H12589

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

DESCRIPTIVE REPORT

Type of Survey:	Navigable Area
Registry Number:	H12589

LOCALITY

State(s):	Alaska
General Locality:	Shumagin Islands, AK
Sub-locality:	Saddlers Mistake to Mountain Pt

2013

CHIEF OF PARTY
Richard T. Brennan, CDR/ NOAA

LIBRARY & ARCHIVES

Date:

U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION	REGISTRY NUMBER:
HYDROGRAPHIC TITLE SHEET	**H12589**

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:	**Saddlers Mistake to Mountain Pt**
Scale:	**40000**
Dates of Survey:	**07/11/2013 to 09/03/2013**
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/.

Table of Contents

List of Tables

List of Figures

Descriptive Report to Accompany Survey H12589

Project: OPR-P183-RA-13

Locality: Shumagin Islands, AK

Sublocality: Saddlers Mistake to Mountain Pt

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 2: "Saddlers Mistake to Mountain Pt" within the Project Instructions. The area is directly east of Nagai Island (Figure 1).

A.1 Survey Limits

Data were acquired within the following survey limits:

Northwest Limit	Southeast Limit
54° 55' 22" N 160° 11' 6" W	54° 52' 9" N 159° 59' 2" W

Table 1: Survey Limits

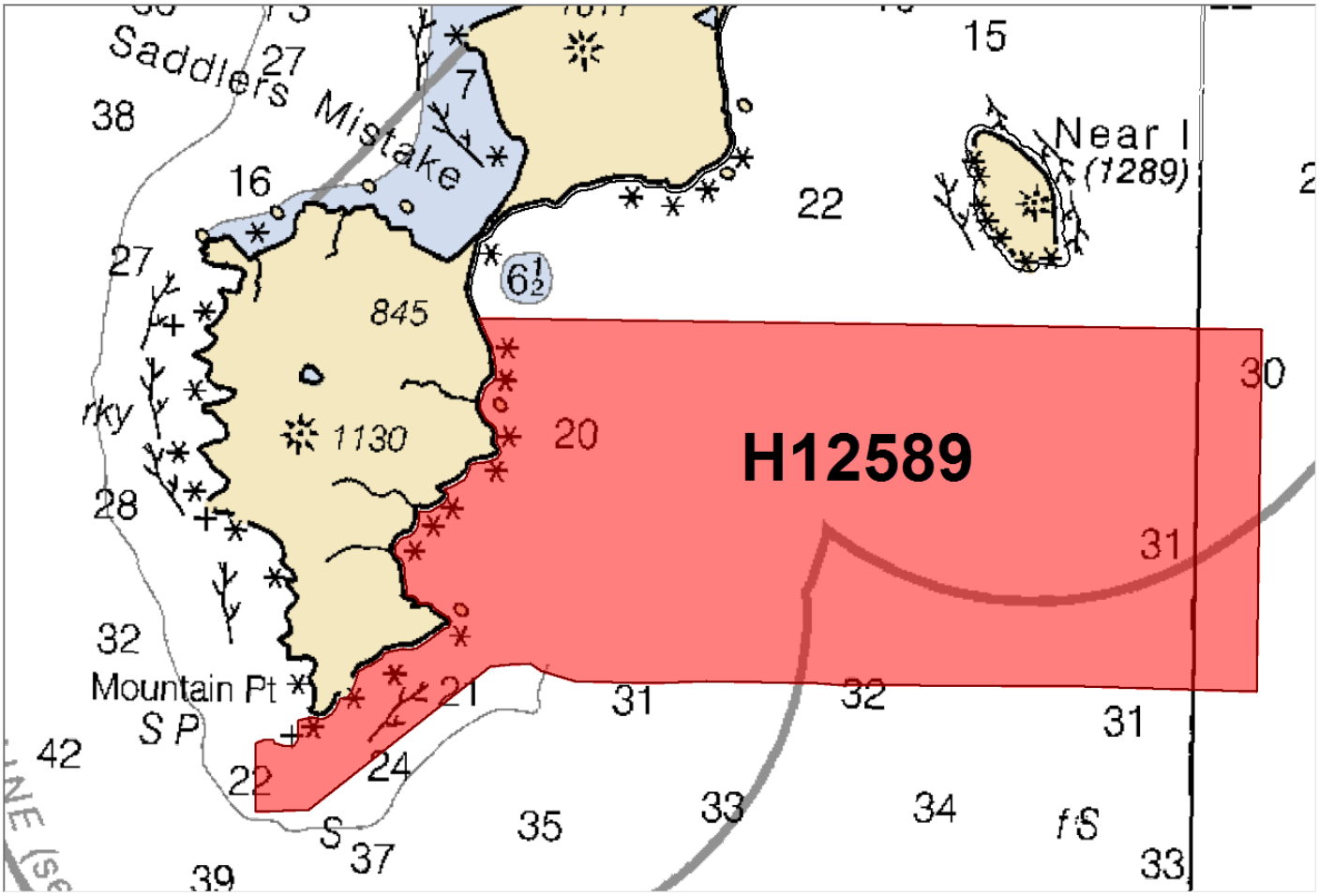


Figure 1: H12589 survey limits.

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

A.2 Survey Purpose

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

A.3 Survey Quality

The entire survey is adequate to supersede previous data.

Data acquired on survey H12589 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). 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 3). Overall, the required data density was achieved in 100.0% of the nodes.

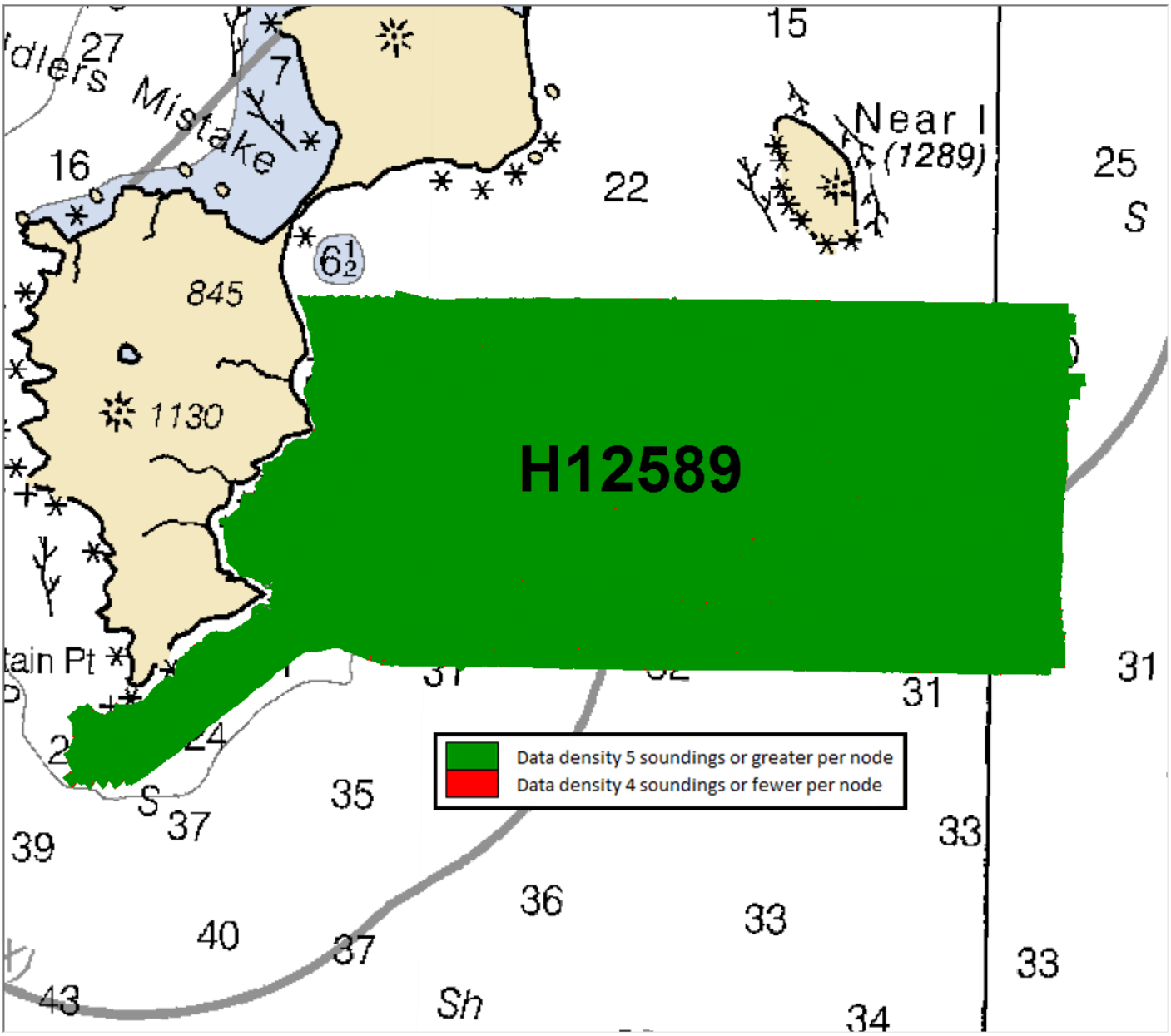


Figure 2: H12589 data density.

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	2,343,039	5,991	99.7%
2m	18 - 40m	2,483,466	1,238	100.0%
4m	36 - 80m	4,932,203	1,780	100.0%
	TOTAL:	9,758,708	9,009	99.9%
	TOTAL (by area):	91,192,151	39,423	100.0%

Figure 3: Summary table showing the percentage of nodes satisfying the 5 sounding density requirements, 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.

Percentages in Figure 3 have been rounded. The percentages carried to 2 decimal places are as follows: 1m resolution (0-20m) is 99.74%, 2m resolution (18-40m) is 99.95%, 4m resolution (36-80m) is 99.96%, Total is 99.91%, and Total by area is 99.96%.

A.4 Survey Coverage

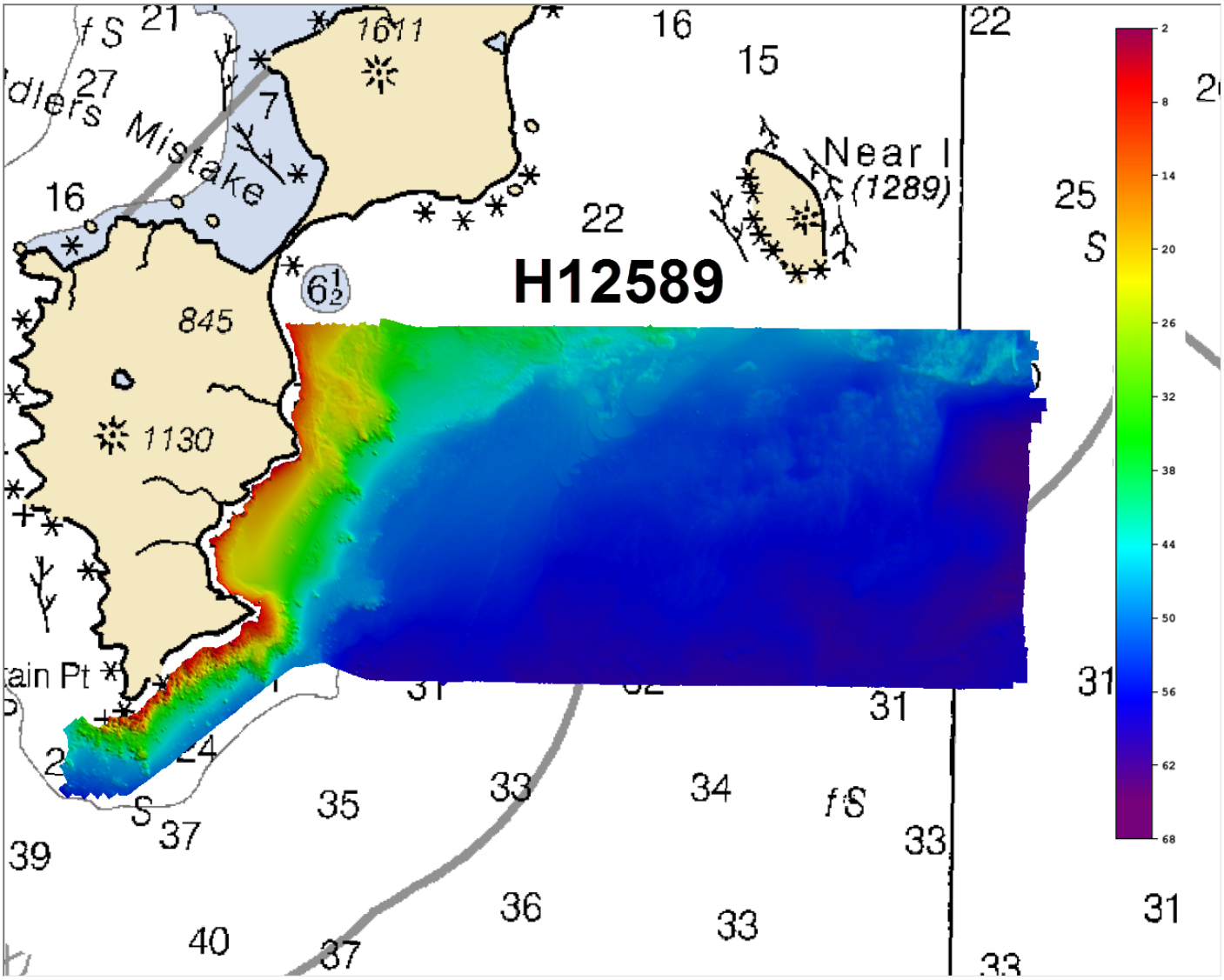


Figure 4: H12589 coverage overlaid on Chart 16540 (scale shows depths in meters).

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 at the western extents of the survey; conditions in these areas were deemed unsafe due to sea state and proximity to shore (Figure 5).

A small gap in coverage (40m x 115m) exists at the western edge of the survey; this area contained fishing gear and could not be safely approached (Figure 6).

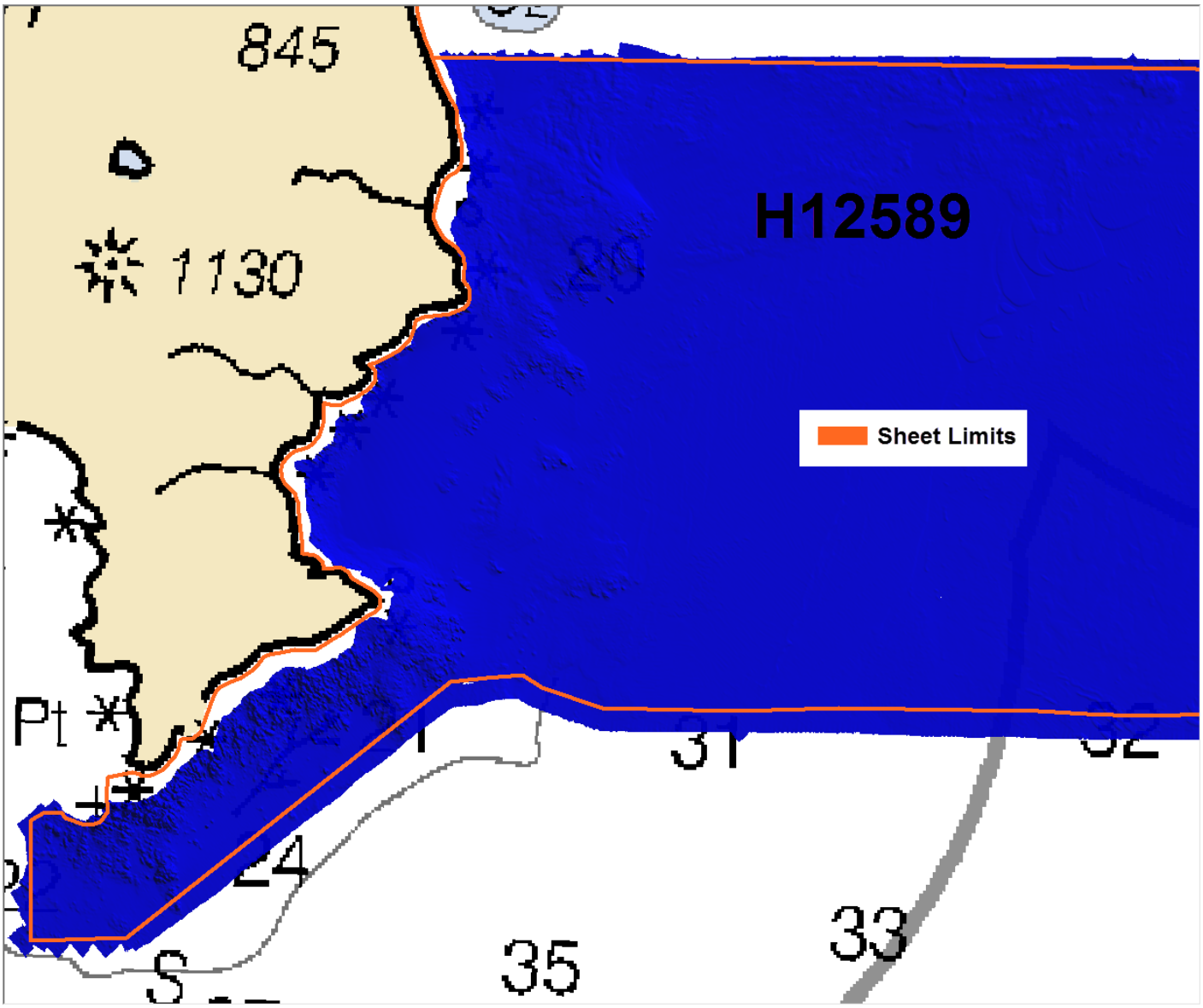


Figure 5: Multibeam coverage did not reach western sheet limits due to sea state and proximity to shore.

