

H11998

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. H11998

LOCALITY

State Alaska

General Locality Endicott Arm

Sublocality Southern Portion of Holkham Bay

2008

CHIEF OF PARTY

CDR Douglas D. Baird, 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;">HYDROGRAPHIC TITLE SHEET</p>	<p>REGISTRY No</p> <p style="text-align: center;">H11998</p>
<p>INSTRUCTIONS – 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: N/A</p>
<p>State <u>Alaska</u></p> <p>General Locality <u>Endicott Arm</u></p> <p>Sub-Locality <u>Southern Portion of Holkham Bay</u></p> <p>Scale <u>1:10,000</u> Date of Survey <u>10/15/2008 - 10/19/2008</u></p> <p>Instructions dated <u>9/22/2008</u> Project No. <u>OPR-O168-FA-08</u></p> <p>Vessel <u>NOAA Ship Fairweather</u></p> <hr/> <p>Chief of party <u>CDR D. Baird, NOAA</u></p> <p>Surveyed by <u>NOAA Ship Fairweather and launches 1010, 1018</u></p> <p>Soundings by <u>Reson 8111, Reson 8101, Reson 8160</u></p> <p>SAR by <u>Fernando Ortiz</u> Compilation by <u>R. Davies</u></p> <p>Soundings compiled in <u>Fathoms and Feet</u></p>	
<p>REMARKS: <u>All times are UTC. UTM Zone 8</u></p> <p><u>The purpose of this survey is to provide contemporary surveys to update National Ocean Service (NOS) nautical charts. All separates are filed with the hydrographic data. Revisions and end notes in red were generated during office processing. 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 http://www.ngdc.noaa.gov/.</u></p>	

Descriptive Report to Accompany Hydrographic Survey H11998

Project OPR-O168-FA

Endicott Arm, Alaska

Scale 1:10,000

October 2008

NOAA Ship *Fairweather*

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

A. AREA SURVEYED

The survey area was located in Endicott Arm within the sub-locality of the southern portion or Holkham Bay. This survey corresponds to Sheet A in the sheet layout provided with the Project Instructions, as shown in Figure 1 below.

Data acquisition was conducted from October 15 to October 19, 2008 (DN 289 to DN 293).

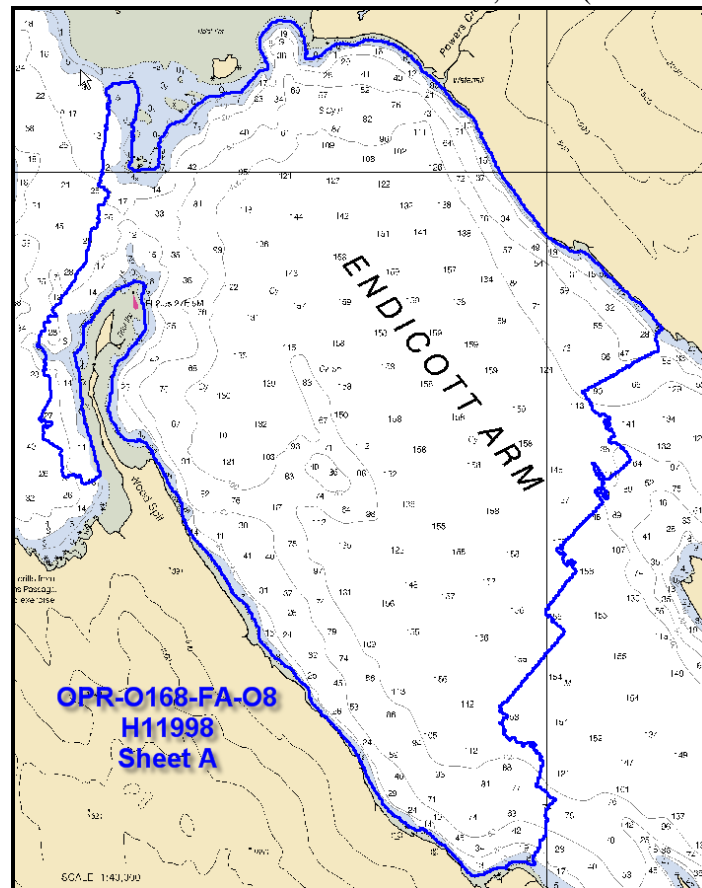


Figure 1: H11998 Survey Outline

One-hundred percent multibeam echosounder (MBES) coverage was obtained in the survey area to at least the 8-meter curve. Data was acquired as close to shore as safely possible. Additional coverage was obtained in order to determine least depths over features or shoals.

Shoreline verification for survey H11998 was conducted seaward of the Navigable Area Limit Line (NALL) in accordance with the Field Procedures Manual May, 2008 (FPM) and the Project Instructions dated September 22, 2008. 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
<u>110.64</u>	Multibeam MS mileage
	<u>33.96</u> FAIRWEATHER S-220
	<u>59.28</u> Launch 1010
	<u>17.40</u> Launch 1018
	0 SideScan MS
<u>110.64</u>	Total MS
CROSSLINE - Mileage	
	0 Single Beam XL
<u>13.73</u>	Multibeam XL
	<u>0.00</u> FAIRWEATHER S-220
	<u>11.72</u> Launch 1010
	<u>2.02</u> Launch 1018
<u>13.73</u>	Total XL
OTHER	
	0 Developments/AWOIS - Mileage
<u>11.9</u>	Shoreline/Nearshore Investigation - Mileage
<u>23</u>	Total # of Investigated Items
<u>7</u>	Total Bottom Samples
<u>9.78</u>	Total SNM
<u>10/15/08, 10/16/08, 10/18/08, 10/19/08</u>	Specific Dates of Acquisition
<u>289, 290, 292, 293</u>	Specific Dn#s of Acquisition

Table 1: H11998 Survey Statistics

B. DATA ACQUISITION 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* 2008 *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-O168-FA-08, dated September, 22, 2008. Additionally, extra coverage inshore of that required in the project instructions was acquired near the terminal moraine forming Wood Spit at the entrance to Endicott Arm due to its navigational significance.

