

H12549

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

**DESCRIPTIVE REPORT**

Type of Survey: Navigable Area

Registry Number: H12549

**LOCALITY**

State(s): Alaska

General Locality: Krenitzin Islands

Sub-locality: Northwest of Akutan Island

**2013**

CHIEF OF PARTY  
Dean Moyles

LIBRARY & ARCHIVES

Date:

**HYDROGRAPHIC TITLE SHEET**

**H12549**

**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: **Krenitzin Islands**

Sub-Locality: **Northwest of Akutan Island**

Scale: **40000**

Dates of Survey: **06/28/2013 to 07/15/2013**

Instructions Dated: **05/15/2013**

Project Number: **OPR-Q191-KR-13**

Field Unit: **Fugro Pelagos, Inc.**

Chief of Party: **Dean Moyles**

Soundings by: **Multibeam Echo Sounder**

Imagery by: **Multibeam Echo Sounder Backscatter**

Verification by: **Pacific Hydrographic Branch**

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

**Remarks:**

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

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## Descriptive Report to Accompany Survey H12549

Project: OPR-Q191-KR-13

Locality: Krenitzin Islands

Sublocality: Northwest of Akutan Island

Scale: 1:40000

June 2013 - July 2013

**Fugro Pelagos, Inc.**

Chief of Party: Dean Moyles

### A. Area Surveyed

H12549 is located Northwest of Akutan Island.

#### A.1 Survey Limits

Data were acquired within the following survey limits:

| Northwest Limit                    | Southeast Limit                   |
|------------------------------------|-----------------------------------|
| 54° 18' 24.98" N<br>165° 58' 35" E | 54° 4' 58.01" N<br>166° 13' 35" E |

*Table 1: Survey Limits*

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

#### A.2 Survey Purpose

The purpose of this work is to provide NOAA with modern and accurate hydrographic survey data for the area Northwest of Akutan Island. The survey covered 23.85 square nautical miles of critical survey area as designated in the NOAA Hydrographic Survey Priorities, 2012 edition.

#### A.3 Survey Quality

The entire survey is adequate to supersede previous data.

### A.4 Survey Coverage

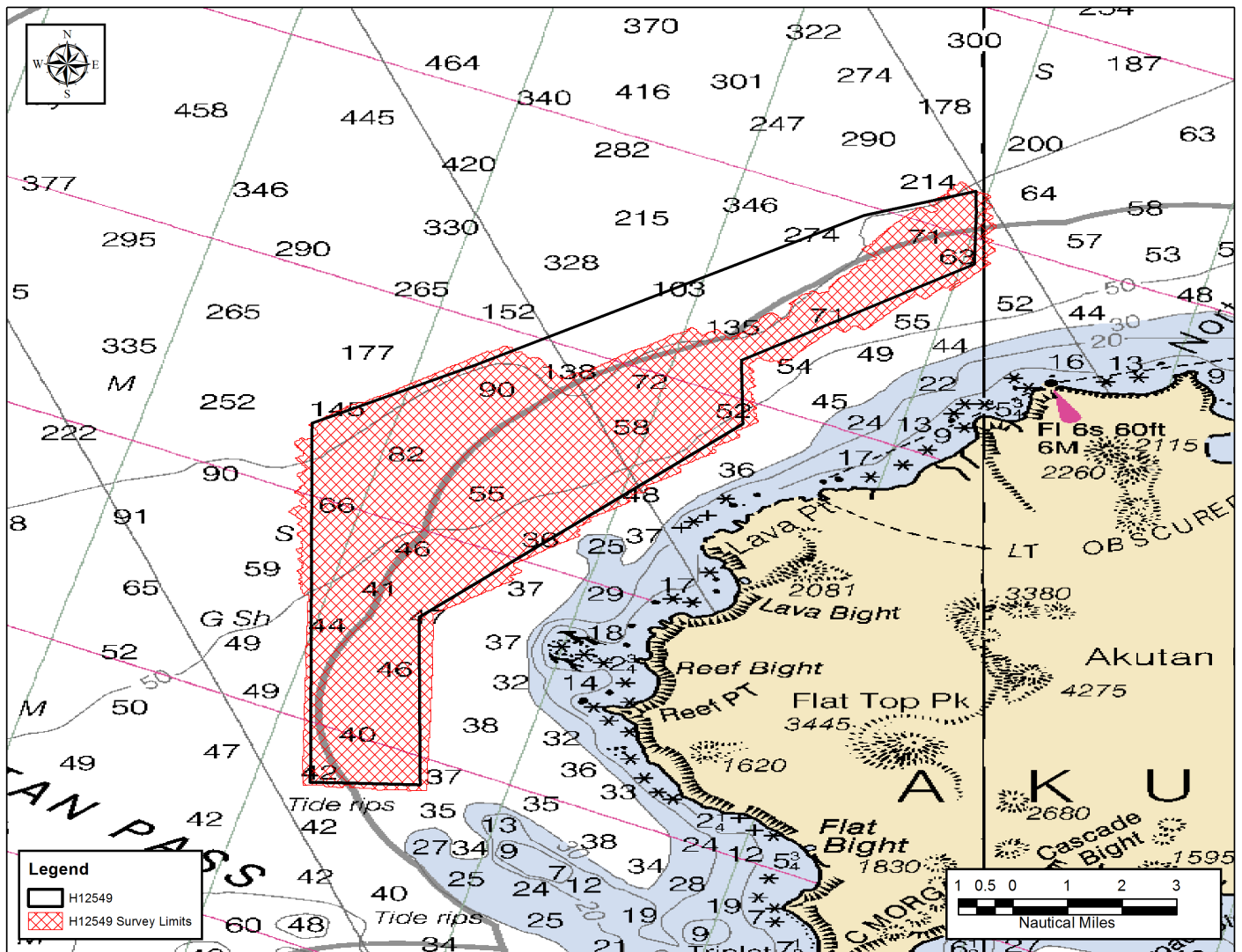


Figure 1: H12549 Survey Limits

Survey Coverage was in accordance with the requirements in the Project Instructions and the HSSD.

### A.5 Survey Statistics

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

|   | <b>HULL ID</b>                  | <i>Ocean<br/>Pioneer</i> | <i>Total</i> |
|---|---------------------------------|--------------------------|--------------|
| <b>LNM</b>  | <b>SBES<br/>Mainscheme</b>      | 0                        | 0            |
|   | <b>MBES<br/>Mainscheme</b>      | 213.08                   | 213.08       |
|   | <b>Lidar<br/>Mainscheme</b>     | 0                        | 0            |
|   | <b>SSS<br/>Mainscheme</b>       | 0                        | 0            |
|   | <b>SBES/MBES<br/>Mainscheme</b> | 0                        | 0            |
|   | <b>SBES/SSS<br/>Mainscheme</b>  | 0                        | 0            |
|   | <b>MBES/SSS<br/>Mainscheme</b>  | 0                        | 0            |
|   | <b>SBES/MBES<br/>Crosslines</b> | 12.72                    | 12.72        |
|   | <b>Lidar<br/>Crosslines</b>     | 0                        | 0            |
| <b>Number of<br/>Bottom Samples</b>                         |                                 |                          | 0            |
| <b>Number of AWOIS<br/>Items Investigated</b>               |                                 |                          | 0            |
| <b>Number Maritime<br/>Boundary Points<br/>Investigated</b> |                                 |                          | 0            |
| <b>Number of DPs</b>  |                                 |                          | 0            |
| <b>Number of Items<br/>Investigated by<br/>Dive Ops</b>     |                                 |                          | 0            |
| <b>Total SNM</b>  |                                 |                          | 23.85        |

Table 2: Hydrographic Survey Statistics



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

| <b>Survey Dates</b> | <b>Day of the Year</b> |
|---------------------|------------------------|
| 06/28/2013          | 179                    |
| 06/29/2013          | 180                    |
| 06/30/2013          | 181                    |
| 07/01/2013          | 182                    |
| 07/06/2013          | 187                    |
| 07/11/2013          | 192                    |
| 07/12/2013          | 193                    |
| 07/15/2013          | 196                    |

*Table 3: Dates of Hydrography*

*No processed data for 6/28/2013 was submitted.*

## **B. Data Acquisition and Processing**

### **B.1 Equipment and Vessels**

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

#### **B.1.1 Vessels**

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

|                |                      |
|----------------|----------------------|
| <b>Hull ID</b> | <i>Ocean Pioneer</i> |
| <b>LOA</b>     | 205 feet             |
| <b>Draft</b>   | 14 feet              |

*Table 4: Vessels Used*

## B.1.2 Equipment

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

| <b>Manufacturer</b> | <b>Model</b> | <b>Type</b>                                |
|---------------------|--------------|--|
| Applanix            | POS M/V v4   | Positioning and Attitude System            |
| OceanScience        | UCTD         | Conductivity, Temperature and Depth Sensor |
| Reson               | 7125         | MBES                                       |
| Reson               | SVP70        | Sound Speed System                         |

*Table 5: Major Systems Used*

WaterLOG H3611 (Radar Water Level Sensors) were installed on the port and starboard gunwales of M/V Ocean Pioneer to obtain a more precise static draft measurement. Samples were taken over a 10 minute period and averaged to determine the vessel's draft. Traditional static draft measurement techniques were also employed as a substitute for the WaterLOG H3611 measurements when required.

