

H13708

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

DESCRIPTIVE REPORT

Type of Survey: Navigable Area

Registry Number: H13708

LOCALITY

State(s): Louisiana
Texas

General Locality: Galveston, Texas

Sub-locality: Sabine Bank

2023

CHIEF OF PARTY
Matthew Jaskoski, CDR/NOAA

LIBRARY & ARCHIVES

Date:

HYDROGRAPHIC TITLE SHEET

H13708

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): **Louisiana Texas**

General Locality: **Galveston, Texas**

Sub-Locality: **Sabine Bank**

Scale: **40000**

Dates of Survey: **03/26/2023 to 06/08/2023**

Instructions Dated: **02/09/2023**

Project Number: **OPR-K371-TJ-23**

Field Unit: **NOAA Ship *Thomas Jefferson***

Chief of Party: **Matthew Jaskoski, CDR/NOAA**

Soundings by: **Kongsberg Maritime EM 2040 (MBES)**

Imagery by: **Kongsberg Maritime EM 2040 (MBES Backscatter)
 EdgeTech 4200 (SSS)**

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 15N, MLLW. 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 SUMMARY

A. Area Surveyed

This hydrographic survey was acquired in accordance with the requirements defined in the Project Instructions OPR-K371-TJ-23 and in the 2022 Hydrographic Survey Specifications and Deliverables (HSSD) (Figure 1). Complete coverage requirements were met with 100% Side Scan Sonar (SSS) coverage and concurrent Multibeam Echosounder (MBES) coverage (Figures 2 and 3). Due to operational time constraints, data was not collected for the entire survey area delineated in the Project Instructions. One MBES holiday exists within the data collected for sheet H13708 (Figure 4). This holiday is co-located with one backscatter holiday.

Data were acquired within the following survey limits:

Northwest Limit	Southeast Limit
29° 35' 5.74" N 94° 14' 17.2" W	29° 17' 4.59" N 93° 30' 37.34" W

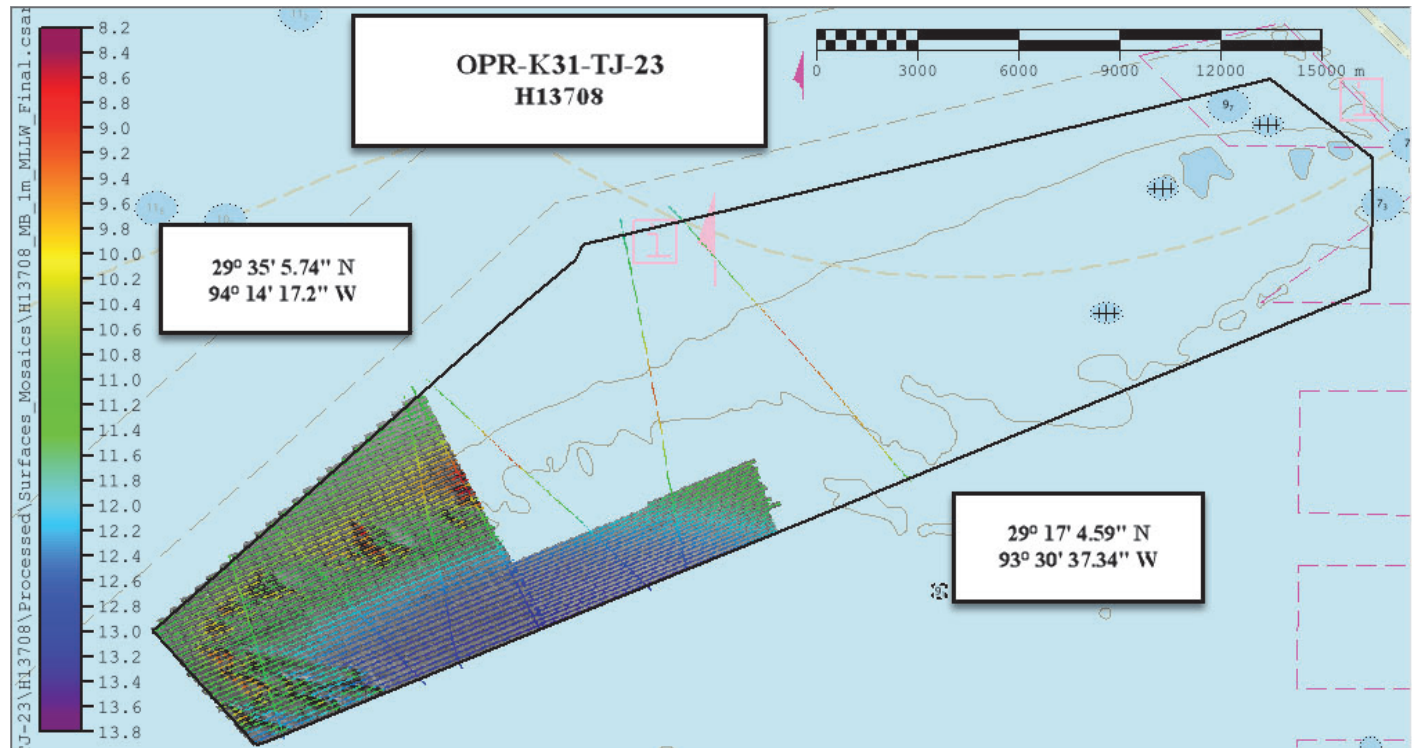


Figure 1: H13708 survey sheet limits outlined in black, plotted over ENC US4TX71M with northwest and southeast limits of collected data noted. This image depicts combined MBES and SSS coverage. The legend is in meters.

