F00638

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

DESCRIPTIVE REPORT

Type of Survey:	Navigable Area
Registry Number:	F00638

LOCALITY

State(s):	Washington
General Locality:	Strait of Juan de Fuca
Sub-locality:	Brown Island to Flat Point

2014

CHIEF OF PARTY
CDR David J. Zezula, NOAA

LIBRARY & ARCHIVES

Date:

U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION	REGISTRY NUMBER:
HYDROGRAPHIC TITLE SHEET	**F00638**

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:	**Strait of Juan de Fuca**
Sub-Locality:	**Brown Island to Flat Point**
Scale:	**12500**
Dates of Survey:	**04/16/2014 to 04/21/2014**
Instructions Dated:	**03/06/2014**
Project Number:	**OPR-N305-FA-14**
Field Unit:	**NOAA Ship *Fairweather***
Chief of Party:	**CDR David J. Zezula, 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:

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. 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 F00638

Project: OPR-N305-FA-14

Locality: Strait of Juan de Fuca

Sublocality: Brown Island to Flat Point

Scale: 1:10000

April 2014 - April 2014

NOAA Ship *Fairweather*

Chief of Party: CDR David J. Zezula, NOAA

A. Area Surveyed

The survey is located in the Strait of Juan de Fuca, WA, within the sub-locality of Friday Harbor to Flat Point

A.1 Survey Limits

Data were acquired within the following survey limits:

Northwest Limit	Southeast Limit
48° 34' 3.81" N 123° 1' 44.53" W	48° 31' 21.23" N 122° 54' 16.46" W

Table 1: Survey Limits

Survey Limits were acquired in accordance with the requirements in the Project Instructions and the HSSD, with the exception of the discrepancies in coverage described in section A.4 and section D.2.1.

Survey F00638 sheet limits were expanded to include survey F00637. See attached correspondence.

A.2 Survey Purpose

The purpose of this project is to provide contemporary surveys to update National Ocean Service (NOS) nautical charting products. Additionally, a request for a survey in the vicinity of Friday Harbor was submitted to determine the extent of shoaling off the Northwest end of Brown Island. This shoaling may influence the Washington State Ferry's accessibility to Friday Harbor, particularly during times of negative tide. This survey covers approximately five square nautical miles of critical and re-survey areas as identified in the 2012 NOAA Hydrographic Survey Priorities (NHSP).

A.3 Survey Quality

The entire survey is adequate to supersede previous data.

A.4 Survey Coverage

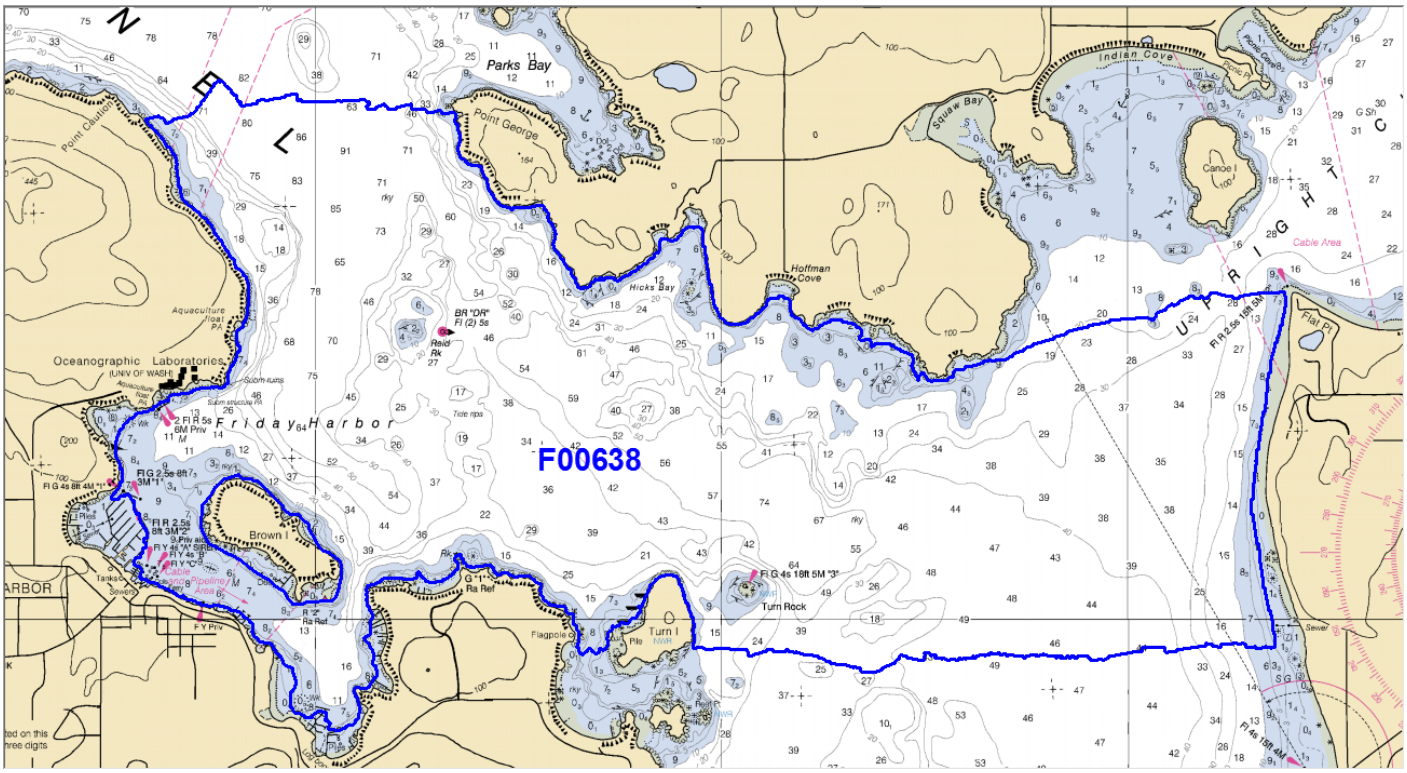


Figure 1: F00638 Survey Coverage

There are two small areas on the South side of Friday Harbor where multibeam data was not collected all the way to the NALL, as shown by the arrows in Figure 2. Figure 3 shows two gaps in the coverage between the 4m and 8m finalized layers near Hicks Bay, despite extending the depth ranges beyond the standard (see section Table 8 in section B.5.2 for depth ranges). The gaps were examined in the 4m surface and determined not to be holidays.

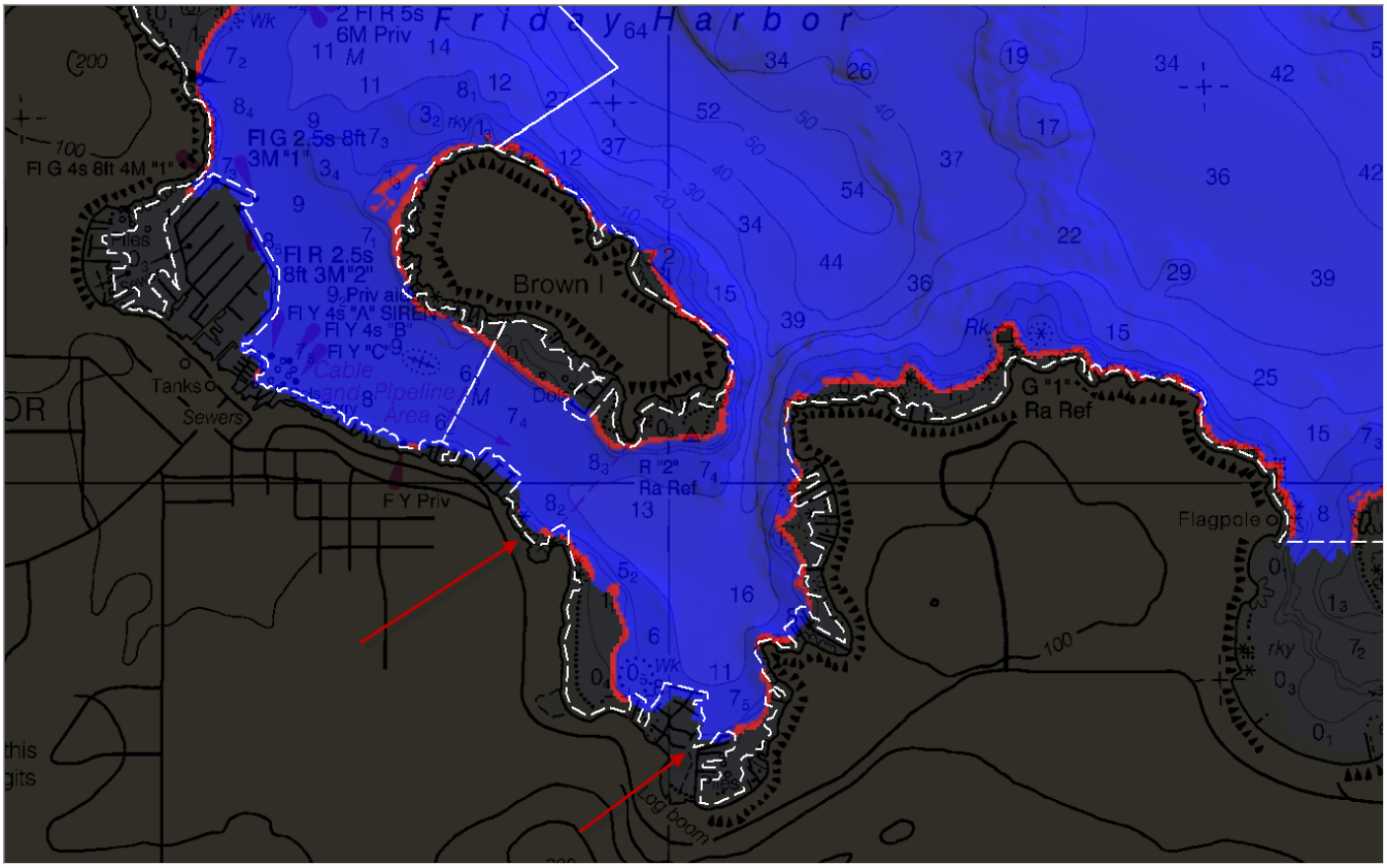


Figure 2: Coverage area overview with red 4m curve and white sheet limits

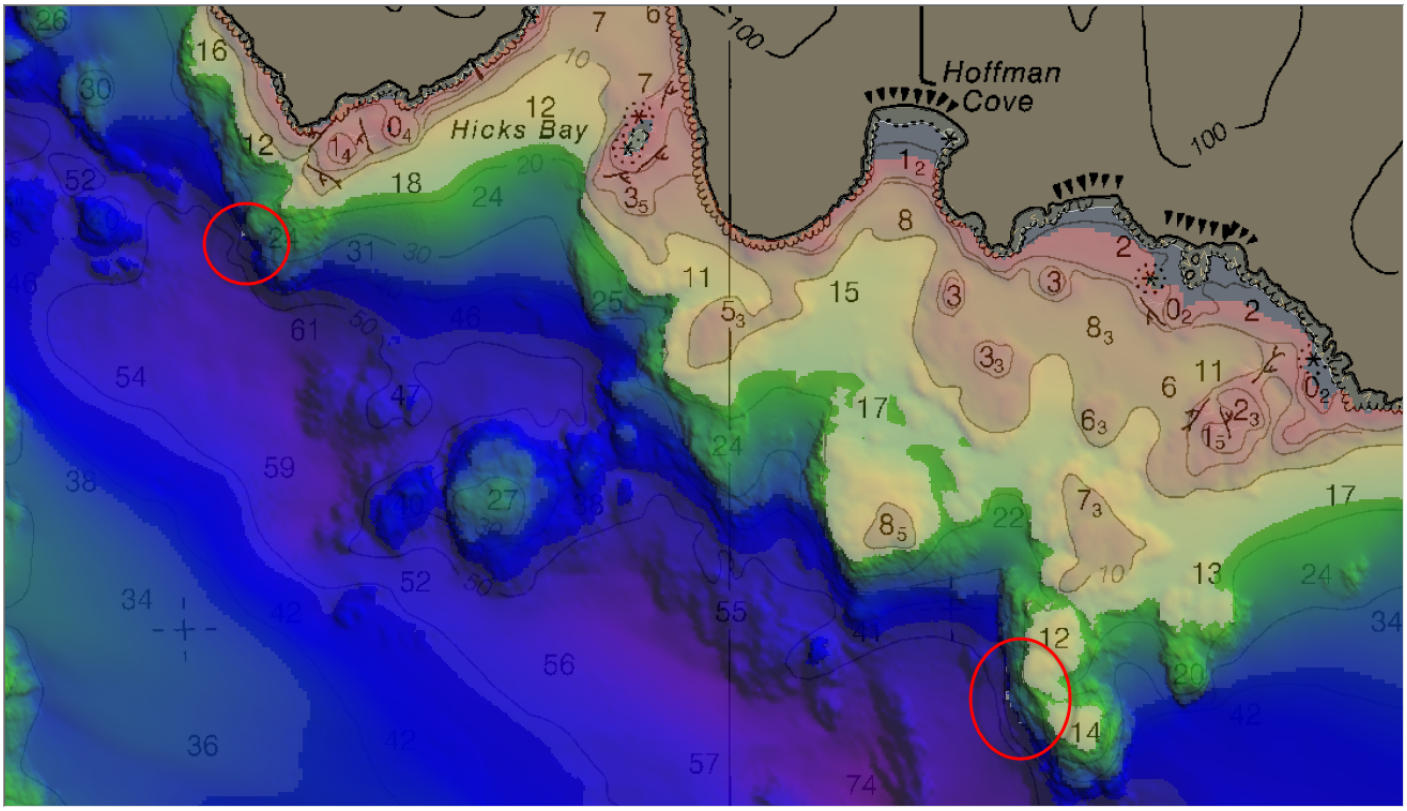


Figure 3: F00638 Coverage gaps between finalized layers

Due to the steep slope, two gaps in coverage are apparent between the 4 meter and 8 meter finalized surfaces; data were examined in the 4 meter unfinalized surface and no navigationally significant features were observed. Data are adequate to supersede charted depths.

A.5 Survey Statistics

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

	HULL ID	*2805*	*2806*	*2807*	*2808*	*Total*
LNM	SBES Mainscheme	0	0	0	0	0
	MBES Mainscheme	34.30	56.03	10.43	16.64	117.4
	Lidar Mainscheme	0	0	0	0	0
	SSS Mainscheme	0	0	0	0	0
	SBES/SSS Mainscheme	0	0	0	0	0
	MBES/SSS Mainscheme	0	0	0	0	0
	SBES/MBES Crosslines	2.56	0	13.83	0	16.39
	Lidar Crosslines	0	0	0	0	0
Number of Bottom Samples						2
Number of AWOIS Items Investigated						4
Number Maritime Boundary Points Investigated						0
Number of DPs						0
Number of Items Investigated by Dive Ops						0
Total SNM						4.39

Table 2: Hydrographic Survey Statistics

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

Survey Dates	Day of the Year
04/16/2014	106
04/17/2014	107
04/18/2014	108
04/21/2014	111

Table 3: Dates of Hydrography

Dates of acquisition for F00638 are April 17th - 20th and April 22nd, 2014.

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*	*2806*	*2807*	*2808*
LOA	8.64 meters	8.64 meters	8.64 meters	8.64 meters
Draft	1.12 meters	1.12 meters	1.12 meters	1.12 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	7125	MBES
Applanix	POS MV V4	Positioning and Attitude System
Sea Bird	SBE 19 Plus	Sound Speed System
RESON	SVP71	Sound Speed System

Table 5: Major Systems Used

B.2 Quality Control

B.2.1 Crosslines

Crosslines acquired for this survey totaled 14% of mainscheme acquisition.

Crosslines were collected, processed and compared in accordance with 5.2.4.3 of the HSSD. Crossline miles account for 12.49% of the data acquired while mainscheme lines account for 87.75%. Surface differencing in CARIS HIPS was used to assess crossline agreement with mainscheme lines. This difference surface is submitted digitally in the Separates II folder. Figure 4 depicts a difference surface made with crosslines only.

Crossline and mainscheme differences: Grey indicates agreement, red indicates crosslines shoaler than mainscheme and blue indicates crosslines are deeper.

Figure 5 is a statistical representation of crosslines differences. 90% of nodes have a standard deviation within 1m. As expected, the areas which show the biggest discrepancies are steep.

