H13070

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

DESCRIPTIVE REPORT

Type of Survey:	Navigable Area
Registry Number:	H13070

LOCALITY

State(s):	Alaska
General Locality:	Yakutat Bay
Sub-locality:	Monti Bay

2017

CHIEF OF PARTY
CDR Mark Van Waes, NOAA

LIBRARY & ARCHIVES

Date:

U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION	REGISTRY NUMBER:
HYDROGRAPHIC TITLE SHEET	**H13070**

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:	**Yakutat Bay**
Sub-Locality:	**Monti Bay**
Scale:	**40000**
Dates of Survey:	**09/15/2017 to 10/29/2017**
Instructions Dated:	**08/10/2017**
Project Number:	**OPR-O346-FA-17**
Field Unit:	**NOAA Ship *Fairweather***
Chief of Party:	**CDR Mark Van Waes, 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 H13070

Project: OPR-O346-FA-17

Locality: Yakutat Bay

Sublocality: Monti Bay

Scale: 1:40000

September 2017 - October 2017

NOAA Ship *Fairweather*

Chief of Party: CDR Mark Van Waes, NOAA

A. Area Surveyed

The survey area is located in Yakutat Bay within the sub-locality of Monti Bay.

A.1 Survey Limits

Data were acquired within the following survey limits:

Northwest Limit	Southeast Limit
59° 36' 0.75" N 139° 57' 36.67" W	59° 30' 32.44" N 139° 43' 43.69" W

Table 1: Survey Limits

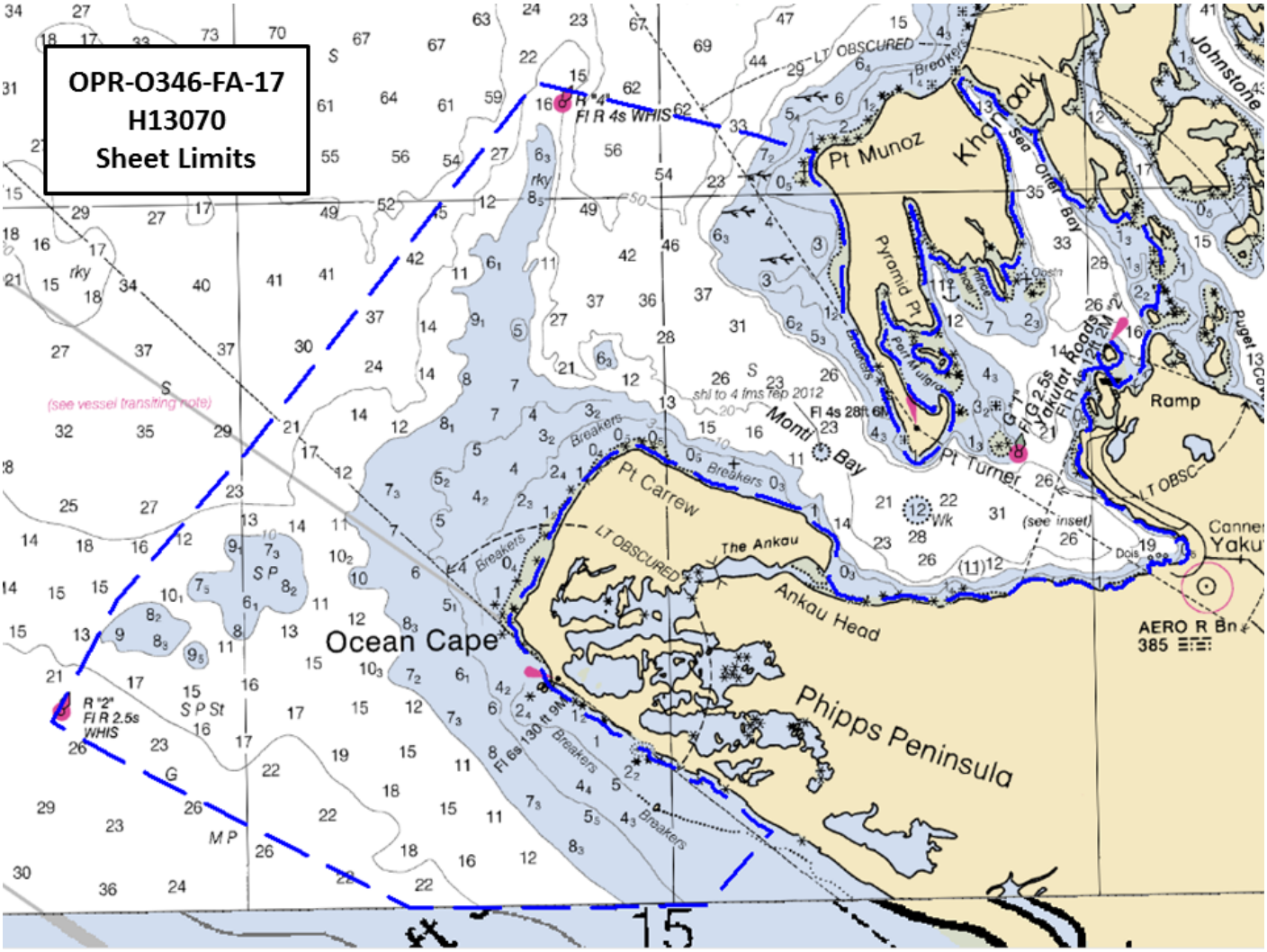


Figure 1: H13070 sheet limits (in blue) overlaid onto Chart 16761 and Chart 16760

Data were acquired to the survey limits in accordance with the requirements in the Project Instructions and the April 2017 NOS Hydrographic Surveys Specifications and Deliverables (HSSD), as shown in Figure 1. In all areas where the 4 meter depth contour or the sheet limits were not met, the Navigable Area Limit Line (NALL) was defined as the inshore limit of bathymetry due to risks of maneuvering the vessel.

In the area around Ocean Cape, the NALL was defined by the presence of large swells and breaking waves, rendering the area unsafe to navigate with the launches (Figure 2).

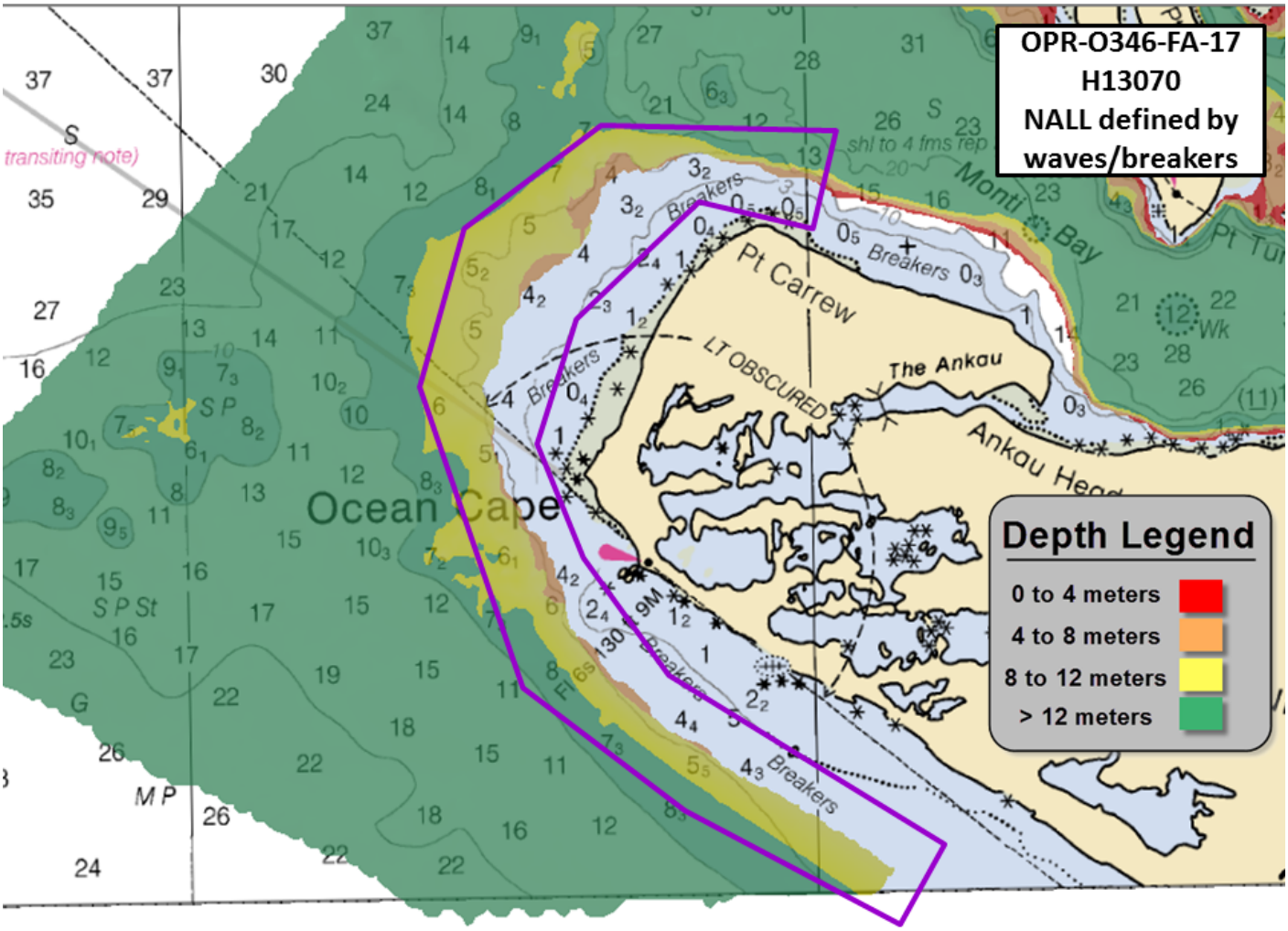


Figure 2: NALL defined by waves and breakers

A.2 Survey Purpose

Yakutat Bay has seen a rapid increase in the number and size of visiting vessels in recent years. Much of this can be attributed to ecotourism amid the area's glaciers, wilderness, and Tongass National Forest. Hubbard Glacier, one of four glaciers which terminate in Disenchantment Bay at the north end of Yakutat Bay, is the largest tidewater glacier in North America. Unlike most other glaciers in Alaska, which are receding, Hubbard's terminus is predicted to continue advancing during the next several years. As a result of this advancement, and the glacier's dramatic calving displays, the glacier is likely to draw more vessel traffic for the foreseeable future to an area of shifting moraines and lag deposits.

Under keel clearance is a risk for the larger cruise ships, which can draft up to 8 meters. Although the bay itself is deep, reaching over 140 fathoms, all traffic has to pass over a glacial terminal moraine, which forms a sill at the mouth of the bay. Near the center of this entrance is a shoal reported to be 6.4 meters (3 ½ fathoms) deep in an area where surveys have not been updated in over 35 years. Royal Caribbean has reported significant chart discrepancies off of the primary route.

The local community of Yakutat is dependent on barge access for delivery of its supplies and groceries. Their economy is largely timber, subsistence hunting, fishing, and tourism. Modern surveys will increase the safety of all of these activities. The Yakutat Bay survey will provide modern bathymetry to update the 1978 vintage survey data. This will update Coast Survey charts and products, improving maritime safety and protecting the local economy.

A.3 Survey Quality

The entire survey is adequate to supersede previous data.

Data acquired in H13070 meet multibeam echo sounder (MBES) coverage requirements for complete coverage and object detection coverage, as required by the HSSD. This includes crosslines (see Section B.2.1), NOAA allowable uncertainty (see Section B.2.10), and density requirements (see Section B.2.11). Additional compliance statistics can be found in the Standards and Compliance Review located in Appendix II of this report.

A.4 Survey Coverage

The following table lists the coverage requirements for this survey as assigned in the project instructions:

Water Depth	Coverage Required
All waters in survey area	Complete Coverage
Extents of 1:10000 US5AK3XM within H13070 Monti Bay	Object Detection Coverage

Table 2: Survey Coverage

To ensure that all data meet the requirements listed above and in the HSSD, two surfaces were created for this project. Figure 3 provides an overview of the surface generated for the entirety of the project to meet complete coverage specifications. Figure 4 provides an overview of the surface generated within the extents of ENC US5AK3XM to meet object detection specifications.

