

H12625

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

**DESCRIPTIVE REPORT**

Type of Survey: Navigable Area

Registry Number: H12625

**LOCALITY**

State(s): Washington

General Locality: Strait of Juan de Fuca, Washington

Sub-locality: Salmon Bank to Kanaka Bay

**2014**

CHIEF OF PARTY  
CDR David J. Zezula, NOAA

LIBRARY & ARCHIVES

Date:

**HYDROGRAPHIC TITLE SHEET**

**H12625**

**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, Washington**

Sub-Locality: **Salmon Bank to Kanaka Bay**

Scale: **12500**

Dates of Survey: **04/19/2014 to 04/30/2014**

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 H12625

Project: OPR-N305-FA-14

Locality: Strait of Juan de Fuca, Washington

Sublocality: Salmon Bank to Kanaka Bay

Scale: 1:12500

April 2014 - April 2014

**NOAA Ship *Fairweather***

Chief of Party: CDR David J. Zezula, NOAA

### A. Area Surveyed

The survey area is located in the Strait of Juan de Fuca, within the sub-locality of Salmon Bank to Kanaka Bay.

#### A.1 Survey Limits

Data were acquired within the following survey limits:

Northwest Limit	Southeast Limit
48° 29' 4.39" N 123° 6' 7.86" W	48° 23' 13.49" N 122° 57' 22.67" 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 project is to provide contemporary surveys to update National Ocean Service (NOS) nautical charting products. Survey Priorities (NHSP). The survey area is in the vicinity of three, high-density traffic lanes separated by shoal areas and is frequently transited by large commercial vessels traveling both north to Cherry Point, Washington and Vancouver, British Columbia and south to Tacoma and Seattle, Washington. H12625 will address critical areas as identified in the 2012 NOAA Hydrographic Survey Priorities (NHSP).

### A.3 Survey Quality

The entire survey is adequate to supersede previous data.

Along the shore of Kanaka Bay, some areas were not surveyed to the 4m inshore limit of hydrography as required by the Project Instructions due to the risk of maneuvering the survey vessel in the proximity of rocky and steep shoreline. See figure 1.

Along the shore west of Cattle Pt, gaps exist in the CUBE surfaces. However, this coverage meets the 25 m line spacing requirement. See Figure 2.

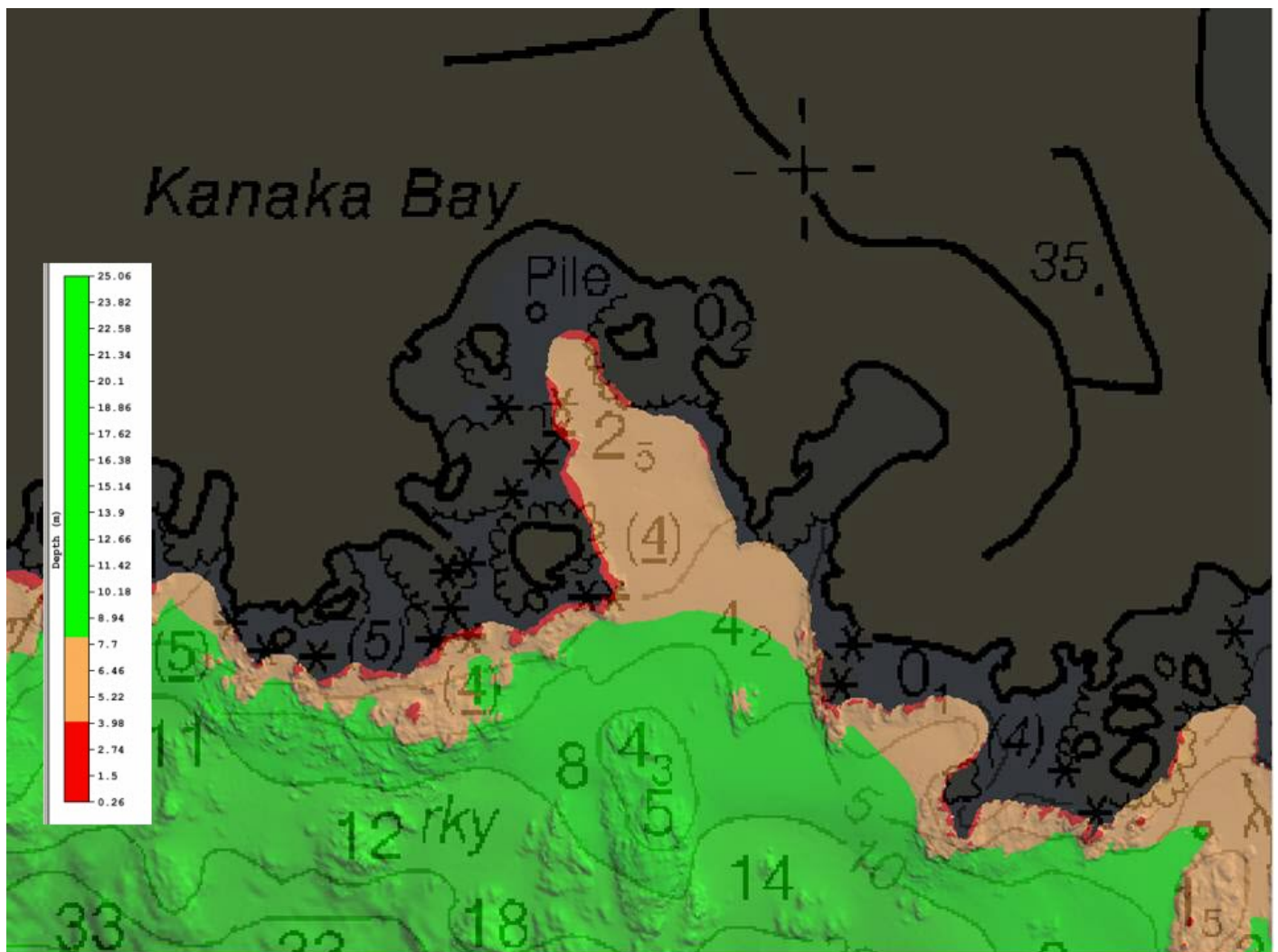


Figure 1: H12625 4m curve shore of Kanaka Bay.

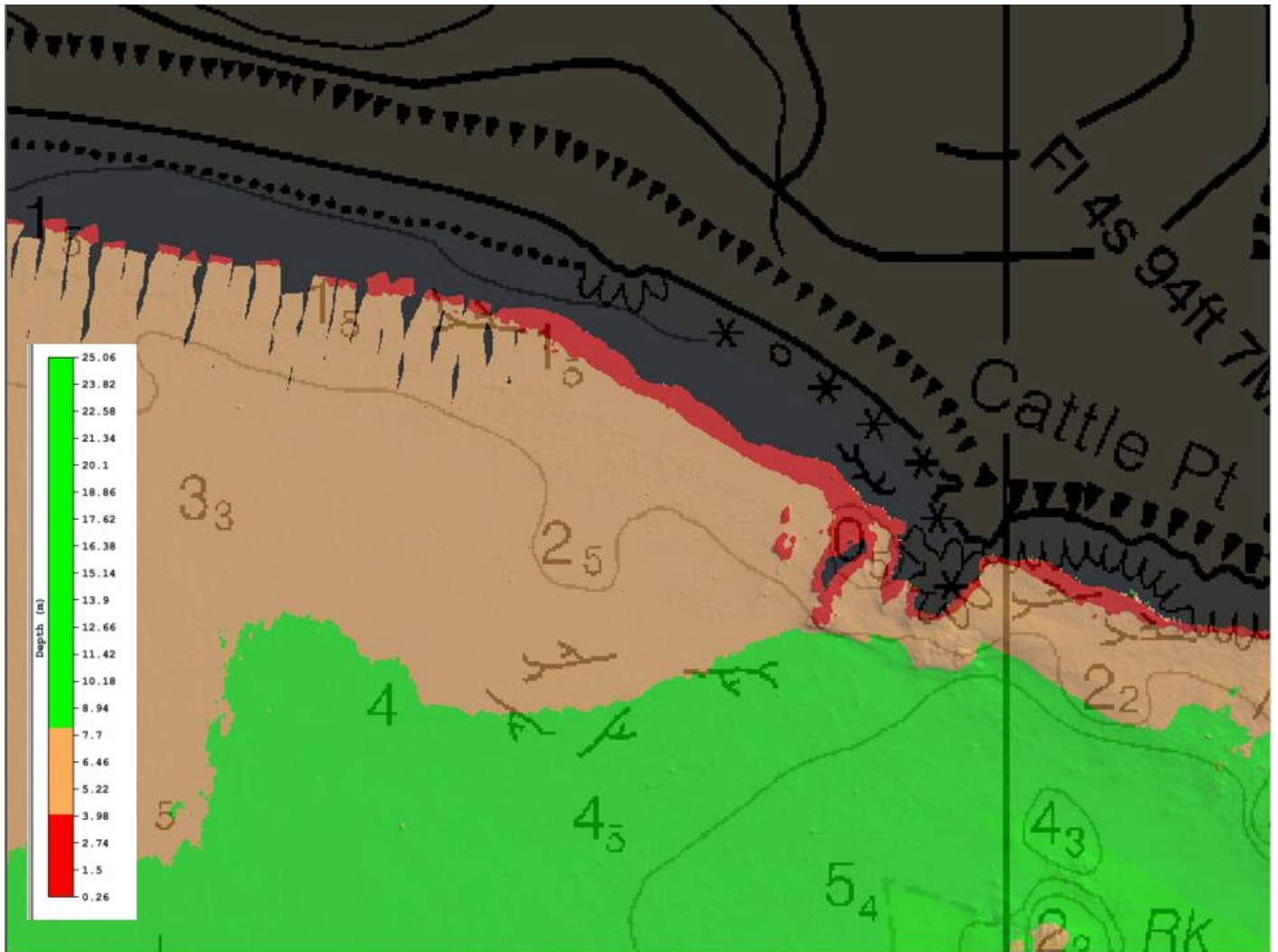


Figure 2: H12625 Survey Quality shore west of Cattle Point.



## A.4 Survey Coverage

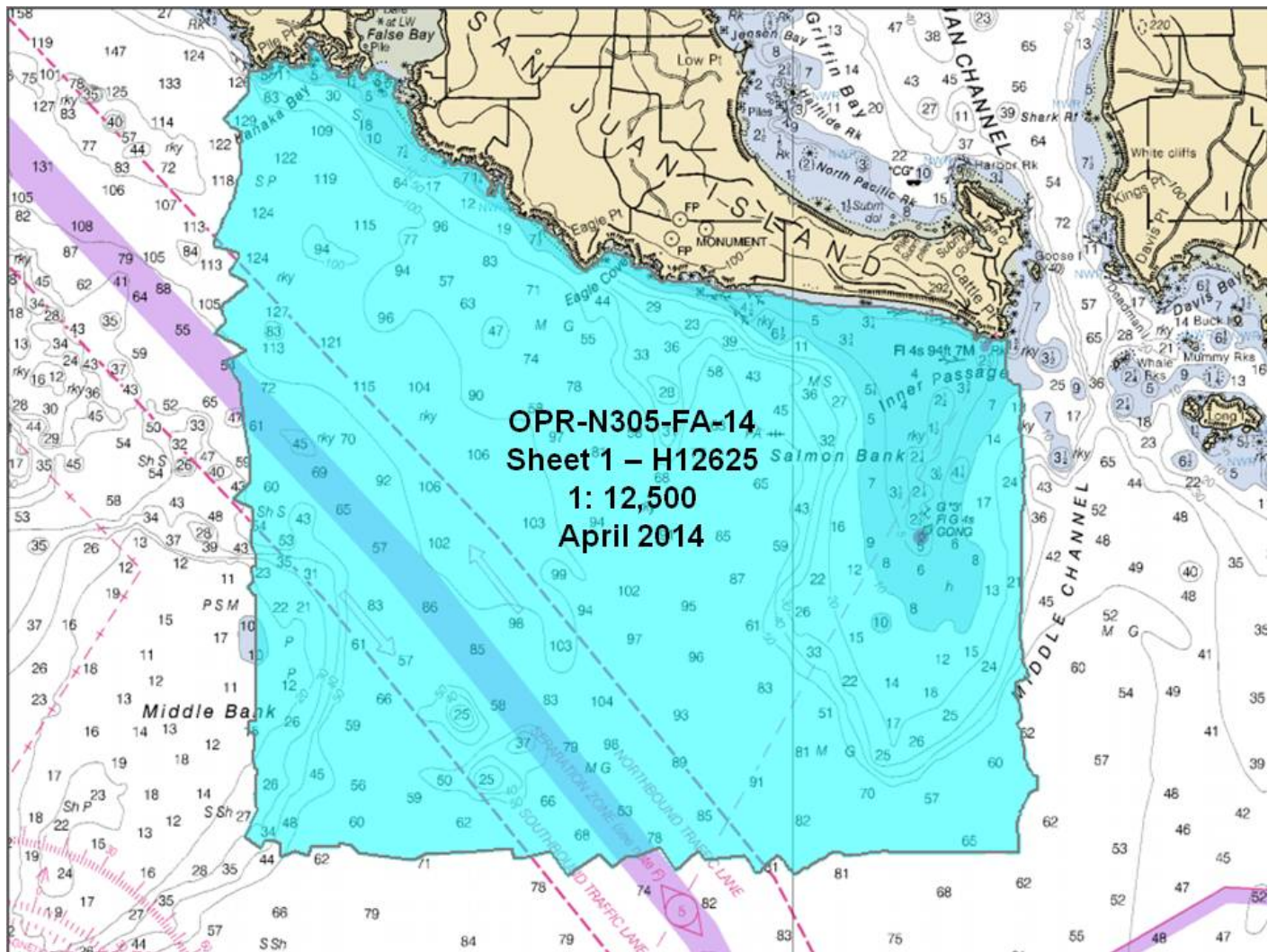


Figure 3: H12625 Survey Outline.

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:

	<b>HULL ID</b>	<i>2806</i>	<i>2807</i>	<i>2808</i>	<b><i>Total</i></b>
<b>LNM</b>	<b>SBES Mainscheme</b>	0	0	0	0
	<b>MBES Mainscheme</b>	114.496	126.190	127.753	368.439
	<b>Lidar Mainscheme</b>	0	0	0	0
	<b>SSS Mainscheme</b>	0	0	0	0
	<b>SBES/SSS Mainscheme</b>	0	0	0	0
	<b>MBES/SSS Mainscheme</b>	0	0	0	0
	<b>SBES/MBES Crosslines</b>	24.009	0	0	24.009
	<b>Lidar Crosslines</b>	0	0	0	0
<b>Number of Bottom Samples</b>					5
<b>Number of AWOIS Items Investigated</b>					0
<b>Number Maritime Boundary Points Investigated</b>					0
<b>Number of DPs</b>					0
<b>Number of Items Investigated by Dive Ops</b>					0
<b>Total SNM</b>					24.27

*Table 2: Hydrographic Survey Statistics*

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

<b>Survey Dates</b>	<b>Day of the Year</b>
04/19/2014	109
04/20/2014	110
04/21/2014	111
04/22/2014	112
04/23/2014	113
04/25/2014	115
04/26/2014	116
04/28/2014	118
04/29/2014	119
04/30/2014	120

*Table 3: Dates of Hydrography*

***The Number of DPs reported in Table 2 should equal 15, not 0.***

## **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:

<b>Hull ID</b>	<b>2806</b>	<b>2807</b>	<b>2808</b>
<b>LOA</b>	8.64 meters	8.64 meters	8.64 meters
<b>Draft</b>	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:

<b>Manufacturer</b>	<b>Model</b>	<b>Type</b>
RESON	7125	MBES
RESON	SVP71	Sound Speed System
Applanix	POS/MV V4	Positioning and Attitude System
Sea-Bird	SBE 19plus	Conductivity, Temperature, and Depth Sensor

*Table 5: Major Systems Used*

## B.2 Quality Control

### B.2.1 Crosslines

Crosslines acquired for this survey totaled 7% 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 main scheme lines. Differences in crosslines to main scheme lines are believed to be caused by abrupt changes in slope. See figure 5 for statistical representation of crossline differences, which shows 95% of all nodes to have a maximum deviation of +/- 1.24 meters.



