H12072

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. H12072

LOCALITY

State Alaska

General Locality Shumagin Islands and Vicinity

Sublocality Cape Thomson to Shoal Bay

2009

CHIEF OF PARTY
Captain Douglas D. Baird, Jr., NOAA

LIBRARY & ARCHIVES

DATE

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

HYDROGRAPHIC TITLE SHEET

REGISTRY No

H12072

INSTRUCTIONS – The Hydrographic Sheet should be accompanied by this form, filled in as completely as possible, when the sheet is forwarded to the Office.

FIELD No: **N/A**

State **Alaska**

General Locality **Shumagin Islands and Vicinity**

Sub-Locality **Cape Thomson to Shoal Bay**

Scale **1:40,000** Date of Survey **06/17/2009 to 07/17/2009**

Instructions dated **4/30/2009** Project No. **OPR-P183-FA-09**

Vessel **NOAA Ship Fairweather (S220), Launches 1010, 1018 and Amber 2302**

Chief of party **CAPT Douglas D. Baird, NOAA**

Surveyed by **FAIRWEATHER Personnel**

Soundings by **Reson 8101, 8125 and 8111**

SAR by **Grant Froelich** Compilation by **Fernando Ortiz**

Soundings compiled in **Fathoms**

REMARKS: **All times are UTC. UTM Projection 4**

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.

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/.

Descriptive Report to Accompany Hydrographic Survey H12072

Project OPR-P183-FA-09
Shumagin Islands and Vicinity, Alaska
Scale 1:40,000
June – July, 2009
NOAA Ship *Fairweather*
Chief of Party: Captain Douglas D. Baird, Jr., NOAA

A. AREA SURVEYED

The survey area was located on the east side of Big Koniuji Island, Shumagin Islands within the sub-locality of Cape Thomson to Shoal Bay. This survey corresponds to Sheet L in the sheet layout provided with the Project Instructions, as shown in Figure 1 below.

Data acquisition was conducted from June 17 to July 17, 2009 (DN 168 to DN 198).

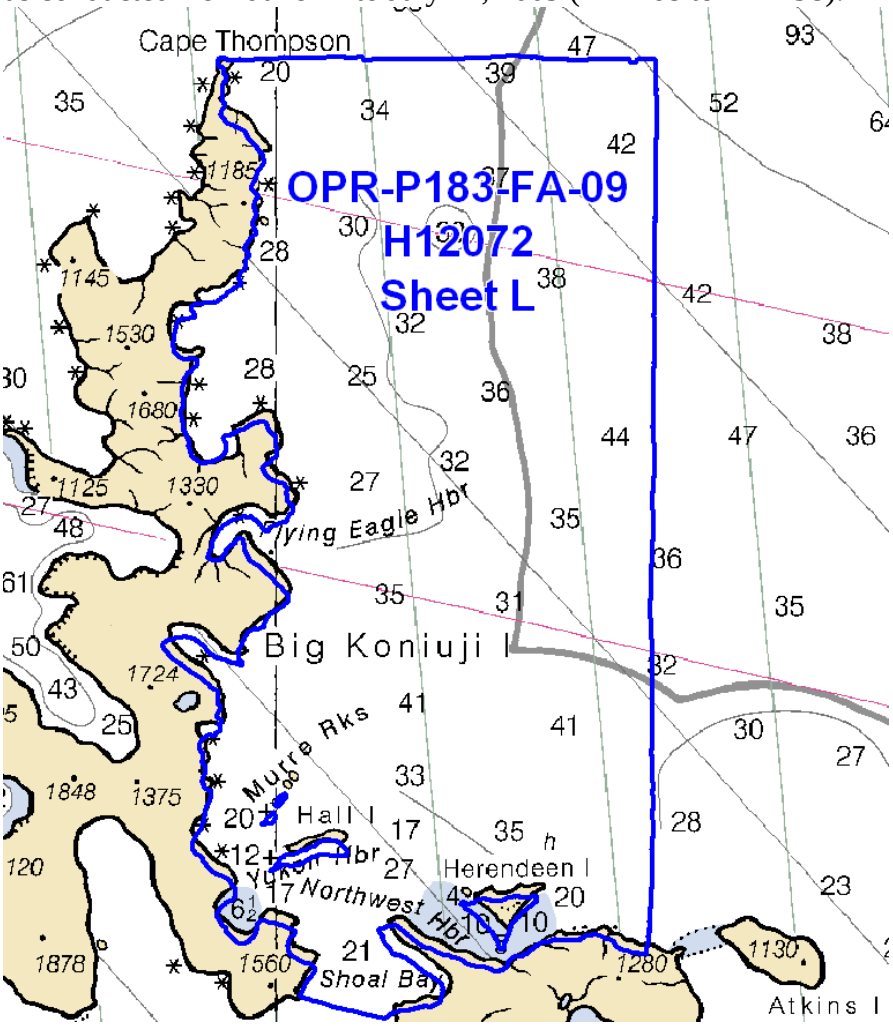


Figure 1: H12072 Survey Outline

One-hundred percent multibeam echosounder (MBES) coverage was obtained in the survey area to at least the 8-meter curve within the survey area, with the exception of one area discussed in Section B2. Data were acquired as close to shore as safely possible.[1]

Limited shoreline verification was conducted seaward of the Navigable Area Limit Line (NALL) for H12072, 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 below.

MAIN SCHEME - Mileage	
0	**Single Beam MS**
1218.82	**Multibeam MS mileage**
546.08	FAIRWEATHER S-220
311.48	Launch 1010
361.26	Launch 1018
0	**SideScan MS**
1218.82	**Total MS**
CROSSLINE - Mileage	
0	**Single Beam XL**
90.52	**Multibeam XL**
34.49	FAIRWEATHER S-220
56.03	Launch 1010
0.00	Launch 1018
90.52	**Total XL**
OTHER	
0	**Developments/AWOIS - Mileage**
38	**Shoreline/Nearshore Investigation - Mileage**
25	**Total # of Investigated Items**
46	**Total Bottom Samples**
66.83	**Total SNM**
6/17,6/18,/6/19,6,20,6/21,6/22,6/23,6/24,6/25,6/26,6/27,6/28/6/29, 6/30,7/8,7/9,7/11,7/17	**Specific Dates of Acquisition**
168,169,170,171,172,173,174,175,176,177,178,179,180,181,189, 190,192,198	**Specific Dn#s of Acquisition**

Table 1: H12072 Survey Statistics

B. DATA ACQUISTION AND PROCESSING

A complete description of data acquisition/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 was completed as specified by Hydrographic Survey Project Instructions OPR-P183-FA-09, dated June 16, 2009. Original hydrographic Survey Project Instructions were dated April 30, 2009, with an initial change dated May 12, 2009.

