

H12070

NOAA FORM 76-35A

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

## DESCRIPTIVE REPORT

Type of Survey Hydrographic

Field No.

Registry No. H12070

### LOCALITY

State Alaska

General Locality Shumagin Islands and Vicinity

Sublocality Northeast of Cape Thompson.

**2009**

### CHIEF OF PARTY

**Captain Douglas D. Baird, Jr., NOAA**

### LIBRARY & ARCHIVES

DATE

<p style="text-align: center;">U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION</p> <p style="text-align: center;"><b>HYDROGRAPHIC TITLE SHEET</b></p>	<p>REGISTRY No</p> <p style="text-align: center;"><b>H12070</b></p>
<p><b>INSTRUCTIONS</b> – The Hydrographic Sheet should be accompanied by this form, filled in as completely as possible, when the sheet is forwarded to the Office.</p>	<p>FIELD No: <b>N/A</b></p>
<p>State <u>Alaska</u></p> <p>General Locality <u>Shumagin Islands and Vicinity</u></p> <p>Sub-Locality <u>Northeast of Cape Thompson.</u></p> <p>Scale <u>1:40,000</u> Date of Survey <u>07/09/2009 to 07/19/2009</u></p> <p>Instructions dated <u>4/30/2009</u> Project No. <u>OPR-P183-FA-09</u></p> <p>Vessel <u>NOAA Ship Fairweather (S220), Launches 1010, 1018 and Amber 2302</u></p> <hr/> <p>Chief of party <u>CAPT Douglas D. Baird, NOAA</u></p> <p>Surveyed by <u>FAIRWEATHER Personnel</u></p> <p>Soundings by <u>Reson 8101, 8125 and 8111</u></p> <p>SAR by <u>Grant Froelich</u> Compilation by <u>Fernando Ortiz</u></p> <p>Soundings compiled in <u>Fathoms</u></p>	
<p><b>REMARKS:</b> <u>All times are UTC. UTM Projection 4</u></p> <p><u>The purpose of this survey is to provide contemporary surveys to update National Ocean Service (NOS) nautical charts. Revisions and end notes in red were generated during office processing.</u></p> <p><u>Page numbering may be interrupted or non sequential.</u></p> <hr/> <p><u>All pertinent records for this survey, including the Descriptive Report, are archived at the National Geophysical Data Center (NGDC) and can be retrieved via <a href="http://www.ngdc.noaa.gov/">http://www.ngdc.noaa.gov/</a>.</u></p>	

# Descriptive Report to Accompany Hydrographic Survey H12070

Project OPR-P183-FA-09  
Shumagin Islands and Vicinity, Alaska

Scale 1:40,000

July 2009

**NOAA Ship *Fairweather***

Chief of Party: Captain Douglas D. Baird, Jr., NOAA

## A. AREA SURVEYED

The survey area was located in the vicinity of the Shumagin Islands, northeast of Cape Thompson. This survey corresponds to Sheet P in the sheet layout provided with the Project Instructions, and as shown in Figure 1 below. The eastern side of the planned sheet layout was not completed due to lack of time on project.

Data acquisition was conducted from July 9 - 19, 2009 (DN 190 to DN 200).

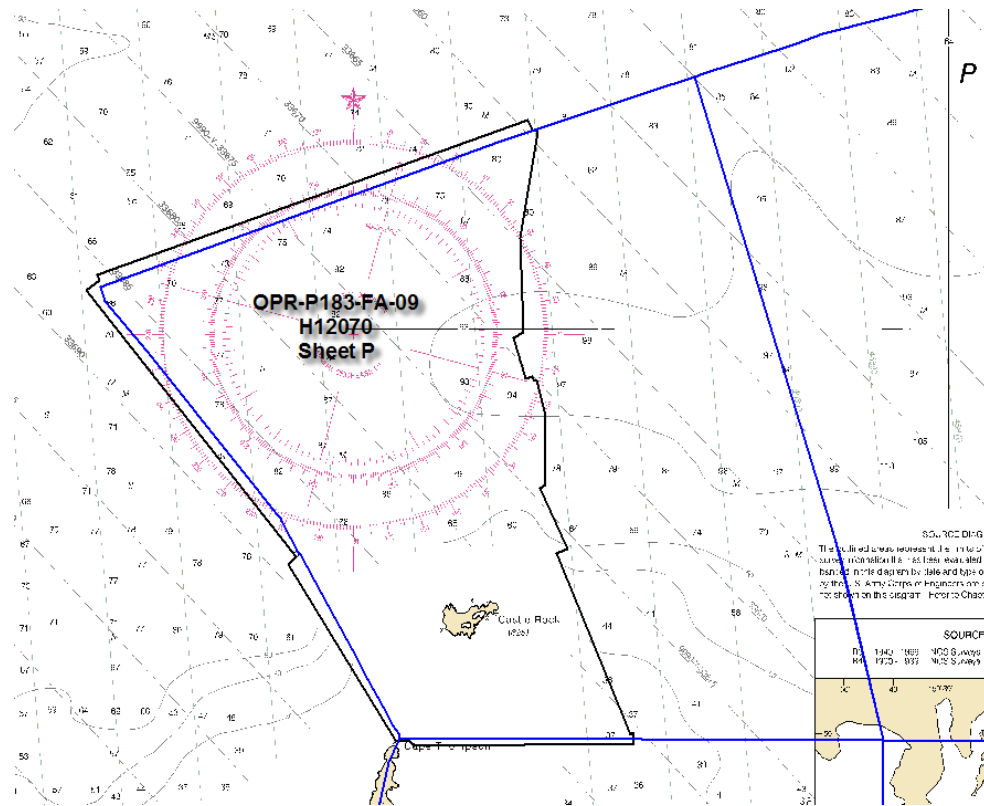


Figure 1: H12070 Survey Outline (blue is planned sheet limits)

Complete multibeam echosounder (MBES) coverage was obtained in the survey area to at least the 8-meter curve. Data were acquired as near to shore as safely possible. Additional coverage was obtained in order to determine least depths over features or shoals.<sup>1</sup>

Limited shoreline verification was conducted to determine the inshore limit of hydrography and for feature verification for H12070, as per section 3.5.5.3 of the Field Procedures Manual April 2009 (FPM). Shoreline features were given S-57 attribution and included for submission in Notebook .hob files.

Mainscheme and crossline mileage for MBES and shoreline acquisition were calculated and are displayed in Table 1.

MAIN SCHEME - Mileage	
<u>0</u>	<b>Single Beam MS</b>
<u>217.22</u>	<b>Multibeam MS mileage</b>
	FAIRWEATHER S-
	<u>171.35</u> 220
	<u>16.57</u> Launch 1010
	<u>29.31</u> Launch 1018
<u>0</u>	<b>SideScan MS</b>
<u>217.22</u>	<b>Total MS</b>
CROSSLINE - Mileage	
<u>0</u>	<b>Single Beam XL</b>
<u>36.22</u>	<b>Multibeam XL</b>
	FAIRWEATHER S-
	<u>11.57</u> 220
	<u>18.86</u> Launch 1010
	<u>5.78</u> Launch 1018
<u>36.22</u>	<b>Total XL</b>
OTHER	
<u>0</u>	<b>Developments/AWOIS - Mileage</b>
<u>2.22</u>	<b>Shoreline/Nearshore Investigation - Mileage</b>
<u>1</u>	<b>Total # of Investigated Items</b>
<u>6</u>	<b>Total Bottom Samples</b>
<u>24.08</u>	<b>Total SNM</b>
<u>July 9, 10, 11, 18, &amp; 19, 2009</u>	<b>Specific Dates of Acquisition</b>
<u>190, 191, 192, 199, 200</u>	<b>Specific Dn#s of Acquisition</b>

Table 1: H12070 Survey Outline

## B. DATA ACQUISITION AND PROCESSING

A complete description of data acquisition and processing systems and survey vessels along with quality control procedures and data processing methods are included and described in the *NOAA Ship Fairweather 2009 Data Acquisition and Processing Report (DAPR)*, submitted under separate cover. Items specific to this survey and any deviations from the aforementioned report are discussed in the following sections. This hydrographic survey H12070 was completed as specified by Hydrographic Survey Project Instructions OPR-P183-FA-09 (dated April 30, 2009, with changes dated May 12 and June 16, 2009).

### B1. Equipment and Vessels

Equipment and vessels used for data acquisition and survey operations during this survey are listed below in Table 2.

	<b>FAIRWEATHER</b>	<b>Launch 1010</b>	<b>Launch 1018</b>	<b>Ambar 2302</b>
<b>Hull Registration Number</b>	S220	1010	1018	2302
<b>Builder</b>	Aerojet-General Shipyard	The Boat Yard, Inc.	The Boat Yard, Inc.	Marine Silverships, Inc
<b>Length Overall</b>	231 feet	28' 10"	28' 10"	23'
<b>Beam</b>	42 feet	10' 8"	10' 8"	9' 4"
<b>Draft, Maximum</b>	15' 6"	4' 0" DWL	4' 0" DWL	1' 4"
<b>Cruising Speed</b>	12.5 knots	24 knots	24 knots	22 knots
<b>Max Survey Speed</b>	6 knots	6 knots	6 knots	
<b>Primary Echosounder</b>	RESON 8111 & RESON 8160	RESON 8101	RESON 8125	
<b>Sound Velocity Equipment</b>	SBE 19plus & 45, MVP 200, SVP70	SBE 19plus	SBE19plus	
<b>Attitude &amp; Positioning Equipment</b>	POS/MV V4	POS/MV V4	POS/MV V4	
<b>Type of operations</b>	MBES	MBES	MBES	Shoreline, VBES, Shore Station

**Table 2: Vessel Inventory**

No vessel configurations used during data acquisition deviated from those described the DAPR.

