H12689

NOAA Form 76-35A

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

DESCRIPTIVE REPORT

Type of Survey: Navigable Area

Registry Number: H12689

LOCALITY

State: Alaska

General Locality: North Coast of Kodiak Island, AK

Sub-locality: Afognak Strait and Whale Passage

2014

CHIEF OF PARTY
CDR E.J. Van Den Ameele

LIBRARY & ARCHIVES

Date:

NOAA FORM 77-28 (11-72)	U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION	REGISTRY NUMBER:
HYDROGRAPHIC TITLE SHEET		**H12689**

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:	**Alaska**
General Locality:	**North Coast of Kodiak Island, AK**
Sub-Locality:	**Afognak Strait and Whale Passage**
Scale:	1: **15,000**
Dates of Survey:	**05/07/2014to 07/08/2014**
Instructions Dated:	**04/01/2014**
Project Number:	**OPR-P136-RA-14**
Field Unit:	**NOAA Ship *Rainier***
Chief of Party:	**CDR E.J. Van Den Ameele**
Soundings by:	**Multibeam Echo Sounder**
Imagery by:	
Verification by:	**Pacific Hydrographic Branch**
Soundings Acquired in:	**meters at Mean Lower Low Water**
H-Cell Compilation Units:	***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 Envitronmental Information (NCEI) and can be retrieved via http://www.ncei.noaa.gov/.

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Descriptive Report to Accompany Survey H12689

Project: OPR-P136-RA-14

Locality: North Coast of Kodiak Island, AK

Sublocality: Afognak Strait and Whale Passage

Scale: 1:15000

May 2014 - July 2014

NOAA Ship Rainier

Chief of Party: Edward J. Van Den Ameele, CDR/NOAA

A. Area Surveyed

The survey area is referred to as Sheet 2: "Afognak Strait and Whale Passage" within the Project Instructions. The area encompasses approximately 21.0 square nautical miles of Afognak Strait and Whale Passage, and the eastern portions of Dry Spruce Bay and Kupreanof Strait (Figures 1-2).

A.1 Survey Limits

Data were acquired within the following survey limits:

Northwest Limit	Southeast Limit
58° 0' 56.77" N 152° 44' 15.81" W	57° 53' 25.75" N 153° 4' 23.76" W

Table 1: Survey Limits

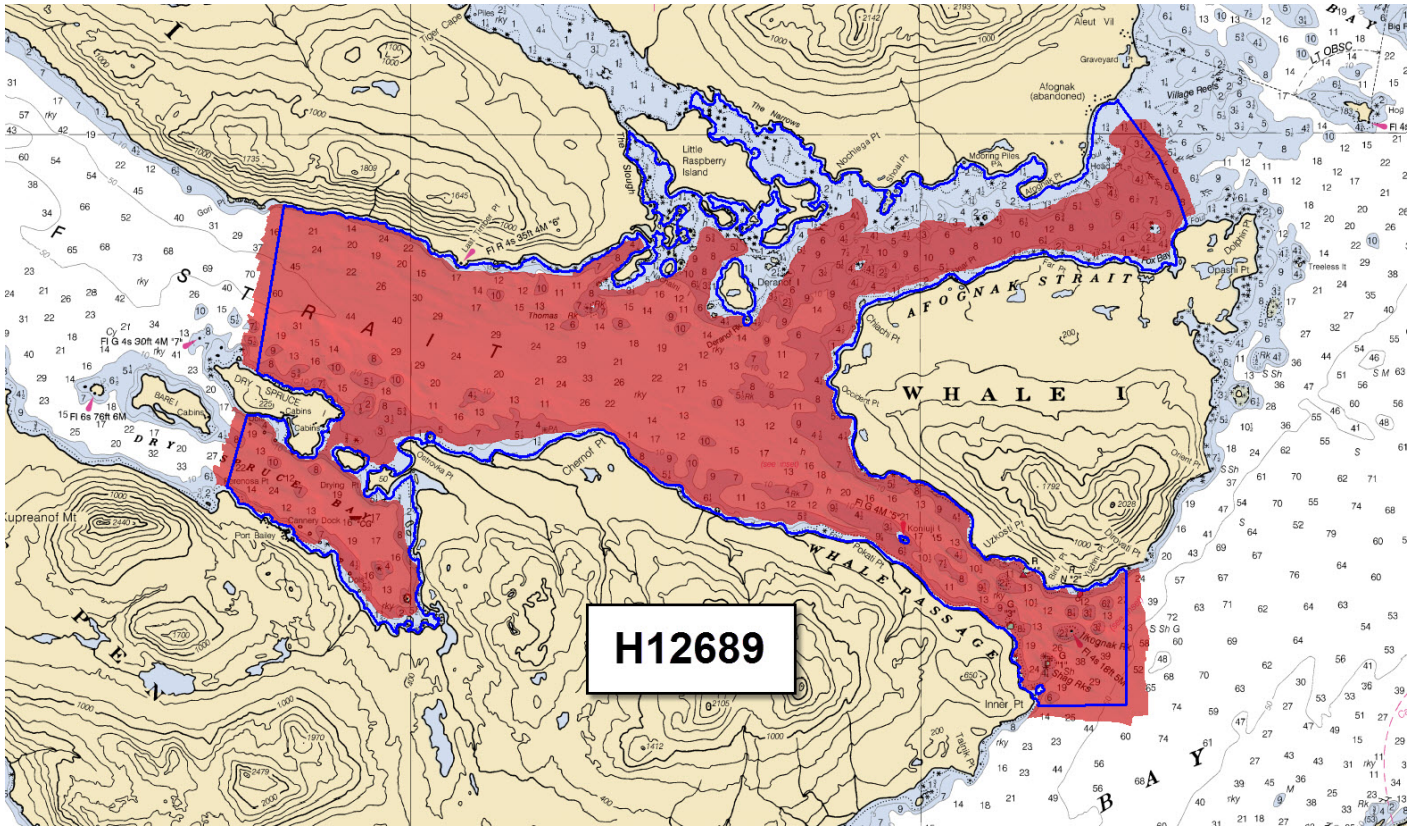

Figure 1: Overlay of H12689 sheet limits (blue) and the acquired survey coverage (red) on Chart 16594.

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

A.2 Survey Purpose

This project is being conducted in support of NOAA's Office of Coast Survey to provide contemporary hydrographic data in order to update the nautical charting products and reduce survey backlog in the area. The nautical chart updates will support Kodiak's large fishing fleet and increasing levels of passenger vessel traffic.

A.3 Survey Quality

The entire survey is adequate to supersede previous data.

Data acquired on survey H12689 met complete multibeam echosounder (MBES) coverage requirements outlined in Section 5.2.2.2 of the HSSD, including data density requirements. Overall, the required data density was achieved in 99.928% of nodes.

During review at the Branch, a density analysis was conducted on each of the finalized surfaces. The requirement of five soundings per node was achieved in: 99.94% of nodes in the 1m surface, 99.99% of

nodes in the 2m surface, 99.96% of nodes in the 4m surface, and 99.72% of nodes in the 8m surface. There was an overall compliance rate of 99.95%.

A.4 Survey Coverage

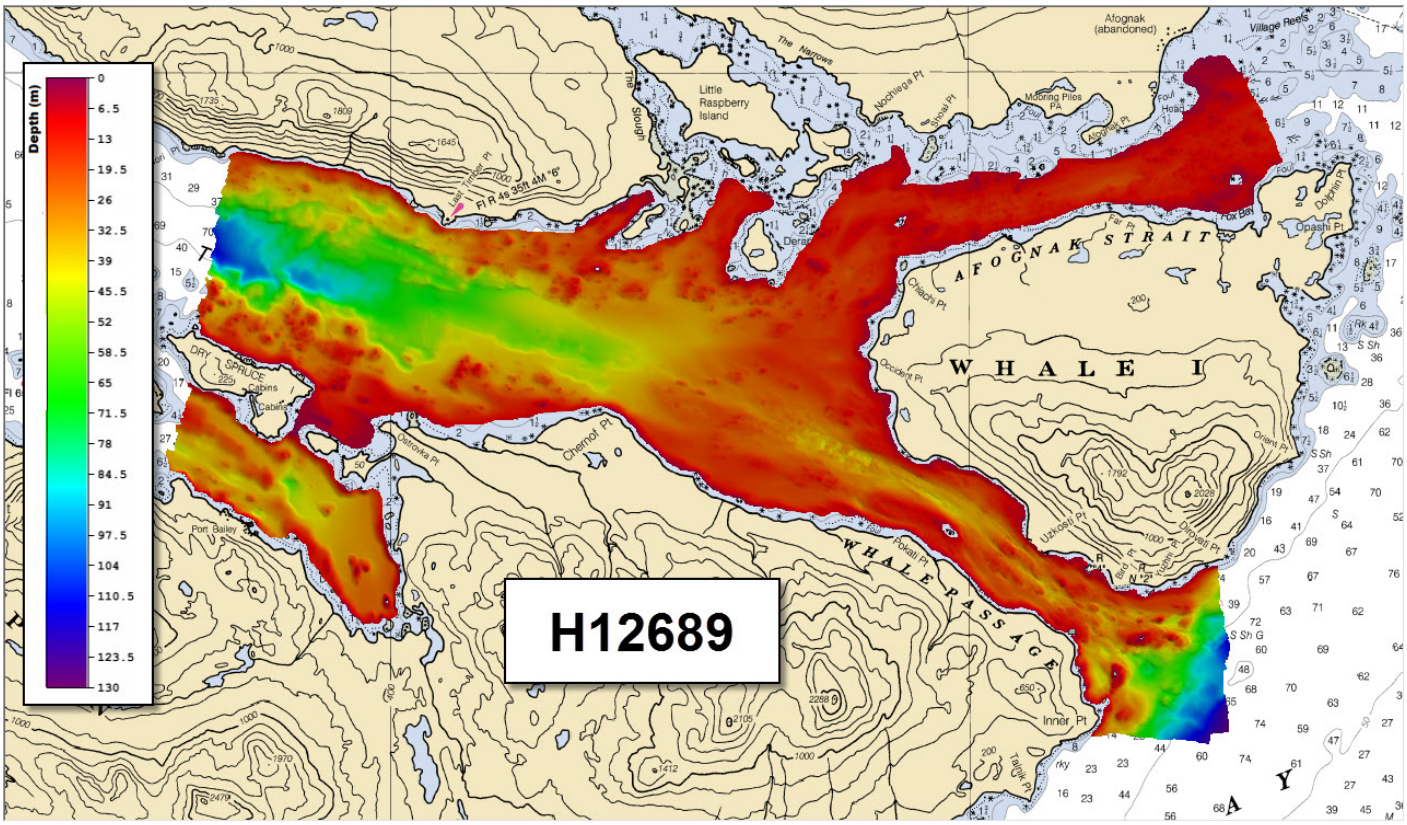

Figure 2: H12689 depth-colored MBES coverage overlay on Chart 16594.

Complete multibeam echosounder (MBES) coverage was achieved within the limits of hydrography as specified in the Project Instructions with the following exceptions:

Survey coverage did not meet the sheet limits along many portions near the shoreline and islets; conditions in these areas were deemed unsafe due to currents and proximity to shore (Figure 3).

Survey coverage also did not meet the sheet limits in The Slough and The Narrows surrounding Little Raspberry Island since they were considered largely unnavigable. Pushing survey operations further inshore in this area would have brought upon unnecessary safety risks (Figure 4).

A roll-stabilization issue with the Reson 7125 SV2 sonar on Launch 2804 resulted in degradation of some H12689 bathymetric data (see Section B.2.5). The affected line (2804_2014RA1902300) ,which was run just north of Ostrovka Point, was removed resulting in an approximately 9 square meter holiday. The surrounding data was examined; no navigationally significant features were present (Figure 5).

Four small holidays measuring 4 to 7 meters long appear in Fox Bay. Data over this area was acquired by both Launch 2801 and 2802 on days 156 and 158 respectively. The acquisition log for Launch 2801 on day 156 indicates issues with Hypack software crashes and associated gaps occurring in the matrix. The acquisition log for Launch 2802 on day 158 indicates several Reson time synchronization errors and the associated "roll blowouts," the same problem seen with the Reson 7125 SV2 on Launch 2804 described previously. As noted in the Final Feature File, the rocks assigned for investigation in this area were not found. The surrounding data was examined; no navigationally significant features were present (Figure 6).

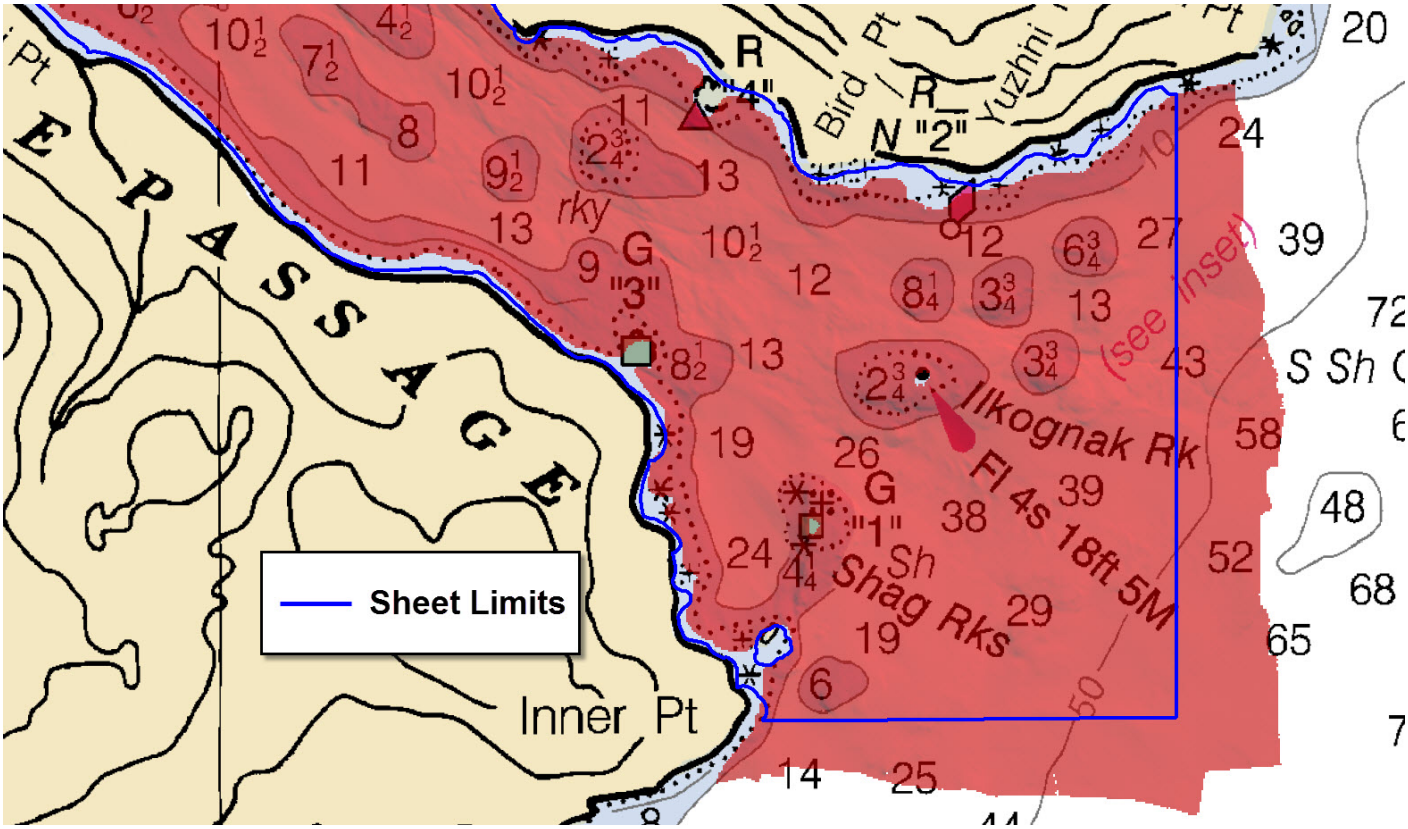

Figure 3: Multibeam coverage did not reach the shoreline due to currents and proximity to shore (Chart 16594).

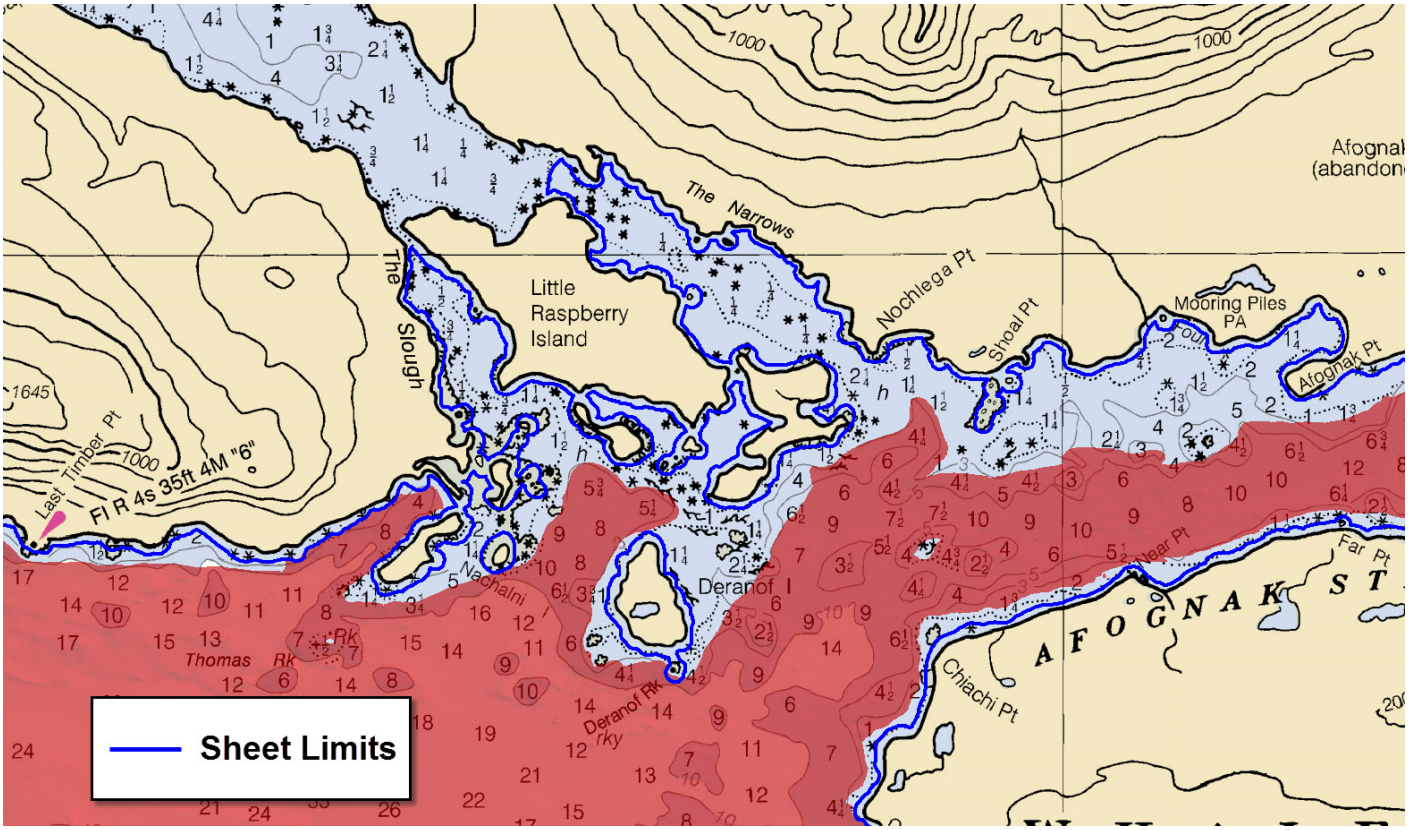

Figure 4: Multibeam coverage did not reach the sheet limits in the unnavigable areas surrounding Little Raspberry Island.

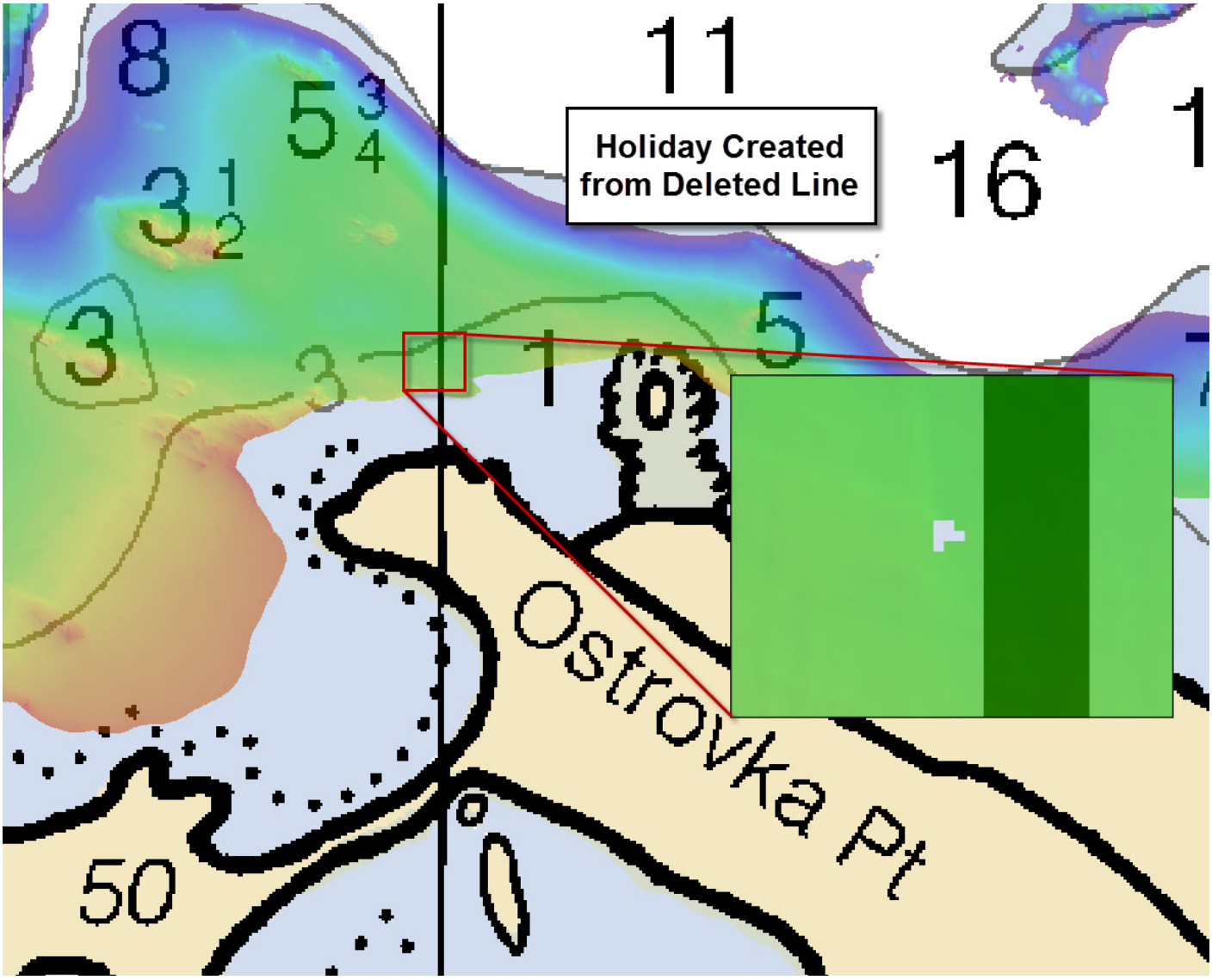

Figure 5: Holiday resulting from removing line affected by Reson 7125 SV2 roll timing issue.