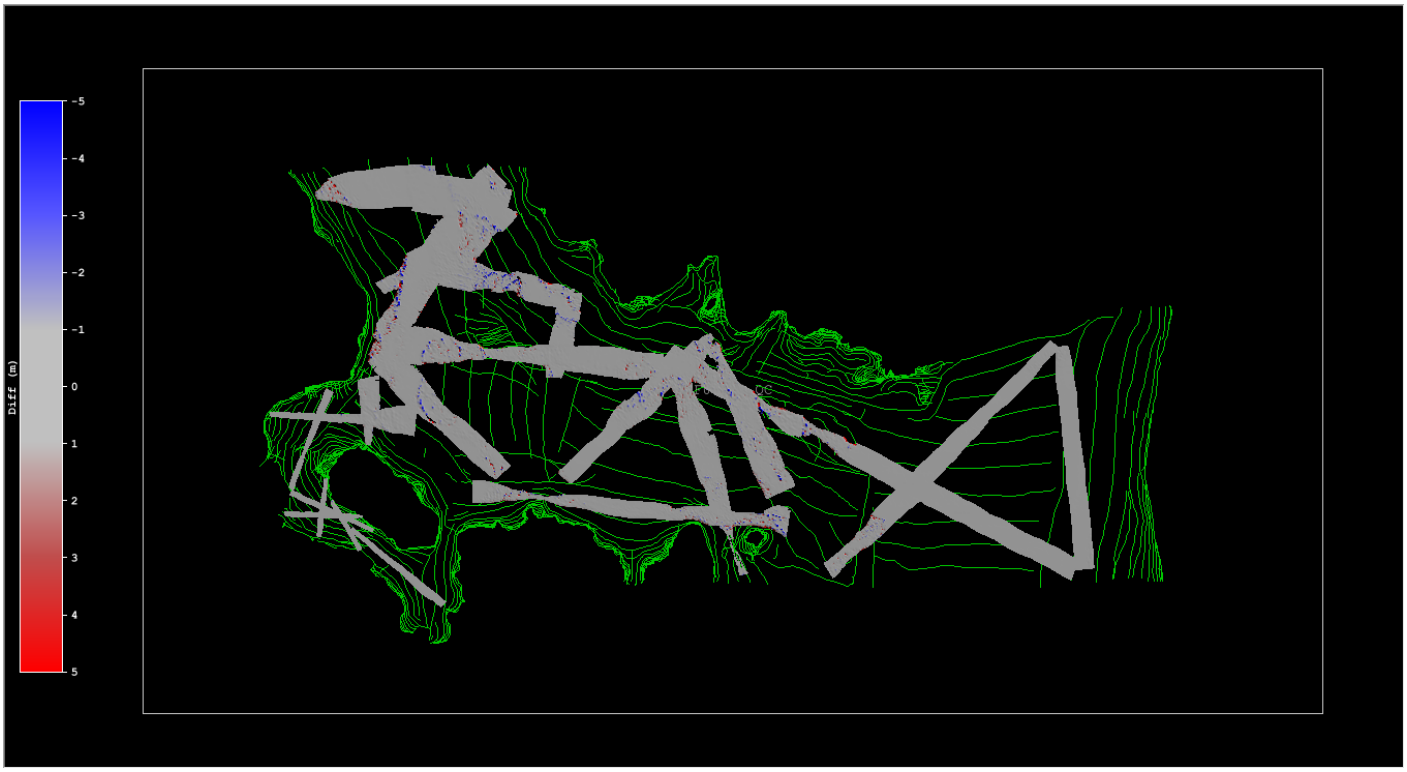
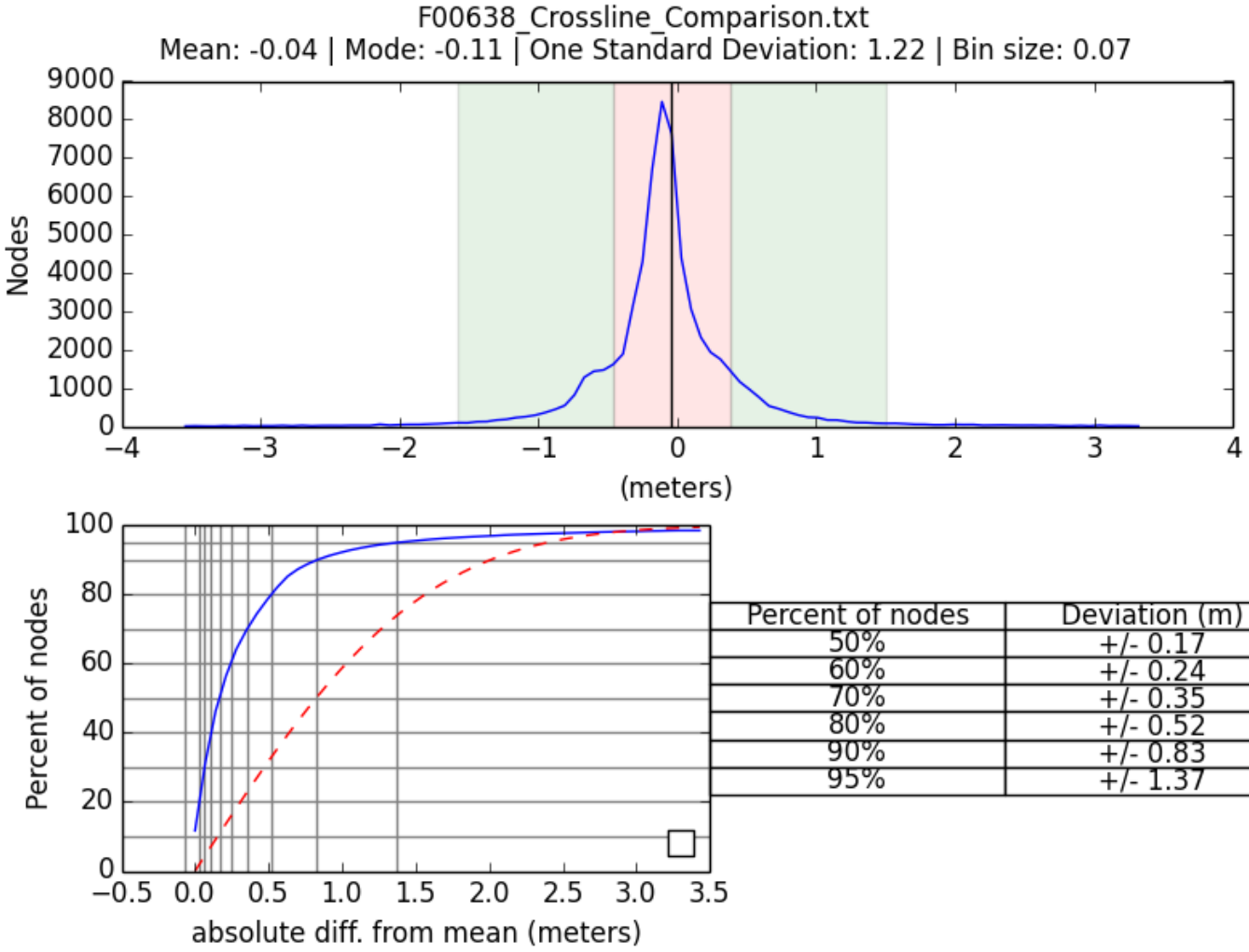


Figure 4: F00638 Crosslines Overview



Percent of nodes	Deviation (m)
50%	+/- 0.17
60%	+/- 0.24
70%	+/- 0.35
80%	+/- 0.52
90%	+/- 0.83
95%	+/- 1.37

Figure 5: F00638 Crossline Statistics

Lines classified as crosslines by the field hydrographer account for 12% of the total line mileage acquired as part of survey F00638. 88% of lines were classified as mainscheme.

B.2.2 Uncertainty

The following survey specific parameters were used for this survey:

Measured	Zoning
0.01 meters	0.23 meters

Table 6: Survey Specific Tide TPU Values

Hull ID	Measured - CTD	Measured - MVP	Surface
2805	2 meters/second		0.5 meters/second
2806	2 meters/second		0.5 meters/second
2807	2 meters/second		0.5 meters/second
2808	2 meters/second		0.5 meters/second

Table 7: Survey Specific Sound Speed TPU Values

B.2.3 Junctions

There were no junctioning surveys for F00638

There are no contemporary surveys that junction with this survey.

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

RESON 7125 200kHz Offset

For data collected on survey F00638, with launch 2805 200kHz on day number 108 there was an observable vertical offset, which varies with water depth as seen in the images below. This error is due to an incorrect setting in the RESON hardware configuration, specifically the mounting bracket offsets for the receiver reference point to projector reference point.

The offset was observed while reviewing reference surface data collected following acquisition of this project (see graphic). The "Z" value in the 2805 200kHz HVF (Transducer 1) was modified to account for the difference imposed by the incorrect setting, which resolved this vertical offset; the value was modified to 0.540 meters from 0.482 meters as shown below.

The entire survey is adequate to supersede previous data.

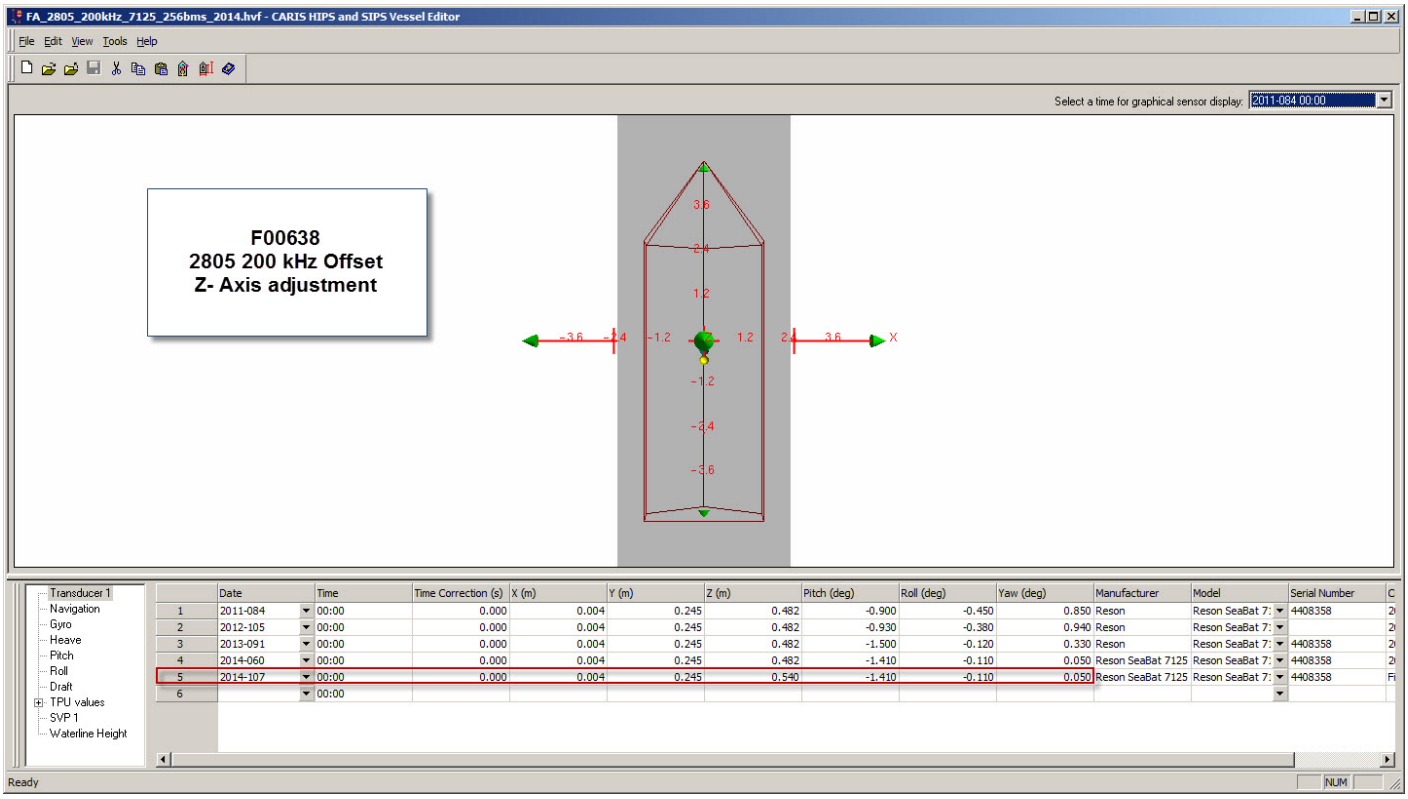


Figure 6: FA 2805 200kHz HVF Z-axis Offset adjustment

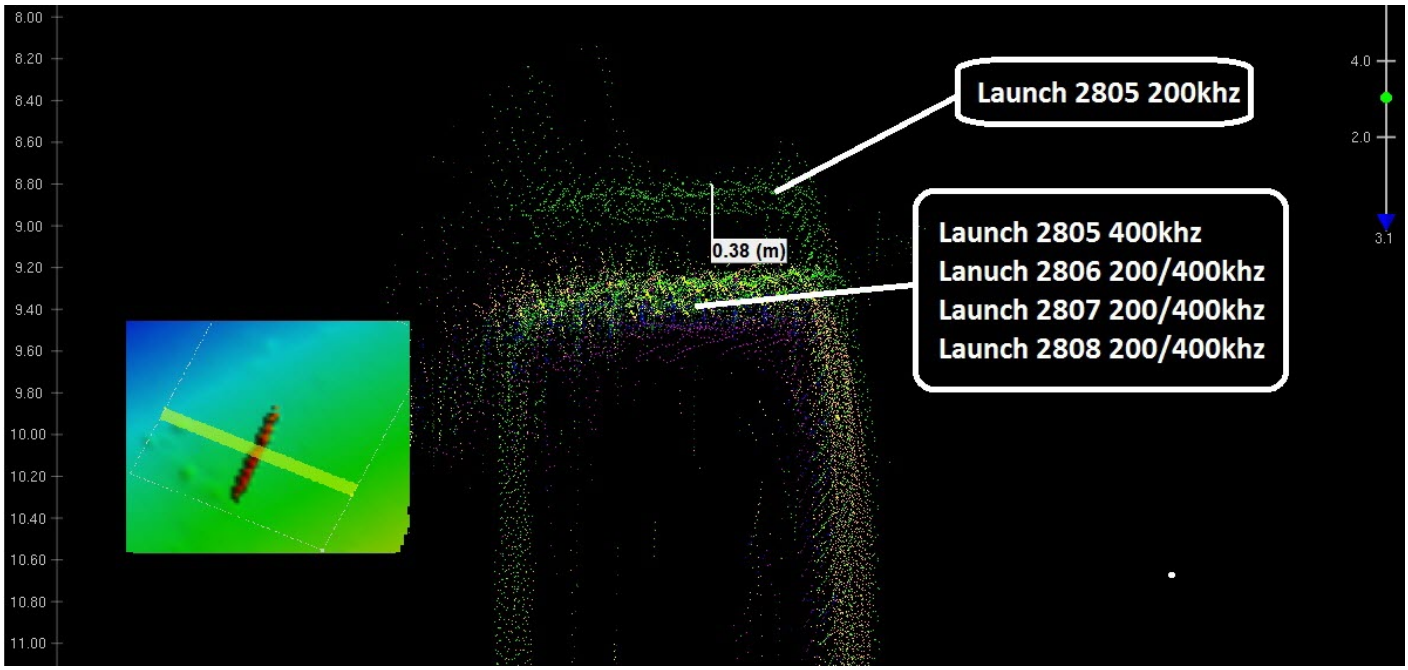


Figure 7: 2805 200kHz Offset found in reference surface

The offset described in section B.2.5 was reduced by adjusting the z-value in the Hips Vessel File. While a change to a static offset value may not entirely eliminate an offset that varies with depth, data were reviewed at the Pacific Hydrographic Branch and are adequate to supersede previous data.

B.2.6 Factors Affecting Soundings

Influence of Vegetation

Vegetation is present on the North and West sides of Friday Harbor in survey F00638. The vegetation data was not removed, nor designated, and all soundings should supersede the chart. See Figure 6 for an overview of the vegetated area and Figure 7 for a subset editor view of the same area.

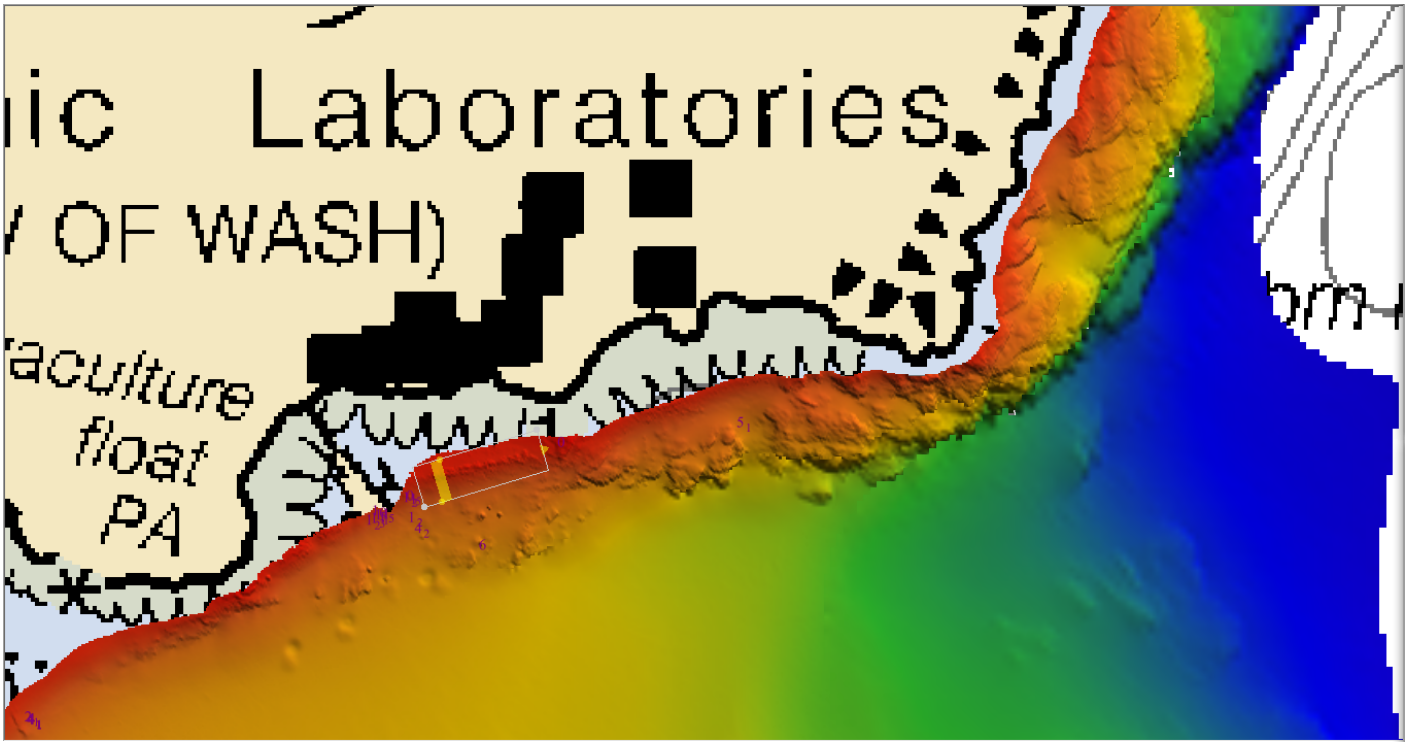


Figure 8: Overview of the northern area of Friday Harbor containing vegetation

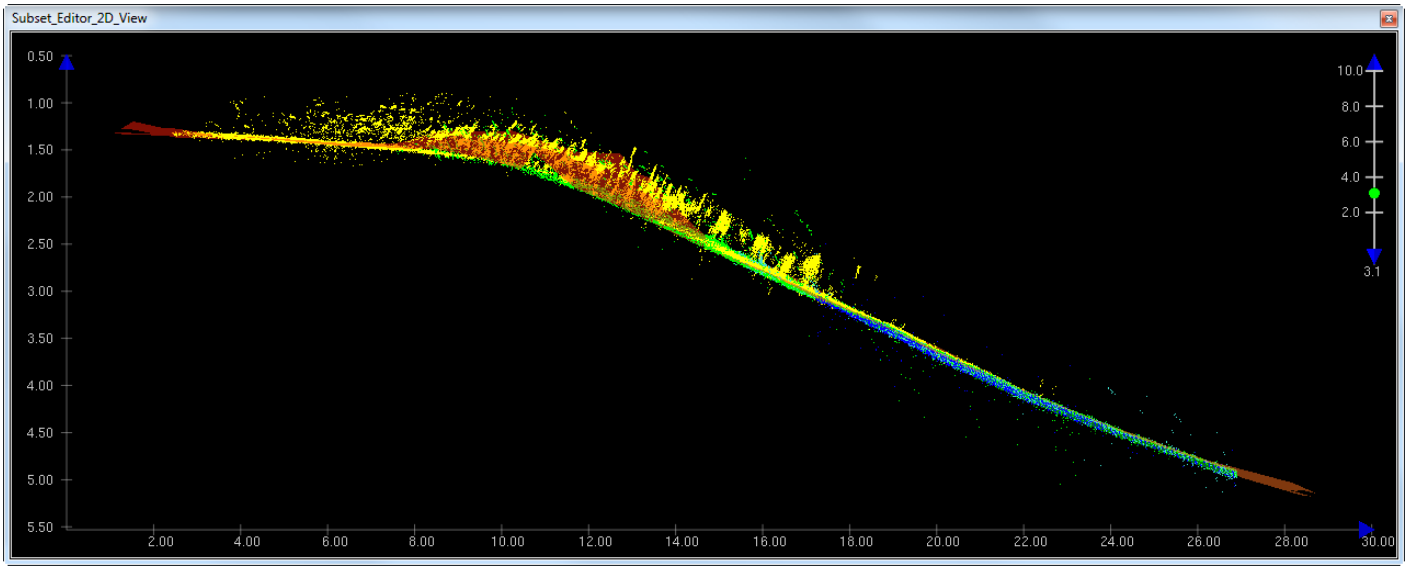


Figure 9: Subset view of vegetation

B.2.7 Sound Speed Methods

Sound Speed Cast Frequency: Sound speed measurements were conducted and applied as discussed in the Data Acquisition section of the DAPR.