## B2. Quality Control

### Crosslines

Multibeam crosslines for this survey totaled 36.22 linear nautical miles (LNM), comprising 16.67% of the 217.22 total LNM of mainscheme MBES hydrography. Both main scheme and crossline mileage are summarized in Table 1 above. Crosslines were filtered down to 45 degrees on both port and starboard and reaccepted in some places to improve surface density and coverage. Two crosslines acquired by S220 Reson 8111 MBES on July 10, 2009 (DN 191), 20009P\_1912236A and 2009P\_191221, were named incorrectly, however, they are counted as crosslines for accounting and comparison purposes for analysis of H12070. <sup>2</sup>

Surface differencing in Fledermaus was used to assess crossline agreement with mainscheme lines. Figure 2 below shows a visual of the differences spatially. Differences are attributed to sound velocity artifacts present throughout the survey. <sup>3</sup>

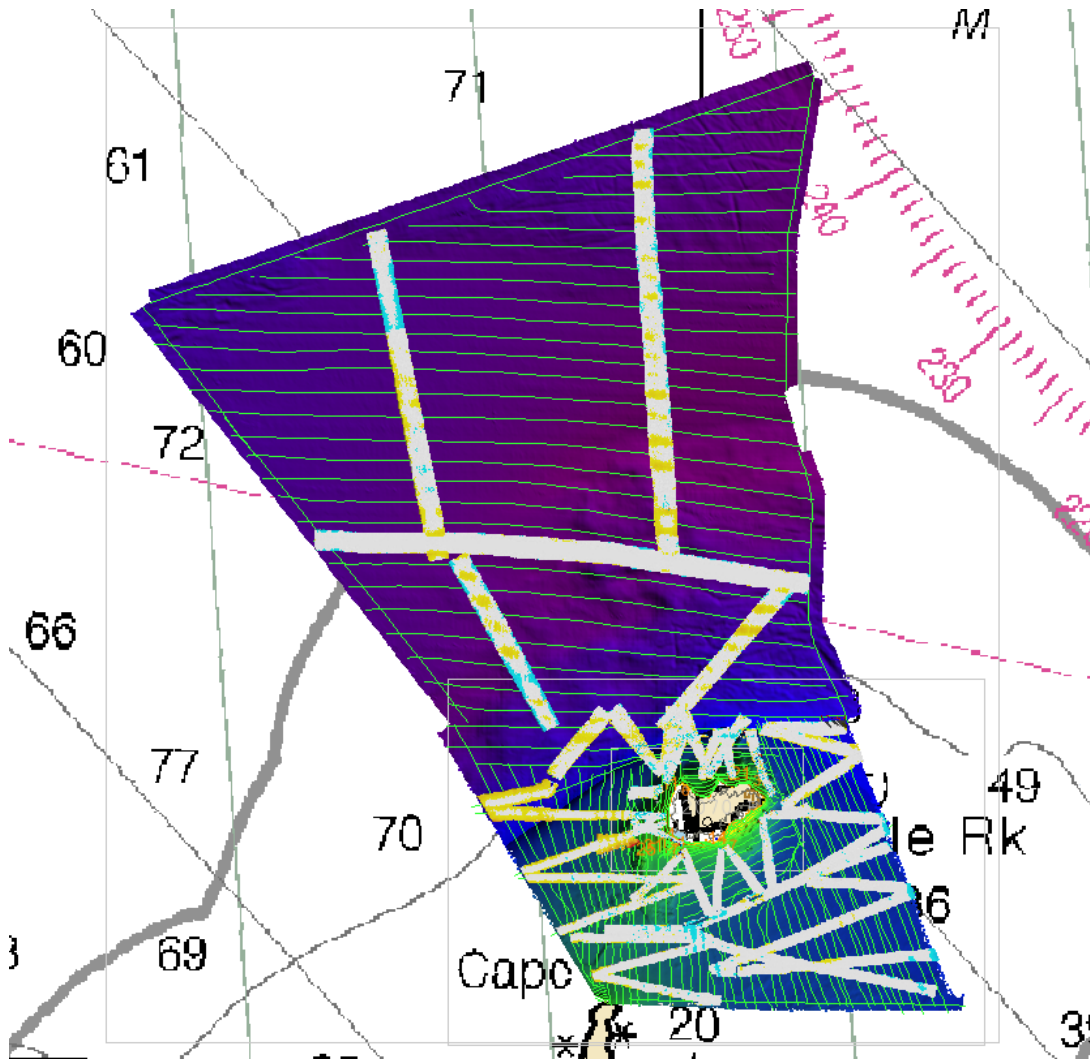


Figure 2: Crossline and mainscheme differences (white indicates agreement, warm colors indicate a Xls shallower than mainscheme and cool colors indicate Xls are deeper).

## Junctions

Survey H12070 junctions with survey H12072 of the same project<sup>4</sup>, OPR-P183-FA-09. The area of overlap between the sheets was reviewed in CARIS Subset Editor for consistency and CARIS BASE surfaces were found to be in general agreement with differences of no more than 0.5 meters. The coverage overlap and sheet limits of H12070 and H12072 are shown in Figure 3.

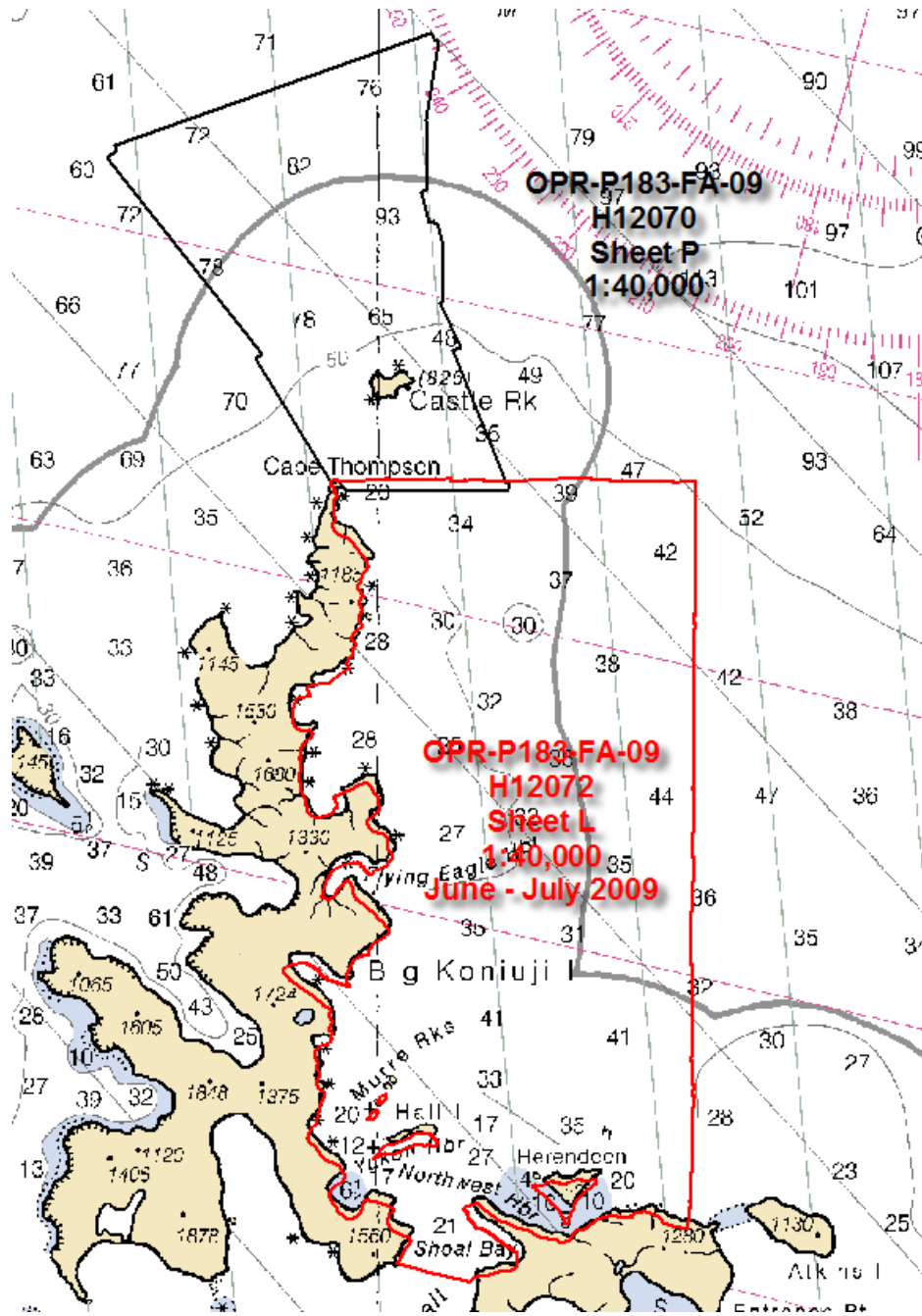


Figure 3: Junction Between H12070 and H12072

## Quality Control Checks

Multibeam echosounder quality control checks were conducted as discussed in the quality control section (section B) of the DAPR.

## Density Analysis

A Python script was written aboard *Fairweather* by ST Weston Renoud to compute the percentage of nodes populated with at least five soundings from the finalized BASE surfaces to determine if data density requirements are met. All surfaces meet the density requirement. Table 3 shows the statistical results of this analysis. In addition, the PDF report from the Python script is found in Appendix 5.

<b>Finalized Surface Resolution</b>	<b>Depth Range</b>	<b>Percentage of nodes with five or more soundings</b>
<b>1m</b>	0 - 23	96.79%
<b>2m</b>	15 - 40	99.89%
<b>4m</b>	30 - 80	97.35%
<b>8m</b>	75-300	97.91%

**Table 3: Finalized surface density analysis results**

## Data Quality Factors

### COVERAGE ASSESSMENT:

There are no holidays within H12070 larger than three nodes.<sup>5</sup>

### POSITIONING:

The POSMV was intermittently but frequently running in course acquisition (CA) mode during data acquisition with S220 due to loss of differential global positioning system (DGPS) corrections. However, post processed kinematic (PPK) navigation data files in the form of Applanix POSPac Smoothed Best Estimate of Trajectory (SBET) files were applied to all data with the exception of S220 Reson 8111 MBES data acquired the morning of July 11, 2009 (DN 192), when the POSPac raw data were not logged during acquisition of the following lines:

- 2009XL1921952
- 2009P\_1921731
- 2009P\_1921754
- 2009P\_1921853
- 2009P\_1921714

The application of SBET files in CARIS HIPS overwrite the TrueHeave file applications that are applied routinely during the evening processing routine described in the DAPR.



## TRUEHEAVE: <sup>6</sup>

Raw POSPac data were not logged during S220 Reson 8111 MBES acquisition the morning of July 11, 2009 (DN192), and therefore TrueHeave is not applied to those MBES data. The bathymetric surfaces are not adversely affected.

