H13104

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

DESCRIPTIVE REPORT

Type of Survey:	Navigable Area
Registry Number:	H13104

LOCALITY

State(s):	Alaska
General Locality:	Kodiak Island, Alaska
Sub-locality:	Cape Greville

2019

CHIEF OF PARTY
Benjamin K. Evans, CAPT/NOAA

LIBRARY & ARCHIVES

Date:

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

REGISTRY NUMBER:

HYDROGRAPHIC TITLE SHEET

H13104

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:	**Kodiak Island, Alaska**
Sub-Locality:	**Cape Greville**
Scale:	**40000**
Dates of Survey:	**05/09/2019 to 06/20/2019**
Instructions Dated:	**04/16/2019**
Project Number:	**OPR-P136-RA-19**
Field Unit:	**NOAA Ship *Rainier***
Chief of Party:	**Benjamin K. Evans, CAPT/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 5N, 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 H13104

Project: OPR-P136-RA-19

Locality: Kodiak Island, Alaska

Sublocality: Cape Greville

Scale: 1:40000

May 2019 - June 2019

NOAA Ship *Rainier*

Chief of Party: Benjamin K. Evans, CAPT/NOAA

A. Area Surveyed

The survey area is referred to as "Cape Greville" (sheet 1) within the Project Instructions. The area extends more than three nautical miles off the western shore of Cape Chiniak and south to Slope Peak; it encompasses approximately 37 square nautical miles.

A.1 Survey Limits

Data were acquired within the following survey limits:

Northwest Limit	Southeast Limit
57° 37' 51.6" N 152° 15' 56.16" W	57° 27' 20.16" N 152° 0' 27.36" W

Table 1: Survey Limits

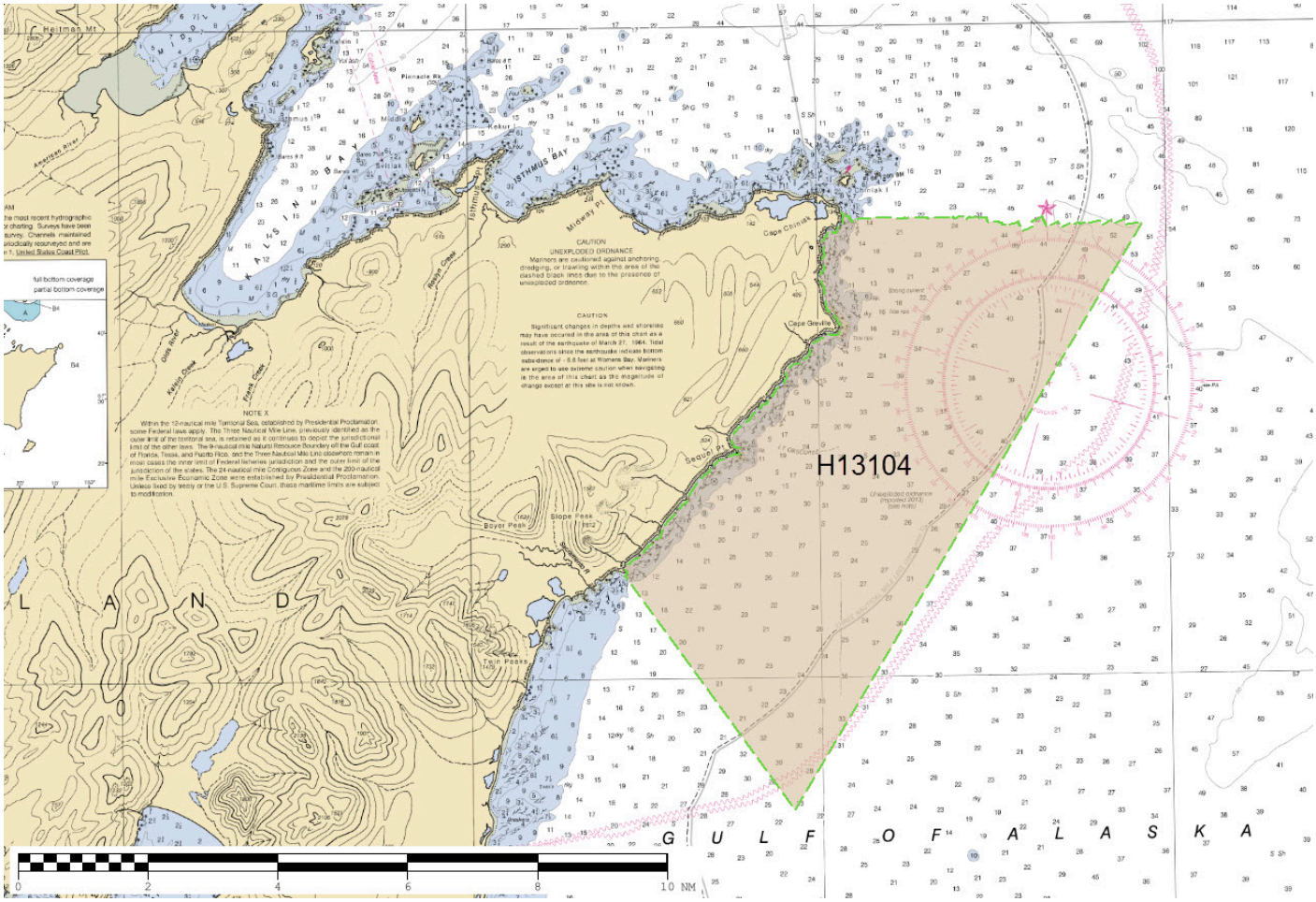


Figure 1: H13104 assigned survey area (Chart 16593)

Survey limits were acquired in accordance with the requirements in the Project Instructions and the HSSD.

A.2 Survey Purpose

The area near Chiniak Bay supports the second busiest and third richest fisheries port in Alaska. Chiniak Bay and the surrounding area is the gateway to Kodiak and has a survey vintage of 1933. In 2015, the Port of Kodiak was responsible for 514 million pounds of fish and 138 million dollars of product. The area around Cape Greville, contained within H13104, is one of the main thoroughfares to the port. Navigation is complicated by the high number of vessels in the area in addition to a legacy of groundings and near misses due to submerged pinnacles and other dangers to navigation. This survey will serve to update nautical charts with modern data to support safe navigation.

A.3 Survey Quality

The entire survey is adequate to supersede previous data.

Pydro QC Tools Grid QA was used to analyze H13104 multibeam echosounder (MBES) data density. The submitted H13104 variable-resolution (VR) surface met HSSD density requirements as shown in the histogram below.

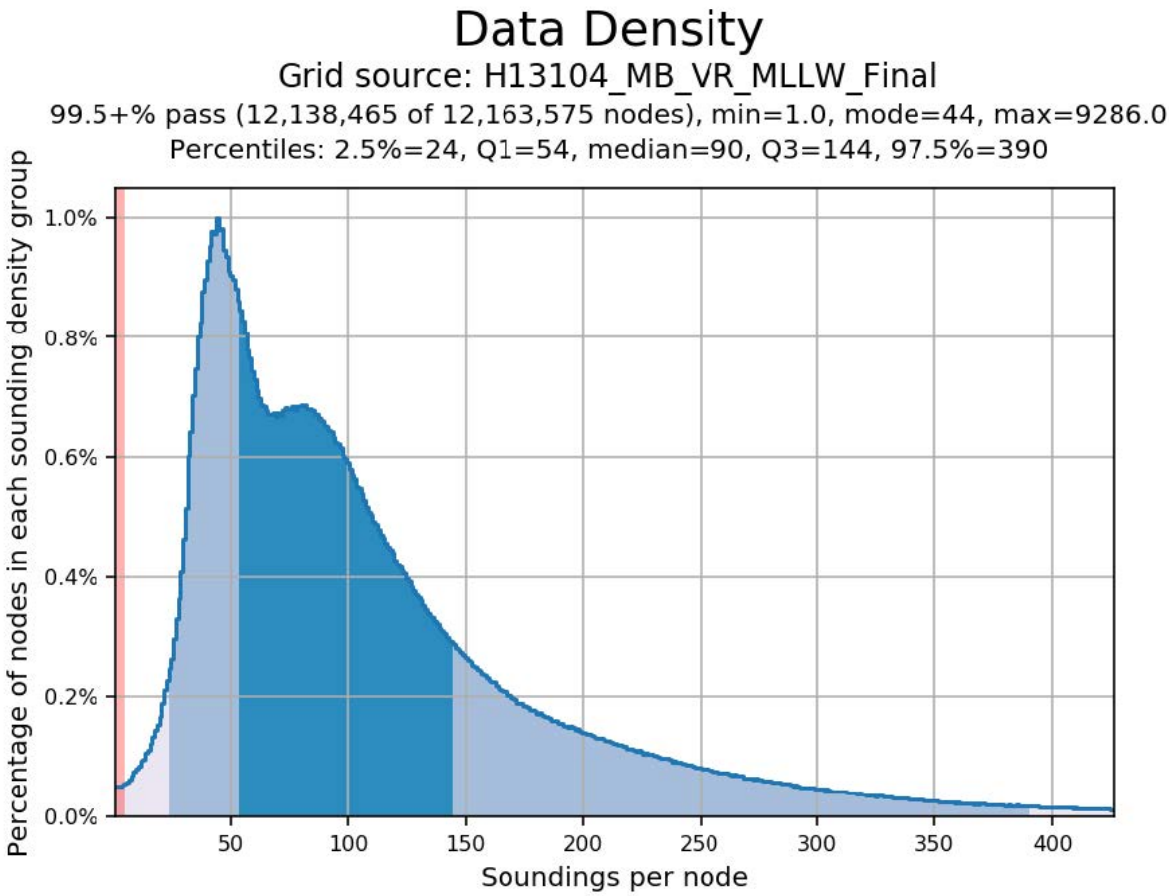


Figure 2: Pydro derived plot showing HSSD density compliance of H13104 finalized variable-resolution MBES data.

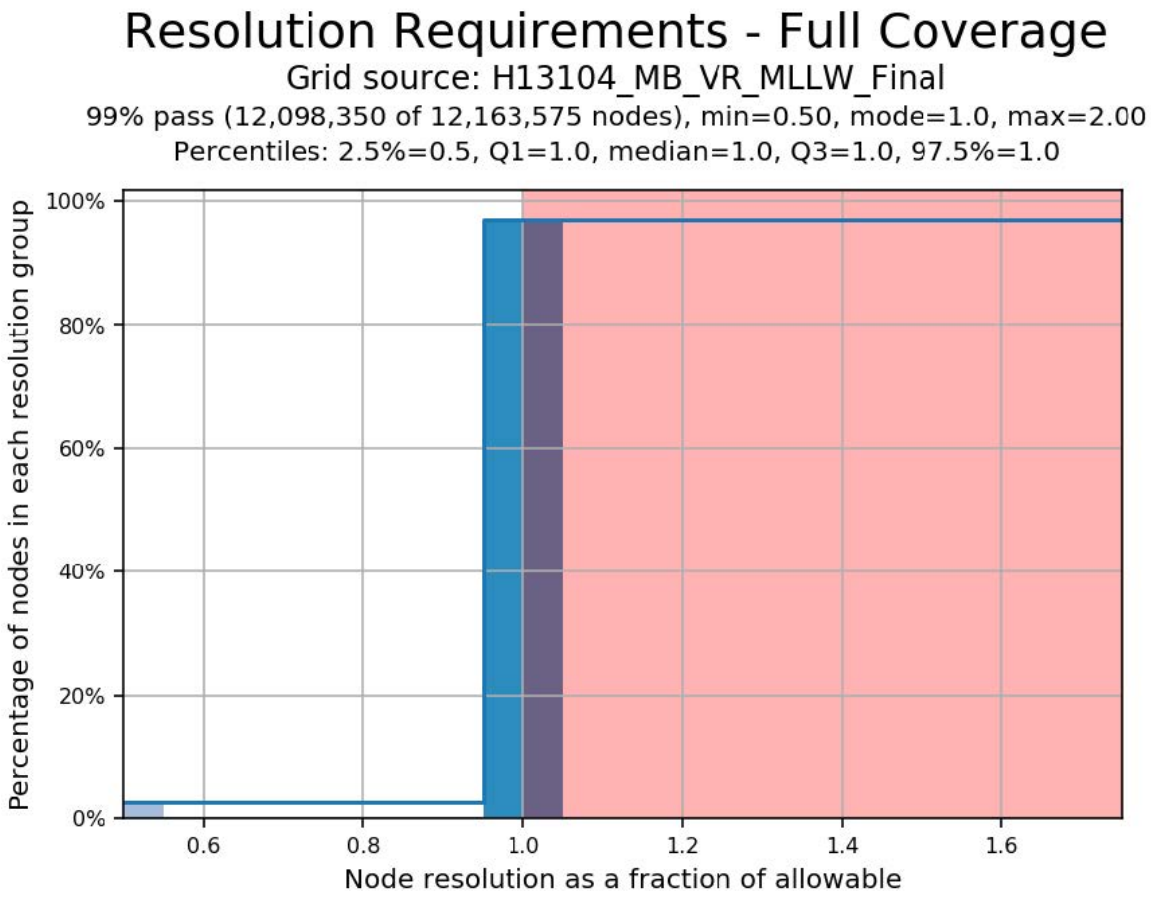


Figure 3: Pydro derived plot showing H13104 finalized variable-resolution MBES data complies with HSSD required resolution standards for complete coverage.

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 HSSD Section 6.2)

Table 2: Survey Coverage

Complete multibeam echosounder (MBES) coverage 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 or the assigned sheet limits were due to the survey vessel reaching the extent of safe navigation as shown in

the figures below. These areas are characterized as being near shore, subject to dangerous wave actions or other hazards. Throughout most of the survey, the NALL was largely defined by thick, impenetrable kelp.

There are 8 gaps in the data (holidays), 5 of which are within the sheet limits. These cases are discussed further in section B.2.10 of this report.

