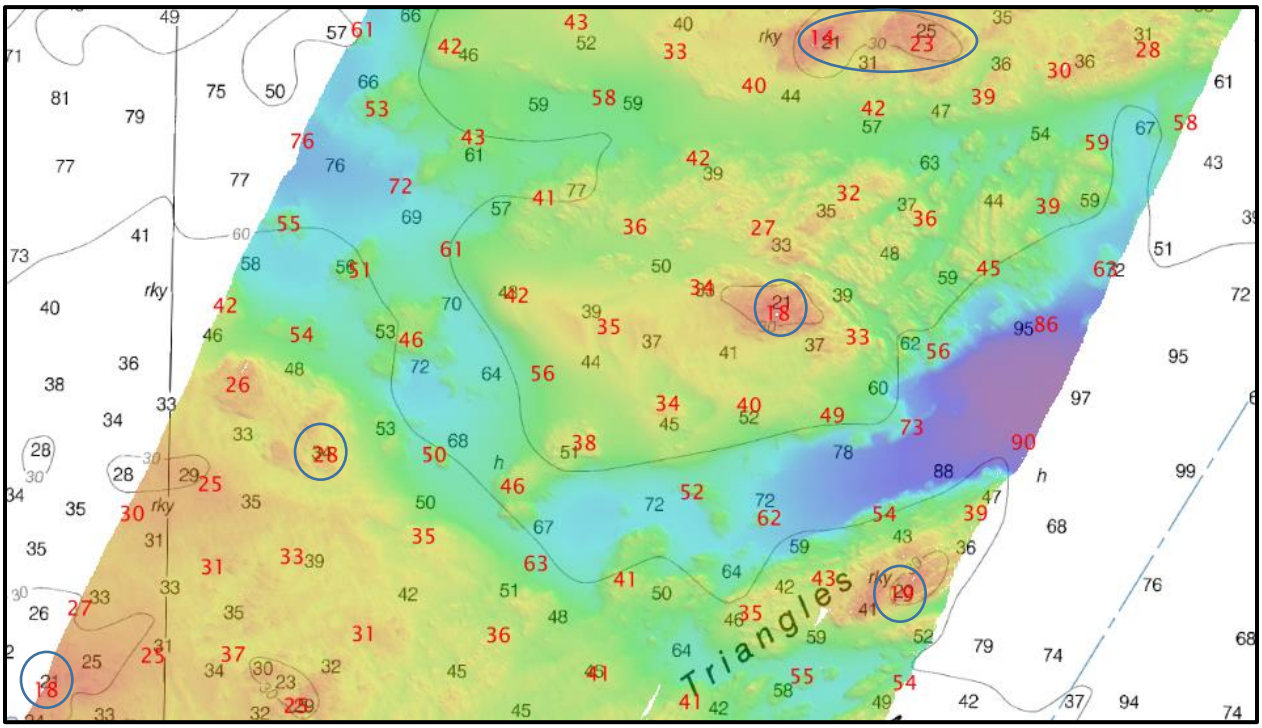

Figure 22: Sounding comparison southern middle section.

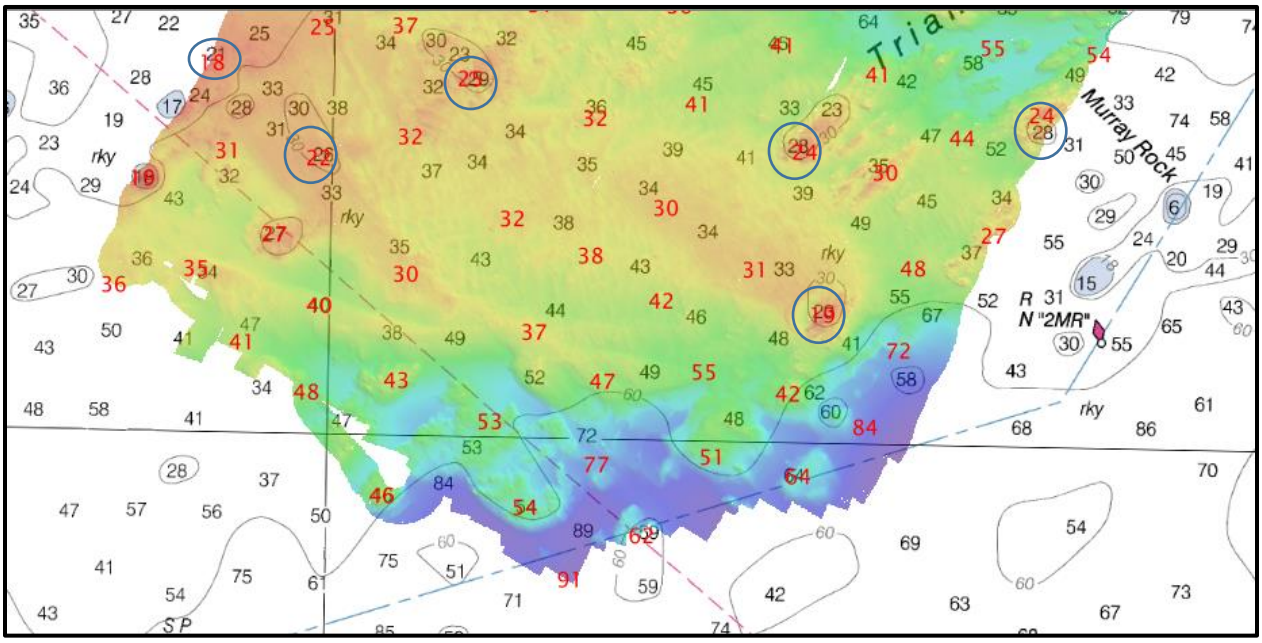

Figure 23: Sounding comparison of southernmost section.

b) Electronic Navigational Chart Comparisons

Chart Name	Chart Scale	Edition	Edition Date	NM Date
ENC US5NH02M	1:20,000	21	03/10/2017	03/10/2017
ENC US4ME01M	1:80,000	13	10/04/2016	10/04/2016

Table 12: Largest scale electronic navigational charts (ENCs) effected by the survey area

Using NOAA's PYDRO QC Tools, the soundings file created from the 1m CUBE .BAG file (described in the above section) was compared to ENC US5NH02M soundings as it is the largest scale chart for the survey area.