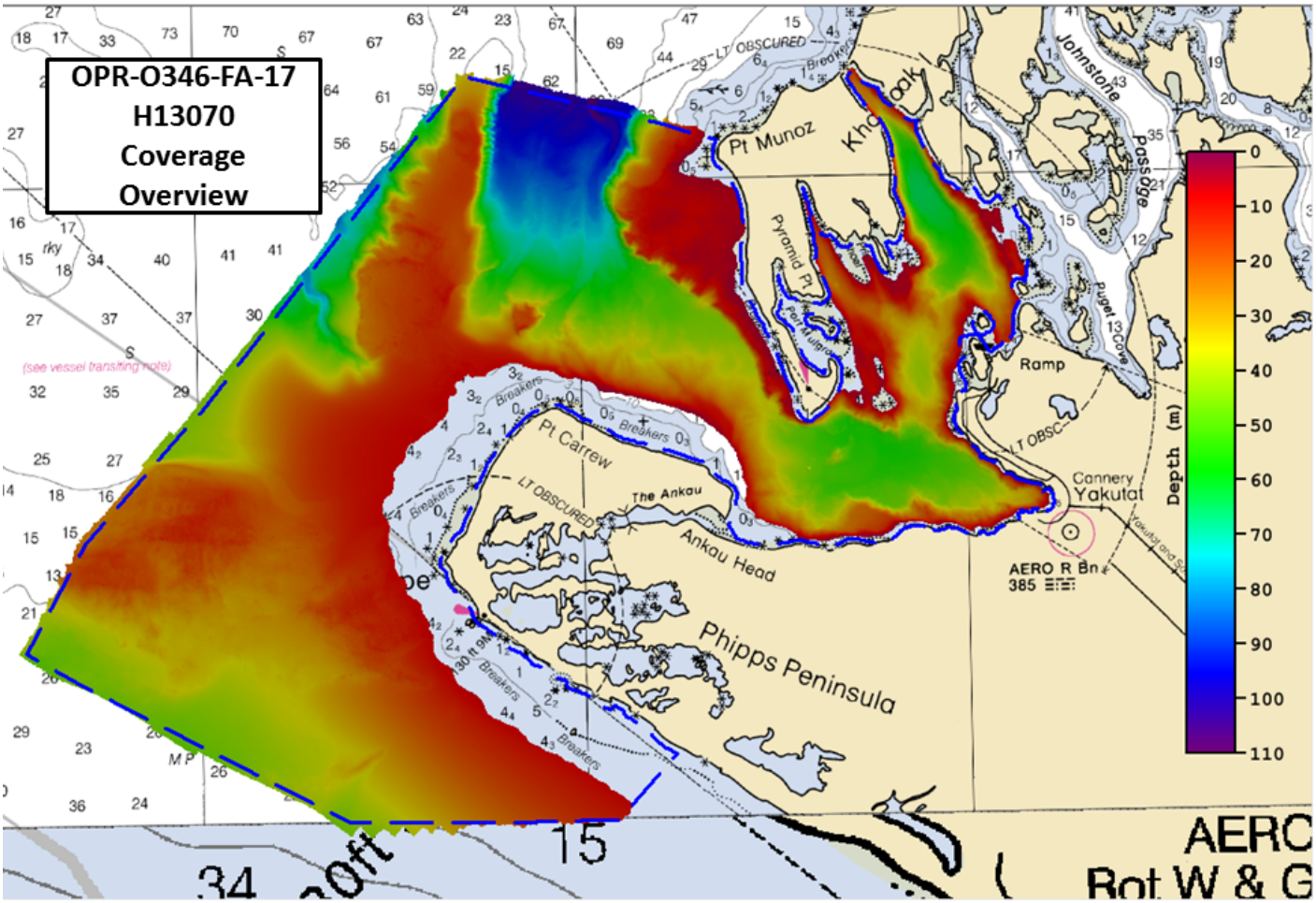


Figure 3: H13070 survey coverage overlaid onto Chart 16761 and Chart 16760

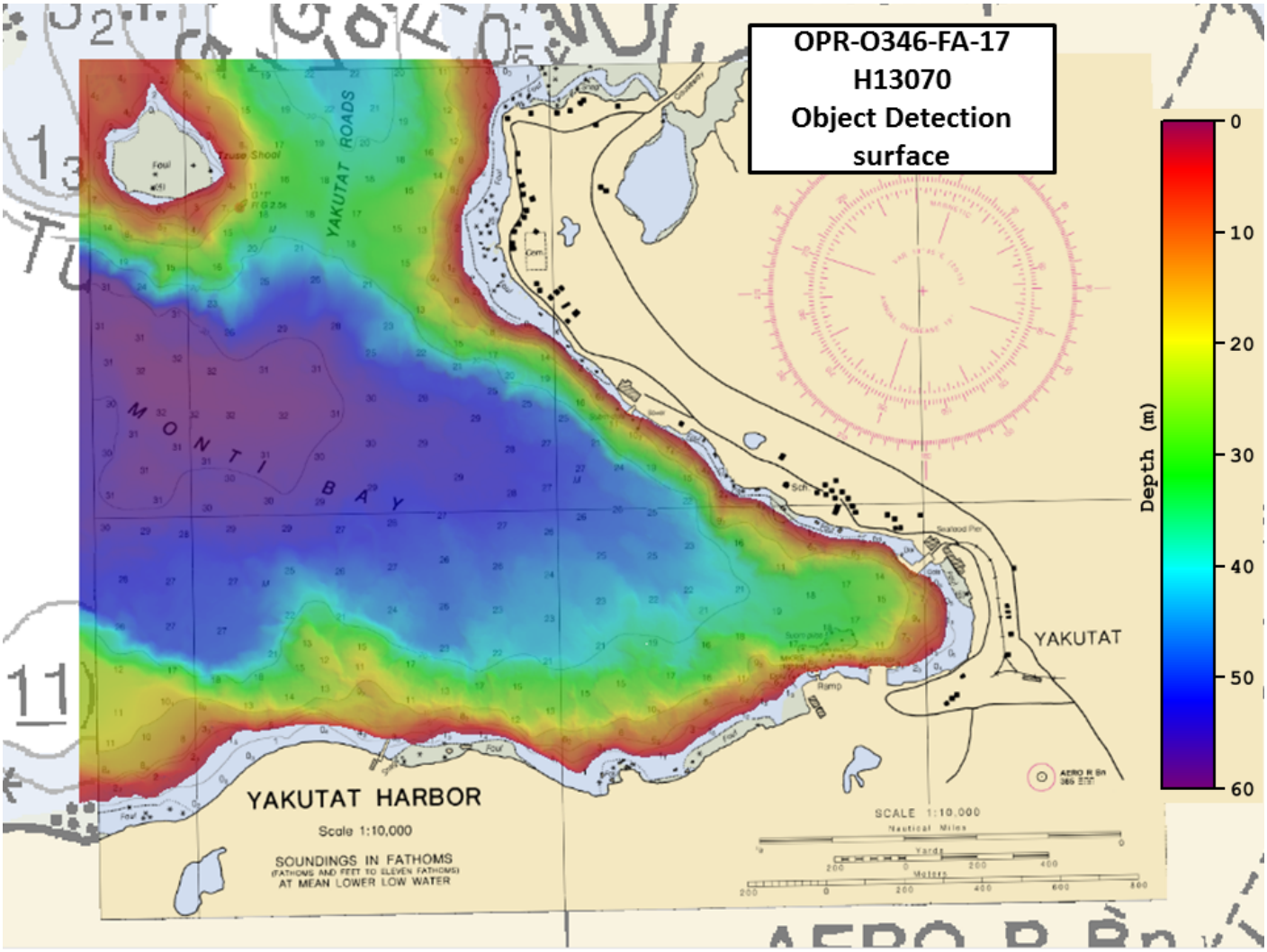


Figure 4: H13070 surface generated for the Monti Bay inset

A.6 Survey Statistics

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

	HULL ID	*2806*	*2807*	*2808*	*Total*
LNM	**SBES Mainscheme**	0	0	0	0
	MBES Mainscheme	64.10	201.16	117.50	382.76
	Lidar Mainscheme	0	0	0	0
	SSS Mainscheme	0	0	0	0
	SBES/SSS Mainscheme	0	0	0	0
	MBES/SSS Mainscheme	0	0	0	0
	SBES/MBES Crosslines	11.26	0	4.48	15.74
	Lidar Crosslines	0	0	0	0
Number of Bottom Samples					12
Number Maritime Boundary Points Investigated					0
Number of DPs					0
Number of Items Investigated by Dive Ops					0
Total SNM					14.4

Table 3: Hydrographic Survey Statistics

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

Survey Dates	Day of the Year
09/15/2017	258
09/19/2017	262

Survey Dates	Day of the Year
09/20/2017	263
09/26/2017	269
09/27/2017	270
09/28/2017	271
09/29/2017	272
09/30/2017	273
10/01/2017	274
10/02/2017	275
10/12/2017	285
10/18/2017	291
10/29/2017	302

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	*2806*	*2807*	*2808*
LOA	8.6 meters	8.6 meters	8.6 meters
Draft	1.1 meters	1.1 meters	1.1 meters

Table 5: Vessels Used

B.1.2 Equipment

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

Manufacturer	Model	Type
Kongsberg Maritime	EM 2040	MBES
Sea-Bird Scientific	SBE 19plus V2	Conductivity, Temperature, and Depth Sensor
Teledyne RESON	SVP 71	Sound Speed System
Applanix	POS MV v5	Positioning and Attitude System

Table 6: Major Systems Used

The equipment was installed on the survey platforms as follows: all launches utilize Kongsberg EM 2040 MBES, Teledyne RESON SVP71 surface sound speed sensors, and Sea-Bird Scientific 19plus CTD casts.

B.2 Quality Control

B.2.1 Crosslines

Multibeam/single beam echo sounder/side scan sonar crosslines acquired for this survey totaled 4.11% of mainscheme acquisition.

Crosslines were collected, processed and compared in accordance with Section 5.2.4.3 of the HSSD. To evaluate crosslines, a surface using strictly mainscheme lines, and a surface using strictly crosslines were created. From these two surfaces, a difference surface (mainscheme - crosslines = difference surface) was generated (Figure 5), and is submitted in the Separates II Digital Data folder. Statistics show the mean difference between the depths derived from mainscheme data and crossline data was 0.00 and 95% of nodes falling within +/- 0.24 meters (Figure 6). For the respective depths, the difference surface was compared to the allowable NOAA uncertainty standards. In total, 99.93% of the depth differences between H13070 mainscheme and crossline data were within allowable NOAA uncertainties.

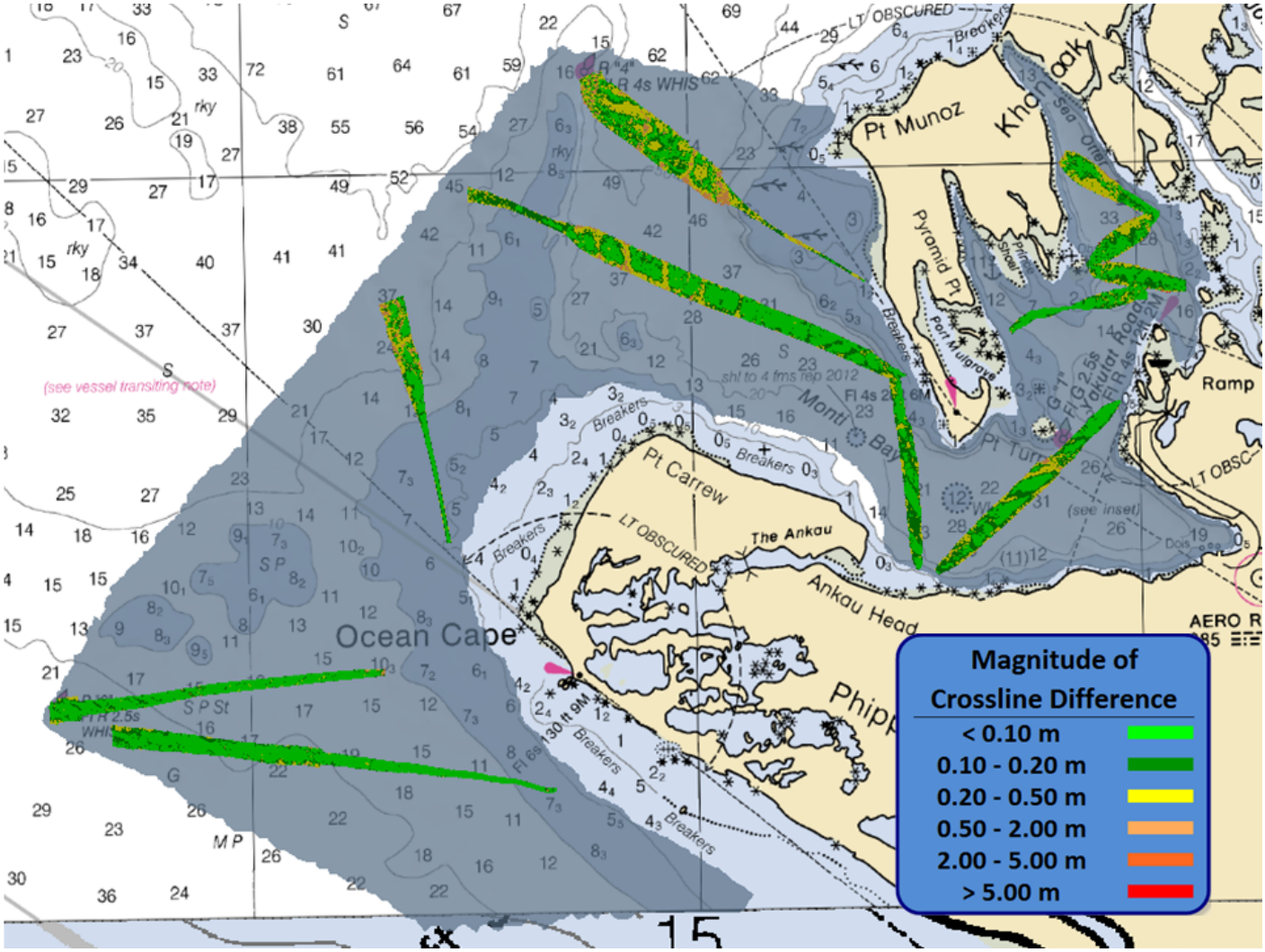
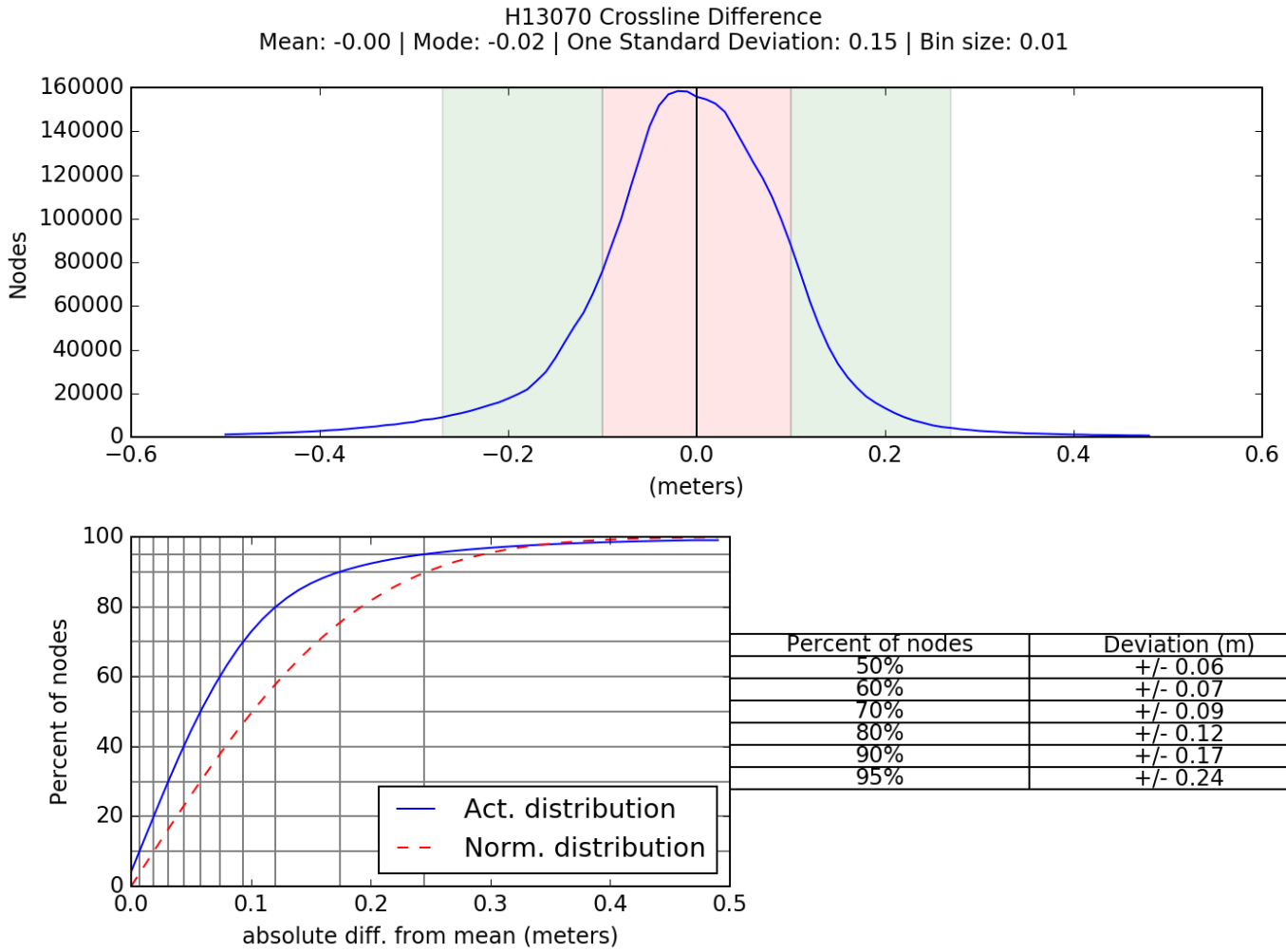


Figure 5: Overview of H13070 crosslines



Percent of nodes	Deviation (m)
50%	+/- 0.06
60%	+/- 0.07
70%	+/- 0.09
80%	+/- 0.12
90%	+/- 0.17
95%	+/- 0.24

Figure 6: H13070 crossline and mainscheme difference statistics

B.2.2 Uncertainty

The following survey specific parameters were used for this survey:

Real time uncertainty values were calculated by TCARI grid

Method	Measured	Zoning
ERS via PMVD	0.0 meters	0.13 meters

Table 7: Survey Specific Tide TPU Values.

Hull ID	Measured - CTD	Measured - MVP	Surface
280X	2 meters/second	N/A meters/second	0.5 meters/second

Table 8: Survey Specific Sound Speed TPU Values.

In addition to the usual a priori estimates of uncertainty provided via device models for vessel motion, ERZT, and Poor Man's VDatum (PMVD), real-time and post-processed uncertainty sources were also incorporated into the depth estimates of survey H13070. Real-time uncertainties were provided via EM 2040 MBES data, Applanix Delayed Heave RMS, and TCARI tides. Following post-processing of the real-time vessel motion, recomputed uncertainties of vessel roll, pitch, gyro and navigation were applied in CARIS HIPS and SIPS via a Smoothed Best Estimate of Trajectory (SBET) RMS file generated in Applanix POSPac.

B.2.3 Junctions

H13070 junctions with two adjacent survey from this project, H13069 and H13073, as shown in Figure 7. Data overlap between H13070 and each adjacent survey was achieved. These areas of overlap between surveys were reviewed with CARIS HIPS and SIPS by surface differencing to assess surface agreement. The junctions with H13070 are generally within the NOAA allowable uncertainty in the area of overlap. For the junctions with H13070, a negative difference indicates H13070 was shoaler, and a positive difference indicates H13070 was deeper.

