

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

DESCRIPTIVE REPORT

Type of Survey: Navigable Area

Registry Number: H13833

LOCALITY

State(s): Massachusetts

General Locality: Offshore of Nantucket Island, Martha's Vineyard, and
Cape Cod, MA

Sub-locality: 5 NM North of Muskeget Island

2023

CHIEF OF PARTY
John R. Bean

LIBRARY & ARCHIVES

Date:

H13833

HYDROGRAPHIC TITLE SHEET

H13833

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: **Offshore of Nantucket Island, Martha's Vineyard, and Cape Cod,**

Sub-Locality: **5 NM North of Muskeget Island**

Scale: **10000**

Dates of Survey: **11/05/2023 to 05/29/2024**

Instructions Dated: **07/26/2023**

Project Number: **OPR-B360-KR-23**

Field Unit: **Ocean Surveys**

Chief of Party: **John R. Bean**

Soundings by: **Multibeam Echo Sounder**

Imagery by: **Multibeam Echo Sounder Backscatter Side Scan Sonar**

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 H13833

Project: OPR-B360-KR-23

Locality: Offshore of Nantucket Island, Martha's Vineyard, and Cape Cod, MA

Sublocality: 5 NM North of Muskeget Island

Scale: 1:10000

November 2023 - May 2024

Ocean Surveys

Chief of Party: John R. Bean

A. Area Surveyed

This survey provides hydrographic data for waters in Nantucket Sound, MA. 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
41° 28' 21.9" N 70° 20' 56.76" W	41° 23' 45.67" N 70° 11' 41.65" 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

This project is located in Nantucket Sound, MA, a body of water between Cape Cod and the islands of Nantucket and Martha's Vineyard, MA. Surveying efforts will provide updated charting products and improve the hydrographic health of the region. The survey area has not been surveyed since the 1990s. Conducting a modern bathymetric survey in this region will identify hazards and changes to the seafloor and provide modern bathymetric data to update National Ocean Service (NOS) nautical charting products and support the Seabed 2030 global mapping initiative.

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 Sheet 1	Object Detection Coverage (Refer to HSSD Section 5.2.2.2)
All waters in Sheets 2-8	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.

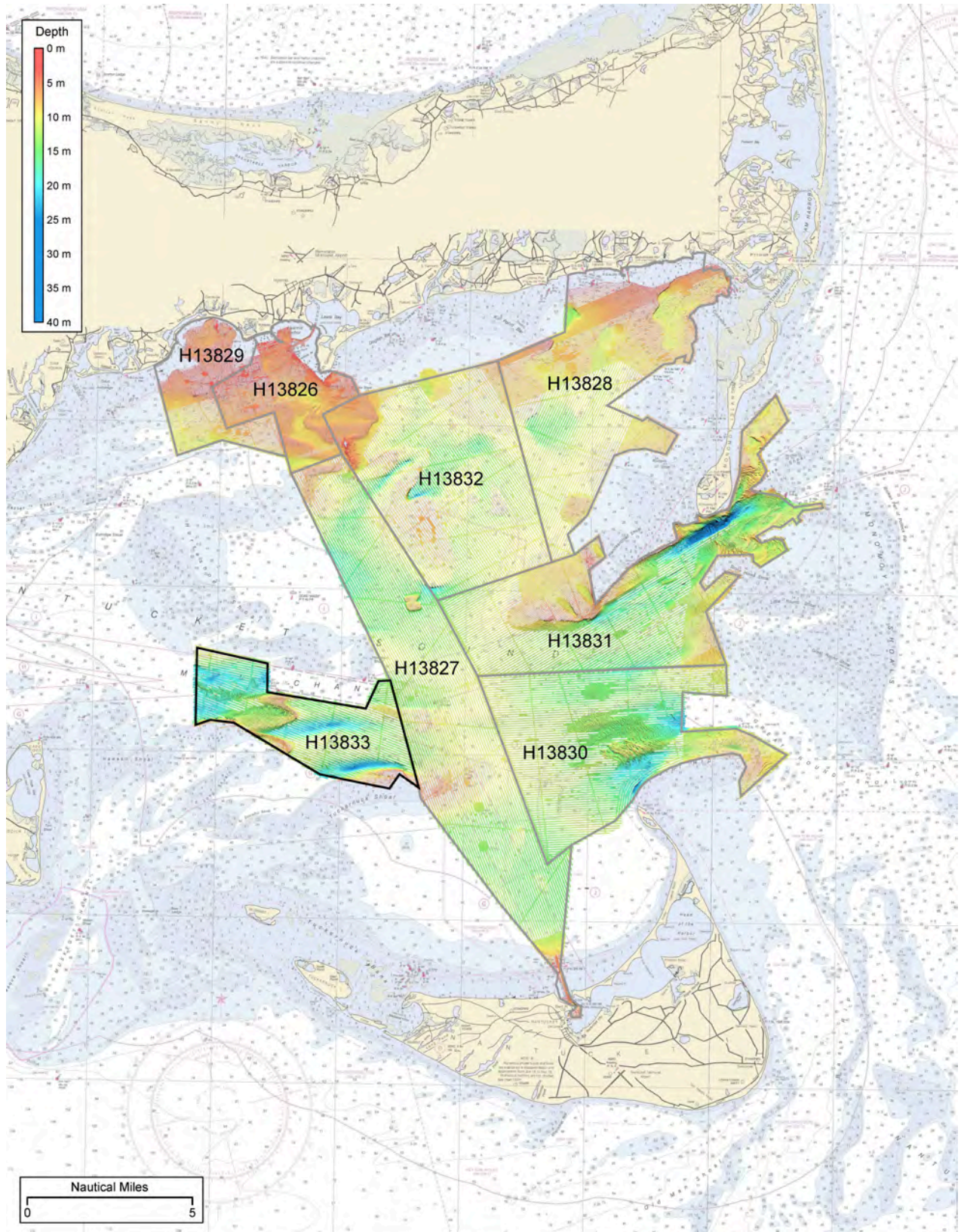


Figure 1: Project OPR-B360-KR-23 coverage with H13833 emphasized.