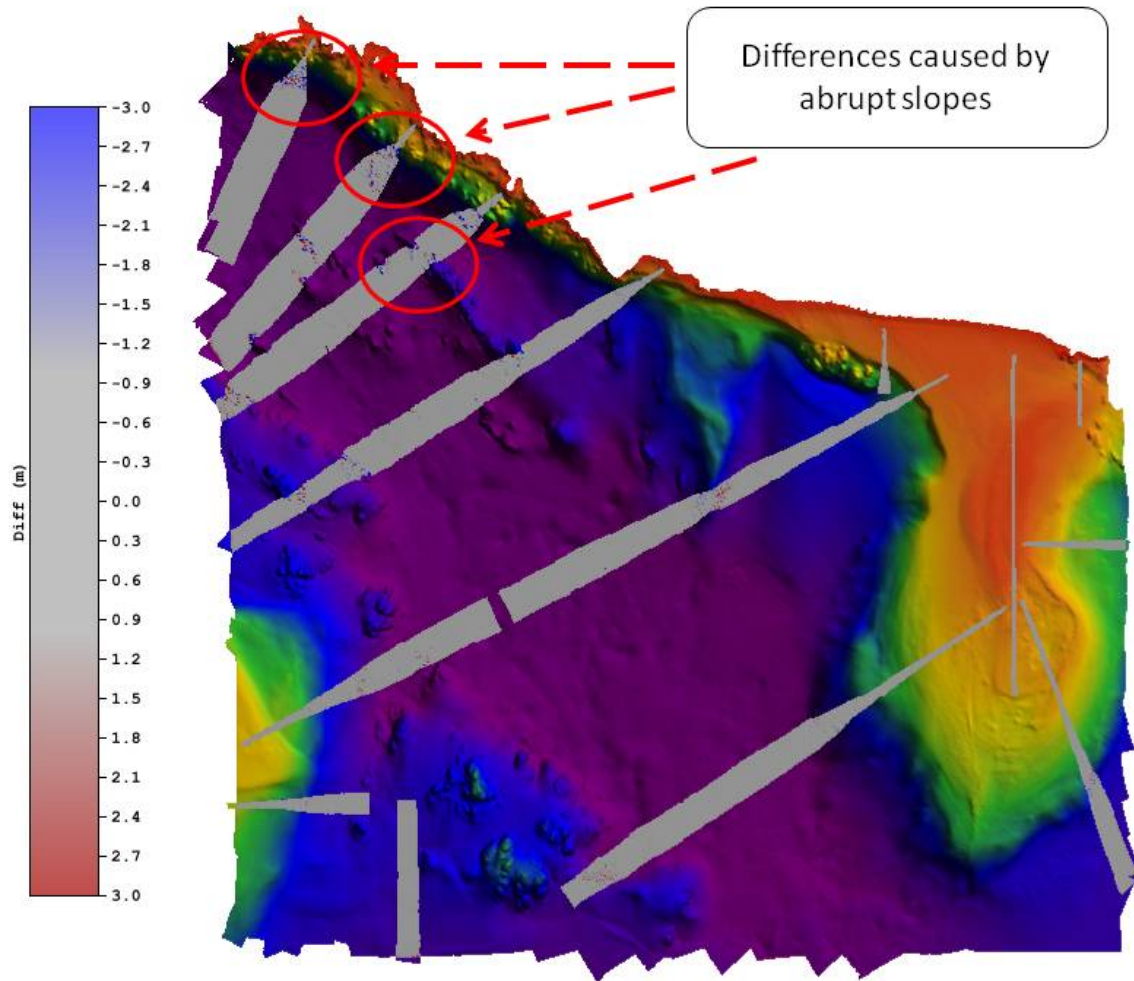


Figure 4: Graphical representation of differences between crossline and mainscheme surfaces.

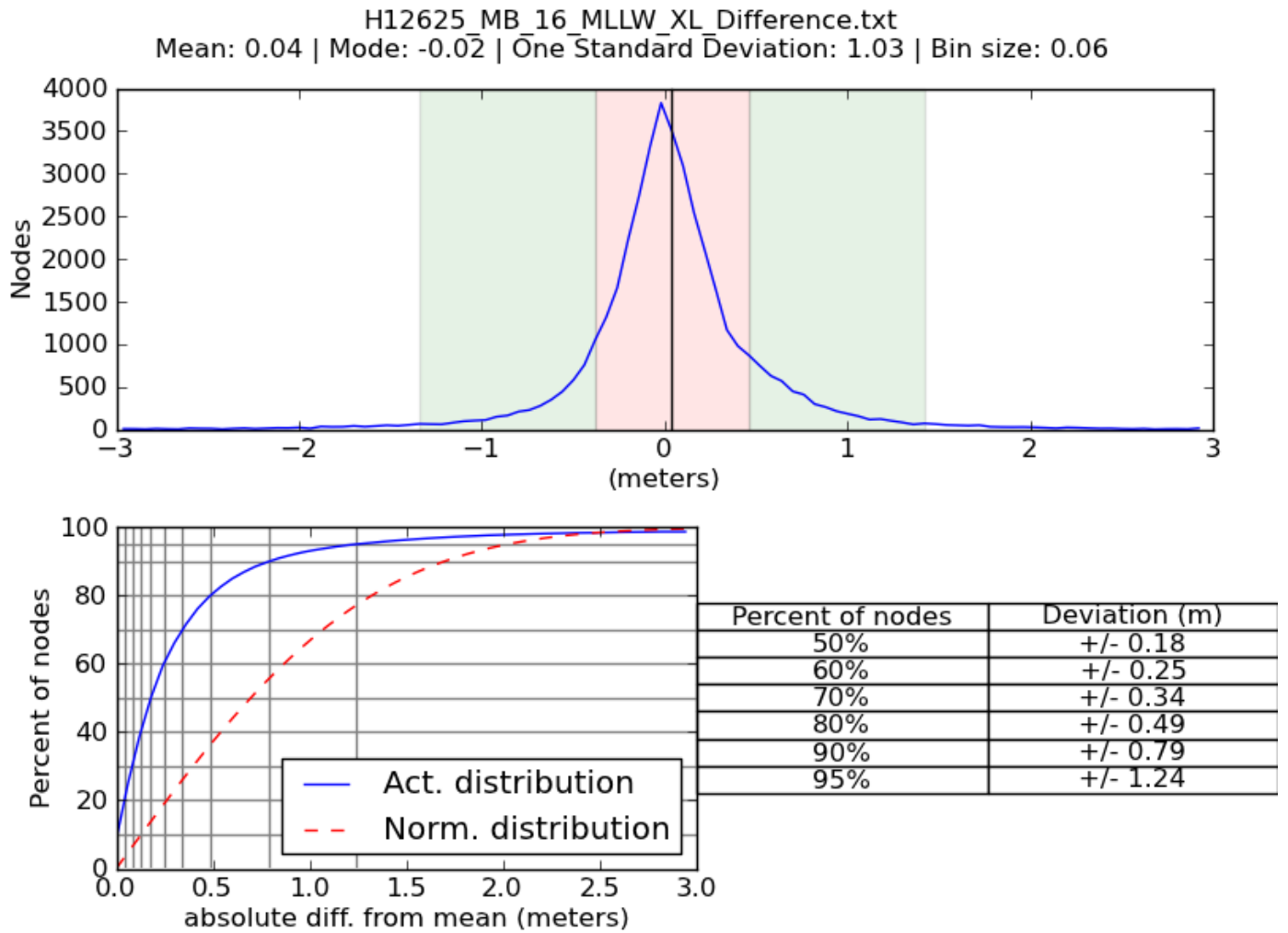


Figure 5: Statistical information for differences between crossline to main scheme.

### B.2.2 Uncertainty

The following survey specific parameters were used for this survey:

Measured	Zoning
0.01 meters	0.12 meters

Table 6: Survey Specific Tide TPU Values

<b>Hull ID</b>	<b>Measured - CTD</b>	<b>Measured - MVP</b>	<b>Surface</b>
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**

The areas of overlap between surveys were reviewed in CARIS Bathy database by surface differencing 16 meter and 10 meter combined surfaces to assess surface agreement. The junction agreement is generally within the total allowable vertical uncertainty in their common areas and depths for all surfaces. Data overlap between all surveys was achieved. See figure 6 for planned areas of overlap.

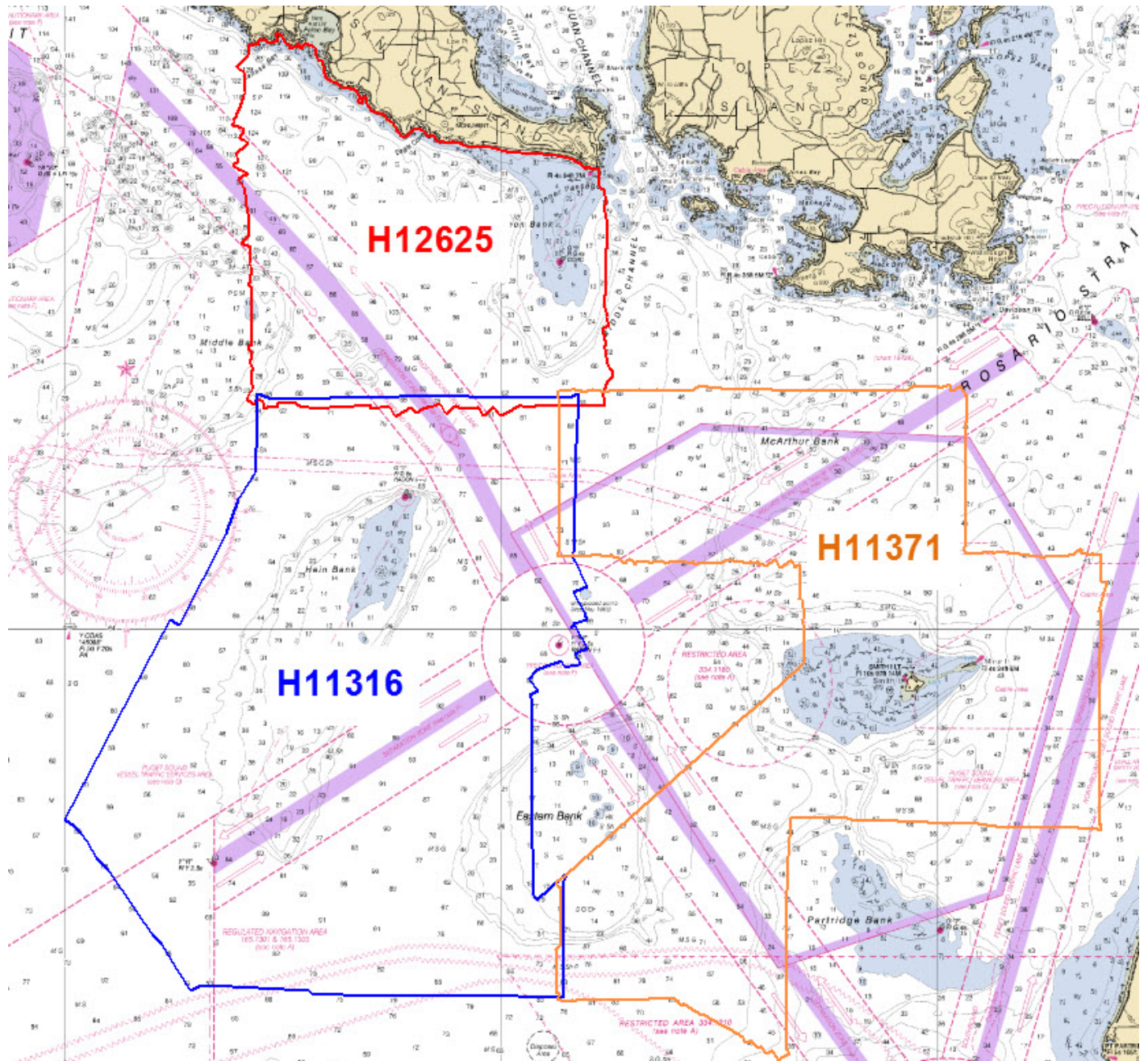


Figure 6: Junctions between H12625, H11316, 11371.

The following junctions were made with this survey:

Registry Number	Scale	Year	Field Unit	Relative Location
H11371	1:20000	2005	NOAA Ship RAINIER	SE
H11316	1:20000	2004	NOAA Ship RAINIER	S



*Table 8: Junctioning Surveys*

H11371

Surface differencing in CARIS Bathy database was used to assess junction agreement between H12625\_MB\_16m\_MLLW\_Combined surface and H11371\_10m\_Combined\_MLLW\_13of13. The difference between surfaces was generally 1m and the few areas of larger differences are believed to be caused by systematic errors on H11371 survey, refer to H11371 Descriptive Report. See figure 8 for a graphical representation and figure 9 for statistical information of the surface differencing.

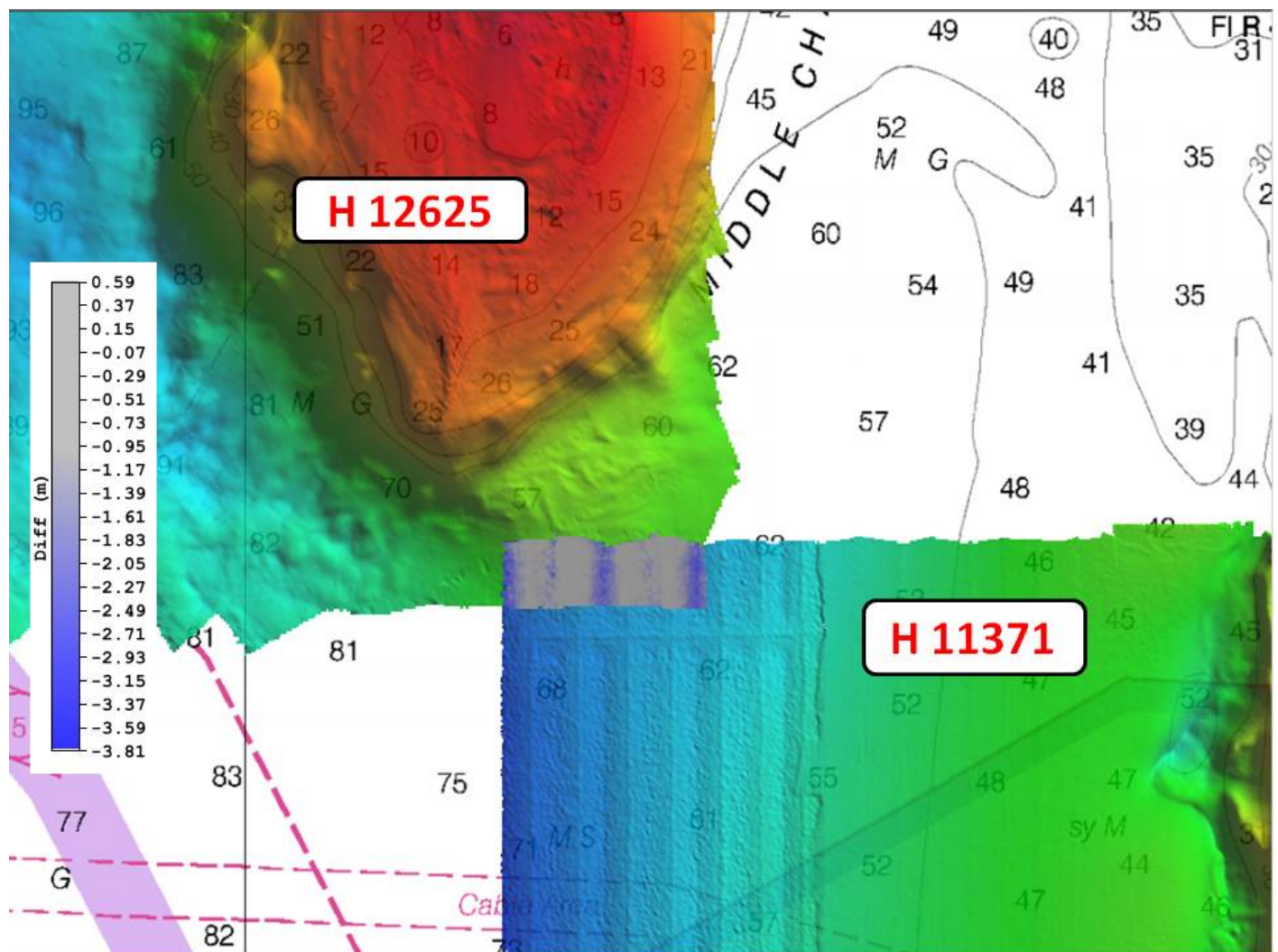


Figure 7: Graphical representation of differences between junction H12625 and H11371.

