H12996

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

DESCRIPTIVE REPORT

Type of Survey:	Navigable Area
Registry Number:	H12996

LOCALITY

State(s):	Alaska
General Locality:	Kodiak Island, AK
Sub-locality:	South of Spruce Island

2017

CHIEF OF PARTY
John J. Lomnicky, CDR/NOAA

LIBRARY & ARCHIVES

Date:

U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION	REGISTRY NUMBER:
HYDROGRAPHIC TITLE SHEET	**H12996**

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:	**South of Spruce Island**
Scale:	**40000**
Dates of Survey:	**04/27/2017 to 07/02/2017**
Instructions Dated:	**03/09/2017**
Project Number:	**OPR-P136-RA-17**
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 H12996

Project: OPR-P136-RA-17

Locality: Kodiak Island, AK

Sublocality: South of Spruce Island

Scale: 1:40000

April 2017 - July 2017

NOAA Ship *Rainier*

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

A. Area Surveyed

The survey area is referred to as "South of Spruce Island" (Sheet 1) within the Project Instructions. The survey area encompassed 19.45 square nautical miles extending from Kodiak Island's Azimuth Point to the area of Williams Reef to include Pelenga Bay, Monashka Bay, Mill Bay, Spruce Cape, and environs (Figure 1).

A.1 Survey Limits

Data were acquired within the following survey limits:

Northwest Limit	Southeast Limit
57° 51' 52" N 152° 26' 32" W	57° 48' 18" N 152° 11' 48" W

Table 1: Survey Limits

Survey data were acquired within survey limits as required in the Project Instructions and the Hydrographic Surveys Specifications and Deliverables (HSSD) unless otherwise noted in this report.

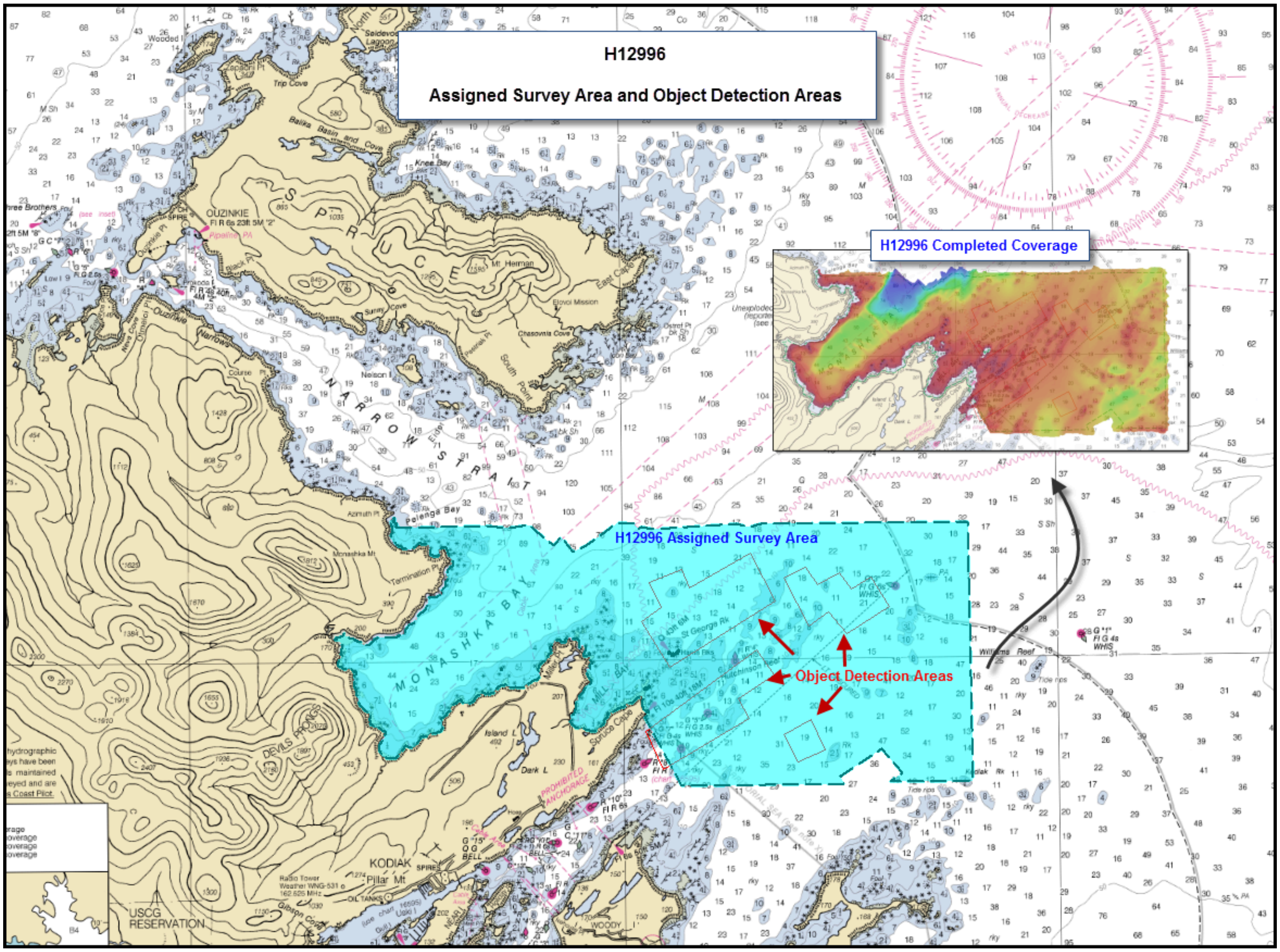


Figure 1: H12996 Assigned Survey Area

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 515 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 submerged pinnacles that exist in this area. The navigation of this area is further complicated by the number of vessels trying to enter and exit the Port of Kodiak via a choke point located at the channel entrance buoy. In recent years a number of groundings in and around the area have occurred, the most famous being a 174 foot long 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 H12996 multibeam echosounder (MBES) data density for a "Complete Coverage" (CC) finalized VR surface over the full extent of the assigned survey area. Additionally, an "Object Detection" (OD) finalized VR surface was analyzed for an area encompassing four designated S57 coverage areas. Both the "Complete Coverage" and the "Object Detection" VR surfaces met HSSD density requirements (Figures 2 and 3).

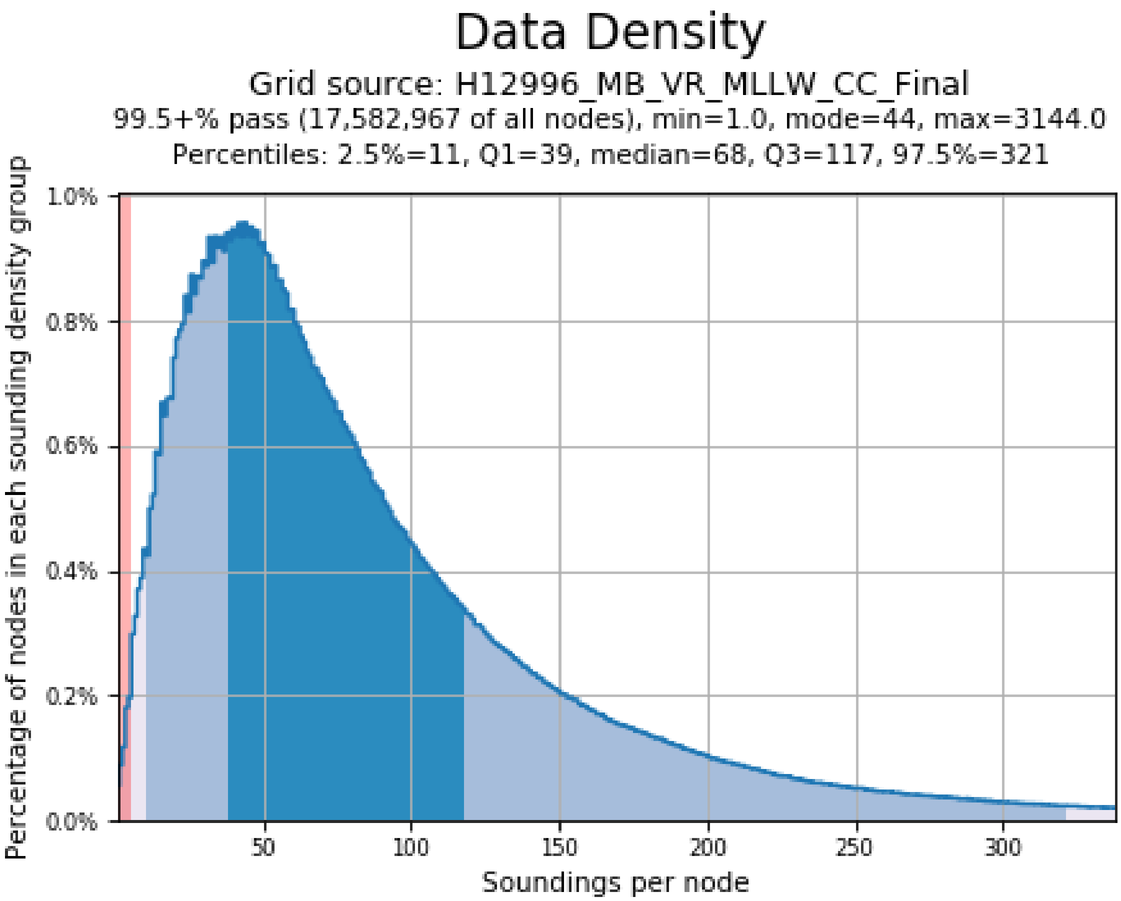


Figure 2: Pydro derived histogram plot showing HSSD compliance of H12996 complete coverage (CC) MBES data within the VR CUBE surface.

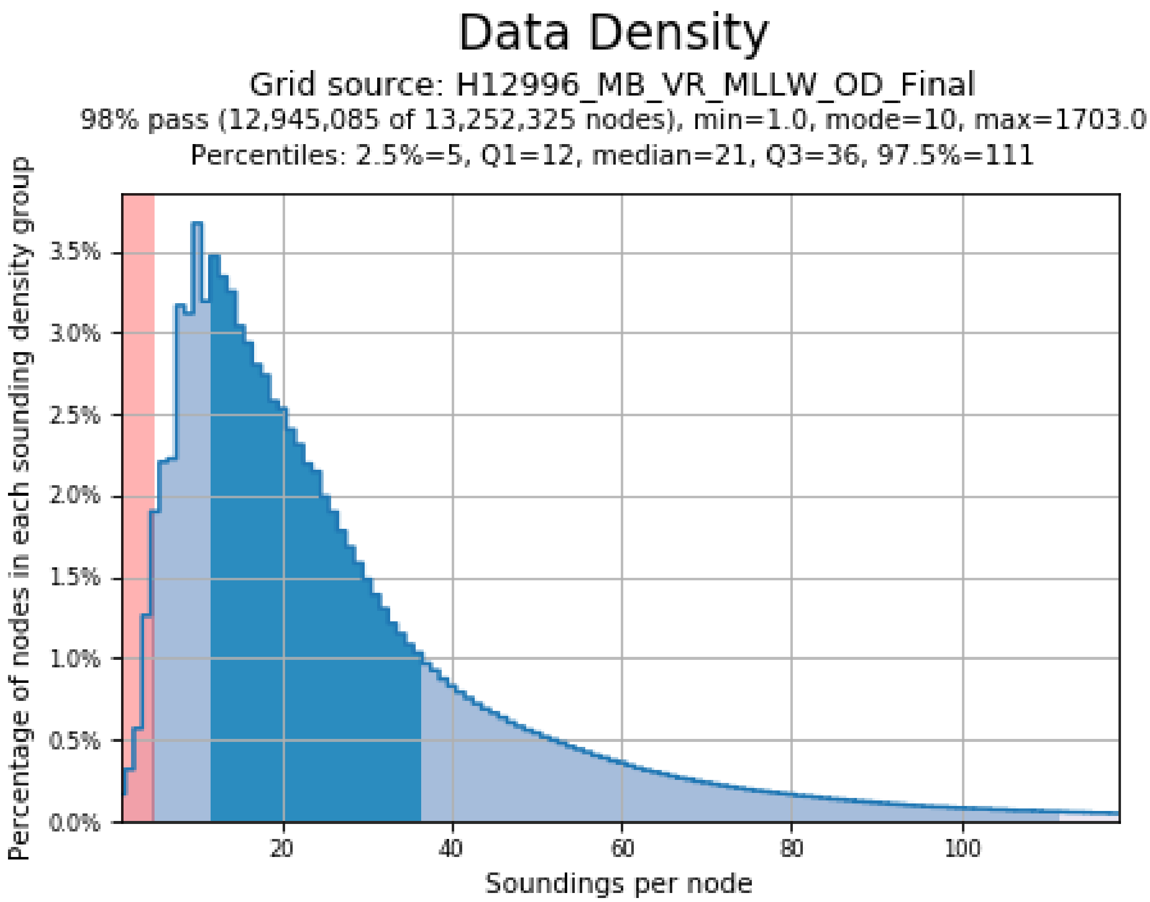


Figure 3: Pydro derived histogram plot showing HSSD compliance of H12996 object detection (OD) MBES data within the VR CUBE surface.

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 cvrage areas	Complete Coverage (refer to HSSD Section 5.2.2.3). Note: All MBES acquisition requires backscatter acquisition (refer to HSSD Section 6.2)
H12997 and designated S-57 cvrage areas	Object Detection Coverage (refer to HSSD Section 5.2.2.2). Note: All MBES acquisition requires backscatter 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 4-meter depth contour or the assigned sheet limits were determined to be the safe inshore extent for survey launch navigation due to the presence of dangerous wave action and/or rocks. This occurred in the vicinity of Termination Point (Figure 4), Spruce Cape (Figure 5), Hanin Rocks (Figure 6), and Miller Point (Figure 7).

Within the boundaries of the Object Detection surface, 578 holidays were discovered after the field unit left the survey area. These holidays generally occur in the deepest part of the 0.5 meter and 1 meter surfaces (Figure 8). The majority of these holidays were caused by the effects of the sea state on vessel motion (yaw and pitch) which resulted in data density not being achieved for Object Detection requirements. In the extreme cases these holidays are one to three nodes long (along track) and three or more nodes wide (across track) in area (Figure 9).

These holidays were missed during acquisition quality control checks due to incorrect CUBE parameters being used for BASE surface creation in Caris HIPS version 10.2. Due to the use of default CUBE parameters being used in the creation of the Object Detection surfaces, the search radius and capture distances for sounding density computations were higher than if the NOAA Object Detection Parameter had been used.

While these holidays do not meet Object Detection standards, they represent a small percentage of the overall survey area. Close inspection of the affected holiday areas was conducted in Caris HIPS Subset Editor with special attention paid to the seafloor for potential shoaling trends that could present a danger to navigation. The hydrographer recommends that this survey be processed and compiled to Object Detection Standards.

Additional MBES coverage was acquired outside of the assigned H12996 sheet limits in the vicinity of Spruce Cape for the purpose of completing coverage in the 2015 F00646 survey area. Total area of the additional coverage is 0.068 square nautical miles (Figure 10).

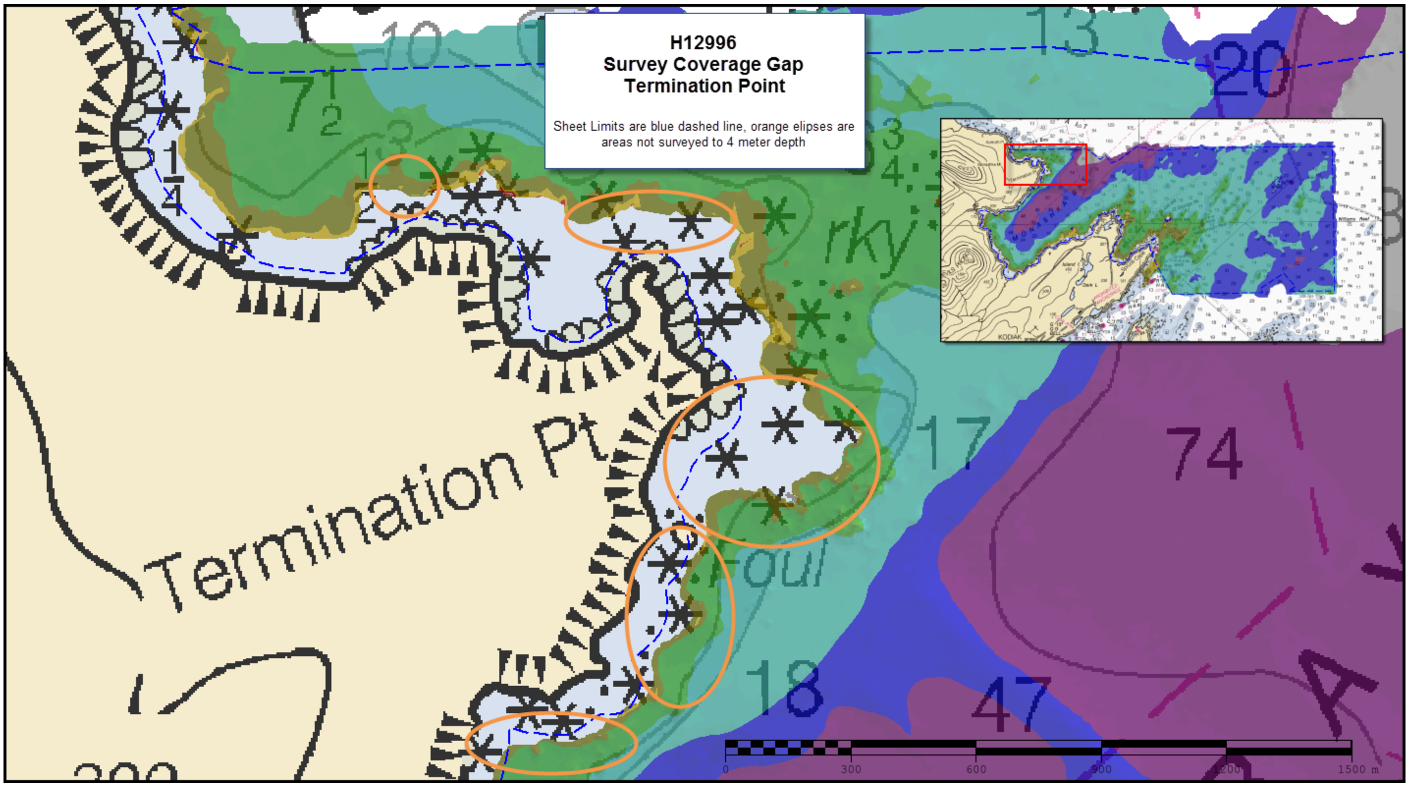


Figure 4: Survey coverage gaps near Termination Point.
Yellow coverage contour indicates 4 meter depth at MLLW.

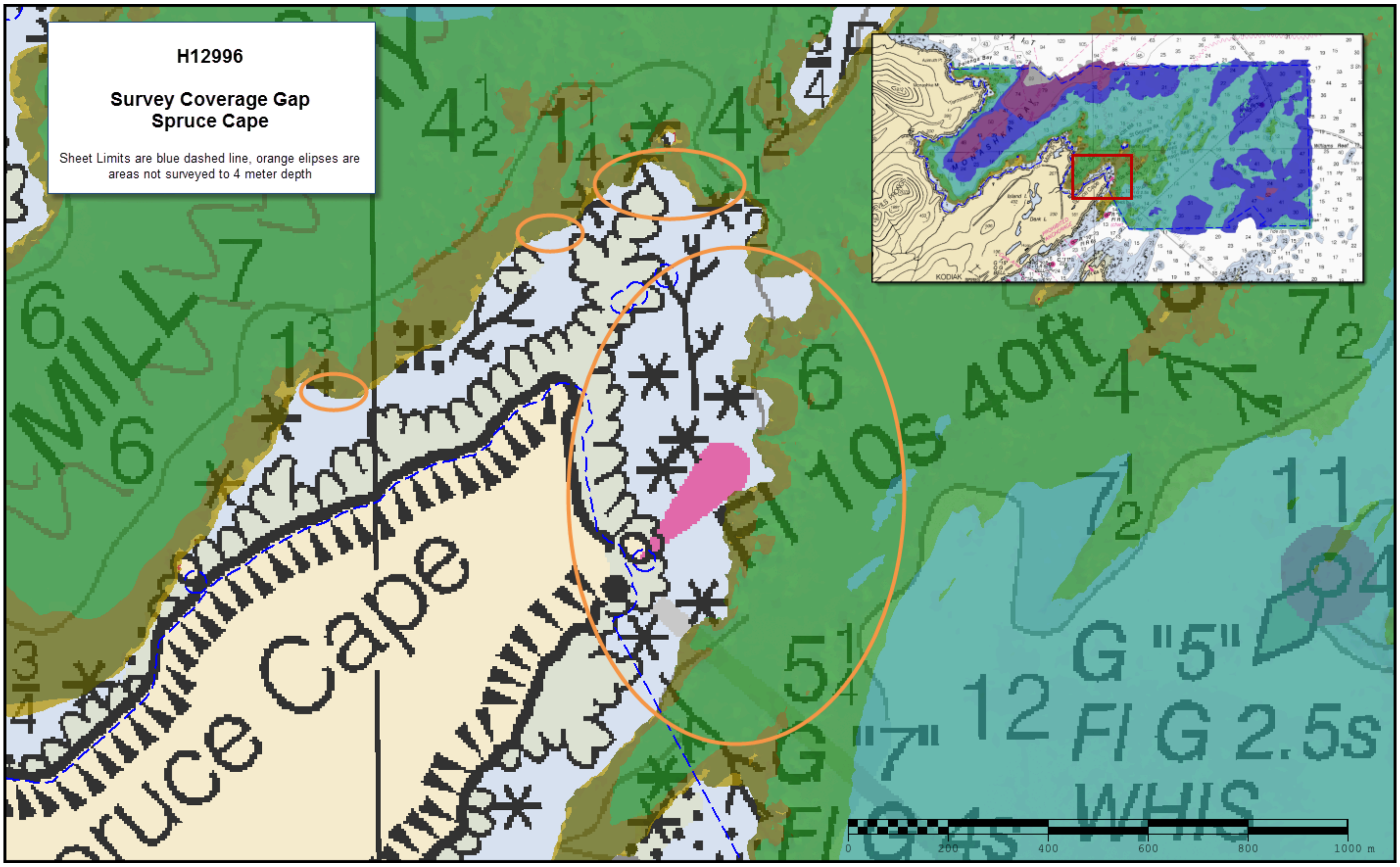


Figure 5: Survey coverage gaps near Spruce Cape. Yellow coverage contour indicates 4 meter depth at MLLW.

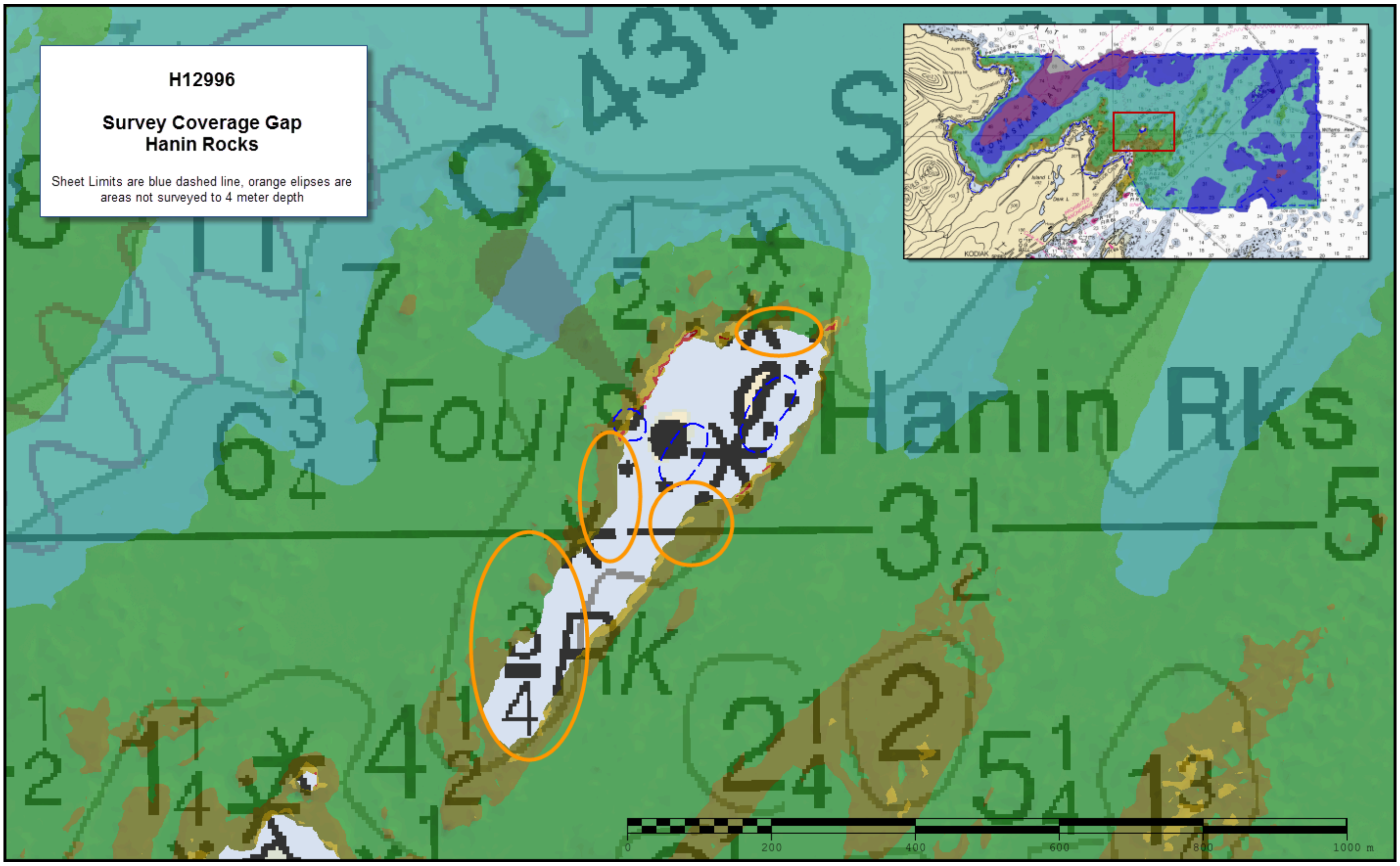


Figure 6: Survey coverage gaps near Hanin Rocks. Yellow coverage contour indicates 4 meter depth at MLLW.