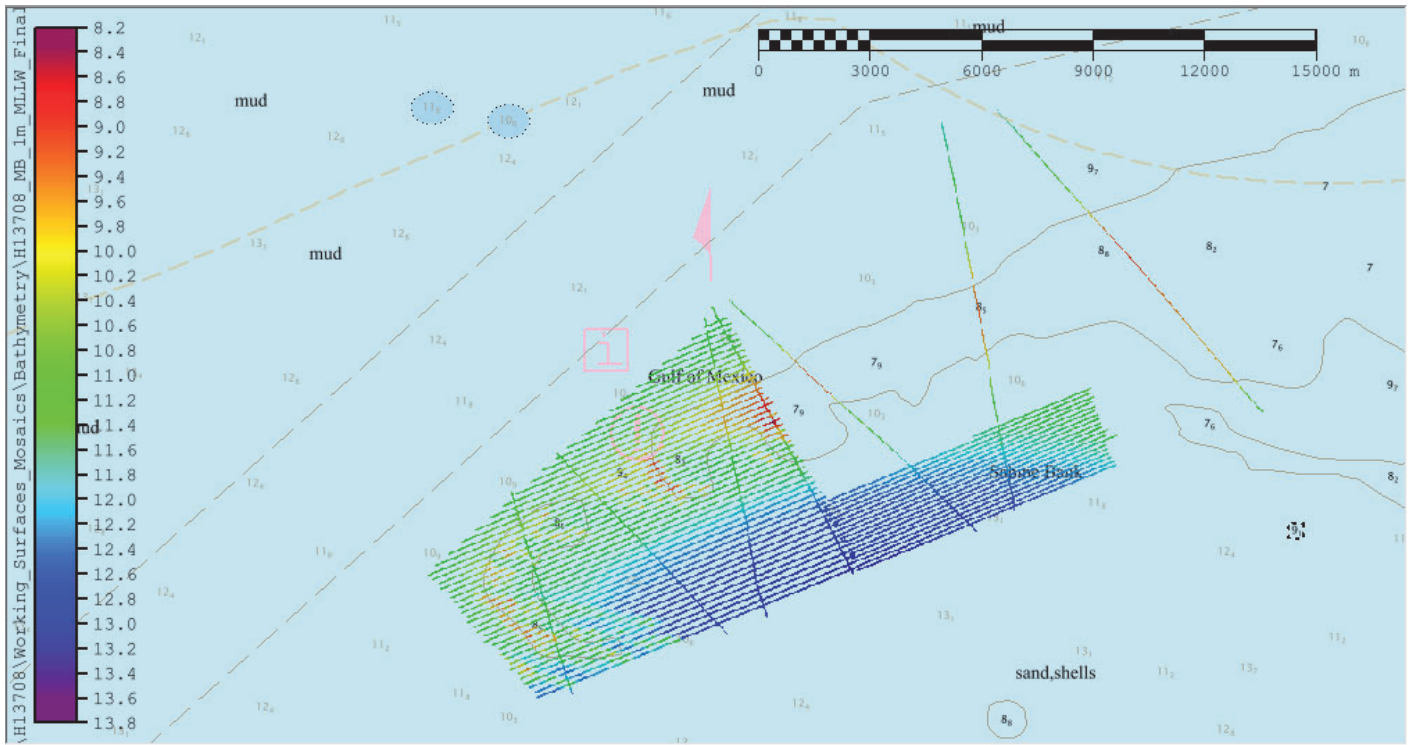


Figure 2: H13708 MBES coverage, including crosslines. The legend is in meters.

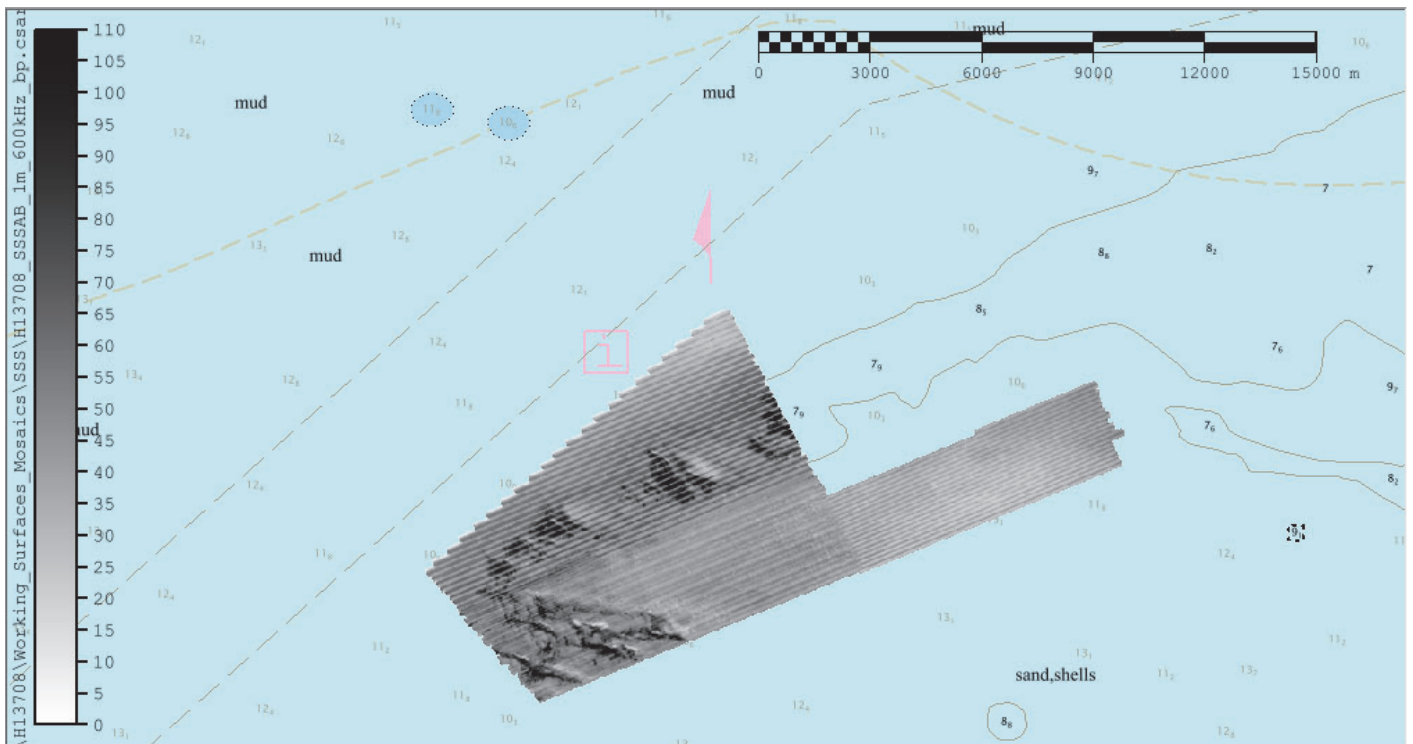


Figure 3: H13708 SSS coverage. The legend is in decibels.