The three shallowest points from cast 2014_107_154731 performed on 2806 Day number 107 at 1547 were removed because they did not agree with data from the surface sound speed velocimeter.

B.2.8 Coverage Equipment and Methods

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

B.2.9 IHO Uncertainty

All data met accuracy specifications as stated in the NOS Hydrographic Surveys Specifications and Deliverables (HSSD) dated April 2013. It was found that all finalized surfaces passed with 100% of the nodes meeting IHO specifications for survey F00638. See Standards Compliance Review in Appendix II. Figure 8 gives a visual representation of the IHO Uncertainty.

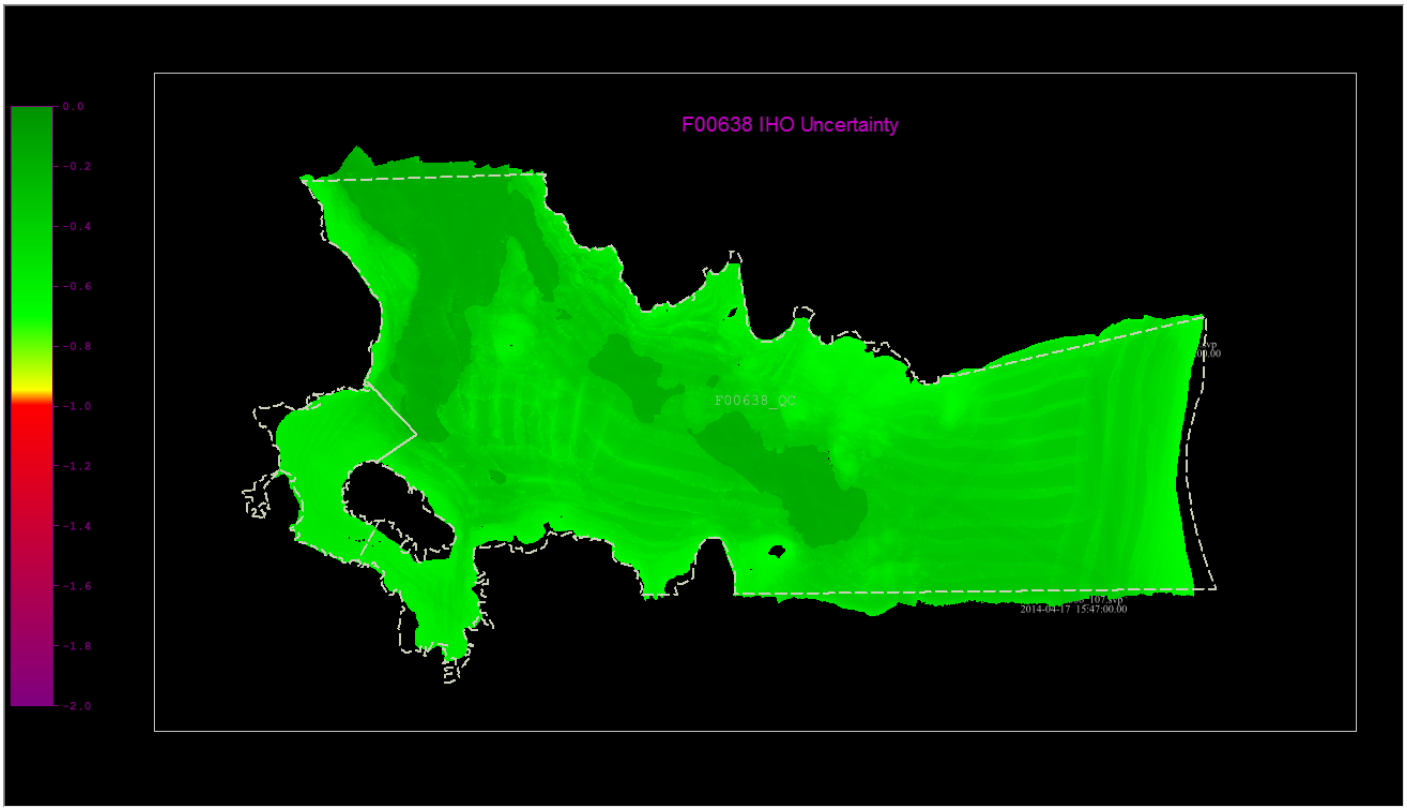


Figure 10: F00638 IHO Uncertainty

B.2.10 Density

Density requirements for all finalized surfaces were achieved with at least 99.83% of finalized surface nodes containing five or more soundings. See Standards Compliance Review.

B.2.11 Holiday Assessment

Complete multibeam coverage was obtained within the limits of F00638, with the exception of three holidays greater than three surface grid notes. Holidays near Point George and Hicks Bay are shown in Figures 9 and 10, respectively. Figure 11 shows a holiday SE of Point George, and Figure 12 shows its 2D subset view.

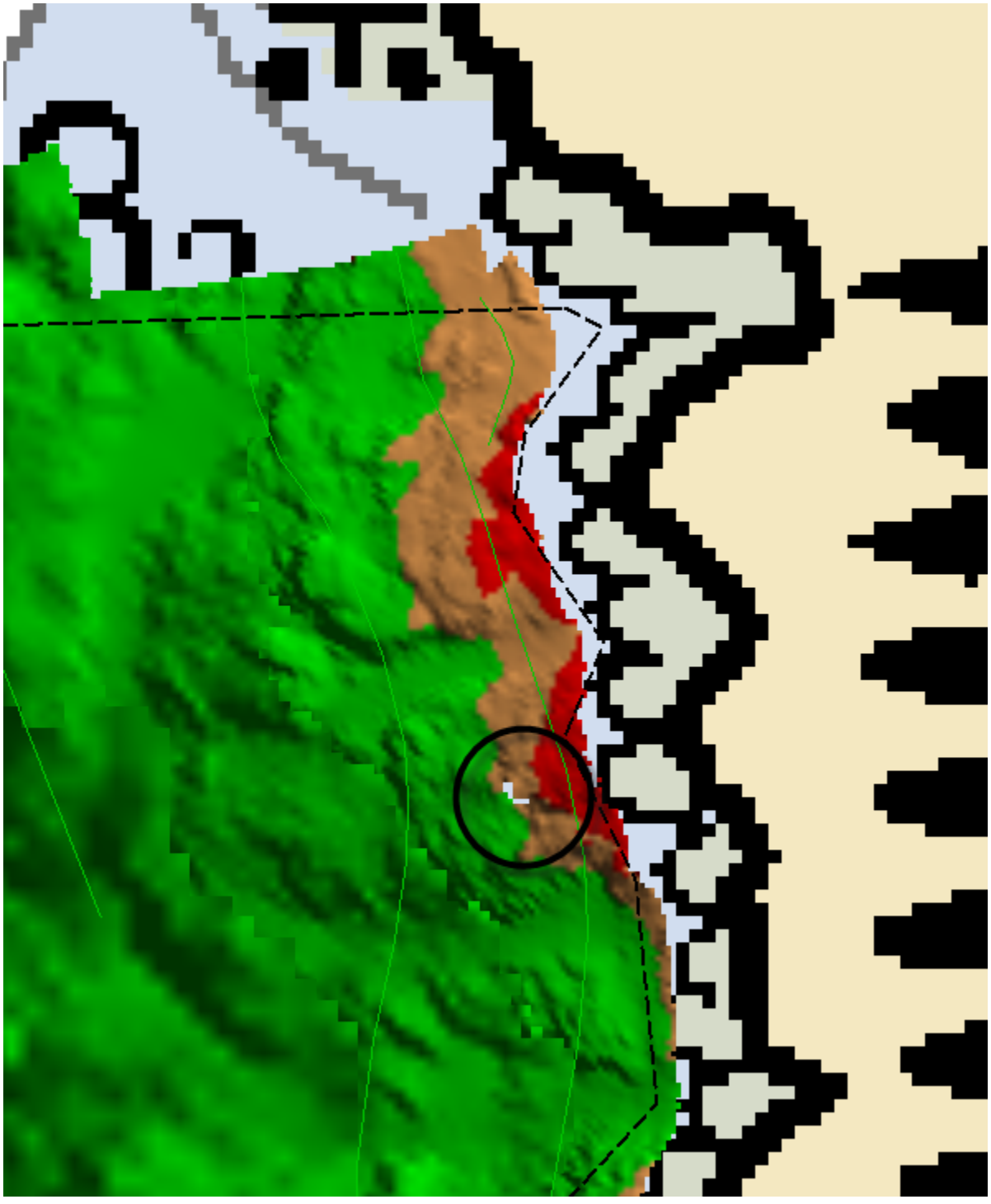


Figure 11: Holiday near Point George

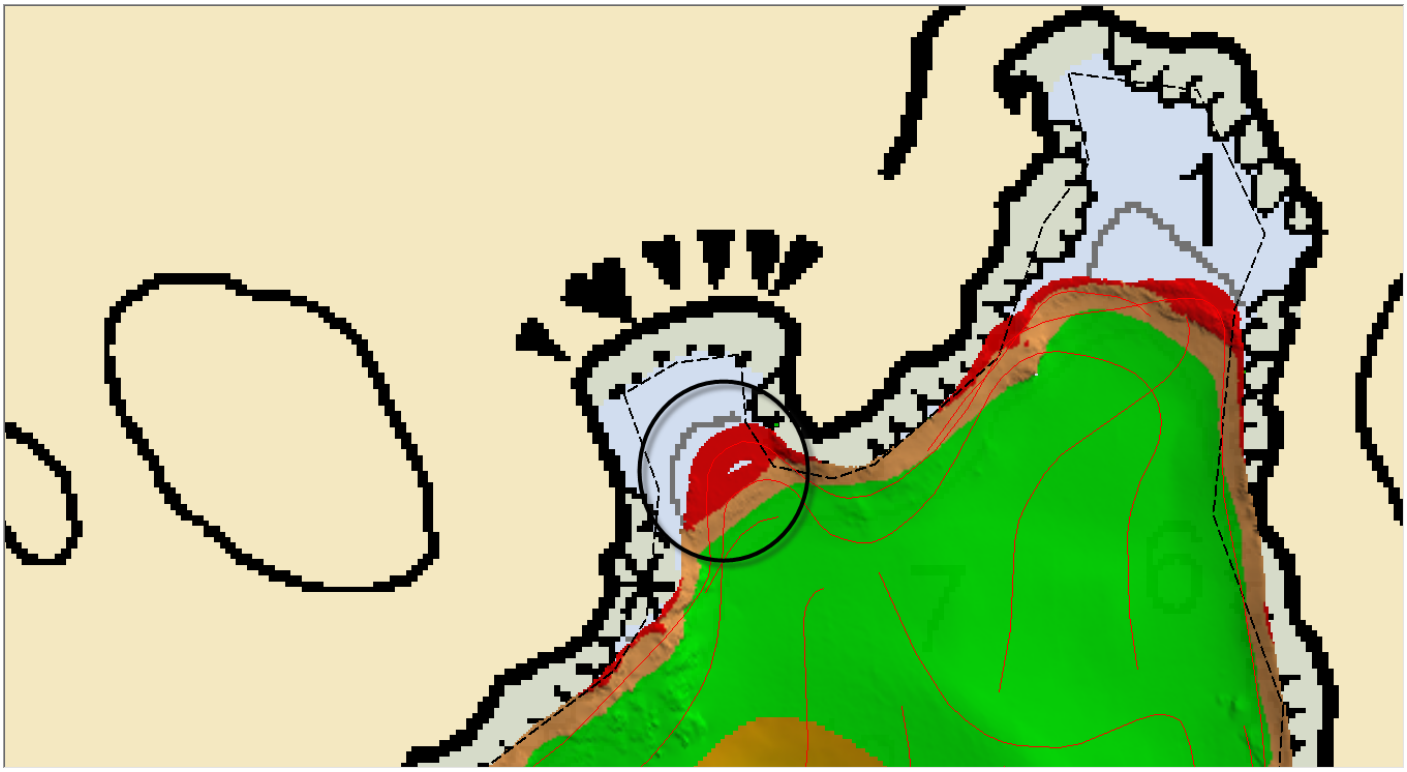


Figure 12: Holiday near Hicks Bay

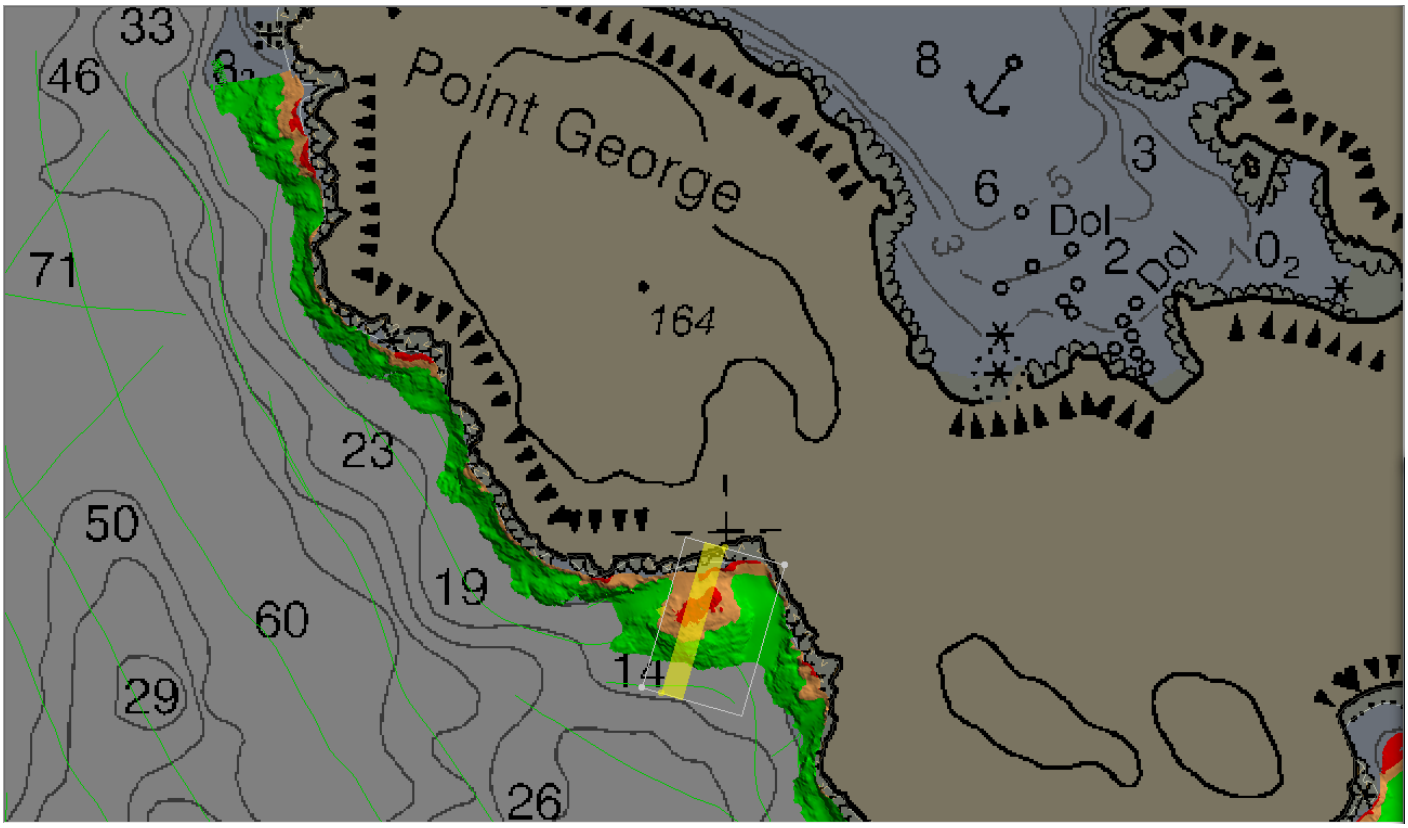


Figure 13: Holiday SE of Point George

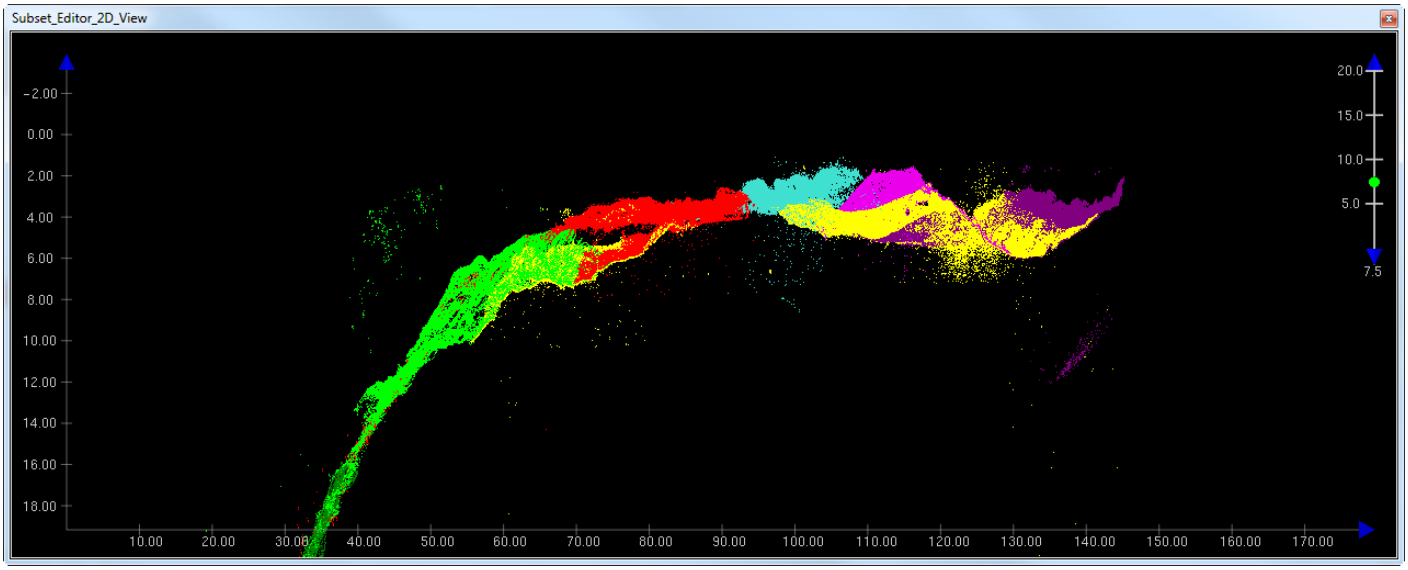


Figure 14: Holiday SE of Point George (2D View)

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 to 7k files and submitted to NGDC for file backup and to the Pacific Hydrographic Branch for processing. At this time Fairweather was not using the saturation monitoring tool. One line of multibeam backscatter data per vessel per day was processed by the field unit with the IVS Fledermaus Geocoder Toolbox for quality assurance. The processing log is submitted within the acquisition and processing log section of Separates section I.

