

H11572

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. H11572

LOCALITY

State Alaska

General Locality Ernest Sound and Eastern Passage

Sublocality Seward Passage

2007

CHIEF OF PARTY

Andrew L. Beaver CDR, NOAA

LIBRARY & ARCHIVES

DATE _____

NOAA FORM 77-28 (11-72)	U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION	REGISTER NO.
HYDROGRAPHIC TITLE SHEET		H11572
INSTRUCTIONS · The hydrographic sheet should be accompanied by this form, filled in as completely as possible, when the sheet is forwarded to the office.		FIELD NO.
State <u>Alaska</u>		
General Locality <u>Ernest Sound and Eastern Passage</u>		
Sublocality <u>Seward Passage</u>		
Scale <u>1:10,000</u>	Date of Survey <u>04/15/2007 to 05/16/2007</u>	
Instructions Date <u>3/13/2007</u>	Project No. <u>OPR-O119-FA-07</u>	
Vessel <u>FAIRWEATHER S220</u>		
Chief of Party <u>CDR Andrew L. Beaver, NOAA</u>		
Surveyed by <u>ST Stephanie Mills, CST Froelich, LT Dowling</u>		
Soundings taken by <u>echo sounder</u> <u>Reson 8101 ER, Reson 8160 ER</u>		
Graphic record <u>s</u> <u>N/A</u>		
Graphic record checked by <u>N/A</u>		
Evaluation by <u>Raymond</u>	Automated plot by <u>N/A</u>	
Verification by <u>M. E. Litrico</u>		
Soundings in <u>Fathoms and Feet</u>	at	<u>MLLW</u>
REMARKS: <u>All times are UTC.</u>		
<u>The purpose of this survey was to provide contemporary surveys to update</u>		
<u>National Ocean Service (NOS) charts.</u>		

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Descriptive Report to Accompany Hydrographic Survey H11572

Project OPR-O119-FA-07
Ernest Sound and Eastern Passage, Alaska

Scale 1:10,000

April, 2007

NOAA Ship FAIRWEATHER

Chief of Party: Commander Andrew L. Beaver, NOAA

A. AREA SURVEYED

The survey area was located in Ernest Sound and Eastern Passage, within the sub-locality of Seward Passage. This survey corresponds to Sheet L in the sheet layout provided with the Letter Instructions, as shown in Figure 1 below. The survey area is bounded on the Southwest corner at 55°57'00"N, 132°03'00"W and the Northeast corner at 56°04'00"N, 131°55'00"W.¹

Data acquisition was conducted from April 15 to May 16, 2007 (DN 105 to DN 136).

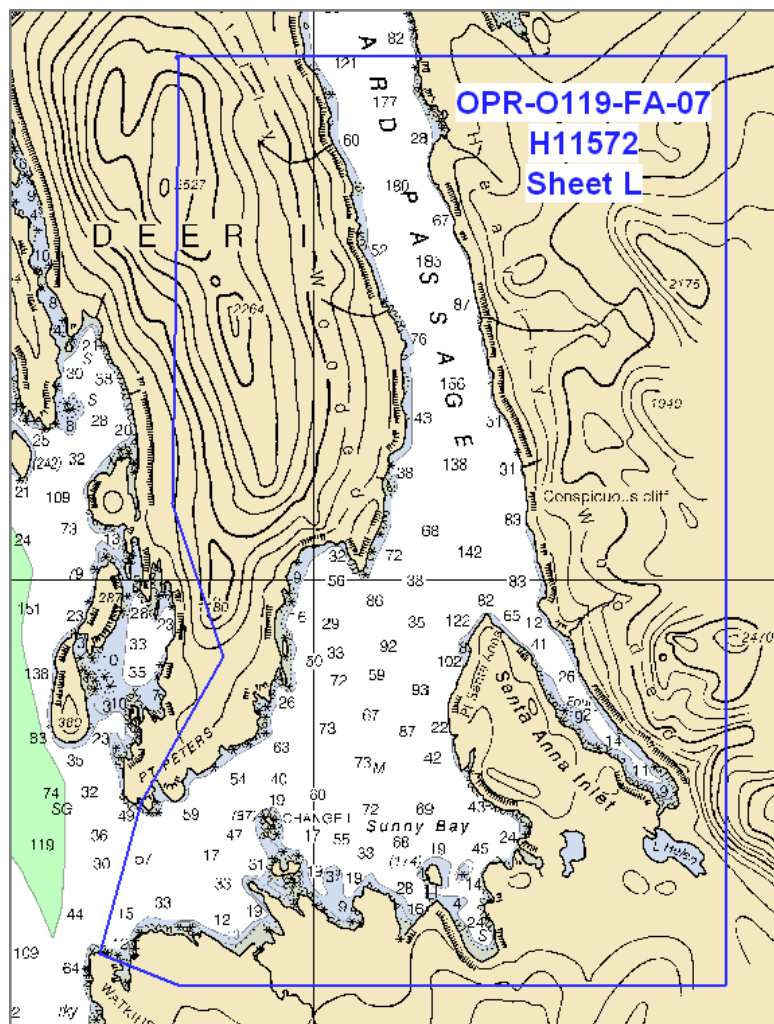


Figure 1: H11572 Sheet Limits

One hundred percent multi beam echo sounder (MBES) coverage was obtained in the survey area offshore of the 8-meter depth curve and the Navigable Area Limit Line (NALL) which is defined as the furthest offshore of either the 4-meter depth contour or a distance of 64 meters (0.8 mm at the scale of the largest scale chart) from the Mean High Water line.² When conditions allowed, multi beam echo sounder (MBES) data was acquired parallel to contours and at a line spacing of no less than 25 meters at depths between four and eight meters. Additional coverage was obtained when determining least depths over features or shoals offshore of the NALL. Due consideration was given to the safety of operations and areas deemed unsafe to survey were avoided by order of the Chief of Party.

Shoreline data were acquired for H11572. These data were attributed as S-57 objects for submittal.

B. DATA ACQUISITION AND PROCESSING

A complete description of data acquisition/processing systems and survey vessels along with quality control procedures and data processing methods are included and described in the *OPR-O119-FA-07 Data Acquisition and Processing Report (DAPR)*, submitted under separate cover.³ Items specific to this survey and any deviations from the aforementioned report are discussed in the following sections. This hydrographic survey was completed as specified by Hydrographic Survey Letter Instructions OPR-O119-FA, dated March 13, 2007.

B1. Equipment and Vessels

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

	FAIRWEATHER	Jensen Launch 1010	Jensen Launch 1018	MonArk	Ambar 700
Hull Registration Number	S220	1010	1018	1706	2302
Builder	Aerojet-General Shipyard	The Boat Yard, Inc.	The Boat Yard, Inc.	MonArk	Marine Silverships, Inc
Length Overall	231 feet	28' 10"	28' 10"	17'	23'
Beam	42 feet	10' 8"	10' 8"	7'2"	9' 4"
Draft, Maximum	15' 6"	4' 0" DWL	4' 0" DWL	1' 3"	1' 4"
Cruising Speed	12.5 knots	24 knots	24 knots	20 knots	22 knots
Max Survey Speed	10 knots	10 knots	10 knots		
Primary Echosounder	RESON 8160	RESON 8101	RESON 8101		
Sound Velocity Equipment	SBE 45, MVP 200	SBE 19plus	SBE19plus		
Attitude & Positioning Equipment	POS/MV V4	POS/MV V4	POS/MV V4		
Type of operations	MBES	MBES, Bottom Samples	MBES	Shoreline	Shoreline

Table 1: Vessel Inventory

No vessel configurations used during data acquisition deviated from the *OPR-O119-FA-07 Data Acquisition and Processing Report (DAPR)*.

B2. Quality Control

Internal consistency and integrity of data among acquisition platforms collected for survey H11572 were manually examined by the Hydrographer in CARIS subset mode. The internal consistency and integrity of data collected for survey H11572 were found to be good as the data agreed within day-to-day, vessel-to-vessel and line-to-line. 8160 crossline data in the southern portion of Seward Passage, with depths ranging from about 45 to 100 meters, were found to have higher-than-acceptable TPE values and were rejected. This is discussed further in the crosslines section below.

Crosslines

Shallow water multibeam crosslines for this survey totaled 19.71 linear nautical miles (lnm), comprising ~~25.18~~ 24.76% of the ~~78.26~~ 79.59 lnm of total MBES hydrography. ⁴ Both mainscheme and crossline mileage are summarized in Table 2.

There are 10 crosslines acquired with the 8160 comprising 6.62 LNM or 33.59% of the total crossline mileage obtained for H11572. Three of these crosslines comprising approximately 1.97 LNM were acquired in depths of about 45 to 100 meters, which is shoaler than recommended surveying depths for the 8160. The DepthTPE for these crosslines was around one meter, which results in rejected soundings in shoaler waters. Hydrographic Systems and Technology Programs (HSTP) is discussing the issue with the University of New Hampshire and Reson in an effort to determine why the DepthTPE was so high for this 8160 data.

The TPE-rejected soundings were associated with crosslines 1 through 3, found in the southern region of the survey area. Soundings in the deeper waters found in the northern part of the main channel were not rejected by TPE.

A quality control beam histogram for Order 1 and Order 2 of the TPE-rejected 8160 data demonstrates acceptable results, meeting 95% confidence requirements (see Figure 2). Manual comparison in 2D subset mode in CARIS HIPS and SIPS showed good comparison between the TPE rejected data, mainscheme, and 8160 crosslines that were not TPE-rejected (see Figure 3).

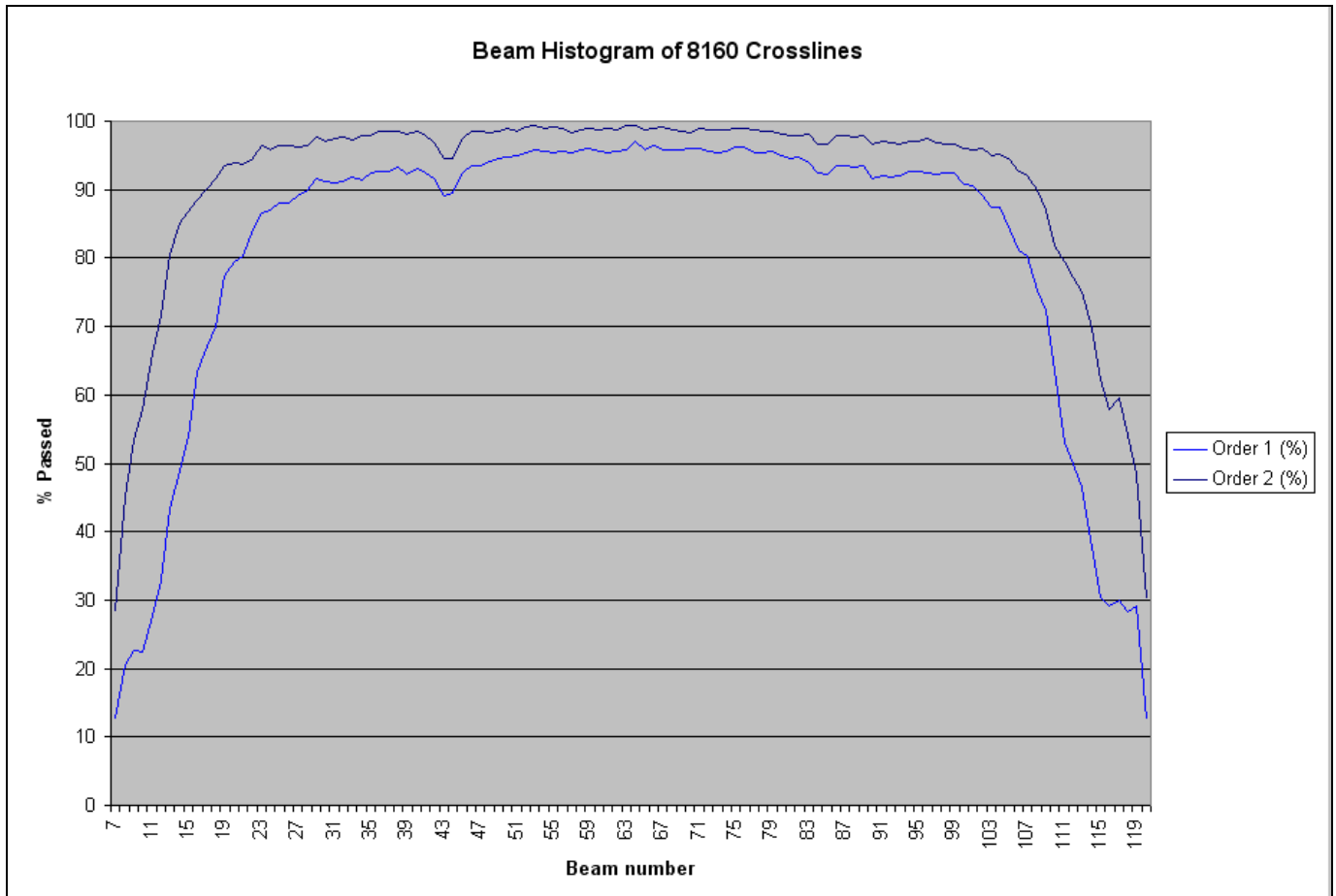


Figure 2: Quality control beam histogram for Order 1 and Order 2 of the TPE-rejected 8160 data