B1. Equipment and Vessels

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

	FAIRWEATHER	**Launch 1010**	**Launch 1018**	**Skiff 1706**	**Ambar 2302**
Hull Registration Number	S220	1010	1018	1706	2302
Builder	Aerojet-General Shipyard	The Boat Yard, Inc.	The Boat Yard, Inc.	MonArk	Marine Silverships, Inc
Length Overall	231 feet	28’ 10”	28’ 10”	17’	23’
Beam	42 feet	10’ 8”	10’ 8”	7’	9’ 4”
Draft, Maximum	15’ 6”	4’ 0” DWL	4’ 0” DWL	1’ 3”	1’ 4”
Cruising Speed	12.5 knots	24 knots	24 knots	20 knots	22 knots
Max Survey Speed	6 knots	6 knots	6 knots		
Primary Echosounder	RESON 8111	RESON 8101	RESON 8101 / 8125		
Sound Velocity Equipment	SBE 19plus & 45, MVP 200, SVP70	SBE 19plus	SBE19plus		
Attitude & Positioning Equipment	POS/MV V4	POS/MV V4	POS/MV V4		
Type of operations	MBES	MBES	MBES	Shore Station	Shoreline, Shore Station

Table 2: Vessel Inventory

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

B2. Quality Control

Crosslines

Multibeam crosslines for this survey totaled 90.52 linear nautical miles (lnm), comprising 7.43% of the 1218.82 lnm of total main scheme MBES hydrography. Both main scheme and crossline mileage are summarized in Table 1 above. Crossline data were filtered to 45 degrees. The resulting difference surface between an 8m main scheme CUBE surface and an 8m cross line CUBE surface agreed generally within 0.5 meters. [2]Areas of larger differences were associated with outer beam sound velocity issues or with steep slopes where the surfacing algorithm picked different depths.

Surface differencing in IVS Fledermaus and Caris Bathy DataBase was used to assess crossline agreement with main scheme data. Figure 2 includes a visual of the differences spatially.

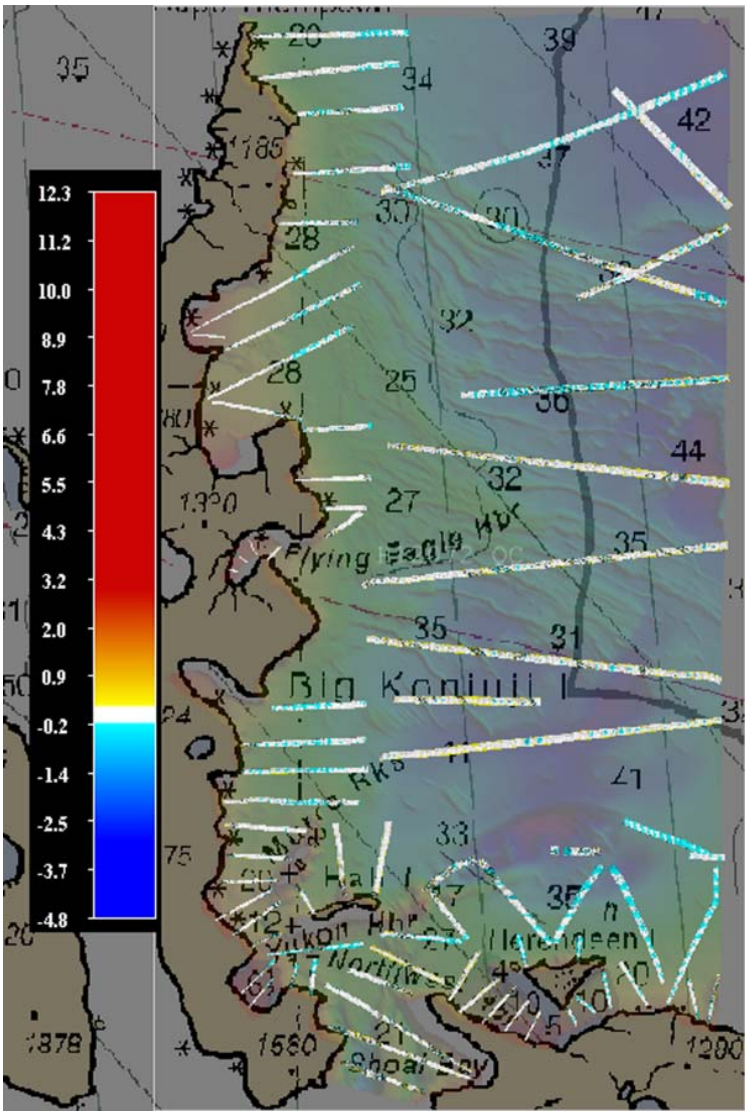


Figure 2: Crossline and main scheme differences (white indicates agreement, warm colors indicate a Xls shoaler than mainscheme and cool colors indicate XLs are deeper).

Junctions

Survey H12072 junctions with surveys H12119 and H12070, respectively Sheets J and P of the same project, and survey H11676, which is from a previous *Fairweather* project.[3] Basic information concerning each of these surveys can be found in Table 3. The sheet limits and area of overlap for all junction surveys are shown in Figure 3.

Junction Survey	Survey Scale	Date of Survey	Survey Location
H12119	1:40,000	June-Aug, 2009	SW Big Koniuji Island to SW Little Koniuji Island and Vicinity
H12070	1:40,000	July, 2009	NE of Cape Thompson
H11676	1:20,000	May-Aug,2007	East Nagai Strait to Cape Thompson.

Table 3: Junction Surveys

The overlaping area between the sheets was reviewed as difference surfaces in Caris Bathy DataBase and IVS Fledermaus for consistency and data were found to be in good general agreement within one meter. Areas with steep slopes or along the sheet edges had larger differences. Along sheet edges depth estimates are not as reliable due to smaller amounts of data. On steep slopes surfacing algorithms pick different depth estimates causing apparent but not navigationally significant depth differences.[4] Survey H11676 was computed at a larger resolution, making the depth difference on steep slopes even more exaggerated.

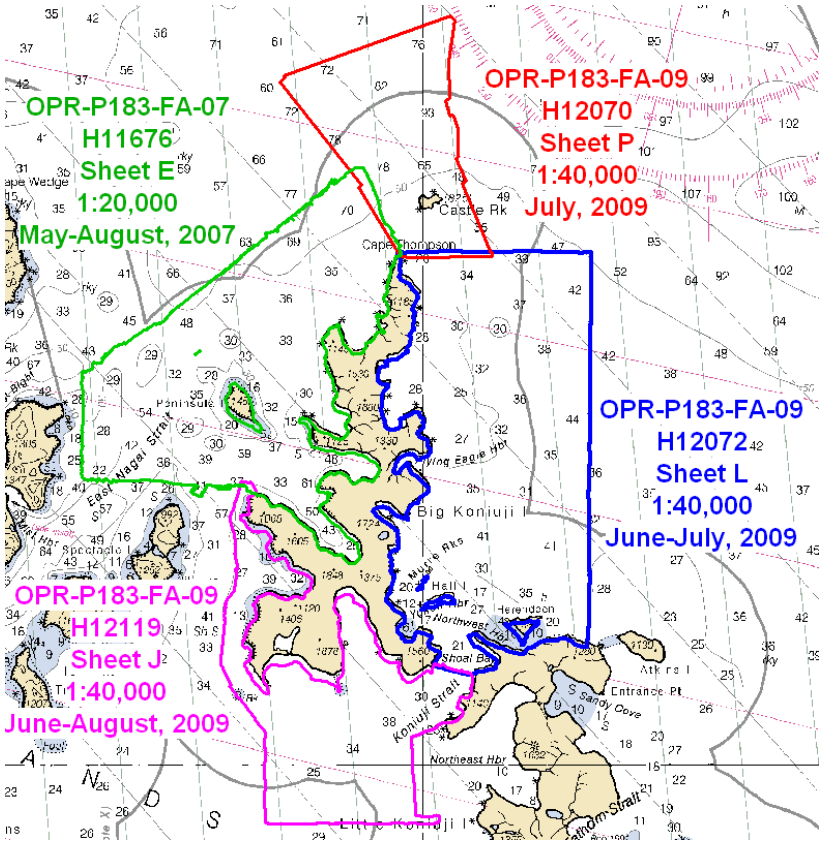


Figure 3: Junction Surveys with H12072

Quality Control Checks

MBES quality control checks were conducted as discussed in the quality control section B of the DAPR.

