H12451

NOAA Form 76-35A

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

DESCRIPTIVE REPORT

Type of Survey: Navigable Area

Registry Number: H12451

LOCALITY

State: Alaska

General Locality: Chirikof Island and Vicinity, AK

Sub-locality: NW Chirikof Island

2012

CHIEF OF PARTY
Richard T. Brennan, CDR/NOAA

LIBRARY & ARCHIVES

Date:

NOAA FORM 77-28 (11-72)	U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION	REGISTRY NUMBER:
HYDROGRAPHIC TITLE SHEET		**H12451**

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:	**Alaska**
General Locality:	**Chirikof Island and Vicinity, AK**
Sub-Locality:	**NW Chirikof Island**
Scale:	**40000**
Dates of Survey:	**06/20/2012 to 08/11/2012**
Instructions Dated:	**05/15/2012**
Project Number:	**OPR-P133-RA-12**
Field Unit:	**NOAA Ship *Rainier***
Chief of Party:	**Richard T. Brennan, CDR/NOAA**
Soundings by:	**Multibeam Echo Sounder**
Imagery by:	
Verification by:	**Pacific Hydrographic Branch**
Soundings Acquired in:	**meters at Mean Lower Low Water**
H-Cell Compilation Units:	***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. Revisions and Rednotes 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/.

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Descriptive Report to Accompany Survey H12451

Project: OPR-P133-RA-12

Locality: Chirikof Island and Vicinity, AK

Sublocality: NW Chirikof Island

Scale: 1:40000

June 2012 - August 2012

NOAA Ship *Rainier*

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

A. Area Surveyed

The project area is referred to as Sheet 6: "NW Chirikof Island" within the Project Instructions. The area borders the northwest corner of Chirikof Island in the Gulf of Alaska (Figure 1).

A.1 Survey Limits

Data was acquired within the following survey limits:

Northeast Limit	Southwest Limit
55.9801666667 N 155.6105 W	55.874 N 155.794833333 W

Table 1: Survey Limits

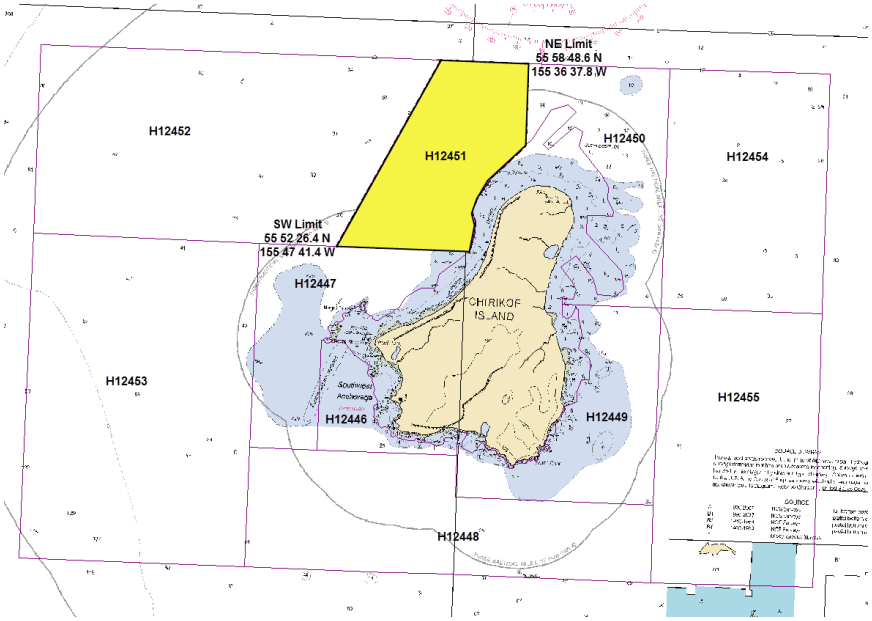


Figure 1: H12451 survey limits (chart 16587).

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

A.2 Survey Purpose

This project is being conducted in support of NOAA's Office of Coast Survey to provide contemporary hydrographic data in order to update the nautical charting products and reduce the survey backlog within the area. The need for nautical chart updates are due to an increasing number of passenger vessels, tour vessels and large fishing fleets in the area. In addition, the data would be used to create DTM maps in support of the efficiencies in longline and pot fisheries, while minimizing habitat disruption.

A.3 Survey Quality

The entire survey is adequate to supersede previous data.

Data acquired on survey H12451 met complete multibeam coverage requirements, including the five soundings per node data density requirements outlined in section 5.2.2.2 of the HSSDM (Figure 2). Survey H12451 has 99.9% of nodes populated with greater than five soundings.

Resolution	Depth range	Number of nodes	Fewer than five soundings per node	Percent of nodes with greater than five soundings per node
1m	144 - 320m	6,537,916	15,811	99.8%
2m	72 - 160m	15,096,934	11,587	99.9%
4m	36 - 80m	1,963,594	3,806	99.8%
	TOTAL:	23,598,444	31,204	99.9%
	TOTAL (by area):	2,671,327,776	4,850,080	99.8%

Figure 2: H12451 density statistics.

A.4 Survey Coverage

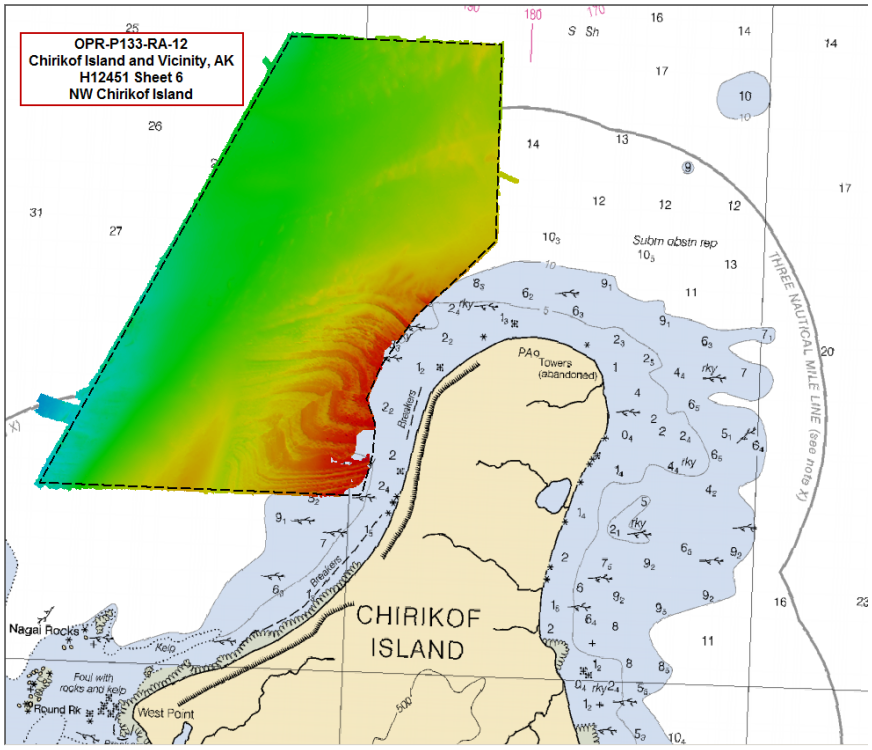


Figure 3: H12451 coverage (chart 16587).

Complete multibeam echo sounder (MBES) coverage was achieved within the limits of hydrography as defined in the Project Instructions with the following exceptions:

Acoustic Shadowing: Numerous insignificant holidays were the result of acoustic shadowing. 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. There are many deep crenulations on the inshore portion of H12451 which caused these acoustic shadows (Figure 4). All cases were investigated to ensure least depths were found. In Figure 5, the holiday gaps are covered by junctioning data from H12447.

Kelp holidays: Complete MBES was not possible in areas foul with kelp (Figure 6). These areas are in the southeast corner of the sheet within the sheet limits and included in the Final Feature File.

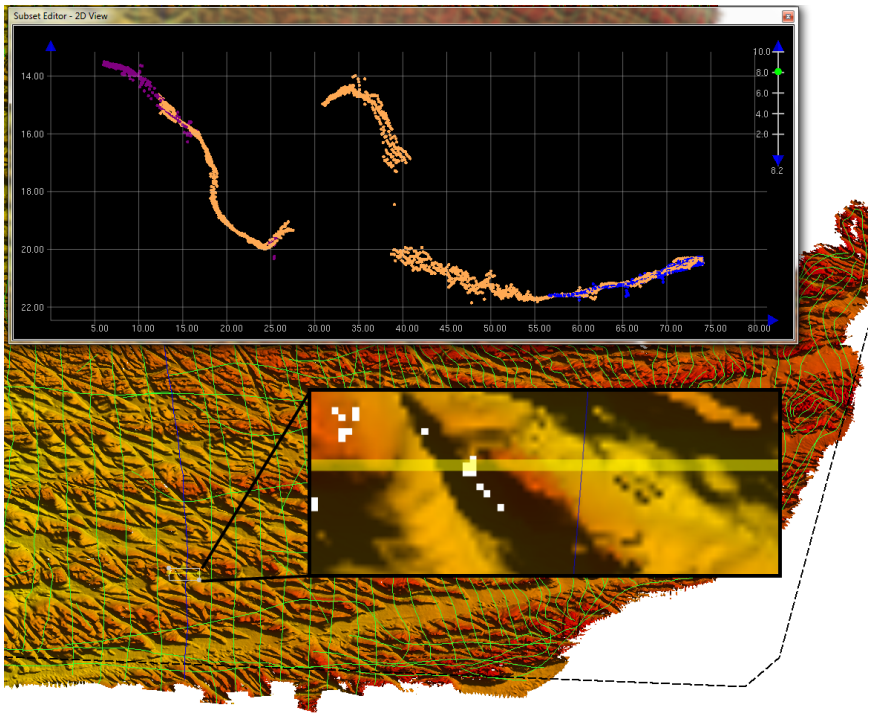


Figure 4: H12451 acoustic shadow holiday.

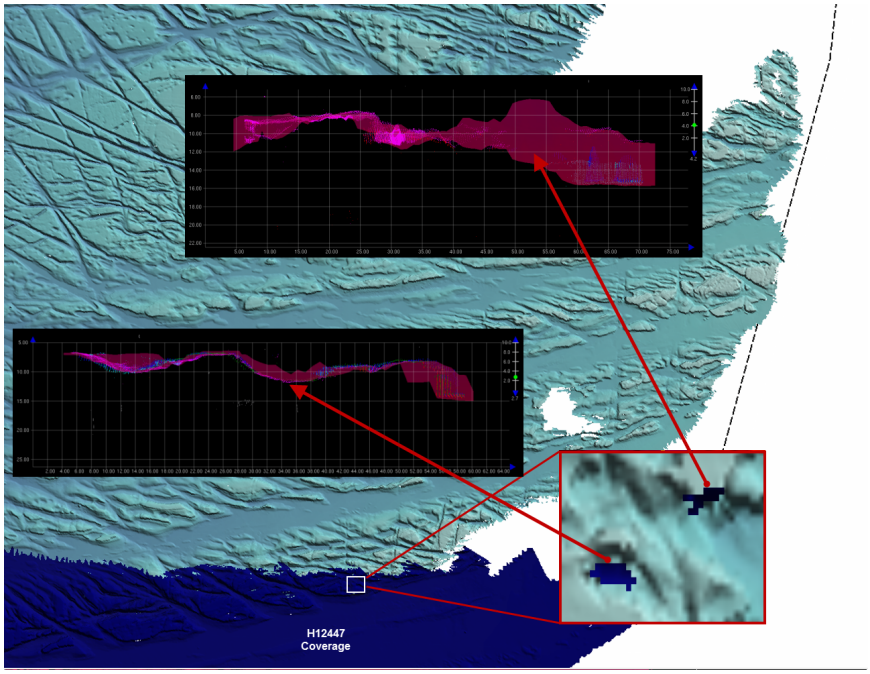


Figure 5: H12451 coverage (light blue) showing some holidays are covered by data from H12447 (dark blue).

