H12593

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

DESCRIPTIVE REPORT

Type of Survey:	Navigable Area
Registry Number:	H12593

LOCALITY

State(s):	Alaska
General Locality:	Shumagin Islands
Sub-locality:	Vicinity of Bird Island

2013

CHIEF OF PARTY
Richard T. Brennan, CDR/NOAA

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

REGISTRY NUMBER:

HYDROGRAPHIC TITLE SHEET

H12593

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**
Sub-Locality:	**Vicinity of Bird Island**
Scale:	**40000**
Dates of Survey:	**07/13/2013 to 09/03/2013**
Instructions Dated:	**05/29/2013**
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 H12593

Project: OPR-P183-RA-13

Locality: Shumagin Islands, AK

Sublocality: Vicinity of Bird Island

Scale: 1:40000

July 2013 - September 2013

NOAA Ship *Rainier*

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

A. Area Surveyed

Survey H12593 encompasses Bird Island and the western extent of Otter Strait (Figures 1-2). The survey area lies to the west of Chernabura Island at the southern extent of the Shumagin Island group.

A.1 Survey Limits

Data were acquired within the following survey limits:

Northwest Limit	Southeast Limit
54° 51" 6.52' N 159° 39" 8.9' W	54° 44" 2.14' N 159° 51" 51.93' W

Table 1: Survey Limits

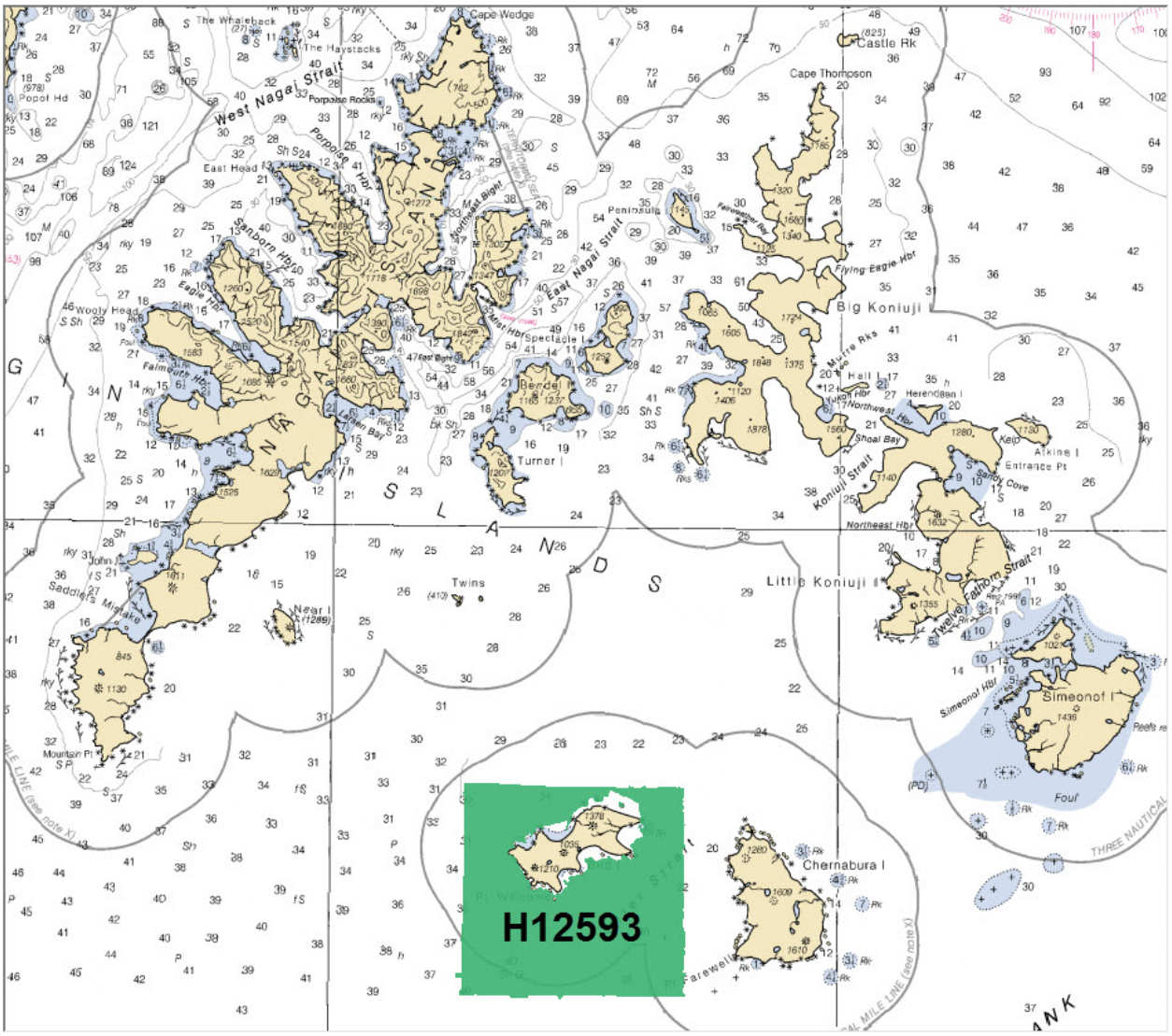


Figure 1: Survey H12593 general location (Chart 16540).

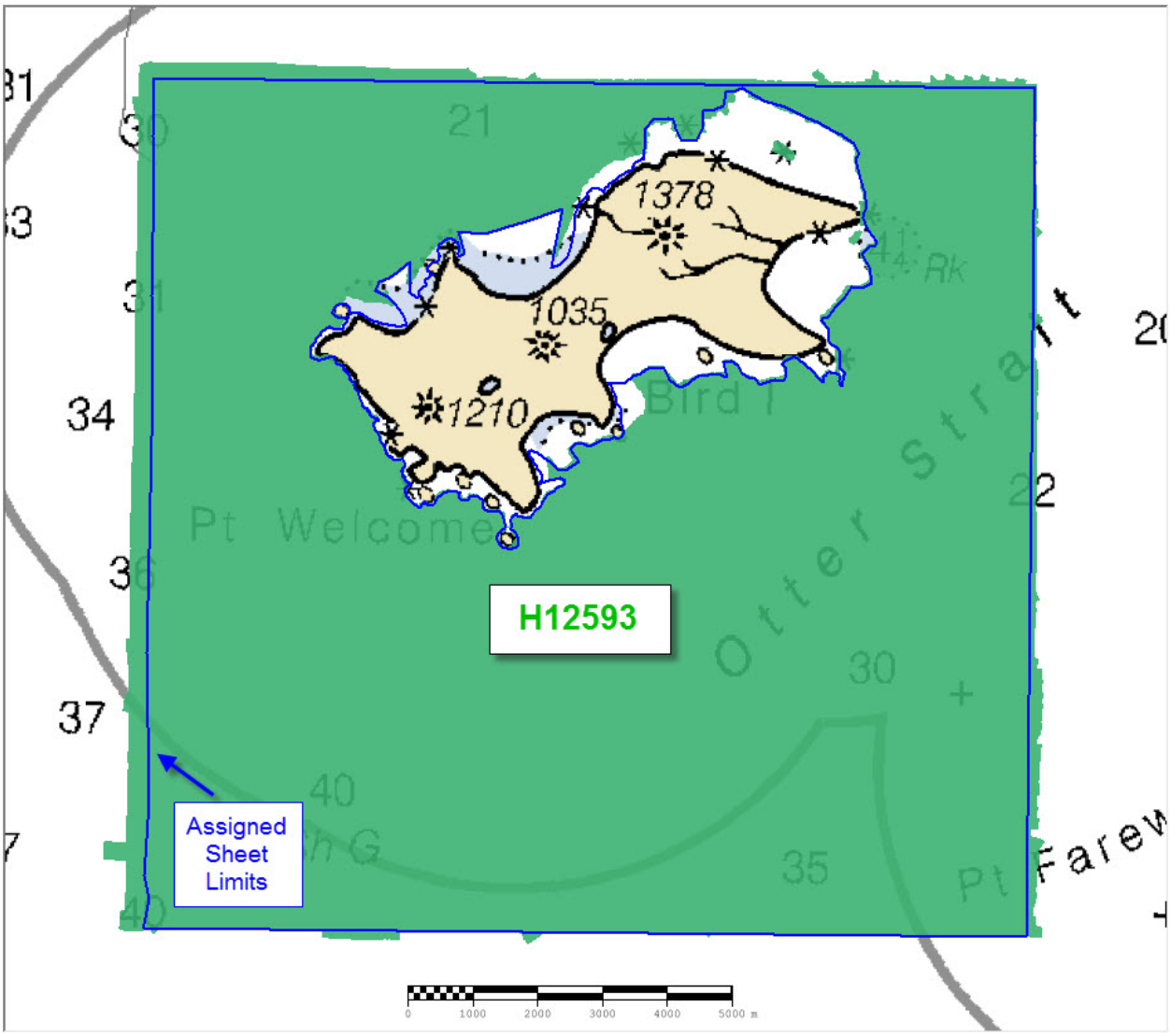


Figure 2: H12593 survey outline and assigned sheet limits (Chart 16540).

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

A.2 Survey Purpose

The purpose of this survey is to provide contemporary data 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 H12593 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 3). In order to extract some descriptive statistics of the data density achievements, the density layer of each finalized surface was queried within CARIS then examined in Excel (Figure 4). Overall, the required data density was achieved in 99.9% of nodes.

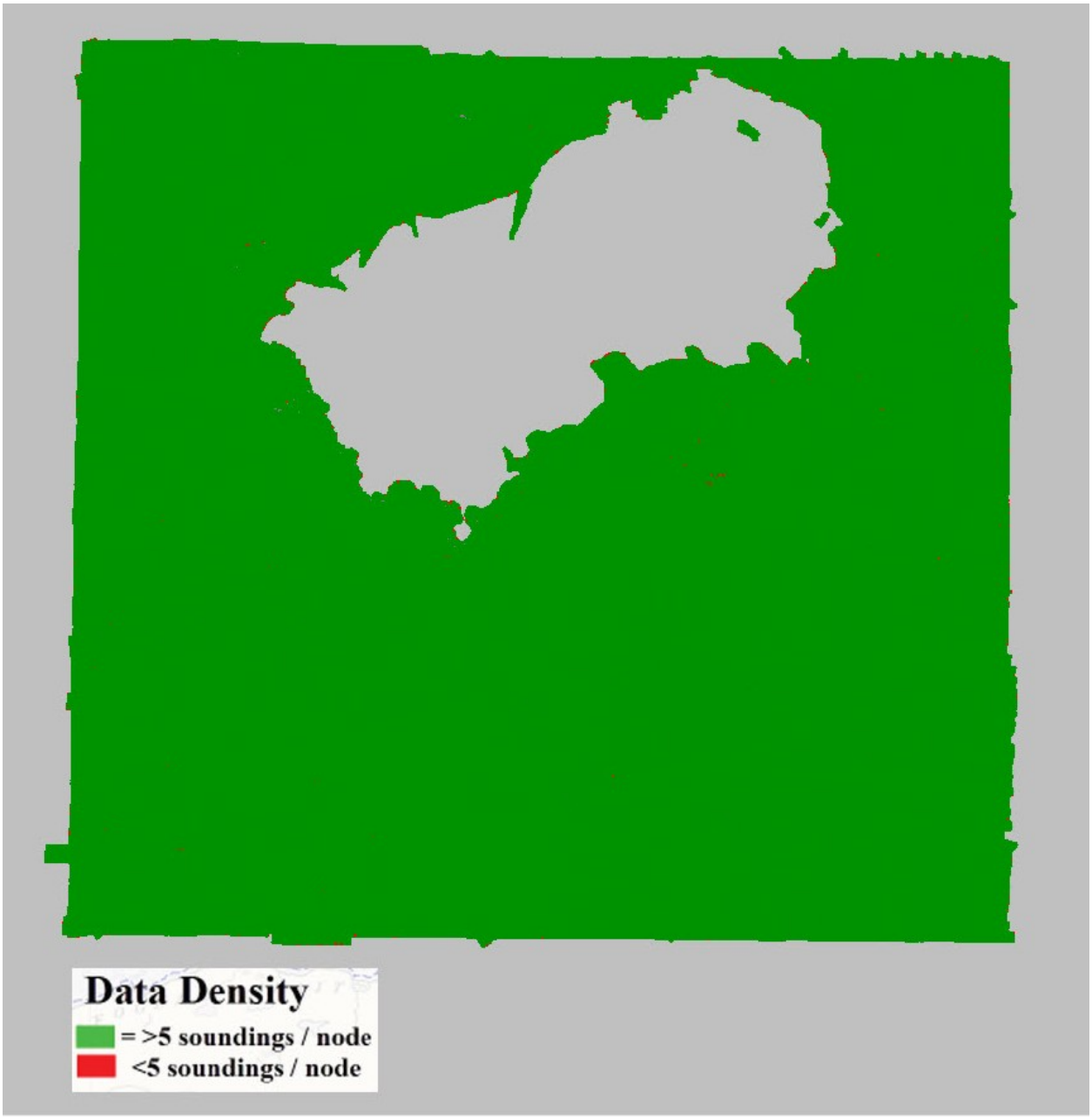


Figure 3: H12593 data density.

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	2,219,088	14,715	99.3%
2m	18 - 40m	7,181,695	7,597	99.9%
4m	36 - 80m	8,540,950	2,321	100.0%
	TOTAL:	17,941,733	24,633	99.9%
	TOTAL (by area):	167,601,068	82,239	100.0%

Figure 4: Summary table showing the percentage of nodes satisfying the 5 sounding density requirements, sub-divided by appropriate 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 HSSD however the reported values in DR have been rounded and provide a inaccurate accounting. Density percentages calculated via Pydro are as follows: 1m = 99.47%, 2m = 99.93%, 4m= 99.98%

A.4 Survey Coverage

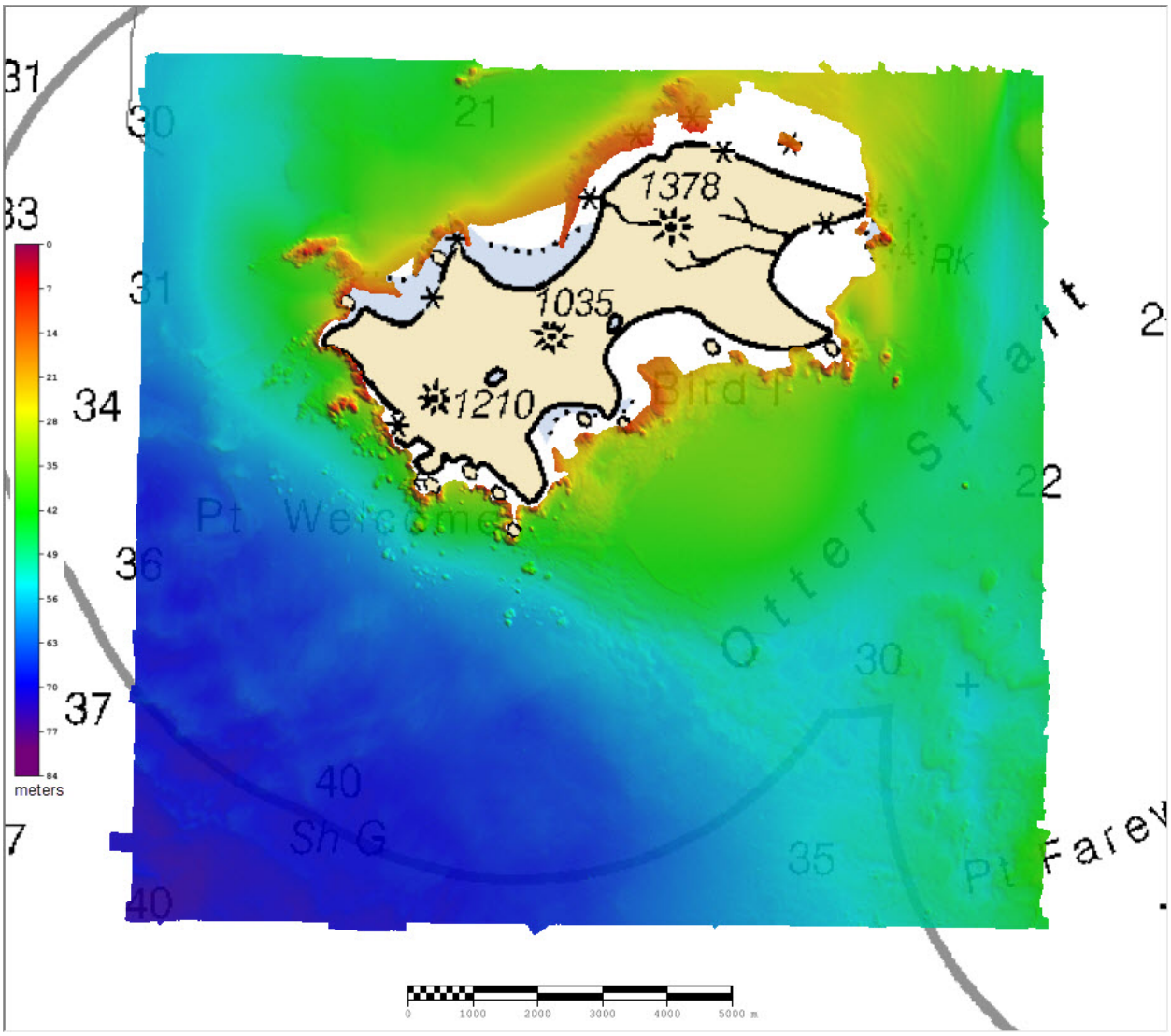


Figure 5: H12593 MBES coverage overlaid on Chart 16540.

Complete multibeam echosounder (MBES) coverage was achieved within the assigned survey area except as noted below:

Foul Areas: Areas foul with kelp or otherwise too dangerous to approach, prevented survey operations to continue to the assigned sheet limits (Figure 6). These areas were generally located very near shore, subject to dangerous wave action and judged to be navigationally insignificant. Foul areas have been delineated and attributed in the H12593 Final Feature File submitted with this report.

Holidays / Coverage Gaps: A holiday measuring approximately 15m x 40m exists in 75 meters water depth along the southwestern edge of the survey (Figure 7). One additional holiday measuring 2m x 6m exists in 26 meters of water depth. Five gaps in coverage, all in depths over 30 meters, are scattered elsewhere in the

survey area; they range in size from 2m x 6m to 4m x 16m and were determined not to be navigationally significant.

Acoustic Shadows: Occasional small, widely scattered holidays were the result of acoustic shadows (Figure 8). This effect was seen where data density on the 'dark side' of a feature, or between features, was too sparse to produce a surface at the appropriate resolution. Acoustic shadow holidays were examined to assure that least depths were obtained.