Data Quality Factors

COVERAGE ASSESSMENT

The 2009 *Fairweather* density requirements, as laid out in the HSD waiver described in the DAPR section B 2.1, were met or exceeded for all finalized surfaces.

The top of one rock in 28 meters of water south of Hall Island at position 55°04.66'N 159°29.29'W was missed at the required resolution (Figure 4). Given the water depth and area without soundings this rock is not considered navigationally significant. The bathymetry shoals in a northern direction, reaching 20 meters deep 90 meters to the north west. [5]

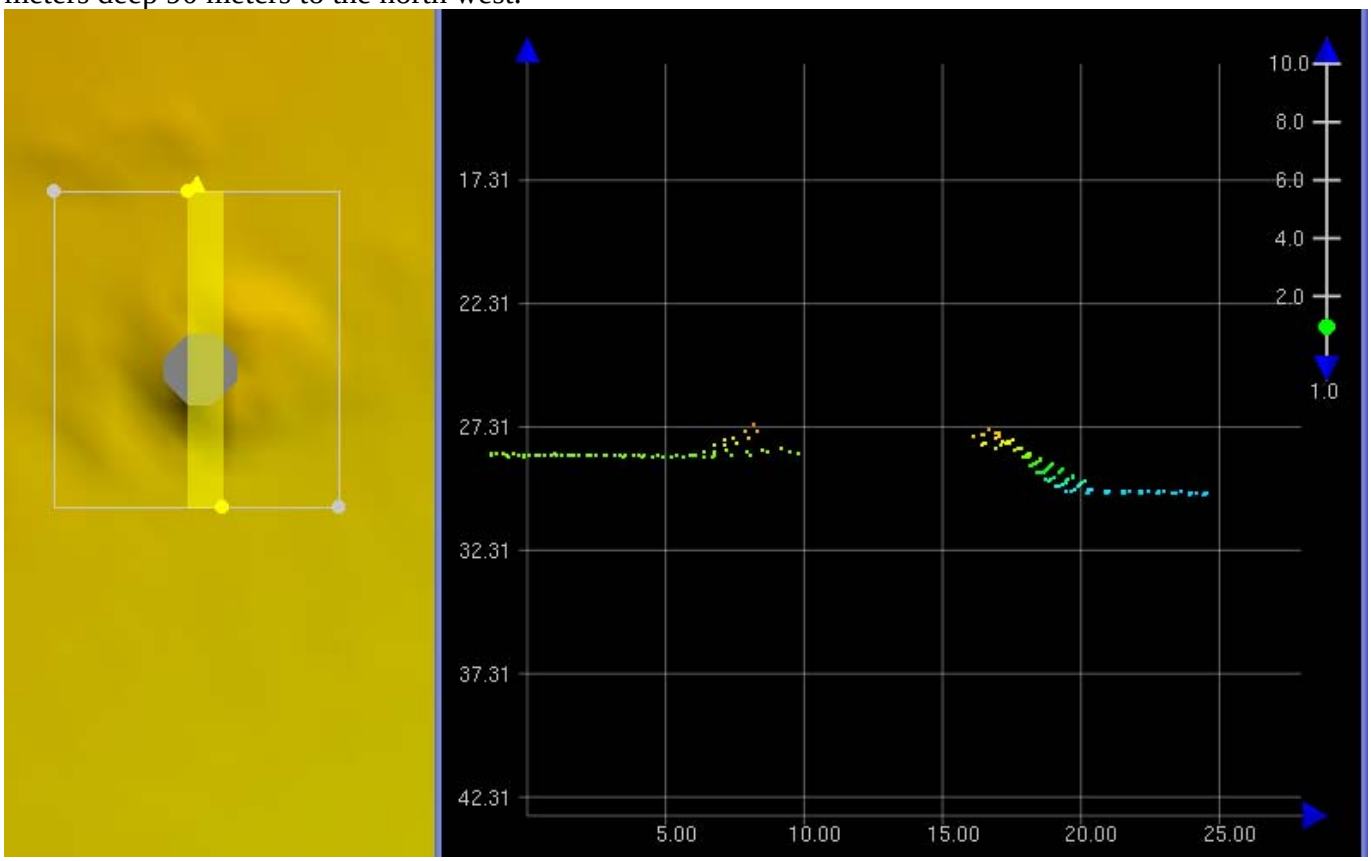


Figure 4 Overview (left) and 2d subset view (right) of rock with unsurveyed top.

POSITIONING:

DGPS dropouts were frequent in the real time navigation, and some satellite dropouts were experienced with launch 1010. A post processed solution from POSPac was applied to data for this survey.[6] The

associated real time positional uncertainty (horizontal, vertical, pitch, roll, yaw) from POSPac have also been applied to the data. Log files of the application of these files can be found in Separates I.

Data from launch 1018 on day number 198 experienced a 12 hour offset from the navigation time stamp recorded in the HSX file. To get the data into Caris the time stamp for the associated shifted messages were shifted back by 12 hours using the Hypack Mbmax utility, and the shifted lines were renamed with a 'NEW' extension. Once the data were in Caris the post processed SBET was applied and no residual effects of the time offset were evident. [7]

TRUEHEAVE:

TrueHeave data could not be applied to the MBES data for launch 1010 line 2009L_1720002 from day number 172, and for launch 1018 line 2009L_1810005 from day number 181 due to issues related to UTC midnight. The data quality for these lines was examined and was not affected by the lack of TrueHeave. [8]

To enable the application of true heave some POS/MV true heave files were "fixed" using the *fixTrueHeave.exe* utility from CARIS. Fixed files were assigned an additional *.fixed suffix. This was performed for the following vessels and days:

- Launch 1010 days 170, 171, 176, 177, 178, 180
- Launch 1018 day 171, 173, 175, 176, 178, 180, 189
- Ship S220 Line 2009L_1782345 from day number 179

SOUND VELOCITY

Some sound velocity issues were present during this survey. These issues either did not cause the final surface to be out of IHO uncertainty specification or the effected data were cleaned out. In general, sound velocity profile extended depth points were not accurate, but due to the relatively flat nature of this survey most data was collected such that the extended depths had little effect.