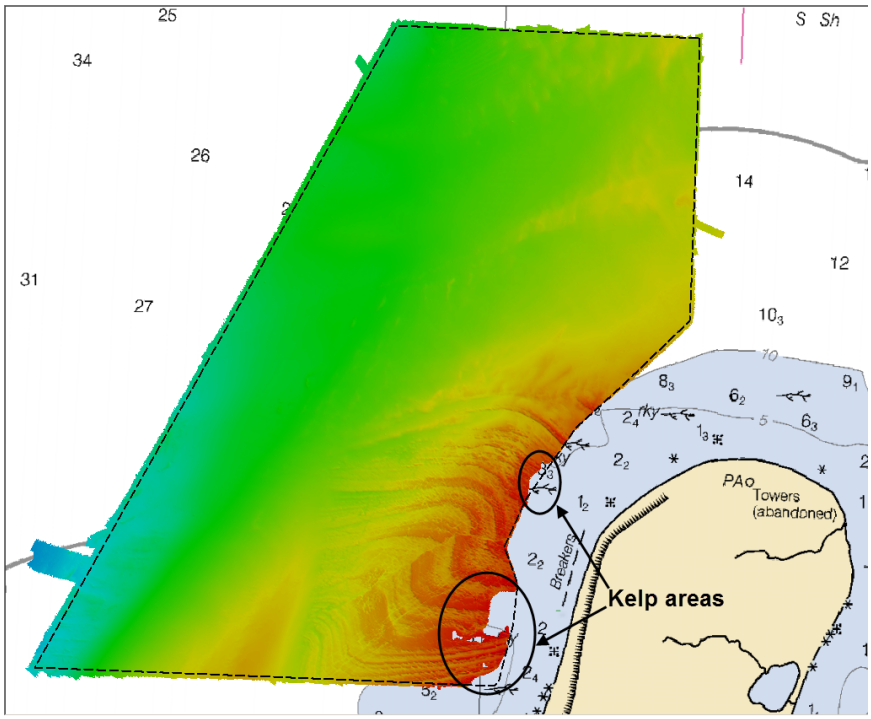


Figure 6: H12451 kelp areas (chart 16587).

Data adequate for charting.

A.5 Survey Statistics

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

	HULL ID	*2801 (RA-4)*	*2802 (RA-5)*	*2803 (RA-3)*	*2804 (RA-6)*	*S-221 (Rainier)*	*Total*
LNM	**SBES Mainscheme**	0	0	0	0	0	0
	MBES Mainscheme	90.1	235.6	101.1	151.4	3.9	582.2
	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	30.0	0	0	4.0	0	33.9
	Lidar Crosslines	0	0	0	0	0	0
Number of Bottom Samples							3
Number of DPs							0
Number of Items Items Investigated by Dive Ops							0
Total Number of SNM							25

Table 2: Hydrographic Survey Statistics

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

Survey Dates
06/20/2012
07/11/2012
07/13/2012
07/14/2012
07/15/2012
07/22/2012
08/06/2012
08/08/2012
08/09/2012
08/11/2012

Table 3: Dates of Hydrography

A.6 Shoreline

Shoreline was investigated in accordance with the Project Instructions and the HSSDM.

A.7 Bottom Samples

Bottom samples were acquired in accordance with the Project Instructions except for one bottom sample location, which was inaccessible due to the dangerous sea state at the time of acquisition (Figure 7). One bottom sample returned no sample after three attempts and is flagged unknown in accordance with HSSDM Sec 7.1.

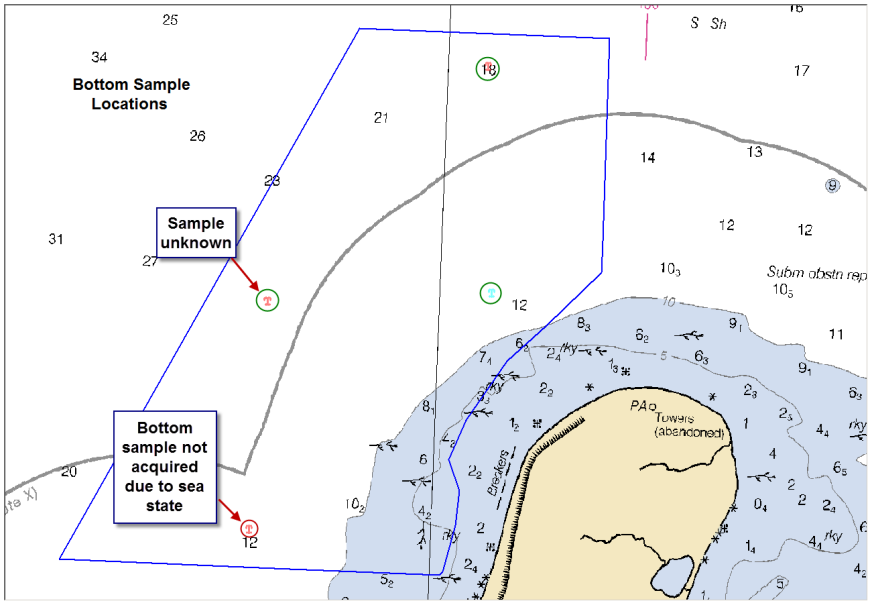


Figure 7: H12451 bottom sample locations (chart 16587).

B. Data Acquisition and Processing

B.1 Equipment and Vessels

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

B.1.1 Vessels

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

Hull ID	***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
Reson	7125	MBES
Kongsberg	EM710	MBES
Applanix	POS-MV V4	Positioning and Attitude System
Seabird	SBE 19 Plus	Conductivity, Temperature and Depth Sensor
Seabird	SBE 19	Conductivity, Temperature and Depth Sensor
Rolls Royce Odim Brooke Ocean Technology	MVP 200	Conductivity, Temperature and Depth Sensor
Reson	SVP 70	Sound Speed System
Reson	SVP 71	Sound Speed System

Table 5: Major Systems Used

B.2 Quality Control

B.2.1 Crosslines

Multibeam crosslines were acquired using the Reson 7125 on vessel 2801 (RA-4) and 2804 (RA-6) totaling 33.9 nautical miles, comprising 5.8% of mainscheme MBES. Separate 2-meter resolution 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 0.7 meters. While the standard deviation is apparently high, upon further inspection it is evident that the rocky geomorphology in the inshore area is causing the variation (Figure 10). Higher differences tended to be in areas of greater bathymetric relief, leading to the higher standard deviation.

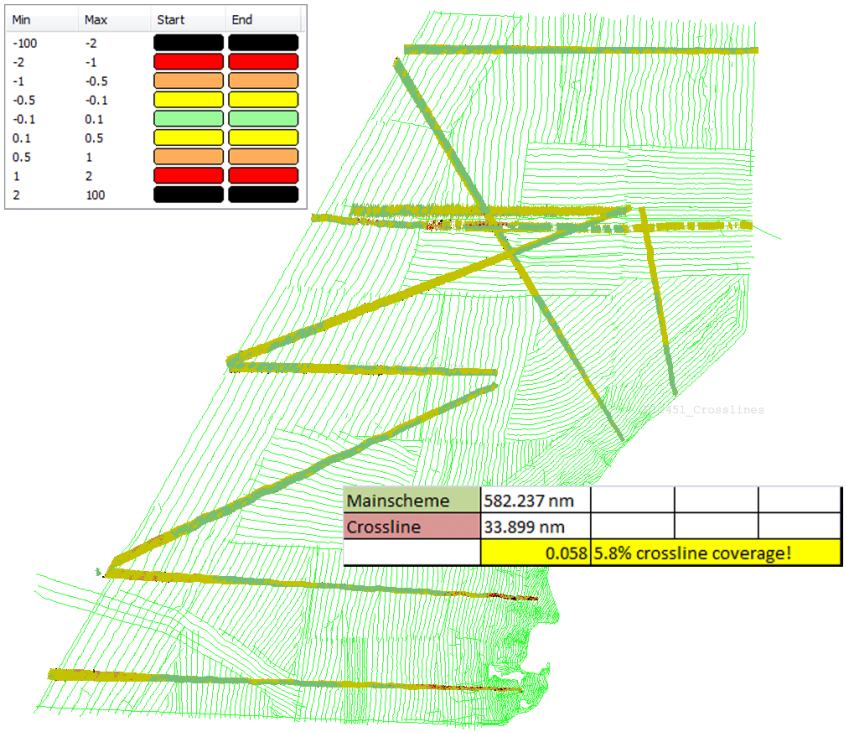


Figure 8: H12451 crossline and mainscheme difference surface (2m) and mainscheme tracklines. Mean difference: 0.02 meters; Standard Deviation: 0.70 meters. Legend in meters

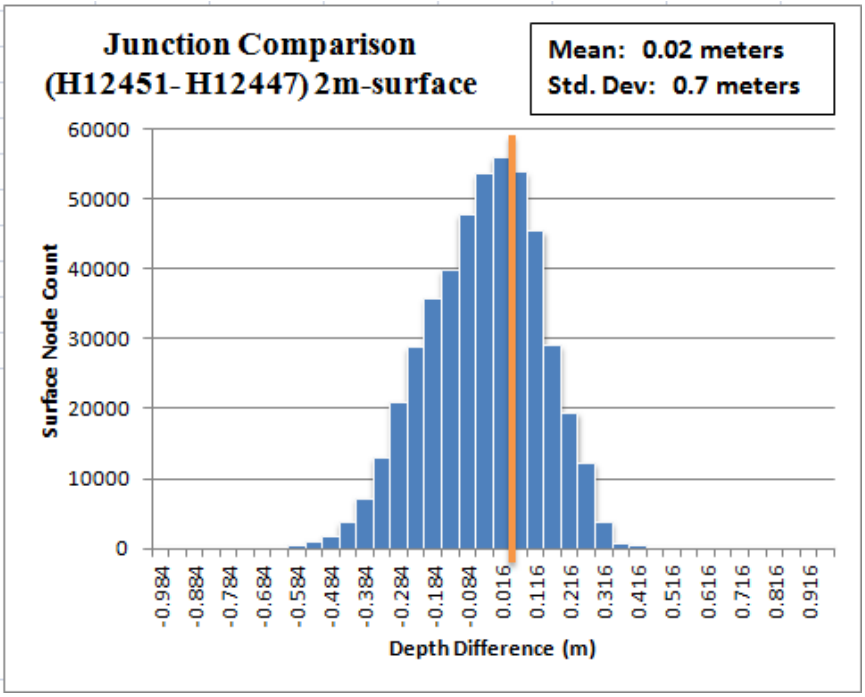


Figure 9: H12451 difference surface histogram for mainscheme and crosslines (mainscheme shoaler), mean value indicated.

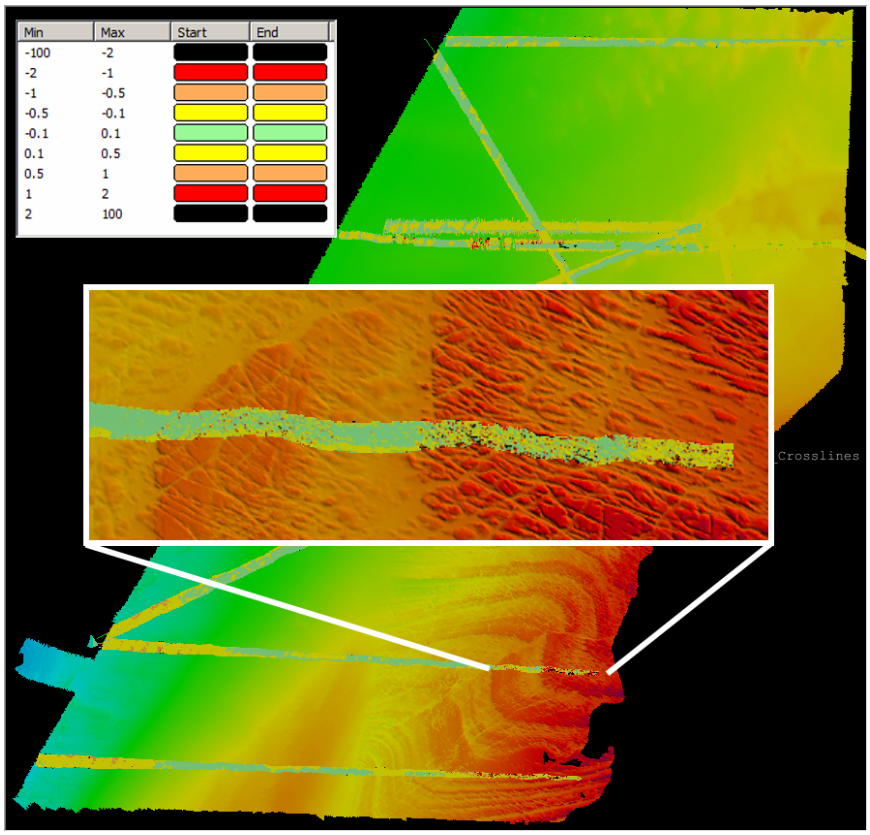


Figure 10: H12451 higher surface differences were seen in areas of high bathymetric relief, legend in meters.

B.2.2 Uncertainty

The following survey specific parameters were used for this survey:

Measured	Zoning
0meters	0.14meters

Table 6: Survey Specific Tide TPU Values

Hull ID	Measured - CTD	Measured - MVP	Surface
2801	3meters/second		0.15meters/second
2802	3meters/second		0.15meters/second
2803	3meters/second		0.15meters/second
2804	3meters/second		0.15meters/second
S221		3meters/second	0.05meters/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" 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, based on the difference between calculated uncertainty of the nodes and the allowable IHO uncertainty (Figure 11). To quantify the extent to which accuracy requirements were met, the preceding "IHOness" layers were queried within CARIS and then examined in Excel (Figure 12). Overall, 100.0% of survey H12451 met the accuracy requirements stated in the HSSDM.

