

H12418

U.S. Department of Commerce
National Oceanic and Atmospheric Administration
National Ocean Survey

DESCRIPTIVE REPORT

Type of Survey: Navigable Area

Registry Number: H12418

LOCALITY

State(s): Washington

General Locality: Admiralty Inlet

Sub-locality: Vicinity of Marrow Stone Island

2012

CHIEF OF PARTY
CDR James M. Crocker, NOAA

LIBRARY & ARCHIVES

Date:

HYDROGRAPHIC TITLE SHEET

H12418

INSTRUCTIONS: The Hydrographic Sheet should be accompanied by this form, filled in as completely as possible, when the sheet is forwarded to the Office.

State(s): **Washington**

General Locality: **Admiralty Inlet**

Sub-Locality: **Vicinity of Marrow Stone Island**

Scale: **10000**

Dates of Survey: **04/15/2012 to 05/10/2012**

Instructions Dated: **03/26/2012**

Project Number: **OPR-N326-FA-12**

Field Unit: **NOAA Ship *Fairweather***

Chief of Party: **CDR James M. Crocker, NOAA**

Soundings by: **Multibeam Echo Sounder**

Imagery by: **Multibeam Echo Sounder Backscatter**

Verification by: **Pacific Hydrographic Branch**

Soundings Acquired in: **meters at Mean Lower Low Water**

Remarks:

Horizontal Coordinate System: UTM Zone 10N. The purpose of this survey is to provide contemporary surveys to update National Ocean Service (NOS) nautical charts. All separates are filed with the hydrographic data. Revisions and end notes in red were generated during office processing. The processing branch concurs with all information and recommendations in the DR unless otherwise noted. Page numbering may be interrupted or non sequential. 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/>.

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Descriptive Report to Accompany Survey H12418

Project: OPR-N326-FA-12

Locality: Admiralty Inlet

Sublocality: Vicinity of Marrow Stone Island

Scale: 1:10000

April 2012 - May 2012

NOAA Ship *Fairweather*

Chief of Party: CDR James M. Crocker, NOAA

A. Area Surveyed

The survey area is located in Admiralty Inlet, WA within the sub-locality of Vicinity of Marrowstone Island.

A.1 Survey Limits

Data were acquired within the following survey limits:

Northwest Limit	Southeast Limit
48° 5" 59.21' N 122° 36" 15.86' W	48° 1" 13.04' N 122° 40" 7.04' W

Table 1: Survey Limits

Survey Limits were acquired in accordance with the requirements in the Project Instructions and the HSSD.

A.2 Survey Purpose

The purpose of this survey is to provide contemporary data to update National Ocean Service (NOS) nautical charting products. The survey will cover category three areas as defined in the 2011 NOAA Hydrographic Survey Priorities (NHSP).

A.3 Survey Quality

The entire survey is adequate to supersede previous data.

A.4 Survey Coverage

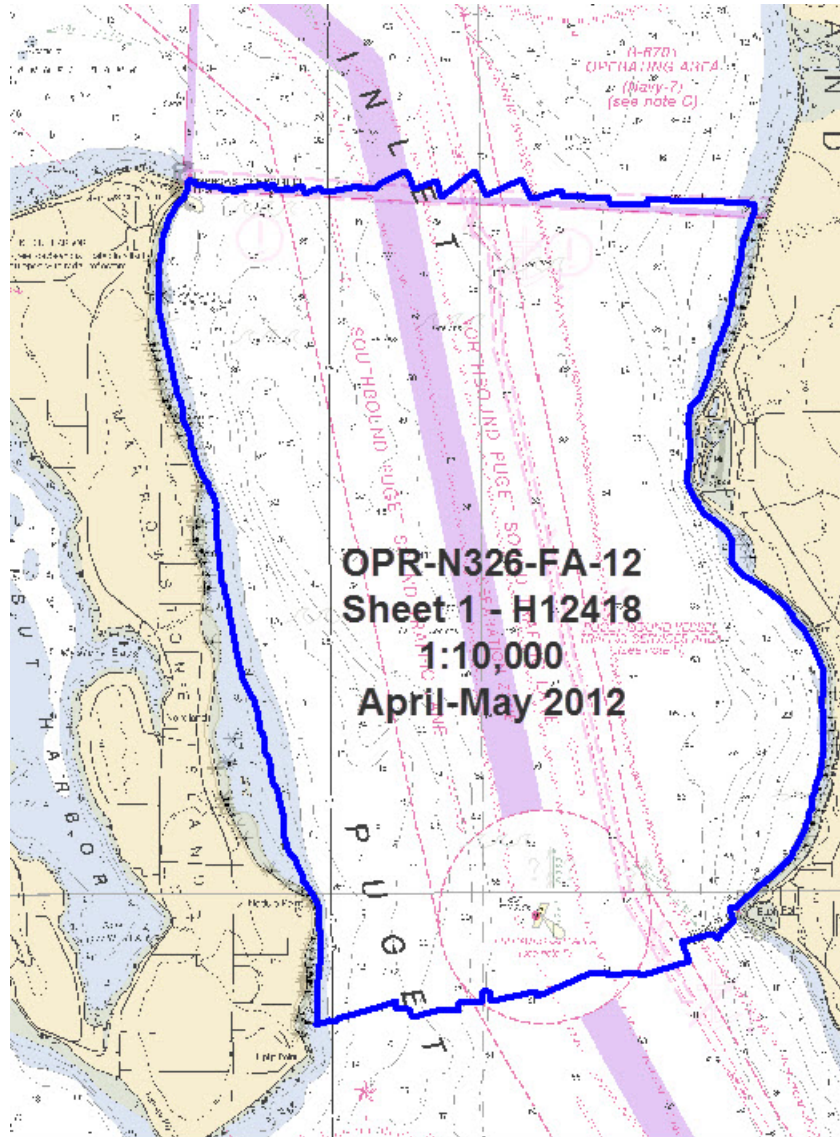


Figure 1: H12418 Survey Outline.

Survey Coverage was in accordance with the requirements in the Project Instructions and the HSSD.

A.5 Survey Statistics

The following table lists the mainscheme and crossline acquisition mileage for this survey:

	HULL ID	2808	s220	2805	Total
LNM	SBES Mainscheme	0.00	0.00	0.00	0.00
	MBES Mainscheme	62.78	66.94	105.92	235.64
	Lidar Mainscheme	0.00	0.00	0.00	0.00
	SSS Mainscheme	0.00	0.00	0.00	0.00
	SBES/MBES Combo Mainscheme	0.00	0.00	0.00	0.00
	SBES/SSS Combo Mainscheme	0.00	0.00	0.00	0.00
	MBES/SSS Combo Mainscheme	0.00	0.00	0.00	0.00
	SBES/MBES Combo Crosslines	0.00	0.00	12.66	12.66
	Lidar Crosslines	0.00	0.00	0.00	0.00
	Number of Bottom Samples				
Number AWOIS Items Investigated					1
Number Maritime Boundary Points Investigated					0
Number of DPs					2
Number of Items Items Investigated by Dive Ops					0
Total Number of SNM					14.1

Table 2: Hydrographic Survey Statistics

The following table lists the specific dates of data acquisition for this survey:

Survey Dates	Julian Day Number
04/15/2012	106
04/16/2012	107
04/17/2012	108
05/01/2012	122
05/07/2012	128
05/10/2012	131

Table 3: Dates of Hydrography

B. Data Acquisition and Processing

B.1 Equipment and Vessels

Refer to the Data Acquisition and Processing Report (DAPR) for a complete description of data acquisition and processing systems, survey vessels, quality control procedures and data processing methods. Additional information to supplement sounding and survey data, and any deviations from the DAPR are discussed in the following sections.

B.1.1 Vessels

The following vessels were used for data acquisition during this survey:

Hull ID	2805	2808	S220
LOA	8.64 meters	8.64 meters	70.4 meters
Draft	1.12 meters	1.12 meters	4.7 meters

Table 4: Vessels Used

B.1.2 Equipment

The following major systems were used for data acquisition during this survey:

Manufacturer	Model	Type
Reson	SVP71	Sound Speed System
Reson	SVP70	Sound Speed System
Sea Bird	SBE 19plus	Conductivity, Temperature and Depth Sensor
Brooke Ocean	MVP 200	Sound Speed System
Applanix	POS/MV V4	Vessel Attitude and Positioning System
Reson	7125	MBES
Reson	7111	MBES

Table 5: Major Systems Used

B.2 Quality Control

B.2.1 Crosslines

Crosslines, acquired for this survey, totalled 5.4% of mainscheme acquisition.

Crosslines were collected, processed and compared in accordance with section 5.2.4.3 of the HSSD. Surface differencing in CARIS HIPS and SIPS was used to assess crossline agreement with mainscheme lines. The difference surface is submitted digitally in the Separates II folder. Percentage of crosslines collected to mainscheme lines is 5.36%. The differences in crosslines to mainscheme were generally less than 1.5m and areas of larger differences are believed to be caused by rapid changes in slope. See figure 2 for an illustration of surface difference along slopes between 10 and 50 meters. Figure 3 is a statistical representation of crossline differences.

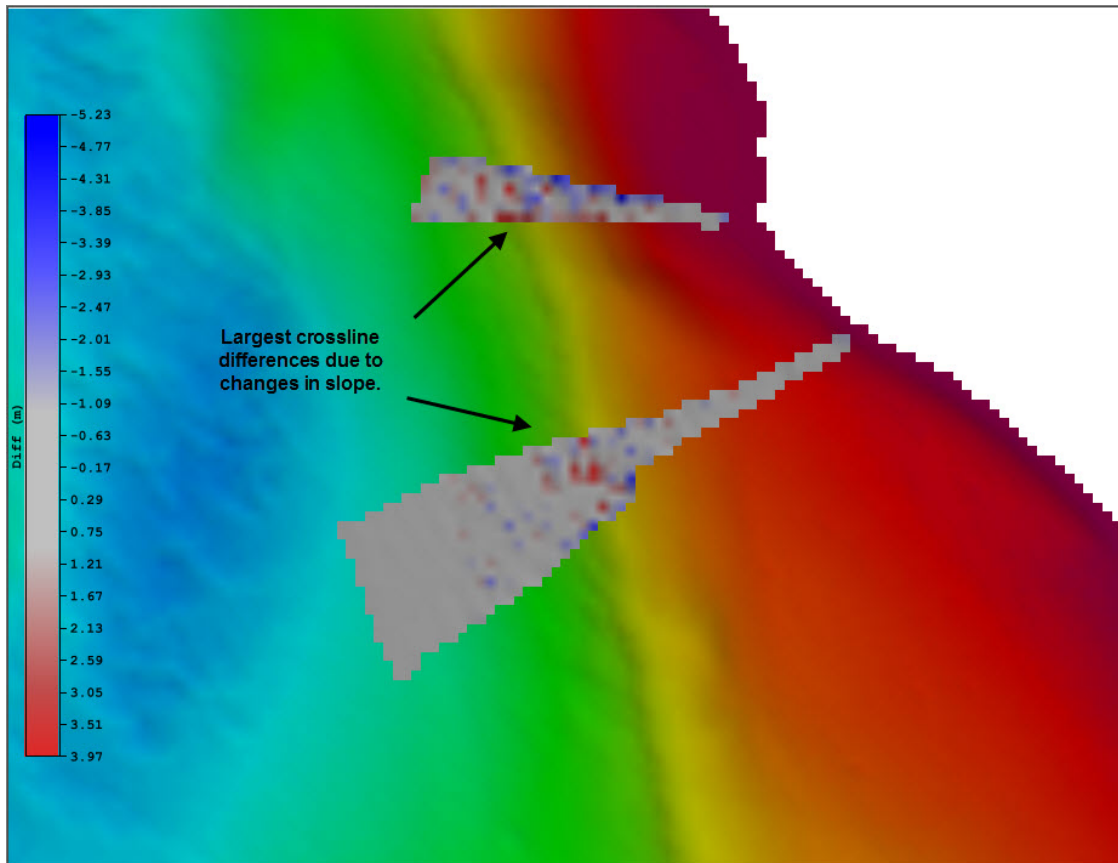


Figure 2: Graphical representation of differences between crossline and mainscheme surfaces.

