

W00289

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

**DESCRIPTIVE REPORT**

Type of Survey: External Source Data

Registry Number: W00289

**LOCALITY**

State(s): Maine

General Locality: Gulf of Maine

Sub-locality: Boothbay and Linekin Bay

**2016**

Matthew Nixon, State of Maine Coastal Mapping Initiative (MCMI)

*Ancillary data collected during project OSD-AHB-16*

LIBRARY & ARCHIVES

Date:

**HYDROGRAPHIC TITLE SHEET**

**W00289**

**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: **Gulf of Maine**

Sub-Locality: **Boothbay and Linekin Bay**

Scale: **1:10,000**

Dates of Survey: **21 Oct 2014 – 3 Nov 2015**

Project Number: **OSD-AHB-16**

Data Source: ***F/V Amy Gale***

Chief of Party: **Matthew Nixon, State of Maine Coastal Mapping Initiative**

Soundings by: **(MCMI) Multibeam Echo Sounder**

Imagery by: **Multibeam Echo Sounder Backscatter**

Verification by: **Atlantic Hydrographic Branch**

Soundings Acquired in: **Meters at Mean Lower Low Water**

**Remarks:**

*The purpose of this survey is to provide contemporary surveys to update National Ocean Service (NOS) nautical charts. All separates are filed with the hydrographic data. Any revisions to the Descriptive Report (DR) generated during office processing are shown in bold red italic text. The processing branch maintains the DR as a field unit product, therefore, all information and recommendations within the body of the DR are considered preliminary unless otherwise noted. The final disposition of surveyed features is represented in the OCS nautical chart update products. All pertinent records for this survey, including the DR, are archived at the National Centers for Environmental Information (NCEI) and can be retrieved via <http://www.ncei.noaa.gov/>.*

*Products created during office processing were generated in NAD83 UTM 19N, MLLW. All references to other horizontal or vertical datums in this report are applicable to the processed hydrographic data provided by the field unit.*

## DR SUMMARY

Descriptive Report Summary to Accompany <b>W00289</b>	
Project	OSD-AHB-16
Survey	W00289
State	Maine
Locality	Gulf of Maine
Sub Locality	Boothbay and Linekin Bay
Scale of Survey	1:10,000
Sonars Used	Kongsberg EM2040c 300kHz
Horizontal Datum	North American Datum of 1983 (NAD83)
Vertical Datum	Mean Lower Low Water (MLLW)
Vertical Datum Correction	Verified Observed Zone Tides
Projection	Latitude-Longitude (NAD83) - UTM Zone 19
Field Unit	F/V Amy Gale
Survey Dates	21 Oct 2014 – 3 Nov 2015
Chief of Party	Mathew Nixon, State of Maine Coastal Mapping Initiative (MCMi)

### A. Area Surveyed

W00289 was surveyed by the State of Maine with a Kongsberg EM2040c onboard the *F/V Amy Gale*, a 35 foot lobster boat. The survey combines two datasets collected in 2014 and 2015 with the same sonar, but different acquisition software. The data were collected from Oct. 21<sup>st</sup> to Nov. 6<sup>th</sup> 2014 and May 20<sup>th</sup> to Nov. 3<sup>rd</sup> 2015. The data were not collected in direct accordance with the *NOS Hydrographic Surveys Specifications and Deliverables* and the *Field Procedures Manual* requirements; however both documents were referenced during acquisition for guidance.

Data were acquired within the following survey limits:

Northeast Limit	Southwest Limit
43.857 N	43.566 N
69.593 W	69.817 W

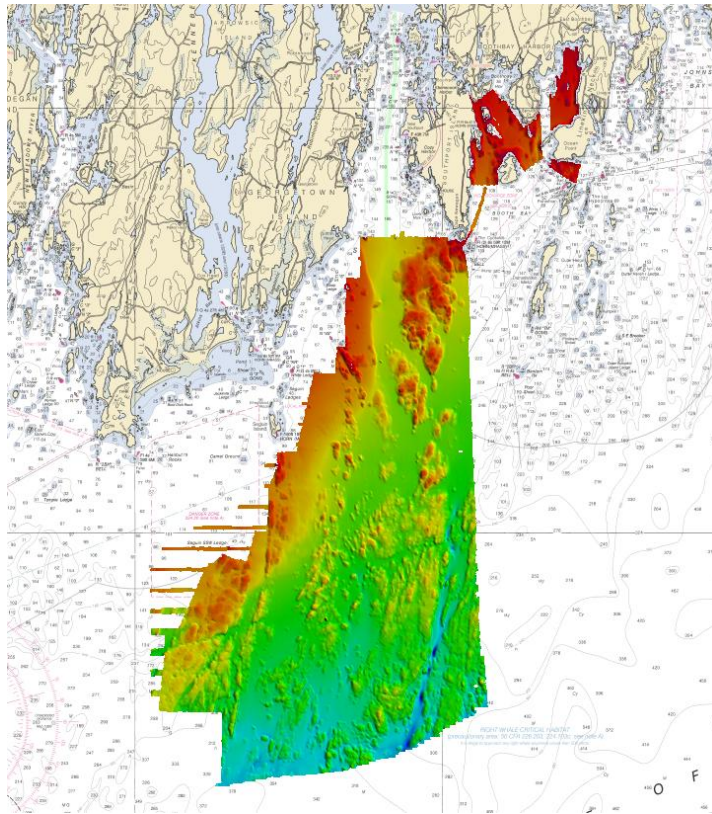


Figure 1 Survey extent of W00289. Background chart 13288, 1:80,000.

