H12681

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

DESCRIPTIVE REPORT

Type of Survey:	Navigable Area
Registry Number:	H12681

LOCALITY

State(s):	Alaska
General Locality:	Kodiak, AK
Sub-locality:	West Aiaktalik Island and Vicinity

2014

CHIEF OF PARTY
CDR David J. Zezula, NOAA

LIBRARY & ARCHIVES

Date:

U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION	REGISTRY NUMBER:
HYDROGRAPHIC TITLE SHEET	**H12681**

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, AK**
Sub-Locality:	**West Aiaktalik Island and Vicinity**
Scale:	**40000**
Dates of Survey:	**05/21/2014 to 08/07/2014**
Instructions Dated:	**04/21/2014**
Project Number:	**OPR-P335-FA-14**
Field Unit:	**NOAA Ship *Fairweather***
Chief of Party:	**CDR David J. Zezula, 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. Notes in red were generated during office processing. The processing branch concurs with all information and recommendations in the DR unless otherwise noted. Page numbering may be interrupted or non-sequential. All pertinent records for this survey, including the Descriptive Report, are archived at the National Geophysical Data Center (NGDC) and can be retrieved via http://www.ngdc.noaa.gov/.

Table of Contents

List of Tables

List of Figures

Descriptive Report to Accompany Survey H12681

Project: OPR-P335-FA-14

Locality: Kodiak, AK

Sublocality: West Aiaktalik Island and Vicinity

Scale: 1:40000

May 2014 - August 2014

NOAA Ship *Fairweather*

Chief of Party: CDR David J. Zezula, NOAA

A. Area Surveyed

The survey area is located in Kodiak, AK with the sub-locality of West Aiaktalik Island and Vicinity

A.1 Survey Limits

Data were acquired within the following survey limits:

Northwest Limit	Southeast Limit
56° 45' 30.48" N 154° 13' 30.42" W	56° 39' 34.68" N 153° 55' 0.96" W

Table 1: Survey Limits

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

A.2 Survey Purpose

The purpose of this project is to provide contemporary surveys to update National Ocean Service (NOS) nautical charting products. The project will include areas off the South Coast of Kodiak Island, AK. Assigned survey area will update 23.06 square nautical miles of previously surveyed area. Project area also addresses survey request number 030001, need for survey due to increasing number of passenger vessels, tour vessels, and large fishing fleet vessels.

A.3 Survey Quality

The entire survey is adequate to supersede previous data.

Due to safe manning issues and mechanical problems Fairweather departed the survey area prior to completing this project. Data from the partially completed survey sheet H12682 was added to this survey (H12681). Figure 1 shows the two areas of disconnected data and one area of contiguous data added from sheet H12682.

Several areas in the original H12681 sheet limits did not reach the 4m curve or the sheet limits. This was mainly due to these areas being foul with kelps, rocks, or both. These areas are shown below in figures 2 and 3 with areas in red representing the 4m curve.

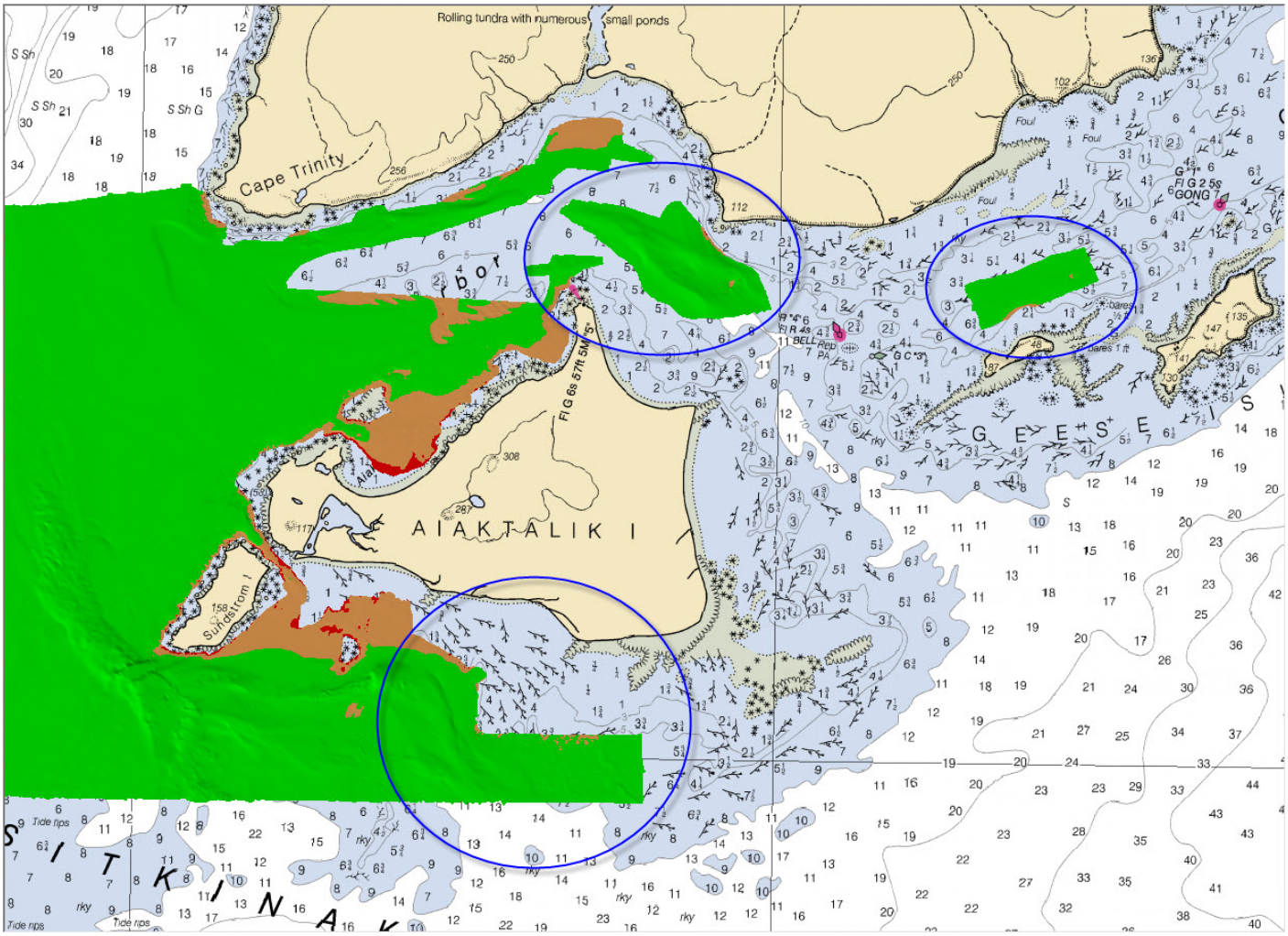


Figure 1: H12681 Additions from H12682.

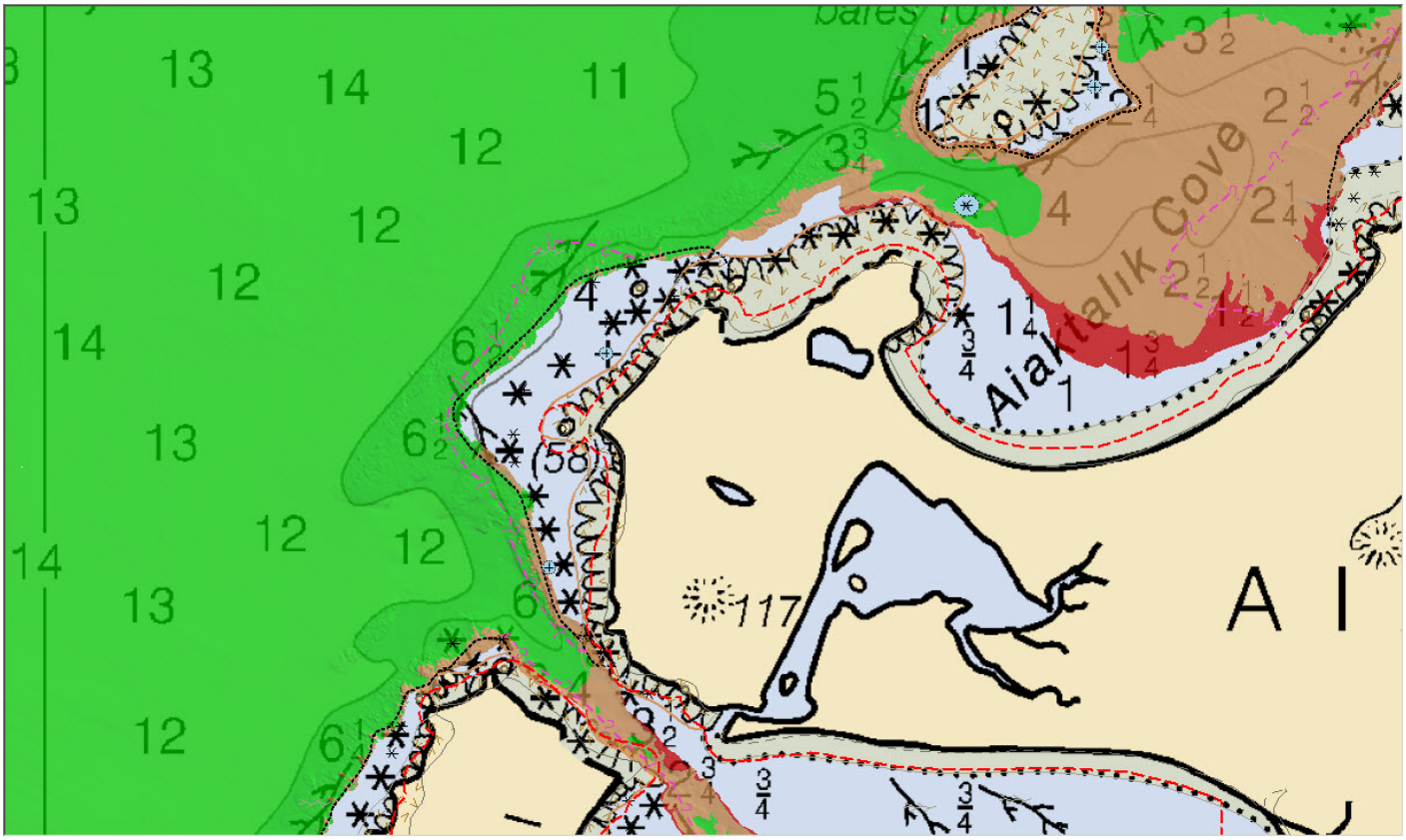


Figure 2: H12681 4m curve, rocky foul area, West of Aiaktalik Cove.

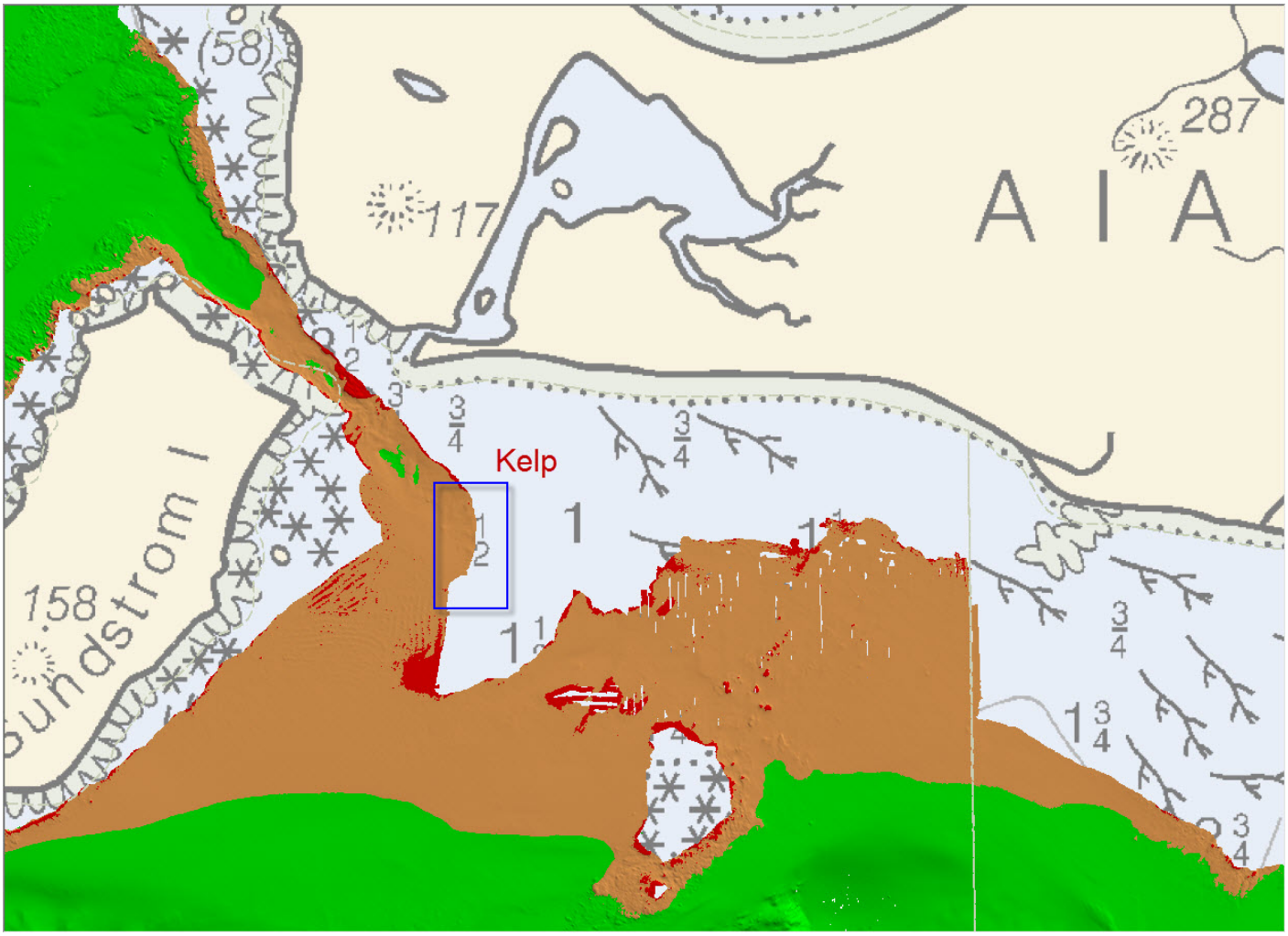


Figure 3: H12681 4m curve, area foul with kelp, East of Sundstrom Island.

A.4 Survey Coverage

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

Water Depth	Coverage Required
Inshore limit to 8 meters	25m spaced Set Line Spacing SBES or MBES with concurrent Backscatter
Greater than 8 meters	Complete Multibeam with concurrent Backscatter

Along the south side of Aiaktalik Island and in Aiaktalik cove on the east side of Aiaktalik Island gaps appear in the CUBE surfaces. This coverage meets the 25 m line spacing requirement.

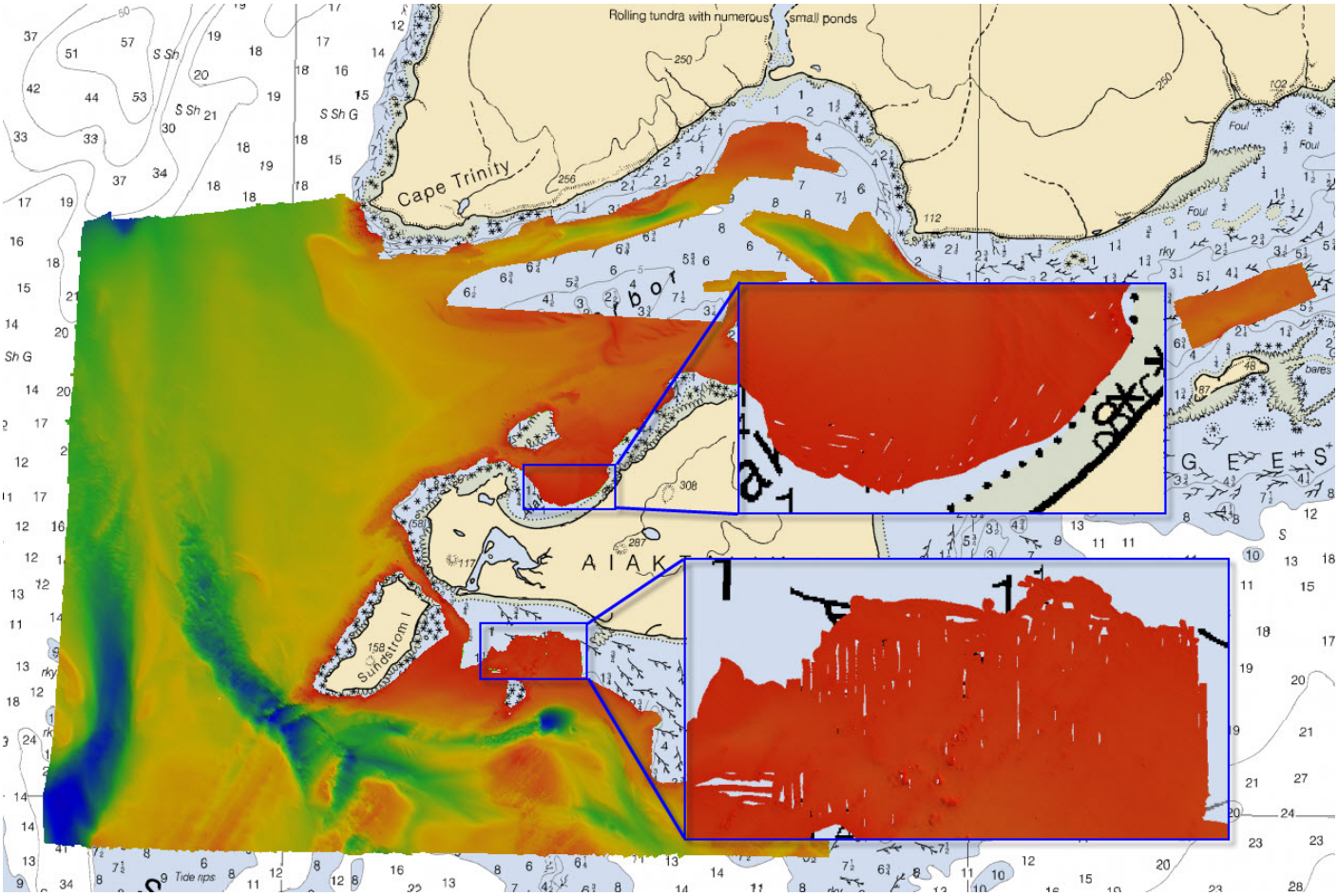


Figure 4: H12681 25 m line spacing areas

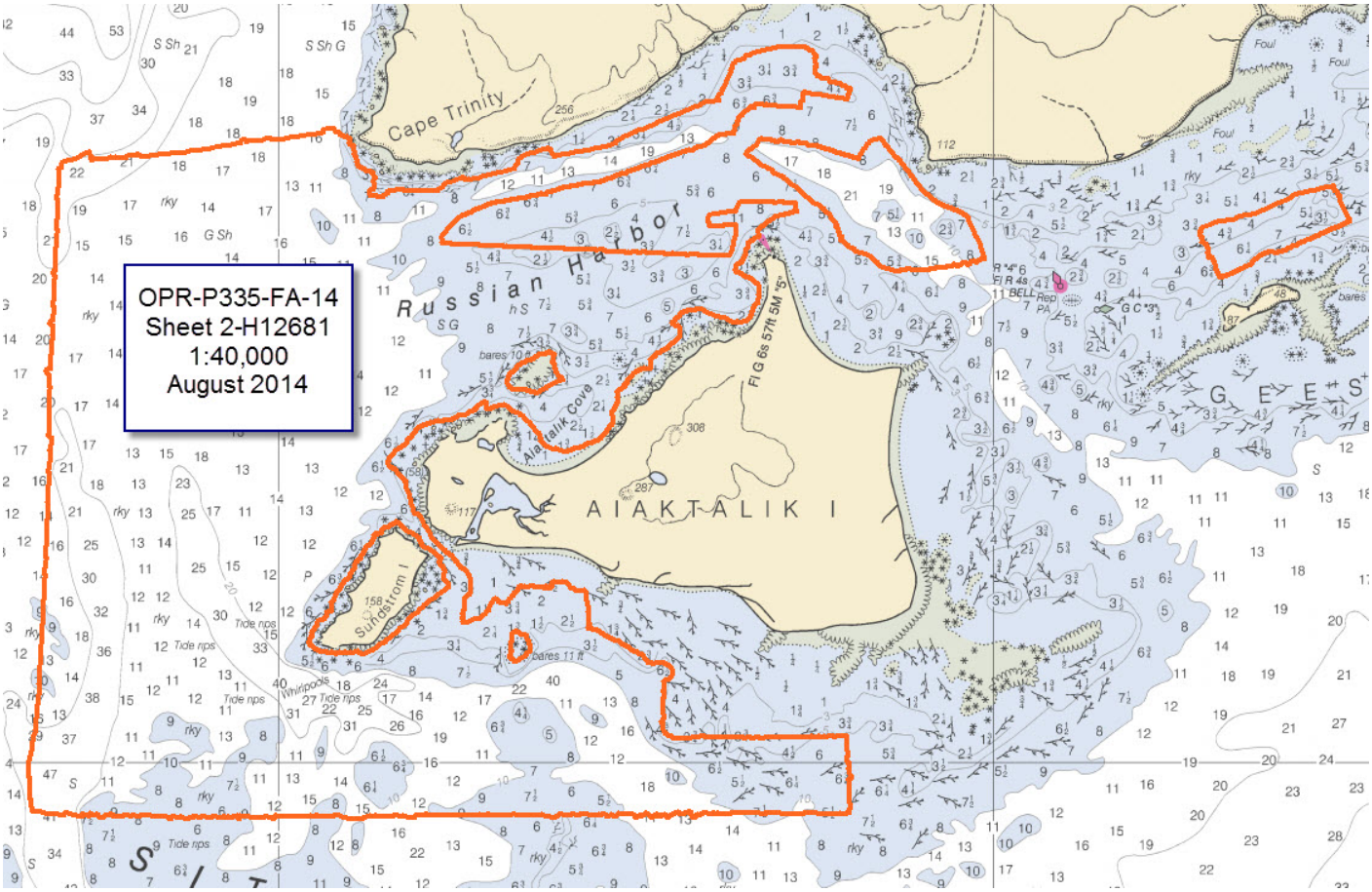


Figure 5: H12681 Survey Outline

A.5 Survey Statistics

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

	HULL ID	*2805*	*2806*	*2807*	*2808*	*Total*
LNM	SBES Mainscheme	0	0	0	0	0
	MBES Mainscheme	144.763	266.24	285.027	125.396	821.426
	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	9.641	1.622	0	33.568	44.831
	Lidar Crosslines	0	0	0	0	0
Number of Bottom Samples						3
Number Maritime Boundary Points Investigated						0
Number of DPs						6
Number of Items Investigated by Dive Ops						0
Total SNM						23.06

Table 2: Hydrographic Survey Statistics

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

Survey Dates	Day of the Year
05/21/2014	141
05/22/2014	142

Survey Dates	Day of the Year
06/01/2014	152
06/02/2014	153
06/03/2014	154
06/04/2014	155
06/05/2014	156
06/16/2014	167
06/19/2014	170
06/20/2014	171
06/24/2014	175
06/25/2014	176
06/26/2014	177
06/27/2014	178
07/01/2014	182
08/06/2014	218
08/07/2014	219

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	*2805*	*2806*	*2807*	*2808*
LOA	8.64 meters	8.64 meters	8.64 meters	8.64 meters
Draft	1.12 meters	1.12 meters	1.12 meters	1.12 meters

Table 4: Vessels Used

B.1.2 Equipment

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

Manufacturer	Model	Type
RESON	7125	MBES
Seabird	19plus	Conductivity, Temperature, and Depth Sensor
RESON	SVP71	Sound Speed System
Applanix	POS/MV V4	Positioning and Attitude System

Table 5: Major Systems Used

B.2 Quality Control

B.2.1 Crosslines

Crosslines acquired for this survey totaled 5.46% of mainscheme acquisition.

Surface differencing in CARIS Hips was used to assess crossline agreement with main scheme lines. Figure 6 depicts an 8-meter surface made with main scheme lines only and an 8-meter surface made with crosslines only. This difference surface is submitted digitally in the Separates II folder. The two surfaces agree within plus or minus 0.5 meters, therefore crosslines agree with main scheme lines within the total allowable vertical and horizontal uncertainty in their common areas.

The only areas of apparent disagreement occur in areas where the topography consists of a combination of steep declines and rocky surfaces. These areas are shown in Figure 8. Crosslines were not able to be run in the annexed H12682 areas due to the unexpected early departure of the project area.

To mitigate the lack of crosslines, reference surfaces were conducted to verify launch to launch cohesion. Section 3.2, Calibrations, further discussed these reference surfaces.

