H13611

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

DESCRIPTIVE REPORT

Type of Survey:	Navigable Area
Registry Number:	H13611

LOCALITY

State(s):	Pennsylvania
General Locality:	Lake Erie, OH
Sub-locality:	2 NM North of Presque Isle

2022

CHIEF OF PARTY
Matthew J. Jaskoski, CDR/NOAA

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Date:

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

REGISTRY NUMBER:

HYDROGRAPHIC TITLE SHEET

H13611

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):	**Pennsylvania**
General Locality:	**Lake Erie, OH**
Sub-Locality:	**2 NM North of Presque Isle**
Scale:	**5000**
Dates of Survey:	**07/05/2022 to 08/15/2022**
Instructions Dated:	**07/01/2022**
Project Number:	**OPR-W386-TJ-22**
Field Unit:	**NOAA Ship *Thomas Jefferson***
Chief of Party:	**Matthew J. Jaskoski, CDR/NOAA**
Soundings by:	**Multibeam Echo Sounder**
Imagery by:	**Multibeam Echo Sounder Backscatter**
Verification by:	**Atlantic Hydrographic Branch**
Soundings Acquired in:	**meters at Low Water Datum IGLD-1985**

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 17N, LWD - IGLD 1985. 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 H13611

Project: OPR-W386-TJ-22

Locality: Lake Erie, OH

Sublocality: 2 NM North of Presque Isle

Scale: 1:5000

July 2022 - August 2022

NOAA Ship *Thomas Jefferson*

Chief of Party: Matthew J. Jaskoski, CDR/NOAA

A. Area Surveyed

Survey H13611, located in Lake Erie within the sub locality of 2 NM North of Presque Isle, PA, was conducted in accordance with coverage requirements set forth in the Project Instructions OPR-W386-TJ-22 (Figures 1 and 2).

A.1 Survey Limits

Data were acquired within the following survey limits:

Northwest Limit	Southeast Limit
42° 13' 27.51" N 80° 24' 33.46" W	42° 5' 49.44" N 80° 2' 44.05" W

Table 1: Survey Limits

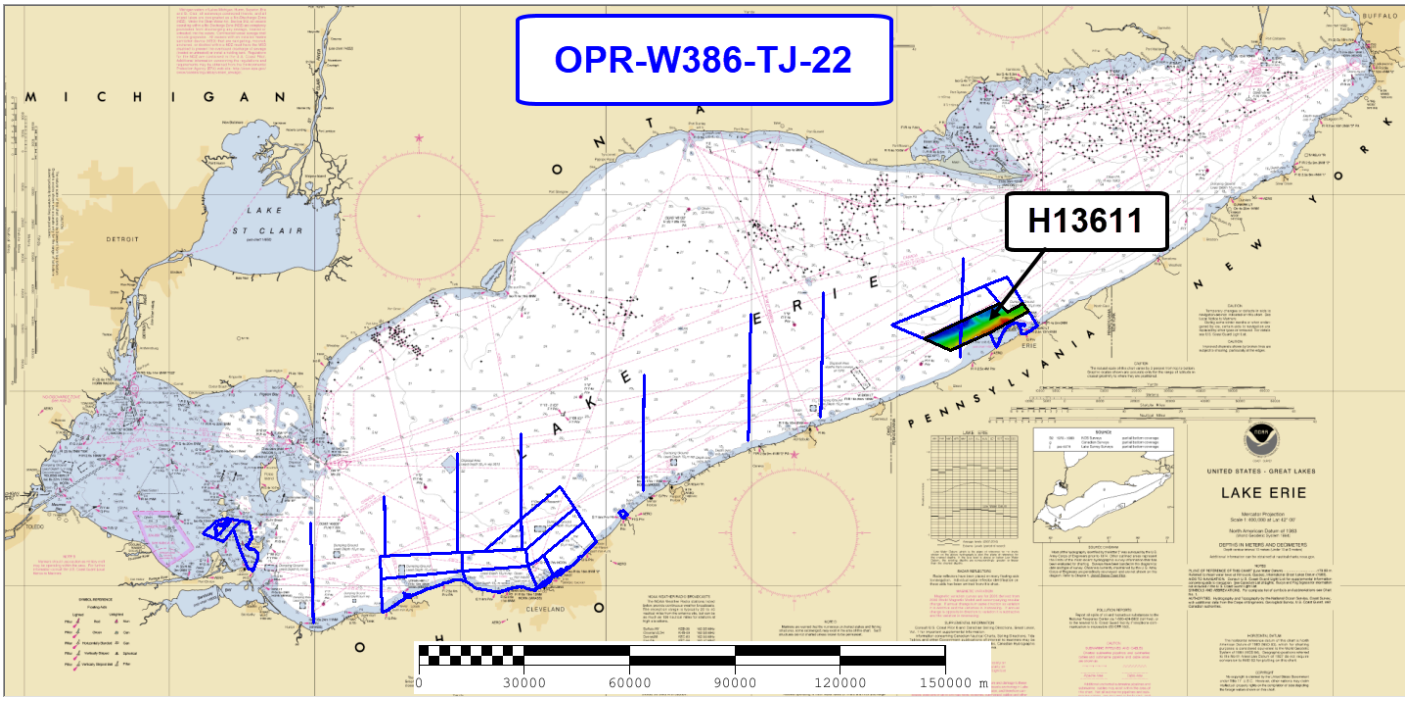


Figure 1: Location of H13611, outlined in black, within Lake Erie. Other assigned sheet limits for Project OPR-W386-TJ-22 outlined in blue over RNC 14820.

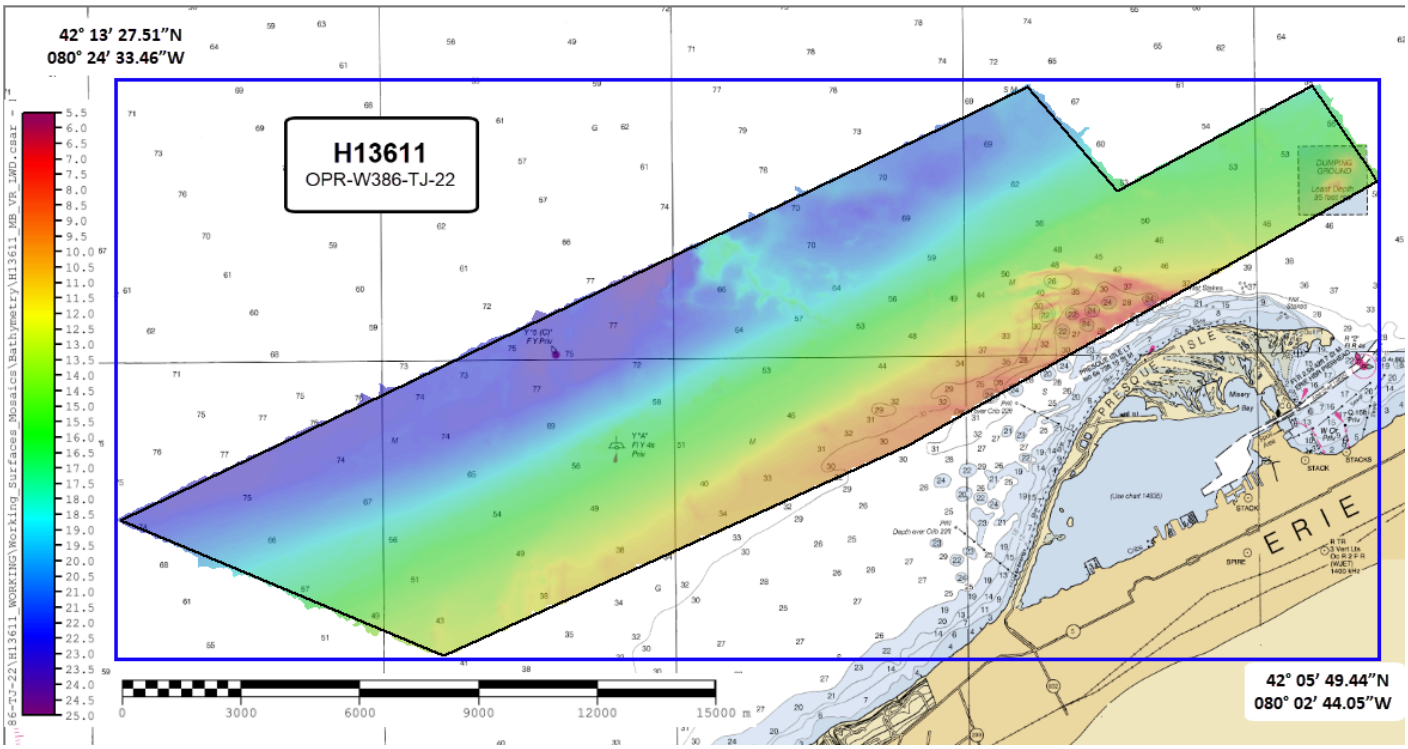


Figure 2: Survey layout for H13611, plotted over RNC 14824. The solid black outline represents the survey limits set forth by the Project Instructions. Multibeam coverage shown in color.

Survey data were acquired in accordance with the requirements set forth by the Project Instructions (PI) and the 2022 Hydrographic Surveys Specifications and Deliverables (HSSD). The assigned survey area covered approximately 44 square nautical miles.

A.2 Survey Purpose

Erie is Pennsylvania's primary port for accessing Lake Erie and the St. Lawrence Seaway. Erie, PA is occasionally used by container ships, tankers, barges, and other large shipping vessels. It also boasts a robust sailing and fishing community, scenic beauty, biodiversity, and historical connections.

This area was identified as a statistically significant hotspot within the 2018 Hydrographic Health Model, a risk model that Coast Survey uses for evaluating priorities based upon navigational risk and the necessary quality of data to support modern traffic.

The modern bathymetric survey in this area will not only identify hazards and changes to the lake bed, but will update National Ocean Service (NOS) nautical charting products and support Erie County's Lake Erie Quadrangle nomination for National Marine Sanctuary designation.

https://www.sail-world.com/Australia/Erie-Pennsylvania-Small-place-big-boating/-127219?
https://en.wikipedia.org/wiki/Economy_of_Erie,_Pennsylvania

A.3 Survey Quality

The entire survey is adequate to supersede previous data.

Data acquired in H13611 meet multibeam echo sounder (MBES) coverage requirements for complete coverage, as required by the 2022 HSSD. This includes crosslines (see section B.2.1), NOAA allowable uncertainty (see Section B.2.10), and density requirements (see Section B.5.2).

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.	Complete Coverage (Refer to the HSSD Section 5.2.2.3)
All waters in survey area.	Acquire backscatter data during all multibeam data acquisition (Refer to the HSSD Section 6.2)

Table 2: Survey Coverage

Survey coverage is in accordance with requirements listed in section 5.2.2 of the 2022 HSSD. Coverage requirements were met with 100% complete coverage MBES (Figure 3).

Two holidays exist in the 100% complete coverage MBES achieved for H13611. Both are located on the southern sheet edge outside of the assigned survey limits. One holiday is completely covered by MBES from junctioning sheet H13610 and no significant features or shoaling were observed in the area (Figure 4). The second holiday does not have coverage from a junctioning survey (Figure 5). While there is no guarantee of the absence of significant features, the hydrographer does not see evidence of hazardous shoaling based on trends in the surrounding bathymetry.

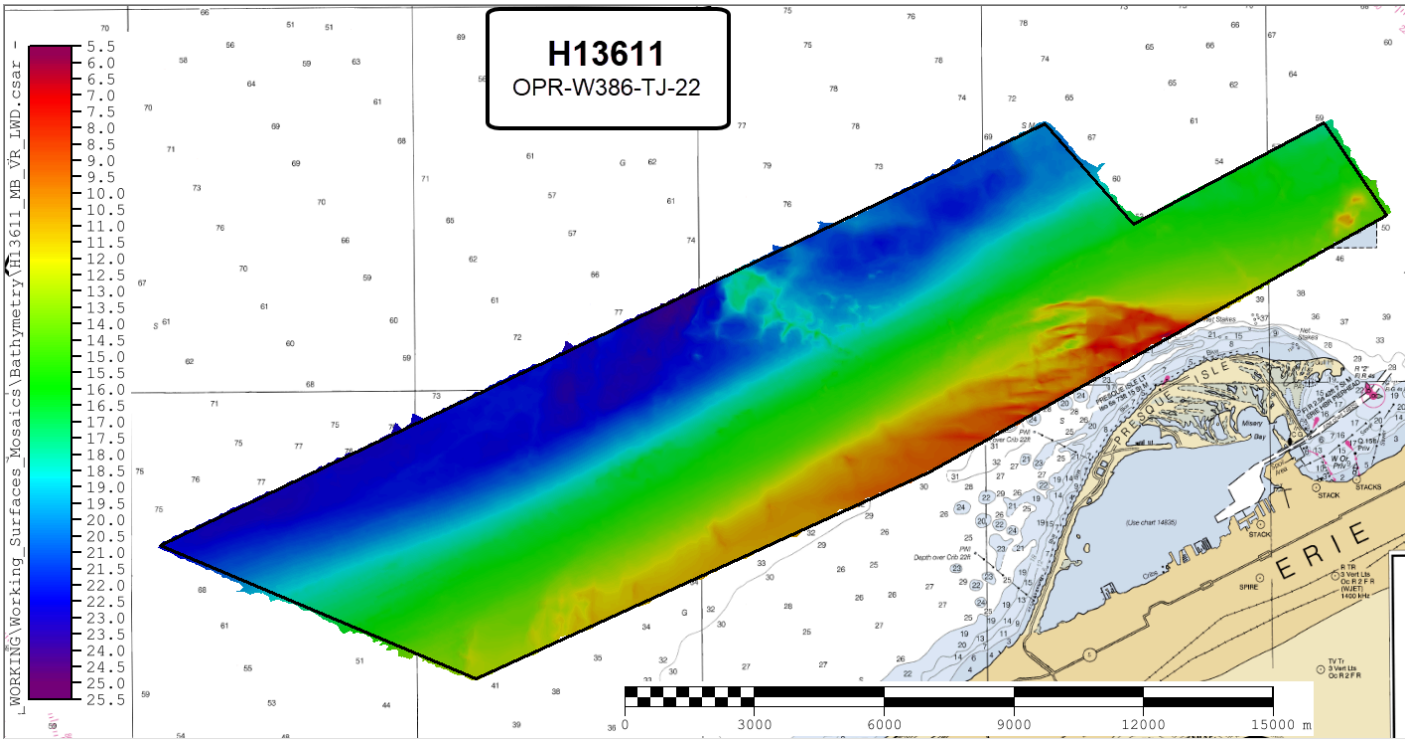


Figure 3: MBES coverage achieved for H13611 shown in color overlaid on RNC 14824. The black outline represents the assigned survey limits.

