

H11500

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.* ..... H11500

### LOCALITY

*State* ..... ALASKA

*General Locality* ..... Approaches to Cordova

*Sublocality* ..... Simpson Bay

2006

### CHIEF OF PARTY

..... Andrew L. Beaver CDR, NOAA

### LIBRARY & ARCHIVES

DATE .....

## HYDROGRAPHIC TITLE SHEET

H11500

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.

State AlaskaGeneral Locality Approaches to CordovaSublocality Simpson BayScale 1:10,000Dates of Survey 09/06/06 – 10/12/06Instructions Date 8/4/2006 Change dated 10/6/2006Project No. OPR-P158-FA-06Vessel Launch 1010, Launch 1018, MonArk 1706, Ambar 2302Chief of Party CDR Andrew L. Beaver, NOAASurveyed by G. Froelich, J. Dowling, G. LewisSoundings taken by echo sounders: Reson 8101ERGraphic record scaled by N/AGraphic record checked by N/AEvaluation by K. ReserAutomated plot by N/AVerification by K. BrownSoundings in Feet

at

MLLWREMARKS: Time in UTC. UTM Projection Zone 6

Revisions and annotations appearing as endnotes were

generated during office processing.

As a result, page numbering may be interrupted or non-sequential

All separates are filed with the hydrographic data.

## Descriptive Report to Accompany Hydrographic Survey H11500

Project OPR-P158-FA-06  
Approaches to Cordova, Alaska

Scale 1:10,000

September 2006

**NOAA Ship FAIRWEATHER**

Chief of Party: Commander Andrew L. Beaver, NOAA

### A. AREA SURVEYED

The survey area was located in Approaches to Cordova, within the sub-locality of Simpson Bay. This survey corresponds to Sheet F in the sheet layout provided with the Letter Instructions, as shown in Figure 1 below. The survey area is bounded on the Southwest corner at  $60^{\circ}35'00''\text{N}$ ,  $146^{\circ}02'00''\text{W}$  and the Northeast corner at  $60^{\circ}43'00''\text{N}$ ,  $145^{\circ}44'00''\text{W}$ .<sup>1</sup>

Data acquisition was conducted from September 6 to October 12, 2006 (DN 249 to DN 285).

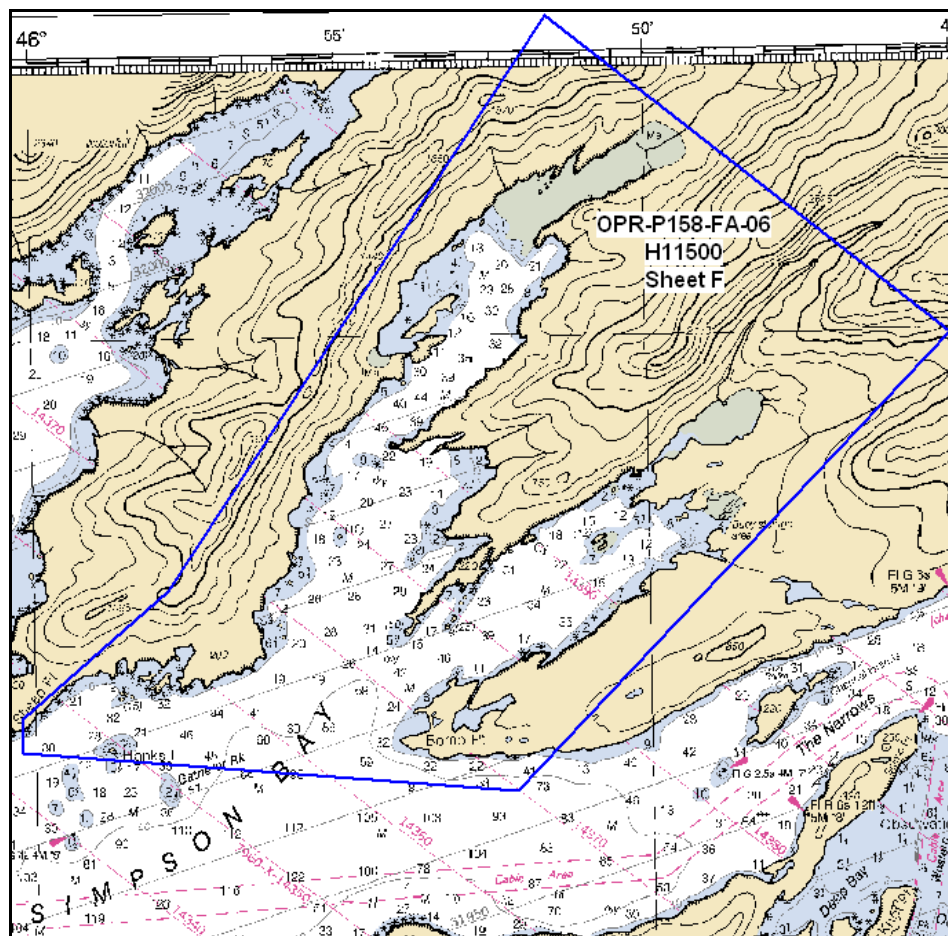


Figure 1: H11500

One hundred percent multibeam echosounder (MBES) coverage was obtained in the survey area offshore of the 8-meter depth curve.<sup>2</sup> When conditions allowed, multibeam echosounder (MBES) data was acquired parallel to contours and at a line spacing of no less than 25 meters at depths between four and eight meters. Additional coverage was obtained when determining least depths over features or shoals offshore of the Navigational Area Limit Line (NALL), which is defined as the furthest offshore from the Mean High Water line of the either the 4-meter depth contour or 0.8mm distance of the scale of the largest chart.

Shoreline data were acquired for H11500. These data were attributed as S-57 objects for submittal.

## 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 *OPR-P158-FA-06 Data Acquisition and Processing Report (DAPR)*<sup>3</sup>, 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 Letter Instructions OPR-P158-FA, dated August 4, 2006, Change No.1, dated October 4, 2006 and Change No. 2, dated October 6, 2006.

### B1. Equipment and Vessels

Equipment and vessels used for data acquisition and survey operations during this survey are listed below in Table 1.

	Jensen Launch 1010	Jensen Launch 1018	MonArk	Ambar 700
<b>Hull Registration Number</b>	1010	1018	1706	2302
<b>Builder</b>	The Boat Yard, Inc.	The Boat Yard, Inc.	MonArk	Marine Silverships, Inc
<b>Length Overall</b>	28' 10"	28' 10"	17'	23'
<b>Beam</b>	10' 8"	10' 8"	7'2"	9' 4"
<b>Draft, Maximum</b>	4' 0" DWL	4' 0" DWL	1' 3"	1' 4"
<b>Cruising Speed</b>	24 knots	24 knots	20 knots	22 knots
<b>Max Survey Speed</b>	10 knots	10 knots		
<b>Primary Echosounder</b>	RESON 8101	RESON 8101		
<b>Sound Velocity Equipment</b>	SBE 19plus	SBE19plus		
<b>Attitude &amp; Positioning Equipment</b>	POS/MV V3	POS/MV V3		
<b>Type of operations</b>	MBES	MBES	Shoreline	Shoreline, Bottom Samples

*Table 1: Vessel Inventory*

No vessel configurations used during data acquisition deviated from the DAPR.<sup>4</sup>

**B2. Quality Control**

Internal consistency and integrity of data collected for survey H11500 were manually examined by the Hydrographer in CARIS subset mode. The internal consistency and integrity of data collected for survey H11500 were found to be very good<sup>5</sup>

**Crosslines**

Shallow water multibeam crosslines for this survey totaled 15.38 linear nautical miles (lnm), comprising 10.56% of the 145.65 total SWMB hydrography completed. Both main scheme and crossline mileage are summarized in Table 2.<sup>6</sup>

<b>MAIN SCHEME - Mileage</b>	
Single Beam MS	0
Multibeam MS mileage	145.6551064
SideScan MS	0
<b>Total MS</b>	<b>145.6551064</b>
<b>CROSSLINE - Mileage</b>	
Single Beam XL	0
Multibeam XL	15.3810054
<b>Total XL</b>	<b>15.3810054</b>
<b>OTHER</b>	
Developments/AWOIS - Mileage	0
Shoreline/Nearshore Investigation - Mileage	27.64
<b>Total # of Investigated Items</b>	<b>28</b>
<b>Total Bottom Samples</b>	<b>13</b>
<b>Total SNM</b>	<b>7.3</b>
<b>Specific Dates of Acquisition</b>	September 6 - October 12, 2006
<b>Specific Dn#s of Acquisition</b>	DN 249- DN 285

*Table 2: Mileage Calculations*

The Hydrographer has determined, through manual examination of the data, that the general crossline agreement with main scheme data meet the vertical accuracy requirements as stated in the *NOS Hydrographic Surveys Specifications and Deliverables (NHSSD)*, dated June 2006. There are several localized areas in the north and northeast arm of Simpson Bay where the crossline agreement deviates by up to 0.75m. In these areas the errors have affected the finalized surfaces.<sup>7</sup>

**Junctions**

SAME PROJECT JUNCTIONS:

Survey H11500 junctions with H11609, which is Sheet G of the same project. The area of overlap between the sheets was approximately 315 meters wide. Data were reviewed in CARIS Subset Editor and depths were found to be consistent between the two surveys, meeting the requirements as stated in the *NHSSD*.<sup>8</sup> The sheet limits and area of overlap for Sheets F and G are shown in Figure 2.