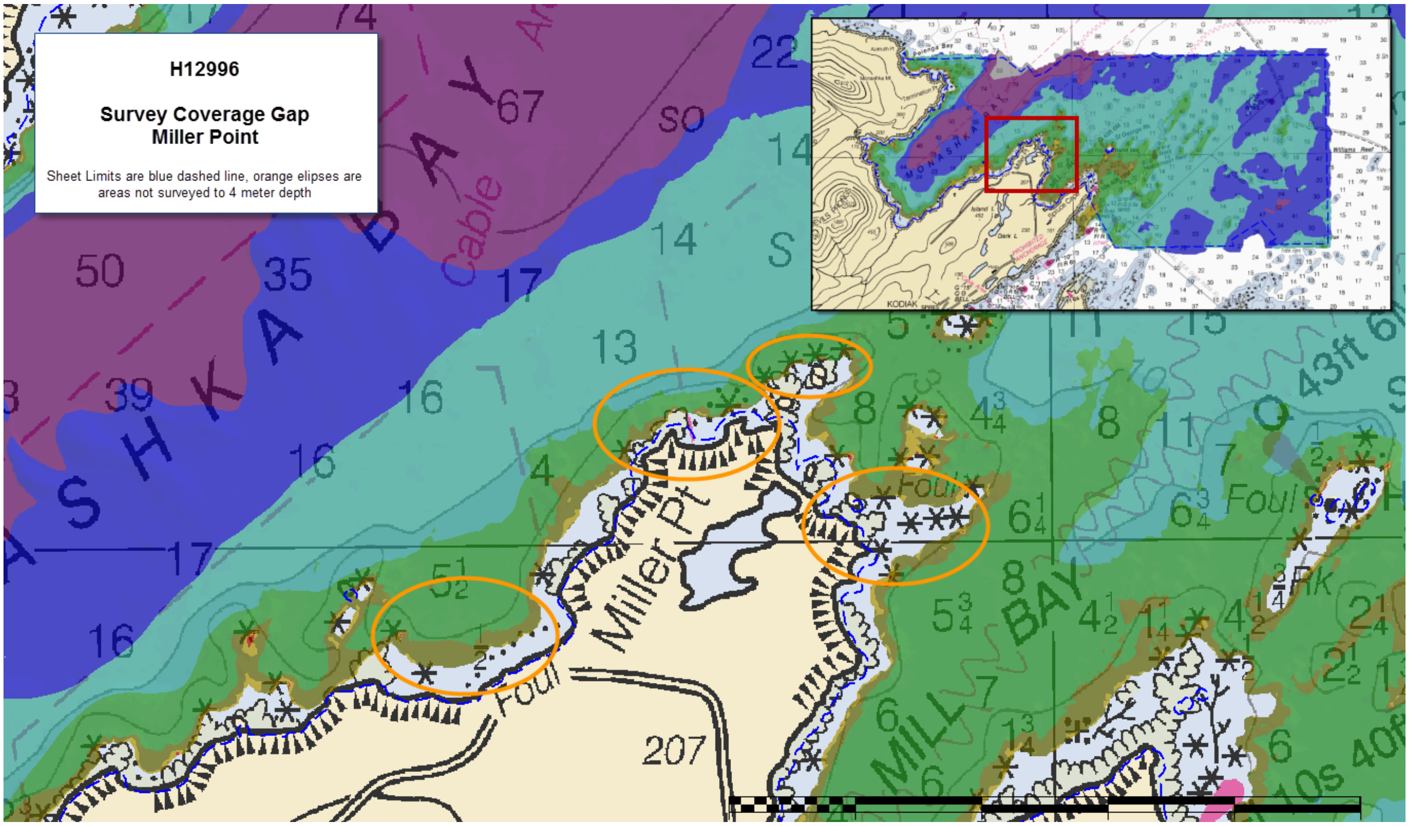


Figure 7: Survey coverage gaps near Miller Point. Yellow coverage contour indicates 4 meter depth at MLLW.

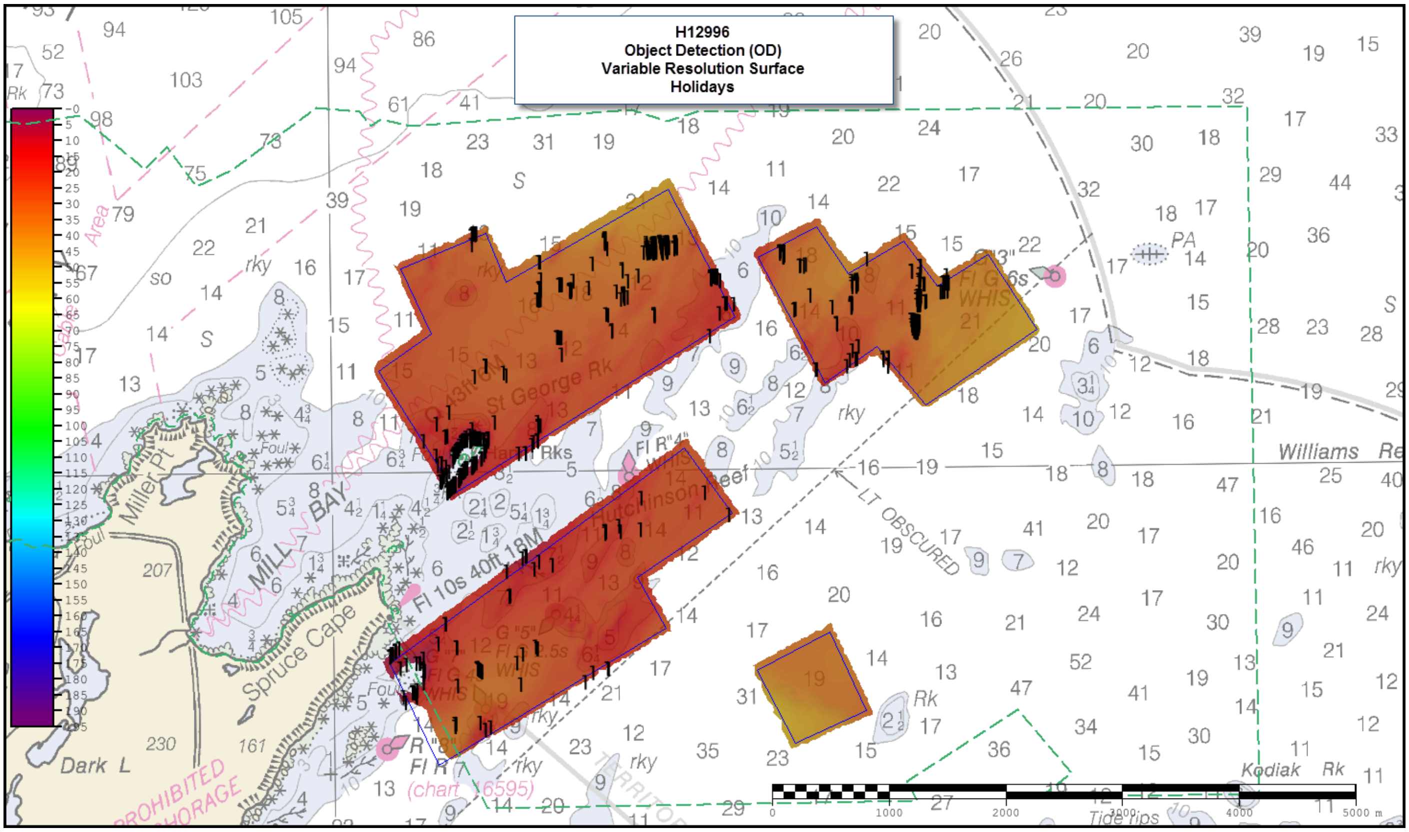


Figure 8: Object Detection (OD) Variable Resolution Surface Holidays.

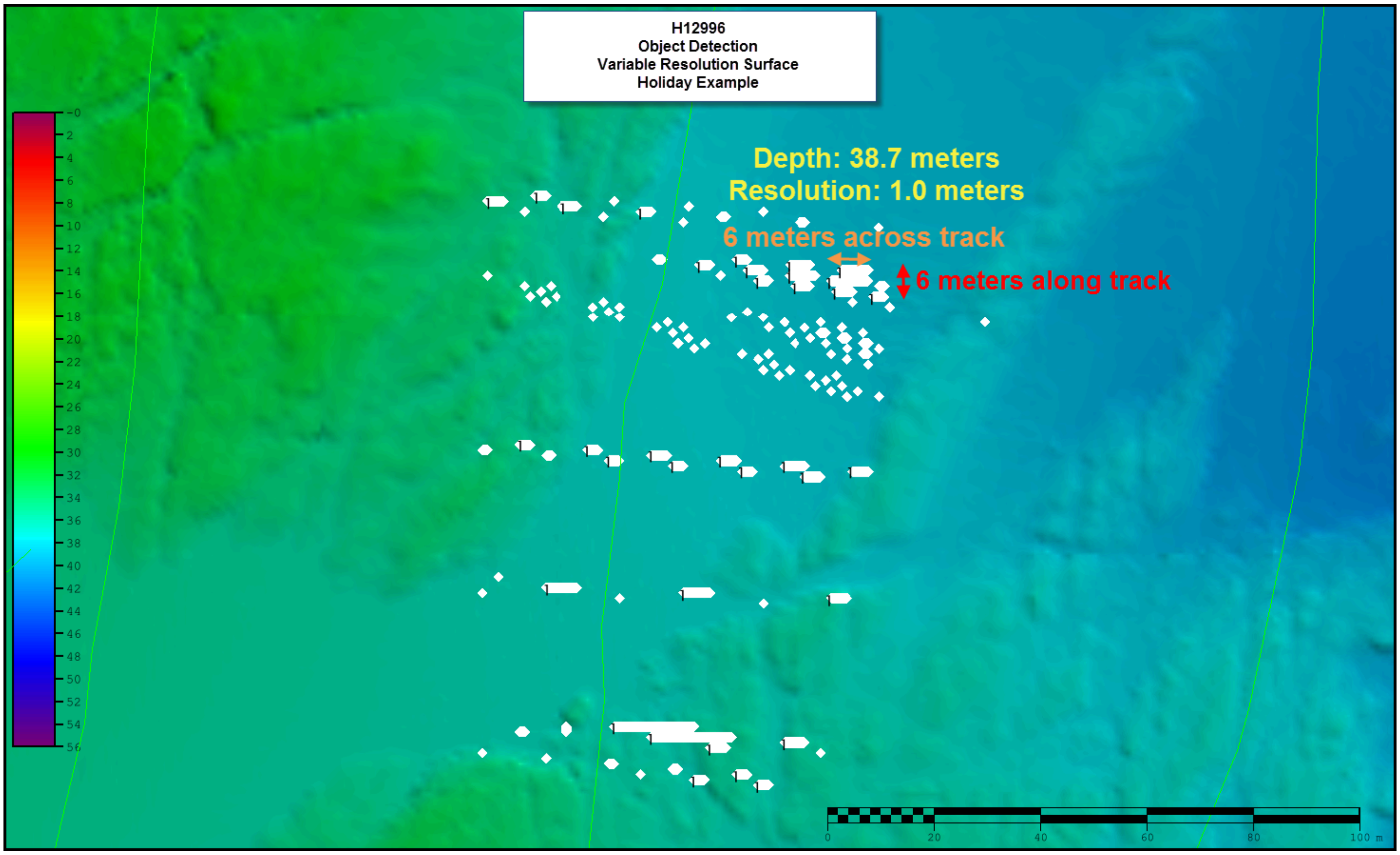


Figure 9: Object Detection (OD) Variable Resolution Surface Holiday Example.

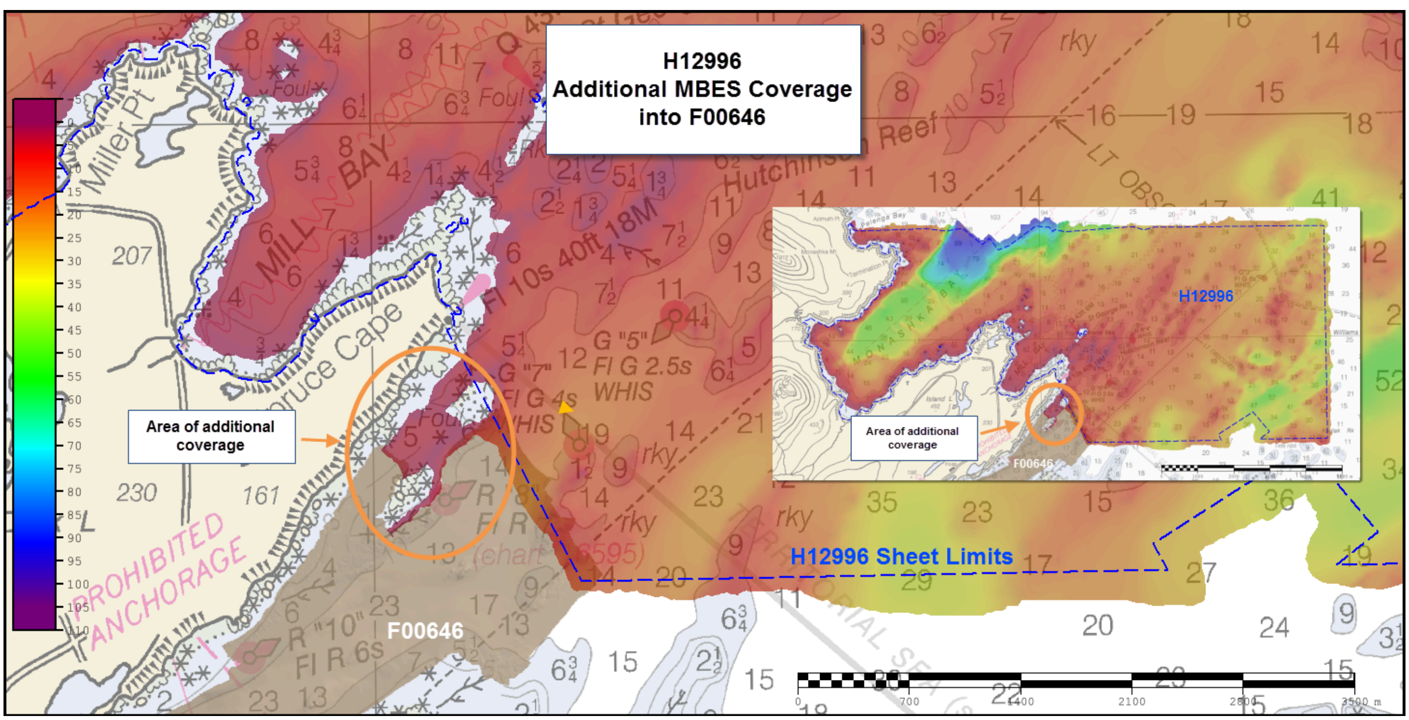


Figure 10: Additional MBES Coverage into F00646.

A.6 Survey Statistics

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

	HULL ID	*2802*	*2803*	*2804*	*Total*
LNM	SBES Mainscheme	0.0	0.0	0.0	0
	MBES Mainscheme	348.93	27.12	157.57	533.62
	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	24.43	6.55	0.0	30.98
	Lidar Crosslines	0.0	0.0	0.0	0
Number of Bottom Samples					7
Number Maritime Boundary Points Investigated					0
Number of DPs					132
Number of Items Investigated by Dive Ops					0
Total SNM					19.45

Table 3: Hydrographic Survey Statistics

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

Survey Dates	Day of the Year
04/27/2017	117
04/29/2017	119
05/01/2017	121
05/08/2017	128
05/09/2017	129
05/10/2017	130
05/11/2017	131
05/12/2017	132
05/13/2017	133
05/14/2017	134
05/15/2017	135
05/22/2017	142
05/27/2017	147
06/13/2017	164
06/20/2017	171
07/02/2017	183

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	*2802*	*2803*	*2804*	*1905*
LOA	8.8 meters	8.8 meters	8.8 meters	5.7 meters
Draft	1.1 meters	1.1 meters	1.1 meters	0.3 meters

Table 5: Vessels Used

Figure 11: Survey Launches 2802, 2804, and 2803 prepare to recover onboard NOAA ship Rainier.

Data for H12996 were acquired using survey launches 2802, 2803, 2804 (See Figure 11). The survey launches acquired MBES depth soundings, backscatter data, and sound speed profiles. Additionally, survey skiff 1905 was used to conduct all shoreline verification which entailed confirming the presence or absence of assigned features as well as measuring rock heights by visual leveling.

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
Teledyne RESON	SeaBat 7125 SV2	MBES
Teledyne RESON	Seabat 7125-B	MBES
Teledyne RESON	SVP 71	Sound Speed System
Sea-Bird Scientific	SBE 19plus	Sound Speed System

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 5.81% of mainscheme acquisition.

Crosslines acquired for this survey totaled 6.16% of mainscheme acquisition.

A total of 30.98 nautical miles of multibeam crosslines were acquired using launches 2802 (RA-5) and 2803 (RA-3) across the majority of depth ranges and boat days. The Hydrographer deems them adequate for verifying and evaluating the internal consistency of H12996 survey data. A variable resolution (VR) CUBE surface (complete coverage) was created using H12996 mainscheme only data while a second VR CUBE surface was created using only crosslines (Figure 12). Using the Pydro Explorer Gridded Surface Comparison tool (v18.1-r7749), a difference surface was created in Caris between the mainscheme and crossline surfaces. For its respective depths, the resulting difference surface was compared to IHO allowable Total Vertical Uncertainty (TVU) standards. In total, 99% of the depth differences between H12996 mainscheme and crossline data meet HSSD TVU standards (Figure 13). The analysis was performed on H12996 MBES data reduced to Mean Lower-Low Water (MLLW) using Ellipsoidally Referenced Zoned Tides (ERZT) methods. Absolute difference statistics (Figure 14) and node depth to allowable error fraction (Figure 15) results were also calculated and are included for reference.