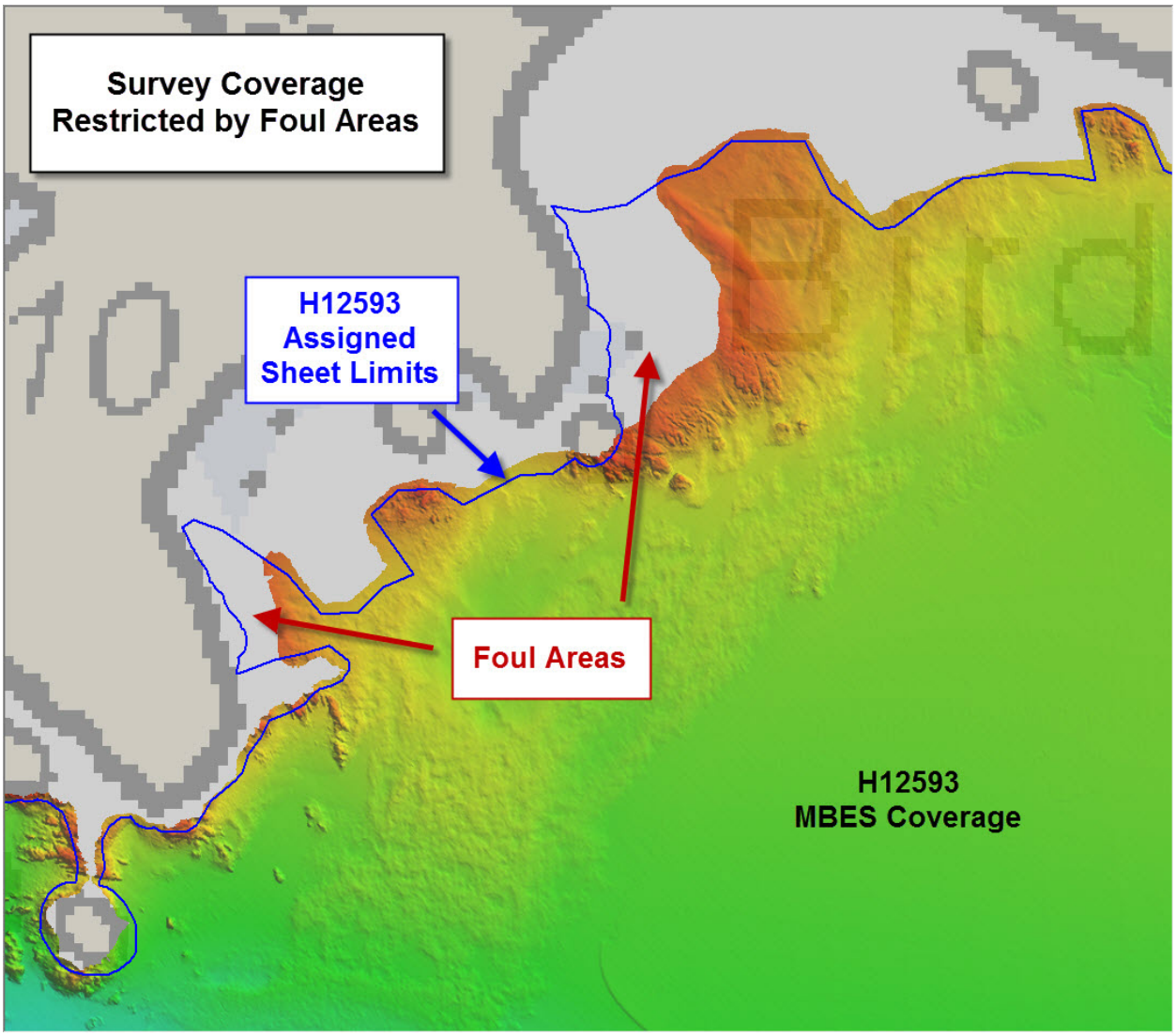


Figure 6: Example of foul areas restricting survey coverage.

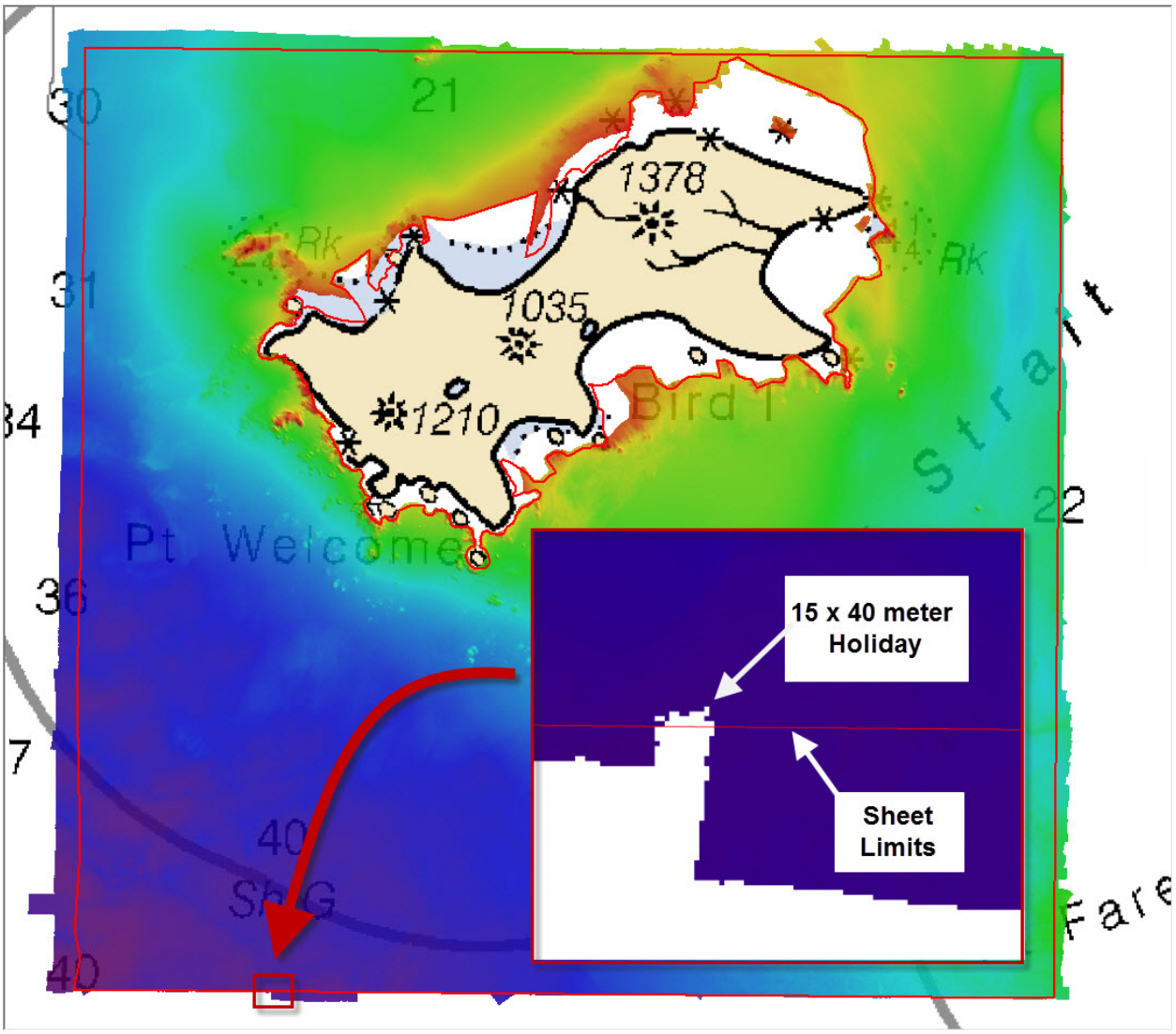


Figure 7: 15m x 40m Holiday

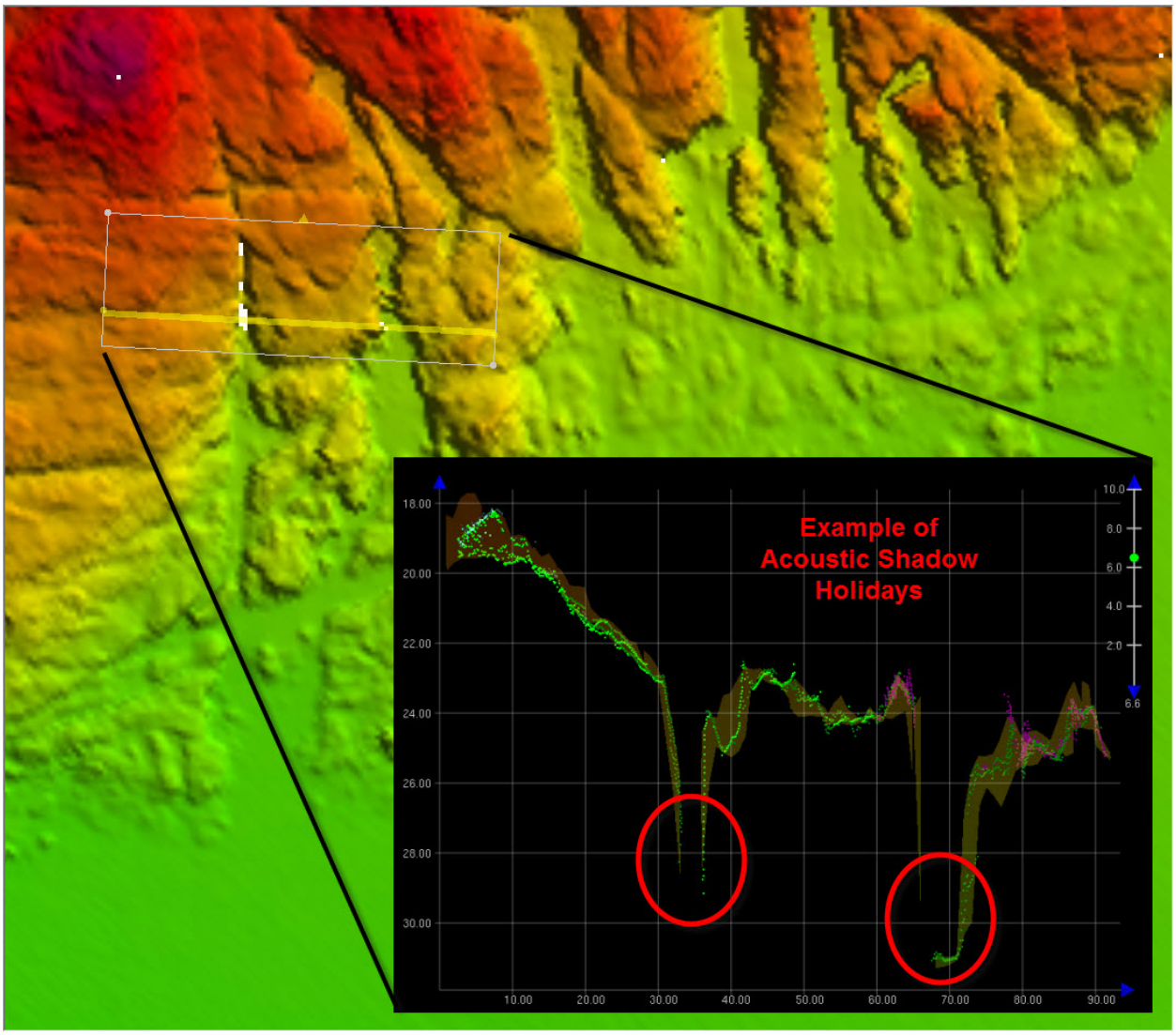


Figure 8: Example of typical holiday caused by acoustic shadows in areas of significant relief. Note that holidays occur on the sides of vertical features and that least depths were obtained.

The H12593 Final Feature File was included in the hydrographic data submission and is not attached to this report.

A.5 Survey Statistics

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

	Vessel	***S221***	***2801***	***2802***	***2803***	***2804***	***Total***
LNM	**SBES Mainscheme**	0	0	0	0	0	0
	MBES Mainscheme	185.6	115.7	73.3	89.0	143.5	607.1
	Lidar Mainscheme	0	0	0	0	0	0
	SSS Mainscheme	0	0	0	0	0	0
	SBES/MBES Combo Mainscheme	0	0	0	0	0	0
	SBES/SSS Combo Mainscheme	0	0	0	0	0	0
	MBES/SSS Combo Mainscheme	0	0	0	0	0	0
	SBES/MBES Combo Crosslines	20.4	0	2.8	0	8.5	31.8
	Lidar Crosslines	0	0	0	0	0	0
Number of Bottom Samples							5
Number AWOIS Items Investigated							0
Number Maritime Boundary Points Investigated							3
Number of DPs							0
Number of Items Items Investigated by Dive Ops							0
Total Number of SNM							45.70

Table 2: Hydrographic Survey Statistics

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

Survey Dates	Julian Day Number
07/13/2013	194
07/19/2013	200
07/20/2013	201
07/23/2013	204
08/31/2013	243
09/01/2013	244
09/03/2013	246

Table 3: Dates of Hydrography

B. Data Acquisition and Processing

B.1 Equipment and Vessels

All H12593 survey data was acquired by NOAA Ship RAINIER, launches 2801, 2802, 2803, 2804, and skiff 1906 (Figure 9). The vessels acquired MBES depths, sound speed profiles, bottom samples and conducted shoreline feature verification.

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***	***1906***
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 feet

Table 4: Vessels Used

Figure 9: NOAA Ship RAINIER with launches.

B.1.2 Equipment

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

Manufacturer	Model	Type
Kongsberg	EM710	MBES
Reson	SeaBat 7125	MBES
Reson	SVP70	Sound Speed System
Reson	SVP71	Sound Speed System
Odim Brooke Ocean (Rolls Royce Group)	Moving Vessel Profiler 200	Conductivity, Temperature, and Depth Sensor
Odim Brooke Ocean (Rolls Royce Group)	Moving Vessel Profiler 30	Conductivity, Temperature, and Depth Sensor
Applanix	POS MV V4	Positioning and Attitude System

Table 5: Major Systems Used

B.2 Quality Control

B.2.1 Crosslines

Crosslines, acquired for this survey, totalled 5.2% of mainscheme acquisition.

Multibeam crosslines were acquired using S221 (RAINIER) as well as launches 2802 and 2804. A 4-meter CUBE surface was created using only H12593 mainscheme lines, and a second 4-meter CUBE surface was created using only crosslines. A 4-meter difference surface was then generated in CARIS (Figure 10) from which statistics were derived; the results are shown in Figure 11. The mean difference between H12593 mainscheme and crosslines was 0.0 meters with a standard deviation of 0.13 meters.

For its respective depths, the difference surface was compared to allowable IHO accuracy standards (Figure 12). In total, 100.0% of the depth differences between H12593 mainscheme and crossline data are within allowable IHO Order 1 standards (Figure 13).

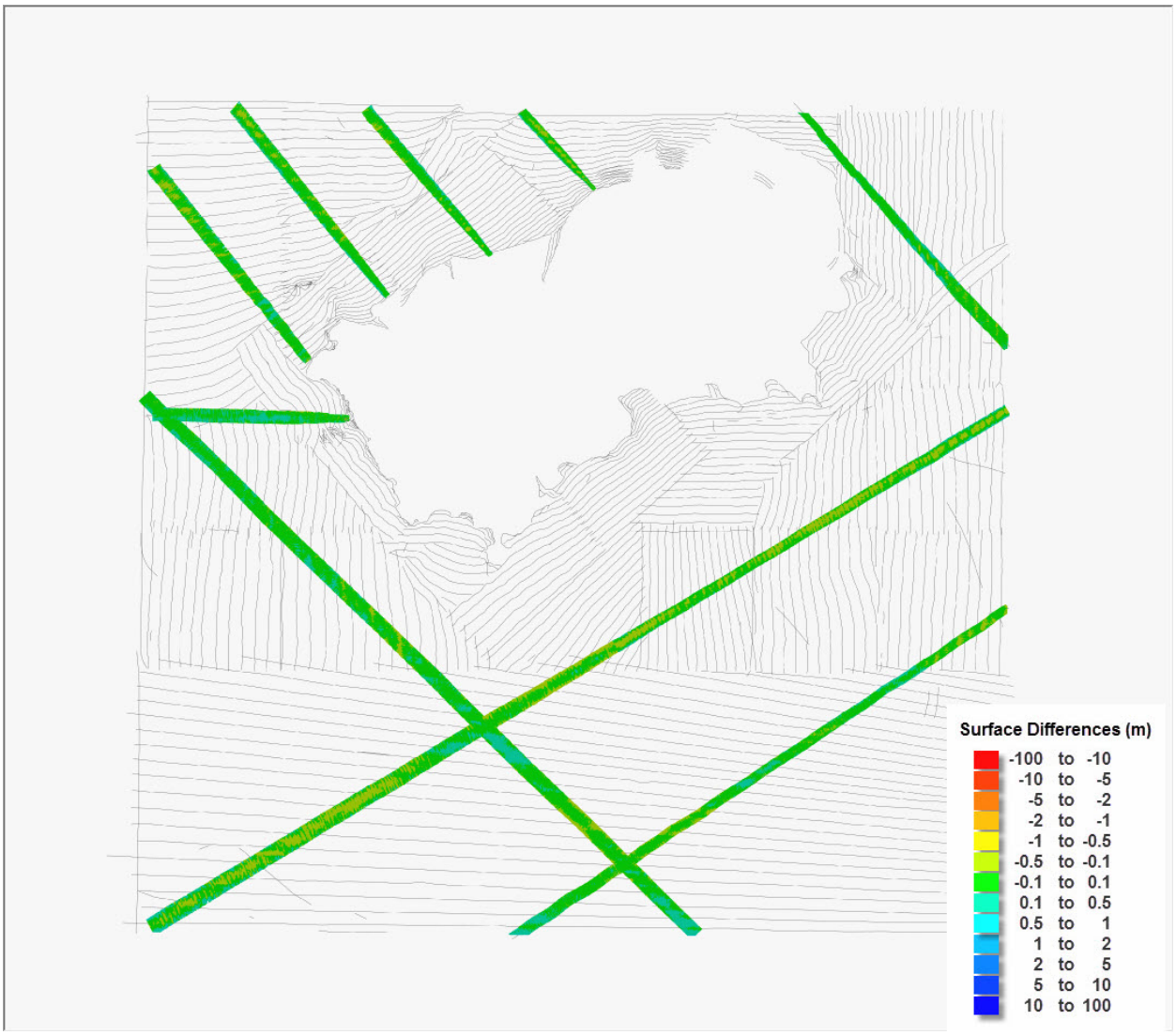


Figure 10: H12593 4-meter mainscheme / crossline difference surface. Mainscheme tracklines shown in gray.

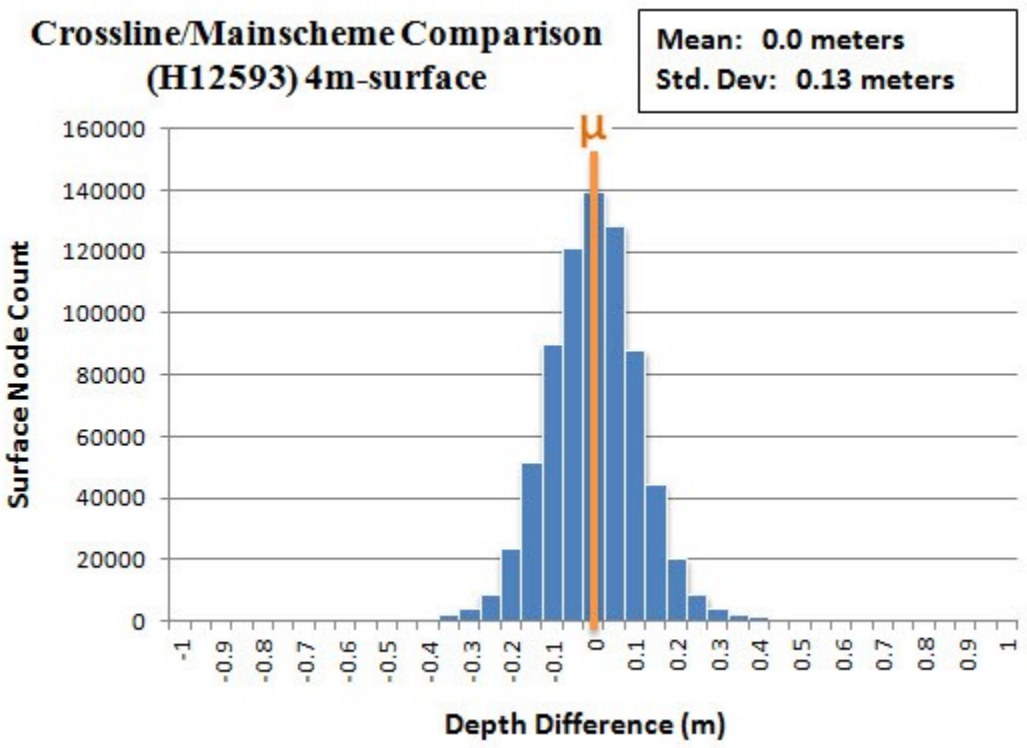


Figure 11: H12593 crossline comparison with mainscheme lines.

