H13082

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

DESCRIPTIVE REPORT

Type of Survey:	Navigable Area
Registry Number:	H13082

LOCALITY

State(s):	California
General Locality:	Channel Islands National Marine Sanctuary
Sub-locality:	Adams Cove to Westcott Shoal

2017

CHIEF OF PARTY
Benjamin K. Evans, CDR/NOAA

LIBRARY & ARCHIVES

Date:

U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION	REGISTRY NUMBER:
HYDROGRAPHIC TITLE SHEET	**H13082**

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):	**California**
General Locality:	**Channel Islands National Marine Sanctuary**
Sub-Locality:	**Adams Cove to Westcott Shoal**
Scale:	**20000**
Dates of Survey:	**10/06/2017 to 11/05/2017**
Instructions Dated:	**08/25/2017**
Project Number:	**OPR-L397-RA-17**
Field Unit:	**NOAA Ship Rainier**
Chief of Party:	**Benjamin K. Evans, 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 H13082

Project: OPR-L397-RA-17

Locality: Channel Islands National Marine Sanctuary

Sublocality: Adams Cove to Westcott Shoal

Scale: 1:20000

October 2017 - November 2017

NOAA Ship Rainier

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

A. Area Surveyed

The survey area is referred to as H13082, "Adams Cove to Westcott Shoals" (sheet 1) within the Project Instructions. The area encompasses approximately 15 square nautical miles of San Miguel Island's western coast, extending from Oil Point and around Point Bennett to Tyler Bight.

A.1 Survey Limits

Data were acquired within the following survey limits:

Northwest Limit	Southeast Limit
34° 6' 3.28" N 120° 29' 10.34" W	33° 59' 28.31" N 120° 23' 28.04" W

Table 1: Survey Limits

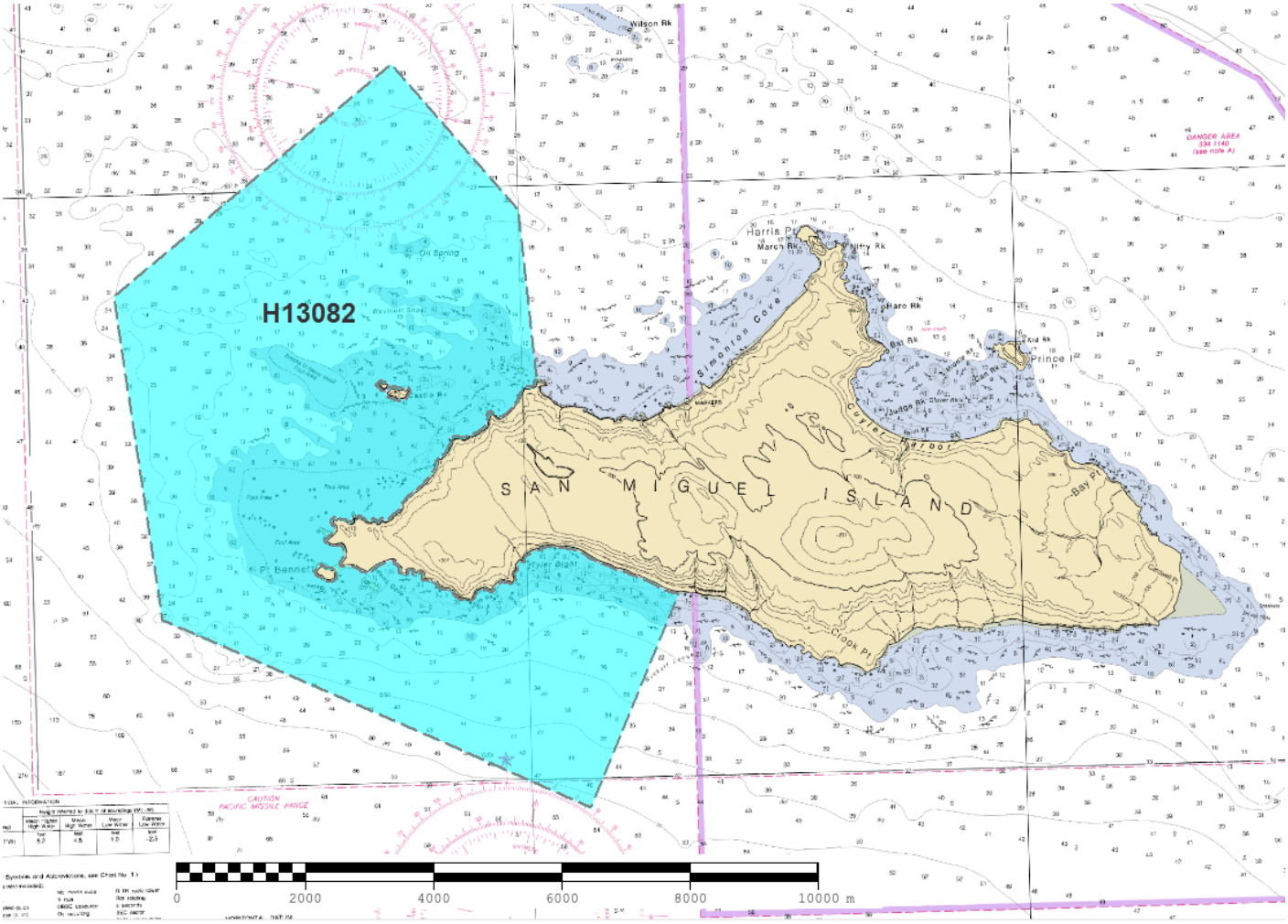


Figure 1: H13082 assigned survey area (Chart 18727).

Data were acquired within the assigned survey limits as required in the Project Instructions and HSSD.

A.2 Survey Purpose

The harbors around the Channel Islands National Marine Sanctuary (CINMS) are home to a highly productive abundance of sea life and aquatic habitats that drive a thriving recreational and commercial fishing industry. The sanctuary also regularly hosts kayakers, divers, surfers, sightseers, whale watchers, researchers, and Channel Islands National Park concessionaires, all of whom access the sanctuary via boats. Additionally, large cargo and tanker vessels transiting from Los Angeles and Long Beach, CA are routed close to CINMS boundaries. The area encompassing survey H13082 is a popular fishing and diving location but has numerous charted foul areas. In addition to providing data for crucial nautical chart updates, this survey will also generate backscatter data that will be used in habitat mapping and substrate analysis. The multibeam and backscatter data collected in this survey will enhance marine navigational safety and aid sanctuary managers, planners, and researchers in their conservation efforts.

A.3 Survey Quality

The entire survey is adequate to supersede previous data.

Pydro QC Tools 2 Grid QA was used to analyze H13082 multibeam echosounder (MBES) data density. The submitted H13082 variable-resolution (VR) met HSSD density requirements as shown in the histogram below.

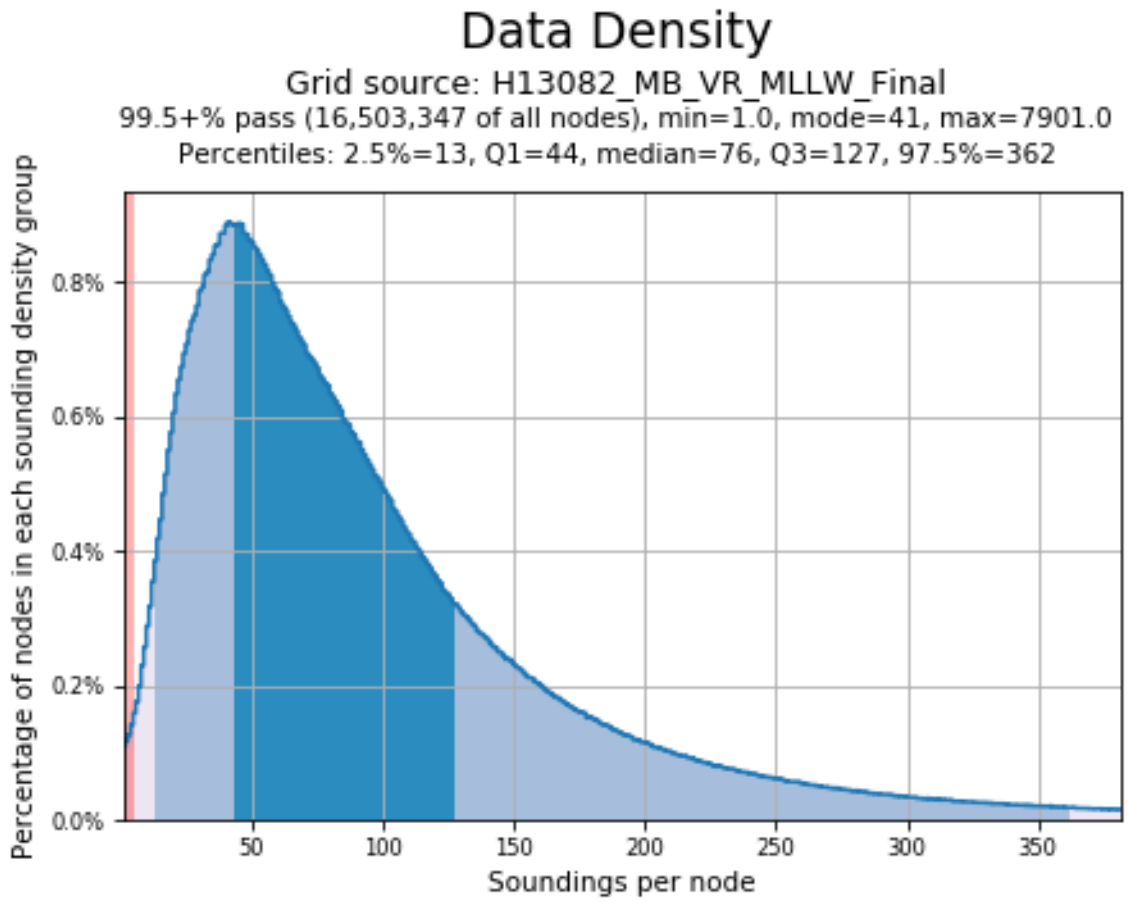


Figure 2: Pydro derived plot showing HSSD density compliance of H13082 finalized variable-resolution MBES data.

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 areas	Complete Coverage (refer to HSSD Section 5.2.2.3)

Complete multibeam echosounder (MBES) coverage was acquired to the inshore limit of hydrography, the 4-meter Navigable Area Limit Line (NALL). Areas where survey coverage did not meet the NALL or the assigned sheet limits was due to the survey vessel reaching the inshore extent of safe navigation as shown in Figure 3. These areas are characterized as being very near shore and subject to hazards such as dangerous wave action or thick kelp. Survey coverage was extended beyond the assigned sheet limits in the south to junction with the BELL M. SHIMADA survey W00320, which is detailed later in this report.

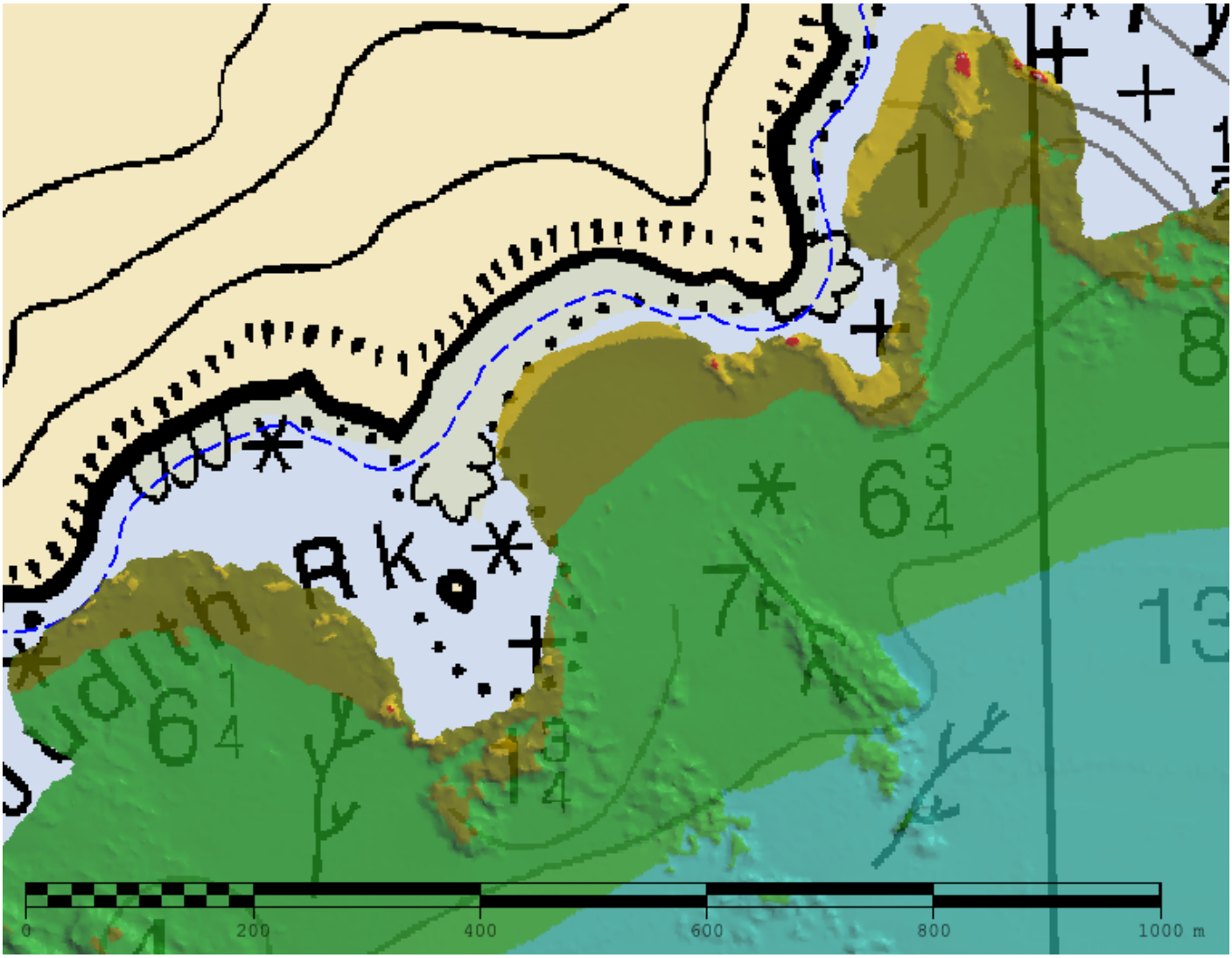


Figure 3: Example of Navigable Area Limit Line (NALL) determination southwest of Tyler Bight; the blue dashed line indicates assigned sheet limits and yellow indicates where the 4-meter contour was reached.

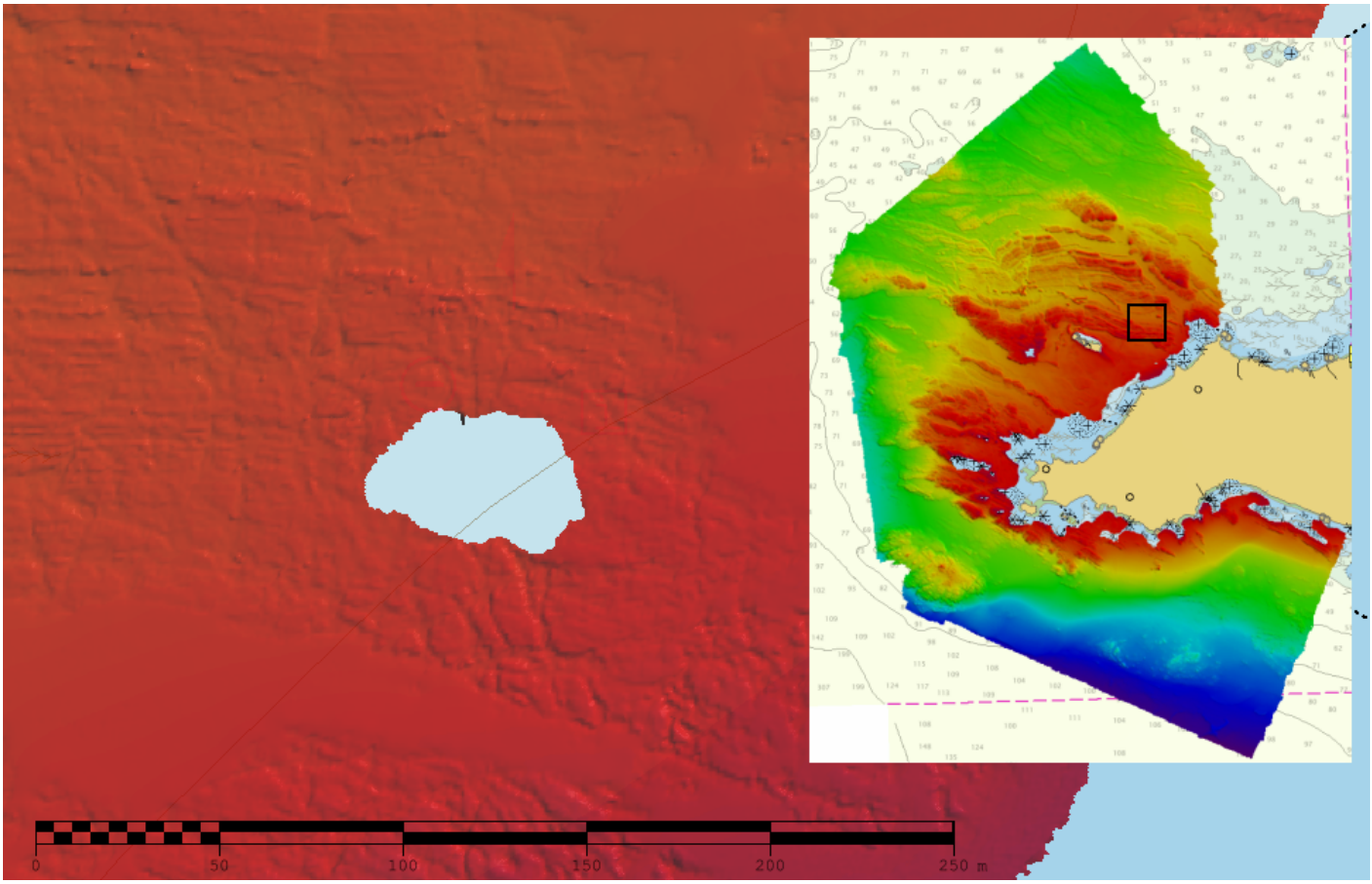


Figure 4: Holiday was caused by excessive kelp and unsafe conditions approaching the shoreline. The shoalest sounding recorded around the holiday is 7.9 meters.

