H13991

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

# DESCRIPTIVE REPORT

| | |
|---|---|
| Type of Survey: | Navigable Area |
| Registry Number: | H13991 |

## LOCALITY

| | |
|---|---|
| State(s): | Massachusetts |
| General Locality: | Northern Massachusetts Bay |
| Sub-locality: | Gloucester Harbor |

**2025**

CHIEF OF PARTY
John R. Bean

LIBRARY & ARCHIVES

Date:

| U.S. DEPARTMENT OF COMMERCE<br>NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION | REGISTRY NUMBER: |
|---|---|
| **HYDROGRAPHIC TITLE SHEET** | **H13991** |

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): | **Massachusetts** |
| General Locality: | **Northern Massachusetts Bay** |
| Sub-Locality: | **Gloucester Harbor** |
| Scale: | **5000** |
| Dates of Survey: | **08/03/2024 to 03/14/2025** |
| Instructions Dated: | **08/01/2024** |
| Project Number: | **OPR-A325-KR-24** |
| Field Unit: | **Ocean Surveys** |
| Chief of Party: | **John R. Bean** |
| Soundings by: | **Multibeam Echo Sounder** |
| Imagery by: | **Multibeam Echo Sounder Backscatter** |
| Verification by: | **Atlantic 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 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.***

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# Descriptive Report to Accompany Survey H13991

Project: OPR-A325-KR-24

Locality: Northern Massachusetts Bay

Sublocality: Gloucester Harbor

Scale: 1:5000

August 2024 - March 2025

**Ocean Surveys**

Chief of Party: John R. Bean

# A. Area Surveyed

This survey provides hydrographic data for waters in Northern Massachusetts Bay. The general locations of the survey limits are presented in Table 1.

## A.1 Survey Limits

Data were acquired within the following survey limits:

| Northwest Limit | Southeast Limit |
|---|---|
| 42° 41' 57.56" N<br>70° 43' 11.78" W | 42° 32' 27.79" N<br>70° 32' 19.76" W |

*Table 1: Survey Limits*

Survey limits were acquired in accordance with the requirements in the Project Instructions and the HSSD.

## A.2 Survey Purpose

The waters in and around the ports of Boston and Gloucester in Northern Massachusetts Bay are some of the most heavily used in the US by commercial and recreational boating traffic. The Port of Boston sees more than 16 million tons of cargo movement annually*, and thousands of vessels travel into, out of, and within Boston Harbor every year. Boston, Gloucester and Rockport are also major fishing ports, with average yearly landings of over 40 million pounds worth over $80 million**.

This project will also provide an analysis of the feasibility of using inshore bathymetric lidar data for identifying and updating features, in concert with new multibeam sonar data collection.

The prior survey data in much of the survey area is over 20 years old, and several areas have data that is from the 1940s. The survey area has an extensive coastline, and has been heavily trafficked by humans for almost 400 years; there have been extensive and poorly documented effects and changes to the seafloor by human activity***. This survey will address this by collecting modern high resolution bathymetry for updating NOAA nautical charting products improving the safety of maritime traffic and commerce as well as supporting the Seabed 2030 global mapping initiative. Survey data from this project is intended to supersede all prior survey data in the common area.

*Massachusetts Port Authority Statistics 2022
**2022 NMFS Landing Statistics https://www.fisheries.noaa.gov/national/sustainable-fisheries/commercial-fisheries-landings
***https://www.sec.state.ma.us/divisions/cis/historical/historical-sketch.htm
and https://stellwagen.noaa.gov/maritime/maritimehistory.html

## A.3 Survey Quality

The entire survey is adequate to supersede previous data.

## A.4 Survey Coverage

The following table lists the coverage requirements for this survey as assigned in the project instructions:

| Water Depth | Coverage Required |
|---|---|
| All waters in survey area within ACHARE feature in PRF | Object Detection Coverage (Refer to HSSD Section 5.2.2.2) |
| All Other Waters in Survey Area | Complete Coverage (Refer to HSSD Section 5.2.2.3) |

*Table 2: Survey Coverage*

Survey coverage was in accordance with the requirements listed above and in the HSSD.

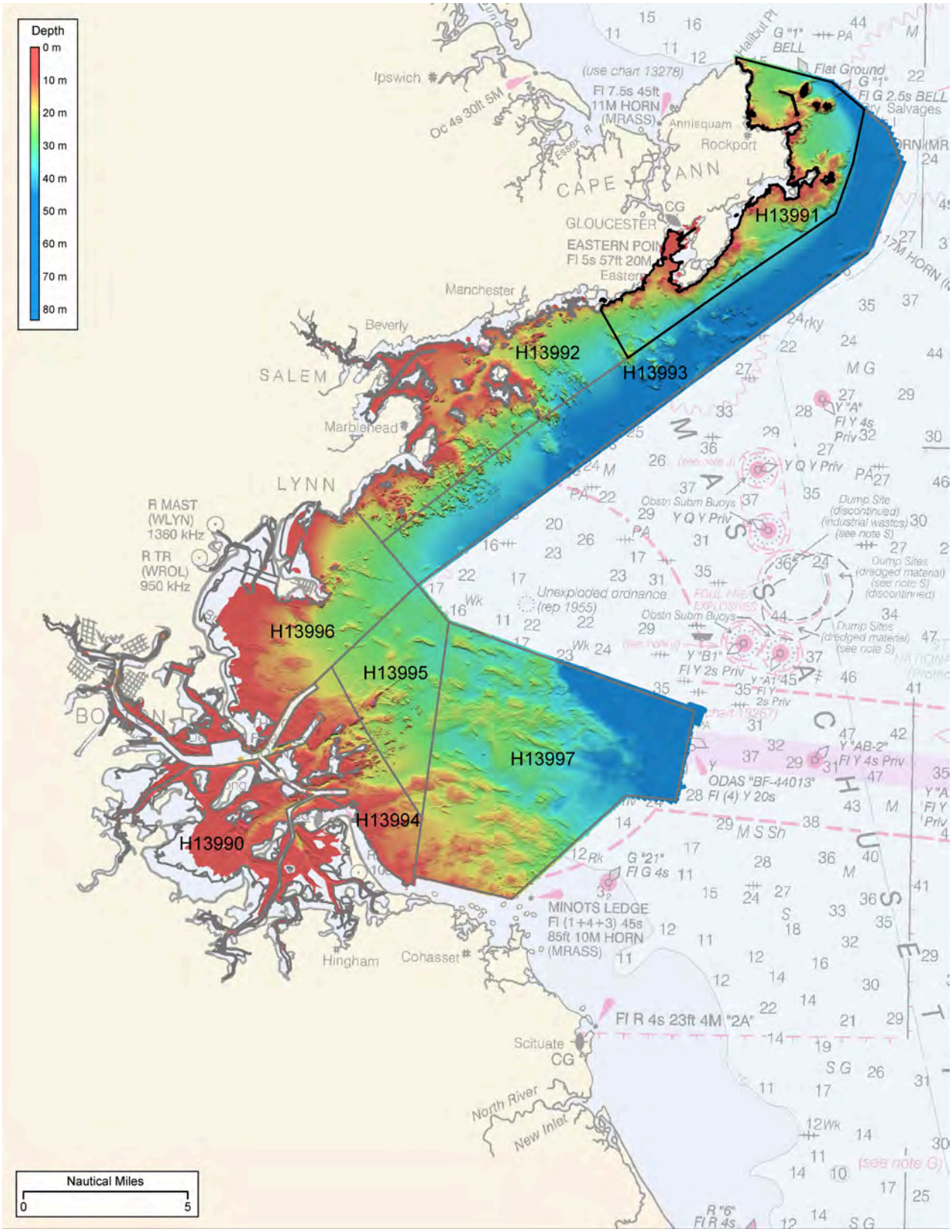



*Figure 1: Project OPR-A325-KR-24 coverage with H13991 emphasized.*

## A.6 Survey Statistics

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

| | HULL ID | *RV South Cove* | *RV West Cove II* | *Total* |
|---|---|---|---|---|
| **LNM** | **SBES Mainscheme** | 0.0 | 0.0 | 0.0 |
| | **MBES Mainscheme** | 511.8 | 406.0 | 917.8 |
| | **Lidar Mainscheme** | 0.0 | 0.0 | 0.0 |
| | **SSS Mainscheme** | 0.0 | 0.0 | 0.0 |
| | **SBES/SSS Mainscheme** | 0.0 | 0.0 | 0.0 |
| | **MBES/SSS Mainscheme** | 0.0 | 0.0 | 0.0 |
| | **SBES/MBES Crosslines** | 43.0 | 0.0 | 43.0 |
| | **Lidar Crosslines** | 0.0 | 0.0 | 0.0 |
| **Number of Bottom Samples** | | | | 0 |
| **Number Maritime Boundary Points Investigated** | | | | 0 |
| **Number of DPs** | | | | 0 |
| **Number of Items Investigated by Dive Ops** | | | | 0 |
| **Total SNM** | | | | 22.1 |

*Table 3: Hydrographic Survey Statistics*

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

| Survey Dates | Day of the Year |
|---|---|
| 08/03/2024 | 216 |
| 08/04/2024 | 217 |
| 08/05/2024 | 218 |
| 08/06/2024 | 219 |
| 08/07/2024 | 220 |
| 08/08/2024 | 221 |
| 08/09/2024 | 222 |
| 08/10/2024 | 223 |
| 08/11/2024 | 224 |
| 08/12/2024 | 225 |
| 08/13/2024 | 226 |
| 08/14/2024 | 227 |
| 08/15/2024 | 228 |
| 03/11/2025 | 70 |
| 03/12/2025 | 71 |
| 03/13/2025 | 72 |
| 03/14/2025 | 73 |

*Table 4: Dates of Hydrography*

# B. Data Acquisition and Processing

## B.1 Equipment and Vessels

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 data processing methods. Additional information to supplement sounding and survey data, and any deviations from the DAPR, are discussed in the following sections.