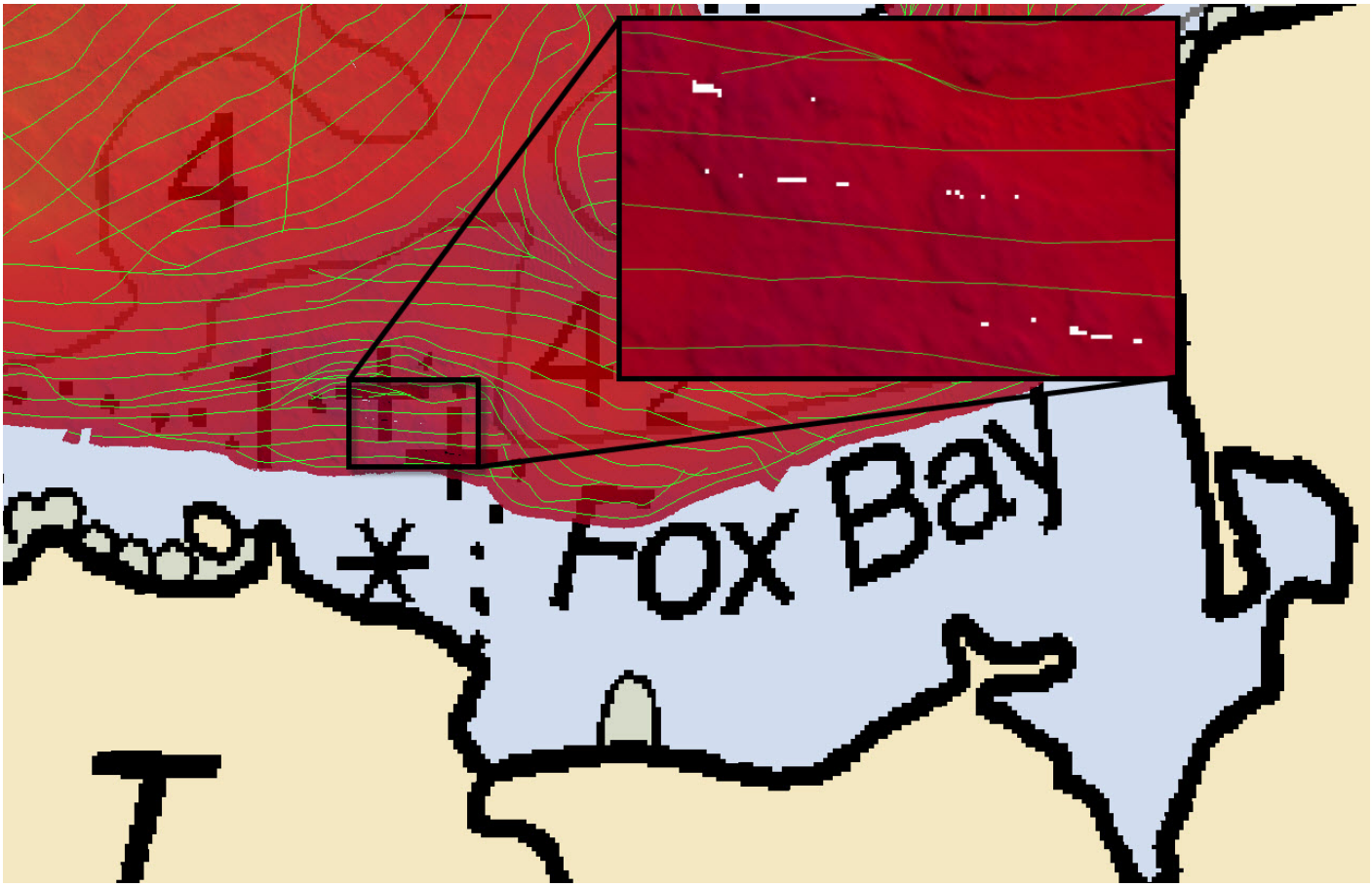

Figure 6: Holidays located in Fox Bay.

In addition to the areas outlined above, coverage did not meet the NALL in a majority of the area between Shoal Pt. and Head Pt.

A.5 Survey Statistics

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

	HULL ID	*2801*	*2802*	*2803*	*2804*	*Total*
LNM	SBES Mainscheme	0	0	0	0	0
	MBES Mainscheme	190.8	152.2	97.2	231.6	671.8
	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	7.92	0	28.6	33.4	69.92
	Lidar Crosslines	0	0	0	0	0
Number of Bottom Samples						7
Number of AWOIS Items Investigated						0
Number Maritime Boundary Points Investigated						0
Number of DPs						0
Number of Items Investigated by Dive Ops						0
Total SNM						21.0

Table 2: Hydrographic Survey Statistics

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

Survey Dates	Day of the Year
05/06/2014	126
05/07/2014	127
05/08/2014	128
05/09/2014	129
05/10/2014	130
05/12/2014	132
05/13/2014	133
05/14/2014	134
05/18/2014	138
05/19/2014	139
05/20/2014	140
05/21/2014	141
06/02/2014	153
06/03/2014	154
06/04/2014	155
06/05/2014	156
06/06/2014	157
06/07/2014	158
06/09/2014	160
06/14/2014	165
06/16/2014	167
06/28/2014	179
06/29/2014	180
07/08/2014	189

Table 3: Dates of Hydrography

Table 2: The "Number of DPs" is incorrectly reported as 0 and should be approximately 85. Table 3: Dates of survey acquisition were compared to the HDCS data and should include all of the following: DN 127, 128, 129, 130, 131, 133, 134, 135, 139, 140, 142, 154, 155, 156, 157, 158, 159, 161, 166, 168, 180, 181, and 190.

B. Data Acquisition and Processing

B.1 Equipment and Vessels

Refer to the 2014 Data Acquisition and Processing Report (DAPR) for a complete description of acquisition and processing systems, survey vessels, quality control procedures, and data processing methods. Additional information to supplement sounding and survey data and any deviations from the DAPR are discussed in the following sections.

B.1.1 Vessels

The following vessels were used for data acquisition during this survey:

Hull ID	*2801*	*2802*	*2803*	*2804*	*1905*	*1906*
LOA	8.8 meters	8.8 meters	8.8 meters	8.8 meters	5.7 meters	5.8 meters
Draft	1.1 meters	1.1 meters	1.1 meters	1.1 meters	0.3 meters	0.3 meters

Table 4: Vessels Used

All data for H12689 was acquired by NOAA Ship Rainier's four survey launches (2801, 2802, 2803, and 2804) and two skiffs (1905, 1906). The survey launches acquired MBES depth soundings, sound speed profiles, and bottom samples. The skiffs acquired bottom samples and conducted shoreline verification.

B.1.2 Equipment

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

Manufacturer	Model	Type
Reson	SeaBat 7125-B	MBES
Reson	SeaBat 7125 SV2	MBES
Reson	SVP 71	Sound Speed System
Applanix	POS-MV V4	Vessel Attitude and Positioning System
Sea-Bird Electronics, Inc.	SBE 19 and 19plus SEACAT Profiler	Conductivity, Temperature, and Depth Sensor

Table 5: Major Systems Used

B.2 Quality Control

B.2.1 Crosslines

Crosslines acquired for this survey totaled 10% of mainscheme acquisition.

Multibeam crosslines were acquired using the Reson 7125-B on launches 2801 (RA-4), 2803 (RA-3), and the Reson 7125 SV2 on Launch 2804 (RA-6) (Figure 7). A 2-meter CUBE surface was created using only mainscheme lines, a second 2-meter CUBE surface was created using only crosslines, and a difference surface was generated from these two surfaces in Caris at a 2-meter resolution. This difference surface was compared to the allowable uncertainty values within the HSSD for the observed depths and statistics were calculated in Excel. In total, 99.702% of the depth differences between H12689 mainscheme and crossline data are within the requirements of the HSSD (Figure 8). In a portion of two crosslines east of Chernof Point, the outer swath did not meet the HSSD requirements (Figure 9). SBETs were not applied to these lines, and may be the cause of this issue (see Section C.3).

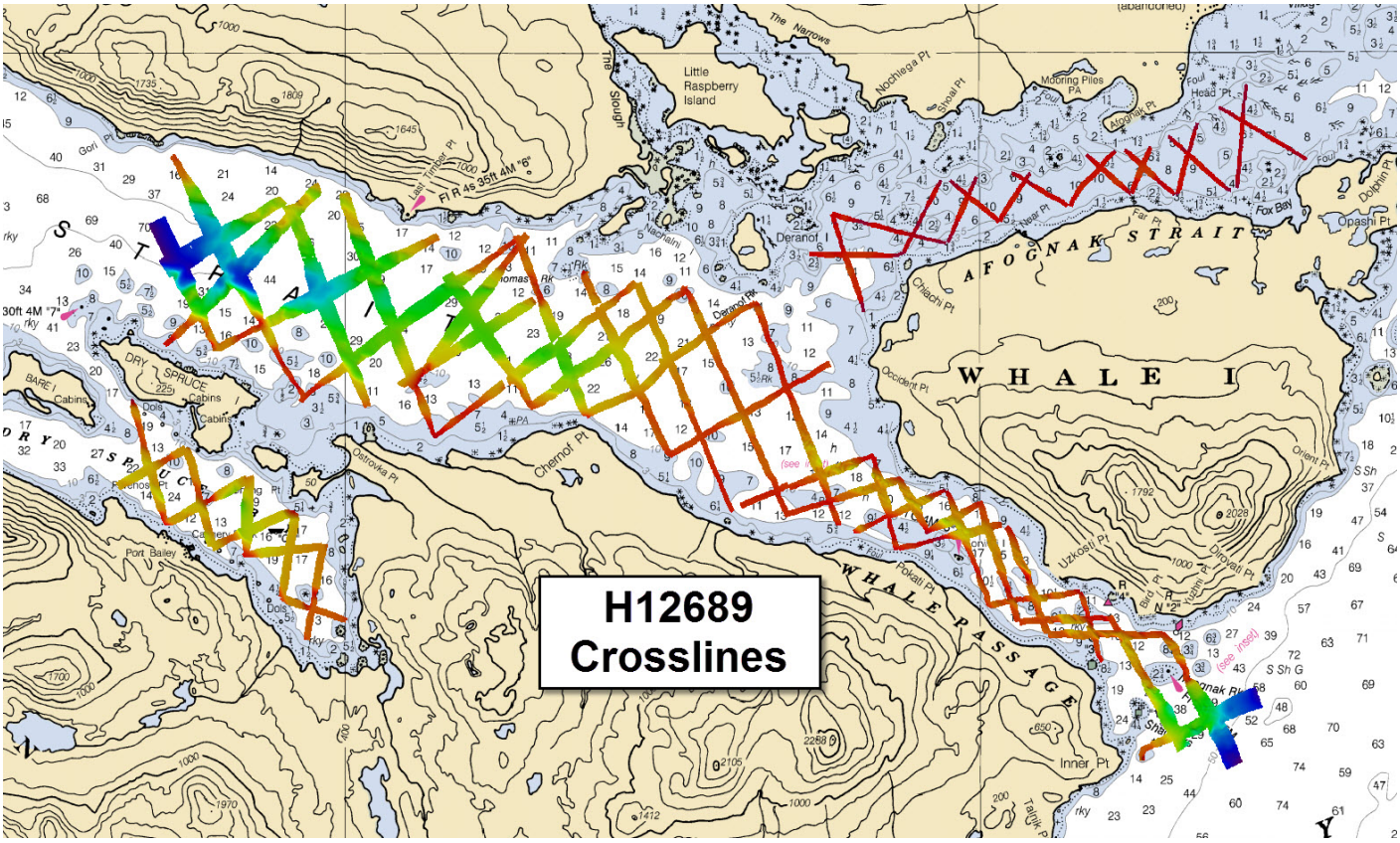

Figure 7: Depth-colored MBES overlay of acquired H12689 crossline data.

Depth range	IHO Order	Number of nodes	Nodes satisfying HSSD	Percent nodes satisfying HSSD accuracy
Less than 100m	Order 1	3,805,063	3,793,729	99.702%

Figure 8: Summary table indicating percentage of difference surface nodes between H12689 mainscheme and crossline data that met HSSD requirements for associated depths.

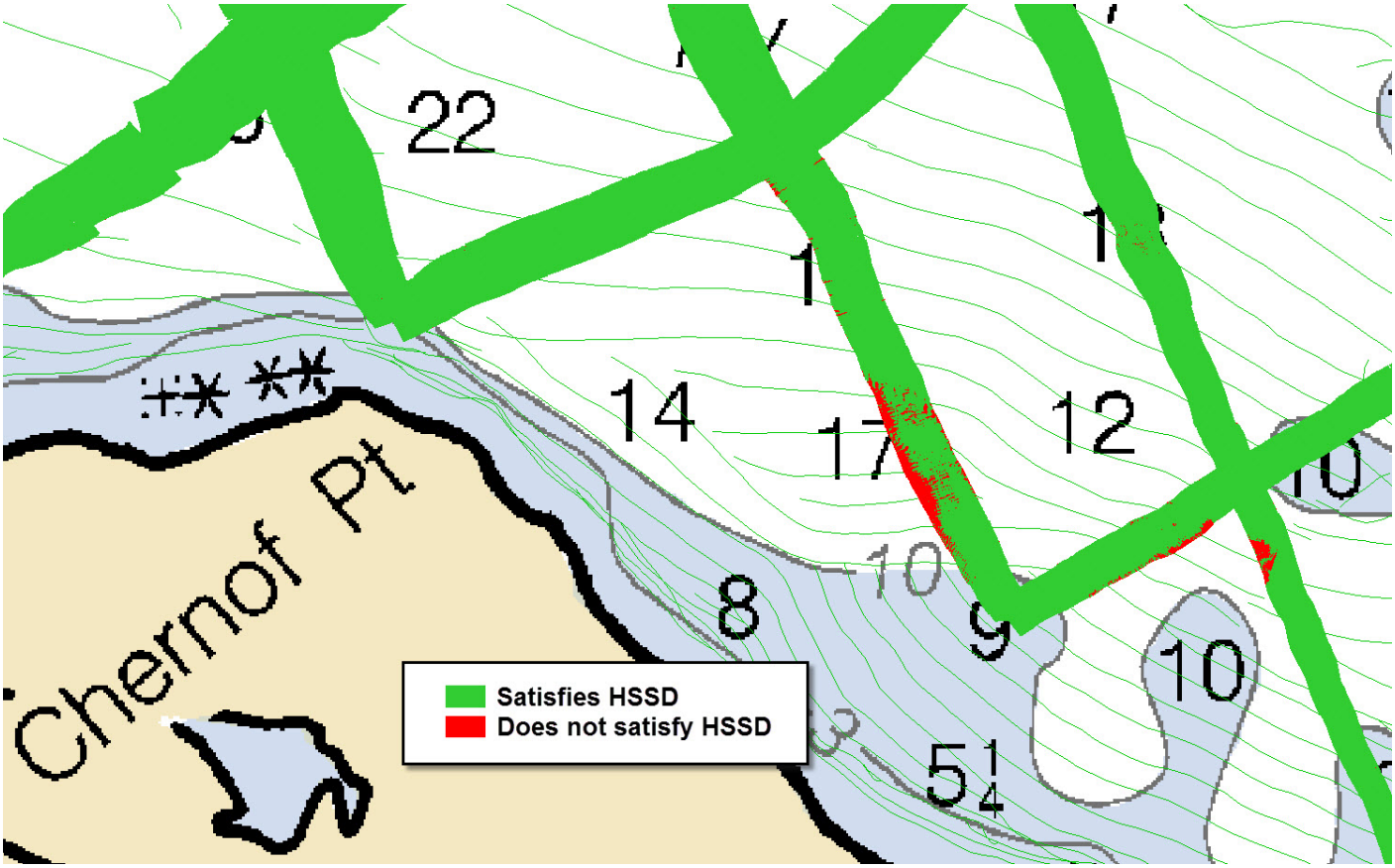

Figure 9: Area east of Chernof Point in which depth differences between H12689 mainscheme and crossline data do not meet the HSSD requirements for the associated depths.

B.2.2 Uncertainty

The following survey specific parameters were used for this survey:

Measured	Zoning
0 meters	0.122 meters

Table 6: Survey Specific Tide TPU Values

Hull ID	Measured - CTD	Measured - MVP	Surface
2801, 2802, 2803, 2804	3.0 meters/second		0.15 meters/second

Table 7: Survey Specific Sound Speed TPU Values

Uncertainty values were measured and applied in accordance with Section B.4 of the DAPR.

Uncertainty values of submitted final grids were calculated in Caris using the "Greater of the Two" of uncertainty and standard deviation (scaled to 95%). To visualize where uncertainty accuracy requirements were met, for each surface a custom "HSSD compliance" layer was created based on the difference between the calculated uncertainty of the nodes and the allowable uncertainty defined in the HSSD. To quantify the extent to which accuracy requirements were met, the HSSD Compliance layers were queried within Caris and examined in Excel. Overall, 99.928% of the nodes of survey H12689 met the uncertainty requirements specified in the HSSD (Figure 10). These HSSD Compliance layers were retained in the submitted surfaces.

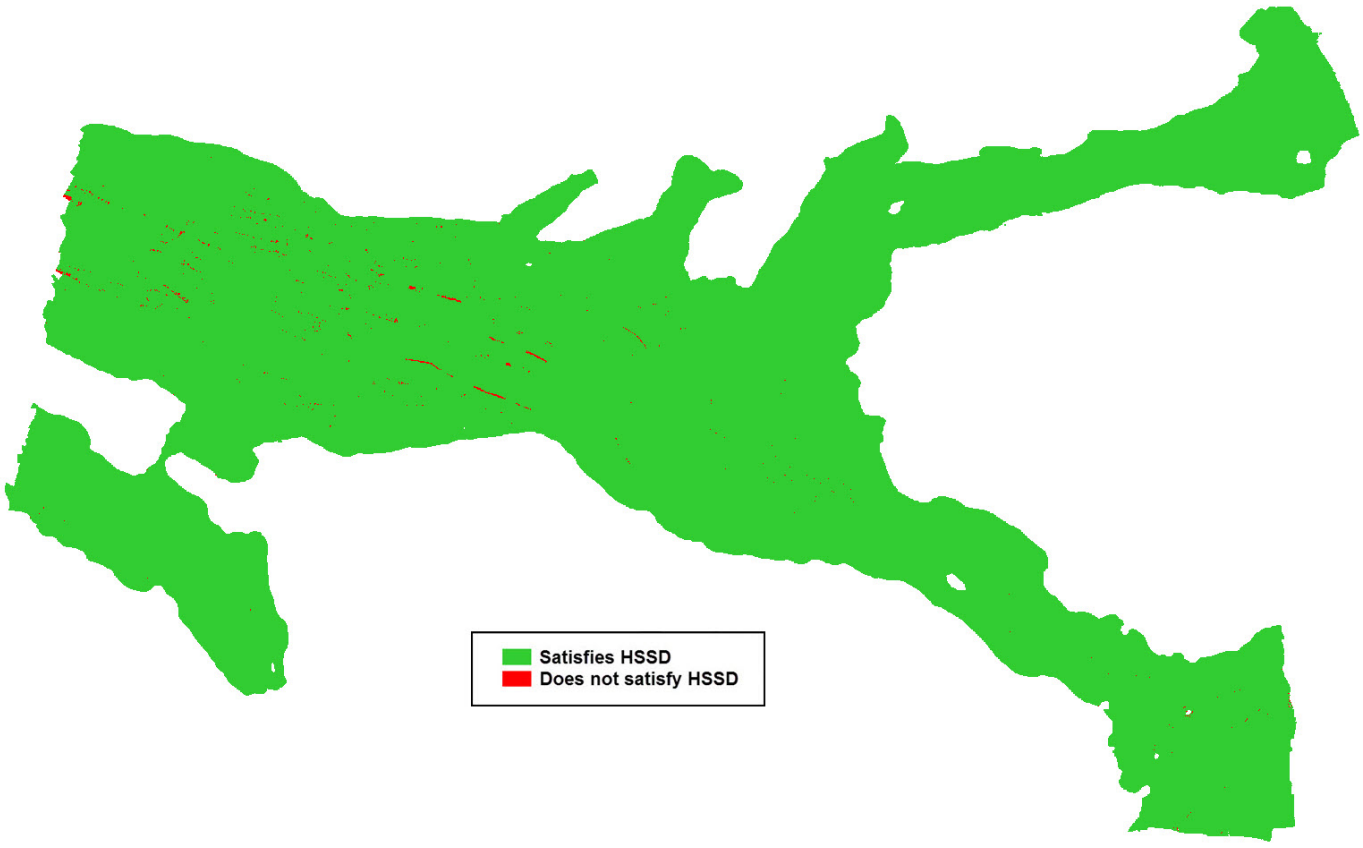

Figure 10: H12689 met HSSD uncertainty standards in 99.928% of all nodes.

B.2.3 Junctions

Four junction comparisons were completed for H12689 (Figure 11). One survey (H12690) was acquired concurrently with this survey, and three surveys (H12512, H12495 and H12496) were completed in 2012 by NOAA Ship Rainier. Depth comparisons were performed using Caris difference surfaces.

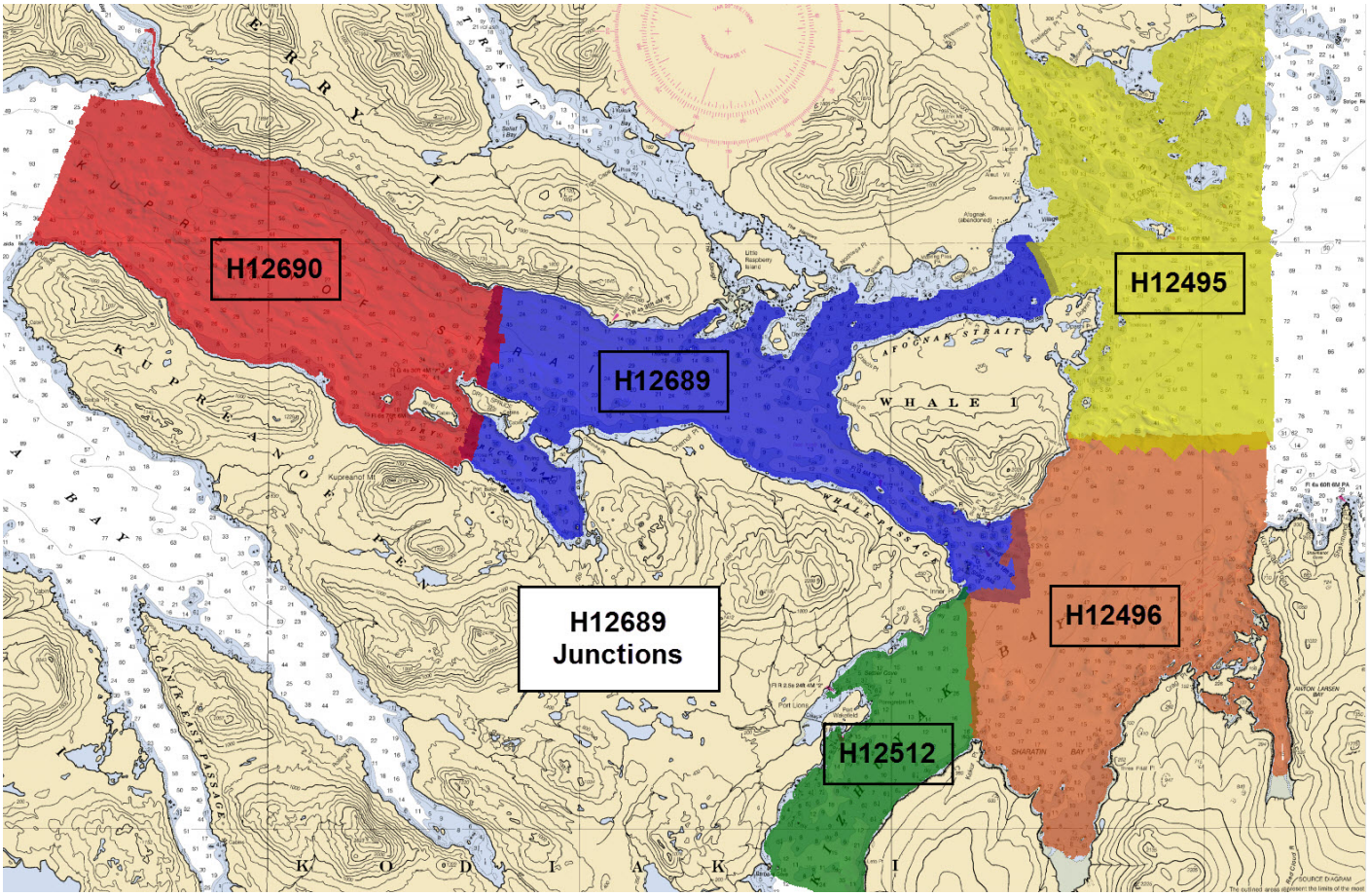

Figure 11: Overview of junctions with survey H12689.

