

H11935

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. H11935

### LOCALITY

State Alaska

General Locality Vicinity of Homer Spit

Sublocality Southern Portion of Cook Inlet

**2008**

### CHIEF OF PARTY

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

### LIBRARY & ARCHIVES

DATE

<p style="text-align: center;">U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION</p> <p style="text-align: center;"><b>HYDROGRAPHIC TITLE SHEET</b></p>	<p>REGISTRY No</p> <p style="text-align: center;"><b>H11935</b></p>
<p><b>INSTRUCTIONS</b> – The Hydrographic Sheet should be accompanied by this form, filled in as completely as possible, when the sheet is forwarded to the Office.</p>	<p>FIELD No: <b>N/A</b></p>
<p>State <u>Alaska</u></p> <p>General Locality <u>Southern Portion of Cook Inlet</u></p> <p>Sub-Locality <u>Vicinity of Homer Spit</u></p> <p>Scale <u>1:10,000</u> Date of Survey <u>08/19/2008 to 09/02/2008</u></p> <p>Instructions dated <u>7/24/2008</u> Project No. <u>OPR-P357-FA-08</u></p> <p>Vessel <u>FAIRWEATHER</u></p> <hr/> <p>Chief of party <u>CAPT Douglas D. Baird, NOAA</u></p> <p>Surveyed by <u>SST Brenna Campbell, CST Lynnette Morgan, LT Matthew Ringel</u></p> <p>Soundings by <u>Reson 8111, Reson 8101ER</u></p> <p>SAR by <u>Fernando Ortiz</u> Compilation by <u>Fernando Ortiz</u></p> <p>Soundings compiled in <u>Fathoms</u></p>	
<p>REMARKS: <u>All times are UTC. UTM Zone 5</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/> <hr/>	

# Descriptive Report to Accompany Hydrographic Survey H11935

Project OPR-P357-FA-RA-08

Southern Portion of Cook Inlet, Alaska

Vicinity of Homer Spit

Scale 1:10,000

August-September, 2008

NOAA Ship *Fairweather* (S220)

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

## A. AREA SURVEYED

The survey area is the Southern Portion of Cook Inlet, Alaska in Kachemak Bay and the sublocality is Vicinity of Homer Spit. This survey corresponds to Sheet C in the sheet layout provided with the Project Instructions dated July 24, 2008. OPR-P357-FA-RA-08 comprises the first year of a two year, cooperative project, referred to as “Hydropooloza”, in which the *Fairweather* and *Rainier* in association with other state and federal organizations will conduct a regional study of Kachemak Bay. An outline of this survey is shown in Figure 1. The surveyed area is bounded on the Northeast corner at 59°40’55.14” North, 151°16’50.32” West, and the Southwest corner at 59°34’09.75” North, 151°25’02.47 West.

Data acquisition was conducted from August 19 to September 2, 2008 (DN 232 to DN 246).

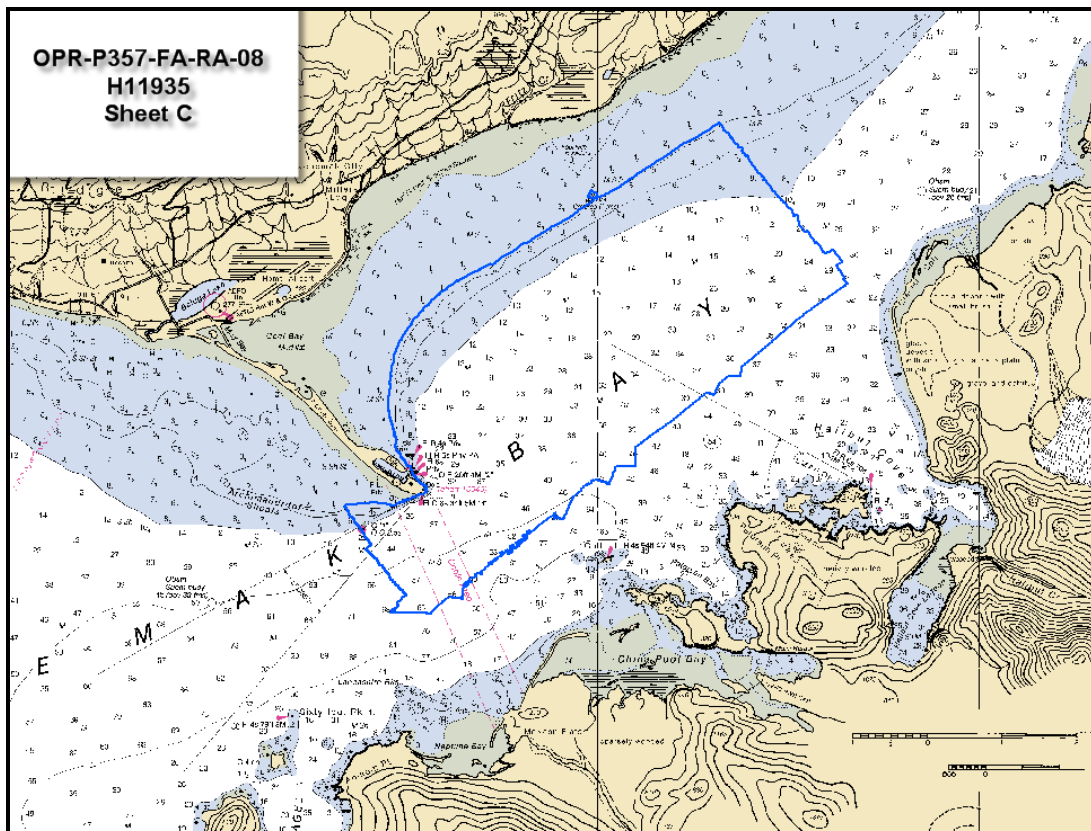


Figure 1: H11935 Survey Outline

**A.1 Survey Scope**

One-hundred percent multibeam echosounder (MBES) coverage was obtained in the survey area to at least the 4-meter depth curve. Additional coverage was obtained in order to determine least depths over features or shoals offshore of the 4-meter curve.

Limited shoreline verification was conducted seaward of the 4-meter depth curve for H11935. As per section 3.5.5 of the Field Procedures Manual May, 2008 (FPM), the Navigable Area Limit Line (NALL) is defined as the farthest offshore of either the 4-meter depth contour or the distance seaward from the Mean High Water line (MHW Buffer) equal to 0.8mm at chart scale. Due to the extensive mud flats along the shoreline of Sheet C and very gradual shoaling the 4-meter depth contour was always the NALL. Shoreline features were given S-57 attribution and included for submission in Notebook .hob files.

Although only partially developed, one AWOIS item for H11935 was slightly inside the NALL or 4-meter depth curve. Due to the very flat nature and gradual shoaling of the seafloor in the area this presented no problems. Indeed, at high tide, areas and charted features well inside the NALL could be surveyed or developed.

The requested development of the Zero Meter Curve Area within the Harbor of Refuge site was not completed during this project due to mechanical breakdowns.

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

<b>MAIN SCHEME - Mileage</b>	
0	Single Beam MS
427.45	Multibeam MS mileage
48.58	FAIRWEATHER S-220
329.21	Launch 1010
49.67	Launch 1018
0	SideScan MS
427.45	Total MS
<b>CROSSLINE - Mileage</b>	
0	Single Beam XL
38.81	Multibeam XL
8.29	FAIRWEATHER S-220
25.37	Launch 1010
5.15	Launch 1018
38.81	Total XL
<b>OTHER</b>	
0	Developments/AWOIS - Mileage
9.18	Shoreline/Nearshore Investigation - Mileage
29	Total # of Investigated Items
12	Total Bottom Samples
19.73	Total SNM
8/19, 8/20, 8/21, 8/22, 8/23, 8/24, 8/25, 8/26, 8/27, 8/28, 8/29, 9/2	Dates of Acquisition
232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 246	Specific Dn#s of Acquisition

*Table 1: H11935 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),<sup>1</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 Project Instructions OPR-P357-FA-RA-08, dated July 24, 2008.

### 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	Ambar 550
<b>Hull Registration Number</b>	S220	1010	1018	2302
<b>Builder</b>	Aerojet-General Shipyard	The Boat Yard, Inc.	The Boat Yard, Inc.	Marine Silverships, Inc
<b>Length Overall</b>	231 feet	28' 10"	28' 10"	23'
<b>Beam</b>	42 feet	10' 8"	10' 8"	9' 4"
<b>Draft, Maximum</b>	15' 6"	4' 0" DWL	4' 0" DWL	1' 4"
<b>Cruising Speed</b>	12.5 knots	24 knots	24 knots	22 knots
<b>Max Survey Speed</b>	10 knots	10 knots	10 knots	
<b>Primary Echosounder</b>	RESON 8111 & RESON 8160	RESON 8101	RESON 8101	
<b>Sound Velocity Equipment</b>	SBE 19plus & 45, MVP 200	SBE 19plus	SBE19plus	
<b>Attitude &amp; Positioning Equipment</b>	POS/MV V4	POS/MV V4	POS/MV V4	
<b>Type of operations</b>	MBES, Bottom Samples	MBES, Tide	MBES	Shoreline, Tide