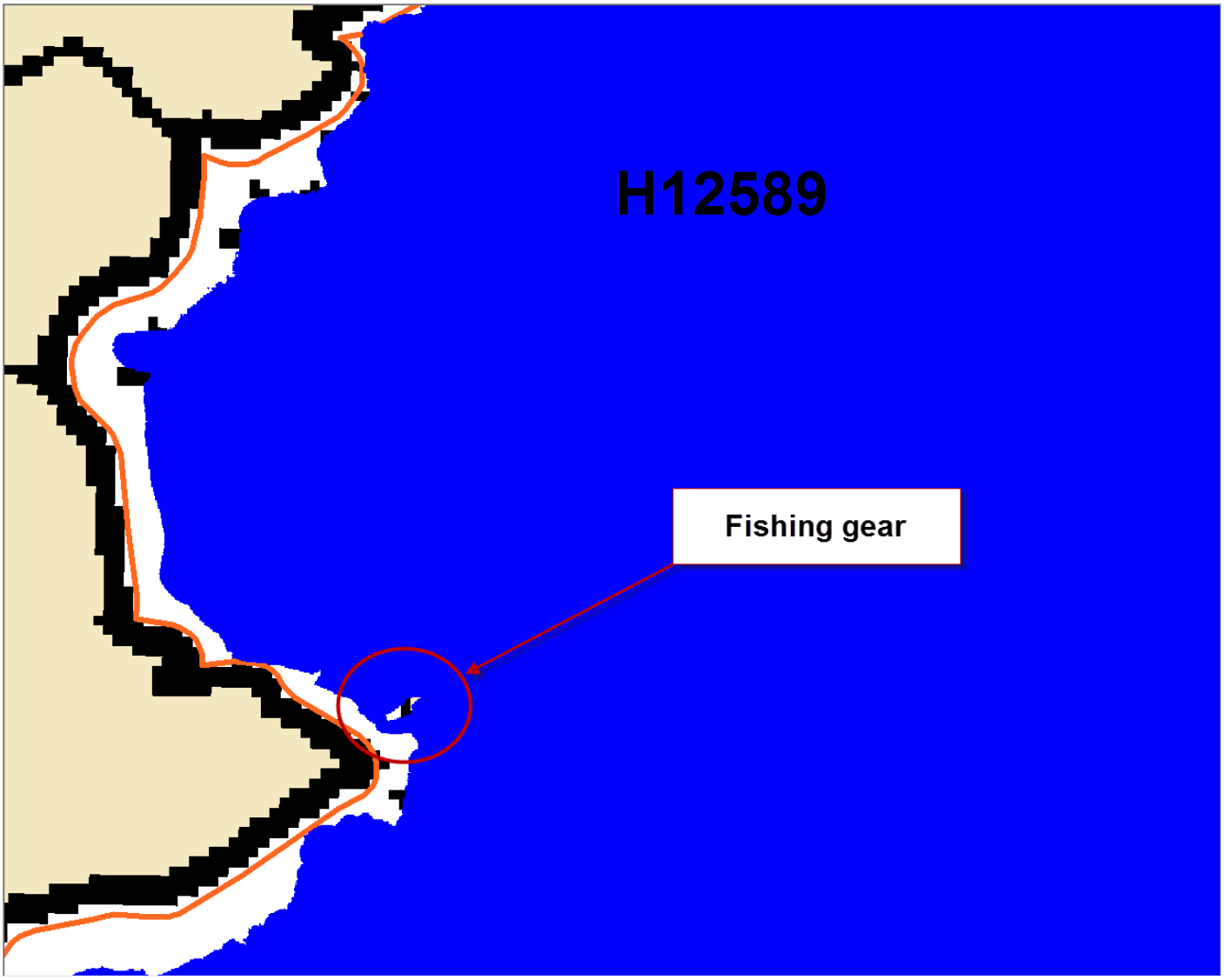


Figure 6: Small gap in coverage due to fishing gear at the western edge of the survey.
Additional gaps in coverage exist, but they do not affect the suitability of the survey for charting.

A.5 Survey Statistics

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

	HULL ID	*S221*	*2801*	*2802*	*2803*	*2804*	*Total*
LNM	SBES Mainscheme	0	0	0	0	0	0
	MBES Mainscheme	117.01	70.08	82.87	55.66	41.68	367.3
	Lidar Mainscheme	0	0	0	0	0	0
	SSS Mainscheme	0	0	0	0	0	0
	SBES/MBES 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	0	0	0	0	14.41	14.41
	Lidar Crosslines	0	0	0	0	0	0
Number of Bottom Samples							4
Number of AWOIS Items Investigated							0
Number Maritime Boundary Points Investigated							5
Number of DPs							0
Number of Items Investigated by Dive Ops							0
Total SNM							25.72

Table 2: Hydrographic Survey Statistics

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

Survey Dates	Day of the Year
07/11/2013	192
07/12/2013	193
07/21/2013	202
07/22/2013	203
08/30/2013	242
08/31/2013	243
09/03/2013	246

Table 3: Dates of Hydrography

Hydrographer incorrectly states that zero Detached Positions were taken in the survey stats. The total number was 22.

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	*S221*	*2801*	*2802*	*2803*	*2804*	*1905*	*1906*
LOA	231 feet	28 feet	28 feet	28 feet	28 feet	19 feet	19 feet
Draft	16.5 feet	3.5 feet	3.5 feet	3.5 feet	3.5 feet	0.9 feet	0.9 feet

Table 4: Vessels Used

All data for H12589 was acquired by RAINIER (S221), her four survey launches (2801, 2802, 2803, and 2804) and two skiffs (1905, 1906). The ship and survey launches acquired MBES depth soundings, sound speed profiles and bottom samples. The skiffs conducted 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	Vessel Attitude and Positioning System
ODIM Brooke Ocean (Rolls-Royce Group)	MVP200	Conductivity, Temperature, and Depth Sensor
ODIM Brooke Ocean (Rolls-Royce Group)	MVP30	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, totalled 3.8% of mainscheme acquisition.

Multibeam crosslines were acquired using the Reson 7125 on Launch 2804 (RA-6) on DN242. Additional data was collected by RAINIER (S221) on DN246 which lowered the crossline percentage to below the minimum requirement of 4% as stated in Section 5.2.4.3 of the HSSD.

A 4-meter CUBE surface was created using strictly the mainscheme lines, while a second 4-meter CUBE surface was created using only crosslines, from which a difference surface was generated in CARIS at a 4-meter resolution (Figure 7). Statistics were then derived from the difference surface and are shown in Figure 8. The average difference between the depths derived from mainscheme and crosslines was 0.10 meters (mainscheme being deeper) with a standard deviation of 0.53 meters.

For the respective depths, the difference surface was compared to the allowable IHO accuracy standards (Figure 9). In total, 100.0% of the depth differences between H12589 mainscheme and crossline data are within allowable IHO accuracies (Figure 10).

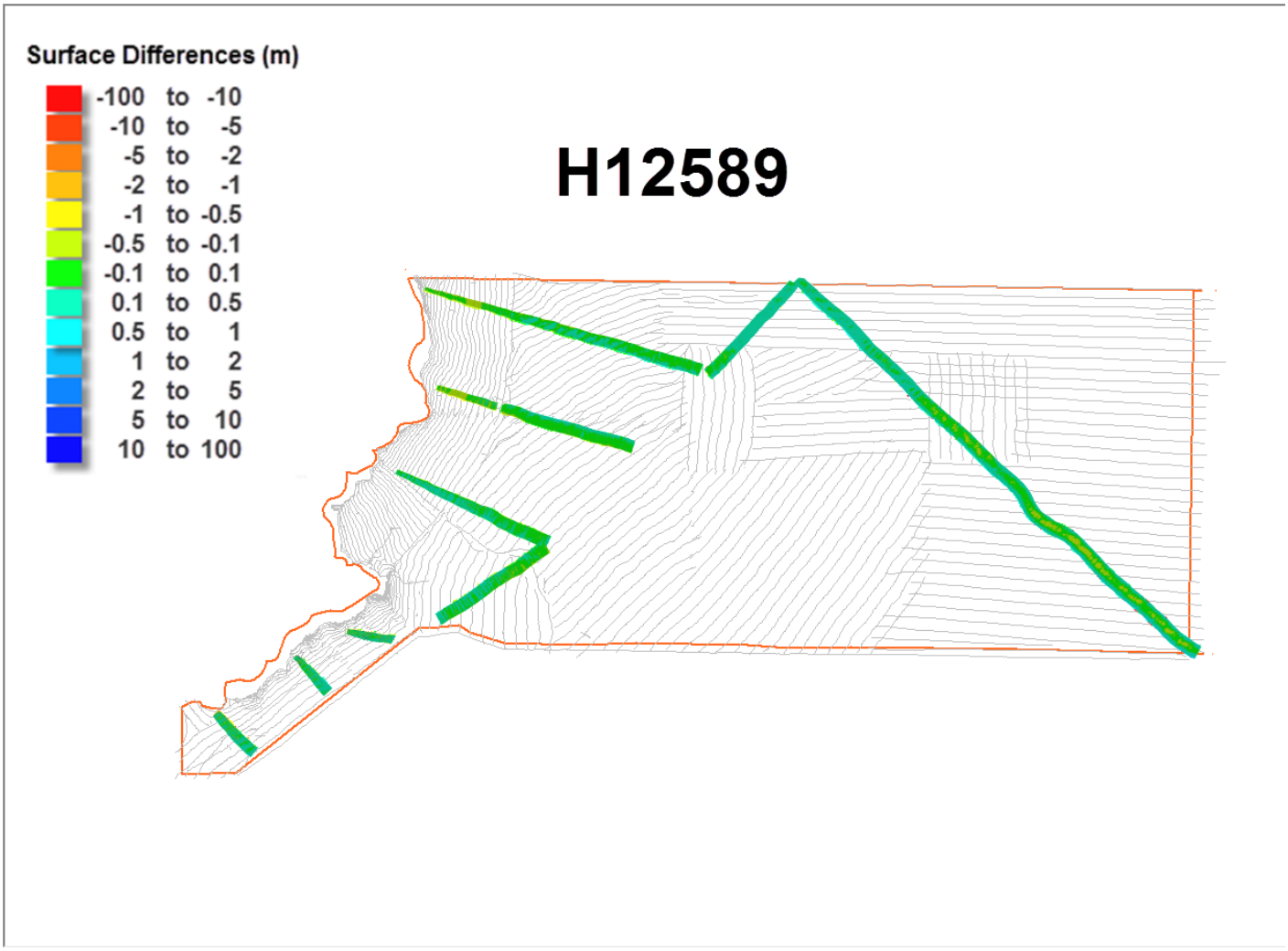


Figure 7: Crossline distribution showing crossline-to-mainscheme difference surface.

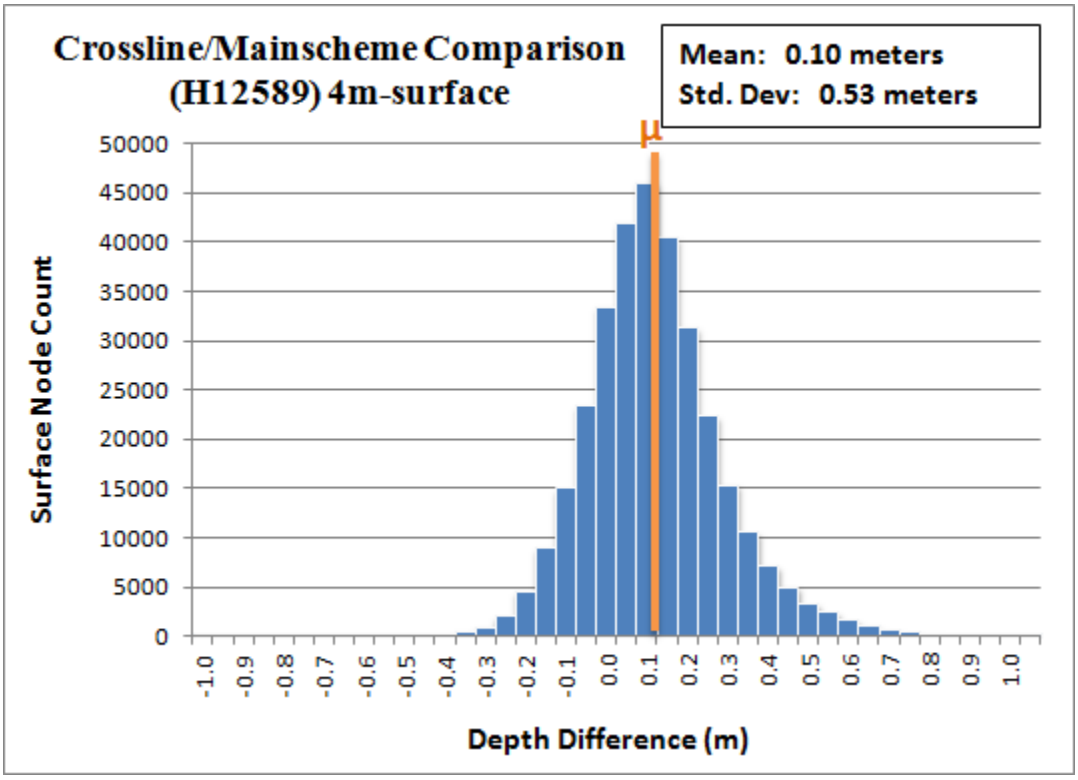


Figure 8: Mainscheme to crossline difference surface statistics.

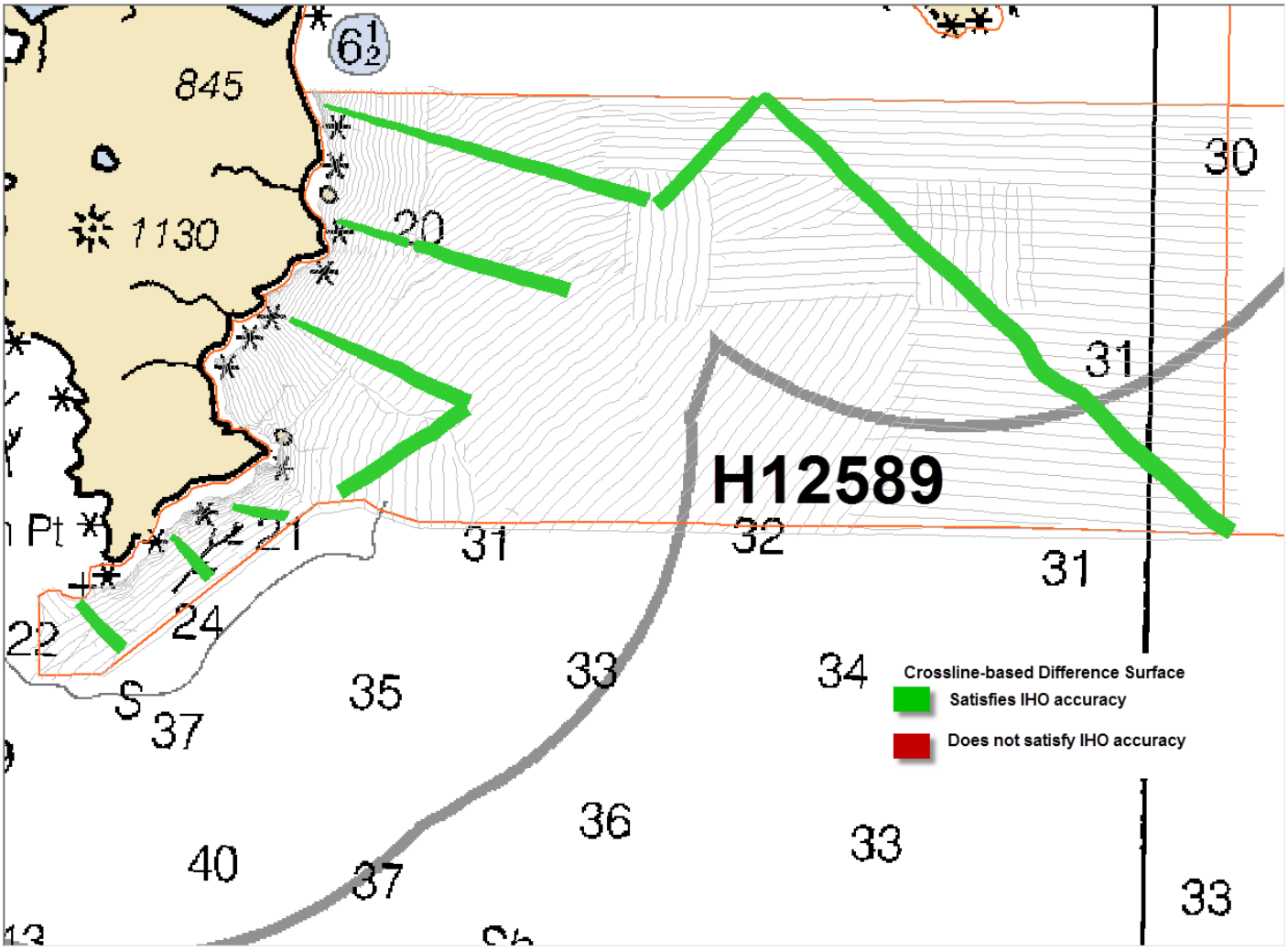


Figure 9: Depth difference between H12589 mainscheme and crossline data as compared to allowable IHO accuracy standards for the associated depths.