The following junctions were made with this survey:

Registry Number	Scale	Year	Field Unit	Relative Location
H12690	1:78900	2014	NOAA Ship Rainier	W
H12512	1:78900	2012	NOAA Ship Rainier	S
H12495	1:78900	2012	NOAA Ship Rainier	NE
H12496	1:78900	2012	NOAA Ship Rainier	SE

Table 8: Junctioning Surveys

H12690

Overlap with survey H12690 was approximately 300 to 600 meters wide, covering an area of 0.59 square nautical miles along the western boundary of H12689 (Figure 11). Depths in the junction area range from approximately 4 to 110 meters. For the respective depths, the difference surface was compared to the allowable TVU (Total Vertical Uncertainty) standards specified in the HSSD. In total, 99.031% of the depth differences between H12689 and junction survey H12690 are within allowable uncertainties.

H12512

Overlap with survey H12512 was approximately 130 to 440 meters wide, covering an area of 0.03 square nautical miles along the southern boundary of H12689 (Figure 11). Depths in the junction area range from 4 to 37 meters. For the respective depths, the difference surface was compared to the allowable TVU standards specified in the HSSD. In total, 96.230% of the depth differences between H12689 and junction survey H12512 are within allowable uncertainties.

H12495

Overlap with survey H12495 was approximately 220 to 300 meters wide, covering an area of 0.14 square nautical miles along the northeastern boundary of H12689 (Figure 11). Depths in the junction area range from 5 to 15 meters. For the respective depths, the difference surface was compared to the allowable TVU standards specified in the HSSD. In total, 99.653% of the depth differences between H12689 and junction survey H12495 are within allowable uncertainties.

H12496

Overlap with survey H12496 was approximately 300 to 900 meters wide, covering an area of 0.62 square nautical miles along the southeastern boundary of H12689 (Figure 11). Depths in the junction area range from 4 to 128 meters. For the respective depths, the difference surface was compared to the allowable TVU standards specified in the HSSD. In total, 97.464% of the depth differences between H12689 and junction survey H12496 are within allowable uncertainties.

The scale of all four junctioning surveys listed in Table 8 should be 1:40000, not 1:78900.
During review at the Branch, a difference surface was created for each junction by differencing the 8-meter Combined surface of H12689 with the 8-meter Combined surface of the junctioning survey. Areas where differences exceeded allowable uncertainty limits were investigated and could be attributed to the steep and/or rocky nature of the seafloor. Statistics were generated from each difference surface which indicate: for junctioning survey H12690, 95% of nodes were within +/-0.51 meters; for junctioning survey H12512, 95% of nodes were within +/-0.63 meters; for junctioning survey H12495, 95% of nodes were within +/-0.27 meters; and for H12496, 95% of nodes were within +/-0.55 meters.

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

Reson 7125 SV2 Roll-Stabilization Issue

An equipment issue with the Reson 7125 SV2 sonar resulted in degradation of some H12689 bathymetric data (Figure 12). High frequency lines from DN190 on Launch 2804 (RA-6) were affected resulting in brief periodic loss of accurate bottom detection (refer to the 2014 DAPR for more information regarding this issue). All affected lines were examined in Caris subset mode and the affected lines were deleted as per Hydrographer-in-Charge recommendation. Although the affected lines were deleted, vertical offsets still remain in this area near Ostrovka Point which are most likely due to a less than accurate tidal zoning (see Section B.2.6 for further details). The vertical offsets that remain where lines have been deleted meet HSSD requirements.

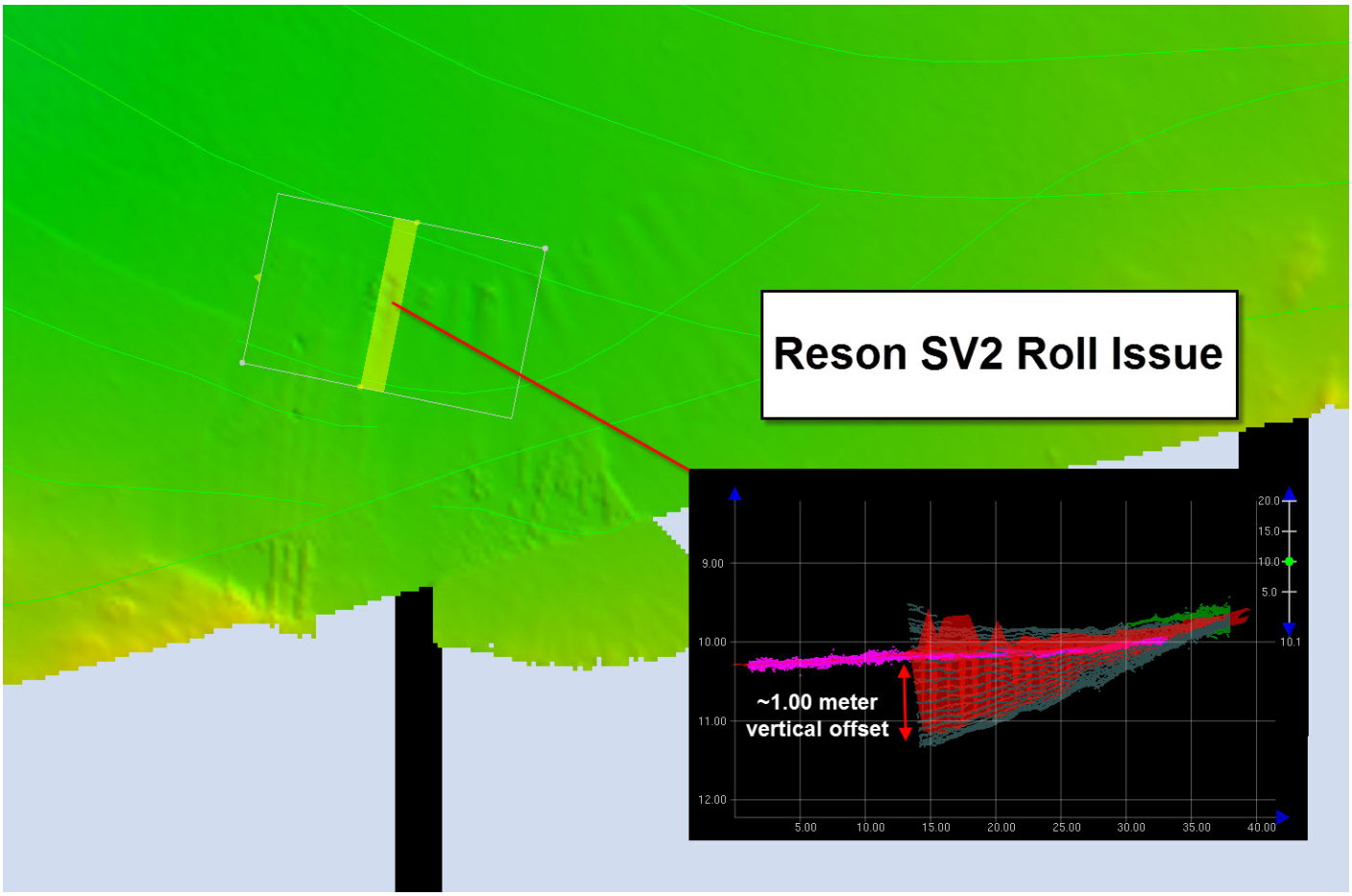

Figure 12: Subset view of Reson 7125 SV2 roll-stabilization issue.

B.2.6 Factors Affecting Soundings

Vertical Offset

Vertical offsets ranging from approximately 0.20 to 0.60 meters were observed in various areas of the survey area. In order to determine whether this offset was due to a less than accurate tidal zoning model, the affected multibeam data was referenced to the WGS84 ellipsoid by applying GPS tides in Caris. Once referenced to the ellipsoid, the vertical offset between overlapping lines was greatly reduced (Figures 13-15). Areas affected include those around Deranof and Nachalni Islands, Dry Spruce Bay, Ostrovka Point, Chernof Point, and Fox Bay (Figures 16-19). Some data in these areas exceed HSSD TVU standards. Strong currents were encountered in these areas creating tidal complexities, which could have caused these offsets. In the most extreme cases east of Chernof Point and to the north and northwest of Ostrovka Point, where the vertical uncertainty breaches accepted limits, the data does not meet the requirements set forth in the HSSD. Soundings from the outer beams of lines in these areas were filtered to limit the occurences of HSSD non-compliance. Moreover, these extreme cases of veritcal offsests have been deemed not to be navigationally significant. In areas not adversely affected by these vertical offsets, which encompasses the majority of the survey area, the data meets or exceeds the requirements set forth in the HSSD.

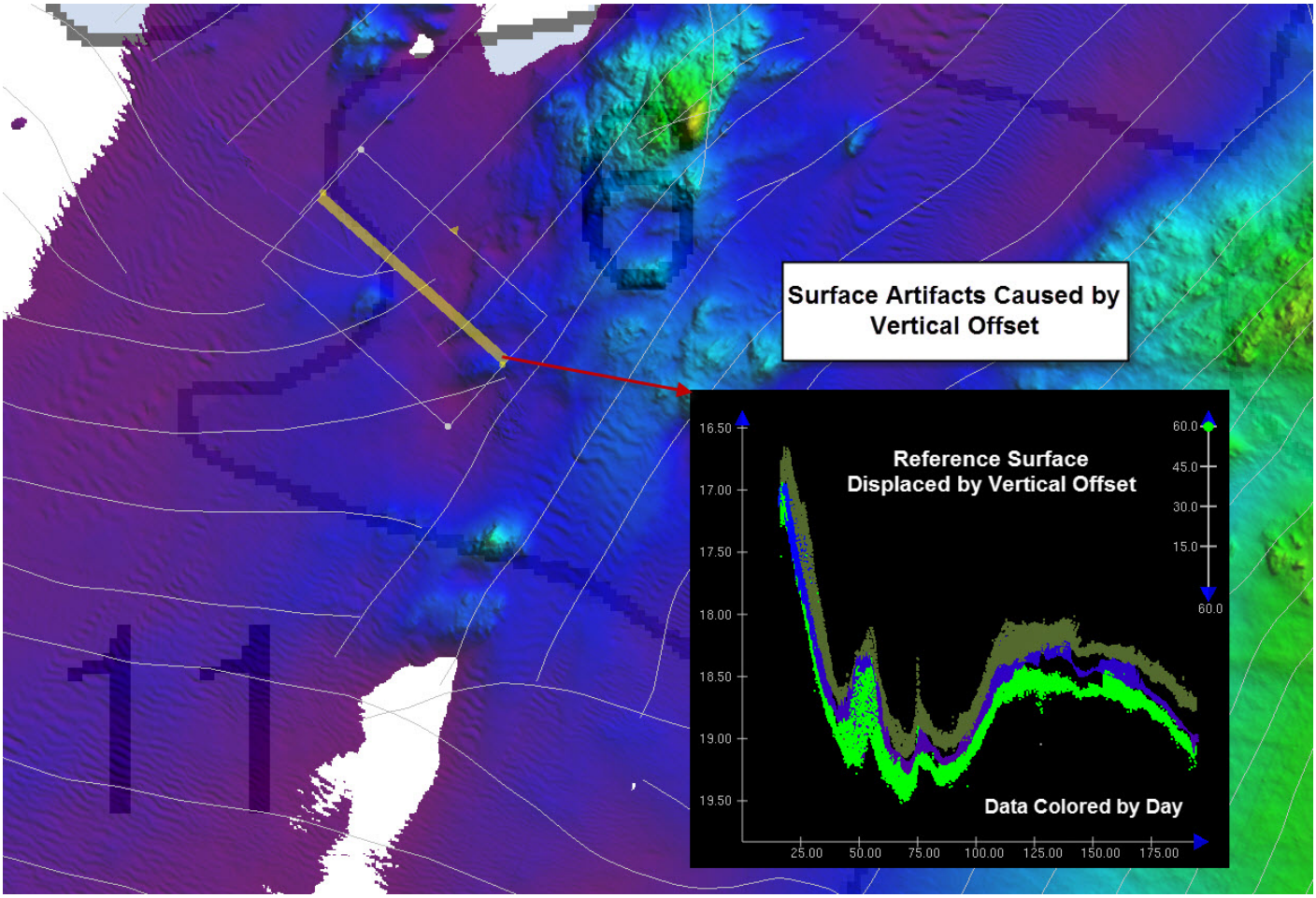

Figure 13: Section of H12689 1-meter surface showing artifacts caused by vertical offset. Vessel track lines shown in green. Note: surface exaggeration value of 15.

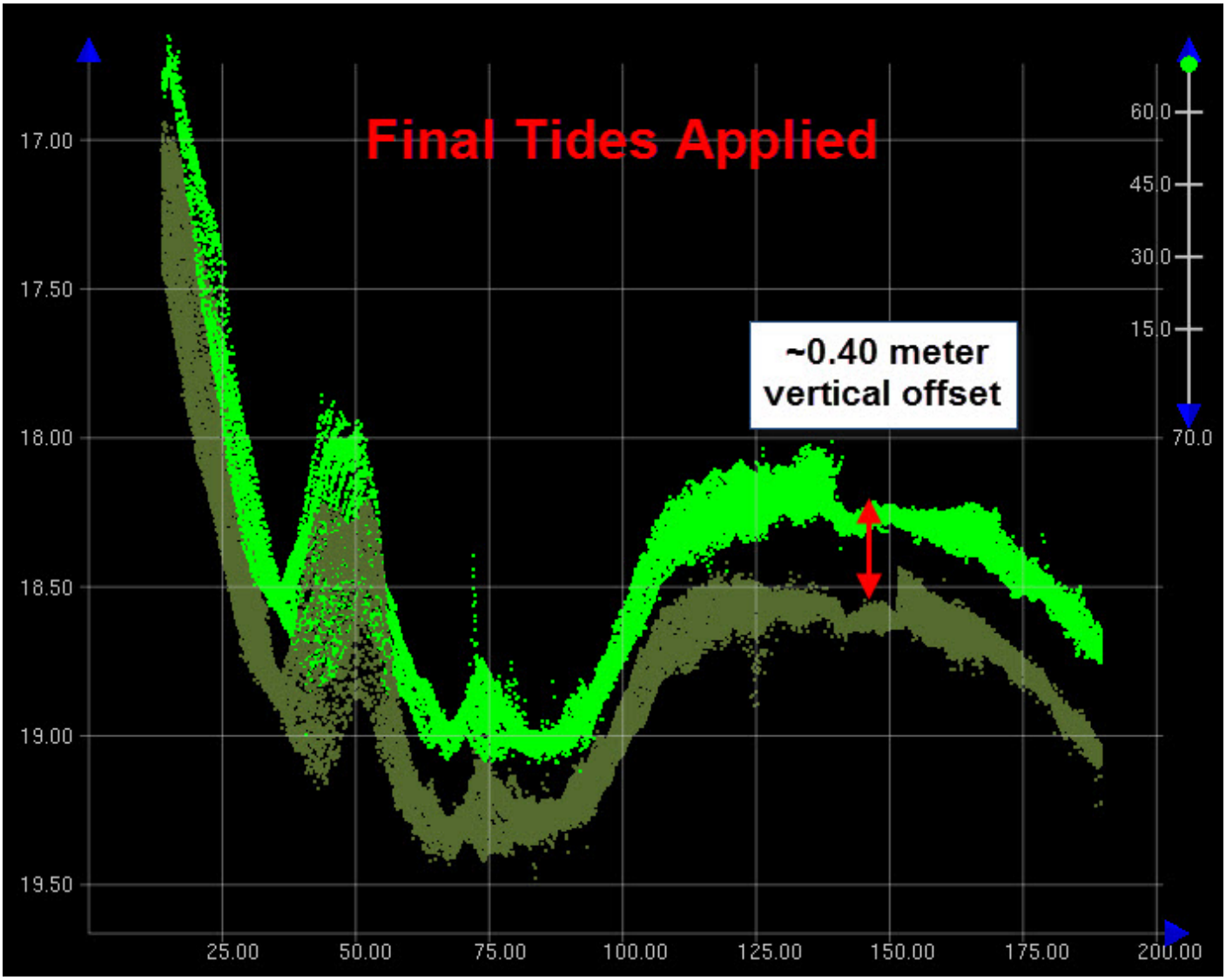

Figure 14: Example of vertical offset in subset view with final zoned tides applied. Data colored by day.

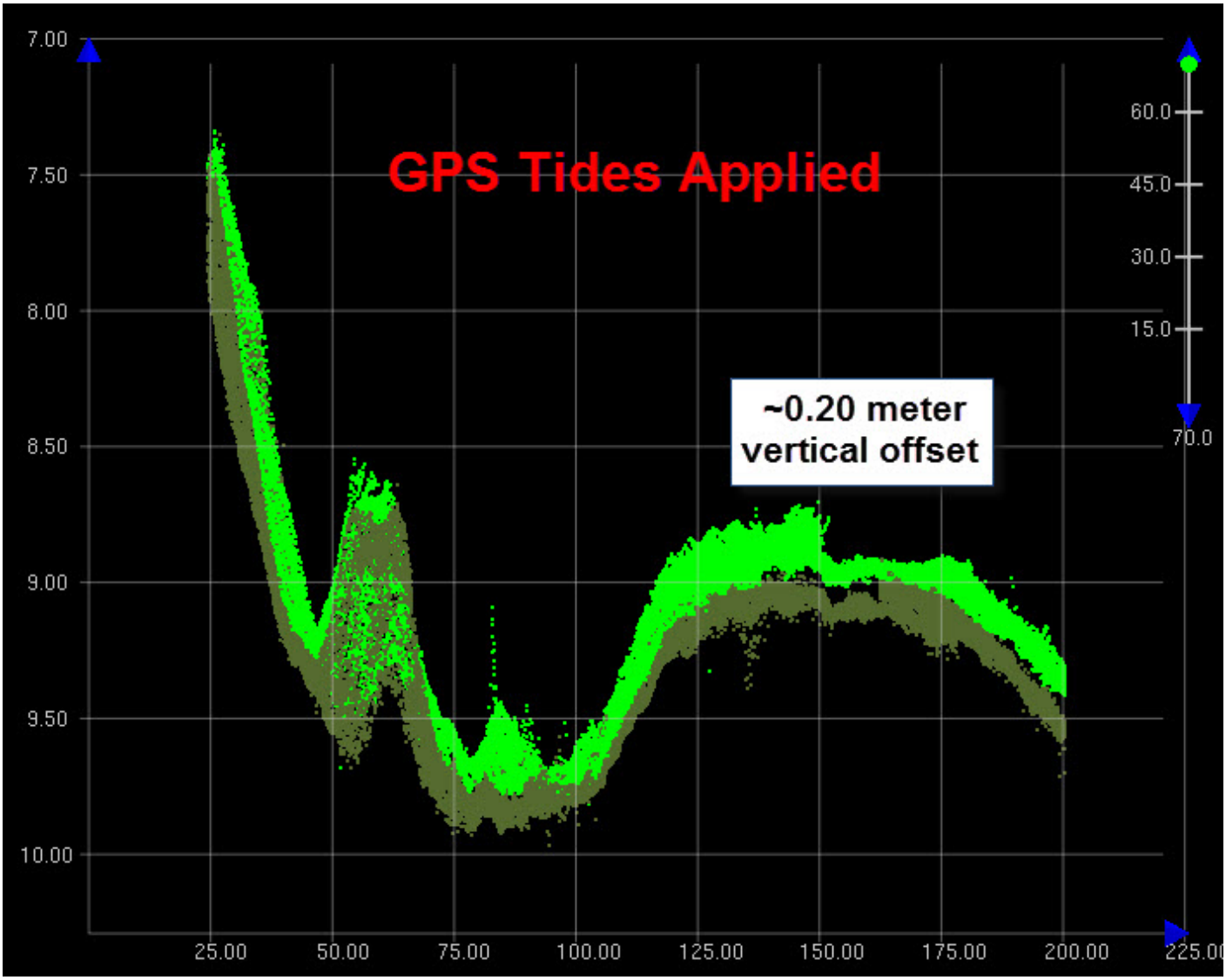

Figure 15: Subset view of data with GPS tides applied, which reduces the vertical offset.

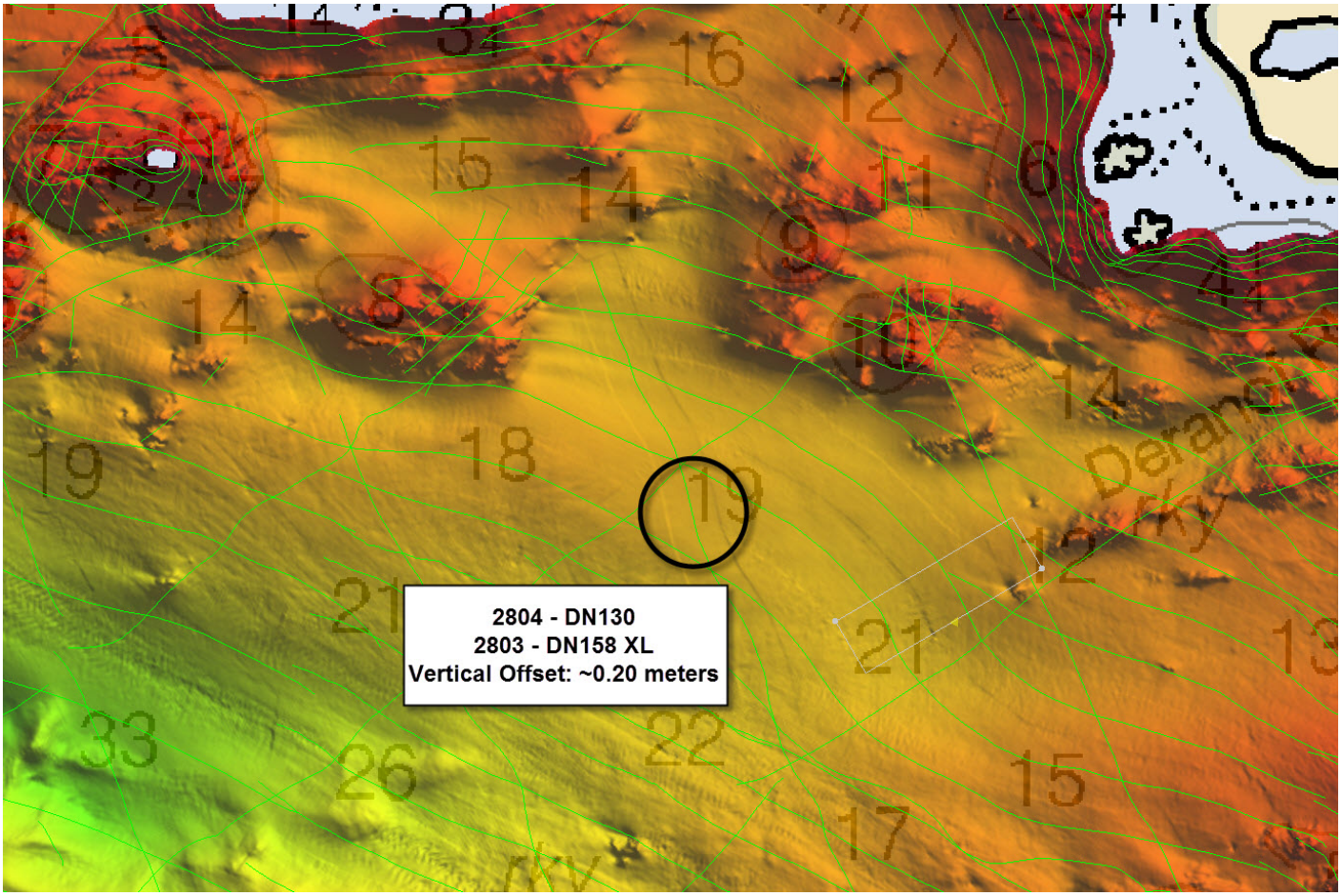

Figure 16: Example area of vertical offset near Nachalni and Deranof Islands.