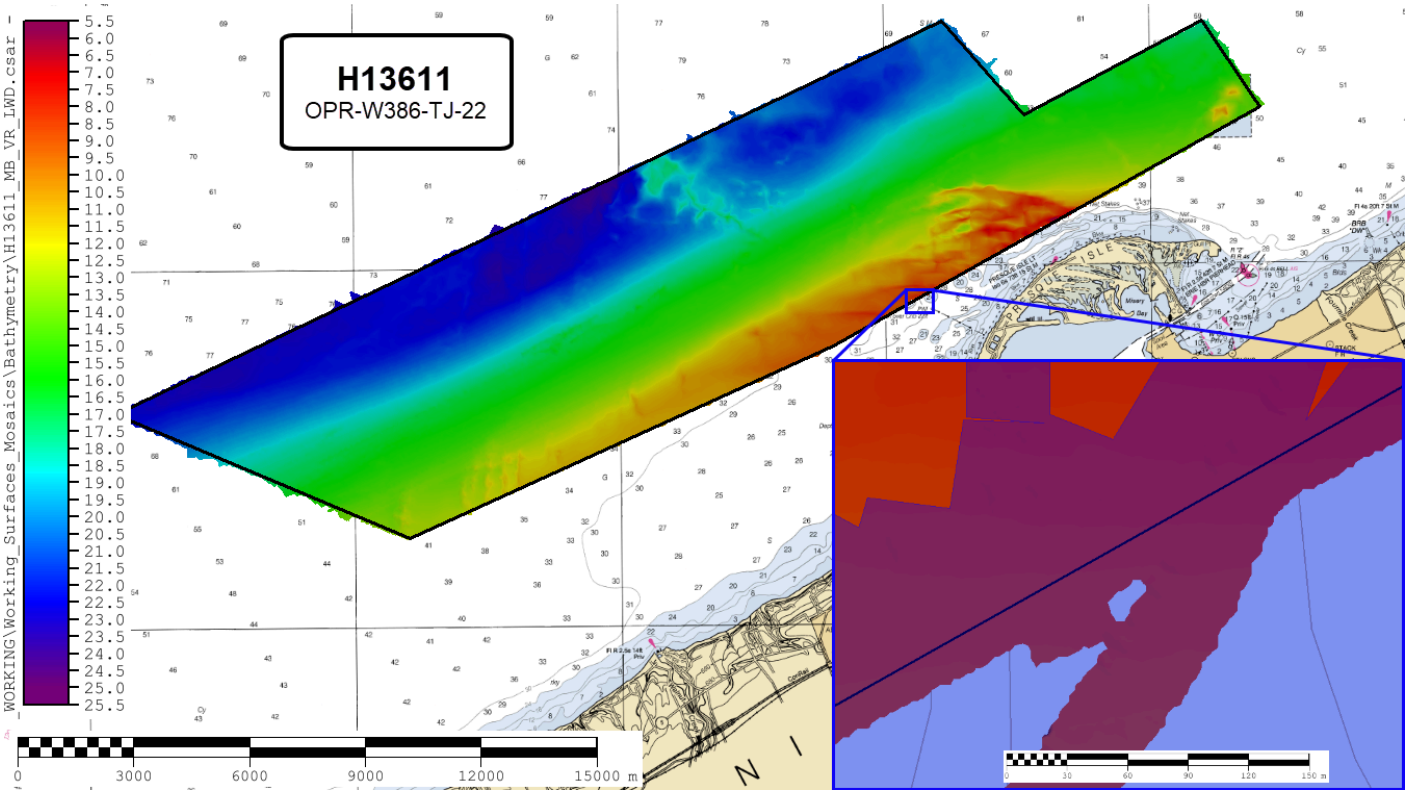


Figure 4: Holiday outside of sheet limits, located at 42° 09' 31.27"N 080° 09' 23.98"W, with coverage from junctioning sheet H13610 overlaid in transparent blue.

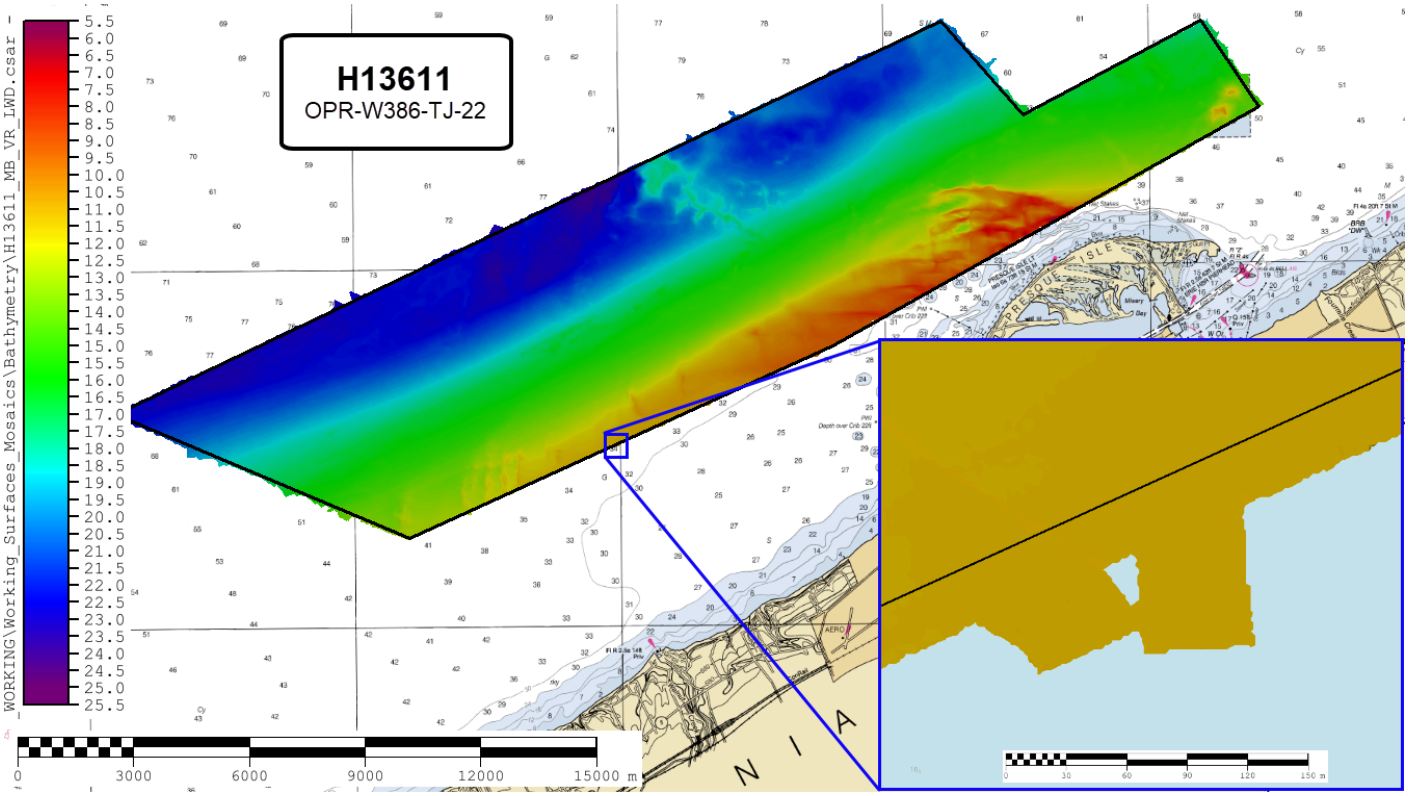


Figure 5: Holiday outside of sheet limits, located at 42° 07' 31.23"N 080° 15' 03.80"W, without coverage from an adjoining sheet.

A.6 Survey Statistics

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

	HULL ID	*S-222*	*2903*	*Total*
LNM	**SBES Mainscheme**	0.0	0.0	0.0
	MBES Mainscheme	1545.23	619.28	2164.51
	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	52.87	34.99	87.86
	Lidar Crosslines	0.0	0.0	0.0
Number of Bottom Samples				9
Number Maritime Boundary Points Investigated				0
Number of DPs				0
Number of Items Investigated by Dive Ops				0
Total SNM				44.56

Table 3: Hydrographic Survey Statistics

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

Survey Dates	Day of the Year
07/05/2022	186
07/06/2022	187

Survey Dates	Day of the Year
07/07/2022	188
07/08/2022	189
07/09/2022	190
07/10/2022	191
07/11/2022	192
07/12/2022	193
07/13/2022	194
07/14/2022	195
07/15/2022	196
07/20/2022	201
07/28/2022	209
07/26/2022	207
07/27/2022	208
07/28/2022	209
07/29/2022	210
07/30/2022	211
08/02/2022	214
08/09/2022	221
08/10/2022	222
08/11/2022	223
08/12/2022	224
08/13/2022	225
08/14/2022	226
08/15/2022	227

Table 4: Dates of Hydrography

Data acquisition for survey H13611 occurred over 26 days from July 5, 2022 until August 15, 2022. A total of nine bottom samples were collected on July 30, 2022 and August 12, 2022.

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	***S-222***	***2903***
LOA	63.3 meters	8.5 meters
Draft	4.6 meters	1.2 meters

Table 5: Vessels Used

Figure 6: NOAA ship Thomas Jefferson

Figure 7: Hydrographic Survey Launch 2903

B.1.2 Equipment

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

Manufacturer	Model	Type
Applanix	POS MV 320 v5	Positioning and Attitude System
Kongsberg Maritime	EM 2040	MBES
Kongsberg Maritime	EM 2040	MBES Backscatter
AML Oceanographic	MVP200	Sound Speed System
AML Oceanographic	MVP-X	Conductivity, Temperature, and Depth Sensor
Valeport	Thru-Hull SVS	Sound Speed System
Teledyne RESON	SVP 70	Sound Speed System
Sea-Bird Scientific	SBE 19plus V2	Conductivity, Temperature, and Depth Sensor

Table 6: Major Systems Used

Vessel configurations, equipment operations, data acquisition, and processing were consistent with specifications described in the DAPR.

B.2 Quality Control

B.2.1 Crosslines

S-222 and 2903 collected a total of 87.86 linear nautical miles of MBES crosslines, or 4.06% of mainscheme MBES data. The crosslines acquired represent good spatial and depth diversity for this survey area (Figure 8).

A variable resolution Combined Uncertainty and Bathymetry Estimator (CUBE) surface of mainscheme data and a variable resolution CUBE surface of crossline data were differenced - the resulting mean was 0.01m with a standard deviation of 0.06m (Figure 9). Over 99.5% of nodes are compliant with fraction of allowable error standards (Figure 10). Visual inspection of the difference surface indicated no systematic issues.

