

H11708

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.* ..... H11708

### LOCALITY

*State* ..... Alaska

*General Locality* ..... Chatham Strait

*Sublocality* ..... NW of Frederick Sound

2007

### CHIEF OF PARTY

..... Dean Moyles

### 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>H11708</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: N/A</p>
<p>State <u>Alaska</u></p> <p>General Locality <u>Chatham Strait</u></p> <p>Sub-Locality <u>NW of Frederick Sound</u></p> <p>Scale <u>1:20,000</u> Date of Survey <u>5/6/2007 - 5/26/2007</u></p> <p>Instructions dated <u>6/15/2006</u> Project No. <u>OPR-O322-KR-07</u></p> <p>Vessel <u>R/V Davidson (1066485), R/V R2 (623241), R/V D2 (647782), Shoreline Skiff (WN6739NW)</u></p> <p>Chief of party <u>Dean Moyles</u></p> <p>Surveyed by <u>Orthmann, Reynolds, Gill, Mount, Stock, Farley, Briggs, Poeckert, et al.</u></p> <p>Soundings by <u>RESON 8101, RESON 8111, RESON 8125</u></p> <p>SAR by <u>Fernando Ortiz</u> Compilation by <u>Anthony Lukach</u></p> <p>Soundings compiled in <u>Fathoms</u></p>		
<p>REMARKS: <u>All times are UTC. UTM Projection 8</u></p> <p><u>Revisions and annotations appearing as endnotes were generated during office processing. As a result, page numbering may be interrupted or non-sequential.</u></p> <p><u>All depths listed in this project are referenced to mean lower low water unless otherwise noted.</u></p> <p><u>All separates are filed with the project or hydrographic data.</u></p>		

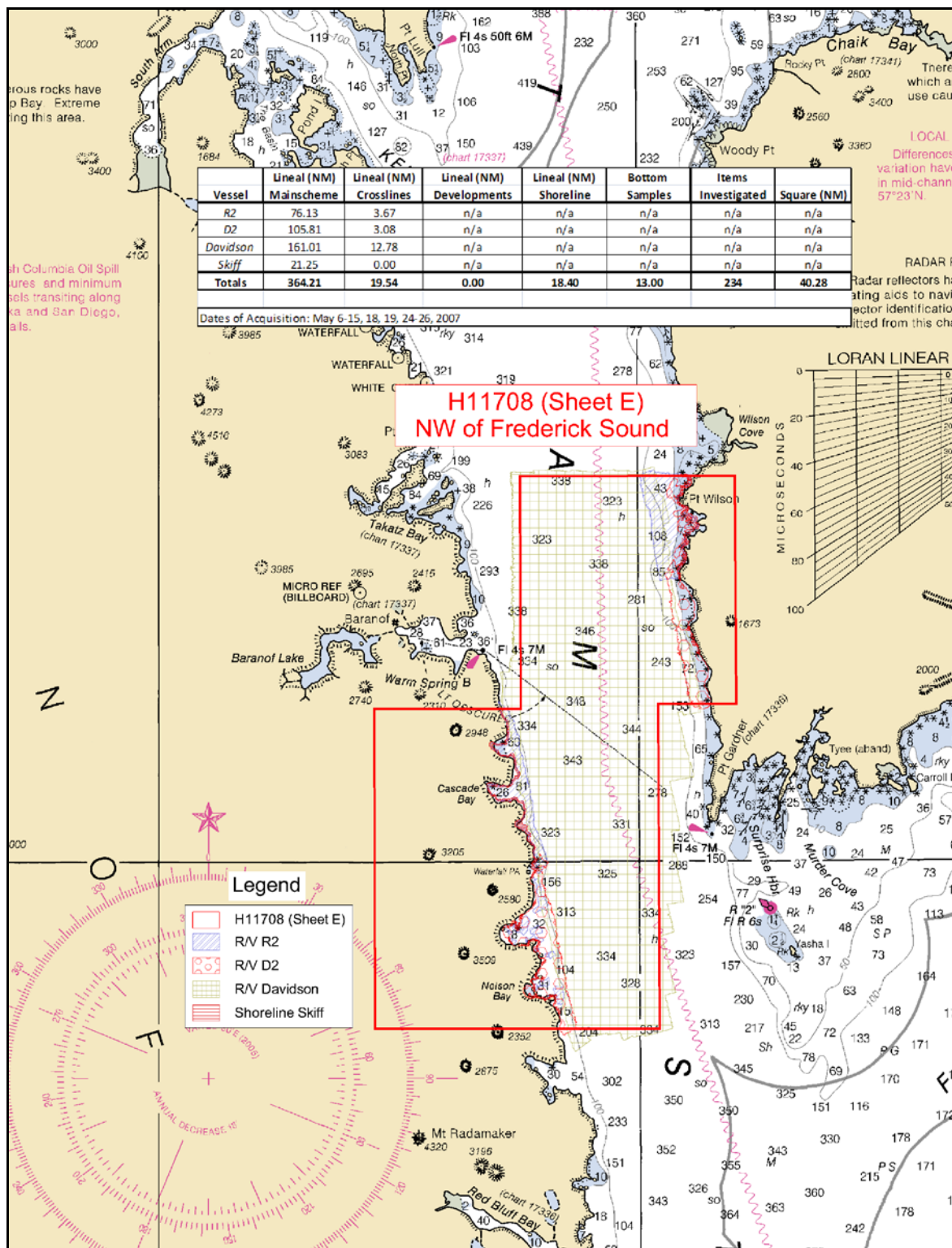
## A - Area Surveyed

H11708 (Sheet E) is bound by the coordinates listed below, which encompass the area NW of Frederick Sound.

Hydrographic data collection began on May 06, 2007 and ended on May 26, 2007.

**Table 1 – H11708 Sheet Limits**

<b>Sheet Limits</b> H11708 Sheet E Scale 1:20,000		
Point #	Positions on NAD83	
	Degrees Latitude (N)	Degrees Longitude (W)
1	56-56-11.95 N	134-51-00.32 W
2	57-03-28.51 N	134-51-00.32 W
3	57-03-28.48 N	134-44-54.06 W
4	57-08-45.72 N	134-44-54.06 W
5	57-08-45.41 N	134-35-55.64 W
6	57-03-33.91 N	134-35-55.64 W
7	57-03-33.85 N	134-39-10.88 W
8	56-56-10.76 N	134-39-10.88 W



**Figure 1 H11708 Area Surveyed**

## **B – Data Acquisition & Processing**

Refer to the OPR-O322-KR-07 Data Acquisition and Processing Report<sup>1</sup> for a detailed description of all equipment, survey vessels, processing procedures, and quality control features. Items specific to this survey and any deviations from the Data Acquisition and Processing Report are discussed in the following sections.

### Equipment & Vessels

The R/V Davidson, R/V R2, R/V D2, and the Shoreline Skiff acquired all soundings for H11708. The R/V Davidson, 175 feet in length with a draft of 17.75 feet, was equipped with a 100 kHz Reson 8111 with option 033 (pseudo Side Scan) for multibeam data acquisition. R/Vs R2 & D2, 29 feet in length with a draft of 5.7 feet, were equipped with a 240 kHz Reson 8101 with option 033 (pseudo Side Scan) for multibeam data acquisition. The Shoreline Skiff, 24 feet in length with a draft of 1.42 feet, was equipped with a 455 kHz Reson 8125 with option 033 (pseudo Side Scan) for multibeam data acquisition. All vessels were also equipped with two AML sound velocity and pressure sensors (SV&P) for sound velocity profiles. Vessel attitude and position were measured using an Applanix Position and Orientation System for Marine Vessel (POS/MV 320) (v4) with XTF files logged in Triton ISIS (v7.0.413.9).

Heights were taken on features awash or above the water level by visual estimation, using simultaneous comparison to a known reference (the vessel's bow).

Refer to OPR-O322-KR-07 Data Acquisition & Processing Report for a complete listing of equipment and vessel descriptions.