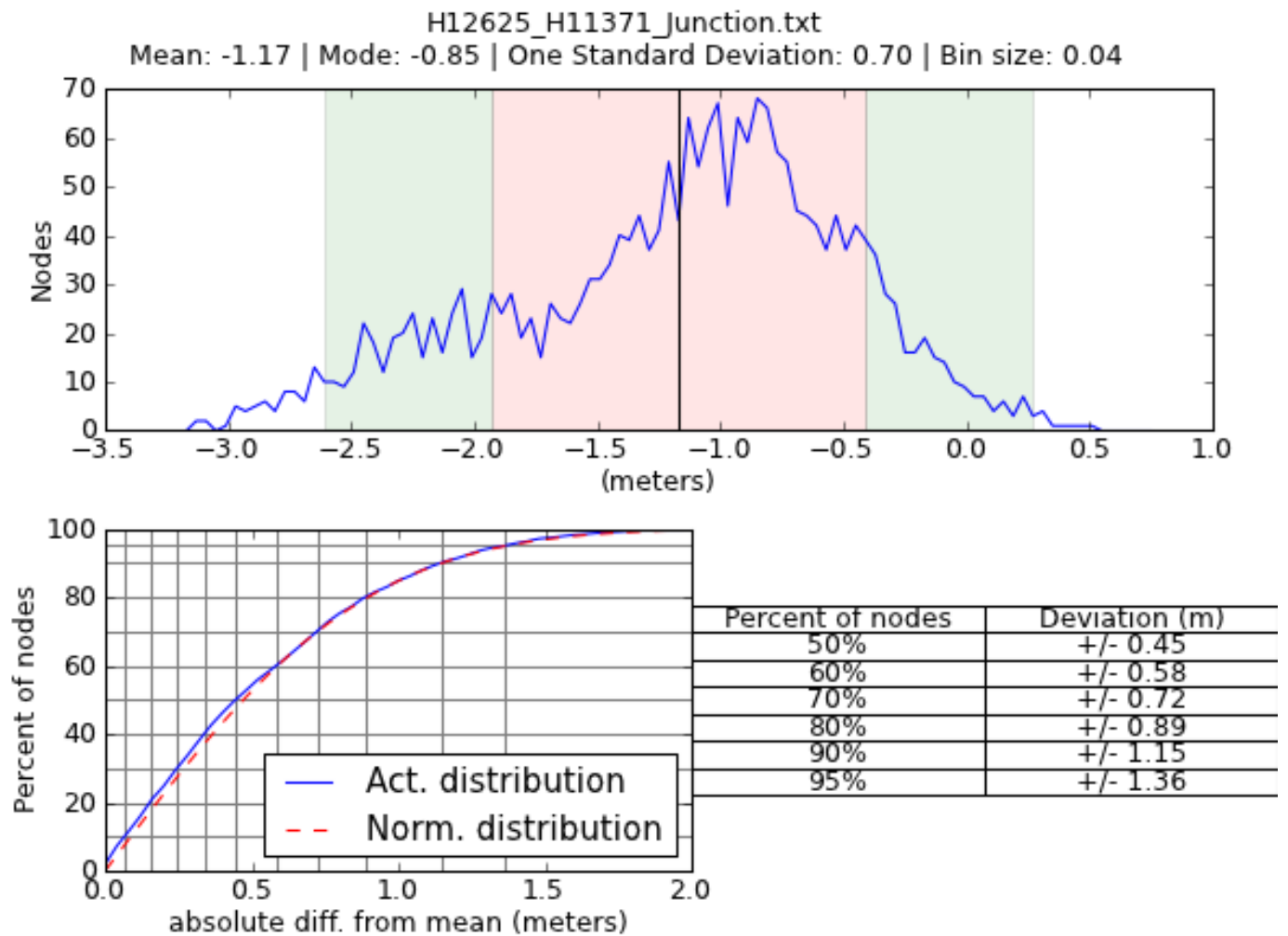


Figure 8: Statistical information for junction comparison between sheet H12625 and H11371.

### H11316

Surface differencing in CARIS Bathymetry database was used to assess junction agreement between H12625\_MB\_16m\_MLLW\_Combined surface and H11316\_10m\_DecDegNAD83. The difference between surfaces was generally -0.5m to 0.5m and the few areas of larger differences are believed to be caused by abrupt slope changes and systematic errors on H11316 survey, refer to H11316 Descriptive Report. See figure 10 for a graphical representation and figure 11 for statistical information of the surface differencing.

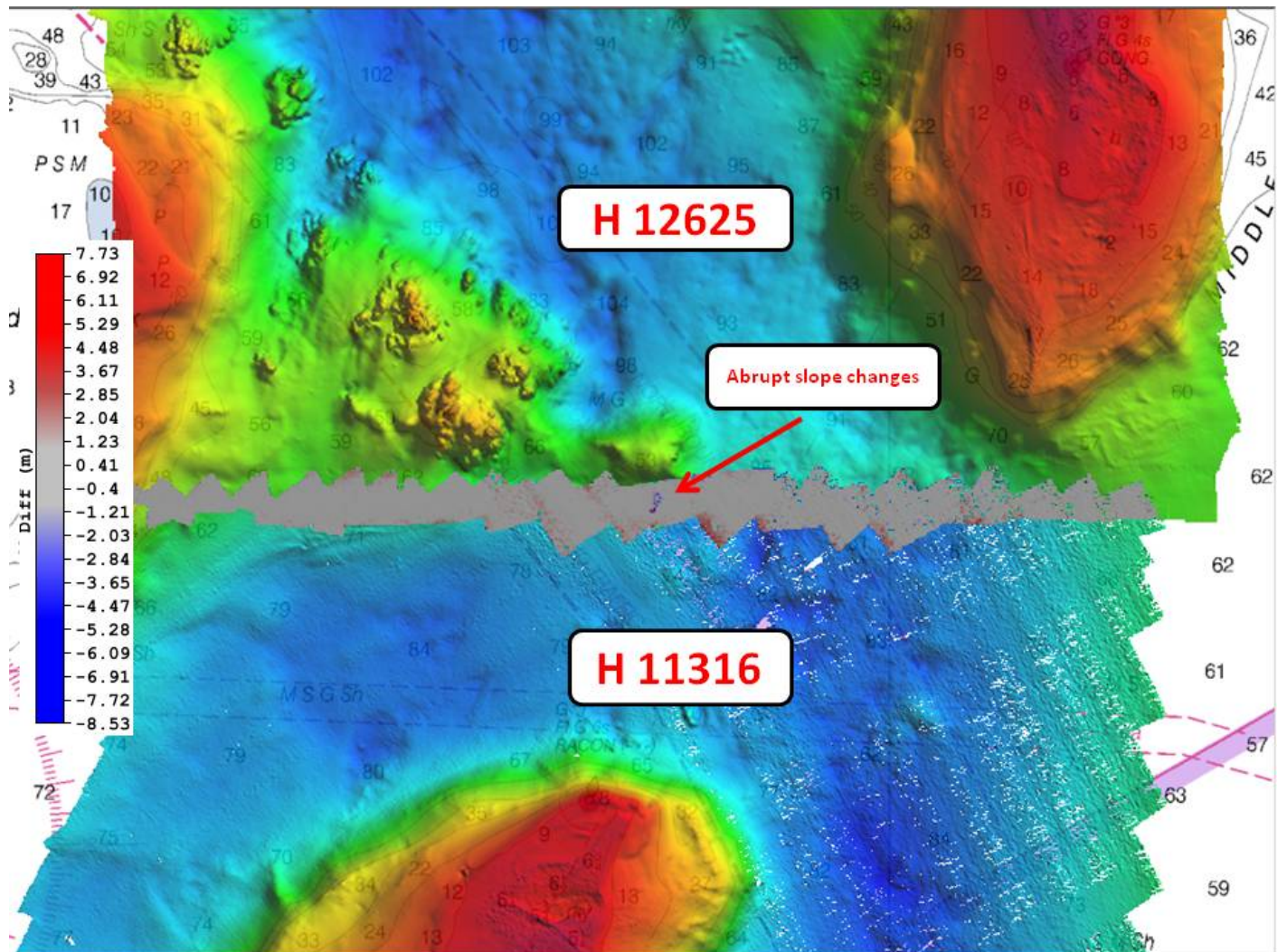


Figure 9: Graphical representation of differences between junction H12625 and H11316.



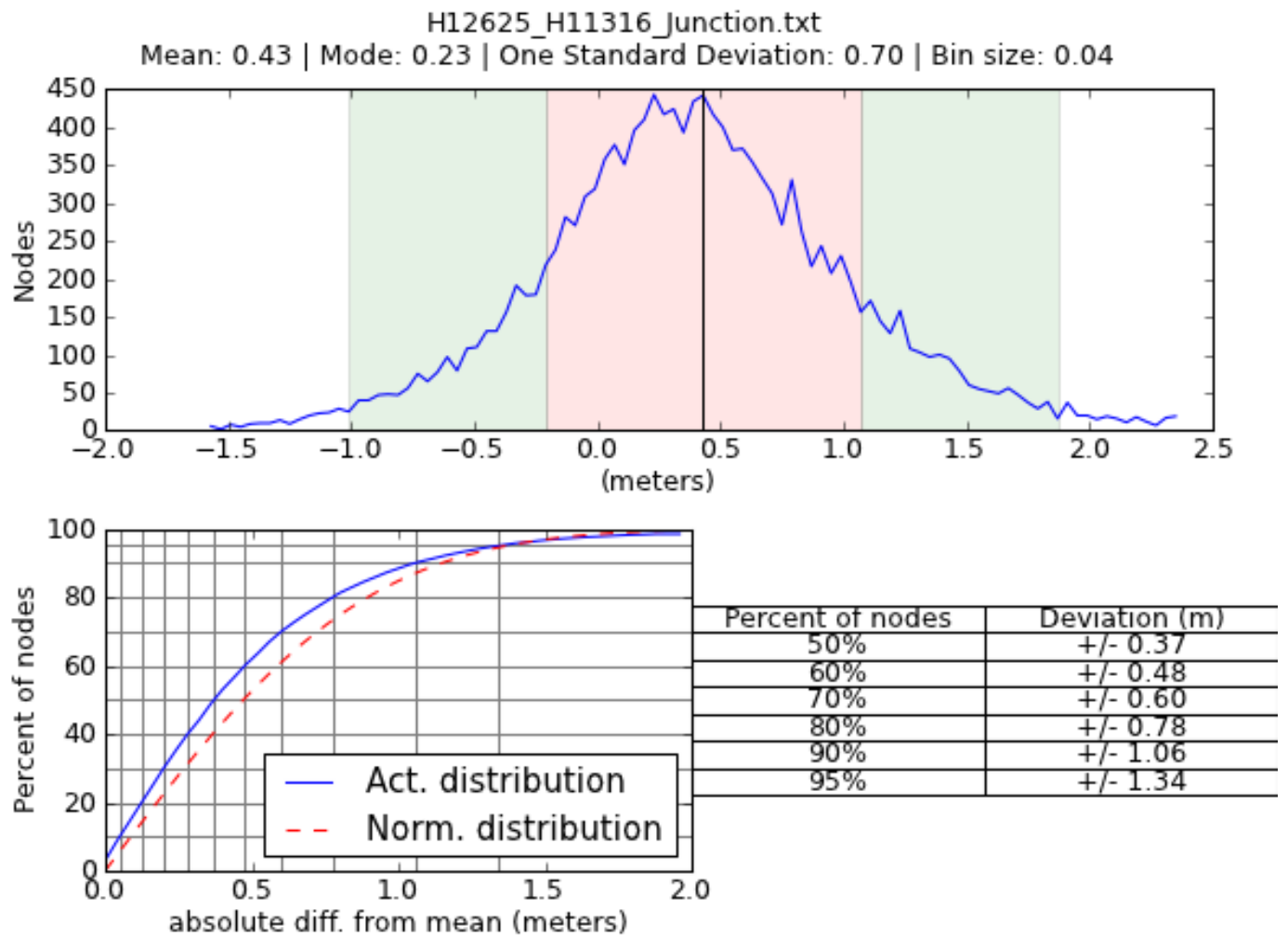


Figure 10: Statistical information for junction comparison between sheet H12625 and H11316.

#### 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 MOXA Card

A number of vessel motion artifacts were observed on 2808 DN116 and DN115. After further investigation it was determined that the RESON 7125 Topside Processing Unit (TPU) MOXA card (Multiport serial board) was not operating properly. The card was replaced and continued normal operation. Due to this problem time offsets were induced to the data. The data was acquired with a surface sound speed value of 1476.21 m/s for



the duration of the day. The surface sound speed was observed to be consistent in the areas surveyed during this period and did not have an appreciable effect on the data.

In CARIS HIPS to compensate for this problem an entry was made in the HIPS vessel file (HVF) with a time offset determined via re-calibration for each day. Another entry was made to the HVF returning the values to those determined during HSRR following the replacement of the MOXA card.

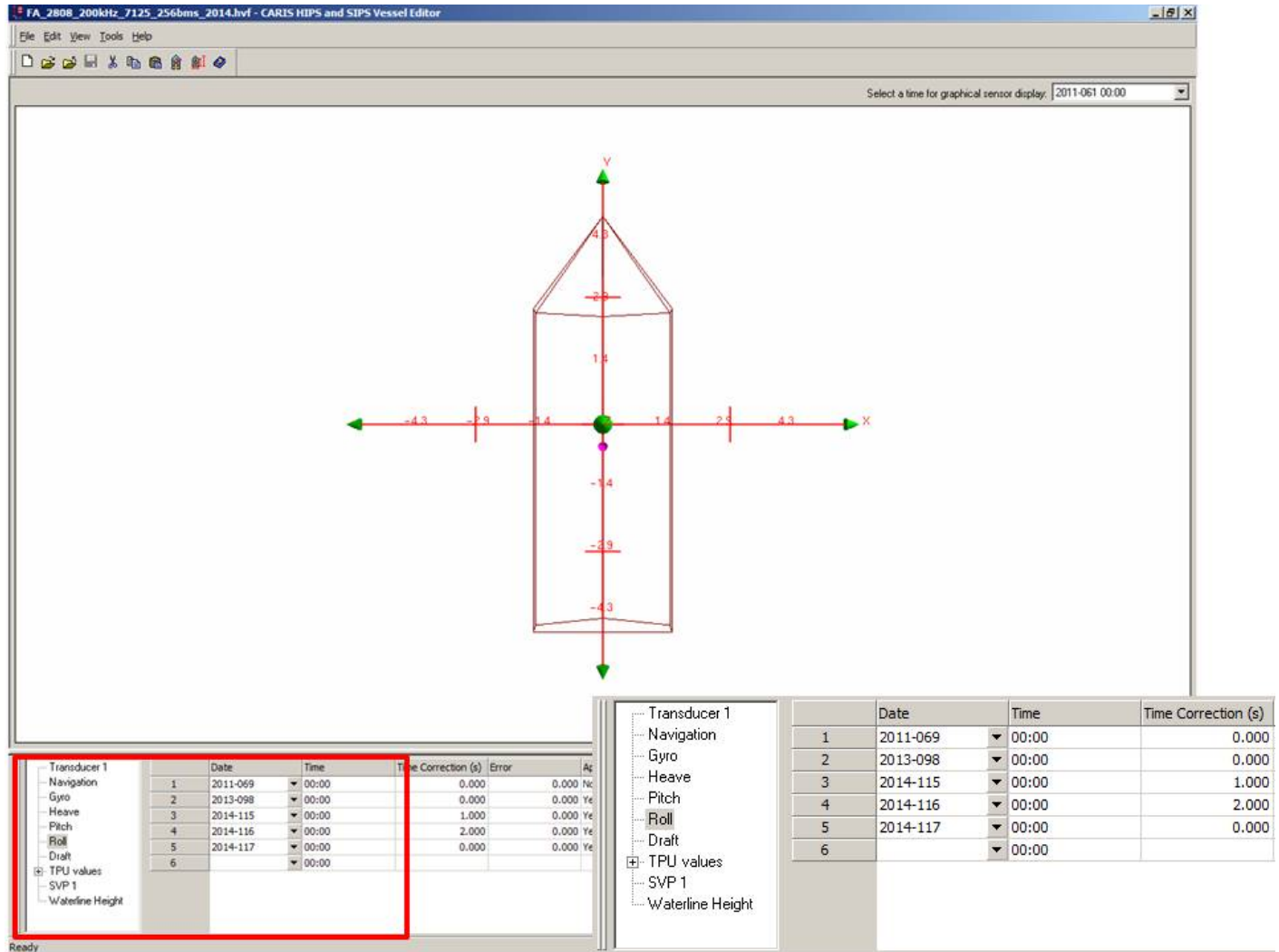


Figure 11: H12625 Time correction value added to FA\_2808\_200kHz\_7125\_256bms\_2014.hvf