## SOUND VELOCITY: <sup>7</sup>

Refraction artifacts in the form of smiles and frowns are prevalent throughout the survey data. Various CARIS HIPS application methods of the observed sound velocity profile (SVP) files were attempted such as previous-in-time and nearest-in-time to correct the artifact with no noted improvement. All sound velocity files were ultimately applied previous-in-time to all data. Despite the sound velocity artifacts, the bathymetric surfaces adequately represent the seafloor, so the residual artifacts have not been addressed further in the form of substantial editing or troubleshooting except for the following cases:

- All lines from S220 Reson 8111 on July 10, 2009 (DN 191) were filtered to reject ten degrees of the outer beams on both port and starboard in order to eliminate severe “smile” artifacts.
- Artifact sound velocity “smiles” occasionally erroneously pull the eight-meter surface shoaler in some areas, which generally correlate to areas of low hypothesis strength in the surface child layer. Such data that caused the preliminary surface to rise outside of IHO vertical tolerance have been rejected. (See Figure 4.)

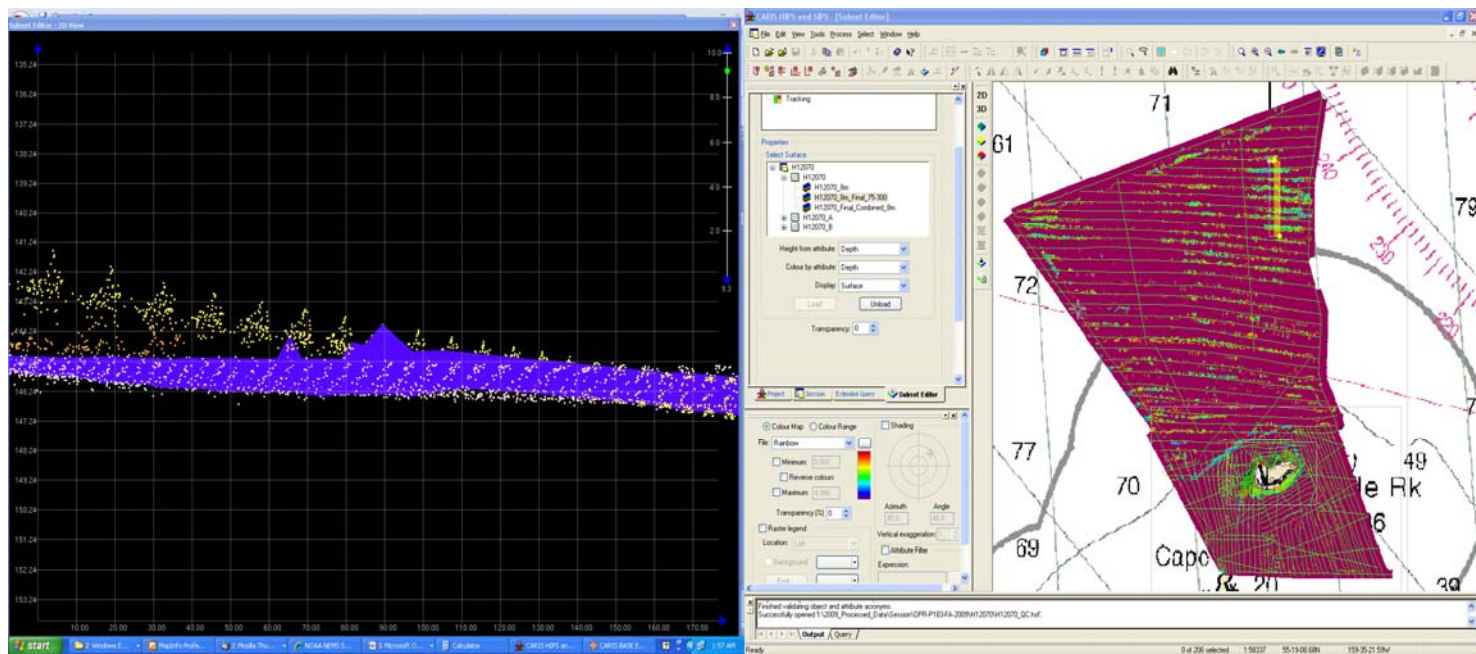


Figure 4: Example of sound velocity artifacts erroneously pulling the surface shoaler.

## DESIGNATED SOUNDINGS

Designation of soundings followed procedures as outlined in section 5.1.1.3 of the NOS Hydrographic Surveys Specifications and Deliverables (HSSDM) dated April 2009.

There are nine designated soundings with H12070 all around Castle Rock.<sup>8</sup> All were selected in order to honor shoal soundings around Castle Rock within the one-meter and two-meter bathymetric surfaces (see Figure 5).

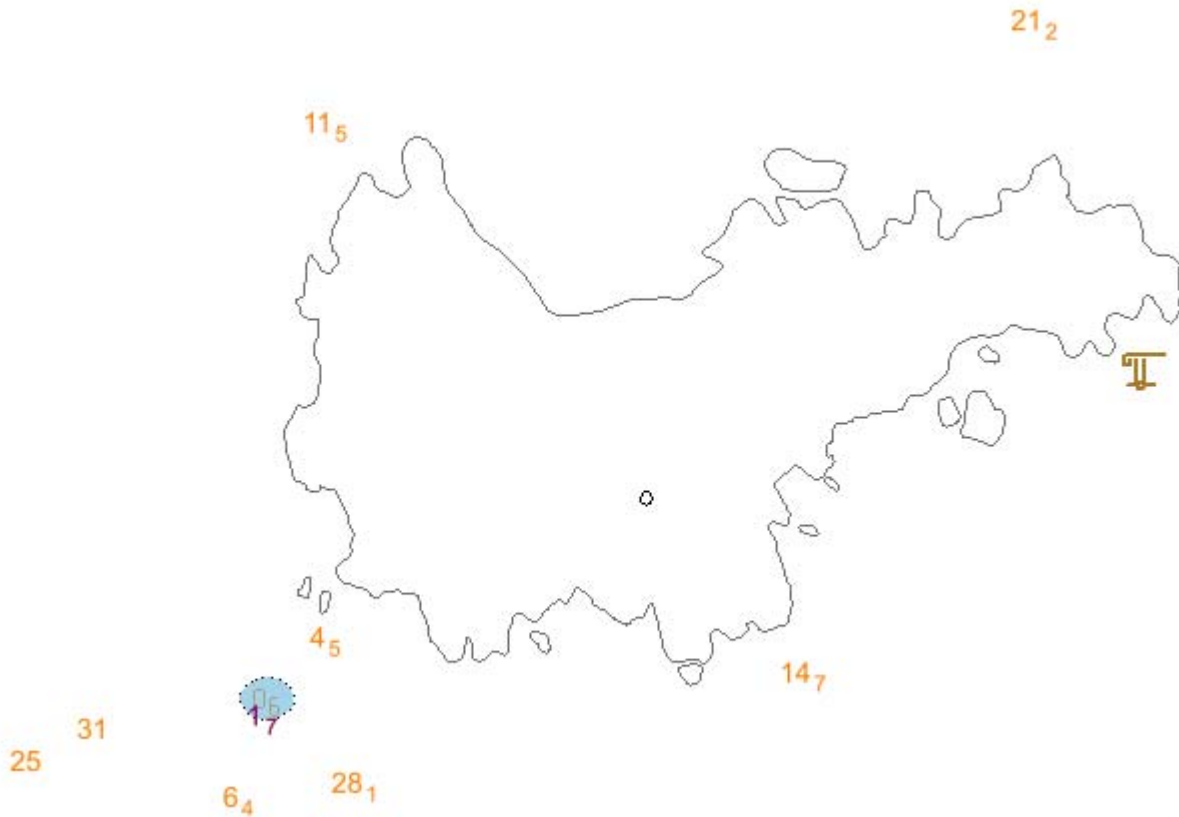


Figure 5: Nine designated soundings around Castle Rock.

## Accuracy Standards

To assess vertical accuracy standards an “IHO\_1” child layer was created for each of the four finalized surfaces with CARIS HIPS using the logic:

$$((0.5 + ((Depth * 0.013)^2))^{0.5}) - Uncertainty,$$

which is the difference between the IHO order one allowable error for the depth of the node minus the uncertainty of the node. A color map was used to assess this IHO-uncertainty difference layer (green for positive values and red for negative values). Figure 6 is a screen-grab of the IHO child layer of all four finalized surfaces with this color map applied, indicating that the CARIS-reported uncertainty of nearly

all nodes from all four finalized surfaces is within the vertical error tolerances allowed by IHO order one standards for their depths.

