H12474

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

# DESCRIPTIVE REPORT

| | |
|---|---|
| Type of Survey: | Navigable Area |
| Registry Number: | H12474 |

## LOCALITY

| | |
|---|---|
| State(s): | Alaska |
| General Locality: | Shumagin Islands |
| Sub-locality: | Northeast of Simeonof Island |

**2012**

CHIEF OF PARTY
Richard T. Brennan, CDR/NOAA

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Date:

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

REGISTRY NUMBER:

# HYDROGRAPHIC TITLE SHEET

# H12474

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: | **Northeast of Simeonof Island** |
| Scale: | **40000** |
| Dates of Survey: | **08/26/2012 to 09/30/2012** |
| Instructions Dated: | **05/16/2012** |
| Project Number: | **OPR-P183-RA-12** |
| 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:

***Horizontal Coordinate System: UTM Zone 4N. The purpose of this survey is to provide contemporary survey to update National Ocean Service (NOS) charts. All separates are filed with the hydrographic data. Revisions and notes in red were generated during office processing. The processing branch concurs with all information and recommendations in the DR unless otherwise noted. Page numbering may be interrupted or non-sequential. All pertinent records for this survey, including the Descriptive Report, are archived at the National Geophysical Data Center (NGDC) and can be retrieved via http://www.ngdc.noaa.gov/. Compilation units is Meters at MLLW.***

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# Descriptive Report to Accompany Survey H12474

Project: OPR-P183-RA-12

Locality: Shumagin Islands

Sublocality: Northeast of Simeonof Island

Scale: 1:40000

August 2012 - September 2012

**NOAA Ship *Rainier***

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

# A. Area Surveyed

The project area is referred to as Sheet 3: "Northeast Simeonof Island" within the Project Instructions. The area is directly northeast of Simeonof Island in the Shumagin Islands and includes areas landward and seaward of the Three Nautical Mile Line. The northeastern most limit is approximately 5.8 nautical miles from Simeonof Island (Figure 1).

## A.1 Survey Limits

Data were acquired within the following survey limits:

| Northwest Limit | Southeast Limit |
|---|---|
| 55° 0" 30.6' N<br>159° 5" 34.8' W | 54° 54" 58.2' N<br>159° 18" 0.6' W |

*Table 1: Survey Limits*

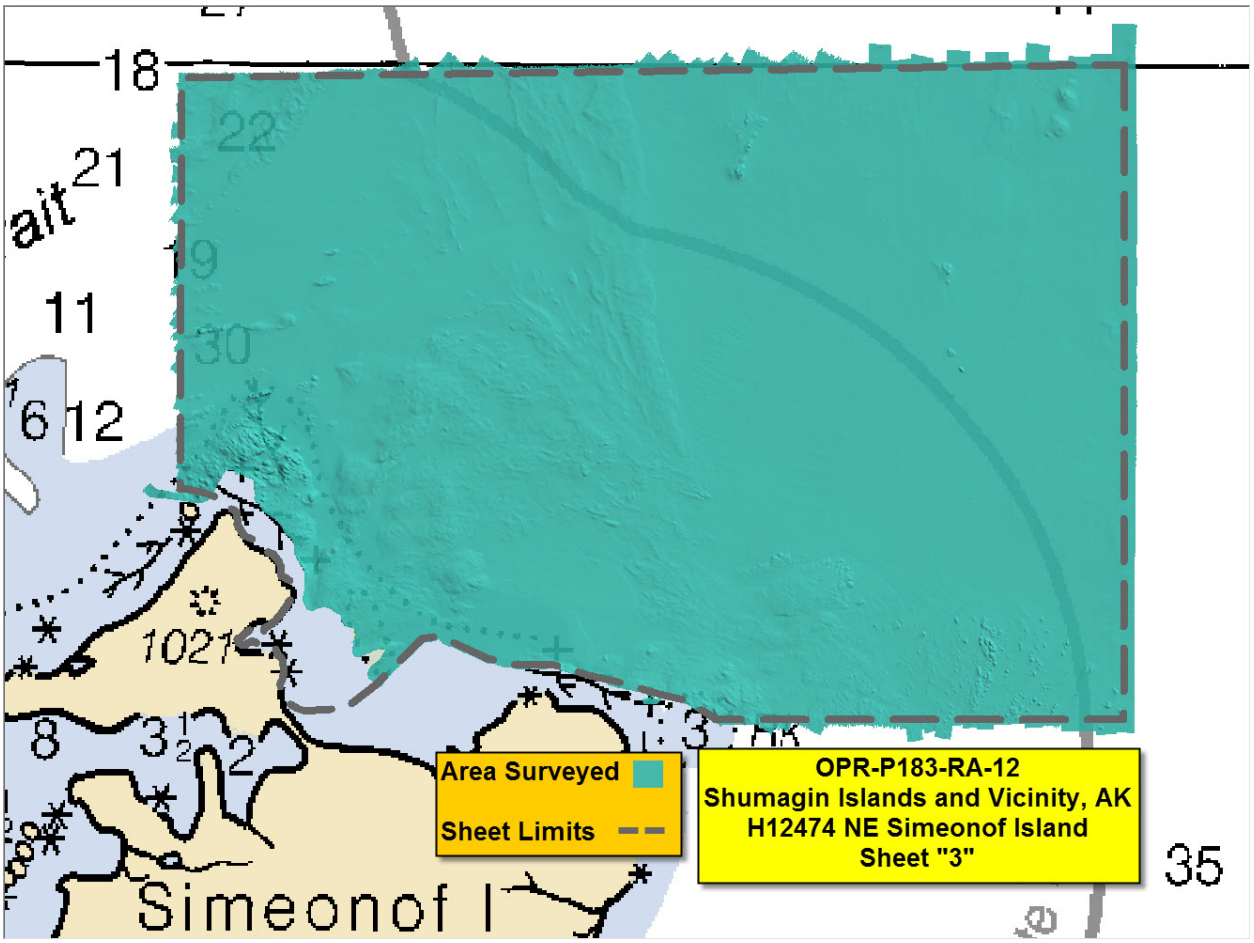



*Figure 1: Area surveyed (Chart 16540).*

Survey limits were met in accordance with the requirements in the Project Instructions and the Hydrographic Survey Specifications and Deliverables Manual (HSSDM).

## A.2 Survey Purpose

The purpose of this survey is to update existing NOS nautical charts. The project includes critical areas in the Shumigin Islands.

## A.3 Survey Quality

The entire survey is adequate to supersede previous data.

Data acquired on survey H12474 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 HSSDM (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 99.8% of the nodes.

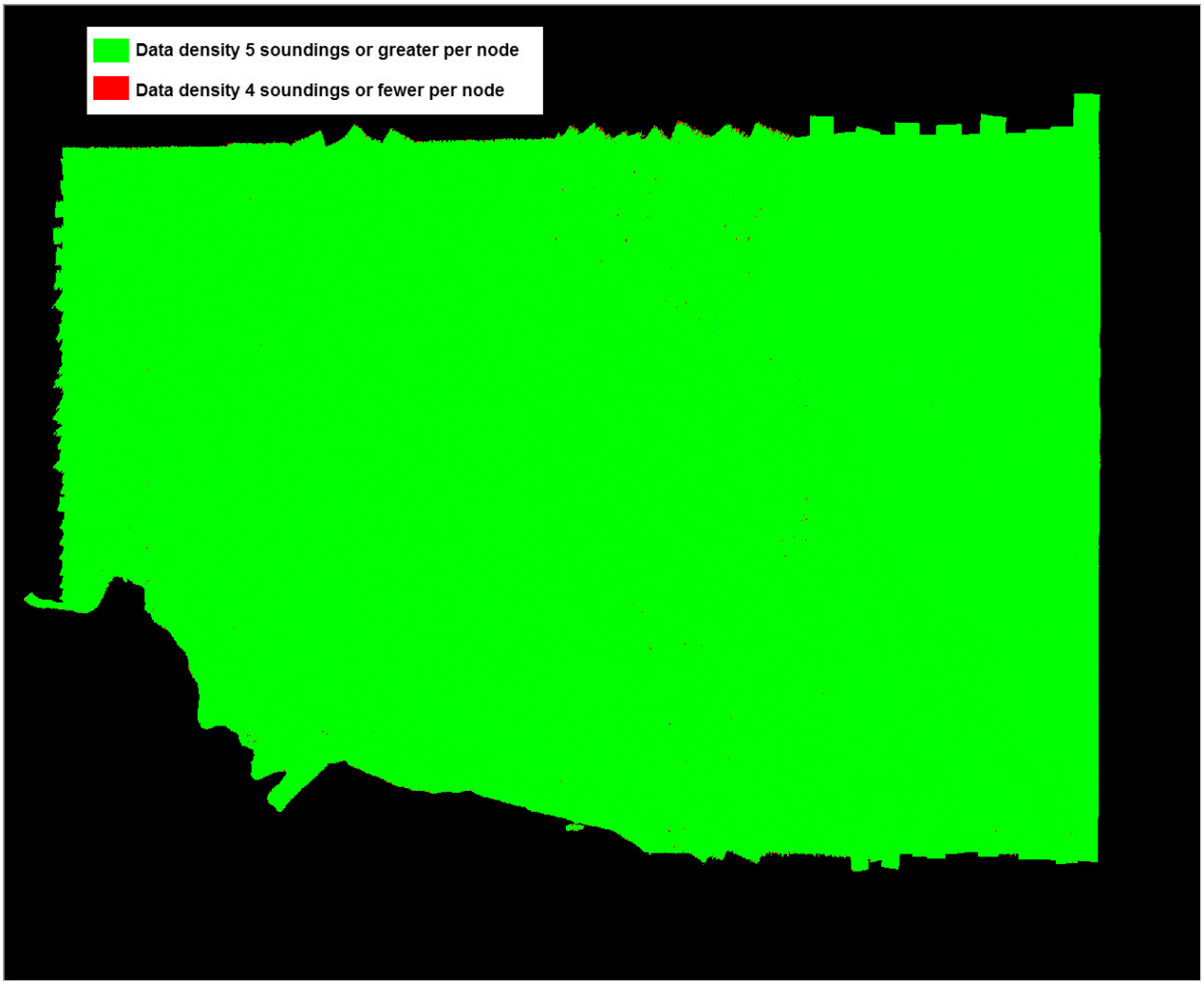



*Figure 2: Sounding density plot for survey H12474. Areas highlighted in green contain at least the requisite 5 soundings per node, whereas the red areas have a data density of 4 soundings or fewer per node. 99.8% of nodes were populated with 5 soundings or greater per node.*

| Resolution | Depth range | Number of nodes | Fewer than five soundings per node | Percent of nodes with greater than five soundings per node |
|---|---|---|---|---|
| 1m | 0 - 20m | 1,181,581 | 4,281 | 99.6% |
| 2m | 18 - 40m | 2,360,125 | 2,592 | 99.9% |
| 4m | 36 - 80m | 2,260,780 | 3,934 | 99.8% |
| 8m | 72 - 160m | 304,363 | 120 | 100.0% |
| | TOTAL: | 6,106,849 | 10,927 | **99.8%** |
| | TOTAL (by area): | 66,273,793 | 85,273 | **99.9%** |

*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.*

## A.4 Survey Coverage

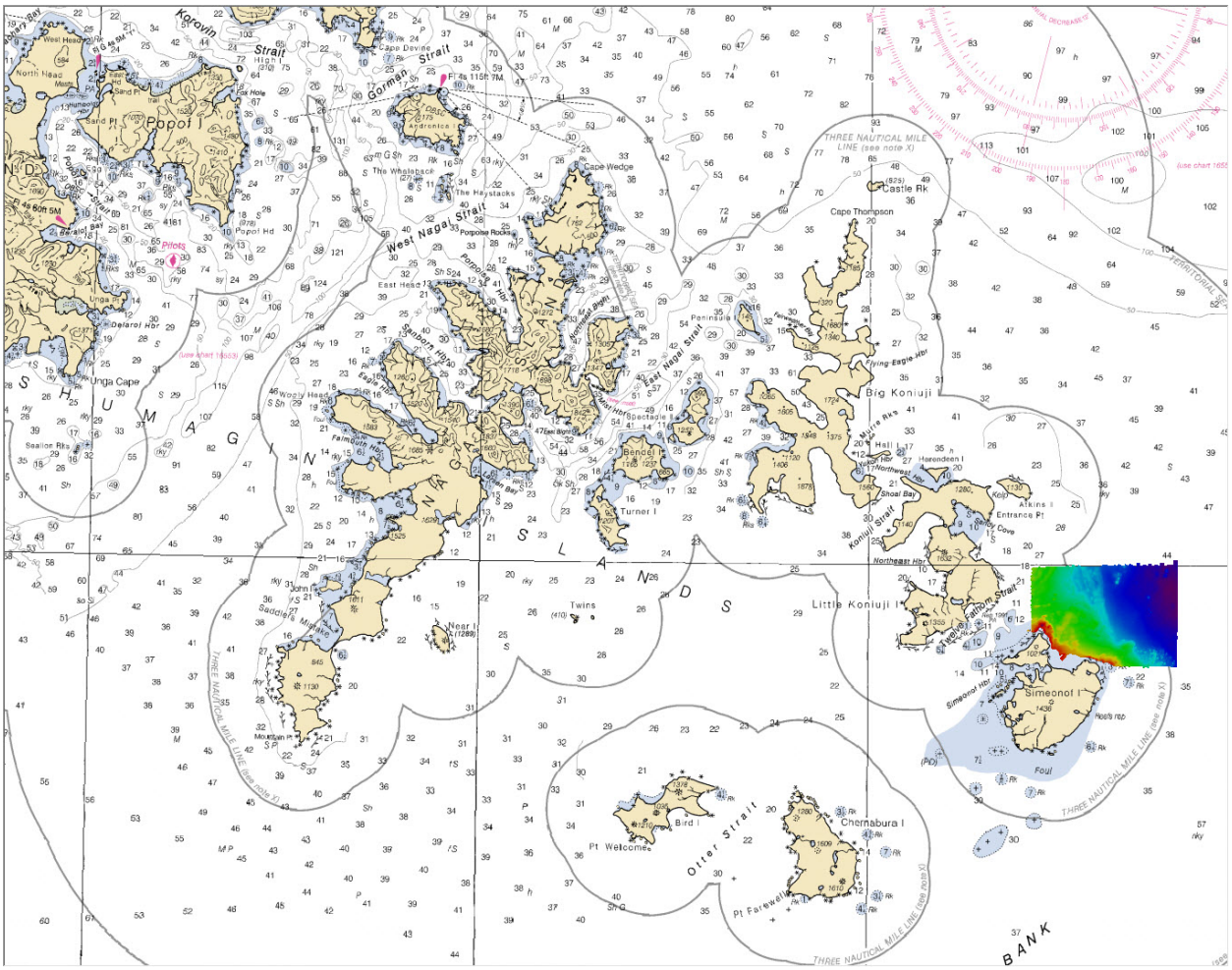



*Figure 4: Survey H12474 is located in the northeast vicinity of Simeonof Island of the Shumagin Islands, Alaska.*

Complete MBES coverage was achieved in the assigned survey area (Figure 4) except for a small acoustic shadow near a least depth of 11 meters (Figure 5) and an inshore area foul with kelp (Figure 6). The kelp area was nearshore, dangerous to approach and determined to be non-navigationally significant. The kelp area is delineated and attributed in the Final Feature File.

