

H12175

NOAA FORM 76-35A	
U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION NATIONAL OCEAN SERVICE	
DESCRIPTIVE REPORT	
<i>Type of Survey</i>	Hydrographic
<i>Field No.</i>	
<i>Registry No.</i>	H12175
LOCALITY	
<i>State</i>	Alaska
<i>General Locality</i>	Behm Canal, AK
<i>Sublocality</i>	Princess Bay to Shoalwater Pass
<hr/> <hr/> 2010 <hr/>	
CHIEF OF PARTY	
Captain David O. Neander, NOAA	
LIBRARY & ARCHIVES	
DATE	

<p style="text-align: center;">U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION</p> <p style="text-align: center;">HYDROGRAPHIC TITLE SHEET</p>	<p>REGISTRY No</p> <p>H12175</p>
<p>INSTRUCTIONS — The Hydrographic Sheet should be accompanied by this form, filled in as completely as possible, when the sheet is forwarded to the Office.</p>	
<p>State <u>Alaska</u></p> <p>General Locality <u>Behm Canal</u></p> <p>Sub-Locality <u>Princess Bay to Shoalwater Pass</u></p> <p>Scale <u>1:40,000</u> Date of Survey <u>05/09/2010 to 05/23/2010</u></p> <p>Instructions dated <u>2/16/2010</u> Project No. <u>OPR-O193-FA-10</u></p> <p>Vessel <u>NOAA Ship Fairweather (S220), Lauches 2805, 2806, 2807 and 2808, Skiff 1905 and Amber 2302</u></p> <p>_____</p> <p>_____</p> <p>Chief of party <u>CAPT David O. Neander, NOAA</u></p> <p>Surveyed by <u>FAIRWEATHER Personnel</u></p> <p>Soundings by <u>Reson 8160 and 7125</u></p> <p>SAR by <u>Grant Froelich</u> Compilation by <u>Fernando Ortiz</u></p> <p>Soundings compiled in <u>Fathoms</u></p> <p>_____</p> <p>REMARKS: All times are UTC. UTM Projection 8</p> <p>The purpose of this survey is to provide contemporary surveys to update National Ocean Service (NOS) nautical charts. Revisions and end notes in red were generated during office processing.</p> <p>Page numbering may be interrupted or non sequential.</p> <p>_____</p> <p>All pertinent records for this survey, including the Descriptive Report, are archived at the National Geophysical Data Center (NGDC) and can be retrieved via http://www.ngdc.noaa.gov/.</p> <p>_____</p>	

Descriptive Report to Accompany Hydrographic Survey H12175

Project OPR-O193-FA-10

Behm Canal, Alaska

Scale 1:40,000

May 2010

NOAA Ship *Fairweather*

Chief of Party: Captain David O. Neander, NOAA

A. AREA SURVEYED

The survey area is located in Behm Canal, within the sub-locality of Princess Bay to Shoalwater Pass. This survey corresponds to sheet priority 3 in the sheet layout provided with the original Project Instructions, as shown in Figure 1 below.

Data acquisition was conducted from May 9 to May 23, 2010 (DN 129 to DN 143).

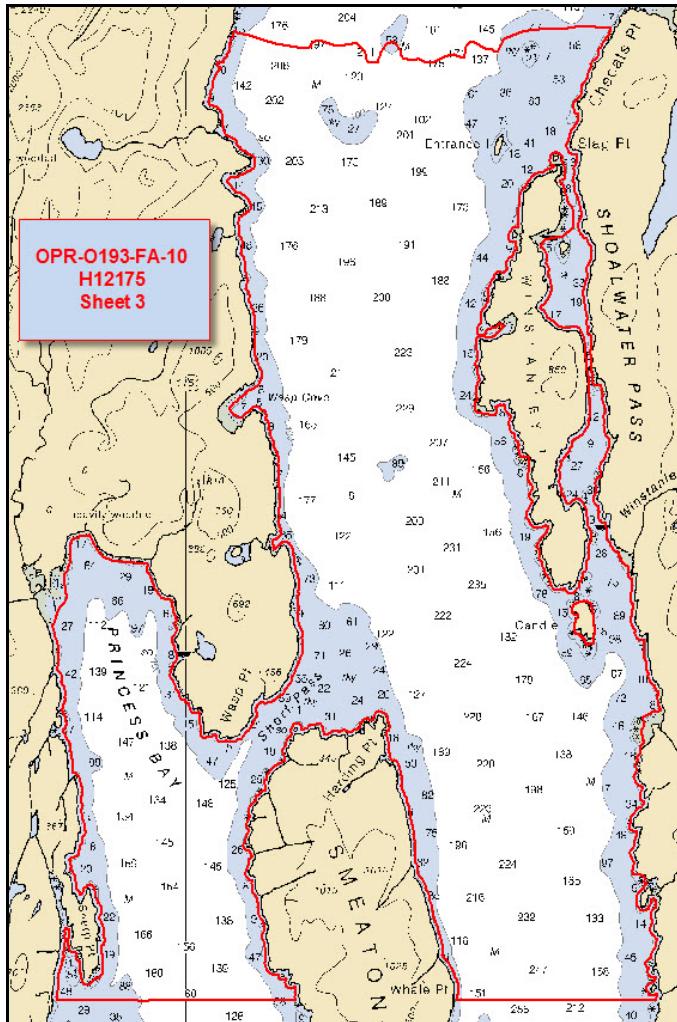


Figure 1: H12175 Survey Outline

One-hundred percent multibeam echosounder (MBES) coverage was obtained in the survey area to the 8-meter curve. Data were acquired between the 8-meter curve and the MHW buffer line as safety permitted. Additional coverage was obtained in navigationally significant areas and in order to determine least depths over features.¹ Exceptions to this are noted in section B.2.

Limited shoreline verification was conducted seaward of the Navigable Area Limit Line (NALL) of H12175, as per section 3.5.5.3 of the Field Procedures Manual May 2010 (FPM). Shoreline features were given S-57 attribution and included for submission in Notebook .hob files.