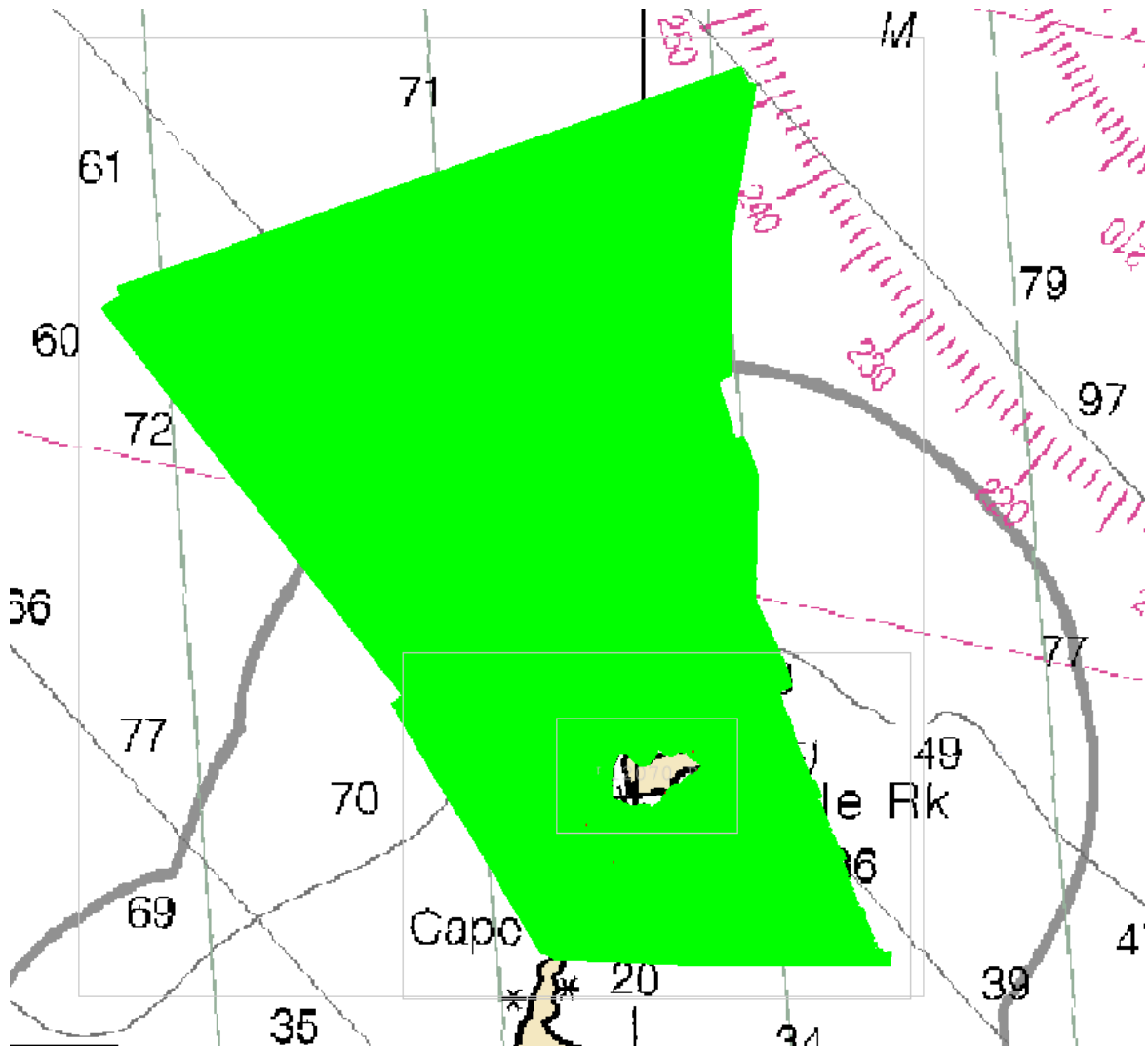


Figure 6: Difference layer between IHO Order 1 vertical tolerance and associated node uncertainty (green = positive difference, red = negative difference)

### B3. Corrections to Echo Soundings

Data reduction procedures for survey H12070 conform to those detailed in the DAPR, with the exception of those described in this report.

### B4. Data Processing

Initial data acquisition and processing notes are included the acquisition and processing logs. Additional processing and analysis is most accurately tracked in the log “Reviewer\_Qry” tab of the H12070\_Data\_Log spreadsheet. All of the survey logs are included in the digital “Separates I” folder.

Data processing procedures for survey H12070 conform to those detailed in the DAPR. Data were processed using CARIS HIPS & SIPS v6.1, Service Pack 2, and Hotfix 8. Additional processing details regarding Total Propagated Uncertainty (TPU/TPE) and Combined Uncertainty and Bathymetry Estimator (CUBE) Surfaces and Parameters utilized, along with any the deviations from the processing procedures outlined in the DAPR are discussed below.

**TPE VALUES:**

The survey specific parameters used to compute TPE in CARIS for H12070 are listed in Table 4.

<b>Tide values:</b>	Measured	TCARI Values	Zoning	TCARI Values
<b>Sound Speed Values:</b>	Measured	2 m/s	Surface	2 m/s

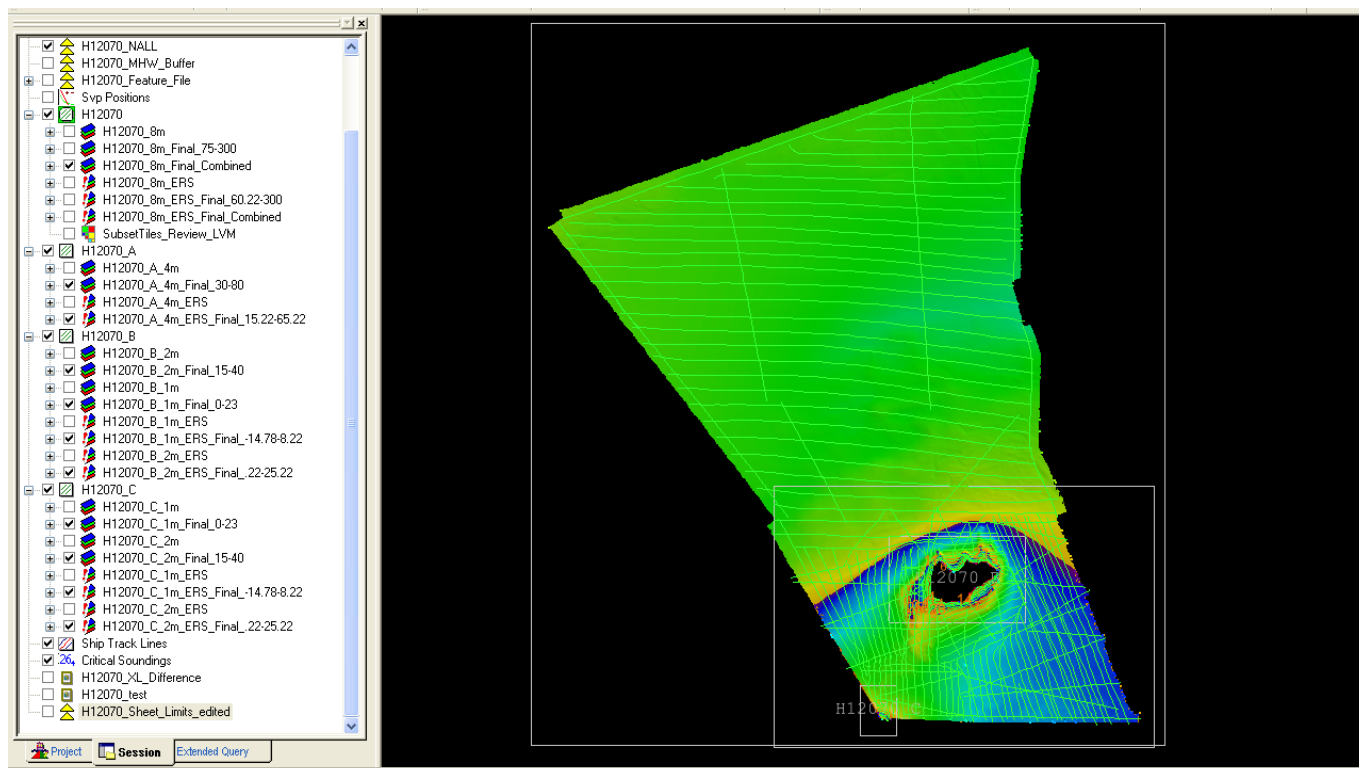
**Table 4: Survey Specific CARIS TPE Parameters**

**CUBE SURFACES:**

The CARIS HIPS BASE (Bathymetry Associated with Statistical Error) surfaces delivered with H12070 and their associated resolutions are listed in Table 5 and shown in Figure 7. All field sheet extents were adjusted using the *Base 16 Calculator* tool to ensure coincident nodes among all bathymetric surfaces regardless of the field sheet in which they are contained given the standard surface resolutions of one, two, four, eight, and sixteen meters. The ellipsoidal surfaces are addressed in a subsequent section of this report.

Fieldsheet Name	Surface Name	Depth Ranges (m)	Resolution (m)	CUBE Parameters
H12070	H12070_8m	All	8	NOAA_8m
H12070	H12070_8m_Final_75-300	75-300	8	NOAA_8m
H12070	H12070_8m_Final_Combined	All	8	N/A
H12070_A	H12070_A_4m	All	4	NOAA_4m
H12070_A	H12070_A_4m_Final_30-80	30-80	4	NOAA_4m
H12070_B	H12070_B_1m	All	1	NOAA_1m
H12070_B	H12070_B_1m_Final_0-23	0-23	1	NOAA_1m
H12070_B	H12070_B_2m	All	2	NOAA_2m
H12070_B	H12070_B_2m_Final_15-40	15-40	2	NOAA_2m
H12070_C	H12070_C_1m	All	1	NOAA_1m
H12070_C	H12070_C_1m_Final_0-23	0-23	1	NOAA_1m
H12070_C	H12070_C_2m	All	2	NOAA_2m
H12070_C	H12070_C_2m_Final_15-40	15-40	2	NOAA_2m
H12070	H12070_8m_ERS	All	8	NOAA_8m
H12070	H12070_8m_ERS_Final_60.22-300	60.22-300	8	NOAA_8m
H12070	H12070_8m_ERS_Final_Combined	All	8	N/A
H12070_A	H12070_A_4m_ERS	All	4	NOAA_4m
H12070_A	H12070_A_4m_ERS_Final_15.22-65.22	15.22-65.22	4	NOAA_4m
H12070_B	H12070_B_1m_ERS	All	1	NOAA_1m
H12070_B	H12070_B_1m_ERS_Final_-14.78-8.22	-14.78-8.22	1	NOAA_1m
H12070_B	H12070_B_2m_ERS	All	2	NOAA_2m
H12070_B	H12070_B_2m_Final_.22-25.55	0.22-25.22	2	NOAA_2m
H12070_C	H12070_C_1m_ERS	All	1	NOAA_1m
H12070_C	H12070_C_1m_Final_-14.78-8.22	-14.78-8.22	1	NOAA_1m
H12070_C	H12070_C_2m_ERS	All	2	NOAA_2m
H12070_C	H12070_C_2m_Final_.22-25.22	0.22-25.22	2	NOAA_2m

**Table 5: Depth Ranges, Resolutions, and CUBE Parameters**



**Figure 7: Four total field sheets with six finalized surfaces.**

The NOAA CUBE parameters mandated in Hydrographic Surveys Technical Directive 2009-2 were used for the creation of all CUBE BASE surfaces within H12070.

#### **SURFACE FILTERING:**

The Surface Filtering function was utilized in CARIS HIPS to remove gross fliers. The confidence level (CL) setting used was 20% (greater of standard deviation and uncertainty) on each of the four individual resolution surfaces (one-meter, two-meter, four-meter, and eight-meter). Data were reaccepted where necessary to meet coverage and/or density requirements.

### **C. HORIZONTAL AND VERTICAL CONTROL**

A complete description of horizontal and vertical control for survey H12070 can be found in the *OPR-P183-FA-09 Horizontal and Vertical Control Report*, submitted under separate cover. A summary of horizontal and vertical control for this survey follows.

#### **Horizontal Control**

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

The Post Processing Kinematic method (PPK) was the primary method of horizontal positioning for soundings during H12070. Correctors from a GPS base station established on horizontal control mark OSCAR on Big Koniuji Island were used for post processing all vessel-day PosPac files. Single Best

Estimated Trajectory files were applied to all MBES data in CARIS HIPS with the exception of S220 Reson 8111 MBES data acquired the morning of July 11, 2009 (DN 192) when the PosPac file was mistakenly not logged by the system operator.

