H13674

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

DESCRIPTIVE REPORT

Type of Survey:	Navigable Area
Registry Number:	H13674

LOCALITY

State(s):	New York
General Locality:	Lake Ontario
Sub-locality:	11 NM North of Oswego

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	**H13674**

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):	**New York**
General Locality:	**Lake Ontario**
Sub-Locality:	**11 NM North of Oswego**
Scale:	**40000**
Dates of Survey:	**10/05/2022 to 10/10/2022**
Instructions Dated:	**08/02/2022**
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 18N, Low Water Datum 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 H13674

Project: OPR-W386-TJ-22

Locality: Lake Ontario

Sublocality: 11 NM North of Oswego

Scale: 1:40000

October 2022 - October 2022

NOAA Ship *Thomas Jefferson*

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

A. Area Surveyed

Survey H13674, located North of Oswego, New York, was conducted in accordance with coverage requirements set forth in the Project Instructions OPR-W386-TJ-22.

A.1 Survey Limits

Data were acquired within the following survey limits:

Northwest Limit	Southeast Limit
43° 32' 10.85" N 76° 23' 3.73" W	43° 46' 14.67" N 76° 41' 17.57" W

Table 1: Survey Limits

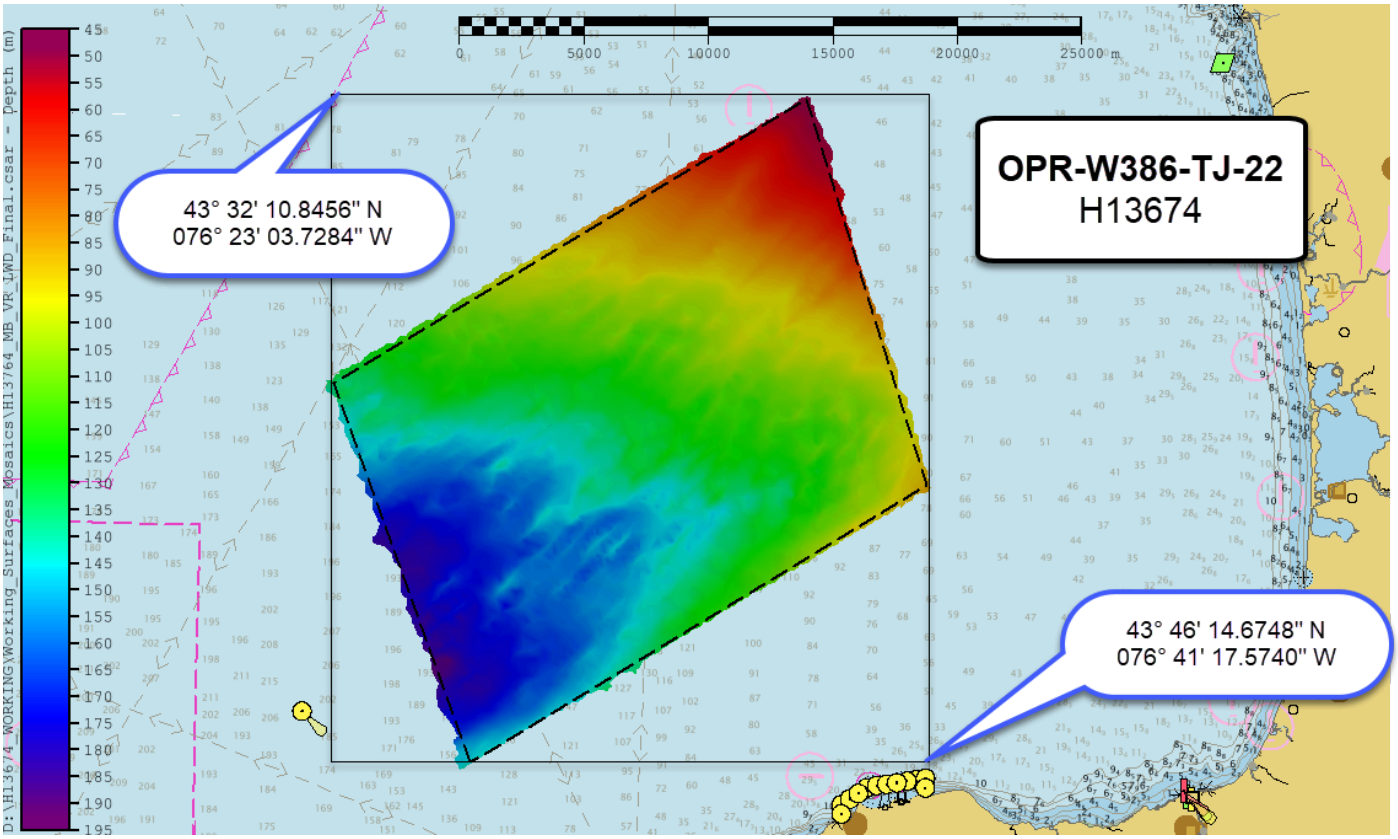


Figure 1: Survey layout for H13674 plotted over ENC US4NY20M and ENC US4NY22M. Dashed black outline represents the survey limits.

Survey data were acquired in accordance with the requirements set forth by the Project Instructions and the 2022 Hydrographic Survey Specifications and Deliverables (HSSD).

A.2 Survey Purpose

This survey is to support the proposed Lake Ontario National Marine Sanctuary (NMS) that would encompass over 1,700 square miles of eastern Lake Ontario. Originally nominated by four Lake Ontario counties, with support from New York State, the sanctuary would manage and protect underwater cultural resources. When designated (estimated in Fall of 2023), NOAA will start implementing its Management Plan. The plan includes surveying, inventorying, and documenting cultural resources; installing mooring buoys at some shipwreck sites; developing education and interpretive programs for schools and the public; creating a NOAA “presence” in the Lake Ontario communities; and promoting this area for tourism and economic development. As all Great Lakes waters are state-owned, NOAA will co-manage this with the State of New York. The Lake Ontario NMS would be the third NMS in the Great Lakes, following Thunder Bay in Lake Huron (designated in 2000) and Wisconsin Shipwreck Coast in Lake Michigan (designated in

2021). These three areas provide great opportunities to interpret the history of the Great Lakes and how it contributed to the growth of out nation.

A.3 Survey Quality

The entire survey is adequate to supersede previous data.

Complete coverage requirements were met utilizing 100% multibeam echo sounder (MBES) coverage as specified by the 2022 HSSD. Data acquired in H13674 meets survey quality standards specified in the 2022 HSSD, including crosslines (see Section B.2.1), NOAA allowable uncertainty (see Section B.2.10), and density requirements (see Section B.2.11).

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 acquisitions (Refer to HSSD Section 6.2)