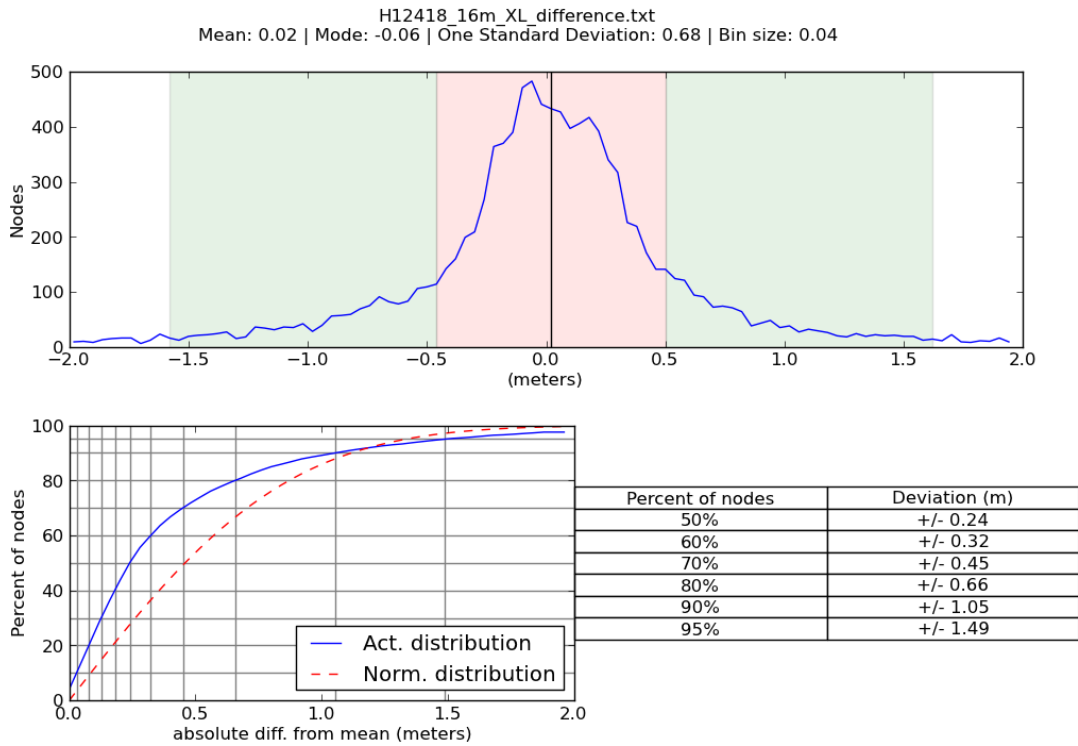


Figure 3: Statistical representation of differences between crossline and mainscheme surfaces. *Data is adequate for charting.*

B.2.2 Uncertainty

The following survey specific parameters were used for this survey:

Measured	Zoning
0.0 meters	0.0970 meters

Table 6: Survey Specific Tide TPU Values

Hull ID	Measured - CTD	Measured - MVP	Surface
2805	2 meters/second		0.5 meters/second
2808	2 meters/second		0.5 meters/second
S220	1 meters/second	1 meters/second	0.5 meters/second

Table 7: Survey Specific Sound Speed TPU Values

The tide uncertainty zoning value of 0.097m was entered for the creation of the VDatum surfaces and a 0m value was entered for the creation of the ERS surfaces.

B.2.3 Junctions

The areas of overlap between the sheets were reviewed in CARIS Subset Editor for sounding consistency and by surface differencing either 16 meter or 8 meter combined surfaces to assess surface agreement. See figure 4 for area of overlap between junctions.

The following junctions were made with this survey:

Registry Number	Scale	Year	Field Unit	Relative Location
H12420	1:10000	2012	NOAA Ship FAIRWEATHER	S
H11038	1:10000	2001	NOAA Ship RAINIER	NW
H11039	1:20000	2002	NOAA Ship RAINIER	N

Table 8: Junctioning Surveys

H12420

Surface differencing in CARIS HIPS and SIPS was used to assess junction agreement between H12418_8m_Combined surface and H12420_8m_Combined surface. The difference between surfaces were generally less than 0.8m and the few areas of larger differences are believed to be caused by rapid changes in slope. See figure 5 for a graphical representation and figure 6 for statistical information of the surface differencing.

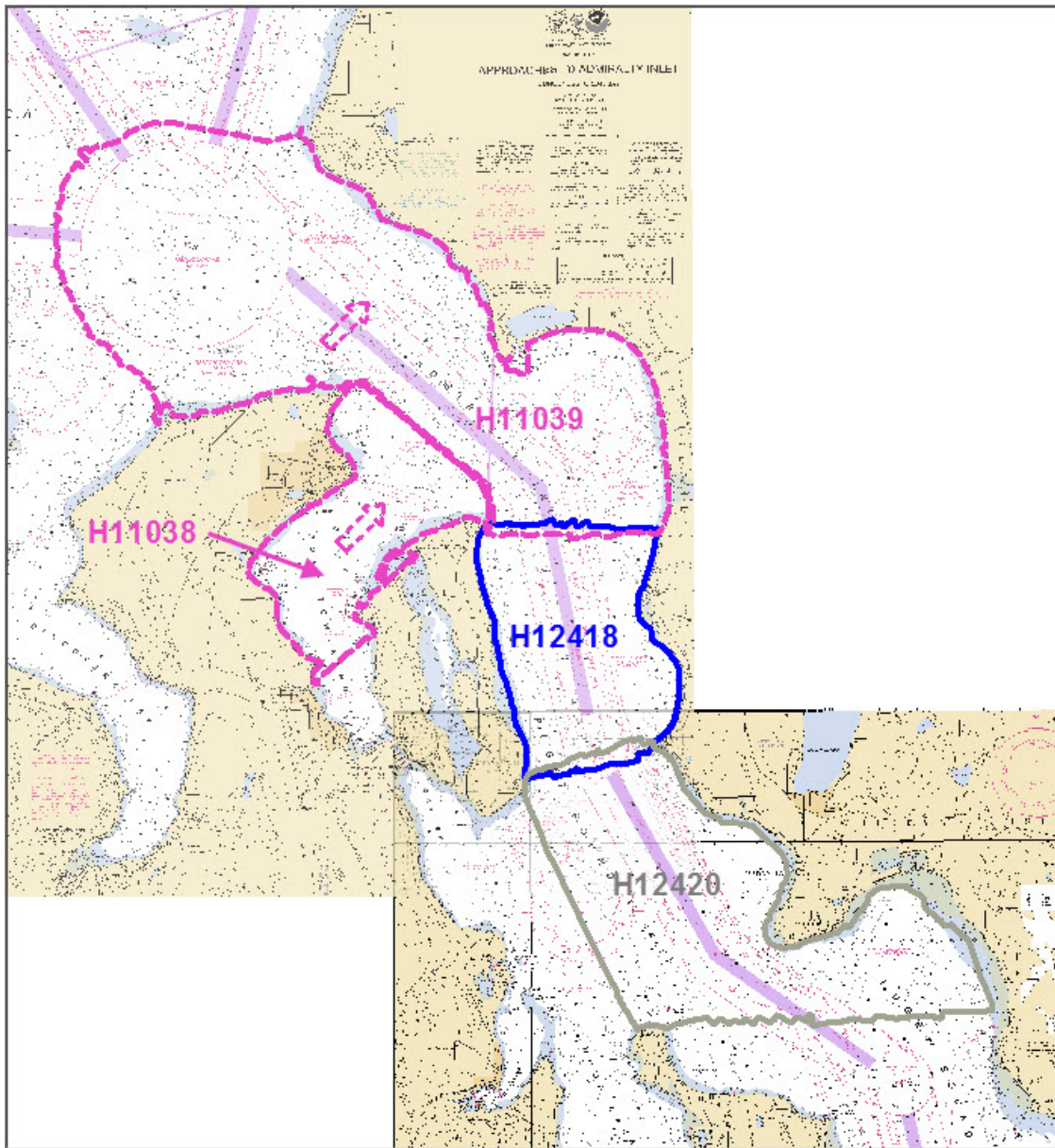


Figure 4: Junctions between H12420, H11038, and H11039.

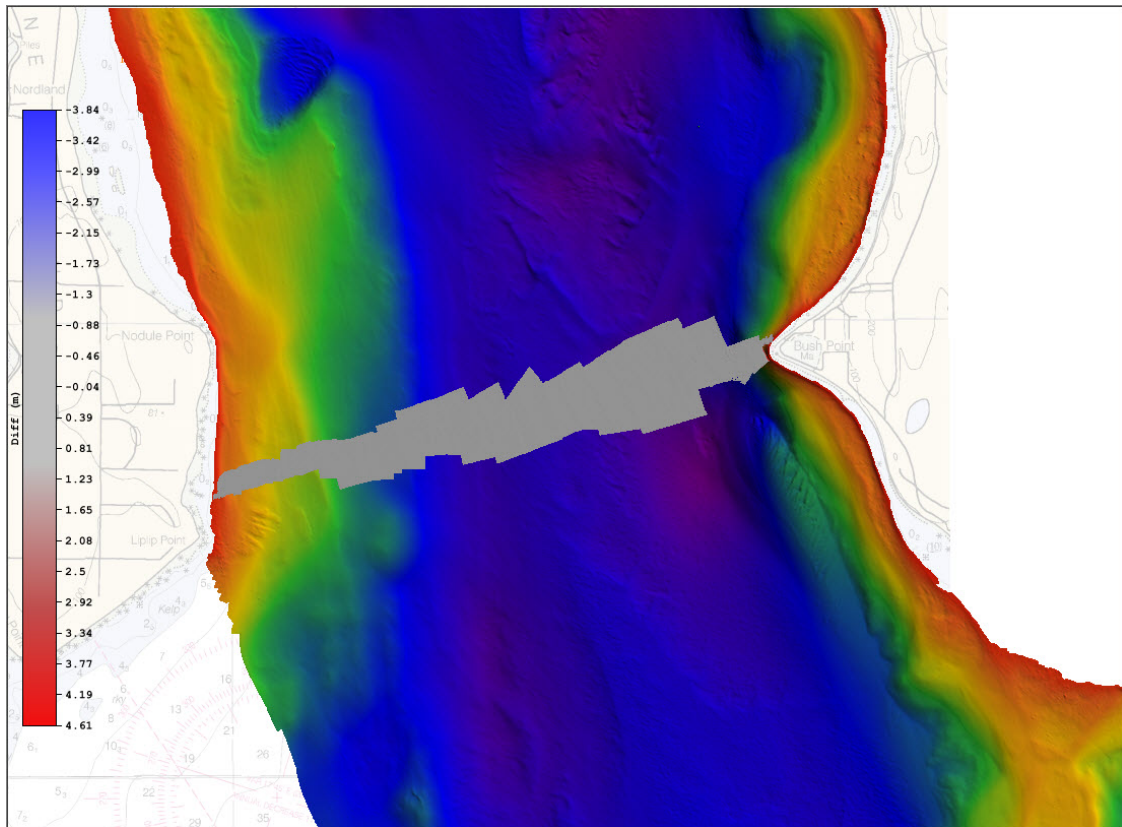


Figure 5: Graphical representation of junction comparison between H12418 and H12420.