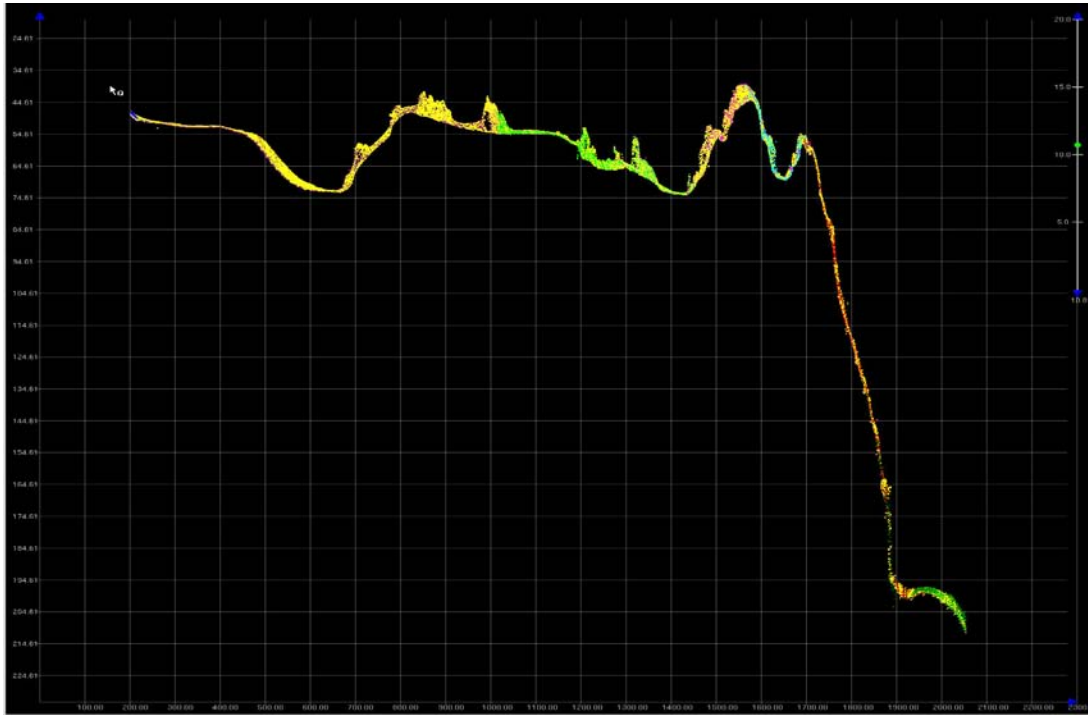
### Quality Control

#### Crosslines

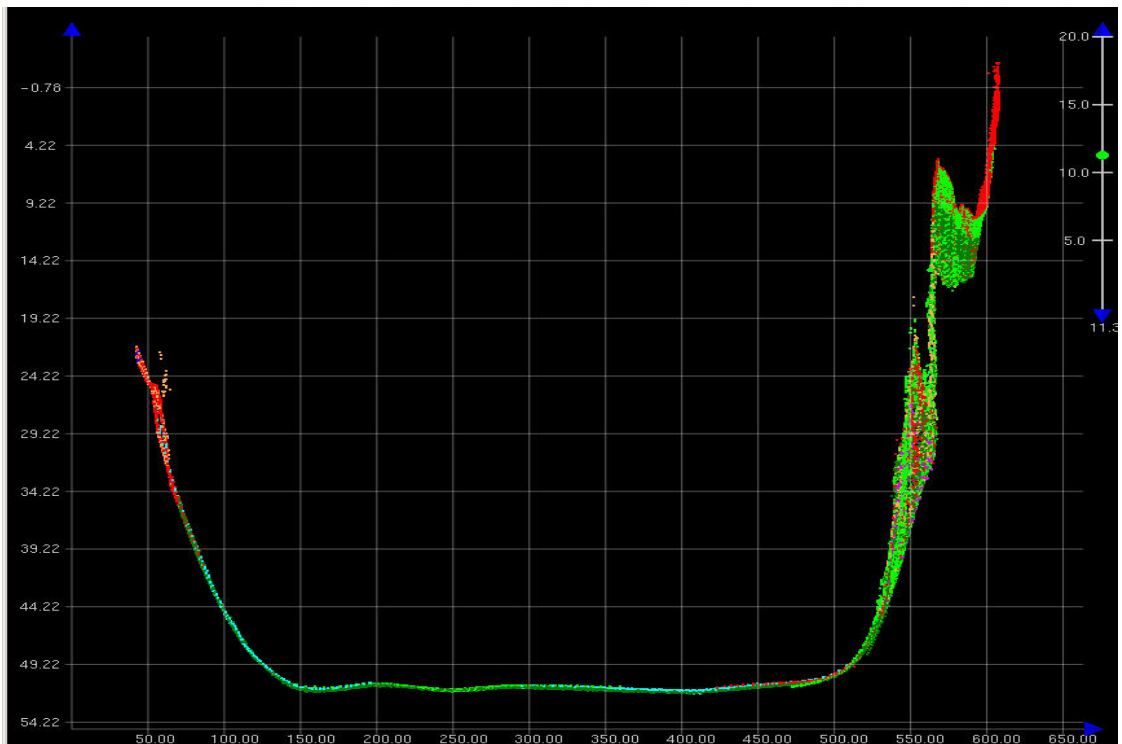
Crosslines were planned and well distributed throughout the survey to ensure adequate quality control. Total crossline length surveyed was 19.54 nautical miles or 5.36 percent of the total main scheme line length, exceeding the 5 percent planned. Each crossline was compared to all main scheme lines it intersected, using the CARIS HIPS QC report routine.

The majority of QC Reports fall well within the required accuracy specifications. However, beams that fall below the 95 percent confidence level in the QC report are associated with areas and conditions illustrated below. It should be noted that these locations are in agreement with the surrounding adjacent lines and are considered well within the required specifications.

The majority of beams that fall below the 95 percent confidence level are located in areas having extremely steep slopes and/or rocks. Figures 2 and 3 below provide examples.



**Figure 2 Profile of 1E06-TIE01**



**Figure 3 Profile of 1E07-TIE03**

Note: The QC reports were generated based on the given accuracy specification of:

$$\pm \sqrt{a^2 + (b * d)^2}$$

where, a = 0.5, b = 0.013, and d = depth.

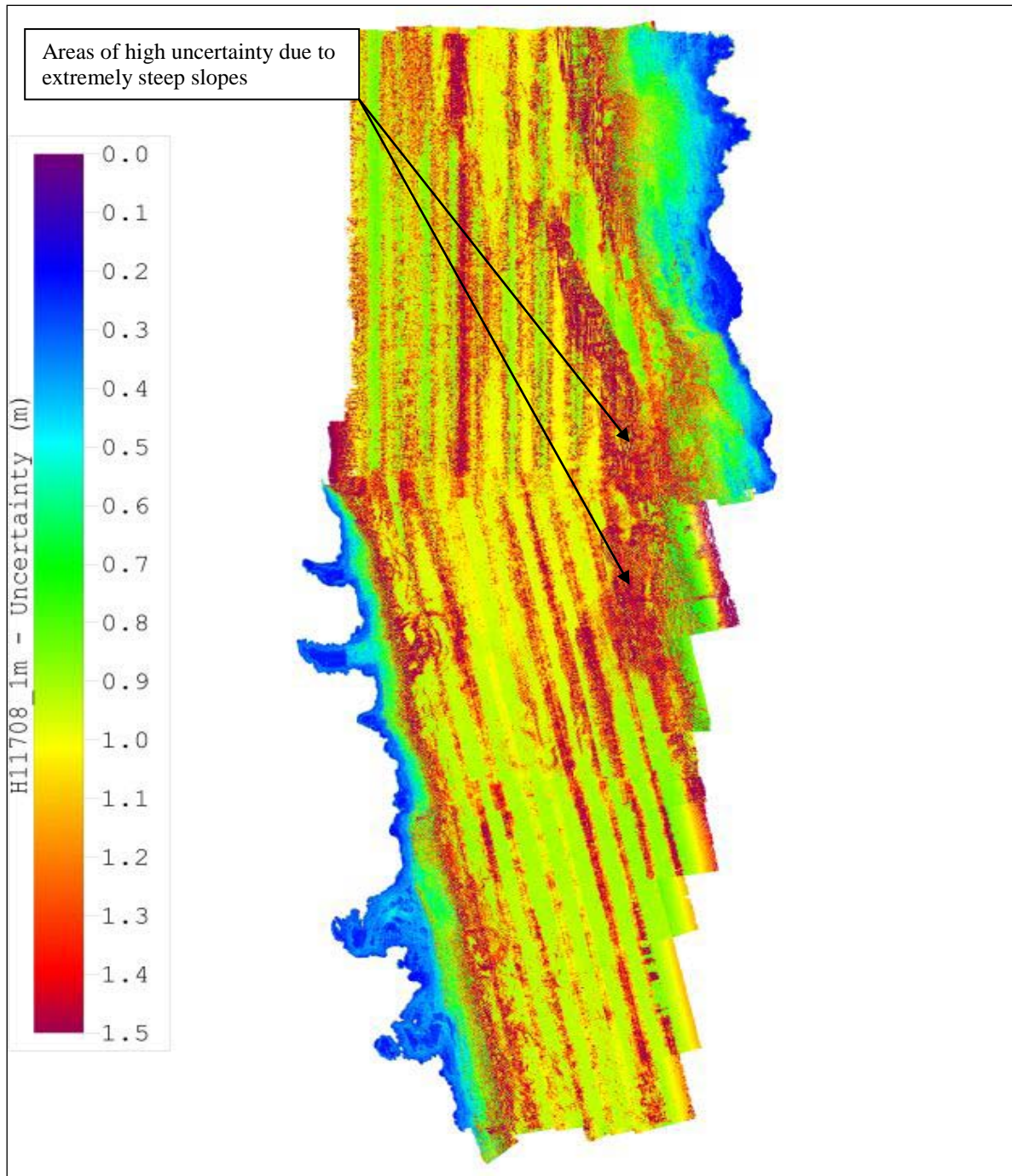
However, since a variance of a difference, rather than a variance from a mean is being used, the a and b values were defined in the user defined option within the CARIS HIPS QC Report routine:

$$a = 0.5 * \sqrt{2} = 0.707$$

$$b = 0.013 * \sqrt{2} = 0.018$$

### Uncertainty Values (CARIS BASE Surface)

The majority of H11708 had an uncertainty of about 0.20 to 0.70 meters, except for the deep water areas having extremely steep slopes or deemed to be rocky, where values ranged from 1.0 to 2.0 meters. No uncertainty values were greater than the IHO level Order 1.<sup>2</sup>



