H12449

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:	H12449

LOCALITY

State:	Alaska
General Locality:	Chirikof Island and Vicinity, AK
Sub-locality:	South Cape

2012

CHIEF OF PARTY
CDR Richard T. Brennan, 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		**H12449**

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:	**South Cape**
Scale:	**40000**
Dates of Survey:	**06/19/2012 to 08/07/2012**
Instructions Dated:	**05/15/2012**
Project Number:	**OPR-P133-RA-12**
Field Unit:	**NOAA Ship *Rainier***
Chief of Party:	**CDR Richard T. Brennan, NOAA**
Soundings by:	**Multibeam Echo Sounder**
Imagery by:	**Multibeam Echo Sounder Backscatter**
Verification by:	**Pacific Hydrographic Branch**
Soundings Acquired in:	**meters at Mean Lower Low Water**
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 H12449

Project: OPR-P133-RA-12

Locality: Chirikof Island and Vicinity, AK

Sublocality: South Cape

Scale: 1:40000

June 2012 - August 2012

NOAA Ship *Rainier*

Chief of Party: CDR Richard T. Brennan, NOAA

A. Area Surveyed

This hydrographic survey was completed as specified by hydrographic survey Project Instructions OPR-P133-RA-12 signed May 15, 2012 and all other applicable direction. The survey area is the South Cape vicinity of Chirikof Island, Alaska. This survey corresponds to sheet "4" in the sheet layout provided with the Project Instructions (Figure 1).

A.1 Survey Limits

Data was acquired within the following survey limits:

Northeast Limit	Southwest Limit
55.8508 N 155.461727778 W	55.7304222222 N 155.676625 W

Table 1: Survey Limits

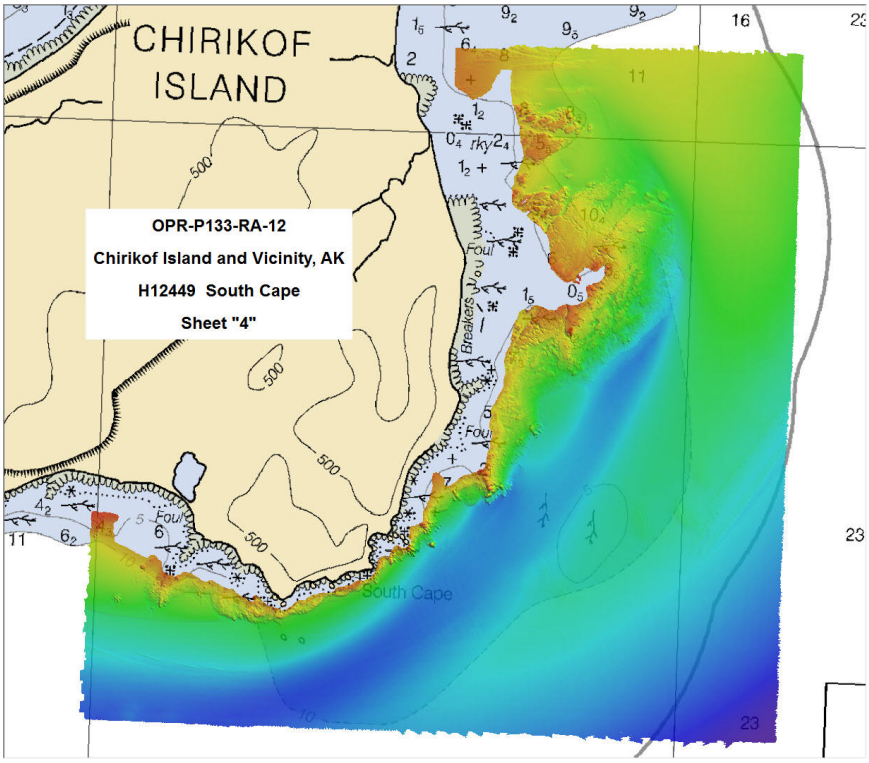


Figure 1: H12449 Area Surveyed (chart 16587).

Complete multibeam echosounder (MBES) coverage was achieved in the assigned survey area as per the Project Instructions except in areas foul with kelp. These foul areas were generally located very near-shore, subject to dangerous wave action and judged to be navigationally insignificant. All areas shown in Figure 4 where H12449 coverage did not extend to the sheet limits, were foul with kelp.

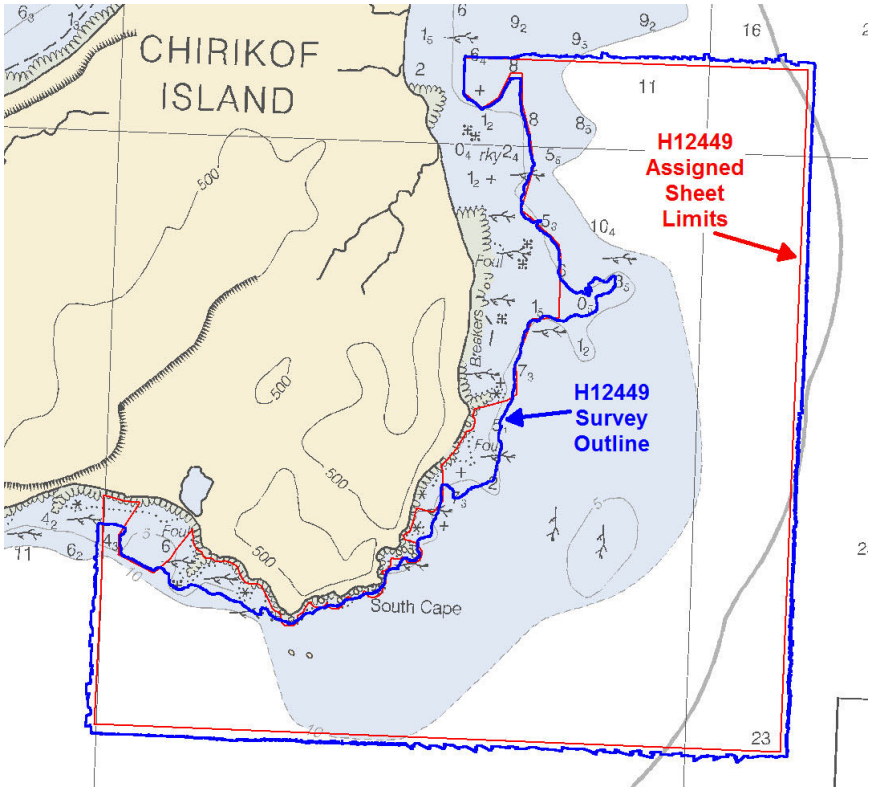


Figure 4: H12449 Survey Outline.

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 efficiencies in longline and pot fisheries, while minimizing habitat disruption.

A.3 Survey Quality

The entire survey is adequate to supersede previous data.

Survey H12449 met HSSD complete multibeam coverage specifications, including the five soundings per node density requirements (Figures 2-3). 99.6 percent of H12449 nodes are populated with greater than 5 soundings.

Figure 2: H12449 Sounding density.

Resolution	Depth range	Number of nodes	Fewer than five soundings per node	Percent of nodes with greater than five soundings per node
1m	0 - 20m	5,864,178	29,131	99.5%
2m	18 - 40m	11,943,410	40,776	99.7%
4m	36 - 80m	3,059,639	4,503	99.9%
	TOTAL:	20,867,227	74,410	**99.6%**
	TOTAL (by area):	102,592,042	264,283	**99.7%**

Figure 3: H12449 Sounding density summary table

A.4 Survey Coverage

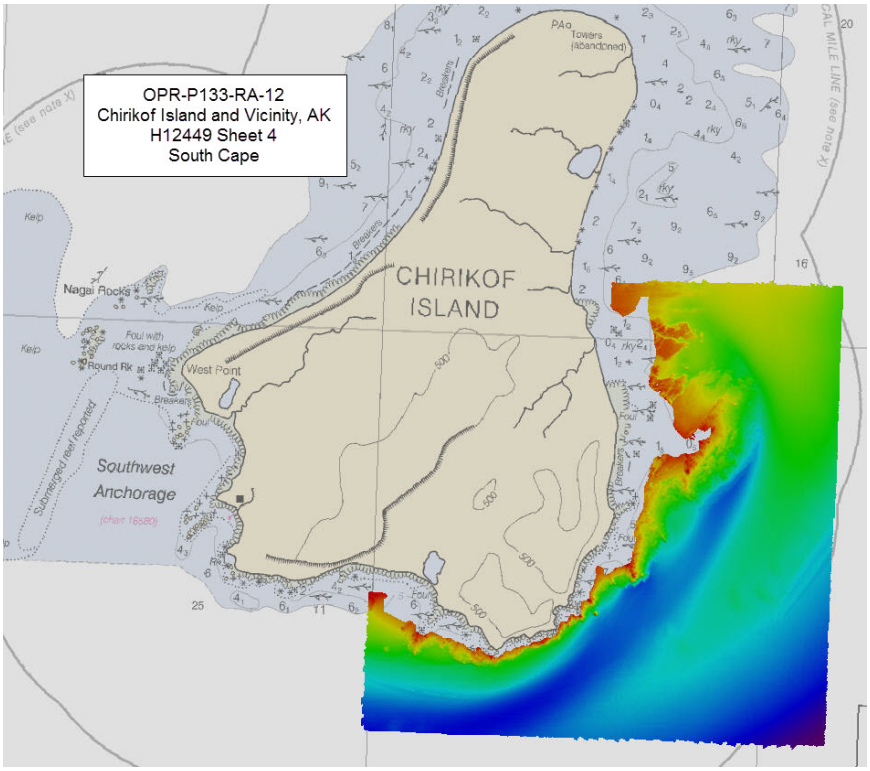


Figure 5: H12449 Coverage.

Kelp holidays: Complete multibeam coverage was not possible in areas with extensive kelp beds. Figure 6 shows examples of such holidays in the vicinity of 55-49-20.65N, 155-32-47.71W. Other examples of kelp holidays are located at 55-48-08.16N, 155-32-45.76W and 55-49-28.82N, 155-32-56.43W.

Acoustic Shadow holidays: Numerous insignificant holidays were the result of acoustic shadowing; the example shown (Figures 7-8) is located at 55-46-45.18N, 155-33-24.63W. These holidays occurred in rocky seabed areas where data density on the 'dark' side of a feature, or between features, was too sparse to produce a surface at the appropriate resolution.

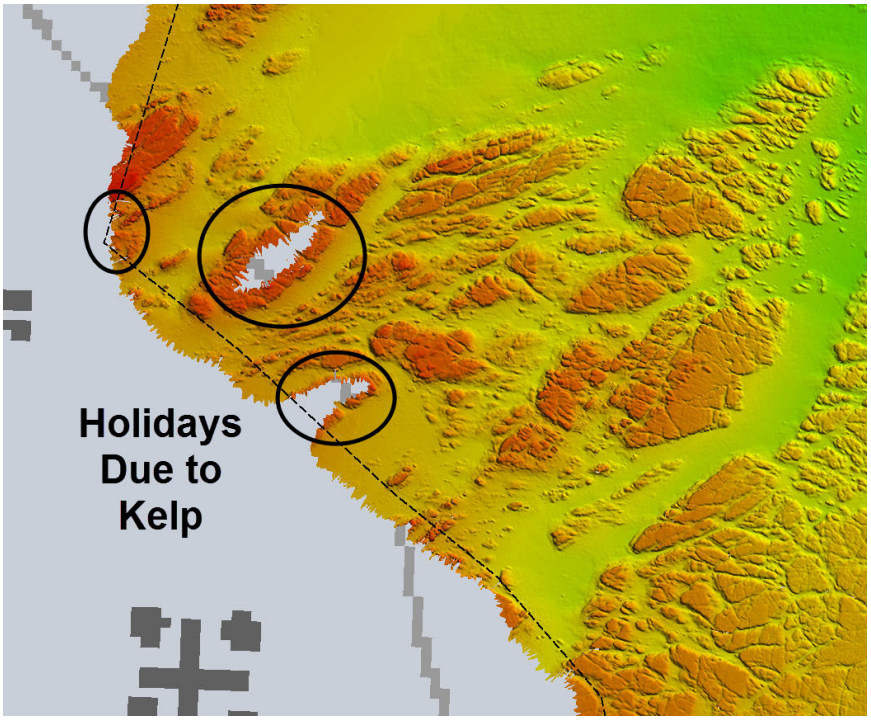


Figure 6: Example of holidays due to kelp.

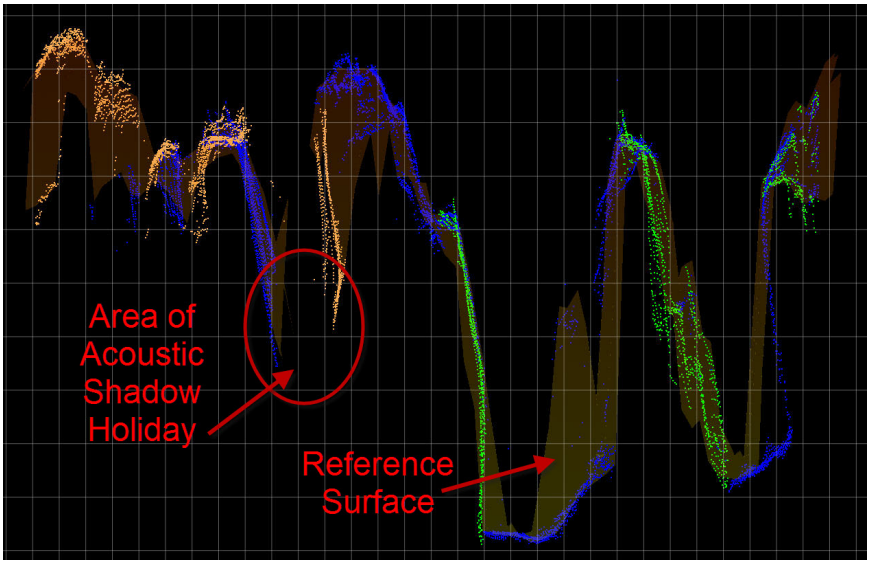


Figure 7: Example of holiday due to acoustic shadow, subset view.