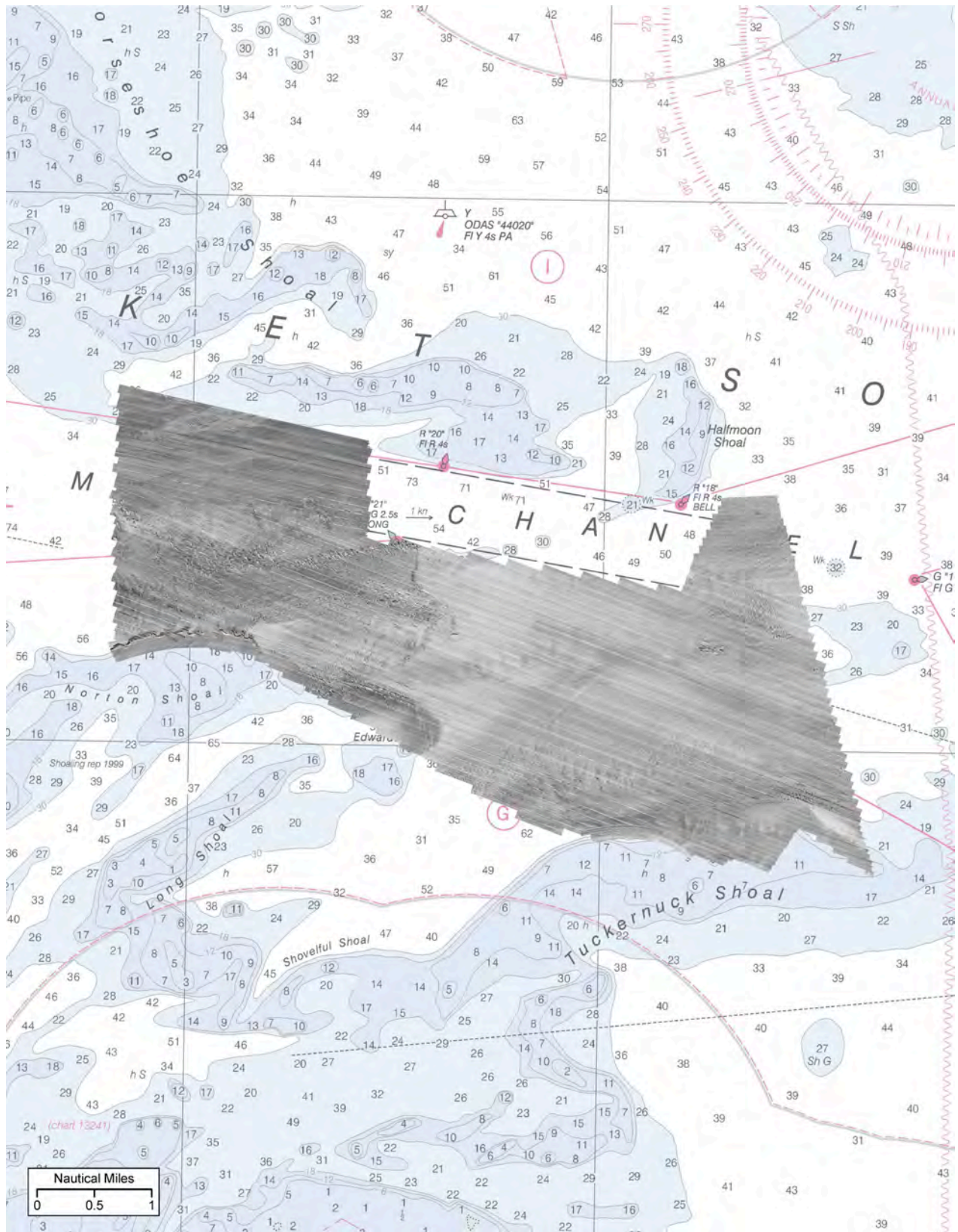


Figure 2: H13833 SSS coverage.

A.6 Survey Statistics

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

	HULL ID	<i>MV</i> <i>Northstar</i> <i>Challenger</i>	<i>RV</i> <i>North</i> <i>Cove</i>	<i>RV</i> <i>South</i> <i>Cove</i>	<i>Total</i>
LNM	SBES Mainscheme	0.0	0.0	0.0	0.0
	MBES Mainscheme	0.1	41.4	6.8	48.3
	Lidar Mainscheme	0.0	0.0	0.0	0.0
	SSS Mainscheme	0.0	0.0	0.0	0.0
	SBES/SSS Mainscheme	0.0	0.0	0.0	0.0
	MBES/SSS Mainscheme	133.9	109.1	34.3	277.3
	SBES/MBES Crosslines	0.0	0.0	12.6	12.6
	Lidar Crosslines	0.0	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				15.9	

Table 3: Hydrographic Survey Statistics

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

Survey Dates	Day of the Year
11/05/2023	309
11/06/2023	310
11/07/2023	311
12/08/2023	342
02/11/2024	42
02/12/2024	43
05/29/2024	150

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	<i>MV Northstar Challenger</i>	<i>RV North Cove</i>	<i>RV South Cove</i>
LOA	28.0 meters	11.1 meters	9.4 meters
Draft	2.6 meters	0.8 meters	0.8 meters

Table 5: Vessels Used



Figure 3: MV Northstar Challenger configured for survey operations.



Figure 4: RV North Cove configured for survey operations.



Figure 5: RV South Cove 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
EdgeTech	4125	SSS
EdgeTech	4200	SSS
Applanix	POS MV 320 v5	Positioning and Attitude System
Trimble	NetR9	Positioning System
AML Oceanographic	Micro SV-Xchange	Sound Speed System
AML Oceanographic	MVP30-350	Conductivity, Temperature, and Depth Sensor
AML Oceanographic	AML-3 LGR	Conductivity, Temperature, and Depth Sensor

Table 6: Major Systems Used

B.2 Quality Control

B.2.1 Crosslines

Crossline mileage in H13833 totaled 3.9% of the mainscheme survey miles. Survey H13833 includes four submitted surfaces covering different time frames due to the movement of sand waves over the course of the survey, but a single mainscheme surface of all survey data was used for crossline comparison purposes. Despite the changes in bathymetry over time, agreement between crosslines and mainscheme bathymetry was very good, with a mean difference of 0.05 in the 1m resolution surface. Differences were greatest in areas of sand waves, where the bathymetry changed between crossline and mainscheme acquisition days.