*Table 2: Vessel Inventory*

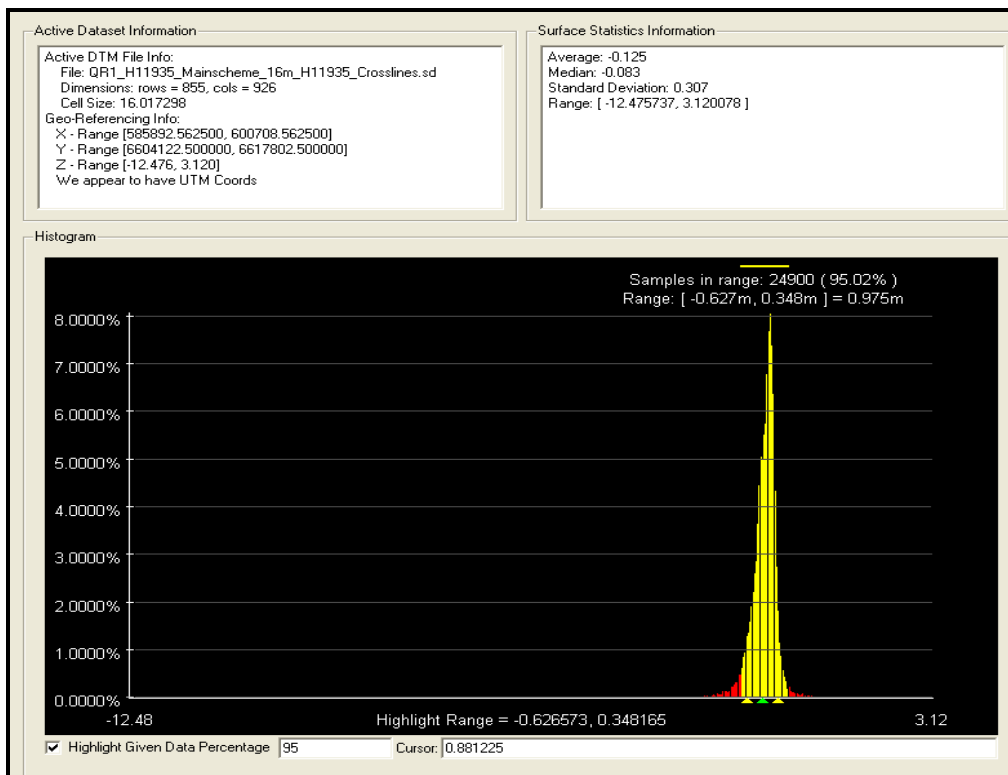
No vessel configurations used during data acquisition deviated from the DAPR.

## B2. Quality Control

### Crosslines

Shallow water multibeam crosslines for this survey totaled 38.81 linear nautical miles (lnm), comprising 9.08% of the 427.46 lnm of total mainscheme MBES hydrography. Both main scheme and crossline mileage are summarized in Table 1 above.

Comparison of crossline and mainscheme data was conducted both manually and quantitatively using separate Combined 16m CARIS Base surfaces. Crosslines were filtered to reject data beyond 45° from nadir in order to remove outerbeam noise. Surface statistics and a data histogram were generated using Fledermaus and are shown in Figure 2. Ninety five percent of the data falls within the -0.627m to 0.348m range with an average value of -0.125 and a standard deviation of 0.307.



*Figure 2: Crossline difference histogram and Statistics*

Due to the range of differences observed during the crossline comparison a crossline difference surface was generated in Fledermaus using the Surface Differencing Method. The areas within the survey exhibiting the greatest crossline/mainscheme line discrepancies are the southeast portion (mostly ship data) and the shallow northwest boundary area in and around Homer Spit. Figure 3 illustrates the areas within the survey where differences were the greatest.

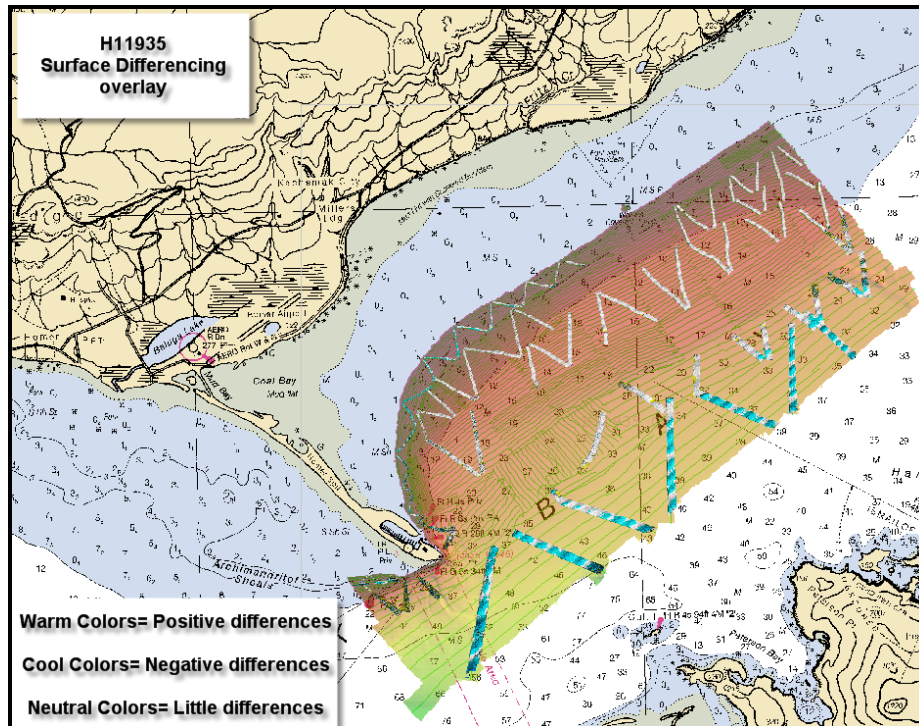


Figure 3: Surface difference surface on 16m combined surface.

Visual examination of some areas of the Difference Surface shows a distinctive “wavy” appearance (Figure 4). This was found to be due to nearly ubiquitous, though mostly minor, Sound Velocity (SV) problems encountered throughout Kachemak Bay. This is probably due to the large tidal range and associated currents, as well as a very large influx of glacial melt water and silt. Additionally, the *Fairweather’s* Brooke Ocean Moving Vessel Profiler (MVP) was down for repairs during the project resulting in fewer SV casts being taken than would normally be the case.

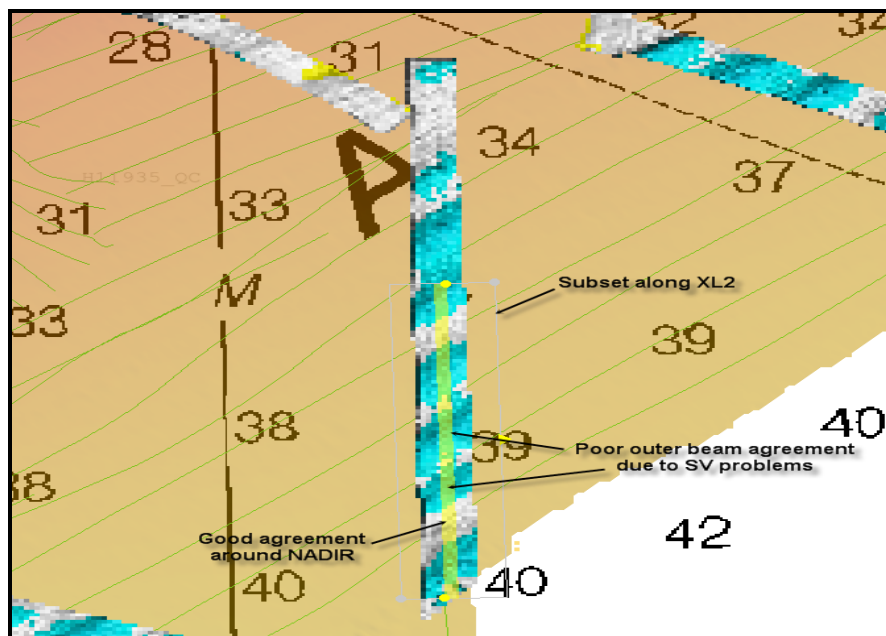
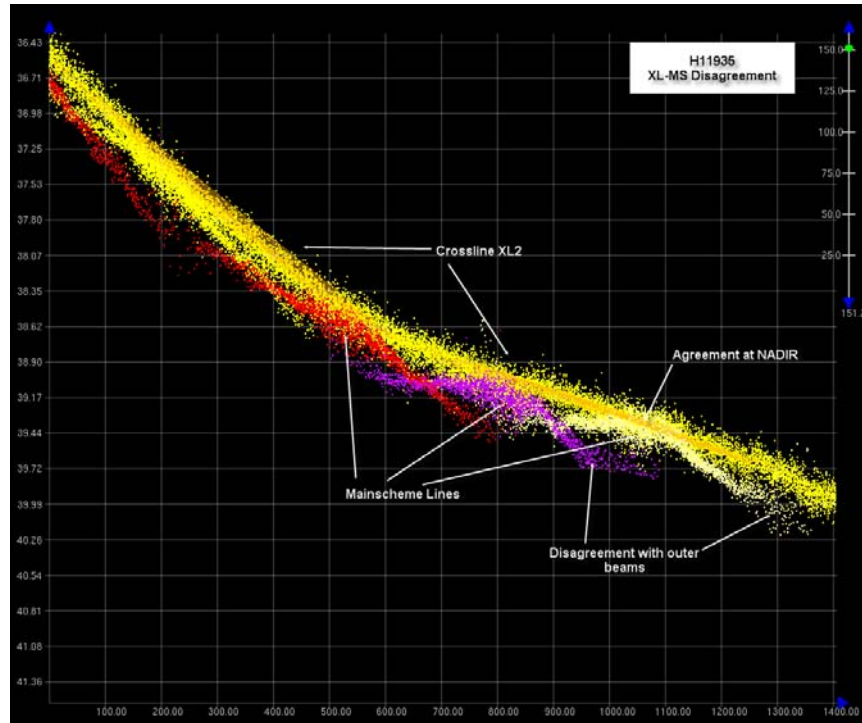


Figure 4: “Wavy” difference surface due to SV problems.

Closer analysis using CARIS Subset Editor along XL2 from day number (Dn) 234 (subset box in Figure 4) shows the SV related “frowns” indicative of inaccurate sound speed corrections (Figure 5). Main scheme and crossline agreement is good around nadir while outer beams show separation of 0.3 to 0.5 meters, giving rise to the “wavy” pattern observed in the difference surface in Figures 3 and 4.