Survey H11500 also junctions with H11498 and H11499, respectively Sheet C and Sheet D of project OPR-P158-FA-05. The area of overlap between H11498 and H11500 was approximately 900 meters along the southern portion of Simpson Bay. The area of overlap between H11499 and H11500 was approximately 100 meters at the far southwest corner of Simpson Bay. Data were reviewed in CARIS Subset Editor and depths were found to be consistent between the two surveys, meeting the requirements as stated in the *NHSSD*.<sup>9</sup> The sheet limits and area of overlap for Sheets F, C and D are shown in Figure 2.

The area of overlap for H11500, H11609, H11498 and H11499 is shown in Figure 2.

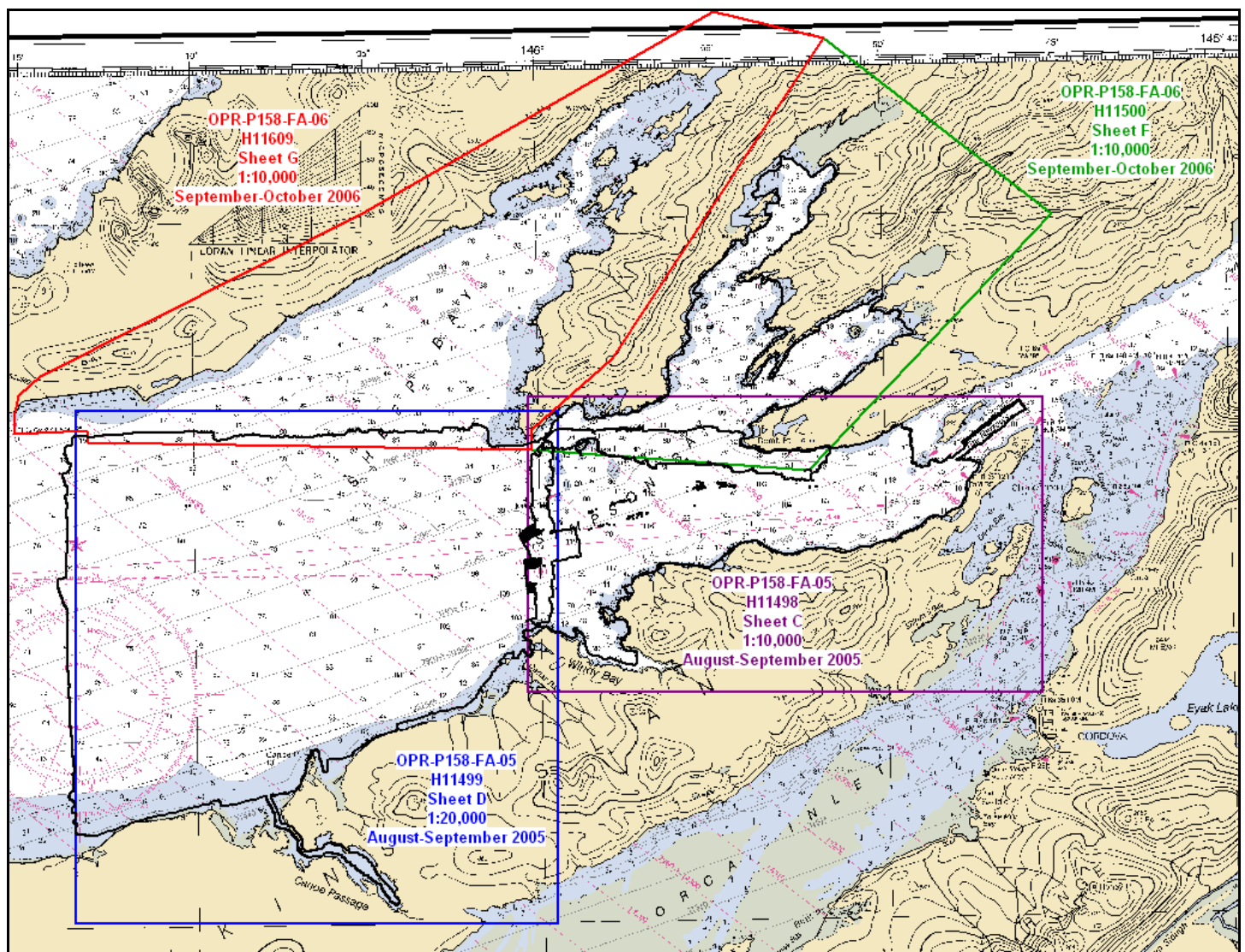


Figure 2: Junctions between H11500, H11609, H11498 and H11499



**Quality Control Checks**

MBES quality control checks were conducted as discussed in the quality control section of the *OPR-P158-FA-06 Data Acquisition and Processing Report (DAPR)*.

**Data Quality Factors**

**COVERAGE ASSESSMENT:**

Coverage assessment was determined using the following base surface resolutions listed below in Table 3.

Depth Ranges (m)		Resolution (m)
Low	High	
0	40	2
30	70	5
50	120	10
100	200	20

**Table 3: Depth Ranges and Resolutions**

**DESIGNATED SOUNDINGS:**

Designation of soundings followed procedures as outlined in the DAPR.

**TRUEHEAVE:**

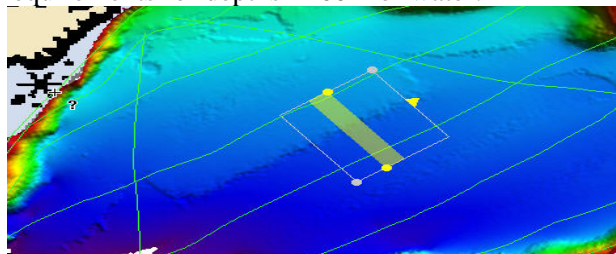
TrueHeave data could not be applied to four lines totaling approximately 2.2 nm, of MBES data from September 9, 2006 (DN 252), due to a corrupt file. Due to the negligible swell in the protected waters of Simpson Bay, MBES data quality from that day does not appear to have been affected by the lack of TrueHeave.

**ROLL:**

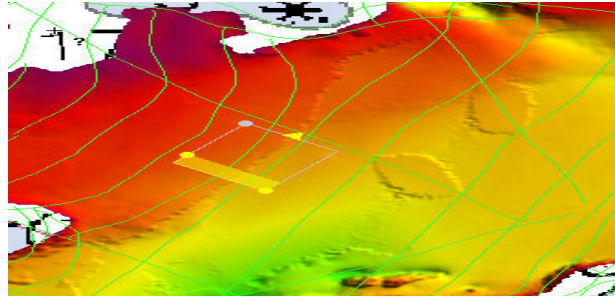
As mentioned in the DAPR, roll issues were found to be present in some of the MBES data collected from launch 1018 and 1010. Survey H11500 found roll issues for Dn 252 from launch 1018 and Dn 255 from launch 1010. To help eliminate roll issues Fairweather personnel evaluated and adjusted daily HVF files, using adjacent lines, for the mentioned days that roll was present. After adjustments were made to the HVF, data met accuracy specifications.<sup>10</sup>

**VERTICAL OFFSETS:**

A 1.5m vertical offset in the 5m surface in the northeast arm of Simpson Bay was discovered. The offset occurs between vessel 1010 on DN249 within 2.5 hours of each other. This offset can most likely be attributed to tidal error. Offset exceeds HSSDM requirements for depths in 60m of water.<sup>11</sup>



A 1m vertical offset in the 5m surface in the northern arm of Simpson Bay was discovered. The offset occurs between vessel 1010 and 1018 on DN252 within 15 minutes of each other. The offset exceeds HSSDM requirements for depths in 40m of water.<sup>12</sup>



### Accuracy Standards

All data meet the data accuracy specifications as stated in the *NHSSD*.<sup>13</sup>

### B3. Corrections to Echo Soundings

Data reduction procedures for survey H11500 conform to those detailed in the DAPR.