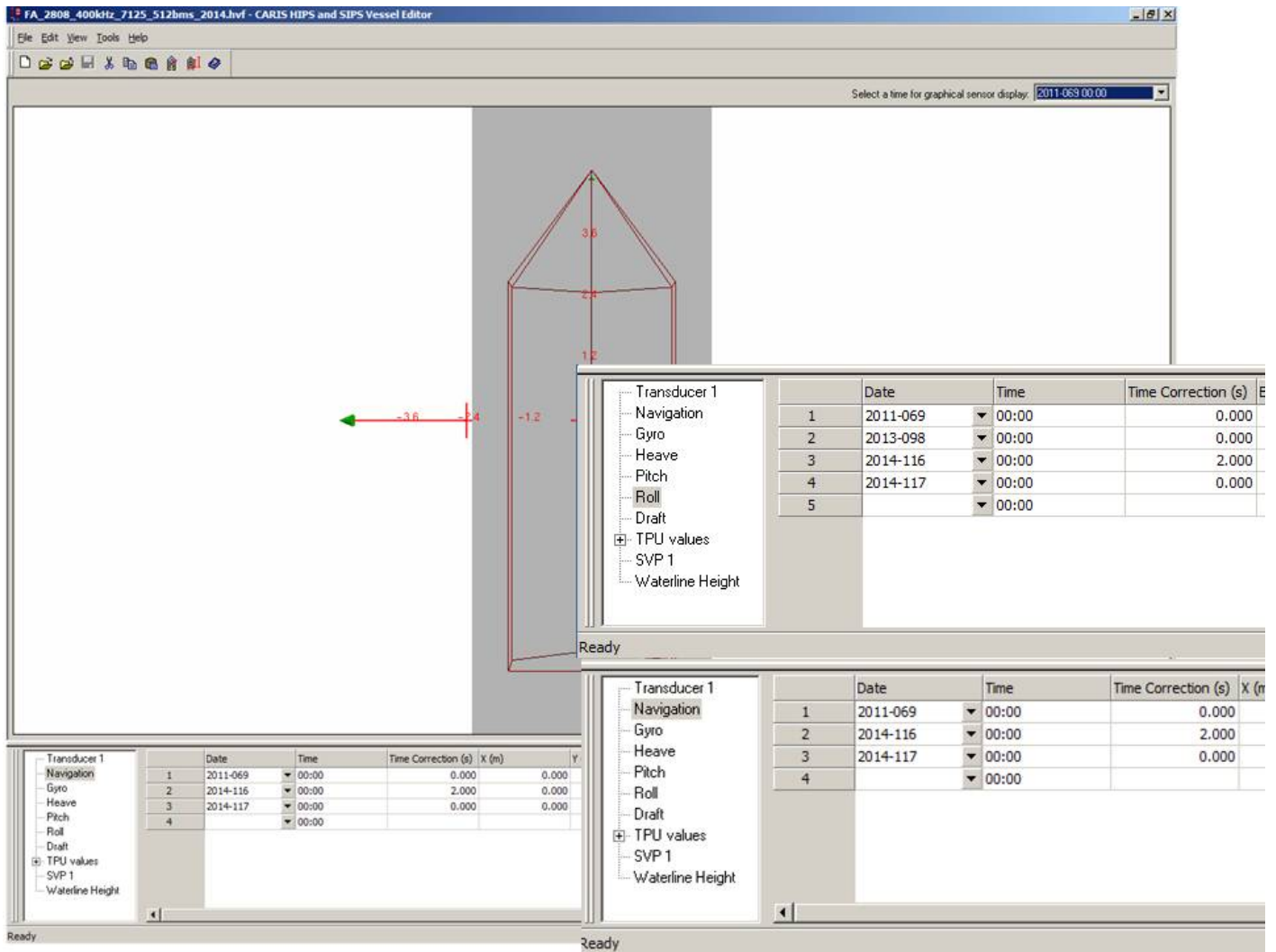


Figure 12: H12625 Time correction value added to FA\_2808\_400kHz\_7125\_512bms\_2014.hvf

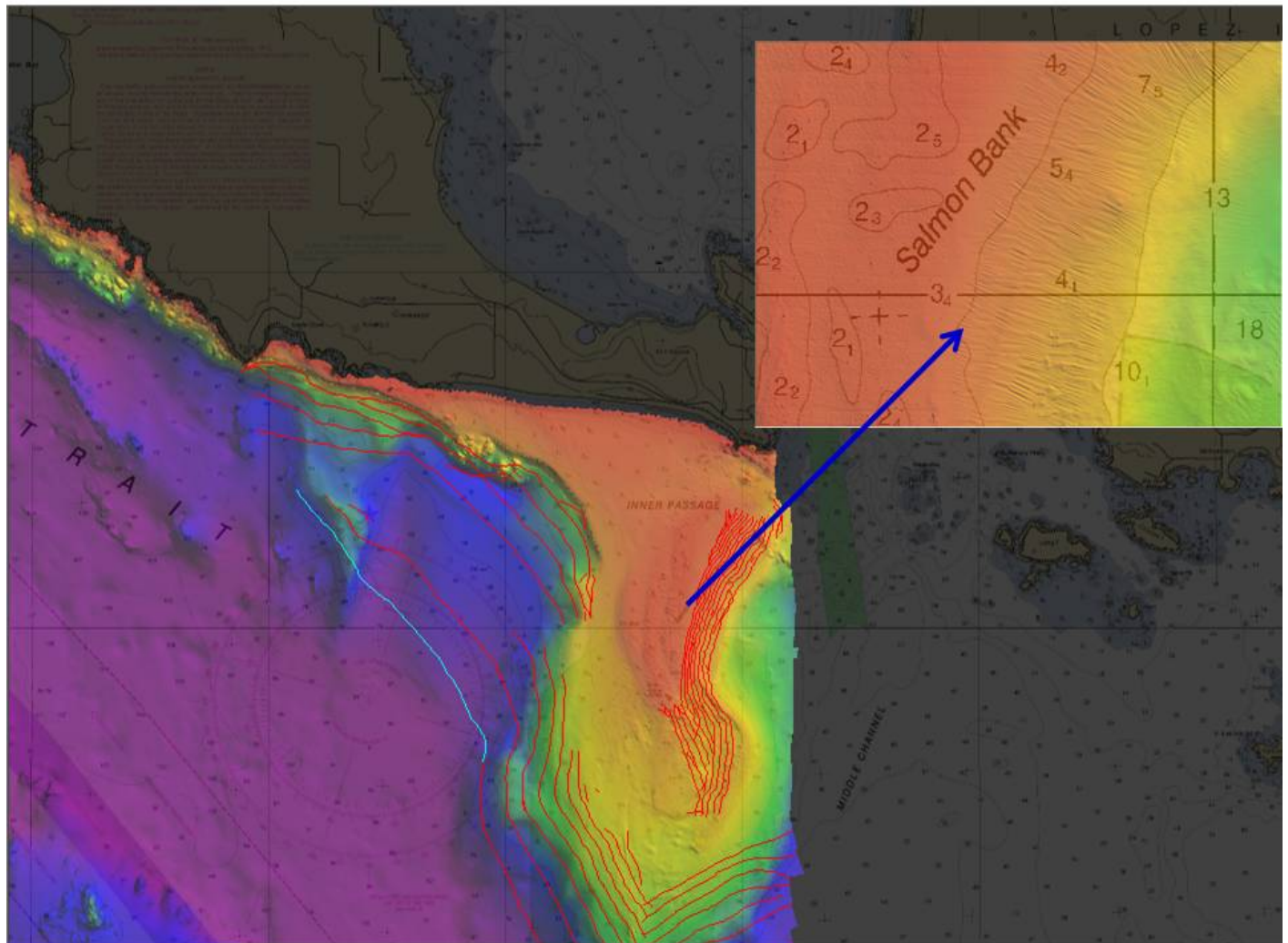
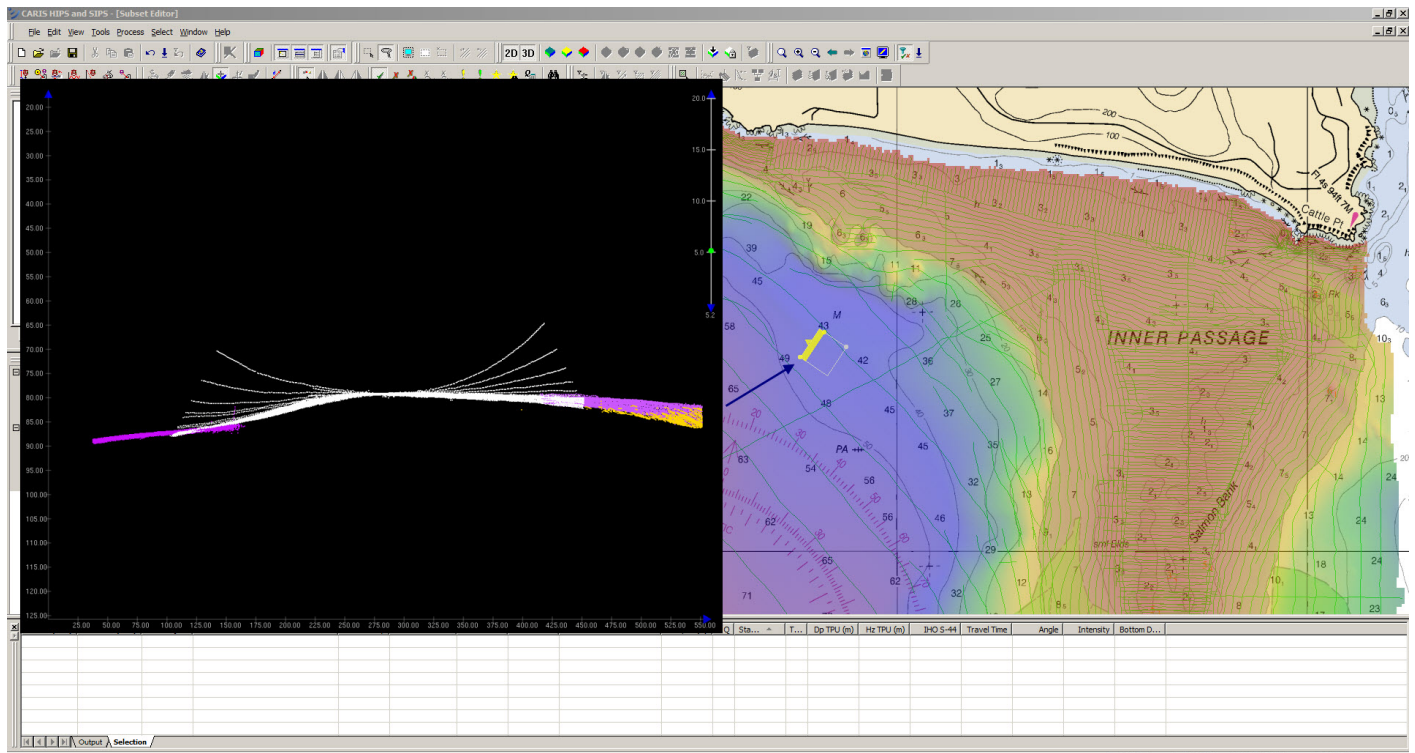


Figure 13: H12625 vessel motion artifacts observed in MBES

## B.2.6 Factors Affecting Soundings

### Surface Sound Speed

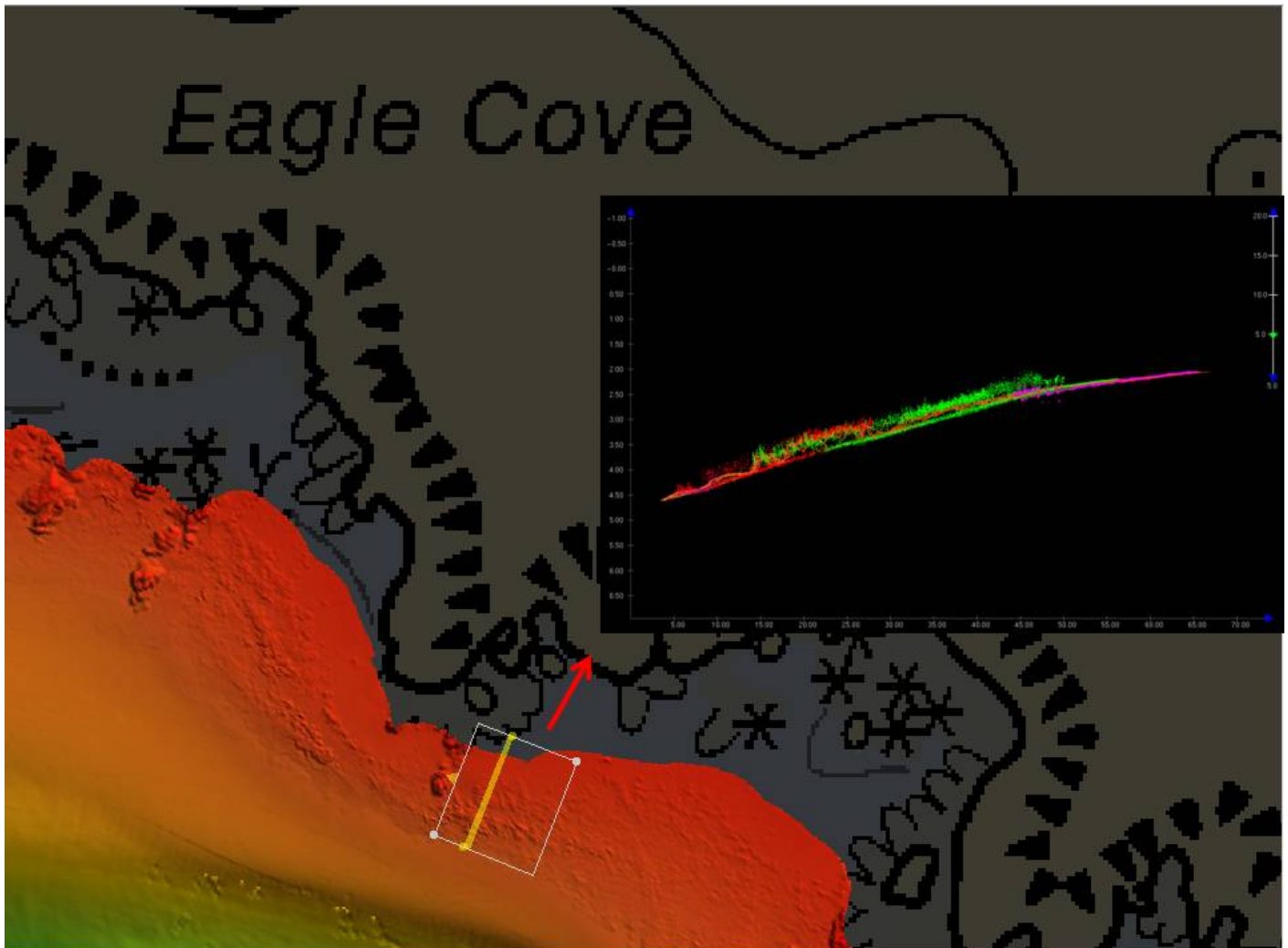
Due to sea conditions as well as current in the project area, all survey vessels experienced hard pitching when surveying into seas and swell. As a result, brief periods of apparent extreme refraction, or profile bending, occurred throughout H12625 when air or bubbles flowed down the hull causing erroneous measurements in the Surface Sound Velocimeter. An example of the erroneous measurements in Surface Sound Speed and the bent profiles can be found at 48-26-56.45N, 123-01-11.18W can be seen in Figure 17. The spikes in Surface Sound Speed caused by pounding were removed.



*Figure 14: H12625 effect of Surface Sound Speed.*

### Influence of Vegetation.

During the cleaning and data review processes of sheet H12625, it was found that the areas near shore, from Pile Point to Cattle Point contained many rocks with vegetation. The MBES data was reviewed in CARIS Subset editor with appropriate reference surfaces. The bathymetry accurately depicts the sea floor.



*Figure 15: H12625 Eagle Cove Influence of Vegetation*

### **B.2.7 Sound Speed Methods**

Sound Speed Cast Frequency: Sound speed measurements were conducted as discussed in the Data Acquisition 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 Holiday Assessment.

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 H12625 survey soundings.

Data holidays exist in the 0.5m, 2m, 4m, and 8m surfaces and some examples of each type are described below:

The holiday located South of Pile point is the result of an acoustic shadow over a steep sea floor, 48-28-48.99N, 123-05-42.62W, the least depth is represented. The holiday is depicted below in Figure 16.

The holiday located South of False Bay is the result of an acoustic shadow over a rock , 48-25-25.20N, 123-04-29.63W, the least depth is represented. The holiday is depicted below in Figure 17.

The holiday located South East of False Bay is the result of an acoustic shadow over a rock , 48-28-13.21N, 123-03-30.04W, the least depth is represented. The holiday is depicted below in Figure 18.

The holiday located South East of Salmon Bank is the result of low data density , 48-25-00.26N, 123-03-30.04W, the least depth is represented. The holiday is depicted below in Figure 19.