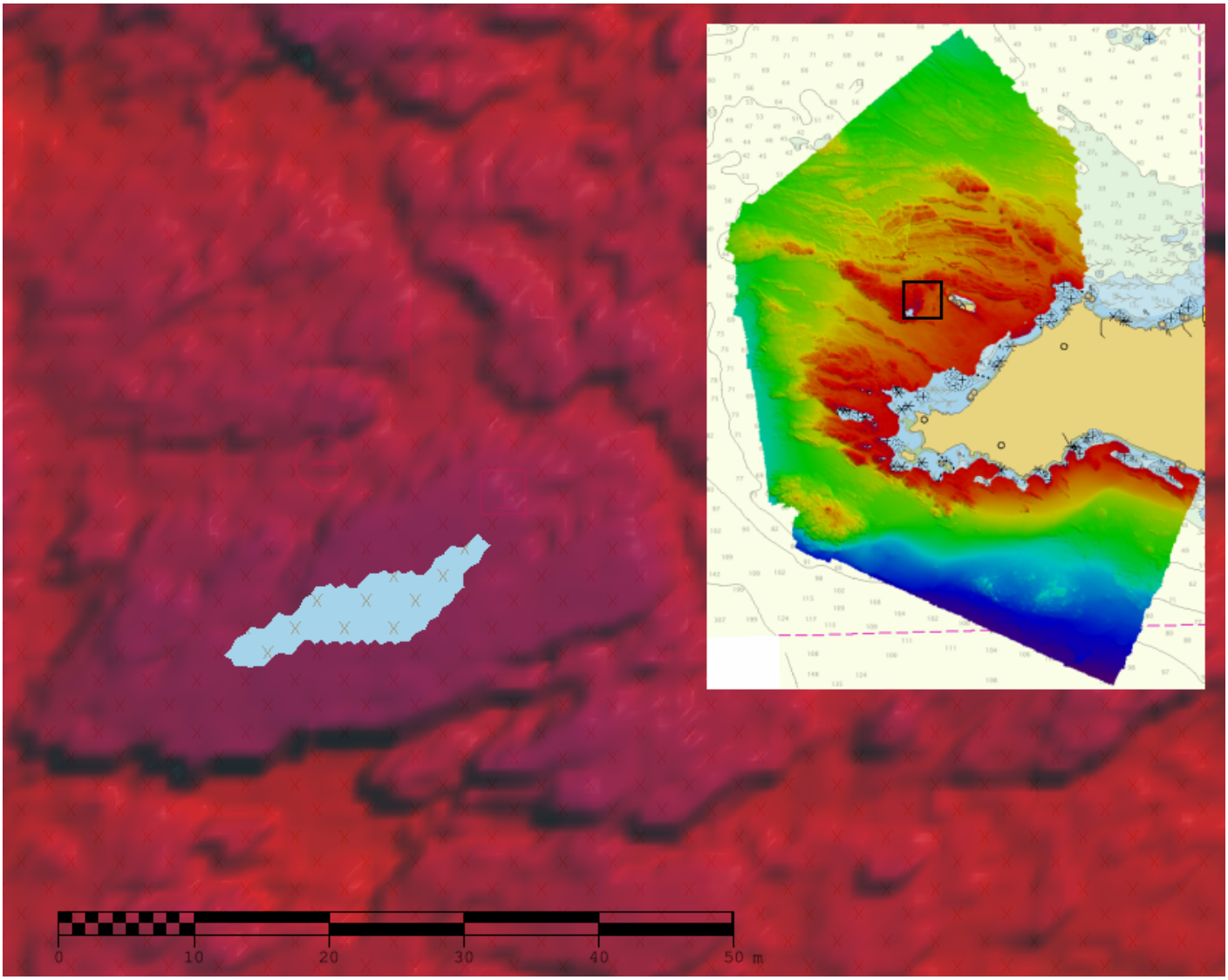


Figure 5: Holiday was caused by unsafe conditions over the top of the rock. The shoalest sounding recorded around the holiday is 1.3 meters.

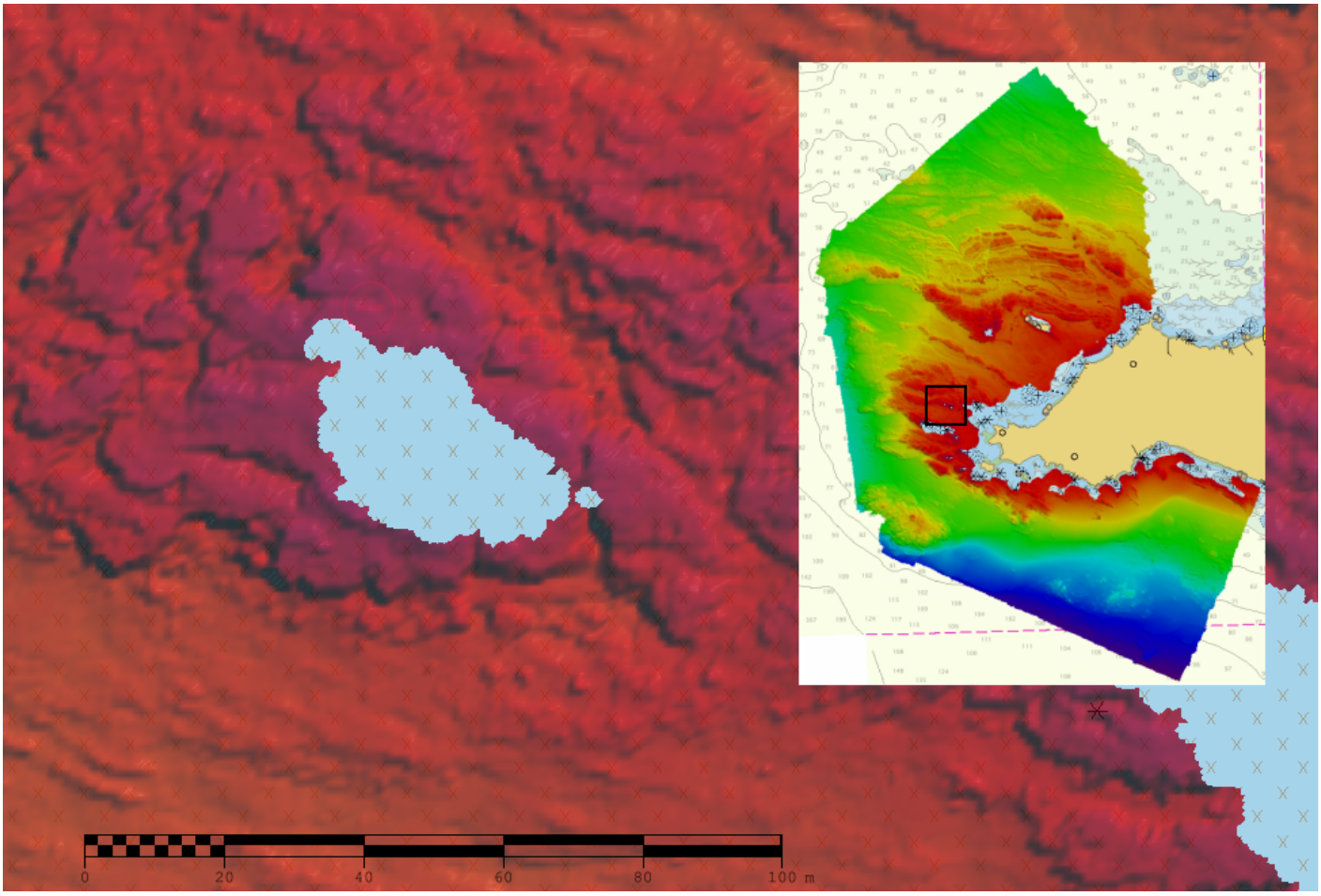


Figure 6: Holiday was caused by unsafe conditions over the top of the rocks. The shoalest sounding recorded around the holiday is 1.7 meters.

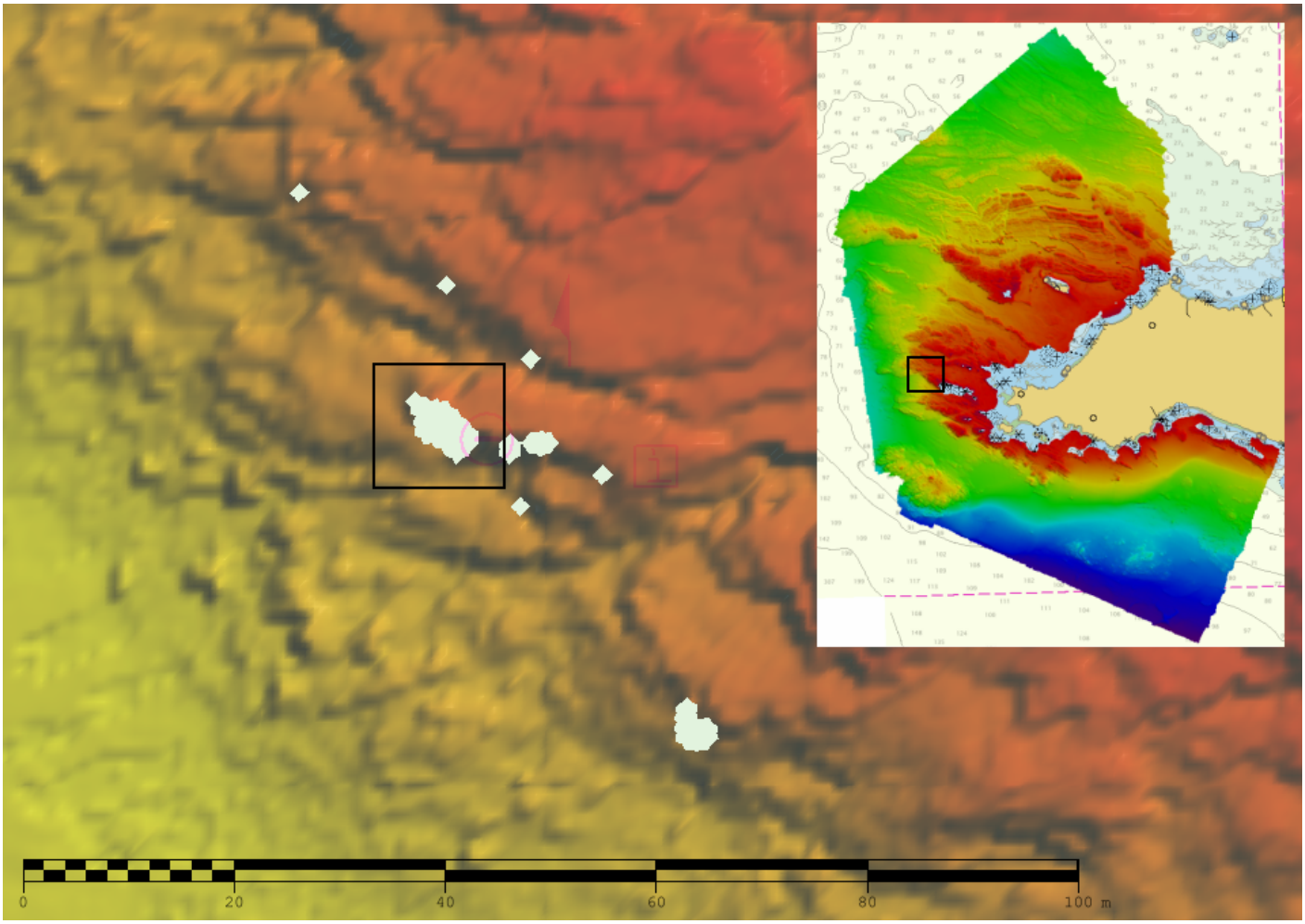


Figure 7: Holiday was caused by an acoustic shadow on the downslope side of a rock ledge in the sonar's outer beams. The shoalest sounding recorded on the top of the ledge is 14.9 meters.

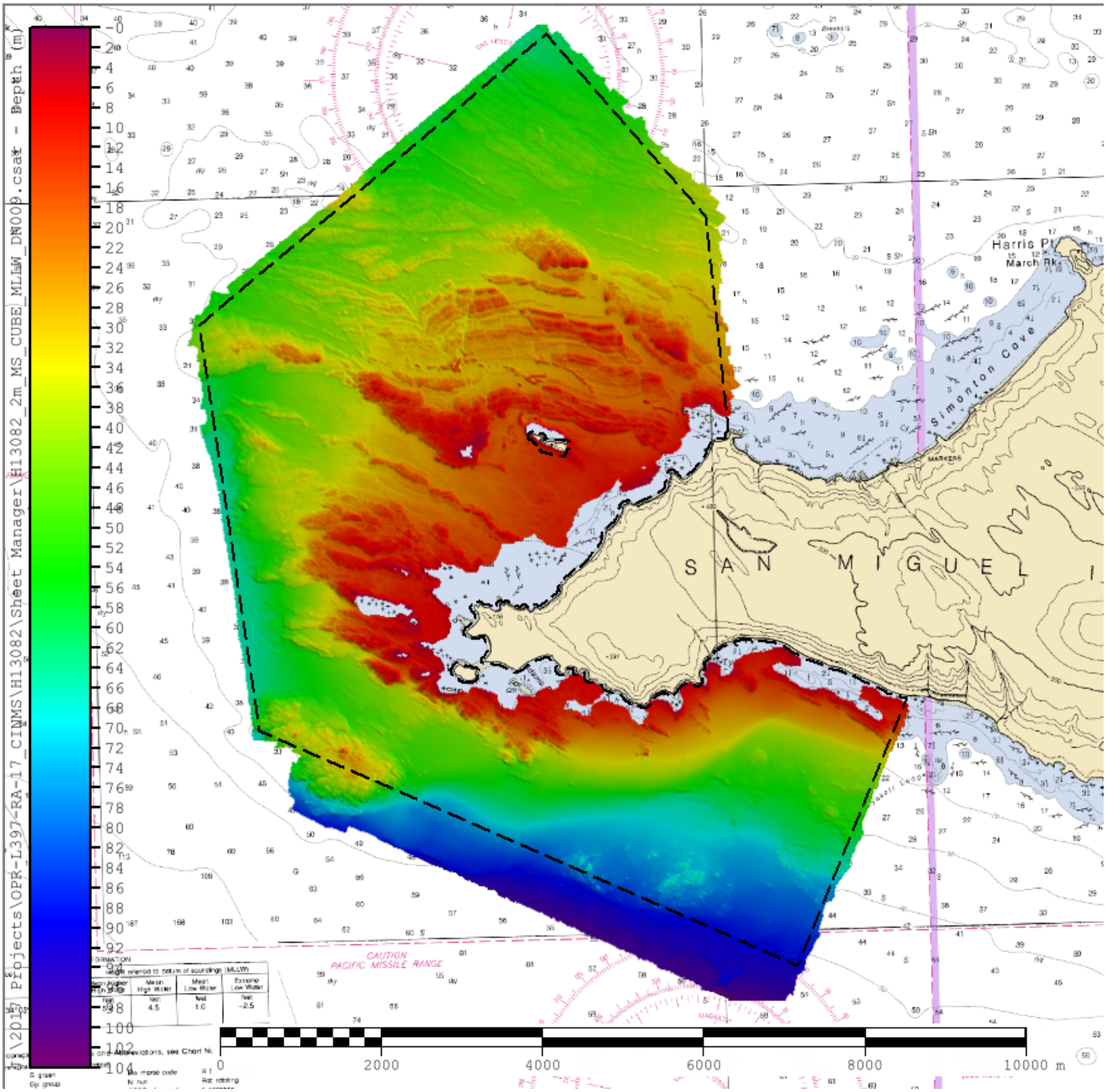


Figure 8: H13082 MBES coverage and assigned survey limits (Chart 18272). Coverage extends approximately 0.4 nautical miles beyond the southern sheet limits to junction with the BELL M. SHIMADA survey W00320.

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	59.93	36.31	148.49	142.33	387.06
	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	28.20	0	7.03	35.23
	Lidar Crosslines	0	0	0	0	0
Number of Bottom Samples						0
Number Maritime Boundary Points Investigated						0
Number of DPs						14
Number of Items Investigated by Dive Ops						0
Total SNM						16.11

Table 2: Hydrographic Survey Statistics

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

Survey Dates	Day of the Year
10/06/2017	279
10/07/2017	280
10/10/2017	283
10/25/2017	298
10/26/2017	299
11/01/2017	305
11/02/2017	306
11/03/2017	307
11/04/2017	308
11/05/2017	309

Table 3: 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	*2801*	*2802*	*2803*	*2804*	*1905*	*1907*
LOA	8.8 meters	8.8 meters	8.8 meters	8.8 meters	5.7 meters	5.7 meters
Draft	1.1 meters	1.1 meters	1.1 meters	1.1 meters	0.35 meters	0.35 meters

Table 4: Vessels Used

Figure 9: NOAA Ship Rainier survey launch 2801 (RA-4).

All data for H13082 were acquired by NOAA Ship RAINIER survey launches 2801, 2802, 2803, and 2804. The vessels acquired depth soundings, backscatter imagery, and sound speed profiles. Shoreline verification was conducted from RAINIER skiffs 1905 and 1907.

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
Kongsberg	2040	MBES
Reson	SVP71	Sound Speed System
Sea-Bird Electronics	SBE 19Plus SEACAT Profiler	Conductivity, Temperature, and Depth Sensor

Table 5: Major Systems Used

B.2 Quality Control

B.2.1 Crosslines

Crosslines acquired for this survey totaled 9.10% of mainscheme acquisition.

RAINIER launches 2802 (RA-5) and 2804 (RA-6) acquired 35.23 nautical miles of multibeam crosslines. H13082 crossline data is adequate for verifying and evaluating the internal consistency of survey data. The Compare Grids function in Pydro Explorer analyzed 2-meter resolution surfaces of H13082 crossline only data and combined mainscheme/crossline data. In the difference surface, 99% of nodes met IHO allowable Total Vertical Uncertainty (TVU) standards. Figures 10-13 provide additional results.

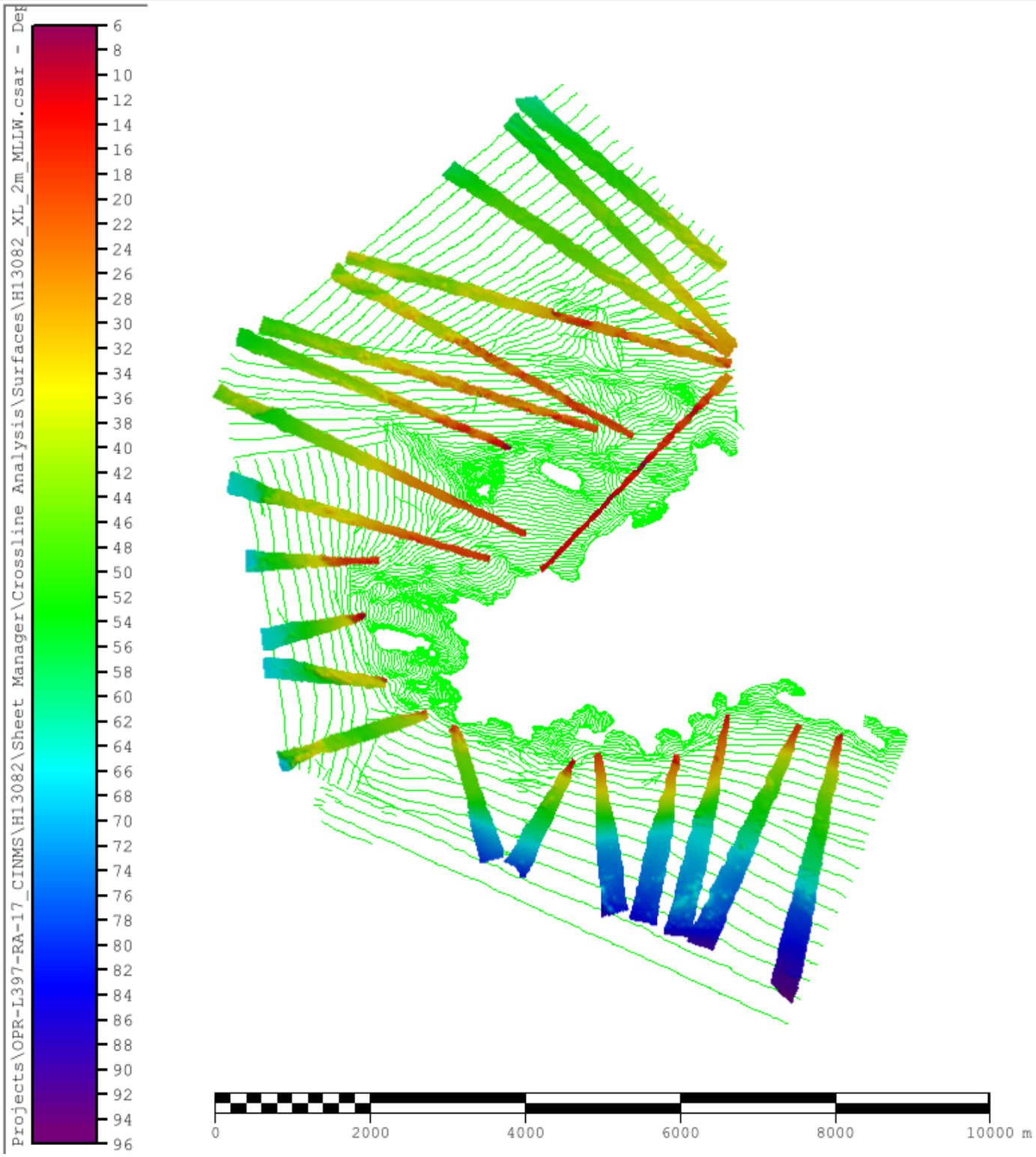


Figure 10: H13082 crossline surface overlaid on mainscheme tracklines.