Depth range	IHO Order	Number of nodes	Nodes satisfying IHO accuracy	Percent nodes satisfying IHO accuracy
Less than 100m	Order 1	322,397	322,392	100.0%

Figure 10: Summary table showing percentage of difference surface nodes between H12589 mainscheme and crossline data that meet allowable IHO accuracy standards for respective depths.

Percentage in Figure 10 has been rounded to 100% from 99.99%.

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 (RA-4)	3 meters/second		0.15 meters/second
2802 (RA-5)	3 meters/second		0.15 meters/second
2803 (RA-3)	3 meters/second		0.15 meters/second
2804 (RA-6)	3 meters/second	1 meters/second	0.15 meters/second

Table 7: Survey Specific Sound Speed TPU Values

Total propagated uncertainty values for survey H12589 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.

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 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 11). 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 12). Overall, 100.0% by node and 100.0% by area of survey H12589 met the accuracy requirements stated in the HSSD.

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 H12589. 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.

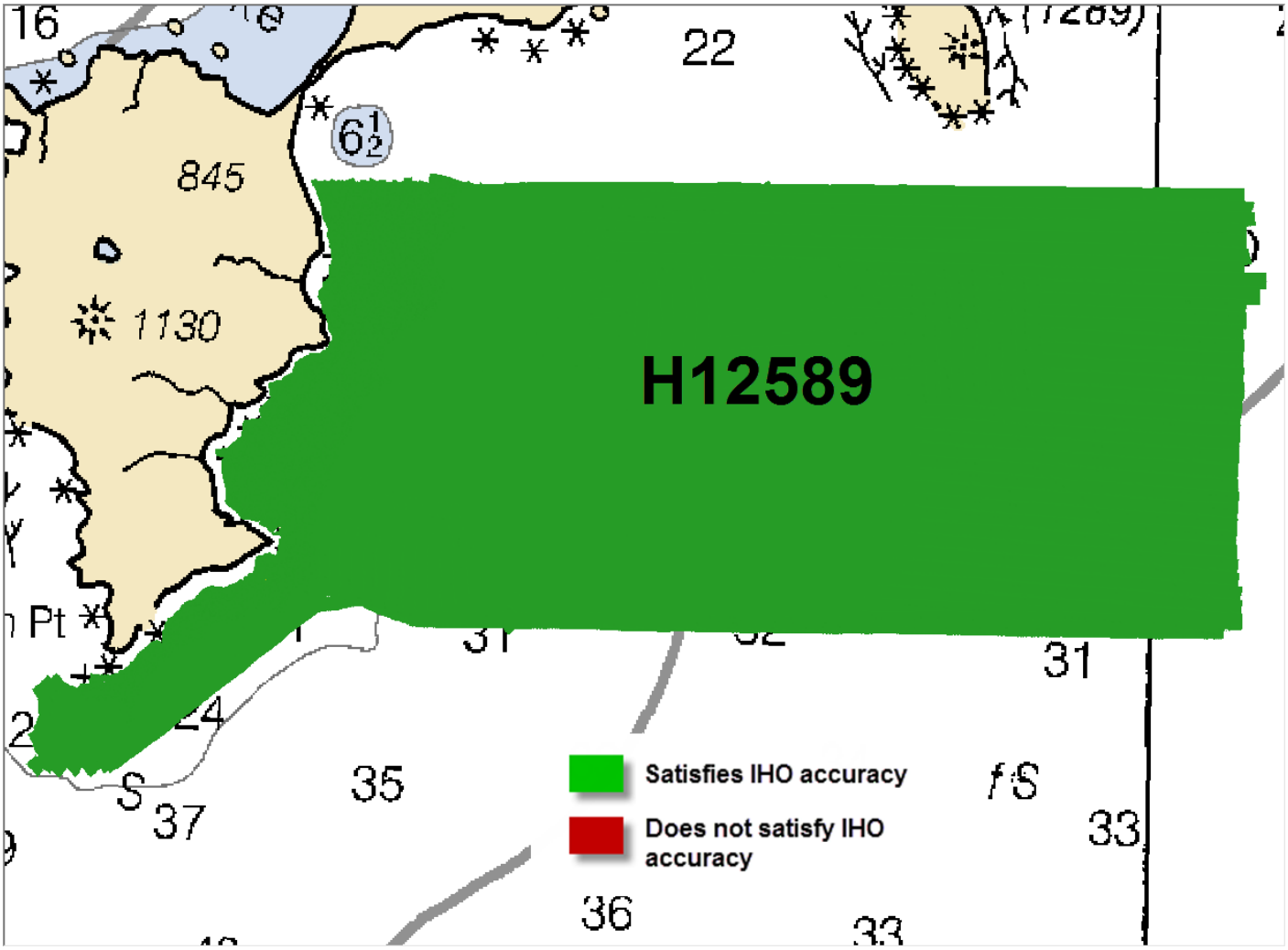


Figure 11: H12589 met IHO Order 1 accuracy standards for 100.0% of this survey.

Resolution	Depth range	IHO Order	Number of nodes	Nodes satisfying IHO accuracy	Percent nodes satisfying IHO accuracy
1m	0 - 20m	Order 1	2,343,039	2,343,027	100.0%
2m	18 - 40m	Order 1	2,483,466	2,483,229	100.0%
4m	36 - 80m	Order 1	4,932,203	4,932,152	100.0%
		TOTAL:	9,758,708	9,758,408	100.0%
		TOTAL (by area):	91,192,151	91,190,375	100.0%

Figure 12: Summary table showing the 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.

Percentages of nodes satisfying IHO levels in Figure 11 have all been rounded to 100% from 99.99%.

B.2.3 Junctions

Five junction comparisons were completed for H12589. Two of the surveys (H12588, H12591) were acquired concurrently with this survey, and three surveys (H11472, H11473, H11489) were completed in 2005 by NOAA Ship FAIRWEATHER. Depth comparisons were performed using CARIS difference surfaces and Subset Editor. Histograms of the surface differences are included, showing mean and standard deviation.

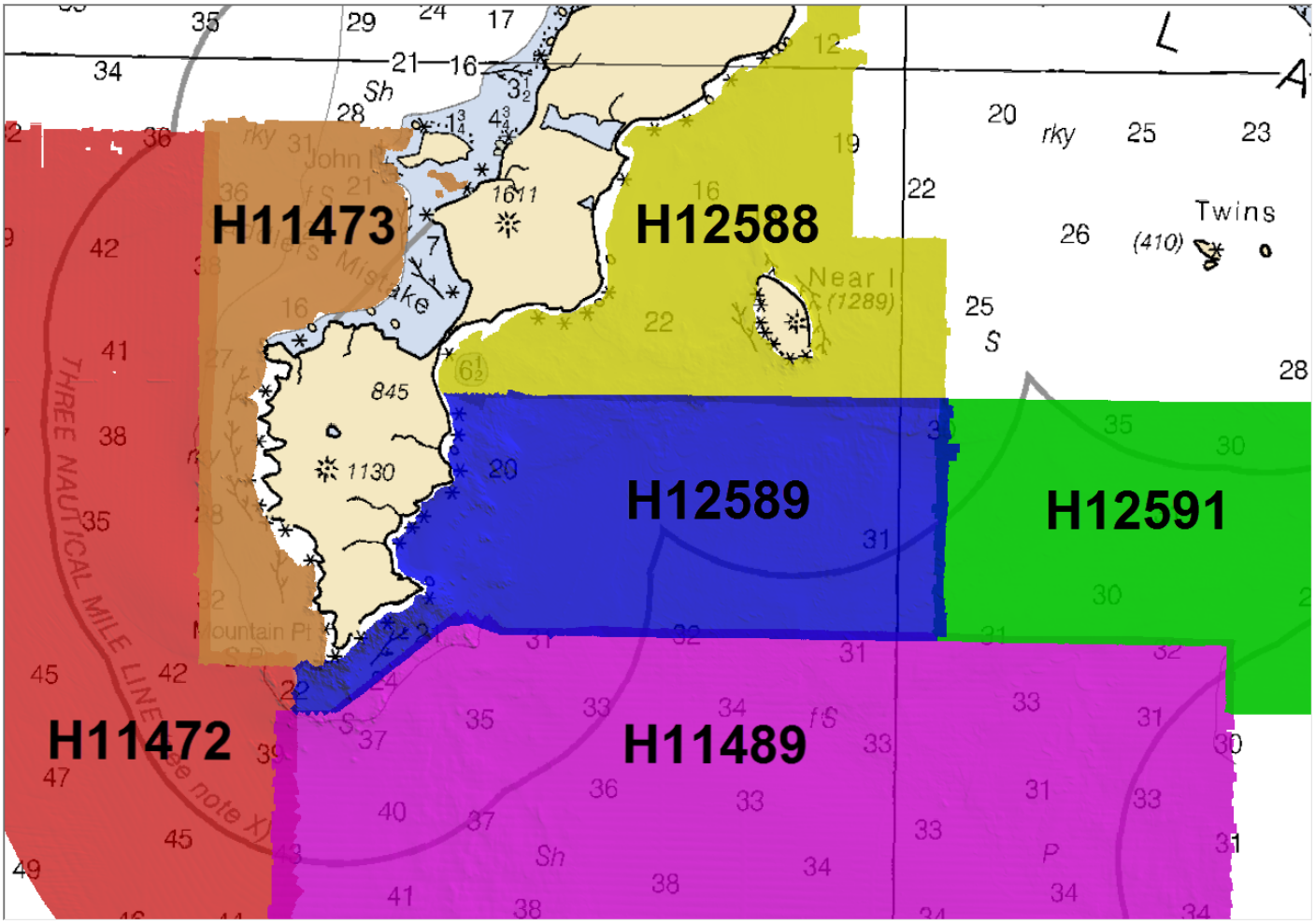


Figure 13: H12589 junction overview.

The following junctions were made with this survey:

Registry Number	Scale	Year	Field Unit	Relative Location
H11472	1:20000	2005	NOAA Ship FAIRWEATHER	W
H11473	1:20000	2005	NOAA Ship FAIRWEATHER	W
H11489	1:20000	2005	NOAA Ship FAIRWEATHER	S
H12588	1:40000	2013	NOAA Ship RAINIER	N
H12591	1:40000	2013	NOAA Ship RAINIER	E

Table 8: Junctioning Surveys

H11472

Overlap with survey H11472 ranges from 160 to 40 meters wide along the southwestern corner of H12589 (Figure 14). Depths in the junction area range from approximately 40 to 50 meters. A difference surface analysis between CUBE depth layers for each survey showed H11472 to be an average of 0.12 meters shoaler than H12589, with a standard deviation of 0.35 meters (Figure 15). This is well within IHO Order 1 accuracy at these depths.

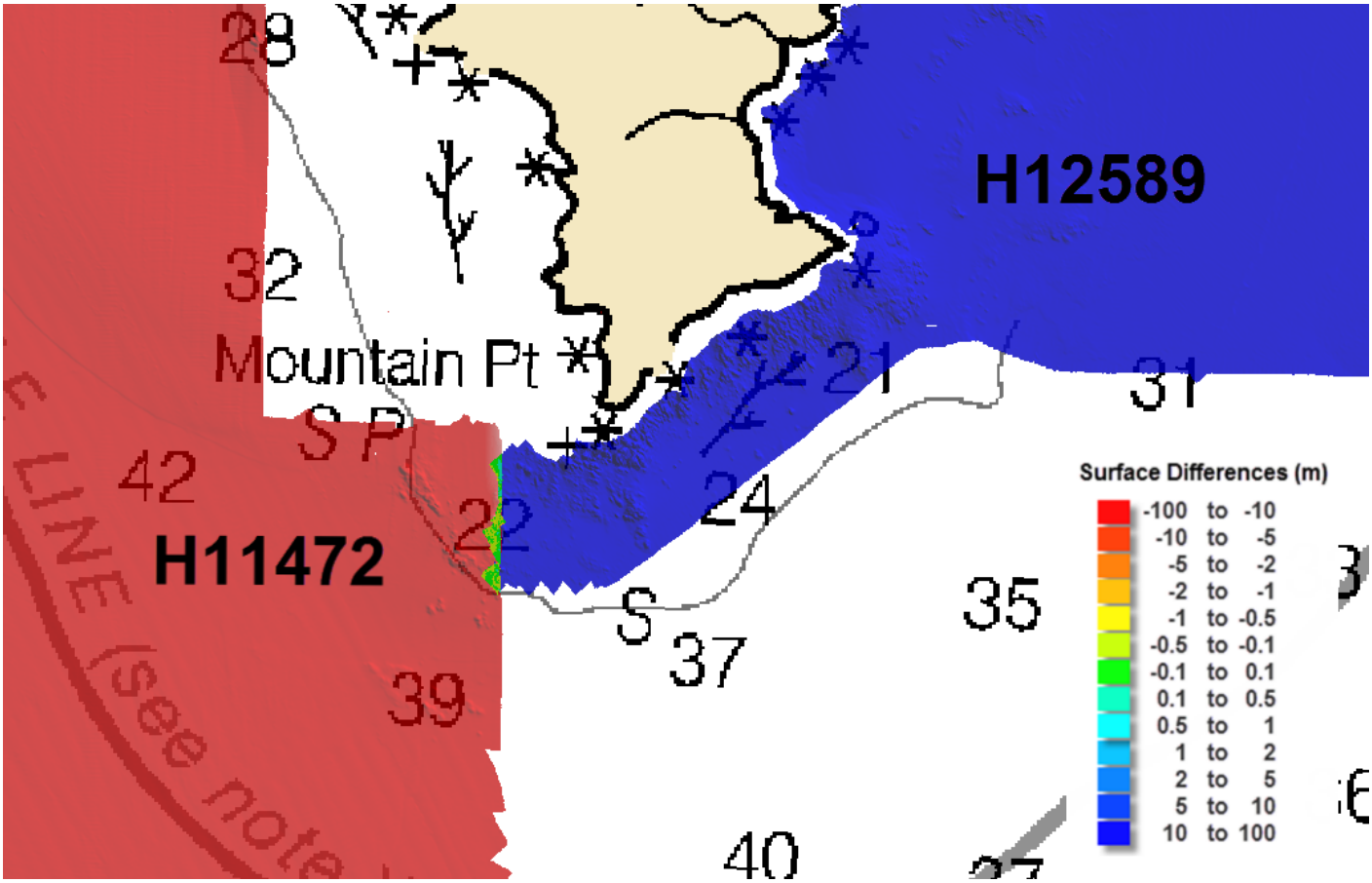


Figure 14: Junction between H12589 and H11472.

