H13000

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

DESCRIPTIVE REPORT

Type of Survey:	Navigable Area
Registry Number:	H13000

LOCALITY

State(s):	Alaska
General Locality:	Kodiak Island, AK
Sub-locality:	Isthmus Bay

2017

CHIEF OF PARTY
John J. Lomnicky, CDR/NOAA

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Date:

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

REGISTRY NUMBER:

HYDROGRAPHIC TITLE SHEET

H13000

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, AK**
Sub-Locality:	**Isthmus Bay**
Scale:	**40000**
Dates of Survey:	**05/13/2017 to 06/30/2017**
Instructions Dated:	**03/09/2017**
Project Number:	**H13000**
Field Unit:	**NOAA Ship *Rainier***
Chief of Party:	**John J. Lomnicky, 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:

The purpose of this survey is to provide contemporary surveys to update National Ocean Service (NOS) nautical charts. All separates are filed with the hydrographic data. Any revisions to the Descriptive Report (DR) generated during office processing are shown in bold red italic text. The processing branch maintains the DR as a field unit product, therefore, all information and recommendations within the body of the DR are considered preliminary unless otherwise noted. The final disposition of surveyed features is represented in the OCS nautical chart update products. All pertinent records for this survey, including the DR, are archived at the National Centers for Environmental Information (NCEI) and can be retrieved via http://www.ncei.noaa.gov/.

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Descriptive Report to Accompany Survey H13000

Project: H13000

Locality: Kodiak Island, AK

Sublocality: Isthmus Bay

Scale: 1:40000

May 2017 - June 2017

NOAA Ship *Rainier*

Chief of Party: John J. Lomnicky, CDR/NOAA

A. Area Surveyed

The survey area is referred to as "Isthmus Bay" (Sheet 5) within the Project Instructions (Figure 1). The area encompasses approximately 19 square nautical miles extending from Isthmus Point to just before Cape Chiniak.

A.1 Survey Limits

Data were acquired within the following survey limits:

Northwest Limit	Southeast Limit
57° 43' 14.04" N 152° 19' 21.9" W	57° 36' 53.83" N 152° 11' 34.59" W

Table 1: Survey Limits

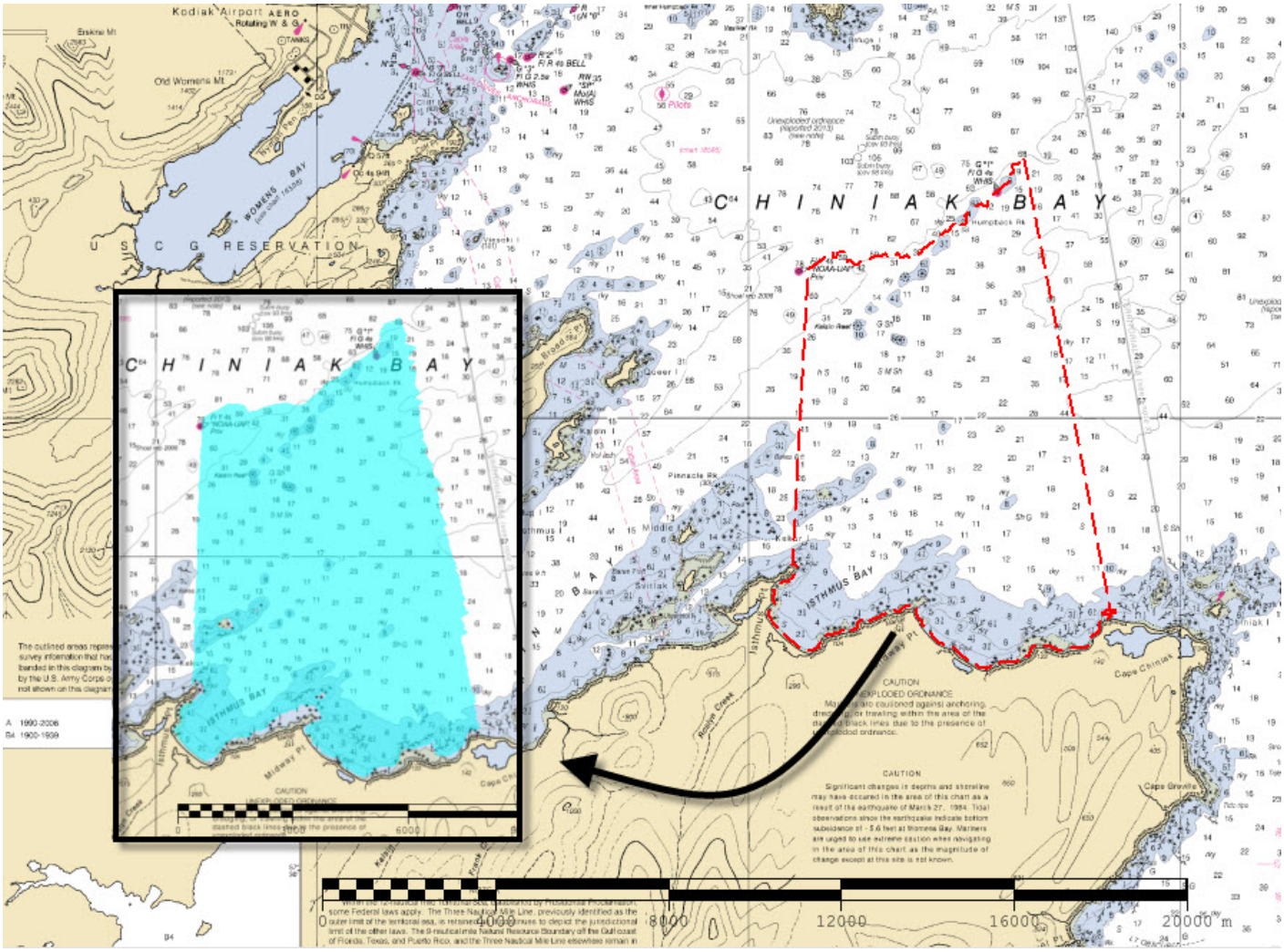


Figure 1: Assigned survey area for H13000

Data were acquired within the H13000 assigned limits as specified by the Project Instructions, except as otherwise noted in this report.

A.2 Survey Purpose

The area of Chiniak Bay supports the second busiest and third richest fisheries port in Alaska. In 2015, the Port of Kodiak was responsible for 514 million pounds of fish and $138 million dollars of product. Chiniak Bay is the gateway to Kodiak and has a survey vintage of 1933. This area has seen many groundings and near misses due to the number of dangers to navigation and pinnacles that exist in this area. In recent years a number of groundings in and around the area have occurred, the most famous being a 174 foot Army Landing craft that was outbound to deliver goods to a remote village in western AK in 2012. This survey will serve to update the nautical charts with modern data to support safe navigation.

A.3 Survey Quality

The entire survey is adequate to supersede previous data.

Data were acquired within assigned survey limits as required in the Project Instructions and HSSD unless otherwise noted in this report. Pydro QC Tools 2 Grid QA was used to analyze H13000 multibeam echosounder (MBES) data density. The submitted H13000 variable-resolution (VR) surface met HSSD density requirements (Figure 2).

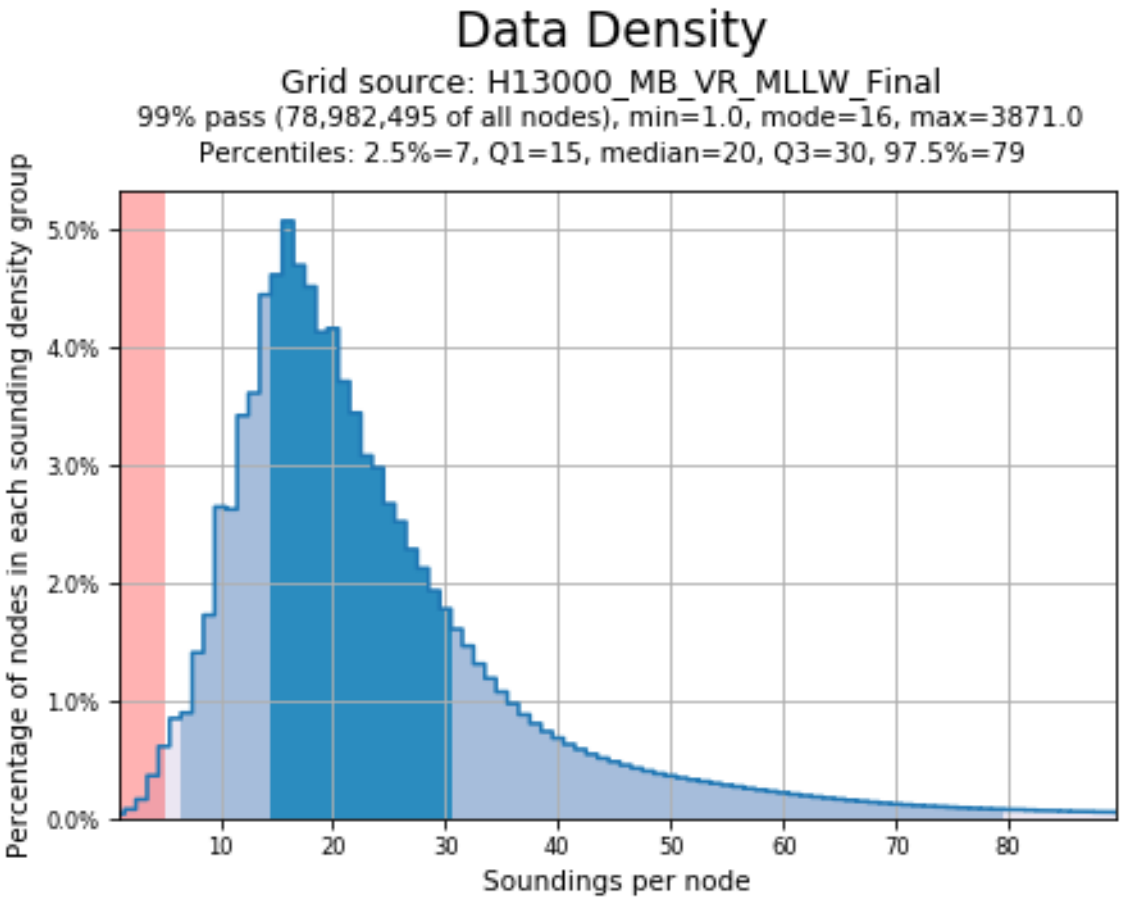


Figure 2: Pydro derived histogram plot showing HSSD density compliance of H13000 variable-resolution MBES data.

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 except for H12997 and designated S-57 coverage areas.	Complete Coverage (refer to HSSD Section 5.2.2.3). Note all MBES acquisitoin requires backscatter acquistion (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) (Figure 7). In some areas, the NALL was defined by unsafe navigation further inshore due to hazardous conditions such as dangerous wave action, rocks, or other hazards. These areas were generally located near shore, were subject to dangerous wave action, and judged to be navigationally insignificant. Figure 3 demonstrates such as area.

There are 13 holidays throughout H13000, all due to rocks. Twelve of the thirteen rocks have least depth heights within the Final Feature File; the remaining holiday, is due to acoustic shadowing of the rocky area (Figure 4 and 5). The least depth of the rocky area surrounding the holiday is 15.6 meters, and a rock of unknown height was not added to the Final Feature File (Figure 6).

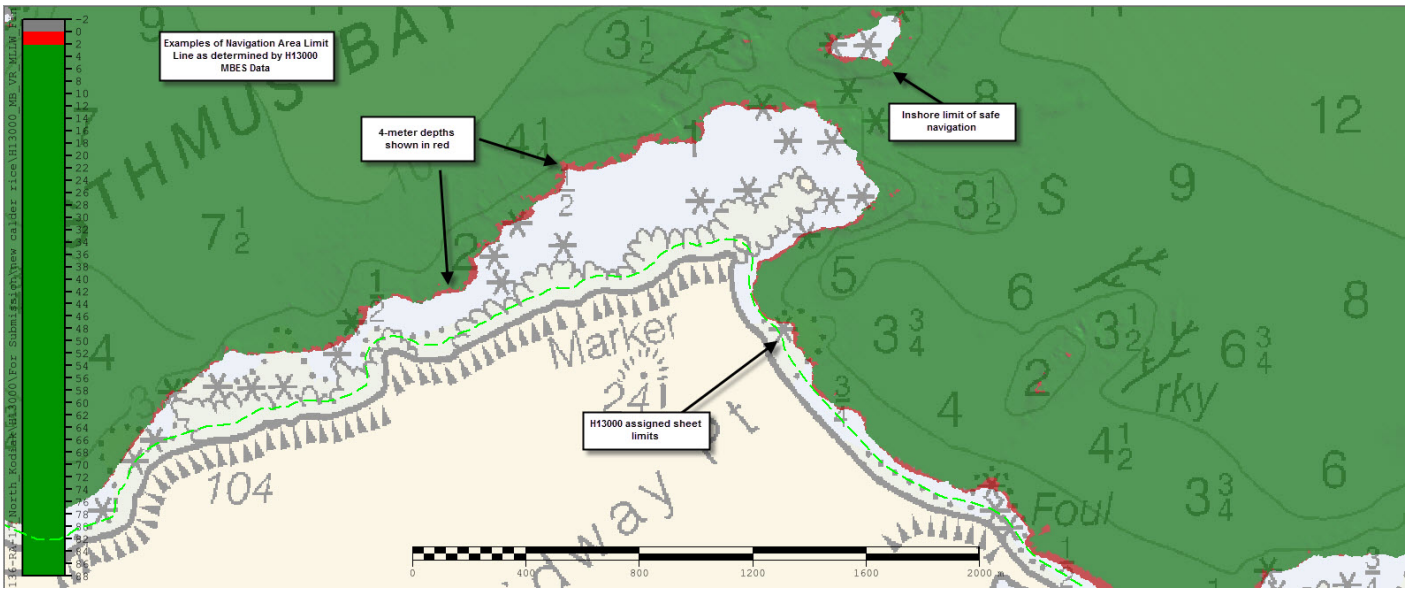


Figure 3: Examples of H1300 NALL determination.

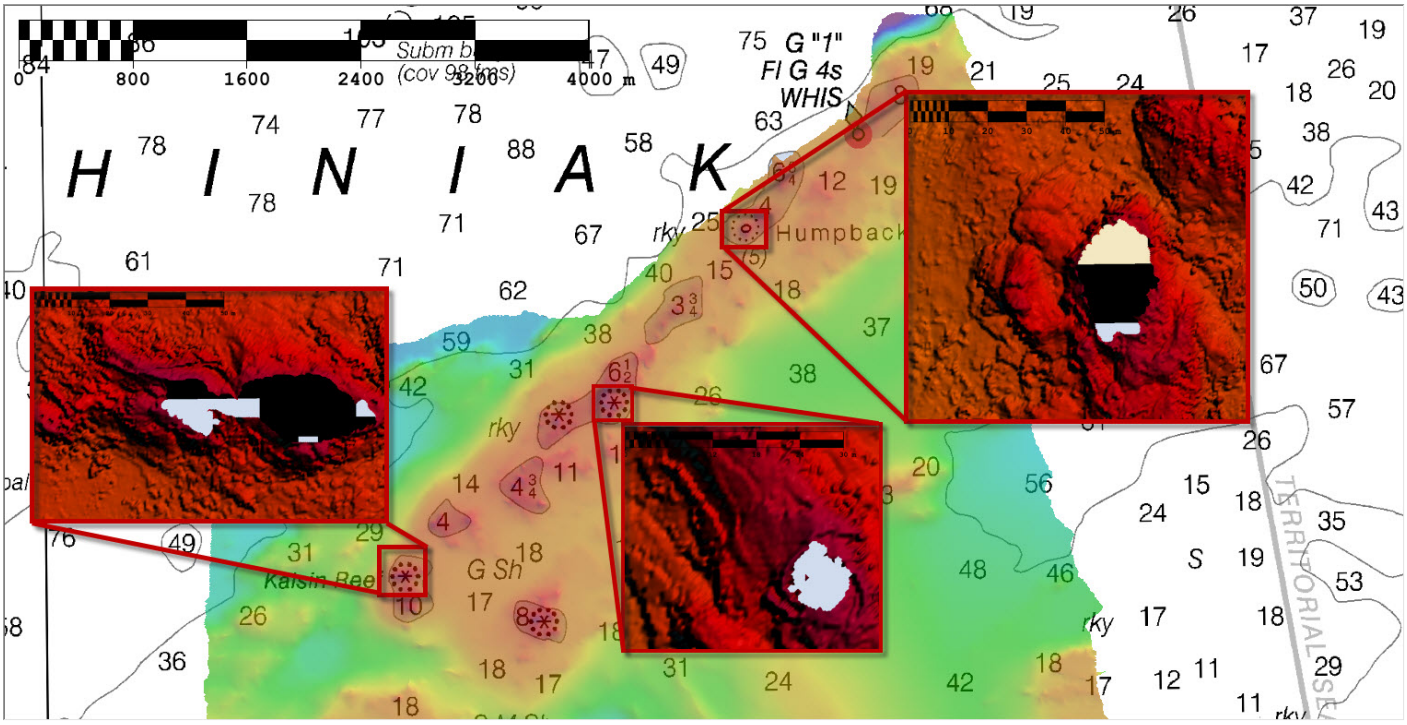


Figure 4: Holidays created due to rocks in the northern half of H13000.