## B. Survey Purpose

This survey was acquired by the State of Maine Coastal Mapping Initiative (MCMCI) and was partially funded by the Bureau of Ocean Energy Management (BOEM) to locate sand in federal waters for beach restoration post Hurricane Sandy. The data were shared with NOAA and post-processed by the UNH Joint Hydrographic Center / Center for Coastal and Ocean Mapping Sandy IOCM group to meet Office of Coast Survey bathymetry standards as best possible.

## C. Intended Use of Survey

Although these data were collected for non-charting purposes, the data are adequate to supersede prior data and are intended for chart compilation.

## D. Data Acquisition and Processing

A traditional Data Acquisition and Processing Report was not submitted with these data, however a report titled *Seafloor Mapping Descriptive Report MCMCI 2015* was included and contains a description of data acquisition and processing systems, survey vessel, quality control procedures and data processing methods. Post processing and analysis of data performed by the UNH IOCM Sandy Group is included in this report.

W00289 combines data collected in 2015 and a small area from 2014 in the vicinity of Boothbay. The 2014 data subset was collected as part of a larger survey previously submitted to the Office of Coast Survey as W00288. Due to its size, distance from the rest of the 2014 data, and plans to survey in the vicinity in 2015, the data were held to be included with W00289. Figure 2 demonstrates coverage and overlap between the 2014 and 2015 data. For detailed information on collection of the 2014 data see NCEI archived survey [W00288](#). Vessel and survey equipment are consistent between years. The primary difference between the data sets is the acquisition and processing software. The 2014 data were collected with SIS and processed with Caris and the 2015 data were collected with Qinsy and processed with Qimera. GSF files were exported from Qimera 1.2.5, and both data sets were reviewed and processed by the IOCM group in Caris Hips and Sips 9.1.7.

### E. Uncertainty

Validation of the accuracy of this outside data was performed by comparing the data between years, to itself, to the chart, and calculating uncertainty based on analysis and information provided in the state report. No other recently collected overlapping data existed to validate depths.