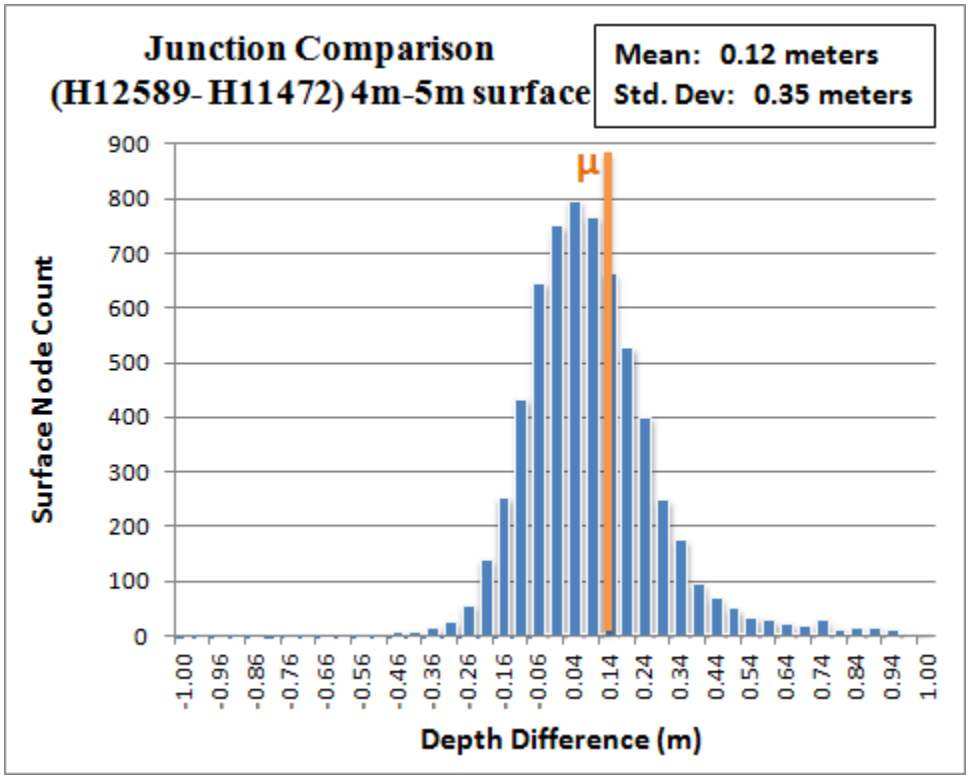


Figure 15: Difference surface statistics between H12589 and H11472 CUBE depth layers (4m-5m grid size). H11472 is an average of 0.12 meters shoaler.

H11473

Overlap with survey H11473 is a small area approximately 300 meters wide by 400 meters long and meets along the southwestern border of H12589 (Figure 16). Depths in the junction area range from approximately 45 to 60 meters. Sounding contribution from survey H11473 in the junction area is sparse and of limited quality (low density and high uncertainty). Additionally, due to the high bathymetric relief in the junction area, statistical comparison was expected to provide suboptimal results. A difference surface analysis between CUBE depth layers for each survey showed H11473 to be 0.5 meters shoaler than H12589, with a standard deviation of 1.29 meters (Figure 17). In areas of high density, there was general agreement between the two surveys.

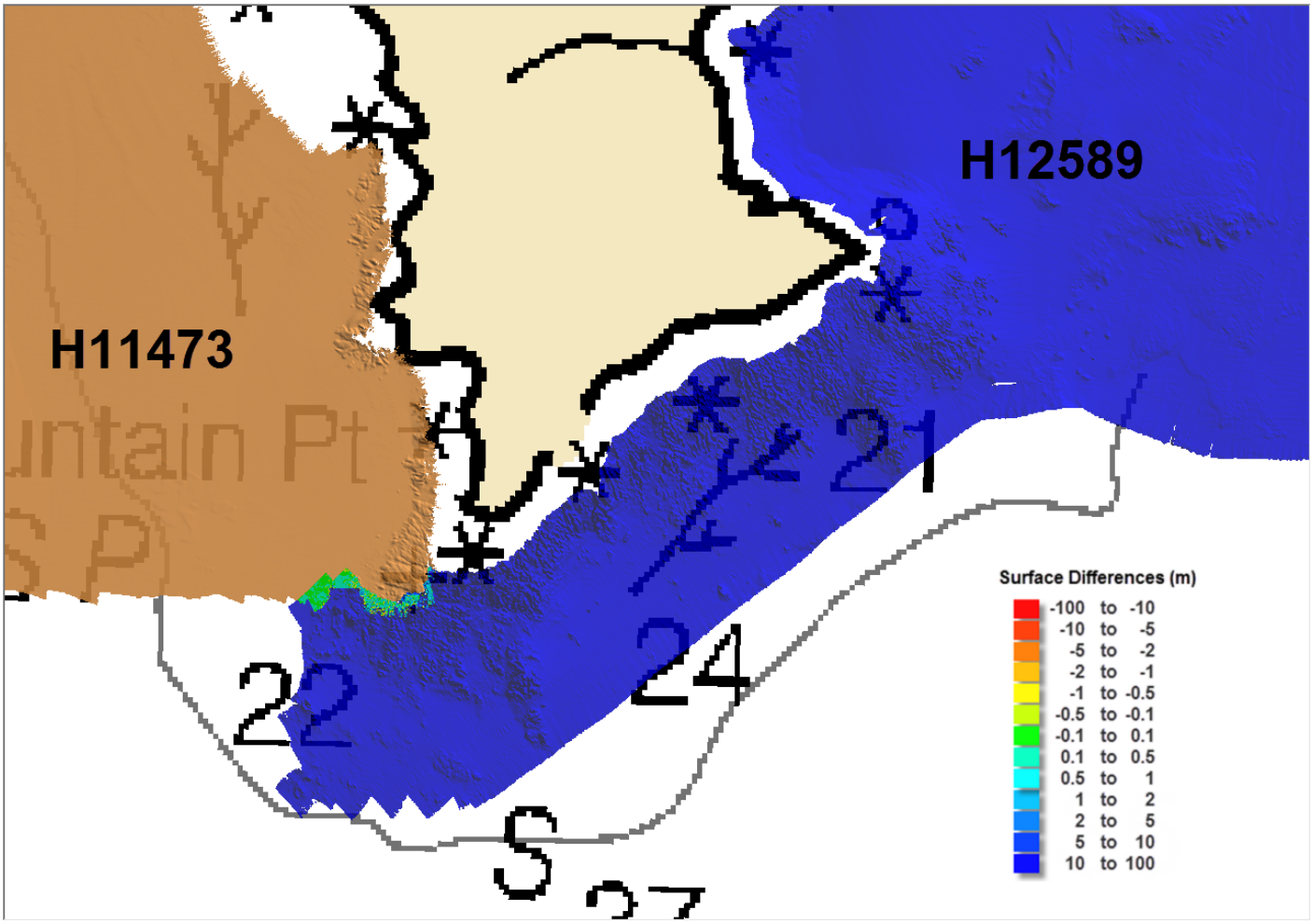


Figure 16: Junction between H12589 and H11473.

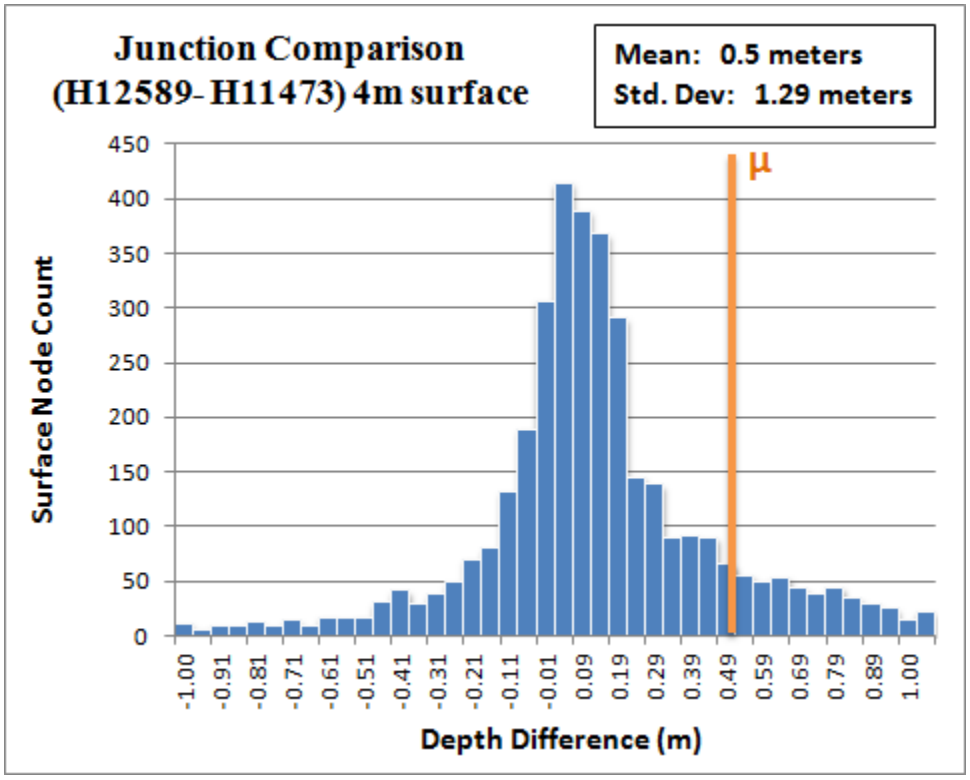


Figure 17: Difference surface statistics between H12589 and H11473 CUBE depth layers (4m grid size). H11473 is an average of 0.5 meters shoaler.

H11489

Overlap with survey H11489 ranges from 30 to 270 meters wide along the southern border of H12589 (Figure 18). Depths in the junction area range from approximately 45 to 60 meters. A difference surface analysis between CUBE depth layers for each survey showed H12489 to be an average of 0.09 meters shoaler than H12589, with a standard deviation of 0.31 meters (Figure 19). This is well within IHO Order 1 accuracy at these depths.

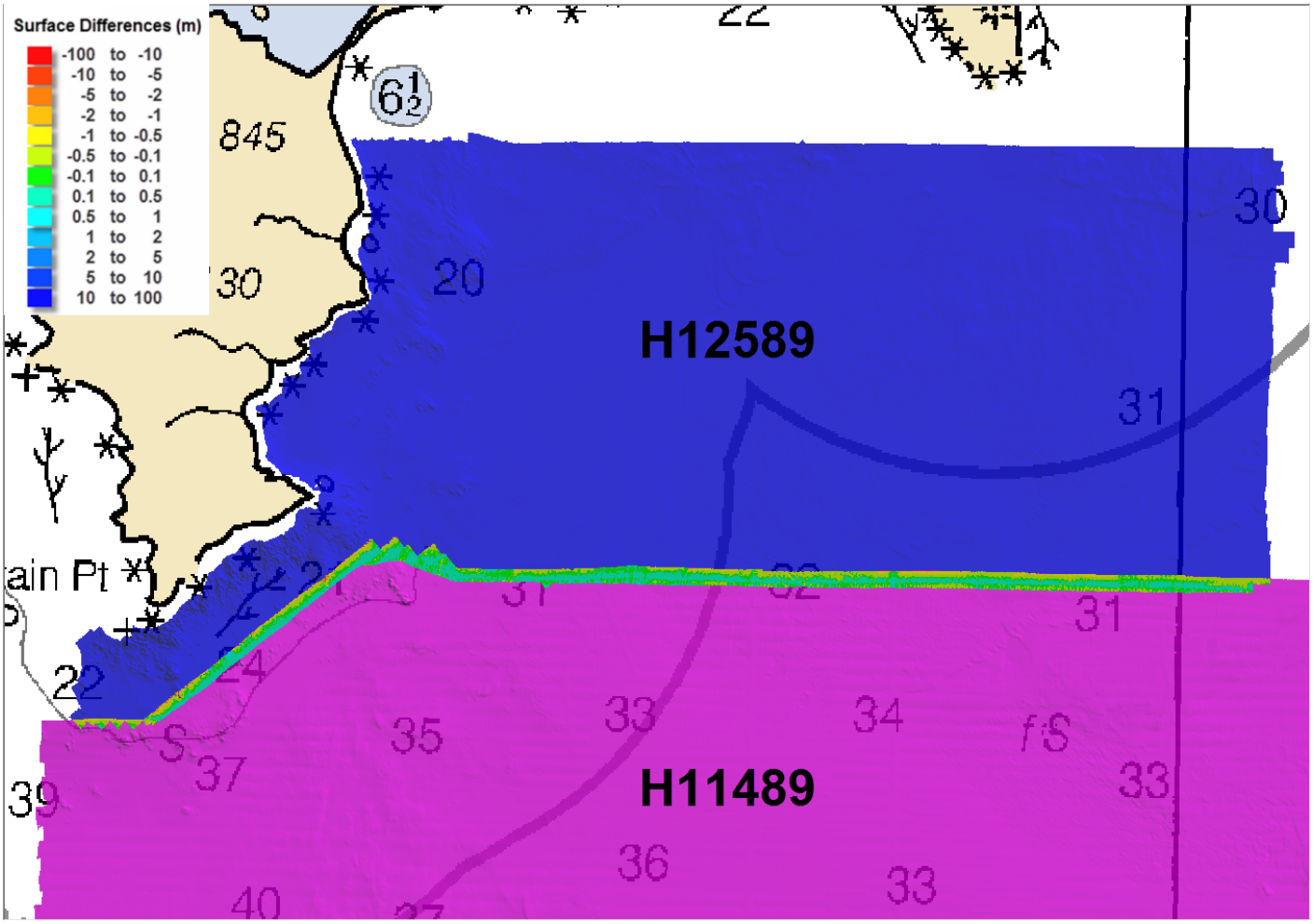


Figure 18: Junction between H12589 and H11489.

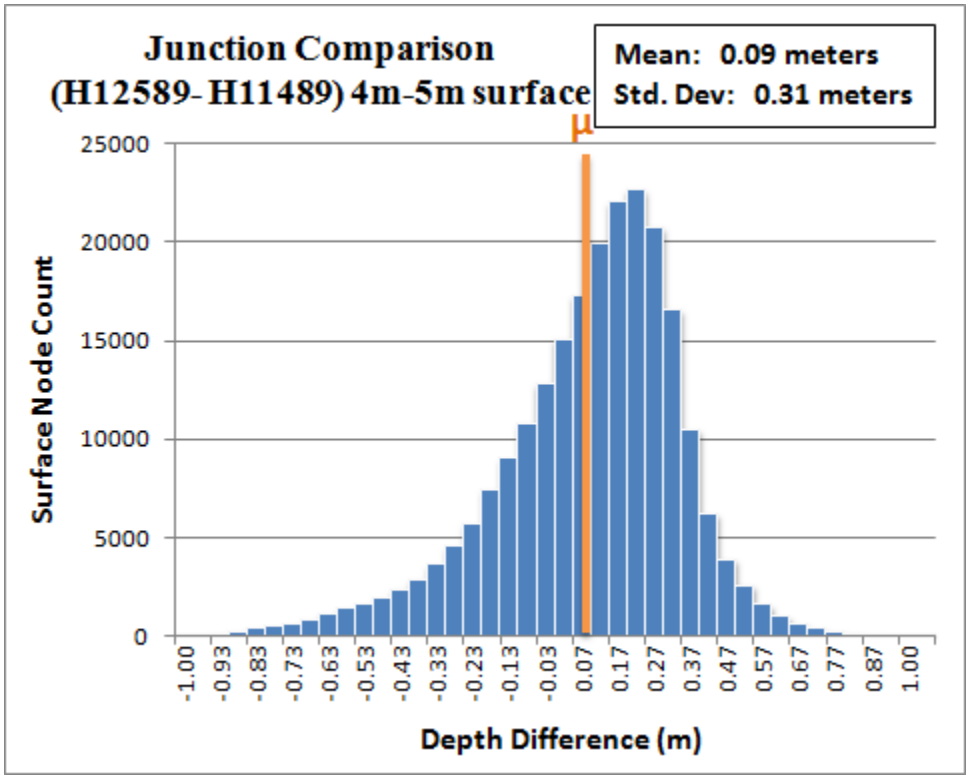


Figure 19: Difference surface statistics between H12589 and H11489 CUBE depth layers (4m-5m grid size). H11489 is an average of 0.09 meters shoaler.

H12588

Overlap with survey H12588 was approximately 170 meters wide along the northern boundary of H12589 (Figure 20). Depths in the junction area range from 4 to 50 meters. A difference surface analysis between CUBE depth layers for each survey showed H12588 to be an average of 0.12 meters shoaler than H12589, with a standard deviation of 0.17 meters (Figure 21). This is well within IHO Order 1 accuracy at these depths.