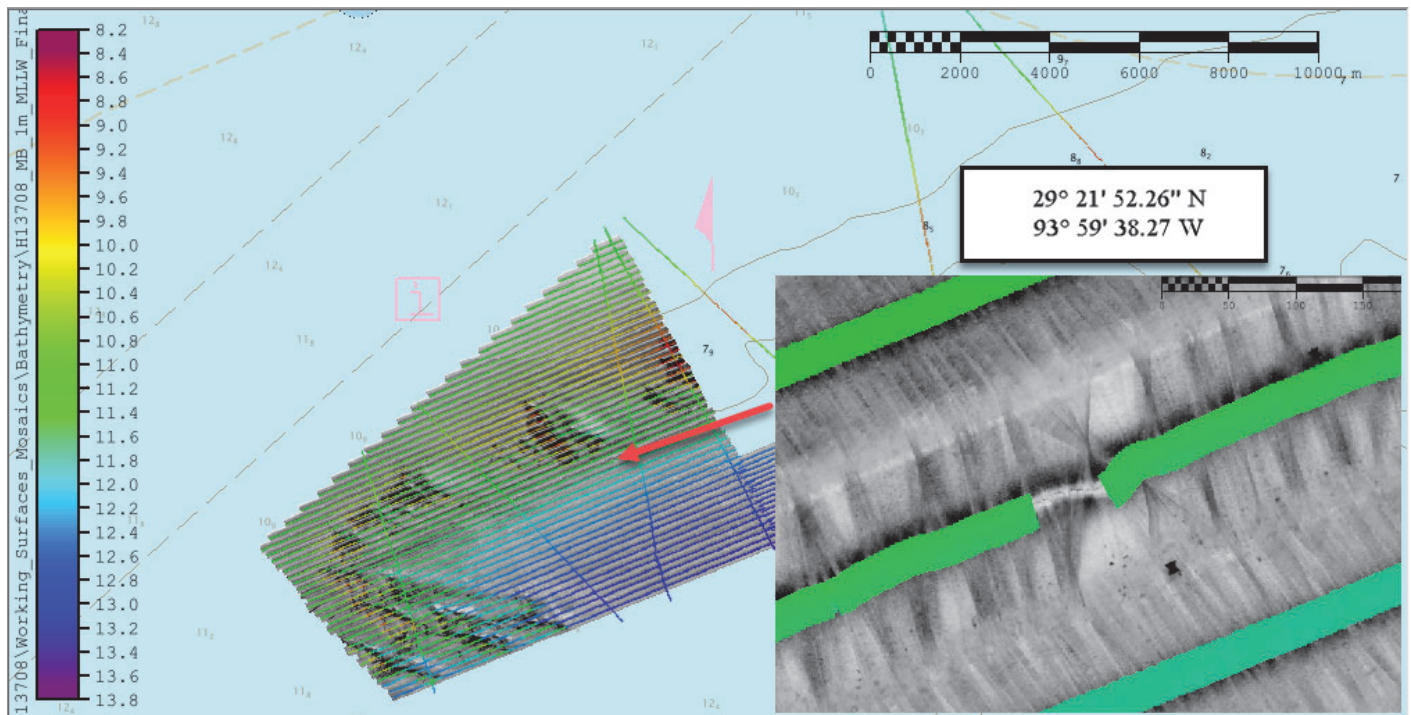


Figure 4: H13708 MBES holiday. It is approximately 56.5m long, and is located at the coordinates 29° 21' 52.26" N, 93° 59' 38.27" W.

B. Survey Purpose

This hydrographic survey covers an area where safe maritime commerce is critical to the regional economy and environment. In 2018, the Port of Houston supported \$159.8 billion in trade. The area around the Houston Shipping Channel is the nation's largest importer/exporter of petroleum products and supported 713,000 jobs directly or indirectly.¹

In 2018, the Port of Galveston supported \$6.4 billion in trade and supported 28,000 jobs directly and indirectly. The Port of Galveston is also home to Texas' main cruise ship terminal supporting over 250 cruise ship calls and approximately 2 million passengers.²

This project covers approximately 880 square nautical miles between the Galveston Entrance and Sabine Bank Channels in an area which has not been surveyed since 1963. The current chart coverage shows numerous reported wrecks and obstructions with their positions reported to be approximate; these pose a risk to surface navigation. This survey will identify changes to the bathymetry and resolve position uncertainty in known hazards to navigation. Data from this project will provide contemporary surveys to update National Ocean Service nautical charts and products in an area critical to the nation's economy. Survey data from this project is intended to supersede all prior survey data in the common area.

1. Texas Comptroller of Public Accounts, <https://comptroller.texas.gov/economy/economic-data/ports/houston.php>

2. <https://comptroller.texas.gov/economy/economic-data/ports/galveston.php>

C. Intended Use of Survey

The entire survey is adequate to supersede previous data.

D. Data Acquisition and Processing

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.

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

S222

Length Overall: 63.4m

Draft: 4.6m

2903

Length Overall: 8.5m

Draft: 1.2m

Sound speed profiles were conducted at the start of data acquisition each day and at a minimum of once every four hours during acquisition using a SeaBird Seacat 19+ V2 CTD and a Moving Vessel Profiler 200 system. All sound speed methods were used as detailed in the DAPR. A total of 24 sound speed profiles were collected as part of the acquisition of survey H13708 (Figure 7). Eight of these profiles were located outside of the sheet limits, not more than 330 meters away, and are representative of the area. All sound speed profile data were concatenated into a master file for the survey. MBES data were corrected by applying profiles nearest in distance in time (4 hours) using this master file.

At the end of OPR-K371-TJ-23 acquisition, the field unit observed a “wobble” artifact in the outer edges of the multibeam for TJ launch 2903. Systematic issues were not observed during Hydrographic Systems Readiness Review (HSRR) or throughout the project due to acquisition in shallow water. The “wobble” became apparent in depths greater than 20 meters.

Hydrographic Systems Technology Branch used QPS’ Qimera Software to investigate the issue and computed a yaw misalignment of +2.2° with the wobble tool. It was further determined that the yaw value calculated during initial patch testing was entered in Applanix POS M/V as -0.9° instead of +0.9°. The field unit used Applanix POSpac Software to update the Z-component of the IMU with respect to reference point mounting angles to 1.1° to correct the misalignment. Then, the following steps were taken:

Re-ran GNSS-inertial processor

Re-exported SBET (with corrected offsets)

Imported the new SBET and RMS to affected TJ Launch 2903 data and overwrote position, height, and attitude (gyro, pitch, and roll)
Georeferenced all affected data
Created new surfaces

Updated SBETs and RMS files are included in the product deliverables. Reference the Project Correspondence included in the submission package for a record of the correspondence with HSTB.



Figure 5: NOAA Ship Thomas Jefferson S222 (Photo Courtesy: <https://nauticalcharts.noaa.gov/updates/thomas-jefferson-search-and-rescue/>)



Figure 6: Thomas Jefferson Launch 2903 (Photo Courtesy: <https://nauticalcharts.noaa.gov/updates/noaa-contributes-to-empowering-women-in-hydrography-through-at-sea-experience-part-4/>)