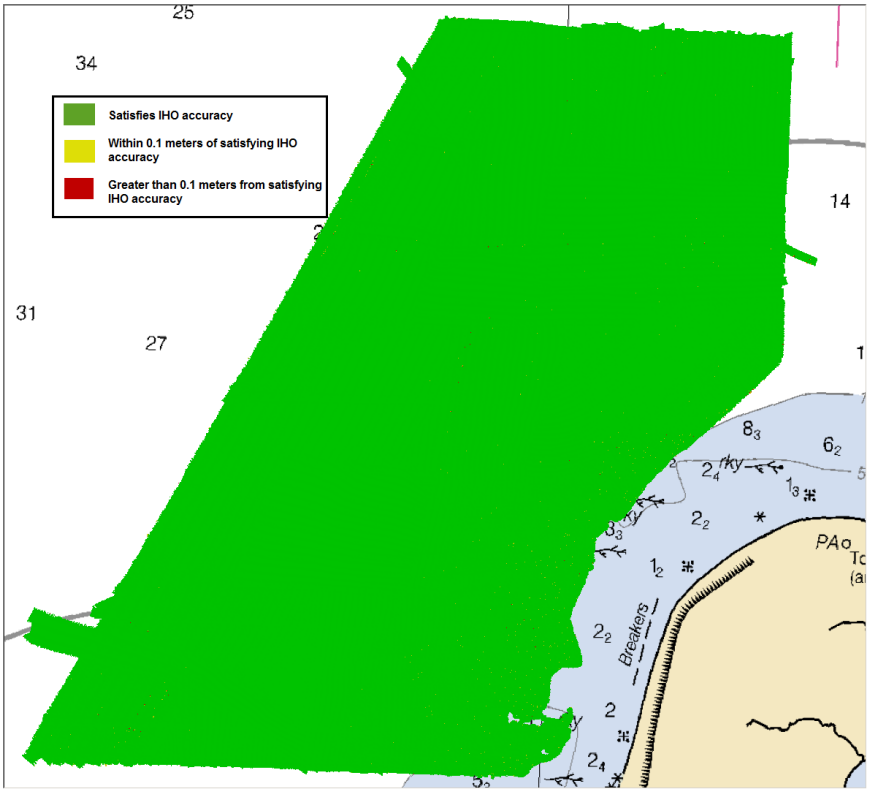


Figure 11: H12451 IHO standards met for accuracy.

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	6,536,304	6,526,212	99.8%
2m	18 - 40m	Order 1	15,098,179	15,096,051	100.0%
4m	36 - 80m	Order 1	1,963,289	1,962,980	100.0%
		TOTAL:	23,597,772	23,585,243	99.9%
		TOTAL (by area):	98,341,644	98,318,096	100.0%

Figure 12: Summary table showing the percentage of nodes satisfying the indicated IHO accuracy level, sub-divided by the appropriate depth ranges.

B.2.3 Junctions

H12451 junctions with three concurrent MBES surveys from the same project (OPR-P133-RA-12) and two Fugro LADS lidar surveys from 2006 (Figure 13). Junction comparisons were performed using a CARIS difference surface, the CARIS tool tip, and CARIS Subset Editor. In the case of the lidar surveys, the lidar shoal layer was used in the difference surface (in accordance with the respective descriptive reports).

The following junctions were made with this survey:

Registry Number	Scale	Year	Field Unit	Relative Location
H11542	1:10000	2006	Fugro LADS	E
H11543	1:10000	2006	Fugro LADS	SE
H12447	1:40000	2012	NOAA Ship RAINIER	S
H12450	1:40000	2012	NOAA Ship RAINIER	NE
H12452	1:40000	2012	NOAA Ship RAINIER	W

Table 8: Junctioning Surveys

H11542

The junction with lidar survey H11542 is along the eastern edge of survey H12451. A CARIS difference surface was created using the 4-meter surface from H12451 and the 3-meter surface provided with the Project Instructions for H11542, yielding a mean difference of -0.07 meters (H11542 shoaler) with a standard deviation of 0.63 meters (Figure 14, 15). As discussed in B.2.1 Crosslines, the higher standard deviation is attributable to high bathymetric relief in the areas of overlap.

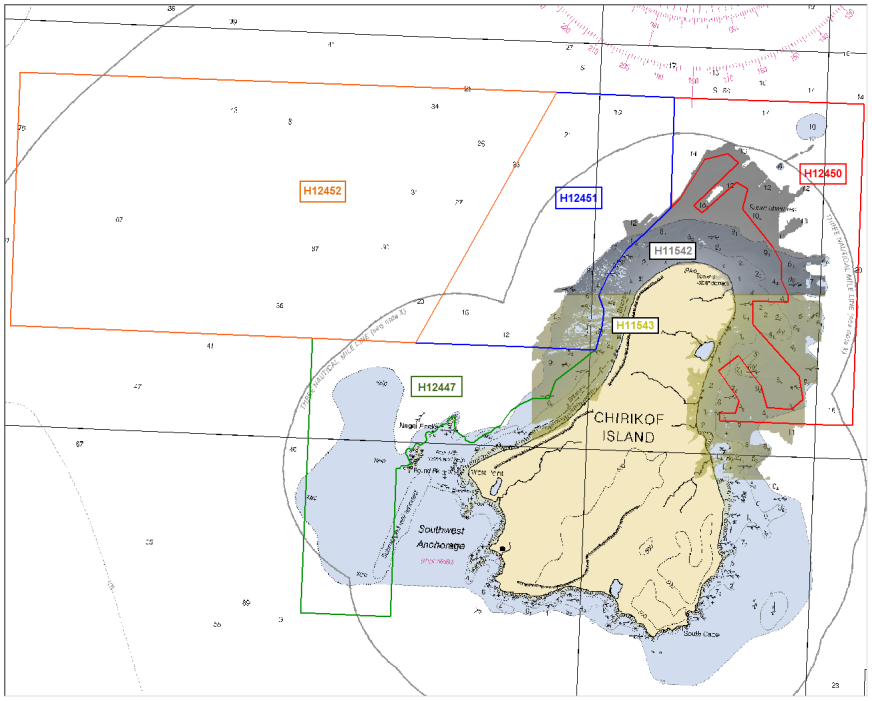


Figure 13: H12451 junction surveys (chart 16587).

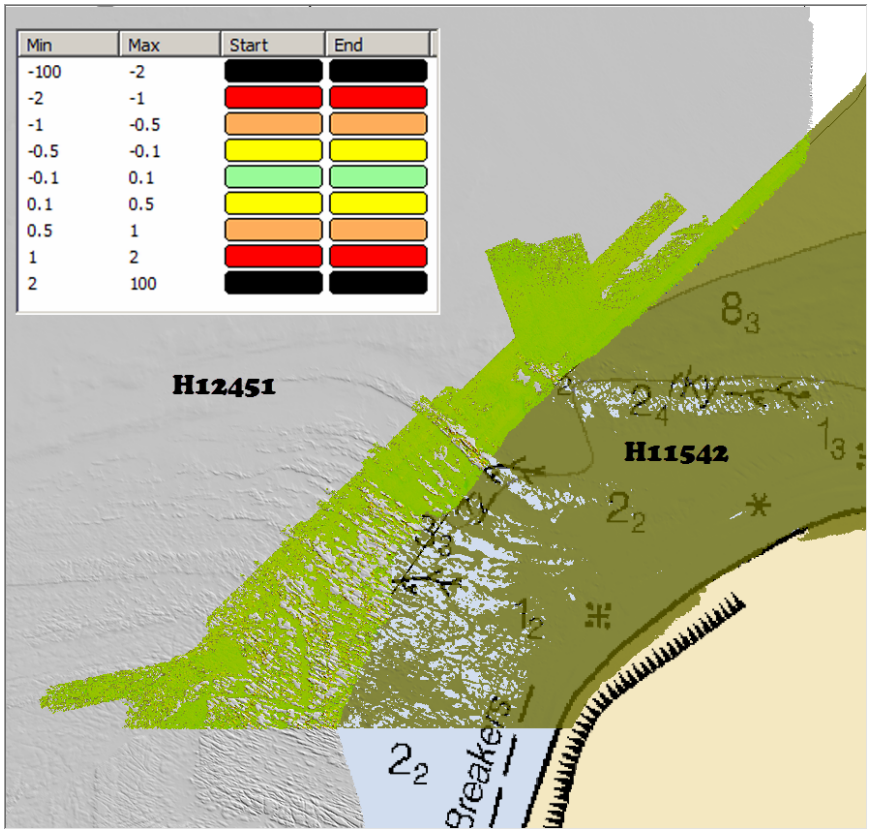


Figure 14: Difference surface of junction between H12451 and H11542 (chart 16587), legend in meters.

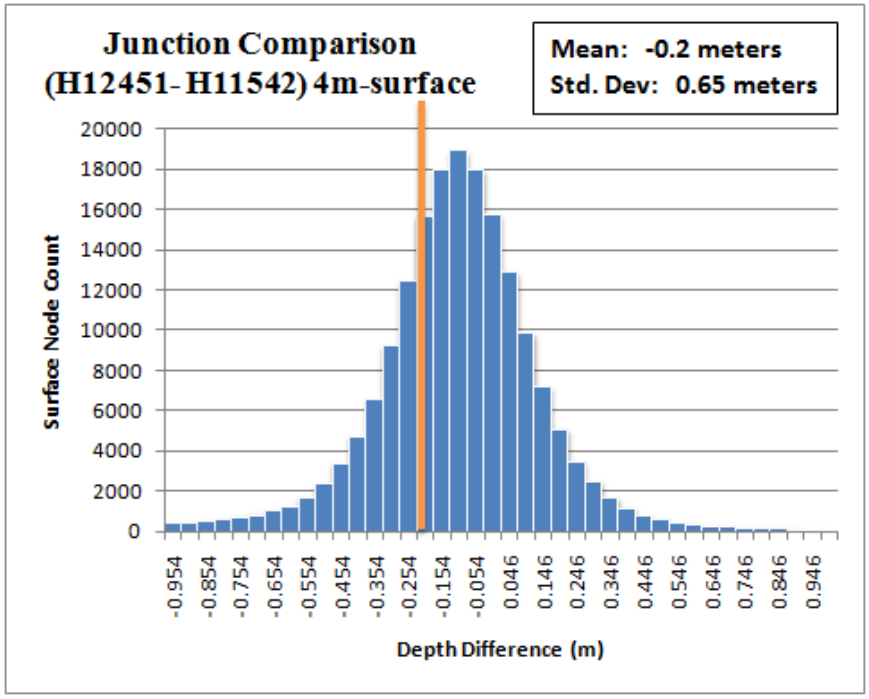


Figure 15: Histogram of difference surface between H12451 and junctioning survey H11542 (H11542 shoaler).

H11543

The junction with lidar survey H11543 is along the southeastern edge of survey H12451. A CARIS difference surface was created using the 4-meter surface from H12451 and the 3-meter surface provided with the Project Instructions for H11543 yielding a mean difference of 0.07 meters (H11543 shoaler) with a standard deviation of 0.97 meters (Figure 16, 17). As discussed in B.2.1 Crosslines, the higher standard deviation is attributable to high bathymetric relief in the areas of overlap.

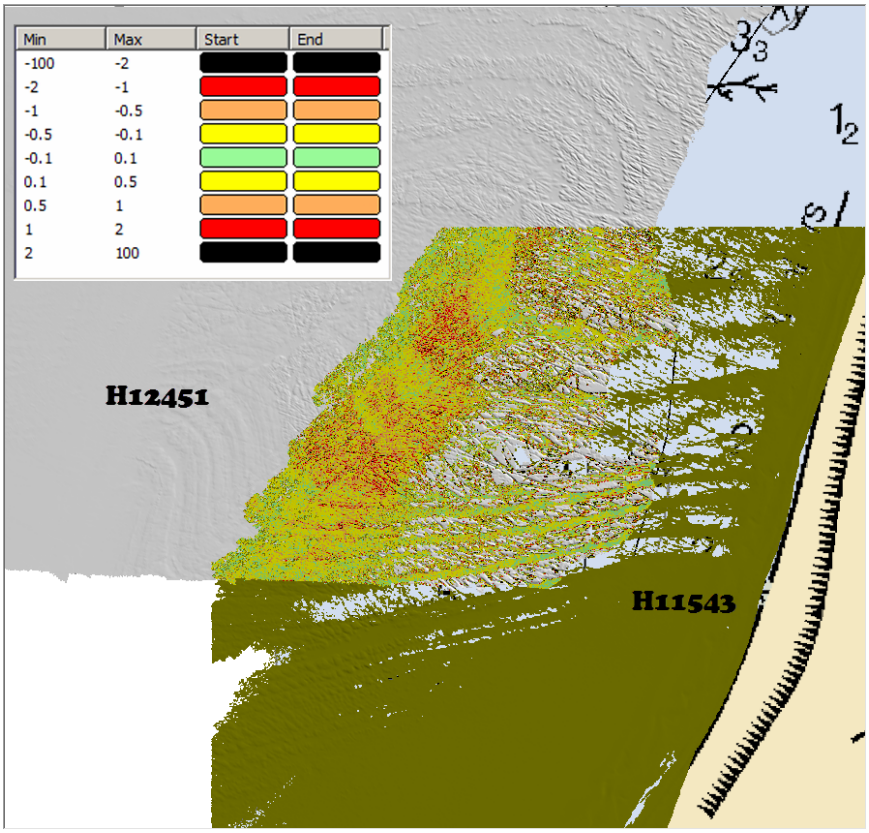


Figure 16: Difference surface of junction between H12451 and H11543 (chart 16587), legend in meters.

