H13673

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

DESCRIPTIVE REPORT

Type of Survey:	Navigable Area
Registry Number:	H13673

LOCALITY

State(s):	New York
General Locality:	Lake Ontario
Sub-locality:	12 NM Northwest of Oswego

2022

CHIEF OF PARTY
Matthew J. Jaskoski, CDR/NOAA

LIBRARY & ARCHIVES

Date:

U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION	REGISTRY NUMBER:
HYDROGRAPHIC TITLE SHEET	**H13673**

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:	**12 NM Northwest of Oswego**
Scale:	**40000**
Dates of Survey:	**10/09/2022 to 10/12/2022**
Instructions Dated:	**07/08/2022**
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 Mean Lower Low Water**

Remarks:

Any revisions to the Descriptive Report (DR) applied during office processing are shown in red italic text. The DR is maintained as a field unit product, therefore all information and recommendations within this report are considered preliminary unless otherwise noted. The final disposition of survey data is represented in the NOAA nautical chart products. All pertinent records for this survey are archived at the National Centers for Environmental Information (NCEI) and can be retrieved via https:// www.ncei.noaa.gov/.

Products created during office processing were generated in WGS84 UTM 18N, MLLW. All references to other horizontal or vertical datums in this report are applicable to the processed hydrographic data provided by the field unit.

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Descriptive Report to Accompany Survey H13673

Project: OPR-W386-TJ-22

Locality: Lake Ontario

Sublocality: 12 NM Northwest of Oswego

Scale: 1:40000

October 2022 - October 2022

NOAA Ship *Thomas Jefferson*

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

A. Area Surveyed

The survey area is referred to as H13673, "12 NM Northwest of Oswego" (sheet 18) in the Project Instructions (PIs) for OPR-W386-TJ-22. The survey area is approximately 108 square nautical miles.

A.1 Survey Limits

Data were acquired within the following survey limits:

Northwest Limit	Southeast Limit
42° 11' 11" N 80° 32' 21" W	42° 12' 40" N 80° 8' 20" W

Table 1: Survey Limits

Data were acquired within the assigned survey limits as required in the Project Instructions and in the 2022 Hydrographic Survey Specifications and Deliverables (HSSD) 2022 unless otherwise noted in this report. See figure below for overview of sheet limits.

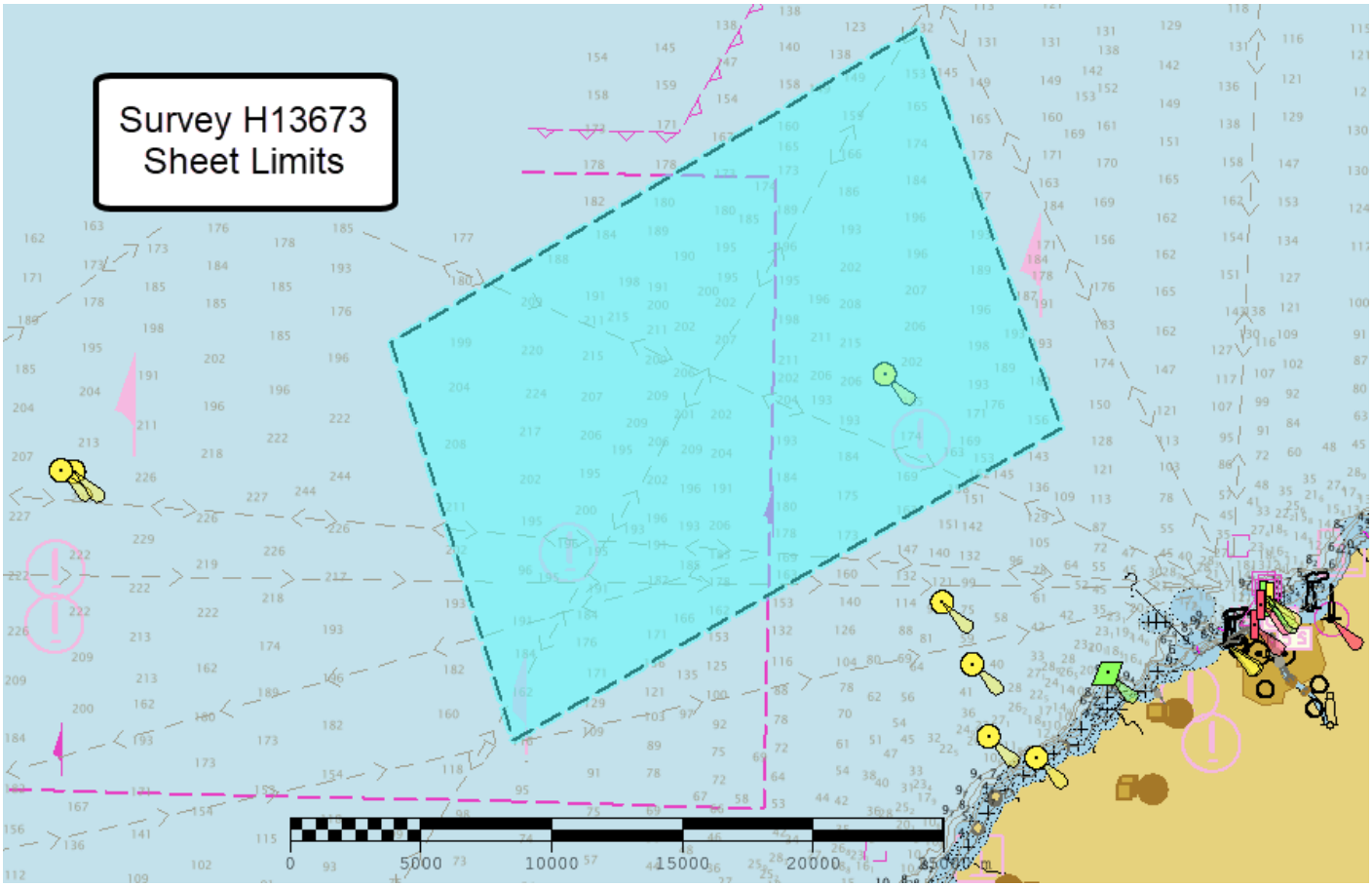


Figure 1: H13673 assigned survey area (Chart US4NY22M and USNY23M).

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 (designation 2000) and Wisconsin Shipwreck Coast in Lake Michigan (designated in 2021). These three areas provide an amazing opportunity to interpret the history of the Great Lakes and how it contributed to the growth of our nation.

A.3 Survey Quality

The entire survey is adequate to supersede previous data.

Data acquired in H13673 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 HSSD Section 5.2.2.3)
All waters in survey area	Acquire backscatter data during all multibeam data

Table 2: Survey Coverage

Survey coverage was acquired in accordance with the 2022 HSSD. Object detection coverage requirements were met with 100% multibeam (MBES) or full MBES coverage. Survey coverage was extended beyond the assigned western side of the assigned sheet limits. This was done as a bridge team training exercise over the charted deepest depth in lake Ontario. See image below for more detail on the extents of survey coverage.