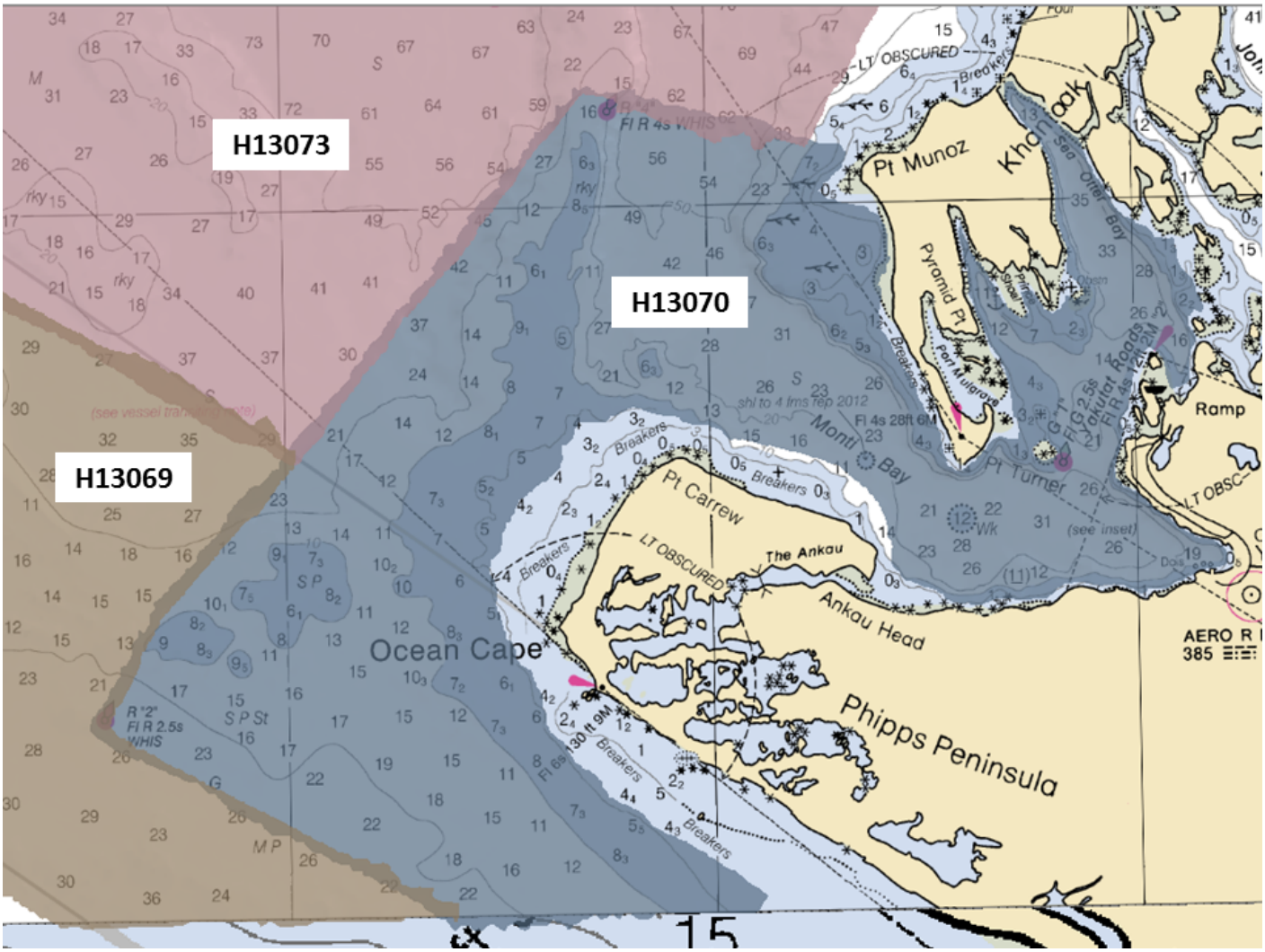


Figure 7: Overview of H13070 junction surveys

The following junctions were made with this survey:

Registry Number	Scale	Year	Field Unit	Relative Location
H13073	1:20000	2017	NOAA Ship FAIRWEATHER	NW
H13069	1:20000	2017	NOAA Ship FAIRWEATHER	W

Table 9: Junctioning Surveys

H13073

Surface differencing in CARIS HIPS and SIPS was used to assess junction agreement between the surface generated from H13070 data and the surface generated from H13073 data. The statistical analysis of the

difference surface shows a mean of -0.04 meters with 95% of all nodes having a maximum deviation of +/- 0.44 meters, as seen in Figure 9. It was found that 99.86% of nodes are within the NOAA allowable uncertainty. The largest differences are located on the northern side of the junction, as seen in Figure 8.

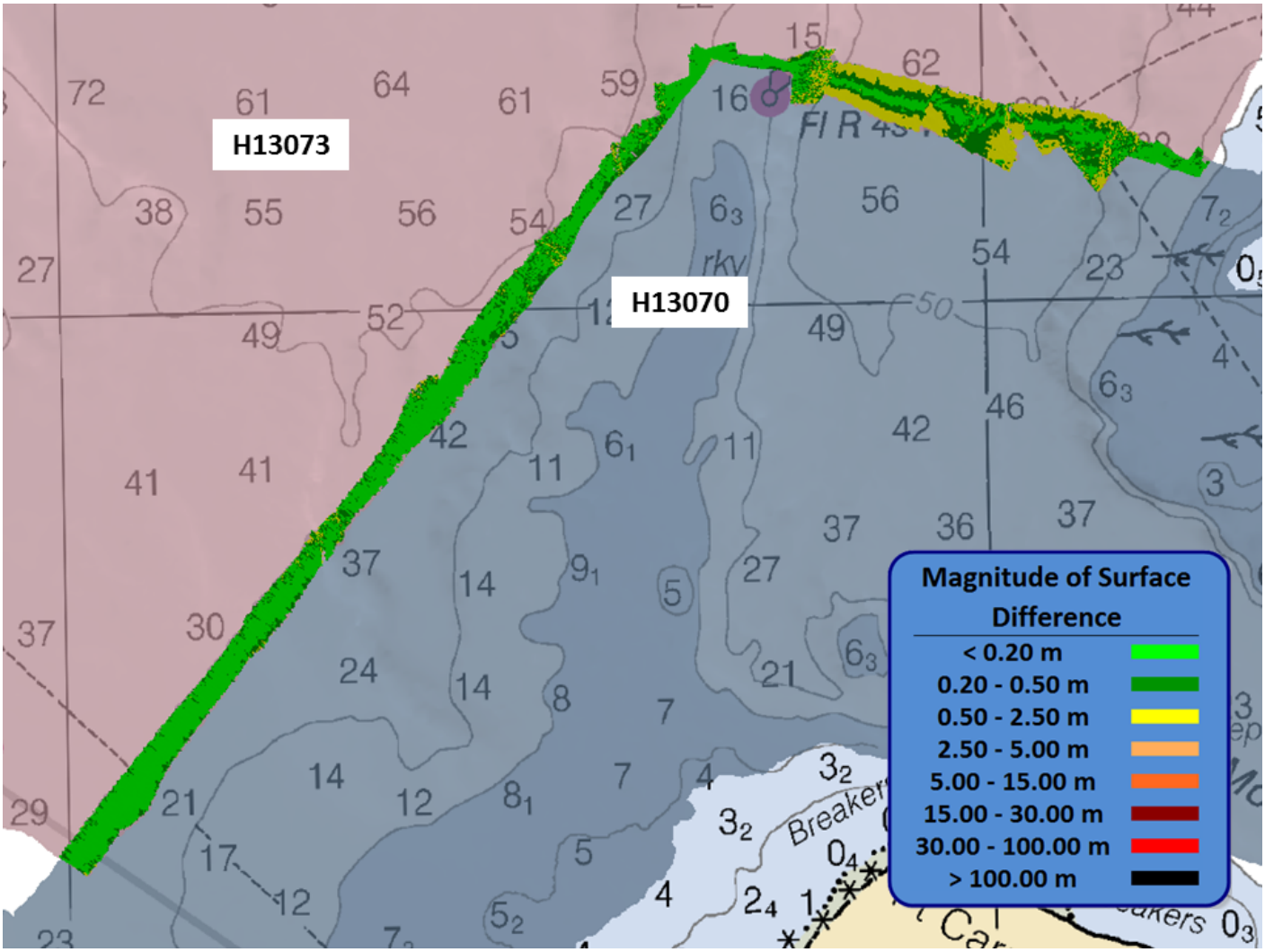
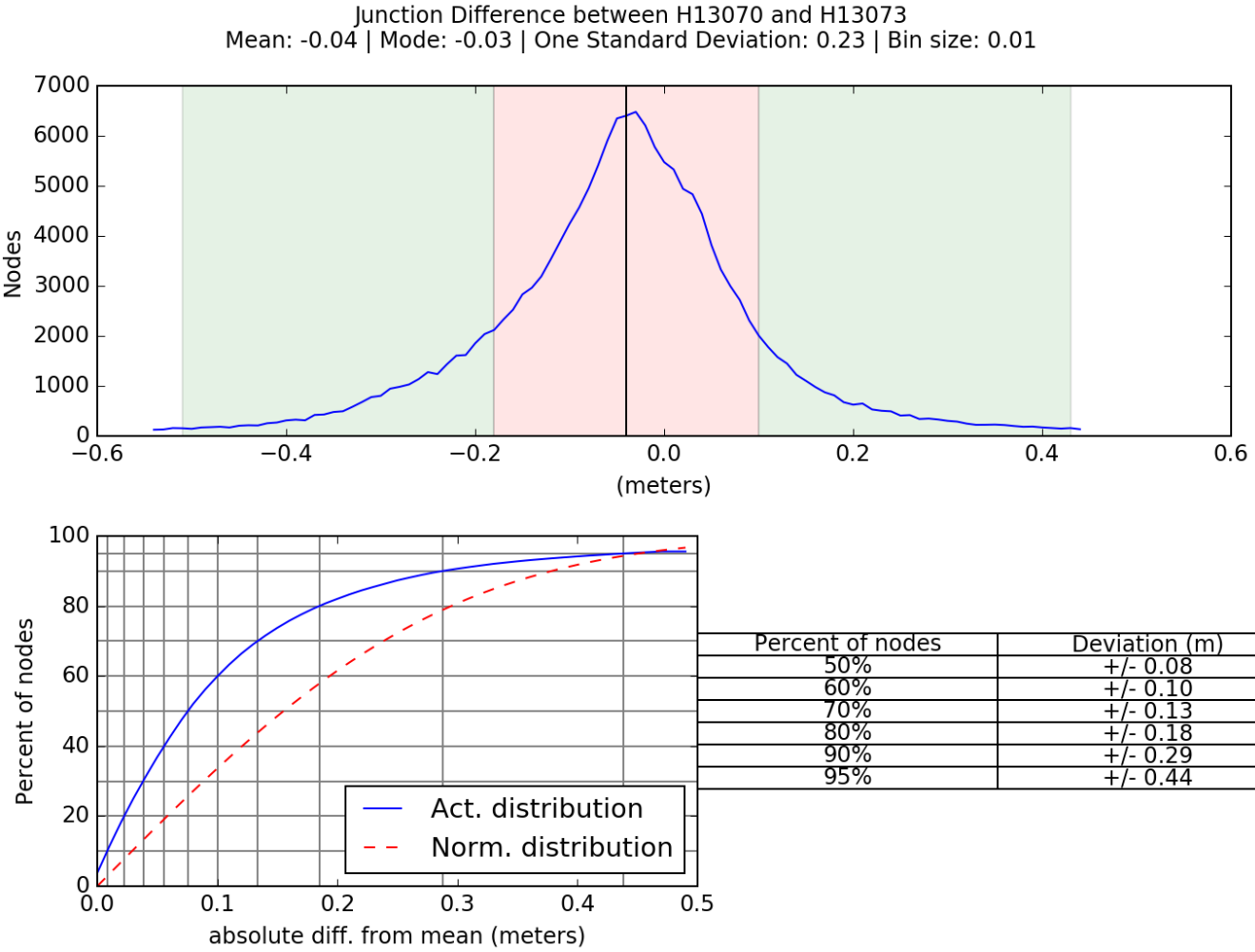


Figure 8: Difference surface between H13070 (blue) and junctioning survey H13073 (pink)



Percent of nodes	Deviation (m)
50%	+/- 0.08
60%	+/- 0.10
70%	+/- 0.13
80%	+/- 0.18
90%	+/- 0.29
95%	+/- 0.44

Figure 9: Difference surface statistics between H13070 and H13073

H13069

Surface differencing in CARIS HIPS and SIPS was used to assess junction agreement between the surface generated from H13070 data and the surface generated from H13069 data (Figure 10). The statistical analysis of the difference surface shows a mean of 0.05 meters with 95% of all nodes having a maximum deviation of +/- 0.26 meters, as seen in Figure 11. It was found that 99.91% of nodes are within the NOAA allowable uncertainty.