B.5 Data Processing

B.5.1 Software Updates

The following software updates occurred after the submission of the DAPR:

Manufacturer	Name	Version	Service Pack	Hotfix	Installation Date	Use
NOAA	Pydro	14.6			01/06/2014	Processing
Caris	Bathy DataBASE	4.0.9			03/03/2014	Processing
Caris	HIPS/SIPS	8.1.7			04/01/2014	Processing
Caris	HIPS/SIPS	8.1.8			07/07/2014	Processing
Caris	HIPS/SIPS	8.1.9			09/15/2014	Processing
Caris	HIPS/SIPS	8.1.10			09/29/2014	Processing
Caris	HIPS/SIPS	8.1.11			01/05/2015	Processing
Applanix	PosPAC	6.2	2		01/13/2014	Processing

Table 8: Software Updates

The following Feature Object Catalog was used: NOAA Profile V_5_3_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
F00638_MB_1m_MLLW	CUBE	1 meters	-	NOAA_1m	Complete MBES
F00638_MB_2m_MLLW	CUBE	2 meters	-	NOAA_2m	Complete MBES
F00638_MB_4m_MLLW	CUBE	4 meters	-	NOAA_4m	Complete MBES
F00638_MB_8m_MLLW	CUBE	8 meters	-	NOAA_8m	Complete MBES
F00638_MB_1m_MLLW_Final	CUBE	1 meters	0 meters - 25 meters	NOAA_1m	Complete MBES
F00638_MB_2m_MLLW_Final	CUBE	2 meters	18 meters - 45 meters	NOAA_2m	Complete MBES
F00638_MB_4m_MLLW_Final	CUBE	4 meters	36 meters - 90 meters	NOAA_4m	Complete MBES

Surface Name	Surface Type	Resolution	Depth Range	Surface Parameter	Purpose
F00638_MB_8m_MLLW_Final	CUBE	8 meters	72 meters - 180 meters	NOAA_8m	Complete MBES
F00638_MB_8m_Combined	CUBE	8 meters	0 meters - 180 meters	NOAA_8m	Complete MBES

Table 9: Submitted Surfaces

The NOAA CUBE parameters mandated in HSSD were used for the creation of all CUBE BASE surfaces in Survey F00638.

The surfaces have been reviewed where noisy data, or 'fliers' are incorporated into the gridded solution causing the surface to be shoaler than the true sea floor. 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.

Ranges for the finalized layers were extended beyond the standard practice with permission of the branch. See Correspondence in Appendix II for additional details.

B.5.3 Data Logs

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 F00638 Data Log spreadsheet. All data logs are submitted digitally in the Separates I folder.

B.5.4 Critical Soundings

Designation of soundings followed procedures as outlined in section 5.2.1.2 of the HSSD. Survey F00638 contained 14 soundings which were Designated in CARIS HIPS. These designated soundings were used to draw the CUBE surface to the sounding which accurately represented the sea floor in cases where the surface differenced from the sounding more than the vertical IHO requirements allowed. The survey also contained 121 Outstanding soundings which were used to reference discrete points for feature creation and attribution in CARIS Bathy Database. Designated soundings for F00638 are shown in Figure 13.

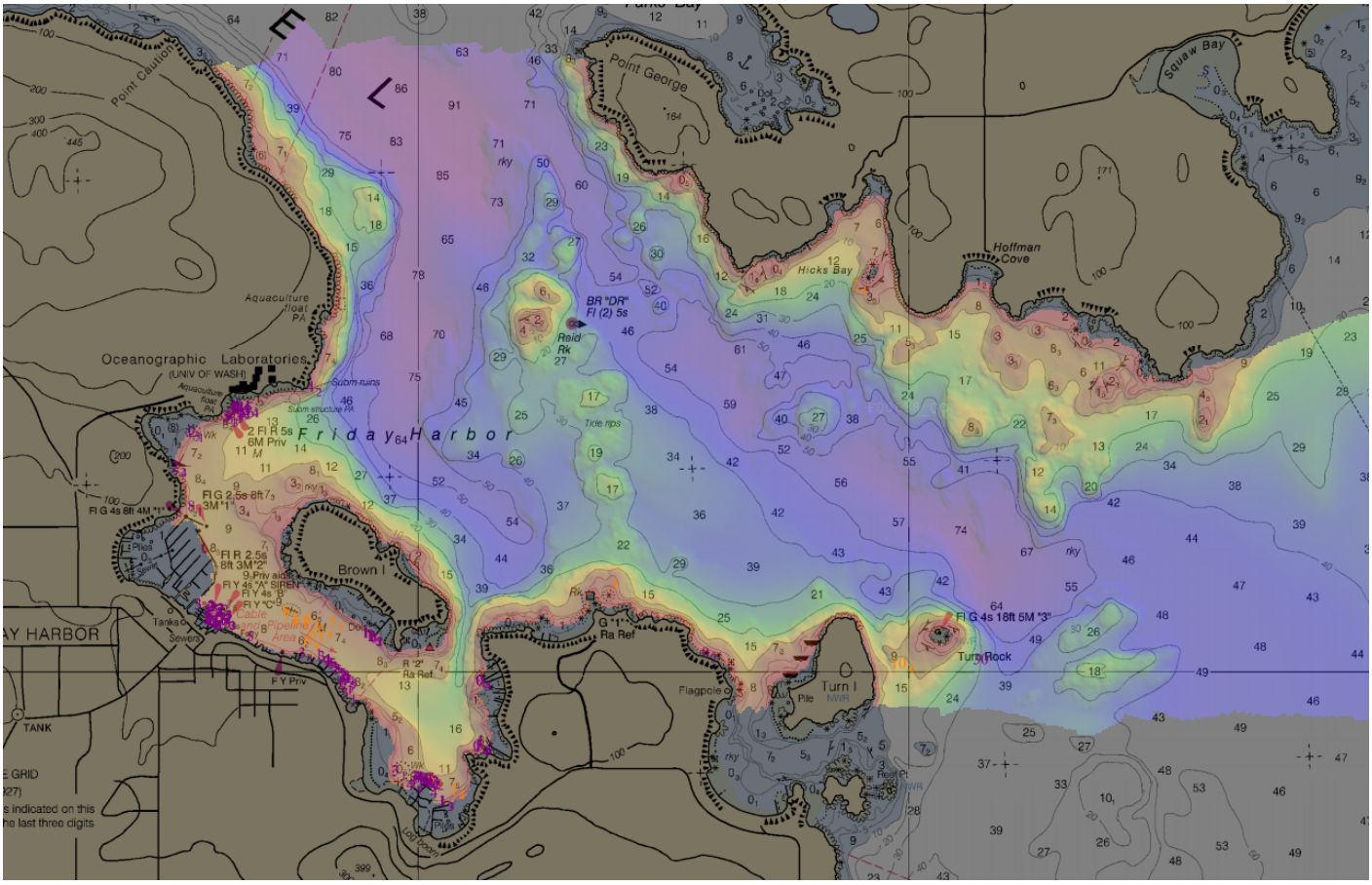


Figure 15: F00638 Designated Soundings. Orange = Designated, Purple = Outstanding

B.5.5 Acquisition Computer Time

On launch 2807, Day numbers 107 and 108, the acquisition computer time was not set to UTC, causing a timing offset. This was remedied through through the reprocessing of the HSX files with Hypack to correct the timing offset. The reprocessed lines were labeled with _new at the end, and were the ones used in CARIS processing.

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:

Discrete Zoning

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

Station Name	Station ID
Friday Harbor	9449880
Port Townsend	9444900

Table 10: NWLON Tide Stations

File Name	Status
9449880.tid	Final Approved

Table 11: Water Level Files (.tid)

File Name	Status
N305FA2014CORP.ZDF	Final

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

A request for final approved tides was sent to N/OPS1 on 05/04/2014. The final tide note was received on 05/08/2014.

Preliminary zoning was verified by CO-OPS and determined to be accurate for use as final zoning.

Non-Standard Vertical Control Methods Used:

VDatum

Ellipsoid to Chart Datum Separation File:

2014_N305_VDatum_NAD83Ellip_MLLW.csar

The V Datum separation file was applied in accordance with the FPM. V Datum was used for the vertical transformation of ellipsoid-referenced data to MLLW and is applied for data submission. All soundings were merged in CARIS HIPS and SIPS using the Apply GPS Tide function, and TPU was computed with the new

V Datum uncertainty value. See correspondence in Appendix II for additional information on V Datum use and approval.

V Datum was not used for vertical corrections in the submitted data. The data was reduced to MLLW using verified tides. The Tide Note is attached.

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 North.

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 F00638 POSPac Processing Logs spreadsheet located in the SBET folder with the GNSS data.

All data from F00638 can be referenced to the ellipsoid.

The following CORS Stations were used for horizontal control:

HVCR Site ID	Base Station ID
P435	ShoresNW1GWA2005
P438	NWIS_PNGA_WA2005
P439	OrcasAirptWA2005
PGC5	PGC5000
SC02	SC02_PNGA_WA2001
WHD5	WHIDBEY ISLAND 6

Table 13: CORS Base Stations

The following DGPS Stations were used for horizontal control:

DGPS Stations
Whidbey Island, WA - 302 kHz

Table 14: USCG DGPS Stations

D. Results and Recommendations

D.1 Chart Comparison

CARIS HIPS was used to create soundings and contours at the appropriate map scale for chart comparison. These soundings were shown above the chart and a 8-meter combined surface. A visual comparison to compare soundings and contours was done between the digital surfaces generated from the survey data and the raster chart for the area.

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
18434	1:25000	7	04/2008	06/06/2014	06/06/2014

Table 15: Largest Scale Raster Charts

18434

Soundings from survey F00638 generally agree within one to three fathoms of the soundings on chart 18434. However, the Northwest side of the survey area has several soundings charted shoaler than the newest data, shown in Figure 14. Contours for Chart 18434 also agree with surveyed soundings except for on the Northwest side of survey F00638, where survey depths are deeper than charted soundings (Figure 15).

One charted sounding on the Northwest side of the survey area was discovered to be placed directly in a relief of the surface, so the chart shows a depth deeper than the surrounding depths. This area is shown in Figure 16, with its 2-Dimensional subset shown in Figure 17.