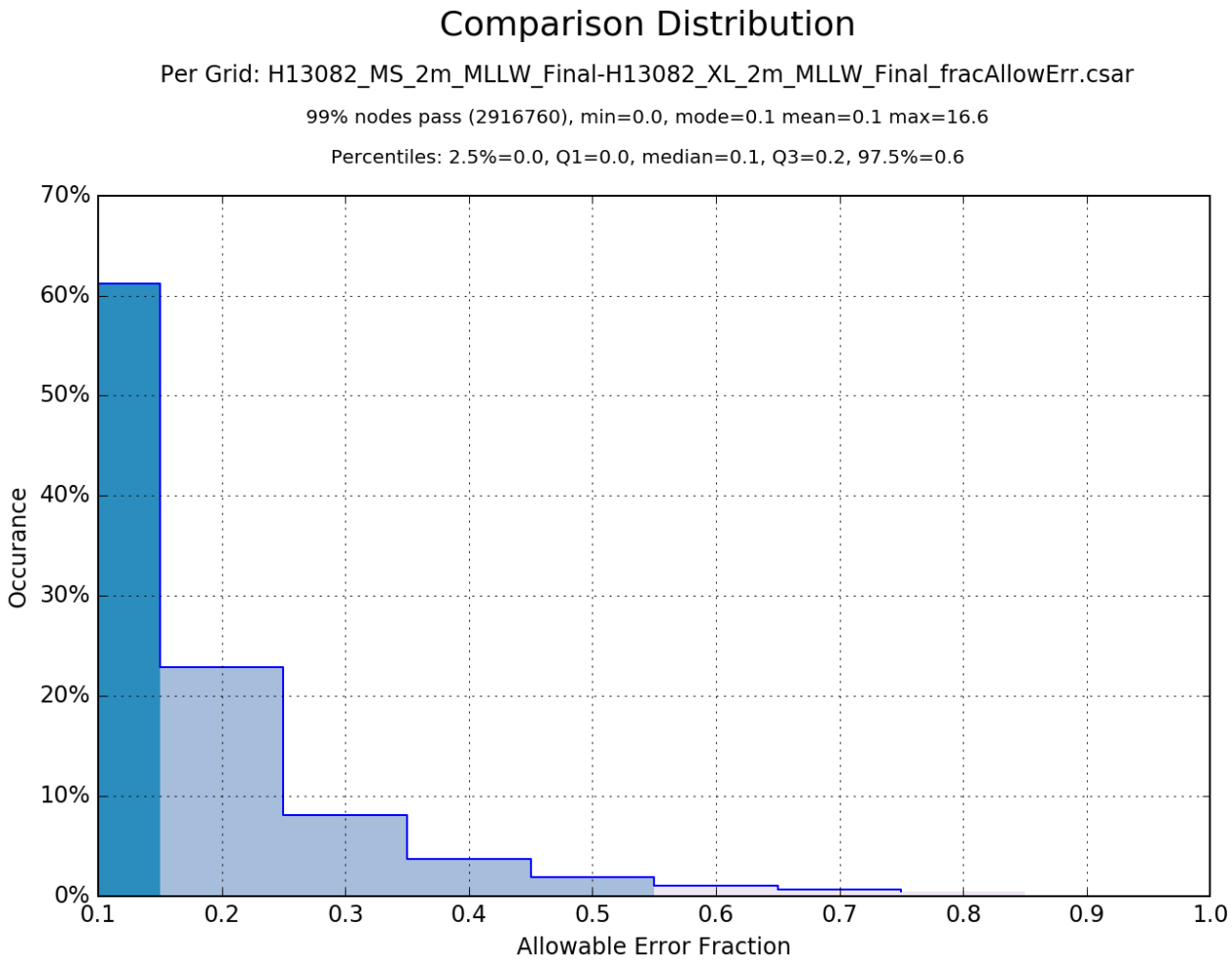
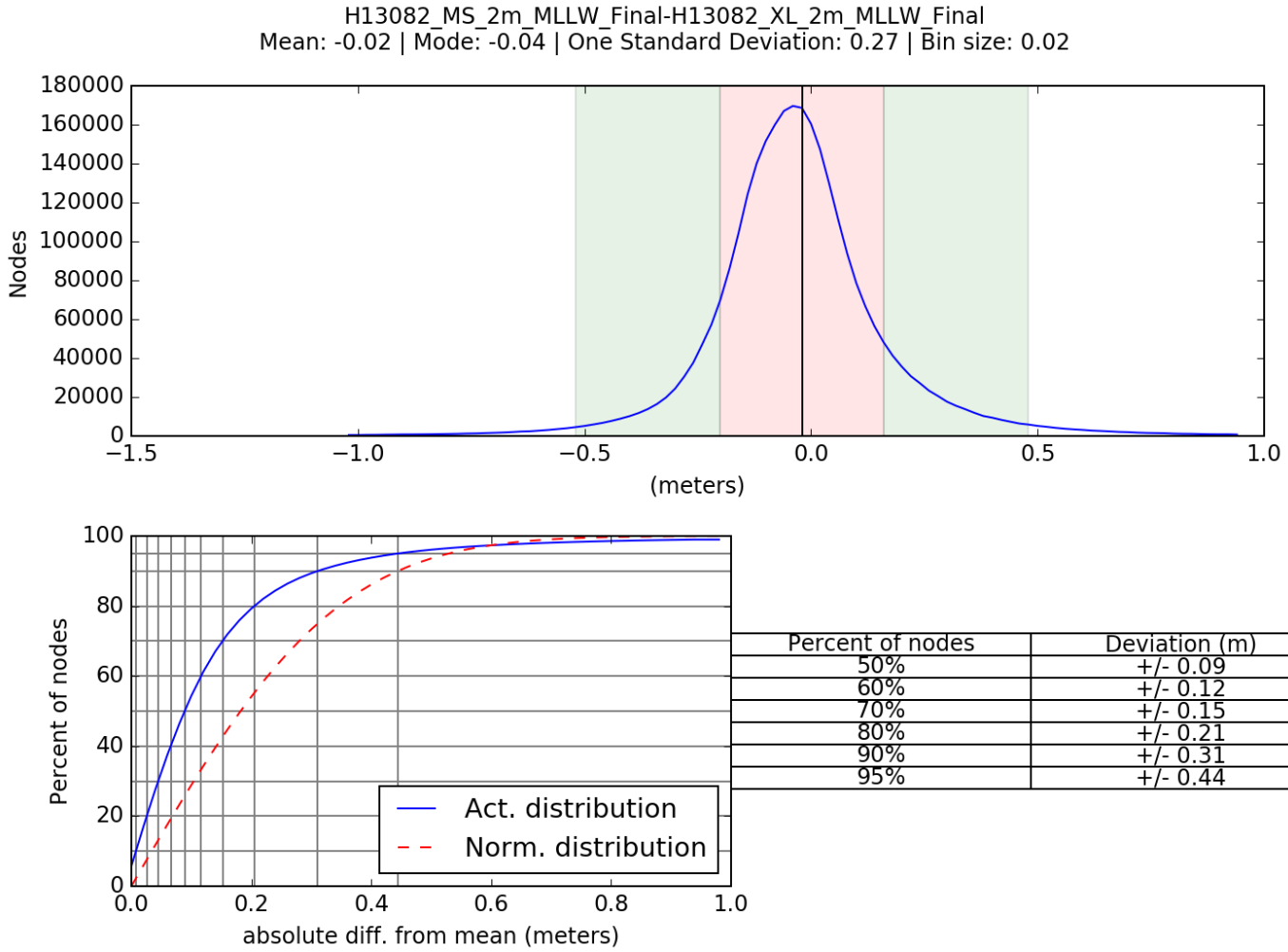


Figure 11: Pydro derived plot showing percentage-pass value of H13082 mainscheme to crossline data.



Percent of nodes	Deviation (m)
50%	+/- 0.09
60%	+/- 0.12
70%	+/- 0.15
80%	+/- 0.21
90%	+/- 0.31
95%	+/- 0.44

Figure 12: Pydro derived plot showing absolute difference statistics of H13082 mainscheme to crossline data.

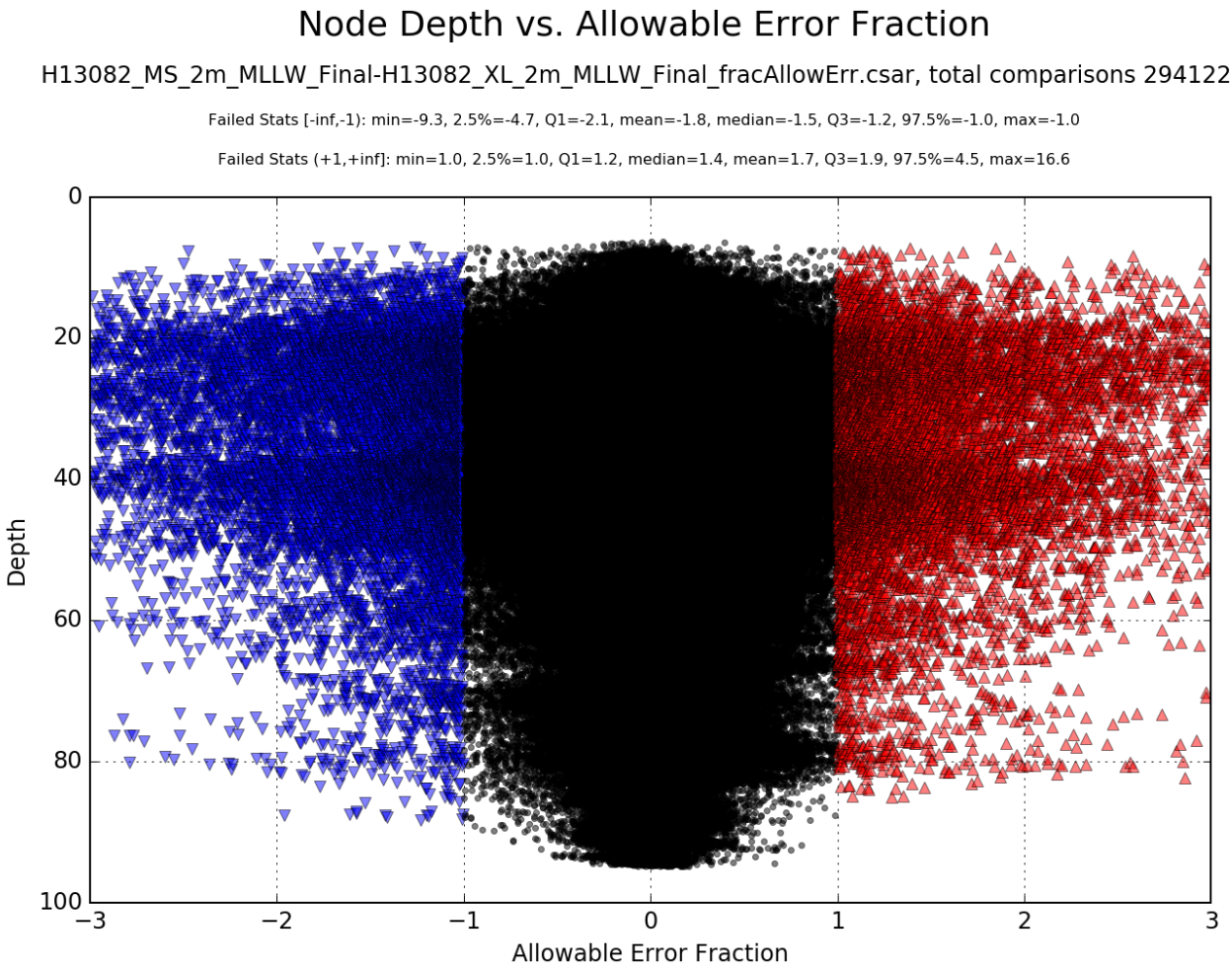


Figure 13: Pydro derived plot showing node depth vs. allowable error fraction of H13082 mainscheme to crossline data.

B.2.2 Uncertainty

The following survey specific parameters were used for this survey:

Measured	Zoning	Method
0 meters	0.082867 meters	ERS via VDATUM

Table 6: 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 7: Survey Specific Sound Speed TPU Values.

Total Propagated Uncertainty (TPU) values for survey H13082 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 zoning uncertainty of 0.082867 meters was provided in the Project Instructions as part of VDatum. See the 2017 DAPR for further information.

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

Uncertainty values of the submitted finalized grid was calculated in Caris using "Greater of the Two" of uncertainty and standard deviation (scaled to 95%). Grid QA v5 within Pydro QC Tools 2 was used to analyze H13082 TVU compliance (Fig. 14).

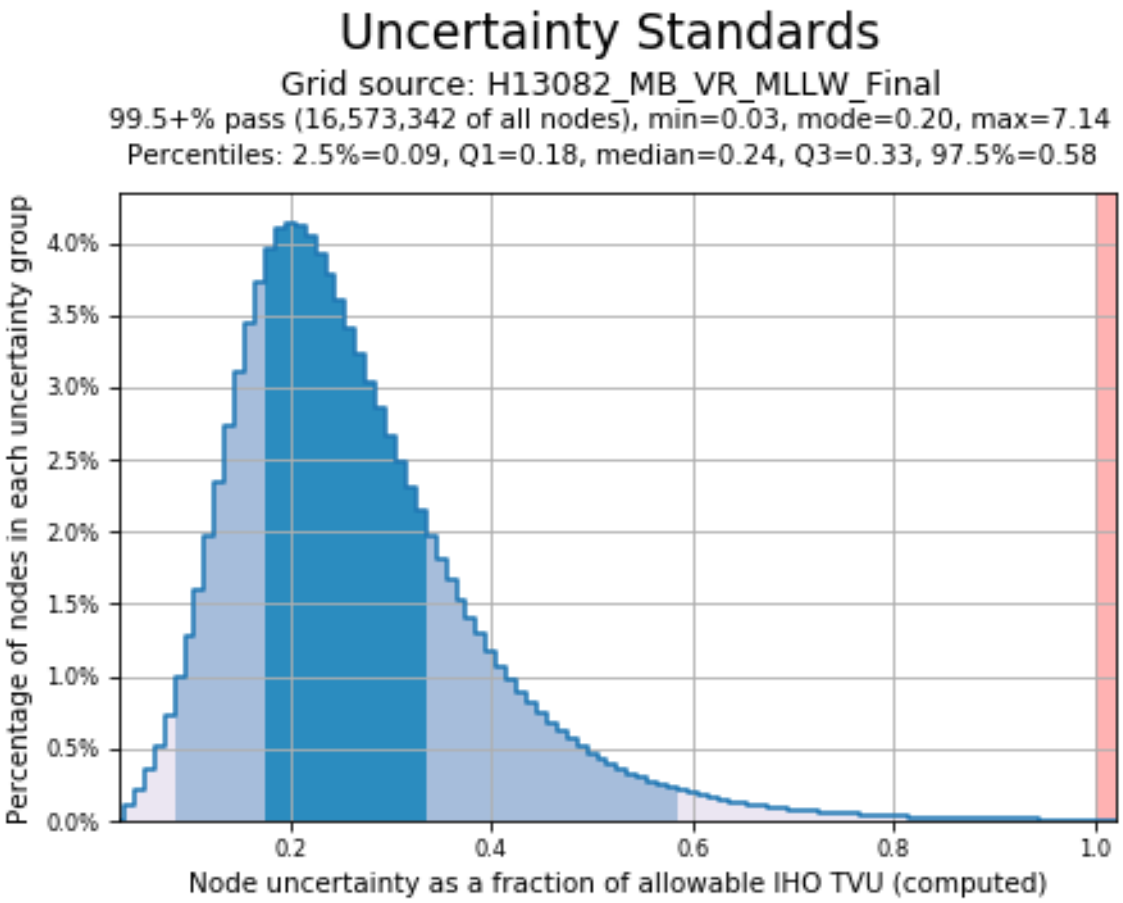


Figure 14: Pydro derived plot showing TVU compliance of H13082 finalized variable-resolution MBES data.

B.2.3 Junctions

Three junction comparisons were completed for survey H13082. Two of these surveys (H13083 and H13084) were acquired concurrently with this survey and one survey (W00320) was completed in 2016 by NOAA Ship BELL M. SHIMADA.

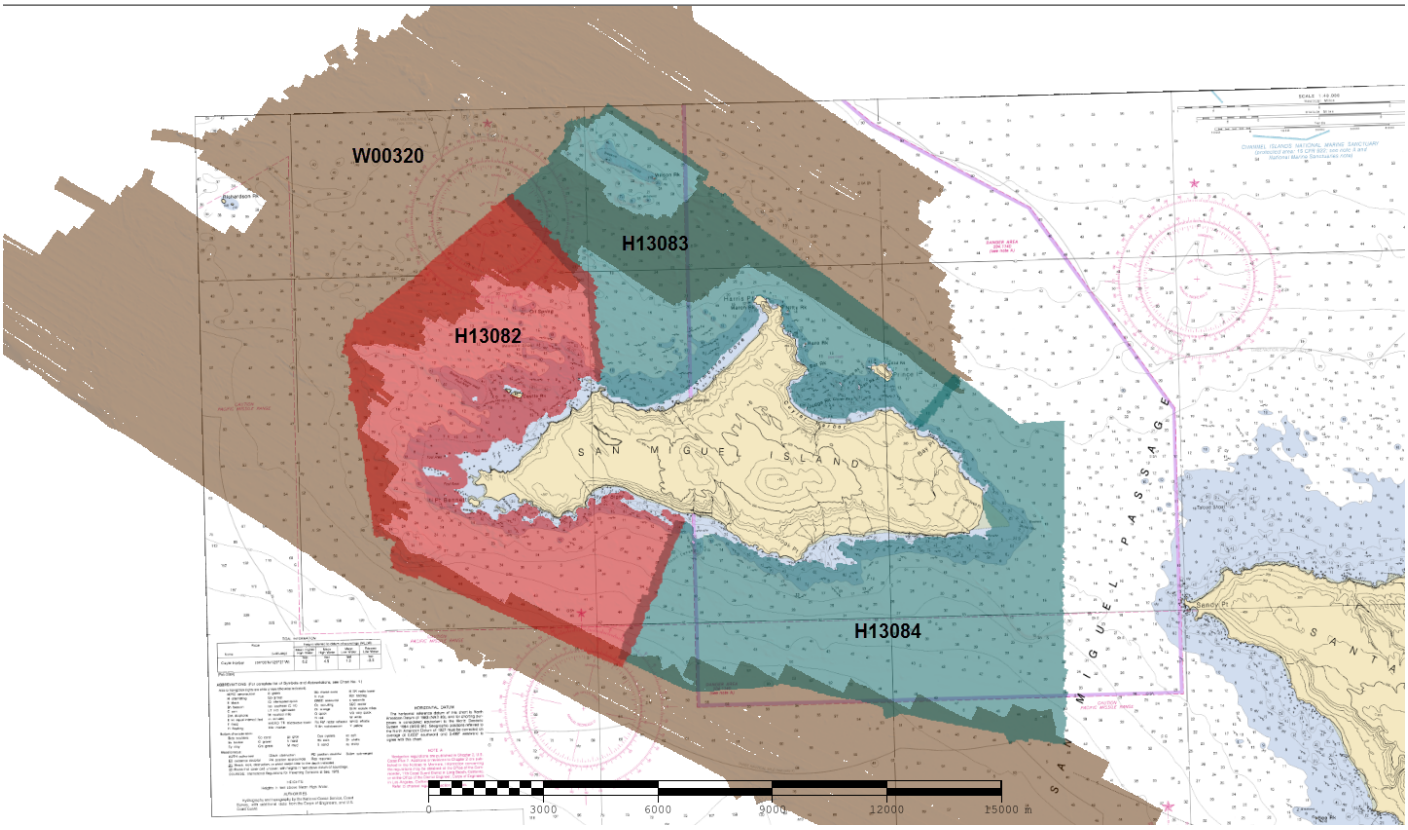


Figure 15: H13082 junctions with surveys H13083, H13084, and W00320.