### B.1.1 Vessels

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

| Hull ID | *RV South Cove* | *RV West Cove II* |
|---|---|---|
| **LOA** | 9.4 meters | 12.8 meters |
| **Draft** | 0.8 meters | 1.4 meters |

*Table 5: Vessels Used*


*Figure 2: RV South Cove configured for survey operations.*


*Figure 3: RV West Cove II configured for survey operations.*

### B.1.2 Equipment

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

| Manufacturer | Model | Type |
|---|---|---|
| Teledyne RESON | SeaBat T50-R | MBES |
| Applanix | POS MV 320 v5 | Positioning and Attitude System |
| Trimble | NetR9 | Positioning System |
| AML Oceanographic | Micro SV-Xchange | Sound Speed System |
| AML Oceanographic | AML-3 LGR | Conductivity, Temperature, and Depth Sensor |
| Velodyne LiDAR | VLP-16 | Lidar System |

*Table 6: Major Systems Used*

## B.2 Quality Control

### B.2.1 Crosslines

Crossline mileage in H13991 totaled 4.7% of the mainscheme survey miles. Agreement between crosslines and mainscheme bathymetry was very good, with a mean difference of 0.03m in the 2m resolution surface.

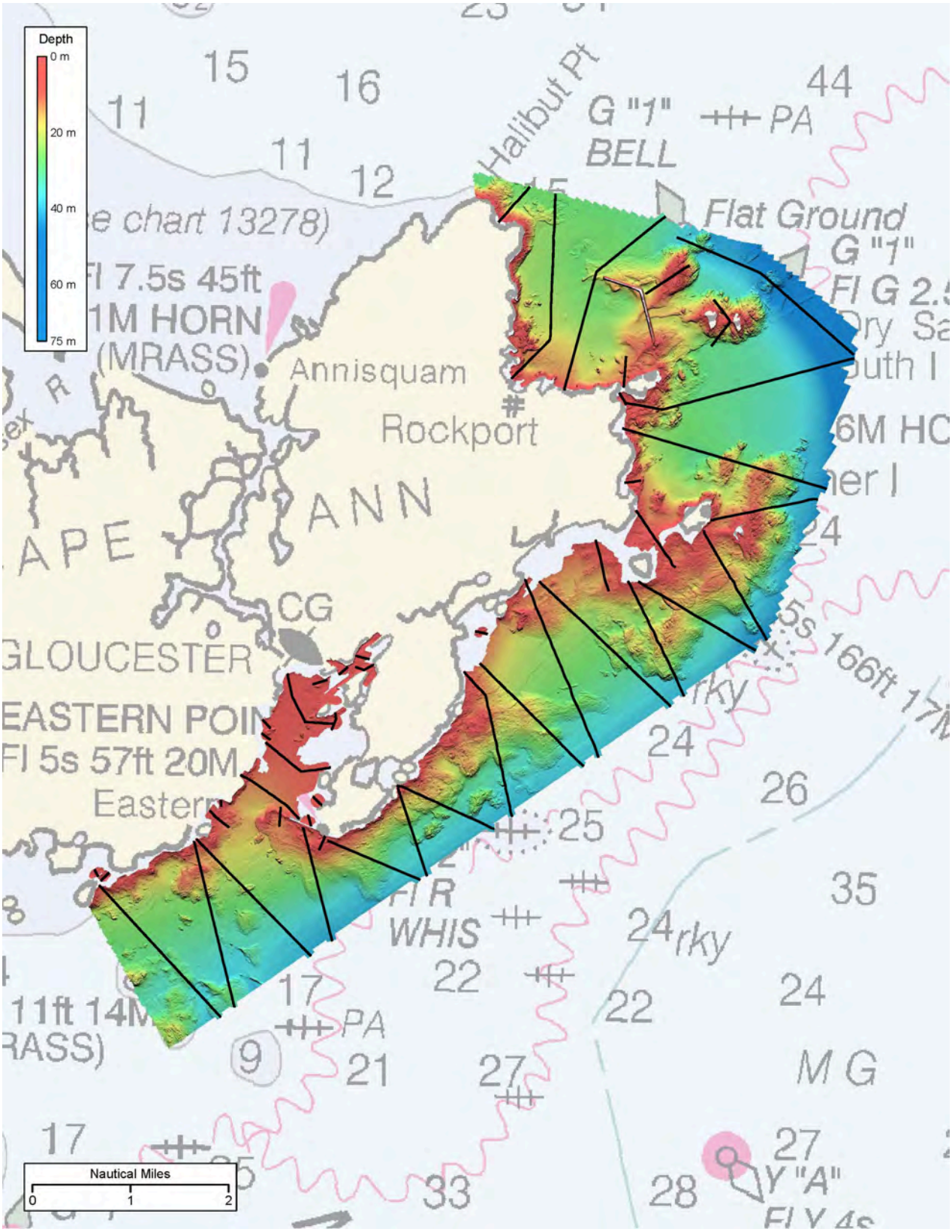
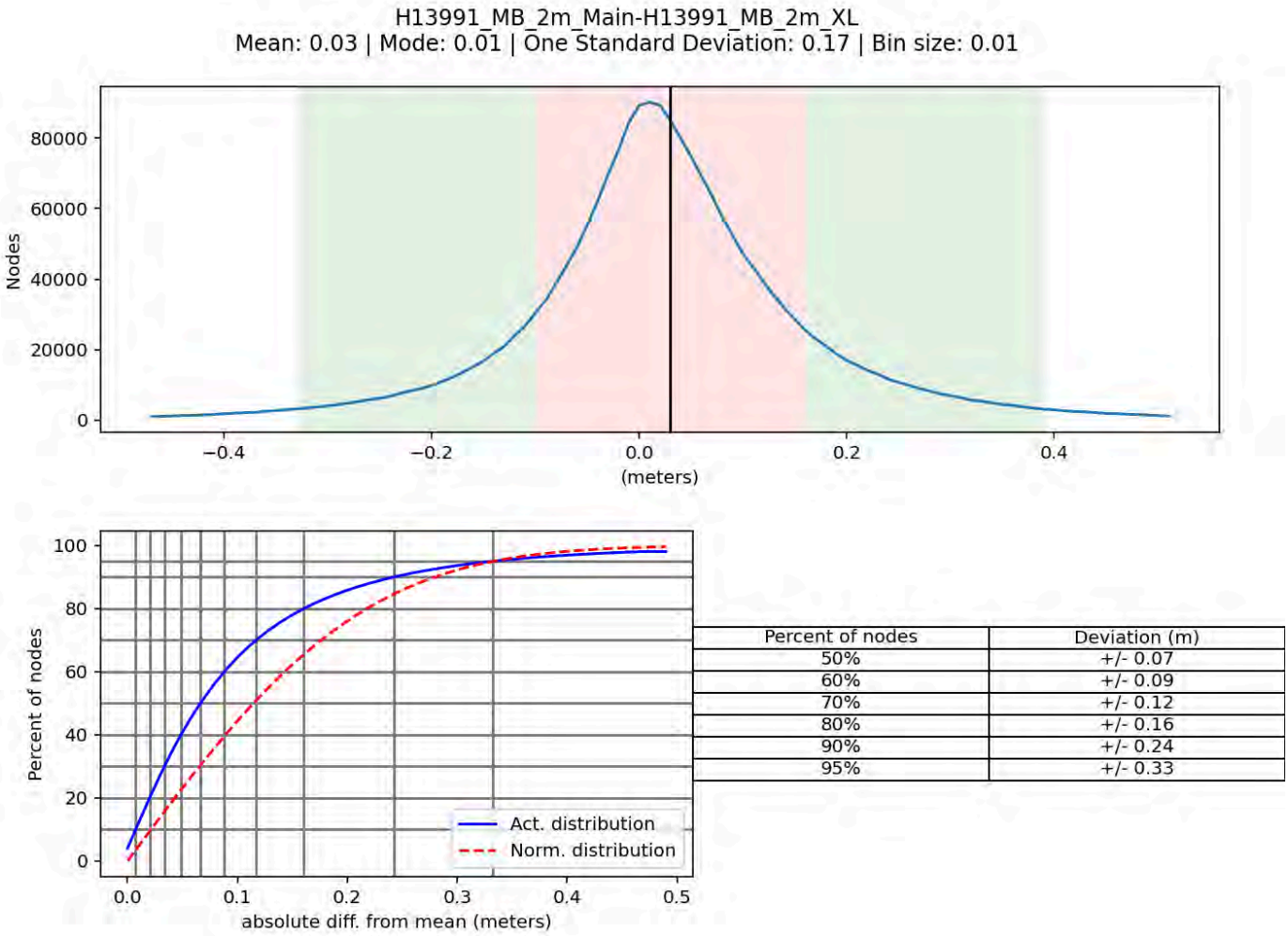



*Figure 4: Crossline tracks overlaid on a coverage surface.*




| Percent of nodes | Deviation (m) |
|---|---|
| 50% | +/- 0.07 |
| 60% | +/- 0.09 |
| 70% | +/- 0.12 |
| 80% | +/- 0.16 |
| 90% | +/- 0.24 |
| 95% | +/- 0.33 |

*Figure 5: Depth differences between mainscheme and crossline data.*

### B.2.2 Uncertainty

The following survey specific parameters were used for this survey:

| Method | Measured | Zoning |
|---|---|---|
| ERS via VDATUM | N/A | 0.13 meters |

*Table 7: Survey Specific Tide TPU Values.*

| Hull ID | Measured - CTD | Measured - MVP | Measured - XBT | Surface |
|---|---|---|---|---|
| RV South Cove | 4 meters/second | N/A | N/A | 2 meters/second |
| RV West Cove II | 4 meters/second | N/A | N/A | 2 meters/second |

*Table 8: Survey Specific Sound Speed TPU Values.*

The NOAA Pydro QC Tools application was used to calculate TVU QC, determined by a ratio of uncertainty to the allowable error per NOAA and IHO specification. A set of surfaces was finalized in CARIS HIPS using the "uncertainty" option to select the combination of a priori and realtime uncertainty estimates as the surface TVU source. The surfaces represented areas of object detection coverage or complete multibeam coverage at different resolutions as appropriate for the water depths; graphs are shown for one representative surface of each coverage type. All surfaces passed the uncertainty check, with at least 97% of nodes meeting the uncertainty standards.