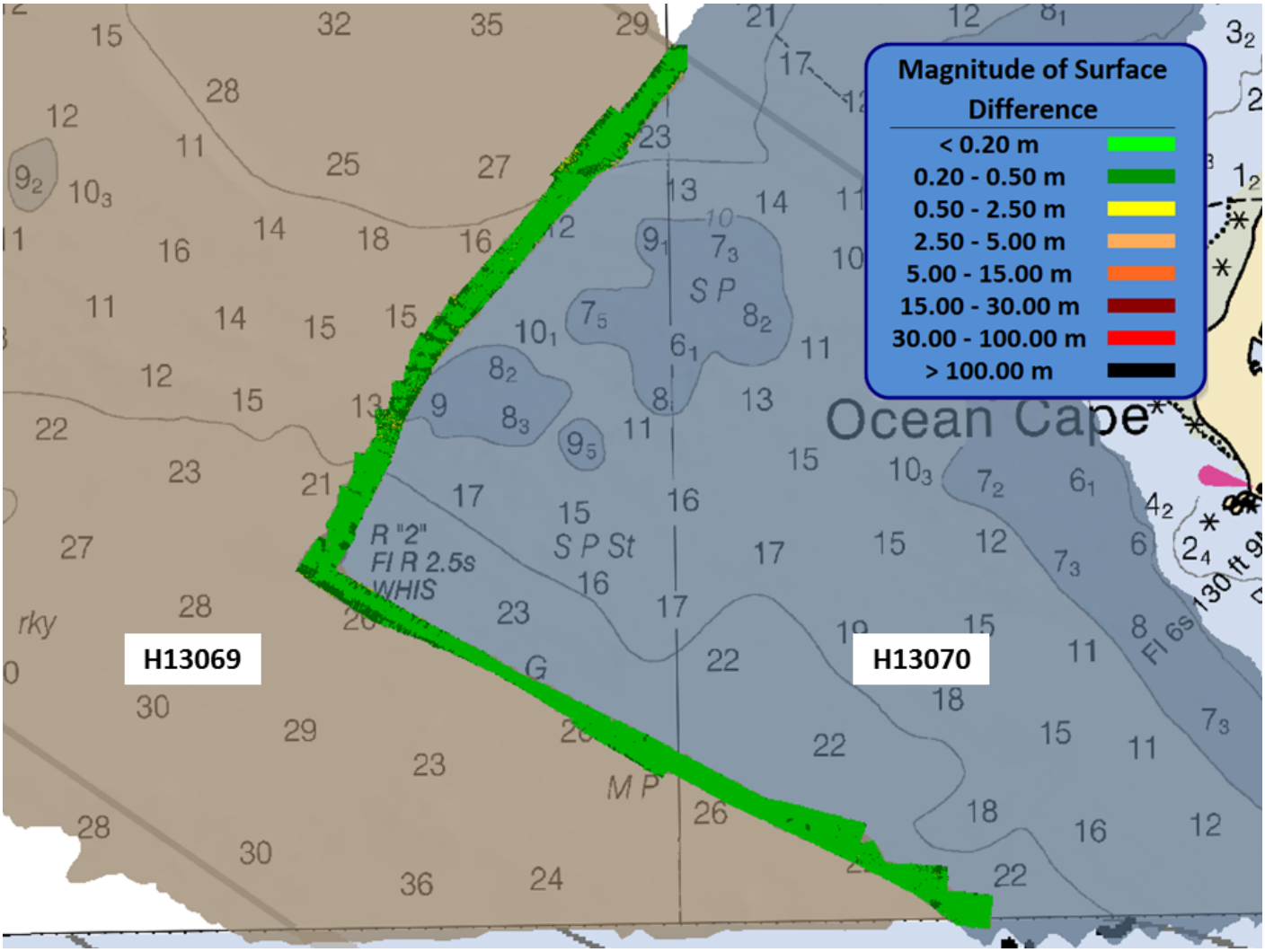
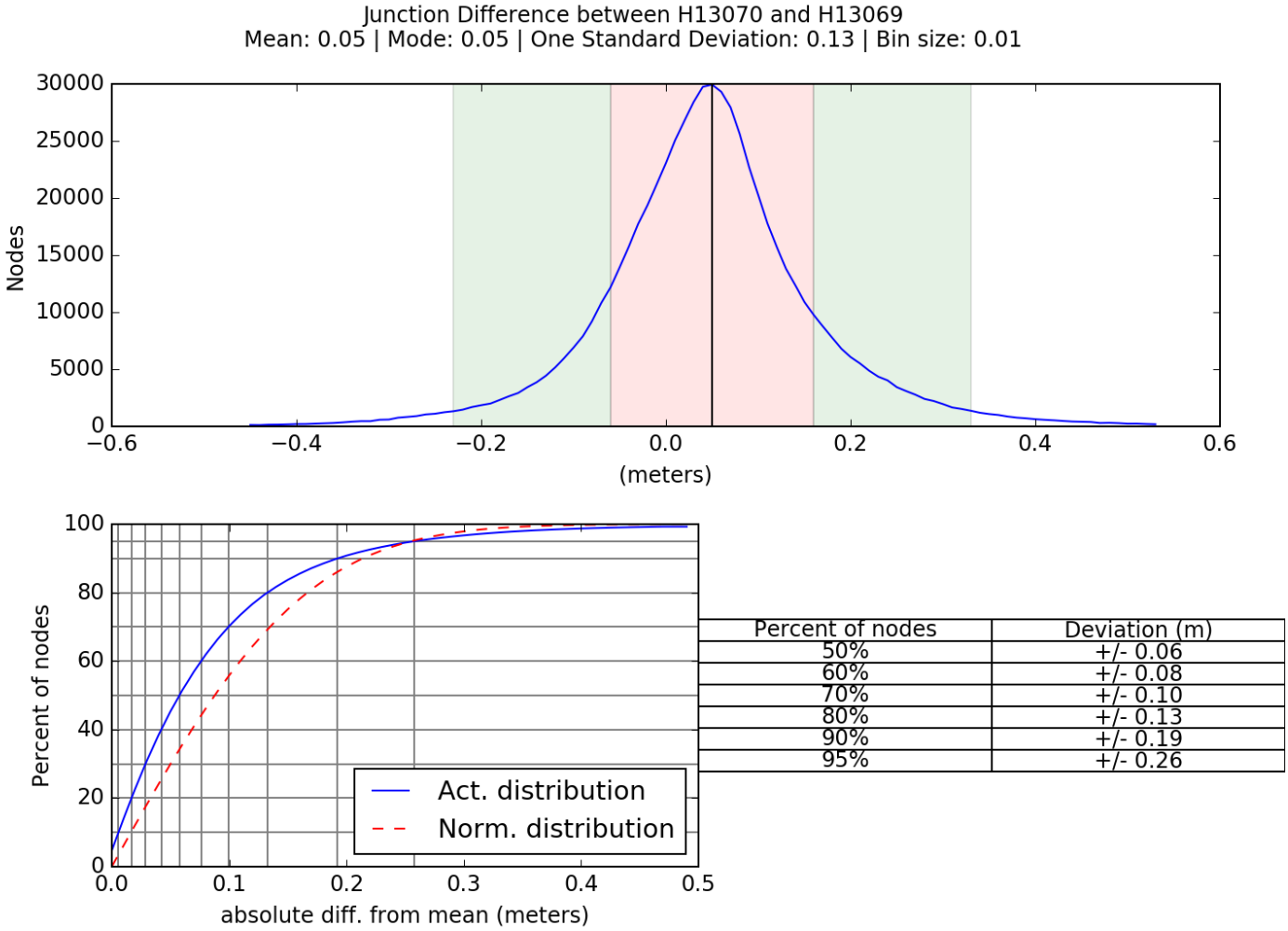


Figure 10: Difference surface between H13070 (blue) and junctioning survey H13069 (brown)



Percent of nodes	Deviation (m)
50%	+/- 0.06
60%	+/- 0.08
70%	+/- 0.10
80%	+/- 0.13
90%	+/- 0.19
95%	+/- 0.26

Figure 11: Difference surface statistics between H13070 and H13069

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: Casts were conducted at a minimum of one every four hours during launch acquisition. Casts were conducted more frequently in areas where the influx of freshwater had an effect on the speed of sound in the water column and when there was a change in surface sound speed greater than two meters per second. All sound speed methods were used as detailed in the DAPR.

B.2.8 Coverage Equipment and Methods

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

B.2.9 Holidays

H13070 data were reviewed in CARIS HIPS and SIPS for holidays in accordance with Section 5.2.2.3 of the HSSD. The Pydro QC Tools Holiday Finder tool, which automatically scans surfaces for holidays as defined in the HSSD, was run independently for the complete coverage surface generated from the entirety of the data acquired within H13070, as well as for the object detection surface generated from the data acquired within the Monti Bay inset, adjusting the holiday thresholds accordingly.

Two holidays which meet the definition described in HTD 2017-2 for complete coverage were identified via the Holiday Finder tool in the areas where data were acquired to complete coverage standards. Holiday "1" is a result of shadowing from an object on the seafloor, while holiday "2" is a result of data being rejected upon conversion in CARIS HIPS and SIPS due to flags from realtime analysis by the sonar. The data over holiday "2" does capture the least depth, while the coverage surrounding Holiday "1" does not does not confidently capture the least depth.

Two holidays which meet the definition described in HTD 2017-2 for object detection were identified via the Holiday Finder tool in the inset where data were acquired to object detection standards. Both holidays are a result of sparse outerbeam data while defining the NALL, and were in areas deemed unsafe to develop further as shown in Figure 14.

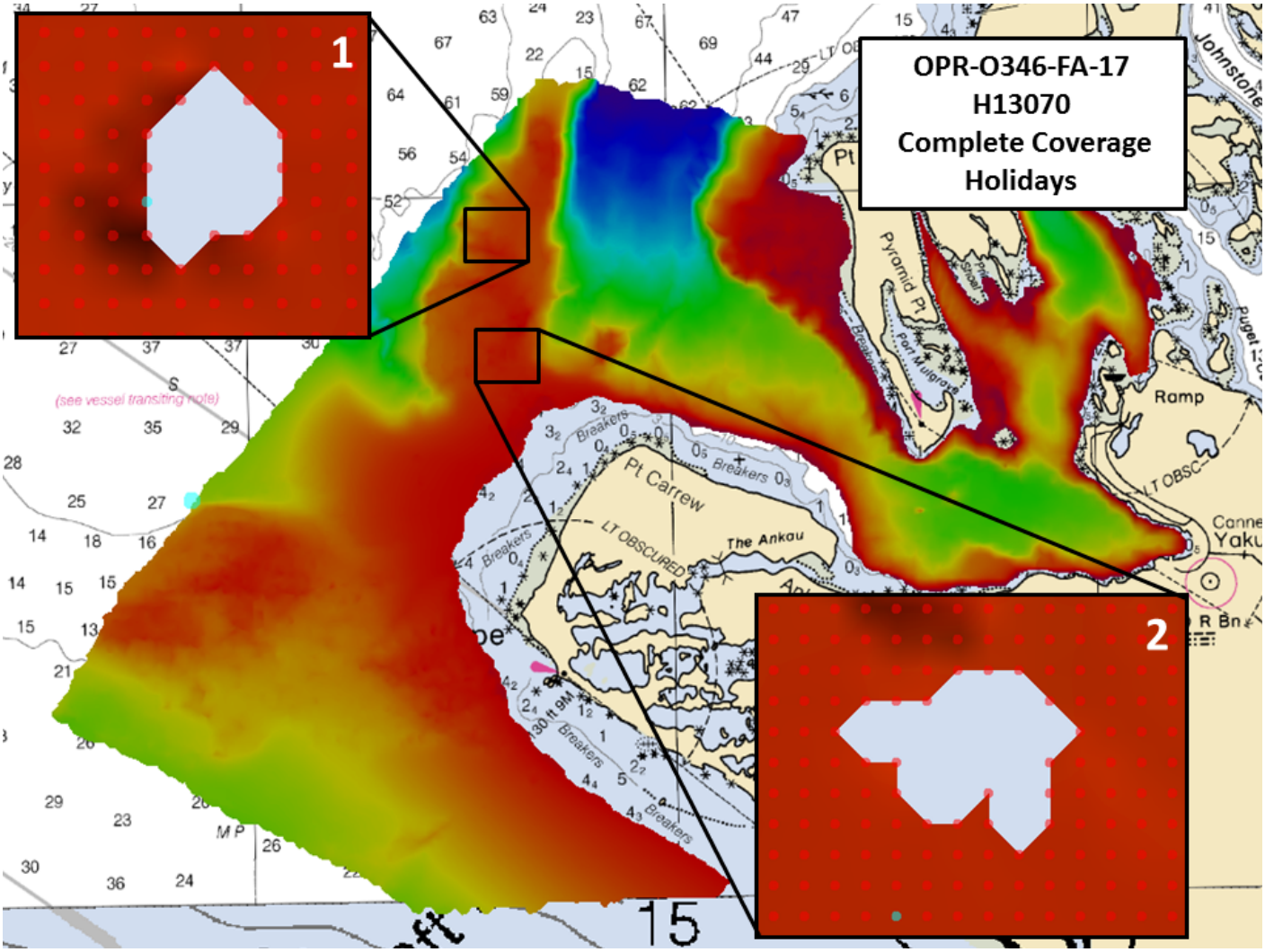


Figure 12: H13070 complete coverage holiday overview

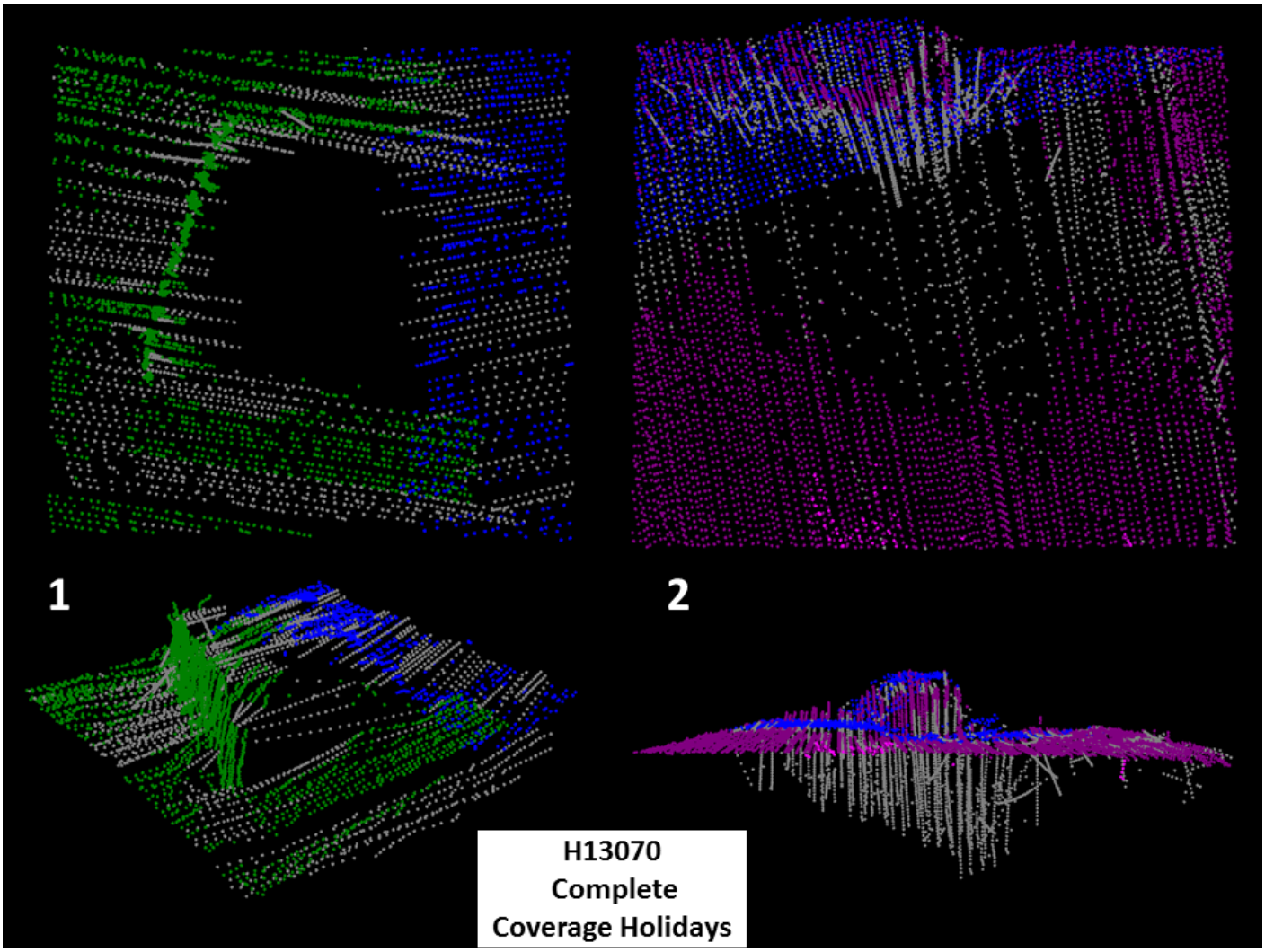


Figure 13: H13070 complete coverage holidays shown in Caris subset editor

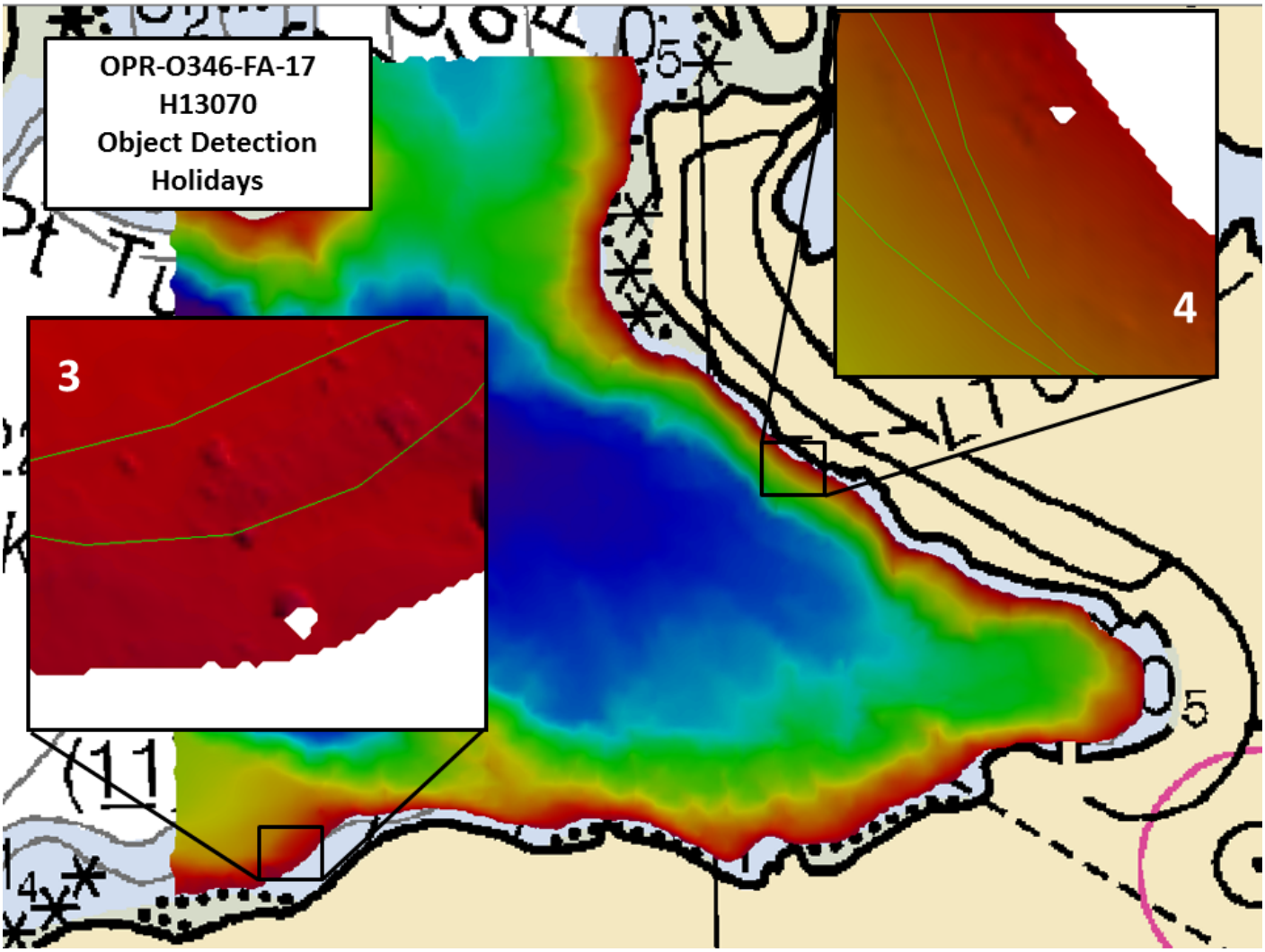


Figure 14: H13070 object detection holiday overview

B.2.10 NOAA Allowable Uncertainty

The complete coverage surface and the object detection surface generated from H13070 data were independently analyzed via the Pydro QC Tools Grid QA feature to determine compliance with specifications. Overall, more than 99% of the nodes in each surface meet NOAA allowable uncertainty specifications. See the Standards and Compliance Review located in Appendix II for a graphical representation of uncertainty compliance.