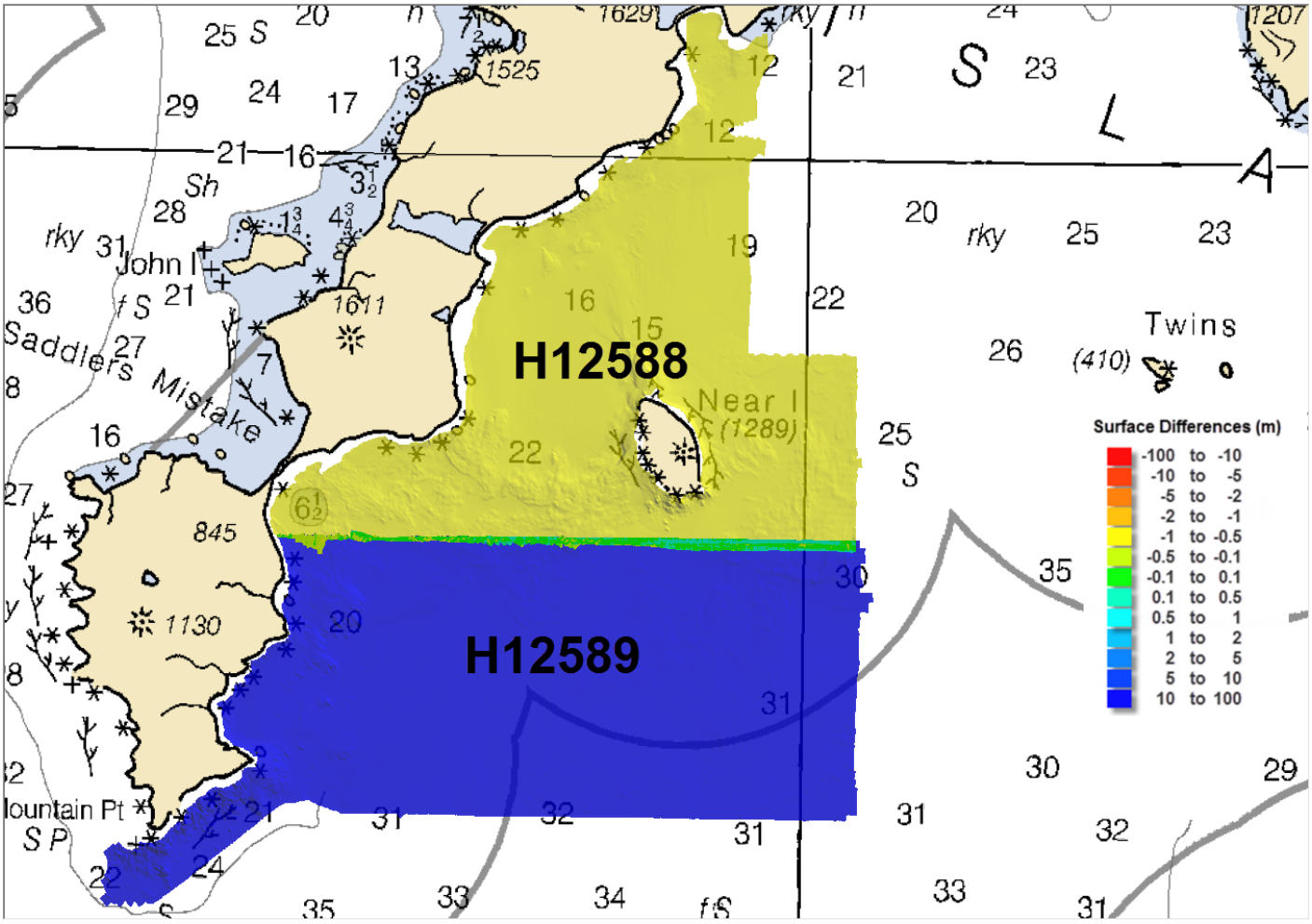


Figure 20: Junction between H12589 and H12588.

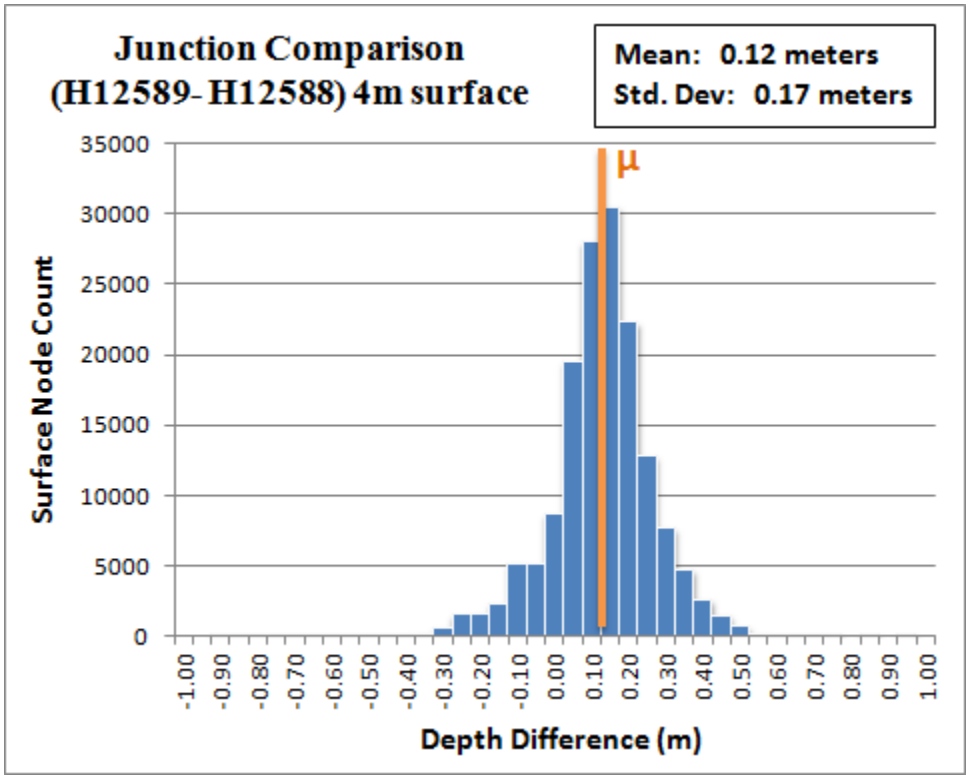


Figure 21: Difference surface statistics between H12589 and H12588 CUBE depth layers (4m grid size). H12588 is an average of 0.12 meters shoaler.

H12591

Overlap with survey H12591 ranges from 200 to 650 meters wide along the eastern boundary of H12589 (Figure 22). Depths in the junction area range from approximately 49 to 62 meters. A difference surface analysis between CUBE depth layers for each survey showed H12591 to be an average of 0.09 meters shoaler than H12589, with a standard deviation of 0.2 meters (Figure 23). This is well within IHO Order 1 accuracy at these depths.

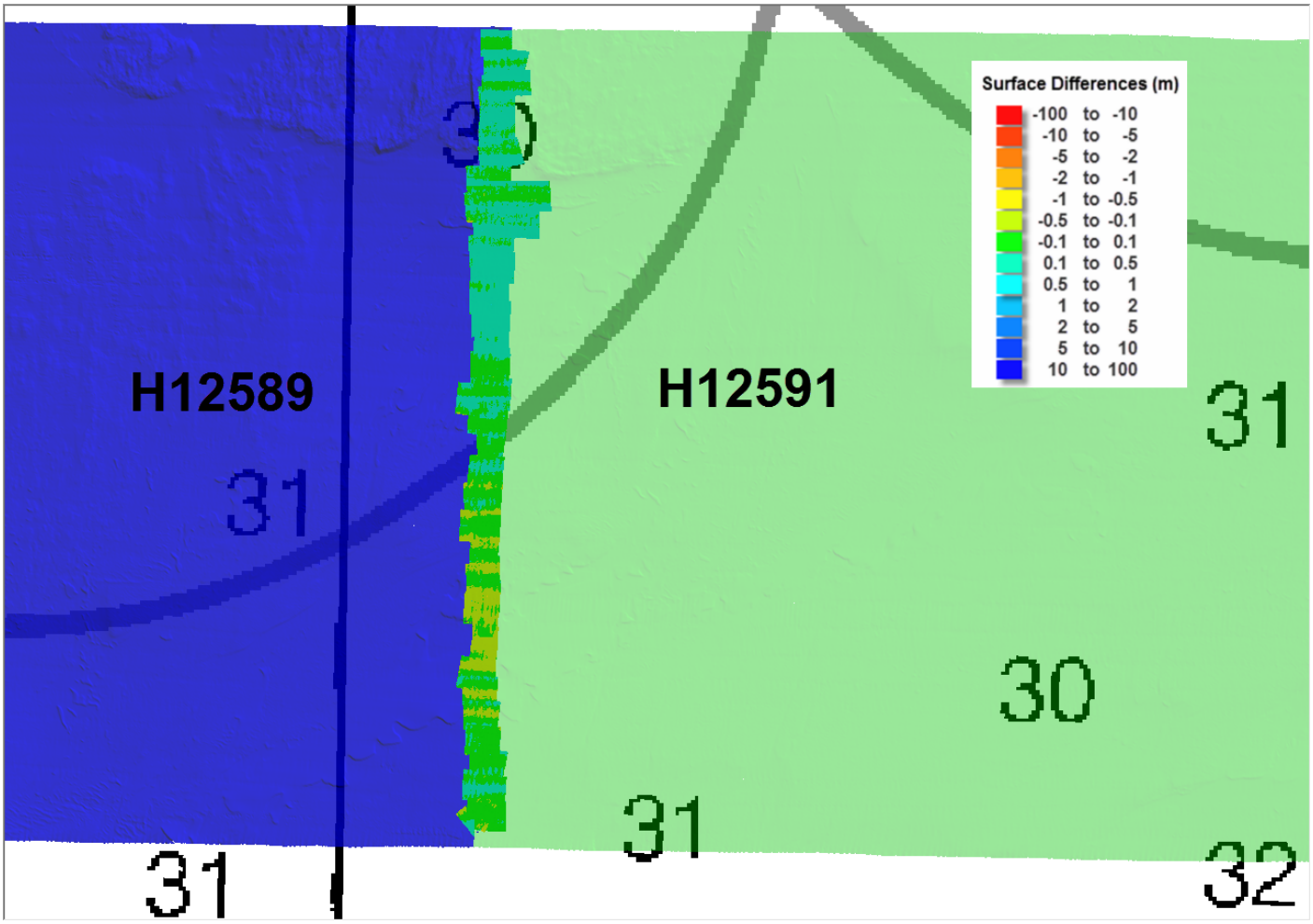


Figure 22: Junction between H12589 and H12591.

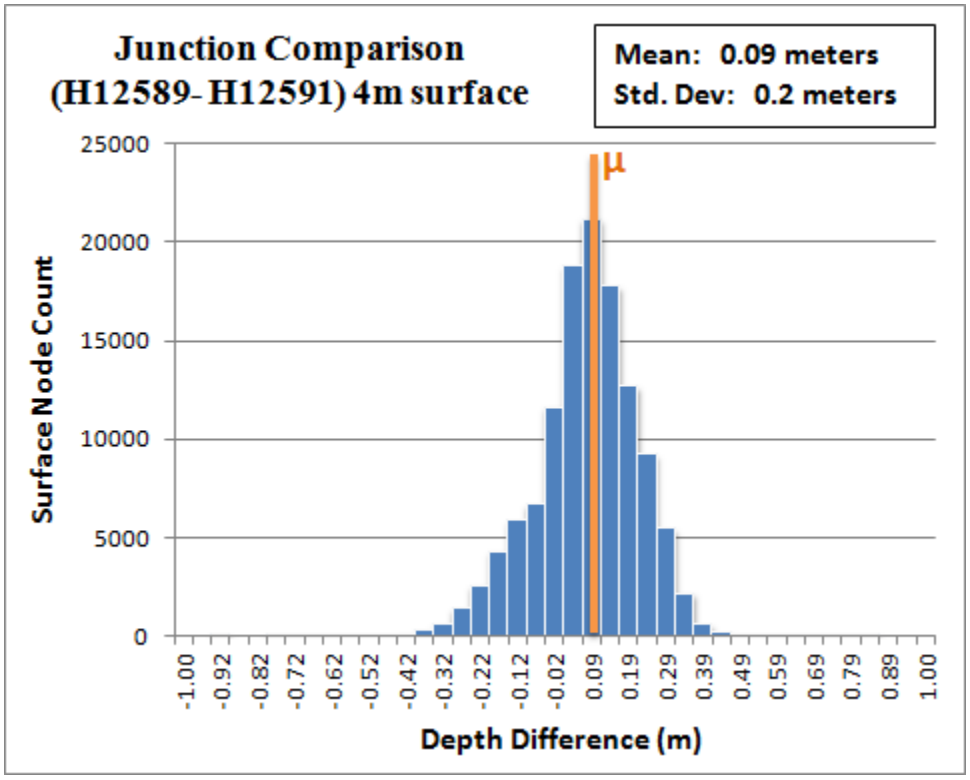


Figure 23: Difference surface statistics between H12589 and H12591 CUBE depth layers (4m grid size). H12591 is an average of 0.09 meters shoaler.

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 Profile Failure

Two of the sound speed casts collected by Launch 2804 on DN242 using the MVP30 were not applied due to an inaccurate salinity profile. Salinity data for these casts was far outside of historic ranges and significantly different from other casts (Figure 23). These inaccurate casts caused sound speed artifacts within the data. Removing the casts removed the artifacts. These casts were identified and removed from the final concatenated SVP file and not applied to the survey.

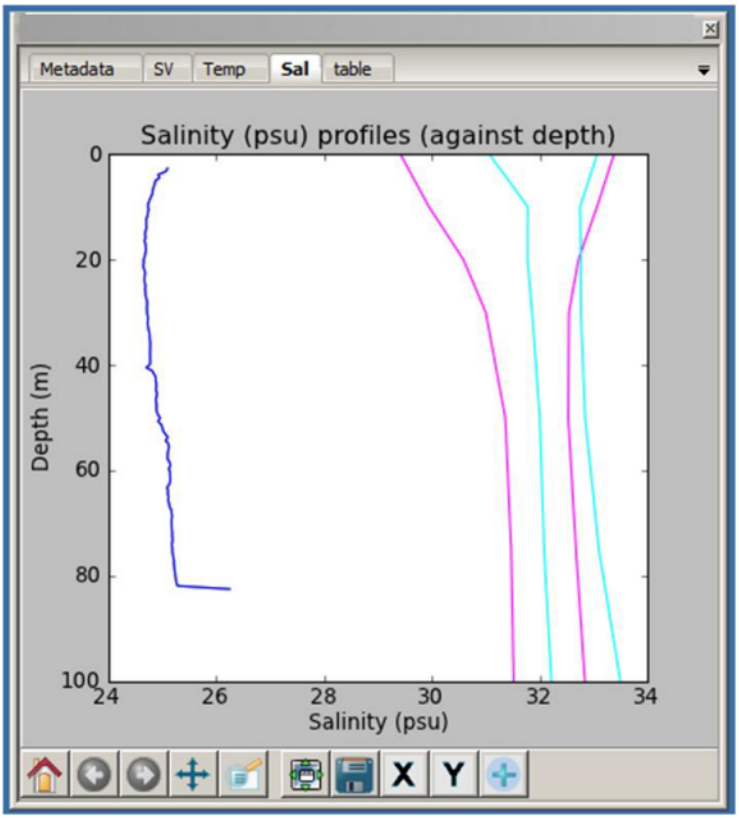


Figure 24: Representative inaccurate salinity profile.

Sound Speed Artifact

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 in the form of 'frowns' in the eastern half of the survey 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 25).