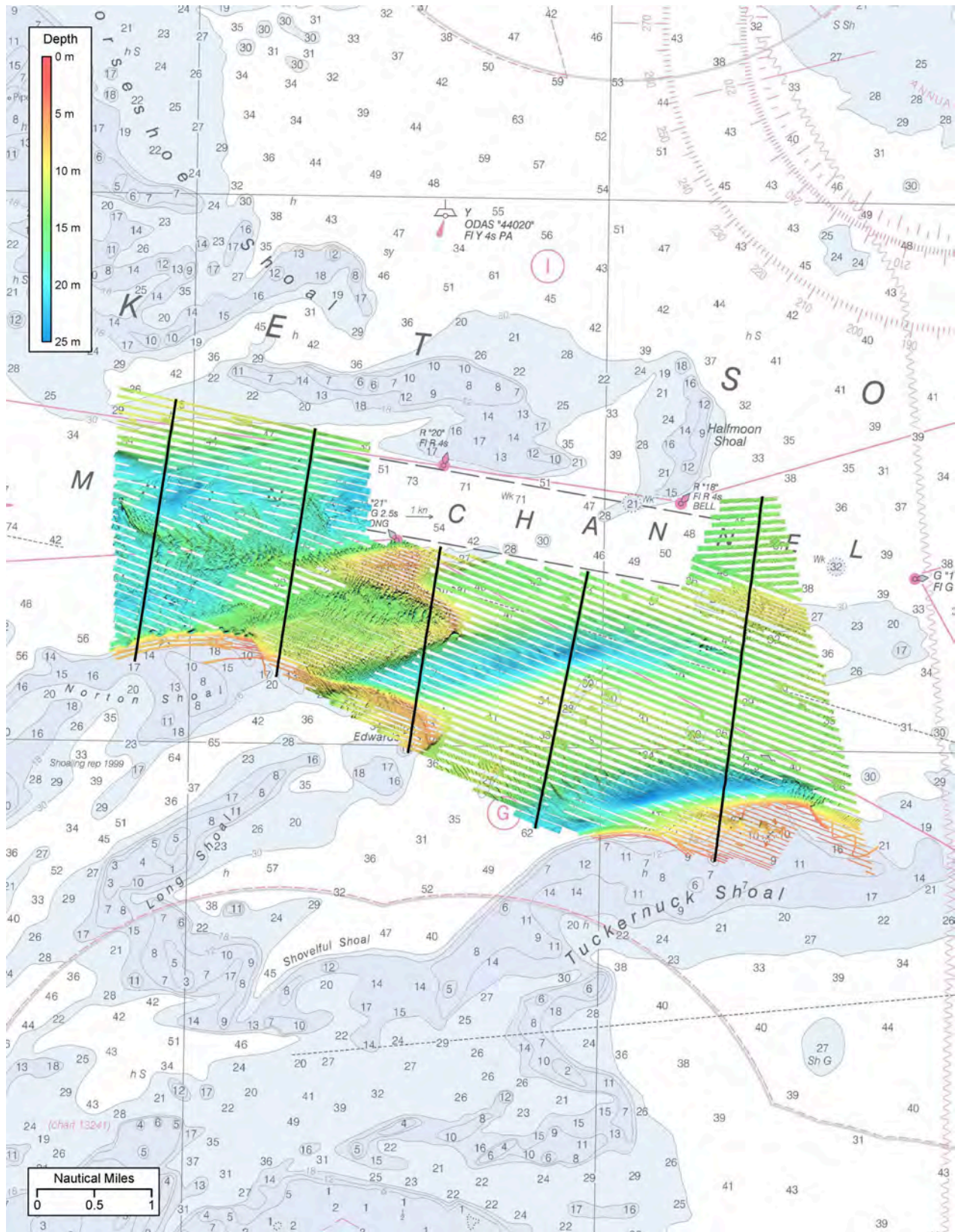


Figure 6: Crossline tracks overlaid on a coverage surface.

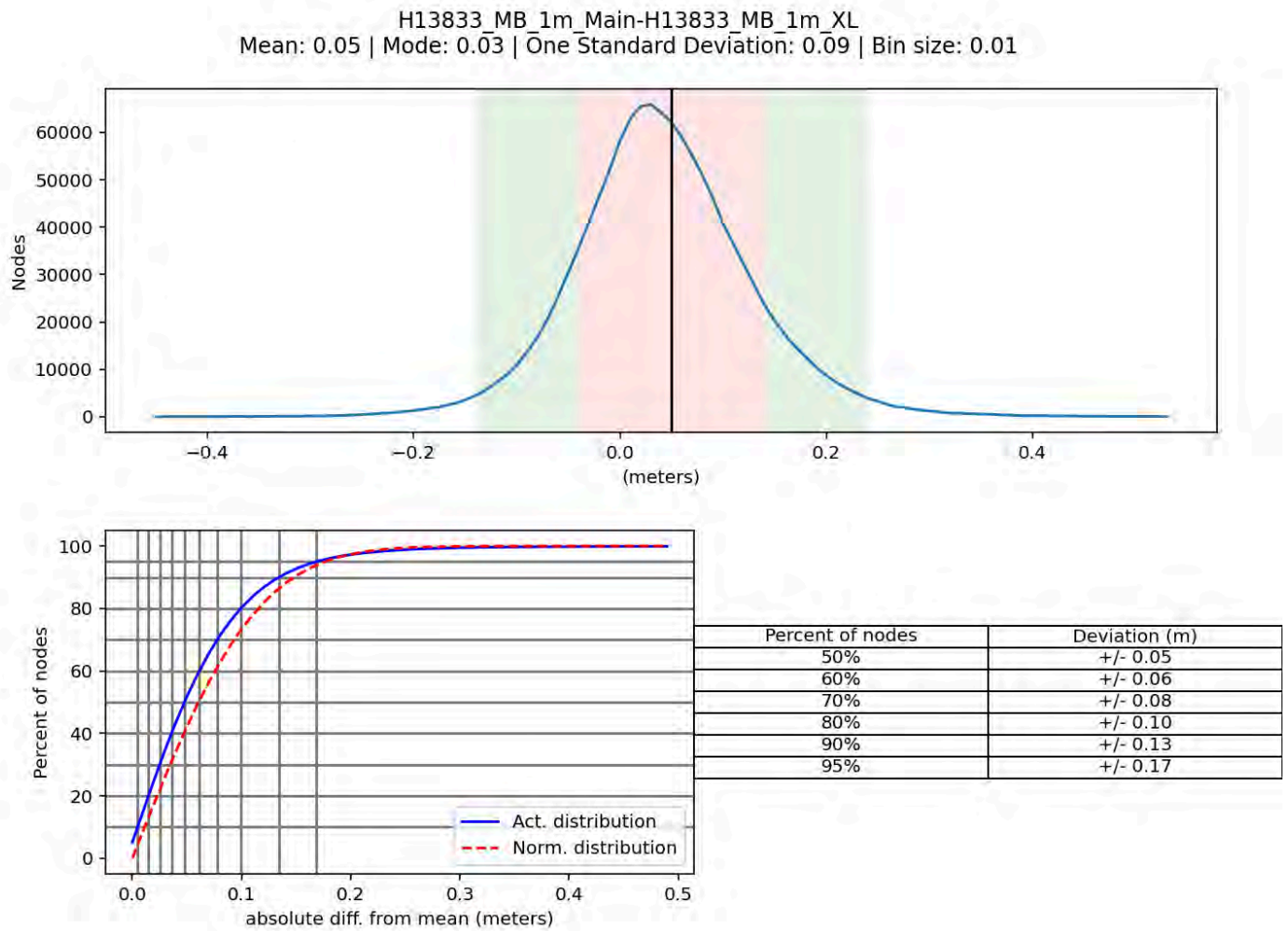


Figure 7: Depth differences between mainscheme and crossline data.

B.2.2 Uncertainty

The following survey specific parameters were used for this survey:

Method	Measured	Zoning
ERS via VDATUM	N/A	13.06 centimeters

Table 7: Survey Specific Tide TPU Values.

Hull ID	Measured - CTD	Measured - MVP	Measured - XBT	Surface
MV Northstar Challenger	N/A	2 meters/second	N/A	1 meters/second
RV North Cove	2 meters/second	N/A	N/A	1 meters/second
RV South Cove	2 meters/second	N/A	N/A	1 meters/second

Table 8: Survey Specific Sound Speed TPU Values.

The HydrOffice "QC Tools" application was used to calculate TVU QC, determined by a ratio of uncertainty to the allowable error per NOAA and IHO specifications. Four surfaces covering different date ranges were 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 passed the uncertainty check, with 99.5+% or 100% of nodes meeting the uncertainty standards in each surface. A single combined surface of all data was also finalized and analyzed, and as the results were similar to each of the other submitted surfaces, only the single surface analysis is shown here for simplicity.

