

H12594

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

DESCRIPTIVE REPORT

Type of Survey: Navigable Area

Registry Number: H12594

LOCALITY

State(s): Alaska

General Locality: Shumagin Islands, AK

Sub-locality: Vicinity of Chernabura Island

2013

CHIEF OF PARTY
Richard T. Brennan, CDR/NOAA

LIBRARY & ARCHIVES

Date:

HYDROGRAPHIC TITLE SHEET

H12594

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: **Shumagin Islands, AK**

Sub-Locality: **Vicinity of Chernabura Island**

Scale: **40000**

Dates of Survey: **07/14/2013 to 09/02/2013**

Instructions Dated: **05/31/2013**

Project Number: **OPR-P183-RA-13**

Field Unit: **NOAA Ship *Rainier***

Chief of Party: **Richard T. Brennan, CDR/NOAA**

Soundings by: **Multibeam Echo Sounder**

Imagery by: **Multibeam Echo Sounder Backscatter**

Verification by: **Pacific Hydrographic Branch**

Soundings Acquired in: **meters at Mean Lower Low Water**

Remarks:

The purpose of this survey is to provide contemporary surveys to update National Ocean Service (NOS) nautical charts. All separates are filed with the hydrographic data. Any revisions to the Descriptive Report (DR) generated during office processing are shown in bold, red italic text. The processing branch maintains the DR as a field unit product, therefore, all information and recommendations within the body of the DR are considered preliminary unless otherwise noted. The final disposition of surveyed features is represented in the OCS nautical chart update products. All pertinent records for this survey, including the DR, are archived at the National Geophysical Data Center (NGDC) and can be retrieved via <http://www.ngdc.noaa.gov/>.

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Descriptive Report to Accompany Survey H12594

Project: OPR-P183-RA-13

Locality: Shumagin Islands, AK

Sublocality: Vicinity of Chernabura Island

Scale: 1:40000

July 2013 - September 2013

NOAA Ship *Rainier*

Chief of Party: Richard T. Brennan, CDR/NOAA

A. Area Surveyed

The survey area is referred to as Sheet 7: "Vicinity of Chernabura Island" within the Project Instructions. It surrounds Chernabura Island extending inshore as far as the existing reliable lidar coverage (Figure 1).

A.1 Survey Limits

Data were acquired within the following survey limits:

Northwest Limit	Southeast Limit
54° 51' 30.35" N 159° 39' 32.16" W	54° 43' 45.54" N 159° 23' 48.82" W

Table 1: Survey Limits

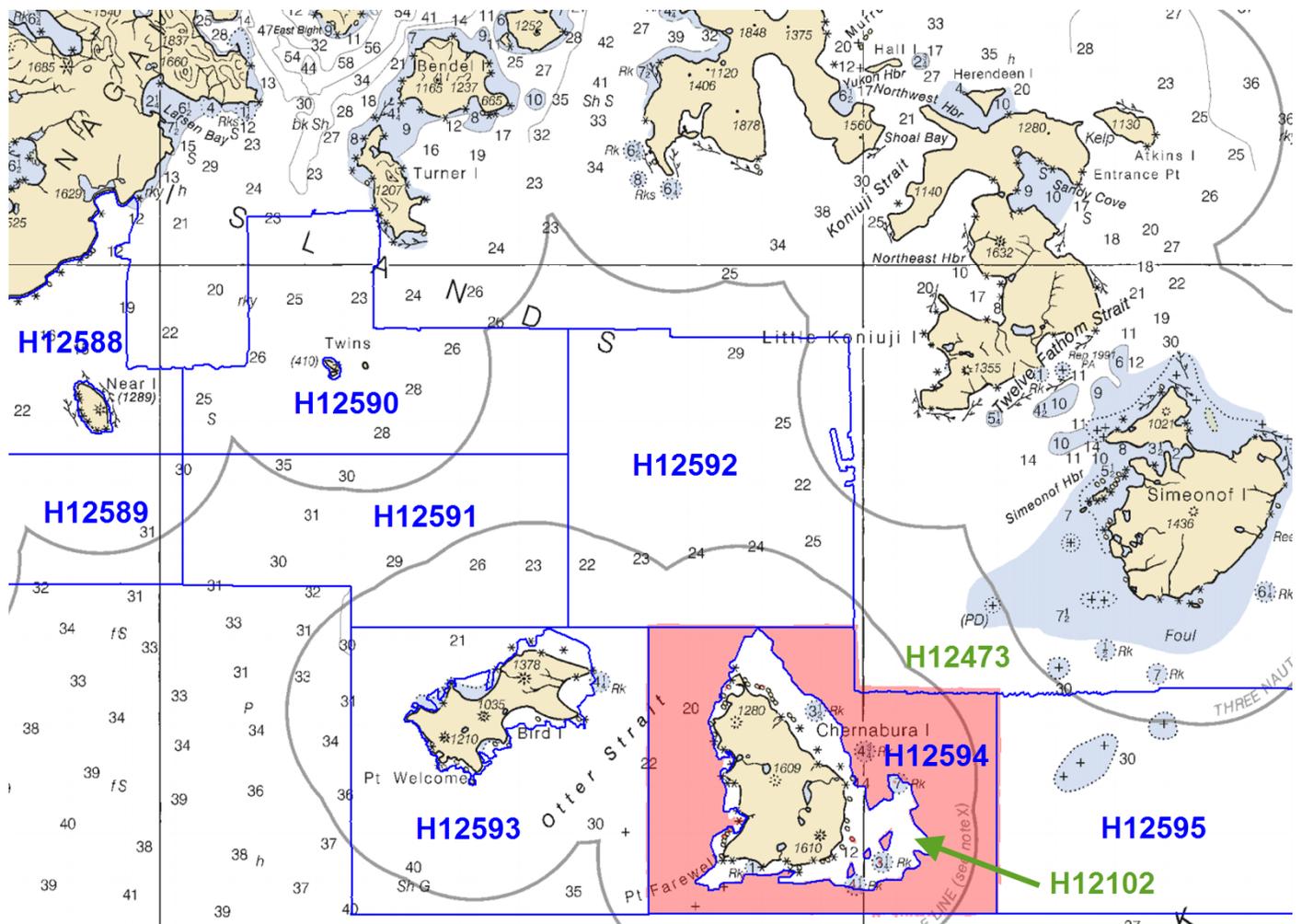


Figure 1: "Vicinity of Chernabura Island" survey limits overlaid on Chart 16540.

Survey limits were acquired in accordance with the requirements in the Project Instructions and the Hydrographic Surveys Specifications and Deliverables (HSSD).

A.2 Survey Purpose

The purpose of this survey is to provide contemporary surveys to update National Ocean Service (NOS) nautical charting products.

A.3 Survey Quality

The entire survey is adequate to supersede previous data.

Data acquired on survey H12594 met complete multibeam echosounder (MBES) coverage requirements, including the 5 soundings per node data density requirements outlined in Section 5.2.2.2 of the HSSD (Figure 2). Low data density occurred during data acquisition in rough seas (Figure 3). In order to extract

some descriptive statistics of the data density achievements, the density layer of each finalized surface was queried within CARIS and then examined in Excel (Figure 4). Overall, the required data density was achieved in 99.9% of the nodes and 99.9% of the total area.

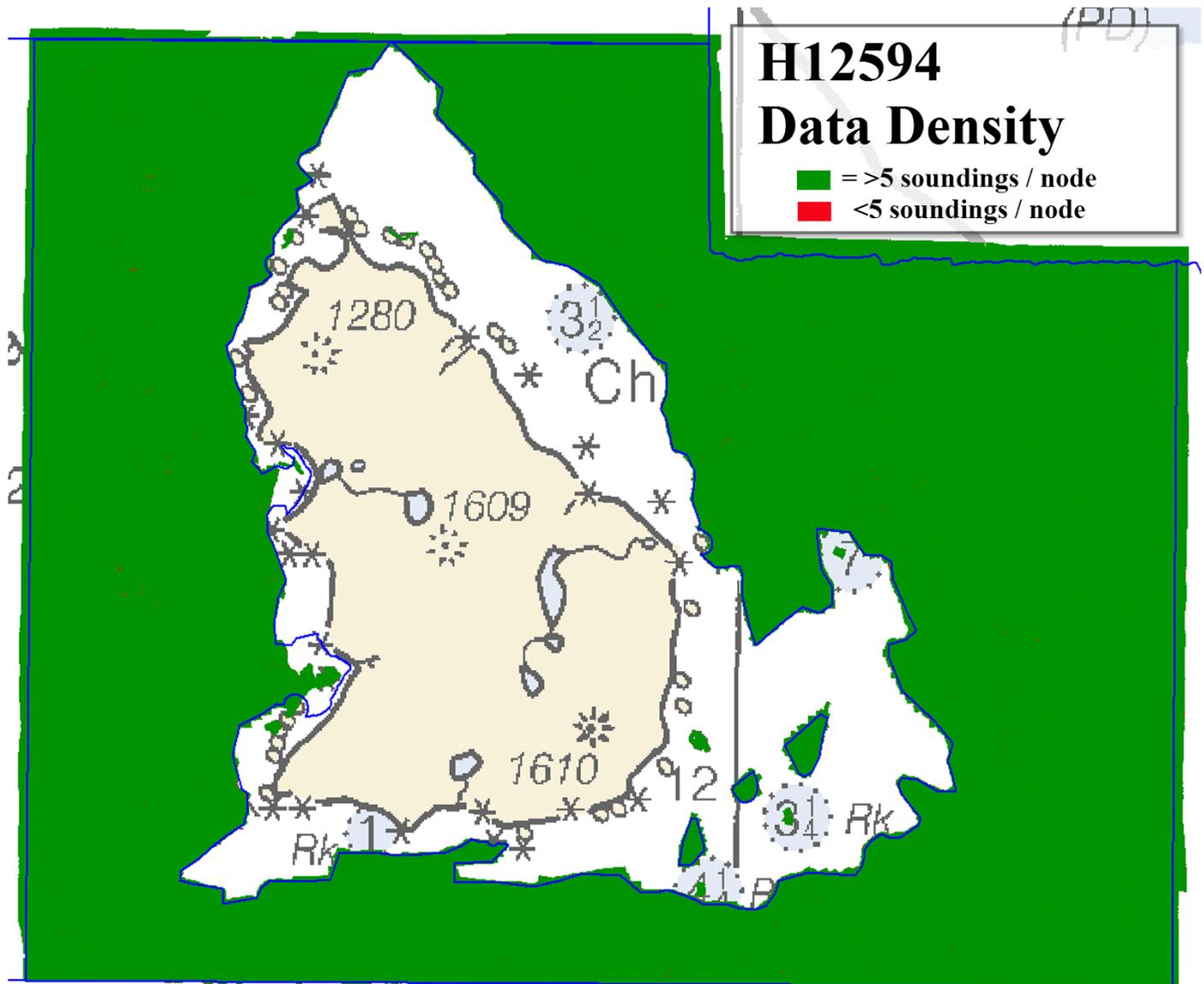


Figure 2: Data density. Areas in green meet the threshold of 5 soundings per node; red areas have a density of fewer than 5 soundings per node.

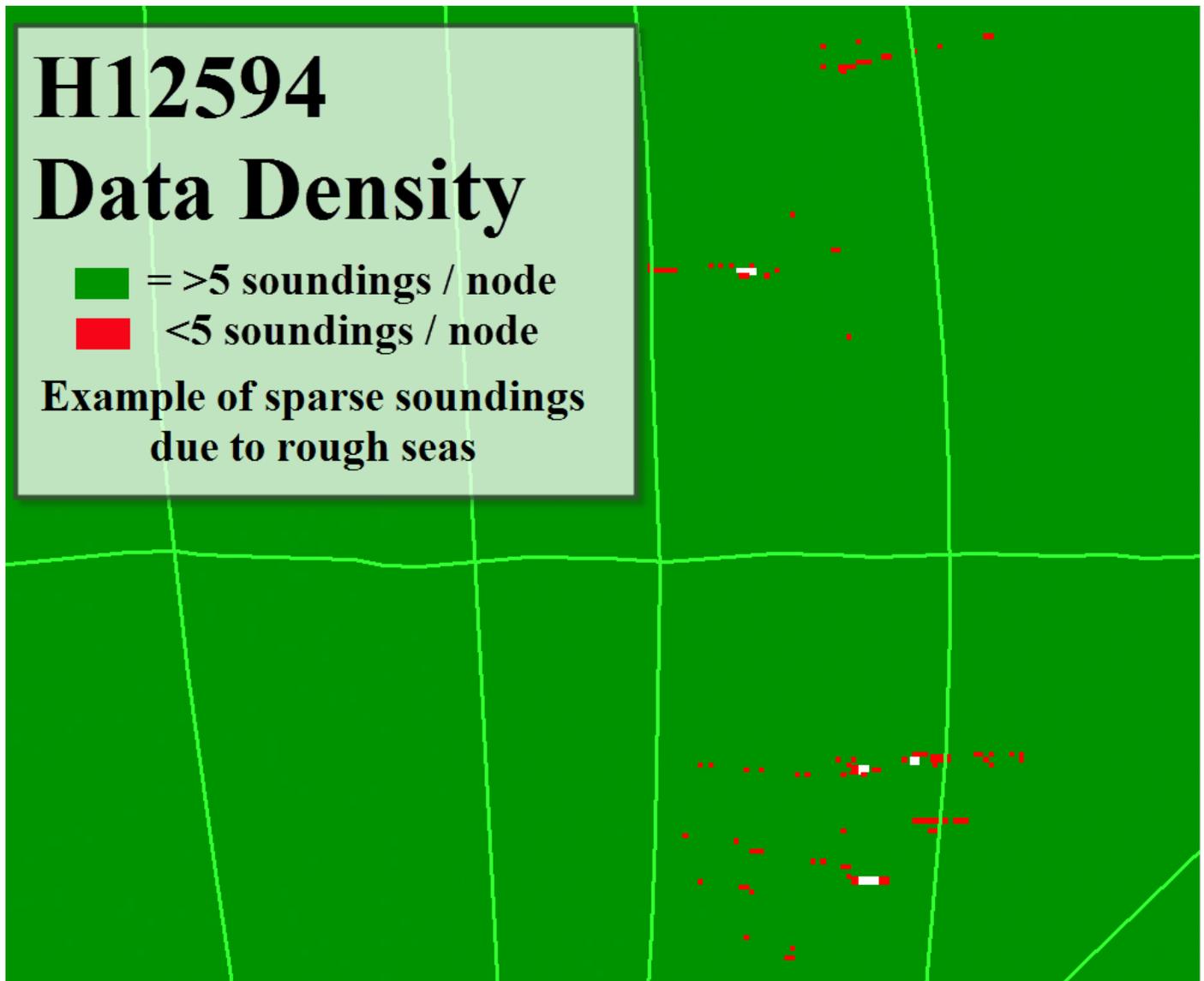


Figure 3: Examples of data density failures due to rough seas. Areas in green meet the threshold of 5 soundings per node; red areas have a density of fewer than 5 soundings per node.

Resolution	Depth range	Number of nodes	Fewer than five soundings per node	Percent of nodes with greater than five soundings per node
1m	0 - 20m	1,966,818	13,899	99.3%
2m	18 - 40m	16,383,828	9,978	99.9%
4m	36 - 80m	4,940,813	1,713	100.0%
TOTAL:		23,291,459	25,590	99.9%
TOTAL (by area):		146,555,138	81,219	99.9%

Figure 4: Percentage of nodes satisfying the 5 sounding density requirements, subdivided by the appropriate depth ranges. Note: The final row has a unit of square meters, and sums the number of different resolution nodes into a common unit of area.

Sounding density is compliant with the HSSDM, however, the percentages reported in Figure 4 have been rounded from two decimal places. Density percentages calculated via Pydro are as follows: 1m = 99.29%, 2m = 99.94%, 4m = 99.97%, Total = 99.99%, Total (by area) = 99.94%.

A.4 Survey Coverage

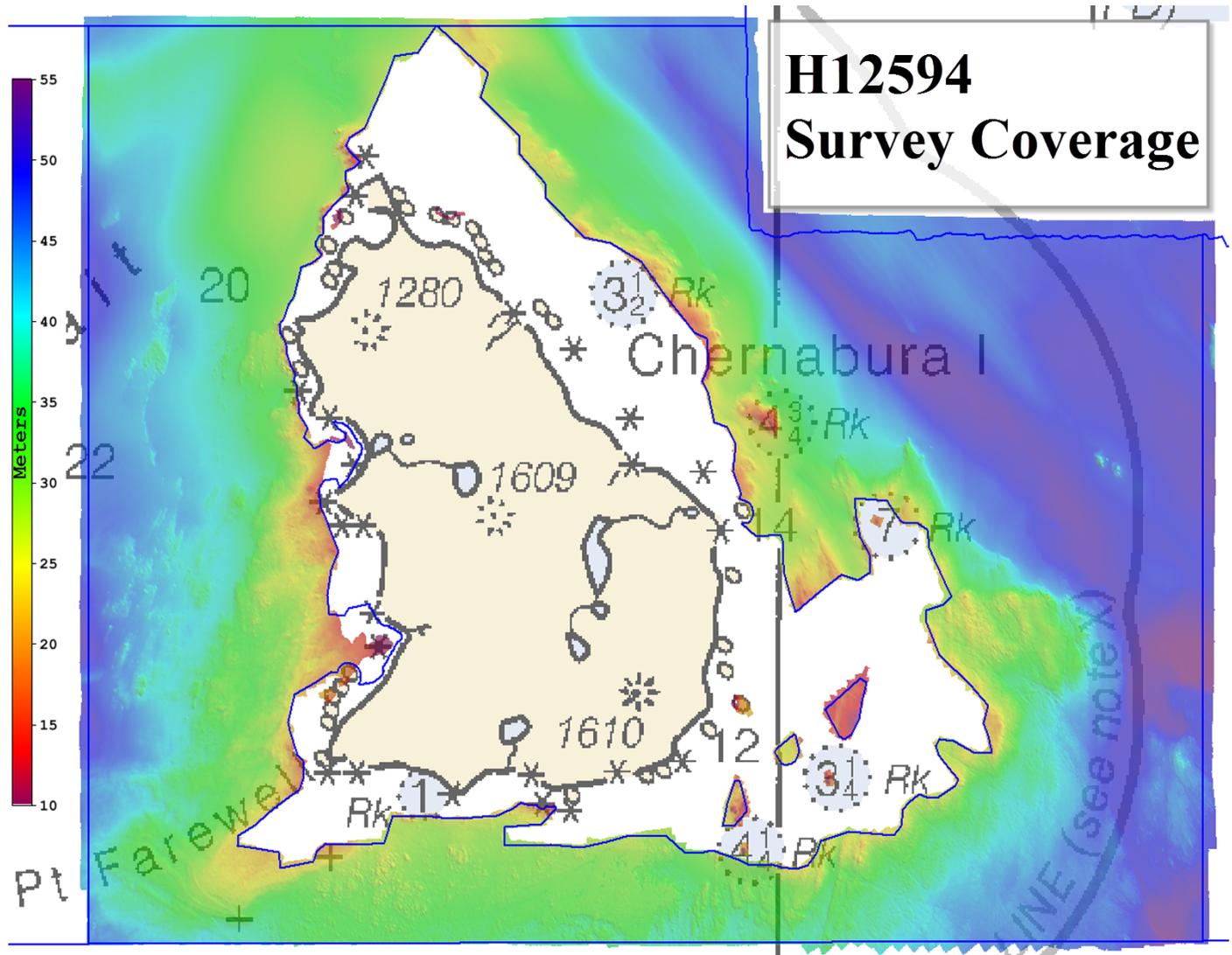


Figure 5: Survey coverage overlaid on Chart 16540 (chart soundings are in fathoms, survey depths are in meters).

Complete MBES coverage was achieved within the limits of hydrography as defined in the Project Instructions with the following exceptions (overview in Figure 6):

On the southwestern sheet limit there is a 14x2 node coverage gap that is completely covered by junction survey H12593 (Figure 7). Southeast of Chernabura Island, there is a 4-node holiday created by inadequate line spacing (Figure 8); this is fully covered by junction survey H12102. There is a 3-node acoustic shadow holiday located east of the island (Figure 9); this is fully covered by junction survey H12102.

There are 9 coverage gaps in depths greater than 30 meters, the largest of which is 16 by 1 grid nodes in size. In the opinion of the Hydrographer these coverage gaps are not navigationally significant.

The sheet limits were not met in three areas due to kelp (Figure 10). These areas are delineated and attributed in the Final Feature File.

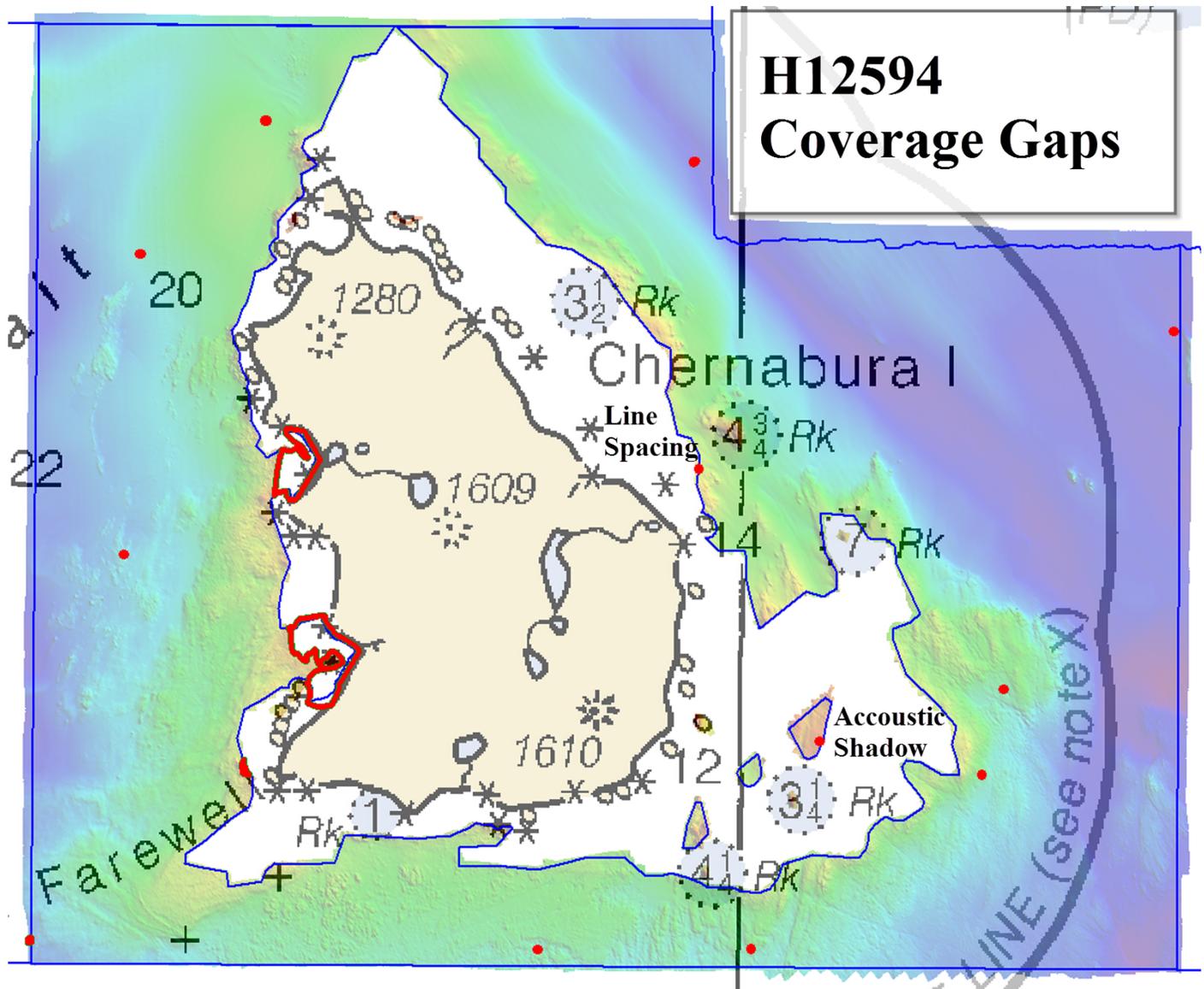


Figure 6: H12594 coverage gaps and holiday overview.

