H13400

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

DESCRIPTIVE REPORT

Type of Survey:	Navigable Area
Registry Number:	H13400

LOCALITY

State(s):	Alaska
General Locality:	Glacier Bay
Sub-locality:	Muir Inlet

2021

CHIEF OF PARTY
Olivia A. Hauser CDR\NOAA

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Date:

U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION	REGISTRY NUMBER:
HYDROGRAPHIC TITLE SHEET	**H13400**

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):	**Alaska**
General Locality:	**Glacier Bay**
Sub-Locality:	**Muir Inlet**
Scale:	**10000**
Dates of Survey:	**03/29/2021 to 06/23/2021**
Instructions Dated:	**03/04/2021**
Project Number:	**OPR-O351-RA-21**
Field Unit:	**NOAA Ship *Rainier***
Chief of Party:	**Olivia A. Hauser CDR\NOAA**
Soundings by:	**Multibeam Echo Sounder**
Imagery by:	**Multibeam Echo Sounder Backscatter**
Verification by:	**Pacific Hydrographic Branch**
Soundings Acquired in:	**meters at Mean Lower Low Water**

Remarks:

Any revisions to the Descriptive Report (DR) applied during office processing are shown in red italic text. The DR is maintained as a field unit product, therefore all information and recommendations within this report are considered preliminary unless otherwise noted. The final disposition of survey data is represented in the NOAA nautical chart products. All pertinent records for this survey are archived at the National Centers for Environmental Information (NCEI) and can be retrieved via https://www.ncei.noaa.gov/. Products created during office processing were generated in NAD83 UTM 8N, 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 H13400

Project: OPR-O351-RA-21

Locality: Glacier Bay

Sublocality: Muir Inlet

Scale: 1:10000

March 2021 - June 2021

NOAA Ship *Rainier*

Chief of Party: Olivia A. Hauser CDR\NOAA

A. Area Surveyed

The survey area is referred to as H13400, "Muir Inlet" (Sheet 2) in the project instructions. The survey area is approximately 11.28 square nautical miles and is located in the northeast portion of Glacier Bay National Park. This includes Muir Inlet, Wachusett Inlet, Adams Inlet, Sebree Cove, Sandy Cove, and Spokane Cove.

A.1 Survey Limits

Data were acquired within the following survey limits:

Northwest Limit	Southeast Limit
59° 5' 19.57" N 136° 25' 15.49" W	58° 40' 45.15" N 135° 57' 22.2" W

Table 1: Survey Limits

The entire extents of the assigned H13400 sheet limits were not surveyed. For more information reference section A4. McBride Glacier was initially part of survey H13400, however was removed and submitted separately as survey F00833 to expedite data to the chart. See project correspondence for more information.

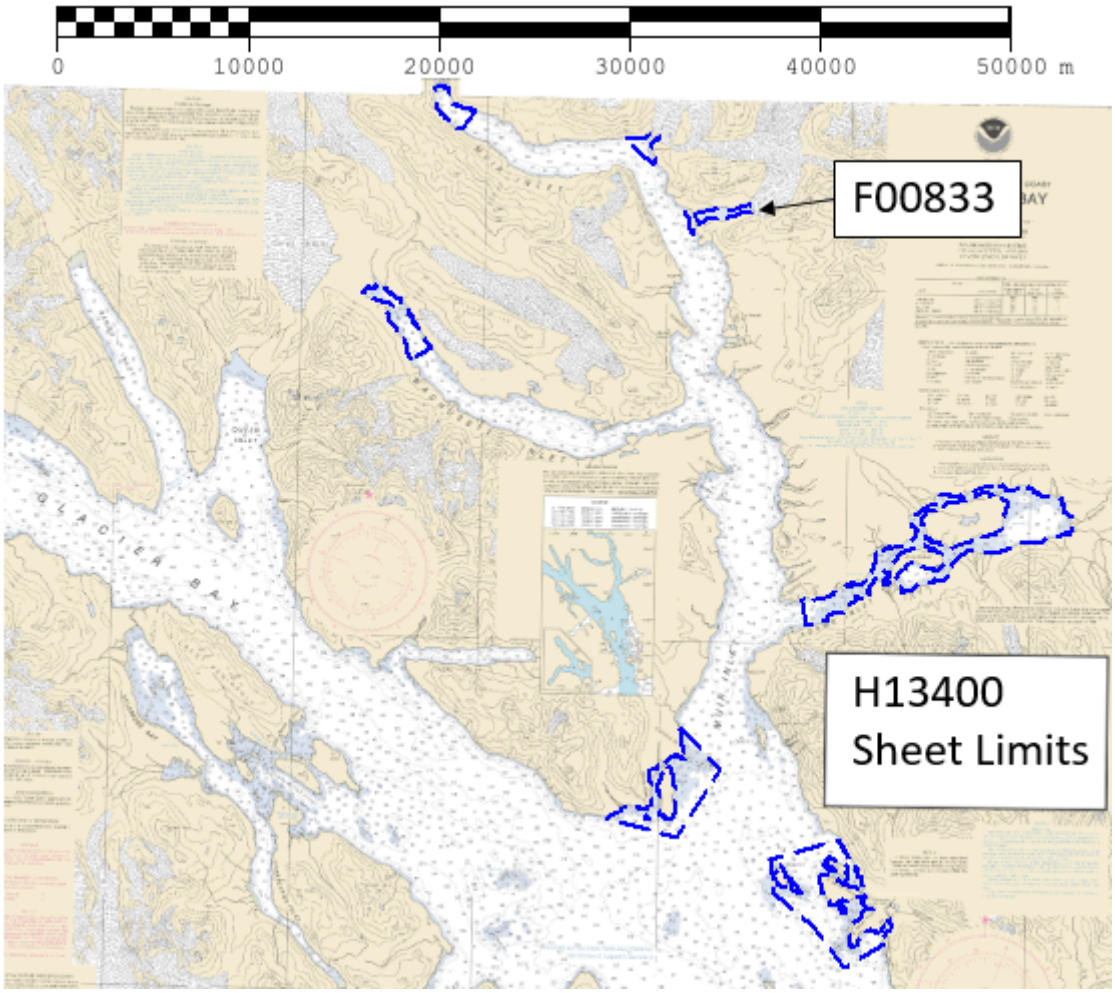


Figure 1: H13400 assigned survey area (Chart 17318). McBride Glacier was submitted seperately as the survey F00833.

A.2 Survey Purpose

Glacier Bay in southeast Alaska was covered by a single ice sheet as recently as the late 1700s. The tidewater glaciers that visitors see today are remnants of the calving and retreat of this glacial ice. In 2019, Glacier Bay National Park received approximately 675,000 visitors traveling by cruise ships, tour boats, charter boats, and private vessels. Most of the glaciers within the bay are thinning and receding due to rapidly warming atmospheric temperatures and ocean water, exposing uncharted areas at the glacier faces. In addition, glacial till has altered the bathymetry in the fjords near the glaciers. While most of Glacier Bay was last surveyed in 2009, the southern portion was last surveyed prior to 2001.

This project focuses on a number of glacier faces, as well as several coves within Glacier Bay. Conducting a modern bathymetric survey in this area will provide critical data for the updating of National Ocean Service (NOS) nautical charting products and services to increase maritime safety in Glacier Bay.

A.3 Survey Quality

The entire survey is adequate to supersede previous data.

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)

Table 2: Survey Coverage

The entire extents of the assigned sheet limits were not surveyed for H13400. NOAA Ship RAINIER attempted to survey Adams Inlet, but was unsuccessful due to time constraints. Wachusett Inlet was unable to be surveyed completely due to high turbidity, in spite of attempts being made on two separate days in hopes of improved conditions. Multibeam echosounder coverage was acquired to the inshore limit of hydrography, the Navigable Area Limit Line (NALL), within a majority of the assigned sheet limits. The NALL is defined as the most seaward of the following: the surveyed 3.5 meter depth contour, the line defined by the distance seaward from the observed MHW line which is equivalent to 0.8 millimeters at chart scale (the assigned sheet limits closely reflect this), or the inshore limit of safe navigation. Areas where H13400 survey coverage reached neither 3.5 meters water depth, nor the assigned sheet limits, were due to time constrains and the presence of hazardous rocks and/ or thick kelp. The figures below illustrate the areas in which MBES data was collected.

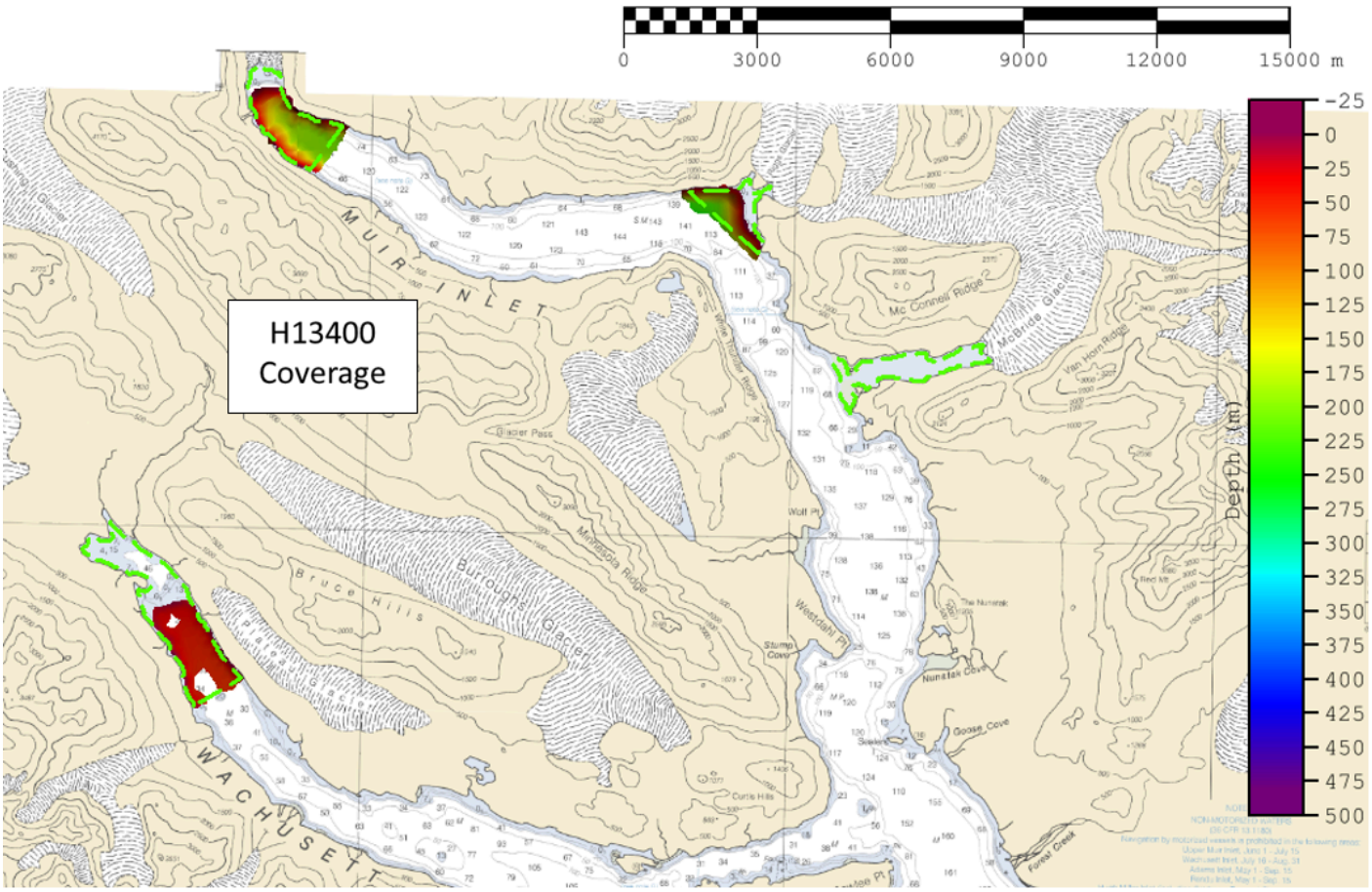


Figure 2: H13400 survey coverage and assigned survey limits for Muir and Wachusett Inlet (Chart 17318).

