H13612

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

DESCRIPTIVE REPORT

Type of Survey:	Navigable Area
Registry Number:	H13612

LOCALITY

State(s):	Ohio
General Locality:	Lake Erie
Sub-locality:	Vicinity of South Bass Island

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	**H13612**

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):	**Ohio**
General Locality:	**Lake Erie**
Sub-Locality:	**Vicinity of South Bass Island**
Scale:	**5000**
Dates of Survey:	**06/07/2022 to 06/14/2022**
Instructions Dated:	**04/19/2022**
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, Side Scan Sonar**
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 H13612

Project: OPR-W386-TJ-22

Locality: Lake Erie

Sublocality: Vicinity of South Bass Island

Scale: 1:5000

June 2022 - June 2022

NOAA Ship *Thomas Jefferson*

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

A. Area Surveyed

Survey H13612, located in Lake Erie, OH in the vicinity of South Bass Island, was conducted in accordance with coverage requirements set forth in the Project Instructions (PI) OPR-W386-TJ-22.

A.1 Survey Limits

Data were acquired within the following survey limits:

Northwest Limit	Southeast Limit
41° 42' 14.02" N 82° 53' 18.65" W	41° 36' 48.91" N 82° 45' 12.98" W

Table 1: Survey Limits

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) (Figure 1).

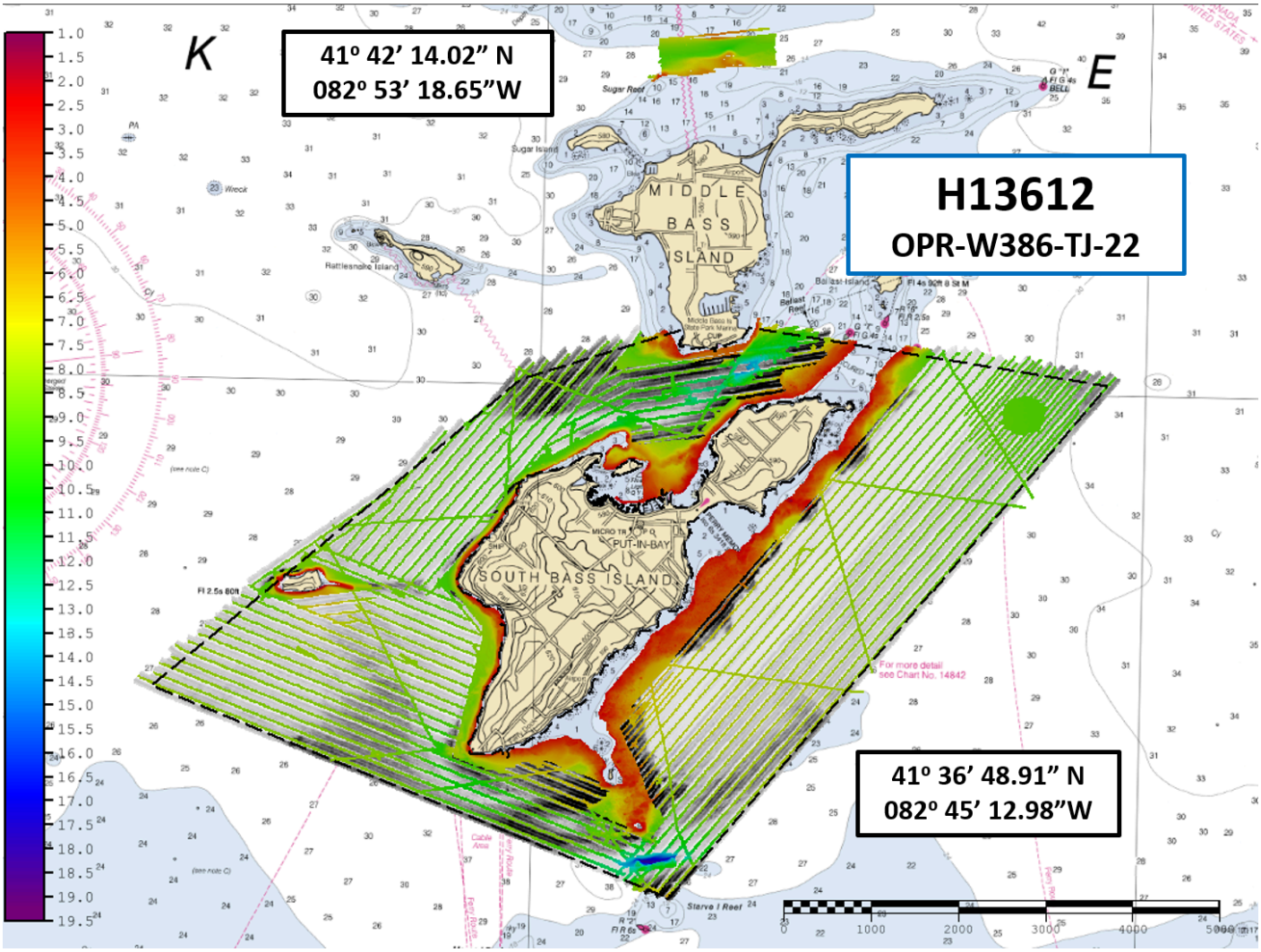


Figure 1: The survey layout for H13612 plotted over RNC 14844. Black outline represents the survey limits set forth by the Project Instructions, MBES coverage is in color, and SSS coverage is in greyscale.

A.2 Survey Purpose

The Port of Cleveland is one of the largest ports in the Great Lakes and ranks within the top 50 ports in the United States. Roughly 13 million tons of cargo are transported through Cleveland Harbor each year supporting over 20,000 jobs and $3.5 billion in annual economic activity [1]. South Bass, Middle Bass, and Kelleys Island's primary industry is tourism supporting approximately 750,000 visitors annually with ferry services available between the islands and mainland Ohio [2].

This project will provide modern bathymetric data for the Cleveland area as well as the vicinity of South Bass Island and Presque Isle. The project area was identified as a statistically significant hot spot within the 2018 Hydrographic Health Model, a risk model that Coast Survey uses for evaluating priorities based upon navigational risks and the necessary quality of data to support modern traffic. Most of this area has not been

surveyed since the 1940s, and experiences significant professional and recreational vessel traffic largely supporting a significant tourist industry.

A modern bathymetric survey in this area will identify hazards and changes to the seafloor, provide critical data for updating National Ocean Service (NOS) nautical charting products and improve maritime safety. Survey data from this project is intended to supersede all prior survey data in the common area.

1. https://www.portofcleveland.com/
2. https://www.greatlakesnow.org/

A.3 Survey Quality

The entire survey is adequate to supersede previous data.

Complete coverage requirements were met utilizing a combination of 100% multibeam echo sounder (MBES) coverage and 100% side scan sonar (SSS) with concurrent MBES coverage as specified by the 2022 HSSD. Data acquired in H13612 meet survey quality standards specified in the 2022 HSSD, including crosslines (see Section B.2.1), NOAA allowable uncertainty (see Section B.2.2), 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 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 Table 2 and in the 2022 HSSD. These requirements were met with a combination of 100% complete coverage MBES and 100% SSS with concurrent MBES coverage. Assigned features requiring a disproval radius were addressed with 200% SSS with concurrent MBES (see Section B.2.8 for more information).

Additional MBES coverage was acquired outside of the assigned limits, between North Bass and Middle Bass Islands, as reconnaissance over an area in which the ship would transit (Figure 2). These additional data are included in the submitted surfaces and in the final delivery package. Due to operational time constraints and the purpose of acquisition, the area was not acquired to the inshore limit of hydrography, and holidays were not collected. Several holidays exist in the reconnaissance area, but after inspection of surrounding areas, do not appear to be navigationally significant.

Coverage within the sheet limits was acquired to the inshore limit of hydrography, the Navigable Area Limit Line (NALL). Areas where survey coverage did not reach the 3.5-meter depth contour, nor the assigned sheet limits, were due to the survey vessel reaching the extent of safe navigation (Figure 3). These areas are characterized as being near shore, in a mooring buoy area, or subject to dangerous wave action or other hazards.

Three holidays exist outside the sheet limits in the combined coverage achieved for H13612 (Figure 4). Two of the holidays exist in Put-in-Bay and are from data intentionally rejected due to pier support structures. One additional holiday exists on the outer edge of the survey coverage and was not collected due to operational time constraints. After inspection of surrounding area, this holiday does not appear to be navigationally significant. Additionally, visible gaps in the bathymetric surface exist but are not large enough to meet the definition of a holiday for complete coverage requirements.

Following completion of mainscheme acquisition, surveyed soundings were assessed against charted soundings on ENC US4OH08M to determine whether bathymetric splits were necessary. Splits were acquired where charted soundings were found to be shallower than neighboring surveyed soundings by more than the maximum allowable TVU at that depth (generally 0.5m or greater). Upon completion of acquisition, surveyed soundings were assessed against charted soundings on the larger scale ENCs US5OH08M and US6OH1AM; it was determined 12 additional bathymetric splits were required by this method but were not acquired due to operational time constraints (Figure 5). After inspection of SSS imagery and surrounding lakebed bathymetry, the hydrographer does not believe 11 of the 12 unacquired charted soundings are critical for safe navigation. Though SSS does not indicate a feature, one charted sounding at 41° 37' 10.9" N/ 082° 49' 18.2" W is recommended to be retained based on the rocky nature of the lakebed in this area (Figure 5).