Given these results, the hydrographer reaccepted all of the 8160 crossline soundings that were rejected due to TPE, and subsequently cleaned the affected surfaces.

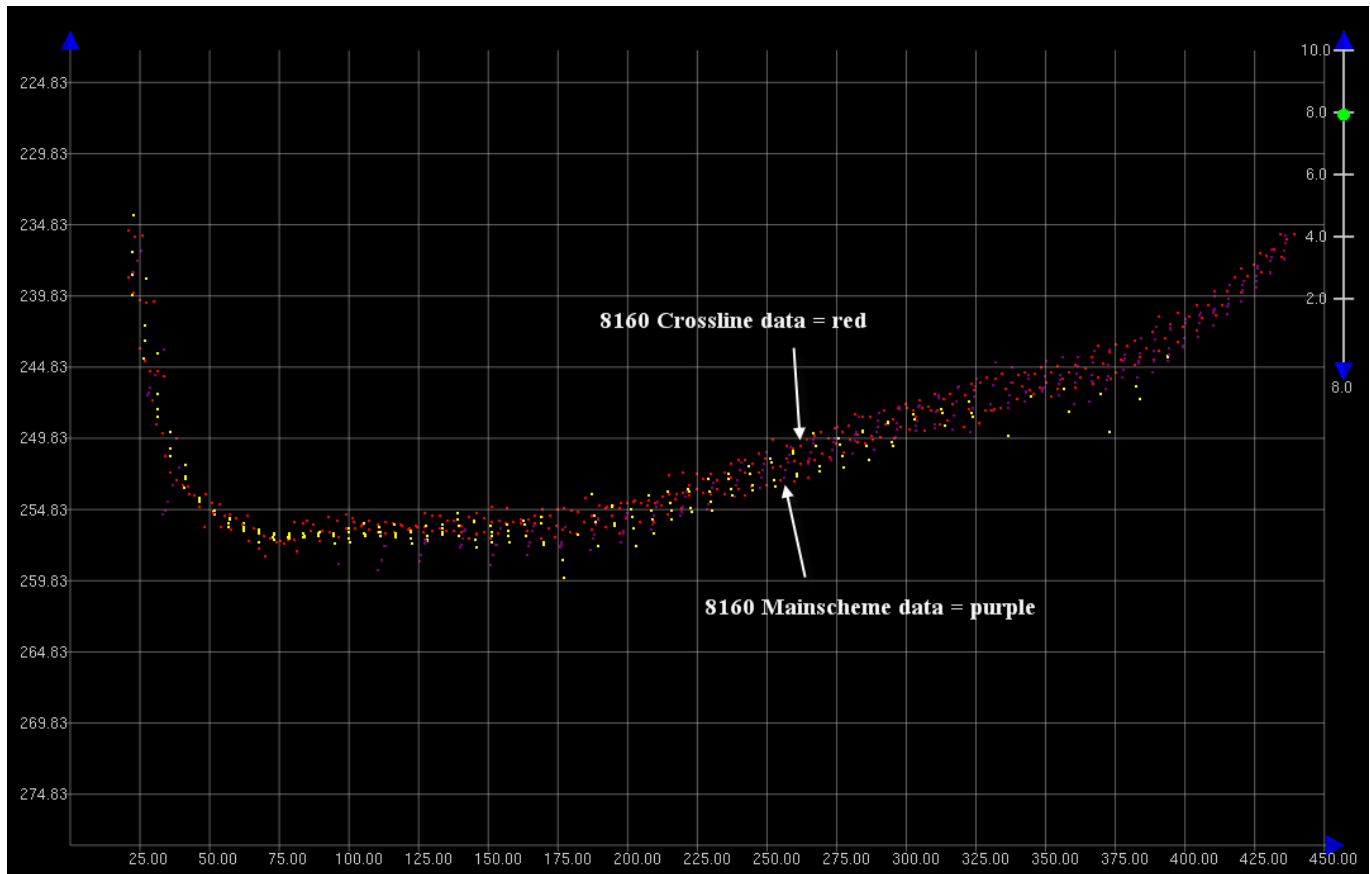


Figure 3: 8160 crossline data in agreement with 8160 main scheme data

The Hydrographer has determined, through manual examination of the data, that the crossline agreement with main scheme data meet the vertical accuracy requirements as stated in the *NOS Hydrographic Surveys Specifications and Deliverables Manual (HSSDM)*. Separate IV⁵ includes a Microsoft Excel spreadsheet named H11572_Crossline_Comparison. The second and third tabs of this spreadsheet include histograms demonstrating the percentage of crossline data meeting IHO order 1 and order 2 specifications. The first tab labeled QC_Report demonstrates that all H11572 data, including crossline data, meets IHO specification.

MAIN SCHEME - Mileage	
Single Beam MS	<u>0</u>
Multibeam MS mileage	<u>78.2618063</u>
SideScan MS	<u>0</u>
Total MS	<u>78.2618063</u>
CROSSLINE - Mileage	
Single Beam XL	<u>0</u>
Multibeam XL	<u>19.7062602</u>
Total XL	<u>19.7062602</u>
OTHER	
Developments/AWOIS - Mileage	<u>0</u>
Shoreline/Nearshore Investigation - Mileage	<u>24.596</u>
Total # of Investigated Items	<u>14</u>
Total Bottom Samples	<u>7</u>
Total SNM	<u>6.355</u>
Specific Dates of Acquisition	<u>April 15, 2007 through May 16, 2007</u>
Specific Dn#s of Acquisition	<u>Dn 105 through Dn 136</u>

Table 2: H11572_Mainscheme and Crossline Statistics Summary

Junctions

Survey H11572 junctions with H11569 and H11571, which are Sheet H and K, respectively of the same project. The area of overlap between survey H11569 and H11572 was approximately 500 meters wide, and the area of overlap between H11572 and H11571 was approximately 250 meters wide. Data were reviewed in CARIS Subset Editor and depths were found to be extremely consistent between the two surveys, meeting the requirements as stated in the *HSSDM*.⁶ The sheet limits and area of overlap for Sheets H, K and L are shown in Figure 4.

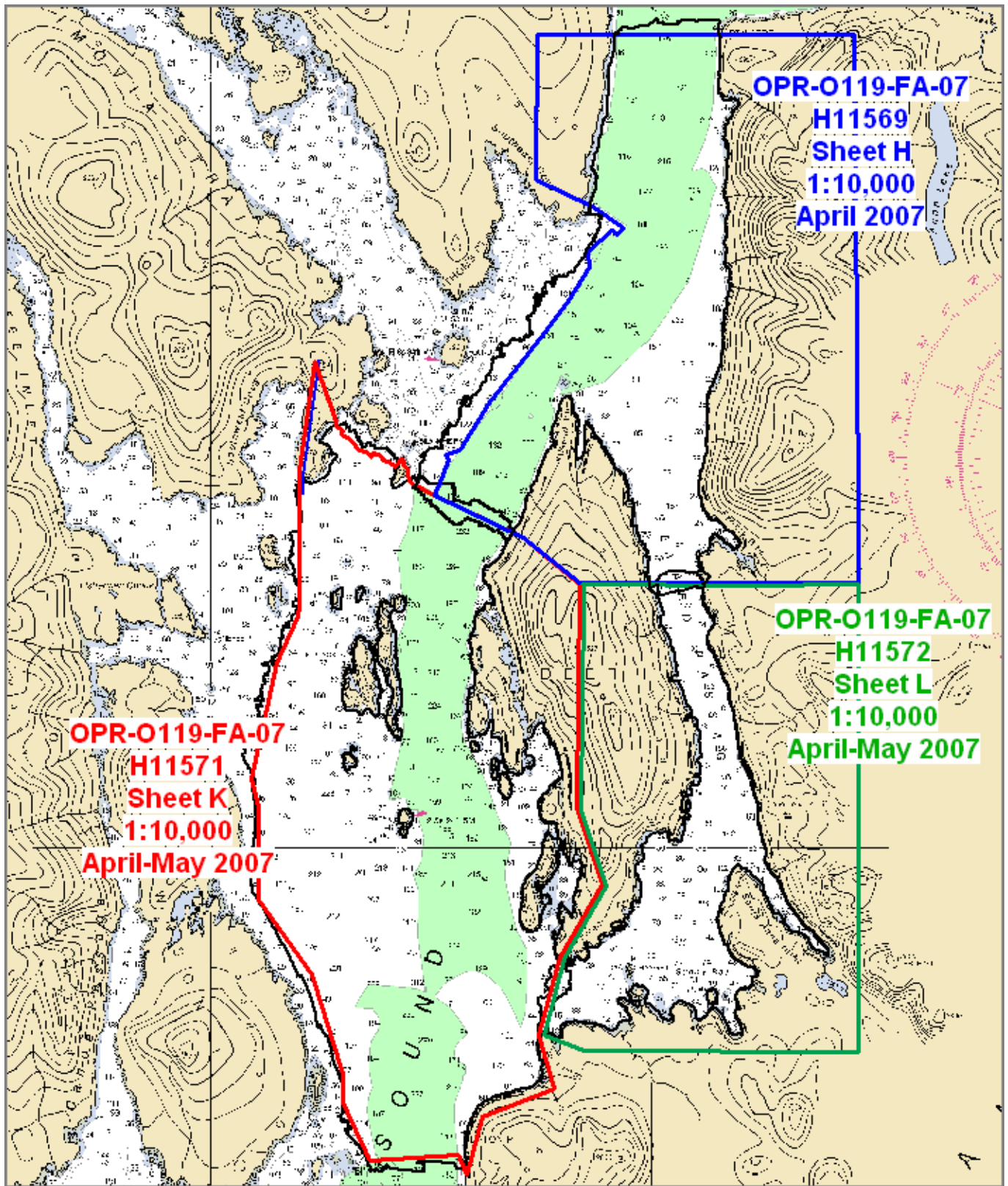


Figure 4: Junctions between H11569, H11572 and H11571

Quality Control Checks

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

Data Quality Factors

COVERAGE ASSESSMENT:

Coverage Assessment followed procedures as outlined in the DAPR.