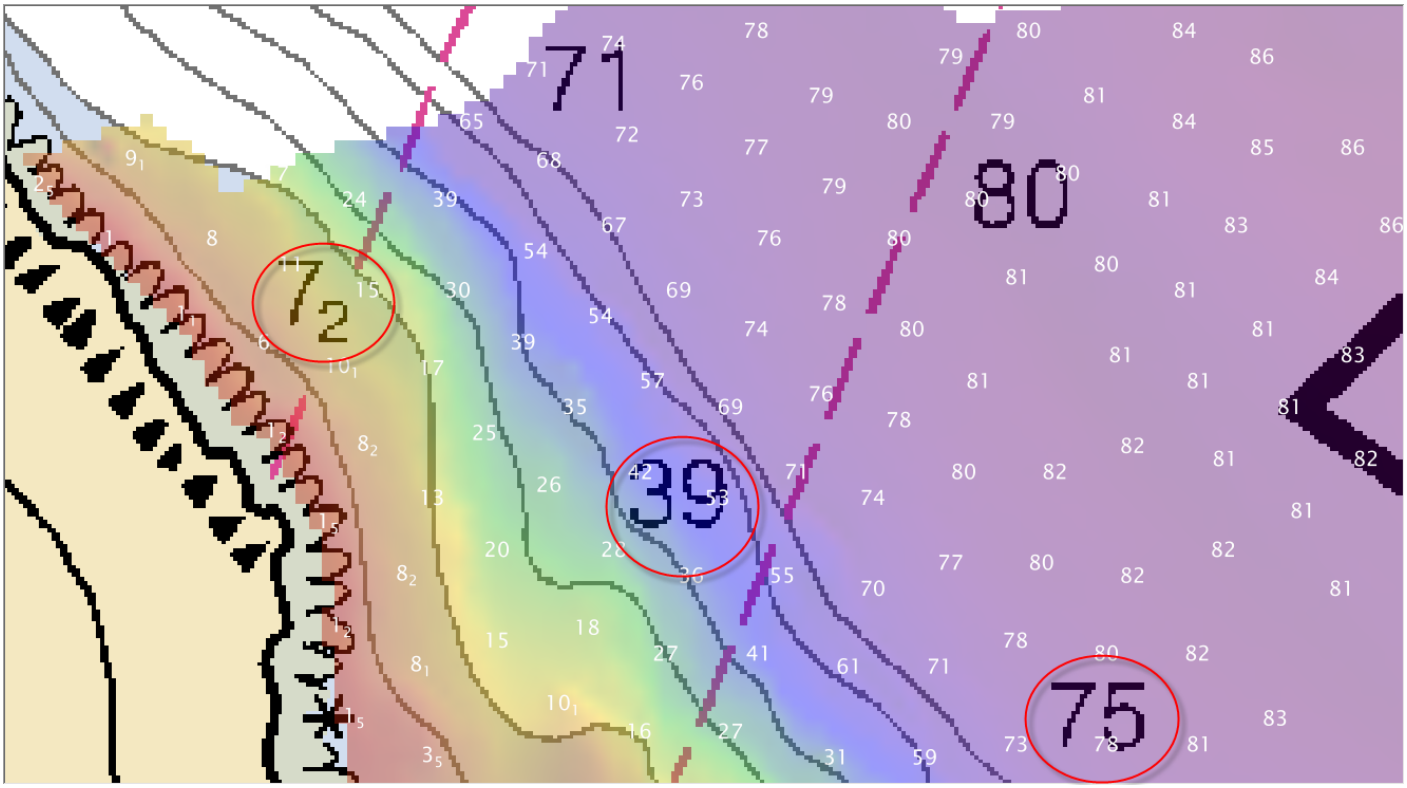


Figure 16: Charted soundings too shallow on NW side of F00638

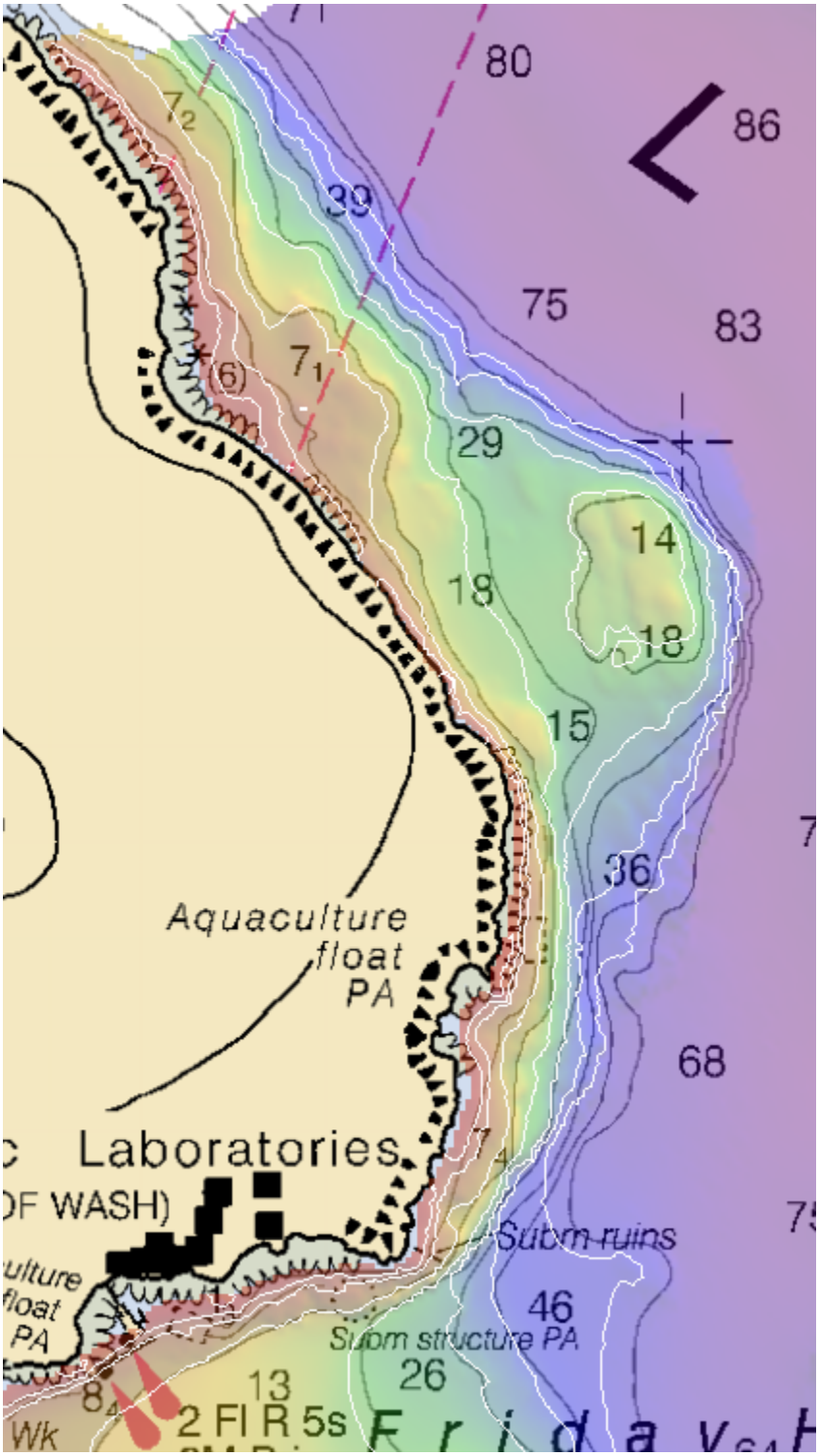


Figure 17: Charted contours too shallow on NW side of F00638

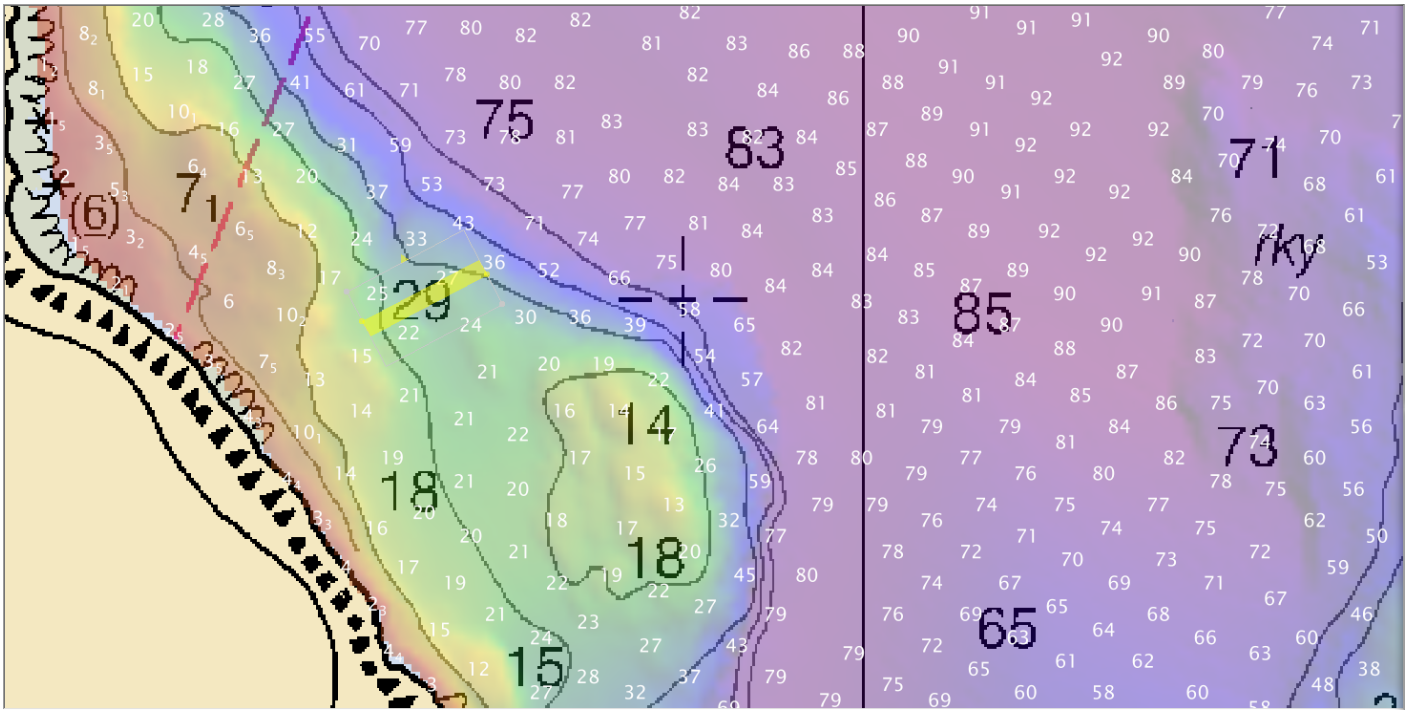


Figure 18: Sounding charted in a relief

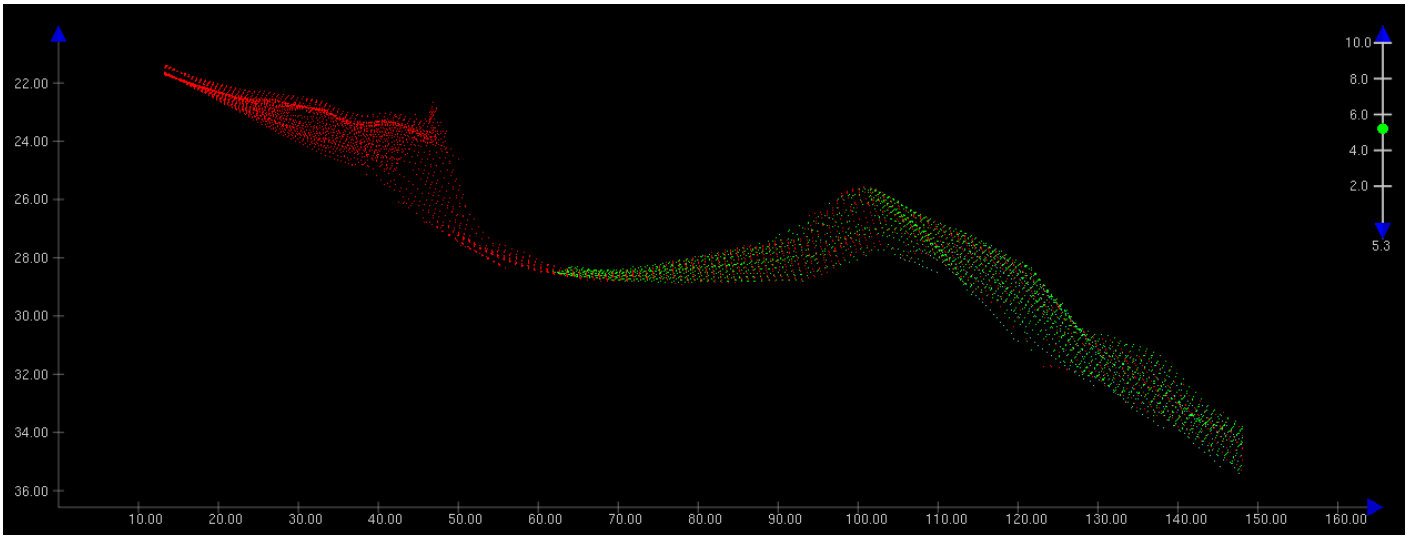


Figure 19: Sounding charted in a relief (2D Subset view)

The survey also falls on raster chart 18423 (1:20,000). Charted depths were found to be within +/- 2 fathoms of surveyed depths. No navigationally significant discrepancies were found.

D.1.2 Electronic Navigational Charts

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

ENC	Scale	Edition	Update Application Date	Issue Date	Preliminary?
US5WA42M	1:25000	10	05/26/2014	01/23/2013	NO
US5WA40M	1:25000	7	05/26/2014	02/12/2012	NO

Table 16: Largest Scale ENCs

US5WA42M

Soundings from survey F00638 generally agree within one to three fathoms of the soundings on chart US5WA42M. Contours in CARIS HIPS closely approximated the charted contours. See comments from Raster Chart 18434 for more information.

US5WA40M

Soundings from survey F00638 generally agree within one to three fathoms of the soundings on chart US5WA40M. Contours in CARIS HIPS closely approximated the charted contours. See comments from Raster Chart 18434 for more information.

D.1.3 AWOIS Items

Four AWOIS items with search radii were assigned for investigation for survey F00638. All AWOIS items are contained within the Final Feature File unless they were disproved and have no corresponding charted feature.

#53082 - Complete MBES coverage of the search radius up to the NALL produced a contact with a least depth of 3.822m. Sheet Manager recommends updating the feature.

#52560 - 200% MBES coverage of the search radius up to the NALL detected no contacts. Sheet Manager recommends removing AWOIS 52560 from the registry and chart.

#54158 - Complete MBES coverage of the search radius up to to the sheet limits detected no contacts. Sheet Manager recommends removing AWOIS 54158 from the registry and chart.

#54147 - 200% MBES coverage of the search radius produced a contact centered 25m to the SW of the published position. The dimensions of the contact are approximately 28m in width, 50m in length, and

1.3m height. The contact's extents were updated by adding a new feature and recommending removal of the previous one.

The feature report including AWOIS items is attached.

D.1.4 Maritime Boundary Points

No Maritime Boundary Points were assigned for this survey.

D.1.5 Charted Features

All assigned features for survey F00638 were investigated or attributed as 'Not Addressed' if they were in shore of the NALL. All addressed charted features are included in the Final Feature File.

D.1.6 Uncharted Features

The Final Feature File includes 16 features with the Description 'New'.

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

No channels exist for this survey. There are no designated anchorages, precautionary areas, safety fairways, traffic separation schemes, pilot boarding areas, or channel and range lines within the survey limits.

D.1.10 Bottom Samples

Two bottom samples were acquired in accordance with the Project Instructions or the HSSD. Bottom Samples are included in the Final Feature File and the Final Feature Report located in Appendix II.

The bottom samples were recommended for charting and included in the chart update product. The attached feature report does not include the bottom samples.

D.2 Additional Results

D.2.1 Shoreline

Fairweather personnel conducted limited shoreline verification within the limits of survey F00638. 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 F00638 do not conform to those detailed in the DAPR, due to limited time and availability for personnel. Heights were not obtained on 2 features-- Turn Rock and the reef on the East side of Hick's Bay. See attribution in "F00638_Final_Feature_File" for details.

A new pier was digitized based on extents of pilings seen in multibeam, as the pier was not investigated during Shoreline activities (Figure 18). The sheet manager recommends that MCD digitize the pier from available ortho-imagery or as built drawings.

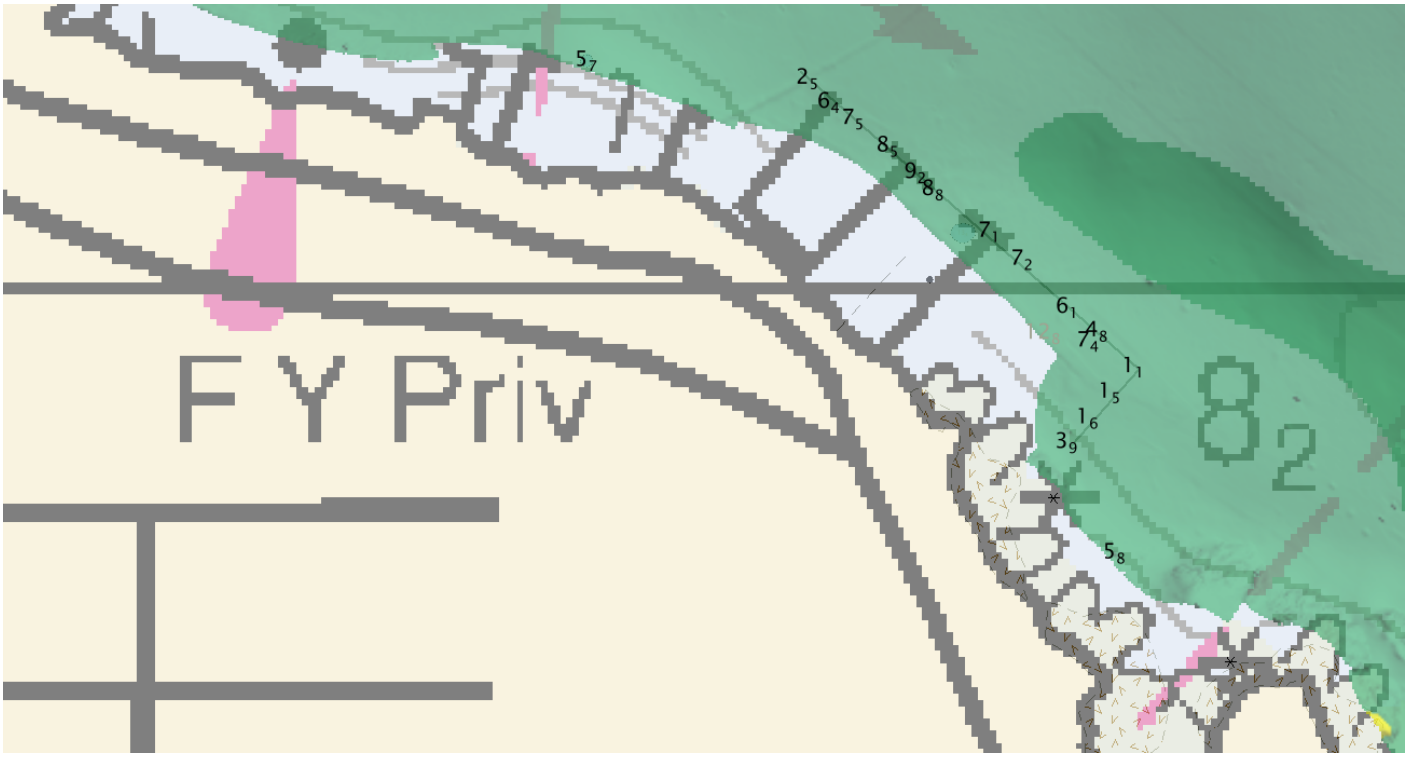


Figure 20: New Pier Extents

Figure 21: Google Earth Image of New Pier

D.2.2 Prior Surveys

No prior survey comparisons exist for this survey.

D.2.3 Aids to Navigation

All ATONs addressed on sheet F00638 were serving their intended purpose and were positioned as charted. A new daymark, discovered on top of one of the ferry terminal dolphins, was added to the Final Feature File. The Final Feature File details which ATONs were addressed.

The ATONs at the ferry terminal are not correctly charted. The lights were included in the HCell at their published (CG Light List) positions and were recommended to be updated.

D.2.4 Overhead Features

No overhead features exist for this survey.

D.2.5 Submarine Features

There are three cable areas in survey F00638. Cable areas in the Northwest corner of the survey and in the Northeast corner near flat point were investigated in the multibeam data, but did not reveal any obtruding features. The cable and pipeline area in Friday Harbor has a pipleline clearly shown in the surface (Figure 19) and in the Subset view (Figures 20 and 21).