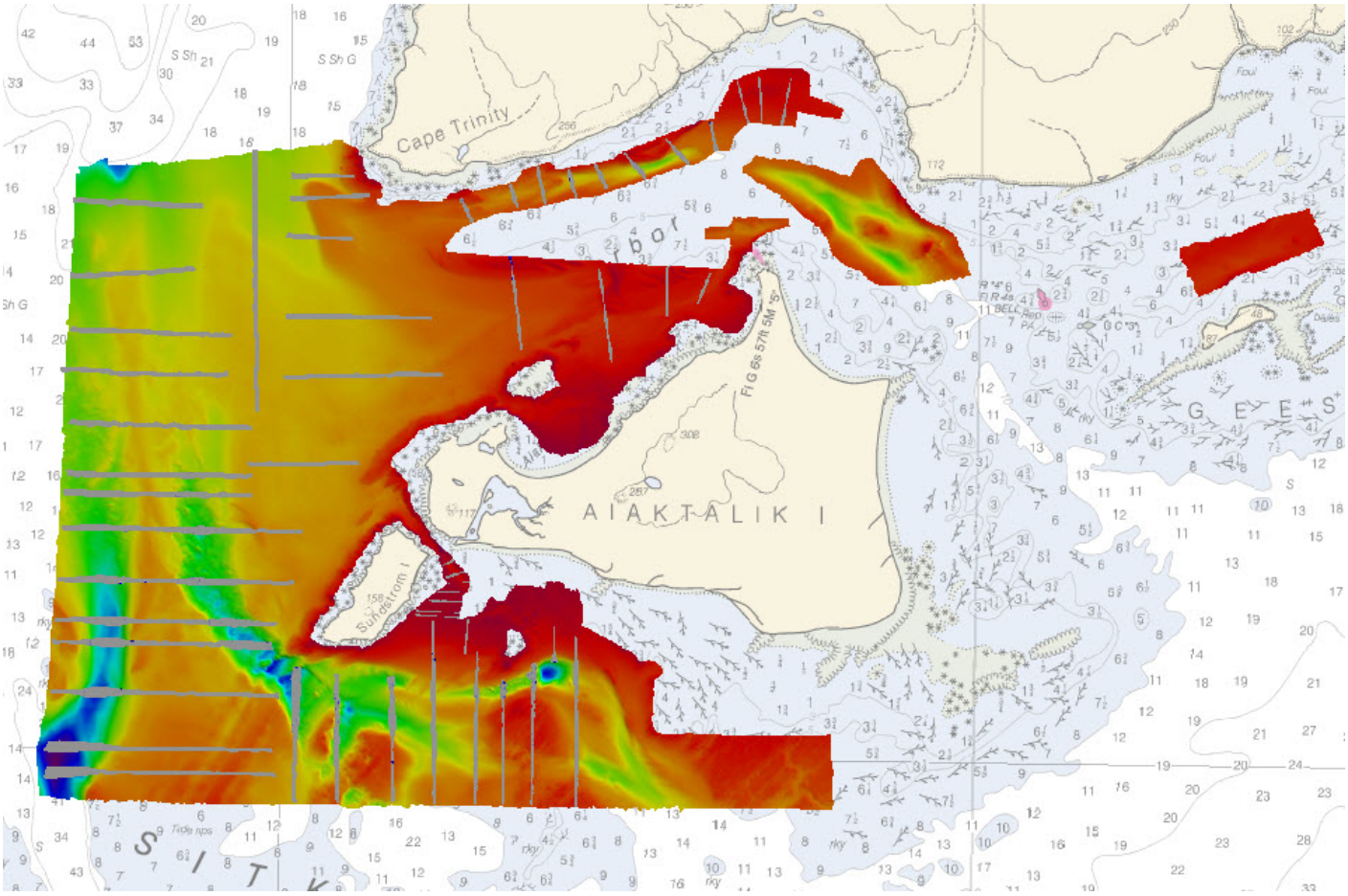


Figure 6: H12681 Mainscheme Crossline Overview

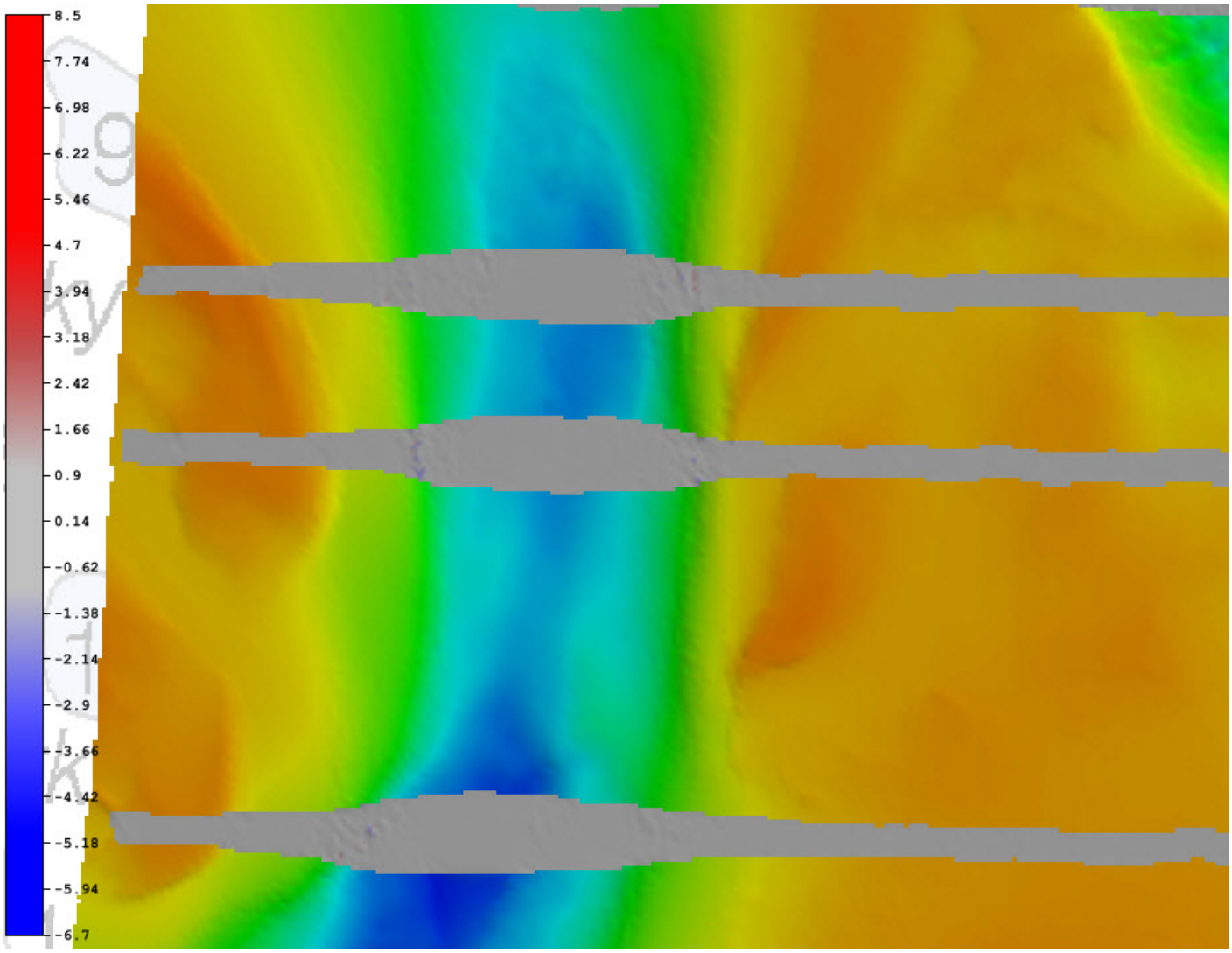


Figure 7: Graphical representation between crossline and mainscheme surfaces.

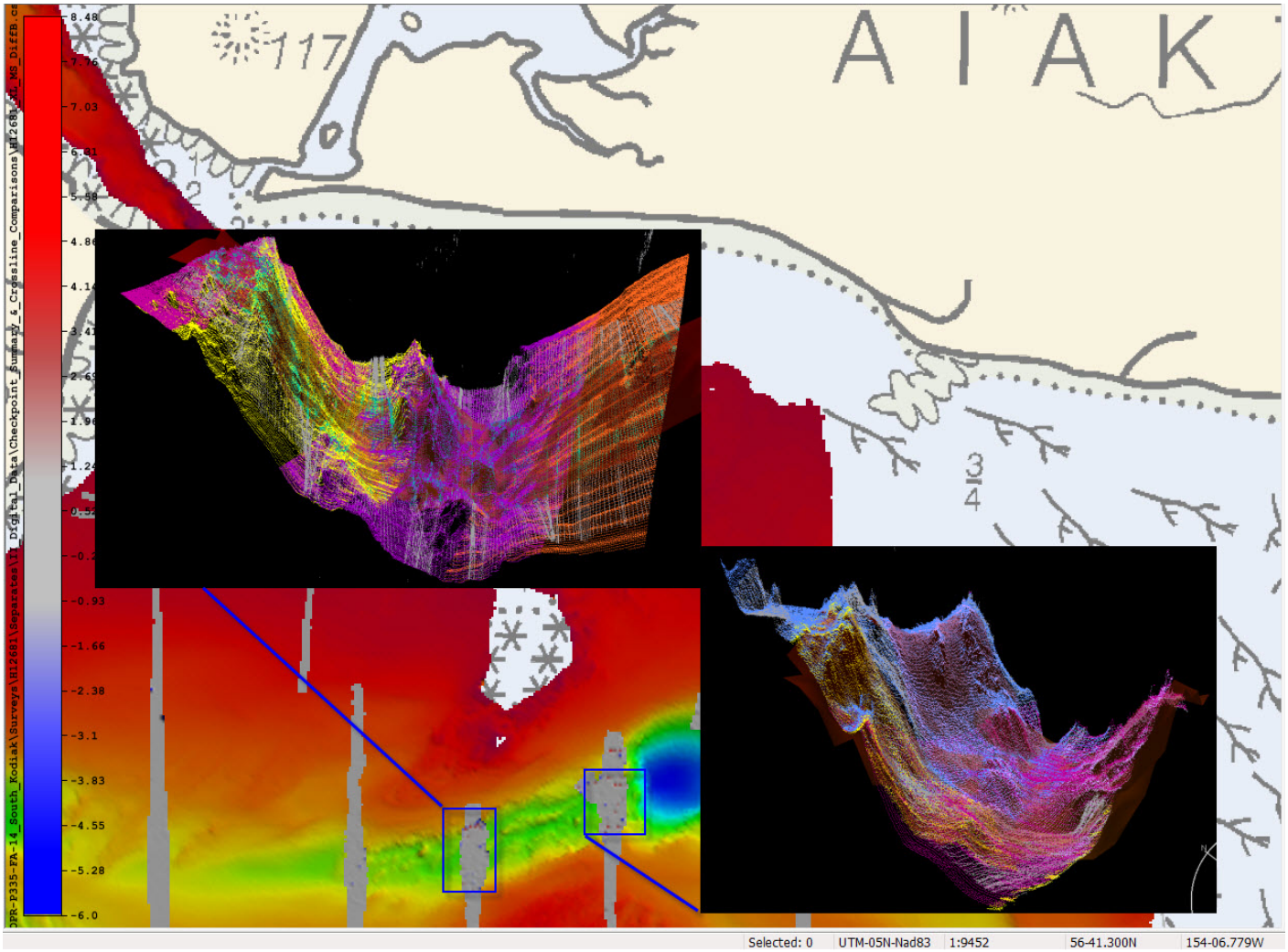
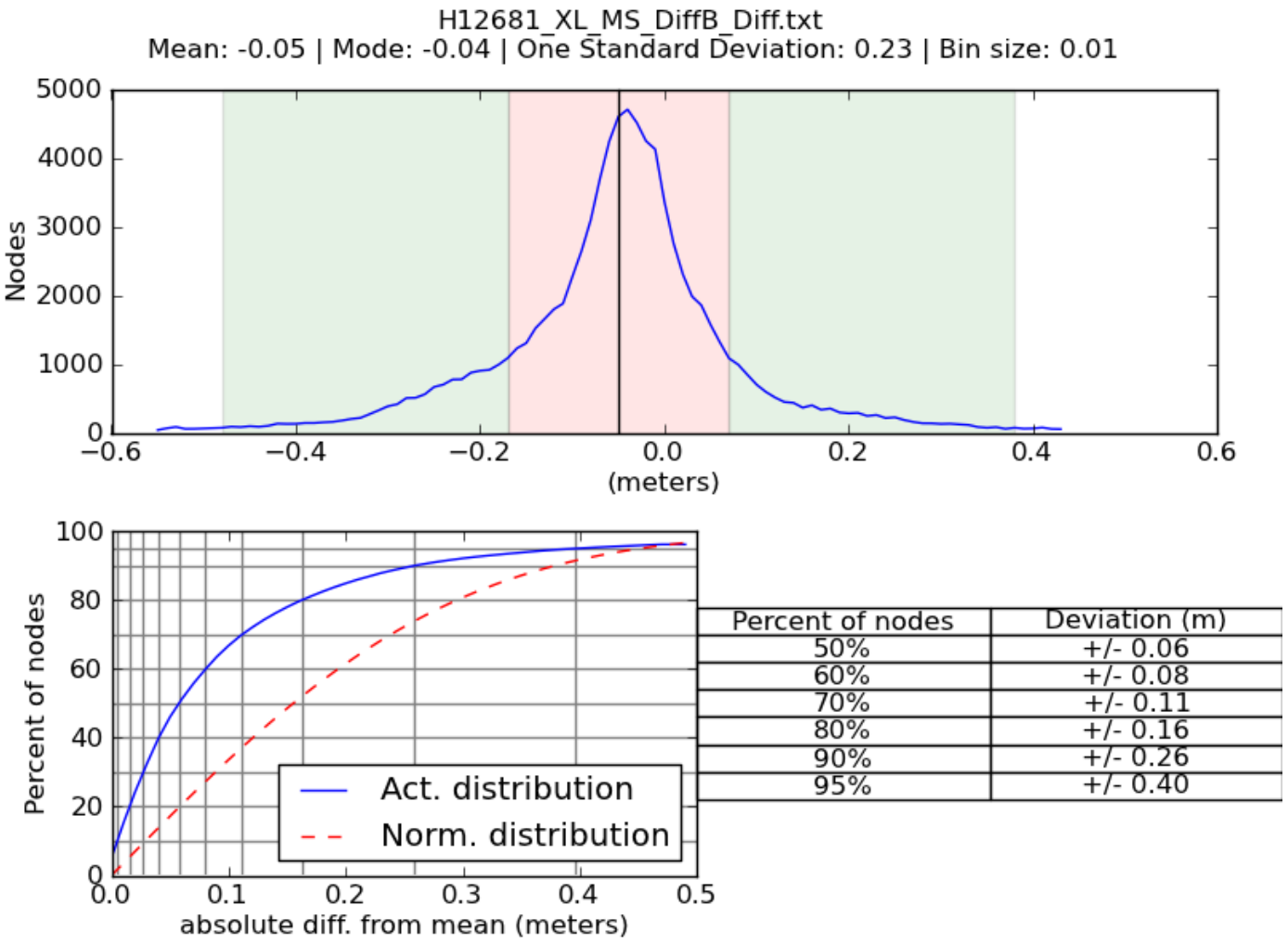


Figure 8: H12681 Mainscheme Crossline Disagreement



Percent of nodes	Deviation (m)
50%	+/- 0.06
60%	+/- 0.08
70%	+/- 0.11
80%	+/- 0.16
90%	+/- 0.26
95%	+/- 0.40

Figure 9: Statistical information for differences between crossline to mainscheme.

B.2.2 Uncertainty

The following survey specific parameters were used for this survey:

Measured	Zoning	Method
0.01 meters	0.08 meters	

Table 6: Survey Specific Tide TPU Values

Hull ID	Measured - CTD	Measured - MVP	Surface
2805	2 meters/second		0.5 meters/second
2806	2 meters/second		0.5 meters/second
2807	2 meters/second		0.5 meters/second
2808	2 meters/second		0.5 meters/second

Table 7: Survey Specific Sound Speed TPU Values

The hydrographer has used incorrect tidal uncertainty correctors during processing. Measured tidal uncertainty values should have been 0.0m instead of 0.01m, and tidal zoning uncertainty should have been 0.075m, instead of 0.08m. Using the values reported in Table 6 added a negligible and insignificant difference to the final gridded uncertainty values. The uncertainty analysis run during review shows complete compliance with NOAA uncertainty standards and all gridded depths should be considered adequate to supersede charted soundings.

B.2.3 Junctions

The areas of overlap between the sheets were reviewed in CARIS HIPS and SIPS Subset Editor for sounding consistency and in CARIS BathyDatabase by surface differencing 8 meter combined surfaces to assess surface agreement. The soundings and surfaces are in agreement within half a meter. The junction agreement is within the total allowable vertical and horizontal uncertainty in their common areas and depths. See figure 10 for area of overlap.

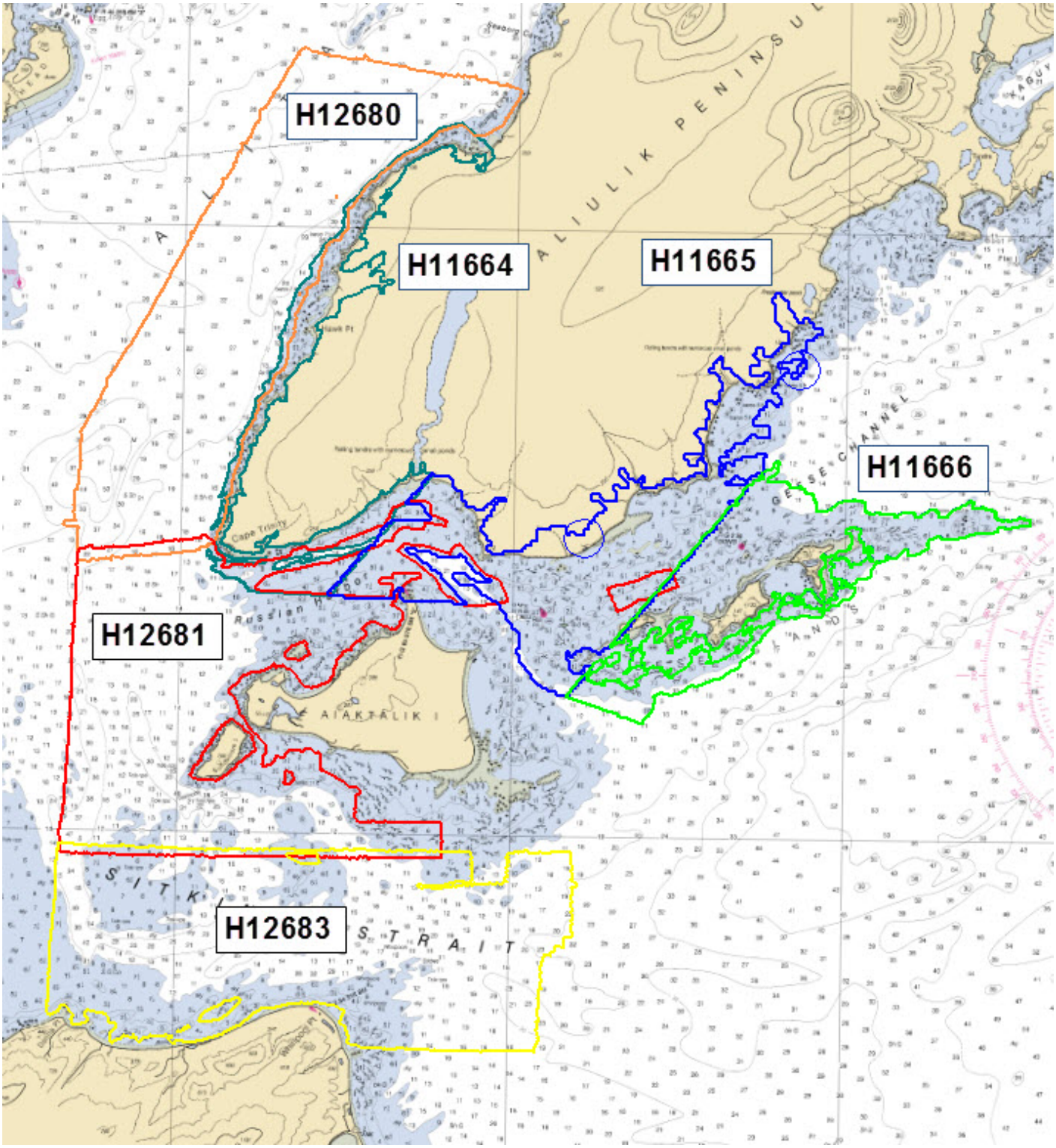


Figure 10: Junction between H12680, H12681, H12683, H11664, H11665 and H11666

The following junctions were made with this survey:

Registry Number	Scale	Year	Field Unit	Relative Location
H12680	1:10000	2014	NOAA Ship FAIRWEATHER	N
H12683	1:40000	2014	NOAA Ship FAIRWEATHER	S
H11664	1:10000	2007	TENIX LADS	E
H11665	1:10000	2007	TENIX	N
H11666	1:10000	2007	TENIX LADS	N

Table 8: Junctioning Surveys

H12680

Surface differencing in CARIS HIPS and SIPS was used to assess junction agreement between H12681_MB_8m_MLLW_Combined and H12680_MB_8m_MLLW_Combined. The difference between the surfaces were generally less than 0.5 m. See figure 11 for a graphical representation and figure 12 for statistical information of the surface differencing.

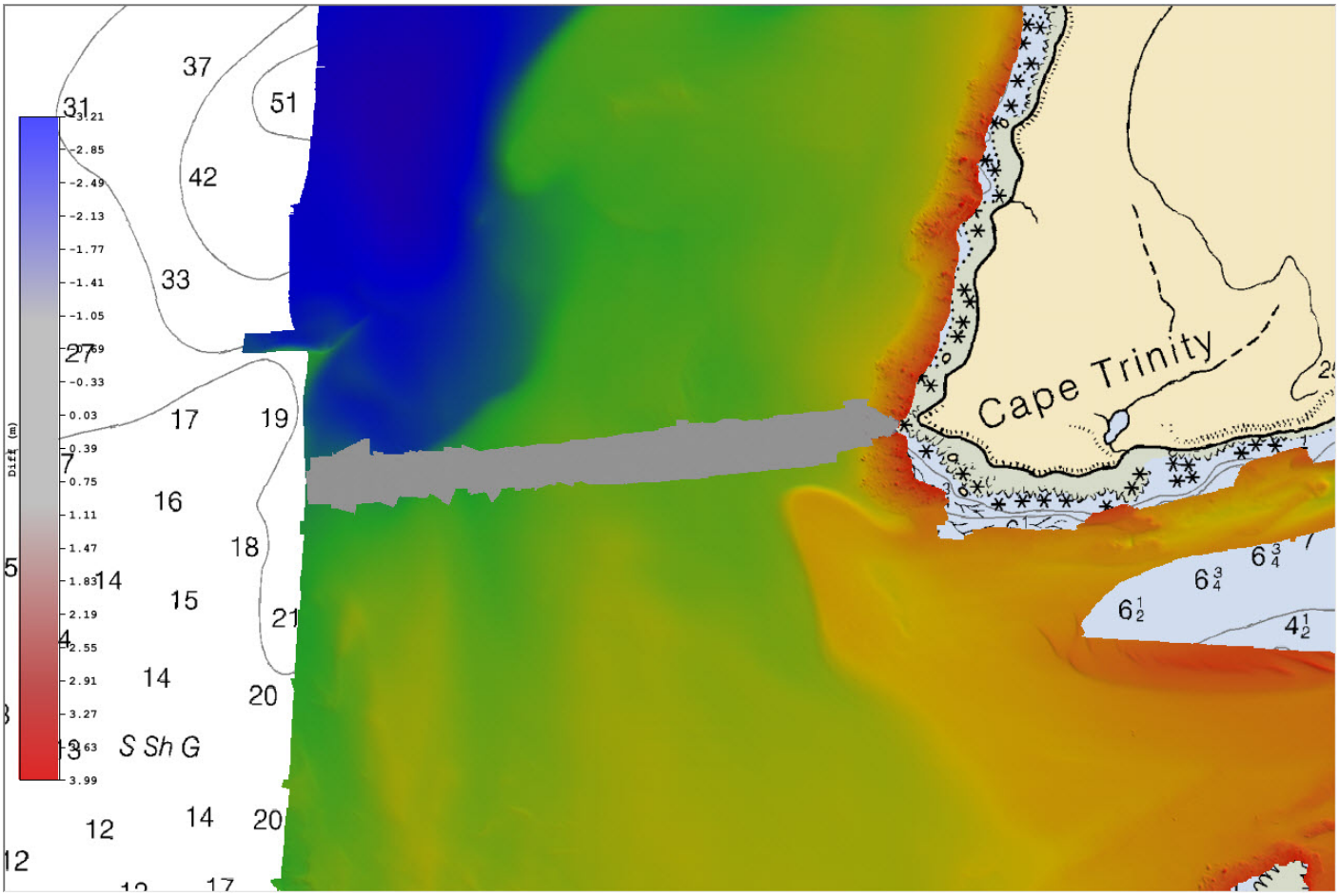


Figure 11: Graphical representation of differences between junction H12681 and H12680

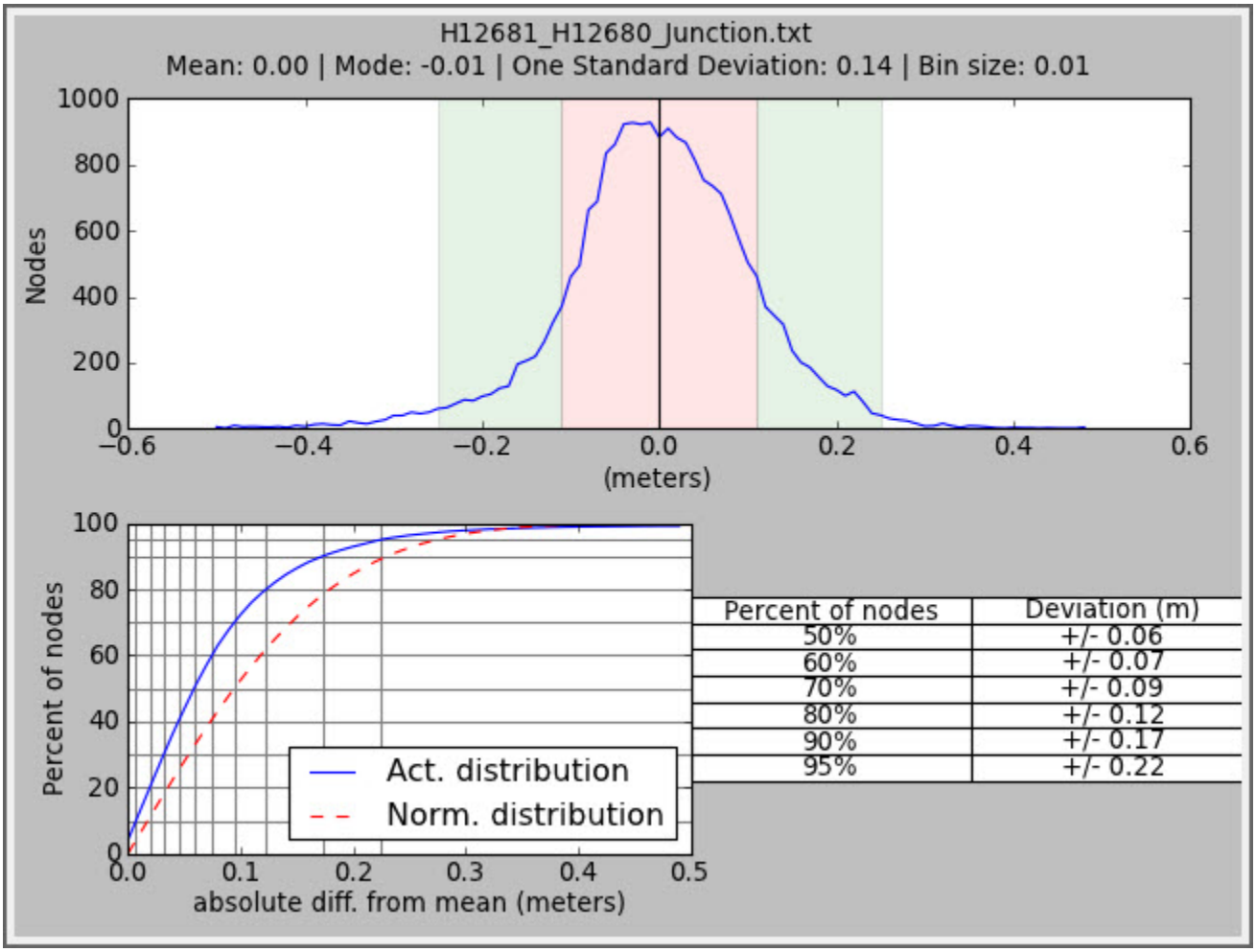


Figure 12: Statistical information for junction comparison between sheet H12681 and H12680

H12683

Surface differencing in CARIS HIPS and SIPS was used to assess junction agreement between H12681_MB_8m_MLLW_Combined and H12683_MB_8m_MLLW_Combined. The difference between the surfaces were generally less than 0.5 m. See figure 13 for a graphical representation and figure 14 for statistical information of the surface differencing.