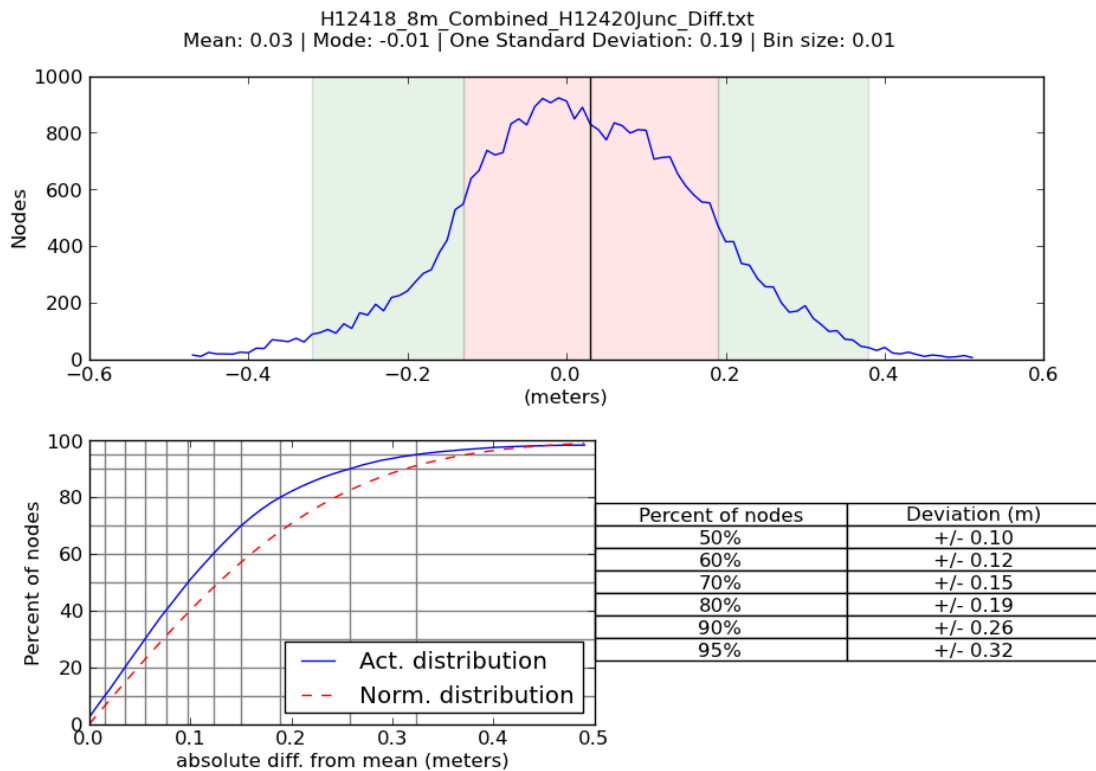


Figure 6: Statistical representation of junction comparison between H12418 and H12420.

H11038

Surface differencing in CARIS HIPS and SIPS was used to assess junction agreement between H12418_16m_Combined surface and H11038_50m surface. The difference between surfaces varied between +/- 8m. These differences are believed to be caused by the combination of rapid changes in slope, and the comparison between a 16m and 50m surface. See figure 5 for a graphical representation and figure 6 for statistical information of the surface differencing.

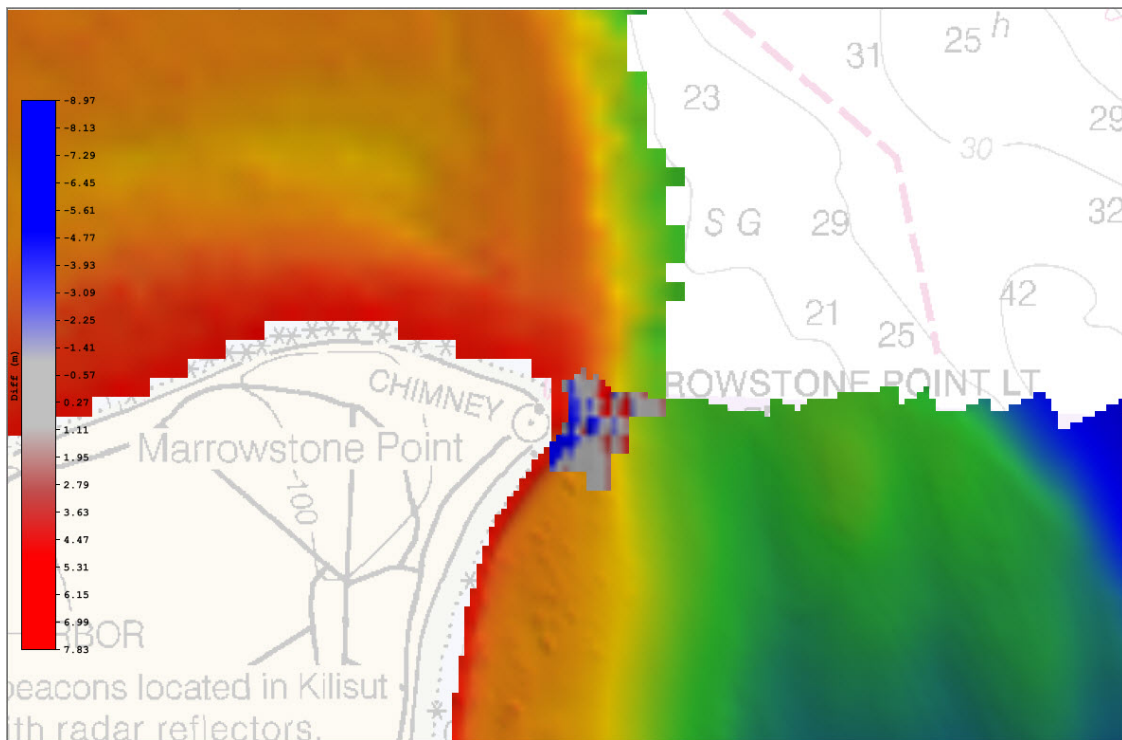


Figure 7: Graphical representation of junction comparison between H12418 and H11038.

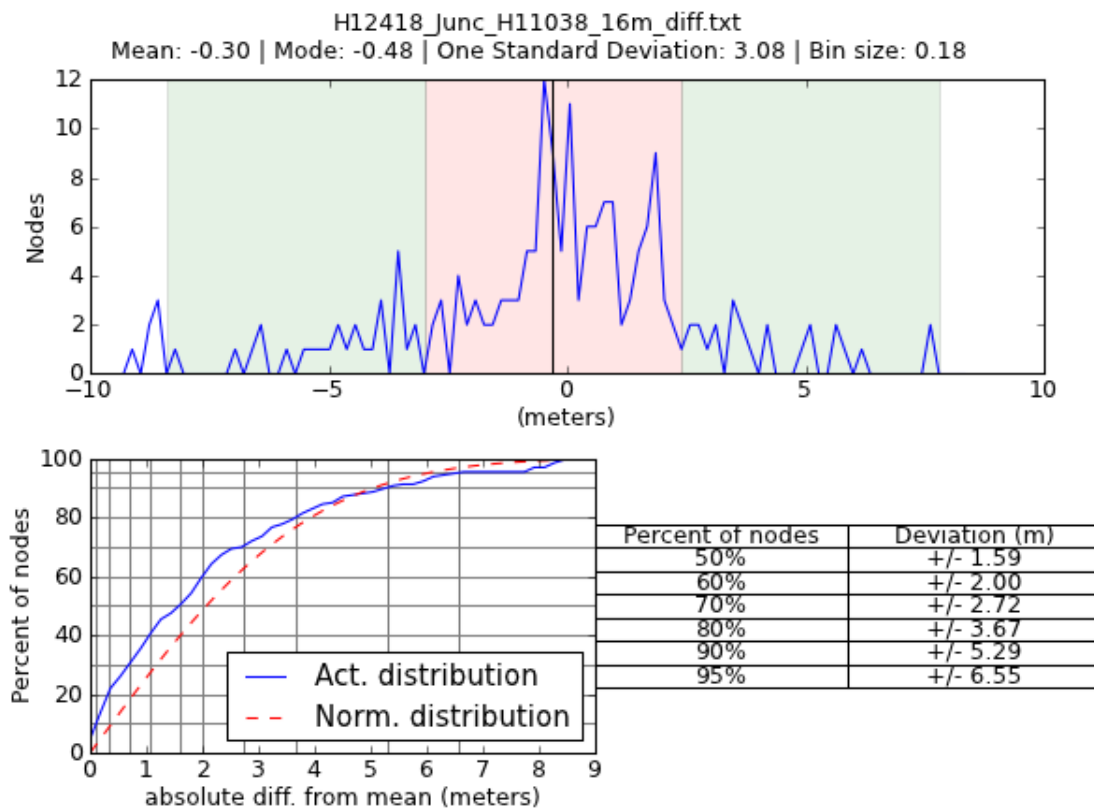


Figure 8: Statistical representation of junction comparison between H12418 and H11038.

H11039

Surface differencing in CARIS HIPS and SIPS was used to assess junction agreement between H12418_16m_Combined surface and H11039_100m surface. The difference between surfaces varied between +/- 20m. These differences are believed to be caused by the comparison between a 16m and 100m surface. See figure 5 for a graphical representation and figure 6 for statistical information of the surface differencing.

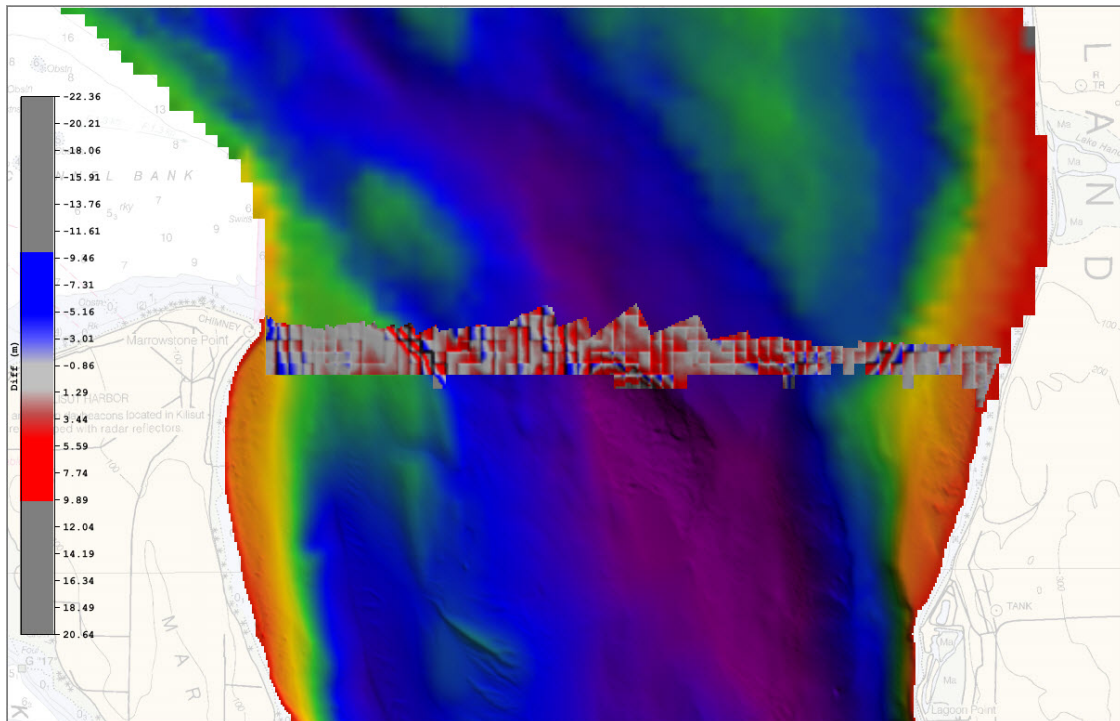


Figure 9: Graphical representation of junction comparison between H12418 and H11039.

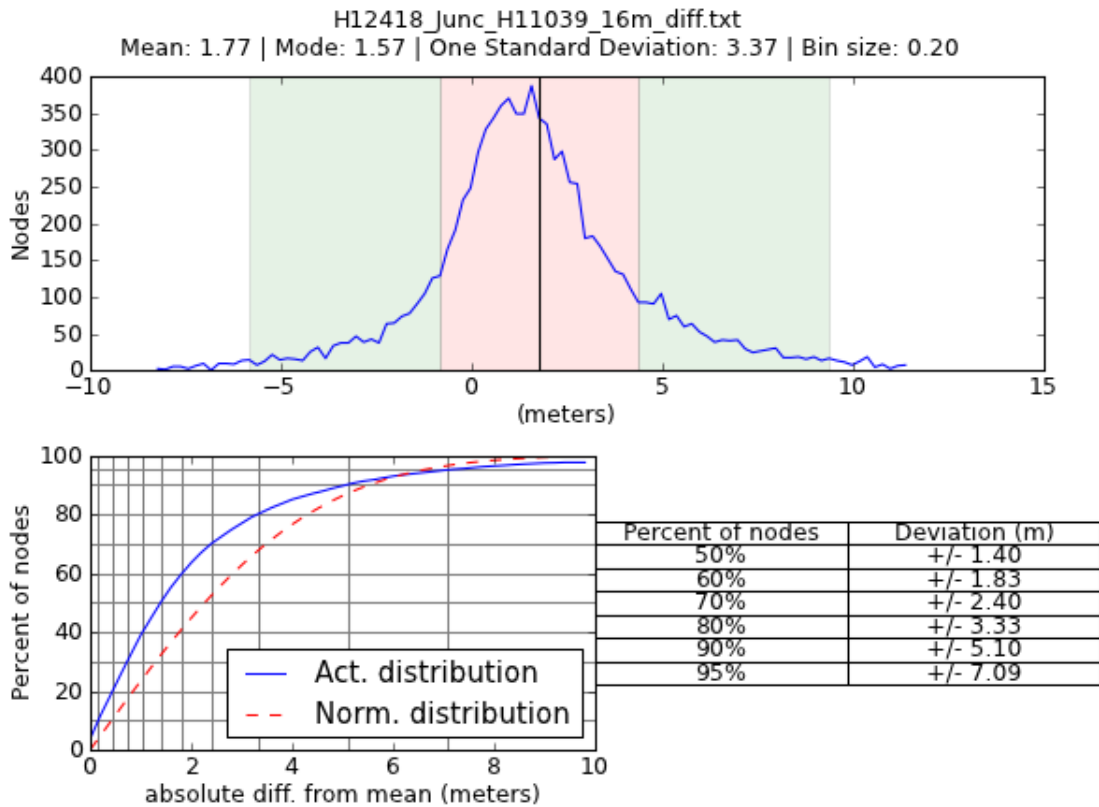


Figure 10: Statistical representation of junction comparison between H12418 and H11039.