Reson 8125 data from launch 1018 also had some issues, specifically related to the surface sound velocity (SSV) sensor. When surveying in areas of kelp occasionally the Digibar sound velocimeter would become blocked by plant matter, causing a blowout like effect in the MBES. Lines that contained this issue had the SSV file removed from the HDCS line directory and the line remerged. This corrected the problem and no negative effect was noticed in the data. The lines with this issue were: 2009L_1930014, 2009L_1930017, and 2009L_193_0019.[9]

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. Ten soundings were designated to preserve the least depth on features, while one was used to flag the single DTON for this survey.[10]

UNUSUAL CONDITIONS

As noted above, surveying did occur in near shore areas with kelp. This caused additional noise that was cleaned out if the surface was effected.[11]

Accuracy Standards

All data meet the data accuracy specifications as stated in the HSSDM. This was determined through the standard models used to estimate uncertainty for soundings and the resulting depth estimates compared to the allowable uncertainty by depth from the IHO order 1 curve.

Based on statistics from Fledermaus 100% of nodes in a combined 8 meter grid meet or exceed IHO Order 1 specifications for all depths, see Figure 5 for a graphic of the surface and Figure 6 for statistics.

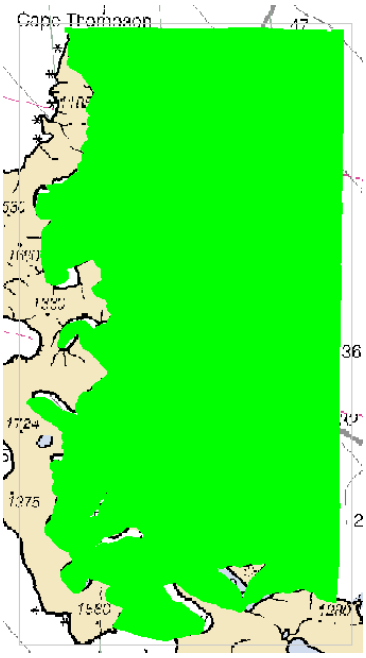


Figure 5: IHO Order 1 Pass (green) or Fail (red)

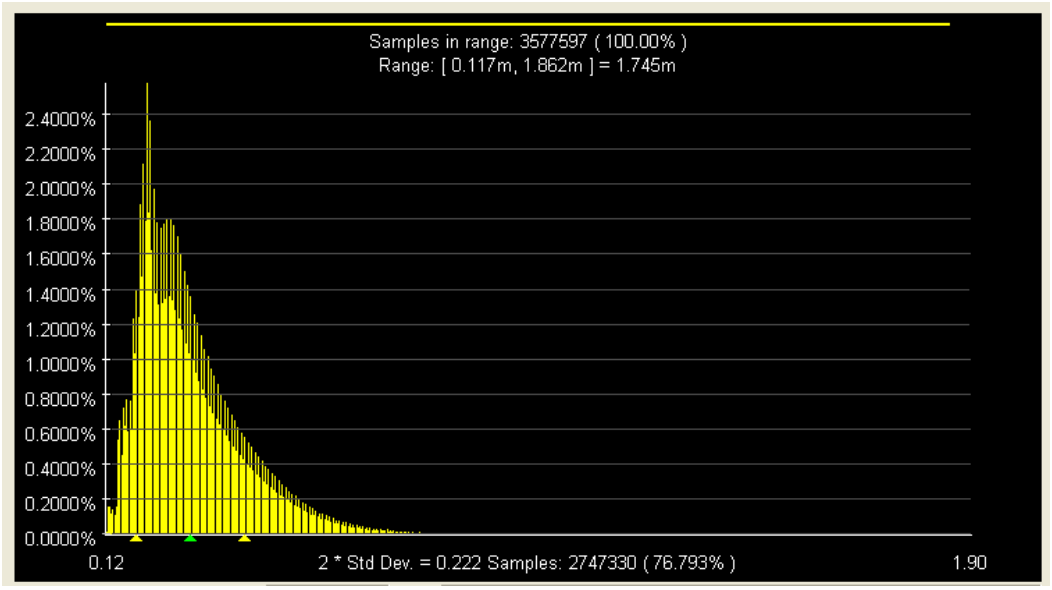


Figure 6: IHO 1 Surface Statistics

B3. Corrections to Echo Soundings

Data reduction procedures for survey H12072 conform to those detailed in the DAPR with the exception of the navigation time offset and SSV fixes described in section B2.

B4. Data Processing

Initial data acquisition and processing notes are included in the acquisition and processing logs, additional processing such as final tides and sound velocity applied is most accurately tracked in the survey wide query in the Reviewer_Qry tab of the H12072_Data_Log spreadsheet. All of the logs are included with the digital Separates I.

Data processing procedures for survey H12072 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 or TPE) and CUBE (Combined Uncertainty and Bathymetry Estimator) 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 sound velocity parameters used to compute TPE in CARIS for H12072 are listed by transducer type in Table 4. Tides TPE were applied through the TCARI grid.

Transducer	Measured SV	Surface SV
8101	1.00 m/s	1.00 m/s
8125	1.00 m/s	0.50 m/s
8111	0.50 m/s	0.50 m/s

Table 4: Survey Specific CARIS TPE Parameters

CUBE SURFACES:

The CARIS HIPS BASE (Bathymetry Associated with Statistical Error) surfaces created and their associated resolutions are listed below in Table 5. Due to the amount of data collected over the course of this project the survey area was split into thirteen overlapping fieldsheets. The finalized surfaces from each fieldsheet were combined to create a single finalized surface for each depth range in a single fieldsheet covering the entire survey area. These combined finalized surfaces were then further combined to create a single 8 meter combined surface for the entire survey. The finalized surfaces for this survey use the deep depth for each depth range as stated in the DAPR, but use a shallower depth than that listed for the shoal depth to ensure no open spaces were left between surfaces. Making finer resolution surfaces in water deeper than the finalized surface ranges used here may create noise in the surfaces and is not recommended.[12]

The CUBE parameters utilized for creating CUBE surfaces are included in Table 5. The CUBE parameters .xml file is included with digital data in the vessel configuration folder.