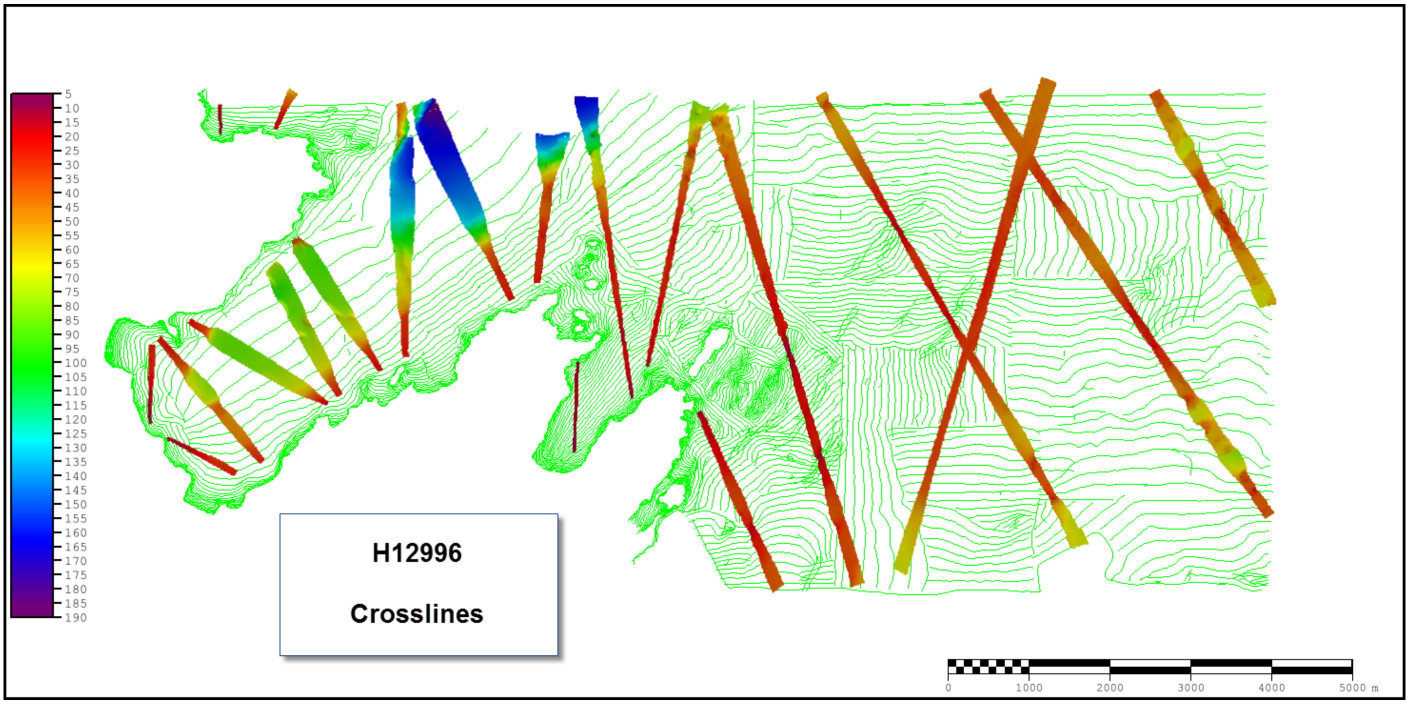


Figure 12: H12996 Crosslines

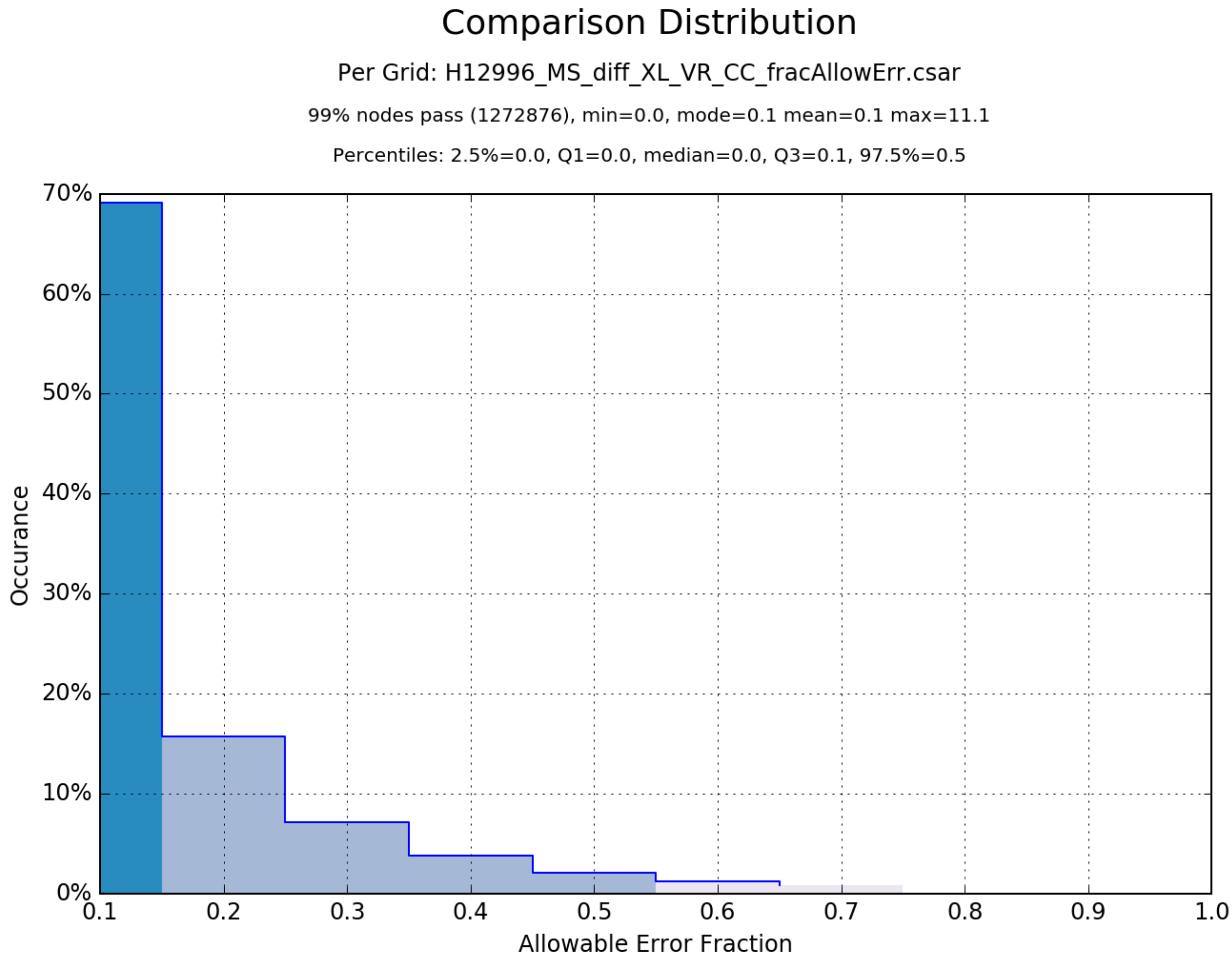
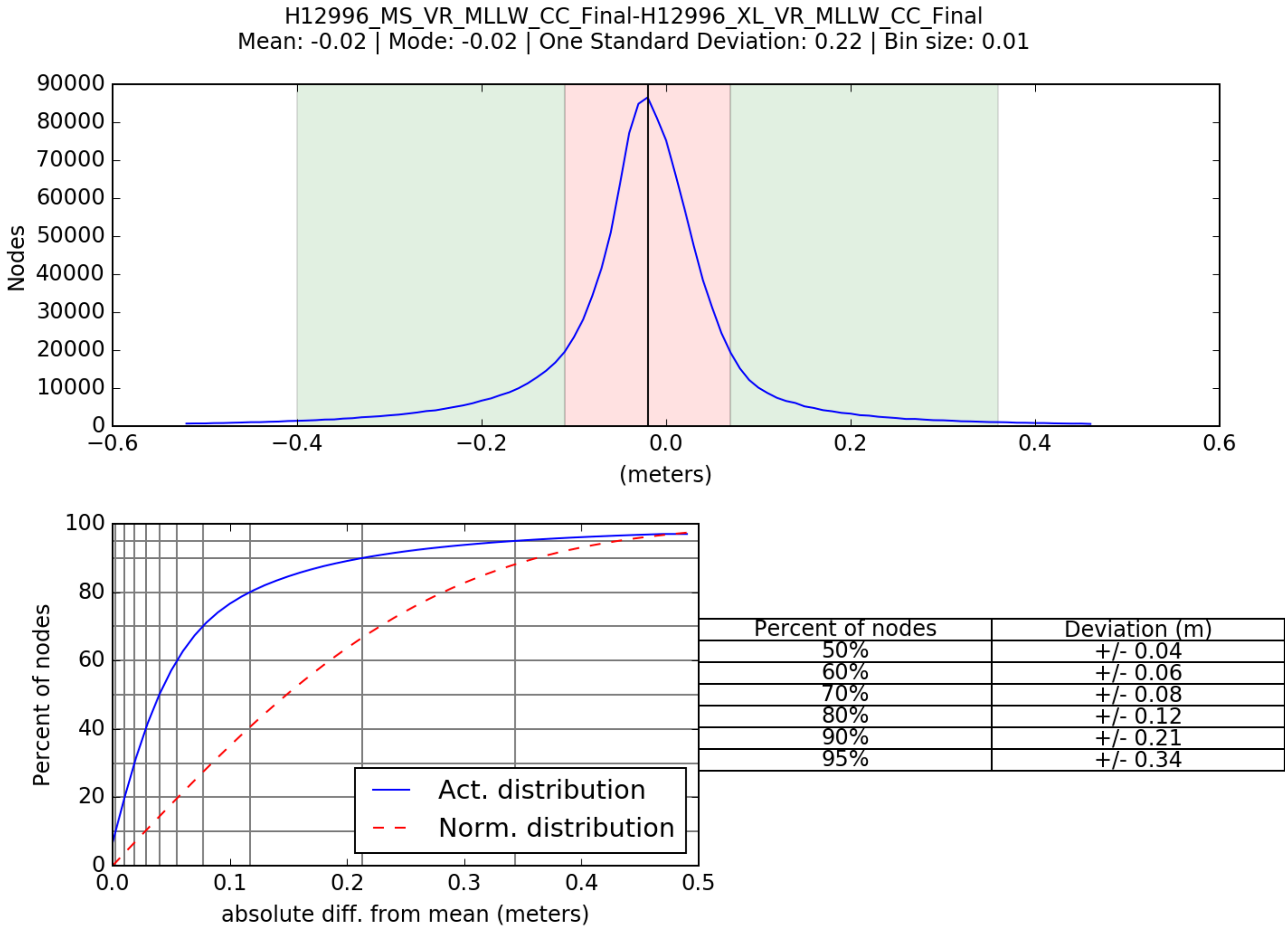


Figure 13: Pydro derived plot showing percentage-pass value of H12996 mainscheme to crossline data.



Percent of nodes	Deviation (m)
50%	+/- 0.04
60%	+/- 0.06
70%	+/- 0.08
80%	+/- 0.12
90%	+/- 0.21
95%	+/- 0.34

Figure 14: Pydro derived plot showing absolute difference statistics for H12996 mainscheme to crossline data.

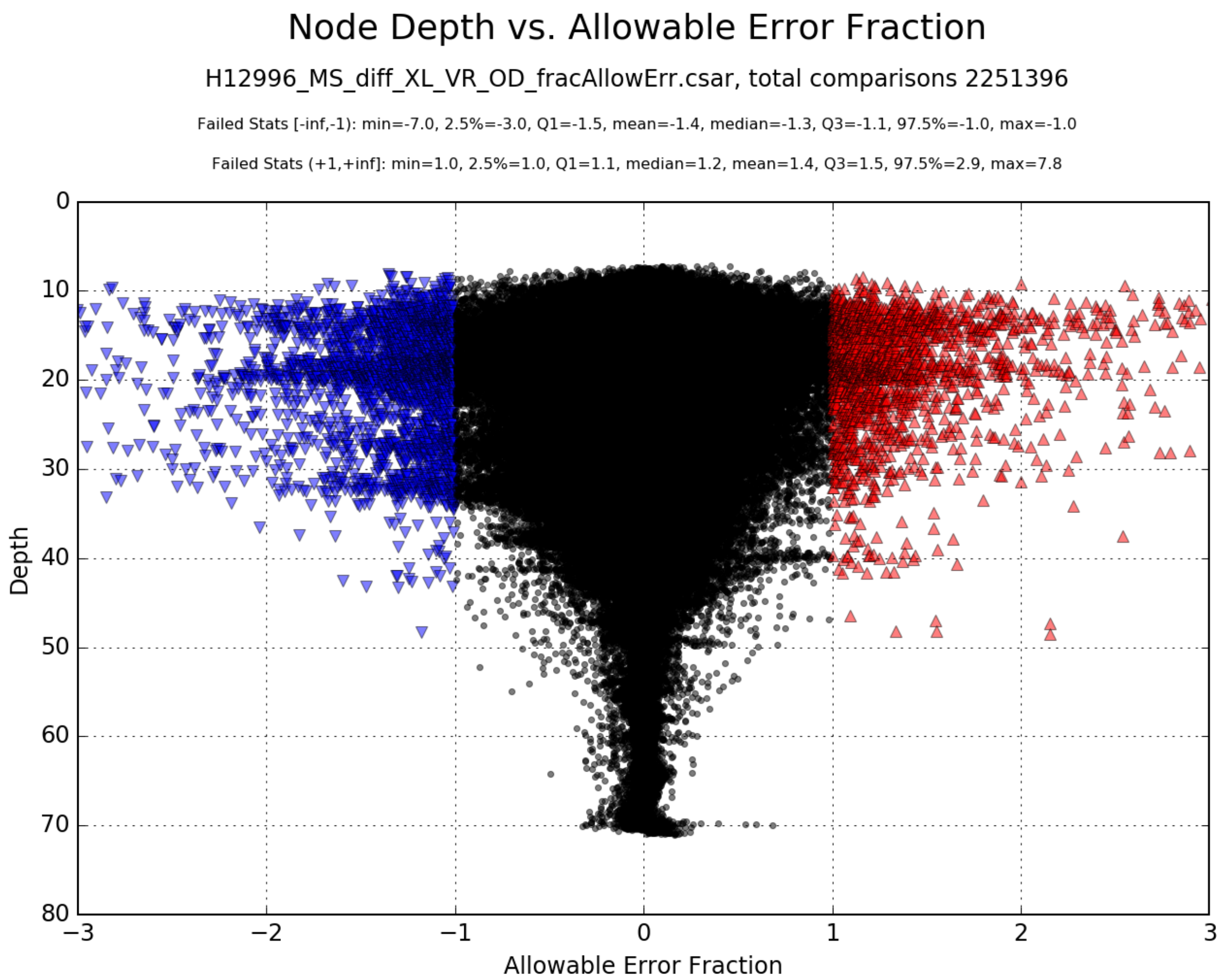


Figure 15: Pydro derived plot showing node depth vs. allowable error fraction of H12996 mainscheme to crossline data.

B.2.2 Uncertainty

The following survey specific parameters were used for this survey:

Method	Measured	Zoning
ERS via ERZT	0 meters	0.0283 meters

Table 7: Survey Specific Tide TPU Values.

Hull ID	Measured - CTD	Measured - MVP	Surface
2802	3.0 meters/second		0.15 meters/second
2803	3.0 meters/second		0.15 meters/second
2804	3.0 meters/second		0.15 meters/second

Table 8: Survey Specific Sound Speed TPU Values.

Total Propagated Uncertainty (TPU) values for H12996 were derived from a combination of fixed values for equipment and vessel characteristics, as well as field assigned values for sound speed uncertainties. Tidal uncertainties were accounted for by examining the created 1000 meter resolution separation model and statistically determining a measured uncertainty. The measured tide uncertainty value of 0.0283 meters was entered to account for ERZT processing methods. See the 2017 DAPR for further 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 Teledyne RESON 7125 SV2 and 7125-B multibeam sonars were recorded and applied during post processing. Applanix TrueHeave (POS) files, which record estimates of heave uncertainty, were also applied during post processing. The post processed uncertainties associated with vessel roll, pitch, yaw, and navigation were applied in CARIS HIPS and SIPS using SBET/RMS files generated using Applanix POSPac MMS 7.1.5 software.

Uncertainty values of submitted finalized grids were calculated in CARIS HIPS and SIPS using the "Greater of the Two" of uncertainty and standard deviation (scaled to 95%). Pydro QC Tools 2 were used to analyze H12996 TVU compliance with histogram plots of the results for both the complete coverage (CC) and object detection (OD) surfaces shown below (Figure 16 and Figure 17).

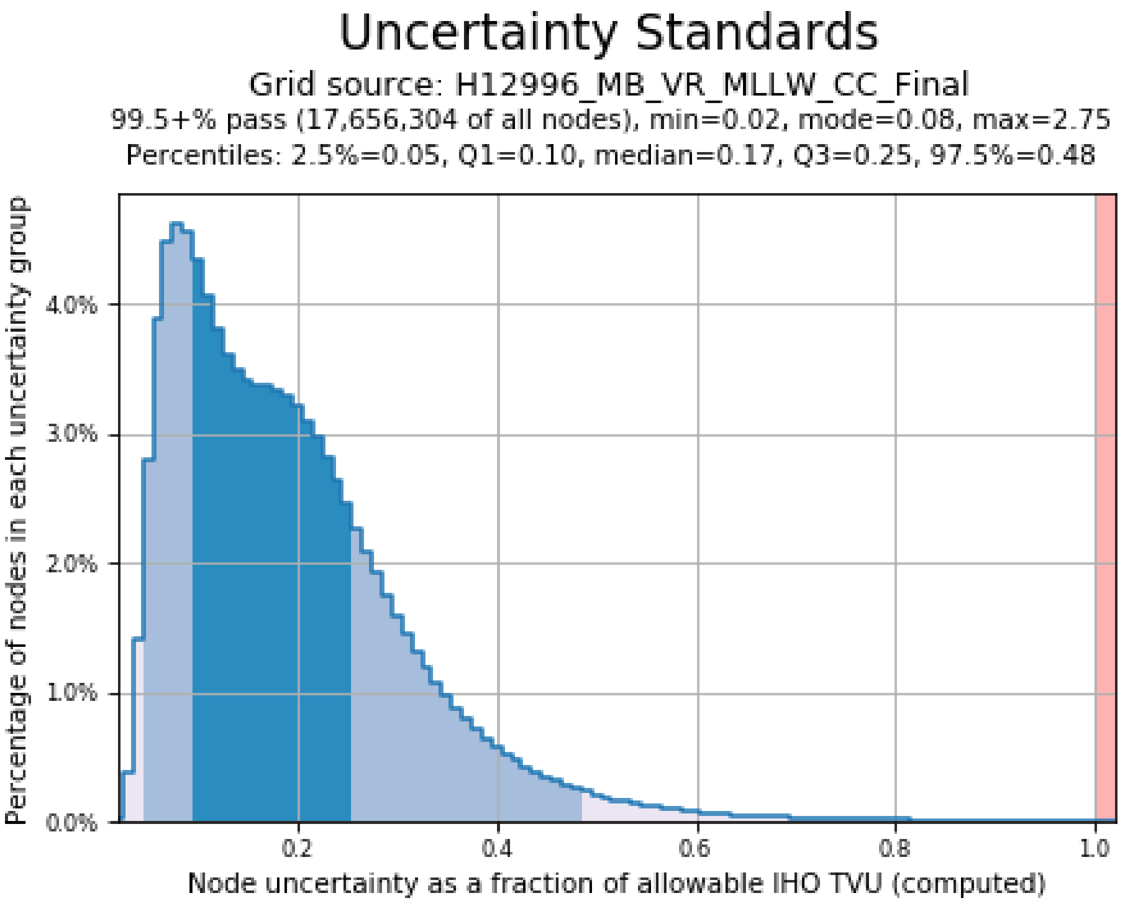


Figure 16: Pydro derived histogram plot showing TVU compliance of H12996 finalized complete coverage variable resolution MBES data.

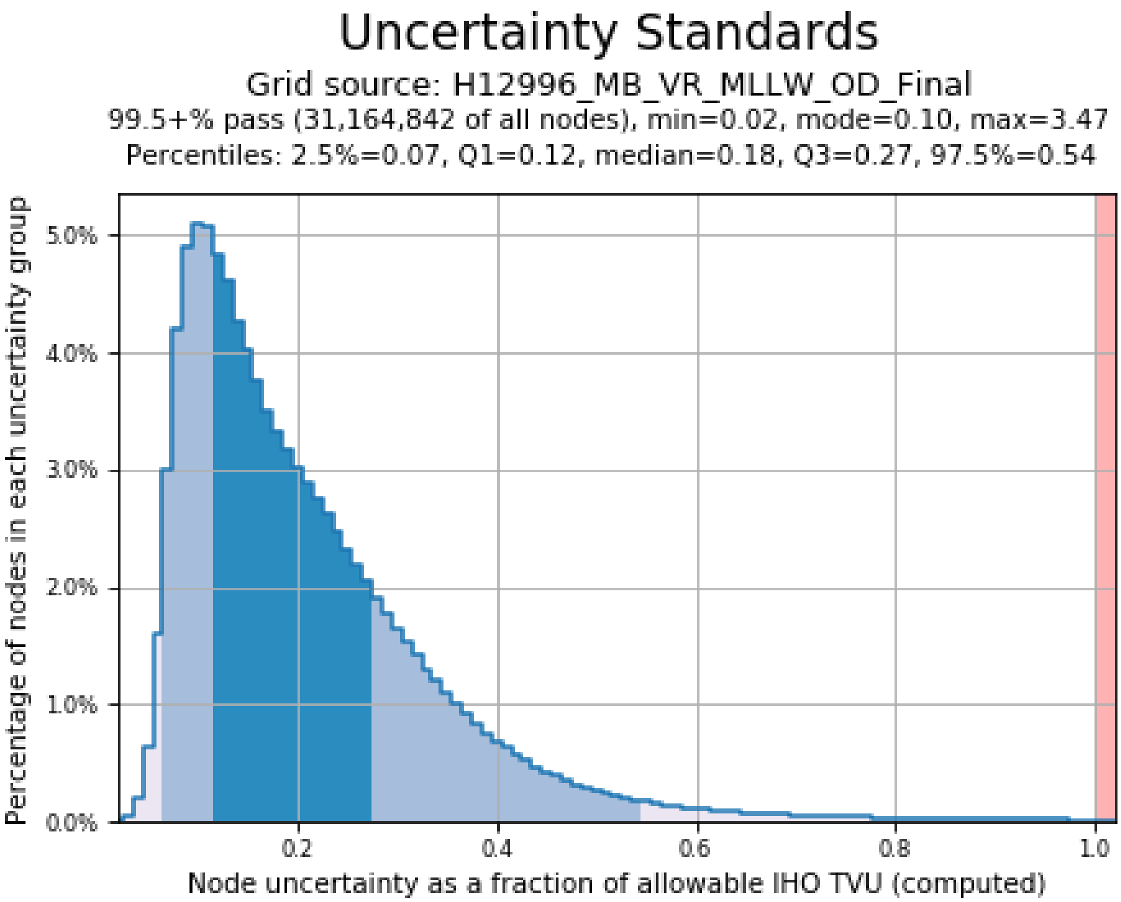


Figure 17: Pydro derived histogram plot showing TVU compliance of H12996 finalized object detection variable resolution MBES data.

B.2.3 Junctions

H12996 junctions with four surveys acquired between 2011 and 2017 (Figure 18). All junction survey analysis was derived using the Pydro XL Compare Grids tool using either a H12996 2m or 4m single resolution .csar CUBE surface differenced with a matching junction single resolution .bag or .csar CUBE surface as available.

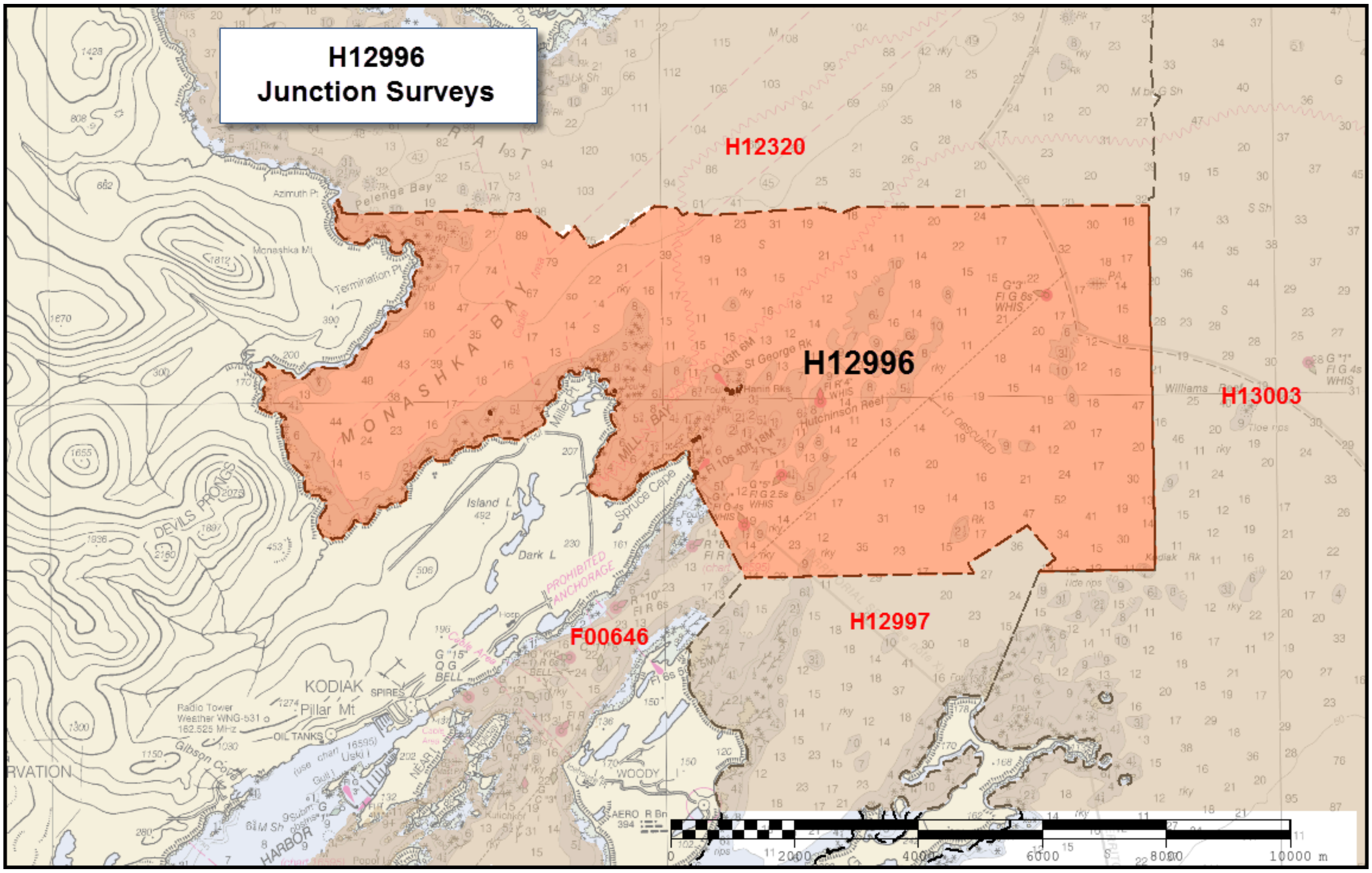


Figure 18: H12996 Junction Surveys.

The following junctions were made with this survey:

Registry Number	Scale	Year	Field Unit	Relative Location
H12320	1:40000	2011	NOAA Ship FAIRWEATHER	N
F00646	1:10000	2014	NOAA Ship RAINIER	SW
H12997	1:40000	2017	NOAA Ship RAINIER	S
H13003	1:40000	2017	NOAA Ship RAINIER	E

Table 9: Junctioning Surveys

<u>H12320</u>

The junction with 2011 survey H12320 encompasses 0.28 square nautical miles along the north boundary of H12996. A comparison was made using a difference surface derived from a 4-meter BAG surface from H12320 with a 4-meter CUBE surface from H12996. The H12320 BAG surface was not a combined surface and therefore did not provide coverage across the full boundary with H12996 (Figure 19). Analysis of the difference surface indicated that H12996 is an average of 0.12 meters shoaler than H12320 with a standard deviation of 0.24 meters (Figure 20). For the respective depths, the difference surface was compared to the allowable TVU standards specified in the HSSD. In total, 99.0% of the depth differences between H12996 and H12320 were within allowable uncertainties (Figure 21). Additionally, analysis of the node depth verses allowable error fraction results are provided (Figure 22).