B1. Equipment and Vessels

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

	<i>Fairweather</i>	Launch 1010	Launch 1018
Hull Registration Number	S220	1010	1018
Builder	Aerojet-General Shipyard	The Boat Yard, Inc.	The Boat Yard, Inc.
Length Overall	231 feet	28' 10"	28' 10"
Beam	42 feet	10' 8"	10' 8"
Draft, Maximum	15' 6"	4' 0" DWL	4' 0" DWL
Cruising Speed	12.5 knots	24 knots	24 knots
Max Survey Speed	10 knots	10 knots	10 knots
Primary Echosounder	RESON 8111 & RESON 8160	RESON 8101	RESON 8101
Sound Velocity Equipment	SBE 19plus & 45, MVP 200	SBE 19plus	SBE19plus
Attitude & Positioning Equipment	POS/MV V4	POS/MV V4	POS/MV V4
Type of operations	MBES	MBES, shoreline, HORCON	MBES, Shoreline, HORCON

Table 2: Vessel Inventory

On Dn 275, RESON Transceiver Processing Units (TPU) were swapped between Launches 1010 and 1018 as a diagnostic for intermittent outages that corrupted data for short durations, about two seconds or so on average. No changes occurred as a result of this swap, and the problem was traced to a bad signal and control cable. Once the cable was replaced and the problem cleared, the TPUs were left in place: 1018

has TPU Serial 34497 and 1010 has TPU Serial 35737. This is a change from the *Fairweather* 2008 Data Acquisition and Processing Report, submitted under separate cover.

B2. Quality Control

Crosslines

Multibeam crosslines for this survey totaled 13.73 linear nautical miles (lnm), comprising 12.4% of the 110.64 lnm of total MBES hydrography. Both main scheme and crossline mileage are summarized in Table 1 above.

The crosslines were filtered to include only data 45 degrees from nadir on port and starboard sides in an effort to eliminate the noisy outer beams from affecting the mainscheme to crossline comparison. The crosslines and mainscheme lines were compared by the Surface Differencing method in Fledermaus. This involved creating separate surfaces and using the Surface Differencing tool to gather statistics and make a georeferenced raster image in tagged image file format (.tfw and .tif) displaying areas of disagreement. The product includes the surface statistics with histogram located in the digital Separates IV.

The surface statistics computed the average difference between surfaces is 0.387m, median was 0.295m, standard deviation was 2.232m. The crosslines were also viewed in Subset Editor which showed similar results as the surface differencing method.

The areas of the survey showing the largest amount of crossline/mainscheme discrepancies were in deep water (greater than 200m). The error in this deep water is due to the crosslines being collected with Launch transducers (Reson 8101) and the mainscheme in deep water being collected by the *Fairweather* (S-220) transducer (Reson 8111). The outerbeams of the Reson 8101 data is noisy and tends to curve upward at the edges. This effect is skewing the statistical comparison. Figure 2 depicts the histogram produced in Fledermaus using the surface differencing tool.

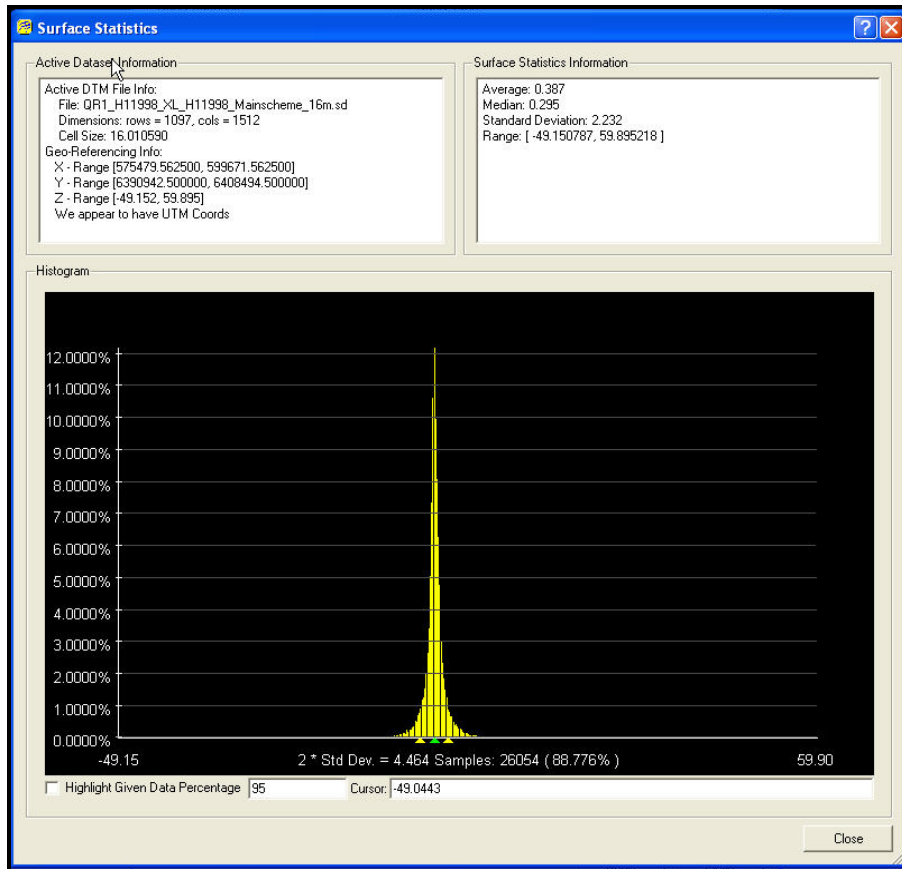


Figure 2: Fledermaus crossline comparison surface statistics

A closer visual analysis of the Crossline/Mainscheme comparison shows the recurring phenomena in deep water that was observed in the Fledermaus statistical and visual comparisons. With fifteen times exaggeration, the curving of the surface at the edges in deep water is depicted below in Figure 3. The crosslines, in water over 200m, agree well with the mainscheme data within IHO Order 2 specifications.¹