As noted in the DAPR, the steep nature of the topography in Ernest Sound prevents a combined final surface of various resolutions, filtered by depth, which exhibits complete overlap. The depth ranges used for different resolutions surfaces remained as described in the DAPR after numerous adjustments to these ranges failed to result in a combined surface exhibiting complete overlap (see Figure 5).

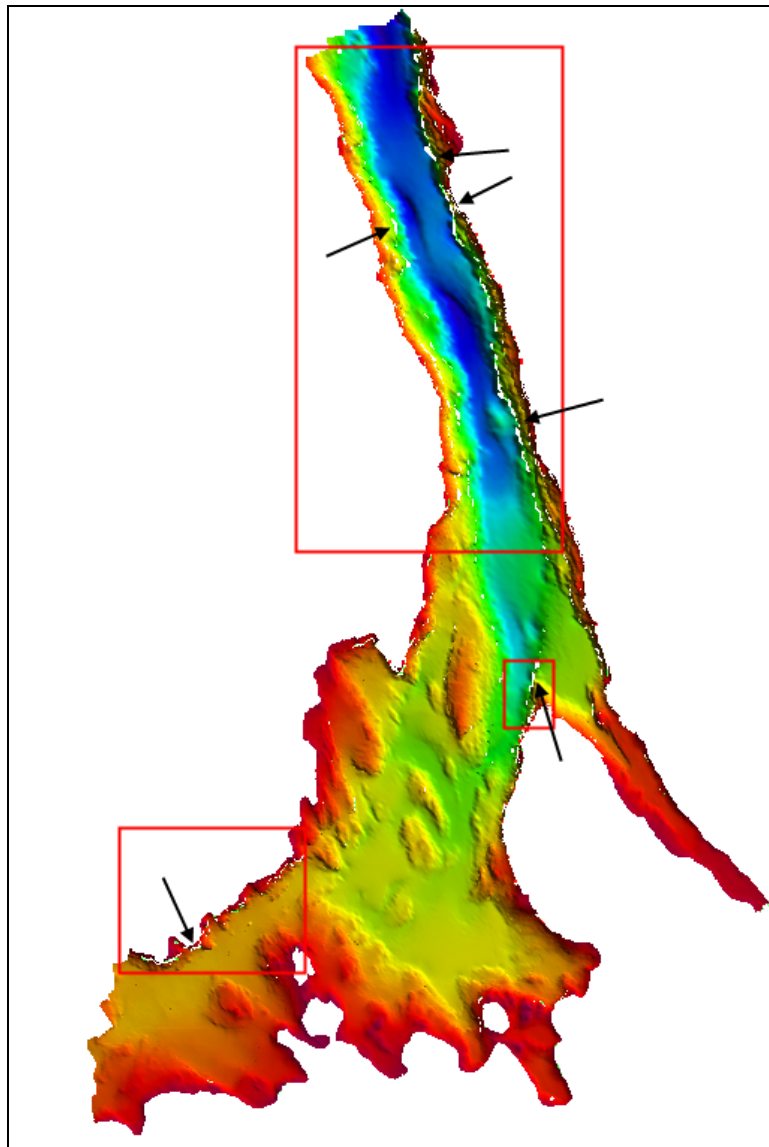


Figure 5: An overview of H11572 with areas displaying "gaps" appearing in finalized surface

Figure 6 shows two different representations of the shoreline along the deep northern channel of Seward Passage: one displaying the various resolutions surfaces at their appropriate depths (2m between 0-40m, 5m between 30-70 meters, 10m between 50-120m, 20m between 100-200m, and 35m between 180-500m), and one displaying the shoreline as depicted by BASE surfaces without range filtering.

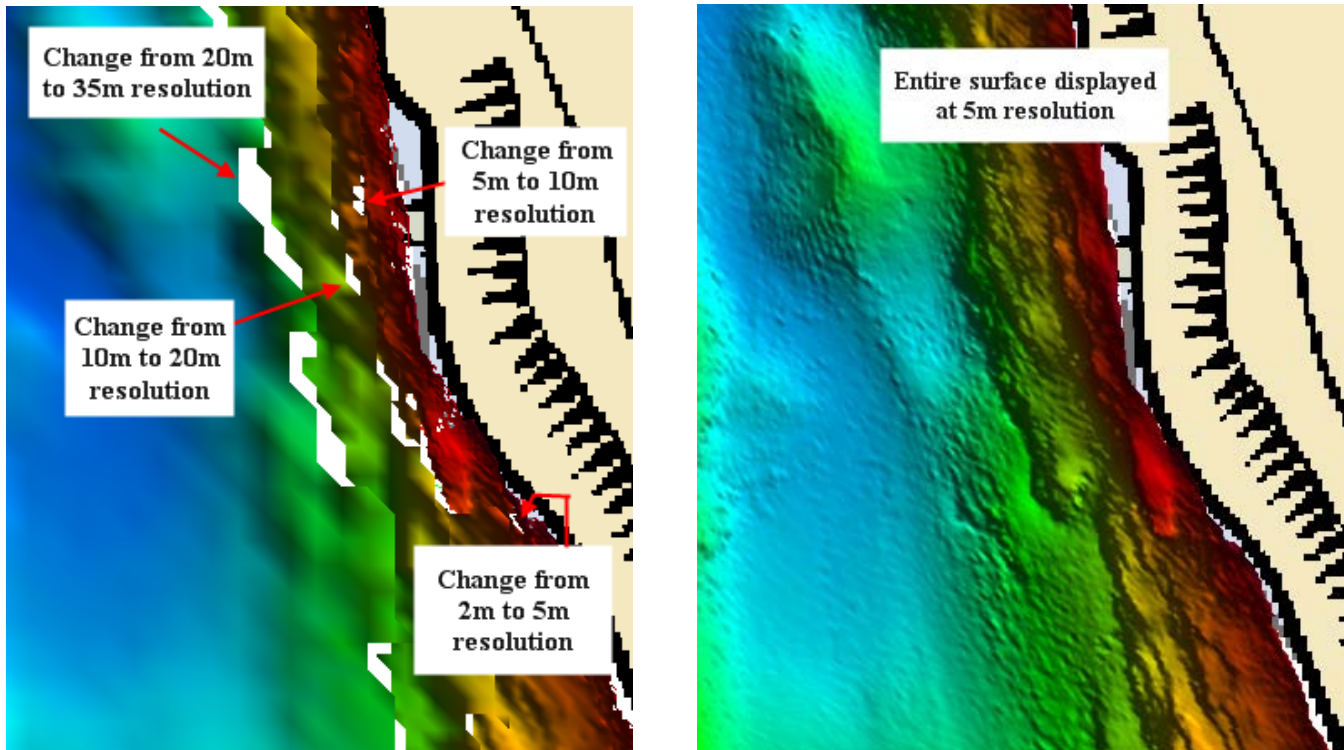


Figure 6: Two representations of the steep and deep shoreline in Seward Passage: one showing the appropriately range filtered 2m, 5m, 10m, 20m, and 35m surfaces (left), and one displaying the shoreline strictly at a 5m resolution (right).

Note that despite there being sufficient data to render the entire slope at a 5m resolution, gaps appear in the multi-resolution surface (area shown here is centered at 56°01'10.78"N, 131°58'01.76"W).

Again, due to the steep nature of the bathymetry in Ernest Sound, it is difficult to get the various resolution surfaces (when filtered by depth) to exhibit overlap. Twenty meters of overlap was used between both the 5 and 10m surfaces as well as the 10 and 20m surfaces and, as shown in Figure 6, there still appear to be gaps along edges of the shoreline. This phenomenon is only exhibited along the edges of shoals and the shoreline with sharp changes in elevation, most noticeably the eastern shore of Seward Passage. There are no significant features in the apparent gaps along the shoreline. According to section 5.1.2.1 of the *HSSDM*, a gap is only considered a holiday if it measures larger than 3 nodes across. Each of these gaps were measured and found to be smaller than the requisite 3 nodes; therefore complete multibeam coverage has been demonstrated.⁷

DESIGNATED SOUNDINGS:

Designation of soundings followed procedures as outlined in the DAPR. Nine soundings are designated in H11572 to preserve shoals or for the best representation of the seafloor, and five soundings are marked outstanding for shoreline feature disprovals.⁸

TRUEHEAVE:

TrueHeave data could not be applied to nine lines of MBES data from May 16, 2007 (DN 136) for unknown reasons. A “fixed TrueHeave” file was created but still would not apply to XL2 through XL10. MBES data quality from that day does not appear to have been affected by the lack of TrueHeave, due to the negligible swell in the protected waters of Seward Passage.⁹

ATTITUDE DATA:

After departing the Ernest Sound working grounds, it was discovered that Launch 1018 was recording attitude data at a rate of 1Hz, as compared to the normal 25Hz. Given the working conditions of Ernest Sound were typically flat calm seas with light winds, Launch 1018 was rarely subjected to a dynamic environment; thus the data integrity was not compromised.¹⁰

Accuracy Standards

All data meet the data accuracy specifications as stated in the *HSSDM*.

B3. Corrections to Echo Soundings

Data reduction procedures for survey H11572 conform to those detailed in the DAPR, with the exceptions discussed below.

There are two sound velocity casts taken by Launch 1010 on DN 121 that fall onshore. The positions entered for the first and third cast (071211635 and 071211734) of the day were reviewed and match the positions entered in Velocwin. There is no sound velocity error in the data associated with these casts.¹¹

Given the ample number of casts FAIRWEATHER acquires with the MVP, we have found that processing these casts using the cast nearest in distance within a time of two hours results in better corrections for sound velocity. Therefore, H11572_S220_8160_SV.svp is applied using the “nearest in distance within time - two hours” method for all lines acquired with the ship. Data collected with Launch 1010 on May 1, 2007 (DN 121) also has SVP applied “nearest in distance within time - two hours” at the recommendation of that day’s launch crew. All other sound velocity profiles for H11572 were applied using “previous in time”. All sound velocity profile methods are documented in the Acquisition and Processing Logs (see Separates I).¹²

B4. Data Processing

Data processing procedures for survey H11572 conform to those detailed in the DAPR.

There are seven total fieldsheets fulfilling the various resolution requirements for survey H11572. Fieldsheet H11572 is the largest, encompassing the entire survey area to the five-, ten-, twenty- and thirty-five meter resolutions. Six additional fieldsheets exist. There are four fieldsheets (H11572_2m_North, H11572_2m_East, H11572_2m_South, and H11572_2m_West) including two meter resolution surfaces. Two additional fieldsheets (H11572_1m_Island and H11572_1m_SE) cover areas near the coastline and shoals where a higher resolution surface is required to accurately represent the seafloor and to retain shoals. Each of these fieldsheets includes one meter resolution surfaces. The fieldsheet areas of coverage are displayed in Figure 7.