Fieldsheet Name	Surface Name	Depth Ranges (m)	Resolution (m)	CUBE Parameters
H12072_A_QC	H12072_A_4m	All	4	NOAA_4m
	H12072_A_8m	All	8	NOAA_8m
	H12072_A_4m_Final_20to80	20 to 80	4	NOAA_4m
	H12072_A_8m_Final_60to140	60 to 140	8	NOAA_8m
H12072_B_QC	H12072_B_4m	All	4	NOAA_4m
	H12072_B_8m	All	8	NOAA_8m
	H12072_B_4m_Final_20to80	20 to 80	4	NOAA_4m
	H12072_B_8m_Final_60to140	60 to 140	8	NOAA_8m
H12072_C_QC	H12072_C_4m	All	4	NOAA_4m
	H12072_C_8m	All	8	NOAA_8m
	H12072_C_4m_Final_20to80	20 to 80	4	NOAA_4m
	H12072_C_8m_Final_60to140	60 to 140	8	NOAA_8m
H12072_D_QC	H12072_D_4m	All	4	NOAA_4m
	H12072_D_8m	All	8	NOAA_8m
	H12072_D_4m_Final_20to80	20 to 80	4	NOAA_4m
	H12072_D_8m_Final_60to140	60 to 140	8	NOAA_8m
H12072_E_QC	H12072_E_2m	All	2	NOAA_2m
	H12072_E_4m	All	4	NOAA_4m
	H12072_E_8m	All	8	NOAA_8m
	H12072_E_2m_Final_20to80	10 to 40	2	NOAA_2m
	H12072_E_4m_Final_20to80	20 to 80	4	NOAA_4m
	H12072_E_8m_Final_60to140	60 to 140	8	NOAA_8m
H12072_F_QC	H12072_F_4m	All	4	NOAA_4m
	H12072_F_8m	All	8	NOAA_8m
	H12072_F_4m_Final_20to80	20 to 80	4	NOAA_4m
	H12072_F_8m_Final_60to140	60 to 140	8	NOAA_8m
H12072_G_QC	H12072_G_1m	All	1	NOAA_1m
	H12072_G_2m	All	2	NOAA_2m
	H12072_G_4m	All	4	NOAA_4m
	H12072_G_8m	All	8	NOAA_8m
	H12072_G_1m_Final_0to23	0 to 23	1	NOAA_1m
	H12072_G_2m_Final_10to40	10 to 40	2	NOAA_2m
	H12072_G_4m_Final_20to80	20 to 80	4	NOAA_4m
	H12072_G_8m_Final_60to140	60 to 140	8	NOAA_8m
H12072_H_QC	H12072_H_1m	All	1	NOAA1m
	H12072_H_2m	All	2	NOAA_2m
	H12072_H_4m	All	4	NOAA_4m
	H12072_H_1m_Final_0to23	0 to 23	1	NOAA_1m
	H12072_H_2m_Final_10to40	10 to 40	2	NOAA_2m
	H12072_H_4m_Final_20to80	20 to 80	4	NOAA_4m
H12072_I_QC	H12072_I_1m	All	1	NOAA1m
	H12072_I_2m	All	2	NOAA_2m
	H12072_I_4m	All	4	NOAA_4m
	H12072_I_1m_Final_0to23	0 to 23	1	NOAA_1m

	H12072_I_2m_Final_10to40	10 to 40	2	NOAA_2m
	H12072_I_4m_Final_20to80	20 to 80	4	NOAA_4m
H12072_J_QC	H12072_J_1m	All	1	NOAA1m
	H12072_J_2m	All	2	NOAA_2m
	H12072_J_4m	All	4	NOAA_4m
	H12072_J_1m_Final_0to23	0 to 23	1	NOAA_1m
	H12072_J_2m_Final_10to40	10 to 40	2	NOAA_2m
	H12072_J_4m_Final_20to80	20 to 80	4	NOAA_4m
H12072_K_QC	H12072_K_1m	All	1	NOAA1m
	H12072_K_2m	All	2	NOAA_2m
	H12072_K_4m	All	4	NOAA_4m
	H12072_K_1m_Final_0to23	0 to 23	1	NOAA_1m
	H12072_K_2m_Final_10to40	10 to 40	2	NOAA_2m
	H12072_K_4m_Final_20to80	20 to 80	4	NOAA_4m
H12072_L_QC	H12072_L_1m	All	1	NOAA1m
	H12072_L_2m	All	2	NOAA_2m
	H12072_L_4m	All	4	NOAA_4m
	H12072_L_1m_Final_0to23	0 to 23	1	NOAA_1m
	H12072_L_2m_Final_10to40	10 to 40	2	NOAA_2m
	H12072_L_4m_Final_20to80	20 to 80	4	NOAA_4m
H12072_M_QC	H12072_M_1m	All	1	NOAA1m
	H12072_M_2m	All	2	NOAA_2m
	H12072_M_4m	All	4	NOAA_4m
	H12072_M_1m_Final_0to23	0 to 23	1	NOAA_1m
	H12072_M_2m_Final_10to40	10 to 40	2	NOAA_2m
	H12072_M_4m_Final_20to80	20 to 80	4	NOAA_4m
H12072_QC	H12072_1m_Combined-Final_0to23	0 to 23	1	Combined 1m
	H12072_2m_Combined-Final_10to40	10 to 40	2	Combined 2m
	H12072_4m_Combined-Final_20to80	20 to 80	4	Combined 4m
	H12072_8m_Combined-Final_60to140	60 to 140	8	Combined 8m
	H12072_8m_Combined	All	8	Combined all

Table 5: Depth Ranges, Resolutions, and CUBE Parameters

SURFACE FILTERING:

The Surface Filtering function was utilized in CARIS HIPS and SIPS for field sheets A through G. Each field sheet was filtered to its 8 meter surface, using a confidence interval of 20 and the "Greater of the two" option for the uncertainty and standard deviation for each node.

C. HORIZONTAL AND VERTICAL CONTROL

A complete description of horizontal and vertical control for survey H12072 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). Differential Global Positioning System (DGPS) was used for positioning data real time, when available. Differential corrections from the U.S. Coast Guard beacon at Cold Bay (289kHz) were used. For further detail during acquisition see the Acquisition and Processing logs for the particular days located in Separates I.

All data have a post processed kinematic solution for navigation and motion with the exception of crosslines 2009XL1690539 and 2009XL1690543 from vessel S220. Applanix POSPac files were processed using a local, ship supported and installed base station as a reference station for the tightly coupled Applanix SingleBase processing algorithm. Only data from launch 1010 data from day number 168 was processed differently, using a loosely coupled Precise Point Positioning solution, because no base station was available at this time. The resulting SBETs were applied in Caris, along with the associated real time POSPac error files. Refer to the *OPR-P357-FA-08 Horizontal and Vertical Control Report* for further information about horizontal control activities for this project. For further detailed information concerning the production of specific SBET files, see the POSPac processing files in Appendix B-V POSPac Processing Logs.

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 survey H12072.

Fairweather personnel installed a Sutron 8210 "bubbler" tide gauge at the tertiary station listed in Table 6. Gauge #13 (S/N 024446) was the gauge used on Herendeen Island, it had the assigned station number 945-9163. The station 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 as a supplement to the primary station listed in the Project Instructions.

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-P357-FA-08 Horizontal and Vertical Control Report* for further information about the tide stations.

A request for delivery of final approved (smooth) tides for survey H12072 was forwarded to N/OPS1 on July 27, 2009 in accordance with the Field Procedures Manual (FPM), dated April 2009. A copy of the request is included in Appendix IV.[13]

As per the Project Instructions, all data were reduced to MLLW using the final approved water levels from the Sand Point, AK station (945-9450) by applying tide file 9459450.txt and time and height correctors through the TCARI file P183FA2009-Final.tc. Since the field had also added an additional

station within the project area on Herendeen Island, Ak (945-9163), the final tide note instructed the use of this gauge with TCARI and the file 9459163.txt was used as well. **It will not be necessary for the Atlantic Hydrographic Branch to reapply the final approved water levels (smooth tides) to the survey data during final processing.**[14]

While this survey was not specifically designated as ellipsoidally referenced, all data has the vertical part of the SBET available through GPS Tides. If all data are remerged with GPS tides applied, all data, except the two lines mentioned above, would be referenced to the ellipsoid. Re-computation of the surfaces would then yield ellipsoidally referenced surfaces.

