H12453

NOAA Form 76-35A

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

DESCRIPTIVE REPORT

Type of Survey:	Basic Hydrographic Survey
Registry Number:	H12453

LOCALITY

State:	Alaska
General Locality:	Chirikof Island and Vicinity
Sub-locality:	Offshore West Chirikof Island

2012

CHIEF OF PARTY
Commander Richard T. Brennan

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Date:

NOAA FORM 77-28
(11-72)

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

REGISTRY NUMBER:

HYDROGRAPHIC TITLE SHEET

H12453

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**
Sub-Locality:	**Offshore West Chirikof Island**
Scale:	**40000**
Dates of Survey:	**06/23/2012 to 07/13/2012**
Instructions Dated:	**05/15/2012**
Project Number:	**OPR-P133-RA-12**
Field Unit:	**NOAA Ship *Rainier***
Chief of Party:	**Commander Richard T. Brennan**
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 H12453

Project: OPR-P133-RA-12

Locality: Chirikof Island and Vicinity

Sublocality: Offshore West Chirikof Island

Scale: 1:40000

June 2012 - July 2012

NOAA Ship *Rainier*

Chief of Party: Commander Richard T. Brennan

A. Area Surveyed

H12453 "Offshore West Chirikof Island" (Figure 1) covers an 11 by 8 nautical mile area west and southwest of Chirikof Island. The area is 2.5 nm west of Round Rock. It is located roughly between the Three Nautical Mile line and the Territorial Sea boundary. Charted soundings range from 40 fathoms to 124 fathoms.

A.1 Survey Limits

Data was acquired within the following survey limits:

Northeast Limit	**Southwest Limit**
55.8963333333 N 155.836333333 W	55.6783333333 N 156.128333333 W

Table 1: Survey Limits

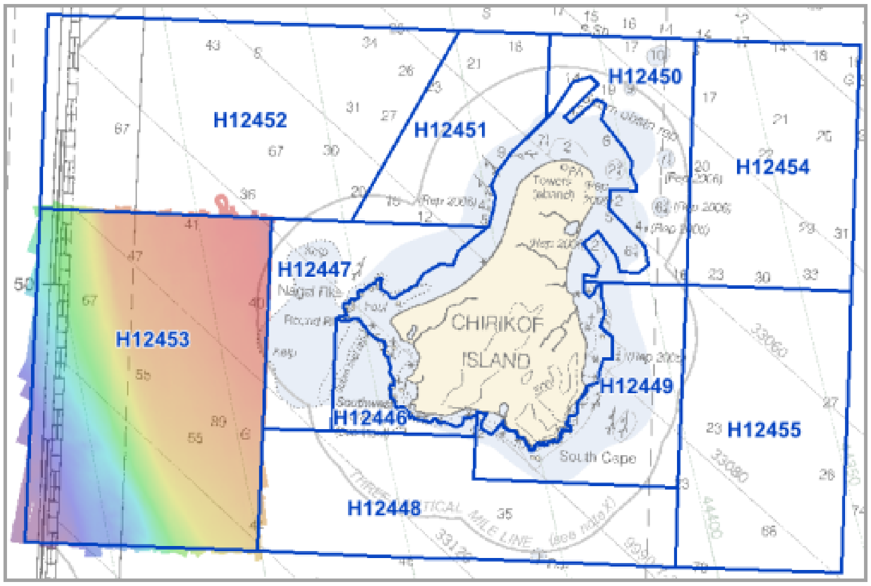

Figure 1: Sheet H12453 survey limits.

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 is 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. This project will cover approximately 390 SNM of which 372 SNM are critical survey areas and 18 SNM are Priority One survey areas as designated in the NOAA Hydrographic Survey Priorities, 2011 edition.

A.3 Survey Quality

The entire survey is adequate to supersede previous data.

Data acquired on survey H12453 met complete multibeam coverage requirements, including the 5 soundings per node data density requirement outlined in section 5.2.2.2 of the HSSD (Figure 2).

In order to extract some descriptive statistics of the data density achievements, the density layer of each finalized surface was queried within CARIS and then exported to MS Excel. Density failures occurred at the edges of acquisition and between a few lines on the east side of the survey (Figure 3). These areas were inspected in CARIS HIPS and SIPS Subset Editor, and it was determined that the surface honored the sea floor. A data density threshold of five soundings or greater per node was achieved in 99.9% of the nodes (Figure 4) meeting data density requirements.

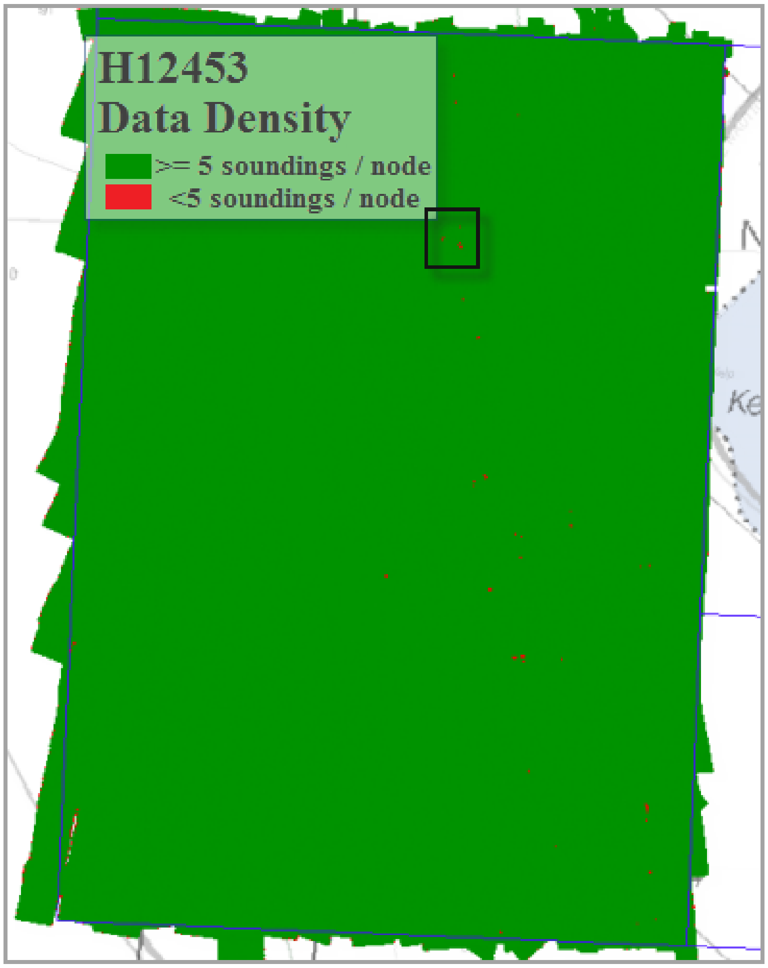

Figure 2: H12453 data density. Areas in green meet the threshold of 5 soundings per node; red areas have a data density less then 5 soundings per node.

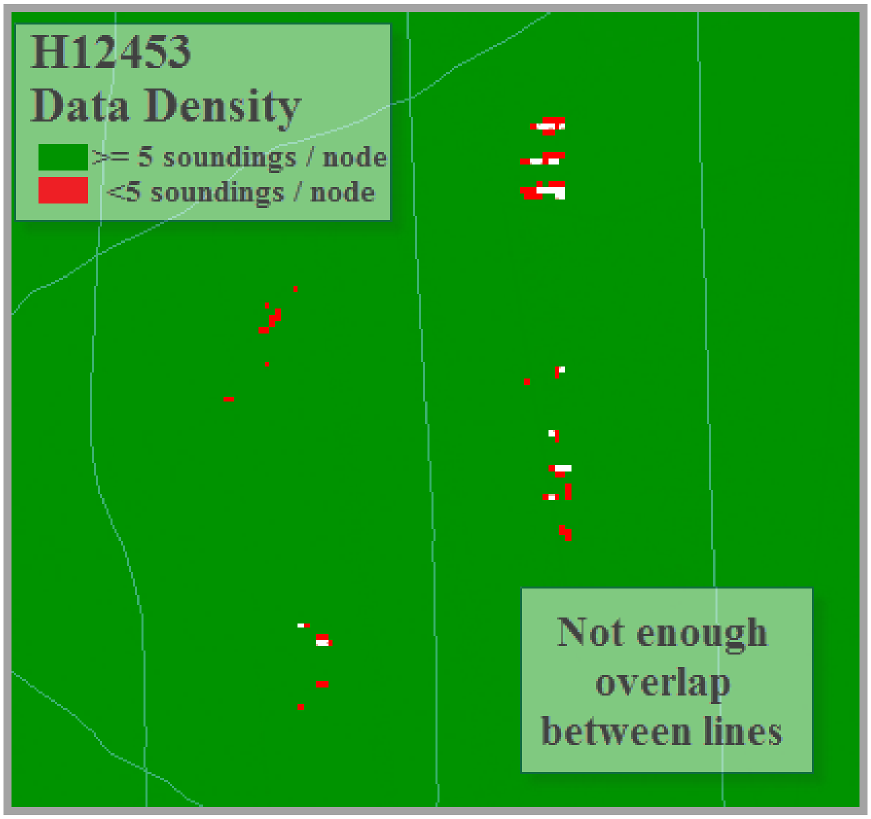

Figure 3: Examples of data density failures between lines. Areas in green meet the threshold of 5 soundings per node; red areas have a data density less then 5 soundings per node.

Resolution	Depth range	Number of nodes	Fewer than five soundings per node	Percent of nodes with greater than five soundings per node
4m	36 - 80m	1,426,594	2,920	99.8%
8m	72 - 160m	3,096,245	1,340	100.0%
16m	144 - 320m	424,711	780	99.8%
	TOTAL:	4,947,550	5,040	99.9%
	TOTAL (by area):	329,711,200	332,160	99.9%

Figure 4: 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

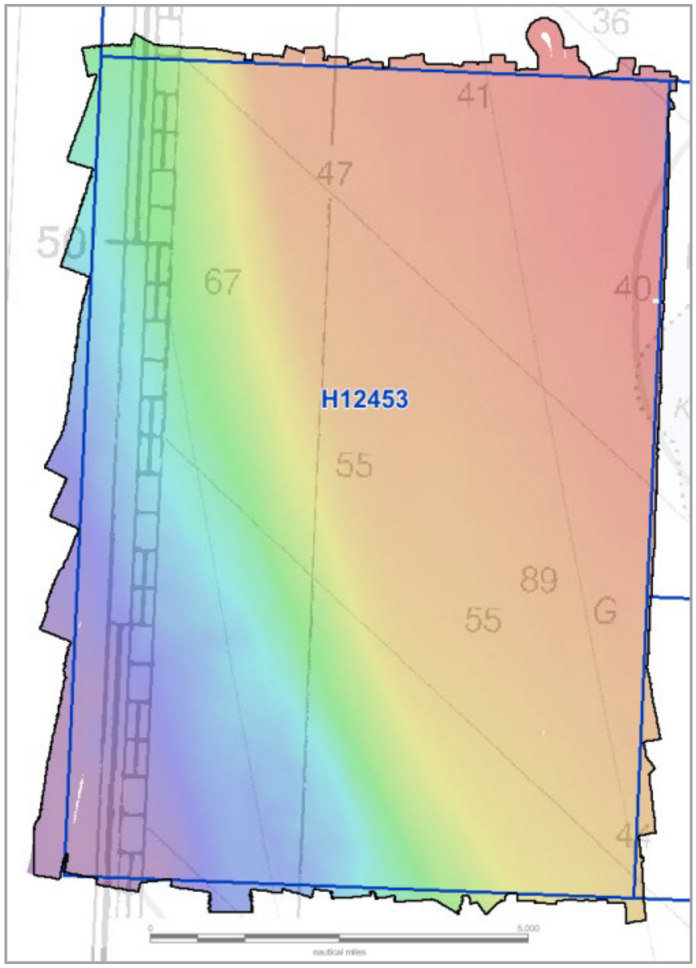

Figure 5: H12453 survey coverage.

Complete multibeam echosounder (MBES) coverage was achieved (Figure 5), except for two coverage gaps in the southwest corner (Figure 6), and one created when applying SBETS (Figure 7).

In the southwest corner, one coverage gap spans 1000m x 60m. The other coverage gap is at the southwest corner of the survey limits and is approximately 60m from the survey edge. The surrounding area is about 250 meters deep, flat, featureless, and navigationally insignificant. The general bathymetry can be interpolated from the surrounding soundings. Fairweather's H11687 survey covers most of the southwest coverage gap.

A coverage gap was created when the POS file was ended 31 seconds early for line 0029_20120627_233752_Rainier. The line ended at 23:37:51 and the SBETS line ended at 23:37:18. When SBET was applied to improve horizontal accuracy, the line was truncated, creating a 180m x 110 m coverage gap. The line was inspected before SBETS was applied and no navigationally significant features lie within this coverage gap. Survey H12447 completely covers this gap.