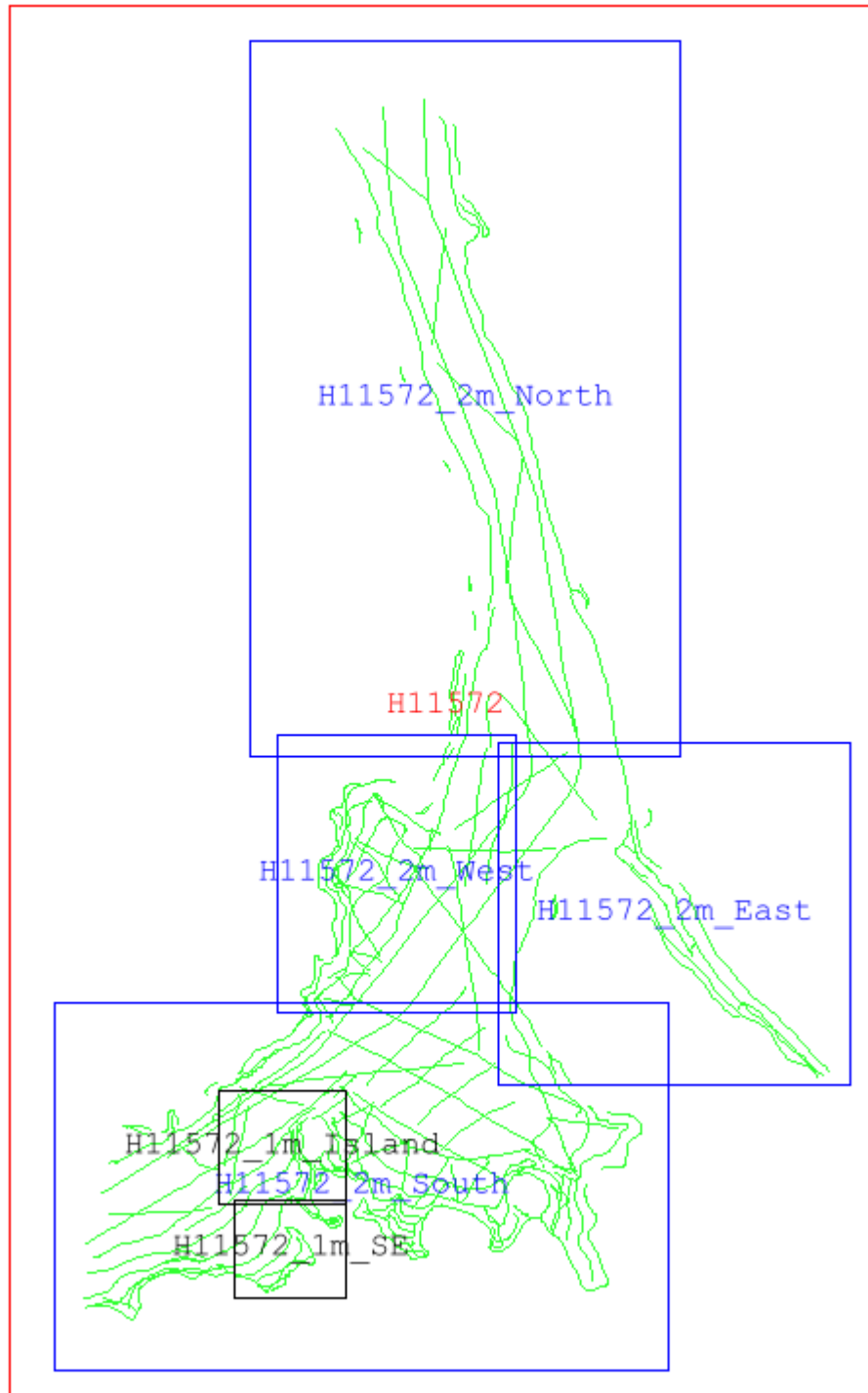


Figure 7: Fieldsheet layout for H11572

The thirty-five meter resolution found in the H11572 fieldsheet is best for the main channel of the survey area, specifically the deep waters in the northern portion of the area. Again, the one meter resolution surfaces are most accurate for the areas encompassed by the H11572_1m_Island and H11572_1m_SE fieldsheets. The steep and deep nature of the survey area presents a challenge to using the “appropriate resolution grid” along the survey area edges (see the Coverage Assessment section of this report).

Fieldsheet	Surfaces
H11572	5 meter, 10 meter, 20 meter, 35 meter
H11572_2m_North	2 meter
H11572_2m_East	2 meter
H11572_2m_South	2 meter
H11572_2m_West	2 meter
H11572_1m_Island	1 meter
H11572_1m_SE	1 meter

Table 3: Fieldsheets and associated surfaces for H11572

Survey H11572 has been examined for noise “pimples” in offshore areas (as described in HydroGeek Volume 3, included in Appendix IV Supplemental Survey Records & Correspondence)¹³ via the creation of a combined surface. All such fliers have been removed.

C. HORIZONTAL AND VERTICAL CONTROL

A complete description of horizontal and vertical control for survey H11572 can be found in the *OPR-O119-FA-07 Horizontal and Vertical Control Report*¹⁴, submitted under separate cover. A summary of horizontal and vertical control for this survey follows.

Horizontal Control

The horizontal datum for this project is the North American Datum of 1983 (NAD83). Differential GPS (DGPS) was the sole method of positioning. Differential corrections came from the U.S. Coast Guard beacons at Annette Island (323 kHz) and Gustavus (288 kHz).

Vertical Control

The vertical datum for this project is Mean Lower-Low Water (MLLW). The operating National Water Level Observation Network (NWLON) primary tide station at Ketchikan (945-0460) served as control for datum determination and as the primary source for water level reducers for survey H11572 during acquisition.

FAIRWEATHER personnel installed one Sutron 8210 “bubbler” tide gauge at the tertiary station listed below. The gauge was installed in order to provide information to the Center for Operational Oceanographic Products and Services (CO-OPS N/OPS1) for the determination of time and height correctors, in accordance with the Project Instructions.

Station Name	Station Number	Type of Gauge	Date of Installation	Date of Removal
Thoms Point	945-0970	Tertiary 30 Day	April 12, 2007	May 22, 2007

Table 4: Thoms Point Tertiary Tide Gauge information

Refer to the *OPR-O119-FA-07 Horizontal and Vertical Control Report* for further information about the tertiary tide station.

A request for delivery of final approved water level data (smooth tides) for survey H11572 was forwarded to N/OPS1 on May 26, 2007 in accordance with the *Field Procedures Manual*, dated March 2007 (FPM). A copy of the request is included in Appendix V.

FAIRWEATHER received the Tide Note for Hydrographic Survey H11572 on July 5, 2007. The Tide Note for Hydrographic Survey H11572 states that preliminary zoning is accepted as the final zoning correctors. Final approved water level data were received by the FAIRWEATHER on July 10, 2007 for NWLON tertiary tide station Thoms Point (945-0970). The Tide Note for Hydrographic Survey H11572 is included in Appendix V.¹⁵

As per the Letter Instructions, all data were reduced to MLLW using the final approved water levels (smooth tides) from tertiary station Thoms Point by applying tide file 9450970.tid and time and height correctors through the zone corrector file H11572CORF.zdf, on July 10, 2007. 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 the FPM.

Survey H11572 was compared with charts 17385 (16th ed.; September 2006, 1:80,000), and 17360 (35th ed.; June 2008, 1:217,828). All charts have been updated with the Notice to Mariners through March 10, 2007 and the most recent Notice to Mariners from June 14, 2008 was consulted. There were no new changes within the survey area.

Chart 17385

There is a charted 12 fathom sounding at the entrance to Santa Anna Inlet. There is a feature in the area that shoals up to about 9.4 fathoms (see Figure 8).

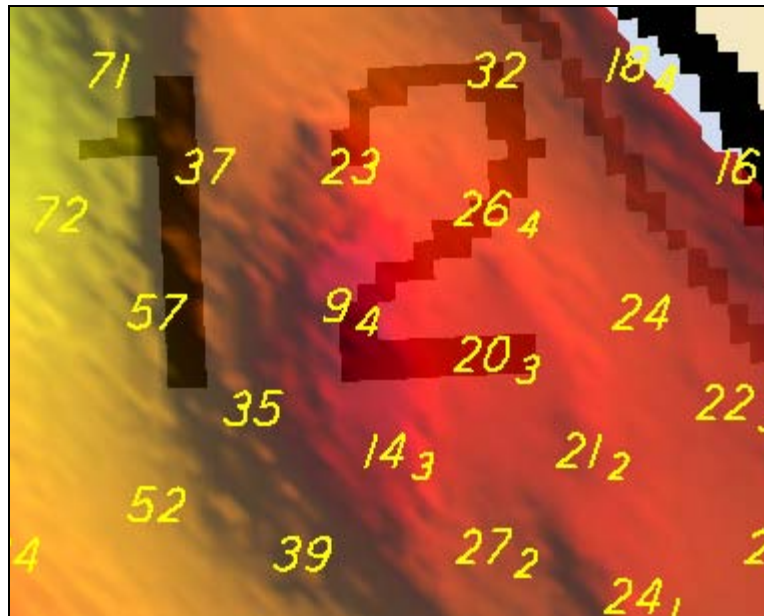


Figure 8: Charted (17385) 12 fathom sounding and neighboring soundings from BASE surface demonstrating shoal

The rest of the depths on chart 17385 generally agreed within one to two fathoms with depths from survey H11572. Some of the shoaler depths represented on the chart near the shoreline appear to have been pulled offshore for cartographic representation but remain accurate within the scale of the chart (see Figure 9).¹⁶

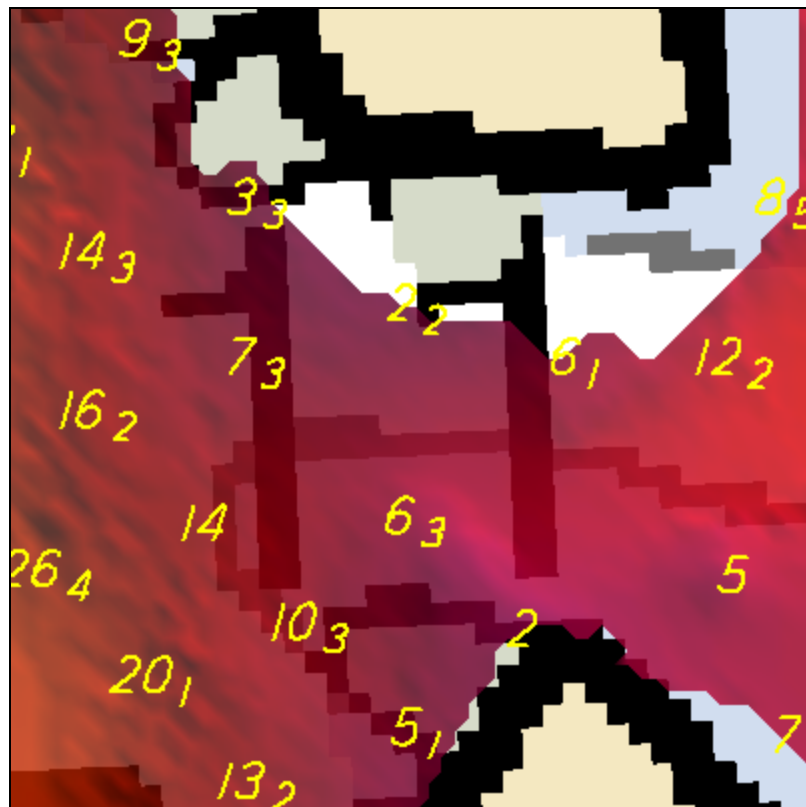


Figure 9: Charted (17385) 11 fathom sounding and neighboring soundings from BASE surface

Chart 17360

Depths from survey H11572 generally agreed within one to two fathoms with depths on chart 17360. Some of the shoaler depths represented on the chart near the shoreline appear to have been pulled off shore for cartographic representation, but remain accurate within the scale of the chart (see Figure 10).¹⁷