D. RESULTS AND RECOMMENDATIONS

D.1 Chart Comparison

Chart comparison procedures were followed as outlined in section 4.5 of the FPM and section 8.1.3-D.1 of the HSSDM, utilizing Caris Bathy DataBase and NOAA's Pydro software programs.

Survey H12072 was compared with the following charts listed in Table 7. There were no new changes within the survey area.

NOAA Chart Number	Chart Scale	Edition Number	Edition Date	Updated with Notice to Mariners through
16540	1:300,000	12th Ed.	January 1, 2005	May 9, 2009
16556	1:80,000	5th Ed.	April1, 2006	May 9, 2009
US4AK58M	1:80,000	6th	March 17, 2009	March 17, 2009
US3AK50M	1:300,000	6th	February 10, 2009	March 10, 2009

Table 7: NOAA Charts compared with Survey H12072

Chart 16540

Between the scarcely charted soundings due to scale and the northerly shift in the chart projection a comparison between the survey and this chart was not particularly significant. The area of most significance was the DTON east of Hall Island. Generally the charted soundings were between 0 and 7 fathoms shallower than the surveyed bathymetry. Other areas that were surveyed as shallower than the chart were near shore, likely generalized given the scale of the chart. Other than the single submitted DTON, the only areas surveyed to be shallower than the chart by two fathoms or more were the areas south and south west of Herendeen Island and in the bight north of Flying Eagle Harbor. These do not appear to be areas of shoaling but rather were areas that were charted incorrectly, perhaps due to prior survey positioning methods.[15]

Chart 16556

This chart only covered the northern portion of the survey area and contained no soundings near shore. All soundings from this chart were shallower than the corresponding bathymetry from this survey.[16]

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.** [17] The accuracy of the current chart justifies that the surveyed soundings be applied to chart as soon as possible.

Automated Wreck and Obstruction Information System (AWOIS) Investigations

There were no AWOIS items located within the limits of H12072.[18]

Dangers to Navigation

One danger to navigation was identified and reported to the Marine Chart Division for verification and final submission to the Seventeenth Coast Guard District on July 2nd, 2009. A copy of the preliminary Danger to Navigation Report is included in Appendix I.[19] Table 8 lists the DTONs by the number of submission to MCD with their positions and depths.

DTON	Latitude	Longitude	Submitted Depth (m)	Final Tide Depth(m)
1.1	55° 04’ 59.8”N	159° 27’ 28.4”	5.26	5.60

Table 8: The DTONs according to their submitted number with the submitted depths and final depths.

D.2 Additional Results

Shoreline Source

A composite source file (CSF) in .000 format from HSD’s Operations Branch was provided with the Project Instructions. Shoreline sources that were included in the composite source file included Geographic Cell (GC), Digital Data (DD), and charted features from charts 16540 and 16556, see Table 9. The original file was imported into CARIS Notebook, converted to a .hob file, clipped to the sheet limits, and named H12072_Original_Composite_Source.hob to be included with the deliverables. This file was copied and named H12072_Feature_File.hob to be utilized during field verification. Additionally, features from the current editions of charts 16540 and 16556 that were not depicted by the source shoreline data were digitized in CARIS Notebook with S-57 attribution into the H12072_Feature_File.hob file, to be displayed for field verification.

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 H12072_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.

Charts 16540 (1:300,000) and 16556 (1:80,000) were the largest scale charts 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 Navigable Area Limit Line (NALL) were verified or disproved during shoreline operations.

Shoreline Data Processing

Acquired and edited positions during shoreline verification operations were processed in CARIS Notebook. A tide file for the features requiring tide correction was created with TCARI in Pydro. Tide correction was 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 H12072_Final_Feature_File.hob (compiled from the field daily files) or H12072_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,survy,H12072) and final survey date 20090717. 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
RSD	US,US,reprt,DD-8773	19991001
RSD	US,US,digitGC,10647	19991000
Chart	US,US,graph,chart 16540	19890304
Chart	US,US,graph,chart 16556	20021100
Survey	US,US,survy,H12072	20090717

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 provided in the Remarks field for features when appropriate and recommendations to the cartographer were included in the Recommendations field.

Items disproved by the Hydrographer and deemed to not be included in the H12072_Final_Feature_File .hob file were moved to the H12072_Disprovals .hob file.

Shoreline Recommendations

The Hydrographer recommends that the shoreline depicted in the CARIS Notebook files and final sounding files supersede and complement shoreline information compiled on the CSF and charts. [20]

Aids to Navigation

There were no aids to navigation within the survey limits.[21]

Bottom Samples

Forty six bottom samples were collected on June 28th , July 8th, 9th and 11th, corresponding to day numbers 179, 189, 190 and 192, and are included as seabed areas in the Notebook H12072_Final_Feature_File .hob file.[22]

E. Supplemental Reports

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

Title	Date Sent	Office
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

November 17, 2009

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

FROM: CAPT David Neander, NOAA
Commanding Officer

David O. Neander
2009.12.15 11:25:48
-08'00'

TITLE: Approval of Hydrographic Survey H12072,
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 H12072 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:

Glen A. Rice
2009.11.17 23:06:17
-09'00'

ENS Glen Rice
Survey Manager

Briana J. Welton
2009.12.15 09:39:01
-09'00'

LT Briana Welton
Field Operations Officer

Digitally signed by Lynnette V. Morgan
Date: 2009.12.15 10:13:56
-09'00'

CST Lynnette V. Morgan
Chief Survey Technician

Attachment

Corrections and Revisions performed during office processing and certification.

---

[1] Concur.
[2] Concur.
[3] H12072 junctions with surveys H12070 to the N. H12119 to the S. A common junction was made with an adjoining portion of H12070. In Addition, a common junction will be made with H12119 to the S. during compilation process.
[4] Concur.
[5] Concur. Data was reviewed during office processing and there is no evidence of a navigationally significant feature. However, the rock south of Hall Island was not captured making the least depth unknown.
[6] Concur. Data is adequate and within specifications despite of the DGPS dropouts. It is recommended that the data from H12072 supersede the data currently on the chart within the common area.
[7] Concur. Data is adequate and within specifications Once the data was processed in CARIS and the SBET was applied. No time offset were evident in the data. It is recommended that the data from H12072 supersede the data currently on the chart within the common area.
[8] Concur. Data is adequate and within specifications despite of the failure of the TH data. It is recommended that the data from H12072 supersede the data currently on the chart within the common area.
[9] Concur.
[10] Concur with clarification. Designated soundings were used as appropriate to the scale of the chart.
[11] Concur.
[12] The fieldsheet H12072_Office contains the surface H12072_8m_Combined that was created for cartographic compilation.
[13] Tide note is attached to this document.
[14] Concur with clarification. The data was processed at the Pacific Hydrographic Branch.
[15] Concur.
[16] Concur.
[17] Concur.
[18] Concur.
[19] Concur. DTON has been applied to the chart. See attached DTON report to this document.
[20] Concur with clarification. The submitted hob files were used in the compilation of HCell H12072. During compilation, some modifications were made to accommodate chart scale. Chart features as depicted in the HCell
[21] Concur.
[22] All forty six bottom samples collected by the field are included in the HCell to be charted. No bottom samples were imported from the ENC to be retained.