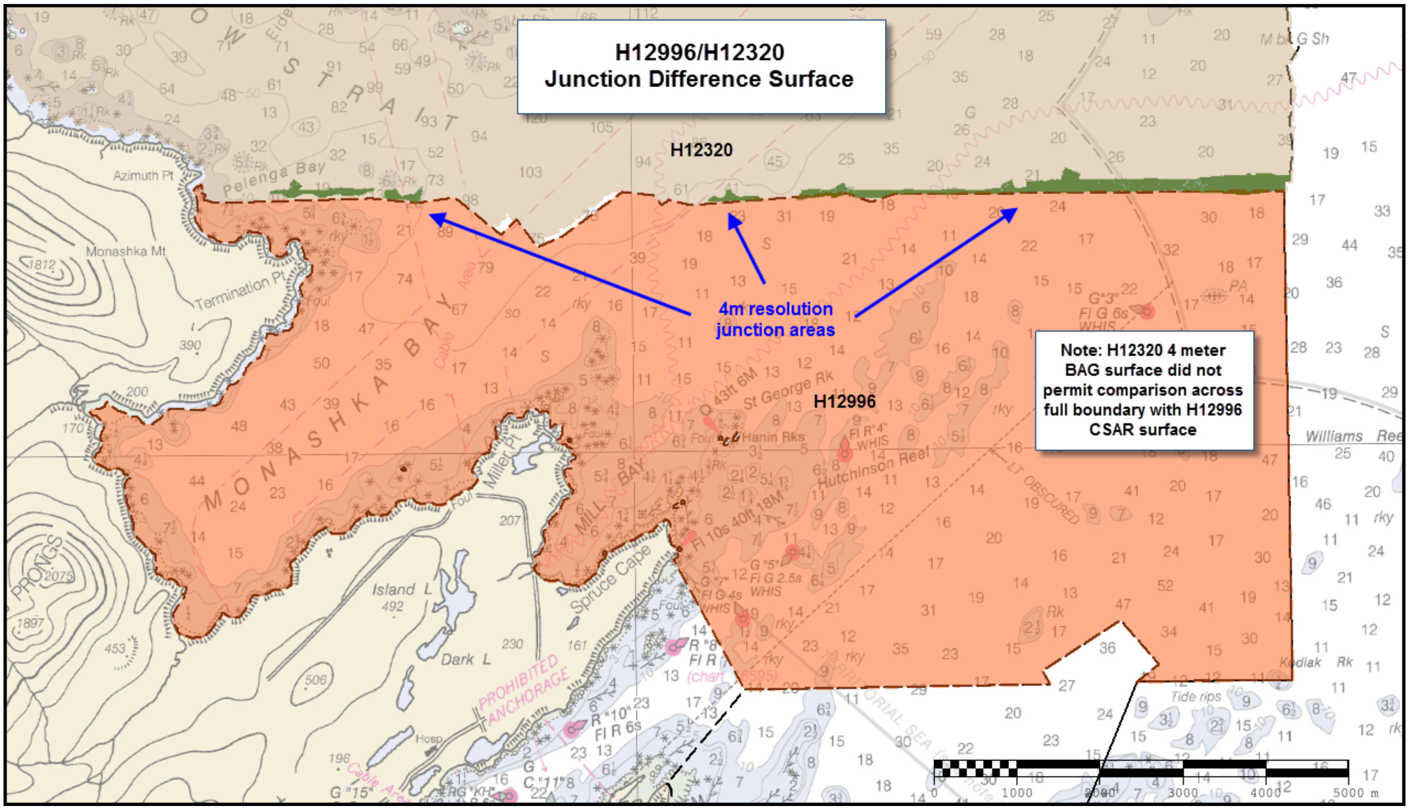
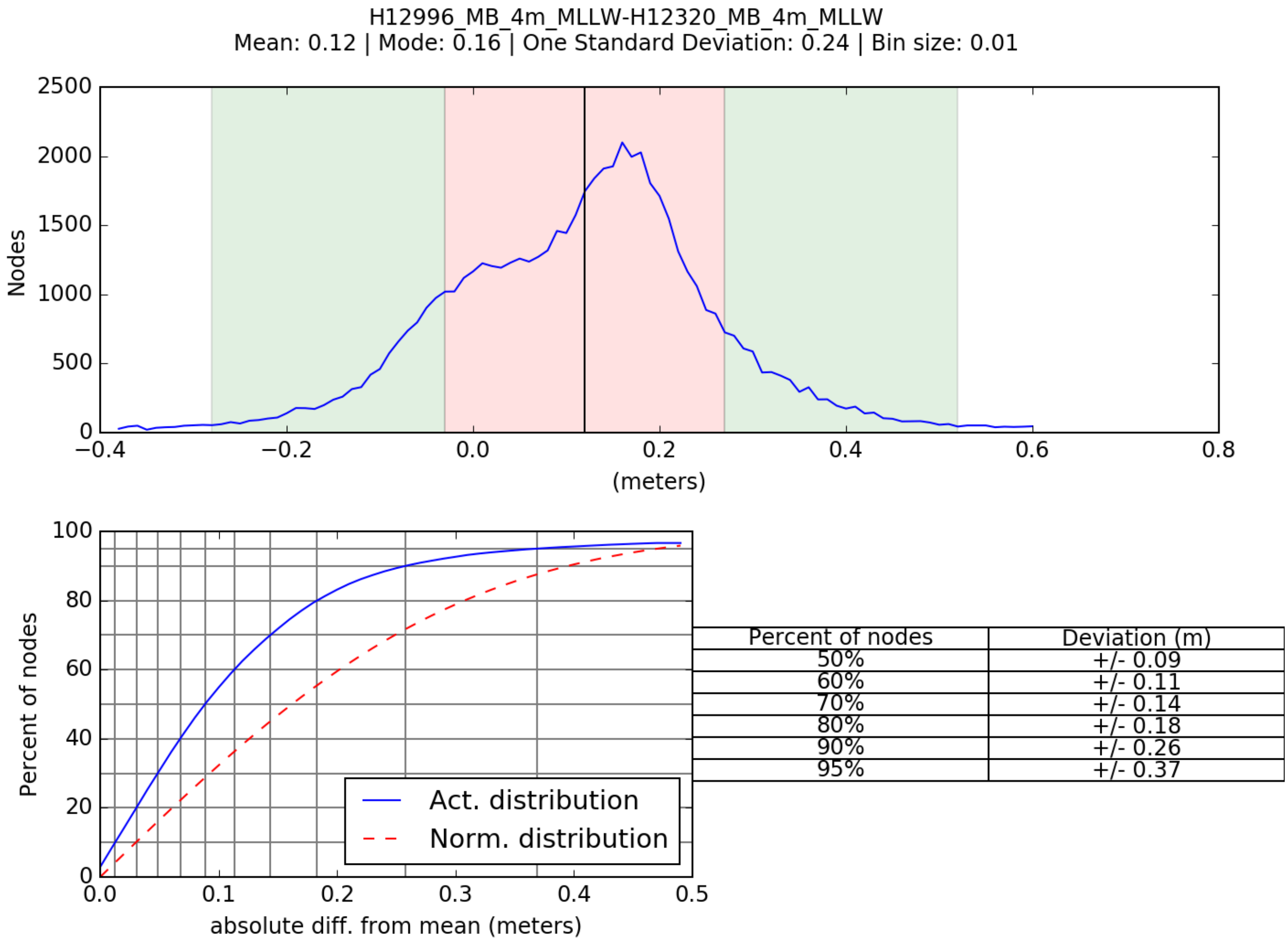


Figure 19: H12996/H12320 Junction Difference Surface.



Percent of nodes	Deviation (m)
50%	+/- 0.09
60%	+/- 0.11
70%	+/- 0.14
80%	+/- 0.18
90%	+/- 0.26
95%	+/- 0.37

Figure 20: H12996/H12320 Depth Differences.

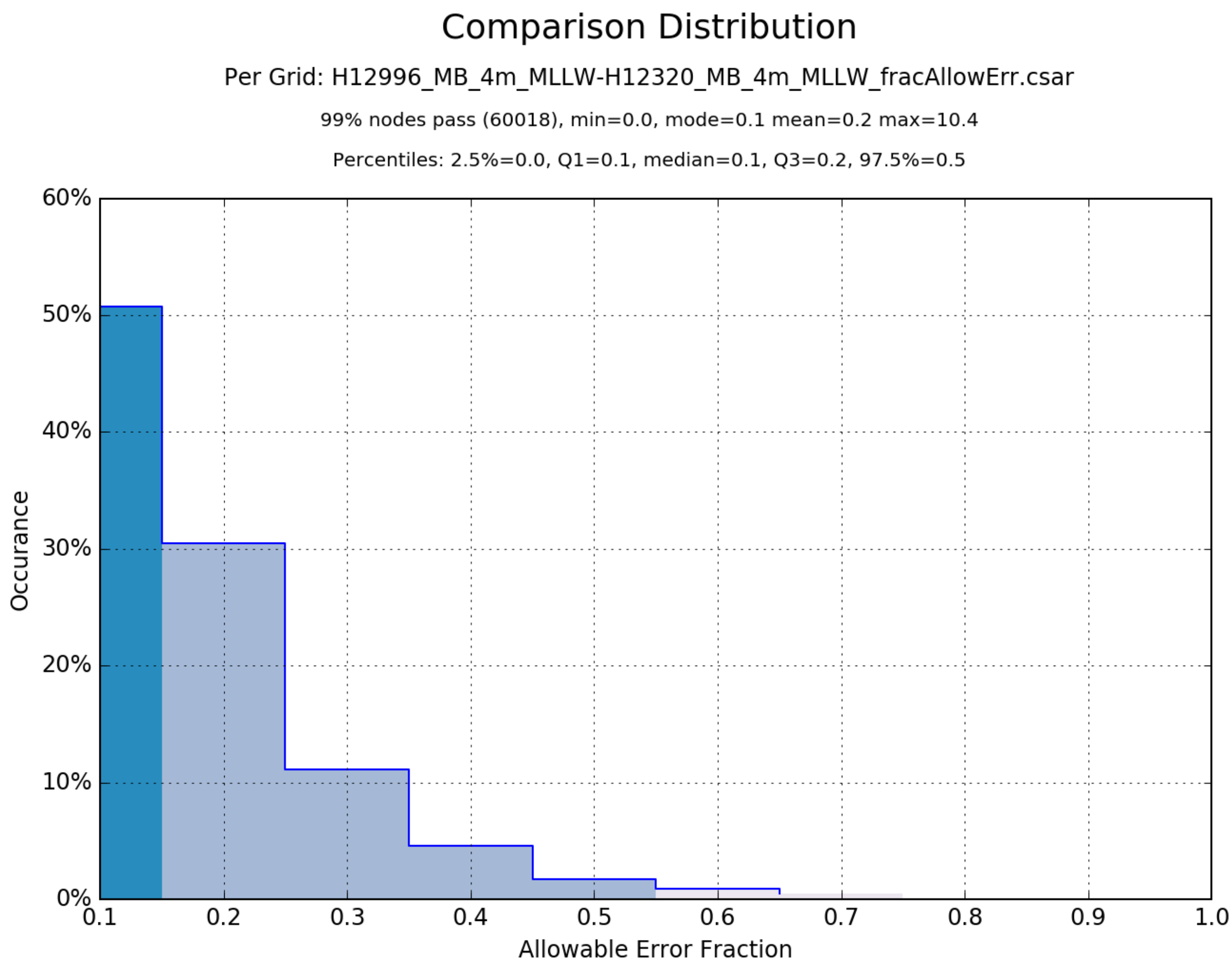


Figure 21: H12996/H12320 Comparison Distribution.

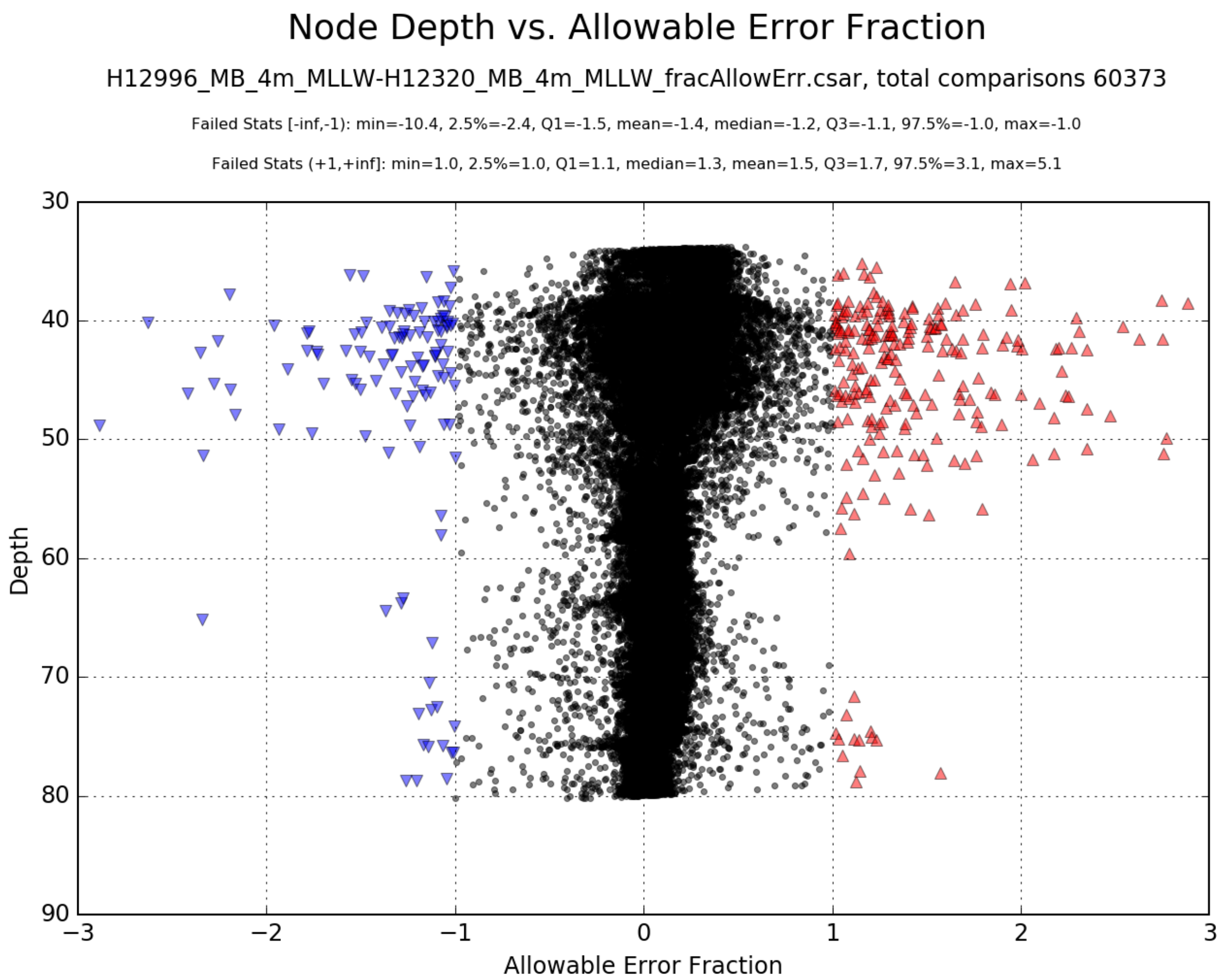


Figure 22: H12996/H12320 Node Depth verses Allowable Error Fraction.

F00646

The junction with 2014 survey F00646 encompasses 0.04 square nautical miles along the southwestern boundary of H12996. A comparison was made using a difference surface derived from a 2-meter BAG surface from F00646 with a 2-meter CUBE surface from H12996. The F00646 BAG surface was not a combined surface and therefore did not provide coverage across the full boundary with H12996 (Figure 23). Analysis of the difference surface indicated that H12996 is an average of 0.02 meters shoaler than F00646 with a standard deviation of 0.11 meters (Figure 24). For the respective depths, the difference surface was compared to the allowable TVU standards specified in the HSSD. In total, 99.5+% of the depth differences between H12996 and F00646 were within allowable uncertainties (Figure 25). Additionally, analysis of the node depth verses allowable error fraction results are provided (Figure 26).

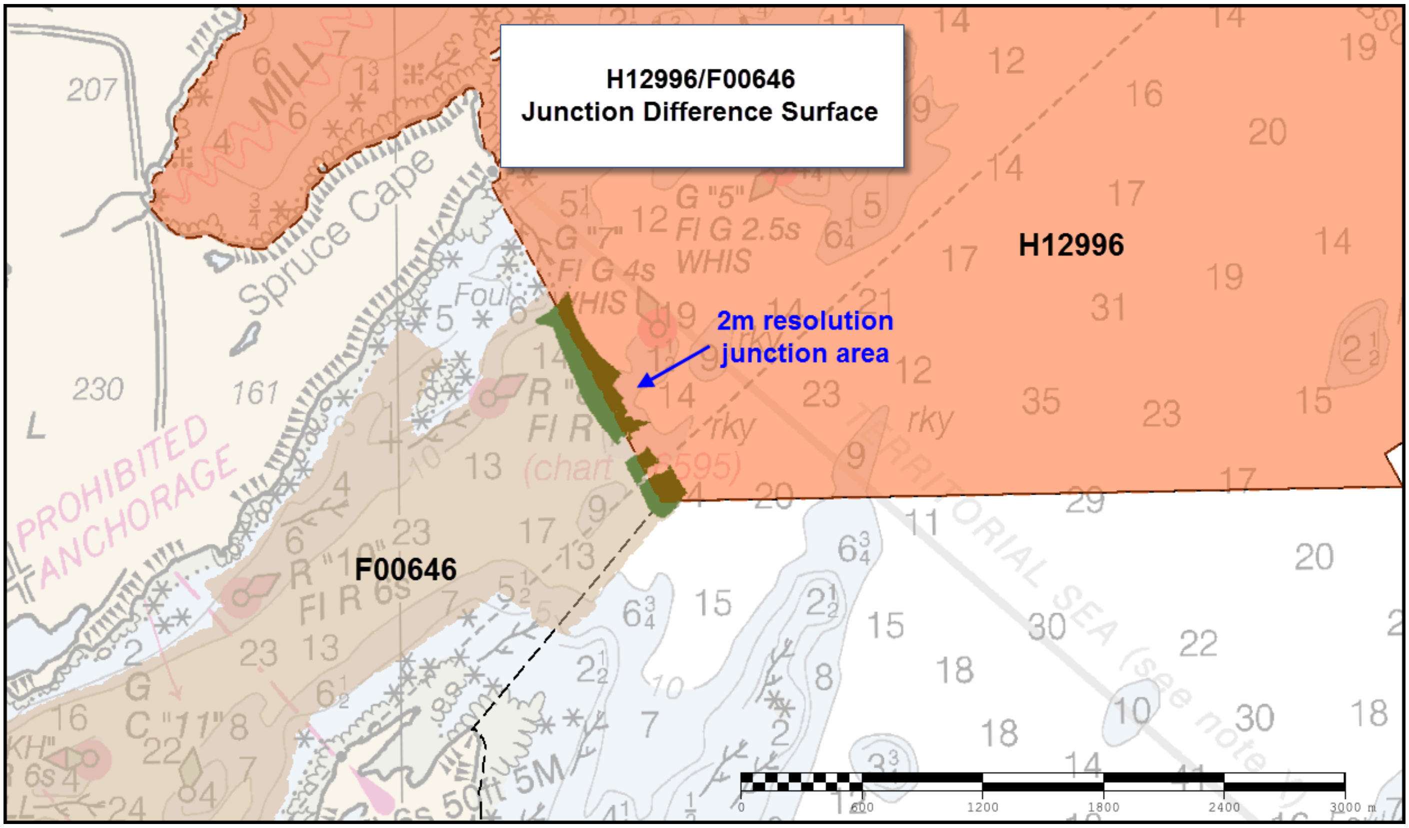
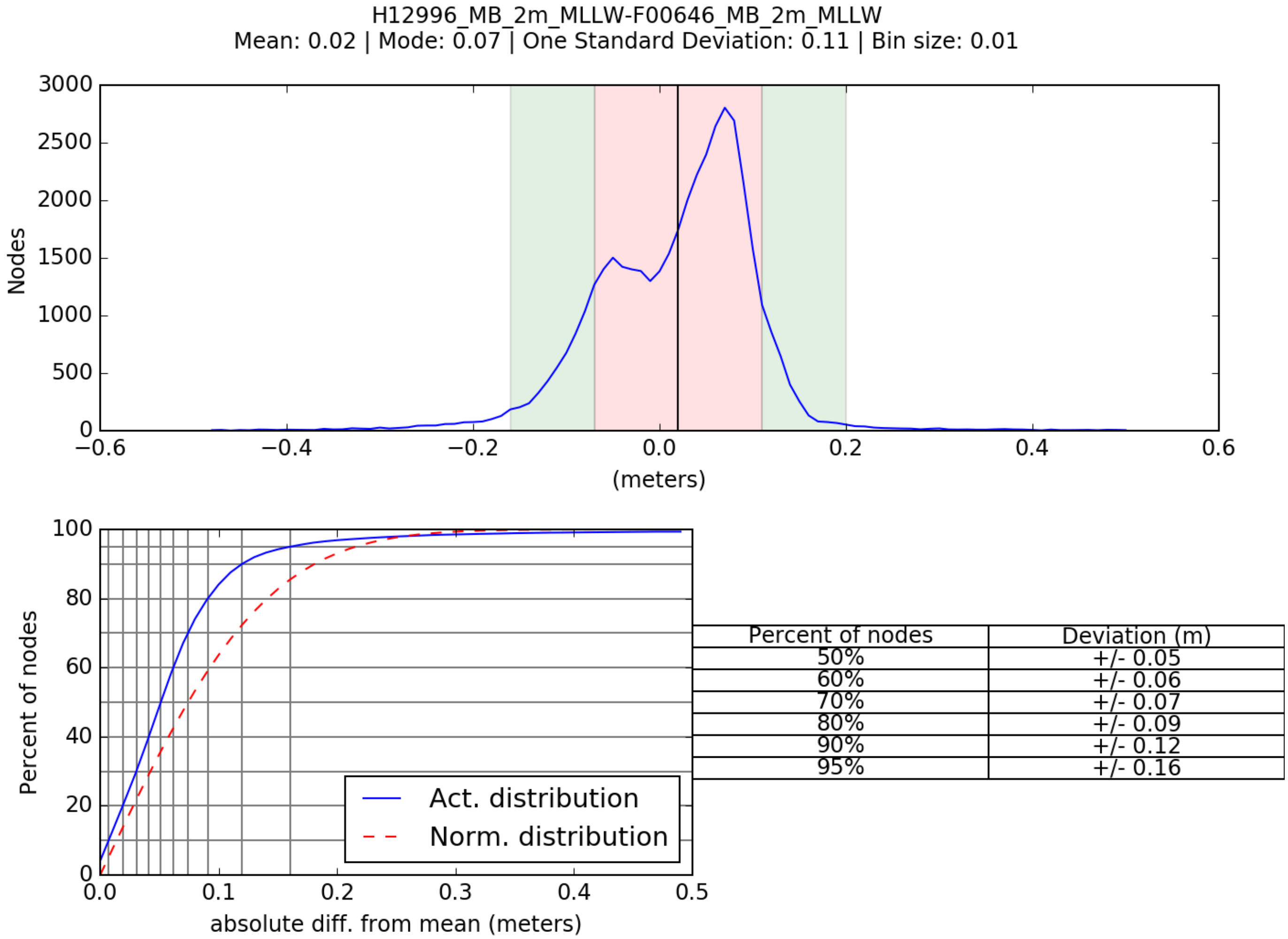


Figure 23: H12996/F00646 Junction Difference Surface.



Percent of nodes	Deviation (m)
50%	+/- 0.05
60%	+/- 0.06
70%	+/- 0.07
80%	+/- 0.09
90%	+/- 0.12
95%	+/- 0.16

Figure 24: H12996/F00646 Depth Differences.

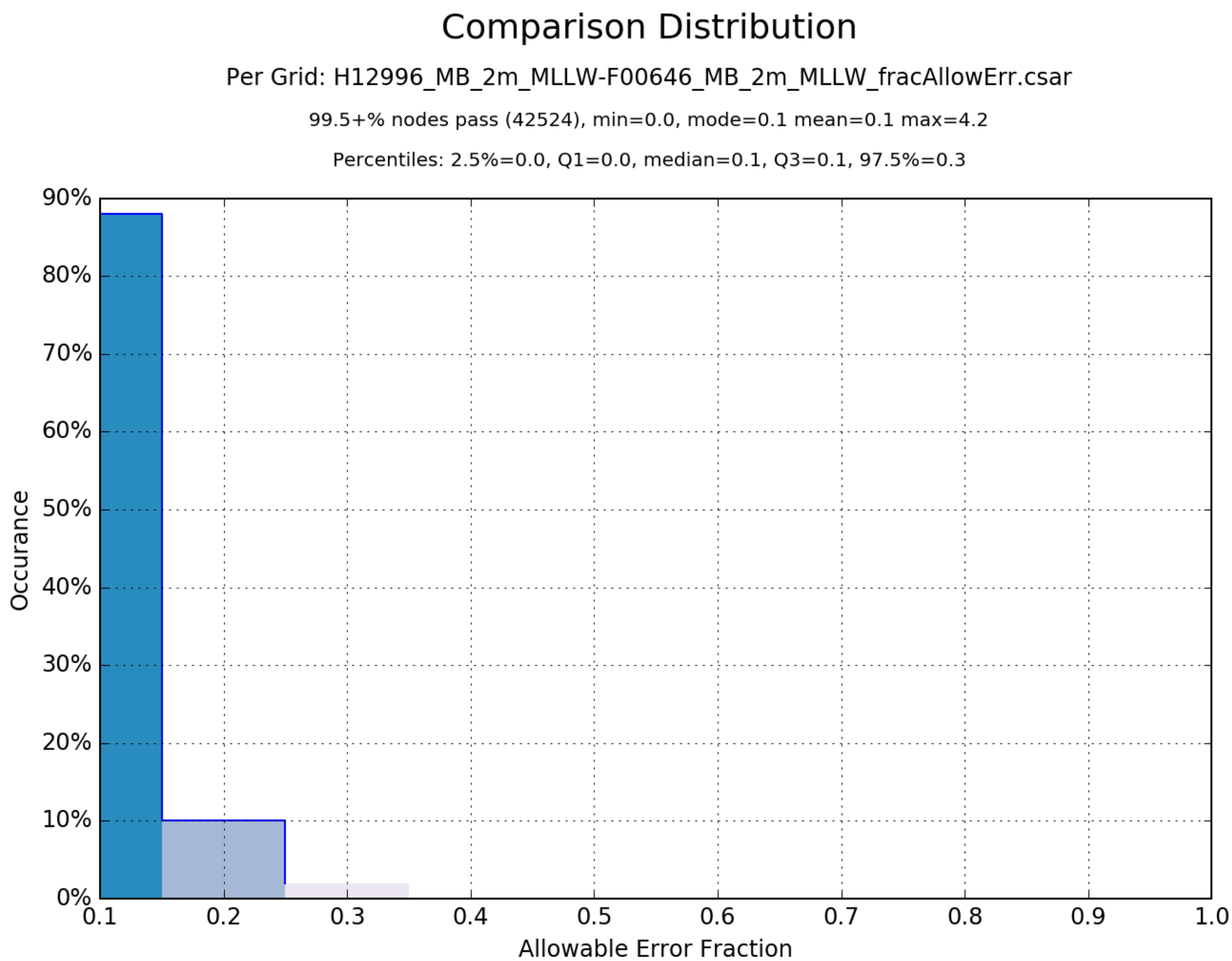


Figure 25: H12996/F00646 Comparison Distribution.