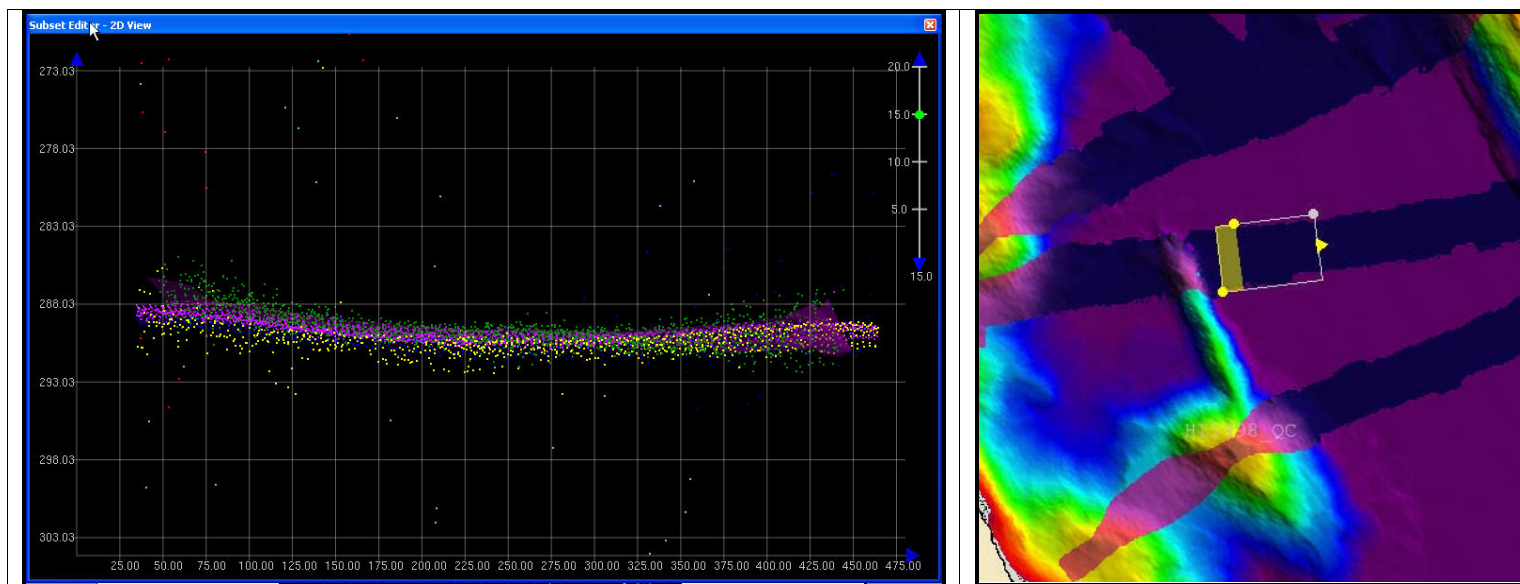


Figure 3: CARIS Subset Editor Comparison of deep water Crosslines and Mainscheme

In shallow water (less than 200m), a good general agreement is observed when comparing the crosslines and mainscheme.²

Junctions

Survey H11998 junctions with H11760, which is Sheet B of the same project.³ The area of overlap between the sheets was reviewed by the Surface Differencing method in Fledermaus. This involved creating separate surfaces and using the Surface Differencing tool to gather statistics and make a georeferenced raster image in tagged image file format (.tfw and .tif) displaying areas of disagreement. The product includes the surface statistics with histogram located in the digital Separates IV.

The surface statistics computed the average difference between surfaces is -0.075m, median was 0.120m, and standard deviation was 3.022m. Figure 4 depicts the histogram produced in Fledermaus using the surface differencing tool.

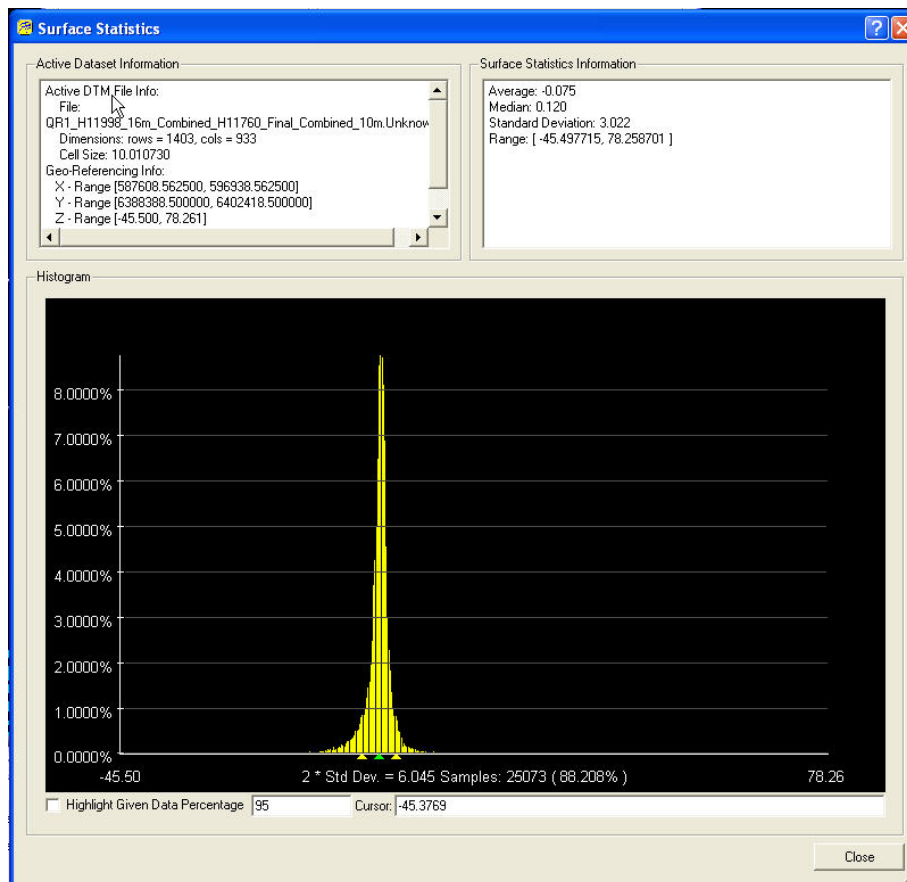


Figure 4: H11998 and H11760 Survey Comparison surface statistics

Additionally, Survey H11998 junctions with Survey H10756, which is a single beam survey conducted in 1997. The areas of overlap between the two surveys were compared using MapInfo Professional. One plot was generated by importing the data from Pydro. The soundings displayed on the plot were in good

general agreement. ⁴ A quantitative estimate was not able to be made due to the comparison of Multibeam data with single beam data.