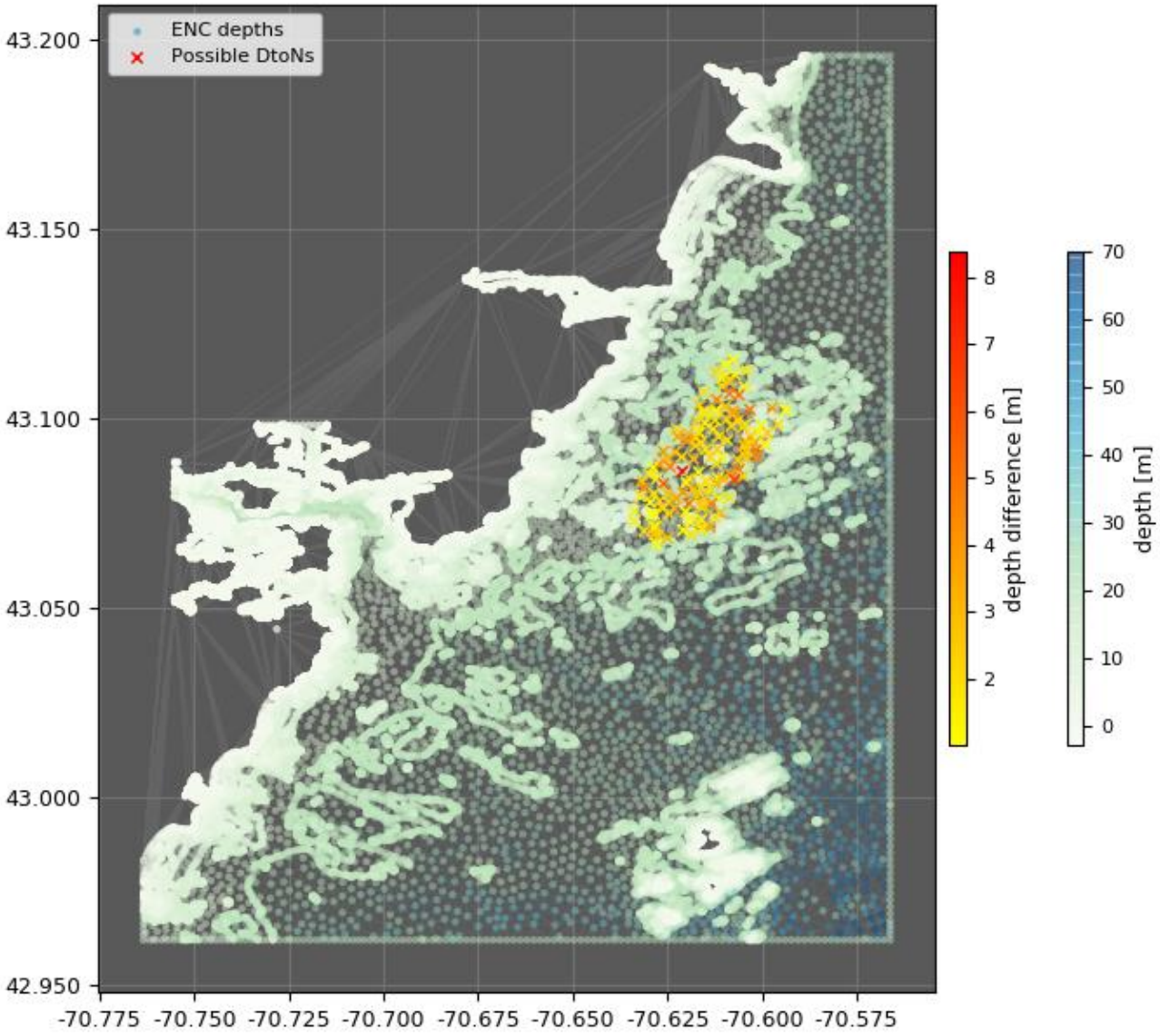

Figure 24: NOAA ENC US5NH02M sounding comparison results generated by NOAA PYDRO QC Tools.

The following figure is a zoom-in of the survey area is outlined in the black box from the above image. PYDRO QC Tools created a tin from the ENC soundings and the Gulf of Maine survey soundings and compared the recorded depths. Both sets of soundings are in feet and differences range from 0-16 feet.

Most of the Gulf of Maine soundings appear around 0-6 feet of difference with only a few significantly different depth changes.

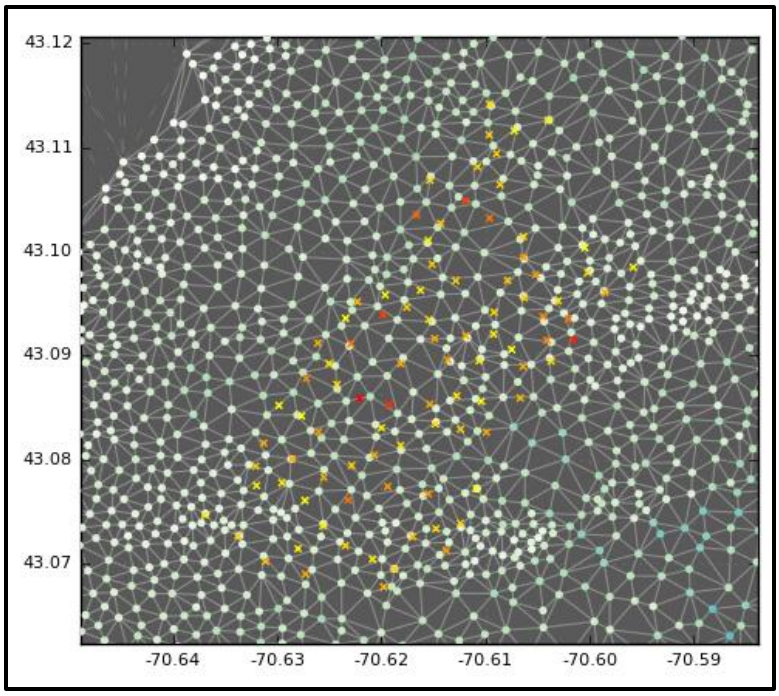

Figure 25: Zoom-in of survey area nodes generated from PYDRO QC Tools.

These results are similar to those from the RNC Chart comparison results described in the previous section. Additionally, a TIN was created from NOAA ENC US5NH02M soundings in Caris Base Editor. This TIN was then used to create a 10m surface which was compared to the Gulf of Maine survey.