B.2.4 Sonar QC Checks

Sonar system quality control checks were conducted as detailed in the quality control section of the DAPR.

B.2.5 Equipment Effectiveness

On DN108, while acquiring cross lines with launch 2805, the Reson 7125 400kHz system with 512 beams experienced systematic operational issues after the number of beams was reduced during acquisition. The Reson 7125 started forming the starboard beams incorrectly as soon as the number of beams was reduced. An accidental power interruption during acquisition caused the crew to reboot all systems, which reset the systematic error and allowed normal beam-forming the remainder of the day. Figure 11 is an example of the incorrect starboard beams in subset editor before being cleaned and figure 12 is an example of the incorrect starboard beams in swath view before being cleaned.

The cross lines that contained the affected starboard beams were still used, with all poor data being cleaned out manually after being converted in CARIS HIPS.

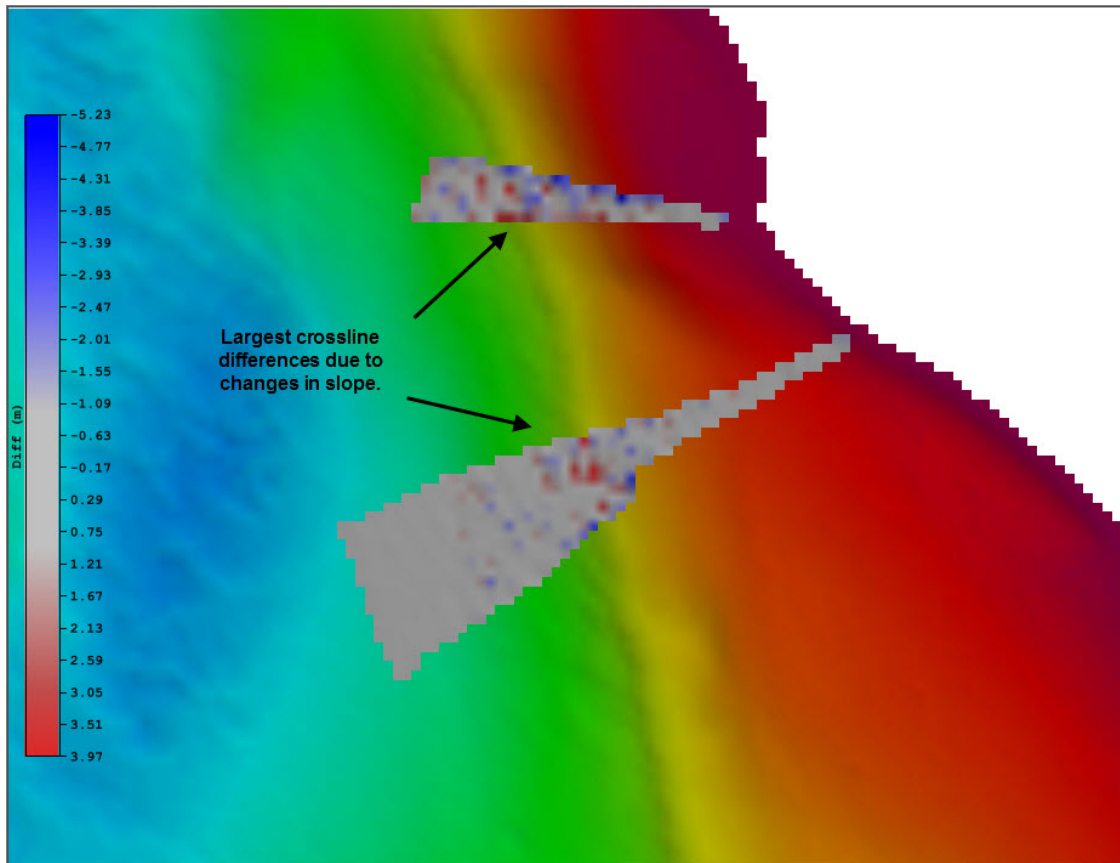


Figure 11: Subset view of Reson 7125 400kHz systematic issues with the starboard beams.

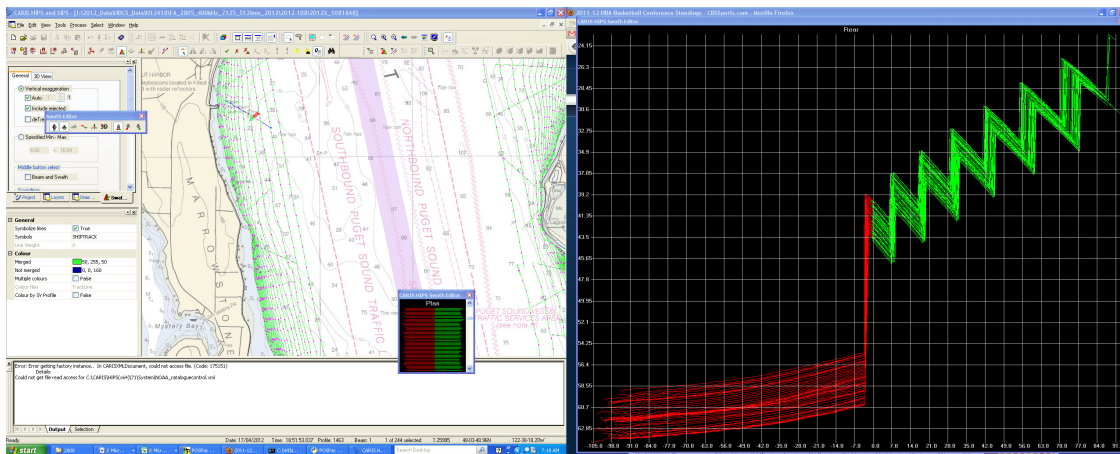


Figure 12: Swath view of the Reson 7215 400kHz systematic issues with the starboard beams.
 Data is adequate for charting.

B.2.6 Factors Affecting Soundings

Sound Speed

Small sound speed artifacts are located throughout the survey area due to the variances in sound velocity. The uncertainty caused by sound velocity artifacts fell within IHO Order 1 specifications (Figure 13) and the hydrographer recommends that they be used to supersede existing charted data.

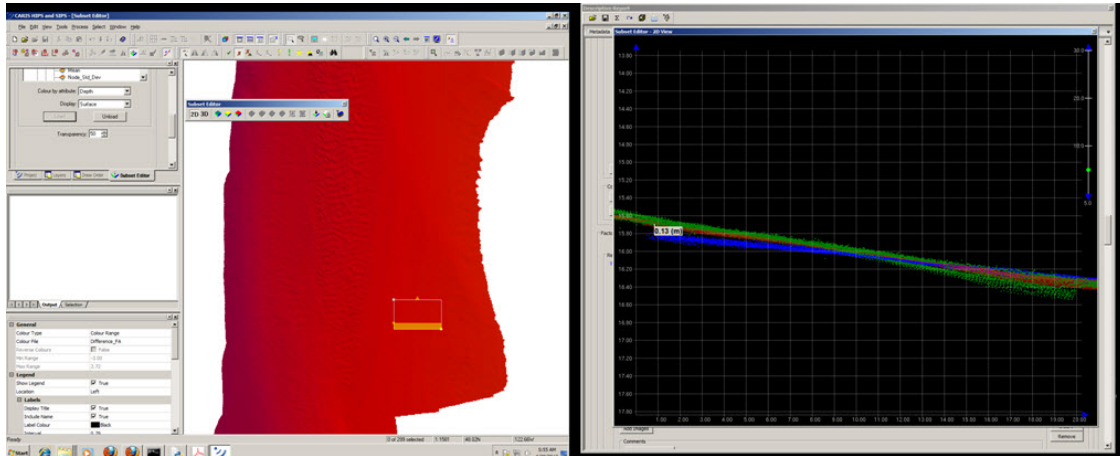


Figure 13: Subset view of an example of the uncertainty caused by sound velocity artifacts on sheet H12418. Influence of Vegetation

The presence of vegetation in the shoal areas in the southwestern and eastern portions of sheet H12418 caused the 0.5 meter surface to honor some of the vegetation soundings. Affected data were not cleaned because the true seafloor could not be distinguished from the vegetation. The affected data is more shoaler biased than the true seafloor and safer from a navigational product standpoint; therefore, the hydrographer recommends that all soundings supersede the chart.

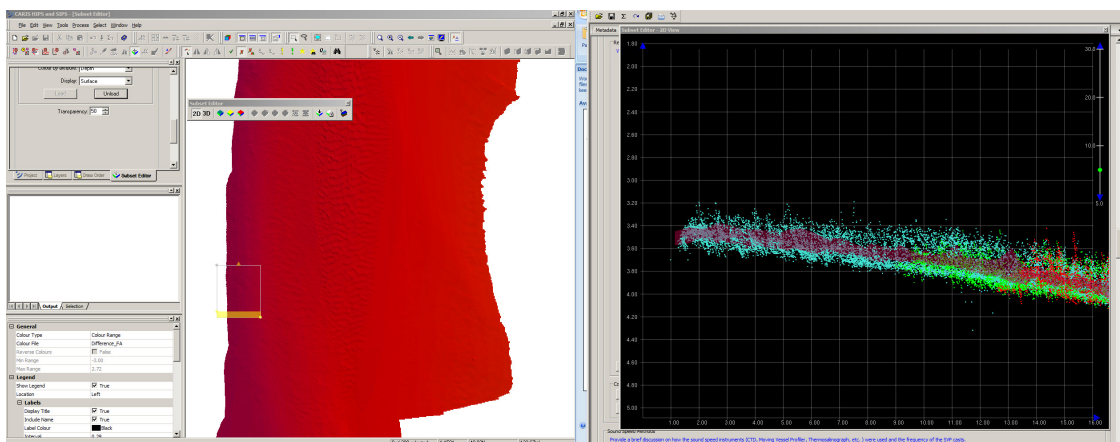


Figure 14: Subset view of 0.5m surface honoring kelp in southwestern portion of sheet H12418.

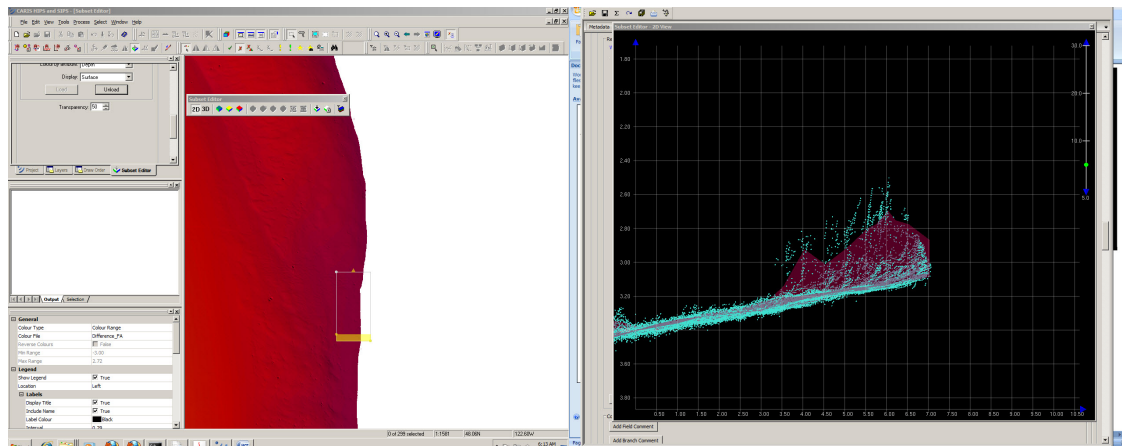


Figure 15: Subset view of 0.5m surface honoring kelp in eastern portion of sheet H12418.