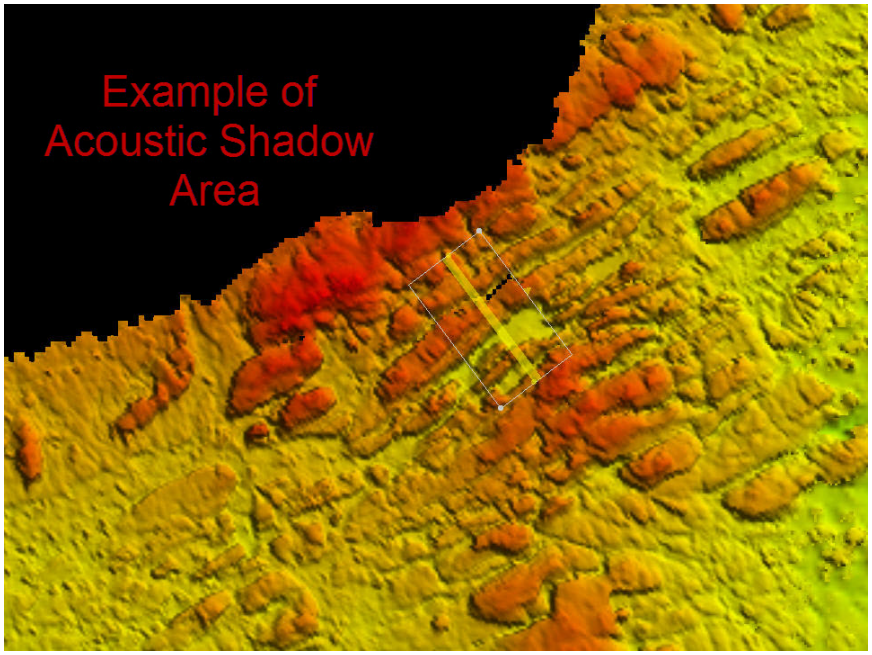


Figure 8: Example of acoustic shadow area.

Data is adequate for charting.

A.5 Survey Statistics

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

	HULL ID	*Total*
LNM	**SBES Mainscheme**	0
	MBES Mainscheme	509.33
	Lidar Mainscheme	0
	SSS Mainscheme	0
	SBES/MBES Combo Mainscheme	0
	SBES/SSS Combo Mainscheme	0
	MBES/SSS Combo Mainscheme	0
	SBES/MBES Combo Crosslines	28.34
	Lidar Crosslines	0
Number of Bottom Samples		3
Number of DPs		0
Number of Items Items Investigated by Dive Ops		0
Total Number of SNM		24.65

Table 2: Hydrographic Survey Statistics

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

Survey Dates
06/19/2012
07/17/2012
07/19/2012
07/20/2012
07/21/2012
07/23/2012
07/31/2012
08/03/2012
08/07/2012

Table 3: Dates of Hydrography

A.6 Shoreline

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

A.7 Bottom Samples

Bottom Samples were acquired in accordance with the Project Instructions or the HSSD.

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)*
LOA	28 feet	28 feet	28 feet	28 feet
Draft	3.5 feet	3.5 feet	3.5 feet	3.5 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	SeaBat 7125 SV	MBES
Applanix	POS M/V	Vessel Attitude System
SBE	SEACAT 19 Profiler	Sound Speed System
SBE	SEACAT 19plus Profiler	Sound Speed System
Reson	SVP 70	Sound Speed System

Table 5: Major Systems Used

B.2 Quality Control

B.2.1 Crosslines

H12449 Multibeam echosounder crosslines totaled 28.34 nautical miles, comprising 5.5% of mainscheme MBES bathymetry (Figure 9). Separate 1-meter CARIS BASE surfaces of the MS and XL data were created, from which a surface difference layer was generated In CARIS HIPS and SIPS (Figure 10). Statistics were then derived from the difference surface and are shown below (Figure 11). The mean difference between depths derived from the mainscheme and crosslines is -0.01 meters; the standard deviation is 0.19 meters.

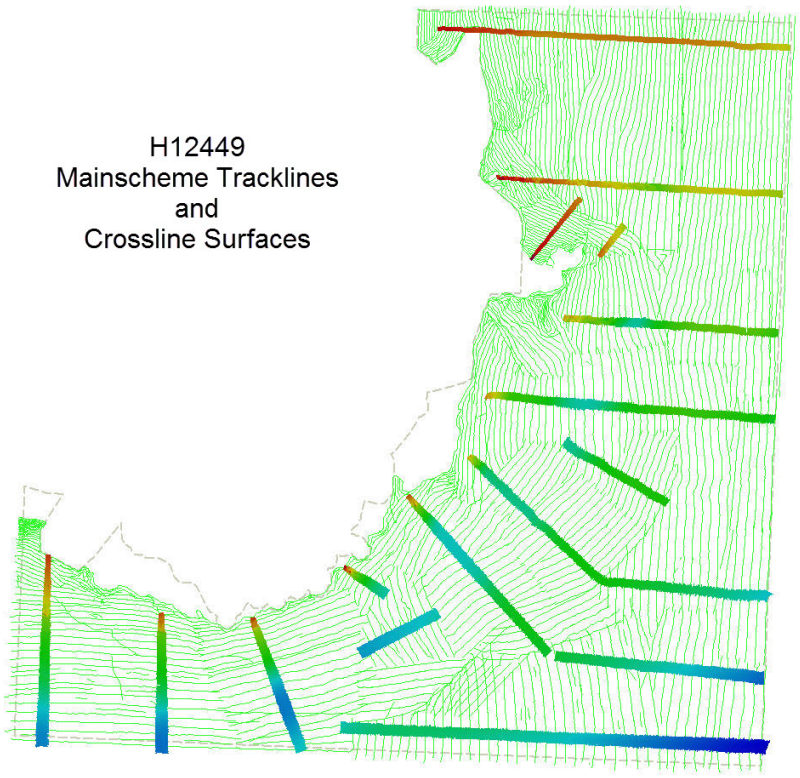


Figure 9: H12449 Mainscheme and Crosslines.

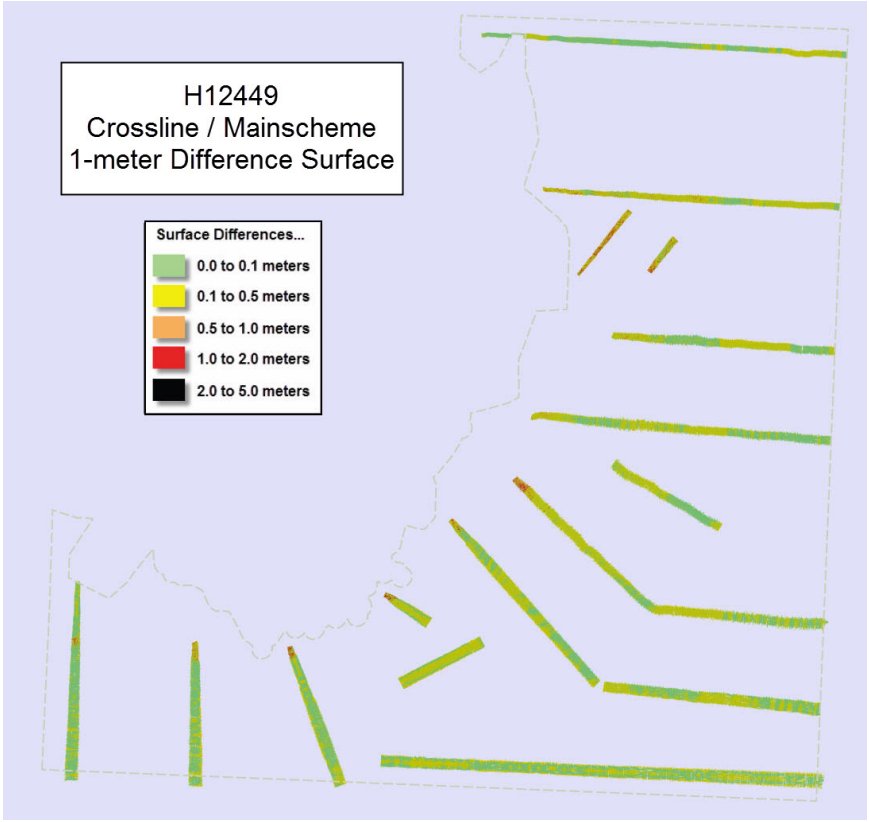


Figure 10: H12449 1-meter resolution difference layer.

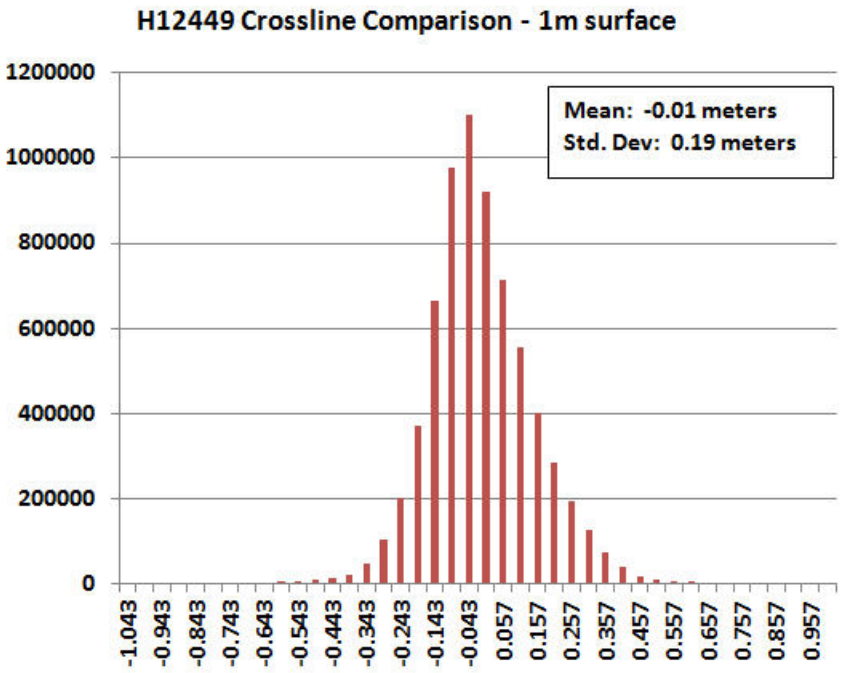


Figure 11: H12449 1-meter resolution difference surface histogram.

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

Table 7: Survey Specific Sound Speed TPU Values

Uncertainty values of submitted, finalized grids were calculated in CARIS using the "Greater of the Two" of total propagated uncertainty and standard deviation (scaled to 95%). In CARIS HIPS, an "IHOness" attribute layer was created for the 1, 2 and 4-meter resolution surfaces, based on the difference between

calculated uncertainty of the nodes and the allowable IHO uncertainty (Figure 12). To quantify the extent to which accuracy requirements were met, the IHOness layer was queried within CARIS and then exported to Excel to produce the table shown in Figure 13.

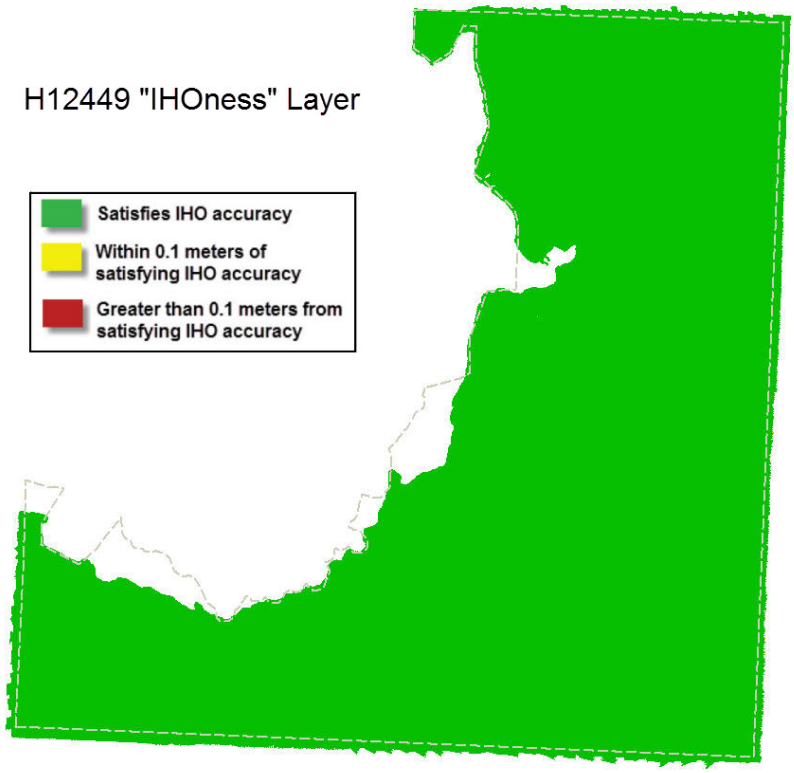


Figure 12: H12449 IHO Order 1 compliance.

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	5,864,176	5,864,176	100.0%
2m	18 - 40m	Order 1	11,943,410	11,943,407	100.0%
4m	36 - 80m	Order 1	3,059,639	3,059,632	100.0%
		TOTAL:	20,867,225	20,867,215	100.0%
		TOTAL (by area):	102,592,040	102,591,916	100.0%

Figure 13: H12449 IHO compliance statistics.

B.2.3 Junctions

H12449 junctions with five concurrent MBES surveys from the same project (OPR-P133-RA-12) and two Fugro LADS lidar surveys from 2006 (Figures 13-14). Junction comparisons were performed by creating a CARIS difference surface for the area of overlap then color-coding by depth for analysis. Additional comparisons were made using CARIS subset editor to examine MBES sounding data, or the lidar reference surface, for consistency and agreement.