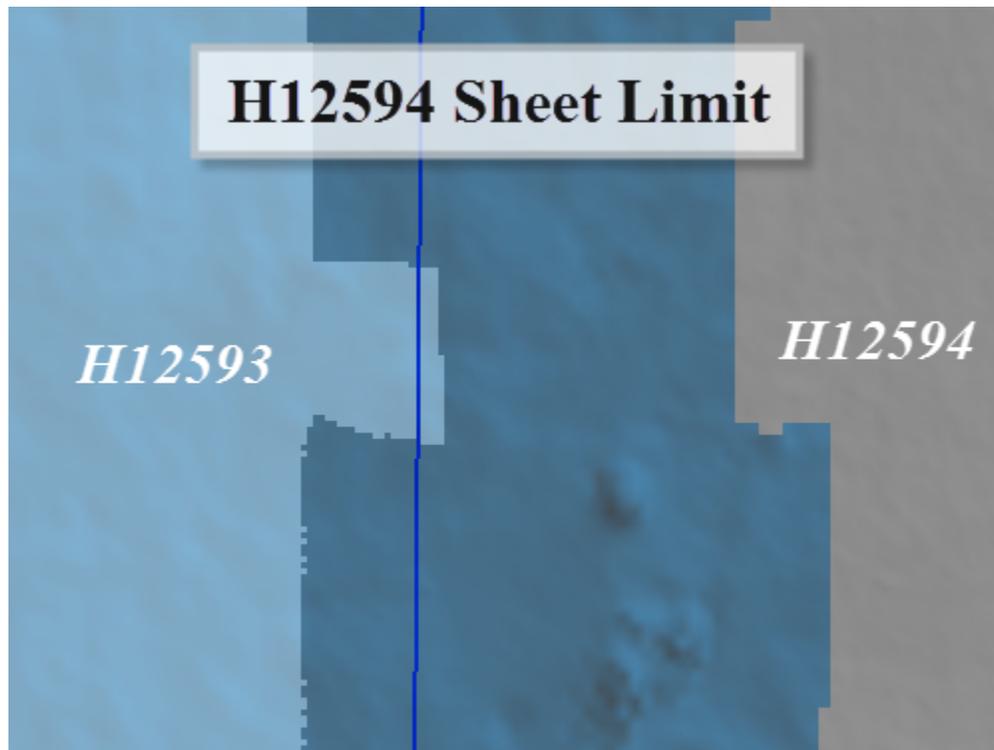


Figure 7: Holiday completely covered by junction H12593 overlap.

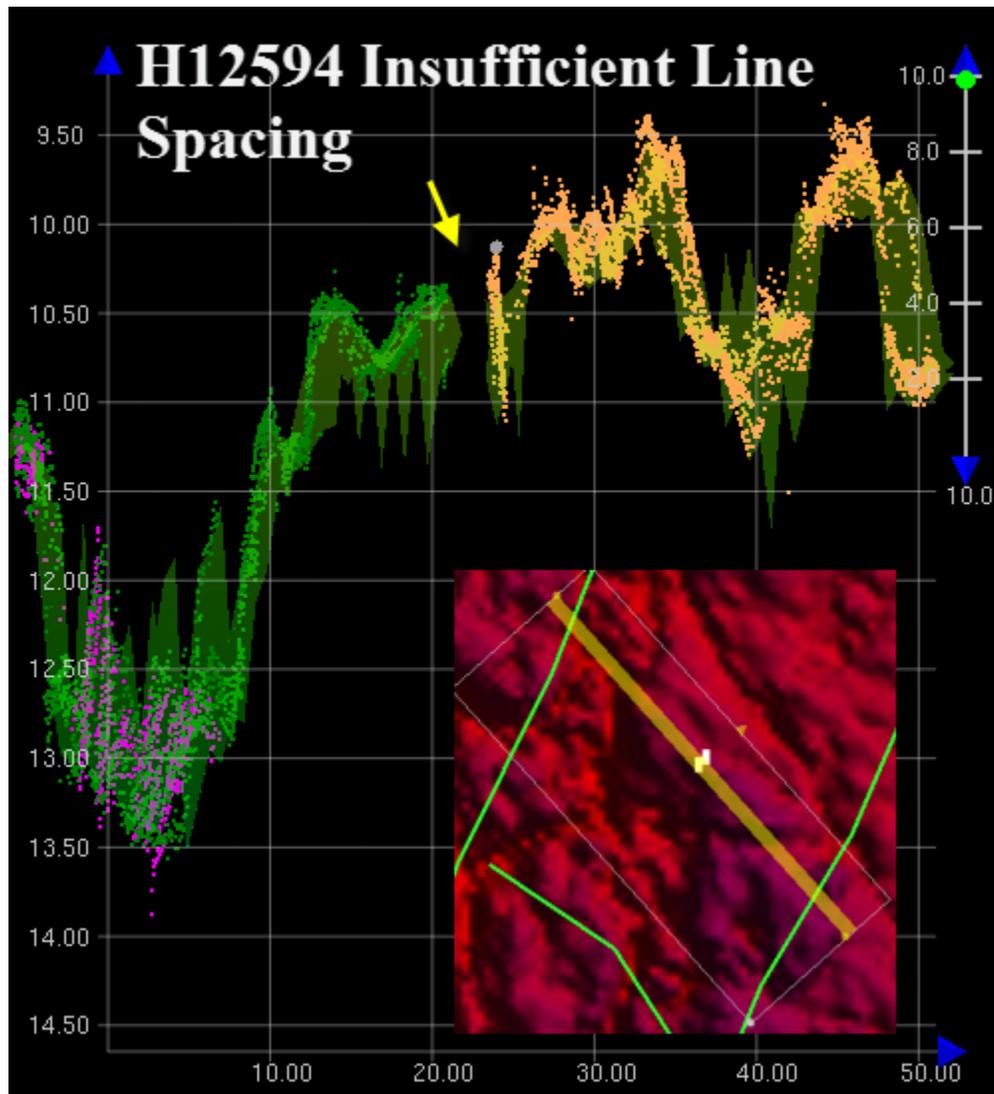


Figure 8: Holiday located southeast of Chernabura Island and north of the 3 1/4 fathom rock. This is covered by junction H12102.

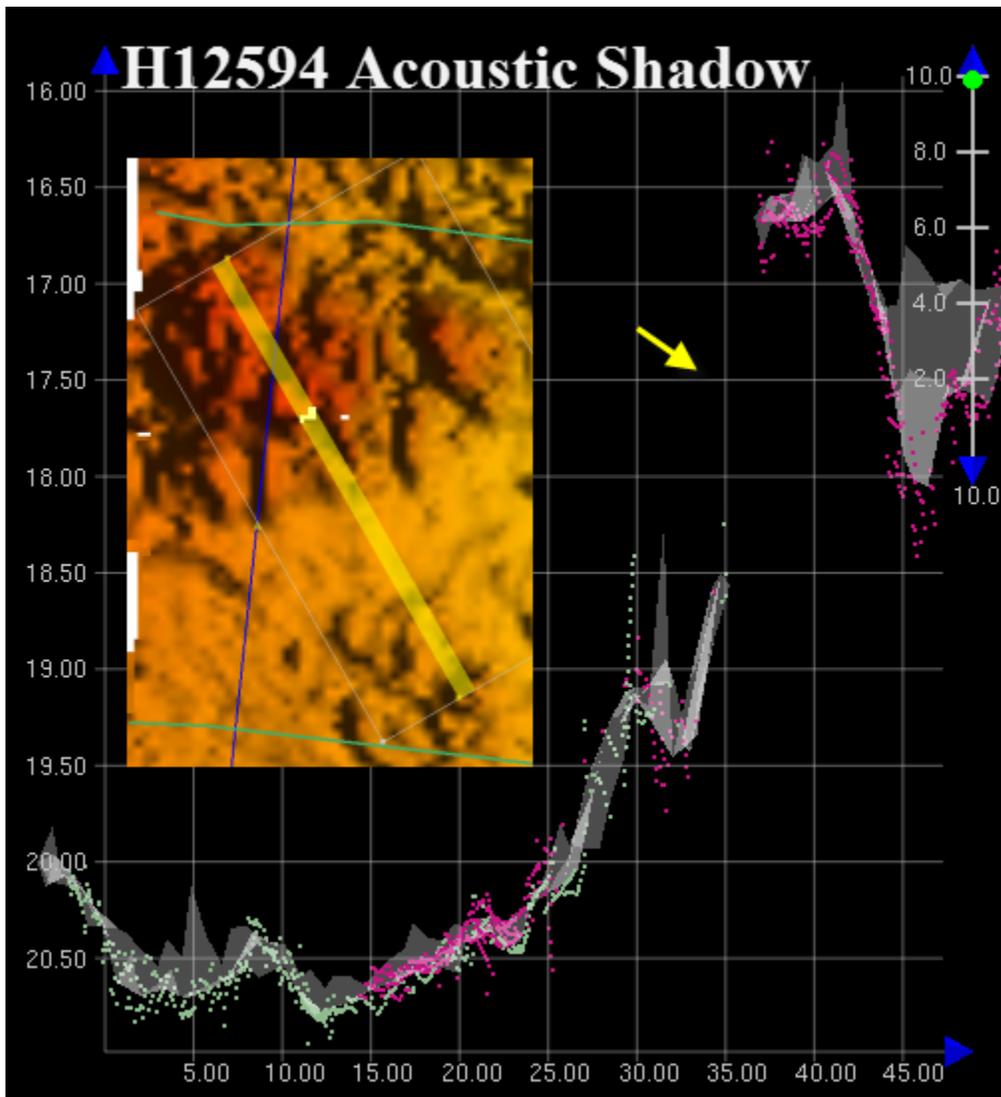


Figure 9: Acoustic shadow holiday located east of Chernabura Island and covered by junction H12102.

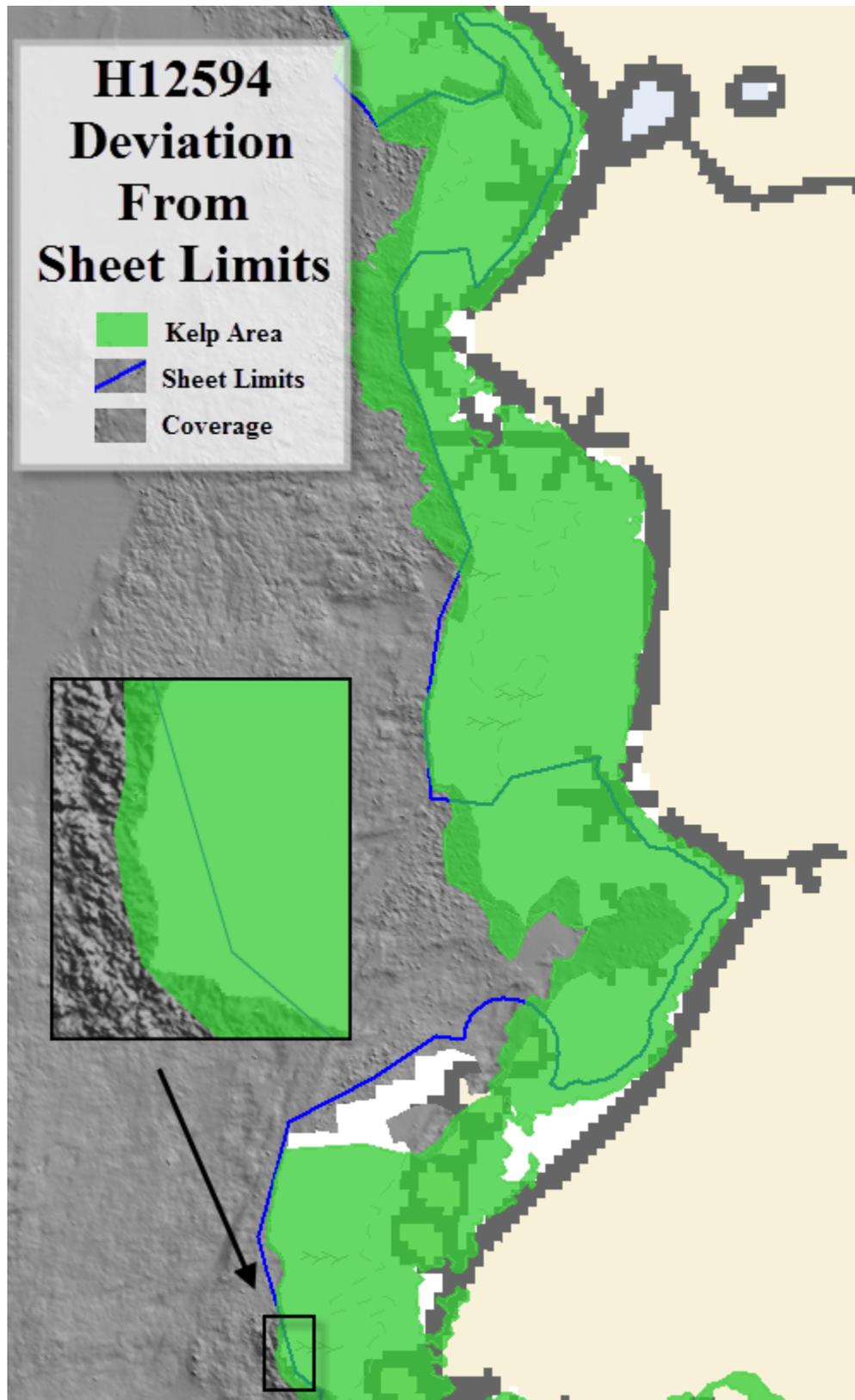


Figure 10: Areas where assigned sheet limits were not met due to kelp.

A.5 Survey Statistics

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

	HULL ID	<i>S221</i> <i>(Rainier)</i>	<i>2801</i>	<i>2802</i>	<i>2803</i>	<i>2804</i>	<i>Total</i>
LNM	SBES Mainscheme	0	0	0	0	0	0
	MBES Mainscheme	207.5	151.4	28.6	134.6	137.0	659.1
	Lidar Mainscheme	0	0	0	0	0	0
	SSS Mainscheme	0	0	0	0	0	0
	SBES/SSS Mainscheme	0	0	0	0	0	0
	MBES/SSS Mainscheme	0	0	0	0	0	0
	SBES/MBES Crosslines	1.9	18.1	1.6	9.1	0	30.7
	Lidar Crosslines	0	0	0	0	0	0
Number of Bottom Samples							4
Number of AWOIS Items Investigated							0
Number Maritime Boundary Points Investigated							10
Number of DPs							52
Number of Items Investigated by Dive Ops							0
Total SNM							39.5

Table 2: Hydrographic Survey Statistics

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

Survey Dates	Day of the Year
07/14/2013	195
07/15/2013	196
07/17/2013	198
07/18/2013	199
07/23/2013	204
07/31/2013	212
08/01/2013	213
08/02/2013	214
08/08/2013	220
08/09/2013	221
08/10/2013	222
09/01/2013	244
09/02/2013	245

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	<i>S221</i>	<i>2801</i>	<i>2802</i>	<i>2803</i>	<i>2804</i>	<i>1906</i>
LOA	231 feet	28 feet	28 feet	28 feet	28 feet	19 feet
Draft	16.5 feet	3.5 feet	3.5 feet	3.5 feet	3.5 feet	1.7 feet

Table 4: Vessels Used

All data for survey H12594 was acquired by NOAA Ship RAINIER, her survey launches (2801, 2802, 2803, and 2804), and a skiff (1906). The survey launches and ship acquired MBES depth soundings, sound speed profiles, bottom samples, and conducted shoreline verification. Skiff 1906 was used for shoreline verification.

B.1.2 Equipment

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

Manufacturer	Model	Type
Kongsberg	EM710	MBES
Reson	7125	MBES
Applanix	POS-MV V4	SBES
Odim Brooke Ocean (Rolls Royce Group)	MVP200	Conductivity, Temperature, and Depth Sensor
Odim Brooke Ocean (Rolls Royce Group)	MVP30	Conductivity, Temperature, and Depth Sensor
Seabird	SBE 19	Conductivity, Temperature, and Depth Sensor
Seabird	SBE 19 Plus	Conductivity, Temperature, and Depth Sensor
Reson	SVP 70	Sound Speed System
Reson	SVP 71	Sound Speed System

Table 5: Major Systems Used

B.2 Quality Control

B.2.1 Crosslines

Crosslines acquired for this survey totaled 5% of mainscheme acquisition.

Multibeam crosslines were acquired using the Kongsberg EM710 on S221 (NOAA Ship RAINIER), and a Reson 7125 on vessels 2801 (RA-4), 2802 (RA-5), and 2803 (RA-3). A 2-meter CUBE surface was created using strictly the mainscheme lines, while a second 2-meter CUBE surface was created using only crosslines, from which a difference surface was generated in CARIS at a 2-meter resolution (Figure 11). Statistics were then derived from the difference surface and are shown in Figure 12. Mainscheme lines were on

average 0.02 meters shoaler than the crosslines, with a standard deviation of 0.13 meters. This is well within allowable IHO Order 1 accuracy at these depths.

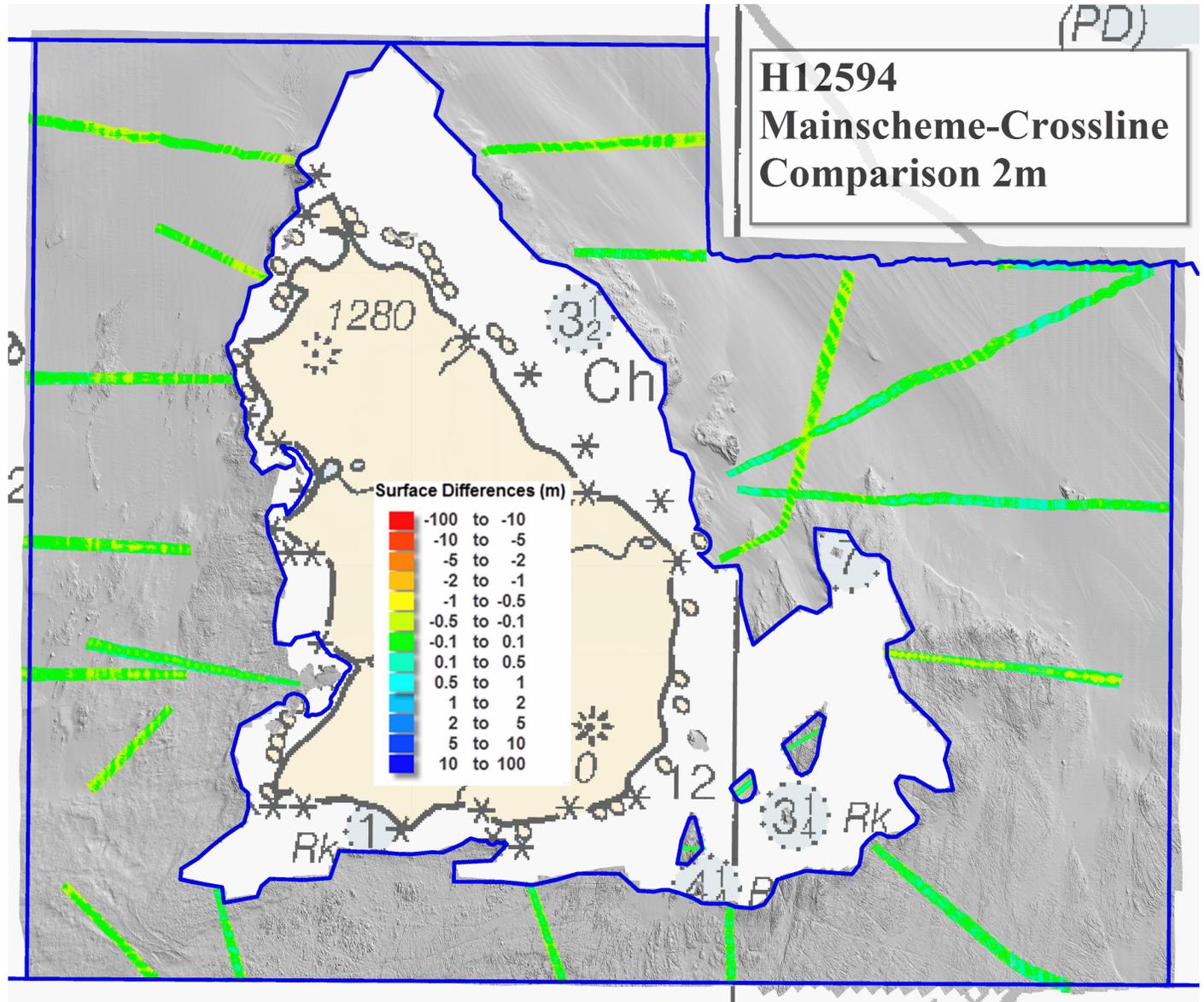


Figure 11: Crossline comparison showing the difference in meters between the mainscheme and crossline soundings for the 2-meter surface. Values are positive where the crosslines are shoaler than the mainscheme.