The sheet limits and area of overlap for Sheets H10756 and H11760 are shown in Figure 5. Table 3 is a summary of the Junction surveys and other pertinent information.

Junction Survey	Survey Scale	Date of Survey	Survey Location
H10756	1:10,000	1997	Holkham Bay
H11760	1:10,000	2007	Endicott Arm

Table 3: Junction Surveys

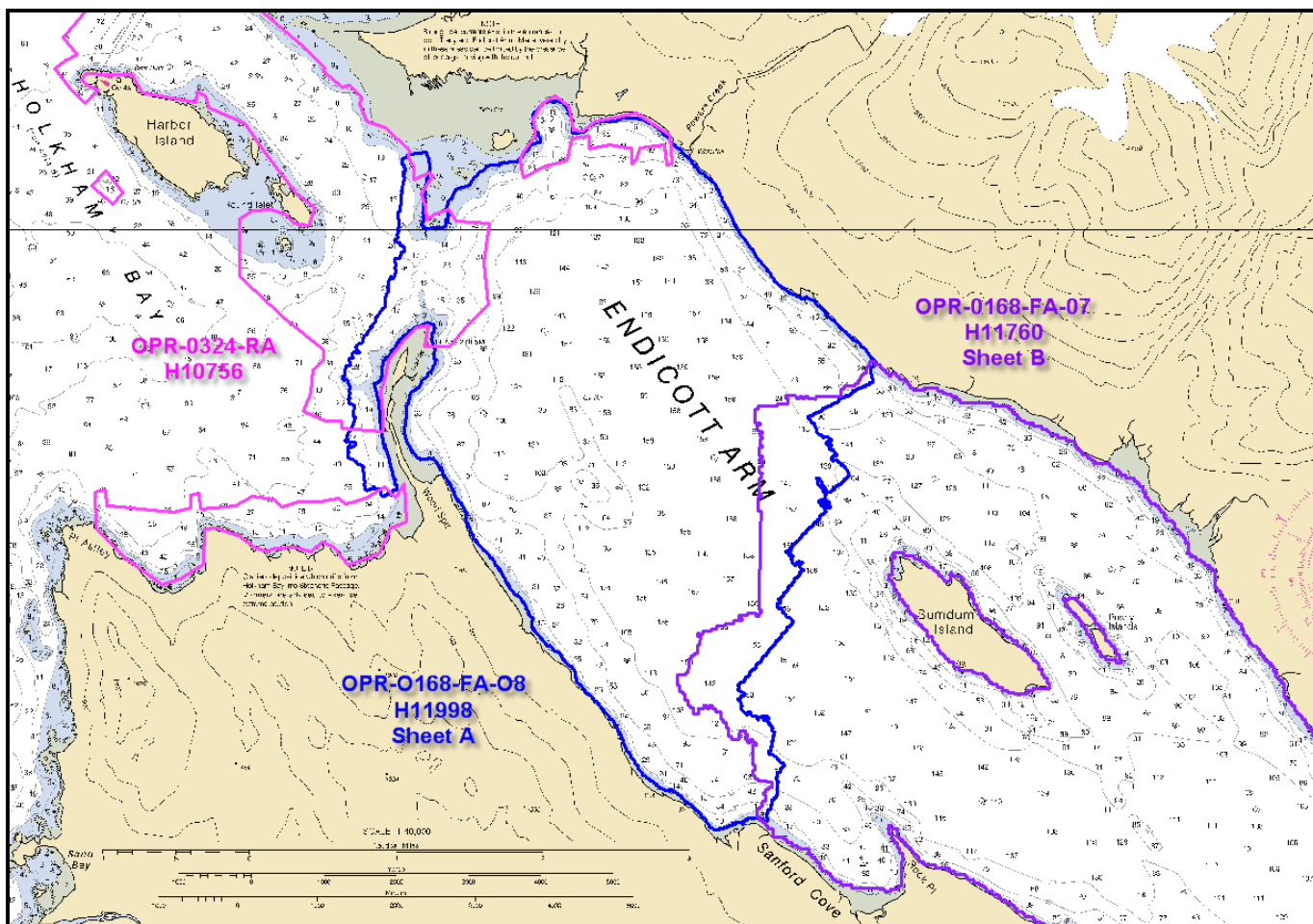


Figure 5: Junction Between H11998, H10756 and H11760

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

Coverage assessment was determined using 2m, 4m, 8m and 16m CARIS Bathymetry Associated with Statistical Error (BASE) surfaces. No data gaps were observed during review of these surfaces and the survey meets the 100% multibeam coverage requirement of the Project Instructions dated September 22, 2008.⁵

POSITIONING:

Other than the *Fairweather* (S-220) not being able to obtain a Differential Global Positioning System (DGPS) signal during this Project, no significant positional errors were observed.⁶ A horizontal control base station was installed and the issue of positioning for the ship was rectified. A complete description of horizontal and vertical control for survey H11988 can be found in the *OPR-O168-FA-08 Horizontal and Vertical Control Report*, submitted under separate cover.

TRUEHEAVE:

True Heave was applied successfully to all lines in Project H11998. It was necessary to apply a utility for correcting corrupt True Heave files, known as Fixtrueheave, on day number 292 from Launch 1010, day numbers 289 and 290 from Launch 1018, and day numbers 292 and 293 from the *Fairweather* (S-220). Both the “fixed” and original True Heave files are available in the appropriate raw data folder. No True Heave errors were noted during data review.⁷