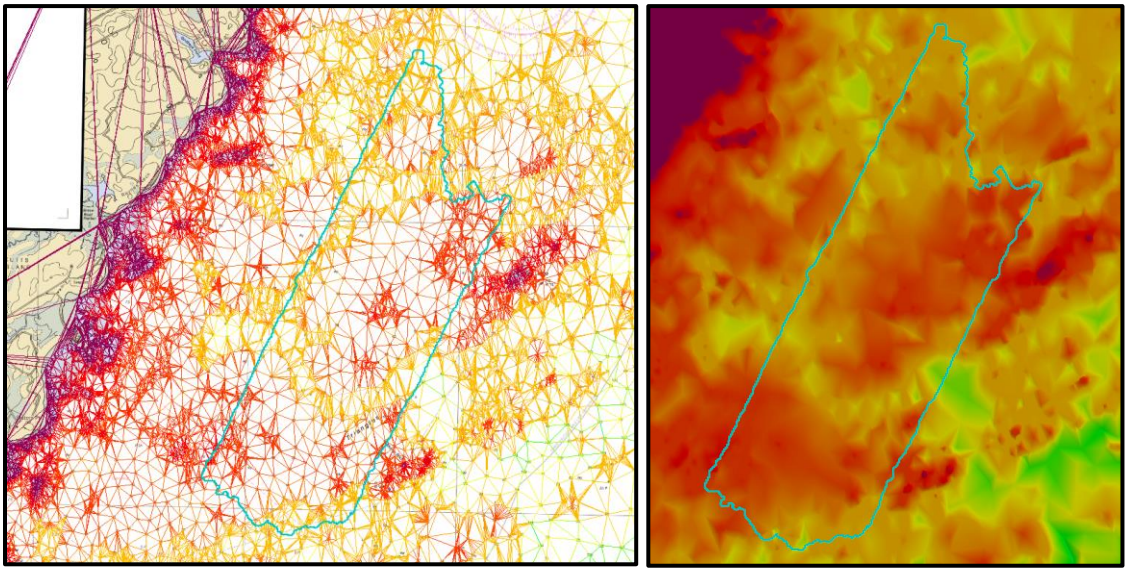

Figure 26: ENC US5NH02M TIN (left) and 10m surface (right).

Positive differences correlate to where the Gulf of Maine survey is deeper than the currently charted depth, conversely negative differences represent shoaler depths. The 0.5m Gulf of Maine

CUBE surface was on average ~1.4m deeper than 10m surface. This value should be taken as a rough estimate as the TIN surface resolution is not as small as the CUBE Gulf of Maine surface. There is one area of significant difference (~11m) where the charted depth is 77 feet and the surveyed depth is ~40 feet.

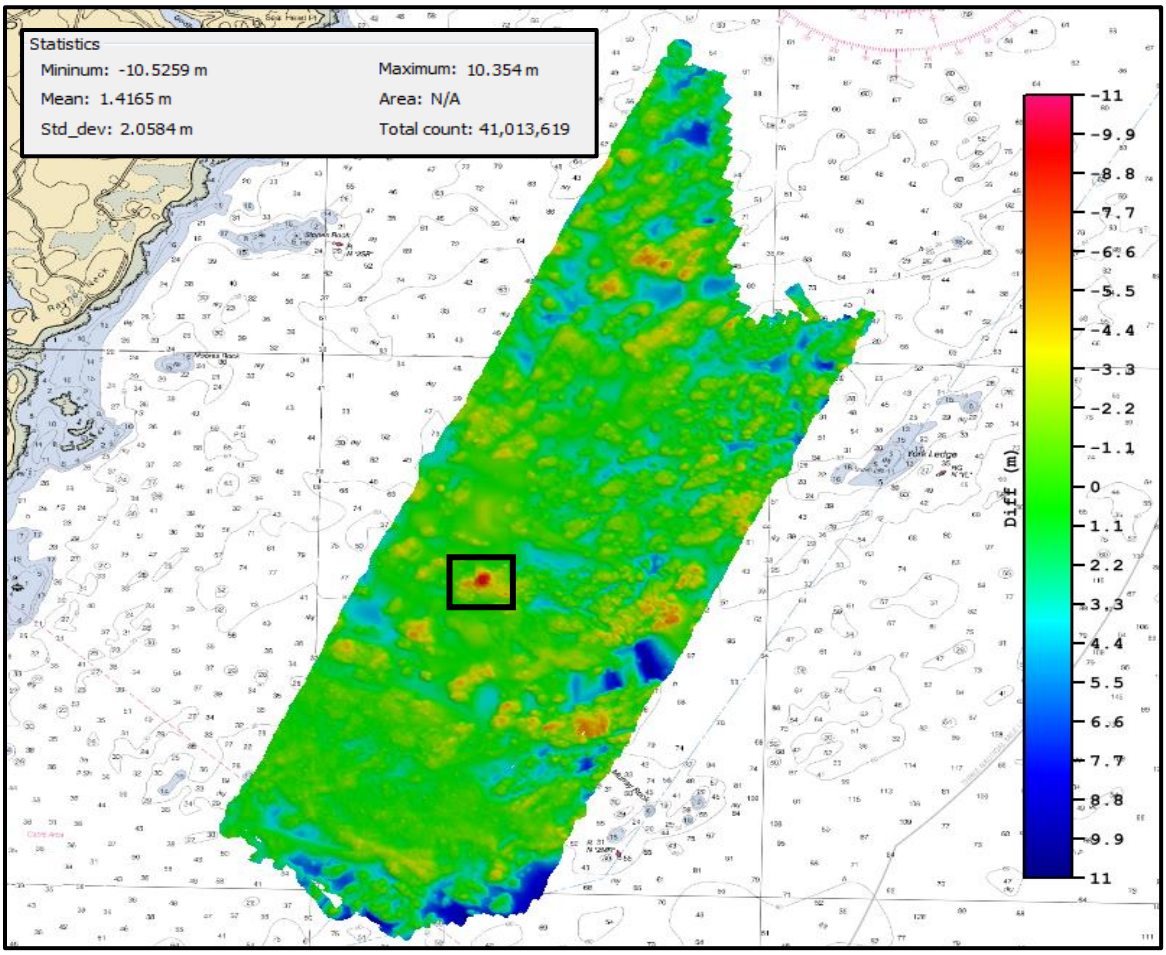

Figure 27: ENC and Gulf of Maine difference surface and statistics.