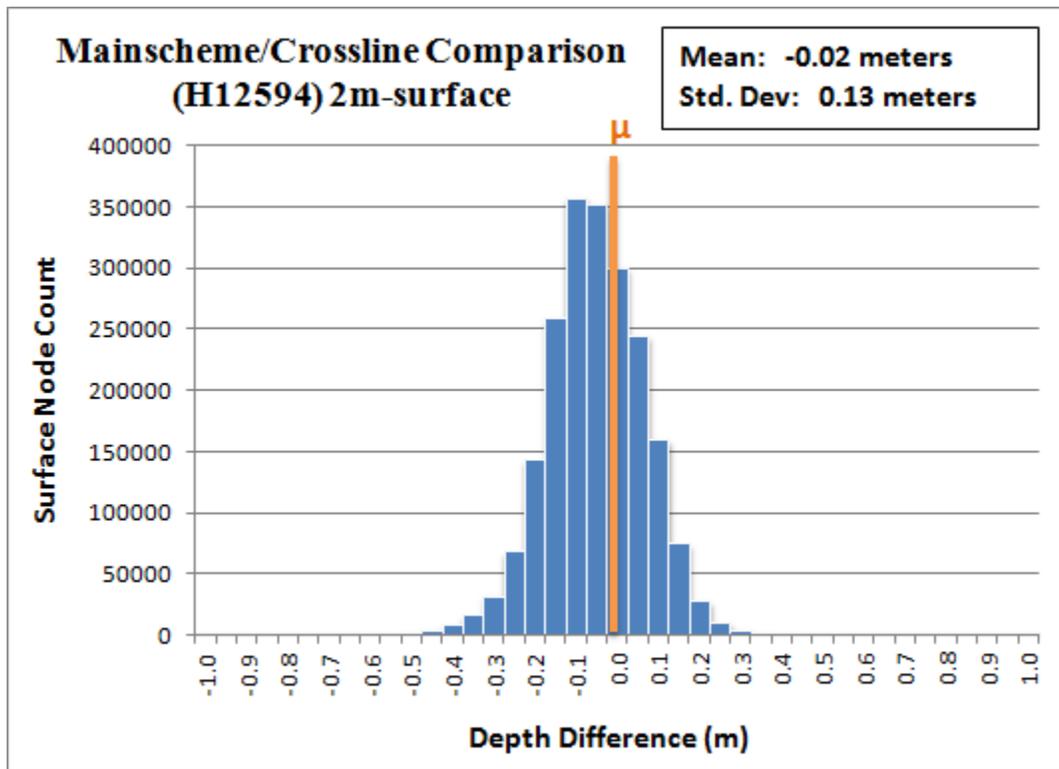


Figure 12: Difference surface statistics between mainscheme and crossline 2-meter surfaces. On average the mainscheme lines are 0.02 meters shoaler than the crosslines. **Crosslines accounted for 4.7% of mainscheme acquisition for this survey, which meets the requirements set forth in the HSSDM.**

B.2.2 Uncertainty

The following survey specific parameters were used for this survey:

Measured	Zoning
0 meters	0.045 meters

Table 6: Survey Specific Tide TPU Values

Hull ID	Measured - CTD	Measured - MVP	Surface
S221		1 meters/second	0.05 meters/second
2801	3 meters/second		0.15 meters/second
2802	3 meters/second		0.15 meters/second
2803	3 meters/second		0.15 meters/second
2804	3 meters/second	1 meters/second	0.15 meters/second

Table 7: Survey Specific Sound Speed TPU Values

Total propagated uncertainty values for survey H12594 were derived from a combination of fixed values for equipment and vessel characteristics, as well as field assigned values for sound speed uncertainties. Tidal uncertainties were provided by NOAA's Center for Operational Oceanographic Products and Services (CO-OPS), and were applied to depth soundings using zoned tides.

In addition to the usual a priori estimates of uncertainty, some real-time and post processed uncertainty sources were also incorporated into the depth estimates of survey H12594. Real-time uncertainties from both the EM710 and Reson 7125 were recorded and applied in post-processing. Applanix TrueHeave files are recorded on all survey vessels, which includes an estimate of the heave uncertainty, and are applied during post-processing. Finally, the post-processed uncertainties associated with vessel roll, pitch, gyro and navigation are applied in CARIS HIPS via an SBET RMS file generated in POSPac.

Uncertainty values of submitted finalized grids were calculated in CARIS using the "Greater of the Two" of uncertainty and standard deviation (scaled to 95%). To visualize the locations in which accuracy requirements were met for each finalized surface, a custom predicted IHO-compliance layer was created, based on the difference between calculated uncertainty of the nodes and the allowable IHO uncertainty (Figure 13). To quantify the extent to which accuracy requirements were met, the preceding predicted IHO compliance layers were queried within CARIS and then examined in Excel (Figure 14). Overall, 100.0% by node and 100.0% by area of survey H12594 met the accuracy requirements stated in the HSSD.

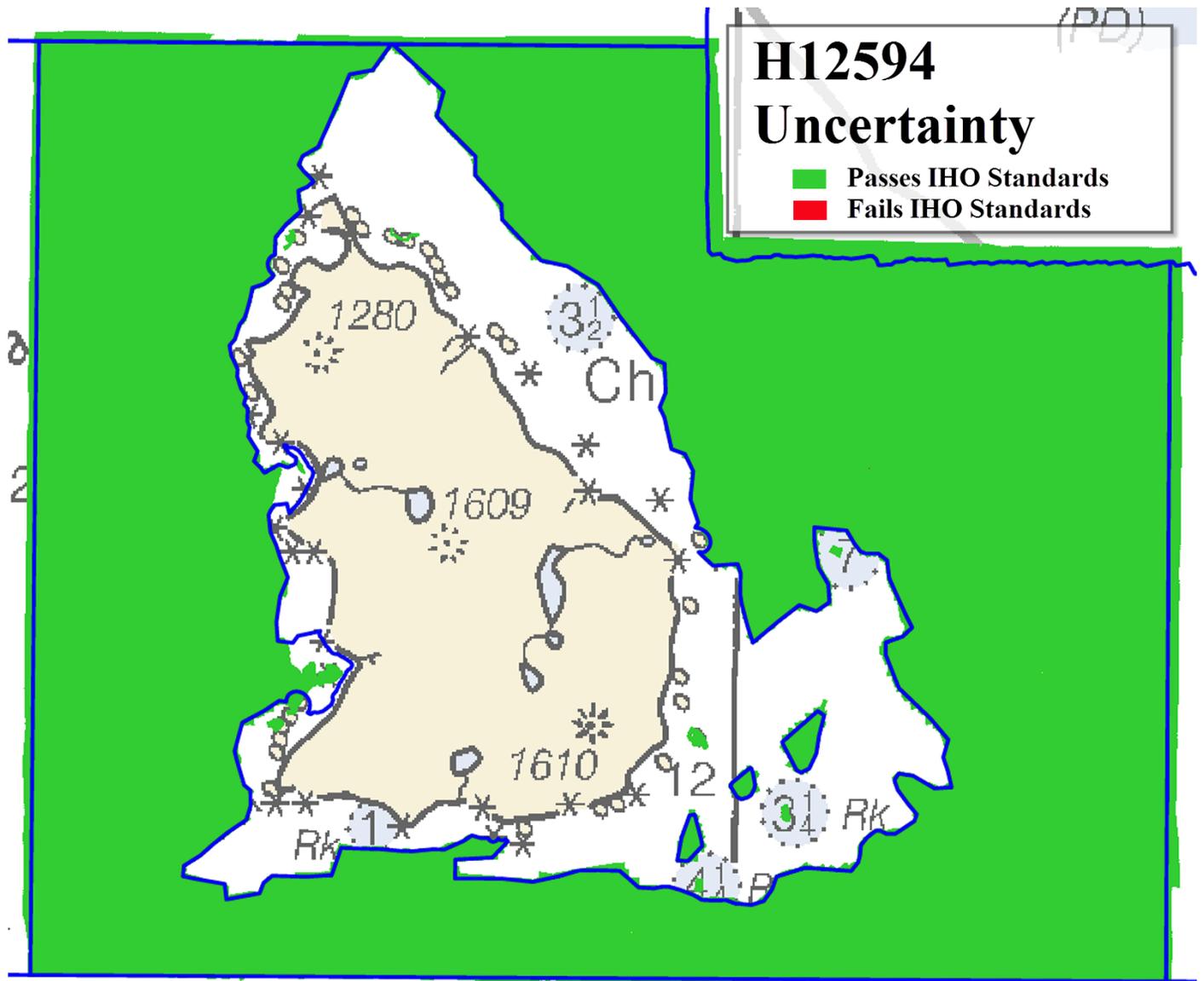


Figure 13: H12594 met IHO accuracy standards for 100.0% of the survey area.

Resolution	Depth range	IHO Order	Number of nodes	Nodes satisfying IHO accuracy	Percent nodes satisfying IHO accuracy
1m	0 - 20m	Order 1	1,966,818	1,966,761	100.0%
2m	18 - 40m	Order 1	16,383,828	16,383,636	100.0%
4m	36 - 80m	Order 1	4,940,813	4,940,791	100.0%
TOTAL:			23,291,459	23,291,188	100.0%
TOTAL (by area):			146,555,138	146,553,961	100.0%

Figure 14: H12594 percentage of nodes satisfying the indicated IHO accuracy level, sub-divided by the appropriate depth ranges. Note: The final row has a unit of square meters, and sums the number of different resolution nodes into a common unit of area.

IHO accuracy has been met, however, reported values in the DR have been rounded and provided an inaccurate accounting. Percentages of nodes satisfying the IHO accuracy level in Figure 14 have all been rounded up from 99.99%.

B.2.3 Junctions

Five junction comparisons were completed for H12594 (Figure 15). Lidar survey H12102 was completed by TENIX in 2009, and covers the nearshore waters of Chernabura Island, inshore of H12594. Survey H12473 was completed by the NOAA Ship RAINIER in 2012. Surveys H12592, H12593, and H12595 were surveyed concurrently with H12594. Depth comparisons were performed using the CARIS Difference Surface and Subset Editor. All junctions were within allowable IHO Order 1 for accuracy.

The following junctions were made with this survey:

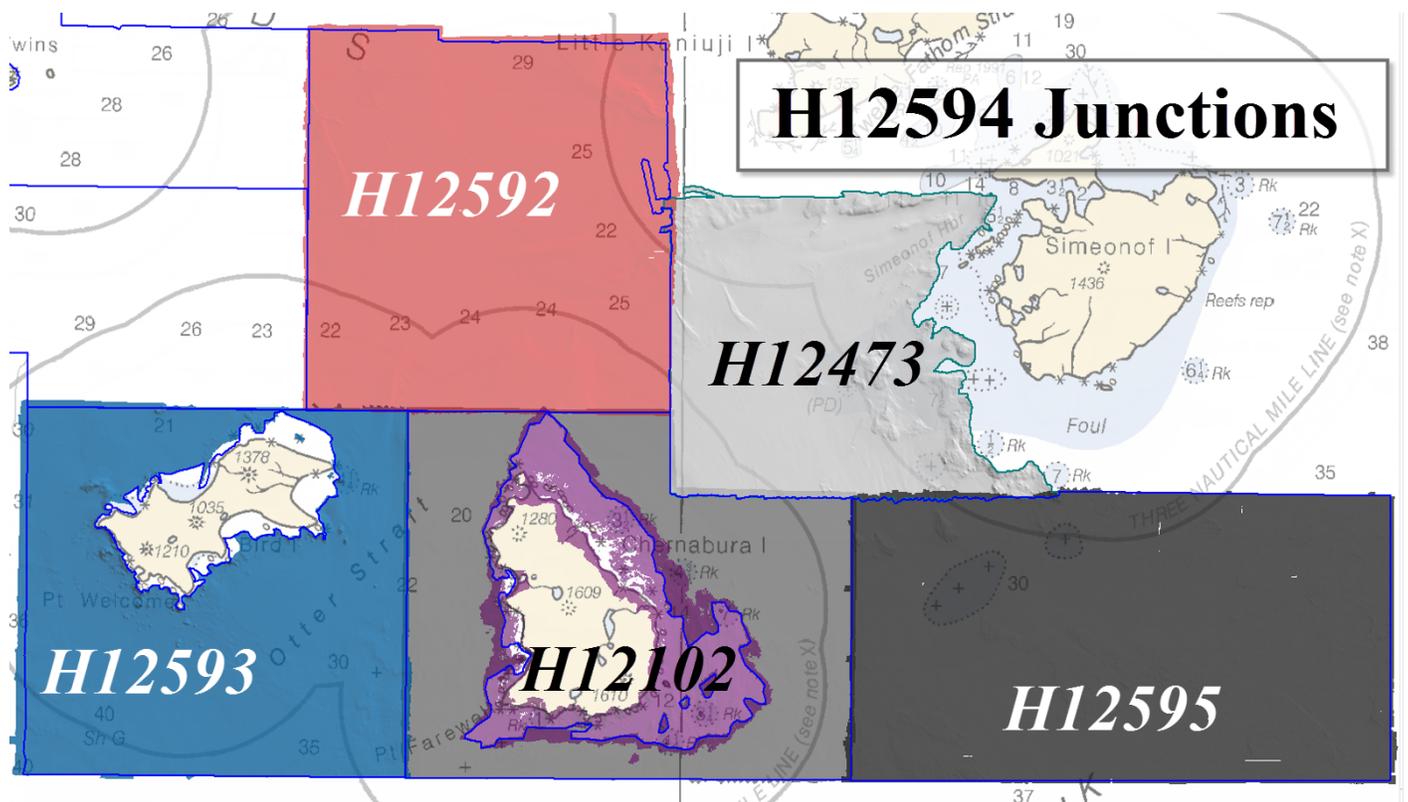


Figure 15: H12594 junction overview.

The following junctions were made with this survey:

Registry Number	Scale	Year	Field Unit	Relative Location
H12102	1:10000	2009	TENIX	S
H12473	1:40000	2012	NOAA Ship RAINIER	NE
H12592	1:40000	2013	NOAA Ship RAINIER	N
H12593	1:40000	2013	NOAA Ship RAINIER	W
H12595	1:40000	2013	NOAA Ship RAINIER	E

Table 8: Junctioning Surveys

H12102

Survey H12102 is in the center of survey H12594, with overlap ranging from 30 to 900 meters and depths from 2 to 35 meters (Figure 16). Difference surface analysis between the H12594 4-meter and the H12102

5-meter depth layers showed H12594 to be an average of 0.02 meters shoaler than H12102, with a standard deviation of 0.36 meters (Figure 17). This is well within allowable IHO Order 1 accuracy at these depths.

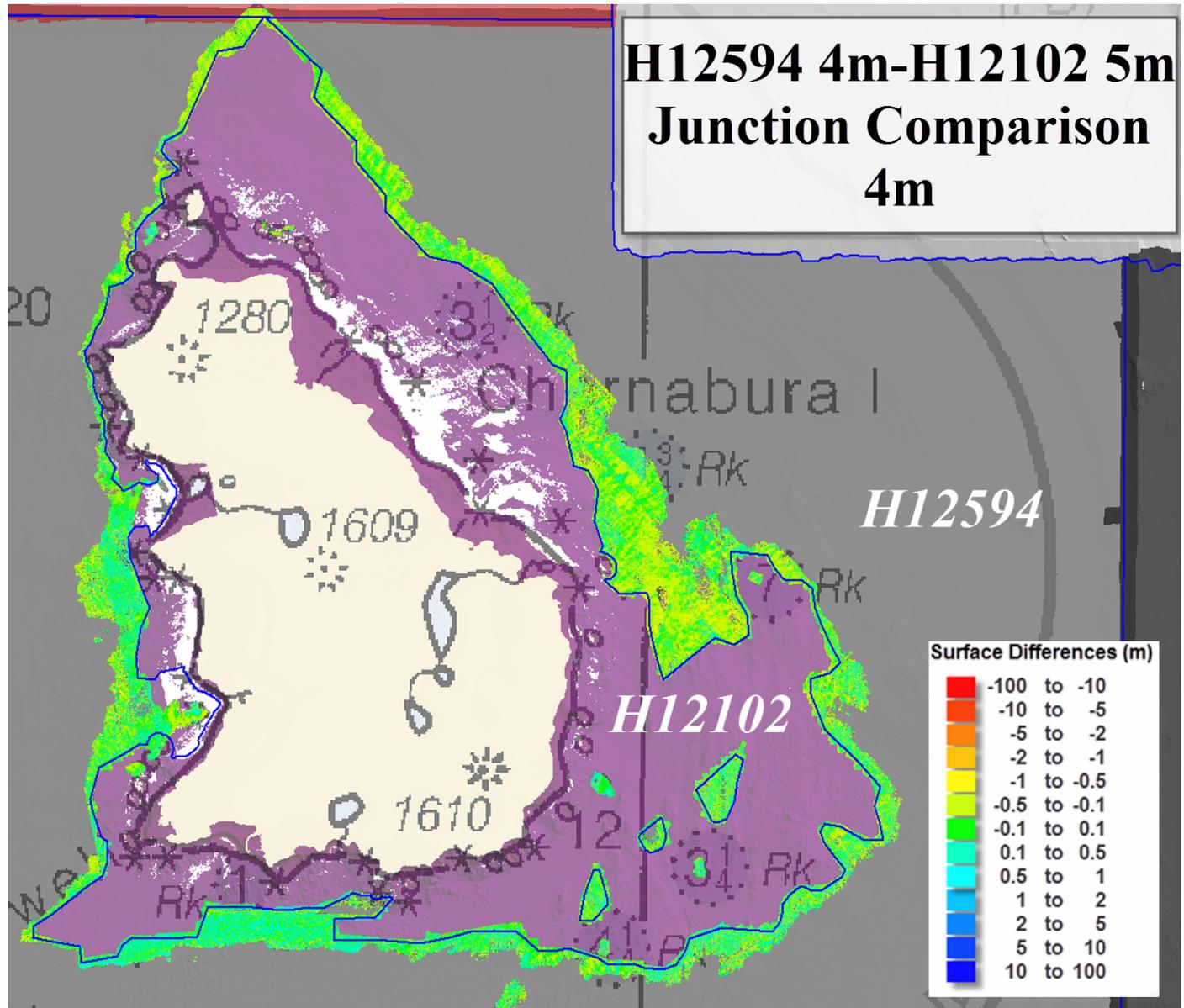


Figure 16: Difference surface (5-meter grid) of the junction of H12594 and H12102 in meters. Values are positive where H12102 is shoaler than H12594.

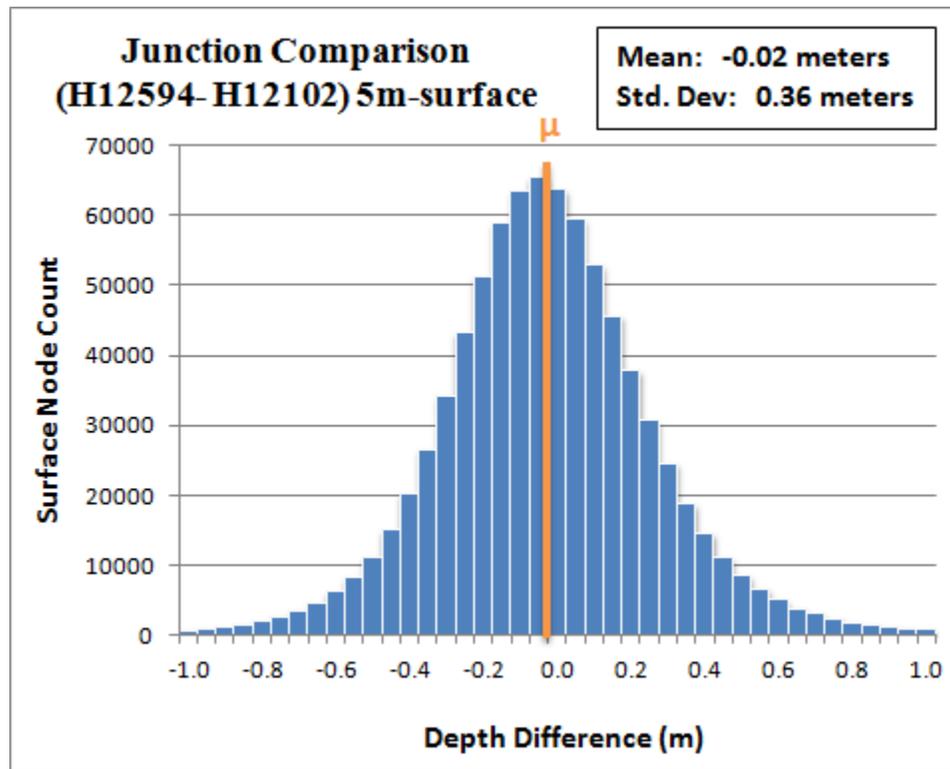


Figure 17: Difference surface statistics between H12594 4-meter and H12102 5-meter depth surfaces. H12102 is on average 0.02 meters deeper than H12594.

H12473

The overlap with survey H12473 was approximately 210 meters wide along the northeastern boundary of H12594, with depths from 45 to 50 meters (Figure 18). Difference surface analysis between the 2-meter CUBE depth layers showed H12594 to be an average of 0.01 meters deeper than H12473, with a standard deviation of 0.12 meters (Figure 19). This is well within allowable IHO Order 1 accuracy at these depths.