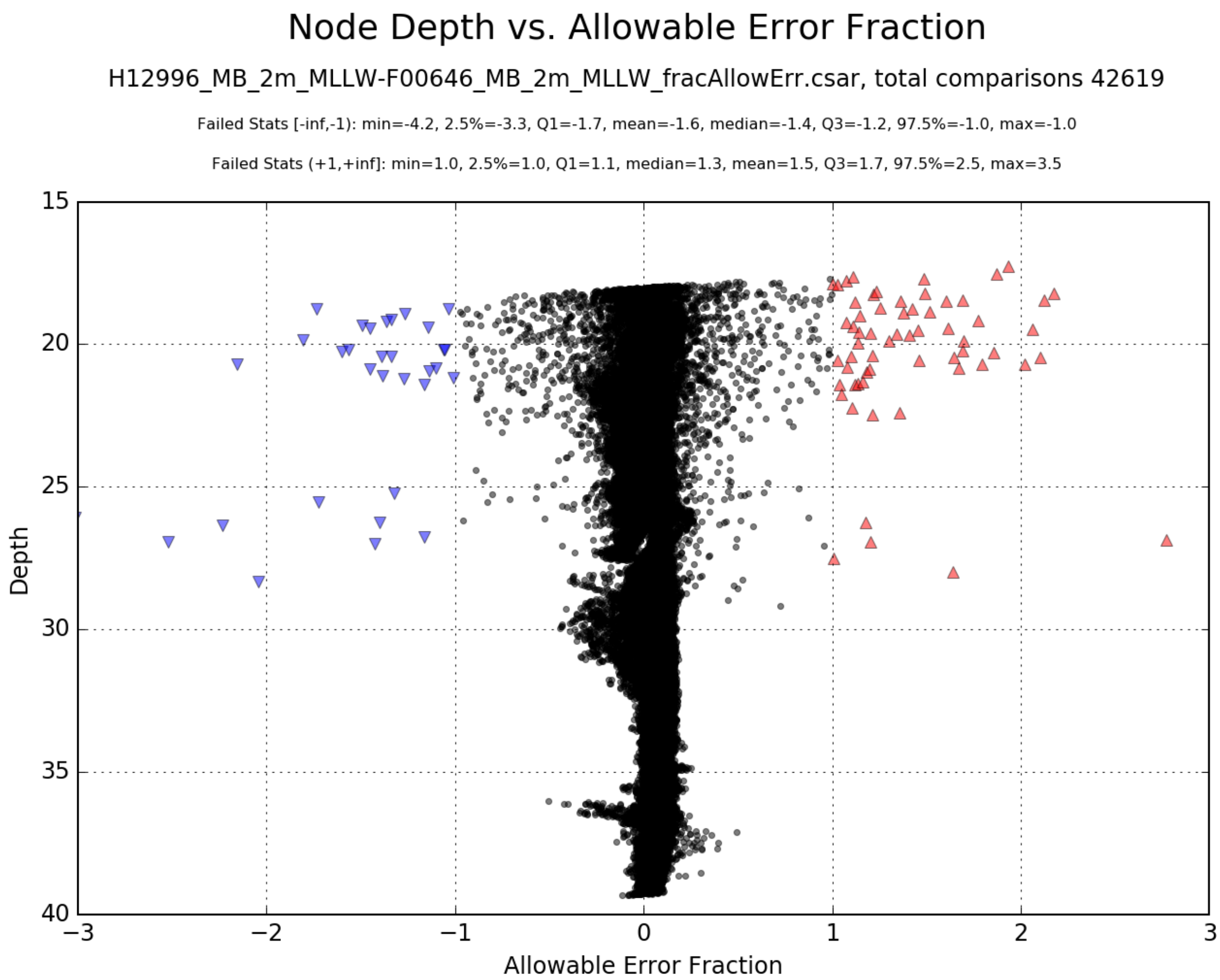


Figure 26: H12996/F00646 Node Depth verses Allowable Error Fraction.

<u>H12997</u>

The junction with concurrent survey H12997 encompasses 0.50 square nautical miles along the southern boundary of H12996. A comparison was made using a difference surface derived from a 2-meter CUBE surface from H12997 with a 2-meter CUBE surface from H12996. The H12997 CUBE surface was a combined surface and did provide coverage across the full boundary with H12996 (Figure 27). Analysis of the difference surface indicated that H12996 is an average of 0.12 meters deeper than H12997 with a standard deviation of 0.15 meters (Figure 28). For the respective depths, the difference surface was compared to the allowable TVU standards specified in the HSSD. In total, 99.5+% of the depth differences between H12996 and H12997 were within allowable uncertainties (Figure 29). Additionally, analysis of the node depth verses allowable error fraction results are provided (Figure 30).

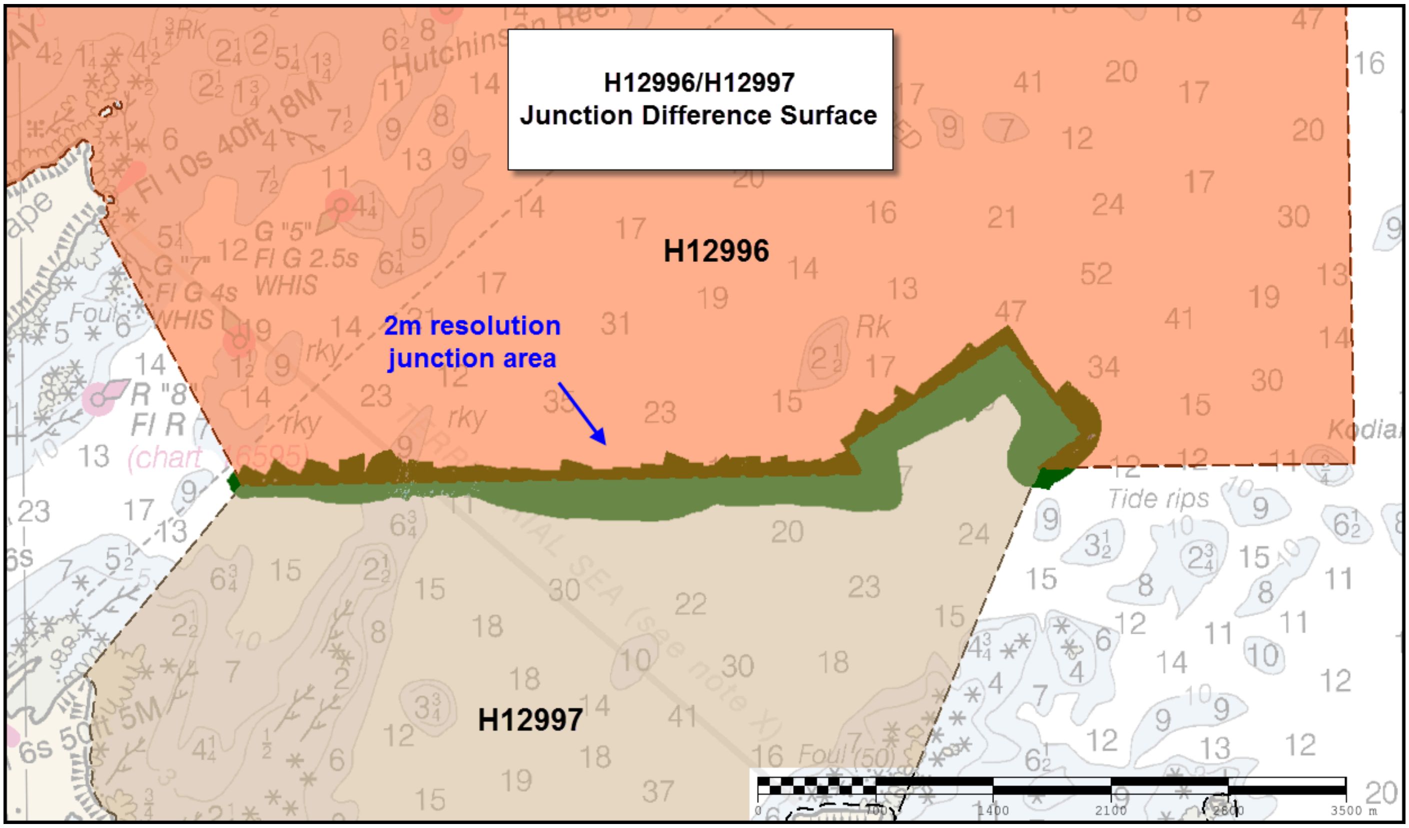
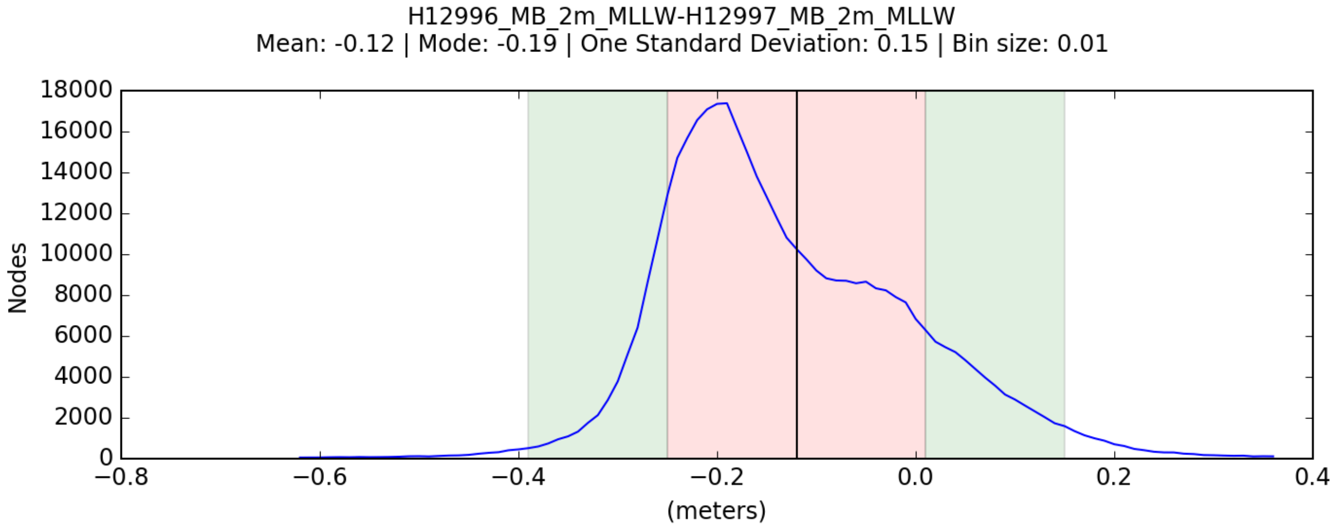
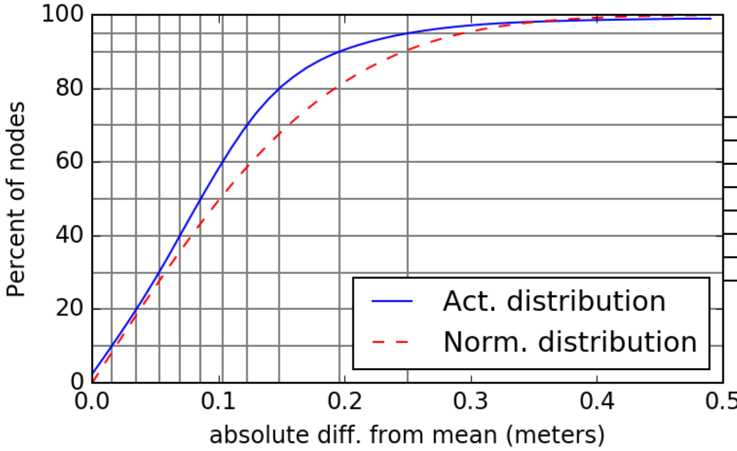


Figure 27: H12996/H12997 Junction Difference Surface.





Percent of nodes	Deviation (m)
50%	+/- 0.09
60%	+/- 0.10
70%	+/- 0.12
80%	+/- 0.15
90%	+/- 0.20
95%	+/- 0.25

Figure 28: H12996/H12997 Depth Differences.

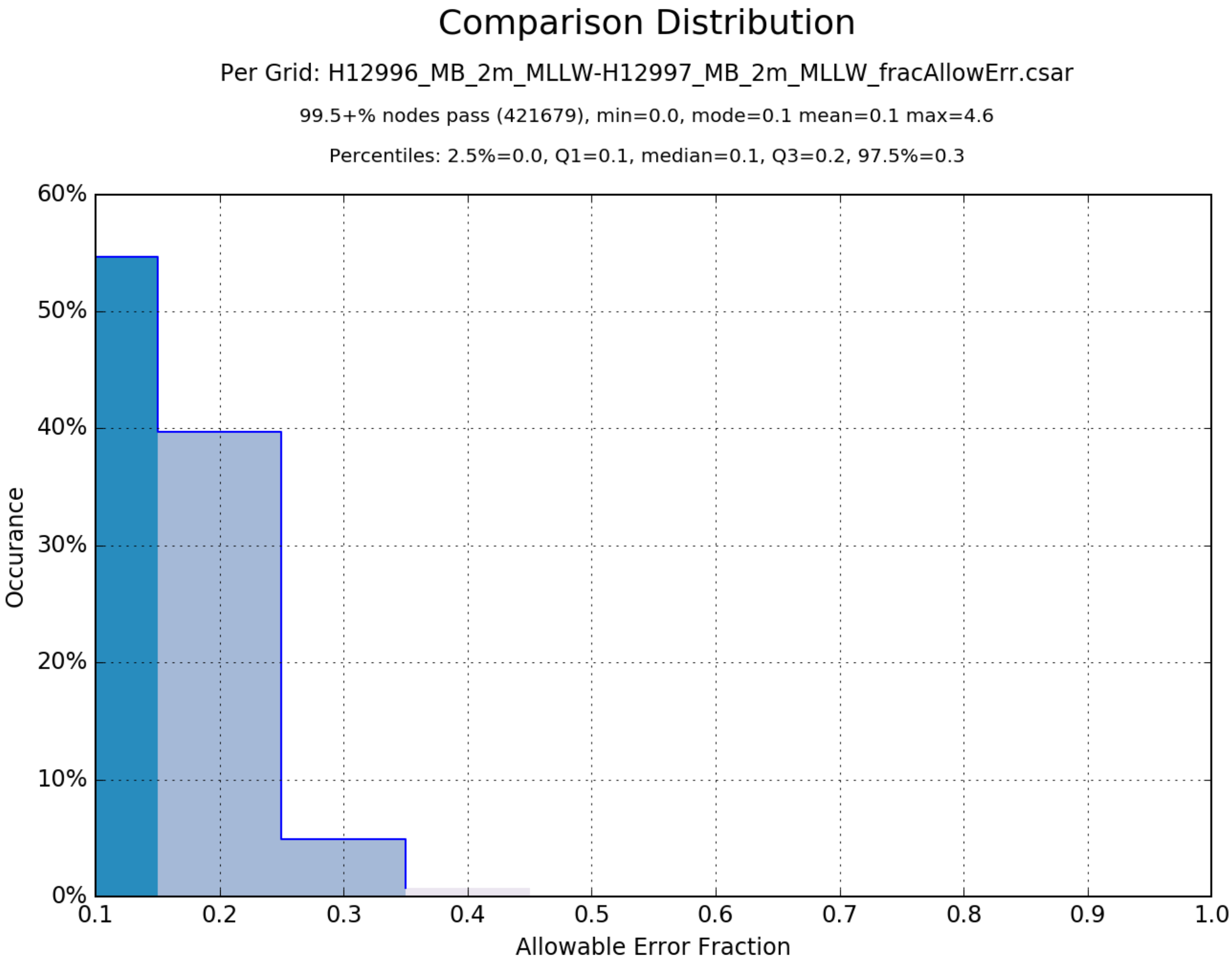


Figure 29: H12996/H12997 Comparison Distribution.

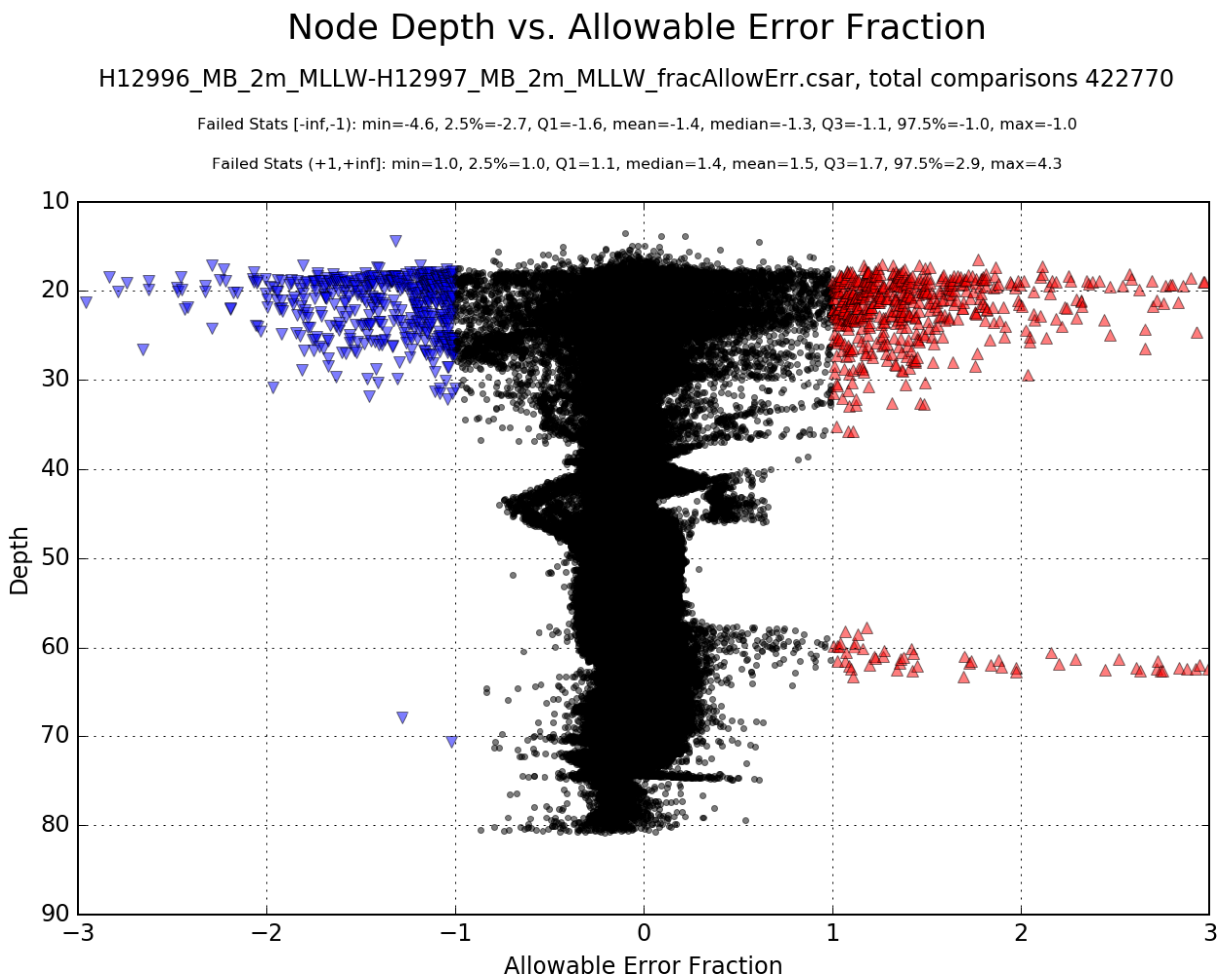


Figure 30: H12996/H12997 Node Depth verses Allowable Error Fraction.

<u>H13003</u>

The junction with concurrent survey H13003 encompasses 0.72 square nautical miles along the eastern boundary of H12996. A comparison was made using a difference surface derived from a 2-meter CUBE surface from H13003 with a 2-meter CUBE surface from H12996. The H13003 CUBE surface was a combined surface and did provide coverage across the full boundary with H12996 (Figure 31). Analysis of the difference surface indicated that H12996 is an average of 0.20 meters shoaler than H13003 with a standard deviation of 0.29 meters (Figure 32). For the respective depths, the difference surface was compared to the allowable TVU standards specified in the HSSD. In total, 98.0% of the depth differences between H12996 and H13003 were within allowable uncertainties (Figure 33). Additionally, analysis of the node depth verses allowable error fraction results are provided (Figure 34).