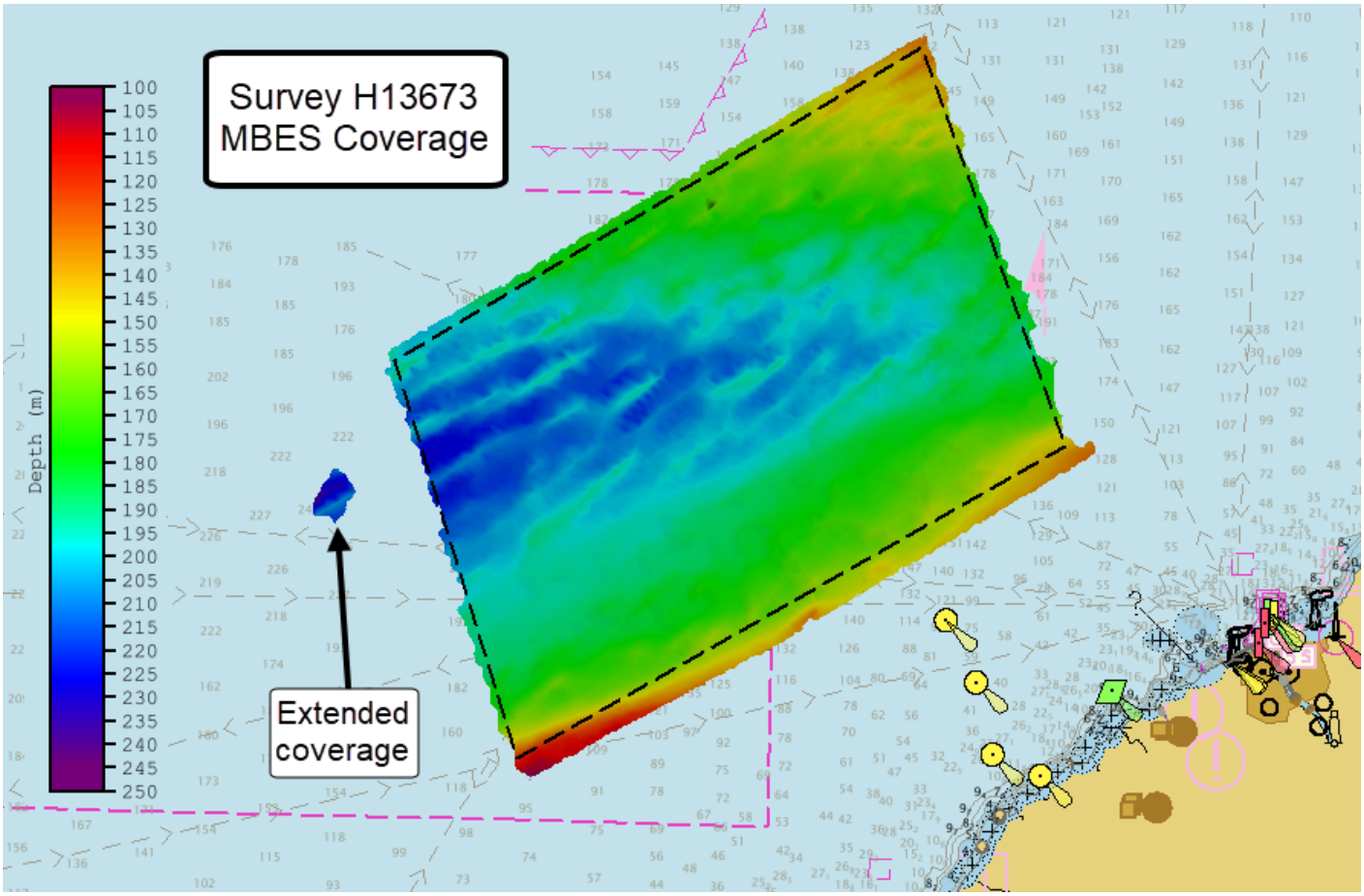


Figure 2: H13673 MBES coverage and assigned survey limits.

A.6 Survey Statistics

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

	HULL ID	*S222*	*Total*
LNM	**SBES Mainscheme**	0	0
	MBES Mainscheme	494.2	494.2
	Lidar Mainscheme	0	0
	SSS Mainscheme	0	0
	SBES/SSS Mainscheme	0	0
	MBES/SSS Mainscheme	0	0
	SBES/MBES Crosslines	34.8	34.8
	Lidar Crosslines	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			121.64

Table 3: Hydrographic Survey Statistics

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

Survey Dates	Day of the Year
10/09/2022	282
10/10/2022	283

Survey Dates	Day of the Year
10/11/2022	284
10/12/2022	285

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	***S-222***
LOA	63.4 meters
Draft	4.6 meters

Table 5: Vessels Used

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

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
AML Oceanographic	MVP200	Sound Speed System
AML Oceanographic	MVP-X	Conductivity, Temperature, and Depth Sensor
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

Thomas Jefferson acquired 34.8 nautical miles of multibeam crosslines or 7.0 % of mainscheme lines across most depth ranges and multiple boat days. H13673 crossline data is adequate for verifying and evaluating the internal consistency of survey data. The Compare Grids function in Pydro Explorer analyzed finalized variable resolution (VR) surfaces of H13673 crossline-only data and mainscheme-only data. In the difference surface, the resulting mean was -0.05 m with a standard deviation of 0.28 m; 100 % of nodes met IHO allowable Total Vertical Uncertainty (TVU) standards. See figures below for specific details on crossline analysis.

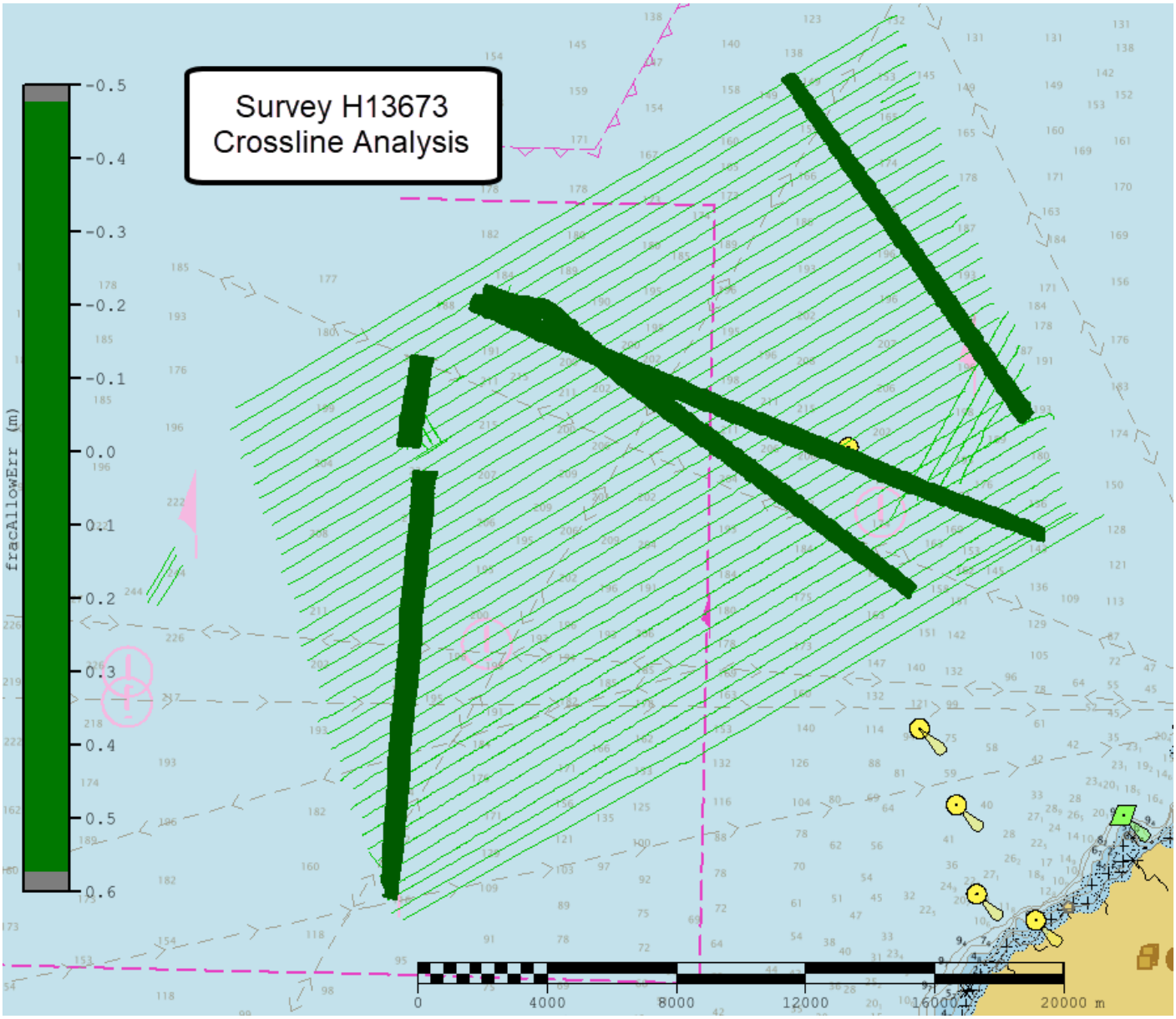
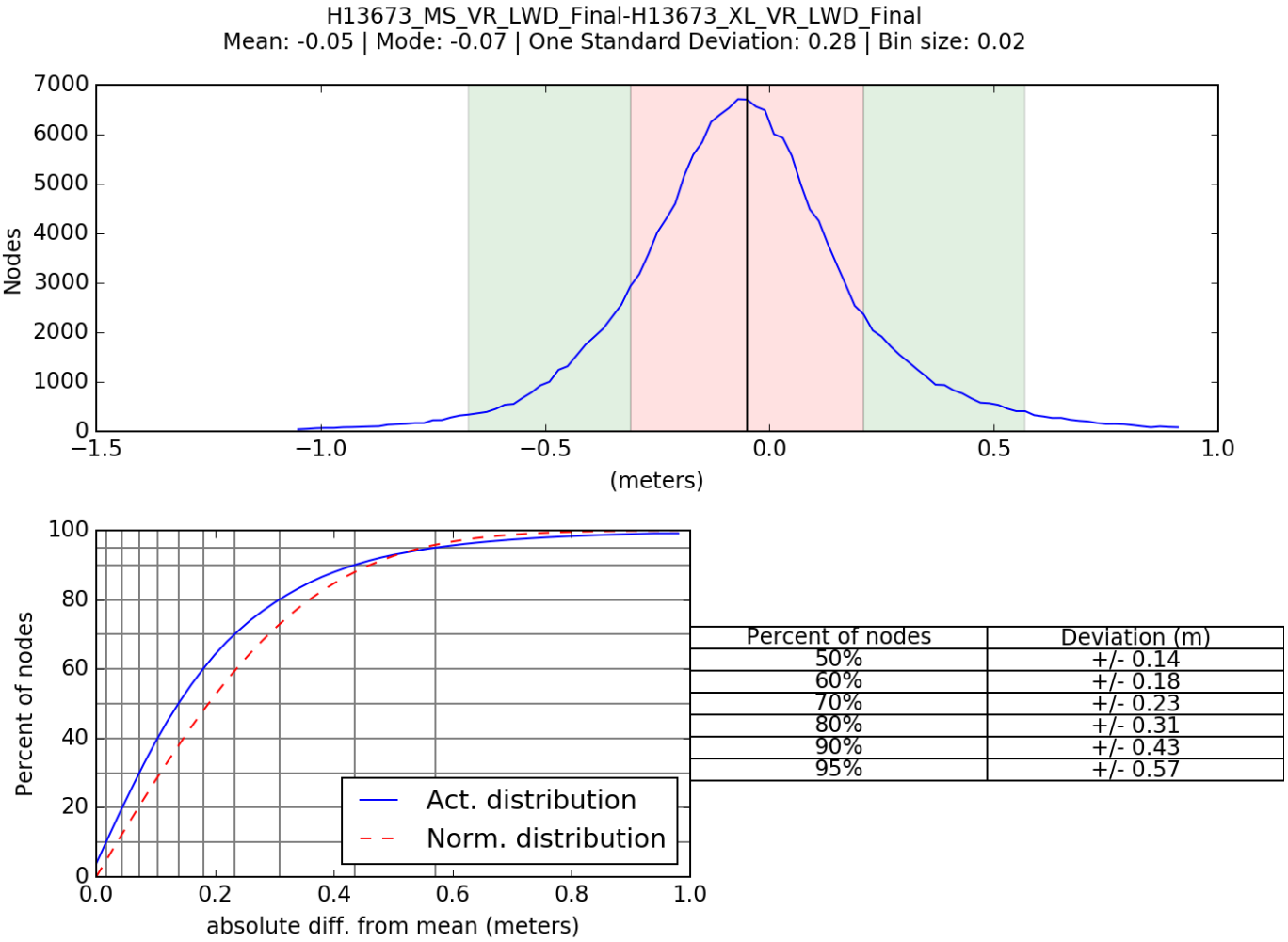