## B.2 Quality Control

### B.2.1 Crosslines

Crosslines, acquired for this survey, totalled 5.97% of mainscheme acquisition.

Crosslines were planned and well distributed throughout the survey to ensure adequate quality control. Total crossline length surveyed was 12.72 nautical miles or 5.97 percent of the total mainscheme line length. Each crossline was compared to the entire mainscheme line plan through a 4m CUBE surface using the CARIS HIPS QC report routine. Good conformity was seen between the mainscheme lines and the crosslines.

### B.2.2 Uncertainty

The following survey specific parameters were used for this survey:

| <b>Measured</b> | <b>Zoning</b> |
|-----------------|---------------|
| 0.1 meters      | 0.2 meters    |

*Table 6: Survey Specific Tide TPU Values*

| <b>Hull ID</b> | <b>Measured - CTD</b> | <b>Measured - MVP</b> | <b>Surface</b>      |
|----------------|-----------------------|-----------------------|---------------------|
| Ocean Pioneer  | 1.740 meters/second   | 0 meters/second       | 0.250 meters/second |

*Table 7: Survey Specific Sound Speed TPU Values*

The majority of the data fell within IHO Order 1a accuracy specifications. Nodes that exceeded the allowable specifications were located in rough or rapidly changing topography or areas where the outer beams of the coverage boundaries were the single contributor to the surface. Despite the higher uncertainty values in these areas, agreement between adjacent lines and co-linearity between soundings was good.

Note: The percentage of nodes within IHO Oder 1a, were computed by CARIS using the Surface QC Report utility and are as follows:

#### CUBE Surface Uncertainty Report

| Surface,         | Depth Range (m), | % of nodes within IHO Order 1a |
|------------------|------------------|--------------------------------|
| H12549-4m_Final  | 36 - 80          | 100.00%                        |
| H12549-8m_Final  | 72 - 160         | 100.00%                        |
| H12549-16m_Final | 144 - 320        | 100.00%                        |
| H12549-32m_Final | 320 - 640        | 100.00%                        |

As illustrated in the uncertainty errors graphic, the uncertainty is generally lowest near the sonar nadir beams and increases toward the outside of each swath. This is expected and primarily a result of the sonar's device model used within CARIS HIPS for TPU calculations. In general, total propagated uncertainty varies proportionally to water depth. Outer beams also have higher uncertainty values as a function of the bottom-detection algorithms within the sonar. Data met project specifications.