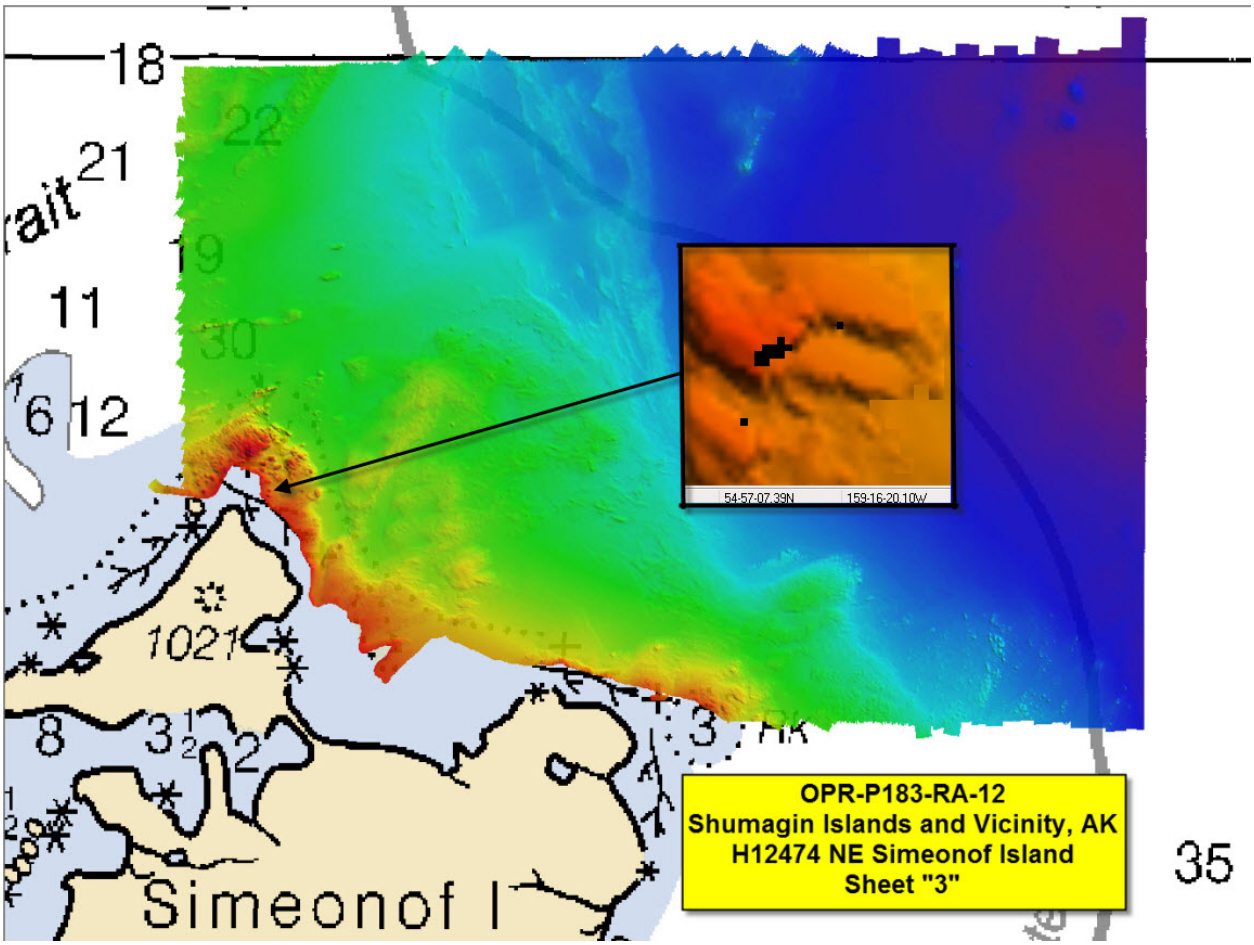



*Figure 5: H12474 survey coverage. Small gap in coverage (due to acoustic shadowing) is highlighted off the northern point of Simeonof Island.*

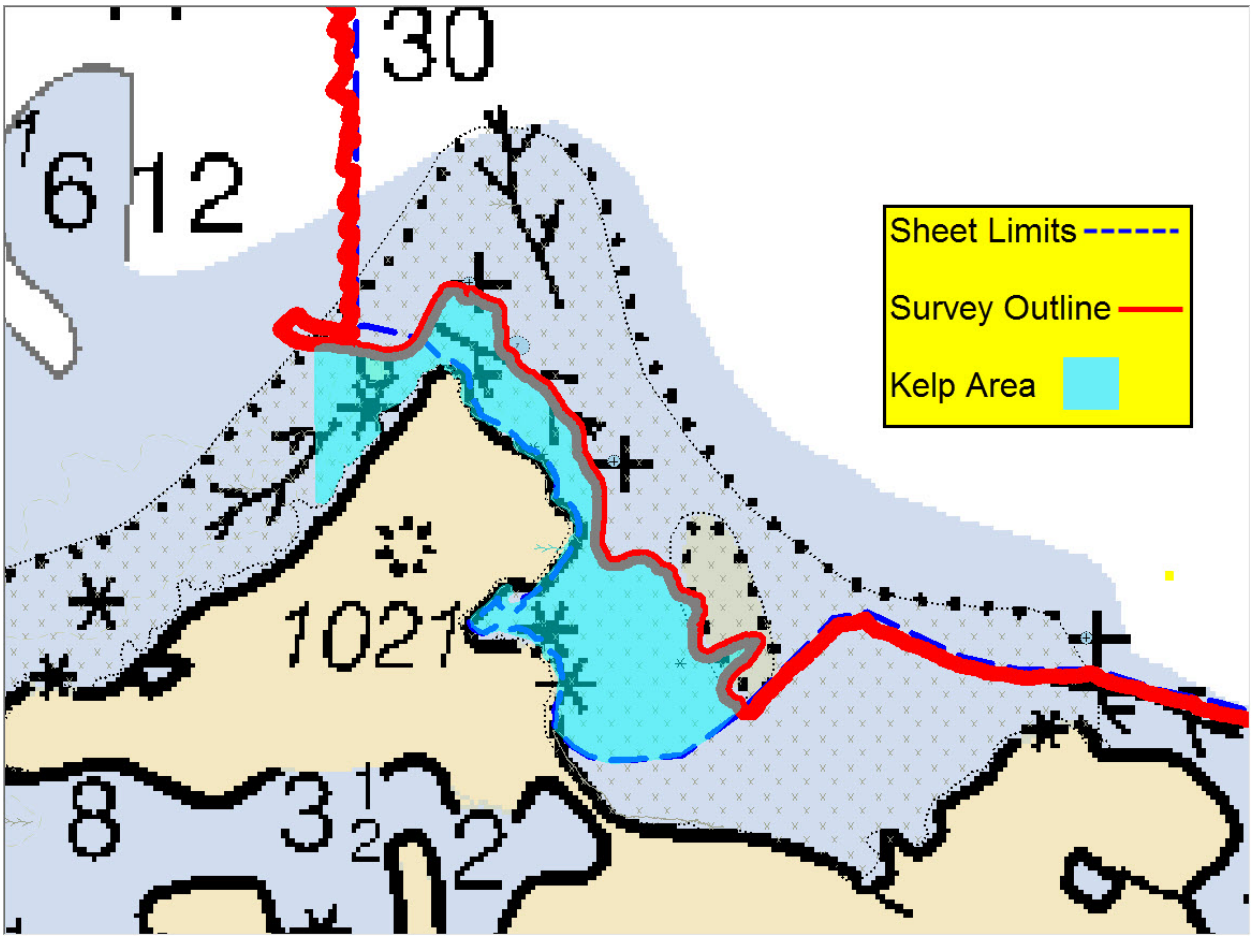



*Figure 6: Survey coverage only differed from assigned sheet limits near one inshore area foul with kelp.* ***The area has been characterized as foul with kelp and rocks in the chart update product.***

## A.5 Survey Statistics

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

| | Vessel | ***S221*** | ***2801 (RA-4)*** | ***2802 (RA-5)*** | ***2803 (RA-3)*** | ***2804 (RA-6)*** | ***Total*** |
|---|---|---|---|---|---|---|---|
| **LNM** | **SBES Mainscheme** | 0 | 0 | 0 | 0 | 0 | 0 |
| | **MBES Mainscheme** | 63.7 | 54.5 | 99.5 | 58.4 | 52.2 | 328.3 |
| | **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** | 0 | 0 | 5.1 | 0 | 16.0 | 21.1 |
| | **Lidar Crosslines** | 0 | 0 | 0 | 0 | 0 | 0 |
| **Number of Bottom Samples** | | | | | | | 5 |
| **Number AWOIS Items Investigated** | | | | | | | 0 |
| **Number Maritime Boundary Points Investigated** | | | | | | | 0 |
| **Number of DPs** | | | | | | | 0 |
| **Number of Items Items Investigated by Dive Ops** | | | | | | | 0 |
| **Total Number of SNM** | | | | | | | 26.51 |

*Table 2: Hydrographic Survey Statistics*

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

| Survey Dates | Julian Day Number |
|---|---|
| 08/26/2012 | 239 |
| 08/28/2012 | 241 |
| 08/29/2012 | 242 |
| 09/09/2012 | 253 |
| 09/10/2012 | 254 |
| 09/12/2012 | 256 |
| 09/13/2012 | 257 |
| 09/30/2012 | 274 |

*Table 3: Dates of Hydrography*

# B. Data Acquisition and Processing

## B.1 Equipment and Vessels

### B.1.1 Vessels

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

| **Hull ID** | ***2801 (RA-4)*** | ***2802 (RA-5)*** | ***2803 (RA-3)*** | ***2804 (RA-6)*** | ***S221*** |
|---|---|---|---|---|---|
| **LOA** | 28 feet | 28 feet | 28 feet | 28 feet | 231 feet |
| **Draft** | 3.5 feet | 3.5 feet | 3.5 feet | 3.5 feet | 16.5 feet |

*Table 4: Vessels Used*

### B.1.2 Equipment

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

| Manufacturer | Model | Type |
|---|---|---|
| Kongsberg | EM710 | MBES |
| Reson | SVP 71 | Sound Speed System |
| Reson | SVP 70 | Sound Speed System |
| Reson | SeaBat 7125 | MBES |
| Applanix | POS-MV V4 | Positioning and Attitude System |
| SeaBird Electronics | SBE 19 | Conductivity, Temperature and Depth Sensor |
| SeaBird Electronics | SBE 19 plus | Conductivity, Temperature and Depth Sensor |
| Odim Brooke Ocean (Rolls Royce Groups) | MVP200 | Conductivity, Temperature and Depth Sensor |
| Odim Brooke Ocean (Rolls Royce Groups) | MVP30 | Conductivity, Temperature and Depth Sensor |

*Table 5: Major Systems Used*

## B.2 Quality Control

### B.2.1 Crosslines

Crosslines, acquired for this survey, totalled 6.4% of mainscheme acquisition.

Multibeam crosslines were acquired using the Reson 7125 on vessel 2802 (RA-5) and 2804 (RA-6) totaling 21.1 nautical miles, comprising 6.4% of mainscheme MBES. Separate 4-meter surfaces of the mainscheme and crosslines were created, from which a difference surface was generated in CARIS HIPS and SIPS (Figure 8). Statistics were then derived from the difference surface and examined in Excel (Figure 9). The mean difference between depths derived from the mainscheme and crosslines is -0.02 meters with the mainscheme being the shoaler of the two; the standard deviation is 0.15 meters.

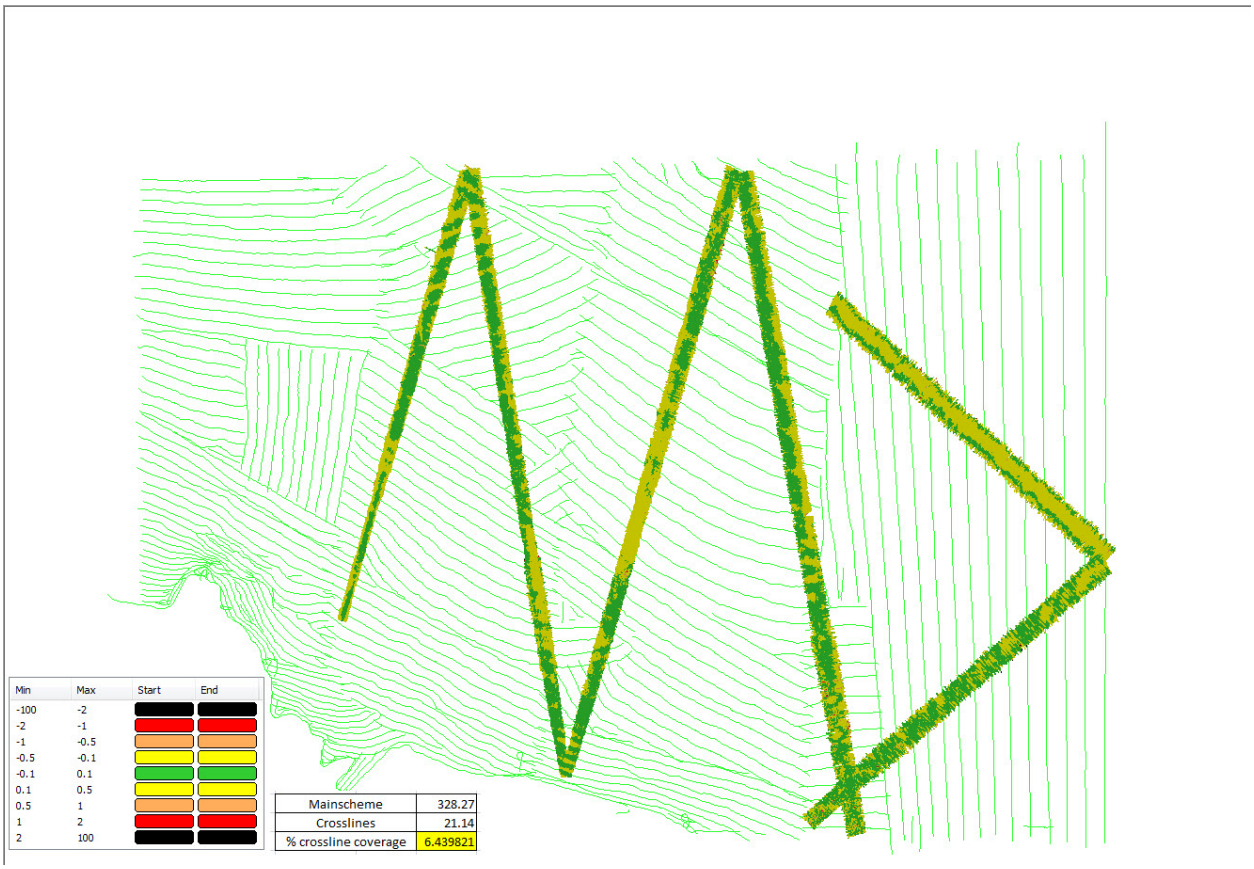



*Figure 7: Crossline and mainscheme difference surface (in meters) and mainscheme tracklines. Mean: -0.02 meters Std. Dev: 0.15 meters.*

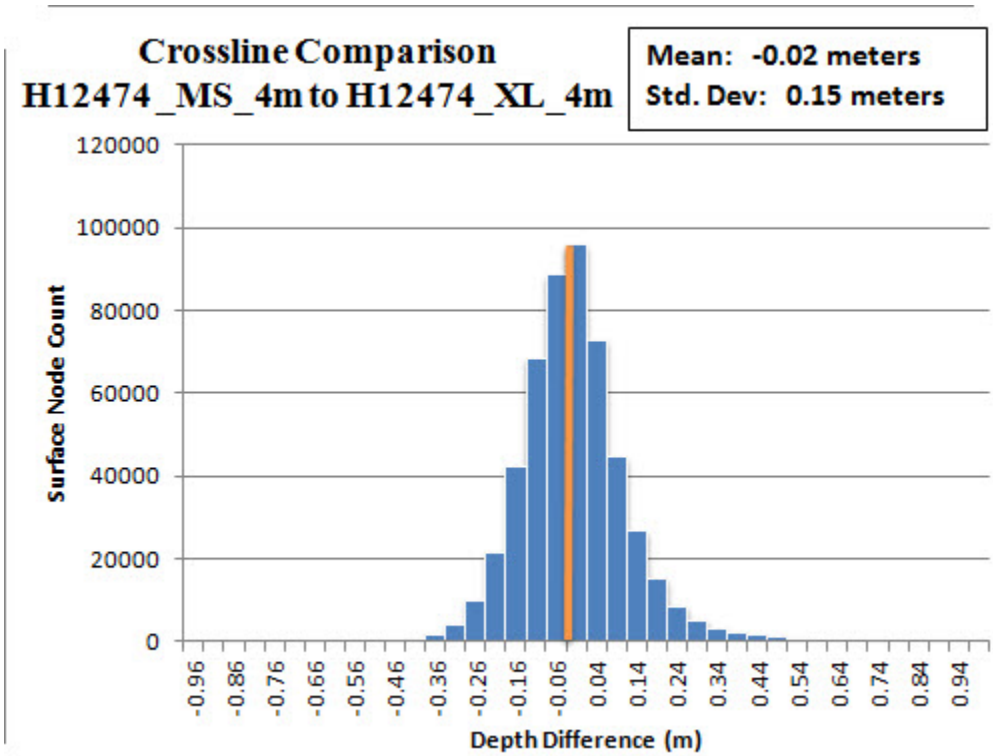



*Figure 8: Difference surface histogram for mainscheme and crosslines (mainscheme shoaler).*

### B.2.2 Uncertainty

The following survey specific parameters were used for this survey:

| Measured | Zoning |
|---|---|
| 0 meters | 0.065 meters |

*Table 6: Survey Specific Tide TPU Values*

| Hull ID | Measured - CTD | Measured - MVP | Surface |
|---|---|---|---|
| S221 | | 1.0 meters/second | 0.05 meters/second |
| 2801 | 3.0 meters/second | | 0.15 meters/second |
| 2802 | 3.0 meters/second | | 0.15 meters/second |
| 2803 | 3.0 meters/second | | 0.15 meters/second |
| 2804 | 3.0 meters/second | 3.0 meters/second | 0.15 meters/second |

*Table 7: Survey Specific Sound Speed TPU Values*

Uncertainty values of submitted, finalized grids were calculated in CARIS using the "Greater of the Two" method among uncertainty and standard deviation (scaled to 95%). To visualize the locations in which accuracy requirements were met for each finalized surface, a custom "IHOness" layer was created in CARIS, based on the difference between calculated uncertainty of the nodes and the allowable IHO uncertainty (Figure 10). To quantify the extent to which accuracy requirements were met, the preceding "IHOness" layers were queried within CARIS and then examined in Excel (Figure 11). Overall, 100.0% of survey H12474 met the accuracy requirements stated in the HSSDM.