The following junctions were made with this survey:

Registry Number	Scale	Year	Field Unit	Relative Location
H11543	1:10000	2006	Fugro LADS	N
H11544	1:10000	2006	Fugro LADS	W
H12448	1:40000	2012	NOAA Ship RAINIER	S
H12446	1:25000	2012	NOAA Ship RAINIER	W
H12455	1:40000	2012	NOAA Ship RAINIER	E
H12450	1:40000	2012	NOAA Ship RAINIER	N
H12454	1:40000	2012	NOAA Ship RAINIER	NE

Table 8: Junctioning Surveys

H11543

A broad area of overlap exists between H12449 and H11543, extending several hundred meters both north to south and east to west (Figure. 15). A CARIS difference layer was created using the H12449 2-meter resolution BASE surface and the H11543_LI_BASE_3m.csar file provided with the Project Instructions. Statistics from the H12449 / H11543 difference surface were computed in CARIS and exported to the excel table shown in Figure 17. The mean difference between the surveys is 0.16 meters; the standard deviation is 0.36 meters; H12449 was the shoaler of the two surveys. The largest depth differences coincide with areas of greatest seafloor relief. This correlation between depth discrepancies and bottom relief may be a function of the gridding algorithms used.

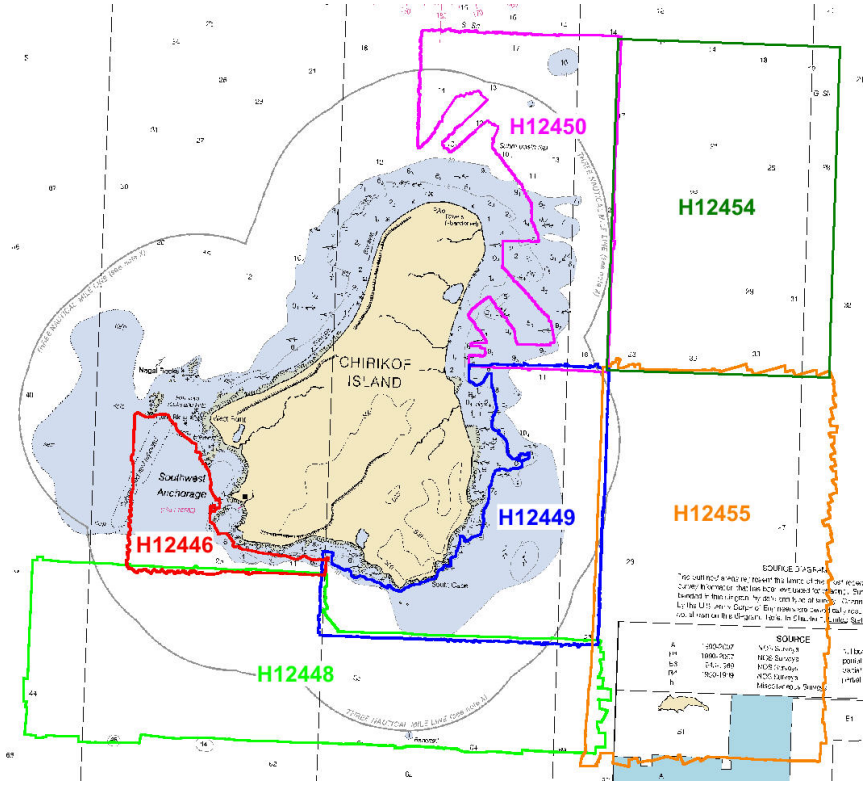


Figure 13: H12449 MBES Junction survey overview.

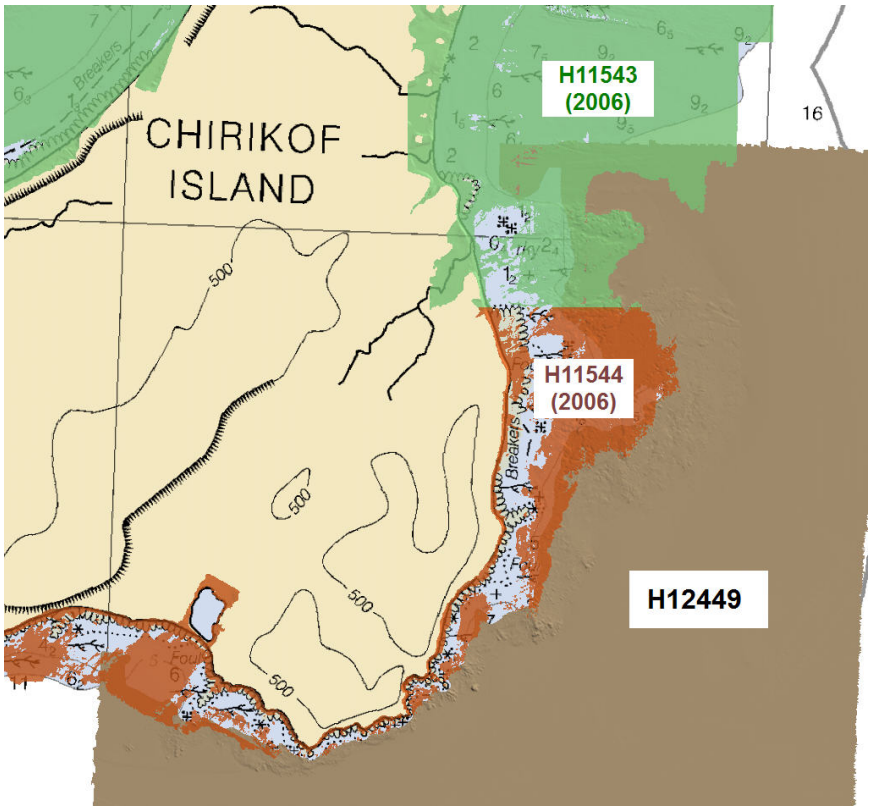


Figure 14: H12449 2006 Lidar junction survey overview.

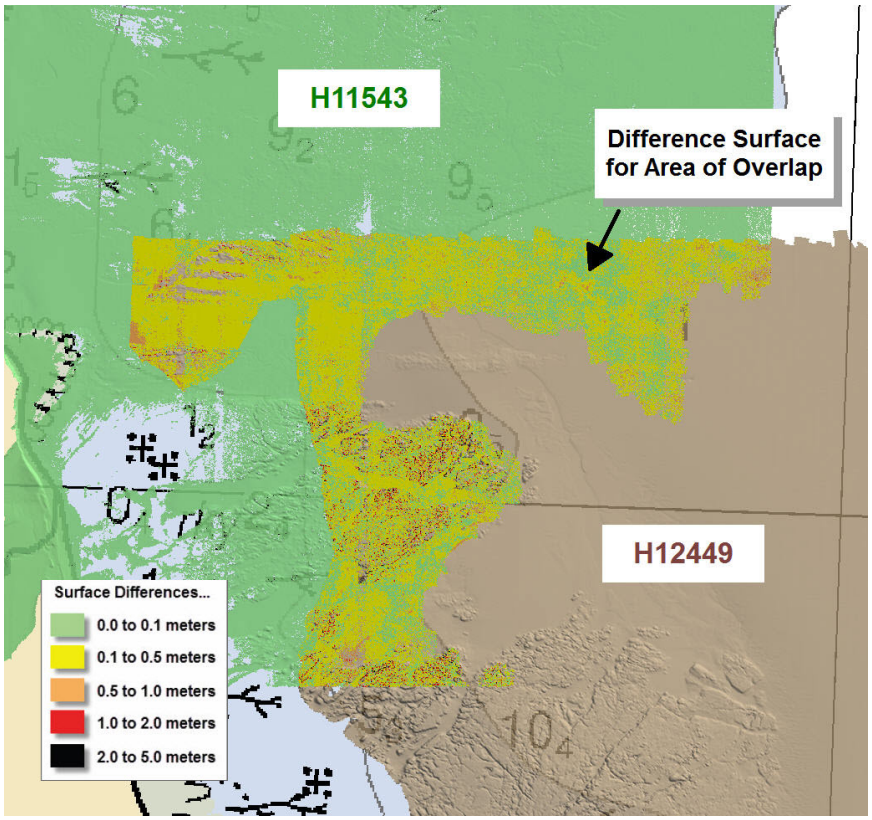


Figure 15: H12449 / H11543 Junction.

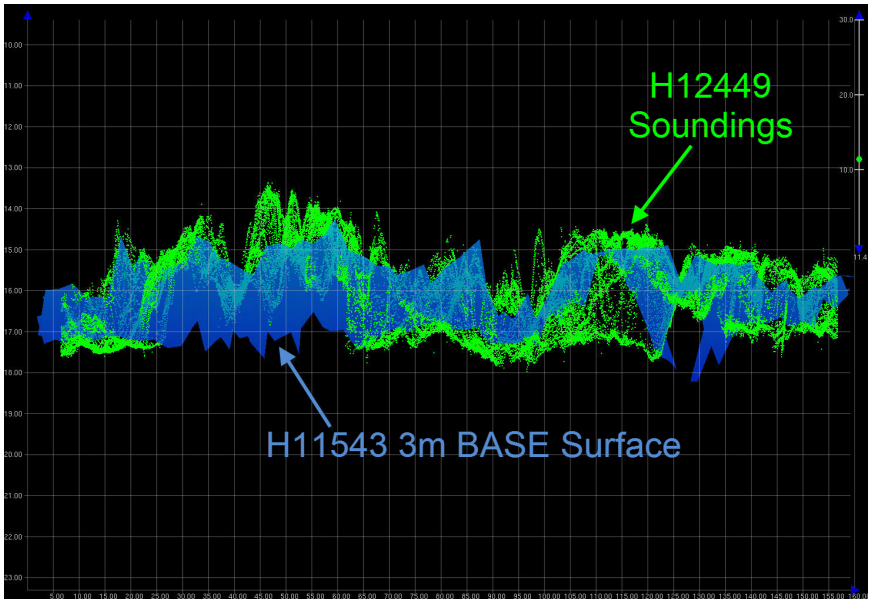


Figure 16: H12449 / H11543 Subset view.

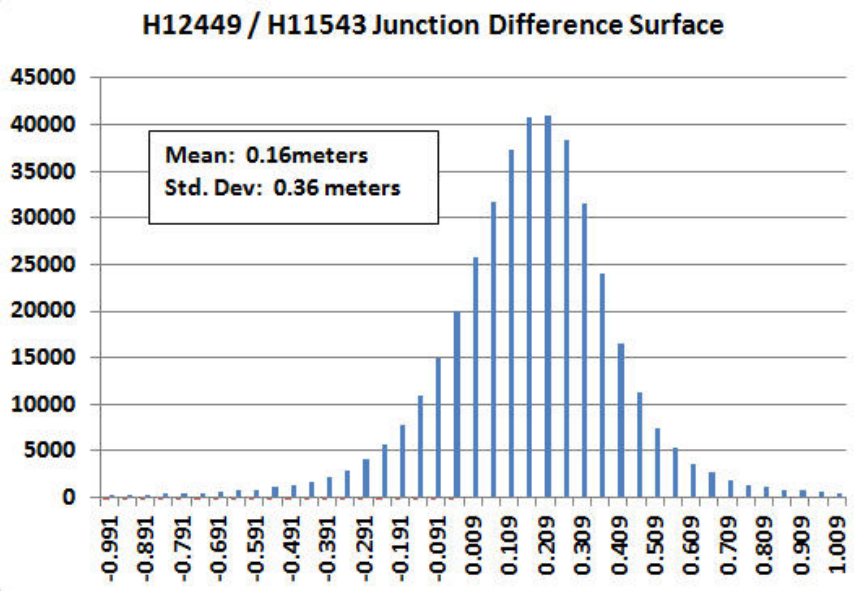


Figure 17: H12449 / H11543 Difference surface results.

H11544

H12449 junctions with lidar survey H11544 to the west as shown in Figure 18; the most extensive area of overlap is to the north of the common area. A CARIS difference layer was created using the H12449 2-meter resolution BASE surface and the H11544_LI_BASE_3m.csar file provided with the Project Instructions. Statistics from the H12449 / H11544 difference surface were computed in CARIS and exported to the excel table shown in Figure 20. The mean difference between the surveys is -0.09 meters; the standard deviation is 0.6 meters in approximately 20 meters water depth; H12449 was the shoaler of the two surveys. The largest depth differences coincide with areas of greatest seafloor relief. This correlation between depth discrepancies and bottom relief may be a function of the gridding algorithms used.

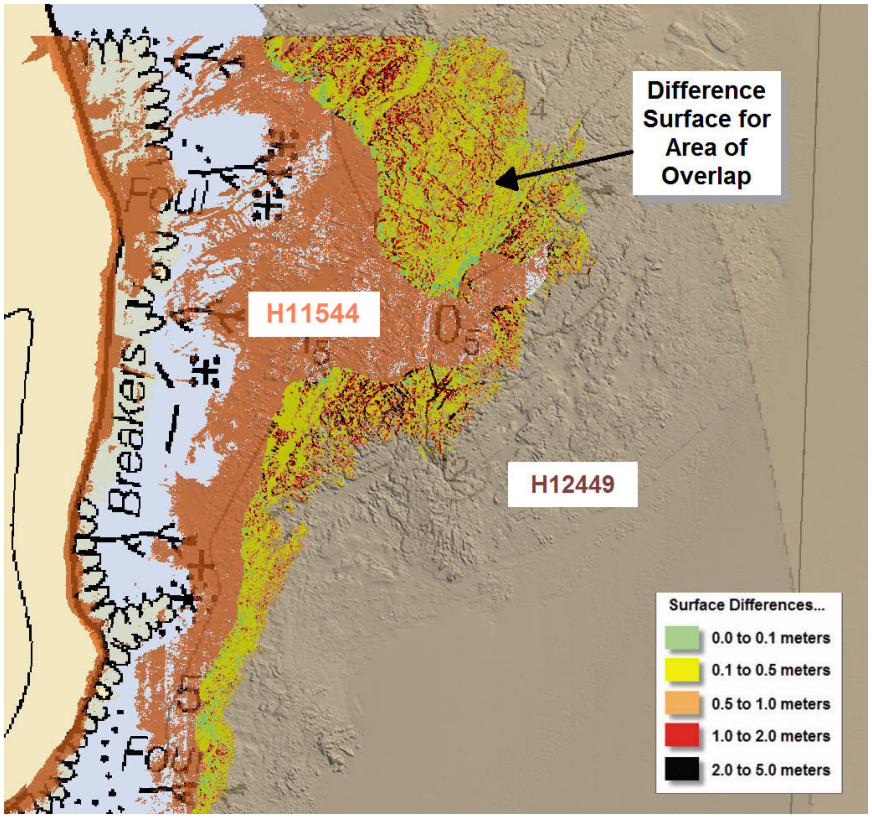


Figure 18: H12449 / H11544 Difference surface (section).