The following junctions were made with this survey:

Registry Number	Scale	Year	Field Unit	Relative Location
H13083	1:20000	2017	NOAA Ship RAINIER	NE
H13084	1:20000	2017	NOAA Ship RAINIER	SE
W00320	1:40000	2016	NOAA Ship BELL M. SHIMADA	NW

Table 8: Junctioning Surveys

H13083

The junction with survey H13083 encompasses 0.40 square nautical miles along the northeastern boundary of survey H13082. The Compare Grids function of Pydro explorer derived a difference surface from the 2-meter CUBE surfaces of each survey for comparison. Analysis of the difference surface indicated that survey H13083 is an average of 0.03 meters deeper than survey H13082 with a standard deviation of 0.18 meters.

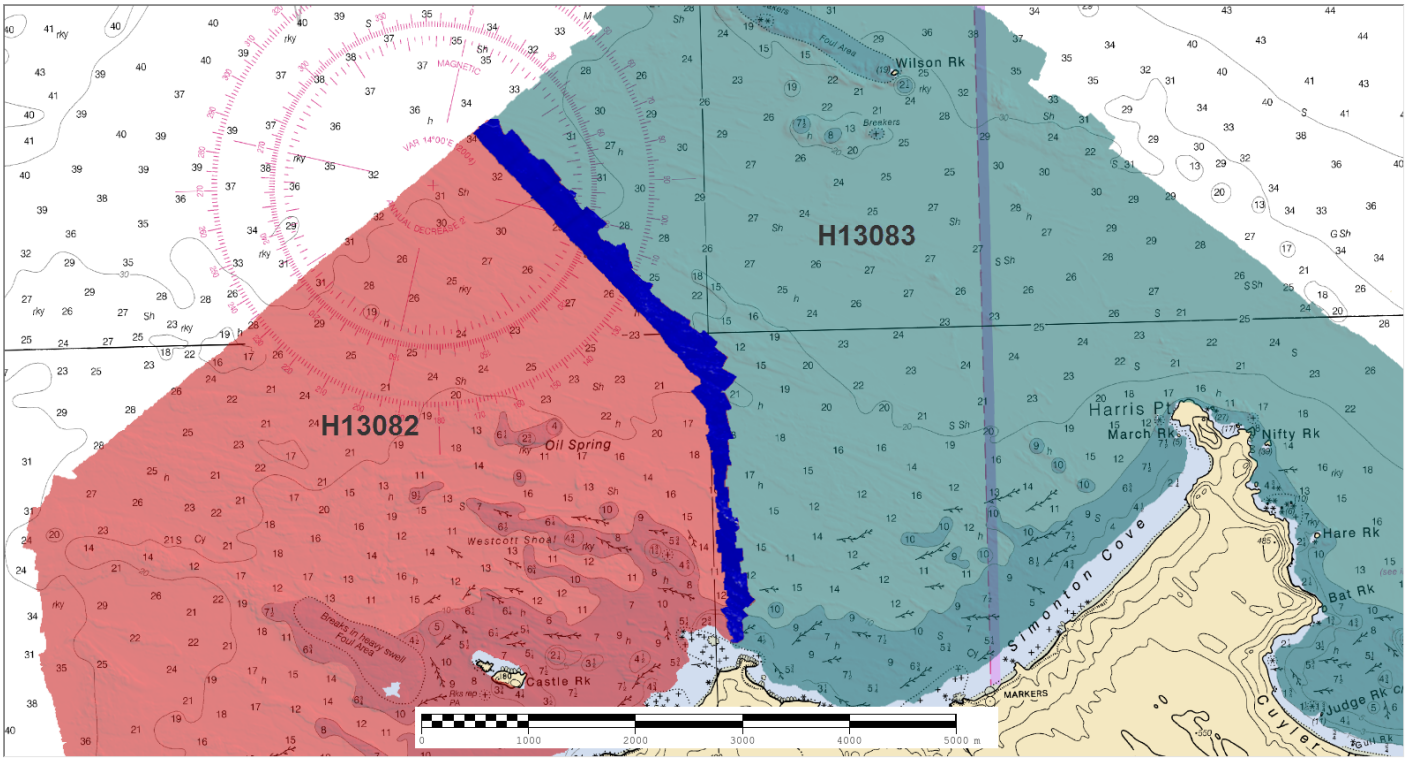


Figure 16: H13082 and H13083 junction difference surface.

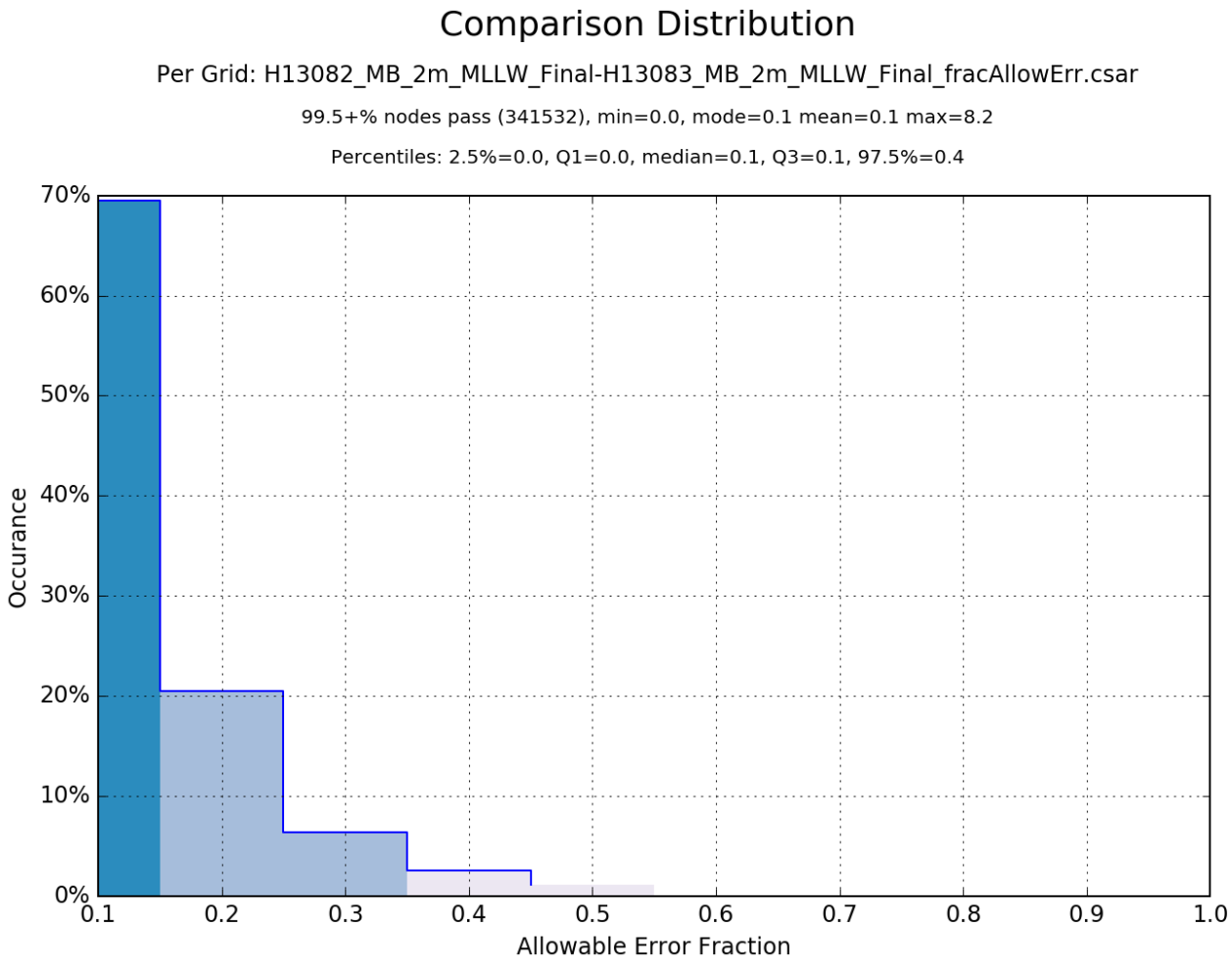
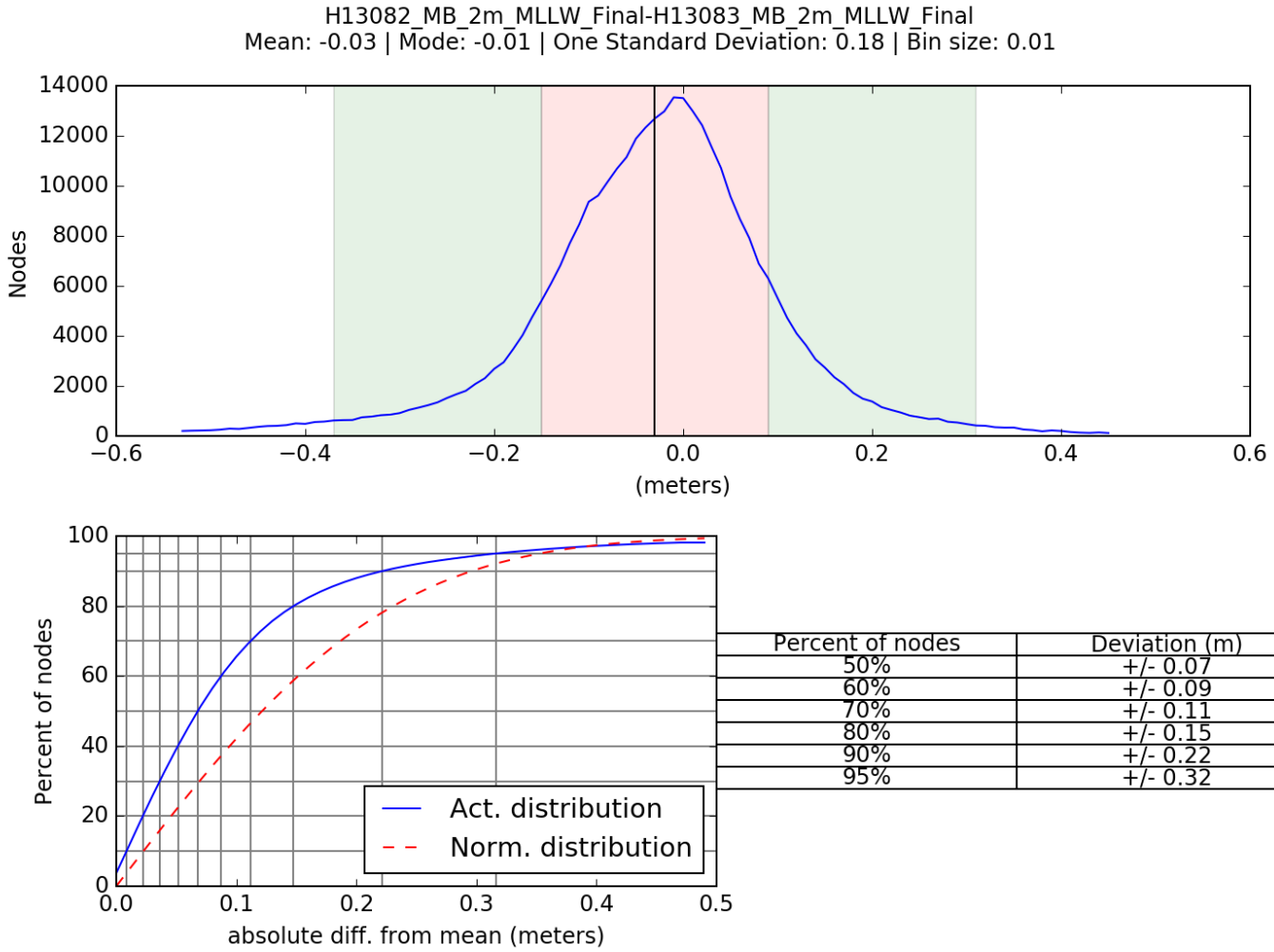


Figure 17: Pydro derived plot showing percentage-pass value of the junction between surveys H13082 and H13083.



Percent of nodes	Deviation (m)
50%	+/- 0.07
60%	+/- 0.09
70%	+/- 0.11
80%	+/- 0.15
90%	+/- 0.22
95%	+/- 0.32

Figure 18: Pydro derived plot showing absolute difference statistics of the junction between surveys H13082 and H13083.

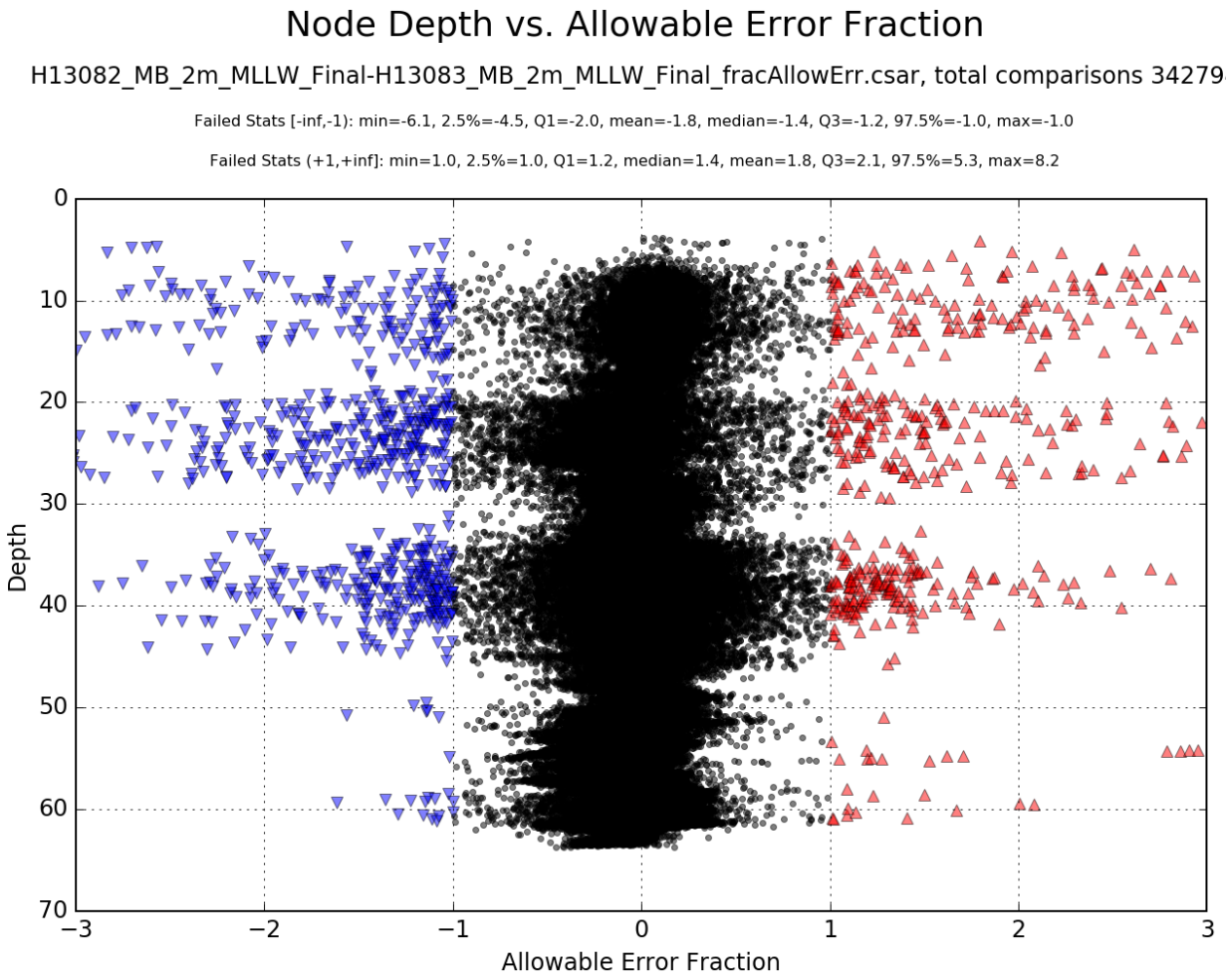


Figure 19: Pydro derived plot showing node depth vs. allowable error fraction of the junction between surveys H13082 and H13083.

H13084

The junction with survey H13084 encompasses 0.27 square nautical miles along the southeastern boundary of survey H13082. The Compare Grids function of Pydro explorer derived a difference surface from the 2-meter CUBE surfaces of each survey for comparison. Analysis of the difference surface indicated that survey H13084 is an average of 0.01 meters deeper than survey H13082 with a standard deviation of 0.23 meters.

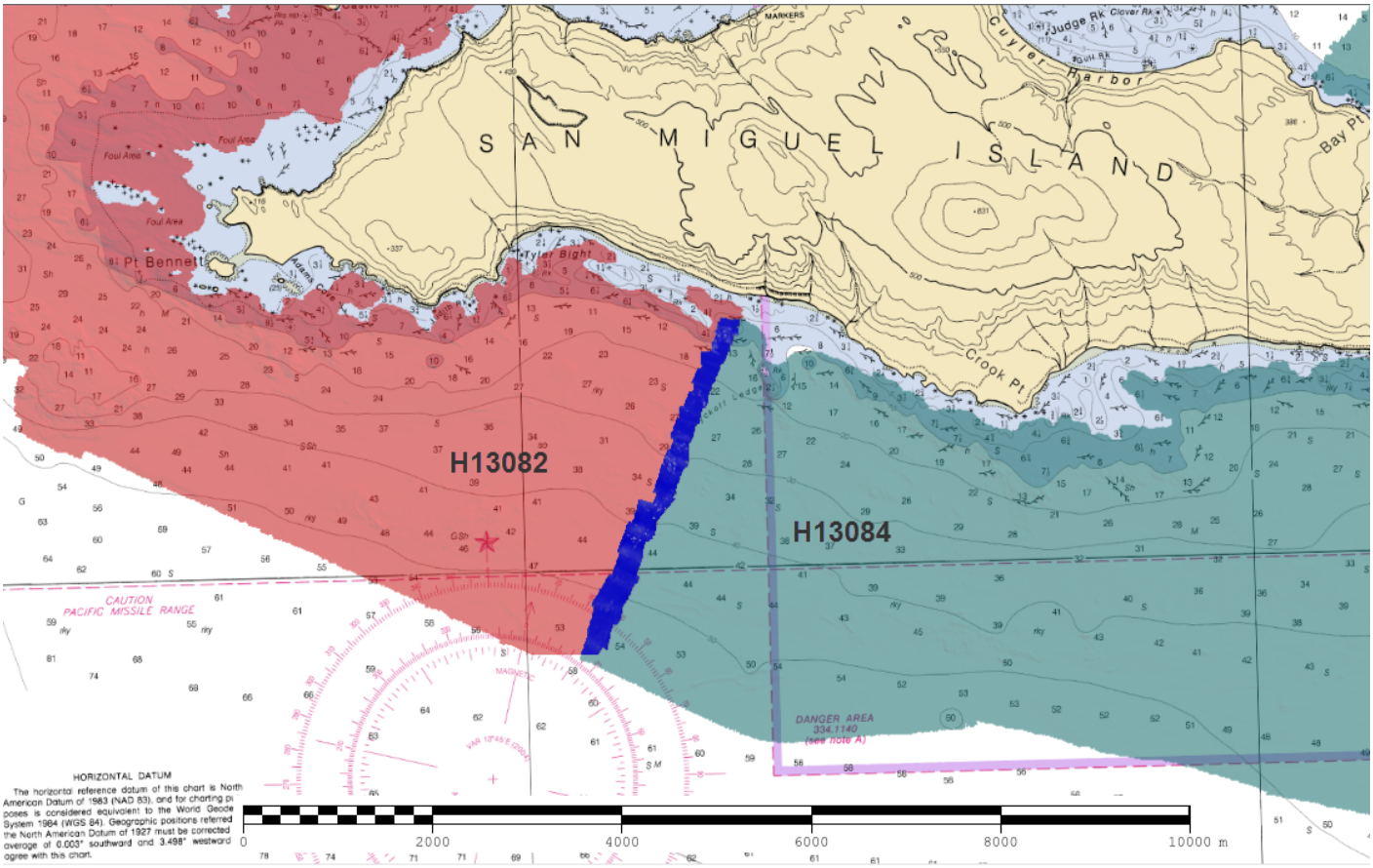


Figure 20: H13082 and H13084 junction difference surface.