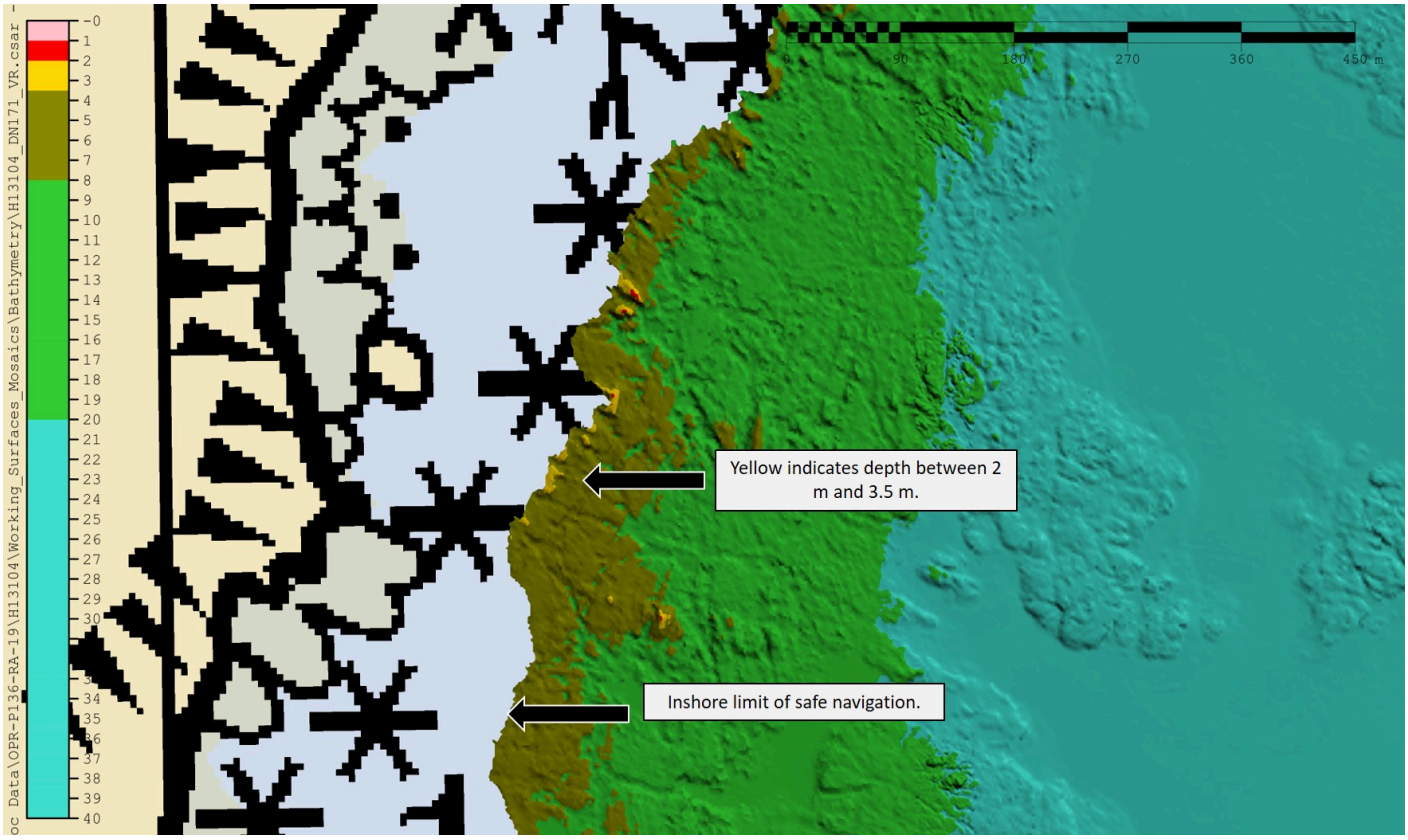


Figure 4: Examples of H13104 NALL determination.

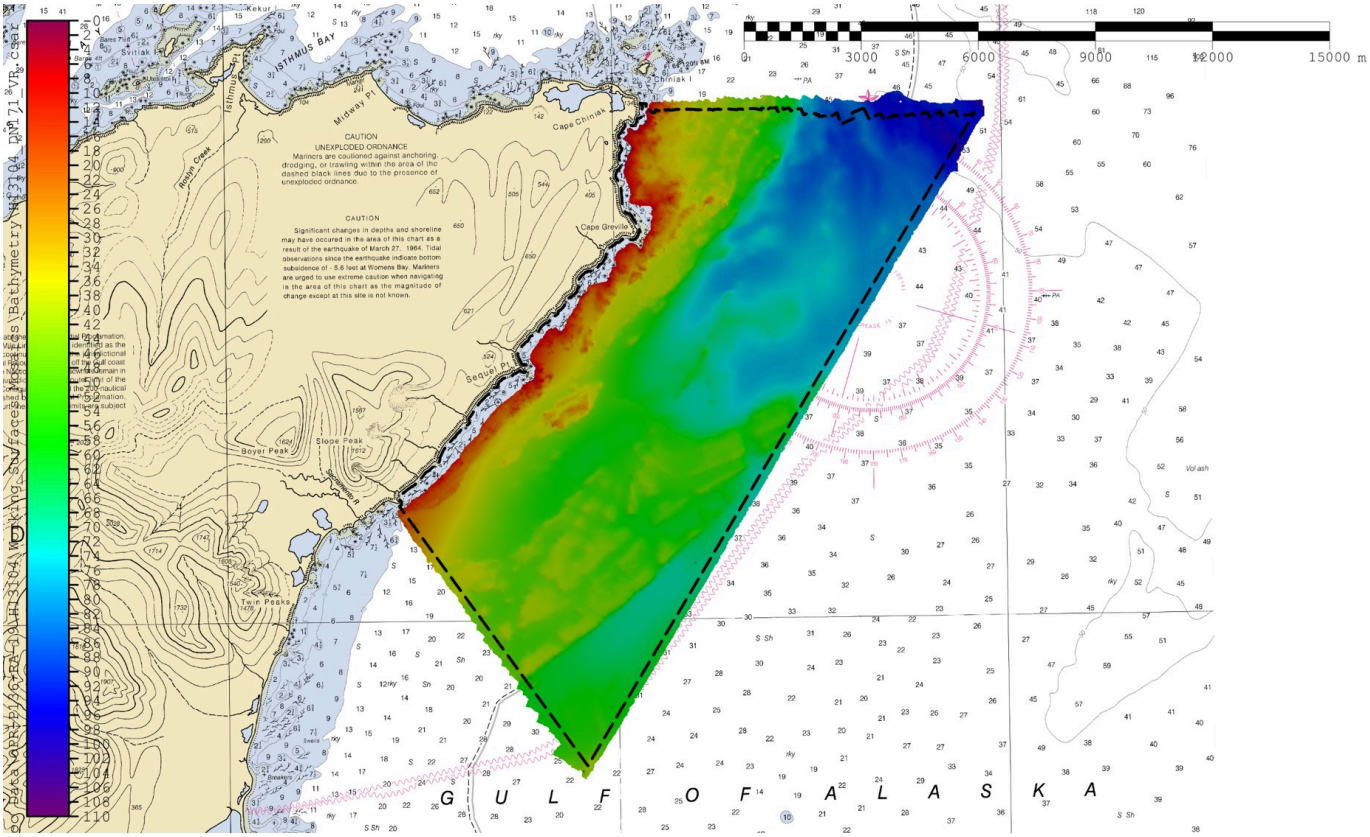


Figure 5: H13104 overall survey coverage displayed on Chart 16593. The dashed black line marks the assigned survey area.

A.6 Survey Statistics

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

	HULL ID	*2801*	*2802*	*2803*	*2804*	*S221*	*2701*	*Total*
LNM	SBES Mainscheme	0	0	0	0	0	8.36	0
	MBES Mainscheme	81.99	125.96	80.91	102.47	34.87	0	426.2
	Lidar Mainscheme	0	0	0	0	0	0	0
	SSS Mainscheme	0	0	0	0	0	0	0
	SBES/SSS Mainscheme	0	0	0	0	0	0	0
	MBES/SSS Mainscheme	0	0	0	0	0	0	0
	SBES/MBES Crosslines	4.23	7.21	0	10.77	0	0	22.21
	Lidar Crosslines	0	0	0	0	0	0	0
Number of Bottom Samples								3
Number Maritime Boundary Points Investigated								5
Number of DPs								8
Number of Items Investigated by Dive Ops								0
Total SNM								33.69

Table 3: Hydrographic Survey Statistics

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

Survey Dates	Day of the Year
05/09/2019	129
05/14/2019	134

Survey Dates	Day of the Year
05/15/2019	135
05/21/2019	141
05/24/2019	144
06/06/2019	157
06/07/2019	158
06/08/2019	159
06/13/2019	164
06/20/2019	171

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	*S221*	*2801*	*2802*	*2803*	*2804*	*2701*	*1905*
LOA	70.4 meters	8.8 meters	8.8 meters	8.8 meters	8.8 meters	7.62 meters	5.7 meters
Draft	4.7 meters	1.1 meters	1.1 meters	1.1 meters	1.1 meters	0.47 meters	0.35 meters

Table 5: Vessels Used

Figure 6: NOAA Ship RAINIER and 2804 (RA-4) in Ugak Bay, Alaska.

All multibeam data for H13104 were acquired by S221 (NOAA Ship RAINIER) and RAINIER launches 2801 (RA-4), 2802 (RA-5), 2803 (RA-3), and 2804 (RA-6). These vessels acquired depth soundings, backscatter, and sound speed profiles. Shoreline verification was conducted from RAINIER launch 2701 (RA-2) and RAINIER skiff 1905 (RA-8).

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 710	MBES
Kongsberg Maritime	EM 2040	MBES
Teledyne RESON	SVP 70	Sound Speed System
Sea-Bird Scientific	SBE 19plus	Conductivity, Temperature, and Depth Sensor
ODIM Brooke Ocean	MVP200	Sound Speed System
Velodyne LiDAR	VLP-16	Lidar System

Table 6: Major Systems Used

B.2 Quality Control

B.2.1 Crosslines

RAINIER launches 2801 (RA-4), 2802 (RA-5), and 2804 (RA-6) acquired 22.2 nautical miles of multibeam crosslines. H13104 crosslines data is adequate for verifying and evaluating the internal consistency of survey data. The Compare Grids function in Pydro Explorer analyzed a finalized VR surface of H13104 crossline only data and mainscheme-only data. In the difference surface, 99.5% of nodes met IHO allowable Total Vertical Uncertainty (TVU) standard.

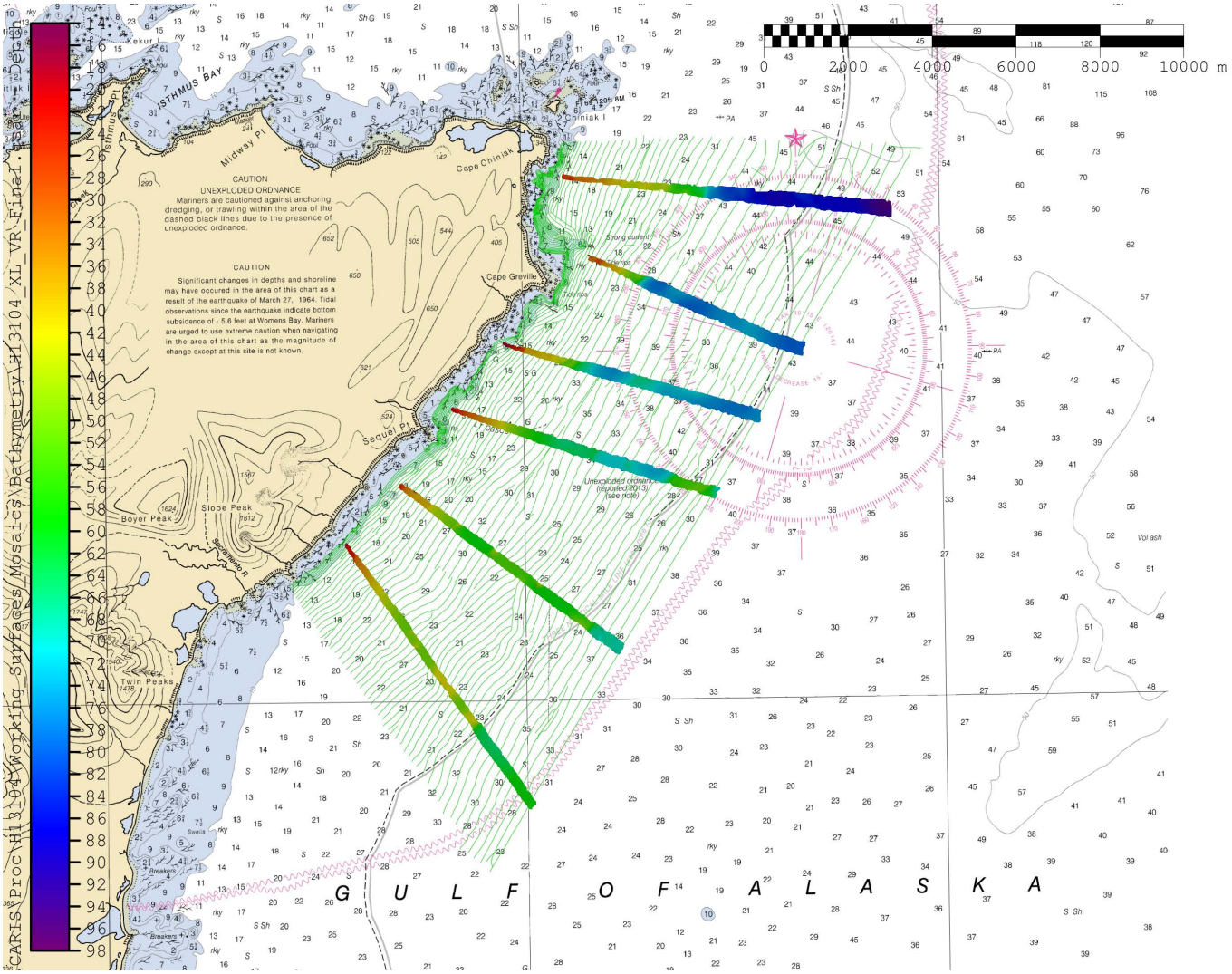


Figure 7: H13104 crossline VR surface overlaid on mainscheme tracklines.