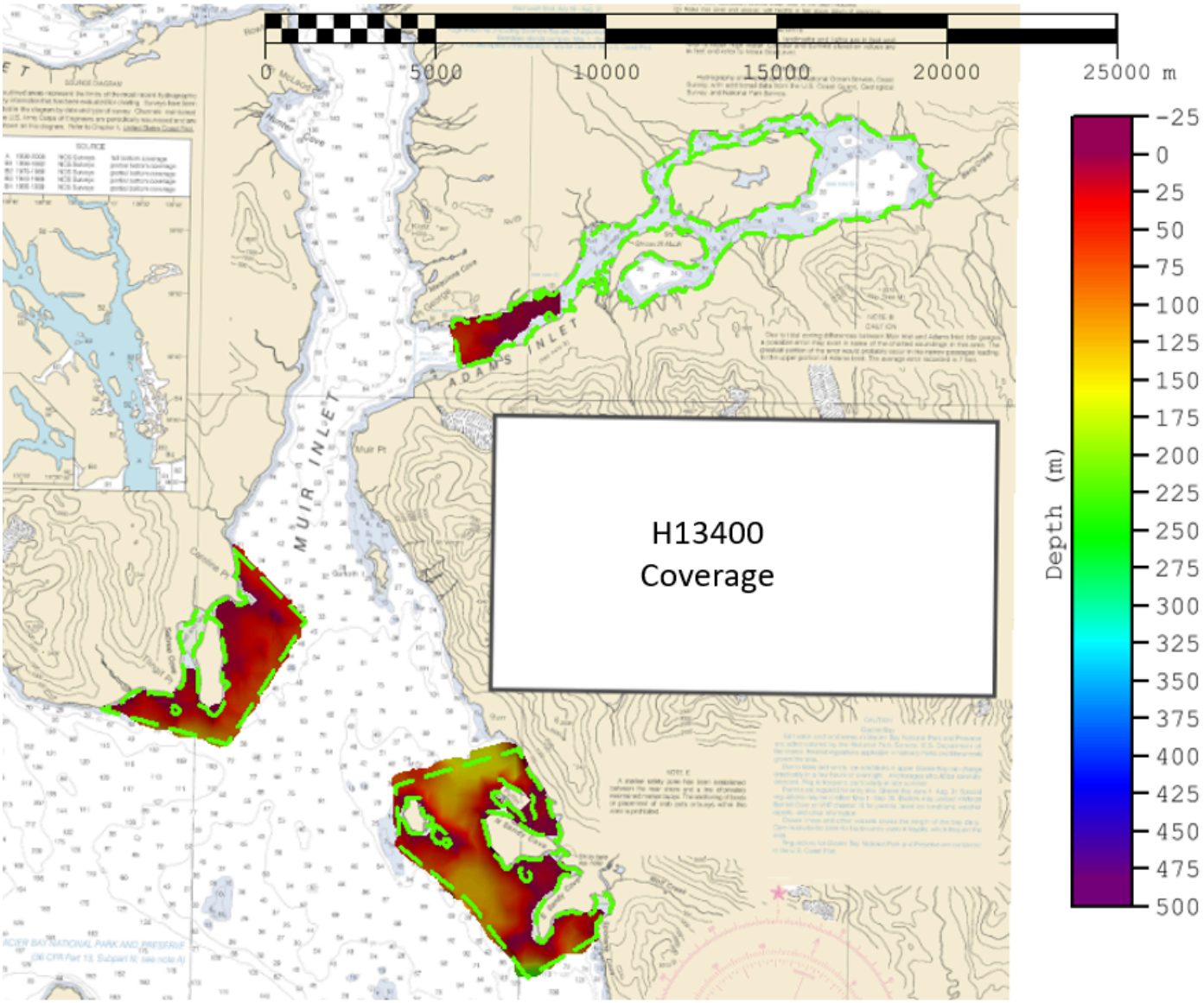


Figure 3: H13400 survey coverage and assigned sheet limits for Adams Inlet, Sebree Cove, Sandy Cove, and Spokane Cove (Chart 17318).

A.6 Survey Statistics

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

	HULL ID	*2801*	*2802*	*2803*	*2804*	*Total*
LNM	**SBES Mainscheme**	0	0	0	0	0
	MBES Mainscheme	26.40	88.54	86.59	72.25	273.78
	Lidar Mainscheme	0	0	0	0	0
	SSS Mainscheme	0	0	0	0	0
	SBES/SSS Mainscheme	0	0	0	0	0
	MBES/SSS Mainscheme	0	0	0	0	0
	SBES/MBES Crosslines	0	8.7	4.47	0	13.17
	Lidar Crosslines	0	0	0	0	0
Number of Bottom Samples						5
Number Maritime Boundary Points Investigated						0
Number of DPs						0
Number of Items Investigated by Dive Ops						0
Total SNM						11.28

Table 3: Hydrographic Survey Statistics

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

Survey Dates	Day of the Year
03/29/2021	88
06/14/2021	165

Survey Dates	Day of the Year
06/15/2021	166
06/16/2021	167
06/17/2021	168
06/20/2021	171
06/22/2021	173
06/23/2021	174

Table 4: Dates of Hydrography

Survey operations concluded after UTC midnight on 6/24/2021 DN 175.

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	*2801*	*2802*	*2803*	*2804*	*2701*	*1906*
LOA	8.8 meters	8.8 meters	8.8 meters	8.8 meters	7.62 meters	5.8 meters
Draft	1.1 meters	1.1 meters	1.1 meters	1.1 meters	0.47 meters	0.53 meters

Table 5: Vessels Used

Figure 4: NOAA Ship RAINIER survey launches.

All data for survey H13400 was acquired by NOAA ship RAINIER launches 2801, 2802, 2803, 2804. NOAA Ship RAINIER's jet boat 2701, and skiff 1906, verified shoreline features.The vessels acquired MBES bathymetry, backscatter, and sound velocity profiles.

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
Sea-Bird Scientific	SBE 19plus V2	Conductivity, Temperature, and Depth Sensor
Teledyne RESON	SVP 70	Sound Speed System

Table 6: Major Systems Used

B.2 Quality Control

B.2.1 Crosslines

RAINIER launches collected 13.17 linear nautical miles (4.80%) of MBES crossline, across a range of depths in the mainscheme data. The Compare Grids function in Pydro Explorer was used to analyze the finalized VR surfaces of H13400 mainscheme only and crossline only data. Pydro determined that 99% of nodes met allowable uncertianties. For additional results, see plots below.

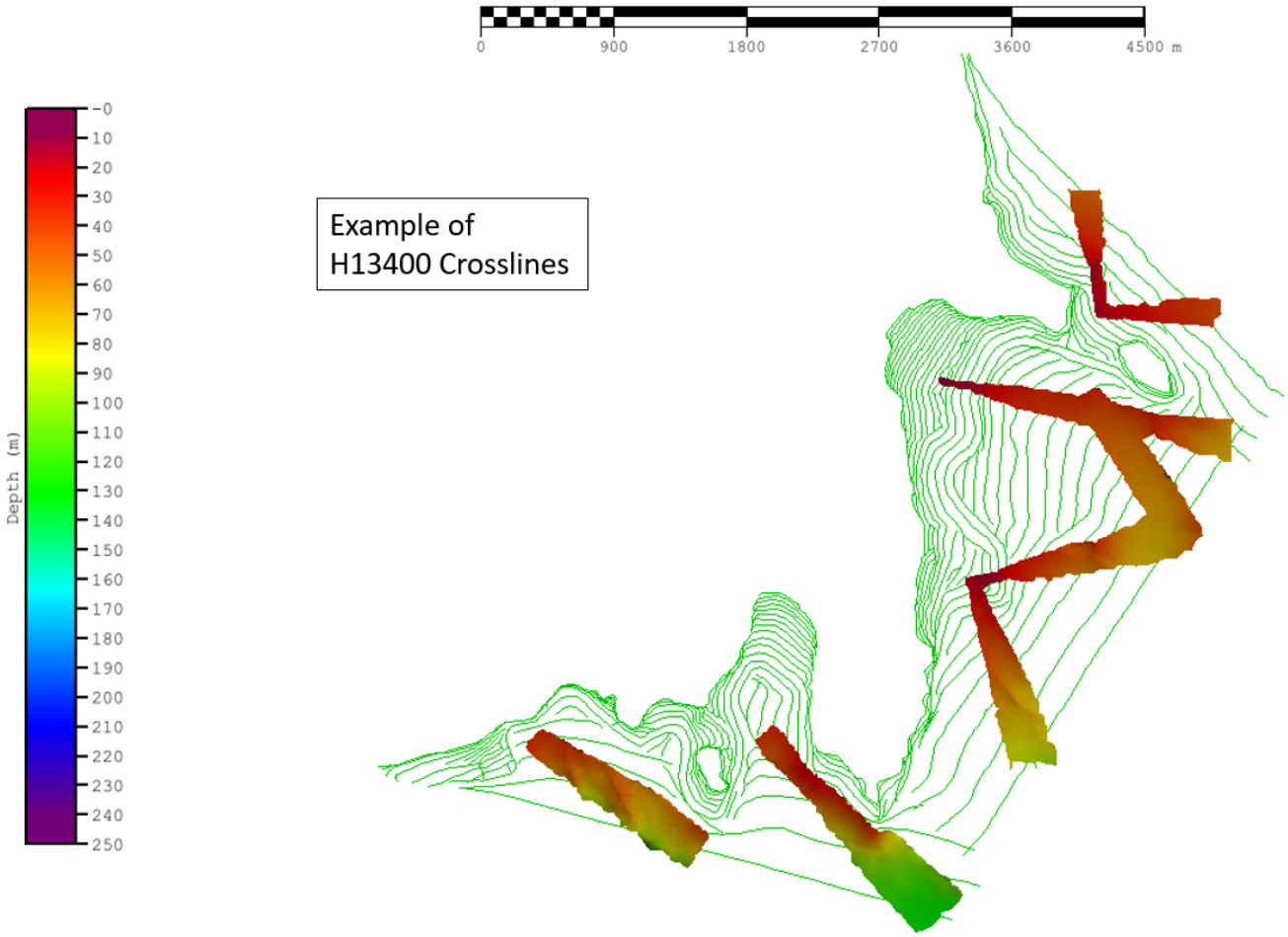
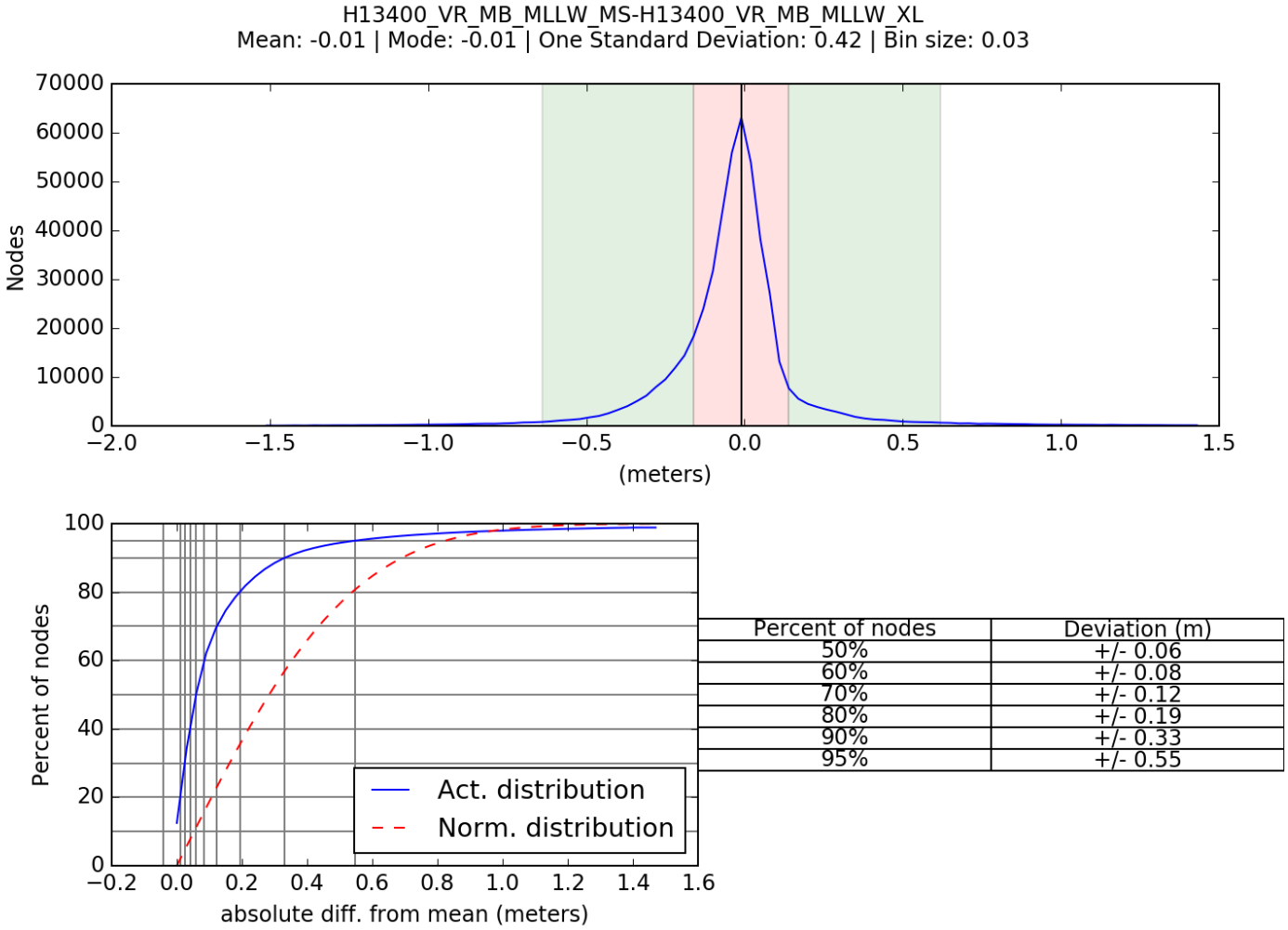


Figure 5: H13400 crossline surface overlaid on mainscheme tracklines.