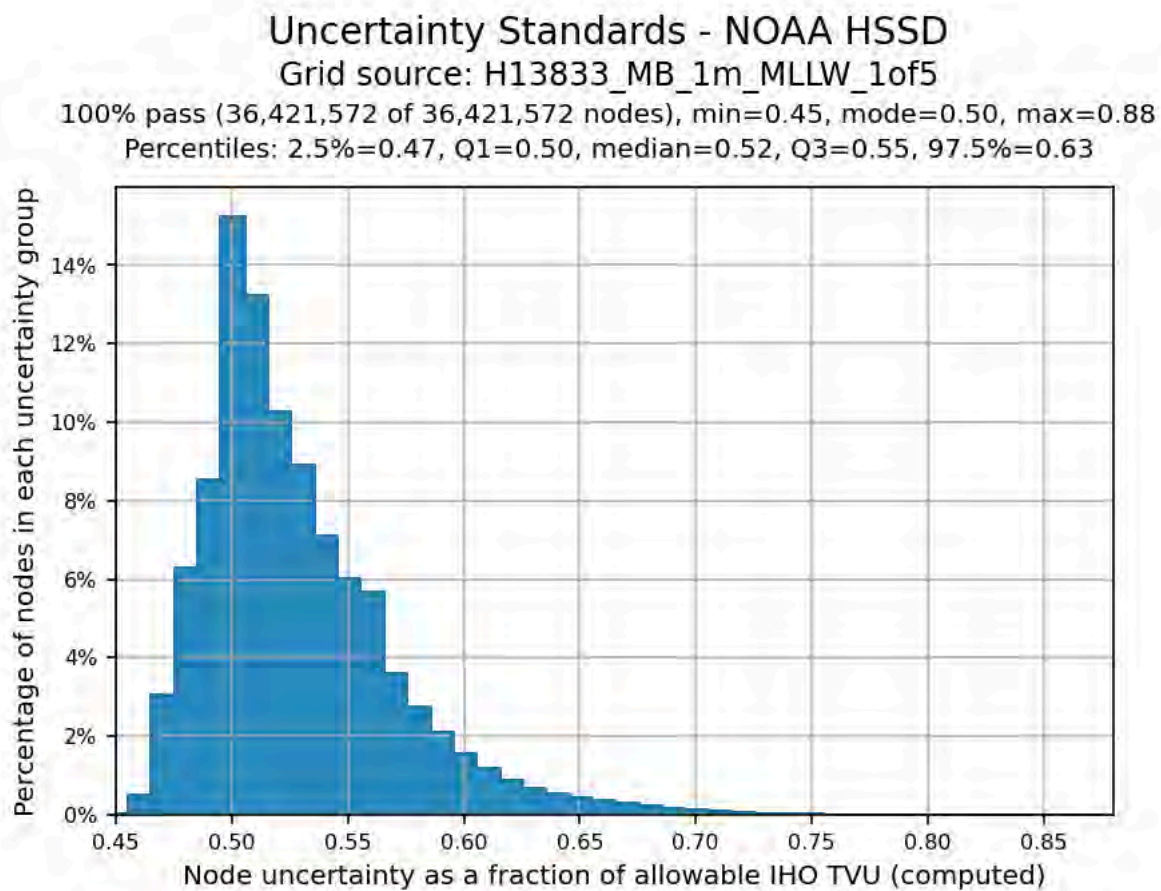


Figure 8: Uncertainty standards, 1m resolution surface.

B.2.3 Junctions

Survey H13833 junctions with a contemporary survey along its eastern border and a prior survey along part of its northern border. For H13833, and other surveys in this project with multiple submitted surfaces covering different date ranges, a single surface that includes all days of that survey was used for the junction comparisons.

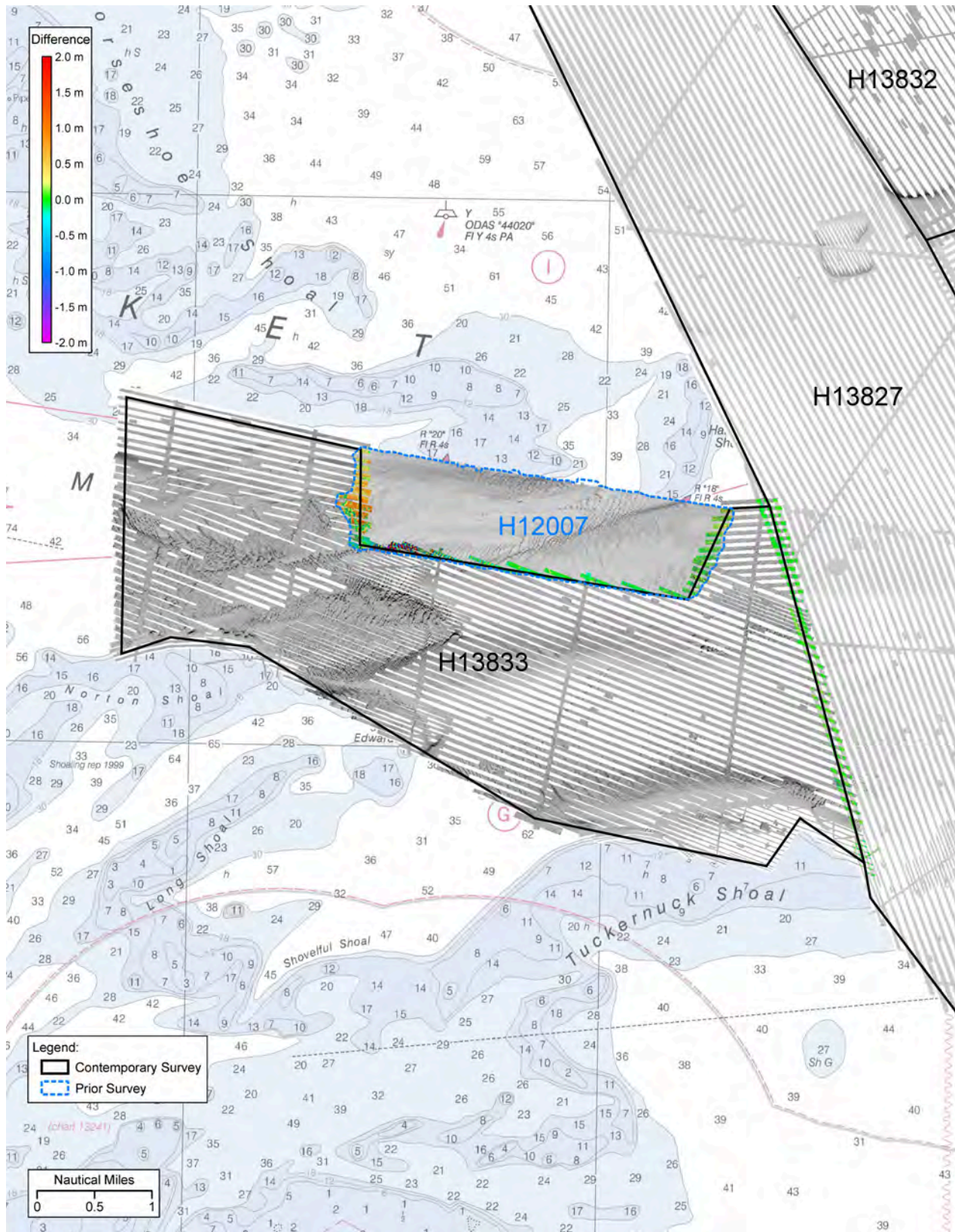


Figure 9: H13833 junction map with junction area depth differences.