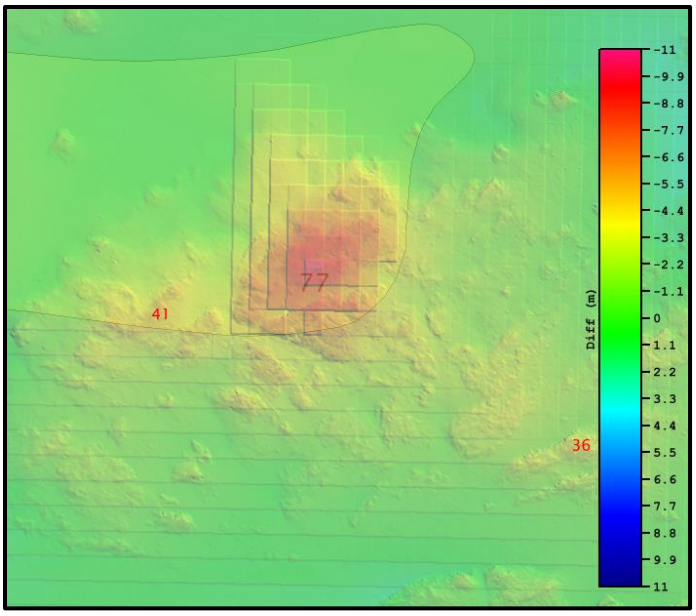

Figure 28: Zoom in of ENC difference surface from above Figure. ENC sounding in grey, Gulf of Maine sounding in red.

Limiting the range of the color ramp to +/- 5m still provides a good idea of where change has occurred between the charted depths and those identified from the Gulf of Maine survey.

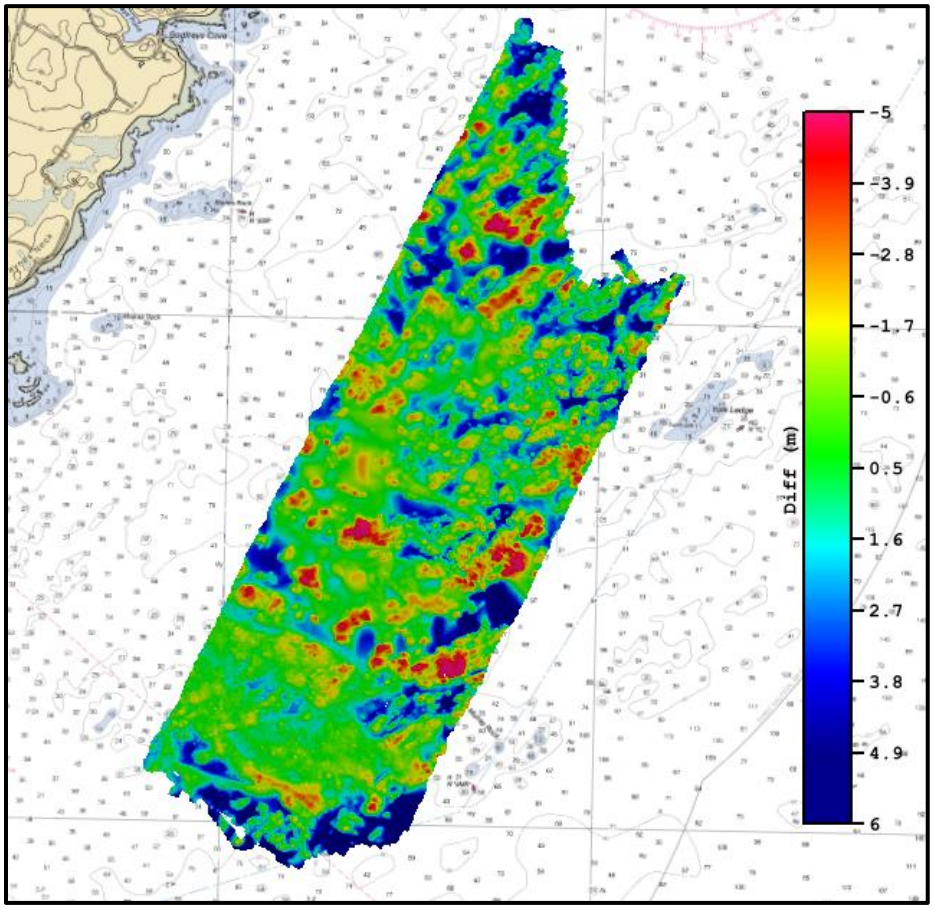

Figure 29: Difference survey with a color range of +/- 5m.

As with the RNC, the largest differences are observed over rocky areas.

c) AWOIS items

No AWOIS items were assigned for this survey

d) Charted Features

No charted features exist for this survey.

e) Uncharted Features

There are no uncharted features for this survey.

f) Dangers to Navigation

A Danger to Navigation Report accompanies this survey.

g) Shoal and Hazardous Features

Several uncharted shoals exist in the data in an area known for many rocky outcrops

h) Channels

No channels exist for this survey.

i) Bottom Samples

Ten bottom samples were collected utilizing R/V Gulf Surveyor on 07/05/2017 (Figure 21: Bottom sampling locations overlaid on backscatter mosaic). Sample locations were chosen from backscatter and bathymetric surfaces acquired in the main survey area (Table 12: Sample locations reported using POSM/V position). Video coverage was obtained at every location, and bottom samples were collected at six of ten stations where sediments were soft enough for collection.

Sample #	Easting	Northing	Sediment	Video
1	366918.1	4769860	Y	Y
2	367650	4770032	N	Y
3	368753	4770961	Y	Y
4	367881.7	4771244	Y	Y
5	368434.8	4771679	N	Y
6	368031.2	4772112	N	Y
7	369042.6	4772146	N	Y
8	368492.7	4772860	Y	Y
9	369909.5	4773126	Y	Y
10	369239.2	4774816	Y	Y

Table 13: Sample locations reported using POSM/V position.