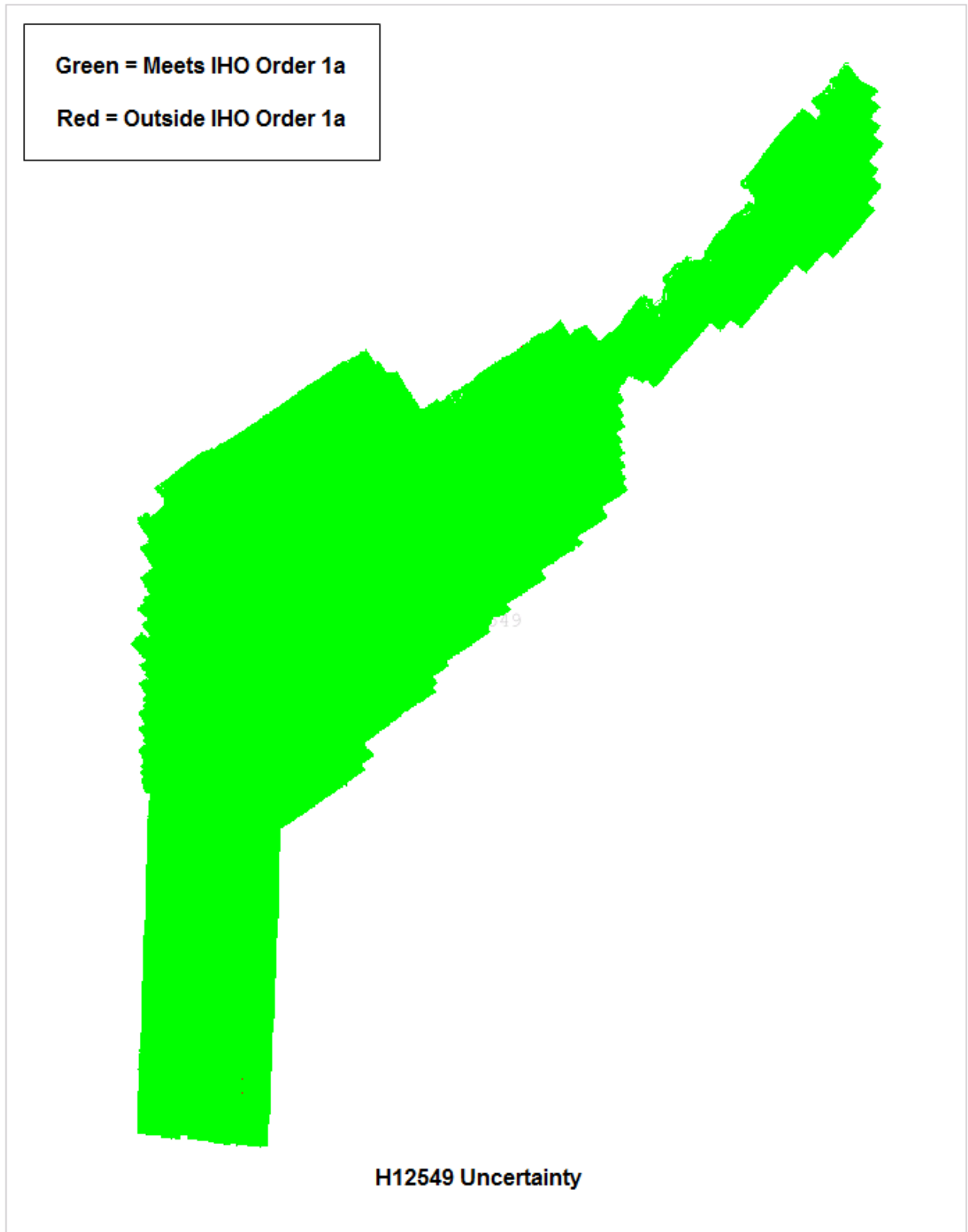


Figure 2: H12549 Uncertainty

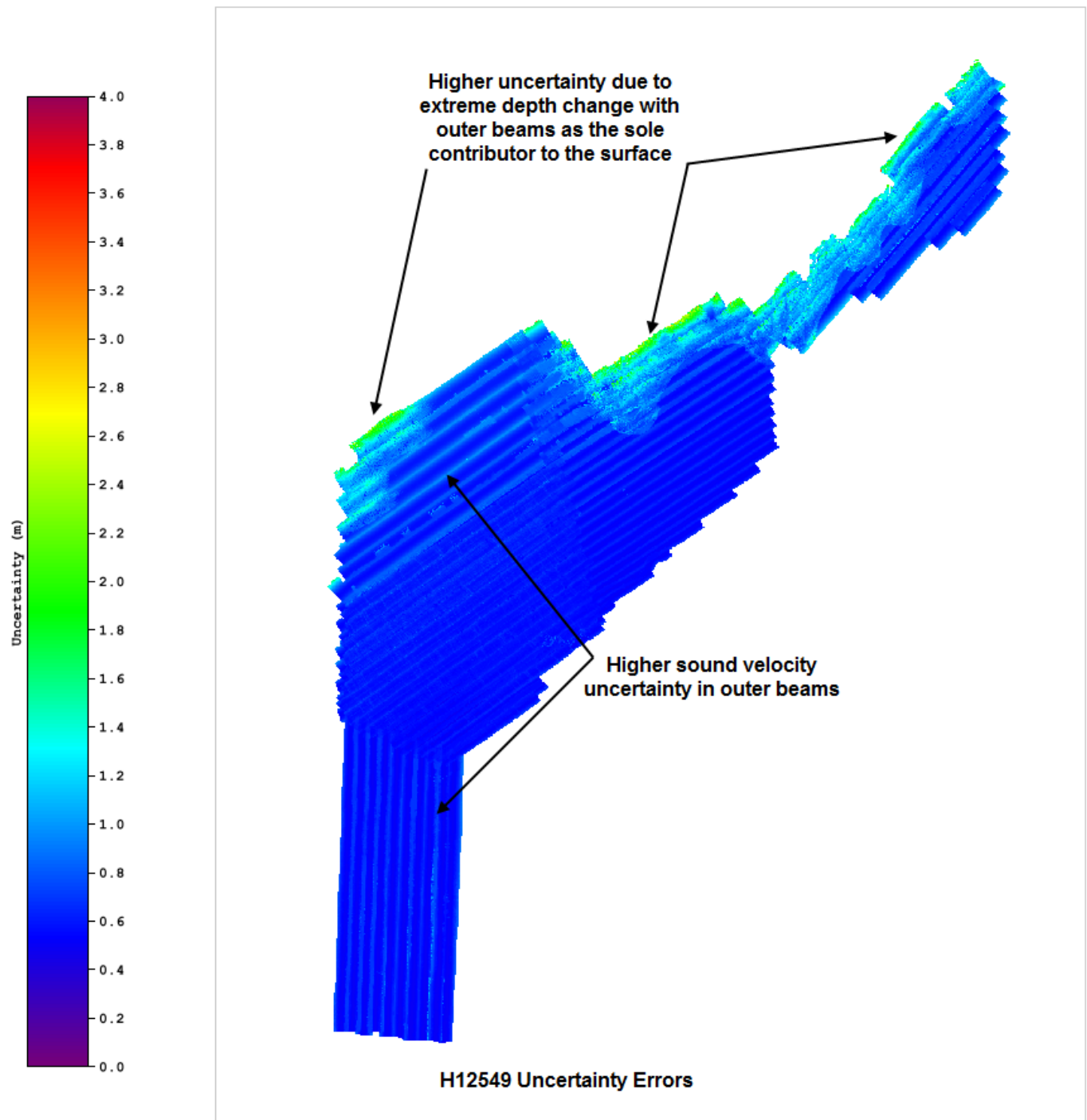


Figure 3: H12549 Uncertainty Errors

### B.2.3 Junctions

The surveys are in agreement along their common borders. The conformity between H12549 and the bordering survey area (H12548) was inspected during processing, using CARIS HIPS' Subset Editor routine and finalized BASE Surfaces. Difference surfaces were also created at a 4-meter resolution between H12549, and the junction with survey area H11713 (2007), and also for the junction of H12549 and survey area W00225 (2011). The data were well within the IHO Order 1a allowable error.

The following junctions were made with this survey:

| Registry Number | Scale   | Year | Field Unit          | Relative Location |
|-----------------|---------|------|---------------------|-------------------|
| H11713          | 1:10000 | 2007 | Fugro Pelagos, Inc. | S                 |
| W00225          | 1:40000 | 2011 | Fugro Pelagos, Inc. | W                 |

*Table 8: Junctioning Surveys*

#### H11713

A difference surface was created to compare the 4-meter surface from H12549 and the junction with the 5-meter surface from H11713 (2007), confirming that approximately 70.97% of the nodes agree to within +/-0.50m. The other 29.03% of the nodes were primarily affected by sound refraction errors in the outer beams of the sonar swath for the survey lines in the southern-most portion of H12549. The data were well within the IHO Order 1a allowable error.