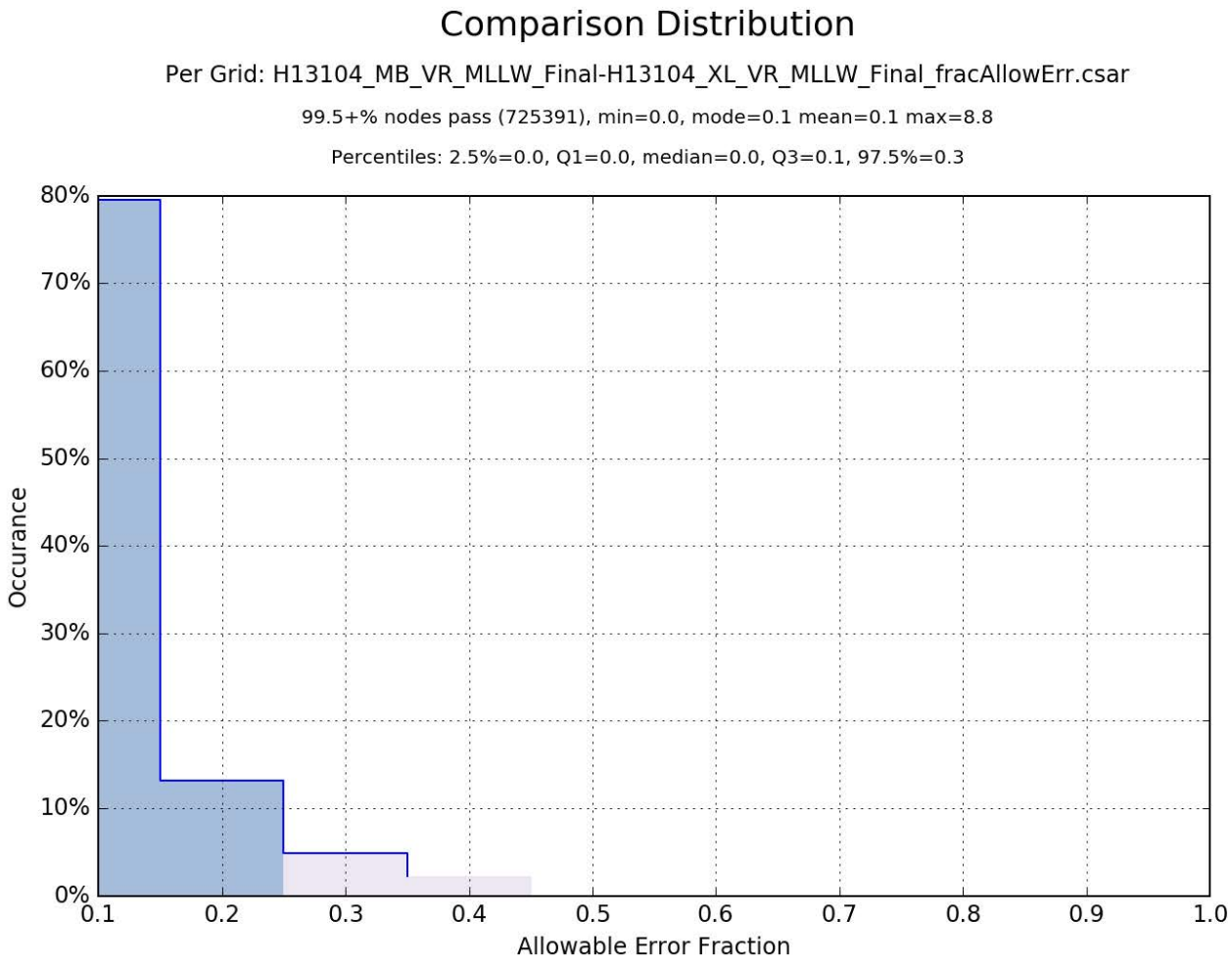
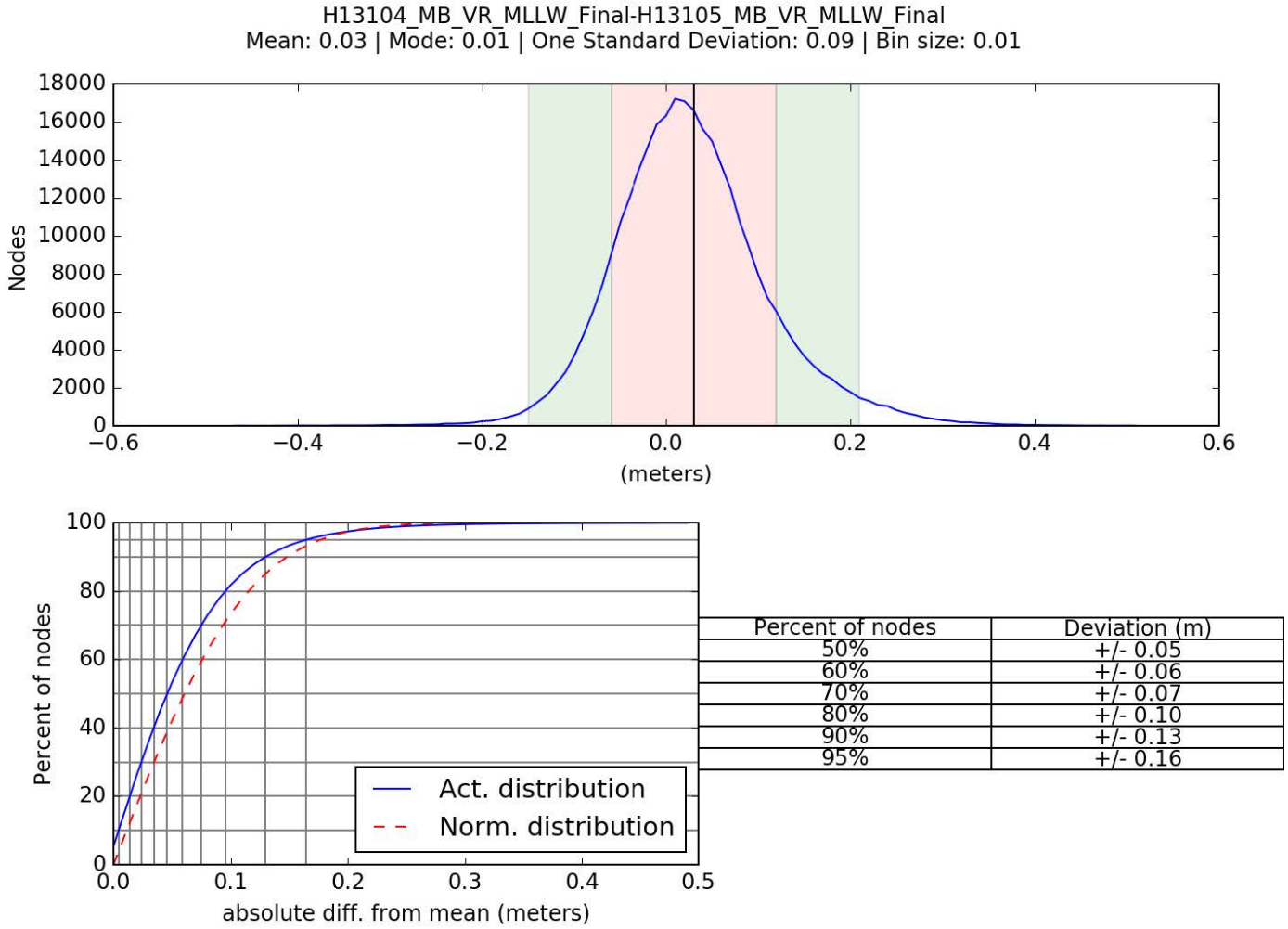


Figure 8: Pydro derived plot showing percentage-pass value of H13104 mainscheme to crossline data.



Percent of nodes	Deviation (m)
50%	+/- 0.05
60%	+/- 0.06
70%	+/- 0.07
80%	+/- 0.10
90%	+/- 0.13
95%	+/- 0.16

Figure 9: Pydro derived plot showing absolute difference statistics of H13104 mainscheme to crossline data.

B.2.2 Uncertainty

The following survey specific parameters were used for this survey:

Method	Measured	Zoning
ERS via ERTDM	0 meters	0.15 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 meters/second	N/A meters/second	0.05 meters/second
S221	N/A meters/second	1 meters/second	N/A meters/second	0.05 meters/second

Table 8: Survey Specific Sound Speed TPU Values.

Total Propagated Uncertainty (TPU) values for survey H13104 were derived from a combination of fixed values for equipment and vessel characteristics, as well as from field assigned values for sound speed uncertainties. The uncertainty value of NOAA's Ellipsoidally-Referenced Tidal Datum Model (ERTDM) was documented in metadata that accompanied the ERTDM.

In addition to the usual a priori estimates of uncertainty, some real-time and post-processing uncertainty sources were also incorporated into the depth estimates of this survey. Real-time uncertainties from Kongsberg MBES sonars were recorded and applied in post-processing. Applanix TrueHeave (POS) files, which record estimates of heave uncertainty, were applied during post-processing. Finally, the post-processed uncertainties associated with vessel roll, pitch, yaw, and position were applied in CARIS HIPS using SBET and RMS files generated using POSPac MMS Software.

Uncertainty values of the submitted finalized grid were calculated in CARIS using "Greater of the Two" of uncertainty and standard deviation (scaled to 95%). Grid QC within Pydro QC Tools was used to analyze H13104 TVU compliance.

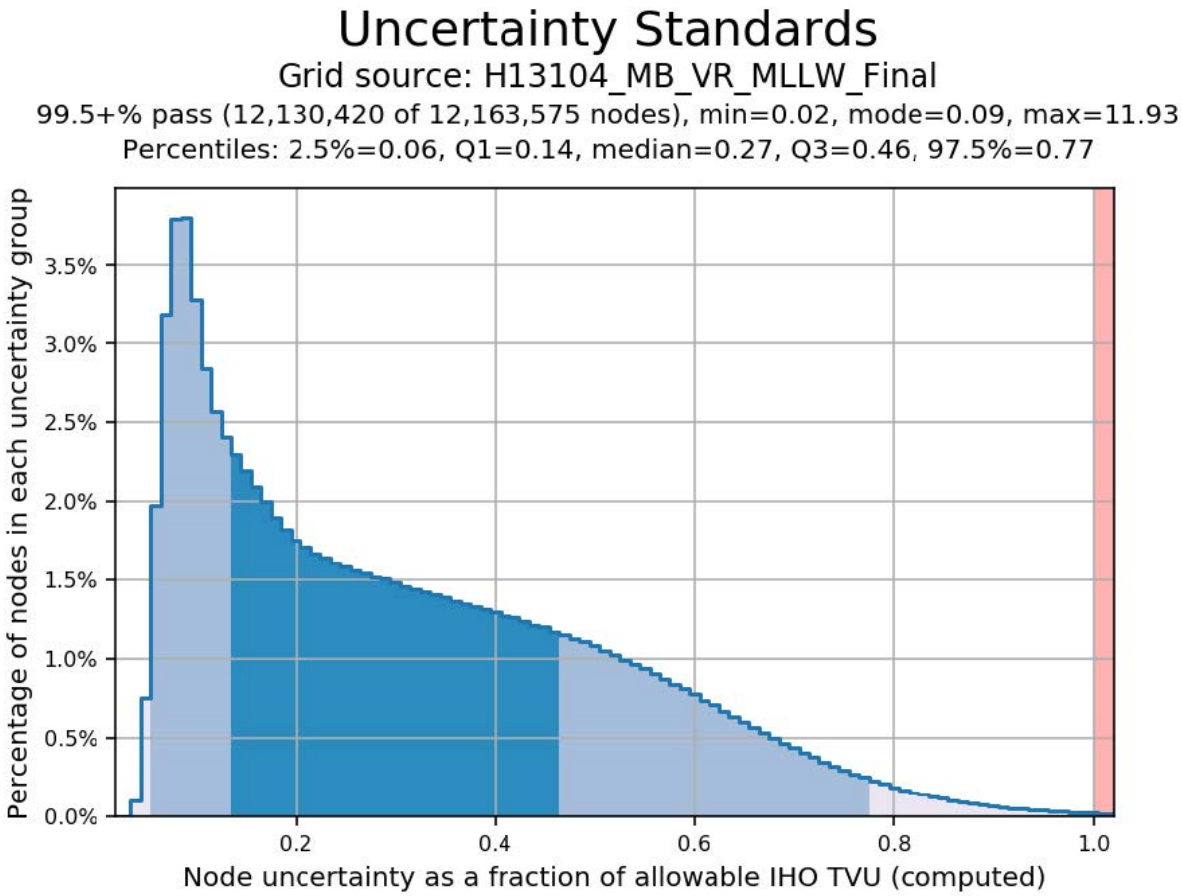


Figure 10: Pydro derived plot showing TVU compliance of H13104 finalized variable resolution MBES data.

B.2.3 Junctions

Four surveys junction with H13104. Two are contemporary and part of project OPR-P136-RA-19 and two others were conducted by NOAA Ship RAINIER in 2017. As per the 2019 HSSD, junction analyses were performed only for the two concurrently acquired surveys.

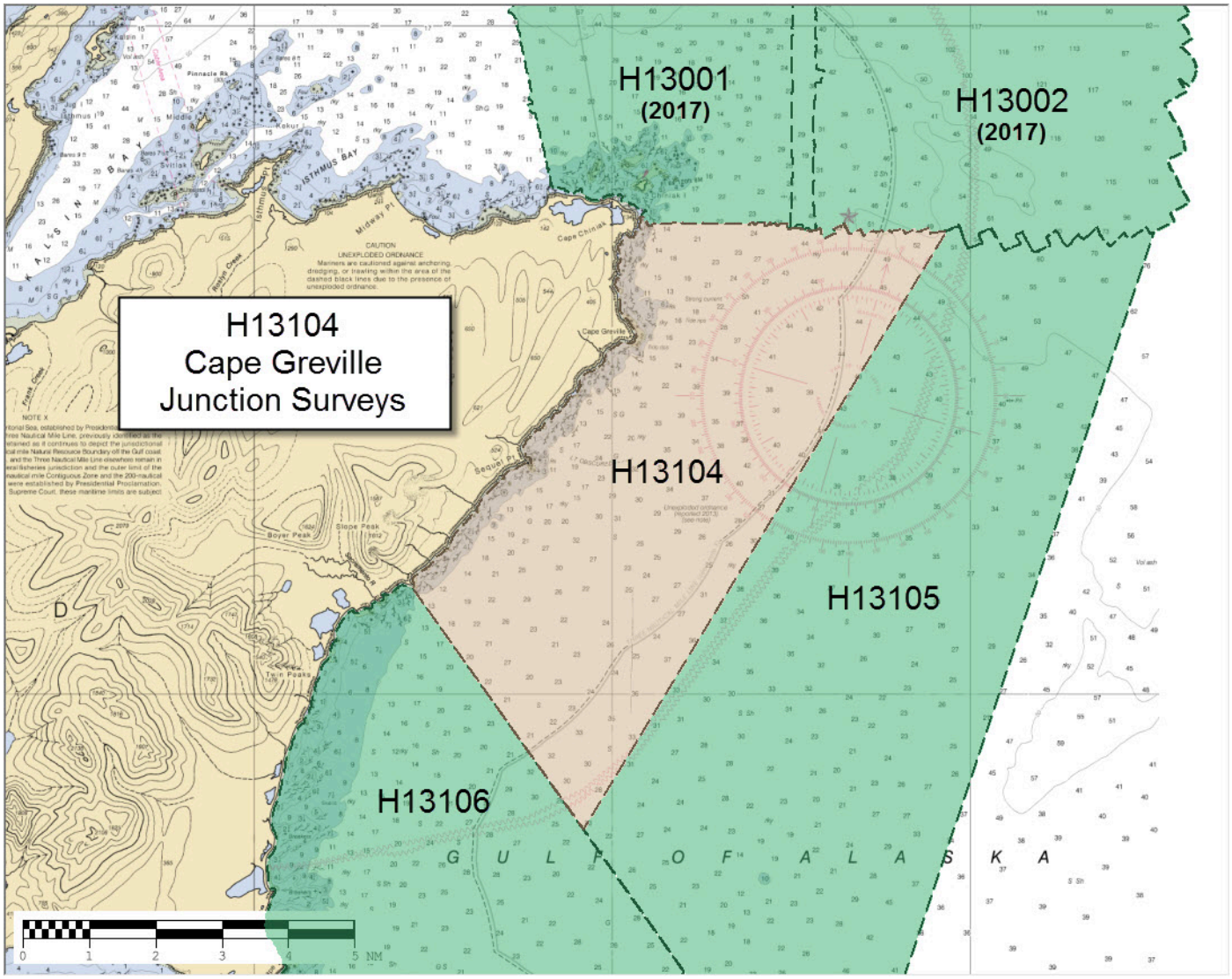


Figure 11: H13104 junction surveys.

The following junctions were made with this survey:

Registry Number	Scale	Year	Field Unit	Relative Location
H13105	1:40000	2019	NOAA Ship RAINIER	E
H13106	1:40000	2019	NOAA Ship RAINIER	SW

Table 9: Junctioning Surveys

H13105

The junction with survey H13105 encompassed approximately 1.94 square nautical miles along the eastern boundary of H13104. Pydro's Compare Grids results showed that 99.5+% of nodes in the common area met NOAA allowable uncertainty standards. Analysis of the difference surface indicated that survey H13104 is an average of 0.03 meters deeper than survey H13105 with a standard deviation of 0.09 meters.