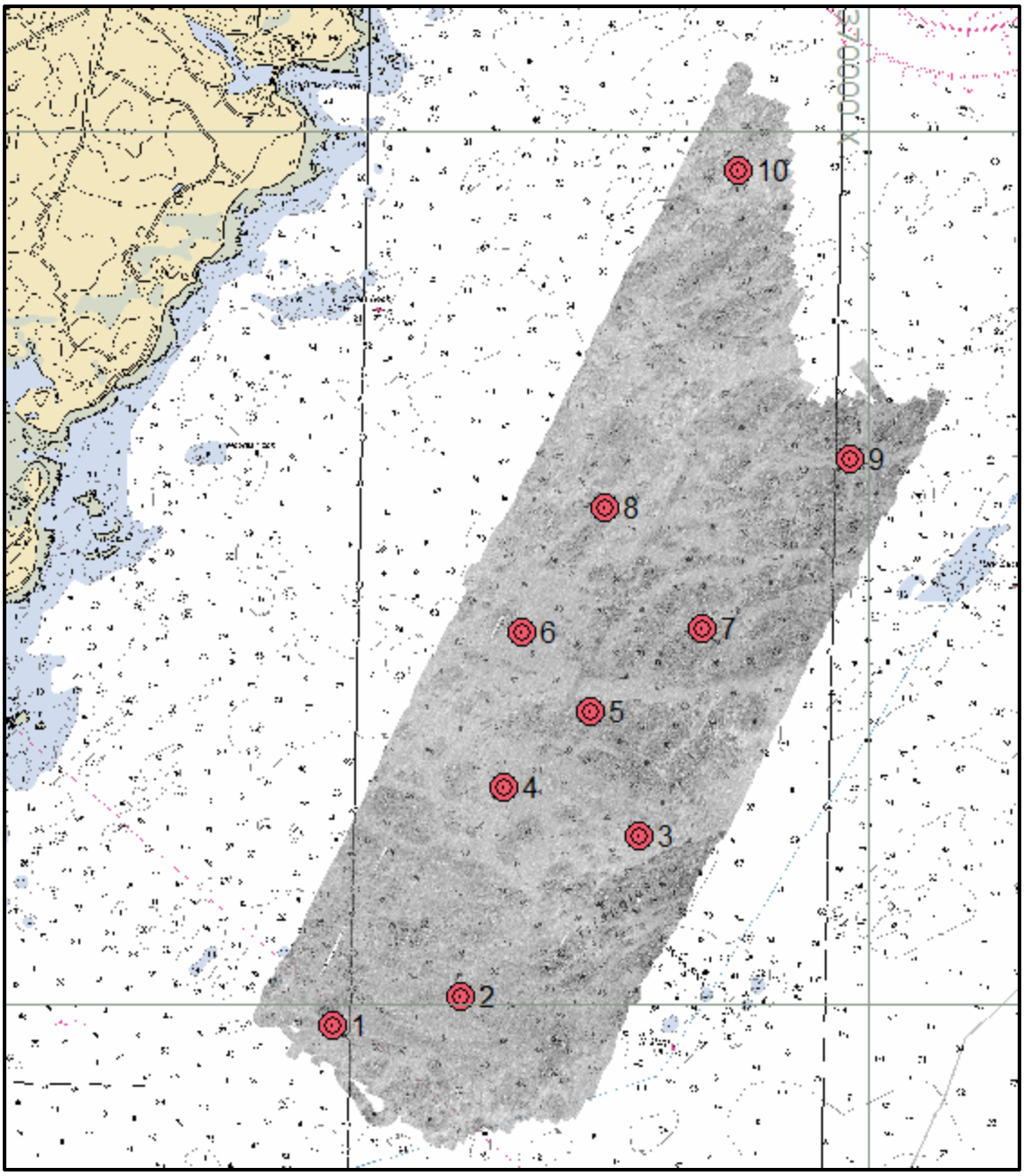

Figure 30: Bottom sampling locations overlaid on backscatter mosaic.

More information can be found in the DAPR and Bottom Sample Report.

j) Additional Results

There are no additional results for this survey.

k) New Survey Recommendation

There are no new survey recommendations created for this survey.

l) Shoreline

Shoreline was not investigated due to time constraints.

m) Prior Surveys

See junctioning survey section for more information.

n) Aids to Navigation

Aids to navigation were not evaluated as part of this survey.

o) Overhead Features

No overhead features exist for this survey.

p) Submarine Features

Submarine features were investigated and attributed in the sheet's final feature file if deemed significant.

q) Ferry Routes and Terminals

No ferry routes or terminals exist for this survey.

r) Platforms

No platforms exist for this survey.

s) Significant Features

No significant features exist for this survey.

t) Construction and Dredging

No present or planned construction or dredging exist within the survey limits.

V. Approval Sheet

As Chief of Party, field operations for this hydrographic survey were conducted under my direct supervision, with frequent personal checks of progress and adequacy. I have reviewed the attached survey data and reports. All field sheets, this Survey Summary Report, and all accompanying records and data are approved. All records are forwarded for final review and processing to the Processing Branch.

VI. TABLE OF ACRONYMS

CCOM/JHC	Center for Coastal and Ocean Mapping/Joint Hydrographic Center
CRM	Compact Measurement Records
CTD	Conductivity Temperature Depth
CUBE	Combined Uncertainty and Bathymetric Estimator
CW	Continuous Wave
DAPR	Data Acquisition and Processing Report
DGPS	Differential Global Positioning System
DP	Detached Position
DR	Descriptive Report
ENC	Electronic Navigational Chart
ERS	Ellipsoidal Referenced Survey
FM	Fledermaus
GAMS	GPS Azimuth Measurement Subsystem
GPS	Global Position System
HBR	Harbor

HVCR	Horizontal and Vertical Control Report
IHO	International Hydrographic Organization
IMU	Inertial Motion Unit
LNM	Linear Nautical Miles
LOA	Length Overall
MBES	Multibeam Echosounder
NOAA	National Oceanic and Atmospheric Administration
NOS	National Ocean Service
OPS	Operations
OPUS	Online Positioning User Service
MBES	Multibeam Echosounder
POS/MV	Position and Orientation System for Marine Vessels
PPS	Pulse per second
PU	Processing Unit
QPS	Quality Positioning Systems
RNC	Raster Navigational Chart
RTK	Real Time Kinematic
RV	Research Vessel
RX	Receiver
SBES	Singlebeam Echosounder
SIS	Seafloor Information System
SH	Summer Hydrographic Field Course
SNM	Square Nautical Miles
SSS	Side Scan Sonar
SVP	Sound Velocity Profiler
TPU	Total Propagated Error
TX	Transducer
UHF	Ultra High Frequency
USACE	United States Army Corps of Engineers
UTM	Universal Transverse Mercator

WGS84	World Geodetic System 1984

BOTTOM SAMPLING REPORT

Gulf of Maine Survey

Summer Hydro 2017

2017 Summer Hydrographic Field Course
CCOM/JHC UNH
June, 2017

Introduction

Ten bottom samples were collected utilizing R/V Gulf Surveyor on 07/05/2017 (Figure 1). Sample locations were chosen from backscatter and bathymetric surfaces acquired in the main survey area (Table 1). Video coverage was obtained at every location, and bottom samples were collected at six of ten stations where sediments were soft enough for collection.