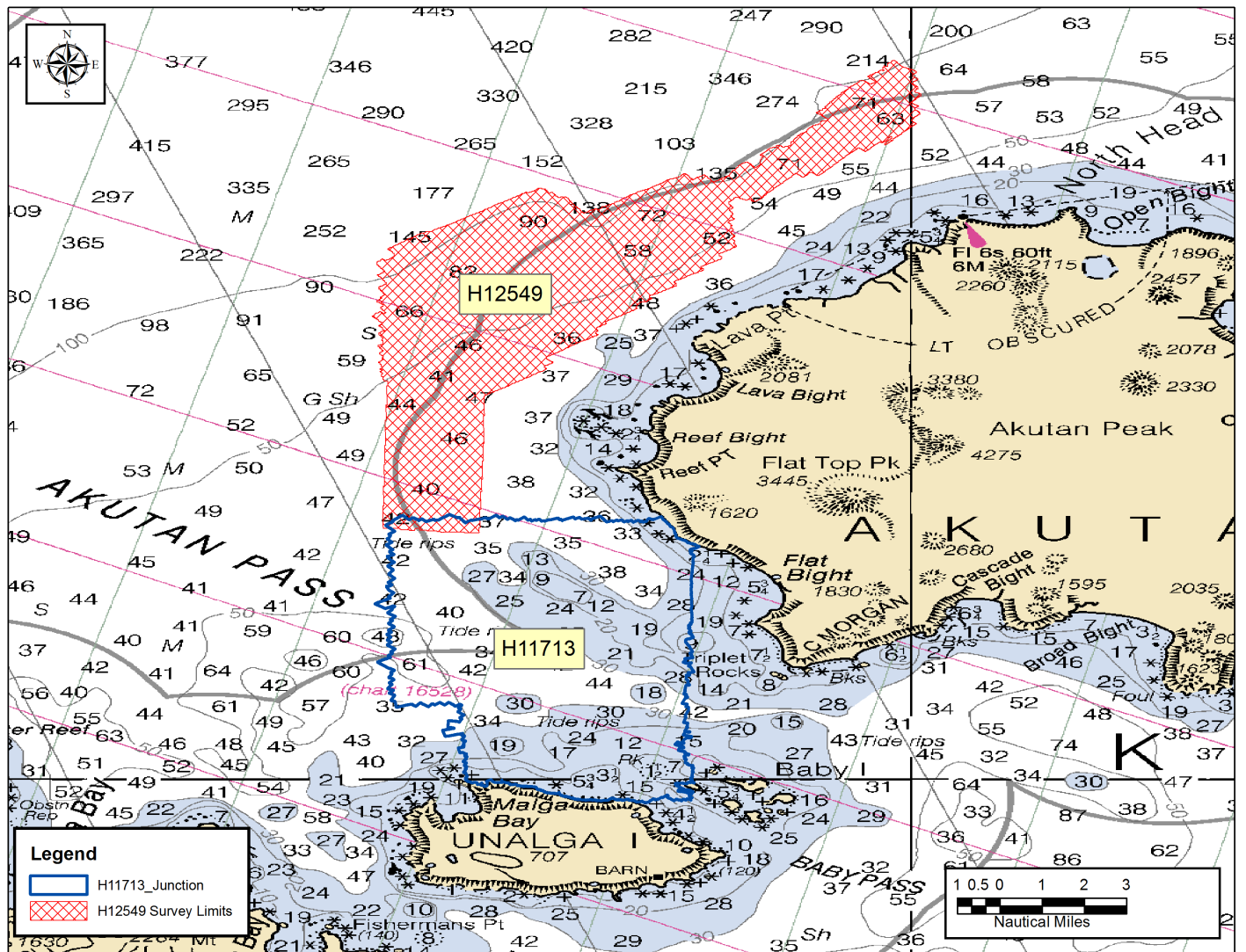


Figure 4: H12549 Junctions with H11713

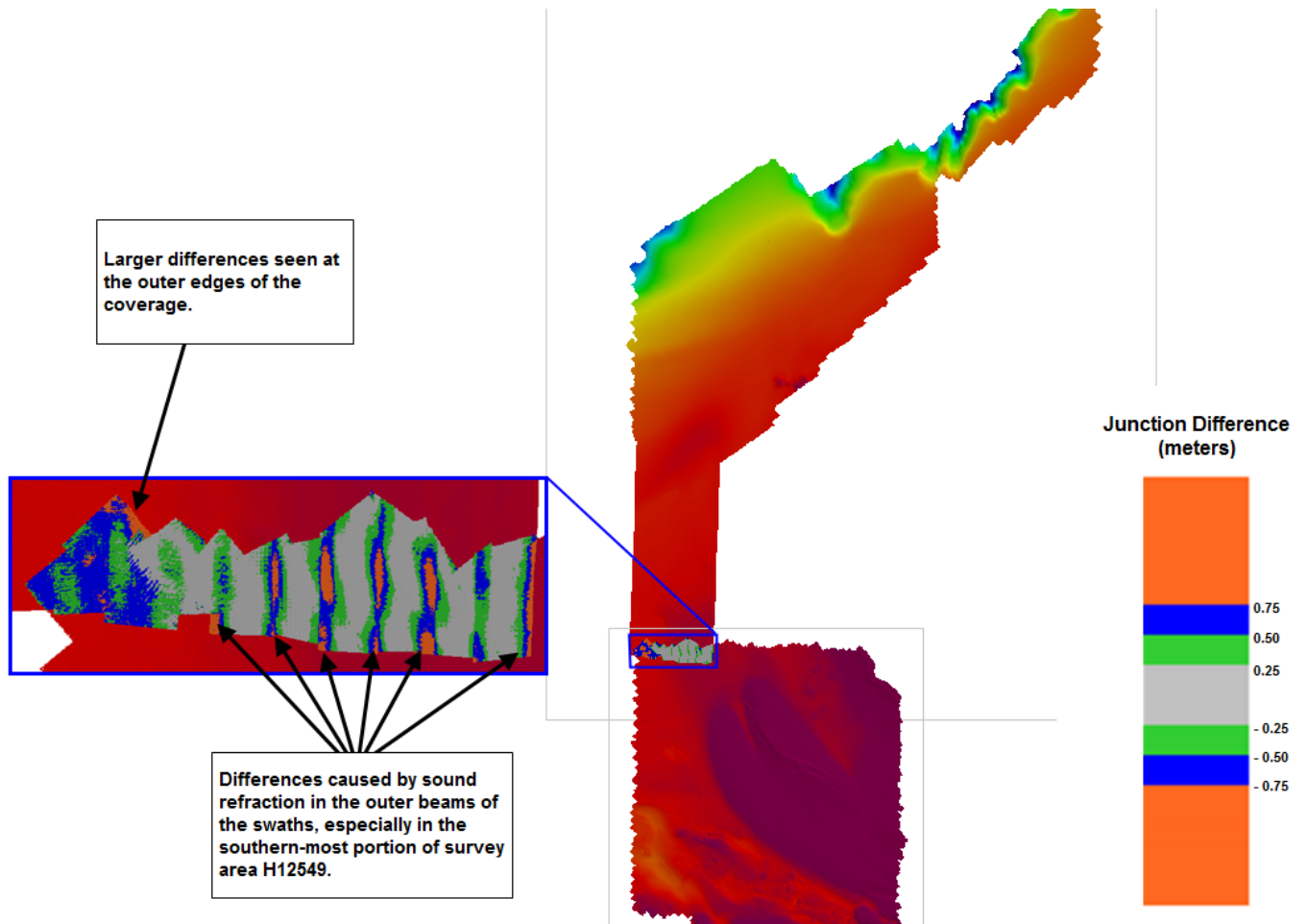
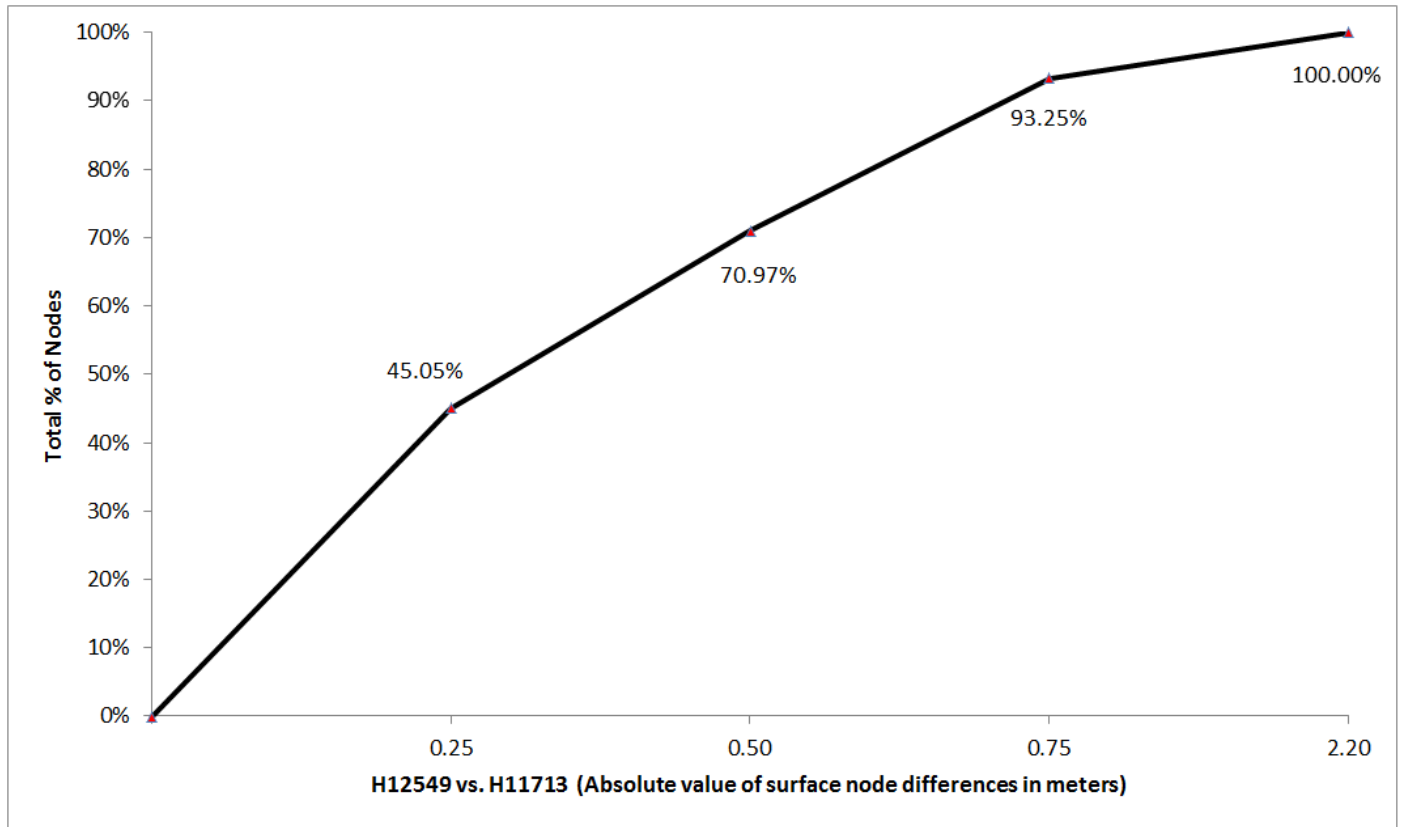


Figure 5: Difference Surface H12549 vs. H11713





*Figure 6: Difference Surface Statistics H12549 vs. H11713*

#### W00225

A difference surface was also created at a 4-meter resolution between H12549, and the junction with survey area W00225 (2011), confirming that approximately 91.83% of the nodes agree to within +/-0.50m. The other 8.17% of the nodes were on the outer edges of the swath at the coverage boundaries or were located in areas where the seafloor had a relatively steep slope. Furthermore, the largest differences between the two survey datasets were seen in areas with water depths greater than 100 meters. The data were well within the IHO Order 1a allowable error.