*Figure 5: SV “frowns” and relationship to XL2*

## Junctions

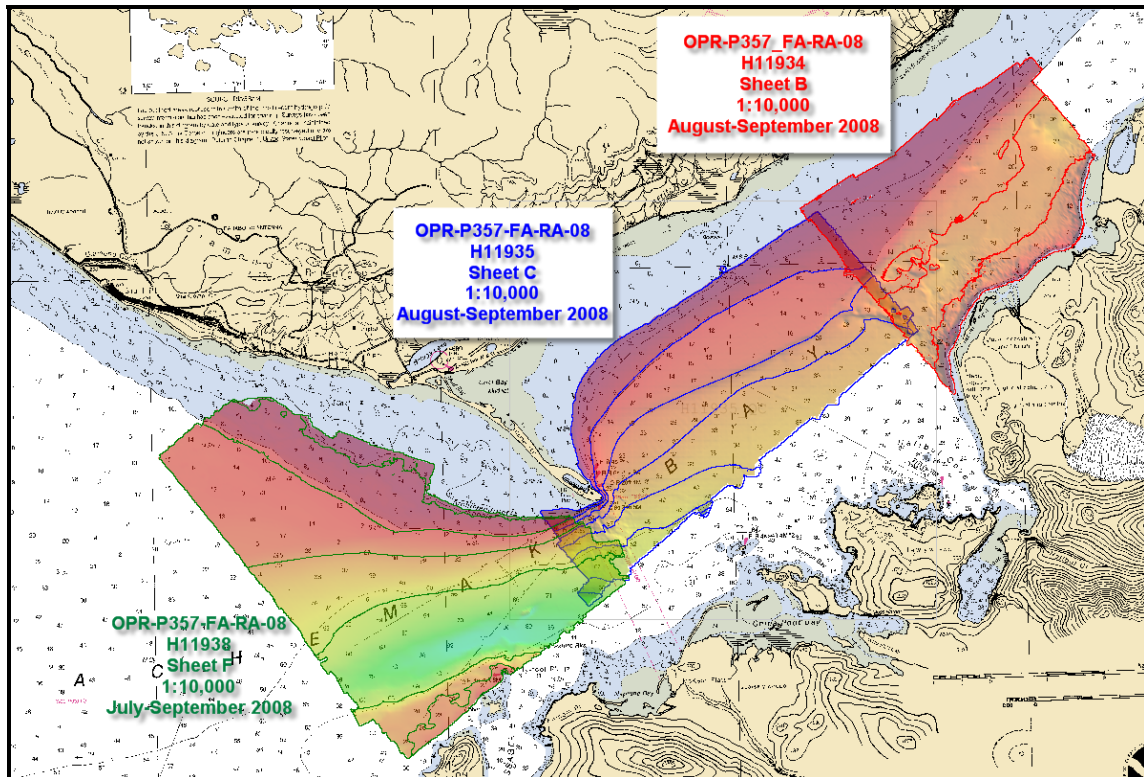
Survey H11935 (Sheet C) junctions with H11938 (Sheet F-Fairweather) and H11934 (Sheet B-Rainier) of the same project (OPR-P357-FA-RA-08)<sup>2</sup>. The area of overlap between H11935 and H11938 covers approximately 3100 meters along the southwest sheet boundary and varies between 750 and 1000 meters in width. The overlap with H11934 covers 5100 meters along the northeast boundary and is between 400 and 500 meters in width. The area of overlap between the sheets was reviewed in CARIS Subset Editor for consistency, and data were found to be in very good agreement within one meter or less. Further comparison using sounding layers generated from 16 meter combined surfaces also shows excellent agreement between all three sheets. Features and general trends are consistent across all surveyed areas.

The sheet limits and area of overlap for Sheets C, F and B are shown in Figure 6. Table 3 lists the three junction surveys and other pertinent information.



Junction Survey	Survey Scale	Date of Survey	Survey Location
H11935	1:10,000	Aug-Sept 08	Vicinity of Homer Spit
H11938	1:10,000	July-Sept 08	Vicinity Archimandritof Shoals
H11934	1:10,000	Aug-Sept 08	Vicinity of Glacier Spit

*Table 3: Junction Surveys*



*Figure 6: Junction Between H11935, H11938 and H11934*

## 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 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 July 24, 2008.<sup>3</sup>

## POSITION:

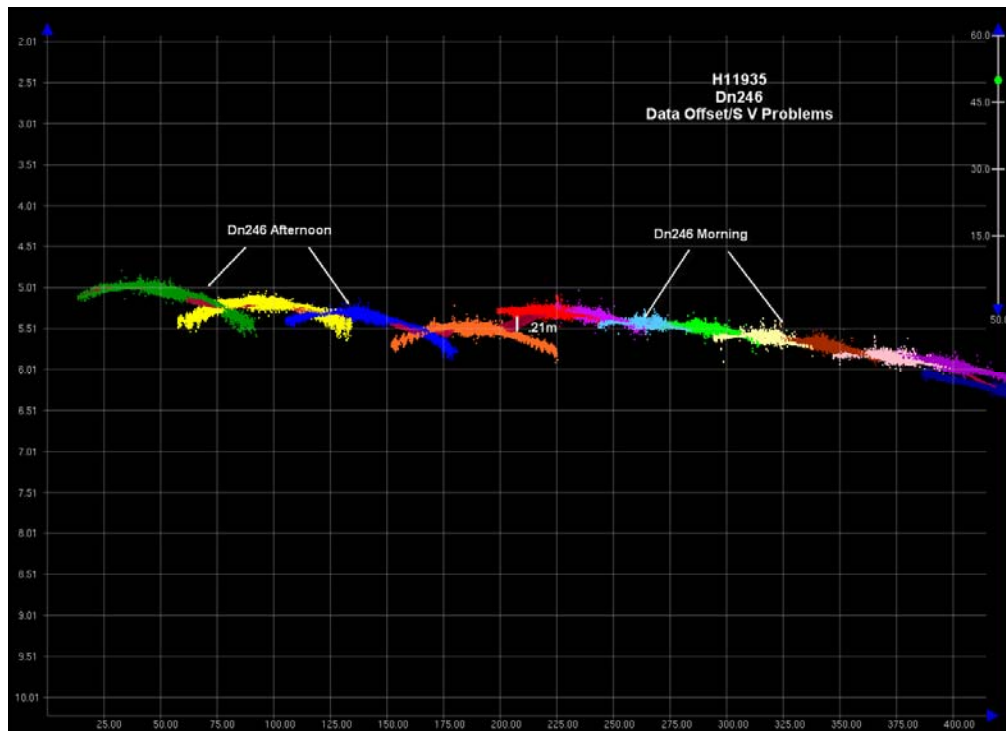
Although occasional DGPS dropouts occurred during this Project no significant positional errors were observed.<sup>4</sup>

## TRUEHEAVE:

True Heave was applied successfully to all lines in Project H11935. It was necessary to use the NOAA utility for correcting corrupt True Heave files, known as Fixtrueheave, on day numbers 233, 234, 236, 238, 239, 240 and 242 from Launch 1010, and day numbers 232 and 233 from Launch 1018. 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.

## SOUND VELOCITY:

Sound Velocity artifacts were common within survey H11935 due to a combination of strong tidal currents and large volumes of glacial melt water and silt. Even after applying sound speed corrections in CARIS HIPS, many lines still exhibited the characteristic “frowns” indicative of inaccurate sound speed corrections (see Figure 7). In the field, CTD sound speed casts were usually taken more frequently than the standard 4 hour time interval. Despite the best efforts of the Hydrographer to conduct sufficient SV casts, distributed both spatially and temporally, SV errors are still noticeable. In most cases the error was within allowable error limits. When outer beam noise due to SV error was more severe or adversely affected the CARIS Base surface the Hydrographer rejected the obviously erroneous soundings. Future surveys in the area should be sure to take an adequate number of SV Casts, especially in the vicinity of freshwater streams.



*Figure 7: SV “frowns” from morning and afternoon data.*

## 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.

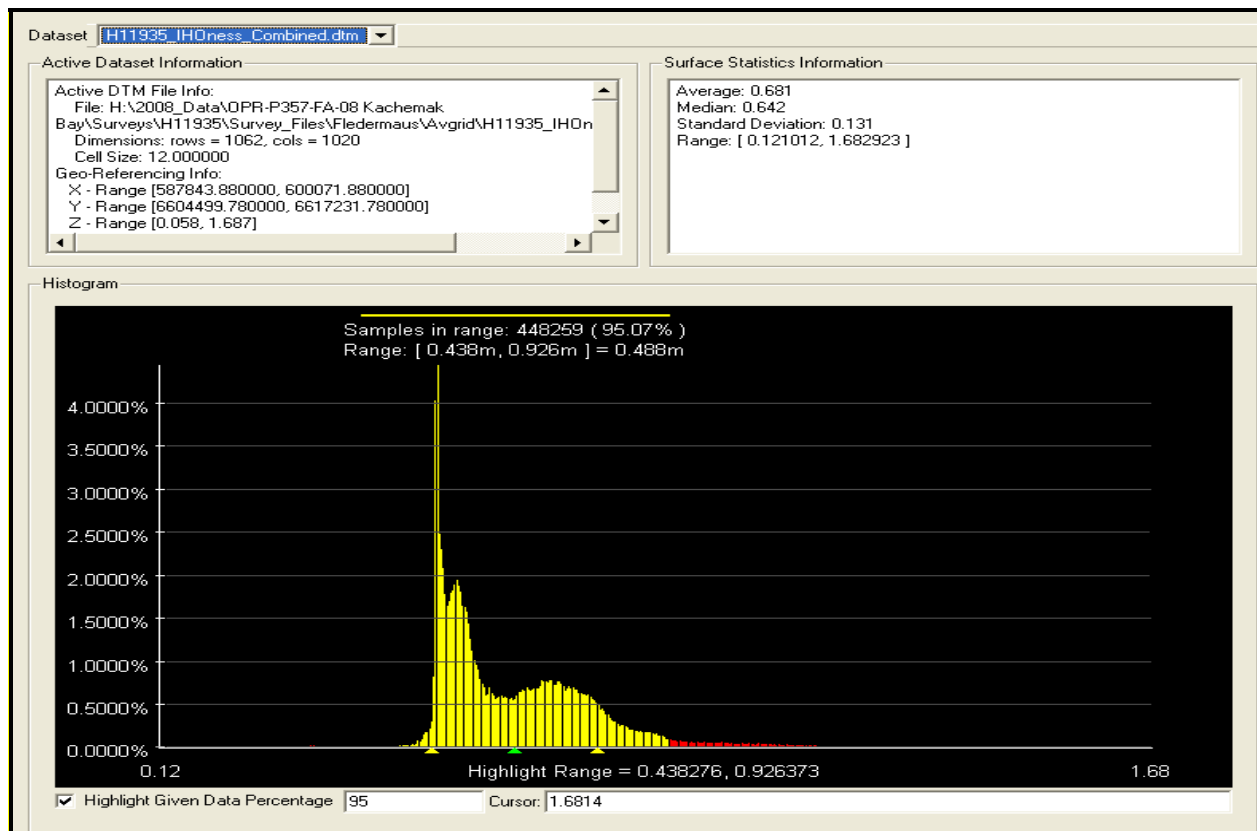
The one designated sounding was on a Danger to Navigation (DTON)/Wreck which is discussed further in the DTON section of this report.