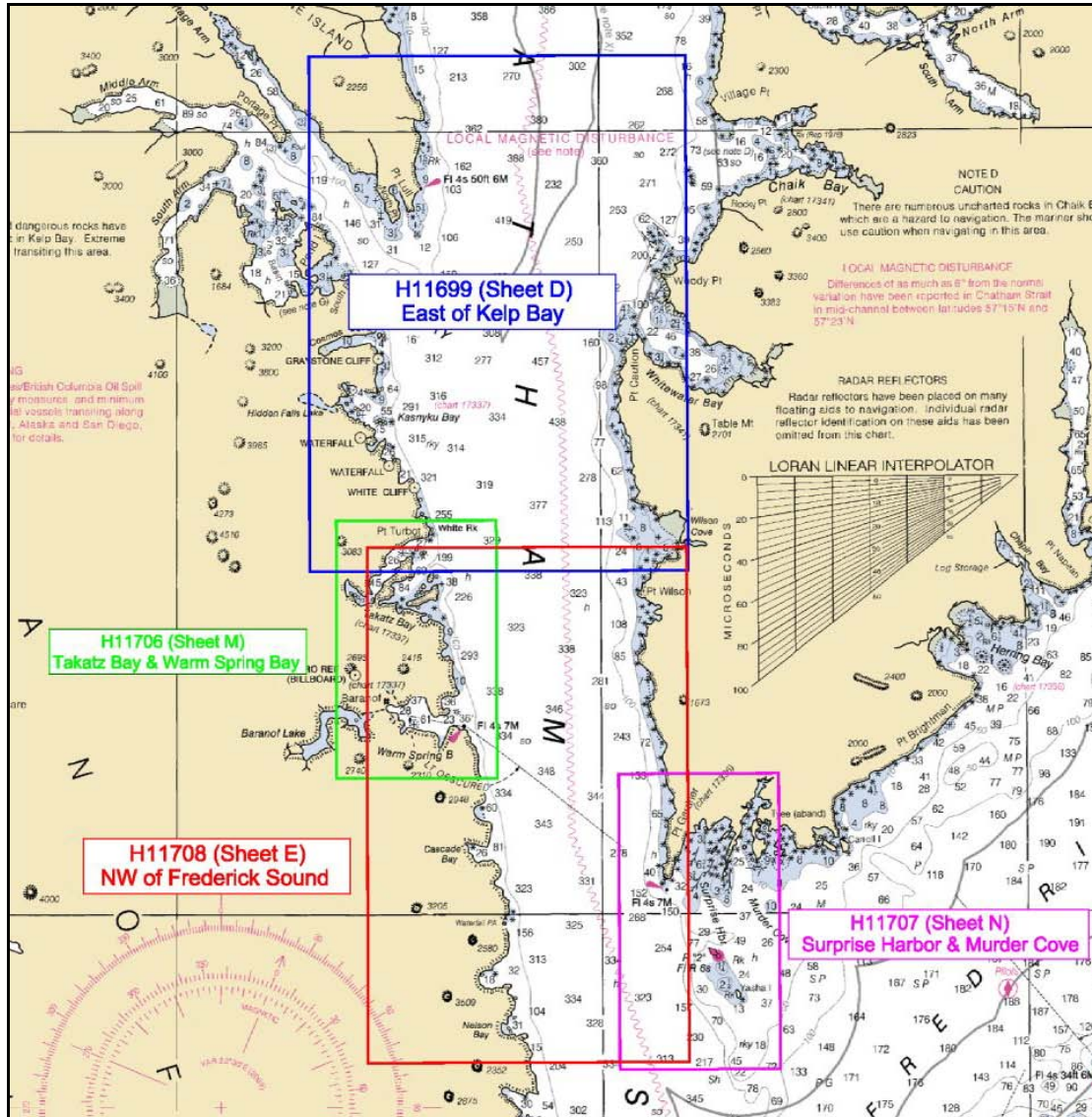
**Figure 4 H11708 Uncertainty DTM**



## Survey Junctions

H11708 (Sheet E) junctions with:

Registry #	Scale	Date	Junction Side
H11699	1:20,000	2007	North
H11707	1:10,000	2007	East
H11706	1:10,000	2007	Northwest



**Figure 5 H11708 Survey Junctions**

The surveys are in agreement along their common borders. The agreement was noted in the field using the CARIS CUBE surfaces during subset cleaning. The conformity is also apparent in the final combined BASE surfaces.<sup>3</sup>

### Quality Control Checks

During the hydrographic survey OPR-O322-KR-07 the survey vessels conducted a number of confidence checks. These consisted of the vessels running two lines in the opposite direction over a reference surface (normally the patch test site). The data sets collected with the Reson 8125 (Shoreline Skiff), 8101 (R2 & D2), and 8111 (Davidson) compared within 5 to 10 centimeters.

Positioning system confidence checks were conducted on a daily basis using the POS/MV controller software. The controller software had numerous real time displays that were monitored throughout the survey to ensure the positional accuracies specified in the NOS Hydrographic Surveys Specifications and Deliverables (April 2007) were achieved. These include, but were not limited to the following: GPS Status, Position Accuracy, Receiver Status (which included HDOP), and Satellite Status. During periods of high HDOP and/or low number of available satellites, survey operations were suspended.

### Data Quality

In general, the multibeam data quality for H11708 was excellent. One notable problem follows:

- During data acquisition and routine processing, a general downward and/or upward cupping was noticed in the across track sounding profiles for certain areas. This is possibly due to a high volume of thermal layering and strong undercurrents in the water column. This problem was addressed by conducting SVP casts more frequently and reducing the line spacing interval. Even though this SVP error is noticeable on the uncertainty surface DTM in Figure 4 above, the data are well within the required specifications.<sup>4</sup>

### Corrections to Echo Soundings

Refer to the OPR-O322-KR-07 Data Acquisition and Processing Report for a detailed description of all corrections to echo soundings. No deviations from the report occurred.

### Data Processing

Refer to the OPR-O322-KR-07 Data Acquisition and Processing Report for a detailed description of the processing flow.

The final Bathymetric with Associated Statistical Error (BASE) surface for H11708 is called H11708 and it contains six different BASE surfaces of different resolutions. To ensure sufficient overlap between these surfaces the follow parameters were used:

Depth Threshold: 0 to 15 meters, resolution = 1m, Name in BASE Surface H11708\_1m  
 Depth Threshold: 10 to 45 meters, resolution = 2m, Name in BASE Surface H11708\_2m  
 Depth Threshold: 40 to 60 meters, resolution = 4m, Name in BASE Surface H11708\_4m  
 Depth Threshold: 50 to 150 meters, resolution = 5m, Name in BASE Surface H11708\_5m  
 Depth Threshold: 130 to 500 meters, resolution = 10m, Name in BASE Surface H11708\_10m  
 Depth Threshold: 400 to Max depth, resolution = 15m, Name in BASE Surface H11708\_15m

The final S57 file for this project is called “H11708\_S57\_Features.000”. This file contains all shoreline and bottom sample feature data for this project in S57 format as required in the Specifications and Deliverables.

## C – Horizontal & Vertical Control

Refer to the OPR-O322-KR-07 Horizontal and Vertical Control Report<sup>5</sup> for a detailed description of the horizontal and vertical control used. No deviations from the report occurred. A summary of the project’s horizontal and vertical control follows.

### Horizontal Control

The horizontal control datum for this survey was the North American Datum of 1983 (NAD83). All raw positions were originally collected in WGS84 and transformed to NAD83 during the post-processed kinematic GPS (PPK) routine.