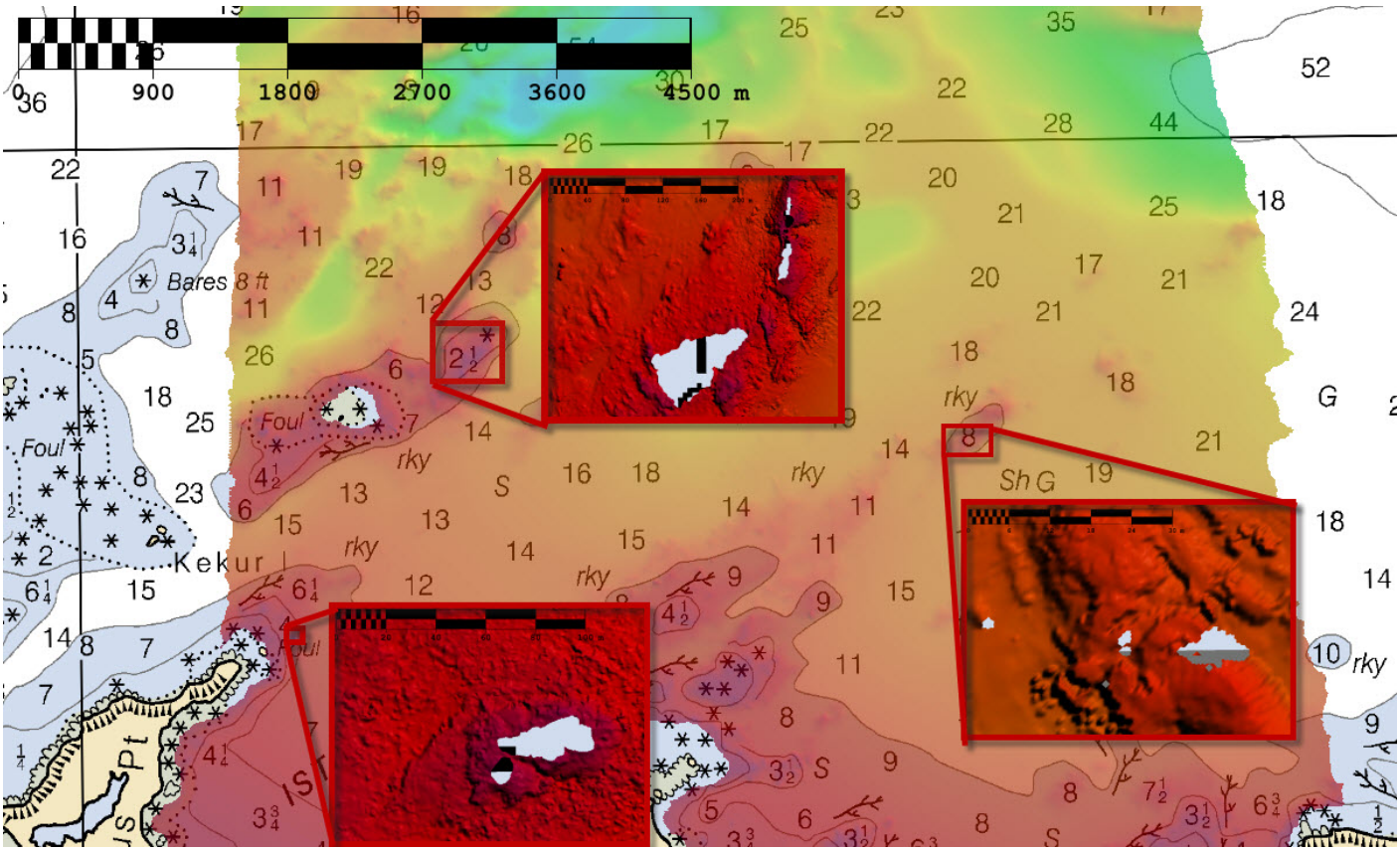


Figure 5: Holidays created due to rocks in the southern half of H13000.

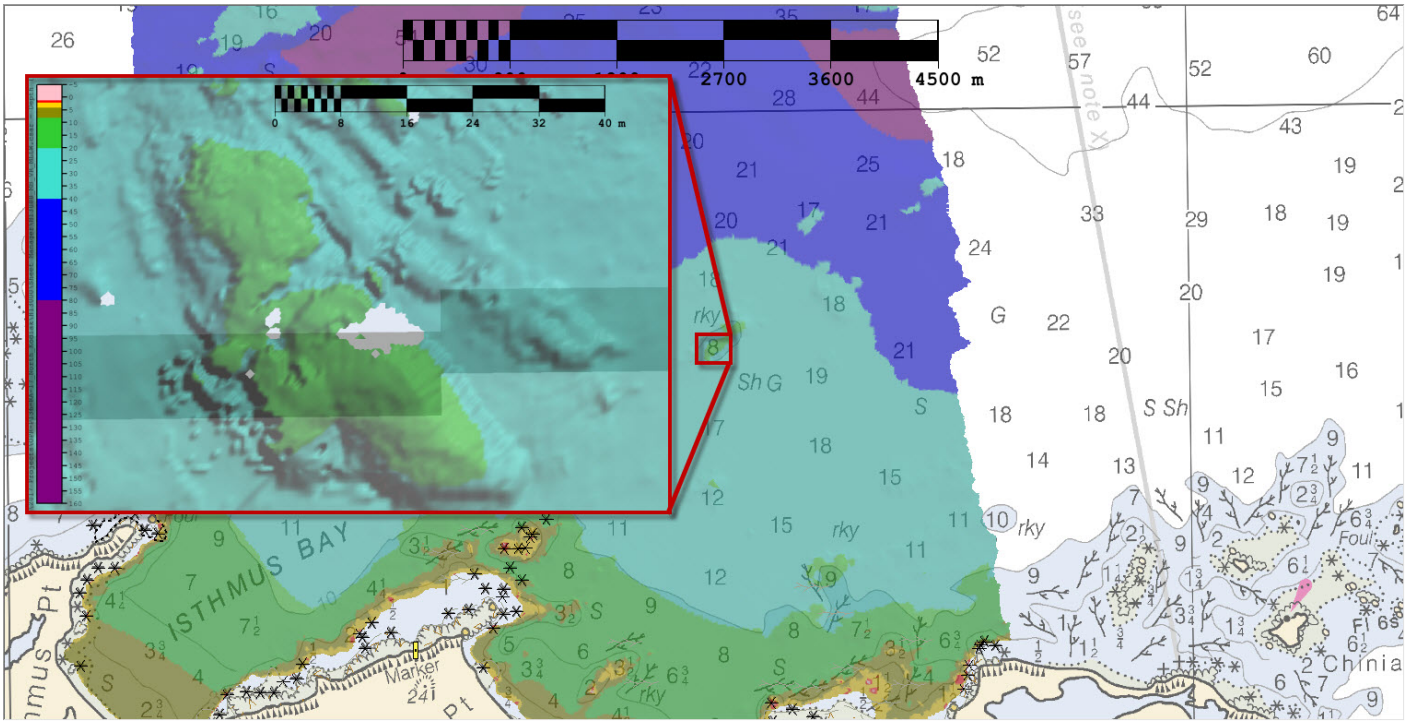


Figure 6: Deep holiday in a rocky area in the middle of H13000, with the surrounding depths ranging from 15.2 meters to 24.59 meters.

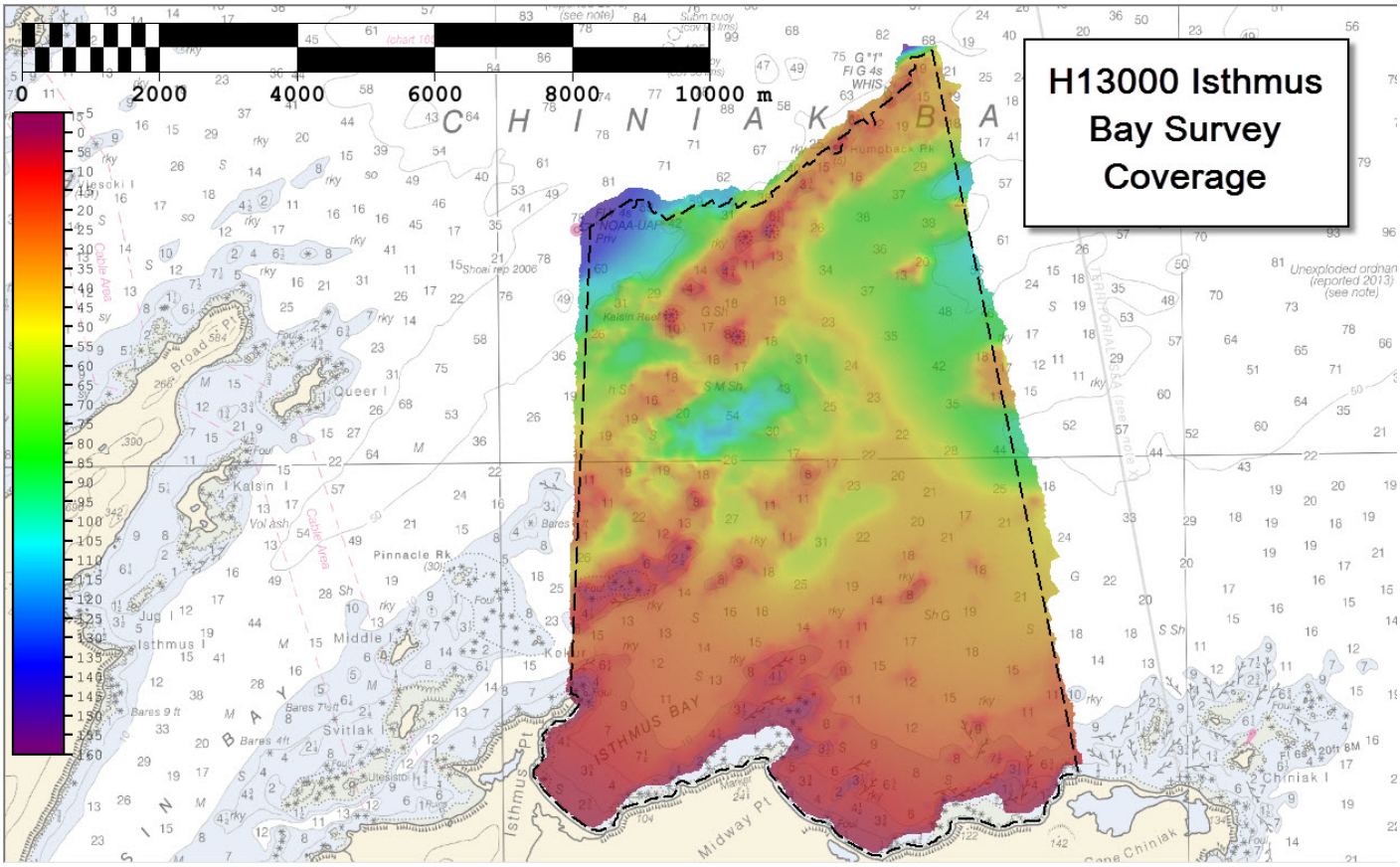


Figure 7: H13000 MBES coverage and assigned survey limits (Chart 16593).

A.5 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	39.55	255.04	0	18.4	312.99
	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	1.97	16.88	0	18.85
	Lidar Crosslines	0	0	0	0	0
Number of Bottom Samples						6
Number Maritime Boundary Points Investigated						0
Number of DPs						46
Number of Items Investigated by Dive Ops						0
Total SNM						18.19

Table 3: Hydrographic Survey Statistics

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

Survey Dates	Day of the Year
05/13/2017	133
05/14/2018	134

Survey Dates	Day of the Year
05/15/2018	135
05/16/2018	136
05/17/2018	137
05/18/2017	138
05/23/2017	143
05/24/2017	144
05/25/2018	145
05/26/2018	146
05/30/2017	150
05/31/2017	151
06/01/2017	152
06/02/2017	153
06/09/2017	160
06/10/2017	161
06/12/2017	163
06/13/2017	164
06/15/2017	166
06/30/2017	181

Table 4: Dates of Hydrography

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	***1905***	***1907***	***2801***	***2802***	***2803***	***2804***
LOA	5.7 meters	5.7 meters	8.8 meters	8.8 meters	8.8 meters	8.8 meters
Draft	0.35 meters	0.35 meters	1.1 meters	1.1 meters	1.1 meters	1.1 meters

Table 5: Vessels Used

Figure 8: NOAA Ship Rainier near Kalsin Bay, Kodiak, AK with survey launches 2803 and 2802 in view.

B.1.2 Equipment

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

Manufacturer	Model	Type
Applanix	POS M/V v5	Positioning and Attitude System
Reson	SeaBat 7125 SV2	MBES
Reson	SeaBat 7125-B	MBES
Reson	SVP71	Sound Speed System
Sea-Bird Scientific	SBE 19plus	Conductivity, Temperature, and Depth Sensor

Table 6: Major Systems Used

B.2 Quality Control

B.2.1 Crosslines

Multibeam/single beam echo sounder/side scan sonar crosslines acquired for this survey totaled 6.02% of mainscheme acquisition.

Multibeam crosslines were acquired using Rainier Launches 2803 and 2802 across a variety of depth ranges, water masses, and boat days that were practical (Figure 9). Due to hydrographer oversight and operational constraints, RAINIER failed to acquire crossline data across all depth ranges. However, the crosslines acquired do have good geographic and temporal distribution, and there is no indication of any comparison issues.

The crosslines are adequate for verifying and evaluating the internal consistency of survey data, requirements for complete coverage are met but crosslines are not representative of the whole sheet due to management error. A 4-meter CUBE surface was created using only H13000 mainscheme coverage, and a second 4-meter surface was created using only crossline coverage. A difference surface was then generated in Pydro tool's Compare Grids program from which statistics were derived. For its respective depths, the difference surface was compared to IHO allowable Total Vertical Uncertainty (TVU) standards. In total, 98% of the total number of nodes pass the TVUmax test between H13000 mainscheme and crossline data (Figure 10). The analysis was performed on H13000 MBES data reduced to Mean Lower-Low Water (MLLW) using Ellipsoidally Referenced Zone Tides (ERZT) methods.

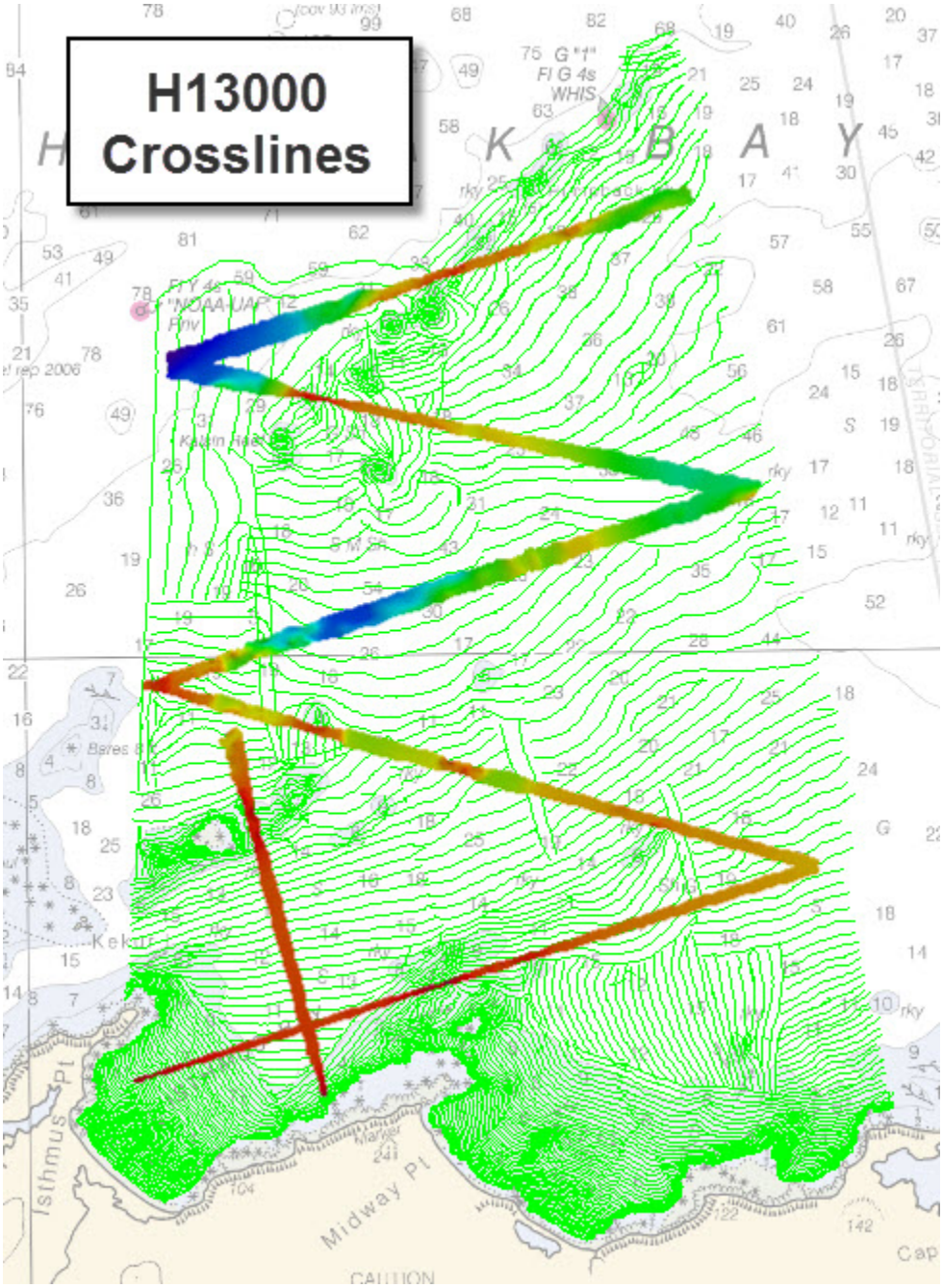


Figure 9: H13000 crossline surface overlaid on mainscheme tracklines, demonstrating adequate temporal and geographic distribution.