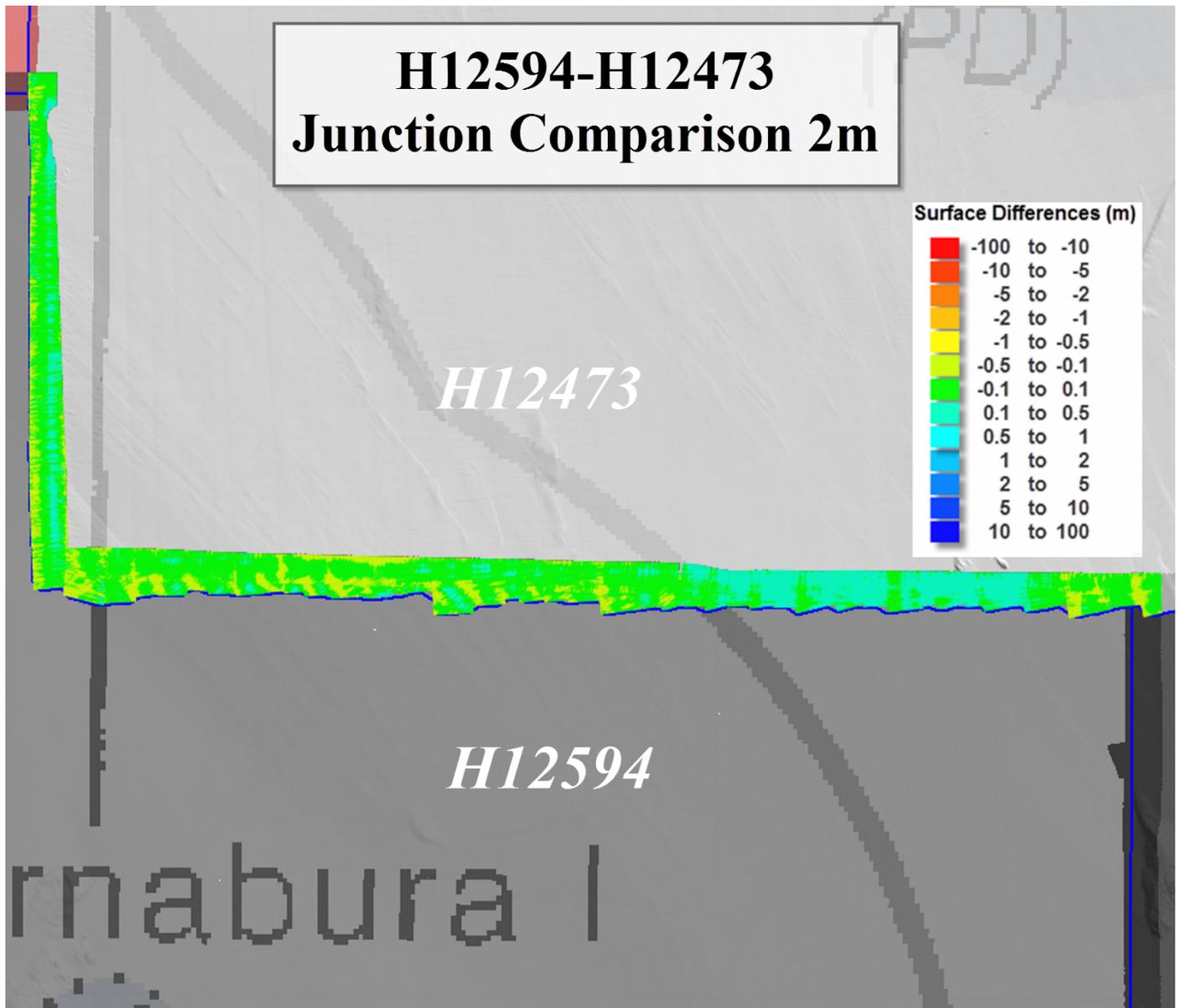


Figure 18: Difference surface (2-meter grid) of the junction of H12594 and H12473 in meters. Values are positive where H12473 is shallower than H12594.

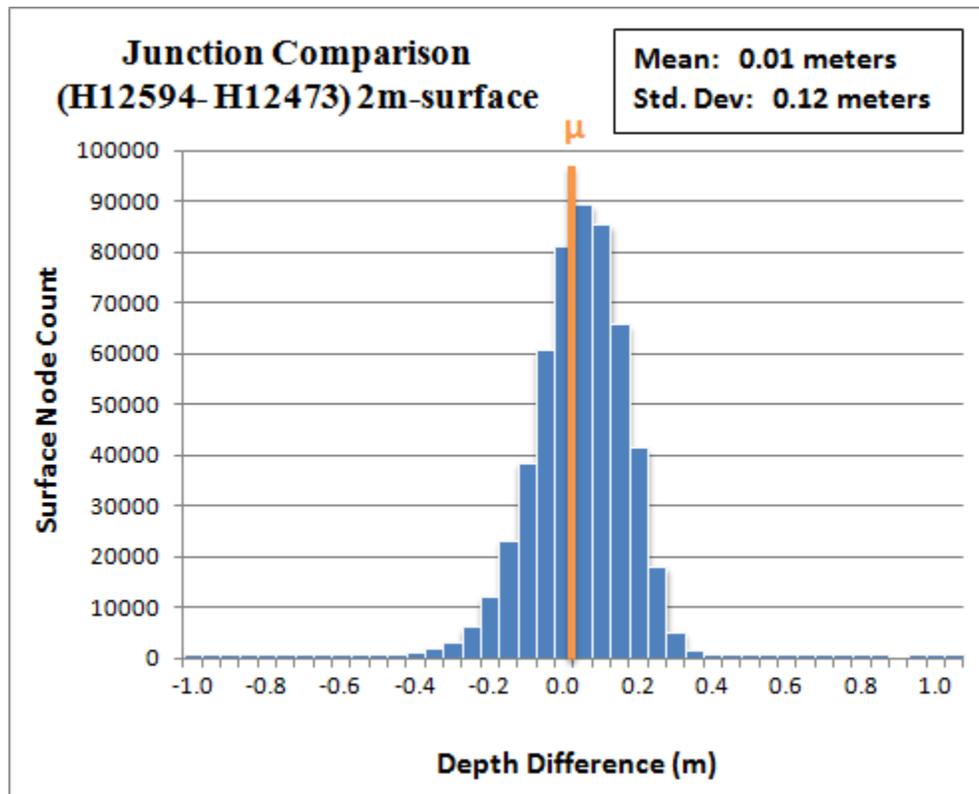


Figure 19: Difference surface statistics between H12594 and H12473 2-meter depth surfaces. H12473 is on average 0.01 meters shoaler than H12594.

H12592

The overlap with survey H12592 was approximately 200 meters wide along the northern boundary of H12594, with depths from 20 to 45 meters (Figure 20). Difference surface analysis between the 2-meter CUBE depth layers showed H12594 to be an average of 0.03 meters deeper than H12592, with a standard deviation of 0.08 meters (Figure 21). This is well within allowable IHO Order 1 accuracy at these depths.

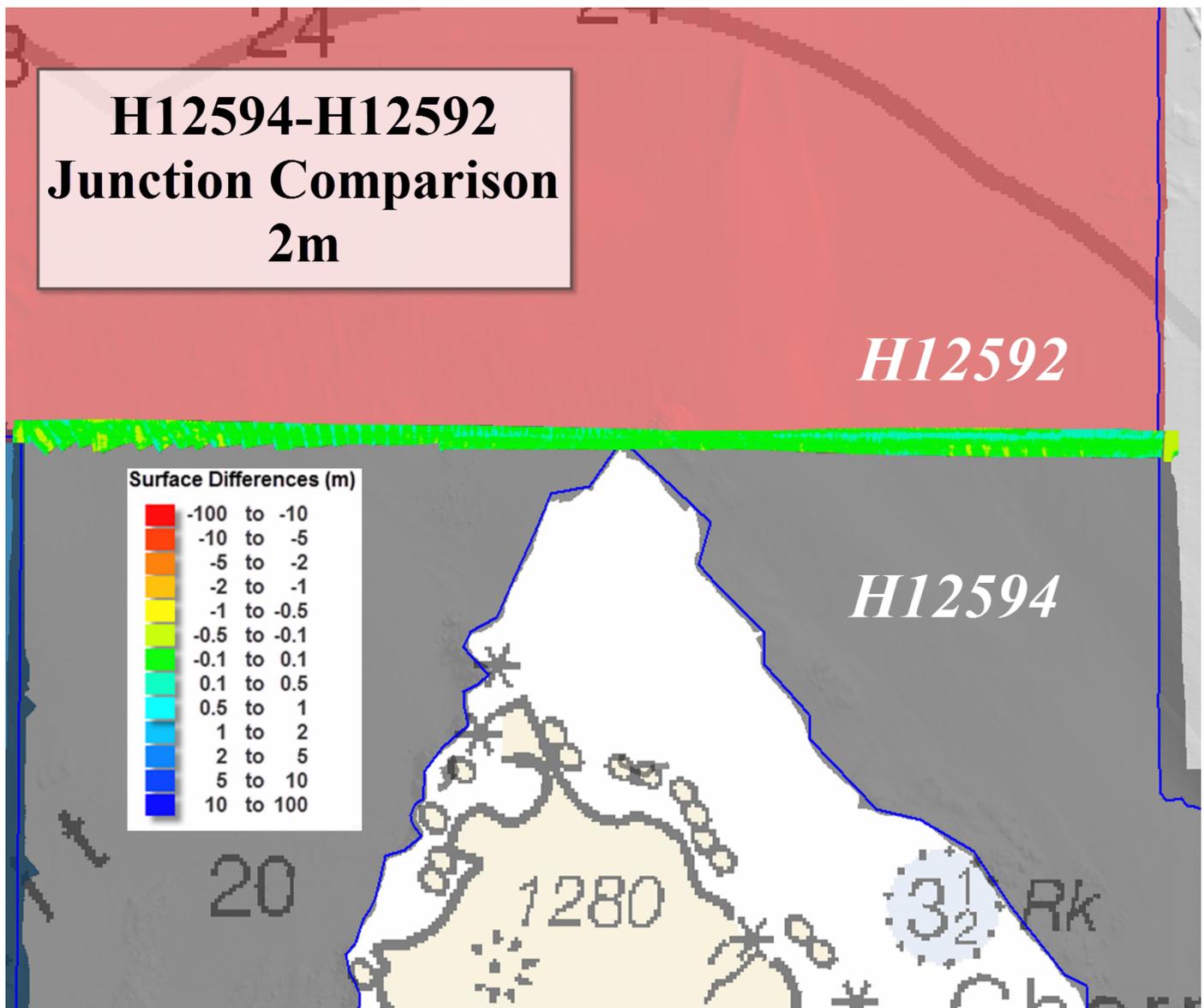


Figure 20: Difference surface (2-meter grid) of the junction of H12594 and H12592 in meters. Values are positive where H12592 is shallower than H12594.

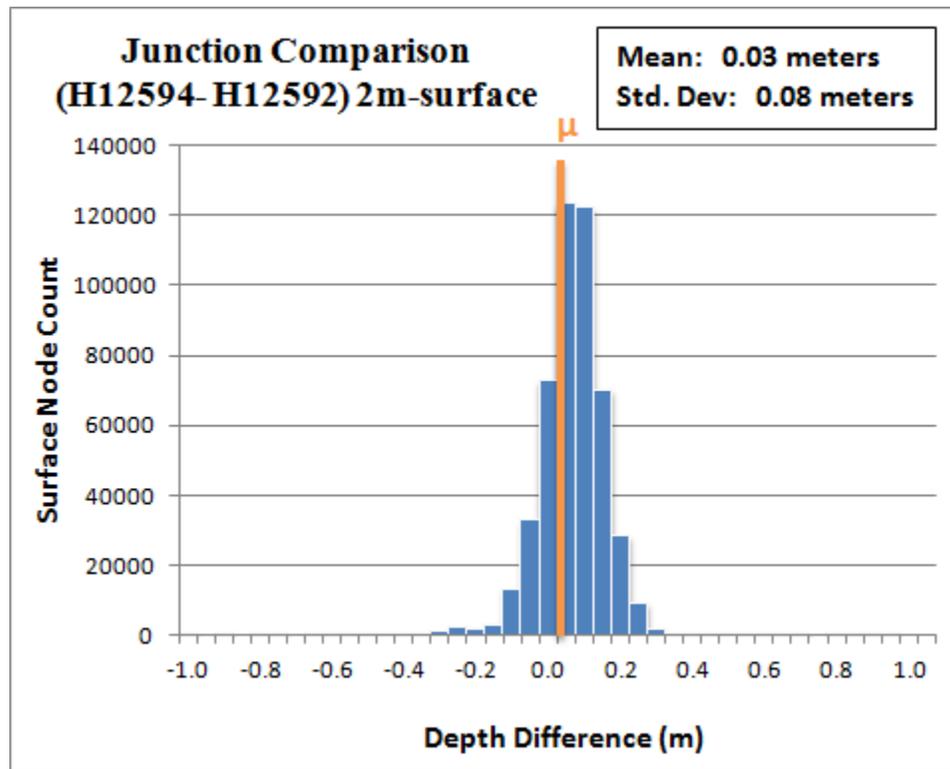


Figure 21: Difference surface statistics between H12594 and H12592 2-meter depth surfaces. H12592 is on average 0.03 meters shoaler than H12594.

H12593

Survey H12593 had 90 to 300 meters of overlap along the western boundary of H12594, with depths from 35 to 40 meters (Figure 22). Difference surface analysis between the 2-meter CUBE depth layers showed H12594 to be an average of 0.04 meters shoaler than H12593, with a standard deviation of 0.11 meters (Figure 23). This is well within allowable IHO Order 1 accuracy at these depths.

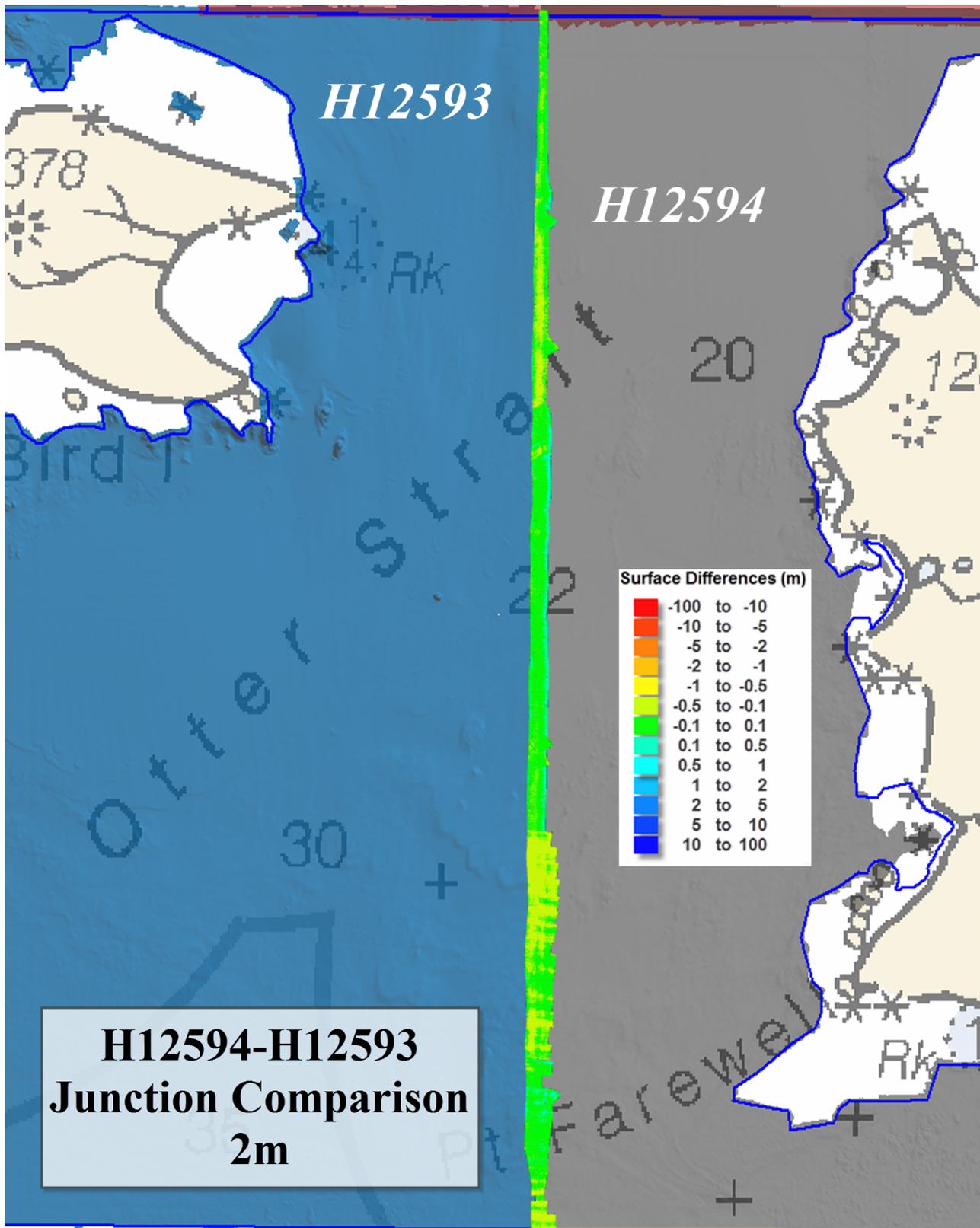


Figure 22: Difference surface (2-meter grid) of the junction of H12594 and H12593 in meters. Values are positive where H12593 is shallower than H12594.

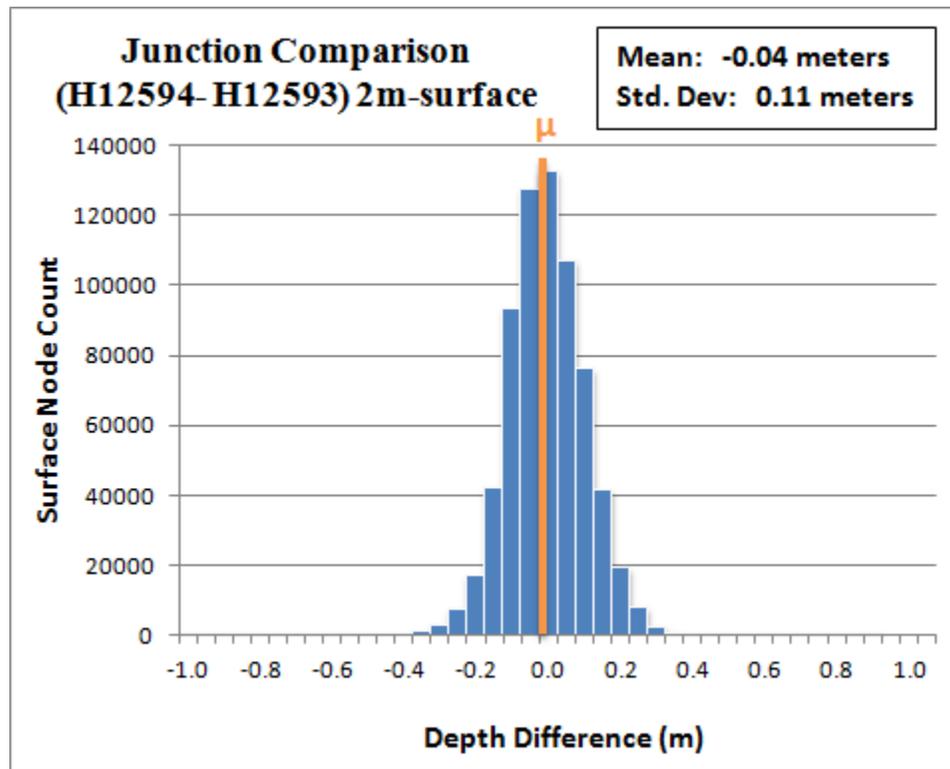


Figure 23: Difference surface statistics between H12594 and H12593 2-meter depth surfaces. H12593 is on average 0.04 meters deeper than H12594.

H12595

The overlap with survey H12595 was approximately 200 meters wide along the eastern boundary of H12594, with depths from 40 to 55 meters (Figure 24). Difference surface analysis between the 2-meter CUBE depth layers showed H12594 to be an average of 0.08 meters deeper than H12594, with a standard deviation of 0.19 meters (Figure 25). This is well within allowable IHO Order 1 accuracy at these depths.

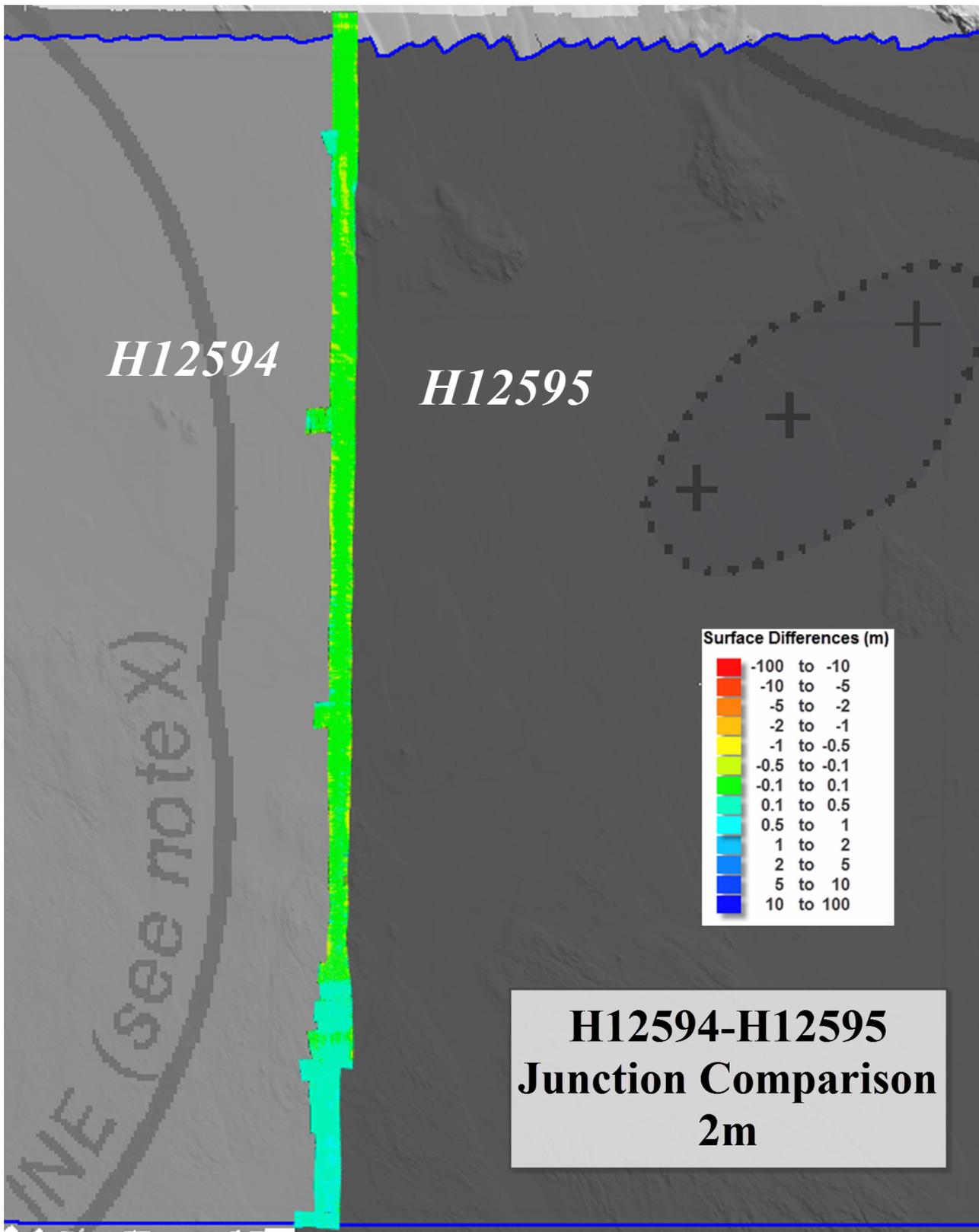


Figure 24: Difference surface (2-meter grid) of the junction of H12594 and H12595 in meters. Values are positive where H12594 is shoaler than H12595.