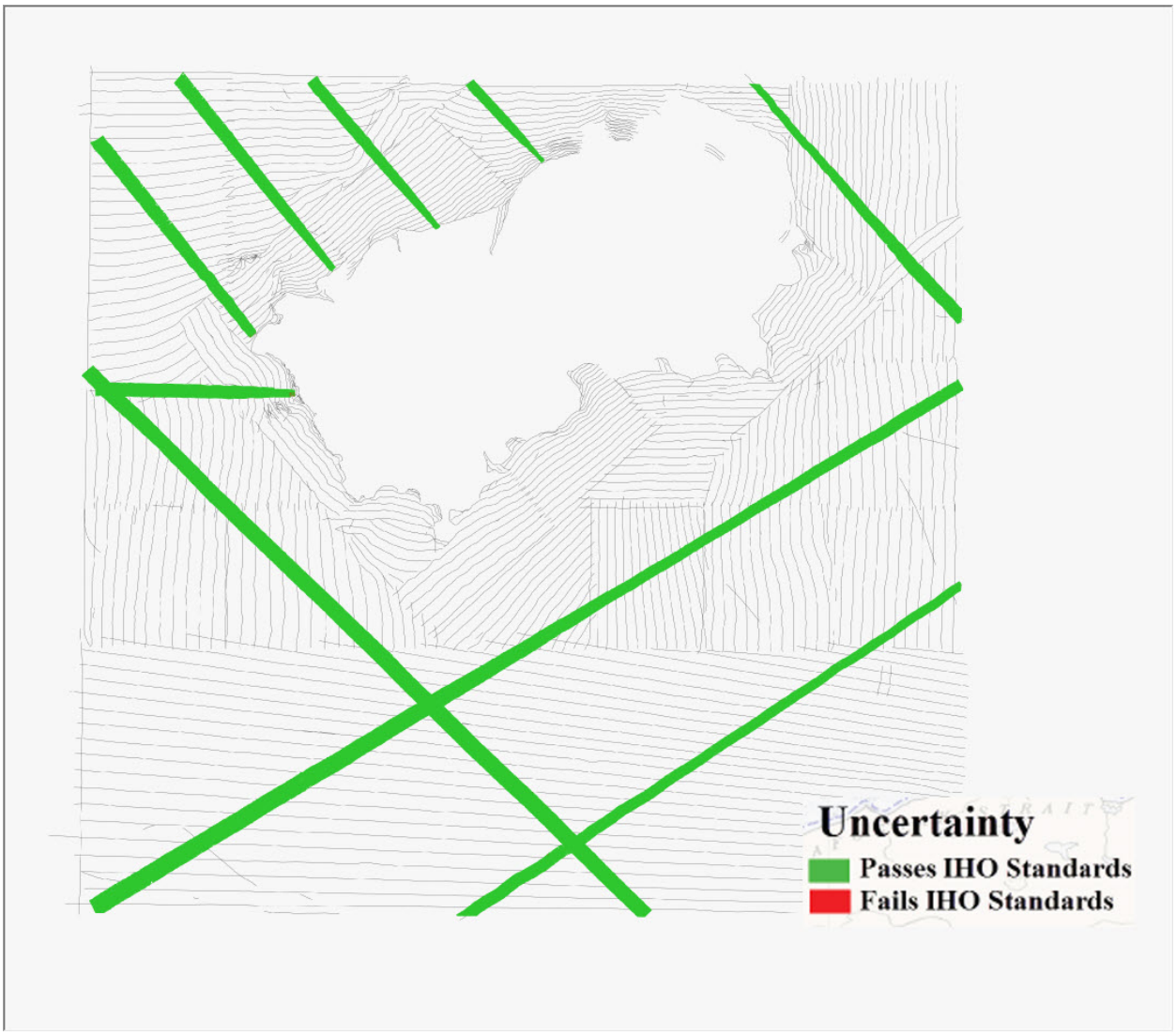


Figure 12: Depth differences between H12593 mainscheme and crossline data as compared to allowable IHO accuracy standards for the associated depths. Mainscheme tracklines shown in gray.

Depth range	IHO Order	Number of nodes	Nodes satisfying IHO accuracy	Percent nodes satisfying IHO accuracy
Less than 100m	Order 1	743,507	743,500	100.0%

Figure 13: Summary table indicating percentage of difference surface nodes between H12593 mainscheme and crossline data that meet allowable IHO accuracy standards for associated depths.
IHO accuracy has been met however reported values in DR have been rounded and provide a inaccurate accounting.

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 H12593 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 finalized grids were calculated in CARIS using the "Greater of the Two" of uncertainty and standard deviation (scaled to 95%). To visualize the locations where 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 14). In order 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 15). Overall, 100.0% by node and 100.0% by area of survey H12593 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 H12593. Real-time uncertainties from both the EM710 and Reson 7125 multibeam echosounders were recorded then applied in post-processing. Applanix TrueHeave files were also recorded on all survey vessels, which include estimates of heave uncertainty and are applied during post-processing. Finally, the post-processed uncertainties associated with vessel roll, pitch, yaw and navigation are applied in CARIS HIPS via SBET RMS files generated in POSPac.

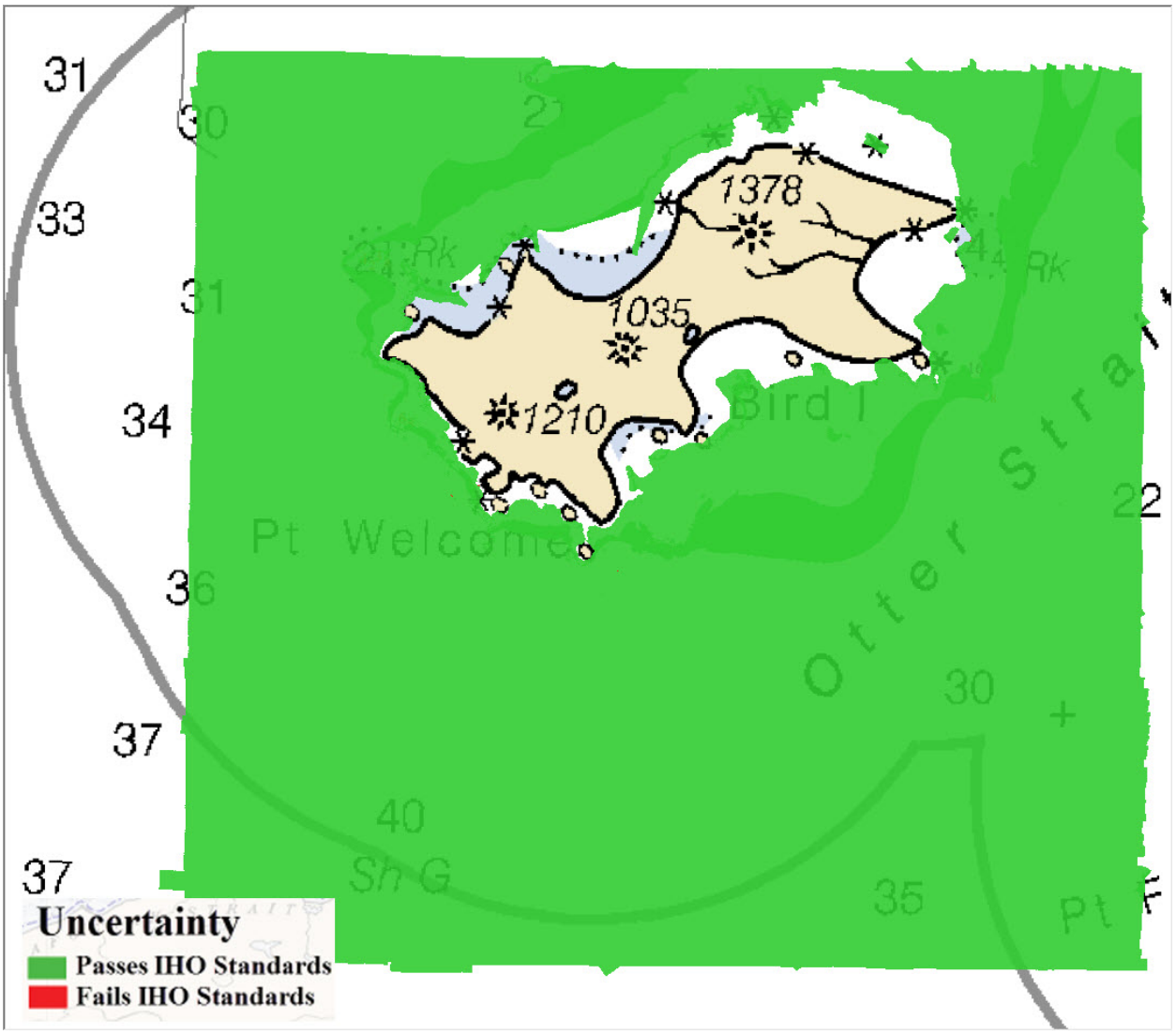


Figure 14: H12593 predicted IHO compliance layer.

Resolution	Depth range	IHO Order	Number of nodes	Nodes satisfying IHO accuracy	Percent nodes satisfying IHO accuracy
1m	0 - 20m	Order 1	2,219,088	2,218,983	100.0%
2m	18 - 40m	Order 1	7,181,695	7,181,495	100.0%
4m	36 - 80m	Order 1	8,540,950	8,540,894	100.0%
		TOTAL:	17,941,733	17,941,372	100.0%
		TOTAL (by area):	167,601,068	167,599,267	100.0%

Figure 15: Summary table showing the percentage of nodes satisfying the indicated IHO accuracy level, sub-divided by the appropriate depth ranges.

Sounding density is compliant with HSSD however the reported values in DR have been rounded and provide a inaccurate accounting. Density percentages calculated via Pydro are as follows: 1m = 99.47%, 2m = 99.93%, 4m= 99.98%

B.2.3 Junctions

Five junction comparisons were made for H12593 (Figure 16). Three of these junctions (H12591, H12592, H12594) were contemporary surveys conducted as part of the same project, OPR-P183-RA-13. H12489 is a 2005 multibeam survey conducted by NOAA ship FAIRWEATHER; H12101 is a 2009 TENIX lidar survey. Depth comparisons were performed using CARIS difference surfaces and derived statistics.

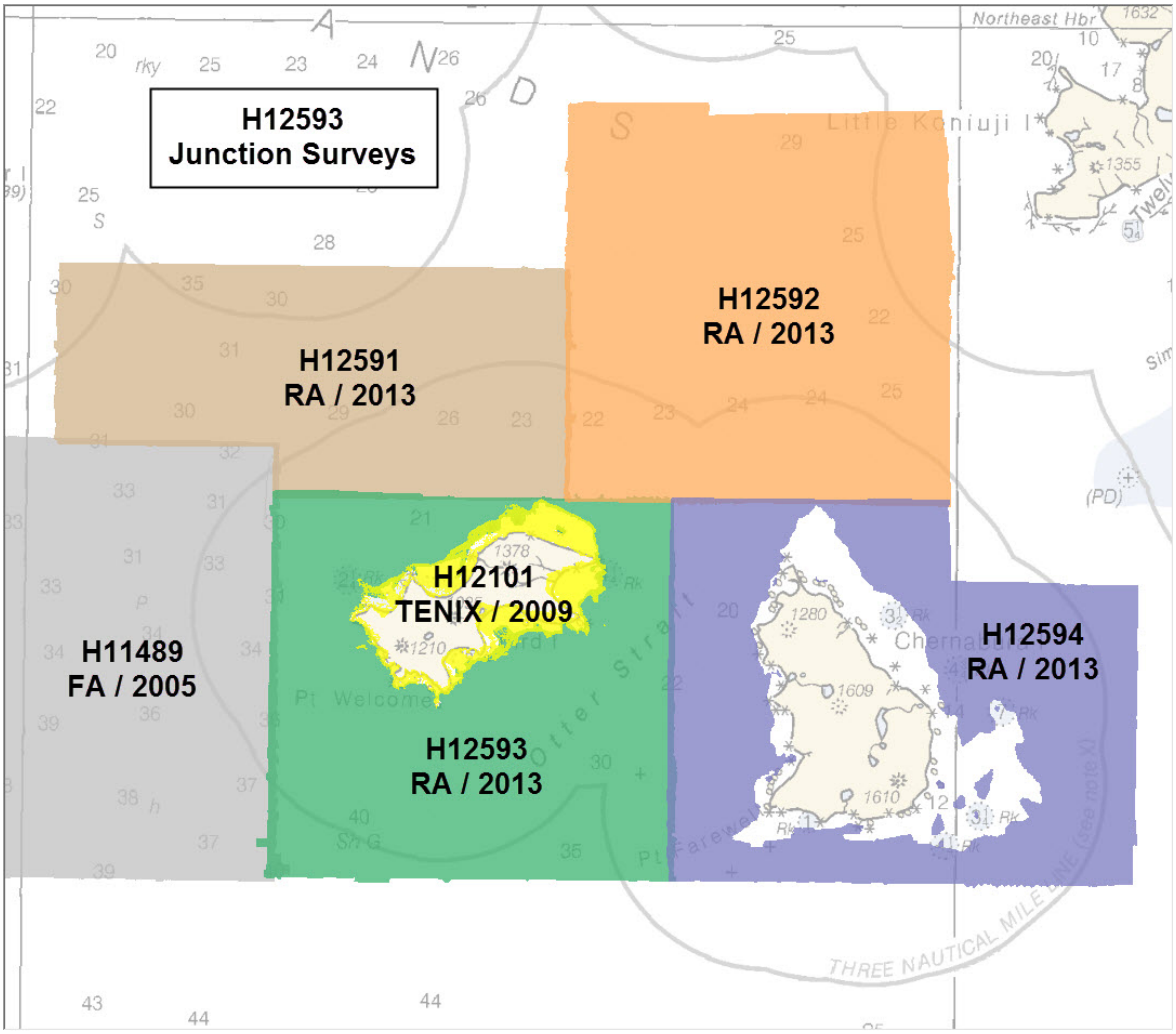


Figure 16: H12593 junction surveys overview.

The following junctions were made with this survey:

Registry Number	Scale	Year	Field Unit	Relative Location
H11489	1:20000	2005	NOAA Ship FAIRWEATHER	W
H12101	1:10000	2009	TENIX	NW
H12591	1:40000	2013	NOAA Ship RAINIER	NW
H12592	1:40000	2013	NOAA Ship RAINIER	NE
H12594	1:40000	2013	NOAA Ship RAINIER	E

H11489

The overlap with survey H11489 averaged approximately 250 meters wide along the western boundary of H12593 (Figure 17). A comparison was made using a difference surface derived from the H11489 5-meter combined surface provided with the Project Instructions and the H12593 4-meter CUBE surface. A pronounced east/west systematic artifact is apparent in the H11489 surface which coincides with obvious color banding in the difference surface. The color banding reflects the increasing and decreasing difference values between the two surveys. Analysis of the difference surface revealed that H12593 was an average of 0.08 meters shoaler than H11489 with a standard deviation of 0.27 meters (Figure 18). This is within allowable IHO Order 1 accuracy standards at these depths.

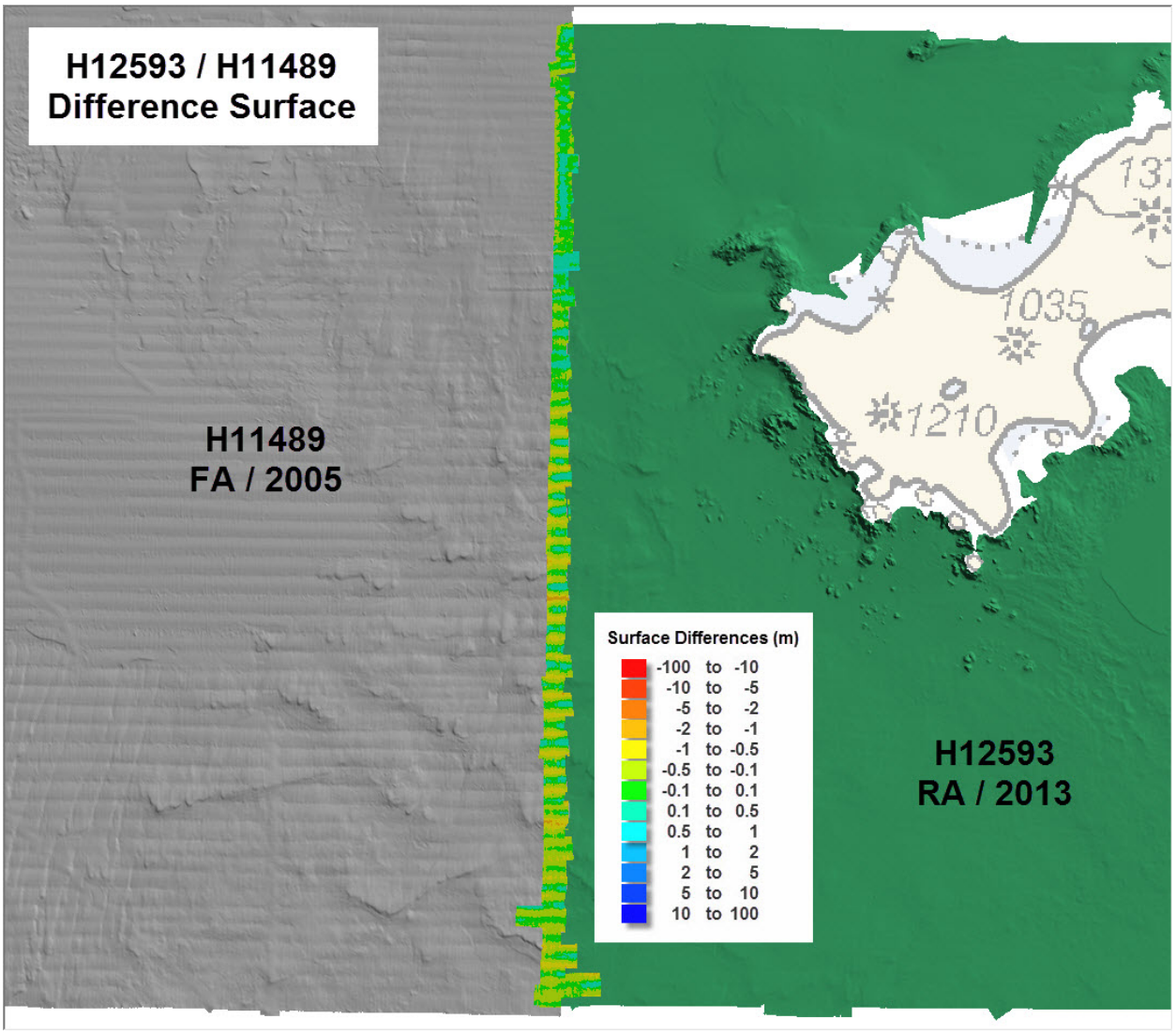


Figure 17: Junction H12593 / H11489 difference surface.

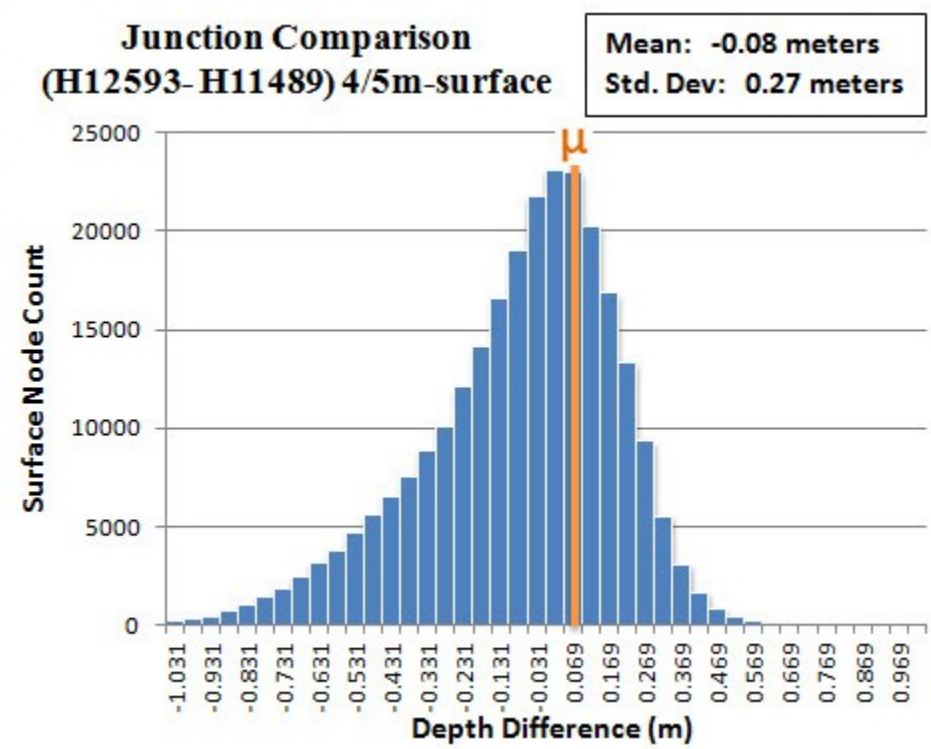


Figure 18: Difference surface statistics between H12593 and H11489 depth layers. H12593 is an average of 0.08 meters shoaler.