B.2.7 Sound Speed Methods

Sound Speed Cast Frequency: Sound speed measurements were conducted and applied as discussed in the Corrections to Echo Soundings section of the DAPR.

B.2.8 Coverage Equipment and Methods

All Equipment and survey methods were used as detailed in the DAPR.

B.2.9 IHO Uncertainty

After filtering all Reson 7111 data to 63 degrees off nadir on both port and starboard, the data meet the accuracy specifications as stated in the NOS Hydrographic Surveys Specifications and Deliverables (HSSD) dated April 2012, see Standards Compliance Review in Appendix V. Reson 7125 data also met the accuracy specifications as stated in the HSSD, with the exception of the starboard beam issue previously mentioned in Section B.2.5.1.

B.2.10 Density

Density requirements for the 0.5m, 1m, 2m, 4m, 8m, and 16m finalized surfaces were achieved with at least 99.14% of finalized surface nodes containing five or more soundings. See Standards Compliance Review in Appendix V.

B.2.11 Holiday Assessment

Complete multibeam coverage was obtained within the limits of H12418. For holidays larger than three surface grid nodes, the corresponding multibeam side scan was examined and no navigationally significant items were found. The least depths of all navigationally significant features are represented by H12418.

The holidays within the limits of H12418 are primarily located within the 0.5 meter finalized surface. Holidays that were not present in the 1 meter finalized surface during acquisition became evident after the higher resolution 0.5 meter finalized surface was created.

B.3 Echo Sounding Corrections

B.3.1 Corrections to Echo Soundings

All data reduction procedures conform to those detailed in the DAPR.

B.3.2 Calibrations

All sounding systems were calibrated as detailed in the DAPR.

B.4 Backscatter

Backscatter was logged as 7k files and submitted to NGDC for file backup and to the Pacific Hydrographic Branch for processing.

B.5 Data Processing

B.5.1 Software Updates

There were no software configuration changes after the DAPR was submitted.

The following Feature Object Catalog was used: NOAA Extended Attribute Files V5_2

B.5.2 Surfaces

The following surfaces and/or BAGs were submitted to the Processing Branch:

Surface Name	Surface Type	Resolution	Depth Range	Surface Parameter	Purpose
H12418_halfmeter_VDATUM	CUBE	0.5 meters	-	NOAA_0.5m	Complete MBES
H12418_1m_VDATUM	CUBE	1 meters	-	NOAA_1m	Complete MBES
H12418_2m_VDATUM	CUBE	2 meters	-	NOAA_2m	Complete MBES
H12418_4m_VDATUM	CUBE	4 meters	-	NOAA_4m	Complete MBES
H12418_8m_VDATUM	CUBE	8 meters	-	NOAA_8m	Complete MBES
H12418_16m_VDATUM	CUBE	16 meters	-	NOAA_16m	Complete MBES
H12418_halfmeter_ERS_Final_0to36	CUBE	0.5 meters	0 meters - 36 meters	NOAA_0.5m	Complete MBES
H12418_1m_ERS_Final_34to44	CUBE	1 meters	34 meters - 44 meters	NOAA_1m	Complete MBES
H12418_2m_ERS_Final_42to64	CUBE	2 meters	42 meters - 64 meters	NOAA_2m	Complete MBES
H12418_4m_ERS_Final_60to104	CUBE	4 meters	60 meters - 104 meters	NOAA_4m	Complete MBES
H12418_8m_ERS_Final_96to184	CUBE	8 meters	96 meters - 184 meters	NOAA_8m	Complete MBES
H12418_16m_ERS_Final_168to344	CUBE	16 meters	168 meters - 344 millimeters	NOAA_16m	Complete MBES
H12418_Combined_16m_ERS	CUBE	16 meters	0 meters - 344 meters	NOAA_16m	Complete MBES
H12418_halfmeter_VDATUM_Final_0to12	CUBE	0.5 meters	0 meters - 12 meters	NOAA_0.5m	Complete MBES
H12418_1m_VDATUM_Final_10to20	CUBE	1 meters	10 meters - 20 meters	NOAA_1m	Complete MBES
H12418_2m_VDATUM_Final_18to40	CUBE	2 meters	18 meters - 40 meters	NOAA_2m	Complete MBES

Surface Name	Surface Type	Resolution	Depth Range	Surface Parameter	Purpose
H12418_4m_VDATUM_Final_36to80	CUBE	4 meters	36 meters - 80 meters	NOAA_4m	Complete MBES
H12418_8m_VDATUM_Final_72to160	CUBE	8 meters	72 meters - 160 meters	NOAA_8m	Complete MBES
H12418_16m_VDATUM_Final_144to320	CUBE	16 meters	144 meters - 320 meters	NOAA_16m	Complete MBES
H12418_Combined_16m_VDATUM	CUBE	16 meters	0 meters - 320 meters	NOAA_16m	Complete MBES

Table 9: Submitted Surfaces

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 surface resolutions of one half, one, two, four, eight and sixteen meters. The NOAA CUBE parameters mandated in HSSD were used for the creation of all CUBE BASE surfaces in Survey H12418.

The surfaces have been reviewed where noisy data, or 'fliers' are incorporated into the gridded solution causing the surface to be shoaler or deeper than the true seafloor. Where these spurious soundings cause the gridded surface to be shoaler or deeper than the reliably measured seabed by greater than the maximum allowable vertical uncertainty at that depth, the noisy data have been rejected and the surface recomputed.

A one half meter surface was created to reduce the number of designated soundings which would have been required for the one meter surface to honor the appropriate soundings. All correspondence with HSD Ops approving one half meter surface has been included in Appendix V.

An Email regarding authorization to use a 0.5m surface in order to reduce the number of designated soundings. is included in this report.

B.5.3 Data Logs

Data acquisition and processing notes are included in the acquisition and processing logs and additional processing such as sound velocity application is noted in the H12418 Data Log spreadsheet. All data logs are submitted digitally in the Separates I folder.

B.5.4 Critical Soundings

Designation of soundings followed the procedures as outlined in section 5.2.1.2 of the HSSD.

Survey H12418 requires 7 designated soundings and 0 outstanding soundings. All seven of the designated soundings are required to accurately represent the seafloor. A one half meter resolution surface was created in lieu of excessive designated soundings.

Office reviewer created several additional designated soundings within the 0.5m surface.

B.5.5 TrueHeave

To enable the application of TrueHeave some POS/MV files were "fixed" using the fixTrueHeave.exe utility from CARIS. Fixed files were assigned an additional *.fixed suffix. This was performed for the following vessels and days: Launch 2805 days 106 and 108; Launch 2808 days 106 and 107.

B.5.6 Data Processing Deviations

All Reson 7111 data were filtered to 63 degrees off nadir on both port and starboard to remove data that did not meet IHO order 1 specifications.

B.5.7 Ellipsoidally-Referenced Surfaces

All finalized ellipsoidally-referenced surfaces are submitted with H12418 for experimental and evaluation purposes as part of the Office of Coast Survey's initiative to survey to the ellipsoid. The surface were created while the soundings were reduced to the ellipsoid after merging with "GPS Tides" applied in CARIS HIPS. After the ellipsoidal surface were created, the soundings were recomputed using the VDatum Separation Model (see Vertical Control section for more information). The ellipsoidal surfaces appear out of date because of the recomputing process.

C. Vertical and Horizontal Control

Additional information discussing the vertical or horizontal control for this survey can be found in the accompanying HVCR.

C.1 Vertical Control

The vertical datum for this project is Mean Lower Low Water.

Standard Vertical Control Methods Used:

TCARI

The following National Water Level Observation Network (NWLON) stations served as datum control for this survey:

Station Name	Station ID
Seattle	9447130
Port Townsend	9444900

Table 10: NWLON Tide Stations

The following subordinate water level stations were established for this survey:

Station Name	Station ID
Foulweather Bluff	9445016

Table 11: Subordinate Tide Stations

There was no Water Level file associated with this survey.

File Name	Status
N326FA2012_Final.tc	Final

Table 12: Tide Correctors (.zdf or .tc)

A request for final approved tides was sent to N/OPS1 on 05/29/2012. The final tide note was received on 10/19/2012.

Due to inaccurate shoreline around Bush Point, survey track lines fall outside of the TCARI grid boundary. TCARI extrapolated the tide corrector to cover these soundings; see Final Tide Note in Appendix IV.

Final tide note is appended to this report.

Non-Standard Vertical Control Methods Used:

VDatum

Ellipsoid to Chart Datum Separation File:

2012_N326_VDatum_Ellip_MLLW.xyz

The VDatum separation file was applied in accordance with the FPM. VDatum was used for the vertical transformation of ellipsoid referenced data to MLLW. All soundings were merged in CARIS HIPS and SIPS using the apply GPS tide function and TPU was computed with the new VDatum uncertainty value. See correspondence in Appendix V for additional information on Vdatum use and approval.

Email correspondence is appended to this report.

C.2 Horizontal Control

The horizontal datum for this project is North American Datum of 1983 (NAD83).

The projection used for this project is UTM Zone 10.

The following PPK methods were used for horizontal control:

Smart Base

Vessel kinematic data were post-processed using Applanix POSPac processing software and SmartBase Post Processed Kinematic methods described in the DAPR. Smooth Best Estimate of Trajectory (SBET) and associated error (RMS) data were applied to all MBES data in CARIS HIPS.

For further details regarding the processing and quality control checks performed see the H12418 POSPac Processing Logs spreadsheet located in the SBET folder with the GNSS data. See also the OPR-N326-FA-12 Horizontal and Vertical Control report, submitted under separate cover.

All data from H12418 can be referenced to the ellipsoid.

The following CORS Stations were used for horizontal control:

HVCR Site ID	Base Station ID
COUP	COUP
P437	P437
P426	P426
P424	P424
CHCM	DI8467
WHD6	DK4113

Table 13: CORS Base Stations

Differential correctors from the U.S. Coast Guard beacon at Robinson Point, WA (323kHz) were used during real-time acquisition and were the sole method of positioning of detached positions (DP) as there is currently no functionality for applying Smoothed Best Estimate of Trajectory (SBET) files to these types of data.

The following DGPS Stations were used for horizontal control:

DGPS Stations
Robinson Point, WA - 323 kHz (200 BPS)

Table 14: USCG DGPS Stations

D. Results and Recommendations

D.1 Chart Comparison

D.1.1 Raster Charts

The following are the largest scale raster charts, which cover the survey area:

Chart	Scale	Edition	Edition Date	LNM Date	NM Date
18464	1:20000	25	10/2011	10/23/2012	10/27/2012
18477	1:25000	5	08/2005	10/23/2012	10/27/2012
18471	1:40000	11	12/2007	10/23/2012	10/27/2012
18473	1:40000	8	09/2005	10/23/2012	10/27/2012

Table 15: Largest Scale Raster Charts

18464

Soundings from survey H12418 generally agreed within one to two fathoms with charted depths on chart 18464.

18477

Soundings from survey H12418 generally agreed within one to two fathoms with charted depths on chart 18477.

18471

Soundings from survey H12418 generally agreed within one to two fathoms with charted depths on chart 18471. Notable exceptions to this general agreement are listed and shown in the figures below.

Southwest of Lagoon Point: A 52 fathom charted depth was surveyed with MBES at 61 fathoms (Figure 16).

North of Lagoon Point: A 4 foot charted dry height was surveyed with MBES at 1.6 fathoms (Figure 17). The charted height is out of position and may be referencing a rock that is inshore of the position of the sounding.