## UNUSUAL CONDITIONS:

Kachemak Bay experiences fairly extreme tides and tidal currents, especially around the Homer Spit, which is included in this survey. In addition to these currents there is a large volume of freshwater glacial inflow from the several large glaciers draining into the bay. This combination of currents and large volumes of freshwater and glacial silt has a marked impact on Sound Velocity (SV) measurements.

## Accuracy Standards

Most of the survey area for H11935 falls under International Hydrographic Organization (IHO) Order 1 accuracy standards. Although the deeper southwest portions of the sheet qualified for IHO Order 2, the surfaces were generated using Order 1 accuracy parameters. A Fledermaus Histogram was produced from the CARIS 16m Combined surface to quantitatively determine the percentage of uncertainty values that fall within IHO Order 1 specifications. Figure 8 shows the histogram along with other pertinent statistics. One hundred percent of the data falls within a range of 0.121 and 1.683 with no data points below 0 and therefore all nodes exceed IHO Order 1 specifications.



*Figure 8: IHO histogram of the CARIS 16m Combined surface*

**B3. Corrections to Echo Soundings**

Data reduction procedures for survey H11935 conform to those detailed in the DAPR.

**B4. Data Processing**

Initial data acquisition and processing notes are included the individual vessel 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 MBES QC Review tab of the H11935\_Data\_Log. All of the logs are included with the digital Separates I.<sup>5</sup>

Data processing procedures for survey H11935 conform to those detailed in the DAPR. Further processing details regarding Total Propagated Uncertainty (TPU/TPE) and Combined Uncertainty and Bathymetry Estimator (CUBE) Surfaces and Parameters utilized, are discussed below.

**Total Propagated Error (TPE) Values:**

The survey specific parameters used to compute TPE in CARIS for H11935 are listed in Table 4. Tide values of 0.00 m were used because final water levels were determined by Tidal Constituent and Residual Interpolation (TCARI). When using TCARI, uncertainty values are automatically applied and no tide values are entered when computing TPE in CARIS.

<b>Tide values:</b>	Measured	0.0 m	Zoning	0.0 m
<b>Sound Speed Values: Launch</b>	Measured	1.0 m/s	Surface	1.0 m/s
<b>Sound Speed Values: Ship (S220)</b>	Measured	0.50 m/s	Surface	0.50 m/s

*Table 4: Survey Specific CARIS TPE Parameters*

**Cube Surfaces:**

Base surface resolutions utilized are listed below in Table 5. One CARIS fieldsheet was adequate for this survey. In general depths decrease from the south to the north sheet boundaries with the shoalest soundings along the flat northern boundary of hydrography and the deepest in the southwest portion of the sheet off the end of the Homer Spit.

Fieldsheet Name	Surface Name	Depth Ranges (m)	Resolution (m)
H11935_QC	H11935_2m	All	2
	H11935_4m	All	4
	H11935_8m	All	8
	H11935_16m	All	16
	H11935_2m_0to20_Final	0-20	2
	H11935_4m_15to40_Final	15-40	4
	H11935_8m_35to80_Final	35-80	8
	H11935_16m_70to150_Final	70-150	16
	H11935_Combined_16m	All	16

**Table 5: Depth Ranges and Resolutions**

**Cube Parameters:**

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

Surface Resolutions	CUBE Parameters				
Grid Resolution	Profile Name	EOV	CDS	CDM	HES
2m	2metergrid	4.0	1.0	1.41	2.95
4m	4metergrid	4.0	1.0	2.83	2.95
8m	8metergrid	4.0	1.0	5.67	2.95
16m	16metergrid	4.0	10.0	11.31	2.95

**Table 6: CUBE parameters used during this survey**

**Surface Filtering:**

The Surface Filtering function was utilized in CARIS HIPS and SIPS. The 2m, 4m and 8m surfaces from Day Numbers (Dn) 232, 233 and 234 were filtered at a confidence level (CL) setting of 15. On Dn 236 and 237 only the 4m surface was filtered, using a CL of 15. The filtering process seems to have worked well for H11935 and no good data was rejected. Areas with flat seafloor and few dramatic features appear to be well suited to more aggressive filtering.

**C. HORIZONTAL AND VERTICAL CONTROL**

A complete description of horizontal and vertical control for survey H11935 can be found in the *OPR-P357-FA-08 Horizontal and Vertical Control Report*, submitted under separate cover. A summary of horizontal and vertical control for this survey follows.

**C.1 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. The differential corrector beacons utilized for this survey are listed in Table 7.

Location	Frequency	Operator	Priority
Kenai	310 kHz	USCG	Primary
Kodiak	313 kHz	USCG	Secondary

**Table 7: Differential Corrector Sources for H11935**

Although occasional short dropouts occurred during the Project, switching to the Secondary DGPS station at Kodiak normally took care of the problem. When this occurred the time and line number were

noted in the days Acquisition and Processing log. Table 8 lists the day numbers and lines affected by these dropouts and station changes. No significant horizontal positioning errors were observed during review of the data. The data meets the horizontal accuracy requirements of the National Ocean Services (NOS) Hydrographic Surveys Specifications and Deliverables dated April 2008.<sup>6</sup>

Day #	Vessel #	Line #
232	1018	CA: 240-1701,1730, 2137, 2154; Switch Sta.#313:232-1737
239	1010	Switch Sta.#313: 239-2033
240	1010	Start Sta.#313; Switch Sta.#310: 240-1830

*Table 8: Lines with DGPS signal loss of station change*

## C.2 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 Seldovia, AK (945-5500) served as control for datum determination and as the primary source for water level correctors for survey H11935.

FAIRWEATHER personnel installed Sutron 8210 “bubbler” tide gauges at the tertiary stations listed below. Gauge #17 (S/N 79049) was the gauge used for Kasitsna Bay. Gauge #08 (S/N 78255) was installed at Bear Cove. Details for both installations are listed in Table 9. The gauges were 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 in accordance with the Project Instructions.

Station Name	Station Number	Type of Gauge	Date of Installation	Date of Removal
Kasitsna Bay	945-5517	Tertiary 30 Day	July 2, 2008	September 3, 2008
Bear Cove	945-5595	Tertiary 30 Day	July 3, 2008	August 29, 2008

*Table 9: Tide Gauge Information*

Refer to the *OPR-P357-FA-08 Horizontal and Vertical Control Report*<sup>7</sup> for further information about the tide stations.

A request for delivery of final approved (smooth) tides for survey H11938 was forwarded to N/OPS1 on September 7, 2008 in accordance with the Field Procedures Manual (FPM), dated May, 2008. A copy of the request is included in Appendix IV.<sup>8</sup>

As per the Project Instructions, all data were reduced to MLLW using the final approved water levels (smooth tides) from the Seldovia, AK, station (954-5500) by applying tide file 9455500.txt and time and height correctors through the final TCARI grid file H11938-TCARI.tc. **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 the CARIS HIPS and SIPS software program.

Survey H11935 was compared with the charts listed in Table 10. All charts have been updated with the Notice to Mariners (NM) through September 20, 2008 (38/08). Chart 16645 had changes to wording for several dolphins (NM, 27/08), and chart 16646 listed changes to dredge depths in the Homer Inner Harbor (NM, 31/08). Although changes were made to both charts in the NM the changes had no affect on the sounding comparisons for this survey.

NOAA Chart Number	Chart Scale	Edition Number	Edition Date	Updated Through
16645	1:82,662	18 <sup>th</sup> Ed.	January 12, 2002	December 4, 2008
16646	1:15,000	13 <sup>th</sup> Ed.	November 1, 2007	November 8, 2008

*Table 10: NOAA Charts compared with Survey H11935*

#### Chart 16645

Depths from survey H11935 generally agree within one to two fathoms or less with depths on chart 16645.<sup>9</sup>

#### Chart 16646

Depths from survey H11935 generally agreed within one to two fathoms or less with depths on chart 16646. A charted 3 fathom 4 foot shoal just east of the Homer Deep Water Dock was disproved during this survey. It has been requested that the shoal be removed from Chart 16646 in the Charted Feature Removal section of this report.<sup>10</sup>

#### Chart Comparison Recommendations

The Hydrographer has determined that bottom coverage requirements have been met and data accuracy meets requirements specified by the *HSSDM*. **The surveyed soundings are adequate to supersede prior surveys in their common areas.**<sup>11</sup>

### D.2 Automated Wreck and Obstruction Information System (AWOIS) Investigations

There was one AWOIS item located within the sheet limits of H11935. Although several short multibeam lines were run over the AWOIS point itself, time constraints prevented full development of the AWOIS region (see Figure 9). As such, this AWOIS item should be fully developed during future survey work in the area.<sup>12</sup> Multibeam development thus far has failed to identify any feature and the seafloor is flat.