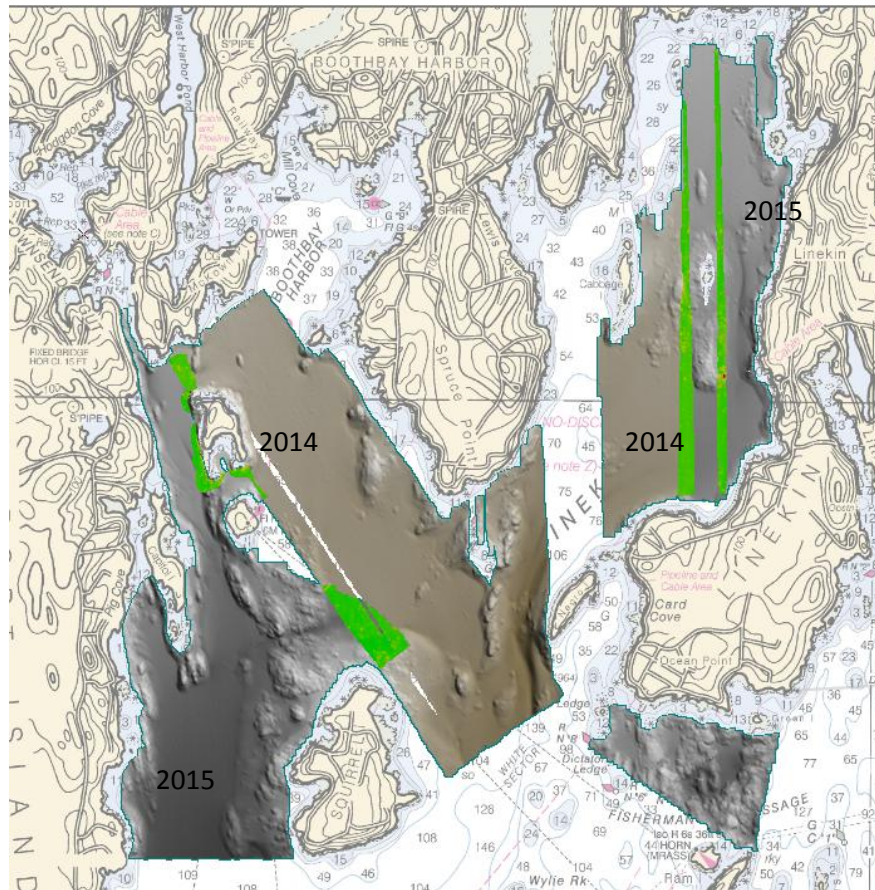


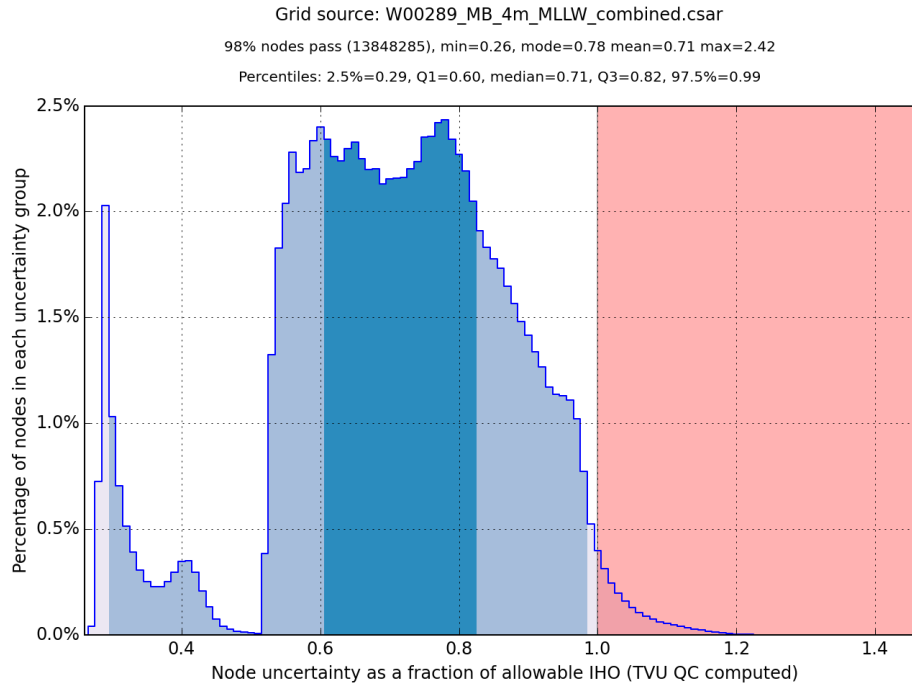
Figure 2 Coverage extents of 2014 data and overlapping region with 2015 data. Green areas highlight the junction and overlap between years.

The State of Maine 2014 data were compared with the 2015 data in areas of overlap (Figure 2) and the data agree very well with an average difference of 7 cm, standard deviation 8 cm, with the 2014 data being shoaler on average than the 2015 data. W00288, which contains the rest of the 2014 data, was validated with NOAA Ship *Hassler* crosslines and was found to agree with an average difference of +6 cm, standard deviation 25 cm (W00288 Descriptive Report Summary).

Crosslines were run over the main survey area and represent 12% of the total 2015 data. No crosslines cover the 2015/2014 inshore Boothbay region. Agreement between crosslines and main scheme lines is very good with an average difference of 0 m, standard deviation 40 cm. No systematic issues were revealed.

Upon receipt of the data, it became apparent that the data had been heavily cleaned in a way that appeared unnecessary, creating massive amounts of holidays when gridded at less than 4 m. In discussion with the state, the IOCM reviewer discovered that E&C Enviroscope, who processed the data, had run a standard deviation filter, as they were used to working with interferometric data on past contracts. This type of filtering was not necessary for the EM2040c data and the data were reprocessed by the IOCM Center. After reprocessing, the data were accepted by the IOCM Center.

Utilizing information mined from the state report and the data, an uncertainty estimate was calculated in Caris and included in the CUBE surfaces. Sound speed and zoned tides (from a CO-OPS zoning plan) were applied to the data by the State of Maine and were not reapplied during post processing. The raw sound speed casts were examined in Velocipy and the frequency of casts and variation in surface sound speed were used to determine uncertainty values. 98% of the surface nodes meet IHO order 1.



**Figure 3** Uncertainty of combined 4 m csar grid generated from HydroOffice.

While the seafloor coverage is good, small holidays exist throughout the data primarily because of an issue with a compromised cable causing dropped pings, as described on page 9 of *Seafloor Mapping Descriptive Report MCFI 2015*. The issue was resolved on July 3<sup>rd</sup> 2015 with the replacement of the cable. Additional holidays due to shadows on rocks, shoaling over rocks, erroneous data cleaned out, and missed coverage exist within the dataset. The largest gaps are presented in Figure 4.