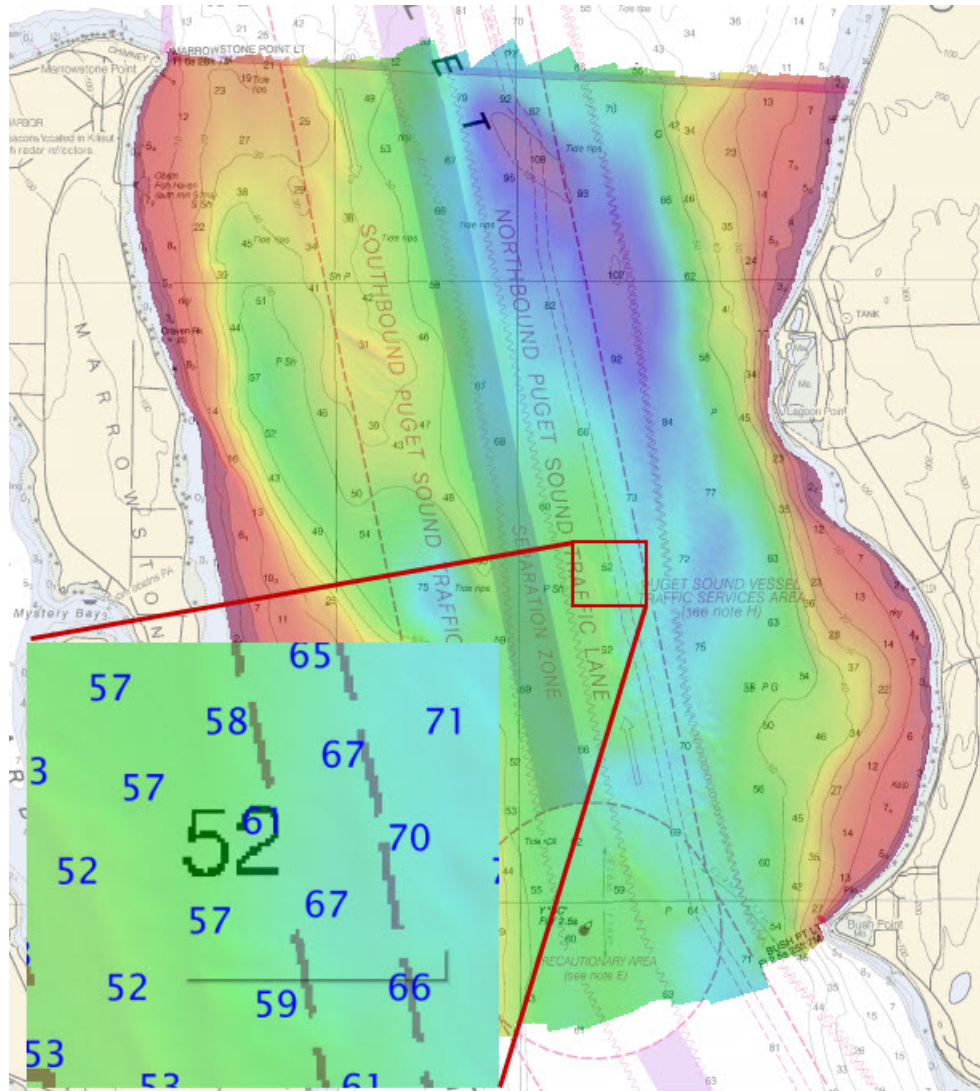


Figure 16: Chart 18471 sounding difference between surveyed soundings southwest of Lagoon Point.

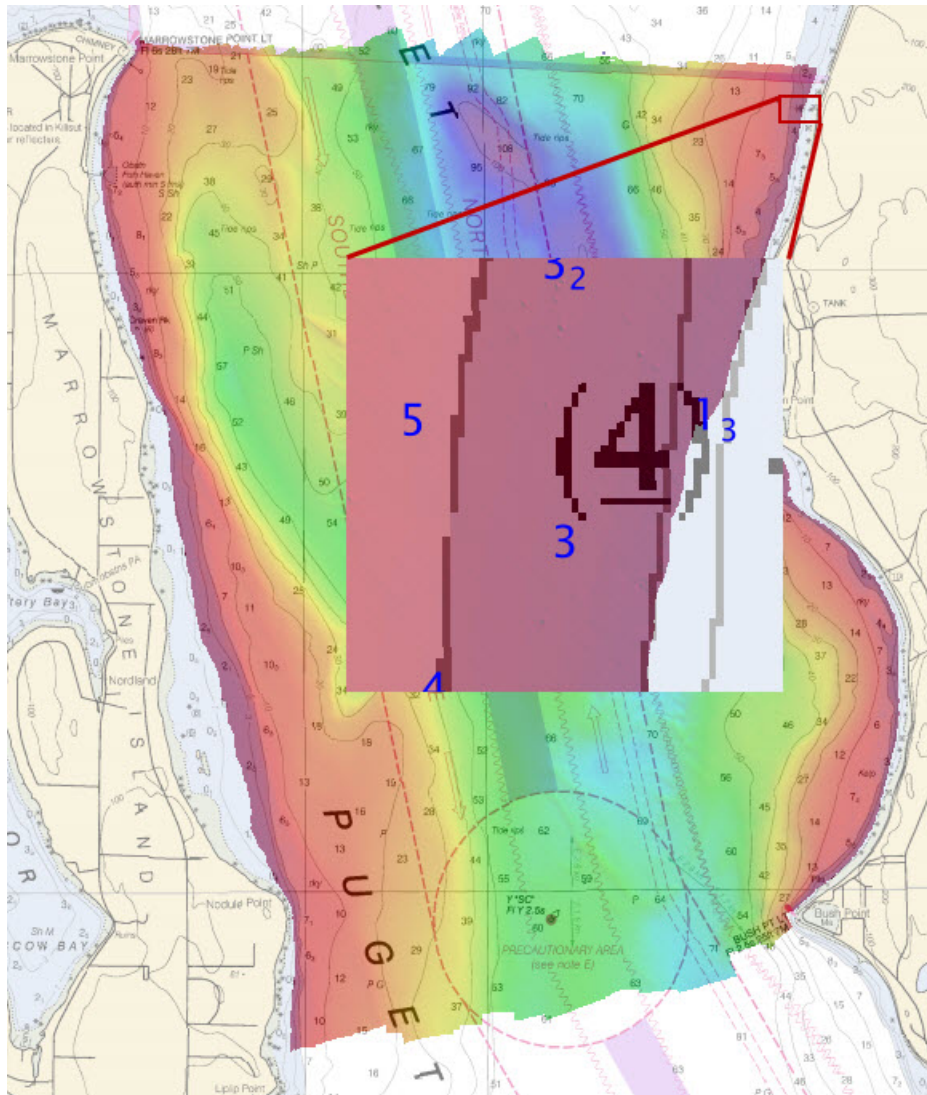


Figure 17: Chart 18471 sounding difference between surveyed soundings north of Lagoon Point. **Charted underlined 4 is the height of a charted rock, not a sounding.**

18473

Soundings from survey H12418 generally agreed within one to two fathoms with charted depths on chart 18473.

D.1.2 Electronic Navigational Charts

The following are the largest scale ENC's, which cover the survey area:

ENC	Scale	Edition	Update Application Date	Issue Date	Preliminary?
US5WA28	1:20000	14	10/27/2011	05/11/2012	NO
US5WA16	1:40000	13	07/23/2012	07/23/2012	NO
US5WA19	1:25000	12	08/26/2011	06/08/2012	NO

Table 16: Largest Scale ENC's

US5WA28

ENC US5WA28 depths match RNC 18464; therefore, all RNC comparisons stated in D.1.1 apply to US5WA28.

US5WA16

ENC US5WA16 depths match RNC 18471; therefore, all RNC comparisons stated in D.1.1 apply to US5WA16.

US5WA19

ENC US5WA19 depths match RNC 18477; therefore, all RNC comparisons stated in D.1.1 apply to US5WA19.

D.1.3 AWOIS Items

There was one AWOIS item located within the limits of H12418. The AWOIS item 52900, Craven Rock, was addressed and included in the H12418 Final Feature File, as well as, the Survey Feature Report in Appendix II. Craven Rock was investigated by MBES and detached position. An updated position for Craven Rock is given in H12418 Final Feature File.

During office processing and certification an AWOIS report containing two AWOIS items (52899 and 52900) was created and is appended to this report.

D.1.4 Maritime Boundary Points

No Maritime Boundary Points were assigned for this survey.

D.1.5 Charted Features

All charted features that were investigated are included in the survey's Final Feature File.

D.1.6 Uncharted Features

Two new land elevations were observed during field operations. Complete information for these features are located in the survey's Final Feature File.

Two new land elevations features are included in the chart update product the DP at 48° 04' 43.6" N, 122° 41' 12.5" W is to update AWOIS Item # 52900 Craven Rock with an elevation of 0.9 m

D.1.7 Dangers to Navigation

No Danger to Navigation Reports were submitted for this survey.

D.1.8 Shoal and Hazardous Features

No shoals or potentially hazardous features exist for this survey.

D.1.9 Channels

A traffic separation scheme exists within survey H12418. No further investigation is required.

D.1.10 Bottom Samples

Bottom samples were assigned for this survey, but were not acquired.

Twenty- three bottom characteristics were imported from the ENC to the chart update to be retained.

D.2 Additional Results

D.2.1 Shoreline

Fairweather personnel conducted limited shoreline verification and reconnaissance at times near predicted negative or low tides within the survey limits. Annotations, information, and diagrams collected on DP forms and boat sheets during field operations are scanned and included in the digital Separates I folder. Shoreline verification procedures for survey H12418 conform to those detailed in the DAPR.

The submitted hob files were used in the compilation of H12418. During compilation, some modifications were made to accommodate features to chart scale.

D.2.2 Prior Surveys

Prior survey comparisons exist for this survey, but were not investigated.

D.2.3 Aids to Navigation

Survey H12418 included one aid to navigation (ATON), which was assigned for positioning by the Project Instructions. See the OPR-N326-FA-12 Horizontal and Vertical Control Report regarding further information on positioned ATON.

D.2.4 Overhead Features

Overhead features do not exist for this survey.

D.2.5 Submarine Features

Submarine features exist for this survey, but were not investigated.

D.2.6 Ferry Routes and Terminals

No ferry routes or terminals exist for this survey.

D.2.7 Platforms

No platforms exist for this survey.

D.2.8 Significant Features

No significant features exist for this survey.

D.2.9 Construction and Dredging

There is no present or planned construction or dredging within the survey limits.

E. Approval Sheet

As Chief of Party, Field operations for this hydrographic survey were conducted under my direct supervision, with frequent personal checks of progress and adequacy. I have reviewed the attached survey data and reports.

All field sheets, this Descriptive Report, and all accompanying records and data are approved. All records are forwarded for final review and processing to the Processing Branch.

The survey data meets or exceeds requirements as set forth in the NOS Hydrographic Surveys and Specifications Deliverables Manual, Field Procedures Manual, Standing and Letter Instructions, and all HSD Technical Directives. These data are adequate to supersede charted data in their common areas. This survey is complete and no additional work is required with the exception of deficiencies noted in the Descriptive Report.

Report Name	Report Date Sent
Data Acquisition and Processing Report	2012-12-05
Horizontal and Vertical Control Report	2013-01-18
Tides and Water Levels Package	2012-06-19
Coast Pilot Report	2012-12-14

Approver Name	Approver Title	Approval Date	Signature
CDR James M. Crocker, NOAA	Chief of Party	01/18/2013	 CDR James M Crocker, NOAA o=NOAA Ship Fairweather, NOAA, ou=Commanding Officer, email=james.m.crocker@noaa.gov, c=US 2013.01.18 12:03:49 -08'00'
LT Caryn M. Zacharias, NOAA	Field Operations Officer	01/18/2013	 Caryn M. Zacharias 2013.01.18 11:28:30 -08'00'
CST Tami M. Beduhn	Chief Survey Technician	01/18/2013	Tami Beduhn '00'08- 10:03:30 2013.01.13 
ENS Daniel D. Smith, NOAA	Sheet Manager	01/18/2013	Not Available
ENS Joshua D. Witmer, NOAA	Sheet Manager	01/18/2013	

F. Table of Acronyms

Acronym	Definition
AHB	Atlantic Hydrographic Branch
AST	Assistant Survey Technician
ATON	Aid to Navigation
AWOIS	Automated Wreck and Obstruction Information System
BAG	Bathymetric Attributed Grid
BASE	Bathymetry Associated with Statistical Error
CO	Commanding Officer
CO-OPS	Center for Operational Products and Services
CORS	Continually Operating Reference Station
CTD	Conductivity Temperature Depth
CEF	Chart Evaluation File
CSF	Composite Source File
CST	Chief Survey Technician
CUBE	Combined Uncertainty and Bathymetry Estimator
DAPR	Data Acquisition and Processing Report
DGPS	Differential Global Positioning System
DP	Detached Position
DR	Descriptive Report
DTON	Danger to Navigation
ENC	Electronic Navigational Chart
ERS	Ellipsoidal Referenced Survey
ERZT	Ellipsoidally Referenced Zoned Tides
FFF	Final Feature File
FOO	Field Operations Officer
FPM	Field Procedures Manual
GAMS	GPS Azimuth Measurement Subsystem
GC	Geographic Cell
GPS	Global Positioning System
HIPS	Hydrographic Information Processing System
HSD	Hydrographic Surveys Division
HSSD	Hydrographic Survey Specifications and Deliverables