### B4. Data Processing

There is one field sheets created for the various resolution requirements for survey H11500. The field sheet named H11500 encompasses the entire survey area and includes the 2 meter, 5 meter, 10 meter and 20 meter resolutions.<sup>14</sup> The field sheet area is shown below in Figure 3.

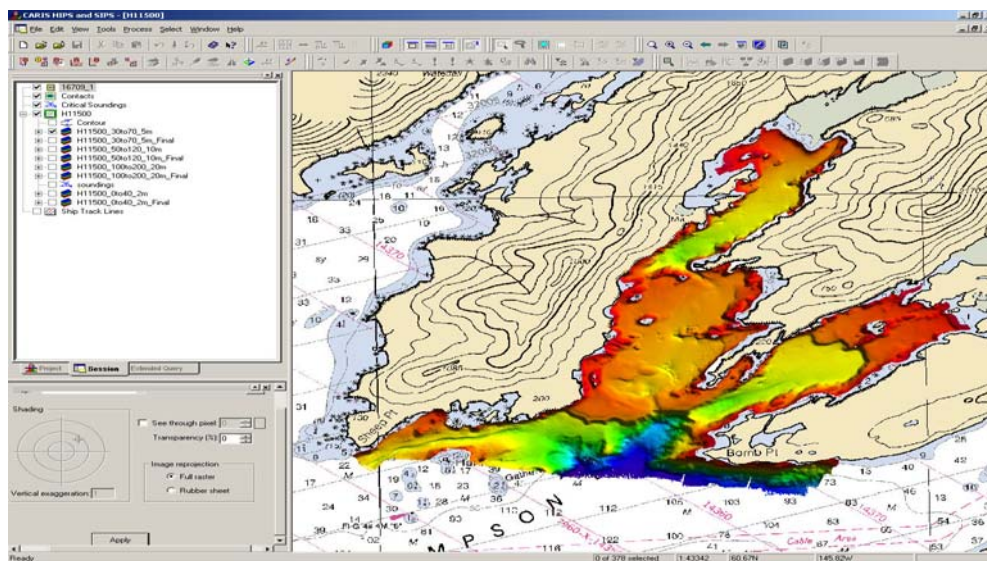


Figure 3: Field Sheet layout for survey H11500



### C. HORIZONTAL AND VERTICAL CONTROL

A complete description of horizontal and vertical control for survey H11500 can be found in the *OPR-P158-FA-06 Horizontal and Vertical Control Report*,<sup>15</sup> 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 GPS (DGPS) was the sole method of positioning. Differential corrections came from the U.S. Coast Guard beacons at Cape Hinchinbrook (292 kHz), Potato Point (298 kHz) and Kenai (310 kHz).

#### Vertical Control

The vertical datum for this project is Mean Lower-Low Water (MLLW). The operating National Water Level Observation Network (NWLON) primary tide station at Cordova, AK (945-4050) served as control for datum determination and as the primary source for water level reducers for survey H11500 during acquisition. Data were collected for the NWLON tertiary tide station listed below, although this data was not applied to final water levels for the project.

FAIRWEATHER personnel installed one Sutron 8210 “bubbler” tide gauge (Gauge #A4 S/N 002326) at the tertiary station listed below. The gauge was installed in order to provide information to Center for Operational Oceanographic Products and Services (CO-OPS N/OPS1).

Station Name	Station Number	Type of Gauge	Date of Installation	Date of Removal
Gravina River, AK	945-4153	Tertiary	October 17, 2006	October 26, 2006

A request for delivery of final approved water level data (smooth tides) for survey H11500 was forwarded to N/OPS1 on October 30, 2006 in accordance with the *Field Procedures Manual v2p1*, dated May 2006 (*FPM*). A copy of the request is included in Appendix V.

FAIRWEATHER received the Tide Note for Hydrographic Survey H11500 on November 9, 2006. The Tide Note for Hydrographic Survey H11500 states that preliminary zoning is accepted as the final zoning correctors. Final approved water level data were received by the FAIRWEATHER on November 9, 2006 for NWLON primary tide station Cordova (945-4050). The Tide Note for Hydrographic Survey H11500 is included in Appendix V.<sup>16</sup>

As per the Letter Instructions, all data were reduced to MLLW using the final approved water levels (smooth tides) from station Cordova (945-4050) by applying tide file 9454050.tid and time and height correctors through the zone corrector file P158FA2006CORP.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<sup>17</sup>

Chart comparisons were carried out using Caris and MapInfo. CUBE surfaces, created for the appropriate resolutions dependent on survey depths, were finalized and brought into Field Sheet Editor in HIPS 6.1. A sounding layer was created for each surface and then exported to an S57 file. This file was then converted to a MapInfo Table, enabling chart comparisons to be carried out in MapInfo where the soundings from the ENC could be imported and overlaid on the soundings generated from the survey CUBE surfaces.

Survey H11500 was compared with the following ENCs (Electronic Navigation Charts) as per the Letter Instructions: Chart US4AK24M.000 (9<sup>th</sup> Ed.; March 2007, 1:79,291), chart US4AK25M.000 (9<sup>th</sup> Ed.; February 2007, 1:80,000) and chart US5AK2CM.000 (5<sup>th</sup> Ed.; January 2007, 1:30,000). All of the ENCs have been updated with the Notice to Mariners through January 2007. There was one new update to the survey area which was applied to the ENCs. Chart comparisons were done in MapInfo, where the soundings from the ENCs could be imported and overlain on the soundings generated from the survey BASE surface. For easier viewing the ENC soundings were colored red and the survey soundings colored black.

#### **Chart US4AK24M.000**

During chart comparisons with chart US4AK24M, discrepancies were found in the southwest corner of H11500 near Hanks Island. A 38 meter ENC sounding was found above a 50 meter sounding, an 84 meter ENC sounding was found centered between a 61 and 54 meter sounding, and a 71 meter ENC sounding was found above the surrounding 56 meter sounding (see figure 4 and 5).

The rest of the depths on chart US4AK24M generally agree with the depths from survey H11500.

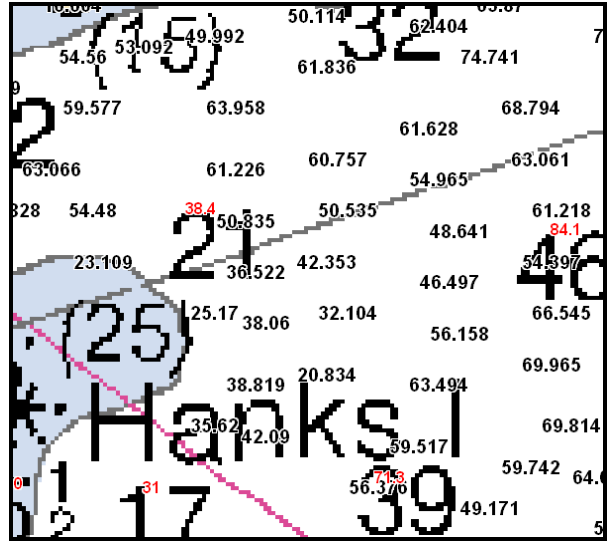


Figure 4. Charted (US4AK24M) 38 meter sounding, 84 meter sounding and 71 meter sounding and surrounding soundings from BASE surface

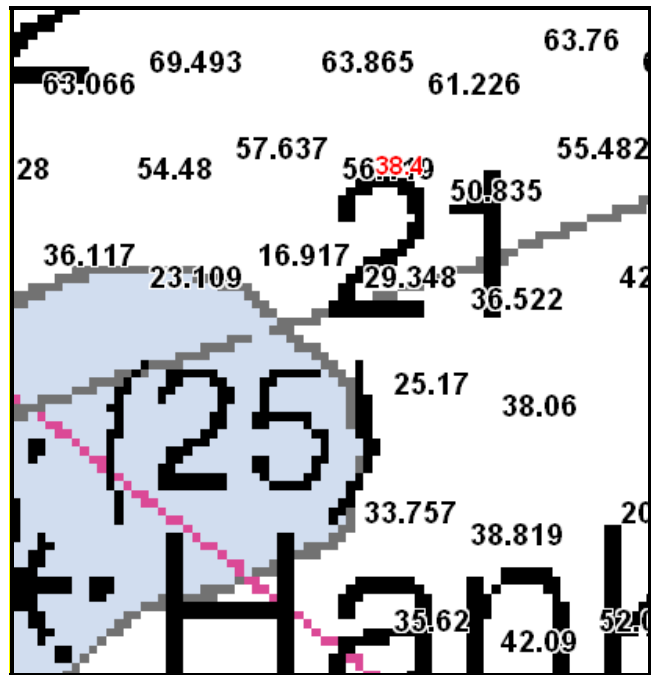


Figure 5. Close up of charted (US4AK24M) 38 meter sounding and surrounding soundings from BASE surface

**Chart US4AK25M.000**

In the northwest corner of H11500 a 29 meter ENC sounding was found near a 50 meter BASE surface generated sounding (see Figure 6). East of Bomb Pt. in the southeast portion of H11500 a 58 meter ENC

sounding was found above a 14 meter BASE surface generated sounding (see Figure 7). Off the center tip above Bomb Pt. a 37 meter ENC sounding was found over a 36 meter BASE surface generated sounding (see Figure 8).