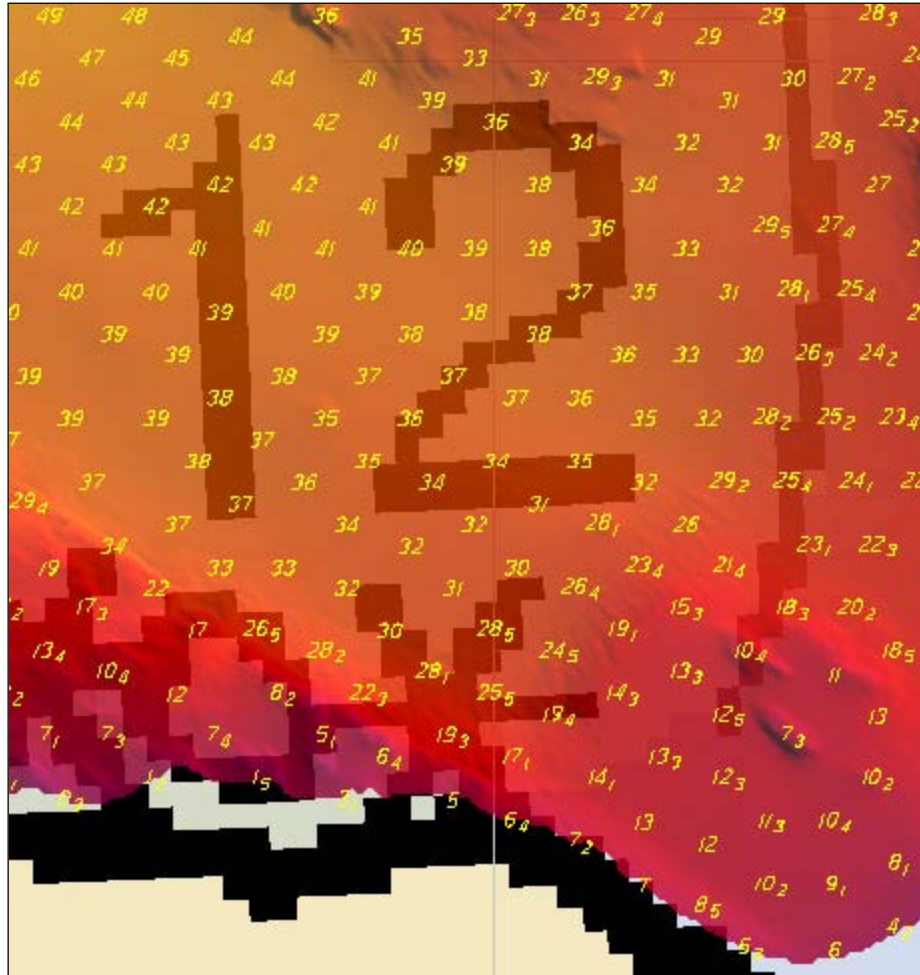


Figure 10: Charted (17360) 12 fathom sounding and neighboring soundings from BASE surface

Chart Comparison Recommendations

The Hydrographer has determined that bottom coverage requirements have been met and data accuracy meets requirements specified by the *HSSDM*. **The surveyed soundings are adequate to supersede prior surveys in their common areas.**¹⁸ Based on the application of verified water level data (smooth tides) by FAIRWEATHER, final chart comparisons are not required by the Pacific Hydrographic Branch.

Automated Wreck and Obstruction Information System (AWOIS) Investigations

There were no AWOIS items located within the limits of H11572.¹⁹

Dangers to Navigation

There were no dangers to navigation found within the survey limits.²⁰

Charted Feature Removal

Charts 17360 and 17385 have a charted “Foul” in Santa Anna Inlet (see Figure 11). Prior to surveying the area, the Hydrographer reviewed prior survey images in an effort to determine what the “foul” label refers to.

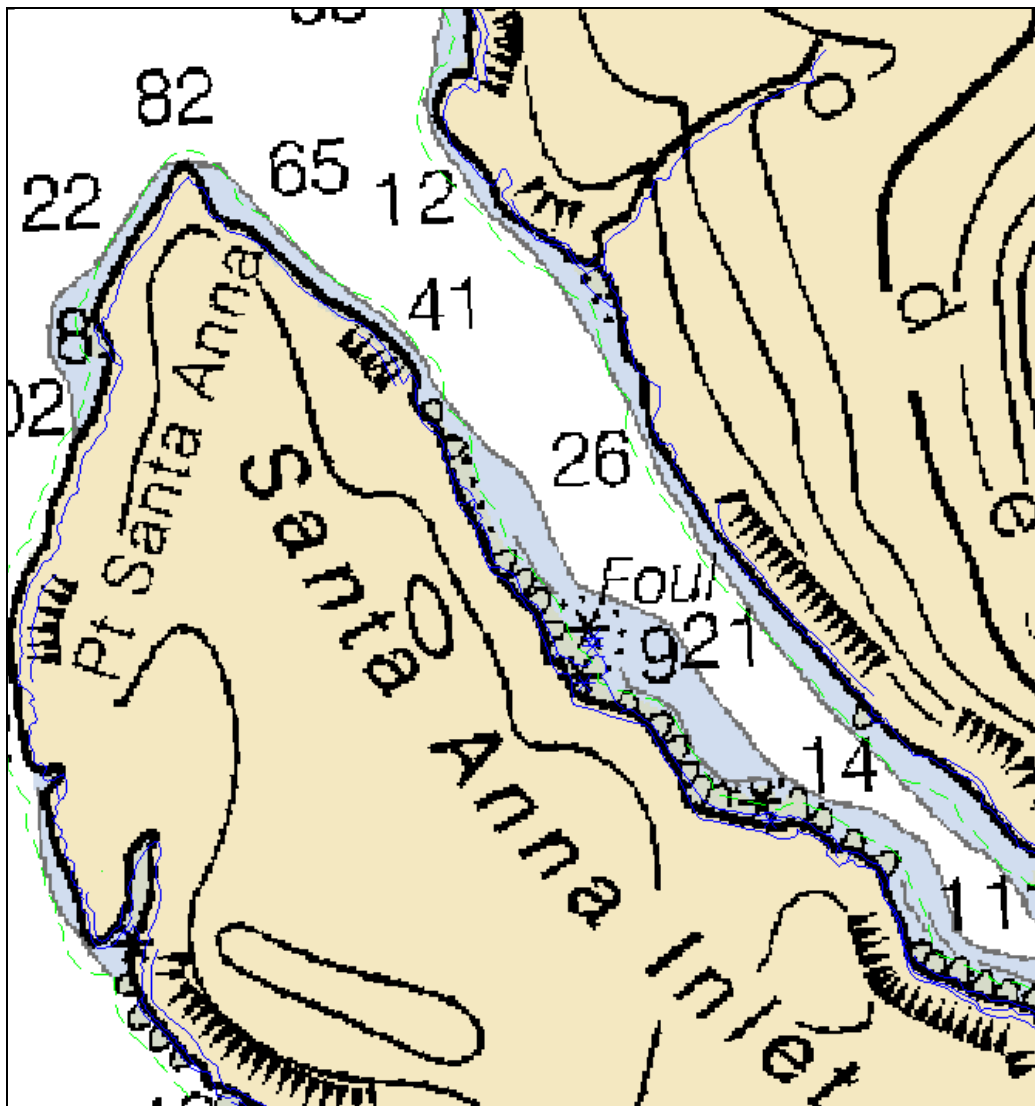


Figure 11: Chart 17385 showing a "Foul" in the middle of Santa Anna Inlet

Figure 12 below shows a control point named “Fowl”, and does not indicate a foul area in the inlet as indicated by charts 17385 and 17360.

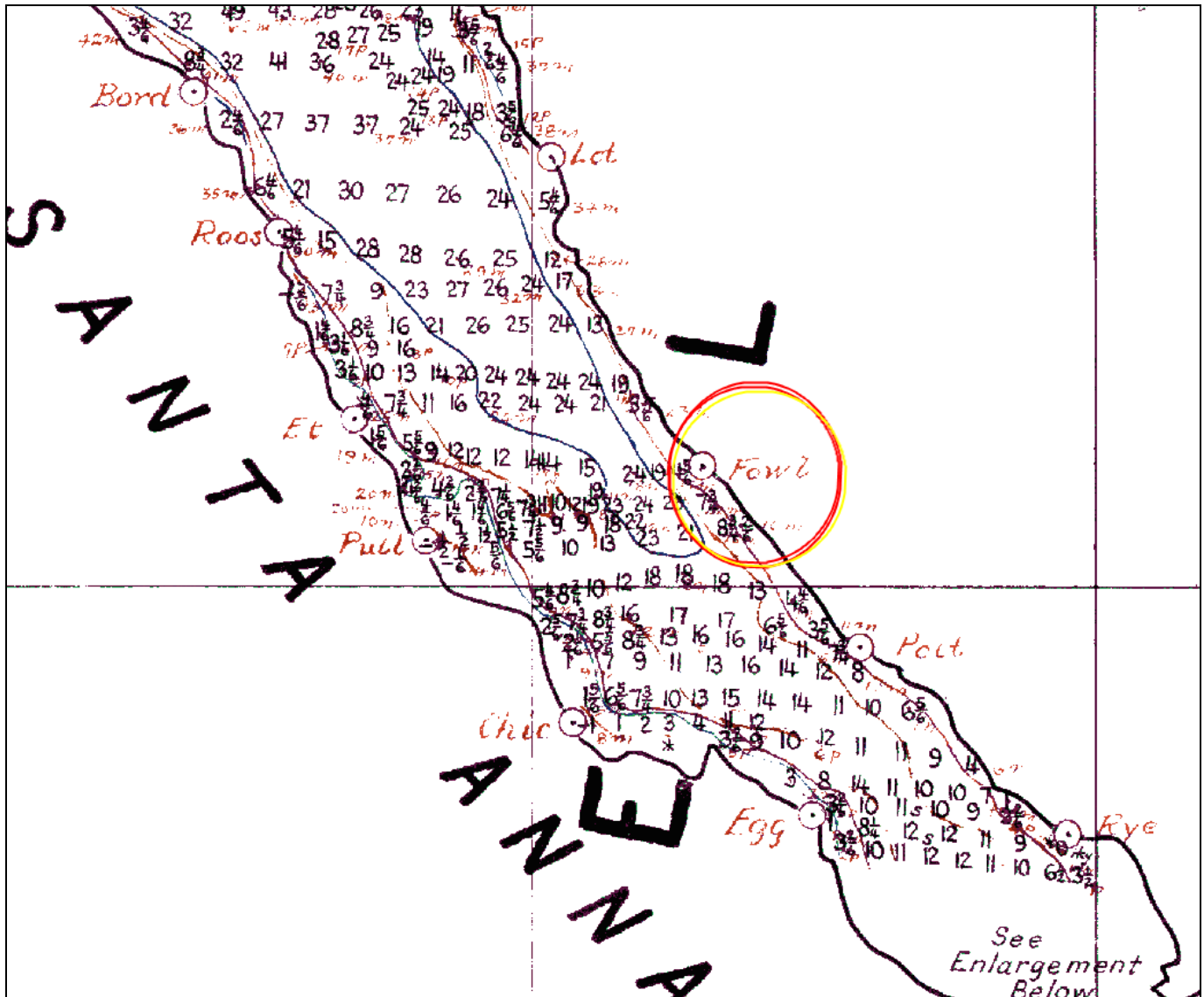


Figure 12: Historic survey with control point "Fowl"

Shoreline verification and MBES coverage of Santa Anna Inlet demonstrate that there is no foul area as depicted on charts 17385 and 17360 (see Figure 13).