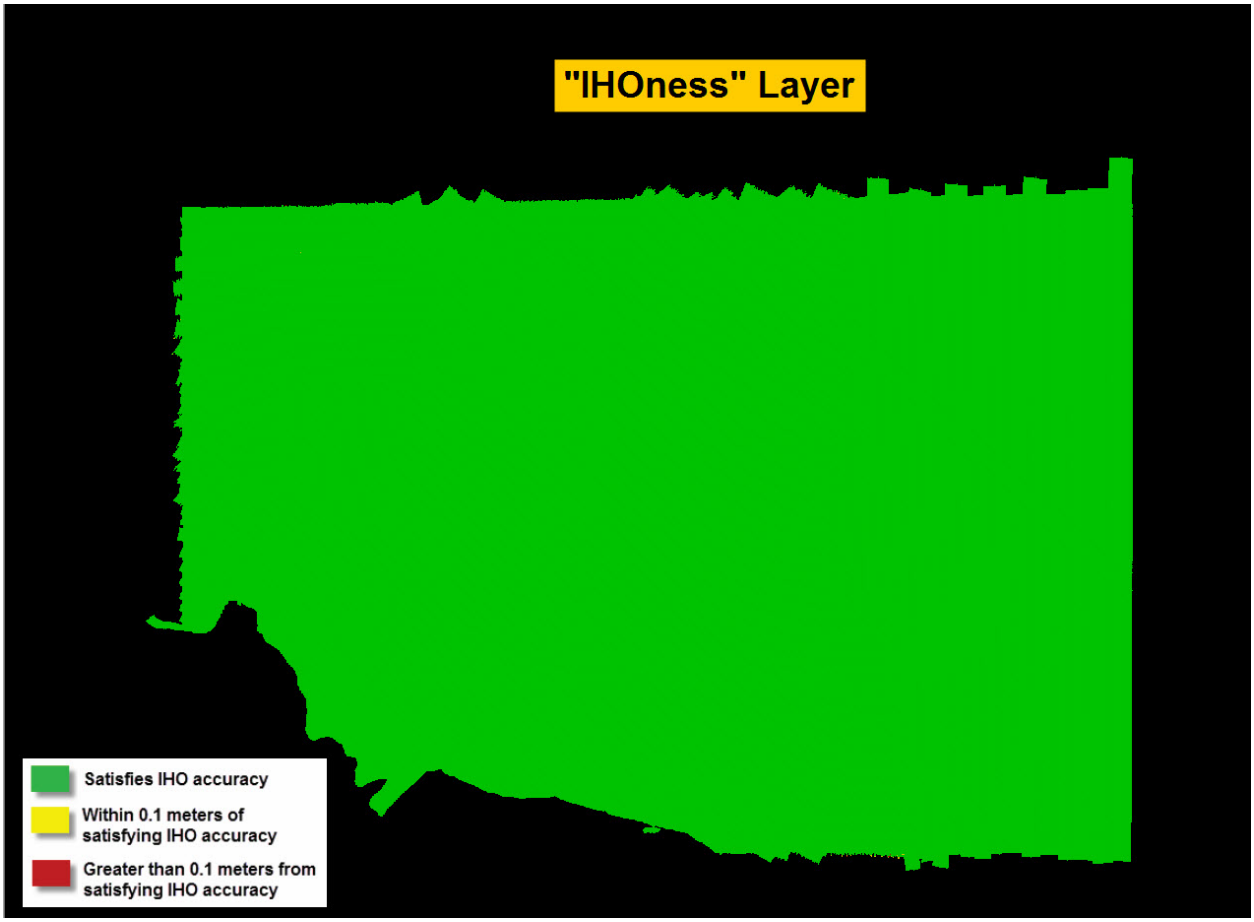



*Figure 9: Survey overview indicating areas in which IHO accuracy standards were met (in green).*

| Resolution | Depth range | IHO Order | Number of nodes | Nodes satisfying given IHO Order accuracy | Percent of nodes satisfying given IHO Order accuracy |
|---|---|---|---|---|---|
| 1m | 0 - 20m | Order 1 | 1,181,742 | 1,181,710 | 100.0% |
| 2m | 18 - 40m | Order 1 | 2,360,347 | 2,360,285 | 100.0% |
| 4m | 36 - 80m | Order 1 | 5,133,587 | 5,133,549 | 100.0% |
| 8m | 72 - 100m | Order 1 | 304,200 | 304,199 | 100.0% |
| | | TOTAL: | 8,979,876 | 8,979,743 | 100.0% |
| | | TOTAL (by area): | 112,229,322 | 112,228,370 | 100.0% |

*Figure 10: Summary table showing the percentage of nodes satisfying the indicated IHO accuracy level, sub-divided by the appropriate depth ranges.*

### B.2.3 Junctions

H12474 junctions with two concurrent RAINIER MBES surveys from the same project (OPR-P183-RA-12) and one Fugro LADS lidar survey from 2009 (Figures 12). Junction comparisons were performed using CARIS difference surfaces, tool tip, and Subset Editor.

The following junctions were made with this survey:

| Registry Number | Scale | Year | Field Unit | Relative Location |
|---|---|---|---|---|
| H12472 | 1:40000 | 2012 | NOAA Ship RAINIER | W |
| H12475 | 1:40000 | 2012 | NOAA Ship RAINIER | S |
| H12104 | 1:10000 | 2009 | Fugro LADS | SW |

*Table 8: Junctioning Surveys*

<u>H12472</u>

The junction with RAINIER survey H12472 is along the western edge of survey H12474. On average, there was 5200 by 200 meters of overlap between H12474 and H12472 (Figure 13). A CARIS difference surface was created using the 4-meter surface from both surveys, yielding a mean difference of -0.07 meters (H12474 shoaler) with a standard deviation of 0.14 meters (Figure 14). In addition, inspection of the data in CARIS Subset Editor showed agreement between the two surveys (Figure 15).

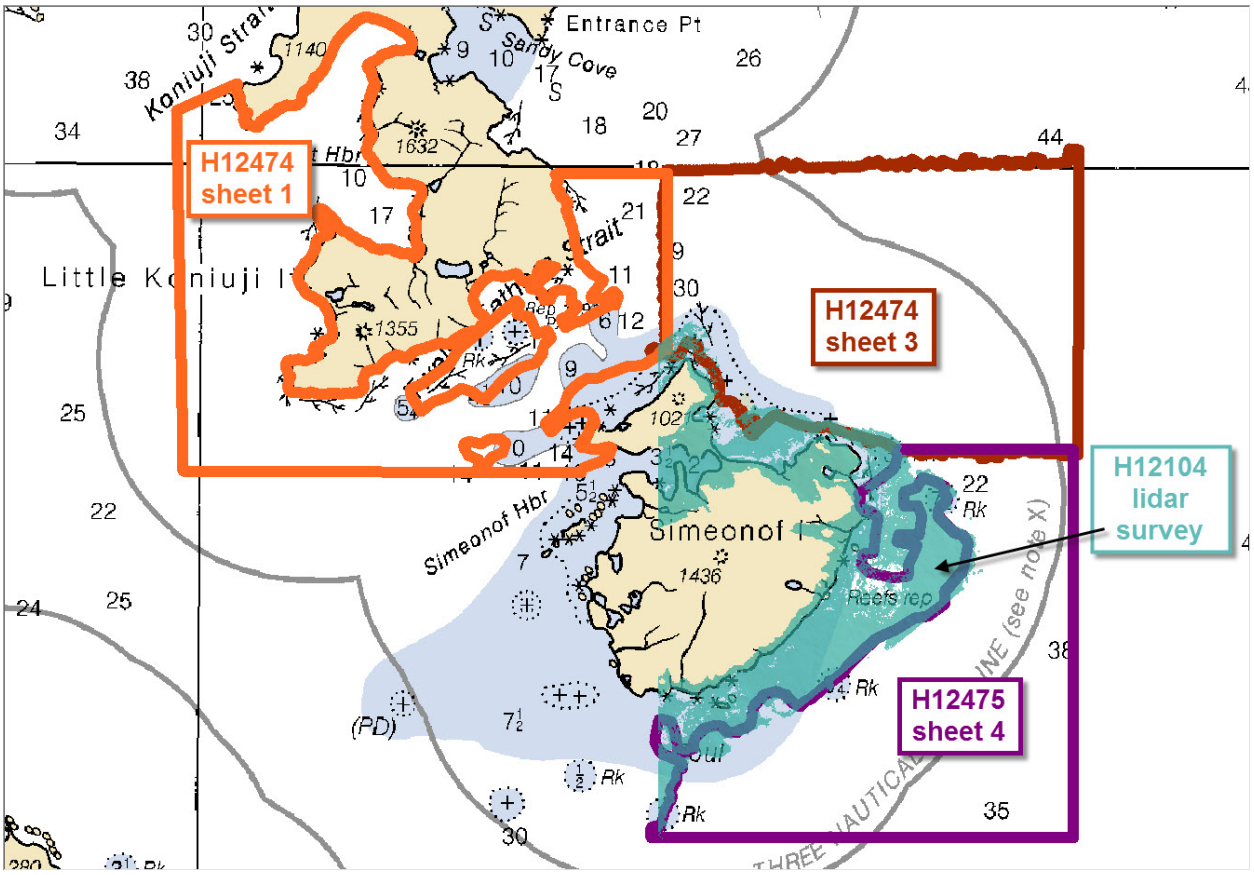



*Figure 11: Junction survey overview (Chart 16540).*

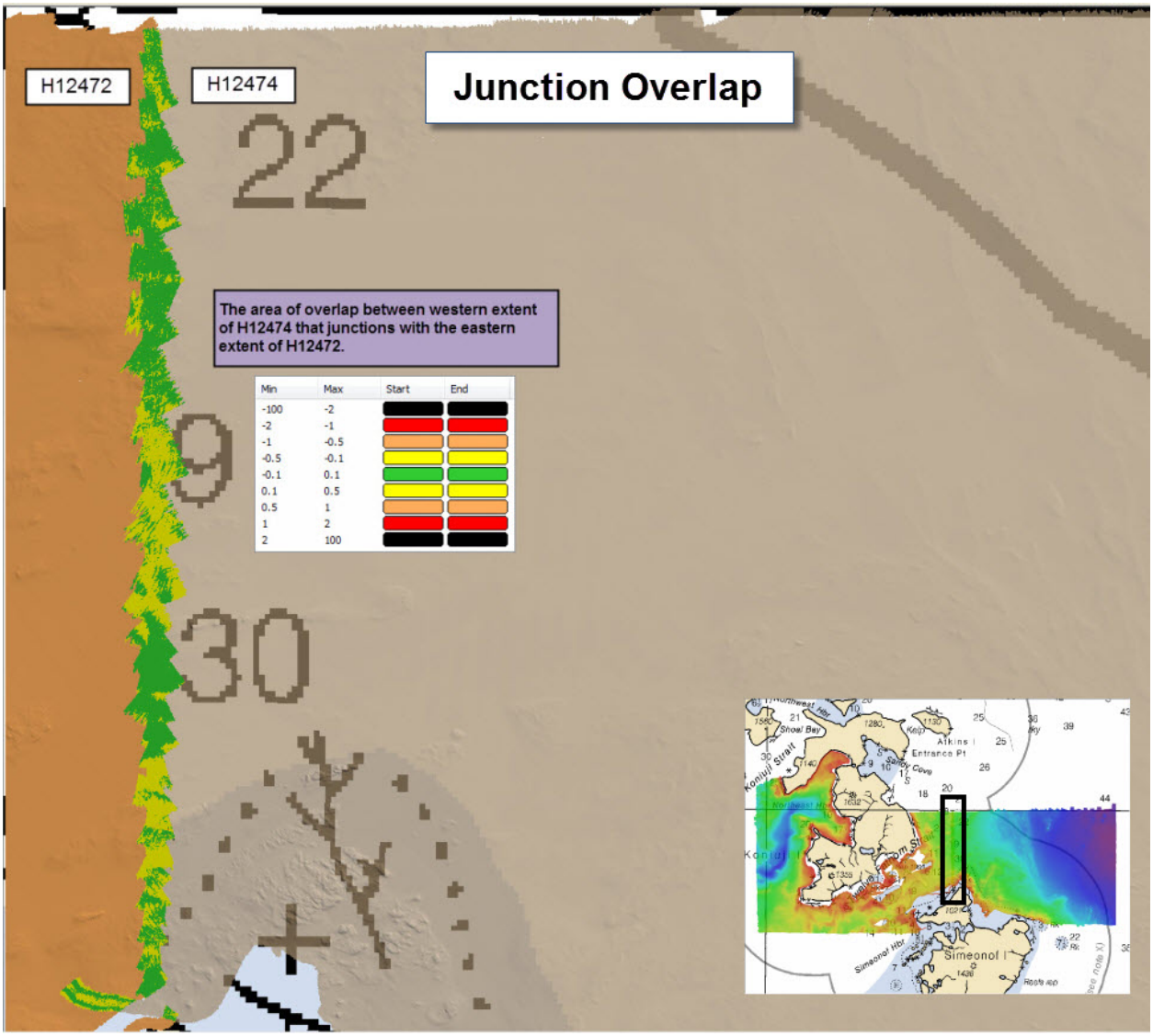



*Figure 12: Difference surface (in meters) of junction between western extent of H12474 and the eastern extent of H12472. The average difference was -0.07 meters.*