The rest of the depths on chart US4AK25M generally agree with the depths from survey H11500.<sup>18</sup>

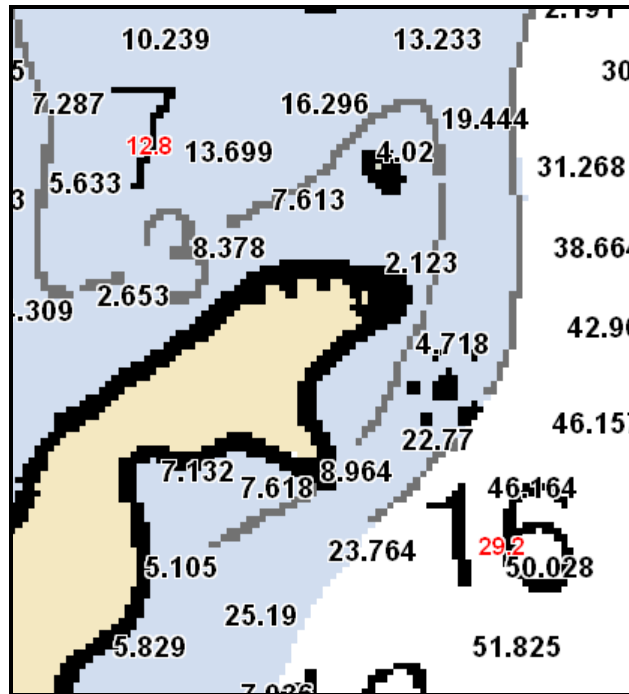


Figure 6. Close up of charted (US4AK25M) 29 meter sounding and surrounding soundings from BASE surface

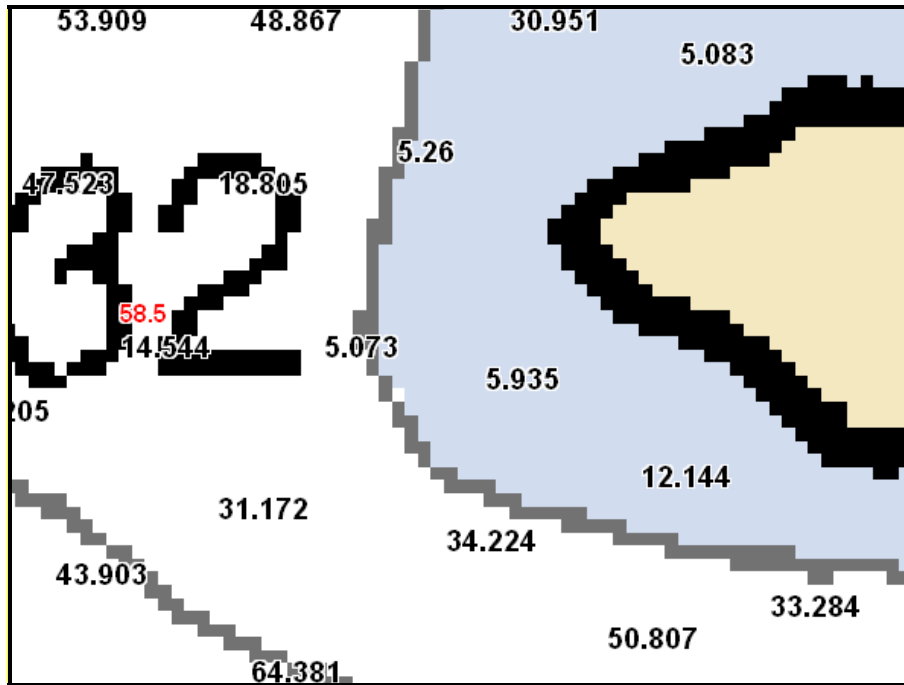


Figure 7. Close up of charted (US4AK25M) 58 meter sounding and surrounding soundings from BASE surface

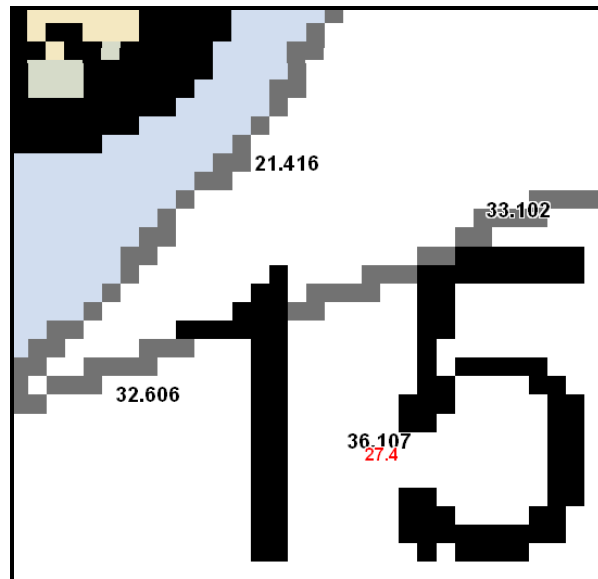


Figure 8. Close up of charted (US4AK25M) 27 meter sounding and surrounding soundings from BASE surface

### Chart US5AK2CM.000

Although chart US5AK2CM overlaps in the eastern portion of Simpson Bay, no soundings were generated for that area on the ENC, therefore a chart comparison could not be done (see figure 9).



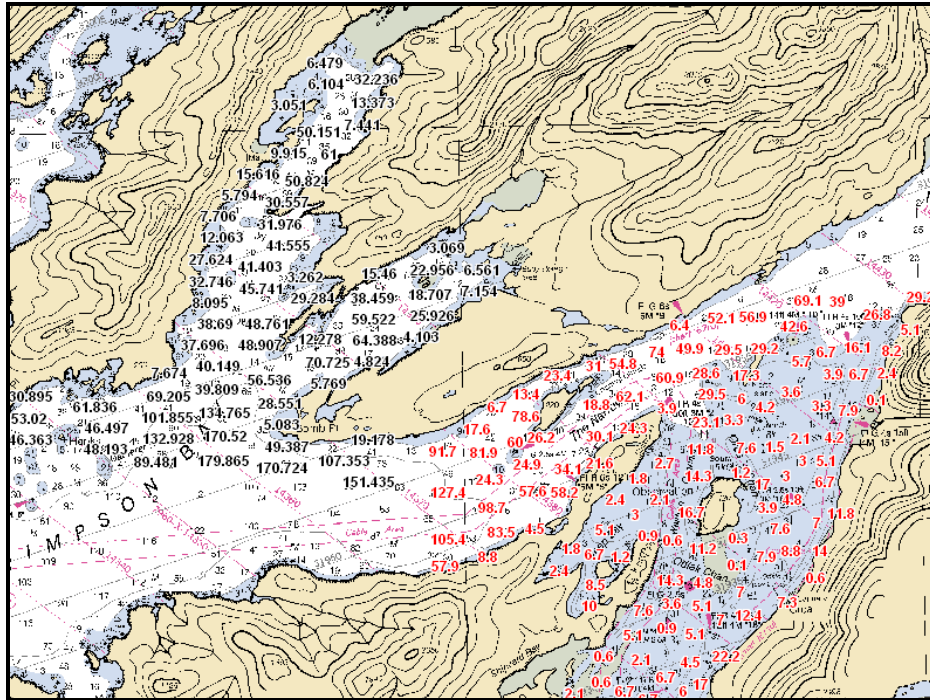


Figure 9. Sounding from Chart US5AK2CM (red) and surrounding soundings from BASE surface

**Chart Comparison Recommendations**

The Hydrographer has determined that bottom coverage requirements have been met and data accuracy meets requirements specified by the *NHSSD*.<sup>19</sup> The BASE surfaces with the application of designated soundings are adequate to supersede prior surveys in their common areas. Based on the application of verified water level data (smooth tides) by FAIRWEATHER, final chart comparisons are not required by the Pacific Hydrographic Branch.