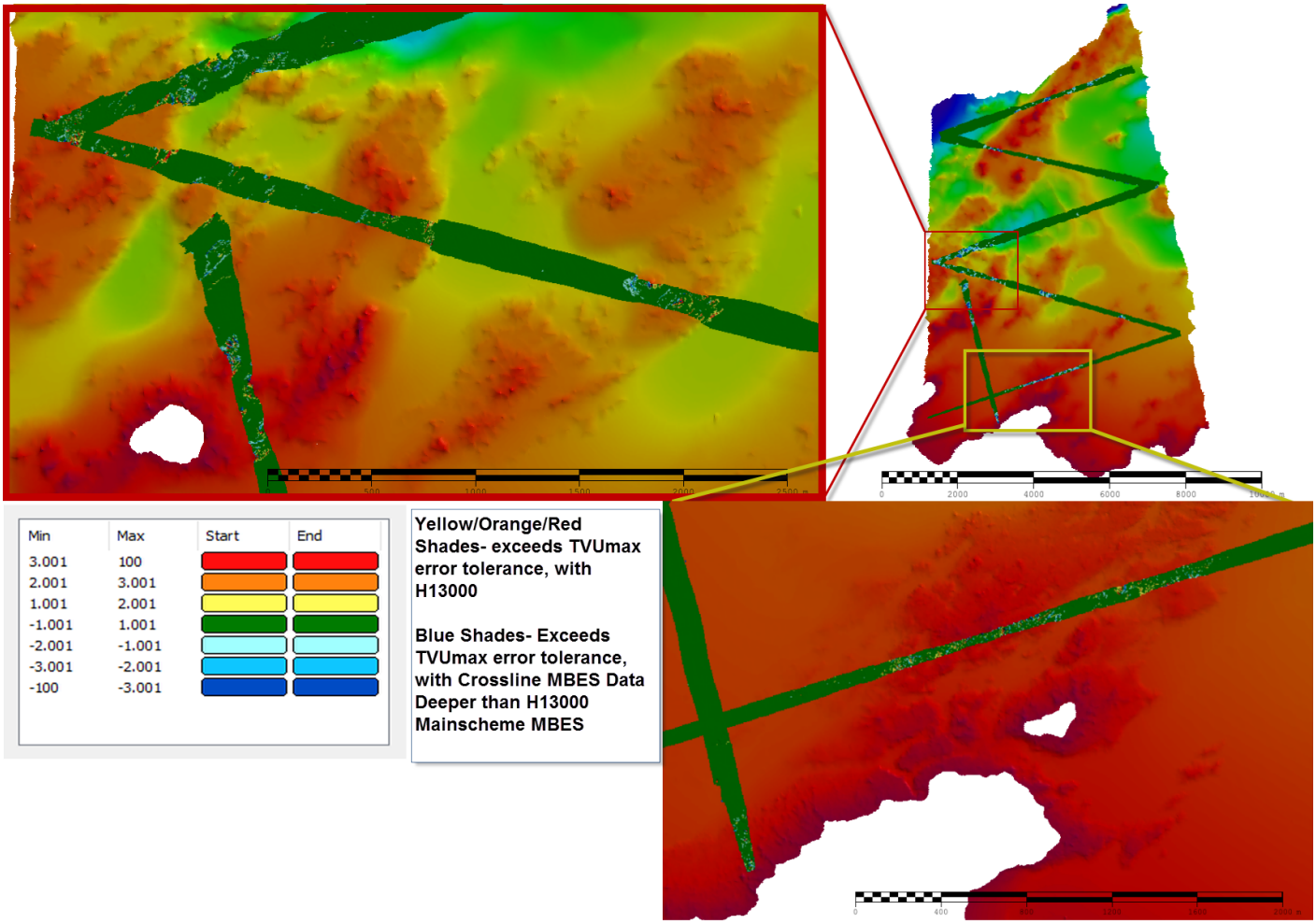


Figure 10: H13000 crossline TVU allowance overlaid on mainscheme MBES data. Positive values represent areas where mainscheme data are deeper than crossline data. Negative values represent areas where crossline data are deeper than mainscheme data.

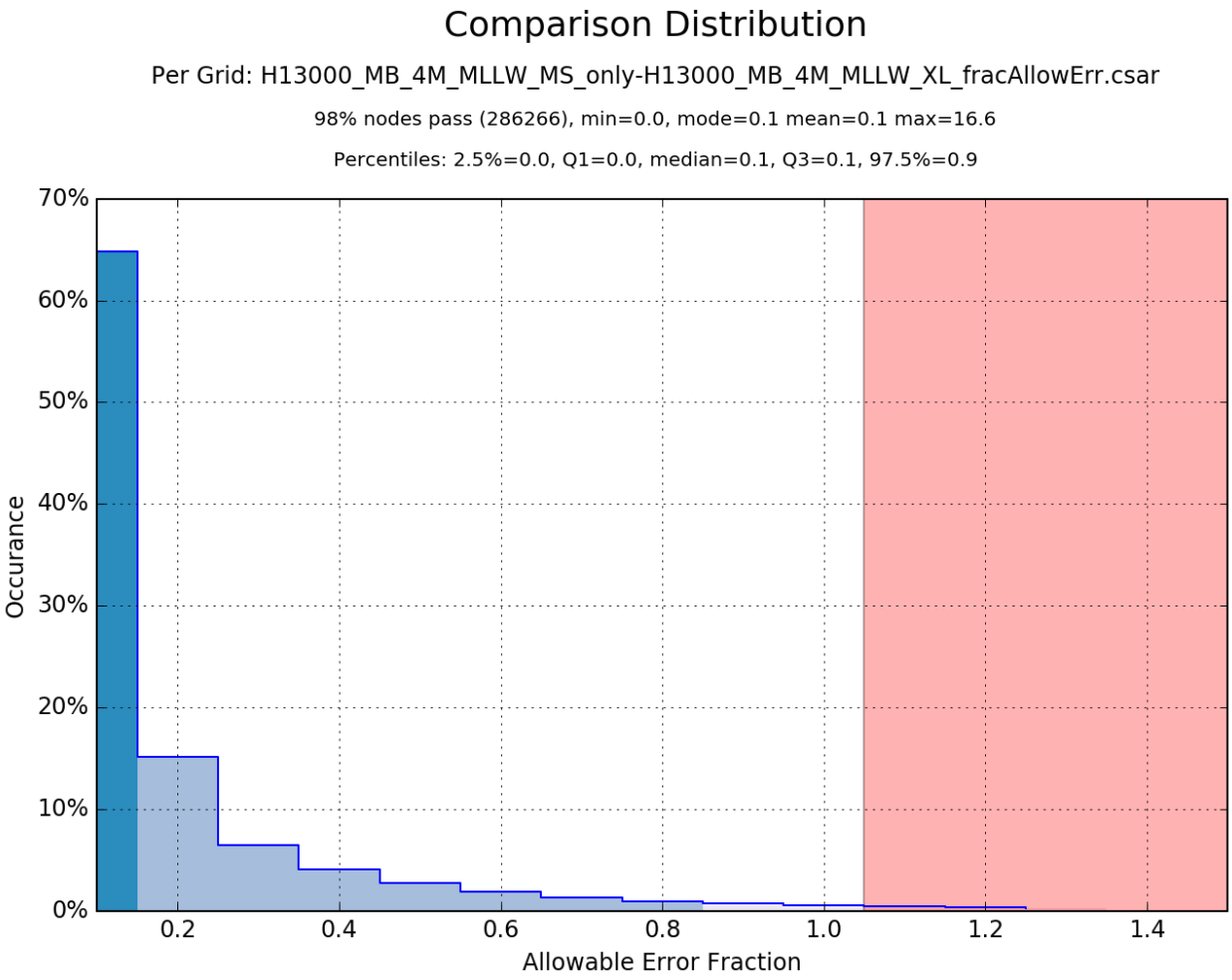
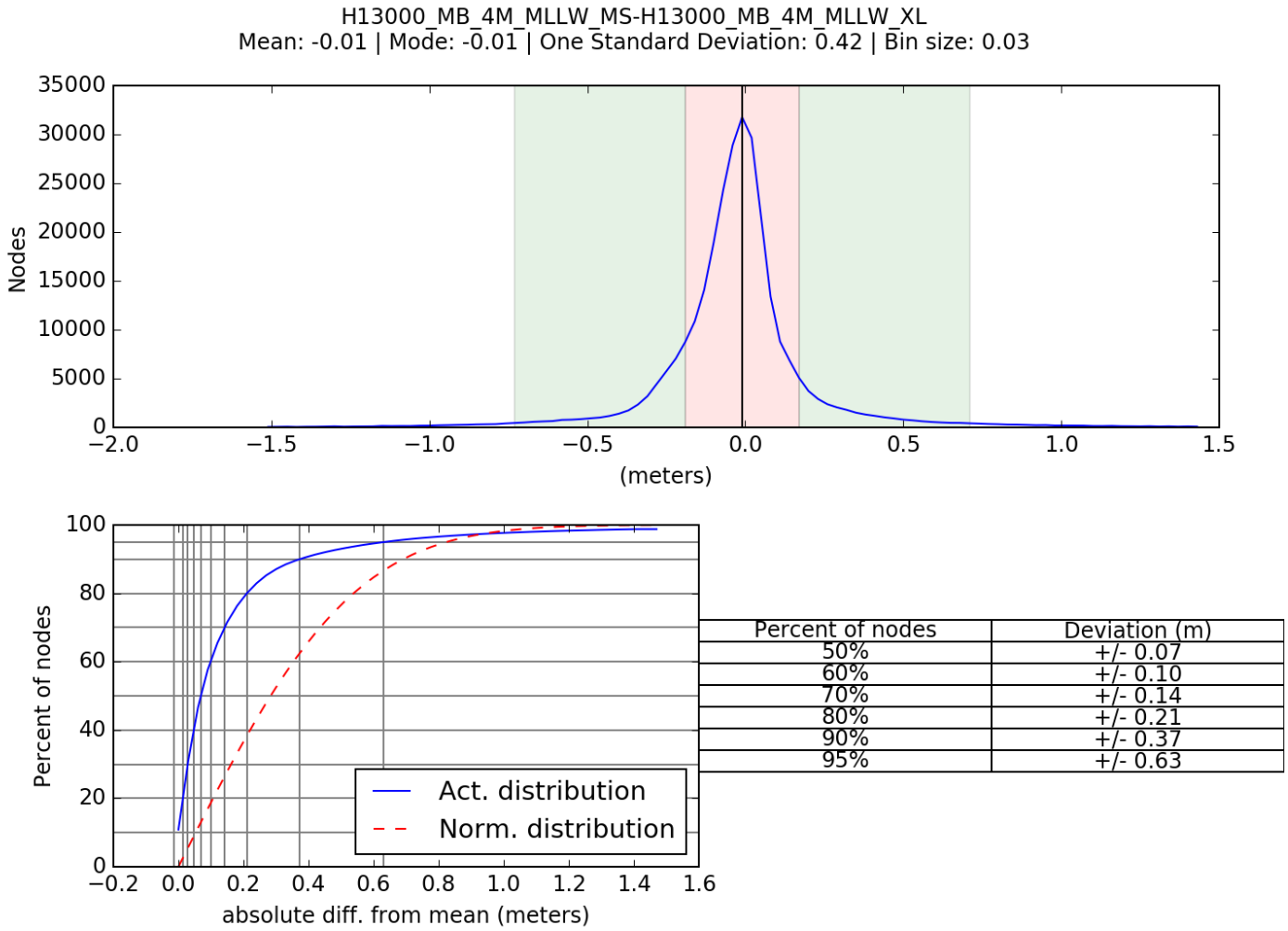


Figure 11: Histogram plot utilizing the magnitude (absolute value) of the Allowable Error Fraction to show the indication of what percentage of the total number of comparisons pass the TVUmax test.



Percent of nodes	Deviation (m)
50%	+/- 0.07
60%	+/- 0.10
70%	+/- 0.14
80%	+/- 0.21
90%	+/- 0.37
95%	+/- 0.63

Figure 12: The statistic and distribution summary plot of the difference between H13000 mainscheme and crosslines.

B.2.2 Uncertainty

The following survey specific parameters were used for this survey:

Method	Measured	Zoning
ERS via ERZT	0.0 meters	0.024 meters

Table 7: Survey Specific Tide TPU Values.

Hull ID	Measured - CTD	Measured - MVP	Surface
2801, 2802, 2803, 2804	3 meters/second	N/A meters/second	0.15 meters/second

Table 8: Survey Specific Sound Speed TPU Values.

Total Propagated Uncertainty (TPU) values for survey H13000 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 accounted for by examining the field generated one thousand-meter resolution separation model and statistically determining a value. A measured uncertainty of 0.024 meters was entered to account for ERZT processing methods. See the 2017 DAPR submitted with this project for more information.

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

Uncertainty values of submitted finalized grids were calculated in CARIS using "Greater of the Two" of uncertainty and standard deviation (scaled to 95%). Pydro QC Tools 2 were used to analyze H13000 TVU compliance; a histogram plot of the results is shown below (Figure 13).

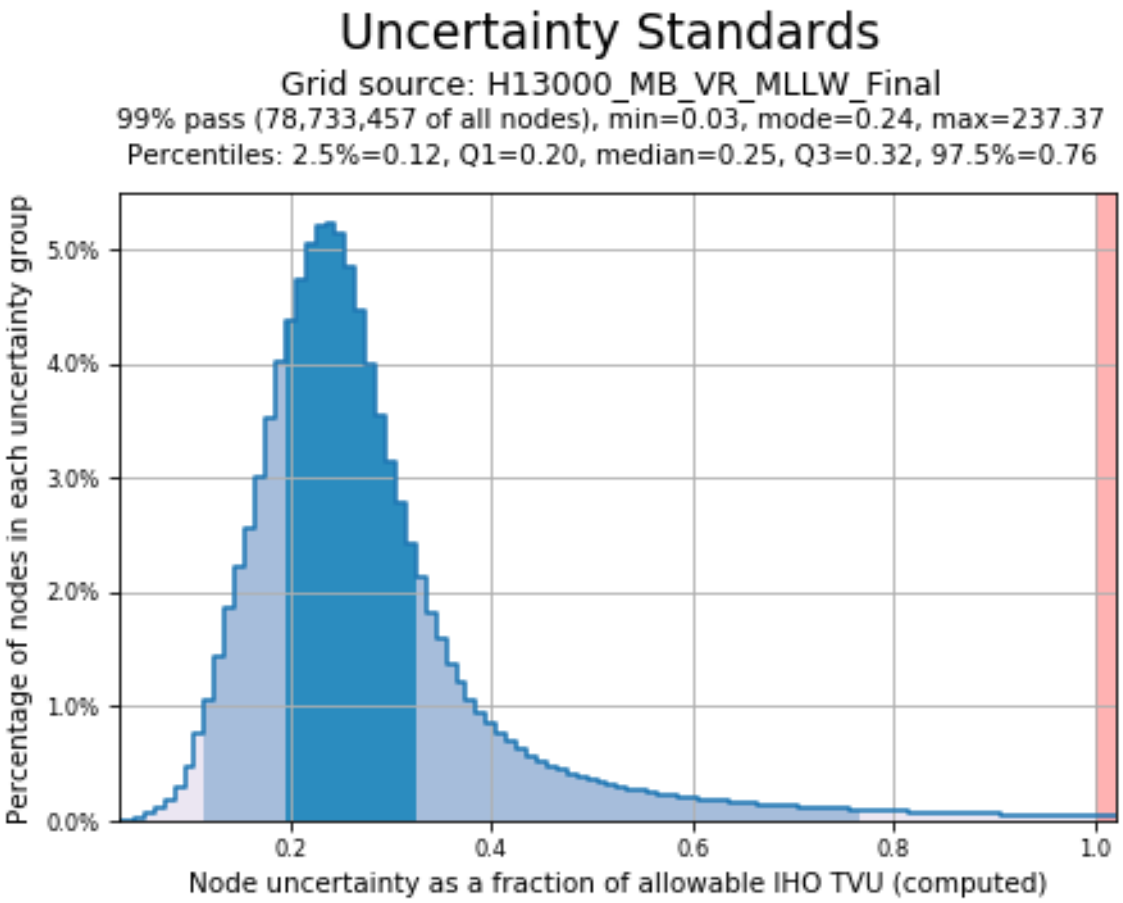


Figure 13: Pydro derived histogram plot showing TVU compliance on H13000 multi-resolution MBES data.

B.2.3 Junctions

Three surveys junction with H13000, two are contemporary and part of project OPR-P136-RA-17, the third was conducted by NOAA Ship Rainier in 1999 (Figure 14).