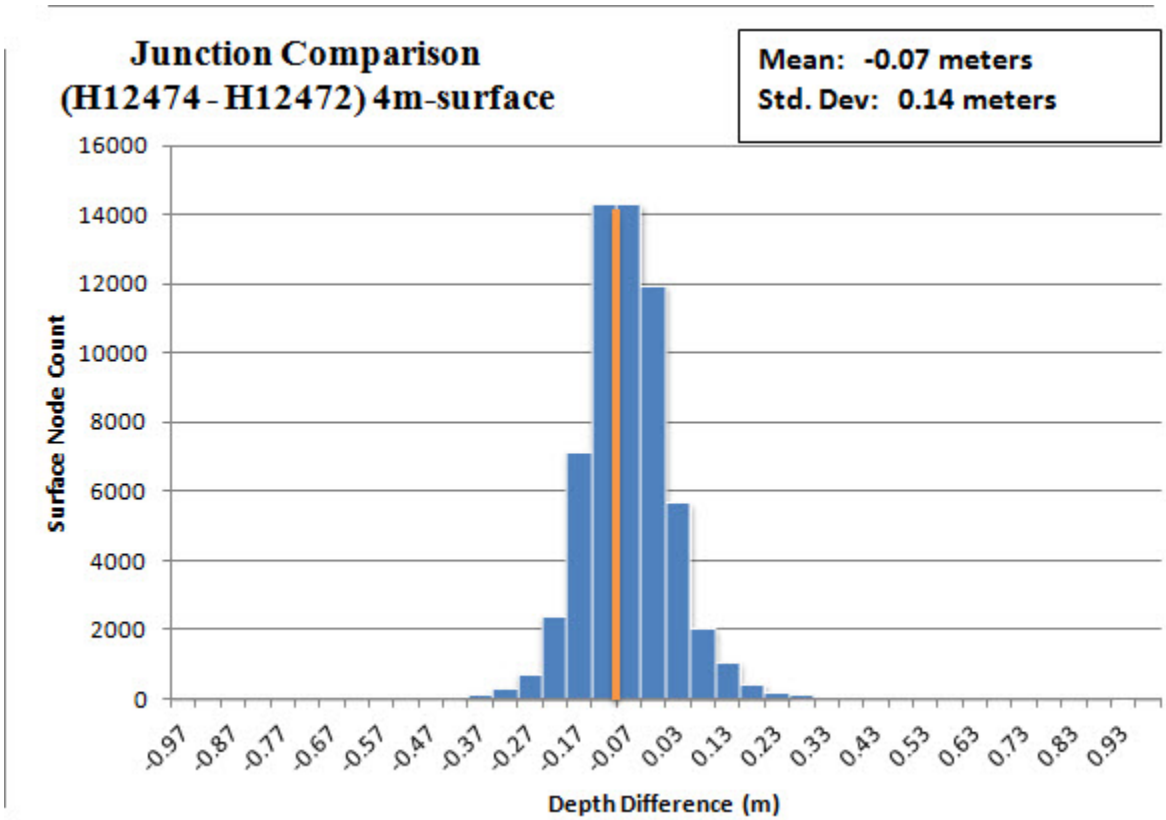



*Figure 13: Difference surface statistics between junction of H12474 and H12472.*

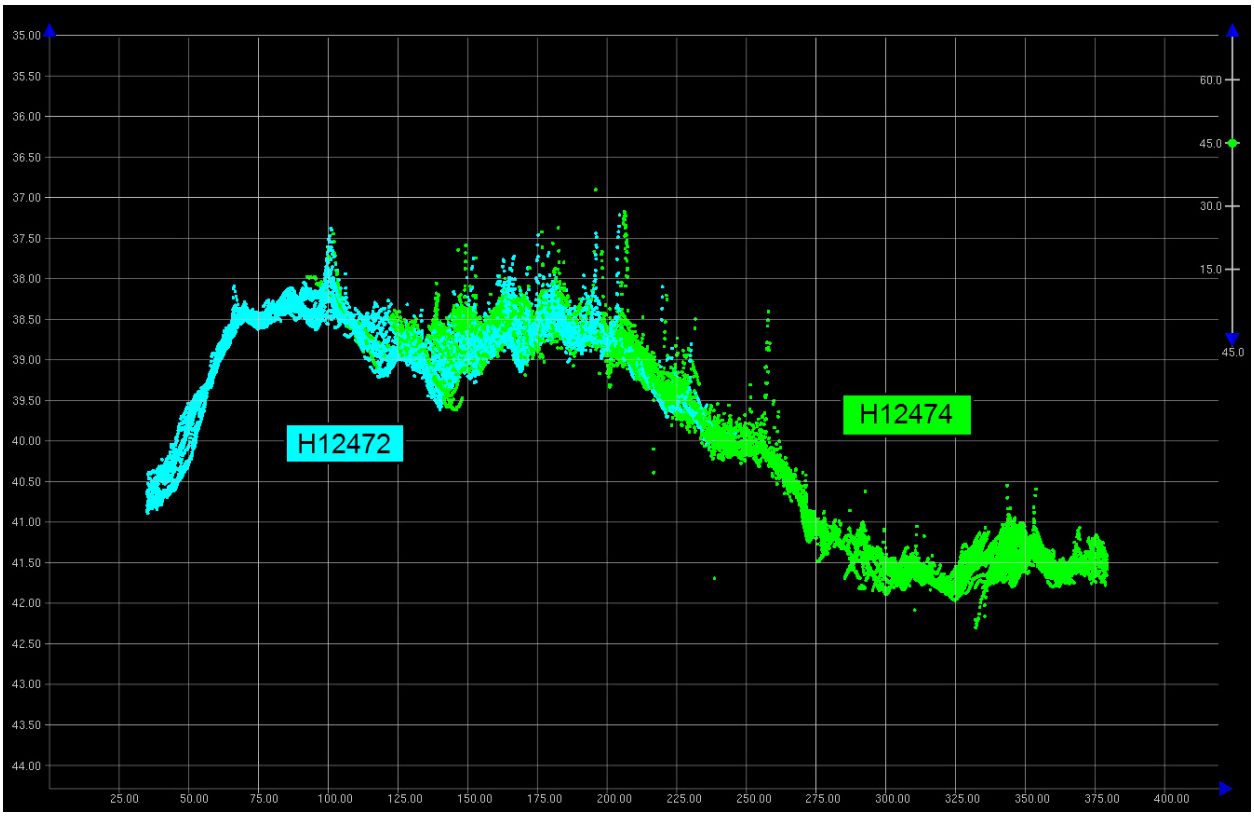



*Figure 14: Subset of multibeam data between junction of H12474 and H12472.*

***In Figure 12, sheet 1 is mislabeled and should read H12472.***

H12475

The junction with RAINIER survey H12475 is along the southern edge of survey H12474 (Figure 16). A CARIS difference surface was created using the 4-meter surface from both surveys, yielding a mean difference of -0.03 meters (H12474 shoaler) with a standard deviation of 0.21 meters (Figure 17). On average, there was 200 by 5200 meters of overlap between H12474 and H12475. In addition, inspection of the data in CARIS Subset Editor showed agreement between the two surveys (Figure 18).

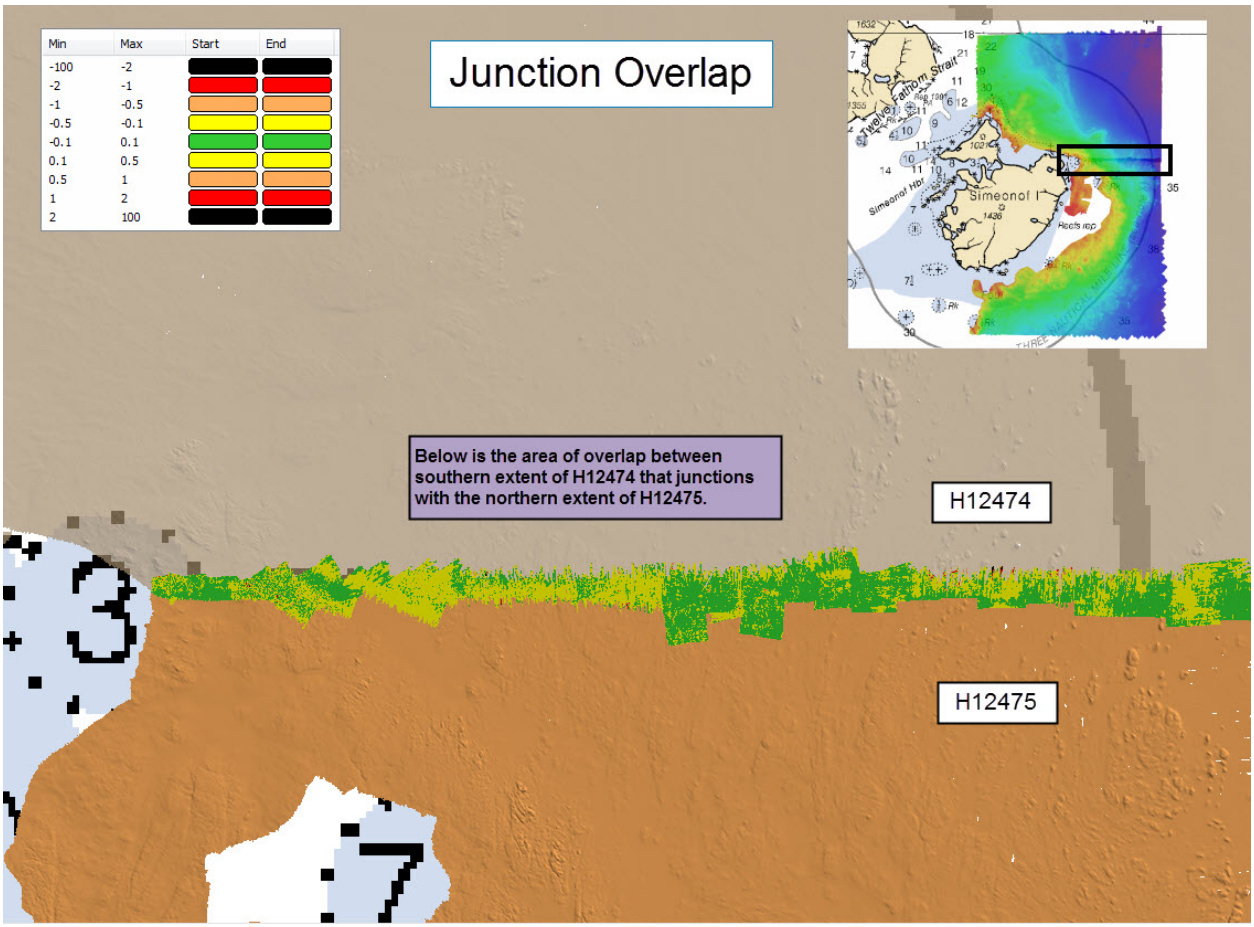



*Figure 15: Difference surface (in meters) of junction between southern extent of H12474 and the northern extent of H12475. The average difference was -0.03 meters.*

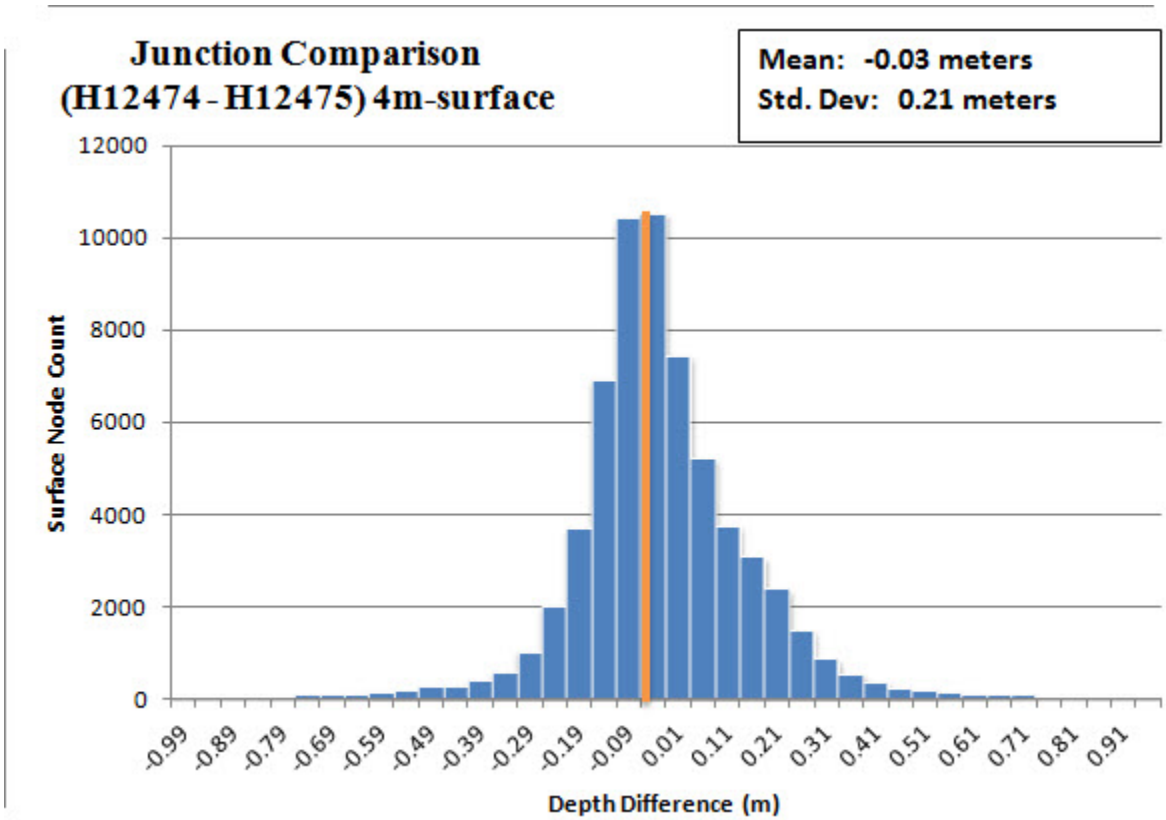



*Figure 16: Difference surface statistics between junction of H12474 and H12475.*

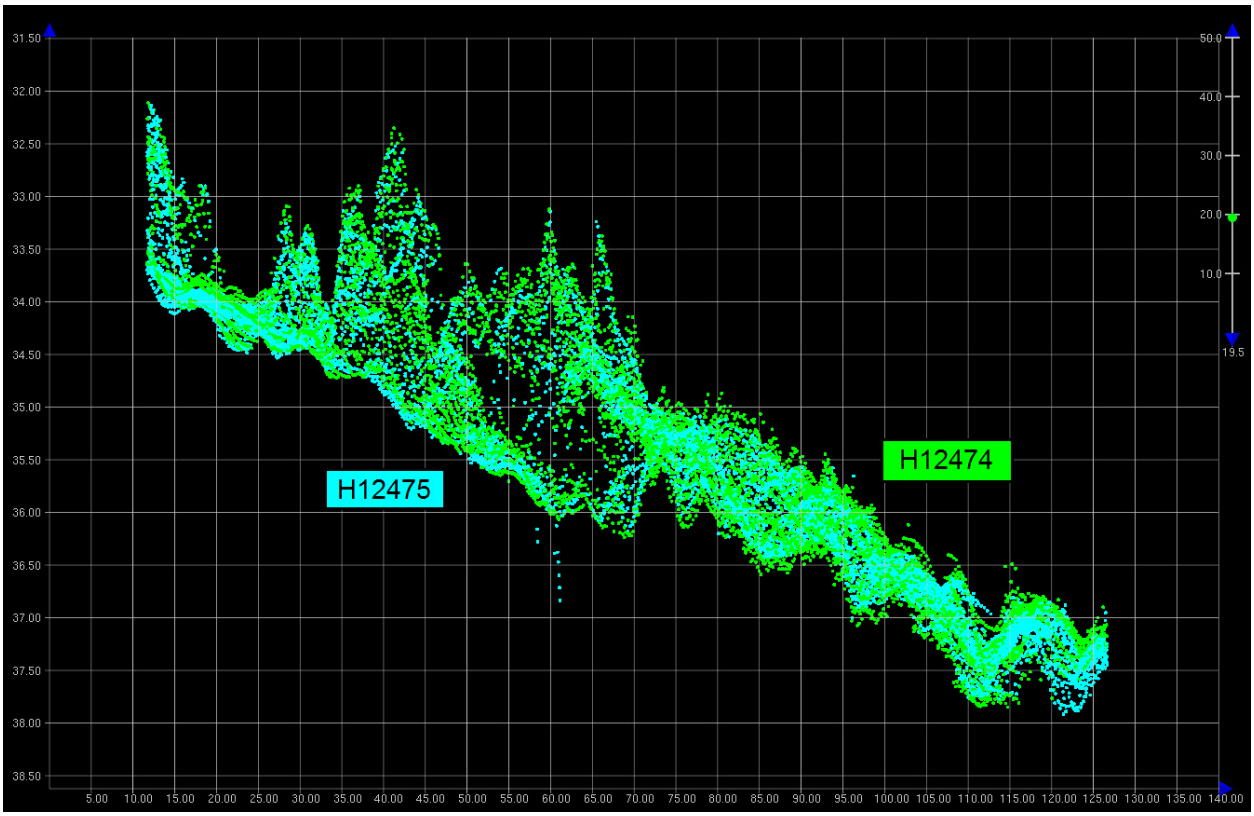



*Figure 17: Subset of multibeam data between junction of H12474 and H12475.*

H12104

The junction with lidar survey H12104 is along the southwestern edge of survey H12474 (Figure 19). In accordance with the H12104 Descriptive Report, the lidar shoal layer was used for the depth comparison. A CARIS difference surface was created using the depth layer from the 4-meter surface of H12474 and the shoal layer of the 5-meter surface of H12104 (Figure 20), yielding a mean difference of -0.04 meters (H12104 shoaler) with a standard deviation of 0.49 meters (Figure 21).