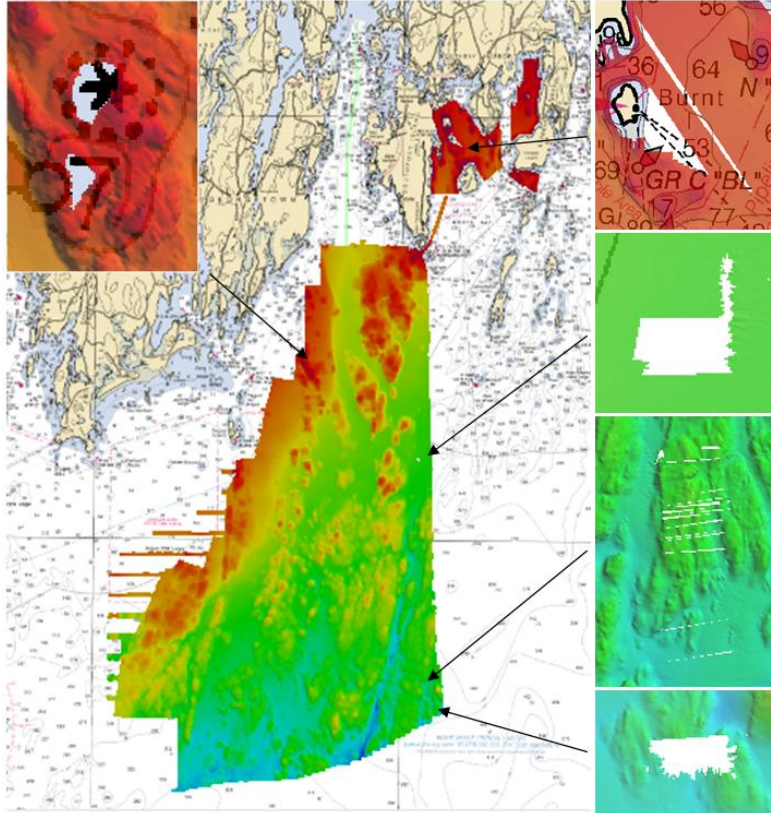


Figure 4 The largest gaps in coverage and relative position within survey. Starting from the top right and moving clockwise: 1. The rock as presently charted is confirmed, least depth not obtained, 2. Shoaling not evident in along track holiday, 3. Gap is at 76 m depth, minimal navigational risk, 4. Gaps are insignificant, 5. Gap is at 85 m depth, minimal navigational risk.

Where coverage exists, data density meets NOAA requirements. Ninety-nine percent of nodes have five soundings or more as demonstrated in Figure 5.

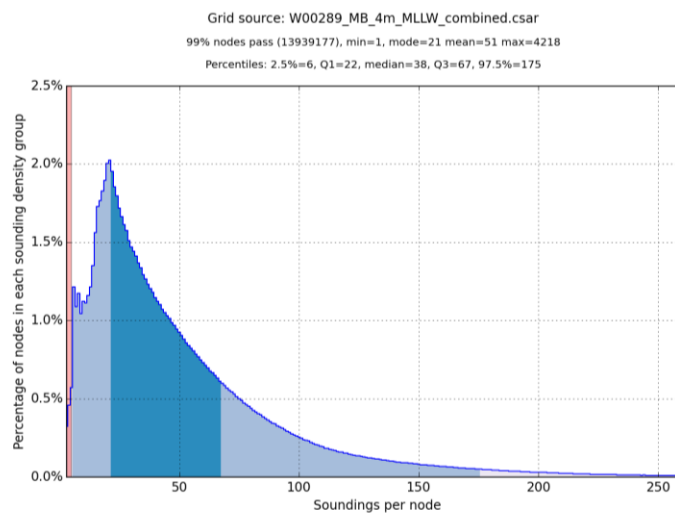


Figure 5 Data density based on number of soundings per node generated in HydroOffice. 99% of nodes have five soundings or more.



## F. Results and Recommendations

The 2014 data and all the 2015 data have been combined for the final grids and regrided to meet NOAA required resolution and depth thresholds for multibeam and backscatter surfaces. The following grids are submitted with this dataset.

Surface Name	Surface Type	Resolution	Depth Range (m)	Purpose
W00289_MB_4m_36-160m_MLLW	CSAR	4 m	36 - 154	Complete Coverage
W00289_MB_1m_18-40m_MLLW	CSAR	1 m	18 - 40	Complete Coverage
W00289_MB_05m_0-20m_MLLW	CSAR	50 cm	0 - 20	Complete Coverage
W00289_MB_4m_MLLW_combined	CSAR	4 m	0 - 154	Complete Coverage
W00289_1m_300kHz_2015_inshore	GeoTIFF	1 m	0 - 36	Backscatter Mosaic
W00289_4m_300kHz_2015	GeoTIFF	4 m	0 - 154	Backscatter Mosaic
W00289_1m_300kHz_2014	GeoTIFF	1 m	0 - 48	Backscatter Mosaic

A final feature file, W00289\_FFF.000 was created and contains 61 bottom samples collected in support of sediment analysis for sand identification for BOEM. Photos of bottom samples and sediment analysis can be found in the state report *Sediment Analysis Report MCFI 2015* included with this submission. The feature file also contains several features identified in the multibeam and backscatter grids, including one possible wreck (Fig. 6), sewer line (Fig. 7), and cable lines (Fig. 7). The sewer line located by the survey differs notably from the charted location. The cable detected by the survey is within the charted cable area. Rocky seabed areas have not been delineated by the hydrographer or the IOCM processing center, but are readily apparent in the grid.