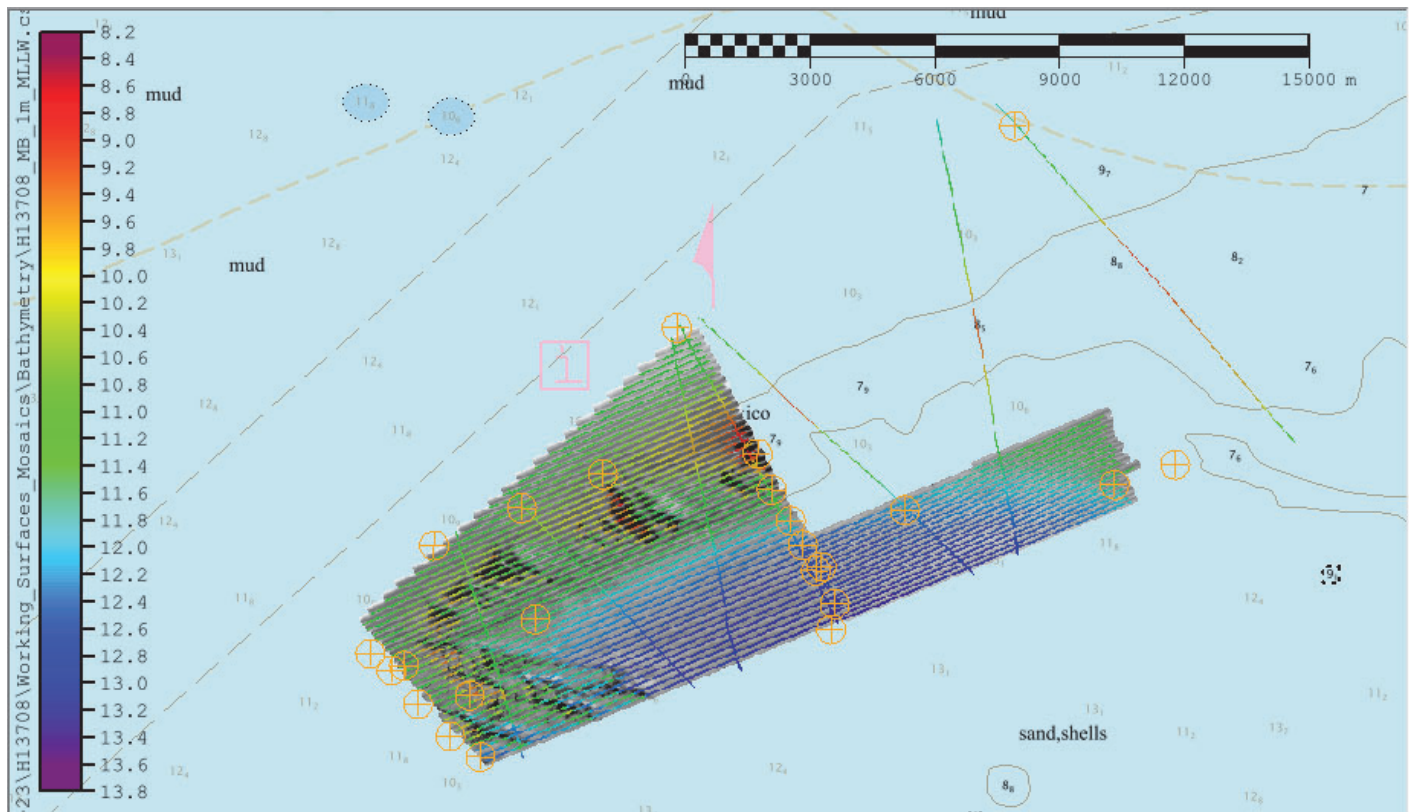


Figure 7: H13708 cast locations shown in orange

E. Uncertainty

The bathymetric surface of survey H13708 complies with uncertainty standards stipulated in the 2022 HSSD. The Uncertainty Standards plot depicted in Figure 8 illustrates that 100% of nodes in the H13708 MBES surface comply with uncertainty requirements.

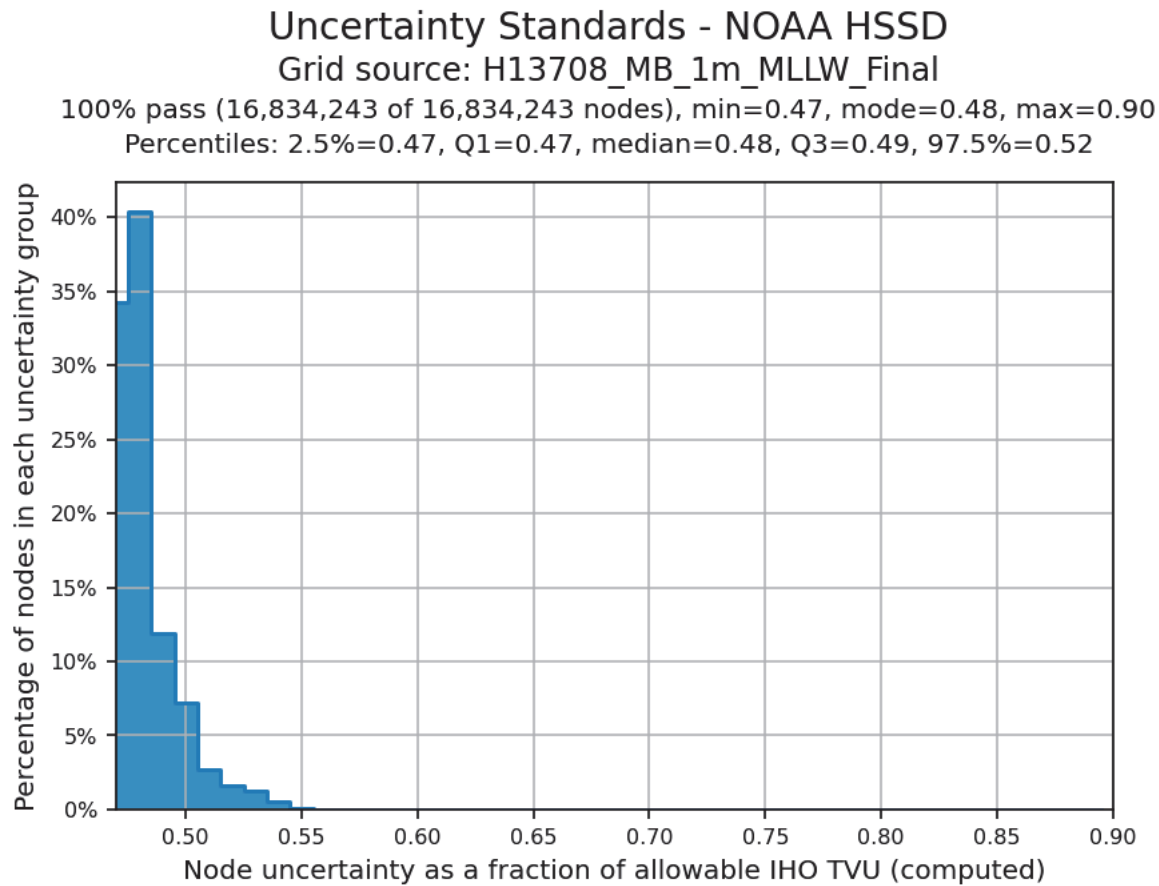


Figure 8: H13708 uncertainty standards

In addition to ensuring that the data collected complies with uncertainty standards, the Pydro tool Compare Grids was utilized to ensure that no systemic issues persist in data collected over the course of acquisition. A Single Resolution (SR) 1m Combined Uncertainty and Bathymetry Estimator (CUBE) surface of mainscheme data and a SR 1m CUBE surface of crossline data were differenced. The resulting mean was 0.03m with a standard deviation of 0.05m, verifying the consistency of the data (Figures 9 and 10). Vessel S222 collected 31.12 linear nautical miles of MBES crosslines, or about 11.34% of mainscheme data. 17.03 linear nautical miles, or about 6% of the crosslines, intersect with mainscheme lines in areas surveyed. An image reflecting crossline distribution and depth may be viewed in Section A (Figure 2).

H13708_MB_1m_MLLW.Mainscheme-H13708_MB_1m_MLLW.XL
 Mean: -0.03 | Mode: -0.05 | One Standard Deviation: 0.05 | Bin size: 0.01