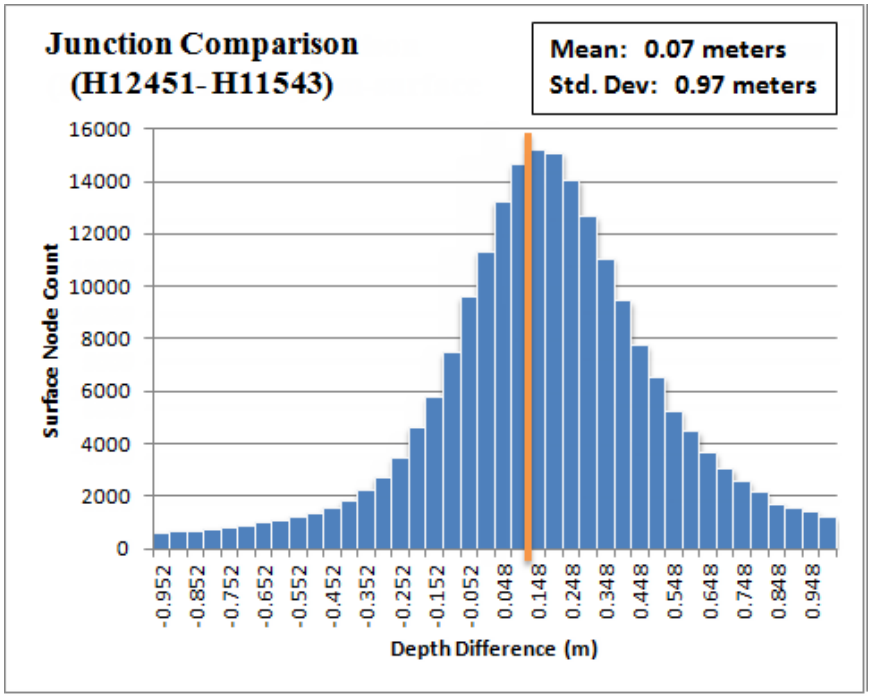


Figure 17: Histogram of difference surface between H12451 and junctioning survey H11452 (H11543 shoaler). Mean value indicated.

H12447

The junction with RAINIER survey H12447 is along the southern edge of survey H12451. A CARIS difference surface was created using the 2-meter surface from both surveys, yielding a mean difference of 0.04 meters (H12447 shoaler) with a standard deviation of 0.26 meters (Figure 18, 19).

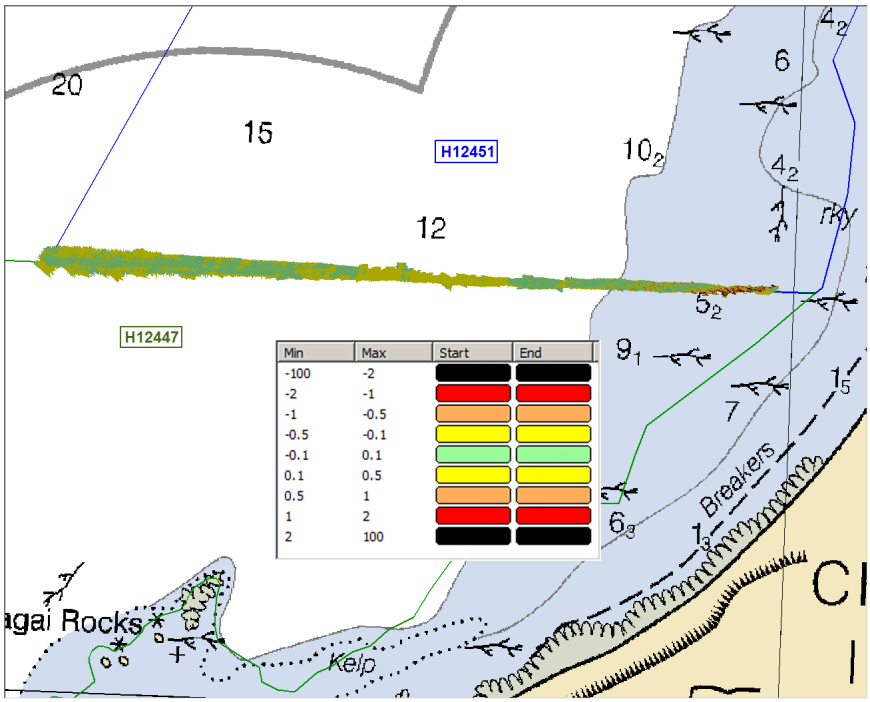


Figure 18: Difference surface of junction between H12451 and H12447 (chart 16587), legend in meters.

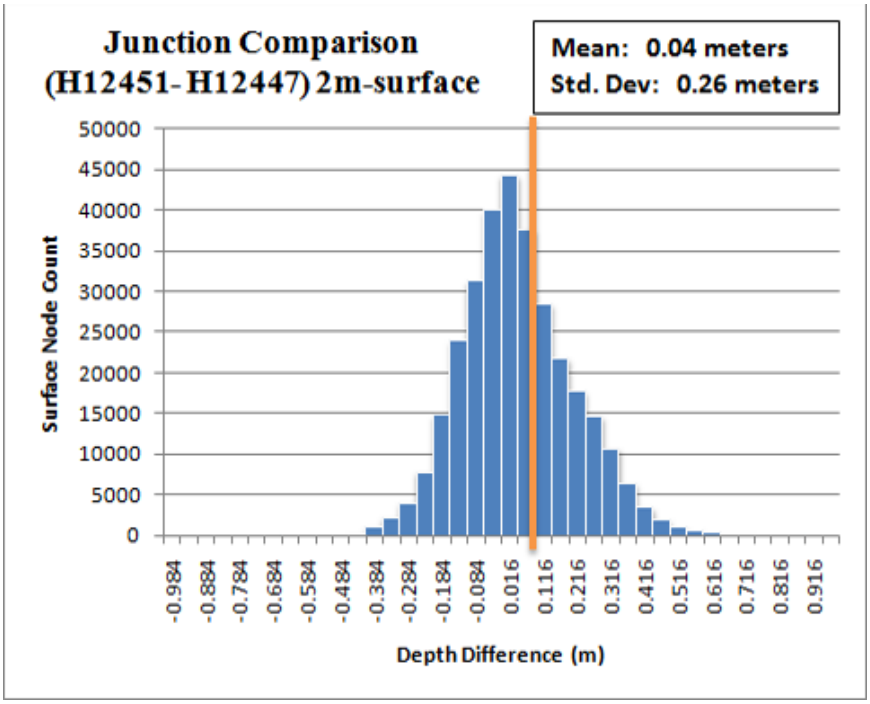


Figure 19: Histogram of difference surface between H12451 and junctioning survey H12447 (H12447 shoaler). Mean value indicated.

H12450

The junction with RAINIER survey H12450 is along the northeastern edge of survey H12451. A CARIS difference surface was created using the 2-meter surface from both surveys, yielding a mean difference of -0.04 meters (H12451 shoaler) with a standard deviation of 0.21 meters (Figure 20, 21). This is within IHO Order 1 accuracy at these depths, but the distribution of differences as seen in Figure 21 shows two distinctive peaks (at about -0.15m and 0.13 m) as opposed to a single Gaussian distribution. Both means are likely an offset from zero due to local tidal errors on the respective days. The tide station used for this project was 325 kilometers from the survey area (Figure 25), so local weather patterns often created tidal offsets in the data.

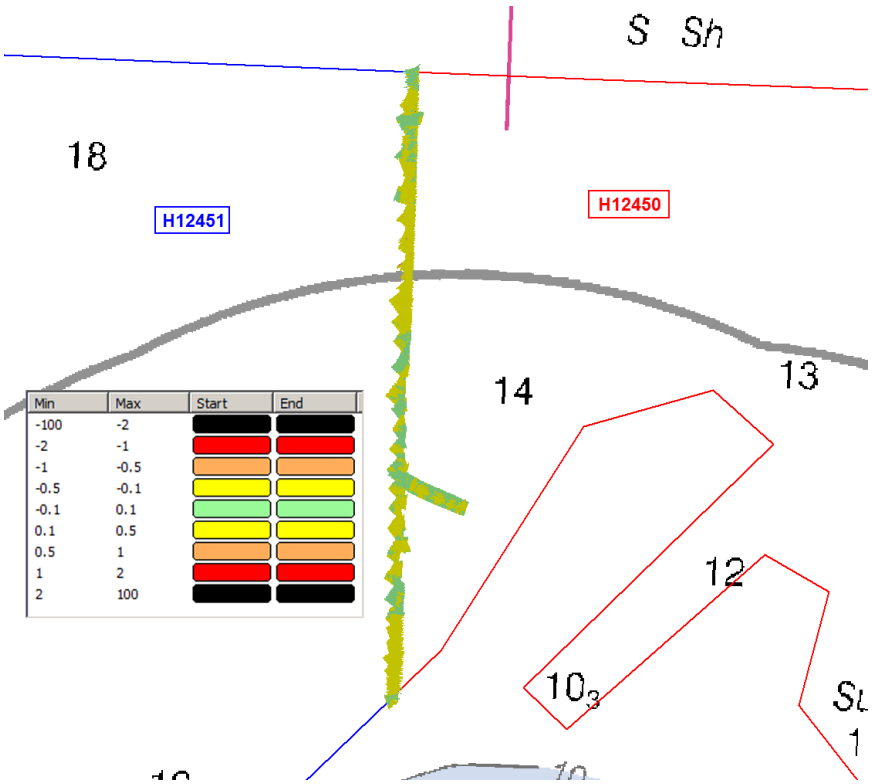


Figure 20: Difference surface of junction between H12451 and H12450 (chart 16587), legend in meters.

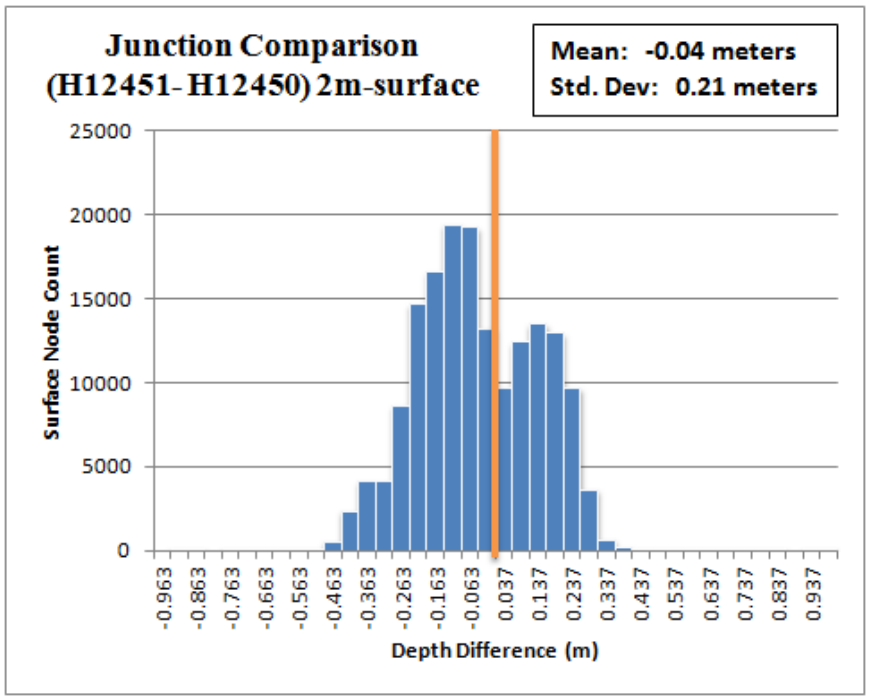


Figure 21: Histogram of difference surface between H12451 and junctioning survey H12450 (H12451 shoaler). Mean value indicated.

H12452

The junction with RAINIER survey H12452 is along the western edge of sheet H12451. A CARIS difference surface was created using the 4 meter surface from both surveys, with a mean difference of 0.01 meters (H12451 shoaler) and a standard deviation of 0.66 meters (Figure 22, 23).