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

MAIN SCHEME - Mileage		
0		Single Beam MS
272.31		Multibeam MS mileage
	49.09	FAIRWEATHER S-220
	81.66	Launch 2805
	48.88	Launch 2806
	74.17	Launch 2807
	18.50	Launch 2808
0		SideScan MS
272.31		Total MS
CROSSLINE - Mileage		
0		Single Beam XL
16.95		Multibeam XL
	12.20	FAIRWEATHER S-220
	4.37	Launch 2805
	0.00	Launch 2806
	0.38	Launch 2807
	0.00	Launch 2808
16.95		Total XL
OTHER		
0		Developments/AWOIS - Mileage
0.23		Shoreline/Nearshore Investigation - Mileage
9		Total # of Investigated Items
8		Total Bottom Samples
27		Total SNM
5/9, 5/10, 5/11, 5/12, 5/20, 5/21, 5/23 129, 130, 131, 132, 140, 141, 143		Specific Dates of Acquisition Specific Dn#s of Acquisition

Table 1: H12175 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 2010 Data Acquisition and Processing Report* (DAPR), submitted under separate cover. Items specific to this survey and any deviations from the aforementioned report are discussed in the following sections. This hydrographic survey was completed as specified by Hydrographic Survey Project Instructions dated February 16, 2010 through Change 1 of OPR-O193-FA-10 dated April 23, 2010.

B.1. Equipment and Vessels

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

	FAIRWEATHER	Launch 2805	Launch 2806	Launch 2807	Launch 2808	Skiff 1905	Ambar 2302
Hull Registration Number	S220	2805	2806	2807	2808	1905	2302
Builder	Aerojet-General Shipyard	All American	All American	All American	All American	SeaArk	Marine Silverships, Inc
Length Overall	231 feet	28' 10"	28' 10"	28' 10"	28' 10"	19'	23'
Beam	42 feet	10' 8"	10' 8"	10' 8"	10' 8"	8'	9' 4"
Draft, Maximum	15' 6"	4' 0" DWL	4' 0" DWL	4' 0" DWL	4' 0" DWL	1' 3"	1' 4"
Cruising Speed	12.5 knots	28 knots	28 knots	28 knots	28 knots	20 knots	22 knots
Max Survey Speed	6 knots	8 knots	8 knots	8 knots	8 knots		
Primary Echo-sounder(s)	RESON 8160	RESON 7125	RESON 7125	RESON 7125	RESON 7125		
Sound Velocity Equipment	MVP 200, SVP70	SBE 19plus	SBE19plus	SBE19plus	SBE19plus		
Attitude & Positioning Equipment	POS/MV V4	POS/MV V4	POS/MV V4	POS/MV V4	POS/MV V4		
Type of operation	MBES	MBES	MBES	MBES	MBES	Shoreline, Shore Station	Shoreline, Shore Station

Table 2: Vessel Inventory

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

B.2. Quality Control

B.2.1. Crosslines

Multibeam crosslines for this survey totaled 16.64 linear nautical miles (LNM), comprising 6.33% of the 262.91 LNM of main scheme MBES hydrography. Both main scheme and crossline mileage are summarized in Table 1 above.

Crosslines were visually inspected in swath editor prior to cleaning to determine the edge of the “good” data. The Hydrographer chose to use both the 45/45-degree swath angle filter in CARIS HIPS and subset editor to reduce noise in the crossline surface caused by outer beams. Surface differencing in CARIS Bathymetric Data BASE was used to assess crossline agreement with main scheme lines. Because all of the

crosslines with the exception of one were run in water equal to or deeper than 200 meters the 16-meter surface resolution was used to create the crosslines BASE surface. Figure 2 depicts the difference surface between the 16-meter surface made with main scheme lines only and the 16-meter surface made with crosslines only. The color legend on the left represents the minimum and maximum difference surface values while the Colour Range Editor window on the right shows the user defined minimum and maximum values for each color range. These values were chosen based upon allowable IHO uncertainty values for Order 1 and Order 2 depth ranges. This difference surface is submitted digitally in the Separates IV folder.

Crosslines agree with main scheme lines within the total allowable vertical and horizontal uncertainty in their common areas, with the exception of the steep slopes along Behm Canal.

Crosslines compared within 0.3 meters in flat areas of Princess Bay in areas deeper than 200 meters. The zig-zag pattern in both surface differences here were caused by roll artifacts in data acquired on DN 141 by Launch 2805. The surface comparison varied by more than 1 meter along steep slopes in Princess Bay.²

Main scheme lines acquired by the S220 in Behm Canal agreed with crosslines within 3 meters in areas deeper than 200 meters on average. In areas shoaler than 200 meters and along steep slopes, depths disagreed by more than 3 meters. Overall, the differences are within the IHO Order 2 error tolerance.³

There was excellent agreement between launch main scheme data and crosslines in Shoalwater Pass. Soundings compared within 0.1 meter on average.⁴