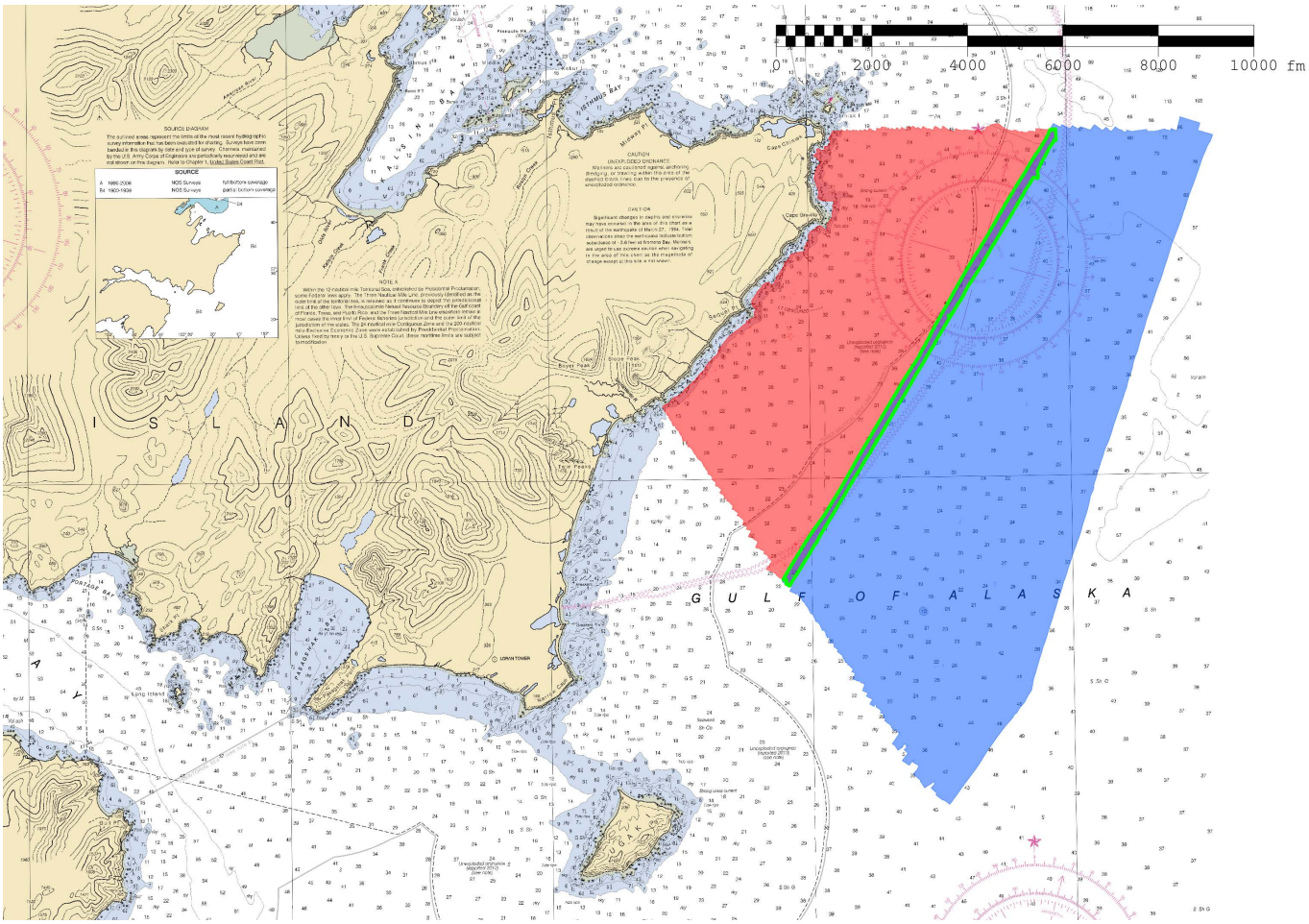


Figure 12: Overview of survey junction between H13104 and H13105.

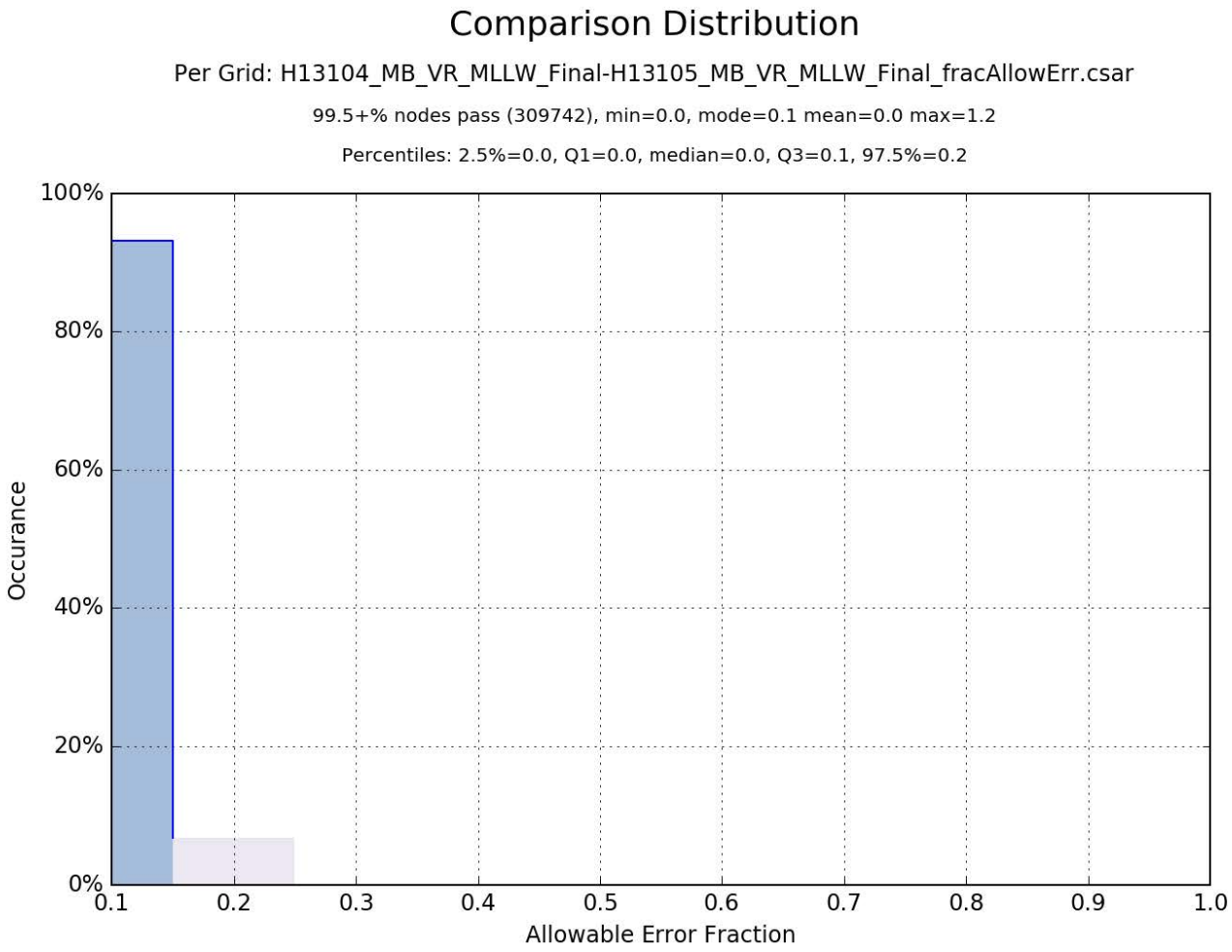
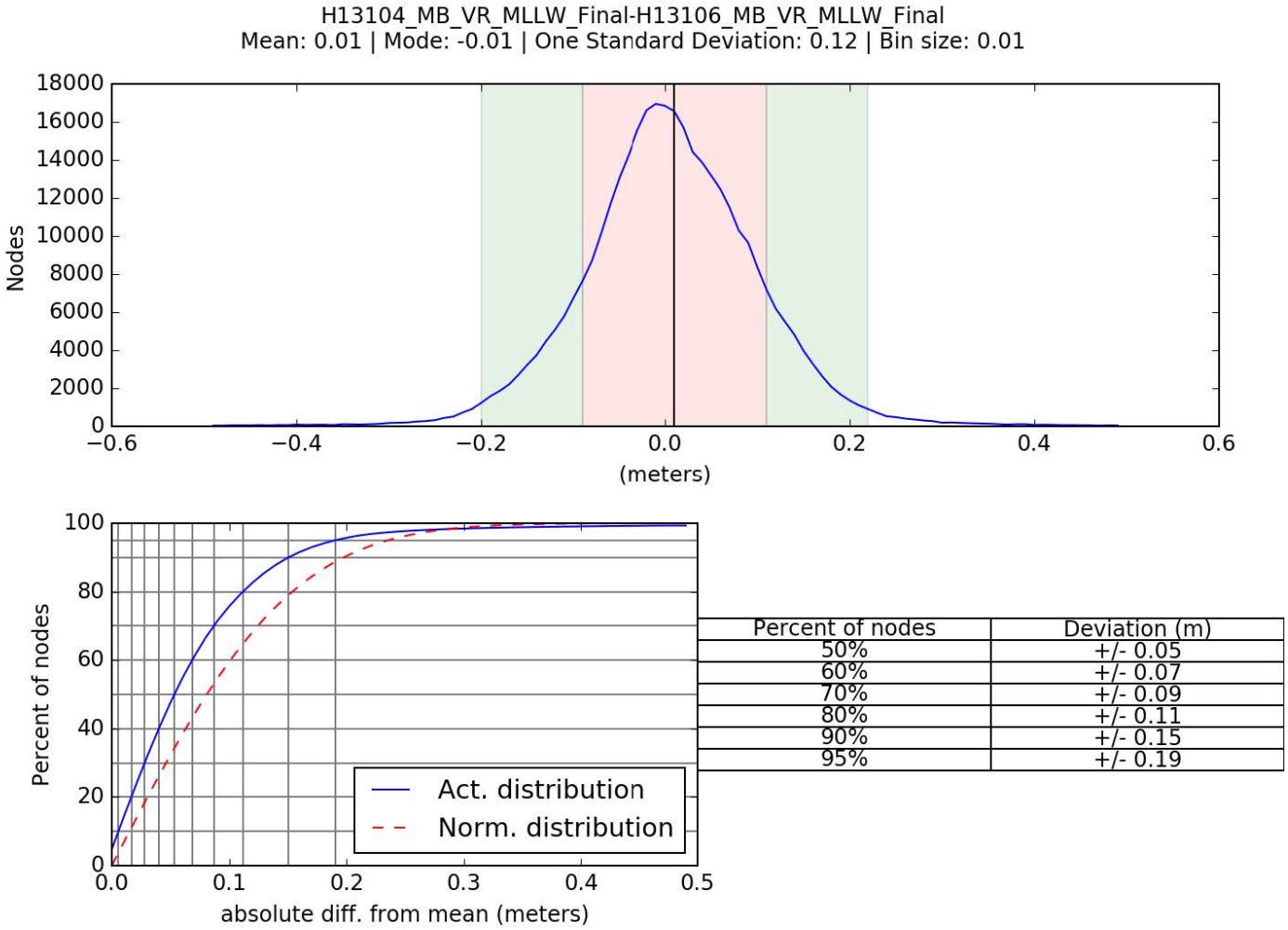


Figure 13: Pydro derived plot showing allowable error between H13104 and H13105.



Percent of nodes	Deviation (m)
50%	+/- 0.05
60%	+/- 0.07
70%	+/- 0.09
80%	+/- 0.11
90%	+/- 0.15
95%	+/- 0.19

Figure 14: Pydro derived plot showing H13104 and H13105 comparison statistics.

The 2019 HSSD requires analysis with prior junctioning surveys. Comparison with prior surveys H13001 and H13002 show good agreement.

H13106

The junction with survey H13106 encompassed approximately 0.96 square nautical miles along the southwest boundary of H13104. Pydro's Compare Grids results showed that 99.5+% of nodes in the common area met NOAA allowable uncertainty standards. Analysis of the difference surface indicated that survey H13104 is an average of 0.01 meters deeper than survey H13106 with a standard deviation of 0.12 meters.

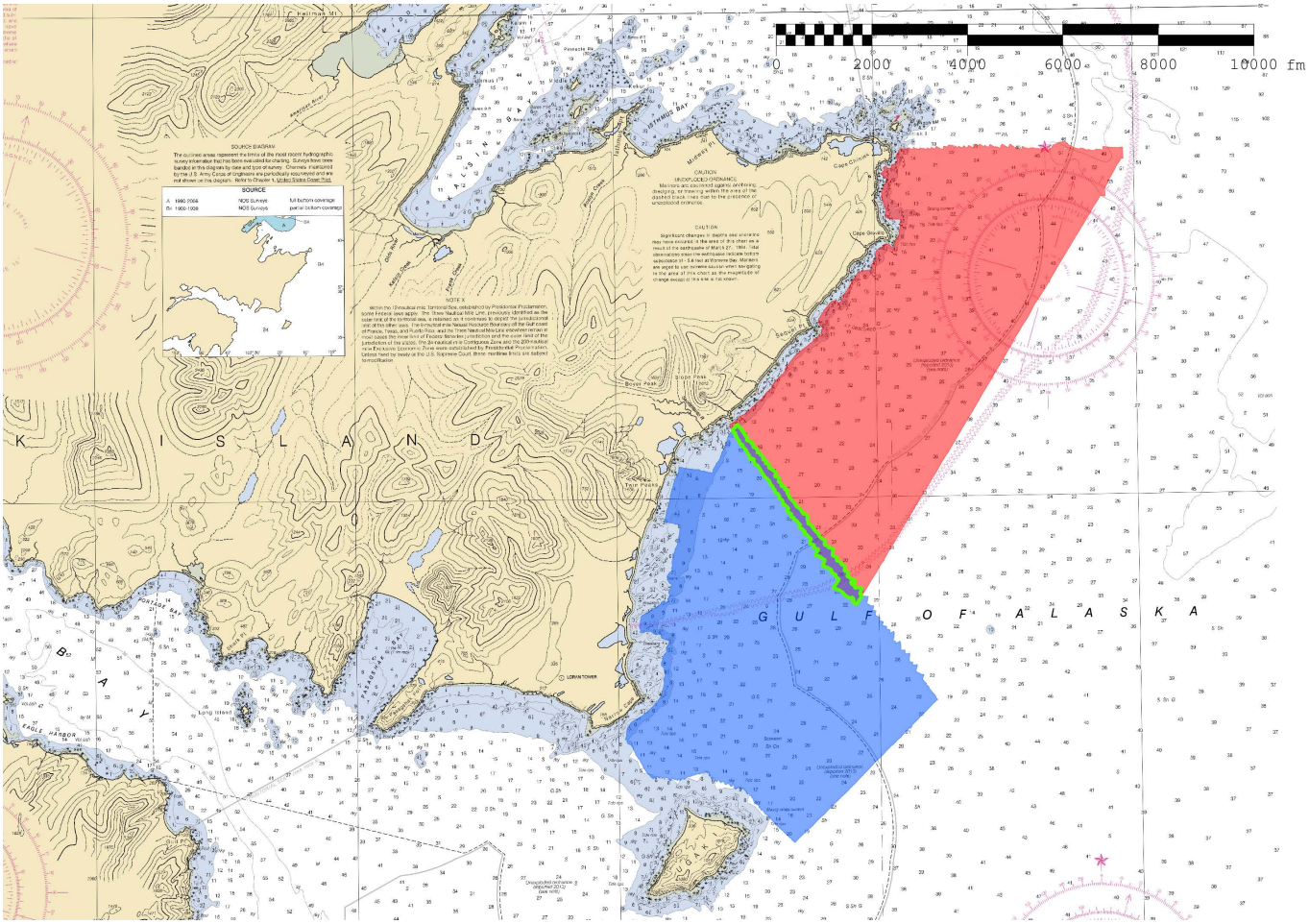


Figure 15: Overview of survey junction between H13104 and H13106.