Differential correctors from the U.S. Coast Guard beacon at Cold Bay (289 kHz) were used during real-time acquisition when not otherwise noted in the acquisition logs. The DGPS correctors from Cold Bay (289 kHz) were the sole method of positioning of detached positions (DP) and bottom samples as there is currently no functionality for applying SBET files to these types of data.

## Vertical Control

The vertical datum for this project is Mean Lower Low Water (MLLW) as specified in the Project Instructions. The operating National Water Level Observation Network (NWLON) primary tide station at Sand Point, AK (945-9450) served as control for datum determination and as the primary source for water level correctors for H12070.

*Fairweather* personnel installed a Sutron 8210 “bubbler” tide gauge (Gauge #13, S/N 85220) at a tertiary station at Herendeen Island (see Table 6 below). The gauge was installed in order to provide information to the Center for Operational Oceanographic Products and Services (CO-OPS N/OPS1) for the determination of time and height correctors at the discretion of the lead hydrographer.

Station Name	Station Number	Type of Gauge	Date of Installation	Date of Removal
Herendeen Island	945-9163	Tertiary 30 Day	June 9, 2009	August 11, 2009

**Table 6: Tide Gauge Information**

Refer to the *OPR-P183-FA-09 Horizontal and Vertical Control Report* for further information about the tide stations.

A request for delivery of final approved (smooth) tides for survey H12070 was forwarded to N/OPS1 on July 28, 2009 in accordance with the Field Procedures Manual (FPM), dated April 2009. Final approved water levels were delivered to *Fairweather* on October 23, 2009. A copy of the request and subsequent approval email is included in Appendix V.<sup>9</sup>

As per the Project Instructions, all data are reduced to MLLW using the final approved water levels (smooth tides) from the tide stations at Sand Point, AK, (945-9450) and Herendeen Island (945-9163) by applying verified tide files 9459450.txt and 9459163.txt time and height correctors through the TCARI file P183FA2009-Final.tc. **It is not necessary for the Pacific Hydrographic Branch to reapply the final approved water levels (smooth tides) to the survey data during final review.**

## Ellipsoidal Surfaces

Ellipsoidal surfaces are submitted with H12070 for experimental and evaluation purposes as part of the Office of Coast Survey's initiative to survey to the ellipsoid.

Global Positioning System (GPS) heights were computed for soundings from the post processed kinematic SBET files in CARIS HIPS using the function "Compute GPS Tide" after the "Load Navigation/Attitude Data" process had been run. The GPS tide computation was completed with the following options selected: Apply Dynamic Heave, Apply MRU Remove Heave, Apply Dynamic Draft, Apply Waterline Offset; and the following options unselected: Smooth Height, Apply Antenna Offset, and Apply Height Correction. The soundings were then vertically referenced to the ellipsoid during the CARIS merge process by selecting the "Apply GPS tide" option.

While the soundings were reduced to the ellipsoid, the CARIS CUBE BASE surfaces listed in Table 5 and Figure 7 with the naming convention H12070\_Xm\_ERS were created. The finalized depth intervals used for the ERS surfaces are 14.78 meters less than the depth intervals used for the MLLW surfaces in order to create finalized ERS surfaces that are the geographical area equivalent to the MLLW finalized surfaces. The 14.78 difference was determined by subtracting the 8-meter ERS grid with the 8-meter MLLW grid in CARIS Bathy Database, exporting the difference surface to a text file, and computing a straight average of the differences.

After the ellipsoidal surfaces were created, the soundings were referenced back to MLLW during the CARIS merge process by unselecting the "Apply GPS tide" option. The traditional MLLW-vertically referenced finalized surfaces were then created as described in the DAPR according to the HSSDM and FPM. The ellipsoidal surfaces appear out of date because the soundings used to create them have been moved back to MLLW.

The lines for which no corresponding raw POSpac file was logged are not included in the ellipsoidal surfaces since no raw data exist with which to reduce the soundings to the ellipsoid. The lines from H12070 that are not included in the ellipsoidal surfaces are S220 Reson 8111 MBES lines from July 11, 2009 (DN 192):

- 2009XL1921952
- 2009P\_1921731
- 2009P\_1921754
- 2009P\_1921853
- 2009P\_1921714

## D. RESULTS AND RECOMMENDATIONS

### D.1 Chart Comparison

Chart comparisons were performed using CARIS Bathy Database (BDB). A survey scale sounding set and a contour set similar to those contained on the area's charts were generated from the final, combined surface *H12070\_Final\_Combined\_8.hns* created in CARIS HIPS and converted into a CARIS Spatial Archive (CSAR) storage format file upon opening in CARIS BDB. Survey soundings and contours from

H12070 were colored to match charted contours (see Figure 8) and were visually compared to the charts listed in Table 7. Additionally, a paper sounding plot was generated in MapInfo using soundings exported from the same final combined surface exported from Pydro for additional comparison.

It should be noted that the source shoreline provided in the Composite Source File (CSF) with the project information has been applied to the electronic nautical charts (ENC) but not to the raster nautical charts (RNC). The CSF shoreline is shifted approximately 150 meters south of the current location as portrayed on the RNCs.<sup>10</sup>

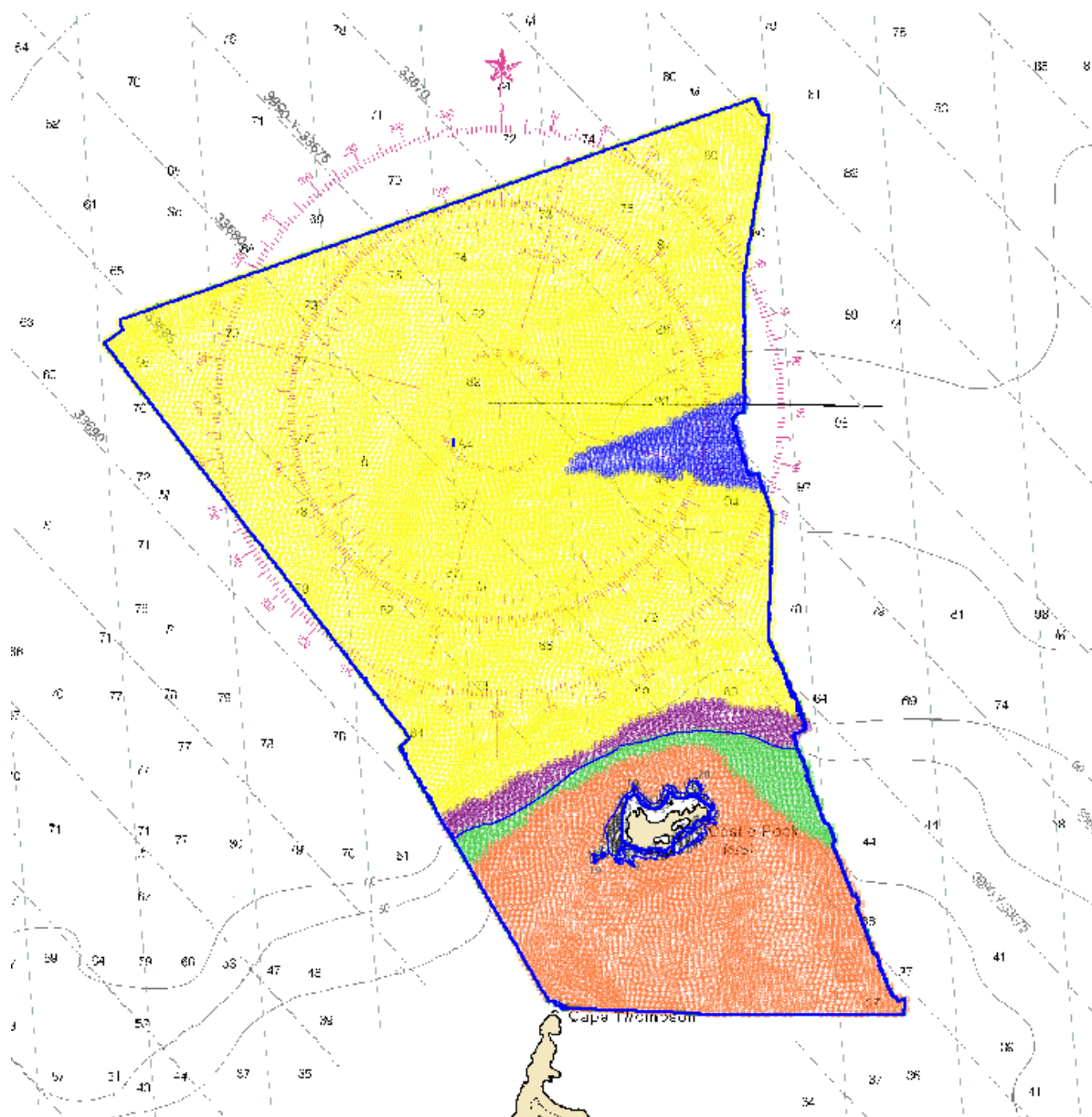


Figure 8: Survey scale soundings colored by contour regions in CARIS Bathymetry Database



NOAA Chart Number	Chart Scale	Edition Number	Edition Date	Updated with Notice to Mariners through
16556	1:80,000	12 <sup>th</sup> Ed.	January 1, 2005	January, 2005 (15/05)
US4AK58M				March 17, 2009

Table 7: NOAA Charts compared with Survey H12070

### Chart 16556

#### SOUNDING COMPARISON:

There are no depths charted on the southern half of the chart area covered by H12070 around Castle Rock. The charted depths in the north half of the survey area range from 60 to 94 fathoms, and the soundings from H12070 are in general agreement within one to two fathoms. <sup>11</sup>

#### CONTOUR COMPARISON:

The region bounded by the 90-fathom contour in the northeast region of H12070 has decreased compared to that which is charted on 16556. The 40, 50, and 60-fathom contours from H12070 that run east-west north of Castle Rock appear to be in-line with what is currently charted on 16556, with the exception of the 60-fathom contour northeast of Castle Rock that is charted curving approximately 500 meters northward of where soundings from H12070 would place it (see Figure 9). <sup>12</sup>