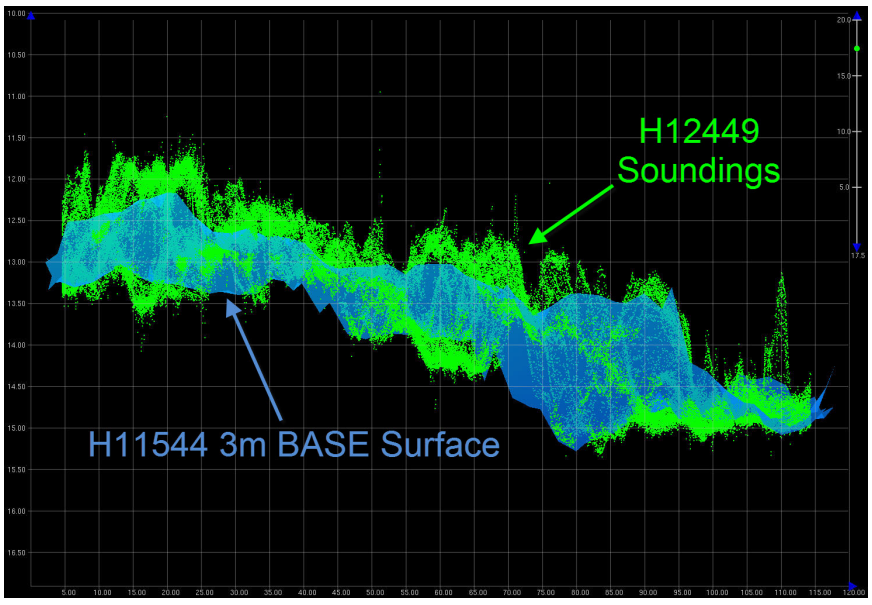


Figure 19: H12449 / H1544 Subset view.

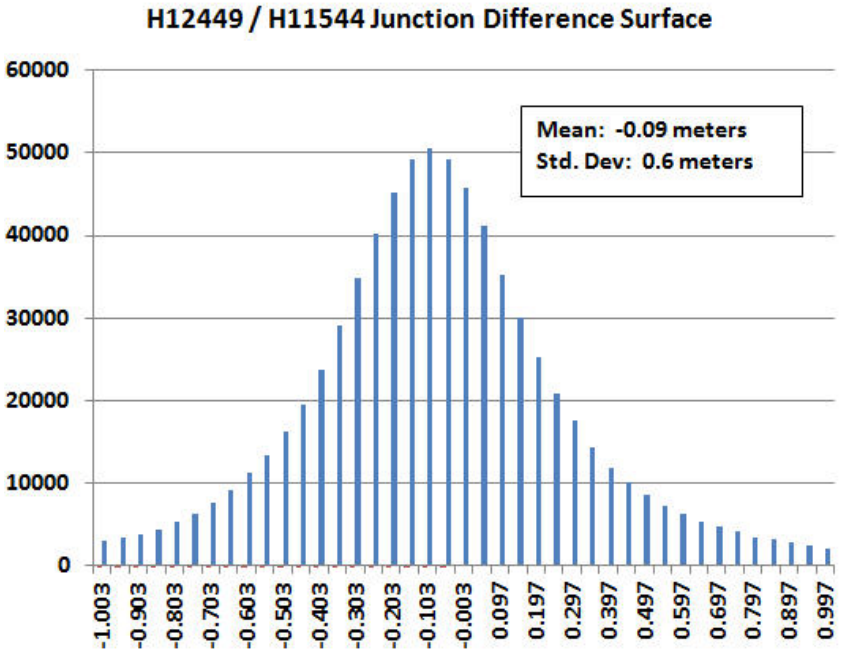


Figure 20: H12449 / H11544 Difference surface results.

H12448

The junction with survey H12448 was approximately 175 meters wide along the south and west limits of H12449 (Figure 21). A CARIS difference layer was created using the 4-meter resolution surface from both sheets. Statistics from the H12449 / H12448 difference surface were computed in CARIS and exported to the excel table shown in Figure 23. The mean difference between the surveys is -0.22 meters; the standard deviation is 0.17 meters in approximately 50 meters water depth; H12449 was the shoaler of the two surveys.

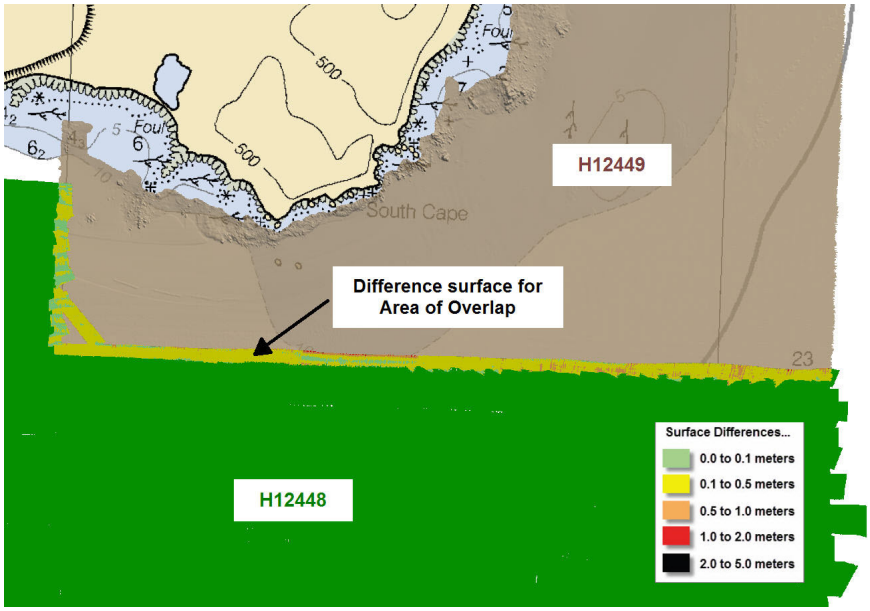


Figure 21: H12449 / H12448 Difference surface.

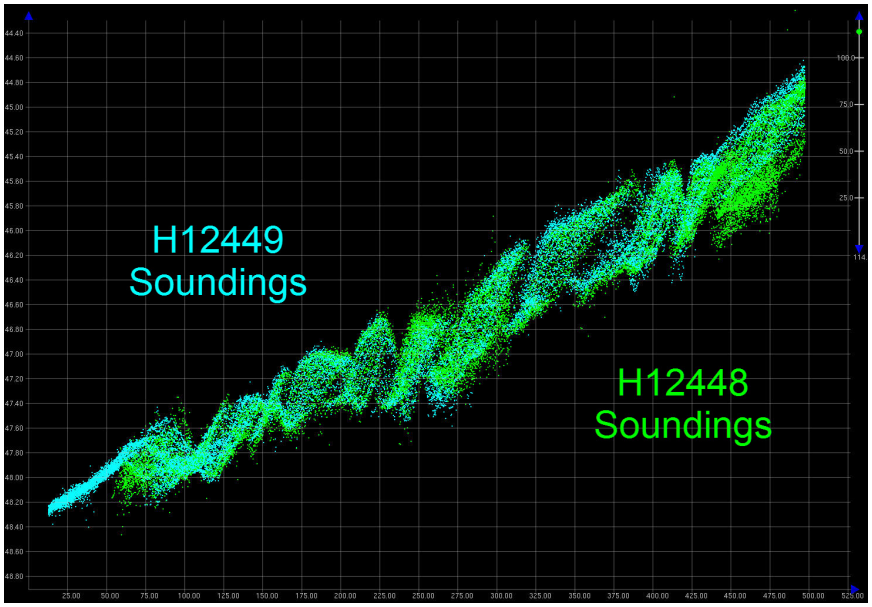


Figure 22: H12449 / H12448 Subset view.

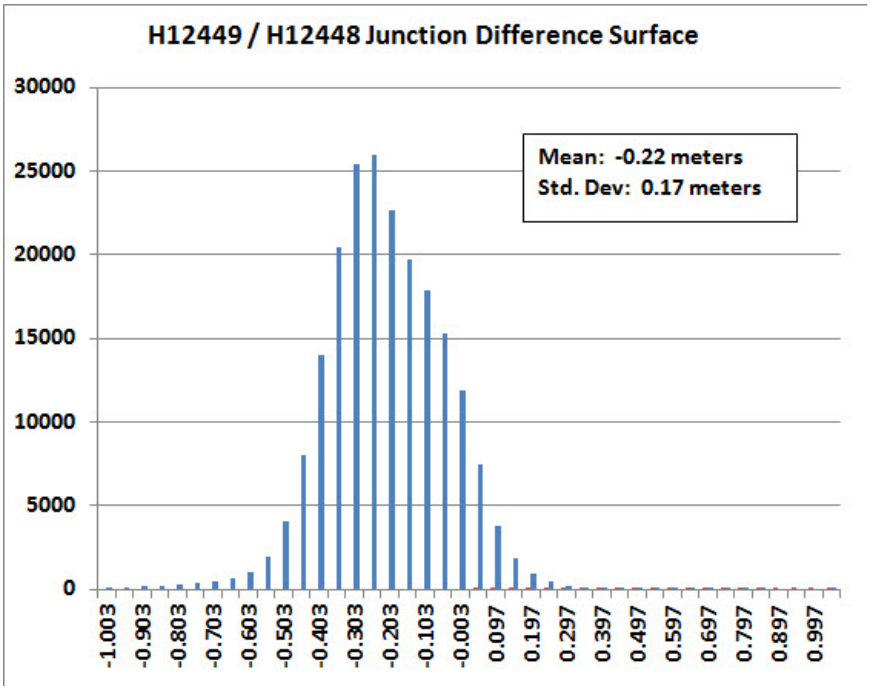


Figure 23: H12449 / H12448 Difference surface results.

H12446

The junction with survey H12446 was approximately 130 meters wide along the western limits of H12449 (Figure 24). A CARIS difference layer was created using the 2-meter resolution surface from both sheets. Statistics from the H12449 / H12446 difference surface were computed in CARIS and exported to the excel table shown in Figure 26. The mean difference between the surveys is 0.03 meters; the standard deviation is 0.26 meters in approximately 15-20 meters water depth; H12449 was the deeper of the two surveys.

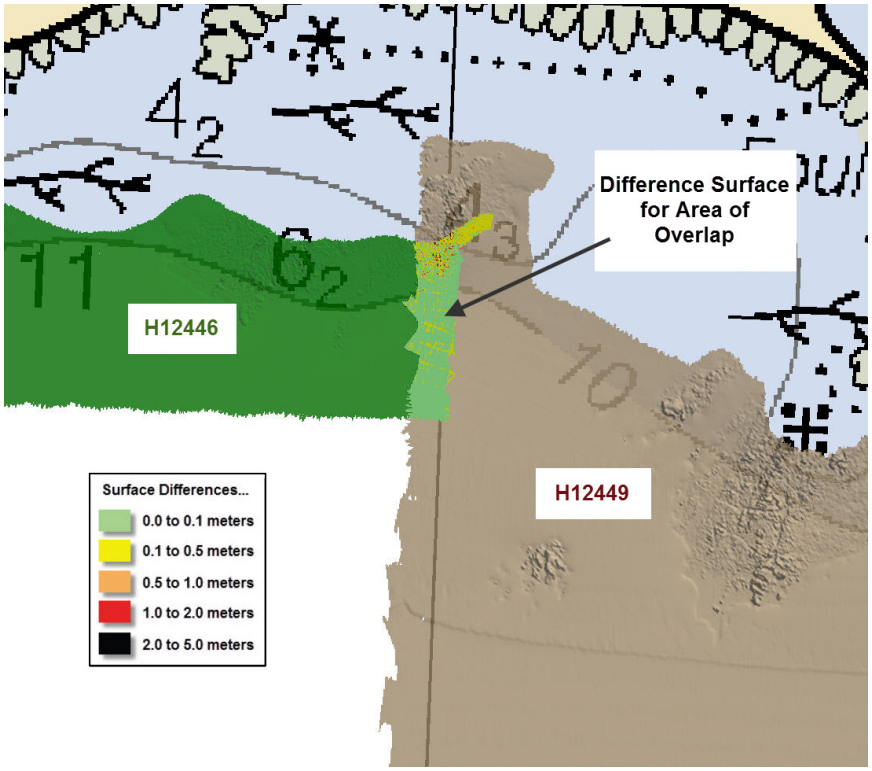


Figure 24: H12449 / H12446 Difference surface.

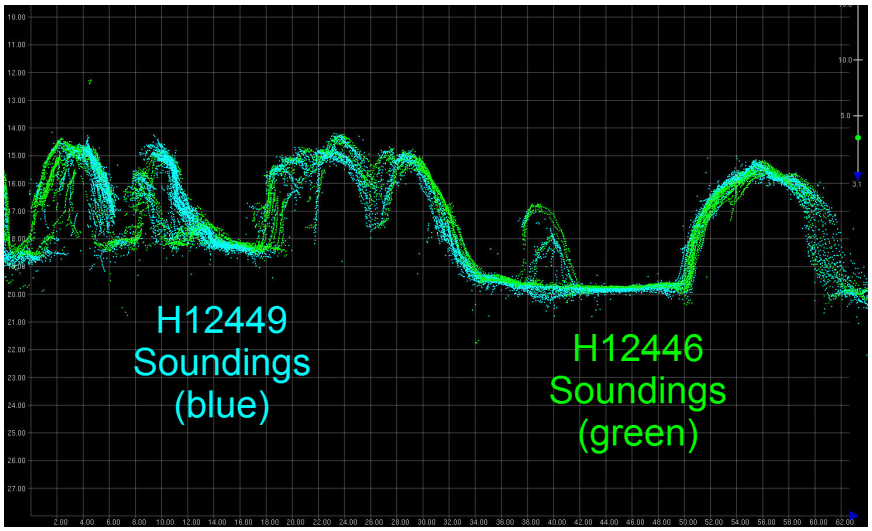


Figure 25: H12449 / H12446 Subset view.