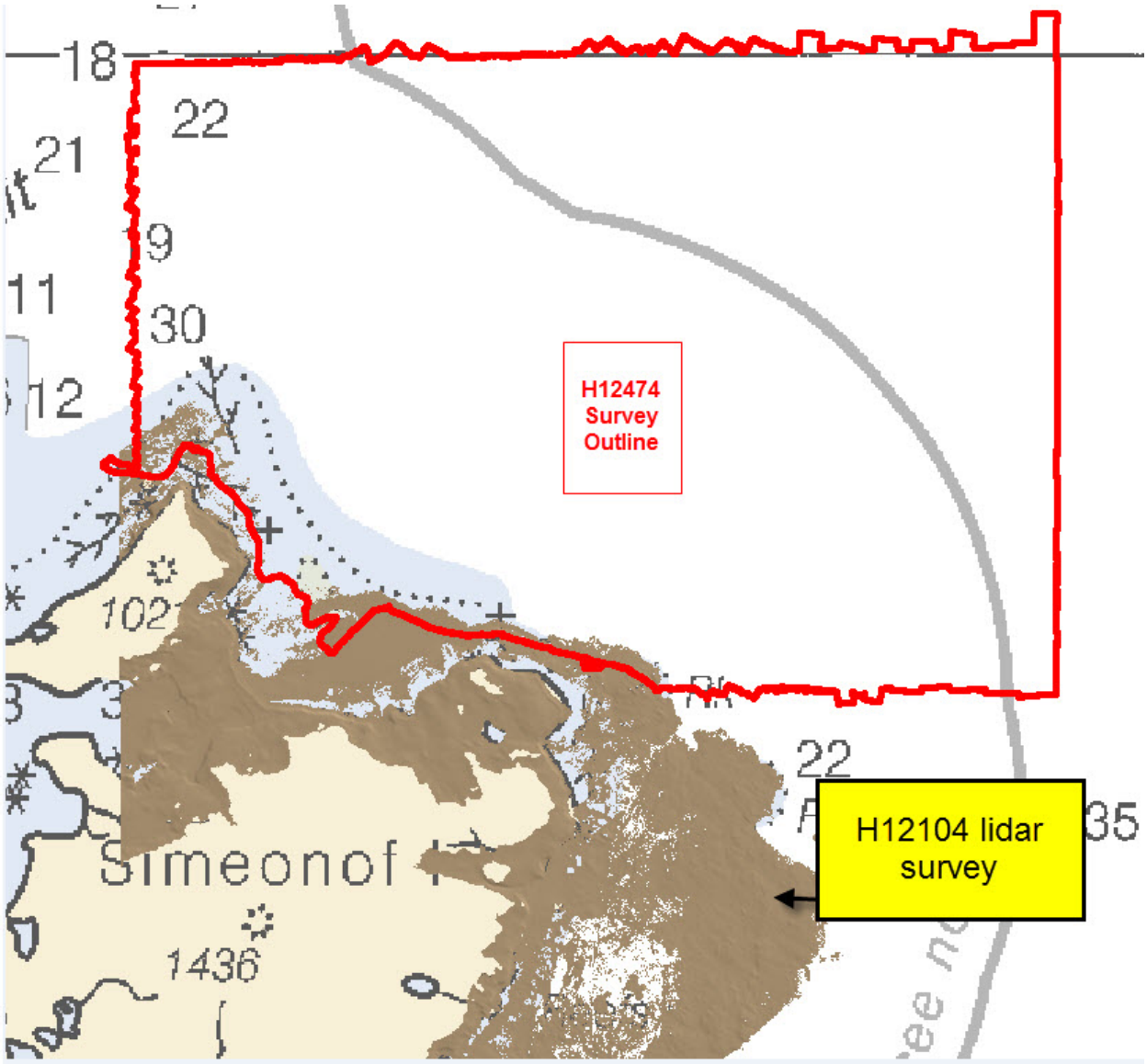



*Figure 18: Lidar junction survey overview.*

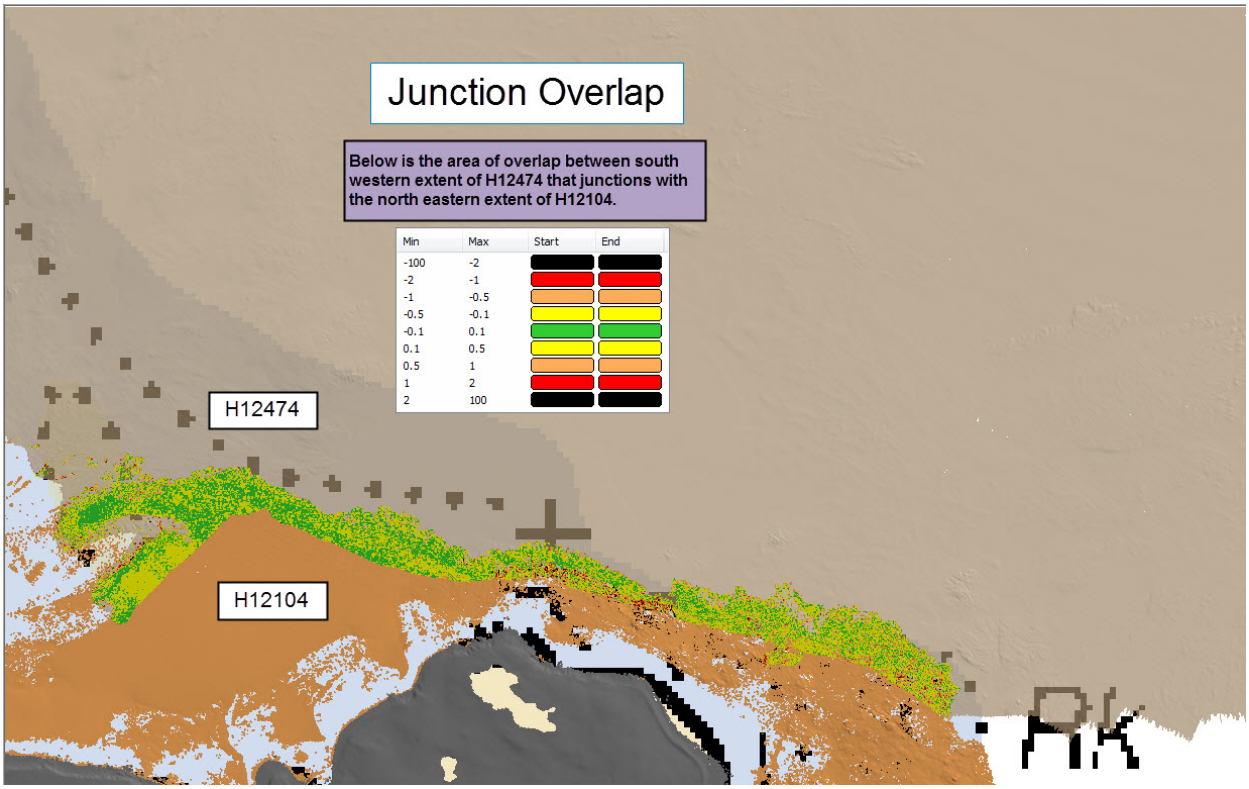



*Figure 19: Difference surface (in meters) of junction between southwestern extent of H12474 and the northeastern extent of H12104. The average difference was -0.04 meters.*

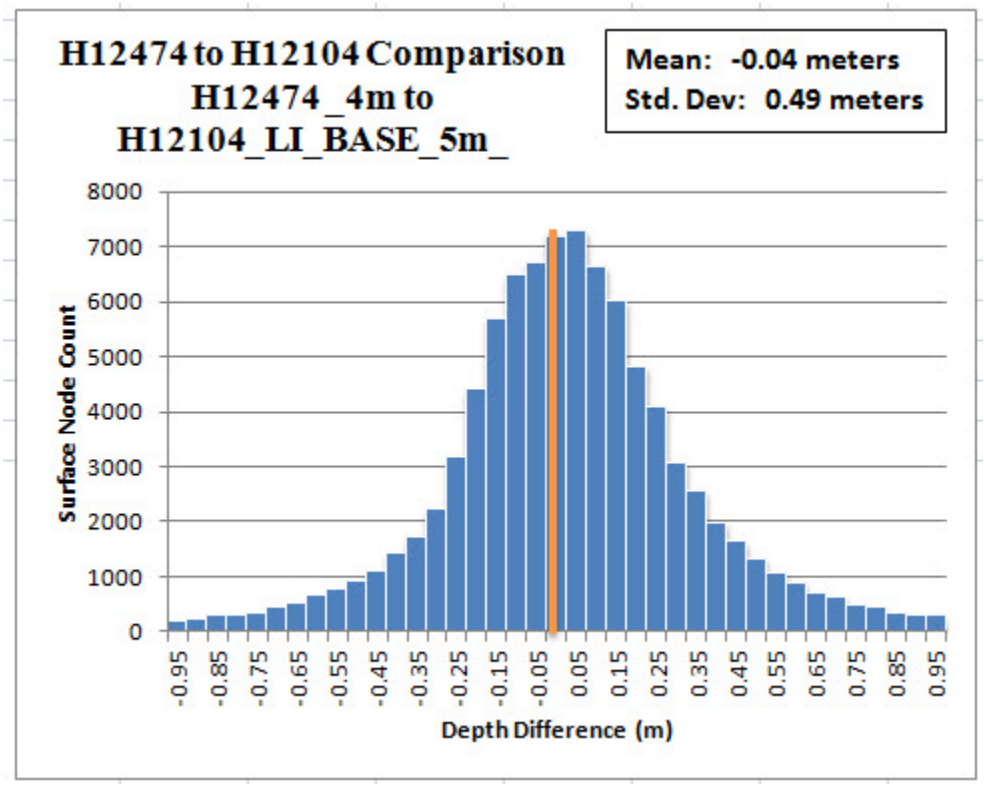



*Figure 20: Difference surface statistics between junction of H12474 and H12104.*

### 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

<u>Kongsberg EM710 Data Artifact</u>

During the 2012 Hydrographic Survey Readiness Review, an artifact was identified in bathymetric data acquired with the RAINIER's Kongsberg EM710. This heave-like artifact amplifies with vessel dynamics; in particular, as the magnitude of the ship's pitch and heave increases (e.g. in heavy weather), so too does the magnitude of the depth errors. Figure 22 shows an overhead view of two survey lines acquired in similar depths (~90 meters) on different days during acquisition of a previous survey. On the left, data was acquired in a more dynamic regime (8 foot seas), while the right was acquired on a calmer day (4 foot seas) -- both lines are gridded at a 4-meter resolution with equivalent vertical exaggerations. The survey lines of Figure 22 are shown in CARIS subset view in Figure 23. Figure 23 (top) demonstrates the characteristic undulation of the nadir pings of the ship's system, when in heavy seas. By way of contrast, Figure 23 (bottom), acquired in a less dynamic environment, is nearly free of the artifact. While not an absolute rule, every 1-degree of vessel pitch leads to about 0.1 meters of vertical bias. Representatives from Kongsberg, Applanix and CARIS have been contacted with regard to this problem, and ship's personnel are actively investigating a remedy to this issue; however, at the time of this writing, the artifact still persists. Although the artifact was

minimal within survey H12474, it nonetheless exists within the data. The examples below are not data from H12474 and are not representative of the overall quality of this particular survey. The artifact seen on survey H12474 had an error on a magnitude of approximately 0.10 meters.

To mitigate problems associated with this artifact, ship's acquisition was only conducted in a sea state that was commensurate with minimizing vessel dynamics. It is in the opinion of the Hydrographer that all data acquired by the EM710 for H12474 is adequate to supersede the chart.

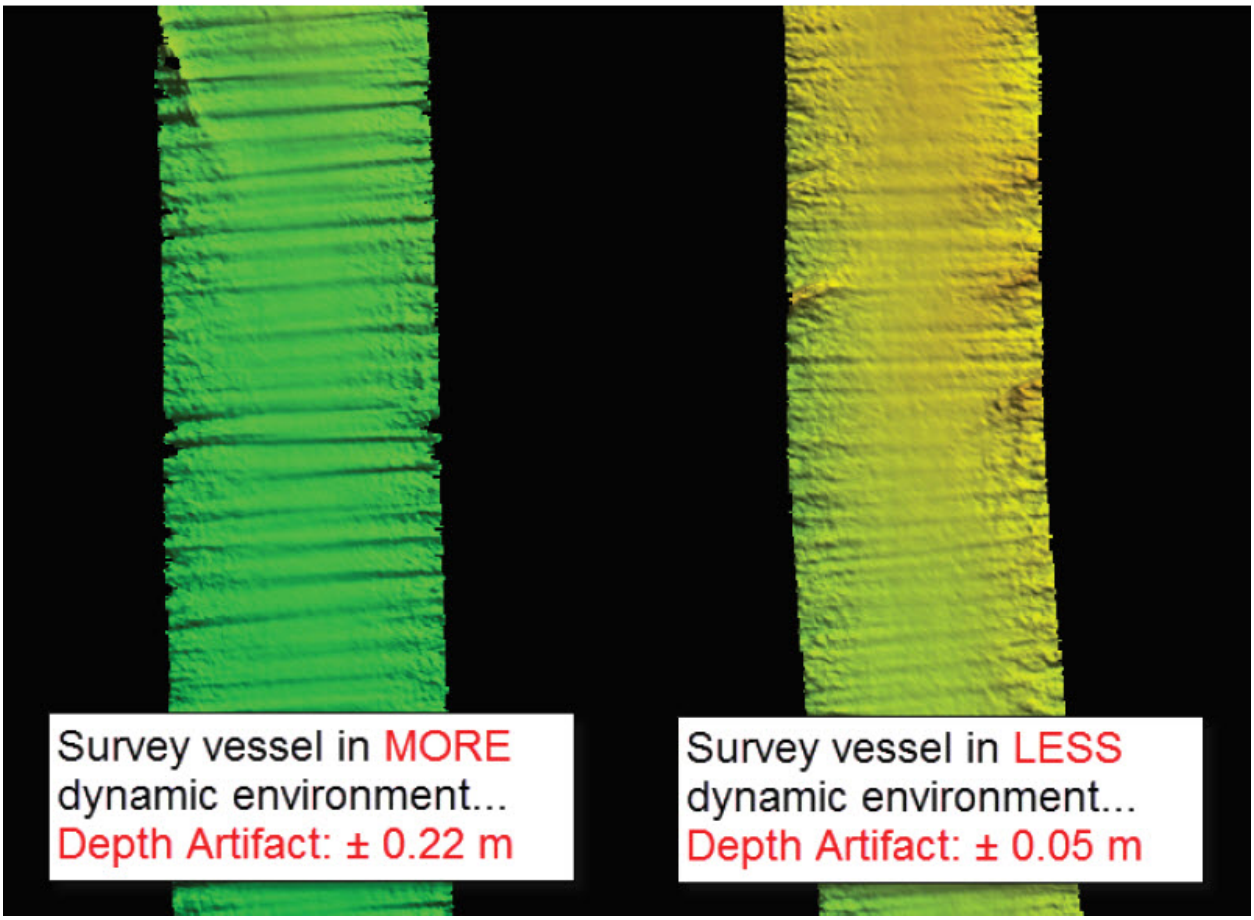



*Figure 21: Overhead view of two survey lines, acquired on different days, using the Rainier's Kongsberg EM710. Data acquired in heavier seas (left) displayed a characteristic undulation in the gridded seafloor, while calmer days (right) yielded a smoother representation of the bottom. This data is not from survey H12474.*