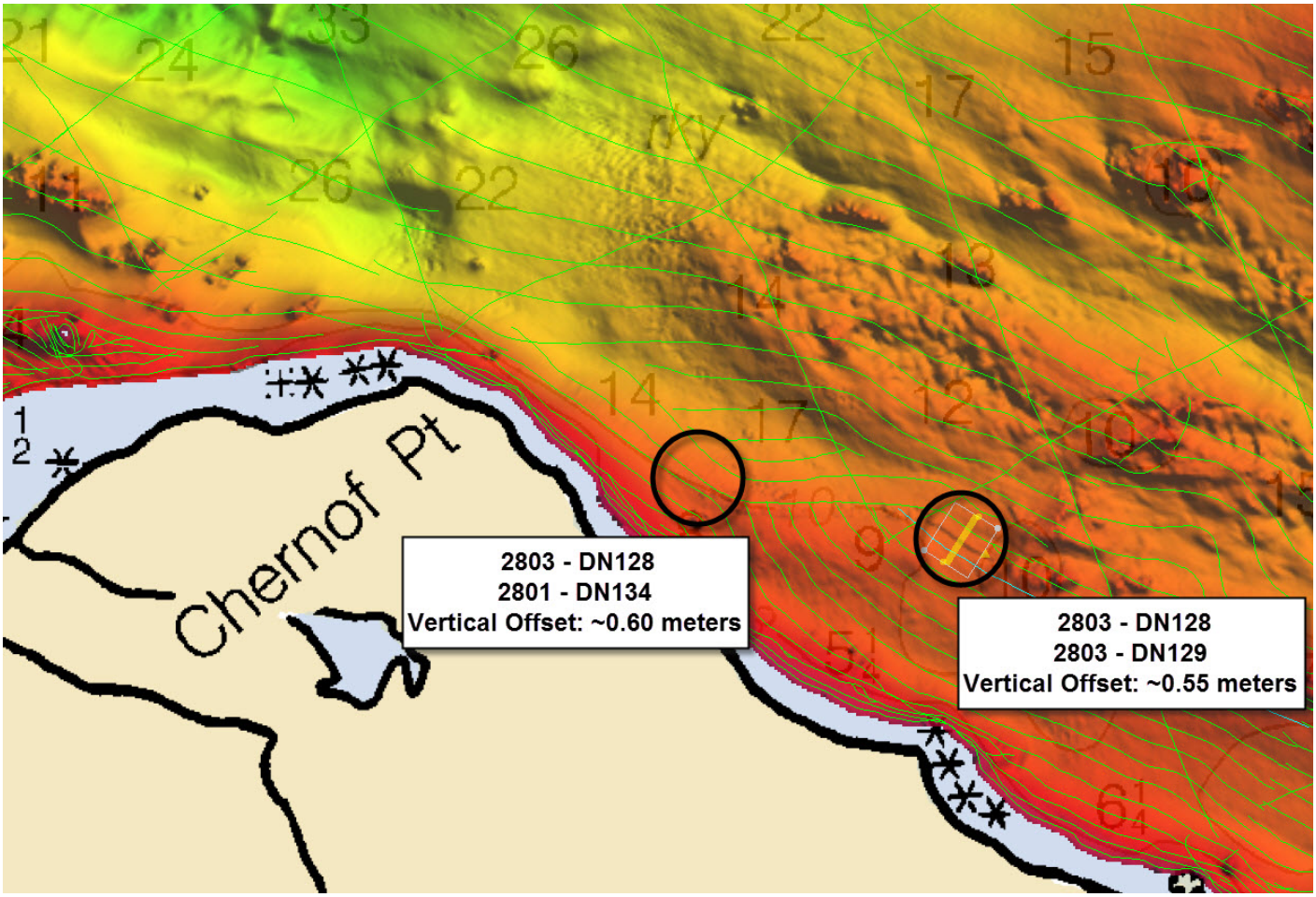

Figure 17: Example areas of vertical offsets near Chernof Point of Kupreanof Peninsula.

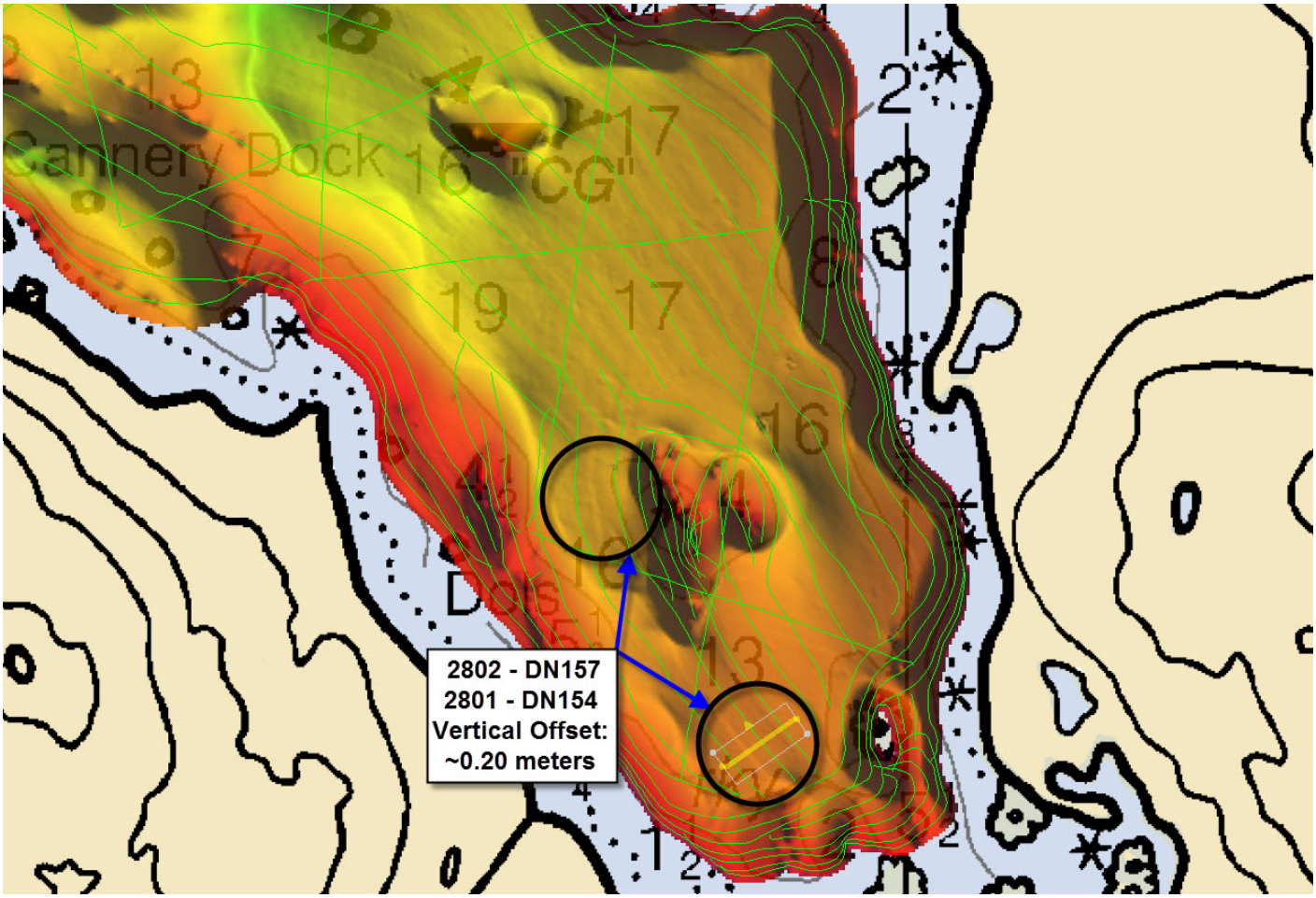

Figure 18: Example areas of vertical offsets in the south end of Dry Spruce Bay.

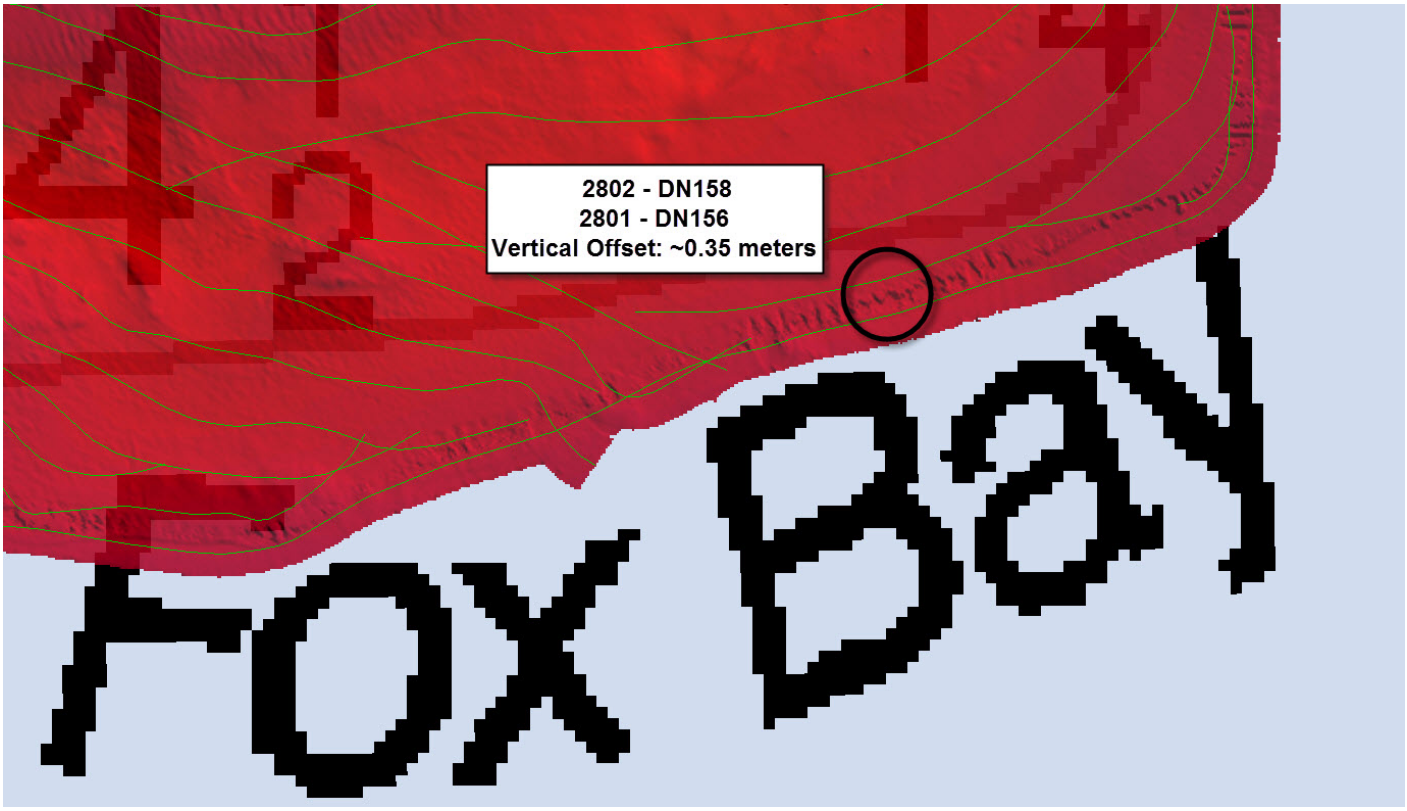

Figure 19: Example area of vertical offset in Fox Bay.

Data exceeding HSSD specifications is limited to small areas and does not exceed specifications by more than 0.2 meters. The surveyed data is sufficient to supersede charted data.

Sound Speed Artifact

In the nearshore area surrounding Nachalni and Deranof Islands, the CTD cast frequency was unable to sufficiently characterize changes in sound speed within the water column. As a result, refraction error artifacts occur in the BASE surface where the outer beams "smile" or frown." (Figure 20). The survey data meets or exceeds the requirements set forth in the HSSD.

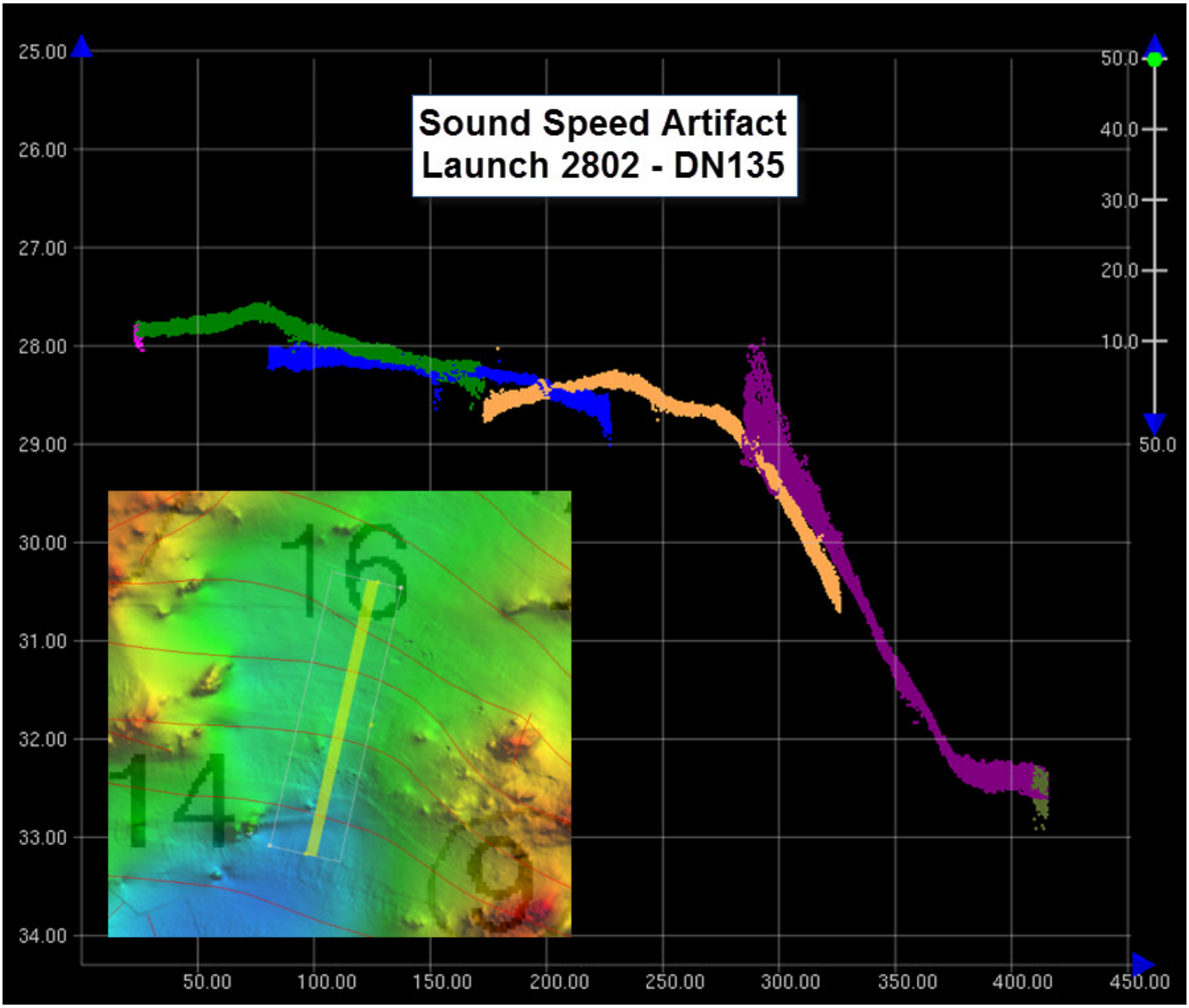

Figure 20: Sound speed artifact found south of Nachalni Island. Data colored by line number.

Kelp

Kelp was encountered in some shoal areas of the survey. Some of the thickest kelp patches were in the shoals at the east end of Afognak Strait (Figure 21). MBES data in these areas was examined using Caris Subset Editor. Soundings that obviously represented kelp and not the seafloor were rejected. When unable to clearly distinguish between kelp and the seafloor, the soundings were retained.

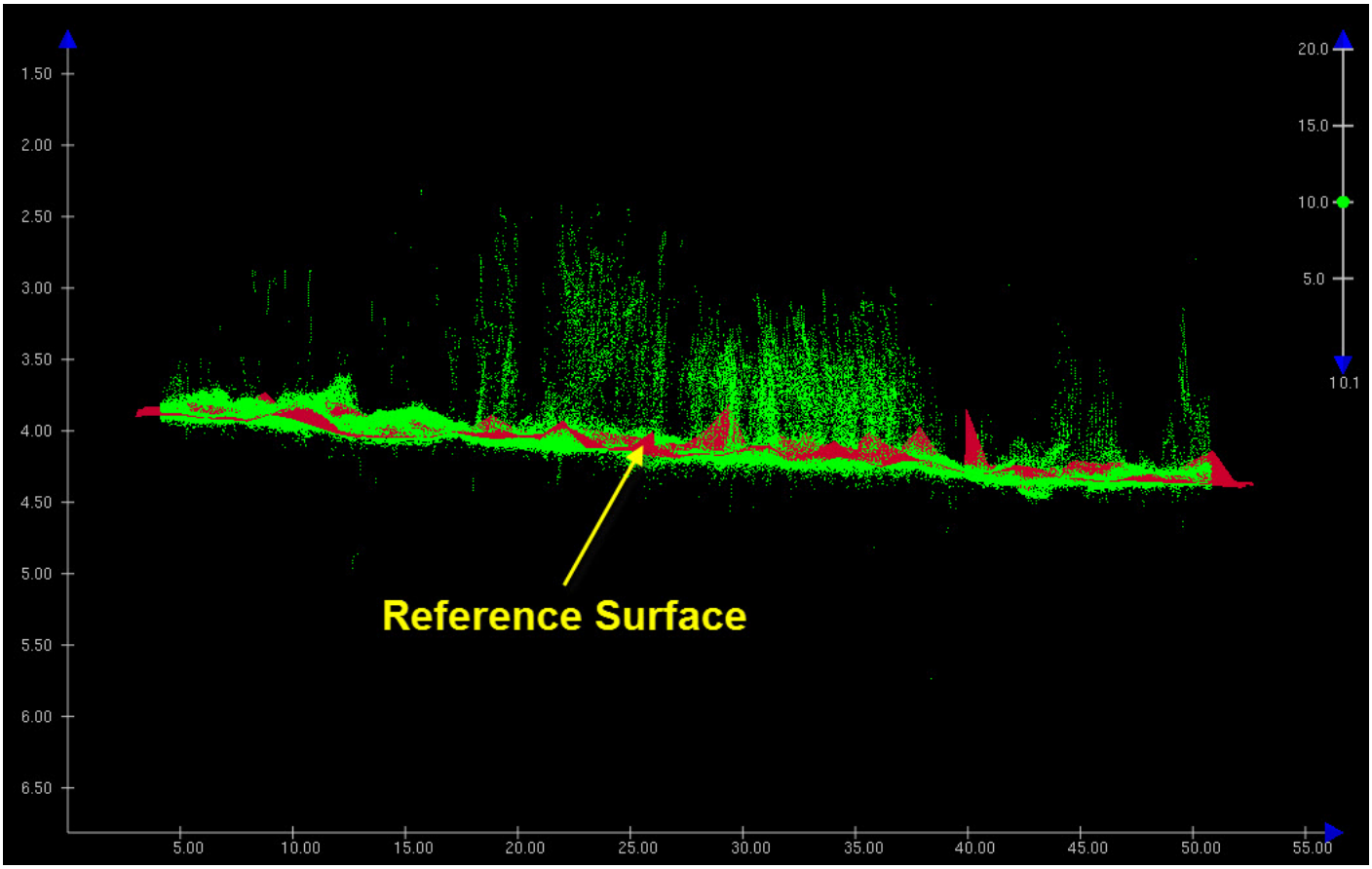

Figure 21: Subset view showing seafloor obscured by kelp and the affected reference surface. Subset taken at 57-59-54.97N, 152-46-02.75W.

B.2.7 Sound Speed Methods

Sound Speed Cast Frequency: All launch sound speed profiles were acquired using the SBE19 and SBE 19Plus SEACAT CTD probes at discrete locations within the survey area at least once every four hours, when significant changes in surface sound speed were observed, or when surveying a new area. A sheet-wide concatenated sound speed file was created and applied to survey lines using the "Nearest in distance within time (4 hours)" profile selection method, with the following exceptions: 5 hours was used for "Nearest in distance within time" for Launch 2804 (RA-6) high frequency lines 2040 through 2116.

B.2.8 Coverage Equipment and Methods

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

B.3 Echo Sounding Corrections

B.3.1 Corrections to Echo Soundings

Delayed Heave could not be applied to Launch 2804 DN181 low-frequency crosslines 2123 through 0000 (line 0000 acquired on DN182 according to UTC). The survey data still meets or exceeds the requirements set forth in the HSSD.

B.3.2 Calibrations

All sounding systems were calibrated as detailed in the DAPR.

B.4 Backscatter

Backscatter data was acquired, but not formally processed by Rainier personnel. Two backscatter lines per boat, per day were reviewed to ensure quality. Backscatter was logged as .7k files and submitted to NGDC, but is not included with the data submitted to the Branch.

B.5 Data Processing

B.5.1 Software Updates

There were no software configuration changes after the DAPR was submitted.

The following Feature Object Catalog was used: NOAA Extended Attribute Files V_5_3_2

All data was processed using Caris HIPS and SIPS 8.1.