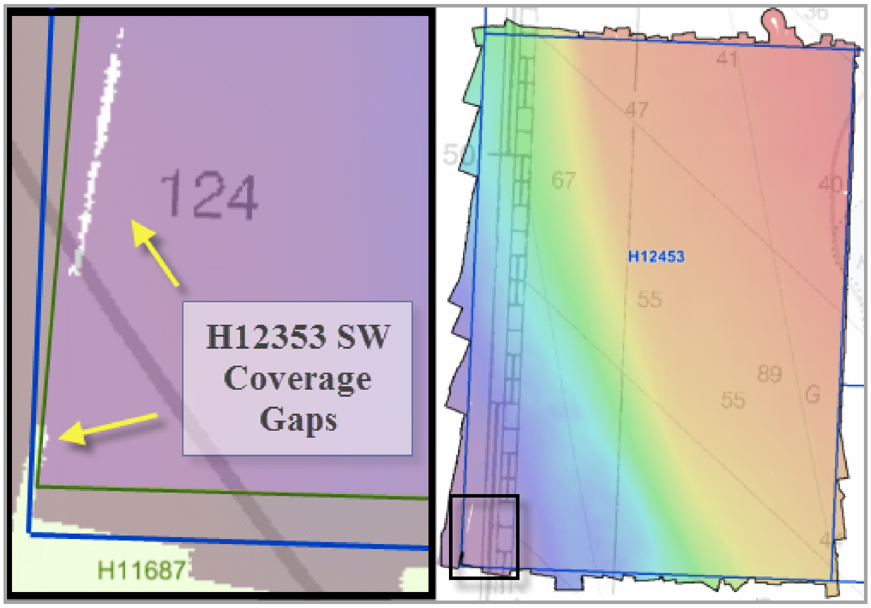

Figure 6: H12453 southwest coverage gaps. H11687 covers some of the gap.

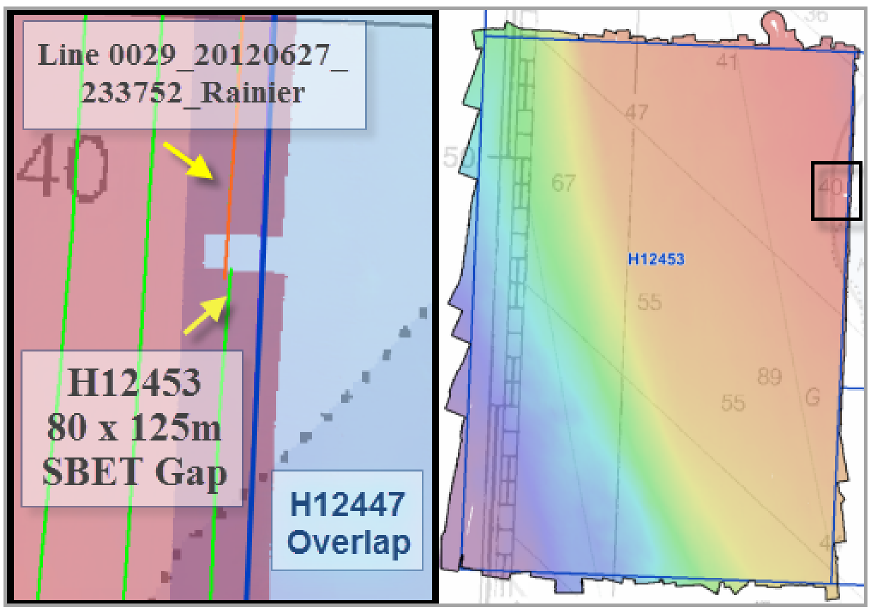

Figure 7: H12453 SBET coverage gap. H12447 covers the gap.

Data is adequite for charting.

A.5 Survey Statistics

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

	HULL ID	*2802 (RA-5)*	*2804 (RA-6)*	*S221*	*Total*
LNM	**SBES Mainscheme**	0	0	0	0
	MBES Mainscheme	5	0	413	418
	Lidar Mainscheme	0	0	0	0
	SSS Mainscheme	0	0	0	0
	SBES/MBES Combo Mainscheme	0	0	0	0
	SBES/SSS Combo Mainscheme	0	0	0	0
	MBES/SSS Combo Mainscheme	0	0	0	0
	SBES/MBES Combo Crosslines	0	41	0	41
	Lidar Crosslines	0	0	0	0
Number of Bottom Samples					0
Number of DPs					0
Number of Items Items Investigated by Dive Ops					0
Total Number of SNM					85.95

Table 2: Hydrographic Survey Statistics

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

Survey Dates
06/23/2012
06/24/2012
06/25/2012
06/26/2012
06/27/2012
06/28/2012
07/13/2012

Table 3: Dates of Hydrography

A.6 Shoreline

There was no shoreline assigned for this sheet.

A.7 Bottom Samples

No bottom samples were collected for this sheet due to time constraints and weather.

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	***2802 (RA-5)***	***2804 (RA-6)***	***S221***
LOA	28 feet	28 feet	231 feet
Draft	3.5 feet	3.5 feet	16.5 feet

Table 4: Vessels Used

Data were acquired by NOAA Ship Rainier (S221) and two of her survey launches (2802 and 2804) The vessels acquired shallow water multibeam (SWMB) soundings, and sound velocity profiles.

B.1.2 Equipment

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

Manufacturer	Model	Type
Kongsberg	EM-710	MBES
Reson	7125	MBES
Applanix	POS-MV V4	Vessel Attitude System and Positioning System
Seabird	SBE 19 Plus	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 acquired by 2804 (RA-6) were compared to the mainscheme data acquired by S221 and 2802 (RA-5). The crosslines covered 41 nautical miles, comprising of 9.8% of the 418 nautical miles of mainscheme lines. The crossline data was filtered to 55 degrees to clean out some of the outer beam noise. Separate 4-meter resolution CUBE surfaces were created for the mainscheme and crossline data. A difference surface was created, subtracting crossline surface from the mainscheme surface (Figures 8 through 10). Statistics were derived from the difference surface and are shown in Figure 11. The soundings were examined in CARIS Subset Editor for consistency and agreement.

The mainscheme and crossline difference averaged -0.06 meters (mainscheme being shoaler), with a standard deviation of 0.57 meters. H12453 survey depth range is 65 to 260 meters. Visual inspection showed the crosslines to be in agreement within 0.1 to 0.25 meters.

Two artifacts are apparent in the difference surface. Sound velocity artifacts show a trend of deepening or shoaling parallel to the mainscheme lines (Figure 12). The Kongsberg EM710 data artifact is also apparent, which manifests as banding perpendicular to the mainscheme lines (Figure 13). Refer to section B.2.5.1 Kongsberg EM710 Data Artifact for more details.

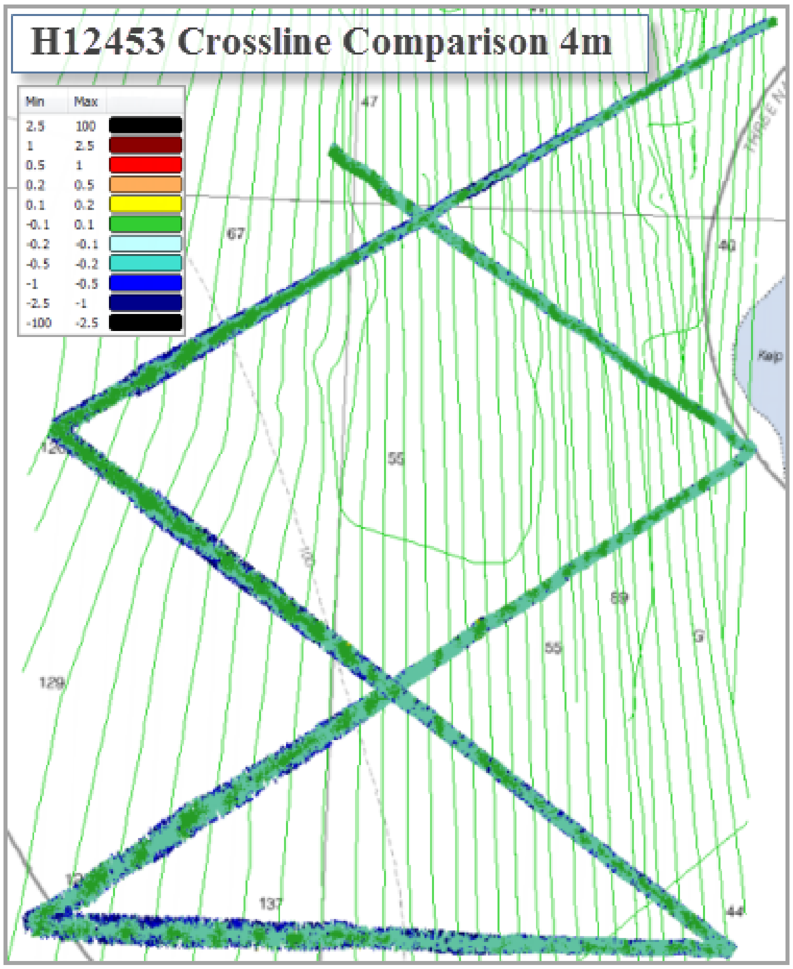

Figure 8: H12453 crossline comparison showing the difference in meters between the mainscheme and crossline soundings for the 4-meter surface.

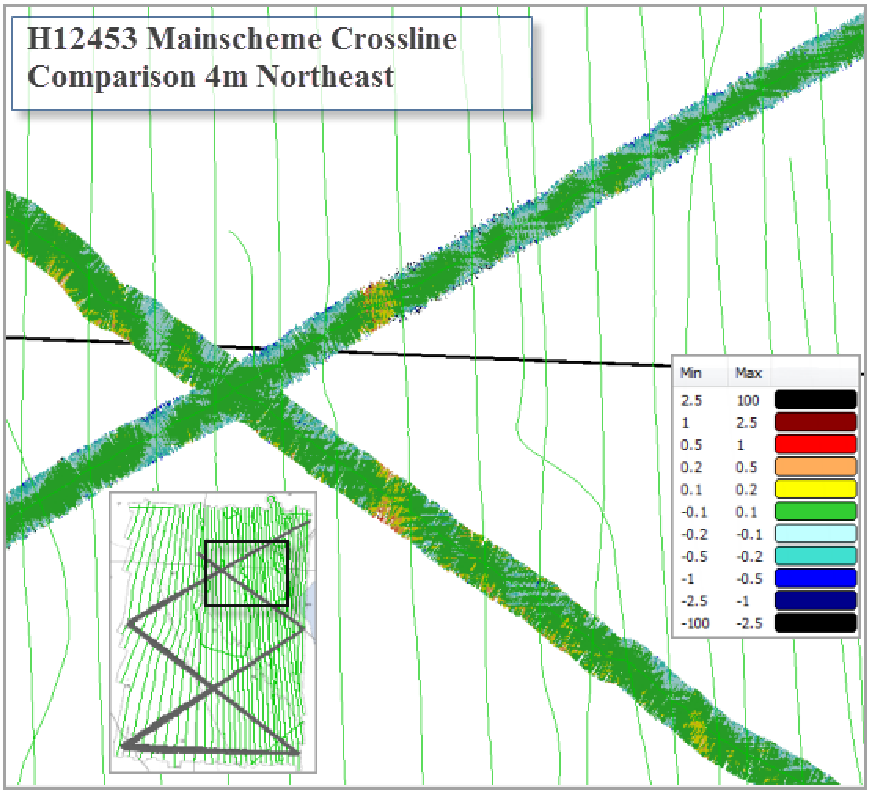

Figure 9: H12453 crossline comparison for the northeast corner showing the difference in meters between the mainscheme and crossline soundings for the 4-meter surface.

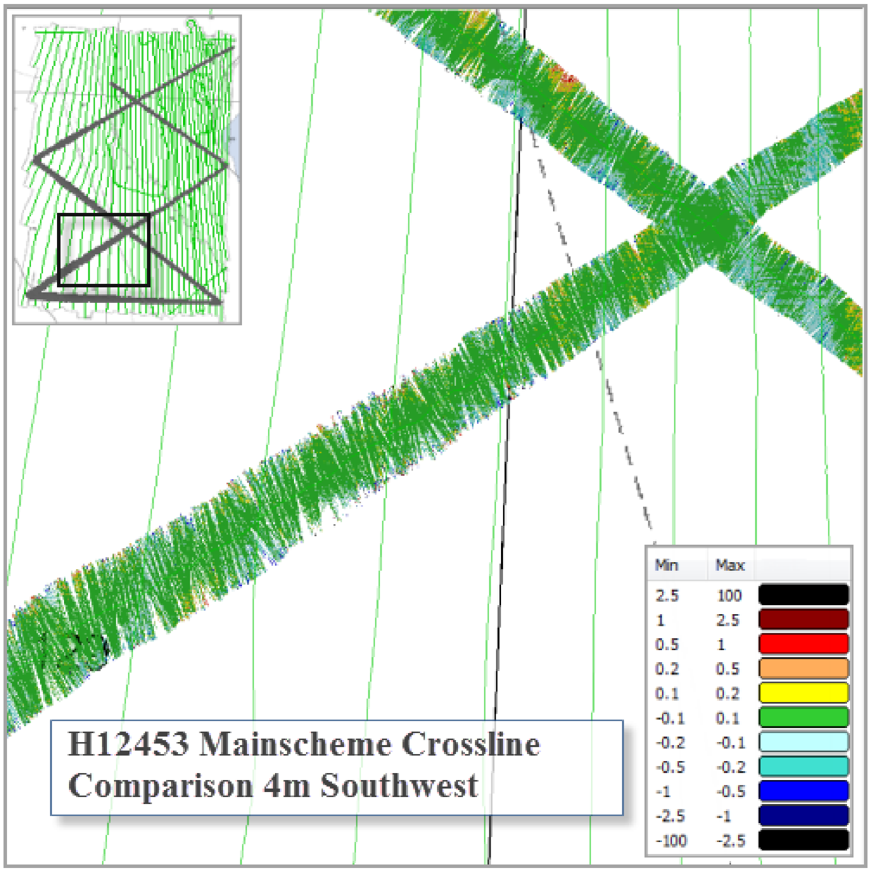

Figure 10: H12453 crossline comparison for the southwest corner showing the difference in meters between the mainscheme and crossline soundings for the 4-meter surface.