B.2.11 Density

The complete coverage surface and the object detection surface generated from H13070 data were independently analyzed via the Pydro QC Tools Grid QA feature to determine compliance with specifications. Overall, more than 99% of the nodes in the complete coverage surface meet density

specifications. For the object detection surface, 96% of the nodes meet density specifications. See the Standards and Compliance Review located in Appendix II for graphical representations of density compliance for each surface.

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 stored in the .all file for the Kongsberg systems. All backscatter data were processed by the field unit via Fledermaus FMGT 7.7.4. All processed mosaics and .gsf files have been submitted to the Pacific Hydrographic Branch. See Figure 15 for a complete mosaic.

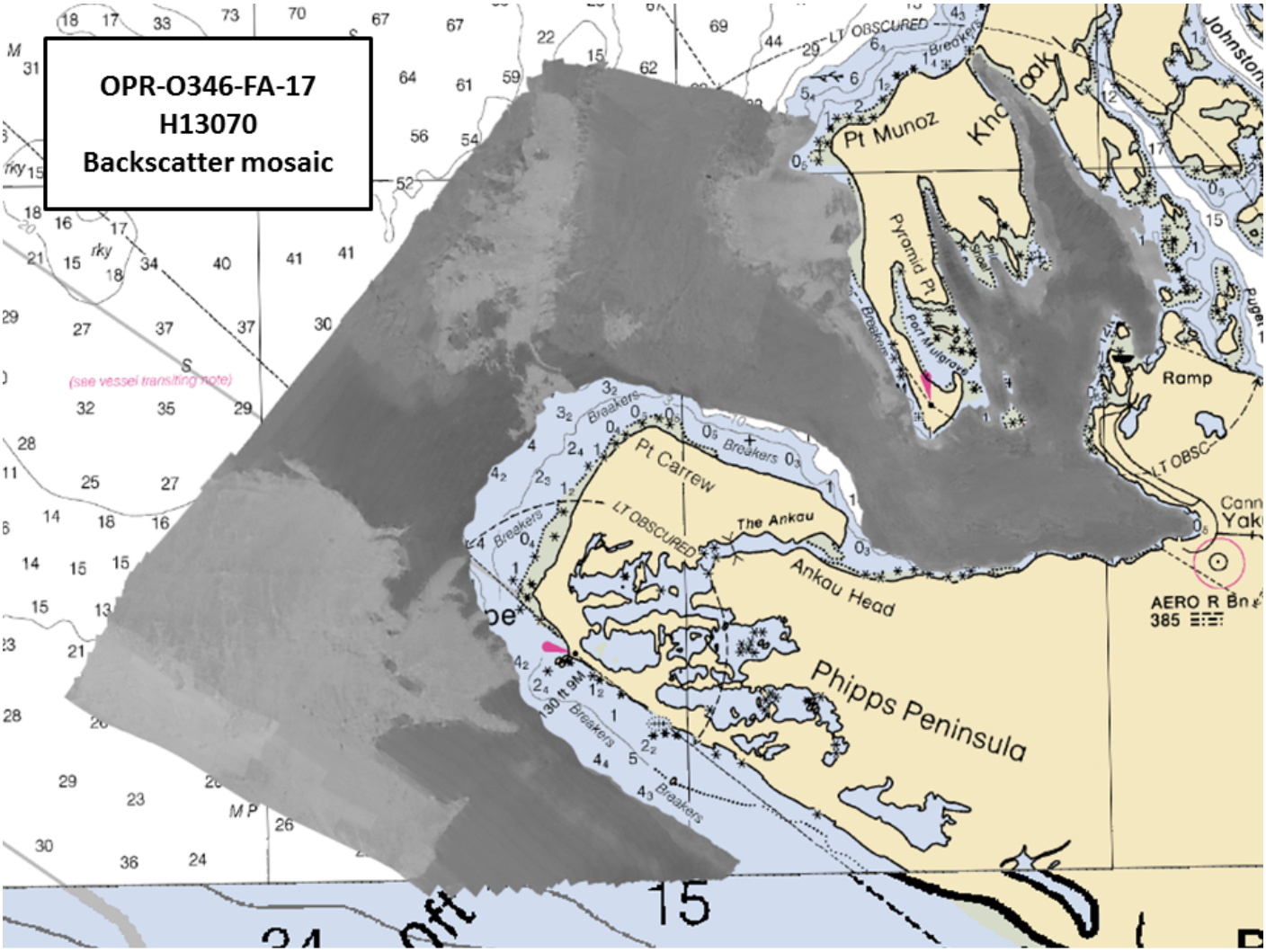


Figure 15: H13070 backscatter mosaic

B.5 Data Processing

B.5.1 Primary Data Processing Software

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

Manufacturer	Name	Version
Teledyne CARIS	HIPS and SIPS	10.3.3

Table 10: Primary bathymetric data processing software

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

Manufacturer	Name	Version
QPS	Fledermaus FMGT	7.7.4

Table 11: Primary imagery data processing software

The following Feature Object Catalog was used: NOAA Profile 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
H13070_MB_VR_MLLW	CARIS VR Surface (CUBE)	Variable Resolution meters	0 meters - 109.8 meters	NOAA_VR	Complete MBES
H13070_MB_VR_MLLW_Final	CARIS VR Surface (CUBE)	Variable Resolution meters	0 meters - 109.8 meters	NOAA_VR	Complete MBES
H13070_MB_VR_ObjectDetection_MLLW	CARIS VR Surface (CUBE)	Variable Resolution meters	0 meters - 57.2 meters	NOAA_VR	Object Detection
H13070_MB_VR_ObjectDetection_MLLW_Final	CARIS VR Surface (CUBE)	Variable Resolution meters	0 meters - 57.2 meters	NOAA_VR	Object Detection

Table 12: Submitted Surfaces

The NOAA CUBE parameters defined in the HSSD were used for the generation of all CUBE surfaces for survey H13070. The surfaces have been reviewed where noisy data, or "fliers," are incorporated into the gridded solutions causing the surface to be shoaler or deeper than the true sea floor. Where these spurious soundings cause the gridded surface to vary from the reliably measured seabed by greater than the maximum allowable Total Vertical Uncertainty at that depth, the noisy data have been rejected by the hydrographer and the surface recomputed.

Flier Finder v5, part of the QC Tools package within Pydro, was used to assist the search for spurious soundings following gross cleaning. Flier Finder was run iteratively until all remaining flagged fliers were deemed to be valid aspects of the steep slopes and dynamic nature of the seafloor.

B.5.3 Data Logs

Data acquisition and processing notes are included in the acquisition and processing logs, and additional processing such as final tide and sound speed application are noted in the H13070 Data Log spreadsheet. All data logs are submitted digitally in the Separates I folder.

C. Vertical and Horizontal Control

Per section 5.1.2.3 of the Field Procedures Manual (2014 ed), no Horizontal and Vertical Control Report has been generated for H13070.

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
Yakutat, AK	9453220

Table 13: NWLON Tide Stations

File Name	Status
9453220.tid	Final Approved

Table 14: Water Level Files (.tid)

File Name	Status
O346FA2017.tc	Final

Table 15: Tide Correctors (.zdf or .tc)

A request for final approved tides was sent to N/OPS1 on 11/01/2017. The final tide note was received on 11/21/2017.

Initial reduction of acquired data to MLLW was accomplished via traditional tidal means using the Tidal Constituent And Residual Interpolation (TCARI) grid provided by HSD-OPS. Following the successful application of SBETs and computation of an Ellipsoidally Referenced Zone Tide (ERZT) separation model, ERS methods were used for reducing data to MLLW.

After final tides were received, the final TCARI grids were applied to the data and used for reducing features to MLLW.

ERS Methods Used:

ERS via Poor Mans VDATUM

Ellipsoid to Chart Datum Separation File:

O346FA2017_PMVD_EPSG6332_NAD83_MLLW_Debiased.csar

ERS methods were used as the final means of reducing H13070 to MLLW for submission. Data were initially reduced via traditional tidal means until an ERZT separation model could be calculated. This empirically derived model was then checked for consistency and compared to the Poor Man's VDatum (PMVD) separation model provided with the Project Instructions. The PMVD separation model was then vertically shifted such that the average difference between these two separation models is zero. This vertical shift de-biases the PMVD separation model, correcting for local offsets that cannot be effectively modeled by the PMVD.

C.2 Horizontal Control

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

The projection used for this project is UTM Zone 7 North.

Vessel kinematic data were post-processed using Applanix POSPac processing software and RTX methods described in the DAPR. Smoothed Best Estimate of Trajectory (SBET) and associated error (RMS) data were applied to all MBES data in CARIS HIPS and SIPS.

For further details regarding the processing and quality control checks performed, see the H13070 POSPac Processing Logs spreadsheet located in the Separates folder.

The following WAAS Stations were used for horizontal control:

DGPS Stations

Table 16: FAA WAAS Stations

C.3 Additional Horizontal or Vertical Control Issues

C.3.1 Horizontal Control Issue

During real-time acquisition, launches 2806, 2807, and 2808 received correctors from the Wide Area Augmentation System (WAS) for increased accuracies similar to USCG DIPS stations. WAS and S Bets were the sole methods of positioning for H13070 as no DIPS stations were available for real-time horizontal control.

D. Results and Recommendations

D.1 Chart Comparison

A comparison was performed between survey H13070 and ENCs US4AK3XM and US5AK3XM, using CARIS HIPS and SIPS sounding and contour layers derived from the surface generated from H13070 data. The contours and soundings were overlaid on the charts to assess differences between the surveyed soundings and charted depths. An eight meter grid was generated from each ENC by extracting all soundings from the chart and creating an interpolated TIN surface which could be differenced with the surface generated from H13070 data. All H13070 data should supersede charted data. In general, surveyed soundings agree with the majority of charted depths. A full discussion of the comparisons follows below.

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?
US4AK3XM	1:80000	5	02/13/2018	02/13/2018	NO
US5AK3XM	1:10000	3	11/21/2016	11/21/2016	NO

Table 17: Largest Scale ENCs

US4AK3XM

Soundings from H13070 are in general agreement with charted depths on chart ENC US4AK3XM, with most depths agreeing to 1-4 fathoms. The largest differences are seen in the entrance to Monti Bay, where the charted contours differ so greatly that they were submitted as a DTON (see section D.1.5 and Appendix II of this report for more detailed discussions).

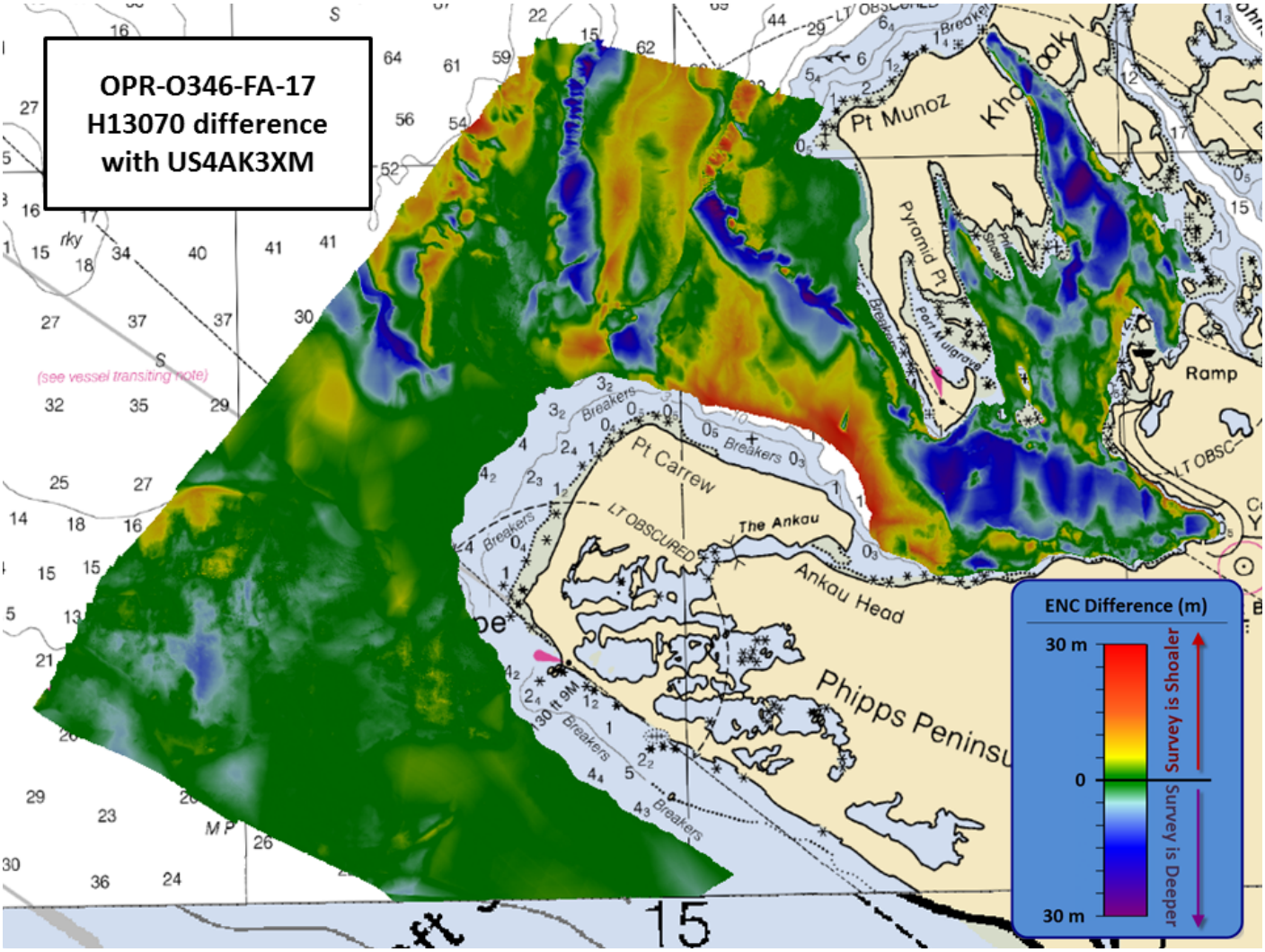
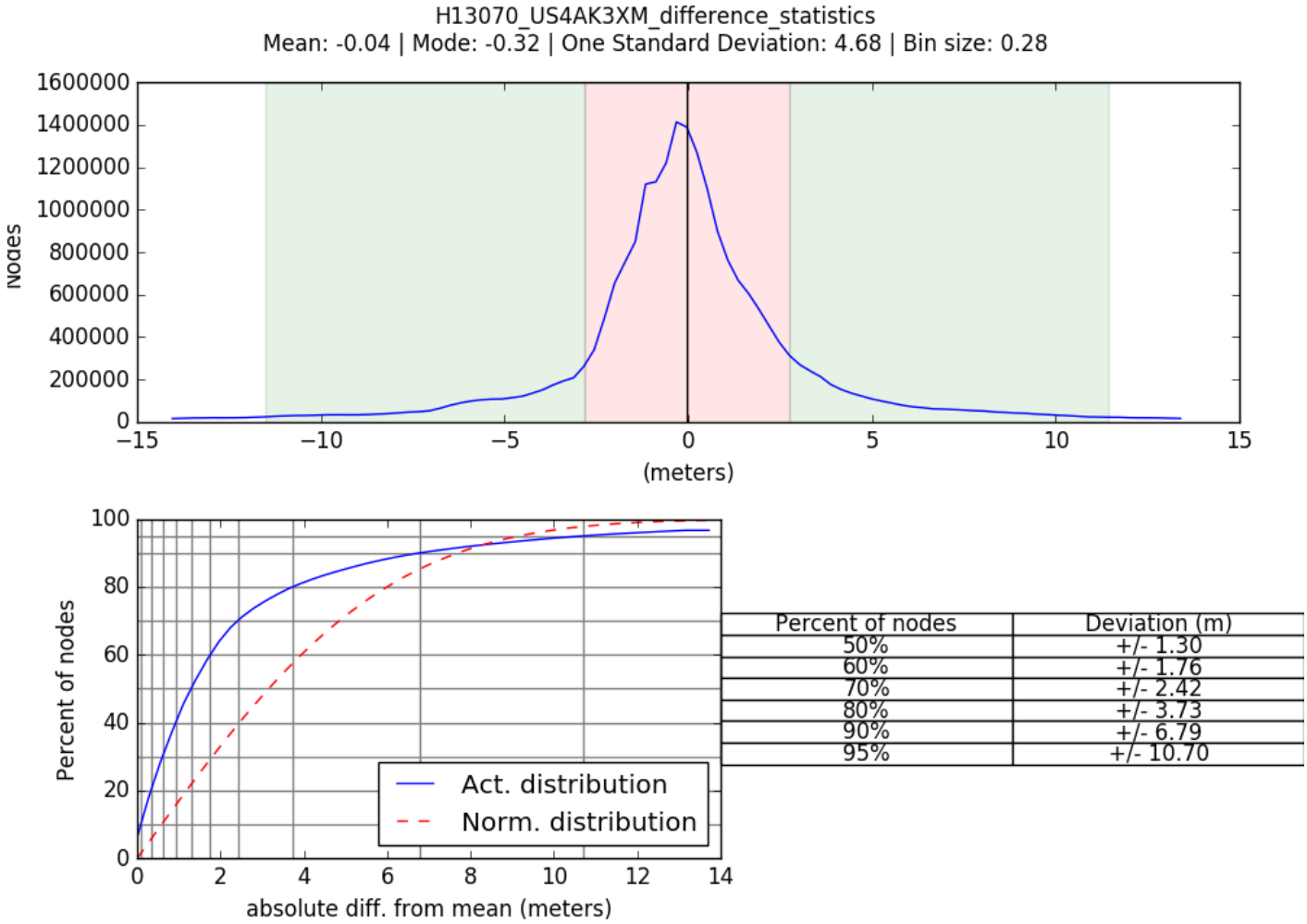