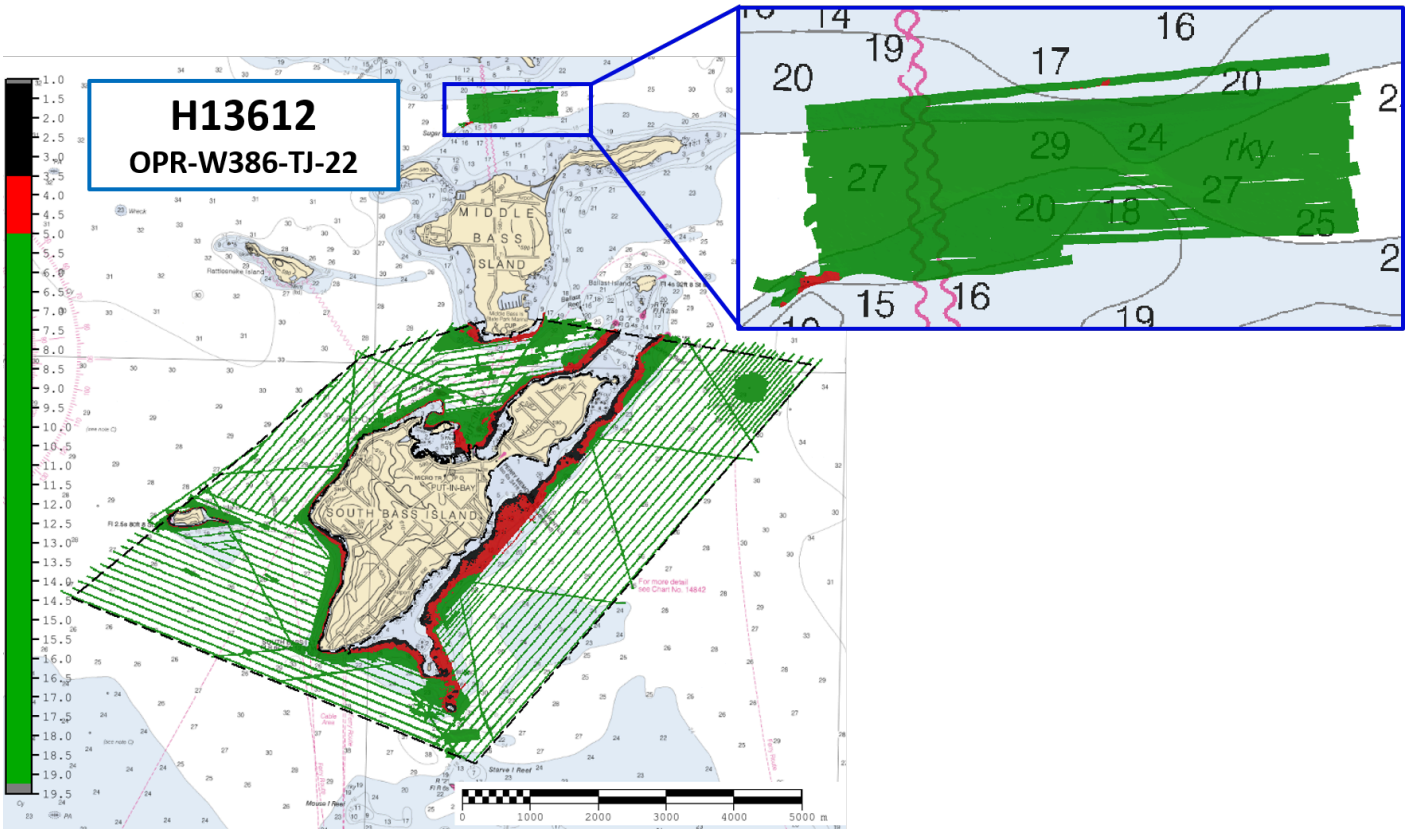


Figure 2: Overview shows the area outside of assigned sheet limits surveyed as reconnaissance prior to ship transit outlined in blue. Inset shows holidays and where the coverage did not meet the inshore limit of hydrography.

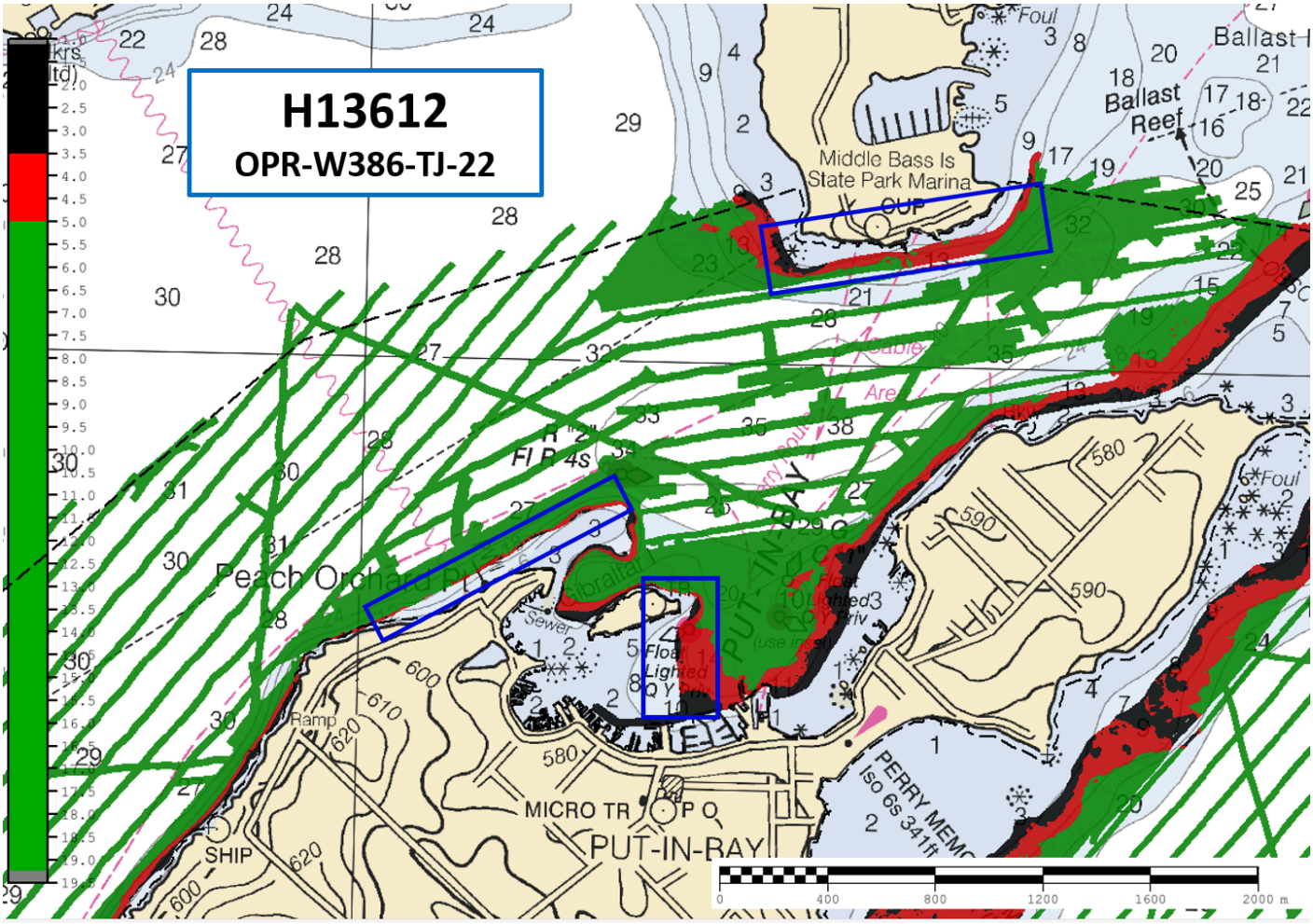


Figure 3: Areas where coverage did not meet the 3.5m depth contour or the assigned sheet limits outlined in blue