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
H12689_MB_1m_MLLW	CUBE	1 meters	-0.57 meters - 128 meters	NOAA_1m	Complete MBES
H12689_MB_2m_MLLW	CUBE	2 meters	-0.50 meters - 128 meters	NOAA_2m	Complete MBES

Surface Name	Surface Type	Resolution	Depth Range	Surface Parameter	Purpose
H12689_MB_4m_MLLW	CUBE	4 meters	0 meters - 128 meters	NOAA_4m	Complete MBES
H12689_MB_8m_MLLW	CUBE	8 meters	0 meters - 128 meters	NOAA_8m	Complete MBES
H12689_MB_1m_MLLW_Final	CUBE	1 meters	-0.70 meters - 20 meters	NOAA_1m	Complete MBES
H12689_MB_2m_MLLW_Final	CUBE	2 meters	12 meters - 40 meters	NOAA_2m	Complete MBES
H12689_MB_4m_MLLW_Final	CUBE	4 meters	36 meters - 80 meters	NOAA_4m	Complete MBES
H12689_MB_8m_MLLW_Final	CUBE	8 meters	72 meters - 160 meters	NOAA_8m	Complete MBES

Table 9: Submitted Surfaces

In accordance with section 5.2.2.2 of the HSSD, the depth range of the 2-meter finalized surface was increased from 18-40 meters to 12-40 meters and the 1-meter finalized surface was increased from 0-20 meters to -1-20 meters in order to prevent apparent holidays resulting from the gridding algorithm in the bathymetry found in H12689.

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
Kodiak Island	9457292
Seldovia	9455500

Table 10: NWLON Tide Stations

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

Station Name	Station ID
Uzkosti Point, AK	9457376
Nachalni Island, AK	9457407

Table 11: Subordinate Tide Stations

File Name	Status
9457292.tid	Final Approved
9457376.tid	Final Approved
9457407.tid	Final Approved

Table 12: Water Level Files (.tid)

File Name	Status
H12689CORF.zdf	Final

Table 13: Tide Correctors (.zdf or .tc)

A request for final approved tides was sent to N/OPS1 on 07/10/2014. The final tide note was received on 10/19/2014.

The NWLON primary tide stations on Kodiak Island, AK (9457292) and in Seldovia, AK (9455500), as well as the subordinate tide stations installed by Rainier personnel at Uzkosti Point, AK (9457376) and Nachalni Island, AK (9457407) served as the controls for datum determination and water level reducers for survey H12689. A complete description of the vertical and horizontal control for this survey can be found

in the accompanying OPR-P136-RA-14 Horizontal and Vertical Control Report (HVCR), submitted under a separate cover.

C.2 Horizontal Control

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

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

The following PPK methods were used for horizontal control:

Smart Base

Vessel kinematic data (POS files) were post-processed with Applanix POSPac and POSGNSS software using Smart Base processing methods described in the DAPR. SBET and RMS data was applied to all survey lines with the exception of those described in Section C.3.3.1.

The following CORS Stations were used for horizontal control:

HVCR Site ID	Base Station ID
KOD5	KODIAK 5
KOD6	KODIAK 6
SELD	SELD_AKDA_AK2000
AC08	CAPDOUGLASAK2007
AC18	Ushagat_IsAK2008
AC24	KINGSALMONAK2006
AC26	CAPE_GULL_AK2008
AC27	AC27MNeil_AK2004
AC34	OldHarbor_AK2006
AC38	QUARTZ_CRKAK2005
AC39	SHUYAKISSPAK2006
AC67	PILLARMTN_AK2006

Table 14: CORS Base Stations

The following DGPS Stations were used for horizontal control:

DGPS Stations
Kodiak 313 kHz
Kenai 310 kHz

Table 15: USCG DGPS Stations

C.3 Additional Horizontal or Vertical Control Issues

3.3.1 Lines without SBETs

SBETs could not be applied to line 2358 acquired by Launch 2803 on DN158, line 2359 acquired by Launch 2801 on DN158, and lines 2123 through 0000 and 1633 acquired by Launch 2804 on DN181 and DN141 respectively due to time extents not overlapping with the lines (Figure 22). On DN181 the POS file for Launch 2804 stopped logging some time before 2123 due to the hard drive being full. No error message was given to indicate any issue. As a result, all lines acquired from that launch after that time could not have SBETS applied. The survey data meets or exceeds the requirements set forth in the HSSD.

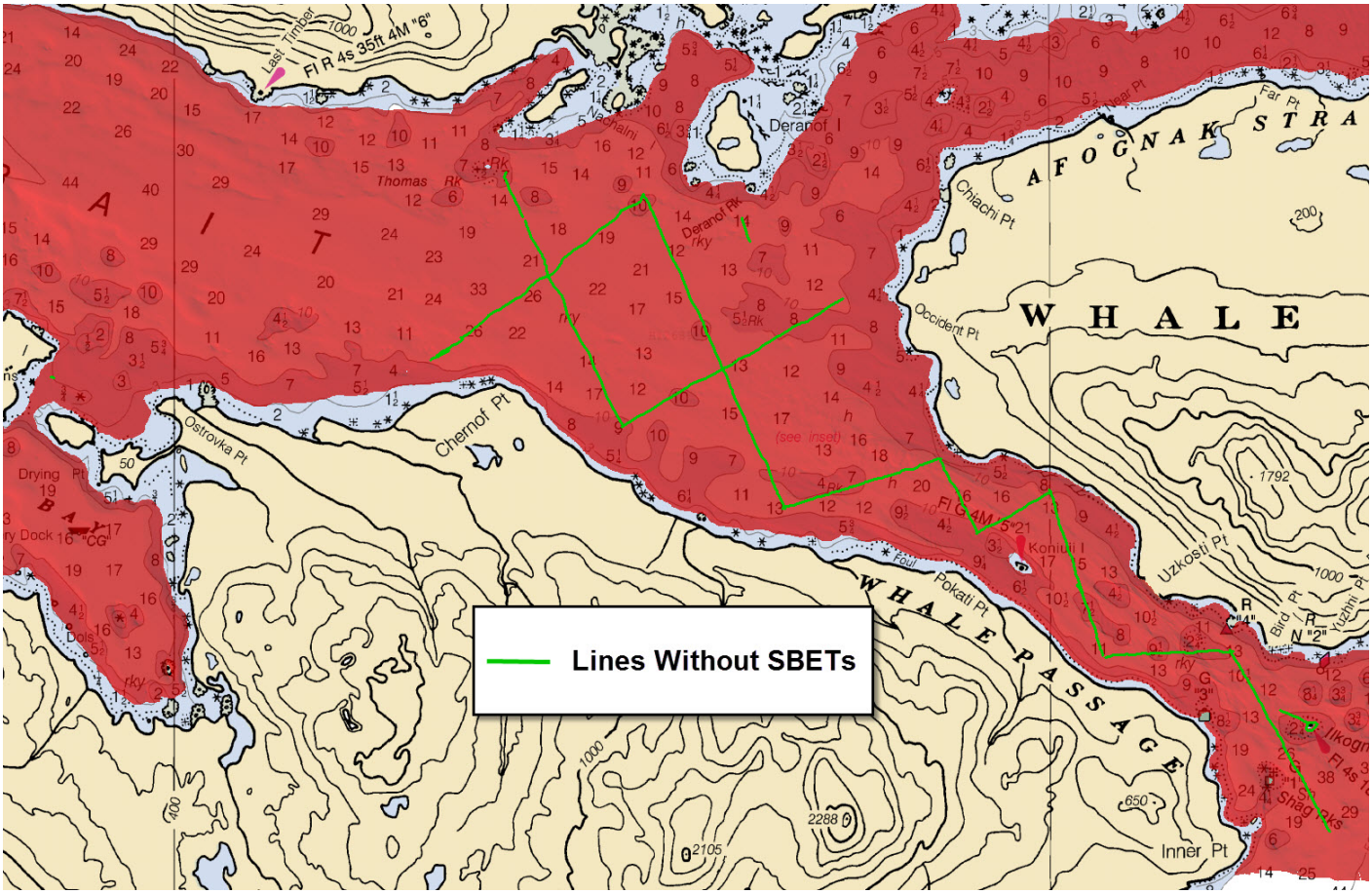

Figure 22: Lines that could not be applied with SBETs.

D. Results and Recommendations

D.1 Chart Comparison

Chart comparisons were performed using a Caris sounding and contour layer based on the 8-meter combined CUBE surface. The contours and soundings were overlaid on the charts and compared for general agreement and to identify areas of significant change.

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
16594	1:78900	13	04/1998	12/15/2014	11/28/2014
16594	1:30000	13	04/1998	12/01/2014	11/28/2014

Table 16: Largest Scale Raster Charts

16594

H12689 derived soundings in Kupreanof Strait agreed with charted depths within 2 fathoms except as noted below. (Figures 23-24). The derived 50-fathom contour at the west end of the survey area is disjointed in comparison with the one charted. Along the southern shoreline of Kupreanof Strait, the derived 10-fathom contour tends to lie inshore from where it has been charted. Along this same shoreline, the derived 3-fathom contour generally agrees with the chart, however, the derived 5-fathom contour is not thoroughly charted in this area and the Hydrographer recommends updating the 5-fathom contour based upon the derived contours and soundings from the survey data. At the east end of Kupreanof Strait and to the west of Occident and Chiachi Points, the derived 10-fathom contour differs significantly from the charted contour (Figure 25).

The derived soundings through the main waterway of Dry Spruce Bay agreed with charted depths within 2 fathoms, however, along the shoreline of the bay the derived soundings are deeper and tend to disagree with the charted contours (Figure 26). In some cases there are derived soundings ranging from 10 to 19 fathoms lying in-between the charted 3 and 10-fathom contours. These discrepancies continue inshore of the charted 3-fathom contour with derived soundings ranging from 4 to 14 fathoms. The derived 5-fathom contour was overlain on Chart 16594 rather than the 3-fathom contour due to this deepening trend towards the shoreline. During the chart comparison analysis the derived 3-fathom contour, when overlain on the chart, follows tightly along the derived 5-fathom contour, so it has also been omitted for visual clarity purposes.

Derived soundings in Afognak Strait agreed with charted depths within 2 fathoms except as noted below (Figures 27-30). The charted 10-fathom contour has not been thoroughly distinguished in this area, yet shoaling occurs to where the chart should be updated with the derived 10 fathom contour. The derived 5-fathom contour generally tends to lie inshore of the charted 5-fathom contour. The derived 3-fathom contour tends to agree with the corresponding charted contour, however, a thorough comparison is hindered by the discontinuities of the derived contour.

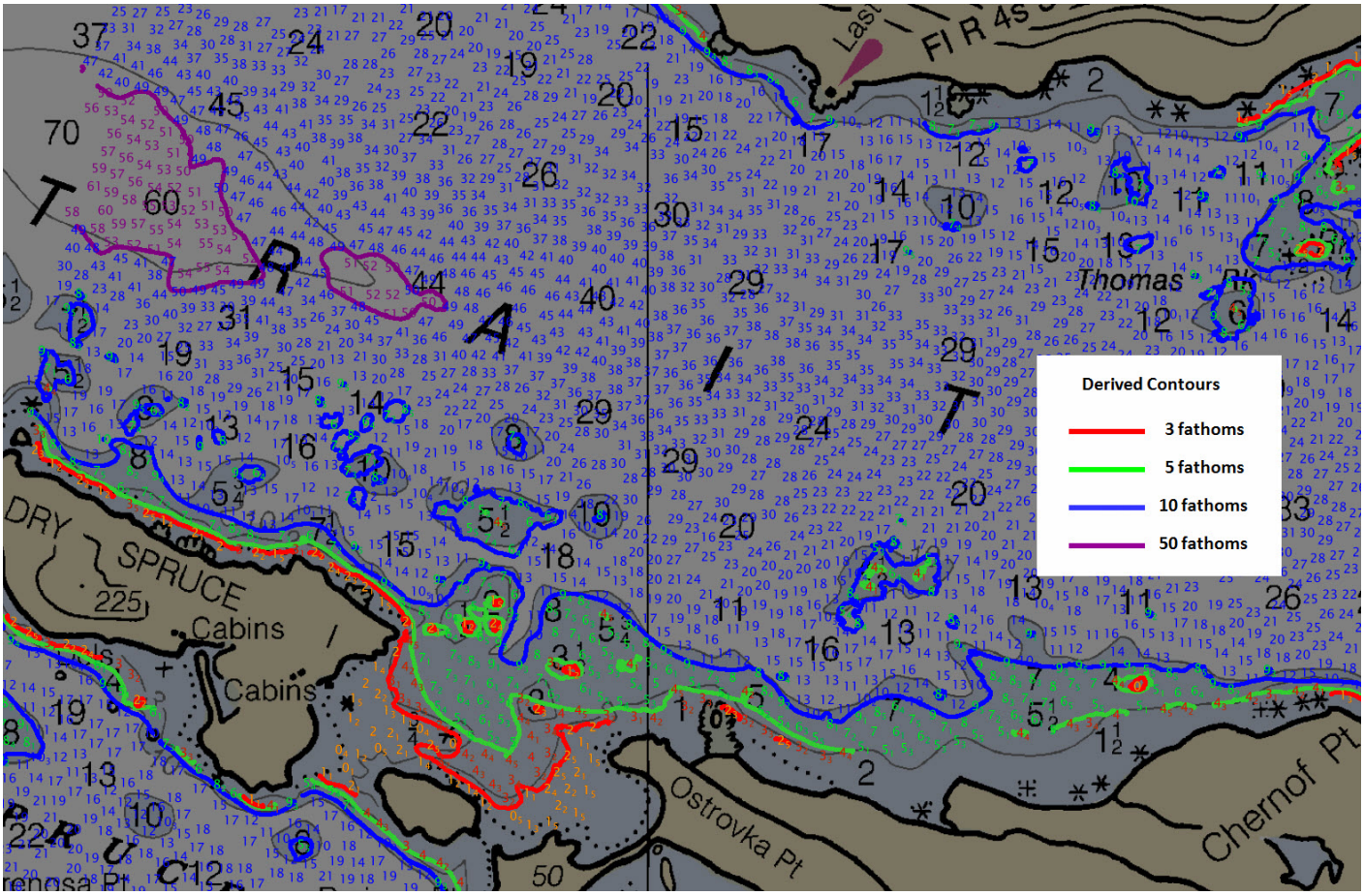

Figure 23: Overview of Kupreanof Strait with an overlay of derived soundings and contours. Note: The chart has been darkened slightly to enhance derived contour and sounding visuals.

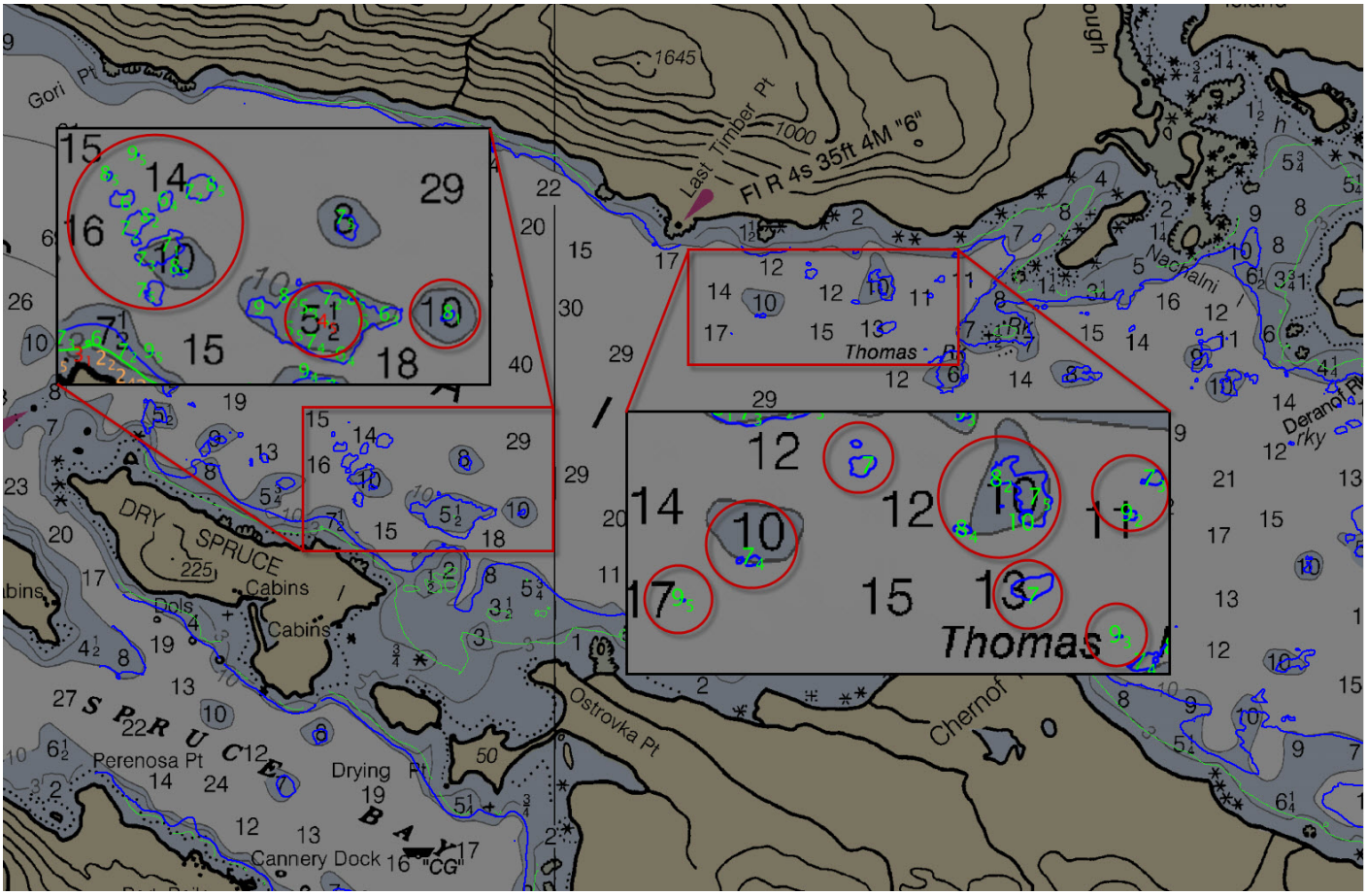

Figure 24: Areas in Kupreanof Strait where derived soundings are shoaler than charted depths

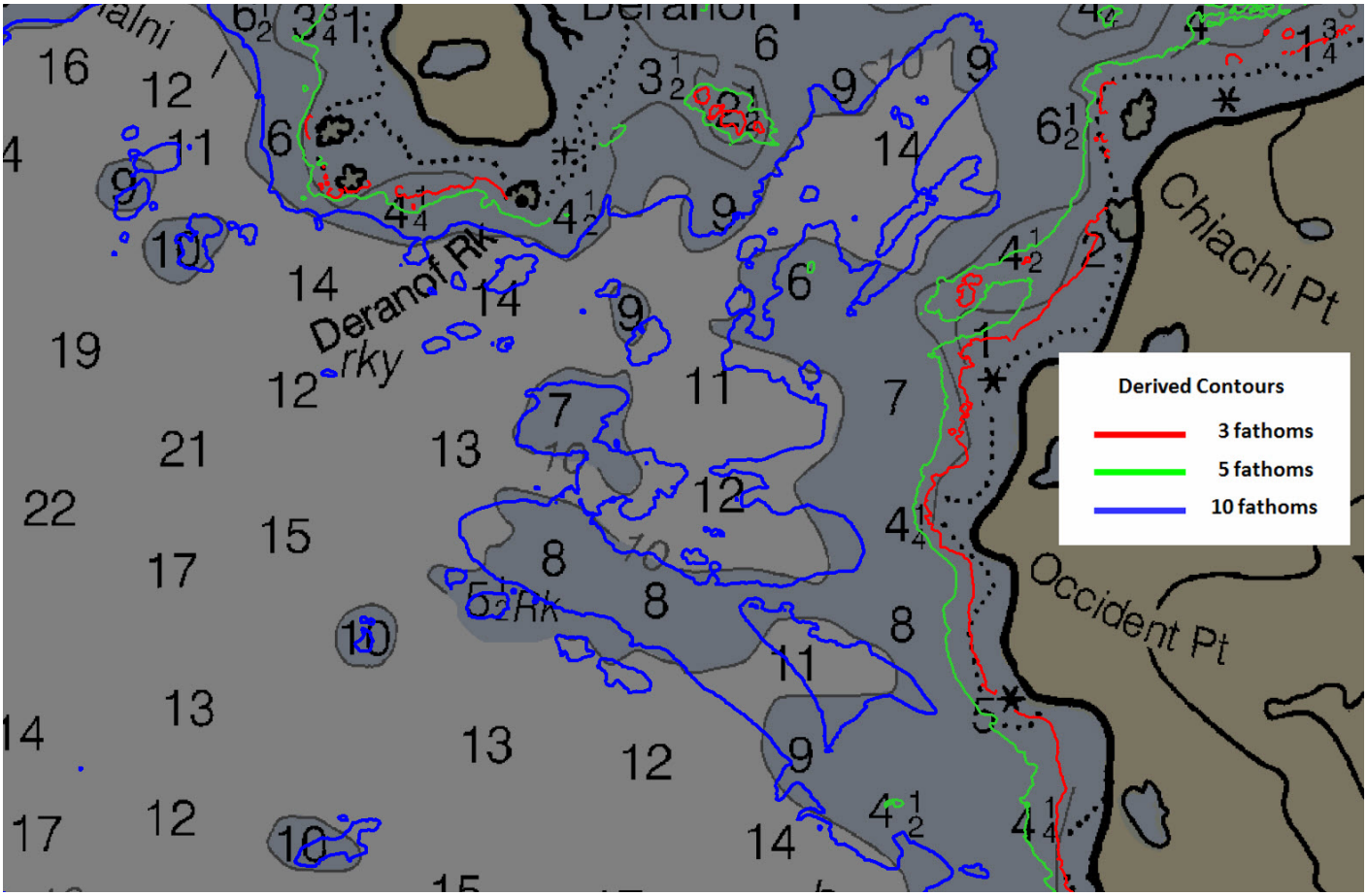

Figure 25: Differences in the derived 10-fathom contour west of Occident and Chiachi Points.