It was necessary to acquire dual frequency GPS data at known locations on the ground so that a PPK solution could be used for final positioning. Sub-contractor John Oswald and Associates LLC (JOA) established two local control points: station “Angoon A” and station “Angoon B” in Angoon, AK. Refer to Appendix II in the “OPR-O322-KR-07 Horizontal & Vertical Control Report” for additional information.

Vessel position was determined in real time using a Trimble Zephyr L1/L2 GPS antenna, which was connected to a Trimble BD950 L1/L2 GPS card residing in the POS/MV. The POS/MV was set up via Com 2 to accept USCG differential corrections, which were output from a CSI MBX-3S Coast Guard beacon receiver. Note: since the pseudo range corrections received by the POS/MV are based on the NAD83 position of the reference station antenna, all DGPS-based final positions are NAD83. However, final positions were determined by a post-processed kinematic (PPK) solution using POSpac 4.3 processing software, which output a final solution in NAD83. (Refer to the “2007-NOAAProcessingProcedures” document for PPK processing procedure).

**Table 2 - DGPS Stations**

Station	ID	Latitude	Longitude	Freq.	Tx. Rate
Biorka, AK USCG	890	56°51’18” N	135°32’05”W	305	100BPS
Level Island, AK USCG	891	56°28’03” N	133°04’32” W	295	100BPS

### Vertical Control

All sounding data were initially reduced to mean lower low water (MLLW) using unverified tidal data from three tide stations located in Warm Spring Bay, False Bay, and Mitchell Bay, AK. Sub-contractor John Oswald & Associates LLC (JOA) operated the gauges and e-mailed the data to the R/V Davidson at the end of every Julian day.

**Table 3 - Tide Gauges**

<b>Gauge</b>	<b>Model</b>	<b>Gauge Type</b>	<b>Location</b>	<b>Latitude</b>	<b>Longitude</b>	<b>Operational</b>
9451625	H350XL/355	Digital Bubbler	Warm Spring Bay, AK	57°05'18"N	134°49'30" W	April-September
9452328	H350XL/355	Digital Bubbler	False Bay, AK	57°40'00"N	134°56'06" W	April-September
9451953	H350XL/355	Digital Bubbler	Mitchell Bay, AK	57°32'24"N	134°25'30" W	August-September

### TIDES

All sounding data were reduced to MLLW initially using unverified tidal data from the three tide stations located in Warm Spring Bay, False Bay, and Mitchell Bay, AK. Tidal data for a twenty-four hour period UTC, (Alaska Daylight Time to UTC was +8 hours) was assembled by JOA and e-mailed to the R/V Davidson at the end of every Julian Day. A cumulative file for the gauges was updated each day by appending the new data. Refer to the OPR-O322-KR-07 Horizontal and Vertical Control Report for additional tidal information and station descriptions.

The tidal zoning was modified by JOA, providing a more elaborate zoning scheme from those zones issued in the Statement of Work. For additional information, refer to JOA's Final Technical Report.

November 5, 2007, JOA issued verified tidal data and final zoning for H11696, H11697, H11698, H11699, H11702, H11703, H11704, H11705, H11706, H11707, & H11708 of OPR-O322-KR-07. On January 2, 2008, JOA issued verified tidal data and final zoning for H11700 & H11701 of OPR-O322-KR-07. All sounding data were then re-merged using CARIS HIPS and SIPS tide routine. Verified tidal data were used for all final Navigation BASE surfaces and S57 Feature files.

## D – Results and Recommendations

### Chart Comparison

H11708 survey was compared with charts:

Chart No.	Scale	Edition	Edition Date
17320	217,828	17th	Nov. 2005

*Note:* Electronic chart (US3AK3BM) covers only a portion of the survey.<sup>6</sup>

### Comparison of Soundings

In general, the soundings from chart 17320 coincide with the soundings from H11708 to within 1 to 5 fathoms; areas that do vary to any degree are as follows:<sup>7</sup>

- Item # 1: Hydrographic survey H11708 revealed a depth of 348 fathoms in the vicinity of a 338 fathom sounding on chart 17320 located at 57°08'39" N, 134°43'10" W. This area was surveyed with 100% multibeam coverage.
- Item # 2: Hydrographic survey H11708 revealed a depth of 333 fathoms in the vicinity of a 323 fathom sounding on chart 17320 located at 57°07'19" N, 134°43'58" W. This area was surveyed with 100% multibeam coverage.
- Item # 3: Hydrographic survey H11708 revealed a depth of 318 fathoms in the vicinity of a 334 fathom sounding on chart 17320 located at 56°58'48" N, 134°39'32" W. This area was surveyed with 100% multibeam coverage. The shoaling is centered in the area depicted below.
- Item # 4: Hydrographic survey H11708 revealed a depth of 336 fathoms in the vicinity of a 328 fathom sounding on chart 17320 located at 56°57'12" N, 134°40'20" W. This area was surveyed with 100% multibeam coverage.