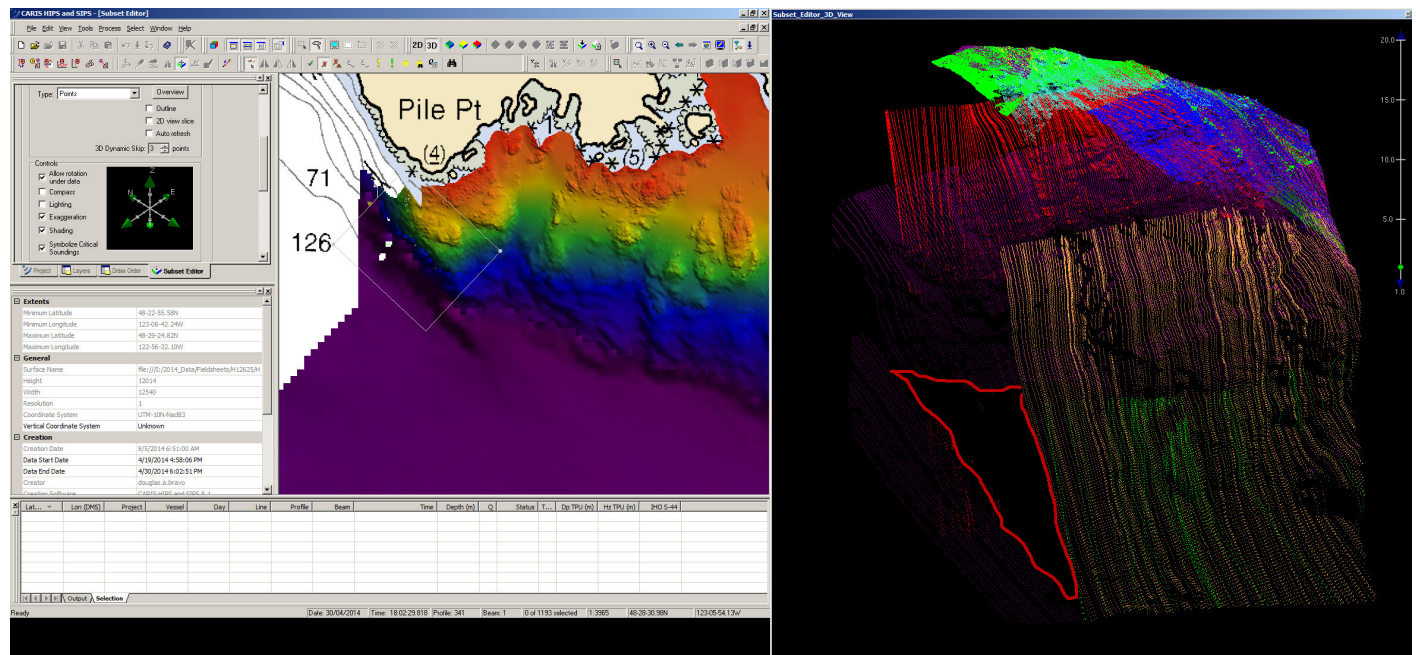


Figure 16: South of Pile Point.

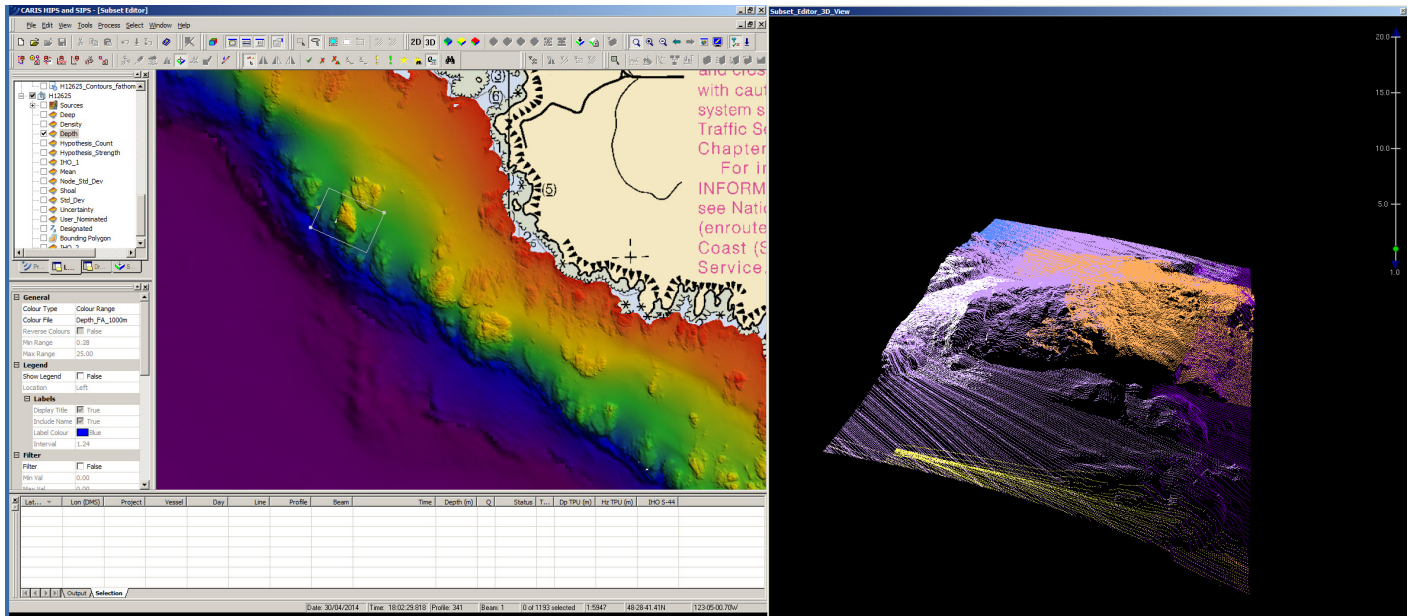


Figure 17: South of False Bay

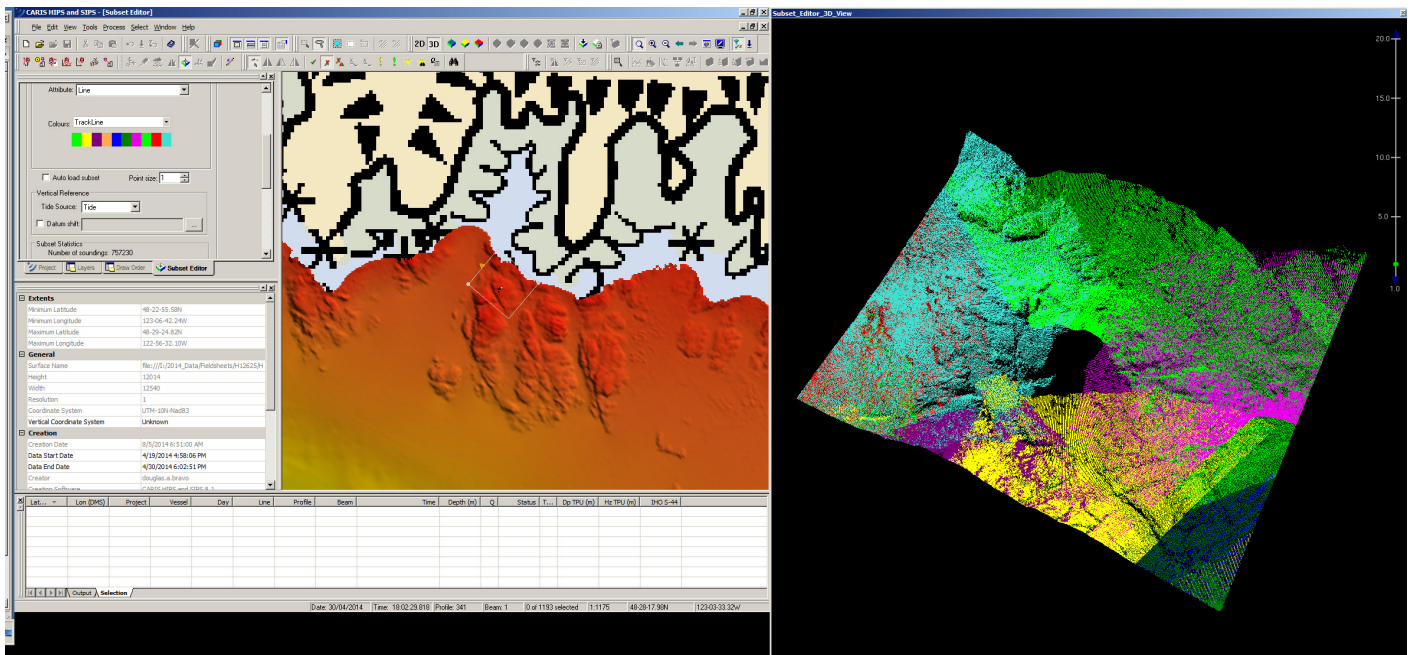


Figure 18: South East of False Bay

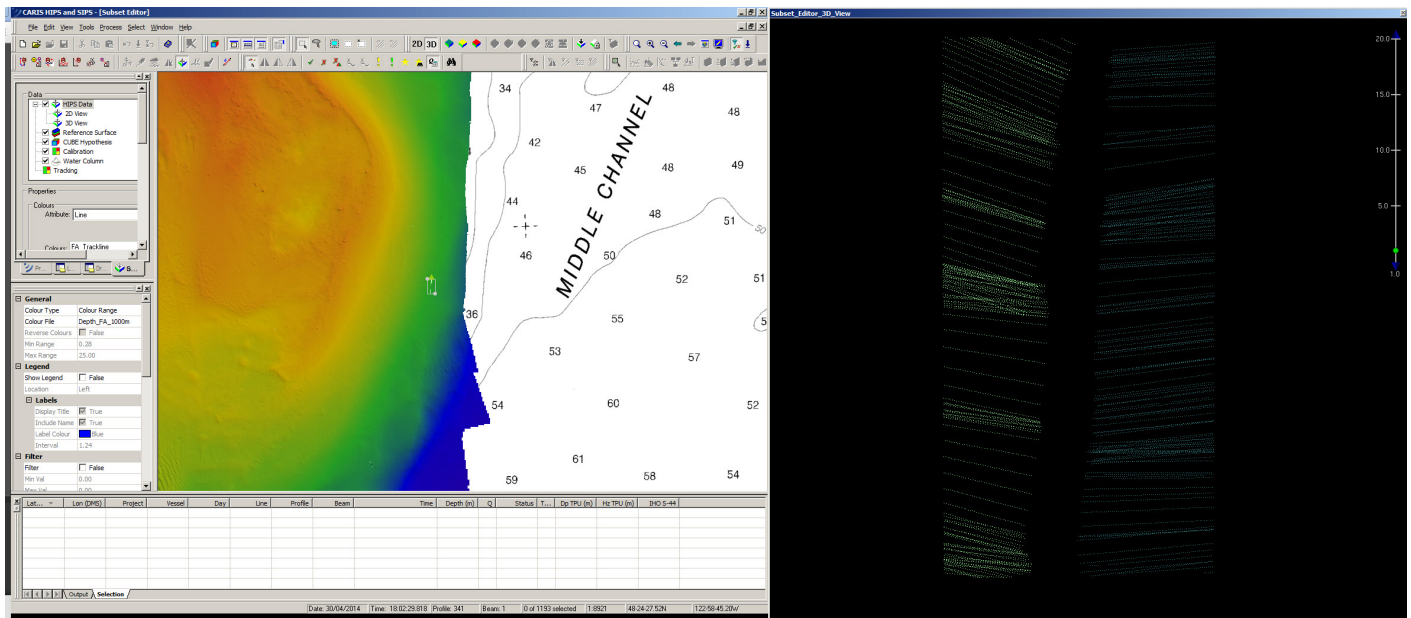


Figure 19: South East of Salmon Bank

### B.2.10 IHO Uncertainty.

The data meet the accuracy specifications as stated in the NOS Hydrographic Surveys Specifications and Deliverables (HSSD) dated April 2014. It was found that 100% of nodes in the finalized 8-meter grid meet or exceed IHO Order 1 specifications, 100% meet the IHO Order 2 for all depths of survey H12625; see Standards Compliance Review in Appendix II. To assess vertical accuracy standards, a child layer titled "IHO1" was created for each of the 1- meter, 2-meter, 4-meter, and 8-meter finalized surfaces and "IHO2" child layer for each of the 8-meter and 16-meter finalized surfaces, using the equation as stated in section C. 2.1 of the DAPR.



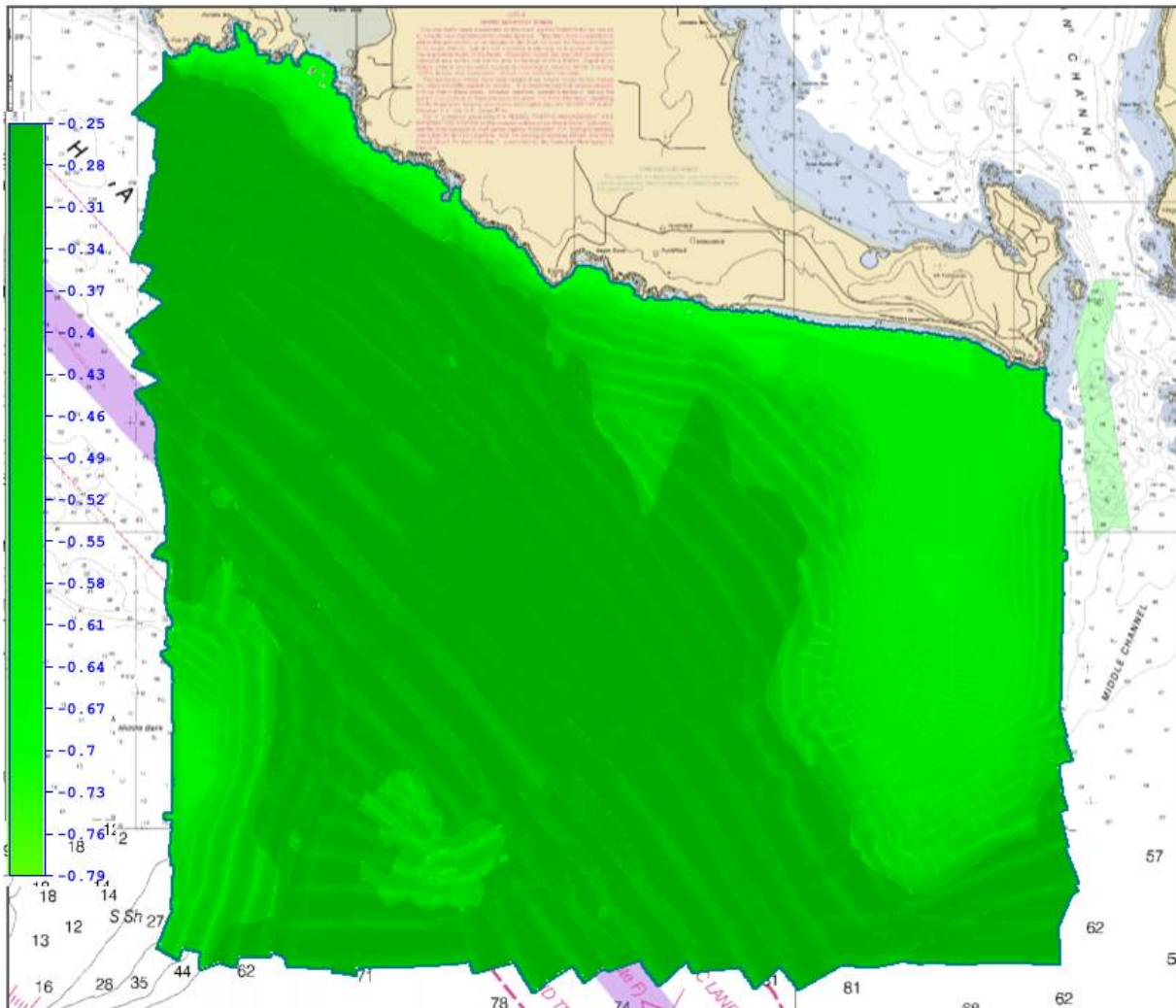


Figure 20: IHO Uncertainty Layer

### B.2.11 Density

Density requirements for the 1m, 2m, 4m, 8m and 16m finalized surfaces were achieved with at least 99.29% of finalized surface nodes containing five or more soundings. See Standards Compliance Review in Appendix II.

## 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 in 7k files and has been submitted directly to NGDC to be archived and to PHB where the data will be processed. Backscatter was not processed by the field unit.