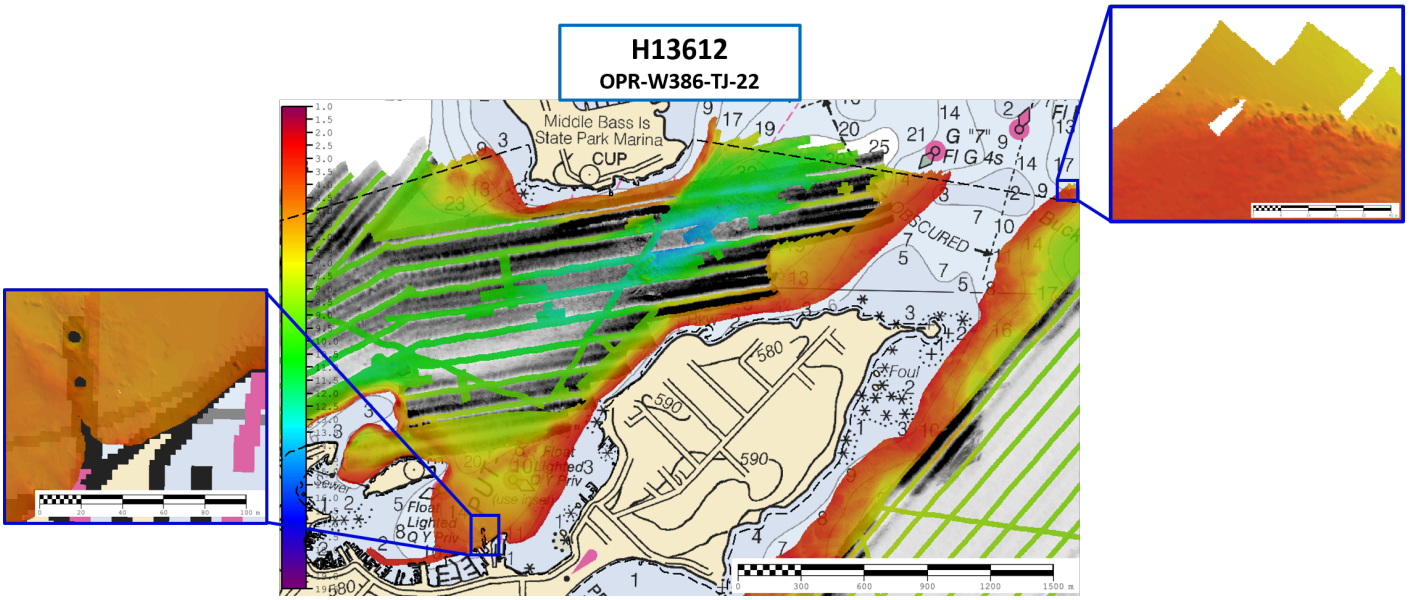


Figure 4: Holidays in multibeam coverage outside the sheet limits

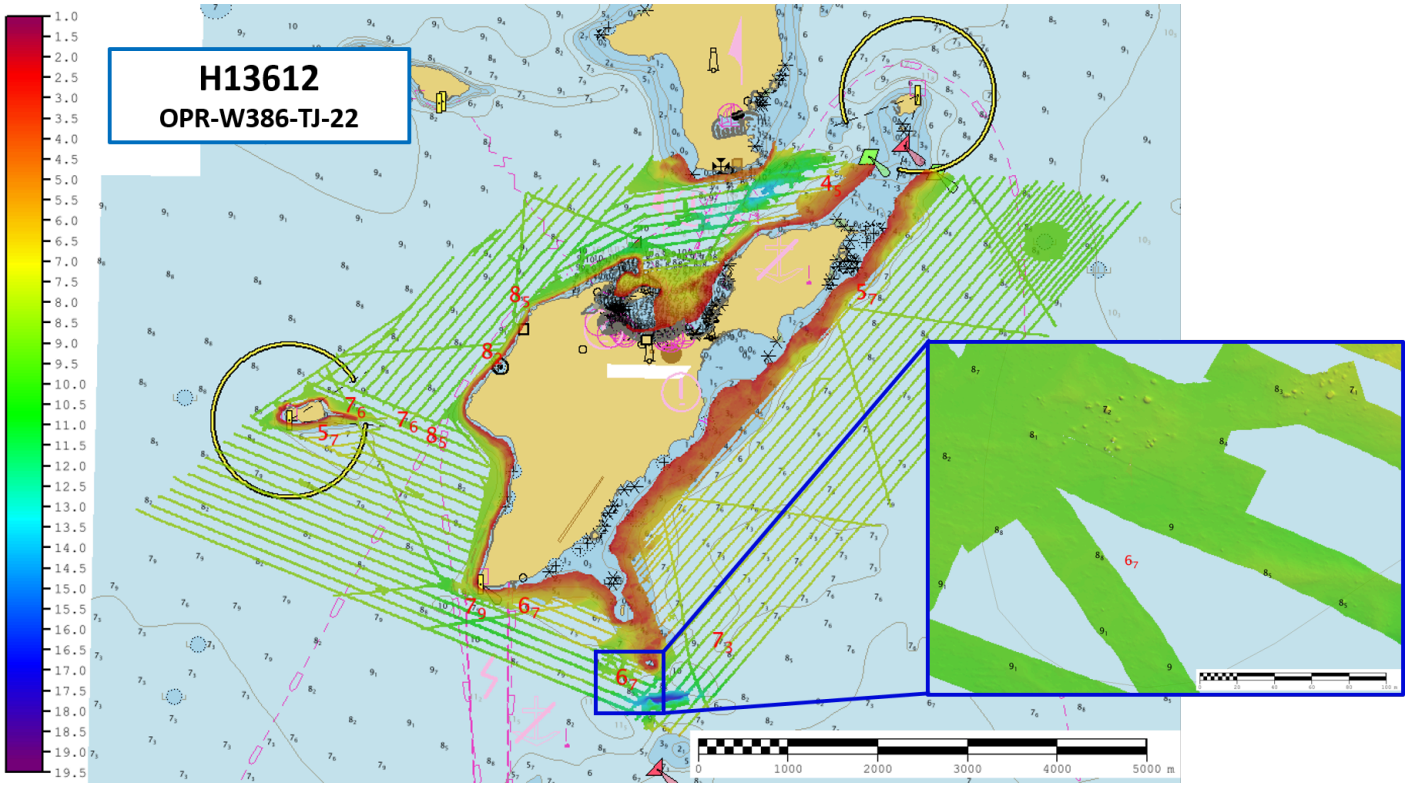


Figure 5: Overview shows red charted soundings requiring a bathymetric split. Inset shows the charted sounding at location 41° 37' 10.9" N/082° 49' 18.2" W that is recommended to be retained based on the rocky lakebed.

A.6 Survey Statistics

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

	HULL ID	*2903*	*2904*	*Total*
LNM	**SBES Mainscheme**	0.0	0.0	0.0
	MBES Mainscheme	79.2	148.3	227.5
	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	133.0	0.0	133.0
	SBES/MBES Crosslines	15.1	0.3	15.4
	Lidar Crosslines	0.0	0.0	0.0
Number of Bottom Samples				6
Number Maritime Boundary Points Investigated				0
Number of DPs				0
Number of Items Investigated by Dive Ops				0
Total SNM				8.6

Table 3: Hydrographic Survey Statistics

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

Survey Dates	Day of the Year
06/07/2022	158
06/08/2022	159
06/09/2022	160
06/10/2022	161
06/11/2022	162
06/13/2022	164
06/14/2022	165

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	*2903*	*2904*
LOA	8.5 meters	8.5 meters
Draft	1.2 meters	1.2 meters

Table 5: Vessels Used

Figure 6: Thomas Jefferson Launch 2903

Figure 7: Thomas Jefferson Launch 2904

B.1.2 Equipment

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

Manufacturer	Model	Type
Kongsberg Maritime	EM 2040	MBES
Kongsberg Maritime	EM 2040	MBES Backscatter
EdgeTech	4200	SSS
Applanix	POS MV 320 v5	Positioning and Attitude System
Sea-Bird Scientific	SBE 19plus V2	Conductivity, Temperature, and Depth Sensor
Teledyne RESON	SVP 70	Sound Speed System

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

Hydrographic Survey Launches 2903 and 2904 collected 15.36 linear nautical miles of MBES crosslines or 4.26% of mainscheme MBES data. The crosslines acquired represent good spatial and depth diversity for this survey area (Figure 8). A 0.5 m single resolution (SR) Combined Uncertainty and Bathymetry Estimator (CUBE) surface of mainscheme data and a 0.5 m SR CUBE surface of crossline data were differenced - the resulting mean was 0.01m with a standard deviation of 0.04m (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.

A 0.5 m SR surface was used because the hydrographer determined it to be a more accurate representation of the observed bathymetry; see Section B.5.2 for more information and reference the DR Appendices for a record of communication regarding approval of a 0.5 m grid.