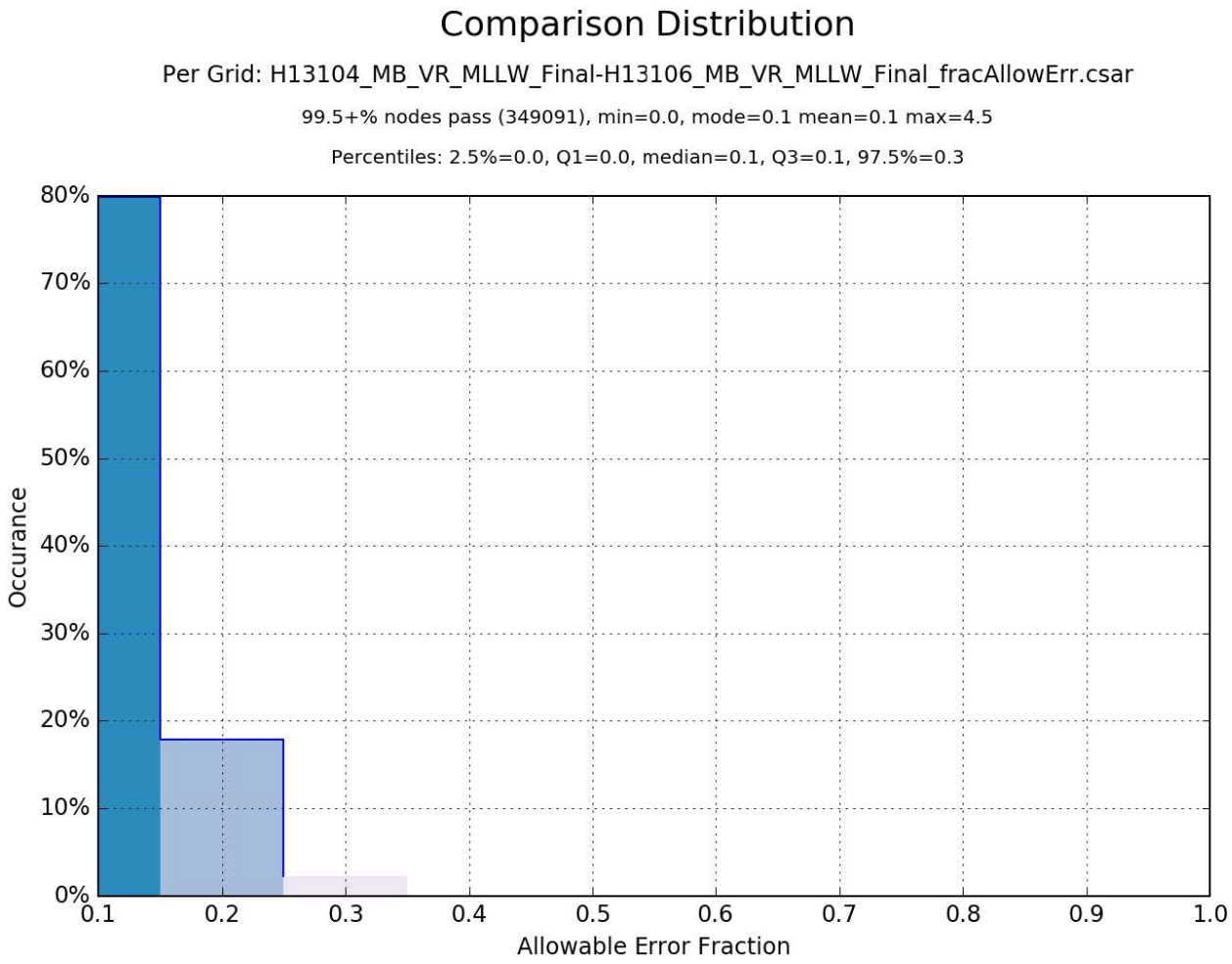
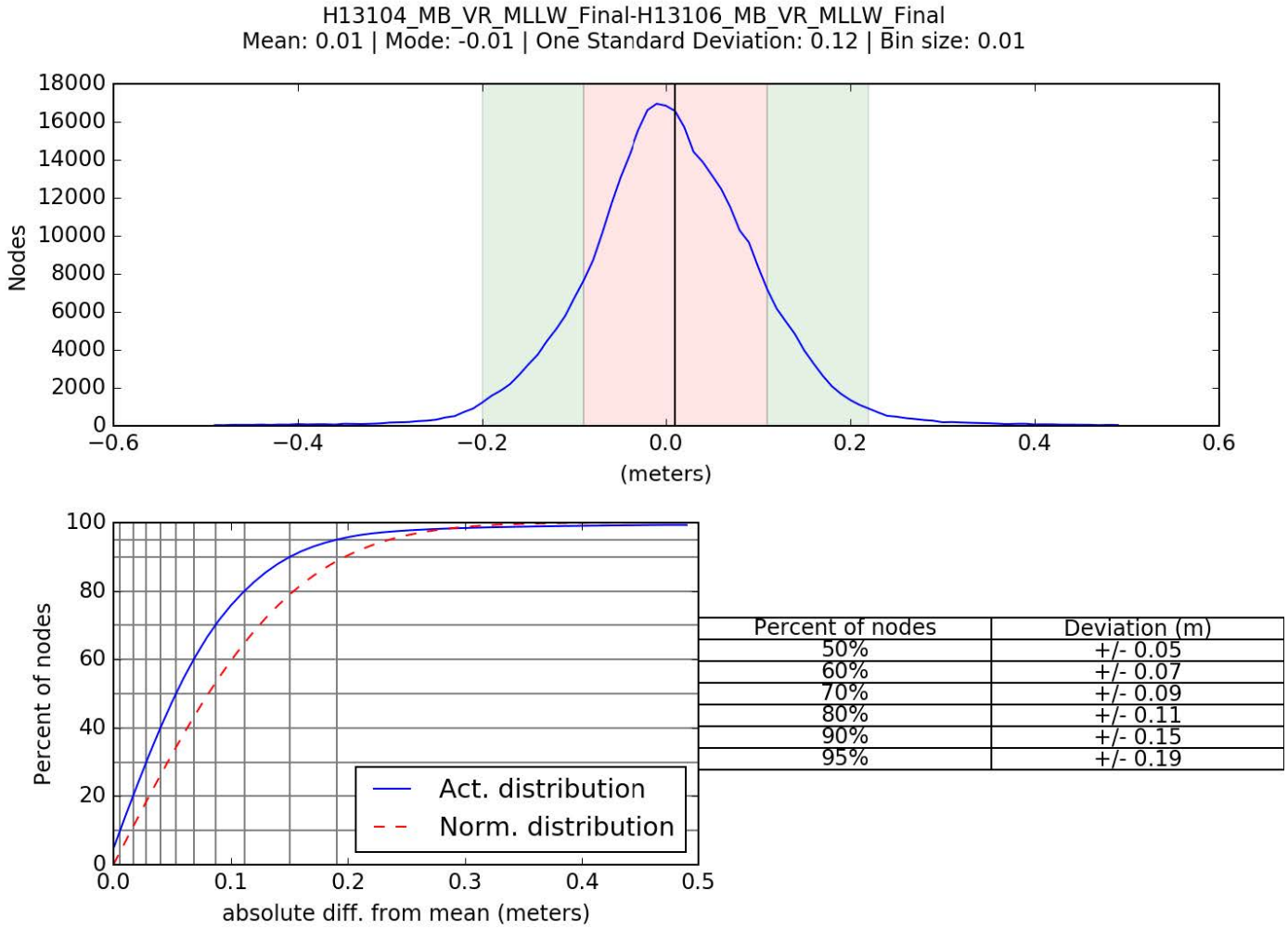


Figure 16: Pydro derived plot showing allowable error between H13104 and H13106.



Percent of nodes	Deviation (m)
50%	+/- 0.05
60%	+/- 0.07
70%	+/- 0.09
80%	+/- 0.11
90%	+/- 0.15
95%	+/- 0.19

Figure 17: Pydro derived plot showing H13104 and H13106 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

Apparent Heave Artifact in Ship's Data

On the eastern extreme of the survey area, the ship acquired four lines of data. In each line, a heave artifact was observed that spans the across-track width. The artifact is an oscillation of roughly 0.5 meters in

amplitude with a 20-30 meter wavelength. It is important to note that the ship was operating in a high sea state with southerly swells of approximately 5-7 feet. In an attempt to resolve this issue, delayed heave was reprocessed and reapplied and the HVF file was confirmed to reflect the previously measured offset values. Despite basic troubleshooting, the issue remains for this survey. The area in question is between 45 meters and 90 meters in depth. The heave issue described herein does not deviate outside the specification for NOAA total vertical uncertainty.

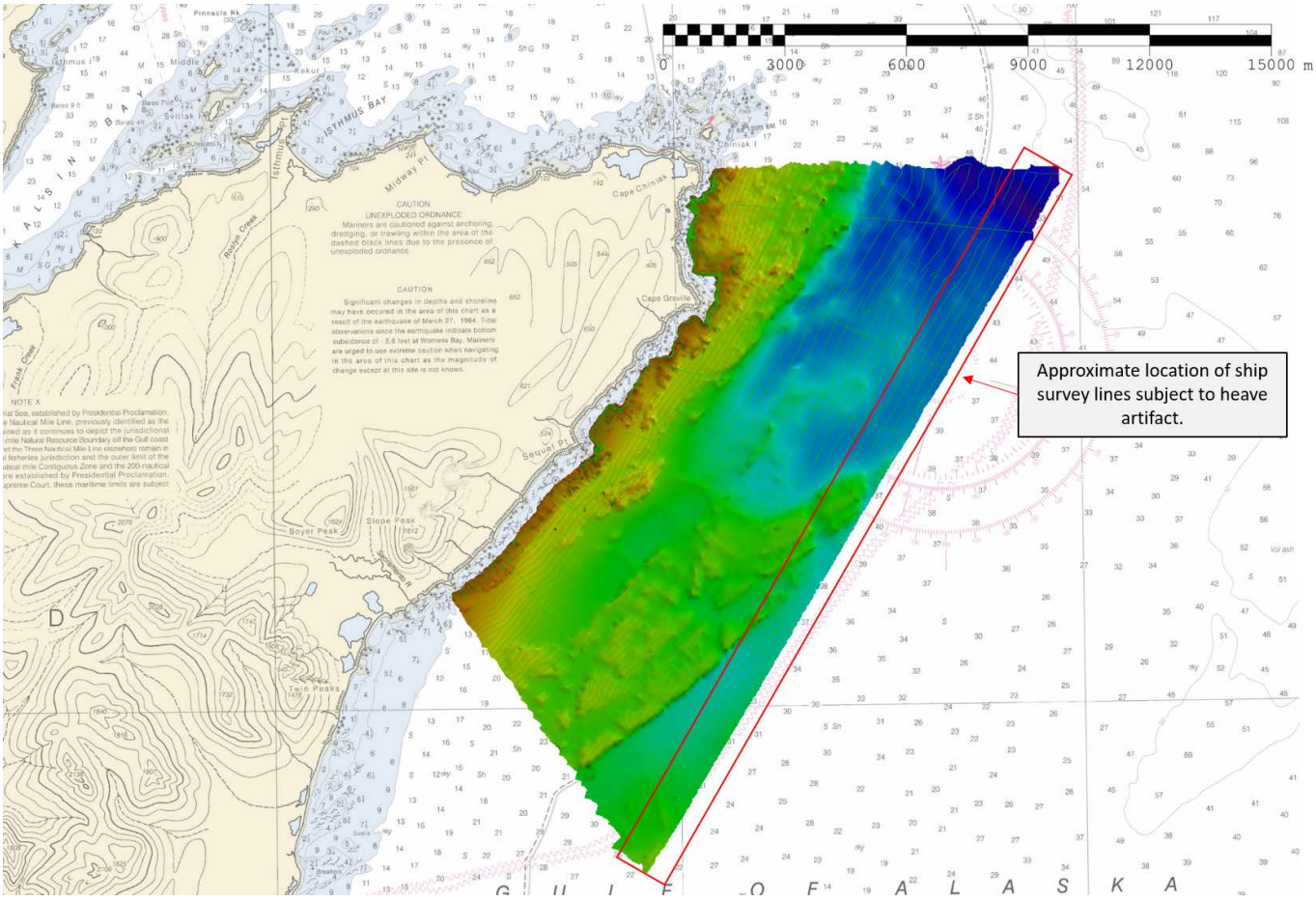


Figure 18: Location of heave artifact relative to overall H13104 coverage.