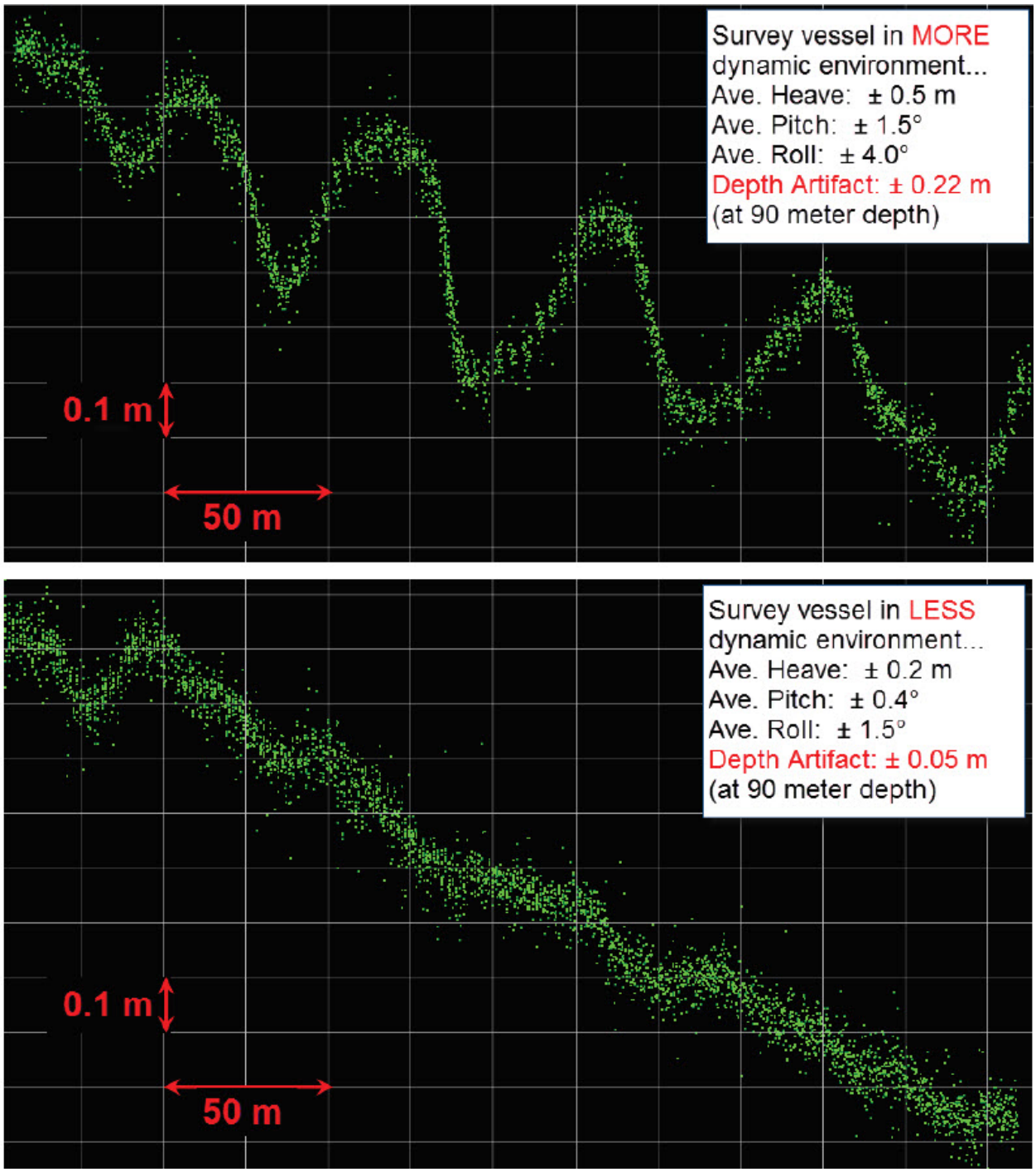



*Figure 22: Cross section view of data acquired using the Rainier's Kongsberg EM710, over a smooth seafloor, on both dynamic (top) and calm (bottom) sea states. Notice that with increased vessel dynamics, there is an increased artifact in the processed depths. This data is not from survey H12474.*

### B.2.6 Factors Affecting Soundings

Sound Speed Artifacts

Due to the dynamic nature of the sound speed within the survey area, there are associated artifacts seen within the data. These artifacts are most pronounced in the outer beams, and generally present themselves in the form of a “frown". The CUBE surface generated by CARIS largely ignored the outer beam sound speed refraction and stayed true to the seafloor (Figure 24). All data meets or exceeds accuracy specifications as outlines in the HSSDM.

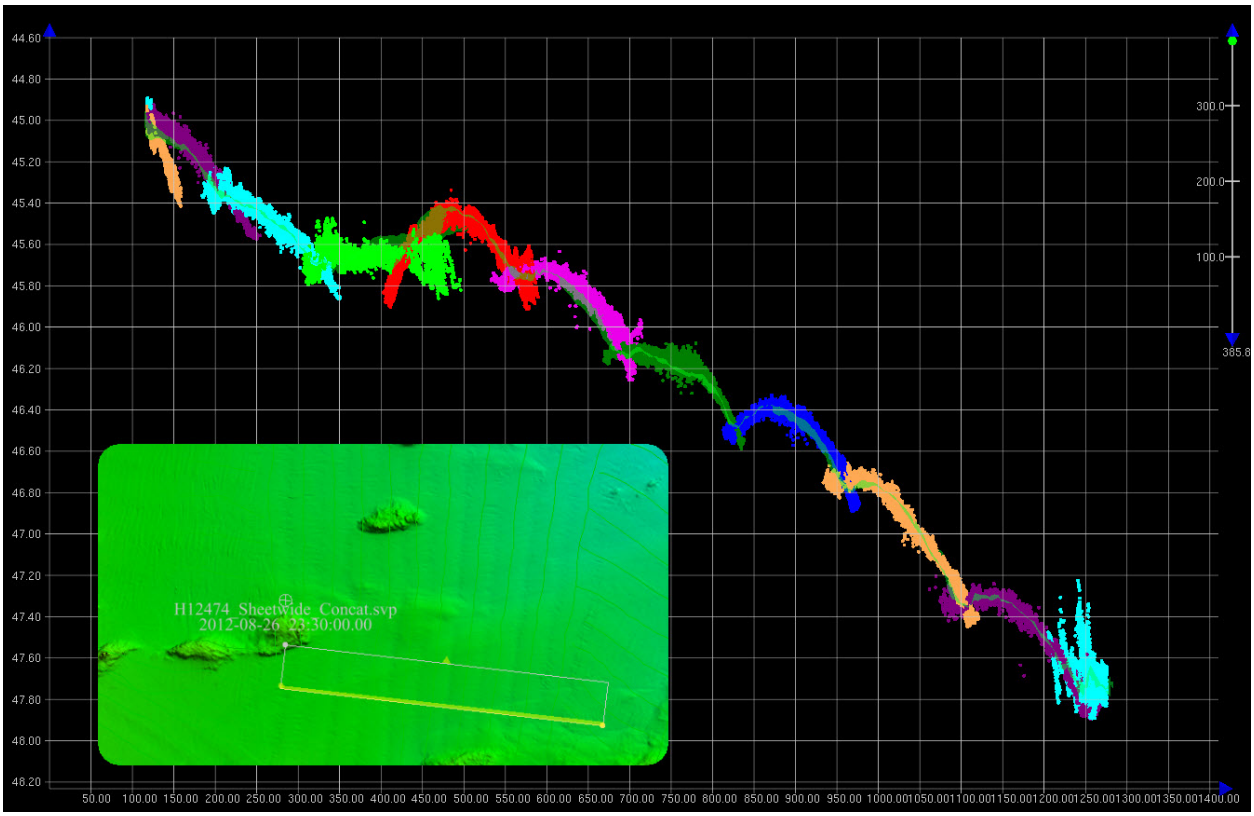



*Figure 23: Example of sound speed artifact seen in survey H12474.*

Large Sea State During Crossline Acquisition

Two crosslines were acquired by Launch 2802 as a quality check against the RAINIER's EM710 data. Owing to a large sea state (greater than 5 feet) observed during crossline acquisition, a heave-like artifact was noted in the crossline (Figure 25). At its worse, the artifact measures ±0.25 meters, which is within allowable accuracy tolerances for the given depths. Though of lesser quality, the data was retained given it was major quality check against the EM710. Again, all data meets the specifications as outlined in the HSSDM.

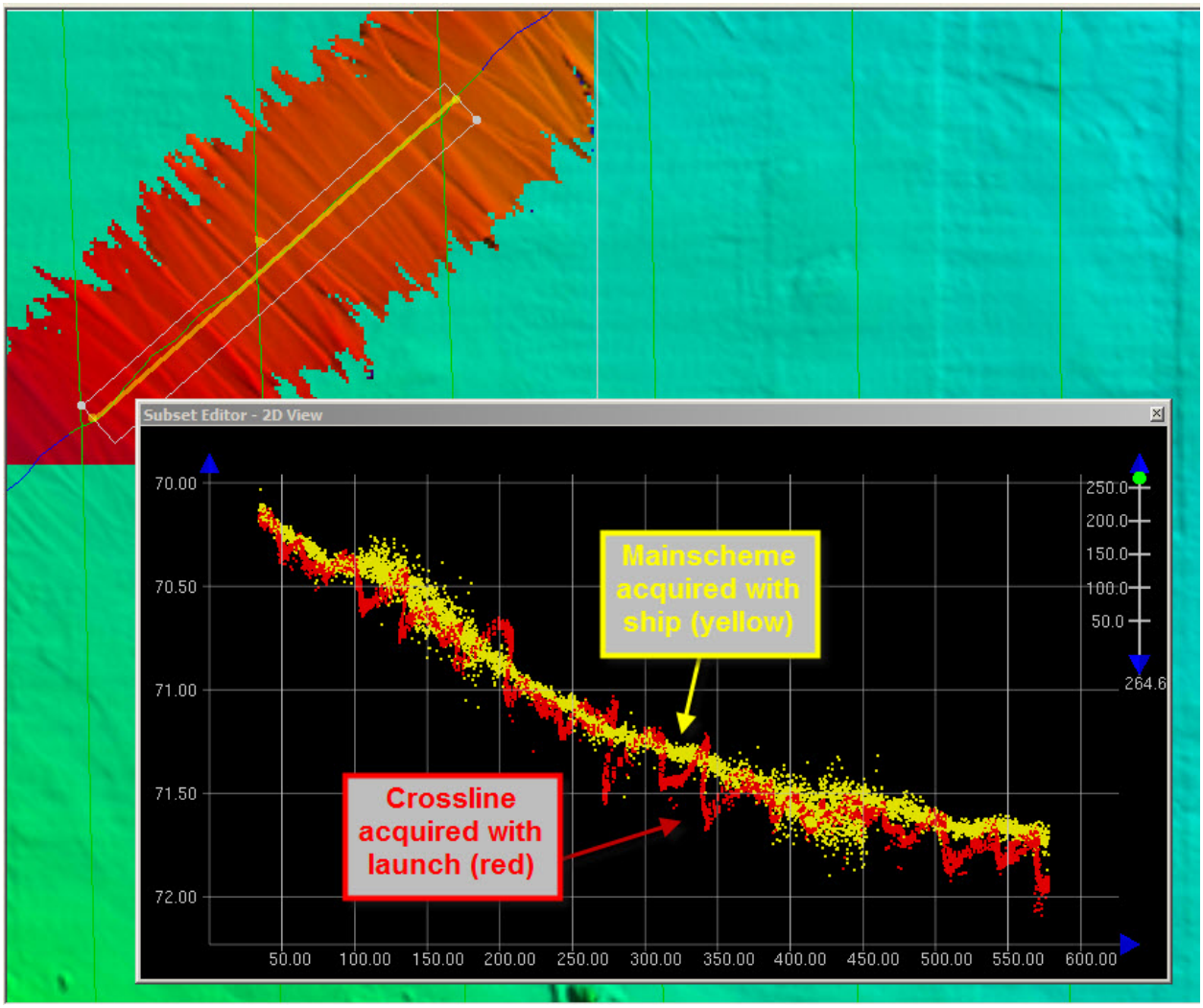



*Figure 24: Example of heave artifact seen in survey H12474.*

### B.2.7 Sound Speed Methods

Sound Speed Cast Frequency: Sound speed profiles were acquired with the MVP200 (S221) and MVP30 Launch 2804) approximately every 15 minutes with efforts made to distribute the casts throughout the survey area. All other launch sound speed profiles were acquired using the SBE-19 and SBE-19 plus CTDs at discrete locations at least once every four hours. A single sheet-wide concatenated SVP was created and applied to all H12474 survey lines using the "Nearest in distance within (4 hours) Time" profile selection method. A total of 55 SVP casts were used (Figure 26).

On DN257, one cast was taken outside of the survey limits. This cast was applied to a single holiday line and it was the only cast acquired that day. There is no apparent sound velocity artifact seen in this data.

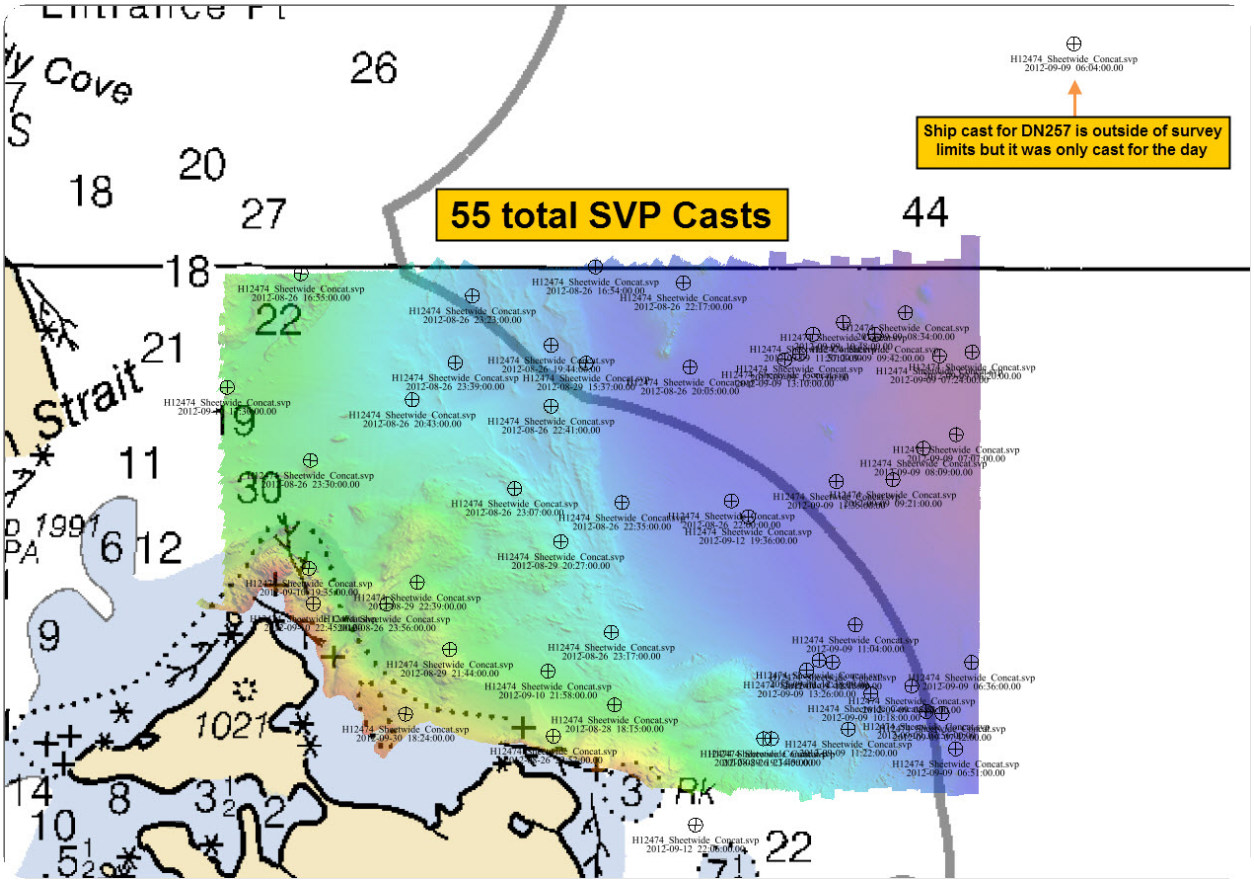



*Figure 25: Sound speed cast locations for survey H12474.*

***The data corrected by the DN 257 SV cast outside the survey limits meets specifications and is adequate to supersede charted data.***

### 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

Applanix True Heave correctors are not applied to Kongsberg EM710 multibeam data collected by RAINIER because tests in the field have demonstrated a marked increase in sonar data artifacts discussed in section B.1.1 of the DAPR. The current theory is that CARIS somehow mis-applies True Heave data to Kongsberg SIS data. This problem remains under investigation.