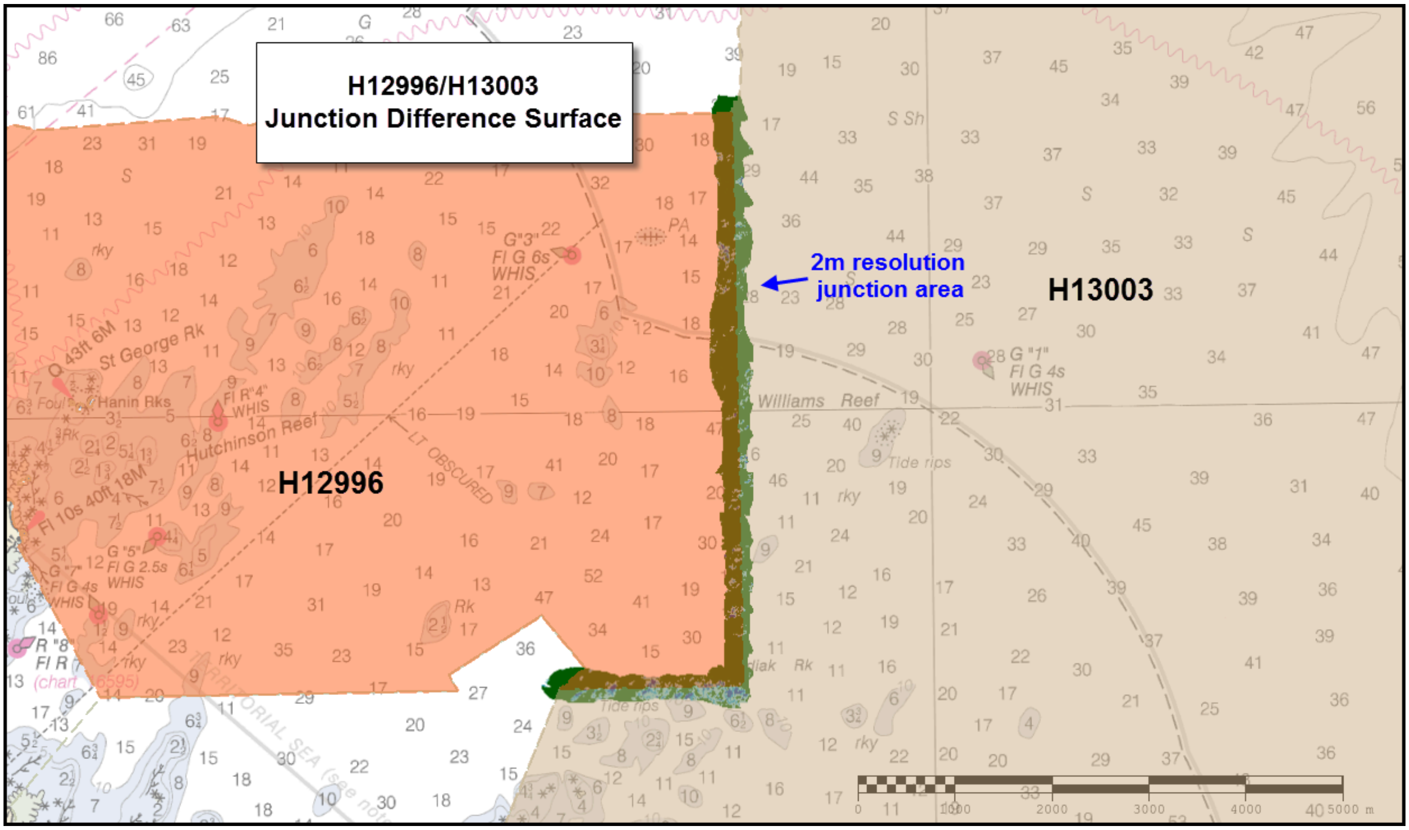
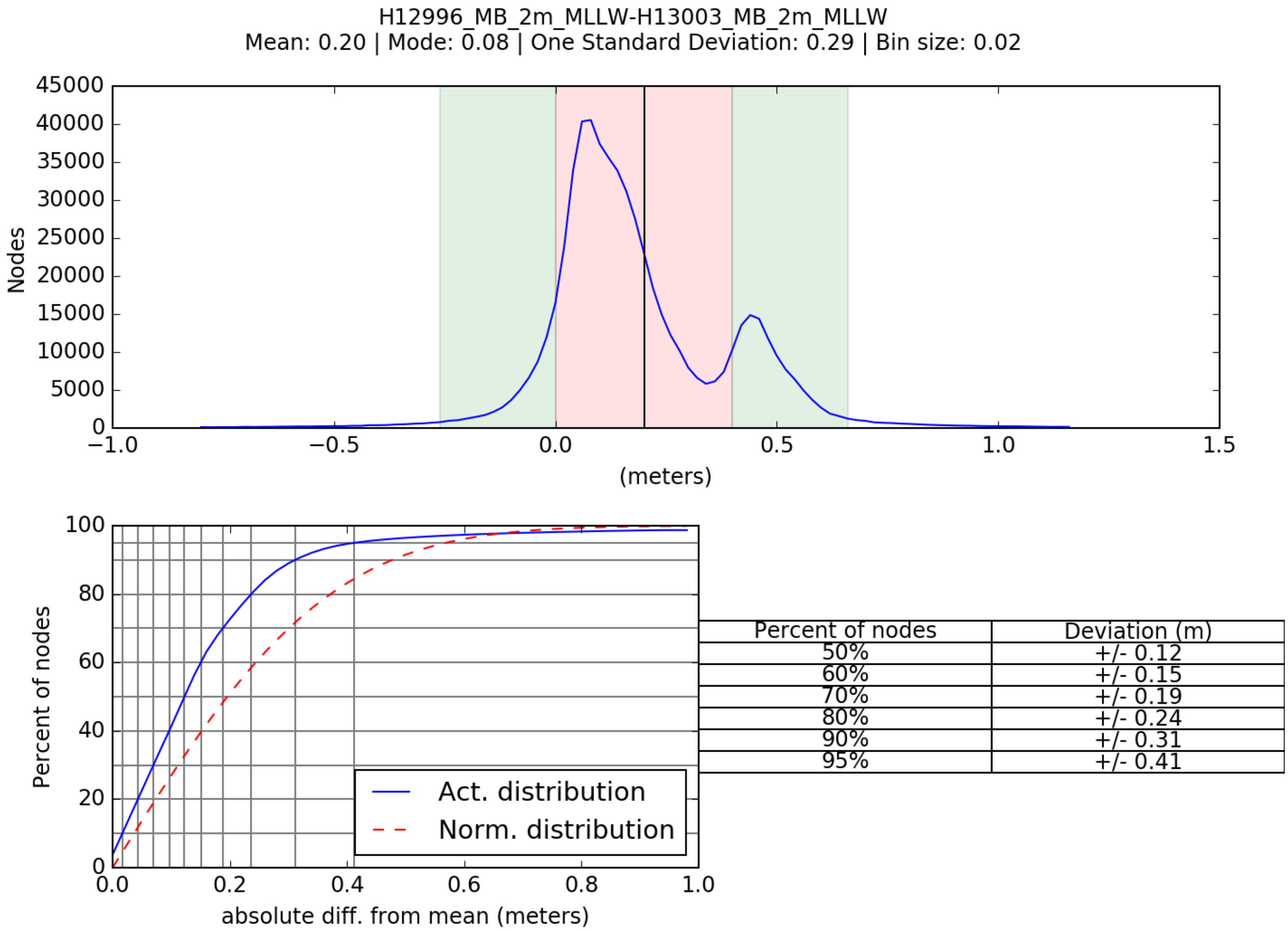


Figure 31: H12996/H13003 Junction Difference Surface.



Percent of nodes	Deviation (m)
50%	+/- 0.12
60%	+/- 0.15
70%	+/- 0.19
80%	+/- 0.24
90%	+/- 0.31
95%	+/- 0.41

Figure 32: H12996/H13003 Depth Differences.

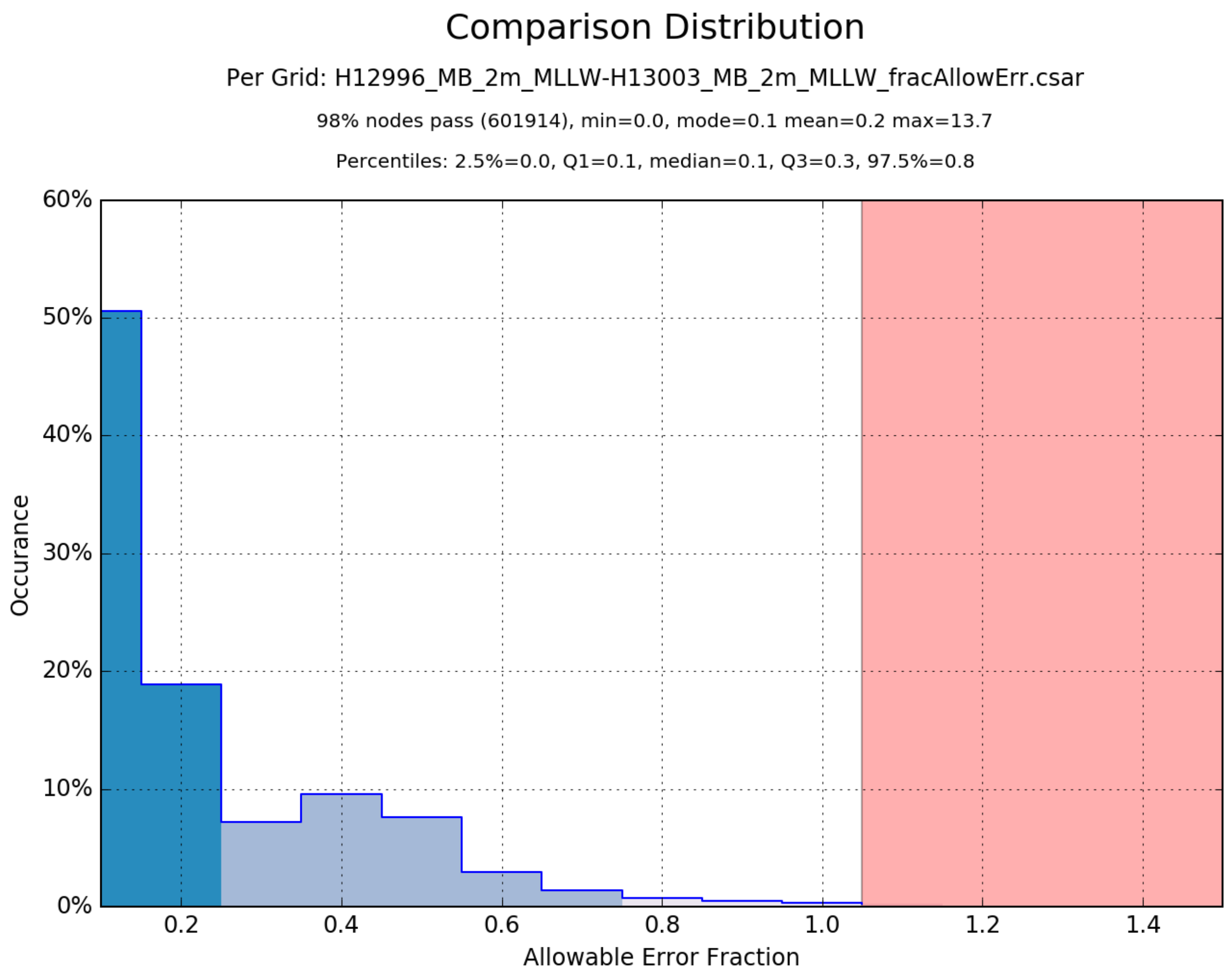


Figure 33: H12996/H13003 Comparison Distribution.

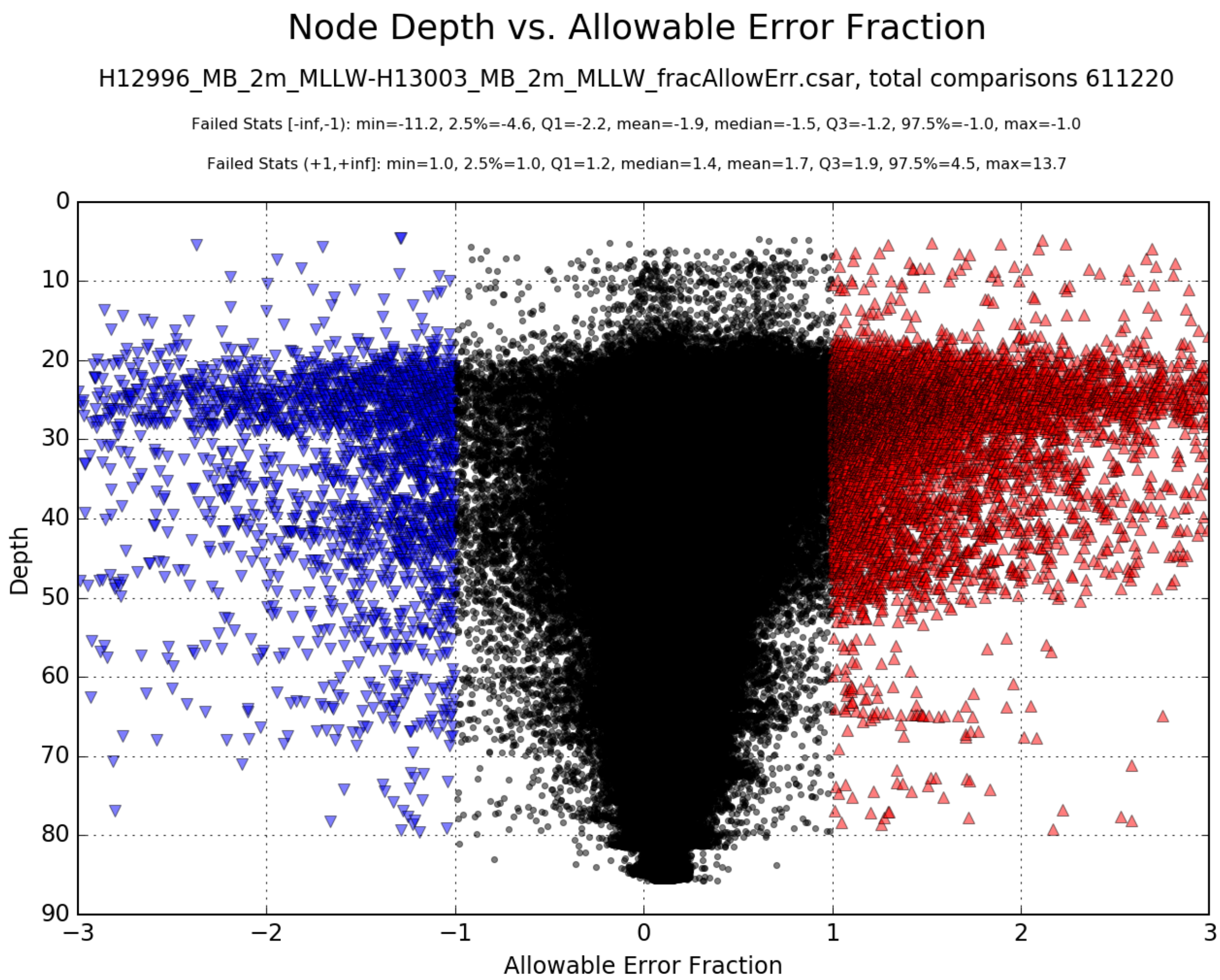


Figure 34: H12996/H13003 Node Depth verses Allowable Error Fraction.

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: Sound speed profiles were acquired using the Seabird SBE 19plus profiler CTD at discrete locations (Figure 35) within the survey area at least once every four hours or when significant changes in surface sound speed were observed from the SVP71 data log. A total of 75 CTD casts were acquired and applied to the H12996 MBES data using the "Nearest Distance within Time 4 hours" method.

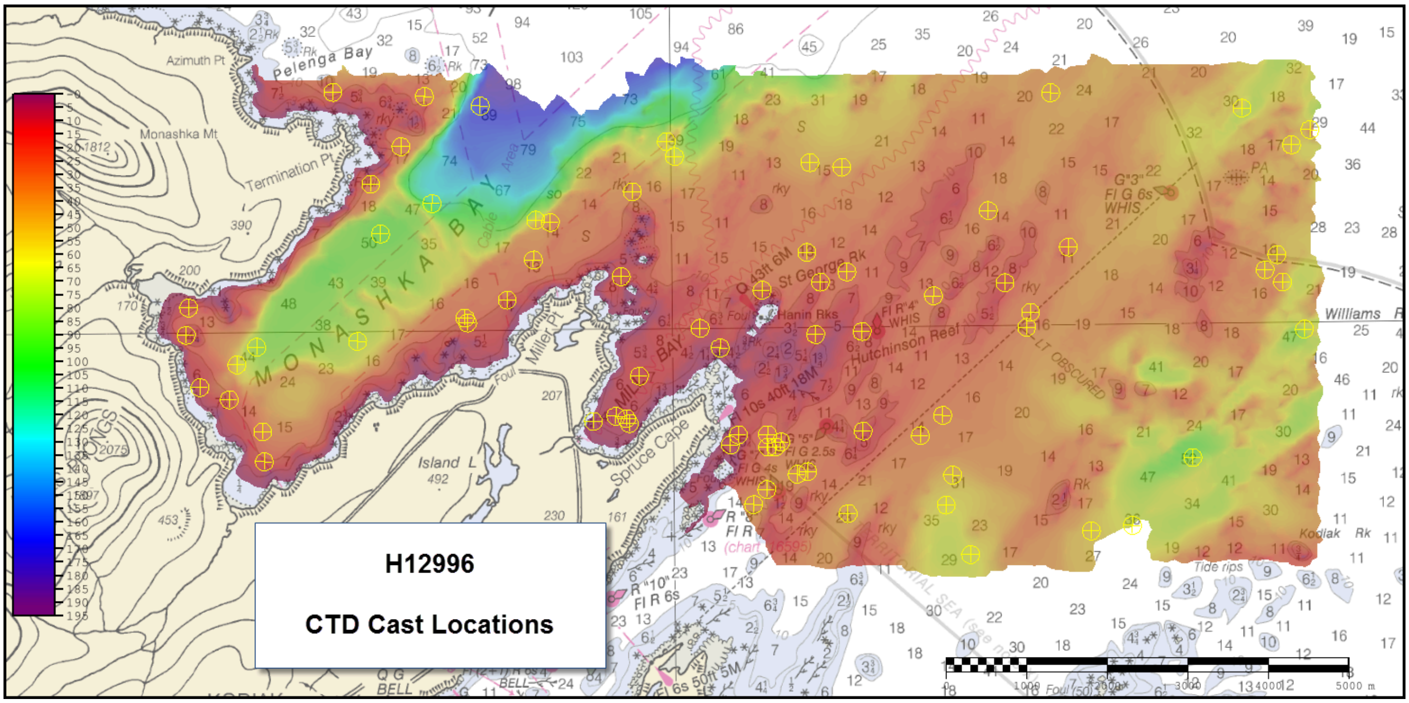


Figure 35: H12996 CTD Cast Locations

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/SIPS	10.3.3

Table 10: Primary bathymetric data processing software

The following Feature Object Catalog was used: NOAA Extended Atrribute Files V_5_6..

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**
H12996_MB_VR_MLLW_CC	CARIS VR Surface (CUBE)	Variable Resolution meters	0.3 meters - 191.9 meters	NOAA_VR	Complete MBES

Surface Name	Surface Type	Resolution	Depth Range	Surface Parameter	Purpose
H12996_MB_VR_MLLW_CC_Final	CARIS VR Surface (CUBE)	Variable Resolution meters	0.3 meters - 191.9 meters	NOAA_VR	Complete MBES
H12996_MB_VR_MLLW_OD	CARIS VR Surface (CUBE)	Variable Resolution meters	0.0 meters - 55.3 meters	NOAA_VR	Object Detection
H12996_MB_VR_MLLW_OD_Final	CARIS VR Surface (CUBE)	Variable Resolution meters	0.0 meters - 55.3 meters	NOAA_VR	Object Detection

Table 11: Submitted Surfaces

Variable resolution (VR) surfaces for both "Complete Coverage" (CC) and "Object Detection" (OD) were generated using the appropriate parameters for Caris depth-based (i.e. "Range" estimation method) bathymetric grids as specified in Hydrographic Surveys Technical Directive 2017-2 (HSTD 2017-2). The CC surfaces encompass the full extent of the assigned survey limits (Figure 36) while the OD surface is tailored to cover four S-57 coverage polygons assigned by the project instructions (Figure 37).

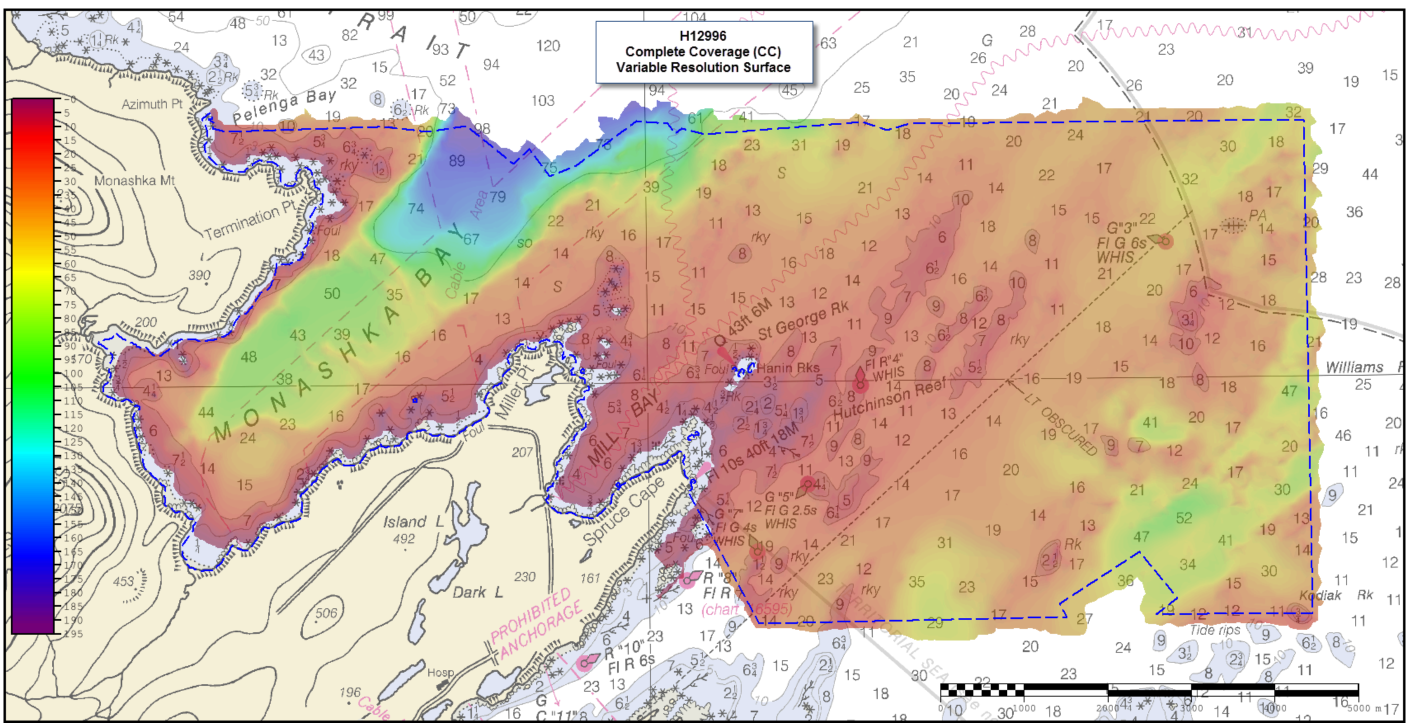


Figure 36: H12996 Complete Coverage VR Surface coverage.

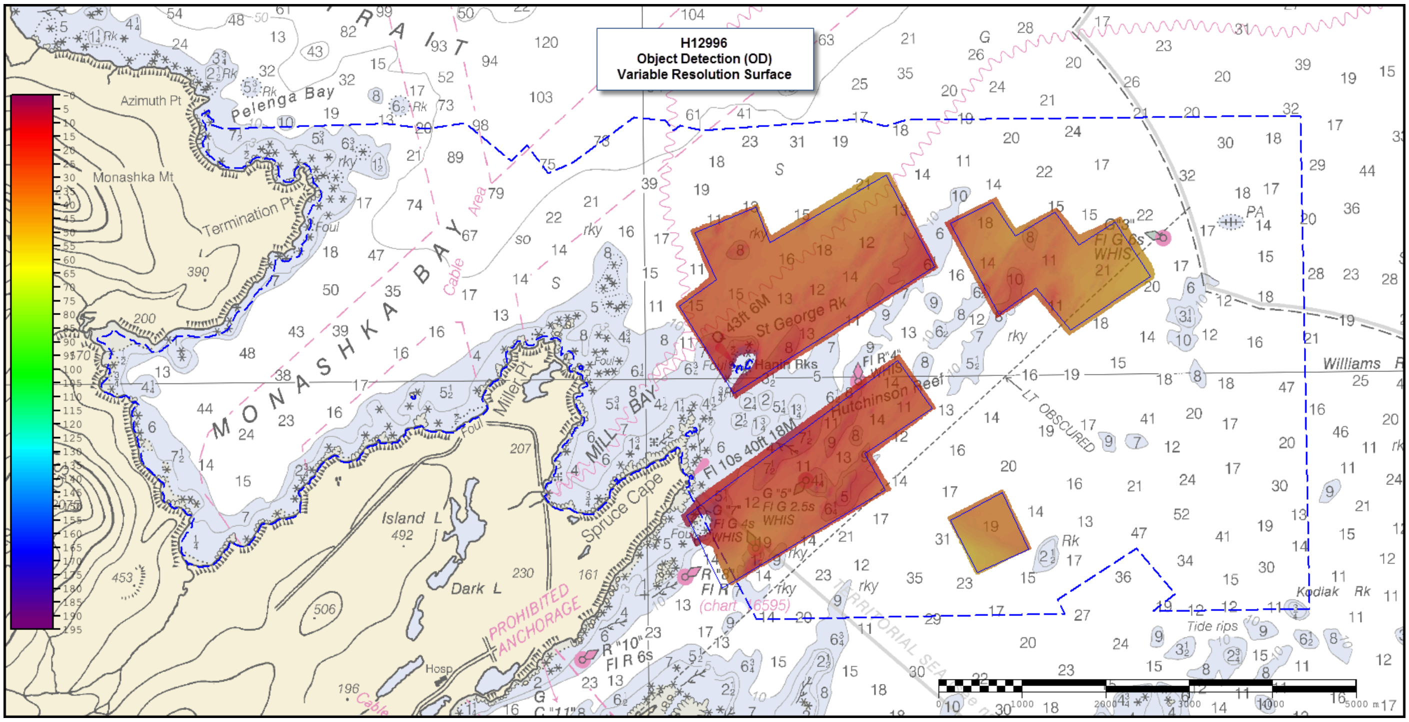


Figure 37: H12996 Object Detection VR Surface coverage.

C. Vertical and Horizontal Control

Shoreline features were reduced to MLLW using traditional tide methods via TCARI. All MBES bathymetry were acquired relative to the ellipsoid and reduced to MLLW via ERZT. 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.

<u>Traditional Methods Used:</u>

TCARI

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

Station Name	Station ID
Kodiak Island, Womens Bay	9457292

Table 12: NWLON Tide Stations

File Name	Status
H12996_TCARI_Feautres.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.