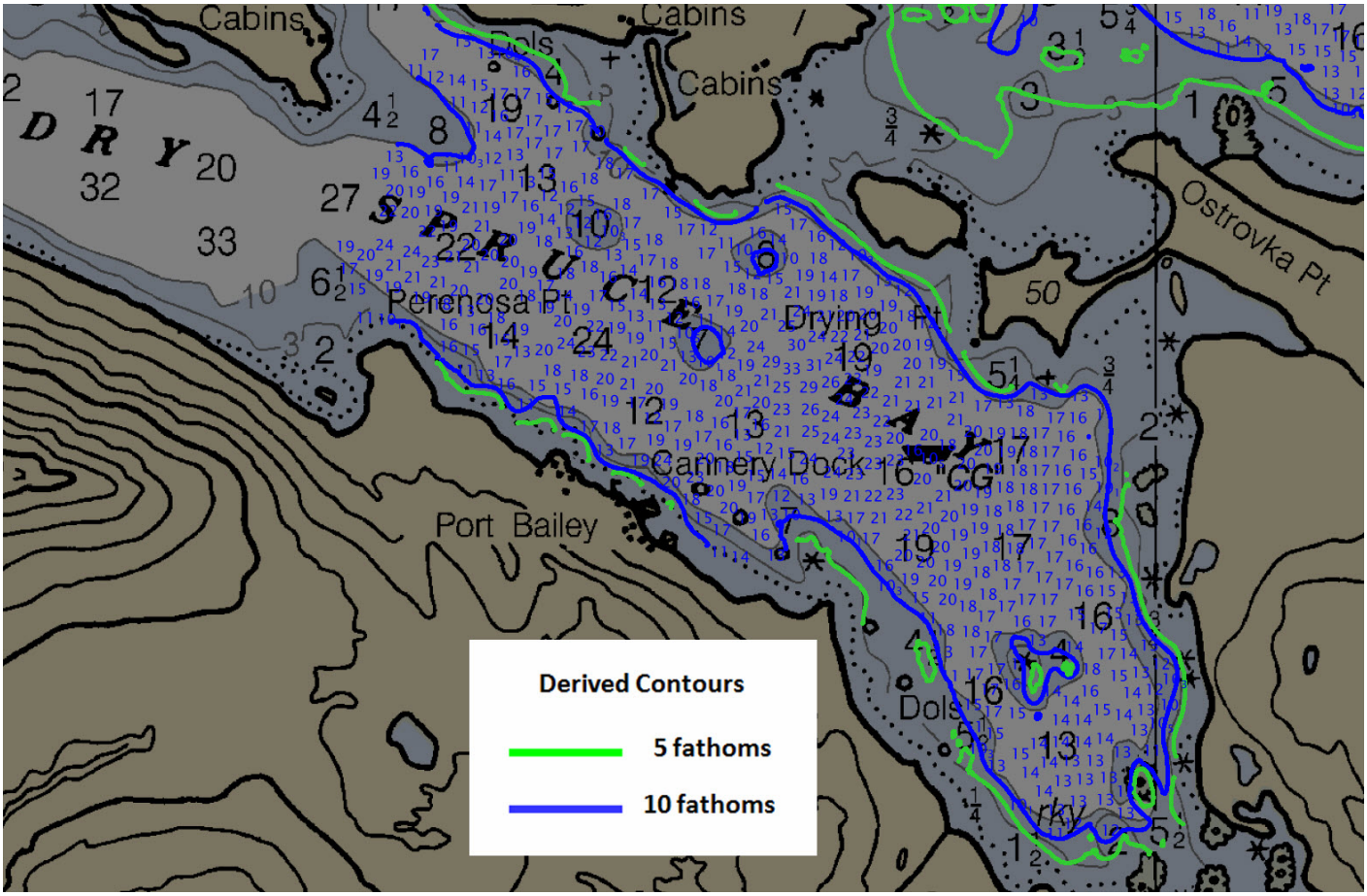

Figure 26: Overview of Dry Spruce Bay with an overlay of derived soundings and contours.

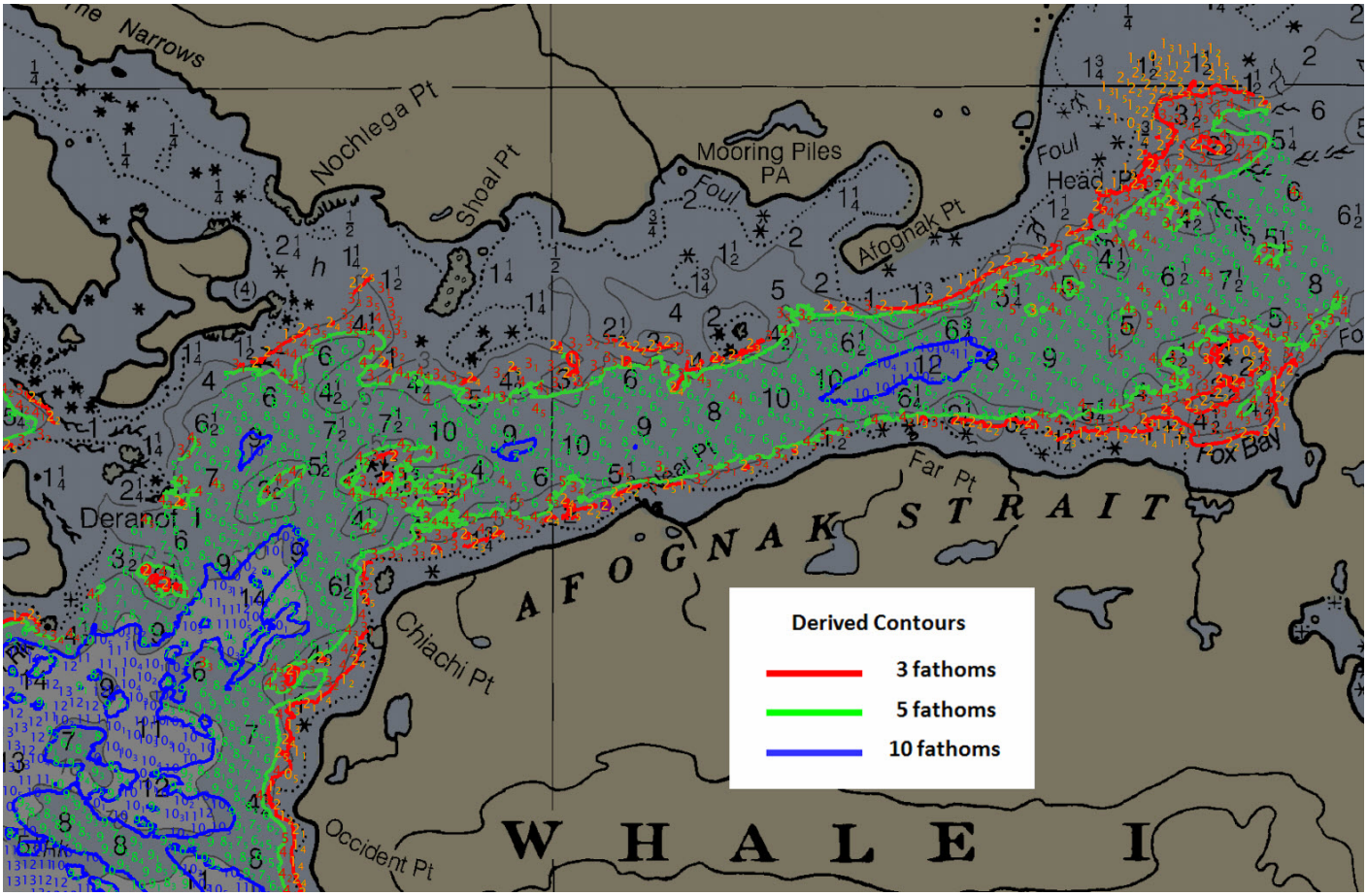

Figure 27: Overview of Afognak Strait with an overlay of derived contours.

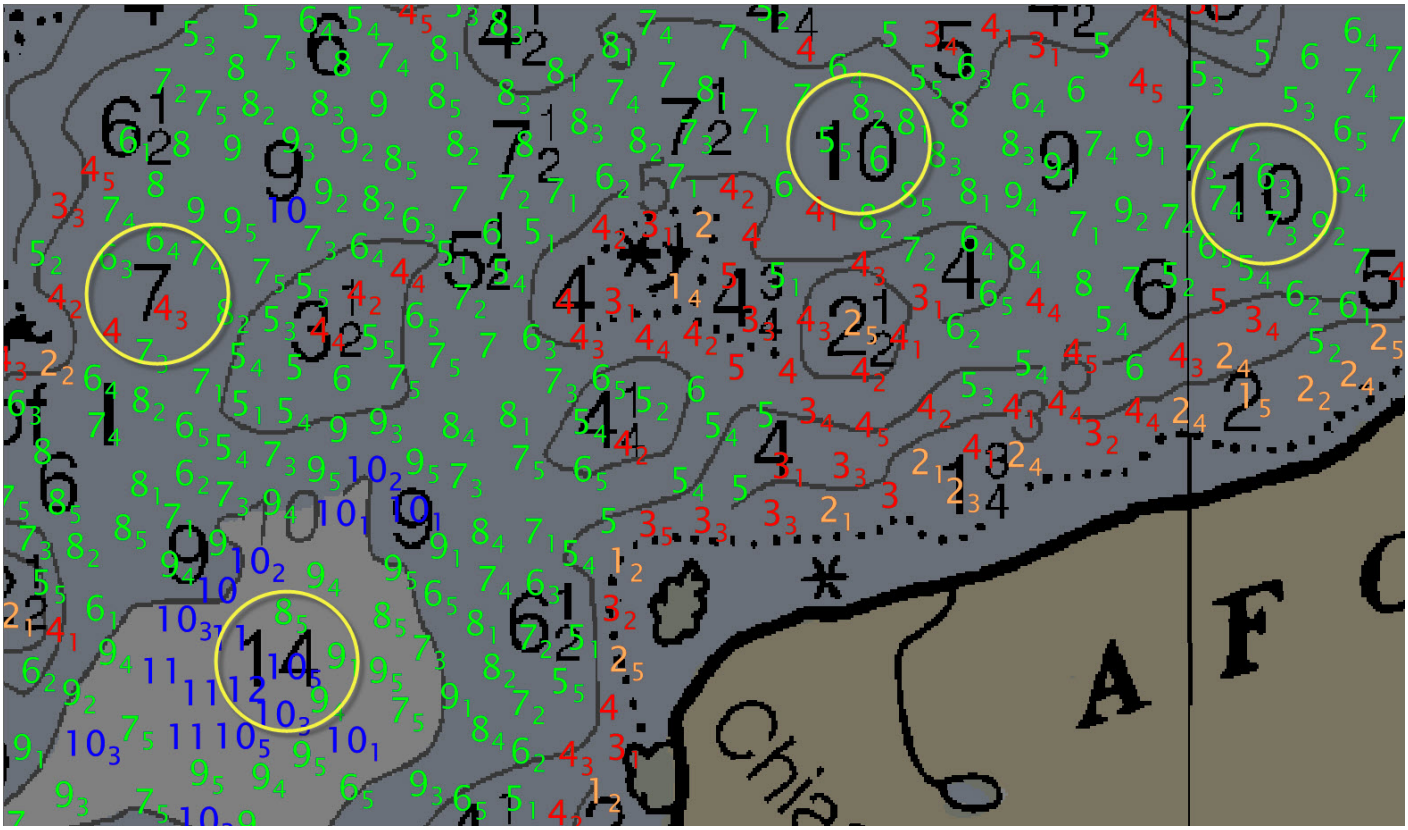

Figure 28: Area at the west end of Afognak Strait where derived soundings are shoaler than charted depths.

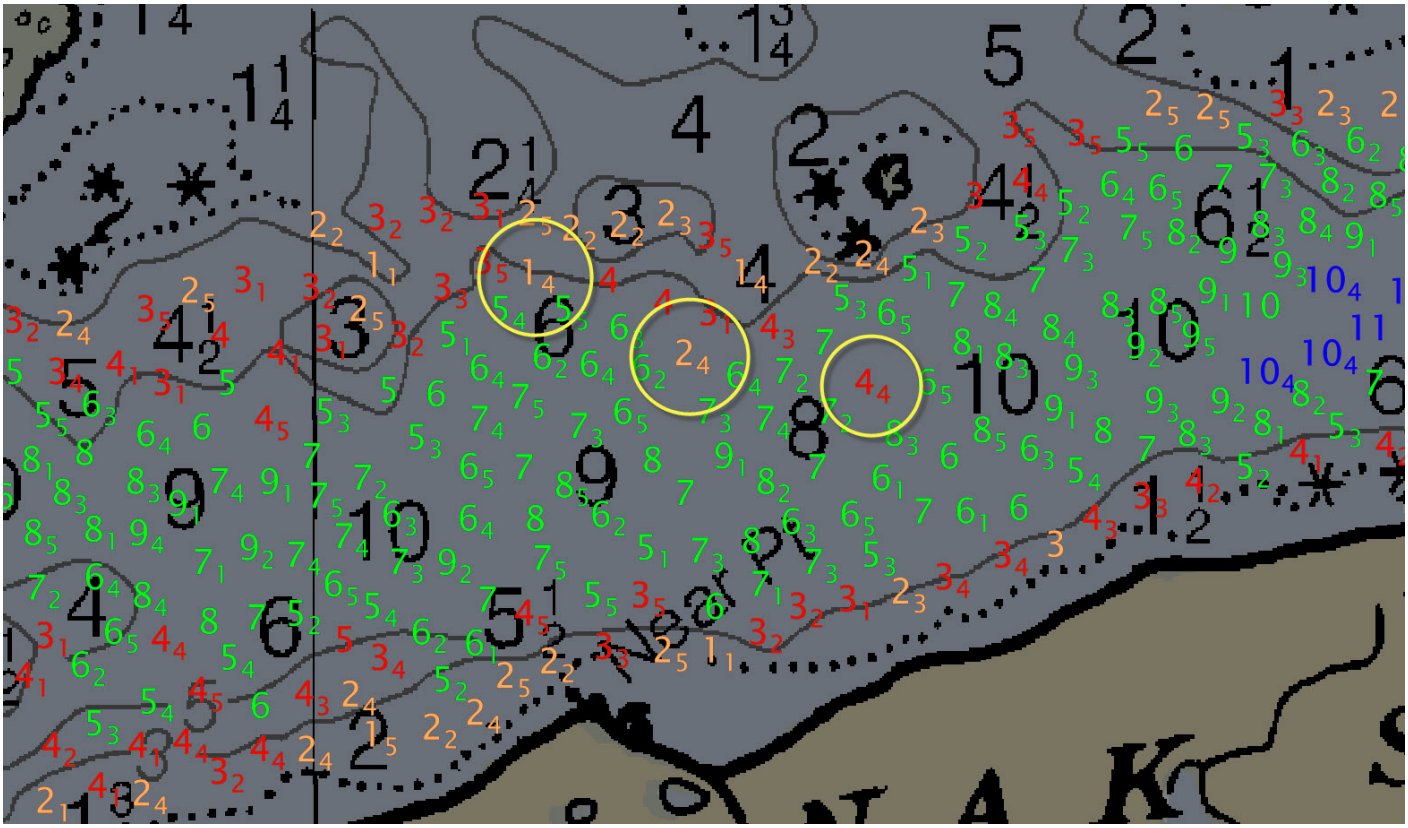

Figure 29: A central area of Afognak Strait where derived soundings are shoaler than charted depths.

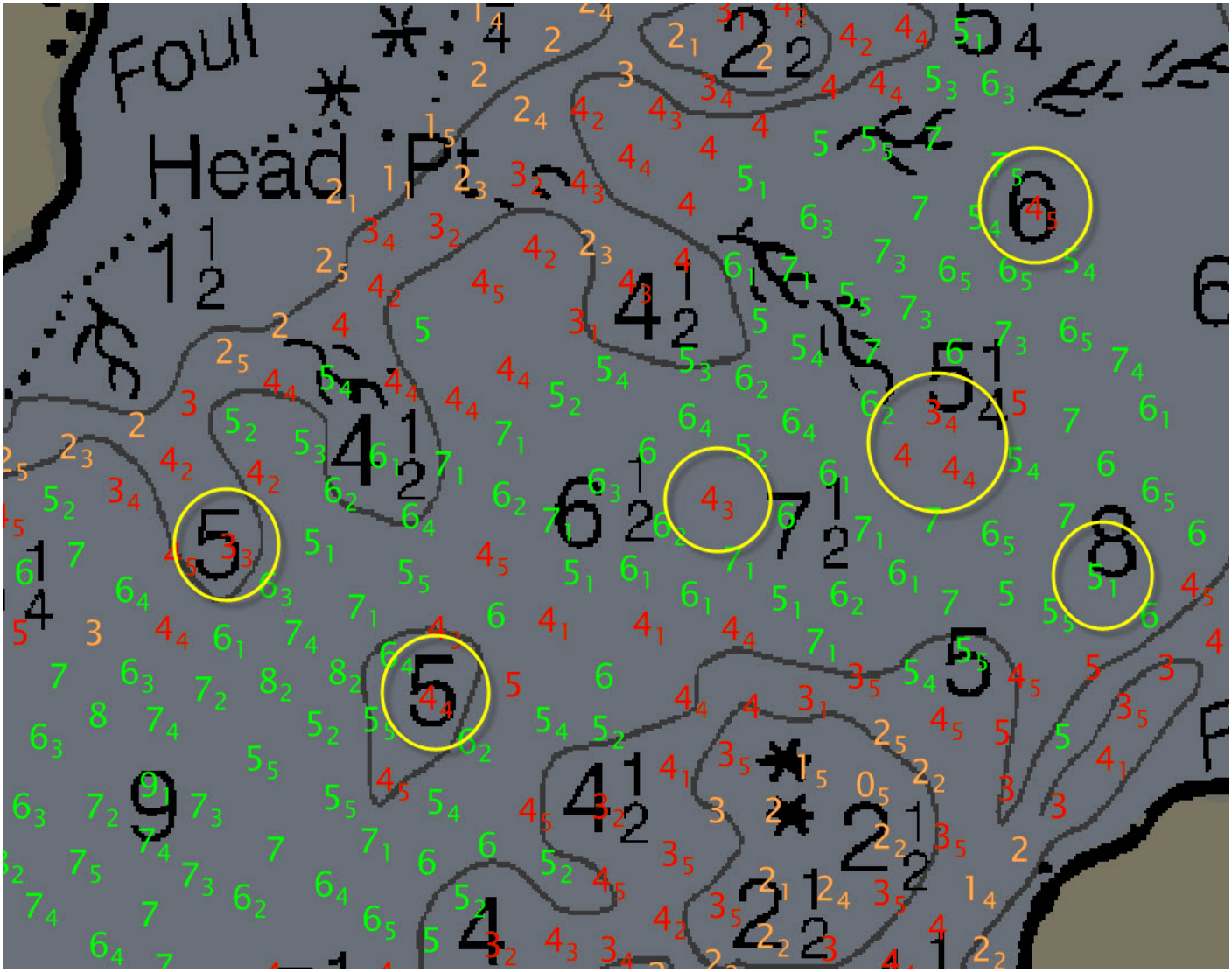

Figure 30: Area at the east end of Afognak Strait where derived soundings are shoaler than charted depths.

16594

The Whale Passage inset from Chart 16594 was used for comparisons made in Whale Passage.

Derived soundings in Whale Passage agreed within 2 fathoms except as noted below (Figures 31-32). The derived 10-fathom contour generally agrees with and follows the trend of the charted 10-fathom contour. However, an exception to this can be seen around Shag Rocks where the derived 10-fathom contour lies inshore of the charted contour.

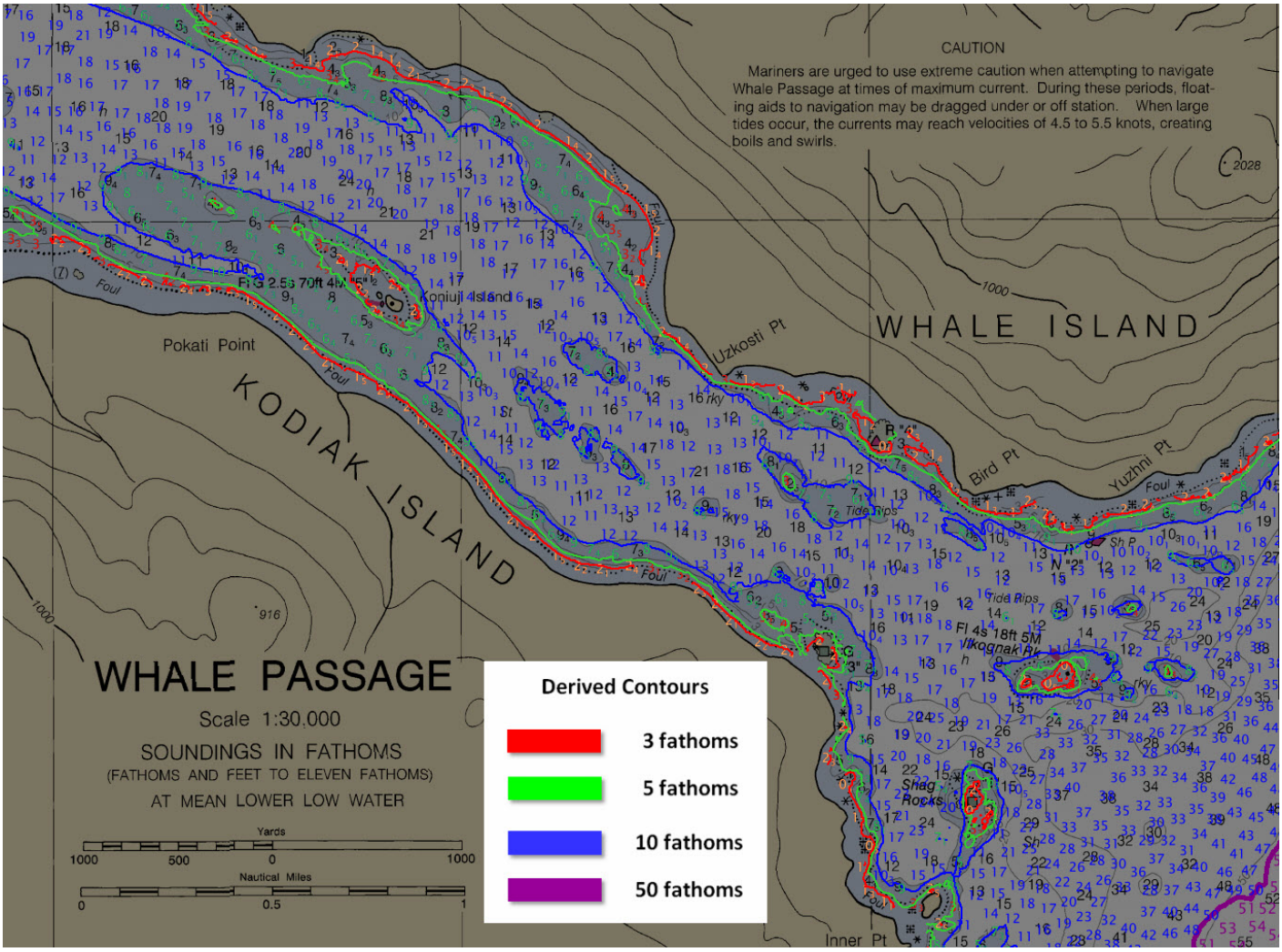

Figure 31: Overview of Whale Passage with an overlay of derived soundings and contours.