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

There were 3 AWOIS items located within the limits of H11500. All AWOIS items are addressed in the H11500\_Features.pdf in Appendix II.

**Dangers to Navigation**

One danger to navigation was found and reported to the Marine Charting Division for final submission to the Seventeenth Coast Guard District on September 12, 2006.<sup>20</sup> However, the initial submitted report was not confirmed within the Marine Charting Division (see correspondence folder) and DTON was not processed until September 27, 2006. A copy of the preliminary Danger to Navigation Report is included with the Pydro Preliminary Smooth Sheet (PSS).

## D.2 Additional Results

### Shoreline Source

Source shoreline for this sheet was taken from photogrammetric survey AK0402 (NAD 83) GC-10570 at the scale of 1:30,000. The CFF shoreline was imported into CARIS Notebook 2.2 as an editable layer named H11500\_Edited\_CFF\_shoreline.hob, with all objects having S57 attribution.

### Shoreline Verification

FAIRWEATHER personnel conducted limited shoreline verification at times near predicted low water, in accordance with the Standing Project Instructions and Hydrographic Surveys Technical Directive 2006-2. Detached positions (DPs) and generic positions (GPs) acquired during shoreline verification were recorded in TerraSync and on paper DP forms. Scanned copies of the DP forms are included in the digital Separates folder and hard copies can be found with the *Separates to be Included with Survey Data*.<sup>21</sup> In addition, annotations describing shoreline were recorded on hard copy plots of the digital shoreline.

### Shoreline Data Processing

Positions acquired during shoreline verification operations were processed in GPS Pathfinder Office and inserted into Pydro using the Generic GPs/DPs Import tool. Features were entered as Detached Positions (DPs) when tide correctors were required, while Generic Positions (GPs) were used if no tide correction was needed. The DPs and GPs indicate new features, revisions to features, or features not found during shoreline verification. All features in Pydro were S57 attributed.

All accepted and primary detached and generic positions including any pertinent Lidar and AWOIS investigation items were imported from the Pydro.xml into one separate stand alone .hob file in CARIS Notebook 2.2 named H11500\_Updates.hob.

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

AWOIS items and items for survey H11500 associated with a detached or generic position that needed further discussion were flagged Report in Pydro. Investigation or survey methods were listed under the Remarks tab and, when appropriate, recommendations to the cartographer were included in the Recommendations tab. A survey feature report for shoreline items was generated and included as H11500\_Survey\_Features.pdf in Appendix II.<sup>22</sup>

The H11500\_Updates.hob, compiled in CARIS Notebook, had new items digitized and existing features from the CFF and chart modified. New and modified items are denoted with the SORIND and SORDAT field filled in for the current survey. Features to be retained as depicted by the source shoreline file were left with their original SORIND value. One exception is when only small sections of the source item was edited, rather than update the entire item's SORIND field, marker notes were used to indicate the section of the item that was modified by the current survey. Field notes made by the Hydrographer on the boat sheets and DP forms were transferred to the remarks field for each feature.

A description of the shoreline files is as follows\*:

H11500_Original_CFF_shoreline.hob	The original composite source file received from ops
H11500_Updates.hob	Contains only new and modified features from shoreline verification
H11500_Disprovals.hob	Contains only disproved features from shoreline verification
H11500_Edited_CFF_shoreline.hob	The “new” shoreline depicting the new and/or modified features and the removal of the disproved features

\*section highlighted in yellow was added in the office.

### 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 CFF and charts.<sup>23</sup>

### Aids to Navigation

There were no Aids to Navigation within the survey limits.<sup>24</sup>

### Bottom Samples

Bottom samples were collected on September 13, 2006 (DN 256) and are included as seabed classifications along with the other S57 features in the Pydro Preliminary Smooth Sheet. The bottom sample positions were also imported to the Notebook H11500\_Updates.hob file.<sup>25</sup>

### 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 Readiness Review 2006	May 18, 2006	N/CS34
OPR-P158-FA-06 Data Acquisition and Processing Report	April 10, 2007	N/CS34
OPR-P158-FA-06 Horizontal & Vertical Control Report	Nov 8, 2006	N/CS34, N/OPS1



**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

May 31, 2007

MEMORANDUM FOR: CDR Donald W. Haines, NOAA  
Chief, Pacific Hydrographic Branch

FROM: CDR Andrew L. Beaver, NOAA  
Commanding Officer

TITLE: Approval of Hydrographic Survey H11500,  
OPR-P158-FA

Andrew L. Beaver  
I am approving this  
document  
2007.06.02 11:18:23  
CEST

As Chief of Party, I have ensured that standard field surveying and processing procedures were adhered to during acquisition and processing of hydrographic survey H11500 in accordance with the Hydrographic Manual, Fourth Edition; Hydrographic Survey Guidelines; Field Procedures Manual, May 2006 Version 2.1; and the NOS Hydrographic Surveys Specifications and Deliverables, as updated for March 2003. 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:

Date: 2007.06.02 16:48:16 Z

LTjg Guinevere Lewis  
Survey Manager

Jennifer Dowling  
I have reviewed this document  
2007.06.02 10:31:40 -0800

LT Jennifer Dowling  
Field Operations Officer

Grant Froelich  
I have reviewed this document  
2007.06.11 16:11:25 Z

CST Grant Froelich  
Chief Survey Technician

Attachment



## Revisions Compiled during Office Processing and Certification

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<sup>1</sup> Concur

<sup>2</sup> Do not concur. 100% multibeam coverage was not obtained to the 8m curve in all cases. There were also alongtrack holidays on the southern edge of the area that do not meet the 3 nodes requirement specified in the HSSDM. The holidays occur in depths from 55m to 150m and have been examined to ensure no significant features exist in the gaps. New holidays were also created in areas where data was removed to address roll errors and vertical offsets that did not meet spec. Prior to removing data the areas were examined to ensure no significant features exist in the new gaps.

<sup>3</sup> Filed with project records.

<sup>4</sup> Do Not Concur. HVF offsets have changed since the DAPR values.

<sup>5</sup> Do not concur. Numerous vertical offsets and roll errors. See endnotes 10-13.

<sup>6</sup> Several crosslines were removed to bring data within spec. Total XL mileage is now 7.13 Inm, which is 4.91% of the now total 145.35 Inm mainscheme. Although the crosslines total less than 5 % of mainscheme lines as required by specifications, they are adequate for crossline tests.

<sup>7</sup> Do not concur. There are differences up to 1m throughout the area and up to 2m in the NW arm of the bay. Entire lines and partial lines were removed to address this issue.

<sup>8</sup> Concur

<sup>9</sup> Concur

<sup>10</sup> Do Not Concur – there is data with roll errors that do not meet spec. Outer beams were manually cleaned in the office to bring the data within spec.

<sup>11</sup> Data in areas that were out of spec were removed.

<sup>12</sup> Data in areas that were out of spec were removed.

<sup>13</sup> After significant cleaning by PHB personnel to remove bad data, the final data meets specifications.

<sup>14</sup> Evaluator created new uncertainty weighted grids at 1m, 2m, and 5m resolutions.

<sup>15</sup> Filed with project records.

<sup>16</sup> See attached Tide Note dated November 9, 2006.

<sup>17</sup> The chart comparison does not include rasters 16708 (1:79,291) and 16709 (1:80,000). The compiler used raster chart 16709 for comparison during compilation as this chart encompassed the entire survey area. Although the two charts are very close in scale, discrepancies were noted in shoreline features throughout the areas in common with each other and survey H11500. The discrepancies arise from a shift of approximately 75 meters to the south in soundings and offshore features on chart 16709 (the MHW of the mainland on the charts match). In addition, many features, such as islets and rocks have been charted twice on 16709, once at their correct position (as shown on chart 16708) and again at their shifted position to the south. Blue notes in the HCell indicate duplicate features on 16709 which are recommended to be removed from the chart. The compiler recommends that the shoreline on chart 16709 be reviewed and recompiled.

<sup>18</sup> Do not concur. When compared to chart 16709, differences up to 5 fathoms with charted soundings were noted in several areas of the survey. In the cases where the surveyed depth were shallower, the new depth was not considered significant enough to constitute a DTON.