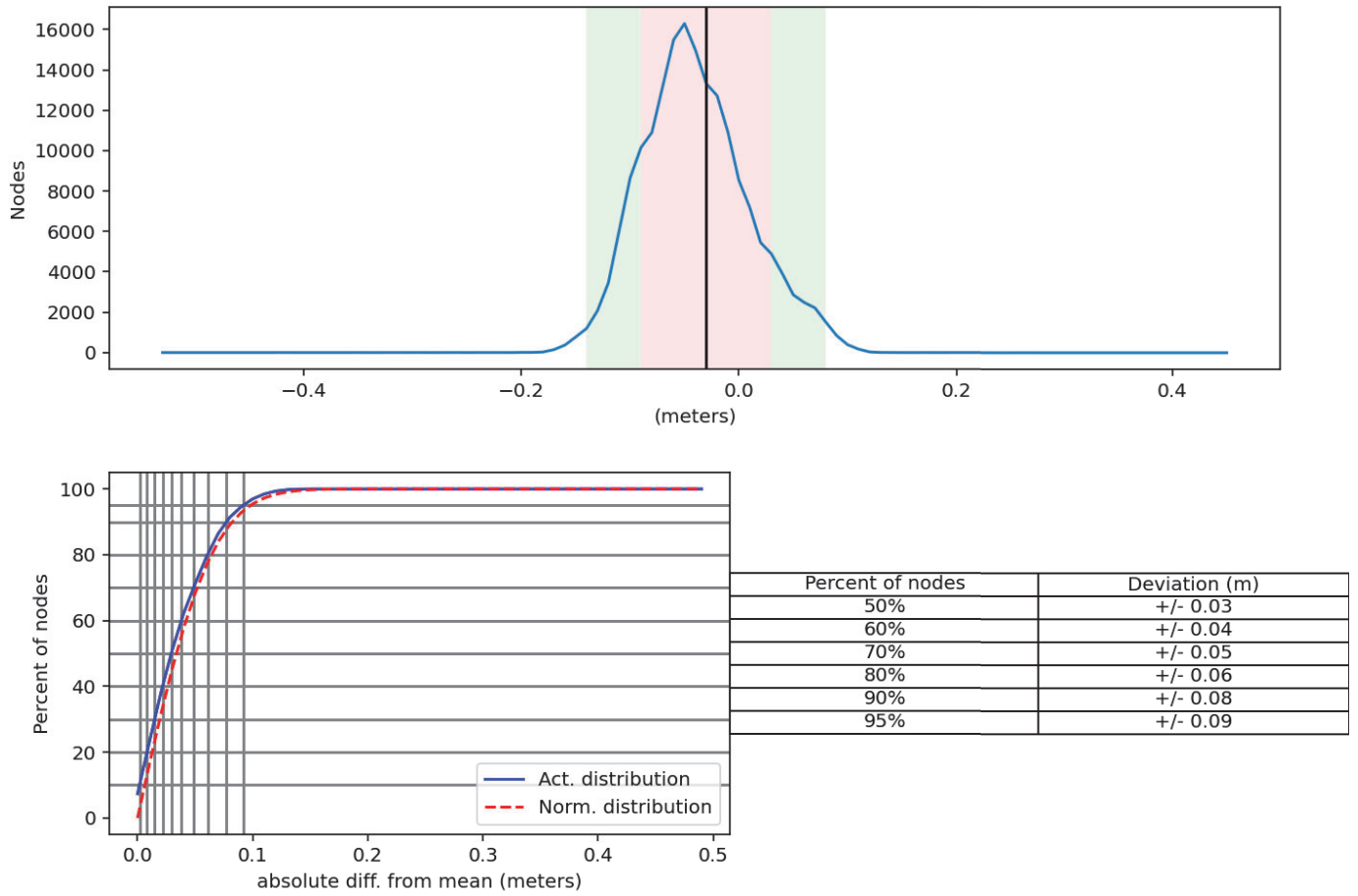


Figure 9: H13708 crossline/mainscheme comparison statistics

Comparison Distribution

Per Grid: H13708_MB_1m_MLLW.Mainscheme-H13708_MB_1m_MLLW.XL_fracAllowErr.csar

99.5+% nodes pass (181275), min=0.0, mode=0.1 mean=0.1 max=1.1

Percentiles: 2.5%=0.0, Q1=0.0, median=0.1, Q3=0.1, 97.5%=0.2

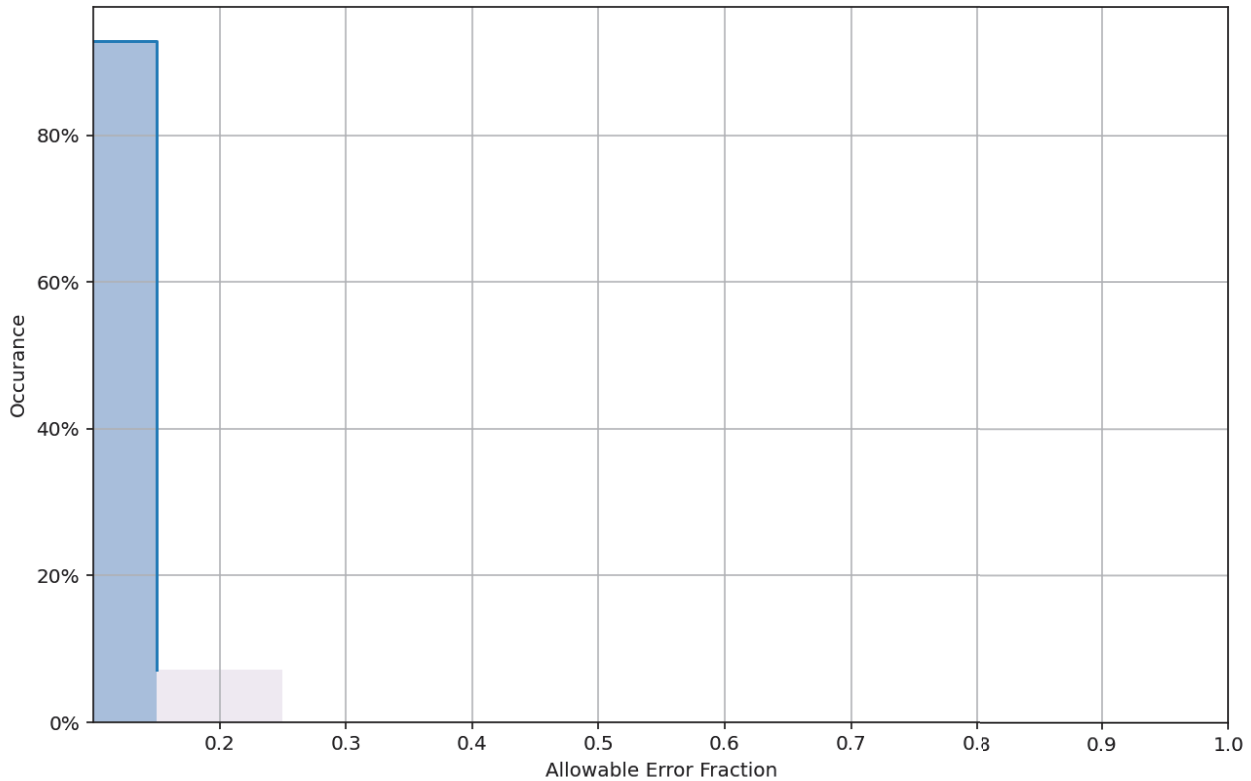


Figure 10: H13708 crossline fraction of allowable error statistics

Survey H13708 junctions with contemporary surveys H13706 and H13709 (Figure 11). In this Descriptive Summary, the junction between H13708 and H13709 will be analyzed. Reference the Descriptive Report for survey H13706 for more information regarding the junction between H13708 and H13706.