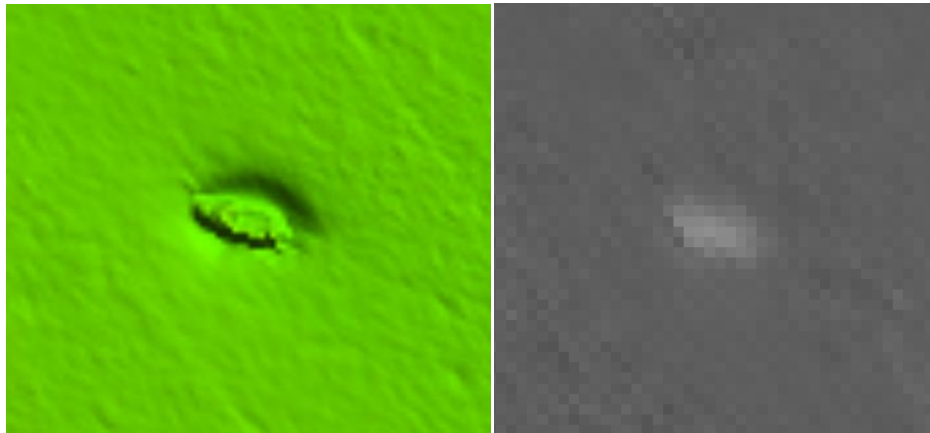


Figure 6 Possible uncharted wreck of approximately 10 m length is located at position 43-49-17.785287 N, 069-37-39.889415 W. Left, feature is represented in 50 cm surface and right, 1 m backscatter mosaic.

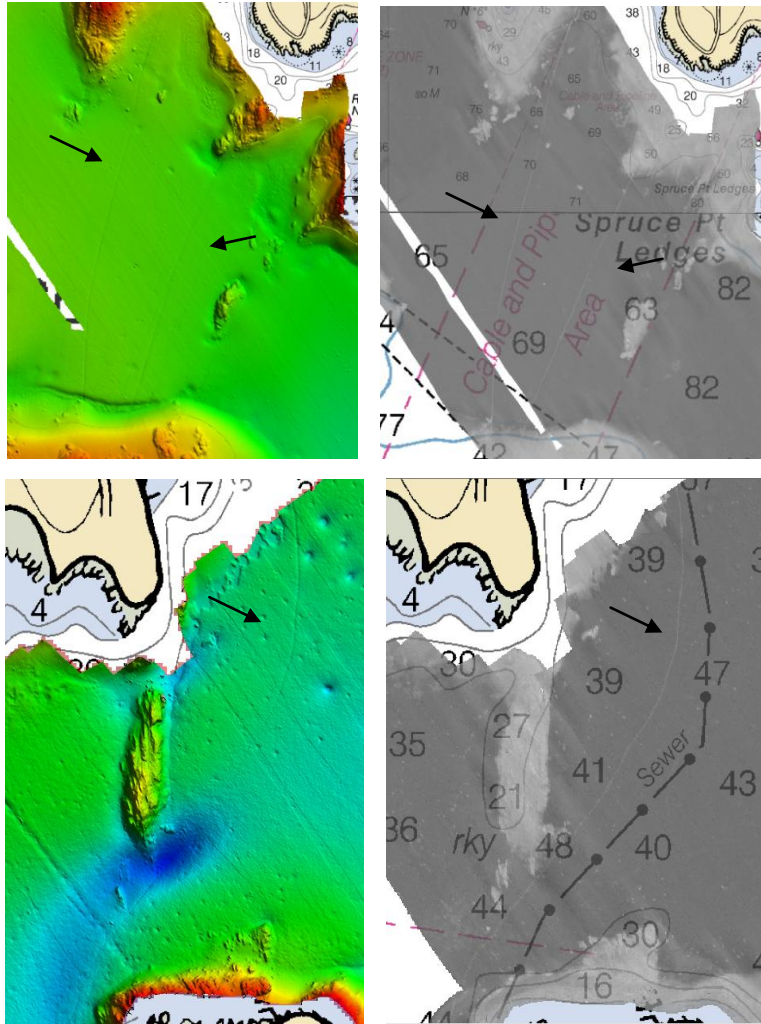
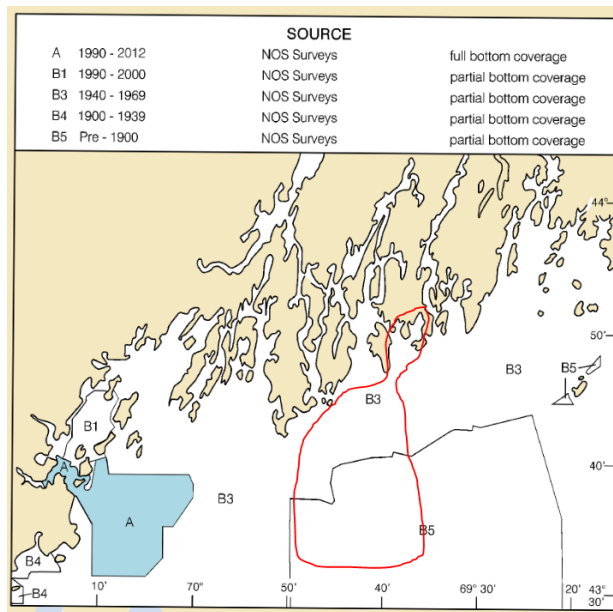