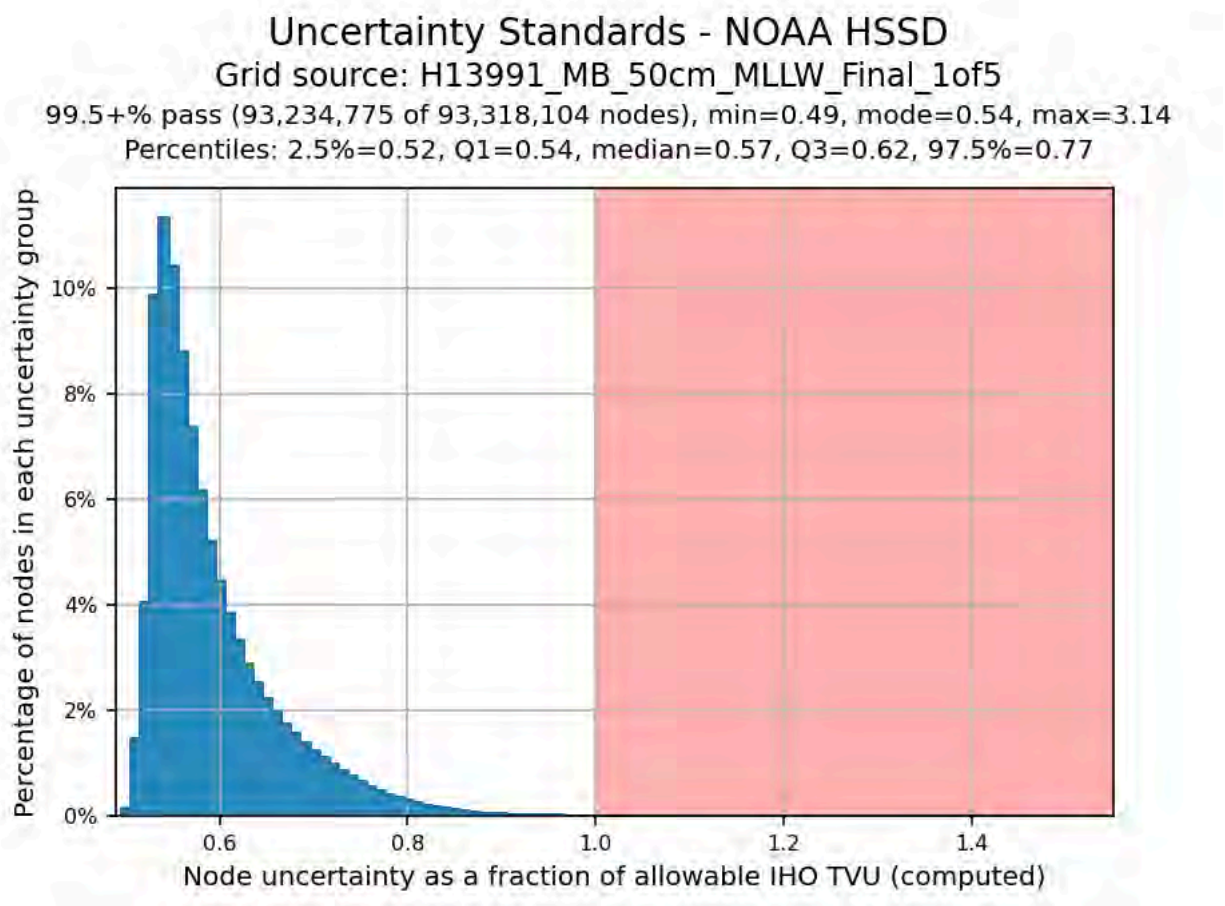



*Figure 6: Uncertainty standards, 50cm object detection multibeam.*

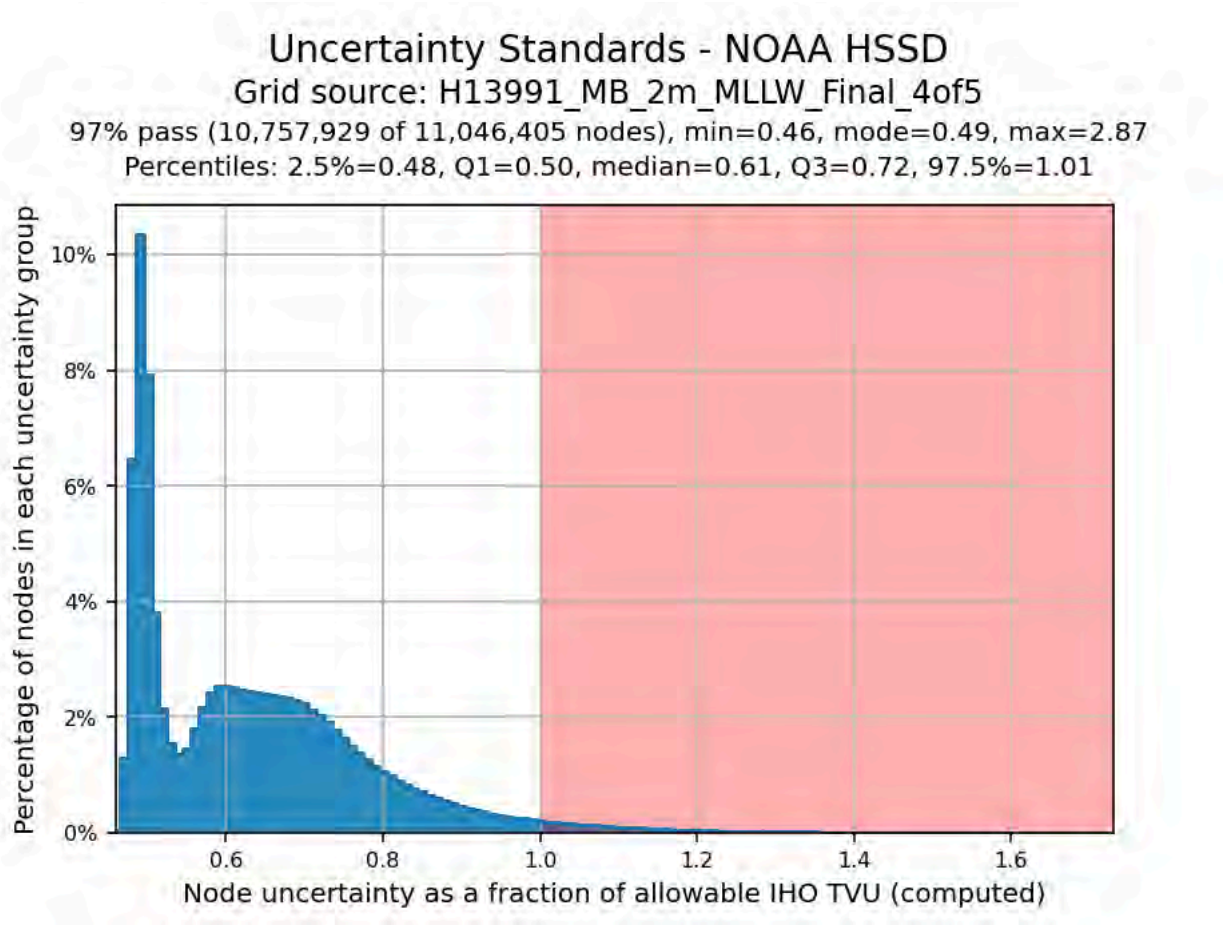



*Figure 7: Uncertainty standards, 2m complete coverage multibeam.*

### B.2.3 Junctions

Junction analyses were assigned for a lidar survey that was under review at the time of the PI, and contemporary surveys junction with the southwestern and eastern edges of H13991.