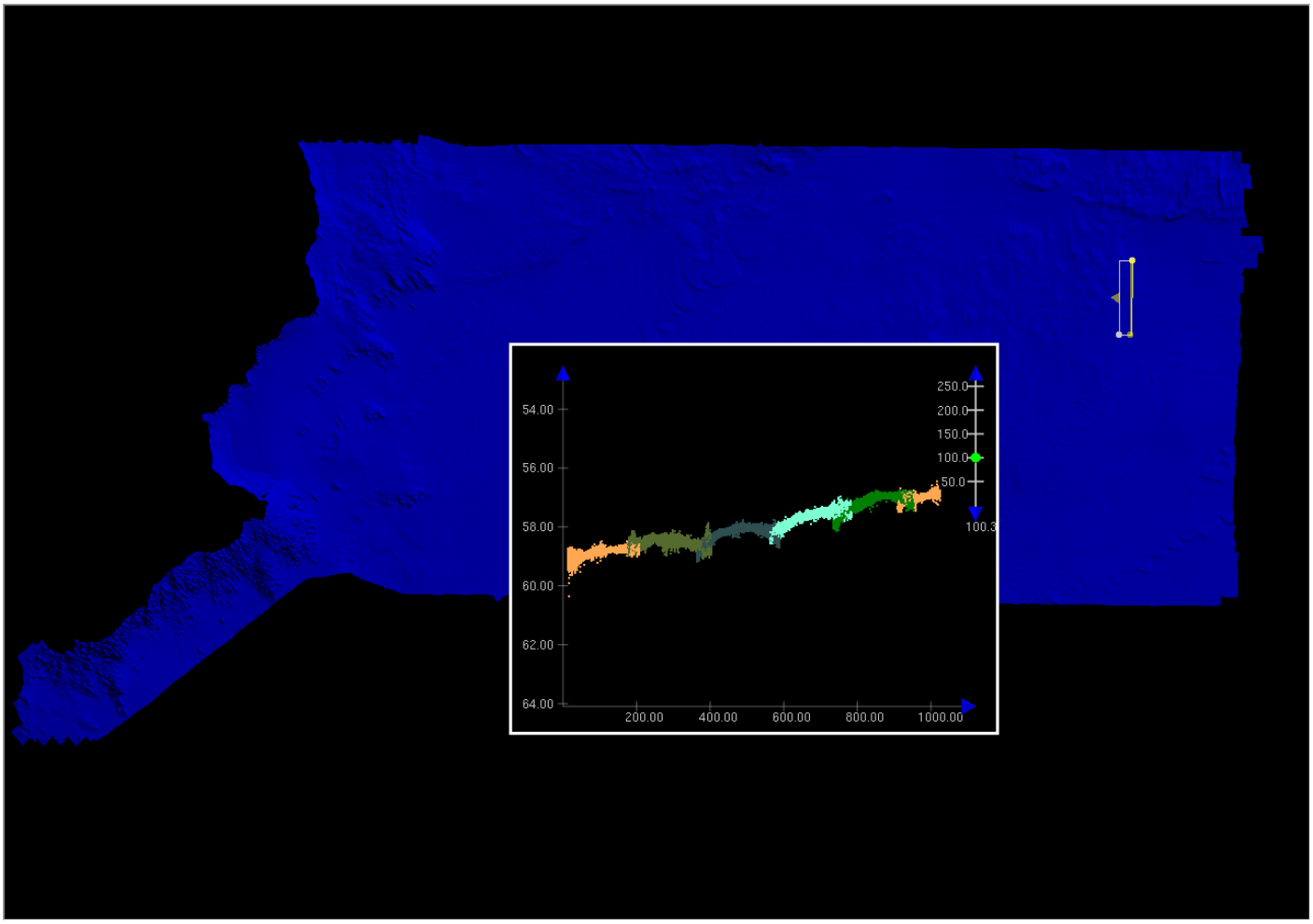


Figure 25: H12589 sound speed artifact.

Ellipsoid-to-Tidal Surface Comparison

Using the GPS height determined from the SBET file, data from H12589 was referenced to the ellipse 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 when referenced to the ellipse for Launch 2804 DN202 between 2024 and 2049 UTC and for all of Launch 2803 on DN202. These offsets at times exceeded 1.0 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 remaining artifacts in this surface constitute differences of no more than 0.5 meters and are considered to be inconsequential to error contributions.

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 26).

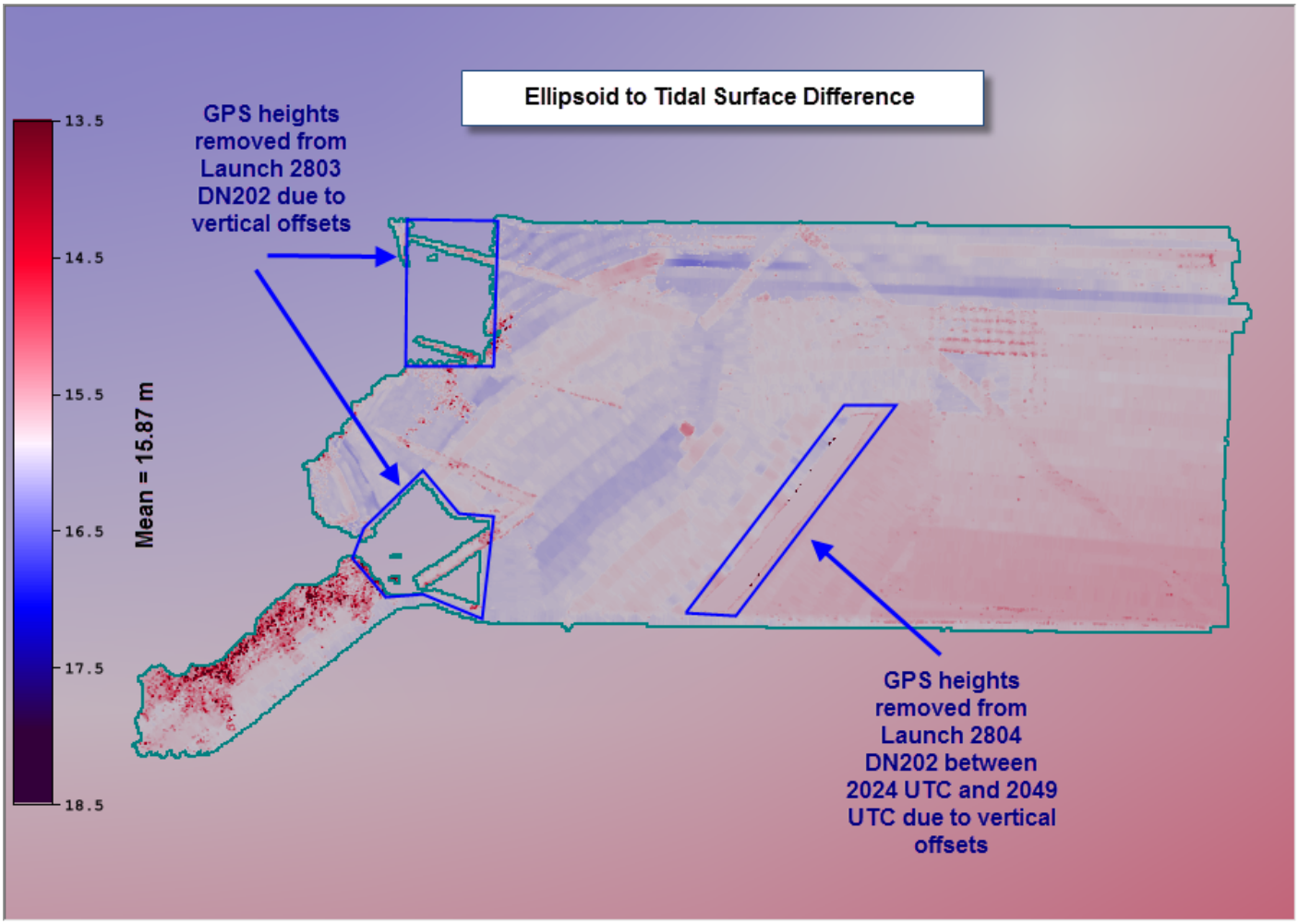


Figure 26: Difference surface between the ellipsoidally-referenced and tidally-referenced surfaces. Difference surface is overlaid on the EGM2008-WGS84 geoid-ellipsoid separation model.

B.2.7 Sound Speed Methods

Sound Speed Cast Frequency: For casts collected on S221, profiles were acquired 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. All other launch sound speed profiles were acquired using the SBE19 and SBE 19Plus CTDs at discrete locations within the survey area at least once every four hours. A concatenated sound speed casts file was created for each vessel and applied to H12589 survey lines using

the "Nearest in distance within time (4 hours)" profile selection method (Figure 27) with the following exception:

On DN242 the Rolls Royce MVP30 on Launch 2804 (RA-6) collected two sound speed casts, both of which were determined to be inaccurate during post-processing; these casts were removed from the concatenated file. Data for Launch 2804 (RA-6) collected on this day was instead corrected using two MVP200 casts from RAINIER on DN246 using "Nearest in distance". Examination of this data shows strong agreement with surrounding data. See Section B.2.6.

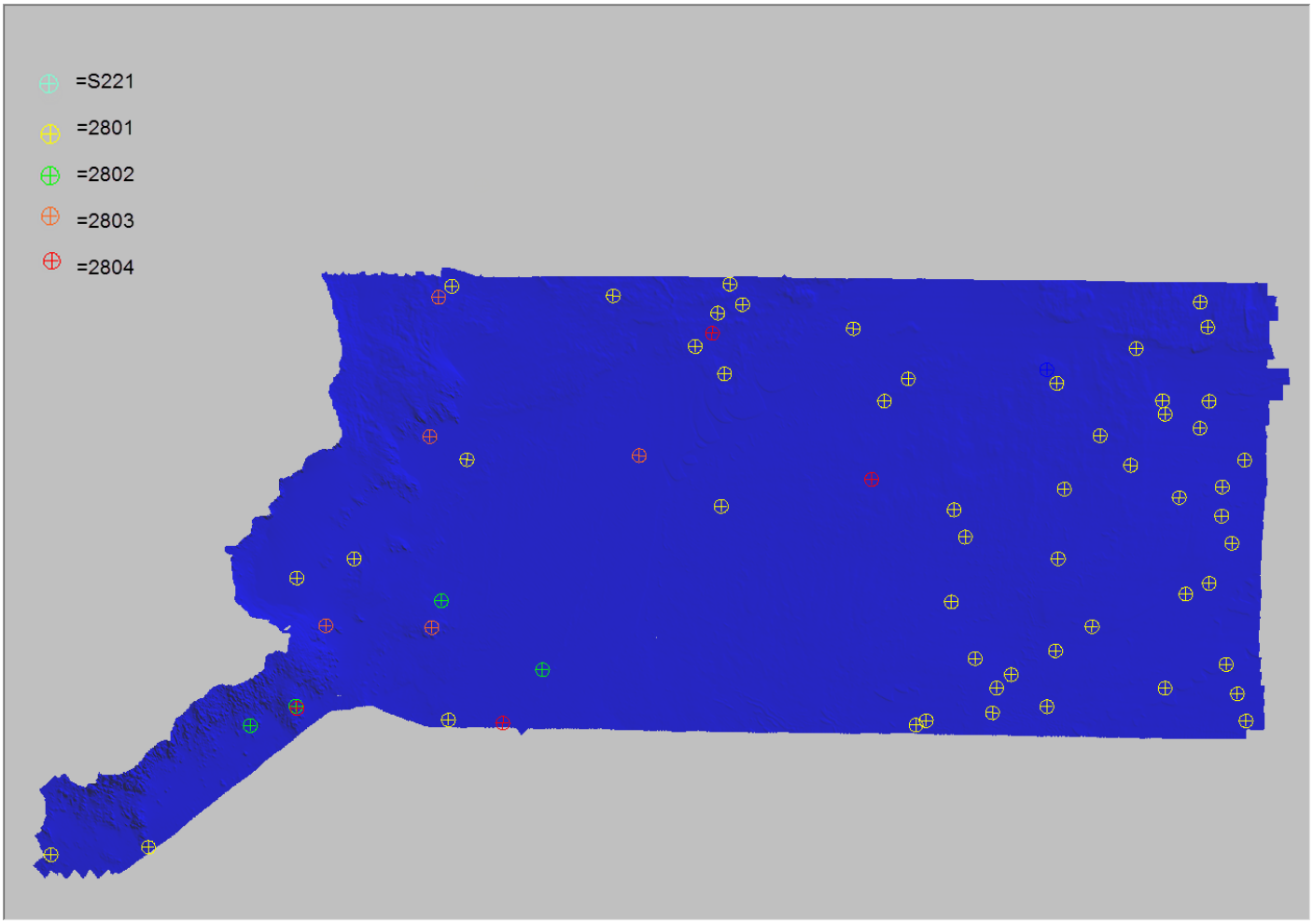


Figure 27: Distribution of sound speed profiles acquired for survey H12589.

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

True Heave could not be applied to Line 2803_2013RA1931920 and Line 2803_2013RA2021823 acquired by Launch 2803, thus real-time heave was retained for these lines.

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 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
H12589_1m	CUBE	1 meters	0 meters - 75 meters	NOAA_1m	Complete MBES

Surface Name	Surface Type	Resolution	Depth Range	Surface Parameter	Purpose
H12589_2m	CUBE	2 meters	0 meters - 75 meters	NOAA_2m	Complete MBES
H12589_4m	CUBE	4 meters	0 meters - 75 meters	NOAA_4m	Complete MBES
H12589_1m_0to20_Final	CUBE	1 meters	0 meters - 20 meters	NOAA_1m	Complete MBES
H12589_2m_18to40_Final	CUBE	2 meters	18 meters - 40 meters	NOAA_2m	Complete MBES
H12589_4m_36to80_Final	CUBE	4 meters	36 meters - 80 meters	NOAA_4m	Complete MBES
H12589_4m_Combined	CUBE	4 meters	0 meters - 80 meters	NOAA_4m	Complete MBES

Table 9: Submitted Surfaces

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, AK	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	Verified Observed
9459251.tid	Verified Observed

Table 12: Water Level Files (.tid)

File Name	Status
H12589CORF.zdf	Final

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

A request for final approved tides was sent to N/OPS1 on 09/04/2013. The final tide note was received on 11/19/2014.

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.

Tide note is appended to this report.

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 were three exceptions: On DN193, DN202, and DN203 there were several processing problems with the Bird Island base station; some of the data for these days was corrected using the Chernabura Island base station.

Vessel kinematic data was post-processed using Applanix POSPac processing software, POSGNSS processing software, and Single Base processing methods described in the DAPR.

Differential Global Positioning System (DGPS) correctors were used for horizontal control when the post-processing methods stated above were not possible (see C.3 Additional Horizontal or Vertical Control Issues).

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	N/A

Table 15: User Installed Base Stations

The following DGPS Stations were used for horizontal control:

DGPS Stations
Cold Bay, AK (313 kHz)
Kodiak, AK (289 kHz)

Table 16: USCG DGPS Stations

C.3 Additional Horizontal or Vertical Control Issues

3.3.1 Lines without SBETs

SBETs could not be applied to Line 2803_2013RA1931920 acquired by Launch 2803 and Line 2801_2013RA2032143 acquired by Launch 2801 due to time extents not overlapping with the line. DGPS correctors were retained for these lines.

D. Results and Recommendations

D.1 Chart Comparison

A comparison was made between survey H12589 and Chart 16540 using CARIS CUBE surfaces and a sounding layer. All data from H12589 should supersede charted depths.

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	10/15/2013	11/09/2013

Table 17: Largest Scale Raster Charts

16540

A comparison was performed with Chart 16540 (1:300000) using a CARIS sounding layer and contour layer based on the combined 4-meter surface from H12589. Both soundings and contours have been overlaid on the chart in Figure 28. All of the eight charted soundings compare to within one fathom.

The area within the sheet limits of H12589 does not currently have a charted 10-fathom contour or associated blue tint along the coast of Nagai Island. A charted 30-fathom contour is found to exist closer to shore than charted. The Hydrographer recommends updating the 30-fathom contour to better reflect the depths seen throughout this survey and creating a 10-fathom contour.

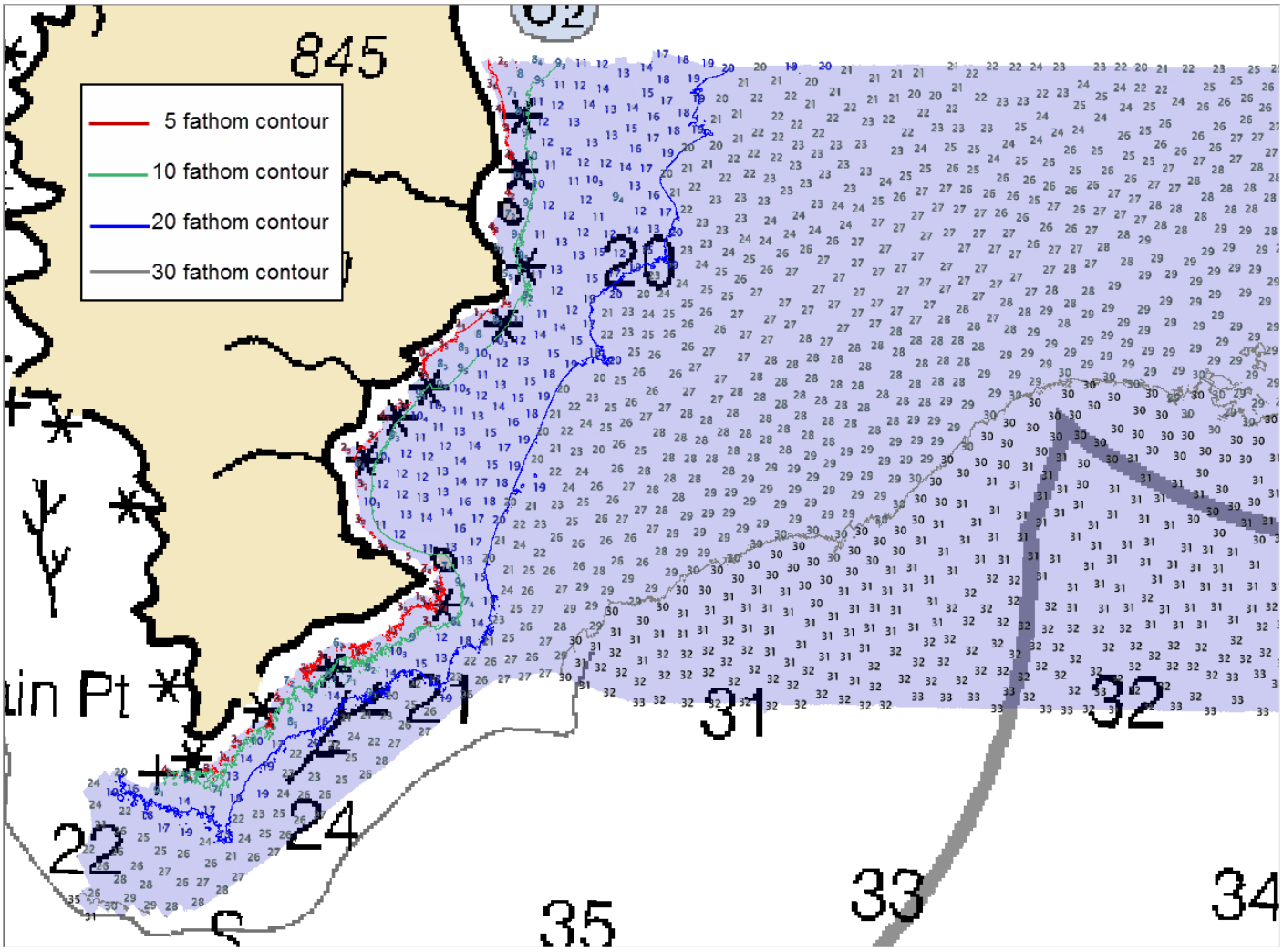


Figure 28: H12589 soundings and contours overlaid on Chart 16540 (1:300000).