<sup>19</sup> Do not concur. See endnote 2.

<sup>20</sup> Do not concur. There are 2 DTON submissions in DR appendix 1. Both have been charted and retained in the HCell.

<sup>21</sup> Filed with hydrographic records.

<sup>22</sup> The features report contains the 3 AWOIS items and one of the two DTONs.

<sup>23</sup> Concur.

<sup>24</sup> Concur

<sup>25</sup> Bottom samples from the survey, along with charted bottom samples from the ENC are included in the HCell. See the SORIND for the source of bottom samples.



# H11500 Danger to Navigation Report

**Registry Number:** H11500  
**State:** Alaska  
**Locality:** Approaches to Cordova  
**Sub-locality:** Simpson Bay  
**Project Number:** OPR-P158-FA-06  
**Survey Dates:** 09/06/06 - 10/12/06

## Charts Affected

Number	Edition	Date	Scale (RNC)	RNC Correction(s)*
16709	23rd	04/01/2005	1:80,000 (16709_1)	[L]NTM: ?
16700	29th	07/01/2004	1:200,000 (16700_1)	[L]NTM: ?
16013	29th	11/01/2003	1:969,761 (16013_1)	[L]NTM: ?
531	23rd	01/01/2006	1:2,100,000 (531_1)	[L]NTM: ?
500	8th	06/01/2003	1:3,500,000 (500_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
1.1	Rock	-0.39 m	60° 40' 30.5" N	145° 52' 45.8" W
1.2	Shoal	2.76 m	60° 36' 46.4" N	145° 54' 13.2" W

## **1 - Danger To Navigation**

**1.1) 12504****DANGER TO NAVIGATION****Survey Summary**

**Survey Position:** 60° 40' 30.5" N, 145° 52' 45.8" W  
**Least Depth:** -0.39 m (= -1.27 ft = -0.212 fm = 0 fm 4.73 ft)  
**TPU ( $\pm 1.96\sigma$ ):** **THU (TPEh)** [None] ; **TVU (TPEv)** [None]  
**Timestamp:** 2006-250.15:39:44.000 (09/07/2006)  
**DP Dataset:** h11500 / fa\_trimble\_dpne\_1 / 2006-250 / tr1\_dn250.mdb  
**Profile/Beam:** 4/1  
**Charts Affected:** 16709\_1, 16700\_1, 16013\_1, 531\_1, 500\_1, 50\_1

**Remarks:**

new rk

**Feature Correlation**

Address	Feature	Range	Azimuth	Status
h11500/fa_trimble_dpne_1/2006-250/tr1_dn250.mdb	4/1	0.00	000.0	Primary

**Hydrographer Recommendations**

Hydrographer recommends charting new rock at position 60°40'30.529" N, 145°52'45.779" W with a least depth of -0.39m (-0.21 fm). Observed tides file used for vertical control.

**Cartographically-Rounded Depth (Affected Charts):**

0 ¼fm (16709\_1, 16700\_1, 16013\_1)

0fm 1ft (531\_1)

-.4m (500\_1, 50\_1)

**Office Notes**

Concur. DTON has been charted as a rock that covers and uncovers with least depth -0.1640 fm. Retain rock as charted.

## Feature Images



*Figure 1.1.1 DP# 12504, New Rock*



*Figure 1.1.2 DP# 12504, New Rock*



**1.1) 12504****DANGER TO NAVIGATION****Survey Summary**

**Survey Position:** 60° 40' 30.5" N, 145° 52' 45.8" W  
**Least Depth:** -0.39 m (= -1.27 ft = -0.212 fm = 0 fm 4.73 ft)  
**TPU ( $\pm 1.96\sigma$ ):** **THU (TPEh)** [None] ; **TVU (TPEv)** [None]  
**Timestamp:** 2006-250.15:39:44.000 (09/07/2006)  
**DP Dataset:** h11500 / fa\_trimble\_dpne\_1 / 2006-250 / tr1\_dn250.mdb  
**Profile/Beam:** 4/1  
**Charts Affected:** 16709\_1, 16700\_1, 16013\_1, 531\_1, 500\_1, 50\_1

**Remarks:**

new rk

**Feature Correlation**

Address	Feature	Range	Azimuth	Status
h11500/fa_trimble_dpne_1/2006-250/tr1_dn250.mdb	4/1	0.00	000.0	Primary

**Hydrographer Recommendations**

Hydrographer recommends charting new rock at position 60°40'30.529" N, 145°52'45.779" W with a least depth of -0.39m (-0.21 fm). Observed tides file used for vertical control.

**Cartographically-Rounded Depth (Affected Charts):**

0 ¼fm (16709\_1, 16700\_1, 16013\_1)

0fm 1ft (531\_1)

-.4m (500\_1, 50\_1)

**Office Notes**

Concur. DTON has been charted as a rock that covers and uncovers with least depth -0.1640 fm. Retain rock as charted.

### Feature Images

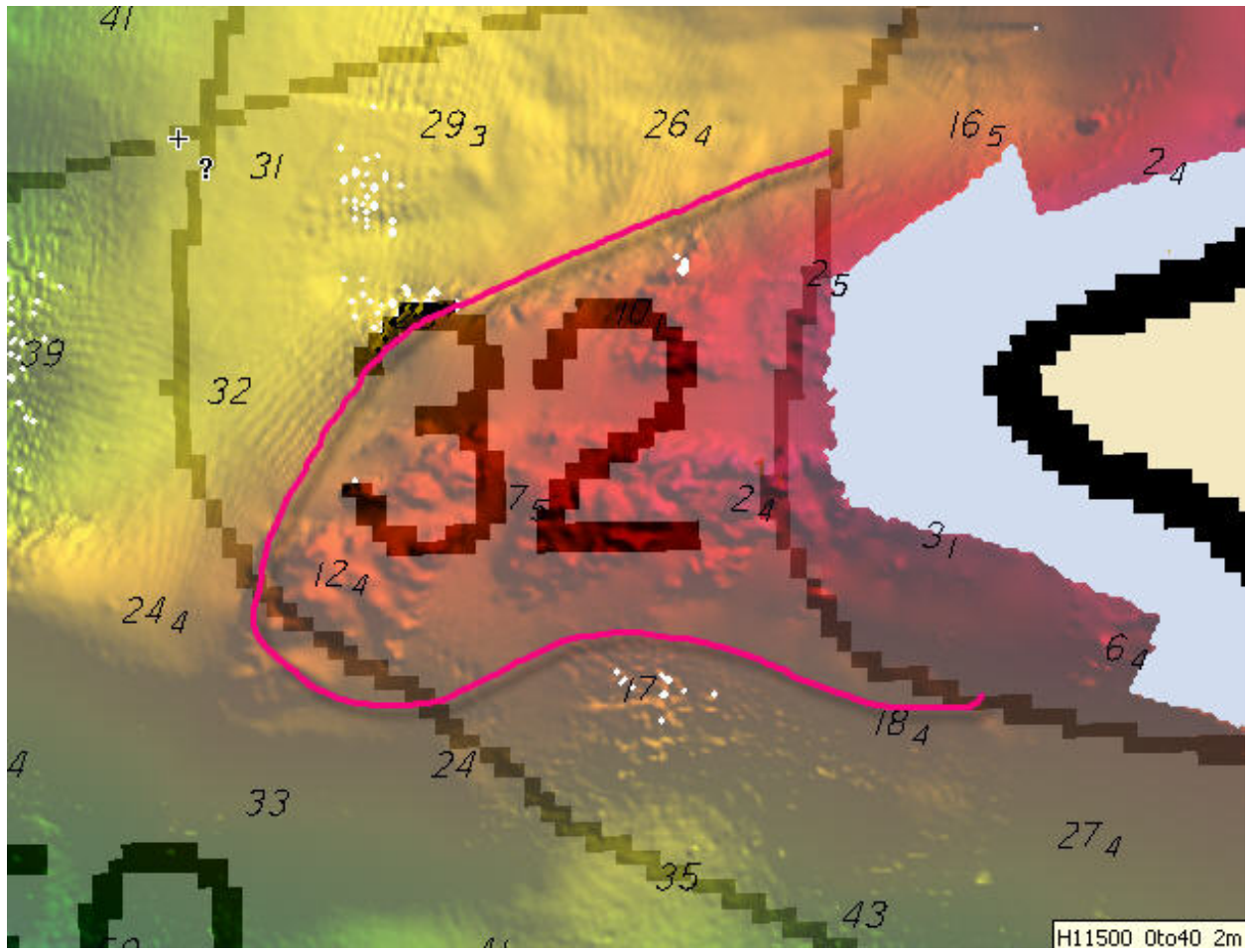


Figure 1.2.1 DP# 12504, New Rock

# H11500 Features Report

**Registry Number:** H11500  
**State:** Alaska  
**Locality:** Approaches to Cordova  
**Sub-locality:** Simpson Bay  
**Project Number:** OPR-P158-FA-06  
**Survey Dates:** 09/06/06 - 10/12/06

Items for survey H11500 associated with a detached position that needed further discussion were flagged Report in Pydro. Recommendations were provided in the Remarks and Recommendations tabs.