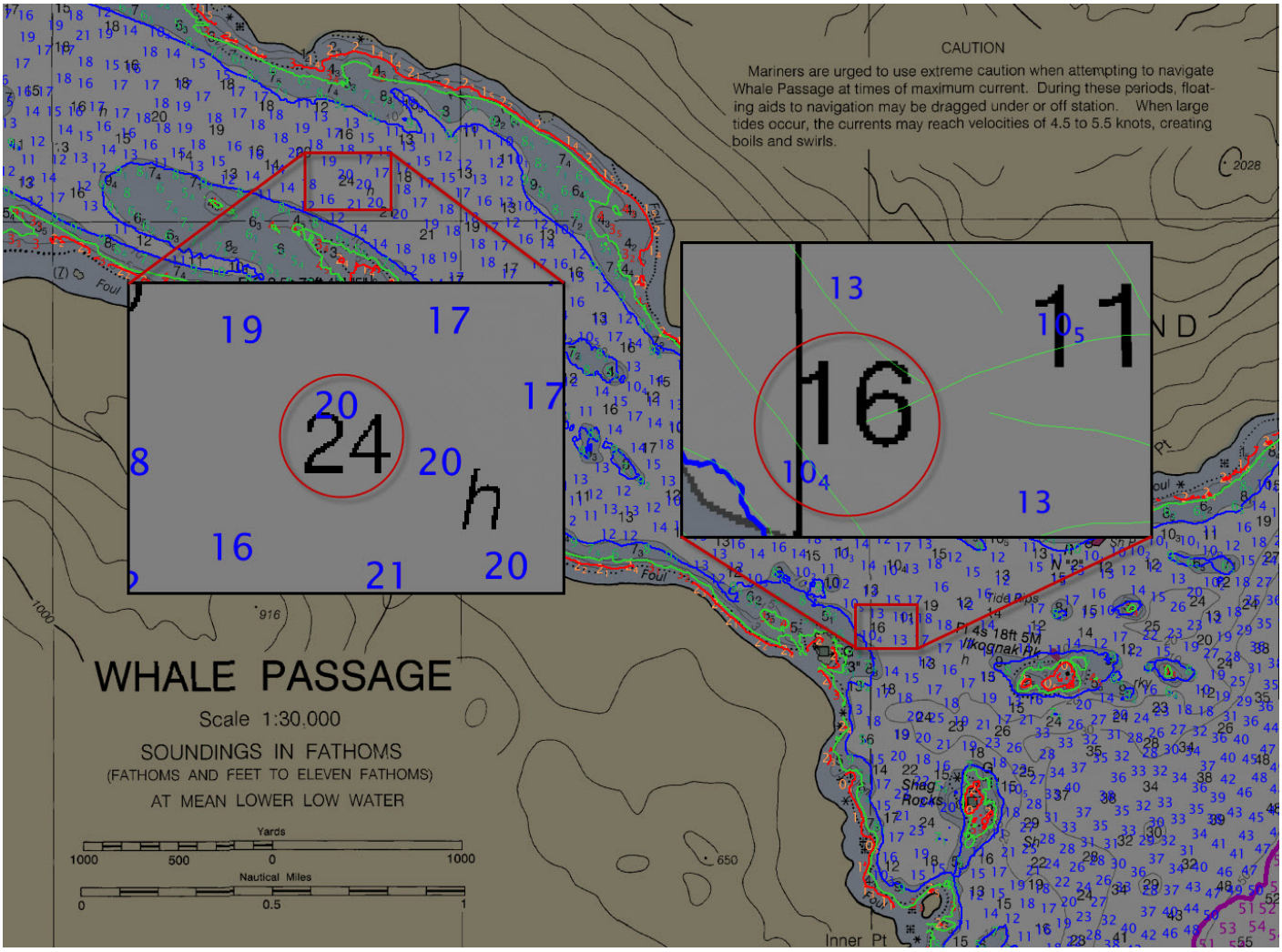

Figure 32: Two spots in Whale Passage where derived soundings are shoaler than the chart depicts.

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?
US4AK5PM	1:78900	4	07/12/2011	08/12/2014	NO

Table 17: Largest Scale ENCs

US4AK5PM

Electronic Navigation Chart (ENC) US4AK5PM coincides with raster Chart 16594. The soundings on the ENC match the raster, however, the contours on raster Chart 16594 tend to be shifted to the northwest by about 40 to 50 meters (Figure 33). Although there is a visible shift in the contours between the raster and the ENC, the contours on the raster and the ENC both follow the same trend and therefore a comparison between H12689 and the ENC is equivalent to the preceding comparison with Chart 16594.

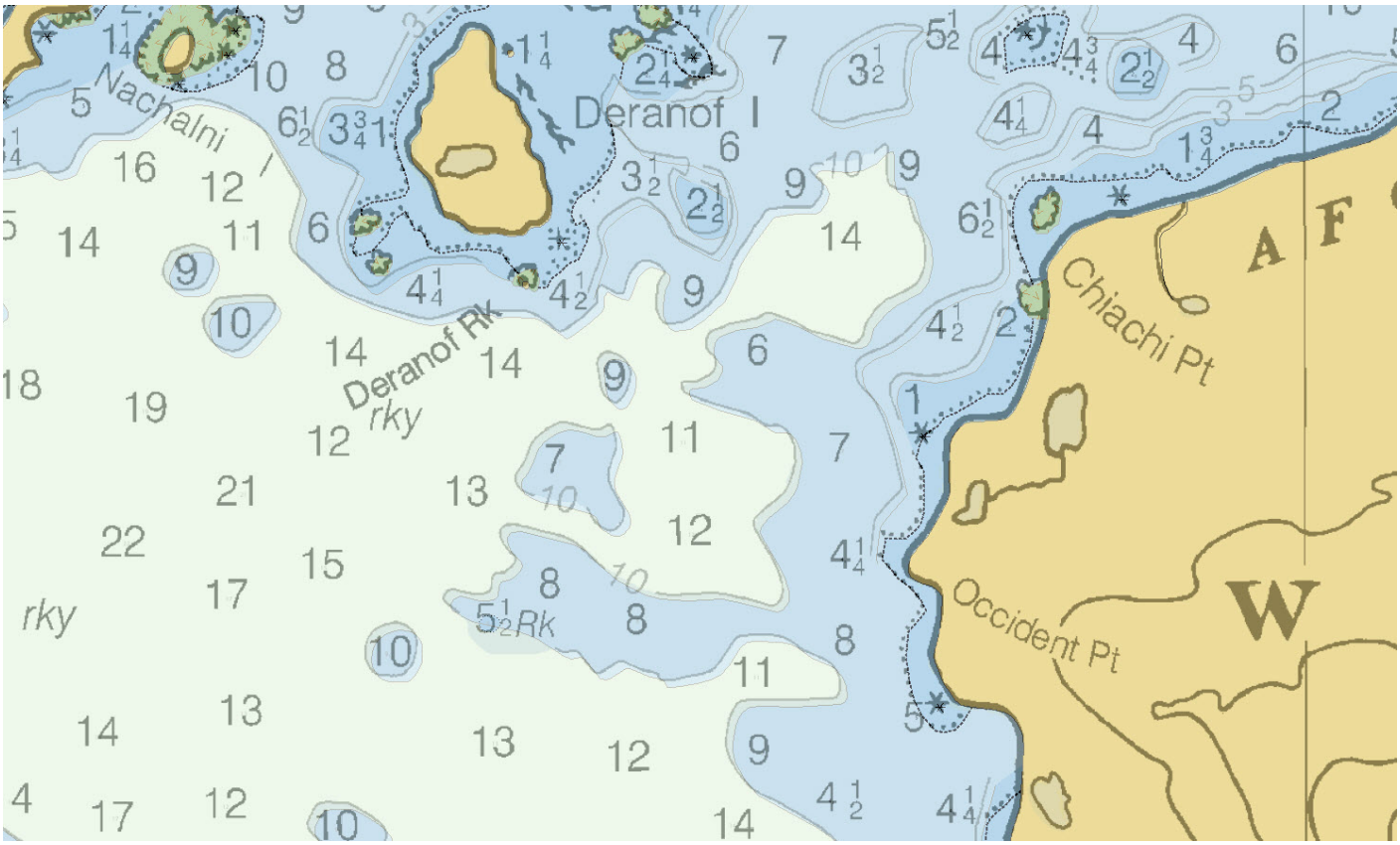

Figure 33: Transparent overlay of raster Chart 16594 on ENC US4AK5PM showing the misalignment of contours.

D.1.3 AWOIS Items

No AWOIS items were assigned for this survey.

D.1.4 Maritime Boundary Points

No Maritime Boundary Points were assigned for this survey.

D.1.5 Charted Features

Complete MBES coverage was obtained over charted rock labeled as PA west of Chernof Point. No feature was discovered.

D.1.6 Uncharted Features

One uncharted, non-dangerous wreck was found near the mouth of Whale Passage (Figure 34). The position and other information for the wreck is attributed in the H12689 Final Feature File submitted with this report.

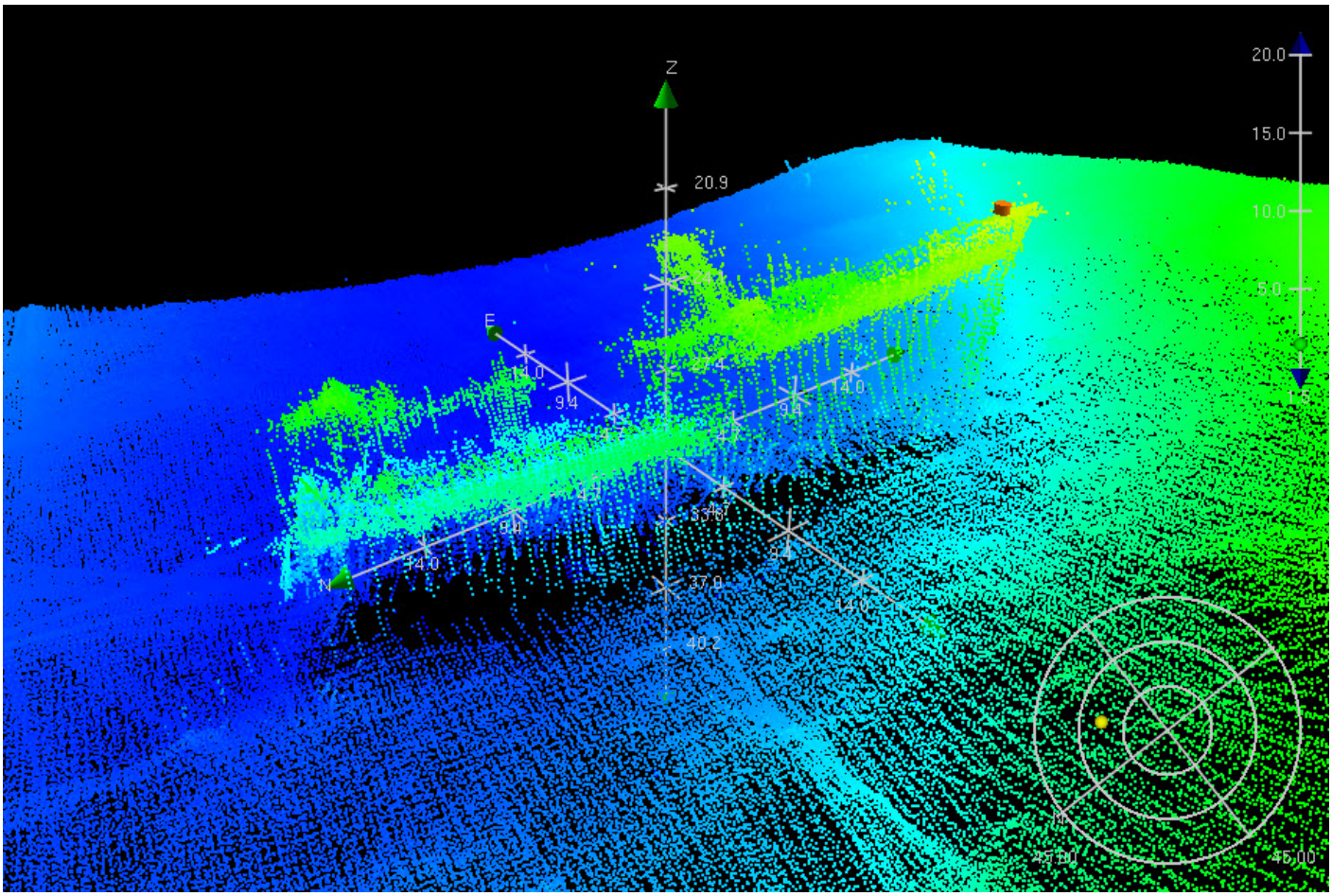

Figure 34: Wreck discovered in Whale Passage.

D.1.7 Dangers to Navigation

The following DTON reports were submitted to the processing branch:

DTON Report Name	Date Submitted
H12689 Danger to Navigation Report	2014-05-17
H12689 Danger to Navigation Report	2015-03-12

Table 18: DTON Reports

Three dangers to navigation were identified during this survey (Figure 35-36). The Danger to Navigation Reports are included in Appendix II of this report. The DTON west of Occident Point and in Whale Passage are reflected in the latest chart update as of 12/16/2014. The DTON located in Afognak Strait has been registered by the Nautical Data Branch and has been directed to Products Branch A for processing as of 3/16/2014.

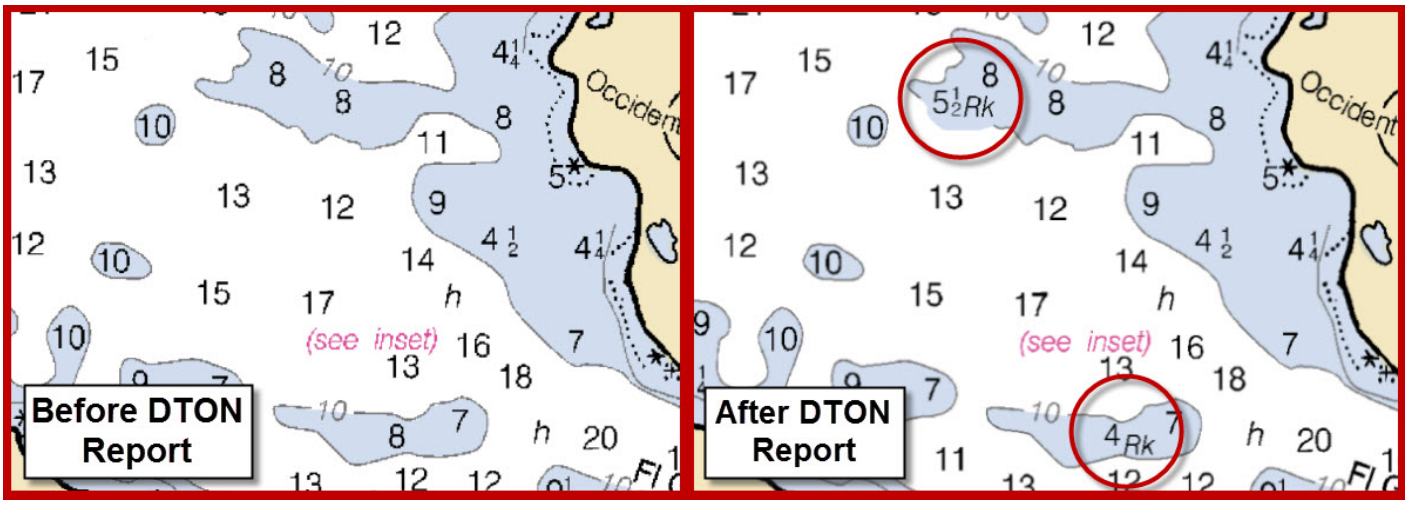

Figure 35: Chart 16594 before (left) and after (right) H12689 DTON were applied.

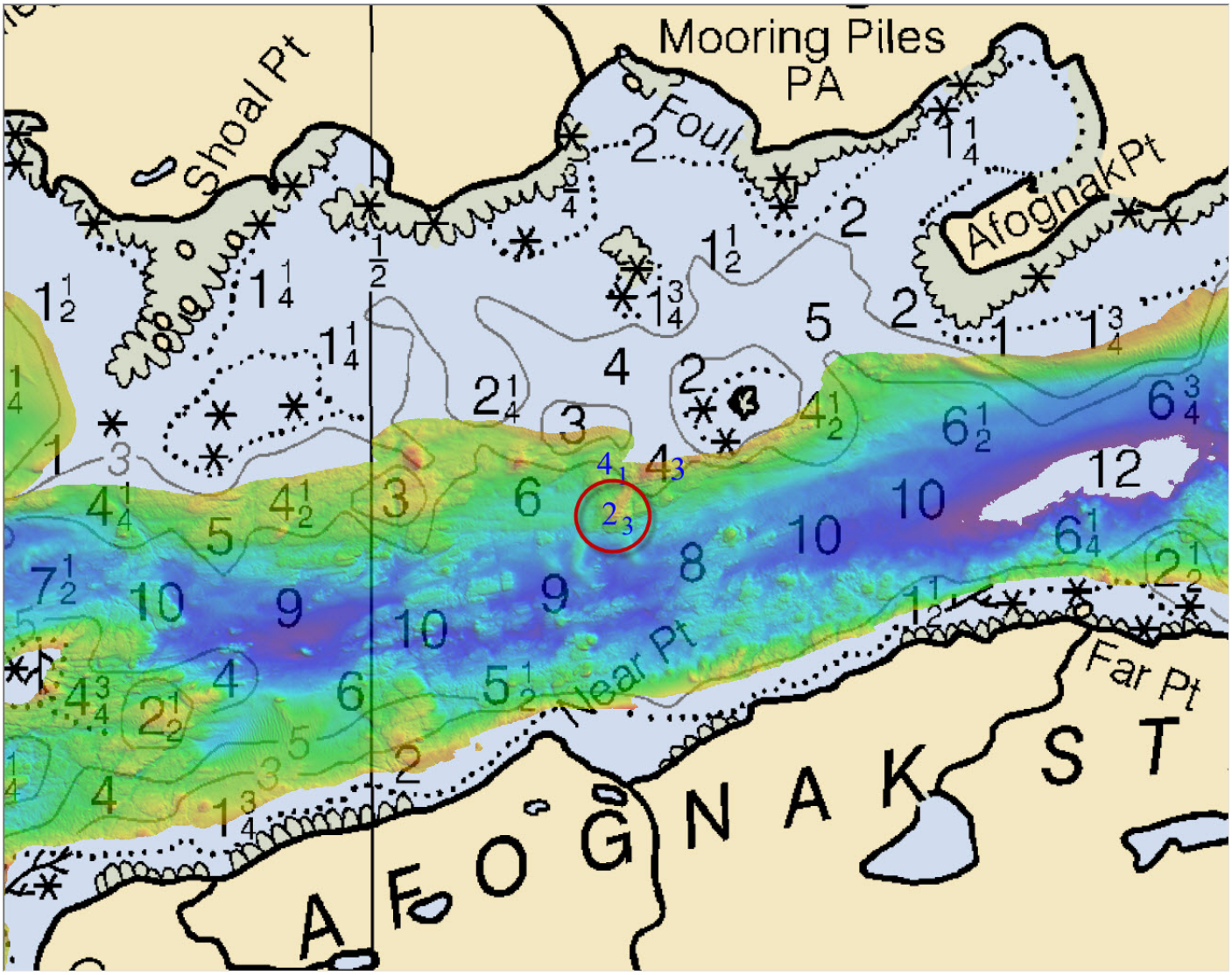

Figure 36: DTON located in Afognak Strait.

All DTONs have been charted and were included in the chart update product. The DTON report is attached.

D.1.8 Shoal and Hazardous Features

All shoal and hazardous features were investigated in accordance with the Project Instruction and the HSSD, and are addressed in the Final Feature File submitted with this report.

D.1.9 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.1.10 Bottom Samples

Eight proposed bottom sample locations were identified in the Project Reference File. All samples were collected at the proposed sites. Only one of the samples was not collected after three failed attempts. Acquired bottom samples are addressed with S-57 attribution and recorded in the Final Feature File submitted with this report

D.2 Additional Results

D.2.1 Shoreline

Shoreline verification was conducted near predicted low water in accordance with the applicable sections of the NOAA HSSDM and FPM. There were 370 assigned features for this survey. All features were addressed as required with S-57 attribution and recorded in the H12689 Final Features File to best represent the features at chart scale.

D.2.2 Prior Surveys

No prior survey comparisons exist for this survey.

D.2.3 Aids to Navigation

Aids to navigation (ATON) were present in the survey area, but were not assigned for investigation. All fifteen ATON observed in the field appeared correctly charted and serve their intended purpose.

D.2.4 Overhead Features

No overhead features exist for this survey.

D.2.5 Submarine Features

No submarine features exist for this survey.

D.2.6 Ferry Routes and Terminals

No ferry routes or terminals exist for this survey.

D.2.7 Platforms

No platforms exist for this survey.

D.2.8 Significant Features

No significant features exist for this survey.

D.2.9 Construction and Dredging

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

D.2.10 New Survey Recommendation

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

D.2.11 Inset Recommendation

No new insets are recommended for this area.

E. Approval Sheet

As Chief of Party, Field operations for this hydrographic survey were conducted under my direct supervision, with frequent personal checks of progress and adequacy. I have reviewed the attached survey data and reports.

All field sheets, this Descriptive Report, and all accompanying records and data are approved. All records are forwarded for final review and processing to the Processing Branch.

The survey data meets or exceeds requirements as set forth in the NOS Hydrographic Surveys and Specifications Deliverables Manual, Field Procedures Manual, Letter Instructions, and all HSD Technical Directives. These data are adequate to supersede charted data in their common areas. This survey is complete and no additional work is required with the exception of deficiencies noted in the Descriptive Report.

Approver Name	Approver Title	Approval Date	Signature
Edward J. Van Den Ameele, CDR/NOAA	Commanding Officer, NOAA Ship Rainier	04/03/2015	
Adam Pfundt, LTJG/NOAA	Field Operations Officer, NOAA Ship Rainier	04/03/2015	Adam Pfundt I have reviewed this document 2015.04.02 09:36:44 -07'00'
James B. Jacobson	Chief Survey Technician	04/03/2015	James Jacobson I have reviewed this document 2015.04.06 11:08:35 -07'00'
Eli R. Smith	Hydrographic Assistant Survey Technician, NOAA Ship Rainier	04/03/2015	Eli Smith 2015.04.02 08:42:29 -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 Porpagated 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

H12689 Feature Report

Registry Number: H12689
State: Alaska
Locality: North Coast of Kodiak Island, AK
Sub-locality: Afognak Strait and Whale Passage
Project Number: OPR-P136-RA-14
Survey Dates: 5/7/2104 - 7/9/2104

Charts Affected

Number	Edition	Date	Scale (RNC)	RNC Correction(s)*
16594	14th	01/01/2015	1:30,000 (16594_3)	USCG LNM: 12/24/2013 (9/22/2015) CHS NTM: None (8/28/2015) NGA NTM: None (10/3/2015)
16594	14th	01/01/2015	1:78,900 (16594_1)	USCG LNM: 9/1/2015 (9/22/2015) CHS NTM: None (8/28/2015) NGA NTM: 2/24/2007 (10/3/2015)
16580	14th	01/01/2008	1:350,000 (16580_1)	[L]NTM: ?
16013	30th	07/01/2006	1:969,761 (16013_1)	[L]NTM: ?
531	24th	07/01/2007	1:2,100,000 (531_1)	[L]NTM: ?
500	8th	06/01/2003	1:3,500,000 (500_1)	[L]NTM: ?
530	32nd	06/01/2007	1:4,860,700 (530_1)	[L]NTM: ?
50	6th	06/01/2003	1:10,000,000 (50_1)	[L]NTM: ?

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

Features

Feature Type	Survey Depth	Survey Latitude	Survey Longitude
Wreck	21.25 m	57° 54' 43.9" N	152° 48' 03.7" W
Rock	10.25 m	57° 57' 16.9" N	152° 53' 34.5" W
Rock	7.46 m	57° 56' 17.0" N	152° 52' 36.1" W
Rock	4.50 m	57° 58' 55.7" N	152° 49' 10.5" W

1 - New Features

1.1) US 0000000001 02387 / Feature_Report_Office.000

Survey Summary

Survey Position:	57° 54' 43.9" N, 152° 48' 03.7" W
Least Depth:	21.25 m (= 69.72 ft = 11.620 fm = 11 fm 3.72 ft)
TPU (±1.96σ):	**THU (TPEh)** [None] ; **TVU (TPEv)** [None]
Timestamp:	2014-190.00:00:00.000 (07/09/2014)
Dataset:	Feature_Report_Office.000
FOID:	US 0000000001 02387(0226000000010953)
Charts Affected:	16594_3, 16594_1, 16580_1, 16013_1, 531_1, 500_1, 530_1, 50_1

Remarks:

WRECKS/remrks: New submerged wreck found with MBES

Feature Correlation

Source	Feature	Range	Azimuth	Status
Feature_Report_Office.000	US 0000000001 02387	0.00	000.0	Primary

Hydrographer Recommendations

Chart wreck as depicted

Cartographically-Rounded Depth (Affected Charts):

11ft (16594_1, 16580_1, 16013_1, 530_1)

11fm (16594_3, 531_1)

21m (500_1, 50_1)

S-57 Data

Geo object 1:	Wreck (WRECKS)
Attributes:	CATWRK - 1:non-dangerous wreck
	QUASOU - 6:least depth known
	SORDAT - 20140709
	SORIND - US,US,graph,H12689
	TECSOU - 3:found by multi-beam
	VALSOU - 21.250 m

WATLEV - 3:always under water/submerged

Office Notes

Office Note: Concur.