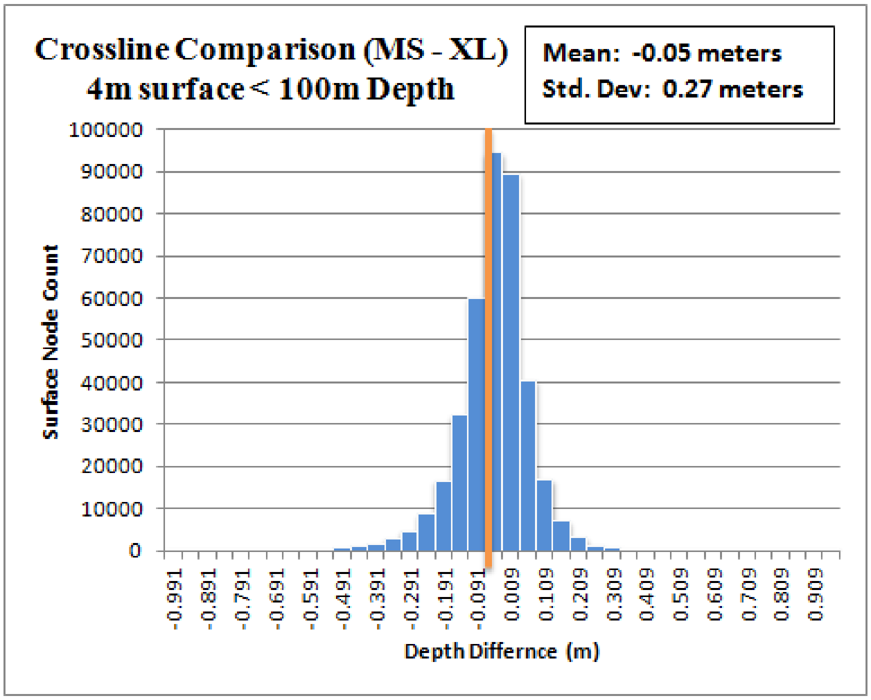

Figure 11: Histogram of 4-meter resolution difference surface between mainscheme and crosslines. The average difference was -0.06 meters, and the standard deviation was 0.57 meters.

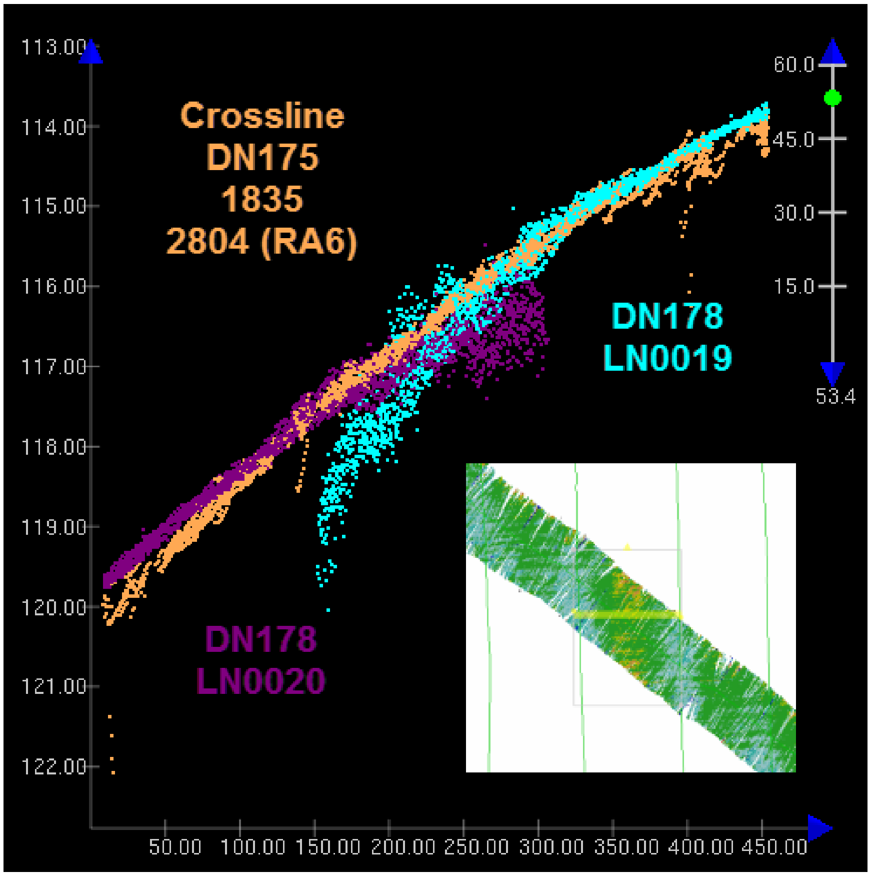

Figure 12: Sound velocity artifact affecting the difference surface parallel to the main scheme lines.

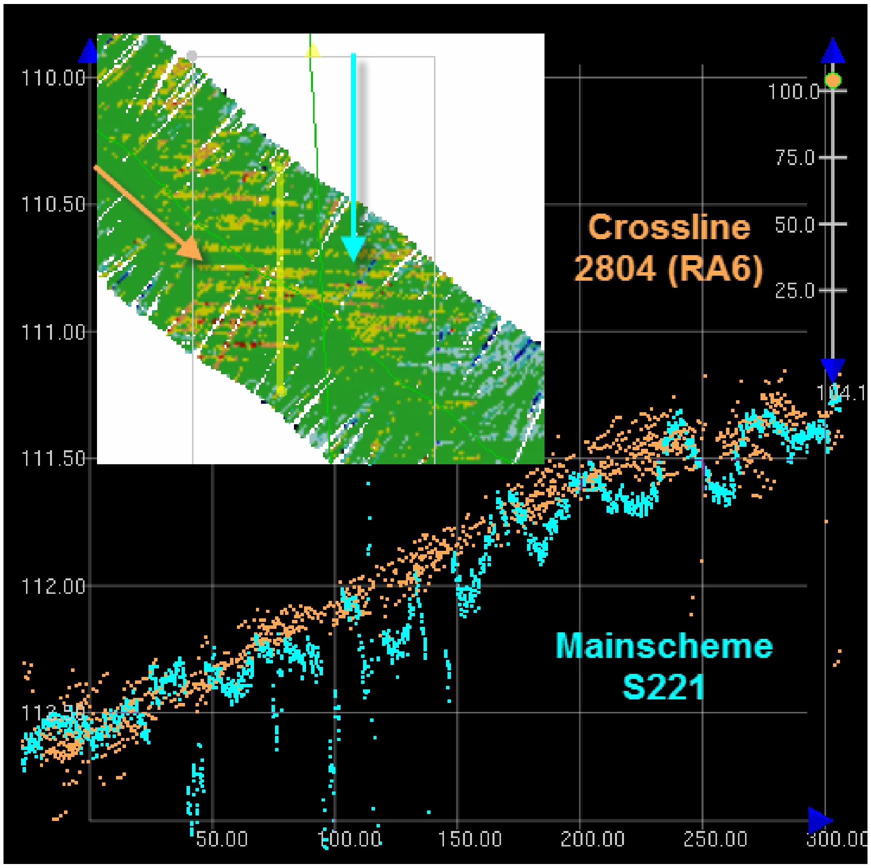

Figure 13: The yellow and red banding, seen perpendicular to the main scheme lines, is indicative of the heave-like artifact seen in Rainier's EM710 data in rough sea states (See section B.5.2.1).

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
2802 (RA-5)	3meters/second		0.15meters/second
2804 (RA-6)	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 are calculated in CARIS HIPS and SIPS using the "Greater of the Two" of Total Propagated Uncertainty and standard deviation (scaled to 95%). To visualize the locations in which accuracy requirements were met for each finalized surface, a custom "IHO" layer was created, based on the difference between calculated uncertainty of the nodes and the allowable IHO uncertainty (Figure 14 and 15).

To quantify the extent to which accuracy requirements were met, CARIS QC Surface Reports were run for each IHO layer (Figure 16). Statistics were also computed for each IHO layer and exported to MS Excel. The Excel results matched the CARIS QC Surface Report. Some IHO failures occurred in the outer beams, however, 99% of the data passed IHO standards. H12453 met the the accuracy requirements stated in the HSSDM.

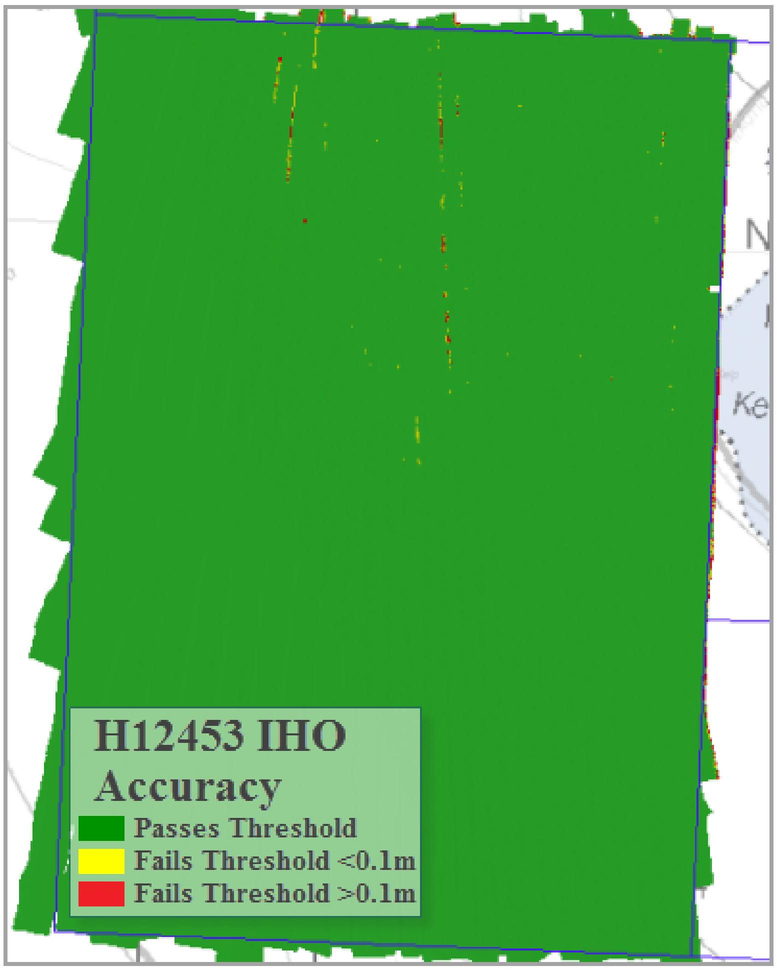

Figure 14: H12453 met IHO accuracy standards for 99% of the data. Green passed the IHO threshold. Yellow failed the threshold by less then 0.1 meters. Red failed the threshold by greater than 0.1 meters.

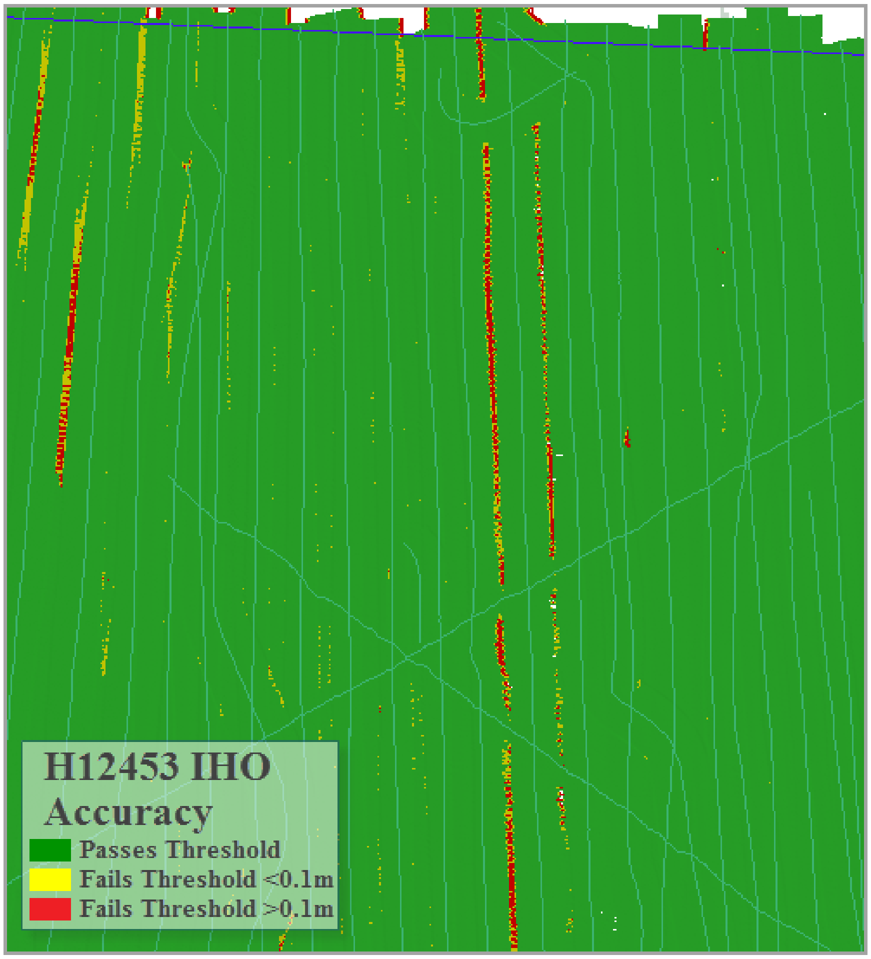

Figure 15: H12453 IHO accuracy was not met in the outer beams in 1% of the data. Green passed the IHO threshold. Yellow failed the threshold by less then 0.1 meters. Red failed the threshold by greater than 0.1 meters.