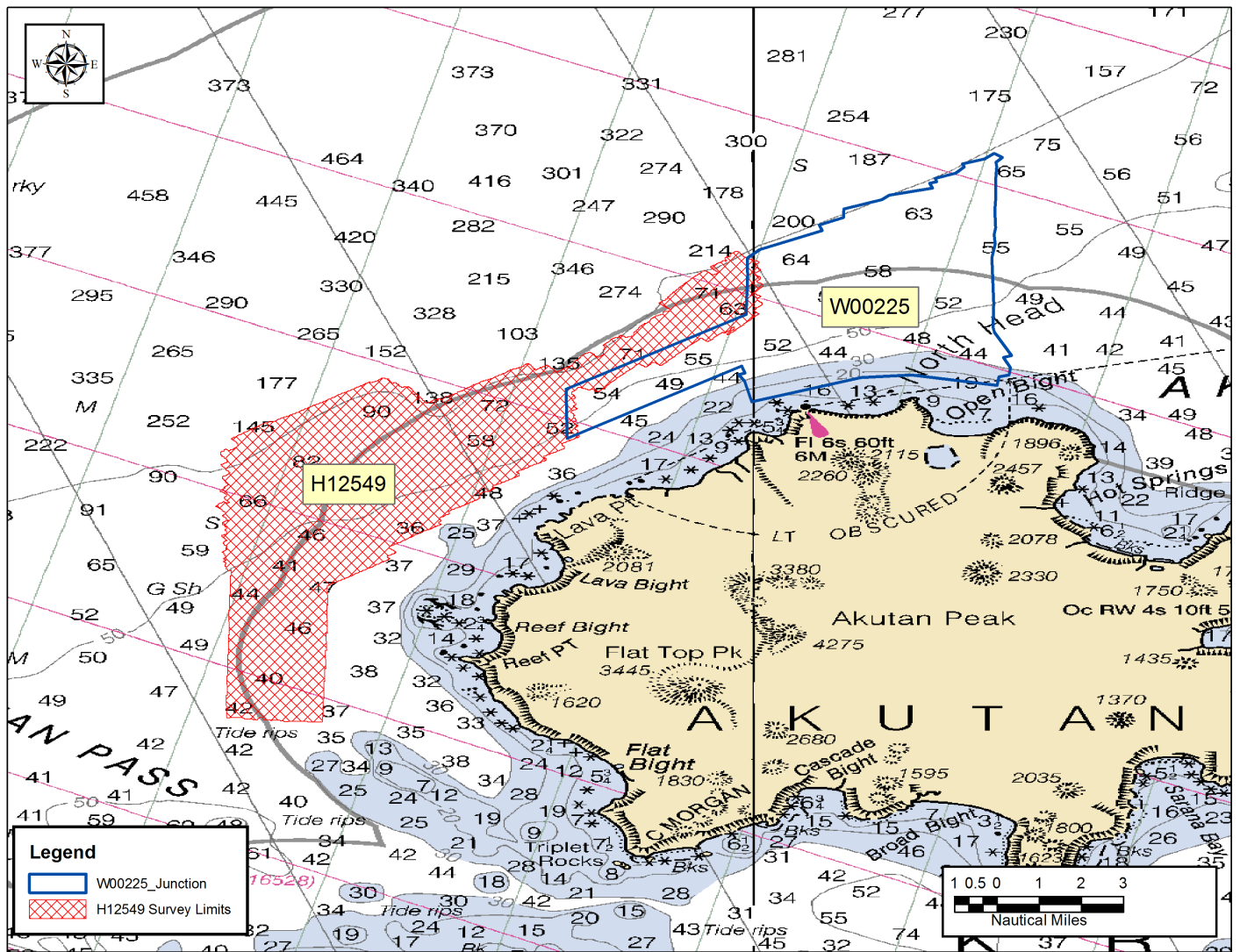


Figure 7: H12549 Junctions with W00225

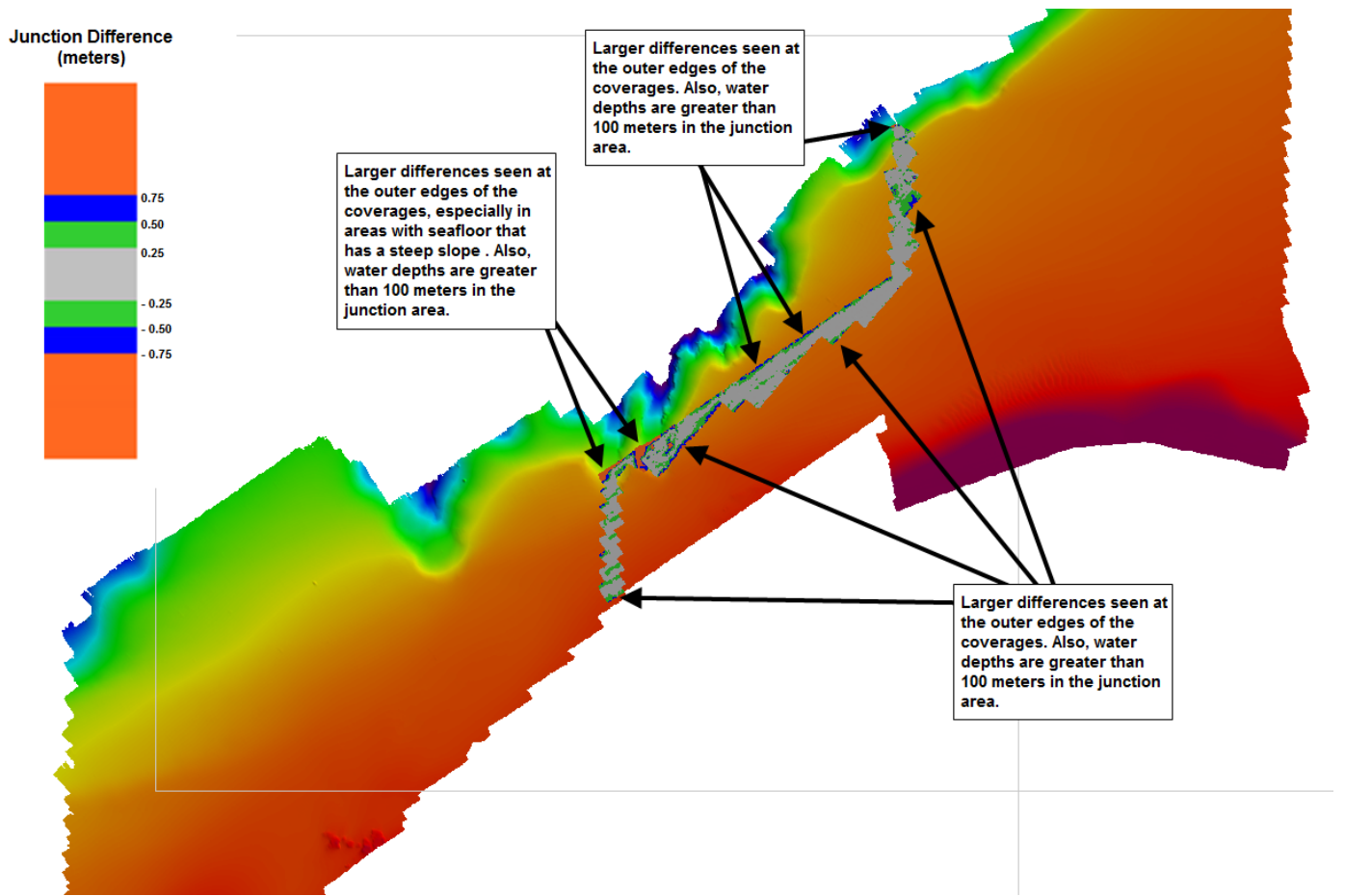


Figure 8: Difference Surface H12549 vs. W00225

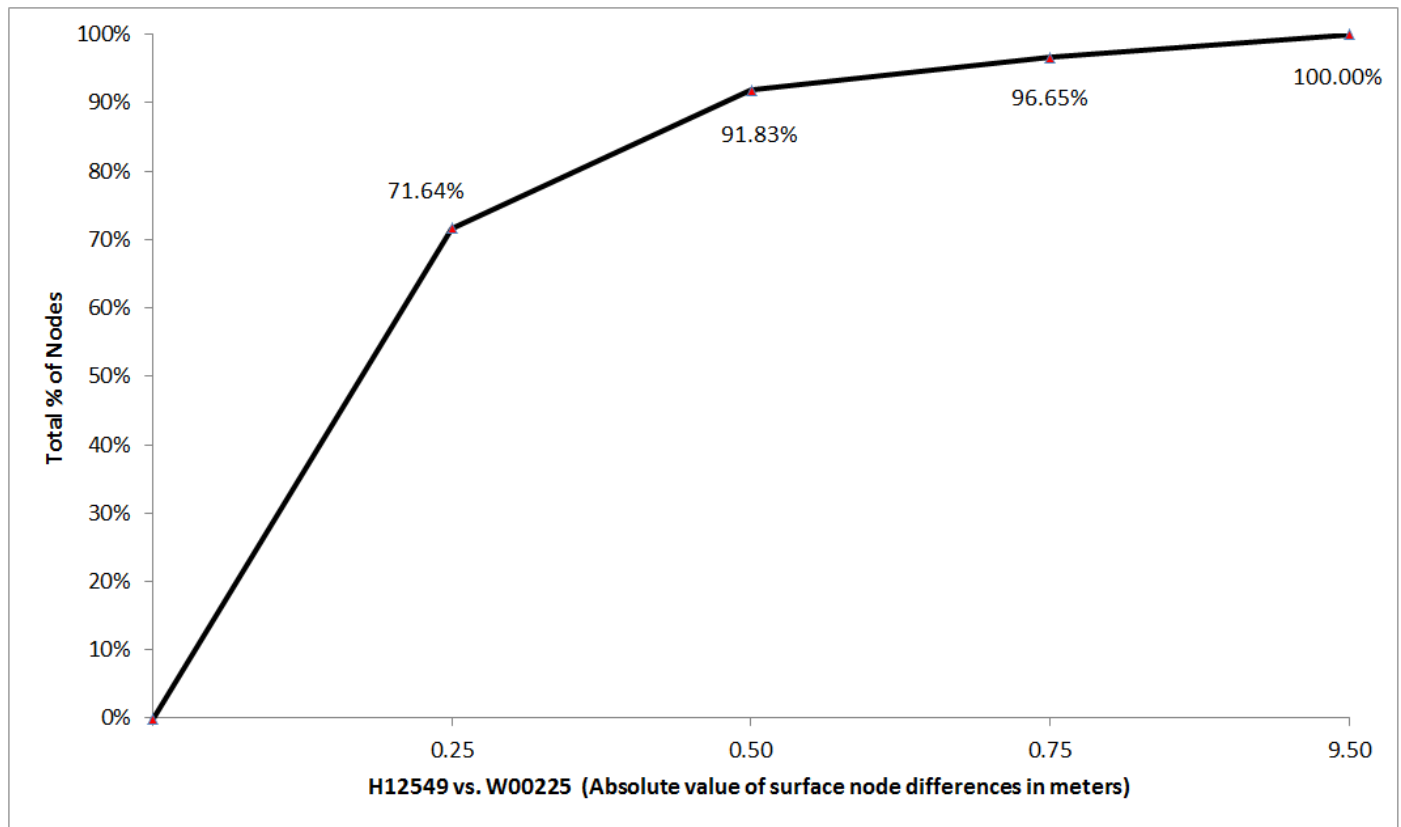


Figure 9: Difference Surface Statistics H12549 vs. W00225

*No junction comparison was done with concurrent survey H12548.*

#### B.2.4 Sonar QC Checks

Sonar system quality control checks were conducted as detailed in the quality control section of the DAPR.

#### B.2.5 Equipment Effectiveness

There were no conditions or deficiencies that affected equipment operational effectiveness.

#### B.2.6 Factors Affecting Soundings

##### Sound Speed Refraction Errors

Sound speed refraction errors were seen in the outer beams of the swaths of survey lines that were run in deeper water. However, line overlap was sufficient, and the affected soundings were rejected in CARIS HIPS' Subset Editor routine to ensure the CUBE surface met IHO Order 1a specifications.

### **B.2.7 Sound Speed Methods**

Sound Speed Cast Frequency: Sound speed measurements were conducted and applied as discussed in the Corrections to Echo Soundings section of the DAPR.