## Charts Affected

Number	Edition	Date	Scale (RNC)	RNC Correction(s)*
16708	26th	10/01/2004	1:79,291 (16708_1)	[L]NTM: ?
16709	23rd	04/01/2005	1:80,000 (16709_1)	[L]NTM: ?
16700	29th	07/01/2004	1:200,000 (16700_1)	[L]NTM: ?
16013	29th	11/01/2003	1:969,761 (16013_1)	[L]NTM: ?
531	23rd	01/01/2006	1:2,100,000 (531_1)	[L]NTM: ?
500	8th	06/01/2003	1:3,500,000 (500_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

Name	Feature Type	Survey Depth	Survey Latitude	Survey Longitude
12496	Rock	-3.10 m	60° 38' 44.4" N	145° 55' 14.0" W
12506	Rock	-1.51 m	60° 38' 58.5" N	145° 54' 19.3" W
12509	Rock	-3.76 m	60° 38' 29.9" N	145° 53' 32.4" W
12504	Rock	-0.39 m	60° 40' 30.5" N	145° 52' 45.8" W
264/57	Shoal	2.76 m	60° 36' 46.4" N	145° 54' 13.2" W

## **1 - AWOIS Features**

**1.1) 12496****Primary Feature for AWOIS Item #53497**

**Search Position:** 60° 38' 45.7" N, 145° 55' 13.2" W  
**Historical Depth:** [None]  
**Search Radius:** 75  
**Search Technique:** VS, VB, MB, S2  
**Technique Notes:** CONDUCT SEARCH WITHIN THE LIMITS OF THE SURVEY.

**History Notes:**

CHARTED POSITION LAT. 60/38/45.7N LONG. 145/55/13.2W (NAD83) OF ROCK AWASH IS OFFSET FROM SOURCE POSITION. CONDUCT SEARCH TO VERIFY OR DISPROVE CHARTED ROCK. (ENTERED 8/2006 BY JCA) ■■■CHARTED ROCK FOUND AT POSITION LAT. 60/38/44.4N LONG. 145/55/13.9W (NAD83) WITH DEPTH OF -2.75 METERS. THREE DETACHED POSITIONS OF ROCK EXTENT TAKEN. SEE DP (12494, 12495, 12496).

**Survey Summary**

**Survey Position:** 60° 38' 44.4" N, 145° 55' 14.0" W  
**Least Depth:** -3.10 m (= -10.18 ft = -1.696 fm = -1 fm 4.18 ft)  
**TPU ( $\pm 1.96\sigma$ ):** THU (TPEh) [None] ; TVU (TPEv) [None]  
**Timestamp:** 2006-249.16:41:44.000 (09/06/2006)  
**DP Dataset:** h11500 / fa\_trimble\_dpne\_1 / 2006-249 / tr1\_dn249.mdb  
**Profile/Beam:** 6/1  
**Charts Affected:** 16708\_1, 16709\_1, 16700\_1, 16013\_1, 531\_1, 500\_1, 50\_1

**Remarks:**

North ext chd (16709) rk

**Hydrographer Recommendations**

The Hydrographer recommends retaining the chd (16709) rock symbol

**Cartographically-Rounded Depth (Affected Charts):**

-1 ¾fm (16708\_1, 16709\_1, 16700\_1, 16013\_1)  
-1fm 4ft (531\_1)  
-3.1m (500\_1, 50\_1)



## S-57 Data

**Geo object 1:** Underwater rock / awash rock (UWTROC)  
**Attributes:** QUASOU - 1,6:depth known,least depth known  
RECDAT - 20060906  
VALSOU - -3.102 m  
VERDAT - 12:Mean lower low water  
WATLEV - 4:covers and uncovers

## Office Notes

Concur

**1.2) 12506****Primary Feature for AWOIS Item #53498**

**Search Position:** 60° 38' 59.3" N, 145° 54' 22.6" W  
**Historical Depth:** [None]  
**Search Radius:** 75  
**Search Technique:** VS, VB, MB, S2  
**Technique Notes:** CONDUCT SEARCH WITHIN THE LIMITS OF THE SURVEY.

**History Notes:**

CHARTED POSITION LAT. 60/38/59.3N LONG. 145/54/22.6W (NAD83) OF ROCK AWASH IS OFFSET FROM SOURCE POSITION. CONDUCT SEARCH TO VERIFY OR DISPROVE CHARTED ROCK. (ENTERED 8/2006 BY JCA) ■■■CHARTED ROCK FOUND AT POSITION LAT. 60/38/58.5 N LONG. 145/55/19.3 W (NAD83) WITH DEPTH OF -1.51 METERS. SEE DP 12506.

**Survey Summary**

**Survey Position:** 60° 38' 58.5" N, 145° 54' 19.3" W  
**Least Depth:** -1.51 m (= -4.95 ft = -0.826 fm = 0 fm 1.05 ft)  
**TPU ( $\pm 1.96\sigma$ ):** THU (TPEh) [None] ; TVU (TPEv) [None]  
**Timestamp:** 2006-250.16:16:39.000 (09/07/2006)  
**DP Dataset:** h11500 / fa\_trimble\_dpne\_1 / 2006-250 / tr1\_dn250.mdb  
**Profile/Beam:** 6/1  
**Charts Affected:** 16709\_1, 16700\_1, 16013\_1, 531\_1, 500\_1, 50\_1

**Remarks:**

chd (16709) rk vfd

**Hydrographer Recommendations**

The Hydrographer recommends retaining the chd (16709) rock symbol

**Cartographically-Rounded Depth (Affected Charts):**

0 ¾fm (16709\_1, 16700\_1, 16013\_1)

0fm 5ft (531\_1)

-1.5m (500\_1, 50\_1)

## S-57 Data

**Geo object 1:** Underwater rock / awash rock (UWTROC)  
**Attributes:** QUASOU - 1,6:depth known,least depth known  
RECDAT - 20060907  
VALSOU - -1.510 m  
WATLEV - 4:covers and uncovers

## Office Notes

Concur

**1.3) 12509****Primary Feature for AWOIS Item #53499**

**Search Position:** 60° 38' 30.4" N, 145° 53' 34.4" W  
**Historical Depth:** [None]  
**Search Radius:** 75  
**Search Technique:** VS, VB, MB, S2  
**Technique Notes:** CONDUCT SEARCH WITHIN THE LIMITS OF THE SURVEY.

**History Notes:**

CHARTED POSITION LAT. 60/38/30.4N LONG. 146/53/34.4W (NAD83) OF ROCK AWASH IS OFFSET FROM SOURCE POSITION. CONDUCT SEARCH TO VERIFY OR DISPROVE CHARTED ROCK. (ENTERED 8/2006 BY JCA) ■■■CHARTED ROCK FOUND AT POSITION LAT. 60/38/29.9 LONG. 145/53/32.4W (NAD83) WITH DEPTH OF -3.76 METERS. SEE DP 12509.

**Survey Summary**

**Survey Position:** 60° 38' 29.9" N, 145° 53' 32.4" W  
**Least Depth:** -3.76 m (= -12.35 ft = -2.058 fm = -2 fm 0.35 ft)  
**TPU ( $\pm 1.96\sigma$ ):** THU (TPEh) [None] ; TVU (TPEv) [None]  
**Timestamp:** 2006-250.16:49:00.000 (09/07/2006)  
**DP Dataset:** h11500 / fa\_trimble\_dpne\_1 / 2006-250 / tr1\_dn250.mdb  
**Profile/Beam:** 9/1  
**Charts Affected:** 16709\_1, 16700\_1, 16013\_1, 531\_1, 500\_1, 50\_1

**Remarks:**

chd (16709) rk vfd

**Hydrographer Recommendations**

The Hydrographer recommends retaining the chd (16709) rock symbol

**Cartographically-Rounded Depth (Affected Charts):**

-2fm (16709\_1, 16700\_1, 16013\_1)  
-2fm 0ft (531\_1)  
-3.8m (500\_1, 50\_1)

## S-57 Data

**Geo object 1:** Underwater rock / awash rock (UWTROC)  
**Attributes:** QUASOU - 1,6:depth known,least depth known  
RECDAT - 20060907  
VALSOU - -3.763 m  
WATLEV - 4:covers and uncovers

## Office Notes

Concur. Retain Chd Rock.