H12101

The overlap with lidar survey H12101 is approximately 100 to 300 meters wide around the perimeter of Bird Island (Figure 19). A comparison was made using a difference surface derived from the H12101 5-meter BASE surface provided with the Project Instructions and the H12593 4-meter surface. Analysis of the difference surface revealed that H12593 was an average of 0.10 meters shoaler than lidar survey H12101 with a standard deviation of 0.61 meters (Figure 20). This is within allowable IHO Order 1 accuracy standards at these depths. The greatest differences (orange and red on the difference surface) coincided with areas of high seafloor relief.

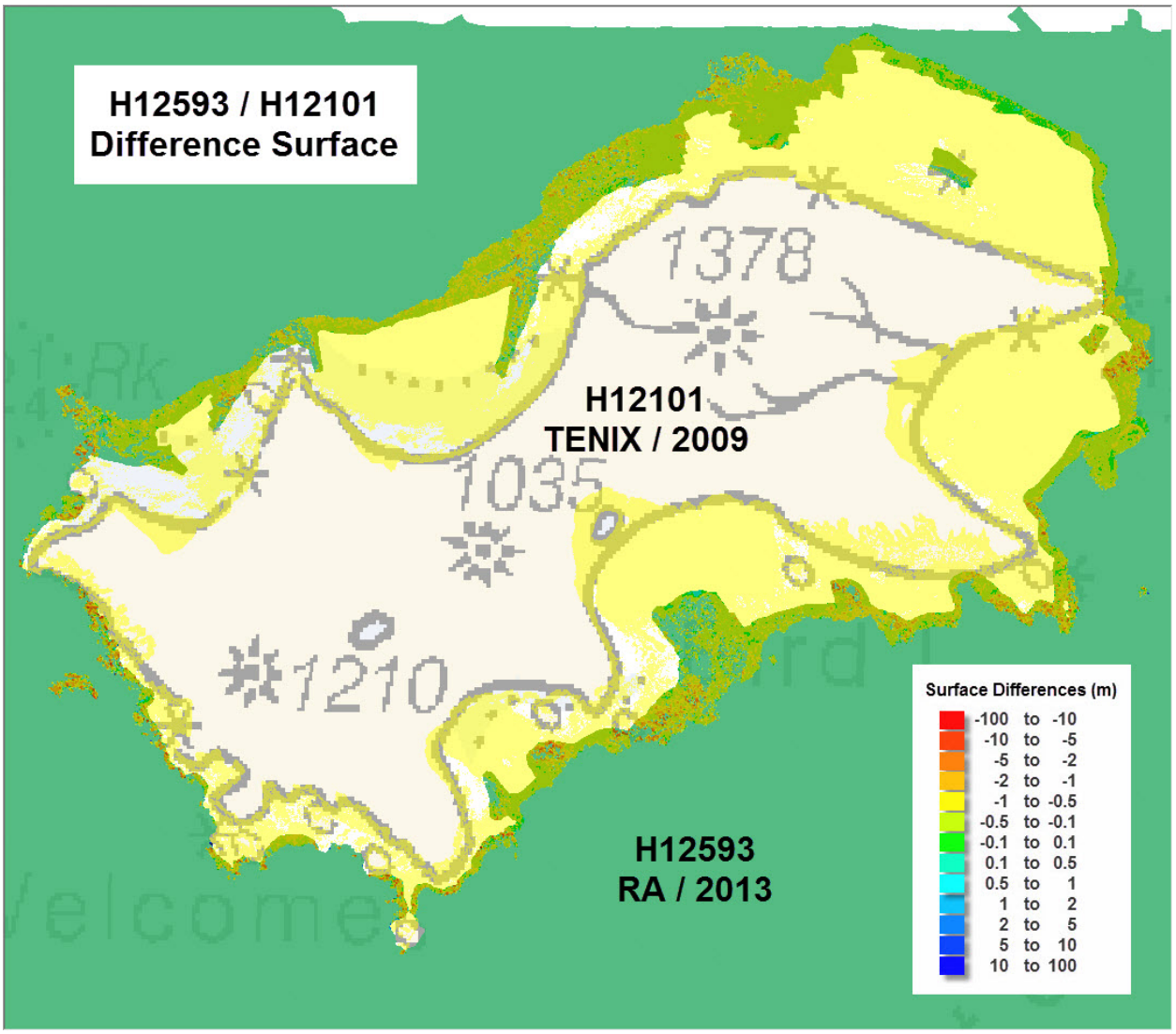


Figure 19: Junction H12593 / H12101 difference surface.

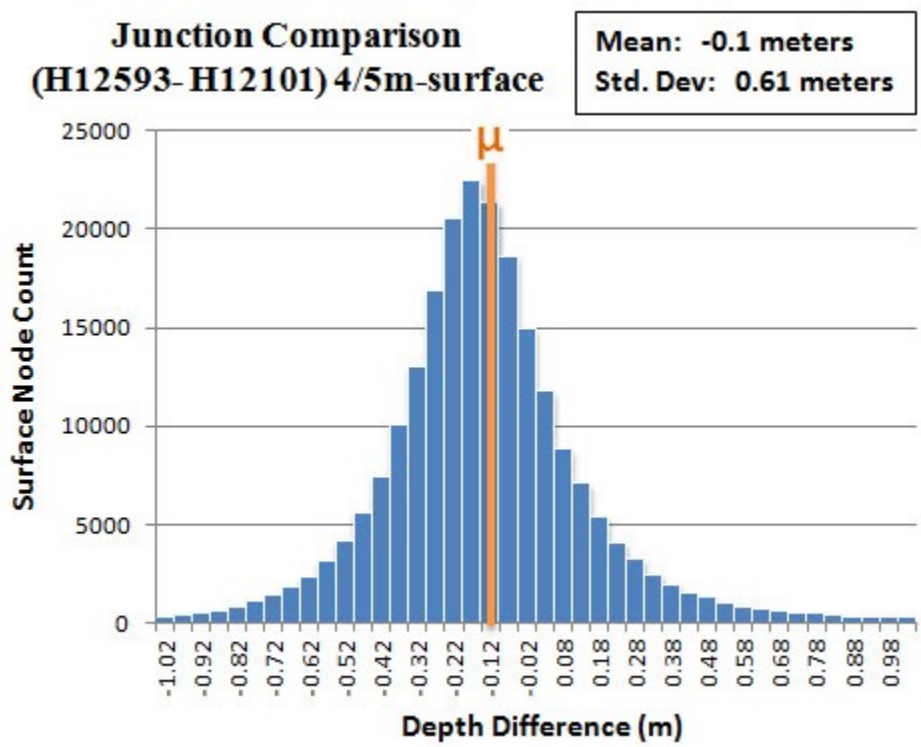


Figure 20: Difference surface statistics between H12593 and H12101 depth layers. H12593 is an average of 0.10 meters shoaler.

Larger depth differences between surveys are expected in deep areas and areas with steep topography. The data is adequate for charting.

H12591

The overlap with survey H12591 is approximately 100-200 meters wide along the northwest boundary of H12593 (Figure 21). A comparison was made using a difference surface derived from the 4-meter BASE surfaces of each survey. Analysis of the difference surface indicated that H12593 is an average of 0.06 meters deeper than H12591 with a standard deviation of 0.12 meters (Figure 22). This is within allowable IHO Order 1 accuracy standards at these depths. The one area showing larger difference values (red) near the center of the surface, coincides with a rocky outcrop with high relief.

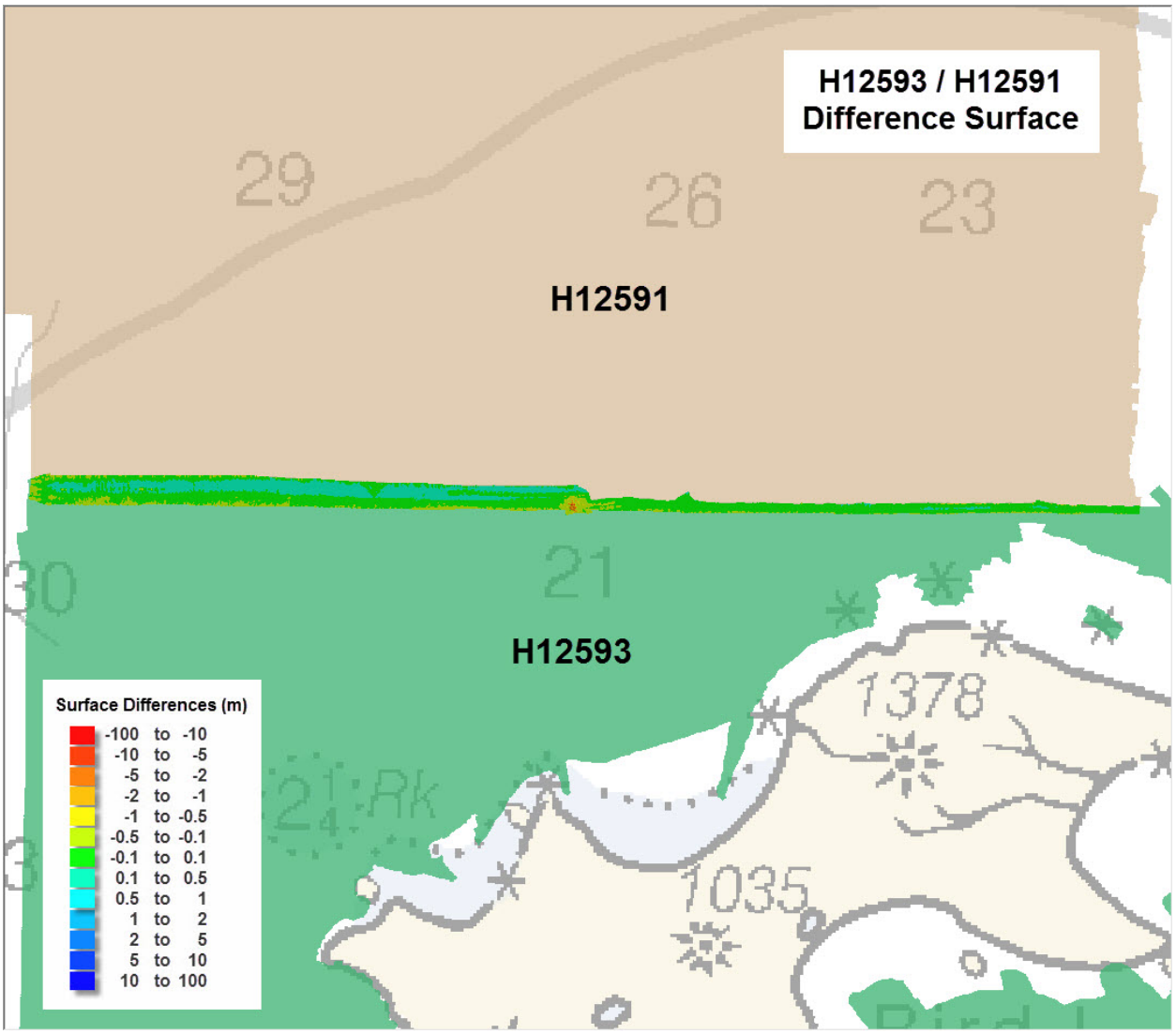


Figure 21: Junction H12593 / H12591 difference surface.

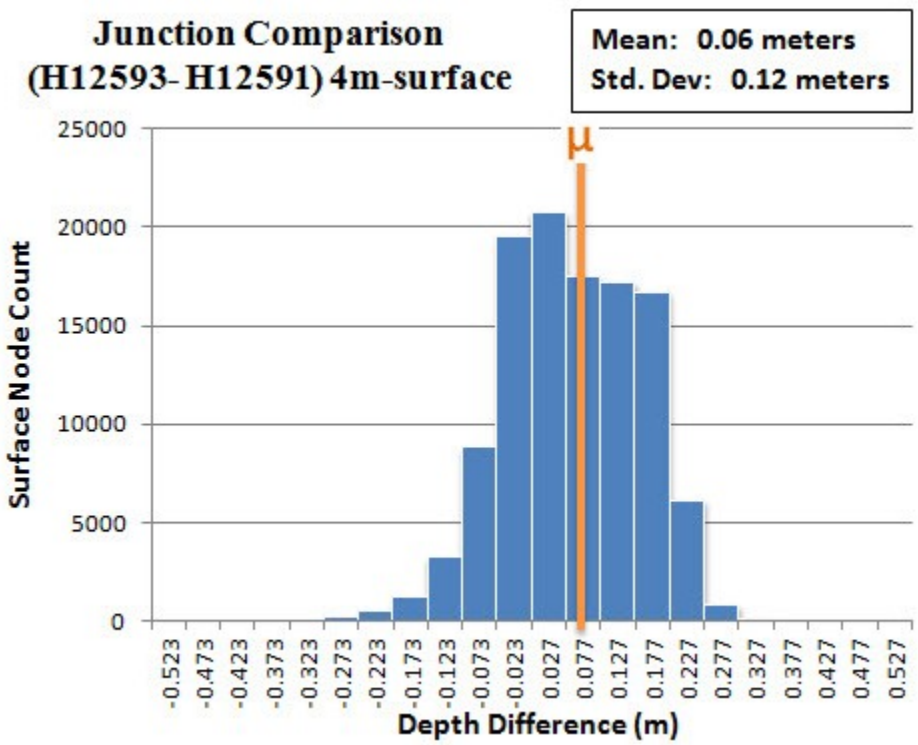


Figure 22: Difference surface statistics between H12593 and H12591 depth layers. H12593 is an average of 0.06 meters deeper.

Larger depth differences between surveys are expected in deep areas and areas with steep topography. The data is adequate for charting.

H12592

The overlap with survey H12592 is approximately 100 meters wide along the northeast boundary of H12593 (Figure 23). A comparison was made using a difference surface derived from the 4-meter BASE surfaces of each survey. Analysis of the difference surface indicated that H12593 is an average of 0.05 meters deeper than H12592 with a standard deviation of 0.09 meters (Figure 24). This is within allowable IHO Order 1 accuracy standards at these depths.

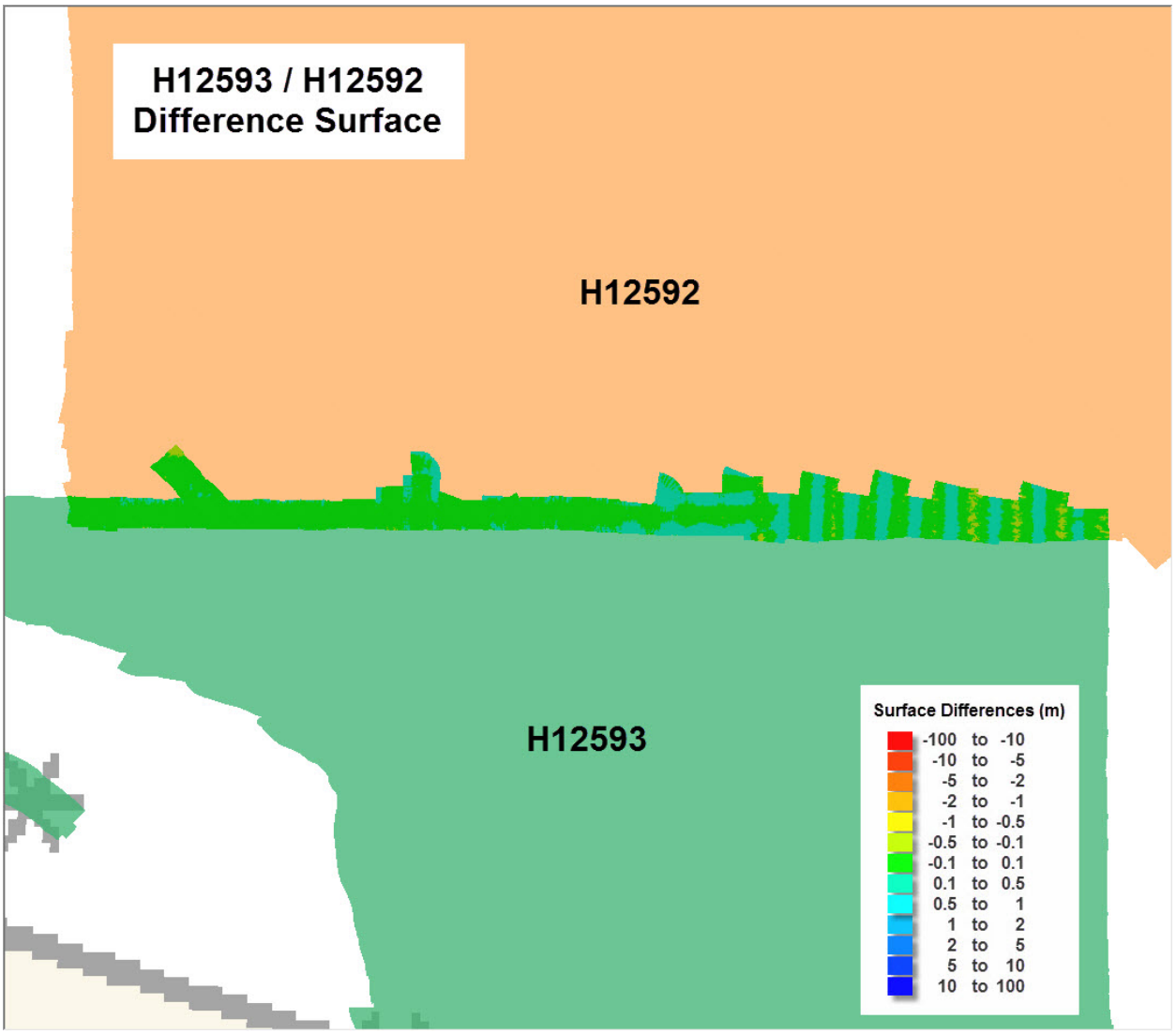


Figure 23: Junction H12593 / H12592 difference surface.

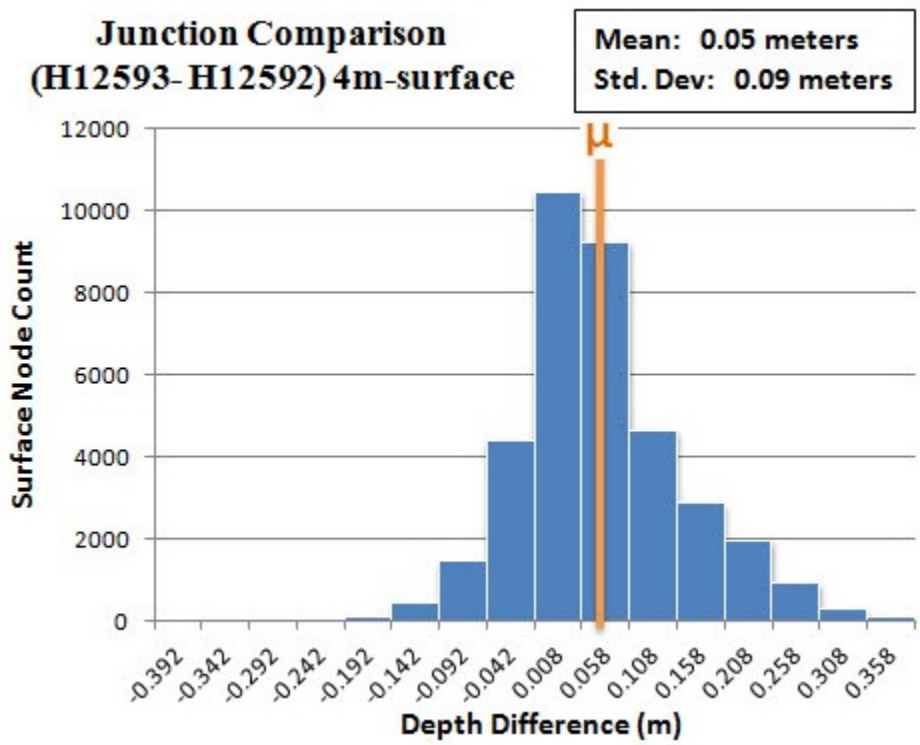


Figure 24: Difference surface statistics between H12593 and H12592 depth layers. H12593 is an average of 0.05 meters deeper.