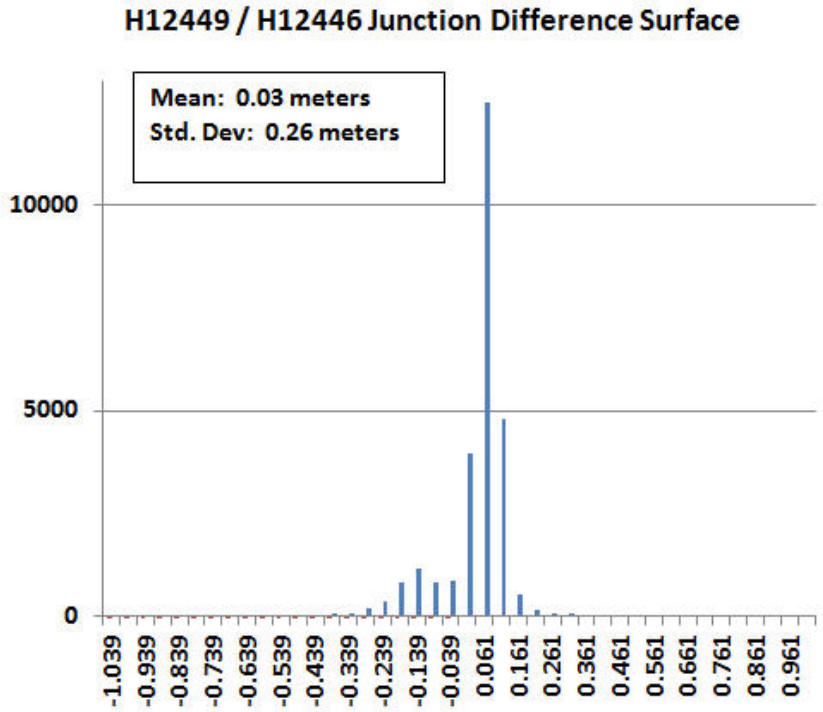


Figure 26: H12449 / H12446 Difference surface results.

H12455

The junction with survey H12455 was approximately 220 meters wide along the eastern sheet limits of H12449 (Figure 27). A CARIS difference layer was created using the 2-meter resolution surface from both sheets. Statistics from the H12449 / H12455 difference surface were computed in CARIS and exported to the excel table shown in Figure 29. The mean difference between the surveys is 0.11 meters; the standard deviation is 0.19 meters in approximately 30-55 meters water depth; H12449 was the shoaler of the two surveys.

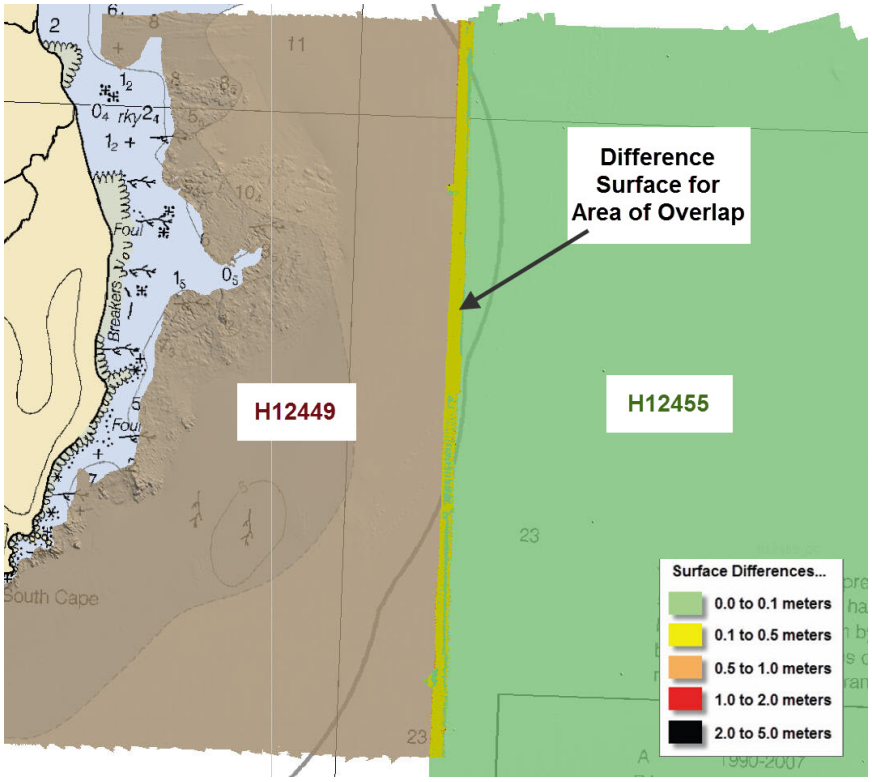


Figure 27: H12449 / H12455 Difference surface.

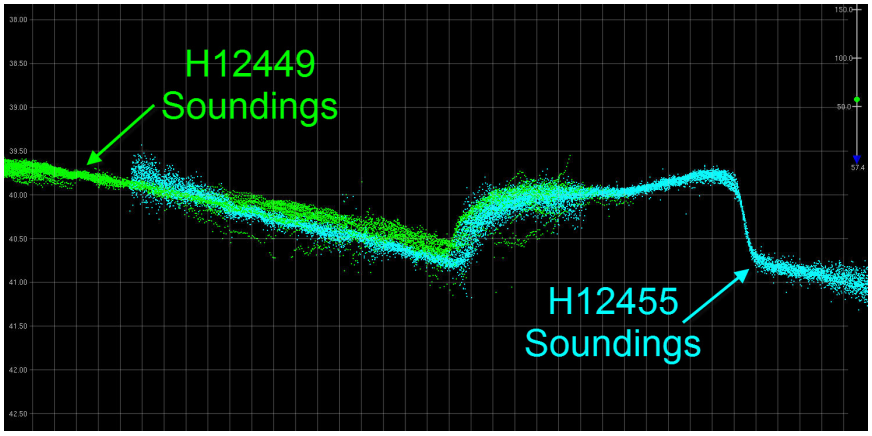


Figure 28: H12449 / H12455 Subset view.

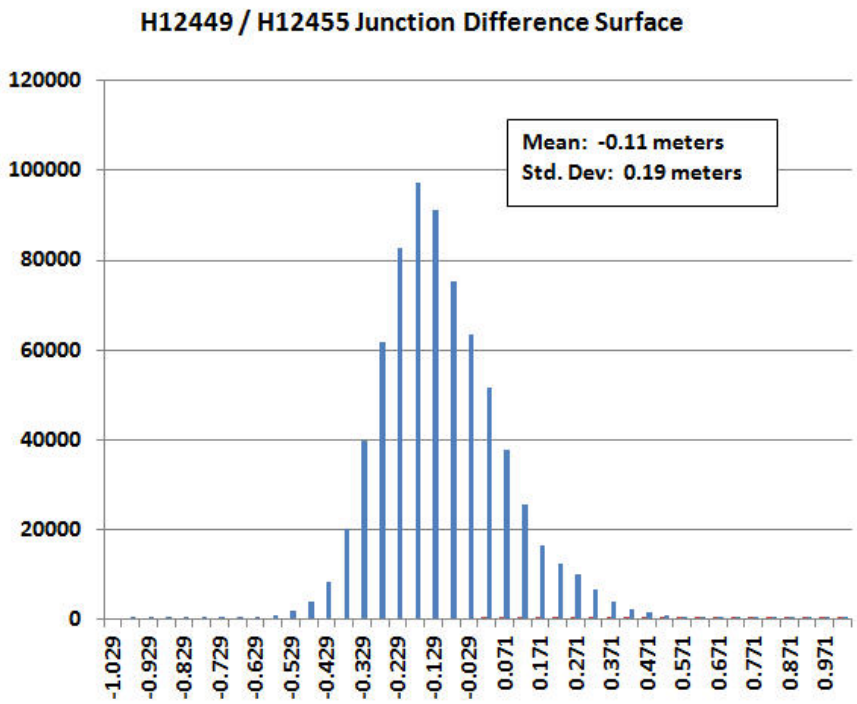


Figure 29: H12449 / H12455 Difference surface results.

H12450

The junction with survey H12450 was approximately 100 meters wide along the northern sheet limits of H12449 (Figure 30). A CARIS difference layer was created using the 2-meter resolution surface from both sheets. Statistics from the H12449 / H12450 difference surface were computed in CARIS and exported to the excel table shown in Figure 32. The mean difference between the surveys is -0.04 meters; the standard deviation is 0.1 meters in approximately 12-25 meters water depth; H12449 was the shoaler of the two surveys.

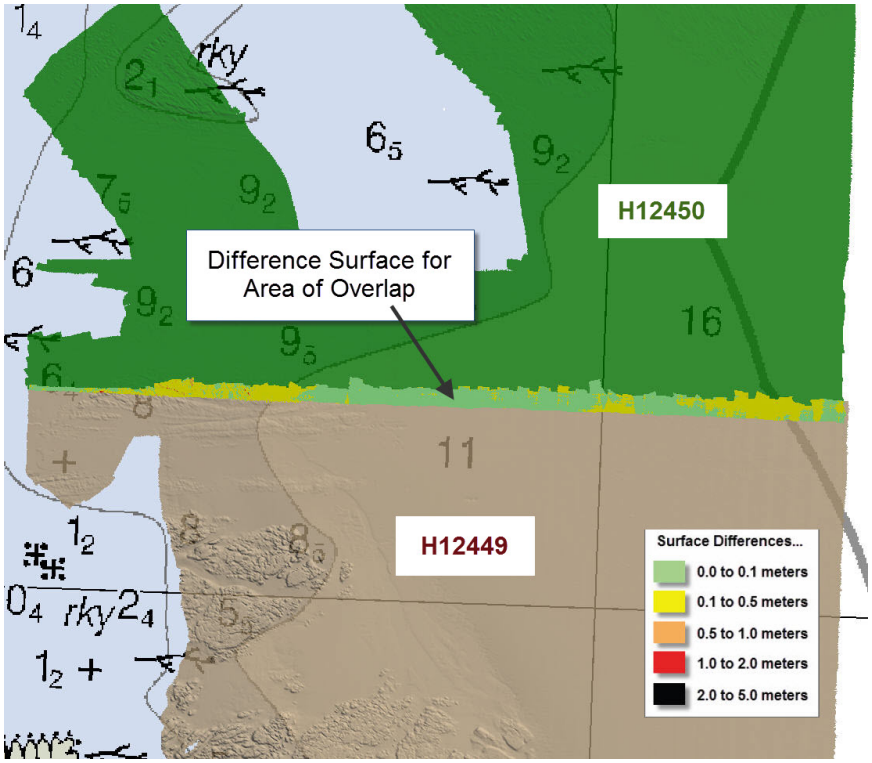


Figure 30: H12449 / H12450 Difference Surface.

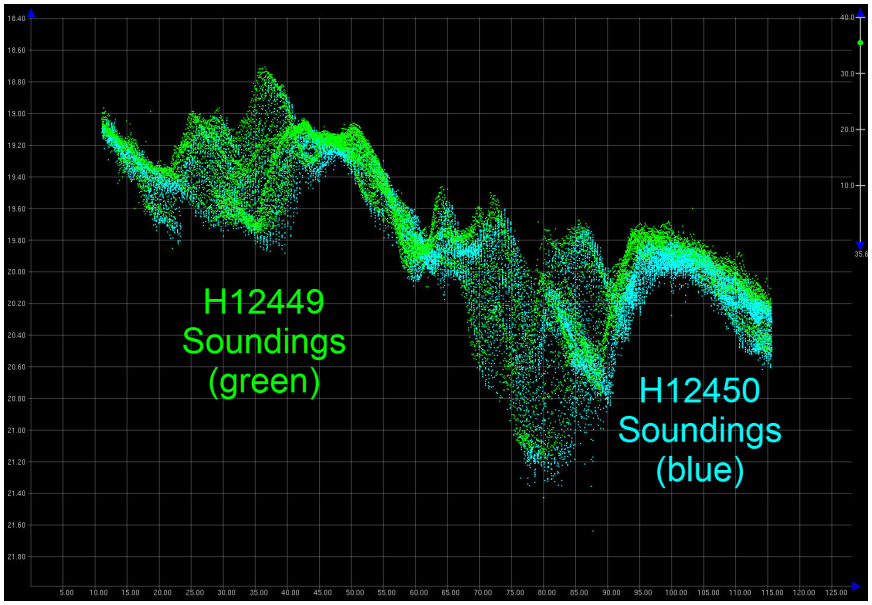


Figure 31: H12449 / H12450 Subset view.

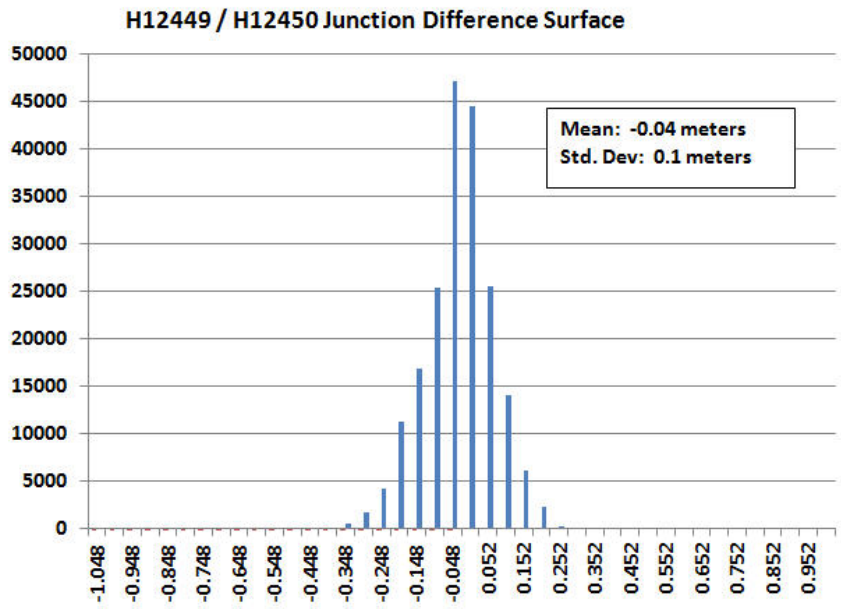


Figure 32: H12449 / H12450 Difference surface results.