Due to manning and mechanical problems, a large gap was not surveyed between H12683 and H12681. This resulted in a reduced amount of overlap obtained between the two sheets.

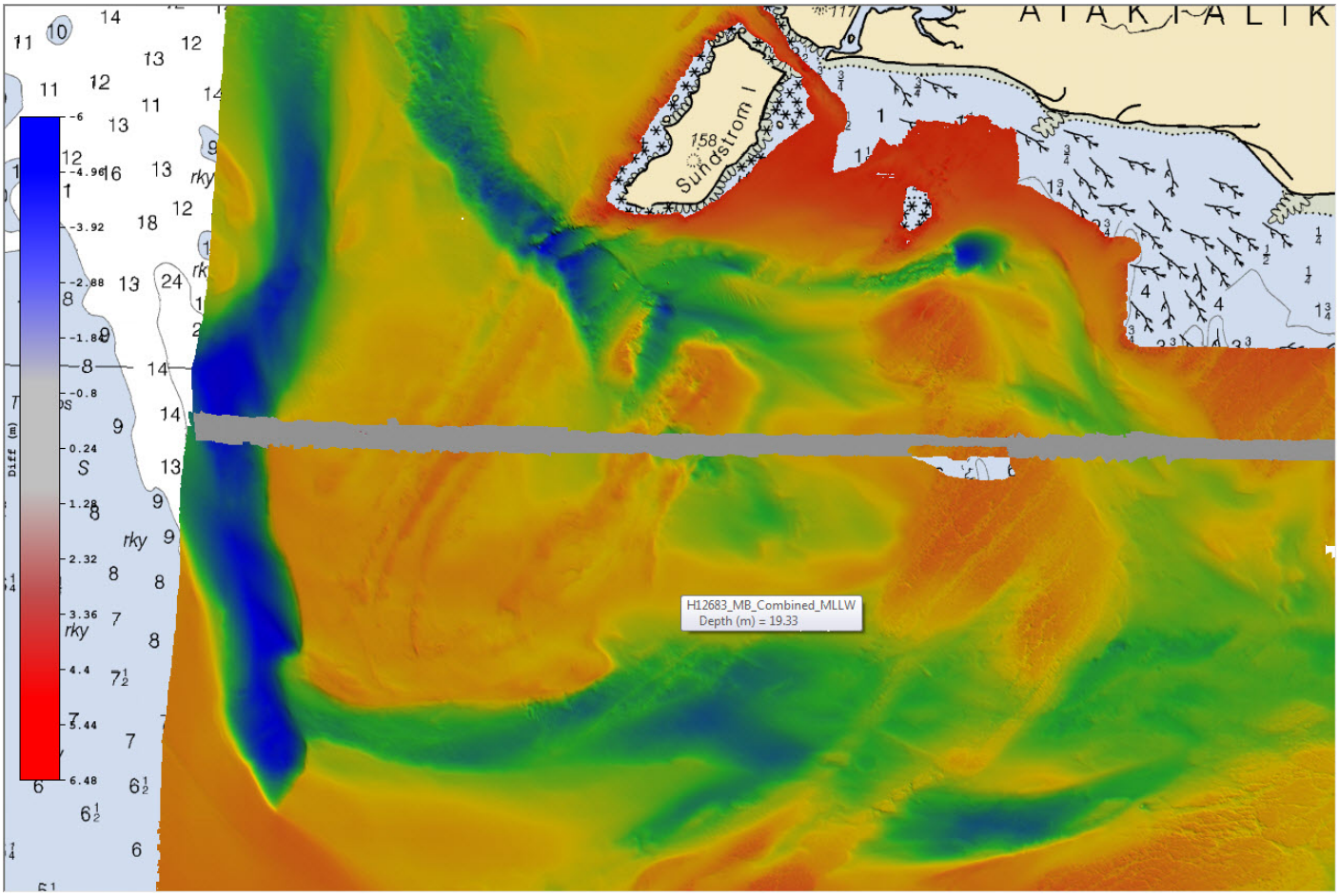


Figure 13: Graphical representation of differences between junction H12681 and H12683

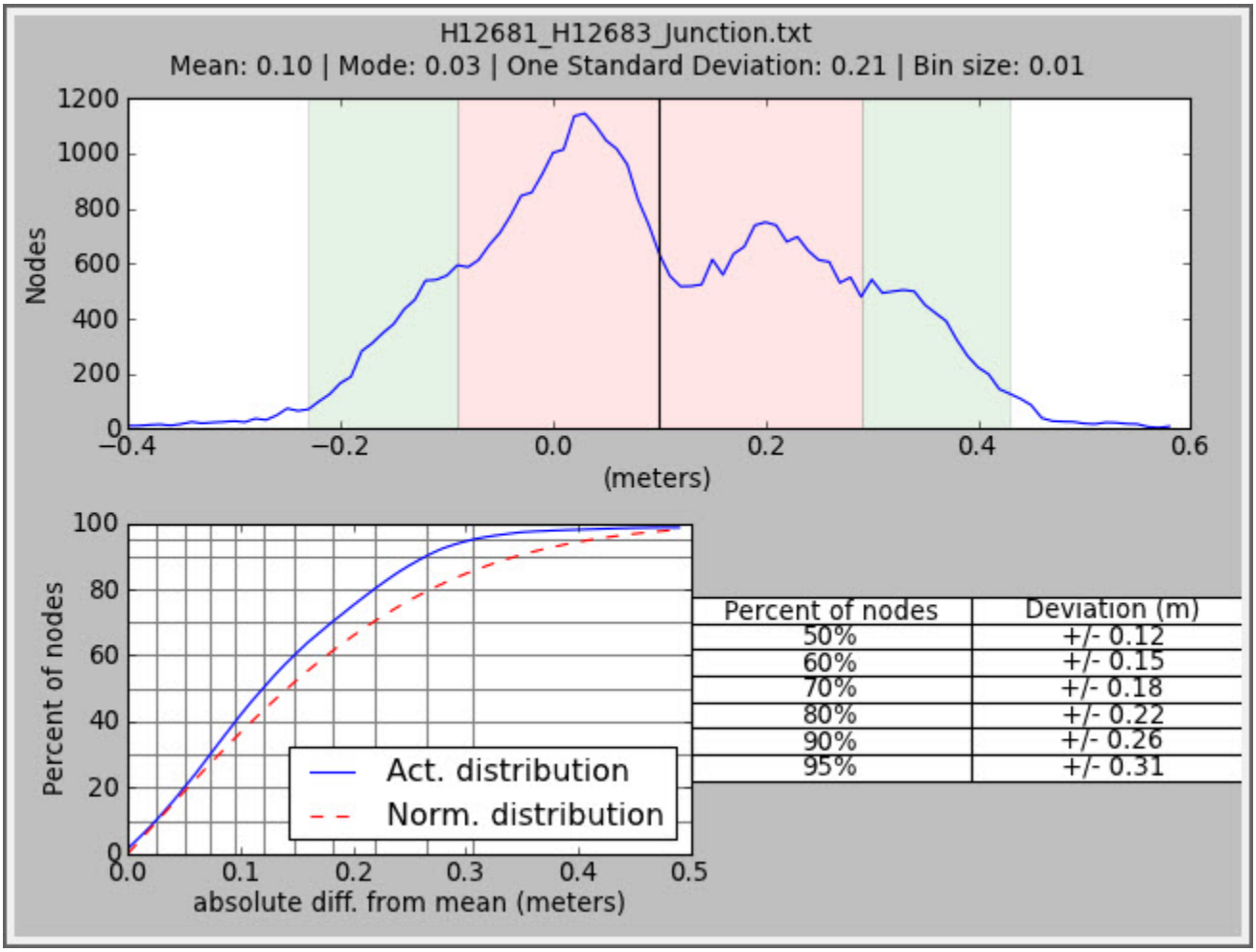


Figure 14: Statistical information for junction comparison between sheet H12681 and H12683

H11664

Survey H12681 was compared to the LIDAR junction survey H11664, which was completed in 2007 by TENIX LADS. It was found that the junctions met the one meter standard set forth in the Office of Coast Survey Field Procedures Manual section 4.5.2. The difference at the 95 percent confidence level was +/- 0.57m as seen in the statistics image below.

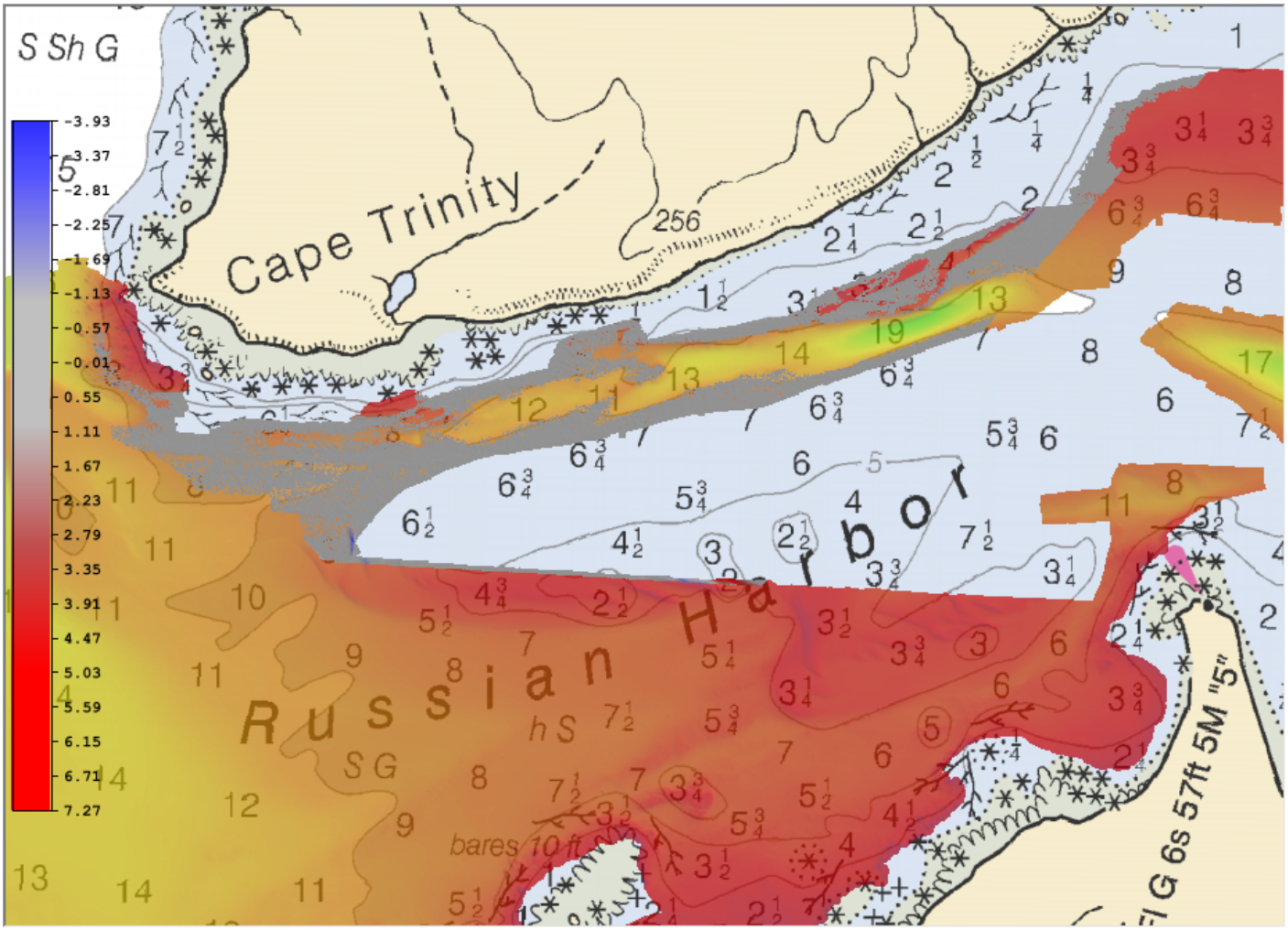


Figure 15: H12681/H11664 Difference Surface

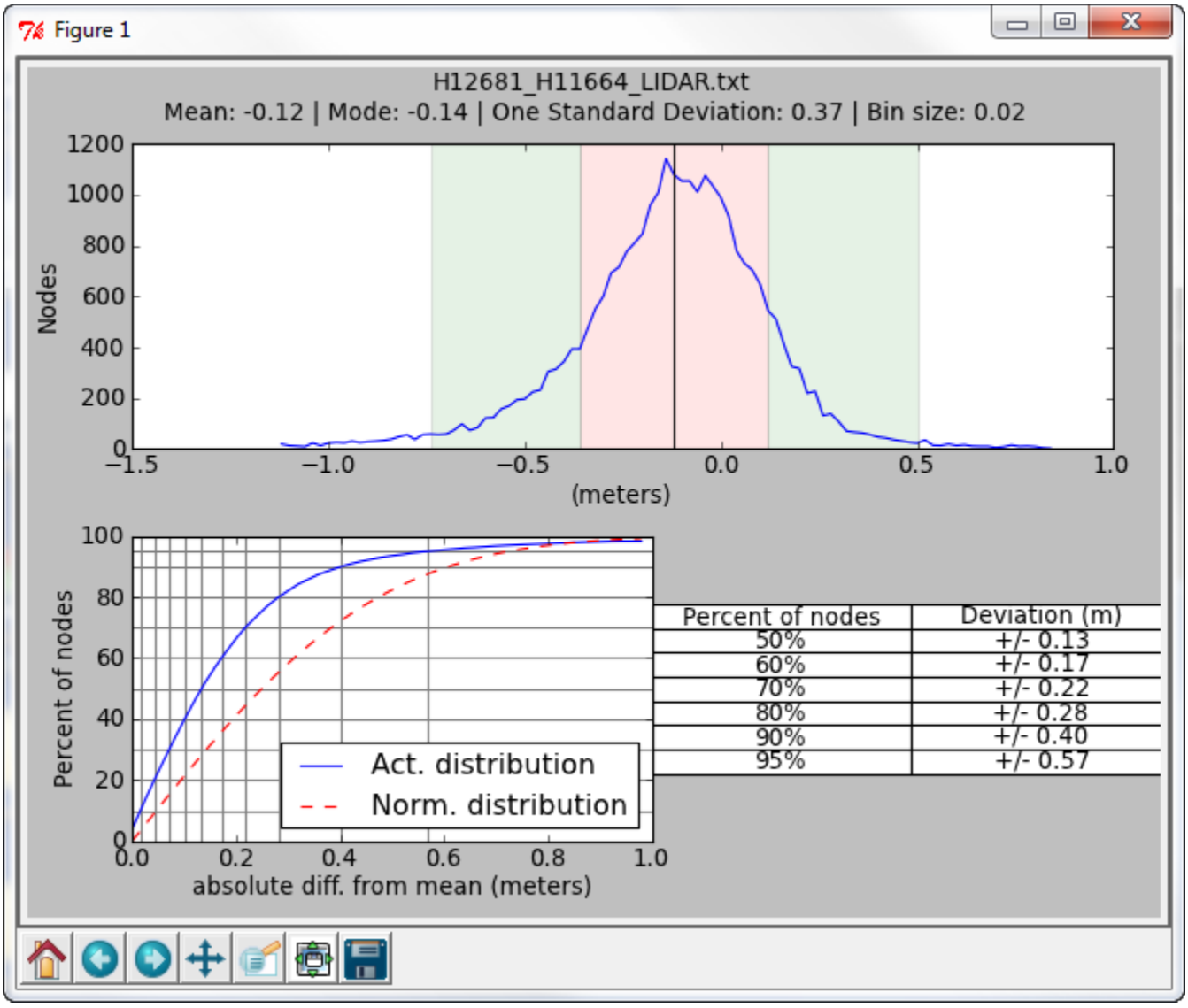


Figure 16: H12681/H12664 Surface Statistics

H11665

Survey H12681 was compared to the LIDAR junction survey H11665, which was completed in 2007 by TENIX. It was found that the junctions met the one meter standard set forth in the Office of Coast Survey Field Procedures Manual section 4.5.2. The difference at the 95 percent confidence level was +/- 0.5m as seen in the statistics image below.

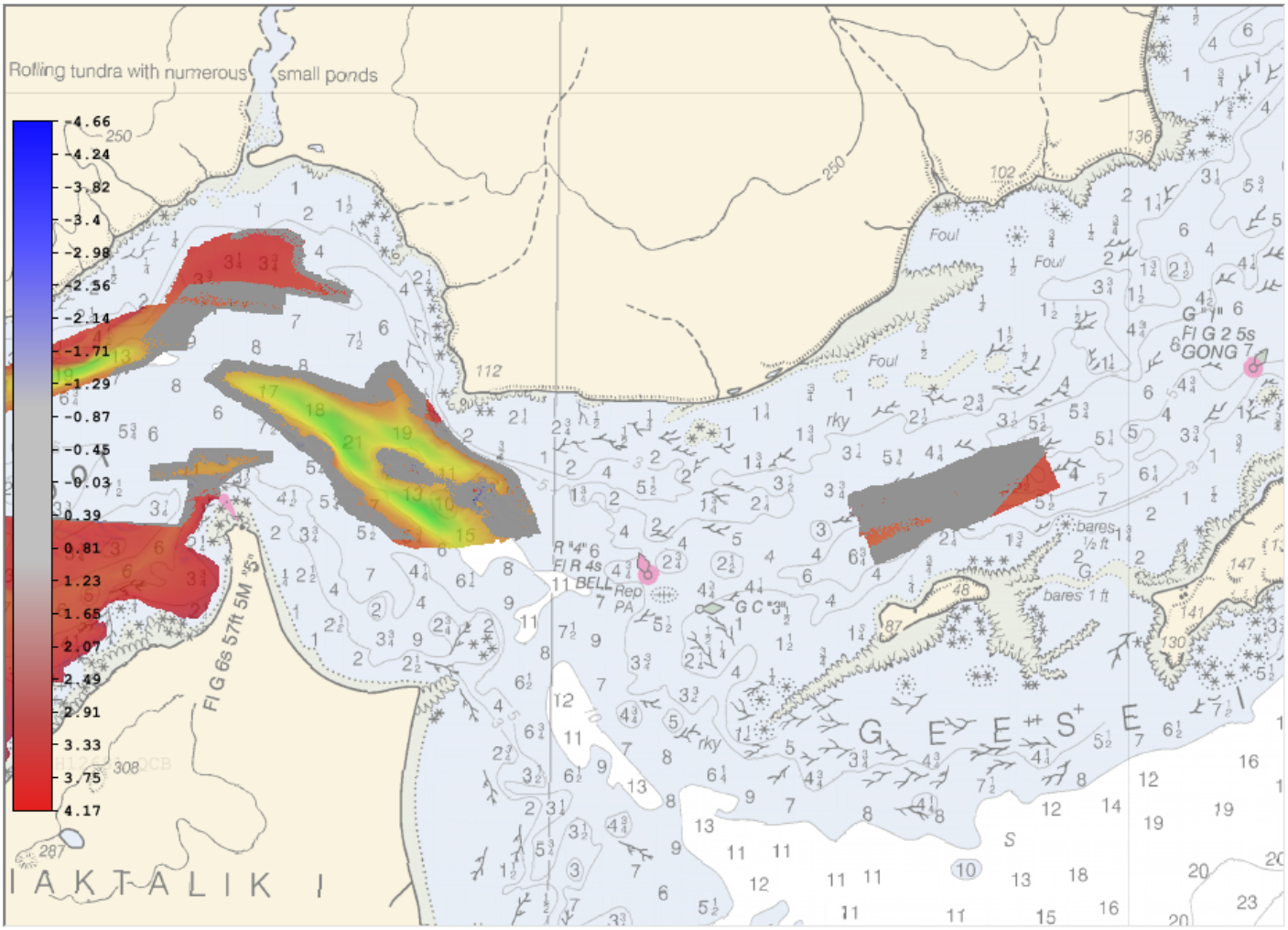


Figure 17: H12681/H11665 Difference Surface

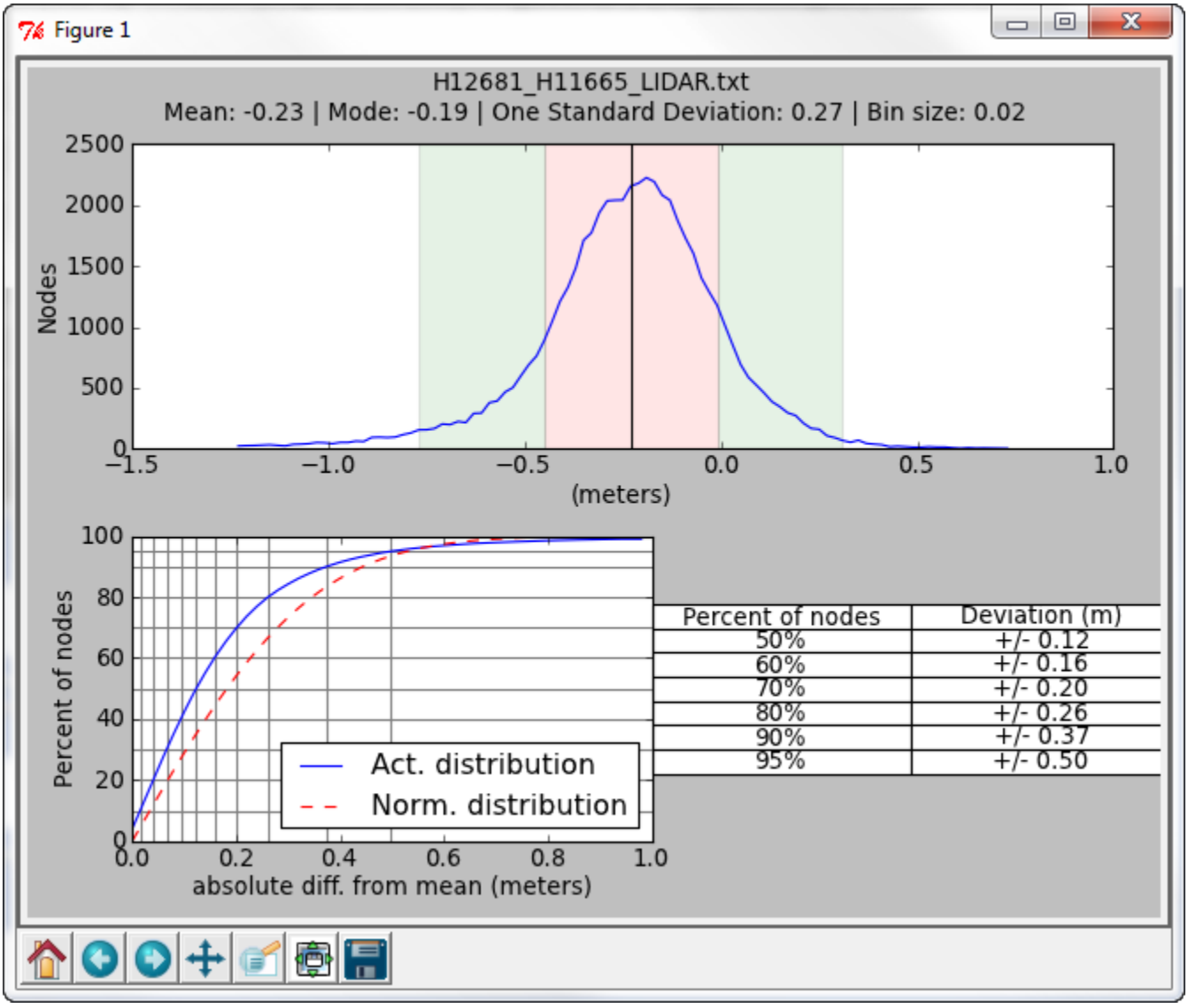


Figure 18: H12681/H11665 Surface Statistics

H11666

Survey H12681 was compared to the LIDAR junction survey H11666, which was completed in 2007 by TENIX LADS. It was found that the junctions met the one meter standard set forth in the Office of Coast Survey Field Procedures Manual section 4.5.2. The difference at the 95 percent confidence level was +/- 0.24m as seen in the statistics image below.