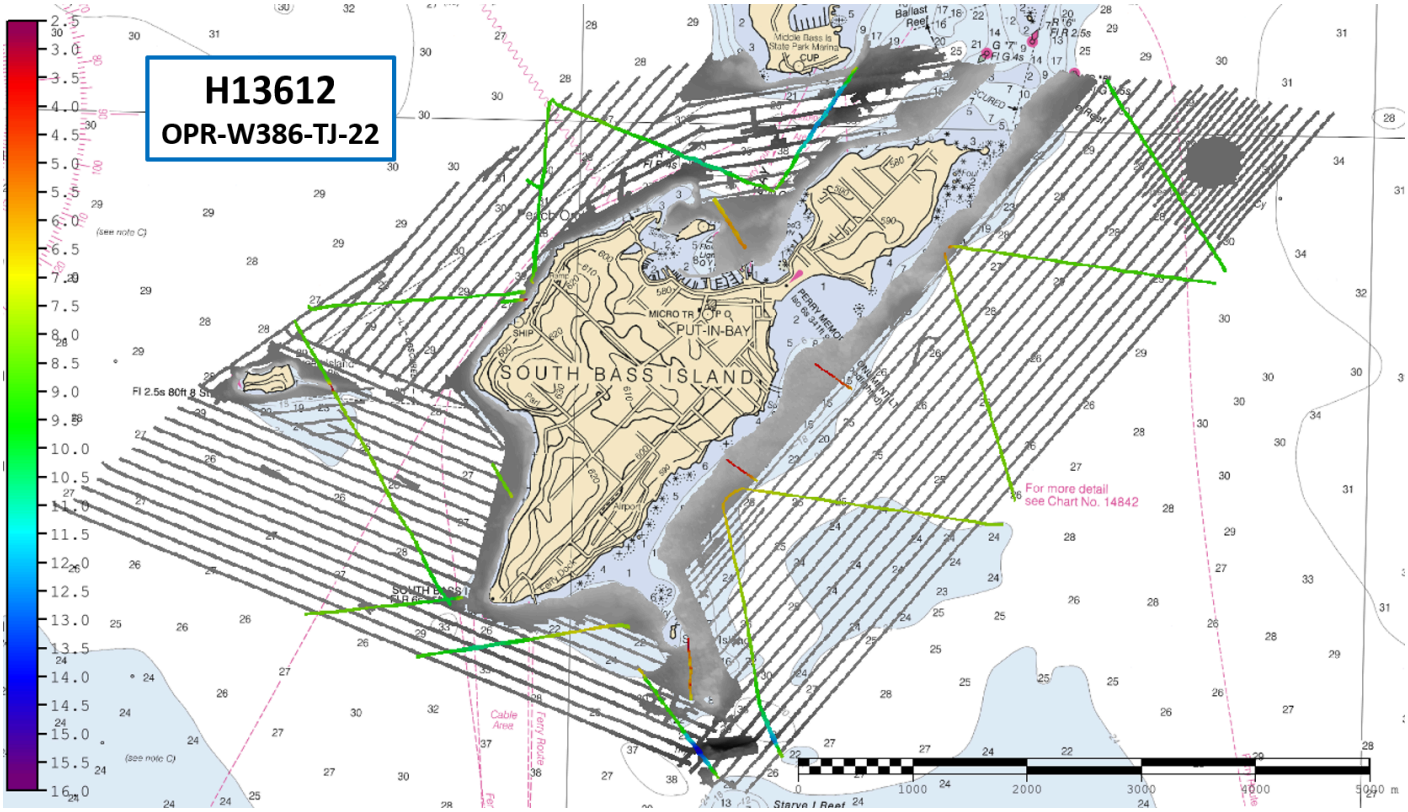
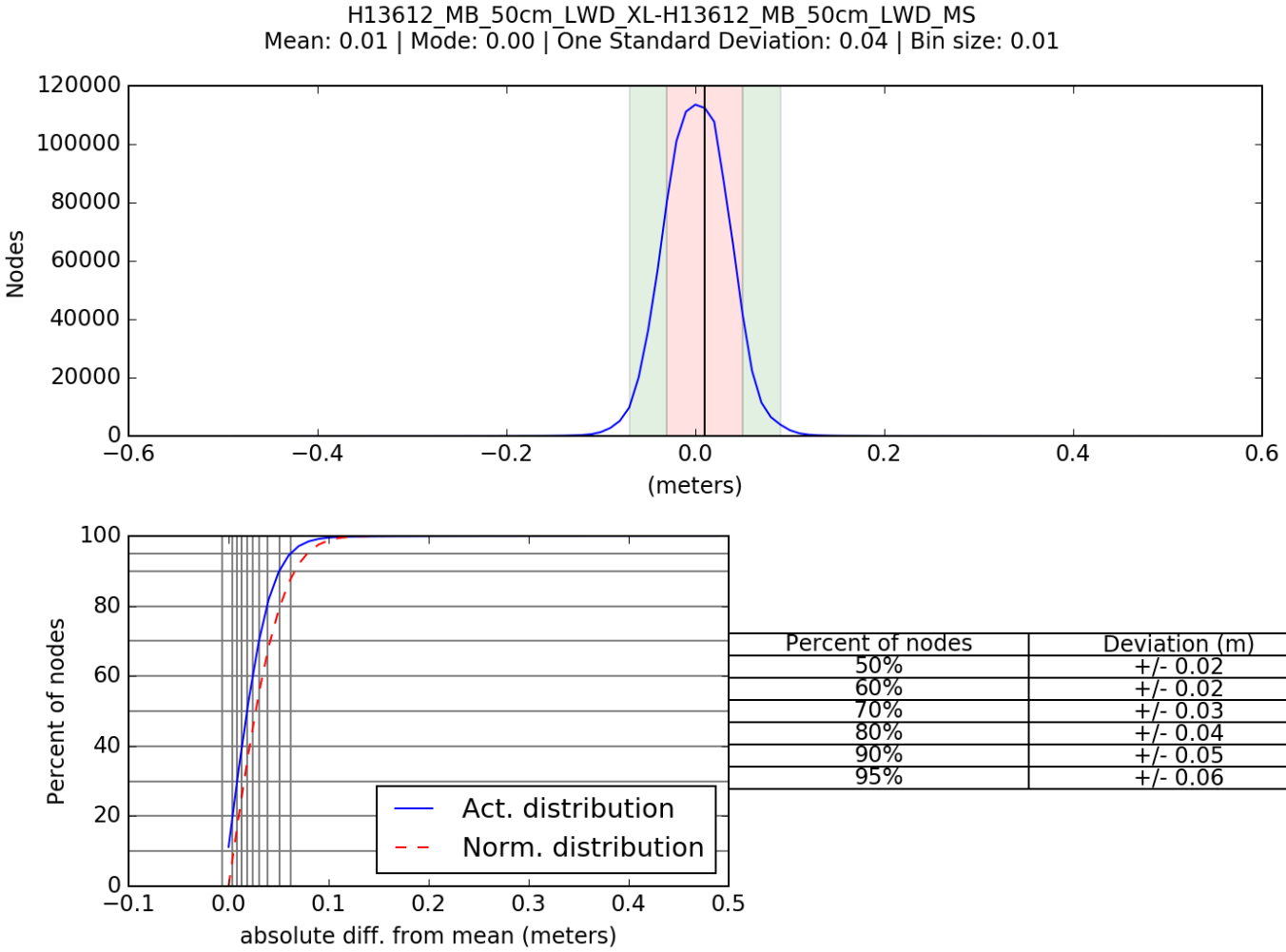


Figure 8: Overview of H13612 crossline distribution by geography and depth, shown in color, overlaid on mainscheme data shown in greyscale



Percent of nodes	Deviation (m)
50%	+/- 0.02
60%	+/- 0.02
70%	+/- 0.03
80%	+/- 0.04
90%	+/- 0.05
95%	+/- 0.06

Figure 9: H13612 crossline/mainscheme comparison statistics

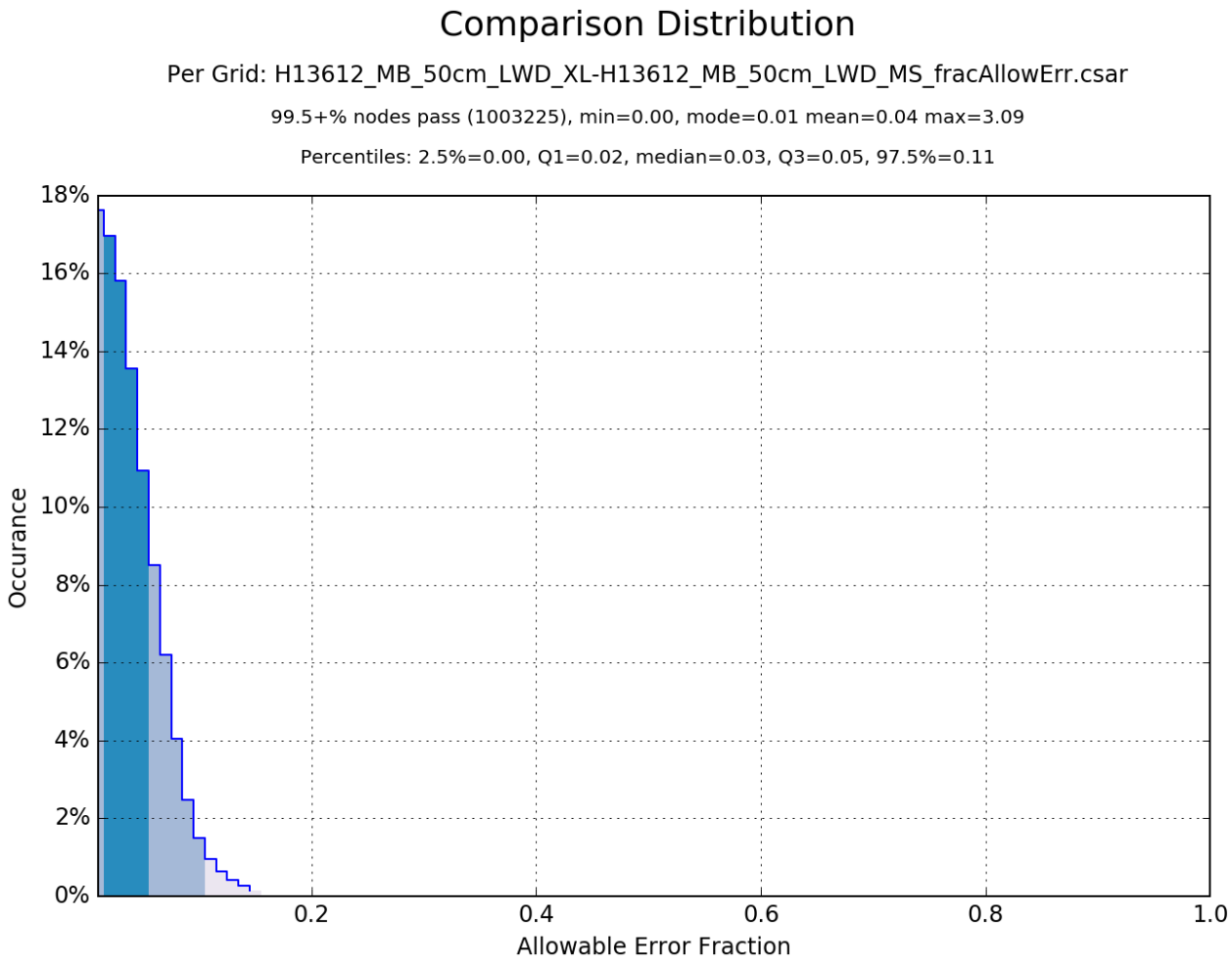


Figure 10: H13612 crossline fraction of allowable error statistics

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
2903	4 meters/second	N/A meters/second	N/A meters/second	0.2 meters/second
2904	4 meters/second	N/A meters/second	N/A meters/second	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).