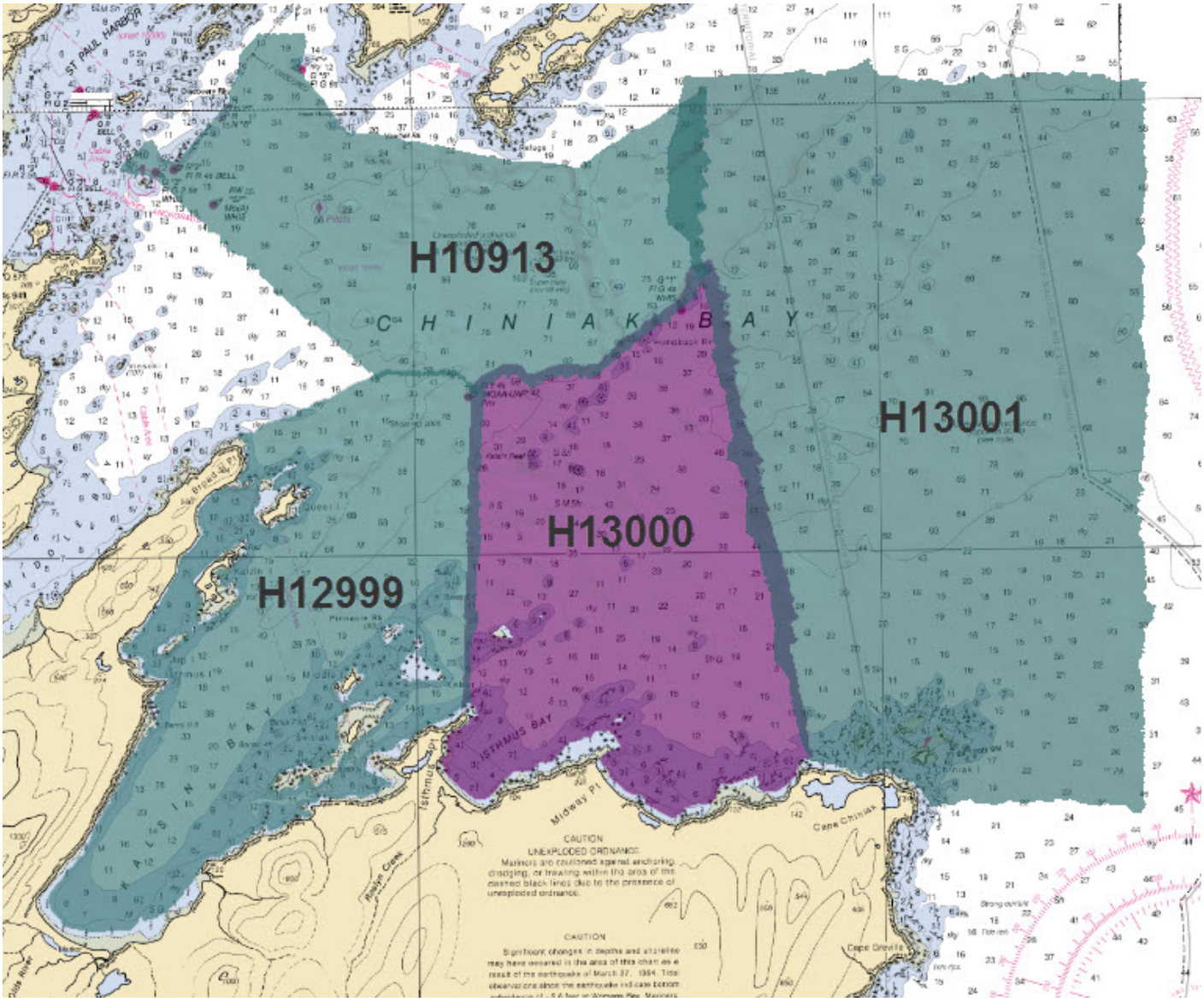


Figure 14: Overview of H13000 junction surveys.

The following junctions were made with this survey:

Registry Number	Scale	Year	Field Unit	Relative Location
H10913	1:10000	1999	NOAA Ship RAINIER	N
H13001	1:40000	2017	NOAA Ship RAINIER	E
H12999	1:40000	2017	NOAA Ship RAINIER	W

Table 9: Junctioning Surveys

H10913

The junction with survey H10913 encompassed approximately 0.30 square nautical miles along the northern boundary of H13000 (Figure 15). An 8-meter surface of H10913 data was created with Caris Base Editor using the following steps: a point cloud was generated from the H10913 .a93 file provided by NOAA's Operations Branch, a Triangulated Irregular Network (TIN) model was created, long edges removed, then used to interpolate the surface. An 8-meter CUBE surface of the H13000 data was created in Caris HIPS and SIPS, then a difference surface was derived between the two surfaces. Analysis of the 8-meter difference surface indicated that H13000 is an average of 0.27meters shoaler than H10913 with a standard deviation of 1.33 meters.

H10913 is a 1999 vintage survey, acquired during the time when robust uncertainty calculation and documentation was not standard practice, therefore it was not possible to conduct a detailed IHO TVU compliance analysis for this junction. In the area north of the Humpback Rock, over the six and three quarters sounding, H13000 is deeper than H10913 with the allowable error fraction ranging from -2.65 m to 17.4 m. 17.4 m is the greatest variation in depth between the two surfaces (Figure 16). The relatively high standard deviation of the junction data and the larger depth differences seen, are attributed to the comparatively low resolution of the H10913 data set, high sea floor relief in some areas and the lower quality of the surface along some of its edges. In these areas, it is recommended the H13000 data supersede the H10913 data.

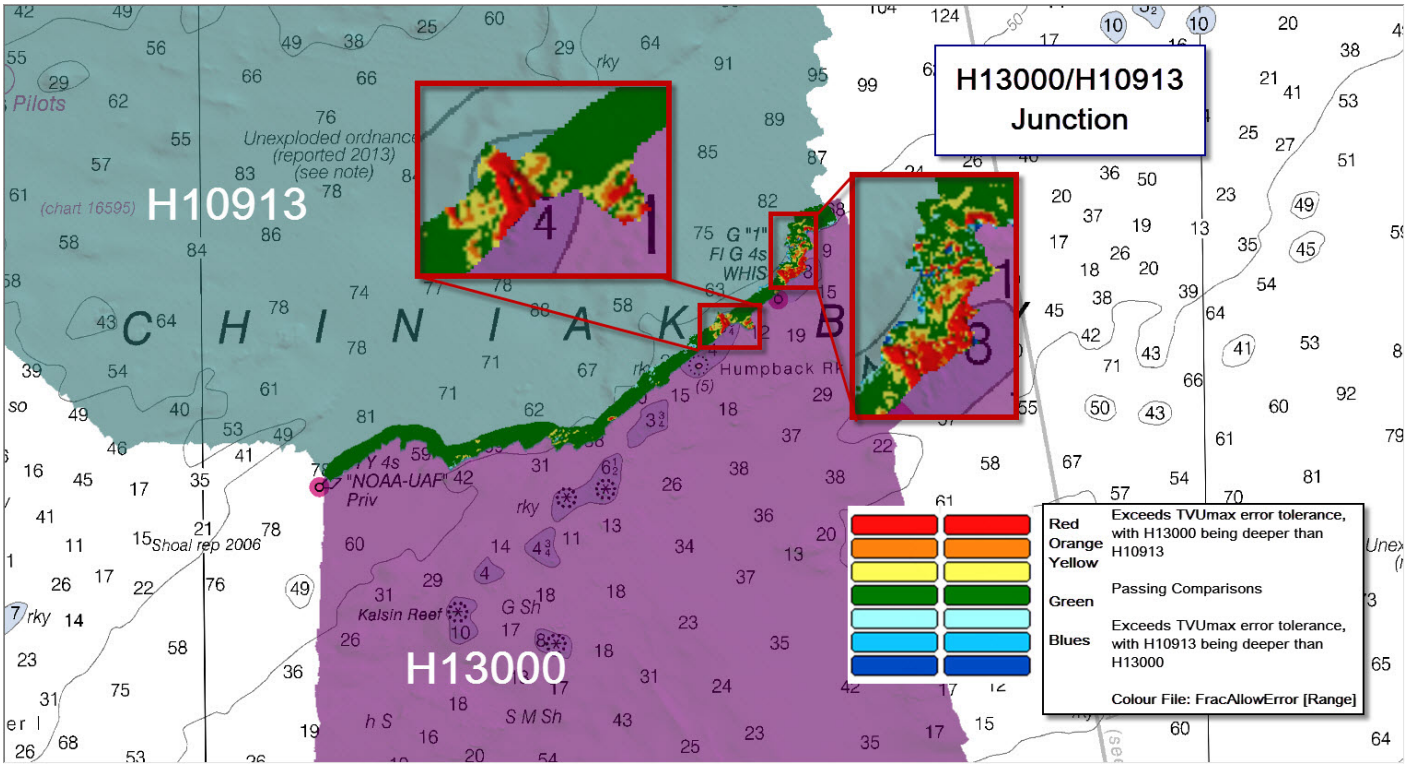


Figure 15: H13000 and H10913 junction showing TVUmax compliance. In the area surrounding the Humpback rock vicinity, H13000 is deeper than H10913.

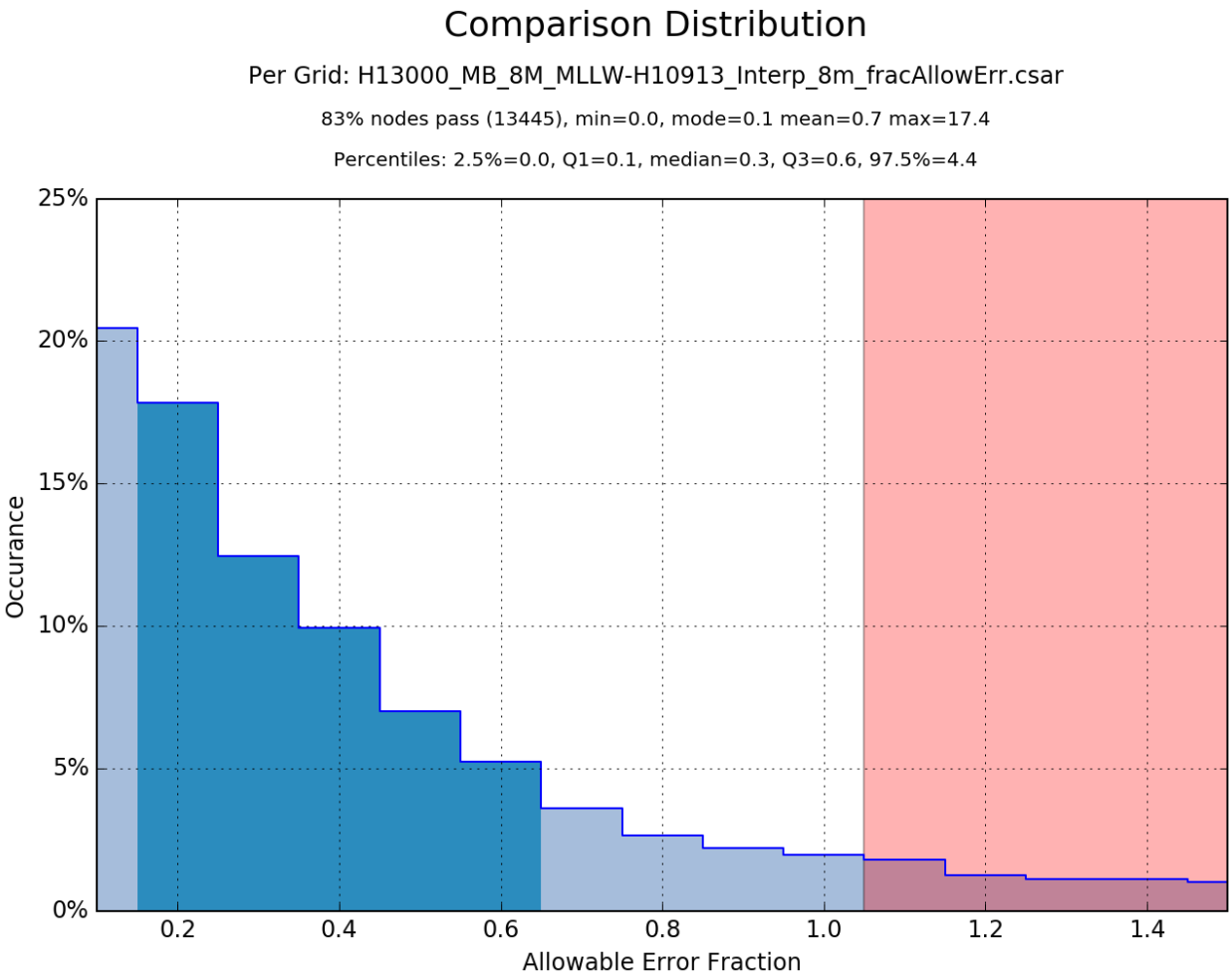


Figure 16: Histogram plot utilizing the magnitude of the Allowable Error Fraction indicate that 83% of the nodes pass the TVUmax test.

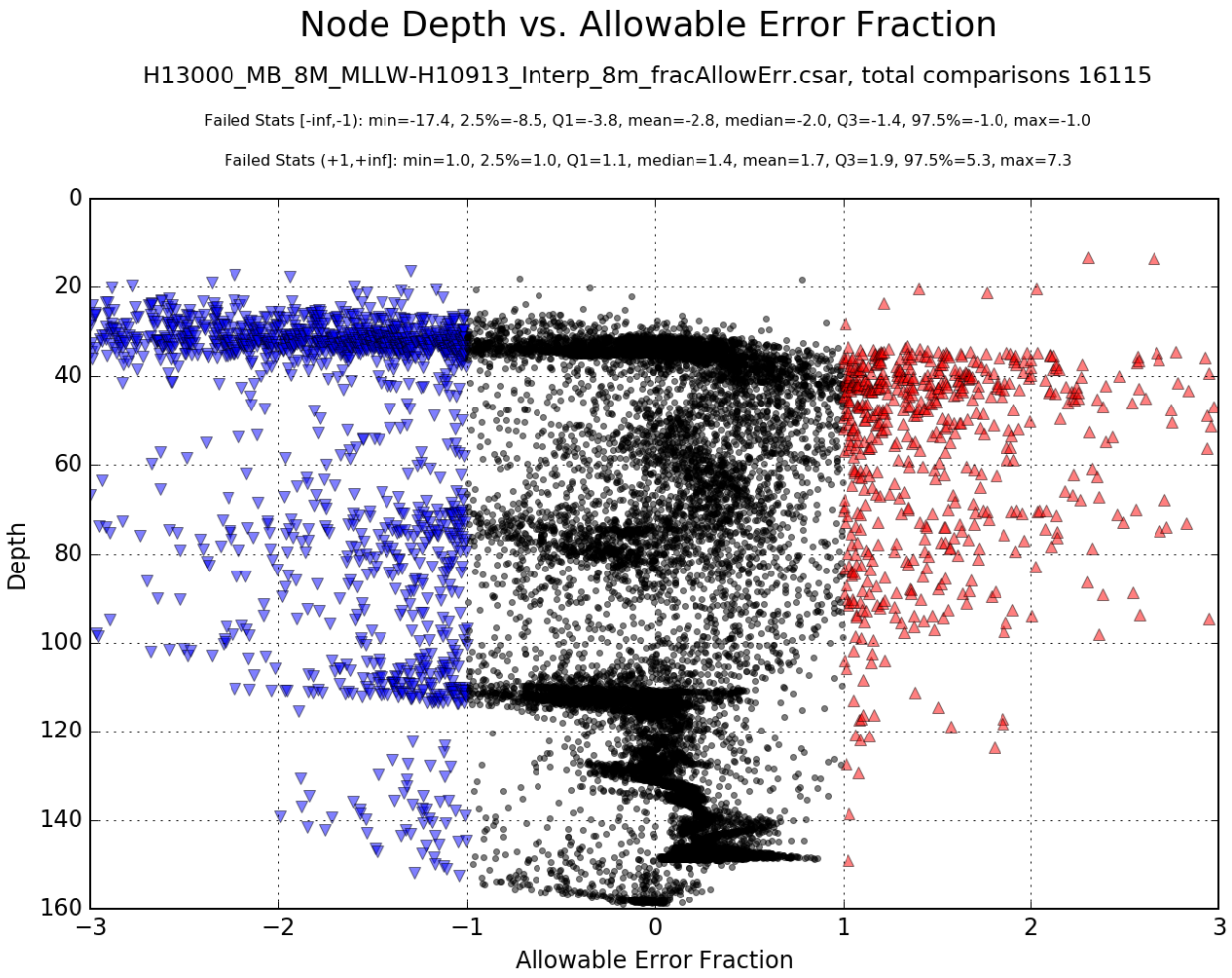


Figure 17: A depth-dependent plot detailing the Allowable Error Fraction, where values between-and-including +/- 1 represent "passing comparisons" for the H13000 and H10913 junction analysis.

H13001

The junction with survey H13001 encompassed 1.01 square nautical miles along the western boundary of H13000 (Figure 18). A comparison was made using a difference surface derived from the 4-meter CUBE surfaces of each survey. Analysis of the difference surface indicated that H13000 was an average of 0.01 meters shoaler than H13001 with a standard deviation of 0.3 meters. For the respective depths, the difference surface was compared to the allowable TVU standards specified in the HSSD (Figure 19). In total, 99% of the depth differences between H13000 and junction survey H13001 were within the allowable uncertainties (Figure 20).