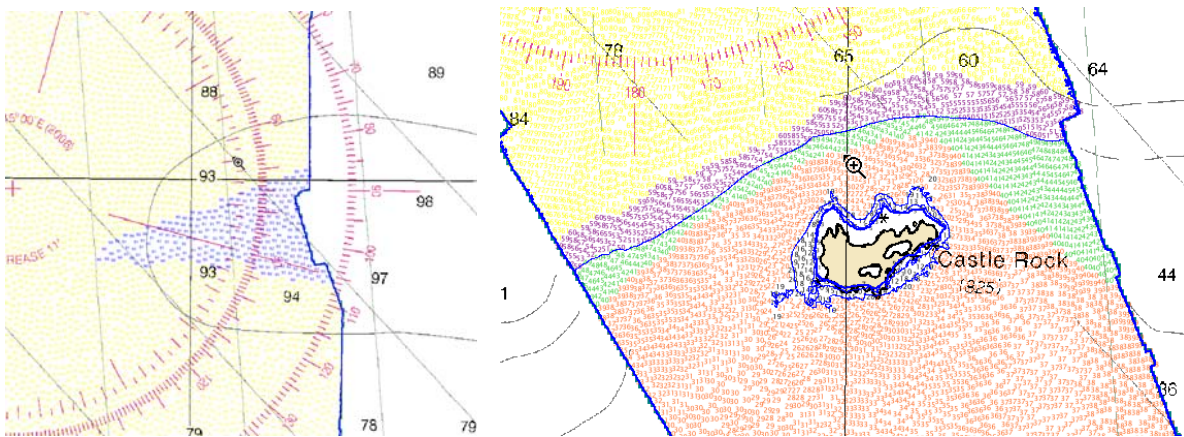


Figure 9: Contours on chart 16556 compared with soundings from H12070

### Chart US4AK58M

The charted depths and contours from chart US4AK58M are the same as those of chart 16556, so H12070 compares similarly to US4AK58M as it does with 16556. <sup>13</sup>

### U.S. Coast Pilot

*U.S. Coast Pilot 9*, 26th Ed., 2008, paragraph 386 on page 317, currently states that, "A 3-fathom shoal extends about 0.8 mile off its [Castle Rock] S end," but no like feature was detected within survey H12070 in the general vicinity. However, a shoal submerged rocky feature approximately 250 meters in

length was located off the southwest corner of Castle Rock. The extents of the feature were developed with Reson 8125 multibeam sonar, but a lead line was used to determine the least depth since a survey launch could not safely maneuver directly over the top of the feature.<sup>14</sup>

### Chart Comparison Recommendations

The Hydrographer has determined that bottom coverage requirements have been met and data accuracy meets requirements specified by the *HSSDM*. **The surveyed soundings are adequate to supersede prior surveys in their common areas.**<sup>15</sup>

### Automated Wreck and Obstruction Information System (AWOIS) Investigations

There was one AWOIS item located within the limits of H12070.<sup>16</sup>

All AWOIS items were addressed and are included in the H12070\_Final\_Final\_Feature\_File.hob and also in the associated feature report exported from CARIS Notebook to a Microsoft Excel table (see Table 8).

AWOIS#	Latitude	Longitude	Remark	Recommendation
53801	55° 16' 43.58"	159° 29' 8.6"	H03796 (1915) Rock awash, investigated for maritime boundary claim, disproved with 100% MBES	Remove from charts <sup>17</sup>

Table 8: AWOIS Items

### Dangers to Navigation

There were no dangers to navigation found within the survey limits of H12070.<sup>18</sup>

## D.2 Additional Results

### Shoreline Source

A CSF in .000 format from HSD's Operations Branch was provided with the Project Instructions. Shoreline sources that were included in the CSF included Digital Data (DD-8873) and charted features from chart 16656 (see Table 9). The original file was imported into CARIS Notebook, converted to a .hob file, and named H12070\_Final\_Final\_Feature\_File.hob to be included with the deliverables.

### Shoreline Verification

*Fairweather* personnel conducted limited shoreline verification at times near predicted low water, in accordance with the Project Instructions and section 3.5.5.3 of the FPM. During shoreline verification, detached positions (DPs) were acquired and edits to the daily field H12070\_Feature\_File\_TRX\_DnXXX.hob were recorded in CARIS Notebook and on paper DP forms and boat sheets. Scanned copies of the DP forms and boat sheets with field annotations are included in the digital Separates I folder.

Chart 16656 (1:80,000) is the largest scale chart for the project area. A Mean High Water (MHW) Buffer line, offset 64 meters (0.8 mm at scale of 1:80,000) from the composite source MHW, was used during shoreline verification to determine the Navigable Area Limit Line (NALL). The NALL was determined in the field as the farthest off-shore of either the MHW buffer listed above, the 4-meter depth contour, or the inshore limit of safe navigation. All shoreline features provided in the composite source file seaward of the NALL were verified or disproved during shoreline operations.

### Shoreline Data Processing

Acquired and edited positions during shoreline verification operations were processed in CARIS Notebook. Features that required tide correction were processed using the Load Tide function in CARIS Notebook. Approved water levels were applied to tide correct features where appropriate.

New features and features requiring revision were given S57 attribution. As outlined in section 4.4.10 of the FPM, features were delineated, attributed and placed on either the survey edited H12070\_Final\_Feature\_File.hob (compiled from the field daily files) or H12070\_Disprovals.hob.

Source features collected or edited by the field have source indication (SORIND) and source date (SORDAT) attribute fields populated to reflect the survey number (US,US,survey,H12070) and final survey date 20090719. Unmodified source shoreline features were left with their original SORIND and SORDAT values. The SORIND/SORDAT information for shoreline features included in the final Notebook .hob files is included in Table 9.

Shoreline Source	SORIND	SORDAT
AWOIS	AWOIS_53801	1915
RSD	US,US,reprt,DD-8773	19991001
Chart	US,US,graph,chart 16556	20021100
Survey	US,US,survey,H12070	20090719

Table 9: SORIND/SORDAT Shoreline Features

### Source Shoreline Changes, New Features and Charted Features

In accordance with section 4.4.10 of the FPM, field notes made by the Hydrographer were entered in the Remarks field and recommendations to the cartographer were entered in the Recommendations field.

Composite source file features disproved by survey H12070 were moved to the H12070\_Disprovals.hob file from the H12070\_Final\_Feature\_File.

### Shoreline Recommendations

The Hydrographer recommends that the shoreline depicted in the CARIS Notebook files and final sounding files supersede and/or complement shoreline information compiled in the CSF and charts.<sup>19</sup>

## **Prior Survey Comparison**

Survey H12070 was not compared to prior survey data as they were not available at the time of review.

## **Aids to Navigation**

There were no aids to navigation within the survey limits of H12070.<sup>20</sup>

## **Miscellaneous**

Apparent trawl lines are visible in the CARIS BASE surfaces approximately 1700 and 8000 meters northeast of Castle Rock.

## **Bottom Samples**

Six total bottom samples were collected on July 10, 2009 (DN 191) and are included as seabed classifications along with the other S57 features in H12070\_Final\_Feature\_File.hob.<sup>21</sup>

## **E. Supplemental Reports**

Listed below are supplemental reports submitted separately that contain additional information relevant to this survey:

<b><u>Title</u></b>	<b><u>Date Sent</u></b>	<b><u>Office</u></b>
Hydrographic Systems Readiness Review 2009	May 15, 2009	N/CS33
Data Acquisition and Processing Report 2009	Dec 21, 2009	N/CS33
Horizontal and Vertical Control Report for OPR-P183-FA-09	Dec 21, 2009	N/CS33
Tides and Water Levels Package for OPR-P183-FA-09	Aug 25, 2009	N/OPS1
Coast Pilot Report for OPR-P183-FA-09	TBD	N/CS26



**UNITED STATES DEPARTMENT OF COMMERCE**

National Oceanic and Atmospheric Administration  
NOAA Marine and Aviation Operations  
NOAA Ship FAIRWEATHER S-220  
1010 Stedman Street  
Ketchikan, AK 99901

December 17, 2009

MEMORANDUM FOR: LCDR Richard T. Brennan, NOAA  
Chief, Atlantic Hydrographic Branch

FROM: CAPT David O. Neander, NOAA  
Commanding Officer

David O. Neander  
2009.12.18  
13:26:18 -08'00'

TITLE: Approval of Hydrographic Survey H12070,  
OPR-P183-FA-09

As Chief of Party, I have ensured that standard field surveying and processing procedures were adhered to during acquisition and processing of hydrographic survey H12070 in accordance with the Hydrographic Manual, Fourth Edition; Field Procedures Manual, May 2009; and the NOS Hydrographic Surveys Specifications and Deliverables, as updated for April 2009. Additional guidance was provided by applicable Hydrographic Technical Directives. These data are adequate to supersede charted data in their common areas. This survey is complete and no additional work is required. All data and reports are respectfully submitted to N/CS33, Atlantic Hydrographic Branch.

I acknowledge that all of the information contained in this report is complete and accurate to the best of my knowledge.

In addition, the following individuals were responsible for oversight of acquisition and processing of this survey:

Briana J. Welton  
I am the author of this document  
2009.12.18 07:54:27 -09'00'

---

LT Briana Welton  
Survey Manager

Digitally signed by Matthew  
Ringel  
Date: 2009.12.18 08:58:12 -08'00'

---

LT Matthew Ringel  
Field Operations Officer

Digitally signed by Lynnette V.  
Morgan  
Date: 2009.12.17 22:54:53 -09'00'

---

CST Lynnette V. Morgan  
Chief Survey Technician

Attachment



## Corrections and Revisions performed During Office Processing and Certification.

---

<sup>1</sup> Concur.

<sup>2</sup> Concur.

<sup>3</sup> See Endnote 7.

<sup>4</sup> Concur with clarification. Hcell H12070 also junctions with survey H11676 to the SW. A common junction was made with an adjoining portion of H11676. In Addition, a common junction will be made with H12072 to the S. during compilation process.

<sup>5</sup> Concur.

<sup>6</sup> Concur. Data is adequate and within specifications despite of the failure of the TH data. It is recommended that the data from H12070 supersede the data currently on the chart within the common area.

<sup>7</sup> Concur. Data is adequate and within specifications despite of SV problems. During SAR processing data was releaned to minimize the artifacts. It is recommended that the data from H12070 supersede charted data within the common area.

<sup>8</sup> Concur with clarification. Designated soundings were used as appropriate to the scale of the chart.

<sup>9</sup> Tide note is attached to this document.

<sup>10</sup> Concur.

<sup>11</sup> Concur.

<sup>12</sup> Concur.

<sup>13</sup> Concur.

<sup>14</sup> Concur. A submerged rock was included in the HCell to represent the area.

<sup>15</sup> Concur.

<sup>16</sup> Concur.

<sup>17</sup> Concur with the hydrographers recommendation to remove AWOIS item #53801 charted at 55° 16' 43.58 N, 159° 29' 08.26 W

<sup>18</sup> Concur.