Figure 4: H13673 crossline surface overlaid on mainscheme tracklines.



Percent of nodes	Deviation (m)
50%	+/- 0.14
60%	+/- 0.18
70%	+/- 0.23
80%	+/- 0.31
90%	+/- 0.43
95%	+/- 0.57

Figure 5: Pydro derived plot showing absolute difference.

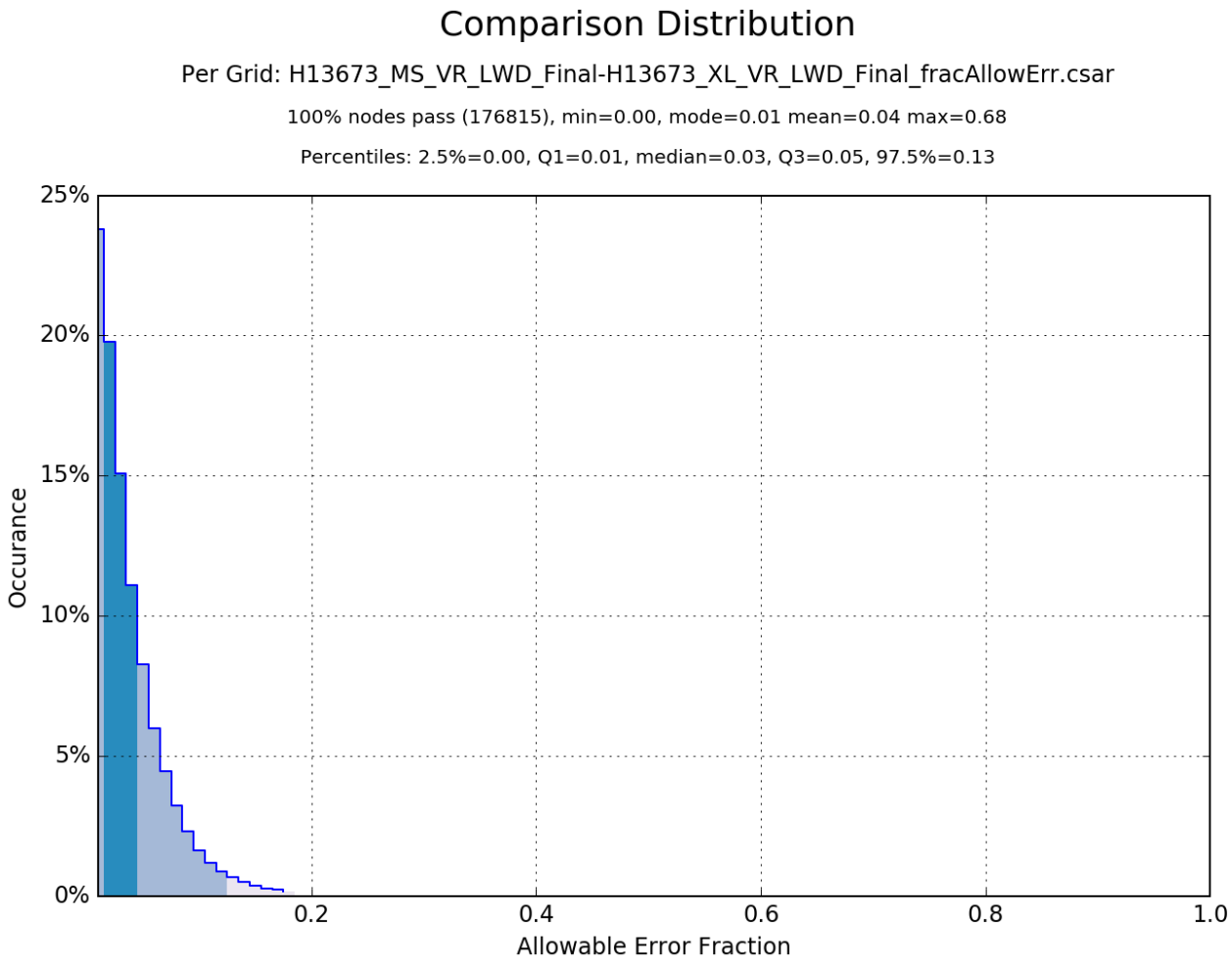


Figure 6: Pydro derived plot showing percentage-pass value of H13673 mainscheme to crossline data.

B.2.2 Uncertainty

The following survey specific parameters were used for this survey:

Method	Measured	Zoning
ERS via VDATUM	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.

B.2.3 Junctions

Survey H13673 junctions with two contemporary surveys conducted by NOAA Ship Thomas Jefferson. Comparisons were made using the Compare Grids program within Pydro Explorer.