Acronym	Definition
HSTP	Hydrographic Systems Technology Programs
HSX	Hypack Hysweep File Format
HTD	Hydrographic Surveys Technical Directive
HVCR	Horizontal and Vertical Control Report
HVF	HIPS Vessel File
IHO	International Hydrographic Organization
IMU	Inertial Motion Unit
ITRF	International Terrestrial Reference Frame
LNM	Local Notice to Mariners
LNM	Linear Nautical Miles
MCD	Marine Chart Division
MHW	Mean High Water
MLLW	Mean Lower Low Water
NAD 83	North American Datum of 1983
NAIP	National Agriculture and Imagery Program
NALL	Navigable Area Limit Line
NM	Notice to Mariners
NMEA	National Marine Electronics Association
NOAA	National Oceanic and Atmospheric Administration
NOS	National Ocean Service
NRT	Navigation Response Team
NSD	Navigation Services Division
OCS	Office of Coast Survey
OMAO	Office of Marine and Aviation Operations (NOAA)
OPS	Operations Branch
MBES	Multibeam Echosounder
NWLON	National Water Level Observation Network
PDBS	Phase Differencing Bathymetric Sonar
PHB	Pacific Hydrographic Branch
POS/MV	Position and Orientation System for Marine Vessels
PPK	Post Processed Kinematic
PPP	Precise Point Positioning
PPS	Pulse per second

Acronym	Definition
PRF	Project Reference File
PS	Physical Scientist
PST	Physical Science Technician
RNC	Raster Navigational Chart
RTK	Real Time Kinematic
SBES	Singlebeam Echosounder
SBET	Smooth Best Estimate and Trajectory
SNM	Square Nautical Miles
SSS	Side Scan Sonar
ST	Survey Technician
SVP	Sound Velocity Profiler
TCARI	Tidal Constituent And Residual Interpolation
TPU	Total Propagated Error
TPU	Topside Processing Unit
USACE	United States Army Corps of Engineers
USCG	United States Coast Guard
UTM	Universal Transverse Mercator
XO	Executive Officer
ZDA	Global Positioning System timing message
ZDF	Zone Definition File

H12418 AWOIS REPORT

Registry Number: H12418
State: Washington
Locality: Admiralty Inlet, WA
Sub-locality: Vicinity of Marrow Stone Island
Project Number: OPR-N326-FA-12
Survey Dates: 04/01/2003 - 05/07/2012

Charts Affected

Number	Edition	Date	Scale (RNC)	RNC Correction(s)*
18464	25th	07/01/2006	1:20,000 (18464_1)	USCG LNM: 4/30/2013 (5/21/2013) CHS NTM: 10/27/2000 (1/25/2013) NGA NTM: None (6/29/2013)
18423	36th	07/01/2007	1:80,000 (18423_15) 1:20,000 (18423_19)	[L]NTM: ?
18471	11th	12/01/2007	1:40,000 (18471_1)	[L]NTM: ?
18441	46th	12/01/2007	1:80,000 (18441_1)	[L]NTM: ?
18440	29th	09/01/2007	1:150,000 (18440_1)	[L]NTM: ?
18003	20th	11/01/2006	1:736,560 (18003_1)	[L]NTM: ?
18007	33rd	02/01/2009	1:1,200,000 (18007_1)	[L]NTM: ?
501	12th	11/01/2002	1:3,500,000 (501_1)	[L]NTM: ?
530	32nd	06/01/2007	1:4,860,700 (530_1)	[L]NTM: ?
50	6th	06/01/2003	1:10,000,000 (50_1)	[L]NTM: ?

* Correction(s) - source: last correction applied (last correction reviewed--"cleared date")

Features

No.	Name	Feature Type	Survey Depth	Survey Latitude	Survey Longitude	AWOIS Item
1.1	US 0000011844 00001	Obstruction	9.10 m	48° 05' 28.1" N	122° 41' 26.1" W	---
1.2	US 0000011834 00001	GP	[None]	48° 04' 43.6" N	122° 41' 12.5" W	---

1 - Charted Features

1.1) US 0000011844 00001 / AWOIS.000

Survey Summary

Survey Position: 48° 05' 28.1" N, 122° 41' 26.1" W
Least Depth: 9.10 m (= 29.86 ft = 4.976 fm = 4 fm 5.86 ft)
TPU ($\pm 1.96\sigma$): THU (TPEh) [None] ; TVU (TPEv) [None]
Timestamp: 2003-091.00:00:00.000 (04/01/2003)
Dataset: AWOIS.000
FOID: US 0000011844 00001(022600002E440001)
Charts Affected: 18464_1, 18471_1, 18423_15, 18441_1, 18440_1, 18003_1, 18007_1, 501_1, 530_1, 50_1

Remarks:

OBSTRN/remrks: not seen by SL verification

Feature Correlation

Source	Feature	Range	Azimuth	Status
AWOIS.000	US 0000011844 00001	0.00	000.0	Primary

Hydrographer Recommendations

[None]

Cartographically-Rounded Depth (Affected Charts):

5fm (18464_1, 18441_1, 18440_1, 18003_1, 18007_1, 530_1)

3fm 0ft (18471_1, 18423_15)

9.1m (501_1, 50_1)

S-57 Data

Geo object 1: Obstruction (OBSTRN)
Attributes: CATOBS - 5:fish haven
 EXPSOU - 2:shoaler than range of depth of the surrounding depth area
 SORDAT - 20030400
 SORIND - US,US,graph,Chart 18464
 VALSOU - 9.100 m

WATLEV - 3:always under water/submerged

Office Notes

Retain charted fish haven, AWOIS item # 52899

Feature Images



Figure 1.1.1

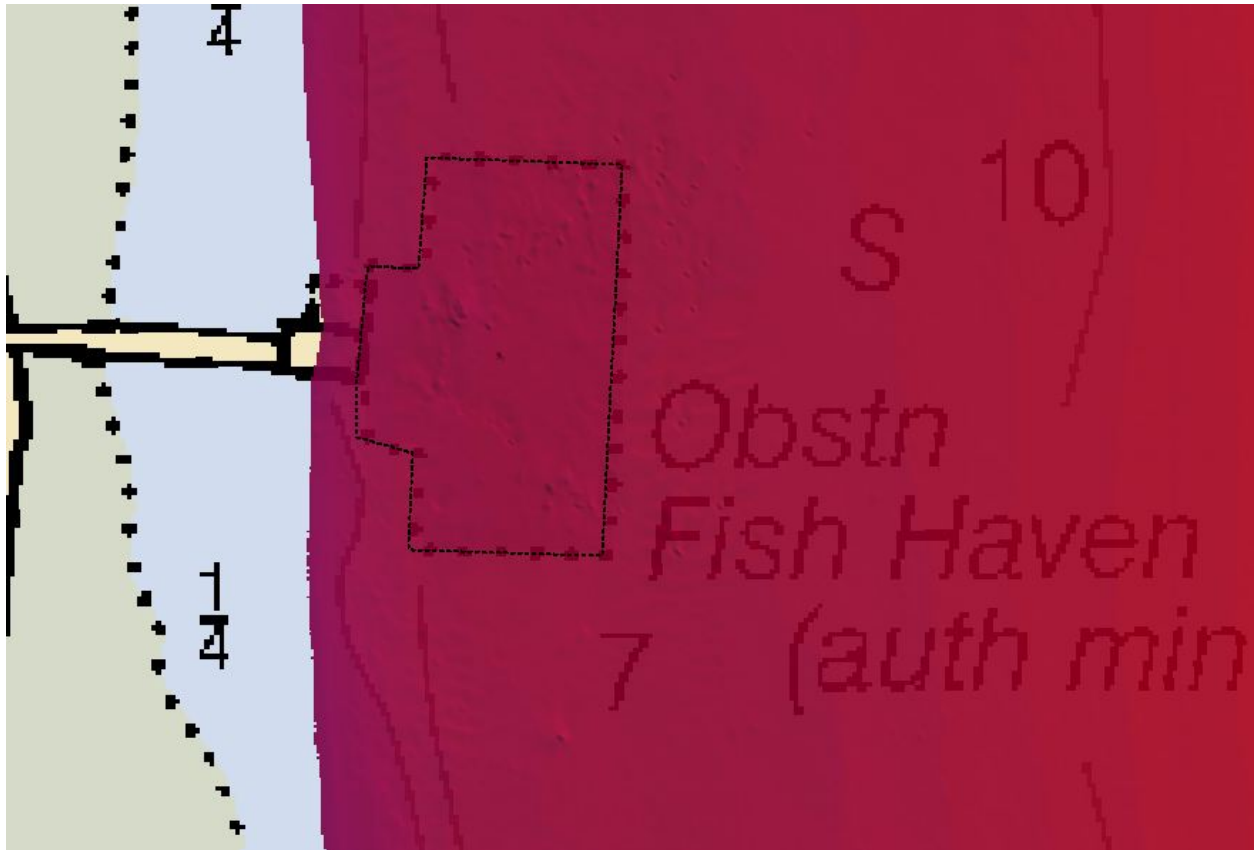


Figure 1.1.2

1.2) US 0000011834 00001 / AWOIS.000

Survey Summary

Survey Position: 48° 04' 43.6" N, 122° 41' 12.5" W
Least Depth: [None]
TPU ($\pm 1.96\sigma$): THU (TPEh) [None] ; TVU (TPEv) [None]
Timestamp: 2012-128.16:11:57.000 (05/07/2012)
Dataset: AWOIS.000
FOID: US 0000011834 00001(022600002E3A0001)
Charts Affected: 18423_19, 18464_1, 18471_1, 18423_15, 18441_1, 18440_1, 18003_1, 18007_1, 501_1, 530_1, 50_1

Remarks:

LNDELV/remrks: chd (18464) islet vfd, new hp

Feature Correlation

Source	Feature	Range	Azimuth	Status
AWOIS.000	US 0000011834 00001	0.00	000.0	Primary

Hydrographer Recommendations

[None]

S-57 Data

Geo object 1: Land elevation (LNDELV)
Attributes: ELEVAT - 0.9 m
 SORDAT - 20120510
 SORIND - US,US,Graph,H12418

Office Notes

Update AWOIS Item # 52900 Craven Rock with an elevation of 0.9 m

Feature Images



Figure 1.2.1



Figure 1.2.2



Daniel Smith <daniel.d.smith@noaa.gov>

OPR-N326-FA12 (H12418) 0.5m Resolution

4 messages

FA OPS <ops.fairweather@noaa.gov>

Sun, Jun 3, 2012 at 9:37 PM

To: crescent.moegling@noaa.gov

Cc: chiefst Fairweather <ChiefST.Fairweather@noaa.gov>, daniel.d.smith@noaa.gov, CDR James Crocker <CO.Fairweather@noaa.gov>, Timothy.M.Smith@noaa.gov, Lori.Knell@noaa.gov, Marc.S.Moser@noaa.gov

Hi Crescent,

I am writing to give you a heads up that one of our surveys in Admiralty Inlet requires us to use a 0.5m surface in order for us to reduce the number of designated soundings.

See the attached images of what we are seeing between the 1 meter and the 0.5 meter surfaces.

We would like to use the following for H12418:

Depth Range, Resolution(m)

0-12, 0.5

10-20, 1

18-40, 2

36-80, 4

72-160, 8

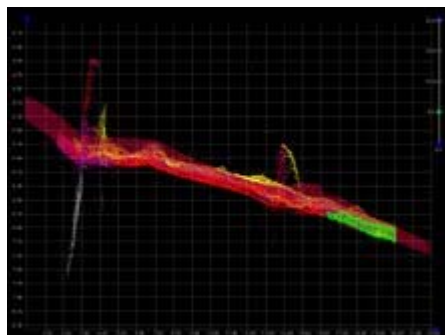
144-320, 16

Please let me know if I need to provide an official memo or if this e-mail is sufficient. Or if you suggest a different solution.