H12454

H12449 does not junction with H12454 in a significant enough manner to warrant a full comparison.

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.2.5.1Time Synchronization Loss

An intermittent Reson time synchronization loss resulted in degradation of some bathymetric data (Figures 33-34). This condition occurred at infrequent, short duration episodes, lasting a matter of a few seconds on the following boat / day / lines: 2803/DN199/1916, 2803/DN199/1927, 2804/DN171/1722, 2804/ DN171/1940. The affected data was deleted or rejected in CARIS, then reacquired.

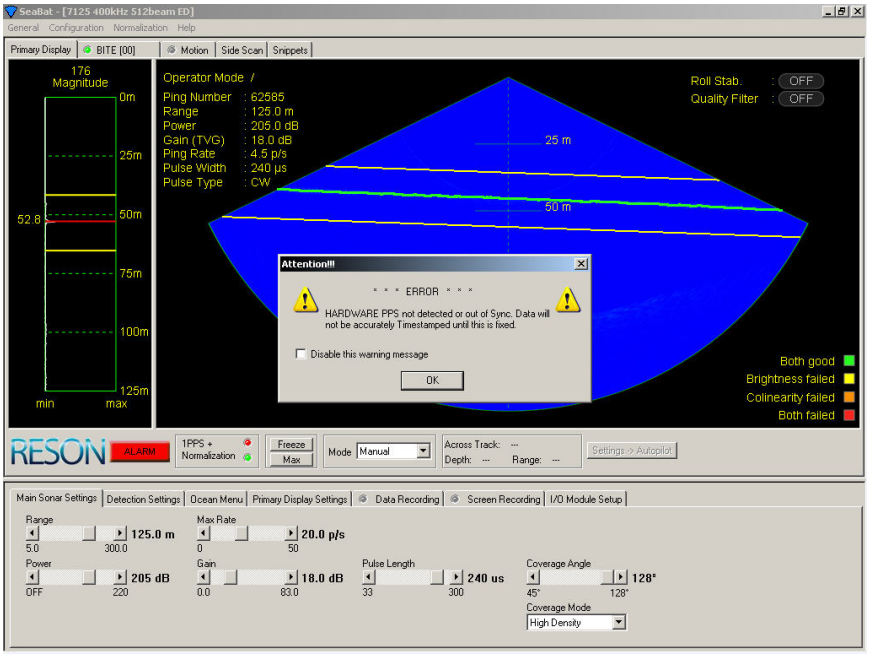


Figure 33: Reson Time sync error message.

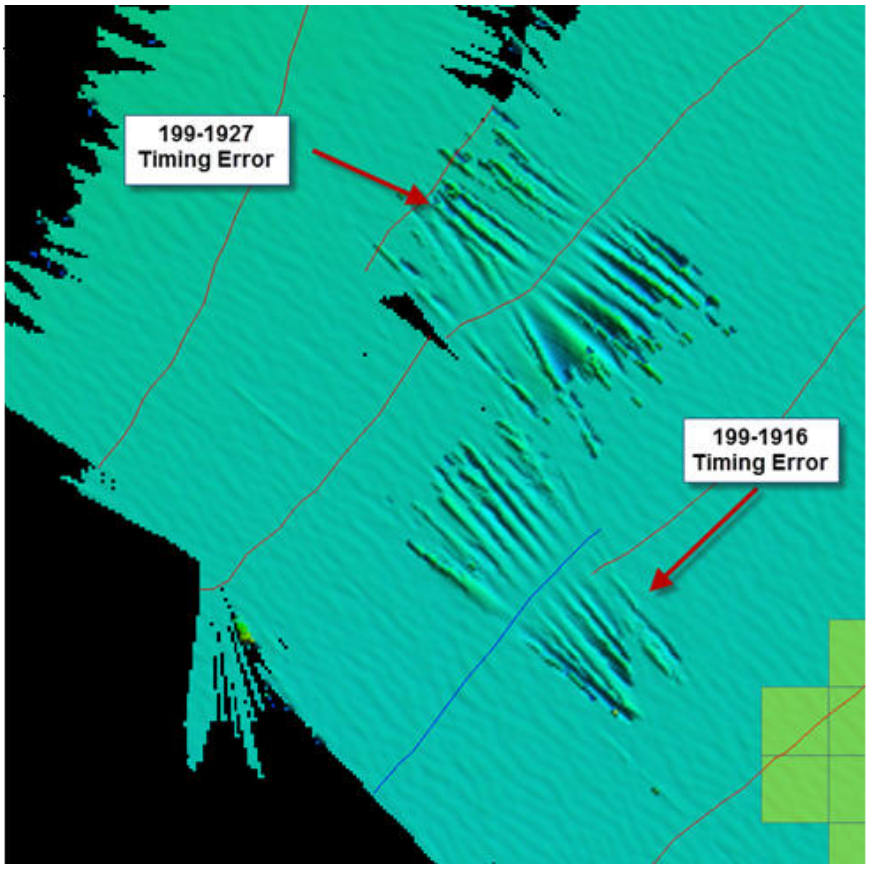


Figure 34: Surface artifact due to time sync error before correction.

B.2.5.1Application of SBET Data

Smoothed Best Estimate Trajectory (SBET) and Root Mean Square (RMS) data were applied to all H12449 survey lines with the following exceptions: Vessel 2802, DN199, high frequency (HF) line 1750 did not load PPK data. The associated true heave file was removed from this line as noted and explained in the acquisition log. Vessel 2802, DN203 HF lines did not load PPK data due to SBET time extents not overlapping with lines. Vessel 2804, DN216 HF lines did not load PPK data due to fatal error processing SBET file.

Data is adequate for charting.

B.2.6 Factors Affecting Soundings

B.2.6.1 Suboptimal Sound Velocity Correction

Due to variations in the water column, thermal layering, tidal influence and other related factors, a distinct demarcation of water masses was sometimes observed in the field. This proved problematic in the acquisition and application of sound velocity (SV) correction data. Despite the best efforts of the hydrographers to conduct sufficient SV casts distributed both spatially and temporally, in some areas sound velocity data correction was suboptimal. Some data exhibit upward or downward deflection ("smiles" or "frowns") when viewed in CARIS 2D subset editor, indicative of inaccurate SV correction. To compensate, some outer-beam soundings obviously in error were flagged as rejected. An example of suboptimal SV data correction at position 55-47-35.55N, 155-29-27.01W is shown below (Figure 35).

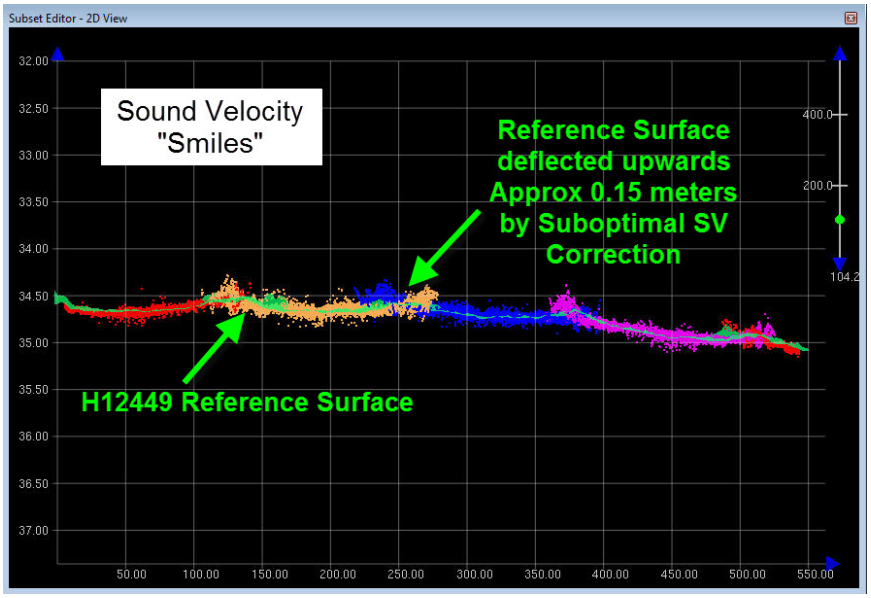


Figure 35: Example of suboptimal SV correction.

Data is adequate for charting.

B.2.6.1 Vertical Offset

A vertical offset of approximately 0.15 meters was observed (at position 55-48-38.86N, 155-28-40.18W) where data acquired on different days overlapped (Figure 36). Factors which may have contributed to this offset include poor SV correction, inaccurate dynamic draft or tide modeling. In order to determine whether this offset was due to a less than accurate tidal zoning model, the affected multibeam data was referenced to the ellipse by applying GPS tides in CARIS. Once referenced to the ellipse, the vertical offset between overlapping lines was almost totally eliminated (Figure 37). It should be noted that H12449 multibeam data with zoned tides applied were delivered to the processing branch and are within the allowable uncertainty margins outlined in NOAA 2012 HSSD.

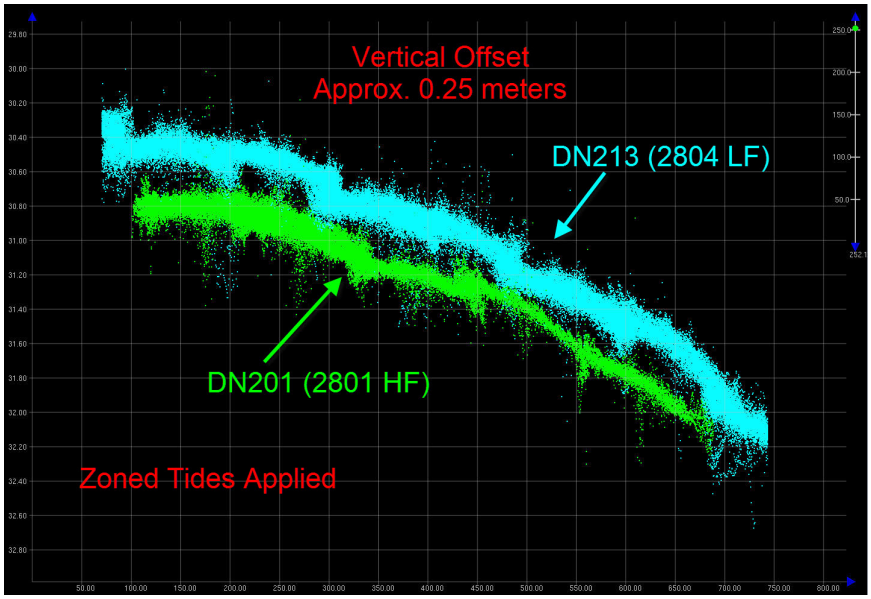


Figure 36: Vertical offset between days - Zoned tides applied.

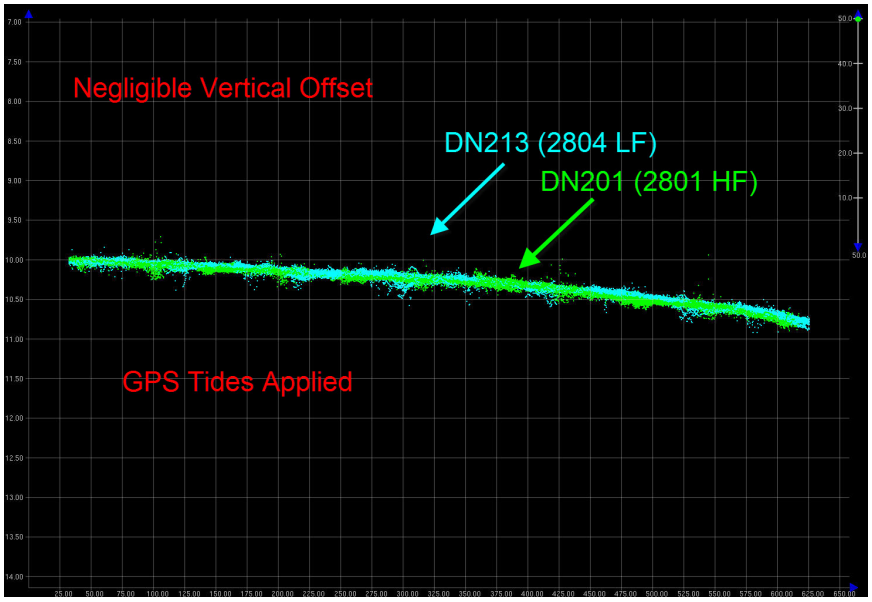


Figure 37: Vertical offset eliminated - GPS tides applied.

Data is adequate for charting.

B.2.7 Sound Speed Methods

Sound Speed Cast Frequency: Sound speed profiles were acquired using SBE-19 and SBE-19 plus CTD probes at discrete locations within the survey area at four hour intervals or more frequently when observed surface sound speed values changed significantly, (approximately 3-meters per second), or when surveying in a new area. A single sheet-wide concatenated SVP was created and applied to all H12449 survey lines using the "Nearest in distance within (4 hours) Time" profile selection method. A total of thirty nine SVP casts were taken and applied (Figure 38).