H12594

The overlap with survey H12594 is approximately 150 meters wide along the eastern boundary of H12593 (Figure 25). A comparison was made using a difference surface derived from the 4-meter BASE surfaces of each survey. Analysis of the difference surface indicated that H12593 is an average of 0.04 meters deeper than H12594 with a standard deviation of 0.10 meters (Figure 26). This is within allowable IHO Order 1 accuracy standards at these depths.

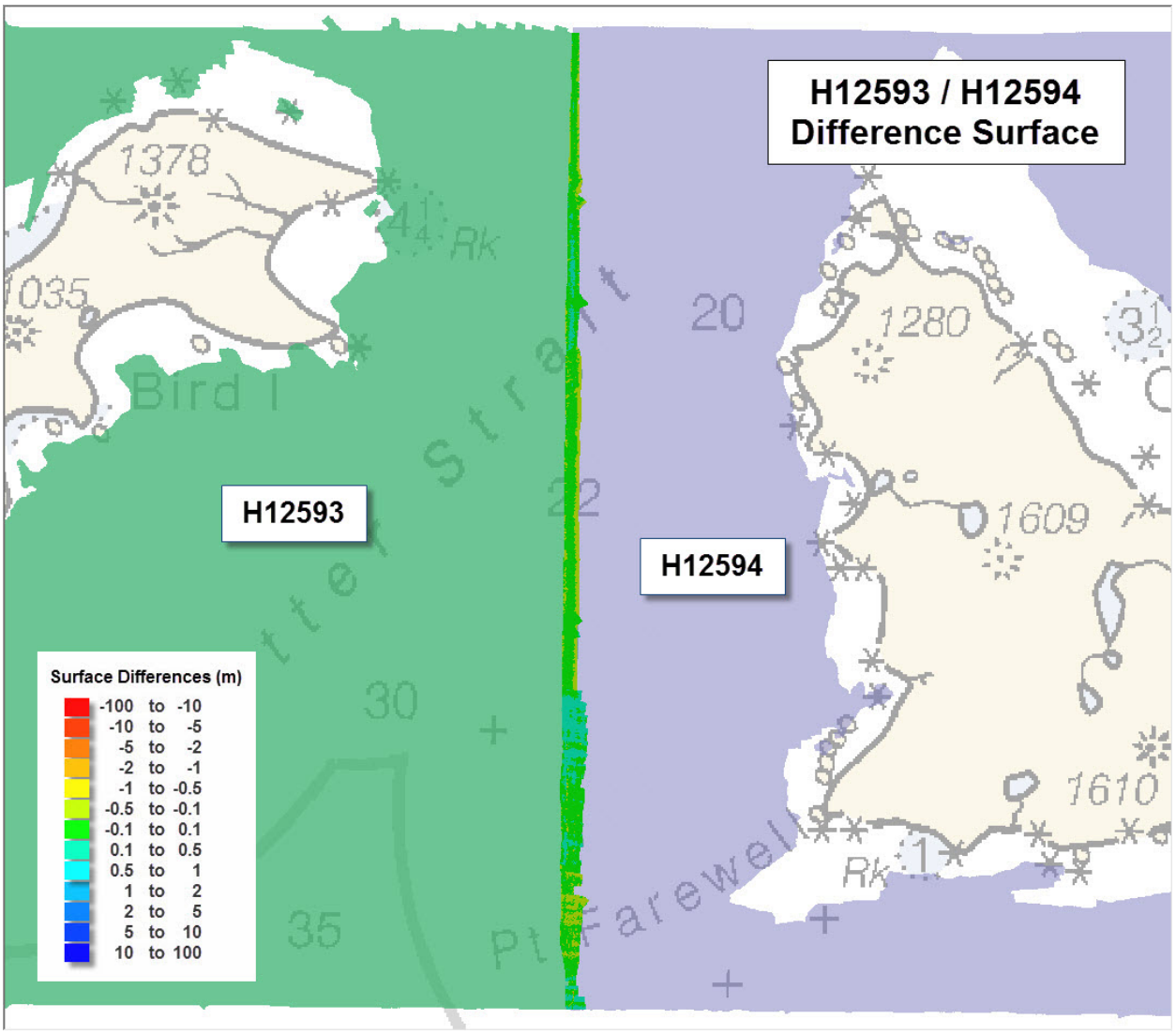


Figure 25: Junction H12593 / H12594 difference surface.

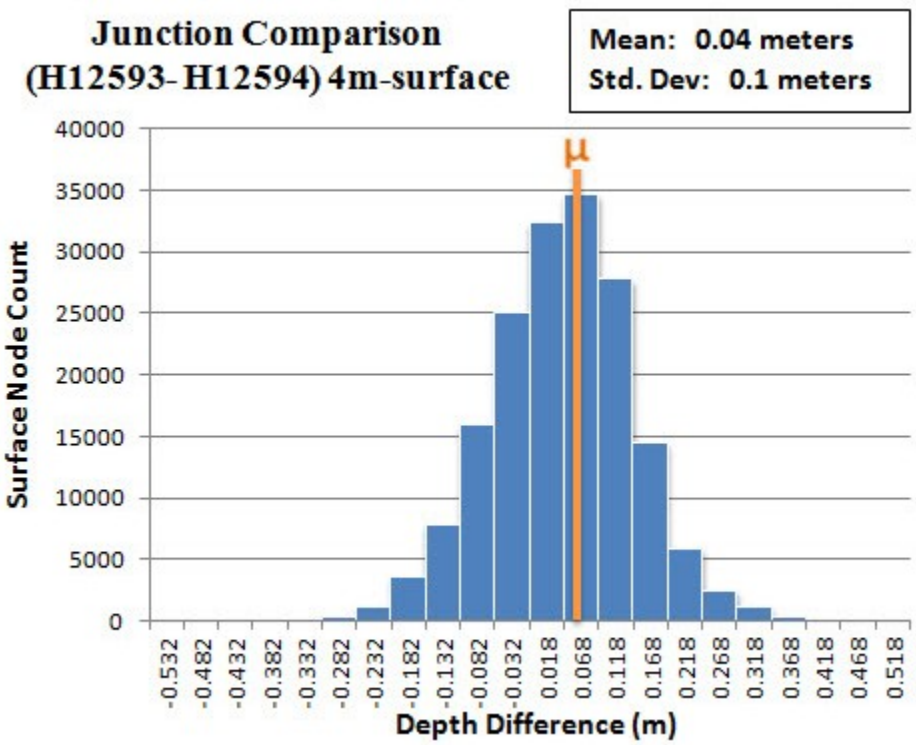


Figure 26: Difference surface statistics between H12593 and H12594 depth layers. H12593 is an average of 0.04 meters deeper.

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

Suboptimal Sound Speed Correction

Due to variations in the water column, thermal layering, tidal influence and other related factors, a distinct demarcation of water masses was sometimes observed in the field. This proved problematic in the acquisition and application of sound speed correction data. Despite the best efforts of the hydrographers to conduct sufficient sound speed casts distributed both spatially and temporally, in some areas sound speed data correction was suboptimal. Some data exhibits upward or downward deflection ("smiles" or "frowns") when viewed in CARIS 2D subset editor, indicating inaccurate sound speed correction. As a result, sound speed related artifacts can be found in the submitted BASE surfaces (Figure 27). All examined sound speed related offsets were observed to be within IHO order 1 tolerance. To address these issues, the Hydrographer

rejected outer beam soundings obviously in error in an attempt to produce surfaces that best represent the seafloor. An example of suboptimal sound speed data correction resulting in outer-beam deflection of approximately 0.15 - 0.20 meters is shown below (Figure 28).

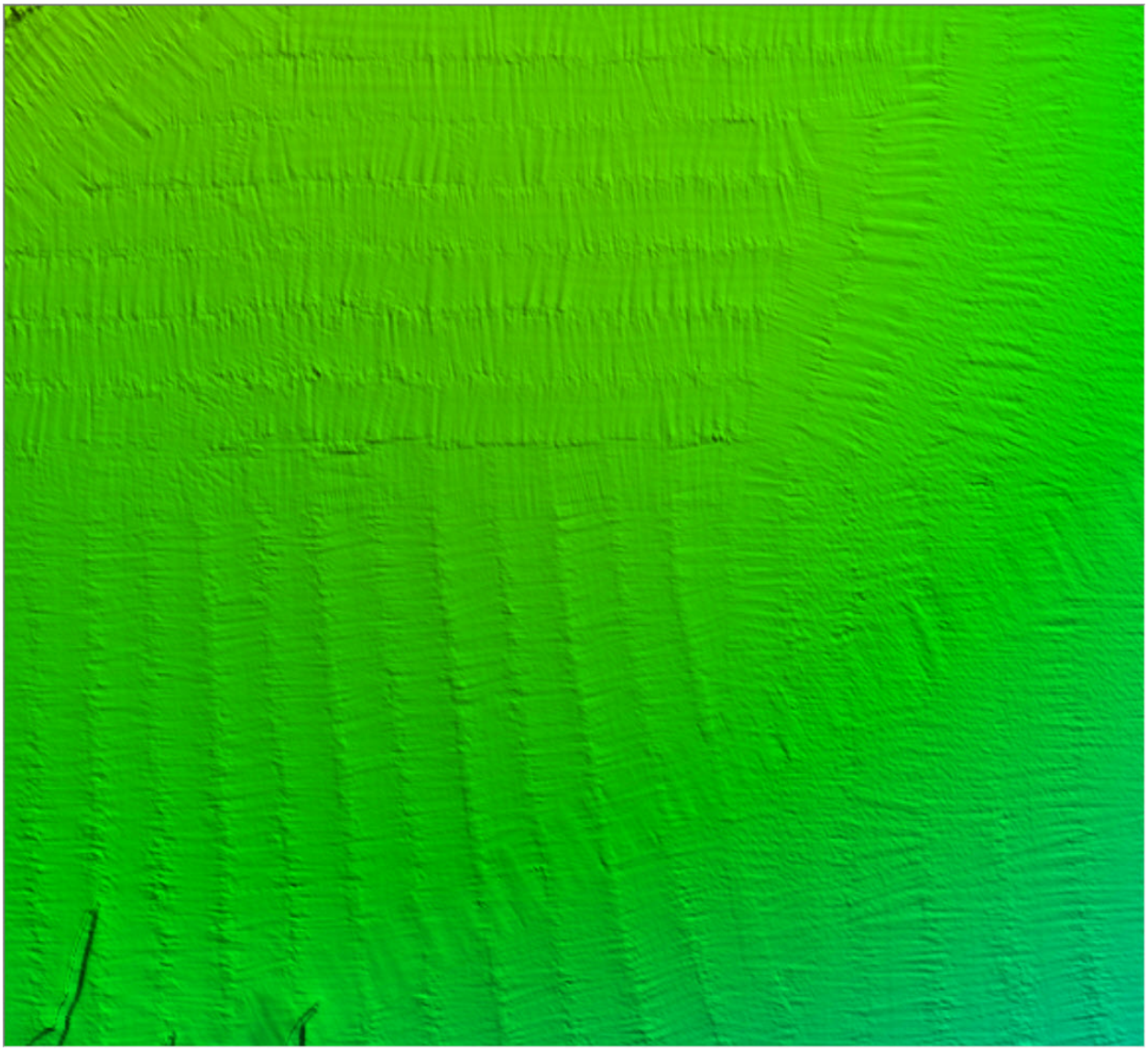


Figure 27: Example of sound speed related data artifact (surface vertical exaggeration = 30).

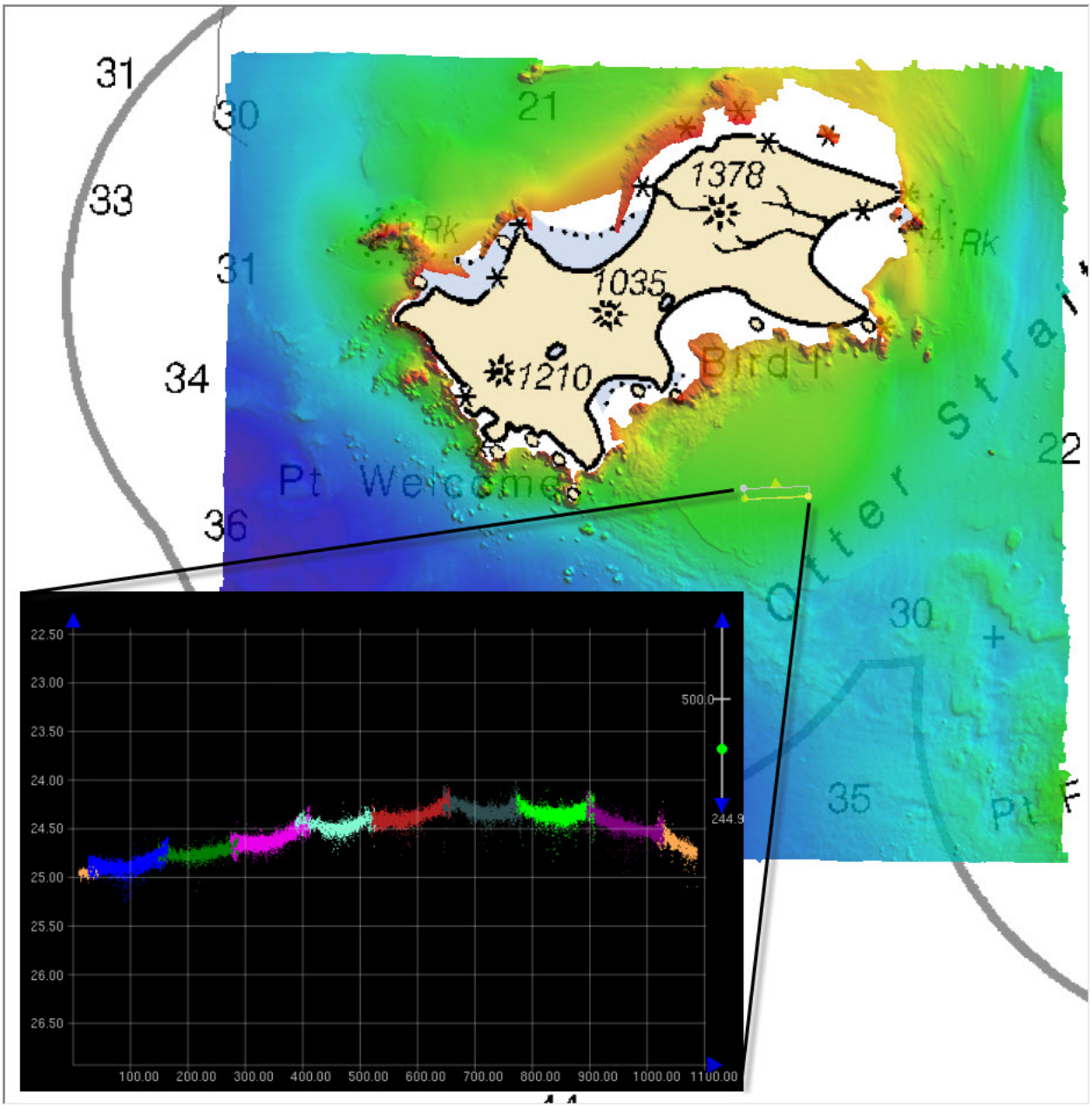


Figure 28: Example of suboptimal sound speed correction. Outer-beam upward deflection approximately 0.15 to 0.20 meters.

After rejecting data to mitigate the effects of the sound speed artifacts, the data is adequate for charting.

Ellipsoid to Tidal Surface Comparison

As a QC tool, an ERS to MLLW difference surface was created to identify potential systematic artifacts. H12593 data was referenced to the ellipse using GPS height determined from SBET files, then gridded in CARIS. By differencing the ellipsoid-referenced surface (ERS) from the traditional tidal-referenced MLLW surface, one should only see the ellipsoidal slope across the extent of the survey. Any deviations from this slope would therefore be the result of errors intrinsic to either the ERS or to the tidal processing work flow. Examples of artifacts that can be identified by an ERS / MLLW difference surface include: misprojected

SBET files, vessel dynamic draft, incorrect waterline measurements, corrupt TrueHeave files or poorly modeled water levels.

Upon review of this surface, a northwest to southeast slope across the survey area was identified. Further investigation revealed that the EGM2008-WGS84 geoid-ellipsoid separation model published by the National Geospatial Intelligence Agency (NGA) showed a similar trend across the survey; these surfaces have a similar slope and magnitude and agree well considering the 2.5' resolution of the NGA surface and the expected differences between the geoid and MLLW (Figure 29).

Seven lines were excluded from this difference surface due to issues described in section 5.3.1 Corrections to Echo Soundings and C.3 Additional Horizontal or Vertical Control Issues.

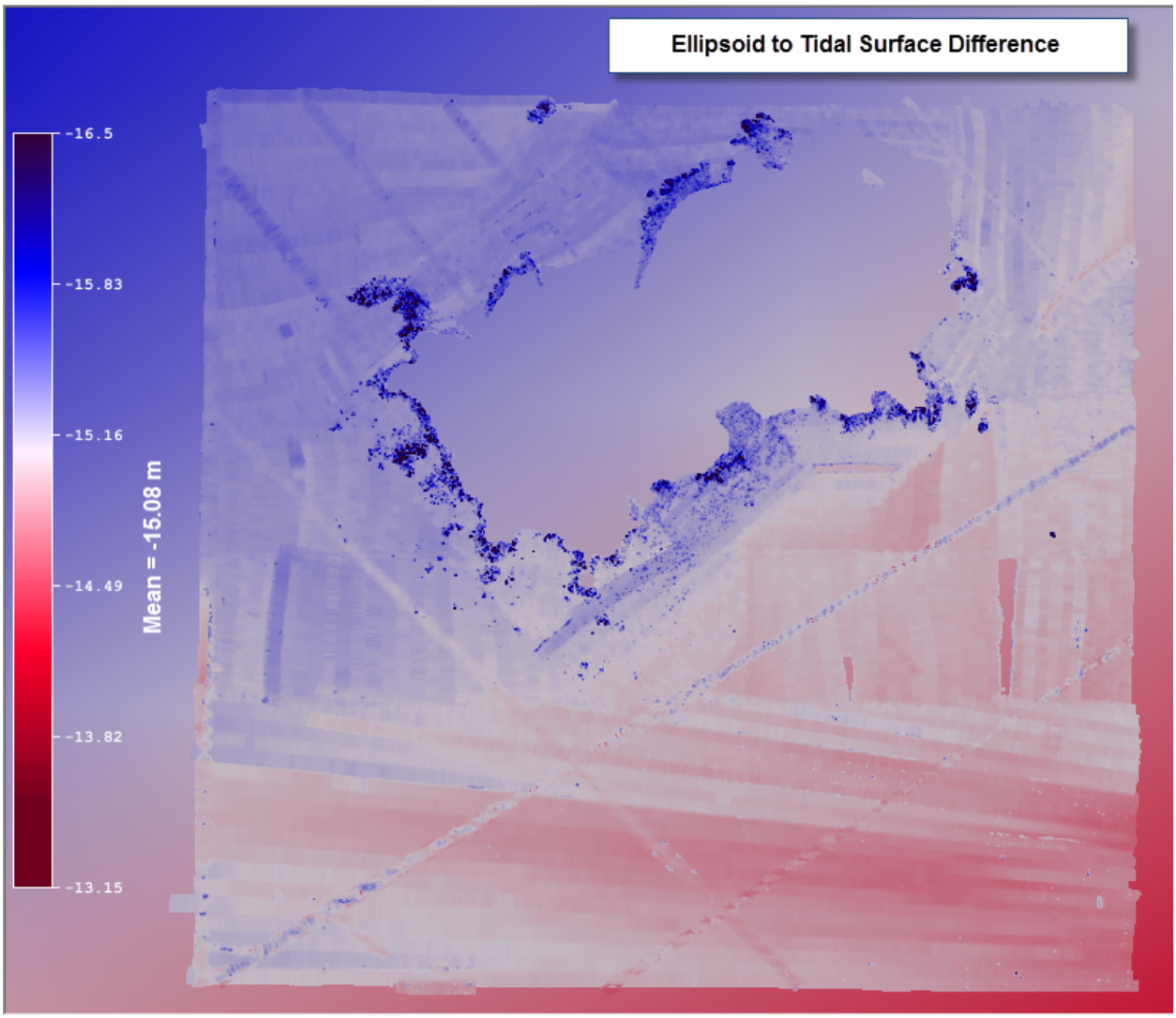


Figure 29: Difference surface between the ellipsoid-referenced and tidal-referenced surfaces. Difference surface is overlaid on the EGM2008-WGS84 geoid-ellipsoid separation model.