Percent of nodes	Deviation (m)
50%	+/- 0.06
60%	+/- 0.08
70%	+/- 0.12
80%	+/- 0.19
90%	+/- 0.33
95%	+/- 0.55

Figure 6: Pydro derived plot showing absolute difference statistics of H13400 mainscheme to crossline data.

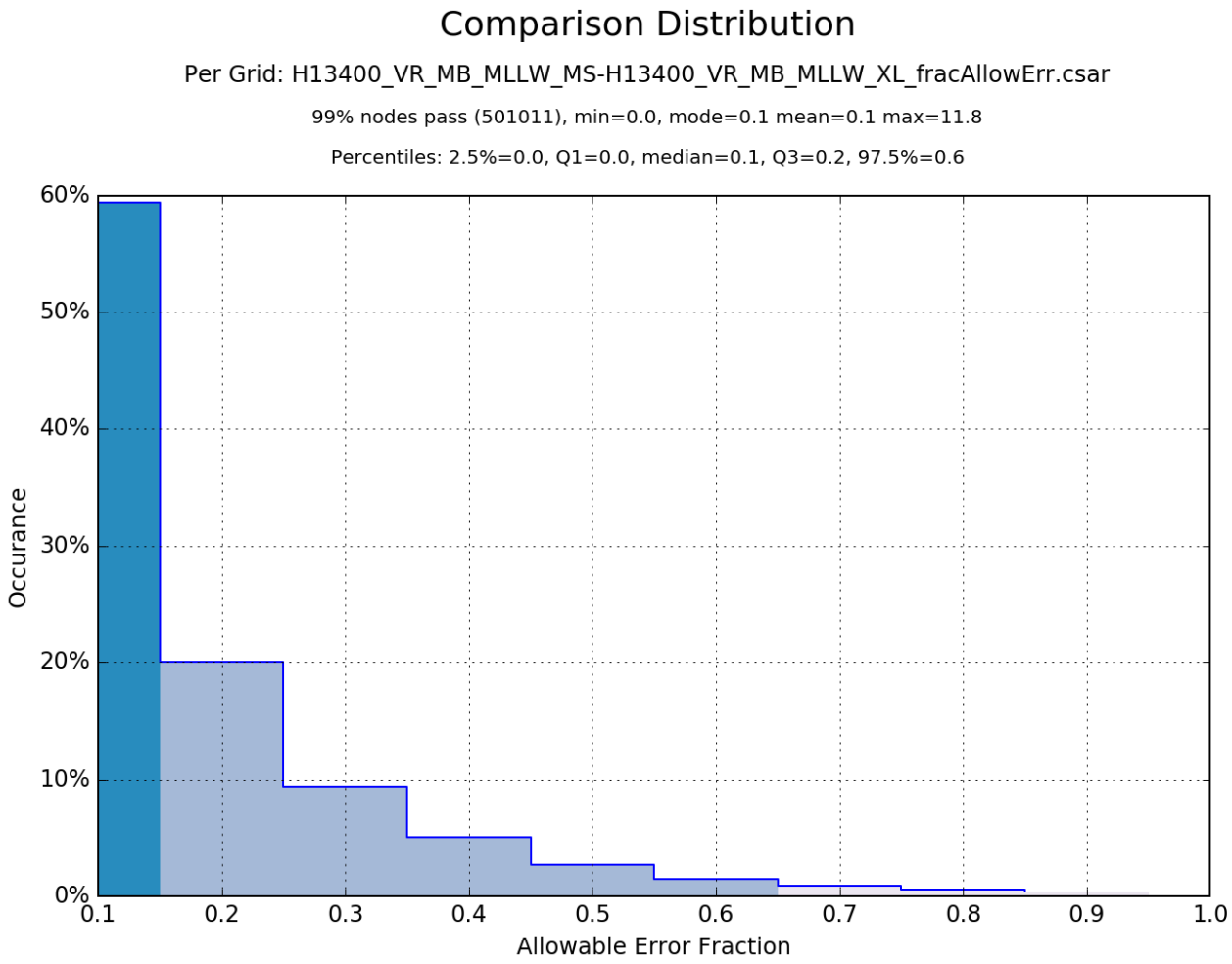


Figure 7: Pydro derived showing percentage-pass value of H13400 mainscheme to crossline data.

B.2.2 Uncertainty

The following survey specific parameters were used for this survey:

Method	Measured	Zoning
ERS via VDATUM	0 meters	0.13 meters

Table 7: Survey Specific Tide TPU Values.

Hull ID	Measured - CTD	Measured - MVP	Measured - XBT	Surface
2801,2802,2803,2804	3 meters/second	N/A	N/A	0.05 meters/second

Table 8: Survey Specific Sound Speed TPU Values.

Total Propagated Uncertainty (TPU) values for survey H13400 were derived from a combination of fixed values for equipment and vessel characteristics, as well as from field assigned values for sound speed uncertainties. Tidal uncertainty was provided in the project instructions for the NOAA vertical datum transformation model used for this survey.

In addition to the usual a priori estimates of uncertainty, real-time and post-processed uncertainty sources were also incorporated into the depth estimates of this survey. Real-time uncertainties for position, navigation, attitude, and vessel motion data from Applanix POS MV were applied during acquisition and initially in post-processing. POSPac SBET and RMS files were later applied in CARIS HIPS to supersede POS MV uncertainties associated with GPS height and position.

Uncertainty values of the submitted finalized grids were calculated in Caris using "Greater of the Two" of uncertainty and standard deviation (scaled to 95%). Grid QA v5 within Pydro QC Tools was used to analyze H13400 TVU compliance. H13400 met HSSD requirements in over 99.5 percent of grid nodes, which is shown in the histogram plot below.

Pydro QC Tools 2 Grid QA was used to analyze H13400 multibeam echosounder (MBES) data density. The submitted H13400 variable-resolution (VR) surface met HSSD density requirements shown in the histograms below.

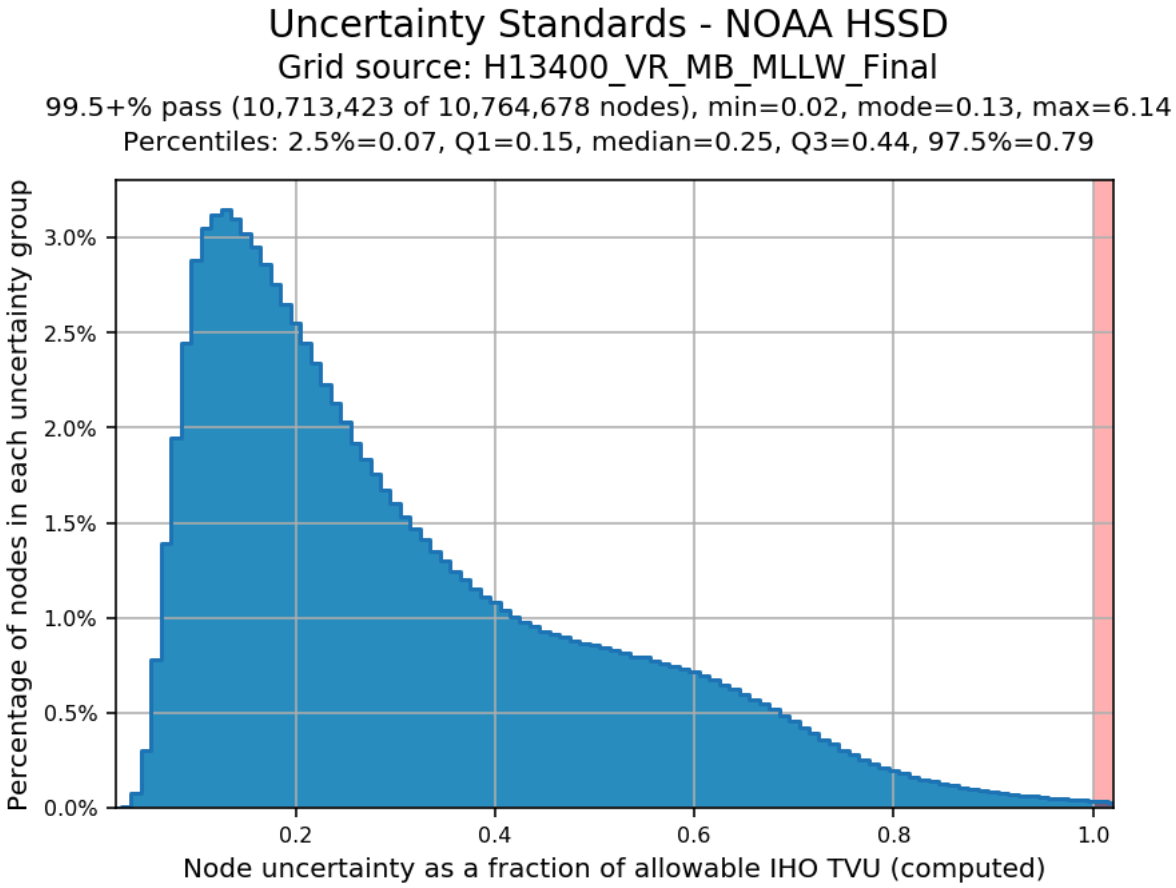


Figure 8: Pydro derived plot showing TVU compliance of H13400 finalized variable-resolution MBES data.

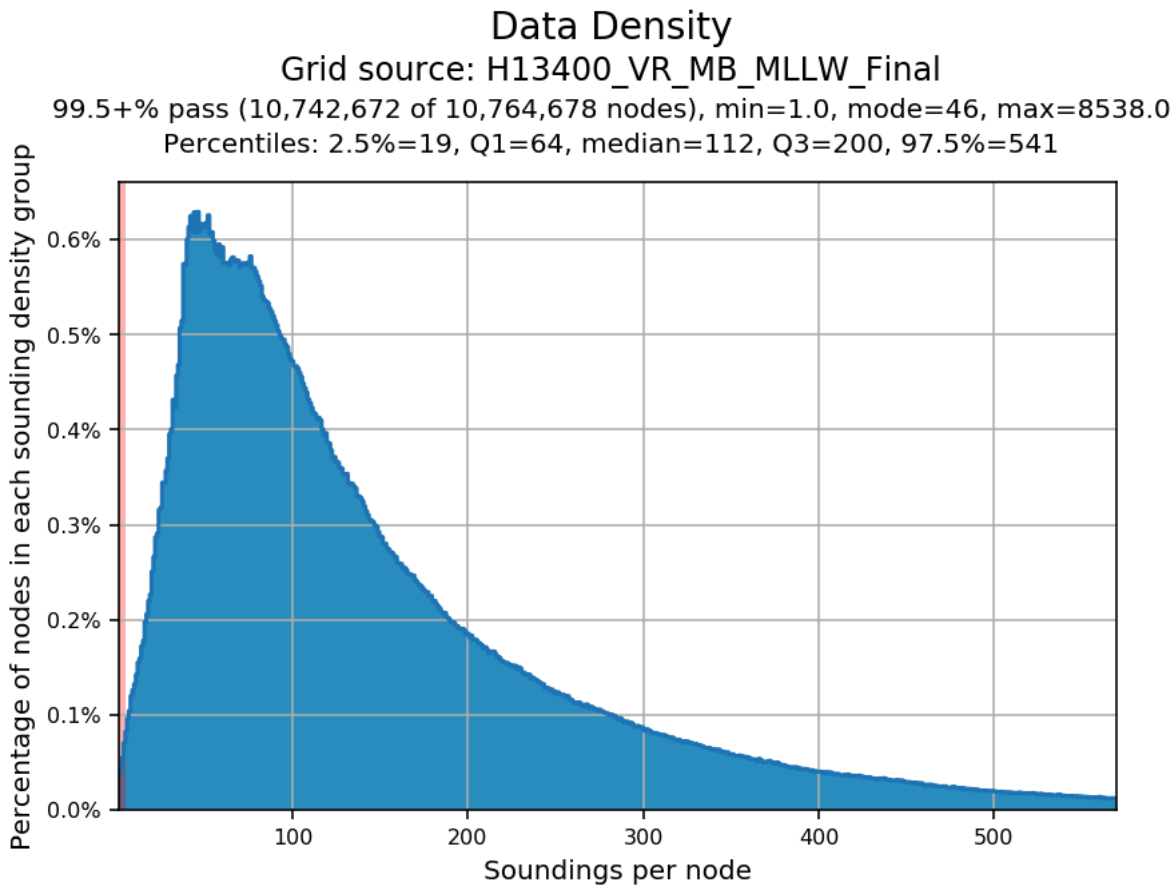


Figure 9: Pydro derived histogram plot showing HSSD density compliance of H13400 finaized variable-resolution MBES data.