The following junctions were made with this survey:

Registry Number	Scale	Year	Field Unit	Relative Location
H12007	1:20000	2009	Thomas Jefferson	W
H13827	1:10000	2023	OSI	E

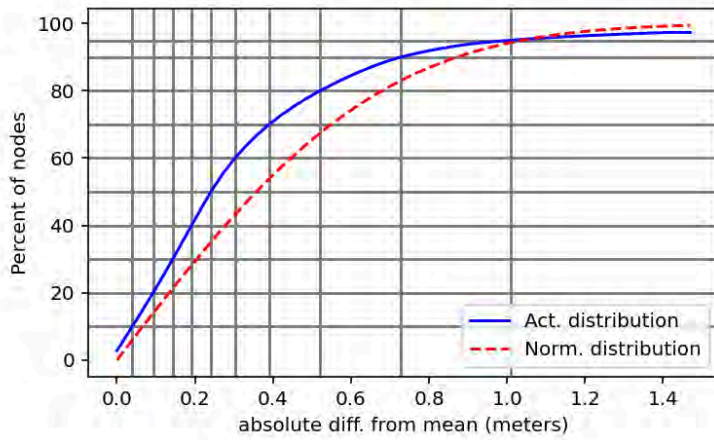
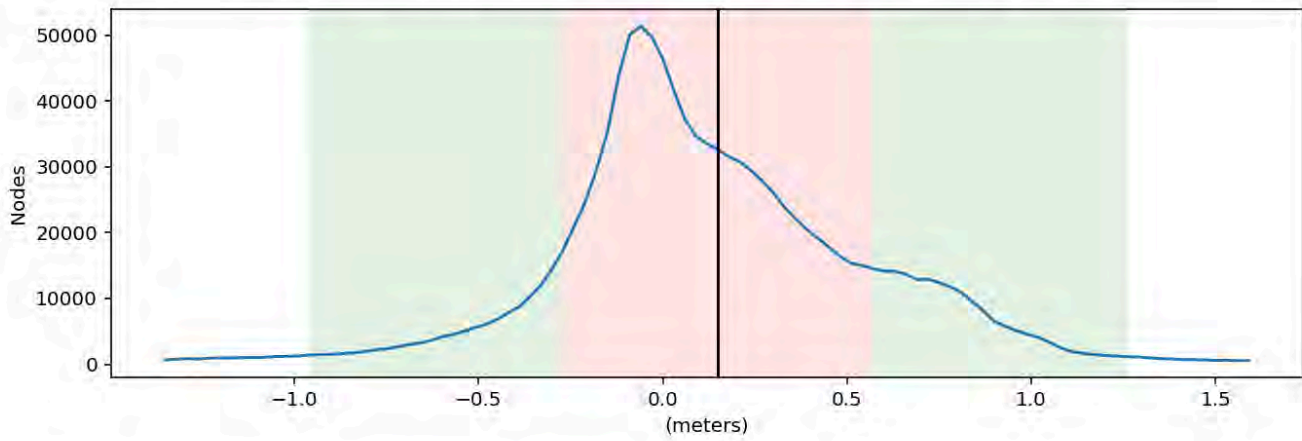
Table 9: Junctioning Surveys

H12007

Prior survey H12007 is surrounded on 3 sides (eastern, southern, and western borders) by H13833; the northern border of H13833 has a rectangular cutout where H12007 is located. The eastern edge of the junction area shows evidence of significant sand wave shifting in the 14 years between the two surveys. The southern border between the surveys is slightly deeper now, with more sand wave shifts in the southwestern area as well. The western edge of the junction area is shoaler in the current survey than the prior survey.

The mean depth difference is 0.15m, and 89% of comparison cells are within the allowable error fraction. The pattern of sand waves in the surface and the length of time between the two surveys make it likely that this is due to changes in bathymetry, not survey errors.

H13833_MB_1m_MLLW-H12007_MB_1m_MLLW_combined
 Mean: 0.15 | Mode: -0.06 | One Standard Deviation: 0.53 | Bin size: 0.03



Percent of nodes	Deviation (m)
50%	+/- 0.24
60%	+/- 0.30
70%	+/- 0.39
80%	+/- 0.52
90%	+/- 0.73
95%	+/- 1.01

Figure 10: Depth differences between H13833 and H12007.

Comparison Distribution

Per Grid: H13833_MB_1m_MLLW-H12007_MB_1m_MLLW_combined_fracAllowErr.csar

89% nodes pass (1047126), min=0.0, mode=0.1 mean=0.5 max=7.3

Percentiles: 2.5%=0.0, Q1=0.1, median=0.3, Q3=0.7, 97.5%=2.0

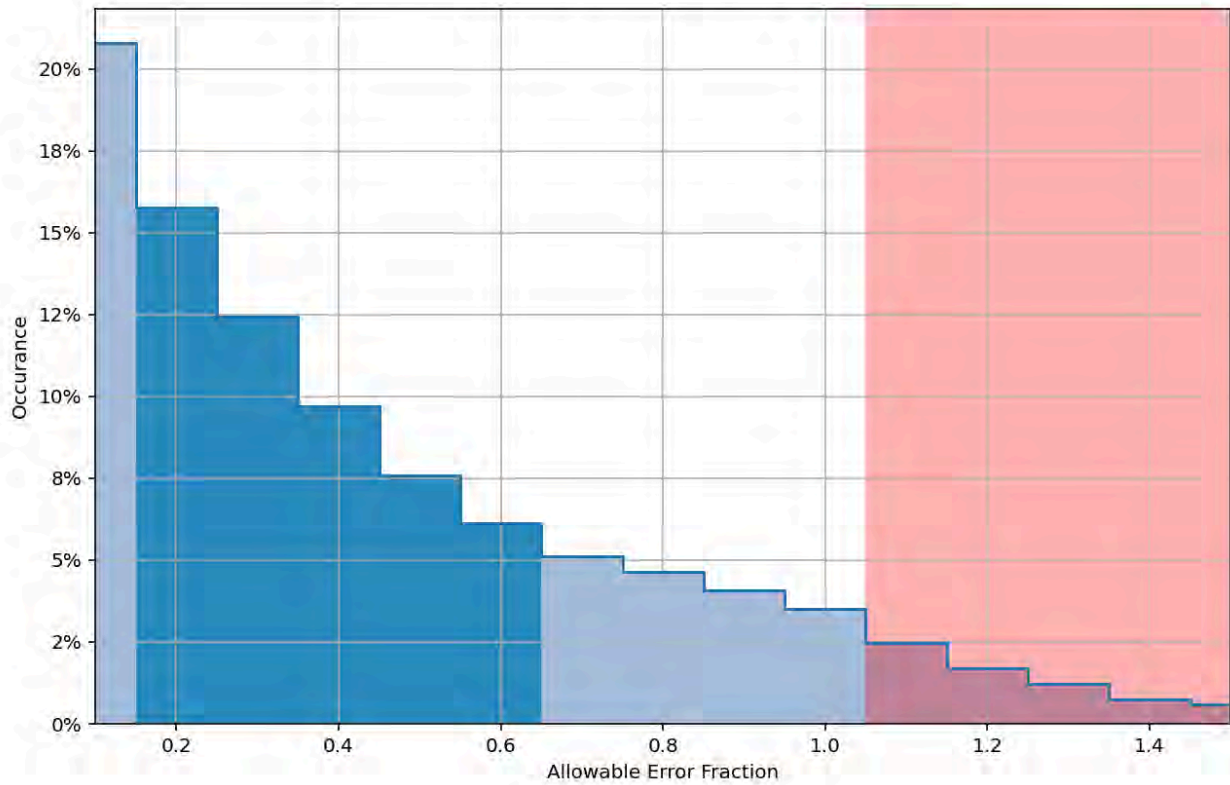


Figure 11: Grid comparison, allowable error fraction.