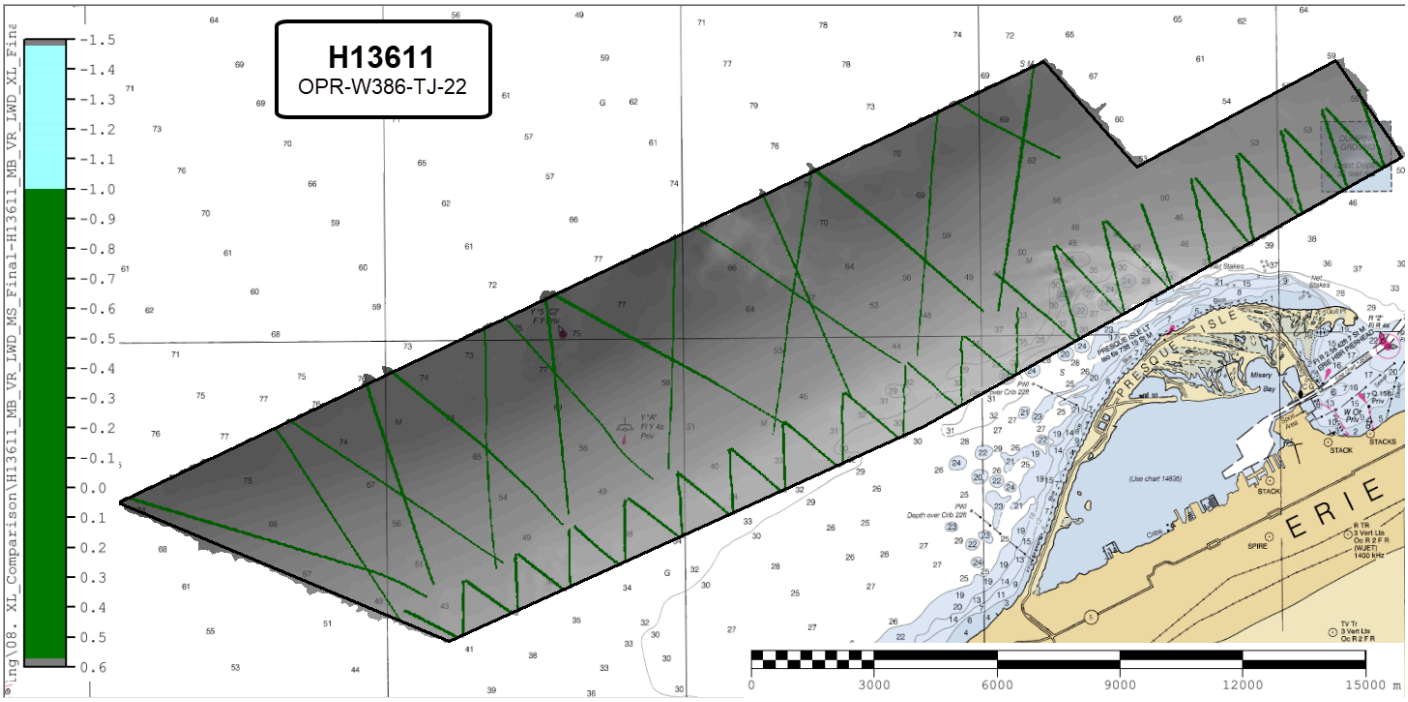
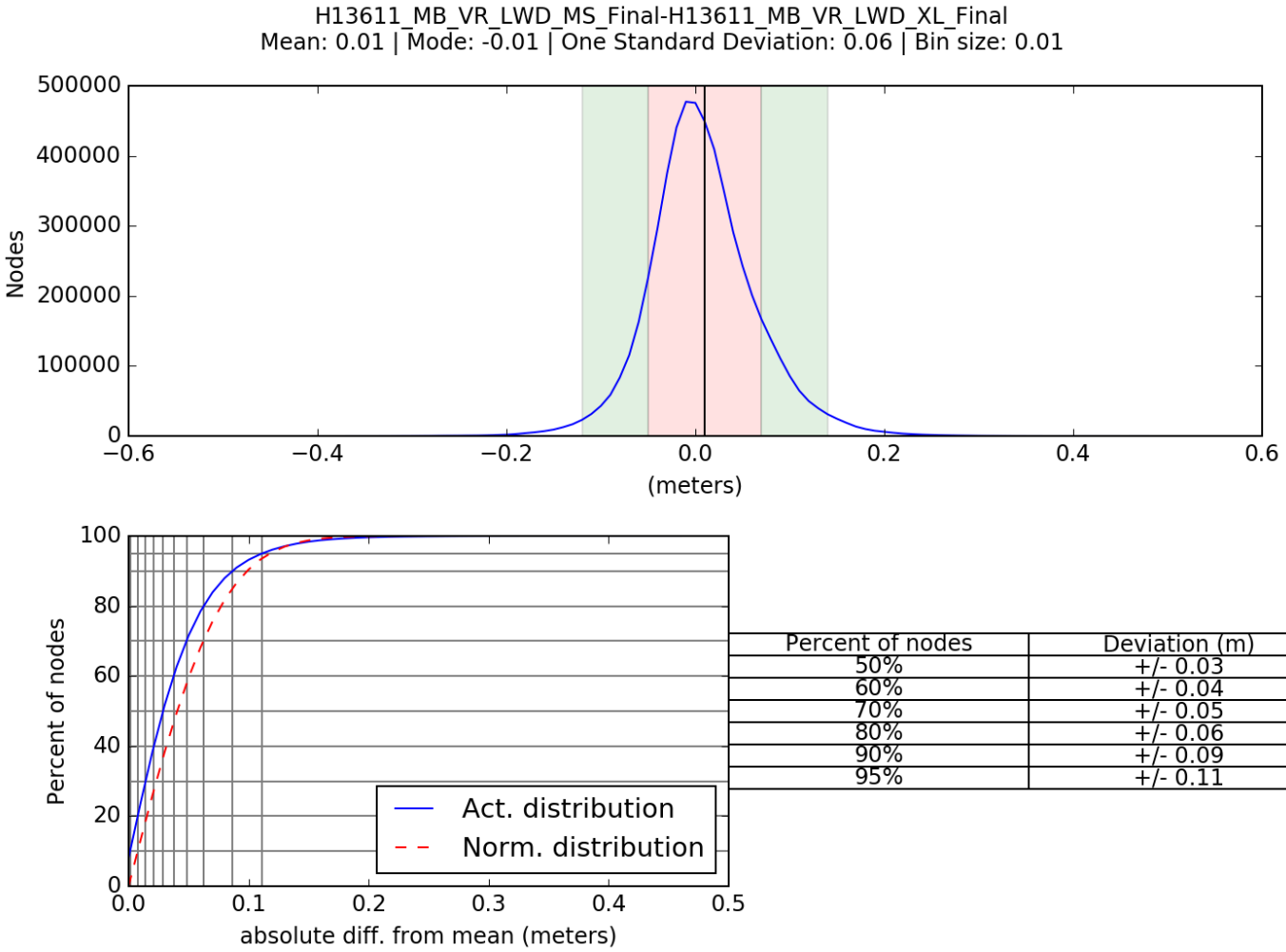


Figure 8: H13611 crossline fraction of allowable error shown in color, overlaid onto survey data shown in greyscale.



Percent of nodes	Deviation (m)
50%	+/- 0.03
60%	+/- 0.04
70%	+/- 0.05
80%	+/- 0.06
90%	+/- 0.09
95%	+/- 0.11

Figure 9: H13611 crossline and mainscheme comparison statistics.

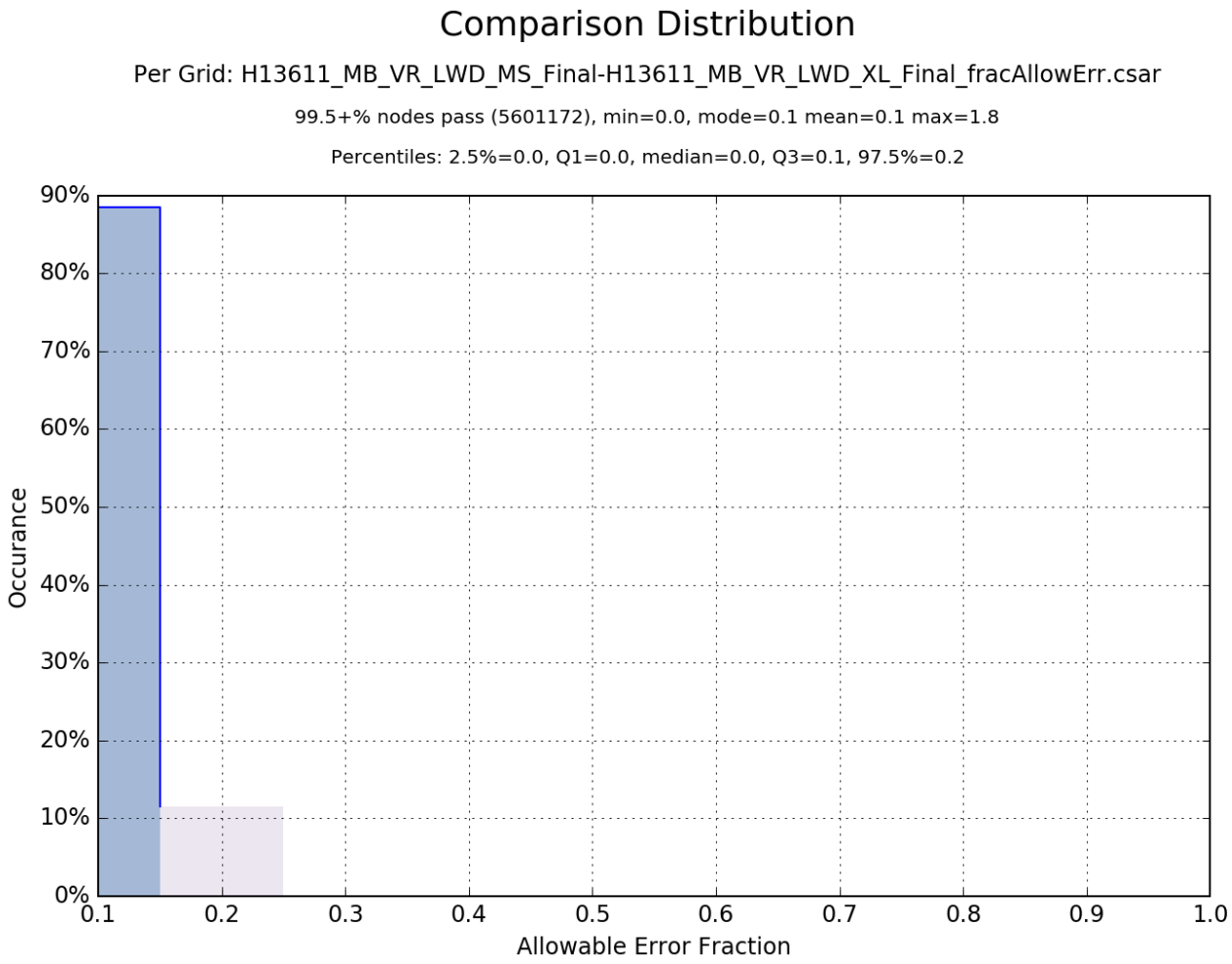


Figure 10: H13611 fraction of allowable error node distribution.

B.2.2 Uncertainty

The following survey specific parameters were used for this survey:

Method	Measured	Zoning
ERS via VDATUM	0.0 meters	0.045 meters

Table 7: Survey Specific Tide TPU Values.

Hull ID	Measured - CTD	Measured - MVP	Measured - XBT	Surface
S-222	N/A	4 meters/second	N/A	0.2 meters/second
2903	4 meters/second	N/A	N/A	0.2 meters/second

Table 8: Survey Specific Sound Speed TPU Values.

The bathymetric surface's uncertainty layer is compliant with 2022 HSSD uncertainty standards. Over 99.5% of all nodes pass uncertainty standards (Figure 11).

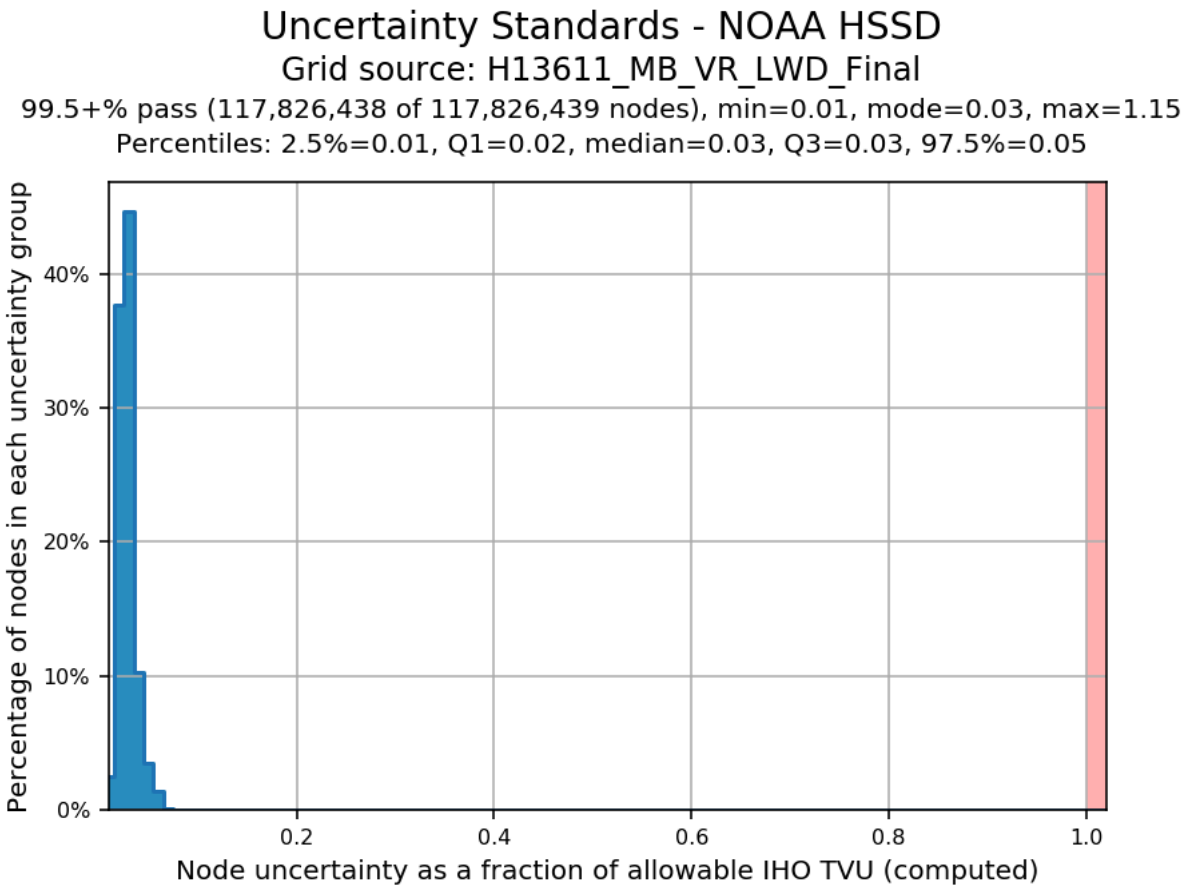


Figure 11: H13611 uncertainty standards.

B.2.3 Junctions

H13611 junctions with three other contemporary surveys within the OPR-W386-TJ-22 project: H13610, H13670, and H13683 (Figure 12).

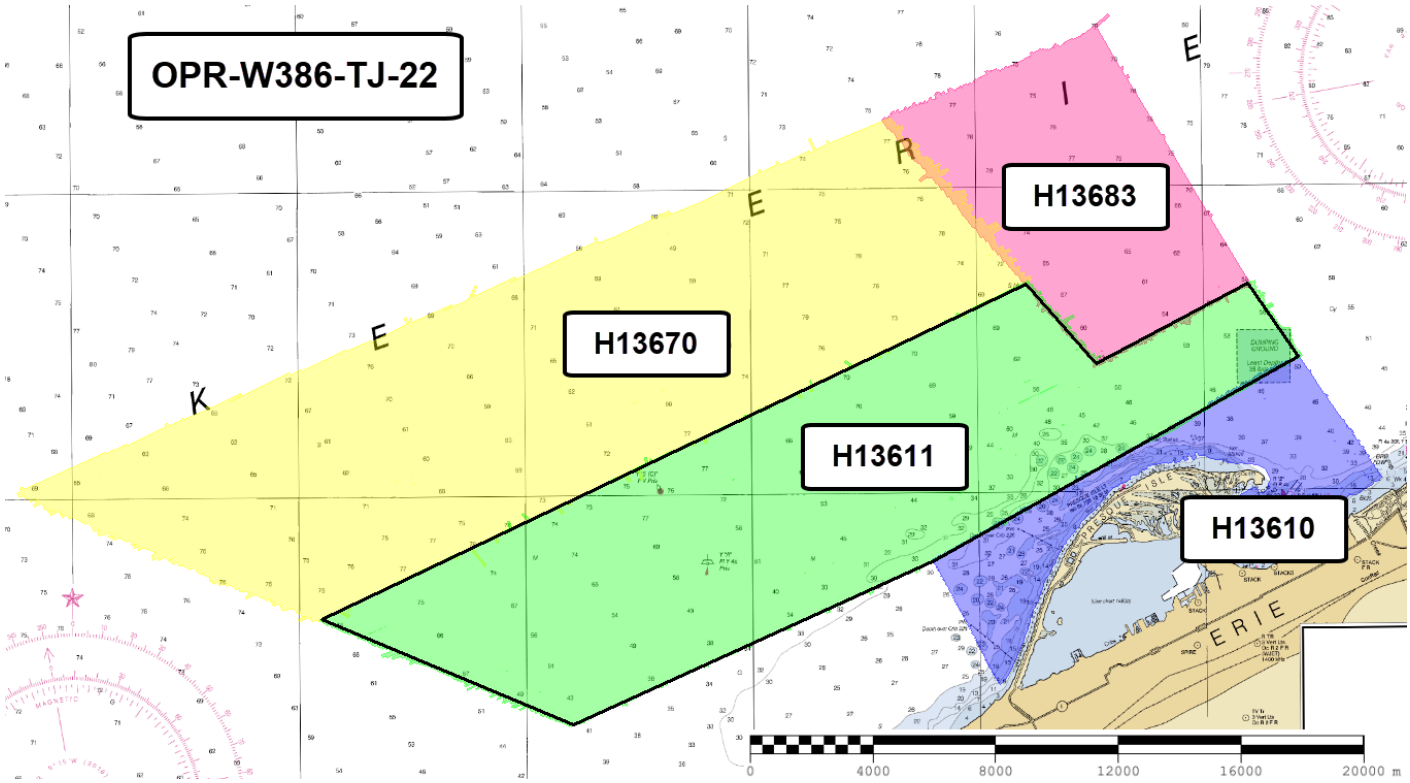


Figure 12: Overview of the relative locations of contemporary surveys that junction with H13611.