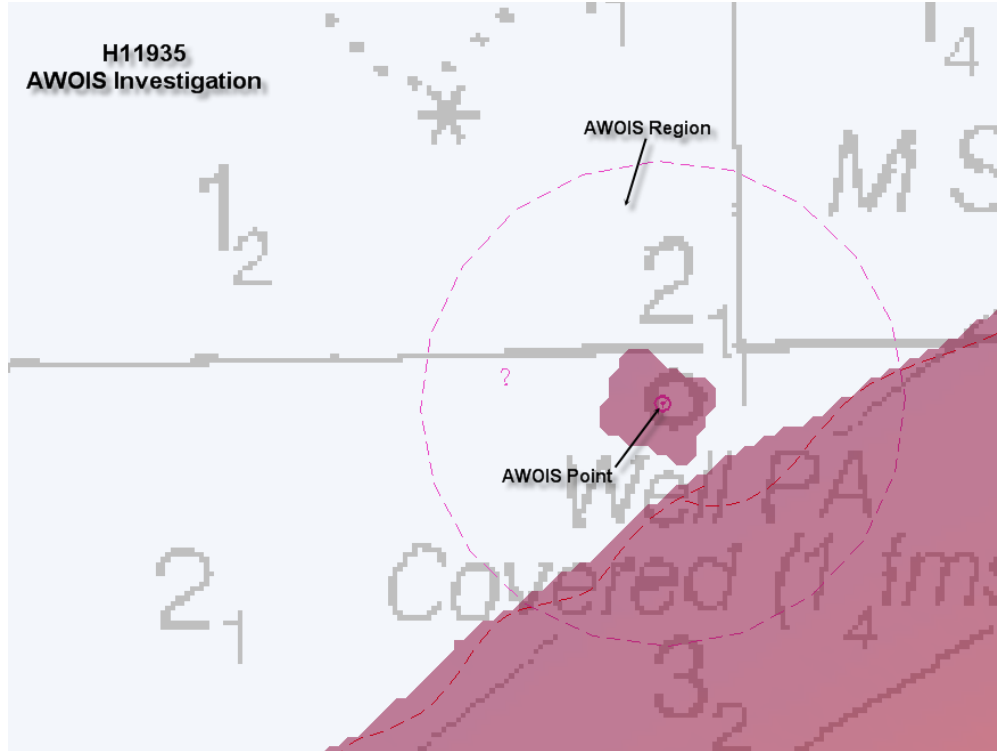


Figure 9: Partially completed AWOIS Item.

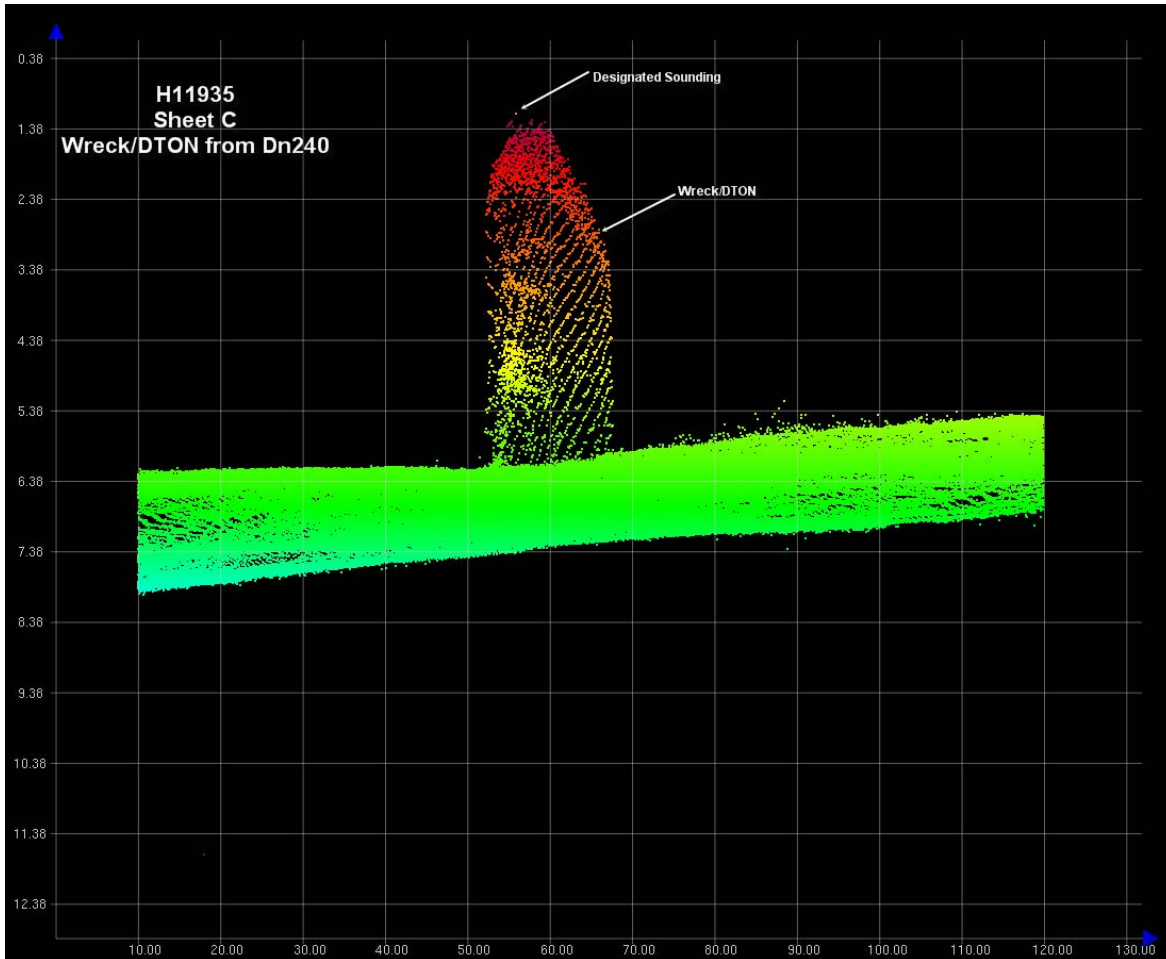
### D.3 Dangers to Navigation<sup>13</sup>

One danger to navigation was found and reported to the Mapping and Charting Division for verification and final submission to the Seventeenth Coast Guard District on September 10, 2008. A copy of the preliminary Danger to Navigation Report is included in Appendix I. Table 11 lists the DTON by the number of submission to MCD with it's position, depth and feature type. Figure 10 is a CARIS subset view of the DTON.<sup>14</sup>

DTON	Feature Type	Latitude	Longitude	Submitted Depth (m)	Final Tide Depth(m)
1.1	Wreck	59°37'32.5" N	151°25'11.3" W	1.10	1.40

Table 11: The DTON according to it's submitted number with the submitted depths and final depths.

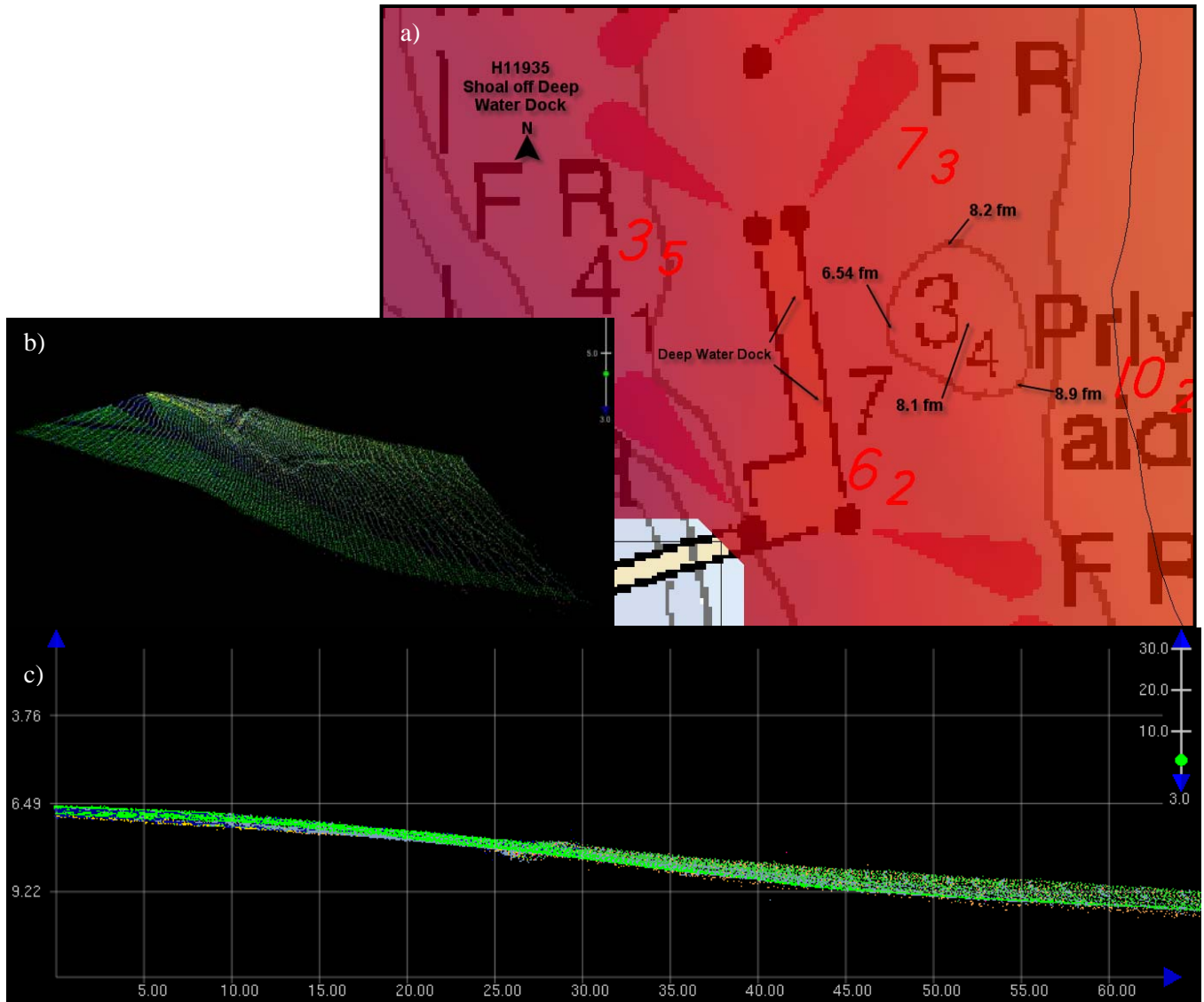




*Figure 10: DTON from Dn 240.*

#### **D.4 Charted Feature Removal Request**

The Hydrographer recommends the removal of the 3 fathom 4 foot shoal area located just west of the Deep Water Dock at 59°36'23.07" N and 151°24'48.25" W. The Shoal only appears on detailed chart 16646 and was disproved with 100% multibeam echosounder coverage by Launch 1010<sup>15</sup>. Figure 11 below illustrates the actual depths encountered in the vicinity of the shoal area.