Resolution (m)	Depth range (m)	IHO Order	Number of nodes	Nodes satisfying given IHO accuracy	Percent of nodes satisfying given IHO accuracy
4	36 - 80	Order 1a	1,431,213	1,400,207	97.8%
8	72 - 100	Order 1a	1,715,331	1,687,419	98.4%
8	100 - 160	Order 2	1,381,334	1,380,692	100.0%
16	144 - 320	Order 2	424,902	424,711	100.0%
		TOTAL:	4,952,780	4,893,029	98.8%
		TOTAL (by area):	241,455,504	239,124,144	99.0%

Figure 16: Summary table showing the percentage of nodes satisfying the indicated IHO accuracy level, sub-divided by the appropriate depth ranges. 99% of the data passed IHO accuracy requirements.

B.2.3 Junctions

Junction comparisons were completed for surveys H12447, H12448, H12452, and H11687 (Figure 17). Surveys H12447, H12448, H12452 were surveyed concurrently with survey H12453. Survey H11687 was completed by NOAA ship Fairweather in 2006. Depth comparisons were performed using the CARIS Difference Surface at the finest resolution for the depth range. Statistics were computed in CARIS HIPS and SIPS, then exported to MS Excel for analysis. For the surveys acquired this year, multibeam was examined in CARIS Subset Editor for consistency and agreement.

The following junctions were made with this survey:

Registry Number	Scale	Year	Field Unit	Relative Location
H11687	1:135000	2006	NOAA Ship FAIRWEATHER	SW
H12447	1:40000	2012	NOAA Ship RAINIER	E
H12448	1:40000	2012	NOAA Ship RAINIER	SE
H12452	1:40000	2012	NOAA Ship RAINIER	N

Table 8: Junctioning Surveys

<u>H11687</u>

Overlap between survey H12453 and H11687 averaged 400 meters (Figure 18). Average difference in depth is 0.19 meters (H12453 being deeper), with a standard deviation of 0.95 meters (Figure 19). The bimodal distribution reflects the different characteristics of the north-south line verses the east-west line depths for the junction range from 160 to 250 meters. Survey H11687’s data is slightly shoaler on average. Surveys H12453 and H11687 are not significantly different based on IHO standards.

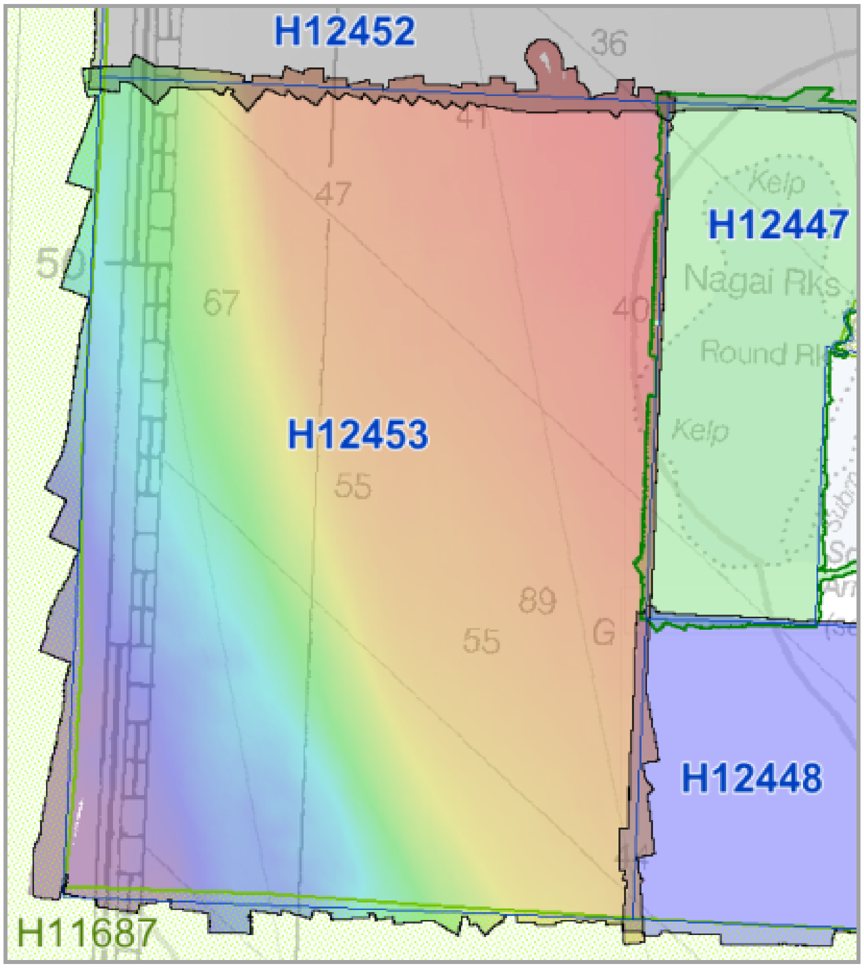

Figure 17: H12453 junctions.

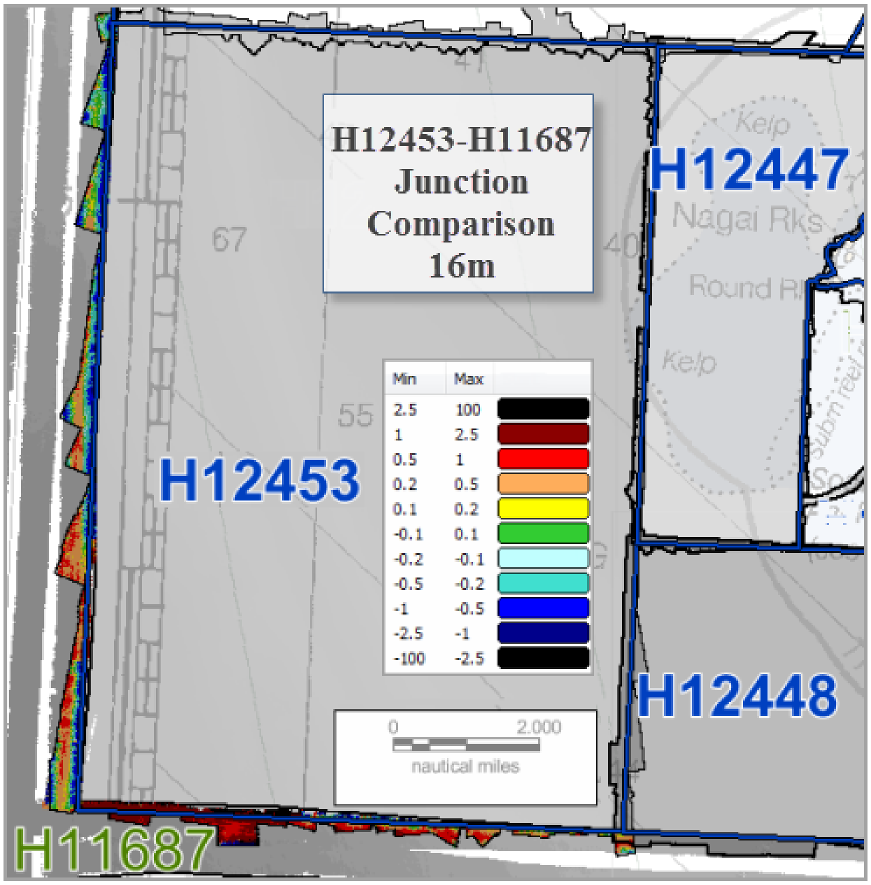

Figure 18: Difference surface of the junction of sheet H12453 and H11687 in meters.

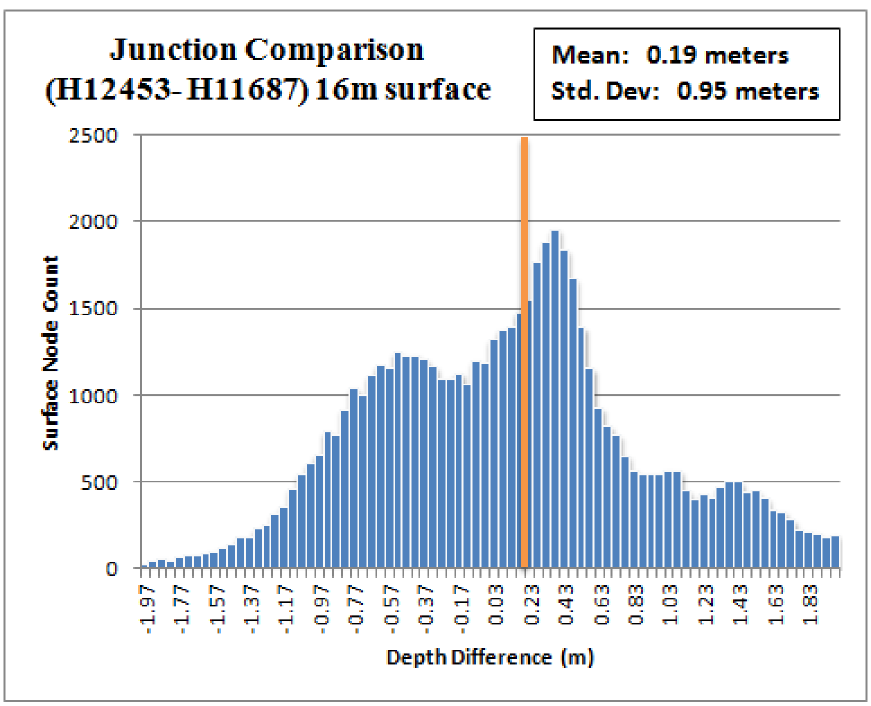

Figure 19: Difference surface statistics between junction of H12453 and H11687. Depths average a difference of 0.19 meters, with a standard deviation of 0.95 meters.

H12447

Overlap between survey H12453 and H12447 averaged 150 meters (Figures 20 and 22). Inspection of the soundings in CARIS Subset Editor showed strong agreement between the datasets (Figure 23). Average difference in depth is -0.16 meters (H12453 being shoaler), with a standard deviation of 0.38 meters (Figure 23). Depths for the junction range from 65 to 100 meters. H12447 is deeper in the southern half of the junction. Overall, surveys H12453 and H12447 are in agreement.

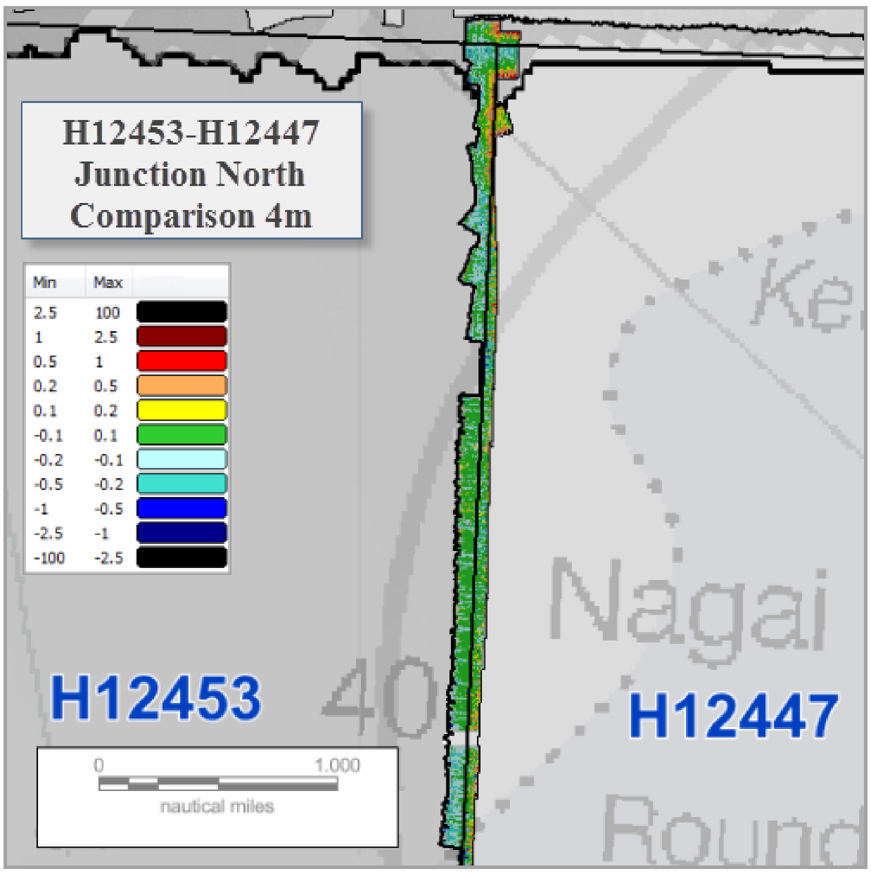

Figure 20: Difference surface of the junction of sheet H12453 and H12447 in meters. Northern half.