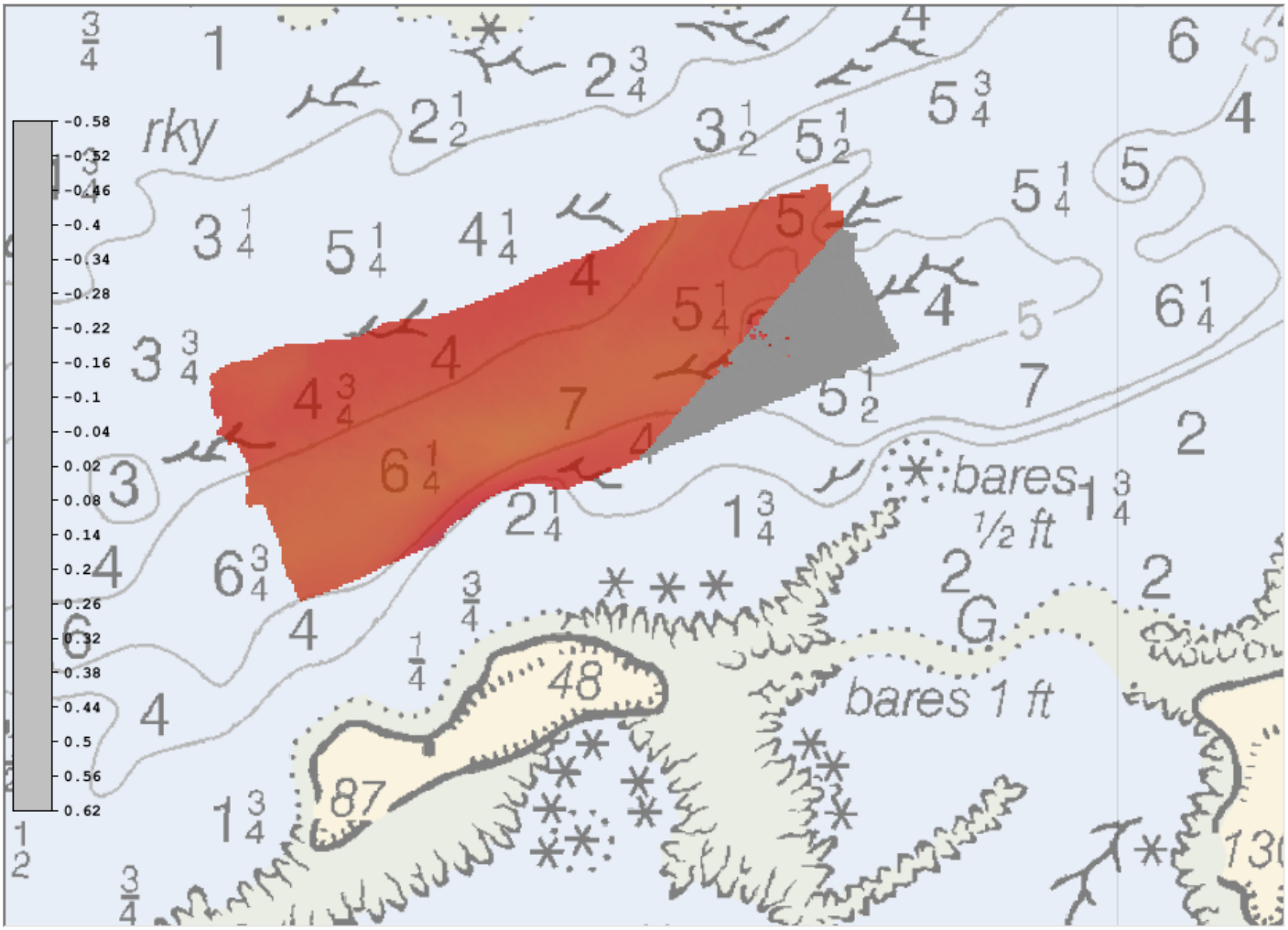


Figure 19: H12681/H11666 Difference Surface

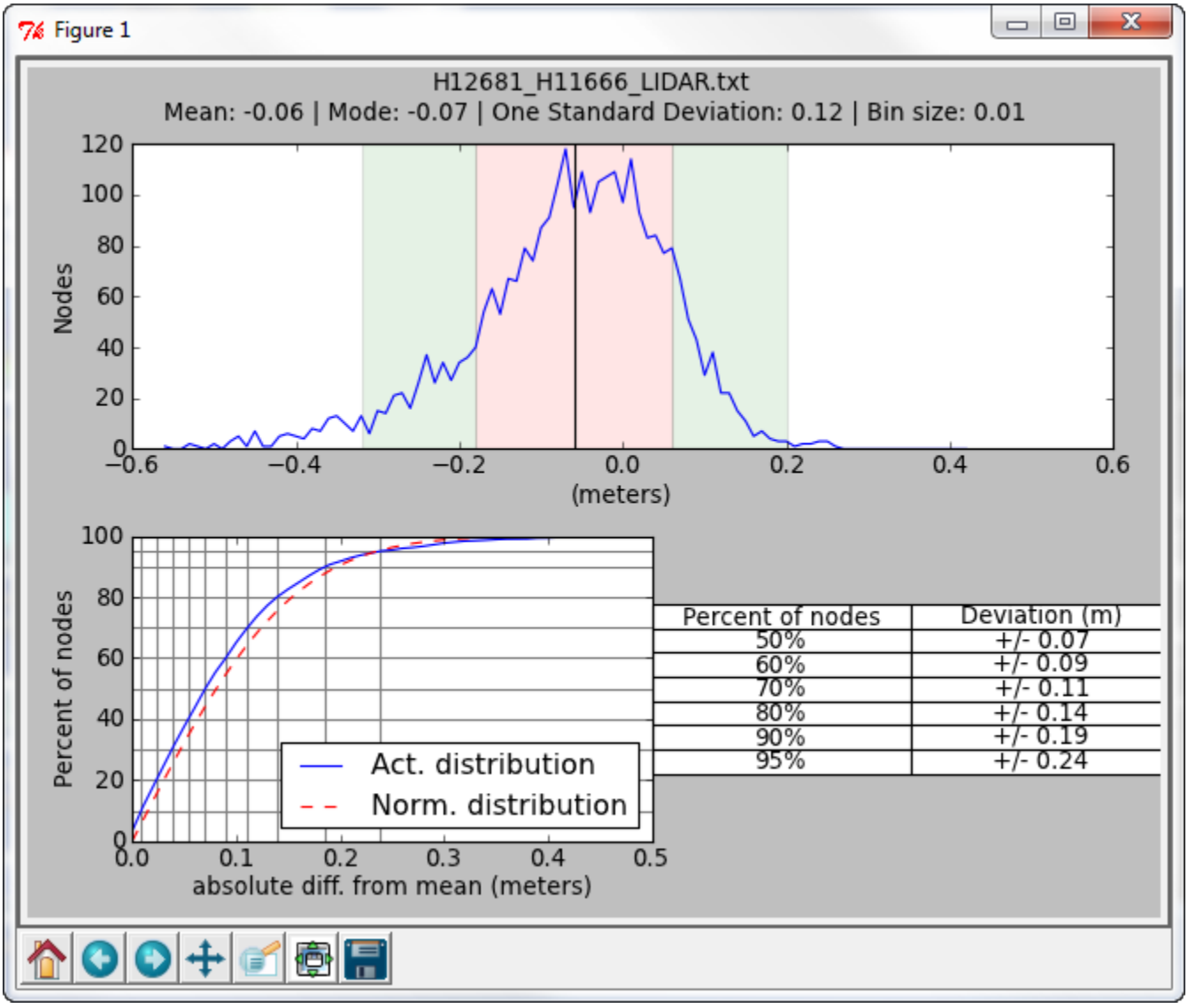


Figure 20: H12681/H11666 Surface Statistics

B.2.4 Sonar QC Checks

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

B.2.5 Equipment Effectiveness

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

B.2.6 Factors Affecting Soundings

Vegetation

During the cleaning and review process of sheet H12681, multiple areas have been found where large amounts of kelp and vegetation are present. After examining several of these areas in CARIS HIPS and SIPS Subset Editor, large amounts of soundings have been found that resemble rocks. Soundings in the areas that did not accurately represent the sea floor due to kelp were removed and the area has been marked as foul with kelp. These areas were mostly located in the vicinity of Aiaktalik Cove, and in the small passage between Sundstrom Island and the South Coast of Aiaktalik Island. A surface with 0.5 meter resolution was created to be used for the depth range 0 to 12 meters in order to more accurately represent the sea floor. Soundings that appeared to be rocks were still designated even if what appeared to be vegetation grabbed the sea floor to a shoaler depth. Vegetation in the water column caused the gridded surface to deviate from most-likely, least depth soundings and any such soundings were removed prior to finalizing surfaces. Submitted surface depths are adequate to supersede charted soundings.

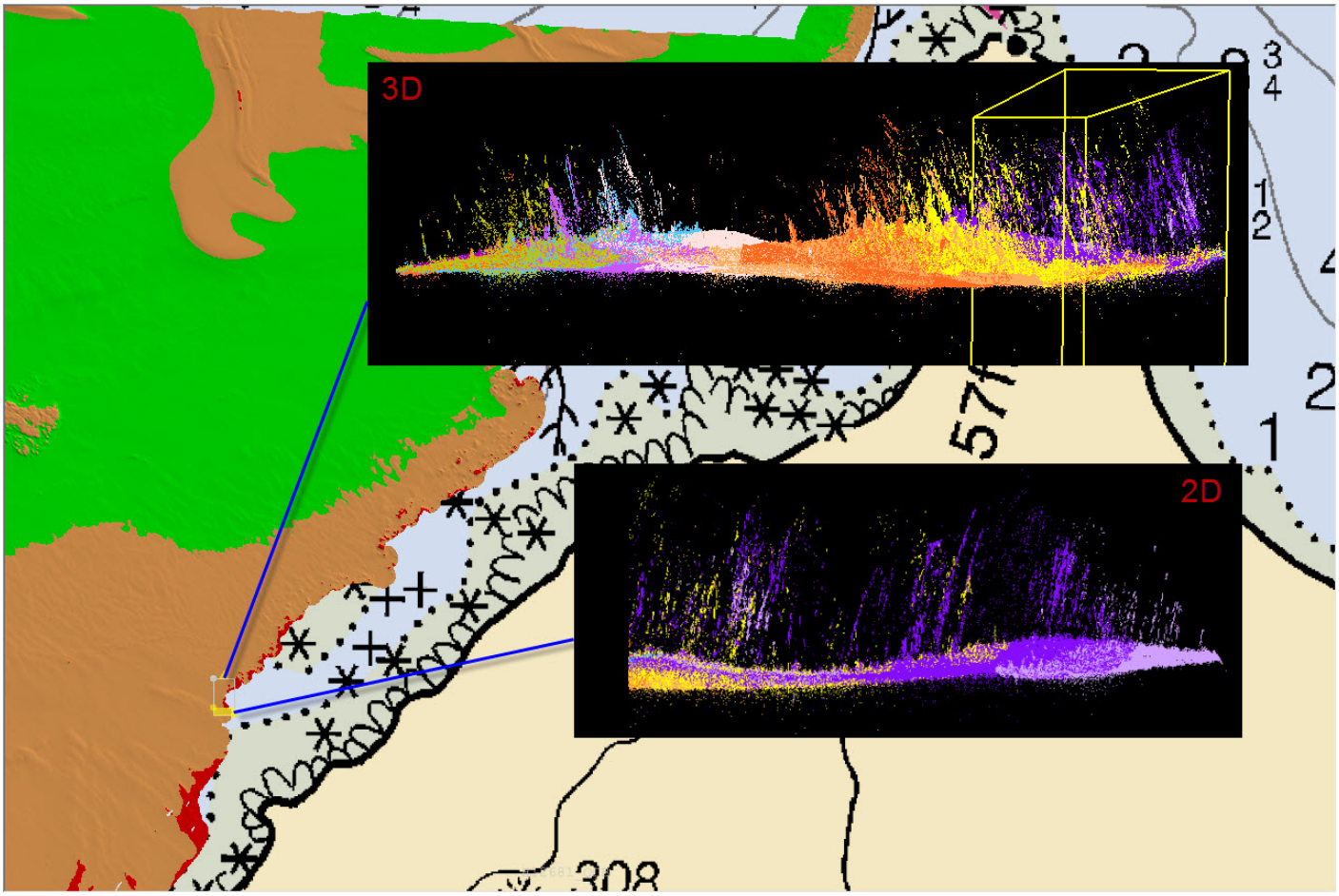


Figure 21: H12681 Vegetation

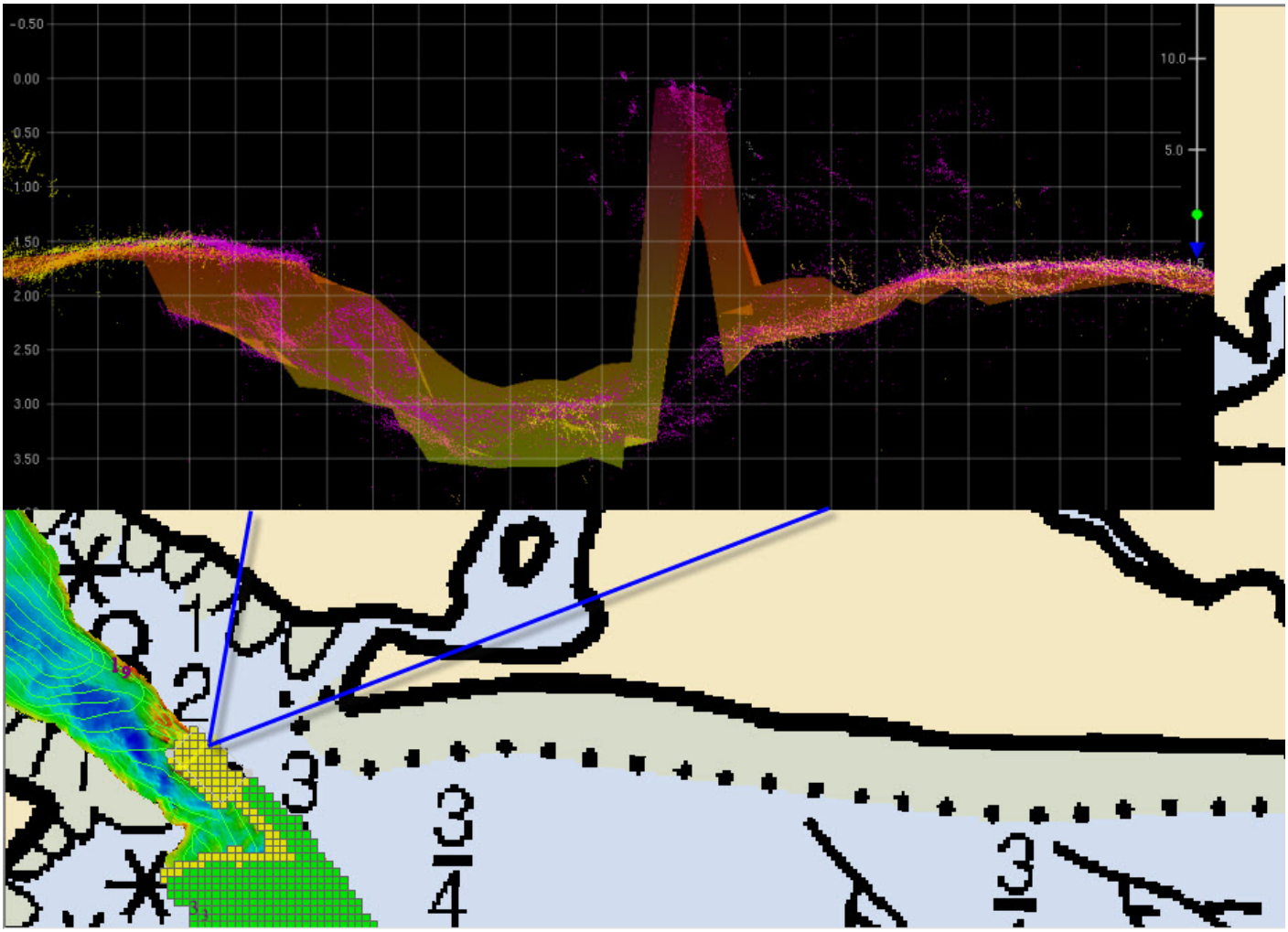


Figure 22: H12681 rejected vegetatation that grabbed BASE surface

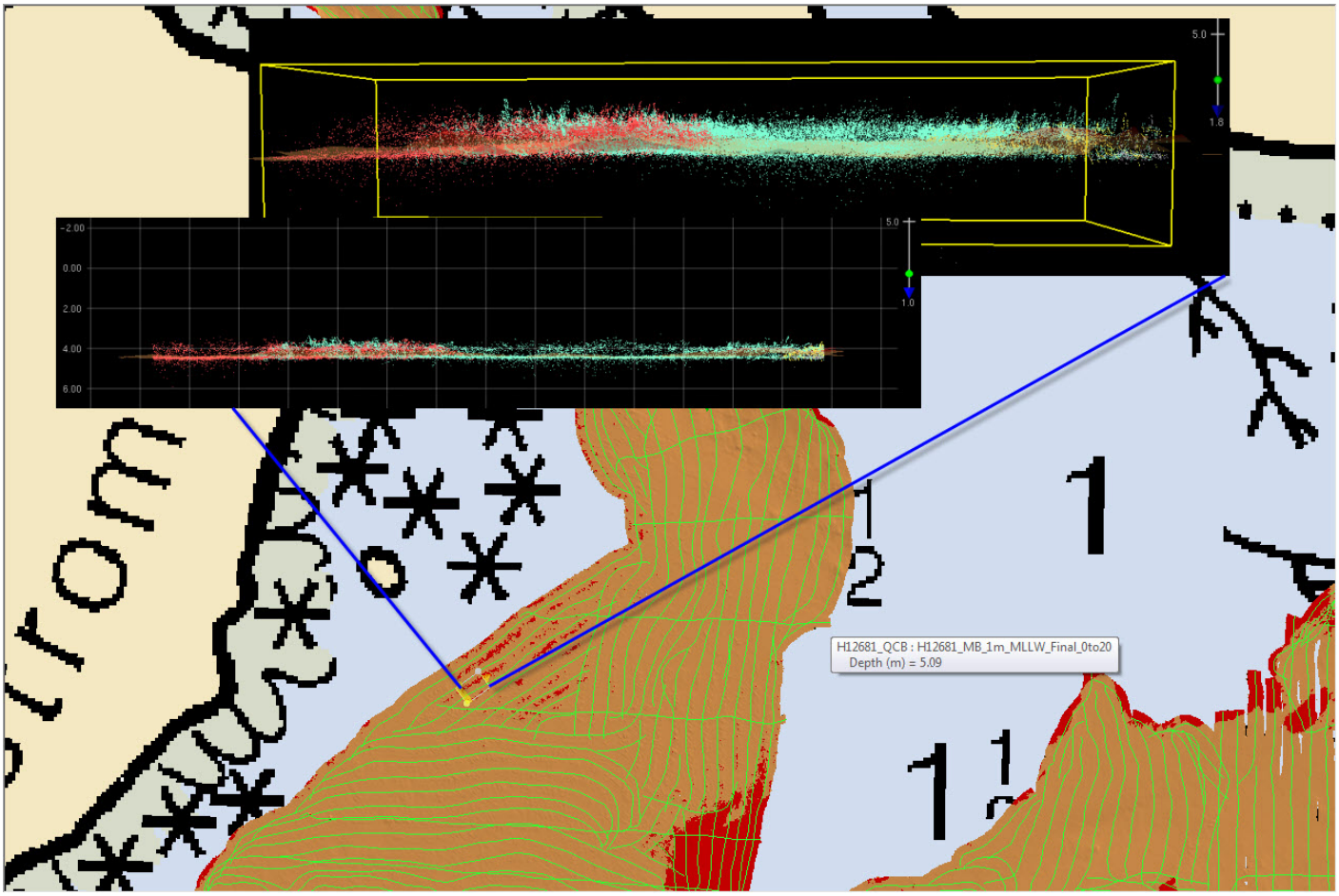


Figure 23: H12681 vegetation that could possibly contain hidden rocks

Surface Sound Speed

Several days of acquisition occurred in foul weather which resulted in various surface sound speed artifacts. These artifacts were discovered during the review of H12681 in CARIS HIPS and SIPS Subset Editor and an example is shown in figure 24.

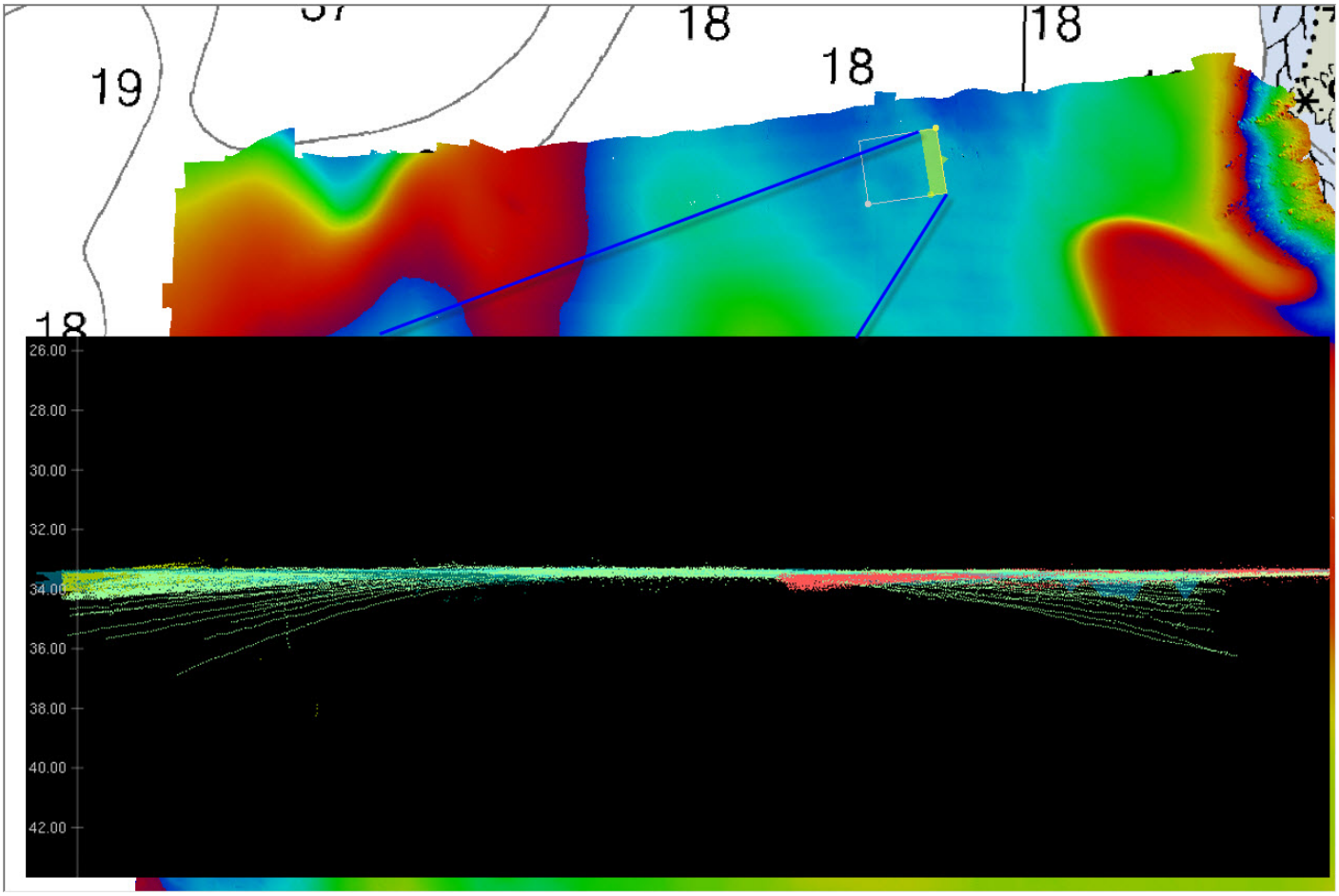


Figure 24: H12681 Surface Sound Speed Artifact

Sound Speed

An area towards the south west corner of the sheet limit was found to contain sound speed artifacts. The MBES data were reviewed in CARIS HIPS and SIPS Subset Editor with the appropriate base surface. The base surface accurately depicts the sea floor.

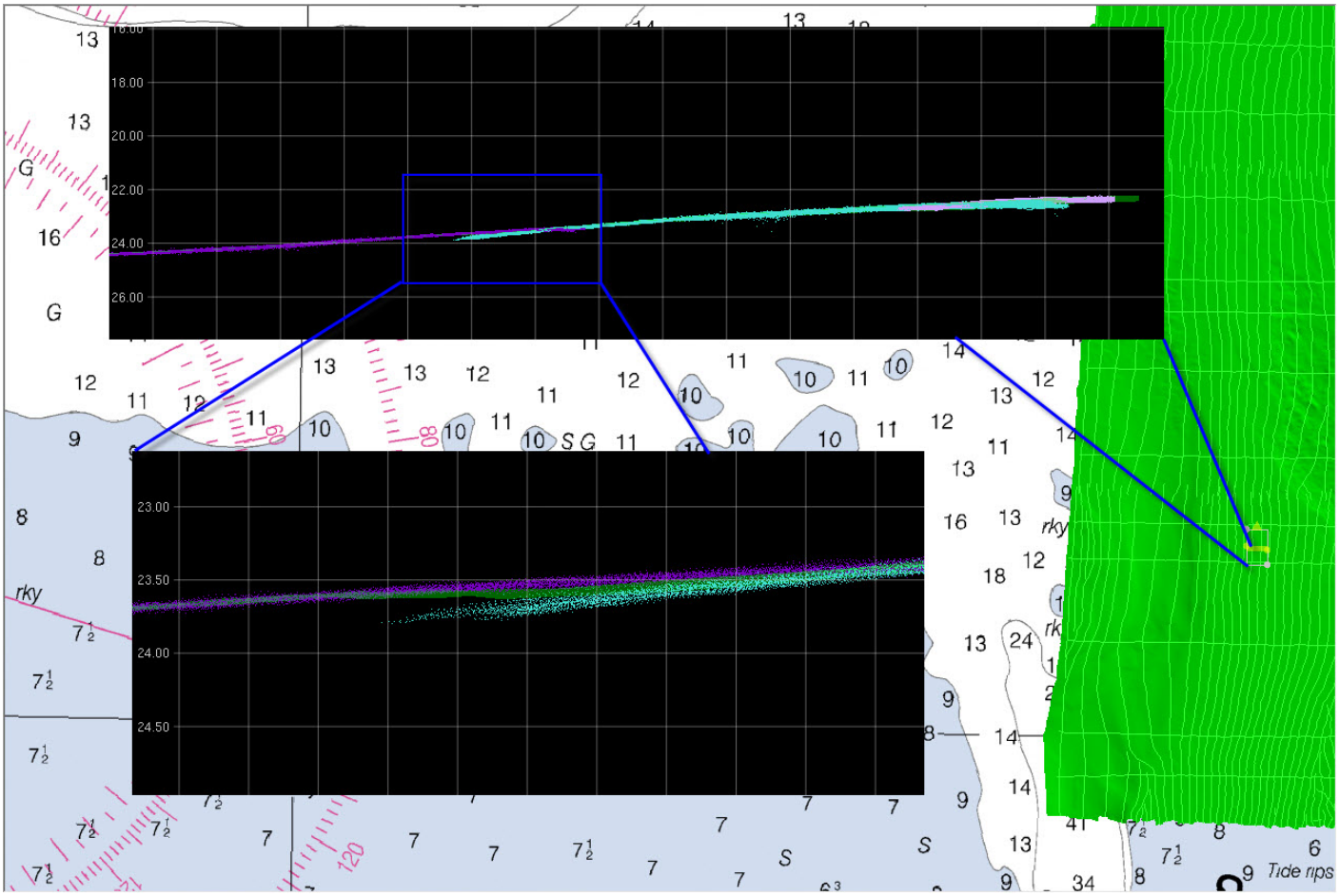


Figure 25: H12681 Sound Speed Artifact

Vertical Offset

During the survey of sheet H12681 data collection during different days happened in adjacent areas. After reviewing the data that overlapped in these areas in CARIS HIPS and SIPS Subset Editor, a vertical offset was observed. Tidal data in the area seemed to be less accurate, as the vertical offset appeared to be reduced after viewing the effected area in CARIS HIPS and SIPS Subset Editor using the feature that allows the vertical datum to be switched between the GPS tides and traditional tidal zone file. On the South Coast of Aiaktalik Island another area containing a vertical offset was observed. After applying GPS tides, the offset became more pronounced. The data that was collected meets all NOAA specifications and the hydrographer recommends survey data supersede charted soundings and contours.