The following junctions were made with this survey:

Registry Number	Scale	Year	Field Unit	Relative Location
H13610	1:5000	2022	NOAA ship THOMAS JEFFERSON	SE
H13670	1:40000	2022	NOAA ship THOMAS JEFFERSON	NW
H13683	1:5000	2022	NOAA ship THOMAS JEFFERSON	NE

Table 9: Junctioning Surveys

H13610

Refer to the Descriptive Report for survey H13610 for details regarding the junction analysis.

H13670

The northwestern edge of H13611 junctions with sheet H13670. A variable resolution (VR) CUBE surface of H13611 data and a VR CUBE surface of H13570 data were differenced (Figure 13). The mean difference between bathymetric surface nodes was 0.01m with a standard deviation of 0.07m (Figure 14). 100% of the compared nodes meet fraction of allowable error standards (Figure 15). Statistics and visual inspection indicate that surveys H13611 and H13670 are in general agreement.

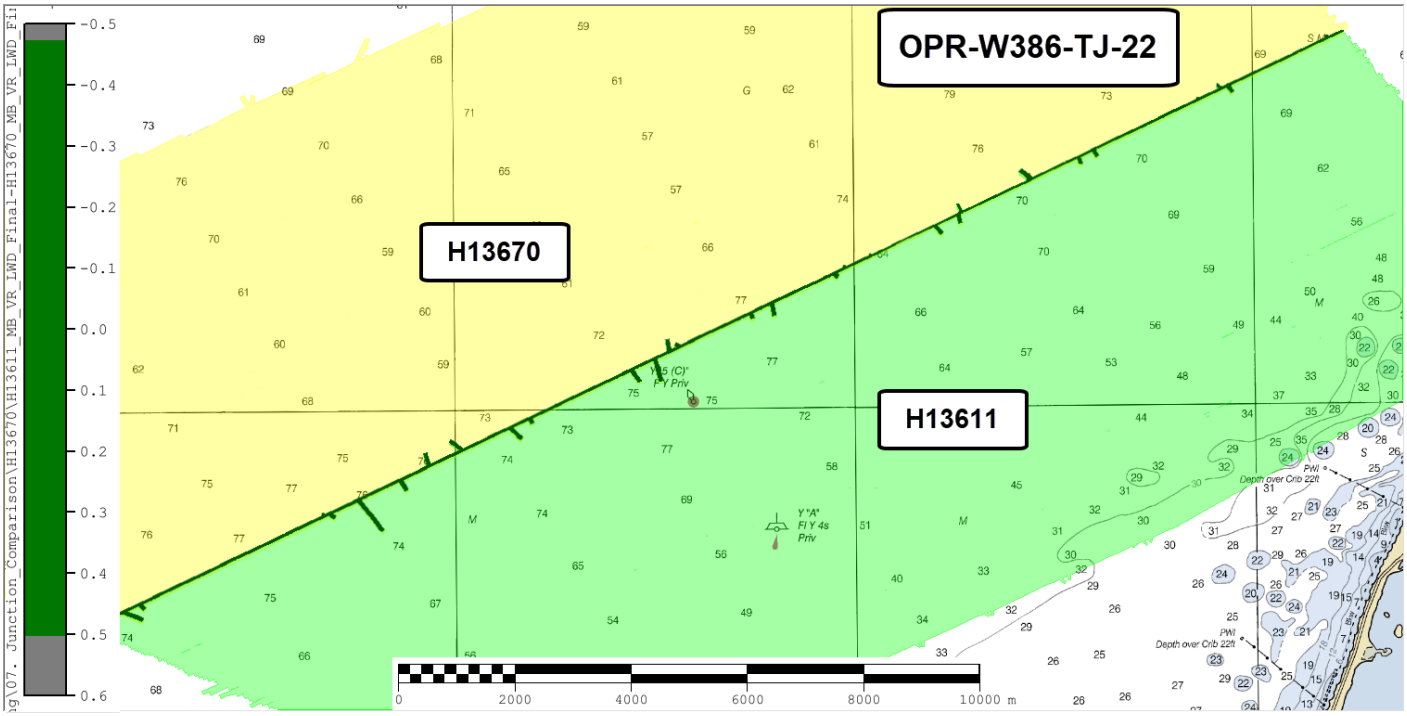
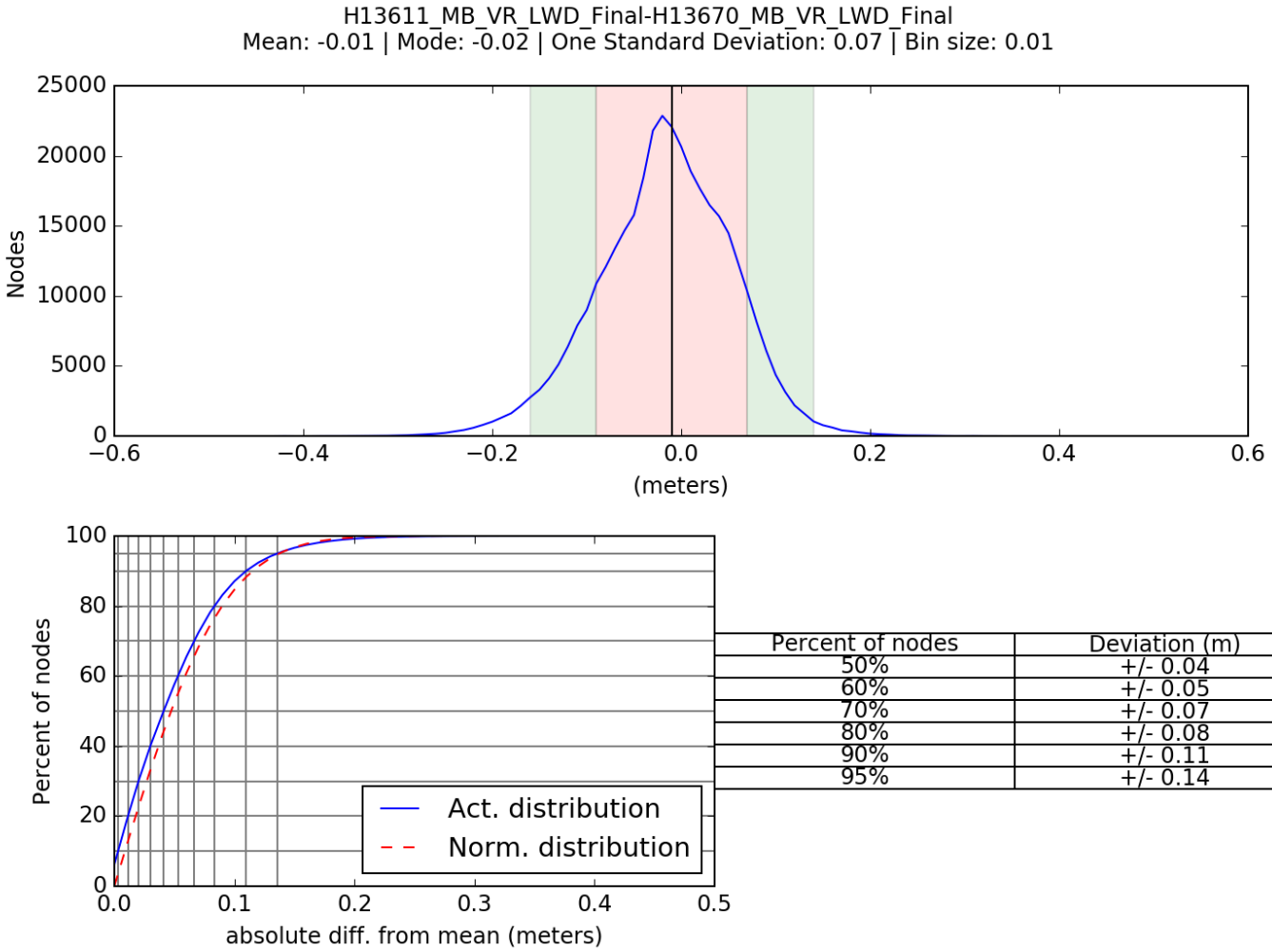


Figure 13: Fraction of allowable error surface difference comparison in color between H13611 and H13670.



Percent of nodes	Deviation (m)
50%	+/- 0.04
60%	+/- 0.05
70%	+/- 0.07
80%	+/- 0.08
90%	+/- 0.11
95%	+/- 0.14

Figure 14: H13611 and H13670 surface difference comparison statistics.

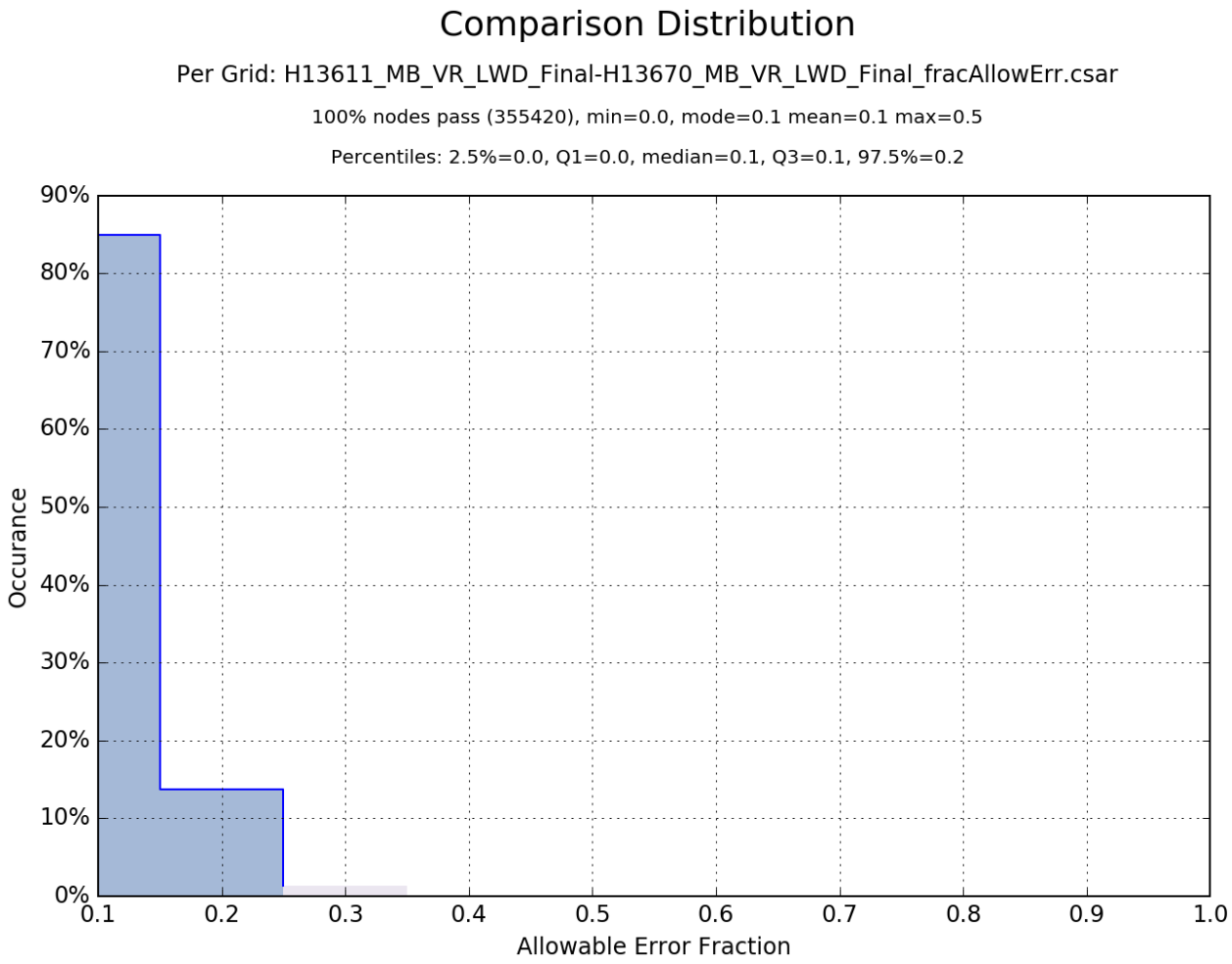


Figure 15: H13511 and H13670 fractional allowable error node distribution comparison stats.

H13683

The northeastern edge of H13611 junctions with sheet H13683. A variable resolution (VR) CUBE surface of H13611 data and a VR CUBE surface of H13583 data were differenced (Figure 16). The mean difference between bathymetric surface nodes was 0.03m with a standard deviation of 0.06m (Figure 17). 100% of the compared nodes meet fraction of allowable error standards (Figure 18). Statistics and visual inspection indicate that surveys H13611 and H13683 are in general agreement.