Table 2: Survey Coverage

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

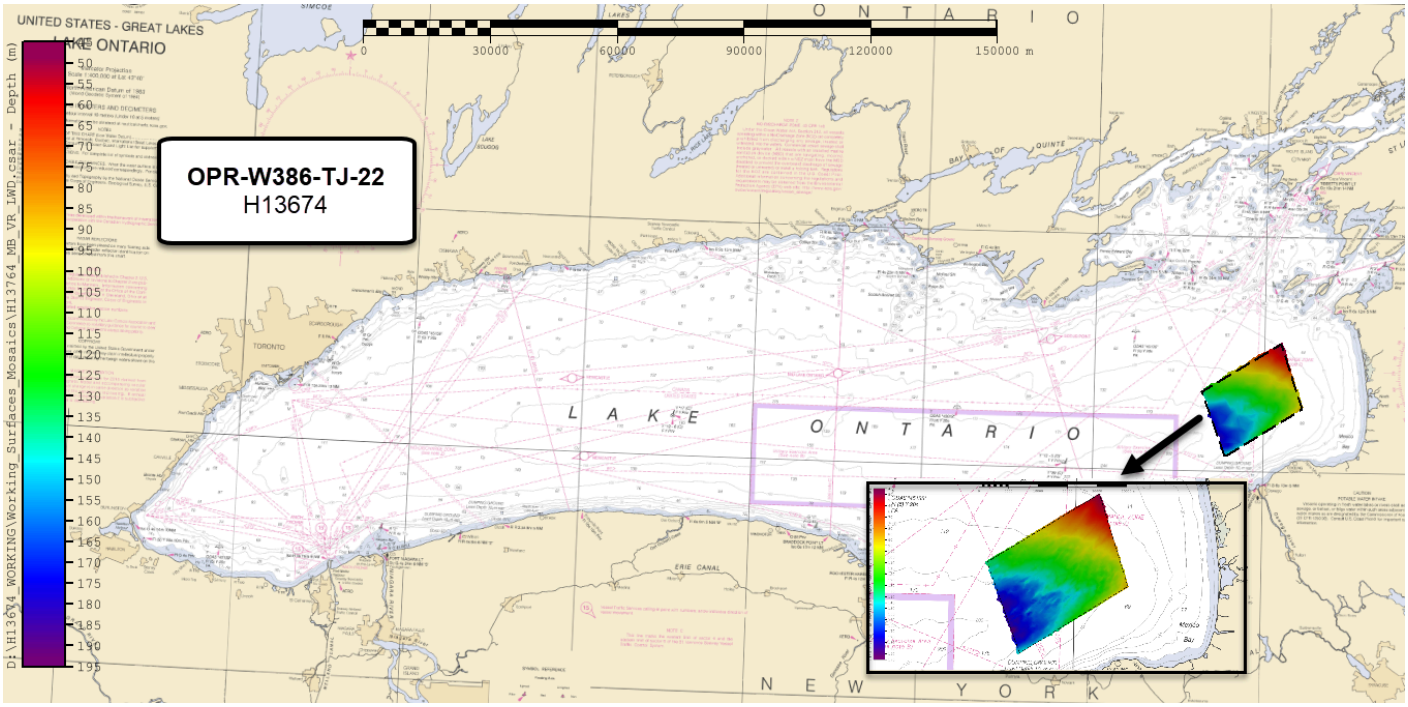


Figure 2: H13674 survey coverage overlaid on RNC 14800.

A.6 Survey Statistics

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

	HULL ID	*S-222*	*Total*
LNM	**SBES Mainscheme**	0.0	0.0
	MBES Mainscheme	708.3	708.3
	Lidar Mainscheme	0.0	0.0
	SSS Mainscheme	0.0	0.0
	SBES/SSS Mainscheme	0.0	0.0
	MBES/SSS Mainscheme	0.0	0.0
	SBES/MBES Crosslines	30.7	30.7
	Lidar Crosslines	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			104.2

Table 3: Hydrographic Survey Statistics

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

Survey Dates	Day of the Year
10/05/2022	278
10/06/2022	279

Survey Dates	Day of the Year
10/07/2022	280
10/08/2022	281
10/10/2022	283

Table 4: Dates of Hydrography

H13674 data was acquired using S-222 over five days.

Figure 3: NOAA Ship Thomas Jefferson (S-222).

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***
LOA	63.4 meters
Draft	4.6 meters

Table 5: Vessels Used

NOAA Ship Thomas Jefferson (S-222) is a Hydrographic Survey Vessel operated by the National Oceanic Atmospheric Administration and is home ported in Norfolk, VA (Figure 3).

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
AML Oceanographic	MVP200	Conductivity, Temperature, and Depth Sensor
AML Oceanographic	MVP-X	Conductivity, Temperature, and Depth Sensor
Applanix	POS MV 320 v5	Positioning and Attitude System
Valeport	Thru-Hull SVS	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

S-222 collected 30.7 linear nautical miles of MBES crosslines, or 4.3% of mainscheme MBES data. The 2022 HSSD Section 5.2.4.2 crosslines requirement of approximately 4% of mainscheme mileage was met. Crosslines that were collected show good temporal and geographic distribution across a variety of depth ranges, vessels, and water masses. A variable resolution (VR) Combined Uncertainty and Bathymetry Estimator (CUBE) surface of mainscheme data and a VR CUBE surface of crossline data were compared using the "Compare Grids" tool in Pydro Explorer 19 (Figure 4). The resulting mean was 0.01 meters with a standard deviation of 0.20 meters (Figure 5). Over 99.5% of nodes were compliant with IHO fraction of allowable error standards (Figure 6). A visual inspection of the difference surface indicated no systematic issues.