<sup>19</sup> Concur with clarification. The submitted hob files were used in the compilation of HCell H12070. During compilation, some modifications were made to accommodate chart scale. Chart features as depicted in the HCell

<sup>20</sup> Concur.

<sup>21</sup> Six bottom samples from the field are included in the HCell and one bottom sample has been imported from the ENC to be retain.

# H12070 AWOIS REPORT

**Registry Number:** H12070  
**State:** Alaska  
**Locality:** Shumagin Islands Vicinity  
**Sub-locality:** Northeast of Cape Thompson  
**Project Number:** OPR-P183-FA-09  
**Survey Date:**

## Charts Affected

Number	Edition	Date	Scale (RNC)	RNC Correction(s)*
16556	5th	04/01/2006	1:80,000 (16556_1)	USCG LNM: 08/26/1992 (05/05/2009) CHS NTM: None (04/24/2009) NGA NTM: None (05/09/2009)
16540	12th	01/01/2005	1:300,000 (16540_1)	[L]NTM: ?
16011	37th	11/01/2007	1:1,023,188 (16011_1)	[L]NTM: ?
16006	35th	04/01/2008	1:1,534,076 (16006_1)	[L]NTM: ?
500	8th	06/01/2003	1:3,500,000 (500_1)	[L]NTM: ?
530	32nd	06/01/2007	1:4,860,700 (530_1)	[L]NTM: ?
50	6th	06/01/2003	1:10,000,000 (50_1)	[L]NTM: ?

\* Correction(s) - source: last correction applied (last correction reviewed--"cleared date")

## Features

No.	Feature Type	Survey Depth	Survey Latitude	Survey Longitude	AWOIS Item
1.1	AWOIS	[no data]	[no data]	[no data]	---

## **1 - AWOIS Features**



**1.1) AWOIS #53801 - MARITIME BOUNDARY CLAIM**

**No Primary Survey Feature for this AWOIS Item**

**Search Position:** 55° 16' 43.6" N, 159° 29' 08.6" W  
**Historical Depth:** [None]  
**Search Radius:** 50  
**Search Technique:** [None]  
**Technique Notes:** VERIFY LOCATION OF POINT IN SUPPORT OF MARITIME BOUNDARY CLAIM

**History Notes:**

H03796(1915)-- A ROCK AWASH IN SCALED POSITION LAT. 55/16/43.58N LONG. 159/29/8.62W (NAD83) NEEDS TO BE VERIFIED FOR A MARITIME BOUNDARY CLAIM. ENTERED 5/7 BY JCA.

**Survey Summary**

**Charts Affected:** 16556\_1, 16540\_1, 16011\_1, 16006\_1, 500\_1, 530\_1, 50\_1

**Remarks:**

Rock awash, investigated for maritime boundary claim, disproved with 100% MBES

**Feature Correlation**

Address	Feature	Range	Azimuth	Status
OPR-P183-FA-09 AWOIS	AWOIS # 53801	0.00	000.0	Primary

**Hydrographer Recommendations**

Remove AWOIS item 53801

**S-57 Data**

[None]

**Office Notes**

Remove AWOIS item 53801



UNITED STATES DEPARTMENT OF COMMERCE  
National Oceanic and Atmospheric Administration  
National Ocean Service  
Silver Spring, Maryland 20910

TIDE NOTE FOR HYDROGRAPHIC SURVEY

DATE : October 21, 2009

HYDROGRAPHIC BRANCH: Pacific  
HYDROGRAPHIC PROJECT: OPR-P183-FA-2009  
HYDROGRAPHIC SHEET: H12070

LOCALITY: Northeast of Cape Thompson, Shumagin Island and Vicinity, AK  
TIME PERIOD: July 9 - 19, 2009

TIDE STATION USED: Sand Point, AK 945-9450  
Lat. 55° 19.9' N Long. 160° 30.3' W  
PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters  
HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 1.988 meters

TIDE STATION USED: Herendeen Island, AK 945-9163  
Lat. 55° 04.0' N Long. 159° 26.3' W  
PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters  
HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 2.020 meters

REMARKS: RECOMMENDED GRID

Please use the TCARI grid "P183FA2009-Final" as the final grid for project OPR-P183-FA-2009, H12070, during the time period between July 9 -19, 2009.

Refer to attachments for grid information.

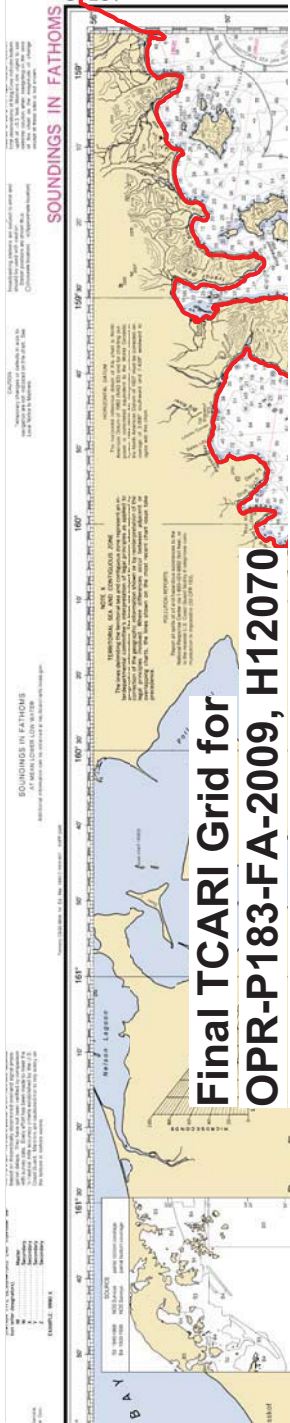
Note 1: Provided time series data are tabulated in metric units (meters), relative to MLLW and on Greenwich Mean Time on the 1983-2001 National Tidal Datum Epoch (NTDE).

Peter J. Stone

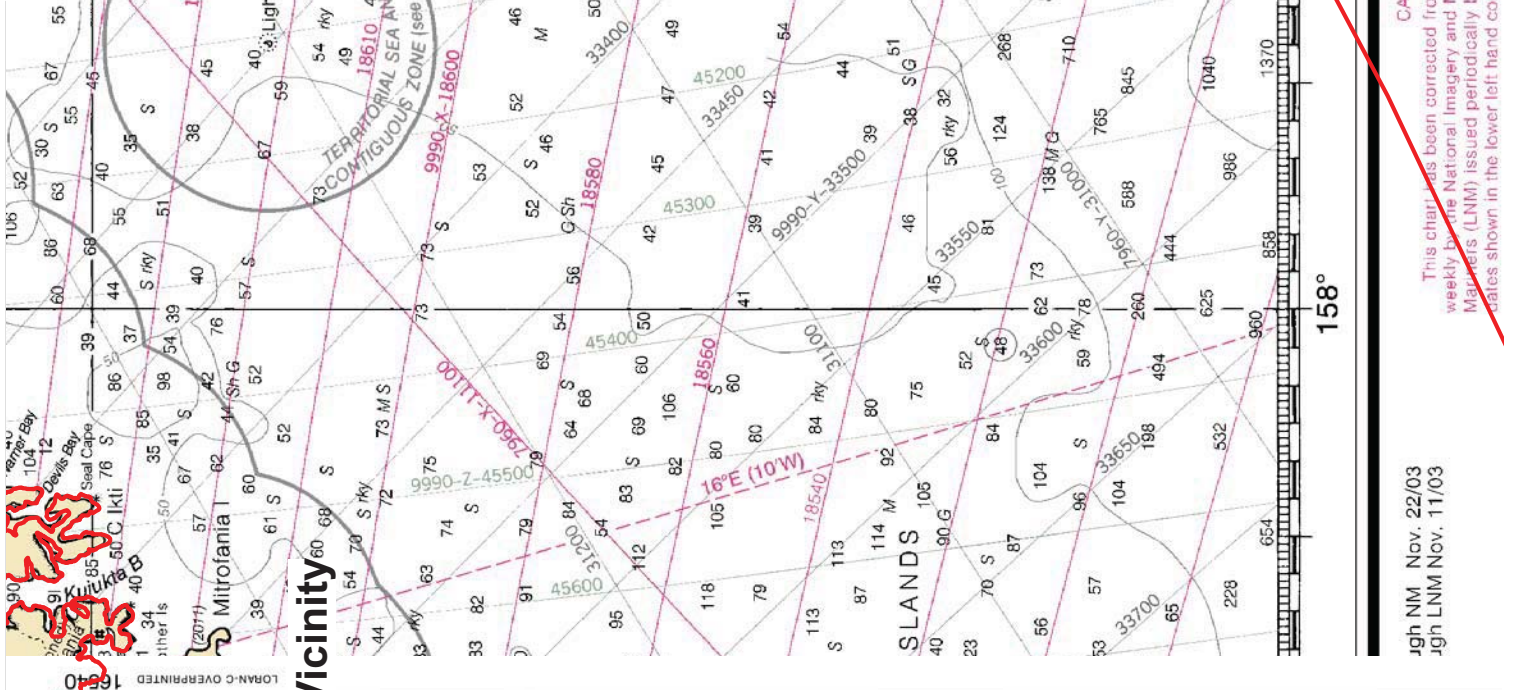
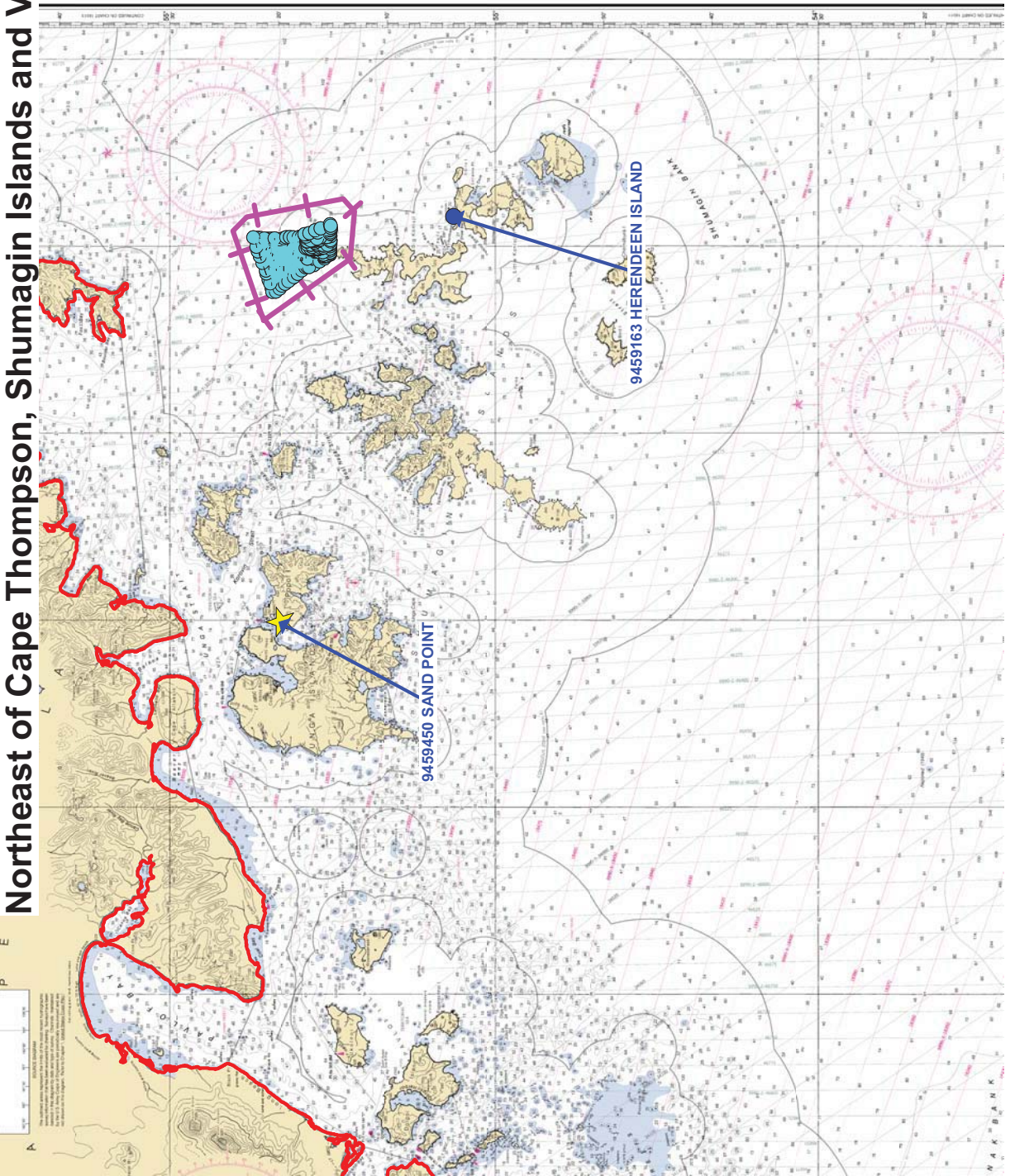
Digitally signed by Peter J. Stone  
DN: cn=Peter J. Stone, o=CO-OPS, ou=NOAA/  
NOS, email=peter.stone@noaa.gov, c=US  
Date: 2009.10.23 15:10:53 -04'00'