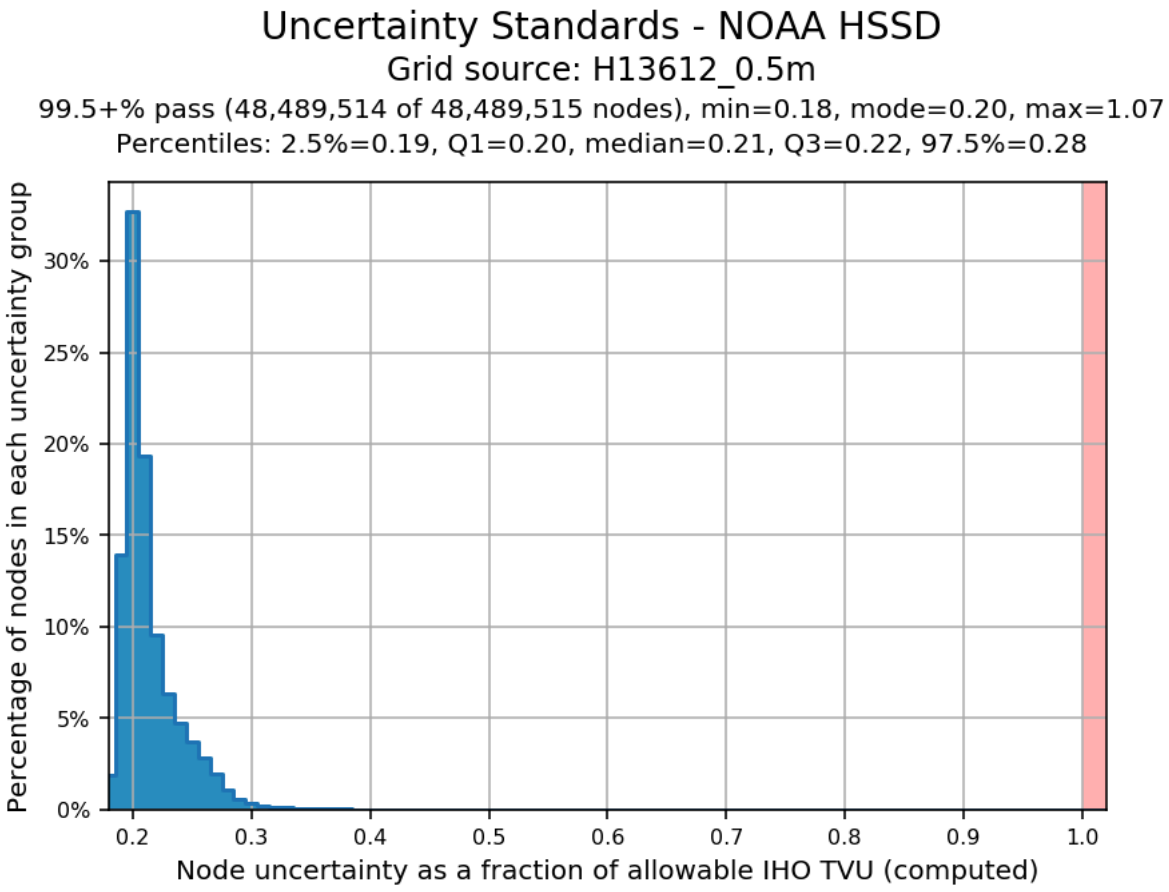


Figure 11: H13612 uncertainty standards

B.2.3 Junctions

Survey H13612 junctions with H13613 within the OPR-W386-TJ-22 project.

The following junctions were made with this survey:

Registry Number	Scale	Year	Field Unit	Relative Location
H13613	1:5000	2022	THOMAS JEFFERSON	E

Table 9: Junctioning Surveys

H13613

Refer to survey H13613 Descriptive Report for junction analysis.

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

There were no other factors that affected corrections to soundings.

B.2.7 Sound Speed Methods

Sound Speed Cast Frequency: Static conductivity, temperature, and depth (CTD) casts were conducted at the start of acquisition each day and at a minimum of one every four hours during launch acquisition using a Sea-Bird Seacat 19+ V2 CTD. Static cast frequency was increased in areas where a change in surface sound speed greater than two meters per second existed. All sound speed methods were used as detailed in the DAPR.

A total of 36 sound speed profiles were collected as part of acquisition of H13612 and display good spatial diversity (Figure 12). Four of these casts were located outside of the sheet limits, not more than 150m away, and display profiles representative of the area. An additional cast was taken 3,220 meters outside the sheet limits, but was within the limits of the reconnaissance data for Sugar Reef. 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.

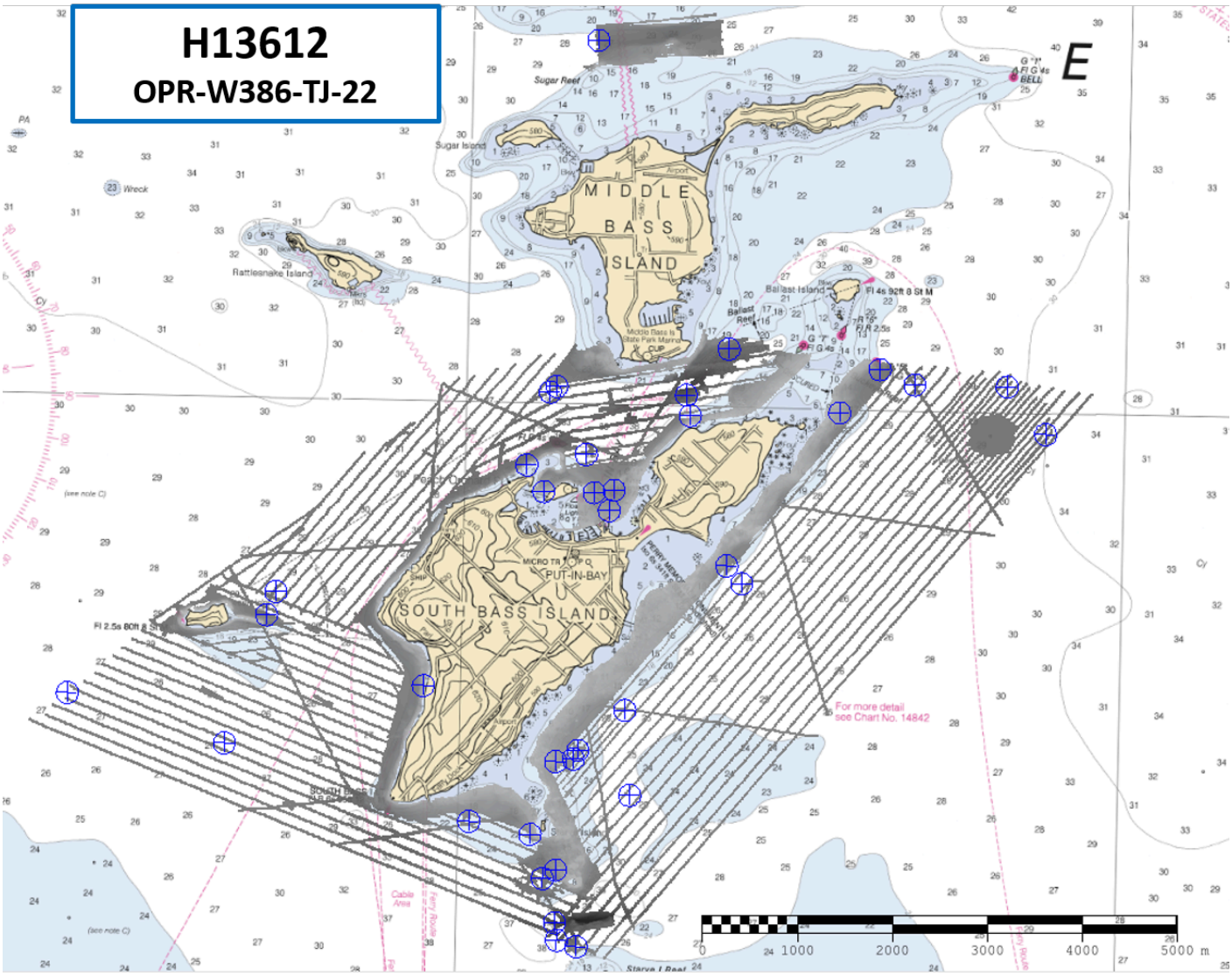


Figure 12: Overview shows all CTD casts collected on H13612. Cast locations are shown as blue targets overlaid on greyscale MBES data.

B.2.8 Coverage Equipment and Methods

Complete coverage requirements were met by 100% SSS coverage with concurrent MBES and 100% complete coverage MBES as specified under section 5.2.2.2 of the 2022 HSSD (Figure 12). Launch 2903 was outfitted with a Kongsberg EM2040 MBES system, an Edgetech 4200 SSS system, and was primarily

used to acquire 100% SSS coverage with concurrent MBES, 200% SSS coverage to address assigned features, and crosslines. Launch 2904 was outfitted with a Kongsberg EM2040 MBES system and was primarily used to acquire 100% complete coverage MBES, developments, bathymetric splits, and holidays.

Additional MBES coverage was acquired outside of the assigned limits as reconnaissance over an area in which the ship would transit (Figure 13). These additional data meet complete coverage specifications and are included in the submitted surfaces and in the final delivery package. Reference Section A.4 for information regarding holidays in the reconnaissance area. Reference the DR Appendices for a record of communications regarding the inclusion of additional data.