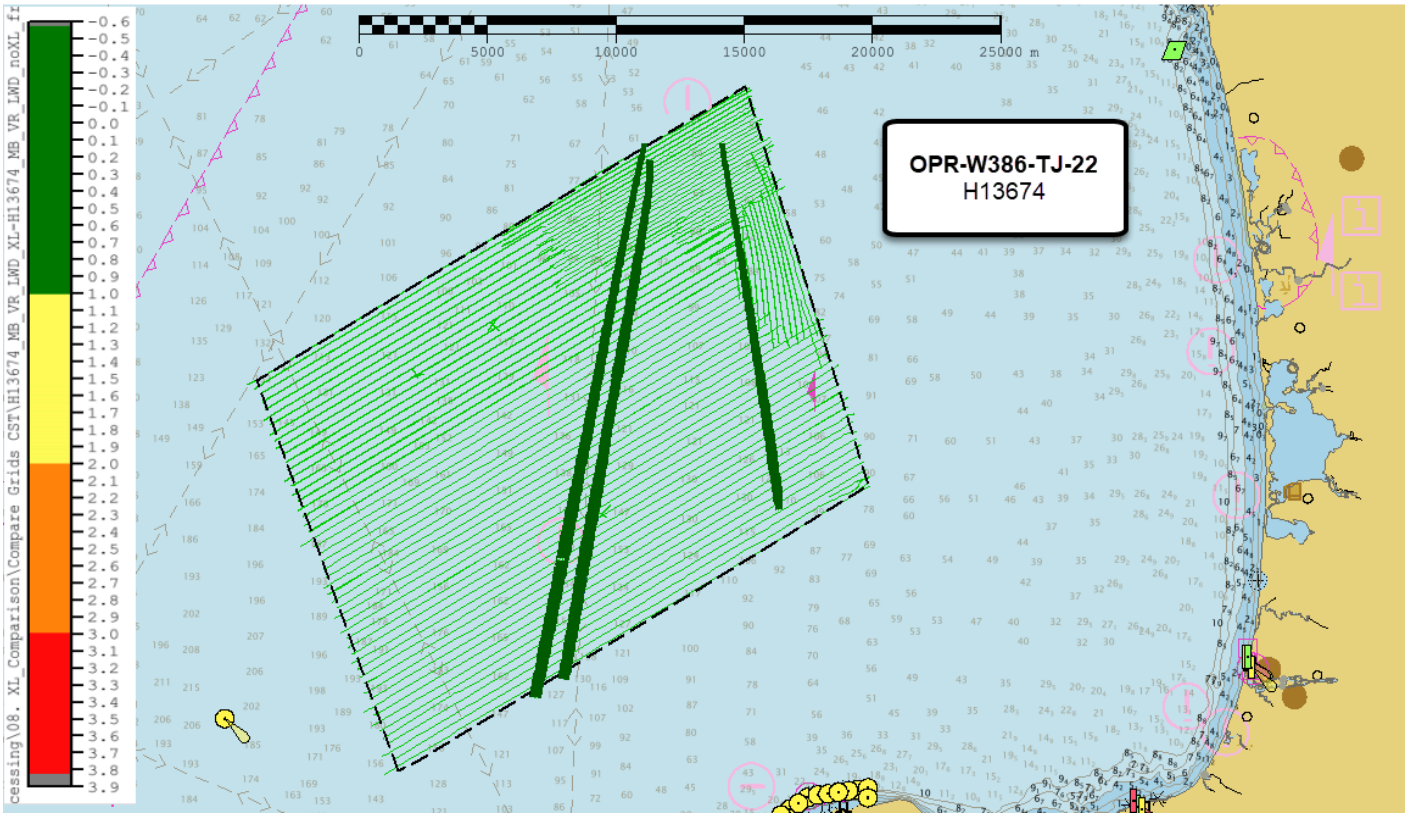
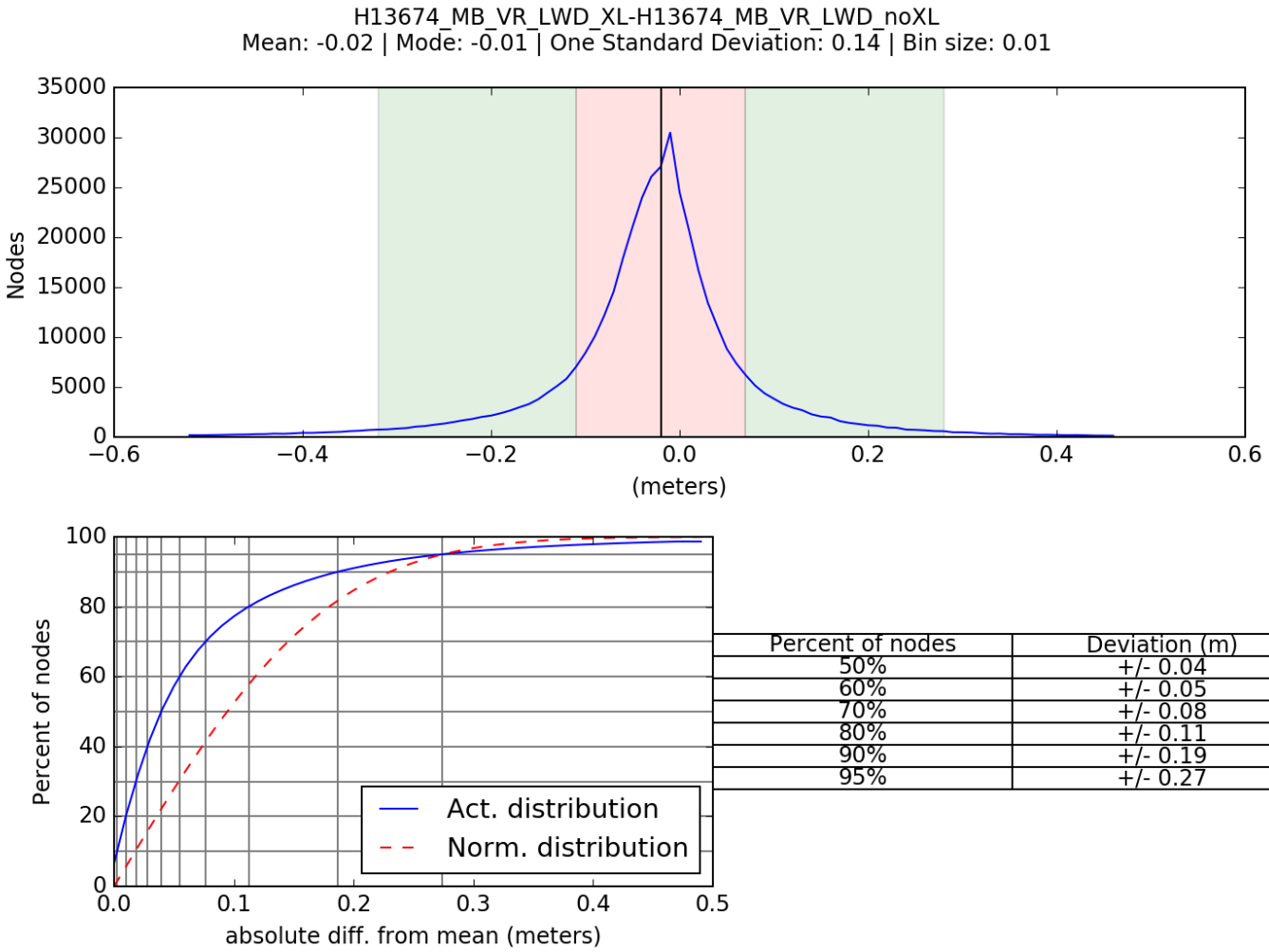


Figure 4: Overview of H13674 crosslines overlaid on survey tracklines, ENC US4NY20M, and ENC US4NY22M.



Percent of nodes	Deviation (m)
50%	+/- 0.04
60%	+/- 0.05
70%	+/- 0.08
80%	+/- 0.11
90%	+/- 0.19
95%	+/- 0.27

Figure 5: H13674 crossline and mainscheme comparison statistics.

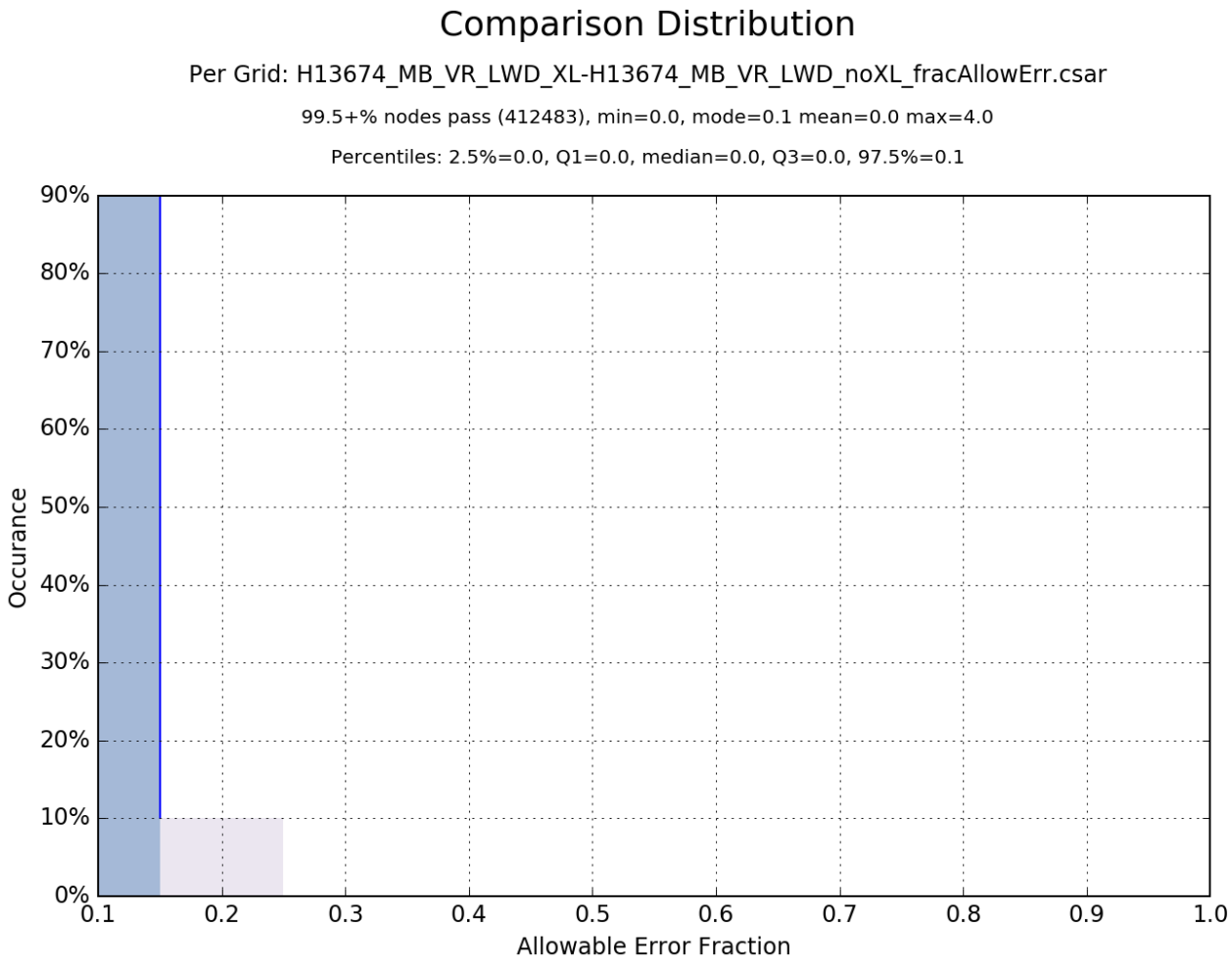


Figure 6: H13674 crossline fraction of allowable error statistics.