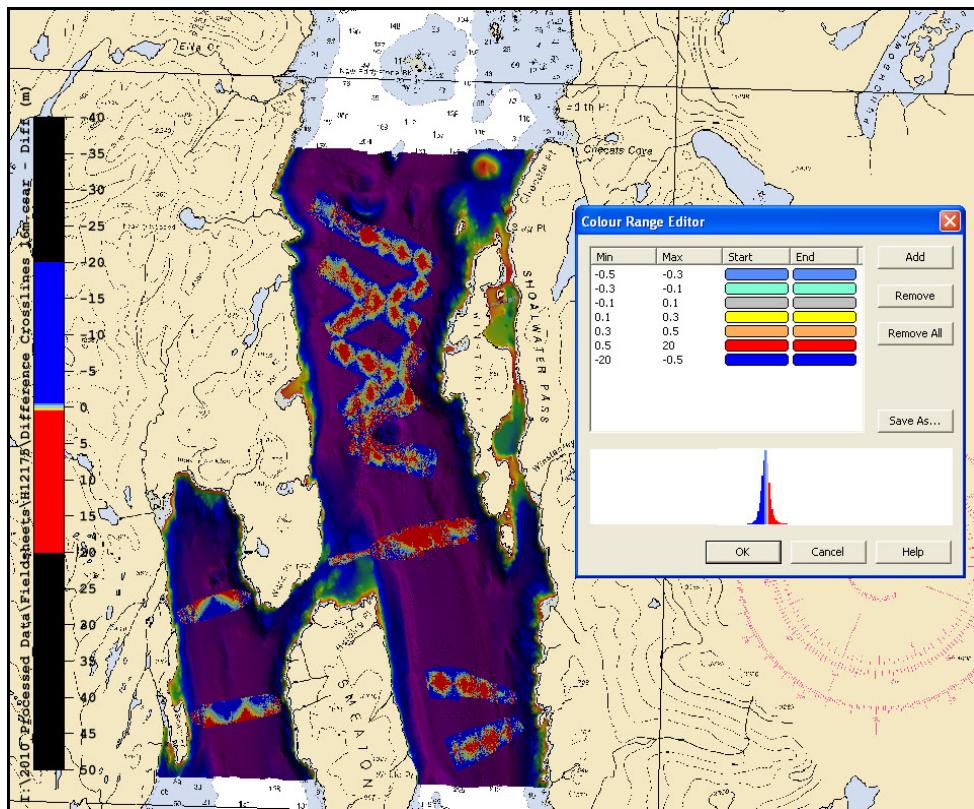


Figure 2: Crossline and main scheme differences (grey indicates agreement, red indicates XLs are shoaler than mainscheme and blue indicates XLs are deeper).

B.2.2. Junctions

Survey H12175 junctions with H12176 to the south, which corresponds to sheet 4 of the same project and H11369 to the north completed in 2004 by NOAA Ship *Fairweather*.⁵ The area of overlap between the sheets was reviewed in CARIS Subset Editor for consistency and data were found to be in agreement within the total allowable vertical and horizontal uncertainty in their common areas. The sheet limits and area of overlap for Sheets H12176 and H11369 are shown in Figure 3.

The junction comparison between survey H11369 and H12175 included the 10-meter combined BAG and the 16-meter BASE surface, respectively. Survey soundings from H11369 are within 1.1 meters of soundings acquired on H12175 in flat areas deeper than 230 meters. In areas shoaler than 150 meters soundings agreed within 0.6 meters.⁶

The junction comparison between H12175 and H12176 was done using the 16-meter BASE surfaces. Soundings compared within 1.1 meters in flat areas deeper than 240 meters. In areas 110 meters and shoaler soundings compared within 0.6 meters on average.⁷

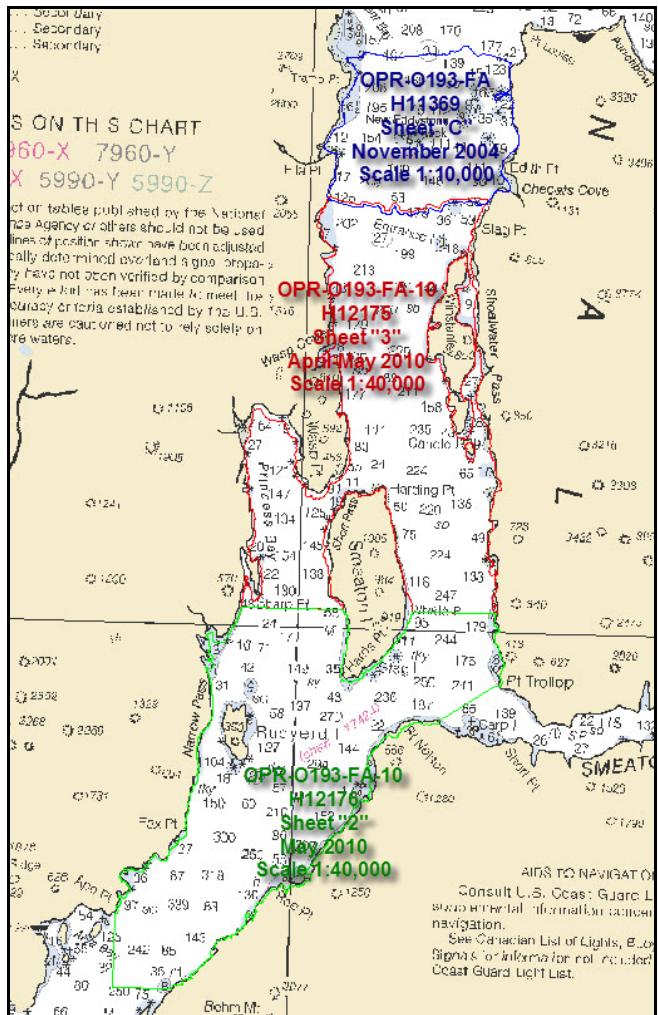


Figure 3: Survey sheet H12175 junctions with H12176 and H11369

B.2.3. Quality Control Checks

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

B.2.4. Data Quality Factors

COVERAGE ASSESSMENT

Complete multibeam coverage was obtained within the limits of H12175. Complete coverage to the 4-meter curve was not attained in areas where the shoreline was steep and deep and in rocky nearshore areas where launch crews were not able to completely ensonify the seafloor resulting in acoustic shadows. For holidays larger than three surface grid nodes shown below in Figure 4, the corresponding multibeam backscatter side scan was examined and no navigationally significant items were found. The least depths of all navigationally significant features are represented by H12175.⁸