## Feature Images



*Figure 1.3.1*



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

**TIDE NOTE FOR HYDROGRAPHIC SURVEY**

**DATE :** November 9, 2006

**HYDROGRAPHIC BRANCH:** Pacific  
**HYDROGRAPHIC PROJECT:** OPR-P158-FA-2006  
**HYDROGRAPHIC SHEET:** H11500

**LOCALITY:** Simpson Bay, Approaches to Cordova, AK  
**TIME PERIOD:** September 6 - October 12, 2006

**TIDE STATION USED:** 945-4050 Cordova, AK  
Lat. 60° 33.5' N Long. 145° 45.3' W

**PLANE OF REFERENCE (MEAN LOWER LOW WATER):** 0.000 meters  
**HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE:** 3.559 meters

**REMARKS: RECOMMENDED ZONING**

Preliminary zoning is accepted as the final zoning for project OPR-P158-FA-2006, H11500, during the time period between September 6 and October 12, 2006.

Please use the zoning file "P158FA2006CORP" submitted with the project instructions for Approaches to Cordova, AK. Zones PWS59A & PWS60 are the applicable zones for H11500.

**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).

*For [Signature]*

CHIEF, PRODUCT AND SERVICES DIVISION



**H11500 HCell Report**  
Kurt Brown, Physical Scientist  
Pacific Hydrographic Branch

**Introduction**

The primary purpose of the HCell is to provide new survey information in International Hydrographic Organization (IHO) format S-57 to update the largest scale ENC's and RNC's in the region: NOAA ENC's US4AK25M, US4AK24M, US5AK2CM and NOAA RNC's 16708 (1:79,291), 16709 (1:80,000) and 16710 (1:30,000).

HCell compilation of survey H11500 used Office of Coast Survey HCell Specifications Version 3.0 and HCell Reference Guide Version 1.0.

**1. Compilation Scale**

The compilation scale for HCell H11500 is 1:30,000 based on the largest scale chart in the region, 16710. This chart only covered a small area of the survey and the density and distribution of soundings for most of H11500 were selected to emulate the distribution on chart 16709 as this chart encompasses the entire survey. No difference was noted in the distribution of soundings on the slightly larger scale chart 16708. Non-bathymetric features have been generalized to chart scale.

**2. Soundings**

A survey-scale sounding (SOUNDG) feature object layer was built from the 12-meter combined surface, **H11500\_Combined\_5m**, in CARIS BASE Editor. A shoal-biased selection was made at 1:7500. The resultant sounding layer contains depths ranging from 0.1 to 183 meters.

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

**3. Depth Areas and Depth Contours**

**3.1 Depth Areas**

The extents of the highest resolution BASE Surface together with the extents of the soundings layer were used to digitize the hydrographic extents, which were then used to create the single, all encompassing depth area (DEPARE). A depth range of 0 to 137 meters was used for the depth area object. Upon conversion to NOAA charting units, the depth range is 0 to 75 fathoms.



### 3.2 Depth Contours

Depth contours at the intervals on the largest scale chart are included in the H11500\_SS HCell for MCD raster charting division to use for guidance in creating chart contours. The generalized metric and feet equivalent contour values are shown in the table below.

Chart Contours in Fathoms	Metric Equivalent of Chart Contours	Metric Equivalent of Chart Contours NOAA Rounded	Actual Value of Chart Contours
3	5.4864	5.715	3.75
5	9.144	9.3726	5.75
10	18.288	18.5166	10.75
50	91.44	92.8116	50.75

Contours delivered in the H11500\_SS file have not been deconflicted against shoreline features, soundings and hydrography as all other features in the H11500\_CS file and soundings in the H11500\_SS have been. This results in conflicts between the H11500\_SS file contours and HCell features at or near the survey limits. Conflicts with M\_COVR, M\_QUAL, DEPARE, COALNE and SBDARE objects, and with DEPCNT objects representing MLLW, should be expected. HCell features should be honored over H11500\_SS.000 file contours in all cases where conflicts are found.

### 4. Meta Areas

The following Meta object areas are included in HCell 11498:

M\_QUAL                      M\_CSCL  
M\_COVR

Meta area objects were constructed on the basis of the limits of the hydrography. (See 3.1 *Depth Areas*.)

### 5. Features

Shoreline features for H11500 were delivered from the field in several .hob files described in the DR. The files contained new features, modification to GC or charted features, and disprovals. These were deconflicted against GC shoreline, the chart and hydrography during office processing.

New rocky seabed areas were delineated using the high resolution BASE surfaces and are included in the H11500 HCell. Bottom samples were imported from the ENC and survey and are included in the HCell.

There were two DTONs reported from survey H11500. The DTONs are charted and reflected in the HCell.

There were three AWOIS items in survey H11500. All AWOIS were verified and retained as charted. See attached Features report.

The source of all features included in the H11500 HCell can be determined by the SORIND field.

## **6. S-57 Objects and Attributes**

The H11500\_CS HCell contains the following Objects:

SOUNDG	Chart scale soundings
DEPARE	All-encompassing depth area and intertidal areas
UWTROC	Rock features
SBDARE	Bottom samples, rocky seabed areas and ledges
M_COVR	Data coverage Meta object
M_QUAL	Data quality Meta object
M_CSCL	Compilation scale Meta object
\$CSYMB	Blue notes
DEPCNT	Zero depth curves.
LNDARE	Islets
OBSTRN	Foul areas

The H11500\_SS HCell contains the following Objects:

DEPCNT	NOAA rounded contours at chart scale intervals
SOUNDG	Soundings at the survey scale density

All S-57 Feature Objects in the H11500\_CS HCell have been attributed as fully as possible based on information provided by the Hydrographer and in accordance with current guidance and the OCS HCell Specifications.

## **7. Blue Notes**

Notes to the RNC and ENC chart compilers are included in the HCell as \$CSYMB features with the Blue Note information located in the INFORM field. The NINFOM field is populated with the charting disposition

## **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**

During creation of sounding sets in CARIS BASE Editor, and creation of the HCell in CARIS S-57 Composer, units are maintained as metric with millimeter resolution. NOAA rounding is applied at the same time that conversion to chart units is made to the metric HCell base cell file, at the end of the HCell compilation process.

A CARIS environment variable, uslXsounding\_round, controls the depth at which rounding occurs. Setting this variable to NOAA feet displays all soundings as whole units.

In an ENC viewer feet display in whole feet. Soundings round to the deeper foot if the decimals of the foot are .75000 or greater.

#### S-57 Composer Units

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

#### Chart Unit Base Cell Units

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

### **9. Data Processing Notes**

#### **9.1 Junctions**

H11500 junctions to the south with surveys H11498 and H11499, both of which have been compiled. Junctions with these surveys have been made. H11500 also junctions with H11609 which has not been compiled. The junctions with this survey will be made when it is compiled.

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

H11500 was subjected to QA checks in S-57 Composer prior to exporting to the HCell base cell (000) file. The millimeter precision metric S-57 HCell was converted to a 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 have been approved by MCD as inherent to and acceptable for HCells.

### **11. Products**

#### **11.1 HSD, MCD and CGTP Deliverables**

- H11500 Base Cell File, Chart Units, Soundings compiled to 1:30,000.
- H11500 Base Cell File, Chart Units, Soundings compiled to 1:7,500
- H11500 Descriptive Report including end notes compiled during office processing and certification, the HCell Report, and supplemental items
- H11500 Survey Outline to populate SURDEX

## 11.2 File Naming Conventions

- Chart units base cell file, chart scale soundings H11500\_CS.000
- Chart units base cell file, survey scale soundings H11500\_SS.000
- Descriptive Report package H11500\_DR.pdf
- Survey outline H11500\_Outline.gml & \*.xsd

## 11.3 Software

CARIS HIPS Ver. 6.1	Inspection of Combined BASE Surfaces
CARIS BASE Editor Ver. 2.2	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. 2.0	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	Validation of the base cell file.
Newport 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:

Kurt Brown, Physical Scientist, PHB, Seattle, WA; 206-526-6839;  
[Kurt.Brown@noaa.gov](mailto:Kurt.Brown@noaa.gov).

APPROVAL SHEET  
H11500

Initial Approvals:

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