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

B.2.7 Sound Speed Methods

Sound Speed Cast Frequency: Sound speed profiles were acquired on RAINIER's launches using SBE 19 and 19plus CTD probes at discrete locations within the survey area at least once every four hours, when there were large changes in surface sound velocity, or when surveying in a new area. Sound speed profiles were acquired on S221 (RAINIER) using a Rolls Royce MVP200 approximately every 15 minutes or when recommended by "CastTime", a cast frequency program developed at the University of New Hampshire. All casts were concatenated into a master file and applied in CARIS using the "Nearest in distance within time (4 hours)" selection method.

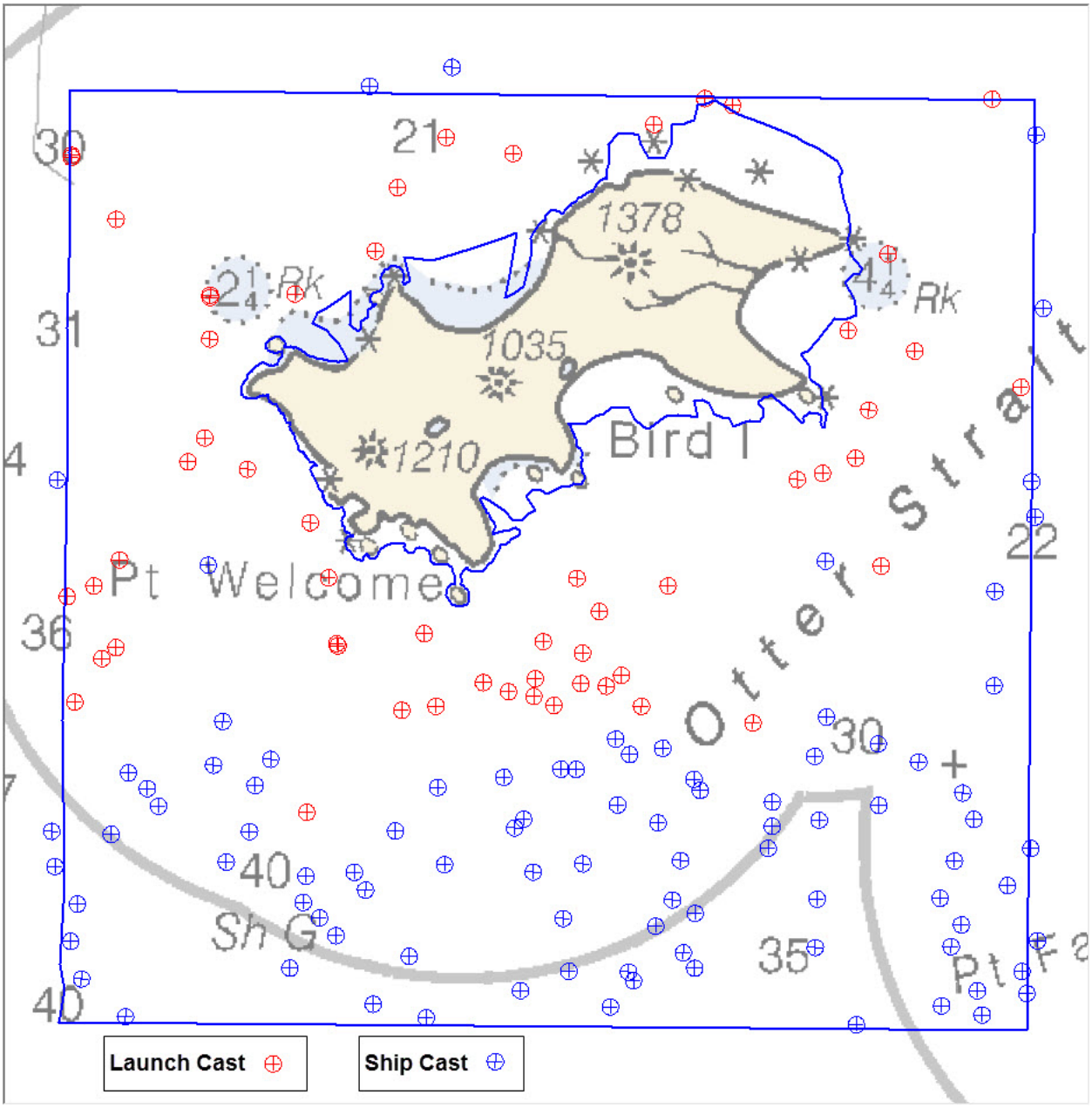


Figure 30: H12593 ship (blue) and launch (red) sound speed cast locations.

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.

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
H12593_1m	CUBE	1 meters	4 meters - 75 meters	NOAA_1m	Complete MBES
H12593_2m	CUBE	2 meters	4 meters - 75 meters	NOAA_2m	Complete MBES
H12593_4m	CUBE	4 meters	4 meters - 75 meters	NOAA_4m	Complete MBES
H12593_1m_Final	CUBE	1 meters	0 meters - 20 meters	NOAA_1m	Complete MBES
H12593_2m_final	CUBE	2 meters	18 meters -	NOAA_2m	Complete MBES

Surface Name	Surface Type	Resolution	Depth Range	Surface Parameter	Purpose
			40 meters		
H12593_4m_Final	CUBE	4 meters	36 meters - 75 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, AK	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
H12593CORF.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 11/20/2013.

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 may be found in the accompanying Horizontal and Vertical Control Report (HVCR), submitted under a 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.

<u>The following PPK methods were used for horizontal control:</u>

Single Base

Applanix POSPac software was used to produce Smoothed Best Estimate of Trajectory (SBET) files for improving positional accuracy of H12593 data. SBET files consist of GPS position and attitude data corrected and integrated with inertial measurements and reference station correctors, exported into NAD83, then applied to survey data by vessel and day.

In conjunction with this survey, a GNSS 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. Vessel kinematic data was post-processed using Applanix POSPac Single Base processing methods as described in the DAPR.

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, AK	n/a

Table 15: User Installed Base Stations

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

On days when a Single Base SBET file could not be fully processed, an Applanix derived Precise Point Positioning (PPP) SBET was processed and applied to H12593 data. A PPP solution was used for 16 lines (0002 - 0122) from launch 2803 on DN200, and for one line (0007) from S221 on DN198.

Data processed using PPP is adequate for charting.

Differential Global Positioning System (DGPS) correctors were used for horizontal control when the post processing methods described above were not possible due to non-overlapping time extents. DGPS correction was used for the following lines: 2801_2013RA2010002, 2802_2013RA2440018, 2802_2013RA2440017, 2804_2013RA2012347, 2804_2013RA2012337, 2804_2013RA2012349, 2804_2013RA2010002.

The following DGPS Stations were used for horizontal control:

DGPS Stations
Cold Bay, AK - 289 kHz
Kodiak, AK - 313 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 Lines without SBET files applied

SBET data could not be applied to the following lines due to non-overlapping time extents: 2801_2013RA2010002, 2802_2013RA2440018, 2802_2013RA2440017, 2804_2013RA2012347, 2804_2013RA2012337, 2804_2013RA2012349, 2804_2013RA2010002. DGPS correction was used for positioning of these lines.

3.3.2 Lines without TrueHeave applied

True Heave could not be applied to line 2802_2013RA2012016. Real-time Heave is applied and the line shows adequate agreement with adjacent data.

Line 2802_2013RA2012016 has true heave applied (2013_201_2802.000.fixed)

D. Results and Recommendations

D.1 Chart Comparison

A comparison was made between H12593 survey data and chart 16540 using CARIS BASE surfaces and selected soundings. Details may be found below and in the H12593 Final Feature File submitted with this report.

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	10/26/2013

Table 17: Largest Scale Raster Charts

16540

At the time of this survey, Chart 16540 included very few depths, features or contours for the H12593 area. Most survey soundings either matched the chart or were within 1-3 fathoms. The one exception was located in the southeast part of the survey, where H12593 data obtained 29-30 fathom soundings over the 35-fathom charted depth. Figure 31 shows H12593 selected soundings overlaid on chart 16540. They are color-coded by depth: Red indicates soundings between 0-10 fathoms, green 10-30 fathoms and blue soundings are deeper than 30 fathoms. The Hydrographer recommends that H12593 soundings supersede all prior survey and charted depths in the common area.

Near the northeast point of Bird Island, H12593 detected a 3.9 fathom feature, slightly shoaler than the chart's 4 1/4 fathom rock (Figure 32).

Two uncharted shoal areas were discovered off the eastern shore of Bird Island (Figure 33). The 9.8 and 16.2 meter (5.3 and 8.8 fathom) shoal areas have surrounding depths of approximately 40 meters (21 fathoms).

Along the northern boundary of this survey, two uncharted shoal areas were detected (Figure 34). A 16 meter (8.7 fathom) feature was located approximately 120 meters south of H12593's northern sheet limit. A 21 meter (11 fathom) feature was located approximately 30 meters north of the boundary into junction survey H12591. Surrounding water depths are approximately 40 meters (21 fathoms).

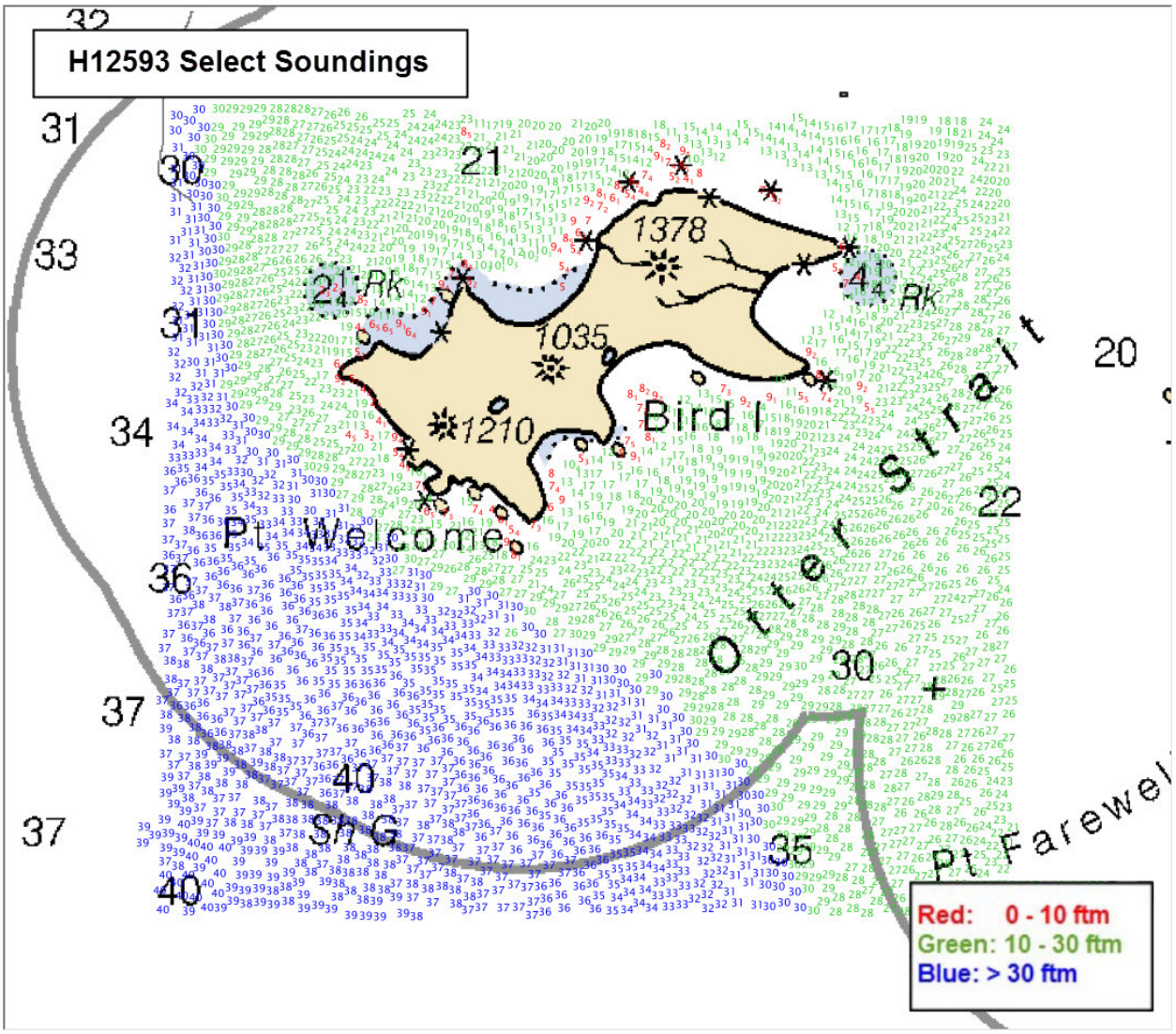


Figure 31: H12593 color-coded sounding selection.

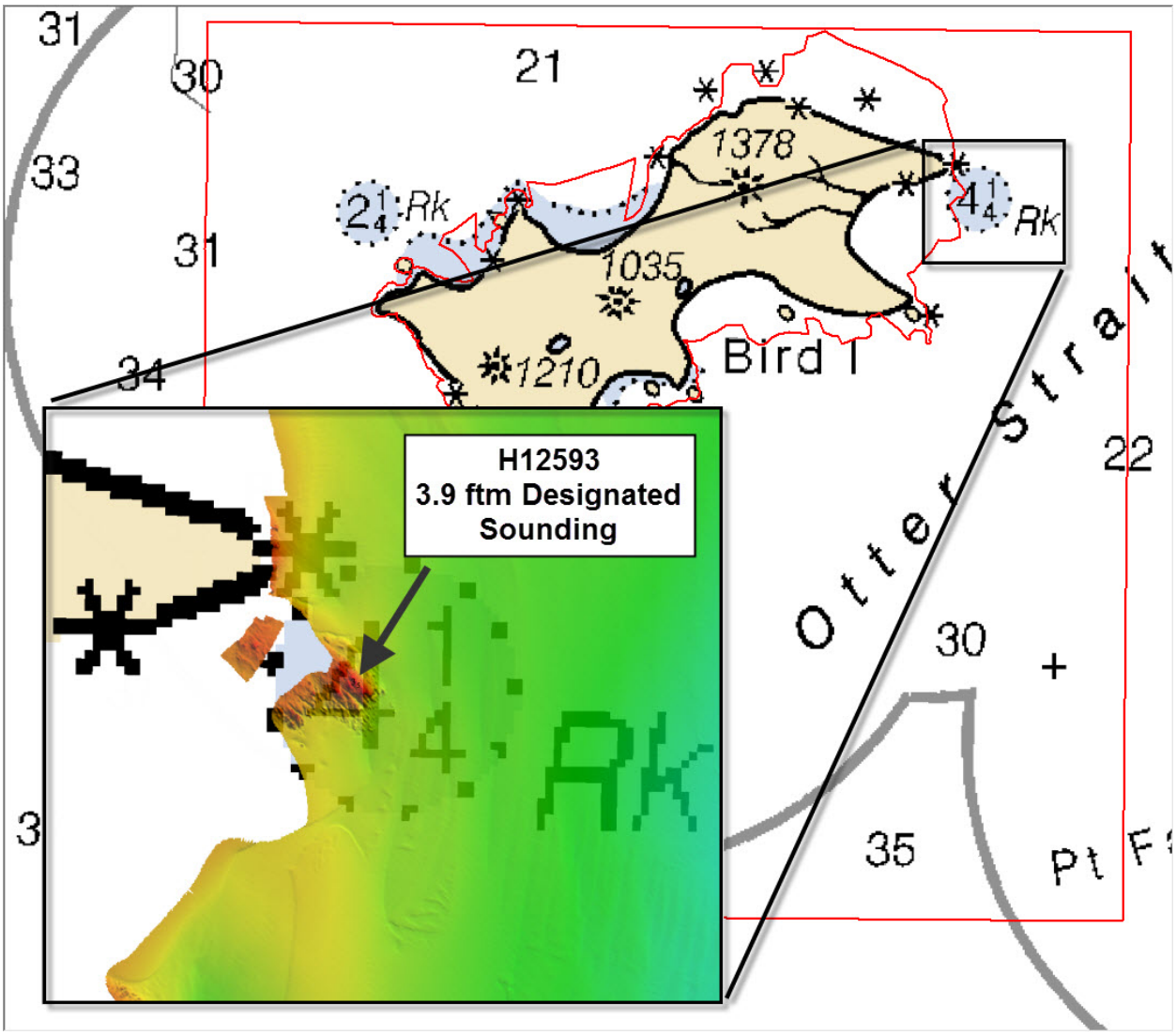


Figure 32: H12593 3.9 fathom designated sounding.

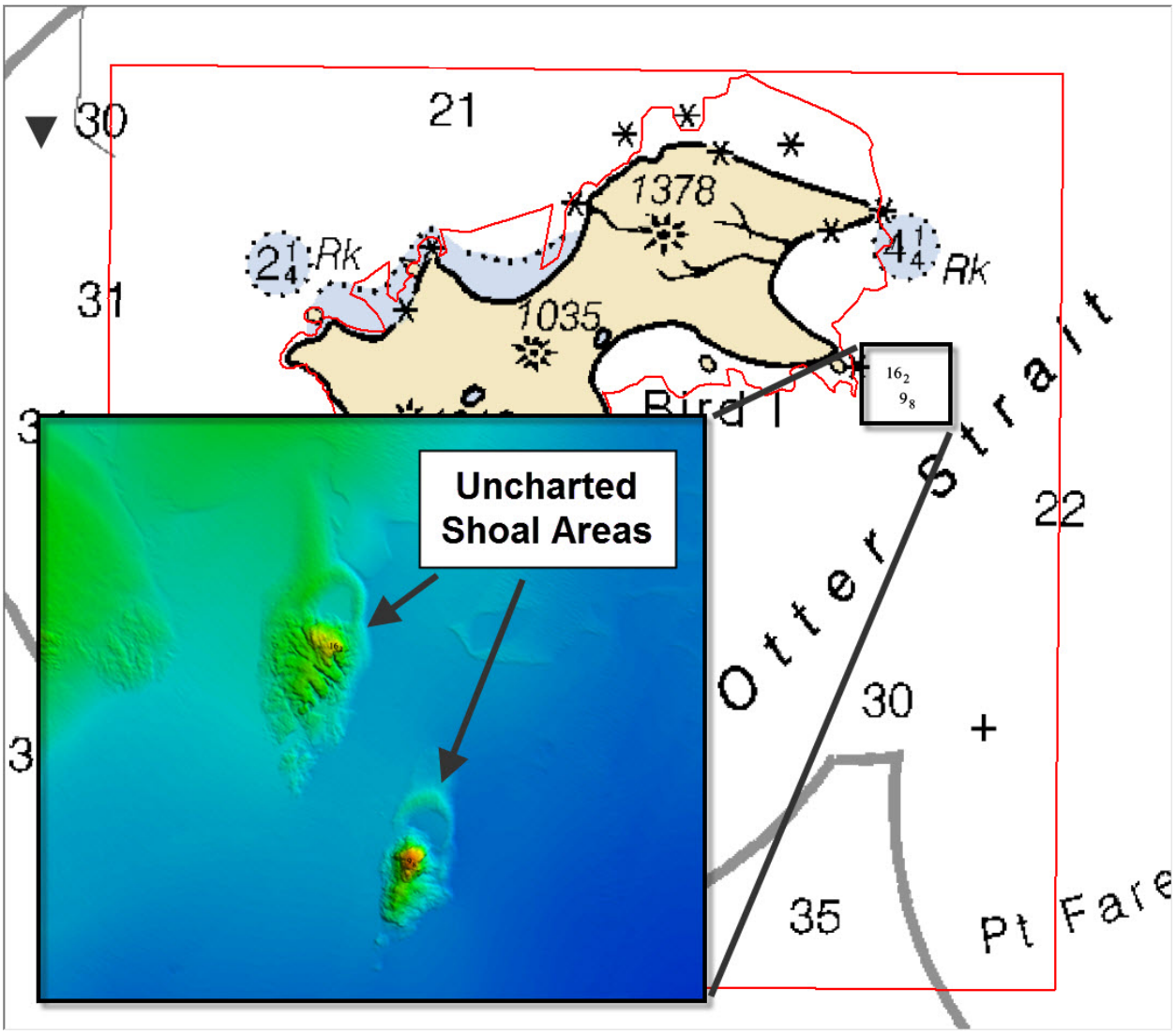


Figure 33: 9.8 and 16.2 meter (5.3 and 8.8 fathom) uncharted shoal areas. Surrounding depths approximately 40 meters (21 fathom).