Figure 7 Position of charted cable and sewer lines represented in multibeam and backscatter grids. Note the presence of pockmarks on the seafloor indicated the (likely natural) escape of gas or fluid from the seabed.

The gridded surfaces were compared with the following largest scale Raster Navigational Charts (RNC) and Electronic Navigational Charts (ENC), which cover the survey area:

RNC	Scale	Edition	Edition Date	LNM Date	NM Date
13009	1:500,000	36	5/1/2014	11/29/2016	12/10/2016
13260	1:378,838	41	8/1/2012	11/29/2016	12/10/2016
13288	1:80,000	44	2/1/2016	11/29/2016	12/10/2016
13293	1:40,000	36	3/1/2016	11/29/2016	12/10/2016
13295	1:15,000	12	5/1/3013	11/29/2016	12/10/2016
13296	1:15,000	26	1/1/2012	11/29/2016	12/10/2016

ENC	Scale	Edition	Update Application Date	Issue Date	LNM Date
US2EC04M	1:675,000	21	11/23/2015	12/5/2016	11/29/2016
US3EC10M	1:378,838	37	12/29/2015	12/5/2016	11/29/2016
US4ME04M	1:80,000	6	9/29/2016	9/29/2016	11/29/2016
US5ME14M	1:40,000	7	9/20/2016	9/20/2016	11/29/2016
US5ME15M	1:15,000	16	8/29/2016	8/29/2016	11/29/2016
US5ME16M	1:15,000	15	8/31/2016	8/31/2016	11/29/2016



**Figure 8 Source diagram from chart 13288, 1:80,000 highlights prior coverage in the general locality of W00289 (red outline) which was previously surveyed with lead line (B5) and single beam (B3).**

The currently charted soundings in the survey region were obtained with lead line and single beam, as depicted in the Figure 8 source diagram from chart 13288. Lead line and single beam provide sparse coverage of the seafloor compared to complete coverage multibeam and the insufficiency in rocky areas are evident in the chart comparison. Shoal depths captured in the gridded surface are poorly represented on the chart, particularly in the lead line region in the southern offshore survey area. Due to the rocky nature of the seabed many shoaler soundings from the survey are located directly next to deeper charted soundings and shoal soundings on outcroppings are not portrayed on the chart. In the deeper areas of the survey, discrepancies exist between the survey and chart of up to 100 ft and greater. In the region closer to shore, agreement between the chart and gridded surface is greatly improved. In flat areas throughout the survey charted depths and grid soundings agree within a foot.

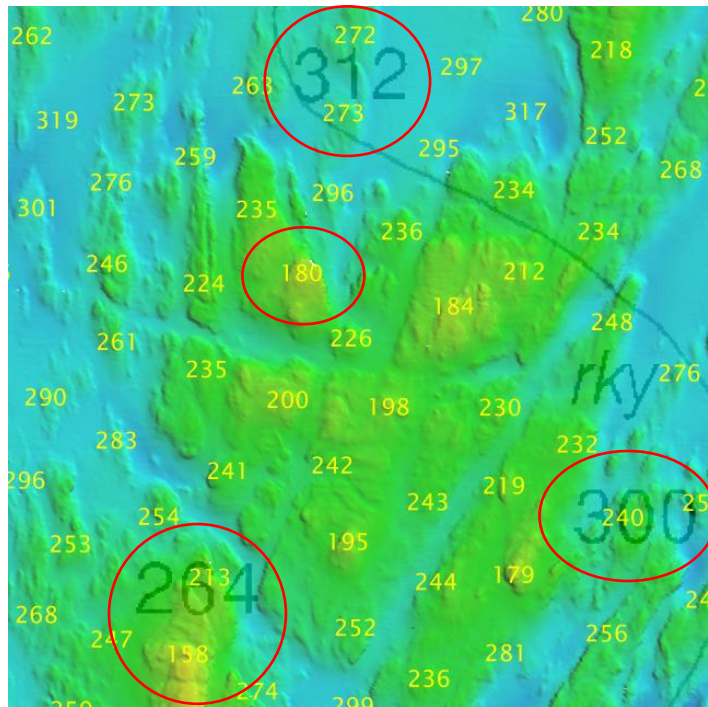


Figure 6 Shoal depths (yellow) captured in gridded surface are not represented on the chart. Discrepancies of 100 ft and greater exist.