Figure 16: Difference surface between H13070 and interpolated TIN surface from US4AK3XM



Percent of nodes	Deviation (m)
50%	+/- 1.30
60%	+/- 1.76
70%	+/- 2.42
80%	+/- 3.73
90%	+/- 6.79
95%	+/- 10.70

Figure 17: Difference surface statistics between H13070 and interpolated TIN surface from US4AK3XM

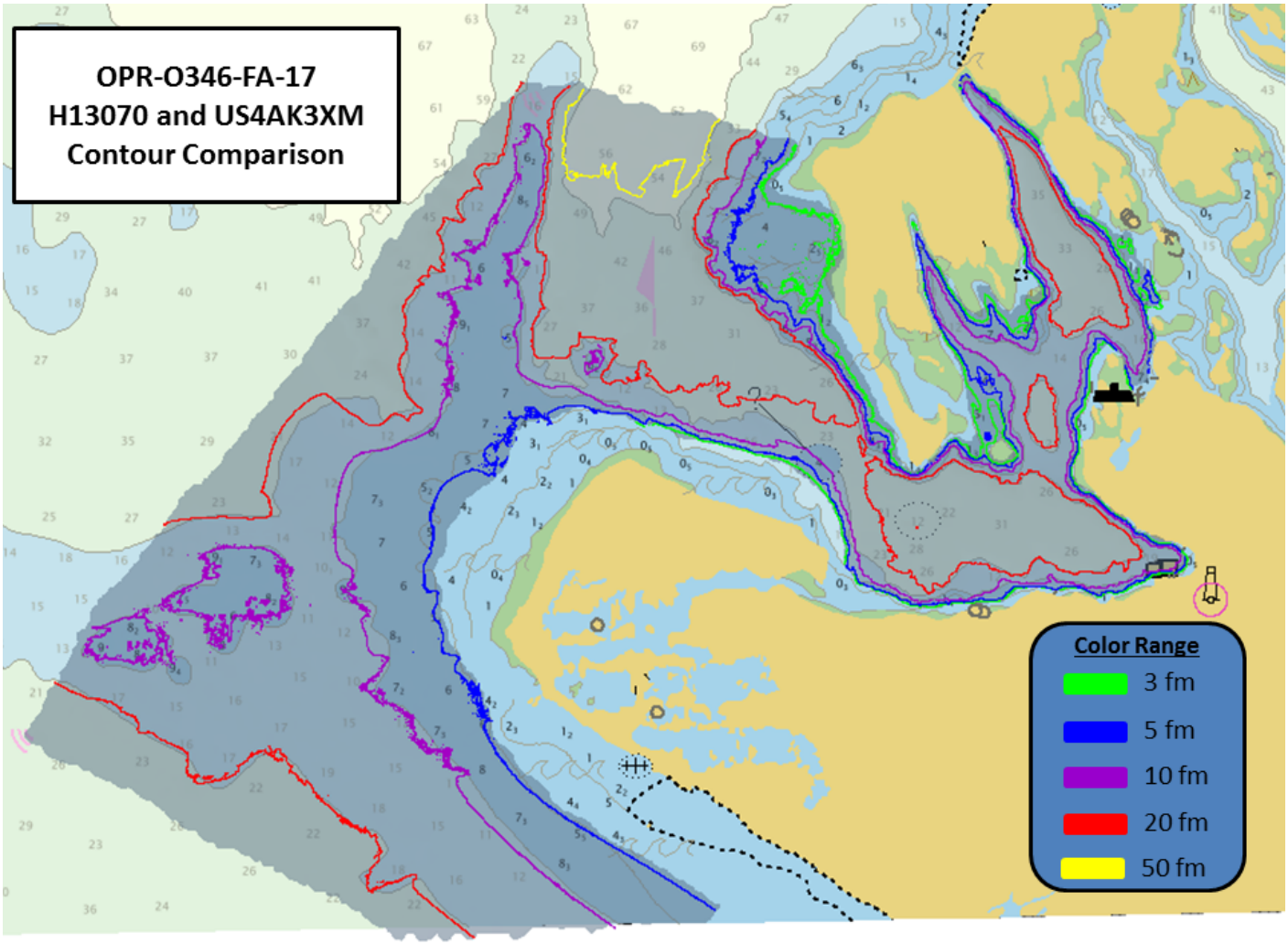


Figure 18: Overview of H13070 contours overlaid onto ENC US4AK3XM.

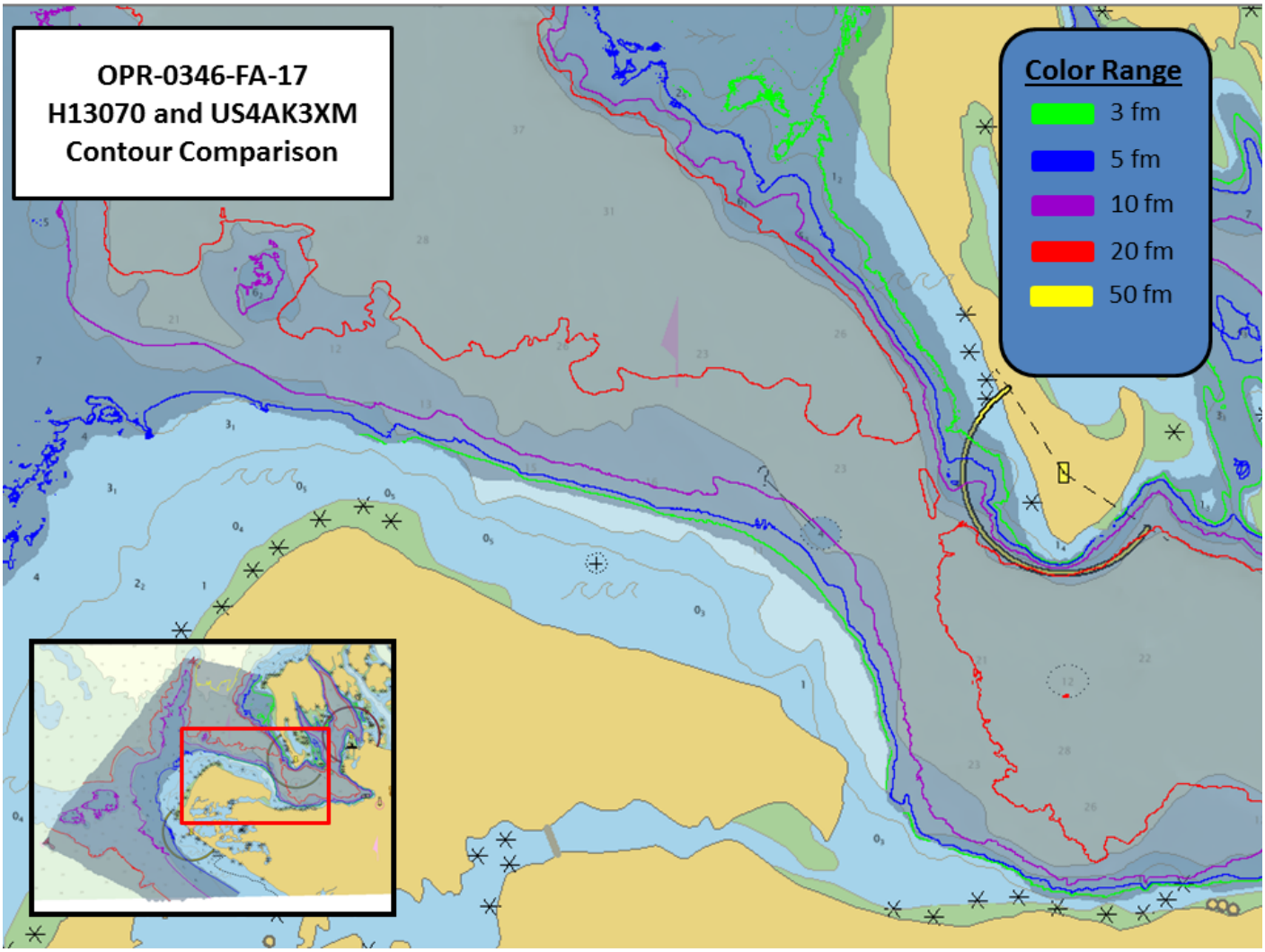


Figure 19: Close up of Monti Bay where significant differences exist between H13070 contours and ENC US4AK3XM contours.

US5AK3XM

Soundings from H13070 are in general agreement with charted depths on ENC US5AK3XM, with most depths agreeing to 1-2 fathoms.

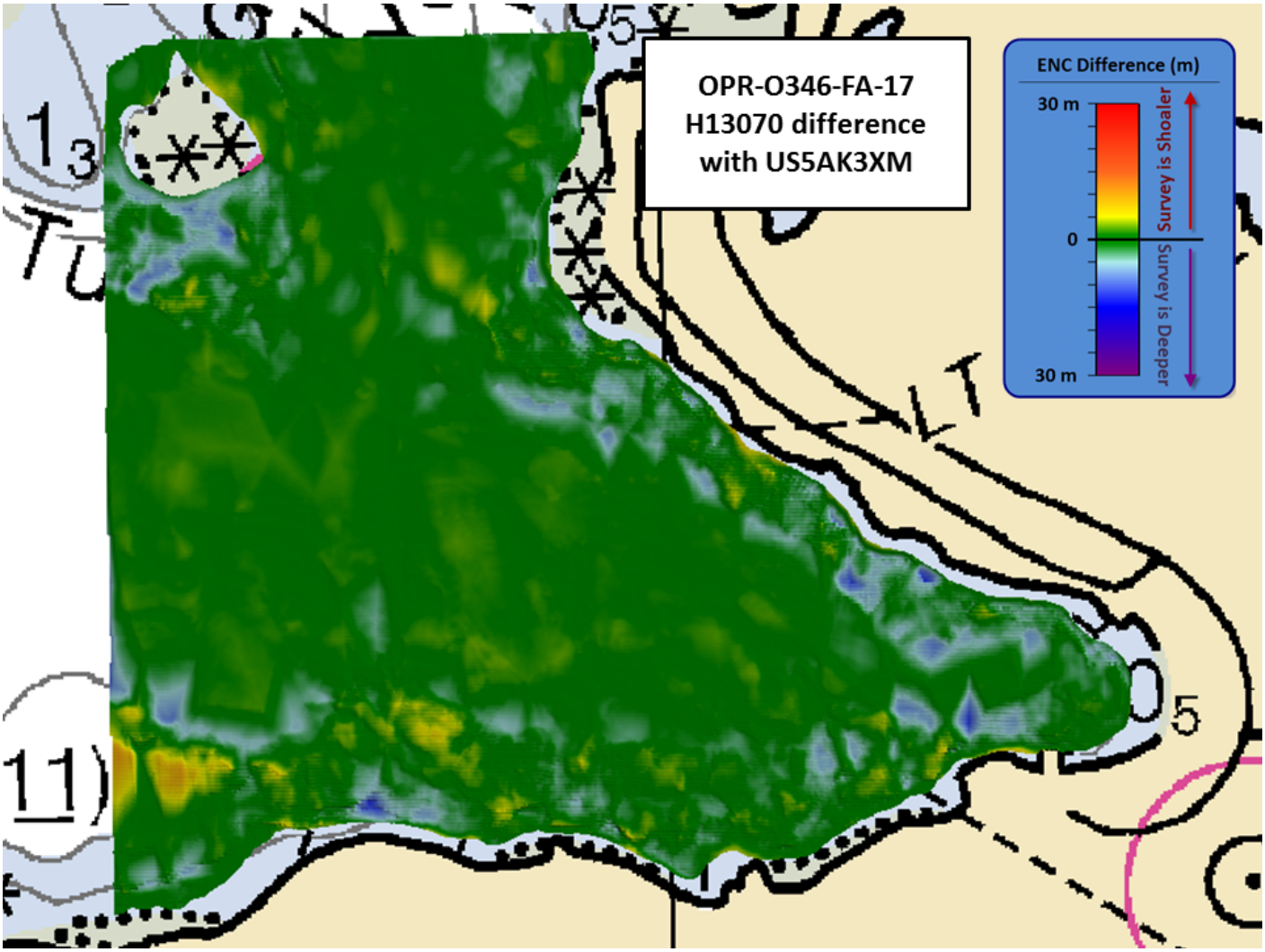
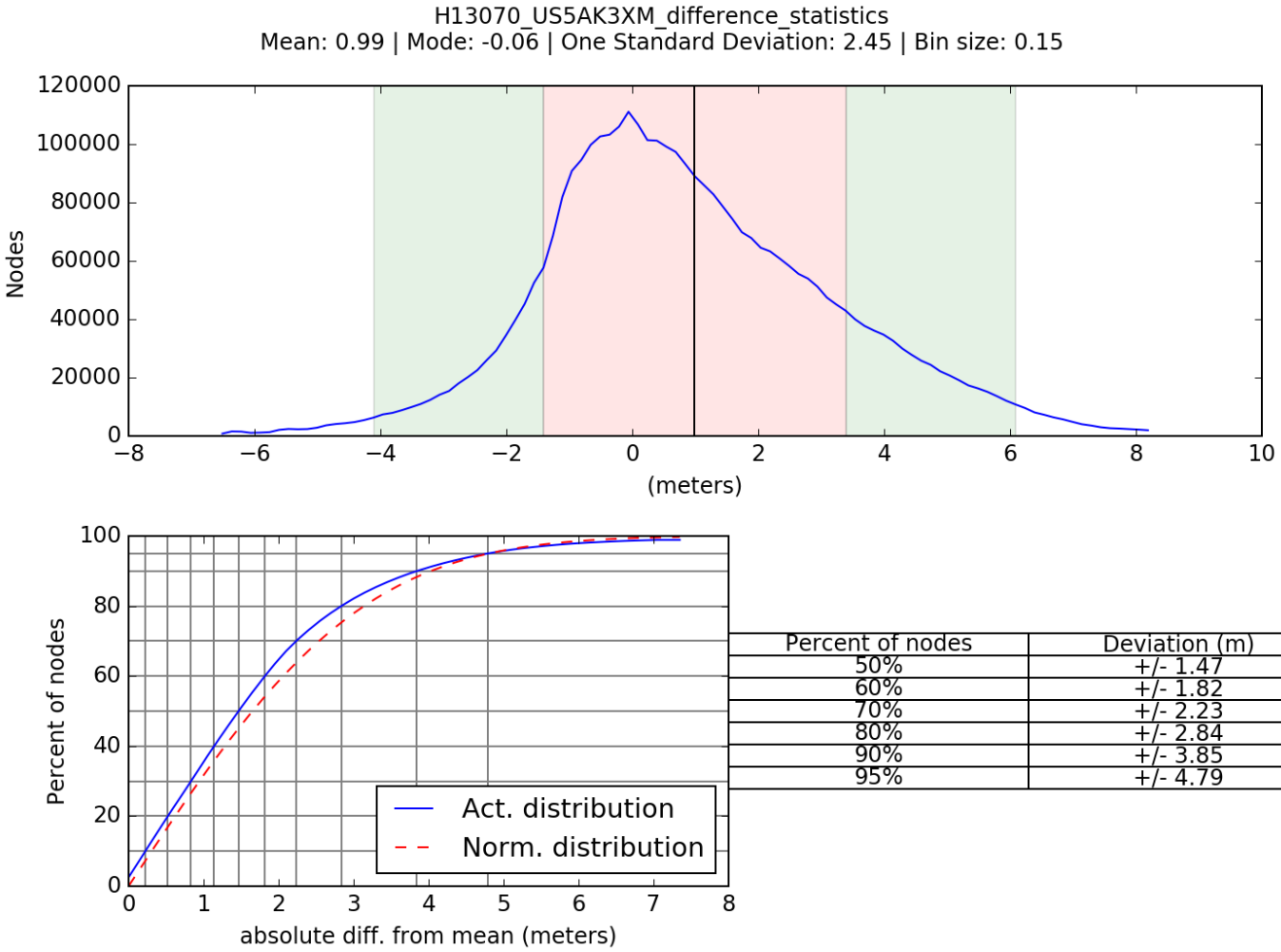