***The data from the EM710 is adequate to supersede charted data despite not having TrueHeave applied.***

### B.3.2 Calibrations

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

| Calibration Type | Date | Reason |
|---|---|---|
| Multibeam Patch Test | 2012-09-15 | Replaced Receiver |

*Table 9: Calibrations not discussed in the DAPR.*

On DN259, the 7125 receiver on Launch 2802 failed. The unit was replaced and subsequently re-calibrated. All changes in alignments are incorporated into the CARIS vessel file.

All other sounding systems were calibrated as detailed in the DAPR.

***Replacement and re-calibration of the Reson 7125 receiver did not negatively affect the data quality acquired with Launch 2802.***

## B.4 Backscatter

Backscatter was logged as .7k files for the launches, included in .ALL files for the ship, and submitted directly to NGDC, but are 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 Catalogue Control Version 5.2 and NOAA Profile Product Version 2.0

Software programs and versions used for data processing are described in 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 |
|---|---|---|---|---|---|
| H12474_1m | CUBE | 1 meters | 0 meters - | NOAA_1m | Complete MBES |

| Surface Name | Surface Type | Resolution | Depth Range | Surface Parameter | Purpose |
|---|---|---|---|---|---|
| | | | 83.0 meters | | |
| H12474_2m | CUBE | 2 meters | 0 meters - 83.0 meters | NOAA_2m | Complete MBES |
| H12474_4m | CUBE | 4 meters | 0 meters - 83.0 meters | NOAA_4m | Complete MBES |
| H12474_8m | CUBE | 8 meters | 0 meters - 83.0 meters | NOAA_8m | Complete MBES |
| H12474_1m_Final | CUBE | 1 meters | 0 meters - 20.0 meters | NOAA_1m | Complete MBES |
| H12474_2m_Final | CUBE | 2 meters | 18.0 meters - 40.0 meters | NOAA_2m | Complete MBES |
| H12474_4m_Final | CUBE | 4 meters | 36.0 meters - 80.0 meters | NOAA_4m | Complete MBES |
| H12474_8m_Final | CUBE | 8 meters | 72.0 meters - 160.0 meters | NOAA_8m | Complete MBES |
| H12474_8m_Combined | CUBE | 8 meters | 0 meters - 83.0 meters | NOAA_8m | Complete MBES |

*Table 10: 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 11: NWLON Tide Stations*

| File Name | Status |
|---|---|
| 9459450.tid | Final Approved |

*Table 12: Water Level Files (.tid)*

| File Name | Status |
|---|---|
| P183RA2012CORP.zdf | Final |

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

A request for final approved tides was sent to N/OPS1 on 10/02/2012. The final tide note was received on 10/18/2012.

***See attached tide note dated October 9, 2012.***

## C.2 Horizontal Control

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

The projection used for this project is 4N.

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

Single Base

In conjunction with this project, a GPS base station was established by RAINIER personnel in the vicinity of Simeonof Harbor near the northwest end of Simeonof Island. Vessel kinematic data (POS files) were post-processed with Applanix POSPac and POSGNSS software using Single Base processing methods described in the DAPR.

The following user installed stations were used for horizontal control:

| HVCR Site ID | Base Station ID |
|---|---|
| Simeonof Island, AK | N/A |

*Table 14: User Installed Base Stations*

The following DGPS Stations were used for horizontal control:

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

*Table 15: USCG DGPS Stations*

# D. Results and Recommendations

## D.1 Chart Comparison

### D.1.1 Raster Charts

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

| Chart | Scale | Edition | Edition Date | LNM Date | NM Date |
|---|---|---|---|---|---|
| 16540 | 1:300000 | 13 | 10/2012 | 10/30/2012 | 10/27/2012 |

*Table 16: Largest Scale Raster Charts*

<u>16540</u>

A comparison was made between survey H12474 and Chart 16540 using CARIS CUBE surfaces and a sounding layer. There are three charted depths within the limits of H12474. The charted 22-fathom depth was found to be 24 fathoms. The charted 19-fathom depth was found to be 23 fathoms and the charted 30-

fathom depth was found to be 23 fathoms (Figure 27). The Hydrographer recommends that a sounding set derived from survey H12474 supersede charted depths.

The charted 10-fathom contour does not agree with the acquired MBES coverage. Surveyed depths from H12474 suggest the contour should be moved shoreward. Data from the junctioning lidar survey (H12104) confirms this assessment (Figure 28).

Refer to section D.2 of this report for information regarding shoreline feature investigation.

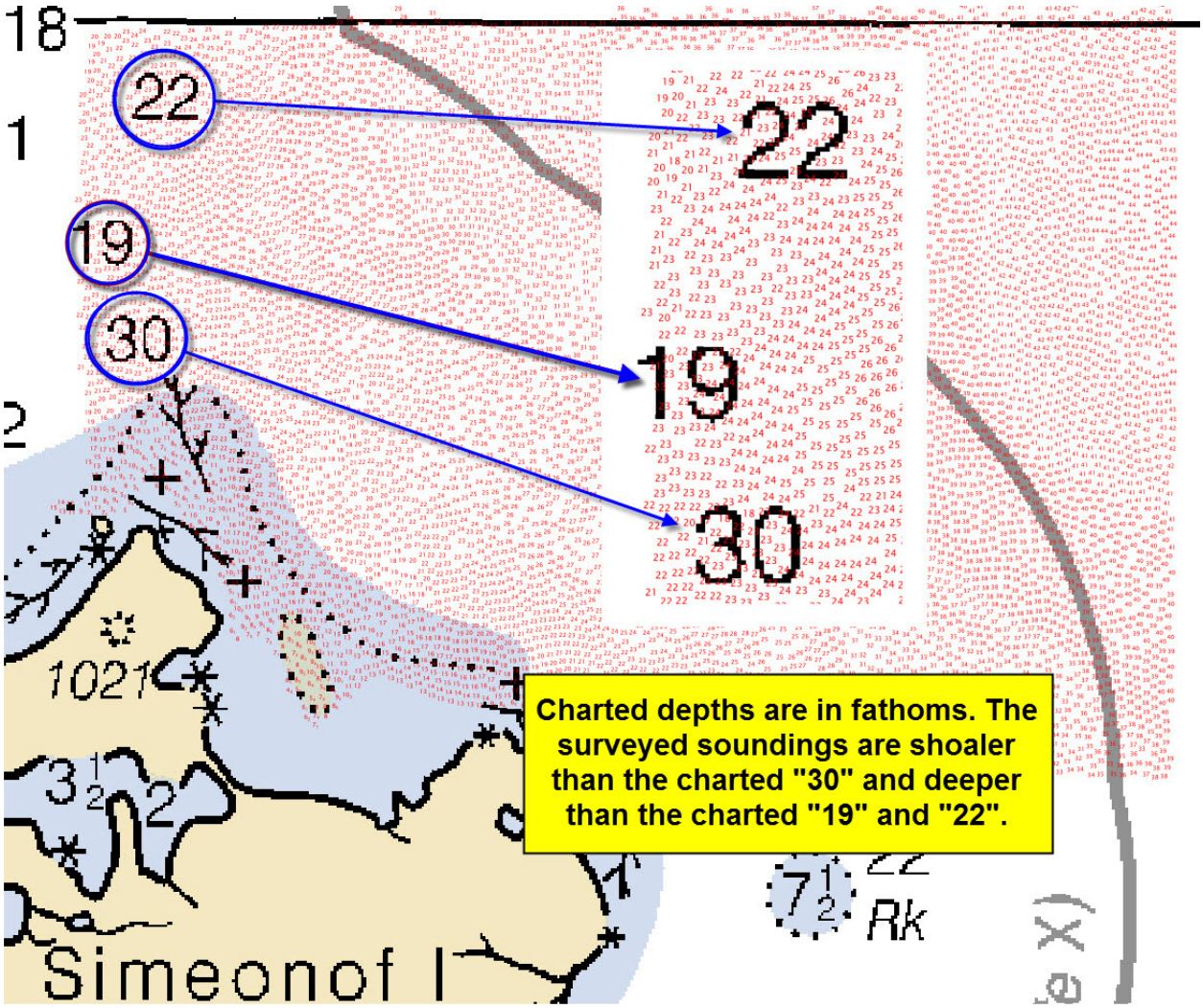



*Figure 26: Survey data as compared to charted (16540) depths.*

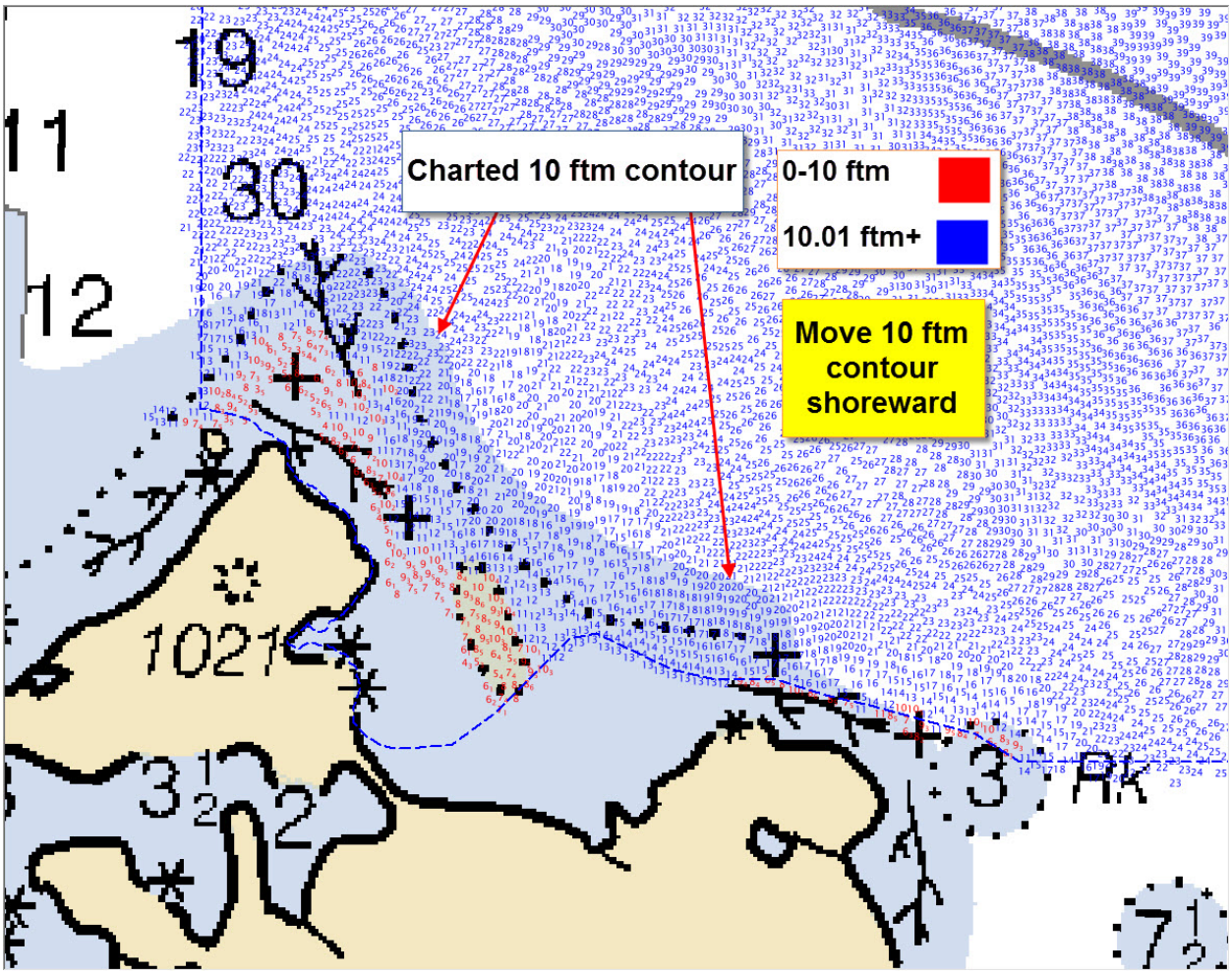



*Figure 27: Comparison between charted (16540) 10-fathom contour and depths measured derived from both survey H12474 and junctioning lidar survey (H12104).*

***Although the shoalest depth directly over the charted 30-fathom sounding is 23-fathoms, a 17-fathom sounding was found 271-meters to the northwest of the center of the charted sounding. It is recommended that the surveyed soundings and contours supersede the charted data.***

### D.1.2 Electronic Navigational Charts

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

| ENC | Scale | Edition | Update Application Date | Issue Date | Preliminary? |
|---|---|---|---|---|---|
| US3AK50M | 1:300000 | 17 | 06/29/2012 | 06/29/2012 | NO |

*Table 17: Largest Scale ENCs*

US3AK50M

ENC US3AK50M was digitized from Chart 16540 and coincides with the raster. The depths and contours on the ENC match the raster, and the comparison between survey H12474 and the ENC is equivalent to the preceding comparison with Chart 16540. The Hydrographer recommends that a sounding set derived from survey H12474 supersede charted depths.

### D.1.3 AWOIS Items

No AWOIS items exist for this survey.

### D.1.4 Maritime Boundary Points

No Maritime Boundary Points were assigned for this survey.

### D.1.5 Charted Features

No charted features that contain the label PA, ED, PD or Rep 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.

***There were no DTONs found during H12474, however there is 1 DTON identified during 2009 LIDAR survey H12104 that junctions with this survey. The DTON reported from H12104 has been applied to the charts. See attached H12104 DTON report.***

### D.1.8 Shoal and Hazardous Features

No shoals or potentially hazardous features exist for this survey.

### D.1.9 Channels

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

### D.1.10 Bottom Samples

Bottom Samples were acquired in accordance with the Project Instructions and the HSSDM and are attributed in the Final Feature File. A total of 6 bottom samples were collected within the sheet limits. After three attempts, one of the six samples did not produce a sample and was labeled "unknown."

## D.2 Additional Results

### D.2.1 Shoreline

There were 17 assigned features for this survey. All of the assigned features were either inshore of the NALL, or addressed in the Final Feature File (Figure 29).

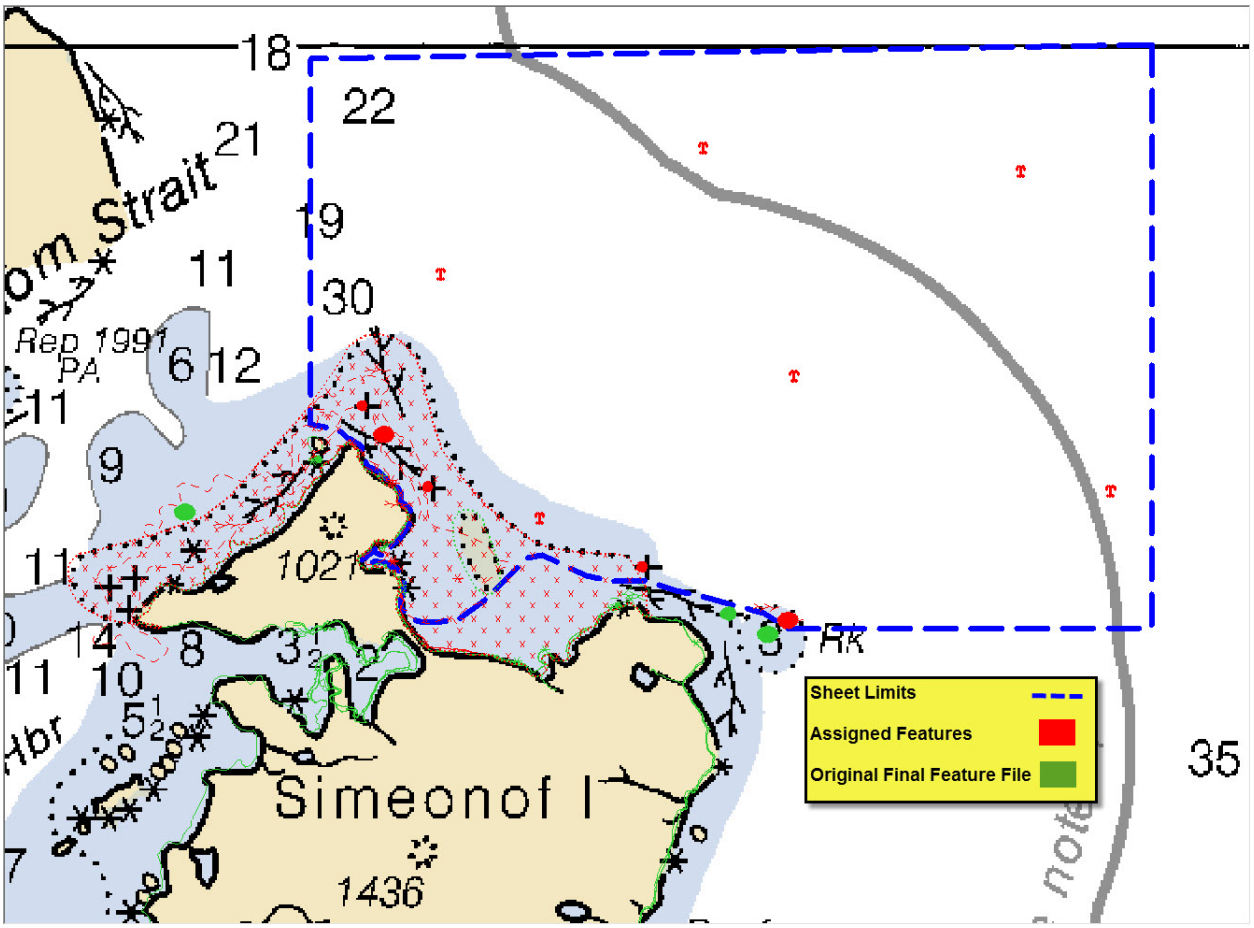



*Figure 28: H12474 shoreline features (those assigned indicated in red).*

### D.2.2 Prior Surveys

No prior survey comparisons exist for this survey.