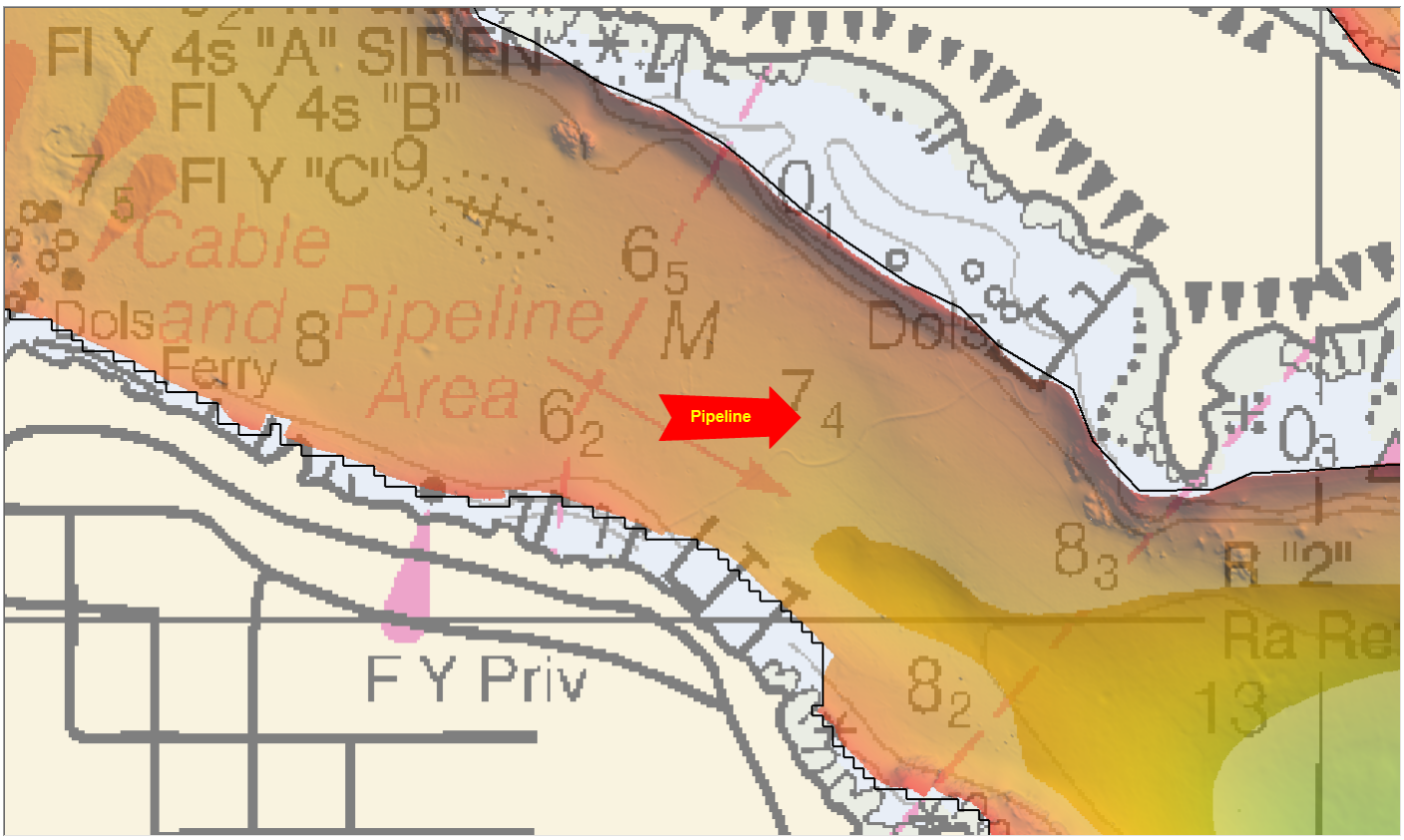


Figure 22: Friday Harbor Pipeline shown in surface

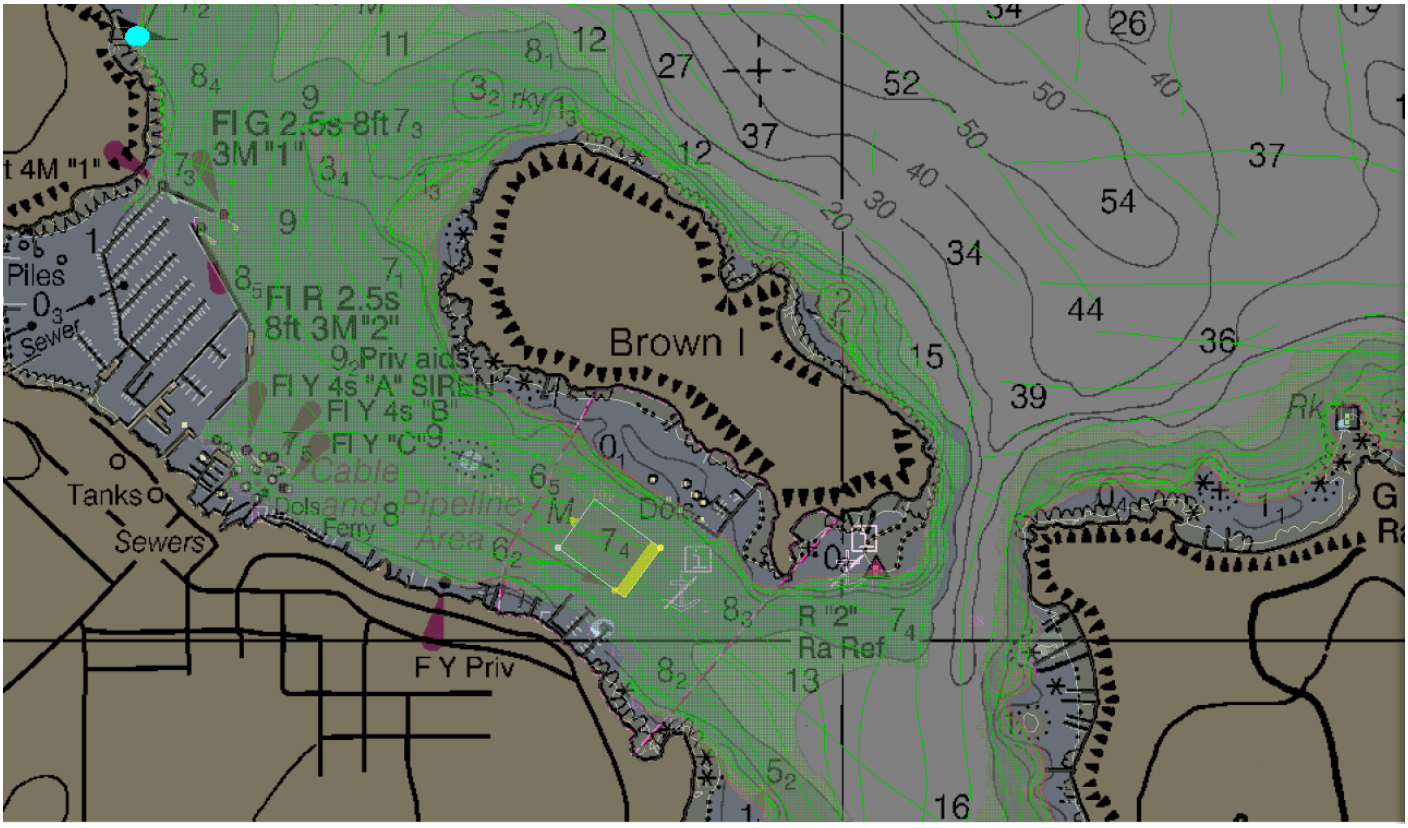


Figure 23: Friday Harbor Pipeline Subset

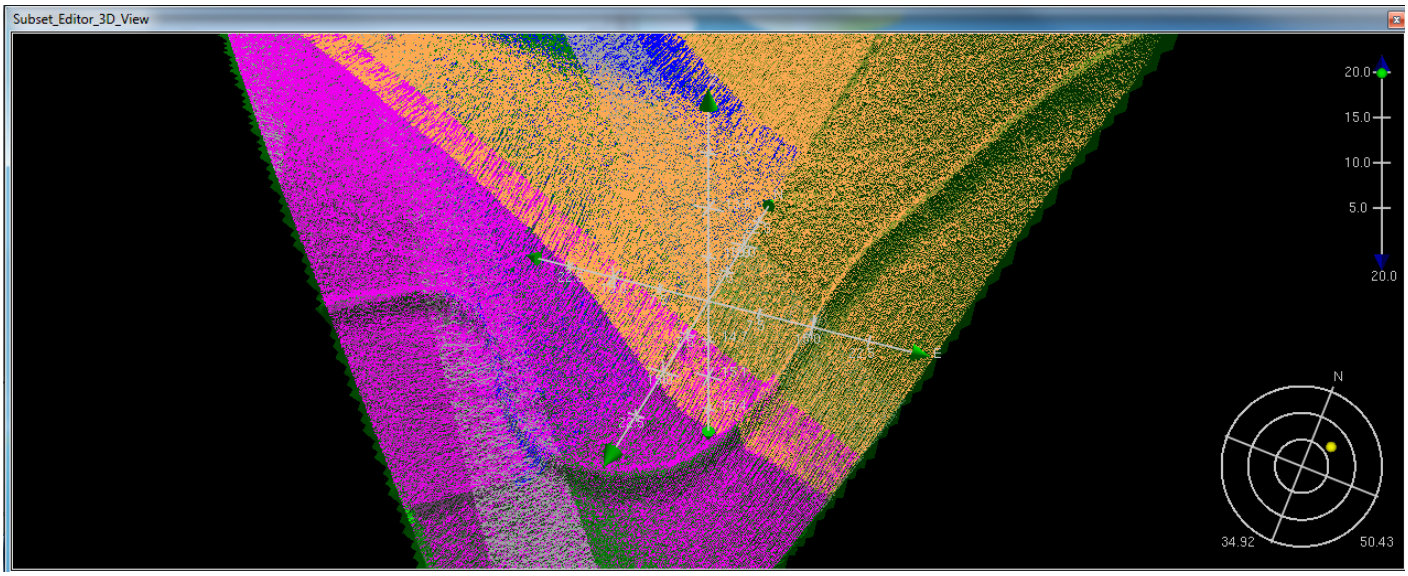


Figure 24: Friday Harbor Pipeline 3D View

D.2.6 Ferry Routes and Terminals

Multiple ferry routes and exist for this survey, but were not investigated. Contact the Navigation Manager for communications with ferry personnel to update the routes. No ferry routes are currently reflected on Chart 18434.

D.2.7 Platforms

No platforms exist for this survey.

D.2.8 Significant Features

The Friday Harbor ferry terminal appears to have undergone major changes. Several pilings were removed and others added, as seen in the multibeam and final feature file. The Northwest Navigation Manager was contacted to help acquire CAD drawings from the Washington State Ferry System. The sheet manager recommends that MCD update the charted ferry terminal from CAD drawings.

D.2.9 Construction and Dredging

No present or planned construction or dredging exist within the survey limits.

D.2.10 New Survey Recommendation

No new surveys or further investigations are recommended for this area.

D.2.11 Inset Recommendation

No new insets are recommended for this area.

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, 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	2015-01-20
Coast Pilot Report	2014-06-18

Approver Name	Approver Title	Approval Date	Signature
CDR David J. Zezula	Chief of Party	01/21/2015	David Zezula 2015.01.22 11:01:18 -08'00'
LT Ryan A. Wartick	Field Operations Officer	01/21/2015	Digitally signed by Ryan Wartick Date: 2015.01.22 08:46:49 -08'00'
LT Matthew M. Forney	Field Operations Officer	01/21/2015	Matthew Forney 2015.01.22 09:13:00 -08'00'
HCST Tami M. Beduhn	Chief Survey Technician	07/25/2014	Tami Beduhn 2014.07.25 13:59:15 -08'00'
ENS Kristin M. Golmon	Sheet Manager	07/25/2014	Kristin Golmon

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 Staiton
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
TPE	Total Porpagated Error
TPU	Topside Processing Unit
USACE	United States Army Corps of Engineers
USCG	United Stated Coast Guard
UTM	Universal Transverse Mercator
XO	Executive Officer
ZDA	Global Positiong System timing message
ZDF	Zone Definition File

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

TIDE NOTE FOR HYDROGRAPHIC SURVEY

DATE : May 09, 2014

HYDROGRAPHIC BRANCH: Pacific
HYDROGRAPHIC PROJECT: OPR-N305-FA-2014
HYDROGRAPHIC SHEET: F00638

LOCALITY: Brown Island to Flat Point, Strait of Juan De Fuca, WA
TIME PERIOD: April 17 - 22, 2014

TIDE STATION USED: 944-9880 Friday Harbor, WA
Lat. 48° 32.8'N Long. 123° 0.6' W
PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters
HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 2.167 meters

REMARKS: RECOMMENDED ZONING

Preliminary zoning is accepted as the final zoning for project OPR-N305-FA-2014, F00638, during the time period between April 17 - 22, 2014.

Please use the zoning file N305FA2014CORP submitted with the project instructions for OPR-N305-FA-2014. Zones PS287 and PS270 is applicable zones for F00638.

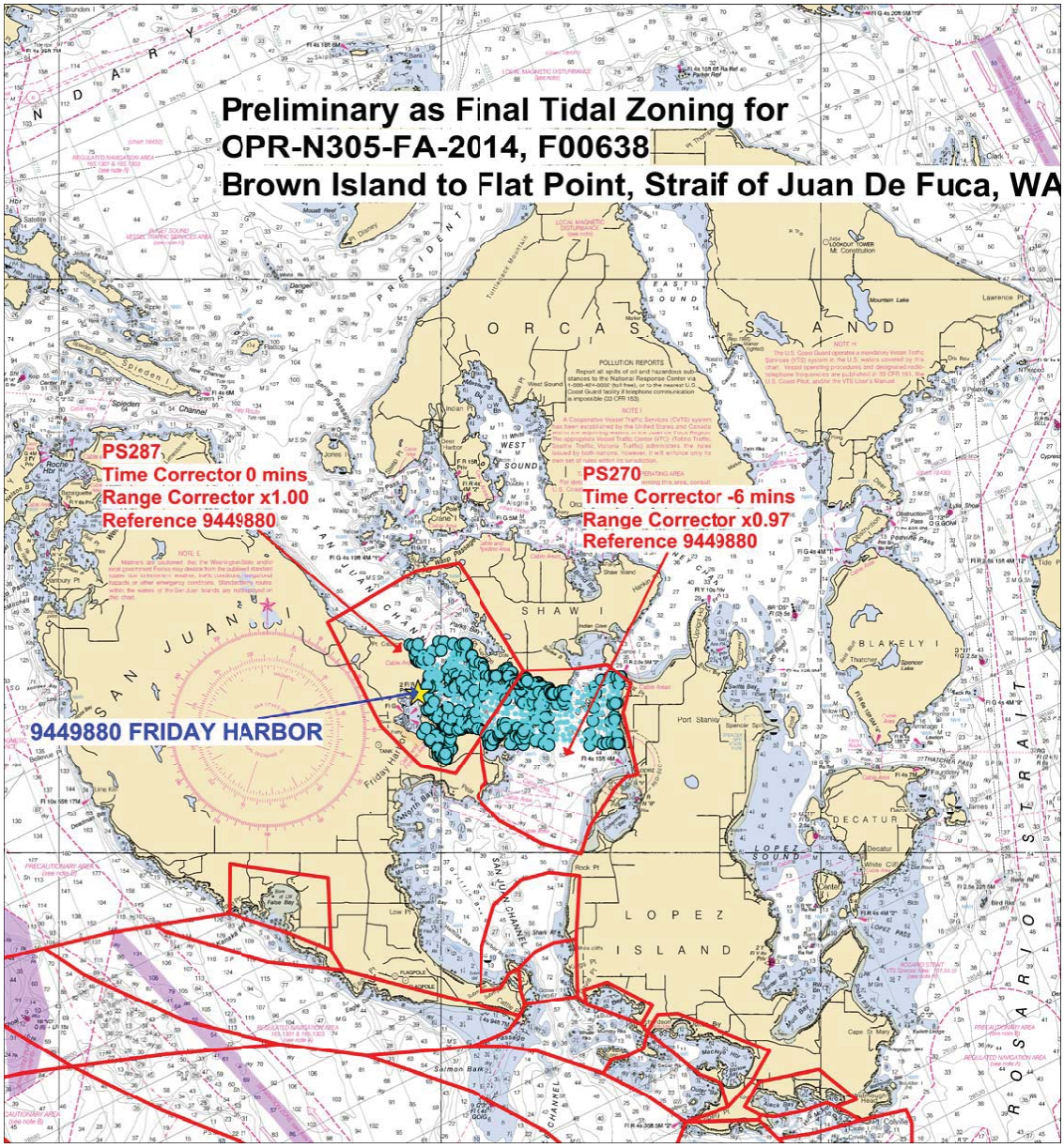
Refer to attachments for zoning information.

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).

HOVIS.GERALD.THOMAS.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: 2014.05.16 10:46:42 -04'00'

CHIEF, PRODUCTS AND SERVICES BRANCH


Preliminary as Final Tidal Zoning for
OPR-N305-FA-2014, F00638
Brown Island to Flat Point, Straif of Juan De Fuca, WA
PS287
Time Corrector 0 mins
Range Corrector x1.00
Reference 9449880
PS270
Time Corrector -6 mins
Range Corrector x0.97
Reference 9449880
9449880 FRIDAY HARBOR
ORCAS ISLAND
SHAW I
BLAKELY I
DECATUR
LOPEZ ISLAND
SAN JUAN I
PRESIDENT CHANNEL
SAN JUAN CHANNEL
ROSARIO STRAIT

Ryan Wartick - NOAA Federal <ryan.wartick@noaa.gov>

F00637 and F00638

ChiefST.Fairweather <ChiefST.Fairweather@noaa.gov> Tue, Jun 3, 2014 at 12:24 PM
To: Corey Allen - NOAA Federal <Corey.Allen@noaa.gov>
Cc: Michael Gonsalves - NOAA Federal <Michael.Gonsalves@noaa.gov>, CO Fairweather <CO.Fairweather@noaa.gov>, _OMAO MOP OPS Fairweather <OPS.Fairweather@noaa.gov>, Christina Fandel - NOAA Federal <Christina.Fandel@noaa.gov>, Theresa Madsen - NOAA Federal <Theresa.A.Madsen@noaa.gov>, Kristin Golmon - NOAA Federal <Kristin.M.Golmon@noaa.gov>, Brian Mohr - NOAA Federal <Brian.Mohr@noaa.gov>

Thank you Mike and Corey-

We will be folding F00637 into F00638 and using F00638 for submission. If we have any issues with the "copy project" function in HIPS, we are lucky enough to have CARIS sailing with us next leg to help with any issues if they do arise. Thank you for your prompt responses and we will submit an updated survey outline as soon as possible. This will aid us in getting the surveys to the branch the quickest.

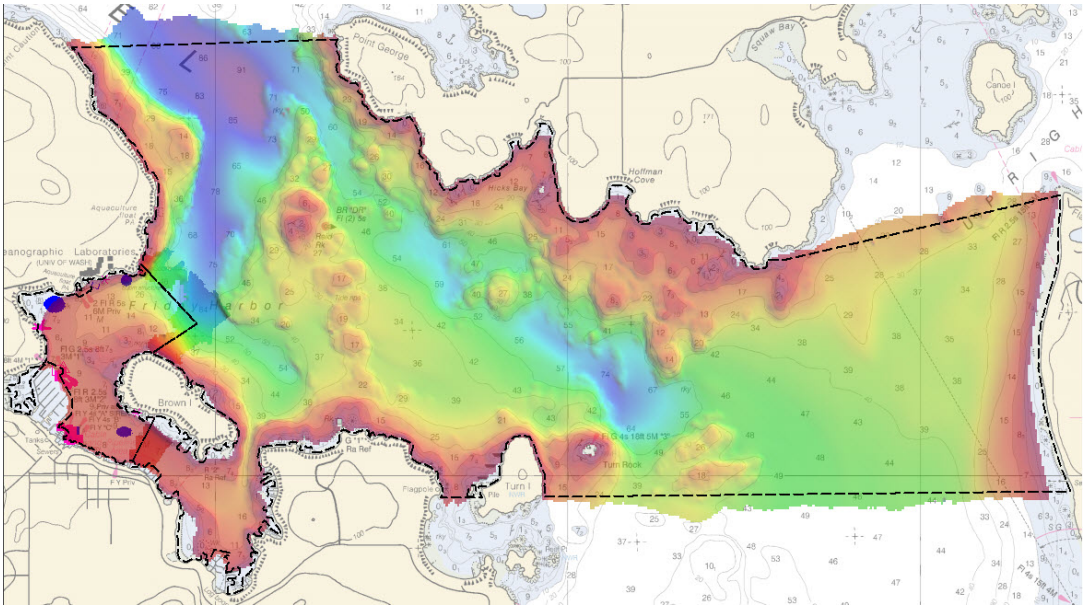
Thank you for your time.