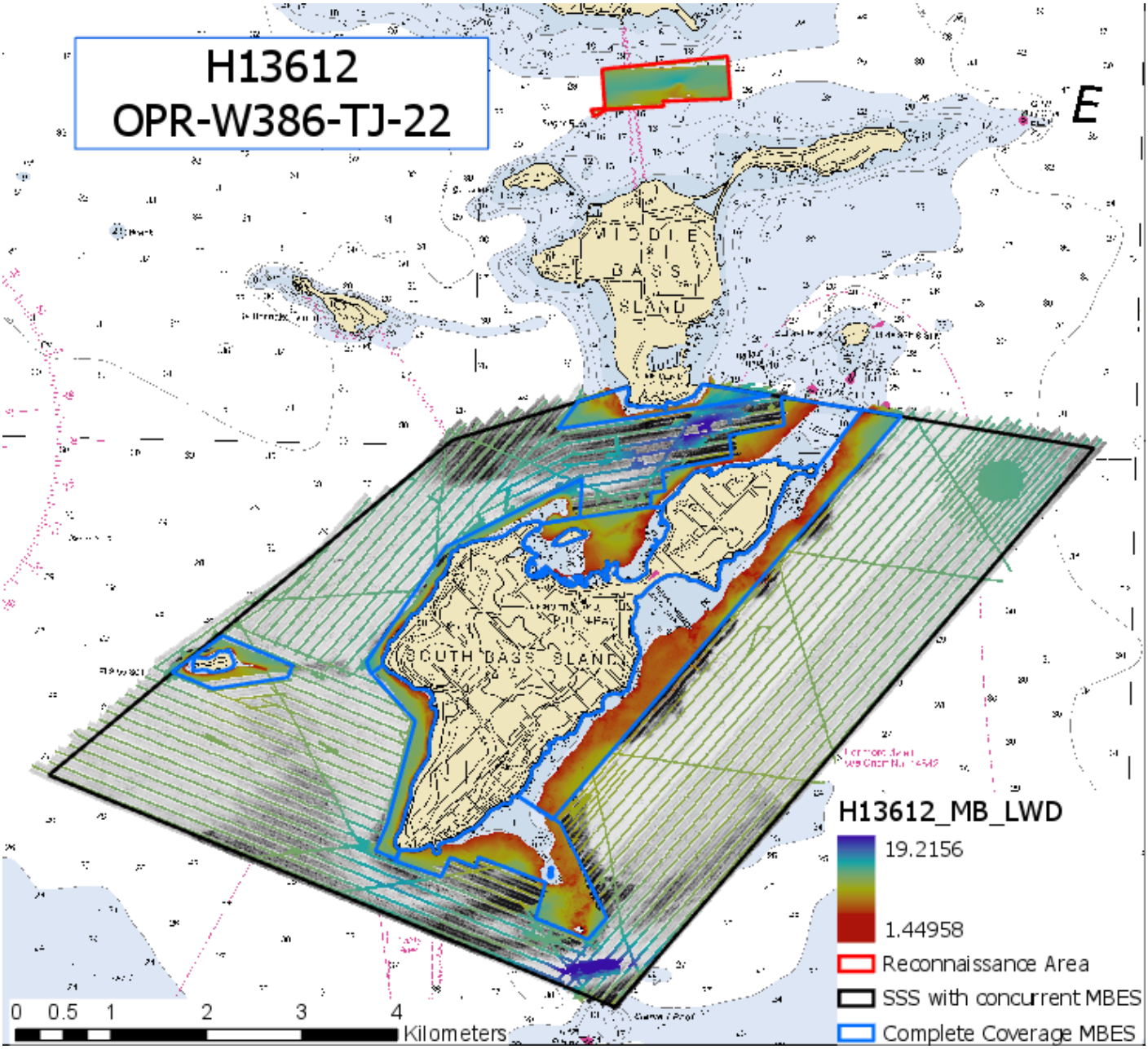


Figure 13: Coverage types used to meet complete coverage specifications. Areas of complete coverage MBES are outlined in blue and areas of complete coverage SSS with concurrent MBES are outlined in black. Reconnaissance area for ship's transit outlined in red.

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. Raw MBES backscatter was flagged as part of the .all file from 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 submission package (Figures 14 and 15).

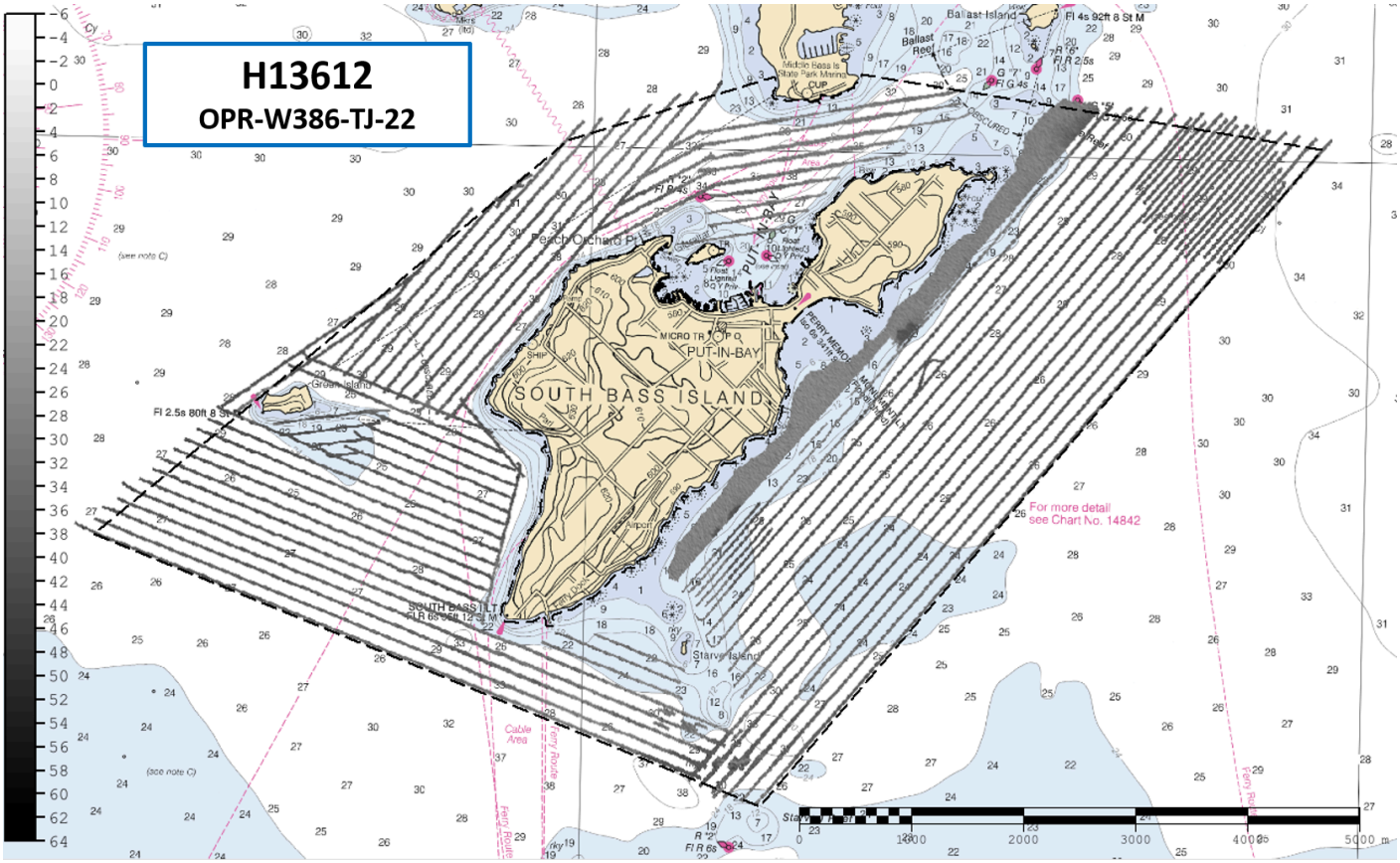


Figure 14: 300kHz backscatter mosaic from data acquired by 2903.