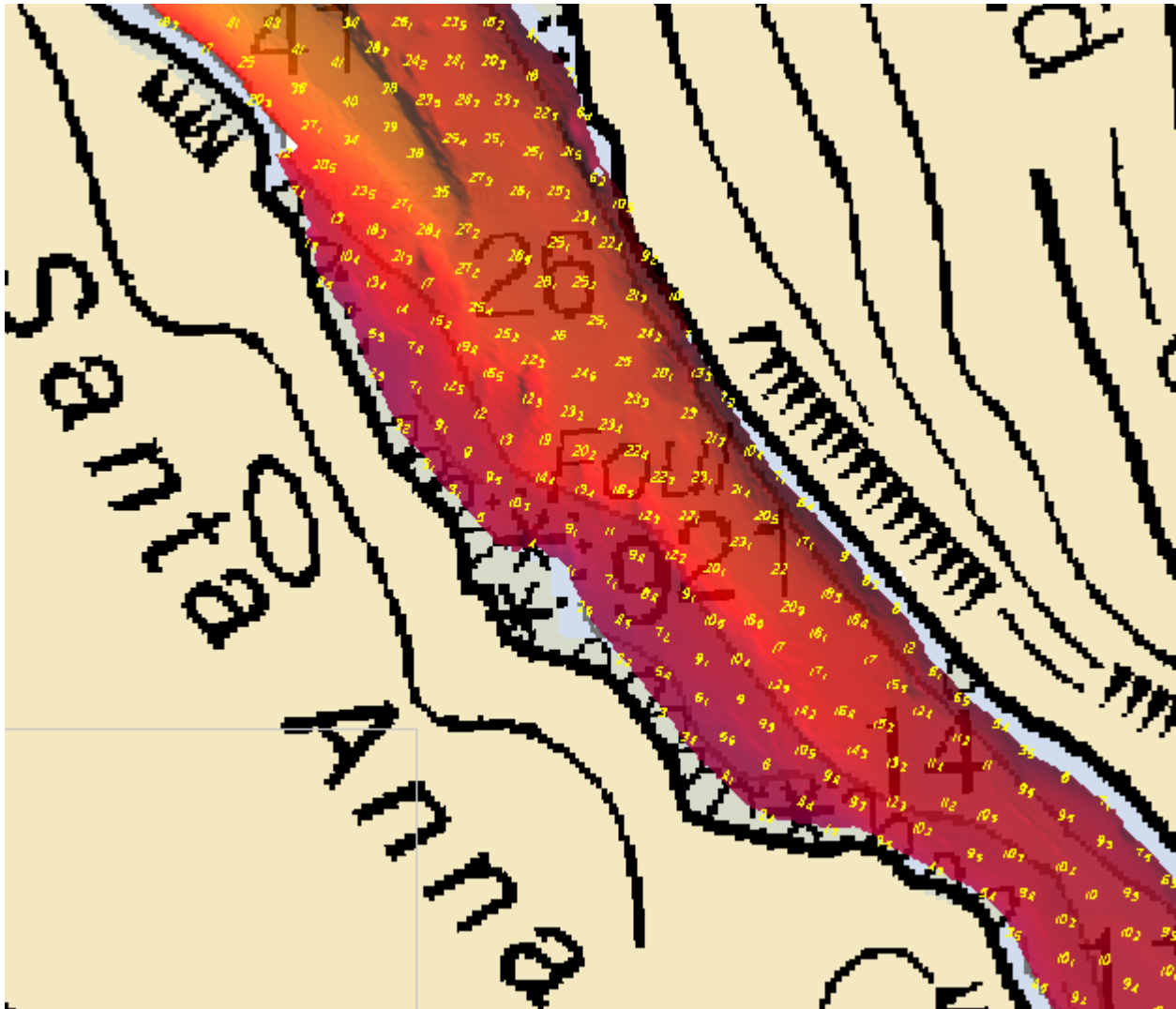


Figure 13: BASE surface demonstrating coverage in Santa Anna Inlet where chart 17385 indicates a foul of some sort

Given the data acquired during H11572, the Hydrographer recommends removing the “Foul” label from charts 17385 and 17360 and depicting a clear, navigable channel.²¹

D.2 Additional Results

Shoreline Verification and Processing

FAIRWEATHER personnel conducted limited shoreline verification at times near predicted low water, in accordance with the Standing Project Instructions and HTD-2007-7. A composite source file was from HSD’s Operations Branch was provided with the project instructions. A sole shoreline source was included in the composite source file: Geographic Cell (GC) Shoreline compiled by the Remote Sensing Division (RSD) from photogrammetric surveys. Navigationally significant charted (17385) features located within the survey limits but not present in the GC file were also digitized into the composite source layer so that they were addressed in the field. All such features were not seen in the field and were disproved with multibeam, and therefore were removed from the composite source layer. All shoreline

features from the composite source seaward of the Navigable Area Limit Line (NALL) were verified or disproved during shoreline operations.

Detached positions (DPs) and generic positions (GPs) acquired during shoreline verification were recorded in Trimble TerraSync 2.4.1 and on paper DP forms. Scanned copies of the DP forms are included in the digital Separates folder²² and hard copies can be found with the *Separates to be Included with Survey Data*. In addition, annotations describing shoreline were recorded on hard copy plots (boat sheets) of the digital shoreline.

DPs and GPs were inserted into Pydro where they were tide corrected, S57 attributed and resolved according to Pydro flagging logic. A survey feature report for shoreline items was generated and included as H11572_Features_Report.pdf in Appendix II.²³ The report includes all significant shoreline items requiring specific attention that were flagged Report in Pydro. Investigation or survey methods for these items were included under the Remarks tab and, when appropriate, recommendations to the cartographer were included in the Recommendations tab.

Shoreline deliverable .HOB files were compiled in Caris Notebook 3.0. Edits to existing source shoreline features were made in the H11572_Composite_Source.hob file, with GC and charted features modified or deleted as necessary. Field notes accompanying verified source features were entered in the remarks attribute field. GPs and DPs were imported into Notebook from Pydro; these features are included in the H11572_Updates and/or H11572_Disprovals .HOB files.

If a source feature was edited in Notebook, the SORIND and SORDAT attribute fields were modified to reflect the survey number (US,US,graph,H11572) and final survey date (May 16, 2007). 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 5.

Shoreline Source	SORIND	SORDAT
RSD	US,US,graph,GC-10548	19970809
RNC	US,US,graph,Chart17360	20060301
RNC	US,US,graph,Chart17385	20050601
Survey	US,US,graph,H11572	20070516

Table 5: SORIND/SORDAT Shoreline Features

For a more detailed description of shoreline verification and processing refer to the DAPR.

Source Shoreline Changes and New Features

All source shoreline changes and new features found during shoreline verification are discussed either in the H11572_Features_Report.pdf in Appendix II or in the CARIS Notebook files. The Hydrographer recommends that the shoreline depicted in the CARIS Notebook files and final sounding files supersede and complement shoreline information compiled on the NOAA charts.²⁴

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 NOAA charts.²⁵

Aids to Navigation

There were no Aids to Navigation found within the survey limits.²⁶

Bottom Samples

Bottom samples were collected on April 28, 2007 (DN 118) and are included as seabed classifications along with the other S57 features in the Pydro Preliminary Smooth Sheet. The bottom sample positions were also imported to the Notebook H11572_Updates.hob file.²⁷

E. Supplemental Reports

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

<u>Title</u>	<u>Date Sent</u>	<u>Office</u>
Hydrographic Systems Readiness Review Memo 2007	April 23, 2007	N/CS34
OPR-O119-FA-07 Data Acquisition and Processing Report	July 7, 2007	N/CS34
OPR-O119-FA-07 Horizontal & Vertical Control Report	May 30, 2007	N/CS34, N/OPS1
OPR-O119-FA-07 Tides and Water Levels Package	May 30, 2007	N/OPS1
OPR-O119-FA-07 Coast Pilot Report	July 7, 2007	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

September 6, 2007

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

FROM: CDR Andrew L. Beaver, NOAA
Commanding Officer

TITLE: Approval of Hydrographic Survey H11572,
OPR-O119-FA

As Chief of Party, I have ensured that standard field surveying and processing procedures were adhered to during acquisition and processing of hydrographic survey H11611 in accordance with the Hydrographic Manual, Fourth Edition; Hydrographic Survey Guidelines; Field Procedures Manual, March 2007; and the NOS Hydrographic Surveys Specifications and Deliverables, as updated for April 2007. 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:

ST Stephanie Mills
Survey Manager

LT Jennifer Dowling
Field Operations Officer

CST Grant Froelich
Chief Survey Technician

Attachment



¹ Concur

² Concur

³ Filed with project records

⁴ Concur with clarification. A line query in CARIS HIPS/SIPS resulted in 79.59 lnm of mainscheme lines run. Crosslines of 19.71 lnm are 24.76% of total MBES main scheme hydrography.

⁵ Filed with survey records

⁶ Concur

⁷ Concur with clarification. Holidays not addressed in the DR were found by the survey reviewer. The reviewer reformatted the grid resolutions and depth thresholds to represent the highest resolution the data would support and to close gaps between finalized surfaces on steep slopes. See also Comments notes 4 and 5 in H11572_Survey_Review_Checklist filed with survey records.

⁸ The survey reviewer designated additional soundings to ensure the 2m surface properly depicted all shoals. See Comments note 6 in H11572_Survey_Review_Checklist filed with survey records.

⁹ Concur

¹⁰ Concur with clarification. The survey reviewer found possible roll errors present in locations listed in the Comments note 8 in H11572_Survey_Review_Checklist that is filed with survey records, and that IHO Order 1 specifications were not met for the depths in certain areas but recommended accepting the data.

¹¹ Concur

¹² Filed with survey records.

¹³ Do not concur. This reference is not included in Appendix IV.

¹⁴ Filed with project records

¹⁵ Attached to this report

¹⁶ Concur

¹⁷ Concur

¹⁸ Concur

¹⁹ Concur

²⁰ Concur

²¹ Concur

²² Filed in Separates I with survey records.

²³ Filed with survey records

²⁴ Concur

²⁵ Concur

²⁶ Concur

²⁷ Concur

Subject:
Re: [Fwd: H11569 - GC not applied to ENC/chart]
From:
Andrew Kampia <Andrew.Kampia@noaa.gov>
Date:
Fri, 02 Oct 2009 17:21:06 -0400
To:
Gary Nelson <Gary.Nelson@noaa.gov>
CC:
Laurie Bennett <Laurie.Bennett@noaa.gov>

Gary,

Sorry for the delayed response. This was an unusual case.

We looked at the GC application and realized that it was applied to the raster with a southeastern shift of about 0.33 mm. This error was reproduced on the ENC.

This is particularly annoying for the visible rocks. I'm sorry for the frustration this probably gives to your compilers.

I recommend you compile the hydro in it's exact geographic position with an understanding that the GC horizontal accuracy is correct, but our ENC/Raster may not be horizontally accurate. It would not help us to apply the GC shoreline in the HCell. If you need more help describing the error so you can make a note of it, I'm happy to discuss it.

Please let me know if you have any questions.

Thanks.

Gary Nelson wrote:
Andy,

I received this information yesterday. The compilers asked why the GC had not been applied. I thought you might be able to help us out. Since we have the information here, would it help if we applied the GC shoreline in the HCell or should we just make note of it.