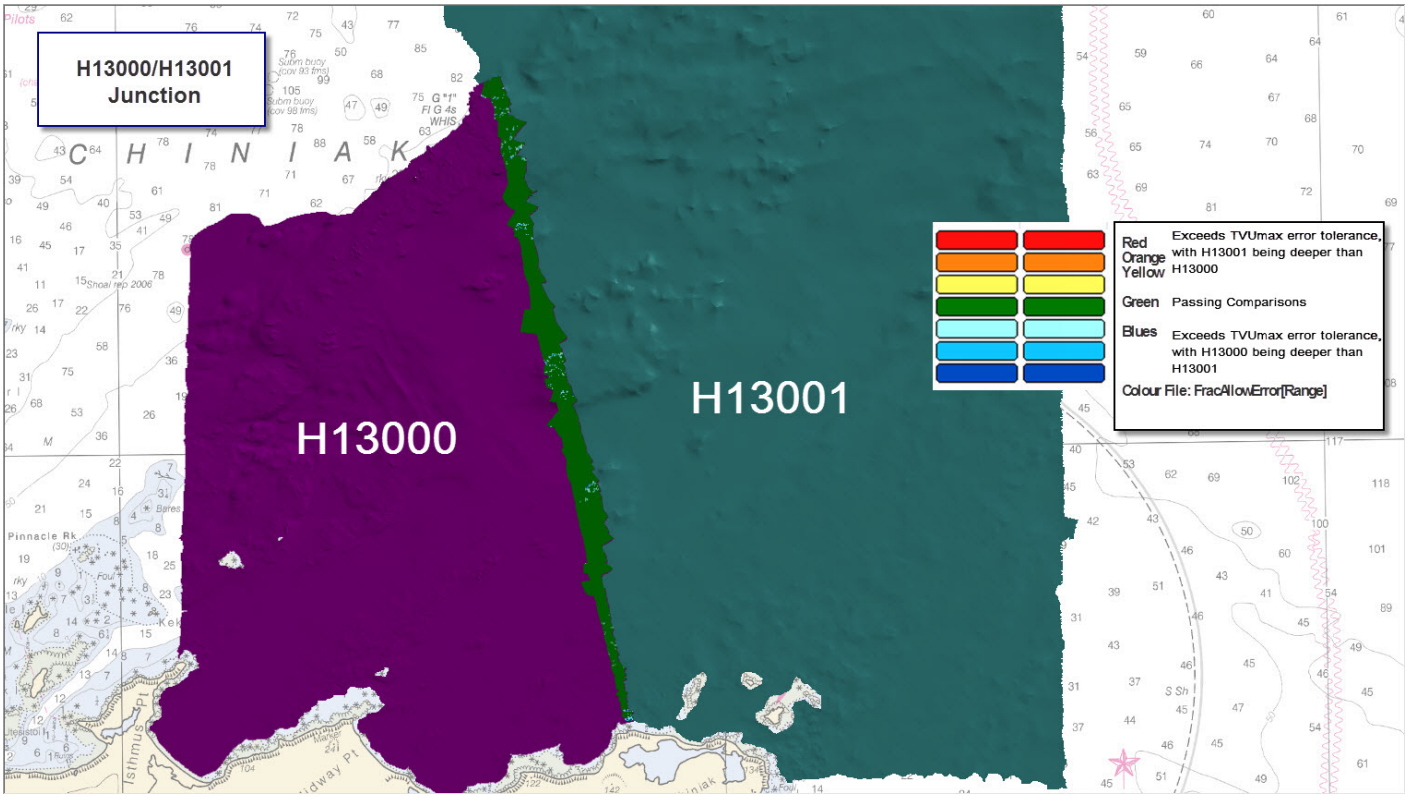


Figure 18: H13000 junction survey with H13001 showing TVUmax compliance.

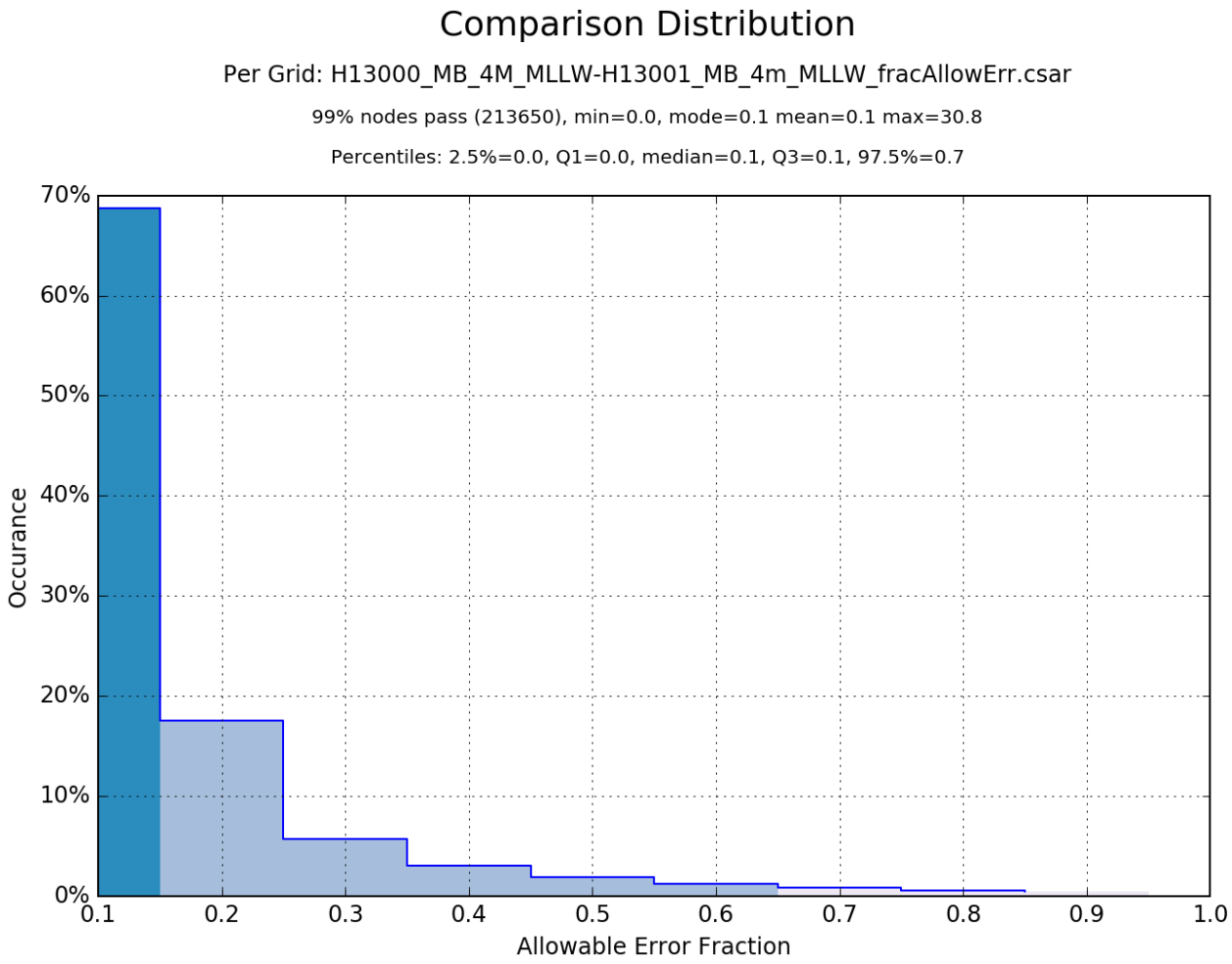


Figure 19: Histogram plot utilizing the magnitude of the Allowable Error Fraction indicate that 99% of the nodes pass the TVUmax test.

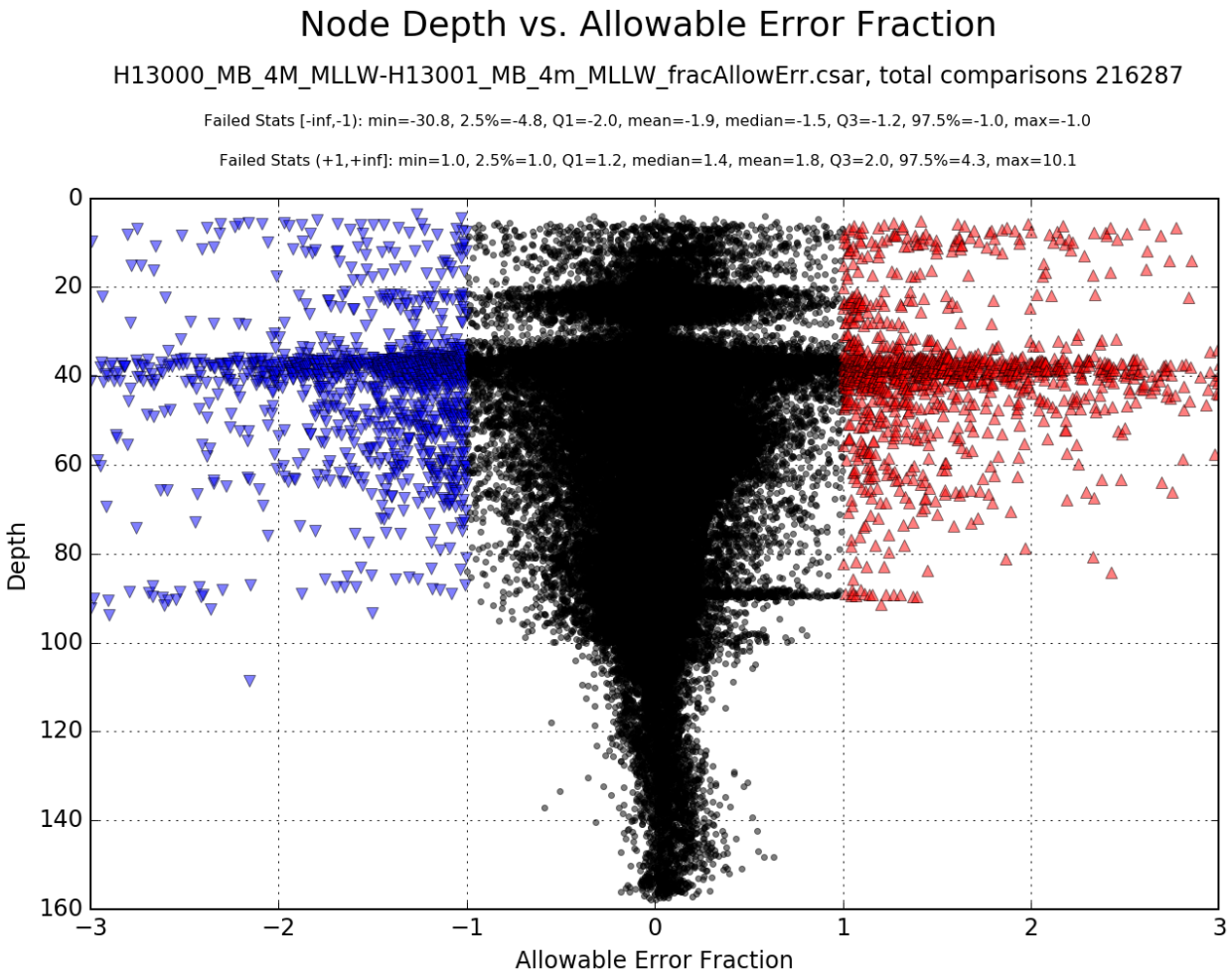


Figure 20: A depth-dependent plot detailing the Allowable Error Fraction, where values between-and-including +/- 1 represent "passing comparisons" for the H13000 and H13001 junction analysis.

H12999

The junction survey H12999 encompassed 0.44 square nautical miles along the westerly boundary of H13000 (Figure 21). A comparison was made using a difference surface derived from the 4-meter CUBE surfaces of each survey. Analysis of the difference surface indicated that H13000 is an average of 0.08 meters shoaler than H12999 with a standard deviation of 0.41 meters (Figure 22). For the respective depths, the difference surface was compared to the allowable TVU standards specified in the HSSD. In total, 98% of the depth differences between H13000 and junction survey H12999 were within allowable uncertainties (Figure 21).

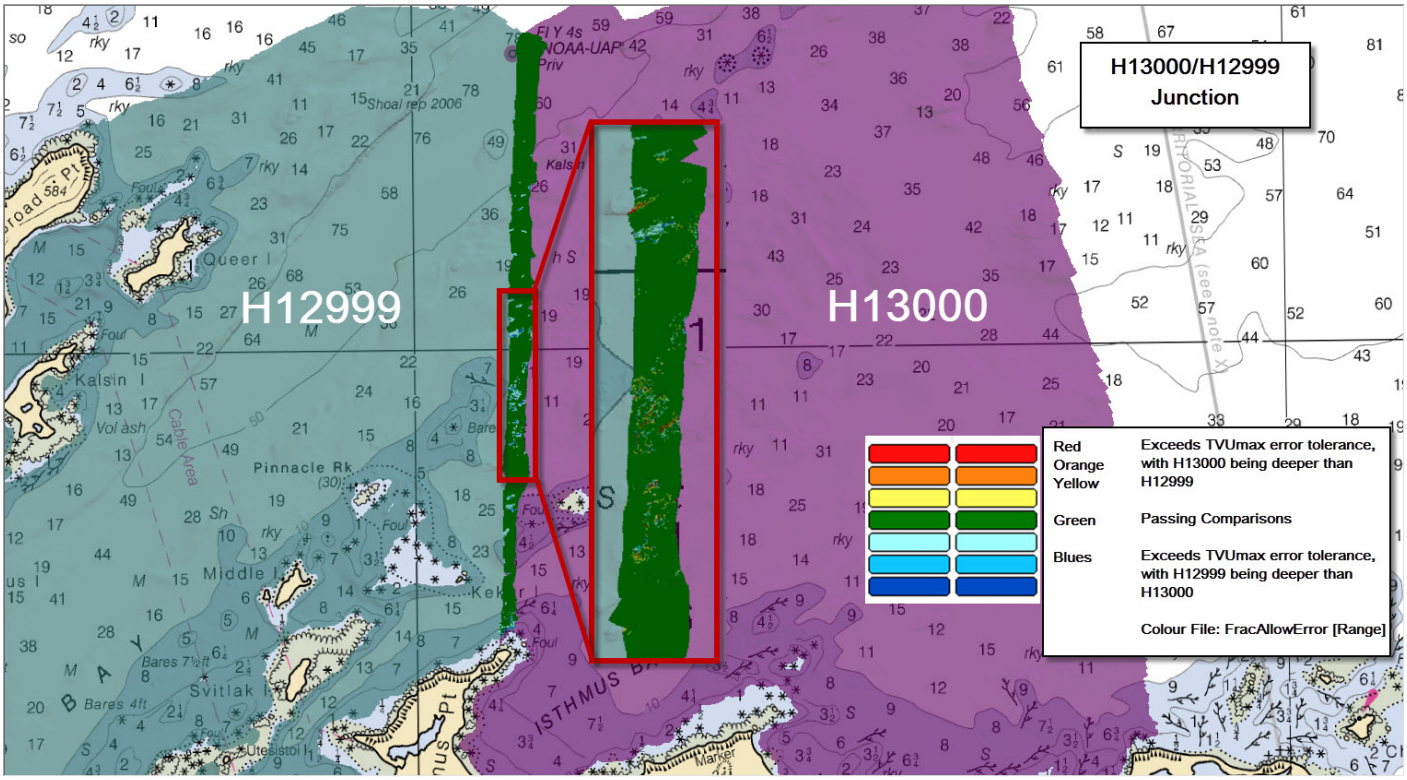


Figure 21: H13000 junction survey H12999 showing showing TVUmax compliance.

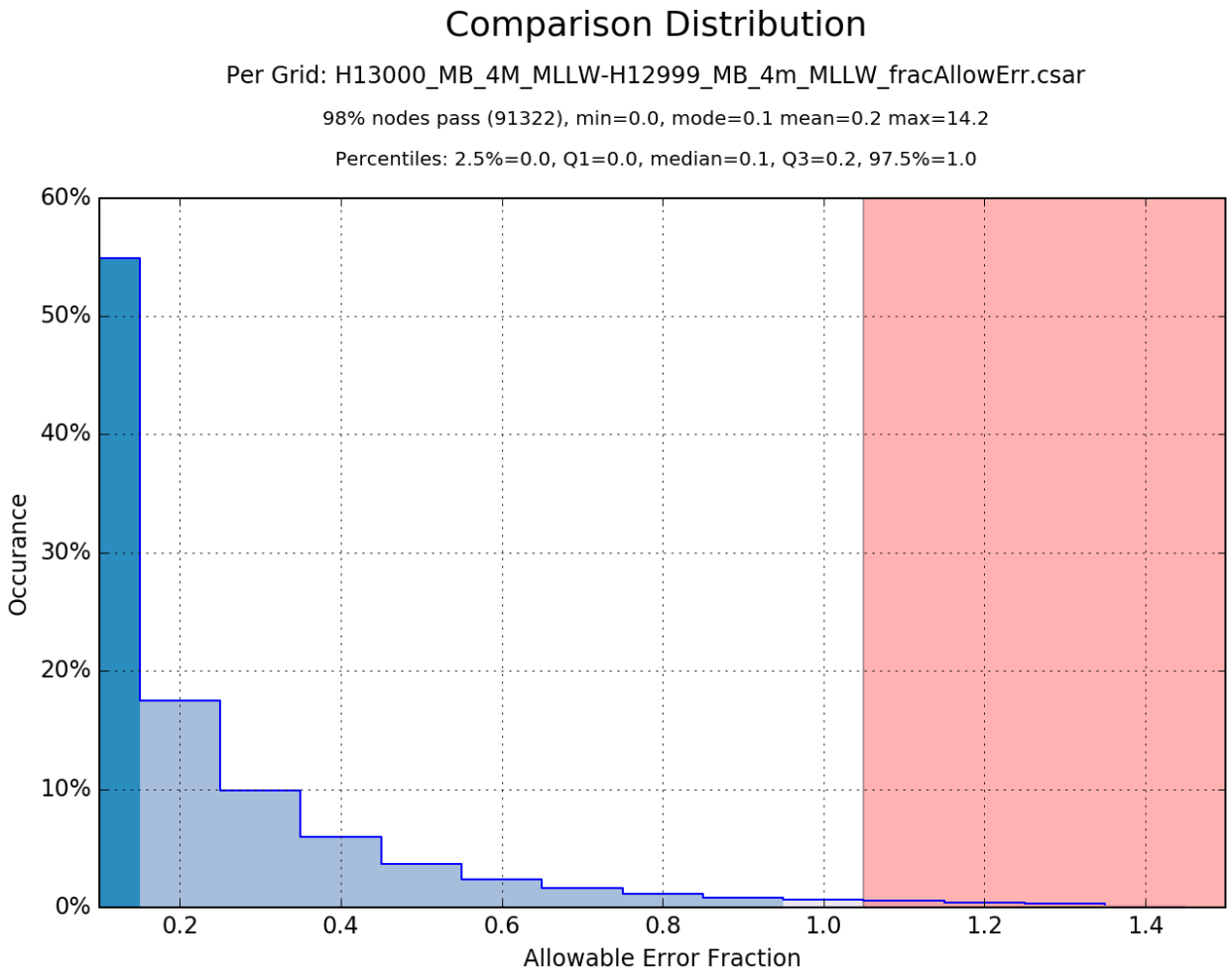


Figure 22: Histogram plot utilizing the magnitude of the Allowable Error Fraction indicate that 98% of the nodes pass the TVUmax test.