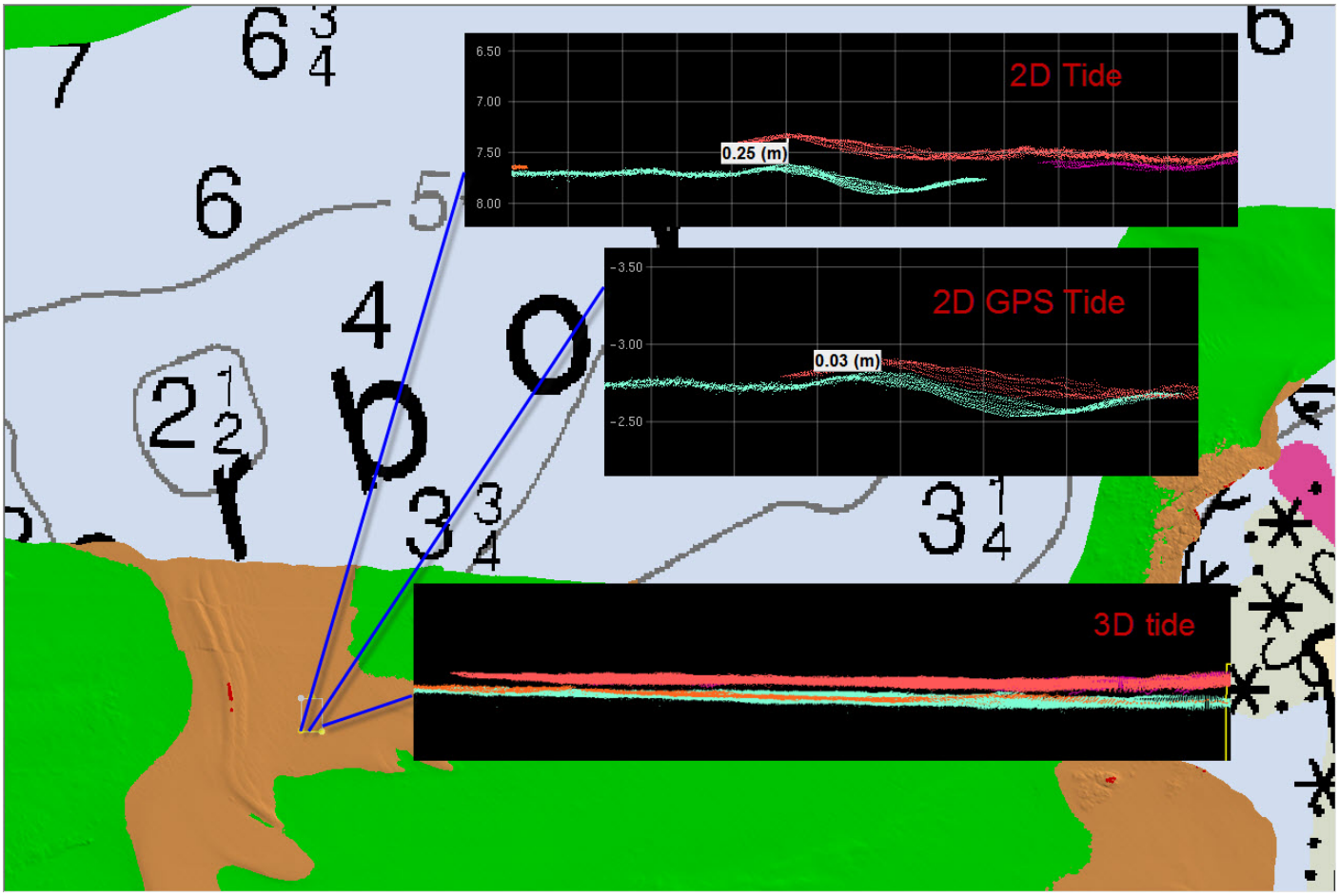


Figure 26: H12681 Vertical offset datum comparison

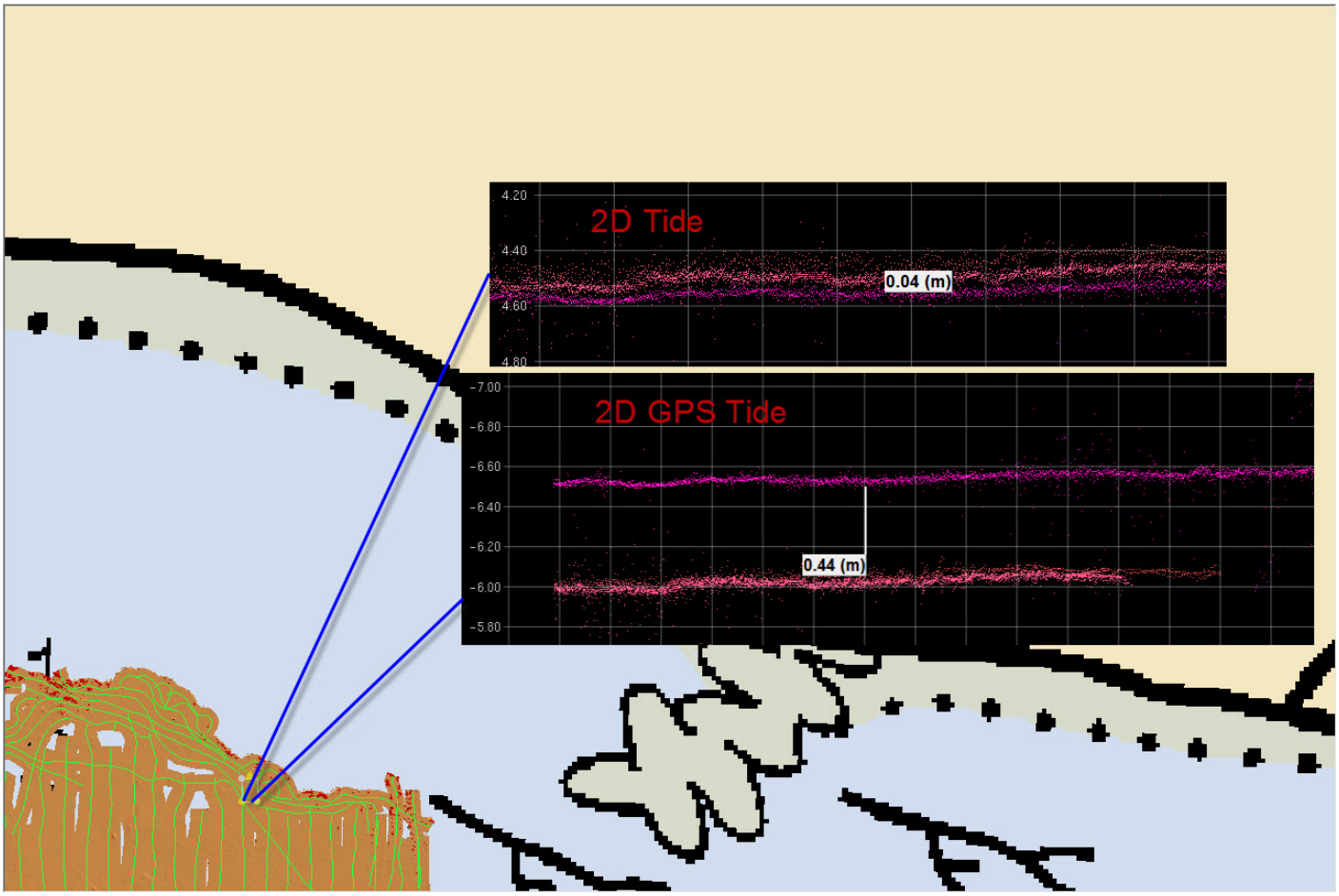


Figure 27: H12681 Vertical offset South Coast of Aiaktalik Island

B.2.7 Sound Speed Methods

Sound Speed Cast Frequency: Sound speed measurements were conducted as discussed in the Data Acquisition section of the DAPR. The only exception to this occurred on DN 153 when Launch 2806's CTD line parted and the CTD was lost. Launch 2806 worked polygons in vicinity to Launch 2807 and casts were shared for the day.

B.2.8 Coverage Equipment and Methods

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

B.2.9 Holiday Assessment

Complete coverage, per coverage requirements described in the project instructions, was obtained within the limits of H12681. The least depths of all navigationally significant features are represented by H12681, however some holidays do exist and examples are described below.

Holidays were left on the back sides of some rocks where it was not safe to survey to the extents of complete coverage. Examples of this are located at 56:43:26.47N, 154:04:24.87W, as well as 56:44:35.26N, 154:08:54.22W. Both of these examples are shown in figure 22 and figure 23 below.

The holidays located towards the north sheet limit, 56:44:33.89N, 154:11:11.61W, the least depth is represented. This area was surveyed during foul weather.

A representation of the holidays located in the three annexed sections of sheet H12681 are shown below. These areas were added to the sheet after the project area was departed, leaving no opportunity for holiday clean up. These are located at 56:39:48.97N, 154:03:09.95W.

A holiday attributed to roll was found in the south east extension of the H12681 sheet limits. This resulted in a holiday and is located at 56:40:26.55N, 154:04:54.95W

Holidays are present in the 0.5m surface where overlap was not present enough to meet the sounding density needs of the higher resolution surface. The decision to use the higher resolution surface was made after the project area was left, leaving no opportunity for holiday clean up.