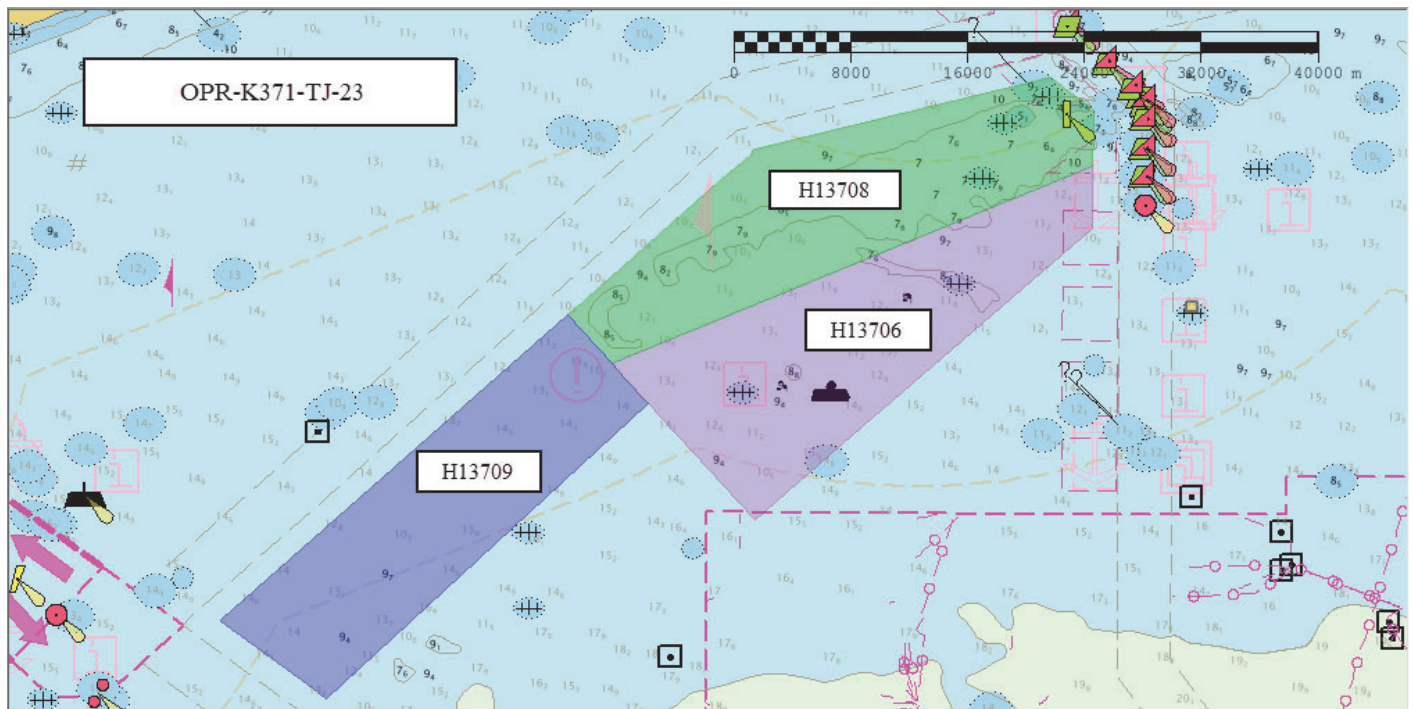


Figure 11: Survey H13708, and contemporary junctioning surveys H13706 and H13709

The western edge of survey H13708 junctions with the eastern edge of survey H13709. The Pydro tool Compare Grids was utilized to difference a 1m SR CUBE surface of H13708 and a 1m SR CUBE surface of H13709. The mean difference between bathymetric surface nodes was 0.06m with a standard deviation of 0.06 (Figure 12). Statistics and visual inspection indicate that surveys H13708 and H13709 are in general agreement (Figures 13 and 14).

H13708_MB_1m_MLLW_Final-H13709_MB_1m_MLLW_Final
 Mean: -0.06 | Mode: -0.04 | One Standard Deviation: 0.06 | Bin size: 0.01