SOUND VELOCITY

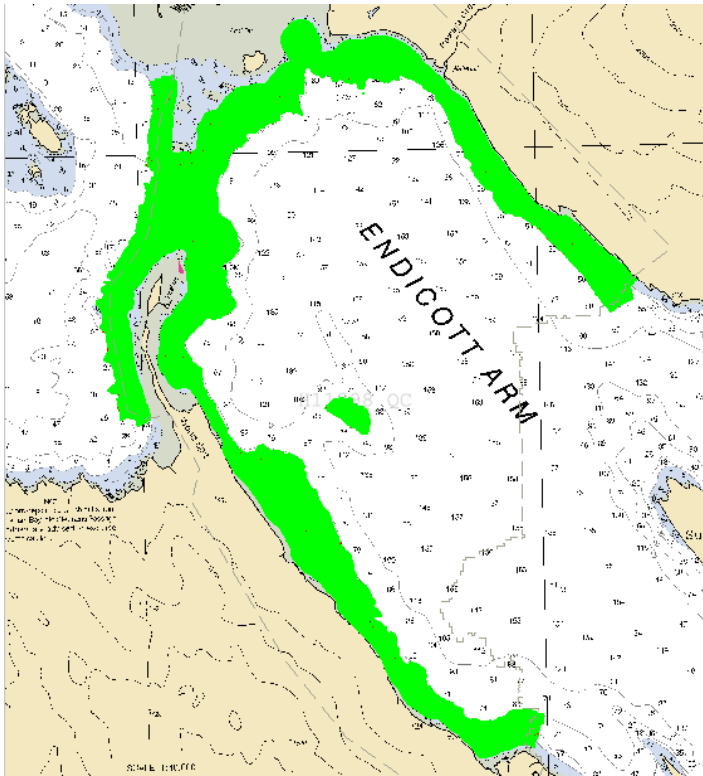
No significant sound velocity issues were experienced during survey H11998.

DESIGNATED SOUNDINGS

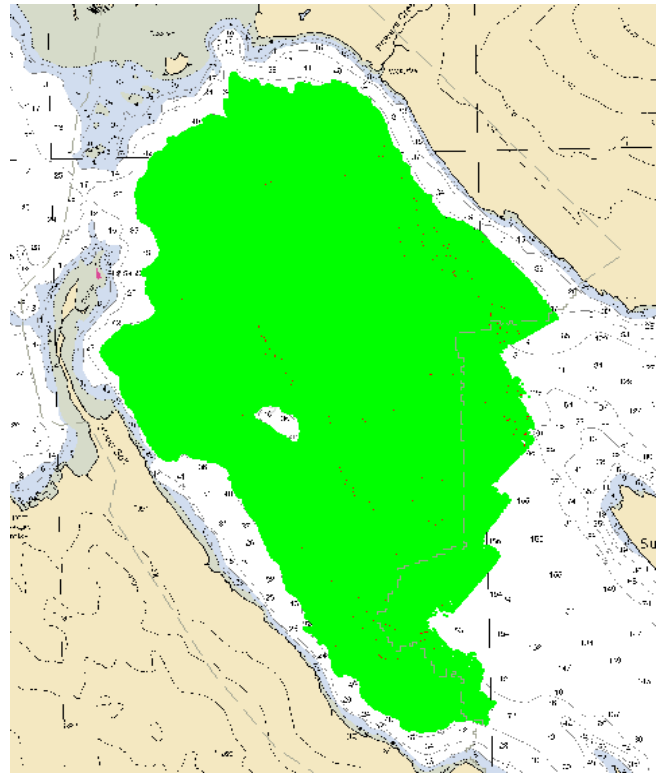
Designation of soundings followed procedures as outlined in section 5.1.1.3 of the NOS Hydrographic Surveys Specifications and Deliverables (HSSDM) dated April 2008. Four designated soundings were detailed to preserve shoal areas in the vicinity of Wood Spit.⁸

Accuracy Standards

Most of the survey area for H11935 meets International Hydrographic Organization (IHO) Order 1 accuracy standards. Although there are steep areas that did not meet IHO Order 1 accuracy standards, the surfaces were generated using Order 1 accuracy parameters. A Fledermaus Histogram was produced from the CARIS 8m Combined surface to quantitatively determine the percentage of uncertainty values that fall within IHO Order 1 specifications. This survey exceeds the requirement that at least 95% of the nodes meet IHO specification. Figure 6 shows IHO Orders 1 and 2 Coverage Maps. Figure 7 shows the histogram along with other pertinent statistics.⁹



IHO Order 1



IHO Order 2

Figure 6: IHO Orders 1 and 2 Coverage Maps

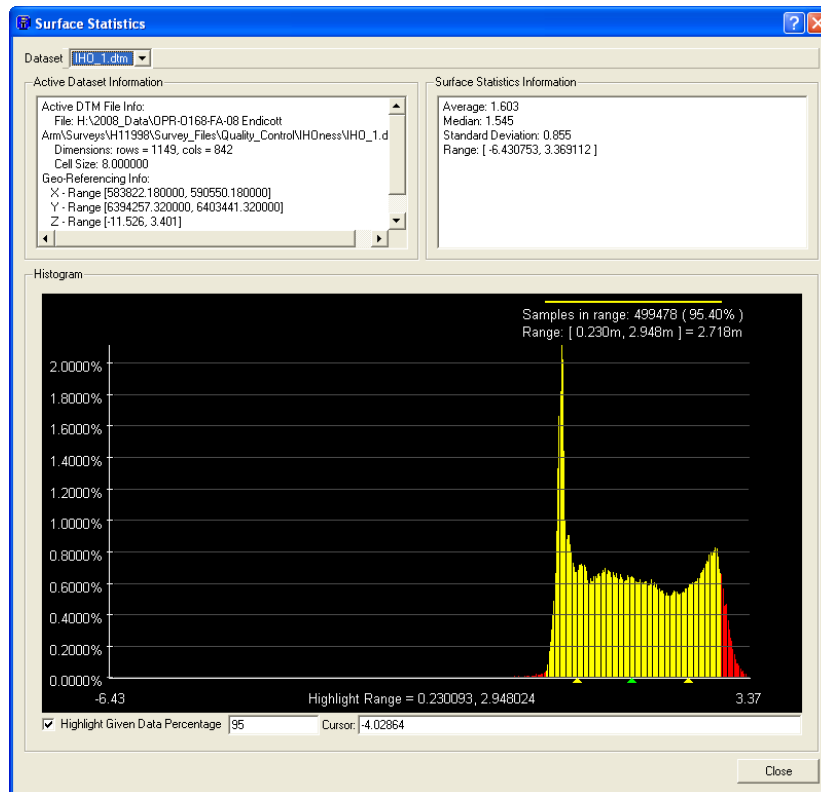


Figure 7: IHO Order 1 Histogram

B3. Corrections to Echo Soundings

Data reduction procedures for survey H11998 conform to those detailed in the DAPR.