### D.2.3 Aids to Navigation

Aids to navigation (ATONs) do not exist for this survey.

### D.2.4 Overhead Features

Overhead features do not exist for this survey.

### D.2.5 Submarine Features

Submarine features do not 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

There is no present or planned construction or dredging within the survey limits.

### D.2.10 New Survey Recommendations

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

### D.2.11 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, Standing and 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 | 01/10/2013 | Richard T Brennan |
| Michael O. Gonsalves LT/NOAA | Field Operations Officer, NOAA Ship RAINIER | 01/10/2013 | Michael O. Gonsalves 2013.01.10 15:05:51 -08'00' |
| James B. Jacobson | Chief Survey Technician, NOAA Ship RAINIER | 01/10/2013 | Digitally signed by James Jacobson Reason: I have reviewed this document Date: 2013.01.10 12:16:38 -08'00' |
| Rosemary P. Abbitt ENS/NOAA | Junior Officer, NOAA Ship RAINIER | 01/10/2013 | Digitally signed by Rosemary Abbitt Date: 2013.01.10 09:14:30 -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 :** October 9, 2012

**HYDROGRAPHIC BRANCH:** Pacific
**HYDROGRAPHIC PROJECT:** OPR-P183-RA-2012
**HYDROGRAPHIC SHEET:** H12474

**LOCALITY:** Northeast of Simeonof Island, Shumagin Islands, AK
**TIME PERIOD:** August 26 - September 30, 2012

**TIDE STATION USED:** 945-9450 Sand Point, AK
Lat. 55° 20.2'N Long. 160° 30.1' W
**PLANE OF REFERENCE (MEAN LOWER LOW WATER):** 0.000 meters
**HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE:** 1.988 meters

**REMARKS: RECOMMENDED ZONING**

Preliminary zoning is accepted as the final zoning for project OPR-P183-RA-2012, H12474, during the time period between August 26 - September 30, 2012.

Please use the zoning file P183RA2012CORP submitted with the project instructions for OPR-P183-RA-2012. Zone SWA193 is the applicable zone for H12474.

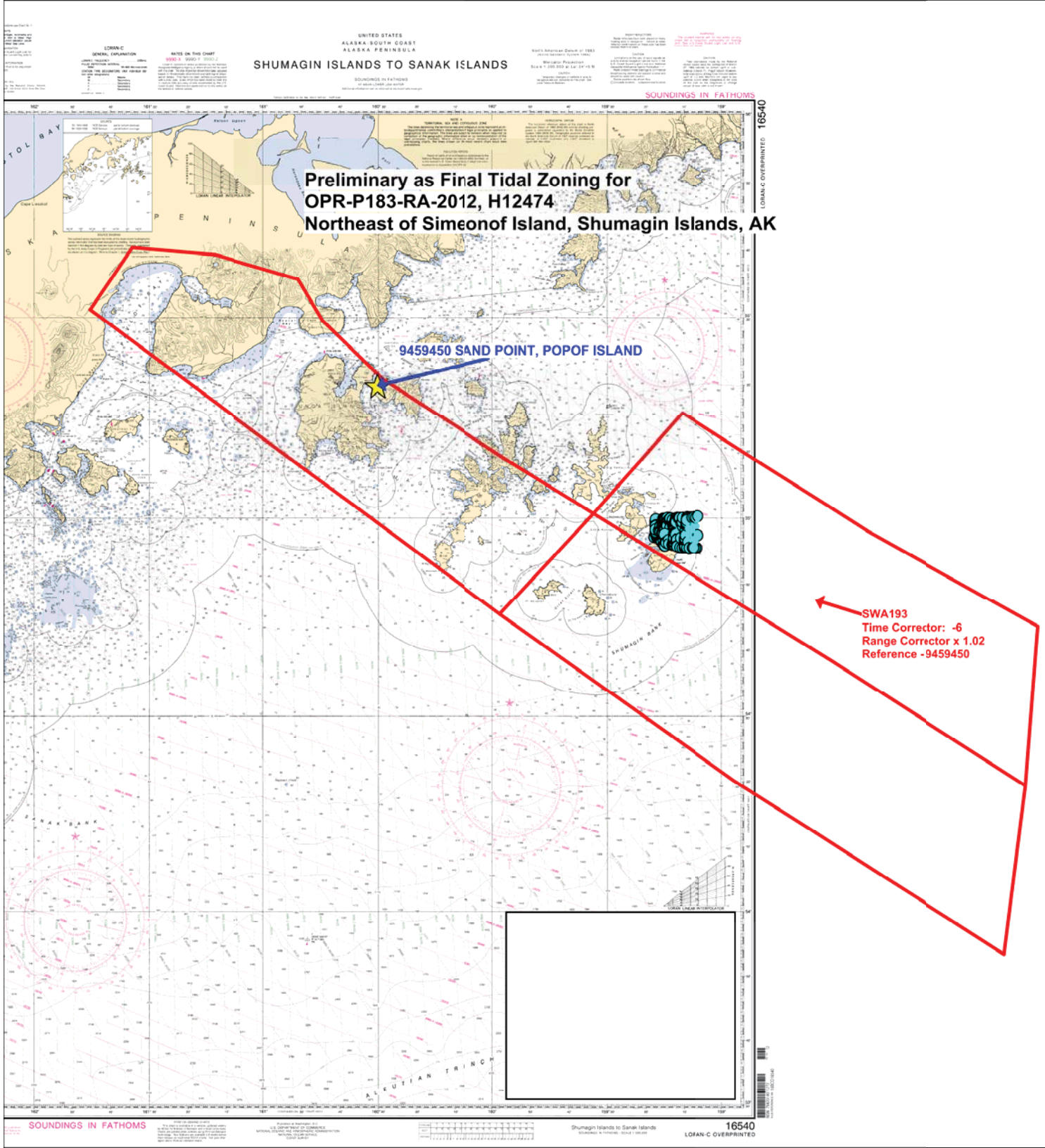
**Refer to attachments for zoning information.**

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

HOVIS.GERALD.THOMAS.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: 2012.10.18 08:28:01 -04'00'

CHIEF, PRODUCTS AND SERVICES BRANCH


UNITED STATES
ALASKA-SOUTH COAST
ALASKA PENINSULA
SHUMAGIN ISLANDS TO SANAK ISLANDS
SOUNDINGS IN FATHOMS
Preliminary as Final Tidal Zoning for
OPR-P183-RA-2012, H12474
Northeast of Simeonof Island, Shumagin Islands, AK
9459450 SAND POINT, POPOF ISLAND
SWA193
Time Corrector: -6
Range Corrector x 1.02
Reference -9459450
SHUMAGIN BANK
ALEUTIAN TRENCH
16540
LORAN-C OVERPRINTED

# APPENDIX I – DANGERS TO NAVIGATION

## DTONS Submitted to PHB

### I.1.1 Danger to Navigation Report

Hydrographic Survey Registry Number: H12104

State: Alaska

Locality: Vicinity of Shumagin Islands

Sub-locality: East of Simeonof Island

Project Number: OPR-P183-KRL-09

Survey Dates: June – August, 2009

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

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

The following items were found during hydrographic survey operations:

| No. | Feature | Depth (m) | Latitude (N) | Longitude (W) | Time, Date, Year | Investigate |
|---|---|---|---|---|---|---|
| 1 | Rk | 5.8 | 54° 55' 34.56" | 159° 11' 21.31" | 22:15:57, July 29, 2009 | No |
| 2 | Rk | 11.5 | 54° 51' 59.10" | 159° 12' 59.58" | 03:23:41, July 30, 2009 | No |
| 3 | Shoal | 12.8 | 54° 49' 58.03" | 159° 17' 27.39" | 03:22:35, July 30, 2009 | No |
| 4 | Rk | 13.9 | 54° 54' 52.44" | 159° 10' 05.62" | 20:58:40, July 19, 2009 | No |

**COMMENTS:** Final verified tides have been applied from the Sand Point tide gauge (9459450). The shoals were found using LIDAR. DTON items 1 through 4 were submitted during data collection from the field. No further DTON's were submitted following product compilation from the Biloxi MS office.

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

## DTONS Submitted to MCD

### I.1.2 Danger to Navigation Report (Submitted during field operations)

# Danger to Navigation Report for Lidar Survey H12104

**Registry Number:** H12104
**State:** Alaska
**Locality:** Vicinity of Shumagin Islands
**Sub-locality:** East of Simeonof 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)<br>NGA NTM: 01/21/2006 (08/01/2009) |
| 16013 | 30th | 07/01/2006 | 1:969,761 (16013_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 | Rock | 5.80 m | 54° 55' 34.6" N | 159° 11' 21.3" W |
| 1.2 | Rock | 11.50 m | 54° 51' 59.1" N | 159° 12' 59.6" W |
| 1.3 | Shoal | 12.80 m | 54° 49' 58.0" N | 159° 17' 27.4" W |
| 1.4 | Rock | 13.90 m | 54° 54' 52.4" N | 159° 10' 05.6" W |

*Generated by Pydro v9.6 (r2698) on Wed Aug 26 20:58:06 2009 [UTC]*

# 1 - Danger To Navigation

## 1.1) GP No. - 1 from H12104_Pydro.xls

### DANGER TO NAVIGATION

### Survey Summary

| | |
|---|---|
| **Survey Position:** | 54° 55' 34.6" N, 159° 11' 21.3" W |
| **Least Depth:** | 5.80 m (= 19.03 ft = 3.171 fm = 3 fm 1.03 ft) |
| **TPU (±1.96σ):** | **THU (TPEh)** [None] ; **TVU (TPEv)** [None] |
| **Timestamp:** | 2009-210.22:15:57.000 (07/29/2009) |
| **GP Dataset:** | H12104_Pydro.xls |
| **GP No.:** | 1 |
| **Charts Affected:** | 16540_1, 16013_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). Least depth determination by field investigation is recommended for this feature. The S-57 attribute QUASOU is set to '3' for doubtful sounding.

### Hydrographer Recommendations

Chart as surveyed.

**Cartographically-Rounded Depth (Affected Charts):**

3fm (16540_1, 16013_1, 16011_1, 16006_1, 530_1)

5.8m (500_1, 50_1)

### S-57 Data

| | |
|---|---|
| **Geo object 1:** | Underwater rock / awash rock (UWTROC) |
| **Attributes:** | QUASOU - 3:doubtful sounding |
| | SORDAT - 20090811 |
| | SORIND - US,US,nsurf,H12104 |
| | TECSOU - 7:found by laser |
| | VALSOU - 5.8 m |
| | VERDAT - 12:Mean lower low water |
| | WATLEV - 3:always under water/submerged |

## 1.2) GP No. - 2 from H12104_Pydro.xls

### DANGER TO NAVIGATION

### Survey Summary

| | |
|---|---|
| **Survey Position:** | 54° 51' 59.1" N, 159° 12' 59.6" W |
| **Least Depth:** | 11.50 m (= 37.73 ft = 6.288 fm = 6 fm 1.73 ft) |
| **TPU (±1.96σ):** | **THU (TPEh)** [None] ; **TVU (TPEv)** [None] |
| **Timestamp:** | 2009-211.03:23:41.000 (07/30/2009) |
| **GP Dataset:** | H12104_Pydro.xls |
| **GP No.:** | 2 |
| **Charts Affected:** | 16540_1, 16013_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):**

6 ¼fm (16540_1, 16013_1, 16011_1, 16006_1, 530_1)

11.5m (500_1, 50_1)

### S-57 Data

| | |
|---|---|
| **Geo object 1:** | Underwater rock / awash rock (UWTROC) |
| **Attributes:** | SORDAT - 20090811 |
| | SORIND - US,US,nsurf,H12104 |
| | TECSOU - 7:found by laser |
| | VALSOU - 11.5 m |
| | VERDAT - 12:Mean lower low water |
| | WATLEV - 3:always under water/submerged |

## 1.3) GP No. - 3 from H12104_Pydro.xls

### DANGER TO NAVIGATION

### Survey Summary

| | |
|---|---|
| **Survey Position:** | 54° 49' 58.0" N, 159° 17' 27.4" W |
| **Least Depth:** | 12.80 m (= 41.99 ft = 6.999 fm = 6 fm 5.99 ft) |
| **TPU (±1.96σ):** | **THU (TPEh)** [None] ; **TVU (TPEv)** [None] |
| **Timestamp:** | 2009-211.03:22:35.000 (07/30/2009) |
| **GP Dataset:** | H12104_Pydro.xls |
| **GP No.:** | 3 |
| **Charts Affected:** | 16540_1, 16013_1, 16011_1, 16006_1, 500_1, 530_1, 50_1 |

**Remarks:**

This sounding 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):**

7fm (16540_1, 16013_1, 16011_1, 16006_1, 530_1)

12.8m (500_1, 50_1)

### S-57 Data

| | |
|---|---|
| **Geo object 1:** | Sounding (SOUNDG) |
| **Attributes:** | SORDAT - 20090811 |
| | SORIND - US,US,nsurf,H12104 |
| | TECSOU - 7:found by laser |
| | VERDAT - 12:Mean lower low water |

## 1.4) GP No. - 4 from H12104_Pydro.xls

# DANGER TO NAVIGATION

## Survey Summary

| | |
|---|---|
| **Survey Position:** | 54° 54' 52.4" N, 159° 10' 05.6" W |
| **Least Depth:** | 13.90 m (= 45.60 ft = 7.601 fm = 7 fm 3.60 ft) |
| **TPU (±1.96σ):** | **THU (TPEh)** [None] ; **TVU (TPEv)** [None] |
| **Timestamp:** | 2009-200.20:58:40.000 (07/19/2009) |
| **GP Dataset:** | H12104_Pydro.xls |
| **GP No.:** | 4 |
| **Charts Affected:** | 16540_1, 16013_1, 16011_1, 16006_1, 500_1, 530_1, 50_1 |

**Remarks:**

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

## Hydrographer Recommendations

Chart as surveyed.

**Cartographically-Rounded Depth (Affected Charts):**

7 ½fm (16540_1, 16013_1, 16011_1, 16006_1, 530_1)

13.9m (500_1, 50_1)

## S-57 Data

| | |
|---|---|
| **Geo object 1:** | Underwater rock / awash rock (UWTROC) |
| **Attributes:** | SORDAT - 20090811 |
| | SORIND - US,US,nsurf,H12104 |
| | TECSOU - 7:found by laser |
| | VALSOU - 13.9 m |
| | VERDAT - 12:Mean lower low water |
| | WATLEV - 3:always under water/submerged |

APPROVAL PAGE

H12474

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

- H12474_DR.pdf
- Collection of depth varied resolution BAGS
- Processed survey data and records
- H12474_GeoImage.pdf

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

Digitally signed by HOLMBERG.PETER.SCOTT.1365886101
Date: 2014.04.14 08:46:28 -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.

Benjamin K. Evans
2014.04.11 15:36:30 -07'00'

Approved:_____

**LCDR Benjamin K. Evans, NOAA**
Chief, Pacific Hydrographic Branch