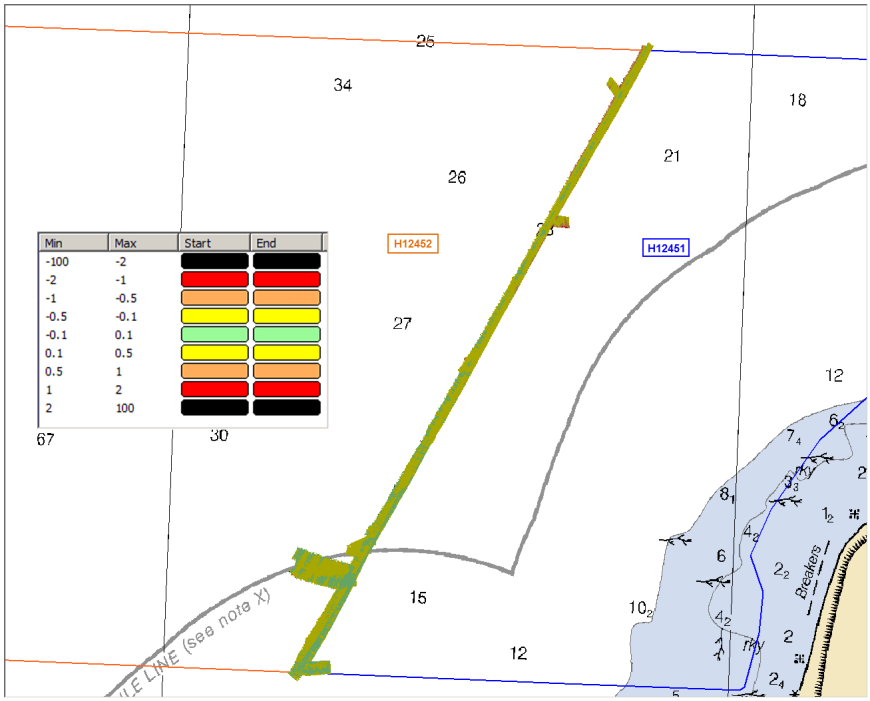


Figure 22: Difference surface of junction between H12451 and H12452 , legend in meters.

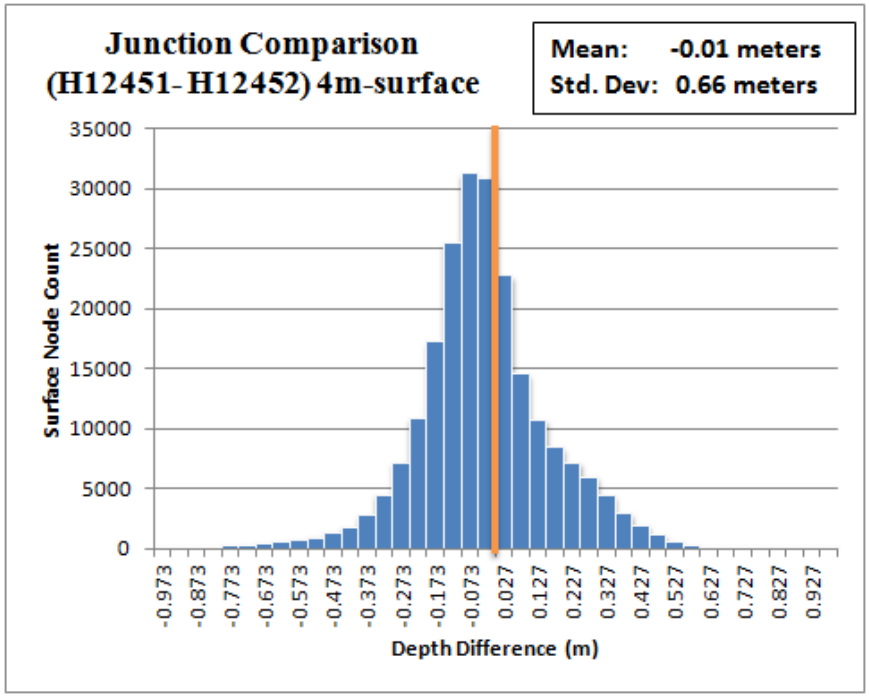


Figure 23: Histogram of difference surface between H12451 and junctioning survey H12452 (H12451 shoaler). Mean value indicated.

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

B.2.5.1 Misapplication of Roll Stabilization

Roll stabilization is a feature in Reson which, during acquisition, may be enabled to account for roll of the vessel. For successful implementation of roll stabilization, the application of roll within the CARIS vessel file must be set to "No". Unfortunately, roll stabilization was erroneously enabled during acquisition for a small portion of three lines (2804 DN 172 1817, 1859, & 1949). On a line-by-line basis, CARIS only permits a single processing paradigm (i.e. roll stabilization enabled, or not); as such, the portion of the lines in which stabilization was enabled had roll double-applied (and was subsequently rejected) (Figure 24). Ultimately, there are no gaps in coverage as a result of this error.

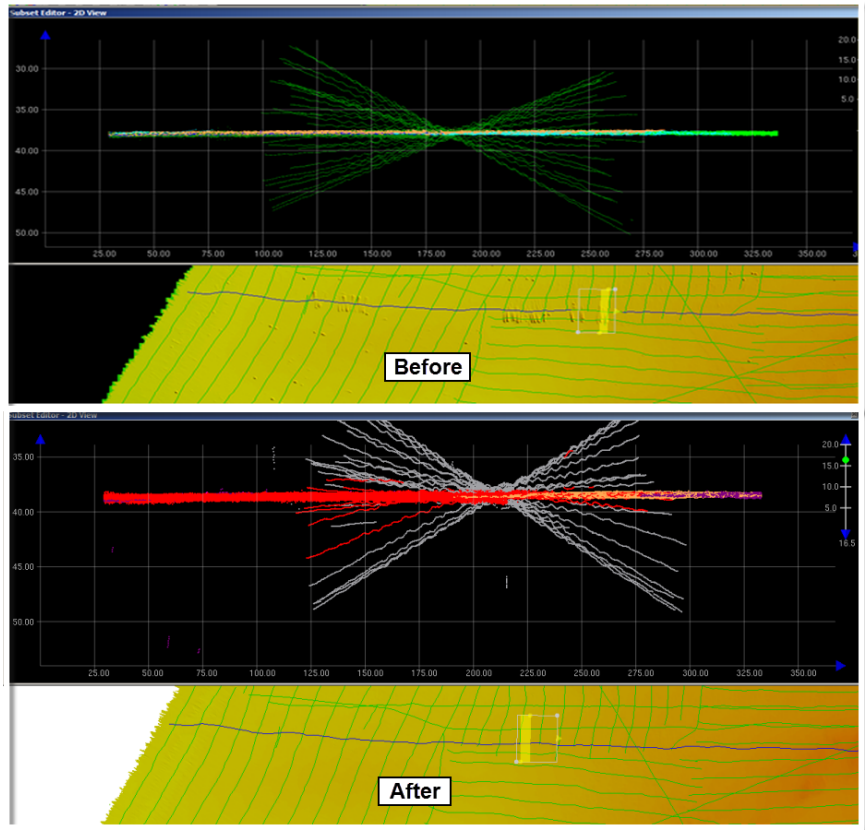


Figure 24: An example of the misapplication of roll stabilization in survey H12451, showing both before and after the data was rejected.

Data is adequate for charting.

B.2.6 Factors Affecting Soundings

B.2.6.1 Tide Errors

The tide station used as a base reference (Sand Point, AK) was about 325 kilometers from the project area (Figure 25). This distance caused multiple tidal errors due to localized currents and storms that were not accounted for in the tide zoning. These offsets were found to be up to 0.30 meters (Figures 26) and were not present when referenced to the ellipse (Figure 27). The error was predominantly found in offshore waters (Figure 28). For the given depths, the data meets the accuracy requirements of the HSSDM.

Figure 25: Relative location of the primary water level control station (Sand Point, AK) for survey H12451.

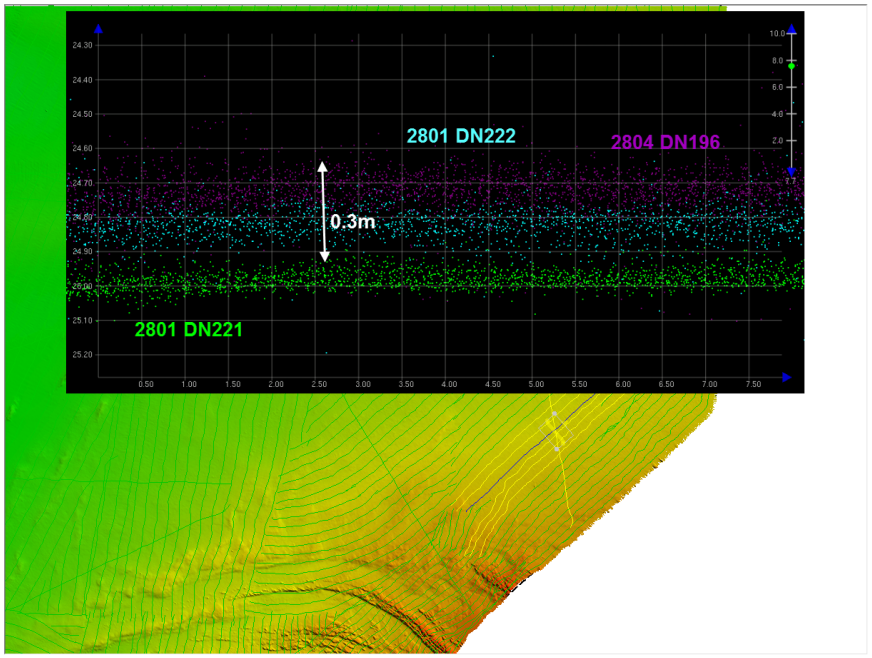


Figure 26: H12451 vertical offset between 2801 DN221, DN222 and 2804 DN196, referenced to MLLW.

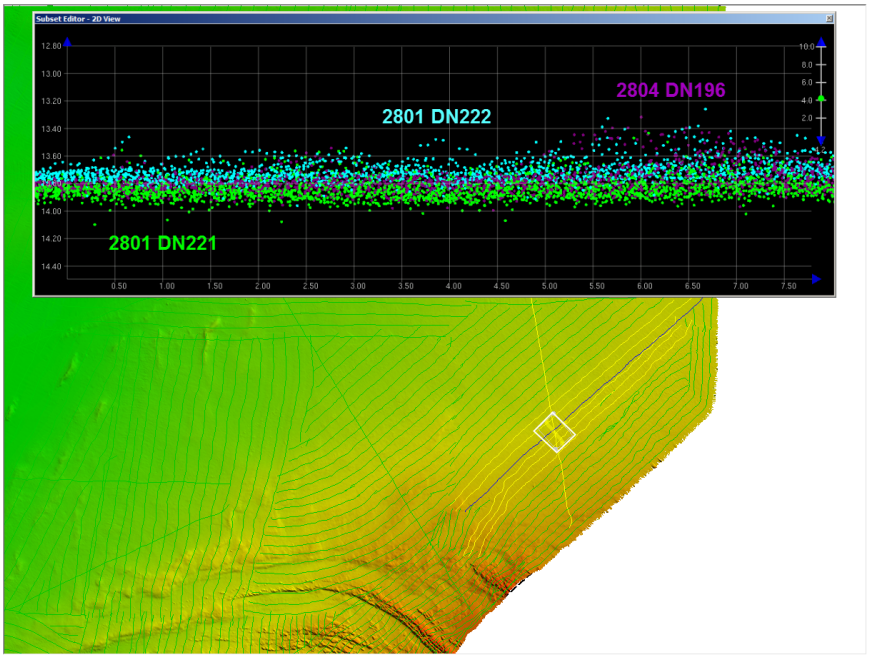


Figure 27: An ellipsoidally referenced view of the same data shown in Figure 26. Note the vertical offset id diminished.

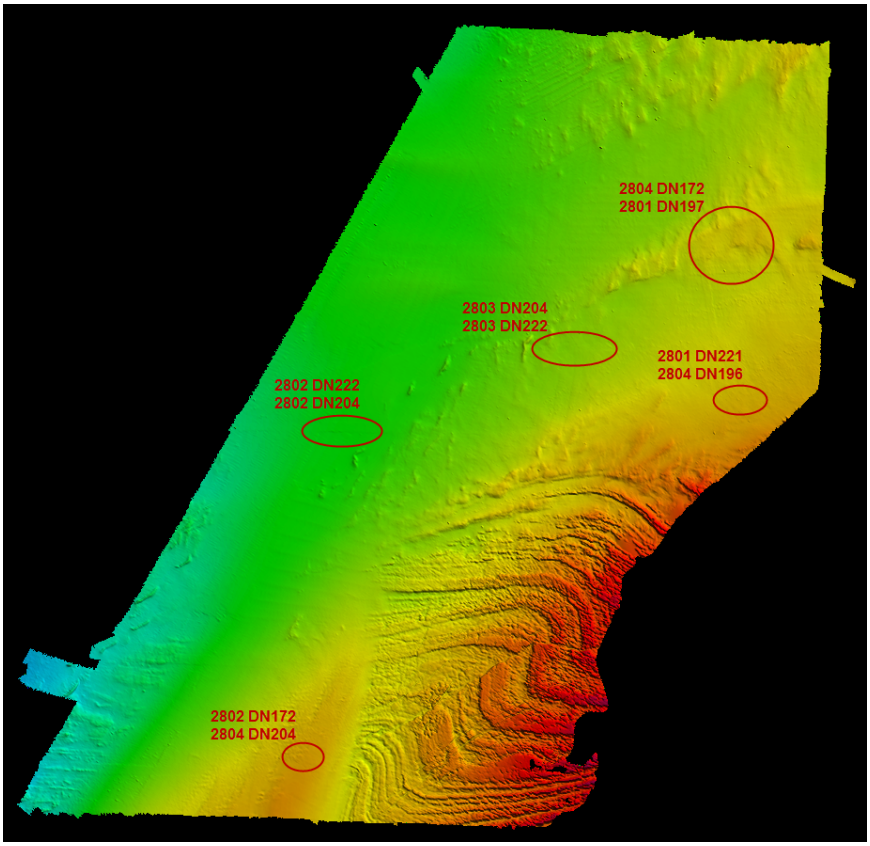


Figure 28: H12451 overview of areas with tidal offsets.