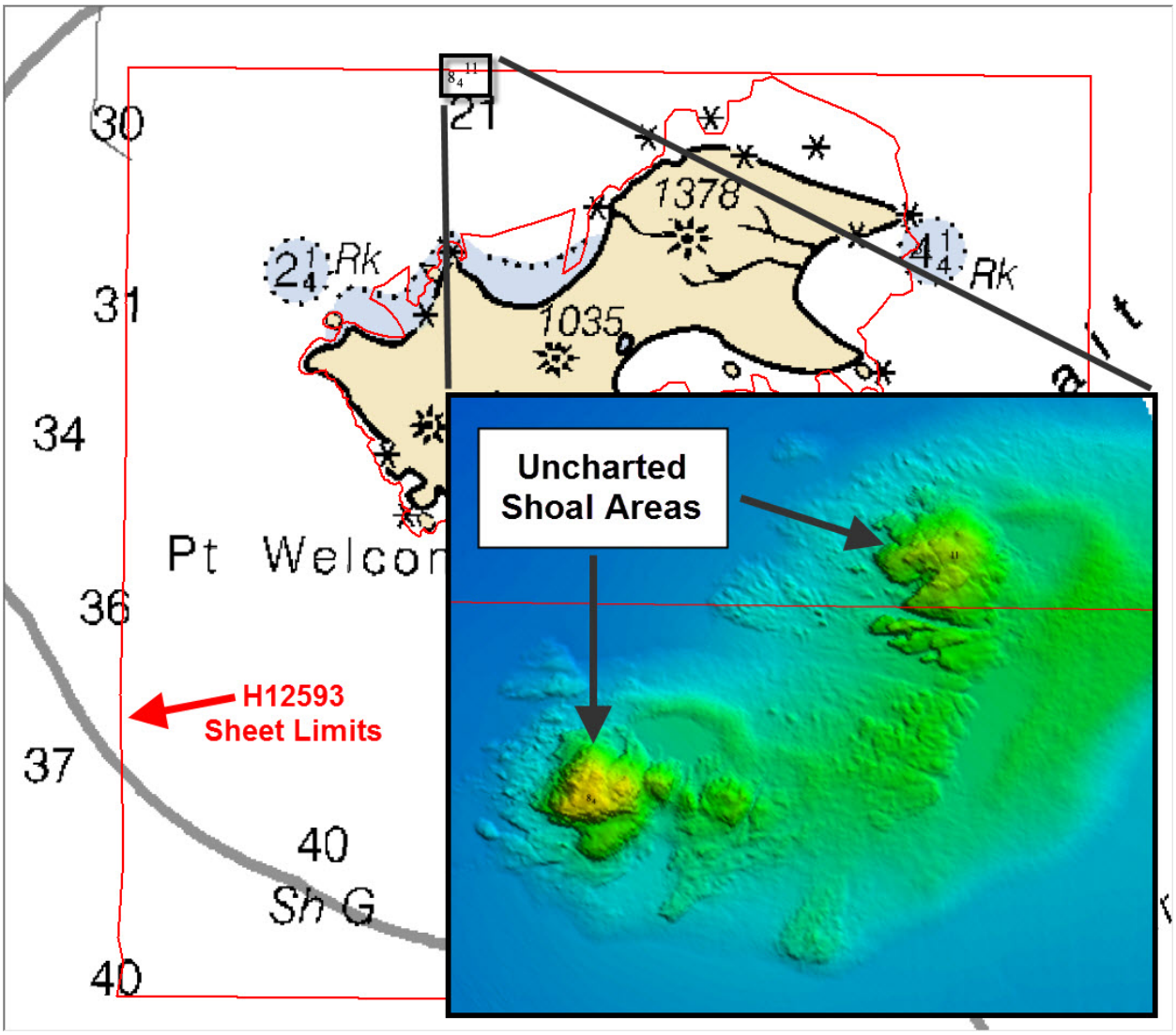


Figure 34: 16 and 21 meter (8.7 and 11 fathom) uncharted shoal areas. Surrounding depths approximately 40 meters (21 fathoms).

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	08/14/2013	NO

Table 18: Largest Scale ENCs

US3AK50M

Electronic Navigation Chart (ENC) US3AK50M coincides with raster chart 16540. Information found on the ENC matches the raster, therefore a comparison between H12593 and the ENC is equivalent to the preceding comparison with chart 16540.

During office review, a slightly shoaler point (8.5 fathom) was identified in the vicinity of the 8.7 fathom depth shown in figure 34 and is located approximately 120 meters south of the northern sheet limit. There is minor issue where the latest 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 in 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

Three maritime boundary claim items were assigned for investigation. The features were addressed in the field; findings are attributed in the H12593 Final Feature File submitted with this report.

See attached feature report. The H12593 Final Feature File was included in the hydrographic data submission and is not attached to this report.

D.1.5 Charted Features

No charted features that contain the labels PA, ED, PD or Rep exist within the survey limits.

D.1.6 Uncharted Features

All uncharted features are addressed in the Chart Comparison section of this document and in the H12593 Final Feature File submitted with this report.

The H12593 Final Feature File was included in the hydrographic data submission and is not attached to this report.

D.1.7 Dangers to Navigation

The following DTON reports were submitted to the processing branch:

DTON Report Name	Date Submitted
H12593_DTON	2013-08-07

Table 19: DTON Reports

Danger to Navigation Reports are included in Appendix II of this report.

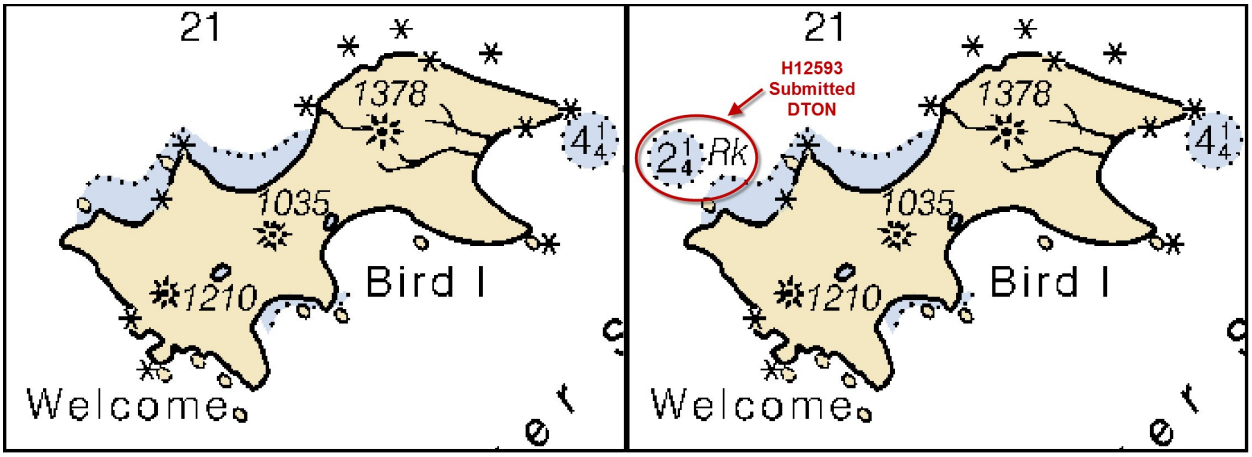


Figure 35: Chart 16540 before and after H12593 DTON submission.

One DTON was found during H12593, however, there is a second DTON that was identified during LIDAR survey H12101 that falls within the junctioning area of H12593. Both DTONs have been applied to the chart, however, shoaler depths were found for both DTONs after they were reported. It has been recommended that the shoaler depths supersede the charted depths for both DTONs. See attached DTON reports for both field submitted DTONs.

D.1.8 Shoal and Hazardous Features

Shoals and hazardous features are addressed in the Chart Comparison section of this document and in the H12593 Final Feature File submitted with this report.

The H12593 Final Feature File was included in the hydrographic data submission and is not attached to this report.

D.1.9 Channels

No channels exist for this survey. There are no designated anchorages, precautionary areas, safety fairways, traffic separation schemes, pilot boarding areas, or channel and range lines within the survey limits.

D.1.10 Bottom Samples

Five bottom samples locations were recommended for this survey. Four locations yielded samples, no sample was collected at the fifth location despite three attempts. A sixth sample was taken in a bight on the north side of Bird Island during anchoring operations (Figure 36). The results of the bottom samples are included in the H12593 Final Feature File submitted with this report.

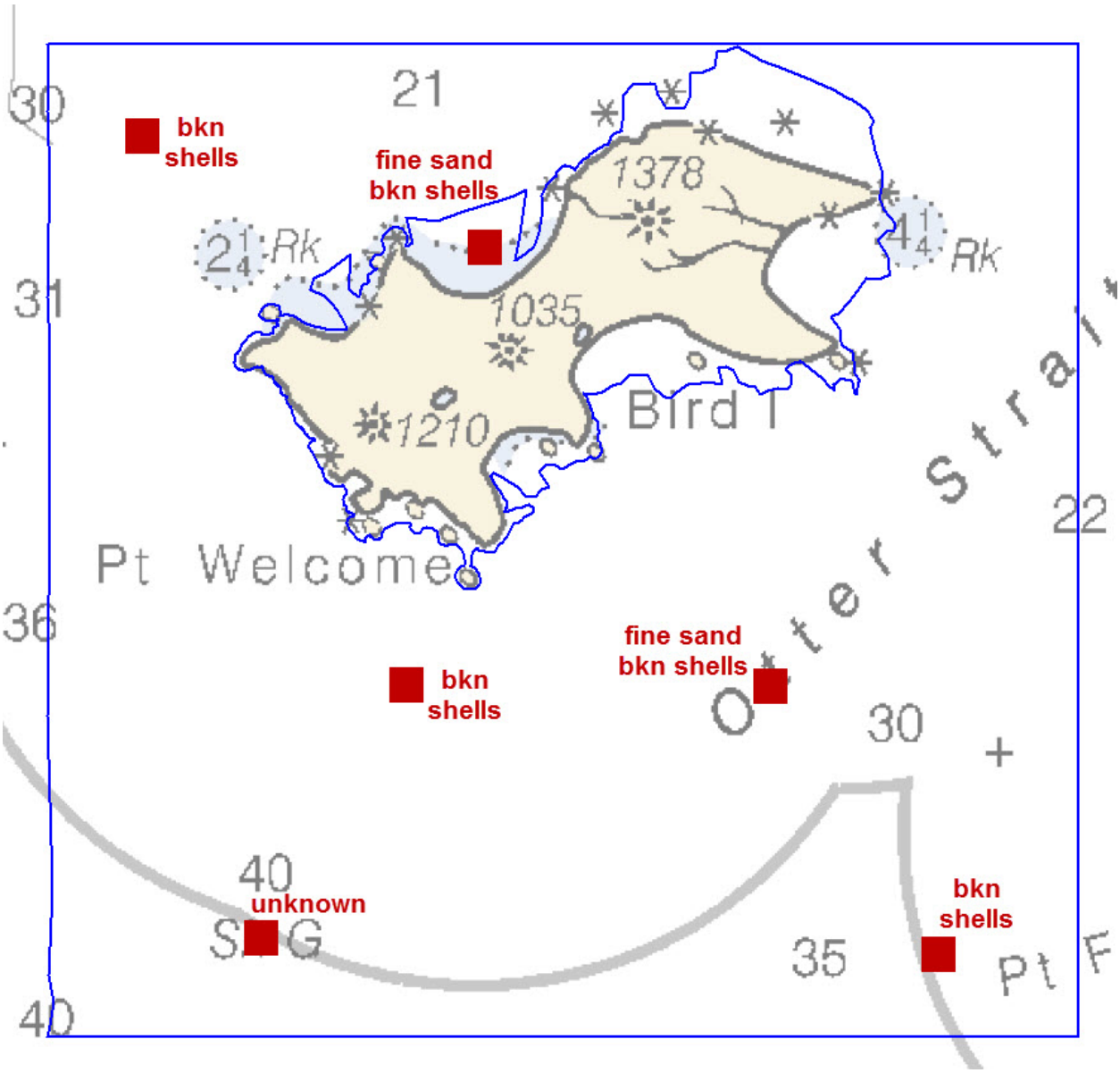


Figure 36: H12593 bottom sample locations.

D.2 Additional Results

D.2.1 Shoreline

Limited shoreline verification was conducted in accordance with the applicable sections of NOAA HSSD and FPM using the Project Reference File (PRF) and Composite Source File (CSF) provided with the Project Instructions. The PRF contains the limits of assigned survey areas, junction survey outlines, proposed bottom sample locations and Maritime Boundary Claim features. The CSF contains additional features assigned for investigation as well as other features derived from multiple sources such as NOAA charts and photogrammetry. From these two project-wide files, the Hydrographer created the H12593 Final Feature File (FFF) which is a sheet-wide subset of features specifically associated with this survey. Both PRF and CSF are S-57 attributed datasets delivered in .000 file format. In the field, all assigned features safe to approach, were addressed as required with S-57 attribution and recorded in the H12593 Final Feature File to best represent the features at chart scale. This file also includes new features found in the field as well as recommendations to update, retain or delete assigned features.

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 in the survey area.

D.2.4 Overhead Features

No overhead features exist in the survey area.

D.2.5 Submarine Features

No submarine features exist in the survey area.

D.2.6 Ferry Routes and Terminals

No ferry routes or terminals exist in the survey area.

D.2.7 Platforms

No platforms exist in the survey area.

D.2.8 Significant Features

No unusual features exist in the survey area.

D.2.9 Construction and Dredging

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

D.2.10 Anchorage Area

An anchorage offering adequate protection from southerly weather was found in a large bight midway along the north side of Bird Island in water depths from five to ten fathoms with a sand bottom (Figure 37).

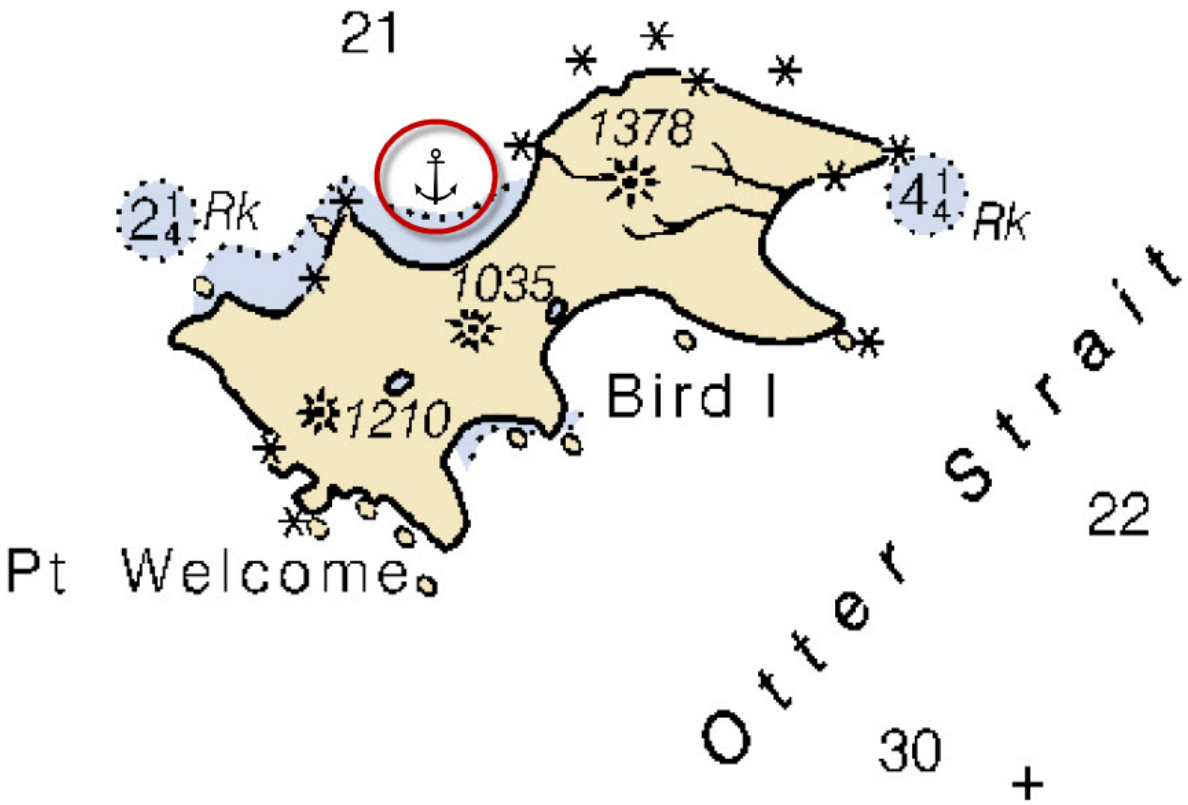


Figure 37: H12593 Bird Island anchorage location.