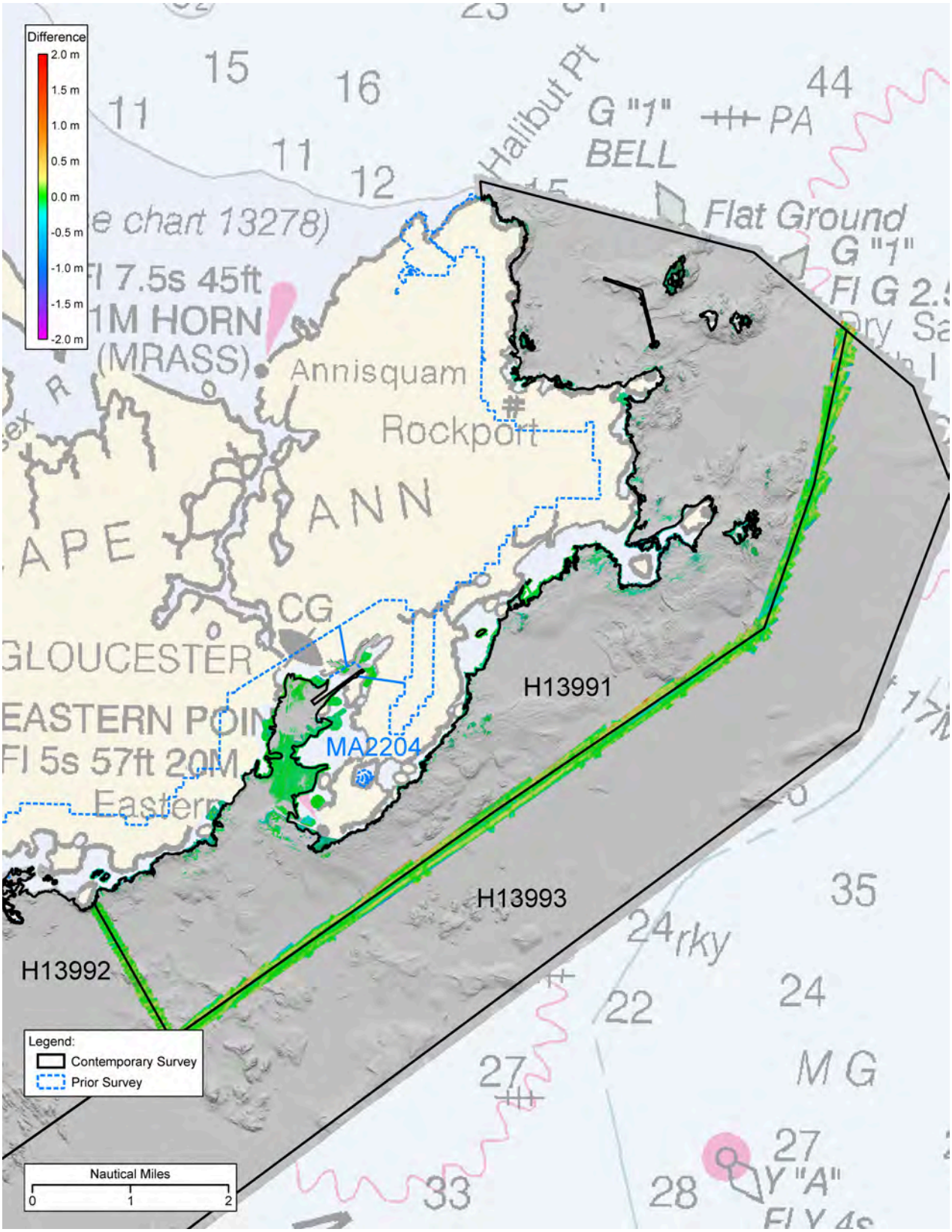



*Figure 8: H13991 junction map with junction area depth differences.*

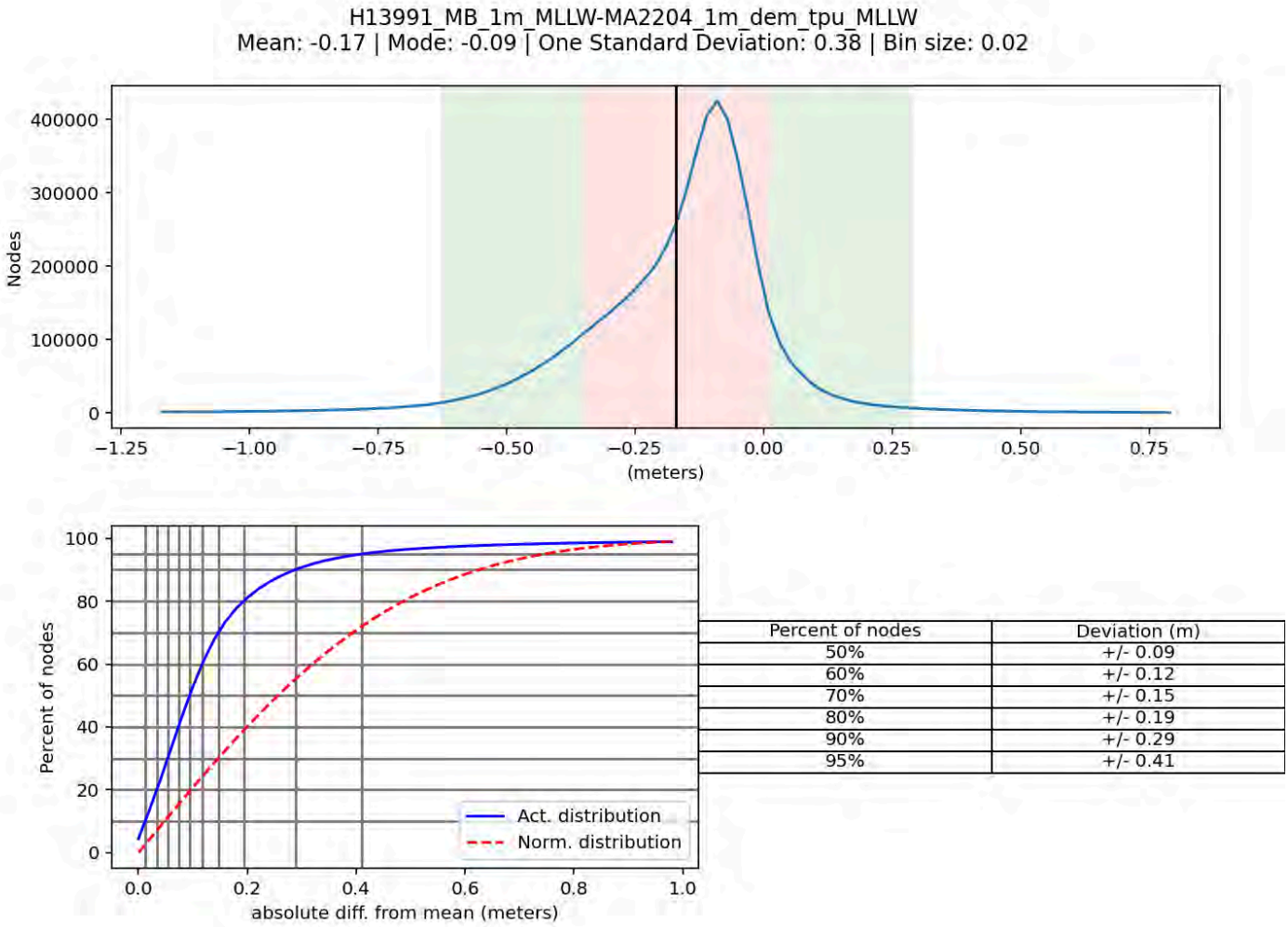
The following junctions were made with this survey:

| Registry Number | Scale | Year | Field Unit | Relative Location |
|---|---|---|---|---|
| MA2204 | 1:1 | 2021 | NOAA RSD | N |
| H13992 | 1:5000 | 2025 | OSI | SW |
| H13993 | 1:5000 | 2024 | OSI | E |

*Table 9: Junctioning Surveys*

MA2204

Preliminary lidar data were provided to OSI and used to perform the junction analysis. Data from MA2204 junctions with the inshore western areas of H13991 and had good agreement for the majority of the overlapping areas, with a mean difference of 0.17m. Agreement was best in shallow, flat areas such as Gloucester Harbor. The greatest differences were seen in rocky areas, and also along the west side of Sandy Bay Breakwater where the lidar data shows distinct shoal patches that were disproved by H13991 bathymetry.




| Percent of nodes | Deviation (m) |
|---|---|
| 50% | +/- 0.09 |
| 60% | +/- 0.12 |
| 70% | +/- 0.15 |
| 80% | +/- 0.19 |
| 90% | +/- 0.29 |
| 95% | +/- 0.41 |