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
S-222	N/A meters/second	4.0 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 7).

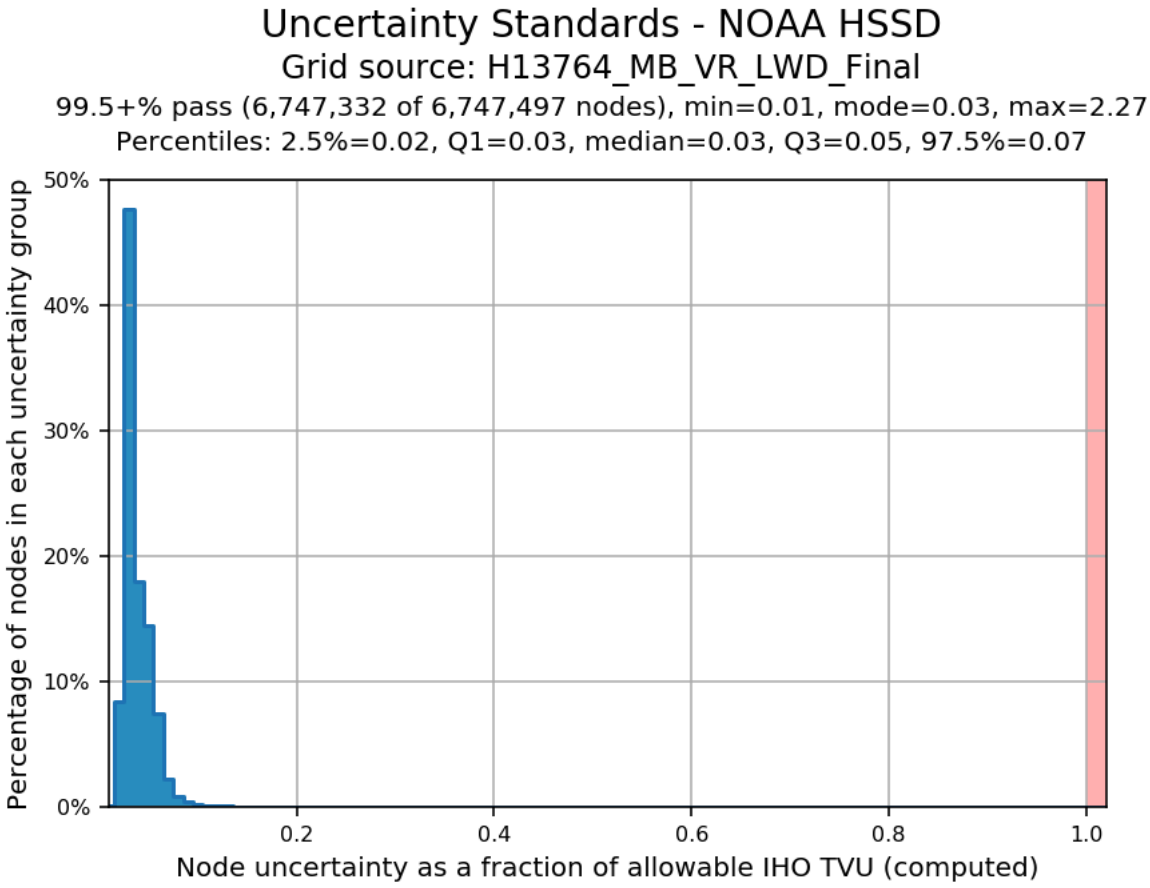


Figure 7: H13674 uncertainty standards.

B.2.3 Junctions

H13674 junctions with two contemporary surveys conducted by NOAA Ship Thomas Jefferson within project OPR-W386-TJ-22 (Figure 8).

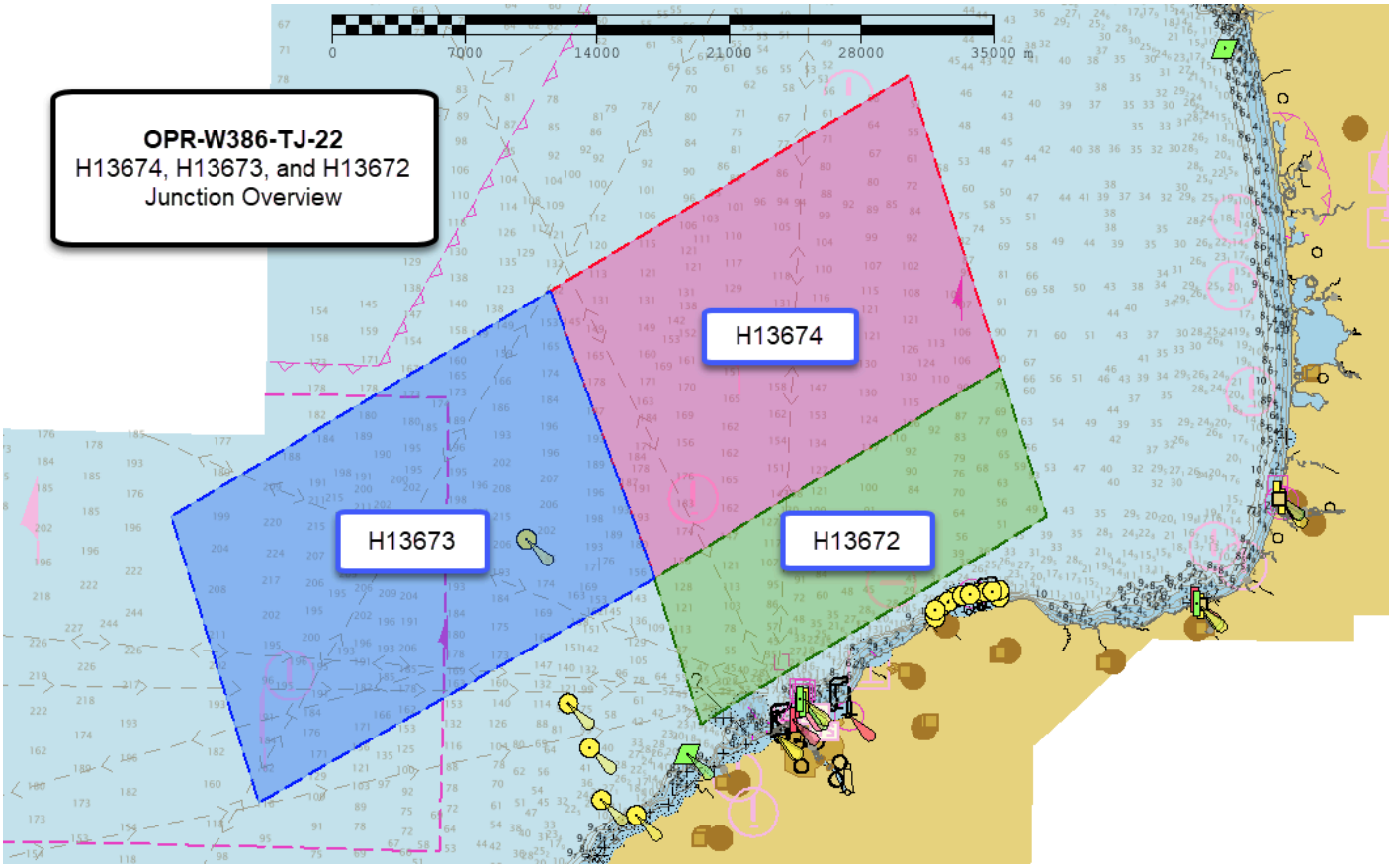


Figure 8: Overview of the contemporary survey junctions for H13674. Two surveys junction with this area, H13672 and H13673.