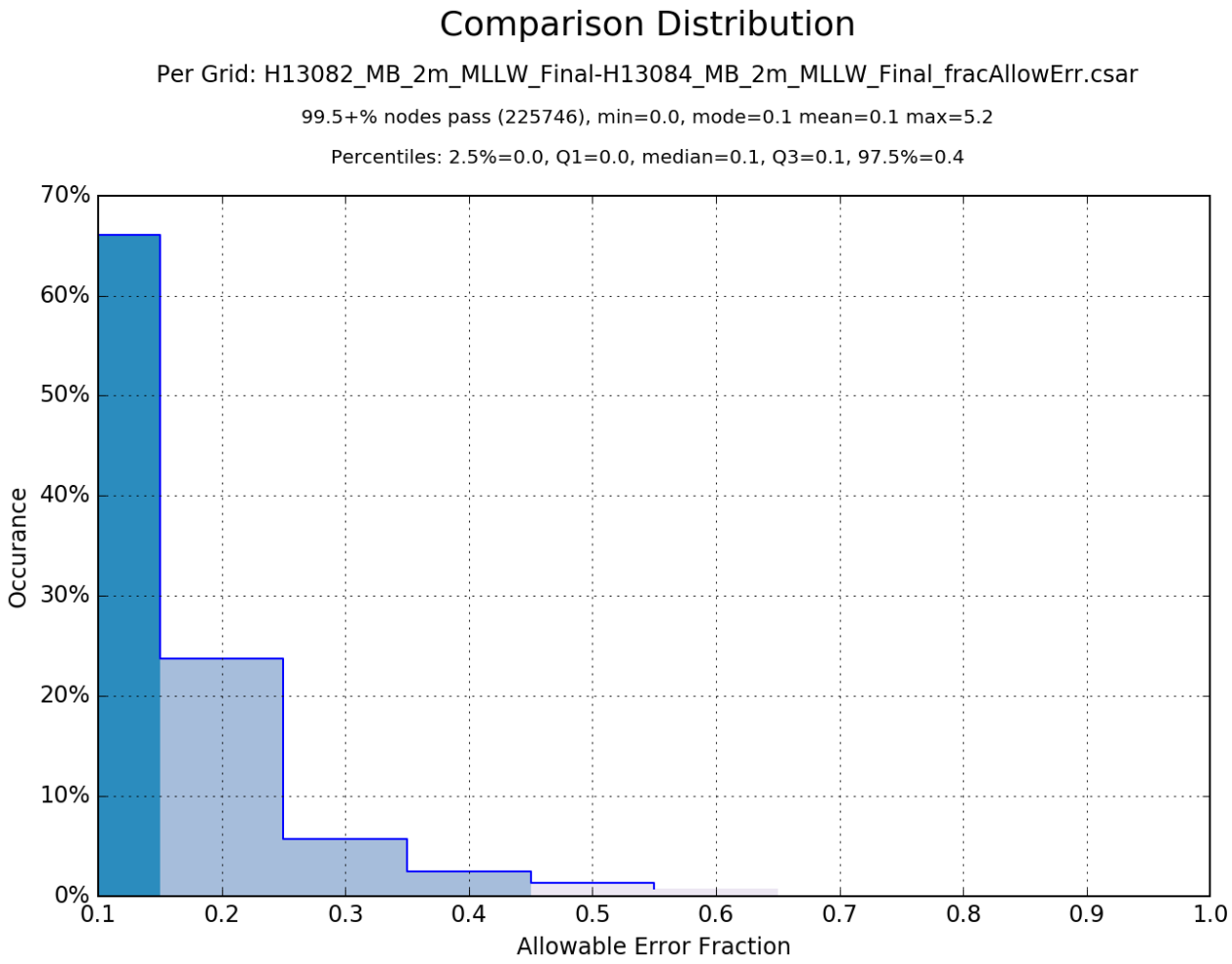
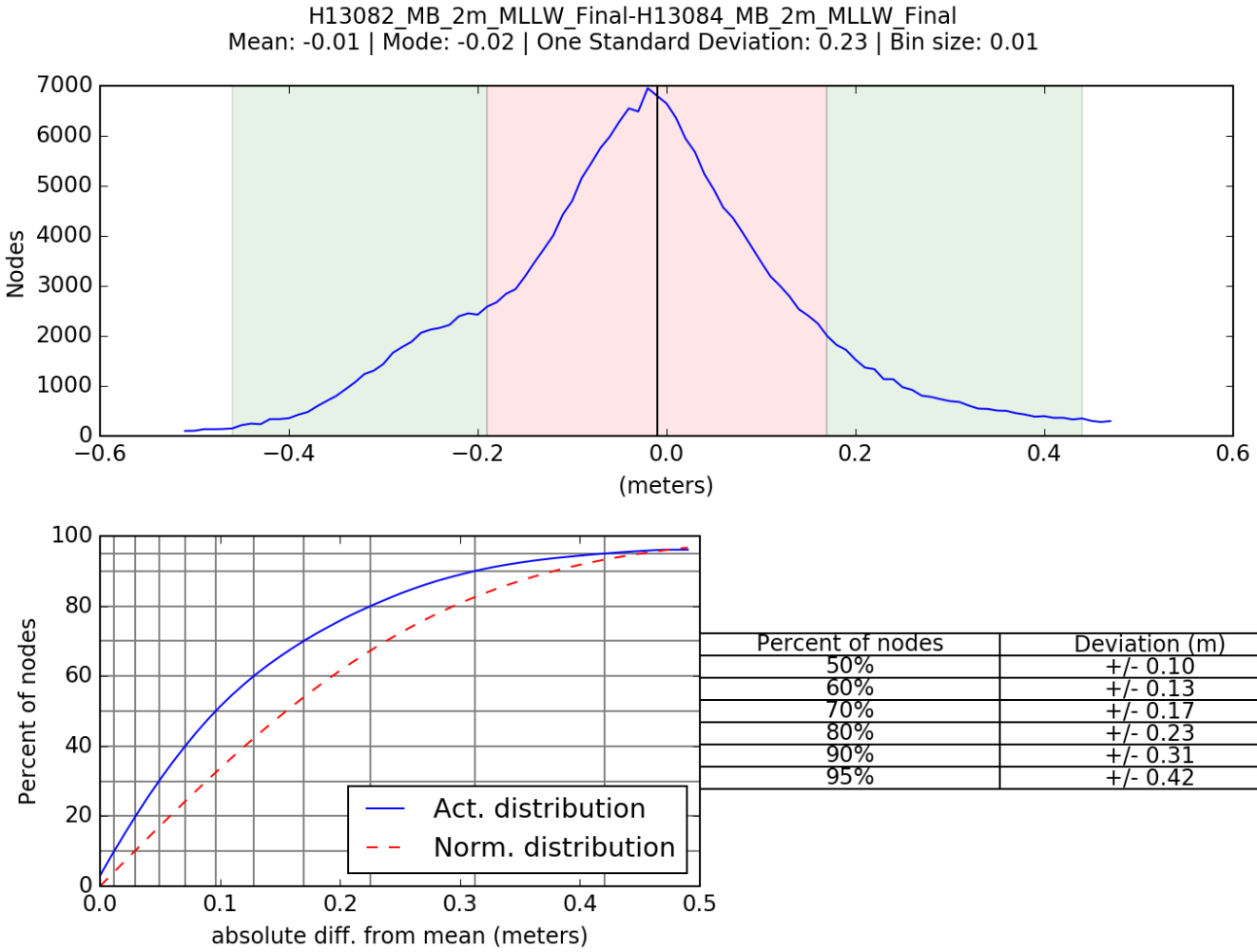


Figure 21: Pydro derived plot showing percentage-pass value of the junction between surveys H13082 and H13084.



Percent of nodes	Deviation (m)
50%	+/- 0.10
60%	+/- 0.13
70%	+/- 0.17
80%	+/- 0.23
90%	+/- 0.31
95%	+/- 0.42

Figure 22: Pydro derived plot showing absolute difference statistics of the junction between surveys H13082 and H13084.

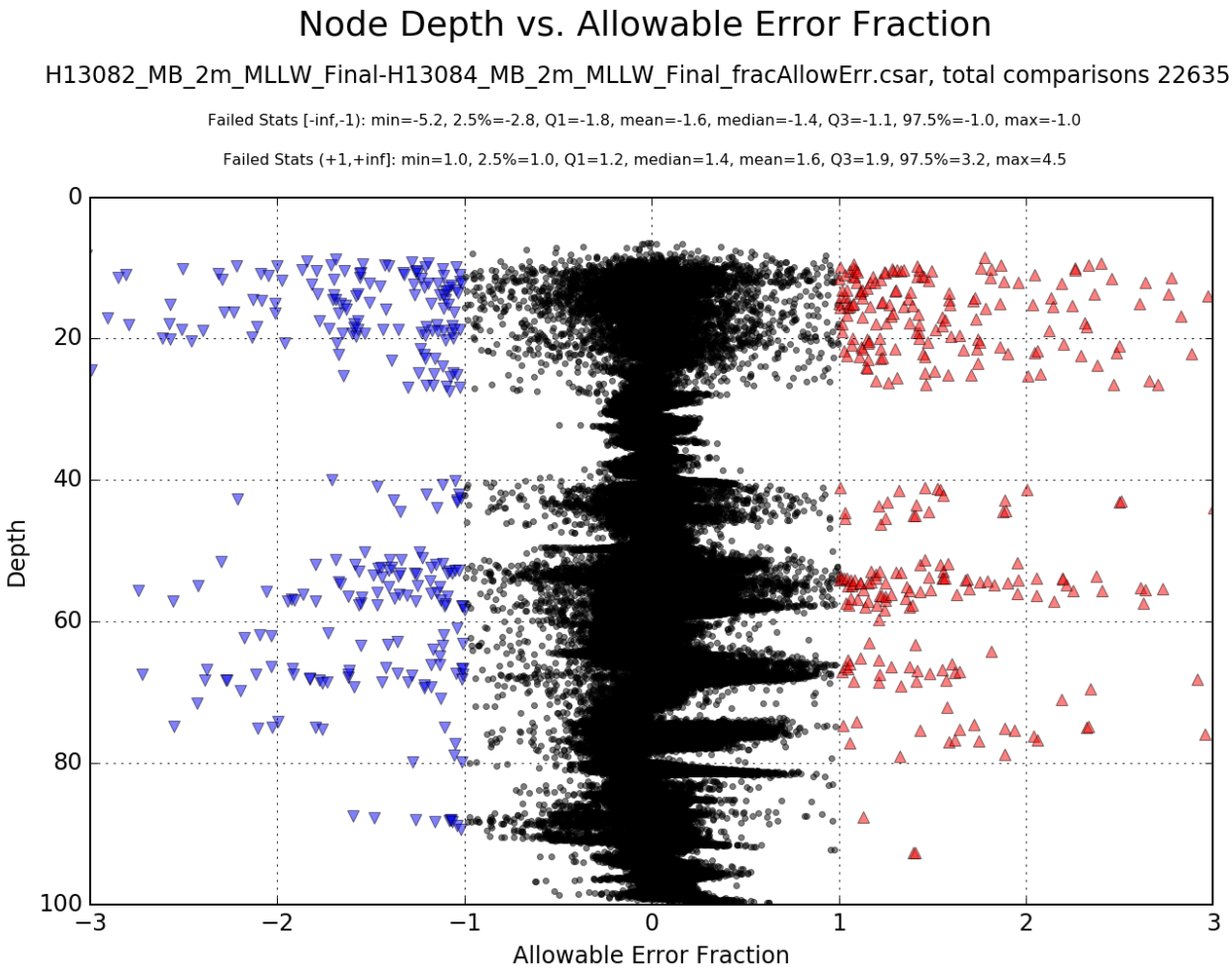


Figure 23: Pydro derived plot showing node depth vs. allowable error fraction of the junction between surveys H13082 and H13084.

W00320

The junction with survey W00320 encompassed 4.57 square nautical miles along the entire northwestern and southwestern portions of the H13082 survey area. A comparison was made with the Compare Grids function of Pydro Explorer using a difference surface derived from 2-meter Caris .csar surfaces of each survey. Analysis of the difference surface indicated that W00320 is an average of 4.6 meters deeper than H13082 with a standard deviation of 0.96 meters. According to its Survey Acceptance Review (SAR), W00320 was a habitat mapping survey acquired with a Simrad ME70, a sonar normally used to collect water column data for fisheries applications. Data from the ME70 are not suitable for object detection, feature disapproval, or for areas of critical under-keel clearance. This information helps to explain the poor comparison between H13082 and W00320 data. The sign, large magnitude, and relatively low standard deviation of this offset suggest a systematic, rather than random error in the SHIMADA dataset. The hydrographer suspects that there may have been an error in static offset application during W00320 acquisition and/or processing. The hydrographer recommends that H13082 fully supersede W00320 in the common area.

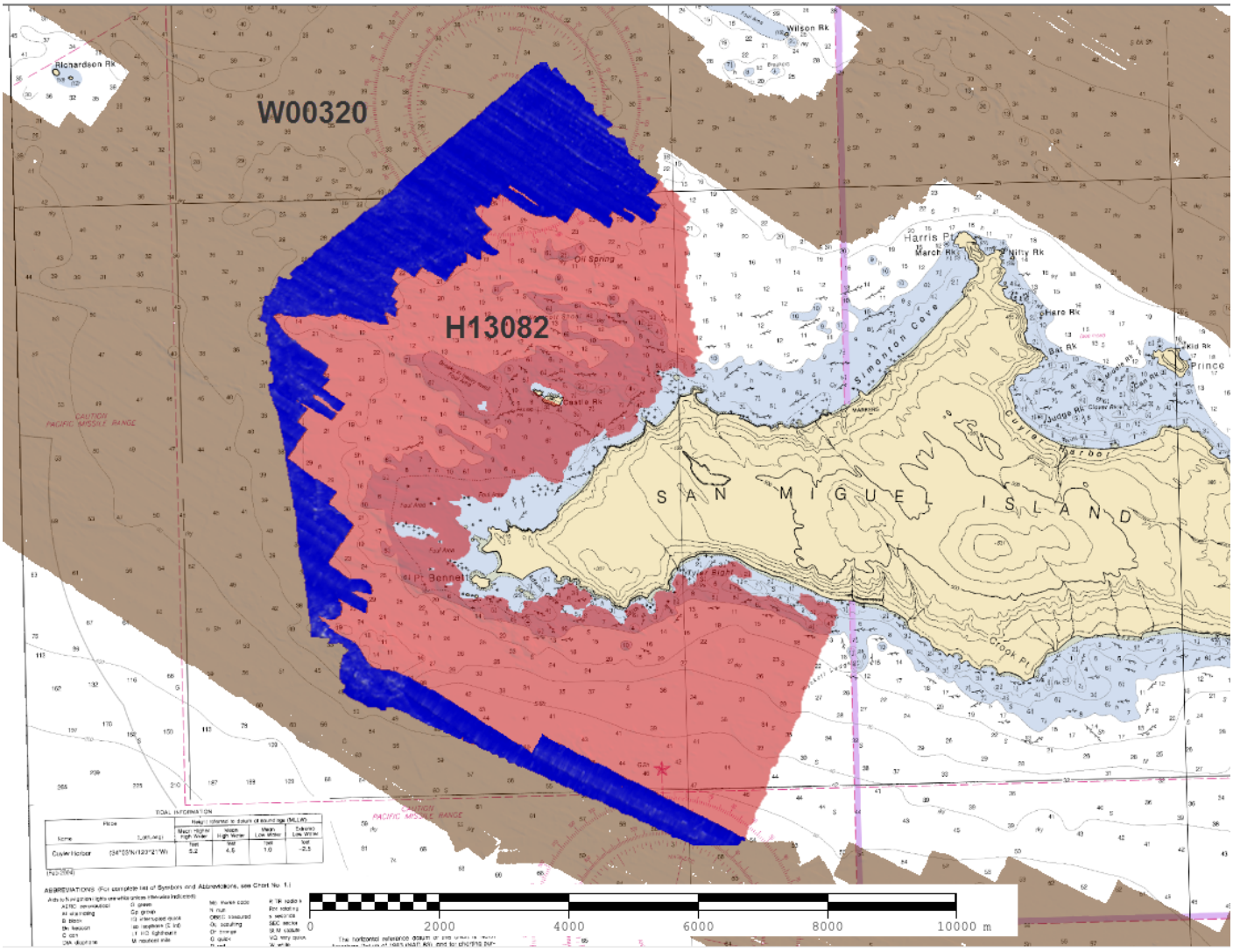


Figure 24: H13082 and W00320 junction difference surface.