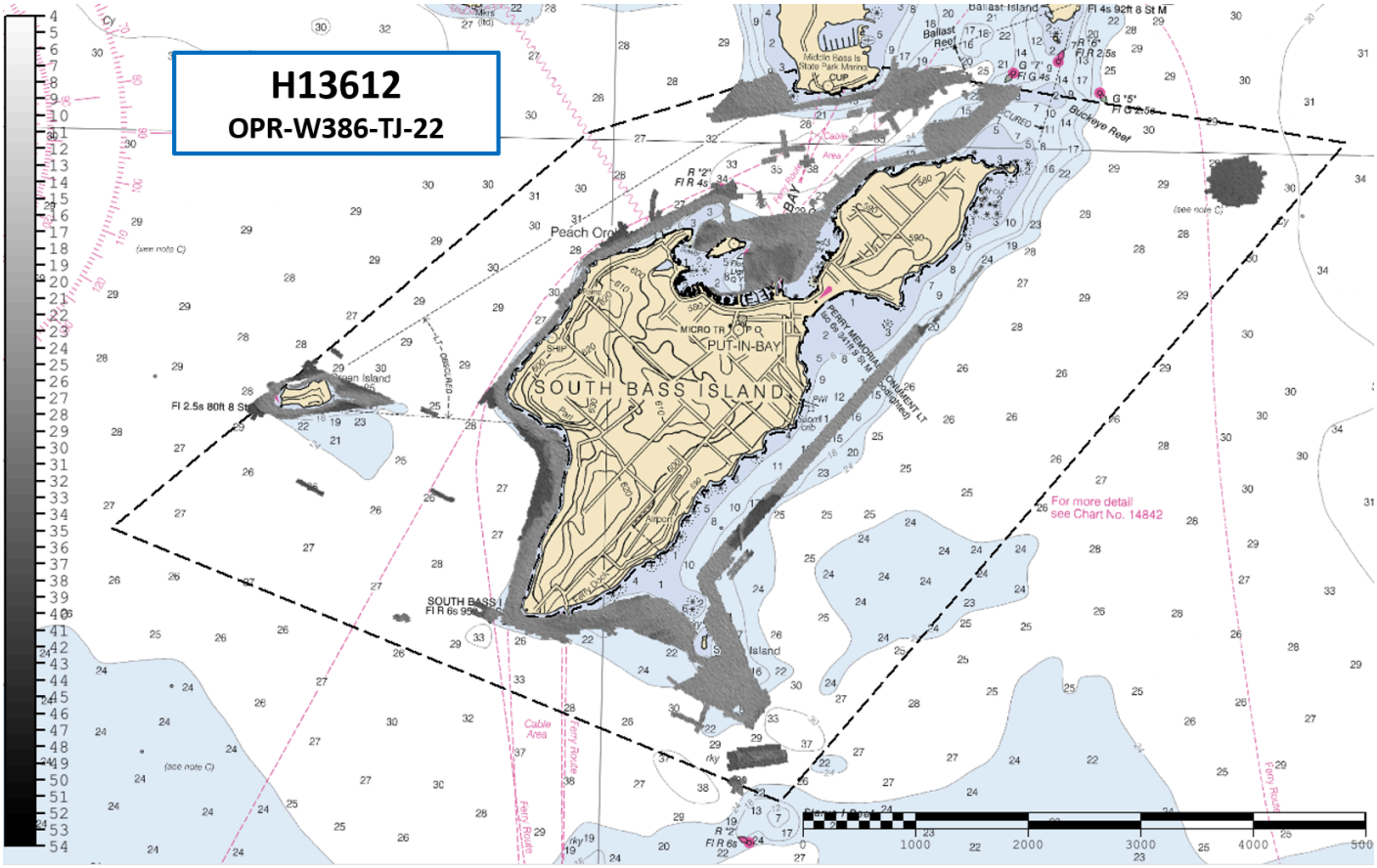


Figure 15: 300kHz backscatter mosaic from data acquired by 2904.

B.5 Data Processing

B.5.1 Primary Data Processing Software

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

Feature Object Catalog NOAA Profile Version 2022 was used for all S-57 attribution in the Final Feature File (FFF). All other software were used as detailed in the DAPR.

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
H13612_MB_50cm_LWD	CARIS Raster Surface (CUBE)	0.5 meters	1.1 meters - 19.3 meters	NOAA_0.5m	Complete MBES
H13612_MB_50cm_LWD_Final	CARIS Raster Surface (CUBE)	0.5 meters	1.1 meters - 19.3 meters	NOAA_0.5m	Complete MBES
H13612_MBAB_2m_300kHz_1of2	MB Backscatter Mosaic	2 meters	-	N/A	Complete MBES
H13612_MBAB_2m_300kHz_2of2	MB Backscatter Mosaic	2 meters	-	N/A	Complete MBES
H13612_SSSAB_1m_600kHz_1of2	SSS Mosaic	1 meters	-	N/A	100% SSS
H13612_SSSAB_1m_600kHz_2of2	SSS Mosaic	1 meters	-	N/A	200% SSS

Table 10: Submitted Surfaces

Complete coverage requirements were met by 100% SSS coverage with concurrent MBES and 100% complete coverage MBES as specified under section 5.2.2.2 of the 2022 HSSD. During the initial phases of surface review and QC, the hydrographer observed that a 1m surface resolution did not adequately represent significant rocks and other features observed in the sounding data. A surface with a 0.5 m resolution was created and found to be a more accurate representation of observed bathymetry. The 0.5 m grid was assessed for compliance with specifications outlined in the 2022 HSSD and was found to meet uncertainty (Section B.2.2) and density standards (Figure 16). Reference the DR Appendices for a record of communications regarding the decision and approval of a 0.5 m grid. While there are visible gaps in the bathymetric surface in areas of 100% complete MBES coverage, they are not large enough to meet the definition of a holiday for complete coverage requirements. There are three holidays present in the combined coverage achieved on H13612 as discussed in Section A.4.

After multiple rounds of surface cleaning, a total of 85 fliers remain as detected by NOAA's QC Tool Flier Finder available in the Pydro XL-19 suite. The hydrographer reviewed the flagged grid nodes, considers them to be accurate representations of the lake bed, and has retained them in the final delivered surfaces.

Two unverified Charted Features (UCFs) outside of the NALL were addressed with 200% SSS with concurrent MBES coverage. See section D.1.3 for details. The 200% SSS mosaic is included in the final deliverables package (Figure 17).