H13827

This junction is discussed in the H13827 DR.

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: MV Northstar Challenger acquired MVP casts at approximately 20 minute intervals. An AML-3 LGR was also onboard the MV Northstar Challenger as a backup for the MVP, and AML casts were acquired at intervals of approximately 2 hours. RV North Cove and RV South Cove acquired AML3 casts at approximately 90 minute intervals.

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 ($>2\text{m/s}$ 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, and RV South Cove in North Atlantic Ocean, Nantucket Sound from 2023-10-18 to 2024-06-04" in NetCDF format to the National Centers for Environmental Information (NCEI) on August 7, 2024.

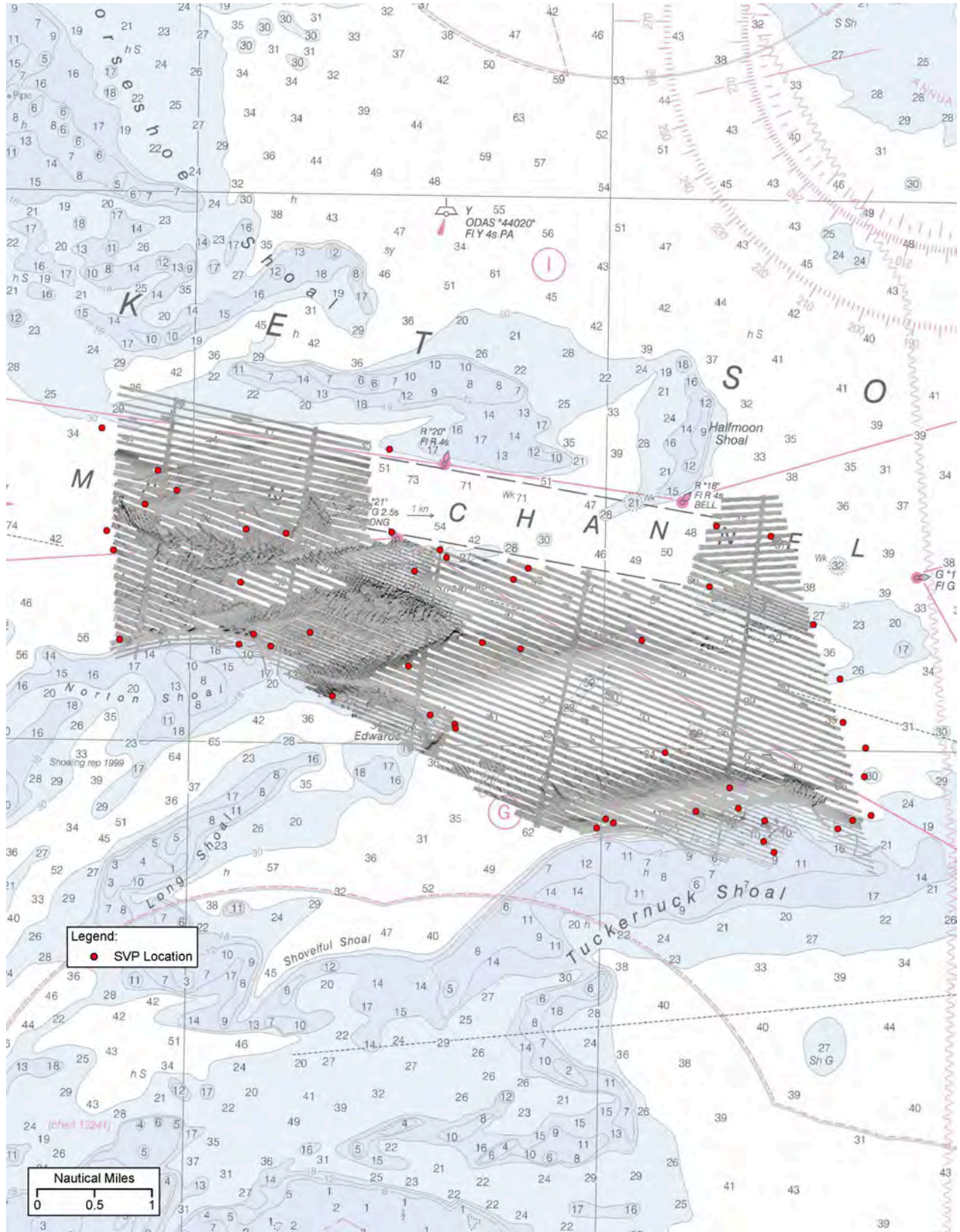


Figure 12: H13833 sound speed cast locations.

B.2.8 Coverage Equipment and Methods

This survey was conducted to achieve Complete Coverage with 100% Side Scan Sonar and Concurrent Multibeam, as specified in HSSD 5.2.2.3, Option B. Complete multibeam coverage was used for feature developments and disprovals. The survey methods used to meet coverage requirements did not deviate from those described in the DAPR.

The HydrOffice "QC Tools" application was used to verify that the multibeam data in each of the submitted surfaces met the density coverage requirements. All surfaces passed the check with 99% or more of the grid nodes populated with at least 5 soundings. For simplicity, the results shown below are only for a single surface including all the multibeam data, as the results were similar to the set of surfaces covering different date ranges.

Most of the survey area had depths of less than 20m, for which a surface resolution of 1m is required. Approximately 7% of the survey area was deeper than 20m, with a maximum depth of 25m. The HSSD calls for a 2m resolution surface to cover these deeper areas. However, the data density of the 1m resolution surface was more than adequate even at these greater depths, and so to reduce the number of submitted surfaces, 1m resolution was used for the entire survey.