**Figure 11:** a) Disproval of Charted Shoal on Chart 16646, b) subset 3D view, and c) subset 2D view (subset views are at 3x exaggeration with depths in fathoms and distances in meters).

## D.5 Additional Results

### Shoreline Source

A composite source file (CSF) in .000 format from the Hydrographic Survey Divisions (HSD) 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), prior survey H09877, and charted features from charts 16645 and 16646 (see Table 12). The original file was imported into CARIS Notebook, converted to a .hob file, clipped to the sheet limits, and named H11935\_Original\_Composite\_Source.hob. This file is included with the Notebook deliverables. It was then copied and named H11935\_Field\_Verified.hob to be utilized during shoreline verification and to contain field edits.

Shoreline Source	SORIND	SORDAT
RSD	US,US,graph,GC10700	20010600
Survey	US,US,graph,surveyH09877	19800000
Chart	US,US,graph,chart 16645	20020112
Chart	US,US,graph,chart 16646	19980919
RSD	US,US,reprt,DD-6720	20060125
	US, US,reprt,L-2309/02	20021120
Survey	US,US,graph,H11935	

*Table 12: SORIND/SORDAT Shoreline Features*

## 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. Detached positions (DPs) and geographic positions (GPs) acquired during shoreline verification were recorded in TerraSync 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 16645 (1:82,662) was the largest scale chart that covered 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 generated in MapInfo to serve as a guide to determining the Navigable Area Limit Line (NALL) during shoreline verification. 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. Due to the very extensive shoal area on H11935 the 4m depth contour was always the NALL. All shoreline features from the composite source seaward of the NALL were verified or disproved during shoreline operations. Features off-shore of the NALL and not addressed or features of an ambiguous nature were flagged with a marker note for further clarification. In addition, navigationally significant cultural features such as new extents to piers and lights were surveyed and are included in the H11935\_Field\_Verified.hob.

## Shoreline Data Processing

Project H11935 was unique in being the transition point for the switch from the old method of shoreline acquisition using TerraSync/Pathfinder, Pydro and Notebook to the new, and much streamlined, acquisition method using Notebook only. Most of the new and modified features were still acquired using TerraSync and imported into Pathfinder as usual (bottom samples were acquired using Notebook only). The data was then exported from Pathfinder as a Shapefile and imported directly into Notebook using the Notebook Object Import Utility, thus bypassing Pydro. Acquired and edited positions identified during shoreline verification were then processed and attributed in CARIS Notebook. The one DTON identified during the project was still imported into Pydro to facilitate creation of a DTON Report. Final TCARI tides were applied for H11935 and this also had to be done using Pydro.

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 in either the H11935\_Field\_Verified.hob or H11935\_Disprovals.hob.

Source features collected or edited during acquisition have source indication (SORIND) and source date (SORDAT) attribute fields populated to reflect the survey number (US,US,graph,H11935) and final survey date 20080902. 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 12.

### 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 recommendations to the cartographer were included in the Recommendations field.

Items disproved by the Hydrographer and deemed to not be included in the H11935\_Field\_Verified .hob file were moved to the H11935\_Disprovals .hob file with appropriate remarks and recommendations.

### 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.<sup>16</sup>**

### Aids to Navigation

Survey H11935 included nine assigned aids to navigation (ATONs) that were positioned as stated in the *Horizontal and Vertical Control Report for OPR-P357-FA-RA-08* using static GPS survey methods. Three additional new ATONs were also positioned using the Trimble backpack system used for shoreline investigation. Three of the assigned ATONs were found not to be positioned within survey tolerance. Table 13 lists all ATONs positioned and the one assigned ATON (Homer Chevron Fuel Float Lights #26213) that was not found during the investigation.

Light List Name	Light List Number	NAD83 (CORSS96) (EPOCH: 2002.0000)						Positioning method	Serves Purpose Yes/No
		N Lat (DMS)			W Long (DMS)				
Homer Spit Light 3	26200	59	36	01.960	151	24	34.556	Static	Yes
Homer Main Dock Lights	26205	59	36	11.191	151	24	39.945	Static	No
Homer Main Dock Lights	26205	59	36	8.137	151	24	39.945	Static	No
Homer Breakwater Light 2	26210	59	66	14.240	151	24	53.504	Static	Yes
Homer Chevron Fuel Float Lights	26213	These lights were not found during the investigation							
Homer Fuel Dock Lights (2 collocated)	26215	59	36	12.840	151	25	1.836	Static	Yes
Homer Spit Deepwater South Dock Lights	26217	59	36	20.135	151	24	53.900	Static	Yes
Homer Spit Deepwater South Dock Lights	26217	59	36	20.630	151	24	51.649	Static	Yes
Homer Spit Deepwater North Dock Lights	26220	59	36	23.920	151	24	53.408	Static	Yes
Homer Spit Deepwater North Dock Lights	26220	59	36	23.976	151	24	52.754	Static	Yes
Homer Spit Deepwater South Dolphin Light	26216.5	59	36	17.70	151	24	50.67	Trimble	No
Homer Spit Deepwater Dolphin Light	26223	59	36	25.95	151	24	53.50	Trimble	No
Homer Pioneer Dock Lights	N/A	59	36	07.408	151	24	31.761	Static	New
Homer Pioneer Dock Lights	N/A	59	36	06.78	151	24	30.36	Trimble	New
Homer Pioneer Dock Lights	N/A	59	36	05.57	151	24	29.92	Trimble	New

*Table 13: Positioned ATONs*

The charted Homer Main Dock Lights (Light List # 26205), on the site of the new Pioneer Dock, were not serving their intended purpose due to repositioning of the lights during construction. The new positions agree with the newly digitized location of the new Pioneer Dock. The new dolphins associated with this pier should be named “Homer Pioneer Dock Lights” to agree with local terminology and the Coast Pilot. It is recommended that the current lights labeled “Homer Main Dock Lights” should also be renamed with “Homer Pioneer Dock Lights”.<sup>17</sup> All positions taken with the Trimble on lights mounted on Dolphins were confirmed with MBES coverage of the supporting piles. All other ATONs were found to be serving their intended purpose.<sup>18</sup>

### **Bottom Samples**

Twelve bottom samples were collected by the *Fairweather* on August 28<sup>th</sup> and 29<sup>th</sup>, 2008 (Dn 241 and 242) for survey H11935. Five of these samples were from prior sample locations, and seven were collected in areas without prior data. All samples were some variation of grey to grey-green or brown clay or sticky mud. Six of the samples also had shells or broken shells as a minor constituent. All samples were logged into CARIS Notebook and included in the H11935\_Field\_Verified.hob layer.<sup>19</sup>

### **Additional Recommendations**

- The request in the 2008 Project Instructions to survey to the 0-meter curve was not accomplished due to mechanical breakdowns. Future projects in this area should include a 0-meter curve survey inshore of H11935.<sup>20</sup>
- The one AWOIS item for this survey was not adequately assessed so should be fully developed during future projects.<sup>21</sup>

### **E. SUPPLEMENTAL REPORTS**

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

<b><u>Title</u></b>	<b><u>Date Sent</u></b>	<b><u>Office</u></b>
Hydrographic Systems Certification Report 2008	May 14, 2008	N/CS34
Data Acquisition and Processing Report 2008	November 14, 2008	N/CS34
Horizontal and Vertical Control Report for OPR-P357-FA-08	December 19, 2008	N/CS34
Tides and Water Levels Package for OPR-P357-FA-08	September 18, 2008	N/OPS1
Coast Pilot Report for OPR-P357-FA-08	December 16, 2008	N/CS26



**UNITED STATES DEPARTMENT OF COMMERCE**

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

December 18, 2008

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

FROM: CDR Douglas D. Baird, 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: 2008.12.17 14:55:38 -08'00'

TITLE: Approval of Hydrographic Survey H11935,  
OPR-P357-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 H11935 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:

Brenna Campbell  
I am the author of this document  
2008.12.12 16:29:20 Z

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SST Brenna Campbell  
Survey Manager

Matthew Ringel  
2008.12.17 08:00:41 -08'00'

---

LT Matthew Ringel  
Field Operations Officer

Digitally signed by Lynnette Morgan  
DN: cn=Lynnette Morgan, c=US, o=NOAA, ou=NOAA  
Ship Fairweather, email=lynnette.v.morgan@noaa.gov  
Date: 2008.12.17 06:18:31 -09'00'

---

CST Lynnette V. Morgan  
Chief Survey Technician

Attachment



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## Revisions and Corrections Compiled During Office Processing and Certification

<sup>1</sup> Filed with project records.

<sup>2</sup> H11935 junctions H11938 (Sheet F-Fairweather) and H11934 (Sheet B-Rainier). A common junction will be made with those surveys when they are compiled.

<sup>3</sup> Concur.

<sup>4</sup> The data is adequate to supersede charted data despite of the occasional DGPS dropouts.

<sup>5</sup> Filed with survey records.

<sup>6</sup> Concur.

<sup>7</sup> Filed with the project records

<sup>8</sup> Tide note is appended to this report.

<sup>9</sup> Concur.

<sup>10</sup> Concur.

<sup>11</sup> Concur.

<sup>12</sup> Concur. There was no AWOIS report filed. The AWOIS item 53704 was not fully developed. The item as a Well PA covered (1.4 fms). Retain AWOIS item as charted.