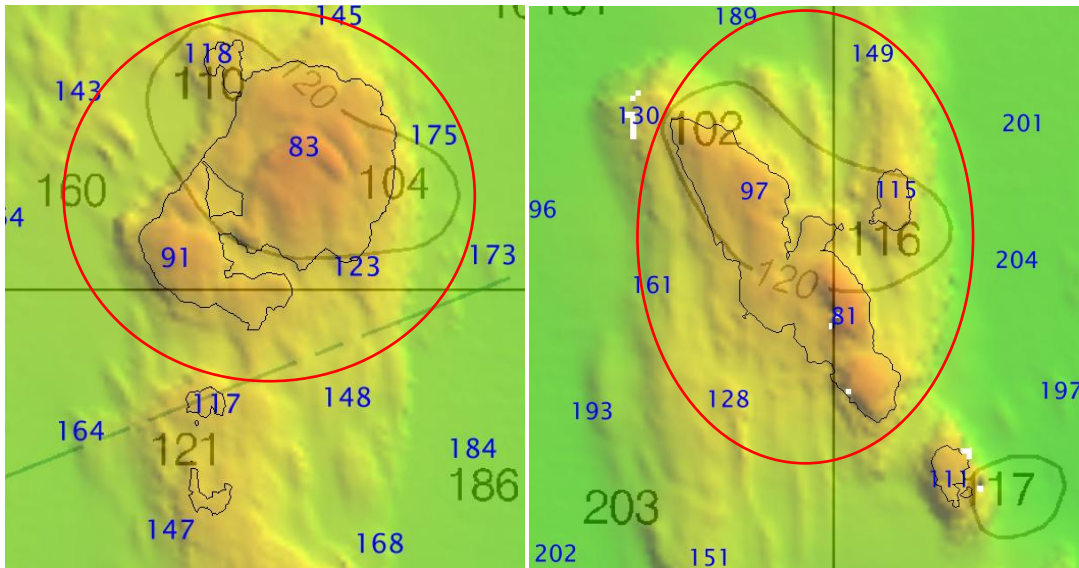


Figure 7 Two examples of the shoalest point of a rock outcropping not represented on the chart. On the left, an 83 ft sounding and on the right, an 81 ft sounding represent shoal points (blue soundings) not captured on the chart.





Figure 8 In flat regions charted soundings and gridded data agree very well, generally within a foot, throughout survey area.

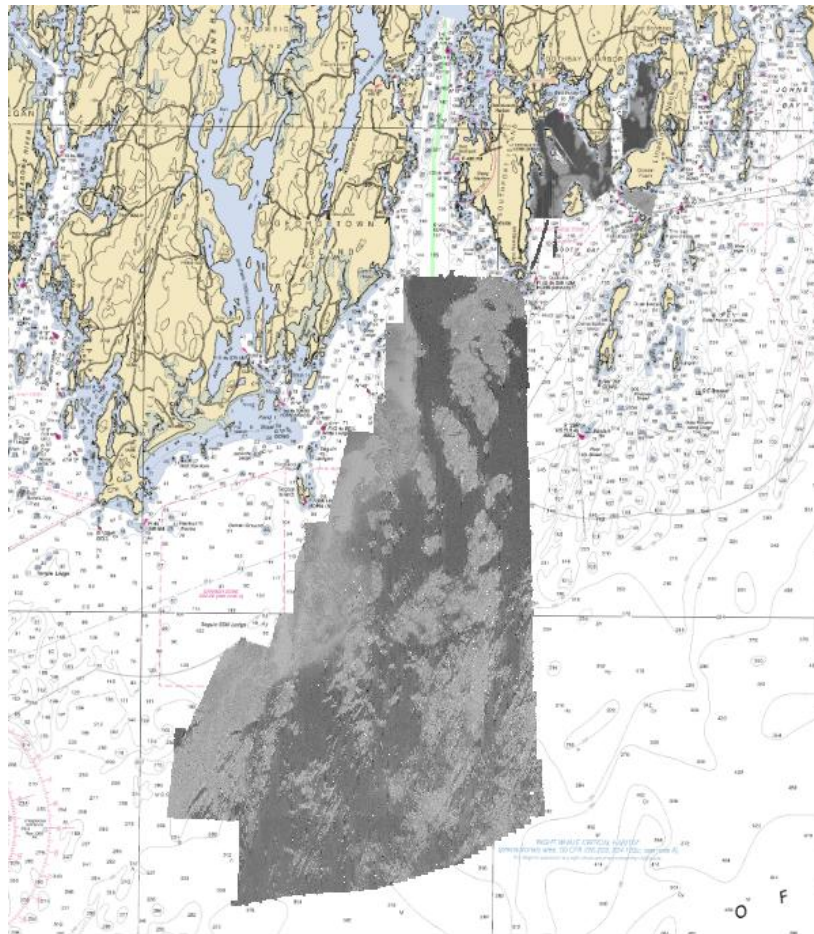


Figure 9 Backscatter mosaic of W00289. Background chart 13288, 1:80,000.