B4. Data Processing

Initial data acquisition and processing notes are included 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 H11998_Data_Log. All of the logs are included with the digital Separates I.

Data processing procedures for survey H11998 conform to those detailed in the DAPR. Further processing details regarding Total Propagated Uncertainty/Error (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 H11998 are listed in Table 4.

Tide values:	Measured	0.02 m	Zoning	0.10 m
Sound Speed Values:	Measured	0.50 m/s	Surface	0.50 m/s

Table 4: Survey Specific CARIS TPE Parameters

CUBE SURFACES:

The CARIS HIPS CUBE BASE surfaces created and the associated resolutions are listed below in Table 5. There were two fieldsheets created for this survey. One fieldsheet encompassed the entire sheet and the other was focused upon the entrance to Endicott Arm from Holkham Bay. The entrance area consists of the waters between Wood Spit and the shoal area to the north. ¹⁰

The features present in the entrance area are significant navigational concerns. The additional entrance field sheet has a one meter and two meter surface as detailed in Table 5 below. The more detailed resolution was utilized to provide a more precise surface that would need less designated soundings.

The depth ranges used for the surfaces in this survey differ from those given in the DAPR in order to prevent gaps between surfaces in the particularly steep sea floor near shore.

Fieldsheet Name	Surface Name	Depth Ranges (m)	Resolution (m)
H11998_QC	H11998_2m	All	2
	H11998_4m	All	4
	H11998_8m	All	8
	H11998_2m_0to20_Final	0-20	2
	H11998_4m_8 to40_Final	8-40	4
	H11998_8m_25to350_Final	25-350	8
	H11998_Combined_8m	All	8
H11998_Entrance	H11998_Entr_1m	All	1
	H11998_Entr_2m	All	2
	H11998_Entr_1m_Final	0-20	1
	H11998_Entr_2m_Final	12-50	2

Table 5: Depth Ranges and Resolutions

CUBE PARAMETERS:

The CUBE parameters utilized for creating CUBE surfaces are included in Table 6. The CUBE parameters .xml file is included with digital data in the vessel configuration folder.

Surface Resolutions	CUBE Parameters				
	Profile Name	EOV	CDS	CDM	HES
1m	1metergrid	4.00	1.0	0.71	2.95
2m	2metergrid	4.0	1.0	1.41	2.95
4m	4metergrid	4.0	1.0	2.83	2.95
8m	8metergrid	4.0	10.0	5.65	2.95

Table 6 CUBE parameters used during this survey

C. HORIZONTAL AND VERTICAL CONTROL

A complete description of horizontal and vertical control for survey H11998 can be found in the *OPR-O168-FA-08 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 utilized for positioning of the Launches 1010 and 1018, and post-processed kinematic GPS was used for positioning the *Fairweather*. Differential corrections from the U.S. Coast Guard beacon at Gustavus Island (288 kHz) were used primarily.

Fairweather (S-220) could not obtain a differential correction or was receiving a weak signal to noise ratios from the U.S. Coast Guard Beacon. A Horizontal Control point was recovered in Endicott Arm (station DAWES – PID UV0058) and static observations were made at this control point for use in post-processed kinematic GPS.

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 Juneau, AK (945-2210) served as control for datum determination and as the primary source for water level correctors for survey H11998.

A request for delivery of final approved (smooth) tides for survey H11998 was forwarded to N/OPS1 on October 23, 2008 in accordance with the Field Procedures Manual (FPM), dated May, 2008.¹¹ A copy of the request is included in Appendix V.

As per the Project Instructions, all data were reduced to MLLW using the final approved water levels (smooth tides) from the Juneau, AK station (954-2210) by applying tide file 9452210.tid and time and height correctors through the zone corrector file O168FA2008CORP.zdf. It will not be necessary for the Pacific Hydrographic Branch to reapply the final approved water levels (smooth tides) to the survey data during final processing.

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 MapInfo software program.

Survey H11998 was compared with the following charts listed in Table 7.

NOAA Chart Number	Chart Scale	Edition Number	Edition Date	Updated with Notice to Mariners through
17360	1:217,828	35ht Ed.	June 2008	June 14, 2008
17311	1:40,000	1 st Ed.	April 2000	

Table 7: NOAA Charts compared with Survey H11998

Chart 17311

Depths and contours from survey H11998 generally agreed within one to two fathoms with depths on chart 17311.¹² Some of the shoaler depths represented on the chart near the shoreline appear to have been pulled off shore for cartographic representation, but remain accurate within the scale of the chart.

Chart 17360

Depths and contours from survey H11998 generally agreed within one to two fathoms with depths on chart 17360. It is recommended that the contours produced during H11998 supersede the contours on chart 17360.¹³

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. ¹⁴

Automated Wreck and Obstruction Information System (AWOIS) Investigations

There were no AWOIS items located within the limits of H11998. ¹⁵

Dangers to Navigation

There were no dangers to navigation found within the survey limits. ¹⁶

D.2 Additional Results

Shoreline Source

A composite source file (CSF) in .000 format from Hydrographic Survey Division's Operations Branch was provided with the project instructions. Shoreline sources that were included in the composite source file included charted features from charts 17311 and 17360 see Table 8. The original file was imported into CARIS Notebook, converted to a .hob file, clipped to the sheet limits, and named H11998_Original_Composite_Source.hob to be included with the deliverables. This file was copied and named H11998_Field_Verified.hob to be utilized during verification and to contain field edits. Additionally, features from the current editions of charts 17360 and 17311 that were not depicted by the source shoreline data were digitized in CARIS Notebook with S-57 attribution into the H11998_Field_Verified.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 of the FPM. During shoreline verification, detached positions (DPs) were acquired and edits to the H11998_Field_Verified.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 17360 (1:217,828) and 17311 (1:40,000) were the largest scale charts for the project area. A Mean High Water (MHW) Buffer line, offset 32 meters (0.8 mm at scale of 1:40,000) from the composite source MHW was used in CARIS Notebook as a reference .hob file and on the boat sheet for use during shoreline verification and 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 or the 4-meter depth contour. All shoreline features from the composite source 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. 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 H11998_Field_Verified.hob or H11998_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,H11998) and final survey date 20081019. 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 8.