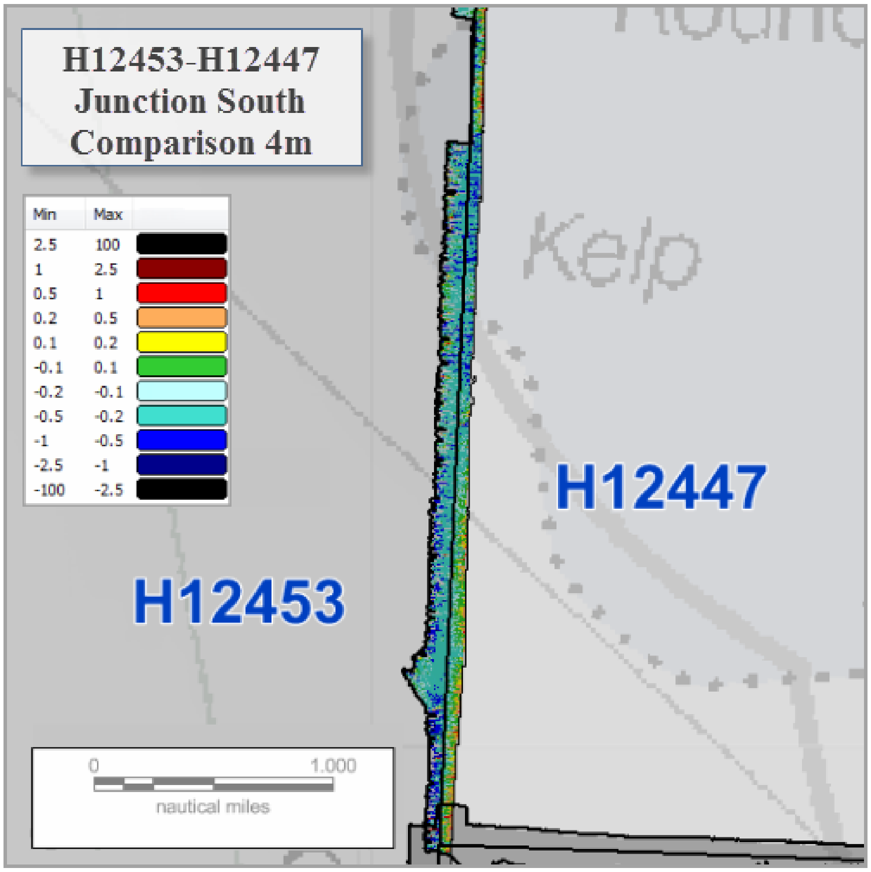

Figure 21: Difference surface of the junction of sheet H12453 and H12447 in meters. Southern half.

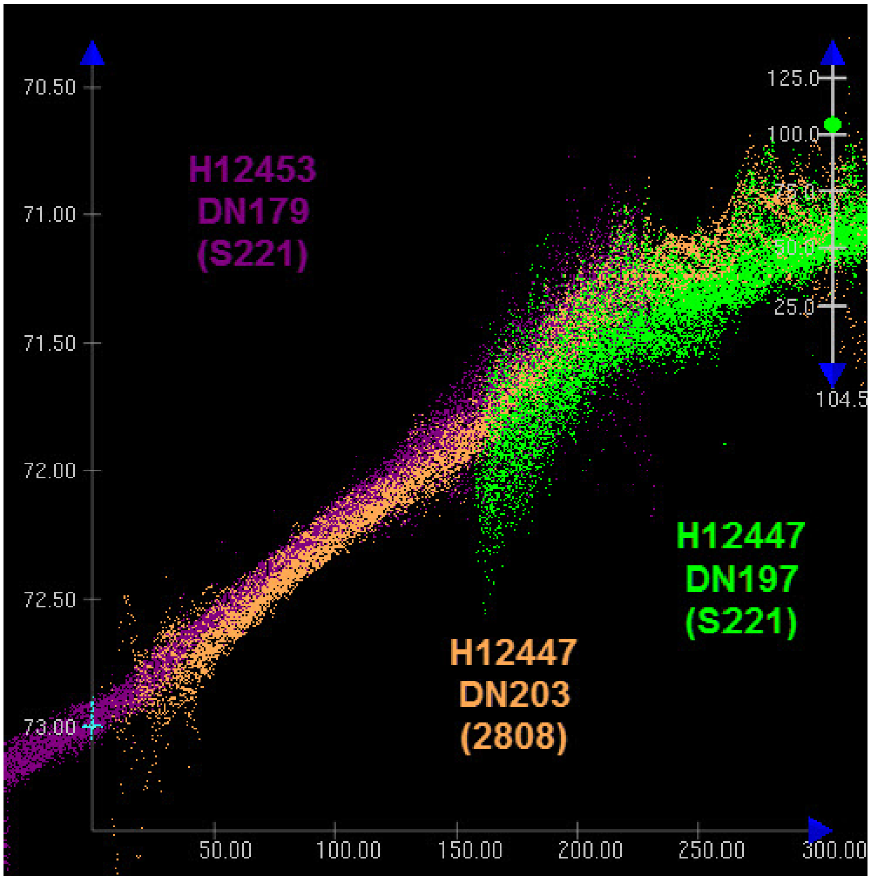

Figure 22: Example cross section of multibeam data between junction of H12453 and H12447.

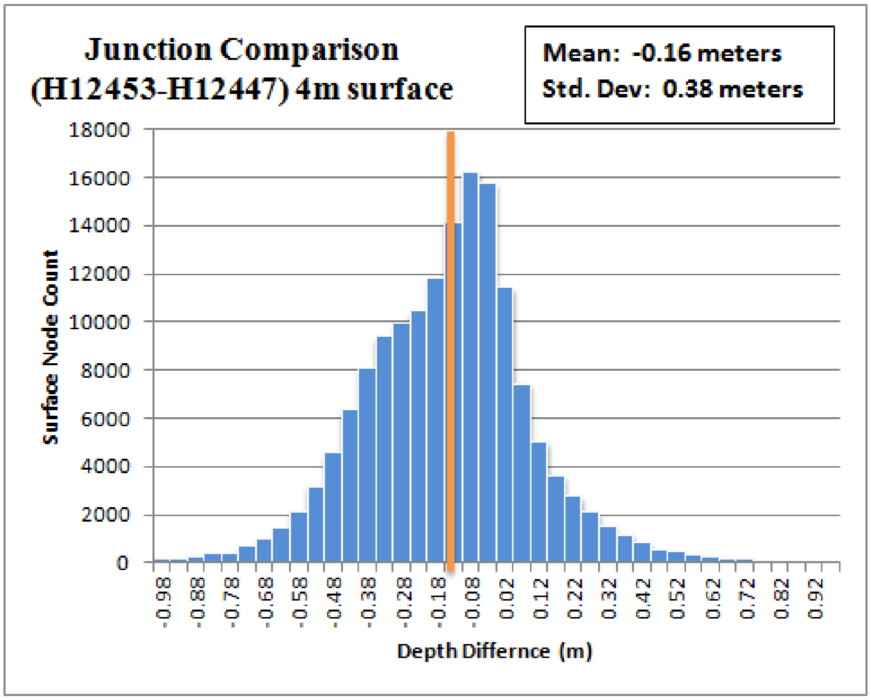

Figure 23: Difference surface statistics between junction of H12453 and H12447. Depths average a difference of -0.16 meters, with a standard deviation of 0.38 meters.

<u>H12448</u>

Overlap between survey H12453 and H12448 averaged about 600 meters (Figure 24). Inspection of the soundings in CARIS Subset Editor showed strong agreement between the datasets (Figure 25). Average difference in depth is -0.09 meters (H12453 being shoaler), with a standard deviation of 0.27 meters (Figure 26). Depths for the junction range from 85 to 110 meters. Surveys H12453 and H12448 are in agreement.

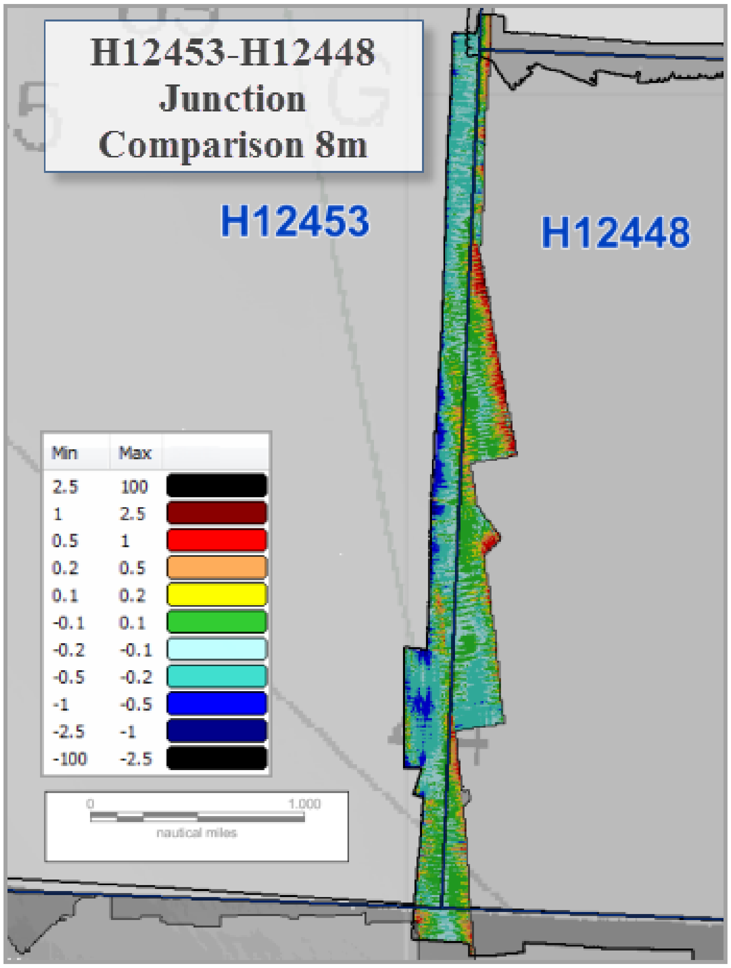

Figure 24: Difference surface of the junction of sheet H12453 and H12448 in meters.

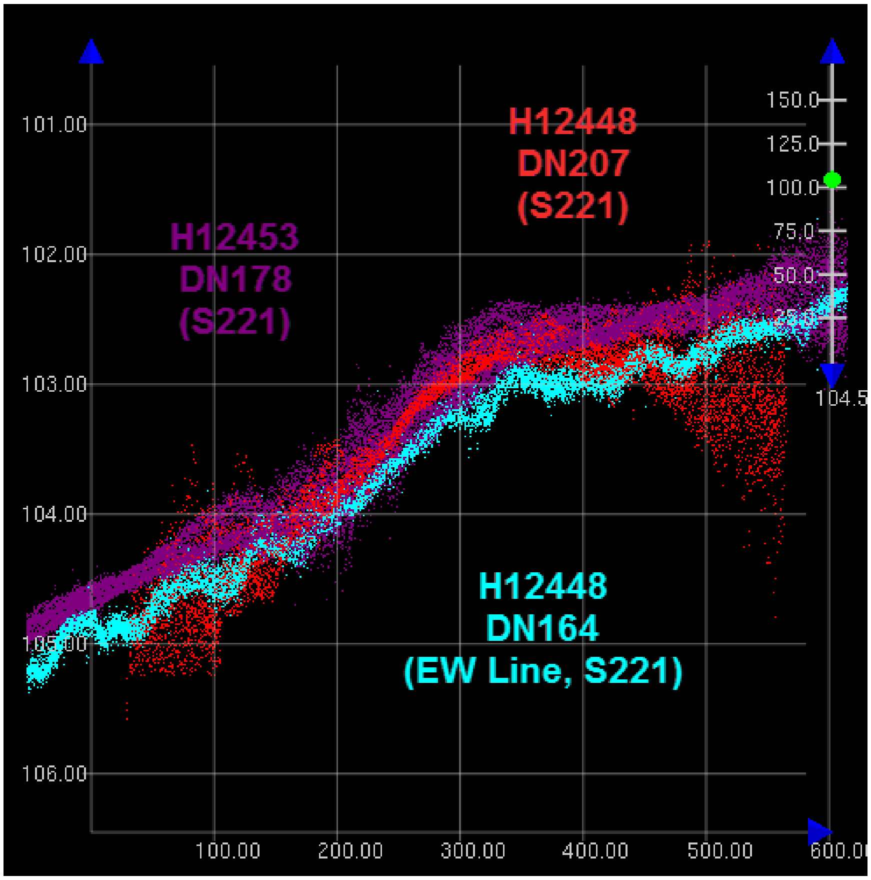

Figure 25: Example cross section of multibeam data between junction of H12453 and H12448.