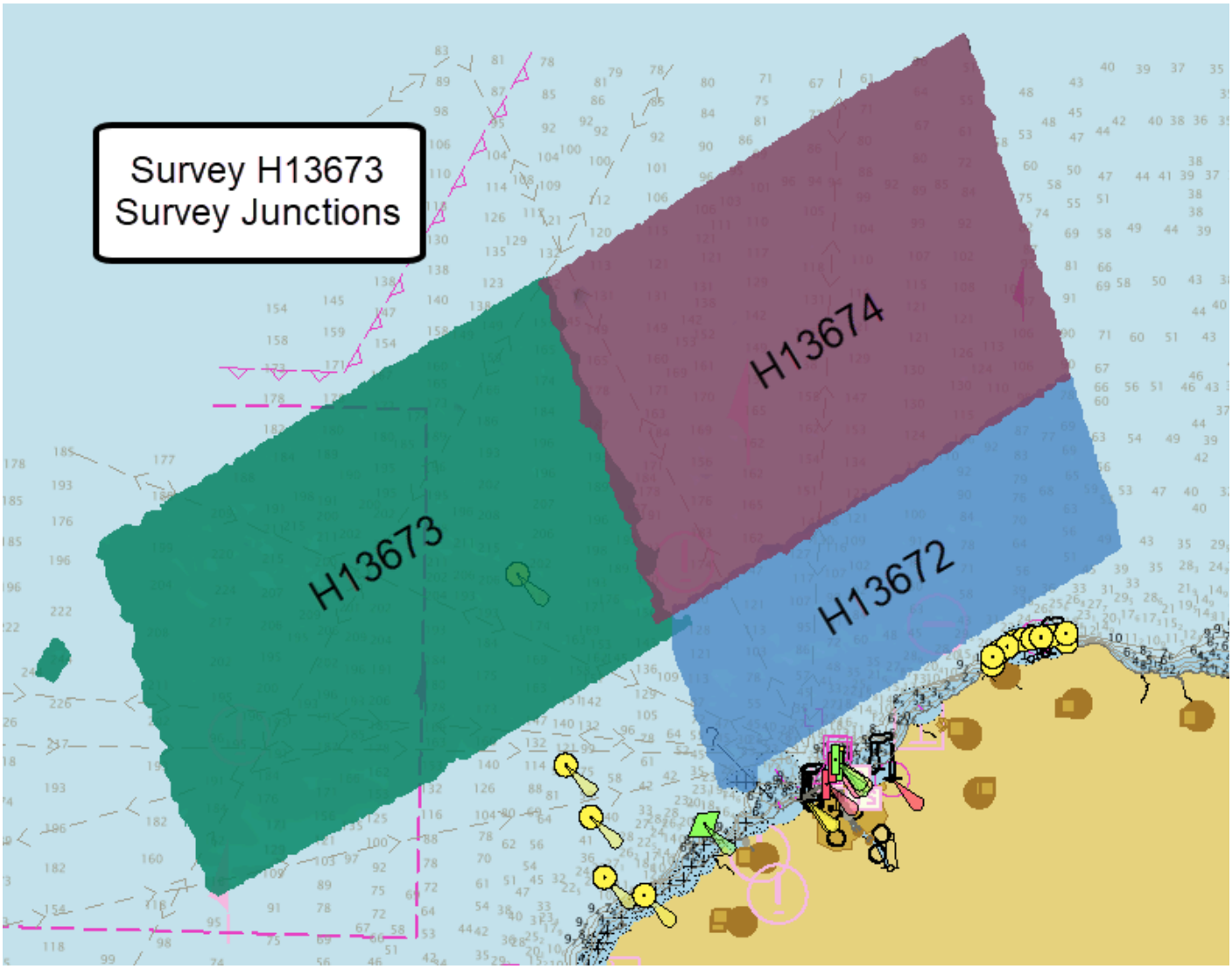


Figure 7: Overview of H13673 junctions.

The following junctions were made with this survey:

Registry Number	Scale	Year	Field Unit	Relative Location
H13674	1:40000	2022	TJ	E
H13672	1:40000	2022	TJ	SE

Table 9: Junctioning Surveys

H13674

The junction with 2022 survey H13674 encompassed approximately 2.47 square nautical miles along the eastern boundary of H13673. Pydro's Compare Grids results showed that 99.5+% of nodes in the common area met NOAA allowable error standards. Analysis of the difference surface indicated that H13674 is an average of -0.08 meters deeper than H13673 with a standard deviation of 0.27 meters. See below graphs for more information.

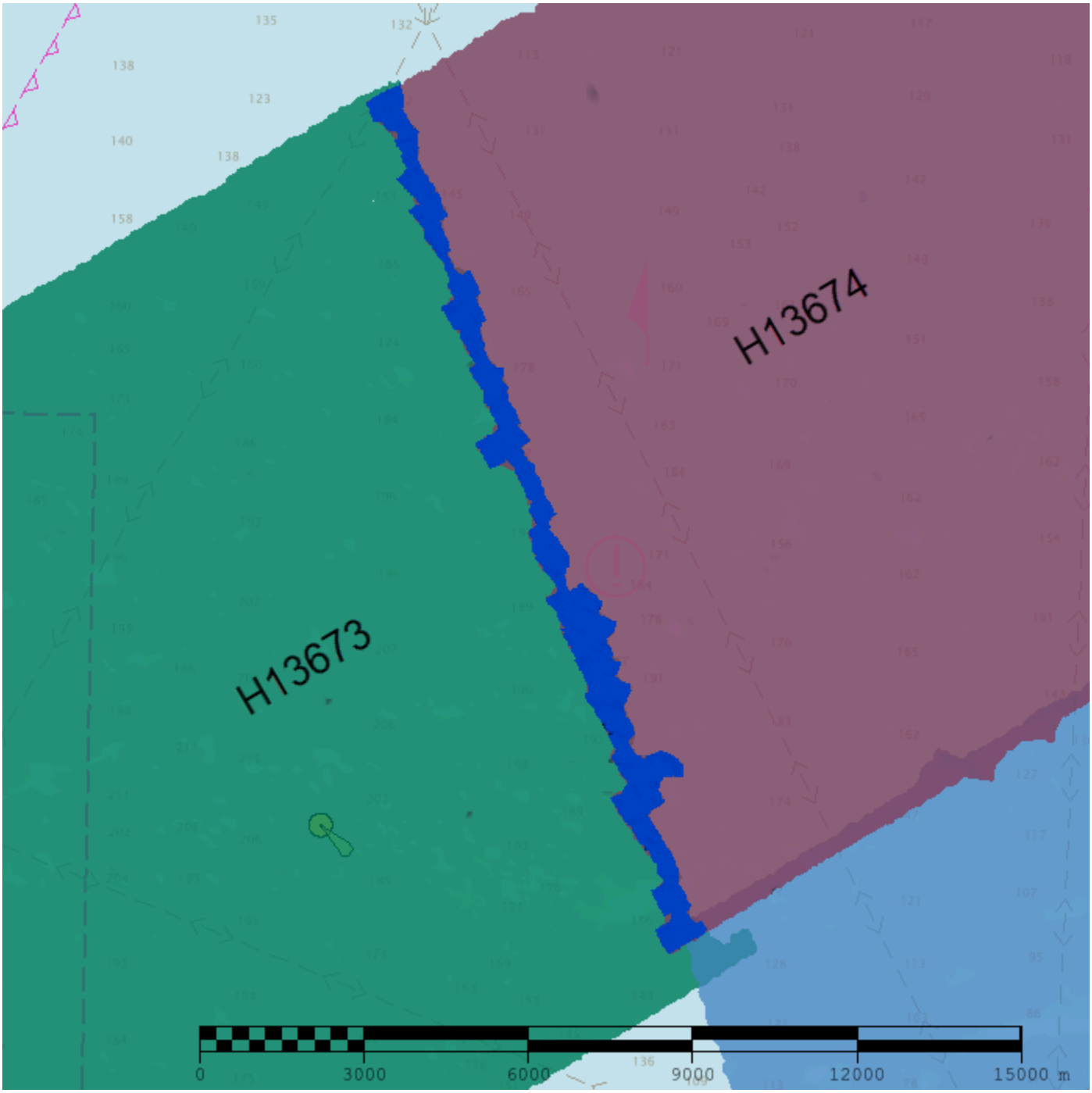


Figure 8: Overview of survey junction between H13673 and H13674.