### G. Vertical and Horizontal Control

The vertical datum for this project is Mean Lower Low Water. Discrete tidal zoning was the vertical control method used. The following National Water Level Observation Network (NWLON) stations served as datum control for this survey:


Station Name	Station ID
Portland	8418150

The horizontal datum of data acquisition for this project is WGS 84, projected to UTM 19 N. In IOCM processing with Caris, the projection was changed to NAD83 UTM 19 N. All grids submitted as W00289 are in NAD83 UTM19 N.

Differential GPS (DGPS) was the sole method of positioning.

### H. Approval

The survey data meets the requirements as set forth in the NOS Hydrographic Surveys and Specifications Deliverables Manual. These data represent a significant improvement in chart source, are adequate and recommended to supersede charted data in their common areas, and to be indicated as full-bottom coverage in the source diagram. This survey is complete and no additional work is required with the exception of deficiencies noted in the Survey Summary Report, Section E. Uncertainty. All records are forwarded for final review and processing to the Processing Branch.

Approver Name	Approver Title	Approval Date	Signature
Andrew A. Armstrong, III	Co-Director, Joint Hydrographic Center	13 February 2017	





James Miller - NOAA Federal <james.j.miller@noaa.gov>

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## Maine Data Follow Up

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**Nixon, Matthew E** <Matthew.E.Nixon@maine.gov>

Tue, Jul 17, 2018 at 9:31 AM

To: "James J. Miller" <james.j.miller@noaa.gov>, Juliet Kinney - NOAA Affiliate <juliet.kinney@noaa.gov>

Cc: Ashley Chappell - NOAA Federal <ashley.chappell@noaa.gov>, "Kraun, Ben" <Ben.Kraun@maine.gov>, "Enterline, Claire" <Claire.Enterline@maine.gov>, \_NOS OCS HSD ESD Team <esd.team@noaa.gov>

Good Morning All.

Juliet, thanks for the email. James – if OCS has not received an official written request, please consider this email as such. Claire Enterline, CC'd on this email, is the project manager for the Maine Coastal Mapping Initiative and can answer additional questions should you have any. Many thanks!

As an aside, Kerby Dobbs has moved on from the Maine Coastal Program. Ben Kraun (also CC'd) is our new hydrographer.

- Matt



MATTHEW NIXON | DEPUTY DIRECTOR  
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21 State House Station  
Augusta, ME 04333-0093  
P: (207) 287-1491 | F: (207) 287-2353 | [www.maineoceanprogram.org](http://www.maineoceanprogram.org)

**From:** James J. Miller [mailto:james.j.miller@noaa.gov]

**Sent:** Tuesday, July 17, 2018 9:26 AM

**To:** Juliet Kinney - NOAA Affiliate <juliet.kinney@noaa.gov>

**Cc:** kerby.m.dobbs@maine.gov; Nixon, Matthew E <Matthew.E.Nixon@maine.gov>; Ashley Chappell - NOAA Federal <ashley.chappell@noaa.gov>; Kraun, Ben <Ben.Kraun@maine.gov>; \_NOS OCS HSD ESD Team <esd.team@noaa.gov>

**Subject:** Re: Maine Data Follow Up

Hi Juliet,

Thank you for clarifying the State of Maine requested for the data to be archived and publicly available on NCEI. Did they provide this request in writing, such as an email?

In the meantime, we are still reviewing and processing the Maine surveys as normal.

Respectfully,

James

James J. Miller

Physical Scientist

NOAA Office of Coast Survey

Atlantic Hydrographic Branch

439 W York St | Norfolk, VA | 23510

757-364-7465

On Mon, Jul 16, 2018 at 5:13 PM, Juliet Kinney - NOAA Affiliate <[juliet.kinney@noaa.gov](mailto:juliet.kinney@noaa.gov)> wrote:

Hi James,

Ashley just asked about what State of Maine data is at NCEI and I realized I do not remember how the new protocol for archiving to NCEI publicly is being done. Is the protocol now to have a note from the collecting agency requesting data be put on NCEI publicly? The State of Maine requested that through us before and then we sent the data on to the branch, but I don't know that that information made it through to internal tracking. I am copying the State of Maine contacts so that they can reply directly if they need to send something to the ESD team.

( This is in reference to W00448, W00449, W00450, W00451 , and W00289)

Thanks,

Juliet

Juliet Kinney, Ph.D.  
Hydrographic Analyst (ERT, Inc.)  
NOAA/UNH Joint Hydrographic Center  
24 Colovos Rd.  
Durham, NH 03824  
(603) 862-0862  
[juliet.kinney@noaa.gov](mailto:juliet.kinney@noaa.gov)

APPROVAL PAGE

W00289

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)
- Processed survey data and records
- Geospatial PDF of survey products
- Collection of backscatter mosaics

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

Approved: \_\_\_\_\_  
**Commander Meghan McGovern, NOAA**  
Chief, Atlantic Hydrographic Branch