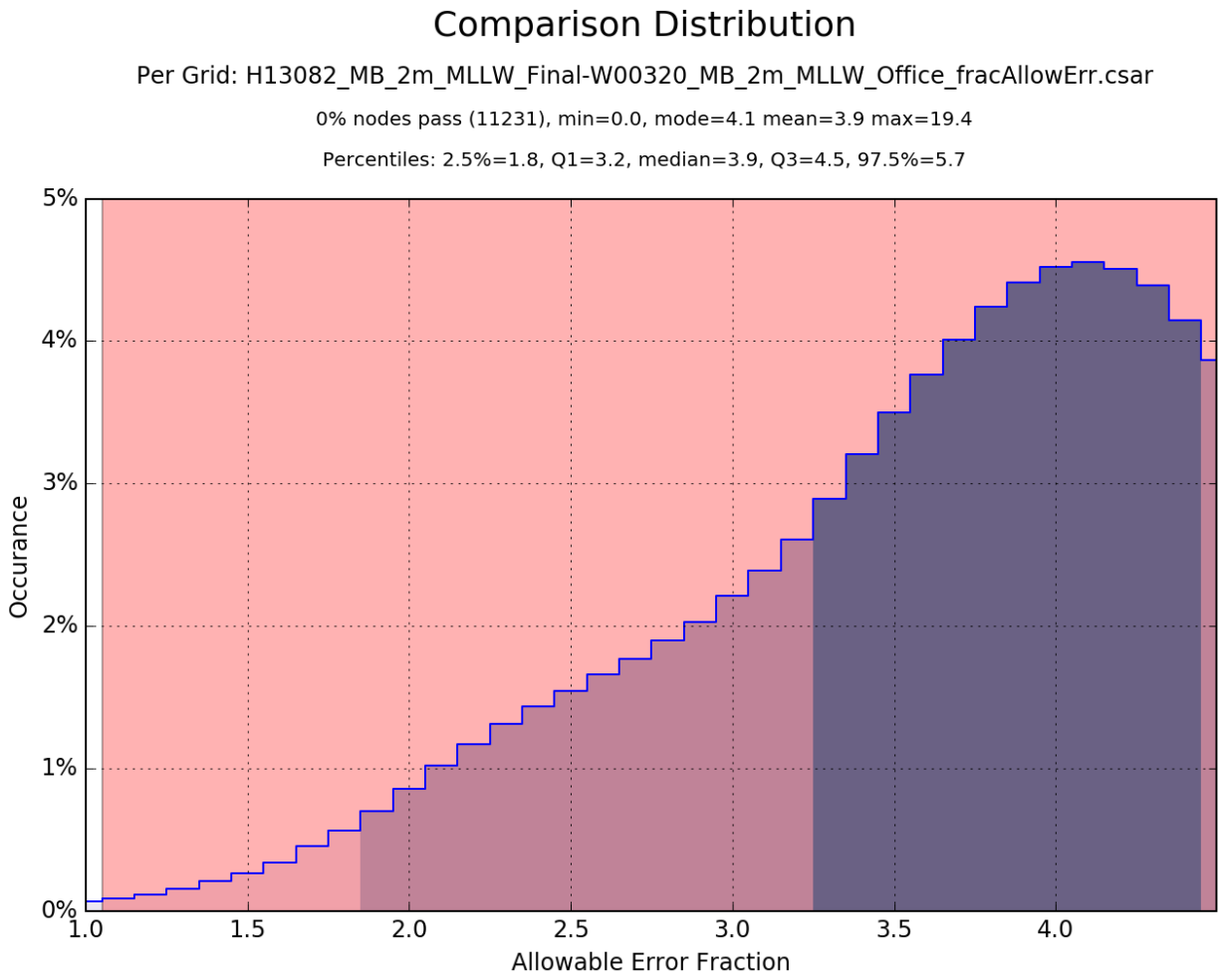
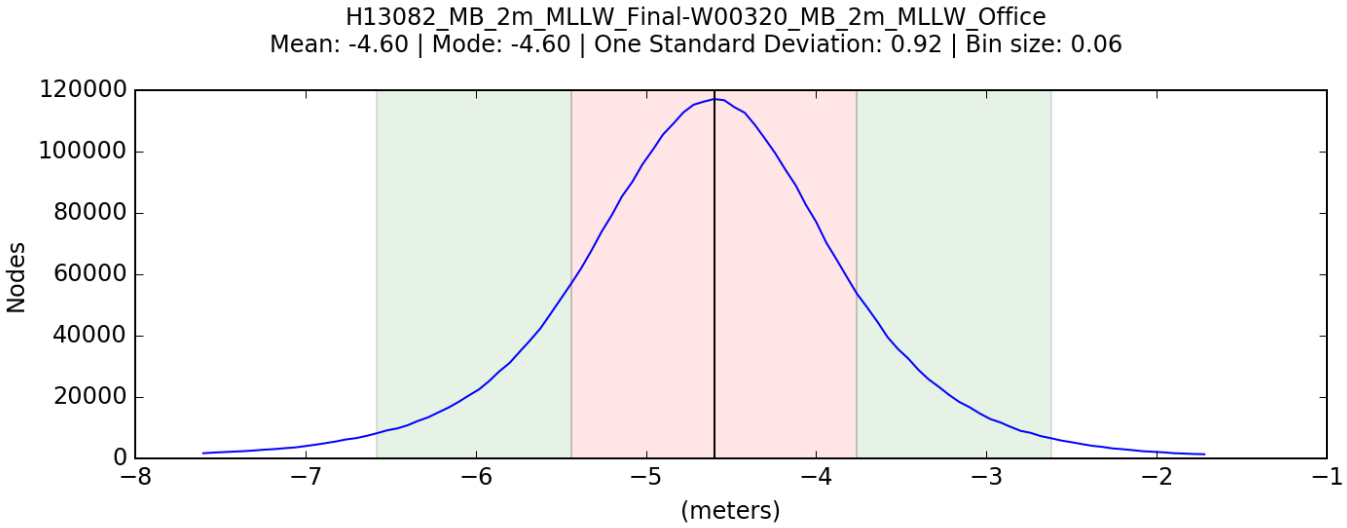
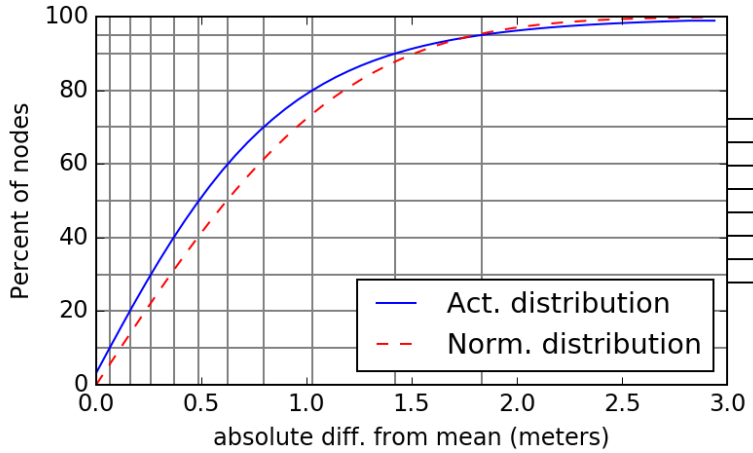


Figure 25: Pydro derived plot showing percentage-pass value of the junction between surveys H13082 and W00320.





Percent of nodes	Deviation (m)
50%	+/- 0.49
60%	+/- 0.63
70%	+/- 0.80
80%	+/- 1.03
90%	+/- 1.42
95%	+/- 1.83

Figure 26: Pydro derived plot showing absolute difference statistics of the junction between surveys H13082 and W00320.

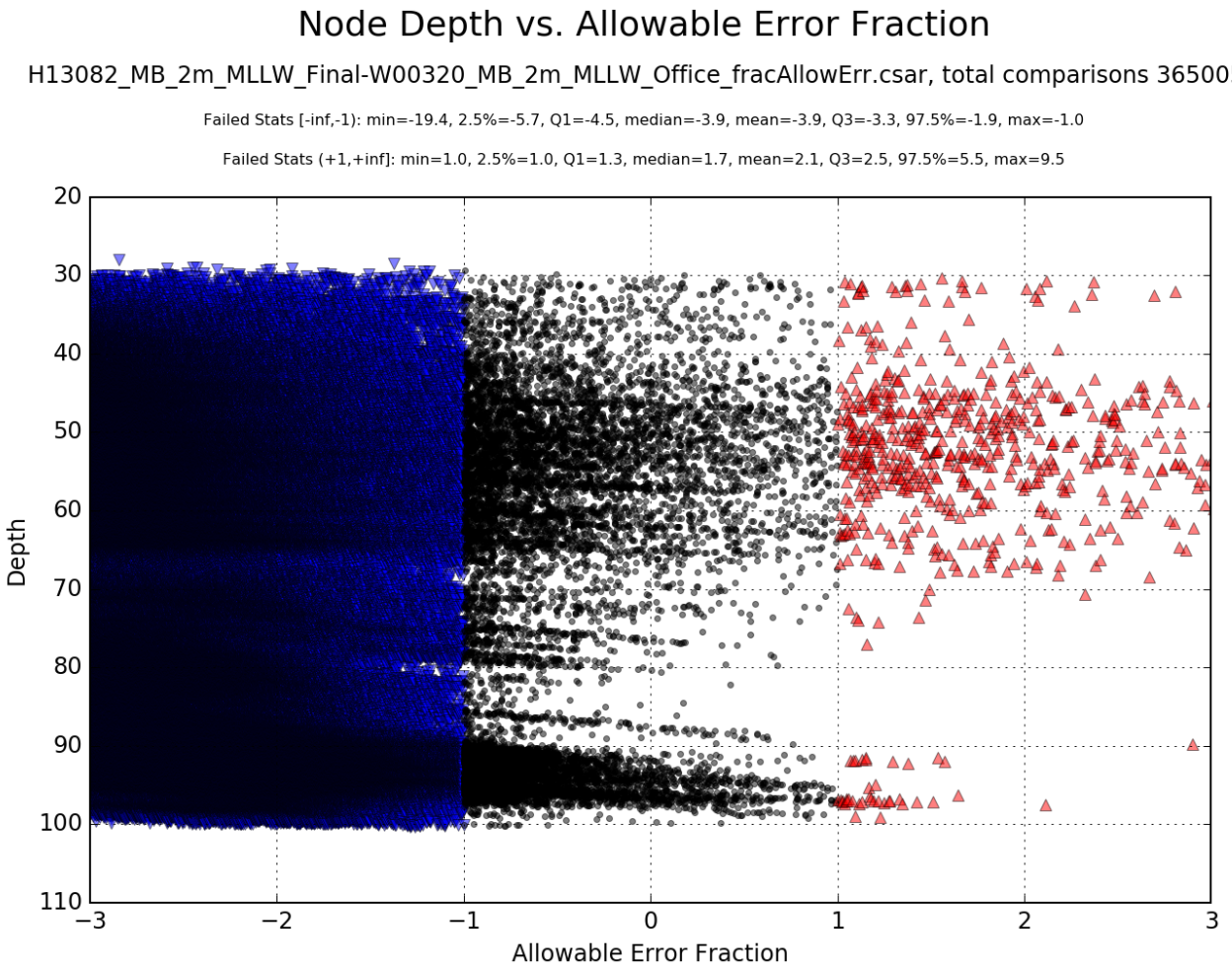


Figure 27: Pydro derived plot showing node depth vs. allowable error fraction of the junction between surveys H13082 and W00320.

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

Sonar Pulse Length

Survey H13082 was acquired to produce bathymetric data and high quality backscatter data. In order to acquire the high quality backscatter, minimal changes to the sonar's operating mode were required. Instead of operating sonar pulse length automatically, it was manually switched between long pulse in depths greater

than 20 meters and short pulse in depths less than 20 meters. The hydrographer monitored the effects of these manual changes out in the field and found no issues in the resulting data.

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: Launches took casts at least once every four hours (before MBES acquisition, middle of the day, and near the end of the day).

Additional casts were taken when significant changes to surface sound speed were observed or when operating in a new area. Sound speed profiles were acquired using Sea-Bird 19plus SEACAT Profilers. All casts were concatenated into a master file and applied to MBES data in Caris HIPS using the "Nearest in distance within time" (4 hours) profile selection method.

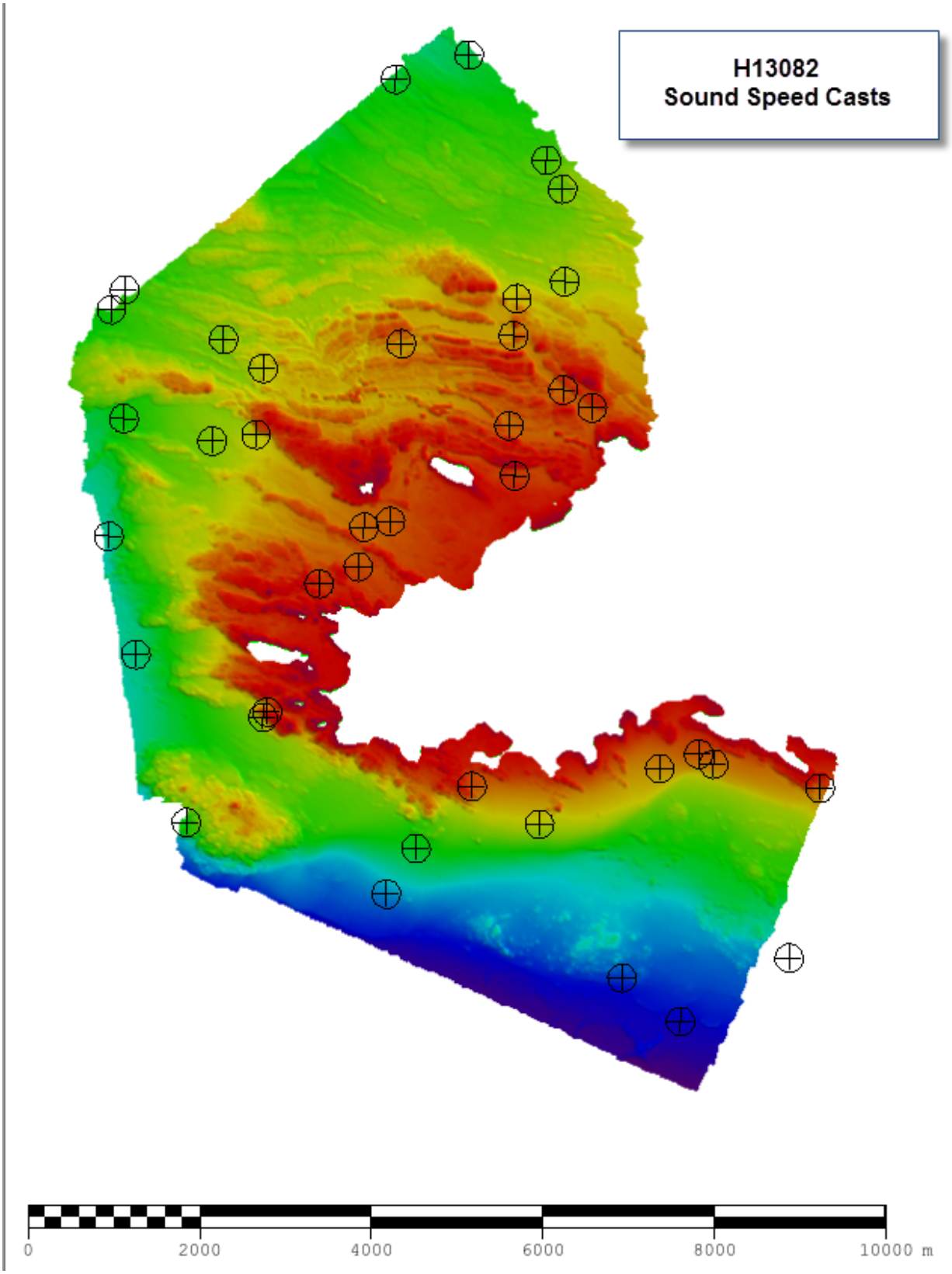


Figure 28: H13082 sound speed cast locations.

B.2.8 Coverage Equipment and Methods

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

B.2.9 Detect Fliers

Pydro QC Tools 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 20 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.

B.3 Echo Sounding Corrections

B.3.1 Corrections to Echo Soundings

All data reduction procedures conform to those detailed in the DAPR.

B.3.2 Calibrations

All sounding systems were calibrated as detailed in the DAPR.

B.4 Backscatter

Raw Backscatter data were logged as .all files for delivery to NOAA's Pacific Hydrographic Branch. The field unit processed the backscatter data and generated backscatter mosaics. One 2 meter mosaic per vessel per frequency was generated for H13082. To create the mosaic, processed HDCS lines were paired with the raw .all files in Fledermaus Geocoder Toolbox version 7.7.7. Errors occurred while processing backscatter, including an “Auto Time-Sync Algorithm failure” message due to a discrepancy between GPS time and UTC time. Entering a -2.0 second merge offset option in the processing window cleared the error and made converting lines and producing backscatter mosaics possible.

B.5 Data Processing

B.5.1 Primary Data Processing Software

The following Feature Object Catalog was used: NOAA Extended Attribute File 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
H13082_MB_VR_MLLW	CUBE	999 meters	-0.4 meters - 102.3 meters	VR	Complete MBES
H13082_MB_VR_MLLW_Final	CUBE	999 meters	-0.4 meters - 102.3 meters	VR	Complete MBES

Table 9: Submitted Surfaces

Submitted surfaces were generated using the recommended parameters for depth-based (Ranges) Caris variable-resolution bathymetric grids as specified in HTD 2017-2. The resolution values indicated in the above table are not accurate: the XML-DR schema used to generate this report did not accommodate variable-resolution grids; the "999" values were entered as a placeholder.

C. Vertical and Horizontal Control

Shoreline features were reduced to Mean Lower Low Water using traditional tide methods via TCARI. All MBES bathymetry were acquired relative to the ellipsoid and reduced to MLLW via VDatum.

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
Los Angeles, CA	9410660
Santa Monica, CA	9410840
Santa Barbara, CA	9411340
Oil Platform Harvest, CA	9411406
Port San Luis, CA	9412110
Monterey, CA	9413450

Table 10: NWLON Tide Stations

There was no Water Level file associated with this survey.

File Name	Status
L397RA2017Rev.tc	Final

Table 11: Tide Correctors (.zdf or .tc)

A request for final approved tides was sent to N/OPS1 on 11/08/2018. The final tide note was received on 11/17/2017.

ERS Methods Used:

ERS via VDATUM

Ellipsoid to Chart Datum Separation File:

OPR-L397-RA-17_VDatumArea_xyNAD83-MLLW_geoid12b.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 Universal Transverse Mercator (UTM) Zone 10 North.

The Wide Area Augmentation System (WAAS) was used for real-time horizontal control for this survey.

Precise Positioning-Real Time Extended (PP-RTX) processing methods were used in Applanix POSPac MMS 8.1 software to produce SBETs for post-processing horizontal correction.

D. Results and Recommendations

D.1 Chart Comparison

Electronic Navigation Chart (ENC) US5CA64M was compared to H13082 survey data using a variable resolution CUBE surface, 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?
US5CA64M	1:40000	9	08/24/2017	12/07/2017	NO

Table 12: Largest Scale ENCs

US5CA64M

Most H13082 survey contours diverge less than 300 meters from the charted depth curve. Survey data detected several uncharted 10 fathom and 20 fathom shoals and established 3 fathom survey contours not previously charted. Unsafe conditions prevented complete data acquisition of the 3 fathom contour in the foul area surrounding Point Bennett.

ENC US5CA64M was compared to H13082 survey data and revealed the following:

- Area 1: Data located uncharted 3 fathom and 5 fathom survey contours in the charted foul area and surrounding Castle Rock; several 10 fathom shoals north of the foul area are not charted; the 10 fathom survey contour diverges from the charted 10 fathom depth curve south of the foul area (Fig. 30)

- Area 2: Data located uncharted 20 fathom shoals between the 20 fathom and 30 fathom depth curves; the 20 fathom survey contour diverges from the charted 20 fathom depth curve in two locations (Fig. 31)

- Area 3: Data located an uncharted 10 fathom shoal within the large charted 20 fathom shoal; the 30 fathom survey contour diverges from the charted 30 fathom depth curve in one location in the north (Fig. 32)

- Area 4: Several 40 and 50 fathom survey contours diverge from their respective charted depth curves (Fig. 33)

- Area 5: Data established uncharted 3 fathom and 5 fathom survey contours within the charted foul area (Fig. 34)

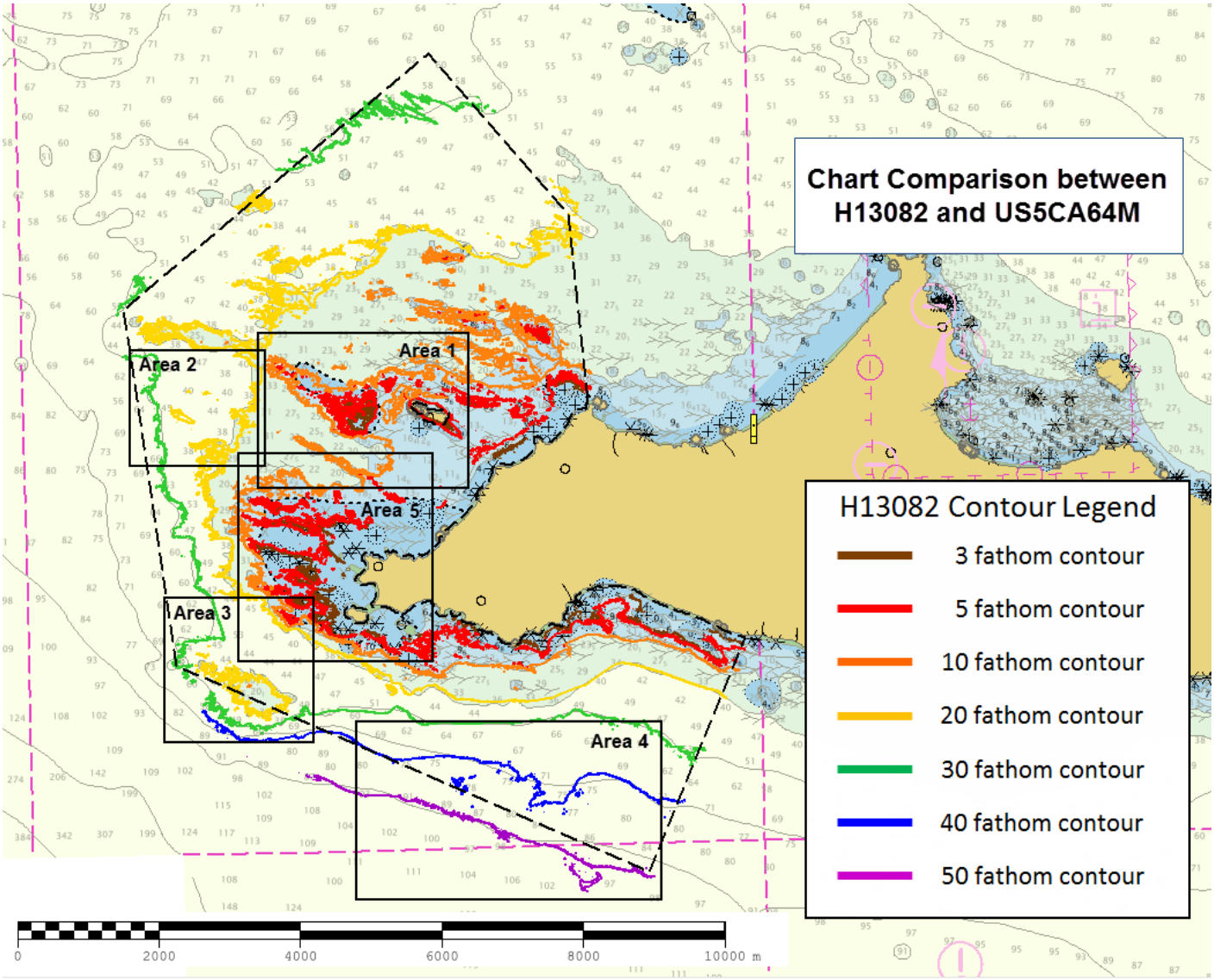


Figure 29: Survey H13082 contours overlaid on ENC US5CA64M.