## 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
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 9: 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
H12625_MB_halfm_MLLW	CUBE	0.5 meters	-	NOAA_0.5m	Complete MBES

Surface Name	Surface Type	Resolution	Depth Range	Surface Parameter	Purpose
H12625_MB_1m_MLLW	CUBE	1 meters	-	NOAA_1m	Complete MBES
H12625_MB_2m_MLLW	CUBE	2 meters	-	NOAA_2m	Complete MBES
H12625_MB_4m_MLLW	CUBE	4 meters	-	NOAA_4m	Complete MBES
H12625_MB_8m_MLLW	CUBE	8 meters	-	NOAA_8m	Complete MBES
H12625_MB_16m_MLLW	CUBE	16 meters	-	NOAA_16m	Complete MBES
H12625_MB_halfm_MLLW_Final	CUBE	0.5 meters	0 meters - 15 meters	NOAA_0.5m	Complete MBES
H12625_MB_1m_MLLW_Final	CUBE	1 meters	0 meters - 25 meters	NOAA_1m	Complete MBES
H12625_MB_2m_MLLW_Final	CUBE	2 meters	18 meters - 45 meters	NOAA_2m	Complete MBES
H12625_MB_4m_MLLW_Final	CUBE	4 meters	36 meters - 90 meters	NOAA_4m	Complete MBES
H12625_MB_8m_MLLW_Final	CUBE	8 meters	72 meters - 180 meters	NOAA_8m	Complete MBES
H12625_MB_16m_MLLW_Final	CUBE	16 meters	144 meters - 320 meters	NOAA_16m	Complete MBES
H12625_MB_16m_MLLW_Combined	CUBE	16 meters	-	NOAA_16m	Complete MBES

*Table 10: Submitted Surfaces*

The NOAA CUBE parameters mandated in HSSD were used for the creation of all CUBE BASE surfaces in Survey H12625.

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 HSD OPS. See Correspondence in Appendix II for additional details.

***The 1m surface was finalized from 10-25m, not 0-25m.***

### 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 H12625 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 H12625 contained 14 soundings which were designated in CARIS HIPS. These designated soundings were used to draw the CUBE surface to the sounding which most accurately represented the sea floor in cases where the surface deviated from the sounding more than the vertical IHO requirements allowed.

### B.5.5 Delayed Heave

To enable the application of Delayed Heave 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 2808 day 111. A power outage was reported during this day.

## C. Vertical and Horizontal Control

No additional Horizontal or Vertical Control Report will be submitted with H12625.

### 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 11: NWLON Tide Stations

File Name	Status
9449880.tid	Final Approved

Table 12: Water Level Files (.tid)

File Name	Status
N305FA2014CORP.ZDF	Final

Table 13: Tide Correctors (.zdf or .tc)

A request for final approved tides was sent to N/OPS1 on 05/05/2014. The final tide note was received on 05/16/2014.

Preliminary zoning was verified by CO-OPS and accepted as the final zoning for project OPR-N305-FA-14.

***The Tide Note is attached.***

#### Non-Standard Vertical Control Methods Used:

VDatum

#### Ellipsoid to Chart Datum Separation File:

2014\_N305\_VDatum\_NAD83Ellip\_MLLW.csar

The VDatum separation file was applied in accordance with the FPM. VDatum was used for the vertical transformation of ellipsoid-referenced data to MLLW and is applied for data submission. 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 II for additional information on V Datum use and approval.

***The VDatum and ERS Validation Report in Appendix II states that three lines should have zoned tides applied to them as there were IMU data gaps. Two of the three lines have zoned tides applied while the third has VDatum with no noticeable offset. It corroborates well with surrounding data.***

## 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, Smart Base 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. With the exception of the lines shown below due to IMU data gaps:

2807 – Dn118 2014M\_1182250, Dn120 2014M\_1201758.

2808 – Dn 113 2014M\_1132016.

For further details regarding the processing and quality control checks performed see the H12625 POSPAC Processing Logs spreadsheet located in the SBET folder with the GNSS data.

The following CORS Stations were used for horizontal control:

<b>HVCR Site ID</b>	<b>Base Station ID</b>
P436	Dungeness_WA2006
WHD5	WHIDBEY ISLAND 6
P435	ShoresNW1GWA2005
P439	OrcasAirptWA2005
P438	NWIS_PNGA_WA2005
SC02	SC02_PNGA_WA2001
PGC5	PGC5000
COUP	coup01

*Table 14: CORS Base Stations*

The following DGPS Stations were used for horizontal control:

DGPS Stations
Whidbey Island, WA - 302 kHz.

*Table 15: USCG DGPS Stations*

## D. Results and Recommendations

### D.1 Chart Comparison

A comparison was performed between survey H12625 and Charts 18434\_1, 18465\_1 using CARIS sounding and contour layers derived from the 16-meter combined surface. The contours and soundings have been overlaid on the chart to assess differences. All data from H12625 should supersede charted data.

#### D.1.1 Raster Charts

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

Chart	Scale	Edition	Edition Date	LNМ Date	NM Date
18434	1:25000	7	04/2008	08/02/2014	08/05/2014
18465	1:80000	39	10/2011	08/02/2014	08/05/2014

*Table 16: Largest Scale Raster Charts*

#### 18434

Soundings from survey H12625 generally agreed within zero to one fathom with charted depths on chart 18434\_1. Contours generated in CARIS HIPS closely approximated the charted 1, 3, 5, 10, 20, 30, 40, 50 and 100 fathom contours.

Notable exceptions to this general agreement are listed and shown in the figures below:

0.5 nautical miles South of Cattle Point: A disagreement between surveyed depths and charted sounding. 7 fathom chart sounding that was surveyed with MBES at 3.2 fathom. See figure 22.

0.6 nautical miles North-West of Eagle Point: A disagreement between surveyed depths and charted sounding. 2.5 fathom chart sounding that was surveyed with MBES at 0.5 fathom. This disagreement was submitted as DTON. See figure 23.

2.6 nautical miles South of Eagle Point: The 100 fathom contour was surveyed approximately 460 m south of the general charted location. See figure 24.

Entrance of False Bay: The 3 fathom contour was surveyed approximately 200 m North of the general charted location. See figure 25.

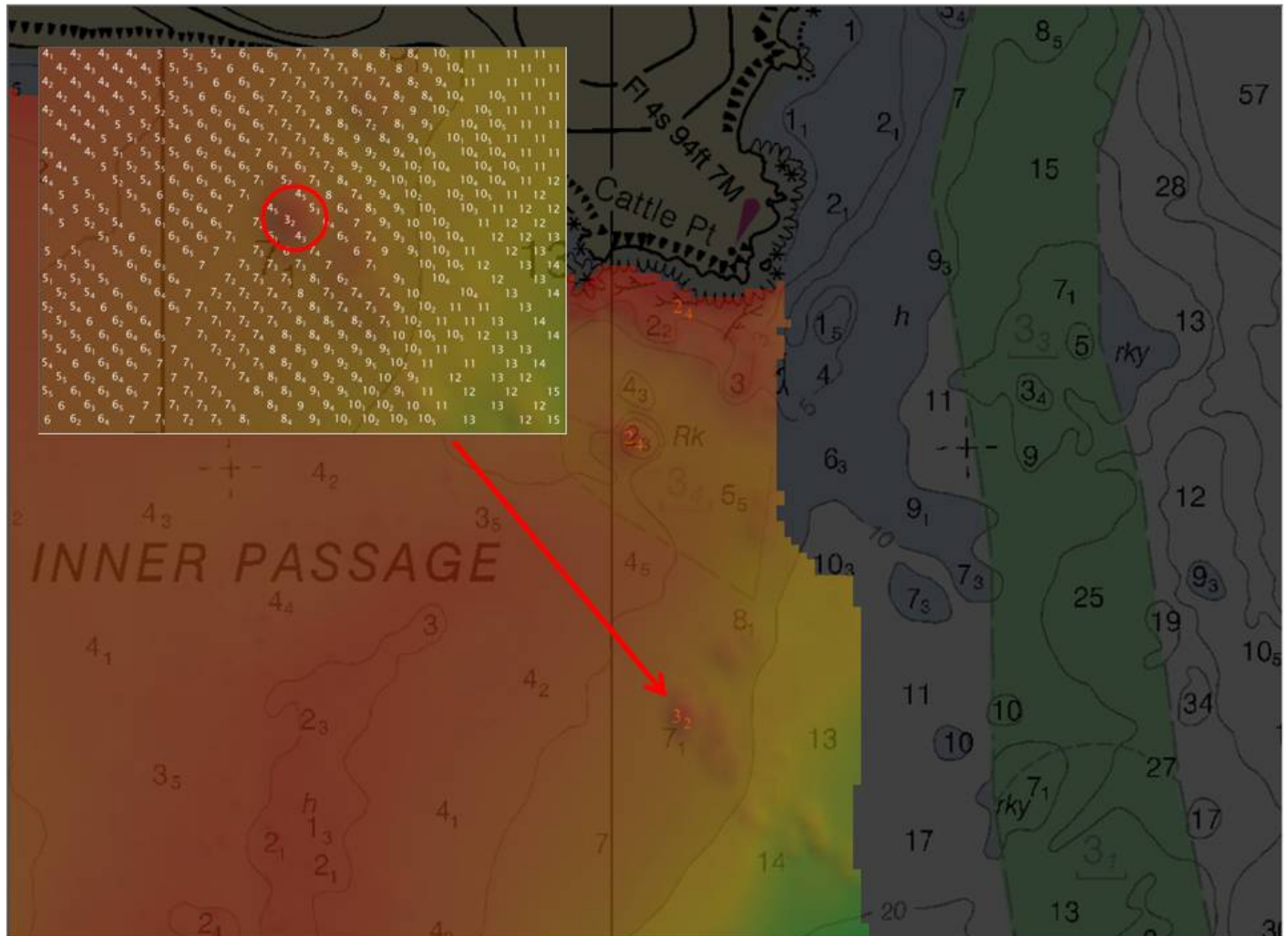


Figure 21: Disagreement South of Cattle Point.



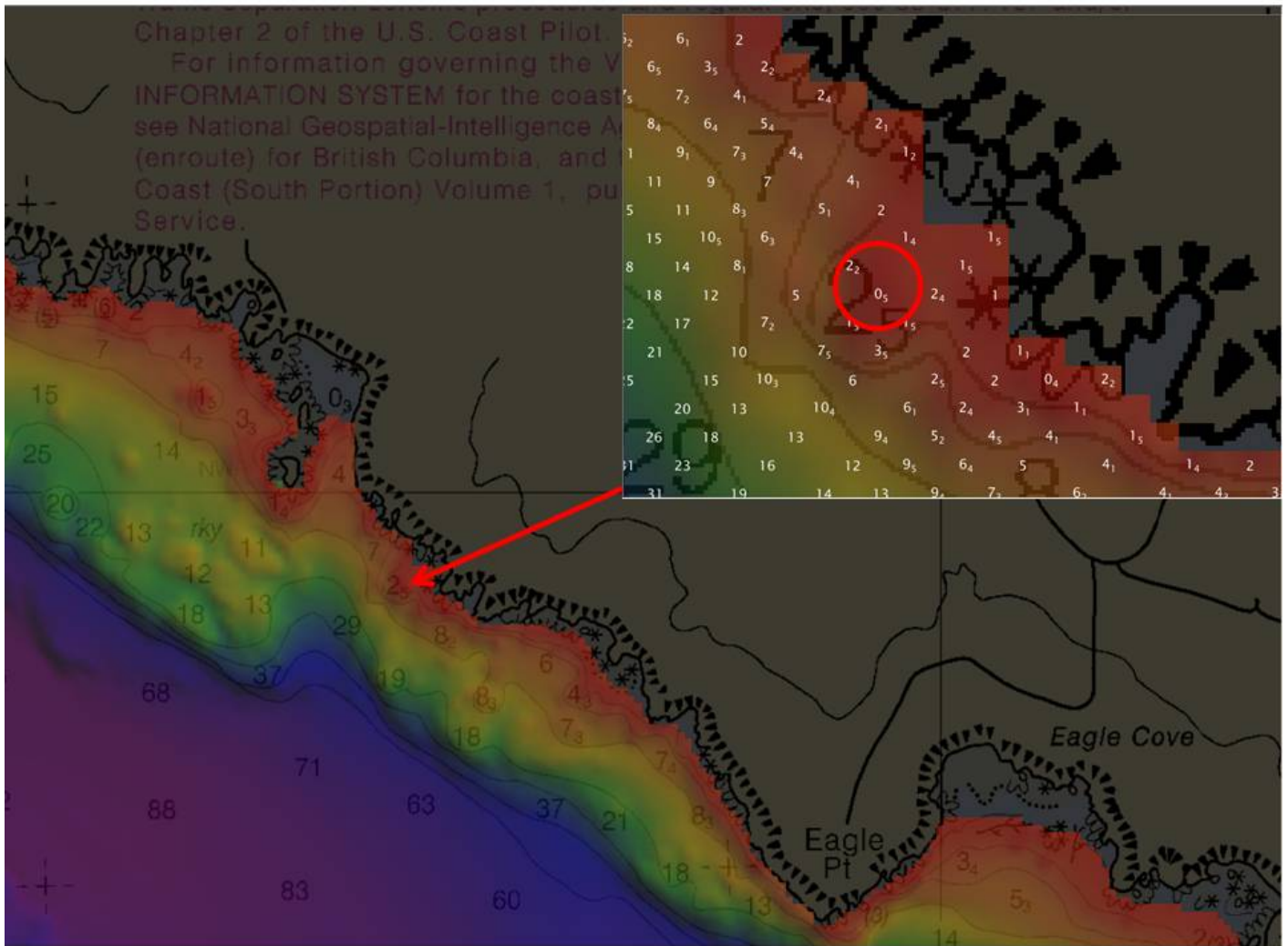


Figure 22: Disagreement North-West of Eagle Point.

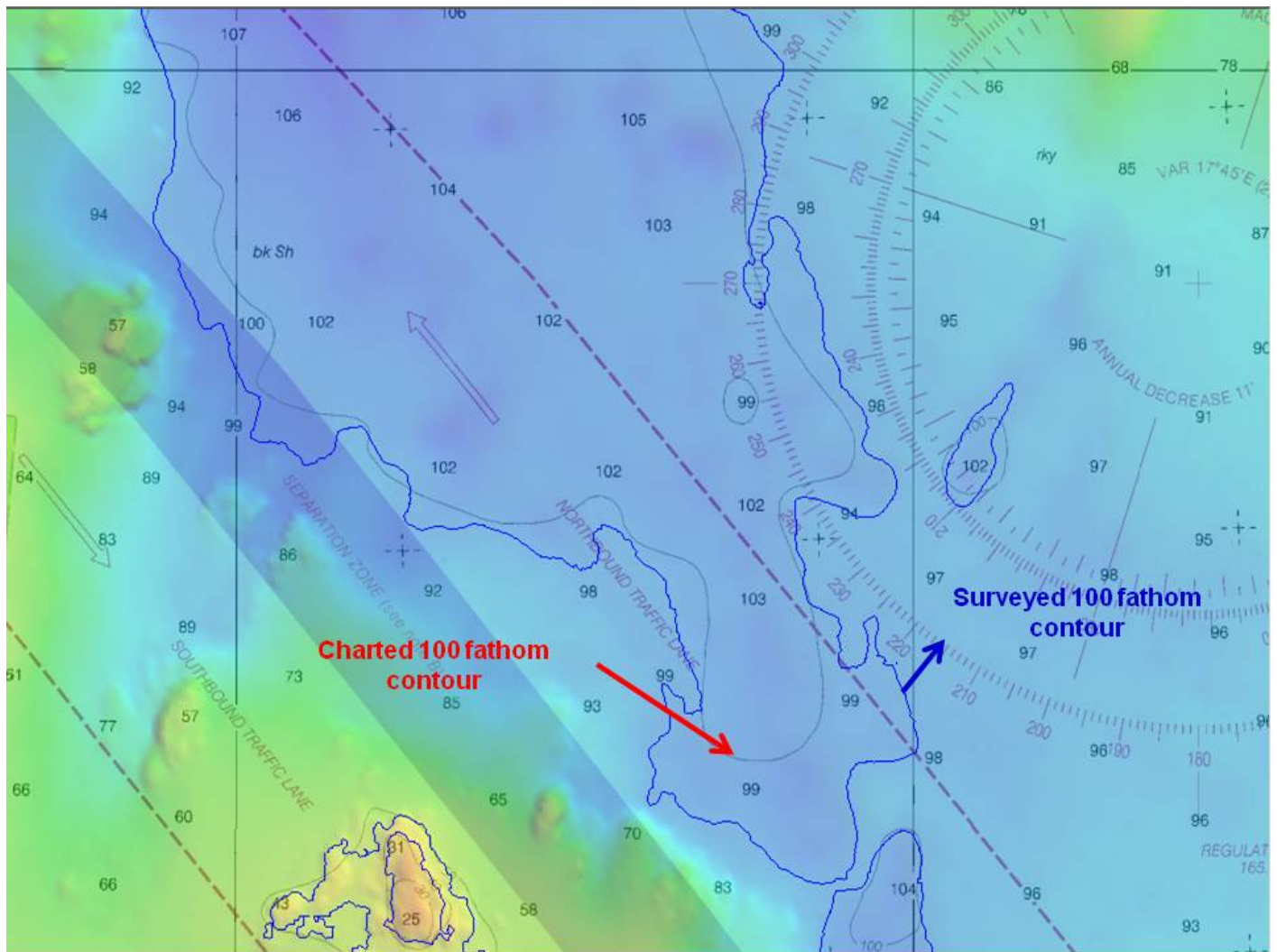


Figure 23: Disagreement South of Eagle Point.