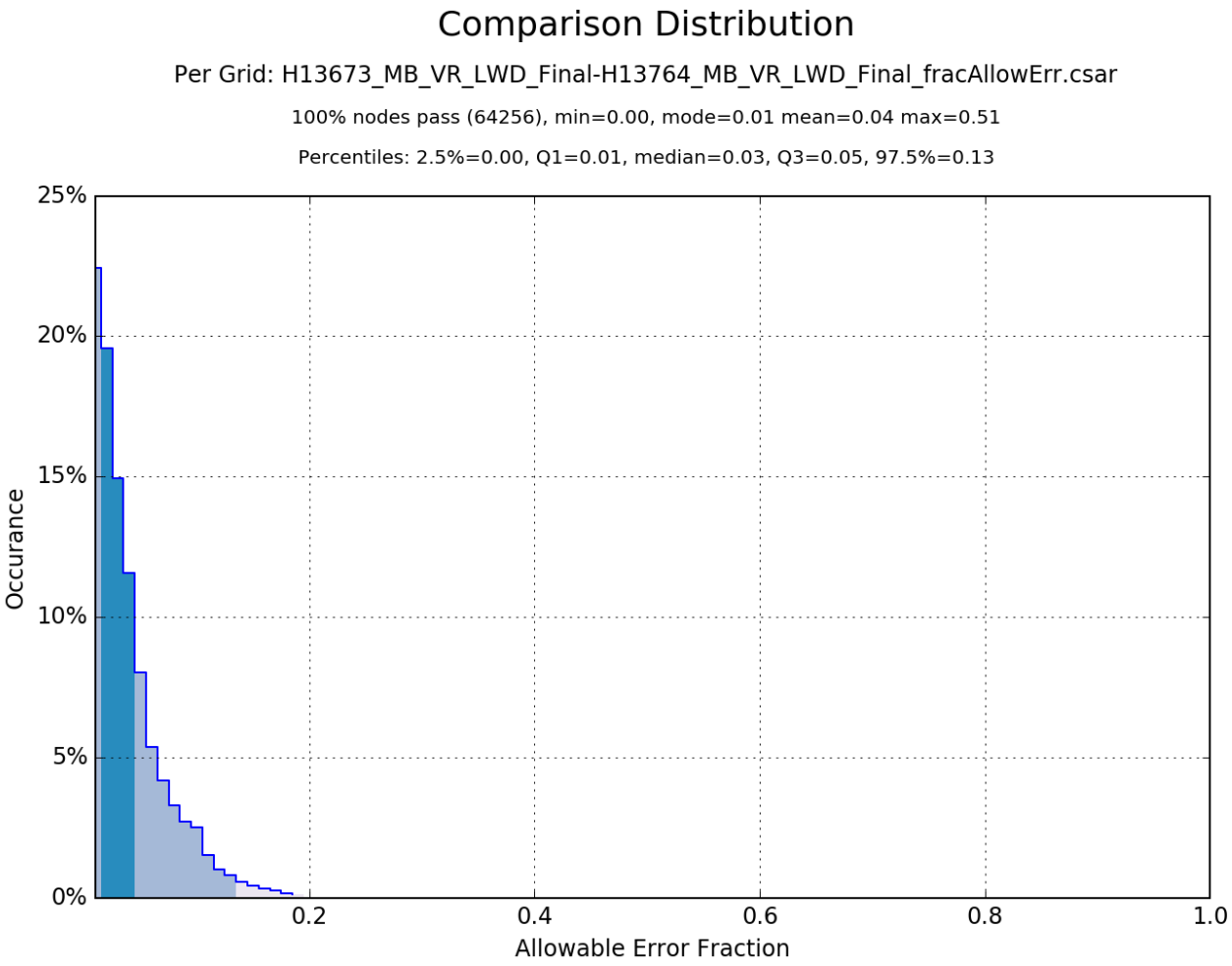
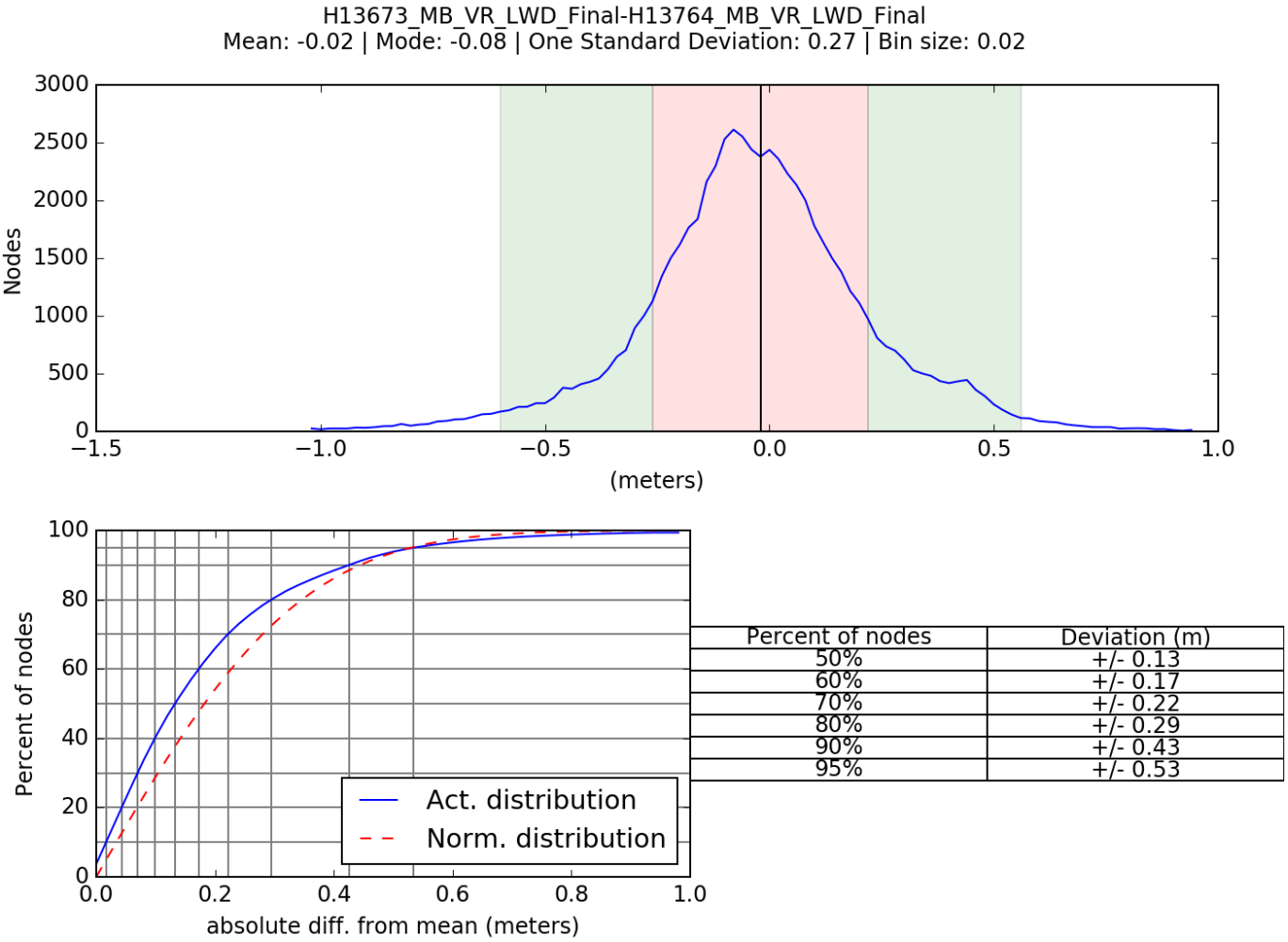


Figure 9: Pydro derived plot showing allowable error between H13673 and H13674.



Percent of nodes	Deviation (m)
50%	+/- 0.13
60%	+/- 0.17
70%	+/- 0.22
80%	+/- 0.29
90%	+/- 0.43
95%	+/- 0.53

Figure 10: Pydro derived plot showing H13673 and H13674 comparison statistics.

H13672

The junction with 2022 survey H13672 encompassed approximately 0.27 square nautical miles along the eastern boundary of H13673. Pydro's Compare Grids results showed that 99.5+% of nodes in the common area met NOAA allowable error standards. Analysis of the difference surface indicated that H13673 is an average of 0.06 meters deeper than H13672 with a standard deviation of 0.25 meters. See below graphs for more information.