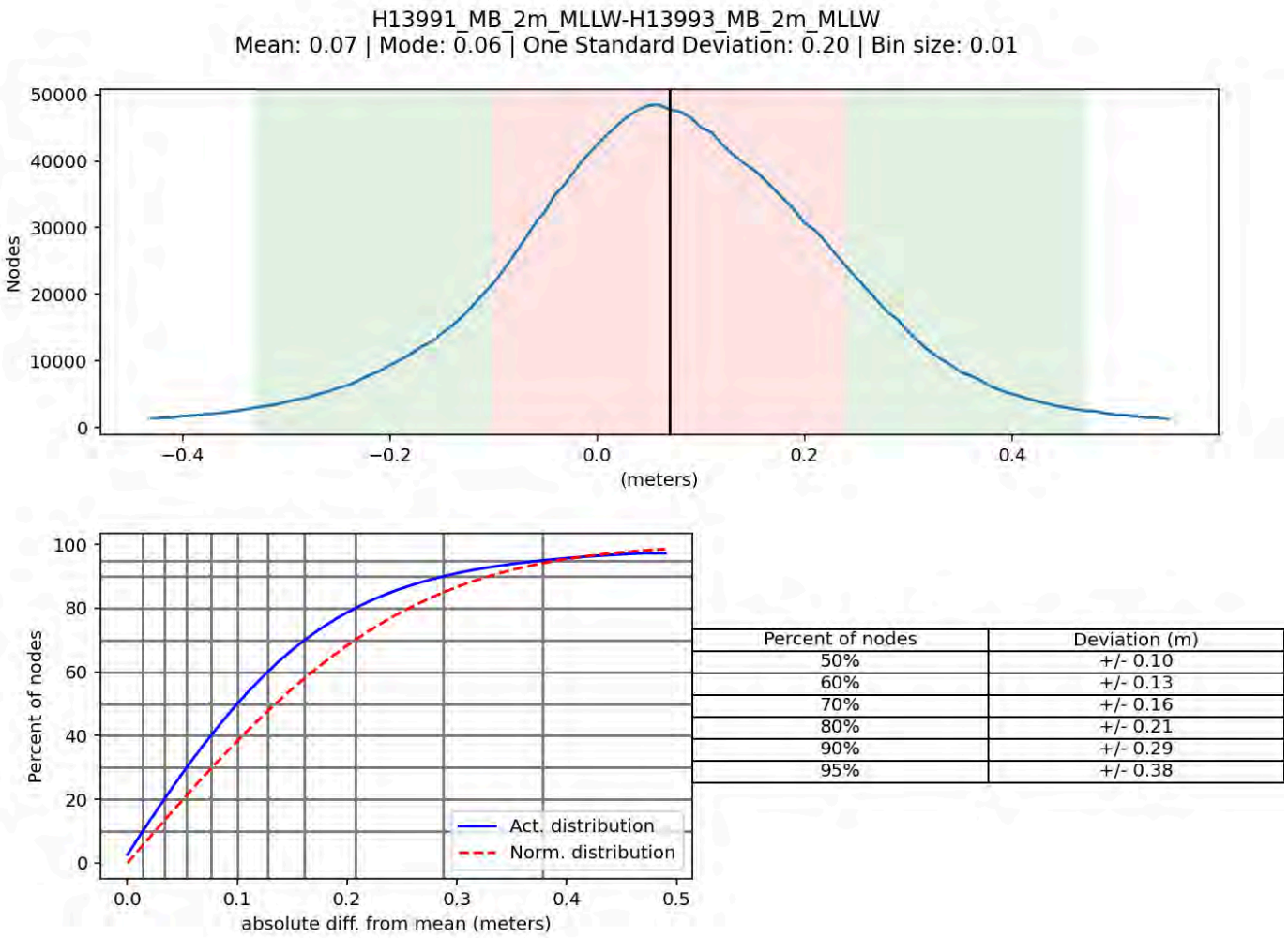
*Figure 9: Depth differences between H13991 and MA2204.*

H13992

This junction is addressed in the H13992 DR.

H13993

The shared border between H13991 and H13993 is approximately 20.6km long. Agreement of surveyed depths between the two surveys was good, with a mean difference of 0.07m and no geographic pattern to the differences.




| Percent of nodes | Deviation (m) |
|---|---|
| 50% | +/- 0.10 |
| 60% | +/- 0.13 |
| 70% | +/- 0.16 |
| 80% | +/- 0.21 |
| 90% | +/- 0.29 |
| 95% | +/- 0.38 |

*Figure 10: Depth differences between H13991 and H13993.*

### B.2.4 Sonar QC Checks

Sonar system quality control checks were conducted as detailed in the quality control section of the DAPR.

### B.2.5 Equipment Effectiveness

There were no conditions or deficiencies that affected equipment operational effectiveness.

### B.2.6 Factors Affecting Soundings

Sound Speed Variation

Sound speed variations were observed throughout the survey area, correlating to factors including the tide, weather, water depth, and bathymetric features, such as slopes or sand waves. In data processing, sound speed profiles that did not adequately reflect the surrounding water mass were identified and removed, edited, or replaced. Sound speed casts were primarily applied using the CARIS HIPS "Nearest in Distance within Time" method, therefore, removing a profile collected on a steep slope would allow deeper and shoaler casts on either side to be applied instead. Casts that were empirically found to represent a large water zone were added at additional locations within that zone to ensure proper corrections given the cast selection options available in the CARIS sound speed tools. Bathymetry, uncertainty, and standard deviation surfaces were used to direct editing and determine the accuracy of sound speed cast selection.

### B.2.7 Sound Speed Methods

Sound Speed Cast Frequency: RV South Cove and RV West Cove II all acquired AML3 casts at intervals of approximately 60 minutes.

Hydrographers acquired more frequent sound speed profiles if high variability was noted in the surface sound speed from the AML Micro-X installed on the head of the transducer, or when the surface sound speed comparison threshold was exceeded (>2m/s change) between the profile reading at the draft of the transducer and the Micro-X.

OSI submitted a data package titled "SOUND VELOCITY collected from MV Northstar Challenger, RV North Cove, RV South Cove, RV Twister, and RV West Cove II in North Atlantic Ocean, Northern Massachusetts Bay from 2024-08-03 to 2025-03-28" in NetCDF format to the National Centers for Environmental Information (NCEI) on May 5, 2025.

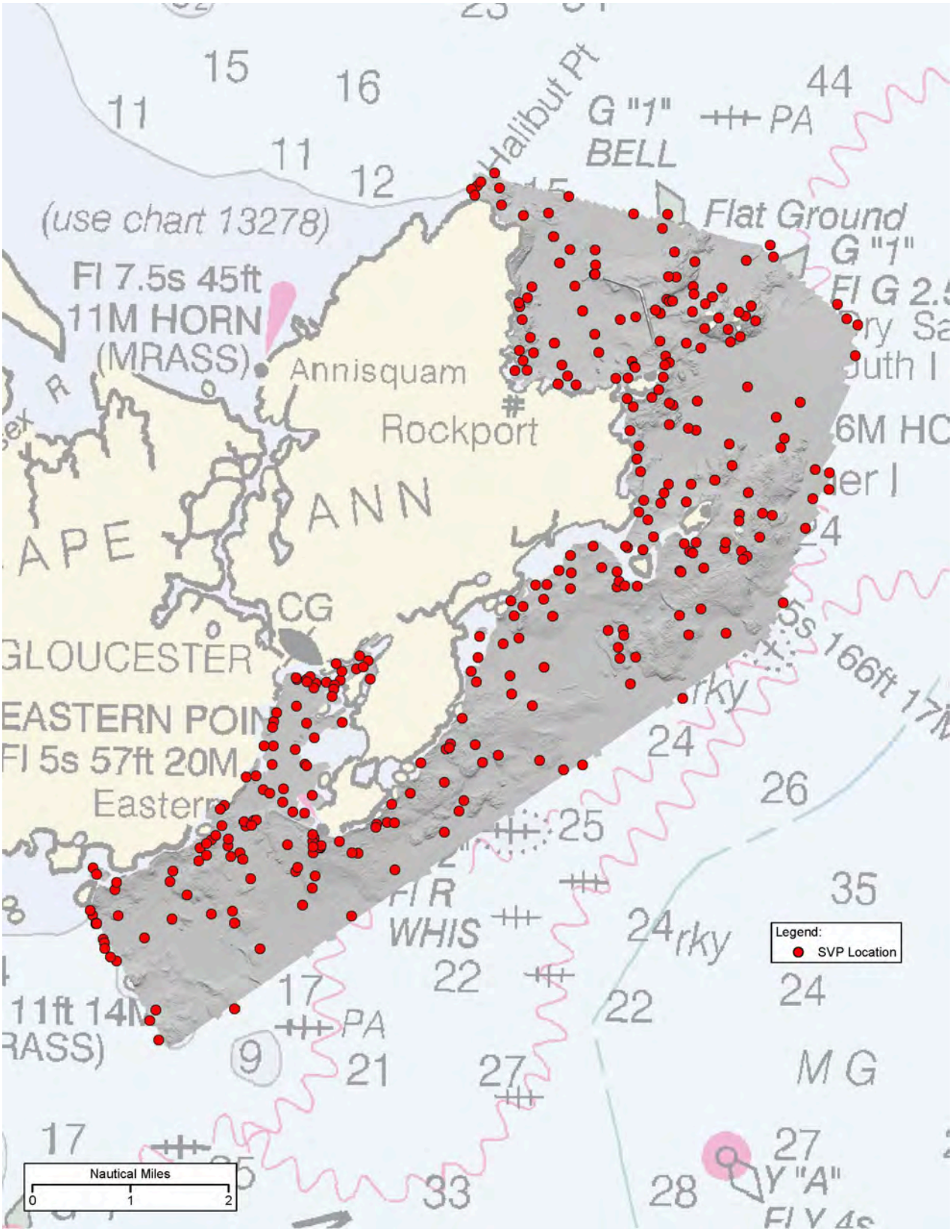



*Figure 11: H13991 Sound speed cast locations.*

### B.2.8 Coverage Equipment and Methods

The majority of this survey was conducted to achieve Complete Coverage with multibeam, as specified in HSSD 5.2.2.3, Option A. Certain areas, as defined by ACHARE features in the PRF, were conducted to achieve Object Detection Coverage with multibeam, as specified in HSSD 5.2.2.2, Option A. The survey methods used to meet coverage requirements did not deviate from those described in the DAPR.

Object detection holidays are present in the 50cm resolution surface, however, they exist almost entirely at or near the NALL where safe vessel navigation was prioritized over small coverage gaps. No holidays are present over the tops of features.

The NOAA Pydro QC Tools application was used to verify that the multibeam data met the density coverage requirements for each of the finalized grids submitted for the survey. All surfaces passed the density check, which requires 95% of nodes to be populated with at least 5 soundings. Representative histograms are shown below.