H12996 features were tide corrected using a .tid file created in Pydro using the "TCARI TID file via S-57" function. The resulting "H12996_TCARI_Features.tid" file was then applied to the final feature file using Caris Notebook. H12996 MBES data were reduced to MLLW using the ERZT processing methods.

<u>ERS Methods Used:</u>

ERS via ERZT

<u>Ellipsoid to Chart Datum Separation File:</u>

H12996_NAD83_MLLW_SEP_1000m.csar

C.2 Horizontal Control

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

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

<u>The following PPK methods were used for horizontal control:</u>

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

WAAS data was available in the survey area and was enabled for use in the survey launch POSMV systems.

The following WAAS Stations were used for horizontal control:

DGPS Stations
ANCHORAGE WAAS 1/ZAN1

Table 16: FAA WAAS Stations

D. Results and Recommendations

D.1 Chart Comparison

Chart comparisons were made between H12996 survey data and Electronic Navigation Charts (ENC) US4AK5PM and US5AK5EM using variable resolution CUBE surfaces and derived contours created in Caris. The soundings and contours were overlaid on the charts to compare for general agreement and to identify areas of significant change.

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	1:80000	13	12/21/2017	12/21/2017	NO
US5AK5EM	1:20000	15	12/04/2017	12/04/2017	NO

Table 17: Largest Scale ENCs

<u>US4AK5PM</u>

ENC US4AK5PM covers the full extent of H12996 survey data. The H12996 derived 50-fathom contour was generally in agreement with the ENC contour although some divergences of up to 330 meters from the charted contours are present. Additionally, three distinct areas of H12996 survey data with depths deeper than 50-fathoms do not have corresponding depth contours charted (Figure 38). The H12996 derived 10-fathom and 3-fathom contours were generally found to be inshore of the corresponding ENC charted contours. Differences were measured up to 435 meters for 10-fathom contour (Figure 39) and 148 meters for 3-fathom contour (Figure 40). The ENC US4AK5PM charted 5-fathom contours located 0.75 nautical miles East of Spruce Cape Light do not correspond to H12996 derived depth soundings (Figure 41). Shoalest H12996 derived depth in this area was 5.2 fathoms with most soundings observed to be in the 6-14 fathom range. ENC US4AK5PM charted soundings are in general agreement with H12996 derived soundings. Some ENC charted soundings inside the 10-fathom contour are observed to be up to 2 fathoms shoaler than the the H12996 derived soundings in the immediate vicinity.

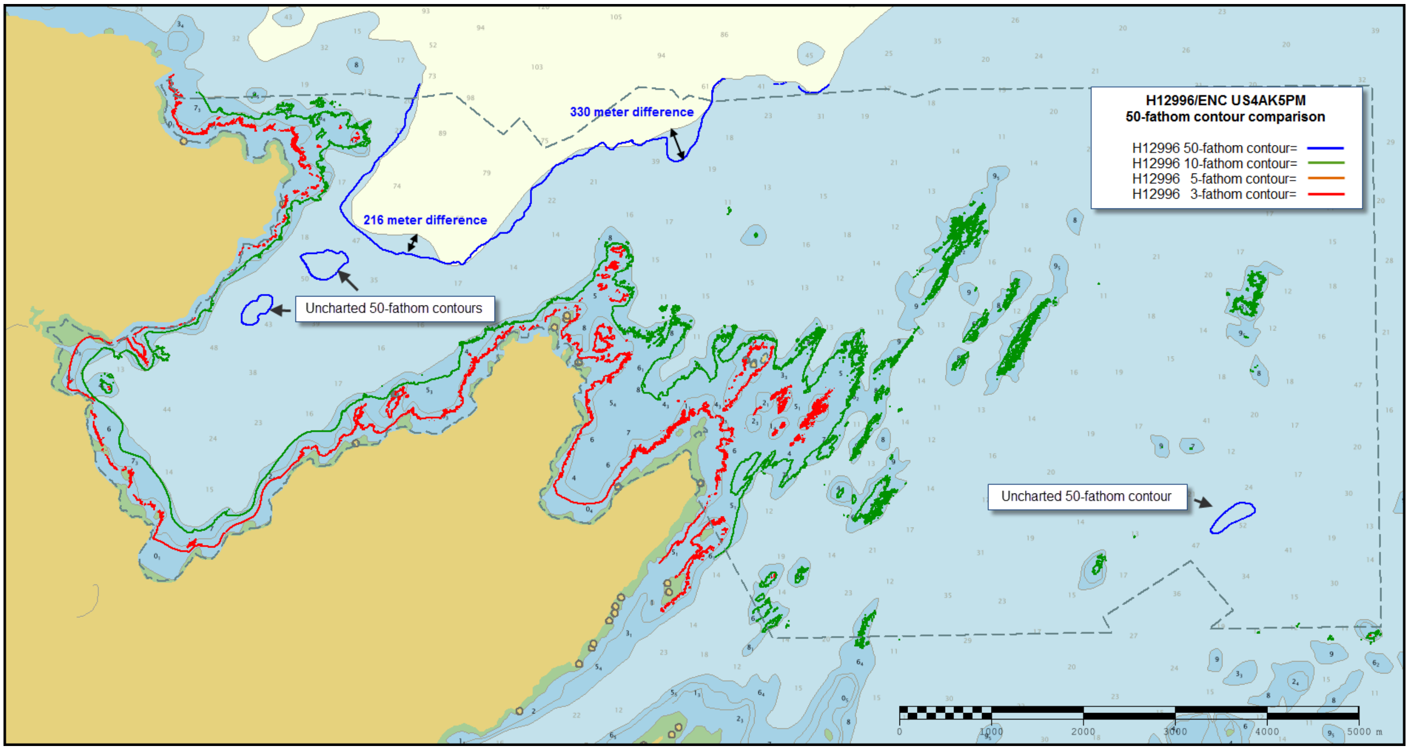


Figure 38: H12996 and ENC US4AK5PM 50-fathom Comparison.

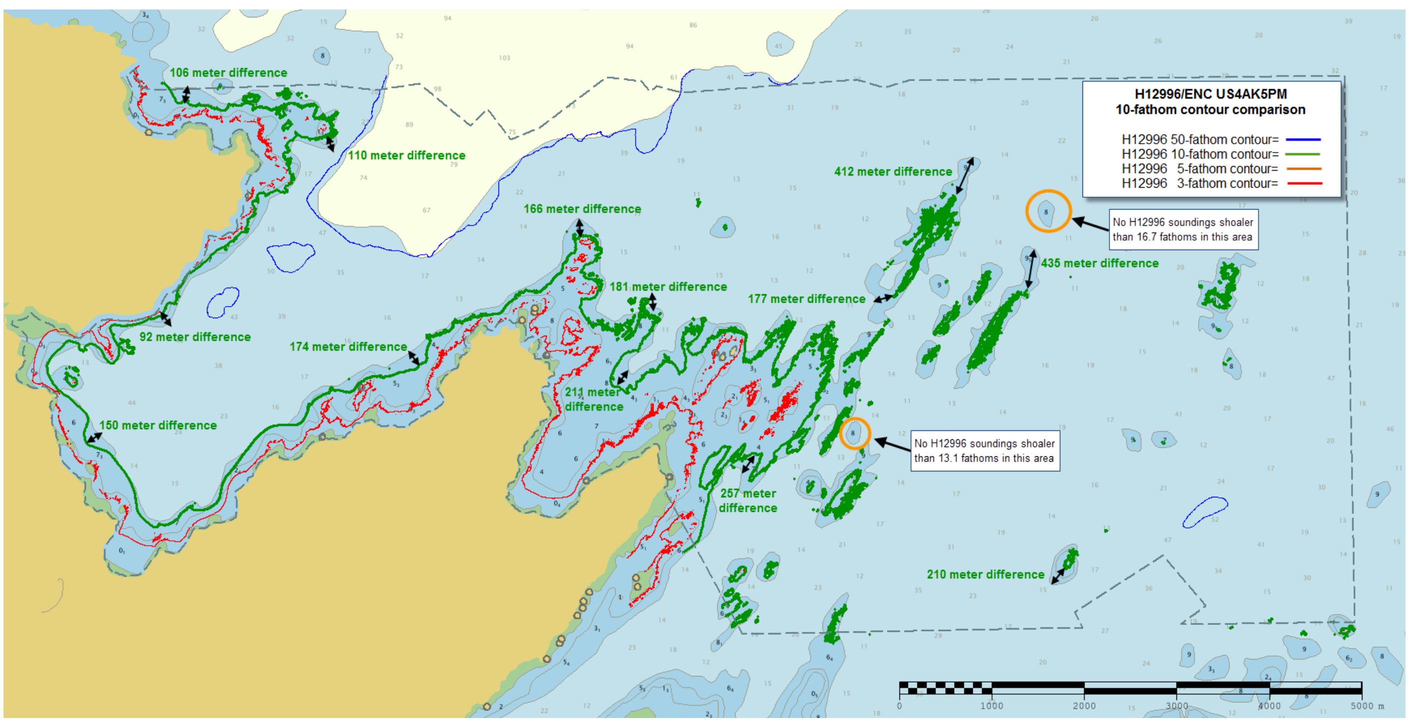


Figure 39: H12996 and ENC US4AK5PM 10-fathom Comparison.

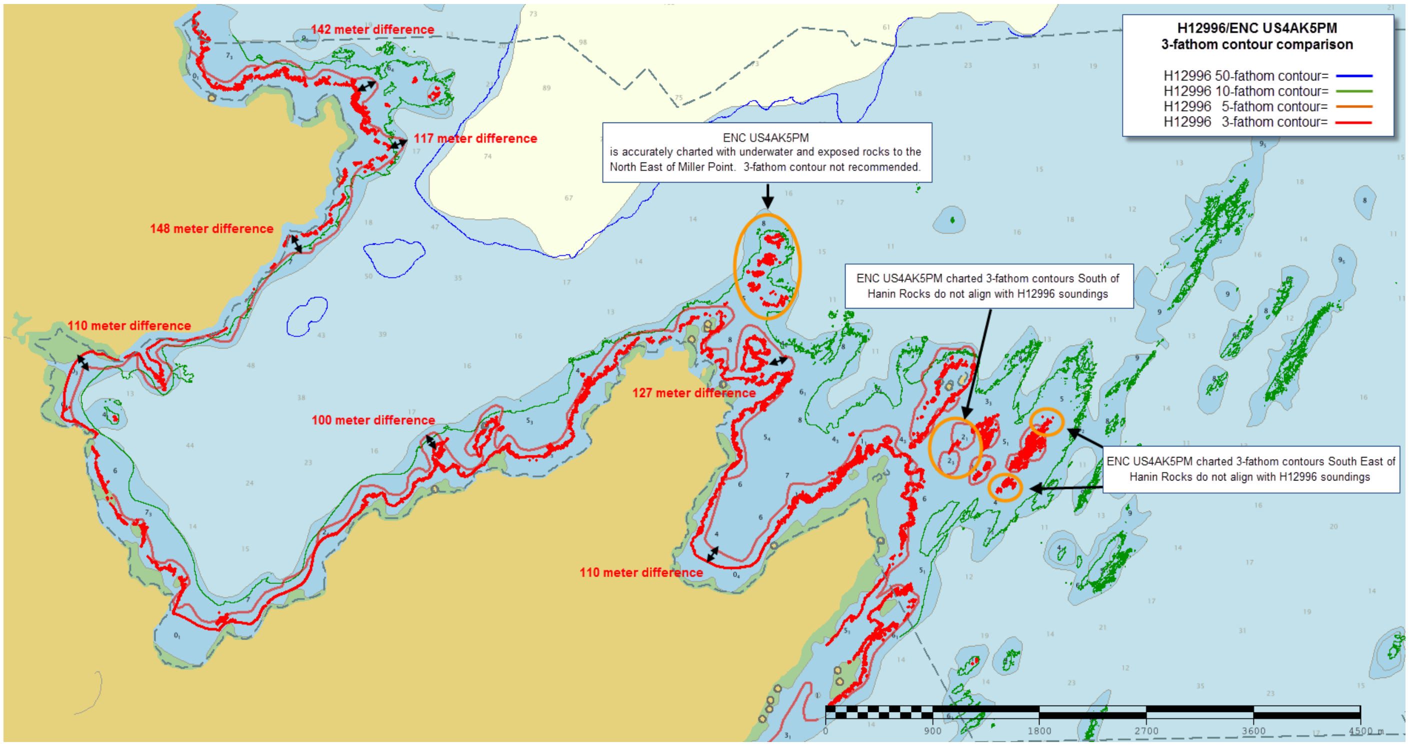


Figure 40: H12996 and ENC US4AK5PM 3-fathom Comparison.

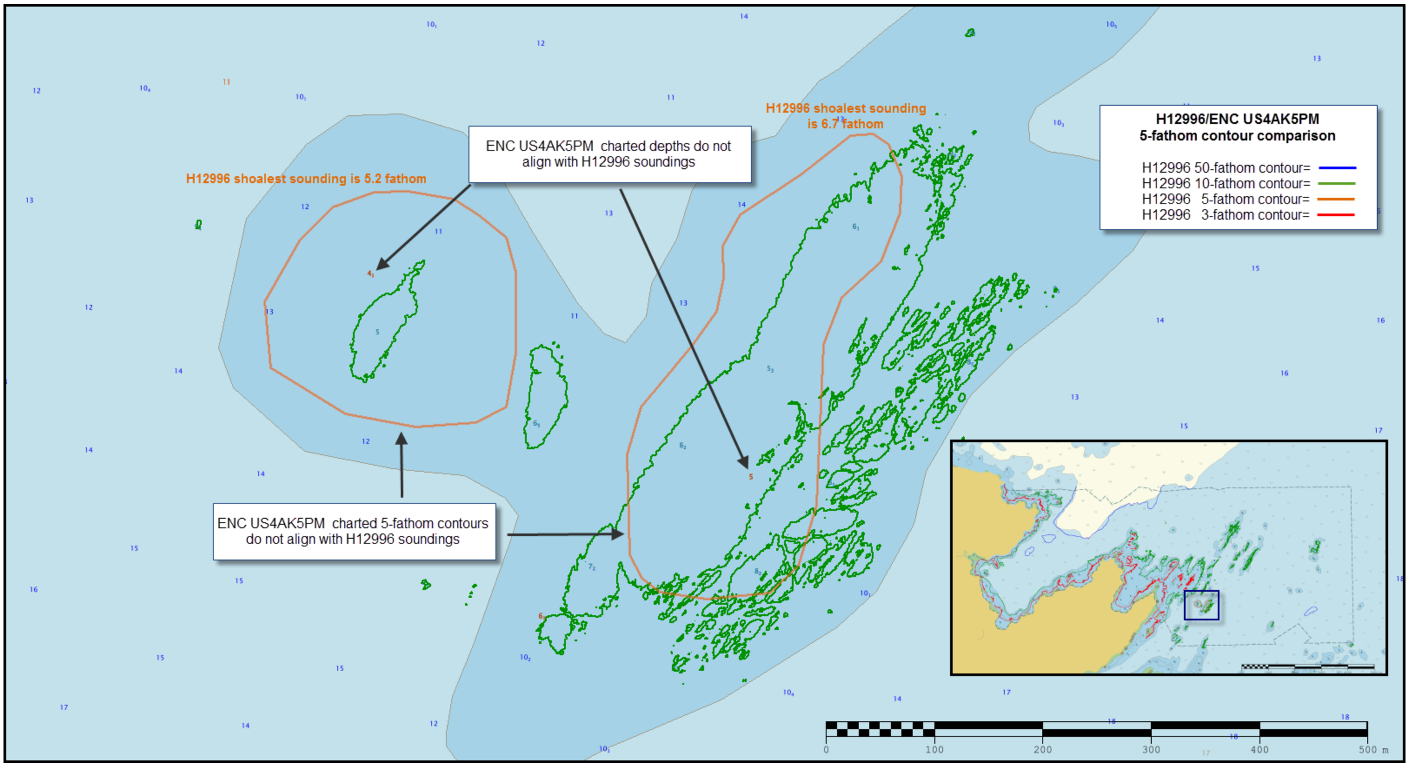


Figure 41: H12996 and ENC US4AK5PM 5-fathom Comparison.

US5AK5EM

ENC US5AK5EM covers approximately the South Western quarter of H12996 survey data. The H12996 derived 10-fathom and 3-fathom contours were generally found to be inshore of the corresponding ENC charted contours. Differences were measured up to 250 meters for 10-fathom contour (Figure 42) and 148 meters for 3-fathom contour (Figure 43). The ENC US4AK5PM charted 5-fathom contours located 0.75 nautical miles East of Spruce Cape Light do not correspond to H12996 derived depth soundings (Figure 43). Shoalest H12996 derived depth in this area was 5.2 fathoms with most soundings observed to be in the 6-14 fathom range. ENC US5AK5EM charted soundings are in general agreement with H12996 derived soundings. Some ENC charted soundings inside the 10-fathom contour are observed to be up to 1.5 fathoms shoaler than the the H12996 derived soundings in the immediate vicinity.

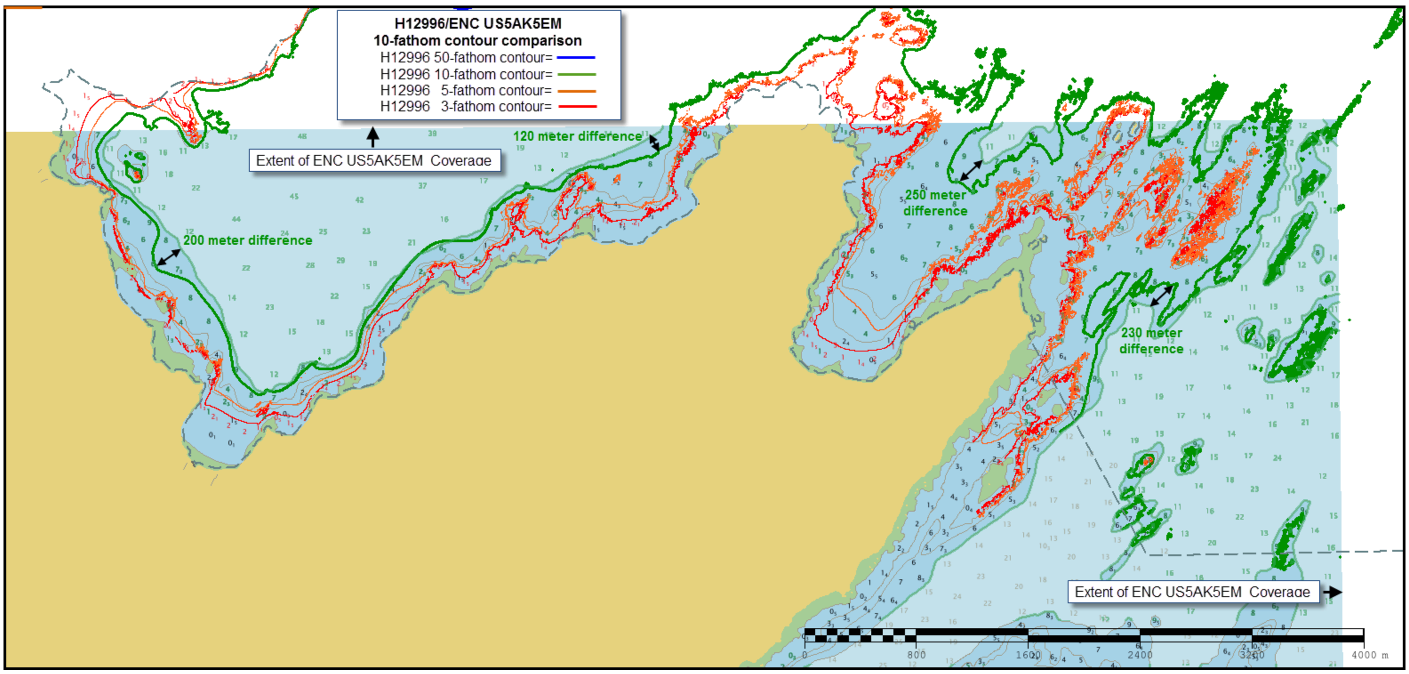


Figure 42: H12996 and ENC US5AK5EM 10-fathom Comparison.

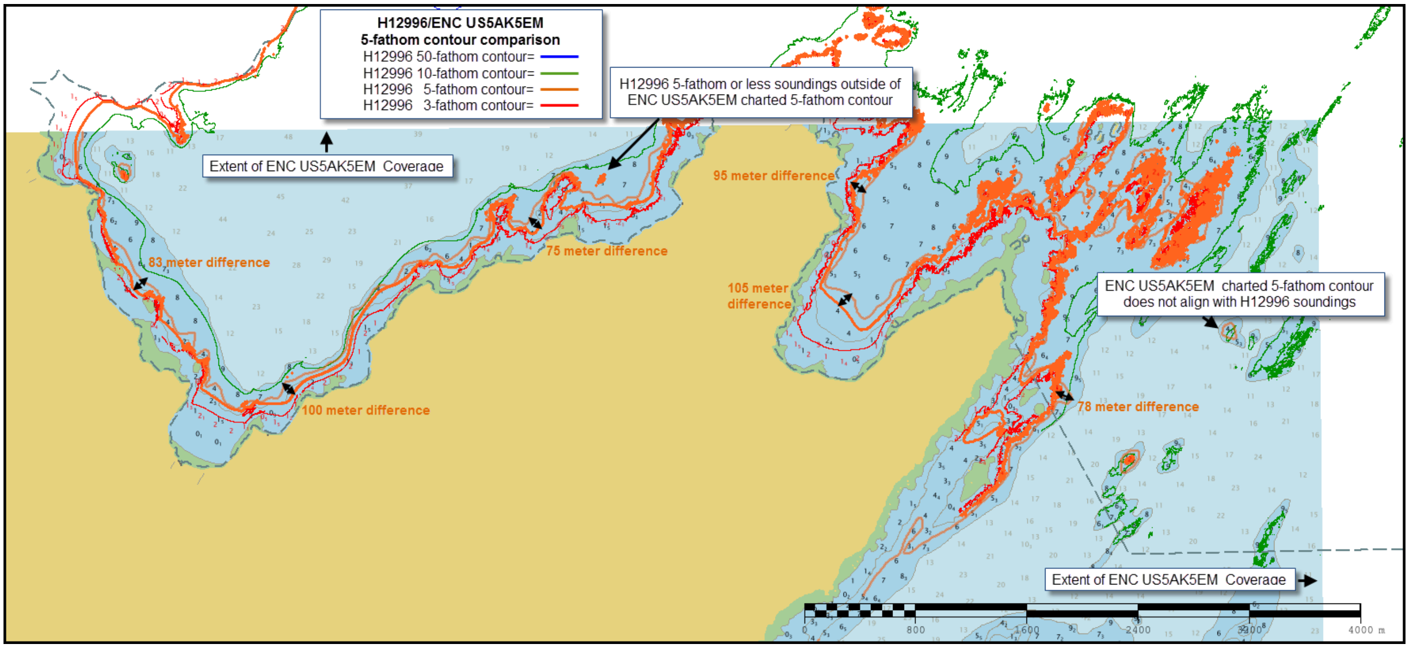


Figure 43: H12996 and ENC US5AK5EM 5-fathom Comparison.