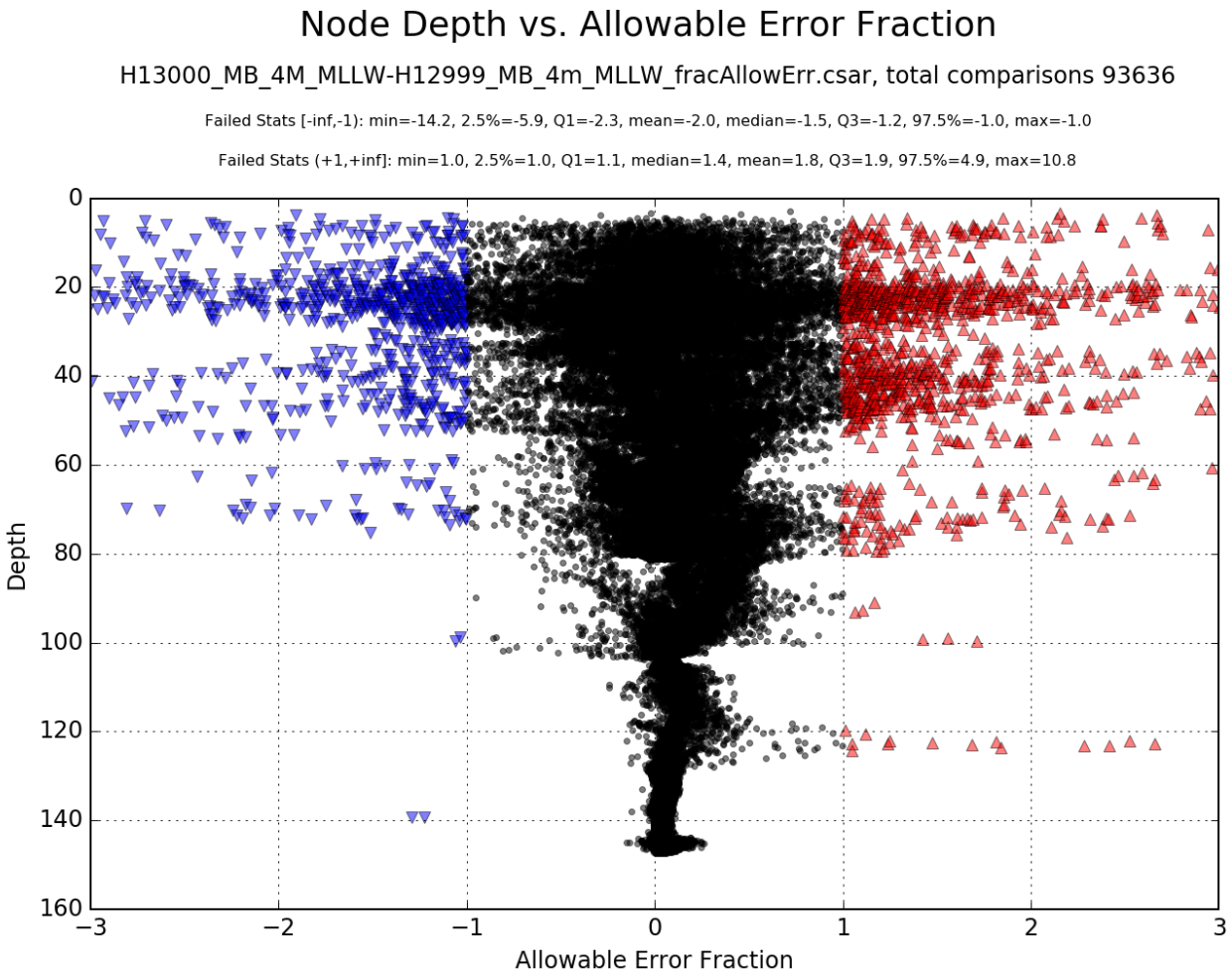


Figure 23: A depth-dependent plot detailing the Allowable Error Fraction, where values between-and-including +/- 1 represent "passing comparisons" for the H13000 and H12999 junction analysis.

B.2.4 Sonar QC Checks

Sonar system quality control checks were conducted as detailed in the quality control section of the DAPR.

B.2.5 Equipment Effectiveness

There were no conditions or deficiencies that affected equipment operational effectiveness.

B.2.6 Factors Affecting Soundings

There were no other factors that affected corrections to soundings.

B.2.7 Sound Speed Methods

Sound Speed Cast Frequency: Forty-eight 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 within the sheet limits (Figure 24). Sound speed profiles were acquired using Sea-Bird 19Plus SEACAT Profilers. All casts were concatenated into a master file and applied to MBES data using the "Nearest in distance within time" (4 hours) profile selection method.

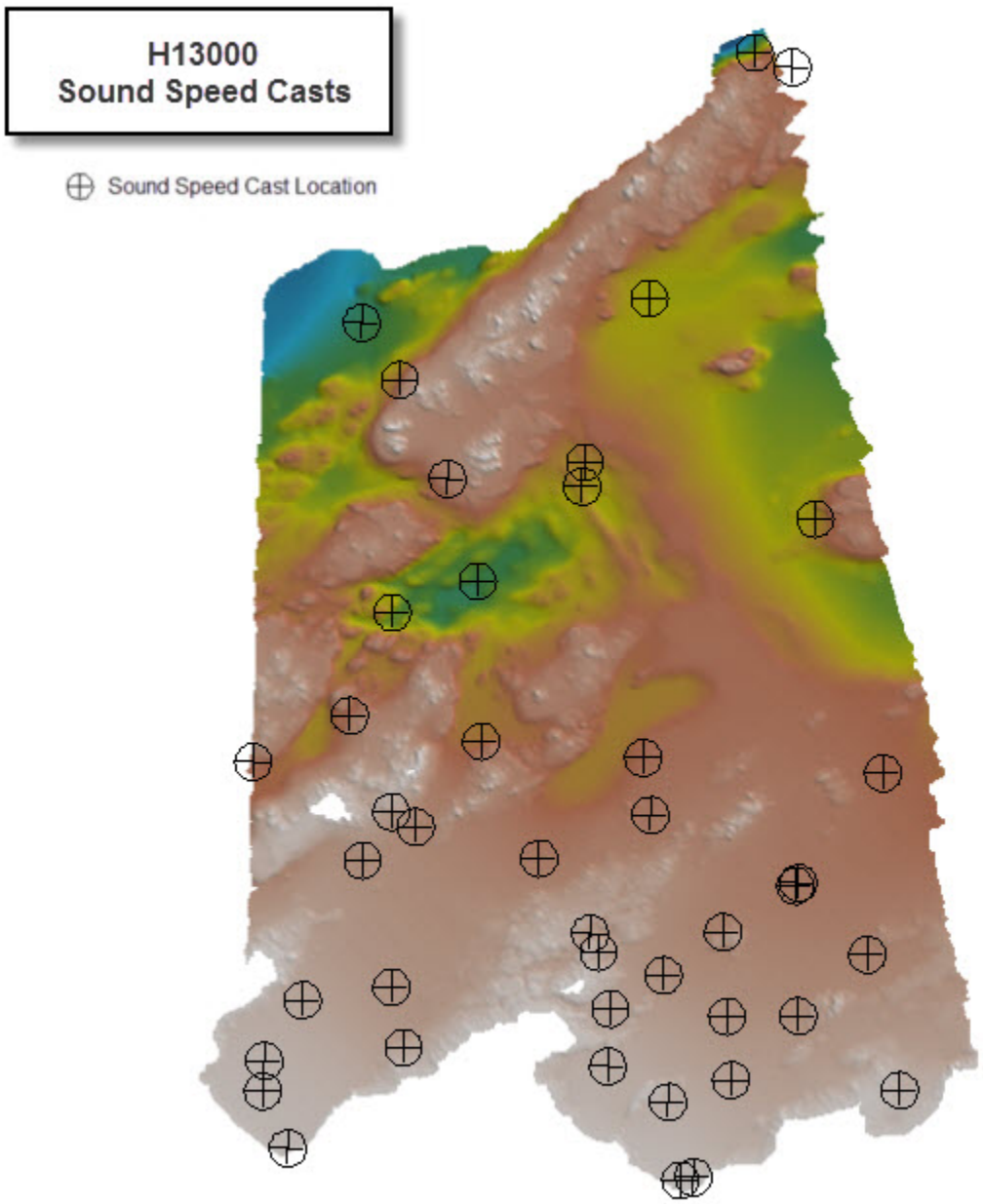


Figure 24: H13000 Sound Speed cast locations.

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

Raw Backscatter was logged as a 7k file and has been sent to the Processing Branch. Backscatter was not processed by the field unit.

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	9.1, 10.2, 10.3, 10.3.1, 10.3.2, 10.4.2

Table 10: Primary bathymetric data processing software

The following Feature Object Catalog was used: NOAA Extended Attribute Files V_5_5.

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
H13000_MB_VR_MLLW	CUBE	999 meters	-0.49 meters - 158.91 meters	N/A	Complete MBES

Surface Name	Surface Type	Resolution	Depth Range	Surface Parameter	Purpose
H13000_MB_VR_MLLW_Final	CUBE	999 meters	-0.49 meters - 158.91 meters	N/A	Complete MBES

Table 11: Submitted Surfaces

Submitted surfaces were generated using the recommended parameters for depth-based (Ranges) Caris variable-resolution bathymetric grids as specified in HSTD 2017-2. The resolution values in the table above are not accurate: the XML-DR schema used to generate this report did not accommodate variable resolution grids. The "999" value was entered merely as a place holder; the XML-DR team is aware of this issues and is working to update the schema.

Pydro QC Tools 2 Detect Fliers was used to find fliers in a finalized VR surface. Obvious noise was rejected by the hydrographer in Caris subset editor. After data cleaning, Detect Fliers was run again and found 9 certain fliers; these were investigated and found to be false positives. The results of the Detect Fliers tool are included as a .000 files in the Separates section of this report.

No soundings were designated for survey H13000.

C. Vertical and Horizontal Control

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

C.1 Vertical Control

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

Traditional Methods Used:

TCARI

The following National Water Level Observation Network (NWLON) stations served as datum control for this survey:

Station Name	Station ID
Kodiak Island, AK	9457292

Table 12: NWLON Tide Stations

File Name	Status
H13000_TCARI_Features.tid	Final Approved

Table 13: Water Level Files (.tid)

File Name	Status
P136RA2017.tc	Final

Table 14: Tide Correctors (.zdf or .tc)

A request for final approved tides was sent to N/OPS1 on 07/29/2017. The final tide note was received on 08/11/2017.

H13000 shoreline features were tide corrected using a .tid file created in Pydro utilizing the "TCARI TID file via S-57" function then loaded in Caris Notebook. H13000 MBES data were reduced to MLLW using ERZT processing methods.

ERS Methods Used:

ERS via ERZT

Ellipsoid to Chart Datum Separation File:

H13000_SEP_1000m_2.csar
H13000_SEP_100_3.csar

Ellipsoidally Referenced Zoned Tides (ERZT) methods were used to transform between the ellipsoid and water level data. A 1000-meter resolution separation model was computed between the ellipsoid and MLLW using real-time position measurements observed during the survey relative to the vessel water line and the TCARI tide file. "GPS tides" were then computed using the above mentioned separation model and then corrected GPS-height-to-water-level data (SBET).

H13000_SEP_1000m_2.csar would not apply to the following eight lines: 2802_2017_1381731, 2802_2017_1381742, 2802_2017_1381939, 2802_2017_1382050, 2802_2017_1382101, 2802_2017_1382049, 2802_2017_1382157, and 2802_2017_1382221. A 100m separation model, H13000_SEP_100_3.csar was applied to these lines. Due to hydrographer error, the separation model file

names did not fall under required naming convention. Both separation models were generated in NAD83 as were the SBETs. Please refer to the Rainier 2017 DAPR for additional information.

C.2 Horizontal Control

The horizontal datum for this project is North American Datum of 1983 (NAD83).

The projection used for this project is Universal Transvese Mercator (UTM) Zone 5 North.

The following PPK methods were used for horizontal control:

Single Base

The following user installed stations were used for horizontal control:

HVCR Site ID	Base Station ID
9715	Woody

Table 15: User Installed Base Stations

C.3 Additional Horizontal or Vertical Control Issues

C.3.1 Multiple SBET and RMS Application

There were discrepancies when applying SBET and RMS to survey lines; in the output window it would appear that the files were correctly applied, and then the output window within Caris would display *File not loaded*. There were numerous instances in this survey where SBET and RMS had to be reapplied to properly compute the 100-meter and 1000-meter separation model in order to reference the data to the ellipsoid.

Please refer to CARIS HelpDesk ticket #01701460; the Help Desk ticket is not resolved. It is believed that these issues originated from switching between CARIS 9.1 and CARIS 10, to complete the separation models. SBET and RMS has been applied on both versions of CARIS, and offset issues have been resolved.

During Survey Acceptance Review. a combined separation file was created using the submitted 100-meter and 1000-meter separation model given the priority to the 100- meter surface overriding the 1000 -meter in the common area. Applying the following rules where the dataset metadata value is least and the Band value =Surface resolution is greatest.

D. Results and Recommendations

D.1 Chart Comparison

A comparison was made between H13000 survey data and Electronic Navigation Charts (ENC) US4AK5PM, US4AK5OM, and US5AK5EM using CUBE surfaces, selected soundings, and contours created in Caris.

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	Preliminary?
US4AK5PM	1:78900	11	04/28/2017	04/28/2017	NO
US4AK5OM	1:80000	4	10/05/2015	10/05/2015	NO
US5AK5EM	1:20000	14	10/23/2017	10/23/2017	NO

Table 16: Largest Scale ENCs

US4AK5PM

ENC US4AK5PM covers the northern quarter of H13000 data. ENC US4AK5PM does not contain a 3 or 5-fathom depth contours, nor does the RNC for the area surrounding Humpback rock (Figure 25).

There are significant discrepancies between the 10-fathom contour derived from H13000 and the corresponding depth curve on the ENC. H13000's 50-fathom depth contour was generally inshore of the ENC's 50-fathom depth contour (Figure 26).

The soundings derived from H13000 typically agreed with those charted on ENC US4AK5PM.

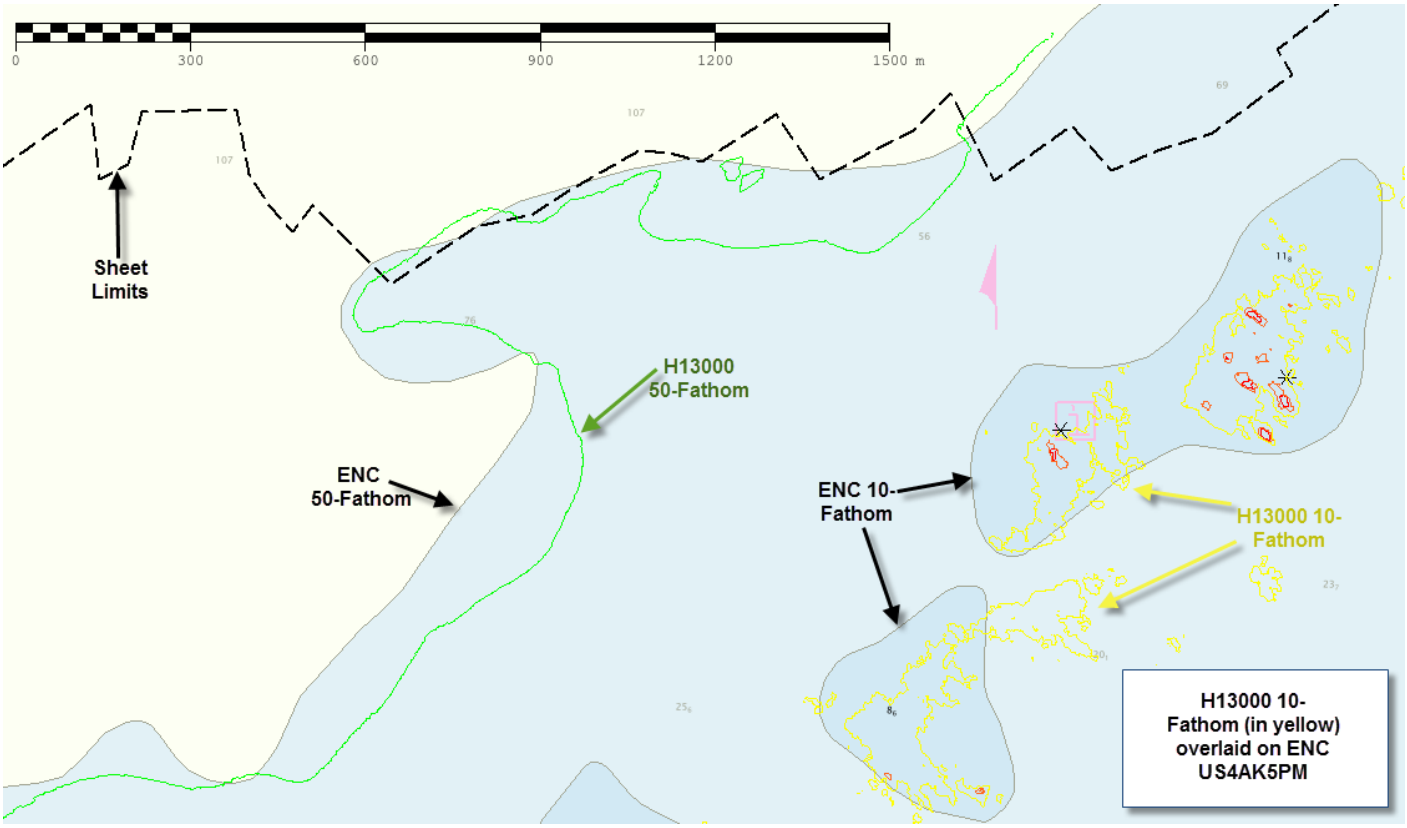


Figure 25: H13000 10-fathom (in yellow) and 50-fathom (in green) overlaid on ENC US4AK5PM showing several discrepancies between survey data the ENC charted data.