CHIEF, OCEANOGRAPHIC DIVISION





**Final TCARI Grid for  
OPR-P183-FA-2009, H12070  
Northeast of Cape Thompson, Shumagin Islands, Shumagin Islands and Vicinity**



John NM Nov. 22/03  
John LNM Nov. 11/03

158°

This chart has been corrected from the National Imagery and Mapping Agency (NIMA) data. The National Imagery and Mapping Agency (NIMA) issued periodically updated charts in the lower left hand corner.

**H12070 HCell Report**  
Fernando Ortiz, Physical Scientist  
Pacific Hydrographic Branch

**1. Specifications, Standards and Guidance Used in HCell Compilation**

HCell compilation of survey H12070 used:

Office of Coast Survey HCell Specifications: Draft, Version: 4.0, 17 March 2010.

HCell Reference Guide: Version 2.0, July 29, 2010.

**2. Compilation Scale**

Depths and features for HCell H12070 were compiled to the largest scale raster charts shown below:

Chart	Scale	Edition	Edition Date	NTM Date
16556	1:80,000	5 <sup>th</sup>	04/2006	12/14/2010

The following ENC's were also used during compilation:

Chart	Scale
US4AK58M	

**3. Soundings**

A survey-scale sounding (SOUNDG) feature object layer was built from the 8-meter Combined Surface in CARIS BASE Editor. A shoal-biased selection was made at 1:20,000 for the 16556 chart at survey scale using a Radius Table file with values shown in the table, below.

Shoal Limit (m)	Deep Limit (m)	Radius (mm)
-5	10	2
10	20	3
20	50	3.5
50	500	4

In CARIS BASE Editor soundings were manually selected from the high density sounding layers (SS) and imported into a new layer (CS) created to accommodate chart density depths. Manual selection was used to accomplish a density and distribution that closely represents the seafloor morphology.

#### 4. Depth Contours

Depth contours at the intervals on the largest scale chart are included in the \*\_SS HCell for MCD raster charting division to use for guidance in creating chart contours. The metric and fathom equivalent contour values are shown in the table below.

Chart Contour Intervals in fathoms from Chart 16556	Metric Equivalent to Chart Fathoms, Arithmetically Rounded	Metric Equivalent of Chart Fathoms, with NOAA Rounding Applied	Fathoms with NOAA Rounding Applied	Fathoms with NOAA Rounding Removed for Display on H12070_SS.000
5	9.144	9.3726	5.125	5
10	18.288	18.5166	10.125	10
20	36.576	37.9476	20.75	20
30	54.864	56.2356	30.75	30
40	73.152	74.5236	40.75	40
50	91.44	92.8116	50.75	50
60	109.728	111.0996	60.75	60
90	164.592	165.9636	90.75	90

#### 5. Meta Areas

The following Meta object area is included in HCell H12070:

M\_QUAL

The Meta area object was constructed on the basis of the limits of the hydrography.

#### 6. Features

Features addressed by the field units are delivered to PHB where they are deconflicted against the hydrography and the largest scale chart. These features, as well as features to be retained from the chart and features digitized from the Base Surface, are included in the HCell. The geometry of these features may be modified to emulate chart scale per the HCell Reference Guide on compiling features to the chart scale HCell.

#### 7.S-57 Objects and Attributes

The \*\_CS HCell contains the following Objects:

\$CSYMB	Blue Notes-Notes to the MCD chart Compiler
M_QUAL	Data quality Meta object
SBDARE	Bottom samples- rocky seabed areas
SOUNDG	Soundings at the chart scale density
UWTROC	Rocks

The \*\_SS HCell contains the following Objects:

DEPCNT	Contours at chart scale intervals
SOUNDG	Soundings at the survey scale density

## **8. Spatial Framework**

### **8.1 Coordinate System**

All spatial map and base cell file deliverables are in an LLDG geographic coordinate system, with WGS84 horizontal, MHW vertical, and MLLW (1983-2001 NTDE) sounding datums.

### **8.2 Horizontal and Vertical Units**

DUNI, HUNI and PUNI are used to define units for depth, height and horizontal position in the chart units HCell, as shown below.

Chart Unit Base Cell Units:

Depth Units (DUNI):	Fathoms and Feet
Height Units (HUNI):	Feet
Positional Units (PUNI):	Meters

During creation of the HCell in CARIS BASE Editor and CARIS S-57 Composer, all soundings and features are maintained in metric units with as high precision as possible. Depth units for soundings measured with sonar maintain millimeter precision. Depths on rocks above MLLW and heights on islets above MHW are typically measured with range finder, so precision is less. Units and precision are shown below.

BASE Editor and S-57 Composer Units:

Sounding Units:	Meters rounded to the nearest millimeter
Spot Height Units:	Meters rounded to the nearest decimeter

See the HCell Reference Guide for details of conversion from metric to charting units, and application of NOAA rounding.

## **9. Data Processing Notes**

There were no significant deviations from the standards and protocols given in the HCell Specification and HCell Reference Guide.

## **10. QA/QC and ENC Validation Checks**

H12070 was subjected to QA checks in S-57 Composer prior to exporting to the metric HCell base cell (000) file. The millimeter precision metric S-57 HCell was converted to chart units and NOAA rounding applied. dKart Inspector was then used to further check the data set for

conformity with the S-58 ver. 2 standard (formerly Appendix B.1 Annex C of the S-57 standard). All tests were run and warnings and errors investigated and corrected unless they are MCD approved as inherent to and acceptable for HCells.

**11. Products**

**11.1 HSD, MCD and CGTP Deliverables**

H12070_CS.000	Base Cell File, Chart Units, Soundings and features compiled to 1:80,000
H12070_SS.000	Base Cell File, Chart Units, Soundings and Contours compiled to 1:20,000
H12070_DR.pdf	Descriptive Report including end notes compiled during office processing and certification, the HCell Report, and supplemental items
H12070_outline.gml	Survey outline
H12070_outline.xsd	

**11.2 Software**

CARIS HIPS Ver. 6.1	Inspection of Combined BASE Surfaces
CARIS BASE Editor Ver. 3.0	Creation of soundings and bathy-derived features, creation of the depth area, meta area objects, and Blue Notes; Survey evaluation and verification; Initial HCell assembly.
CARIS S-57 Composer Ver. 2.1	Final compilation of the HCell, correct geometry and build topology, apply final attributes, export the HCell, and QA.
CARIS GIS 4.4a	Setting the sounding rounding variable for conversion of the metric HCell to NOAA charting units with NOAA rounding.
CARIS HOM Ver. 3.3	Perform conversion of the metric HCell to NOAA charting units with NOAA rounding.
HydroService AS, dKart Inspector Ver. 5.1, SP 1	Validation of the base cell file.
Northport Systems, Inc., Fugawi View ENC Ver.1.0.0.3	Independent inspection of final HCells using a COTS viewer.

**12. Contacts**

**Inquiries regarding this HCell content or construction should be directed to:**

Fernando Ortiz  
 Physical Scientist  
 Pacific Hydrographic Branch  
 Seattle, WA  
 206.526.6859  
[Fernando.ortiz@noaa.gov](mailto:Fernando.ortiz@noaa.gov).

APPROVAL SHEET  
H12070

The survey evaluation and verification has been conducted according to branch processing procedures and the HCell compiled per the latest OCS HCell Specifications.

The survey and associated records have been inspected with regard to survey coverage, delineation of the depth curves, development of critical depths, S-57 classification and attribution of soundings and features, cartographic characterization, and verification or disproval of charted data within the survey limits. The survey records and digital data comply with OCS requirements except where noted in the Descriptive Report and are adequate to supersede prior surveys and nautical charts in the common area.

I have reviewed the HCell, accompanying data, and reports. This survey and accompanying digital data meet or exceed OCS requirements and standards for products in support of nautical charting except where noted in the Descriptive Report.