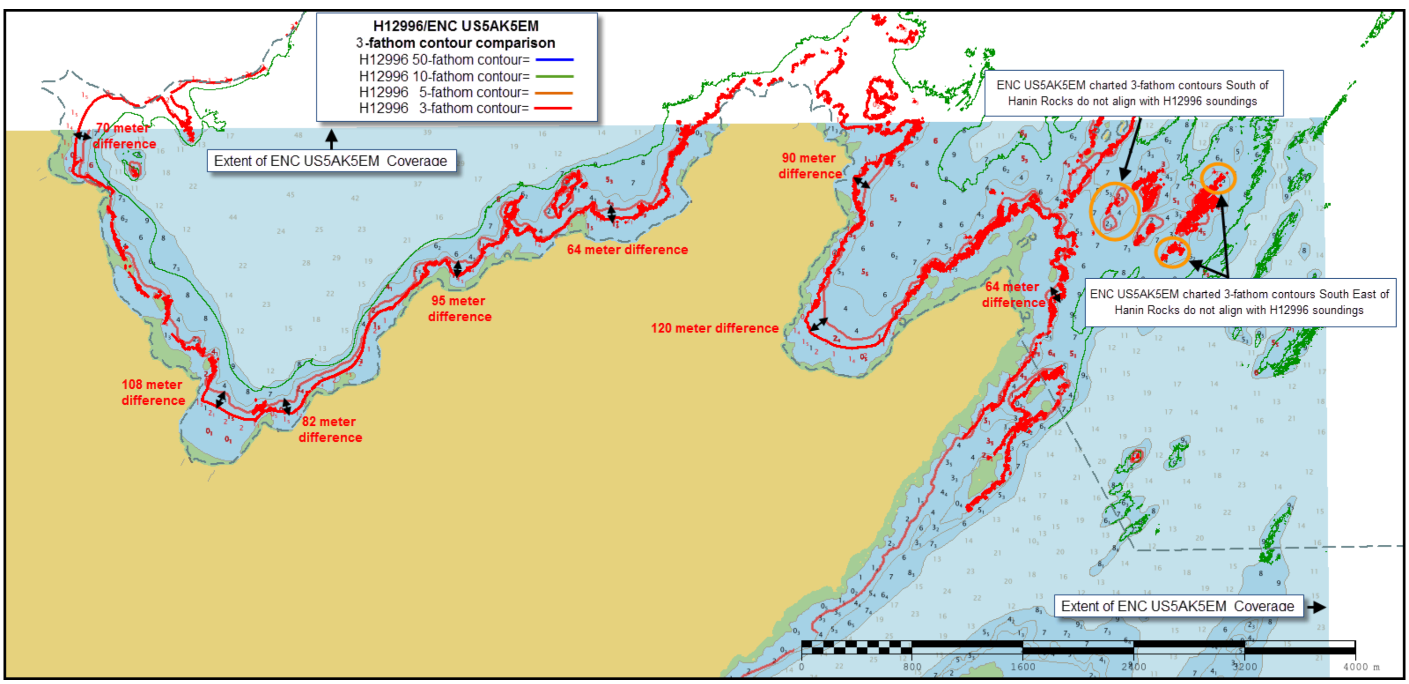


Figure 44: H12996 and ENC US5AK5EM 3-fathom Comparison.

D.1.2 Maritime Boundary Points

No Maritime Boundary Points were assigned for this survey.

D.1.3 Charted Features

A dangerous wreck of unknown depth (PA) is charted at N57-50-58.125291/W152-12-54.453872 (Final Feature File ID 0_000000631400001). Investigation of MBES data did not reveal any unusual artifacts or man made structures on the seabed within the general area of the charted position of this wreck. Approximate average depth in the vicinity of the charted wreck is 22 fathoms (40.0 meters). H12996 MBES data do not support conclusive disproval of the wreck and the feature is recommended for retention.

Do not concur with the recommendation to retain charted wreck. The MB data shows no indications of a wreck in the vicinity. Also in the Final Feature file, the hydrographer recommends removing the charted wreck.

D.1.4 Uncharted Features

No new navigatonally significant features were detected that were not included in the H12996 Final Feature File or elsewhere in this report.

D.1.5 Shoal and Hazardous Features

Four Dangers to Navigation (DTON) were identified in the survey area and submitted in one report. The DTONs were all identified in the vicinity of Hutchinson Reef (Figure 45) The H12996 Danger to Navigation Report is included in Appendix II of this Descriptive Report.

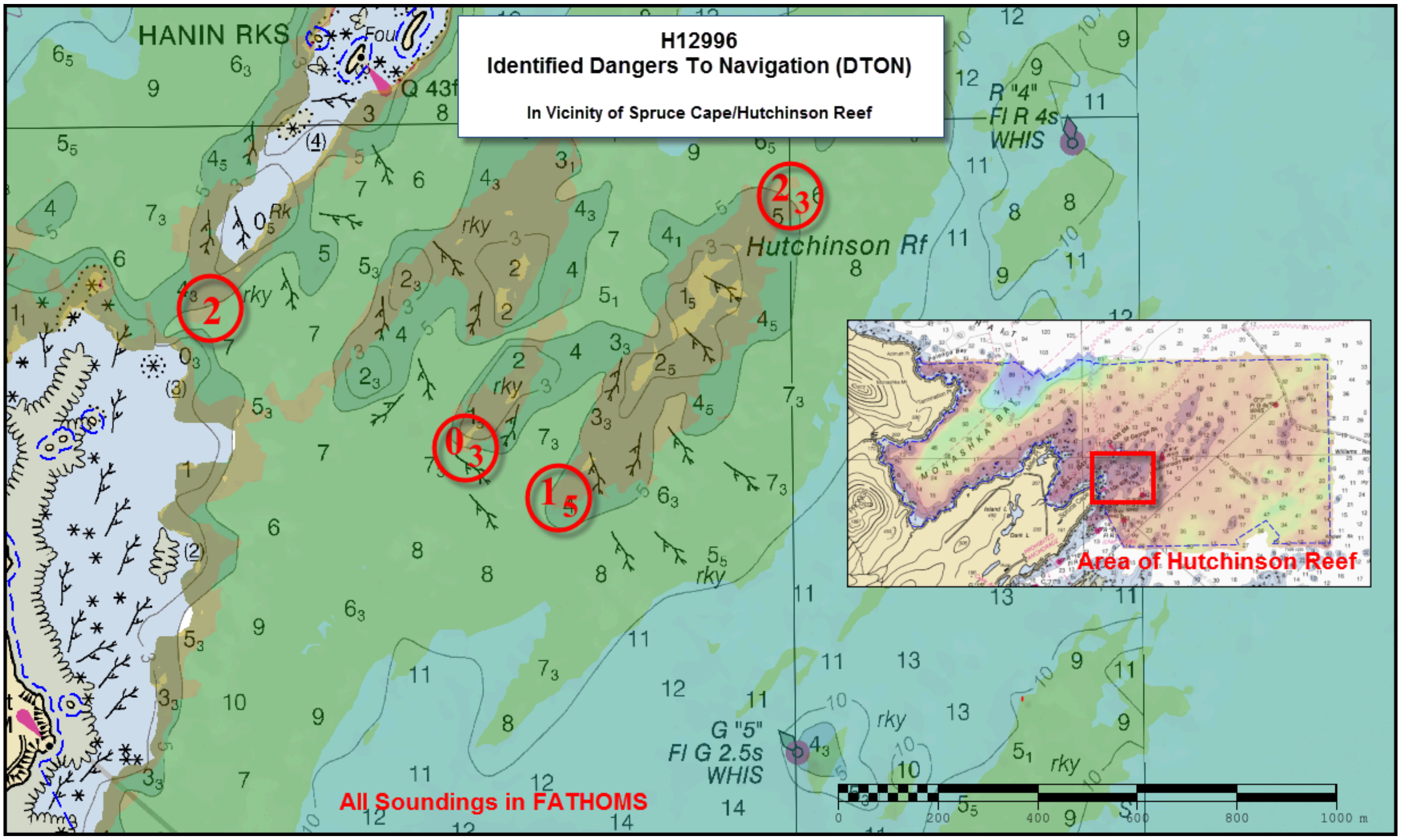


Figure 45: Identified Dangers to Navigation within H12996 Survey Area.

D.1.6 Channels

A channel through the southern portions of the survey area is marked by government Aids to Navigation (ATON) but the channel depths are not federally maintained or controlled. No designated anchorages, precautionary areas, safety fairways, traffic separation schemes, pilot boarding areas, and/or channel and range lines exist within the survey limits.

D.1.7 Bottom Samples

Seven bottom samples were assigned inside the H12996 survey area. One bottom sample was obtained while the six other bottom samples had no success after three attempts. All seven samples were updated in the H12996_Final_Feature_File (FFF).

D.2 Additional Results

D.2.1 Shoreline

Limited shoreline verification was conducted in accordance with applicable sections of the 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 H12996_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

All aids to navigation in the survey area were confirmed to be on station and serving their intended purpose.

D.2.4 Overhead Features

No overhead features exist for this survey.

D.2.5 Submarine Features

Areas for submarine cable routes are charted in Monashka Bay and Mill Bay (RNCs 16594/16595 and ENCs US4AK5PM/US5AK5EM) . No cable crossing signs were observed on the shoreline portions of the survey area and no cable related artifacts were observed in MBES data.

D.2.6 Platforms

No platforms exist for this survey.

D.2.7 Ferry Routes and Terminals

No ferry routes and/or terminals are charted in the survey area but the Alaska Marine Highway system has regular service between port Kodiak and various other locations. Smaller passenger ferries were regularly observed transiting through the survey area while enroute to or from the Woody Island Channel.

D.2.8 Abnormal Seafloor and/or Environmental Conditions

Abnormal seafloor and/or environmental conditions were not observed 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

No new surveys or further investigations are recommended for this area.

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, 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	03/29/2018	Digitally signed by EVANS.BENJAMIN.K.1237217094 Date: 2018.03.29 10:13:45 -07'00'
Scott E. Broo, LT/NOAA	Field Operations Officer	03/29/2018	BROO.SCOTT.EDWARD.1396599976 2018.03.29 17:03:05 -07'00'
James B. Jacobson	Chief Survey Technician	03/29/2018	JACOBSON.JAMES.BRYAN.1269664017 I have reviewed this document 2018.03.29 10:25:27 -07'00'
Gregory J. Gahlinger	Senior Survey Technician	03/29/2018	GAHLINGER.GREGORY.JOS.1100701304 2018.03.29 10:06:35 -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	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
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
PRF	Project Reference File

Acronym	Definition
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
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: H12996
LOCALITY: South of Spruce Island, North Coast of Kodiak Island, AK
TIME PERIOD: April 26 - July 01, 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, H12996, during the period between April 26 and July 01, 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).

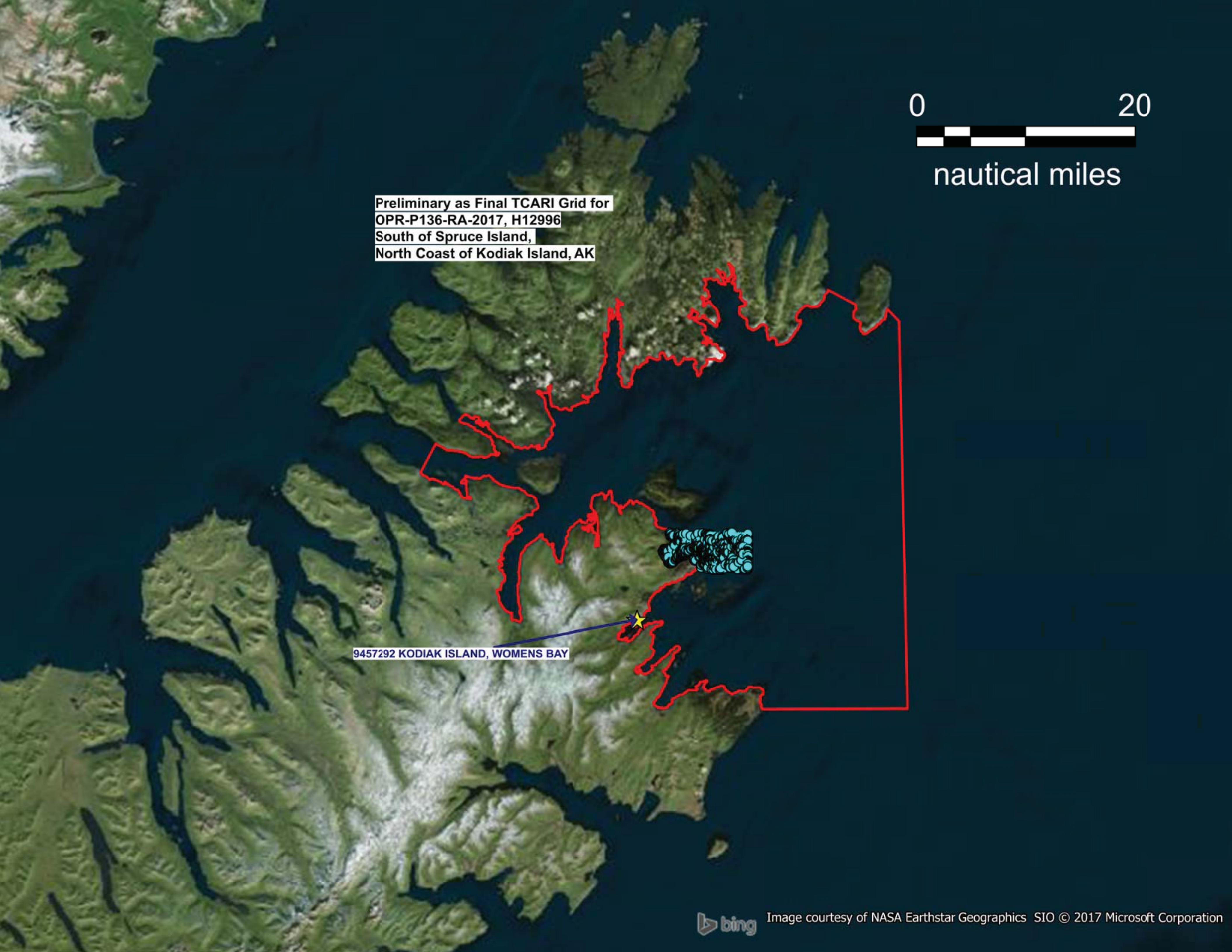
Note 2: Annual leveling for Kodiak Island, AK (9457292) was not completed in FY17. A review of the verified leveling records from May 2006 - May 2016 shows the tide station benchmark network to be stable within an allowable 0.009 m tolerance. This Tide Note may be used as final stability verification 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

BURKE.PATRICK.B.1365830335

Digitally signed by BURKE.PATRICK.B.1365830335
DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=OTHER, cn=BURKE.PATRICK.B.1365830335
Date: 2017.08.11 10:19:55 -04'00'

CHIEF, OCEANOGRAPHIC DIVISION


0
20
nautical miles
Preliminary as Final TCARI Grid for
OPR-P136-RA-2017, H12996
South of Spruce Island,
North Coast of Kodiak Island, AK
9457292 KODIAK ISLAND, WOMENS BAY
bing
Image courtesy of NASA Earthstar Geographics SIO © 2017 Microsoft Corporation

Barry Jackson - NOAA Federal <barry.jackson@noaa.gov>

Re: Necessary Discussion About RAINIER Surveys

1 message

Scott Broo - NOAA Federal <scott.e.broo@noaa.gov> Thu, Feb 22, 2018 at 10:50 AM
To: Kathryn Pridgen - NOAA Federal <kathryn.pridgen@noaa.gov>
Cc: Grant Froelich <grant.froelich@noaa.gov>, OPS - Rainier <ops.rainier@noaa.gov>, Corey Allen <corey.allen@noaa.gov>, Olivia Hauser <olivia.hauser@noaa.gov>, CO - Rainier <co.rainier@noaa.gov>, CST RAINIER <chiefst.rainier@noaa.gov>, Andrew Clos <andrew.clos@noaa.gov>, Gregory Gahlinger - NOAA Federal <gregory.gahlinger@noaa.gov>, Barry Jackson <barry.jackson@noaa.gov>, Martha Herzog - NOAA Federal <martha.herzog@noaa.gov>

Katy,

Received. Thank you to HSD and PHB for agreeing with our proposal.

Regards,

Scott

On Thu, Feb 22, 2018 at 10:42 AM, Kathryn Pridgen - NOAA Federal <kathryn.pridgen@noaa.gov> wrote:

> Broo,
> Please submit these two surveys (H12996 and H12997) according to the coverage requirements as assigned in the project instructions. In the DR, please acknowledge that the holidays exist, why you suspect they occurred, and explain, to your best ability,that no navigationally significant features were missed within the holiday. PHB has been consulted about these holidays and will do their best with the situation at the processing branch.
>
> Thank you,
> Katy
>
> --
> Kathryn "Katy" Pridgen
> Physical Scientist
> NOAA-HSD OPS
> 240-533-0033
> kathryn.pridgen@noaa.gov
>
> On Wed, Feb 14, 2018 at 8:01 PM, Scott Broo - NOAA Federal <scott.e.broo@noaa.gov> wrote:
>
>> Katy,
>>
>> The holidays in H12997 are similar to the holidays in H12996. I haven't had a chance to take as close a look at those. There are about 600 of them. Again though, very small, low-density based holidays, not acoustic shadows, blowouts, etc.
>>
>> Scott
>>
>> On Wed, Feb 14, 2018 at 7:37 AM, Kathryn Pridgen - NOAA Federal <kathryn.pridgen@noaa.gov> wrote:
>>
>>> Scott,
>>> We are further discussing this at OPS and we had a few more questions:
>>>
>>> 1) What was the grid resolution on the VR grid. Possibly the VR surface is gridding at a too high of a resolution and these are false holidays, as in the holidays are actually in .25 resolution.   It will grid to what density allows, unless you specify the minimum resolution.
>>>
>>> 2) How does H12997 look in comparison to H12996 for holidays?
>>>
>>> Thanks,

Katy

Kathryn "Katy" Pridgen
Physical Scientist
NOAA-HSD OPS
240-533-0033
kathryn.pridgen@noaa.gov

On Tue, Feb 13, 2018 at 7:04 PM, Scott Broo - NOAA Federal <scott.e.broo@noaa.gov> wrote:

> Grant,
>
> Thanks for the quick reply. While I agree that this holiday is in a depression between shoaler areas, I don't believe this is an acoustic shadow (see image, the holiday area is in the yellow box). There are many of these though (1,543 certain holidays by the last QC Tools count), and they're indicative of us either not properly QC'ing our data while we were on project, or not having the proper tools to, which is a big lesson learned. Because of the sheer number of these, we wanted to put this issue forward to see if there is any mitigation needed before we proceed with the final steps.
>
> Thanks,
>
> Scott
>
> P.S. The 1,543 certain holidays are those located on the object detection VR grid created to encompass the four object detection areas of this survey. The first slide of the presentation I sent shows how much of this sheet that represents, and the second slide shows the distribution of object detection holidays in that surface. Note that many of them, perhaps most, are in complete coverage areas.
>
> On Tue, Feb 13, 2018 at 2:57 PM, Grant Froelich <grant.froelich@noaa.gov> wrote:
>
>> Image attached this time
>>
>> --
>> Grant Froelich
>> Hydrographic Team Lead
>> NOAA's National Ocean Service
>> Office of Coast Survey, Hydrographic Surveys Division
>> Pacific Hydrographic Branch, N/CS34
>> 7600 Sand Point Way N.E.
>> Seattle, WA 98115-6349
>>
>> w: (206)526-4374 | grant.froelich@noaa.gov
>>
>>> On 2/13/2018 2:55:19 PM, Grant Froelich <grant.froelich@noaa.gov> wrote:
>>>
>>> Scott,
>>>
>>> In the attached image from your powerpoint, it appears as if the 14x8 m holiday is caused by acoustic shadowing. The light yellow swath looks to be cut out because of the depression following the rise. If this is the case, PHB has always accepted that these holidays are acceptable because to have an acoustic shadow, you must have a depression on the outside of a rise. Because you have captured the rise within the same swath, you have by definition captured the high point of the area and no other navigationally significant shoals can be present.
>>>
>>> I can't say anything about the other holidays but at least in this case, PHB would note the holiday in the checklist but would not look at this the same way as if you did not get coverage over the top of a submerged navigationally significant rock.
>>>
>>> grant
>>>
>>> --

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On 2/13/2018 2:42:07 PM, RA OPS <ops.rainier@noaa.gov> wrote:

All,

Please see the attached powerpoint presentation, further describing the issue through images and annotation. What's important to keep in mind is that this survey meets object detection specifications where necessary, and meets complete coverage specifications elsewhere. That said, the presence of many object detection holidays was significant enough for us to desire a consultation with PHB and the project management team at HSD about the appropriate way to proceed. The attached presentation should stand on its own, through the notes I included, but please let me know if you have any questions about any of the slides.

To answer Katy's questions in the email below, the holidays are all rather small. One among the most egregious, which is shown in the presentation, is 14m x 8m, but is really 4 holidays which are each 2m wide and 7-14m long. We inspected the area with the subset viewer in Caris and observed swath data bisecting the larger holidays. There are large enough gaps between swath data, collected at times while the launch was pitching and yawing in a heavier than typical sea state, to create true holidays. Other holidays are representative of poor data density, but the highlighted issue in this presentation is that of gaps between swaths of bathy data.

I don't anticipate that opening up the range of the minimum resolution (i.e. 16-40m vs. 18-40m) would be worth exploring. It would take care of some holidays, to be sure, but I think we can explain all of these in a way which provides confidence that we didn't miss any significant features. Furthermore, this would only be possible if we were to provide single resolution surfaces, correct? We're intending to submit a VR surface, and I'm not sure it's worth pulling strings in the Range/Resolution File needed for appropriate surface generation. I'm afraid it may create more problems than it solves.

Perhaps a waiver isn't needed, I hope. But this is an issue we felt consulting about with our shore side support folks before we package this up and submit it for review and acceptance. And again, these surveys technically meet density specs, helped no doubt, by the presence of so many small holidays which aren't considered in a density assessment (do I have that correct?).

Thanks,

Scott

On 2/13/2018 8:56 AM, Kathryn Pridgen - NOAA Federal wrote:

> Scott
> Can you send me more information? Some screen shots of the holidays in question would be great. How big are the holidays? Also, how did you inspect the data to ensure there were no features in the holiday areas? Backscatter? Just visually inspect the grid and soundings and see that it was flat around the holiday? Since RA says the holidays were on right at the end of the OD coverage, would the holidays be mitigated if they extended 1m and 2m 1-2m shoaler? For instance, if the 1m grid were extended down to 17-40m (instead of 18-40), and 35-80 (instead of 36-80) for the 4m grid, would that wipe the holidays? I know we discussed this as a possible option, what holidays

(and sizes) would be left over if we just extended the depth ranges and required resolution?
We are just starting to dig into this and decide what kind of waiver we need. Please send more information and any other suggestions you may have for this issue.

Katy

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On Fri, Feb 9, 2018 at 6:01 PM, OPS RAINIER <ops.rainier@noaa.gov> wrote:

> Katy,
>
> My apologies. I mis-typed your email address.
>
> Scott
>
> -------- Forwarded Message --------
> **Subject:** Necessary Discussion About RAINIER Surveys
> **Date:** Fri, 9 Feb 2018 15:00:34 -0800
> **From:** OPS RAINIER <Ops.Rainier@noaa.gov>
> **To:** Corey Allen - NOAA Federal <corey.allen@noaa.gov>, kathryn.pridgen@noa.gov, olivia.hauser@noaa.gov, grant.froelich@noaa.gov, co.rainier@noaa.gov, chiefst.rainier@noaa.gov
> **CC:** andrew.clos@noaa.gov, scott.e.broo@noaa.gov, gregory.gahlinger@noaa.gov, barry.jackson@noaa.gov
>
> All,
>
> A discussion is necessary regarding holidays in the areas where RAINIER surveyed to Object Detection specifications in 2017. This is isolated to portions of sheet H12996 and all of H12997. The issue is the presence of holidays, particularly in the deep ends of the 0.5m and 1.0m resolution object detection depth ranges (i.e. approaching 18m and 36m). These holidays are primarily away from nadir and caused by poor data density due to pitching and yawing. Additionally, they tend to be narrow, and do not suggest that any navigationally significant features were missed. The fact that we missed them until recently is regrettable. We have theories about how we missed them while on project, and naturally shifted our focus after departing the project area, but this email is not about that. We want to discuss the way forward.
>
> We recognize there are a few options:
>
> 1. Proceed with holding these surveys to Object Detection specifications, and write a statement in the DRs describing what happened. We believe these surveys remain valid and that all dangerous features were detected. This is RA's preferred option.
>
> 2. Request that these surveys be accepted at Complete Coverage specifications instead. Nearly all of the holidays will be resolved by

affecting this change. RA may be able to provide enough information about the bathymetry to justify this change, if it is worth exploring.

The following two options are included only because they are technically possible, and will naturally cross the mind of anyone included here, but they carry significant adverse effects which should discourage their acceptance.

3. Reject the surveys for not meeting specifications and resurvey at a later date. RA believes the data collected have enough value to dismiss this idea.

4. Fill holidays as early as late April, when RA returns to the vicinity of the project area. The complications associated with this idea should be deemed prohibitive. Such an effort would distract from new acquisition and quality control, would require a special or additional DAPR (further delaying submission), would be complicated from a Fleet Allocation Plan perspective, and would further complicate the status of these two surveys. RA proposes this idea be rejected.

In summary, RA proposes that these surveys be submitted, and without the collection of any new data.

Respectfully,

LT Scott Broo

--
Very Respectfully,

Lieutenant Scott E. Broo, NOAA
Operations Officer
NOAA Ship RAINIER
2002 SE Marine Science Drive
Newport, OR 97365

Ship: 541-272-9430
Cell: 248-302-0689

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Very Respectfully,

Lieutenant Scott E. Broo, NOAA
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--
Very Respectfully,

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APPROVAL PAGE

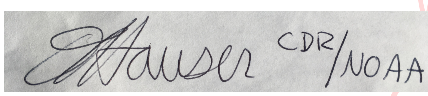
H12996

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.



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Approved:____

Commander Olivia Hauser, NOAA
Chief, Pacific Hydrographic Branch