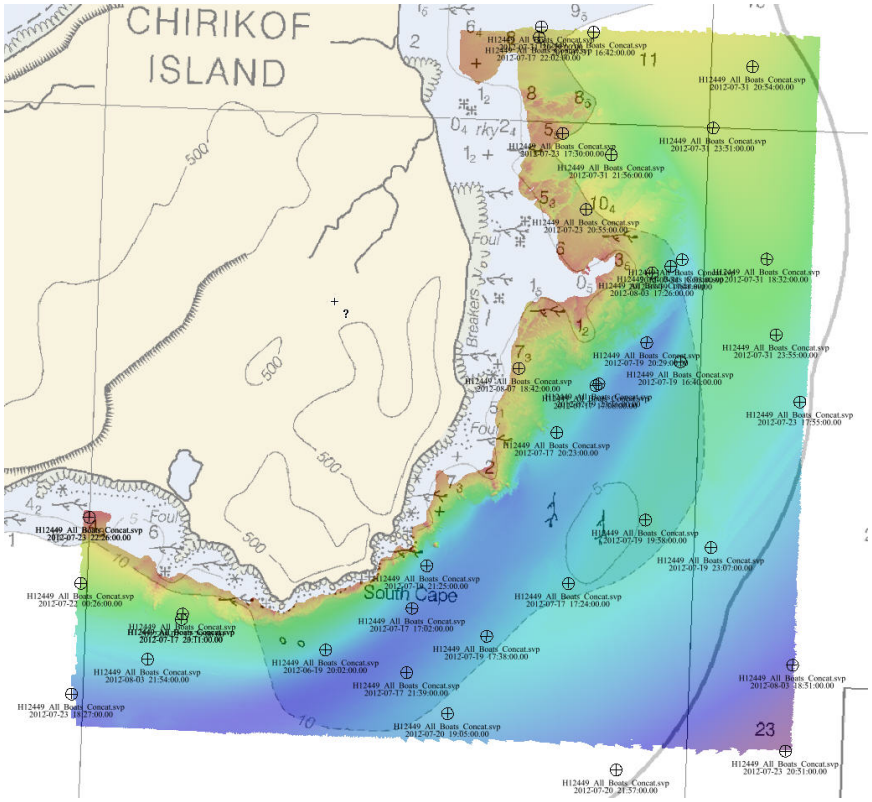


Figure 38: H12449 Sound velocity cast locations.

B.2.8 Coverage Equipment and Methods

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

B.3 Echo Sounding Corrections

B.3.1 Corrections to Echo Soundings

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

B.3.2 Calibrations

All sounding systems were calibrated as detailed in the DAPR.

B.4 Backscatter

Backscatter data was logged as .7k files and submitted directly to NGDC, and is not included with the data submitted to the Branch.

B.5 Data Processing

B.5.1 Software Updates

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

The following Feature Object Catalog was used: NOAA Profile

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

The Feature Object Catalog used for this survey was NOAA Extended Attributes Files V5_2.

B.5.2 Surfaces

The following CARIS surfaces were submitted to the Processing Branch:

Surface Name	Surface Type	Resolution	Depth Range	Surface Parameter	Purpose
H12449_1m	CUBE	1 meters	2.53 meters - 57.12 meters	NOAA_1m	Complete MBES
H12449_2m	CUBE	2 meters	2.68 meters - 57.12 meters	NOAA_2m	Complete MBES
H12449_4m	CUBE	4 meters	2.84 meters - 57.10 meters	NOAA_4m	Complete MBES
H12449_1m_Final	CUBE	1 meters	2.45 meters - 20 meters	NOAA_1m	Complete MBES
H12449_2m_Final	CUBE	2 meters	18 meters - 40 meters	NOAA_2m	Complete MBES
H12449_4m_Final	CUBE	4 meters	36 meters - 57 meters	NOAA_4m	Complete MBES
H12449_Combined	CUBE	4 meters	2.45 meters - 57.10 meters	N/A	Complete MBES

Table 9: CARIS Surfaces

One field sheet, three single-resolution, three finalized and one combined CARIS BASE surfaces were created to process this survey. Final BASE surface resolution and depth ranges were specified in the file "CUBEParams_NOAA.xml" submitted with this report. A H12449 Critical Soundings layer includes four examined and one designated sounding. The designated sounding was to created ensure the surface honored the least depth of a significant rock; the examined soundings were flagged by the hydrographer during data analysis and may be ignored by the reviewer.

H12449_Office_4m_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 submitted 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	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 08/09/2012. The final tide note was received on 08/10/2012.

Applied water levels were based on data collected at Sand Point, AK (9459450), and preliminary zoning was used as provided by CO-OPS. Preliminary tide zones were accepted as final; final tides were applied to all data.

Tide note appended.

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 (POS files) were post-processed with Applanix POSPac and POSGNSS software using 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.2.5.1 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

Vessel 2804 acquired shoreline buffer data on DN171 prior to base station installation. Precise Point Position (PPP) correction was applied to this data only.

DGPS signal reception was variable during this survey. The USCG DGPS stations at Kodiak (313 kHz), Cold Bay (289 kHz) and Kenai (310 kHz) Alaska were used for initial horizontal control depending on which provided the best signal reception at the time of acquisition. Refer to H12449 processing and acquisition logs for details. Improved horizontal control was achieved through the use of Post Processed Kinematic data.

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	09/04/2012	09/01/2012

Table 15: Largest Scale Raster Charts

16587

A comparison was made between survey H12449 and chart 16587 using Caris BASE surfaces and sounding layer. H12449 soundings agreed with charted (16587) depths to within 1-fathom except as indicated in Figure 39. Charted depths circled in green indicate where H12449 soundings are within 1-fathom of charted depths. A single blue circled depth indicates where H12449 soundings are more than 1-fathom deeper than charted. The hydrographer recommends that a sounding set derived from survey H12449 be applied to chart 16587.

A charted 10-fathom depth contour is positioned as much as 2 nautical miles too far offshore of the correct position determined by H12449 data. The actual 10-fathom contour is located at the junction between the green and blue depth ranges shown in Figure 40. A charted offshore 5-fathom depth contour is not supported by H12449 data and should be deleted (Figure 41). A new contour set should be derived from H12449 digital data.

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

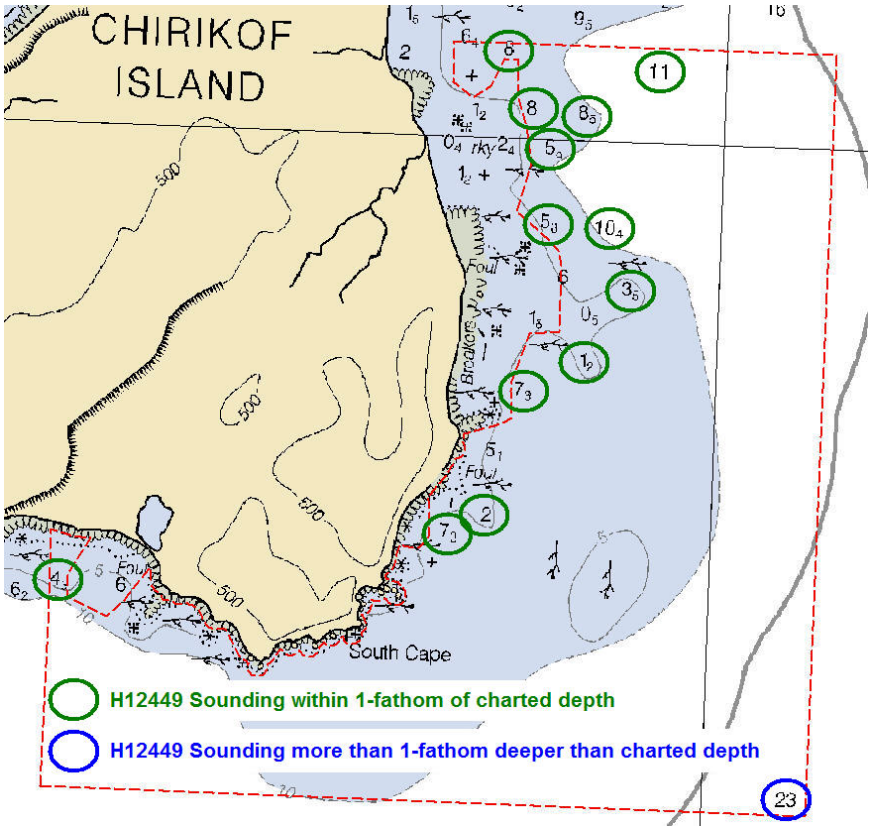


Figure 39: H12449 Depth comparison.

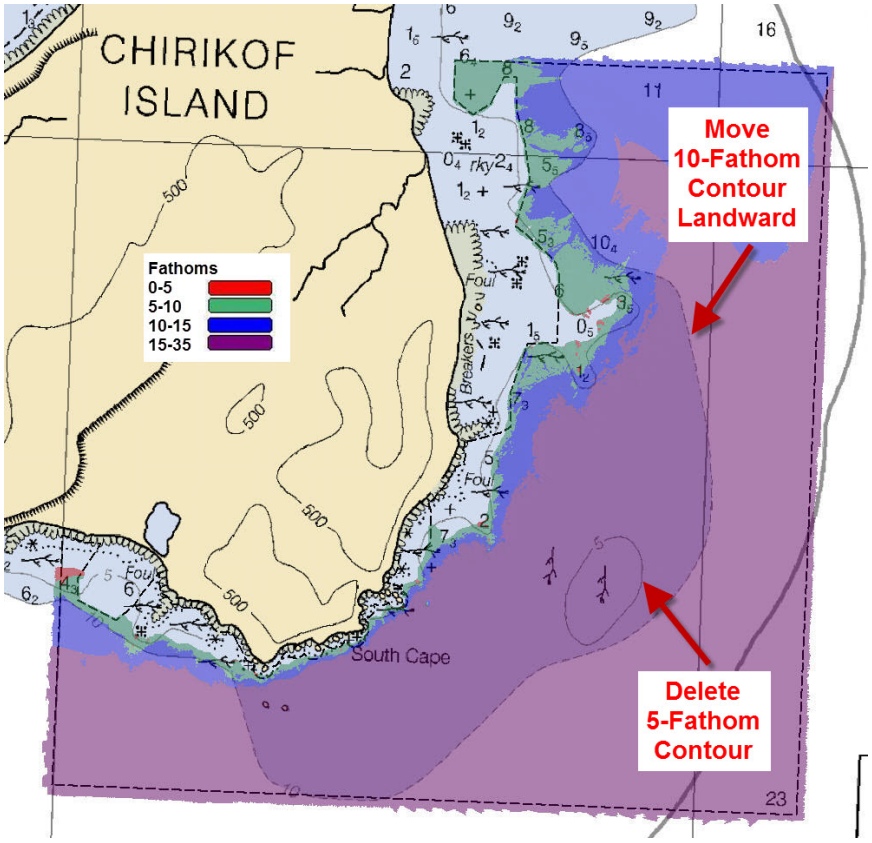


Figure 40: H12449 Contour recommendation.

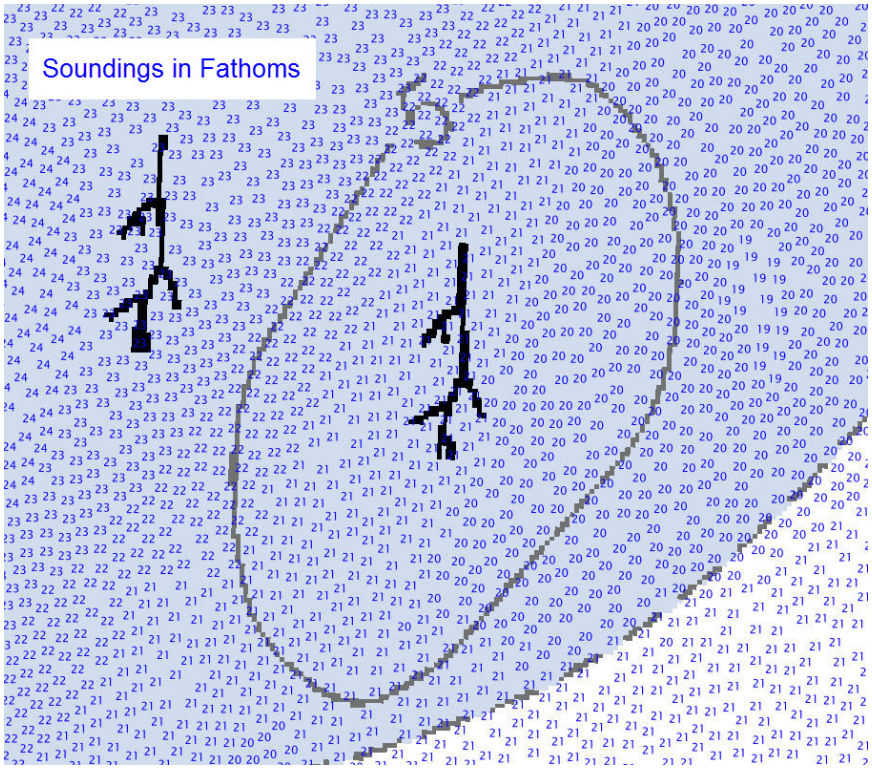


Figure 41: Incorrect 5-fathom contour.

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

An ENC land area at position 55-49-03.05N, 155-33-00.29W conflicts with chart 16587 which depicts a rock awash at the level of chart datum (Figure 42). H12449 observed no land area at the position indicated by the ENC. The discrepancy is likely due to the differences in scale between the ENC and chart 16587.

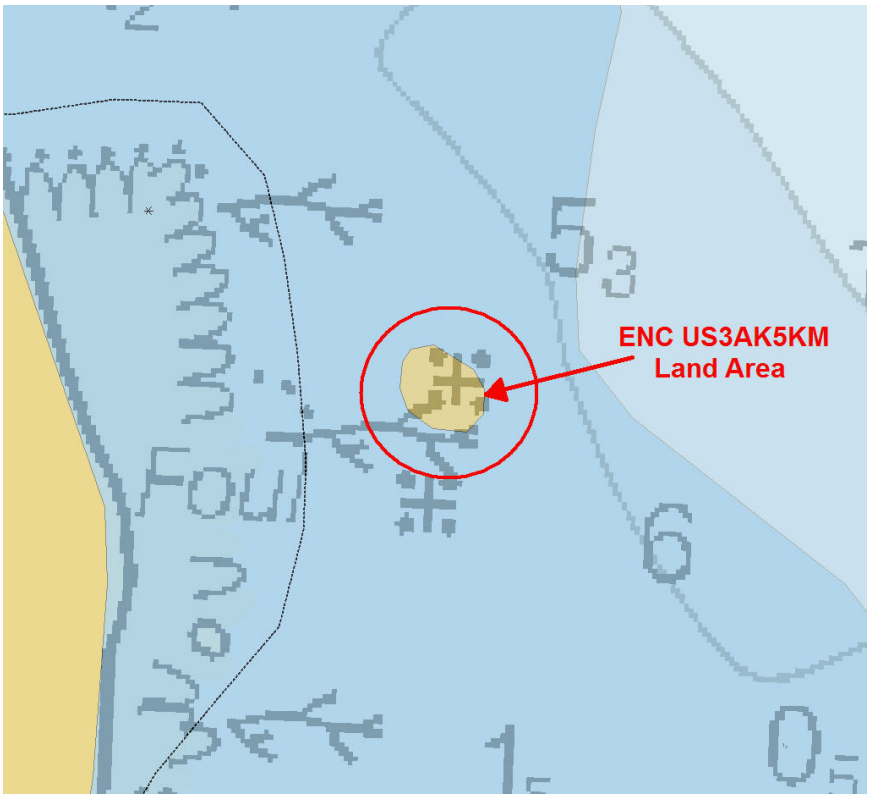


Figure 42: ENC / Chart confliction.