Data is adequate for charting.

B.2.6.1 Large Sea State And Associated Sonar Blow Outs

On DN 197, Launch 2802 was surveying in a 6 to 8 foot sea state in the southwestern corner of survey 12451. The heavy seas and excessive vessel motion led to a number of sonar blow outs due to bubble sweep over both the transducer and the surface sound speed probe. Ultimately operations were canceled that day, but up to that point, all data logged demonstrated noisier outer beams than normal (Figure 29). Under a large vertical exaggeration, some artifacts are visible in the CUBE surfaces derived from this data set; however all data meets the accuracy requirements outlined in the HSSDM.

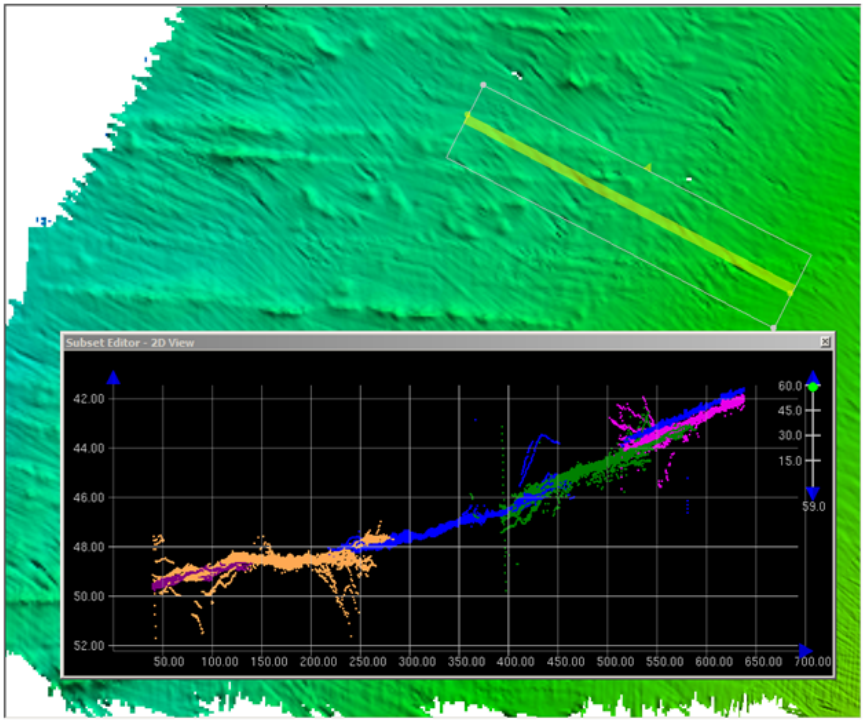


Figure 29: Example of large blow outs on DN197 due to sea state

Data is adequate for charting.

B.2.7 Sound Speed Methods

Sound Speed Cast Frequency: Sound speed profiles were acquired using the SBE-19 and SBE-19 plus CTDs at discrete locations within the survey at least once every four hours, or when surveying in a new area.

Casts were grouped by vessel and applied within CARIS using the "Nearest in distance within time (4 hours)" profile selection method.

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

Smoothed Best Estimate Trajectory (SBET) and Root Mean Square (RMS) data were applied to all H12451 survey lines with the following exceptions: On vessel 2801, four lines from DN195 and three lines from DN204 did not load PPK data due to a missing file. One line associated with S221 on DN 219 experienced similar problems. The affected data was examined in subset editor, and no artifacts were detected among overlapping lines (Figure 30, 31, 32).

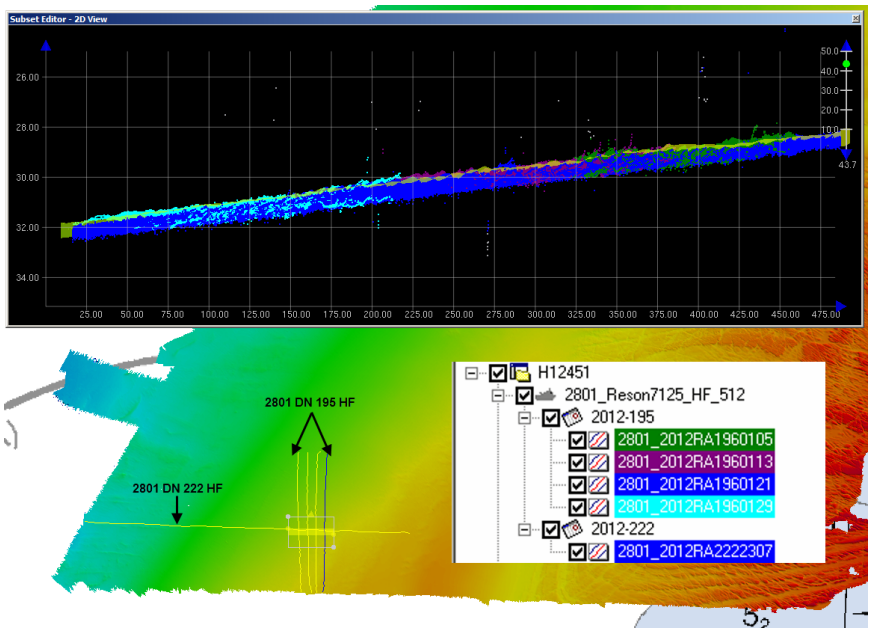


Figure 30: Vessel 2801 DN195 HF overlap with 2801 DN 222 HF showing no artifacts.

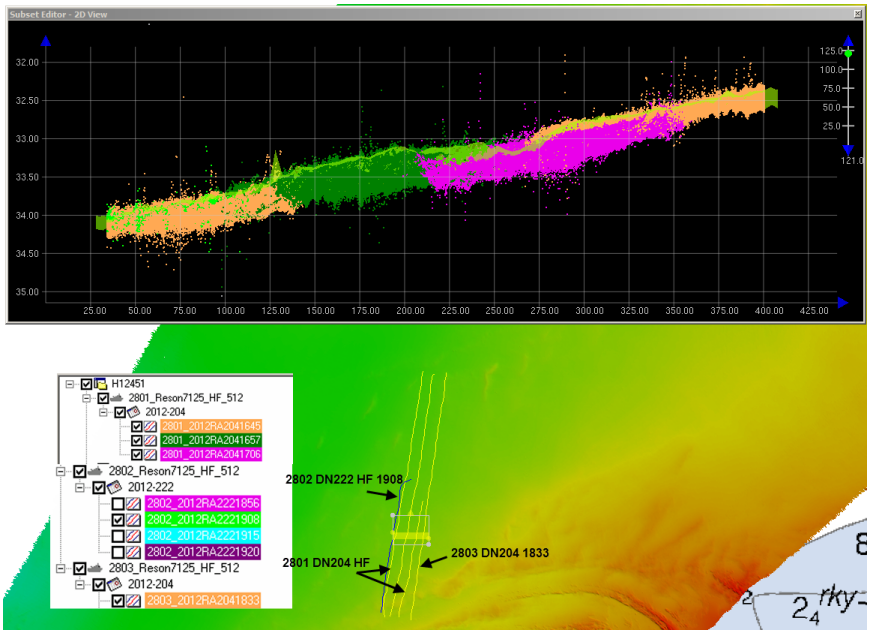


Figure 31: Vessel 2801 DN204 overlap with adjacent survey lines showing no artifacts.

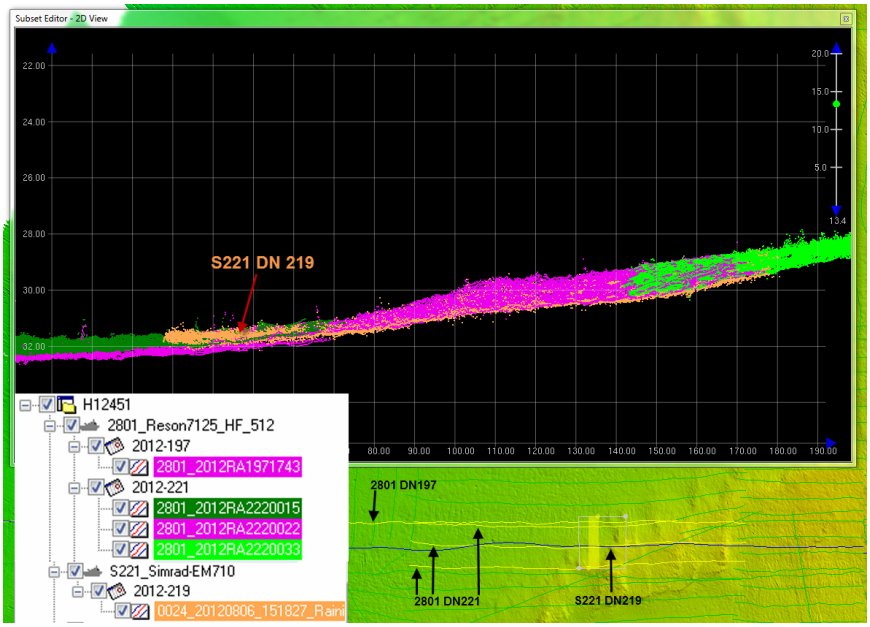


Figure 32: Vessel S221 DN219 overlap with adjacent survey lines showing no artifacts.

Data is adequate for charting.

B.3.2 Calibrations

All sounding systems were calibrated as detailed in the DAPR.

B.4 Backscatter

Backscatter was logged as 7k files or .ALL files and submitted 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 Extended Attributes Files V5.2

Software programs and versions used for data processing are described in the DAPR.

B.5.2 Surfaces

The following CARIS surfaces were submitted to the Processing Branch:

Surface Name	Surface Type	Resolution	Depth Range	Surface Parameter	Purpose
H12451_QC_1m	CUBE	1 meters	0 meters - 77 meters	NOAA_1m	Complete MBES
H12451_QC_2m	CUBE	2 meters	0 meters - 77 meters	NOAA_2m	Complete MBES
H12451_QC_4m	CUBE	4 meters	0 meters - 77 meters	NOAA_4m	Complete MBES
H12451_QC_1m_Final	CUBE	1 meters	0 meters - 20 meters	NOAA_1m	Complete MBES
H12451_QC_2m_Final	CUBE	2 meters	18 meters - 40 meters	NOAA_2m	Complete MBES
H12451_QC_4m_Final	CUBE	4 meters	36 meters - 80 meters	NOAA_4m	Complete MBES
H12451_Combine	CUBE	4 meters	0 meters - 77 meters	NOAA_4m	Complete MBES

Table 9: CARIS Surfaces

H12451_4m_Combined_Office.csar created during office processing was used for compilation.

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
Sand Point, AK	9459450

Table 10: NWLON Tide Stations

File Name	Status
9459450.tid	Final Approved

Table 11: Water Level Files (.tid)

File Name	Status
P133RA2012CORP.zdf	Final

Table 12: Tide Correctors (.zdf or .tc)

A request for final approved tides was sent to N/OPS1 on 08/12/2012. The final tide note was received on 08/16/2012.

Tide note appened.

C.2 Horizontal Control

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

The following PPK methods were used for horizontal control:

Single Base

In conjunction with this project a GPS base station was established by RAINIER personnel in the vicinity of Slaughterhouse Lake near the northeast end of Chirikof Island. Vessel kinematic data was post-processed using Applanix POSPac processing software, POSGNSS processing software and single base processing methods described in the DAPR. SBET and associated error (RMS) data was applied to all survey lines with the exception of those described in section B.3.1 of this report.

The following user installed stations were used for horizontal control:

HVCR Site ID	Base Station ID
Chirikof Island, AK	N/A

Table 13: User Installed Base Stations

The following DGPS Stations were used for horizontal control:

DGPS Stations
Kodiak (313 kHz)
Cold Bay (289 kHz)
Kenai (310 kHz)

Table 14: 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
16587	1:135000	2	02/2012	10/20/2012	10/09/2012

Table 15: Largest Scale Raster Charts

16587

A comparison was made between survey H12451 and chart 16587 using a CARIS CUBE surface and an associated sounding layer. There are 14 soundings on chart 16587 within the extents of survey H12451 (Figure 33). Six of the 14 soundings are in general agreement (Figure 34), six of the 14 soundings agree within one fathom (Figure 35), and two soundings have a difference of 8-10 fathoms (Figure 36). The Hydrographer recommends that a sounding set derived from survey H12451 supersede all charted depths.