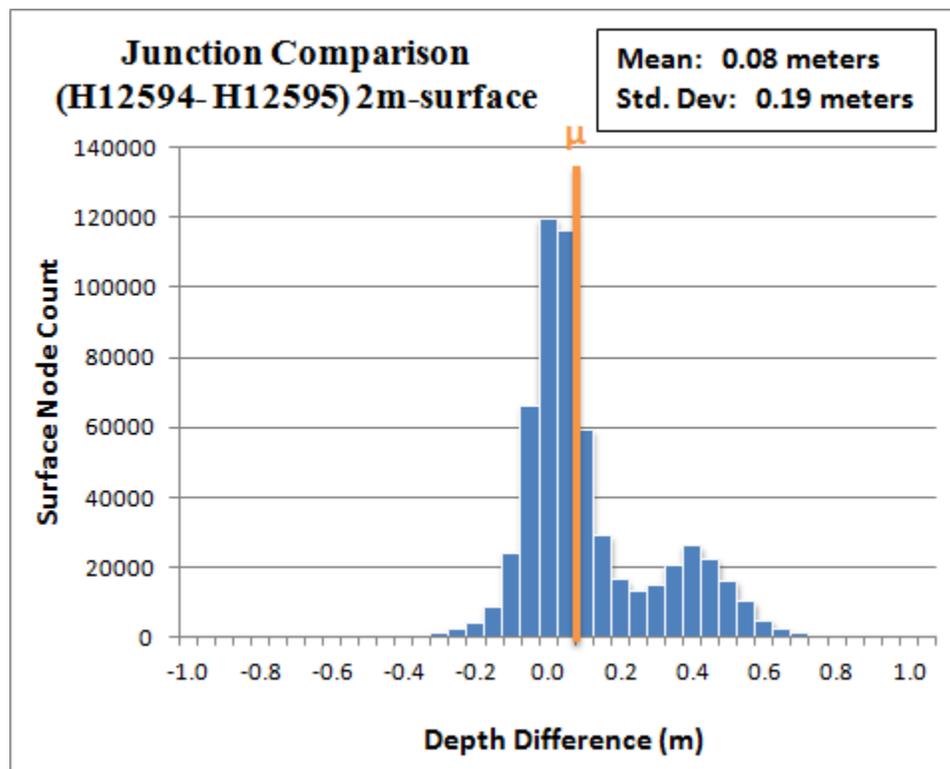


Figure 25: Difference surface statistics between H12594 and H12595 2-meter depth surfaces. H12595 is on average 0.08 meters shoaler than H12594.

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

Sound Speed Artifact in Outer Beams

Despite casts being taken as frequently as every 15 minutes, with consideration to spatial distribution, sound speed artifacts were seen within the data. These artifacts occurred as "smiles" or "frowns" due to inadequately modeled refraction. In these areas, the outer beams were flagged as rejected to assist the gridding algorithm in bringing the surface back to better represent the true seafloor. Although this artifact exists within the data, it is within uncertainty standards specifications as stated within Section 5.1.3 of the HSSD. The Hydrographer finds that the data is adequate to supersede charted data (Figure 26).

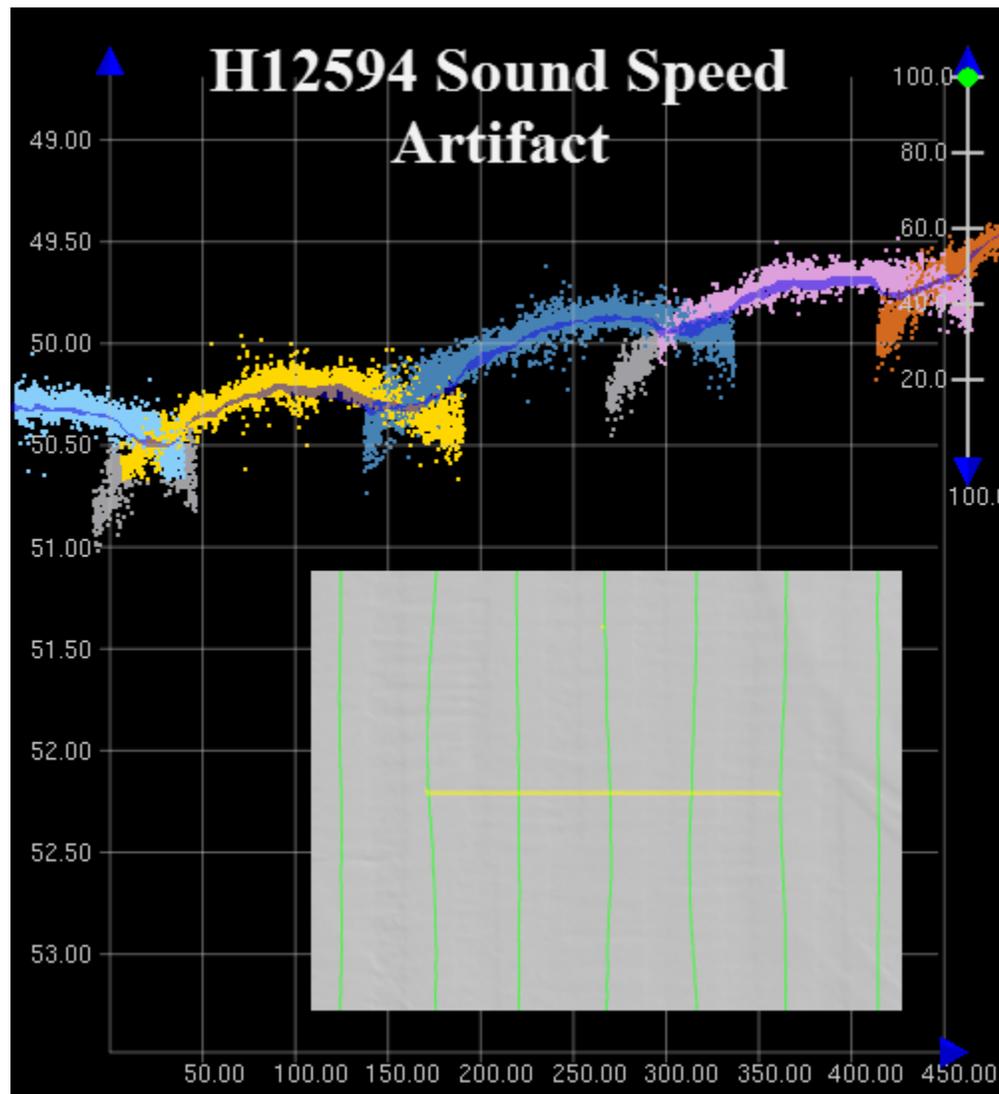


Figure 26: Example of sound speed artifact. Areas were cleaned where it significantly affected the CUBE surface.

Weather Induced Surface Sound Speed Artifacts

In heavy seas, bubble sweep across the SVP70 sound speed sensor resulted in occasional loss of accurate surface sound speed data, causing artifacts on DN198, 212, 214, and 244 (Figure 27). Artifacts are visible in the CUBE surfaces on southbound lines heading into the prevailing sea state. Artifacts were inspected in CARIS using Subset Editor and cleaned to within IHO standards of neighboring data. Although this artifact exists within the data, it is within specification as stated within the HSSD. It is in the opinion of the Hydrographer that the data is adequate to supersede the chart.

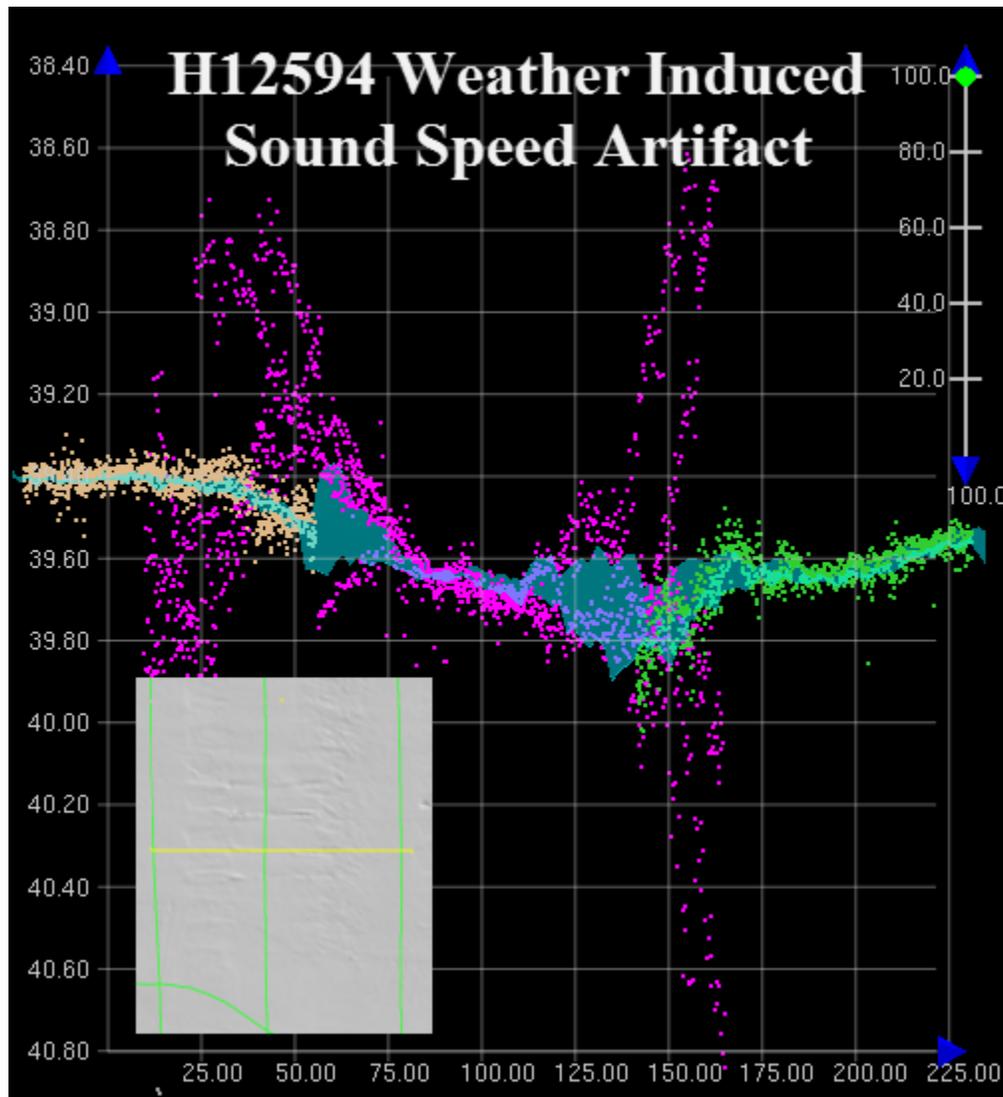


Figure 27: Typical weather induced 0.15 meter surface sound speed artifact in CUBE surface. Areas were cleaned where it significantly affected the CUBE surface, based on IHO standards.

Ellipsoid-to-Tidal Surface Comparison

Using the GPS height determined from the SBET file, data from H12594 was referenced to the ellipsoid and gridded. As a QC tool an ERS to MLLW difference surface was created to identify artifacts. By differencing this ellipsoidally-referenced surface (ERS) from the traditional tidally-referenced surface, one should only see the ellipsoidal slope across the length of the survey. Any deviations from this slope would therefore be the result of an error intrinsic to either the ERS or tidal processing work flow. Misprojected SBETs, current-induced dynamic draft, incorrect waterline measurements, corrupt True Heave files, or poorly-modeled water levels are all examples of artifacts that can be identified through the difference of the ERS and tidally-referenced surfaces.

Upon review of this surface, vertical offsets were found in the data for Launch 2804 (RA-6) on DN220 after 2100 UTC, and for line 2804_2013RA1952106 from Launch 2804 on DN195, when referenced to the ellipse. These offsets at times exceeded one meter vertically when compared to surrounding data. Out

of an abundance of caution, GPS heights were removed from this data. Since no horizontal offsets were seen at MLLW or the ellipse, the rest of the correctors within the SBETs were retained (see C.3 Additional Horizontal or Vertical Control Issues).

The depth gradient between the MLLW and the ERS surfaces is expected to be similar in magnitude and position as the EGM2008-WGS84 geoid-ellipsoid separation model published by the National Geospatial Intelligence Agency (NGA). In review it was found that the two models compare well - exhibiting a signature NW-to-SE gradient of depth differences across the survey area - particularly considering the 2.5' resolution of the NGA surface and the expected differences between the geoid and MLLW (Figure 28).

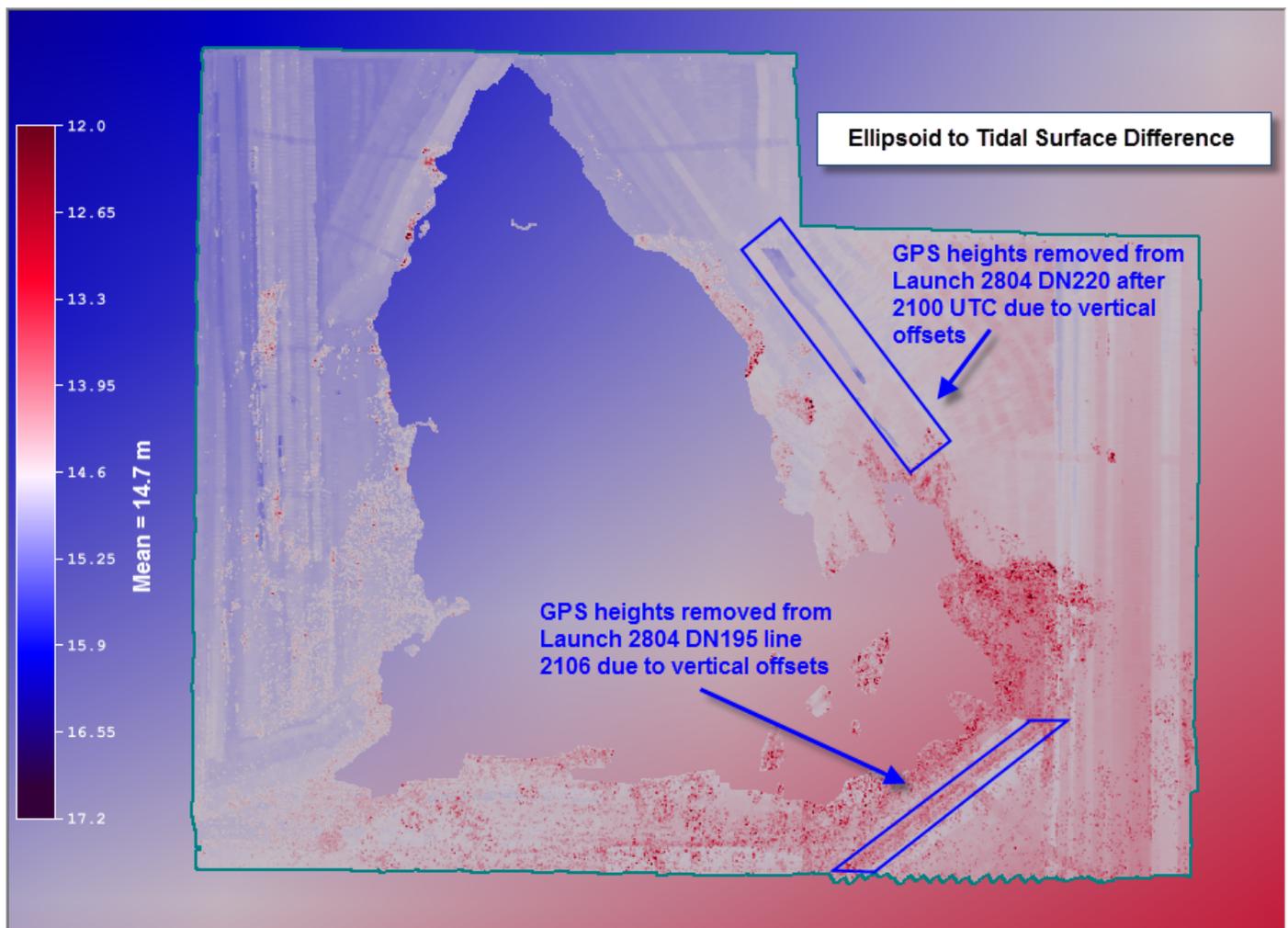


Figure 28: Difference surface between the ellipsoidally-referenced and tidally-referenced surfaces.

Difference surface is overlaid on the EGM2008-WGS84 geoid-ellipsoid separation model.

The data is adequate to supersede charted data in the common area.

B.2.7 Sound Speed Methods

Sound Speed Cast Frequency: Launch sound speed profiles were acquired using the SBE 19 and SBE 19 plus CTDs at discrete locations within the survey area at least once every four hours, when large changes in surface sound speed were apparent, and when moving to a new area. On DN196, Launch 2804 (RA-6) acquired sound speed profiles using the Rolls Royce MVP30. Sound speed profiles were acquired on S221 (RAINIER) using the Rolls Royce MVP200 approximately every 15 minutes or when recommended by "CastTime", a cast frequency program developed at the University of New Hampshire. A total of 139 casts were concatenated into a master file for the project and applied to lines using the "Nearest in distance within time (4 hours)" selection method (Figure 29). This allowed the nearest cast to always be applied in cases where vessels were working in close proximity.

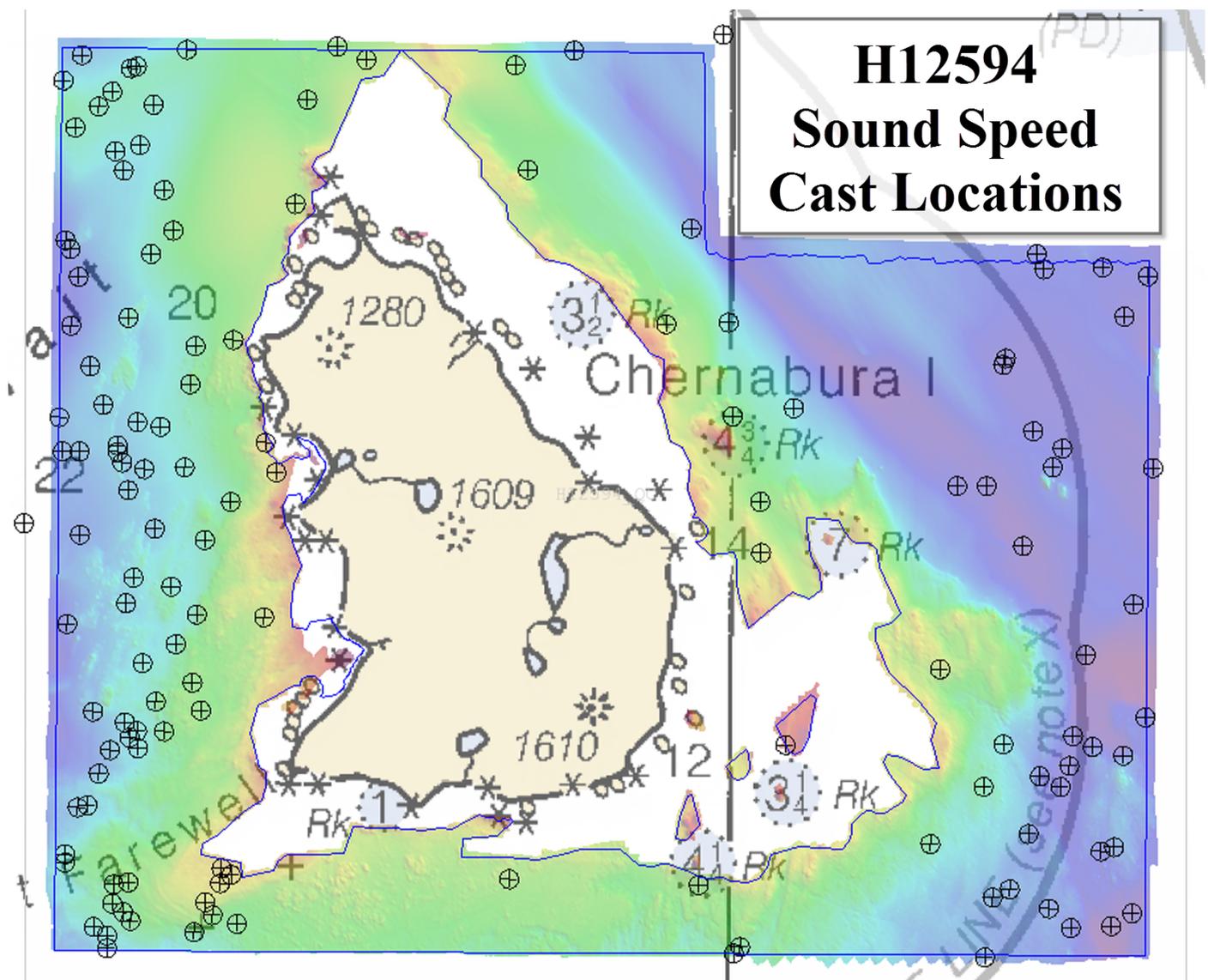


Figure 29: Locations of H12594 sound speed casts.

B.2.8 Coverage Equipment and Methods

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

B.3 Echo Sounding Corrections

B.3.1 Corrections to Echo Soundings

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

B.3.2 Calibrations

All sounding systems were calibrated as detailed in the DAPR.

B.4 Backscatter

Backscatter data was acquired, but not formally processed by RAINIER personnel. However, periodic spot checks were performed to ensure backscatter quality. Backscatter was logged as .7k or .ALL 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 Profile V_5_3_2.

All data was processed using CARIS HIPS and SIPS 8.0.4. It should be noted that all Kongsberg EM710 data was intentionally processed without the Simrad Sound Velocity Correction (SVC) module. This was done in order to avoid a known error in the SVC module associated with reverse-mounted transducers. To accomplish this, a custom CARIS license file was used, which excluded the licensing for the Simrad SVC. For further details, refer to the DAPR.