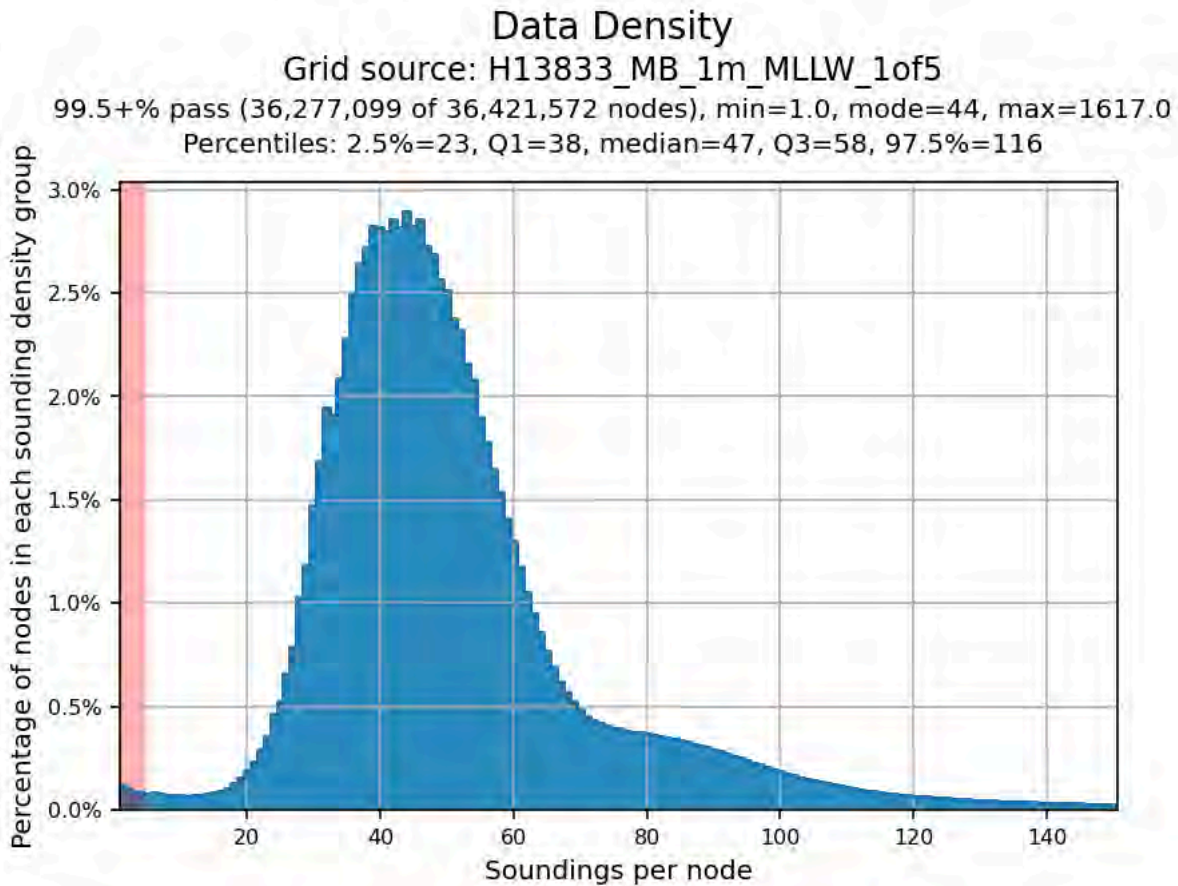


Figure 13: Data density, 1m resolution surface.

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.

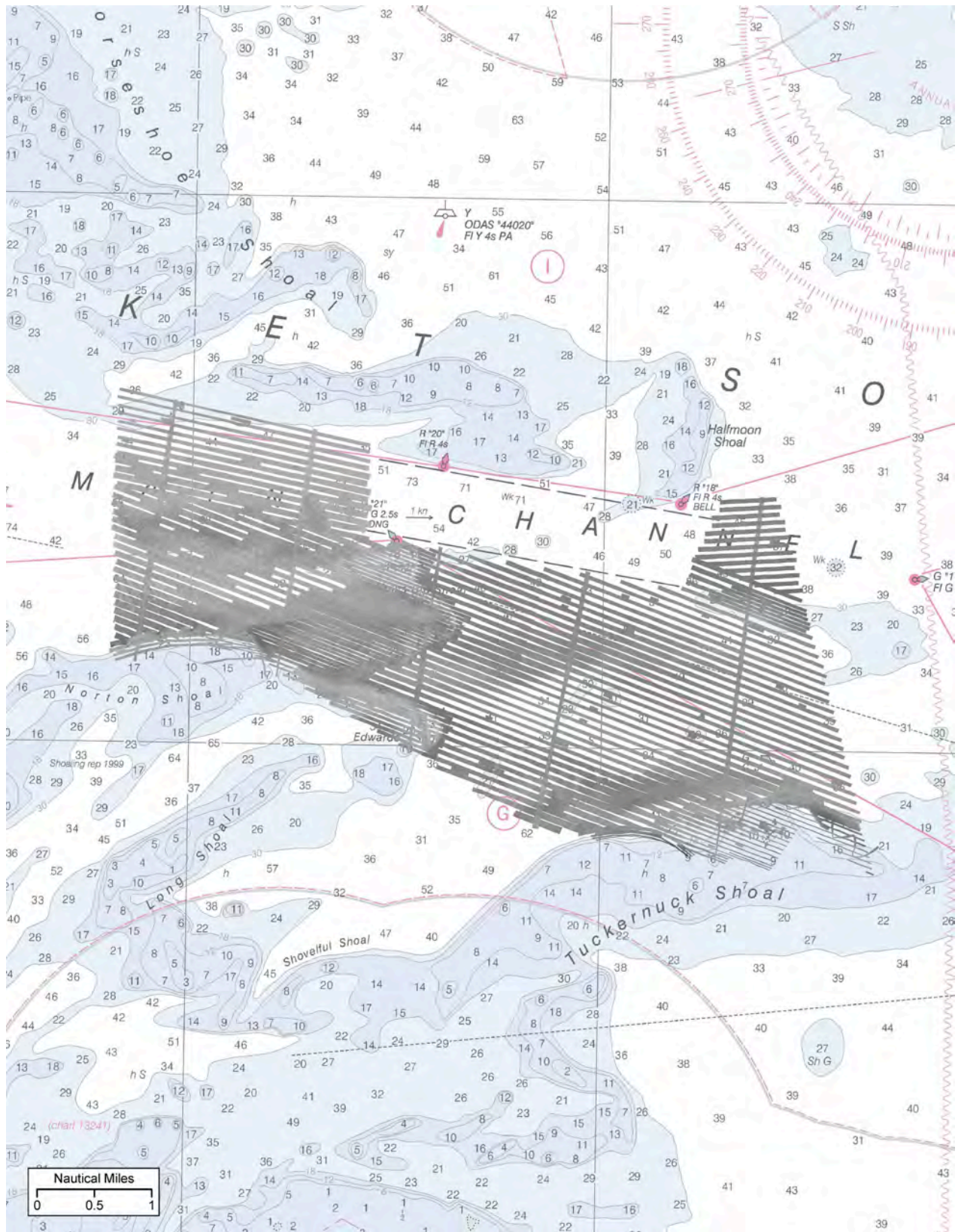


Figure 14: H13833 multibeam backscatter mosaic.

B.5 Data Processing

B.5.1 Primary Data Processing Software

The following Feature Object Catalog was used: NOAA Profile Version 2023.

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
H13833_MB_1m_MLLW_1of5_Final	CARIS Raster Surface (CUBE)	1 meters	2.31 meters - 25.23 meters	NOAA_1m	Complete MBES
H13833_MB_1m_MLLW_2of5_Final	CARIS Raster Surface (CUBE)	1 meters	3.11 meters - 23.93 meters	NOAA_1m	Complete MBES
H13833_MB_1m_MLLW_3of5_Final	CARIS Raster Surface (CUBE)	1 meters	4.08 meters - 23.02 meters	NOAA_1m	Complete MBES
H13833_MB_1m_MLLW_4of5_Final	CARIS Raster Surface (CUBE)	1 meters	2.31 meters - 25.23 meters	NOAA_1m	Complete MBES
H13833_MB_1m_MLLW_5of5_Final	CARIS Raster Surface (CUBE)	1 meters	3.48 meters - 23.75 meters	NOAA_1m	Complete MBES
H13833_MB_1m_MLLW_1of5	CARIS Raster Surface (CUBE)	1 meters	2.31 meters - 25.23 meters	NOAA_1m	Complete MBES
H13833_MB_1m_MLLW_2of5	CARIS Raster Surface (CUBE)	1 meters	3.11 meters - 23.94 meters	NOAA_1m	Complete MBES
H13833_MB_1m_MLLW_3of5	CARIS Raster Surface (CUBE)	1 meters	4.08 meters - 23.02 meters	NOAA_1m	Complete MBES