<sup>13</sup> DTON was reported in the described area. The DTON have been applied to the charts and It is included in the HCell. See attached DTON report.

<sup>14</sup> It is recommended that this feature be added to the AWOIS database.

<sup>15</sup> Concur. Chart area as shown in the HCell.

<sup>16</sup> Concur with clarification. The submitted hob files were used in the compilation of HCell H11935. During compilation, some modifications were made to accommodate chart scale. Chart features as depicted in the HCell.

<sup>17</sup> Concur with the hydrographers recommendations.

<sup>18</sup> Chart private ATONS addressed during survey H11935 as depicted in the Hcell. Chart all other ATONS per latest ATONIS information.

<sup>19</sup> 31 bottom samples were imported into the Hcell. 12 bottoms samples were collected during H11935 survey operations and 19 bottom samples were imported from the ENC to be retained.

<sup>20</sup> Concur.

<sup>21</sup> Concur. See Endnote 12.

# H11935 Danger to Navigation Report

**Registry Number:** H11935  
**State:** Alaska  
**Locality:** Kachemak Bay  
**Sub-locality:** Vicinity of Homer Spit  
**Project Number:** OPR-P357-FA-08  
**Survey Dates:** 2008/08/19 - 2008/09/03

Wreck/DTON in Kachemak Bay, Alaska

## Charts Affected

Number	Edition	Date	Scale (RNC)	RNC Correction(s)*
16646	13th	11/01/2007	1:15,000 (16646_3)	[L]NTM: ?
16645	18th	01/12/2002	1:82,662 (16645_1)	[L]NTM: ?
16647	3rd	05/12/2001	1:100,000 (16647_1)	[L]NTM: ?
16640	24th	09/15/2001	1:200,000 (16640_1)	[L]NTM: ?
16680	10th	07/10/1999	1:200,000 (16680_1)	[L]NTM: ?
16013	30th	07/01/2006	1:969,761 (16013_1)	[L]NTM: ?
531	24th	07/01/2007	1:2,100,000 (531_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	Wreck	1.10 m	59° 37' 32.5" N	151° 25' 11.3" W	---



## **1 - Danger To Navigation**

**1.1) 136/8****DANGER TO NAVIGATION****Survey Summary**

**Survey Position:** 59° 37' 32.5" N, 151° 25' 11.3" W  
**Least Depth:** 1.10 m (= 3.60 ft = 0.600 fm = 0 fm 3.60 ft)  
**TPU ( $\pm 1.96\sigma$ ):** **THU (TPEh)**  $\pm 0.985$  m ; **TVU (TPEv)**  $\pm 0.246$  m  
**Timestamp:** 2008-240.19:43:39.759 (08/27/2008)  
**Survey Line:** h11935 / fa\_1010\_reson8101 / 2008-240 / 240-1943  
**Profile/Beam:** 136/8  
**Charts Affected:** 16646\_3, 16645\_1, 16647\_1, 16640\_1, 16680\_1, 16013\_1, 531\_1, 500\_1, 530\_1, 50\_1

**Remarks:**

Sounding is least depth on obstruction/wreck. Obstruction/wreck was identified and least depth determined using 200% multibeam (Reson 8101). Verified/Observed tides have been applied to this feature.

**Feature Correlation**

Address	Feature	Range	Azimuth	Status
h11935/fa_1010_reson8101/2008-240/240-1943	136/8	0.00	000.0	Primary

**Hydrographer Recommendations**

The Hydrographer recommends charting a wreck in the surveyed position.

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

0 ½fm (16645\_1, 16640\_1, 16680\_1, 16013\_1, 530\_1)

0fm 3ft (16646\_3, 16647\_1, 531\_1)

1.1m (500\_1, 50\_1)