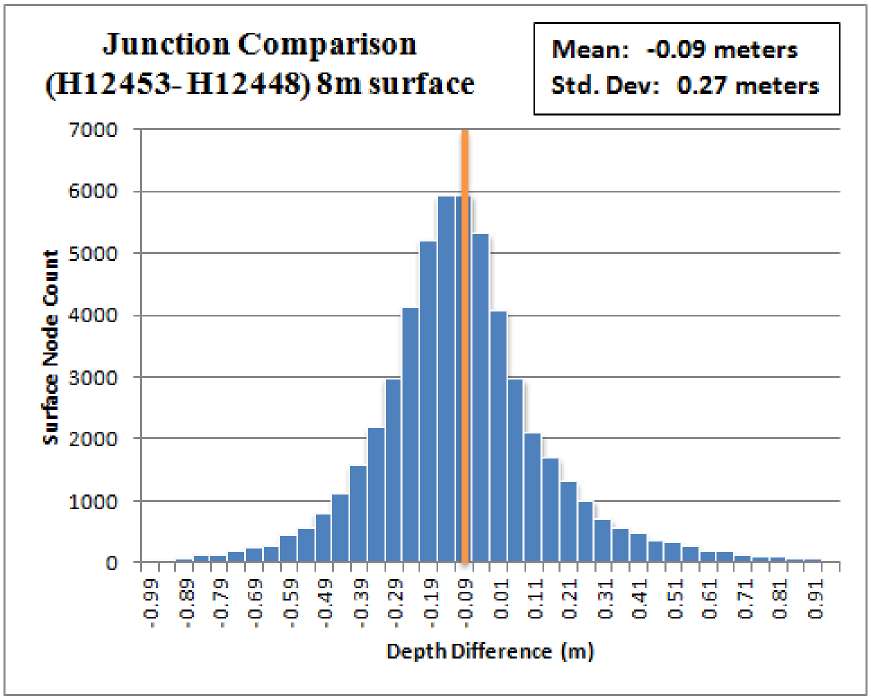

Figure 26: Difference surface statistics between junction of H12453 and H12448. Depths average a difference of -0.09 meters, with a standard deviation of 0.27 meters.

H12452

Overlap between survey H12453 and H12452 averaged 400 meters (Figure 27). Verified tides for H12452 were not available at the time of junction comparison. The junction comparison was made with observed tides applied to H12452. Inspection of the soundings in CARIS Subset Editor showed strong agreement between the datasets (Figure 28). Average difference in depth is -0.17 meters (H12453 being shoaler), with a standard deviation of 0.82 meters (Figure 29). Depths for the junction range from 65 to 165 meters. Overall, surveys H12453 and H12452 are in agreement.

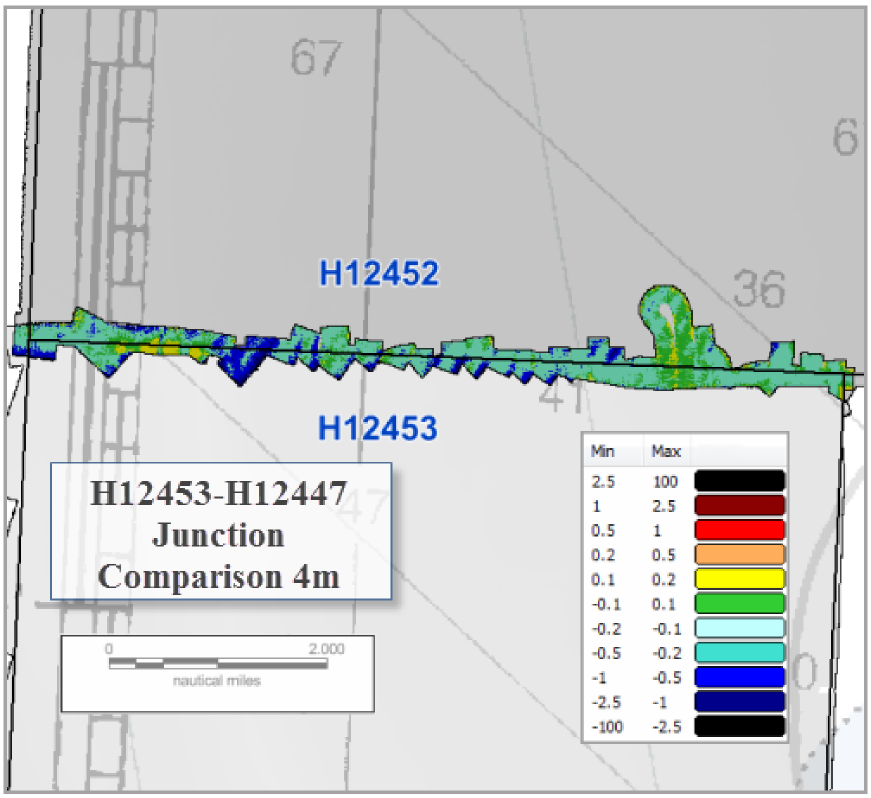

Figure 27: Difference surface of the junction of sheet H12453 and H12452 in meters.

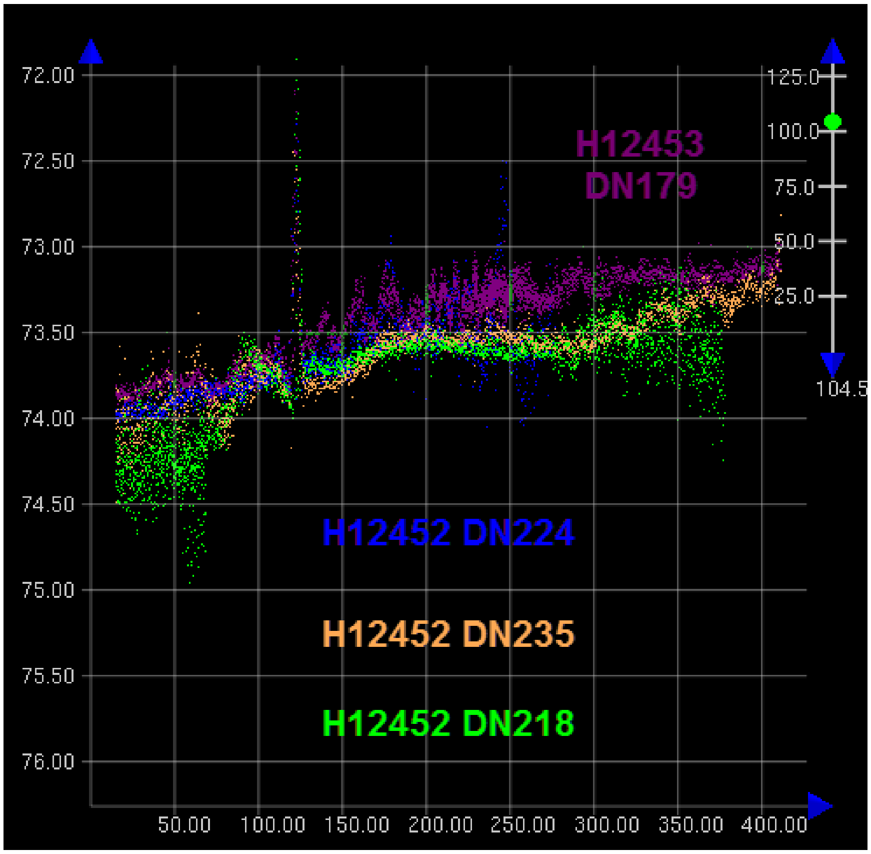

Figure 28: Example cross section of multibeam data between junction of H12453 and H12452.

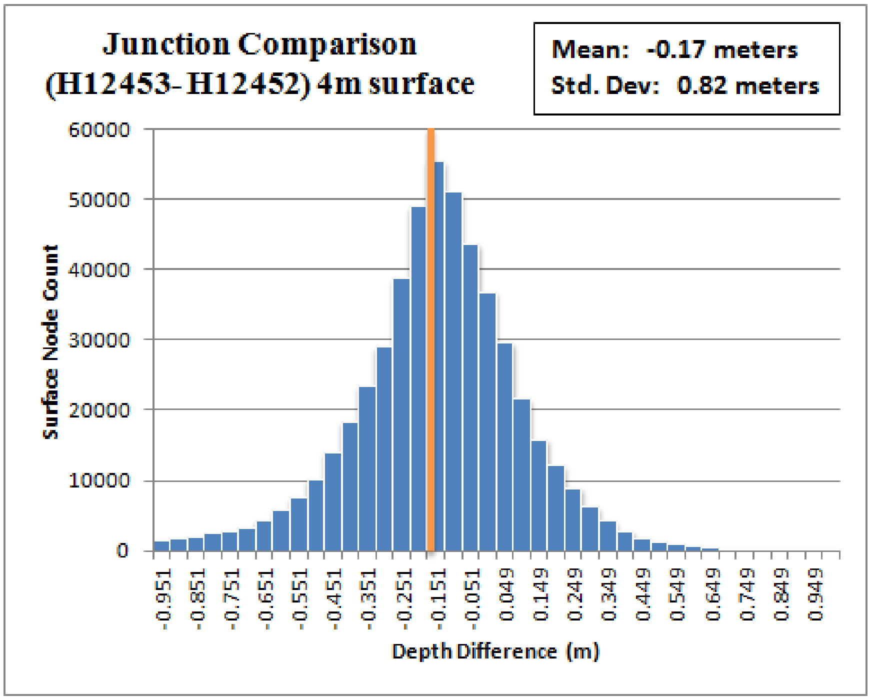

Figure 29: Difference surface statistics between junction of H12453 and H12452. Depths average a difference of -0.17 meters, with a standard deviation of 0.82 meters.

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.2.5.1Kongsberg EM710 Data Artifact

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 30 shows an overhead view of two survey lines acquired in similar depths (~90 meters) on different days. 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 30 are shown in CARIS Subset view in Figure 31. Figure 31 (top) demonstrates the characteristic undulation of the nadir pings of the ship's system, when in heavy seas. By way of contrast, Figure 31 (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.

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 this survey H12453 is adequate to supersede the chart.

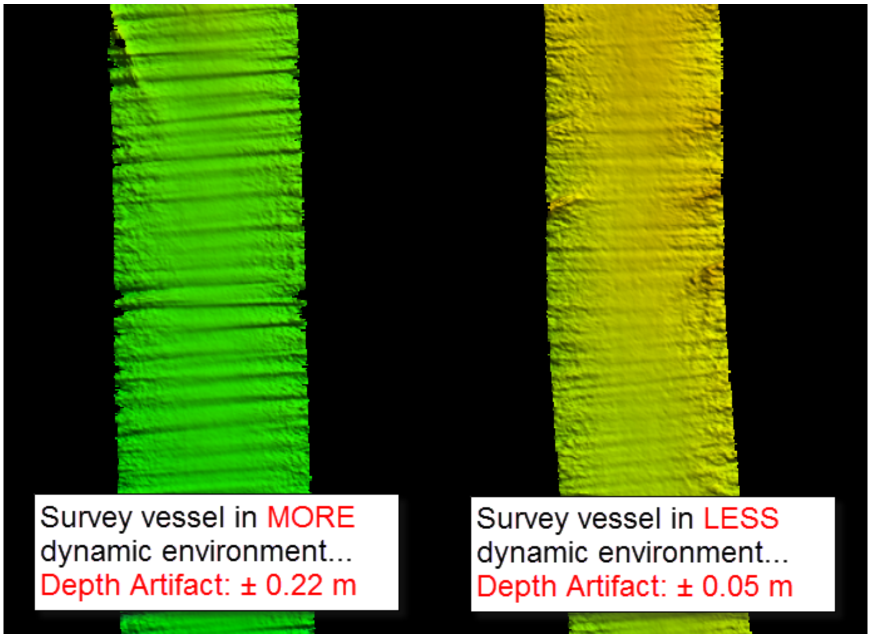

Figure 30: Overhead view of two survey lines, acquired on different days, using the Rainier's Kongsberg EM710. Data acquired in heavier seas (left) displayed a characteristic undulation in the gridded sea floor, while calmer days (right) yielded a smoother representation of the bottom.