The 5 and 10-fathom contours should be moved westward to encompass the rocky areas on the seafloor (Figure 37).

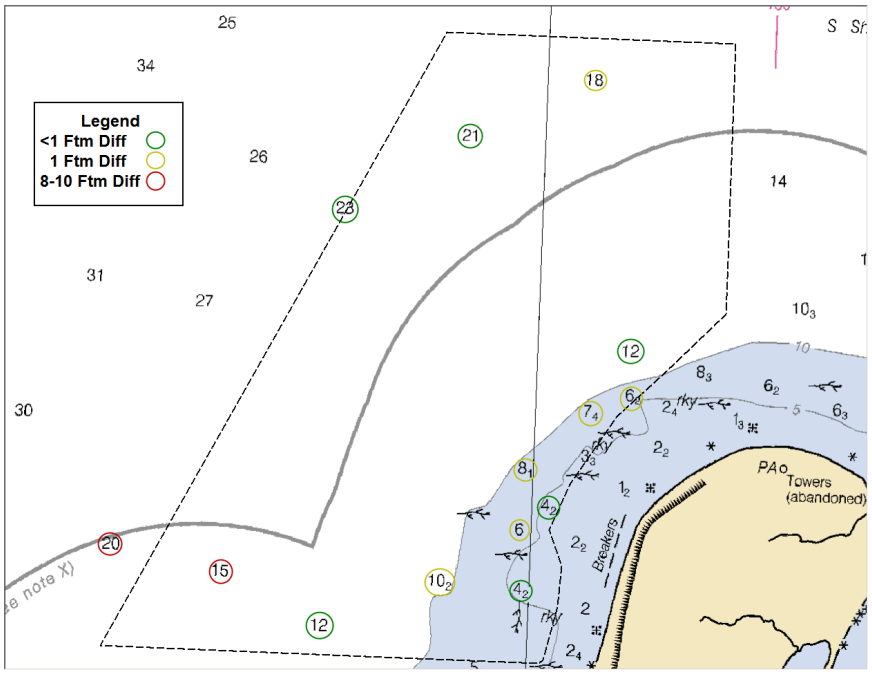


Figure 33: Fourteen soundings used for comparison between 16587 and survey H12451.

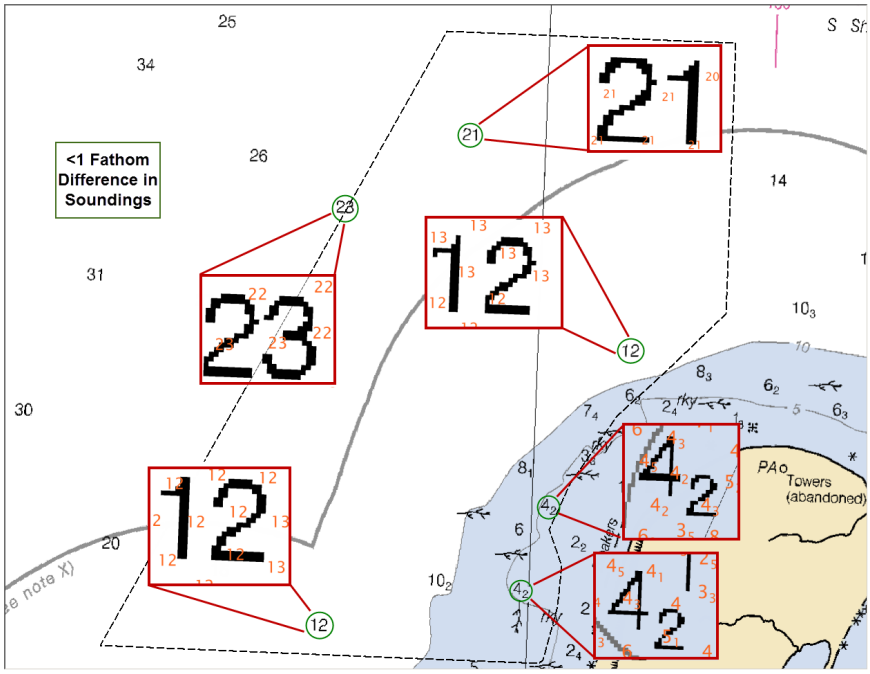


Figure 34: H12451 soundings in general agreement.

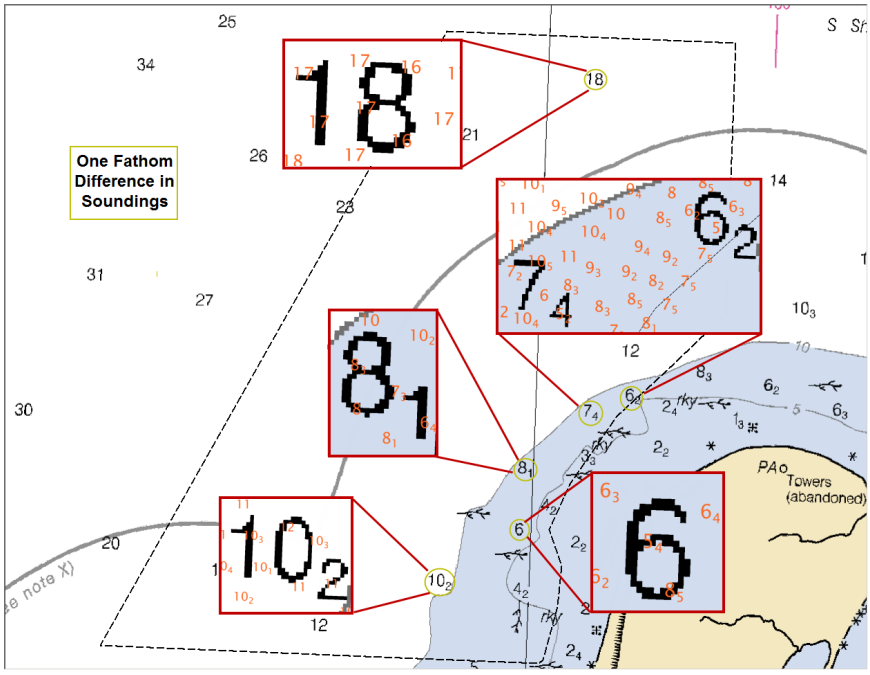


Figure 35: H12451 one fathom difference in soundings.

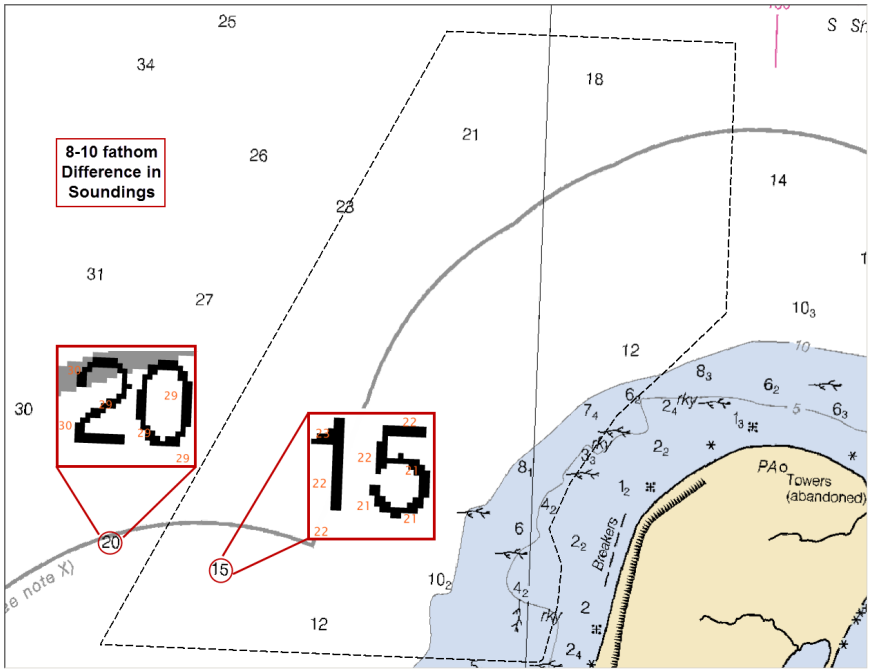


Figure 36: H12451 8-10 fathom difference in soundings (chart being shoaler).

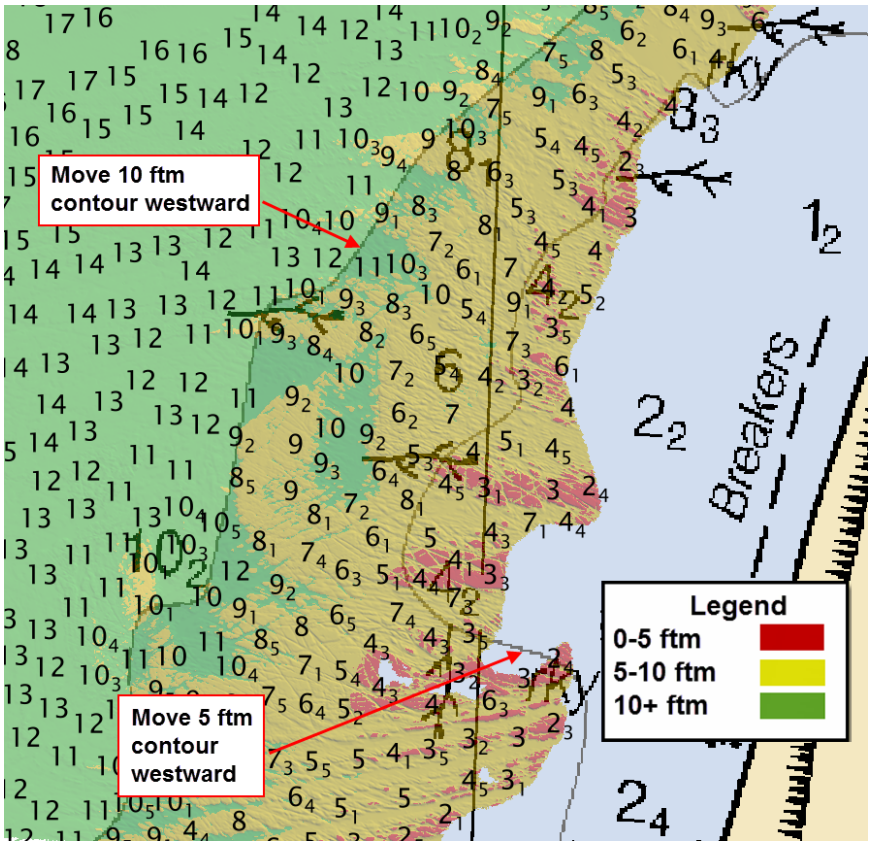


Figure 37: The extents of the surveyed 5 and 10-fathom contours are slightly to the west of the charted contours.

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?
US3AK5KM	1:350000	14	07/20/2011	07/05/2012	NO

Table 16: Largest Scale ENCs

US3AK5KM

ENC US3AK5XM was mostly digitized from chart 16587 and coincides with the raster with the exception of three inshore soundings. The depths and contours on the ENC match the raster, and the comparison between survey H12451 and the ENC is equivalent to the preceding comparison with chart 16587, with the exception of the three inshore soundings. All charted soundings agree to within one fathom of the surveyed data (Figure 38) . The Hydrographer recommends that a sounding set derived from survey H12451 supersede all charted depths.

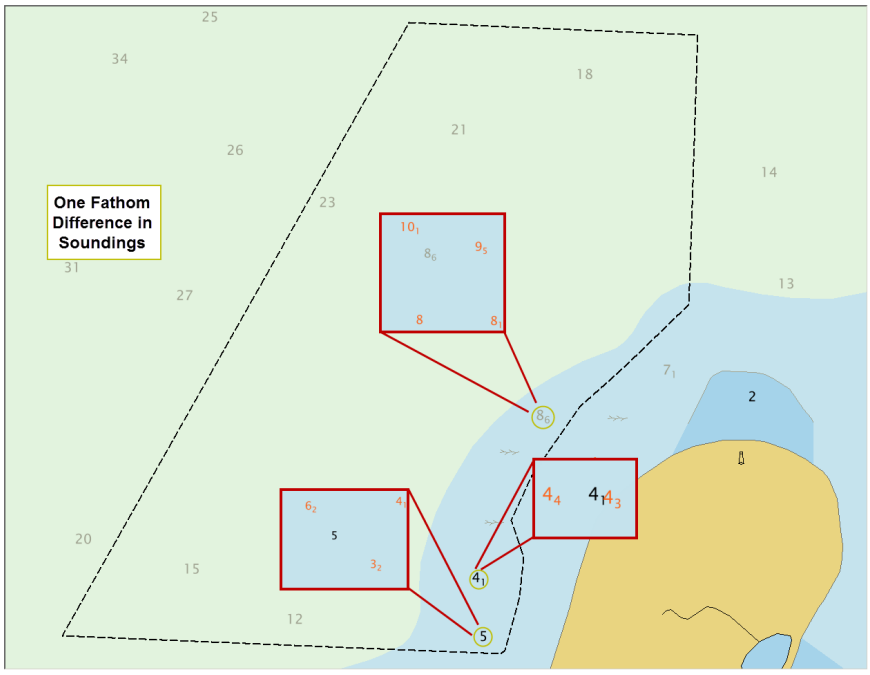


Figure 38: Comparison of ENC and surveyed depths of H12451.