**S-57 Data**

**Geo object 1:** Wreck (WRECKS)  
**Attributes:** CATWRK - 2:dangerous wreck  
 CONVIS - 2:not visual conspicuous

SORDAT - 20080902

SORIND - US,US,graph,H11935

TECSOU - 3:found by multi-beam

VALSOU - 1.097 m

VERDAT - 12:Mean lower low water

WATLEV - 3:always under water/submerged

### Feature Images

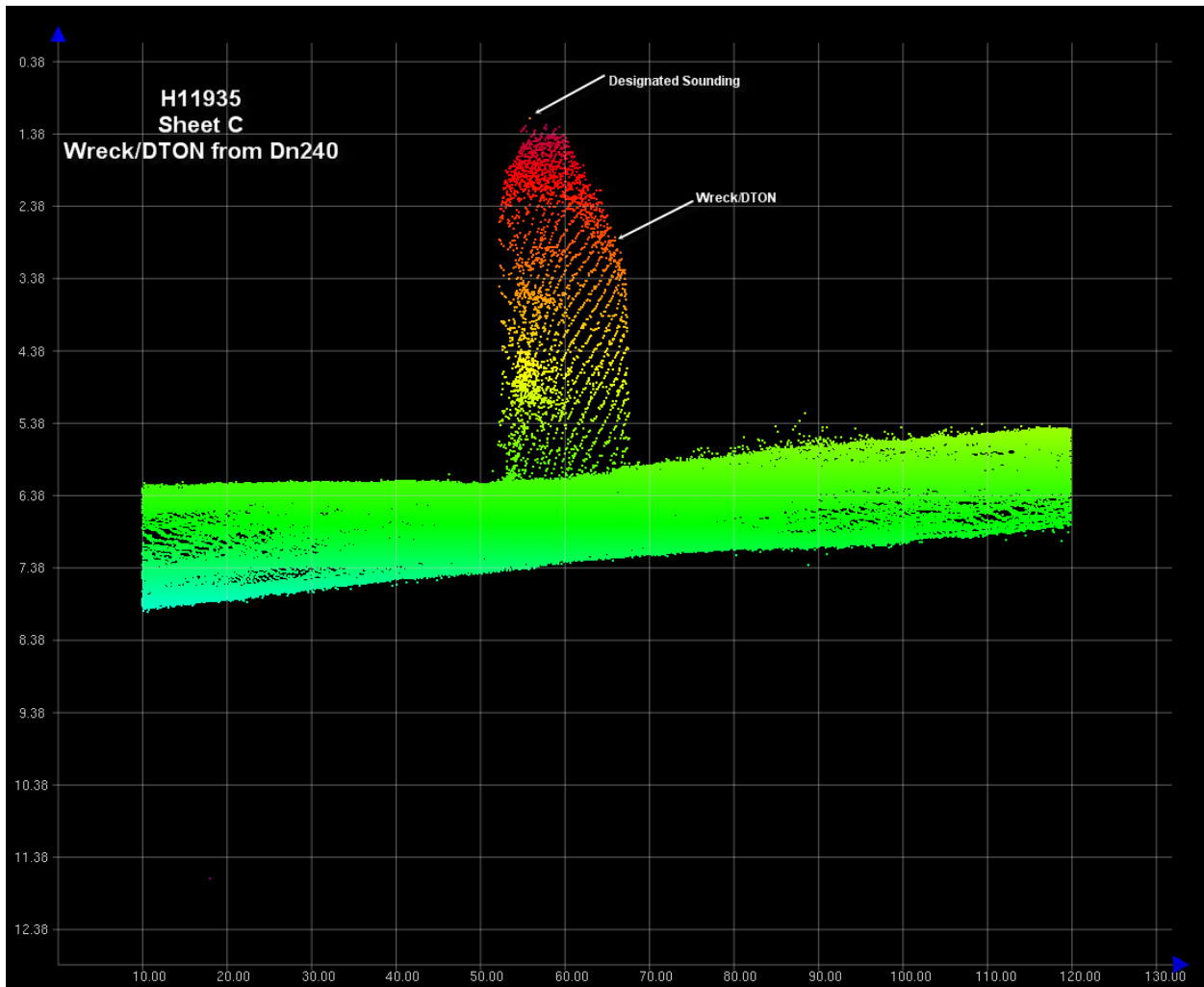


Figure 1.1.1

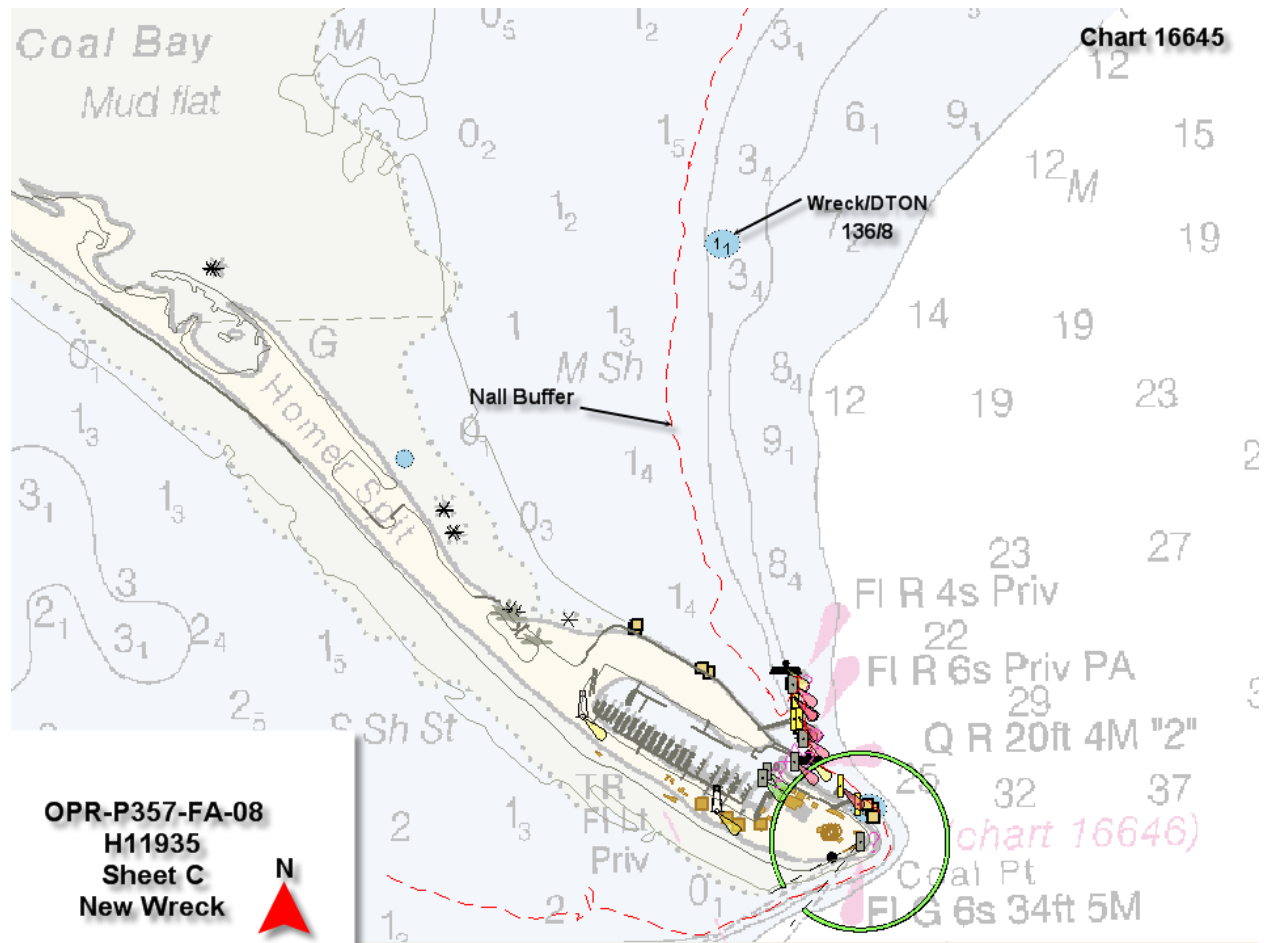


Figure 1.1.2



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

**TIDE NOTE FOR HYDROGRAPHIC SURVEY**

**DATE :** October 22, 2008

**HYDROGRAPHIC BRANCH:** Pacific  
**HYDROGRAPHIC PROJECT:** OPR-P357-FA-2008  
**HYDROGRAPHIC SHEET:** H11935

**LOCALITY:** Vicinity of Homer Spit, Kachemak Bay, AK  
**TIME PERIOD:** August 19 - September 2, 2008

**TIDE STATION USED:** 945-5500 Seldovia, AK  
Lat. 59° 26.4'N Long. 151° 43.2' W

**PLANE OF REFERENCE (MEAN LOWER LOW WATER):** 0.000 meters  
**HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE:** 5.252 meters

**REMARKS: RECOMMENDED ZONING**

Please use the TCARI grid, "H11935-TCARI.tc" posted at [ftp://140.90.121.83/pub/outgoing/HPT/Smooth\\_Tides\\_TCARI](ftp://140.90.121.83/pub/outgoing/HPT/Smooth_Tides_TCARI), as the final grid for project OPR-P357-RA/FA-2008, H11935, during the time period between August 19 - September 2, 2008.

**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).

**Note 2:** The water levels stations installed at Bear Cove, Ak (9455595) and Kasitsna Bay, AK (9455517), did not meet the requirements specified in the OCS Hydro Specifications and Deliverables manual. CO-OPS could not verify the stability of the stations sensors or staffs. Therefore, Bear Cove and Katsitna Bay provided only harmonic constants and preliminary datums for this TCARI grid.

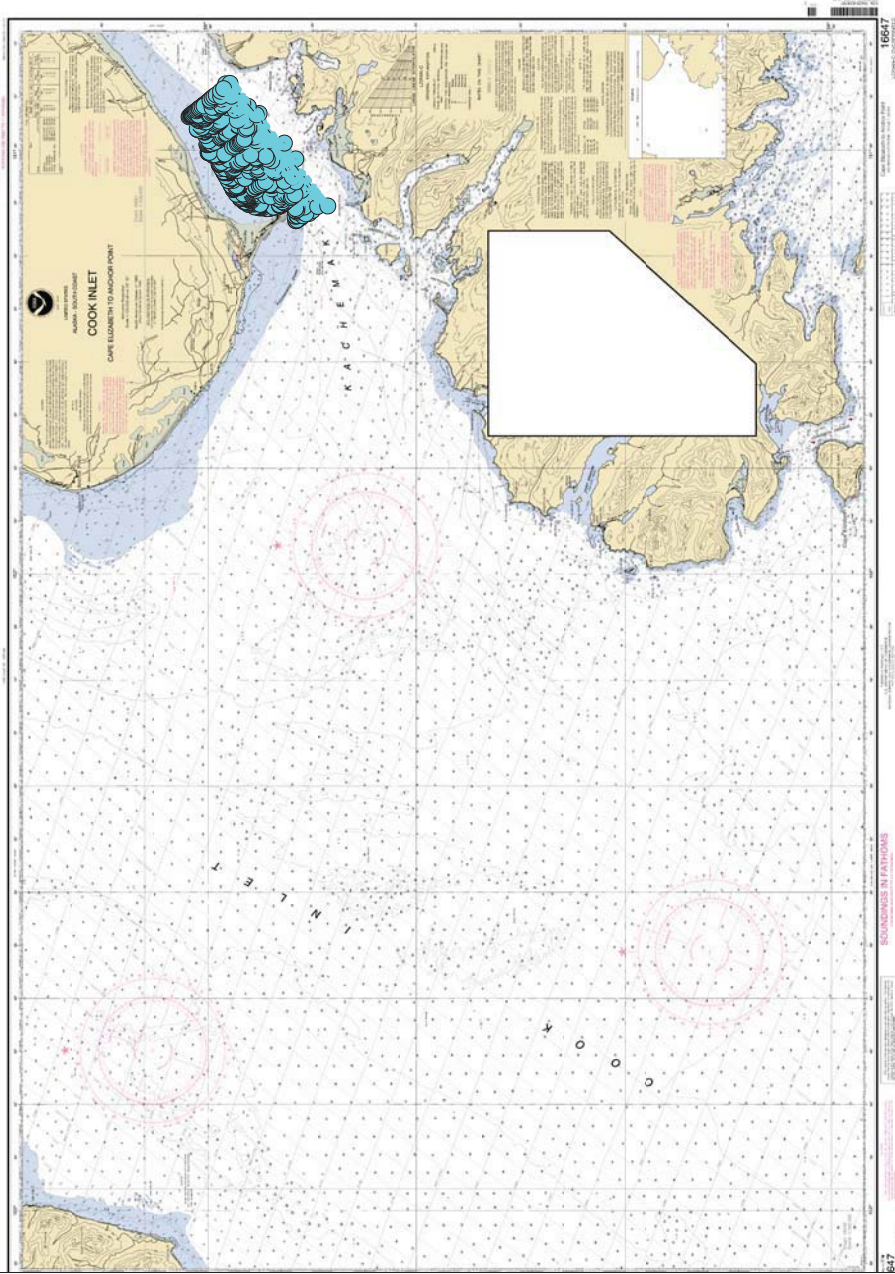
**Stephen K. Gill**

Digitally signed by Stephen K. Gill  
DN: c=US, st=Maryland, l=Silver Spring, ou=Center for Operational  
Oceanographic Products & Serv., o=National Oceanic and Atmospheric  
Administration, cn=Stephen K. Gill, email=Stephen.Gill@noaa.gov  
Date: 2008.10.22 17:54:01 -04'00'

CHIEF, OCEANOGRAPHIC DIVISION



Final Tides for  
OPR-P357-FA-2008, H11935  
Vicinity of Homer Spit, Kachemak Bay, AK  
Final TCARI Grid



**H11935 HCell Report**  
Fernando Ortiz, Physical Scientist  
Pacific Hydrographic Branch

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

HCell compilation of survey H11935 used:

Office of Coast Survey HCell Specifications: Draft, Version: 4.0, 17 March 2010.  
HCell Reference Guide: Version 2.0, July 29, 2010.

**2. Compilation Scale**

Depths and features for HCell H11935 were compiled to the largest scale raster charts shown below:

Chart	Scale	Edition	Edition Date	NTM Date
16646_3	1:15,000	13th	11/2007	07/10/2010
16646_2 (inset)	1:7,500	13th	11/2007	07/10/2010

The following ENC's were also used during compilation:

Chart	Scale
US5AK1BM	

**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 1:15,000 for the 16646\_3 chart, and 1:10,000 for chart 16643\_3 at survey scale using a Radius Table file with values shown in the table, below.

Shoal Limit (m)	Deep Limit (m)	Radius (mm)
0	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 16646_3, 16645_1	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 H11935_SS.000
1	1.8288	2.0574	1.125	1
3	5.4864	5.715	3.125	3
5	9.144	9.3726	5.125	5
10	18.288	18.5166	10.125	10
20	36.576	37.9476	20.75	20
30	54.864	56.2356	30.75	30
40	73.152	74.5236	40.75	40
50	91.44	92.8116	50.75	50
60	109.728	111.0996	60.75	60
70	128.016	129.3876	70.75	70

#### 5. Meta Areas

The following Meta object areas are included in HCell H11935:

M\_QUAL  
M\_CSCL

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
BCNSPP	Beacon, especial purpose/general
LIGHTS	Light (Private)
MORFAC	Mooring
M_CSCL	Chart Scale Meta Object
M_QUAL	Data quality Meta object
OBSTRN	Obstruction area object
SBDARE	Bottom samples
SLCONS	Shoreline Construction (Jetty)
SOUNDG	Soundings at the chart scale density
WRECKS	Wreck

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**

H11935 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**

H11935_CS.000	Base Cell File, Chart Units, Soundings and features compiled to 1:15,000
H11935_SS.000	Base Cell File, Chart Units, Soundings and Contours compiled to 1:15,000
H11935_DR.pdf	Descriptive Report including end notes compiled during office processing and certification, the HCell Report, and supplemental items
H11935_outline.gml	Survey outline
H11935_outline.xsd	

## 11.2 Software

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

## 12. Contacts

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

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

APPROVAL SHEET  
H11935

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.