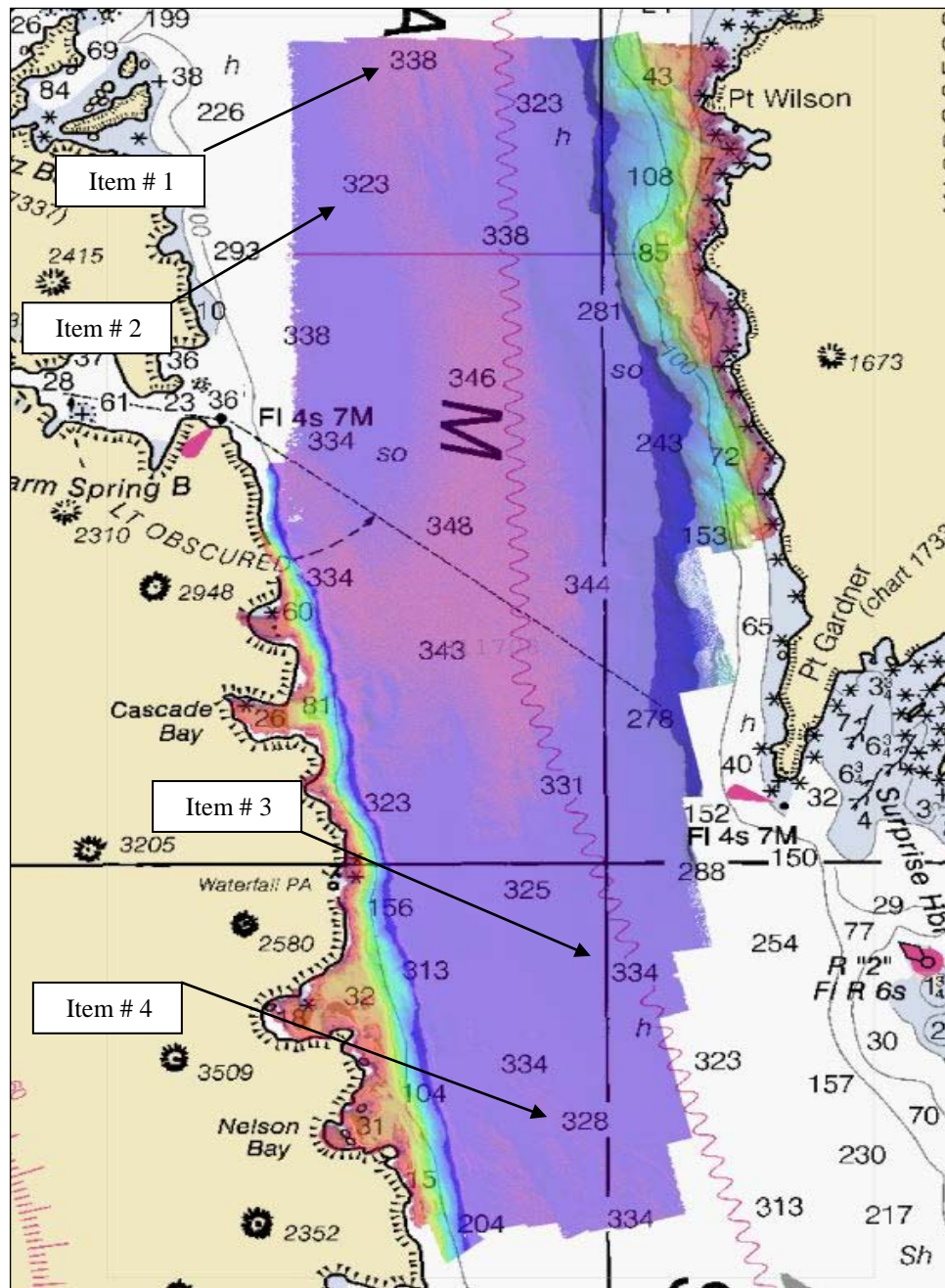
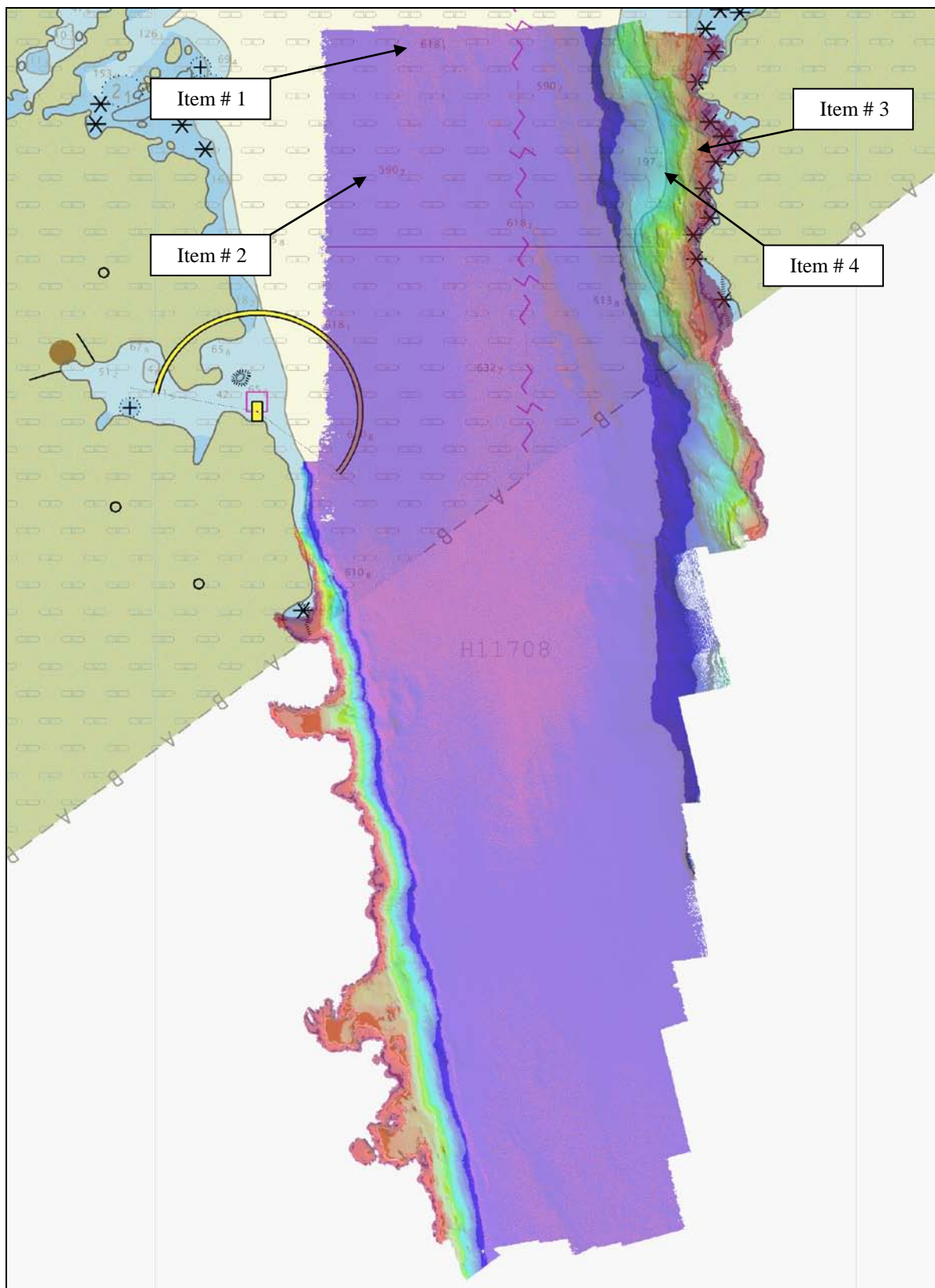


Figure 6 H11708 Chart Comparison (Chart 17320)

In general, the soundings from electronic chart US3AK3BM coincide with the soundings from H11708 to within 5 to 15 meters; areas that do vary to any degree are as follows: <sup>8</sup>

- Item # 1: Hydrographic survey H11708 revealed a depth of 640 meters in the vicinity of a 618.1 meter sounding on electronic chart US3AK3BM located at 57°08'40" N, 134°43'13" W. This area was surveyed with 100% multibeam coverage.
- Item # 2: Hydrographic survey H11708 revealed a depth of 612 meters in the vicinity of a 590.7 meter sounding on electronic chart US3AK3BM located at 57°07'22" N, 134°43'59" W. This area was surveyed with 100% multibeam coverage.
- Item # 3: Hydrographic survey H11708 revealed a depth of 55 meters in the vicinity of a 12.8 meter sounding on electronic chart US3AK3BM located at 57°07'31" N, 134°38'13" W. This area was surveyed with 100% multibeam coverage.
- Item # 4: Hydrographic survey H11708 revealed a depth of 279 meters in the vicinity of a 197.5 meter sounding on electronic chart US3AK3BM located at 57°07'26" N, 134°39'12" W. This area was surveyed with 100% multibeam coverage.



**Figure 7 H11708 Electronic Chart Comparison (Chart US3AK3BM)**



### Automated Wreck and Observation Information System

There were no AWOIS items assigned to H11708.<sup>9</sup>

### Charted Features

There were no charted features labeled PA, ED, PD, or Rep within the limits of H11708.<sup>10</sup>

### Dangers to Navigation

No Dangers to Navigation located during the survey of H11708.<sup>11</sup>

### Bottom Samples

The R/Vs Davidson, R2, and D2 were fitted to obtain bottom samples as specified in the Statement of Work. The purpose of this was to characterize the bottom in charted anchorages and for general bottom classification.

Samples were taken with a Van Veen grab sampler and position was recorded with WinFrog (v3.7.0). Sediment retrieved from the sampler was analyzed and then encoded with the appropriate S57 attributes. Positions and descriptions of all samples are found in the H11708\_S57\_Features file.<sup>12</sup>

### Aids to Navigation

There were no charted aids to navigation in the survey area. No uncharted aids to navigation were found in the survey area.<sup>13</sup>

### Shoreline Verification Results

Remote Sensing Division (RSD) provided the shoreline detail (AK0401B) for this survey. Since the RSD shoreline was the official shoreline source provided by NOAA, primary focus was given to its verification during this survey. However, charted features were investigated if practical as were any significant new features observed during the course of shoreline verification. Significant features were deemed to be those potentially dangerous to navigation and / or seaward of the 4m contour.

Visual inspection during shoreline verification determined the RSD shoreline to be very accurate. RSD foul areas commonly needed some adjustment but the MHW line and point features provided by RSD were particularly good. Any discrepancies are detailed below.

The Hydrographer recommends that the RSD MHW from (AK0401B) supersede previously charted shoreline where any discrepancies occur unless noted below.

The following tables itemize any errors or discrepancies found in the RSD source and charted shoreline. Note that RSD and charted features that were found to be positioned accurately are not itemized here and are not included in the S57 feature file. New features (features not in the RSD source/chart but found during field investigation) do appear in the S57 feature file, but are generally not itemized here.

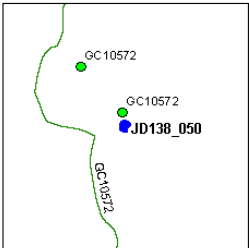
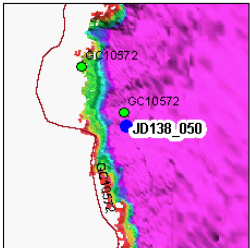
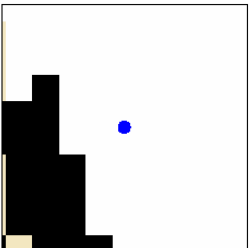
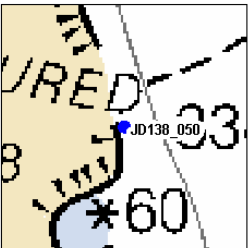
<b>RSD Source (AK0401B) Changes and Discrepancies<sup>14</sup></b>				
RSD Feature	RSD Position	Remarks	Actions Taken in S57 Feature File / Recommendations	Applicable DP form(s)
Rock	57 03 05.20 N 134 45 27.50 W	RSD rock 45148 not found, full MBES coverage available and visual inspection performed at position.	Remove.	JD138_050