The following junctions were made with this survey:

Registry Number	Scale	Year	Field Unit	Relative Location
H13672	1:40000	2022	NOAA Ship Thomas Jefferson	S
H13673	1:40000	2022	NOAA Ship Thomas Jefferson	W

Table 9: Junctioning Surveys

H13672

The southern border of sheet H13674 junctions with sheet H13672. A Variable Resolution (VR) CUBE surface of H13674 data and a VR CUBE surface of H13672 data were differenced (Figure 9). The mean difference between bathymetric surface nodes was 0.06 meters with a standard deviation of 0.24 meters (Figure 10). 100% of nodes are compliant with fraction of allowable error standards (Figure 11). Statistics and visual inspection indicate that surveys H13674 and H13672 are in general agreement.

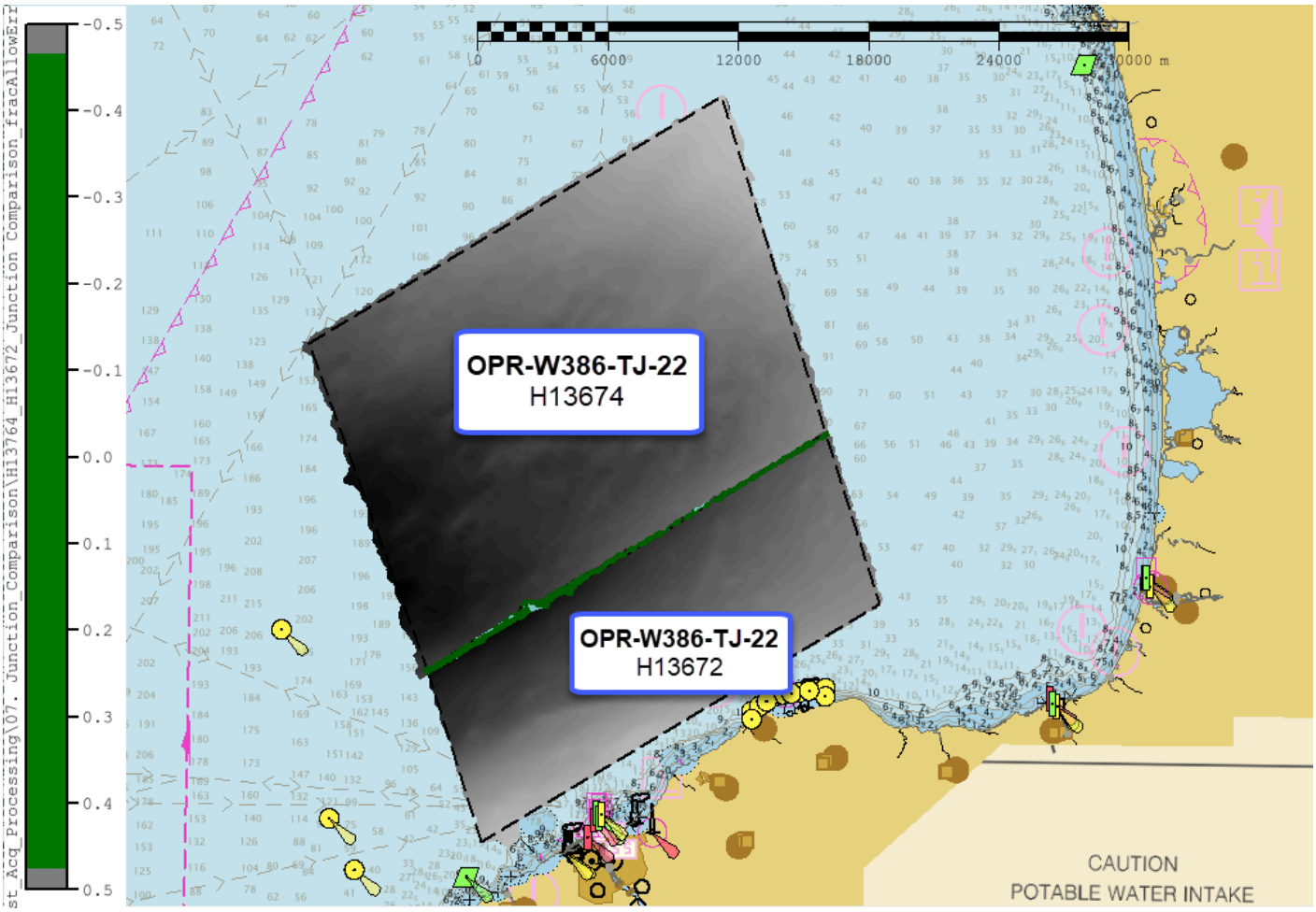
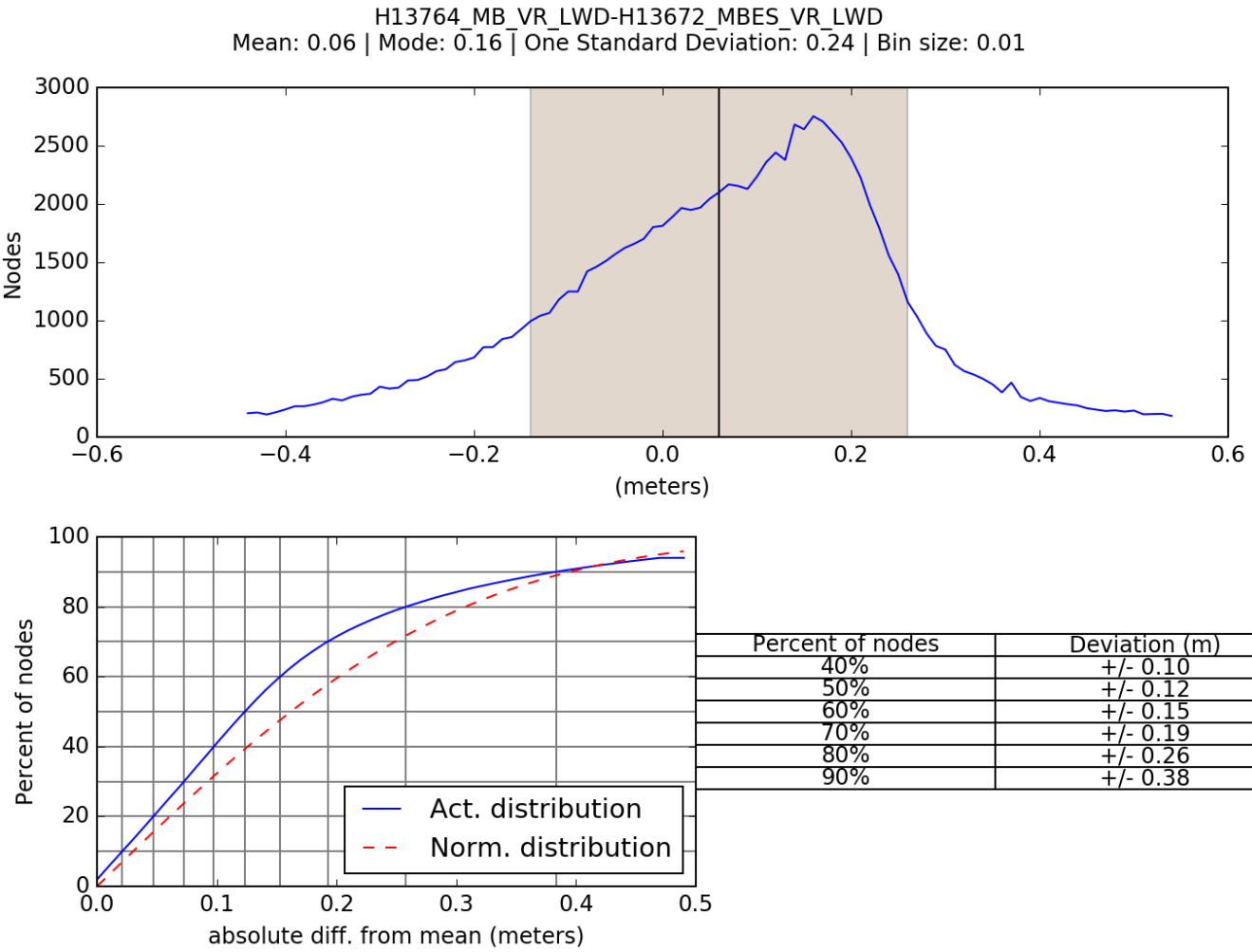