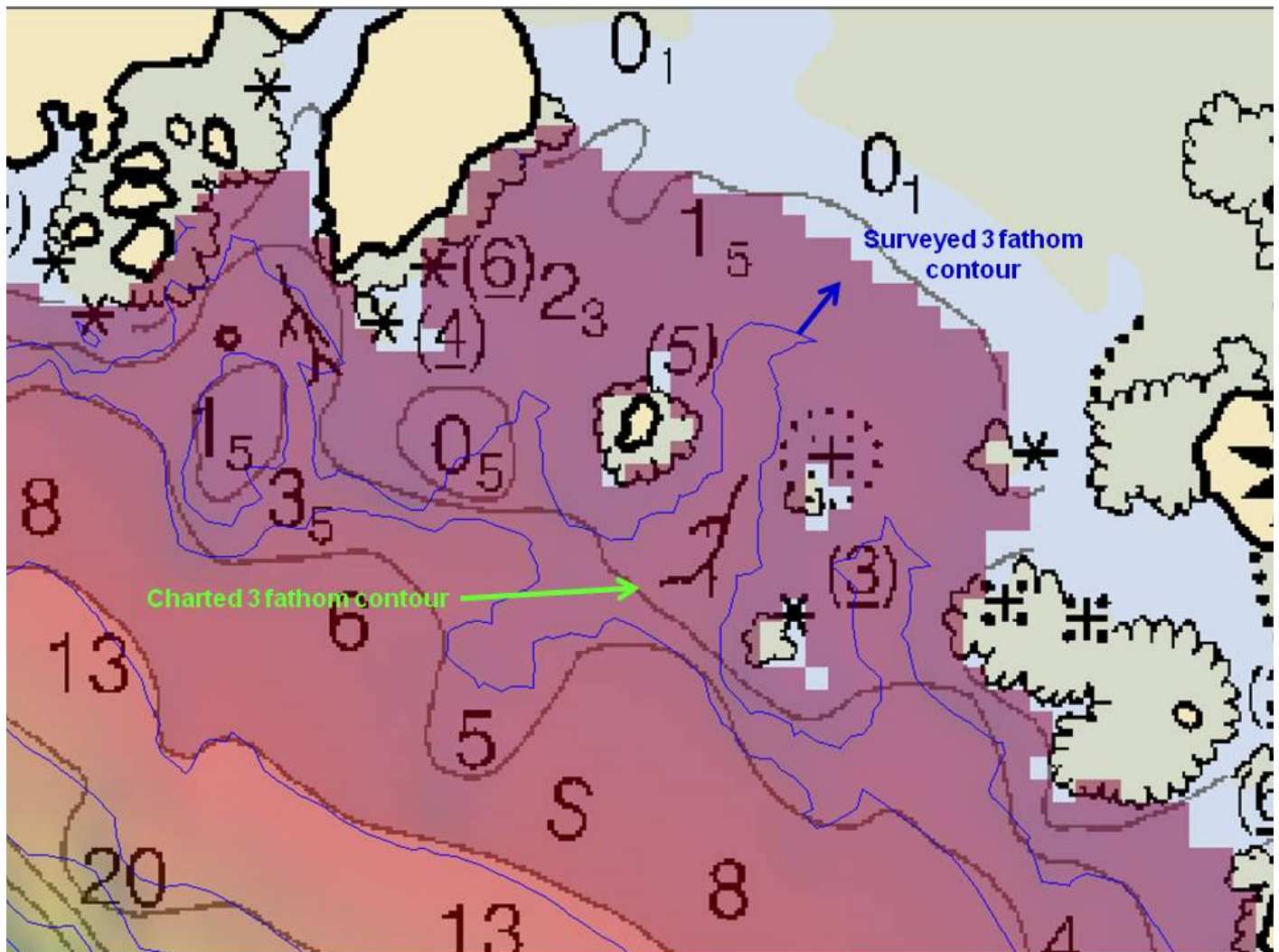


Figure 24: Disagreement Entrance of false Bay.

18465

Soundings from survey H12625 generally agreed within zero to one fathom with charted depths on chart 18465\_1. Contours generated in CARIS HIPS closely approximated the charted 1, 3, 5, 10, 20, 30, 40, 50 and 100 fathom contours.

Notable exceptions to this general agreement are listed and shown in the figures below:

2 nautical miles South West of Salmon Bank: A disagreement between surveyed depths and charted sounding. 79 fathom chart sounding that was surveyed with MBES at 69 fathom. See figure 26.



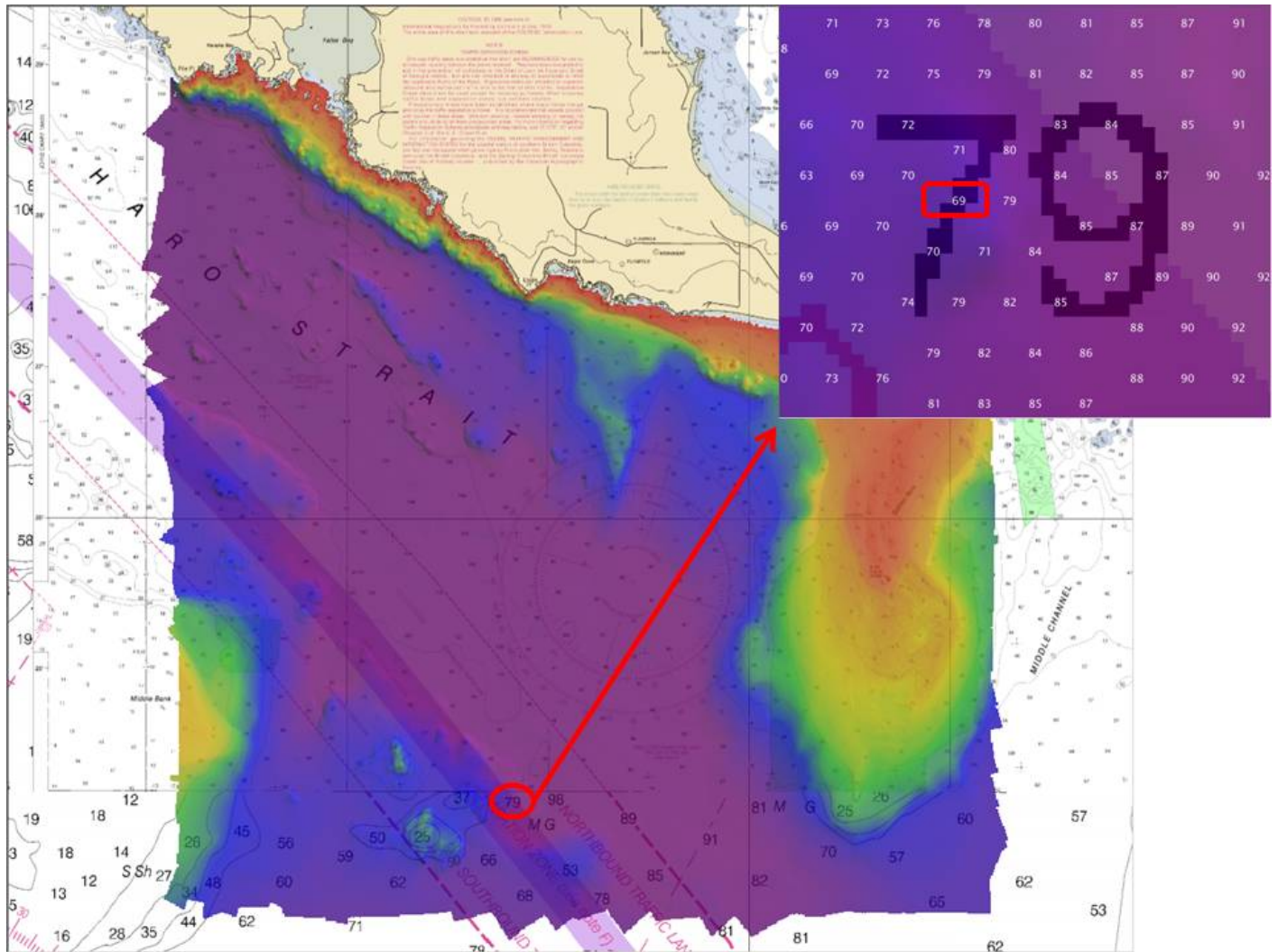


Figure 25: Disagreement South West of Salmon Bank.

### 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?
US5WA42M	1:25000	10	01/24/2013	05/27/2014	YES

Table 17: Largest Scale ENC's

US5WA42M

Soundings from survey H12625 generally agreed within zero to one fathoms on chart US5WA42M. Contours in CARIS HIPS closely approximate the charted contours. See discussion from Raster chart 18434\_1 for more details.

### **D.1.3 AWOIS Items**

No AWOIS items were assigned for this survey.

### **D.1.4 Maritime Boundary Points**

No Maritime Boundary Points were assigned for this survey.

### **D.1.5 Charted Features**

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

### **D.1.6 Uncharted Features**

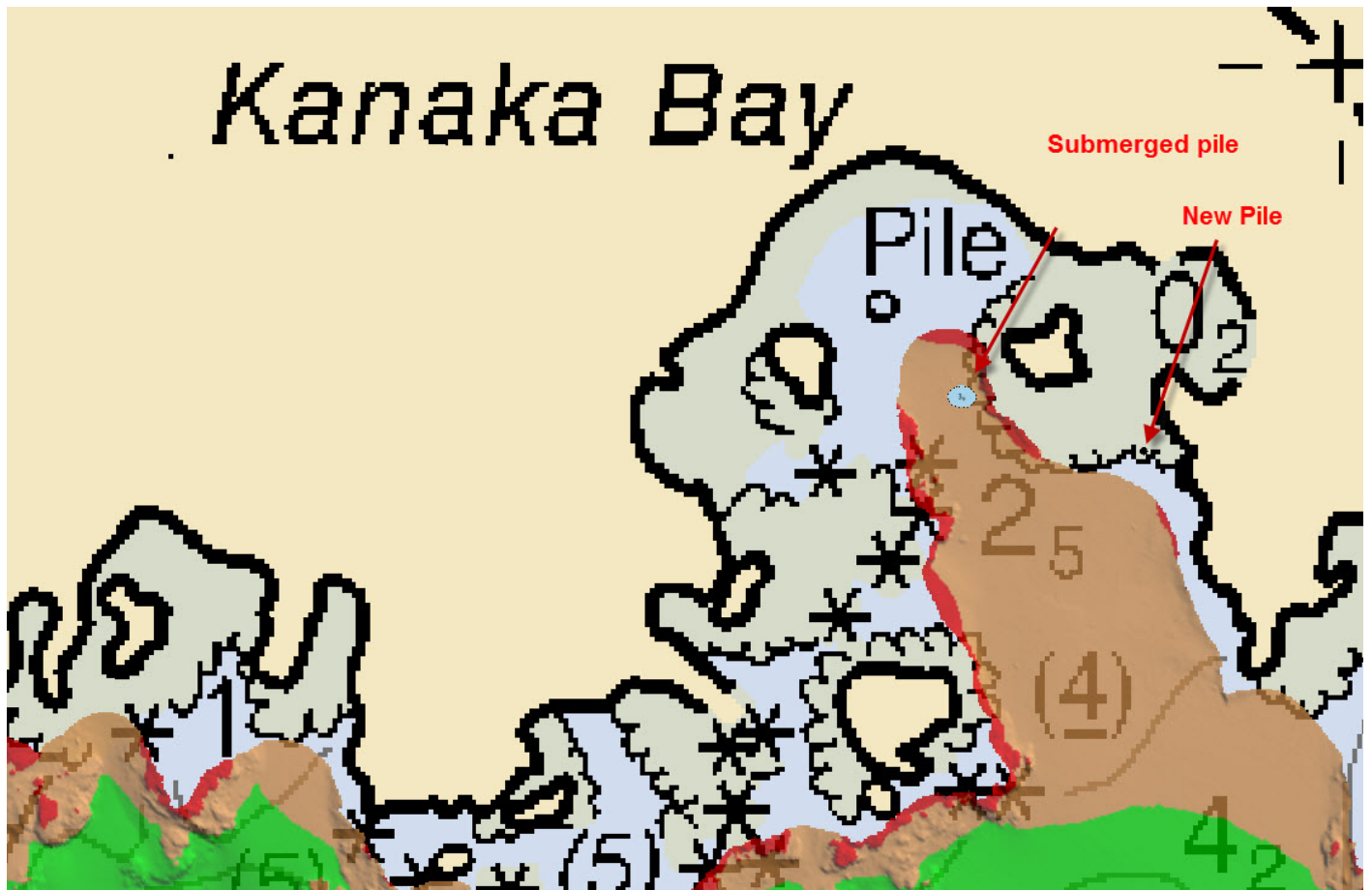
One submerged pile located at Kanaka Bay. See figure 26.

One Pile located at Kanaka Bay. See figure 26.

One Underwater rock located 0.48NM South of Cattle Point. See figure 27.

Two foul areas with rocks. One located south of Cattle Point and another located South of False Bay. See figures 28 and 29.

All items were addressed and are included in the H12625 Final Feature File.



*Figure 26: New Pile and submerged pile in kanaka bay.*

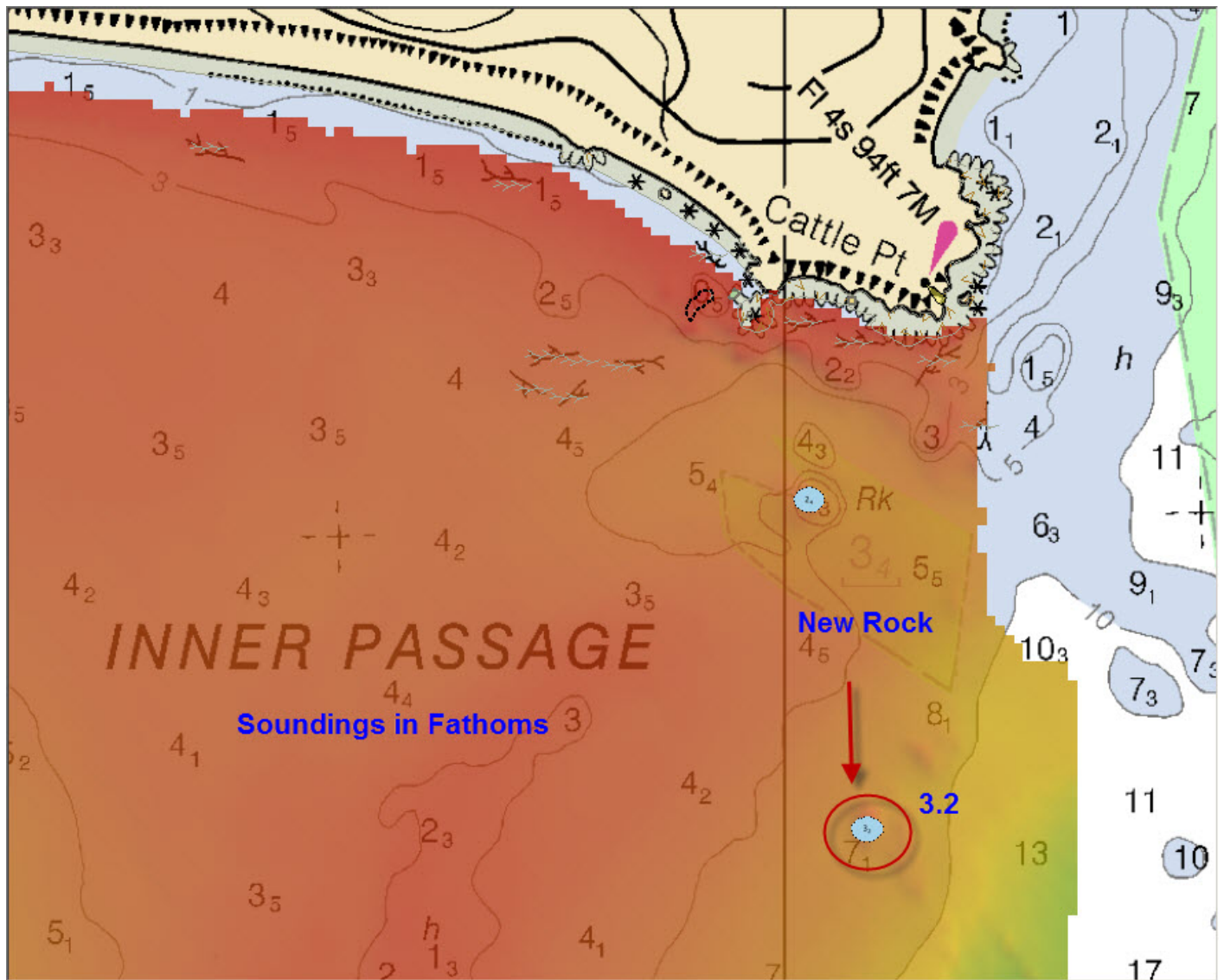


Figure 27: Submerged rock south of Cattle Point.