### **B.2.8 Coverage Equipment and Methods**

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

### **B.2.9 Data Density**

The NOS Hydrographic Surveys Specifications and Deliverables, April 2012, requires 95% of all nodes to be populated with at least five soundings. Survey H12549 met these project specifications.

Density requirements for H12549 were achieved with at least 99.49% of finalized surface nodes containing five or more soundings. Nodes that failed to meet the allowable specifications were located in rough or rapidly changing topography or areas where the outer beams of the coverage boundaries were the single contributor to the surface.

#### **CUBE Surface Density Report**

Surface, Depth Range (m), % of nodes within HSSD 2012

|                  |           |        |
|------------------|-----------|--------|
| H12545-4m_Final  | 36 - 80   | 99.80% |
| H12545-8m_Final  | 72 - 160  | 99.86% |
| H12545-16m_Final | 144 - 320 | 99.50% |
| H12545-32m_Final | 320 - 640 | 99.66% |

Detection requirements were met by minimizing vessel speed when necessary, using sonar range scales appropriate to the water depth to maximize ping rates, and maximizing swath overlap. These variables were adjusted in real-time by the online acquisition crew based on the WinFrog QC and coverage displays. The shipboard processing crew provided feedback after preliminary processing and coverage creation in CARIS HIPS and In-fills were run as necessary.

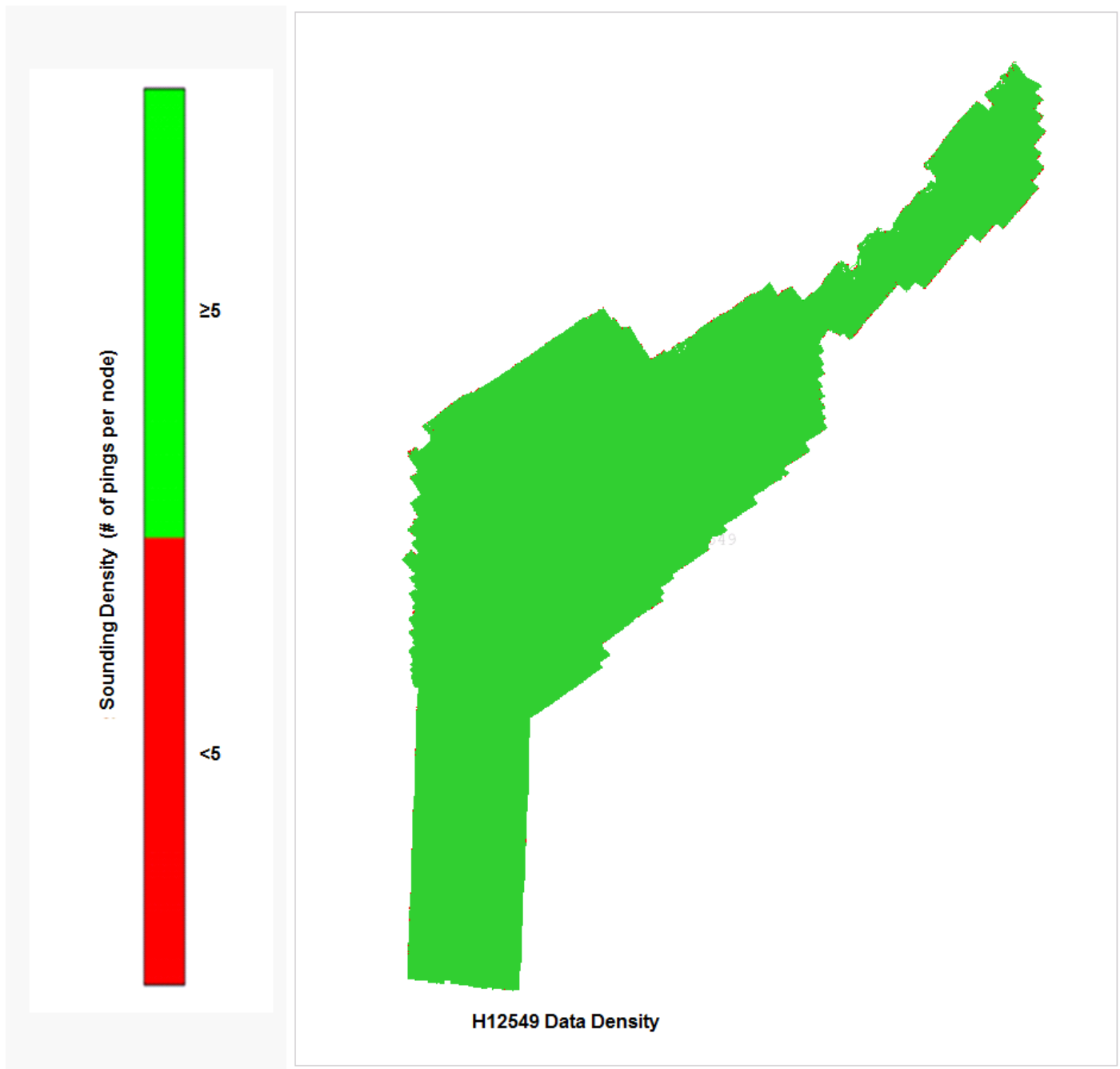


Figure 10: H12549 Data Density

## 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

Towed Side Scan Sonar (SSS) operations were not required by this contract, but the backscatter and beam imagery snippet data from all multibeam systems were logged and are stored in the s7k files. All beam imagery snippet data was logged in the 7028 record of the s7k file for the project.

### 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: Version 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       |
|------------------|--------------|------------|-------------------------|-------------------|---------------|
| H12549_4m        | CUBE         | 4 meters   | 0 meters - 361 meters   | NOAA_4m           | Complete MBES |
| H12549_4m_Final  | CUBE         | 4 meters   | 36 meters - 80 meters   | NOAA_4m           | Complete MBES |
| H12549_8m        | CUBE         | 8 meters   | 0 meters - 361 meters   | NOAA_8m           | Complete MBES |
| H12549_8m_Final  | CUBE         | 8 meters   | 72 meters - 160 meters  | NOAA_8m           | Complete MBES |
| H12549_16m       | CUBE         | 16 meters  | 0 meters - 361 meters   | NOAA_16m          | Complete MBES |
| H12549_16m_Final | CUBE         | 16 meters  | 144 meters - 320 meters | NOAA_16m          | Complete MBES |
| H12549_32m       | CUBE         | 32 meters  | 0 meters - 361 meters   | NOAA_32m          | Complete MBES |

| Surface Name     | Surface Type | Resolution | Depth Range             | Surface Parameter | Purpose       |
|------------------|--------------|------------|-------------------------|-------------------|---------------|
| H12549_32m_Final | CUBE         | 32 meters  | 320 meters - 640 meters | NOAA_32m          | Complete MBES |

*Table 9: Submitted Surfaces*

The surfaces have been reviewed where noisy data, or 'fliers' are incorporated into the gridded solution causing the surface to be shoaler than the true seafloor. Where these spurious soundings cause the gridded surface to be shoaler than the reliably measured seabed by greater than the maximum allowable TVU at that depth, the noisy data have been rejected and the surface recomputed.

The NOAA CUBE parameters mandated in HSSD were used for the creation of all CUBE BASE surfaces in Survey H12549.

## C. Vertical and Horizontal Control

Additional information discussing the vertical and 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 |
|------------------------|------------|
| Unalaska, Dutch Harbor | 9462620    |
| King Cove              | 9459881    |

*Table 10: NWLON Tide Stations*



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

| Station Name      | Station ID |
|-------------------|------------|
| Broad Bight       | 9462676    |
| SE Tigalda Island | 9462705    |
| Green Bight       | 9462786    |

*Table 11: Subordinate Tide Stations*

| File Name   | Status            |
|-------------|-------------------|
| 9462676.tid | Verified Observed |
| 9462705.tid | Verified Observed |
| 9462786.tid | Verified Observed |

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

| File Name                          | Status      |
|------------------------------------|-------------|
| OPR-Q191-KR-13_Zoning_20131008.zfd | Preliminary |

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

On October 08, 2013, John Oswald and Associates (JOA) issued verified tidal data and zoning for OPR-Q191-KR-13. All sounding data was then re-merged using CARIS HIPS and SIPS tide routine. JOA verified tidal data were used for all final Navigation BASE surfaces and S-57 Feature files. It should be noted that the tidal data applied to OPR-Q191-KR-13 is JOA verified and not CO-OPs verified. JOA are currently in the WALI verification process, which is pending, awaiting CO-OPs approval. Since the timeframe for CO-OPs verification is unknown, FPI were given approval, by our COTR, to submit the data with the JOA verified tides and zoning applied.

***CO-OPs approved the JOA verified tidal data and zoning on January 30, 2014.***

## **C.2 Horizontal Control**

The horizontal datum for this project is NAD83.

The projection used for this project is UTM.

The following PPK methods were used for horizontal control:

## Single Base

For real-time DGPS corrections, a CSI MBX-3 unit was tuned to the Cold Bay, Alaska USCG DGPS site. The unit output differentially corrected positions at 1 Hz to the (POS MV) 320 V4 where it was integrated with inertial data, and a position for the top-center of the IMU generated. This position was logged concurrently with the bathymetry from WinFrog and the POS file using Fugro Pelagos PosMvLogger. It was later corrected for offsets to the multibeam echosounder (MBES) by CARIS HIPS in post-processing.