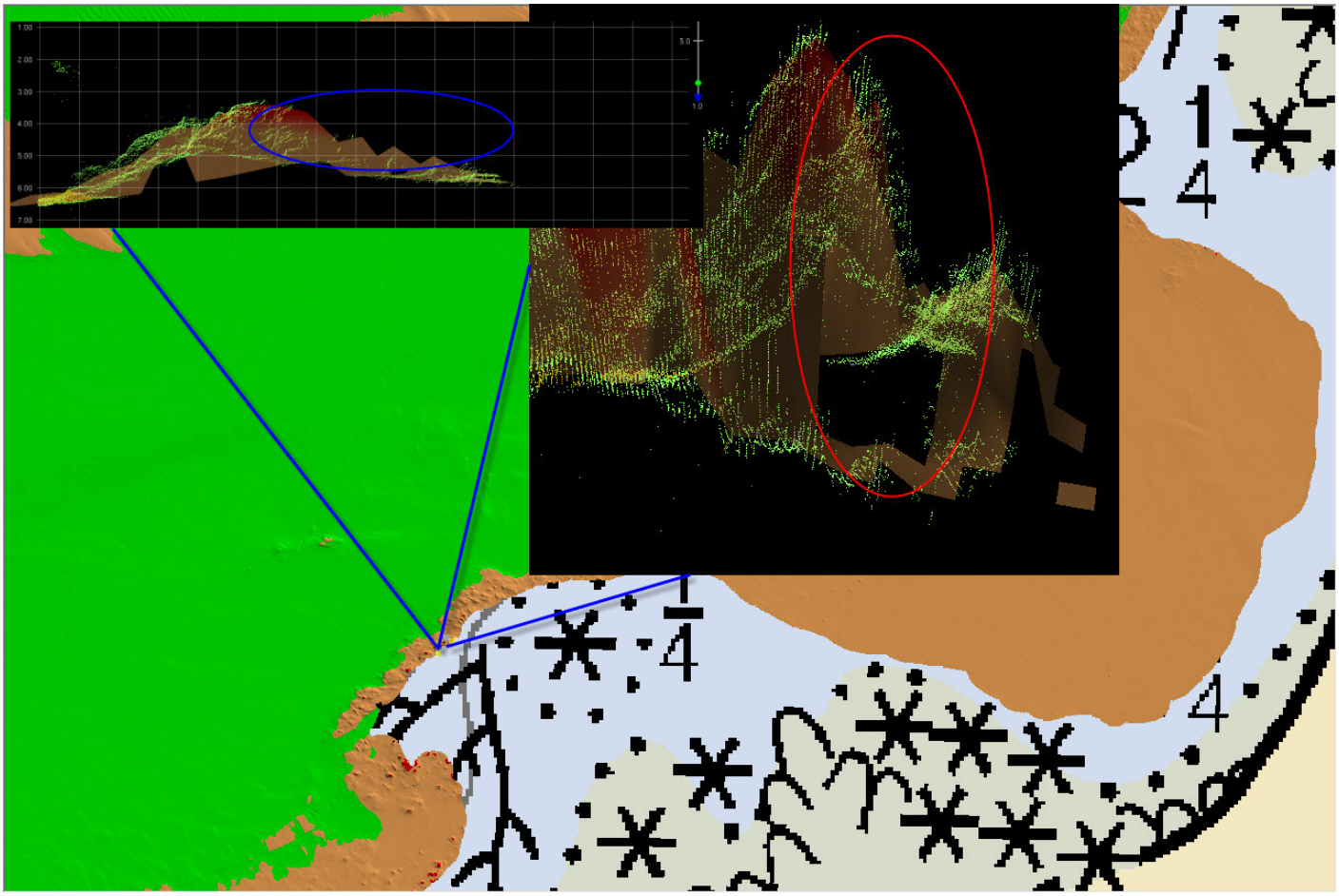


Figure 28: Rock shadow holiday north east of Aiaktalik Cove

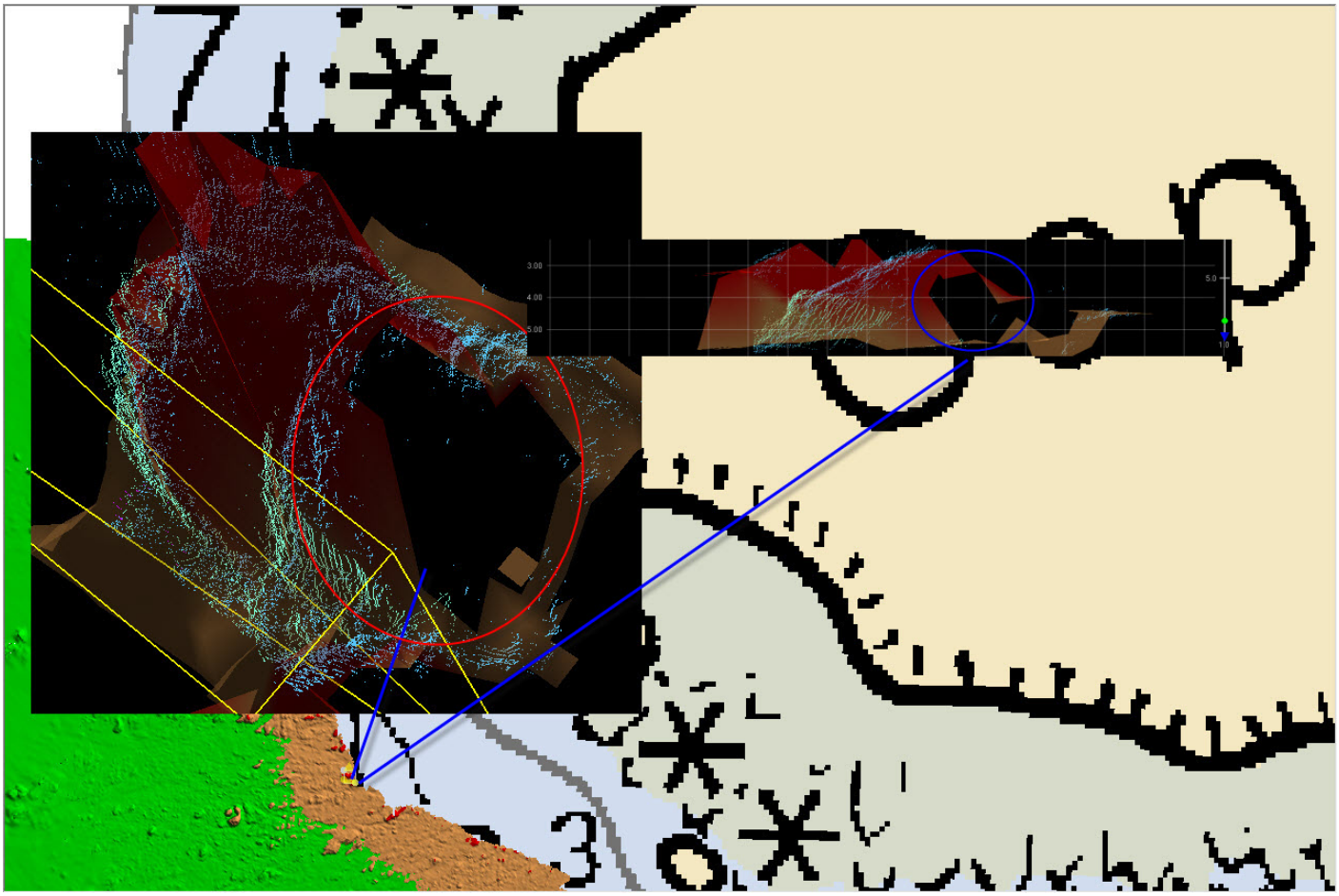


Figure 29: Rock shadow holiday south east of Cape Trinity

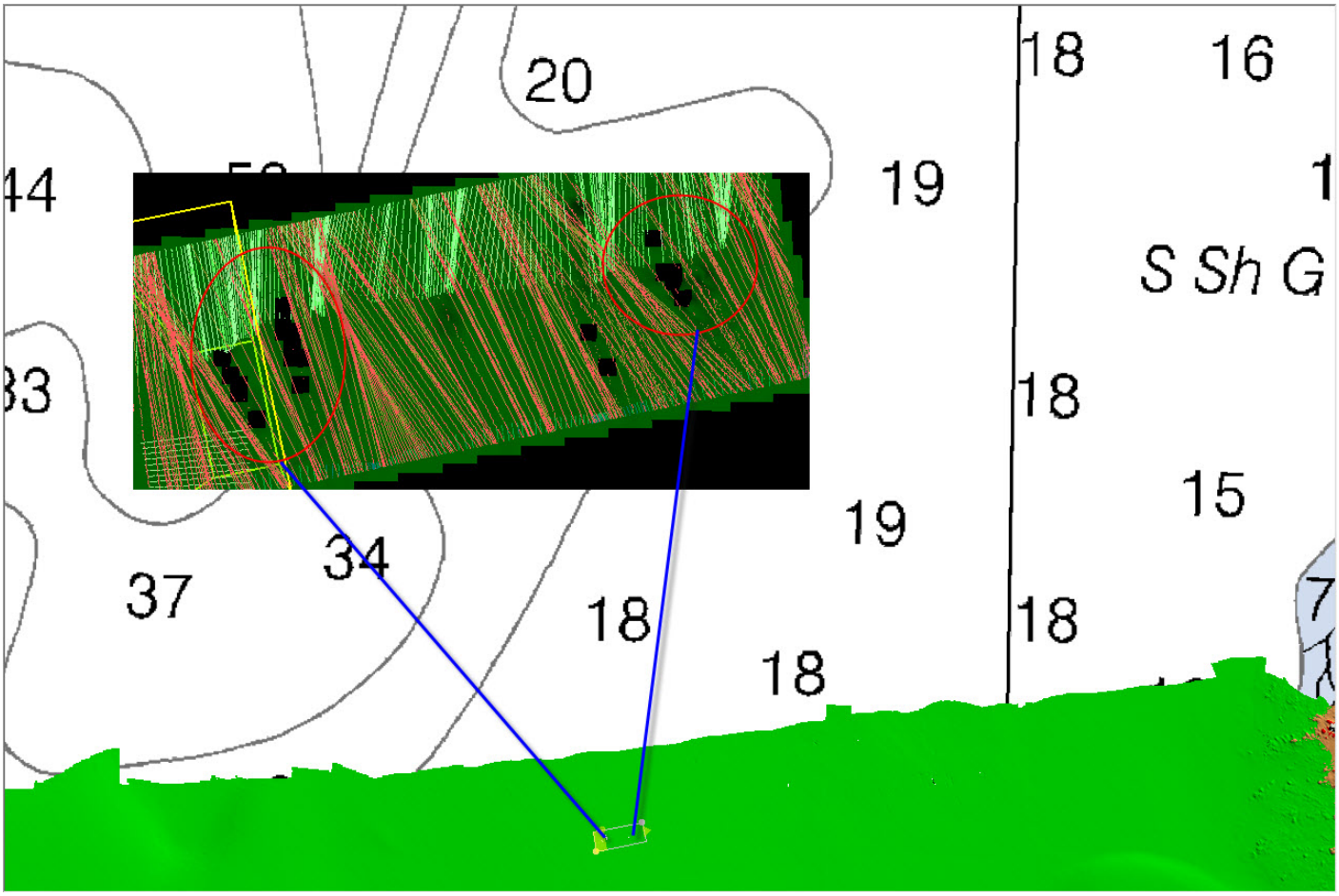


Figure 30: H12681 north sheet limit holidays

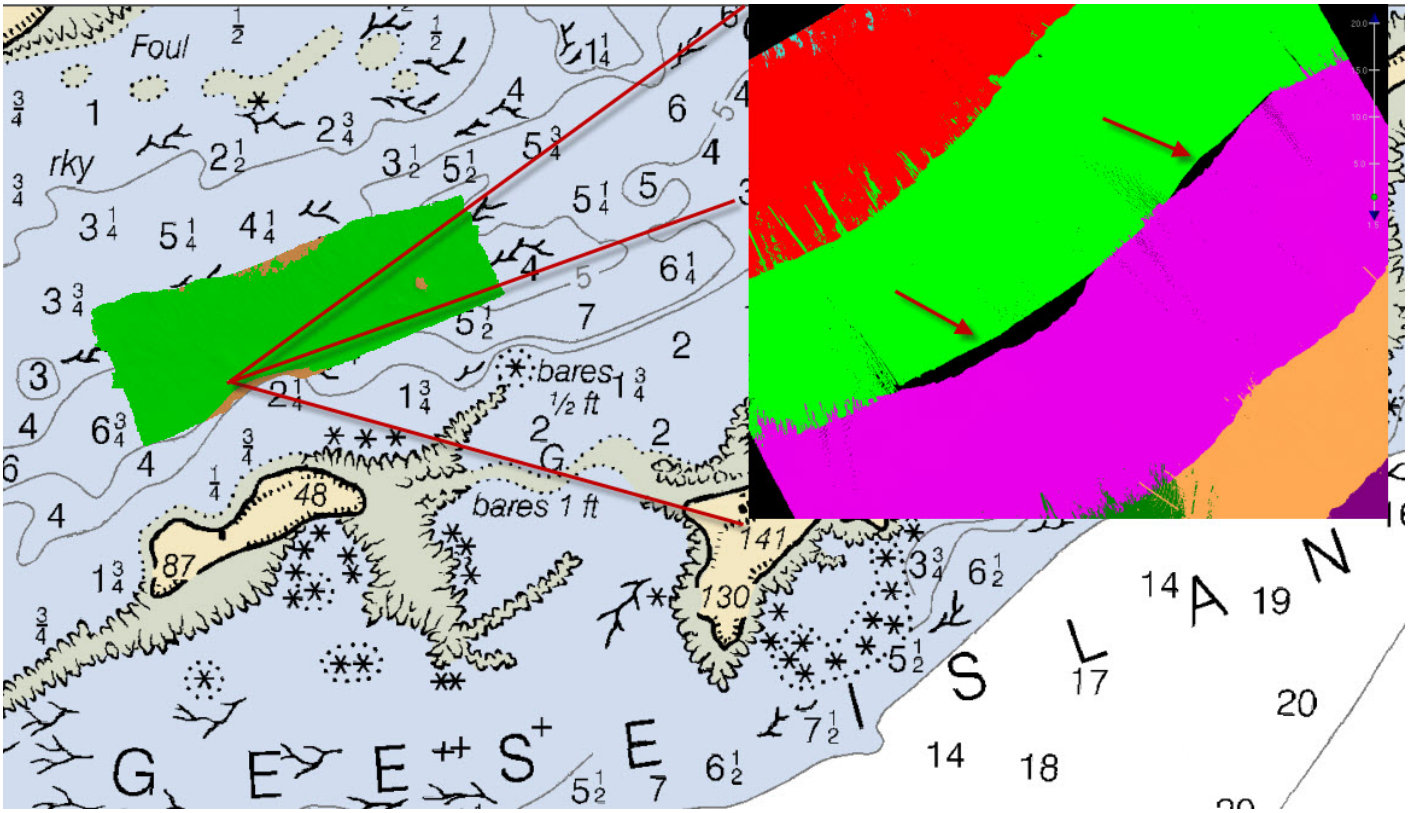


Figure 31: H12681 Geese Channel Holiday

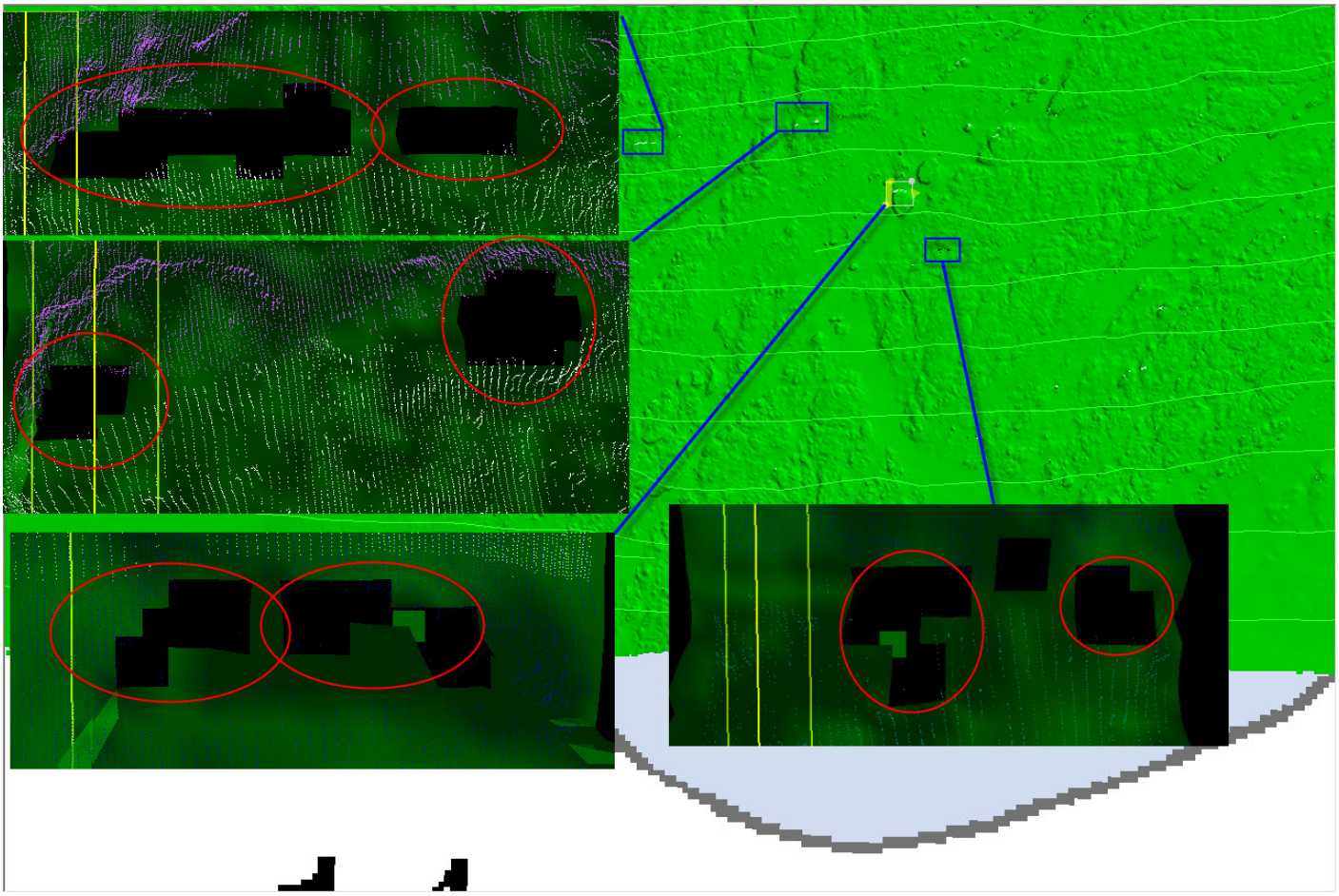


Figure 32: H12681 sheet limit extension holidays

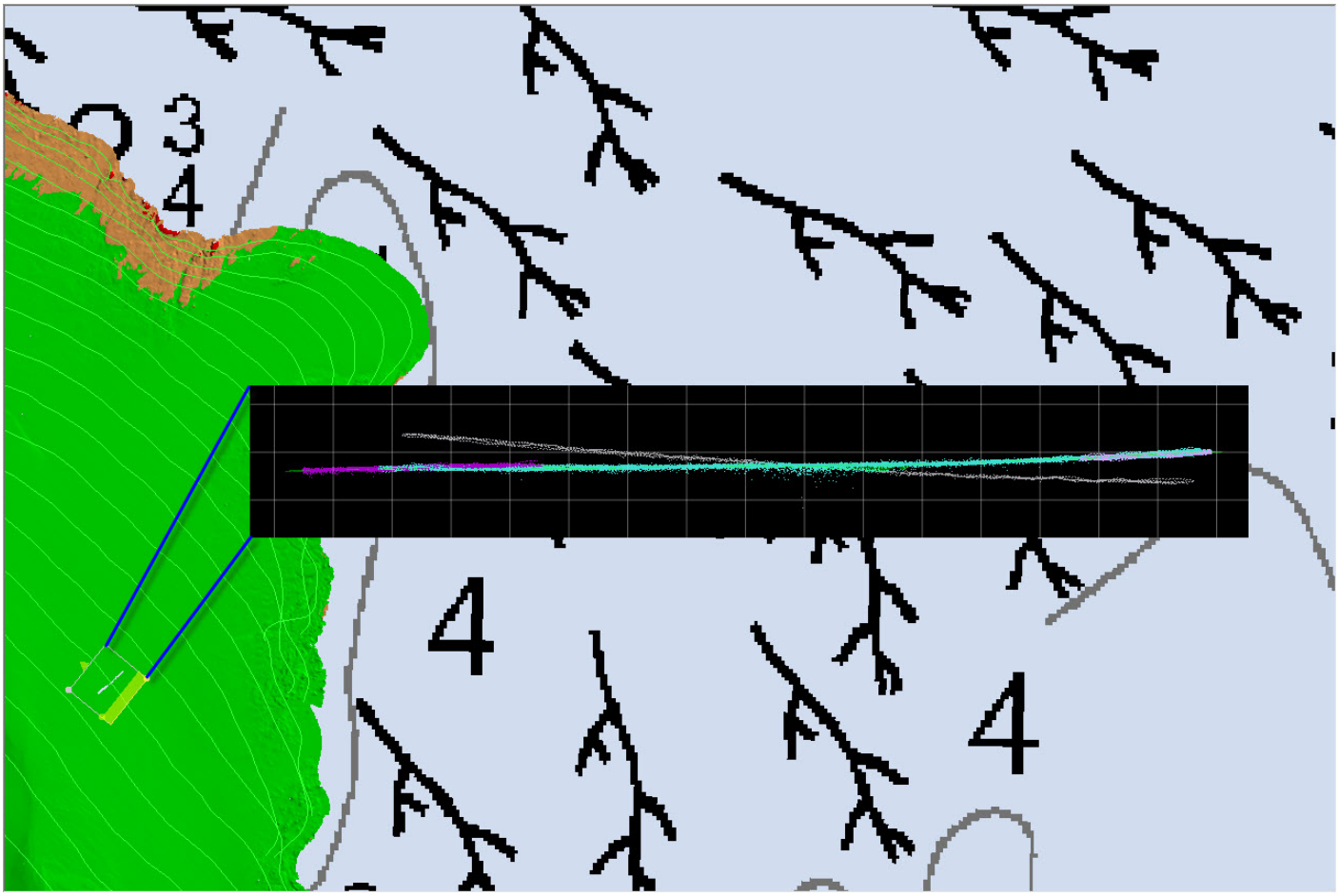


Figure 33: H12681 Roll Holiday

B.2.10 IHO Uncertainty

It was found that at least 99.96% of nodes meet or exceed IHO order 1 specifications as stated in the NOS Hydrographic Surveys Specifications and Deliverables dated April 2014 (HSSD) for all depths of survey H12681. A rocky area West of Cape Trinity has low IHO values and is shown in the image below. See Standards Compliance Review in Appendix II. To assess vertical uncertainty, a child layer "IHO1" was created for each of the 1-meter, 2-meter, 4-meter, and 8-meter finalized surfaces using the equation as stated in section C. 2.1 of the DAPR.

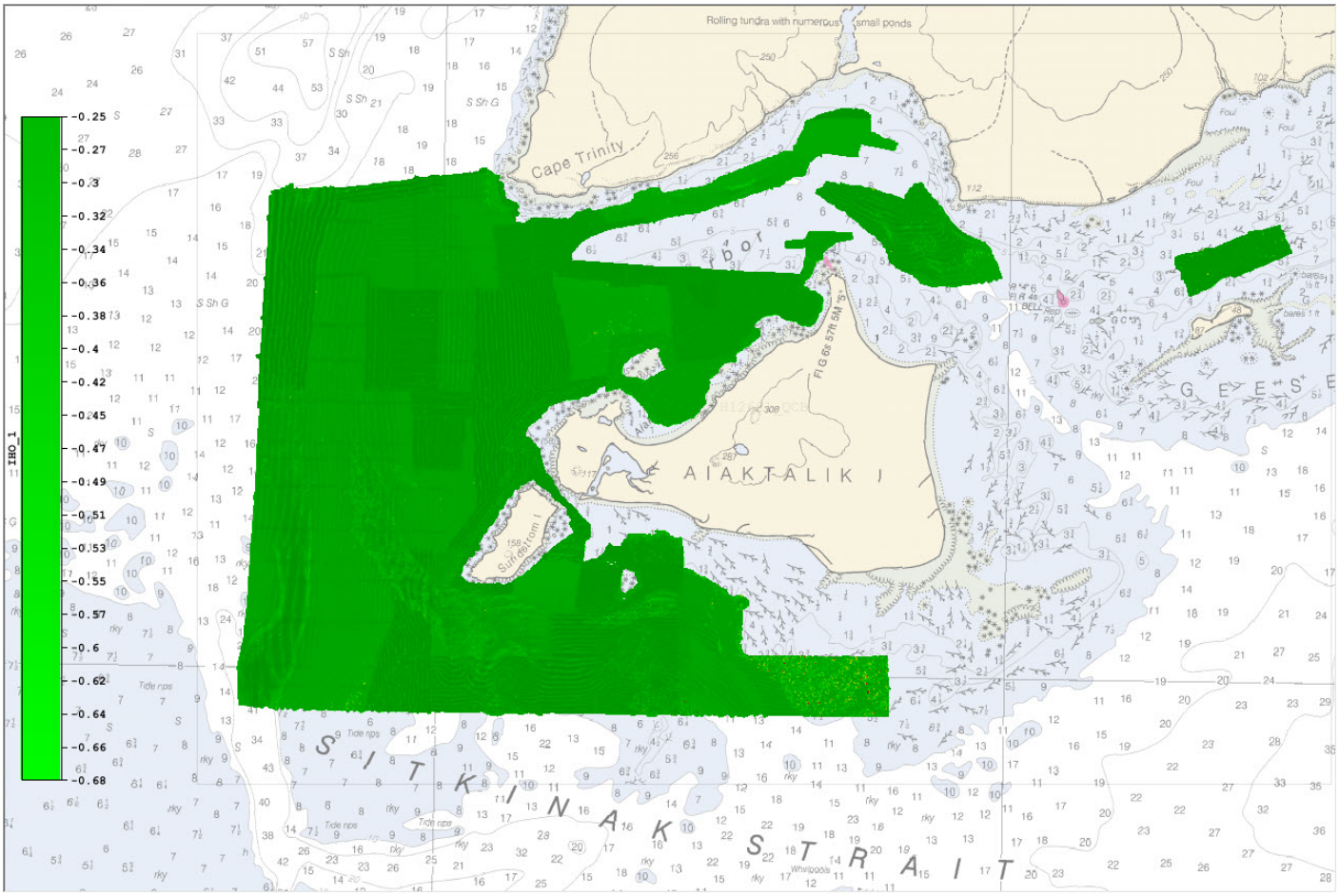


Figure 34: H12681 IHO Uncertainty Layer

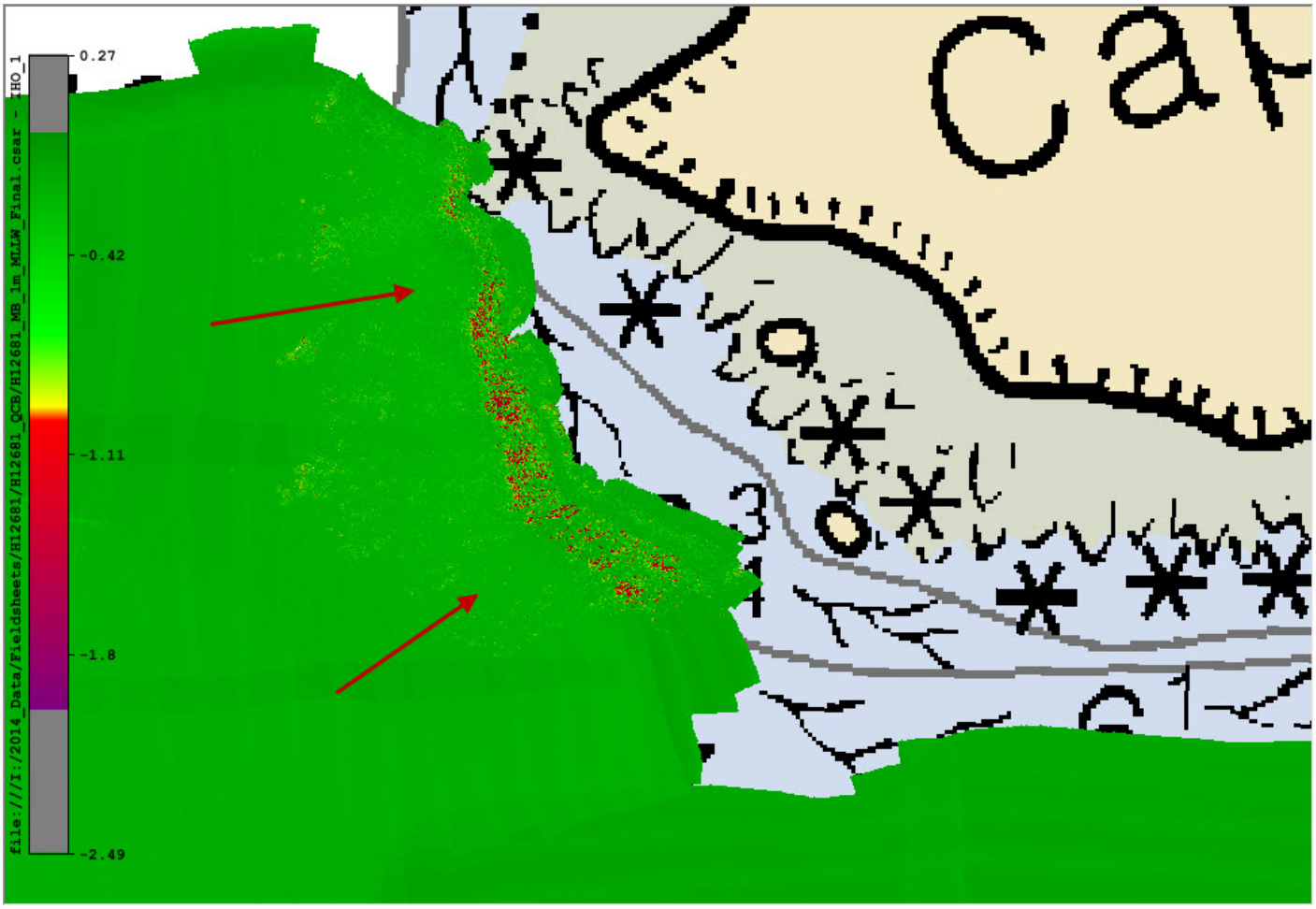


Figure 35: H12681 Low IHO values in rocky area West of Cape Trinity

B.2.11 Density

Density requirements for H12681 were achieved with at least 99.92% of finalized surface nodes containing five or more soundings, see Standards and Compliance Review in Appendix II.

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

The following calibrations were conducted after the initial system calibration discussed in the DAPR:

Calibration Type	Date	Reason
Reference Surface	2014-09-13	Launch comparison following completion of the project.

Table 9: Calibrations not discussed in the DAPR.

A series of reference surfaces were conducted in the Puget Sound, in the vicinity of Shilshole Bay following completion of this project. These reference surfaces were conducted to confirm all FA hydrographic survey launches, with both the 200kHz and 400kHz transducers, both produced consistent sounding depths and did not developed any systematic errors. This test was done explicitly to help validate the accuracy of data collected on this project, which has reduced or no crosslines. The comparison of all eight reference surfaces (two from each launch) were within +/- .08m or better at the 95% confidence level demonstrating no noticeable change from the results seen during HSRR.

B.4 Backscatter

Raw Backscatter was logged as a 7k file and submitted directly to NGDC to be archived and to PHB where the data will be processed. One line per vessel per day was processed by the field.

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	See DAPR

Table 10: Primary bathymetric data processing software

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

Manufacturer	Name	Version
CARIS	HIPS/SIPS	See DAPR

Table 11: Primary imagery data processing software

The following Feature Object Catalog was used: NOAA Profile V_5_3_2Due to an error in CARIS HIPS version 8.1.8 that causes TPU to be computed incorrectly, HIPS was reverted to 8.1.7 for Survey H12681. TPU and all surfaces were re-computed and the IHO uncertainty statistics was re-evaluated.

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
H12681_MB_50cm_MLLW	CUBE	0.5 meters	-	NOAA_0.5m	Complete MBES
H12681_MB_1m_MLLW	CUBE	1 meters	-	NOAA_1m	Complete MBES
H12681_MB_2m_MLLW	CUBE	2 meters	-	NOAA_2m	Complete MBES
H12681_MB_4m_MLLW	CUBE	4 meters	-	NOAA_4m	Complete MBES
H12681_MB_8m_MLLW	CUBE	8 meters	-	NOAA_8m	Complete MBES
H12681_MB_50cm_MLLW_Final	CUBE	0.5 meters	0 meters - 12 meters	NOAA_0.5m	Complete MBES
H12681_MB_1m_MLLW_Final	CUBE	1 meters	0 meters - 20 meters	NOAA_1m	Complete MBES
H12681_MB_2m_MLLW_Final	CUBE	2 meters	18 meters - 40 meters	NOAA_2m	Complete MBES
H12681_MB_4m_MLLW_Final	CUBE	4 meters	36 meters - 80 meters	NOAA_4m	Complete MBES
H12681_MB_8m_MLLW_Final	CUBE	8 meters	72 meters - 160 meters	NOAA_8m	Complete MBES

Surface Name	Surface Type	Resolution	Depth Range	Surface Parameter	Purpose
H12681_MB_8m_MLLW_combine	CUBE	8 meters	-	NOAA_8m	Complete MBES

Table 12: Submitted Surfaces

The NOAA CUBE parameters mandated in HSSD were used for the creation of all CUBE BASE surfaces in Survey H12681. The surfaces have been reviewed where noisy data, or "fliers" are incorporated into the gridded solution causing the surface to be shoaler or deeper than the true sea floor. Where these spurious soundings cause the gridded surface to be shoaler or deeper than the reliably measured seabed by greater than the maximum allowable TVU at that depth, the noisy data have been rejected and the surface recomputed.

An additional one half meter resolution surface was created in its own separate filed sheet to cover areas where the one meter resolution surface did not adequately represent the sea floor. A separate field sheet was used in order to limit the surface to only cover the areas where the one half meter resolution surface was appropriate. This reduced the amount of time required to recompute the surface.

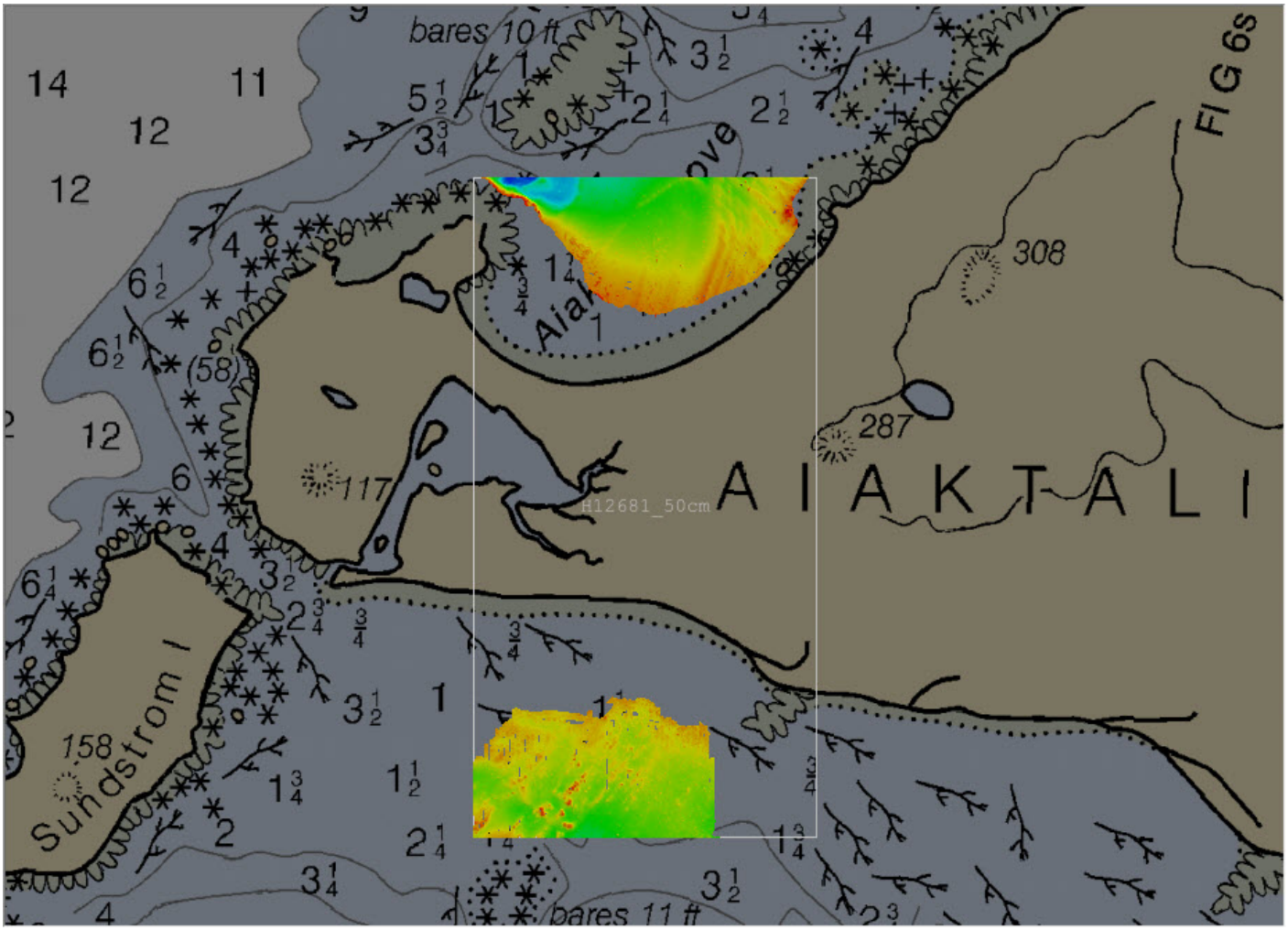


Figure 36: H12681 half meter field sheet extents

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 velocity application is noted in the H12681 Data Log spreadsheet. All data logs are submitted digitally in the Separates I folder.

B.5.4 Critical Soundings

Designation of soundings followed procedures as outlined in section 5.2.1.2 of the HSSD.

Survey H12681 contained 124 soundings which were designated in CARIS HIPS and SIPS. These designated soundings were used to draw the CUBE surface to the sounding which most accurately

represented the sea floor in cases where the surface deviated from the sounding more than the vertical IHO requirements allowed.

C. Vertical and Horizontal Control

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

C.1 Vertical Control

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

Standard Vertical Control Methods Used:

Discrete Zoning

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

Station Name	Station ID
Alitak	9457804
Kodiak Island	9457292

Table 13: NWLON Tide Stations

The following subordinate water level stations were established for this survey:

Station Name	Station ID
Japanese Bay	9457634

Table 14: Subordinate Tide Stations

File Name	Status
9457292.tid	Final Approved
9457804.tid	Final Approved

Table 15: Water Level Files (.tid)

File Name	Status
H12681RevCORF.zdf	Final

Table 16: Tide Correctors (.zdf or .tc)

A request for final approved tides was sent to N/OPS1 on 08/21/2014. The final tide note was received on 08/26/2014.

Preliminary zoning was accepted as final.

The Tide Note is attached.

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 5 North.

The following PPK methods were used for horizontal control:

Single Base

Vessel kinematic data were post processed using Applanix POSPac processing software and the SingleBase method was used as described in the DAPR. Smooth Best Estimate of Trajectory (SBET) and associated error (RMS) data were applied to all MBES data in CARIS HIPS with the exception of the following line.

2808- DN176 2014M_1762238

For further details regarding the process and quality control checks performed see the H12681 POSPac Processing Logs spreadsheet located in the SBET folder with the GNSS data. See also the OPR-335-FA-14 Horizontal and Vertical Control report, submitted under separate cover.

The following CORS Stations were used for horizontal control:

HVCR Site ID	Base Station ID
AC45	Sitkinak Island

Table 17: CORS Base Stations

The following user installed stations were used for horizontal control:

HVCR Site ID	Base Station ID
9677	Aiaktalik Island

Table 18: User Installed Base Stations

Differential correctors from the U.S. Coast Guard beacon at Kodiak (313 kHz) were used during real-time acquisition when not otherwise noted in the acquisition logs, and were the sole method of detached positions (DP) and bottom samples as there is currently no functionality for applying Smoothed Best Estimate of Trajectory (SBET) files to these types of data

The following DGPS Stations were used for horizontal control:

DGPS Stations
Kodiak 313 kHz (100 BPS)

Table 19: USCG DGPS Stations

D. Results and Recommendations

D.1 Chart Comparison

A comparison was performed between survey H12681 and charts 16590_1 and US4AK5LM using CARIS sounding and contour layer derived from the 8-m combined surface. The contours and soundings have been overlaid on the chart to assess differences. All data from H12681 should supersede charted data.

D.1.1 Raster Charts

The following are the largest scale raster charts, which cover the survey area:

Chart	Scale	Edition	Edition Date	LNM Date	NM Date
16590	1:81529	99	01/2011	09/23/2014	09/23/2014

Table 20: Largest Scale Raster Charts

16590

Soundings from survey H12681 generally agreed within zero to one fathom with charted depths on chart 16590. Contours generated in CARIS HIPS closely approximated the charted 3, 5, 10, and 20 fathom contour. Notable exceptions to this agreement are listed and shown in the figures below.

Figure 37. Near the southern edge of the sheet limit the 10 fathom contour differs by close to 500m in some sections all the way up to 1000m. A large section of this 10 fathom contour that appears on the chart does not appear in the CARIS generated contour.

Figure 38. Near the northwest corner of the sheet limit the 20 fathom contour needs to be extended in two places along the contour.

Figure 39. On the south side of Aiaktalik Island there is a large section of 20 fathom contour that was not placed on the chart.

Figure 40. On the north side of Aiaktalik Island, close to the charted Aid to Navigation (ATON) light, a 10 fathom contour was missing from the previous chart.

Figure 41. In the southeast corner within the sheet limit extension the 10 fathom contour CARIS generated extends 422m further inshore then the charted contour. Also there is a 10 fathom contour in the southeast corner of this section that does not exist on the chart as well.

Figure 42. The section of the sheet extension at the mouth of Geese Channel closest to Cape Trinity has two 20 fathom contours that were generated by CARIS that were not on the previous chart.

Figure 43. The 10 fathom contour at the west entrance to Russian Harbor was surveyed different in a variety of places. These difference were as large as 690m in some places.

Figure 44. In the passage between Sundstrom Island and Aiaktalik Island there are several areas where the CARIS soundings generated are shoaler then what is charted. these areas are mostly along the sides of the channel, there is a 3 fathom contour running through the middle of the passage.

Figure 45. Off the coast of Cape Trinity there is a zero sounding at the end of the 3 fathom contour. There is also a 3.75 fathom sounding southeast of the 0 sounding that has a 1.2 and a 2.2 fathom sounding within very close proximity of it.