Surface Name	Surface Type	Resolution	Depth Range	Surface Parameter	Purpose
H13833_MB_1m_MLLW_4of5	CARIS Raster Surface (CUBE)	1 meters	2.31 meters - 25.23 meters	NOAA_1m	Complete MBES
H13833_MB_1m_MLLW_5of5	CARIS Raster Surface (CUBE)	1 meters	3.48 meters - 23.75 meters	NOAA_1m	Complete MBES
H13833_SSSAB_1m_600kHz_1of1	SSS Mosaic	1 meters	-	N/A	100% SSS
H13833_MBAB_2m_400kHz_1of1	MB Backscatter Mosaic	2 meters	-	N/A	Processed Backscatter

Table 10: Submitted Surfaces

Survey H13833 was conducted over more than 6 months, with data collection days spread out due to weather conditions and survey priorities of the project. Over this time frame, significant changes were observed in the bathymetry as sand waves shifted and migrated. These changes were less apparent early in the survey, as mainscheme data was collected across the area with minimal overlap between days, but investigations and fills collected later in the survey showed larger differences from previous data. Per guidance from the NOAA OCS Project Manager, the submitted surfaces have been divided into groups of survey days to best reflect the bathymetry as observed. A surface inclusive of all data is also provided, showing artifacts of the changed bathymetry.

DN range	Date range	Number of Survey Days	Surface Name
All days	All days	7	H13833_MB_1m_MLLW_1of5
DN 2023-309 to 2023-311	11/5/2023 to 11/7/2023	3	H13833_MB_1m_MLLW_2of5
DN 2023-342	12/8/2023	1	H13833_MB_1m_MLLW_3of5
DN 2024-042 to 2024-043	2/11/2024 to 2/12/2024	2	H13833_MB_1m_MLLW_4of5
DN 2024-150	5/29/2024	1	H13833_MB_1m_MLLW_5of5

Figure 15: Summary of dates included in each submitted MB grid.

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-B360-KR-23_NAD83_VDatum_MLLW.csar OPR-B360-KR-23_NAD83_VDatum_MHW.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

The following CORS Stations were used for horizontal control:

HVCR Site ID	Base Station ID
MACM CHATHAM	MACM
DARTMOUTH	MADA
FALMOUTH	MAFA
MANT NANTUCKET	MANT
PLYMOUTH	MAPL
TRURO	MATU
N001_NEWPORT_RI	N001

Table 12: CORS Base Stations

The following user installed stations were used for horizontal control:

HVCR Site ID	Base Station ID
Ocean Surveys Bass River	OSBR

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 ENC's, which cover the survey area:

ENC	Scale	Edition	Update Application Date	Issue Date
US4MA43M	1:80000	27	04/17/2024	05/09/2024
US5MA41M	1:40000	16	06/27/2022	12/19/2023

Table 14: Largest Scale ENC's

D.1.2 Shoal and Hazardous Features

Shoaling is evident in several areas across the sheet, particularly along the southern border where the charted contours do not match the surveyed depths. DTONS were submitted as sounding sets for 4 shoal areas in the survey.

D.1.3 Charted Features

There were 3 charted wrecks in H13833, 2 of which were present and 1 was disproved. See the FFF for details.

D.1.4 Uncharted Features

The southeast corner of the survey area contained 4 uncharted features, which may be wrecks or wreck debris. They are included in the FFF as obstructions or area wrecks, and an informational cartographic area

in the FFF contains additional details about this group of features. Multiple new sand wave area features were delineated, as well as a water turbulence area. See the FFF for details.

D.1.5 Channels

No channels exist within the survey limits.

D.2 Additional Results

D.2.1 Aids to Navigation

There were 4 ATONS charted in H13833, 1 marking a channel that is outside the sheet and 3 marking different shoals. All were found to be on station.

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

No platforms exist for this survey.

D.2.7 Ferry Routes and Terminals

Ferry routes between Nantucket Island and New Bedford or Martha's Vineyard cross through H13833. Ferries were observed by the field crews during the project. No ferry routes are shown on the charts for this survey.

D.2.8 Abnormal Seafloor or Environmental Conditions

Most of the H13833 survey area contained sand waves of varying size, which were observed to have shifted over the course of the survey. Data collection days were spread over more than 6 months, due to weather conditions and survey priorities, and data collected later in the survey period show large differences from adjacent prior data. Observations of change are limited by the survey time frame, with fewer comparisons available in areas that did not have fills, reruns, or investigation lines collected later in the survey.

Sand waves in the northeast area of the survey appeared more stable, with minimal changes over time. Greater changes were observed in all the named shoal areas of the survey, which are Cross Rip Shoal, Edwards Shoal, Norton Shoal, and Tuckernuck Shoal. Sand wave features covering these areas are included in the FFF. An area of water turbulence was also observed, and a new tide rips area is included in the FFF.

The figure shows a cross section of a sand wave on two survey lines, data collected on DN 2023-309 (pink) and 2024-042 (cyan), at 5x vertical exaggeration. Water depths and horizontal distance are labeled in meters.

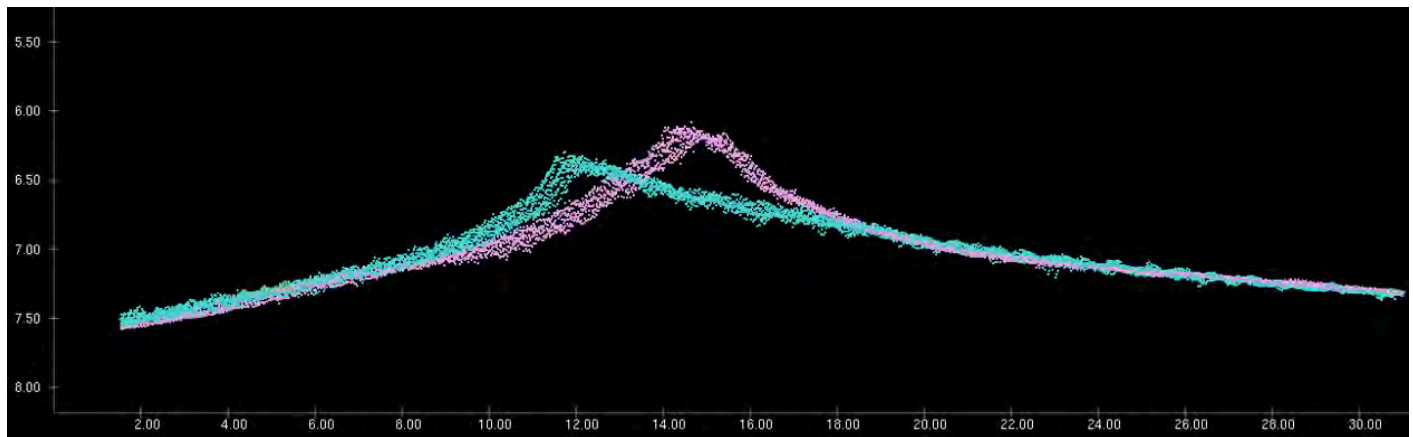


Figure 16: Cross sectional view of a sand wave on different survey days with 5x vertical exaggeration.

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	10/30/2024	Digitally signed by John R. Bean
David T. Somers	Data Processing Manager	10/30/2024	Digitally signed by David T. Somers
Kelley J. Bostrom	Sheet Manager	10/30/2024	Digitally signed by Kelley J. Bostrom

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