H12072 DTON Report 1

Registry Number: H12072

State: Alaska

Locality: Shumagin Islands

Sub-locality: Cape Thompson to Shoal Bay

Project Number: OPR-P183-FA-09

Survey Date: 06/20/2009

During OPR-P183-FA-09, H12072 Sheet L, a new shoal was found with Reson 8101 MBES. The shoal is in the area east of Hall Island and north west of Herendeen Island in the Shumagin Islands. The least depth found was 2.89 fathoms (5.28 meters), corrected with preliminary tides, in an area charted to be 17 fathoms by chart 16540.

Charts Affected

Number	Edition	Date	Scale (RNC)	RNC Correction(s)*
16540	12th	01/01/2005	1:300,000 (16540_1)	USCG LNM: 02/24/2009 (04/28/2009) CHS NTM: None (04/24/2009) NGA NTM: 01/21/2006 (05/09/2009)
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	Shoal	5.26 m	55° 04' 59.8" N	159° 27' 28.4" W	---

1 - Danger To Navigation

1.1) Profile/Beam - 445/9 from h12072 / fa_1010_reson8101_2009 / 2009-171 / 2009l_1711909

DANGER TO NAVIGATION

Survey Summary

Survey Position: 55° 04' 59.8" N, 159° 27' 28.4" W

Least Depth: 5.26 m (= 17.26 ft = 2.876 fm = 2 fm 5.26 ft)

TPU (±1.96σ): **THU (TPEh)** ±0.983 m ; **TVU (TPEv)** ±0.198 m

Timestamp: 2009-171.19:10:28.336 (06/20/2009)

Survey Line: h12072 / fa_1010_reson8101_2009 / 2009-171 / 2009l_1711909

Profile/Beam: 445/9

Charts Affected: 16540_1, 16011_1, 16006_1, 500_1, 530_1, 50_1

Remarks:

During OPR-P183-FA-09, H12072 Sheet L, a new shoal was found with Reson 8101 MBES. The shoal is in the area east of Hall Island and north west of Herendeen Island in the Shumagin Islands. The least depth found was 2.89 fathoms (5.28 meters), corrected with preliminary tides, in an area charted to be 17 fathoms by chart 16540.

Feature Correlation

Address	Feature	Range	Azimuth	Status
h12072/fa_1010_reson8101_2009/2009-171/2009l_1711909	445/9	0.00	000.0	Primary

Hydrographer Recommendations

Chart in the surveyed location.

Cartographically-Rounded Depth (Affected Charts):

2 ¾fm (16540_1, 16011_1, 16006_1, 530_1)

5.3m (500_1, 50_1)

S-57 Data

Geo object 1: Sounding (SOUNDG)

Attributes: QUASOU - 1:depth known

TECSOU - 3:found by multi-beam

VERDAT - 12:Mean lower low water

Feature Images

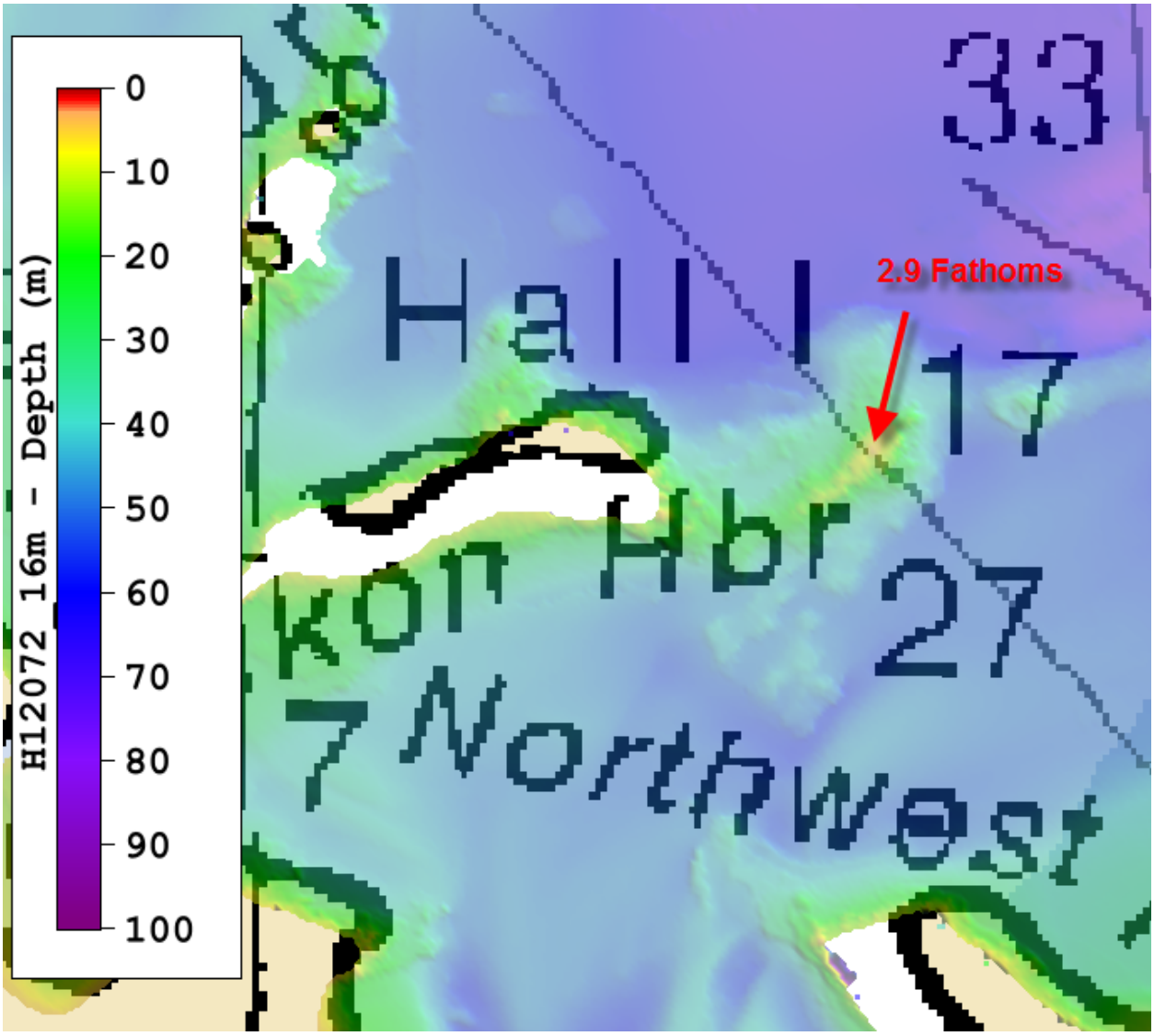


Figure 1.1.1

UNITED STATES DEPARMENT 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: H12072

LOCALITY: Northeast of Cape Thompson, Shumagin Island and Vicinity, AK
TIME PERIOD: June 17 - July 17, 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, H12072, during the time period between June 17 - July 17, 2009.