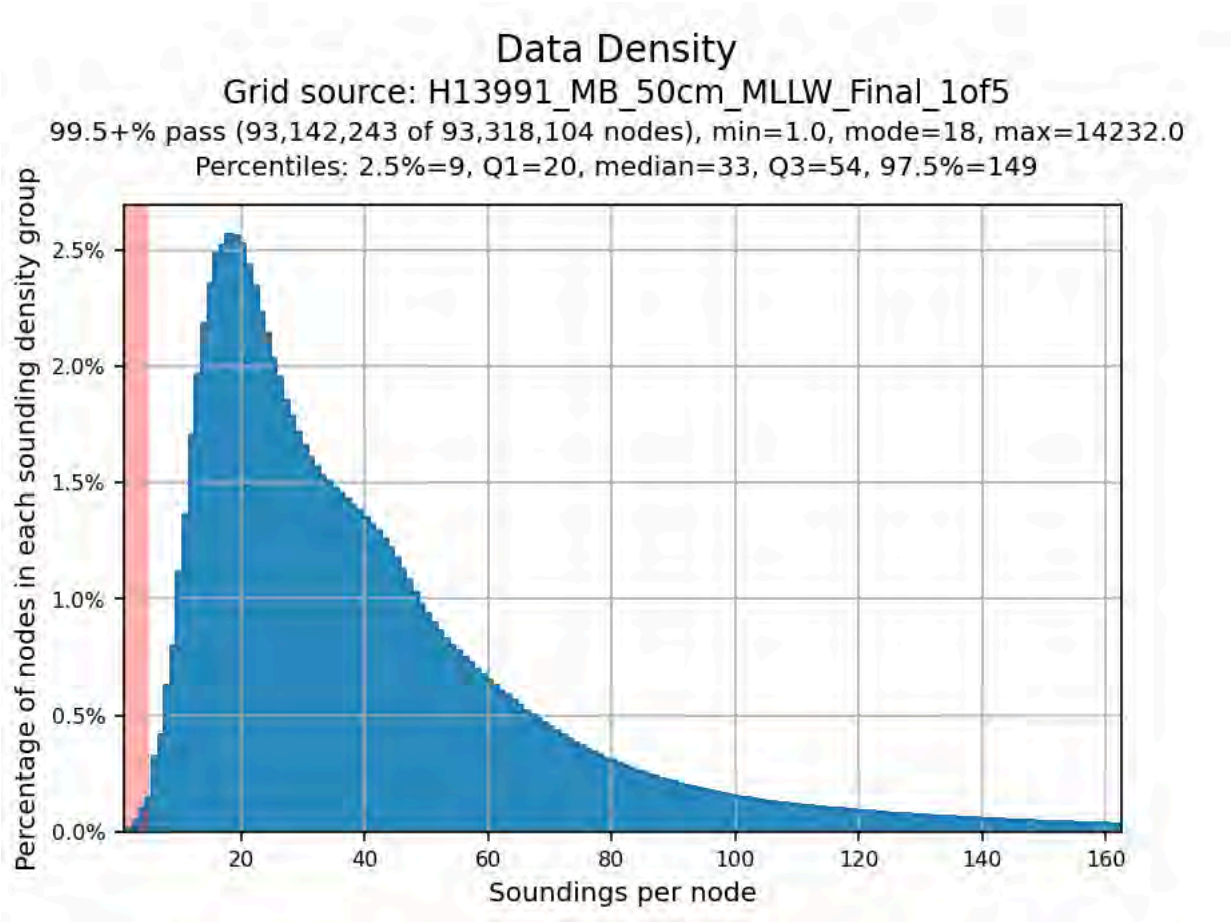



*Figure 12: Data density, 50cm resolution surface.*

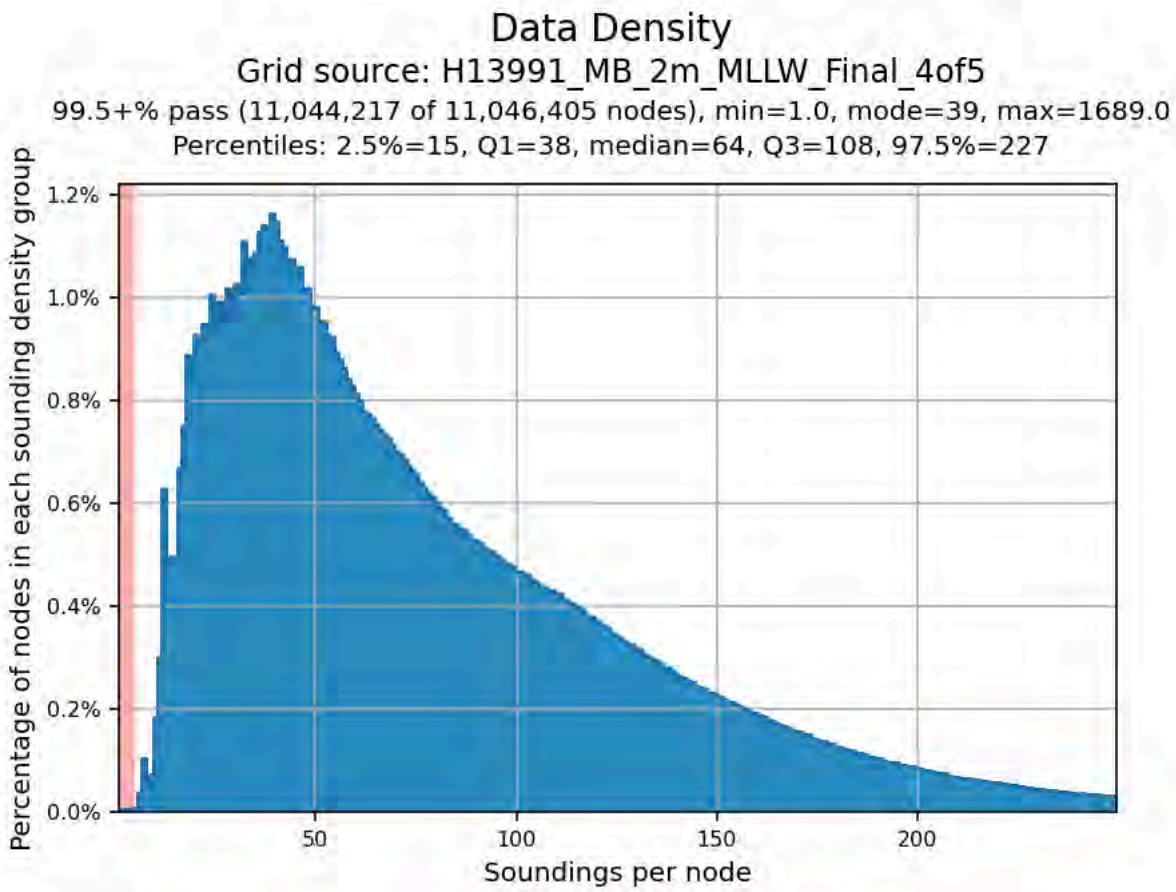



*Figure 13: Data density, 2m resolution surface.*

## B.3 Echo Sounding Corrections

### B.3.1 Corrections to Echo Soundings

All data reduction procedures conform to those detailed in the DAPR.

### B.3.2 Calibrations

All sounding systems were calibrated as detailed in the DAPR.

## B.4 Backscatter

All equipment and survey methods were used as detailed in the DAPR.

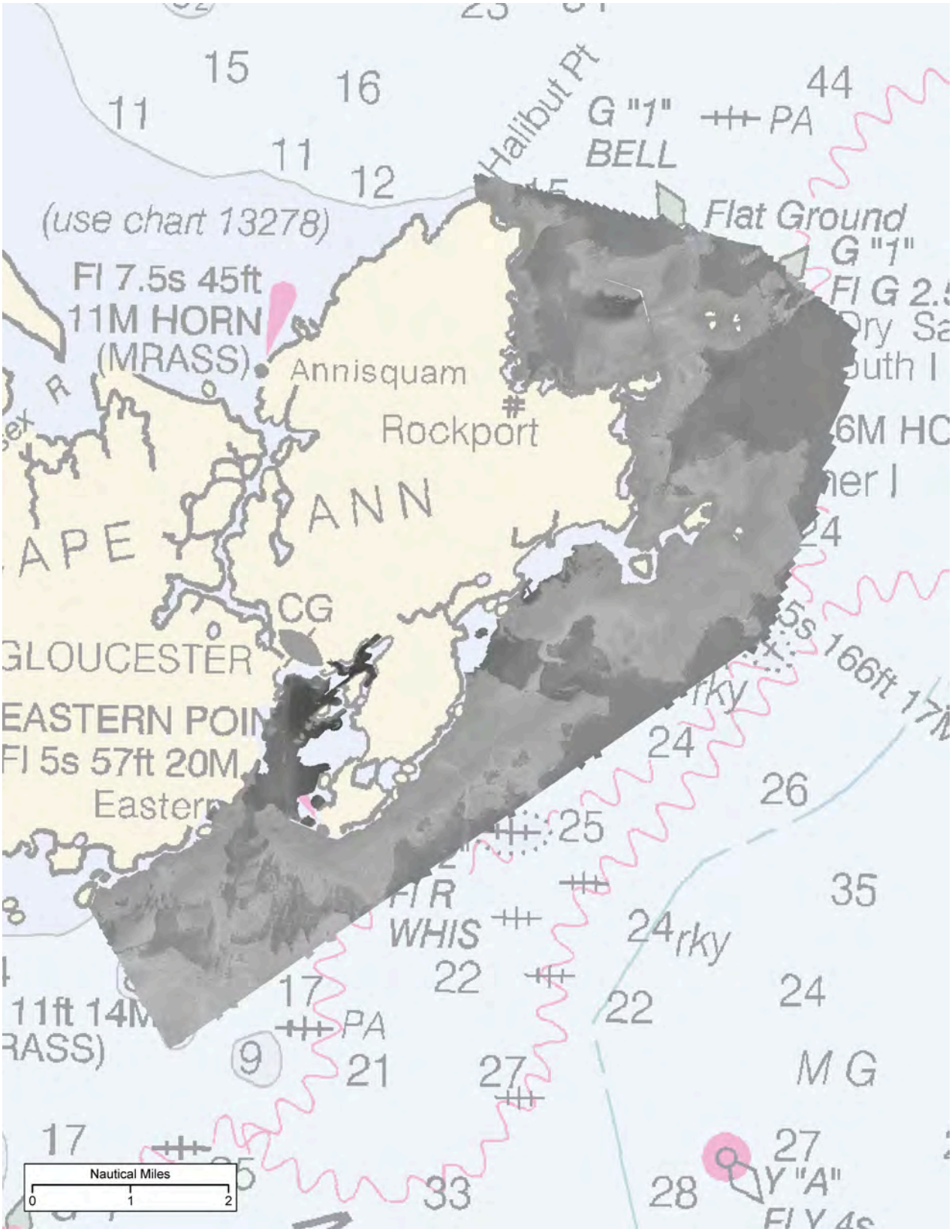



*Figure 14: H13991 multibeam backscatter mosaic.*

## B.5 Data Processing

### B.5.1 Primary Data Processing Software

The following Feature Object Catalog was used: NOAA Profile Version 2024.