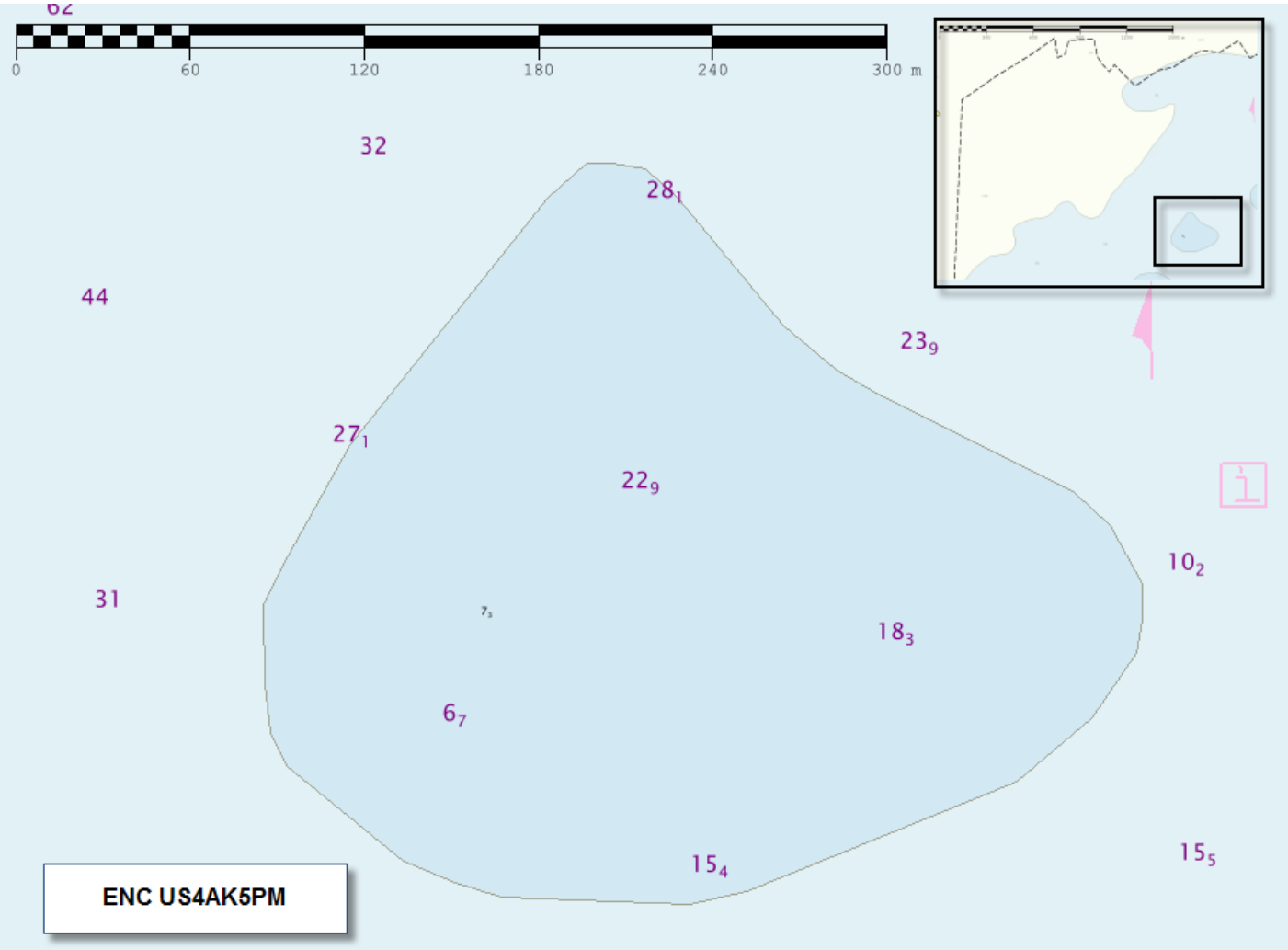


Figure 26: Several survey soundings (fathoms) deeper than the charted depths depicted on ENC US4AK5PM.

US4AK5OM

H13000 survey data coincide with sections of ENC US4AK5PM and US4AK5OM. A horizontal offset between the two ENCs of approximately 40 to 90 meters was identified at the junction of these charts in the middle of the H13000 survey area (Figure 27).

ENC US4AK5OM covers the majority of the lower 75% of H13000 survey data. The comparison of depth contours from ENC US4AK5OM and H13000 derived depth contours shows that the 3, 5, and 10-fathom depth contours were generally inshore of the ENC positions (Figure 28). This ENC does contain a 50-fathom depth curve, which agrees with the Raster Navigational Chart (RNC) 50-fathom depth curve and generally agrees with the H13000 50-fathom depth contour. Otherwise, the soundings found from H13000 generally agreed with those of ENC US4AK5OM with the exception of 1-fathom shoal on the lower eastern end of the sheet 200 meters offshore (Figure 29). The Coast Pilot (CP9-CH5-238-371) provides detailed instructions on navigating the H13000 south western most corner, recommending to stay ~367 meters offshore.

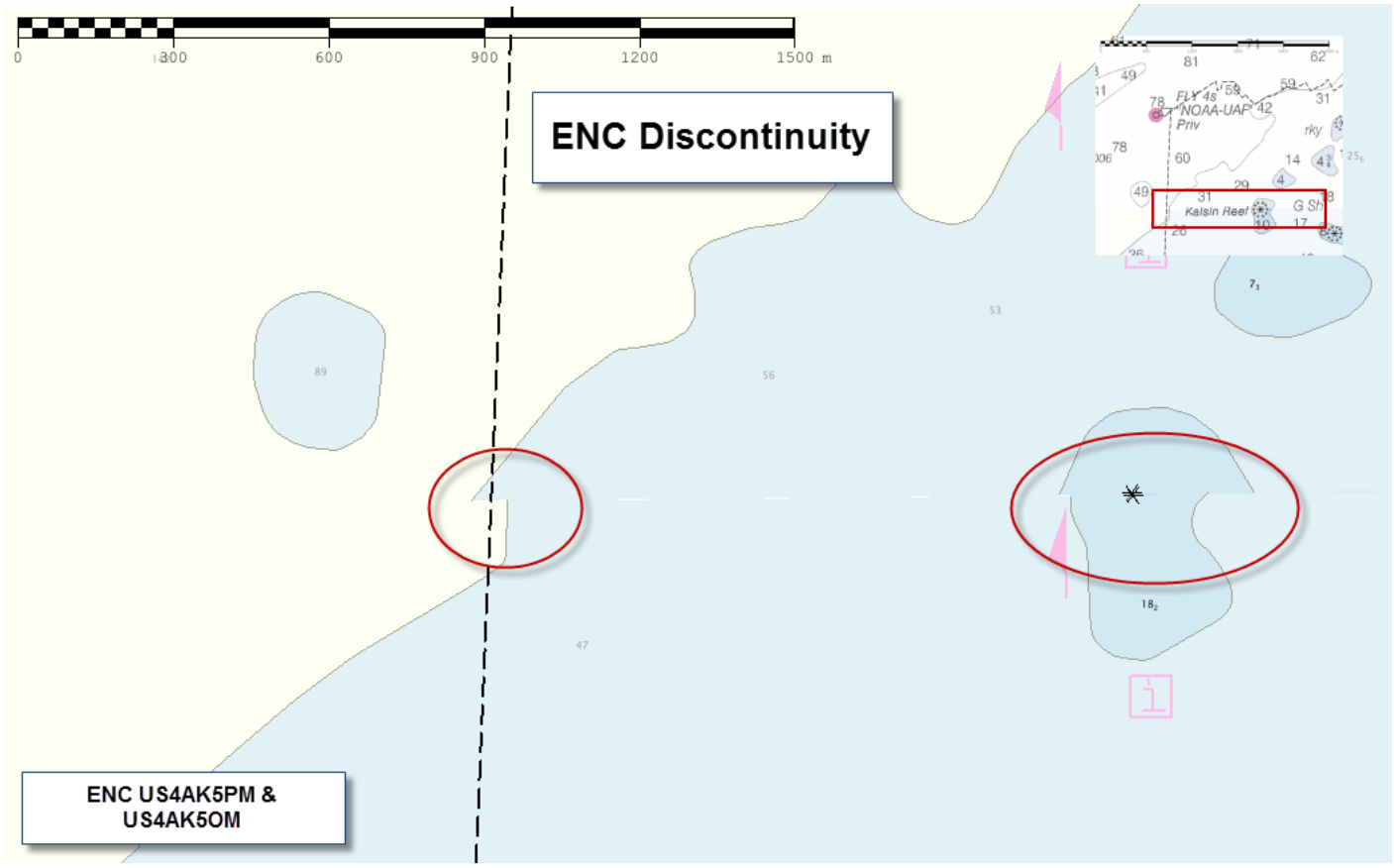


Figure 27: ENC Discontinuity. Red circles identify areas with positional offsets between ENCs of approximately 40 to 90 meters within the H13000 survey area.

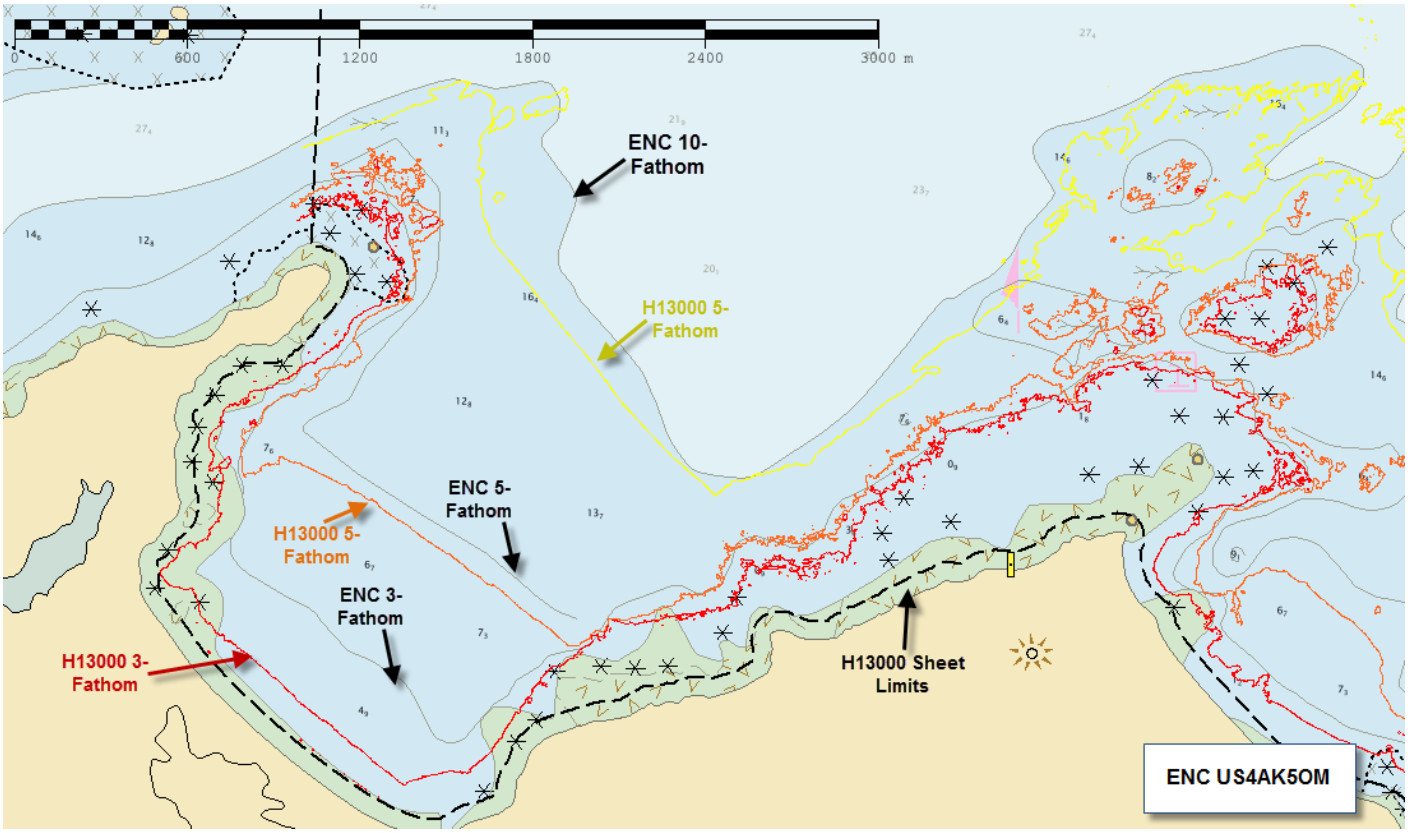


Figure 28: ENC US4AK5OM overlaid with H13000 derived contours.

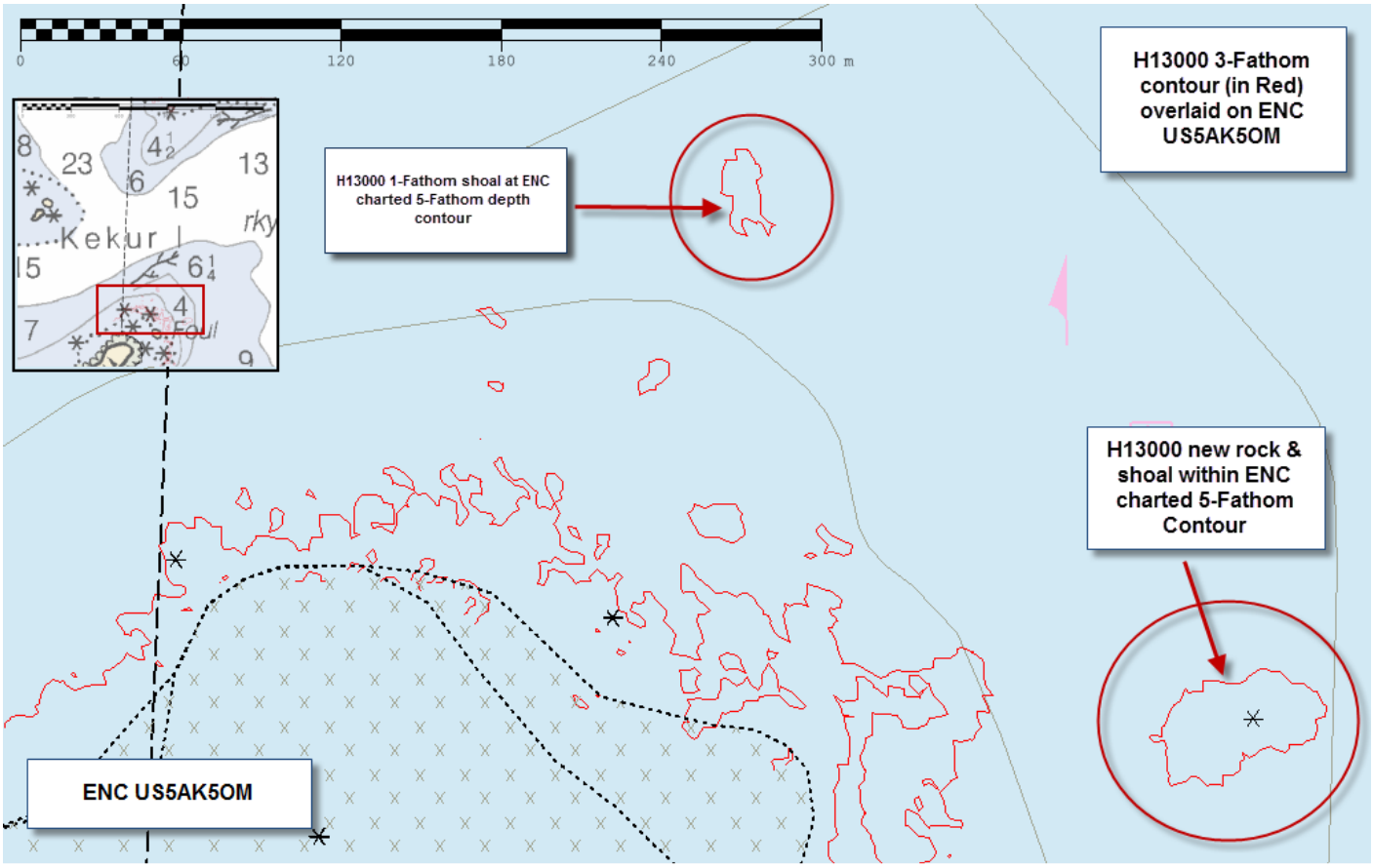


Figure 29: H13000 3-fathom depth contours (in red) overlaid on ENC US4AK5OM showing discrepancies between survey data and the chart, including soundings. The 1-fathom shoal area is located 200 meters offshore.

US5AK5EM

ENC US5AK5EM overlays with the extreme northwest corner of H13000 survey data.