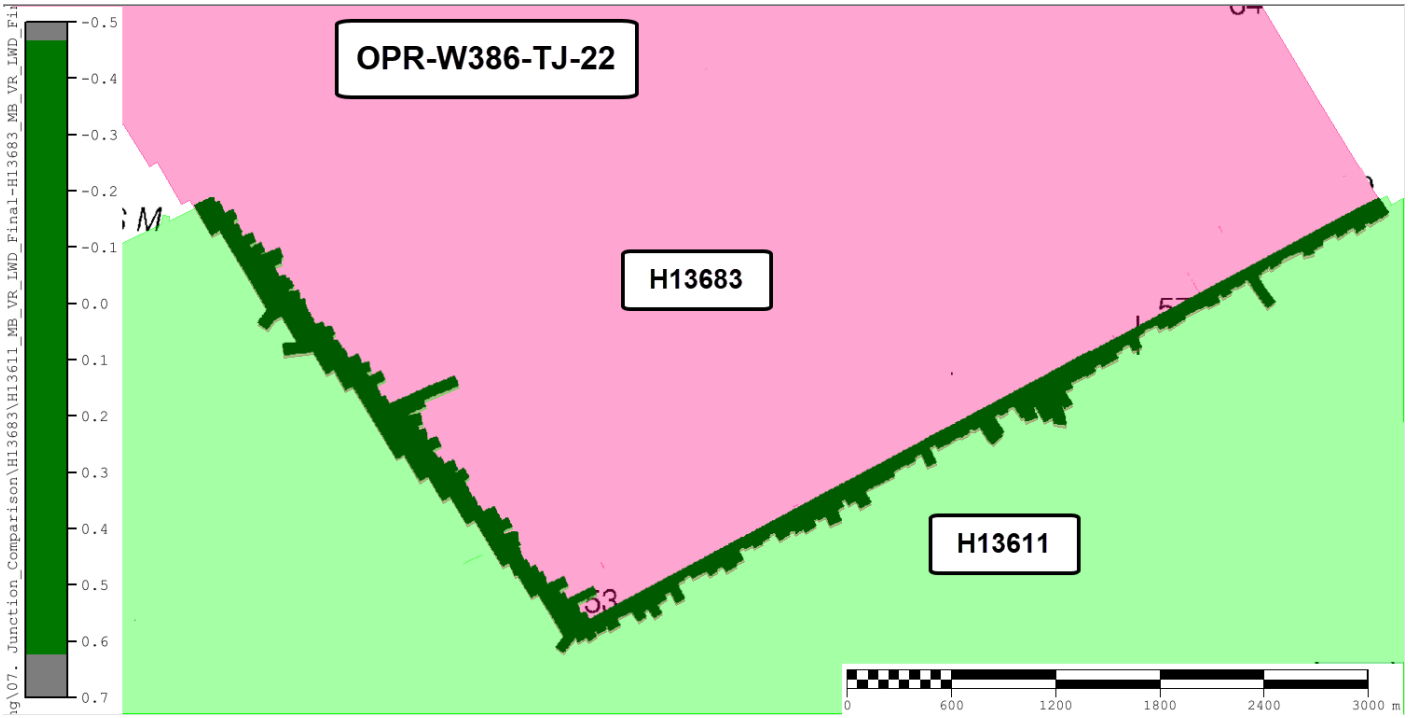
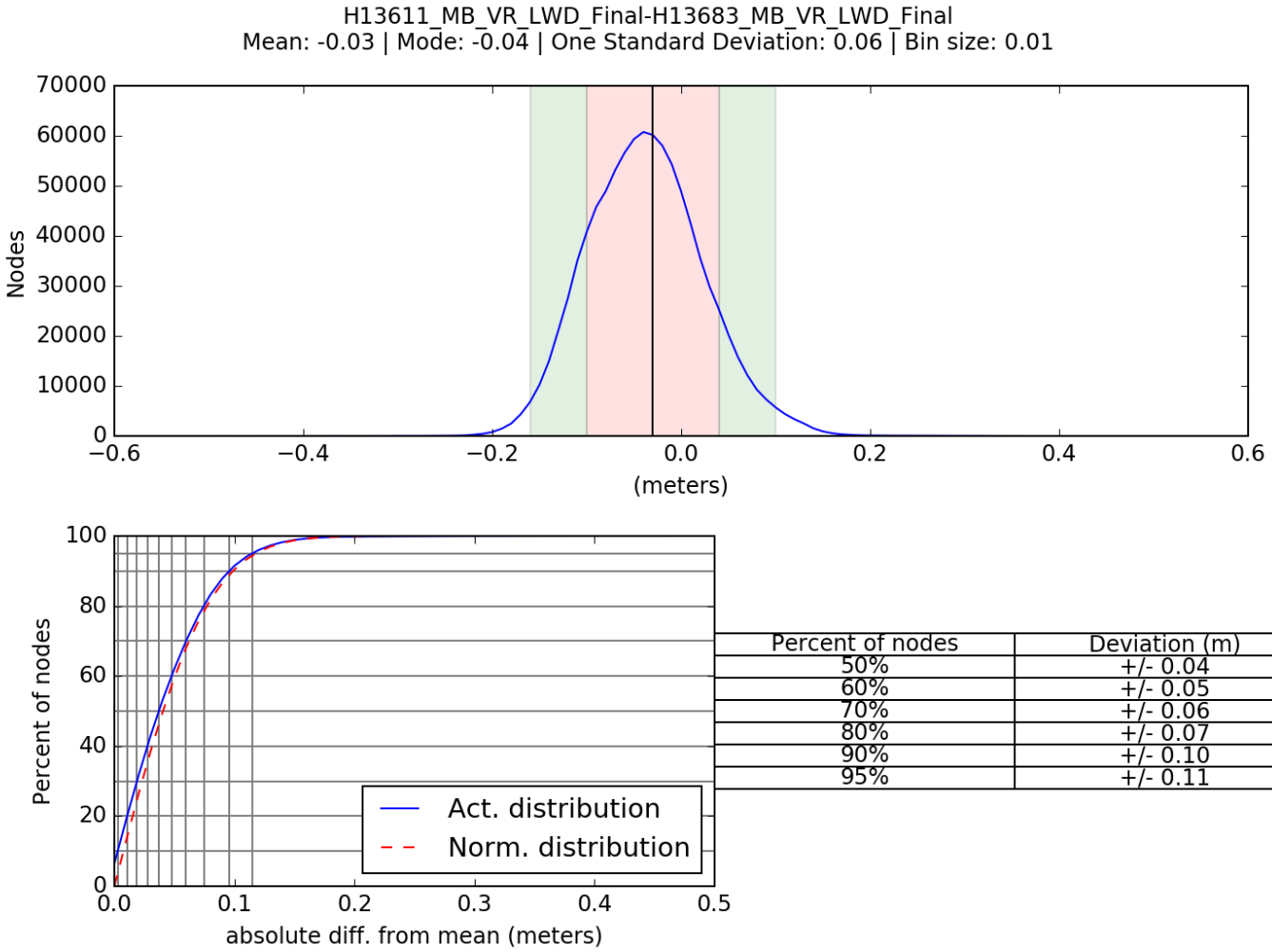


Figure 16: Fraction of allowable error surface difference comparison in color between H13611 and H13683.



Percent of nodes	Deviation (m)
50%	+/- 0.04
60%	+/- 0.05
70%	+/- 0.06
80%	+/- 0.07
90%	+/- 0.10
95%	+/- 0.11

Figure 17: H13611 and H13683 surface difference comparison statistics.

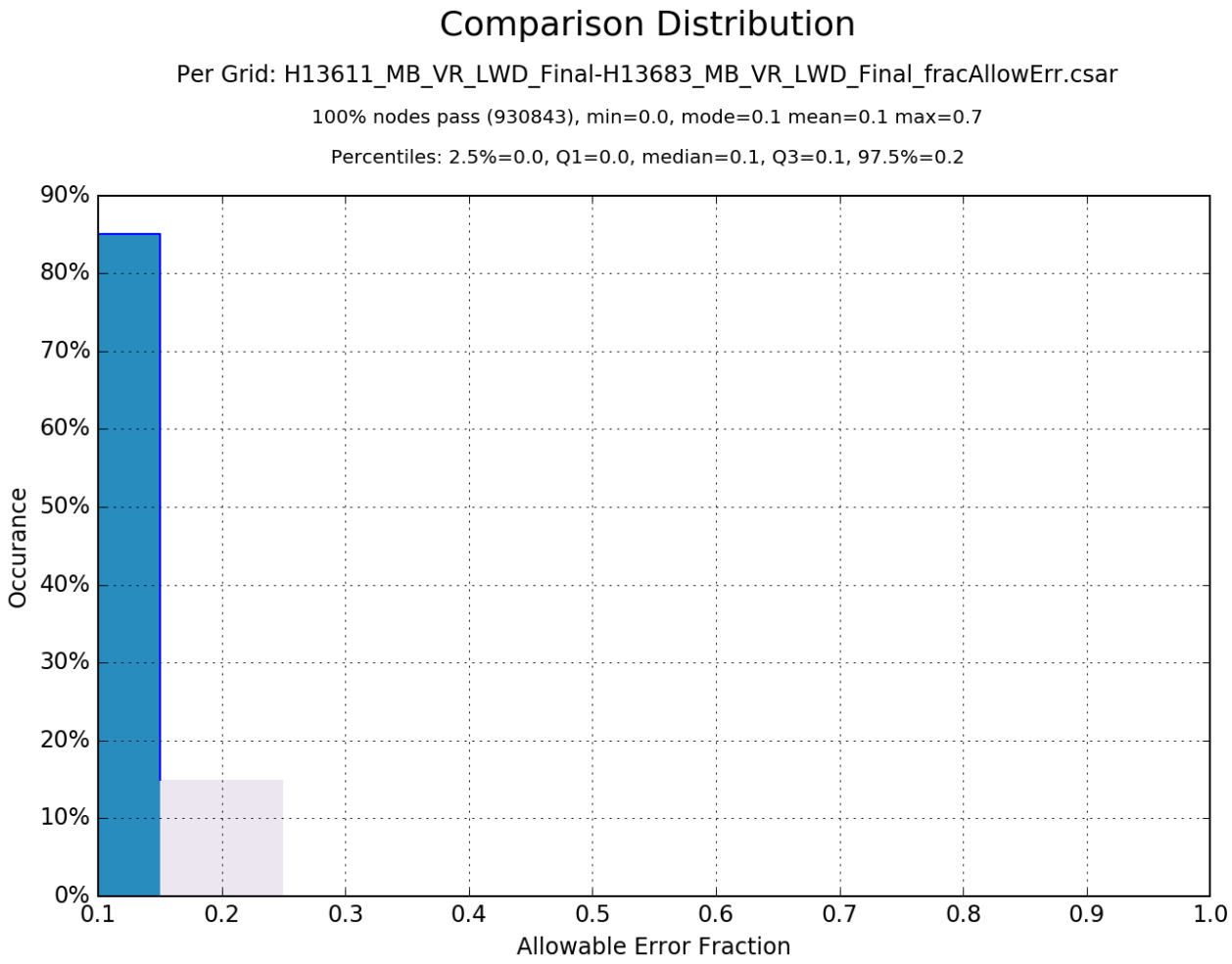


Figure 18: H13511 and H13683 fraction of allowable error node distribution comparison stats.

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

Thermal Stratification

Thermal stratification is a persistent environmental condition encountered in the project area and was present for the duration for the survey. This stratification was identified in the MVP and CTD sound speed profiles (Figure 19) and resulted in varying degrees of refraction of the outer MBES swath. However, this refraction did not result in vertical displacement of soundings that was greater than the maximum allowable total vertical uncertainty (TVU) at any depth (Figure 20). The final delivered surfaces meet NOAA allowable vertical uncertainty parameters from the 2022 HSSD (Figure 11). As such, the data remain sufficient to supersede previous data.

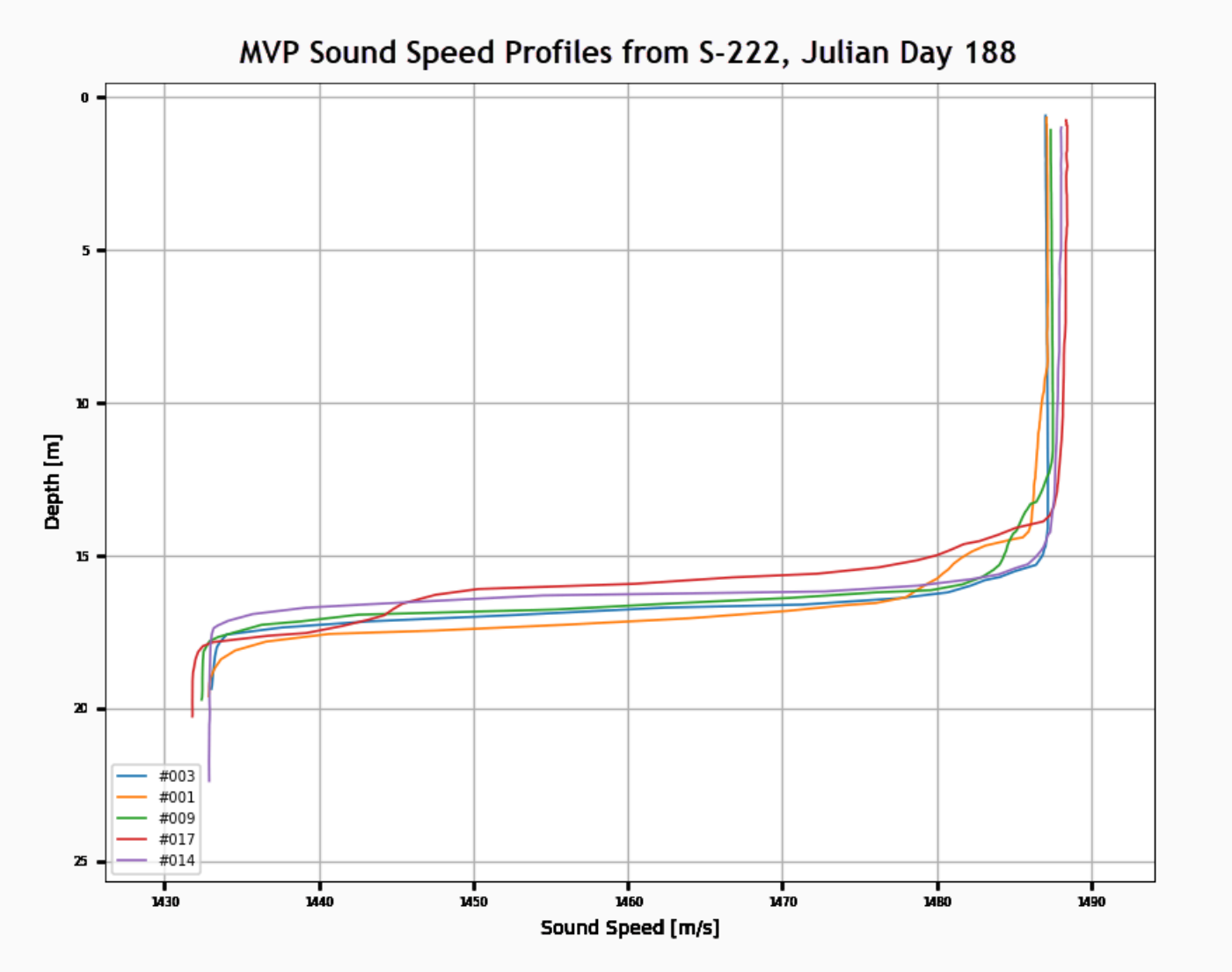


Figure 19: Sound speed profiles from MVP casts that represent typical conditions in the survey area.