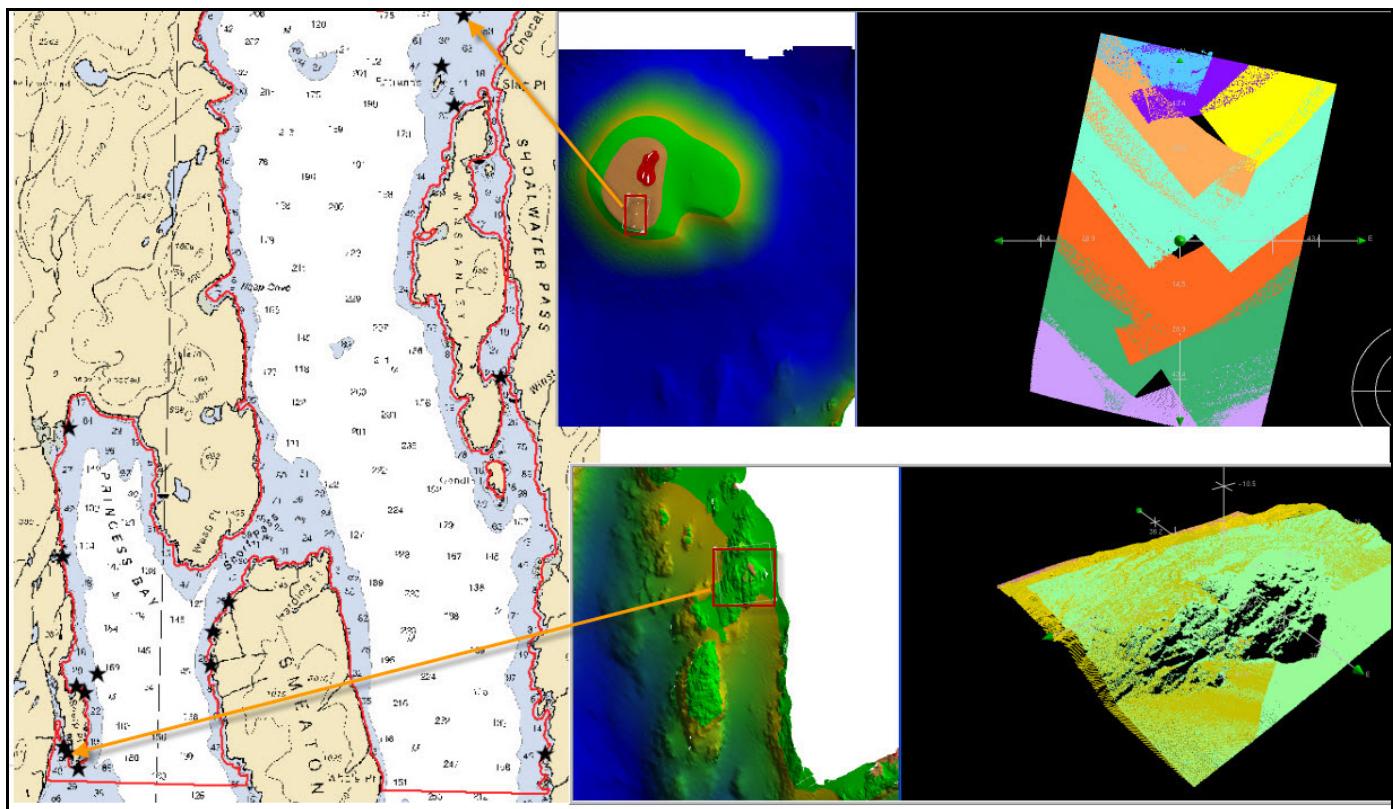


Figure 4. H12175 holiday locations shown as black stars

DENSITY

Density requirements for H12175 were achieved with at least 95% of the finalized nodes containing five or more soundings, see “H12175 Sounding Count Analysis.html” in Appendix V.⁹

TRUEHEAVE

To enable the application of TrueHeave one POS/MV TrueHeave file was “fixed” using the *fixTrueHeave.exe* utility from CARIS. Fixed files were assigned an additional *.fixed suffix. This was performed for the following vessel and day for S220 8160 DN 140.¹⁰

SOUND VELOCITY

Sound velocity profiles were reapplied to all lines for each launch to make certain that the correct casts were applied to each launch and day number using the nearest in distance within time 2 hours method selected unless the acquisition log specified another method. In addition to and before reapplying SVP, each concatenated SVP file was reviewed in CARIS HIPS SVP Editor for maximum bottom depth sampled versus the depth acquired by the Reson 7125 and the surface sound velocity measurement versus the speed of sound at or above the 1-meter depth acquired by the SBE 19 plus. The following launch days contained outliers +/- 2 m/s that were deleted from the sound velocity profile:

- 2010/05/21 17:54:00 2805 141, first point deleted bad correlation w/ surface sound speed
- 2010/05/21 16:34:00 2805 141, first point deleted bad correlation w/ surface sound speed
- 2010/05/20 19:08:00 2805 140, first point deleted bad correlation w/ surface sound speed

Several of the ship MVP casts were extended in Velocity using the most probable slope method to include deeper depths. Both the original concatenated file and the extended concatenated SVP file are included with the submitted data in the CARIS SVP S220 folder.

- 2010/05/12 20:04:00 S220 132, cast extended by probable slope method
- 2010/05/12 21:01:00 S220 132, cast extended by probable slope method
- 2010/05/12 22:44:00 S220 132, cast extended by probable slope method
- 2010/05/12 21:43:00 S220 132, cast extended by probable slope method
- 2010/05/12 23:07:00 S220 132, cast extended by probable slope method
- 2010/05/12 19:30:00 S220 132, cast extended by probable slope method
- 2010/05/20 17:19:00 S220 140, cast extended by probable slope method
- 2010/05/20 18:36:00 S220 140, cast extended by probable slope method
- 2010/05/20 19:35:00 S220 140, cast extended by probable slope method
- 2010/05/20 19:52:00 S220 140, cast extended by probable slope method
- 2010/05/20 20:40:00 S220 140, cast extended by probable slope method
- 2010/05/20 21:23:00 S220 140, cast extended by probable slope method
- 2010/05/20 21:39:00 S220 140, cast extended by probable slope method
- 2010/05/20 22:20:00 S220 140, cast extended by probable slope method

Two CTD casts acquired by launch 2806 at 20:17:00 and 2807 at 22:13:00 on DN 132 have sound velocity profiles that do not agree with other profiles collected in the area on the same day. The profiles were not removed because they do not affect the data to which they were applied.