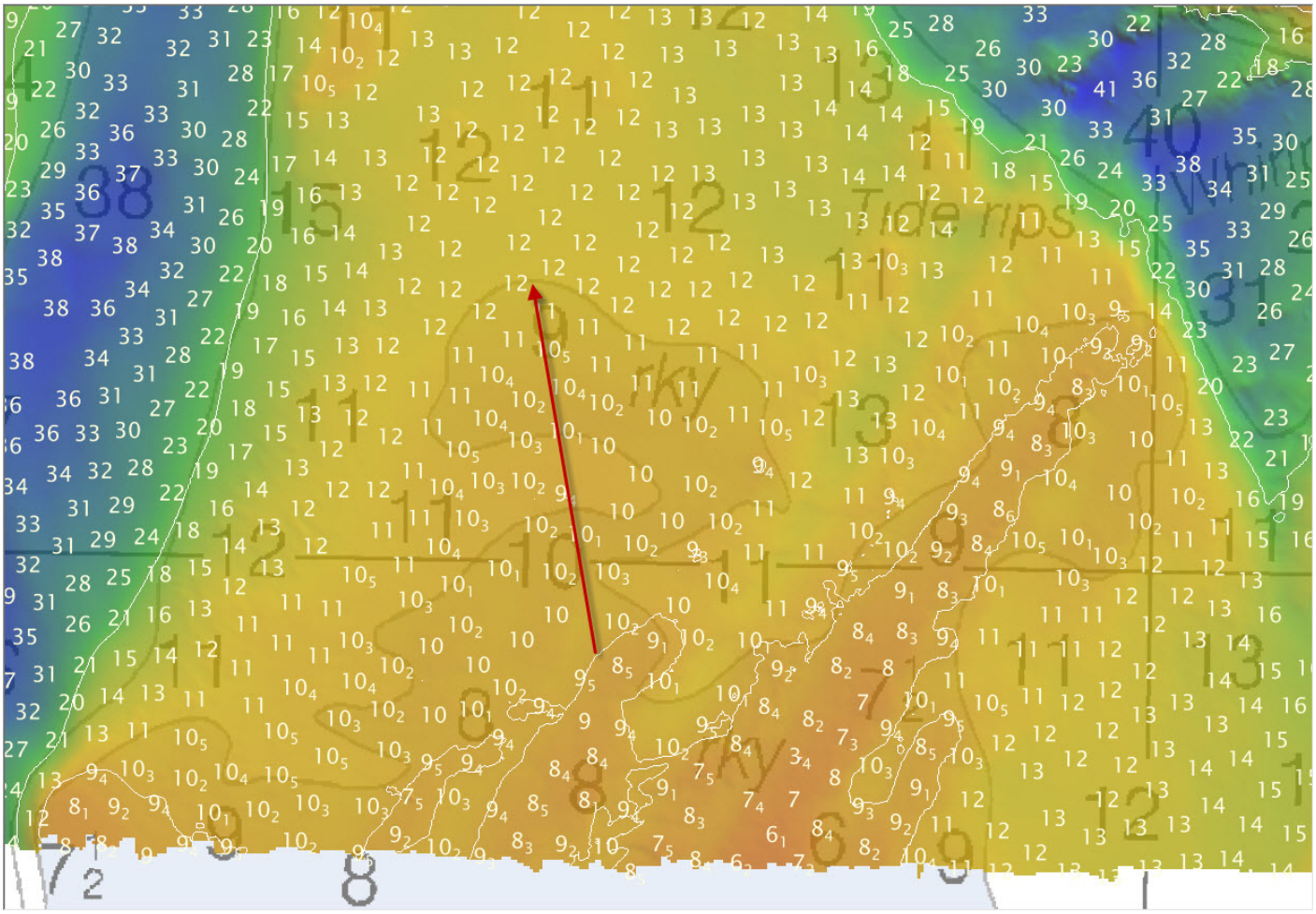


Figure 37: H12681 south side 10f contour discrepancy.

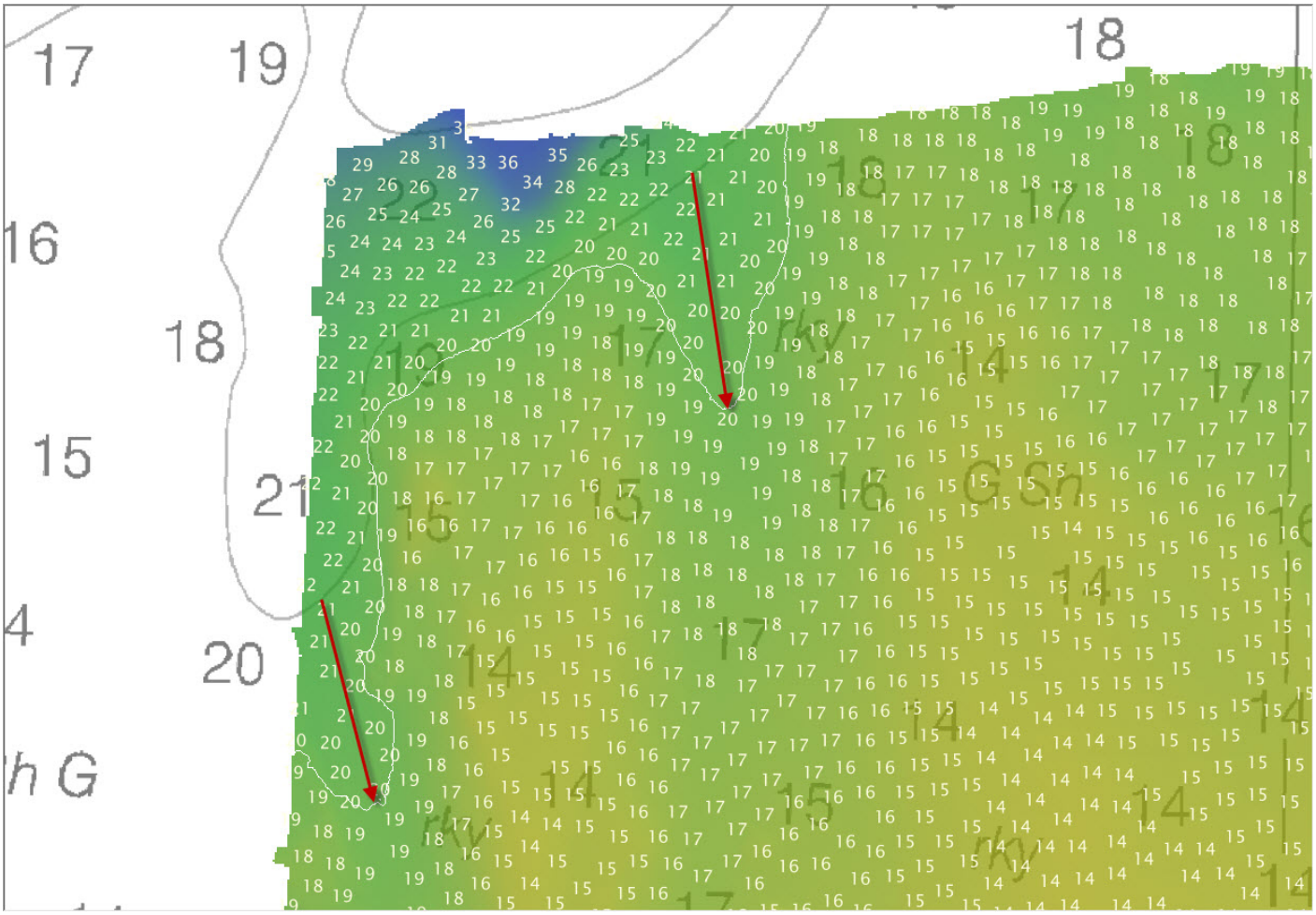


Figure 38: H12681 northeast corner 20f contour discrepancy.

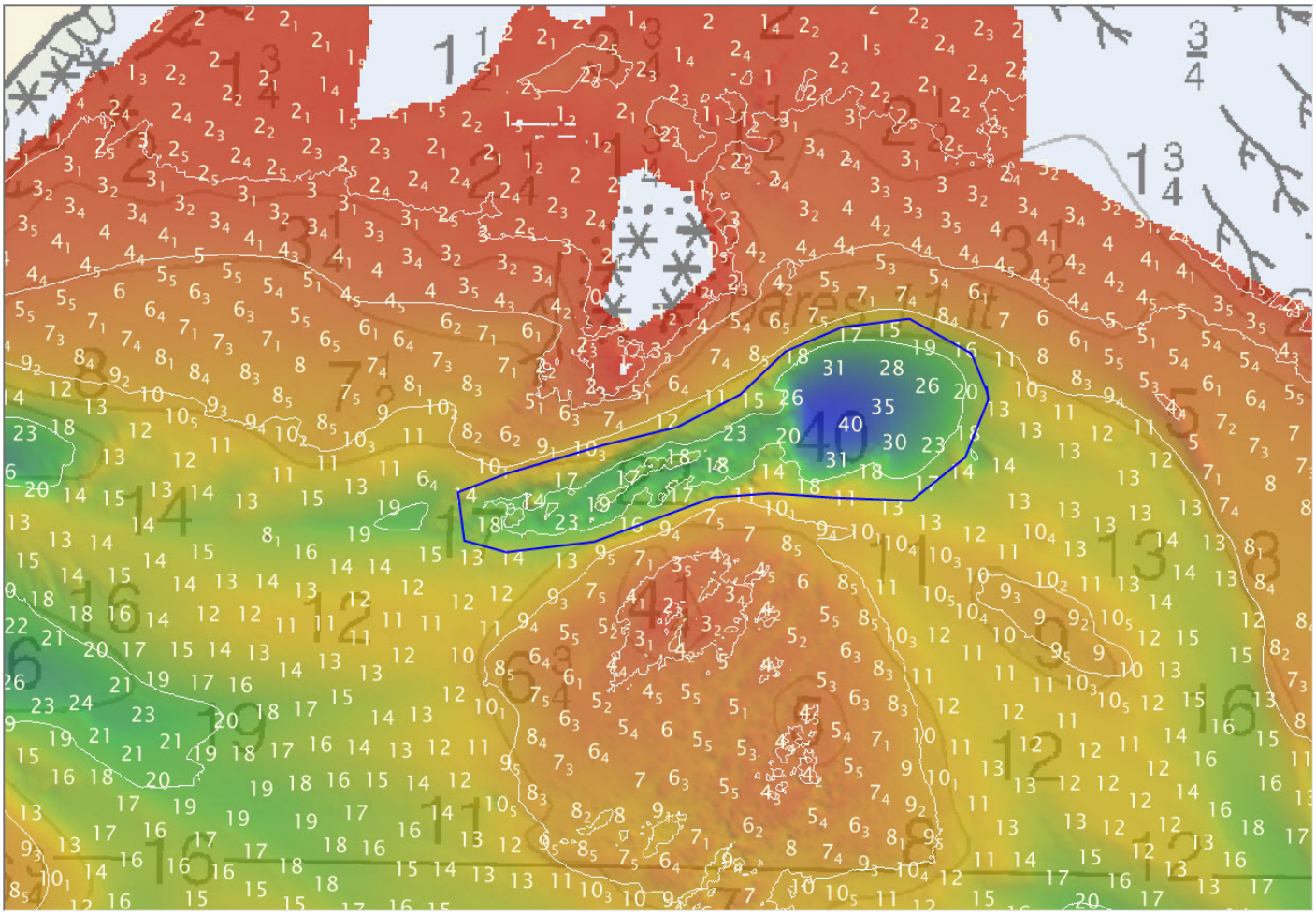


Figure 39: H12681 south of Aiaktalik Island missing 20f contour.

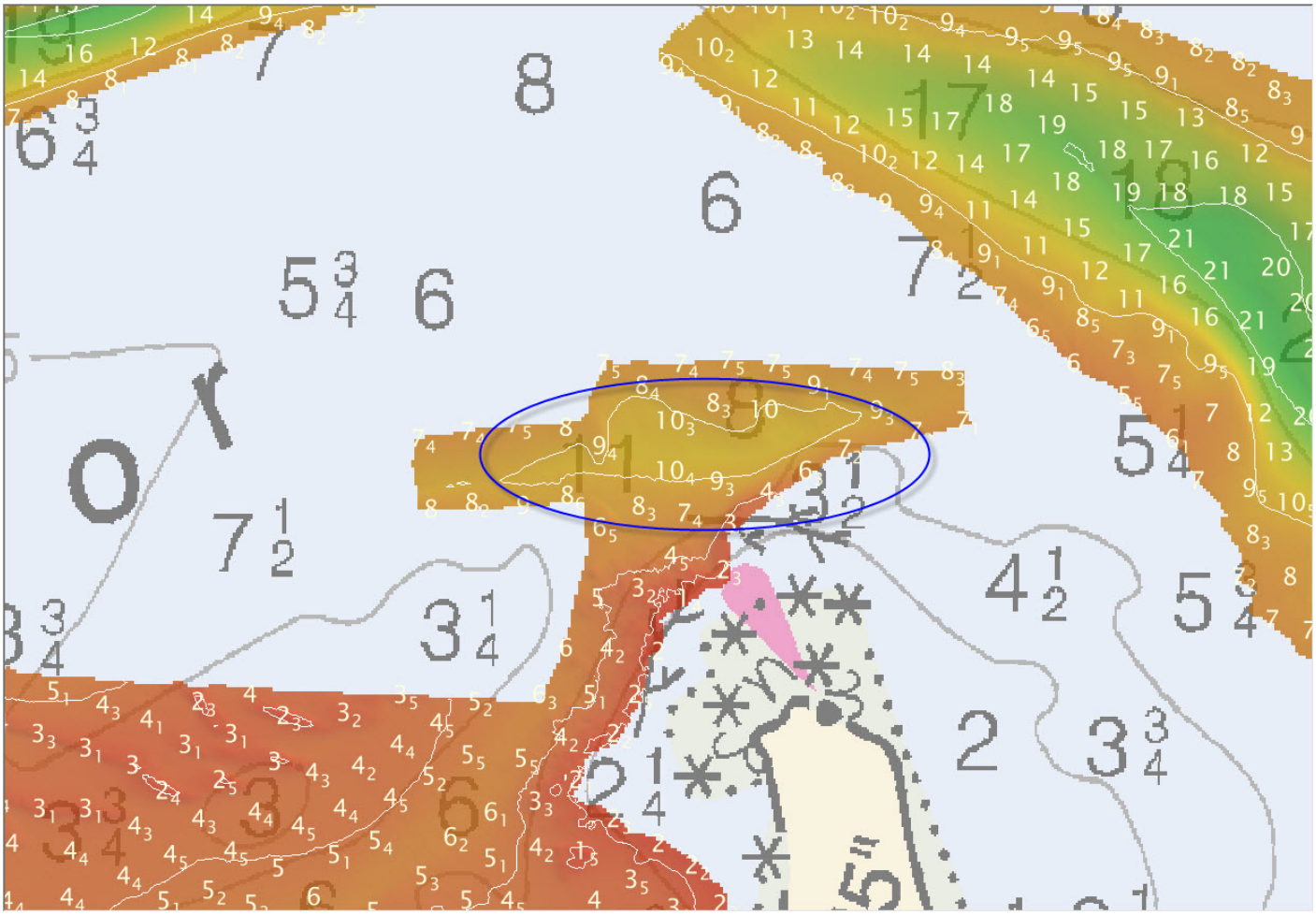


Figure 40: H12681 north side of Aiaktalik Island missing 10f contour near ATON.

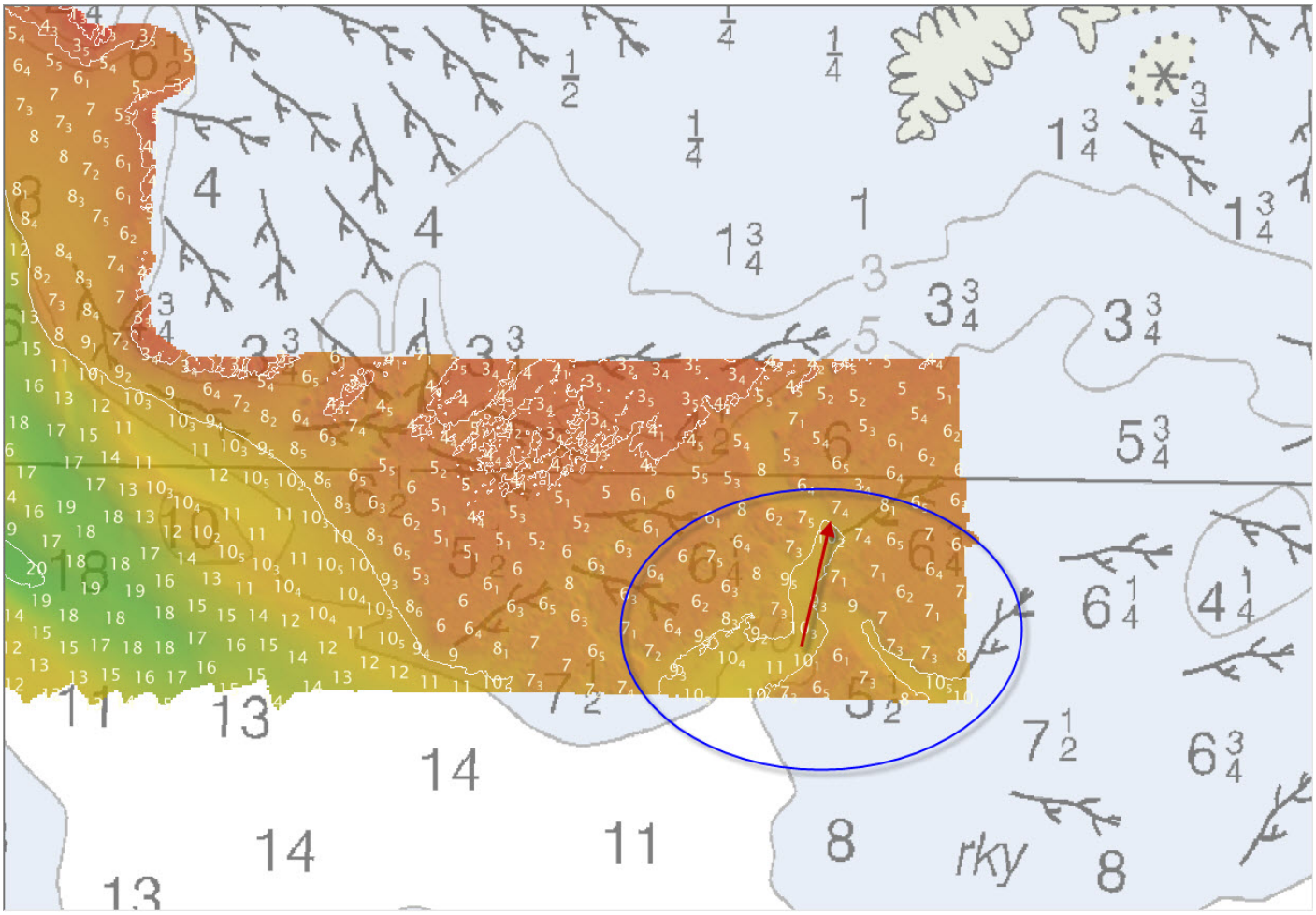


Figure 41: H12681 SE sheet limit extension discrepancies.

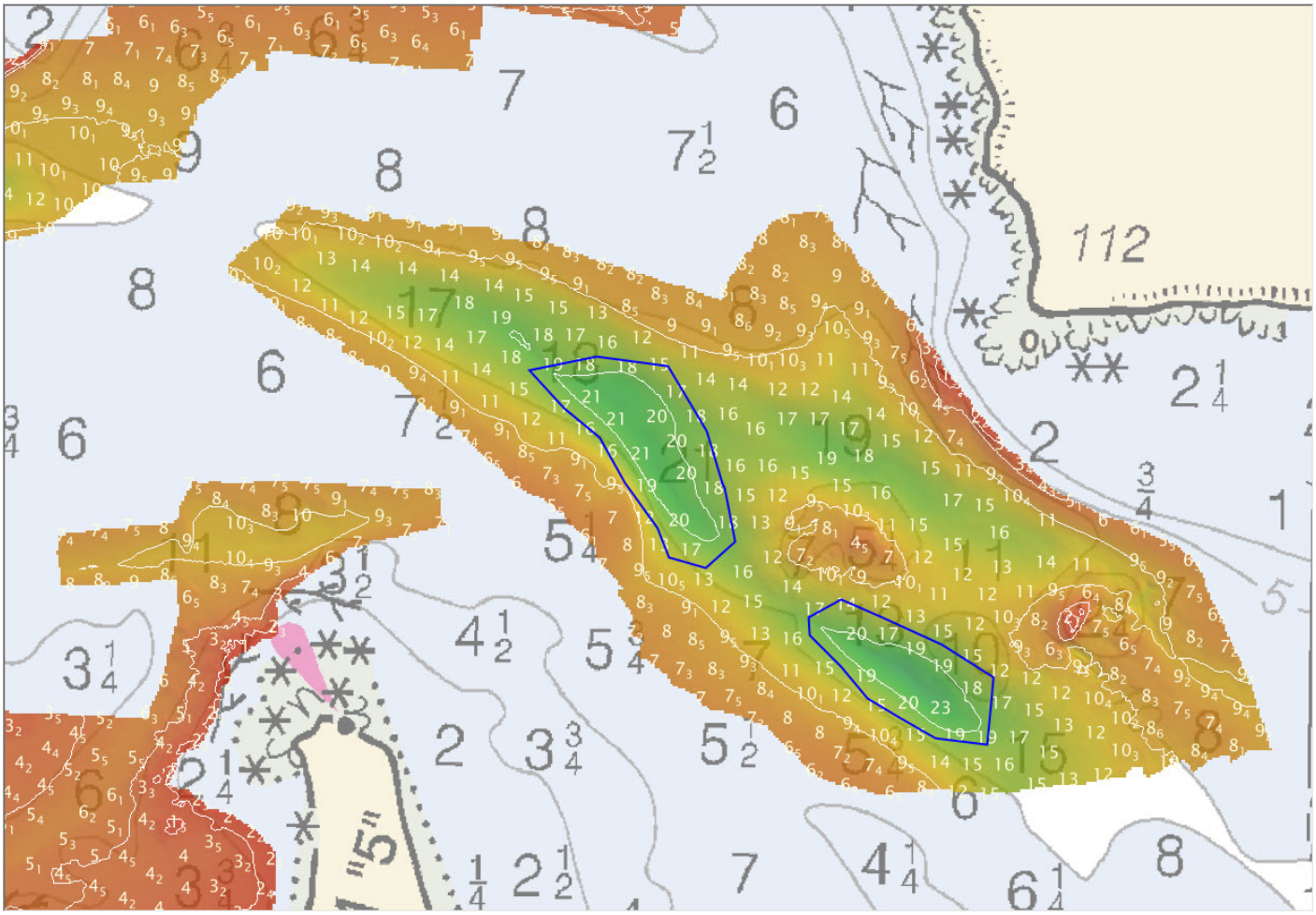


Figure 42: H12681 Geese channel mouth extension missing contour.

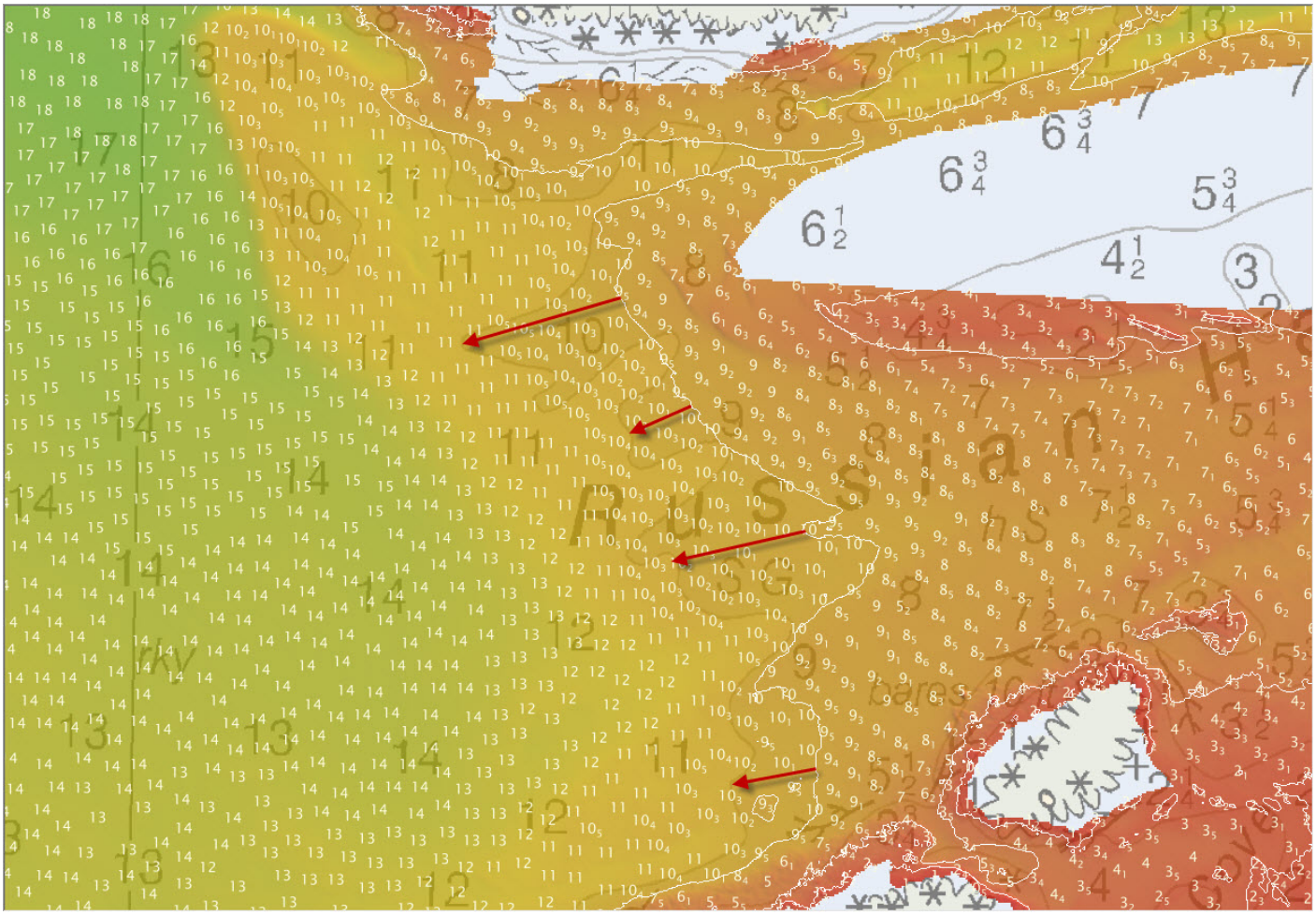


Figure 43: H12681 Russian Harbor 10f contour difference.