<b>Charted Feature Changes and Discrepancies</b>				
Chart No. and Feature	Charted Position	Remarks	Recommendations	Applicable DP form(s)
17320 Rock	57 01 41.86 N 134 46 03.98 W	Charted rock not found, full MBES coverage at position.	Remove.	N/A
17320 MHW	Extents:  57 03 02.67 N 134 45 25.05 W  57 00 41.97 N 134 44 49.91 W	Charted MHW does not conform to MBES data. RSD MHW is a better indication of the true MHW line.	Revise Charted MHW to the RSD MHW.	N/A
17320 Rock	57 00 02.54 N 134 44 11.30 W	Charted rock not found, full MBES coverage at position.	Remove.	N/A
17320 Rock	56 59 50.65 N 134 44 12.99 W	Charted rock not found, full MBES coverage at position.	Remove.	N/A
17320 Islet	56 57 51.23 N 134 44 05.94 W	Charted islet not found, full MBES coverage at position.	Remove.	N/A

Charted Feature Changes and Discrepancies				
Chart No. and Feature	Charted Position	Remarks	Recommendations	Applicable DP form(s)
17320 MHW	Extents:  56 57 28.23 N 134 44 18.57 N  56 56 55.77 N 134 43 36.45 W	Charted MHW does not conform to MBES data. RSD MHW is a better indication of the true MHW line.	Revise Charted MHW to the RSD MHW.	N/A
17320 Rock	57 03 29.72 N 134 36 59.62 W	Charted rock not found, full MBES coverage at position.	Remove.	N/A
17320 Rock	57 04 20.38 N 134 57 08.19 W <sup>15</sup>	Charted rock not found, full MBES coverage at position. Possibly RSD rock 44972.	Remove.	N/A
17320 Rock	57 07 48.66 N 134 38 01.57 W	Charted rock not found, full MBES coverage at position.	Remove.	N/A

## Shoreline Correlator Sheet

ArcMap (v9.2) with the Shoreline Correlator add-on, written by the Fugro Pelagos Inc. GIS department, aided in the processing of the investigation results. The Correlator utilized the WinFrog log files to create an individual DP form for all acquired DPs. The Correlator was mapped to the log file, tide file, photos, NOAA Chart (largest scale available), and CARIS BASE Surfaces to calculate and display the desired information for each DP. The DP forms and raw field records can be found on the Project USB Drive under; OPR-O322-KR-07\H11708\Final\_Deliverables\Reports\Descriptive Report\H11708 Shoreline.

DP ITEM NUMBER : JD138_050		DP Form	
<p>Date: 18 May, 2007 Julian Day: 138 UTC Time: 16:03:45 Latitude: 57 03 04.85 N Longitude: 134 45 27.34 W Northing: 6323127.77 Easting: 514705.32 Raw (+Depth) or (-Height) (m): N/A Draft Corrector (m): N/A SV Corrector (m): N/A Tide Corrector (m): -1.03 Corrected to MLLW (m): N/A Corrected to MLLW (fathoms): N/A Corrected to MLLW (feet): N/A DP Comment: E_rsd 45148 not found full mbe coverage</p>		<p>Correlating DP Item Numbers: N/A N/A N/A N/A</p>	<p>No photo available</p>
		<p>Correlating MB Least Depth: None</p>	
		<p>Remarks/Recommendations: RSD rock 45148 not found, full MBES coverage available and visual inspection performed at position. Do not chart. Chart: 17320 Topo: Carto Code: None</p>	
			
DPs and RSD AK0401B 200m x 200m	DPs and MBES Coverage 200m x 200m	DP and Chart 200m x 200m	DP and Chart 2000m x 2000m



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## E – Approval Sheet

### Approval Sheet

For

**H11708**

Standard field surveying and processing procedures were followed in producing this survey in accordance with the following documents:

OPR-O322-KR-07 Statement of Work and 2007 Specifications & Deliverables;  
Fugro Pelagos, Inc. Acquisition Procedures (2007- NOAAAcquisitionProcedures);  
Fugro Pelagos, Inc. Processing Procedures (2007-NOAAProcessingProcedures);

The data were reviewed daily during acquisition and processing.

This report has been reviewed and approved. All records are forwarded for final review and processing to the Chief, Pacific Hydrographic Branch.

Approved and forwarded,

Dean Moyles,  
Lead Hydrographer  
Fugro Pelagos, Inc. Survey Party

3/2/2008

X 

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Dean Moyles  
ACSM Certified

## Revisions Compiled During Office Processing and Certification

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

<sup>2</sup> Concur with clarification, data are adequate to supersede charted data within the common area.

<sup>3</sup> Concur.

<sup>4</sup> Concur.

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

<sup>6</sup> Electronic chart US3AK4PM, not mentioned in the DR, covers the southern two-thirds of the survey area.

<sup>7</sup> All sounding discrepancies between chart 17320 and H11708 have been reviewed during compilation and are reflected in the HCell as appropriate.

<sup>8</sup> All sounding discrepancies between the US3AK3BM and H11708 have been reviewed during compilation and are reflected in the HCell as appropriate.

<sup>9</sup> Concur.

<sup>10</sup> Concur.

<sup>11</sup> Concur.

<sup>12</sup> 3 bottom samples were retained from survey feature file.

<sup>13</sup> Concur.

<sup>14</sup> All items addressed in the tables have been reviewed during compilation and are either included in the HCell or have been blue noted to be removed or modified as appropriate.

<sup>15</sup> No rock found at the described location, but a rock of this description is located at 57 04 20.38 N 134 37 08.19 W.



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## **Appendix I - Dangers to Navigation Reports**

No Dangers to Navigation located during the survey of H11708.



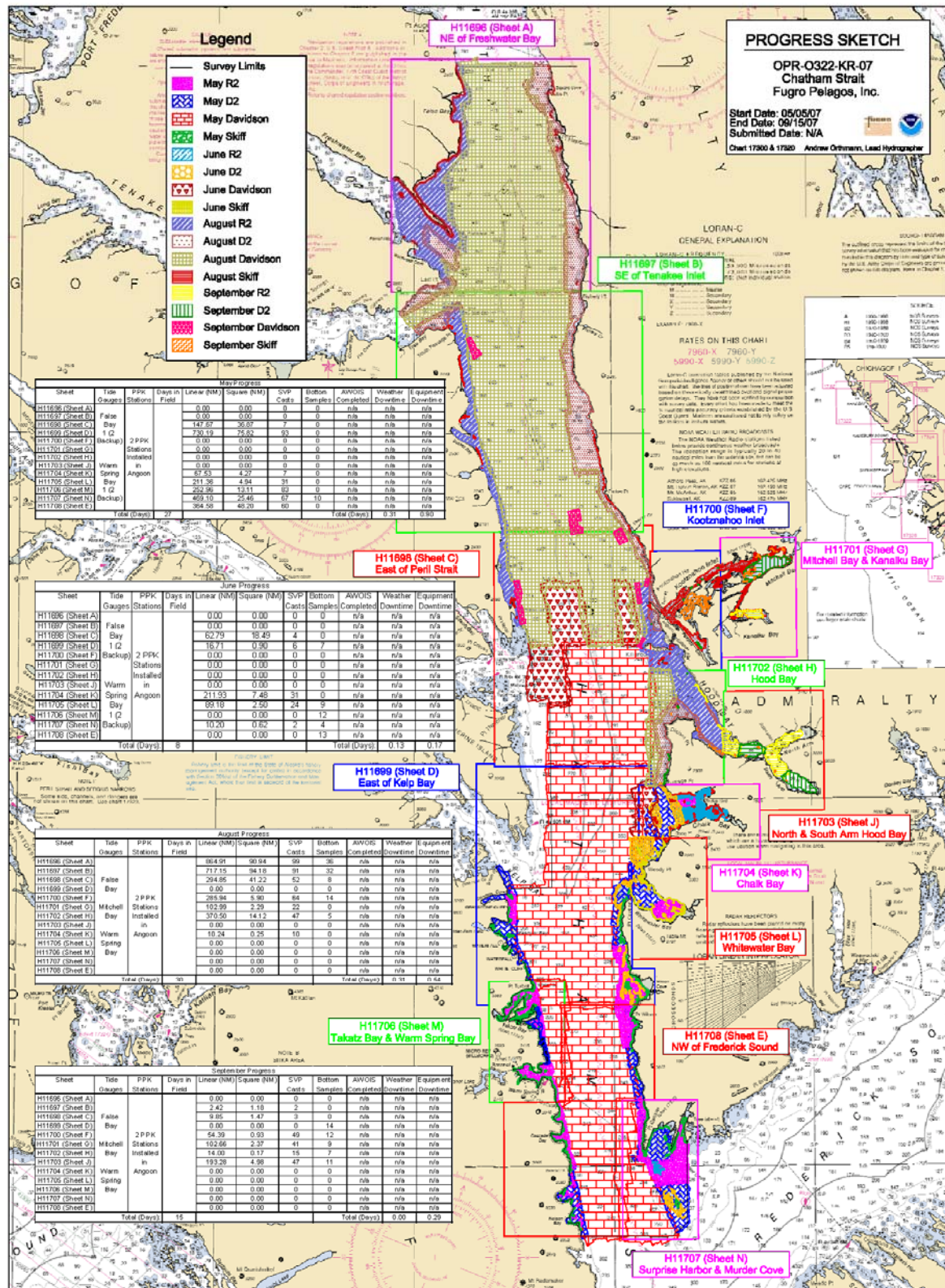
## **Appendix II – Survey Feature Report**

No AWOIS items were assigned for H11708.