ROLL

The crossline comparison to main scheme lines showed significant roll biases in the data on Launch 2805 on DN 141. This can be accounted for due to currents in Short Pass that allow for the exchange of water from Behm Canal to Princess Bay and prevailing winds from the south creating waves perpendicular to

the direction in which the crosslines were run. Despite this discrepancy the data are within IHO Order 2 error allowance.¹¹

DESIGNATED SOUNDINGS

Four soundings were designated following the procedures as outlined in section 5.2.1.2 of the NOS Hydrographic Surveys Specifications and Deliverables (HSSD) dated April 2010. The soundings have been designated to preserve shoal depths and accurately represent the bottom.¹²

B.2.5. Accuracy Standards

To assess vertical accuracy standards “IHO_1” and “IHO_2” child layers were created for the 1m to 16m finalized BASE surfaces. The equations used to create these layers can be found in section 2.1 of the DAPR. Each IHO child layer was reviewed and all data meet the accuracy requirements for total sounding error in a measured depth at the 95 percent confidence level.

B.3. Corrections to Echo Soundings

Data reduction procedures for survey H12175 conform to those detailed in the DAPR.

B.4. Data Processing

Data acquisition and processing notes are included in the acquisition and processing logs, and additional processing such as final tide and sound velocity application is noted in the H12175_Data_Log spreadsheet. All data logs are submitted digitally in the Separates I folder.

Data processing procedures for survey H12175 conform to those detailed in the DAPR. Data were processed using CARIS HIPS & SIPS v7.0, Service Pack 1, and Hotfix 5. Additional processing details regarding Total Propagated Uncertainty (TPU/TPE) and CUBE (Combined Uncertainty and Bathymetry Estimator) Surfaces and Parameters utilized, along with any deviations from the processing procedures outlined in the DAPR are discussed below.

B.4.1 TPU Values

The survey specific parameters used to compute TPU in CARIS for H12175 are listed in Table 3 by sonar system, i.e. 7125 and 8160.

Tide values:	Measured	0.01 m	Zoning	0.1 m
Sound Speed Values 7125:	Measured	1.0 m/s	Surface	0.50 m/s
Sound Speed Values 8160:	Measured	0.5 m/s	Surface	0.5 m/s

Table 3: Survey Specific CARIS TPE Parameters

B.4.2 CUBE Surfaces

The CARIS HIPS BASE (Bathymetry Associated with Statistical Error) surfaces delivered with H12175 and their associated resolutions are listed in Table 4. All field sheet extents were adjusted using the *Base 16 Calculator* tool to ensure coincident nodes among all bathymetric surfaces regardless of the field sheet in which they are contained given the standard surface resolutions of one, two, four, eight, and sixteen meters. The NOAA CUBE parameters mandated in by the 2010 HSSD were used for the creation of all CUBE BASE surfaces in Survey H12175.¹³

Fieldsheet Name	Surface Name	Depth Ranges (m)	Resolution (m)
H12175_QC	H12175_1m	All	1
	H12175_2m	All	2
	H12175_4m	All	4
	H12175_8m	All	8
	H12175_16m	All	16
	H12175_1m_Final_0to22	0-22	1
	H12175_2m_Final_20to44	20-44	2
	H12175_4m_Final_40to88	40-88	4
	H12175_8m_Final_80to176	80-176	8
	H12175_16m_Final_160+	160+	16
	H12175_16m_Finalized_Combined	All	16

Table 4: Depth Ranges, Resolutions, and CUBE Parameters

B.4.3 Post-Processed Kinematic Data

Kinematic data post-processed using the Single Base Applanix POSPac processing methods described in the DAPR in the form of Single Best Estimate of Trajectory (SBET) files are applied to all data with the following exceptions:

- S220 8160 lines:
 - 2010M_1402040
 - 2010M_1401833
 - 2010M_1321728

For further detail see the Acquisition and Processing logs for the particular days located in Separates I. The SBET files were not applied to the above ship lines due to a degraded signal while logging the POS file in Course Acquisition mode.

C. HORIZONTAL AND VERTICAL CONTROL

A complete description of horizontal and vertical control for survey H12175 can be found in the *OPR-O193-FA-10 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 correctors from the U.S. Coast Guard beacon at Annette Island, AK (323 kHz) were used during real-time acquisition when not otherwise noted in the acquisition logs, and were the sole method of positioning of detached positions (DP) and bottom samples as there is currently no functionality for applying SBET files to these types of data. The Post Processing Kinematic method (PPK) is the primary method of horizontal positioning of MBES soundings on H12175. Correctors from a GPS base station established on horizontal control mark OSCAR on South Twin Island were used for post processing all vessel-day POSMV files.

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 Ketchikan, AK (945-0460) served as control for datum determination for water level correctors for survey H12175.

Fairweather personnel installed a tide gauge at the tertiary station listed below in Table 5. 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	Gauge #	S/N
Custom House Cove	945-0296	Tertiary 30 Day	April 12, 2010	May 23, 2010	14	24444

Table 5: Tide Gauge Information

Refer to the *OPR-O193-FA-10 Horizontal and Vertical Control Report* for further information about the tide stations.

A request for delivery of final approved tides for survey H12175 was forwarded to N/OPS1 on May 24, 2010 in accordance with the FPM. A copy of the request is included in Appendix IV.¹⁴

As per the Final Tide Note, all data were reduced to MLLW using final, approved water levels from the Customhouse Cove station (945-0296) by applying tide file 9450296 and time and height correctors through the zone corrector file H12175CORF.zdf. **It will not be necessary for the 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 HSSD, utilizing CARIS Notebook Version 3.1 with Hotfix 1 software program.