The largest scale ENC in the survey area is US4AK5XM at 1:135,000 which corresponds to chart 16587 with the exception of inshore soundings. Concur with chart comparison. Area should be charted per the chart update product.

D.1.3 AWOIS Items

No AWOIS items exist for this survey.

D.1.4 Charted Features

No charted features exist for this survey.

D.1.5 Uncharted Features

No uncharted features exist for this survey.

D.1.6 Dangers to Navigation

No Danger to Navigation Reports were submitted for this survey.

D.1.7 Shoal and Hazardous Features

No shoals or potentially hazardous features exist for this survey.

D.1.8 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.2 Additional Results

D.2.1 Shoreline

There were eight assigned features for this survey. All of the assigned features were addressed in the H12451_Final_Feature_File.hob (Figure 39).

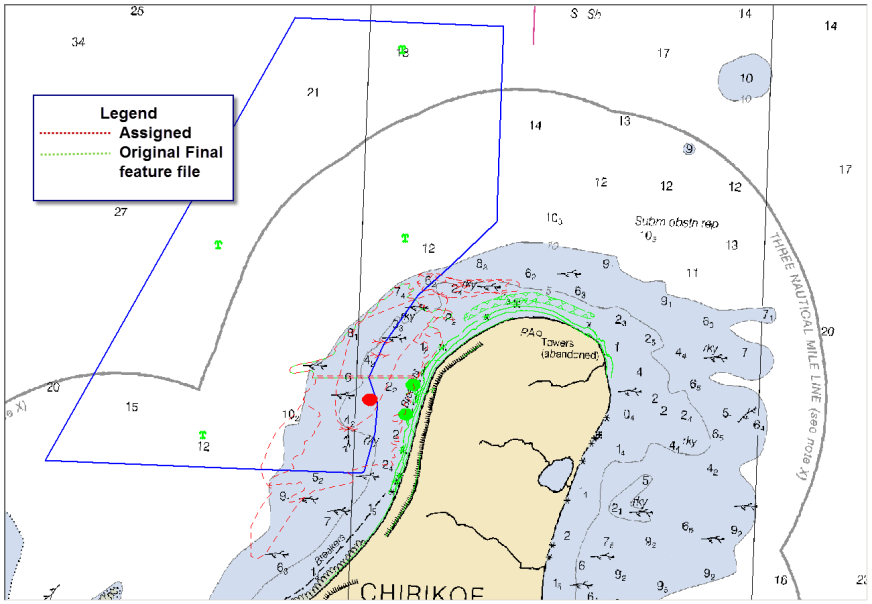


Figure 39: H12451 shoreline. Assigned features are in red.

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

A presumed fault in the seafloor exists at the south eastern area of H12451 where the rocky sections do not align (Figure 40).

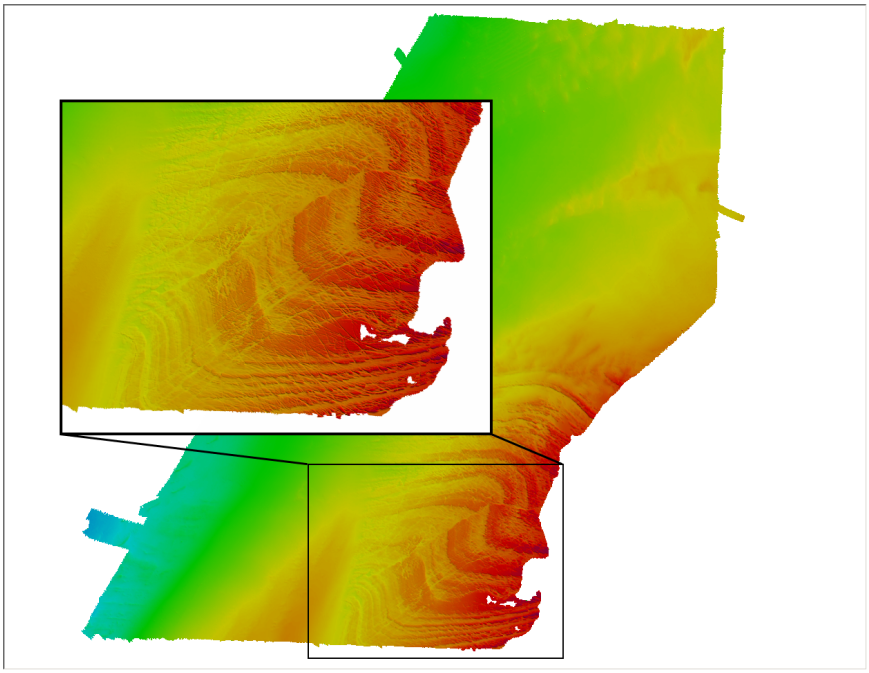


Figure 40: H12451 seafloor fault

D.2 Construction and Dredging

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

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	11/07/2012	Richard T. Brennan 2012.12.14 16:21:11 -08'00'
Michael O. Gonsalves, LT/NOAA	Field Operations Officer	11/07/2012	Michael O. Gonsalves 2012.12.14 15:50:20 -08'00'
James Jacobson	Chief Survey Technician	11/07/2012	Digitally signed by James Jacobson Reason: I have reviewed this document Date: 2012.12.14 15:54:01 -08'00'
Andrea Proie, ENS/NOAA	Sheet Manager	11/07/2012	Andrea Proie 2012.12.14 13:06:22 -08'00'

F. Table of Acronyms

Acronym	Definition
AFF	Assigned Features File
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
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
HSSDM	Hydrographic Survey Specifications and Deliverables Manual

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	Exectutive 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 : August 14, 2012

HYDROGRAPHIC BRANCH: Pacific
HYDROGRAPHIC PROJECT: OPR-P133-RA-2012
HYDROGRAPHIC SHEET: H12451

LOCALITY: NW Chirikof Island,Chirikof Island and Vicinity,AK
TIME PERIOD: June 20 - August 11, 2012

TIDE STATION USED: 9459450 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-P133-RA-2012, H12451, during the time period from June 20 to August 11, 2012.

Please use the zoning file P133RA2012CORP submitted with the project instructions for OPR-P133-RA-2012. Zones SWA175 and SWA180 are the applicable zones for H12451.

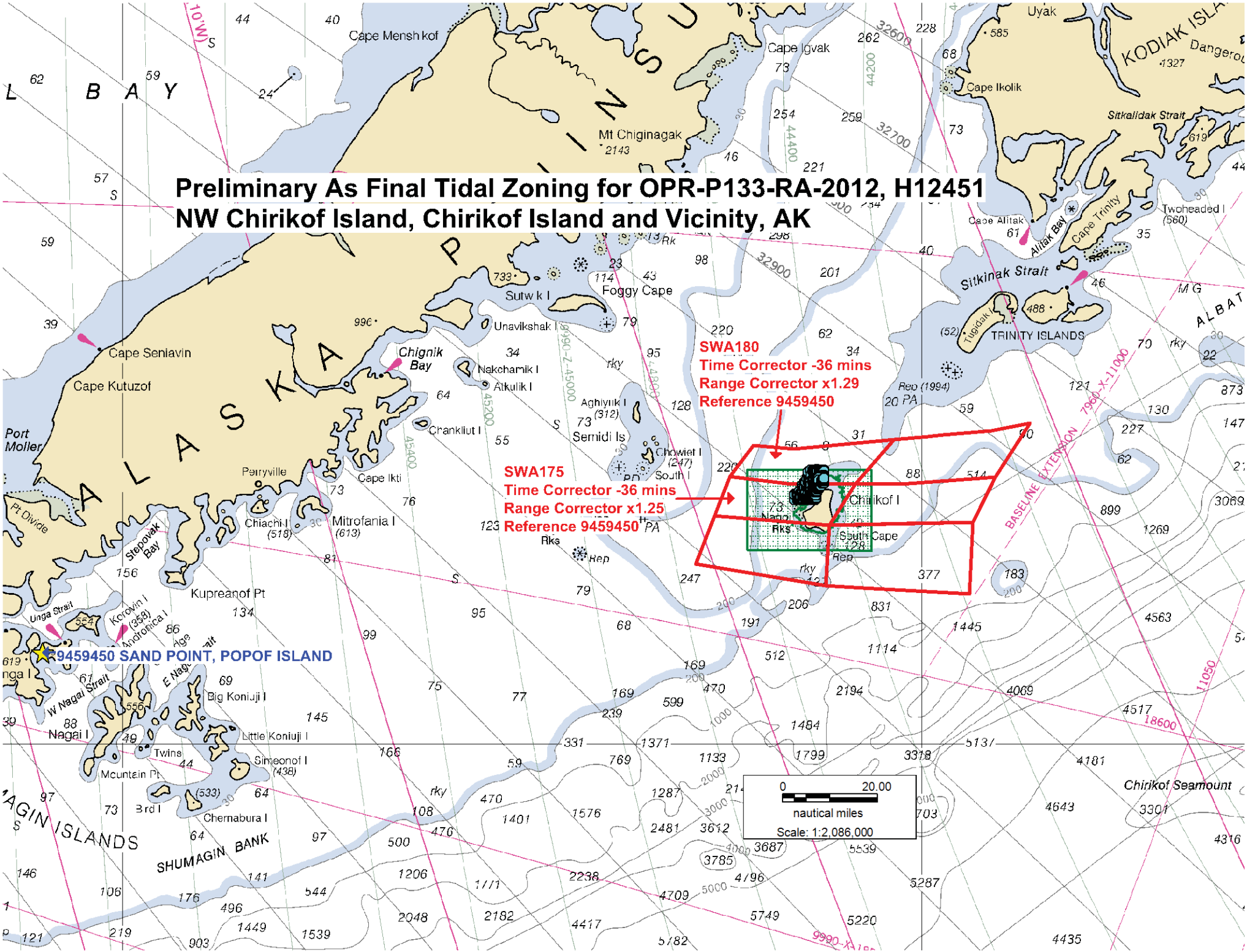
Refer to attachments for zoning information.

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).

STONE.PETER.J.1365842546

Digitally signed by STONE.PETER.J.1365842546
DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=OTHER, cn=STONE.PETER.J.1365842546
Date: 2012.08.15 17:19:27 -04'00'

CHIEF, OCEANOGRAPHIC DIVISION


Preliminary As Final Tidal Zoning for OPR-P133-RA-2012, H12451
NW Chirikof Island, Chirikof Island and Vicinity, AK
SWA180
Time Corrector -36 mins
Range Corrector x1.29
Reference 9459450
SWA175
Time Corrector -36 mins
Range Corrector x1.25
Reference 9459450
9459450 SAND POINT, POPOF ISLAND
0
20.00
nautical miles
Scale: 1:2,086,000
Cape Menshikof
Cape Igvak
Uyak
KODIAK ISLAND
Cape Ikolik
Sitkalidak Strait
Mt Chiginagak
2143
Cape Alitak
Alitak Bay
Cape Trinity
Twoheaded I
Sitkinak Strait
TRINITY ISLANDS
Foggy Cape
Sutwik I
Unavikshak I
Cape Seniavin
Cape Kutuzof
Chignik Bay
Nakchamik I
Atkulik I
Chankliut I
Aghiyuk I
Semidi Is
Chowiet I
South I
Port Moller
Perryville
Cape Ikti
Pt Divide
Stepovak Bay
Chiachi I
Mitrofania I
Kupreanof Pt
Unga Strait
Kerovin I
Nagai I
W Nagai Strait
E Nagai Strait
Big Koniuji I
Little Koniuji I
Twins
Mountain Pt
Simeonof I
Chernabura I
Brd I
SHUMAGIN ISLANDS
SHUMAGIN BANK
Chirikof I
South Cape
BASELINE EXTENSION
Chirikof Seamount
ALASKA PENINSULA
BAY

APPROVAL PAGE

H12451

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

- H12451_DR.pdf
- Collection of depth varied resolution BAGS
- Processed survey data and records
- H12451_GeoImage.pdf

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

Approved: 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: 2013.04.29 15:00:41 -07'00'

Pete Holmberg
Cartographic Team Lead, Pacific Hydrographic Branch

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

Approved: Digitally signed by BROWN.KURT.E.1156712600
DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=OTHER, cn=BROWN.KURT.E.1156712600
Reason: For Dave Zezula
Date: 2013.04.29 15:01:41 -07'00'

Kurt Brown
Physical Scientist, for Chief, Pacific Hydrographic Branch