### B.5.2 Surfaces

The following surfaces and/or BAGs were submitted to the Processing Branch:

| Surface Name | Surface Type | Resolution | Depth Range | Surface Parameter | Purpose |
|---|---|---|---|---|---|
| H13991_MB_50cm_MLLW_Final_1of5 | CARIS Raster Surface (CUBE) | 0.5 meters | -1.0 meters - 20.0 meters | NOAA_0.5m | Object Detection |
| H13991_MB_1m_MLLW_Final_2of5 | CARIS Raster Surface (CUBE) | 1 meters | 18.0 meters - 33.2 meters | NOAA_1m | Object Detection |
| H13991_MB_1m_MLLW_Final_3of5 | CARIS Raster Surface (CUBE) | 1 meters | 1.0 meters - 20.0 meters | NOAA_1m | Complete MBES |
| H13991_MB_2m_MLLW_Final_4of5 | CARIS Raster Surface (CUBE) | 2 meters | 18.0 meters - 40.0 meters | NOAA_2m | Complete MBES |
| H13991_MB_4m_MLLW_Final_5of5 | CARIS Raster Surface (CUBE) | 4 meters | 36.0 meters - 71.5 meters | NOAA_4m | Complete MBES |
| H13991_MB_50cm_MLLW_1of4 | CARIS Raster Surface (CUBE) | 0.5 meters | -0.9 meters - 71.7 meters | NOAA_0.5m | Source |
| H13991_MB_1m_MLLW_2of4 | CARIS Raster Surface (CUBE) | 1 meters | -0.8 meters - 71.5 meters | NOAA_1m | Source |
| H13991_MB_2m_MLLW_3of4 | CARIS Raster Surface (CUBE) | 2 meters | -0.8 meters - 71.5 meters | NOAA_2m | Source |

| Surface Name | Surface Type | Resolution | Depth Range | Surface Parameter | Purpose |
|---|---|---|---|---|---|
| H13991_MB_4m_MLLW_4of4 | CARIS Raster Surface (CUBE) | 4 meters | 0.7 meters - 71.5 meters | NOAA_4m | Source |
| H13991_MBAB_2m_400kHz_1of1 | MB Backscatter Mosaic | 2 meters | - | N/A | Processed Backscatter |

*Table 10: Submitted Surfaces*

The unfinalized csar surfaces are sources containing both object detection and complete coverage areas. After finalization in CARIS, the surfaces were modified using the CARIS coverage extraction tool to clip their boundaries such that they include the appropriate object detection or complete coverage areas only.

The finalized surfaces are numbered 1-5, with object detection coverage listed first (1of5, 2of5) followed by complete coverage surfaces (3of5, 4of5, 5of5). The CARIS files delineating the different coverage areas that were used for the extraction are included in Supporting Data.

# C. Vertical and Horizontal Control

Additional information discussing the vertical or horizontal control for this survey can be found in the accompanying HVCR.

## C.1 Vertical Control

The vertical datum for this project is Mean Lower Low Water.

ERS Datum Transformation

The following ellipsoid-to-chart vertical datum transformation was used:

| Method | Ellipsoid to Chart Datum Separation File |
|---|---|
| ERS via VDATUM | OPR-A325-KR-24_NAD83(2011)-MHW.csar<br>OPR-A325-KR-24_NAD83(2011)-MLLW.csar |

*Table 11: ERS method and SEP file*

## C.2 Horizontal Control

The horizontal datum for this project is North American Datum 1983 (2011).

The projection used for this project is Universal Transverse Mercator (UTM) Zone 19.

The following PPK methods were used for horizontal control:

- Smart Base
- Single Base

The following CORS Stations were used for horizontal control:

| HVCR Site ID | Base Station ID |
|---|---|
| Bar Harbor | BARH |
| Milton | MAMI |
| Plymouth | MAPL |
| Salisbury | MASA |
| Tewksbury | MATB |
| Truro | MATU |
| Bath | MEBA |
| Gorham | MEGO |
| Rockland | MERO |
| Newport, RI | N001 |
| U New Hampshire | NHUN |
| U of RI Coop | URIL |
| Westford | WES2 |
| Boston WAAS 1 | ZBW1 |

*Table 12: CORS Base Stations*

The following user installed stations were used for horizontal control:

| HVCR Site ID | Base Station ID |
|---|---|
| Ocean Surveys Gloucester | OSGL |

*Table 13: User Installed Base Stations*

# D. Results and Recommendations

## D.1 Chart Comparison

### D.1.1 Electronic Navigational Charts

The following are the largest scale ENCs, which cover the survey area:

| ENC | Scale | Edition | Update Application Date | Issue Date |
|---|---|---|---|---|
| US5MA1SJ | 1:12000 | 3 | 03/04/2025 | 03/04/2025 |
| US5MA1SK | 1:22000 | 3 | 02/27/2025 | 02/27/2025 |
| US5MA1TJ | 1:12000 | 4 | 03/06/2025 | 03/06/2025 |
| US5MA1TK | 1:12000 | 4 | 03/14/2025 | 03/14/2025 |
| US5MA1TL | 1:22000 | 2 | 02/27/2025 | 02/27/2025 |
| US5MA1UK | 1:22000 | 2 | 02/27/2025 | 02/27/2025 |
| US5MA1UL | 1:22000 | 2 | 02/27/2025 | 02/27/2025 |

*Table 14: Largest Scale ENCs*

### D.1.2 Shoal and Hazardous Features

The rocky coastline area of H13991 included several potentially hazardous rocks that were surveyed to be shoaler than charted depths. DTONS were submitted for 11 of these rocks.

### D.1.3 Charted Features

Charted features assigned in H13991 included items that were inshore of NALL or outside the defined survey coverage limits for the vessels on this project. To address these features, OSI undertook an additional task of lidar evaluation as outlined in the PI. Lidar data from survey MA2204, including both a grid and point cloud data, were provided to OSI to use for this additional analysis. Two separate feature files were submitted for this survey; a standard FFF file including features addressed with OSI survey data, and a separate Lidar Final Feature File (LI_FFF) for features addressed using the provided lidar data.

Features addressed using OSI survey data and documented in the FFF were primarily submerged rocks, wrecks, and obstructions. Features documented in the LI_FFF were primarily land areas, awash or covers & uncovers rocks and seabed areas, and submerged rocks and ruined piers inshore of the survey area.

### D.1.4 Uncharted Features

A majority of the new features surveyed in H13991 were found in Gloucester Harbor, where a number of uncharted obstructions and wrecks were found. The wrecks included both smaller features and larger wrecks that were included in the FFF as area features. New features outside Gloucester Harbor included additional area wrecks, and the submerged rocks that were submitted as DTONS. See the FFF for details.

### D.1.5 Channels

Assigned channels and dredged areas in H13991 were nearly all in the Gloucester Harbor area, with Rockport Harbor Channel as the only exception. Rockport Harbor Channel and the Annisquam River Channel in the Gloucester area were not covered by any OSI survey data.

The Gloucester Inner Harbor North Channel, Smith Cove Channel, Harbor Cove Anchorage, and Harbor Cove Channel were fully surveyed with multibeam. The western edge of the Harbor Cove Channel was shoaler than the charted depth, and rocks in the Harbor Cove Anchorage create a shoal spot that is represented in the bathymetry grid. Gloucester Inner Harbor Entrance Channel, Inner Harbor Anchorage, and Gloucester Inner Harbor South Channel were all partially covered with multibeam. The areas surveyed were all deeper than charted dredge area depths, with exceptions for the least depths of 2 uncharted wrecks, 1 in the Inner Harbor Anchorage and 1 in the Gloucester Inner Harbor South Channel. See the FFF for wreck details.

## D.2 Additional Results

### D.2.1 Aids to Navigation

A report was made to the U.S. Coast Guard for Dodge Rock Daybeacon 2, which was not present and no remnants of the structure were visible above the surface. All other ATONS within the survey area were observed at or near their charted positions.

### D.2.2 Maritime Boundary Points

No Maritime Boundary Points were assigned for this survey.

### D.2.3 Bottom Samples

No bottom samples were required for this survey.

### D.2.4 Overhead Features

No overhead features exist for this survey.

### D.2.5 Submarine Features

No submarine features exist for this survey.

### D.2.6 Platforms

An offshore platform charted in Gloucester Harbor was found to be a recreational structure used for the Greasy Pole contest of St Peter's Fiesta (www.stpetersfiesta.org). The platform includes a long horizontal pole off one side, so a new area platform feature was included in the FFF to delineate the extent of the structure. The feature was positioned with vessel-mounted lidar data.