Survey H12175 was compared with the following charts listed in Table 6. ¹⁵

NOAA Chart Number	Chart Scale	Edition Number	Edition Date	Updated with Notice to Mariners through
17424	1:80,000	9 th Ed.	October 2009	October 24, 2010
17434	1:80,000	13 th Ed.	July 2005	July 2, 2005
17420	1:229,376	28 th Ed.	March 2007	March 3, 2007

Table 6: NOAA Charts compared with Survey H12175

D.1.1. Charts 17424 and 17434

Charts 17424 and 17434, shown in Figure 5, are the largest scale charts of this area and because 17434 only overlaps 17424 at the very southern edge of sheet H12175 the chart comparison was conducted on chart 17424. Soundings from survey H12175 generally agree within one to two fathoms with depths on charts 17424. ¹⁶ Exceptions to this occur along steep slopes where the charted depth has been moved offshore to preserve spacing between neighboring charted depths. ¹⁷

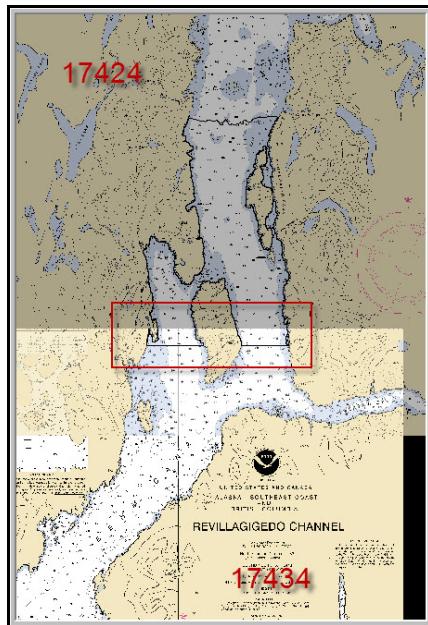


Figure 5. Area of overlap between charts 17424 and 17434

SOUNDING COMPARISON

Soundings compared to charted depths within 2 meters in areas deeper than 100 fathoms. Charted depths in water shoaler than 80 fathoms appear to have been moved offshore to preserve the scale and spacing between neighboring depths as shown in Figure 6 below.¹⁸

CONTOUR COMPARISON

Contour lines generated from soundings acquired on this survey compared well with charted contours. Exceptions occurred in the northern end of Princess Bay along the 100 fathom contour and near the entrance to Short Pass in the center of the channel where the charted 100 fathom contour extends much further into Short Pass than the contours generated from this survey's soundings.¹⁹ The contours generated from this survey show a consistent trend that the 100 fathom contour was surveyed approximately 100 meters offshore of the charted 100 fathom contour.

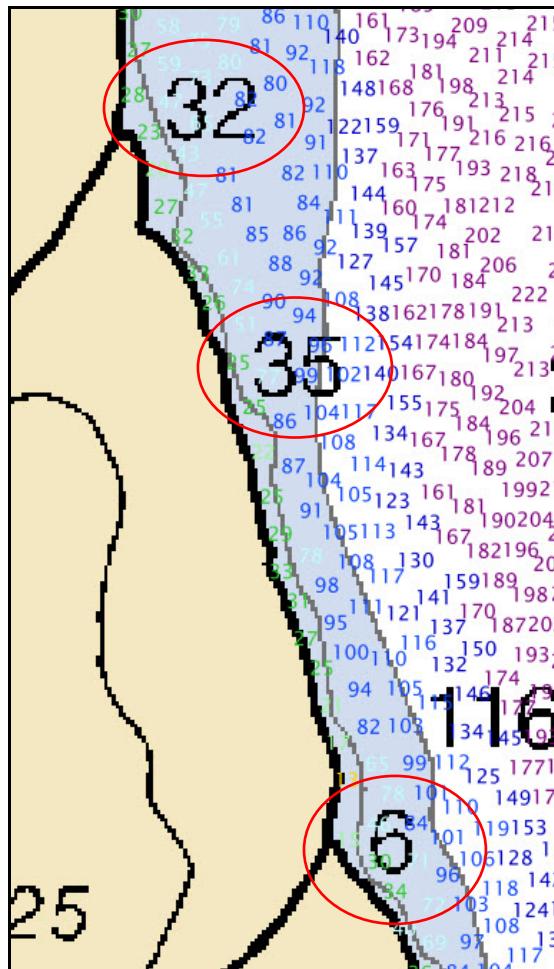


Figure 6. Charted depths on 17424 in fathoms pulled offshore to preserve chart scale

D.1.2. Chart 17420

Soundings acquired on survey H12175 compare within 1 meter of charted depths in all areas of chart 17420. Chart 17420 was not used in the field during data acquisition as the shoreline is not accurately positioned on the chart and appears to have been shifted by approximately 150 meters to the northwest as shown in Figure 7 below.²⁰

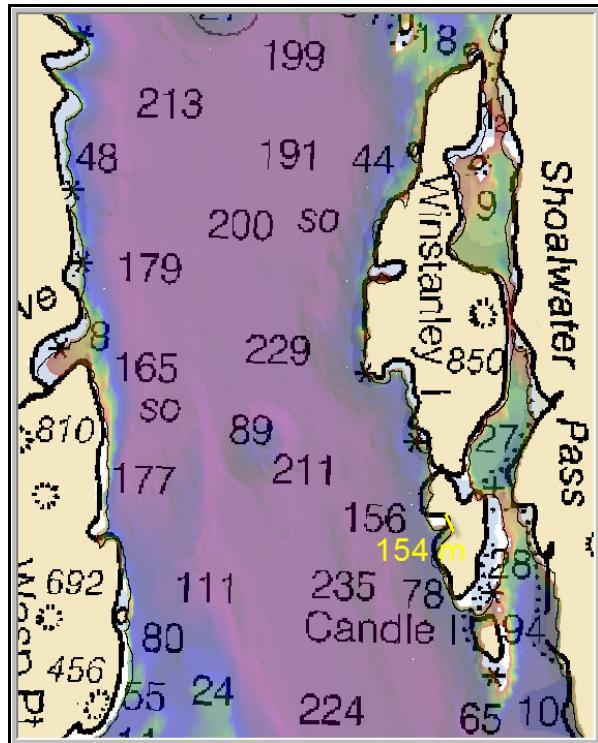


Figure 7. Shoreline positioning discrepancy between chart 17420 and H12175 sheet limits