Tami

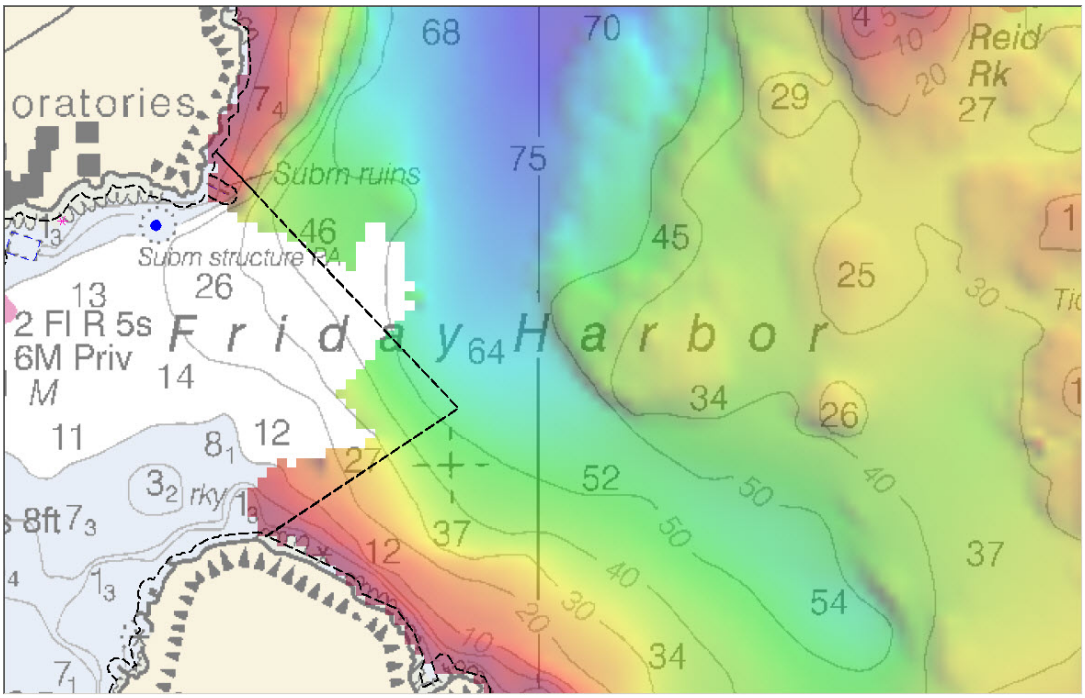
On Tue, Jun 3, 2014 at 12:06 PM, Corey Allen - NOAA Federal <Corey.Allen@noaa.gov> wrote:

> If you're willing to put in the data management work, we're happy to update stuff on our end. Do you have a preference on which number is maintained and which is deleted? Once we determine which number is going forward, please resubmit a combined survey outline. I'll work with Brian to get SURDEX all straightened out once that is received.
>
> Corey
>
> On Mon, Jun 2, 2014 at 6:59 PM, Michael Gonsalves - NOAA Federal <michael.gonsalves@noaa.gov> wrote:
>
> > Hey Tami,
> >
> > With respect to the gap in coverage, I think it's fine to simply mention in the gappy survey's DR that the data is covered by the junctioning survey, then throw in an image for good measure.
> >
> > With respect to combining the sheets, I don't personally have a problem with it, but I'll need to consult my Team Lead so he can give me a sanity check on the paperwork ramifications. I suspect, if anything, the real data management will be on your end, attempting to interleave all these raw files, CARIS projects, etc. But, perhaps CARIS has finally perfected the "copy project" button.
> >
> > Again, let me get back to you tomorrow, after I speak with Corey.
> >
> > ~~ mike.g.
> >
> > On Mon, Jun 2, 2014 at 5:13 PM, ChiefST.Fairweather <ChiefST.Fairweather@noaa.gov> wrote:
> >
> > > Hello Mike-
> > >
> > > Fairweather is continuing to process the Strait of Juan de Fuca surveys and cleaning is progressing

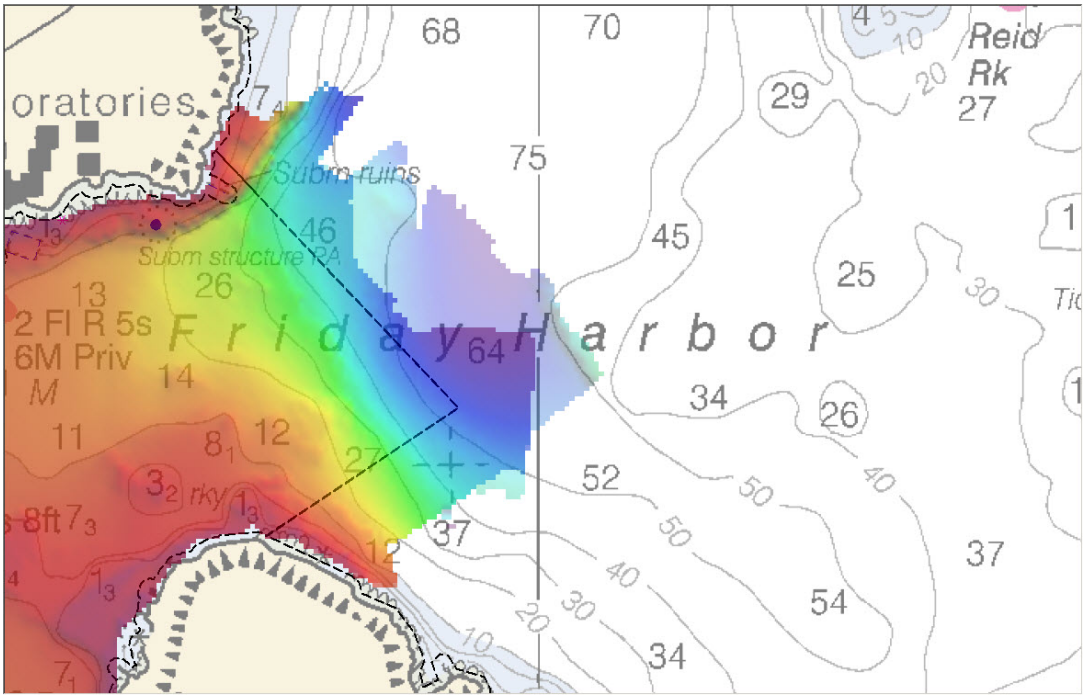
nicely. We have a couple of questions regarding surveys F00637 and F00638 and the sheet limits. The CO, OPS, and I have been wondering if there would be a problem combining these two small surveys, 0.3 and 4.1 square nautical miles respectively. We recognize they have differing survey scales 10,000 (F00637) and 12,500 (F00638), but are hoping that we might be able to come to a resolution that could allow us to make a single package submission and Descriptive Report for the area.



Due to limited qualified survey personnel and departures from the ship, it is likely that the same sheet manager could be charged with writing both descriptive reports. Additionally, we have discovered an issue with the sheet limits and overlap between the two surveys that we are debating on rectifying, however it could be cause for both survey outlines to be resubmitted.
Below you will see a gap in coverage between F00638 and the sheet limit.



The gap is covered with a line currently belonging to F00637 and is not required to meet the coverage requirements of that survey.
Below are surfaces of F00637 with and without the line suggested for potential movement to F00638.



If the gap in coverage were okay to simply explain in the DR's for F00637 and F00638, that would be great concession, however, it would really be the ship's preference to combine the two surveys if possible.

Thank you for your time.

Tami

--
Tami Beduhn
Chief Survey Technician
NOAA Ship *Fairweather*

1010 Stedman St.
Ketchikan, AK 99901
Ship Cell: 907-254-2842
Personal: 231-679-4284

--
J. Corey Allen
Operations Branch Team Lead
Hydrographic Surveys Division
Office of Coast Survey, NOAA
Corey.Allen@noaa.gov
301.713.2777 x119 (Office)
301.717.7271 (Cell)

F00638 Feature Report

Registry Number: F00638
State: Washington
Locality: Strait of Juan de Fuca
Sub-locality: Friday Harbor to Flat Point
Project Number: OPR-N305-FA-14
Survey Dates: April 17th, 2014 - April 21st, 2014

Charts Affected

Number	Edition	Date	Scale (RNC)	RNC Correction(s)*
18423	38th	10/01/2011	1:20,000 (18423_12)	USCG LNM: 2/24/2015 (3/10/2015) CHS NTM: None (12/26/2014) NGA NTM: None (3/7/2015)
18434	7th	04/01/2008	1:25,000 (18434_1)	USCG LNM: 2/24/2015 (2/24/2015) CHS NTM: None (12/26/2014) NGA NTM: 11/13/1999 (2/28/2015)
18423	36th	07/01/2007	1:80,000 (18423_8) 1:80,000 (18423_11)	[L]NTM: ?
18421	49th	02/01/2008	1:80,000 (18421_1)	[L]NTM: ?
18400	48th	12/01/2008	1:200,000 (18400_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
1.1	AWOIS #52560	Obstruction	[None]	48° 32' 44.3" N	123° 00' 30.3" W
1.2	AWOIS #54148	Obstruction	[None]	48° 32' 58.7" N	123° 00' 18.4" W
2.1	4.38m WRECK	Wreck	4.38 m	48° 32' 33.2" N	123° 00' 58.5" W
2.2	AWOIS #53082	Wreck	3.43 m	48° 32' 38.9" N	123° 00' 54.8" W

2.3	AWOIS #54147	GP	[None]	48° 32' 43.2" N	123° 00' 43.2" W
2.4	11.93m WRECK	Wreck	11.93 m	48° 32' 10.0" N	123° 00' 31.4" W
2.5	5.99m WRECK	Wreck	5.99 m	48° 31' 44.0" N	123° 00' 04.7" W

1 - Charted Features

1.1) AWOIS #52560

Survey Summary

Survey Position:	48° 32' 44.3" N, 123° 00' 30.3" W
Least Depth:	[None]
TPU (±1.96σ):	**THU (TPEh)** [None] ; **TVU (TPEv)** [None]
Timestamp:	2002-274.00:00:00.000 (10/01/2002)
Dataset:	F00638_Feature_Report.000
FOID:	US 0000085236 00001(022600014CF40001)
Charts Affected:	18423_12, 18434_1, 18421_1, 18423_11, 18400_1, 18003_1, 18007_1, 501_1, 530_1, 50_1

Remarks:

AWOIS #52560 is disproved by 200% coverage MBES.

HISTORY:

SOURCE UNKNOWN; APPEARS AS SUBMERGED STRUCTURE PA ON 24TH ED 10/11/75 OF CHART 18421 IN POS.48-32-44.2 N 123-00-30.4 W (PRESENT NAD 83 POS.). ENTERED 3/00 MCR F00459/00--OPR-N411-NRB: The search area is a steep slope near shore. No structure was observed on the sonargram . The area is along the shoreline of the University of Washington's Marine Laboratories where marine and aquaculture research is conducted. Craig Staude. Ph. D. Marine Technologist at the laboratories (360-378-2165) reported that he is not aware of any submerged research structure at this location at this time. However he stated that temporary experimental structures are frequently deployed in the area and he would prefer that the charted structure be retained to discourage anchoring in that location. Retain the submerged structure as charted. Updated 8/03 MCR.

Feature Correlation

Source	Feature	Range	Azimuth	Status
F00638_Feature_Report.000	US 0000085236 00001	0.00	000.0	Primary

Hydrographer Recommendations

Remove from chart and AWOIS database.

S-57 Data

Geo object 1:	Obstruction (OBSTRN)
Attributes:	QUASOU - 2:depth unknown
	SORDAT - 20021000

SORIND - US,US,graph,Chart 18434

WATLEV - 3:always under water/submerged

Office Notes

Concur. Delete OBSTRN.

1.2) AWOIS #54148

Survey Summary

Survey Position:	48° 32' 58.7" N, 123° 00' 18.4" W
Least Depth:	[None]
TPU (±1.96σ):	**THU (TPEh)** [None] ; **TVU (TPEv)** [None]
Timestamp:	2002-274.00:00:00.000 (10/01/2002)
Dataset:	F00638_Feature_Report.000
FOID:	US 0000085234 00001(022600014CF20001)
Charts Affected:	18423_12, 18434_1, 18421_1, 18423_11, 18423_8, 18400_1, 18003_1, 18007_1, 501_1, 530_1, 50_1

Remarks:

AWOIS #54148 is chd (18434) aquaculture float disproved by full coverage MBES and shoreline investigation.

HISTORY:

L176-1989 --- Aquaculture float located 1000 yards from the center of the channel and 15 yards from the rocky shore. The aquaculture float is anchored just outside of the kelp bed and 15 yards from the rocky shore (ent. 1/7/2014).

Feature Correlation

Source	Feature	Range	Azimuth	Status
F00638_Feature_Report.000	US 0000085234 00001	0.00	000.0	Primary

Hydrographer Recommendations

Remove from chart and AWOIS database.

S-57 Data

Geo object 1:	Obstruction (OBSTRN)
Attributes:	INFORM - Aquaculture float PA
	QUASOU - 2:depth unknown
	SORDAT - 20021000
	SORIND - US,US,graph,Chart 18434
	WATLEV - 3:always under water/submerged

Office Notes

Concur delete OBSTRN.

2 - New Features

2.1) 4.38m WRECK

Survey Summary

Survey Position:	48° 32' 33.2" N, 123° 00' 58.5" W
Least Depth:	4.38 m (= 14.37 ft = 2.395 fm = 2 fm 2.37 ft)
TPU (±1.96σ):	**THU (TPEh)** [None] ; **TVU (TPEv)** [None]
Timestamp:	2014-112.00:00:00.000 (04/22/2014)
Dataset:	F00638_Feature_Report.000
FOID:	US 0000085226 00001(022600014CEA0001)
Charts Affected:	18423_12, 18434_1, 18421_1, 18423_11, 18400_1, 18003_1, 18007_1, 501_1, 530_1, 50_1

Remarks:

Wreck not observed at negative tides.

Feature Correlation

Source	Feature	Range	Azimuth	Status
F00638_Feature_Report.000	US 0000085226 00001	0.00	000.0	Primary

Hydrographer Recommendations

Change category of wreck to always underwater/submerged, wreck is located 12.0m to SE of charted location.

Cartographically-Rounded Depth (Affected Charts):

2 ¼fm (18421_1, 18400_1, 18003_1, 18007_1, 530_1)

2fm 2ft (18423_12, 18434_1, 18423_11)

4.4m (501_1, 50_1)

S-57 Data

Geo object 1:	Wreck (WRECKS)
Attributes:	CATWRK - 2:dangerous wreck
	QUASOU - 6:least depth known
	SORDAT - 20140422
	SORIND - US,US,graph,F00638
	TECSOU - 3:found by multi-beam

VALSOU - 4.380 m

WATLEV - 3:always under water/submerged

Office Notes

Update wreck with new position and least depth.

Feature Images

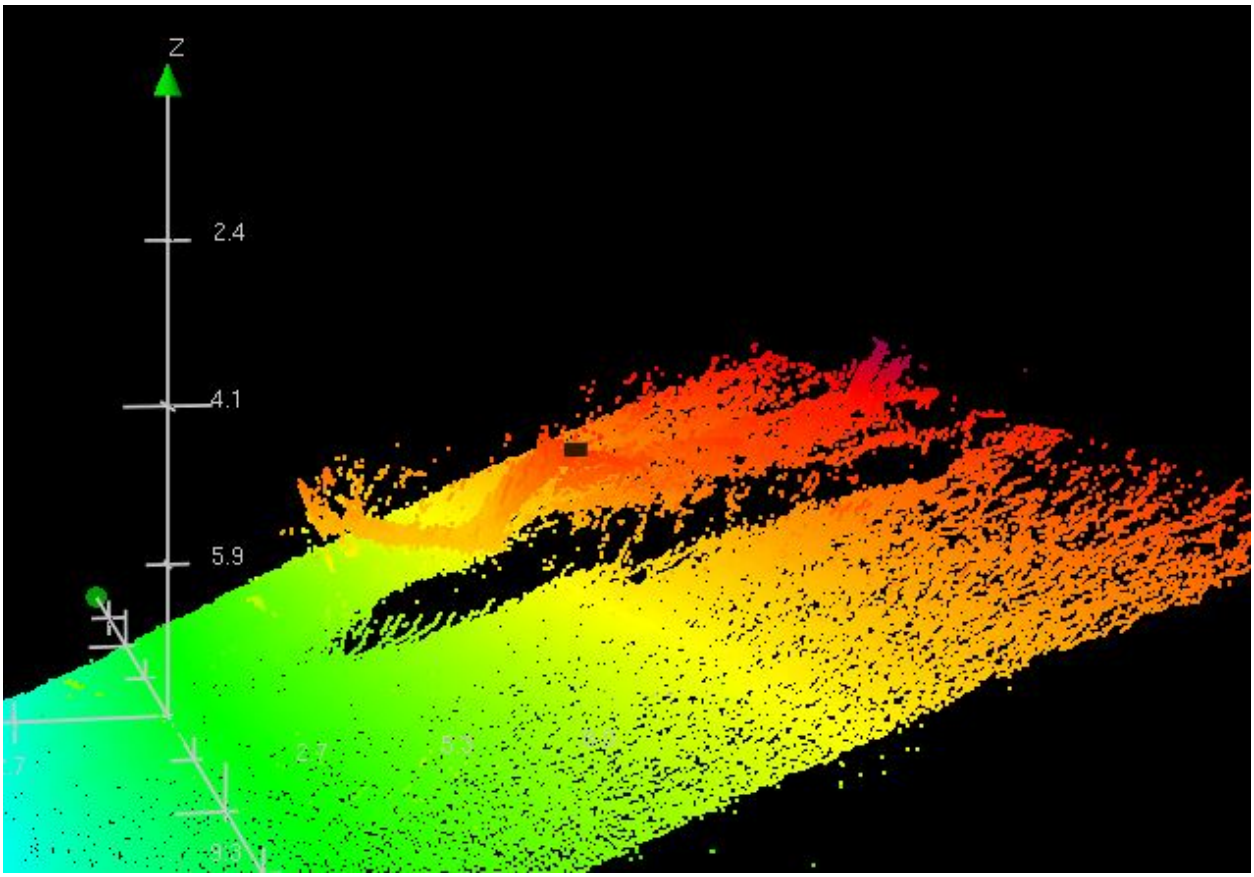


Figure 2.1.1

2.2) AWOIS #53082

Survey Summary

Survey Position:	48° 32' 38.9" N, 123° 00' 54.8" W
Least Depth:	3.43 m (= 11.25 ft = 1.876 fm = 1 fm 5.25 ft)
TPU (±1.96σ):	**THU (TPEh)** [None] ; **TVU (TPEv)** [None]
Timestamp:	2014-112.00:00:00.000 (04/22/2014)
Dataset:	F00638_Feature_Report.000
FOID:	US 0000085225 00001(022600014CE90001)
Charts Affected:	18423_12, 18434_1, 18421_1, 18423_11, 18400_1, 18003_1, 18007_1, 501_1, 530_1, 50_1

Remarks:

AWOIS #53082 is charted wreck found by multibeam, update height.

HISTORY:

FOO459/00--OPR-N411-NRB; WOOD FISHING BOAT APPROX. 50 FT. LONG AND 20 FT WIDE TILTED APPROX. 10-15° ONTO IT'S STARBOARD SIDE WITH BOW ORIENTATED TO THE NORTH. THE VESSEL WAS COVERED WITH KELP. A MAST EXTENDS APPROX. 6 METERS ABOVE THE DECK. LEAST DEPTH BY LEADLINE WAS 1.5M/.8 FATHOM IN POS. 48 32 38.95N 123 00 54.89W (NAD 83).

Feature Correlation

Source	Feature	Range	Azimuth	Status
F00638_Feature_Report.000	US 0000085225 00001	0.00	000.0	Primary

Hydrographer Recommendations

AWOIS #53082 is charted wreck found by multibeam, update height.

Cartographically-Rounded Depth (Affected Charts):

1 ¾fm (18421_1, 18400_1, 18003_1, 18007_1, 530_1)

1fm 5ft (18423_12, 18434_1, 18423_11)

3.4m (501_1, 50_1)

S-57 Data

Geo object 1: Wreck (WRECKS)

Attributes:

CATWRK - 2:dangerous wreck
QUASOU - 6:least depth known
SORDAT - 20140422
SORIND - US,US,graph,F00638
TECSOU - 3:found by multi-beam
VALSOU - 3.430 m
WATLEV - 3:always under water/submerged

Office Notes

Update wreck with new position and least depth (AWOIS #53082).