The 50-fathom contour derived from H13000 agreed well with the corresponding ENC depth curve, with the H13000 contour slightly inshore of its charted position. Surveyed soundings compared well with the depths charted on ENC US5AK5EM. Significant differences are noted below (Figure 30).

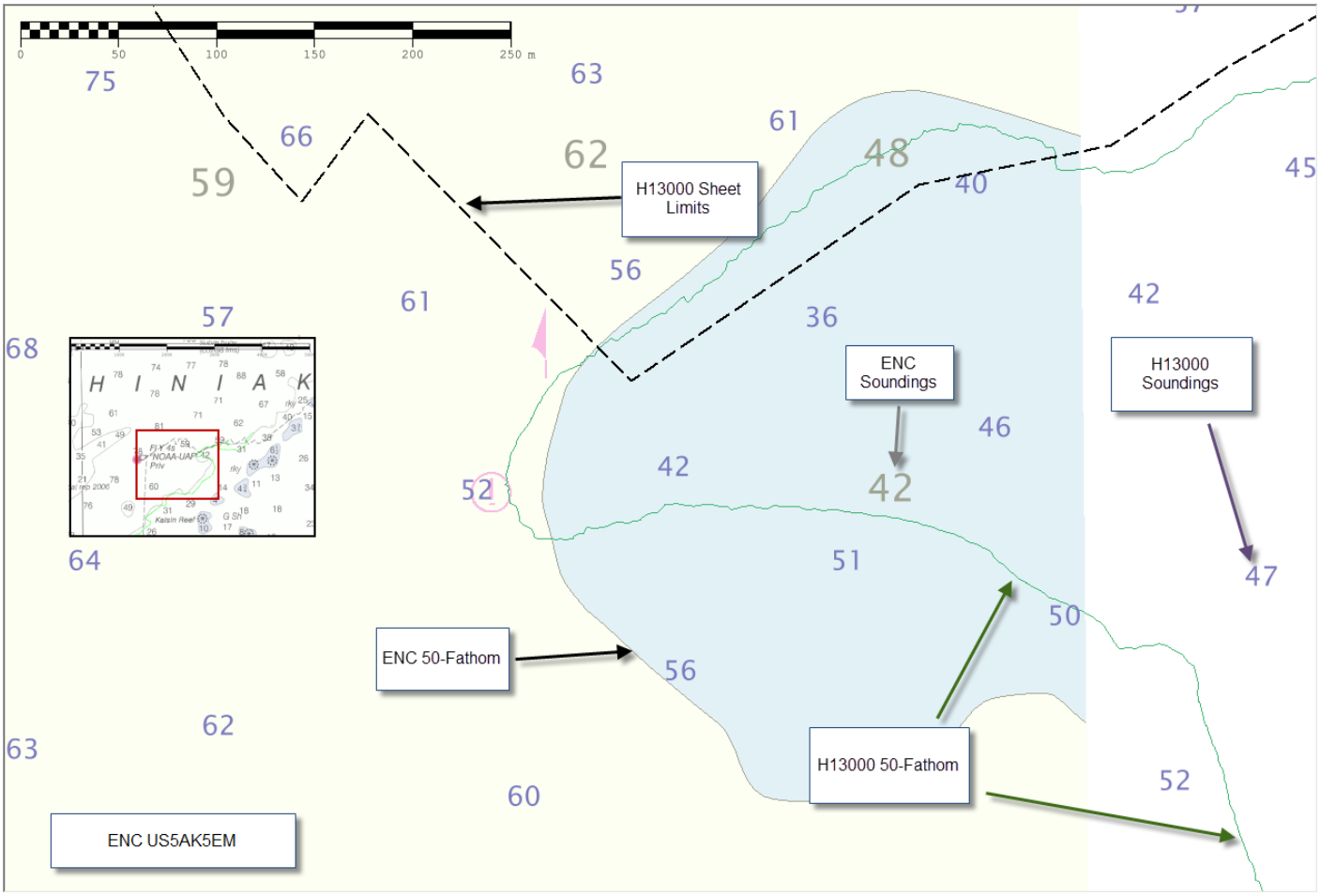


Figure 30: In the northwestern corner of H13000, there is significant disagreement between the surveyed soundings and contours and the charted ENC US5AK5EM 50-fathom curve.

D.1.2 Maritime Boundary Points

No Maritime Boundary Points were assigned for this survey.

D.1.3 Charted Features

No charted features with the label PA,ED,PD,or REP exist for this survey.

D.1.4 Uncharted Features

No uncharted features exist for this survey.

D.1.5 Shoal and Hazardous Features

Features of navigational significance are discussed in the chart comparison section above or are included in the H13000 Final Feature File submitted with this report.

D.1.6 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.1.7 Bottom Samples

Bottom sampling was conducted in the five assigned locations. Refer to the results included in the H13000 Final Feature File submitted with this report.

D.2 Additional Results

D.2.1 Shoreline

Limited shoreline verification was conducted in the accordance with applicable section of NOAA HSSD and FPM using the Project Reference File (PRF) and Composite Source File (CSF) provided with the project instructions. In the field, all assigned features that were safe to approach, were addressed as required with S-57 attribution and recorded in the H13000_Final_Feature_File (FFF), to best represent the features at chart scale. This file also includes new features found in the field as well as recommendations to update, retain or delete assigned features.

D.2.2 Prior Surveys

No prior survey comparisons exist for this survey.

D.2.3 Aids to Navigation

Two ATONs were investigated during shoreline verification. Humpback Rock lighted buoy is charted accurately and serving its intended purpose (Figure 31).

A assigned beacon shaped as a stake, pole, perch or post located on the Northwest side of Midway Point (57.62639'N 152.2761'W), was investigated and not observed; recommend to remove from chart.

Figure 31: Humpback Rock lighted buoy on the eastern edge of H13000.

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 and/or Environmental Conditions

No Significant Features 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 Recommendation

Some offshore rocks between Isthmus Point and Humpback Rock, including Kalsin Reef, were not investigated (Figure 32). Due to unsafe conditions and logistical reasons, least depths were not obtained at these locations. In these cases, an underwater rock of unknown depth has been retained or added to the Final Feature File.

The hydrographer recommends utilizing a shallow draft survey vessel to fully survey these areas.

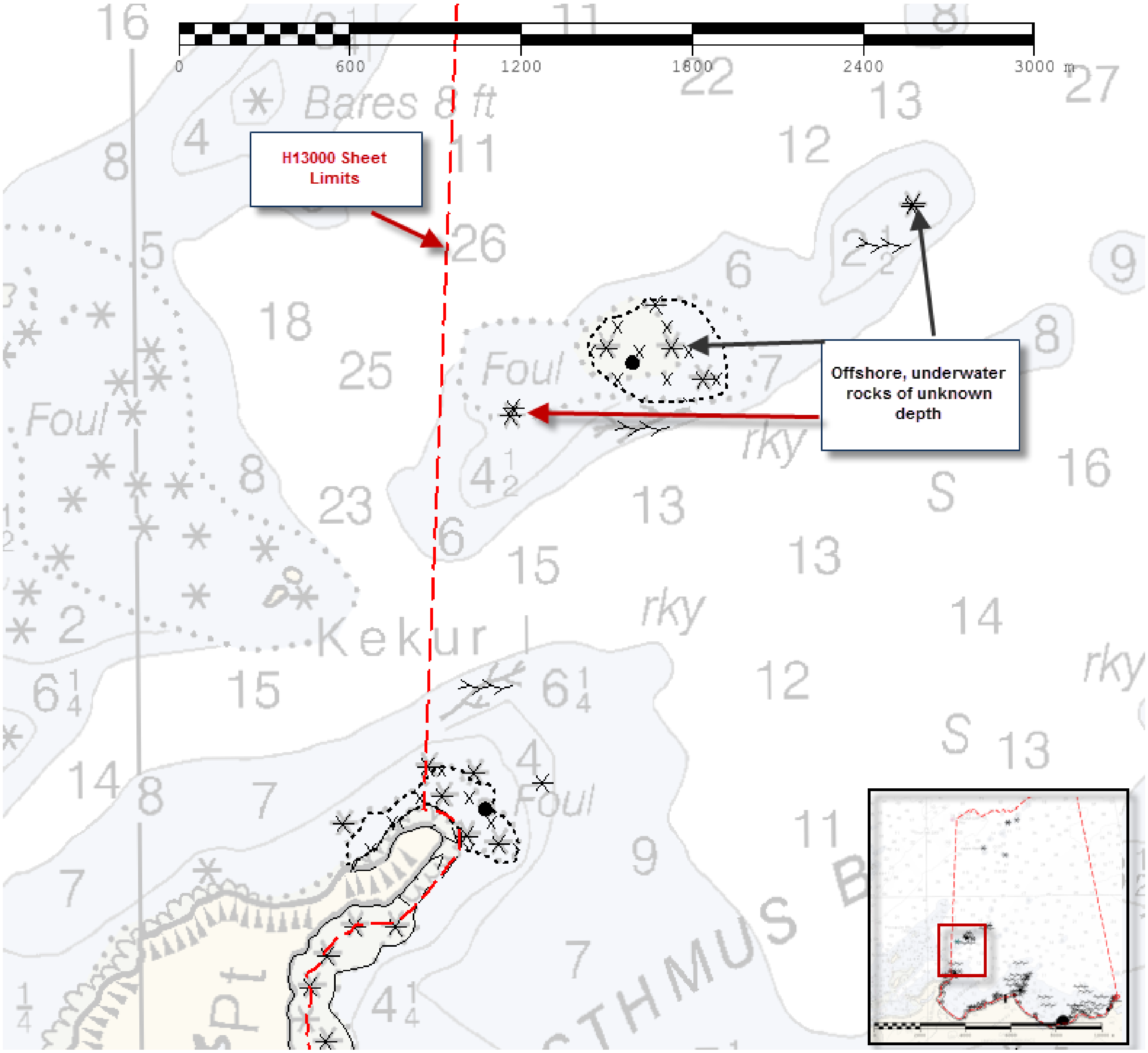


Figure 32: Offshore, unknown least depth rocks off Isthmus Point.

D.2.11 Inset Recommendation

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 and Specifications Deliverables Manual, 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
John J. Lomnicky, CDR/NOAA	Commanding Officer, NOAA Ship RAINIER	06/20/2018	Digitally signed by EVANS.BENJAMIN.K.1237217094 Date: 2018.06.22 08:57:41 -07'00'
Scott E. Broo, LT/NOAA	Field Operations Officer, NOAA Ship RAINIER	06/20/2018	Digitally signed by BROO.SCOTT.EDWARD.1396599976 Date: 2018.06.20 17:49:43 -08'00'
James B. Jacobson	Chief Survey Technician, NOAA Ship RAINIER	06/20/2018	JACOBSON.JAMES.BRYAN.1269664017 I have reviewed this document 2018.06.20 16:11:05 -08'00'
Michelle M. Levano, LTJG/NOAA	Sheet Manager, NOAA Ship RAINIER	06/20/2018	Digitally signed by LEVANO.MICHELLE.MARIE.1516645888 Date: 2018.06.20 18:53:24 -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	Continually Operating Reference Staiton
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
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
HSSD	Hydrographic Survey Specifications and Deliverables

Acronym	Definition
HSTP	Hydrographic Systems Technology Programs
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
NAIP	National Agriculture and Imagery Program
NALL	Navigable Area Limit Line
NM	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
PST	Physical Science Technician
RNC	Raster Navigational Chart
RTK	Real Time Kinematic
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
TPE	Total Propagated Error
TPU	Topside Processing Unit
USACE	United States Army Corps of Engineers
USCG	United Stated Coast Guard
UTM	Universal Transverse Mercator
XO	Executive Officer
ZDA	Global Positiong System timing message
ZDF	Zone Definition File

UNITED STATES DEPARMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Ocean Service
Silver Spring, Maryland 20910

PROVISIONAL TIDE NOTE FOR HYDROGRAPHIC SURVEY

DATE : August 07, 2017

HYDROGRAPHIC BRANCH: Pacific
HYDROGRAPHIC PROJECT: OPR-P136-RA-2017
HYDROGRAPHIC SHEET: H13000
LOCALITY: Isthmus Bay, Kodiak Island, AK
TIME PERIOD: May 13 - June 30, 2017

TIDE STATION USED: 9457292 Kodiak Island, AK
Lat. 57° 43.8'N Long. 152° 30.8' W
PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters
HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 2.400 meters

REMARKS: RECOMMENDED GRID Please use the TCARI grid "P136RA2017.tc" as the final grid for project OPR-P136-RA-2017, H13000, during the period between May 13 and June 30, 2017.

Refer to attachments for zoning information.

Note 1: Provided time series data are tabulated in metric units(meters), relative to MLLW and on Greenwich Mean Time on the 1983-2001 National Tidal Datum Epoch (NTDE).

Note 2: Annual leveling for Kodiak Island, AK (9457292) was not completed in FY17. A review of the verified leveling records from May 2006 - May 2016 shows the tide station benchmark network to be stable within an allowable 0.009 m tolerance. This Tide Note may be used as final stability verification for survey OPR-P136-RA-2017, H12998. CO-OPS will immediately provide a revised Tide Note should subsequent leveling records indicate any benchmark network stability movement beyond the allowable 0.009 m tolerance.

Note 3: Due to inaccurate shoreline around Middle Bay, AK, survey track lines fall outside of the TCARI grid boundaries in some areas. TCARI will extrapolate the tide corrector to cover these soundings

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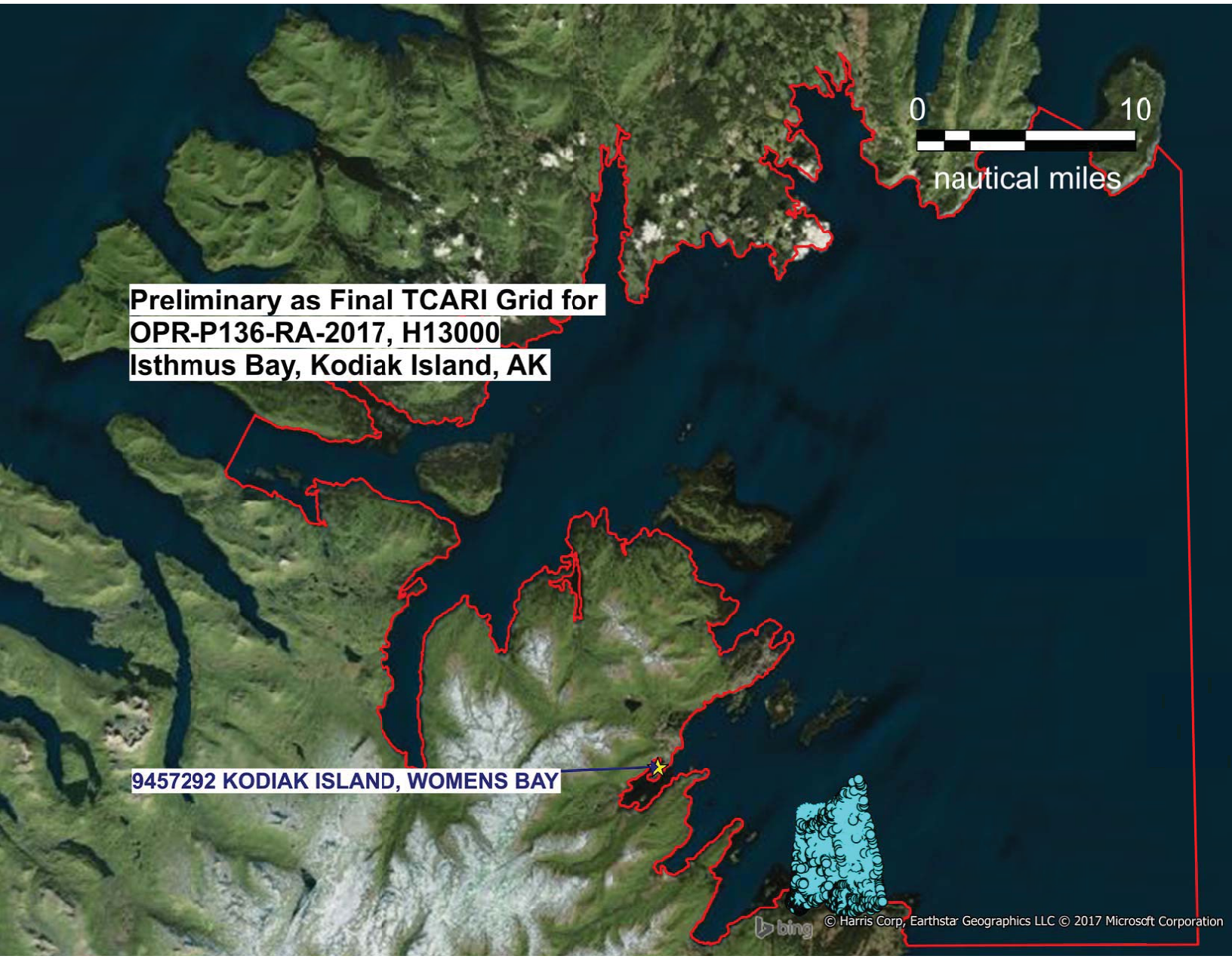
Date: 2017.08.11 10:20:36 -04'00'

CHIEF, OCEANOGRAPHIC DIVISION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nautical miles
Preliminary as Final TCARI Grid for
OPR-P136-RA-2017, H13000
Isthmus Bay, Kodiak Island, AK
9457292 KODIAK ISLAND, WOMENS BAY
bing
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APPROVAL PAGE

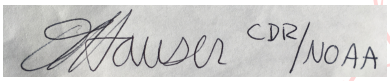
H13000

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 products

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.

Approved:  HAUSER.OLIVIA.A.1275636009
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CDR Olivia Hauser, NOAA
Chief, Pacific Hydrographic Branch