Shoreline Source	SORIND	SORDAT
Chart	US,US,graph,chart 17311	20000429
Chart	US,US,graph,chart 17360	20060301
Survey	US,US,graph,H11998	20081019

Table 8: 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 and 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 H11998_Field_Verified .hob file were moved to the H11998_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.¹⁷

Aids to Navigation

Survey H11998 included one (1) aid to navigation (ATON). The ATON is a flashing light that illuminates every 2.5 seconds and visible for 5 nautical miles. The height of the light is 27 feet. A detached position was taken on the ATON for check purposes only, because the ATON was positioned using static GPS methods in 2007. The ATON was found to serve its intended purpose.¹⁸

Bottom Samples

Bottom samples were collected on October 18, 2008 (DN292) and are included as seabed areas in the Notebook H11998_Field_Verified.hob file. Bottom Samples collected in the field have source indication (SORIND) and source date (SORDAT) attribute fields populated to reflect the survey number (US,US, graph, H11998) and final survey date. ¹⁹

E. Supplemental Reports

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

<u>Title</u>	<u>Date Sent</u>	<u>Office</u>
Hydrographic Systems Certification Report 2008	May 14, 2008	N/CS34
Data Acquisition and Processing Report 2008	November 21, 2008	N/CS34
Horizontal and Vertical Control Report for OPR-O168-FA-08	January 23, 2008	N/CS34
Coast Pilot Report for OPR-O168-FA-08	N/A	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

January 21, 2009

MEMORANDUM FOR: CAPT David Neander, NOAA
Chief, Pacific Hydrographic Branch

FROM: CDR Douglas D. Baird, Jr., NOAA
Commanding Officer

Digitally signed by Doug Baird
DN: cn=Doug Baird, o=NOAA Ship
FAIRWEATHER, ou=NOAA, email=co.
fairweather@noaa.gov, c=US
Reason: I am approving this
document
Date: 2009.01.21 16:17:19 -08'00'

TITLE: Approval of Hydrographic Survey H11998,
OPR-O168-FA-08

As Chief of Party, I have ensured that standard field surveying and processing procedures were adhered to during acquisition and processing of hydrographic survey H11752 in accordance with the Hydrographic Manual, Fourth Edition; Field Procedures Manual, May 2008; and the NOS Hydrographic Surveys Specifications and Deliverables, as updated for April 2008. 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/CS34, Pacific 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:

Matthew Forney
2009.01.21 10:15:41 -08'00'

ENS Matthew Forney
Survey Manager

Matthew Ringel
2009.01.21 08:50:06
-08'00'

LT Matthew Ringel
Field Operations Officer

CST Lynnette V. Morgan
Chief Survey Technician

Attachment



Revisions Compiled During Office Processing and Certification:

¹ Concur

² Concur

³ A junction with surveys H11760 and H10756 was accomplished. See H11998 HCell for selection of soundings in the junction area.

⁴ Concur

⁵ Concur with clarification, during the SAR process minor data gaps were found. This data was re-accepted.

⁶ Concur

⁷ During the SAR process, no True Heave errors were noted.

⁸ Designated soundings were applied in the HCell as appropriate for scale and surrounding soundings.

⁹ Concur, the data is adequate to supersede charted data in the common area.

¹⁰ Office generated surface, H11998_Office_Combined, was used for cartographic compilation.

¹¹ A copy of the Tide Note, dated November 4, 2008 is attached to this report.

¹² Concur

¹³ Concur

¹⁴ Concur

¹⁵ Concur

¹⁶ Concur

¹⁷ All shoreline updates which the hydrographer recommended were applied to the HCell or already applied to the chart.

¹⁸ Concur

¹⁹ All bottom samples which were collected are applied to the HCell. Four charted bottom samples should be retained, see blue notes on the HCell.



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

TIDE NOTE FOR HYDROGRAPHIC SURVEY

DATE : November 4, 2008

HYDROGRAPHIC BRANCH: Pacific
HYDROGRAPHIC PROJECT: OPR-0168-FA-2008
HYDROGRAPHIC SHEET: H11998

LOCALITY: Southern Portion of Holkham Bay, Endicott Arm, AK
TIME PERIOD: October 15 - 19, 2008

TIDE STATION USED: 945-2210 Juneau, AK
Lat. 58° 17.9'N Long. 134° 24.6' W

PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters
HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 4.676 meters

REMARKS: RECOMMENDED ZONING

Preliminary zoning is accepted as the final zoning for project OPR-0168-FA-2008, H11998, during the time period between October 15 and 19, 2008.

Please use the zoning file "0168FA2008CORP" submitted with the project instructions for OPR-0168-FA-2008. Zones SA447 and SA449 are the applicable zones for H11998.

Refer to attachments for zoning information.