Feature Images

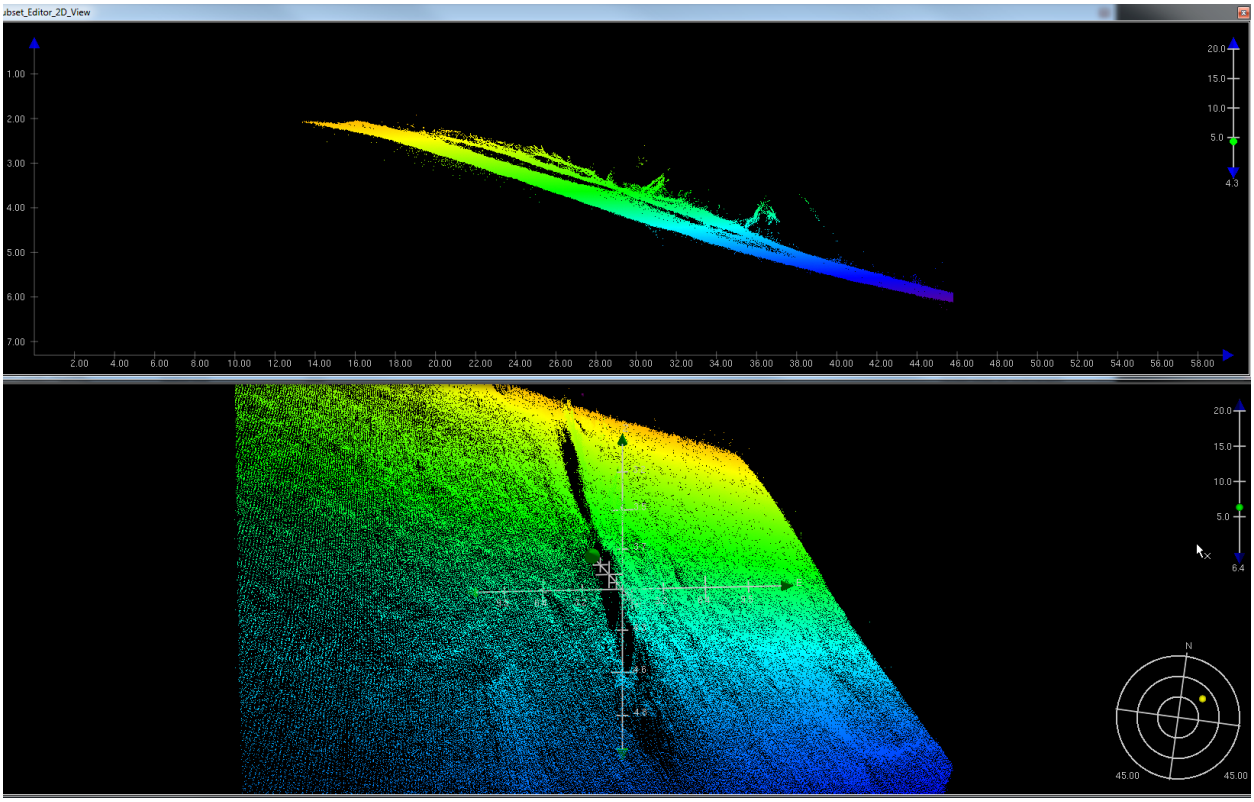


Figure 2.2.1

2.3) AWOIS #54147

Survey Summary

Survey Position:	48° 32' 43.2" N, 123° 00' 43.2" W
Least Depth:	[None]
TPU (±1.96σ):	**THU (TPEh)** [None] ; **TVU (TPEv)** [None]
Timestamp:	2014-112.00:00:00.000 (04/22/2014)
Dataset:	F00638_Feature_Report.000
FOID:	US 0000085235 00001(022600014CF30001)
Charts Affected:	18423_12, 18434_1, 18421_1, 18423_11, 18400_1, 18003_1, 18007_1, 501_1, 530_1, 50_1

Remarks:

AWOIS #54147 is New Extents Marine Aquaculture site.

HISTORY:

L176-1980 --- Aquaculture float located 50 m from University of Washington lab pier in 8 ft of water. The float is anchored next to an existing piling.

Feature Correlation

Source	Feature	Range	Azimuth	Status
F00638_Feature_Report.000	US 0000085235 00001	0.00	000.0	Primary

Hydrographer Recommendations

Chart based on multibeam extents.

S-57 Data

Geo object 1:	Marine farm/culture (MARCUL)
Attributes:	SORDAT - 20140422
	SORIND - US,US,graph,F00638
	WATLEV - 3:always under water/submerged

Office Notes

The status of the charted Float PA (aquaculture) is being researched and will be updated during compilation at MCD based on the status of the permit for this feature.

Feature Images

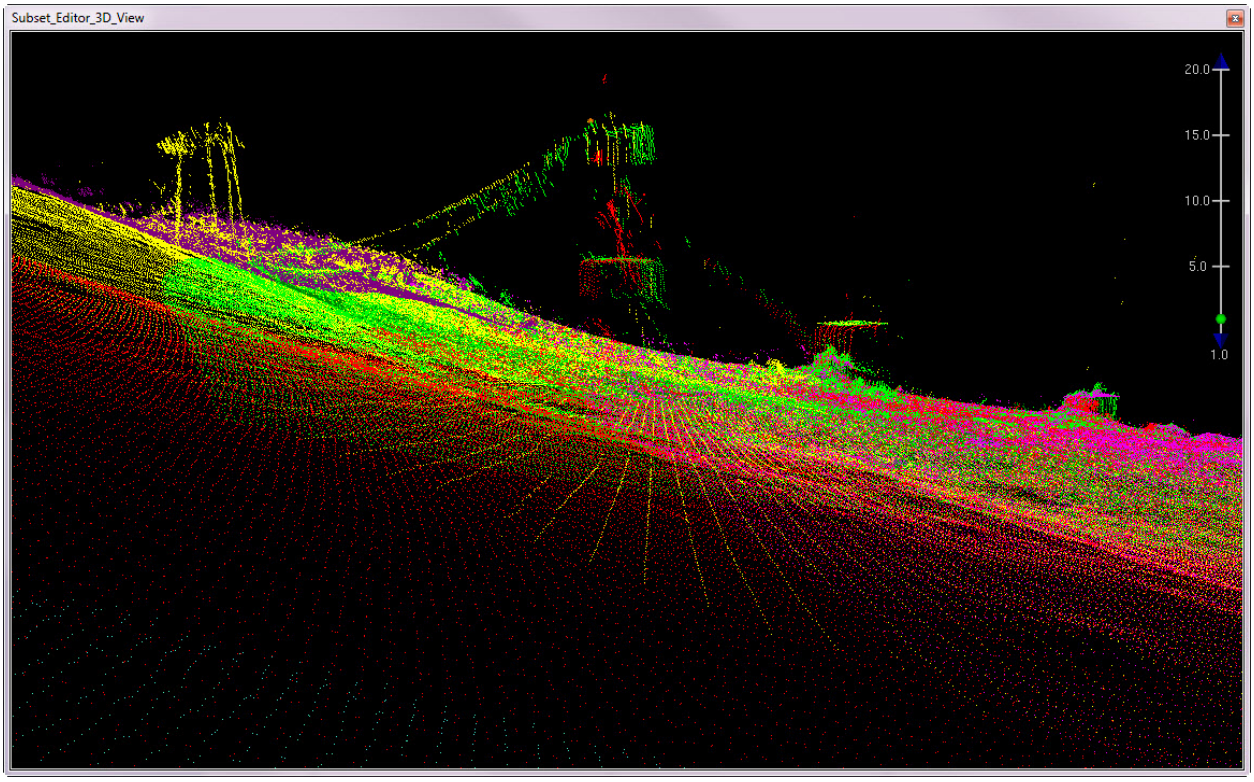


Figure 2.3.1

2.4) 11.93m WRECK

Survey Summary

Survey Position:	48° 32' 10.0" N, 123° 00' 31.4" W
Least Depth:	11.93 m (= 39.14 ft = 6.523 fm = 6 fm 3.14 ft)
TPU (±1.96σ):	**THU (TPEh)** [None] ; **TVU (TPEv)** [None]
Timestamp:	2014-112.00:00:00.000 (04/22/2014)
Dataset:	F00638_Feature_Report.000
FOID:	US 0000085228 00001(022600014CEC0001)
Charts Affected:	18423_12, 18434_1, 18421_1, 18423_11, 18400_1, 18003_1, 18007_1, 501_1, 530_1, 50_1

Remarks:

chd (18434) wreck verified, new value of sounding.

Feature Correlation

Source	Feature	Range	Azimuth	Status
F00638_Feature_Report.000	US 0000085228 00001	0.00	000.0	Primary

Hydrographer Recommendations

Update VALSOU.

Cartographically-Rounded Depth (Affected Charts):

6 ½fm (18421_1, 18400_1, 18003_1, 18007_1, 530_1)

6fm 3ft (18423_12, 18434_1, 18423_11)

11.9m (501_1, 50_1)

S-57 Data

Geo object 1:	Wreck (WRECKS)
Attributes:	CATWRK - 2:dangerous wreck
	INFORM -
	QUASOU - 6:least depth known
	SORDAT - 20140422
	SORIND - US,US,graph,F00638

TECSOU - 3:found by multi-beam

VALSOU - 11.930 m

WATLEV - 3:always under water/submerged

Office Notes

Update wreck with new position and least depth.

Feature Images

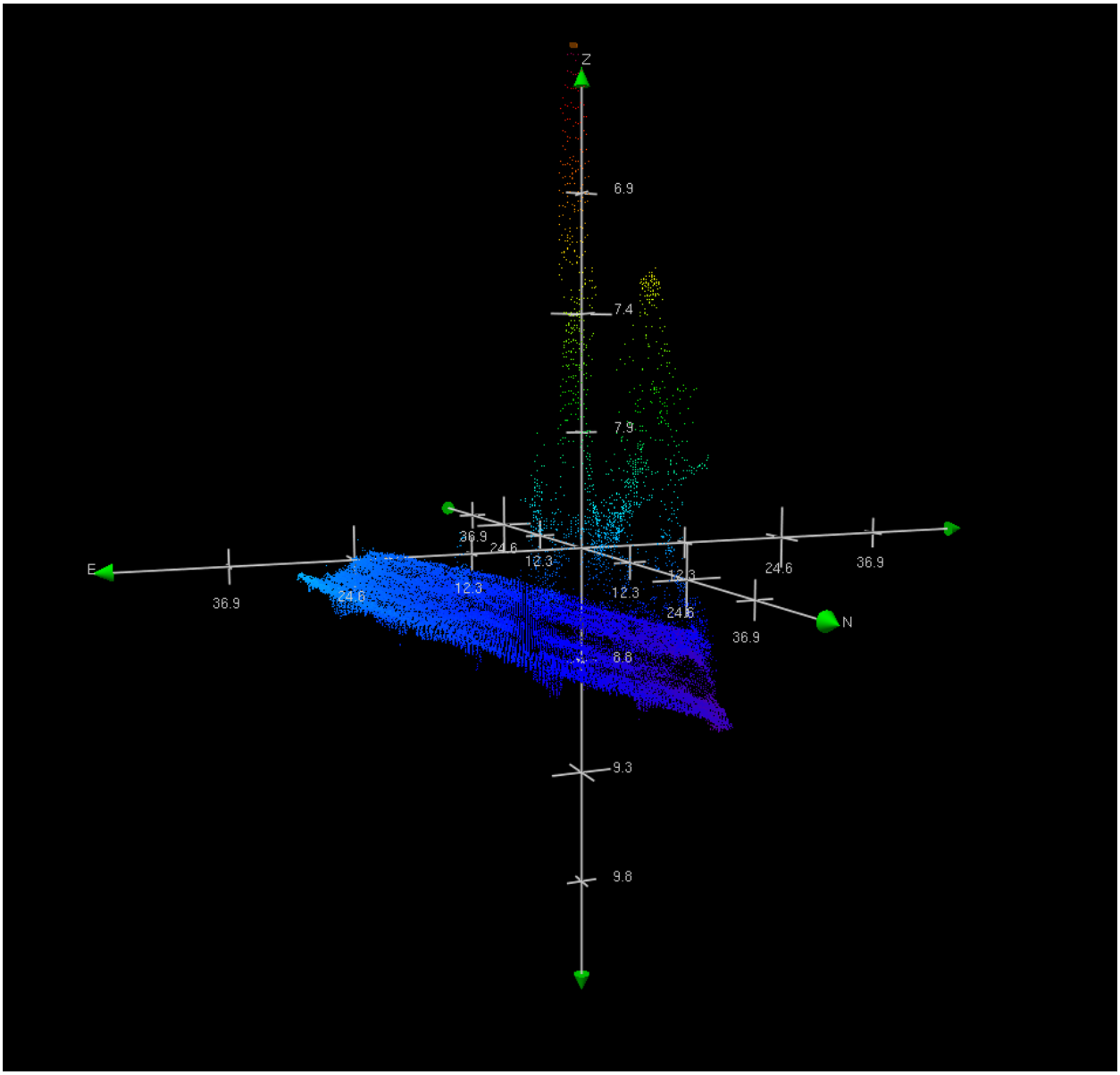


Figure 2.4.1

2.5) 5.99m WRECK

Survey Summary

Survey Position:	48° 31' 44.0" N, 123° 00' 04.7" W
Least Depth:	5.99 m (= 19.65 ft = 3.275 fm = 3 fm 1.65 ft)
TPU (±1.96σ):	**THU (TPEh)** [None] ; **TVU (TPEv)** [None]
Timestamp:	2014-112.00:00:00.000 (04/22/2014)
Dataset:	F00638_Feature_Report.000
FOID:	US 0000085231 00001(022600014CEF0001)
Charts Affected:	18423_12, 18434_1, 18421_1, 18423_11, 18400_1, 18003_1, 18007_1, 501_1, 530_1, 50_1

Remarks:

chd (18434) wreck verified, new value of sounding.

Feature Correlation

Source	Feature	Range	Azimuth	Status
F00638_Feature_Report.000	US 0000085231 00001	0.00	000.0	Primary

Hydrographer Recommendations

Update VALSOU.

Cartographically-Rounded Depth (Affected Charts):

3 ¼fm (18421_1, 18400_1, 18003_1, 18007_1, 530_1)

3fm 1ft (18423_12, 18434_1, 18423_11)

6.0m (501_1, 50_1)

S-57 Data

Geo object 1:	Wreck (WRECKS)
Attributes:	CATWRK - 2:dangerous wreck
	EXPSOU - 2:shoaler than range of depth of the surrounding depth area
	QUASOU - 6:least depth known
	SORDAT - 20140422
	SORIND - US,US,graph,F00638

TECSOU - 3:found by multi-beam

VALSOU - 5.990 m

WATLEV - 3:always under water/submerged

Office Notes

Update wreck with new position and least depth.

Feature Images

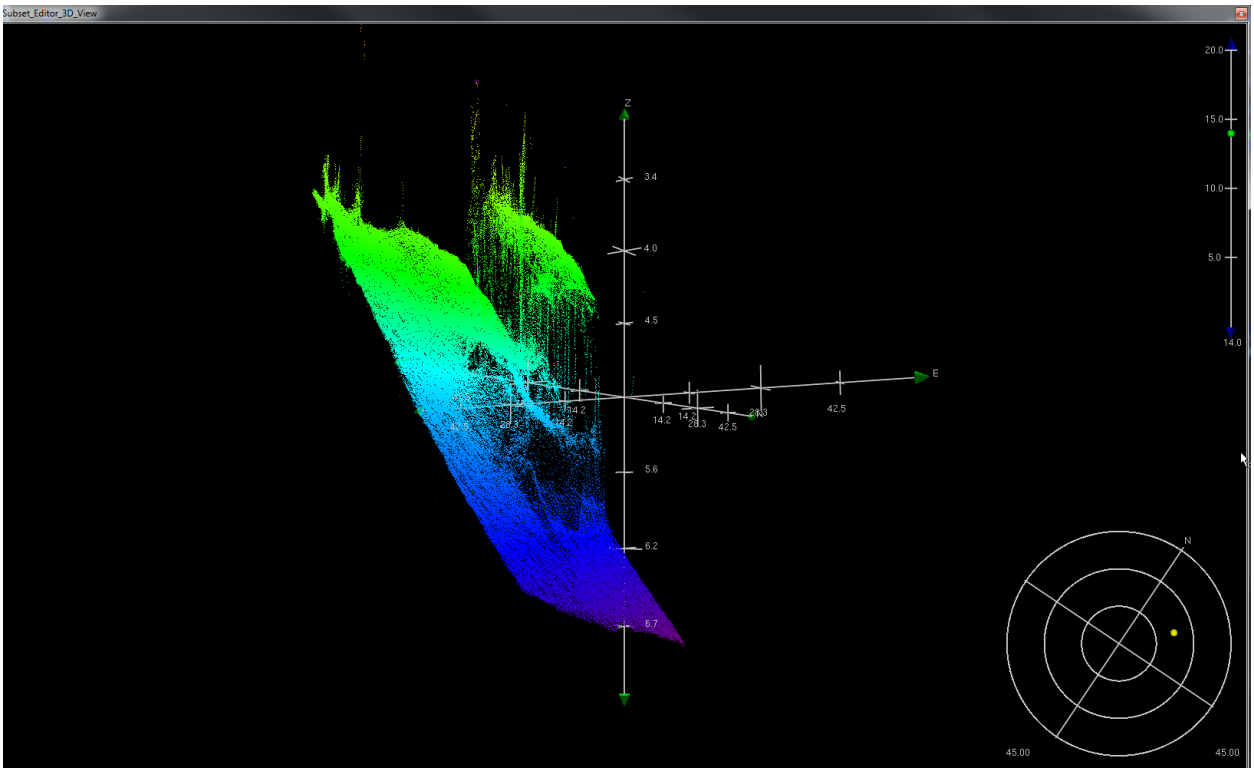


Figure 2.5.1

APPROVAL

PAGE F00638

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

- F00638_DR.pdf
- Collection of depth varied resolution BAGS
- Processed survey data and records
- F00638_GeoImage.pdf

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

Approved: Digitally signed by HOLMBERG.PETER.SCOTT.1365886101
DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=OTHER, cn=HOLMBERG.PETER.SCOTT.1365886101
Date: 2015.08.14 13:02:50 -07'00'

Pete 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: Digitally signed by Peter Holmberg
DN: cn=Peter Holmberg, o, ou=signing for Benjamin K. Evans, email=benjamin.k.evans@noaa.gov, c=US
Date: 2015.08.14 13:05:34 -07'00'

CDR Benjamin K. Evans, NOAA
Chief, Pacific Hydrographic Branch