B.2.3 Junctions

Two junction comparisons were completed for H13400. The surveys, H12143 and H12144, were completed by the NOAA Ship FAIRWEATHER in 2009.

The following junctions were made with this survey:

Registry Number	Scale	Year	Field Unit	Relative Location
H12143	1:40000	2009	Fairweather	S
H12144	1:40000	2009	Fairweather	S

Table 9: Junctioning Surveys

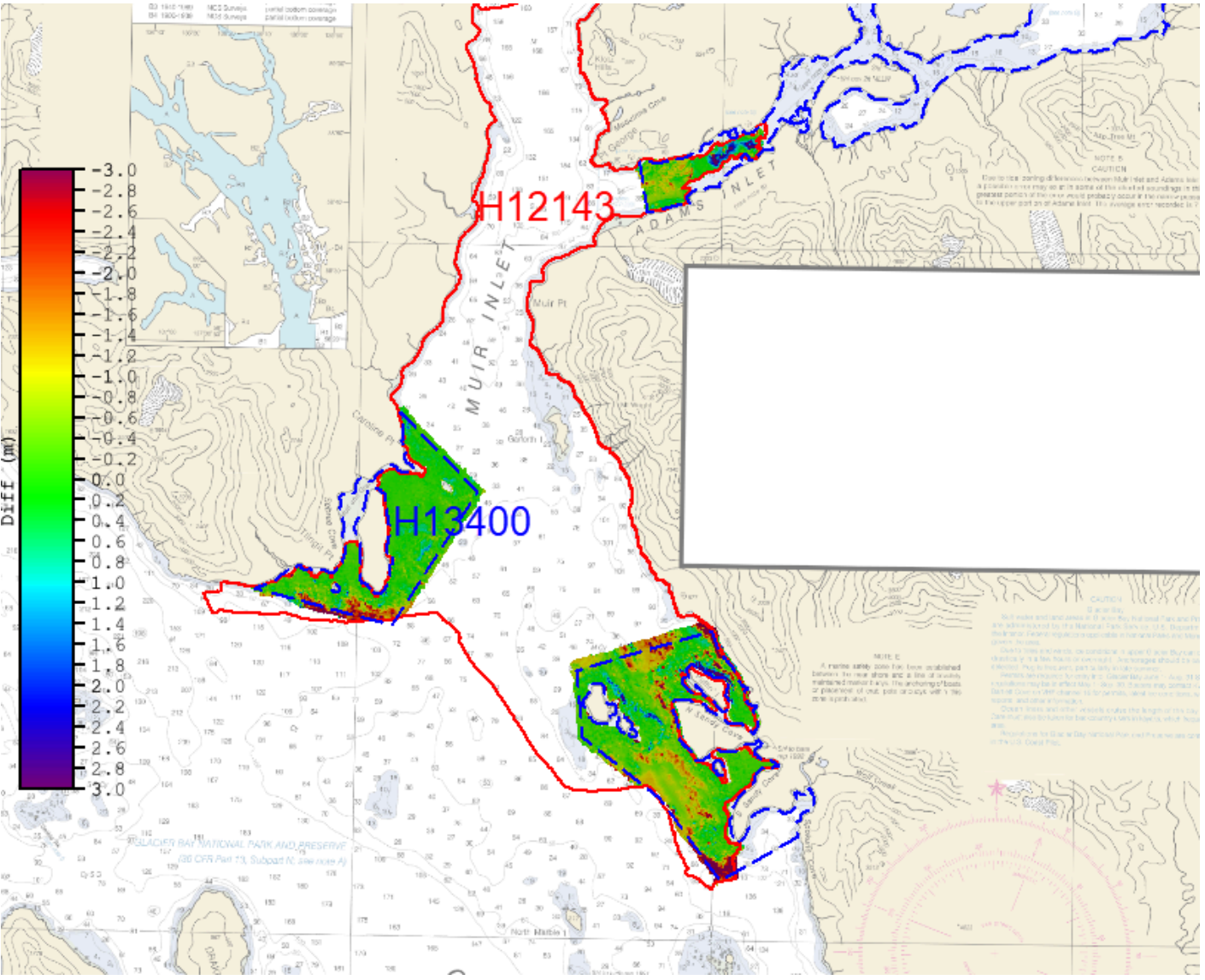
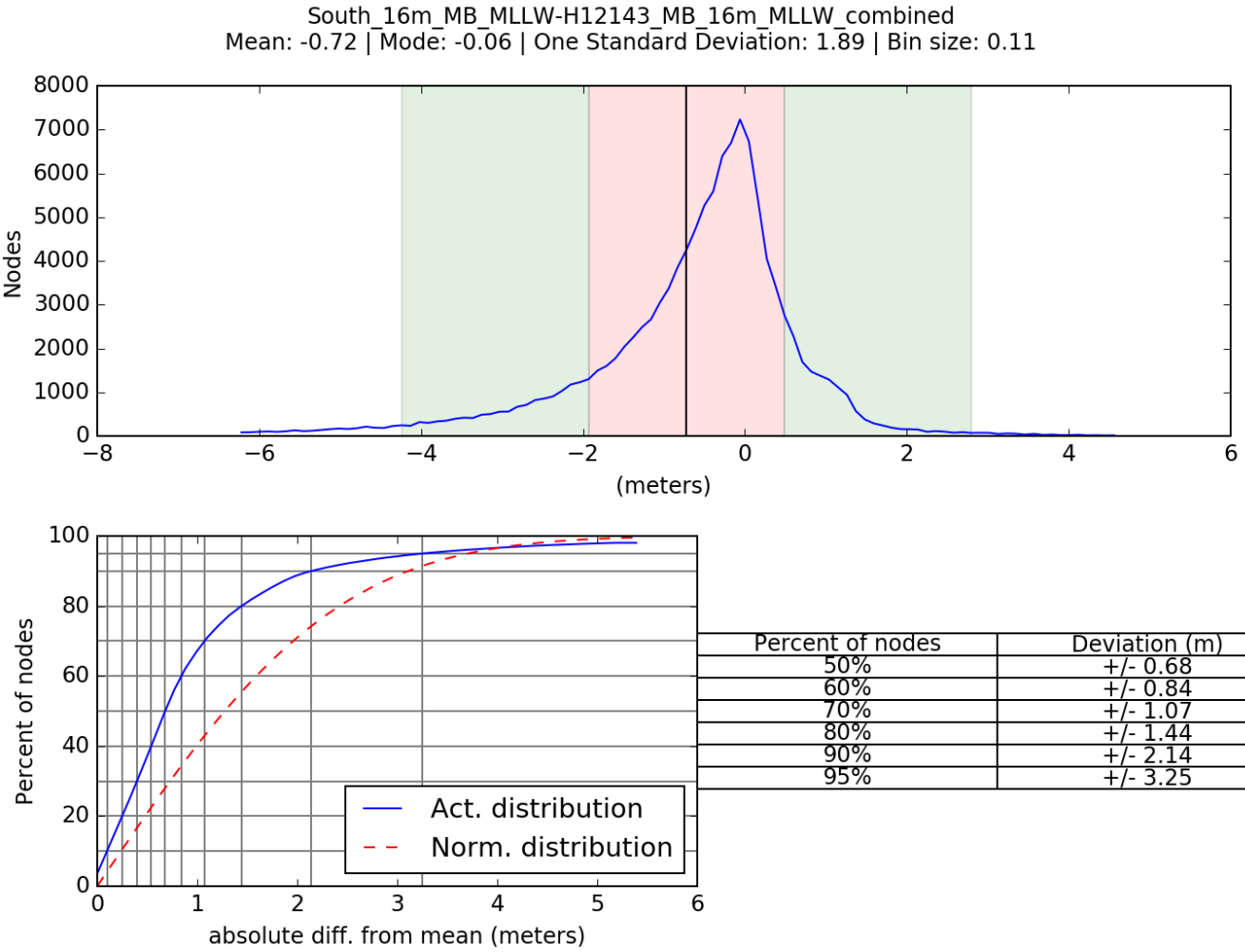


Figure 10: H13400 and H12143 junction difference surface in Muir Inlet (Chart 17318).



Percent of nodes	Deviation (m)
50%	+/- 0.68
60%	+/- 0.84
70%	+/- 1.07
80%	+/- 1.44
90%	+/- 2.14
95%	+/- 3.25

Figure 11: Pydro derived plot showing percentage-pass volume of the junction between H13400 and H12143 variable-resolution surface in Muir Inlet.

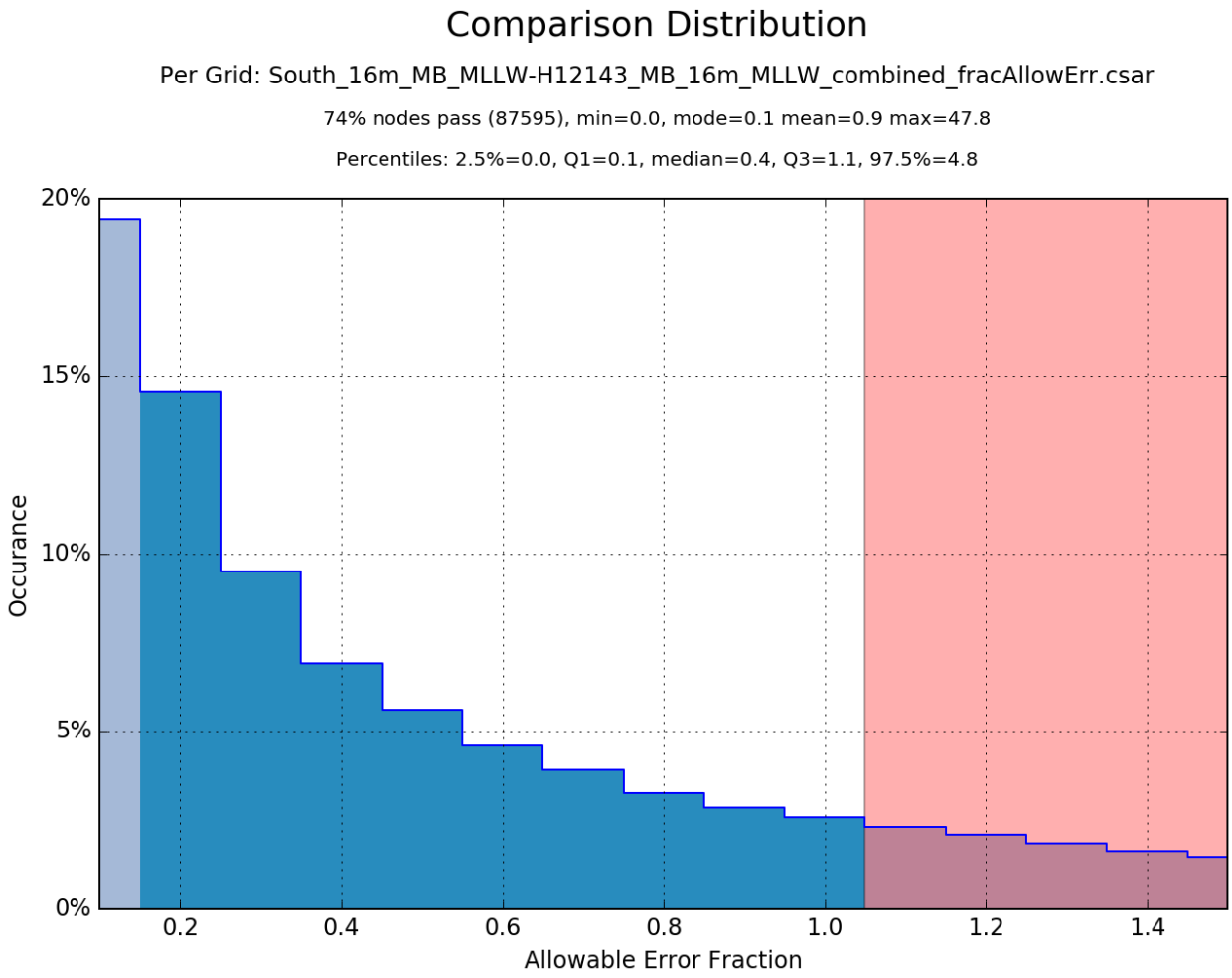


Figure 12: Pydro derived plot showing percentage-pass volume of the junction between H13400 and H12143 variable-resolution surface in Muir Inlet.