D.1.3. Chart Comparison Recommendations

The Hydrographer has determined that bottom coverage requirements have been met and data accuracy meets requirements specified by the HSSD. **All soundings from H12175 are adequate to supersede prior surveys in their common areas.**²¹

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

There were no AWOIS items located within the limits of H12175.²²

D.3. Dangers to Navigation

There were no dangers to navigation found within the survey limits.²³

D.4. Additional Results

D.4.1. Shoreline/Feature Verification

Fairweather personnel conducted limited shoreline verification and reconnaissance at times near predicted negative tides on DN 140 and 141 within the survey sheet limits. Scanned copies of the DP forms and boat sheets with field annotations are included in the digital Separates I folder. Shoreline verification procedures for survey H12175 conform to those detailed in the DAPR. All field digital photographs are included in the multimedia submission folder. Photos are labeled by year, DN, and picture ID number.

D.4.2. Shoreline/Feature Data Processing

Feature processing procedures were followed as outlined in the DAPR. Within the survey area several charted islets were disproved with contemporary hydrographic data. There are relatively few areas where charted ledges and the mean lower low water line are in conflict with the contemporary hydrographic data compared with sheet H12176.

D.5. Source Shoreline Changes, New Features and Charted Features

In accordance with section 4.4.5.3 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.²⁴

Items disproved by the Hydrographer and deemed to not be included in the H12175_Final_Feature_File.hob file were flagged delete in the description field.²⁵

D.5.1. 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.²⁶

D.6. Prior Survey Comparison

One charted rock (17424) located in the northeastern section of H12175 was flagged delete and repositioned using a prior survey H05175 rock, both of which are included in the CARIS Notebook H12175 Final Feature File.hob file.²⁷

D.7. Aids to Navigation

There were no aids to navigation within the survey limits.²⁸

D.8. Miscellaneous

Chart 17424 does not include ferry routes within survey H12175 sheet limits.²⁹ However it is worth noting that tour boats were seen frequently transiting Shoalwater Pass and Short Pass during the time this survey was conducted. The tour company offers trips daily from Ketchikan from May to September.

Two charted (17424) mooring buoys were verified during shoreline investigation and given S-57 attributes in the Final Features File. The buoy in Princess Bay was found as positioned on the chart, while the buoy in Shoalwater Pass was found approximately half a kilometer south of the charted position.³⁰

D.8.1. Bottom Samples

Eight bottom samples were collected on May 21, 2010 (DN 141) and given S-57 attributes in the field as outlined in the Field Procedures Manual Section 2.5.4.2.1. The bottom samples are included in the Notebook H12175_Final_Feature_File.hob file.³¹

D.9. 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 2010	April 9, 2010	N/CS34
Data Acquisition and Processing Report 2010	August 9, 2010	N/CS34
Horizontal and Vertical Control Report for OPR-O193-FA-10	July 26, 2010	N/CS34
Tides and Water Levels Package for OPR-O193-FA-10	May 25, 2010	N/OPS1



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

October 1, 2010

MEMORANDUM FOR:

Gary Nelson
Chief, Pacific Hydrographic Branch

FROM:

CAPT David O. Neander, NOAA
Commanding Officer

David O. Neander
2010.10.01
10:06:50 -08'00'

TITLE:

Approval of Hydrographic Survey H12175,
OPR-O193-FA-10

As Chief of Party, I have ensured that standard field surveying and processing procedures were adhered to during acquisition and processing of hydrographic survey H12175 in accordance with the Hydrographic Manual, Fourth Edition; Field Procedures Manual, April 2010; and the NOS Hydrographic Surveys Specifications and Deliverables, as updated for April 2010. 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:

Digitally signed by Jennifer
Wilson
Date: 2010.10.01 17:30:44 Z

ST Jennifer Wilson
Survey Manager

Digitally signed by Briana Welton
Date: 2010.10.01 09:34:34 -08'00'

LT Briana Welton
Field Operations Officer

Digitally signed by
Lynnette V. Morgan
Date: 2010.10.01 17:42:50 Z

CST Lynnette V. Morgan
Chief Survey Technician

Attachment



Revisions and corrections performed during office processing and certification

¹ Concur.

² Concur. High variation between surfaces on steep slopes is expected. The data is adequate to supersede charted data in the common area.

³ Concur.

⁴ Concur. Data is adequate to supersede charted data in the common area.

⁵ H12175 junctions with H12176 to the South and H11369 to the north. A common junction was made with an adjoining portion of H12176. However, all of the junctioning area with H11369 was completely covered by multibeam in 2004 and applied to the charts, therefore no junctions was made with H11369.

⁶ Concur.

⁷ Concur.

⁸ Concur.

⁹ Concur.

¹⁰ Concur. Data is within specifications and adequate after the application of the *fixTrueHeave.exe* utility from CARIS to the vessel S220 8160 on DN 140

¹¹ Concur. Data is within specifications and adequate despite the Roll error. It is recommended that the data from H12075 supersede the data currently on the chart.

¹² Concur with clarification. Designated soundings were used as appropriate to the scale of the chart.

¹³ A 16 meter combined surface was created during the Survey Acceptance Review and was used for the cartographic compilation of this survey.

¹⁴ Tide note is attached to this report.

¹⁵ Concur with clarification. During HCell processing the following charts were used:

NOAA Chart Number	Chart Scale	Edition Number	Edition Date	Updated with Notice to Mariners through
17424	1:80,000	9 th Ed.	October 2009	3/26/2011
17434	1:80,000	13 th Ed.	July 2005	3/26/2011

¹⁶ Concur.

¹⁷ Concur with clarification. Generalizing depths offshore is no longer accepted practice. Chart depths as depicted in the HCell.

¹⁸ Concur. Chart depths as depicted in the HCell.

¹⁹ Concur. Update contours based on surveyed depths.

²⁰ Concur. Use latest GC shoreline and survey data to update chart 17420.

²¹ Concur.

²² Concur.

²³ Concur.