Figure 9: Fraction of allowable error surface difference comparison in color between H13674 and H13672 plotted over ENC US4NY20M and ENC US4NY22M.



Percent of nodes	Deviation (m)
40%	+/- 0.10
50%	+/- 0.12
60%	+/- 0.15
70%	+/- 0.19
80%	+/- 0.26
90%	+/- 0.38

Figure 10: H13674 and H13672 surface difference comparison statistics.

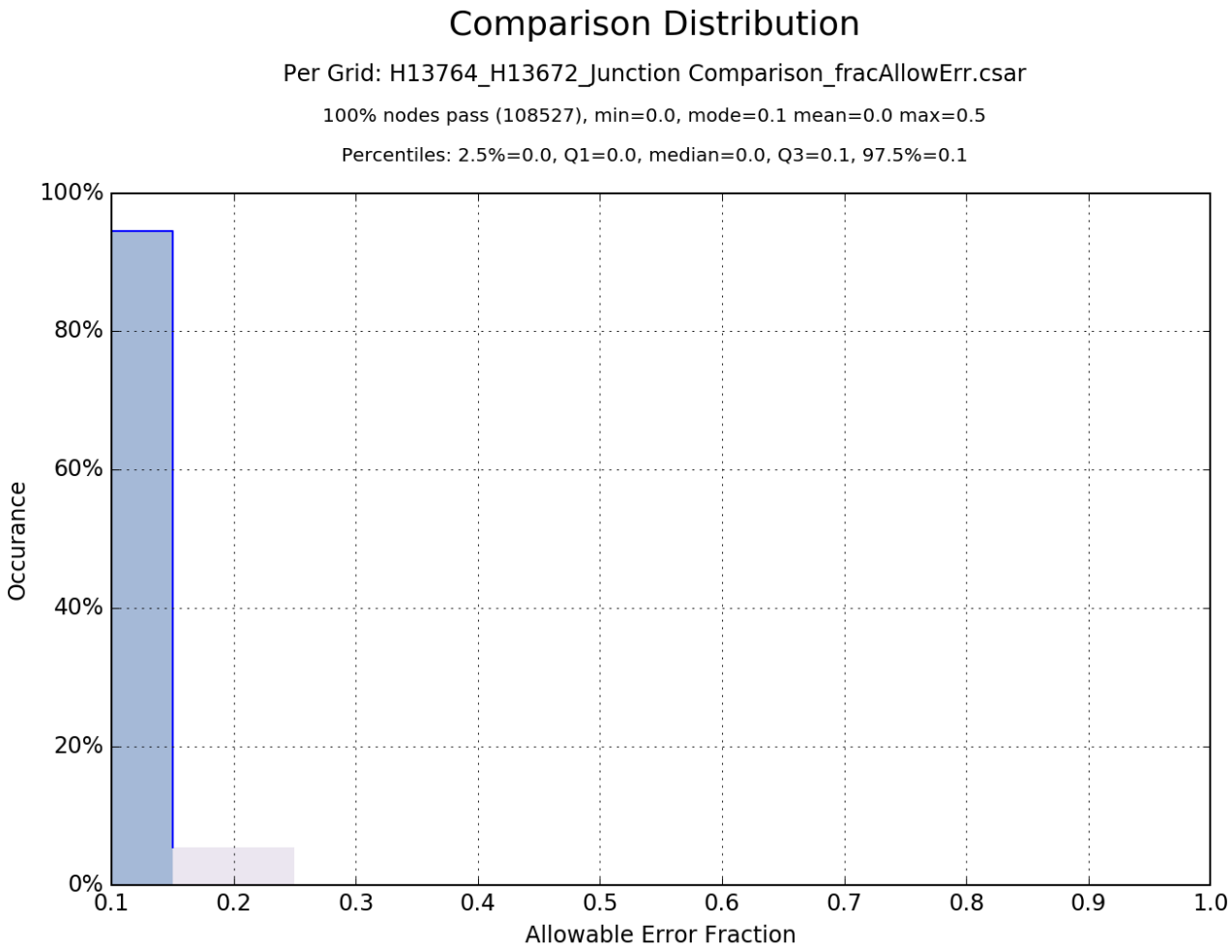


Figure 11: H13674 and H13672 fraction of allowable error statistics.

H13673

Please refer to the descriptive report for OPR-W386-TJ-22 H13673 for the 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: 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 acquisition using a MVP 200. Cast frequency was increased in areas where a change in surface sound speed great than two meters per second existed. All sound speed methods used are detailed in the DAPR.

A total of 48 sound speed profiles were collected as part of the acquisition of H13674 and display spatial and depth diversity (Figure 12). MVP casts on S-222 were conducted at an average interval of 90 minutes, guided by observation of the surface sound speed and targeted to deeper areas. All sound speed methods were used as detailed in the DAPR. One of these casts was located outside the sheet limit, approximately 273 meters away from the assigned survey limits. Sound Speed Profiles acquired are representative of the entire survey area. 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.