Feature Images

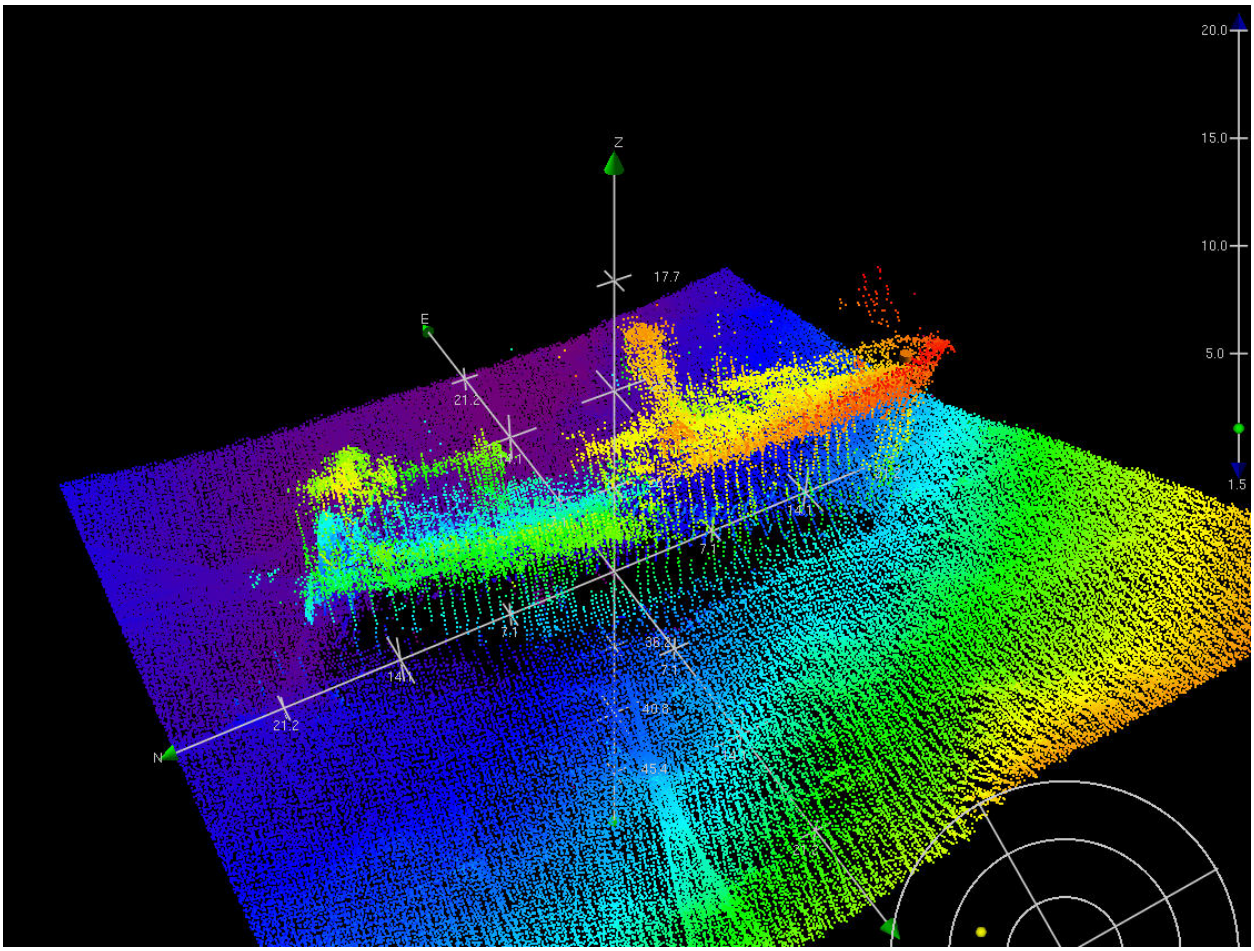

Figure 1.1.1

2 - Dangers To Navigation

2.1) US 0000007040 00001 / Feature_Report_Office.000

DANGER TO NAVIGATION

Survey Summary

Survey Position:	57° 57' 16.9" N, 152° 53' 34.5" W
Least Depth:	10.25 m (= 33.64 ft = 5.606 fm = 5 fm 3.64 ft)
TPU (±1.96σ):	**THU (TPEh)** [None] ; **TVU (TPEv)** [None]
Timestamp:	2014-129.00:00:00.000 (05/09/2014)
Dataset:	Feature_Report_Office.000
FOID:	US 0000007040 00001(022600001B800001)
Charts Affected:	16594_1, 16580_1, 16013_1, 531_1, 500_1, 530_1, 50_1

Remarks:

UWTROC/remrks: SAR: Update

Feature Correlation

Source	Feature	Range	Azimuth	Status
Feature_Report_Office.000	US 0000007040 00001	0.00	000.0	Primary

Hydrographer Recommendations

SAR: Update

Cartographically-Rounded Depth (Affected Charts):

5 ½fm (16594_1, 16580_1, 16013_1, 530_1)

5fm 3ft (531_1)

10.2m (500_1, 50_1)

S-57 Data

Geo object 1:	Underwater rock / awash rock (UWTROC)
Attributes:	EXPSOU - 1:within the range of depth of the surrounding depth area
	QUASOU - 6:least depth known
	SORDAT - 20140509
	SORIND - US,US,reprt,L-1211/14

TECSOU - 3:found by multi-beam

VALSOU - 10.253 m

WATLEV - 3:always under water/submerged

Office Notes

Office Note: Concur

2.2) US 0000007041 00001 / Feature_Report_Office.000

DANGER TO NAVIGATION

Survey Summary

Survey Position:	57° 56' 17.0" N, 152° 52' 36.1" W
Least Depth:	7.46 m (= 24.46 ft = 4.077 fm = 4 fm 0.46 ft)
TPU (±1.96σ):	**THU (TPEh)** [None] ; **TVU (TPEv)** [None]
Timestamp:	2014-129.00:00:00.000 (05/09/2014)
Dataset:	Feature_Report_Office.000
FOID:	US 0000007041 00001(022600001B810001)
Charts Affected:	16594_1, 16580_1, 16013_1, 531_1, 500_1, 530_1, 50_1

Remarks:

UWTROC/remrks: SAR: Update

Feature Correlation

Source	Feature	Range	Azimuth	Status
Feature_Report_Office.000	US 0000007041 00001	0.00	000.0	Primary

Hydrographer Recommendations

SAR: Update

Cartographically-Rounded Depth (Affected Charts):

4fm (16594_1, 16580_1, 16013_1, 530_1)

4fm 0ft (531_1)

7.4m (500_1, 50_1)

S-57 Data

Geo object 1:	Underwater rock / awash rock (UWTROC)
Attributes:	EXPSOU - 2:shoaler than range of depth of the surrounding depth area
	QUASOU - 6:least depth known
	SORDAT - 20140509
	SORIND - US,US,reprt,L-1211/14

TECSOU - 3:found by multi-beam

VALSOU - 7.456 m

WATLEV - 3:always under water/submerged

Office Notes

Office Note: Concur.

2.3) US 0000007039 00001 / Feature_Report_Office.000

DANGER TO NAVIGATION

Survey Summary

Survey Position:	57° 58' 55.7" N, 152° 49' 10.5" W
Least Depth:	4.50 m (= 14.76 ft = 2.461 fm = 2 fm 2.76 ft)
TPU (±1.96σ):	**THU (TPEh)** [None] ; **TVU (TPEv)** [None]
Timestamp:	2014-295.00:00:00.000 (10/22/2014)
Dataset:	Feature_Report_Office.000
FOID:	US 0000007039 00001(022600001B7F0001)
Charts Affected:	16594_1, 16580_1, 16013_1, 531_1, 500_1, 530_1, 50_1

Remarks:

[None]

Feature Correlation

Source	Feature	Range	Azimuth	Status
Feature_Report_Office.000	US 0000007039 00001	0.00	000.0	Primary

Hydrographer Recommendations

SAR: Retain

Cartographically-Rounded Depth (Affected Charts):

2 ½fm (16594_1, 16580_1, 16013_1, 530_1)

2fm 3ft (531_1)

4.5m (500_1, 50_1)

S-57 Data

Geo object 1:	Underwater rock / awash rock (UWTROC)
Attributes:	EXPSOU - 2:shoaler than range of depth of the surrounding depth area
	QUASOU - 6:least depth known
	SORDAT - 20141022
	SORIND - US,US,reprt,L489/15

TECSOU - 3:found by multi-beam

VALSOU - 4.500 m

WATLEV - 3:always under water/submerged

Office Notes

Office Note: Concur with clarification. Depth updated to 4.54 meters.

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

TIDE NOTE FOR HYDROGRAPHIC SURVEY

DATE: 10/08/2014

HYDROGRAPHIC BRANCH: Pacific
HYDROGRAPHIC PROJECT: OPR-P136-RA-2014
HYDROGRAPHIC SHEET: H12689

LOCALITY: Afognak Strait and Whale Passage, Kodiak Island, AK

TIME PERIOD: May 7th - July 9th, 2014

TIDE STATION USED: 945-7292 Kodiak Island, AK
Lat: 57° 43.8' N Long: 152° 30.8' W
PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters
HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 2.400 meters

TIDE STATION USED: 945-7376 Uzkosti Point, AK
Lat:57° 55.7' N Long: 152° 48.7' W
PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters
HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 3.160 meters

TIDE STATION USED: 945-7407 Nachalni Island, AK
Lat:57° 58.7' N Long: 152° 55.5' W
PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters
HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 3.908 meters

ESTIMATED ZONING ERROR: 0.24 **meters**

REMARKS: RECOMMENDED ZONING

Use Zone(s) identified as: SS22, SS149, SS150, SS150a, SS151, SS153, SS154, SS154a, SS155, SS155a, SS156, SS157, SWA273, SWA275, SWA276, SWA277, SWA278, SWA279, SWA280, SWA281, SWA282, SWA283, SWA284, SWA285, SWA286, SWA287, SWA288, SWA289, SWA290, SWA291, SWA292, SWA293, SWA294, SWA295, SWA296, SWA297, SWA298, SWA299, and SWA300

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: Use tide data from the appropriate station with applicable zoning correctors for each zone according to the order in which they are listed in the tide zone corrector file (*.zdf). For example, tide station one (TS1) would be the first choice for an applicable zone followed by TS2, etc. when data are not available

HOVIS.GERALD.THOMAS.JR.1365860250

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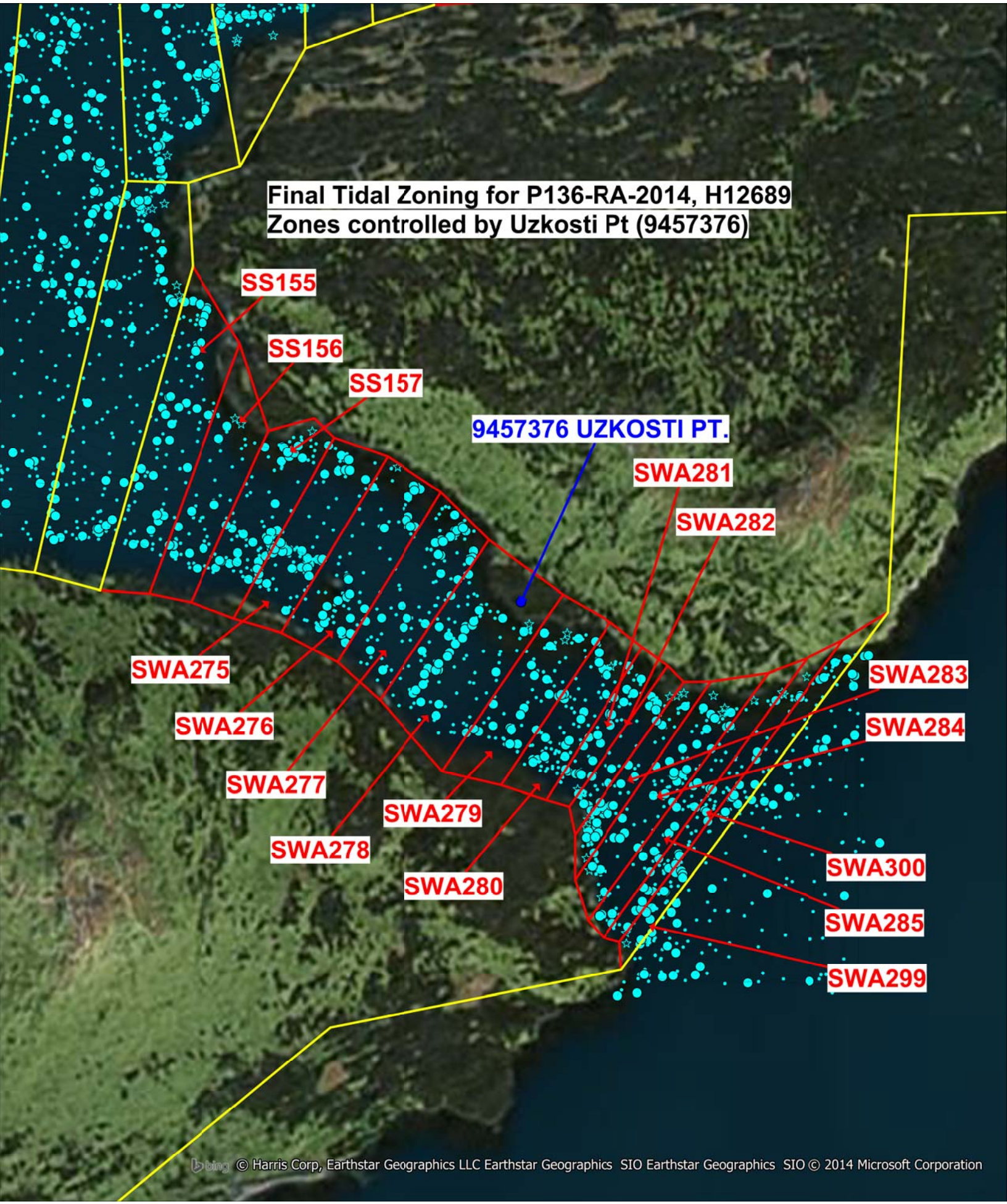
DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=OTHER, cn=HOVIS.GERALD.THOMAS.JR.1365860250
Date: 2014.10.16 09:57:43 -04'00'

CHIEF, PRODUCTS AND SERVICES BRANCH


Final Tidal Zoning for P136-RA-2014, H12689
Zones controlled by Uzkosti Pt (9457376)
SS155
SS156
SS157
9457376 UZKOSTI PT.
SWA281
SWA282
SWA275
SWA276
SWA277
SWA278
SWA279
SWA280
SWA283
SWA284
SWA300
SWA285
SWA299
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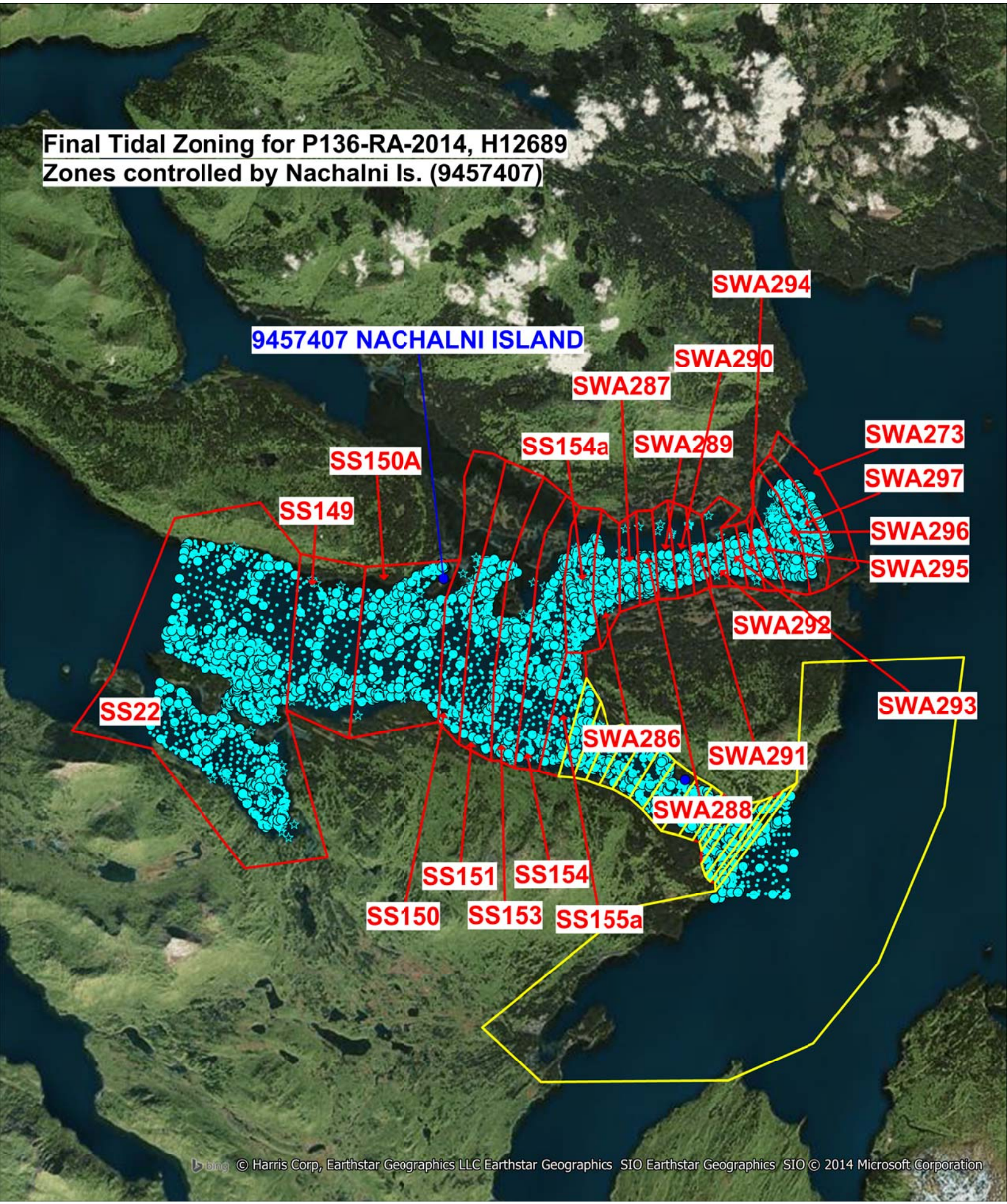
Final Tidal Zoning for P136-RA-2014, H12689
Zones controlled by Nachalni Is. (9457407)
9457407 NACHALNI ISLAND
SWA294
SWA290
SWA287
SWA273
SS154a
SWA289
SS150A
SWA297
SS149
SWA296
SWA295
SWA292
SS22
SWA293
SWA286
SWA291
SWA288
SS151
SS154
SS150
SS153
SS155a
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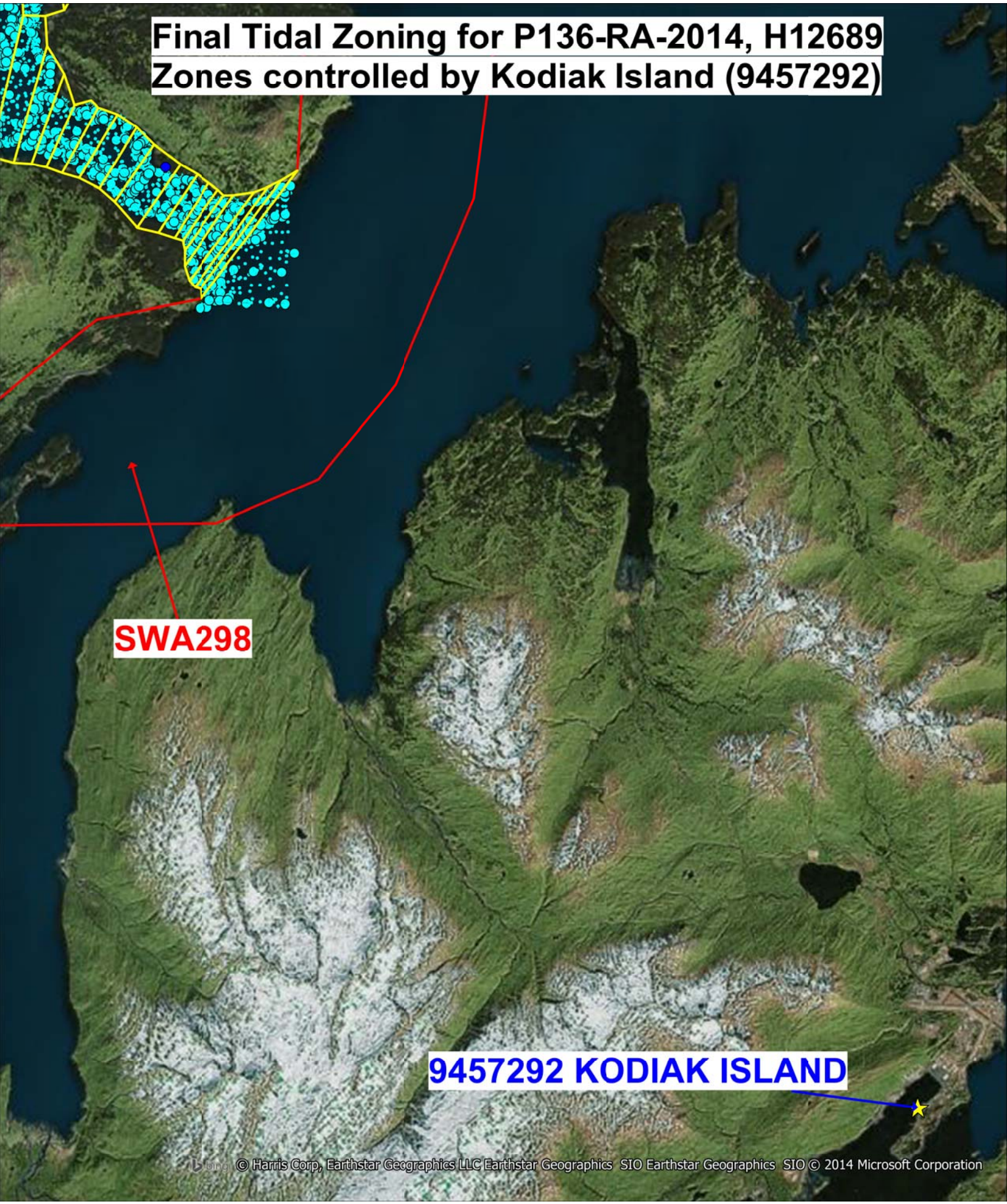
Final Tidal Zoning for P136-RA-2014, H12689
Zones controlled by Kodiak Island (9457292)
SWA298
9457292 KODIAK ISLAND
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APPROVAL PAGE

H12689

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

- H12689_DR.pdf
- Collection of depth varied resolution BAGS
- Processed survey data and records
- H12689_GeoImage.pdf

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

Approved:_____ Digitally signed by RAYMOND.ANNEMIEKE.S.1365883048 Date: 2016.07.25 10:37:17 -07'00'

Annie Raymond
Physical Scientist, Pacific Hydrographic Branch

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

Approved:_____ 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: 2016.07.25 13:23:17 -07'00'

Peter Holmberg
Cartographic Team Lead, Pacific Hydrographic Branch