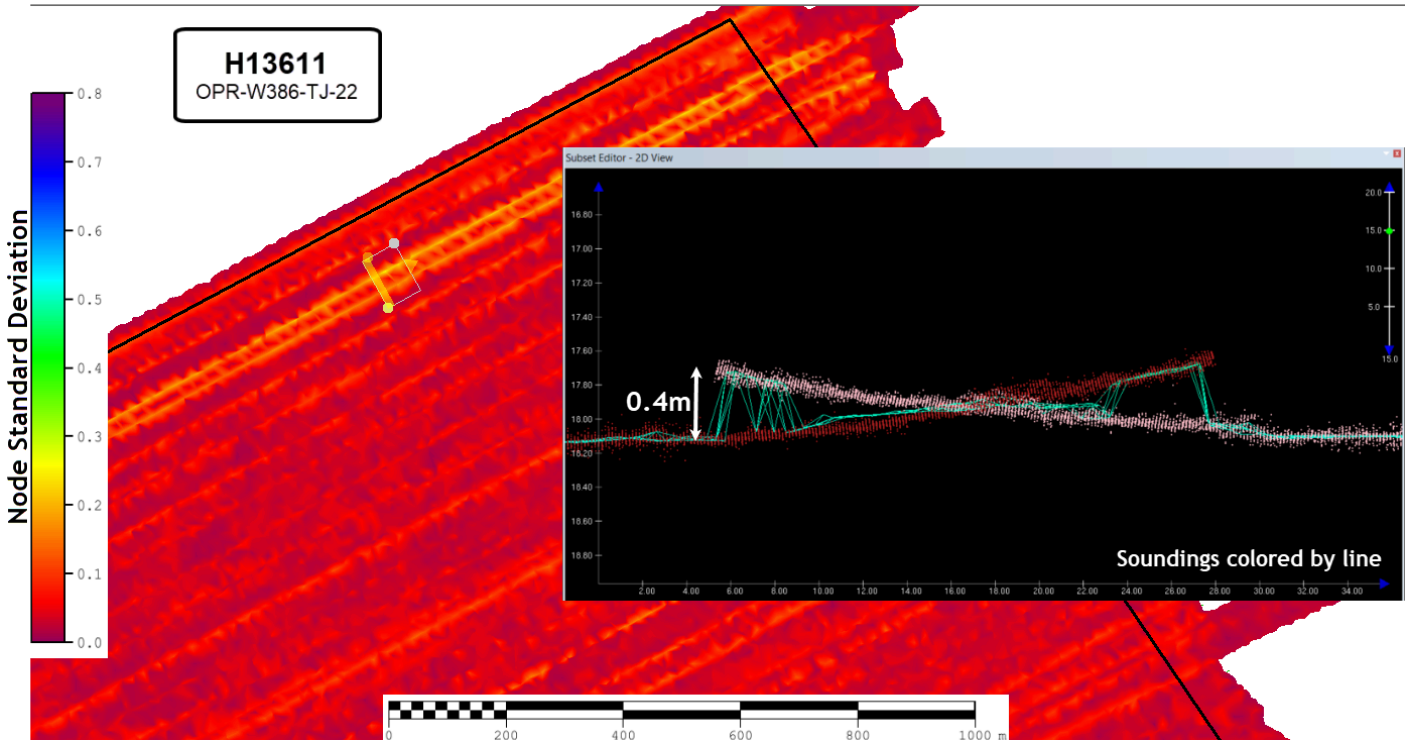


Figure 20: 2D view of survey data showing upturn in the outer swath likely caused by sound speed issues. 2D view exaggeration 15x.

B.2.7 Sound Speed Methods

Sound Speed Cast Frequency: A sound speed profile was acquired at the beginning of each acquisition day and at least once every four hours thereafter. MVP casts on S-222 were collected approximately every hour and targeted to deeper areas of the sheet in order to fully sample the thermocline. CTD casts on 2903 were collected approximately every two to three hours. All sound speed methods were used as detailed in the DAPR.

A total of 233 sound speed profiles were collected as part of acquisition of H13611 and display good spatial diversity (Figure 21). Twenty of these profiles were collected outside of the assigned survey limits but not more than 350m away. The casts display profiles representative of the survey area and have been retained for data processing. All sound speed profile data were concatenated into a master file for the sheet. MBES data were corrected by applying profiles nearest in distance in time (4 hours) using this master file.

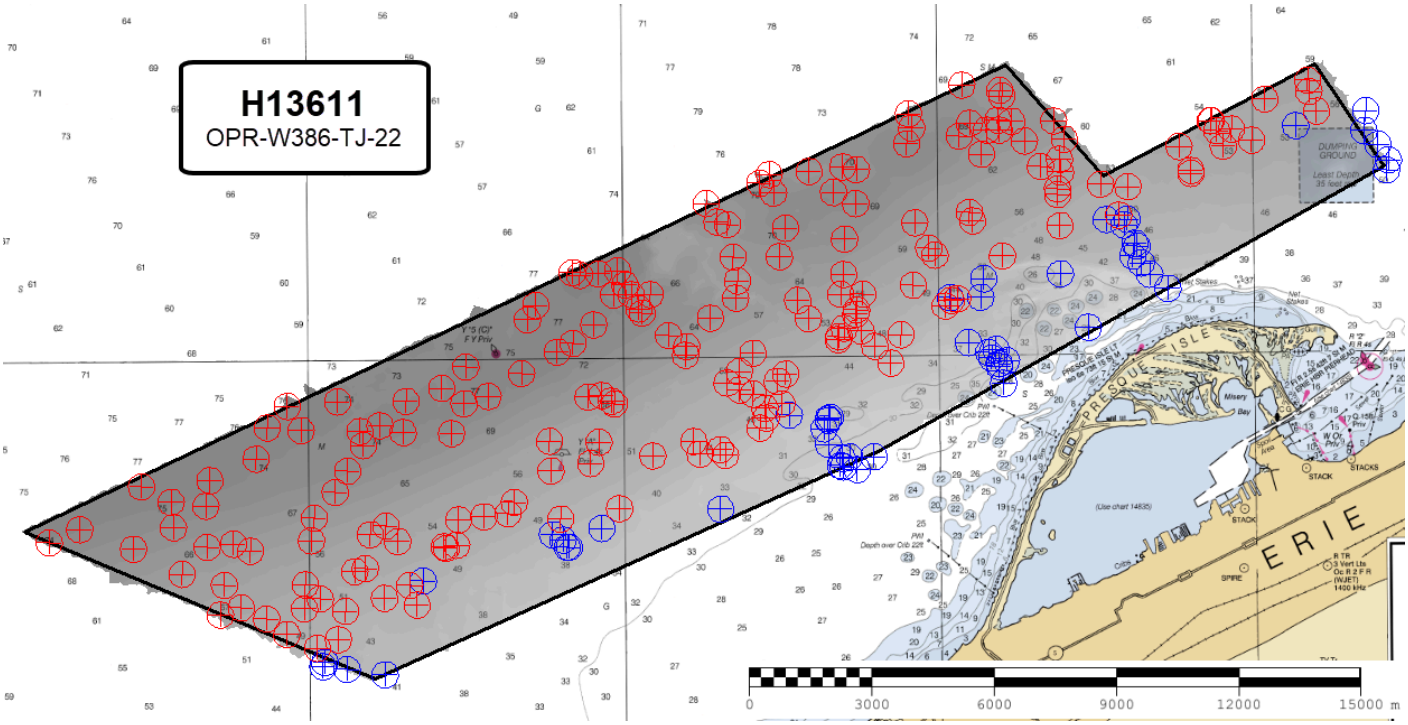


Figure 21: Overview of H13611 sound speed profile locations plotted over greyscale MBES coverage. Profiles collected by S-222 shown as red targets, profiles collected by 2903 shown as blue targets.

B.2.8 Coverage Equipment and Methods

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

B.3 Echo Sounding Corrections

B.3.1 Corrections to Echo Soundings

On Julian Day 209, HSL 2903's Applanix POS/MV positioning and attitude system experienced IMU data gaps that resulted in the inability to apply Delayed Heave using procedures outlined in the DAPR. The affected survey lines were removed from the project and re-acquired. However, during post-acquistion processing QC review, one line was found to not have Delayed Heave applied (line 0131_20220728_163417_2903_EM2040, Figure 22). Further investigation of POS data revealed an IMU data gap of 292 seconds for a period of time covering the line. This problem was not identified until after the field unit had departed the area, so the line was not able to be re-acquired. Inspection of the data and of the surface revealed no vertical offsets being present with the absence of Delayed Heave. The line was re-processed allowing a time gap of 293 seconds which successfully applied Delayed Heave to the rest of the line. The line has been retained as part of the final delivered surfaces so as not to create a holiday.

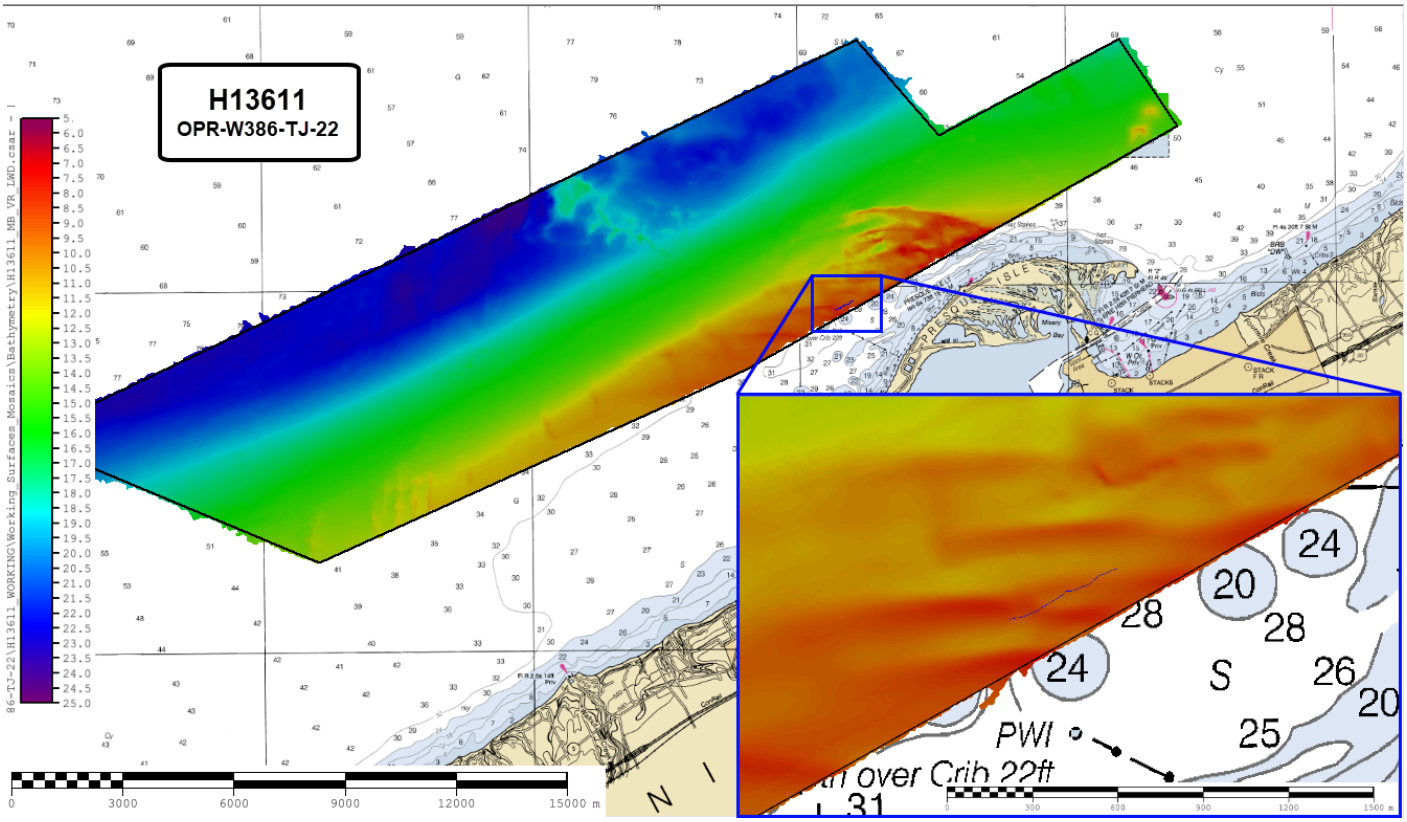


Figure 22: Location of line 0131_20220728_163417_2903_EM2040 acquired on Julian Day 209 by HSL 2903.

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. Raw MBES backscatter was flagged as part of the .all file from the Kongsberg EM2040 systems. Backscatter was processed in the QPS Fledermaus GeoCoder Toolbox (FMGT) software, and the exported geotiffs are included in the final processed data submission package (Figures 23, 24, and 25).