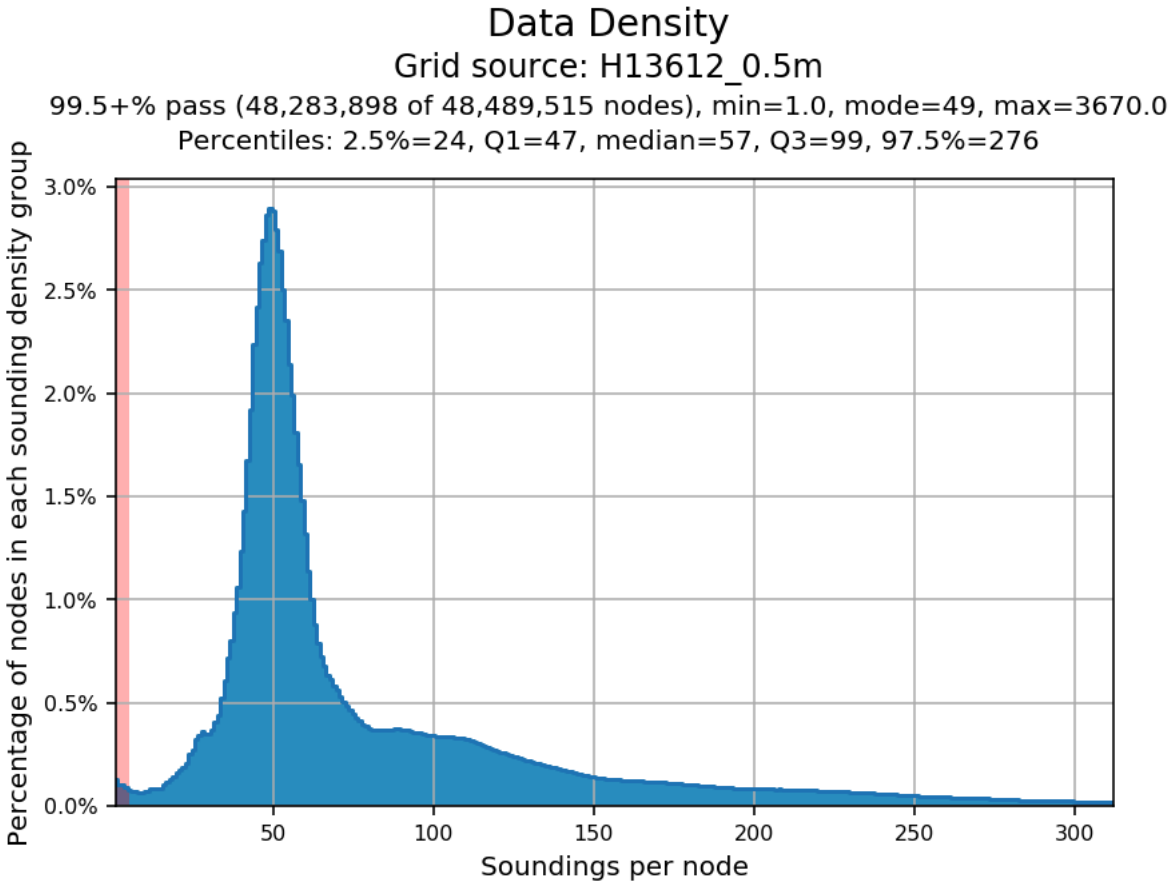


Figure 16: H13612 data density standards

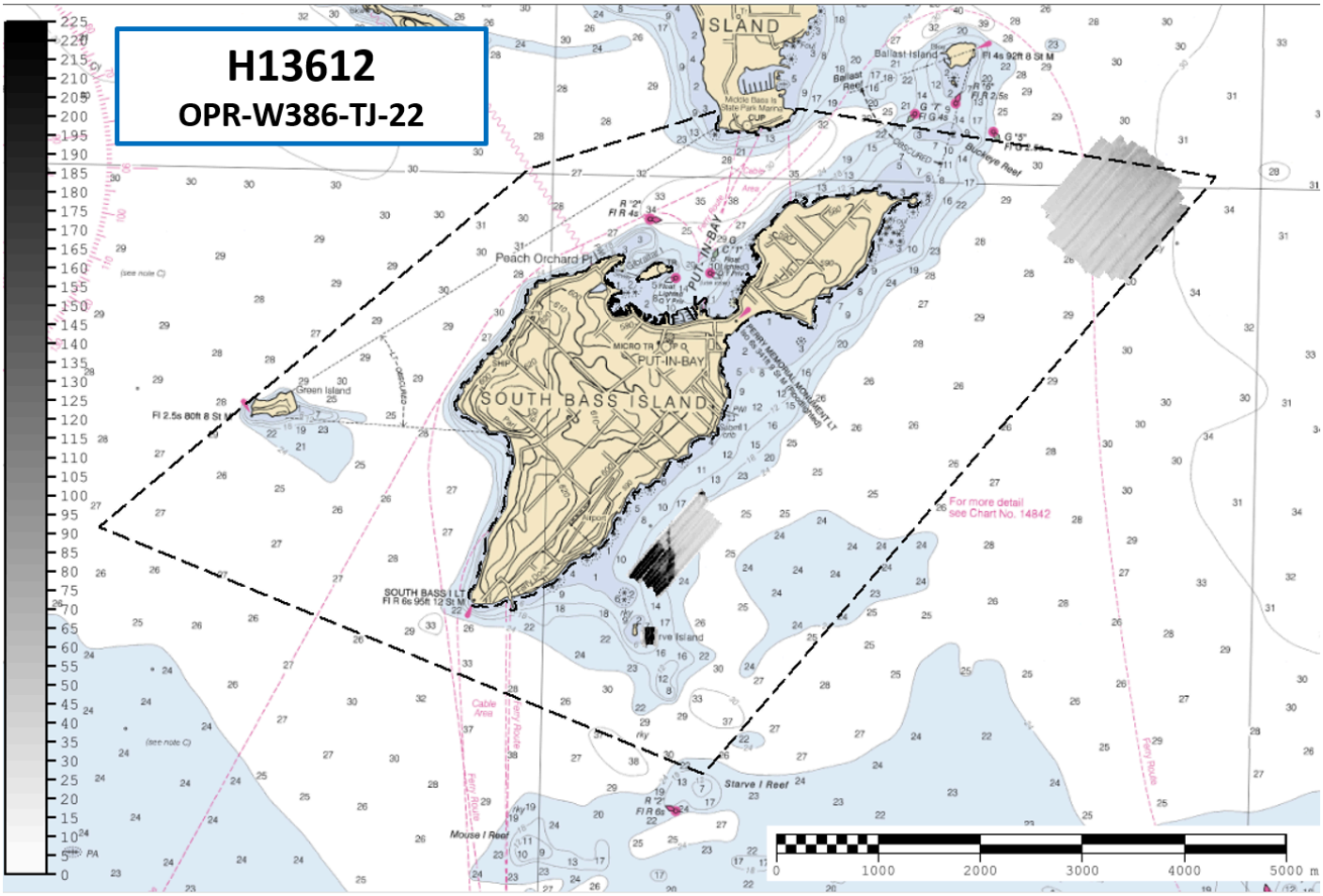


Figure 17: H13612 200% SSS mosaic for feature disproval areas

C. Vertical and Horizontal Control

Field installed tide and GPS stations were not utilized for this survey. There is no HVCR report included with the submission of H13612.

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

All soundings submitted for H13612 are reduced to LWD IGLD-85 using VDatum techniques as outlined in the DAPR.

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 H13612 MBES data from HSLs 2903 and 2904.

WAAS

The Wide Area Augmentation System (WAAS) was used for real-time horizontal control during data acquisition on HSLs 2903 and 2904.

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
US6OH1AM	1:5000	1	08/30/2017	05/15/2018
US5OH08M	1:40000	5	05/05/2022	05/17/2022

Table 12: Largest Scale ENCs

D.1.2 Shoal and Hazardous Features

No shoals or potentially hazardous features exist for this survey.

D.1.3 Charted Features

A total of 137 charted features were assigned for investigation, and 103 were not addressed due to being inshore of the NALL. Two fishing stakes were designated as Unverified Charted Features (UCFs) and are recommended to be retained. Reference the FFF for more information.

D.1.4 Uncharted Features

Three uncharted features were investigated as part of acquisition on H13612 and are recommended for charting. Reference the FFF for more information.

D.1.5 Channels

Two channels were investigated as part of acquisition on H13612 and visually confirmed to exist. Surveyed soundings were determined to be deeper than controlling depths for both Put-In-Bay Approach Channel and Put-In-Bay Dock Channel.

D.2 Additional Results

D.2.1 Aids to Navigation

Twelve charted aids to navigation (ATONs) were investigated and confirmed to be on station. No ATON reports were filed with the U.S. Coast Guard.

D.2.2 Maritime Boundary Points

No Maritime Boundary Points were assigned for this survey.

D.2.3 Bottom Samples

Six bottom sample locations were assigned for investigation and completed. See FFF for more information.

D.2.4 Overhead Features

No overhead features exist for this survey.

D.2.5 Submarine Features

Six submarine cables were assigned for investigation within H13612. None were observed in MBES and SSS data. Additionally, four pipeline features were assigned for investigation but were not addressed due to being inshore of the NALL.

D.2.6 Platforms

No platforms exist for this survey.

D.2.7 Ferry Routes and Terminals

Five ferry routes were assigned for investigation within H13612 and are serving their intended purpose per visual confirmation and AIS traffic data.

D.2.8 Abnormal Seafloor or Environmental Conditions

One depression centered around 41° 37' 03.6" N/082° 48' 59.3" W was investigated with complete coverage MBES based on information from a local ferry (Figure 18). The ferry captain reported existence of a 60 foot sounding approximately 0.5 nautical miles southeast of Starve Island. Upon review of SSS with concurrent MBES, the hydrographer saw evidence of soundings significantly deeper than charted soundings in this area, so complete coverage MBES was acquired. A max depth of 19.3 m was surveyed in the vicinity of a 9.1 m charted depth (Figure 18).

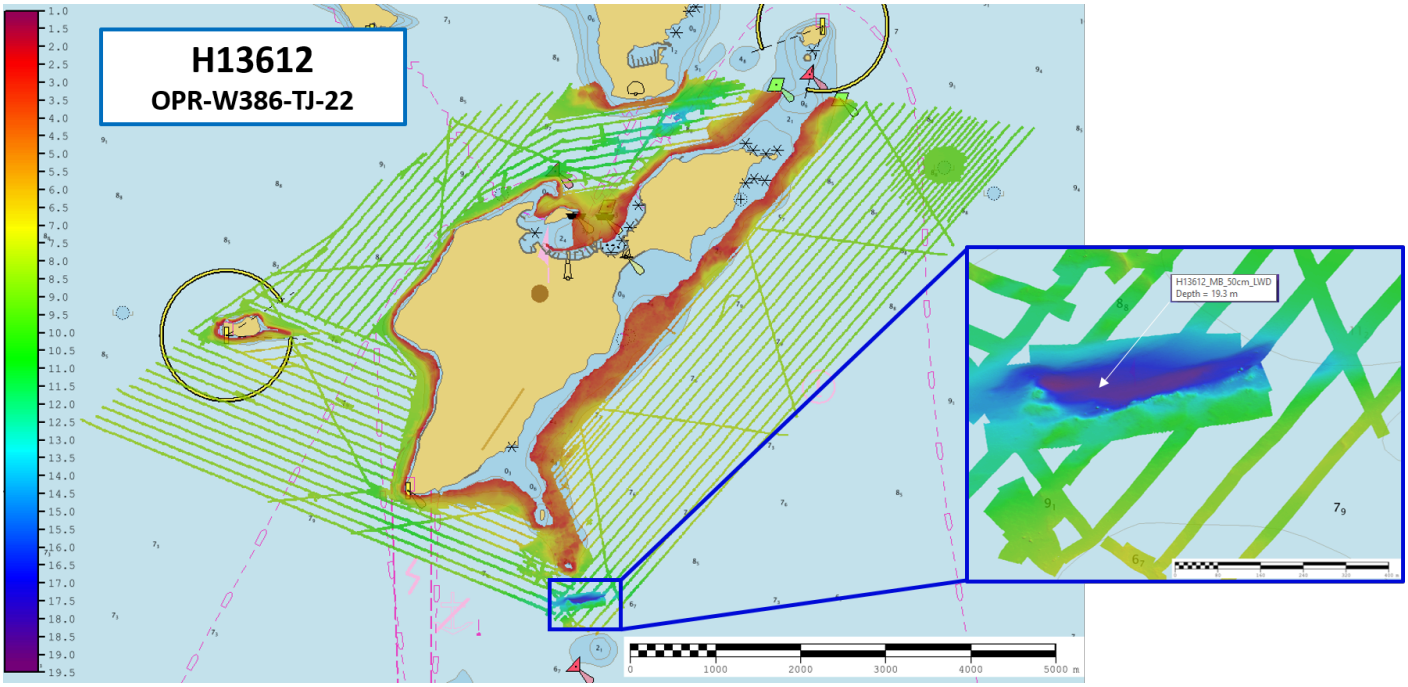


Figure 18: Surveyed deep area centered around 41° 37' 03.6" N/082° 48' 59.3" W overlaid on ENC US5OH08M.

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	09/20/2022	JASKOSKI.MATTHEW.JACOB.1275636262 2022.09.21 07:32:50 -04'00'
Michelle M. Levano, LT/NOAA	Field Operations Officer	09/20/2022	Digitally signed by LEVANO.MICHELLE.MARIE.1516645888 Date: 2022.09.21 12:30:30 -04'00'
Erin K. Cziraki	Chief Survey Technician	09/20/2022	CZIRAKI.ERIN.KAYE.1550015338 Digitally signed by CZIRAKI.ERIN.KAYE.1550015338 Date: 2022.09.21 06:27:57 -04'00'
Sydney M. Catoire, LT/NOAA	Sheet Manager	09/20/2022	CATOIRE.SYDNEY.MARIE.1120060623 Digitally signed by CATOIRE.SYDNEY.MARIE.1120060623 Date: 2022.09.20 13:55:49 -04'00'

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