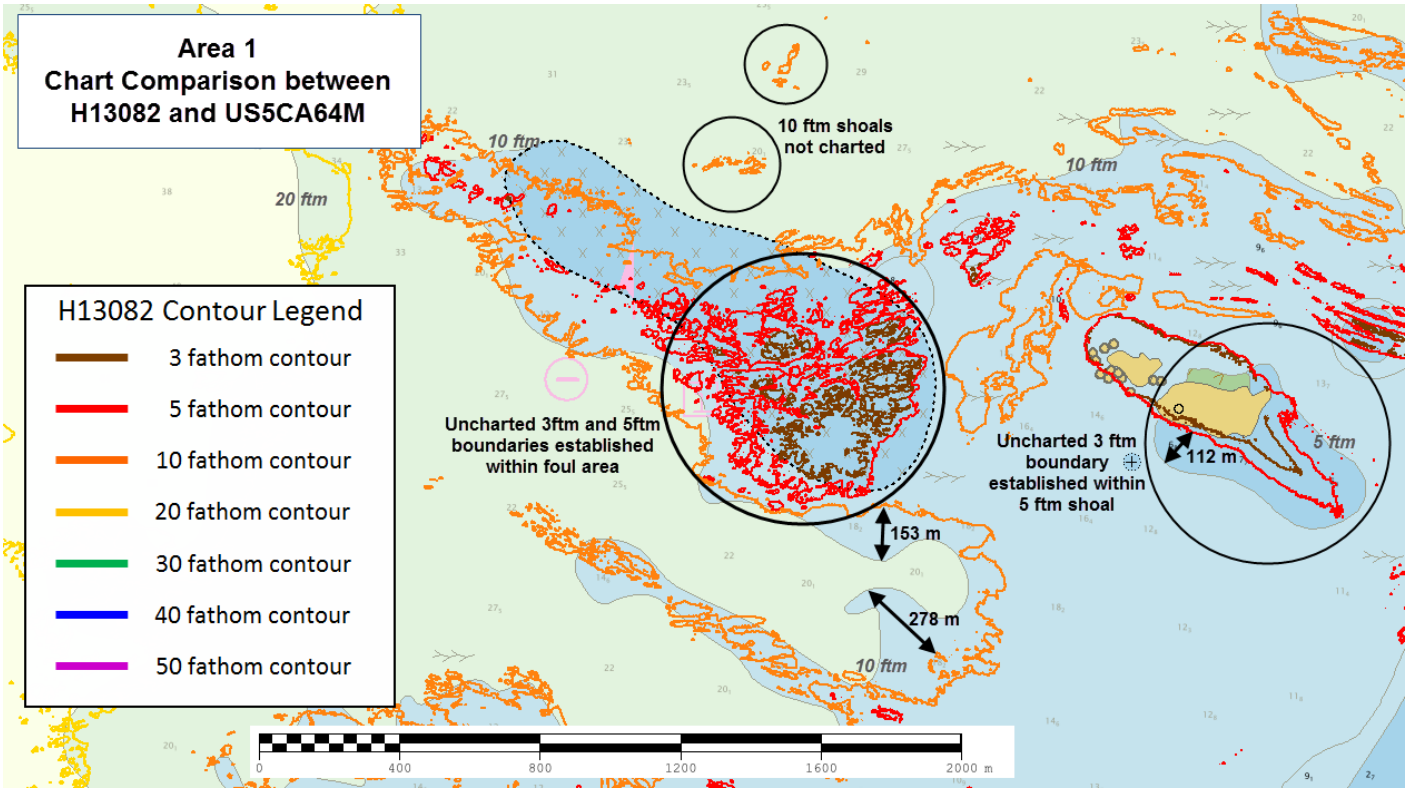


Figure 30: Area 1 contour offsets between H13082 and US5CA64M.

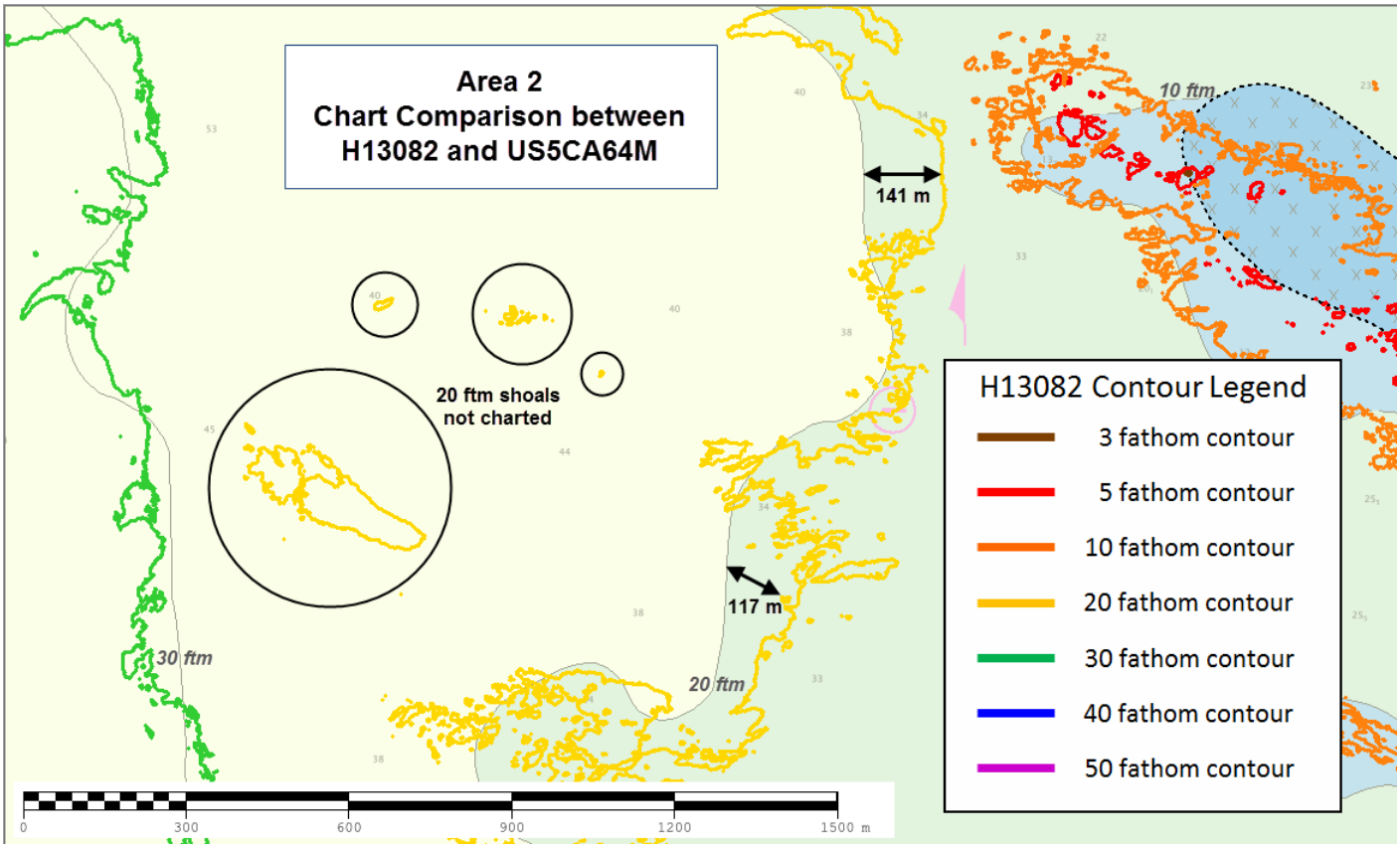


Figure 31: Area 2 contour offsets between H13082 and US5CA64M.

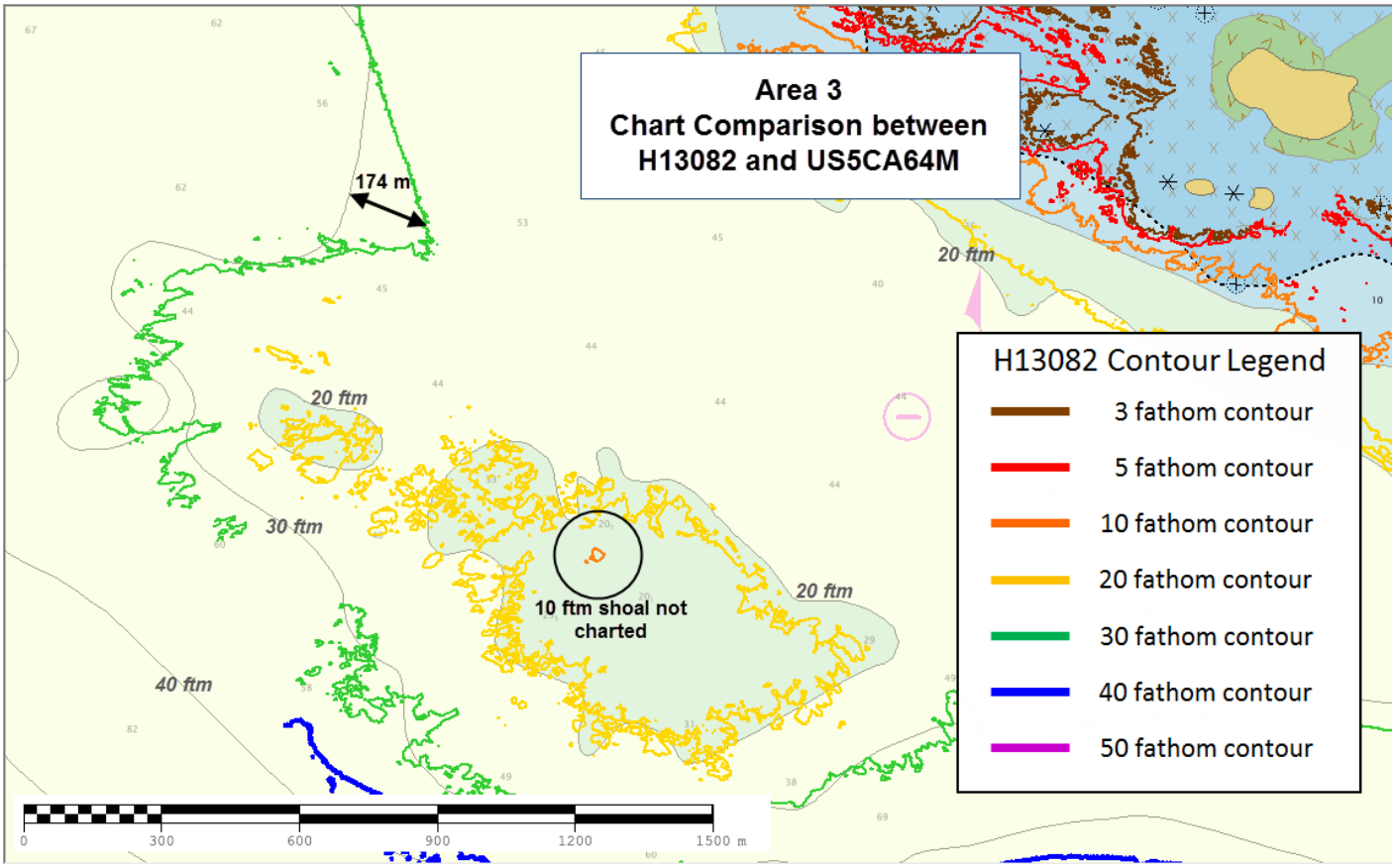


Figure 32: Area 3 contour offsets between H13082 and US5CA64M.

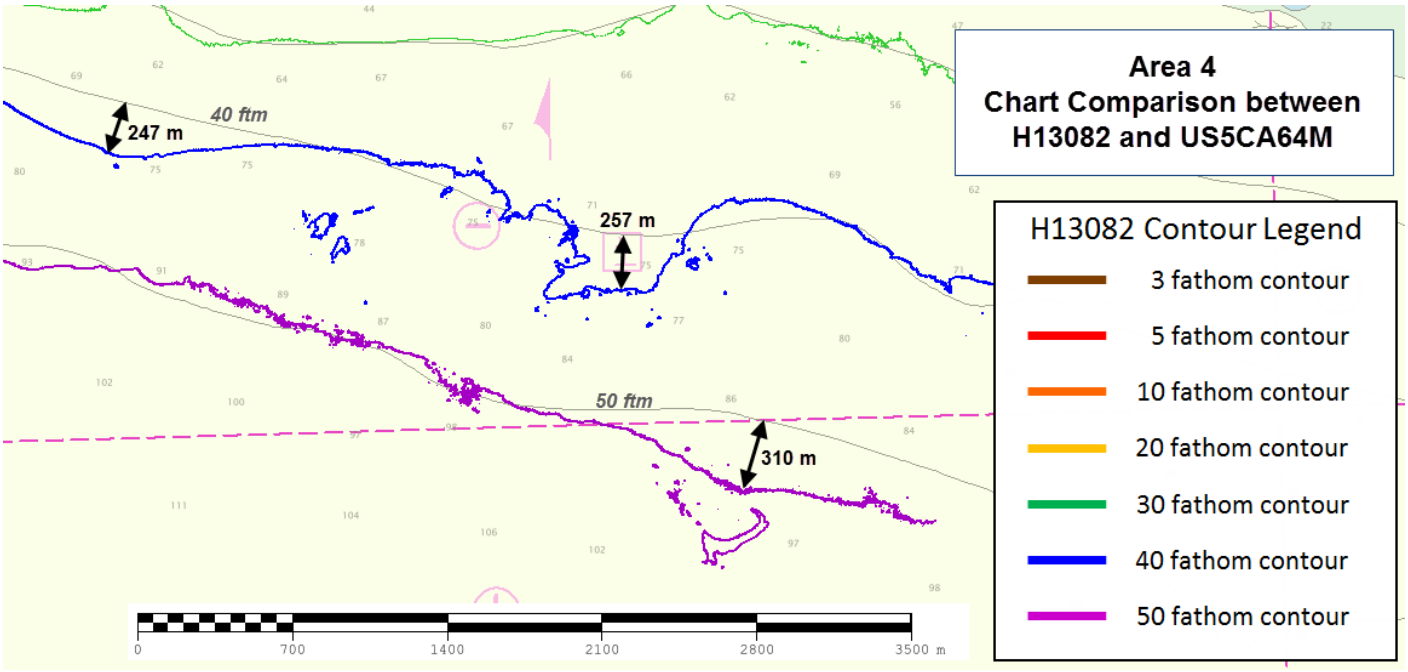


Figure 33: Area 4 contour offsets between H13082 and US5CA64M.

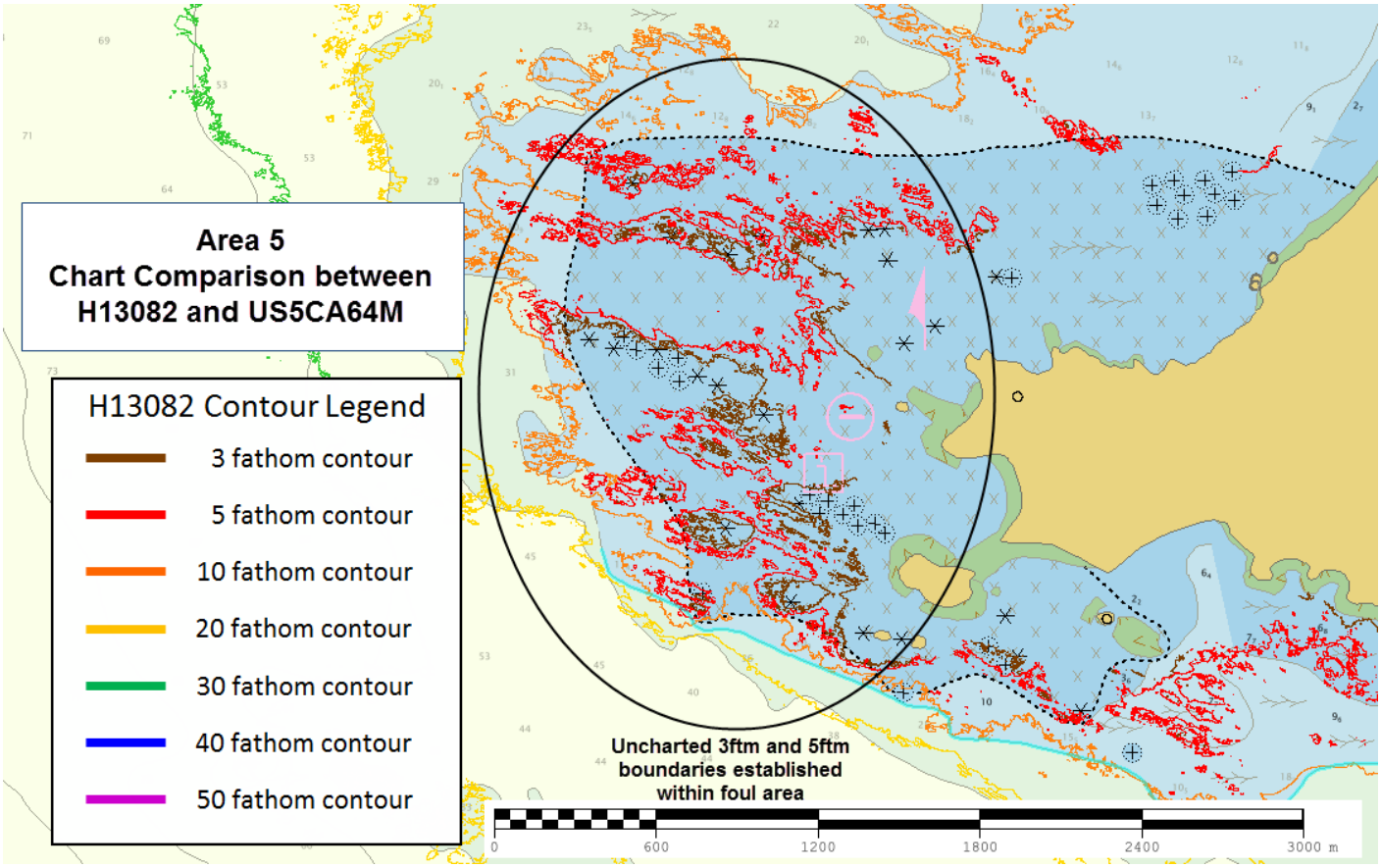


Figure 34: Area 5 contour offsets between H13082 and US5CA64M.

D.1.2 Maritime Boundary Points

No Maritime Boundary Points were assigned for this survey.

D.1.3 Charted Features

A reported position approximate "Rks" is charted 100-200 meters southwest of Castle Rock. The hydrographer recommends removing this feature; please refer to the Final Feature File for more information.

D.1.4 Uncharted Features

No uncharted features exist for this survey.

D.1.5 Dangers to Navigation

One Danger to Navigation Report containing two DTONs is included in Appendix II of this report.

As of 3/5/2018, both DTONs were compared to the latest version of the largest scale ENC in the area and were found to be properly applied to the chart.

D.1.6 Shoal and Hazardous Features

Features of navigational significance are discussed in the chart comparison sections above or are included in the H13082 Final Feature File submitted with this report.