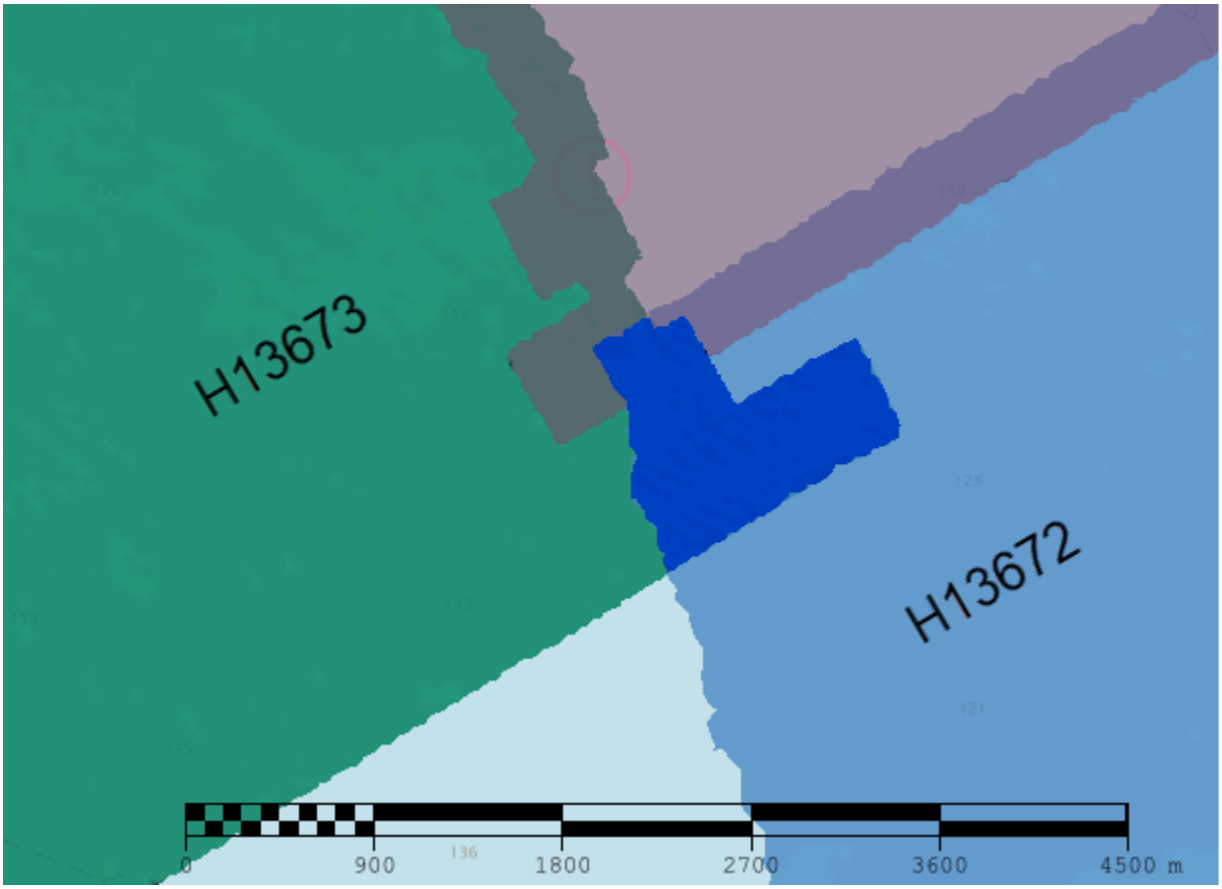


Figure 11: Overview of survey junction between H13673 and H13672.

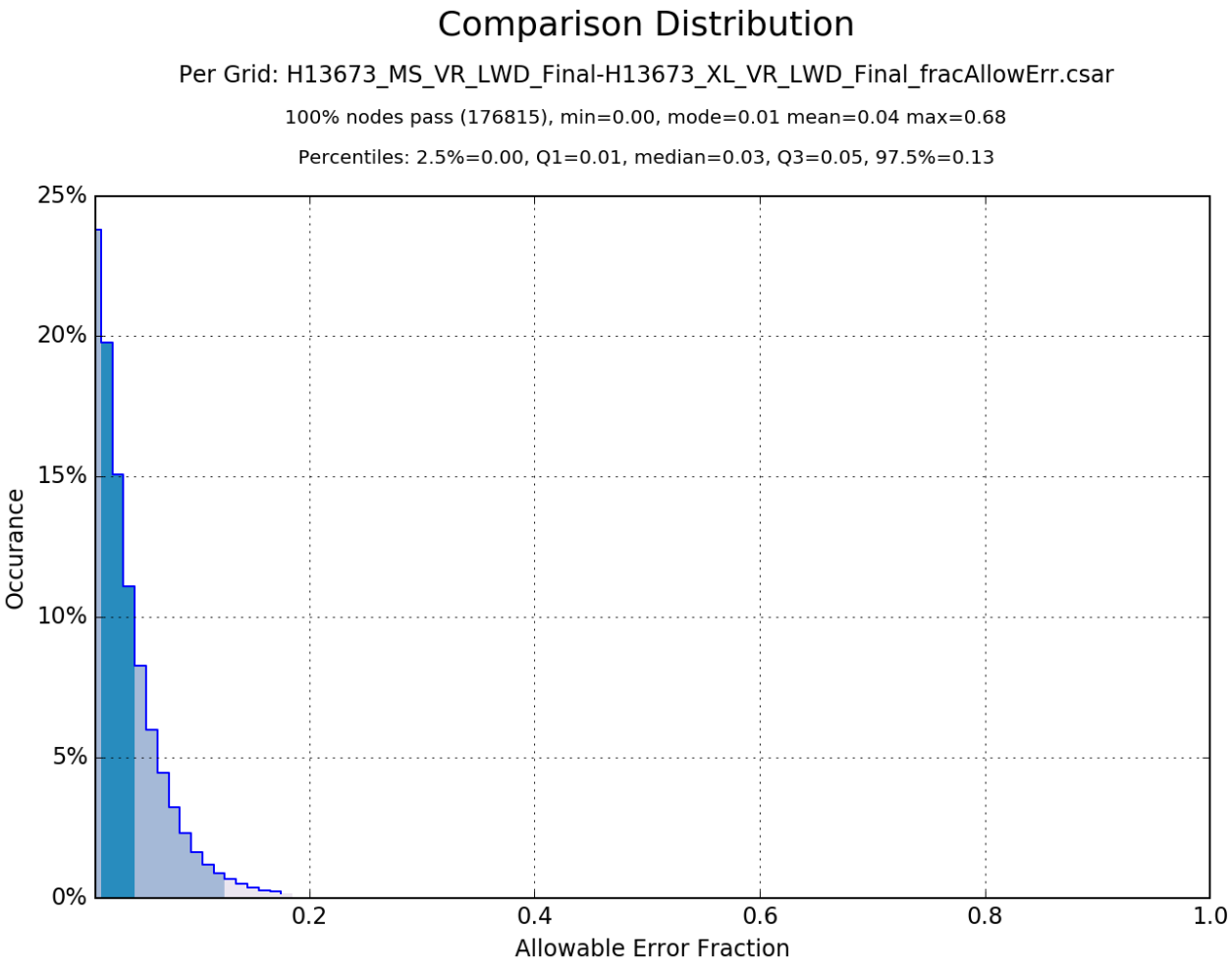
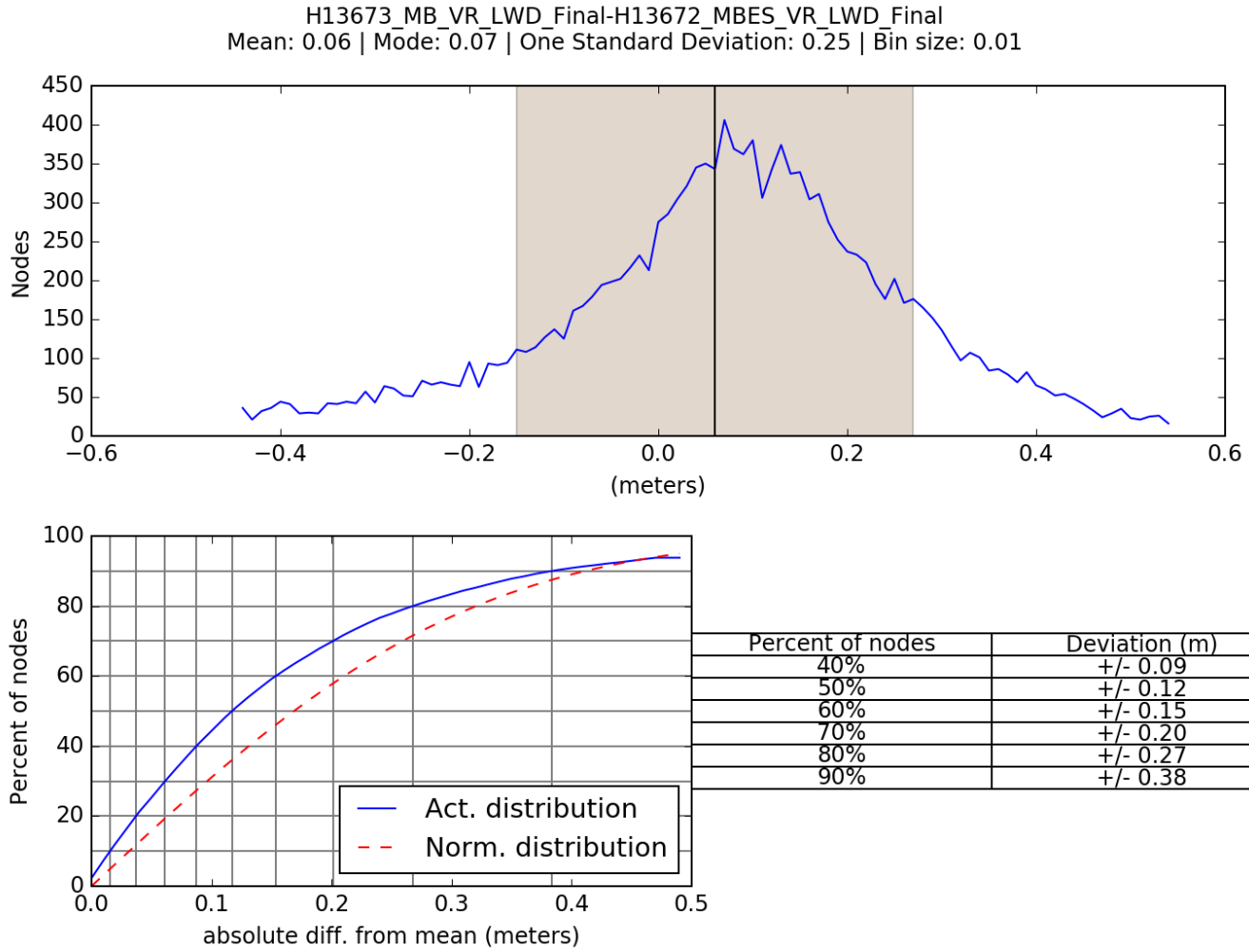