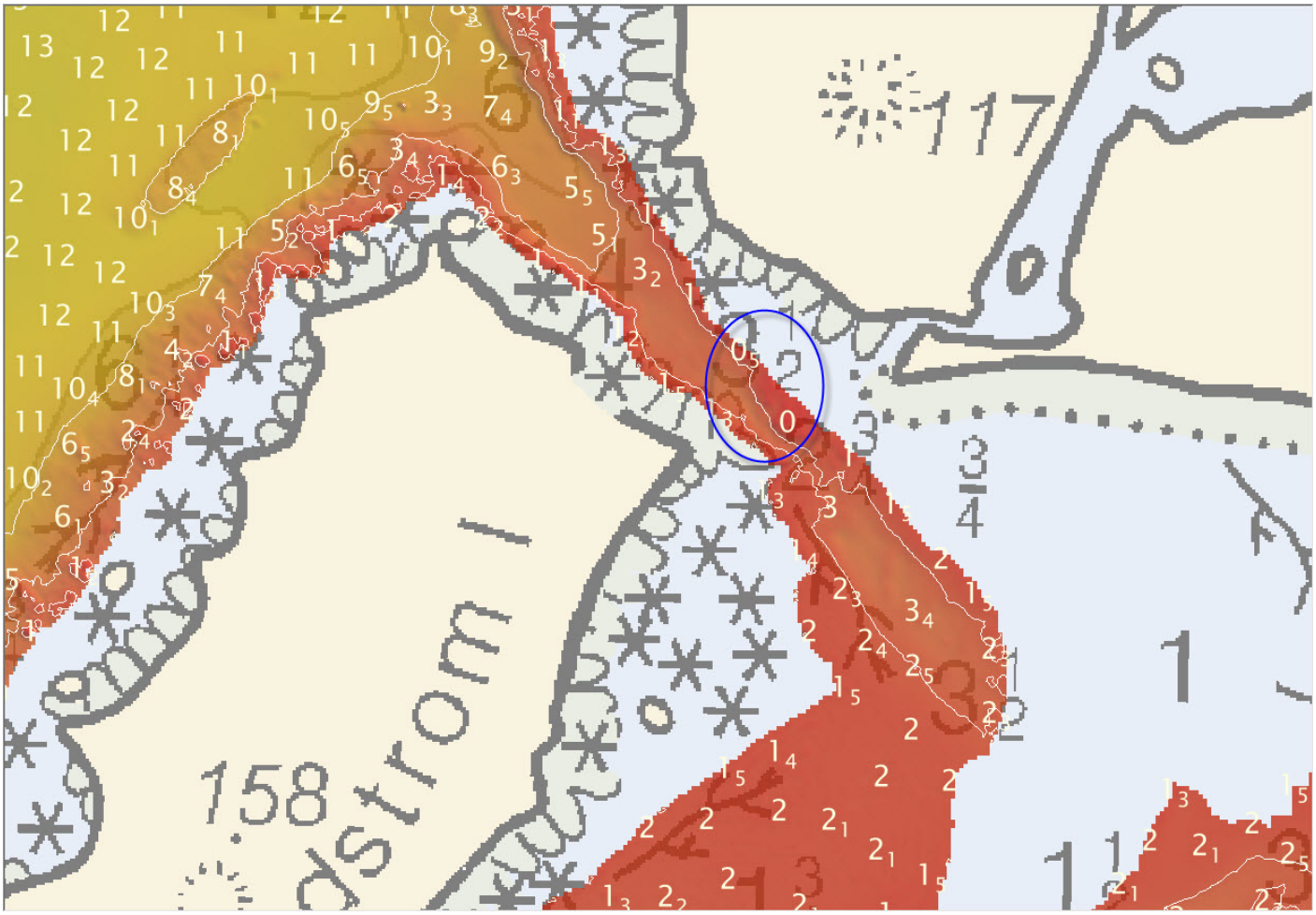


Figure 44: H12681 passage between Sundstrom and Aiaktalik Islands sounding differences.

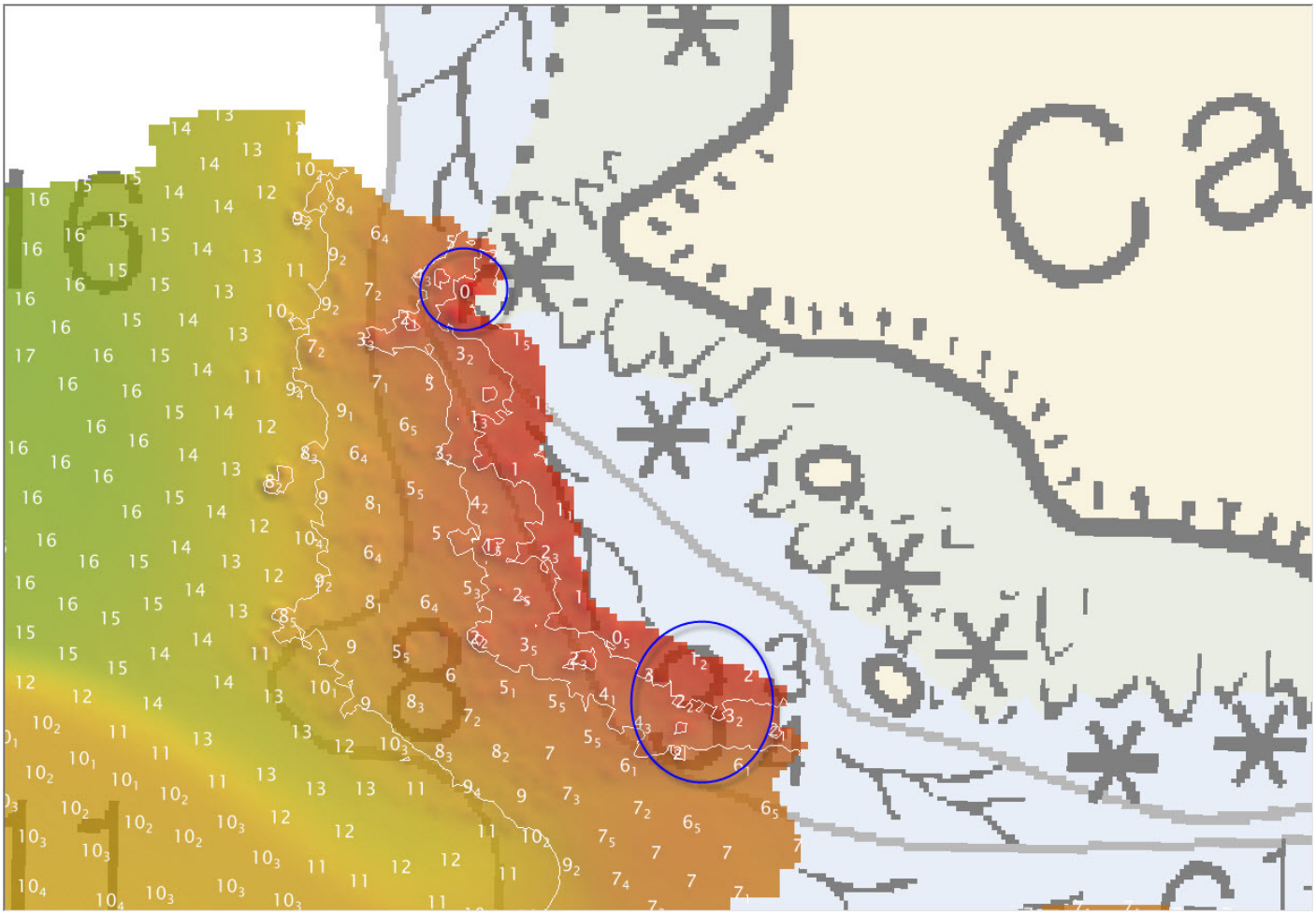


Figure 45: H12681 Cape Trinity sounding discrepancies.

Regarding all noted contour discrepancies between the survey and the charts, depth contours for the chart update product reflect new sounding data.

D.1.2 Electronic Navigational Charts

The following are the largest scale ENCs, which cover the survey area:

ENC	Scale	Edition	Update Application Date	Issue Date	Preliminary?
US4AK5LM	1:81529	99	09/04/2014	09/04/2014	NO

Table 21: Largest Scale ENCs

US4AK5LM

Soundings from survey H12681 generally agreed within zero to one fathoms on chart US4AK5LM. Contours in CARIS HIPS closely approximate the charted contours. See discussion from Raster chart 16590 for more details.

D.1.3 Maritime Boundary Points

Maritime Boundary Points were assigned for this survey, but were not addressed.

The Maritime Boundary Points were not addressed at the time of submission, but were subsequently addressed by the field prior to final review. At the processing branch, four Maritime Boundary Points were compiled to the chart update product. See Maritime Boundary Report, attached.

D.1.4 Charted Features

All assigned features were addressed and are included in the H12681_Final_Feature_File.

D.1.5 Uncharted Features

During shoreline investigation several areas were found to be foul with kelp or foul with rocks and kelp. Kelp lines are illustrated by cartography line features. A potentially hazardous sand bar was located and added as a caution area feature. These areas have been added to the final feature file and examples are shown below.

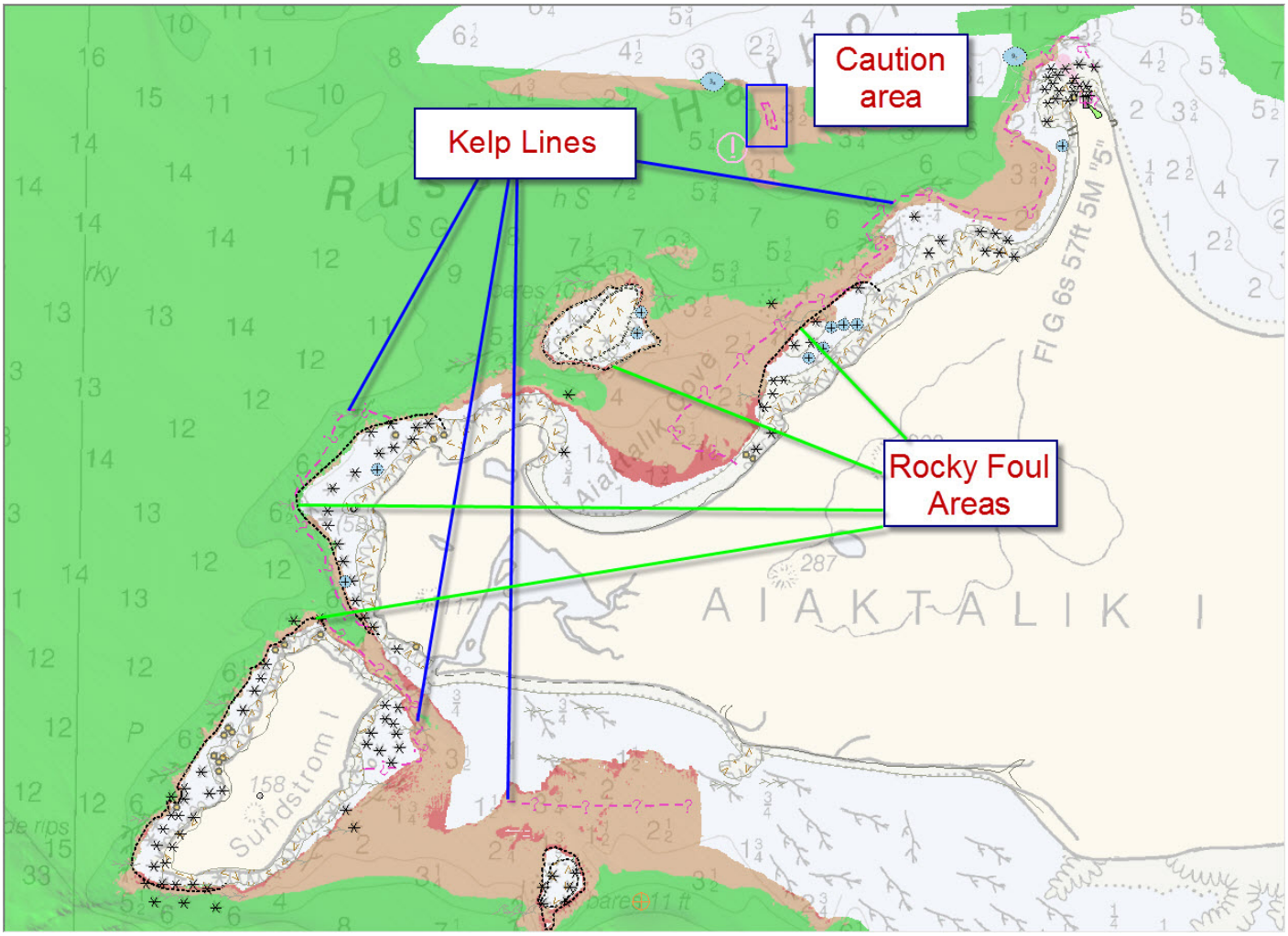


Figure 46: H12681 feature addition examples.

A number of areas foul with rocks and/or kelp have been compiled to the chart update product. In addition, a 2 fathom sounding inside a new area of breakers has been compiled in place of the field-submitted Caution area feature.

D.1.6 Dangers to Navigation

No Danger to Navigation Reports were submitted for this survey.

D.1.7 Shoal and Hazardous Features

Towards the center of Russian Harbor what appears to be a sand bar was found that was shoaler than 4 m. This area did not appear on the chart at all and when combined with the current in the area could be considered hazardous. The sand bar was located at 56:43:47.57N, 154:05:16.08W. Breakers were seen over the top of the sand bar.

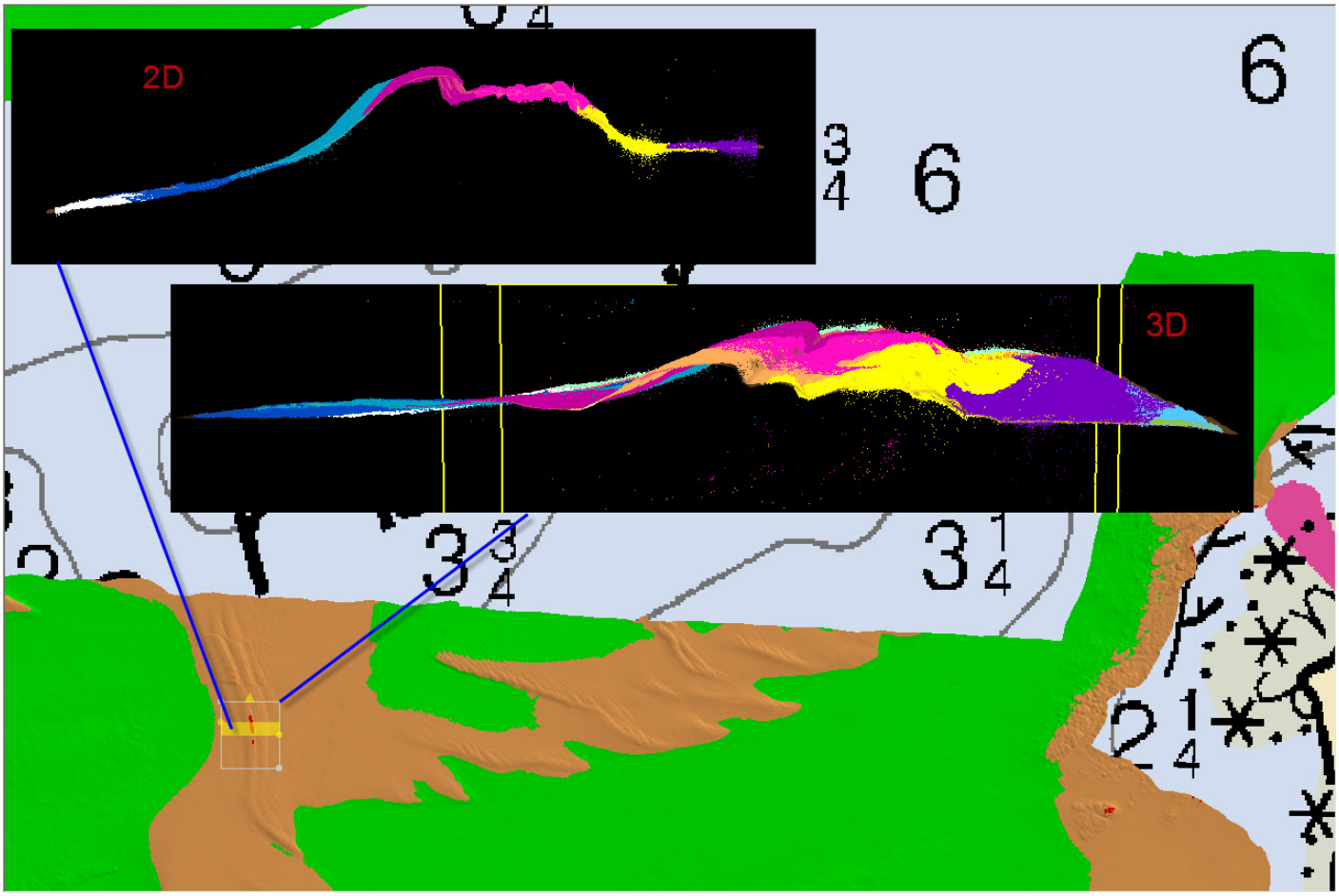


Figure 47: Russian Harbor Sand Bar.

See Rednote for D.1.5. This was compiled as a 2 fathom sounding inside a new breakers area.

D.1.8 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.1.9 Bottom Samples

Three bottom samples were obtained in accordance with section 7.1 of the HSSD in areas designated by the feature object class (SPRING) in the Project Reference File (PRF). Each bottom sample was attributed and can be found in the H12681_Final_Feature_File.hob file.

D.2 Additional Results

D.2.1 Shoreline

Fairweather personnel conducted limited shoreline verification and reconnaissance at times near predicted negative of low tides within the survey limits. Annotations, information, and diagrams collected on DP forms and boat sheets during field operations are scanned and included in the digital Separates I folder. Shoreline verification procedures for survey H12681 conform to those detailed in the DAPR.

Features from the current editions of charts 16590 and US4AK5LM that were not depicted by the source shoreline data were digitized with in CARIS Notebook with S-57 attribution into the H12681_Final_Feature_File.hob file to be displayed for field verification.

D.2.2 Prior Surveys

Prior LIDAR survey comparisons exist for this survey, but were not investigated.

D.2.3 Aids to Navigation

A charted green navigation light and fixed aid to navigation were observed as charted on the north point of Aiaktalik Island.

The Aid to Navigation was found to be on-station and appear to be serving their intended purpose as charted.

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

Please see comments on D.1.8 Shoal and Hazardous Features.

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.

Report Name	Report Date Sent
Data Acquistion and Processing Report	2015-01-20
Coast Pilot Report	2014-09-10
Horizontal and Vertical Control Report	2014-10-03

Approver Name	Approver Title	Approval Date	Signature
CDR David J. Zezula, NOAA	Chief of Party	04/16/2015	David Zezula 2015.04.17 08:50:47 -07'00'
LT Ryan A. Wartick, NOAA	Field Operations Officer	04/16/2015	2015.04.17 08:25:18 -07'00'
LT Matthew M. Forney	Field Operations Officer	04/16/2015	Matthew Forney 2015.04.16 14:30:23 -07'00'
HCST Doulgas A. Bravo	Chief Survey Technician	04/16/2015	2015.04.16 14:15:06 -07'00'
HST Patrick J. Berube	Sheet Manager	04/16/2015	2015.04.16 15:25:23 -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	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

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

TIDE NOTE FOR HYDROGRAPHIC SURVEY

DATE : August 22, 2014

HYDROGRAPHIC BRANCH: Pacific
HYDROGRAPHIC PROJECT: OPR-P335-FA-2014
HYDROGRAPHIC SHEET: H12681Rev

LOCALITY: West Aiaktalik Island and Vicinity, Kodiak, AK
TIME PERIOD: May 21 - August 07, 2014

TIDE STATION USED: 945-7804 Alitak, AK
Lat. 56° 53.9'N Long. 154° 14.9' W

PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters
HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 3.311 meters

ESTIMATED ZONING ERROR: 0.15 meters

REMARKS: RECOMMENDED ZONING
Use zone(s) identified as: SS72, SS75, SS82, SS84, SS85, SS87 & SWA141.

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).

HOVIS.GERALD.THOMAS.JR.1365860250

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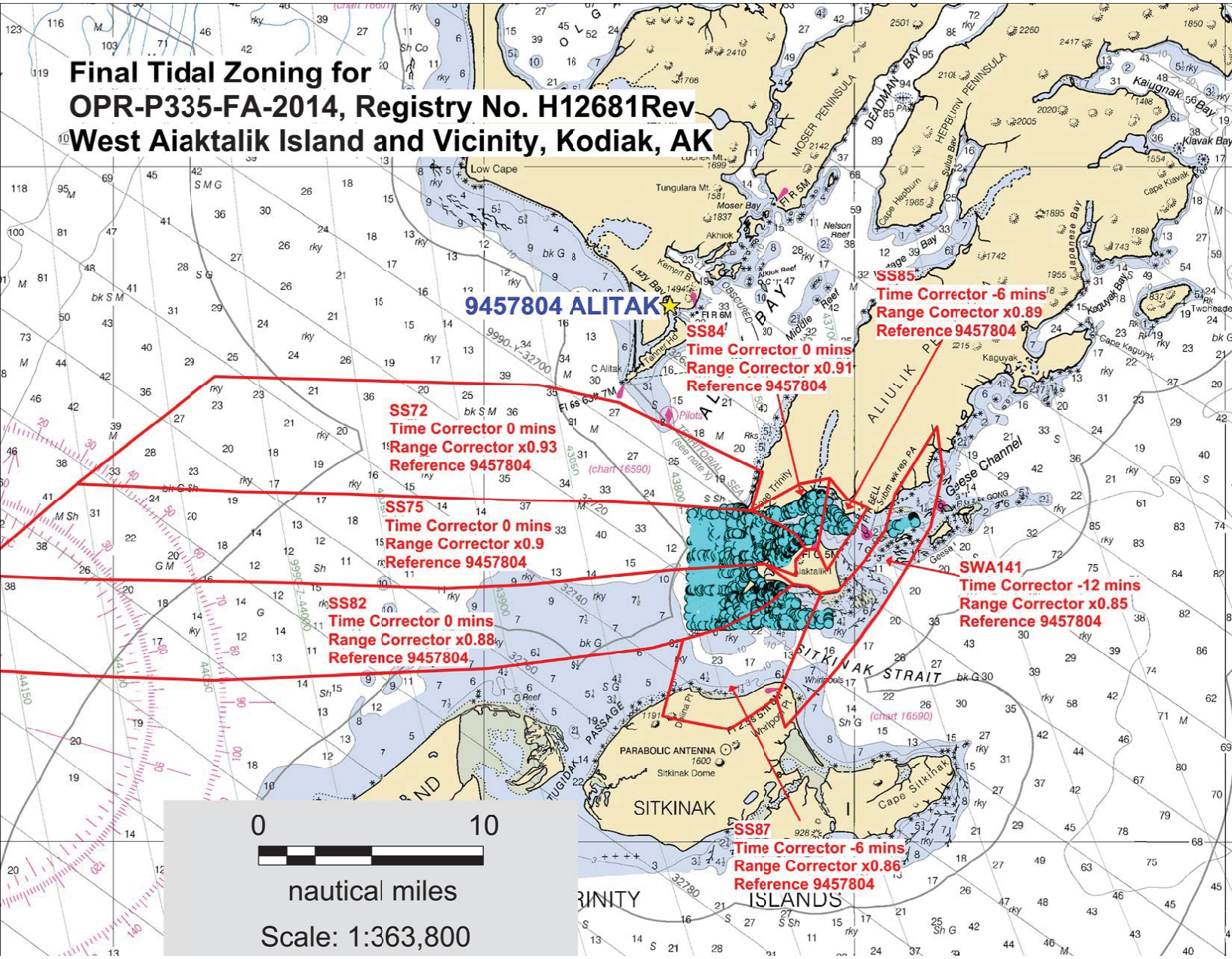
DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=OTHER, cn=HOVIS.GERALD.THOMAS.JR.1365860250
Date: 2014.08.26 10:11:15 -04'00'

CHIEF, PRODUCTS AND SERVICES BRANCH


Final Tidal Zoning for
OPR-P335-FA-2014, Registry No. H12681Rev
West Aiaktalik Island and Vicinity, Kodiak, AK
9457804 ALITAK
SS84
Time Corrector 0 mins
Range Corrector x0.91
Reference 9457804
SS85
Time Corrector -6 mins
Range Corrector x0.89
Reference 9457804
SS72
Time Corrector 0 mins
Range Corrector x0.93
Reference 9457804
SS75
Time Corrector 0 mins
Range Corrector x0.9
Reference 9457804
SS82
Time Corrector 0 mins
Range Corrector x0.88
Reference 9457804
SWA141
Time Corrector -12 mins
Range Corrector x0.85
Reference 9457804
SS87
Time Corrector -6 mins
Range Corrector x0.86
Reference 9457804
0
10
nautical miles
Scale: 1:363,800

Maritime Boundary Report

Survey: H12681
Project: OPR-P335-FA-14
Locality: West Aiaktalik Island, Kodiak, Alaska
Charts: Chart 16590, US4AK5NM

Description: Four Maritime Boundary Points were investigated by the field and compiled to the chart update product.

(1) Retain charted rock and use as new Maritime Boundary Point:

Geographic Position:	56°40’51.365”N Lat., 153°09’23.732”W Long.
Value of Sounding (VALSOU):	Unknown
Water Level Effect (WATLEV):	covers and uncovers
Source Date (SORDAT):	20140807
Source Indication (SORIND):	US,US,graph,H12681

(2) Retain rock sourced from chart 16590:

Geographic Position:	56°42’21.883”N Lat., 154°08’16.551”W Long.
Value of Sounding (VALSOU):	Unknown
Water Level Effect (WATLEV):	covers and uncovers
Source Date (SORDAT):	20140807
Source Indication (SORIND):	US,US,graph,Chart 16590

(3) Updated charted (16590) rock and use as new Maritime Boundary Point:

Geographic Position:	56°41’13.392”N Lat., 153°09’15.249”W Long.
Value of Sounding (VALSOU):	Unknown
Water Level Effect (WATLEV):	covers and uncovers
Source Date (SORDAT):	20140807
Source Indication (SORIND):	US,US,graph,H12681

(4) Retain Rock sourced from Chart 16590:

Geographic Position:	56°41’01.227”N Lat., 153°09’28.535”W Long.
Value of Sounding (VALSOU):	Unknown
Water Level Effect (WATLEV):	covers and uncovers
Source Date (SORDAT):	20140807
Source Indication (SORIND):	US,US,graph,Chart 16590

APPROVAL PAGE

H12681

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 NGDC for archive

- H12681_DR.pdf
- Collection of depth varied resolution BAGS
- Processed survey data and records
- H12681_GeoImage.pdf

The survey evaluation and verification has been conducted according current OCS Specifications.

Digitally signed by Peter Holmberg
DN: cn=Peter Holmberg, o, ou=signing for Cathleen Barry, email=peter.holmberg@noaa.gov, c=US
Date: 2016.02.18 14:06:22 -08'00'

Approved:_____

Cathleen Barry
Cartographer, Pacific Hydrographic Branch

The survey has been approved for dissemination and usage of updating NOAA's suite of nautical charts.

Digitally signed by HOLMBERG.PETER.SCOTT.1365886101
DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=OTHER, cn=HOLMBERG.PETER.SCOTT.1365886101
Date: 2016.02.18 14:06:55 -08'00'

Approved:_____

Peter Holmberg
Cartographic Team Lead, Pacific Hydrographic Branch