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?
US3AK50M	1:300000	17	06/29/2011	06/29/2011	NO

Table 18: Largest Scale ENCs

US3AK50M

Depth Soundings: There are only two ENC soundings within the survey area; a 20-fathom and 30-fathom sounding. The 20-fathom sounding is in the same location as the 20-fathom charted depth on the RNC, and agrees to within 1-fathom with data from H12589. The 30-fathom charted depth, which does not exist on the RNC, is 3-fathoms deeper than data from H12589. The Hydrographer recommends updating the ENC (Figure 29).

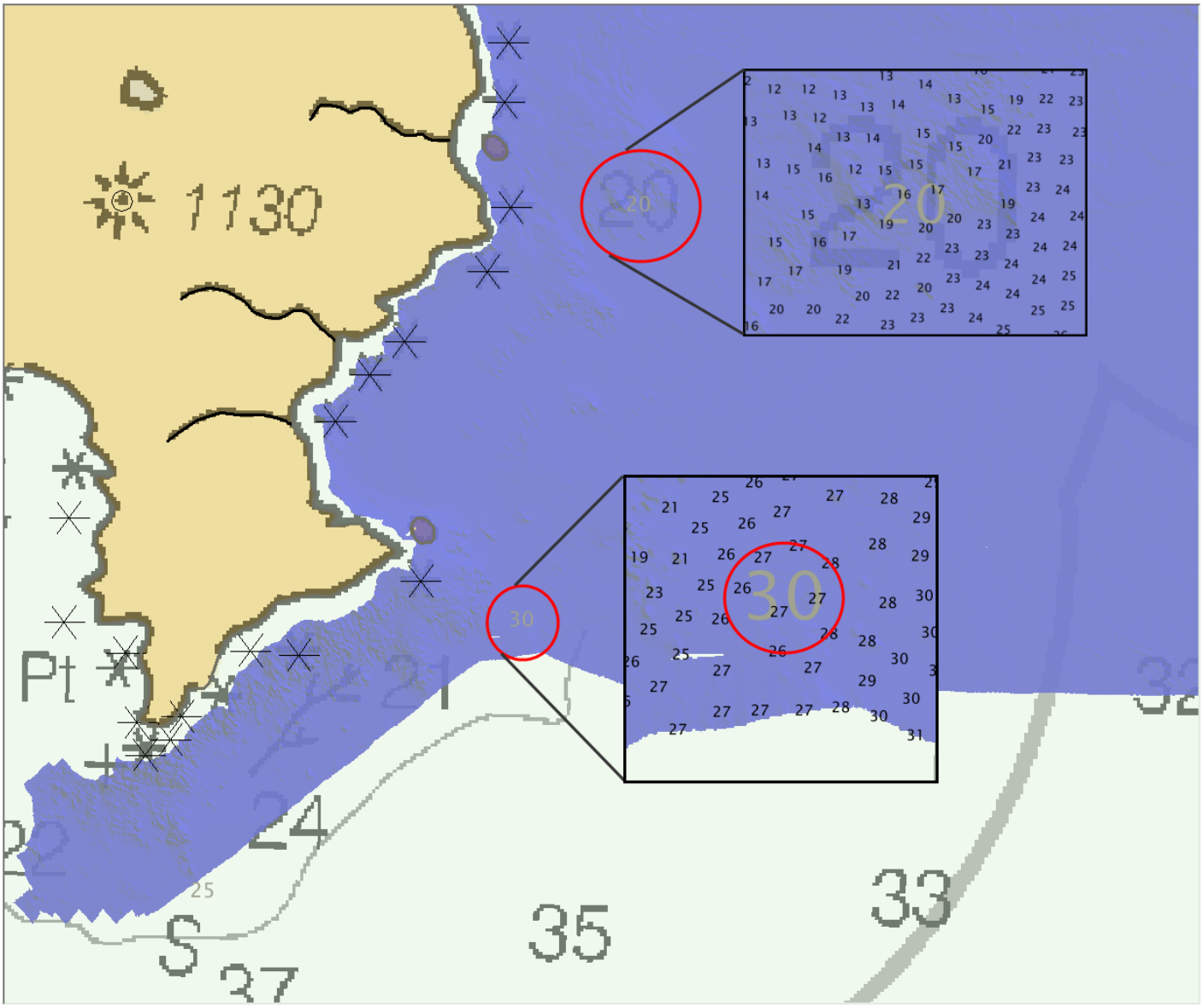


Figure 29: US3AK50M displayed with H12589 data on Chart 16540.

D.1.3 AWOIS Items

No AWOIS items were assigned for this survey.

D.1.4 Maritime Boundary Points

There were five assigned maritime boundaries for this survey. The assigned features were addressed as required and recorded in the H12589 Final Feature File (see Section D.2.1 Shoreline).

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.

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. Four proposed bottom sample locations were included in the Project Reference File, however only two bottom samples were collected for survey H12589. The remaining locations did not produce a sample after three attempts and were labeled 'unknown'. All samples were labeled in accordance with the HSSD with S-57 attribution and can be found in the Final Feature File (Figure 30).

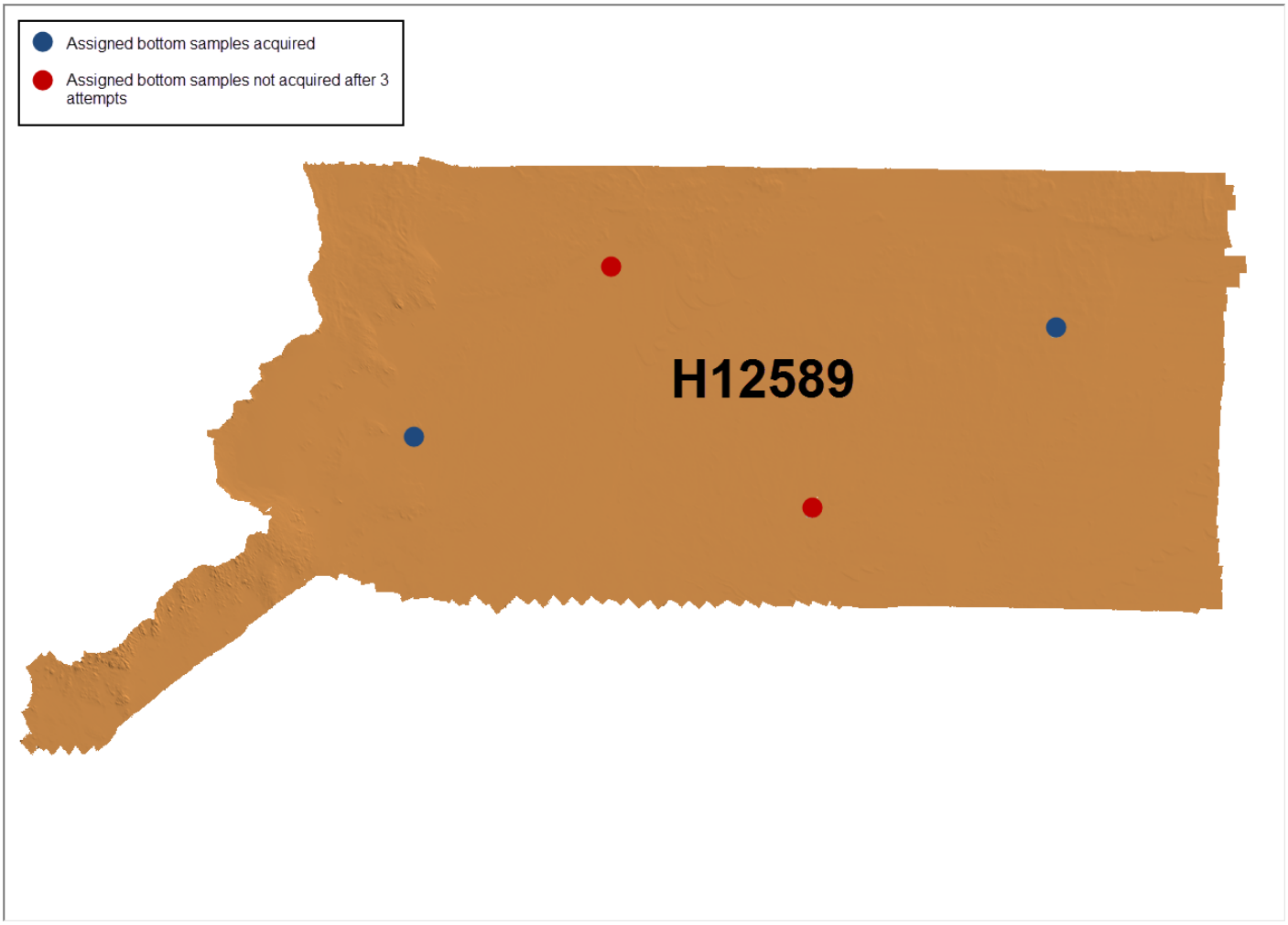


Figure 30: H12589 bottom sample locations.

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 HSSD and FPM. There were 22 assigned features for this survey. All assigned features were addressed as required with S-57 attribution and recorded in the H12589 Final Feature 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 2013.12.20 14:48:08 -08'00'
Meghan McGovern, LT/NOAA	Field Operations Officer	12/13/2013	2013.12.16 13:42:51 -08'00'
James B. Jacobson	Chief Survey Technician	12/13/2013	James Jacobson I have reviewed this document 2013.12.18 09:04:48 -08'00'
William J. Carrier, ENS/NOAA	Sheet Manager	12/13/2013	

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

UNITED STATES DEPARMENT 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: H12589

LOCALITY: Saddlers Mistake to Mountain Pt, Shumagin Islands, AK
TIME PERIOD: July 11, 2013 - September 3, 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: SWA205

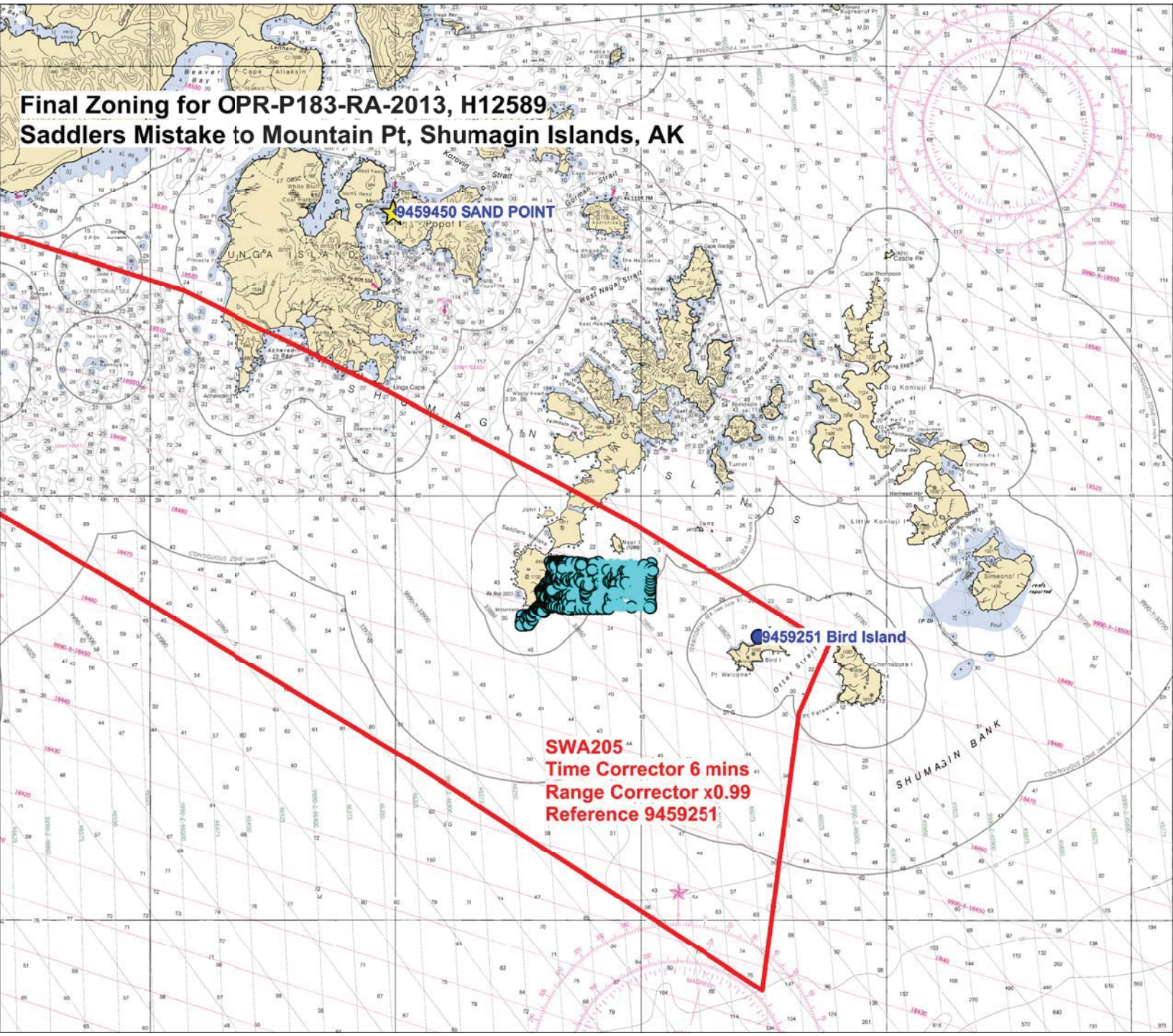
Refer to attachments for zoning information.