Sample #	Easting	Northing	Sediment	Video
1	366918.1	4769860	Y	Y
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7	369042.6	4772146	N	Y
8	368492.7	4772860	Y	Y
9	369909.5	4773126	Y	Y
10	369239.2	4774816	Y	Y

Table 1: Sample locations reported using PosMV position.

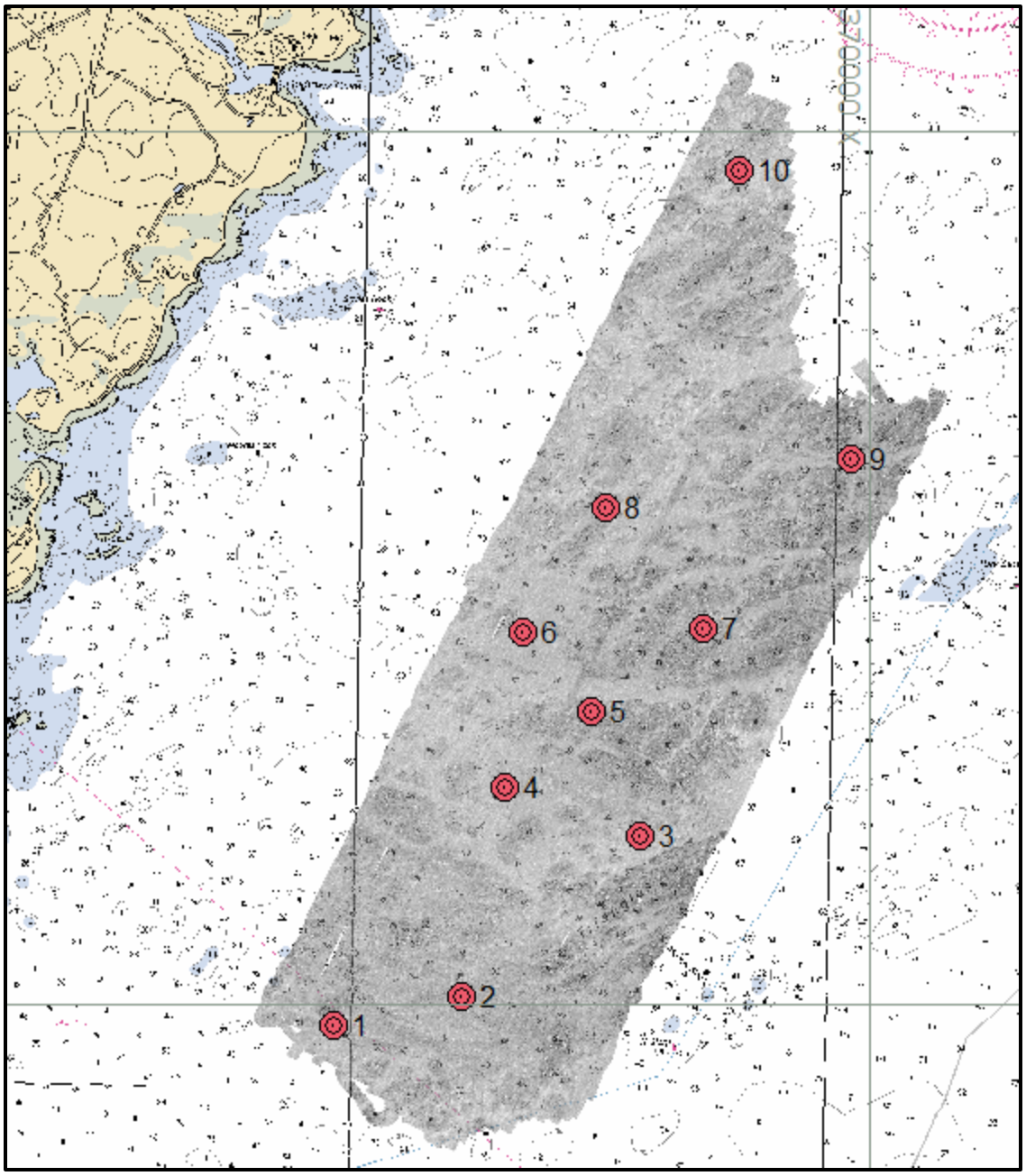


Figure 1: Bottom sampling locations overlaid on backscatter mosaic.

The following report discusses the sample location with video snapshots at each location in the survey area.

Bottom Samples

Station 1

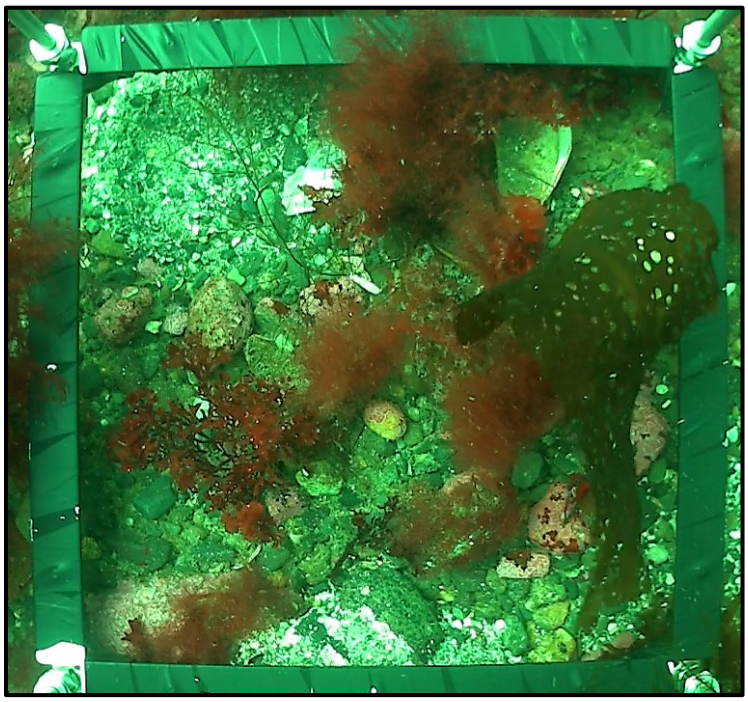


Figure 2: Station 1 video grab.