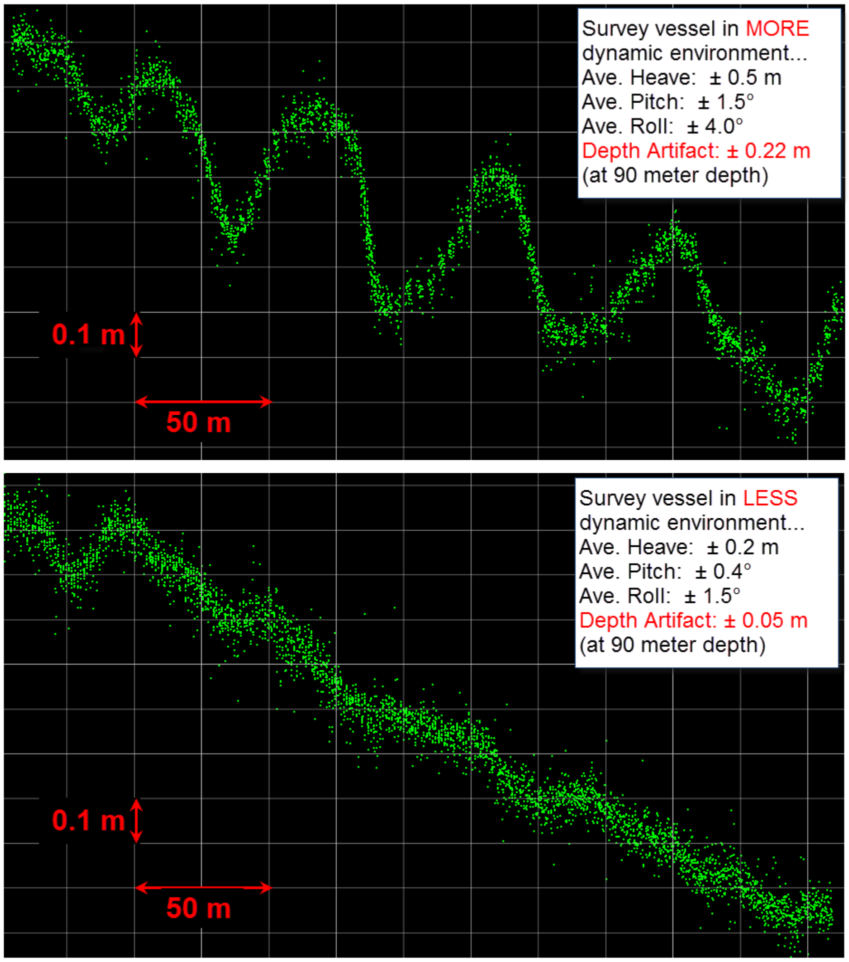

Figure 31: Cross section view of data acquired using the Rainier's Kongsberg EM710, over a smooth sea floor, on both dynamic (top) and calm (bottom) sea states. Notice that with increased vessel dynamics, there is an increased artifact in the processed depths.

B.2.5.1Conductivity Sensor Malfunction in Moving Vessel Profiler

Eight of the one hundred and eleven sound speed casts collected by the ship were not applied to the data because of anomalous salinity profiles (Figure 32). In the eight erroneous casts, the MVP did not acquire the correct salinity, skewing the sound speed profile. Casts where the conductivity was less then historic ranges and significantly less than the subsequent casts were rejected (Figure 33 and 34).

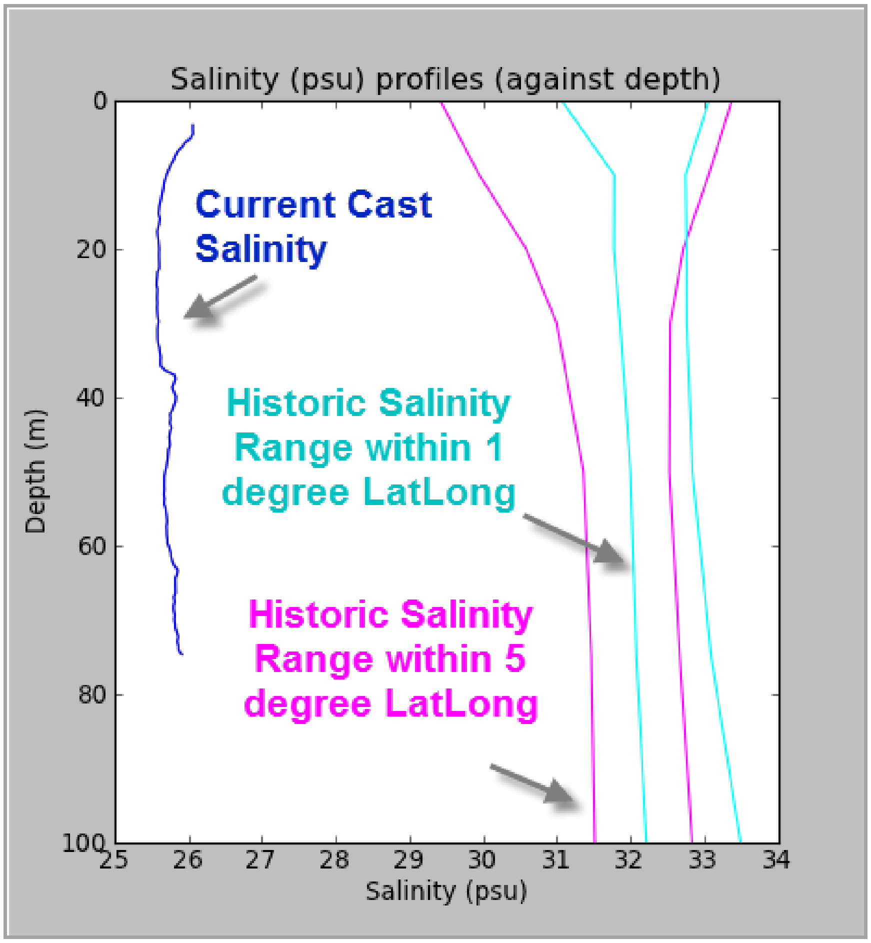

Figure 32: Example of a rejected sound velocity profile (MVP_2012-06-26_081123).

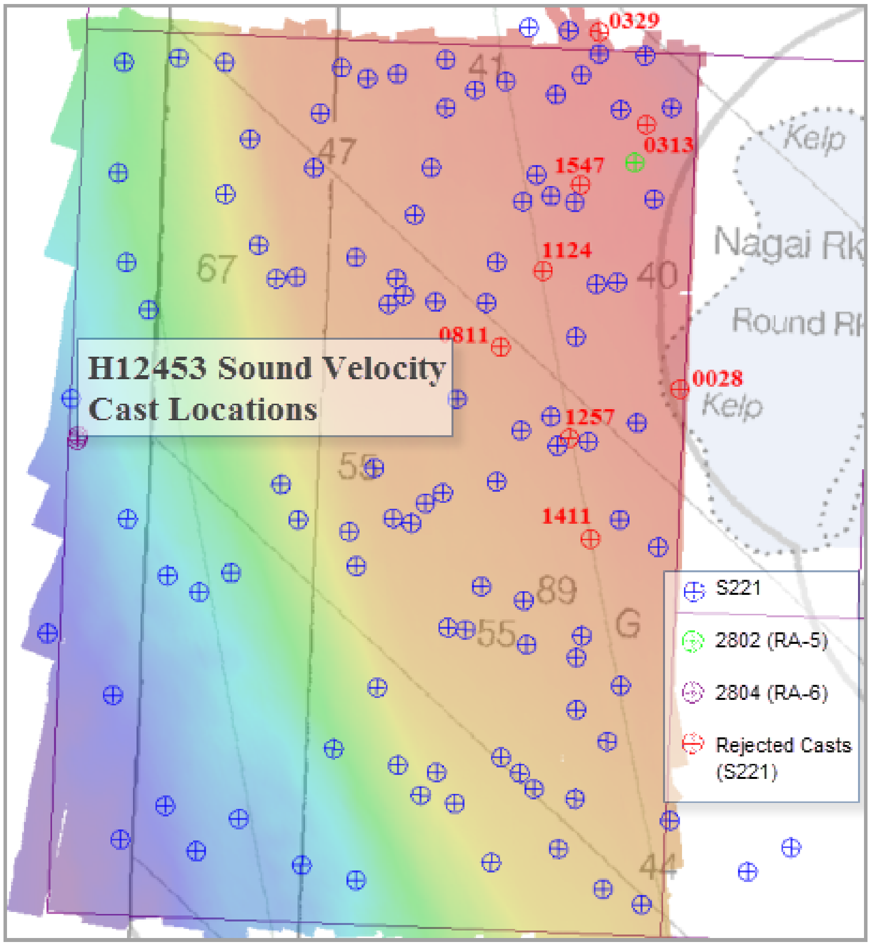

Figure 33: H12453 sound velocity profiles, used and rejected.

DN	S221 MVP Cast	Salinity
178	Section 2012-178 03:29 55:52:41 -155:54:20	Reject
178	Section 2012-178 08:11 55:48:48 -155:56:11	Reject
178	Section 2012-178 11:24 55:49:45 -155:55:20	Reject
178	Section 2012-178 12:57 55:47:44 -155:54:37	Reject
178	Section 2012-178 14:11 55:46:31 -155:54:04	Reject
178	Section 2012-178 15:47 55:50:49 -155:54:36	Reject
180	Section 2012-180 00:28 55:48:23 -155:52:16	Reject
180	Section 2012-180 03:13 55:51:35 -155:53:14	Reject

Figure 34: Table of rejected sound velocity profiles.

B.2.6 Factors Affecting Soundings

B.2.6.1 None Exist

There were no other factors that affected corrections to soundings.

B.2.7 Sound Speed Methods

Sound Speed Cast Frequency: Sound speed profiles were acquired on the ship using the Rolls Royce MVP 200 about every 15 minutes. Launch sound speed profiles were acquired using the SBE-19 plus CTDs at discrete locations at least once every 4 hours. Sound speed casts were concatenated by vessel and applied to the data using nearest in distance within 4 hours.

B.2.8 Coverage Equipment and Methods

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

B.3 Echo Sounding Corrections

B.3.1 Corrections to Echo Soundings

All data reduction procedures conform to those detailed in the DAPR.

B.3.2 Calibrations

The patch test for the Kongsberg EM710 was acquired on DN177 and was processed and entered into the SIS software on DN178 (See DAPR for additional information). Two lines from H12453 were acquired prior to the patch test. Patch test correction values, determined in CARIS, were entered into the HVF under DN176 to compensate for alignment biases not accounted for in SIS. The two line numbers that are affected by these values are : 0028_20120624_234531_Rainier and 0029_20120625_000643_Rainier from DN176.

B.4 Backscatter

Backscatter data was acquired, but was not formally processed by Rainier personnel. However, periodic spot checks were performed to ensure backscatter quality. Backscatter data will be sent to NGDC for archival.

B.5 Data Processing

B.5.1 Software Updates

There were no software configuration changes after the DAPR was submitted.

The following Feature Object Catalog was used: NOAA Profile

B.5.2 Surfaces

The following CARIS surfaces were submitted to the Processing Branch:

Surface Name	Surface Type	Resolution	Depth Range	Surface Parameter	Purpose
H12453_4m	CUBE	4 meters	66 meters - 289 meters	NOAA_4m	Complete MBES
H12453_8m	CUBE	8 meters	66 meters - 255 meters	NOAA_8m	Complete MBES
H12453_16m	CUBE	16 meters	66 meters - 255 meters	NOAA_16m	Complete MBES
H12453_4m_Final_36to80	CUBE	4 meters	36 meters - 80 meters	NOAA_4m	Complete MBES
H12453_8m_Final_72to160	CUBE	8 meters	72 meters - 160 meters	NOAA_8m	Complete MBES
H12453_16m_Final_144to320	CUBE	16 meters	144 meters - 320 meters	NOAA_16m	Complete MBES

Table 9: CARIS Surfaces

H12453_16m_Combined.csar created during office processing was used for compilation.

C. Vertical and Horizontal Control

Additional information discussing the vertical or horizontal control for this survey can be found in the accompanying Horizontal and Vertical Control Report (HVCR).

C.1 Vertical Control

The vertical datum for this project is Mean Lower Low Water.

<u>Standard Vertical Control Methods Used:</u>

Discrete Zoning

The following National Water Level Observation Network (NWLON) stations served as datum control for this survey:

Station Name	Station ID
Sand Point	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 07/13/2012. The final tide note was received on 08/09/2012.

C.2 Horizontal Control

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

To improve positional accuracy, all real time position and attitude data were acquired using POSView and were post processed using precise point positioning in POSPac MMS 5.4 (See DAPR for more details). The data on DN 195 was processed using a version of P1_C1 DCB without an ionospheric model. SBETs and RMS data were applied to all data according to the processes outlined in the DAPR.

DGPS correctors were used for positioning in real time. The DGPS receiver on S221 was not functioning properly for part of this survey, and was providing corrector information intermittently. During these outages, S221 continued to acquire depth data, with the understanding that positional data would be overwritten with more accurate post-processed position information from POSPac. Post-processed positional data, i.e. POSpac SBETS, were applied to all ship data. No positional offsets were noted in any of the data on sheet H12453.

The following DGPS Stations were used for horizontal control:

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

Table 13: 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	07/17/2012	10/07/2008
16580	1:350000	14	01/2008	01/08/2008	01/19/2008

Table 14: Largest Scale Raster Charts

<u>16587</u>

Chart comparison procedures were followed as outlined in Section 4.5 of the FPM and Section 8.1.4 - D.1 of the HSSDM, using CARIS HIPS. Chart 16587 is the largest scale chart for this area, and the one used for comparison. Chart 16580 is a smaller scale chart and contains no additional soundings or contours when compared to chart 16587. The two ENC's are equivalent in scope and content to the raster charts. This area had few soundings to compare.