## Appendix III – Final Progress Sheet and Survey Outline



**Appendix IV - Tides and Water Levels**

Abstract of Times of Hydrography for Smooth Tides

Project Number: OPR-O322-KR-07

Registry Number: H11708

Contractor Name: Fugro Pelagos Inc.

Date: March 13, 2008

Sheet Letter: E

Inclusive Dates: May 06, 2007 and ended on May 26, 2007

Fieldwork is complete and verified tides were applied for the production of the final combined soundings and S-57 feature file.

**Final Tide Zones**

Zone	Primary			
	Site	Number	Time	Range Ratio
SEA200	9452328	False Bay, AK	0	1
JOA231	9451625	Warm Spring Bay, AK	0	0.97
JOA231A	9451625	Warm Spring Bay, AK	0	0.96
JOA232	9451625	Warm Spring Bay, AK	0	0.99
JOA233	9451625	Warm Spring Bay, AK	0	1
JOA234	9451625	Warm Spring Bay, AK	0	1.02
SA234A	9451625	Warm Spring Bay, AK	0	1.03
SA234F	9451625	Warm Spring Bay, AK	0	1.03
JOA237A	9451625	Warm Spring Bay, AK	0	1.04
SA238	9452328	False Bay, AK	0	0.96
SA239	9452328	False Bay, AK	0	0.97
SA240	9452328	False Bay, AK	0	0.98
SA240A	9452328	False Bay, AK	0	0.99
SA241	9452328	False Bay, AK	0	0.99
MB01	9451953	Mitchell Bay, AK	30	0.96
MB02	9451953	Mitchell Bay, AK	24	0.97
MB03	9451953	Mitchell Bay, AK	18	0.97
MB04	9451953	Mitchell Bay, AK	12	0.98
MB05	9451953	Mitchell Bay, AK	0	1
MB06	9451953	Mitchell Bay, AK	-6	1
MB07	9451953	Mitchell Bay, AK	6	1
MB08	9451953	Mitchell Bay, AK	0	1
MB09	9451625	Warm Spring Bay, AK	30	0.94
MB10	9451625	Warm Spring Bay, AK	36	0.95
MB11	9451625	Warm Spring Bay, AK	42	0.96



Zone	Primary			
	Site	Number	Time	Range Ratio
MB12	9451625	Warm Spring Bay, AK	36	0.91
MB20	9451625	Warm Spring Bay, AK	42	0.93
MB21	9999921	*Warm Spring Bay & Mitchell Bay, AK	0	1
MB22	9999922	*Warm Spring Bay & Mitchell Bay, AK	0	1
MB23	9999923	*Warm Spring Bay & Mitchell Bay, AK	0	1
MB24	9999924	*Warm Spring Bay & Mitchell Bay, AK	0	1
MB25	9999925	*Warm Spring Bay & Mitchell Bay, AK	0	1
MB26	9999926	*Warm Spring Bay & Mitchell Bay, AK	0	1
MB27	9999927	*Warm Spring Bay & Mitchell Bay, AK	0	1
MB28	9999928	*Warm Spring Bay & Mitchell Bay, AK	0	1
MB29	9999929	*Warm Spring Bay & Mitchell Bay, AK	0	1
MB30	9451625	Warm Spring Bay, AK	18	0.98
MB31	9451625	Warm Spring Bay, AK	24	0.96

\*see "Tidal Zoning for Mitchell Bay 20080102.doc" in Horizontal & Vertical Control Report", Appendix I.

#### Abstract of Times of Hydrography for R/V R2

YEAR	DAY	START TIME (UTC)	END TIME (UTC)	COMMENTS
2007	128	16:49:48	00:22:42	
2007	129	00:35:44	02:36:03	
2007	129	15:45:17	16:31:54	
2007	134	19:59:12	23:59:59	
2007	135	00:00:00	01:53:57	
2007	135	16:07:29	21:43:34	
2007	145	21:49:37	23:59:59	
2007	146	00:00:00	02:18:11	
2007	146	15:44:03	19:37:46	

#### Abstract of Times of Hydrography for R/V D2

YEAR	DAY	START TIME (UTC)	END TIME (UTC)	COMMENTS
2007	128	16:40:40	23:59:59	
2007	129	00:00:00	02:00:06	



YEAR	DAY	START TIME (UTC)	END TIME (UTC)	COMMENTS
2007	129	16:10:40	23:59:59	
2007	130	00:00:00	01:52:12	
2007	130	17:41:42	18:58:40	
2007	134	23:43:37	23:59:59	
2007	135	00:00:00	02:24:38	
2007	135	16:09:48	22:27:13	
2007	145	16:53:05	19:55:19	
2007	146	16:52:00	19:14:56	

**Abstract of Times of Hydrography for R/V Davidson**

YEAR	DAY	START TIME (UTC)	END TIME (UTC)	COMMENTS
2007	126	20:18:39	23:59:59	
2007	127	00:00:00	01:27:00	
2007	127	18:10:21	23:59:59	
2007	128	00:00:00	01:47:53	
2007	128	15:49:39	23:59:59	
2007	129	00:00:00	02:09:29	
2007	129	20:28:05	23:59:59	
2007	130	00:00:00	01:59:20	
2007	131	00:06:44	02:14:18	
2007	131	16:06:12	00:28:48	
2007	132	01:20:19	01:45:26	
2007	132	22:55:38	23:59:59	
2007	133	00:00:00	00:22:38	
2007	135	21:56:04	22:34:09	

**Abstract of Times of Hydrography for Shoreline Skiff**

YEAR	DAY	START TIME (UTC)	END TIME (UTC)	COMMENTS
2007	133	16:25:21	23:59:59	
2007	134	00:00:00	00:01:00	
2007	138	00:14:29	00:15:48	
2007	139	00:21:38	02:32:19	



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## Appendix V – Supplemental Survey Records and Correspondence

**H11708 HCell Report**  
Tony Lukach, ERT Associate  
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, US3AK3BM and US3AK4PM, and NOAA RNC, 17320.

HCell compilation of survey H11708 utilized Office of Coast Survey HCell Specifications Version 3.1, with approved modifications to better align with PHB's HCell process and to meet MCD needs.

**1. Compilation Scale**

Depths for HCell H11708 were compiled to the largest scale chart in the region, 17320, 1:217,828. Non-bathymetric features have been generalized to chart scale in characterization and density.

**2. Soundings**

A survey-scale sounding (SOUNDG) feature object layer was built from the 15-meter Combined Surface in CARIS BASE Editor. A shoal-biased selection was made at 1:75,000 survey scale using a Radius Table file with values shown in the table, below. The resultant sounding layer contains 1,236 depths ranging from 0 to 652.0 meters.

Upper limit (m)	Lower limit (m)	Radius (mm)
0	10	3
10	20	4
20	50	4.5
50	700	5

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 Contours**

Depth contours at the intervals on the largest scale chart are included in the H11708\_SS HCell for MCD raster charting division to use for guidance in creating chart contours. The generalized metric and fathom equivalent contour values are shown in the table below.

Chart Contours in Fathoms from Chart 17320	Metric Equivalent of Chart Contours, arithmetically rounded	Metric Equivalent of Chart Contours NOAA Rounded	Actual Value of Chart Contours
0	0	0.2286	0.229
10	18.288	18.5166	18.517
100	182.88	184.2516	184.252

Contours delivered in the H11708\_SS file have not been deconflicted against shoreline features, soundings and hydrography as all other features in the H11708\_CS file and soundings in the H11708\_SS have been. This results in conflicts between the H11708\_SS file contours and HCell features at or near the survey limits. Conflicts with M\_QUAL, COALNE and SBDARE objects, and with DEPCNT objects representing MLLW, should be expected. HCell features should be honored over H11708\_SS.000 file contours in all cases where conflicts are found.

Some modifications made to GC MLLW contours, to bring them into agreement with H11708 hydrography, necessitated inclusion of several DEPCNT features in the HCell. These 0 value contours have not been generalized. See 9.2 *Conflicts between Shoreline and Hydrography*.