Figure 20: Difference surface between H13070 and interpolated TIN surface from US5AK3XM



Percent of nodes	Deviation (m)
50%	+/- 1.47
60%	+/- 1.82
70%	+/- 2.23
80%	+/- 2.84
90%	+/- 3.85
95%	+/- 4.79

Figure 21: Difference surface statistics between H13070 and interpolated TIN surface from US5AK3XM

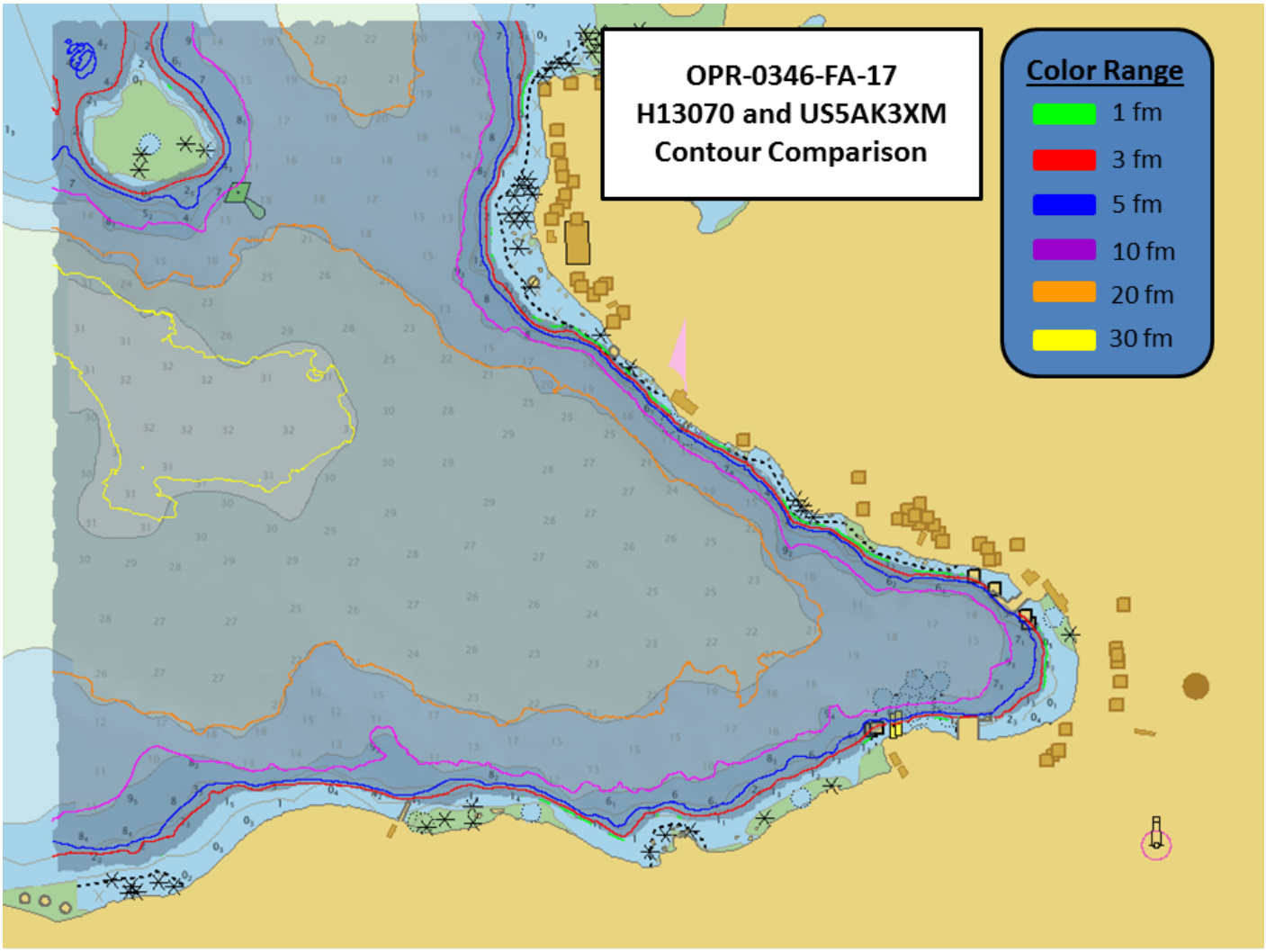


Figure 22: Overview of H13070 contours overlaid onto ENC US5AK3XM.

D.1.2 Maritime Boundary Points

No Maritime Boundary Points were assigned for this survey.

D.1.3 Charted Features

H13070 data covers a four fathom shoal that was reported in 2012. The surveyed area did not show any depths which support this reported sounding, nor are their any significant features in the surrounding area. The hydrographer recommends replacing the reported sounding with charted depths.

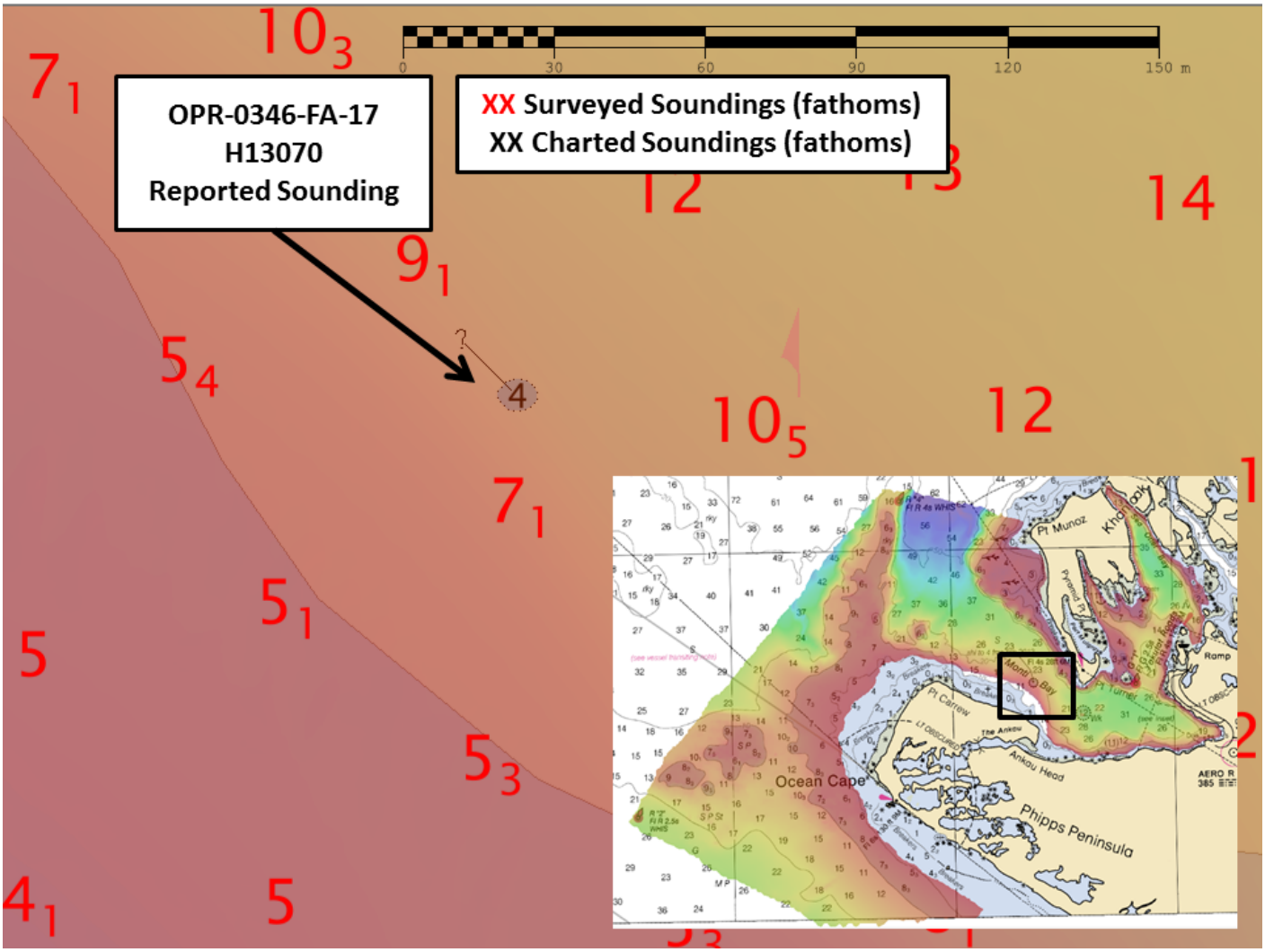


Figure 23: Reported sounding in H13070 (surveyed soundings in red)

D.1.4 Uncharted Features

No uncharted features exist for this survey.

D.1.5 Shoal and Hazardous Features

A significant discrepancy between the charted contours and surveyed depths was observed during acquisition, prompting one Danger to Navigation Report to be submitted on 11/7/2017 (Figure 24). Surveyed data revealed the 3 fathom contour lies outside of the charted 10 fathom contour line. Additionally, in this area the intertidal zone extends as much as 450 meters from the charted shoreline. The Danger to Navigation Report is included in Appendix II of this report.

While surveying the area South of Pt. Mulgrove, a shoal area was defined by the 4 meter contour (Figure 25). During shoreline investigation, no features were observed in this area above the surface, and a least depth was unable to safely be obtained within the ensuing gap in coverage. Caution is advised to mariners transiting the area.