D.1.7 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.1.8 Bottom Samples

A bottom sample requirement was not specified in the project instructions, however photos at ten individual sites were obtained using a Go Pro camera attached to a CTD probe. Video footage was recorded during the CTD cast and still photos where derived from the footage to obtain a "virtual bottom sample'. A copy of the pertinent acquisition log is also include with photos to link each bottom sample site with a lat/long. These images and acquisition logs are included with the Separates section of this report for archival purposes.

D.2 Additional Results

D.2.1 Shoreline

Limited shoreline verification was conducted in accordance with applicable sections 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 H13093_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

No Aids to navigation (ATONs) exist for this survey.

D.2.4 Overhead Features

No overhead features exist for this survey.

D.2.5 Submarine Features

No submarine features exist for this survey.

D.2.6 Ferry Routes and Terminals

No ferry routes or terminals exist for this survey.

D.2.7 Platforms

No platforms exist for this survey.

D.2.8 Significant Features

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

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 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
Benjamin K. Evans, CDR/NOAA	Commanding Officer NOAA Ship Rainier	05/29/2018	Digitally signed by EVANS.BENJAMIN.K.1237217094 Date: 2018.06.22 08:58:25 -07'00'
Scott E. Broo, LT/NOAA	Field Operations Officer NOAA Ship Rainier	05/29/2018	Digitally signed by BROO.SCOTT.EDWARD.1396599976 Date: 2018.06.21 09:43:48 -08'00'
James B. Jacobson	Chief Survey Technician NOAA Ship Rainier	05/29/2018	JACOBSON.JAMES.BRYAN.1269664017 I have reviewed this document 2018.05.29 10:08:25 -07'00'
Amanda M. Finn	Assistant Survey Tech. NOAA Ship Rainier	05/29/2018	FINN.AMANDA.MARIA.1540474253 Digitally signed by FINN.AMANDA.MARIA.1540474253 Date: 2018.05.29 10:23:19 -07'00'

Subject: Re: CINMS survey boundary gaps along prior surveys
From: "ops.rainier" <ops.rainier@noaa.gov>
Date: 10/2/2017 07:25
To: Meredith Payne - NOAA Federal <meredith.payne@noaa.gov>
CC: ChiefST <ChiefST.Rainier@noaa.gov>, Peter Holmberg - NOAA Federal <peter.holmberg@noaa.gov>, _OMAO MOP CO Rainier <co.rainier@noaa.gov>

Meredith,

Thank you very much. We will cover the gaps as operationally possible.

Scott

On 10/2/2017 6:19 AM, Meredith Payne - NOAA Federal wrote:

> Please push the sheet limits for OPR-L397-RA-17 out to cover those gaps, if operationally possible.
> Thank you,
> Meredith
>
> On Sun, Oct 1, 2017 at 12:24 PM, ops.rainier <ops.rainier@noaa.gov> wrote:
>
> > Hi Meredith,
> >
> > PS Pete Holmberg joined us on Saturday for the cruise south. With him, he brought surfaces for the surveys adjacent to the CINMS sheets. When CST Jacobson opened them he noticed there are some gaps you needed to be aware of. Please see the attached images as a reference. These prior surveys are in the SAR process now, and have passed RSA. I wanted to shine a light on this because I believe OCS would like to not leave these gaps in coverage, but with CINMS paying for much of the project, I can't be sure that these sheet boundaries aren't where they should be. RAINIER's sheet managers are finishing up their sheet preps over the next couple of days, so a quick resolution here would be ideal. However, I imagine this may be the first you've seen of this. Please let us know how you'd like us to proceed.
> >
> > Thanks,
> >
> > Scott
>
> --
> Meredith C. Payne
> Physical Scientist,
> Hydrographic Surveys Division Operations Branch

National Oceanic & Atmospheric Administration
1315 East-West Hwy, SSMC3 6201
Silver Spring, MD 20910
240-533-0025

H13082 Danger to Navigation Report

Registry Number: H13082

State: California

Locality: Channel Islands National Marine Sanctuary, and Offshore of Morro Bay, California

Sub-locality: Adams Cove to Westoctt Shoal

Project Number: OPR-L397-RA-17

Survey Dates: 04 October 2017 - 12 October 2017

Charts Affected

Number	Edition	Date	Scale (RNC)	RNC Correction(s)*
18727	12th	07/01/2004	1:40,000 (18727_1)	USCG LNM: 12/6/2016 (7/11/2017) NGA NTM: None (7/22/2017)
18721	11th	07/08/2000	1:100,000 (18721_1)	[L]NTM: ?
18720	33rd	08/01/2008	1:232,188 (18720_1)	[L]NTM: ?
18022	35th	08/01/2005	1:868,003 (18022_1)	[L]NTM: ?
18020	38th	10/01/2007	1:1,444,000 (18020_1)	[L]NTM: ?
501	12th	11/01/2002	1:3,500,000 (501_1)	[L]NTM: ?
530	32nd	06/01/2007	1:4,860,700 (530_1)	[L]NTM: ?
50	6th	06/01/2003	1:10,000,000 (50_1)	[L]NTM: ?

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

Features

No.	Feature Type	Survey Depth	Survey Latitude	Survey Longitude	AWOIS Item
1.1	Shoal	6.21 m	34° 04' 14.9" N	120° 25' 49.2" W	---
1.2	Shoal	5.63 m	34° 03' 40.3" N	120° 27' 41.3" W	---

1 - Dangers To Navigation

1.1) 150/272

DANGER TO NAVIGATION

Survey Summary

Survey Position:	34° 04' 14.9" N, 120° 25' 49.2" W
Least Depth:	6.21 m (= 20.37 ft = 3.395 fm = 3 fm 2.37 ft)
TPU (±1.96σ):	**THU (TPEh)** ±0.114 m ; **TVU (TPEv)** ±0.159 m
Timestamp:	2017-283.22:16:42.350 (10/10/2017)
Survey Line:	h13082 / 2803_em2040 / 2017-283 / 0020_20171010_221630_2803_283
Profile/Beam:	150/272
Charts Affected:	18727_1, 18721_1, 18720_1, 18022_1, 18020_1, 501_1, 530_1, 50_1

Remarks:

[None]

Feature Correlation

Source	Feature	Range	Azimuth	Status
0020_20171010_221630_2803_283	150/272	0.00	000.0	Primary

Hydrographer Recommendations

[None]

Arithmetically-Rounded Depth (Unit-wise Affected Charts):

3 ½fm (18727_1, 18720_1, 18022_1, 18020_1, 530_1)

3fm 2ft (18721_1)

6.2m (501_1, 50_1)

S-57 Data

Geo object 1:	Sounding (SOUNDG)
Attributes:	QUASOU - 6:least depth known
	SORDAT - 1
	SORIND - US,US,graph,H13082
	TECSOU - 3:found by multi-beam

Feature Images

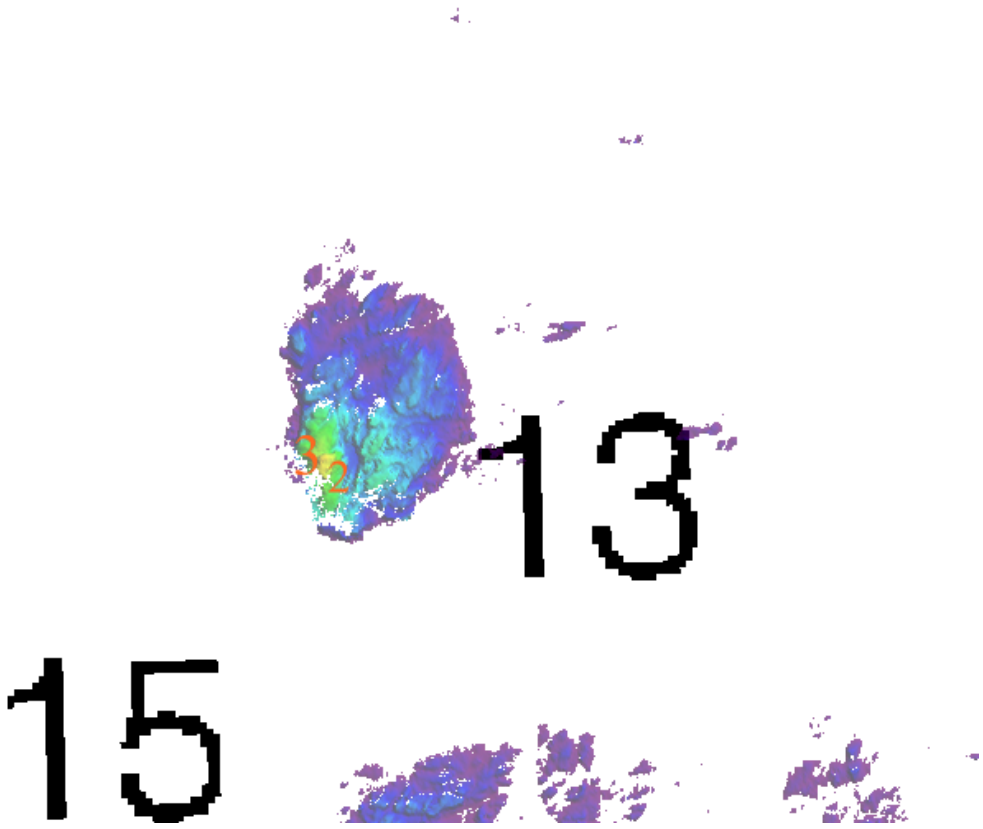


Figure 1.1.1

1.2) 7907/338

DANGER TO NAVIGATION

Survey Summary

Survey Position:	34° 03' 40.3" N, 120° 27' 41.3" W
Least Depth:	5.63 m (= 18.49 ft = 3.081 fm = 3 fm 0.49 ft)
TPU (±1.96σ):	**THU (TPEh)** ±0.137 m ; **TVU (TPEv)** ±0.139 m
Timestamp:	2017-283.20:53:09.042 (10/10/2017)
Survey Line:	h13082 / 2801_em2040 / 2017-283 / 0008_20171010_204457_2801_283
Profile/Beam:	7907/338
Charts Affected:	18727_1, 18721_1, 18720_1, 18022_1, 18020_1, 501_1, 530_1, 50_1

Remarks:

[None]

Feature Correlation

Source	Feature	Range	Azimuth	Status
0008_20171010_204457_2801_283	7907/338	0.00	000.0	Primary

Hydrographer Recommendations

[None]

Arithmetically-Rounded Depth (Unit-wise Affected Charts):

3fm (18727_1, 18720_1, 18022_1, 18020_1, 530_1)

3fm 0ft (18721_1)

5.6m (501_1, 50_1)

S-57 Data

Geo object 1:	Sounding (SOUNDG)
Attributes:	QUASOU - 6:least depth known
	SORDAT - 1
	SORIND - US,US,graph,H13082
	TECSOU - 3:found by multi-beam

Feature Images

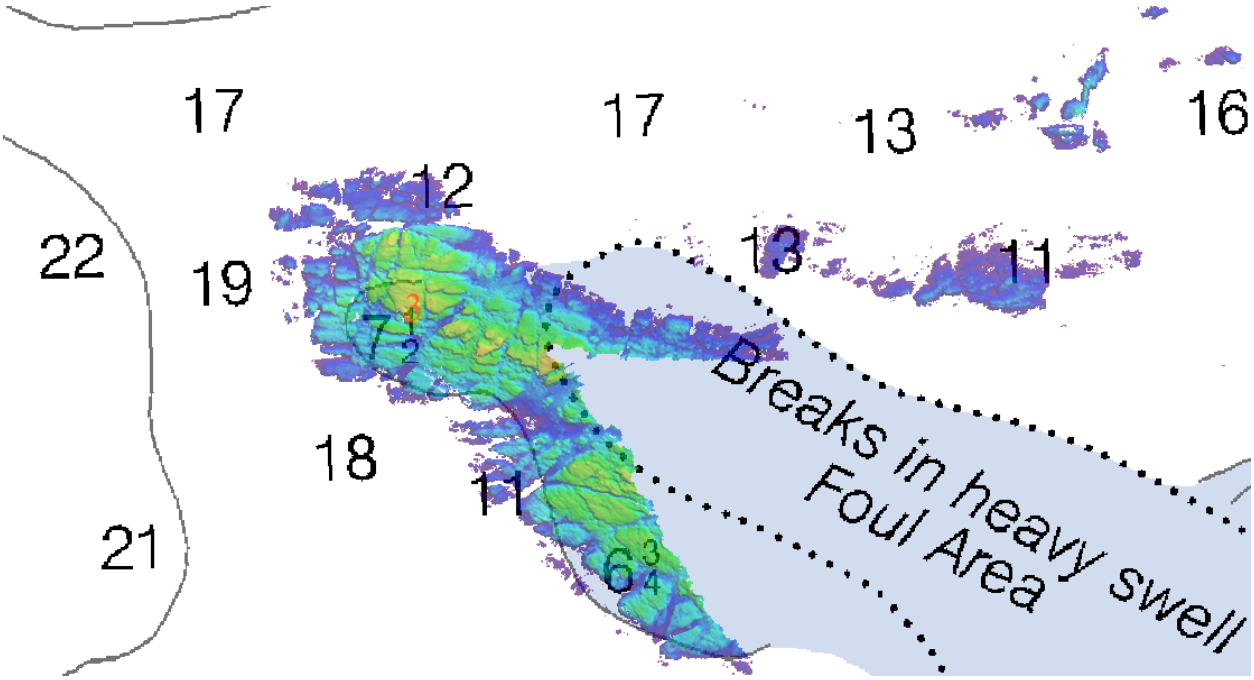


Figure 1.2.1

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

PROVISIONAL TIDE NOTE FOR HYDROGRAPHIC SURVEY

DATE : November 17, 2017

HYDROGRAPHIC BRANCH: Pacific
HYDROGRAPHIC PROJECT: OPR-L397-RA-2017
HYDROGRAPHIC SHEET: H13082

LOCALITY: Adams Cove to Westcott Shoal, Channel Islands National Marine Sanctuary, and Offshore of Morro Bay, California

TIME PERIOD: October 5 - November 5, 2017

TIDE STATION USED: Los Angeles, CA 9410660
Lat.33° 43.2' N Long. 118° 16.4' W
PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters
HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 1.448 meters

TIDE STATION USED: Santa Monica, CA 9410840
Lat. 34° 0.5' N Long. 118° 30' W
PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters
HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 1.428 meters

TIDE STATION USED: Santa Barbara, CA 9411340
Lat. 34° 24.2' N Long. 119° 41.6' W
PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters
HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 1.415 meters

TIDE STATION USED: Oil Platform Harvest, CA 9411406
Lat. 34° 28.1' N Long. 120° 40.9' W
PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters
HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 1.373 meters

TIDE STATION USED: Port San Luis, CA 9412110
Lat. 35° 10.1' N Long. 120° 45.2' W
PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters
HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 1.408 meters

TIDE STATION USED: Monterey, CA 9413450
Lat. 36° 36.3' N Long. 121° 53.3' W
PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters
HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 1.412 meters

REMARKS: RECOMMENDED Grid

Please use the TCARI grid "L397RA2017Rev.tc" as the final grid for project OPR-L397-RA-2017, H13082, during the time period between October 5 - November 5, 2017.

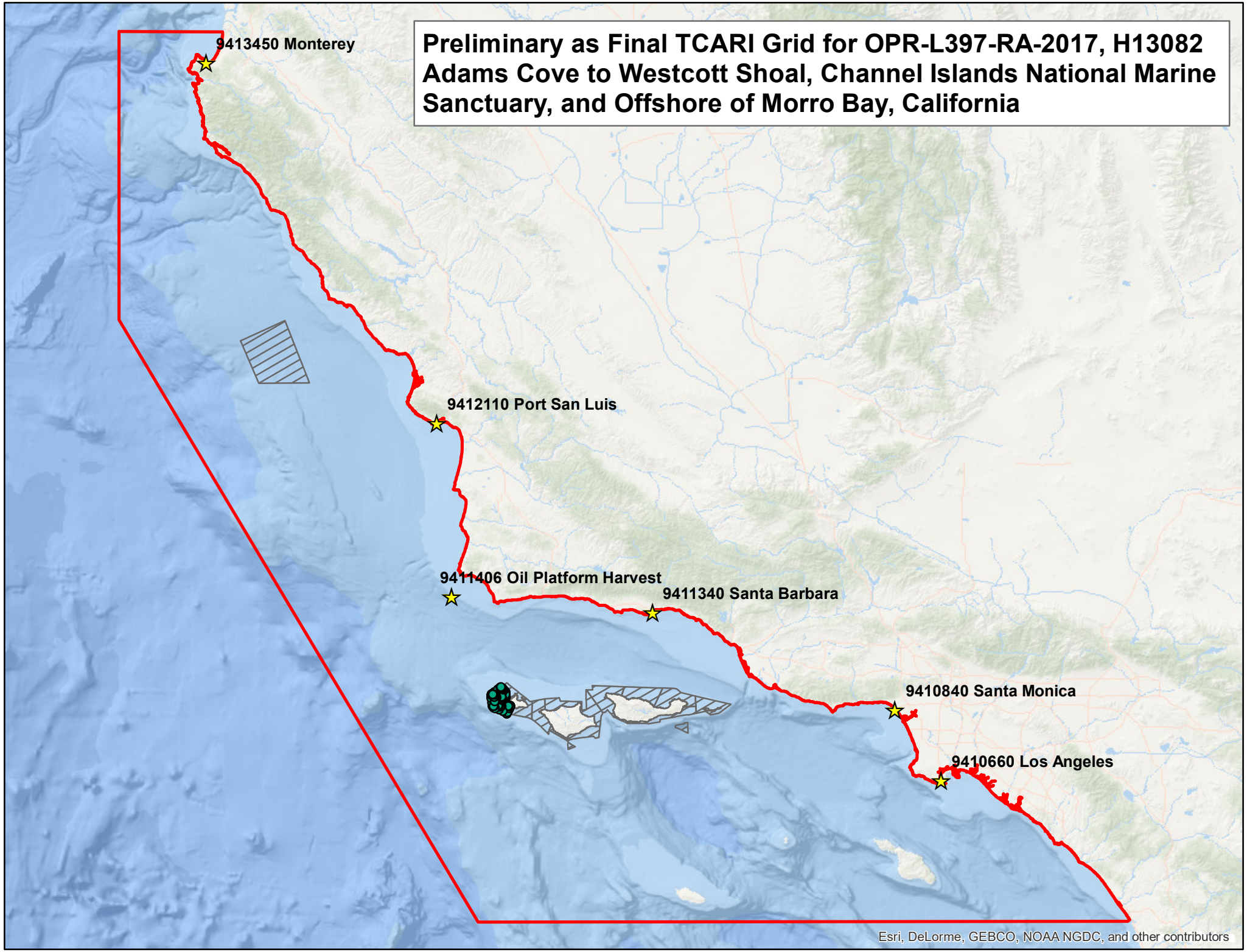
Refer to attachments for grid information.

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 Los Angeles (9410660) and Port San Luis (9412110) was not completed in FY17. A review of the verified leveling records from October 2007 - March 2016 shows the tide station benchmark networks to be stable within an allowable 0.009 m tolerance. This Tide Note may be used as final stability verification for survey OPR-L397-RA-2017, H13082. 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.

_____

CHIEF, OCEANOGRAPHIC DIVISION


Preliminary as Final TCARI Grid for OPR-L397-RA-2017, H13082
Adams Cove to Westcott Shoal, Channel Islands National Marine Sanctuary, and Offshore of Morro Bay, California
9413450 Monterey
9412110 Port San Luis
9411406 Oil Platform Harvest
9411340 Santa Barbara
9410840 Santa Monica
9410660 Los Angeles
Esri, DeLorme, GEBCO, NOAA NGDC, and other contributors

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	Local Notice to Mariners
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

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
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

APPROVAL PAGE

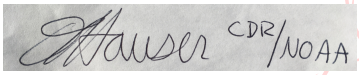
H13082

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
- 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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Commander Olivia Hauser, NOAA
Chief, Pacific Hydrographic Branch