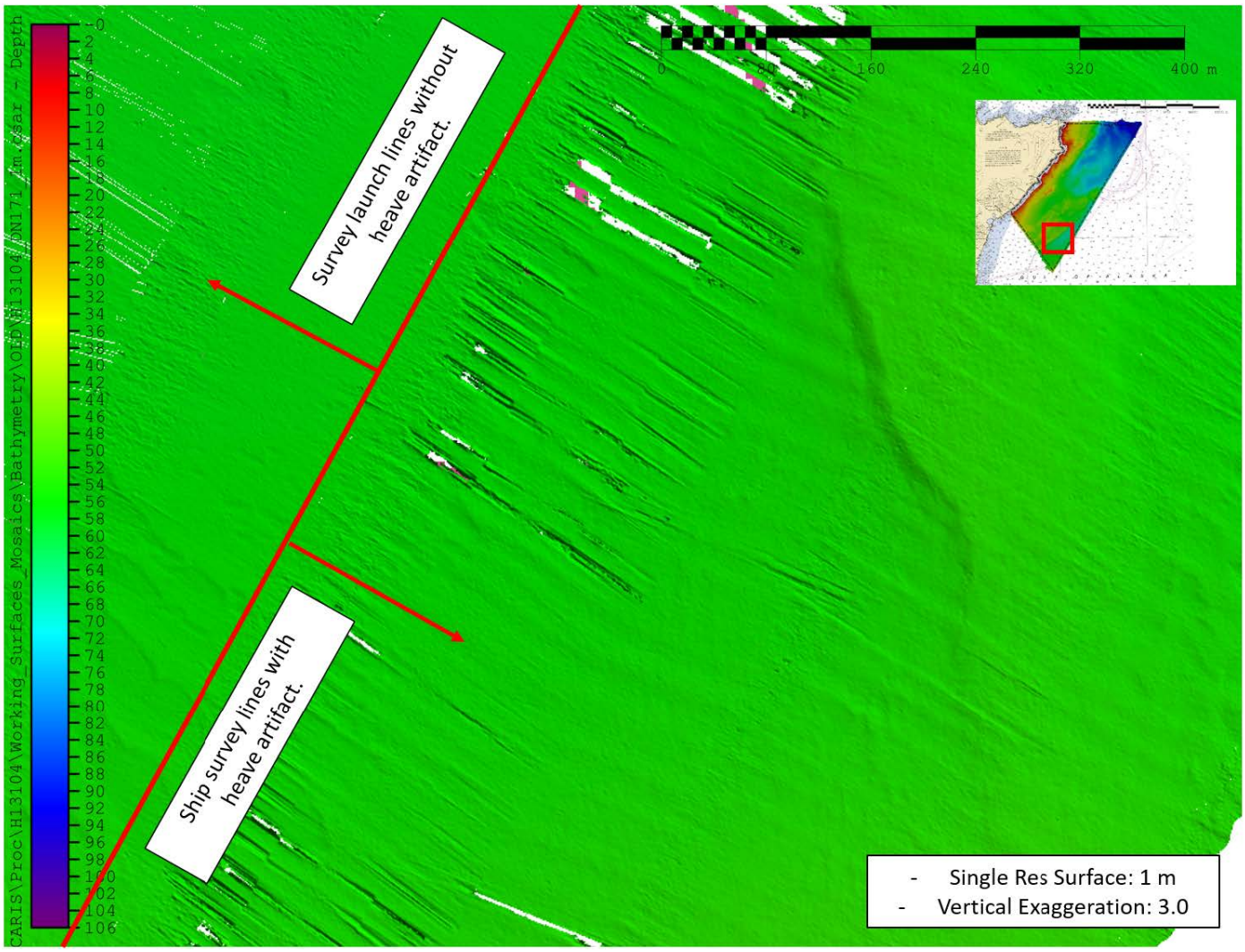


Figure 19: Comparison of ship data and launch data, showing greater detail of heave artifact. Inset shows screenshot location on overall survey.

Single Beam Data Offset

Equipment misconfiguration of the RA-2 SBES at the time of survey rendered the data unusable and unable to determine a least depth with sufficient confidence. When comparing the SBES surface with the MBES surface an apparent time offset was evident.

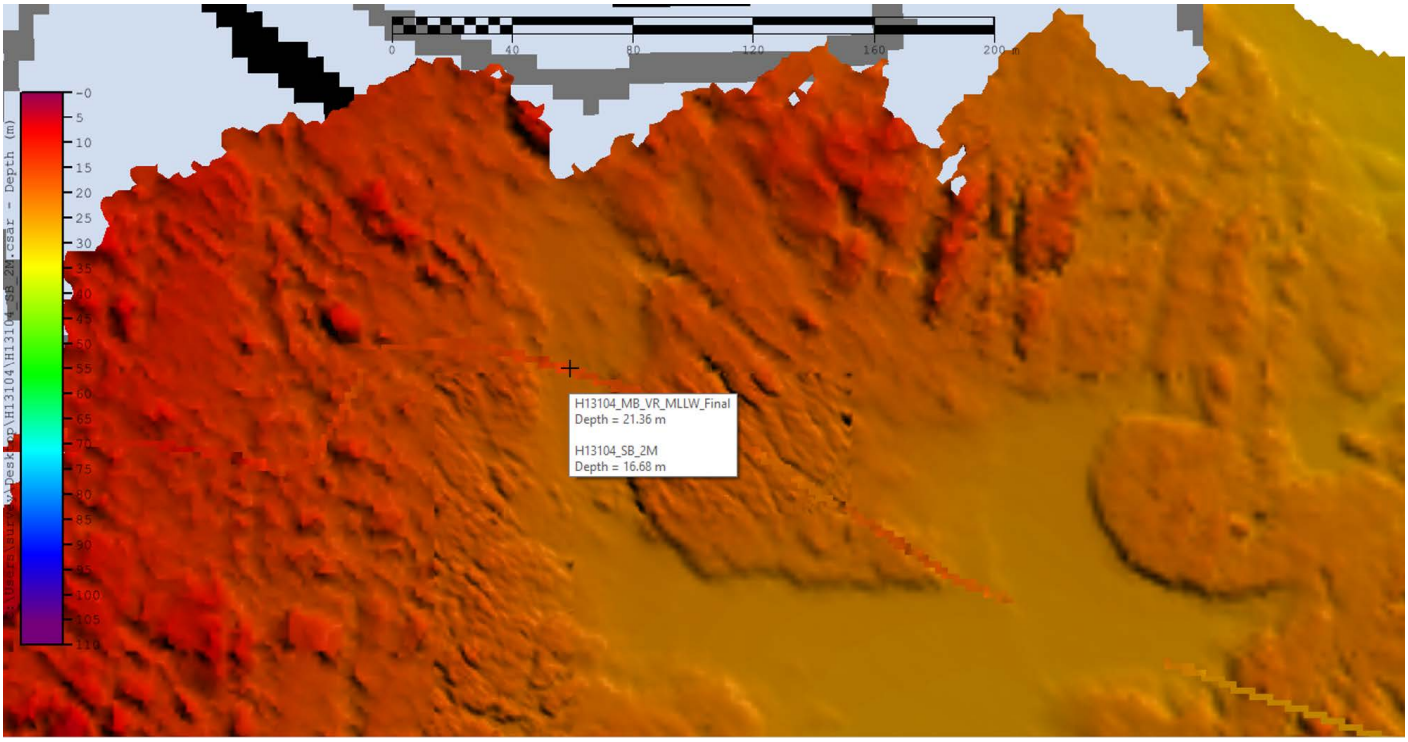


Figure 20: Example of SBES misconfiguration. In this example, tooltip shows that MBES and SBES depths differ by approximately 4.5 meters, likely due to a timing offset.

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: Once every four hours.

In addition to temporal separation, emphasis was placed on geographic distribution throughout the survey area.

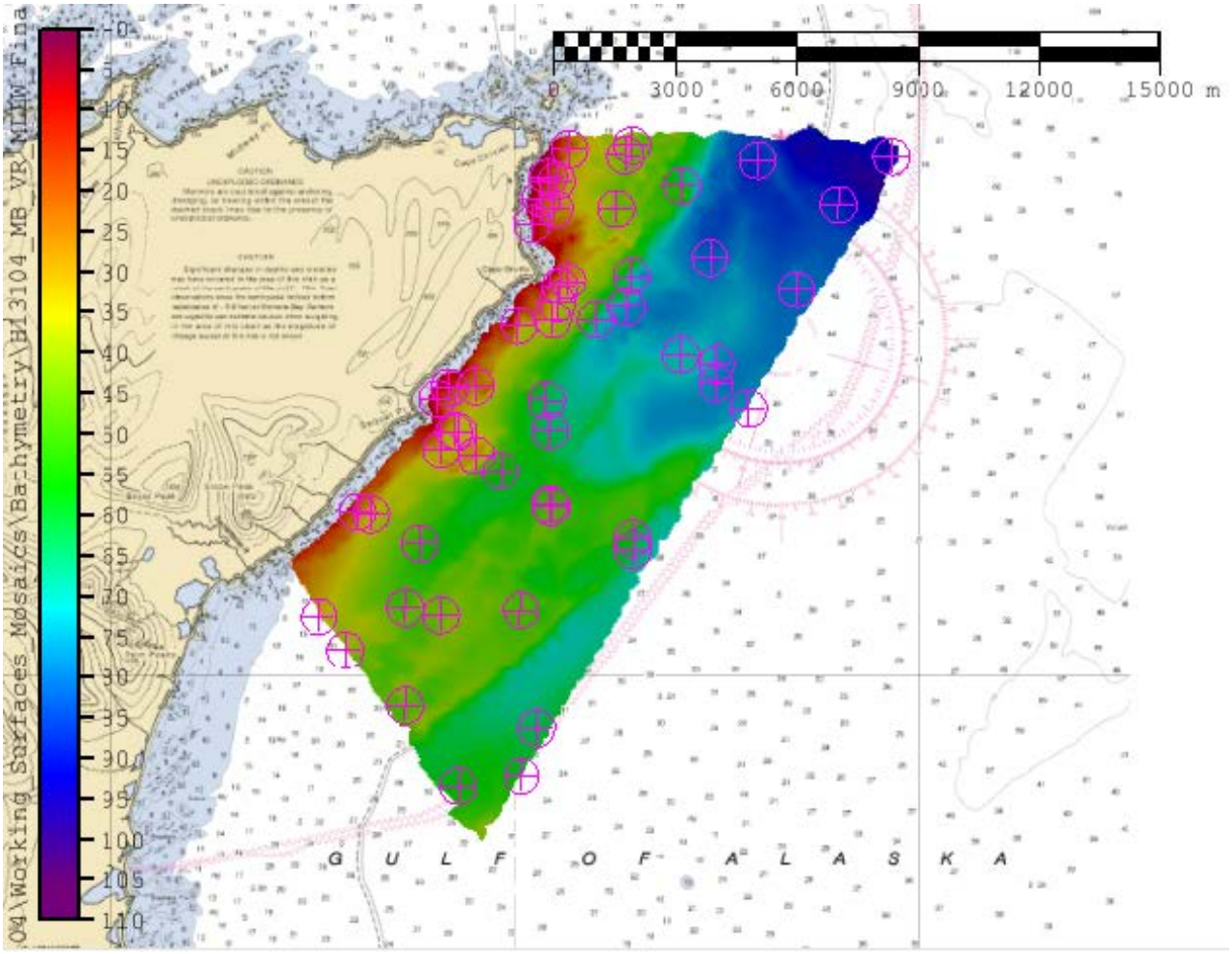


Figure 21: CTD cast distribution throughout H13104.

B.2.8 Coverage Equipment and Methods

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

B.2.9 Detect Fliers

Pydro QC Tools "Detect Fliers" was used to find fliers in the finalized VR surface. After data cleaning, Detect Fliers listed 7 potential fliers. All potential fliers were investigated in CARIS subset editor and were found to be false positives due to dynamic sea floor variation. The results of the "Detect Fliers" tool are included as a .000 file in Appendix II of this report.

B.2.10 Holiday Finder

Pydro QC Tools "Holiday Finder" was used to detect holidays in the finalized variable resolution surface. Holiday finder parameters were set to full coverage settings and detected 8 holidays. Three are located outside of the northern limit of the sheet and four are along the inshore edge of the sheet and proved difficult or dangerous to reacquire. The remaining holiday is in the middle of the sheet in approximately 26 meters of water. This holiday measures approximately 10 meters across and was due to acoustic shadowing in the outer beams. Investigation in CARIS subset editor revealed that is highly unlikely that the seafloor area co-located with the holiday in question is shoaler than adjacent least depth of 26 meters. As such, it is improbable that this area poses a hazard to navigation.

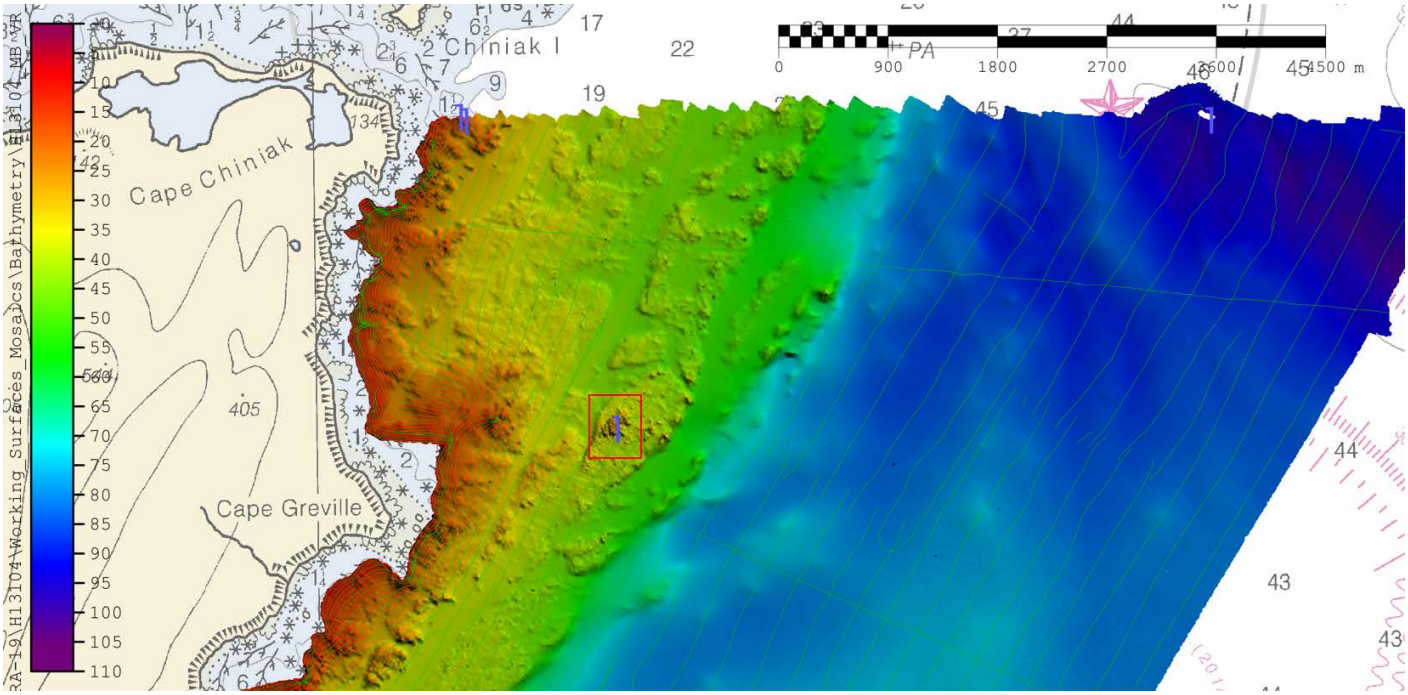


Figure 22: Location of holiday in middle of H13104 survey area.