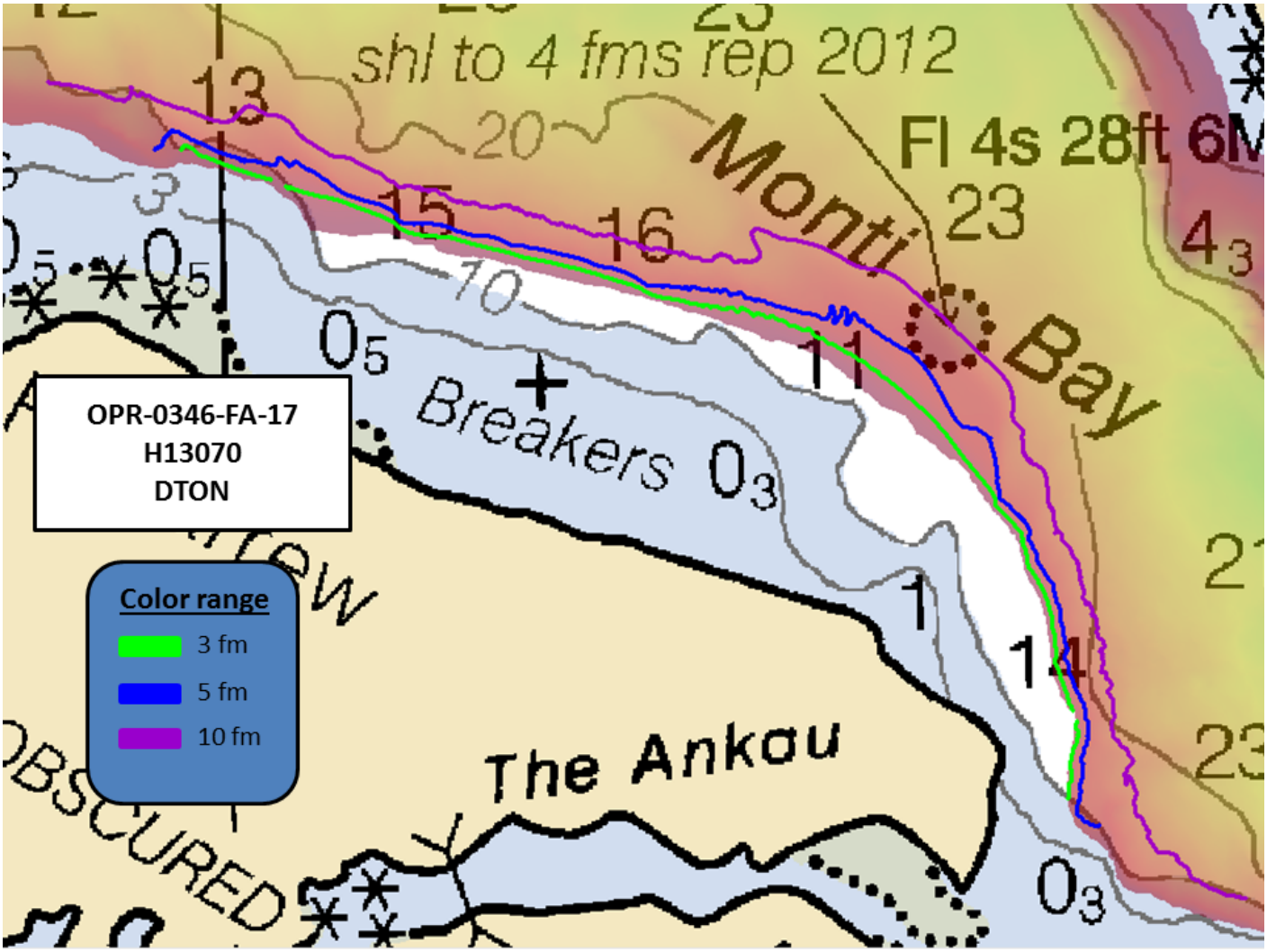


Figure 24: Overview of DTON found in entrance to Monti Bay

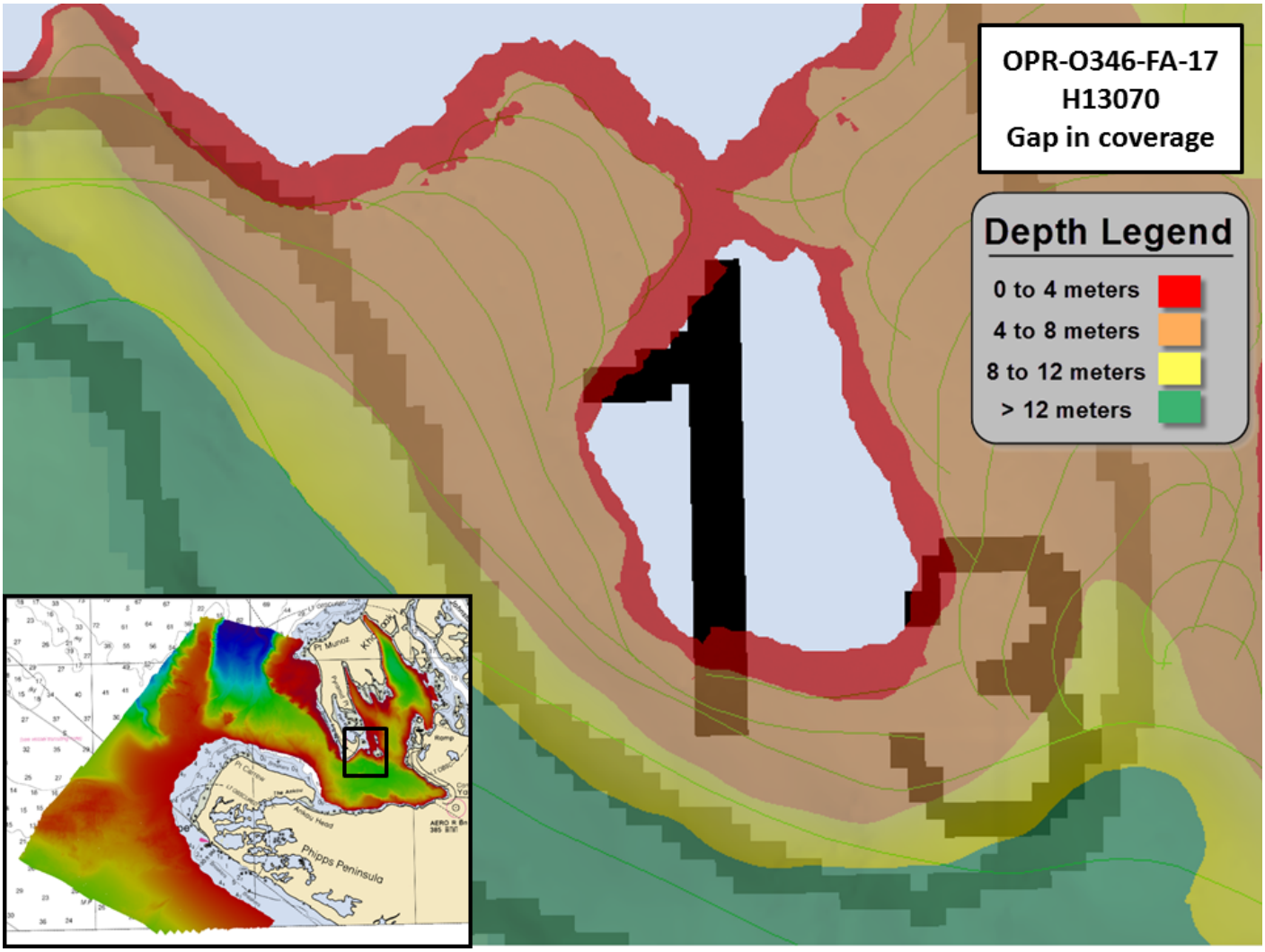


Figure 25: Shoal area south of Pt. Mulgrove with gap in survey coverage

The field-submitted DTON will be applied to the chart once the survey has been reviewed and submitted to MCD.

D.1.6 Channels

No channels exist for this survey. There are no precautionary areas, safety fairways, traffic separation schemes, pilot boarding areas, or channel and range lines within the survey limits. The Rurik Harbor designated anchorage northeast of Port Mulgrave was relocated to reflect the description in the Coast Pilot and conditions observed during field operations.

D.1.7 Bottom Samples

Twelve bottom samples were acquired in accordance with the Project Instructions for survey H13070 and entered in the H13070 Final Feature File. Additional bottom samples were unable to be collected due to time constraints. See Figure 26 for a graphical overview of the location of the bottom samples.

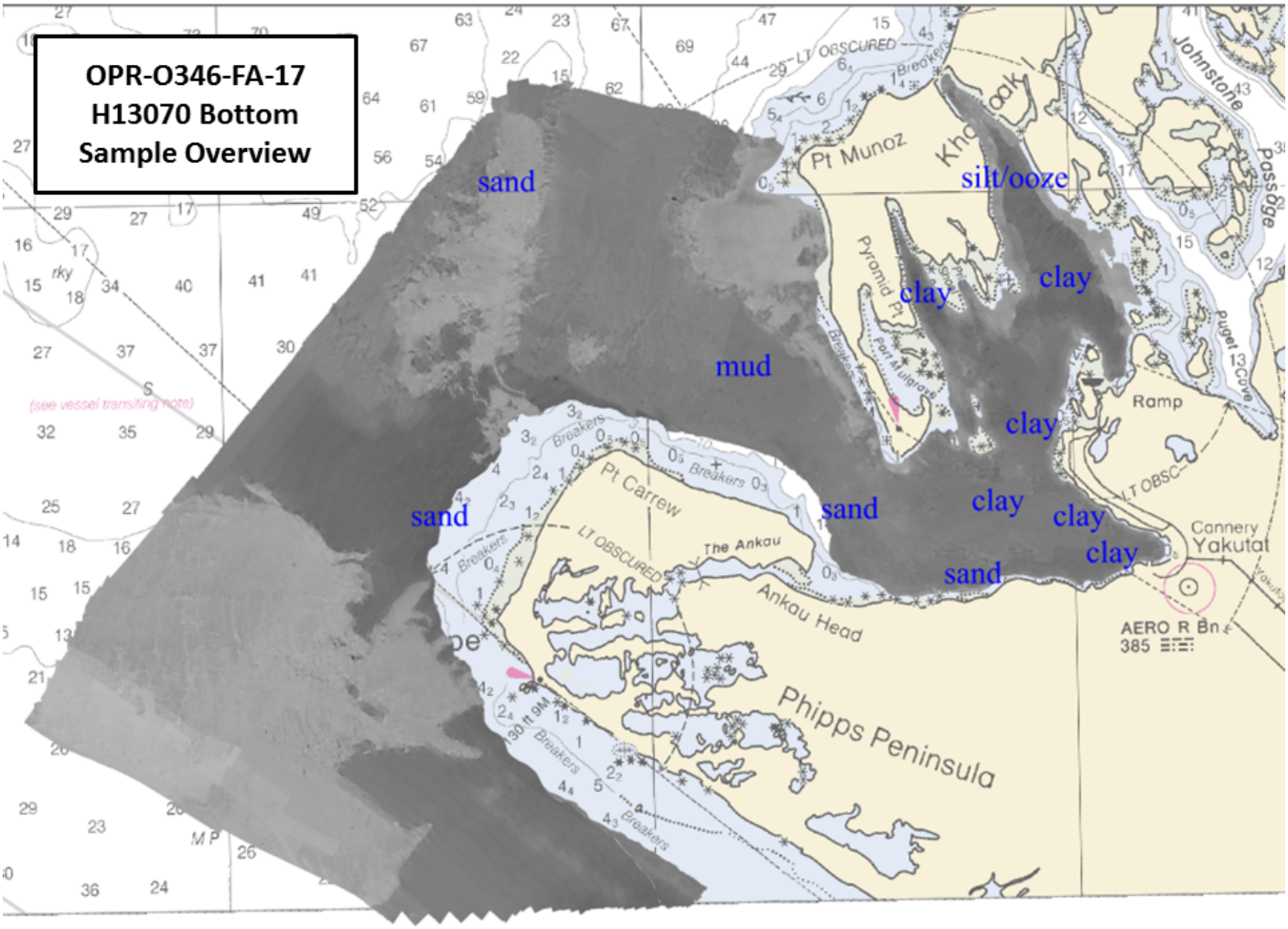


Figure 26: H13070 bottom sample locations

D.2 Additional Results

D.2.1 Shoreline

All features within the survey limits and the NALL were addressed and attributed in the H13070 Final Feature File. All features inshore of the NALL were attributed in the Final Feature File with the description of "Not Addressed" and remarks of "Retain as charted, not investigated due to being inshore of NALL" as

per HSSD Section 7.3.1. Annotations, information, and diagrams collected on DP forms and boat sheets during field operations are scanned and included in the Separates I Detached Positions folder.

D.2.2 Prior Surveys

No prior survey comparisons exist for this survey.

D.2.3 Aids to Navigation

Buoys numbered 1, 2, and 4 are located within H13070 and were observed to be on station and serving their intended purposes.

D.2.4 Overhead Features

No overhead features exist for this survey.

D.2.5 Submarine Features

No submarine features exist for this survey.

D.2.6 Platforms

No platforms exist for this survey.

D.2.7 Ferry Routes and Terminals

Ferry routes and/or terminals exist for this survey, but were not investigated.

D.2.8 Abnormal Seafloor and/or Environmental Conditions

No abnormal seafloor and/or environmental conditions exist for this survey.

D.2.9 Construction and Dredging

No present or planned construction or dredging exist within the survey limits.

D.2.10 New Survey 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 Specifications and Deliverables, Field Procedures Manual, Letter Instructions, and all HSD Technical Directives. These data are adequate to supersede charted data in their common areas. This survey is complete and no additional work is required with the exception of deficiencies noted herein.

Approver Name	Approver Title	Approval Date	Signature
CDR Mark Van Waes	Chief of Party	04/13/2018	VAN WAES.MARK.1240076329 2018.04.13 16:26:17 -07'00'
LT Damian Manda	Field Operations Officer	04/13/2018	VAN WAES.MARK.1240076329 Signed for LT Damian Manda 2018.04.13 16:25:47 -07'00'
HCST Samuel Candio	Chief Survey Technician	04/13/2018	Digitally signed by CANDIO.SAMUEL.LOUIS.1515897743 Date: 2018.04.13 11:11:18 -07'00'
LTJG Jeffrey Douglas	Sheet Manager	04/13/2018	DOUGLAS.JEFFREY.JAMES.1365482353 2018.04.13 10:25:26 -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

TIDE NOTE FOR HYDROGRAPHIC SURVEY

DATE : November 21, 2017

HYDROGRAPHIC BRANCH: Pacific
HYDROGRAPHIC PROJECT: OPR-O346-FA-2017
HYDROGRAPHIC SHEET: H13070

LOCALITY: Monti Bay, Yakutat Bay, AK
TIME PERIOD: September 15 - October 29, 2017

TIDE STATION USED: 945-3220 Yakutat, AK
Lat. 59° 32.9'N Long. 139° 44.0' W
PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters
HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 2.807 meters

REMARKS: RECOMMENDED GRID

Please use the TCARI grid "O346FA2017.tc" as the final grid for project OPR-O346-FA-2017, H13070, during the time period between September 15 and October 29, 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: Due to inaccurate shoreline, survey track lines fall outside of the TCARI grid boundaries in some areas. TCARI will extrapolate the tide corrector to cover these soundings.

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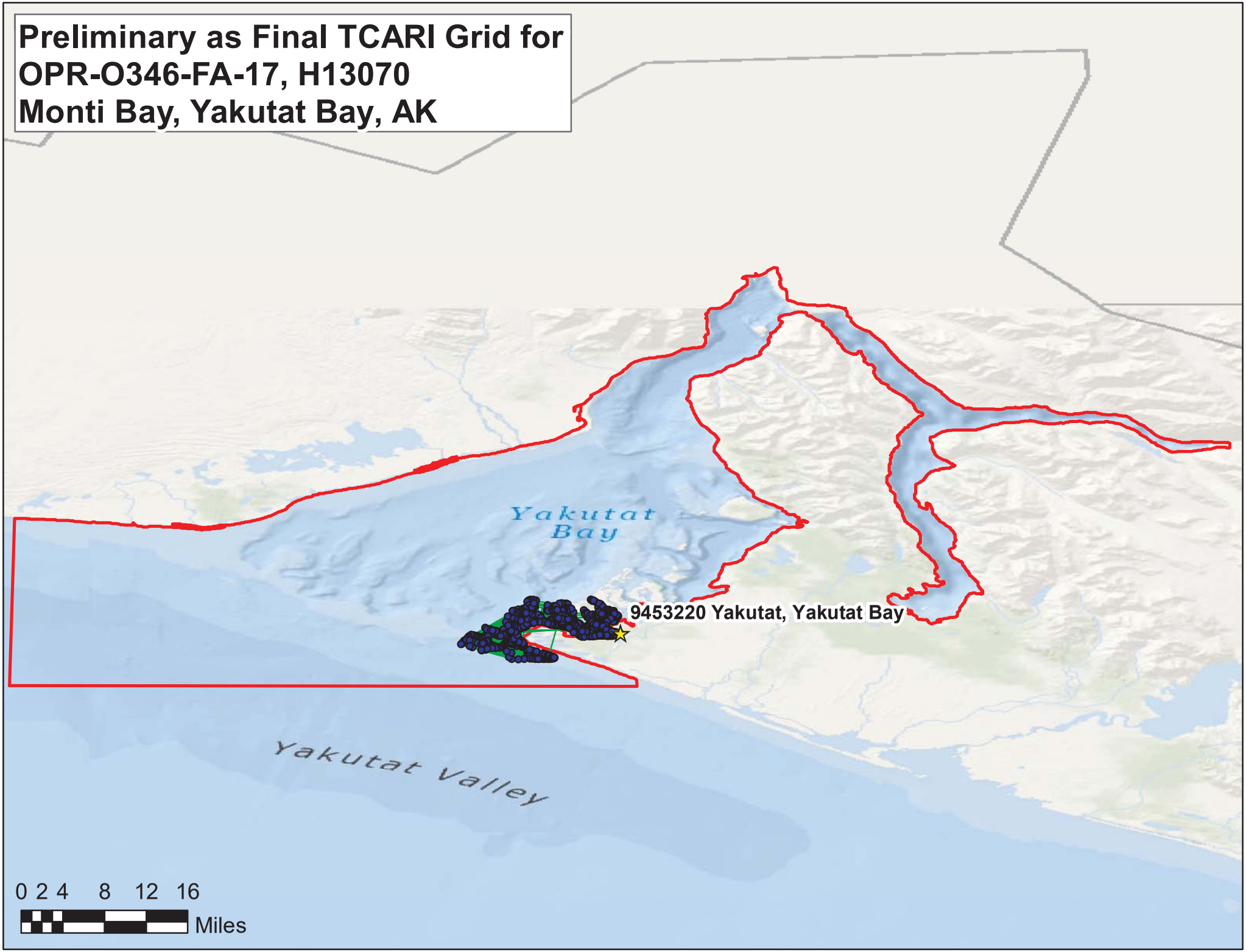
Date: 2017.11.21 08:32:59 -05'00'

CHIEF, PRODUCTS AND SERVICES BRANCH


Preliminary as Final TCARI Grid for
OPR-O346-FA-17, H13070
Monti Bay, Yakutat Bay, AK
Yakutat Bay
9453220 Yakutat, Yakutat Bay
Yakutat Valley
0 2 4 8 12 16
Miles

APPROVAL PAGE

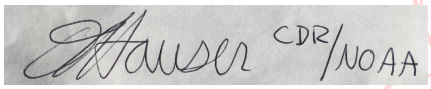
H13070

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