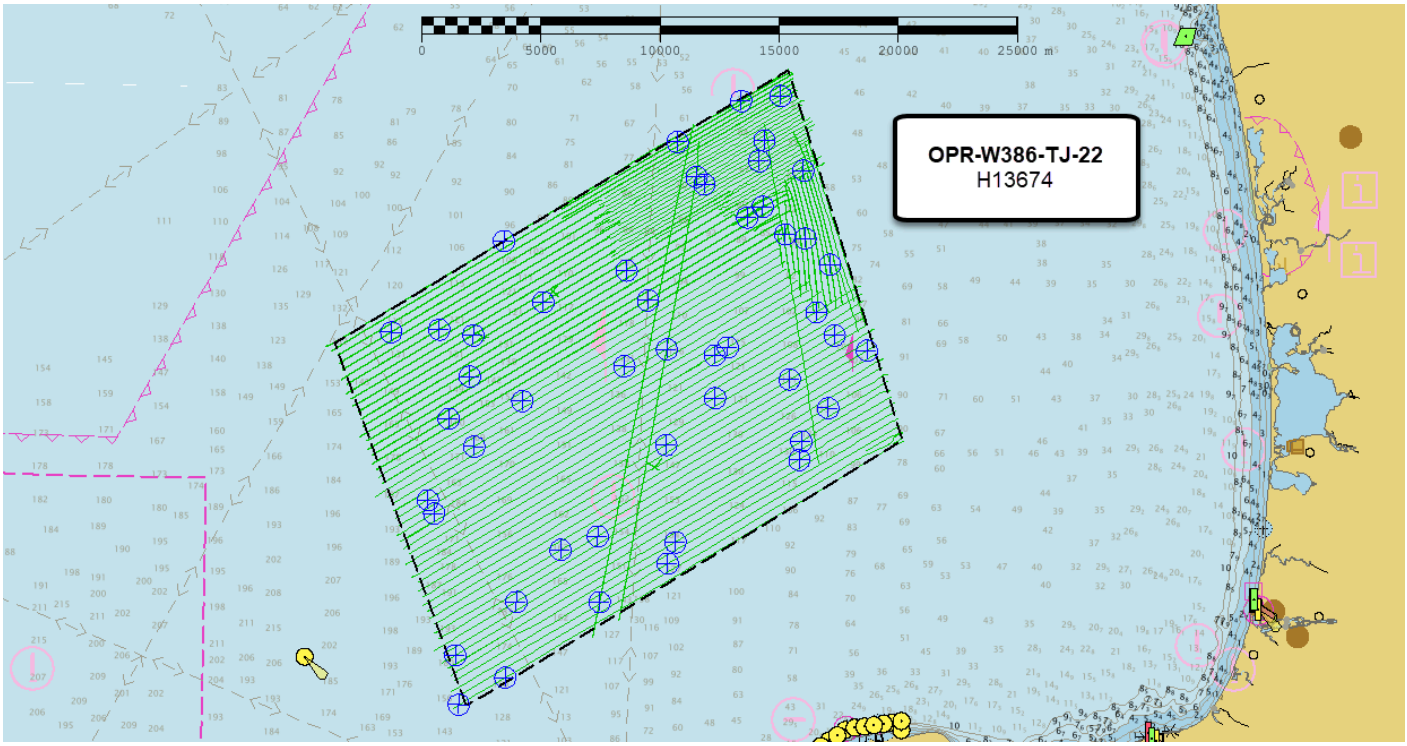


Figure 12: Overview of all sound speed casts collected on H13674 overlaid on chart US4NY20M. Cast locations shown as blue targets overlaid on survey tracklines.

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

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 logged as part of the .all file of the Kongsberg EM2040 systems acquired by S-222. Backscatter was processed in QPS Fledermaus GeoCoder Toolbox (FMGT) software, and exported geotiff's are included in the final processed data package (Figure 13).

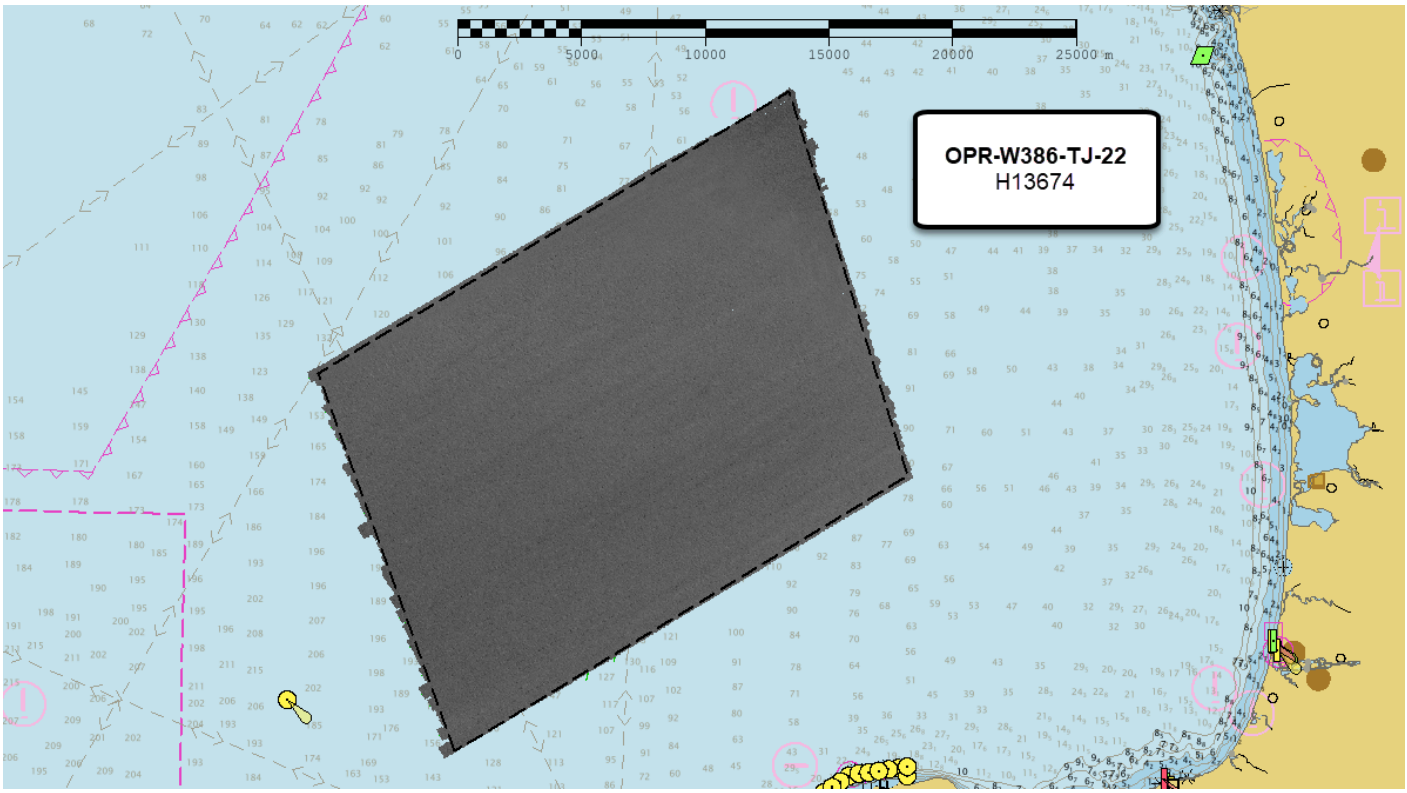


Figure 13: 300 kHz backscatter mosaic from data acquired by S-222.

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 used is 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
H13674_MB_VR_LWD	CARIS VR Surface (CUBE)	Variable Resolution	48.4 meters - 193.1 meters	NOAA_VR	Complete MBES
H13674_MB_VR_LWD_Final	CARIS VR Surface (CUBE)	Variable Resolution	48.4 meters - 193.1 meters	NOAA_VR	Complete MBES
H13674_MBAB_2m_S222_300kHz_1of1	MB Backscatter Mosaic	2 meters	-	N/A	Complete MBES

Table 10: Submitted Surfaces

H13674_MB_VR_LWD_Final uncertainty layer is resolved from the maximum H13674_MB_VR_LWD nodal TVU standard deviation values. Complete Coverage requirements were met by 100% Multibeam Beam Echo Sounder (MBES) coverage as specified under section 5.2.2.2 of the 2022 HSSD. There is one holiday present in the coverage achieved (Figure 14). All bathymetric grids for H13674 meet density requirements per the 2022 HSSD (Figure 15).