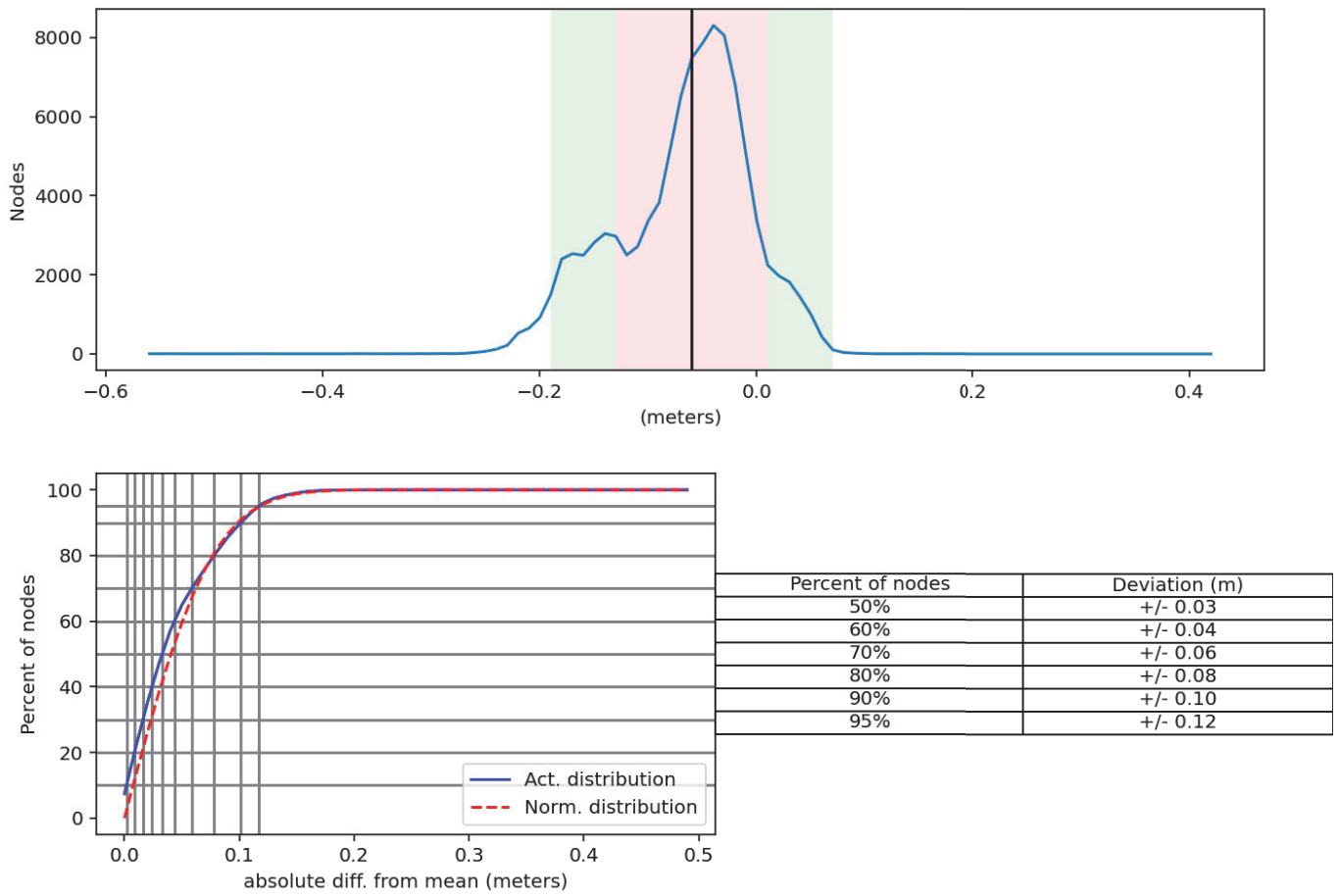


Figure 12: H13708 and H13709 surface difference comparison statistics

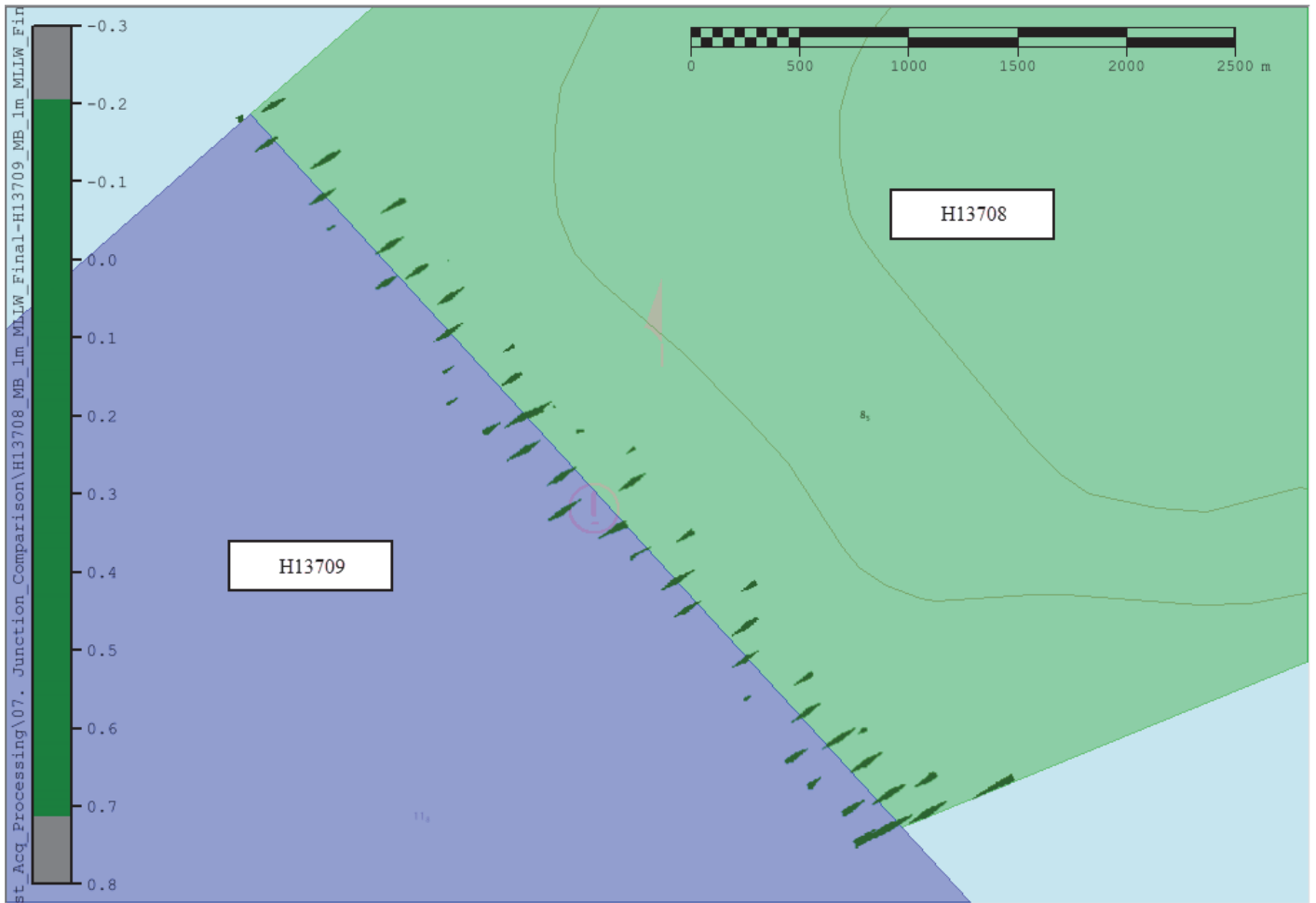


Figure 13: Fraction of allowable error surface difference comparison in color between H13708 and H13709

Comparison Distribution

Per Grid: H13708_MB_1m_MLLW_Final-H13709_MB_1m_MLLW_Final_fracAllowErr.csar

100% nodes pass (100299), min=0.0, mode=0.1 mean=0.1 max=0.7

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

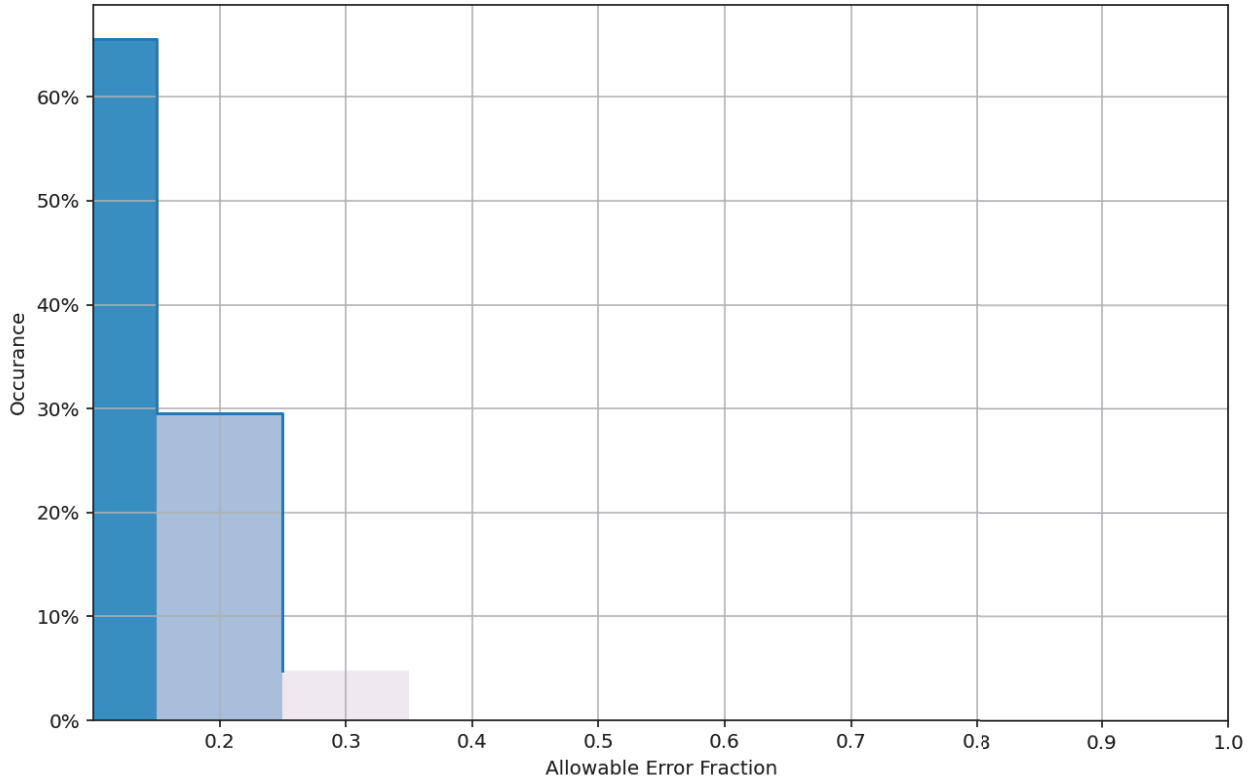


Figure 14: H13708 and H13709 fraction of allowable error statistics

F. Results and Recommendations

The following are the largest scale ENC's, which cover the survey area:

ENC	Scale	Edition	Update Application Date	Issue Date
US3GC02M	1:25000	67	04/26/2022	11/15/2022
US4TX71M	1:80000	42	07/12/2022	08/02/2022

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

Surface Name	Surface Type	Resolution	Depth Range	Surface Parameter	Purpose
H13708_MB_1m_MLLW	CARIS Raster Surface (CUBE)	1 m	8.36 m - 13.69 m	NOAA_1m	Complete MBES
H13708_MB_1m_MLLW_Final	CARIS Raster Surface (CUBE)	1 m	8.36 m - 13.69 m	NOAA_1m	Complete MBES
H13708_SSSAB_1m_600kHz_1of1	SSS Mosaic	1 m	N/A	N/A	100% SSS
H13708_MBAB_2m_2903_300kHz_1of1	MB Backscatter Mosaic	2 m	N/A	N/A	Complete MBES

Complete coverage requirements were met by 100% SSS with concurrent MBES coverage as specified under section 5.2.2.2 of the 2022 HSSD. All bathymetric grids for H13708 meet density requirements per the 2022 HSSD (Figure 15). Raw MBES backscatter was logged as part of the .all file of the Kongsberg EM2040 systems. Backscatter was processed in QPS Fledermaus GeoCoder Toolbox (FMGT) software, and the exported geotiffs are included in the final processed data package.

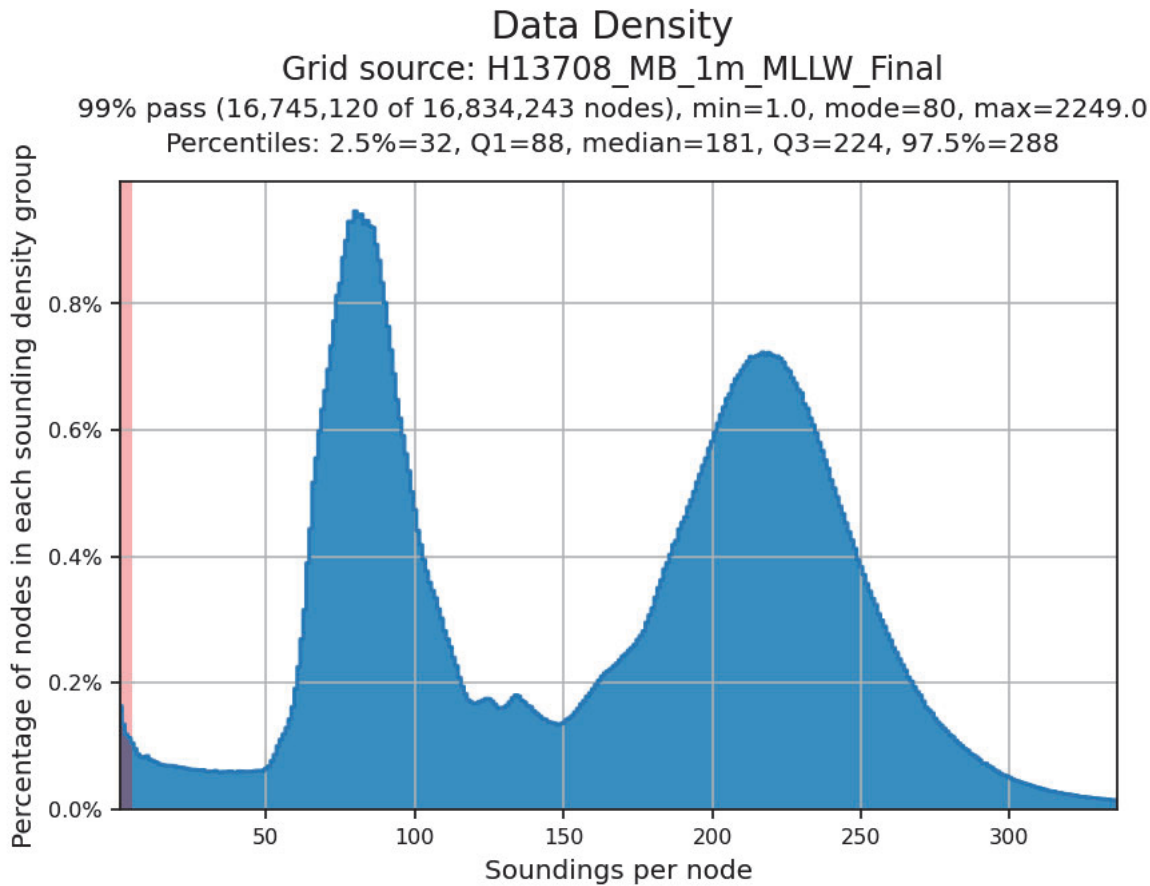


Figure 15: H13708 data density statistics

G. Vertical and Horizontal Control

The vertical datum for this project is Mean Lower Low Water. The vertical control method used was VDatum.

Refer to the DAPR for a complete description of vertical control procedures.

The horizontal datum for this project is North American Datum of 1983 (NAD 83). The projection used for this project is Universal Transverse Mercator (UTM) Zone 15.

The Trimble-RTX service was used with an Applanix POS MVv5 GNSS_INS system to obtain highly accurate ellipsoidally referenced position data to meet ERS specifications for H13708 MBES data from vessels S222 and HSL 2903. The Wide Area Augmentation System was used for real-time horizontal control during data acquisition on vessels S222 and 2903.

Refer to the DAPR for a complete description of horizontal control procedures.

H. Additional Results

Assigned Feature Investigations and Unburied Pipelines

A limited number of assigned feature investigations were completed during the course of acquisition. Reference the Final Feature File included in the submission package for this survey for details.


One segment of unburied pipeline was found and reported following guidance in the 2022 HSSD. Reference the Survey Correspondence for a record of this submission.

I. Approval

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.

The survey data meets or exceeds requirements as set forth in the NOS Hydrographic Surveys Specifications and Deliverables, Field Procedures Manual, Standing and 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 Survey Summary Report.

Approver Name	Title	Date	Signature
Matthew J. Jaskoski, CDR/NOAA	Commanding Officer	09/29/2023	 JASKOSKI.MATTHEW.JACOB. 1275636262 2023.09.29 10:59:37 -04'00'
Sydney M. Catoire, LT/NOAA	Field Operations Officer	09/29/2023	CATOIRE.SYDNEY.M ARIE.1120060623 Digitally signed by CATOIRE.SYDNEY.MARIE.1120060623 Date: 2023.09.29 10:34:29 -04'00'
Erin K. Cziraki	Chief Survey Technician	09/29/2023	CZIRAKI.ERIN.KA YE.1550015338 Digitally signed by CZIRAKI.ERIN.KAYE.1550015338 Date: 2023.09.29 11:43:48 -04'00'
Danielle H. Black	Sheet Manager	09/29/2023	BLACK.DANIELLE.HARBIN.161 6553832 Digitally signed by BLACK.DANIELLE.HARBIN.1616553832 Date: 2023.09.29 11:35:33 -04'00'