H12144

The junction with survey H12144 encompasses approximately 8.88 square nautical miles along the southern border of coverage in Wachusett Inlet, Riggs Glacier, and Muir Inlet.

The Compare Grids function of Pydro Explorer derived a difference surface from H13400 16 meter single resolution surface and H12144 16 meter single resolution surface. Pydro Compare Grids showed that 28% of nodes in the overlapping area met NOAA allowable error standards. Analysis of the difference surface indicated that there is a 6.65 meter average difference between the two surveys. The pattern of difference between the two surveys suggests sedimentation, scouring, and real world change. The Hydrographer believes recent survey data to be accurate and recommends that the data from H13400 supersede the data in H12144 for in Wachusett Inlet, Riggs Glacier, and Muir Inlet to account for changes in the sea floor. For additional results, see figures below.

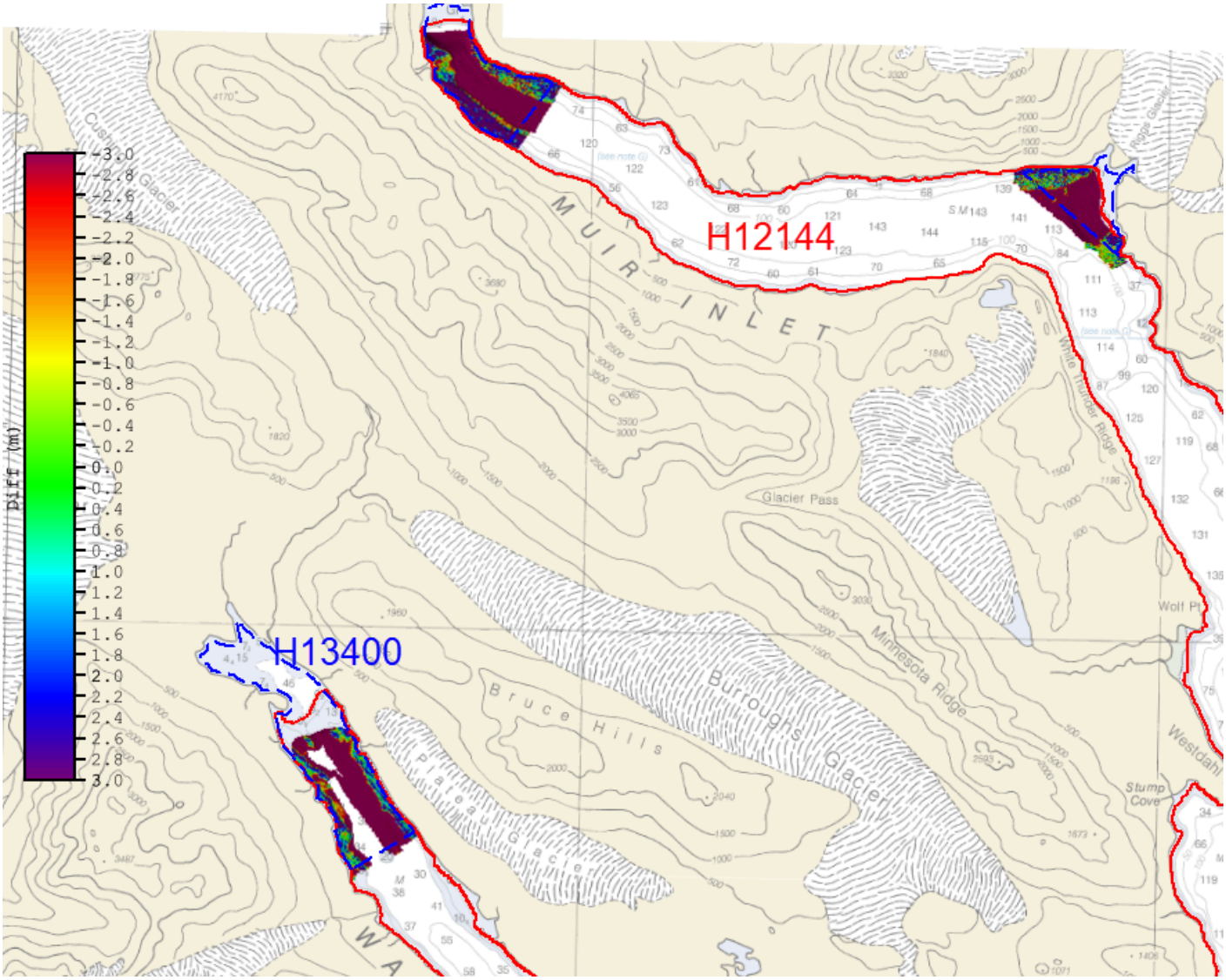
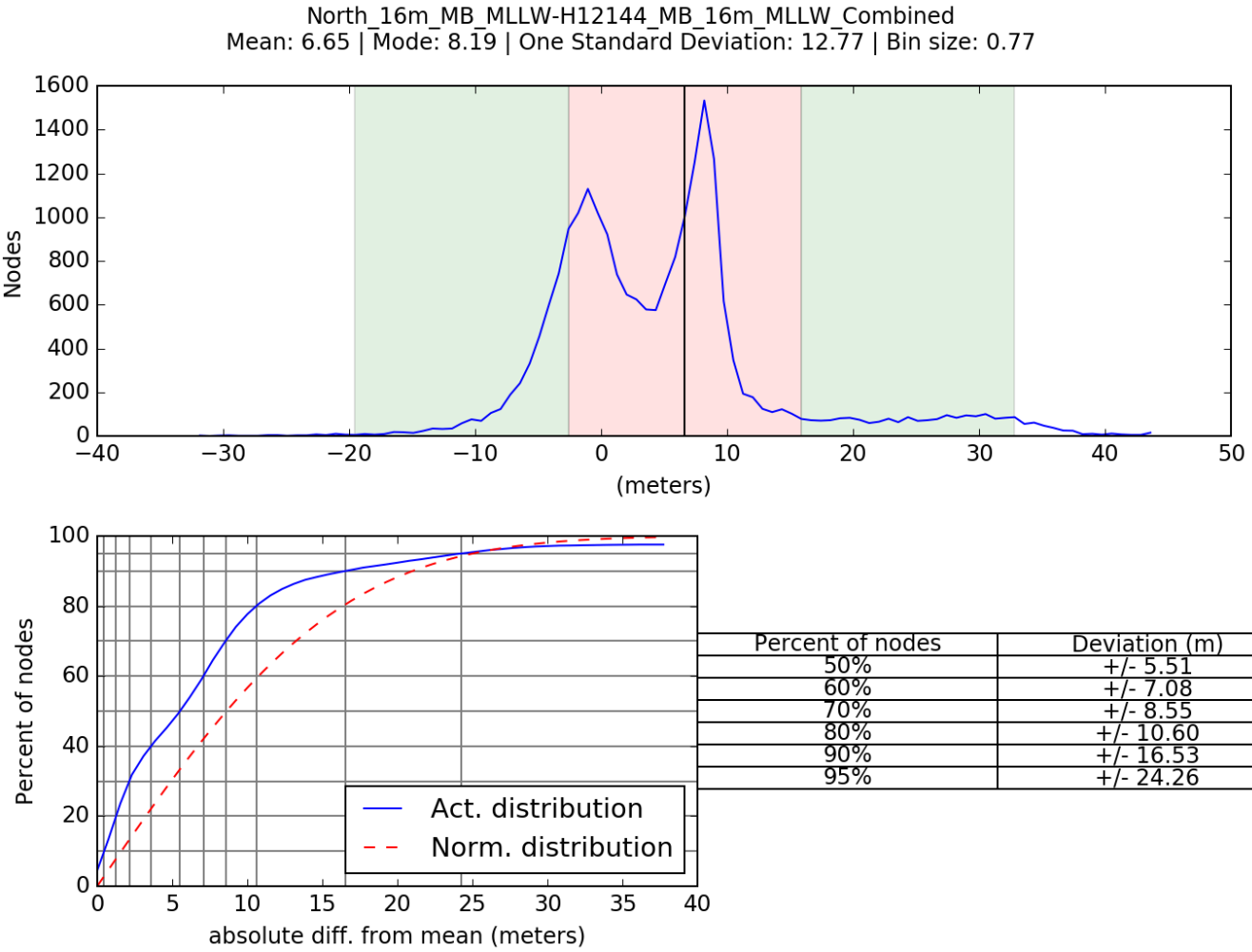


Figure 13: H13400 and H12144 junction difference surface in Muir Inlet (Chart 17318).



Percent of nodes	Deviation (m)
50%	+/- 5.51
60%	+/- 7.08
70%	+/- 8.55
80%	+/- 10.60
90%	+/- 16.53
95%	+/- 24.26

Figure 14: Pydro derived plot showing absolute difference statistics of the junction between H13400 and 12144 variable-resolution surface in Muir Inlet.

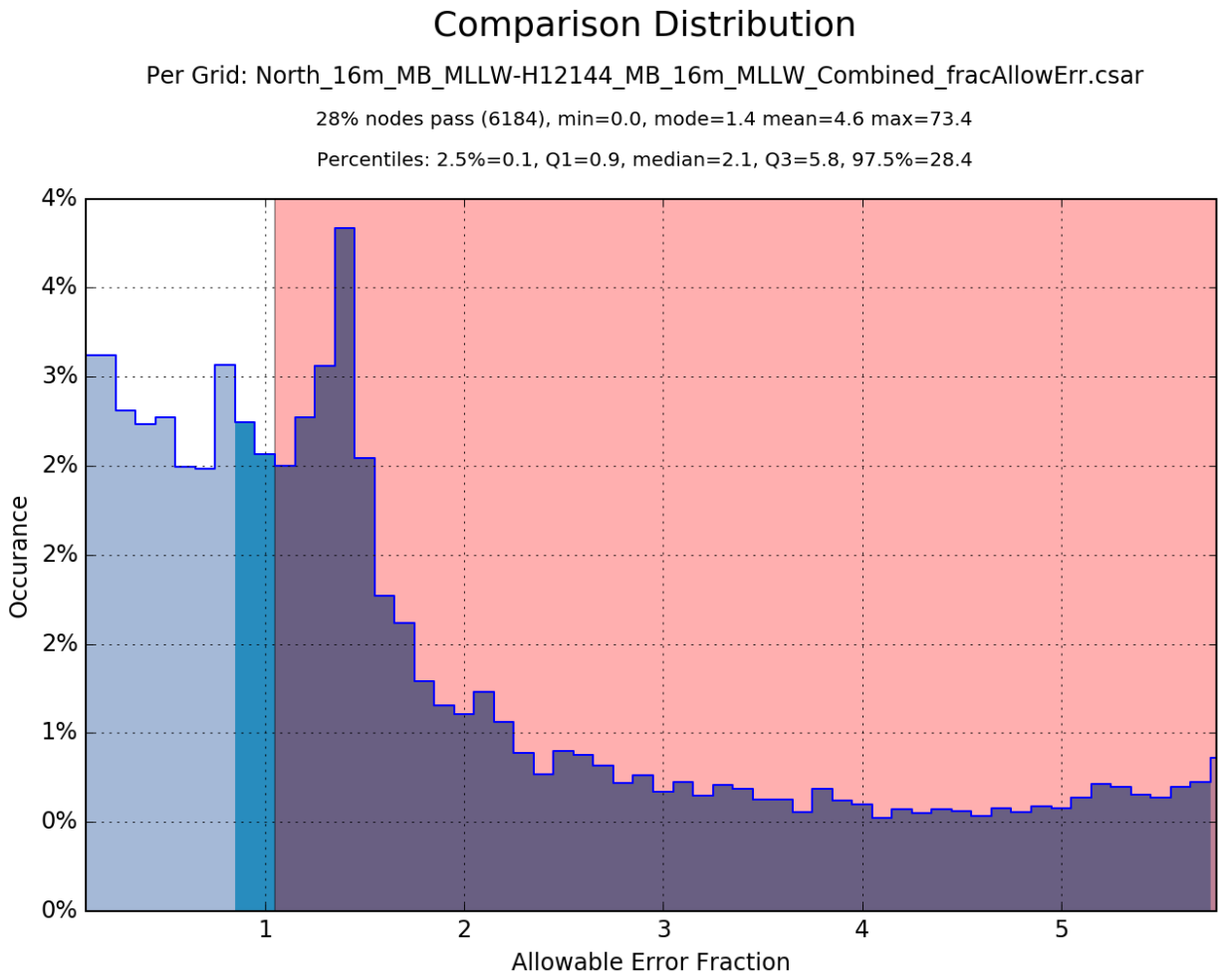


Figure 15: Pydro derived plot showing percentage pass volume of the junction between H13400 and H12144 surface in Muir Inlet.