Figure 12: Pydro derived plot showing allowable error between H13673 and H13672.



Percent of nodes	Deviation (m)
40%	+/- 0.09
50%	+/- 0.12
60%	+/- 0.15
70%	+/- 0.20
80%	+/- 0.27
90%	+/- 0.38

Figure 13: Pydro derived plot showing H13673 and H13672 comparison statistics.

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: 37 sound speed profiles were acquired for this survey at discrete locations within the survey area at least once every four hours, when significant changes in surface sound speed were observed, or when operating in a new area. Sound speed profiles were acquired using the Odim Brooke Ocean MVP200. All casts were concatenated into a master file and applied to MBES data using the "Nearest distance within time" (4 hours) profile selection method.

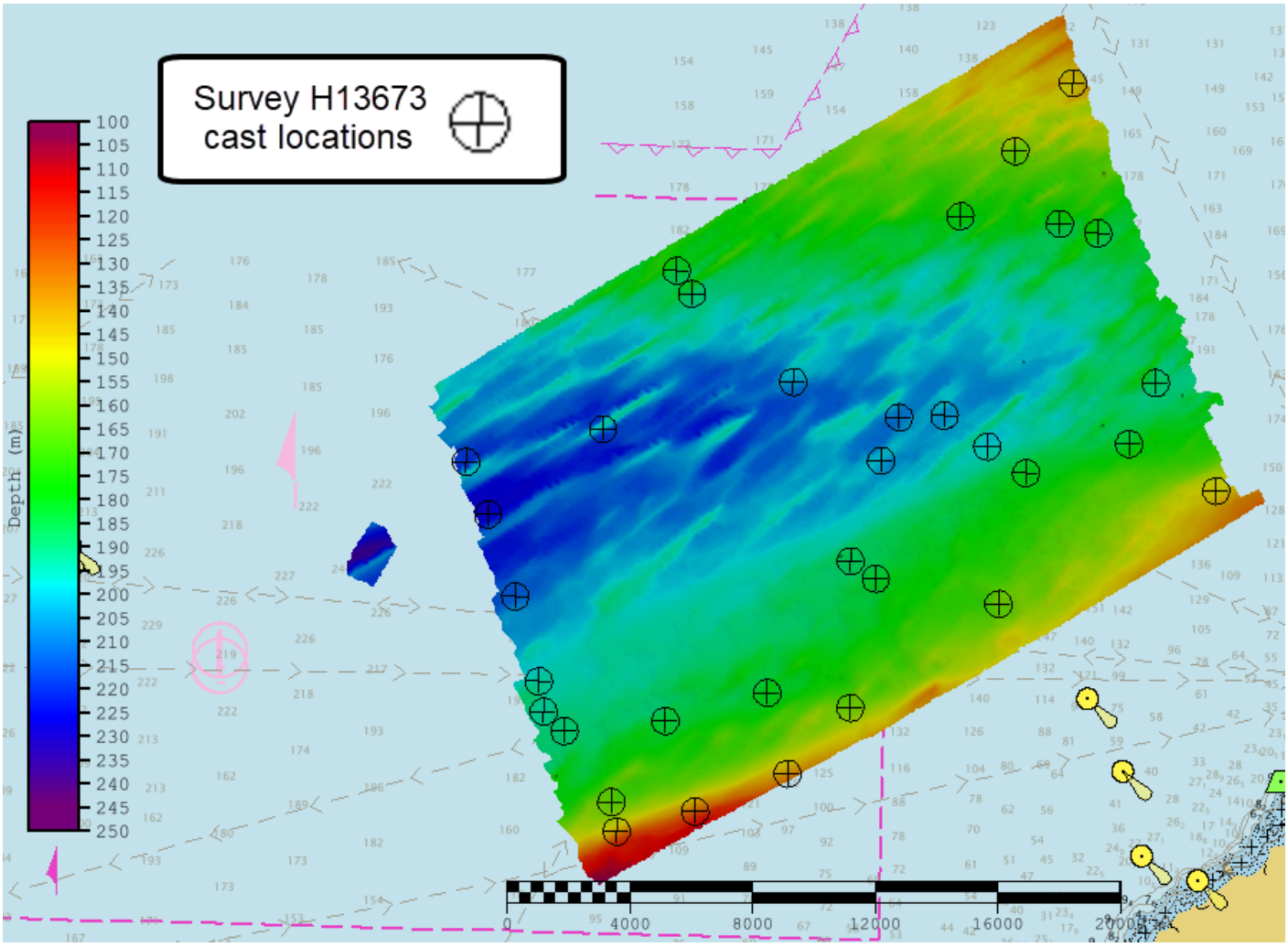


Figure 14: H13673 sound speed cast locations.

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 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.