D.2.11 New Survey Recommendations

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

D.2.12 New Inset Recommendations

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, NOAA Ship RAINIER	12/10/2013	Richard T. Brennan 2013.12.10 16:34:34 -08'00'
Meghan E. McGovern, LT/NOAA	Field Operations Officer, NOAA Ship RAINIER	12/10/2013	Date: 2013.12.10 15:43:10 -08'00'
James B. Jacobson	Chief Survey Technician, NOAA Ship RAINIER	12/10/2013	James Jacobson I have reviewed this document 2013.12.10 15:07:58 -08'00'
B.D. Jackson	Senior Survey Technician, NOAA Ship RAINIER	12/10/2013	I am the author of this document 2013.12.10 15:11:12 -08'00'

F. Table of Acronyms

Acronym	Definition
AHB	Atlantic Hydrographic Branch
AST	Assistant Survey Technician
ATON	Aid to Navigation
AWOIS	Automated Wreck and Obstruction Information System
BAG	Bathymetric Attributed Grid
BASE	Bathymetry Associated with Statistical Error
CO	Commanding Officer
CO-OPS	Center for Operational Products and Services
CORS	Continually Operating Reference Staiton
CTD	Conductivity Temperature Depth
CEF	Chart Evaluation File
CSF	Composite Source File
CST	Chief Survey Technician
CUBE	Combined Uncertainty and Bathymetry Estimator
DAPR	Data Acquisition and Processing Report
DGPS	Differential Global Positioning System
DP	Detached Position
DR	Descriptive Report
DTON	Danger to Navigation
ENC	Electronic Navigational Chart
ERS	Ellipsoidal Referenced Survey
ERZT	Ellipsoidally Referenced Zoned Tides
FFF	Final Feature File
FOO	Field Operations Officer
FPM	Field Procedures Manual
GAMS	GPS Azimuth Measurement Subsystem
GC	Geographic Cell
GPS	Global Positioning System
HIPS	Hydrographic Information Processing System
HSD	Hydrographic Surveys Division
HSSD	Hydrographic Survey Specifications and Deliverables

Acronym	Definition
HSTP	Hydrographic Systems Technology Programs
HSX	Hypack Hysweep File Format
HTD	Hydrographic Surveys Technical Directive
HVCR	Horizontal and Vertical Control Report
HVF	HIPS Vessel File
IHO	International Hydrographic Organization
IMU	Inertial Motion Unit
ITRF	International Terrestrial Reference Frame
LNM	Local Notice to Mariners
LNM	Linear Nautical Miles
MCD	Marine Chart Division
MHW	Mean High Water
MLLW	Mean Lower Low Water
NAD 83	North American Datum of 1983
NAIP	National Agriculture and Imagery Program
NALL	Navigable Area Limit Line
NM	Notice to Mariners
NMEA	National Marine Electronics Association
NOAA	National Oceanic and Atmospheric Administration
NOS	National Ocean Service
NRT	Navigation Response Team
NSD	Navigation Services Division
OCS	Office of Coast Survey
OMAO	Office of Marine and Aviation Operations (NOAA)
OPS	Operations Branch
MBES	Multibeam Echosounder
NWLON	National Water Level Observation Network
PDBS	Phase Differencing Bathymetric Sonar
PHB	Pacific Hydrographic Branch
POS/MV	Position and Orientation System for Marine Vessels
PPK	Post Processed Kinematic
PPP	Precise Point Positioning
PPS	Pulse per second

Acronym	Definition
PRF	Project Reference File
PS	Physical Scientist
PST	Physical Science Technician
RNC	Raster Navigational Chart
RTK	Real Time Kinematic
SBES	Singlebeam Echosounder
SBET	Smooth Best Estimate and Trajectory
SNM	Square Nautical Miles
SSS	Side Scan Sonar
ST	Survey Technician
SVP	Sound Velocity Profiler
TCARI	Tidal Constituent And Residual Interpolation
TPU	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: H12593

LOCALITY: Vicinity of Bird Island, Shumagin Islands, AK
TIME PERIOD: July 13, 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: SWA204A, SWA205, SWA206

Refer to attachments for zoning information.

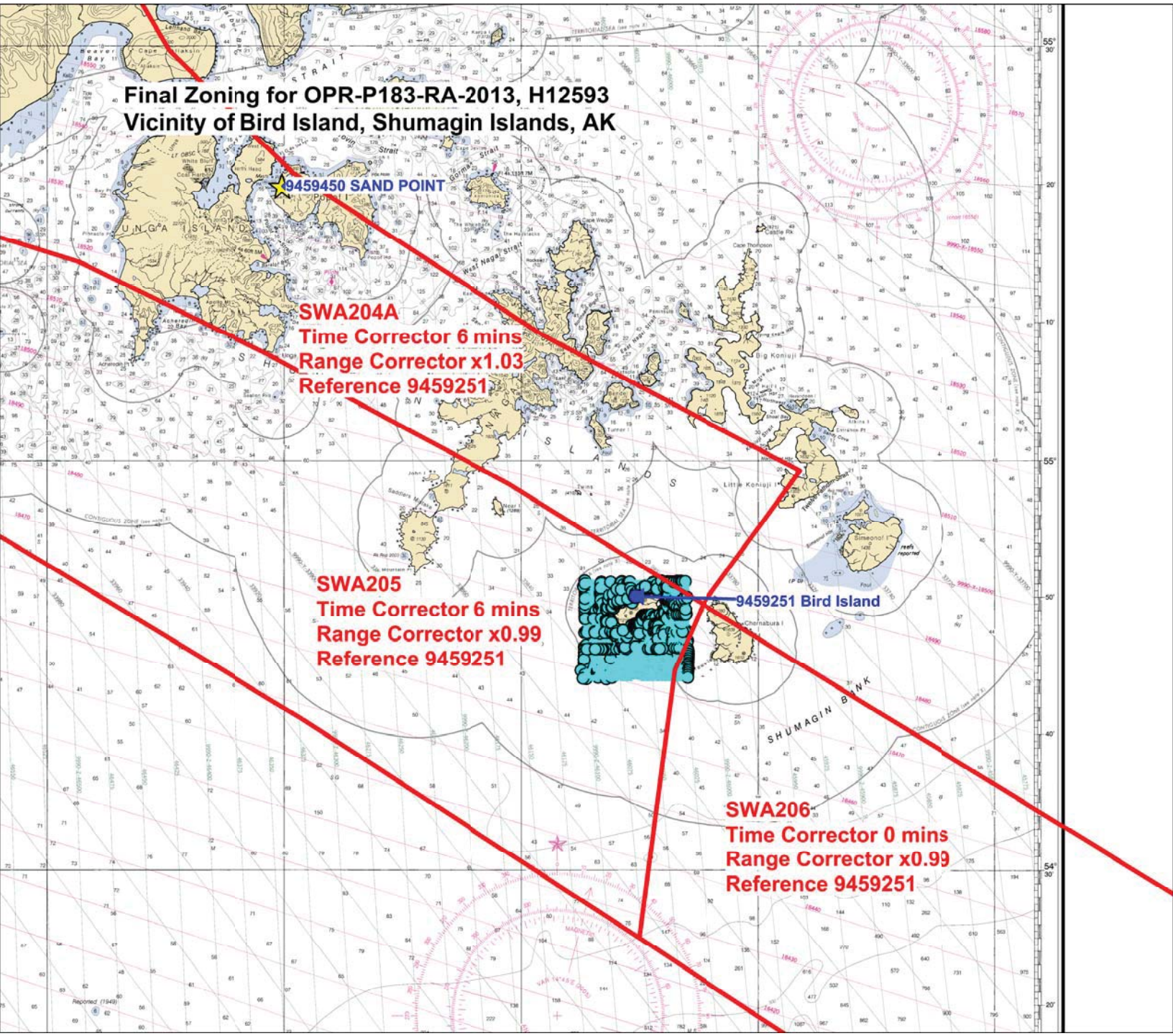
Note 1: Provided time series data are tabulated in metric units (meters), relative to MLLW and on Greenwich Mean Time on the 1983-2001 National Tidal Datum Epoch (NTDE).

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.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 12:06:53 -05'00'

CHIEF, PRODUCTS AND SERVICES BRANCH


Final Zoning for OPR-P183-RA-2013, H12593
Vicinity of Bird Island, Shumagin Islands, AK
9459450 SAND POINT
SWA204A
Time Corrector 6 mins
Range Corrector x1.03
Reference 9459251
SWA205
Time Corrector 6 mins
Range Corrector x0.99
Reference 9459251
9459251 Bird Island
SWA206
Time Corrector 0 mins
Range Corrector x0.99
Reference 9459251
UNGA ISLAND
SHUMAGIN BANK

H12593 Danger to Navigation Report

Registry Number: H12593
State: Alaska
Locality: Shumagin Islands
Sub-locality: Vicinity of Bird Island
Project Number: OPR-P183-RA-13
Survey Dates: 7/13/2013 - 8/2/2013

Charts Affected

Number	Edition	Date	Scale (RNC)	RNC Correction(s)*
16540	13th	10/01/2010	1:300,000 (16540_1)	USCG LNM: 5/7/2013 (5/14/2013) CHS NTM: None (10/26/2012) NGA NTM: 1/21/2006 (5/18/2013)
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

Generated by Pydro v13.2(r4250) on Fri Aug 02 23:04:24 2013 [UTC]

1.1	Rock	4.24 m	54° 49' 35.8" N	159° 49' 43.0" W	---

1 - Dangers To Navigation

1.1) 54/454

DANGER TO NAVIGATION

Survey Summary

Survey Position: 54° 49' 35.8" N, 159° 49' 43.0" W

Least Depth: 4.24 m (= 13.90 ft = 2.317 fm = 2 fm 1.90 ft)

TPU (±1.96σ): **THU (TPEh)** ±1.961 m ; **TVU (TPEv)** ±0.105 m

Timestamp: 2013-194.20:47:37.501 (07/13/2013)

Survey Line: h12593 / 2802_reson7125_hf_512 / 2013-194 / 2802_2013ra1942047

Profile/Beam: 54/454

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

Remarks:

Dangerous submerged rock is farthest offshore point feature on rocky shoal with offshore surrounding depths of approximately 30m. Observed water levels with Preliminary zoning have been applied.

Feature Correlation

Source	Feature	Range	Azimuth	Status
2802_2013ra1942047	54/454	0.00	000.0	Primary

Hydrographer Recommendations

Hydrographer recommends charting dangerous submerged rock with observed least depth of 4.24 meters.

Cartographically-Rounded Depth (Affected Charts):

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

4.2m (500_1, 50_1)

S-57 Data

Geo object 1:	Underwater rock / awash rock (UWTROC)
Attributes:	VALSOU - 4.237 m

Feature Images

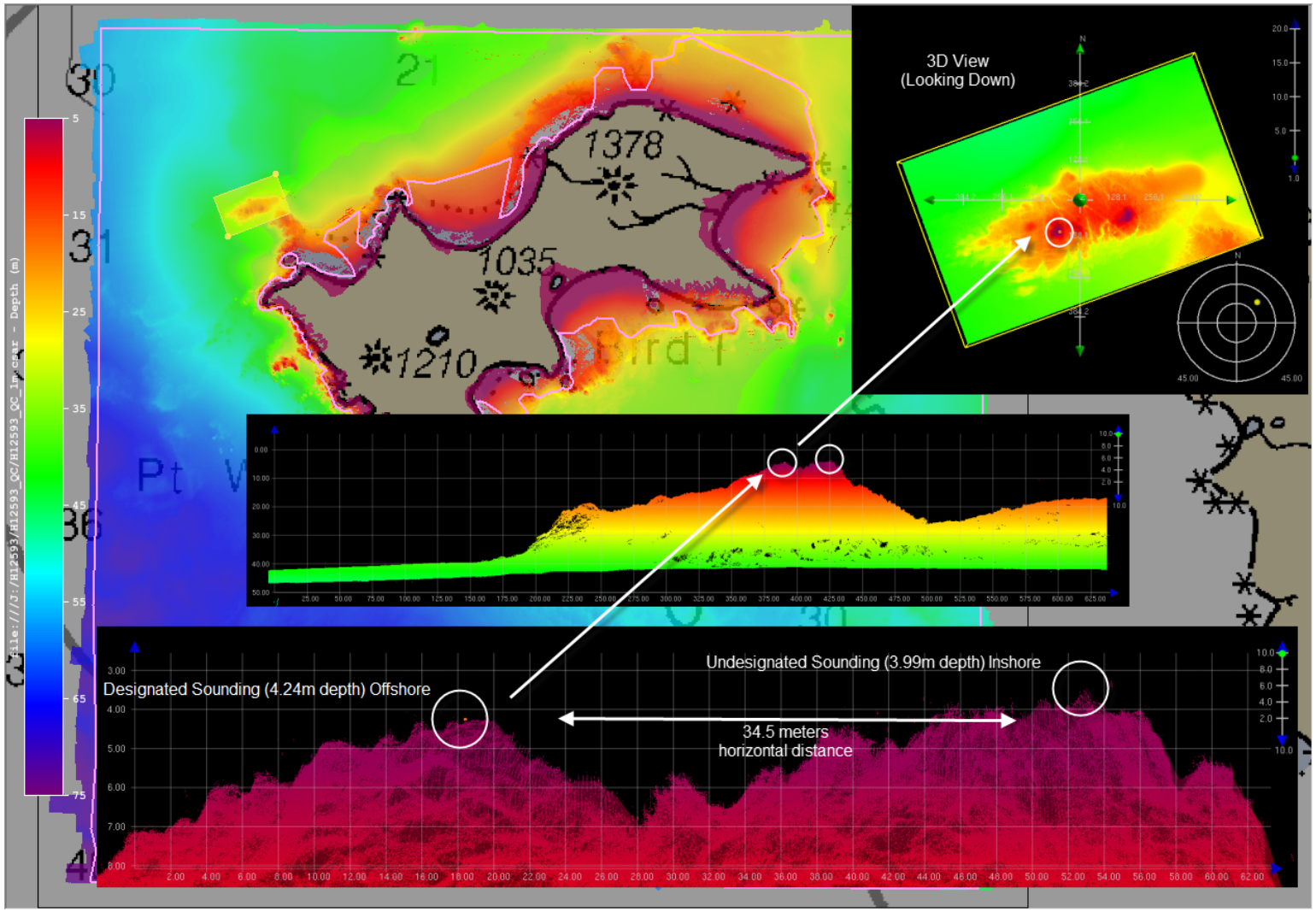


Figure 1.1.1

APPENDIX I – DANGERS TO NAVIGATION

DTONS Submitted to PHB

I.1.1 Danger to Navigation Report

Hydrographic Survey Registry Number: H12101

State: Alaska

Locality: Shumagin Islands

Sub-locality: Bird Island

Project Number: OPR-P183-KRL-09

Survey Dates: May – August 2009

Depths are in meters and reduced to Mean Lower Low Water using preliminary 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.

Charts Affected

Number	Edition	Date	Scale
US3AK50M	8th	7/7/2009	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	8.0	54° 49' 46.25"	159° 41' 22.24"	23:55:06, July 29, 2009	Yes

COMMENTS: Final verified tides have been applied from the Sand Point tide gauge (9459450). The shoal was found using LIDAR. DTON item 1 was submitted during data collection from the field.

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 Report for Lidar Survey H12101

Registry Number: H12101
State: Alaska
Locality: Shumagin Islands
Sub-locality: Bird 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

No.	Feature Type	Survey Depth	Survey Latitude	Survey Longitude
1.1	Rock	8.06 m	54° 49' 46.3" N	159° 41' 22.2" W

Generated by Pydro v9.6 (r2698) on Wed Aug 26 18:26:36 2009 [UTC]

1 - Danger To Navigation

1.1) GP No. - 1 from H12101_Pydro.xls

DANGER TO NAVIGATION

Survey Summary

Survey Position:	54° 49' 46.3" N, 159° 41' 22.2" W
Least Depth:	8.06 m (= 26.44 ft = 4.407 fm = 4 fm 2.44 ft)
TPU (±1.96σ):	**THU (TPEh)** [None] ; **TVU (TPEv)** [None]
Timestamp:	2009-210.23:55:06.000 (07/29/2009)
GP Dataset:	H12101_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):

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

8.1m (500_1, 50_1)

S-57 Data

Geo object 1:	Underwater rock / awash rock (UWTROC)
Attributes:	SORDAT - 20090811
	SORIND - US,US,nsurf,H12101
	TECSOU - 7:found by laser
	VALSOU - 8.06 m
	VERDAT - 12:Mean lower low water
	WATLEV - 3:always under water/submerged

H12593 Feature Report

Registry Number: H11593
State: Alaska
Locality: Shumagin Islands
Sub-locality: Vicinity of Bird Island
Project Number: OPR-P183-RA-13
Survey Dates: 07/13/2013 - 09/03/2013

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
1.1	GP	[None]	54° 47' 40.3" N	159° 48' 05.7" W
1.2	GP	[None]	54° 47' 40.3" N	159° 48' 05.7" W
1.3	Rock	[None]	54° 50' 35.9" N	159° 44' 59.5" W
1.4	Rock	[None]	54° 50' 45.1" N	159° 44' 09.6" W

1 - Maritime Boundary Investigations

1.1) US 0000014340 00001 / H12593_Feature_report_office.000

Survey Summary

Survey Position:	54° 47' 40.3" N, 159° 48' 05.7" W
Least Depth:	[None]
TPU (±1.96σ):	**THU (TPEh)** [None] ; **TVU (TPEv)** [None]
Timestamp:	2013-246.00:00:00.000 (09/03/2013)
Dataset:	H12593_Feature_report_office.000
FOID:	US 0000014340 00001(0226000038040001)
Charts Affected:	16540_1, 16011_1, 16006_1, 500_1, 530_1, 50_1

Remarks:

LNDARE/remrks: New islet is the furthest offshore feature observed in the area.

Hydrographer Recommendations

Use new islet for Maritime Boundary Claim.

S-57 Data

Geo object 1:	Land area (LNDARE)
Attributes:	SORDAT - 20130903
	SORIND - US,US,graph,H12593

Office Notes

New islet is part of a larger island. Chart island.

Feature Images

Figure 1.1.1

1.2) US 0000014339 00001 / H12593_Feature_report_office.000

Survey Summary

Survey Position:	54° 47' 40.3" N, 159° 48' 05.7" W
Least Depth:	[None]
TPU (±1.96σ):	**THU (TPEh)** [None] ; **TVU (TPEv)** [None]
Timestamp:	2013-246.00:00:00.000 (09/03/2013)
Dataset:	H12593_Feature_report_office.000
FOID:	US 0000014339 00001(0226000038030001)
Charts Affected:	16540_1, 16011_1, 16006_1, 500_1, 530_1, 50_1

Remarks:

LNDELV/remrks: New islet is the furthest offshore feature observed in the area.

Hydrographer Recommendations

Use new islet for Maritime Boundary Claim.

S-57 Data

Geo object 1:	Land elevation (LNDELV)
Attributes:	ELEVAT - 8.3 m
	SORDAT - 20130903
	SORIND - US,US,graph,H12593

Office Notes

Chart new elevation as a part of larger island.

Feature Images

Figure 1.2.1

1.3) US 0000006300 00001 / H12593_Feature_report_office.000

Survey Summary

Survey Position:	54° 50' 35.9" N, 159° 44' 59.5" W
Least Depth:	[None]
TPU (±1.96σ):	**THU (TPEh)** [None] ; **TVU (TPEv)** [None]
Timestamp:	1989-063.00:00:00.000 (03/04/1989)
Dataset:	H12593_Feature_report_office.000
FOID:	US 0000006300 00001(02260000189C0001)
Charts Affected:	16540_1, 16011_1, 16006_1, 500_1, 530_1, 50_1

Remarks:

UWTROC/remrks: Complete MBES disproves charted rk. No next furthest offshore feature dry at MLLW was detected within the assigned survey area.

UWTROC/invreq: Verify the existence of the furthest offshore feature that is dry at MLLW. See Baseline Priorities.doc and section 8.1.4 Descriptive Report of the HSSD for further information. NOAA units, see FPM section 3.5.6 Maritime Boundary Delineation.

Hydrographer Recommendations

Delete charted rock.

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.

1.4) US 0000006307 00001 / H12593_Feature_report_office.000

Survey Summary

Survey Position:	54° 50' 45.1" N, 159° 44' 09.6" W
Least Depth:	[None]
TPU (±1.96σ):	**THU (TPEh)** [None] ; **TVU (TPEv)** [None]
Timestamp:	1989-063.00:00:00.000 (03/04/1989)
Dataset:	H12593_Feature_report_office.000
FOID:	US 0000006307 00001(0226000018A30001)
Charts Affected:	16540_1, 16011_1, 16006_1, 500_1, 530_1, 50_1

Remarks:

UWTROC/remrks: Complete MBES disproves charted rk. No next furthest offshore feature dry at MLLW was detected within the assigned survey area.

UWTROC/invreq: Verify the existence of the furthest offshore feature that is dry at MLLW. See Baseline Priorities.doc and section 8.1.4 Descriptive Report of the HSSD for further information. NOAA units, see FPM section 3.5.6 Maritime Boundary Delineation.

Hydrographer Recommendations

Delete charted rock.

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.

APPROVAL PAGE

H12593

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

- H12593_DR.pdf
- Collection of depth varied resolution BAGS
- Processed survey data and records
- H12593_GeoImage.pdf

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

Digitally signed by HOLMBERG.PETER.SCOTT.1365886101
DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=OTHER, cn=HOLMBERG.PETER.SCOTT.1365886101
Date: 2014.10.29 11:39:39 -07'00'

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.

Digitally signed by EVANS.BENJAMIN.K.1237217094
Reason: I attest to the accuracy and integrity of this document
Date: 2014.10.29 14:07:32 -07'00'

Approved:_____

CDR Benjamin K. Evans, NOAA
Chief, Pacific Hydrographic Branch