#### **4. Meta Areas**

The following Meta object areas are included in HCell H11708:

M\_QUAL

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

#### **5. Features**

##### **5.1 Generalization of Features to Chart Scale**

Features gathered by field units are delivered to PHB and applied to the preliminary HCell. Features are deconflicted against hydrography, and geometry is corrected as needed. Linear and area features are also digitized against the BASE Surfaces, and features to be retained are imported from the chart. This features file is used as the basis for the final HCell compilation with features reduced to the largest scale RNC and ENC. In addition, the product of the survey scale features file, H11708\_Features.000, is archived at PHB.

Pending further guidance from MCD, features generalization has been accomplished primarily through reduction in the number of features included in the HCell. Generalizing area features to point objects is entrusted to the RNC division. Where line and area objects are included in the HCell, complexity of the lines and edges comprising the features have been smoothed commensurate with chart scale.

##### **5.2 Compilation of Features to the HCell**

Features for H11708 were delivered from the field in a single feature file, H11708\_S57\_Features.000. These were deconflicted against GC shoreline, the chart and hydrography during office processing.



During office processing submerged rocks and rocky seabed areas were digitized using the high resolution BASE Surfaces.

The source of all features included in the H11708 HCell can be determined by the SORIND field.

### **5.3 Mean High Water Used for HCells**

For the purposes of determining the height at which a rock becomes an islet, the CO-OPS “*Tide Note for Hydrographic Survey*”, “*Height of High Water Above the Plane of Reference*” is used.

For the purpose of compilation of intertidal depth areas, a MHW (-h) value is used for defining the DRVAL1 (Depth Range Value) attribute field for the DEPARE component of the feature, where DRVAL2 is always 0.0. The MHW value from US3AK3BM was used for H11708.

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

The \*\_CS HCell contains the following Objects:

\$CSYMB	Blue Notes
DEPCNT	Modified GC MLLW
M_QUAL	Data quality Meta object
SBDARE	Modified GC ledges and reefs, bottom samples, and rocky seabed areas
SOUNDG	Soundings at the chart scale density
UWTROC	Rock features
WEDKLP	Weed and kelp features

The \*\_SS HCell contains the following Objects:

COALNE	GC Shoreline
DEPCNT	Generalized contours at chart scale intervals
SOUNDG	Soundings at the survey scale density

All S-57 Feature Objects in the \*\_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. By agreement with MCD, the NINFOM field is populated with an abbreviated version of the Blue Note (30 characters or less), describing the chart disposition, to be used by MCD in generating their Chart History spreadsheet.

## **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

Conversion to charting units and application of NOAA rounding is completed in the same step, at the end of the HCell compilation process.

Conversion to fathoms and feet charting units with NOAA rounding ensures that:

- All depths deeper or equal to 11 fathoms display as whole fathoms.
- All depth units between 0 fathoms (MLLW) and 11 fathoms display as fathoms and whole feet.
- All depth units above 0 fathoms (MLLW) to 2.0 feet above MHW display in feet for values that round to 5 feet or less, and in fathoms and feet above that.
- All height units (HUNI) which have been converted to charting units, and that are 2.00 feet above MHW and greater, are shown in feet.

In an ENC viewer fathoms and feet depth units (DUNI) display in the format X.YZZZ, where X is fathoms, Y is feet, and ZZZ is decimals of the foot. In an ENC viewer, heights (HUNI) display as whole feet.

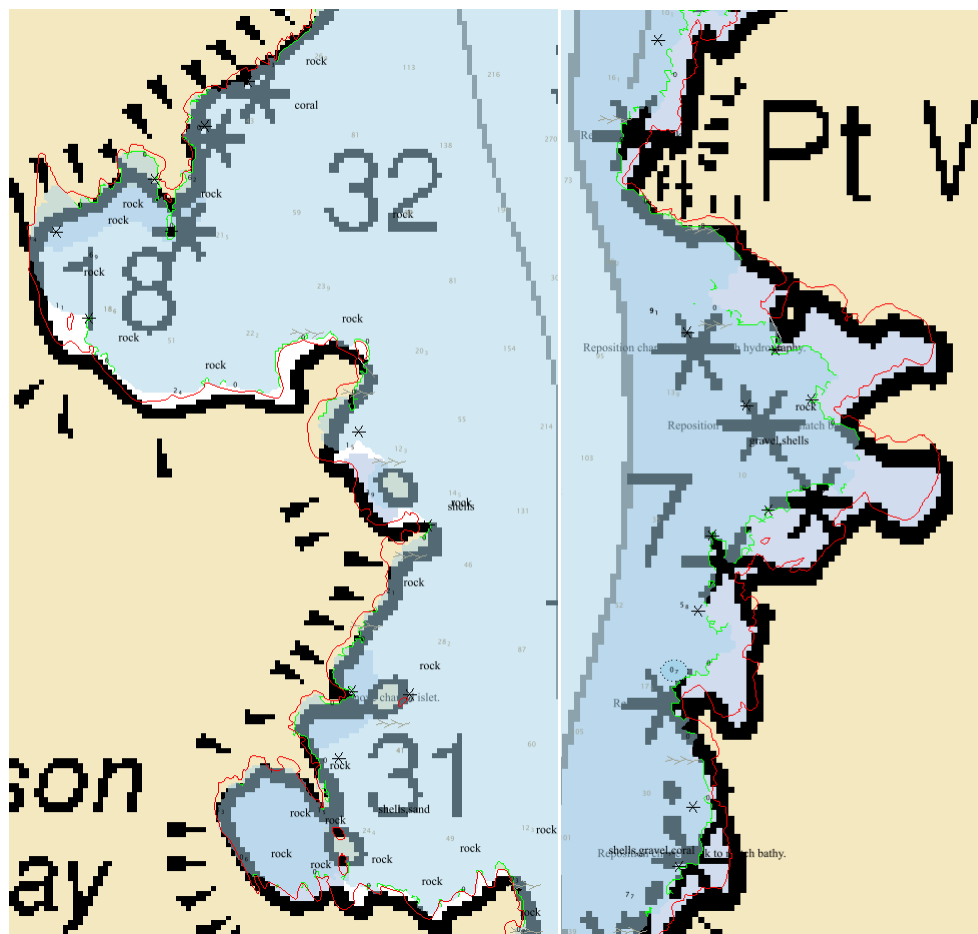
## 9. Data Processing Notes

### 9.1 Junctions

H11708 junctions with surveys H11699, H11706, and H11707. H11708 survey limits have been adjusted to accommodate for junctioning surveys.

### 9.2 Conflicts between Shoreline and Hydrography

There are general, consistent discrepancies between GC shoreline, hydrography, and the charted shoreline in chart 17320.



Portions of the Western and Eastern shores. Red line depicts GC Shoreline, green line depicts 0-curve.

The GC Shoreline seems to be displaced roughly 100 meters to the NNW of the charted shoreline, consistently throughout the survey area. The surveyed 0-curve appears to generally agree with the GC Shoreline along the Western shore. Along the Eastern shore, the surveyed 0-curve typically falls seawards of both GC Shoreline and charted shoreline. Areas of particularly large discrepancies were Blue Noted in the HCell.

## 10. QA/QC and ENC Validation Checks

H11708 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 are MCD approved as inherent to and acceptable for HCells.

## 11. Products

### 11.1 HSD, MCD and CGTP Deliverables

- H11708 Base Cell File, Chart Units, Soundings and features compiled to 1:217,828.

- H11708 Base Cell File, Chart Units, Soundings and contours compiled to survey scale.
- H11708 Descriptive Report including end notes compiled during office processing and certification, the HCell Report, and supplemental items.
- H11708 Survey outline to populate the SURDEX.

## 11.2 File Naming Conventions

- Chart units base cell file, chart scale soundings H11708\_CS.000
- Chart units base cell file, survey scale sounding set H11708\_SS.000
- Descriptive Report package H11708\_DR.pdf
- Survey outline H11708\_Outline.gml & \*.xsd

## 11.3 Software

CARIS HIPS Ver. 6.1	Inspection of Combined BASE Surfaces
CARIS BASE Editor Ver. 2.3	Creation of soundings and bathy-derived features, creation of the depth area, meta area objects, and Blue Notes; Survey evaluation and verification; Initial HCell assembly.
CARIS S-57 Composer Ver. 2.1	Final compilation of the HCell, correct geometry and build topology, apply final attributes, export the HCell, and QA.
CARIS GIS 4.4a	Setting the sounding rounding variable for conversion of the metric HCell to NOAA charting units with NOAA rounding.
CARIS HOM Ver. 3.3	Perform conversion of the metric HCell to NOAA charting units with NOAA rounding.
HydroService AS, dKart Inspector Ver. 5.1	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:

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APPROVAL SHEET  
H11708

Initial Approvals:

The survey evaluation and verification has been conducted according to branch processing procedures and the H-Cell 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 disproof 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 H-Cell, 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.