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

Sound Speed

Several areas in the survey were effected by changes in sound speed. Two examples are shown in the images below. The most significant offset, up to 4 meters, was identified in Muir Inlet. (See Figure 16). This offset was determined to be the result of variable sound velocity, most likely caused by extensive freshwater input from the surrounding streams and rivers. The hydrographer attempted to resolve the sound speed issue by applying alternative CTD casts to the affected lines, this solution failed to resolve the offset. After completing a QC Tools analysis, it was determined that the offset does not impede the reliability of the data. See images below.

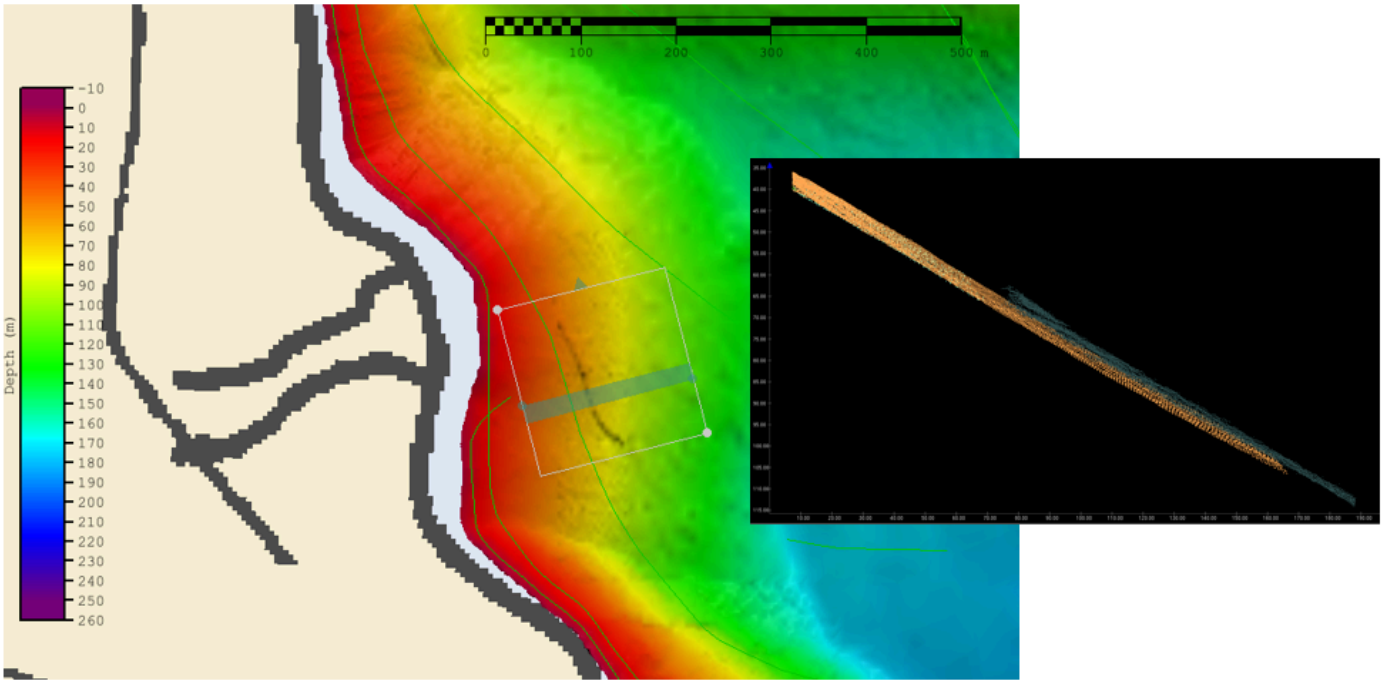


Figure 16: Example of sound speed issues in Muir Inlet identified in the MBES data.

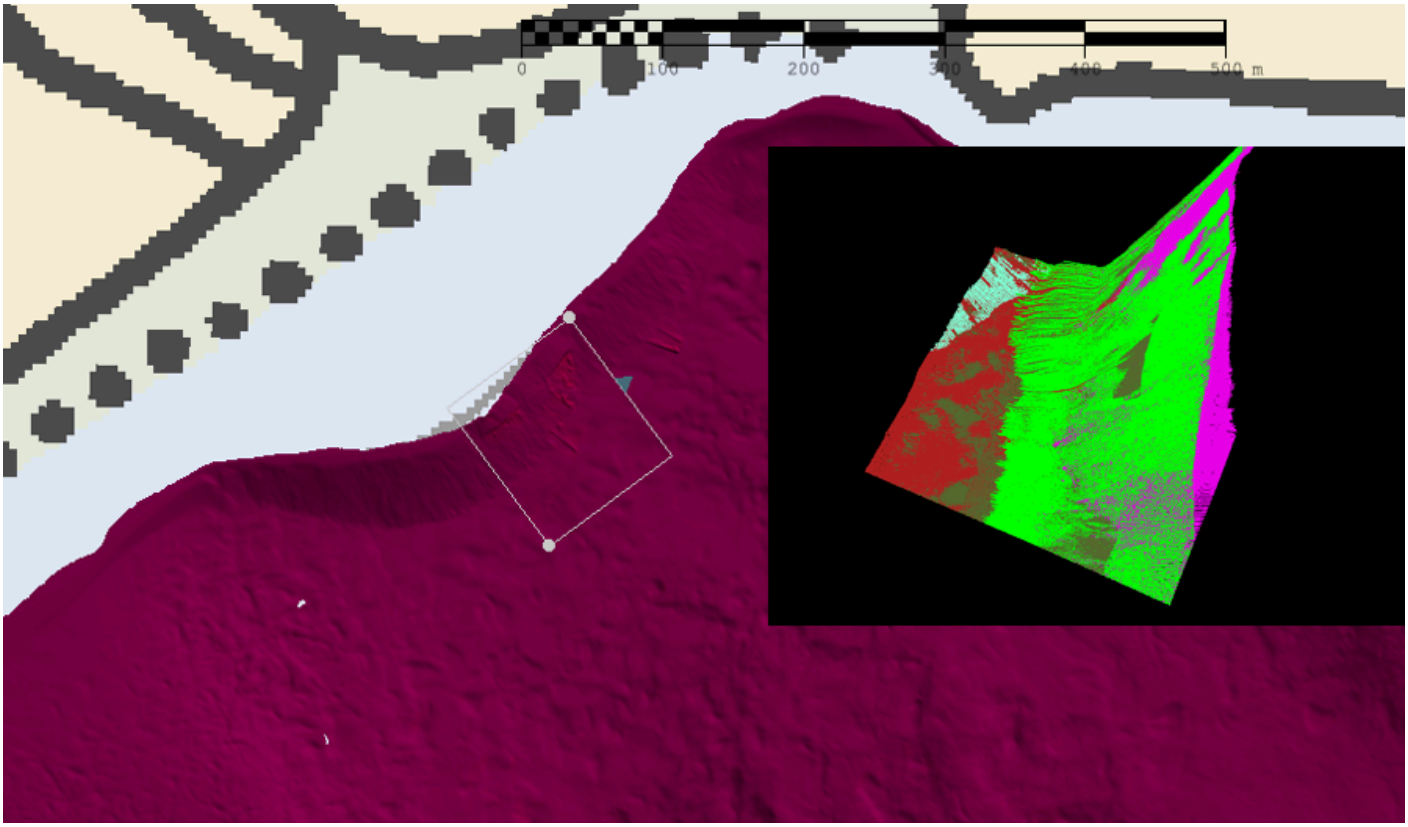


Figure 17: Example of sounds speed issues in Sebree Cove identified in the MBES data.

B.2.7 Sound Speed Methods

Sound Speed Cast Frequency: At least one cast every four hours or as needed.

Forty six sound speed profiles were acquired for this survey at various locations within the survey area at least one every four hours, when significant changes in surface sound speed were observed, or when operating in a new area. Sound speed profiles were obtained using Sea-Bird 19 Plus V2 SEACAT Profilers. All casts were concatenated into a master file and applied to MBES data using the "Nearest distance within time" (4 hours) profile selection method.

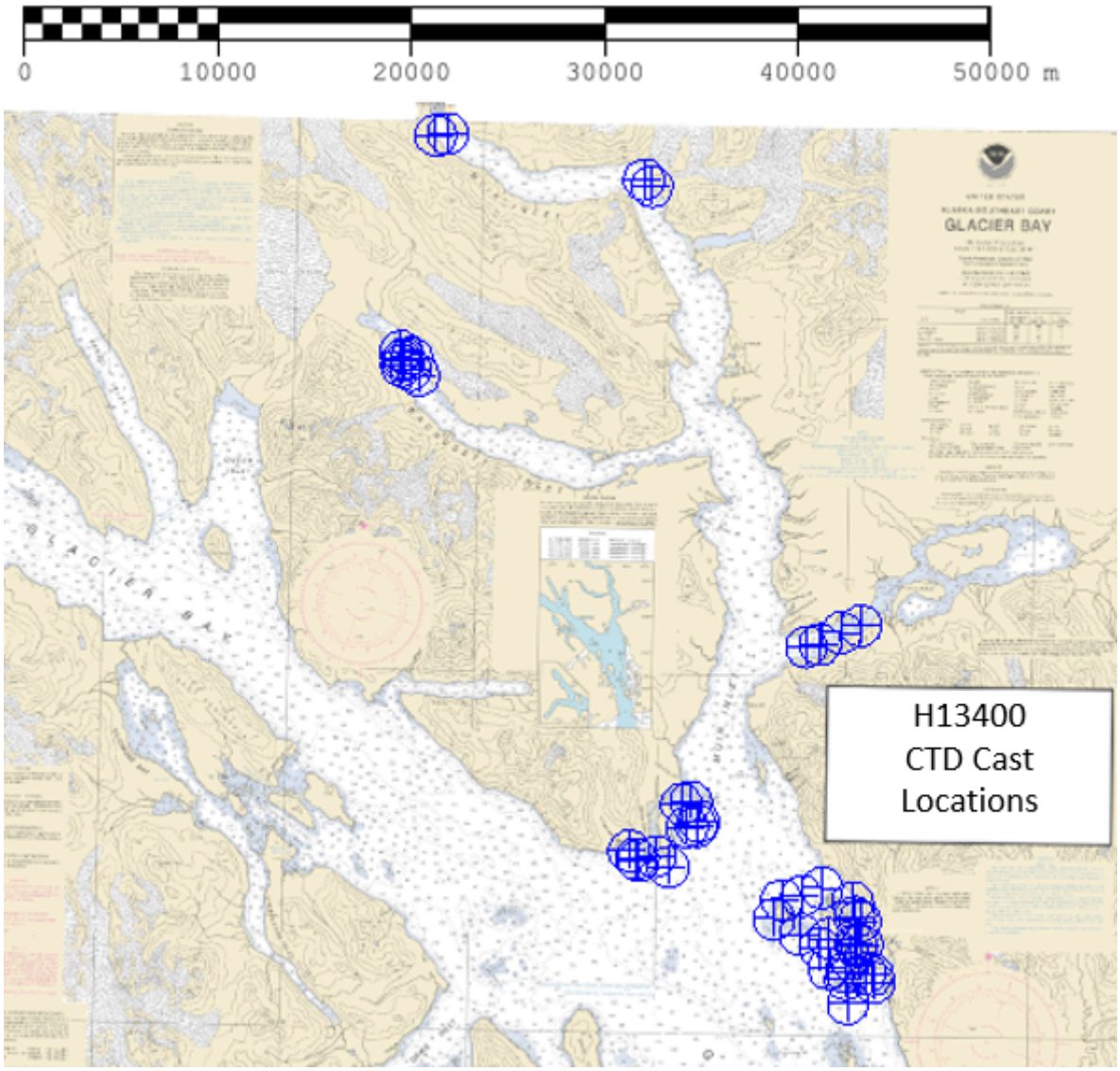


Figure 18: H13400 sound speed cast locations (Chart 13718).