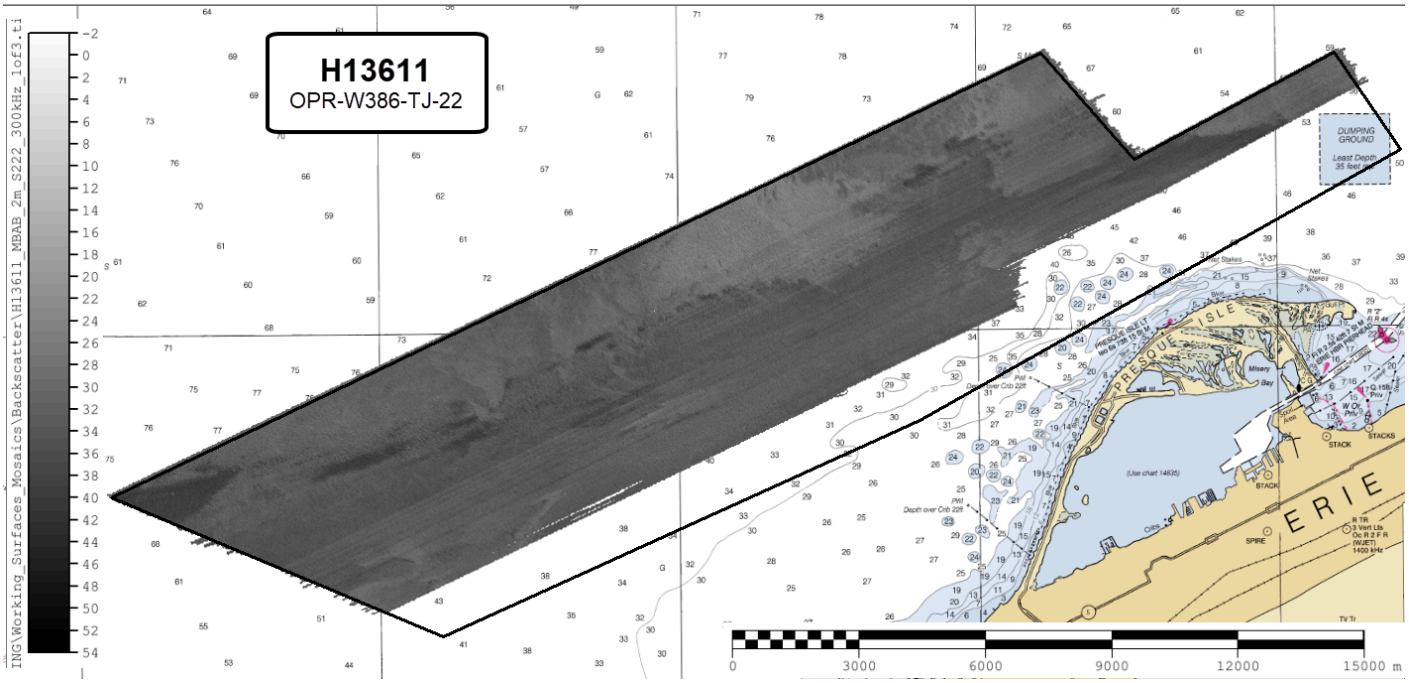


Figure 23: 300kHz backscatter mosaic from data acquired by S-222.

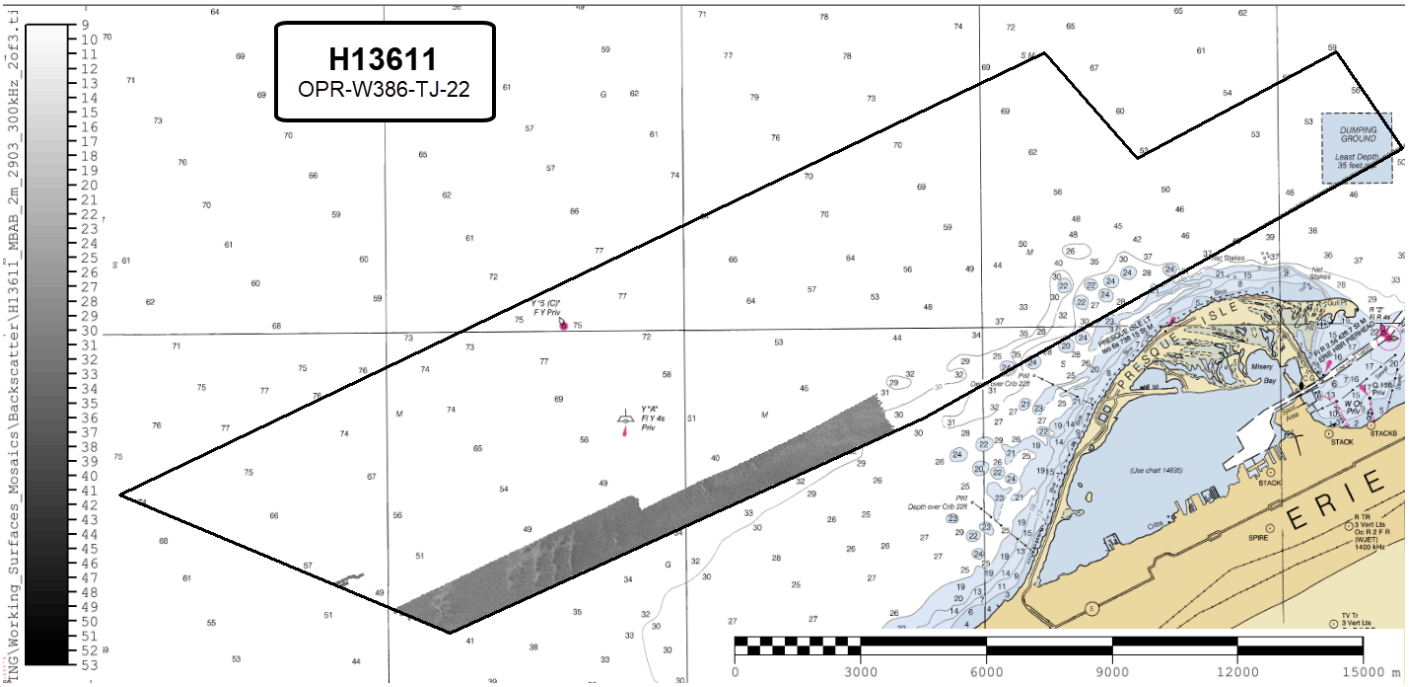


Figure 24: 300kHz backscatter mosaic from data acquired by 2903.

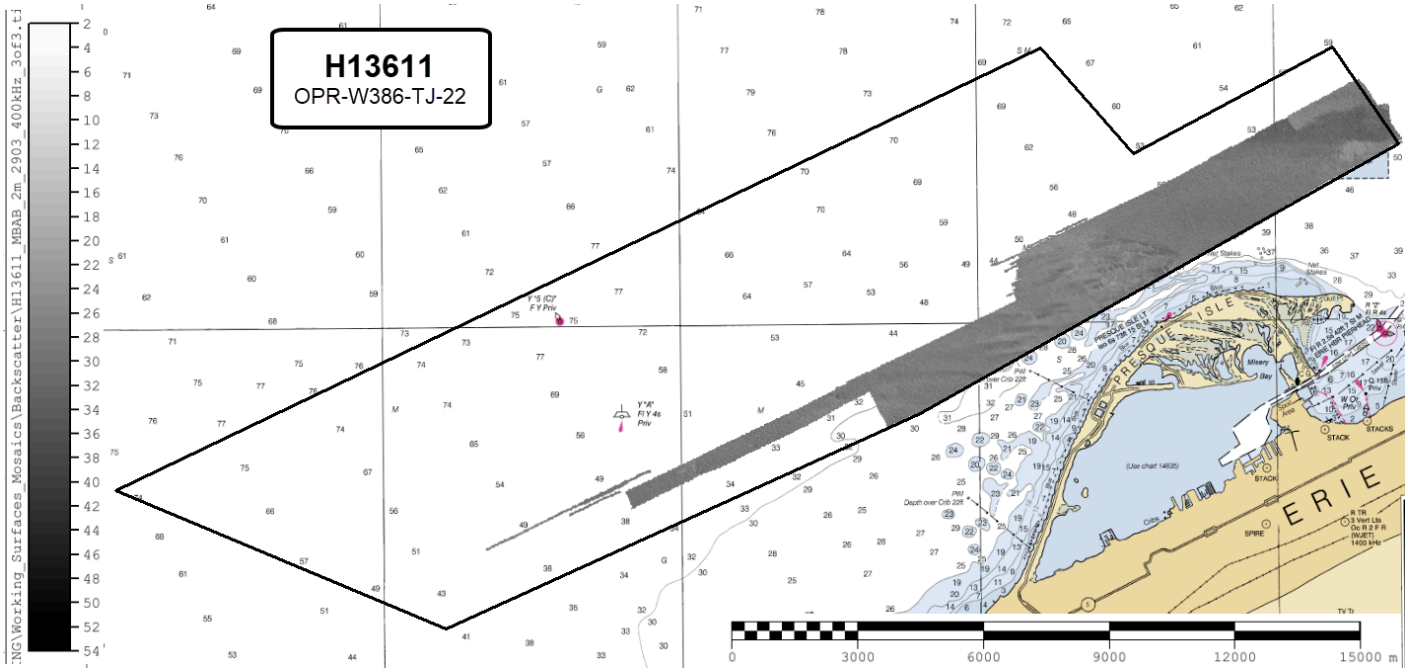


Figure 25: 400kHz backscatter mosaic from data acquired by 2903.

B.5 Data Processing

B.5.1 Primary Data Processing Software

The following Feature Object Catalog was used: NOAA Profile Version 2022.

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
H13611_MB_VR_LWD	CARIS VR Surface (CUBE)	Variable Resolution	5.72 meters - 24.97 meters	NOAA_VR	Complete MBES
H13611_MB_VR_LWD_Final	CARIS VR Surface (CUBE)	Variable Resolution	5.72 meters - 24.97 meters	NOAA_VR	Complete MBES

Surface Name	Surface Type	Resolution	Depth Range	Surface Parameter	Purpose
H13611_MBAB_2m_S222_300kHz_1of3	MB Backscatter Mosaic	2 meters	-	N/A	Complete MBES
H13611_MBAB_2m_2903_300kHz_2of3	MB Backscatter Mosaic	2 meters	-	N/A	Complete MBES
H13611_MBAB_2m_2903_400kHz_3of3	MB Backscatter Mosaic	2 meters	-	N/A	Complete MBES

Table 10: Submitted Surfaces

Complete coverage requirements were met by 100% complete coverage MBES as specified under section 5.2.2.2 of the 2022 HSSD. All bathymetric grids for H13611 meet density requirements per the 2022 HSSD (Figure 26). There are two holidays within the coverage achieved for H13611 as discussed in Section A.4.

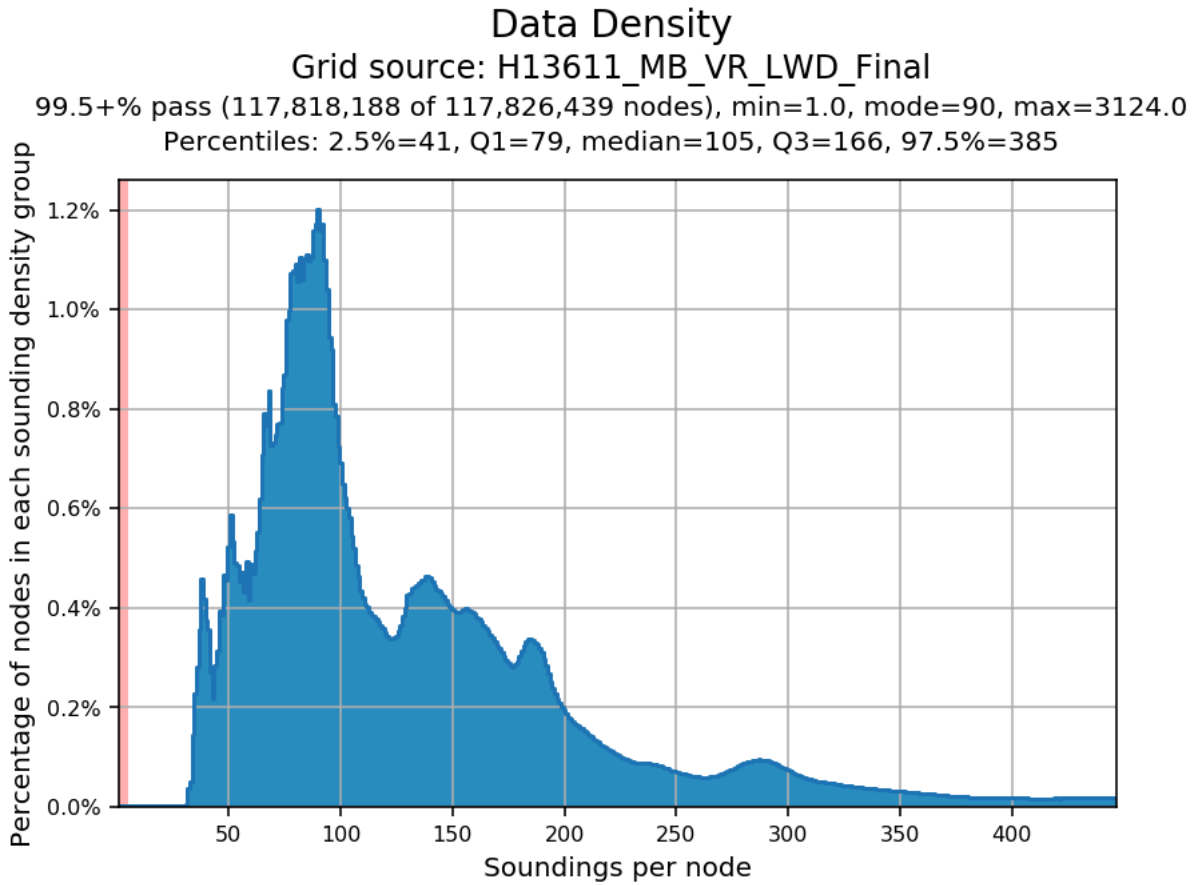


Figure 26: H13611 data density standards.