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
H12594_05m	CUBE	0.5 meters	0 meters - 80 meters	NOAA_0.5m	Complete MBES
H12594_1m	CUBE	1 meters	0 meters - 80 meters	NOAA_1m	Complete MBES
H12594_2m	CUBE	2 meters	0 meters - 80 meters	NOAA_2m	Complete MBES
H12594_4m	CUBE	4 meters	0 meters - 80 meters	NOAA_4m	Complete MBES
H12594_05m_0to20_Final	CUBE	0.5 meters	0 meters - 20 meters	NOAA_0.5m	Complete MBES
H12594_1m_0to22_Final	CUBE	1 meters	0 meters - 22 meters	NOAA_1m	Complete MBES
H12594_2m_18to41_Final	CUBE	2 meters	18 meters - 41 meters	NOAA_2m	Complete MBES
H12594_4m_36to80_Final	CUBE	4 meters	36 meters - 80 meters	NOAA_4m	Complete MBES
H12594_Combined	CUBE	4 meters	0 meters - 80 meters	NOAA_4m	Complete MBES

Table 9: Submitted Surfaces

A half-meter resolution CUBE surface was created for the southern-most bay on the west side of Chernabura Island in order to accurately represent the numerous rocks found in the area.

In order to prevent apparent coverage gaps resulting from the gridding algorithm, finalized surfaces were extended beyond the depth thresholds specified in the HSSD. The 1-meter resolution finalized grid depth range was processed as 0 to 22 meters, and the 2-meter finalized grid depth range was processed as 18 to 41 meters.

Ten designated soundings were selected in accordance with 5.2.1.2 of the HSSD to override the gridded CUBE surfaces in an area in which the model did not accurately reflect the shoalest sounding (Figure 30).

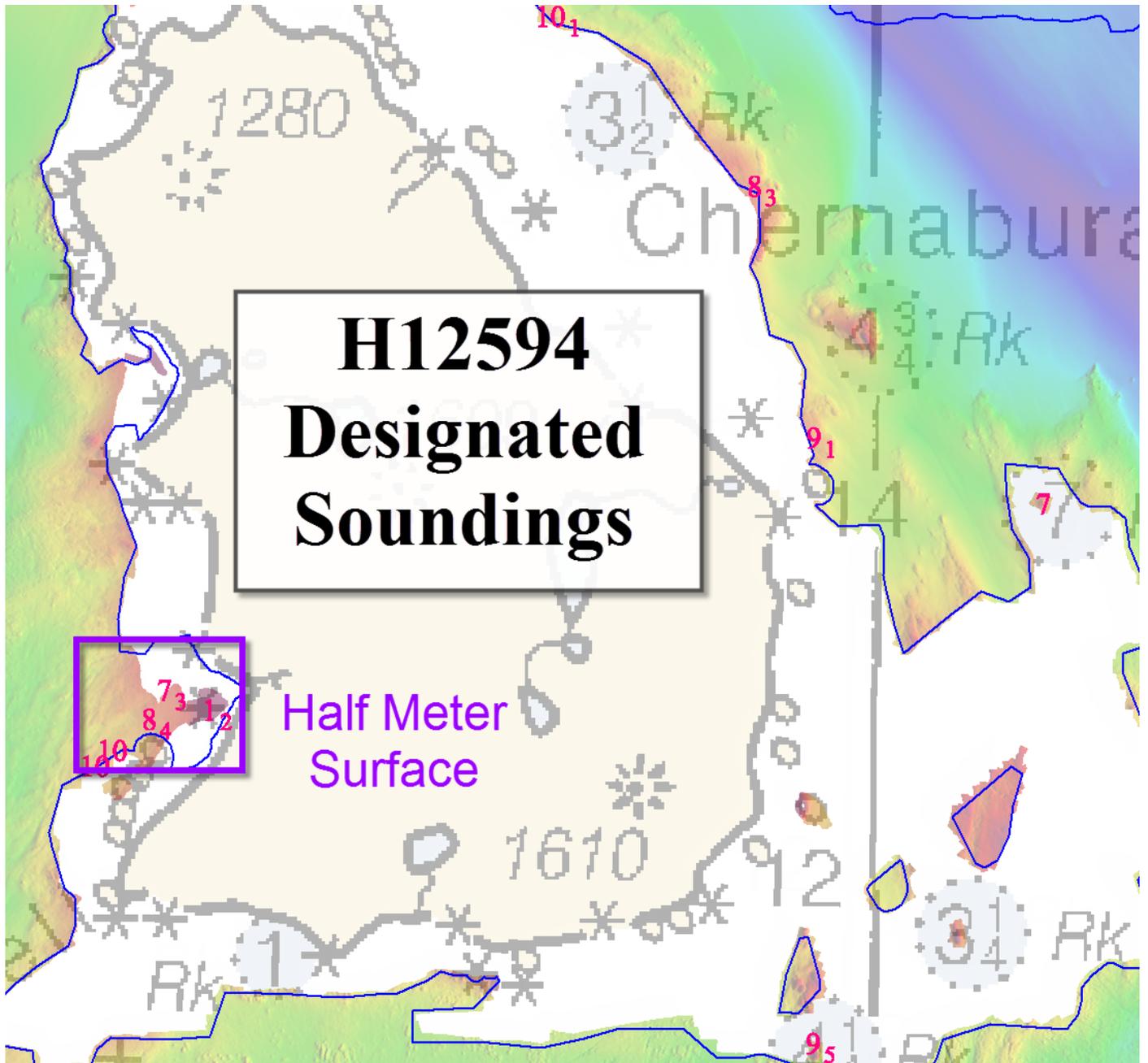


Figure 30: H12594 designated soundings in fathoms.

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
Sand Point	945-9450

Table 10: NWLON Tide Stations

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

Station Name	Station ID
Bird Island	945-9251

Table 11: Subordinate Tide Stations

File Name	Status
9459450.tid	Final Approved
9459251.tid	Final Approved

Table 12: Water Level Files (.tid)

File Name	Status
H12594CORF.zdf	Final

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

A request for final approved tides was sent to N/OPS1 on 09/03/2013. The final tide note was received on 11/19/2013.

The tide station installed by RAINIER personnel on Bird Island, AK (945-9251) was used as the primary control for datum determination and as a source for water level reducers from 2348 UTC on 13 July (DN194) through 0436 UTC on 18 August (DN230). The National Water Level Observation Network (NWLON) tide station in Sand Point, AK (945-9450) served as a subordinate gauge during this time. During the time of acquisition when the Bird Island gauge was not operational, the NWLON tide station in Sand Point served as the primary gauge. A complete description of the vertical and horizontal control for this survey can be found in the accompanying Horizontal and Vertical Control Report (HVCR), submitted under separate cover.

See attached tide note dated November 18, 2013.

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 - 04 North.

The following PPK methods were used for horizontal control:

Single Base

In conjunction with this project, a GPS base station was established by RAINIER personnel on Bird Island, AK; the station was operational from DN192 through DN207 and from DN222 through DN245. During the times when the Bird Island base station was not operational (DN208 through DN221 and DN246 through DN254), a Plate Boundary Observatory station on Chernabura Island (ChernaburaAK2008, AC12) was used for post-processing. There was one exception: Data from S221 on DN244 was collected while the Bird Island base station was operational, but data with these correctors displayed vertical offsets when referenced to the ellipse; this data was instead post-processed using the Chernabura Island base station.

Vessel kinematic data was post processed with Applanix POSpac and POSGNSS software using Single Base processing methods described in the DAPR. One line was processed using Precise Point Positioning (PPP) as discussed below.

The following CORS Stations were used for horizontal control:

HVCR Site ID	Base Station ID
ChernaburaAK2008	AC12

Table 14: CORS Base Stations

The following user installed stations were used for horizontal control:

HVCR Site ID	Base Station ID
Bird Island	NA

Table 15: User Installed Base Stations

Data processed using the Plate Boundary Observatory station is adequate for charting.

Precise Point Positioning (PPP) was used for S221 DN212 line 0009 because a Single Base solution could not be fully processed for that line. When compared to surrounding data, there is a vertical offset of up to 0.50 meters when referenced to the ellipse. There is no apparent artifact when referenced to MLLW so the SBET was retained for this line.

Data processed using PPP is adequate for charting.

The following DGPS Stations were used for horizontal control:

DGPS Stations
Cold Bay, AK (289.0 kHz)

Table 16: USCG DGPS Stations

Data corrected using DGPS is adequate for charting.

C.3 Additional Horizontal or Vertical Control Issues

3.3.1 GPS Heights Removed

GPS heights were removed from data for 2804 (RA-6) DN220 after 2100 UTC and for 2804 (RA-6) DN195 line 2804_2013RA1952106 due to vertical offsets found in the data when referenced to the ellipse, which at times exceeded one meter. Since there were no horizontal offsets seen at MLLW or the ellipse, the other SBET correctors were retained.

The data with the GPS heights removed is adequate for charting.

D. Results and Recommendations

D.1 Chart Comparison

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
16540	1:300000	13	10/2010	05/23/2013	05/18/2013

Table 17: Largest Scale Raster Charts

16540

Contours and soundings were created from H12594 data and were visually compared to Chart 16540 (Figure 31). One of the seven soundings was found to be deeper than previously charted. The Hydrographer recommends that H12594 data supersede all charted depths on Chart 16540.

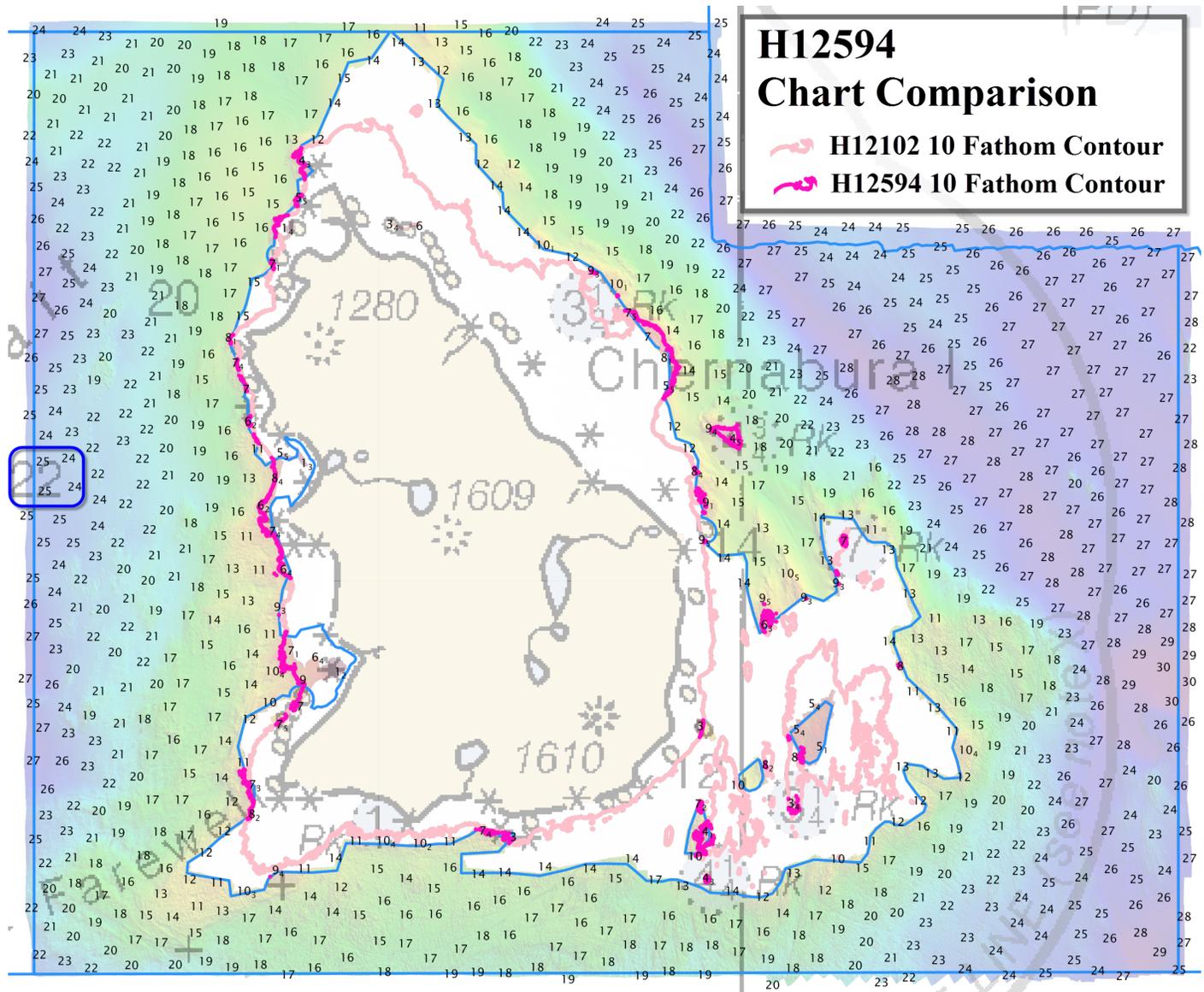


Figure 31: Comparison of Chart 16540 soundings to those derived from H12594. All soundings are in fathoms. Chart soundings are larger, survey soundings are smaller. One sounding was deeper than charted (marked in blue). All other soundings were found to be in general agreement.

D.1.2 Electronic Navigational Charts

The following are the largest scale ENC's, which cover the survey area:

ENC	Scale	Edition	Update Application Date	Issue Date	Preliminary?
US3AK50M	1:300000	17	06/29/2011	05/28/2013	NO

Table 18: Largest Scale ENC's

US3AK50M

ENC US3AK50M coincides with raster 16540. The depth and contours on the ENC match the raster, and the comparison between survey H12594 and the ENC is equivalent to the preceding comparison with Chart 16540. The Hydrographer recommends that H12594 data supersede all charted depths on ENC US3AK50M.

During office review, it was noted that the GC source has been applied to both the ENC and RNC, but it was not applied at the appropriate scale on the ENC. Therefore, there are rocks, islands and foul areas depicted on the ENC that are not and cannot be displayed on the RNC. All charted features will be updated with the new, survey verified features.

D.1.3 AWOIS Items

No AWOIS items were assigned for this survey.

D.1.4 Maritime Boundary Points

Two Maritime Boundary Points were assigned and investigated in accordance with section 3.5.6 of the FPM. Eight additional unassigned MBPs were disproved during shoreline investigation (Figure 31). The MBP features were addressed as required with S-57 attribution and recorded in the H12594 Final Features File.

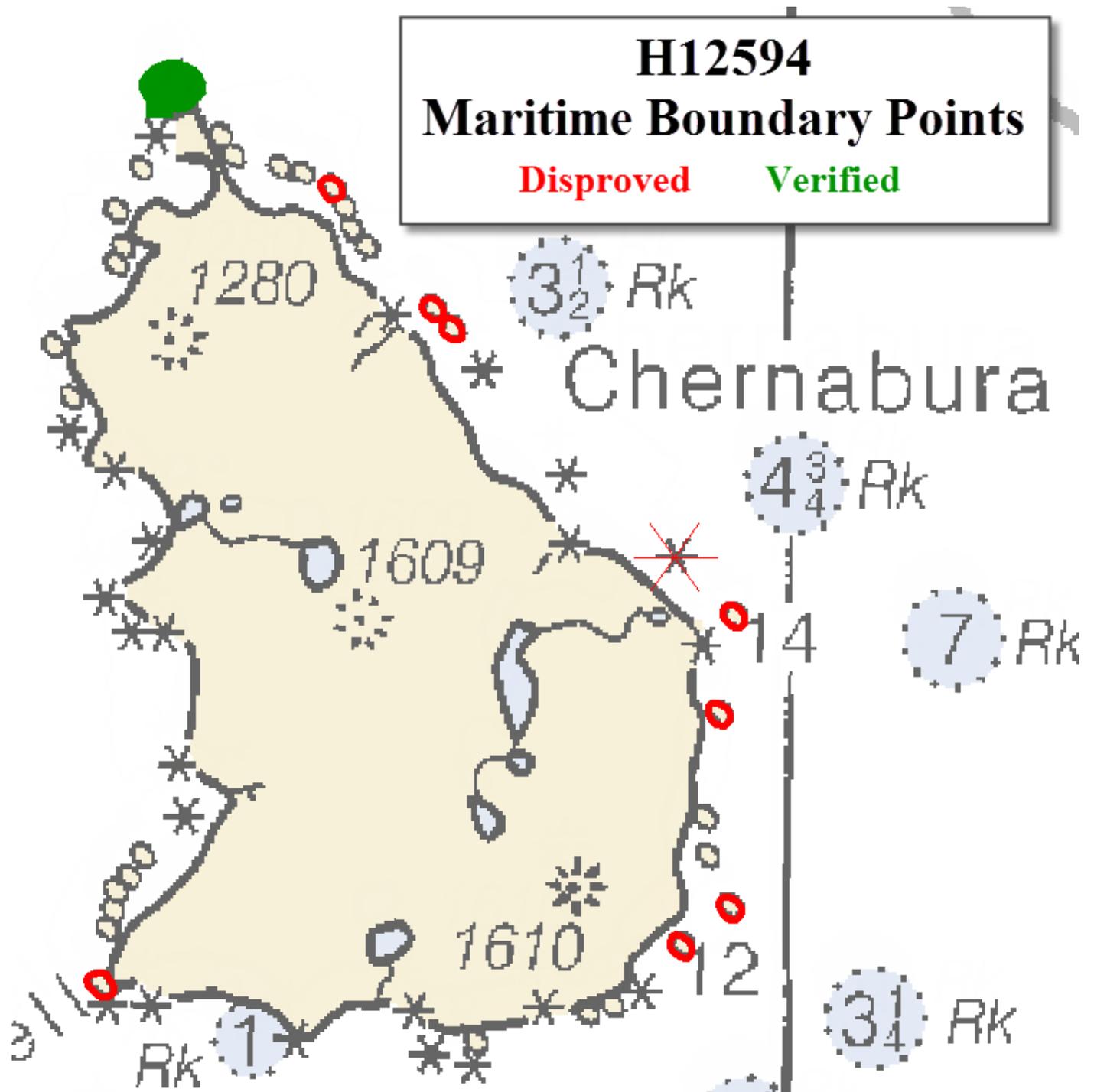


Figure 32: H12594 disproved and verified Maritime Boundary Points.

There were a total of 13 features identified as maritime boundary investigations in the submitted final feature file, two of which were an islet and a height derived from junctioning LIDAR survey H12102. See attached feature report.

D.1.5 Charted Features

No charted features exist for this survey.

D.1.6 Uncharted Features

No uncharted features exist for this survey.

D.1.7 Dangers to Navigation

No Danger to Navigation Reports were submitted for this survey.

No DTONs were identified during H12594, however, 7 DTONs were identified during LIDAR survey H12102 that fall within the junctioning area of H12594. Six of the 7 DTONs have been applied to the chart, however, it has been recommended that the final DTON also be applied. See attached H12102 DTON report.

D.1.8 Shoal and Hazardous Features

No shoals or potentially hazardous features exist for this survey.

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

Bottom samples were acquired in accordance with the Project Instructions and the HSSD and are attributed in the Final Features File. A total of 8 bottom samples were collected, 4 of which had conclusive samples (Figure 33).

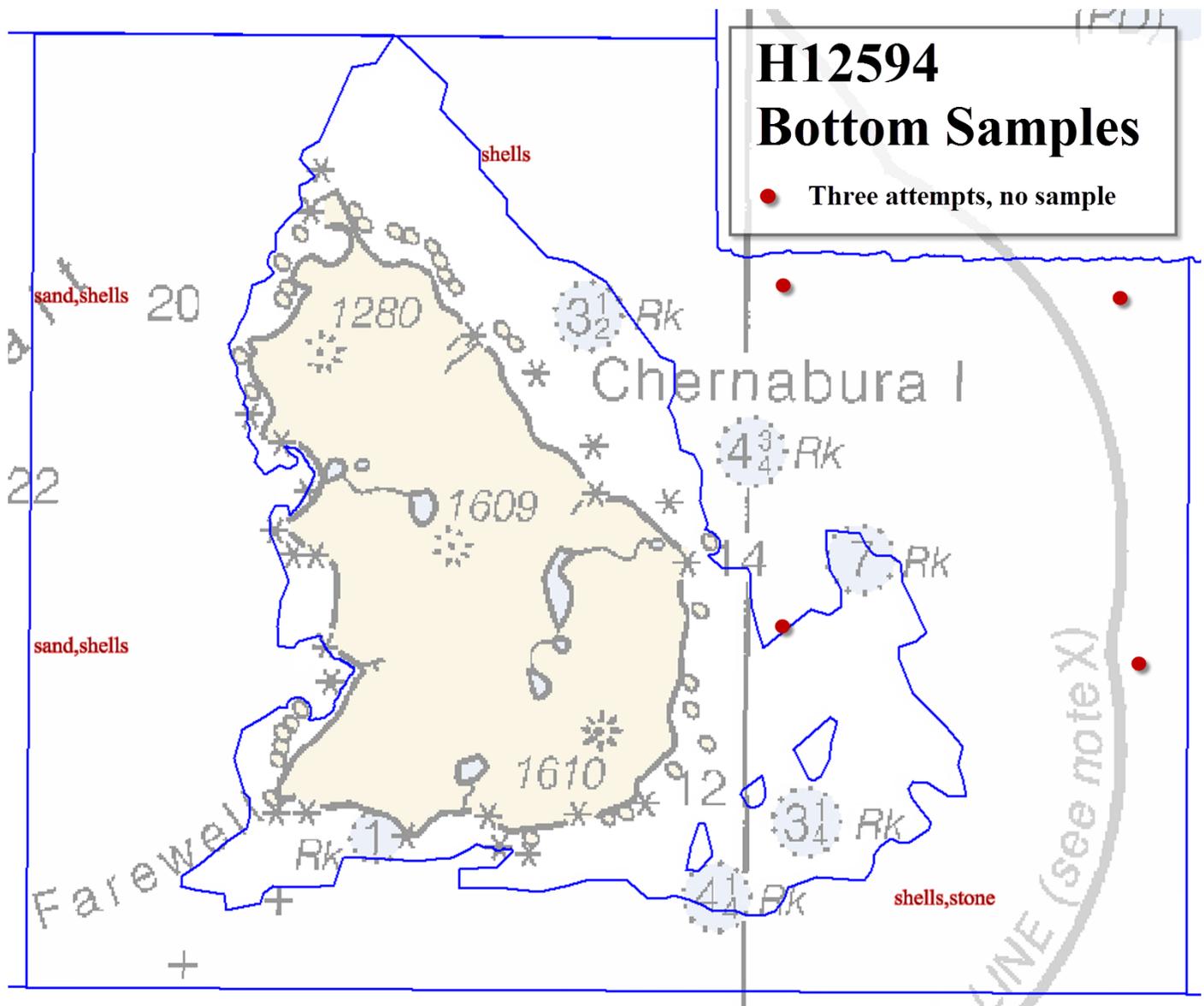


Figure 33: Locations of H12594 bottom samples.