Final positioning was done using post-processed kinematic (PPK) methods. Applanix POSPac MMS v5.4 software was used in conjunction with the POS files and local 1Hz base station data to generate a higher accuracy position, which was applied in processing to replace the real-time position records.

The following user installed stations were used for horizontal control:

| <b>HVCR Site ID</b> | <b>Base Station ID</b> |
|---------------------|------------------------|
| Broad Bight         | BB_E                   |
| SE Tigalda Island   | TI_N                   |

*Table 14: User Installed Base Stations*

The following DGPS Stations were used for horizontal control:

| <b>DGPS Stations</b>  |
|-----------------------|
| Cold Bay DGPS Station |

*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:

| <b>Chart</b> | <b>Scale</b> | <b>Edition</b> | <b>Edition Date</b> | <b>LNМ Date</b> | <b>NM Date</b> |
|--------------|--------------|----------------|---------------------|-----------------|----------------|
| 16531        | 1:80000      | 7              | 02/2002             | 10/01/2013      | 09/28/2013     |

*Table 16: Largest Scale Raster Charts*

#### 16531

The Raster chart was downloaded from NOAA's Office of Coast Survey website on October 9, 2013.

Given that the survey area was ensounded with 100% multibeam coverage, discrepancies were discovered between the charted and surveyed depths.

Sounding agreement between surveyed soundings on sheet H12549 and spot soundings displayed on Raster chart 16531 varied between 1 and 2 fathoms.

The Hydrographer recommends that soundings within the survey limits of H12549 supersede all prior survey and charted depths.

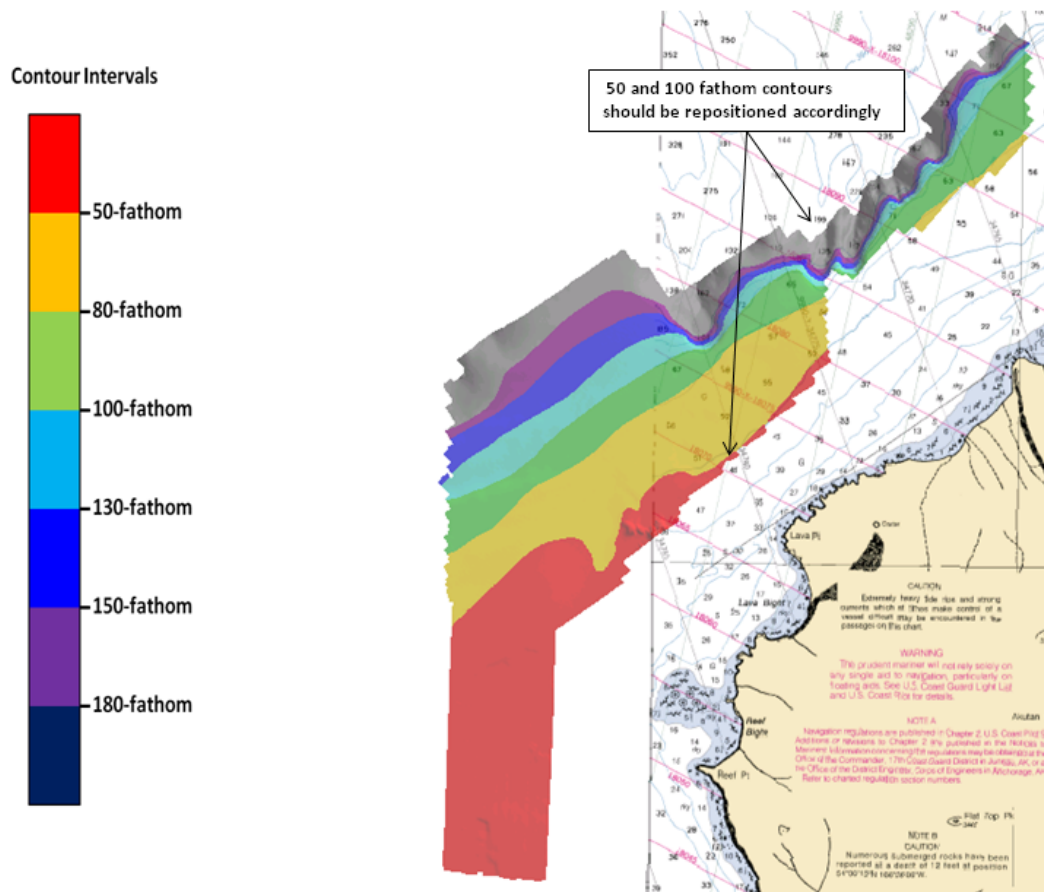


Figure 11: Chart Comparison H12549 vs. 16531

### D.1.2 Electronic Navigational Charts

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

| ENC      | Scale    | Edition | Update Application Date | Issue Date | Preliminary? |
|----------|----------|---------|-------------------------|------------|--------------|
| US3AK61M | 1:300000 | 16      | 01/12/2011              | 06/24/2013 | NO           |
| US4AK6FM | 1:80000  | 8       | 04/28/2011              | 05/02/2013 | NO           |

Table 17: Largest Scale ENC's

US3AK61M

The ENC's were downloaded from NOAA's Office of Coast Survey website on October 9, 2013. Thus, the issue dates displayed in the table above are more recent than the dates in the Project Instructions.

Given that the survey area was ensonified with 100% multibeam coverage, discrepancies were discovered between the charted and surveyed depths.

Sounding agreement between surveyed soundings on sheet H12549 and spot soundings displayed on ENC US3AK61M varied between 1 meter and 10 meters. Generally, the surveyed data in the vicinity of the charted spot soundings from the ENC agreed to within 1 to 5 meters. However, the largest discrepancy found was 18 meters.

Although the ENC displays the spot soundings in meters, the contours are displayed in fathoms. The surveyed data for sheet H12549 shows contours that generally agree with the contour trends from ENC US3AK61M.

The Hydrographer recommends that soundings within the survey limits of H12549 supersede all prior survey and charted depths.

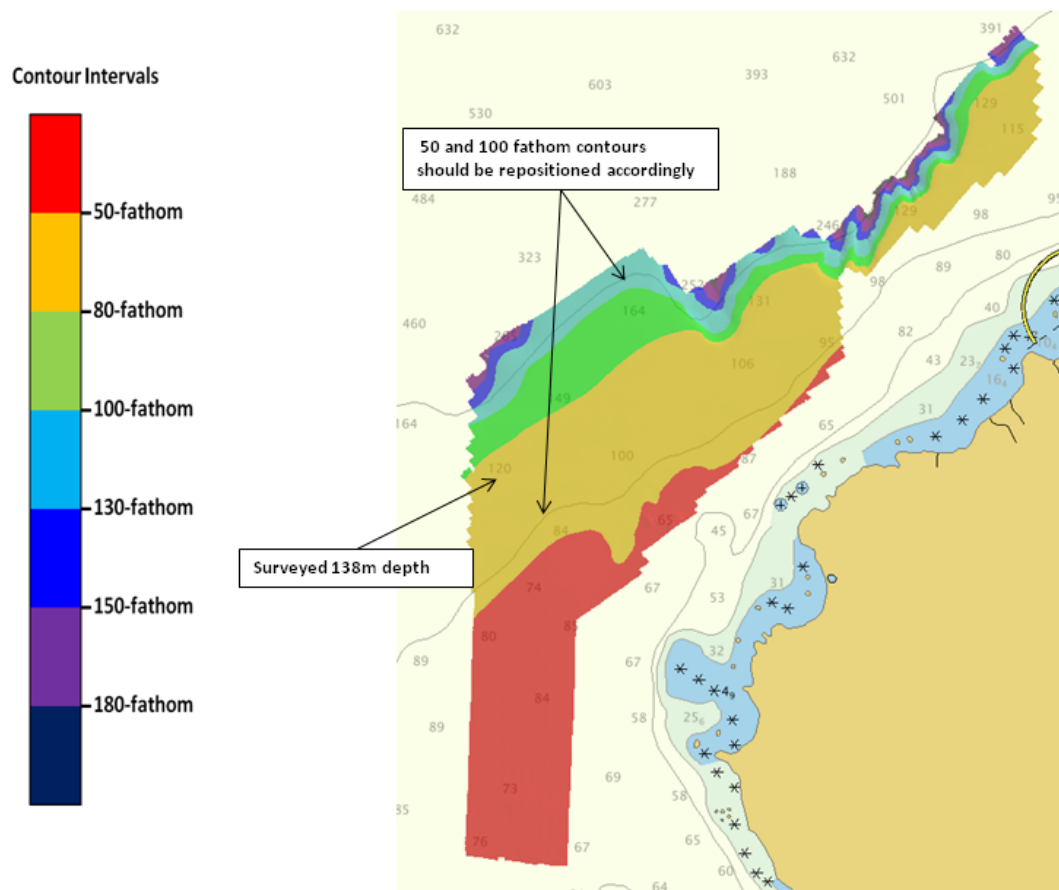


Figure 12: Chart Comparison H12549 vs. US3AK61M

***No comparison with Chart 16520 (1:300,000) was done. However, the comparison to ENC US3AK61M is adequate.***

#### US4AK6FM

Given that the survey area was ensounded with 100% multibeam coverage, discrepancies were discovered between the charted and surveyed depths.