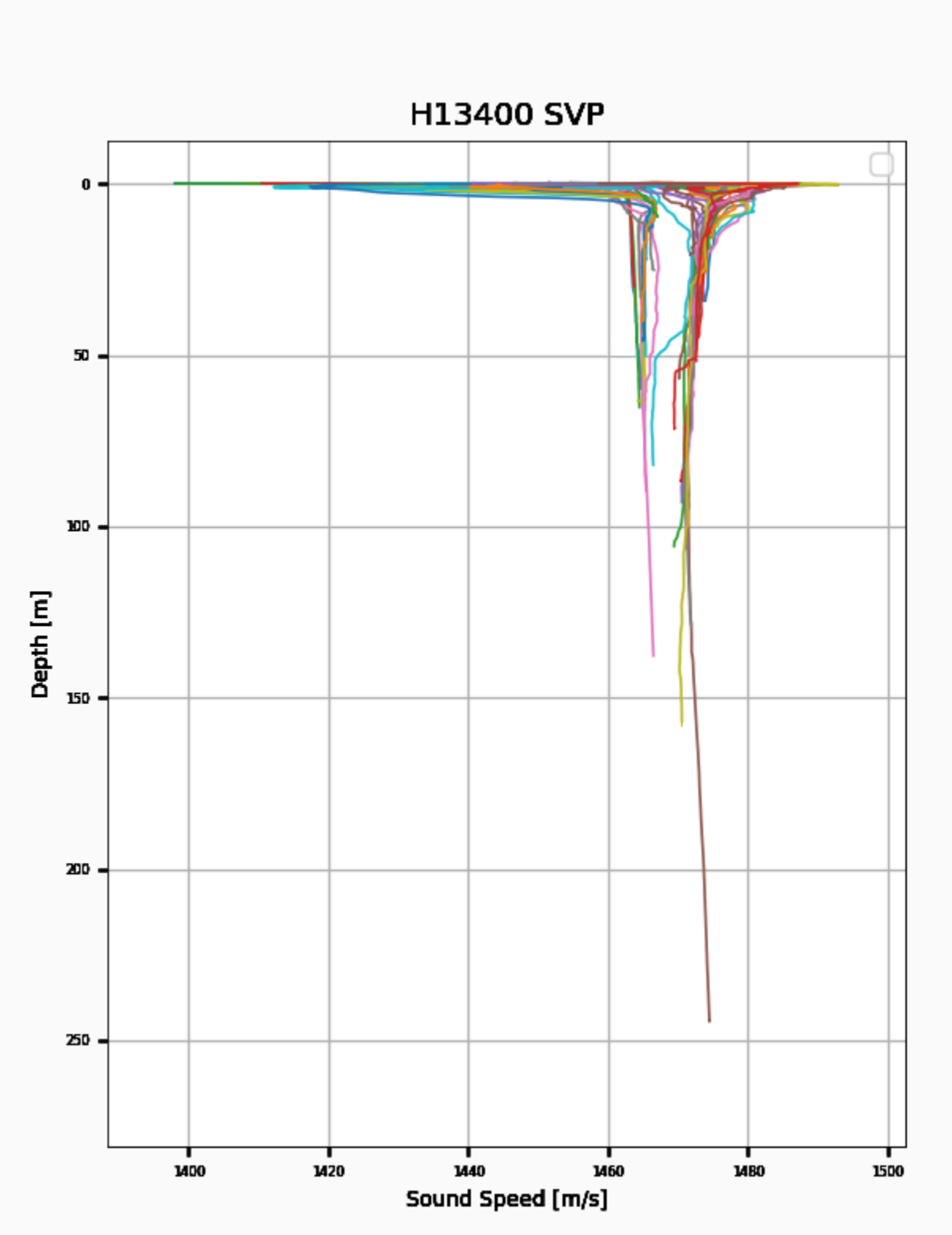


Figure 19: Comparison plot of CTD casts taken during survey acquisition of H13400.

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

Raw backscatter data were acquired as .ALL files logged during MBES operations and subsequently processed by RAINIER personnel. The .GSF files created during processing and backscatter mosaic per vessel and per frequency are derived with this report. All equipment and survey methods were used as detailed in the DAPR.

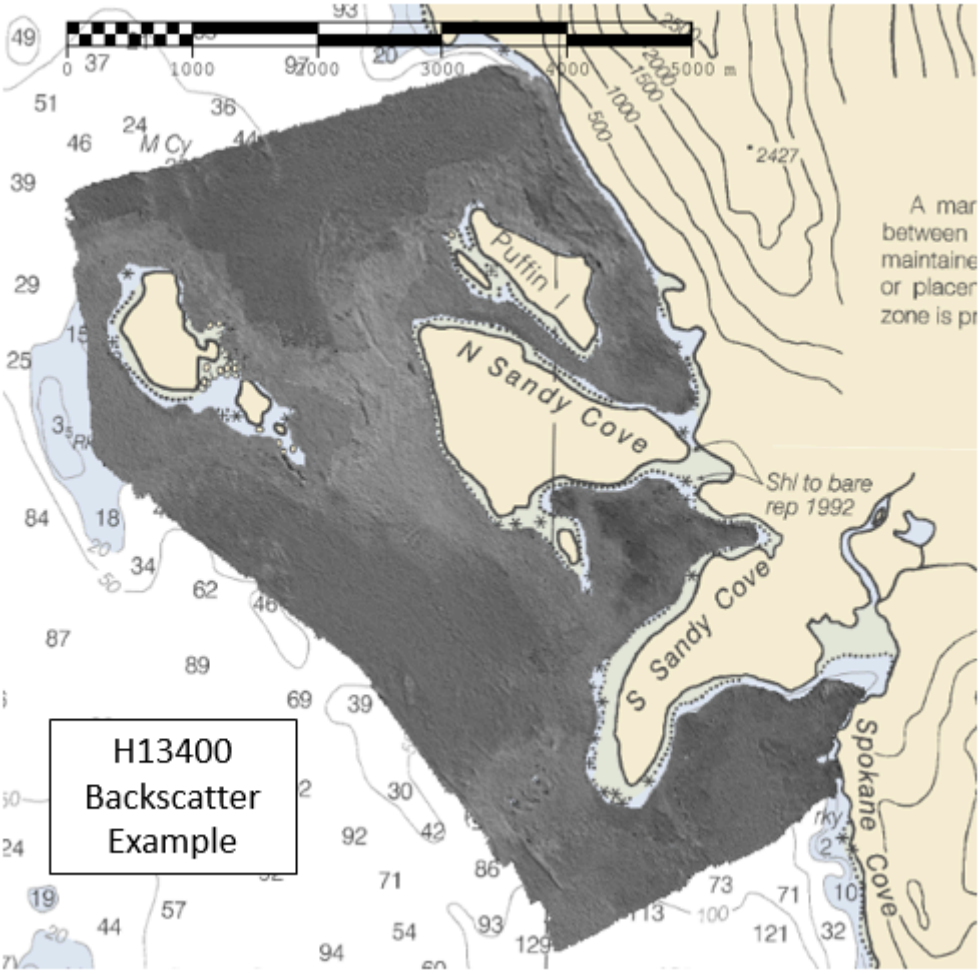


Figure 20: H13400 Backscatter mosaics (Chart 13718).

B.5 Data Processing

B.5.1 Primary Data Processing Software

The following software program was the primary program used for bathymetric data processing:

Manufacturer	Name	Version
CARIS	HIPS and SIPS	11.3.15

Table 10: Primary bathymetric data processing software

The following software program was the primary program used for imagery data processing:

Manufacturer	Name	Version
QPS	Fledermaus	7.9.4

Table 11: Primary imagery data processing software

The following Feature Object Catalog was used: **NOAA Profile Version 2021**

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
H13400_MB_VR_MLLW	CARIS VR Surface (CUBE)	Variable Resolution	-2.16 meters - 250.97 meters	NOAA_VR	Complete MBES
H13400_MB_VR_MLLW_Final	CARIS VR Surface (CUBE)	Variable Resolution	-2.16 meters - 250.97 meters	NOAA_VR	Complete MBES

Table 12: Submitted Surfaces

Submitted H13400 surfaces were generated using NOAA recommended parameters for density-based (Ranges) Caris variable-resolution bathymetric grids. Two soundings were designated and included in the Final Feature File to update the location and height of the corresponding assigned feature. A significant discrepancy between charted depth and surveyed depth was identified in the northern end of Muir Inlet and the western end of Wachusett Inlet and were submitted as a DTON. See DTON report in supplemental records submitted with this report.

Pydro QC Tools v.3.4.5 Flier Finder, with default settings, was used to identify sounding "fliers" in the finalized H13400 VR surface. Obvious noise was rejected by the hydrographer in Caris Subset Editor. After data cleaning, the Flier Finder tool was run again and found 19 potential fliers in the Complete Coverage surface. These were investigated and found to be false positives.

Pydro QC Tools v3.4.5 Holiday Finder was used with default settings to find holidays in the finalized H13400 VR surface. Holiday Finder detected 9 holidays in the Complete Coverage Surface. Of the detected holidays, 5 were identified as features and found to be false. The remaining 4 detected holidays were confirmed to be gaps in data coverage, but they do not impact the reliability of the data. The 4 holidays that were data gaps were reviewed in the MBES data and based on the surrounding depths and location, it is assumed that there are no features or shoals of concern.