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

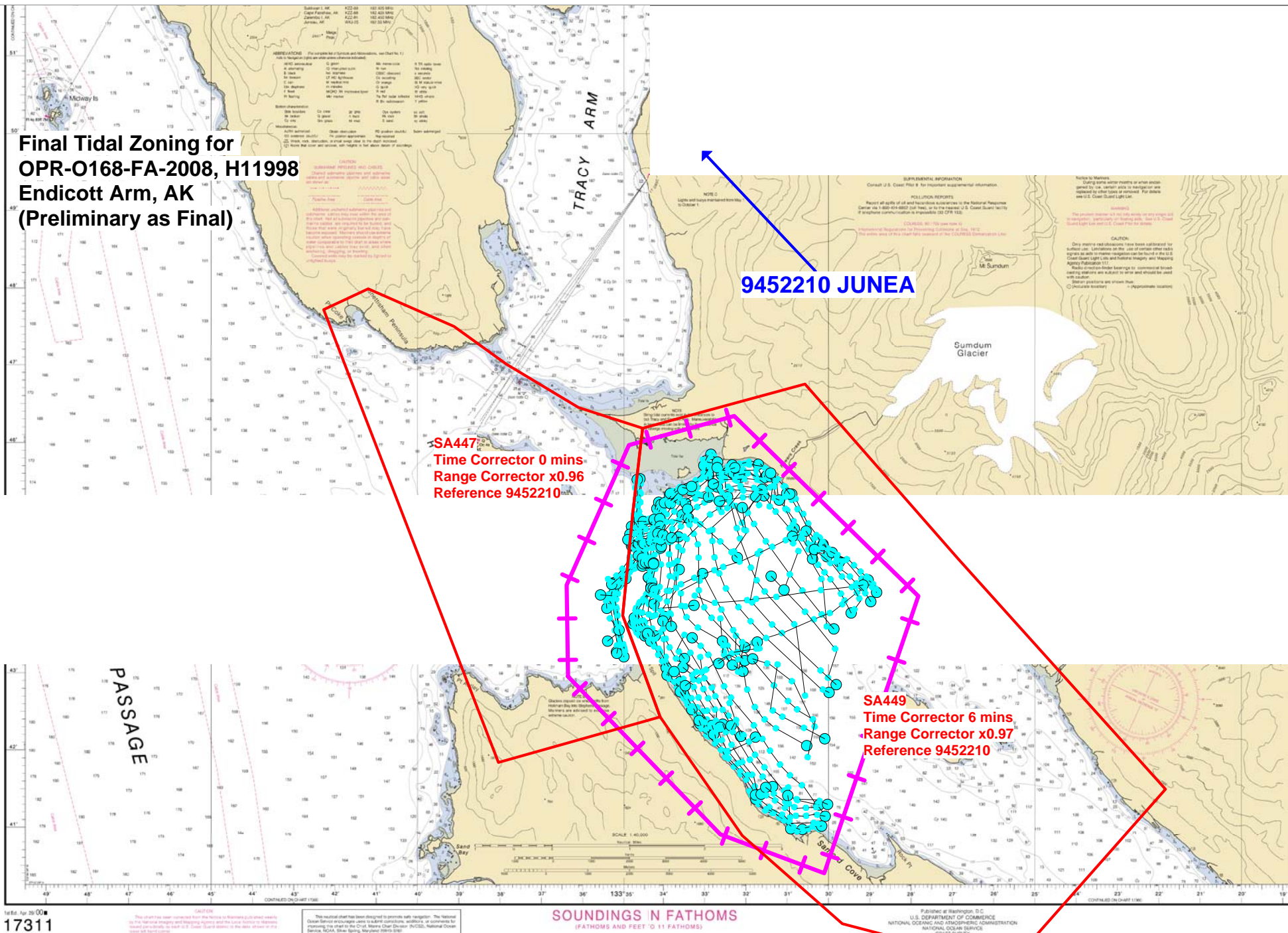
Peter J. Stone

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: 2008.11.07 07:35:15 -05'00'

CHIEF, OCEANOGRAPHIC DIVISION



**Final Tidal Zoning for
OPR-O168-FA-2008, H11998
Endicott Arm, AK
(Preliminary as Final)**



SA447
Time Corrector 0 mins
Range Corrector x0.96
Reference 9452210

9452210 JUNE A

SA449
Time Corrector 6 mins
Range Corrector x0.97
Reference 9452210

17311

This chart has been revised from the previous edition to include published notices to the mariner and other information. The U.S. Coast Guard is responsible for the accuracy of the data and the U.S. Coast Guard is not responsible for the accuracy of the data.

This nautical chart has been designed to provide safe navigation. The National Oceanic and Atmospheric Administration (NOAA) is not responsible for the accuracy of the data and the U.S. Coast Guard is not responsible for the accuracy of the data.

SOUNDINGS 'N FATHOMS
(FATHOMS AND FEET 'N 11 FATHOMS)

Electronic Navigation Certificate of Authenticity
This electronic chart was produced under the authority of the National Oceanic and Atmospheric Administration (NOAA) and is the national hydrographic office for the United States of America. The digital data provided by NOAA from which this electronic chart was produced has been certified by NOAA for navigation. "NOAA" and the NOAA emblem.

H11998 HCell Report
Russ Davies, Cartographer
Pacific Hydrographic Branch

1. Specifications, Standards and Guidance Used in HCell Compilation

HCell compilation of survey H1 1998 used:

Office of Coast Survey HCell Specifications: Draft, Version: 4.0, 17 March, 2010.
HCell Reference Guide: Version 2.0, 22 February, 2010.

2. Compilation Scale

Depths and features for HCell H1 1998 were compiled to the largest scale raster charts shown below:

Chart	Scale	Edition	Edition Date	NM Date
17311_1	1:40,000	1st	04/2000	05/20/2006

The following ENC was not used during compilation:

Chart	Scale
US2AK30M	1:1,500,000

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 survey scale using a Radius Table file with values shown in the table, below.

Shoal Limit (m)	Deep Limit (m)	Radius (mm)
0.0	10	3
10	20	4
20	50	4.5
50	300	5

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 17311	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 H11998_SS.000
0	0	0.000	0.000	0
3	5.4864	5.715	3.125	3
10	18,288	18.5166	10.125	10
20	36.576	37.9476	20.750	20
50	91.44	92.8116	50.750	50
100	182.88	184.2416	100.750	100

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 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 areas are included in HCell H11998:

M_QUAL

The Meta area objects were 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
ACHARE	Anchorage Area
DEPCNT	Modified GC MLLW
M_QUAL	Data quality Meta object
SBDARE	Rocky seabed areas
SOUNDG	Soundings at the chart scale density
UWTROC	Rocks

The *_SS HCell contains the following Objects:

DEPCNT	Generalized 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

H11998 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

H11998_CS.000	Base Cell File, Chart Units, Soundings and features compiled to 1:10,000
H11998_SS.000	Base Cell File, Chart Units, Soundings and Contours compiled to 1:40,000
H11998_DR.pdf	Descriptive Report including end notes compiled during office processing and certification, the HCell Report, and supplemental items
H11998_outline.gml	Survey outline
H11998_outline.xsd	Survey outline

11.2 Software

CARIS HIPS Ver. 6.1	Inspection of Combined BASE Surfaces
CARIS BASE Editor Ver. 2.3	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:

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APPROVAL SHEET
H11998

Initial Approvals:

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 disapproval 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.