The largest scale ENC in the survey area is US4AK5XM at 1:135,000 which corresponds to chart 16587. 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 with the label PA, ED, PD or Rep, exist for this survey.

D.1.5 Uncharted Features

No uncharted features exist for this survey. Chart as per H12449 digital data.

D.1.6 Dangers to Navigation

No Danger to Navigation Reports were submitted for this survey.

D.1.7 Shoal and Hazardous Features

Chart as per H12449 digital data.

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

Limited shoreline verification was accomplished using the Project Reference File (PRF) and Composite Source File (CSF) provided with the Project Instructions. The PRF contains the limits of the assigned survey area, junction survey outlines, proposed bottom sample locations and a selection of features assigned for investigation. The CSF contains additional features for investigation as well as other features derived from multiple sources including NOAA charts, lidar surveys, and photogrammetry. From these two project-

wide files, the hydrographer created an Assigned Feature File (AFF) which is a subset of those features specifically assigned for investigation by this survey. Both PRF and CSF are S-57 attributed datasets in .000 file format.

Limited shoreline verification was conducted near predicted low water in accordance with the applicable sections of NOAA HSSD and FPM. All assigned features safe to approach, were addressed as required with S-57 attribution and recorded in the H12449_Final_Feature_File to best represent the features at chart scale. This file also includes any new features found in the field as well as recommendations to delete features disproved during the survey. Also submitted with this survey is a copy of the original H12449 AFF before any edits were made.

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

An interested seafloor feature was located at position 55-46-23.99N, 155-29-05.98W. The feature resembles a staircase when seen in plan view (Figures 43-44).

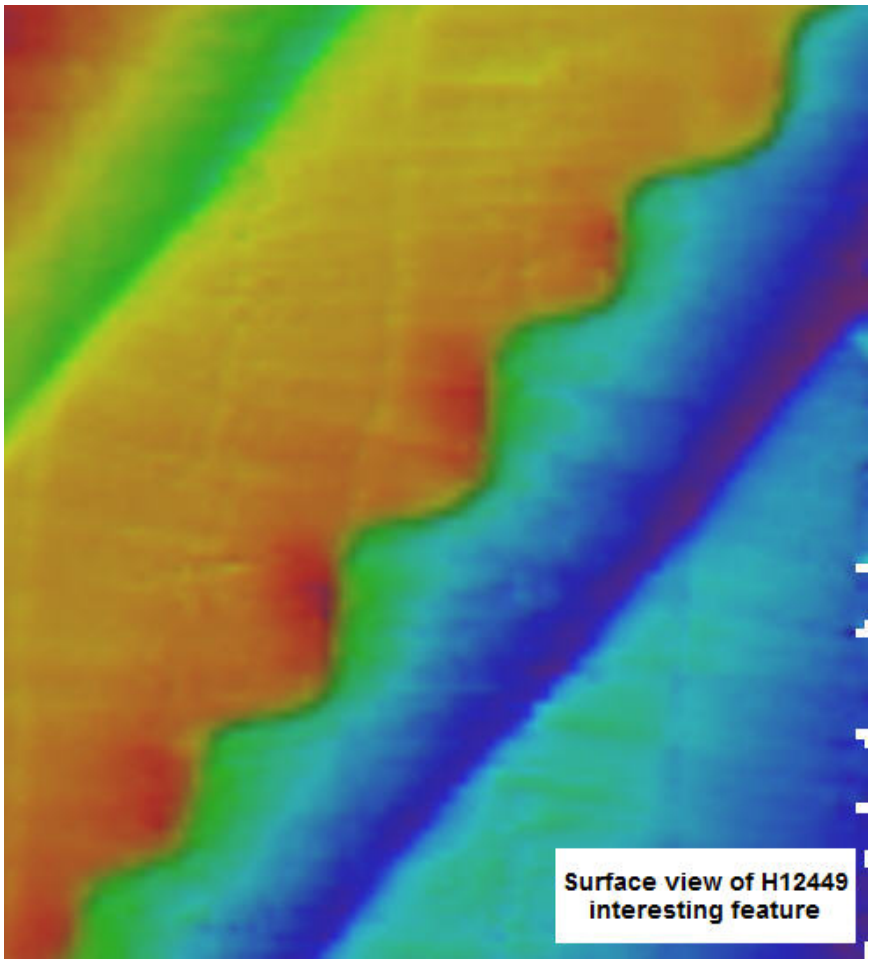


Figure 43: H12449 Interesting feature - plan view.

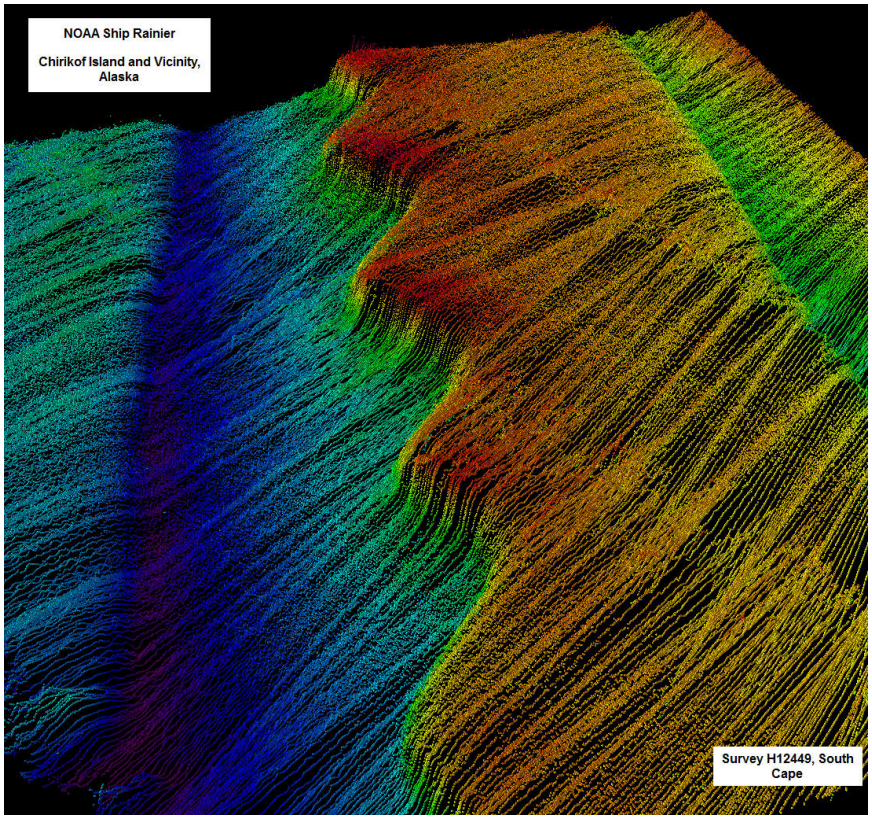


Figure 44: H12449 Interesting feature - 3-D view.

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
CDR Richard T. Brennan, NOAA	Commanding Officer, NOAA Ship Rainier	10/11/2012	
LT Michael O. Gonsalves, NOAA	Field Operations Officer, NOAA Ship Rainier	10/11/2012	
James B. Jacobson	Chief Survey Technician, NOAA Ship Rainier	10/11/2012	Digitally signed by James Jacobson Reason: I have reviewed this document Date: 2012.10.11 16:02:56 -08'00'
B. Jackson	Senior Survey Technician, NOAA Ship Rainier	10/11/2012	barry jackson I am the author of this document 2012.10.11 15:58:12 -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 10, 2012

HYDROGRAPHIC BRANCH: Pacific
HYDROGRAPHIC PROJECT: OPR-P133-RA-2012
HYDROGRAPHIC SHEET: H12449

LOCALITY: South Cape,Chirikof Island and Vicinity,AK
TIME PERIOD: June 19 - August 07, 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, H12449, during the time period from June 19 to August 07, 2012.

Please use the zoning file P133RA2012CORP submitted with the project instructions for OPR-P133-RA-2012. Zones SWA146, SWA147, SWA173, and SWA175 are the applicable zones for H12449.

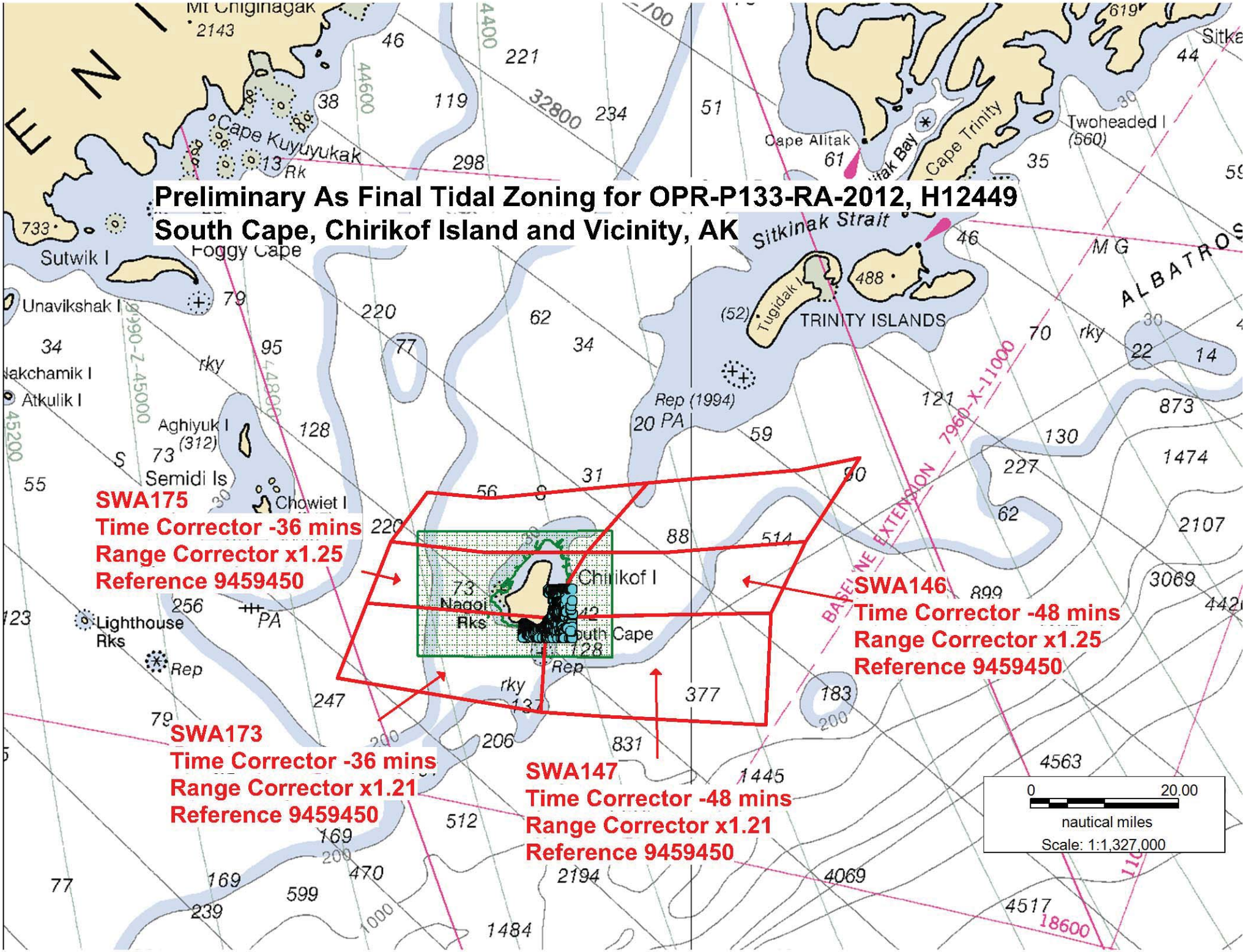
Refer to attachments for zoning information.

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: 2012.08.10 14:28:12 -04'00'

CHIEF, OCEANOGRAPHIC DIVISION


Preliminary As Final Tidal Zoning for OPR-P133-RA-2012, H12449
South Cape, Chirikof Island and Vicinity, AK
SWA175
Time Corrector -36 mins
Range Corrector x1.25
Reference 9459450
SWA146
Time Corrector -48 mins
Range Corrector x1.25
Reference 9459450
SWA173
Time Corrector -36 mins
Range Corrector x1.21
Reference 9459450
SWA147
Time Corrector -48 mins
Range Corrector x1.21
Reference 9459450
Cape Kuyuyukak
Foggy Cape
Sutwik I
Unavikshak I
Atkulik I
Aghiyuk I
Semidi Is
Chowiet I
Lighthouse Rks
Chirikof I
Nagoi Rks
South Cape
Rep
Rep (1994)
20 PA
Cape Alitak
Cape Trinity
Twoheaded I
Sitkinak Strait
TRINITY ISLANDS
Tugidak I
ALBATROS
BASELINE EXTENSION
7960-X-11000
7960-Z-45000
44600
32800
0
20.00
nautical miles
Scale: 1:1,327,000

APPROVAL PAGE

H12449

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

- H12449_DR.pdf
- Collection of depth varied resolution BAGS
- Processed survey data and records
- H12449_GeoImage.pdf

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

Digitally signed by HOLMBERG.PETER.SCOTT.1365886101
DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=OTHER, cn=HOLMBERG.PETER.SCOTT.1365886101
Date: 2013.04.25 07:37:21 -07'00'

Approved:_____

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.

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: Signed for Dave Zezula
Date: 2013.04.25 07:59:05 -07'00'

Approved:_____

Kurt Brown
Physical Scientist, for Chief Pacific Hydrographic Branch