Thanks,

Gary

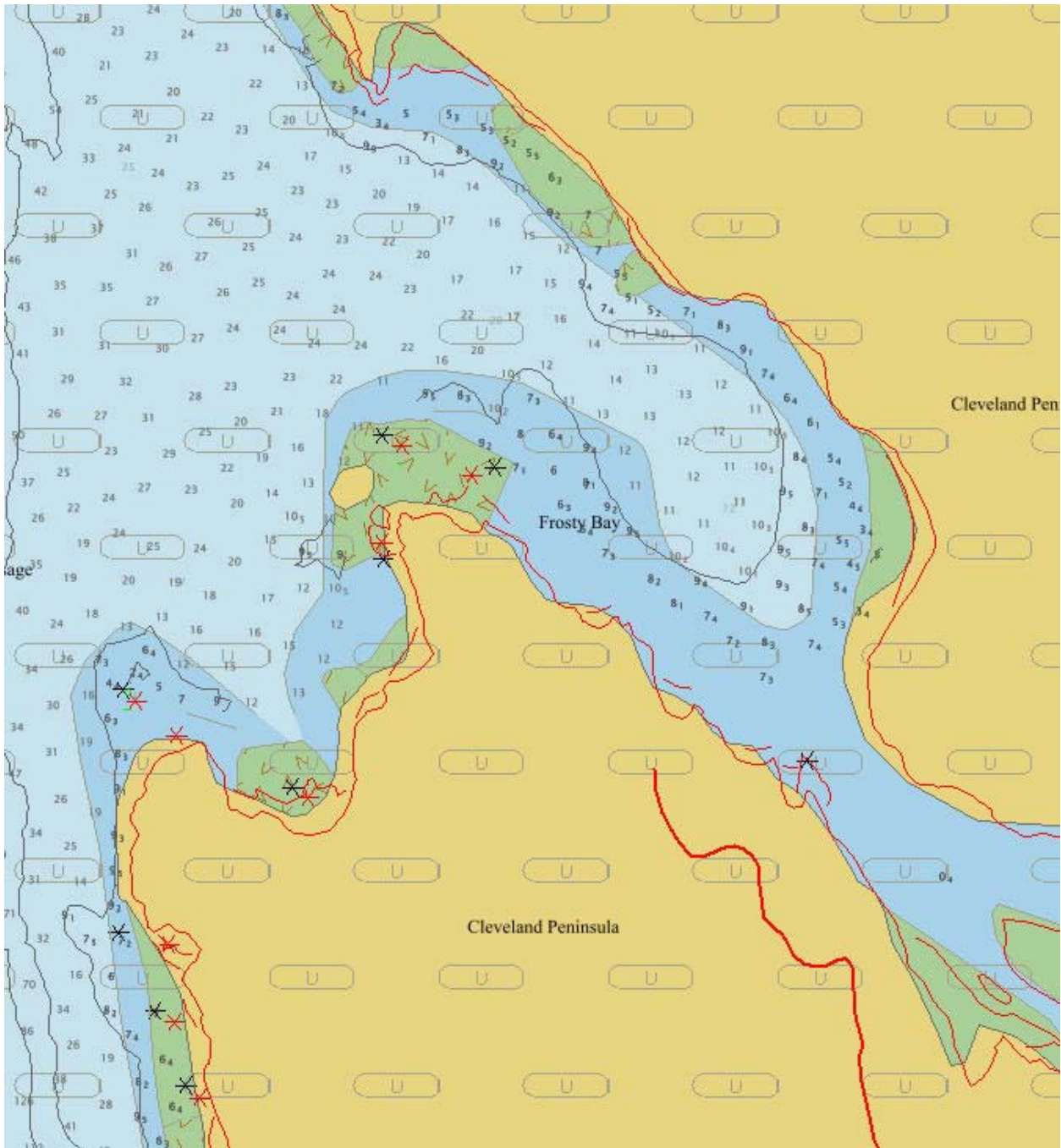
Subject:
H11569 - GC not applied to ENC/chart
From:
"martha.herzog" <martha.herzog@noaa.gov>
Date:
Tue, 29 Sep 2009 15:15:36 -0700
To:
Gary Nelson <Gary.Nelson@noaa.gov>
To:
Gary Nelson <Gary.Nelson@noaa.gov>

Hi Gary,

This is one of the areas in H11569 where the GC has not been applied to ENC US4AK3OM or chart 17385.

The GC (Composite Source) is in red. There are plenty of places where soundings/DEPARE overlap with ledges.

-martha





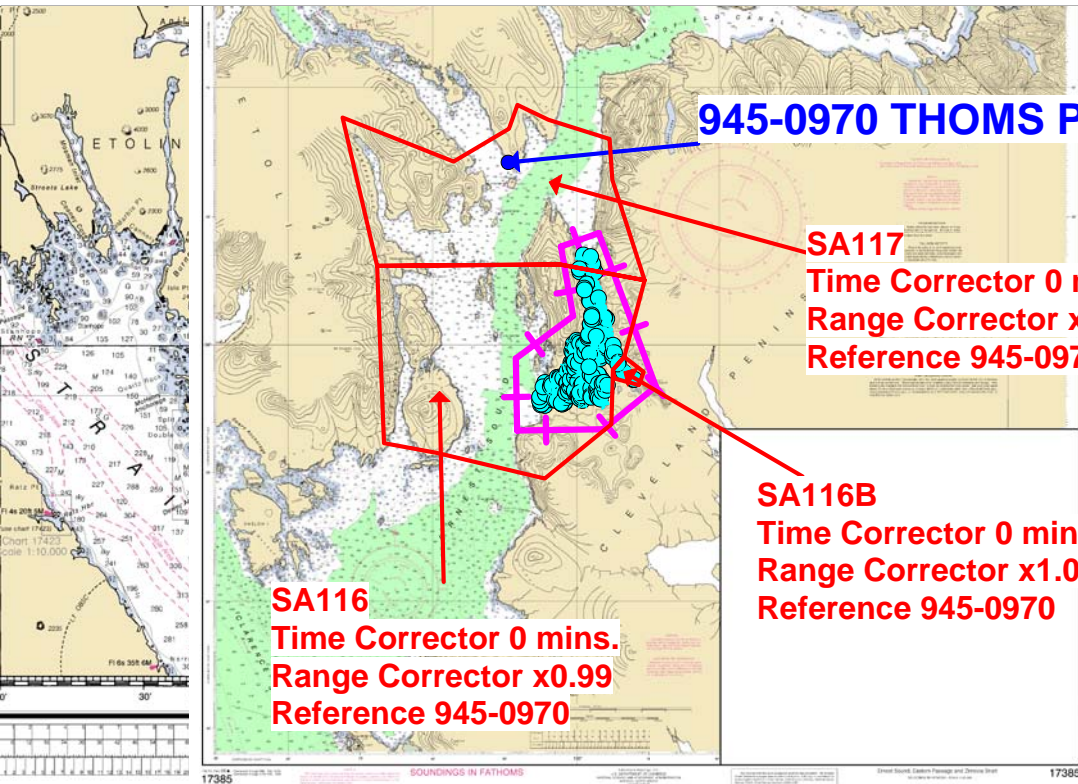
UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Ocean Service
Silver Spring, Maryland 20910



Final tide zone node point locations for OPR-O119-FA-2007, H11572

Format: Tide Station (in recommended order of use)
 Average Time Correction (in minutes)
 Range Correction
 Longitude in decimal degrees (negative value denotes Longitude West),
 Latitude in decimal degrees

	Tide Station Order	AVG Time Correction	Range Correction
Zone SA116	945-0970	0	x0.99
	945-0460	0	x1.05
-131.957153 55.983659			
-131.943951 55.991965			
-131.920439 56.04175			
-132.018721 56.052018			
-132.230563 56.05108			
-132.222667 55.935868			
-132.161117 55.929514			
-132.036082 55.912845			
-131.958945 55.948125			
-131.957153 55.983659			
Zone SA116B	945-0970	0	x1.02
	945-0460	+6	x1.08
-131.943951 55.991965			
-131.957153 55.983659			
-131.955316 55.977957			
-131.927073 55.973697			
-131.921424 55.982215			
-131.943951 55.991965			
Zone SA117	945-0970	0	x1.00
	945-0460	+6	x1.06
-131.920439 56.04175			
-131.957818 56.106856			
-131.961061 56.133332			
-132.031824 56.14577			
-132.067839 56.155399			
-132.07769 56.139917			
-132.141902 56.118694			
-132.270577 56.147212			
-132.230563 56.05108			
-132.018721 56.052018			
-131.920439 56.04175			

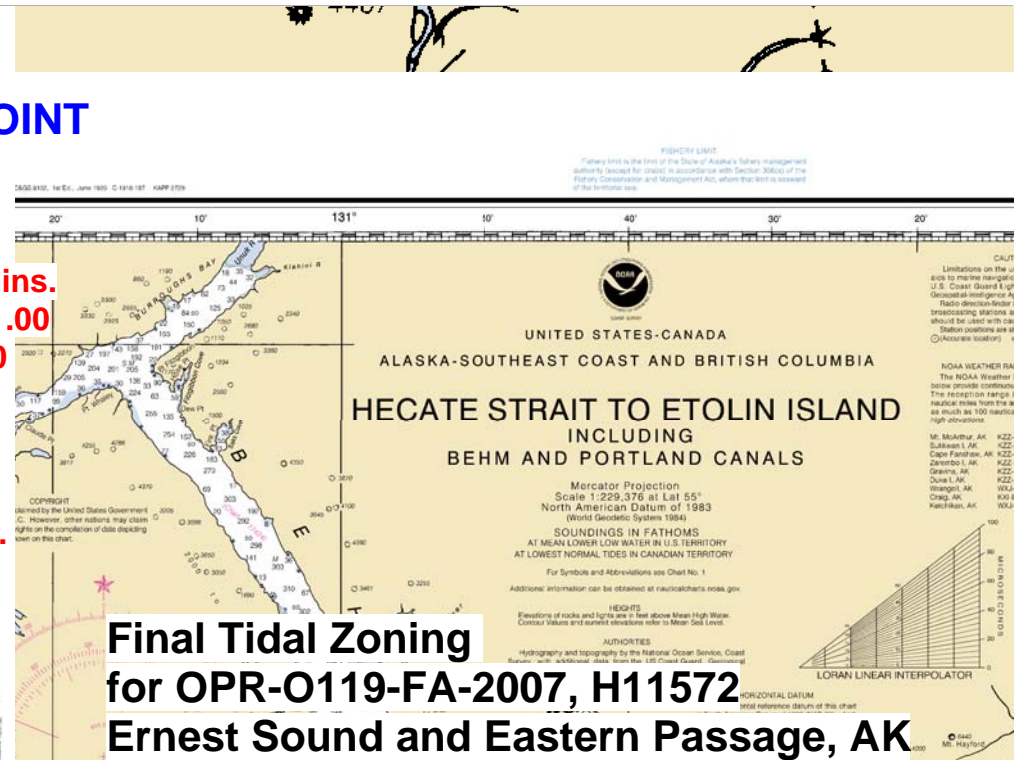


945-0970 THOMS POINT

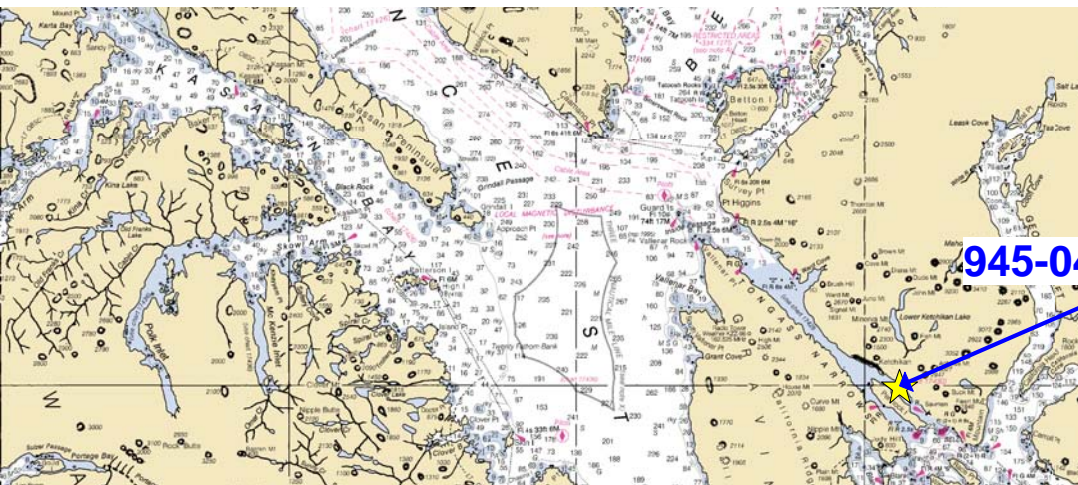
SA117
 Time Corrector 0 mins.
 Range Corrector x1.00
 Reference 945-0970