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.THOMAS.1365860250
Digitally signed by HOVIS.GERALD.THOMAS.1365860250
DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=OTHER, cn=HOVIS.GERALD.THOMAS.1365860250
Date: 2013.11.19 12:07:59 -05'00'

CHIEF, PRODUCTS AND SERVICES BRANCH


Final Zoning for OPR-P183-RA-2013, H12589
Saddlers Mistake to Mountain Pt, Shumagin Islands, AK
9459450 SAND POINT
9459251 Bird Island
SWA205
Time Corrector 6 mins
Range Corrector x0.99
Reference 9459251
SHUMAGIN BANK
UNGA ISLAND
SHUMAGIN ISLANDS

H12589 Feafure File

Registry Number: H12589
State: Alaska
Locality: Shumagin Islands, AK
Sub-locality: Saddlers Mistake to Mountain Pt
Project Number: OPR-P183-RA-13
Survey Dates: 05/01/2000 - 09/03/2013

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 (10/21/2014) CHS NTM: None (9/26/2014) NGA NTM: 1/21/2006 (11/1/2014)
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.	Feature Type	Survey Depth	Survey Latitude	Survey Longitude	AWOIS Item
1.1	Rock	[None]	54° 51' 51.9" N	160° 13' 16.3" W	---
2.1	Rock	-1.96 m	54° 51' 39.9" N	160° 13' 47.2" W	---
2.2	Rock	-0.66 m	54° 51' 40.7" N	160° 13' 33.9" W	---
2.3	GP	[None]	54° 51' 45.2" N	160° 13' 21.7" W	---
2.4	GP	[None]	54° 51' 45.2" N	160° 13' 21.7" W	---
2.5	Rock	-1.76 m	54° 51' 56.4" N	160° 12' 54.0" W	---
2.6	Rock	0.03 m	54° 52' 19.8" N	160° 12' 04.2" W	---
2.7	Rock	-1.98 m	54° 52' 28.3" N	160° 11' 43.7" W	---
2.8	GP	[None]	54° 52' 40.2" N	160° 11' 31.2" W	---
2.9	Rock	-0.59 m	54° 52' 35.1" N	160° 11' 27.2" W	---

2.10	GP	[None]	54° 54' 06.4" N	160° 10' 55.3" W	---
2.11	GP	[None]	54° 54' 06.4" N	160° 10' 55.3" W	---
2.12	Rock	-2.05 m	54° 54' 17.1" N	160° 10' 48.0" W	---

1 - Charted Features

1.1) US 0000763227 00001 / Maritime.000

Survey Summary

Survey Position: 54° 51' 51.9" N, 160° 13' 16.3" W

Least Depth: [None]

TPU (±1.96σ): **THU (TPEh)** [None] ; **TVU (TPEv)** [None]

Timestamp: 2000-122.00:00:00.000 (05/01/2000)

Dataset: Maritime.000

FOID: US 0000763227 00001(0226000BA55B0001)

Charts Affected: 16540_1, 16011_1, 16006_1, 500_1, 530_1, 50_1

Remarks:

Retain

Feature Correlation

Source	Feature	Range	Azimuth	Status
Maritime.000	US 0000763227 00001	0.00	000.0	Primary

Hydrographer Recommendations

Hydrographer recommends adding to chart

S-57 Data

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

Attributes: NINFOM - Retain charted rock as Maritime Boundary

SORDAT - 20000501

SORIND - US,US,reprt,DD-7398

WATLEV - 4:covers and uncovers

Office Notes

Reviewer recommends retaining the rock as the maritime boundary point

2 - New Features

2.1) US 0000763222 00001 / Maritime.000

Survey Summary

Survey Position:	54° 51' 39.9" N, 160° 13' 47.2" W
Least Depth:	-1.96 m (= -6.42 ft = -1.070 fm = -1 fm 0.42 ft)
TPU (±1.96σ):	**THU (TPEh)** [None] ; **TVU (TPEv)** [None]
Timestamp:	2013-246.00:00:00.000 (09/03/2013)
Dataset:	Maritime.000
FOID:	US 0000763222 00001(0226000BA5560001)
Charts Affected:	16540_1, 16011_1, 16006_1, 500_1, 530_1, 50_1

Remarks:

New

Feature Correlation

Source	Feature	Range	Azimuth	Status
Maritime.000	US 0000763222 00001	0.00	000.0	Primary

Hydrographer Recommendations

Hydrographer recommends adding to chart

Cartographically-Rounded Depth (Affected Charts):

-2 ¾fm (16540_1, 16011_1, 16006_1, 530_1)

-1.9m (500_1, 50_1)

S-57 Data

Geo object 1:	Underwater rock / awash rock (UWTROC)
Attributes:	NINFOM - chart new rock - update new Maritime Boundary
	QUASOU - 6:least depth known
	SORDAT - 20130903
	SORIND - US,US,graph,H12589
	TECSOU - 12:found by levelling
	VALSOU - -1.956 m
	WATLEV - 4:covers and uncovers

Office Notes

Reviewer recommends using as maritime boundary point

2.2) US 0000763225 00001 / Maritime.000

Survey Summary

Survey Position:	54° 51' 40.7" N, 160° 13' 33.9" W
Least Depth:	-0.66 m (= -2.15 ft = -0.358 fm = 0 fm 3.85 ft)
TPU (±1.96σ):	**THU (TPEh)** [None] ; **TVU (TPEv)** [None]
Timestamp:	2013-246.00:00:00.000 (09/03/2013)
Dataset:	Maritime.000
FOID:	US 0000763225 00001(0226000BA5590001)
Charts Affected:	16540_1, 16011_1, 16006_1, 500_1, 530_1, 50_1

Remarks:

New

Feature Correlation

Source	Feature	Range	Azimuth	Status
Maritime.000	US 0000763225 00001	0.00	000.0	Primary

Hydrographer Recommendations

Hydrographer recommends adding to chart

Cartographically-Rounded Depth (Affected Charts):

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

-0.6m (500_1, 50_1)

S-57 Data

Geo object 1:	Underwater rock / awash rock (UWTROC)
Attributes:	NINFOM - chart new rock - update new Maritime Boundary
	QUASOU - 6:least depth known
	SORDAT - 20130903
	SORIND - US,US,graph,H12589
	TECSOU - 12:found by levelling
	VALSOU - -0.655 m
	WATLEV - 4:covers and uncovers

Office Notes

Reviewer recommends using as maritime boundary point

2.3) US 0000763269 00001 / Maritime.000

Survey Summary

Survey Position: 54° 51' 45.2" N, 160° 13' 21.7" W

Least Depth: [None]

TPU (±1.96σ): **THU (TPEh)** [None] ; **TVU (TPEv)** [None]

Timestamp: 2013-246.00:00:00.000 (09/03/2013)

Dataset: Maritime.000

FOID: US 0000763269 00001(0226000BA5850001)

Charts Affected: 16540_1, 16011_1, 16006_1, 500_1, 530_1, 50_1

Remarks:

New

Feature Correlation

Source	Feature	Range	Azimuth	Status
Maritime.000	US 0000763269 00001	0.00	000.0	Primary

Hydrographer Recommendations

Hydrographer recommends adding to chart

S-57 Data

Geo object 1: Land area (LNDARE)

Attributes: NINFOM - chart new islet - Maritime Boundary

SORDAT - 20130903

SORIND - US,US,graph,H12589

Office Notes

reviewer recommends using as maritime boundary point

2.4) US 0000763272 00001 / Maritime.000

Survey Summary

Survey Position: 54° 51' 45.2" N, 160° 13' 21.7" W

Least Depth: [None]

TPU (±1.96σ): **THU (TPEh)** [None] ; **TVU (TPEv)** [None]

Timestamp: 2013-246.00:00:00.000 (09/03/2013)

Dataset: Maritime.000

FOID: US 0000763272 00001(0226000BA5880001)

Charts Affected: 16540_1, 16011_1, 16006_1, 500_1, 530_1, 50_1

Remarks:

[None]

Feature Correlation

Source	Feature	Range	Azimuth	Status
Maritime.000	US 0000763272 00001	0.00	000.0	Primary

Hydrographer Recommendations

[None]

S-57 Data

Geo object 1: Land elevation (LNDELV)

Attributes: ELEVAT - -3.0 m

NINFOM - chart new height - new Maritime Boundary

SORDAT - 20130903

SORIND - US,US,graph,H12589

Office Notes

Reviewer recommends using as maritime boundary point

2.5) US 0000763228 00001 / Maritime.000

Survey Summary

Survey Position: 54° 51' 56.4" N, 160° 12' 54.0" W

Least Depth: -1.76 m (= -5.77 ft = -0.961 fm = 0 fm 0.23 ft)

TPU (±1.96σ): **THU (TPEh)** [None] ; **TVU (TPEv)** [None]

Timestamp: 2013-246.00:00:00.000 (09/03/2013)

Dataset: Maritime.000

FOID: US 0000763228 00001(0226000BA55C0001)

Charts Affected: 16540_1, 16011_1, 16006_1, 500_1, 530_1, 50_1

Remarks:

New

Feature Correlation

Source	Feature	Range	Azimuth	Status
Maritime.000	US 0000763228 00001	0.00	000.0	Primary

Hydrographer Recommendations

Hydrographer recommends adding to chart

Cartographically-Rounded Depth (Affected Charts):

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

-1.7m (500_1, 50_1)

S-57 Data

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

Attributes: NINFOM - chart new rock - update new Maritime Boundary

QUASOU - 6:least depth known

SORDAT - 20130903

SORIND - US,US,graph,H12589

TECSOU - 12:found by levelling

VALSOU - -1.758 m

WATLEV - 4:covers and uncovers

Office Notes

Reviewer recommends using as maritime boundary point

2.6) US 0000763224 00001 / Maritime.000

Survey Summary

Survey Position:	54° 52' 19.8" N, 160° 12' 04.2" W
Least Depth:	0.03 m (= 0.11 ft = 0.019 fm = 0 fm 0.11 ft)
TPU (±1.96σ):	**THU (TPEh)** [None] ; **TVU (TPEv)** [None]
Timestamp:	2013-246.00:00:00.000 (09/03/2013)
Dataset:	Maritime.000
FOID:	US 0000763224 00001(0226000BA5580001)
Charts Affected:	16540_1, 16011_1, 16006_1, 500_1, 530_1, 50_1

Remarks:

New

Feature Correlation

Source	Feature	Range	Azimuth	Status
Maritime.000	US 0000763224 00001	0.00	000.0	Primary

Hydrographer Recommendations

Hydrographer recommends adding to chart

Cartographically-Rounded Depth (Affected Charts):

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

0.0m (500_1, 50_1)

S-57 Data

Geo object 1:	Underwater rock / awash rock (UWTROC)
Attributes:	NINFOM - chart new rock - update new Maritime Boundary
	QUASOU - 6:least depth known
	SORDAT - 20130903
	SORIND - US,US,graph,H12589
	TECSOU - 12:found by levelling
	VALSOU - 0.034 m
	WATLEV - 5:awash

Office Notes

Reviewer recommends using as maritime boundary point

2.7) US 0000763226 00001 / Maritime.000

Survey Summary

Survey Position:	54° 52' 28.3" N, 160° 11' 43.7" W
Least Depth:	-1.98 m (= -6.48 ft = -1.080 fm = -1 fm 0.48 ft)
TPU (±1.96σ):	**THU (TPEh)** [None] ; **TVU (TPEv)** [None]
Timestamp:	2013-246.00:00:00.000 (09/03/2013)
Dataset:	Maritime.000
FOID:	US 0000763226 00001(0226000BA55A0001)
Charts Affected:	16540_1, 16011_1, 16006_1, 500_1, 530_1, 50_1

Remarks:

New

Feature Correlation

Source	Feature	Range	Azimuth	Status
Maritime.000	US 0000763226 00001	0.00	000.0	Primary

Hydrographer Recommendations

Hydrographer recommends adding to chart

Cartographically-Rounded Depth (Affected Charts):

-2 ¾fm (16540_1, 16011_1, 16006_1, 530_1)

-1.9m (500_1, 50_1)

S-57 Data

Geo object 1:	Underwater rock / awash rock (UWTROC)
Attributes:	NINFOM - chart new rock - update new Maritime Boundary
	QUASOU - 6:least depth known
	SORDAT - 20130903
	SORIND - US,US,graph,H12589
	TECSOU - 12:found by levelling
	VALSOU - -1.975 m
	WATLEV - 4:covers and uncovers

Office Notes

Reviewer recommends using as maritime boundary point

2.8) US 0000763268 00001 / Maritime.000

Survey Summary

Survey Position: 54° 52' 40.2" N, 160° 11' 31.2" W

Least Depth: [None]

TPU (±1.96σ): **THU (TPEh)** [None] ; **TVU (TPEv)** [None]

Timestamp: 2013-246.00:00:00.000 (09/03/2013)

Dataset: Maritime.000

FOID: US 0000763268 00001(0226000BA5840001)

Charts Affected: 16540_1, 16011_1, 16006_1, 500_1, 530_1, 50_1

Remarks:

New

Feature Correlation

Source	Feature	Range	Azimuth	Status
Maritime.000	US 0000763268 00001	0.00	000.0	Primary

Hydrographer Recommendations

Hydrographer recommends adding to chart

S-57 Data

Geo object 1: Land area (LNDARE)

Attributes: NINFOM - chart new island - Maritime Boundary

SORDAT - 20130903

SORIND - US,US,graph,H12589

Office Notes

reviewer recommends using as maritime boundary

2.9) US 0000763221 00001 / Maritime.000

Survey Summary

Survey Position:	54° 52' 35.1" N, 160° 11' 27.2" W
Least Depth:	-0.59 m (= -1.95 ft = -0.325 fm = 0 fm 4.05 ft)
TPU (±1.96σ):	**THU (TPEh)** [None] ; **TVU (TPEv)** [None]
Timestamp:	2013-246.00:00:00.000 (09/03/2013)
Dataset:	Maritime.000
FOID:	US 0000763221 00001(0226000BA5550001)
Charts Affected:	16540_1, 16011_1, 16006_1, 500_1, 530_1, 50_1

Remarks:

New

Feature Correlation

Source	Feature	Range	Azimuth	Status
Maritime.000	US 0000763221 00001	0.00	000.0	Primary

Hydrographer Recommendations

Hydrographer recommends adding to chart

Cartographically-Rounded Depth (Affected Charts):

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

-0.5m (500_1, 50_1)

S-57 Data

Geo object 1:	Underwater rock / awash rock (UWTROC)
Attributes:	NINFOM - chart new rock - update new Maritime Boundary
	QUASOU - 6:least depth known
	SORDAT - 20130903
	SORIND - US,US,graph,H12589
	TECSOU - 12:found by levelling
	VALSOU - -0.595 m
	WATLEV - 5:awash

Office Notes

Reviewer recommends using as maritime boundary point

2.10) US 0000763267 00001 / Maritime.000

Survey Summary

Survey Position: 54° 54' 06.4" N, 160° 10' 55.3" W

Least Depth: [None]

TPU (±1.96σ): **THU (TPEh)** [None] ; **TVU (TPEv)** [None]

Timestamp: 2013-246.00:00:00.000 (09/03/2013)

Dataset: Maritime.000

FOID: US 0000763267 00001(0226000BA5830001)

Charts Affected: 16540_1, 16011_1, 16006_1, 500_1, 530_1, 50_1

Remarks:

New

Feature Correlation

Source	Feature	Range	Azimuth	Status
Maritime.000	US 0000763267 00001	0.00	000.0	Primary

Hydrographer Recommendations

Hydrographer recommends adding to chart

S-57 Data

Geo object 1: Land area (LNDARE)

Attributes: NINFOM - chart new islet - Maritime Boundary

SORDAT - 20130903

SORIND - US,US,graph,H12589

Office Notes

reviewer recommends using as maritime boundary point

2.11) US 0000763273 00001 / Maritime.000

Survey Summary

Survey Position: 54° 54' 06.4" N, 160° 10' 55.3" W

Least Depth: [None]

TPU (±1.96σ): **THU (TPEh)** [None] ; **TVU (TPEv)** [None]

Timestamp: 2013-246.00:00:00.000 (09/03/2013)

Dataset: Maritime.000

FOID: US 0000763273 00001(0226000BA5890001)

Charts Affected: 16540_1, 16011_1, 16006_1, 500_1, 530_1, 50_1

Remarks:

[None]

Feature Correlation

Source	Feature	Range	Azimuth	Status
Maritime.000	US 0000763273 00001	0.00	000.0	Primary

Hydrographer Recommendations

[None]

S-57 Data

Geo object 1: Land elevation (LNDELV)

Attributes: ELEVAT - -3.14 m

NINFOM - chart new height - new Maritime Boundary

SORDAT - 20130903

SORIND - US,US,graph,H12589

Office Notes

Reviewer recommends using as maritime boundary point

2.12) US 0000763220 00001 / Maritime.000

Survey Summary

Survey Position:	54° 54' 17.1" N, 160° 10' 48.0" W
Least Depth:	-2.05 m (= -6.72 ft = -1.119 fm = -1 fm 0.72 ft)
TPU (±1.96σ):	**THU (TPEh)** [None] ; **TVU (TPEv)** [None]
Timestamp:	2013-246.00:00:00.000 (09/03/2013)
Dataset:	Maritime.000
FOID:	US 0000763220 00001(0226000BA5540001)
Charts Affected:	16540_1, 16011_1, 16006_1, 500_1, 530_1, 50_1

Remarks:

New

Feature Correlation

Source	Feature	Range	Azimuth	Status
Maritime.000	US 0000763220 00001	0.00	000.0	Primary

Hydrographer Recommendations

Hydrographer recommends adding to chart

Cartographically-Rounded Depth (Affected Charts):

-2 ¾fm (16540_1, 16011_1, 16006_1, 530_1)

-2.0m (500_1, 50_1)

S-57 Data

Geo object 1:	Underwater rock / awash rock (UWTROC)
Attributes:	NINFOM - chart new rock - update new Maritime Boundary
	QUASOU - 6:least depth known
	SORDAT - 20130903
	SORIND - US,US,graph,H12589
	TECSOU - 12:found by levelling
	VALSOU - -2.047 m
	WATLEV - 4:covers and uncovers

Office Notes

Reviewer recommends using as maritime boundary point

APPROVAL PAGE

H12589

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

- H12589_DR.pdf
- Collection of depth varied resolution BAGS
- Processed survey data and records
- H12589_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