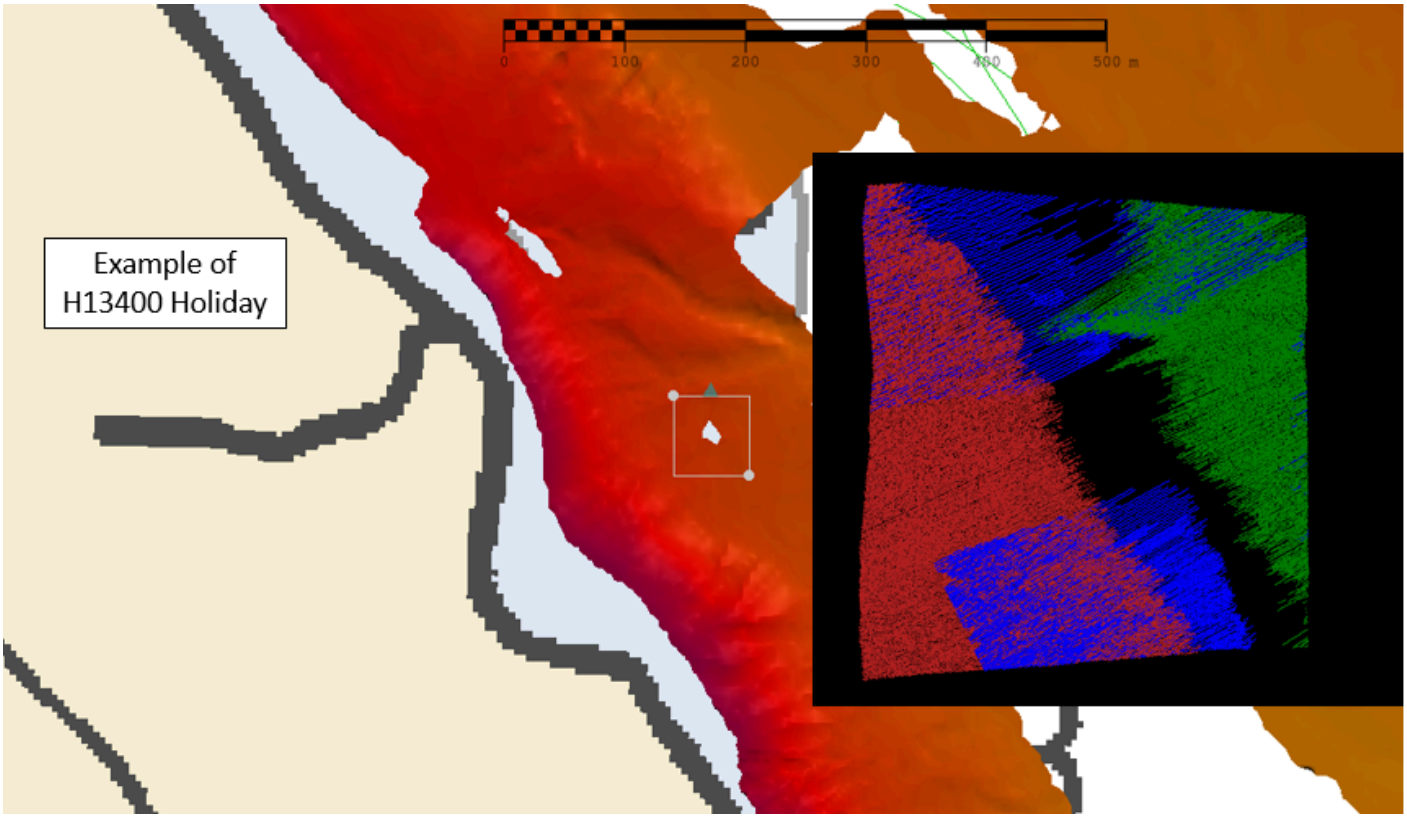


Figure 21: Example of holiday in MBES data.

C. Vertical and Horizontal Control

Additional information discussing the vertical or horizontal control for this survey can be found in the accompanying DAPR.

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-O351-FA-20_VDatum_100m_NAD83(2011)-MLLW_XGEOID16B.csar OPR-O351-FA-20_VDatum_100m_NAD83(2011)-MHW_XGEOID16B.csar

Table 13: 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 8.

The following PPK methods were used for horizontal control:

- RTX

RTK

Precise Positioning-Real Time Extended (PP-RTX) processing methods were used in Applanix POSPac MMS (v8.5) software during post-processing horizontal correction of submitted H13400 MBES data

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
US4AK3DM	1:80000	7	07/14/2021	09/20/2018

Table 14: Largest Scale ENCs

D.1.2 Shoal and Hazardous Features

All assigned shoals and hazardous features were addressed. Features shore ward of the NALL were not investigated and are labeled as such in the final feature file. Due to a limited shoreline window, a partial shoreline investigation was completed in areas with the most dangerous features. Features investigated during data acquisition and confirmed in the MBES data have been updated as required in the Final Feature File. Two shoal areas were identified in Muir and Wachusett Inlet and submitted as a DTONs for Chart 17318. Aside from the DTONs, no other significant differences between the chart and the data were identified. See supplemental records for DTON report.

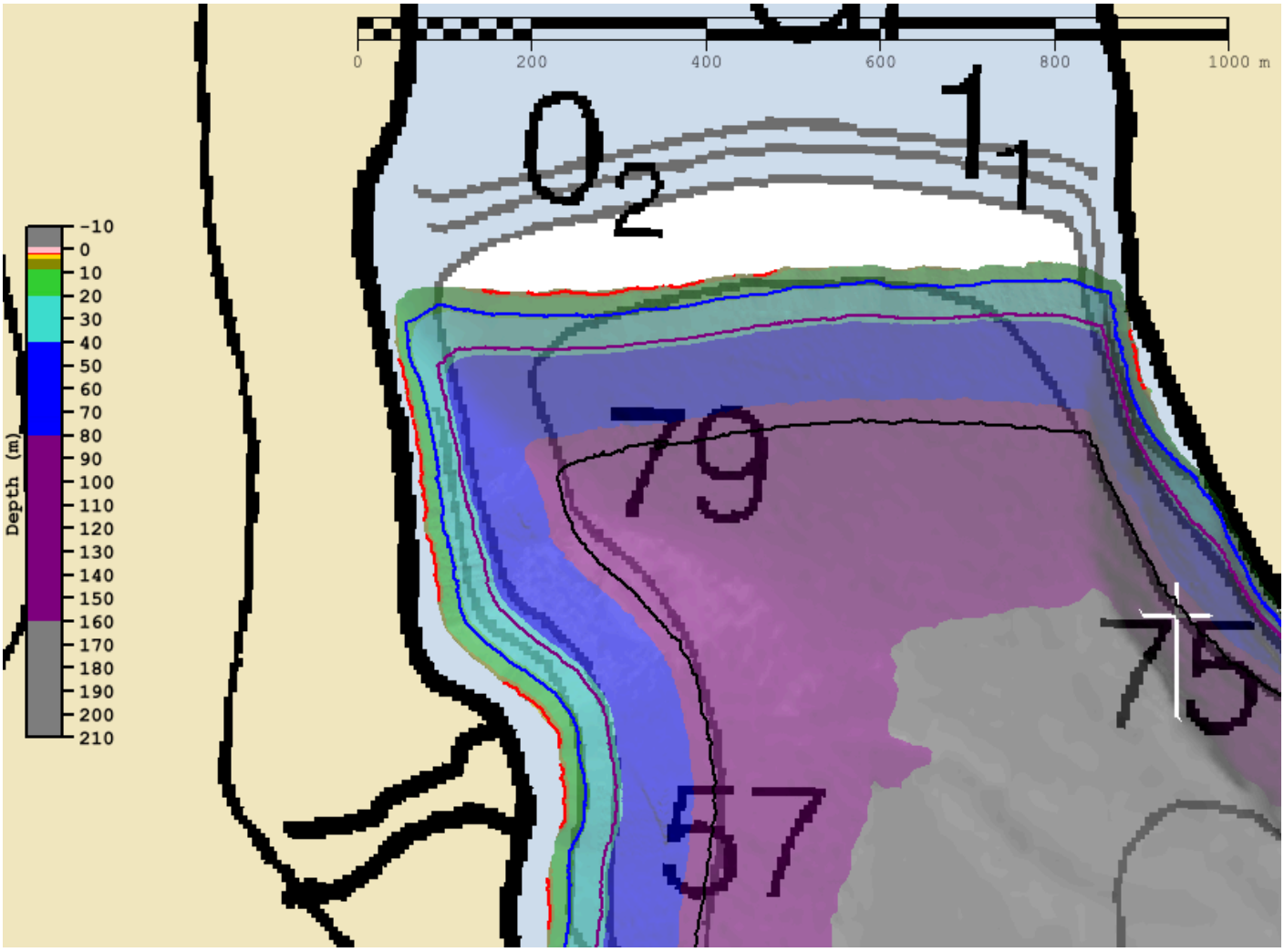


Figure 22: Shoal area identified as DTON in Muir Inlet (Chart 17318).

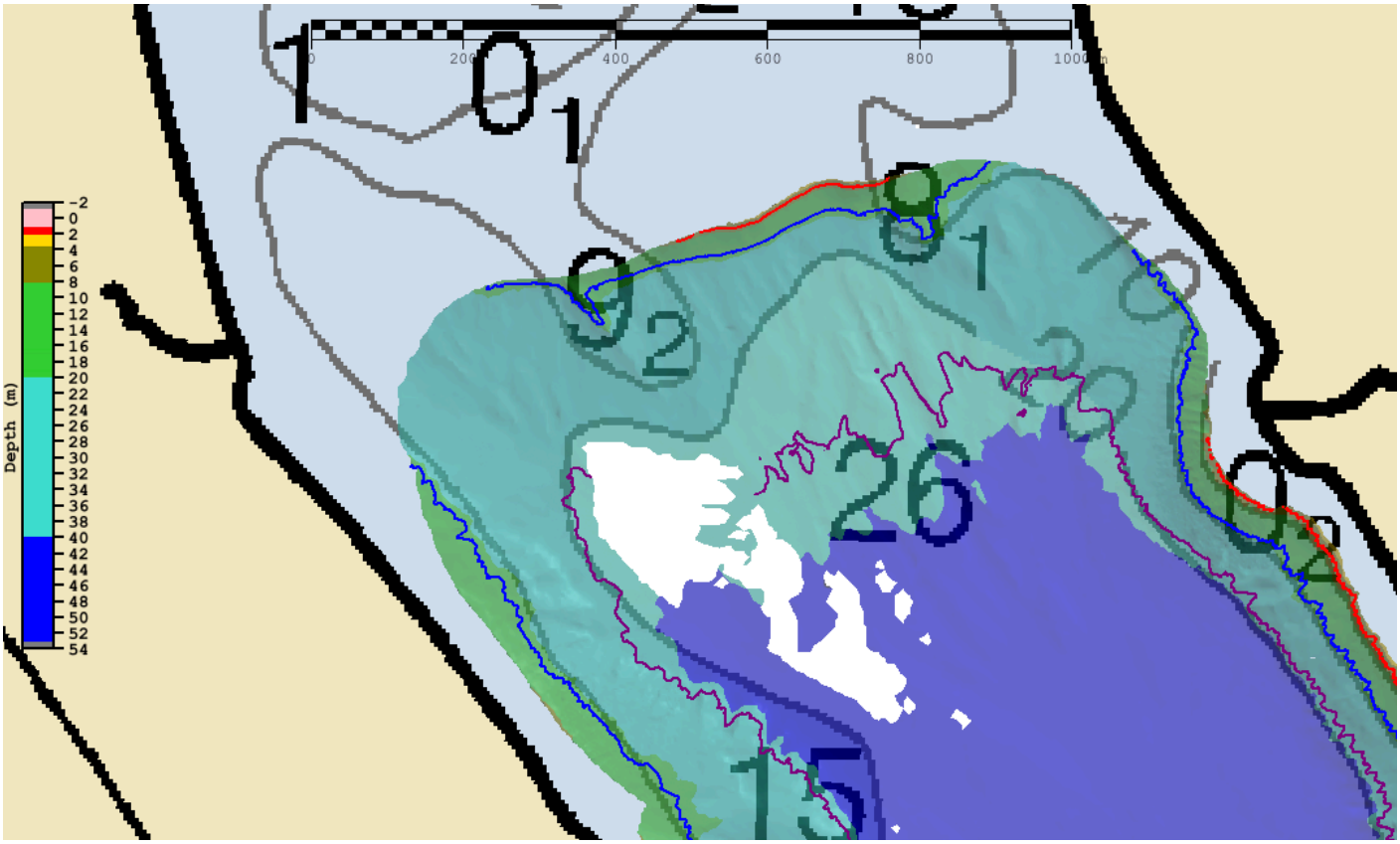


Figure 23: Shoal area identified as DTON in Wachusett Inlet (Chart 17318).

DTONs have been applied to the latest ENC. The DTON report was not appended to this report.

D.1.3 Charted Features

No charted features exist for this survey.

D.1.4 Uncharted Features

No uncharted features exist for this survey.

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

Five bottom samples were acquired during survey H13400. The results of the acquired bottom samples are included in the H13400 Final Feature File submitted with this report.

The Final Feature File was not appended to this report.

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

Positioning was recorded in Adams Inlet during a tidal cycle over the course of one day to address the vertical offset that is noted on the chart. The position files were used to create SBETs and sent to Hydrographic Systems and Technology Branch Pacific for further analysis. See project correspondence for more information.

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
Olivia A. Hauser CDR/ NOAA	Chief of Party	10/16/2021	HAUSER.OLIVIA.ANN.1275636009 2021.10.20 11:45:12 -07'00'
Dylan A. Kosten LT/NOAA	Field Operations Officer	10/16/2021	Digitally signed by KOSTEN.DYLAN.ANDREW.1504527405 Date: 2021.10.20 11:49:10 -07'00'
James B. Jacobson	Chief Survey Technician	10/16/2021	JACOBSON.JAMES.BRYAN.1269664017 I have reviewed this document 2021.10.18 08:49:48 -07'00'
Christina L. Brooks	Sheet Manager	10/16/2021	Digitally signed by BROOKS.CHRISTINA.LORRAINE.1553513177 Date: 2021.10.16 12:51:51 -07'00'

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