SA116B
 Time Corrector 0 mins.
 Range Corrector x1.02
 Reference 945-0970

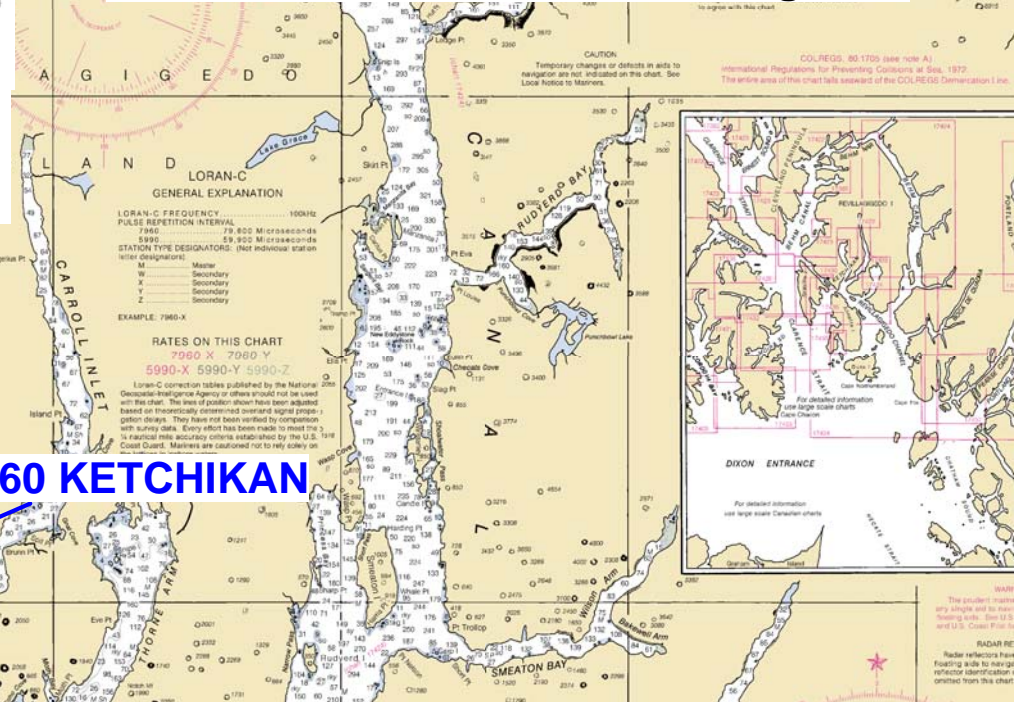
SA116
 Time Corrector 0 mins.
 Range Corrector x0.99
 Reference 945-0970



**Final Tidal Zoning
 for OPR-O119-FA-2007, H11572
 Ernest Sound and Eastern Passage, AK**



945-0460 KETCHIKAN



LORAN-C FREQUENCY
 PULSE REPETITION INTERVAL
 7960 73.825 Microseconds
 5990 59.920 Microseconds
STATION TYPE DESIGNATORS: (not midcourse station letter designators)
 M: Master
 W: Secondary
 X: Secondary
 Y: Secondary
 Z: Secondary
EXAMPLE: 7960-X
RATES ON THIS CHART
 7960 X 7080 Y
 5990-X 5990-Y 5990-Z
 Loran-C correction tables published by the National Oceanic and Atmospheric Administration or others should not be used on this chart. The time of position above has been adjusted based on theoretically determined overlaid signal propagation delays. They have not been verified by comparison with survey data. Every effort has been made to meet the 1% radial time accuracy criteria established by the U.S. Coast Guard. Mariners are cautioned not to rely solely on Loran-C.

H11572 HCell Report
Mary Beth Litrico, Physical Scientist
Pacific Hydrographic Branch

Introduction

The primary purpose of the HCell is to provide new survey information in International Hydrographic Organization (IHO) format S-57 to update the largest ENC and RNC in the region: NOAA ENC, US4AK30M, and NOAA RNC's, 17385 and 17360.

HCell compilation of survey H11572 utilized Office of Coast Survey HCell Specifications Version 3.1 and HCell Reference Guide Version 1.1.

1. Compilation Scale

Soundings for HCell H11572 were compiled to the largest scale chart in the region, chart 17385, at a scale of 1:80,000. The density and distribution of soundings from H11572 were selected to emulate the distribution on chart 17385. Non-bathymetric features have been generalized to chart scale.

2. Soundings

2.1 Source Data

A survey-scale sounding (SOUNDG) feature object layer was built from the **H11572_Office_Combined_10m** surface in CARIS BASE Editor. A shoal-biased selection was made using a single radius value of 1mm at survey scale (1:10,000). The sounding feature object source layer was exported as H11572_SS.hob and imported into CARIS HOM.

2.2 Sounding Feature Objects

In CARIS BASE Editor, soundings were manually selected from the survey scale sounding set, H11572_SS.hob, and imported into a new layer, H11572_CS.hob. This sounding selection is of a similar density and distribution of soundings on chart 17385 and more closely represents the seafloor morphology.

3. Depth Areas and Depth Contours

3.1 Depth Areas

The **H11572_Office_Combined_10m** BASE Surface was used to define hydrographic extents, and an all encompassing depth area (DEPARE). One depth range, from 0 to 413 meters, was used for DEPARE. Upon conversion to NOAA charting units, the depth range is 0 to 226 fathoms.

3.2 Depth Contours

A 10-fm depth contour was included in the H11572_SS HCell for MCD raster charting division to use for guidance in creating chart contours. The generalized metric and fathom equivalent contour value is shown in the table below.

Chart Contour in Fathoms	Metric Equivalent of Chart Contour	Metric Equivalent of Chart Contour Generalized	Actual Value of Chart Contour
3	5.4864	5.715	3.000
10	18.288	18.5166	10.000
50	91.44	92.8116	50.000

Contours delivered in the H11572_SS file have not been deconflicted against soundings and hydrography as all other features in the H11572_CS file and soundings in the H11572_SS have been. Therefore, conflicts may exist between the H11572_SS file contours and HCell features at or near the survey limits. Conflicts with M_COVR, M_QUAL, DEPARE and SBDARE objects should be expected. HCell features should be honored over H11572_SS.000 file contours in all cases where conflicts are found.

4. Meta Areas

The following Meta object areas are included in HCell H11572:

M_QUAL
M_COVR

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

5. Features

Two features files, **H11572_Disprovals.hob** and **H11572_Updates.hob**, delivered by the field were reviewed in the office and a new feature file was brought forward to compilation called **H11985_Features.hob**. All of these were deconflicted against GC shoreline, the chart and hydrography during office processing. No DTONs were reported by the field or found in the office. Refer to the SORIND field for the sources of all features included in the H11572 HCell.

Six bottom samples were collected during H11572 and are included in the HCell. Two charted bottom samples from chart 17385 were blue-noted to be retained.

6. S-57 Objects and Attributes

The H11572_CS HCell contains the following Objects:

\$CSYMB	Blue Notes
DEPARE	The all-encompassing depth area
M_COVR	Data coverage meta object
M_QUAL	Data quality meta object
SBDARE	Bottom samples and rocky seabed areas
SOUNDG	Soundings at the chart scale density
UWTROC	Rock features

The H11572_SS HCell contains the following Objects:

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

All S-57 Feature Objects in the H11572_CS HCell have been attributed as fully as possible based on information provided by the Hydrographer and in accordance with current guidance and the OCS HCell Specifications.

7. Blue Notes

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

8. Spatial Framework

8.1 Coordinate System

All spatial map and base cell file deliverables are in an LLDG geographic coordinate system, with WGS84 horizontal, MHW vertical, and MLLW (1983-2001 NTDE) sounding datums.

8.2 Horizontal and Vertical Units

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 skyward of 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 skyward of 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

H11572 junctions with H11569 (already compiled) and H11571 (in compilation). A common junction was made between the surveys.

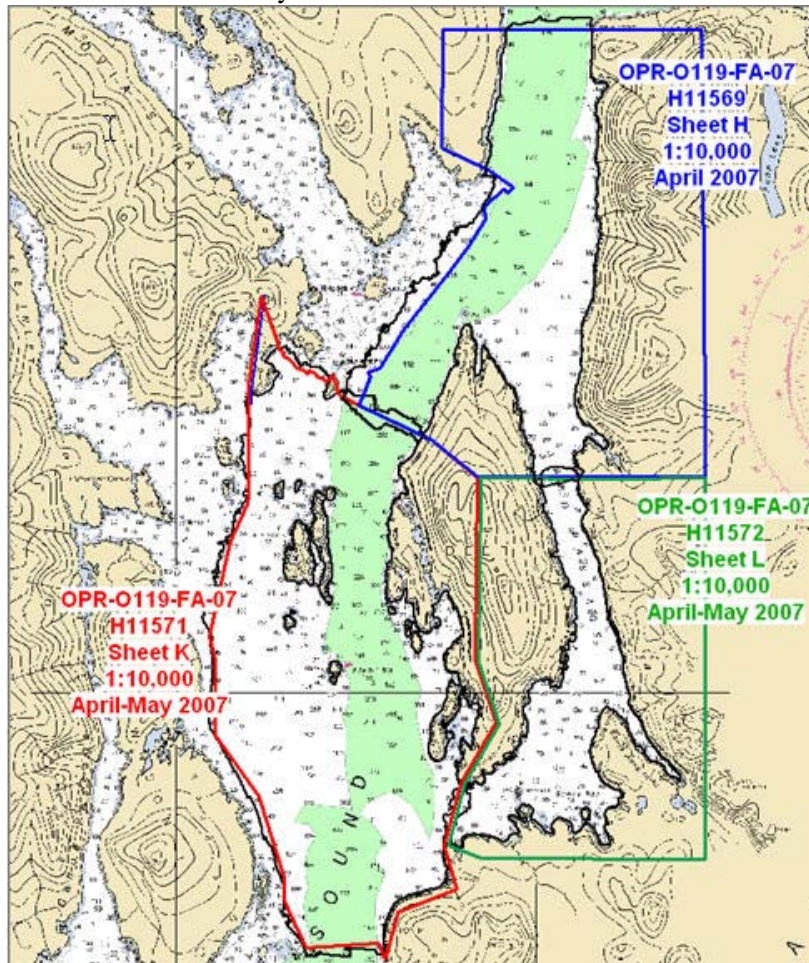


Figure 1. H11569, H11571 and H11572 survey coverage

9.2 Conflicts between Shoreline and Hydrography

There are numerous instances of charted shoreline and ledges in conflict with hydrography. This is because when the GC was applied to the raster, an approximate southeastern shift of 0.33 mm occurred. This error was reproduced on the ENC. MCD should resolve this error.

10. QA/QC and ENC Validation Checks

H11572 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

- H11572_CS, Chart Units, soundings and features compiled to 1:80,000
- H11572_SS, Survey Units, soundings compiled to 1:10,000
- H11572 Descriptive Report including end notes compiled during office processing and certification, the HCell Report, and supplemental items.
- H11572 Survey outline to populate the SURDEX.

11.2 File Naming Conventions

- Chart units base cell file, chart scale soundings, features, Blue Notes H11572_CS.000
- Chart units base cell file, survey scale sounding set H11572_SS.000
- Descriptive Report package H11572_DR.pdf
- Survey outline H11572_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:

Mary Beth Litrico, Physical Scientist, PHB, Seattle, WA; 206-526-4761;

[Mary.E.Litrico @noaa.gov](mailto:Mary.E.Litrico@noaa.gov).

APPROVAL SHEET
H11572

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.