D.2 Additional Results

D.2.1 Shoreline

Shoreline verification was conducted near predicted low water in accordance with the applicable sections of the HSSD and FPM. There were 30 assigned features for the survey. All features were addressed as required with S-57 attribution and recorded in the H12594 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

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

D.2.4 Overhead Features

No overhead features exist for this survey.

D.2.5 Submarine Features

No submarine features exist for this survey.

D.2.6 Ferry Routes and Terminals

No ferry routes or terminals exist for this survey.

D.2.7 Platforms

No platforms exist for this survey.

D.2.8 Significant Features

No significant features exist for this survey.

D.2.9 Construction and Dredging

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

D.2.10 New Survey Recommendation

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

D.2.11 Inset Recommendation

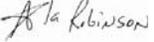
No new insets are recommended for this area.

E. Approval Sheet

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

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

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

Approver Name	Approver Title	Approval Date	Signature
Richard T. Brennan, CDR/NOAA	Commanding Officer	12/13/2013	 Richard T. Brennan 2013.12.18 12:07:11 -08'00'
Meghan McGovern, LT/NOAA	Field Operations Officer	12/13/2013	 Date: 2013.12.14 13:06:04 -08'00'
James B. Jacobson	Chief Survey Technician	12/13/2013	 James Jacobson I have reviewed this document 2013.12.17 09:32:36 -08'00'
Starla D. Robinson	Sheet Manager	12/13/2013	 Starla Robinson

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 Station
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 States Coast Guard
UTM	Universal Transverse Mercator
XO	Executive Officer
ZDA	Global Positioning System timing message
ZDF	Zone Definition File



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

TIDE NOTE FOR HYDROGRAPHIC SURVEY

DATE : November 18, 2013

HYDROGRAPHIC BRANCH: Pacific
HYDROGRAPHIC PROJECT: OPR-P183-RA-13
HYDROGRAPHIC SHEET: H12594

LOCALITY: Vicinity of Chernabura Island, Shumagin Islands, AK
TIME PERIOD: July 14, 2013 - September 2, 2013

TIDE STATION USED: 945-9450 Sand Point, AK
Lat. 55° 19.9' N Long. 160° 30.3' W
PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters
HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 1.988 meters

TIDE STATION USED: 945-9251 Bird Island, AK
Lat. 54° 50.1' N Long. 159° 45.6' W
PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters
HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 1.928 meters

REMARKS: RECOMMENDED ZONING

Use zone(s) identified as: SWA204, SWA204A, SWA205, SWA206

Refer to attachments for zoning information.

Note 1: Provided time series data are tabulated in metric units (meters), relative to MLLW and on Greenwich Mean Time on the 1983-2001 National Tidal Datum Epoch (NTDE).

Note 2: 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 Tidezone 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.TH
OMAS.1365860250

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DN: c=US, o=U.S. Government, ou=DoD, ou=PKI,
ou=OTHER, cn=HOVIS.GERALD.THOMAS.1365860250
Date: 2013.11.19 12:12:29 -05'00'

CHIEF, PRODUCTS AND SERVICES BRANCH



**Final Zoning for OPR-P183-RA-2013, H12594
Vicinity of Chernabura Island, Shumagin Islands, AK**

9459450 SAND POINT

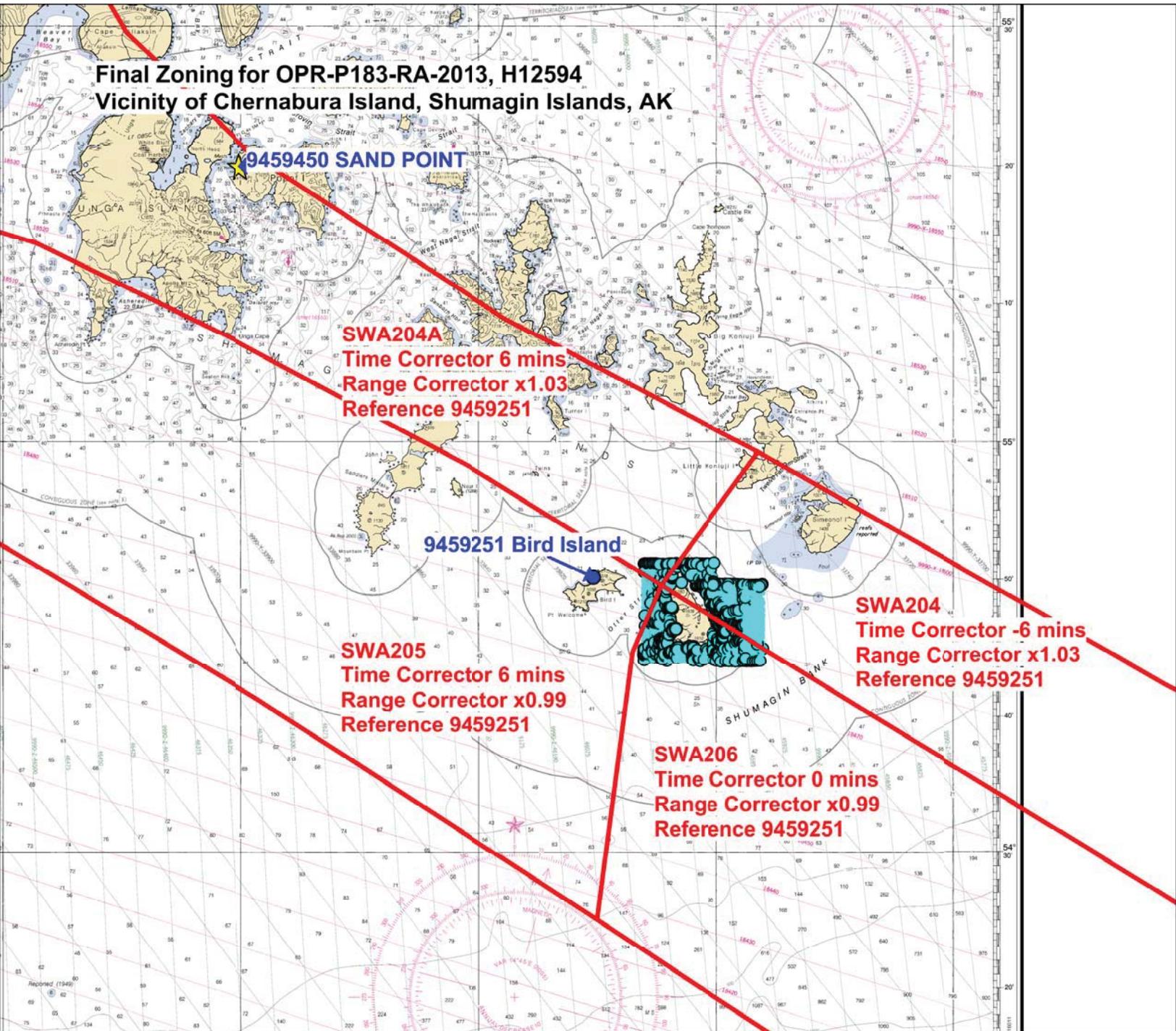
SWA204
Time Corrector 6 mins
Range Corrector x1.03
Reference 9459251

9459251 Bird Island

SWA205
Time Corrector 6 mins
Range Corrector x0.99
Reference 9459251

SWA204
Time Corrector -6 mins
Range Corrector x1.03
Reference 9459251

SWA206
Time Corrector 0 mins
Range Corrector x0.99
Reference 9459251



APPENDIX I – DANGERS TO NAVIGATION

DTONS Submitted to PHB

I.1.1 Danger to Navigation Report

Hydrographic Survey Registry Number: H12102

State: Alaska

Locality: Vicinity of Shumagin Islands

Sub-locality: Chernabura Island

Project Number: OPR-P183-KRL-09

Survey Dates: June – August, 2009

Depths are in meters and reduced to Mean Lower Low Water using final verified tides. Drying heights are in meters relative to MLLW. Islets are related to MHW. Positions are based on the NAD83 horizontal datum. All times and dates are relative to UTC.

Number	Edition	Date	Scale
US3AK50M	12 th	12/1/2009	1:300,000

The following items were found during hydrographic survey operations:

No.	Feature	Depth (m)	Latitude (N)	Longitude (W)	Time, Date, Year	Investigate
1	Rk	6.4	54° 49' 02.94"	159° 32' 08.54"	05:29:00, July 30, 2009	No
2	Rk	8.6	54° 48' 03.30"	159° 30' 03.70"	21:11:09, July 23, 2009	No
3	Rk	13.2	54° 47' 17.86"	159° 28' 38.61"	21:44:45, July 29, 2009	No
4	Rk	1.9	54° 45' 10.92"	159° 34' 42.87"	17:27:47, Aug 11, 2009	No
5	Rk	6.2	54° 45' 19.46"	159° 29' 17.77"	19:39:31, July 19, 2009	No
6	Rk	7.9	54° 44' 46.02"	159° 30' 25.04"	19:39:49, July 19, 2009	No
7	Rk	6.5	54° 45' 07.91"	159° 32' 12.69"	00:50:18, July 30, 2009	No

COMMENTS: Final verified tides have been applied from the Sand Point tide gauge (9459450). The shoals were found using LIDAR. DTON items 1 through 6 were submitted during data collection from the field. DTON item 7 was submitted upon the completion of product compilation from the Biloxi MS office.

Questions concerning this report should be directed to the Survey Manager, Mr. Scott Ramsay, in the Fugro LADS Inc. office in Biloxi MS. at (228) 594 6800.

DTONS Submitted to MCD**I.1.2 Danger to Navigation Report (Submitted during field operations)****Danger to Navigation for Lidar Survey H12102**

Registry Number: H12102
State: Alaska
Locality: Vicinity of Shumagin Islands
Sub-locality: Chernabura Island
Project Number: OPR-P183-KRL-09
Survey Dates: June 13, 2009 - August 11, 2009

Charts Affected

Number	Edition	Date	Scale (RNC)	RNC Correction(s)*
16540	12th	01/01/2005	1:300,000 (16540_1)	USCG LNM: 02/24/2009 (07/21/2009) NGA NTM: 01/21/2006 (08/01/2009)
16011	37th	11/01/2007	1:1,023,188 (16011_1)	[L]NTM: ?
16006	35th	04/01/2008	1:1,534,076 (16006_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 No.	Feature Type	Survey Depth	Survey Latitude	Survey Longitude
1.1	Rock	6.40 m	54° 49' 02.9" N	159° 32' 08.5" W
1.2	Rock	8.60 m	54° 48' 03.3" N	159° 30' 03.7" W
1.3	Rock	13.20 m	54° 47' 17.9" N	159° 28' 38.6" W
1.4	Rock	2.10 m	54° 45' 10.8" N	159° 34' 42.6" W
1.5	Rock	6.20 m	54° 45' 19.5" N	159° 29' 17.8" W
1.6	Rock	7.90 m	54° 44' 46.0" N	159° 30' 25.0" W
1.7	Shoal	21.90 m	54° 45' 07.9" N	159° 35' 19.2" W

1 - Danger To Navigation

1.1) GP No. - 1 from H12102_Pydro.xls**DANGER TO NAVIGATION****Survey Summary**

Survey Position: 54° 49' 02.9" N, 159° 32' 08.5" W
Least Depth: 6.40 m (= 21.00 ft = 3.500 fm = 3 fm 3.00 ft)
TPU ($\pm 1.96\sigma$): THU (TPEh) [None] ; TVU (TPEv) [None]
Timestamp: 2009-211.05:29:00.000 (07/30/2009)
GP Dataset: H12102_Pydro.xls
GP No.: 1
Charts Affected: 16540_1, 16011_1, 16006_1, 500_1, 530_1, 50_1

Remarks:

This feature was found during Lidar hydrographic survey operation by Fugro LADS Inc. Depth was reduced to Mean Lower Low Water using preliminary tides from the King Cove tide gauge (9459881).

Hydrographer Recommendations

Chart as surveyed.

Cartographically-Rounded Depth (Affected Charts):

3 ½fm (16540_1, 16011_1, 16006_1, 530_1)

6.4m (500_1, 50_1)

S-57 Data

Geo object 1: Underwater rock / awash rock (UWTROC)
Attributes: SORDAT - 20090811
SORIND - US,US,nsurf,H12102
TECSOU - 7:found by laser
VALSOU - 6.4 m
VERDAT - 12:Mean lower low water
WATLEV - 3:always under water/submerged

1.2) GP No. - 2 from H12102_Pydro.xls**DANGER TO NAVIGATION****Survey Summary**

Survey Position: 54° 48' 03.3" N, 159° 30' 03.7" W
Least Depth: 8.60 m (= 28.22 ft = 4.703 fm = 4 fm 4.22 ft)
TPU ($\pm 1.96\sigma$): THU (TPEh) [None] ; TVU (TPEv) [None]
Timestamp: 2009-204.21:11:09.000 (07/23/2009)
GP Dataset: H12102_Pydro.xls
GP No.: 2
Charts Affected: 16540_1, 16011_1, 16006_1, 500_1, 530_1, 50_1

Remarks:

This feature was found during Lidar hydrographic survey operation by Fugro LADS Inc. Depth was reduced to Mean Lower Low Water using preliminary tides from the King Cove tide gauge (9459881).

Hydrographer Recommendations

Chart as surveyed.

Cartographically-Rounded Depth (Affected Charts):

4 ¾fm (16540_1, 16011_1, 16006_1, 530_1)

8.6m (500_1, 50_1)

S-57 Data

Geo object 1: Underwater rock / awash rock (UWTROC)
Attributes: SORDAT - 20090811
 SORIND - US,US,nsurf,H12102
 TECSOU - 7:found by laser
 VALSOU - 8.6 m
 VERDAT - 12:Mean lower low water
 WATLEV - 3:always under water/submerged

1.3) GP No. - 3 from H12102_Pydro.xls

DANGER TO NAVIGATION

Survey Summary

Survey Position: 54° 47' 17.9" N, 159° 28' 38.6" W
Least Depth: 13.20 m (= 43.31 ft = 7.218 fm = 7 fm 1.31 ft)
TPU ($\pm 1.96\sigma$): THU (TPEh) [None] ; TVU (TPEv) [None]
Timestamp: 2009-210.21:44:45.000 (07/29/2009)
GP Dataset: H12102_Pydro.xls
GP No.: 3
Charts Affected: 16540_1, 16011_1, 16006_1, 500_1, 530_1, 50_1

Remarks:

This feature was found during Lidar hydrographic survey operation by Fugro LADS Inc. Depth was reduced to Mean Lower Low Water using preliminary tides from the King Cove tide gauge (9459881).

Hydrographer Recommendations

Chart as surveyed.

Cartographically-Rounded Depth (Affected Charts):

7 ¼fm (16540_1, 16011_1, 16006_1, 530_1)

13.2m (500_1, 50_1)

S-57 Data

Geo object 1: Underwater rock / awash rock (UWTROC)
Attributes: SORDAT - 20090811
SORIND - US,US,nsurf,H12102
TECSOU - 7:found by laser
VALSOU - 13.2 m
VERDAT - 12:Mean lower low water
WATLEV - 3:always under water/submerged

1.4) GP No. - 4 from H12102_Pydro.xls**DANGER TO NAVIGATION****Survey Summary**

Survey Position: 54° 45' 10.8" N, 159° 34' 42.6" W
Least Depth: 2.10 m (= 6.89 ft = 1.148 fm = 1 fm 0.89 ft)
TPU ($\pm 1.96\sigma$): THU (TPEh) [None] ; TVU (TPEv) [None]
Timestamp: 2009-197.02:33:40.000 (07/16/2009)
GP Dataset: H12102_Pydro.xls
GP No.: 4
Charts Affected: 16540_1, 16011_1, 16006_1, 500_1, 530_1, 50_1

Remarks:

This feature was found during Lidar hydrographic survey operation by Fugro LADS Inc. Depth was reduced to Mean Lower Low Water using preliminary tides from the King Cove tide gauge (9459881).

Hydrographer Recommendations

Chart as surveyed.

Cartographically-Rounded Depth (Affected Charts):

1fm (16540_1, 16011_1, 16006_1, 530_1)

2.1m (500_1, 50_1)

S-57 Data

Geo object 1: Underwater rock / awash rock (UWTROC)
Attributes: SORDAT - 20090811
SORIND - US,US,nsurf,H12102
TECSOU - 7:found by laser
VALSOU - 2.1 m
VERDAT - 12:Mean lower low water
WATLEV - 3:always under water/submerged

1.5) GP No. - 5 from H12102_Pydro.xls

DANGER TO NAVIGATION

Survey Summary

Survey Position: 54° 45' 19.5" N, 159° 29' 17.8" W
Least Depth: 6.20 m (= 20.34 ft = 3.390 fm = 3 fm 2.34 ft)
TPU ($\pm 1.96\sigma$): THU (TPEh) [None] ; TVU (TPEv) [None]
Timestamp: 2009-200.19:39:31.000 (07/19/2009)
GP Dataset: H12102_Pydro.xls
GP No.: 5
Charts Affected: 16540_1, 16011_1, 16006_1, 500_1, 530_1, 50_1

Remarks:

This feature was found during Lidar hydrographic survey operation by Fugro LADS Inc. Depth was reduced to Mean Lower Low Water using preliminary tides from the King Cove tide gauge (9459881).

Hydrographer Recommendations

Chart as surveyed.

Cartographically-Rounded Depth (Affected Charts):

3 ¼fm (16540_1, 16011_1, 16006_1, 530_1)

6.2m (500_1, 50_1)

S-57 Data

Geo object 1: Underwater rock / awash rock (UWTROC)
Attributes: SORDAT - 20090811
SORIND - US,US,nsurf,H12102
TECSOU - 7:found by laser
VALSOU - 6.2 m
VERDAT - 12:Mean lower low water
WATLEV - 3:always under water/submerged

1.6 GP No. - 6 from H12102_Pydro.xls**DANGER TO NAVIGATION****Survey Summary**

Survey Position: 54° 44' 46.0" N, 159° 30' 25.0" W
Least Depth: 7.90 m (= 25.92 ft = 4.320 fm = 4 fm 1.92 ft)
TPU ($\pm 1.96\sigma$): THU (TPEh) [None] ; TVU (TPEv) [None]
Timestamp: 2009-200.19:39:49.000 (07/19/2009)
GP Dataset: H12102_Pydro.xls
GP No.: 6
Charts Affected: 16540_1, 16011_1, 16006_1, 500_1, 530_1, 50_1

Remarks:

This feature was found during Lidar hydrographic survey operation by Fugro LADS Inc. Depth was reduced to Mean Lower Low Water using preliminary tides from the King Cove tide gauge (9459881).

Hydrographer Recommendations

Chart as surveyed.

Cartographically-Rounded Depth (Affected Charts):

4 ¼fm (16540_1, 16011_1, 16006_1, 530_1)

7.9m (500_1, 50_1)

S-57 Data

Geo object 1: Underwater rock / awash rock (UWTROC)
Attributes: SORDAT - 20090811
SORIND - US,US,nsurf,H12102
TECSOU - 7:found by laser
VALSOU - 7.9 m
VERDAT - 12:Mean lower low water
WATLEV - 3:always under water/submerged

1.7) GP No. - Depth 1 from ChartGPs - ENC US3AK50M**ANTI-DANGER TO NAVIGATION****Survey Summary**

Survey Position: 54° 45' 07.9" N, 159° 35' 19.2" W
Least Depth: 21.90 m (= 71.85 ft = 11.975 fm = 11 fm 5.85 ft)
TPU ($\pm 1.96\sigma$): THU (TPEh) [None] ; TVU (TPEv) [None]
Timestamp: [None]
GP Dataset: ChartGPs - ENC US3AK50M
GP No.: Depth 1
Charts Affected: 16540_1, 16011_1, 16006_1, 500_1, 530_1, 50_1

Remarks:

Shoaler soundings were found in the vicinity by Lidar hydrographic survey.

Hydrographer Recommendations

Remove charted sounding.

Cartographically-Rounded Depth (Affected Charts):

12fm (16540_1, 16011_1, 16006_1, 530_1)

22m (500_1, 50_1)

S-57 Data

Geo object 1: Sounding (SOUNDG)
Attributes: SORDAT - 19890304
SORIND - US,US.graph,Chart 16540

DTONS Submitted to MCD

I.1.3 Danger to Navigation Report (Submitted following field operations)

Registry Number: H12102
State: Alaska
Locality: Southwest Alaska Peninsula - Shumagin Islands
Sub-locality: Vicinity of Chernabura Island
Project Number: OPR-P183-KRL-09
Survey Date: 07/30/2009

Charts Affected

Number	Edition	Date	Scale (RNC)	RNC Correction(s)*
16540	12th	01/01/2005	1:300,000 (16540_1)	[L]NTM: ?
16011	37th	11/01/2007	1:1,023,188 (16011_1)	[L]NTM: ?
16006	35th	04/01/2008	1:1,534,076 (16006_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

No.	Feature Type	Survey Depth	Survey Latitude	Survey Longitude	AWOIS Item
1.1	Rock	6.50 m	54° 45' 07.9" N	159° 32' 12.7" W	---

1 - Danger To Navigation

1.1) GP No. - 1 from H12102_Pydro_2.xls**DANGER TO NAVIGATION****Survey Summary**

Survey Position: 54° 45' 07.9" N, 159° 32' 12.7" W
Least Depth: 6.50 m (= 21.33 ft = 3.554 fm = 3 fm 3.33 ft)
TPU ($\pm 1.96\sigma$): THU (TPEh) [None] ; TVU (TPEv) [None]
Timestamp: 2009-211.00:50:18.000 (07/30/2009)
GP Dataset: H12102_Pydro_2.xls
GP No.: 1
Charts Affected: 16540_1, 16011_1, 16006_1, 500_1, 530_1, 50_1

Remarks:

This feature was found during Lidar hydrographic survey operation by Fugro LADS, Inc. Depth was reduced to Mean Lower Low Water using final tides from the Sand Point tide gauge (9459450).

Feature Correlation

Address	Feature	Range	Azimuth	Status
H12102_Pydro_2.xls	1	0.00	000.0	Primary

Hydrographer Recommendations

Chart as surveyed.