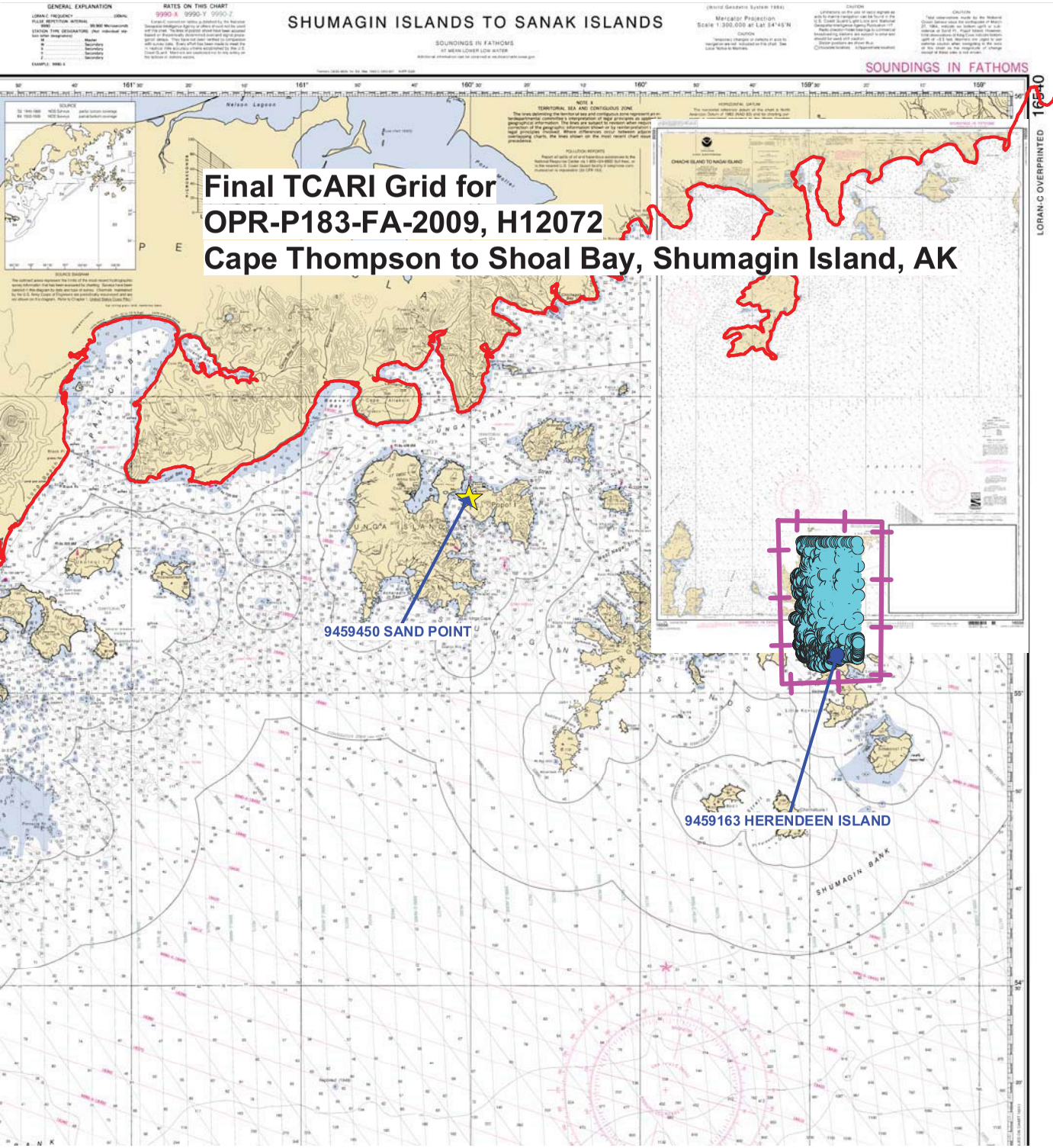
Refer to attachments for grid information.

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 15:08:51 -04'00'

CHIEF, OCEANOGRAPHIC DIVISION


SHUMAGIN ISLANDS TO SANAK ISLANDS
SOUNDINGS IN FATHOMS
Mercator Projection
Scale 1:300,000 at Lat 54°45'N
SOUNDINGS IN FATHOMS
16540
LORAN-C OVERPRINTED
Final TCARI Grid for
OPR-P183-FA-2009, H12072
Cape Thompson to Shoal Bay, Shumagin Island, AK
9459450 SAND POINT
9459163 HERENDEEN ISLAND
SHUMAGIN BANK

H12072 HCell Report

Fernando Ortiz, Physical Scientist
Pacific Hydrographic Branch

1. Specifications, Standards and Guidance Used in HCell Compilation

HCell compilation of survey H12072 used:

Office of Coast Survey HCell Specifications: Draft, Version: 4.0, 17 March 2010.
HCell Reference Guide: Version 2.1, February2, 2011.

2. Compilation Scale

Depths and features for HCell H12072 were compiled to the largest scale raster charts shown below:

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

The following ENCs 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 1:10,000 for the16556 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 H12072_SS.000
0	0	0.2286	0	0
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

With the exception of the zero contours included in the *_CS file, contours have not been deconflicted against shoreline features, soundings and hydrography, as all other features in the *_CS file and soundings in the *_SS have been. This may result in conflicts between the *_SS file contours and HCell features at or near the survey limits. Conflicts with M_QUAL, COALNE and SBDARE objects, and with DEPCNT objects representing MLLW, should be expected. HCell features should be honored over *_SS.000 file contours in all cases where conflicts are found.

5. Meta Areas

The following Meta object area is included in HCell H12072:

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
COALNE	Coastline
DEPCNT	Zero Contours
LNDARE	Land Area
LNDELV	Land Elevation
M_QUAL	Data quality Meta object
OBSTRN	Obstruction
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

H12072 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

H12072_CS.000	Base Cell File, Chart Units, Soundings and features compiled to 1:80,000
H12072 _SS.000	Base Cell File, Chart Units, Soundings and Contours compiled to 1:10,000
H12072 _DR.pdf	Descriptive Report including end notes compiled during office processing and certification, the HCell Report, and supplemental items
H12072 _outline.gml H12072 _outline.xsd	Survey outline

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.

APPROVAL SHEET
H12072

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

Fernando Ortiz
2011.02.28
10:42:08 -08'00'

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.

Digitally signed
by Kurt Brown
Date: 2011.02.28
10:57:25 -08'00'

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.

Digitally signed by Gary C. Nelson
DN: cn=Gary C. Nelson, o=NOAA, ou=Pacific Hydrographic Branch, email=gary.nelson@noaa.gov, c=US
Date: 2011.02.28 10:49:35 -08'00'

Rachel Medley
AWOIS and SURF
Check Complete
2011.03.01 08:51:35
-05'00'