V/r,
Caryn

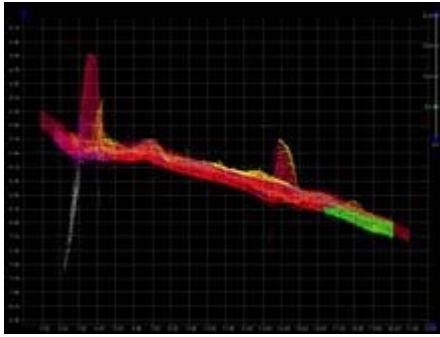
--
LT Caryn Zacharias (Arnold), NOAA
Operations Officer
NOAA Ship Fairweather
1010 Stedman Street
Ketchikan, AK 99901
Ship Cell 907-254-2842
Ship Sat 808-659-0054

2 attachments



H12418_1m_b.jpg

208K



H12418_05m_b.jpg
205K

Crescent Moegling <Crescent.Moegling@noaa.gov> Mon, Jun 4, 2012 at 9:39 PM

To: _OMAO MOP OPS Fairweather <OPS.Fairweather@noaa.gov>
Cc: _OMAO MOP ChiefST Fairweather <ChiefST.Fairweather@noaa.gov>, Daniel Smith <Daniel.D.Smith@noaa.gov>, _OMAO MOP CO Fairweather <CO.Fairweather@noaa.gov>, Timothy Smith <Timothy.M.Smith@noaa.gov>, Lori Knell <Lori.Knell@noaa.gov>, Marc Moser <Marc.S.Moser@noaa.gov>

Hi Caryn,
This looks like a good proposal. Do you think there is enough overlap for the steeper areas? I think in past surface resolution variations from the HSSD needed approval memo from OPS.

Crescent Moegling
Hydrographic Team Lead
Northwest Navigation Manager
Pacific Hydrographic Branch
206.526.6840

[Quoted text hidden]

Marc Moser <Marc.S.Moser@noaa.gov> Tue, Jun 5, 2012 at 11:51 AM

To: _OMAO MOP OPS Fairweather <OPS.Fairweather@noaa.gov>
Cc: Crescent Moegling <Crescent.Moegling@noaa.gov>, _OMAO MOP ChiefST Fairweather <ChiefST.Fairweather@noaa.gov>, Daniel Smith <Daniel.D.Smith@noaa.gov>, _OMAO MOP CO Fairweather <CO.Fairweather@noaa.gov>, Timothy Smith <Timothy.M.Smith@noaa.gov>, Lori Knell <Lori.Knell@noaa.gov>

LT Zacharias,

Ops concurs with your proposal as it reduces the number of designated soundings for this survey. Please include this email in the DR to constitute written authorization of the modified resolution proposal for H12418.

[Quoted text hidden]

--
LCDR Marc S. Moser, NOAA
Chief, Operations Branch
SSMC3, Rm: 6854, N/CS31, 1315 East West Highway
Silver Spring, MD 20910
Tel: (301) 713-2702 x112, Fax: (301) 713-4533, Cel: (757) 339-1950

OPS Fairweather <ops.fairweather@noaa.gov> Tue, Jun 5, 2012 at 3:39 PM

To: Marc Moser <Marc.S.Moser@noaa.gov>
Cc: Crescent Moegling <Crescent.Moegling@noaa.gov>, _OMAO MOP ChiefST Fairweather <ChiefST.Fairweather@noaa.gov>, Daniel Smith <Daniel.D.Smith@noaa.gov>, _OMAO MOP CO Fairweather <CO.Fairweather@noaa.gov>, Timothy Smith <Timothy.M.Smith@noaa.gov>, Lori Knell <Lori.Knell@noaa.gov>

Thank you. We will include this e-mail as authorization.


V/r,
Caryn
[Quoted text hidden]



UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEANIC SERVICE
Office of Coast Survey
Silver Spring, Maryland 20910-3282

December 13, 2012

MEMORANDUM FOR: CDR James M. Crocker, NOAA
Commanding Officer NOAA Ship *Fairweather*

FROM: Jeffrey Ferguson 
Chief, Hydrographic Surveys Division

SUBJECT: Vertical Datum Transformation Technique,
OPR-N326-FA-12, Admiralty Inlet, WA

Hydrographic surveys H12418, H12419, and H12420 are approved for vertical reduction to chart datum, Mean Lower Low Water (MLLW), using the NOAA Vertical Datum Transformation (VDatum) (<http://vdatum.noaa.gov>) derived separation (SEP) model provided on the project CD/DVD.

Approval of VDatum, in lieu of the NOAA Center for Operational Oceanographic Products and Services (CO-OPS) TCARI package as per the Project Instructions, is based on your recommendation and the review of comparison results you included in your document from November 19, 2012, Subject "OPR-N326-FA-12 ERS VDatum Evaluation – Interim Deliverable."

The results of the data analysis show that ellipsoidally referenced survey (ERS) techniques with VDatum used as the vertical datum reducer to MLLW in this area indicate a better internal consistency of the survey data and produces final sounding values that meet or exceed horizontal and vertical specifications for hydrographic surveys.

The comparison techniques are in line with the procedures that were developed and approved as part of the CSDL Ellipsoidally Referenced Survey (ERS) project. These procedures and deliverables were added to the April 2012 edition of the NOS Hydrographic Surveys Specifications and Deliverables Manual and Field Procedures Manual documents.

You shall include a description of your ERS processing procedures and the comparisons you conducted between ERS and traditional tides in the appropriate Descriptive Report (DR), Horizontal and Vertical Control Report and/or Data Acquisition and Processing Report.

This memo and your document, shall be included in the supplemental correspondence Appendix of the DR.





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

TIDE NOTE FOR HYDROGRAPHIC SURVEY

DATE : October 18, 2012

HYDROGRAPHIC BRANCH: Pacific
HYDROGRAPHIC PROJECT: OPR-N326-FA-2012
HYDROGRAPHIC SHEET: H12418

LOCALITY: Vicinity of Marrow Stone Island, Admiralty Inlet, WA
TIME PERIOD: April 15 - May 10, 2012

TIDE STATION USED: 9444900 Port Townsend, WA
Lat. 48° 6.7' N Long. 122° 45.5' W
PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters
HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 2.389 meters

TIDE STATION USED: 9445016 Foulweather Bluff, WA
Lat. 47° 55.6' N Long. 122° 37.0' W
PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters
HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 2.797 meters

Tide STATION USED: 9447130 Seattle, WA
Lat. 47° 36.2' N Long. 122° 20.4' W
PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters
HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 3.199 meters

REMARKS: RECOMMENDED GRID

Please use the TCARI grid "N326FA2012_Final.tc" as the final grid for project OPR-N326-FA-2012, Registry No. H12418 during the time period between April 15 and May 10, 2012.

Refer to attachments for grid 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).

Note 2: Due to inaccurate shoreline around Bush Point, survey track lines fall outside of the TCARI grid boundary. TCARI will extrapolate the tide corrector to cover these soundings.

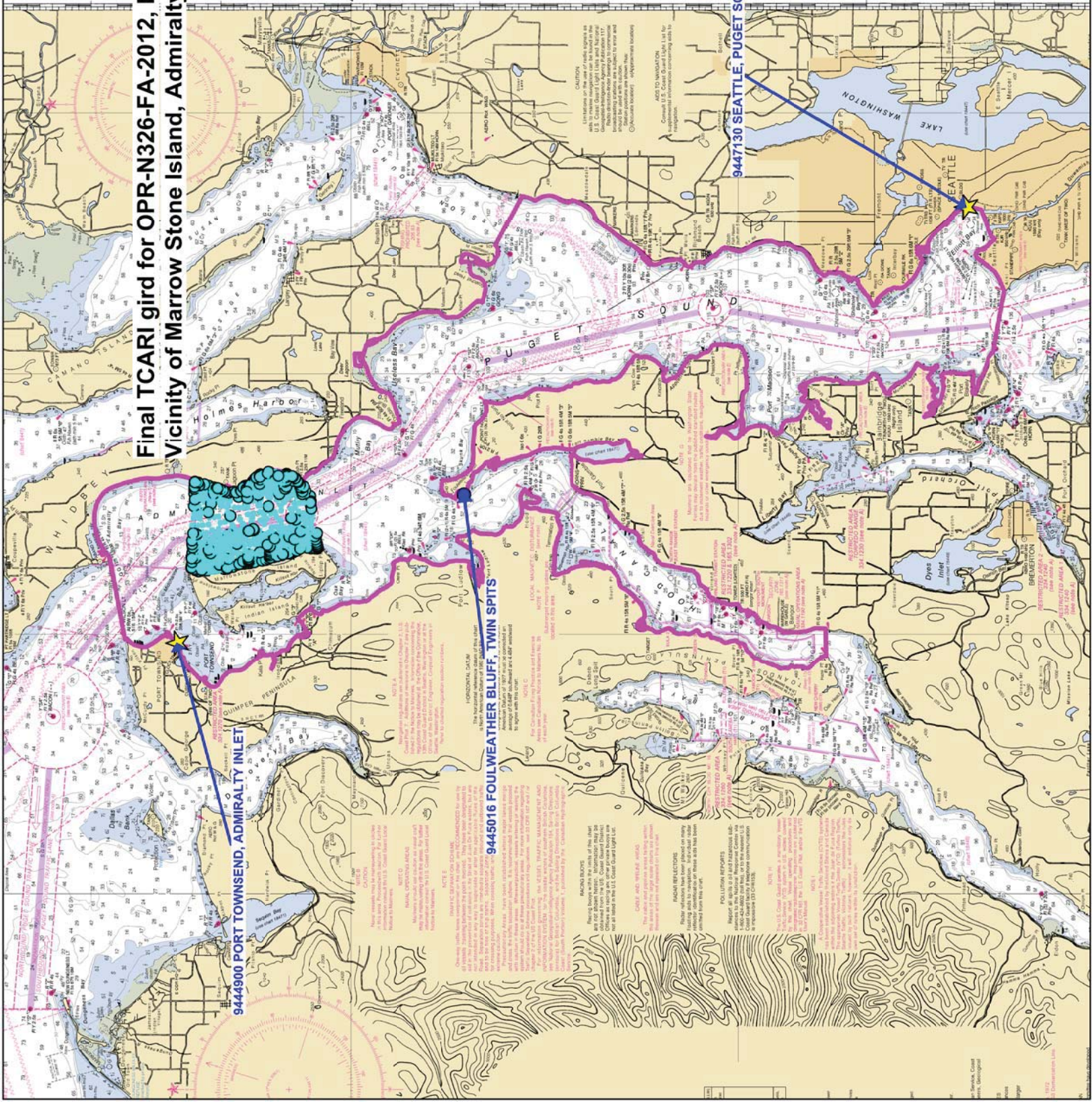
HOVIS.GERALD.TH
OMAS.1365860250

Digitally signed by
HOVIS.GERALD.THOMAS.1365860250
DN: c=US, o=U.S. Government, ou=DoD,
ou=PKI, ou=OTHER,
cn=HOVIS.GERALD.THOMAS.1365860250
Date: 2012.10.19 13:16:06 -04'00'

CHIEF, PRODUCTS AND SERVICES BRANCH



**Final TCARI gird for OPR-N326-FA-2012, Registry No. H12418
Vicinity of Marrow Stone Island, Admiralty Inlet, WA**



9444900 PORT TOWNSEND, ADMIRALTY INLET

9445016 FOULWEATHER BLUFF, TWIN SPITS

9447130 SEATTLE, PUGET SOUND

NOTE

Obstructions to navigation are indicated by the following symbols:
 - Obstructions to navigation are indicated by the following symbols:
 - Obstructions to navigation are indicated by the following symbols:
 - Obstructions to navigation are indicated by the following symbols:
 - Obstructions to navigation are indicated by the following symbols:

NOTE

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APPROVAL PAGE

H12418

Data meet or exceed current specifications as certified by the OCS survey acceptance review process. Descriptive Report and survey data except where noted are adequate to supersede prior surveys and nautical charts in the common area.

The following products will be sent to NGDC for archive

- H12418_DR.pdf
- Collection of depth varied resolution BAGS
- Processed survey data and records
- H12418_GeoImage.pdf

The survey evaluation and verification has been conducted according current OCS Specifications.

Approved: _____

Peter Holmberg
Cartographic Team Lead, Pacific Hydrographic Branch

The survey has been approved for dissemination and usage of updating NOAA's suite of nautical charts.

Approved: _____

Kurt Brown
Physical Scientist, Pacific Hydrographic Branch