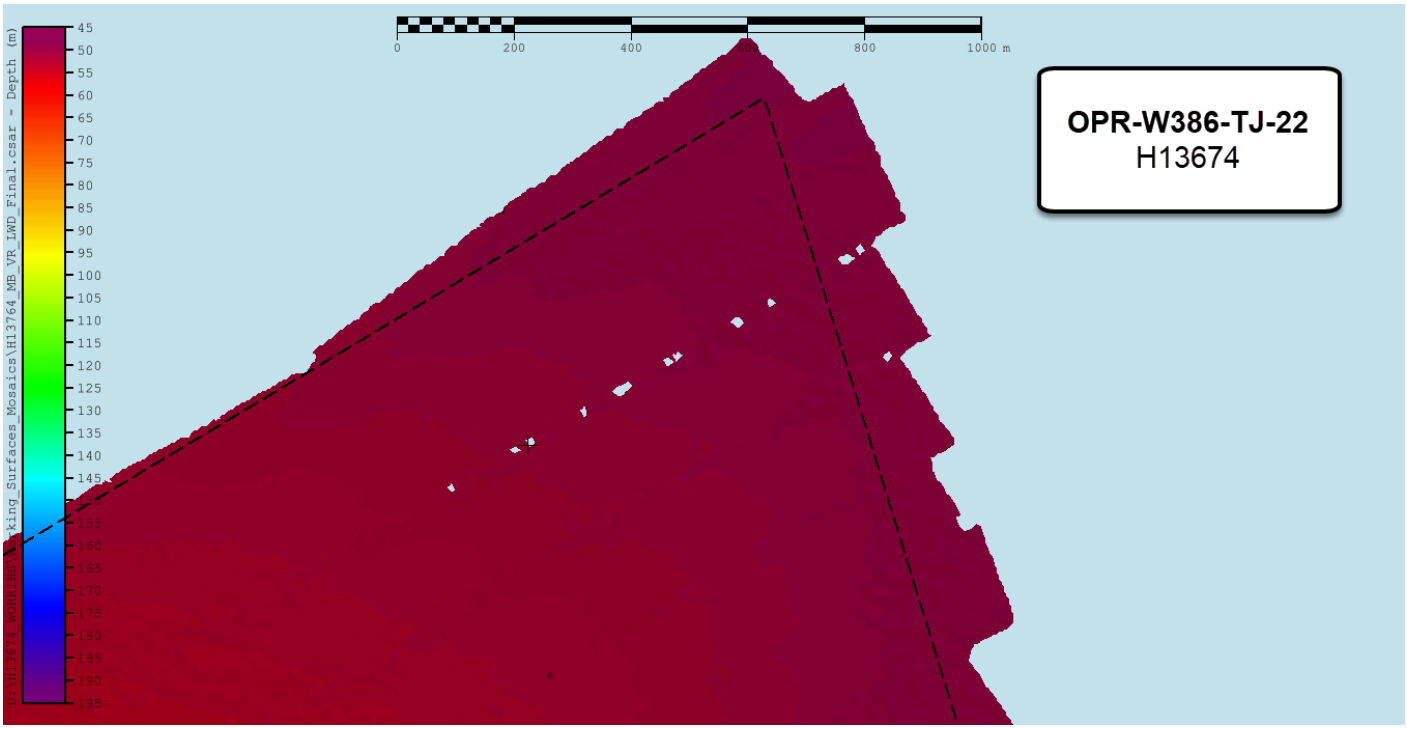


Figure 14: Image of holiday present in the northeast corner of the coverage achieved.

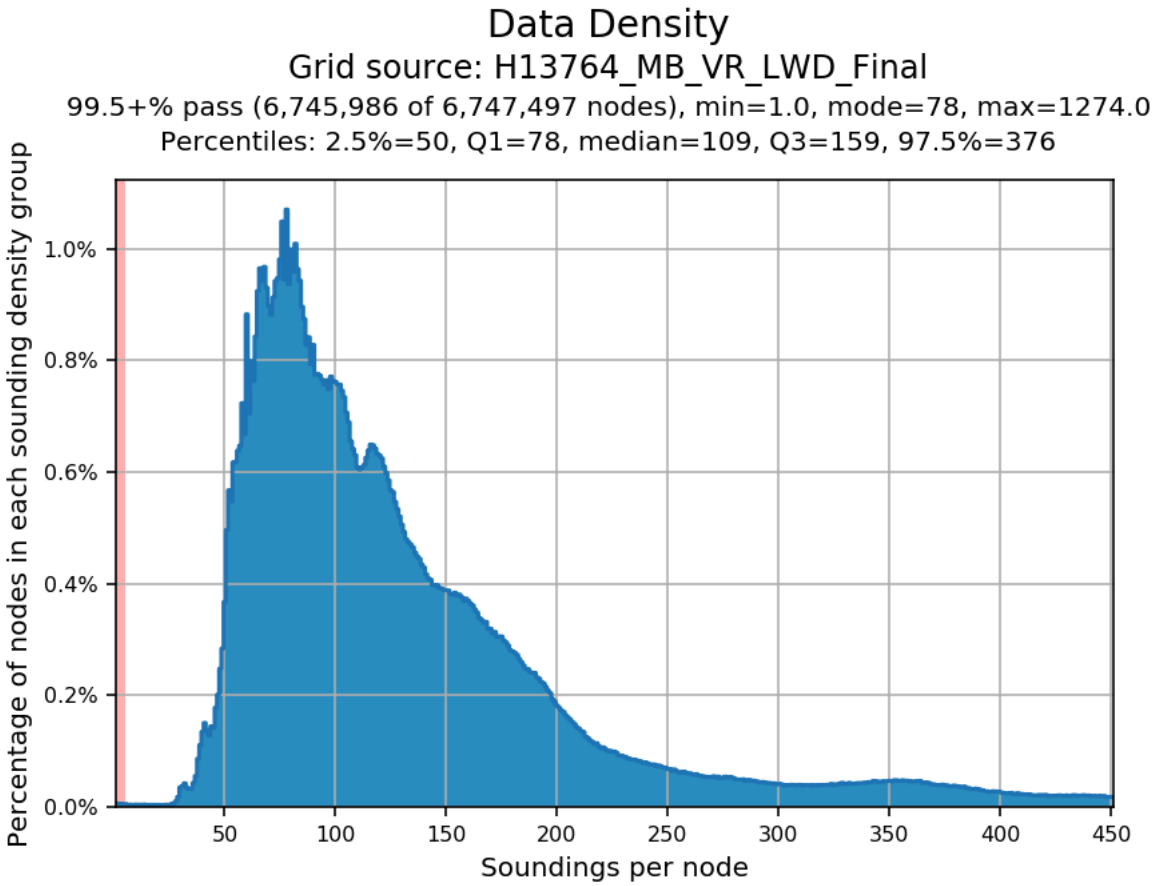


Figure 15: H13674 data density.

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 H13674.

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 H13674 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 18.

RTK

Trimble PP-RTX service was used with an Applanix POS MV v5 system and POSPac MMS software for ERS control in accordance with the 2022 HSSD for H13674 MBES data from S-222.

WAAS

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

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
US4NY20M	1:80000	120	06/15/2021	06/15/2021
US4NY22M	1:80000	120	06/15/2021	06/15/2021

Table 12: Largest Scale ENCs

D.1.2 Shoal and Hazardous Features

Surveyed soundings and contours were compared against previously charted data on ENC US4NY20M and ENC US4NY22M. Depth values were found to be in general agreement with previously charted soundings. The hydrographer believes the surveyed soundings do not pose a hazard to navigation. No danger of navigation reports were submitted for this survey. All data acquired on H13674 are recommended to supersede prior data.

D.1.3 Charted Features

No charted features exist for this survey.

D.1.4 Uncharted Features

Three uncharted features were identified and investigated. None of the features were considered dangerous to navigation. Reference the Final Feature File (FFF) included with the submission of this project 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

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

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	01/30/2023	JASKOSKI.MATTHEW JACOB.1275636262 2023.01.30 11:22:51 -05'00'
Sydney M. Catoire, LT/NOAA	Field Operations Officer	01/30/2023	CATOIRE.SYDNEY.MARIE.1120060623 Digitally signed by CATOIRE.SYDNEY.MARIE.1120060623 Date: 2023.01.30 08:47:01 -05'00'
Erin K. Cziraki	Chief Survey Technician	01/30/2023	CZIRAKI.ERIN.KAYE.1550015338 Digitally signed by CZIRAKI.ERIN.KAYE.1550015338 Date: 2023.01.30 09:12:30 -05'00'
Cara L. Geiger, ENS/NOAA	Sheet Manager	01/30/2023	GEIGER.CARA.LYNN.1548230051 Digitally signed by GEIGER.CARA.LYNN.1548230051 Date: 2023.01.30 11:27:10 -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