²⁴ Concur.

²⁵ Concur. Disproved items have been blue noted to be remove in the HCell.

²⁶ Concur with clarification, shoreline depicted in the CARIS Notebook files and final soundings delivered from the field were used in the compilation of H12175_CS.000, however modifications were made at the Pacific Hydrographic Branch to accommodate chart scale. Chart features as depicted in the HCell.

²⁷ Concur. Chart features as depicted in the HCell.

²⁸ Concur.

²⁹ Concur.

³⁰ Concur. Chart feature as depicted in the HCell.

³¹ Eight bottom samples from the field are included in the HCell to be charted. There is general blue note in the HCell recommending that all charted bottom samples be retained.



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

TIDE NOTE FOR HYDROGRAPHIC SURVEY

DATE : July 22, 2010

HYDROGRAPHIC BRANCH: Pacific

HYDROGRAPHIC PROJECT: OPR-O193-FA-2010

HYDROGRAPHIC SHEET: H12175

LOCALITY: Princess Bay to Shoalwater Pass, Behm Canal, AK

TIME PERIOD: May 9 - May 23, 2010

TIDE STATION USED: 945-0296 Custom House Cove, AK

Lat. 55° 5.77'N Long. 131° 13.33' W

PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters

HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 4.369 meters

REMARKS: RECOMMENDED ZONING

Use zone(s) identified as: SA76 and SA78

Refer to attachments for zoning information.

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

Peter J. Stone

Digitally signed by Peter J. Stone
DN: cn=Peter J. Stone, o=NOAA/NOS/CO-OPS,
ou=Oceanographic Division,
email=peter.stone@noaa.gov, c=US
Date: 2010.07.23 15:13:44 -04'00'

CHIEF, OCEANOGRAPHIC DIVISION



Final Tidal Zoning for
OPR-O193-FA-2010, Registry No. H12175
Princess Bay to Shoalwater Pass, Behm Canal, AK

Time Corrector 0 mins
Range Corrector x 1.02
Reference 9450296

Range Corrector x 1.01
Reference 9450296

1000

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High-Speed I

COLLUTION REACTION

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H12175 HCell Report
Fernando Ortiz, Physical Scientist
Pacific Hydrographic Branch

1. Specifications, Standards and Guidance Used in HCell Compilation

HCell compilation of survey H12175 used:

Office of Coast Survey HCell Specifications: Draft, Version: 4.0, 17 March 2010.
HCell Reference Guide: Version 4.0, March 11, 2011.

2. Compilation Scale

Depths and features for HCell H12175 were compiled to the largest scale raster charts shown below:

Chart	Scale	Edition	Edition Date	NTM Date
17424_1	1:80,000	9 th	10/2009	03/26/2011
17434_1	1:80,000	13 th	07/2005	03/26/2011

The following ENCs were also used during compilation:

Chart	Scale
US4AK4SM	1:80,000
US4AK44M	1:80,000

3. Soundings

A survey-scale sounding (SOUNDG) feature object layer was built from the 16-meter Combined Surface in CARIS BASE Editor. A shoal-biased selection was made at 1:20,000 for the 17424_1 and 17434_1 charts at survey scale using a Radius Table file with values shown in the table, below.

Shoal Limit (m)	Deep Limit (m)	Radius (mm)
-5	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 17424_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 H12175_SS.000
0	0	0.2286	0	0
3	5.4864	5.715	3.125	3
10	18.288	18.5166	10.125	10
100	182.88	184.252	100.75	100

With the exception of the zero contours included in the *_CS file, contours have not been deconflicted against shoreline features, soundings and hydrography, as all other features in the *_CS file and soundings in the *_SS have been. This may result in conflicts between the *_SS file contours and HCell features at or near the survey limits. Conflicts with M_QUAL, COALNE and SBDARE objects, and with DEPCNT objects representing MLLW, should be expected. HCell features should be honored over *_SS.000 file contours in all cases where conflicts are found.

5. Meta Areas

The following Meta object area is included in HCell H12175:

M_QUAL

The Meta area object was 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
COALNE	Coastline
DEPCNT	Zero contour lines
LNDARE	Land area

LNDELV	Land elevation
MORFAC	Mooring/Warping facility
M_QUAL	Data quality Meta object
OBSTRN	Obstruction
SBDARE	Bottom samples- ledge
SOUNDG	Soundings at the chart scale density
UWTROC	Rocks

The *_SS HCell contains the following Objects:

DEPCNT	Contours at chart scale intervals and GC MLLW to be retained
SOUNDG	Soundings at the survey scale density
COALNE	GC coastline to be retained
SBDARE	GC ledges to be retained

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

H12175 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

H12175_CS.000	Base Cell File, Chart Units, Soundings and features compiled to 1:80,000
H12175_SS.000	Base Cell File, Chart Units, Soundings and Contours compiled to 1:20,000
H12175_DR.pdf	Descriptive Report including end notes compiled during office processing and certification, the HCell Report, and supplemental items
H12175_outline.gml	Survey outline
H12175_outline.xsd	

11.2 Software

CARIS HIPS Ver. 7.0	Inspection of Combined BASE Surfaces
CARIS BASE Editor Ver. 3.0	Creation of soundings and bathy-derived features, creation of the meta area objects, and Blue Notes; Survey evaluation and verification; Initial HCell assembly.
CARIS S-57 Composer Ver. 2.1	Final compilation of the HCell, correct geometry and build topology, apply final attributes, export the HCell, and QA.
CARIS GIS 4.4a	Setting the sounding rounding variable for conversion of the metric HCell to NOAA charting units with NOAA rounding.
CARIS HOM Ver. 3.3	Perform conversion of the metric HCell to NOAA charting units with NOAA rounding.
HydroService AS, dKart Inspector Ver. 5.1, SP 1	Validation of the base cell file.
Northport Systems, Inc., Fugawi View ENC Ver.1.0.0.3	Independent inspection of final HCells using a COTS viewer.

12. Contacts

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

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APPROVAL SHEET
H12175

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.