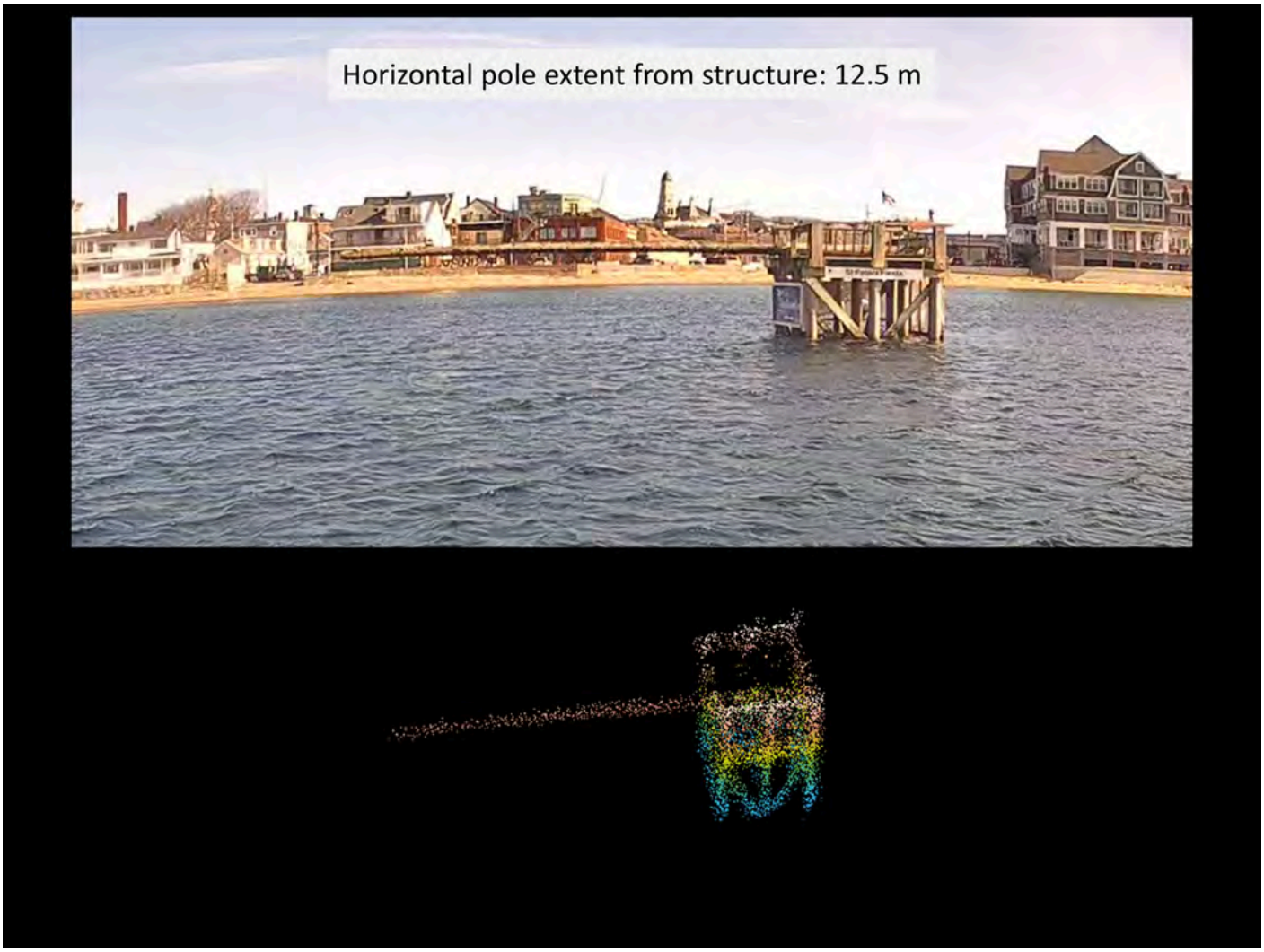



*Figure 15: Platform photo and vessel-mounted lidar point cloud.*

### D.2.7 Ferry Routes and Terminals

A seasonal ferry between Boston and Salem may pass through this survey area, but the route is not on the chart.

### D.2.8 Abnormal Seafloor or Environmental Conditions

No abnormal seafloor or environmental conditions exist for this survey.

### D.2.9 Construction and Dredging

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

### D.2.10 New Survey Recommendations

No new surveys or further investigations are recommended for this area.

### D.2.11 ENC Scale Recommendations

No new ENC scales are recommended for this area.

# E. 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 Descriptive Report, and all accompanying records and data are approved. All records are forwarded for final review and processing to the Processing Branch.

The survey data meets or exceeds requirements as set forth in the NOS Hydrographic Surveys Specifications and Deliverables, Field Procedures Manual, Letter Instructions, and all HSD Technical Directives. These data are adequate to supersede charted data in their common areas. This survey is complete and no additional work is required with the exception of deficiencies noted in the Descriptive Report.

| Approver Name | Approver Title | Approval Date | Signature |
|---|---|---|---|
| John R. Bean | Chief of Party | 06/05/2025 | Digitally signed by John R. Bean |
| David T. Somers | Data Processing Manager | 06/05/2025 | Digitally signed by David T. Somers |

# F. Table of Acronyms

| Acronym | Definition |
|---|---|
| **AHB** | Atlantic Hydrographic Branch |
| **AST** | Assistant Survey Technician |
| **ATON** | Aid to Navigation |
| **AWOIS** | Automated Wreck and Obstruction Information System |
| **BAG** | Bathymetric Attributed Grid |
| **BASE** | Bathymetry Associated with Statistical Error |
| **CO** | Commanding Officer |
| **CO-OPS** | Center for Operational Products and Services |
| **CORS** | Continuously Operating Reference Station |
| **CTD** | Conductivity Temperature Depth |
| **CEF** | Chart Evaluation File |
| **CSF** | Composite Source File |
| **CST** | Chief Survey Technician |
| **CUBE** | Combined Uncertainty and Bathymetry Estimator |
| **DAPR** | Data Acquisition and Processing Report |
| **DGPS** | Differential Global Positioning System |
| **DP** | Detached Position |
| **DR** | Descriptive Report |
| **DTON** | Danger to Navigation |
| **ENC** | Electronic Navigational Chart |
| **ERS** | Ellipsoidal Referenced Survey |
| **ERTDM** | Ellipsoidally Referenced Tidal Datum Model |
| **ERZT** | Ellipsoidally Referenced Zoned Tides |
| **FFF** | Final Feature File |
| **FOO** | Field Operations Officer |
| **FPM** | Field Procedures Manual |
| **GAMS** | GPS Azimuth Measurement Subsystem |
| **GC** | Geographic Cell |
| **GPS** | Global Positioning System |
| **HIPS** | Hydrographic Information Processing System |
| **HSD** | Hydrographic Surveys Division |

| Acronym | Definition |
|---|---|
| **HSSD** | Hydrographic Survey Specifications and Deliverables |
| **HSTB** | Hydrographic Systems Technology Branch |
| **HSX** | Hypack Hysweep File Format |
| **HTD** | Hydrographic Surveys Technical Directive |
| **HVCR** | Horizontal and Vertical Control Report |
| **HVF** | HIPS Vessel File |
| **IHO** | International Hydrographic Organization |
| **IMU** | Inertial Motion Unit |
| **ITRF** | International Terrestrial Reference Frame |
| **LNM** | Linear Nautical Miles |
| **MBAB** | Multibeam Echosounder Acoustic Backscatter |
| **MCD** | Marine Chart Division |
| **MHW** | Mean High Water |
| **MLLW** | Mean Lower Low Water |
| **NAD 83** | North American Datum of 1983 |
| **NALL** | Navigable Area Limit Line |
| **NTM** | Notice to Mariners |
| **NMEA** | National Marine Electronics Association |
| **NOAA** | National Oceanic and Atmospheric Administration |
| **NOS** | National Ocean Service |
| **NRT** | Navigation Response Team |
| **NSD** | Navigation Services Division |
| **OCS** | Office of Coast Survey |
| **OMAO** | Office of Marine and Aviation Operations (NOAA) |
| **OPS** | Operations Branch |
| **MBES** | Multibeam Echosounder |
| **NWLON** | National Water Level Observation Network |
| **PDBS** | Phase Differencing Bathymetric Sonar |
| **PHB** | Pacific Hydrographic Branch |
| **POS/MV** | Position and Orientation System for Marine Vessels |
| **PPK** | Post Processed Kinematic |
| **PPP** | Precise Point Positioning |
| **PPS** | Pulse per second |

| Acronym | Definition |
|---|---|
| **PRF** | Project Reference File |
| **PS** | Physical Scientist |
| **RNC** | Raster Navigational Chart |
| **RTK** | Real Time Kinematic |
| **RTX** | Real Time Extended |
| **SBES** | Singlebeam Echosounder |
| **SBET** | Smooth Best Estimate and Trajectory |
| **SNM** | Square Nautical Miles |
| **SSS** | Side Scan Sonar |
| **SSSAB** | Side Scan Sonar Acoustic Backscatter |
| **ST** | Survey Technician |
| **SVP** | Sound Velocity Profiler |
| **TCARI** | Tidal Constituent And Residual Interpolation |
| **TPU** | Total Propagated Uncertainty |
| **USACE** | United States Army Corps of Engineers |
| **USCG** | United States Coast Guard |
| **UTM** | Universal Transverse Mercator |
| **XO** | Executive Officer |
| **ZDF** | Zone Definition File |