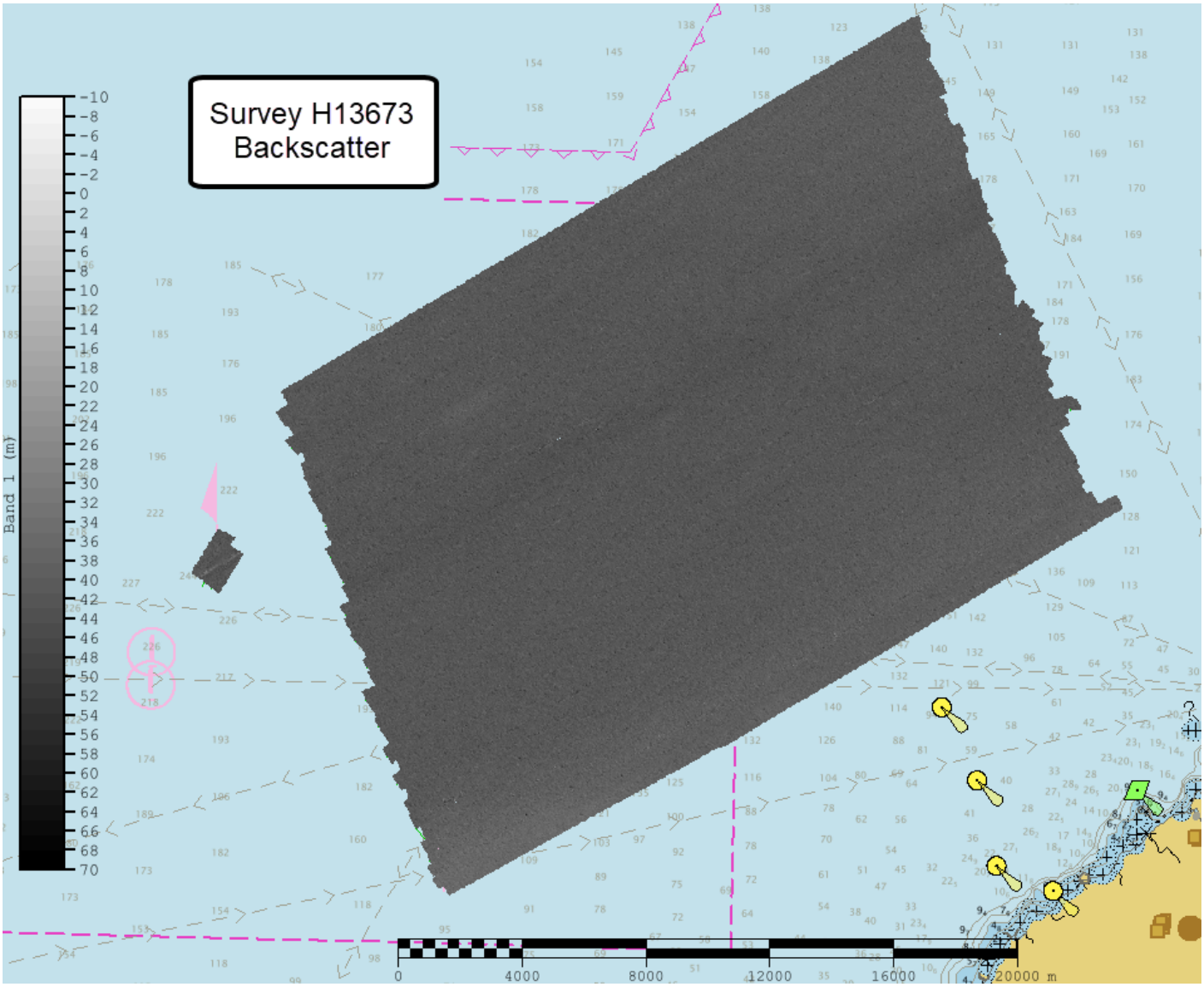


Figure 15: Overview of H13673 backscatter mosaics.

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
H13673_MBES_VR_LWD	CARIS Raster Surface (CUBE)	Variable Resolution	102.6 meters - 245.2 meters	NOAA_VR	Complete MBES
H13673_MBES_VR_LWD_Final	CARIS Raster Surface (CUBE)	Variable Resolution	102.6 meters - 245.2 meters	NOAA_VR	Complete MBES
H13673_MBAB_2m_S222_200kHz_1of2	MB Backscatter Mosaic	2 meters	-	NOAA_2m	Complete MBES
H13673_MBAB_2m_S222_300kHz_2of2	MB Backscatter Mosaic	2 meters	-	NOAA_2m	Complete MBES

Table 10: Submitted Surfaces

A total of three 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. There are no holidays present in the coverage achieved. All bathymetric grids for H13672 meet density requirements per the 2022 HSSD see figure bellow for more information.

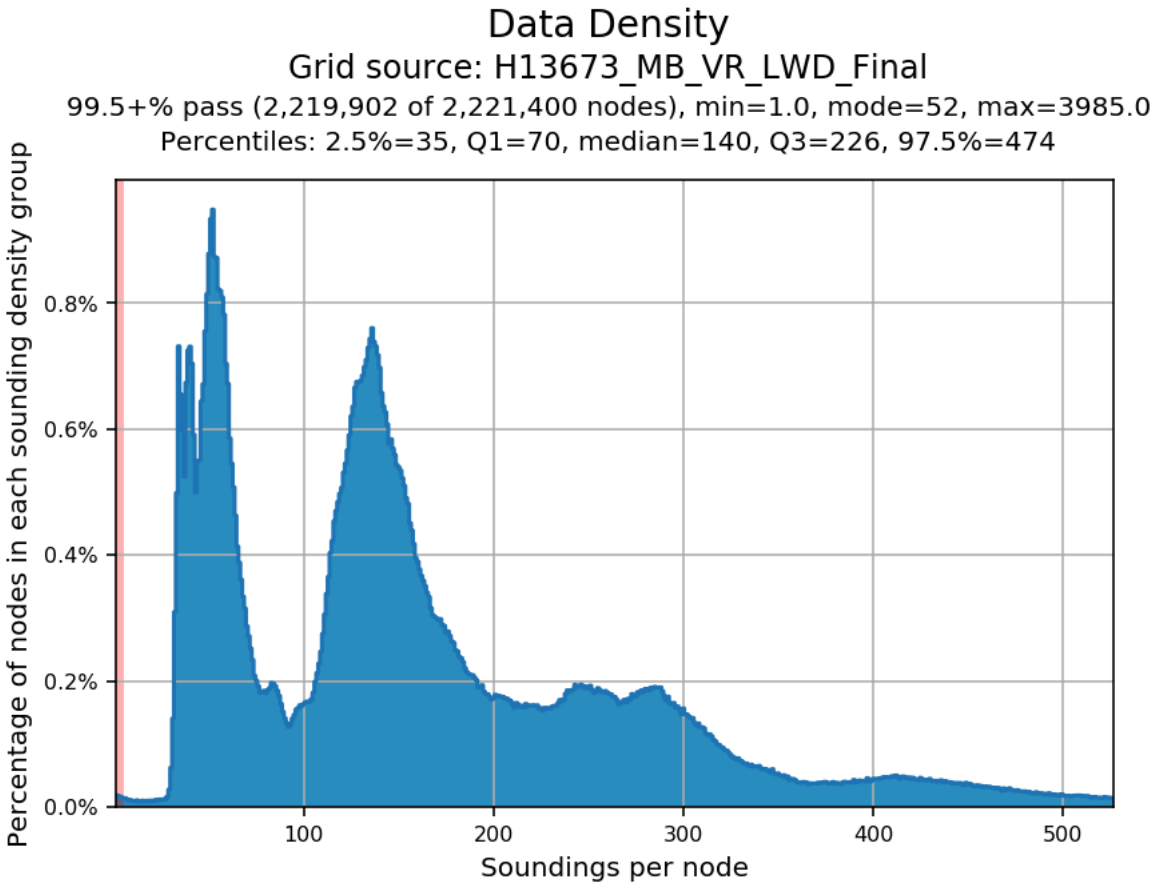


Figure 16: H13673 Data Density.

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 H13673.

C.1 Vertical Control

The vertical datum for this project is Mean Lower Low Water.

ERS Datum Transformation

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

Method	Ellipsoid to Chart Datum Separation File
ERS via VDATUM	OPR-W387-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 18.

The following PPK methods were used for horizontal control:

- RTX

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
US4NY22M	1:40000	120	06/15/2021	06/15/2021

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

No charted features exist for this survey.

D.1.4 Uncharted Features

One uncharted feature was identified and investigated. Reference the 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	01/27/2023	JASKOSKI.MATTHEW.JACOB.1275636262 2023.01.30 11:25:12 -05'00'
Sydney M. Catoire, LT/NOAA	Field Operations Officer	01/27/2023	CATOIRE.SYDNEY.MARIE.1120060623 Digitally signed by CATOIRE.SYDNEY.MARIE.1120060623 Date: 2023.01.27 12:25:31 -05'00'
Erin K. Cziraki	Chief Survey Technician	01/27/2023	CZIRAKI.ERIN.KAYE.1550015338 Digitally signed by CZIRAKI.ERIN.KAYE.1550015338 Date: 2023.01.30 08:02:33 -05'00'
Audrey E. Jerauld	Senior Survey Technician	01/27/2023	Digitally signed by JERAULD.AUDREY.ELIZABETH.1170496260 Date: 2023.01.27 12:31:06 -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