Station one was collected on a mixture of gravel, large rocks, and fine sand area with considerable vegetation. A sediment sample was collected at this station.

Station 2

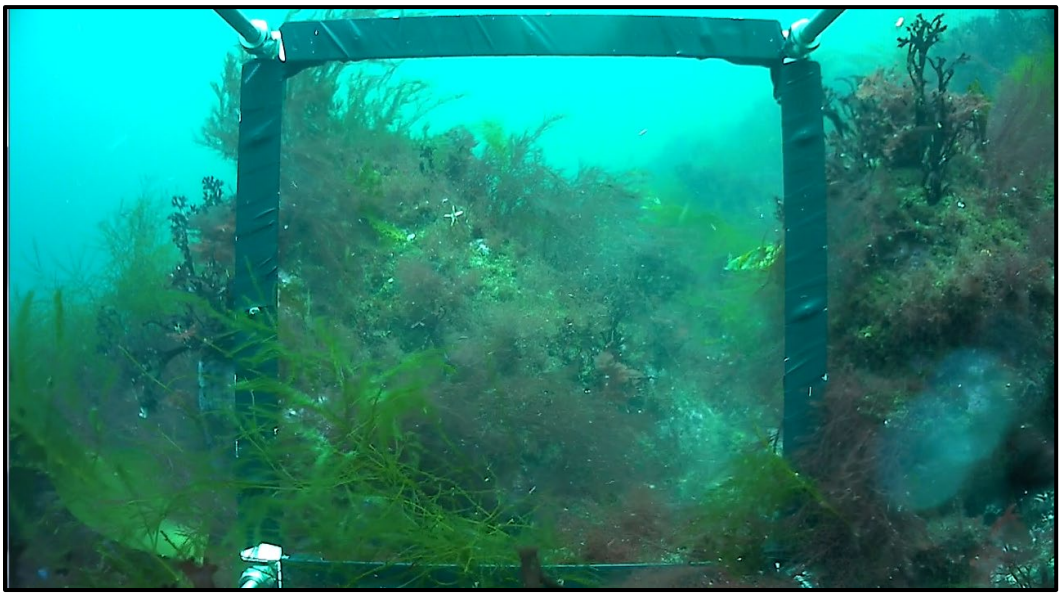


Figure 3: Station 2 video grab.

Station two was taken over large boulders with large amounts of vegetation. The rugosity of the seafloor made it difficult for the sampler to make contact without falling over. Video evidence shows the sampler on its side repeatedly while being dropped down to the seafloor, in Figure 3. As a result, no sediment samples were able to be taken at this station.

Station 3

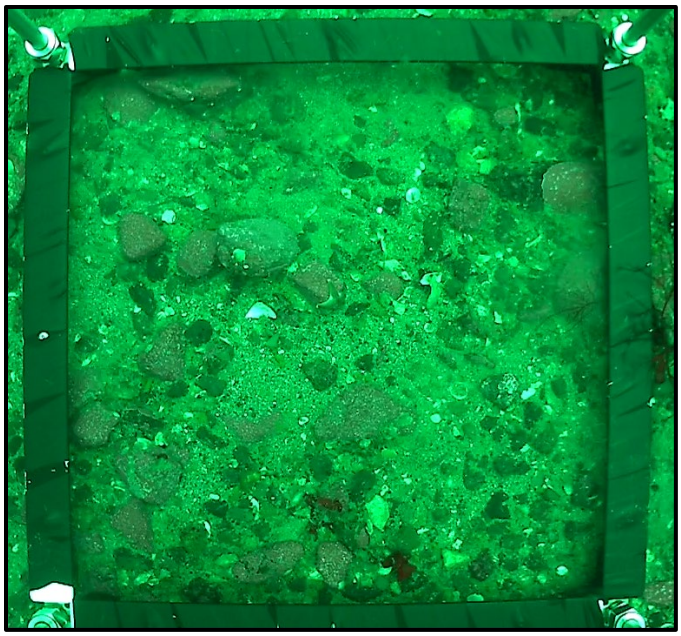


Figure 4: Station 3 video grab.

Station three was taken over a mixed rocky/gravel bottom with pockets of sand and no vegetation. This location did produce a sediment sample.

Station 4

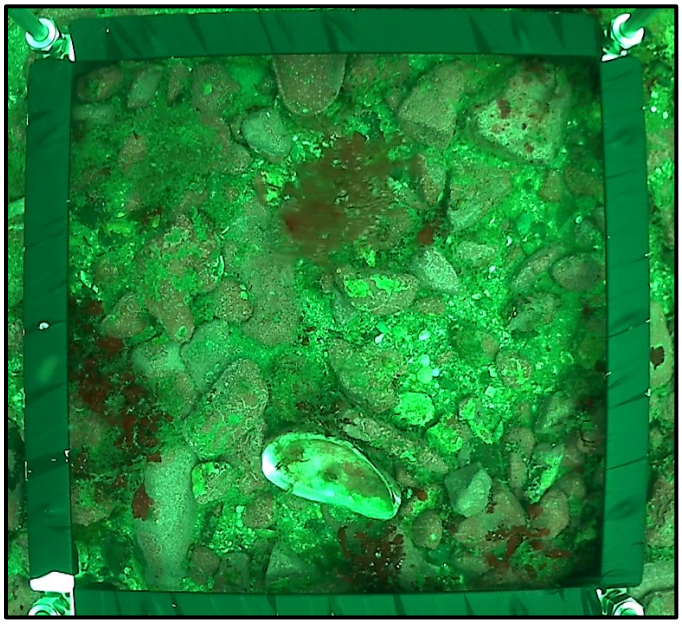


Figure 5: Station 4 video grab.

Station four was collected over a large gravelly area, with some biological material and moderate vegetation. This location also produced a sediment sample.