Cartographically-Rounded Depth (Affected Charts):

3 ½fm (16540_1, 16011_1, 16006_1, 530_1)

6.5m (500_1, 50_1)

S-57 Data

Geo object 1: Underwater rock / awash rock (UWTROC)
Attributes: SORDAT - 20090811
 SORIND - US,US,nsurf,H12102
 TECSOU - 7:found by laser
 VALSOU - 6.5 m

VERDAT - 12:Mean lower low water

WATLEV - 3:always under water/submerged

H12594 Feature Report

Registry Number: H12594
State: Alaska
Locality: Shumagin Islands
Sub-locality: Vicinity of Chernabura Island
Project Number: OPR-P183-RA-13
Survey Dates: 7/14/2013 - 9/2/2013

Charts Affected

Number	Edition	Date	Scale (RNC)	RNC Correction(s)*
16540	13th	10/01/2010	1:300,000 (16540_1)	USCG LNM: 4/15/2014 (8/26/2014) CHS NTM: None (6/27/2014) NGA NTM: 1/21/2006 (8/30/2014)
16011	37th	11/01/2007	1:1,023,188 (16011_1)	[L]NTM: ?
16006	35th	04/01/2008	1:1,534,076 (16006_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

No.	Name	Feature Type	Survey Depth	Survey Latitude	Survey Longitude
1.1	US 0001126594 00001	GP	[None]	54° 45' 24.4" N	159° 36' 01.1" W
1.2	US 0001126603 00001	GP	[None]	54° 50' 03.7" N	159° 35' 28.0" W
1.3	US 0001126602 00001	GP	[None]	54° 50' 03.7" N	159° 35' 28.0" W
1.4	US 0001126604 00001	Rock	-0.98 m	54° 50' 09.4" N	159° 35' 17.9" W
1.5	US 0001126599 00001	GP	[None]	54° 49' 29.8" N	159° 34' 04.9" W
1.6	US 0001126595 00001	GP	[None]	54° 48' 53.2" N	159° 33' 10.1" W
1.7	US 0001126597 00001	GP	[None]	54° 48' 47.1" N	159° 32' 58.7" W
1.8	US 0001126593 00001	Rock	[None]	54° 47' 40.6" N	159° 30' 58.8" W
1.9	US 0001126600 00001	GP	[None]	54° 45' 38.2" N	159° 30' 55.5" W
1.10	US 0001126598 00001	GP	[None]	54° 46' 49.6" N	159° 30' 36.4" W

1.11	US 0001126601 00001	GP	[None]	54° 45' 50.0" N	159° 30' 29.7" W
1.12	US 0001126596 00001	GP	[None]	54° 47' 19.7" N	159° 30' 28.8" W
2.1	US 0001126642 00001	Rock	0.32 m	54° 45' 54.7" N	159° 30' 31.3" W

1 - Charted Features

1.1) US 0001126594 00001

Survey Summary

Survey Position: 54° 45' 24.4" N, 159° 36' 01.1" W
Least Depth: [None]
TPU ($\pm 1.96\sigma$): THU (TPEh) [None] ; TVU (TPEv) [None]
Timestamp: 2005-001.00:00:00.000 (01/01/2005)
Dataset: H12594_Maritime_Boundary_Investigations.000
FOID: US 0001126594 00001(0226001130C20001)
Charts Affected: 16540_1, 16011_1, 16006_1, 500_1, 530_1, 50_1

Remarks:

COALNE/remrks: Charted (16540) MHW islet not seen during MLLW shoreline investigation

Feature Correlation

Source	Feature	Range	Azimuth	Status
H12594_Maritime_Boundary_Investigations.000	US 0001126594 00001	0.00	000.0	Primary

Hydrographer Recommendations

Remove islet from chart

S-57 Data

Geo object 1: Coastline (COALNE)
Attributes: SORDAT - 20050100
 SORIND - US,US,graph,chart 16540

Office Notes

Concur.

Feature Images



Figure 1.1.1

1.2) US 0001126603 00001

Survey Summary

Survey Position: 54° 50' 03.7" N, 159° 35' 28.0" W
Least Depth: [None]
TPU ($\pm 1.96\sigma$): THU (TPEh) [None] ; TVU (TPEv) [None]
Timestamp: 2009-228.00:00:00.000 (08/16/2009)
Dataset: H12594_Maritime_Boundary_Investigations.000
FOID: US 0001126603 00001(0226001130CB0001)
Charts Affected: 16540_1, 16011_1, 16006_1, 500_1, 530_1, 50_1

Remarks:

LNDARE/remrks: Land area is rock

Feature Correlation

Source	Feature	Range	Azimuth	Status
H12594_Maritime_Boundary_Investigations.000	US 0001126603 00001	0.00	000.0	Primary

Hydrographer Recommendations

Delete

S-57 Data

Geo object 1: Land area (LNDARE)
Attributes: SORDAT - 20090816
 SORIND - US,US,graph,H12102

Office Notes

Concur with clarification. Do not chart LIDAR islet/height.

Feature Images



Figure 1.2.1



Figure 1.2.2

1.3) US 0001126602 00001

Survey Summary

Survey Position: 54° 50' 03.7" N, 159° 35' 28.0" W
Least Depth: [None]
TPU ($\pm 1.96\sigma$): THU (TPEh) [None] ; TVU (TPEv) [None]
Timestamp: 2009-228.00:00:00.000 (08/16/2009)
Dataset: H12594_Maritime_Boundary_Investigations.000
FOID: US 0001126602 00001(0226001130CA0001)
Charts Affected: 16540_1, 16011_1, 16006_1, 500_1, 530_1, 50_1

Remarks:

LNDELV/remrks: Land area is a rock

Feature Correlation

Source	Feature	Range	Azimuth	Status
H12594_Maritime_Boundary_Investigations.000	US 0001126602 00001	0.00	000.0	Primary

Hydrographer Recommendations

Delete

S-57 Data

Geo object 1: Land elevation (LNDELV)
Attributes: ELEVAT - 0.5 m
 SORDAT - 20090816
 SORIND - US,US,graph,H12102

Office Notes

Concur with clarification. Do not chart LIDAR islet/height.

Feature Images



Figure 1.3.1



Figure 1.3.2

1.4) US 0001126604 00001

Survey Summary

Survey Position: 54° 50' 09.4" N, 159° 35' 17.9" W
Least Depth: -0.98 m (= -3.21 ft = -0.535 fm = 0 fm 2.79 ft)
TPU ($\pm 1.96\sigma$): THU (TPEh) [None] ; TVU (TPEv) [None]
Timestamp: 2013-195.21:41:36.000 (07/14/2013)
Dataset: H12594_Maritime_Boundary_Investigations.000
FOID: US 0001126604 00001(0226001130CC0001)
Charts Affected: 16540_1, 16011_1, 16006_1, 500_1, 530_1, 50_1

Remarks:

UWTROC/remrks: Lidar (H12102) rock height and position DP-ed during shoreline, maritime boundary investigation

Feature Correlation

Source	Feature	Range	Azimuth	Status
H12594_Maritime_Boundary_Investigations.000	US 0001126604 00001	0.00	000.0	Primary

Hydrographer Recommendations

Update height

Cartographically-Rounded Depth (Affected Charts):

-1 ½fm (16540_1, 16011_1, 16006_1, 530_1)

-0.9m (500_1, 50_1)

S-57 Data

Geo object 1: Underwater rock / awash rock (UWTROC)

Attributes: NATSUR - 9:rock
 QUASOU - 6:least depth known
 SORDAT - 20130901
 SORIND - US,US,graph,H12594
 TECSOU - 12:found by levelling
 VALSOU - -0.978 m

WATLEV - 4:covers and uncovers

Office Notes

Concur with clarification. Chart rock with updated depth.

Feature Images



Figure 1.4.1



Figure 1.4.2

1.5) US 0001126599 00001

Survey Summary

Survey Position: 54° 49' 29.8" N, 159° 34' 04.9" W
Least Depth: [None]
TPU ($\pm 1.96\sigma$): THU (TPEh) [None] ; TVU (TPEv) [None]
Timestamp: 1989-063.00:00:00.000 (03/04/1989)
Dataset: H12594_Maritime_Boundary_Investigations.000
FOID: US 0001126599 00001(0226001130C70001)
Charts Affected: 16540_1, 16011_1, 16006_1, 500_1, 530_1, 50_1

Remarks:

COALNE/remrks: Charted (16540) MHW islet not seen during MLLW shoreline investigation

Feature Correlation

Source	Feature	Range	Azimuth	Status
H12594_Maritime_Boundary_Investigations.000	US 0001126599 00001	0.00	000.0	Primary

Hydrographer Recommendations

Remove islet from chart

S-57 Data

Geo object 1: Coastline (COALNE)
Attributes: NINFOM - Charted islet not detected by lidar or imagery
 SORDAT - 19890304
 SORIND - US,US,graph,Chart 16540

Office Notes

Concur.

Feature Images



Figure 1.5.1

1.6) US 0001126595 00001

Survey Summary

Survey Position: 54° 48' 53.2" N, 159° 33' 10.1" W
Least Depth: [None]
TPU ($\pm 1.96\sigma$): THU (TPEh) [None] ; TVU (TPEv) [None]
Timestamp: 1989-063.00:00:00.000 (03/04/1989)
Dataset: H12594_Maritime_Boundary_Investigations.000
FOID: US 0001126595 00001(0226001130C30001)
Charts Affected: 16540_1, 16011_1, 16006_1, 500_1, 530_1, 50_1

Remarks:

COALNE/remrks: Charted (16540) MHW islet not seen during MLLW shoreline investigation

Feature Correlation

Source	Feature	Range	Azimuth	Status
H12594_Maritime_Boundary_Investigations.000	US 0001126595 00001	0.00	000.0	Primary

Hydrographer Recommendations

Remove islet from chart

S-57 Data

Geo object 1: Coastline (COALNE)
Attributes: NINFOM - Charted islet not detected by lidar or imagery
 SORDAT - 19890304
 SORIND - US,US,graph,Chart 16540

Office Notes

Concur.

Feature Images



Figure 1.6.1

1.7) US 0001126597 00001

Survey Summary

Survey Position: 54° 48' 47.1" N, 159° 32' 58.7" W
Least Depth: [None]
TPU ($\pm 1.96\sigma$): THU (TPEh) [None] ; TVU (TPEv) [None]
Timestamp: 1989-063.00:00:00.000 (03/04/1989)
Dataset: H12594_Maritime_Boundary_Investigations.000
FOID: US 0001126597 00001(0226001130C50001)
Charts Affected: 16540_1, 16011_1, 16006_1, 500_1, 530_1, 50_1

Remarks:

COALNE/remrks: Charted (16540) MHW islet not seen during MLLW shoreline investigation

Feature Correlation

Source	Feature	Range	Azimuth	Status
H12594_Maritime_Boundary_Investigations.000	US 0001126597 00001	0.00	000.0	Primary

Hydrographer Recommendations

Remove islet from chart

S-57 Data

Geo object 1: Coastline (COALNE)
Attributes: NINFOM - Charted islet not detected by lidar or imagery
 SORDAT - 19890304
 SORIND - US,US,graph,Chart 16540

Office Notes

Concur.

Feature Images



Figure 1.7.1

1.8) US 0001126593 00001

Survey Summary

Survey Position: 54° 47' 40.6" N, 159° 30' 58.8" W
Least Depth: [None]
TPU ($\pm 1.96\sigma$): THU (TPEh) [None] ; TVU (TPEv) [None]
Timestamp: 1989-063.00:00:00.000 (03/04/1989)
Dataset: H12594_Maritime_Boundary_Investigations.000
FOID: US 0001126593 00001(0226001130C10001)
Charts Affected: 16540_1, 16011_1, 16006_1, 500_1, 530_1, 50_1

Remarks:

UWTROC/remrks: Charted (16540) rock not seen during MLLW shoreline investigation. Skiff drove over location confirming not shoal. Maritime boundary point disproved.

Feature Correlation

Source	Feature	Range	Azimuth	Status
H12594_Maritime_Boundary_Investigations.000	US 0001126593 00001	0.00	000.0	Primary

Hydrographer Recommendations

Remove rock from chart

S-57 Data

Geo object 1: Underwater rock / awash rock (UWTROC)
Attributes: NATSUR - 9:rock
 QUASOU - 2:depth unknown
 SORDAT - 19890304
 SORIND - US,US,graph,Chart 16540
 WATLEV - 4:covers and uncovers

Office Notes

Concur.

Feature Images



Figure 1.8.1

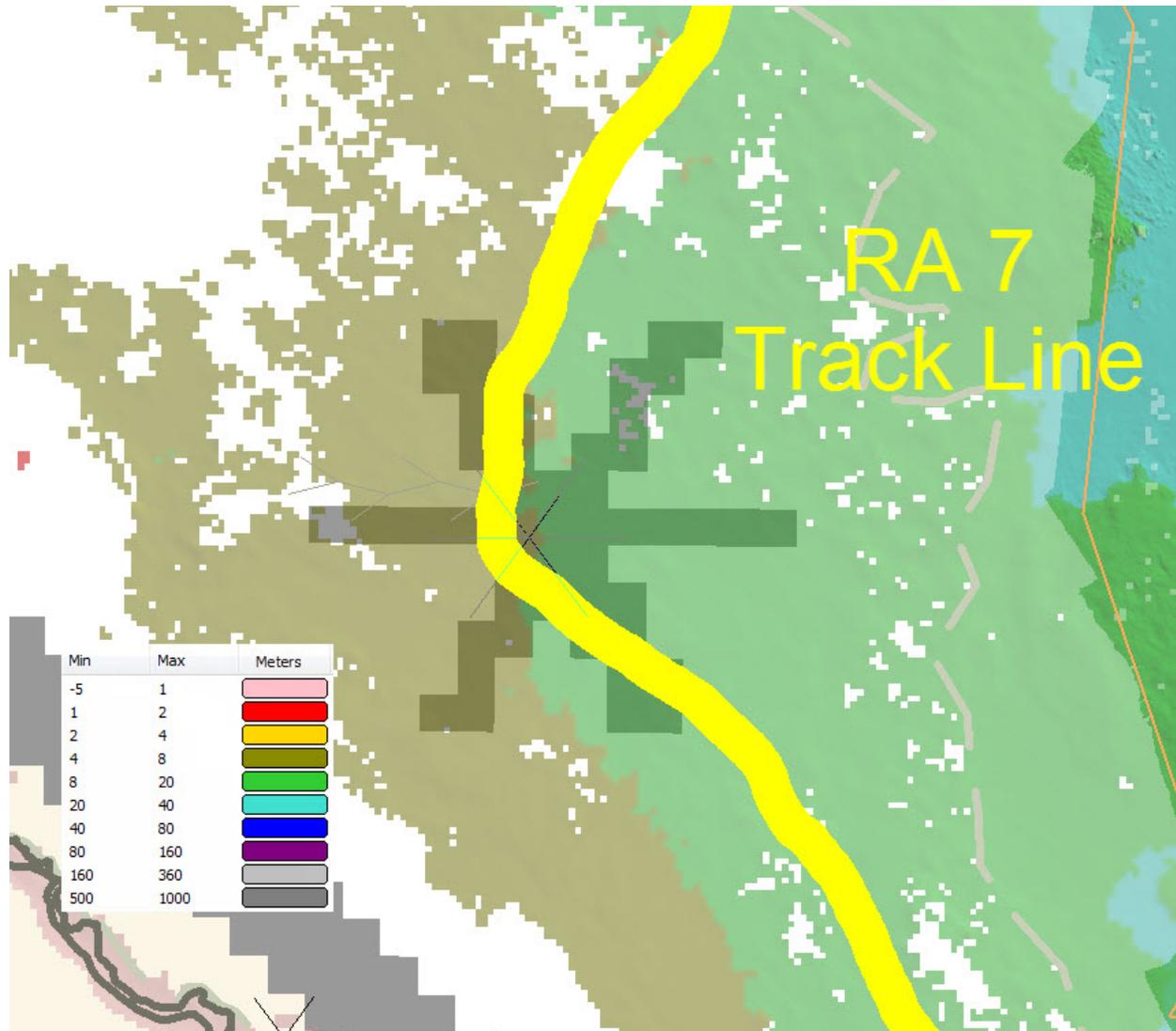


Figure 1.8.2

1.9) US 0001126600 00001

Survey Summary

Survey Position: 54° 45' 38.2" N, 159° 30' 55.5" W
Least Depth: [None]
TPU ($\pm 1.96\sigma$): THU (TPEh) [None] ; TVU (TPEv) [None]
Timestamp: 1989-063.00:00:00.000 (03/04/1989)
Dataset: H12594_Maritime_Boundary_Investigations.000
FOID: US 0001126600 00001(0226001130C80001)
Charts Affected: 16540_1, 16011_1, 16006_1, 500_1, 530_1, 50_1

Remarks:

COALNE/remrks: Charted (16540) MHW islet not seen during MLLW shoreline investigation

Feature Correlation

Source	Feature	Range	Azimuth	Status
H12594_Maritime_Boundary_Investigations.000	US 0001126600 00001	0.00	000.0	Primary

Hydrographer Recommendations

Remove islet from chart

S-57 Data

Geo object 1: Coastline (COALNE)
Attributes: NINFOM - Charted islet not detected by lidar or imagery
 SORDAT - 19890304
 SORIND - US,US,graph,Chart 16540

Office Notes

Concur.

Feature Images



Figure 1.9.1

1.10) US 0001126598 00001

Survey Summary

Survey Position: 54° 46' 49.6" N, 159° 30' 36.4" W
Least Depth: [None]
TPU ($\pm 1.96\sigma$): THU (TPEh) [None] ; TVU (TPEv) [None]
Timestamp: 1989-063.00:00:00.000 (03/04/1989)
Dataset: H12594_Maritime_Boundary_Investigations.000
FOID: US 0001126598 00001(0226001130C60001)
Charts Affected: 16540_1, 16011_1, 16006_1, 500_1, 530_1, 50_1

Remarks:

COALNE/remrks: Charted (16540) MHW islet not seen during MLLW shoreline investigation. Shoreline crew observed depths deeper then 8 meters

Feature Correlation

Source	Feature	Range	Azimuth	Status
H12594_Maritime_Boundary_Investigations.000	US 0001126598 00001	0.00	000.0	Primary

Hydrographer Recommendations

Remove islet from chart

S-57 Data

Geo object 1: Coastline (COALNE)
Attributes: NINFOM - Charted islet not detected by lidar or imagery
 SORDAT - 19890304
 SORIND - US,US,graph,Chart 16540

Office Notes

Concur.

1.11) US 0001126601 00001

Survey Summary

Survey Position: 54° 45' 50.0" N, 159° 30' 29.7" W
Least Depth: [None]
TPU ($\pm 1.96\sigma$): THU (TPEh) [None] ; TVU (TPEv) [None]
Timestamp: 1989-063.00:00:00.000 (03/04/1989)
Dataset: H12594_Maritime_Boundary_Investigations.000
FOID: US 0001126601 00001(0226001130C90001)
Charts Affected: 16540_1, 16011_1, 16006_1, 500_1, 530_1, 50_1

Remarks:

COALNE/remrks: Charted (16540) islet is rock

Feature Correlation

Source	Feature	Range	Azimuth	Status
H12594_Maritime_Boundary_Investigations.000	US 0001126601 00001	0.00	000.0	Primary

Hydrographer Recommendations

Delete islet

S-57 Data

Geo object 1: Coastline (COALNE)
Attributes: NINFOM - Charted islet not detected by lidar or imagery
 SORDAT - 19890304
 SORIND - US,US,graph,Chart 16540

Office Notes

Concur with clarification. Chart rock in place of islet.

1.12) US 0001126596 00001

Survey Summary

Survey Position: 54° 47' 19.7" N, 159° 30' 28.8" W
Least Depth: [None]
TPU ($\pm 1.96\sigma$): THU (TPEh) [None] ; TVU (TPEv) [None]
Timestamp: 1989-063.00:00:00.000 (03/04/1989)
Dataset: H12594_Maritime_Boundary_Investigations.000
FOID: US 0001126596 00001(0226001130C40001)
Charts Affected: 16540_1, 16011_1, 16006_1, 500_1, 530_1, 50_1

Remarks:

COALNE/remrks: Charted (16540) MHW islet not seen during MLLW shoreline investigation

Feature Correlation

Source	Feature	Range	Azimuth	Status
H12594_Maritime_Boundary_Investigations.000	US 0001126596 00001	0.00	000.0	Primary

Hydrographer Recommendations

Remove islet from chart

S-57 Data

Geo object 1: Coastline (COALNE)
Attributes: SORDAT - 19890304
 SORIND - US,US,graph,Chart 16540

Office Notes

Concur.

2 - New Features

2.1) US 0001126642 00001

Survey Summary

Survey Position: 54° 45' 54.7" N, 159° 30' 31.3" W
Least Depth: 0.32 m (= 1.06 ft = 0.176 fm = 0 fm 1.06 ft)
TPU ($\pm 1.96\sigma$): **THU (TPEh)** [None] ; **TVU (TPEv)** [None]
Timestamp: 2013-195.19:48:47.000 (07/14/2013)
Dataset: H12594_Maritime_Boundary_Investigations.000
FOID: US 0001126642 00001(0226001130F20001)
Charts Affected: 16540_1, 16011_1, 16006_1, 500_1, 530_1, 50_1

Remarks:

UWTROC/remrks: New rock

Feature Correlation

Source	Feature	Range	Azimuth	Status
H12594_Maritime_Boundary_Investigations.000	US 0001126642 00001	0.00	000.0	Primary

Hydrographer Recommendations

Chart rock in place of islet

Cartographically-Rounded Depth (Affected Charts):

0fm (16540_1, 16011_1, 16006_1, 530_1)

0.3m (500_1, 50_1)

S-57 Data

Geo object 1: Underwater rock / awash rock (UWTROC)

Attributes: NATSUR - 9:rock
 QUASOU - 6:least depth known
 SORDAT - 20130902
 SORIND - US,US,graph,H12594
 TECSOU - 12:found by levelling
 VALSOU - 0.322 m
 WATLEV - 5:awash

Office Notes

Concur with clarification. Chart rock in place of islet with depth found by levelling (shoaler than LIDAR depth).

Feature Images



Figure 2.1.1



Figure 2.1.2



Figure 2.1.3

APPROVAL PAGE

H12594

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

- H12594_DR.pdf
- Collection of depth varied resolution BAGS
- Processed survey data and records
- H12594_GeoImage.pdf

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

Approved: _____

Peter Holmberg

Cartographic Team Lead, Pacific Hydrographic Branch

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

Approved: _____

CDR Benjamin K. Evans, NOAA

Chief, Pacific Hydrographic Branch