Sounding agreement between surveyed soundings on sheet H12549 and spot soundings displayed on ENC US4AK6FM varied between 1 meter and 5 meters.

Although the ENC displays the spot soundings in meters, the contours are displayed in fathoms. The surveyed data for sheet H12549 shows contours that generally agree with the contour trends from ENC US4AK6FM.

The Hydrographer recommends that soundings within the survey limits of H12549 supersede all prior survey and charted depths.

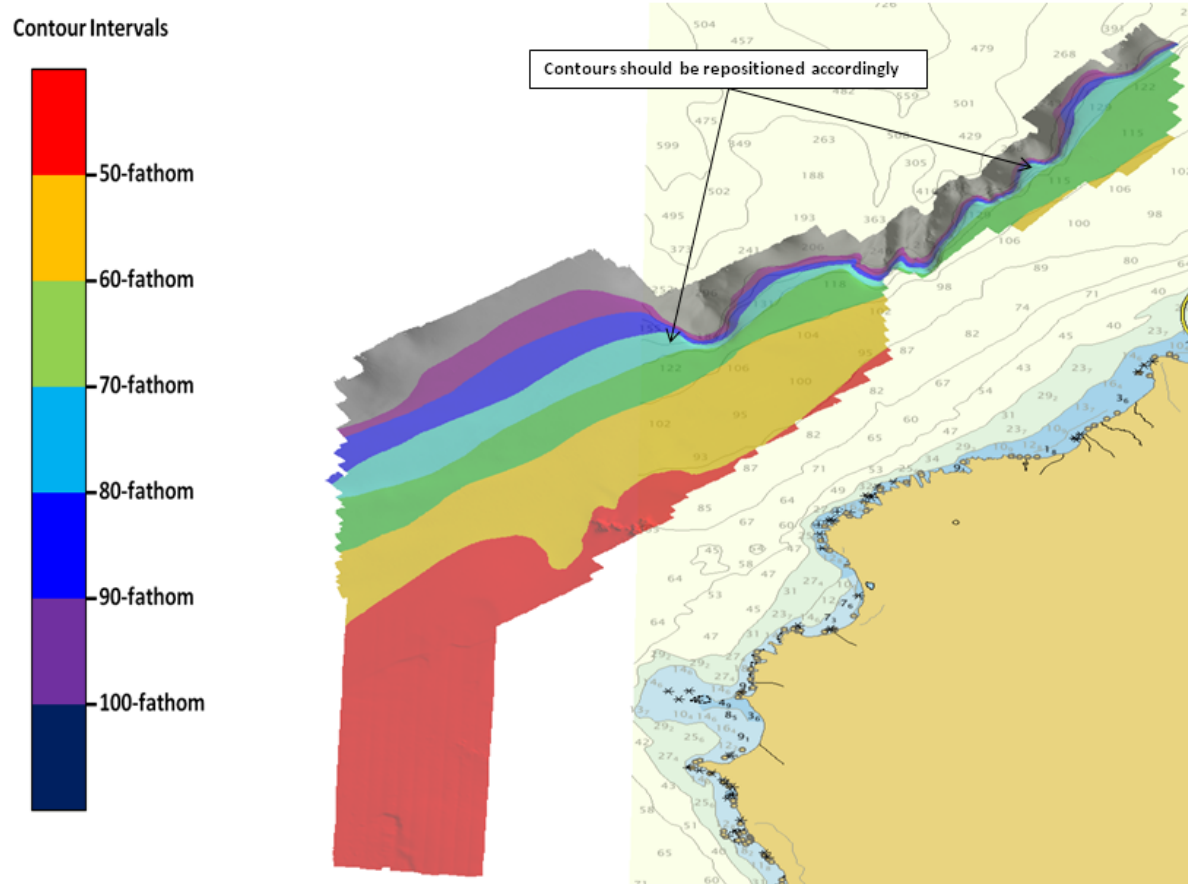


Figure 13: Chart Comparison H12549 vs. US4AK6FM

### D.1.3 AWOIS Items

No AWOIS items exist for this survey.

### D.1.4 Maritime Boundary Points

Maritime Boundary Points were assigned for this survey, but were not addressed.

### D.1.5 Charted Features

No charted features exist for this survey.

### **D.1.6 Uncharted Features**

No uncharted features exist for this survey.

### **D.1.7 Dangers to Navigation**

No Danger to Navigation Reports were submitted for this survey.

### **D.1.8 Shoal and Hazardous Features**

No shoals or potentially hazardous features exist for this survey.

### **D.1.9 Channels**

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

### **D.1.10 Bottom Samples**

No bottom samples were required for this survey. However, two bottom characteristics were imported from the ENC to be retained.

## **D.2 Additional Results**

### **D.2.1 Shoreline**

Shoreline was not assigned in the Hydrographic Survey Project Instructions or Statement of Work.

*Shoreline was assigned for all surveys in this project. H12549 is an offshore survey and no shoreline features were located within it's limits.*

### **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 Recommendation**

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

**D.2.11 Final Feature File**

All features, including ones from the NOAA assigned feature file, that were within the geographical bounds of H12549 are included in the "H12549\_Field\_Features.000" file.

Features that fell within the survey limits were addressed and attributed appropriately. This file contains the object and metadata with extended attributes as required in the Specifications and Deliverables (April 2012).

Note: Since CARIS Notebook and Bathymetry DataBASE were unable to export to S-57 with the parameters outlined in section 8.2 of the HSSD 2012, an additional text file with the required meta information was sent to accompany the S-57 file.

*Shoreline investigation was not assigned for this survey.*

*H12549 is an offshore survey and no shoreline features were located within its limits.*

#### **D.2.12 Inset Recommendation**

No new insets are recommended for this area.


## E. Approval Sheet

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

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

The survey data meets or exceeds requirements as set forth in the NOS Hydrographic Surveys and Specifications Deliverables Manual, Field Procedures Manual, 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.

| Report Name                              | Report Date Sent |
|--|------------------|
| Data Acquisition and Processing Report   | 2013-11-04       |
| Horizontal and Vertical Control Report   | 2013-11-04       |
| Tides and Water Levels Package           | 2013-11-04       |
| MAR-P-001-R2 MBES Acquisition Procedures | 2013-11-04       |
| DAC-P-010-R3 MBES Processing Procedures  | 2013-11-04       |

| Approver Name | Approver Title                              | Approval Date | Signature   |
|---------------|---|---------------|---|
| Dean Moyles   | Senior Hydrographer<br>(ACSM Cert. No. 226) | 11/04/2013    | Dean Moyles <br><small>Digitally signed by Dean Moyles<br/>           DN: cn=Dean Moyles, o=Fugro<br/>           Pelagos, Inc., ou,<br/>           email=dmoyles@fugro.com, c=US<br/>           Date: 2014.05.23 04:13:56 -0700'</small> |

## F. Table of Acronyms

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

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

| <b>Acronym</b> | <b>Definition</b>                            |
|----------------|--|
| <b>PRF</b>     | Project Reference File                       |
| <b>PS</b>      | Physical Scientist                           |
| <b>PST</b>     | Physical Science Technician                  |
| <b>RNC</b>     | Raster Navigational Chart                    |
| <b>RTK</b>     | Real Time Kinematic                          |
| <b>SBES</b>    | Singlebeam Echosounder                       |
| <b>SBET</b>    | Smooth Best Estimate and Trajectory          |
| <b>SNM</b>     | Square Nautical Miles                        |
| <b>SSS</b>     | Side Scan Sonar                              |
| <b>ST</b>      | Survey Technician                            |
| <b>SVP</b>     | Sound Velocity Profiler                      |
| <b>TCARI</b>   | Tidal Constituent And Residual Interpolation |
| <b>TPE</b>     | Total Propagated Error                       |
| <b>TPU</b>     | Topside Processing Unit                      |
| <b>USACE</b>   | United States Army Corps of Engineers        |
| <b>USCG</b>    | United States Coast Guard                    |
| <b>UTM</b>     | Universal Transverse Mercator                |
| <b>XO</b>      | Executive Officer                            |
| <b>ZDA</b>     | Global Positioning System timing message     |
| <b>ZDF</b>     | Zone Definition File                         |

APPROVAL PAGE

**H12549**

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

- H12549\_DR.pdf
- Collection of depth varied resolution BAGS
- Processed survey data and records
- H12549\_GeoImage.pdf

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

Approved: \_\_\_\_\_

**Kurt Brown**

**Physical Scientist, Pacific Hydrographic Branch**

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

Approved: \_\_\_\_\_

**Peter Holmberg**

**Cartographic Team Lead, Pacific Hydrographic Branch**