C. Vertical and Horizontal Control

No Horizontal and Vertical Control Report (HVCR) is required for this survey.

C.1 Vertical Control

The vertical datum for this project is Low Water Datum IGLD-1985.

ERS Datum Transformation

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

Method	Ellipsoid to Chart Datum Separation File
ERS via VDATUM	OPR-W386-TJ-22_NAD83_2011_VDatum_LWD_IGLD85

Table 11: ERS method and SEP file

C.2 Horizontal Control

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 17.

RTK

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 H13611 MBES data from vessels HSL 2903 and S-222.

WAAS

The Wide Area Augmentation System (WAAS) was used for real-time horizontal control during data acquisition on vessels HSL 2903 and S-222.

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
US5PA22M	1:15000	19	04/20/2022	04/20/2022
US4PA21M	1:80000	14	10/15/2021	03/31/2022

Table 12: Largest Scale ENCs

D.1.2 Shoal and Hazardous Features

Surveyed soundings and contours were compared against previously charted data on ENCs US4PA21M and US5PA22M. Depth values were found to be in general agreement with previously charted soundings across most of the survey area. However, differences in soundings and contours were observed over the shoal located offshore of the northwest edge of Presque Isle. The largest discrepancies in soundings were found on the eastern edge of the shoal, but are outside of the recommended traffic routes (Figure 27). The hydrographer does not believe these changes pose an immediate danger to navigation.

Nine newly discovered features are included in the Final Feature File (FFF) and none were considered to be navigational hazards. No danger to navigation (DTON) reports were submitted for this survey and all data acquired on H13611 are recommended to supersede prior data.

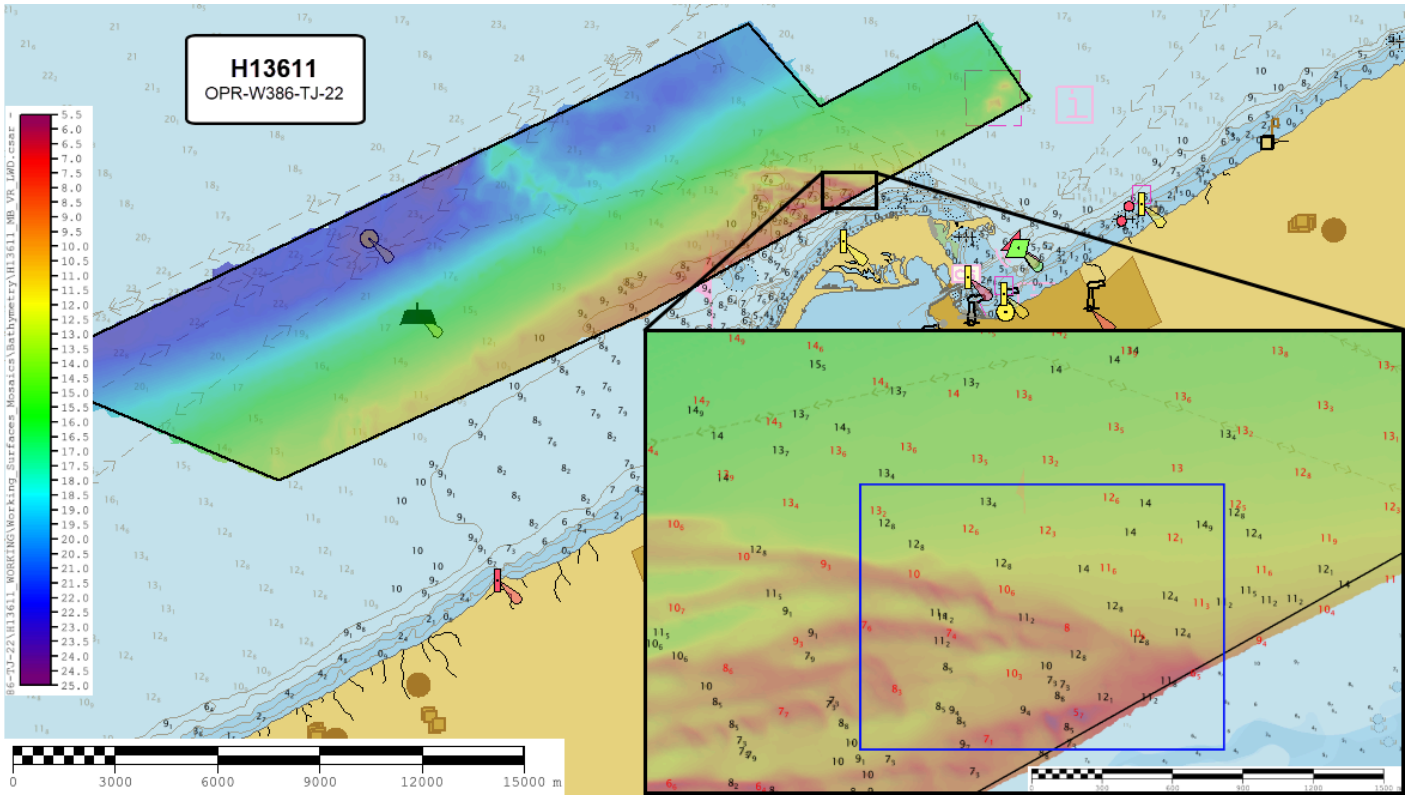


Figure 27: Comparison of charted soundings in black with surveyed soundings in red. Recommended traffic routes shown in grey dashed arrows. Area within the blue box showed greatest difference but is not considered a navigational hazard.

D.1.3 Charted Features

No previously charted features were assigned for investigation. However, the field unit decided to acquire additional coverage outside of the sheet limits over a charted dumping ground to confirm the least depth (Figure 28). The south east corner of the dumping ground has coverage from survey H13610.

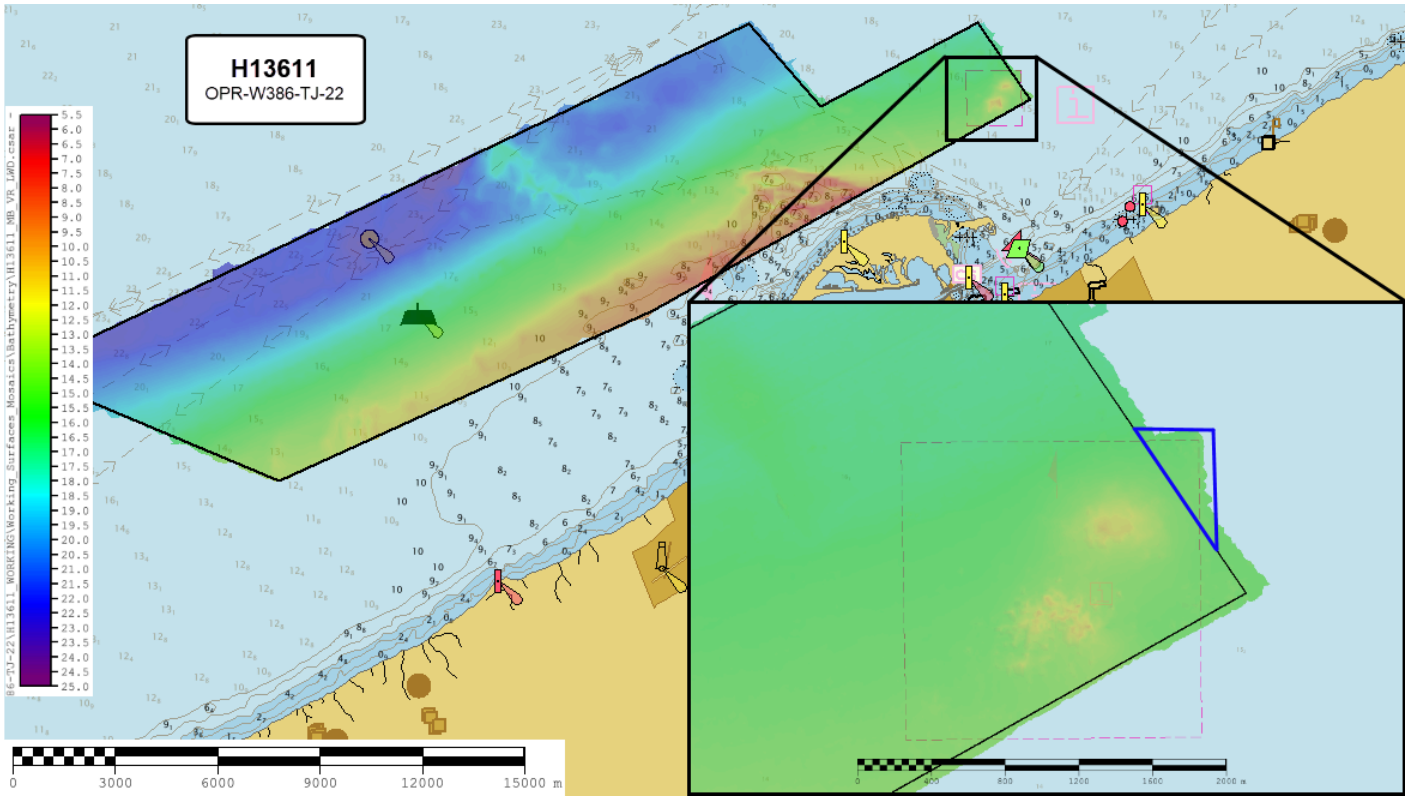


Figure 28: Additional coverage, outlined in blue, acquired outside of sheet limits to confirm least depth over charted dumping ground.

D.1.4 Uncharted Features

Nine uncharted features were identified, investigated, and are recommended for charting. None of them are considered dangerous to navigation and no DTON reports were submitted for this survey. Reference the Final Feature File for further information.

D.1.5 Channels

No channels exist for this survey. There are no designated anchorages, precautionary areas, safety fairways, traffic separation schemes, pilot boarding areas, or channel and range lines within the survey limits.

D.2 Additional Results

D.2.1 Aids to Navigation

No Aids to navigation (ATONs) exist for this survey.

D.2.2 Maritime Boundary Points

No Maritime Boundary Points were assigned for this survey.

D.2.3 Bottom Samples

Nine bottom sample locations were assigned for investigation (Figures 29 and 30). Details regarding bottom sample attribution can be found in the Final Feature File.

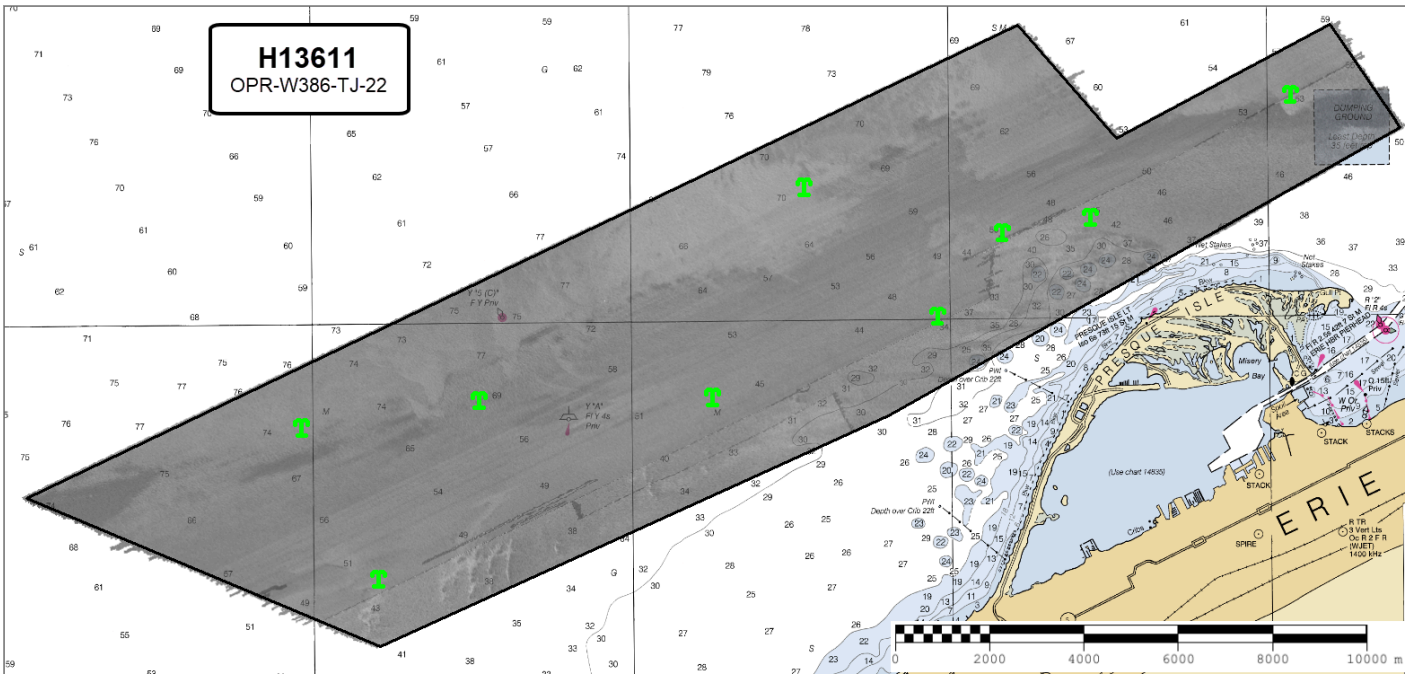


Figure 29: H13611 bottom sample locations in green plotted over the 2m resolution backscatter mosaics.

Figure 30: Example bottom type collected for H13611.

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

No ferry routes or terminals exist for this survey.

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
Matthew J. Jaskoski, CDR/NOAA	Chief of Party	11/14/2022	JASKOSKI.MATTHEW.JACOB.1275636262 2022.11.15 08:57:15 -05'00'
Sydney M. Catoire, LT/NOAA	Field Operations Officer	11/14/2022	CATOIRE.SYDNEY.MARIE.1120060623 Digitally signed by CATOIRE.SYDNEY.MARIE.1120060623 Date: 2022.11.15 07:52:28 -05'00'
Erin K. Cziraki	Chief Survey Technician	11/14/2022	CZIRAKI.ERIN.KAYE.1550015338 Digitally signed by CZIRAKI.ERIN.KAYE.1550015338 Date: 2022.11.15 07:49:25 -05'00'

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