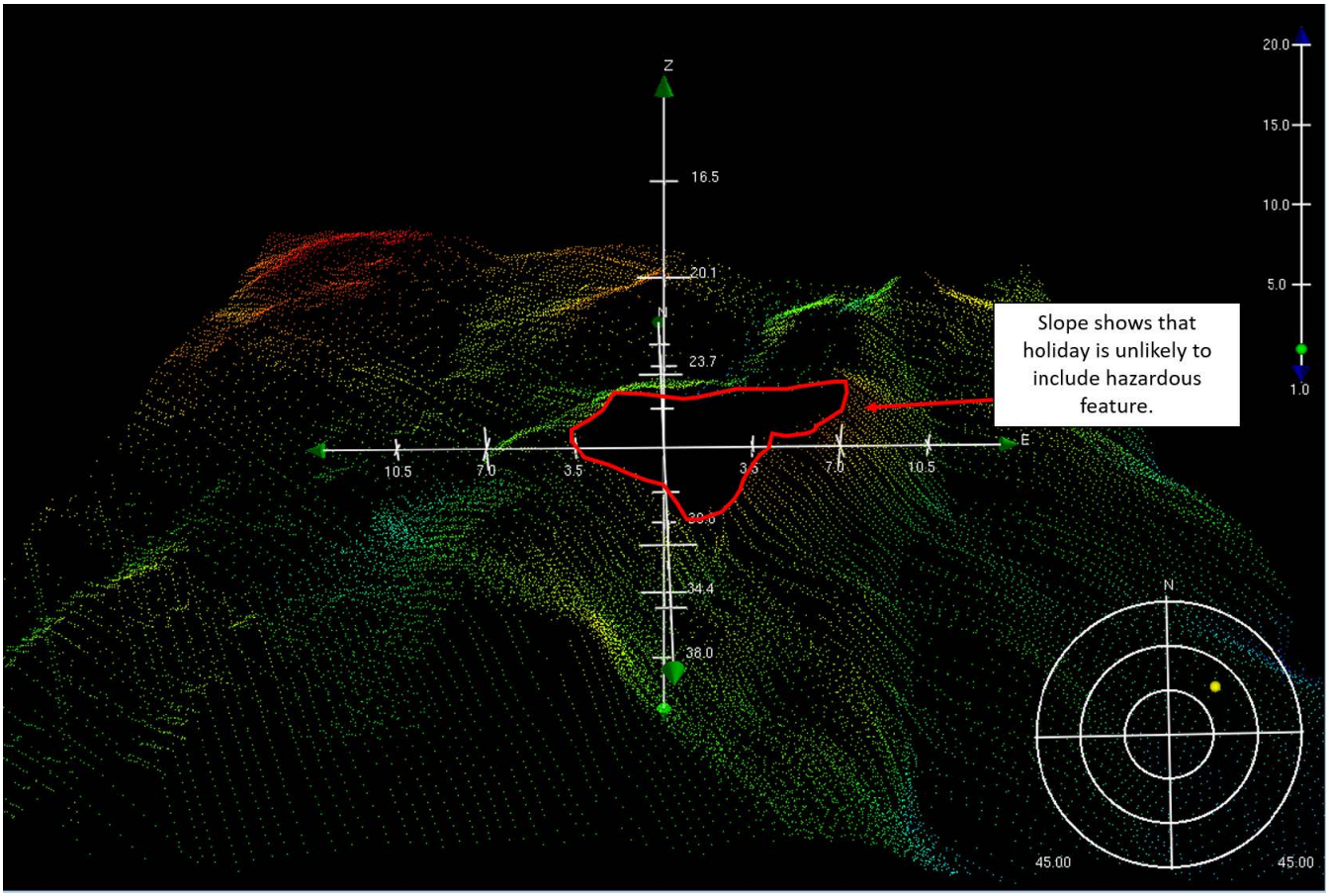


Figure 23: CARIS subset editor 3D view of holiday in middle of survey area.

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 was acquired as .all files logged during MBES operations and subsequently processed by the field unit aboard RAINIER. The .GSF files created during processing and one mosaic per vessel per frequency have been delivered with this report. All backscatter processing procedures utilized follow those detailed in the DAPR.

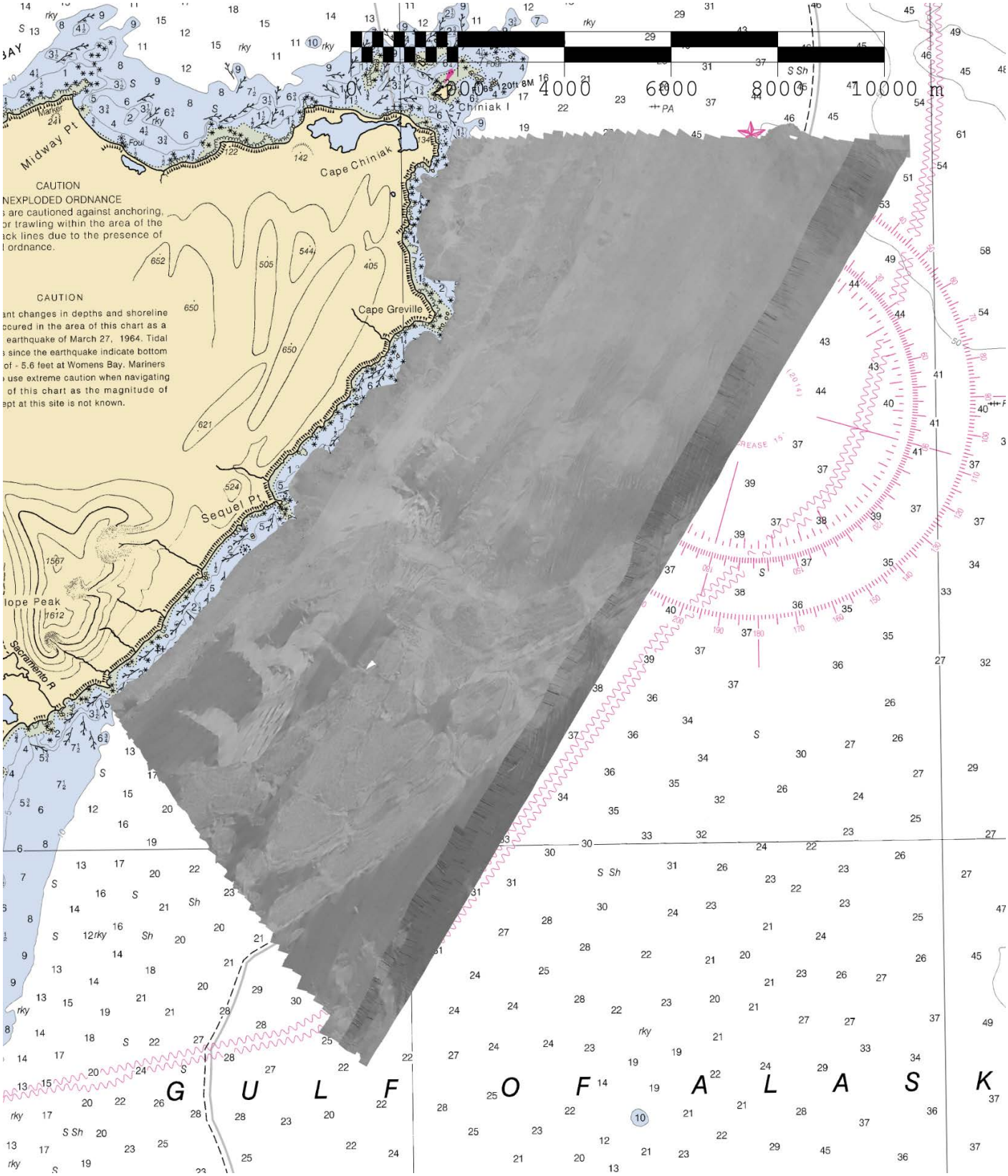


Figure 24: H13104 Backscatter Mosaic.

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 & SIPS	11.1.3

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 Geocoder Tool Box (FMGT)	7.8.1

Table 11: Primary imagery data processing software

The following Feature Object Catalog was used: NOAA Profile Version 5.7.

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
H13104_MB_VR_MLLW	CARIS VR Surface (CUBE)	Variable Resolution	0.8 meters - 105.9 meters	NOAA_VR	Complete MBES
H13104_MB_VR_MLLW_Final	CARIS VR Surface (CUBE)	Variable Resolution	0.8 meters - 105.9 meters	NOAA_VR	Complete MBES

Table 12: Submitted Surfaces

Submitted surfaces were generated using the recommended parameters for "Ranges" style variable resolution bathymetric grids as specified in HSSD 2019.

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 ERTDM	P136RA2019_ERTDM_NAD83-MLLW.csar P136RA2019_ERTDM_NAD83-MHW.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 5.

The following PPK methods were used for horizontal control:

- RTX

Post Processed-Real-Time Extended (PP-RTX) processing methods were used in Applanix POSPac MMS 8.3 software to produce SBETs for post-processing horizontal correction.

D. Results and Recommendations

D.1 Chart Comparison

H13104 survey data was compared with Electronic Navigation Chart (ENC) US4AK5OM using a variable resolution CUBE surface, selected soundings, and contours created in CARIS.
The assigned survey area of H13104 contained 3-Fathom, 10-Fathom, and 50-Fathom charted depth curves. H13104 survey data revealed a consistent offshore bias of the charted 10-fathom depth curve of 50 to 150 meters. Due to kelp and other navigational hazards, multibeam data was generally not acquired inshore of the charted 3 fathom depth curve. The areas that were surveyed beyond 3 fathoms depth show general agreement with the chart, with an offshore bias of the charted 3-fathom depth curve of approximately 25 to 75 meters. The charted 50-fathom depth curve is only included in the northeast corner of the assigned survey area. The charted 50-fathom depth curve is between 100 and 500 meters offshore of the acquired contour line. Offshore H13104 soundings show general agreement with the chart with no appreciable trend. Nearshore H13104 soundings were generally, though not ubiquitously, shoaler than charted soundings.

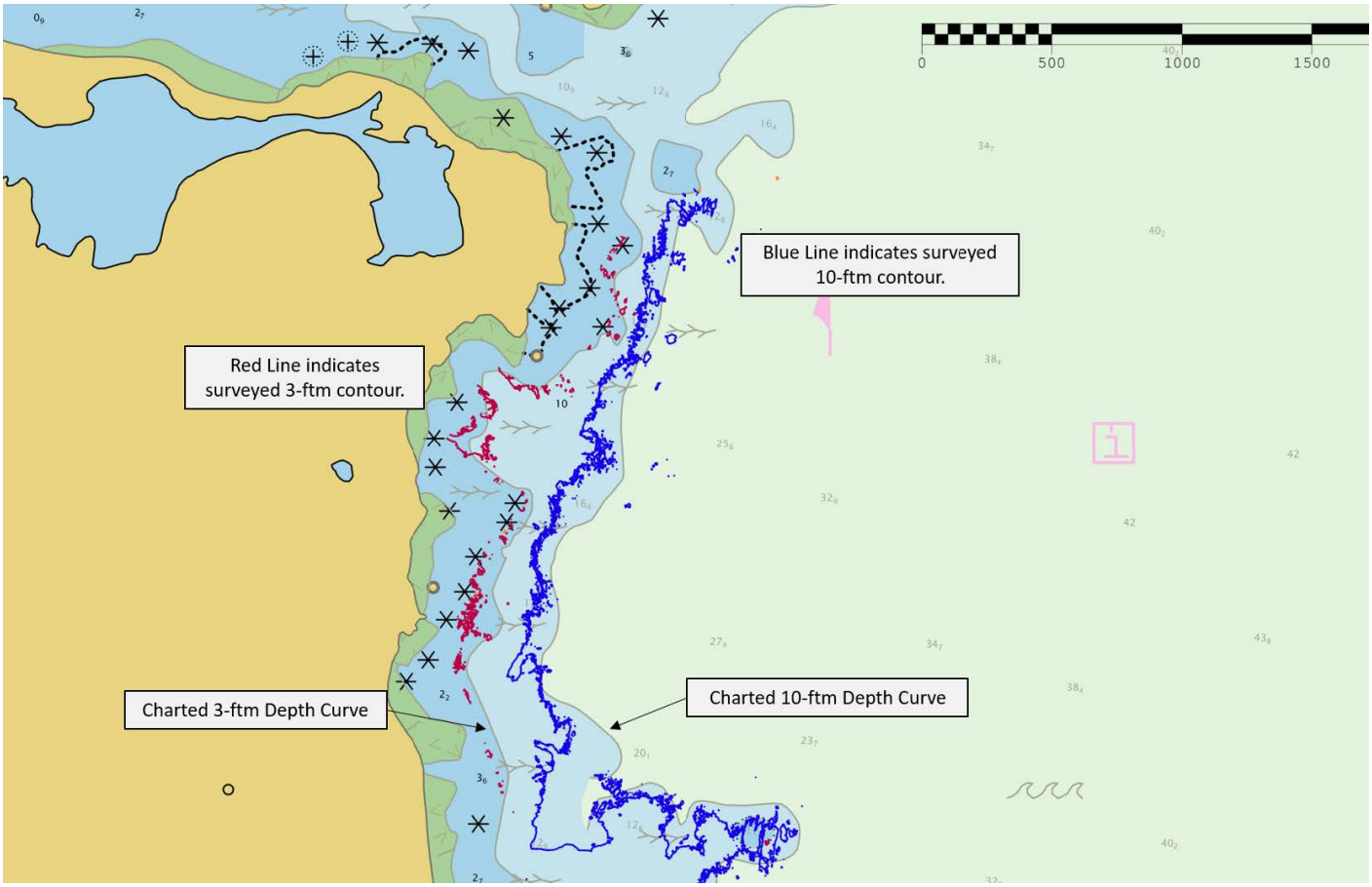


Figure 25: Contour comparison of H13104 data and ENC US4AMOK.

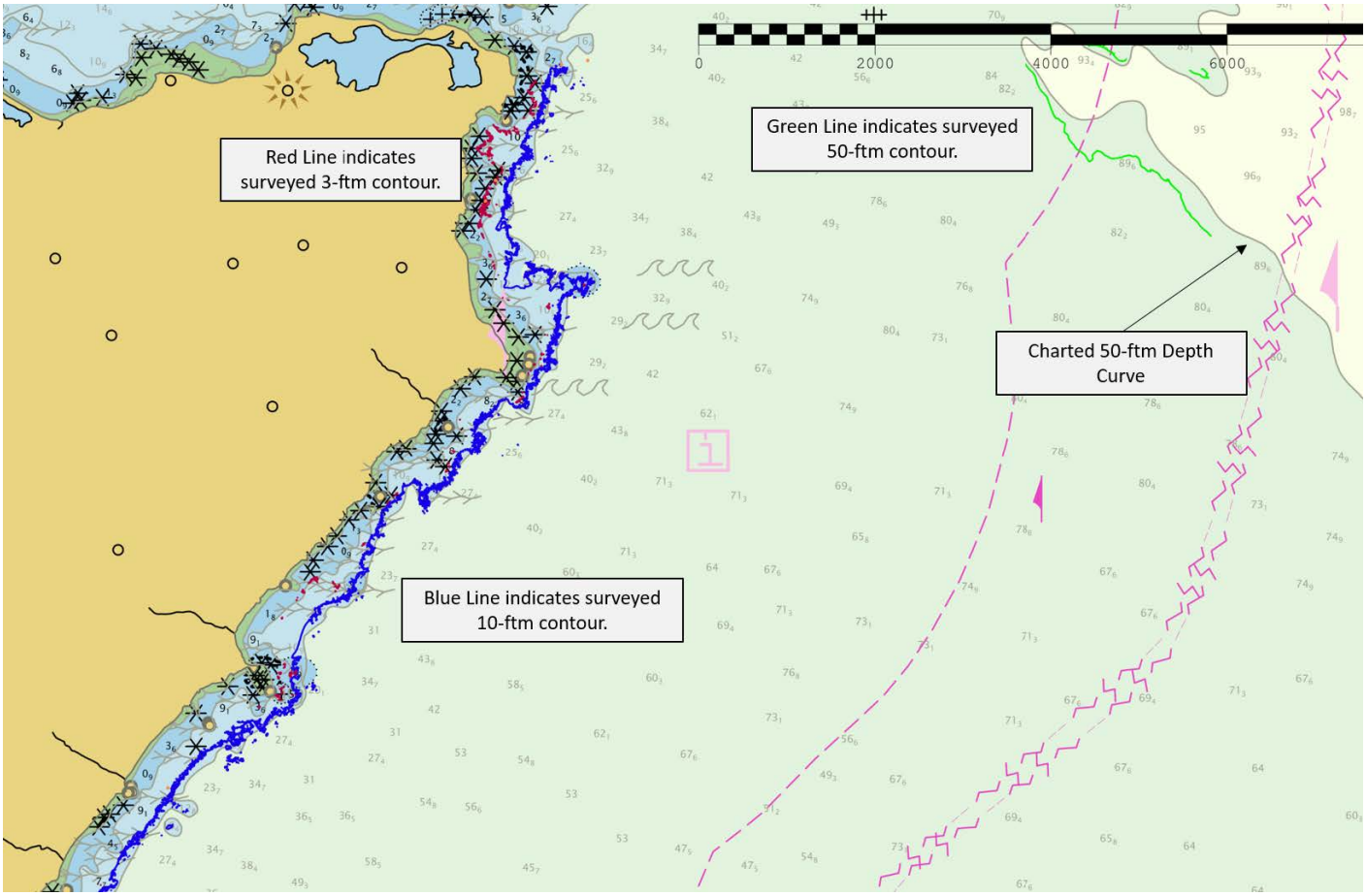


Figure 26: Overview of surveyed contours and charted depth curves for H13104 and ENC US4AK5OM