Station 5

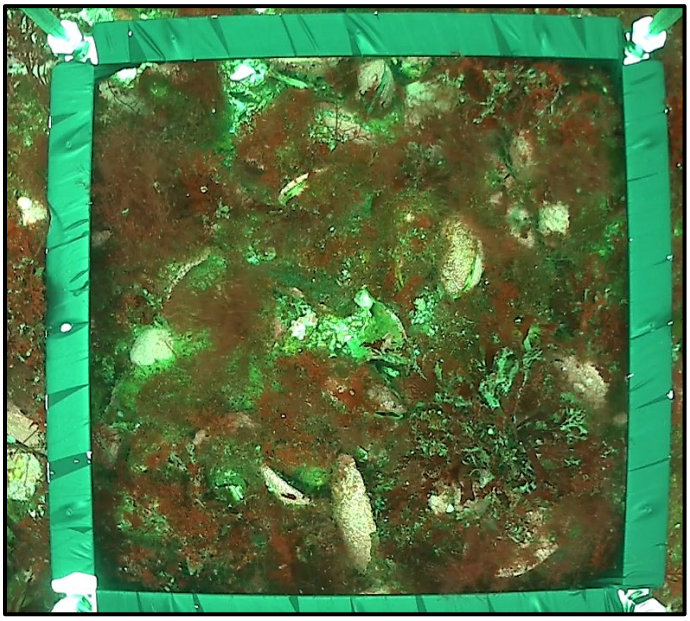


Figure 6: Station 5 video grab.

Station five was collected over a significantly vegetated area with some large rocks. Due to these rocks, a sediment sample was not able to be collected at this station.

Station 6

Figure 7: Station 6 video grab.

Station six was collected over a largely rocky area with some vegetation. Due to the rocks, a sediment sample was not able to be collected at this station.

Station 7

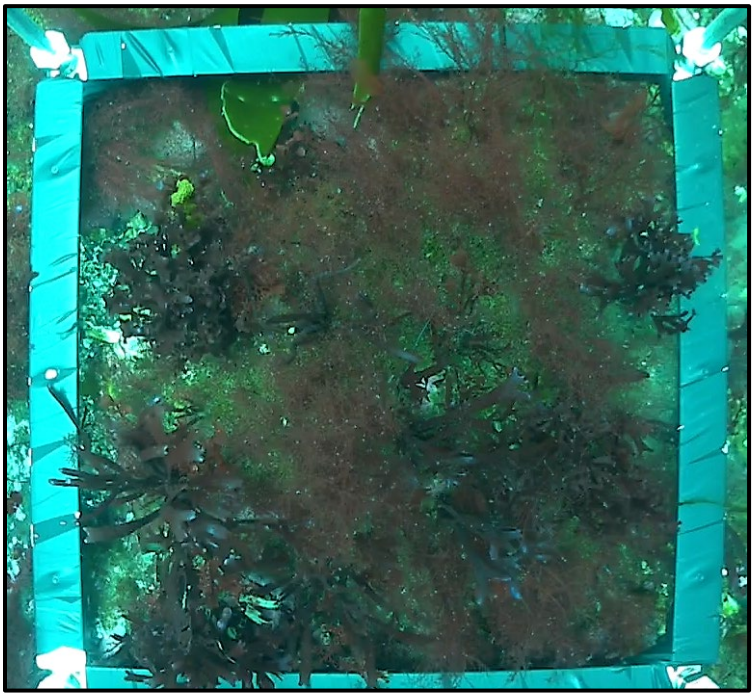


Figure 8: Station 7 video grab.

Station seven was a lot like station two. The area was covered in large boulders making it difficult to land the sampler on a relatively flat surface. Figure 8 is of the one successful drop over this station and was captured on top of a large rock. It is clear that this area contains large amounts of vegetation. Additionally, a sediment sample was not produced at this station due to these boulders.

Station 8

Figure 9: Station 8 video grab.

Station eight was collected on a rocky bottom with biological material and moderate vegetation. A sediment sample was successfully collected at this site.

Station 9

Figure 10: Station 9 video grab.

Station nine was collected on a rocky bottom with some gravel and little to no vegetation. This station produced a successful sediment sample as well.

Station 10

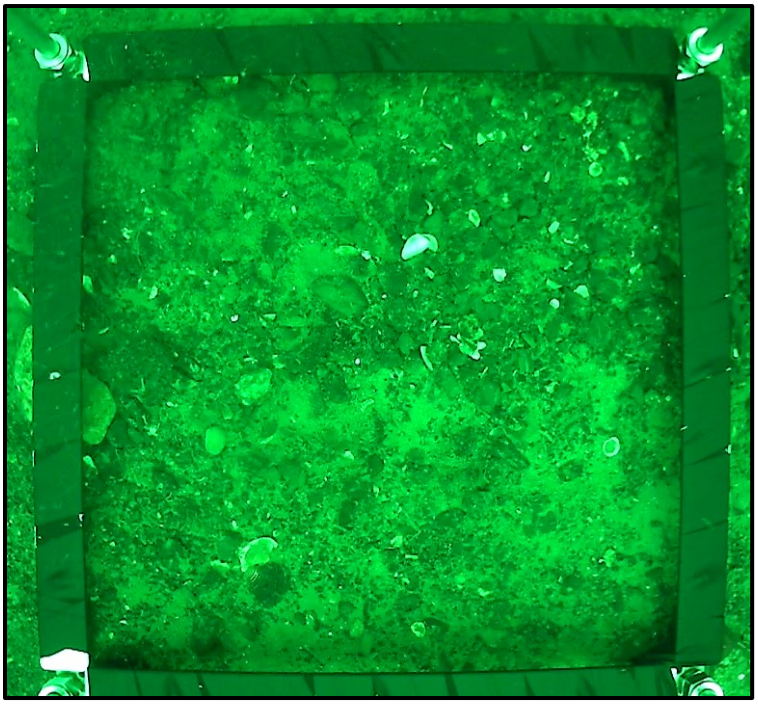


Figure 11: Station 10 video grab.

Station ten was collected over relatively loose bottom – gravels, sands, and small biological materials. No vegetation was identified at this station and a sediment sample was successfully taken.

APPROVAL PAGE

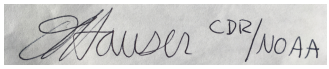
W00505

Data meet or exceed current specifications as certified by the OCS survey acceptance review process. Descriptive Report and survey data except where noted are adequate to supersede prior surveys and nautical charts in the common area.

The following products will be sent to NCEI for archive

- Descriptive Report
- Collection of Bathymetric Attributed Grids (BAGs)
- Collection of backscatter mosaics
- Processed survey data and records
- Bottom samples
- GeoPDF of survey products

The survey evaluation and verification has been conducted according current OCS Specifications, and the survey has been approved for dissemination and usage of updating NOAA's suite of nautical charts.



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Approved:_____

Commander Olivia Hauser, NOAA
Chief, Pacific Hydrographic Branch