Contours and soundings were created from survey H12453 data using CARIS HIPS and visually compared to chart 16587's 15 soundings (Figure 35 and 36). The surveyed soundings were found to be significantly shoaler than previously charted at the 100 fathom contour and at three of the soundings. Five soundings were found to be deeper than previously charted. None of the changes are dangerous to navigation. The Hydrographer recommends that the chart is updated with H12453 data, including shifting the 100 fathom contour offshore.

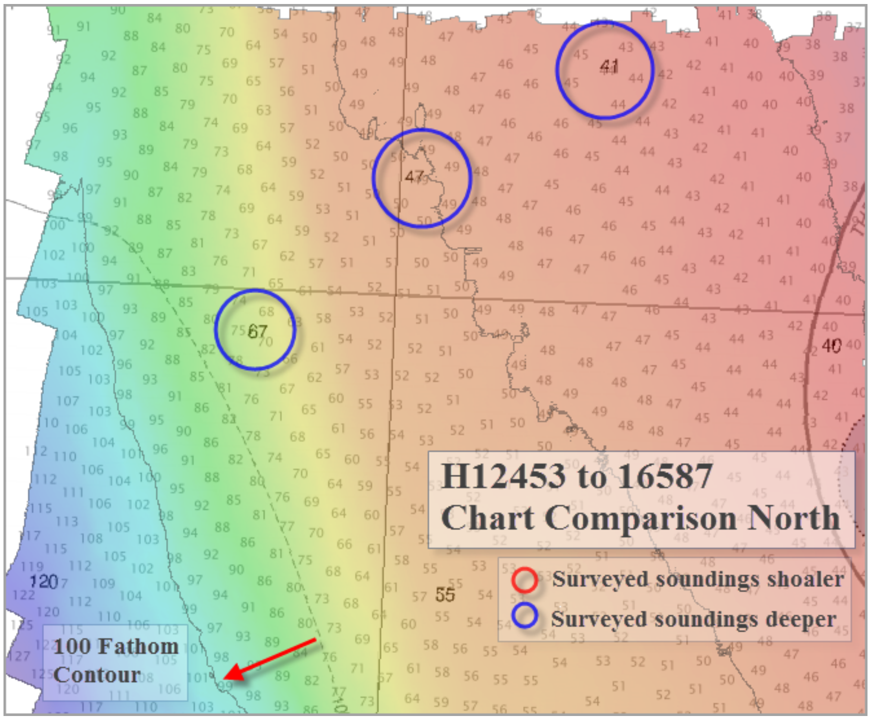

Figure 35: Northern comparison of charted (16587) soundings to those derived from H12453. All soundings are in fathoms. Chart soundings are larger in black. Survey soundings are smaller and in gray. Red circles mark where surveyed soundings are shoaler then charted. Blue circles mark where survey soundings are deeper then charted. Soundings that agreed are not highlighted.

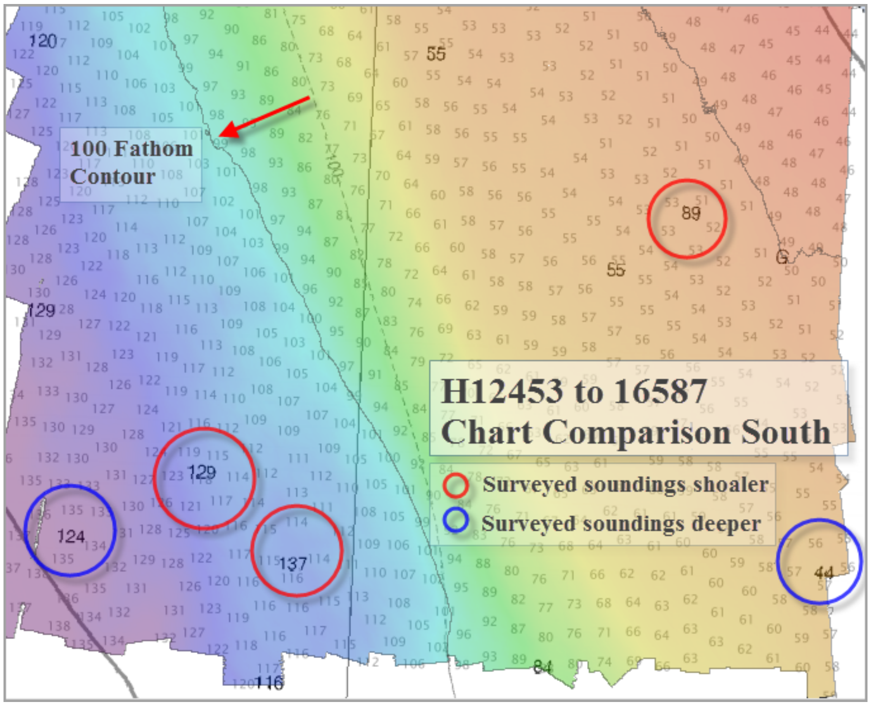

Figure 36: Southern comparison of charted (16587) soundings to those derived from H12453. All soundings are in fathoms. Chart soundings are larger in black. Survey soundings are smaller and in gray. Red circles mark where surveyed soundings are shoaler then charted. Blue circles mark where survey soundings are deeper then charted. Soundings that agreed are not highlighted.

<u>16580</u>

Chart 16580 (1:350000) is the smallest scale chart available that covers the entire project area. All of the soundings present in Chart 16580 were also in chart 16587. The comparison between survey H12453 and chart 16580 is equivalent to the preceding comparison with Chart 16587.

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?
US4AK5XM	1:135000	1	01/31/2011	01/31/2011	NO
US3AK5KM	1:350000	14	07/20/2011	07/05/2012	NO

Table 15: Largest Scale ENCs

<u>US4AK5XM</u>

ENC US4AK5XM coincides with raster 16587. The depths and contours on the ENC match the raster, and the comparison between survey H12453 and the ENC is equivalent to the preceding comparison with Chart 16587.

US3AK5KM

ENC US3AK5KM coincides with raster 16580. The depths and contours on the ENC match the raster, and the comparison between survey H12453 and the ENC is equivalent to the preceding comparison with Chart 16580.

D.1.3 AWOIS Items

No AWOIS items exist for this survey.

D.1.4 Charted Features

No charted features exist for this survey.

The very western edge of a charted foul with kelp area was not specifically addressed by survey H12453 but 100% multibeam coverage over the common area was achieved. The foul area was addressed by junction survey H12447 from the same project and found not to exist.

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

This sheet has no shoreline.

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 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	09/03/2012	
Olivia A. Hauser LT/NOAA	Field Operations Officer	09/03/2012	2012.09.03 22:52:13 -08'00'
James Jacobson	Hydrographic Chief Survey Technician	09/03/2012	Digitally signed by James Jacobson Reason: I have reviewed this document Date: 2012.09.04 11:09:12 -08'00'
Starla Robinson-DeLorey	Sheet Manager	09/03/2012	

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 : July 26, 2012

HYDROGRAPHIC BRANCH: Pacific
HYDROGRAPHIC PROJECT: OPR-P133-RA-2012
HYDROGRAPHIC SHEET: H12453

LOCALITY: Offshore West, Chirikof Island and Vicinity, AK
TIME PERIOD: June 23 - July 13, 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, H12453, during the time period from June 23 to July 13, 2012.

Please use the zoning file P133RA2012CORP submitted with the project instructions for OPR-P133-RA-2012. Zones SWA173 and SWA175 are the applicable zones for H12453.

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).

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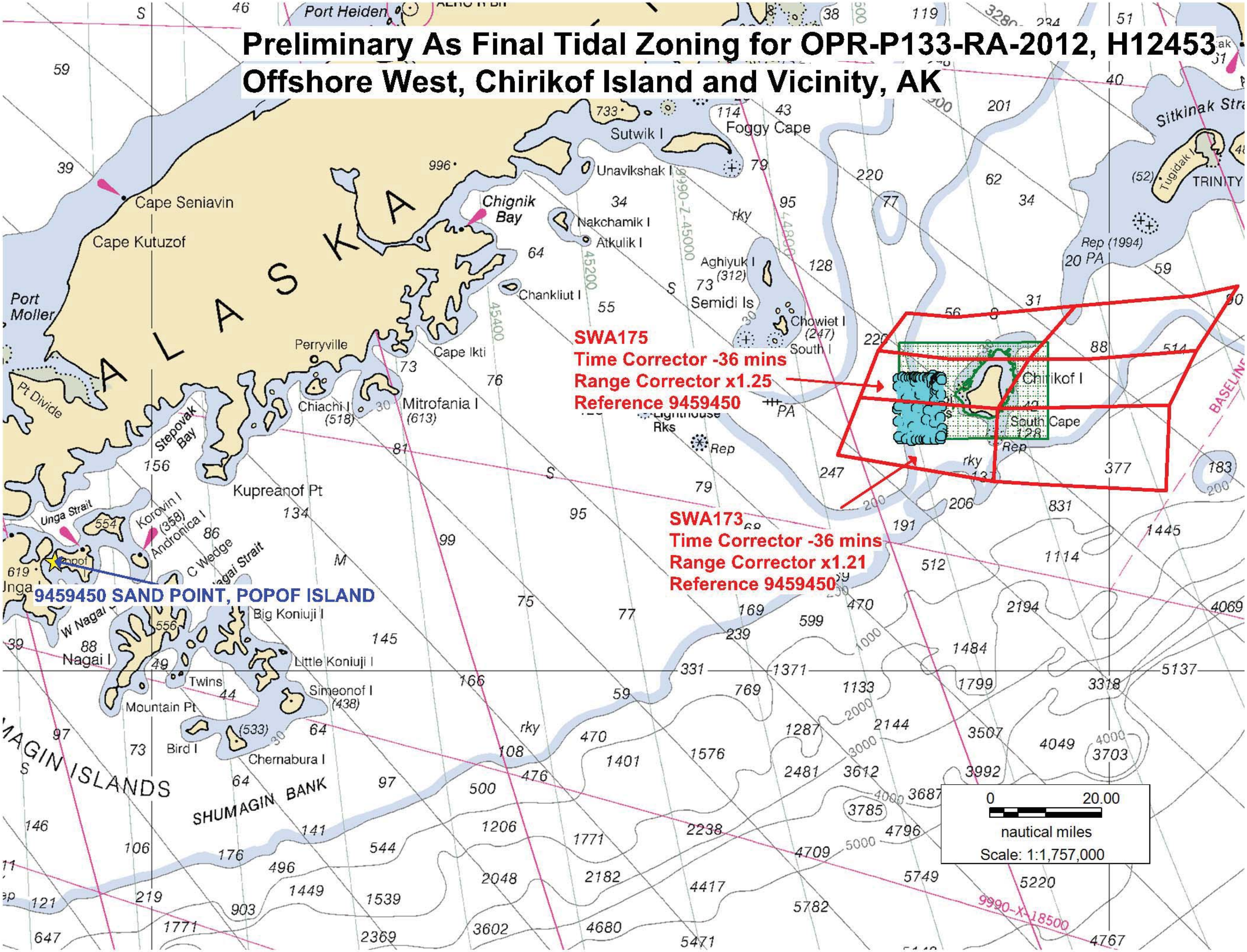
Date: 2012.08.09 09:18:56 -04'00'

CHIEF, OEANOGRPAHIC DIVISION



Preliminary As Final Tidal Zoning for OPR-P133-RA-2012, H12453
Offshore West, Chirikof Island and Vicinity, AK
SWA175
Time Corrector -36 mins
Range Corrector x1.25
Reference 9459450
SWA173
Time Corrector -36 mins
Range Corrector x1.21
Reference 9459450
9459450 SAND POINT, POPOF ISLAND
ALASKA
Chirikof I
South Cape
Semidi Is
Chowiet I
Aghiyuk I
Sutwik I
Foggy Cape
Chignik Bay
Cape Seniavin
Cape Kutuzof
Port Moller
Pt Divide
Perryville
Cape Ikti
Mitrofania I
Chiachi I
Stepovak Bay
Kupreanof Pt
Unga Strait
Korovin I
Andronica I
C Wedge
Nagai Strait
Big Koniuji I
Little Koniuji I
Simeonof I
Chernabura I
Bird I
Mountain Pt
Twins
Nagai I
W Nagai
SHUMAGIN ISLANDS
SHUMAGIN BANK
Unavikshak I
Nakchamik I
Atkulik I
Chankliut I
Lighthouse Rks
Sitkinak Strait
Tugidak I
TRINITY
Port Heiden
BASELINE
0
20.00
nautical miles
Scale: 1:1,757,000

APPROVAL PAGE

H12453

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

- H12453_DR.pdf
- Collection of depth varied resolution BAGS
- Processed survey data and records
- H12453_GeoImage.pdf

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

Digitally signed by Peter S. Holmberg
DN: cn=Peter S. Holmberg, o, ou,
email=peter.holmberg@noaa.gov,
c=US
Date: 2013.01.30 10:55:04 -08'00'

Approved:______________________________________

Peter Holmberg
Cartographic Team Lead, Pacific Hydrographic Branch

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

Digitally signed by Russ Davies
signed for Dave Zezula
DN: cn=Russ Davies signed for Dave
Zezula, o=PHB, ou=NOAA,
email=Russ.Davies@NOAA.Gov, c=US
Date: 2013.01.30 11:05:00 -08'00'

Approved:______________________________________

CDR David Zezula, NOAA
Chief, Pacific Hydrographic Branch