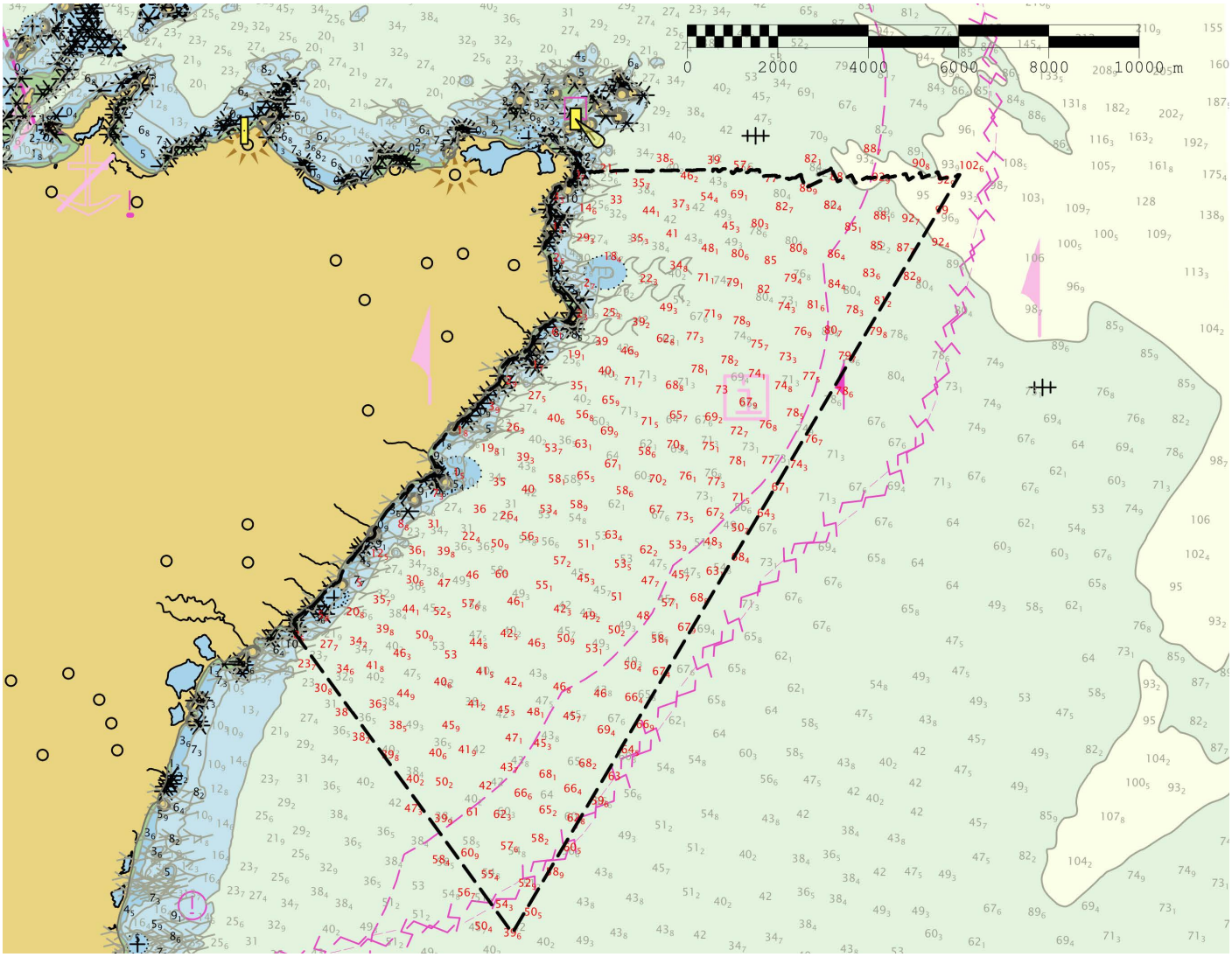


Figure 27: Sounding comparison of H13104 and ENC US4AK5OM

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
US4AK5OM	1:800000	8	08/23/2018	08/23/2018

Table 14: Largest Scale ENCs

D.1.2 Shoal and Hazardous Features

Four dangers to navigation were submitted during acquisition of H13104. The DTON report can be found in Appendix II. Supplemental Survey Records and Correspondence.

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

Four Maritime Boundary Features were assigned and investigated per HSSD section 7.2.1. Results are included in the Final Feature File.

D.2.3 Bottom Samples

Six bottom sample locations were assigned on H13104. Five locations were attempted and three returned samples. The results are outlined in the Final Feature File.

D.2.4 Overhead Features

No overhead features exist for this survey.

D.2.5 Submarine Features

See the Final Feature File.

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 and/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 insets 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
Benjamin K. Evans, CAPT/NOAA	Commanding Officer	11/18/2019	Digitally signed by EVANS.BENJAMIN.K.1237217094 Date: 2019.11.18 09:33:39 -08'00'
Hadley A. Owen, LT/NOAA	Field Operations Officer	11/18/2019	Digitally signed by OWEN.HADLEY.ANNE.1410967070 Date: 2019.11.18 08:52:21 -08'00'
James B. Jacobson	Chief Survey Technician	11/18/2019	JACOBSON.JAMES.BRYAN.1269664017 I have reviewed this document 2019.11.18 09:36:35 -08'00'
S. Harper Umfress, ENS/NOAA	Sheet Manager	11/18/2019	UMFRESS.SAMUEL.HARPER.1542542345 Digitally signed by UMFRESS.SAMUEL.HARPER.1542542345 Date: 2019.11.18 16:23:13 -08'00'

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

Maritime Boundary Report

Registry Number: H13104
State: Alaska
Locality: Kodiak Island
Sub-locality: Cape Greville
Project Number: OPR-P136-RA-19
Survey Dates: 5/9/2019 - 6/20/2019

Charts Affected

Number	Edition	Date	Scale (RNC)	RNC Correction(s)*
16593	12th	07/01/2014	1:80,000 (16593_1)	USCG LNM: 7/9/2019 (12/22/2020) CHS NTM: None (11/27/2020) NGA NTM: 2/24/2007 (1/2/2021)
16580	14th	01/01/2008	1:350,000 (16580_1)	[L]NTM: ?
16013	30th	07/01/2006	1:969,761 (16013_1)	[L]NTM: ?
531	24th	07/01/2007	1:2,100,000 (531_1)	[L]NTM: ?
500	8th	06/01/2003	1:3,500,000 (500_1)	[L]NTM: ?
530	32nd	06/01/2007	1:4,860,700 (530_1)	[L]NTM: ?
50	6th	06/01/2003	1:10,000,000 (50_1)	[L]NTM: ?

* Correction(s) - *source: last correction applied (last correction reviewed--"cleared date")*

Features

Name	Feature Type	Survey Depth	Survey Latitude	Survey Longitude
Maritime Boundary 1	Rock	[None]	57° 31' 48.9" N	152° 14' 55.1" W
Maritime Boundary 2	Rock	[None]	57° 33' 01.6" N	152° 13' 01.6" W
Maritime Boundary 3	Rock	[None]	57° 34' 43.1" N	152° 10' 08.6" W
Maritime Boundary 4	Rock	-0.49 m	57° 34' 42.7" N	152° 10' 07.7" W
Maritime Boundary 5	Rock	[None]	57° 35' 31.3" N	152° 09' 06.3" W

1 - Tree

1.1) Maritime Boundary 1

Survey Summary

Survey Position:	57° 31' 48.9" N, 152° 14' 55.1" W
Least Depth:	[None]
TPU (±1.96σ):	**THU (TPEh)** [None] ; **TVU (TPEv)** [None]
Timestamp:	2005-152.00:00:00.000 (06/01/2005)
Dataset:	H13104_Martime_Boundary.000
FOID:	0_ 1522248603 00089(FFFE5ABBAB9B0059)
Charts Affected:	16593_1, 16580_1, 16013_1, 531_1, 500_1, 530_1, 50_1

Remarks:

UWTROC/remrks: Observed rock.

UWTROC/invreq: Investigate per HSSD Section 7.3.1 and use appropriate attribution, Section 7.5

Hydrographer Recommendations

Retain as charted.

S-57 Data

Geo object 1:	Underwater rock / awash rock (UWTROC)
Attributes:	QUASOU - 2:depth unknown
	SORDAT - 20050601
	SORIND - US,US,graph,GC-10732
	WATLEV - 4:covers and uncovers

Feature Images

Figure 1.1.1

1.2) Maritime Boundary 2

Survey Summary

Survey Position:	57° 33' 01.6" N, 152° 13' 01.6" W
Least Depth:	[None]
TPU (±1.96σ):	**THU (TPEh)** [None] ; **TVU (TPEv)** [None]
Timestamp:	2003-032.00:00:00.000 (02/01/2003)
Dataset:	H13104_Martime_Boundary.000
FOID:	0_ 1522248601 00074(FFFE5ABBAB99004A)
Charts Affected:	16593_1, 16580_1, 16013_1, 531_1, 500_1, 530_1, 50_1

Remarks:

UWTROC/remrks: Observed rock.

UWTROC/invreq: Investigate per HSSD Section 7.3.1 and use appropriate attribution, Section 7.5

Hydrographer Recommendations

Retain as charted.

S-57 Data

Geo object 1:	Underwater rock / awash rock (UWTROC)
Attributes:	QUASOU - 2:depth unknown
	SORDAT - 200302
	SORIND - US,US,graph,Chart 16593
	WATLEV - 4:covers and uncovers

Feature Images

Figure 1.2.1

1.3) Maritime Boundary 3

Survey Summary

Survey Position:	57° 34' 43.1" N, 152° 10' 08.6" W
Least Depth:	[None]
TPU (±1.96σ):	**THU (TPEh)** [None] ; **TVU (TPEv)** [None]
Timestamp:	2005-152.00:00:00.000 (06/01/2005)
Dataset:	H13104_Martime_Boundary.000
FOID:	0_ 1522248602 00024(FFFE5ABBAB9A0018)
Charts Affected:	16593_1, 16580_1, 16013_1, 531_1, 500_1, 530_1, 50_1

Remarks:

UWTROC/remrks: Delete charted rock in favor of marked laser-positioned rock.

UWTROC/invreq: Investigate per HSSD Section 7.3.1 and use appropriate attribution, Section 7.5

Hydrographer Recommendations

Delete charted rock.

S-57 Data

Geo object 1:	Underwater rock / awash rock (UWTROC)
Attributes:	QUASOU - 2:depth unknown
	SORDAT - 20050601
	SORIND - US,US,graph,GC-10732
	WATLEV - 4:covers and uncovers

1.4) Maritime Boundary 4

Survey Summary

Survey Position:	57° 34' 42.7" N, 152° 10' 07.7" W
Least Depth:	-0.49 m (= -1.62 ft = -0.270 fm = 0 fm 4.38 ft)
TPU (±1.96σ):	**THU (TPEh)** [None] ; **TVU (TPEv)** [None]
Timestamp:	2019-141.19:00:05.000 (05/21/2019)
Dataset:	H13104_Martime_Boundary.000
FOID:	US 0000000166 00001(0226000000A60001)
Charts Affected:	16593_1, 16580_1, 16013_1, 531_1, 500_1, 530_1, 50_1

Remarks:

UWTROC/remrks: New Rock found

Hydrographer Recommendations

Chart new Rock

S-57 Data

Geo object 1:	Underwater rock / awash rock (UWTROC)
Attributes:	QUASOU - 1:depth known
	SORDAT - 20190620
	SORIND - US,US,graph,H13104
	TECSOU - 7:found by laser
	VALSOU - -0.494 m
	WATLEV - 4:covers and uncovers

Feature Images

Figure 1.4.1

1.5) Maritime Boundary 5

Survey Summary

Survey Position:	57° 35' 31.3" N, 152° 09' 06.3" W
Least Depth:	[None]
TPU (±1.96σ):	**THU (TPEh)** [None] ; **TVU (TPEv)** [None]
Timestamp:	2003-032.00:00:00.000 (02/01/2003)
Dataset:	H13104_Martime_Boundary.000
FOID:	0_ 1522248601 00044(FFFE5ABBAB99002C)
Charts Affected:	16593_1, 16580_1, 16013_1, 531_1, 500_1, 530_1, 50_1

Remarks:

UWTROC/remrks: Delete charted rock in favor of marked laser-positioned rock.

UWTROC/invreq: Investigate per HSSD Section 7.3.1 and use appropriate attribution, Section 7.5

Hydrographer Recommendations

Delete charted rock.

S-57 Data

Geo object 1:	Underwater rock / awash rock (UWTROC)
Attributes:	QUASOU - 2:depth unknown
	SORDAT - 200302
	SORIND - US,US,graph,Chart 16593
	WATLEV - 4:covers and uncovers

APPROVAL PAGE

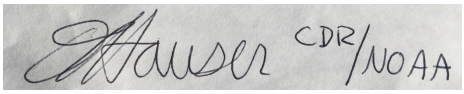
H13104

Data meet or exceed current specifications as certified by the OCS survey acceptance review process. Descriptive Report and survey data except where noted are adequate to supersede prior surveys and nautical charts in the common area.

The following products will be sent to NCEI for archive

- Descriptive Report
- Collection of Bathymetric Attributed Grids (BAGs)
- Collection of backscatter mosaics
- Processed survey data and records
- Bottom Samples
- GeoPDF of survey product

The survey evaluation and verification has been conducted according current OCS Specifications, and the survey has been approved for dissemination and usage of updating NOAA's suite of nautical charts.



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Date: 2021.03.11 15:35:04 -08'00'

Approved:_____

Commander Olivia Hauser, NOAA
Chief, Pacific Hydrographic Branch