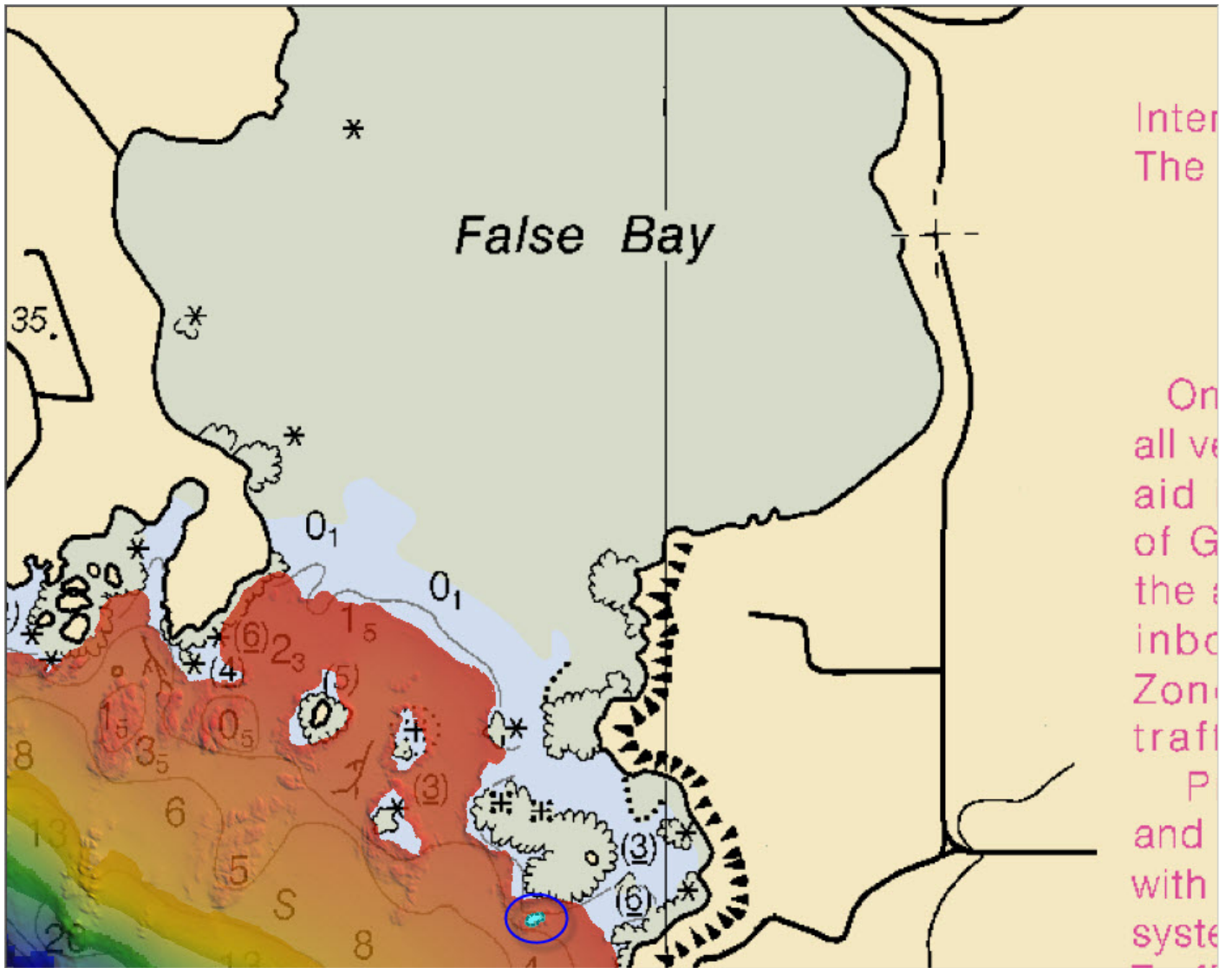
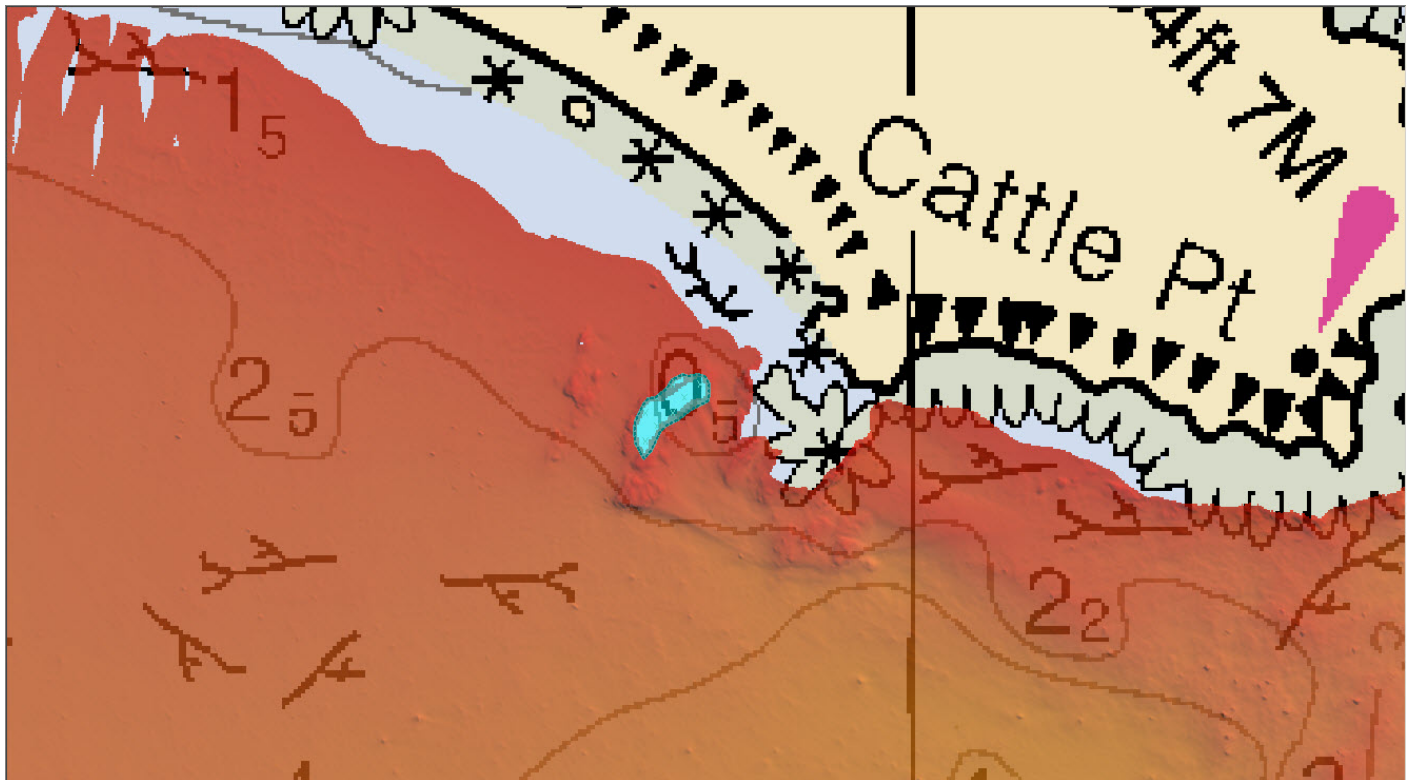


Figure 28: Obstruction South of False bay.





*Figure 29: Obstruction South of Cattle Point.*

### D.1.7 Dangers to Navigation

The following DTON reports were submitted to the processing branch:

DTON Report Name	Date Submitted
H12625_DTON	2014-08-21

*Table 18: DTON Reports*

Danger to Navigation Reports are included in Appendix II of this report.

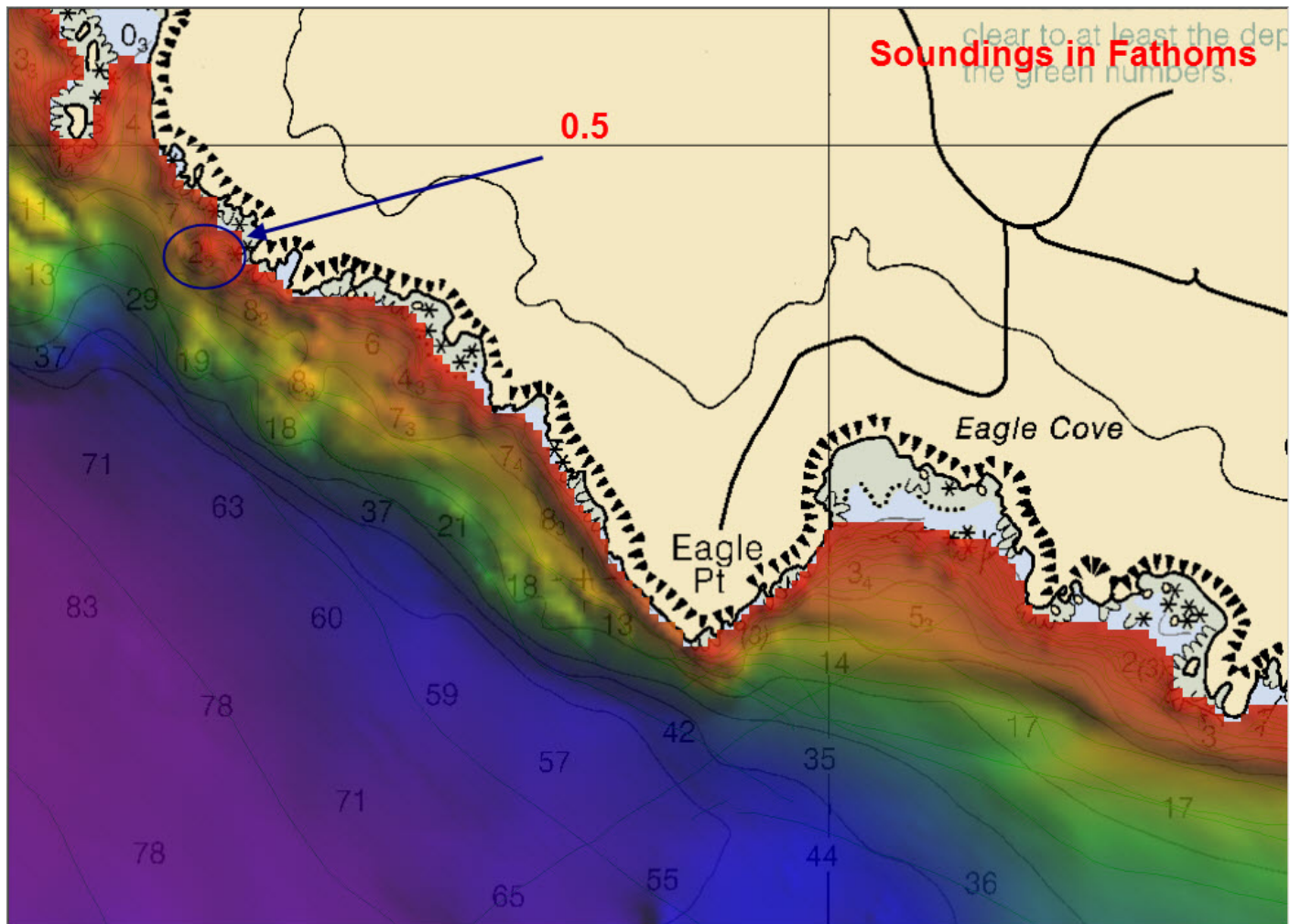


Figure 30: H12625 DTON, overview.

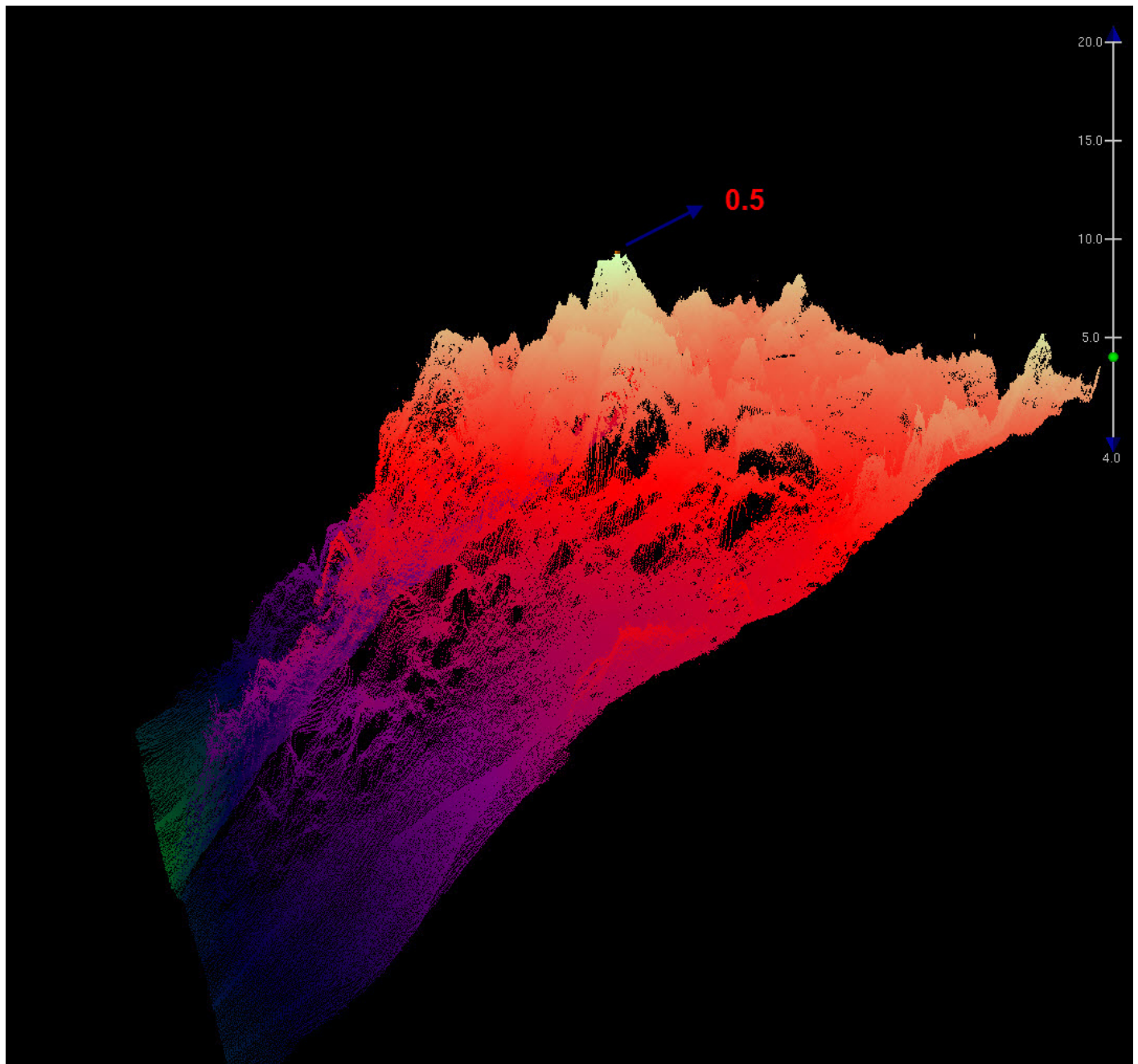


Figure 31: H12625 DTON, 3D.

*The DTON Report is attached.*

#### D.1.8 Shoal and Hazardous Features

No uncharted shoals or potentially hazardous features exist for this survey.

### **D.1.9 Channels**

Soundings from survey H12625 generally agreed within one to two fathom with charted depths in the traffic separation schemes within the survey limits except as noted in section D.1, figure 25.

### **D.1.10 Bottom Samples**

Five bottom samples were obtained in accordance with section 7.1 of the HSSD in areas designated by the feature object class springs (SPRING) in the Project Reference File (PRF).

All bottom samples were attributed and located in the surveys Final Feature File.

*Three of the five bottom samples were included in the chart update product.*

## **D.2 Additional Results**

### **D.2.1 Shoreline**

Fairweather personnel conducted limited shoreline verification and reconnaissance near times of predicted low tides within the survey limits. Annotations, information, and diagrams collected on DP forms and boat sheets during field operations were scanned and are included in the digital Separates I folder. Shoreline verification procedures for survey H12625 conform to those detailed in the DAPR. Features from the current editions of charts 18434 that were not depicted by the source shoreline data were digitized in CARIS Notebook with S-57 attribution into the H12625\_Final\_Feature\_File.hob file, to be displayed for field verification. The Hydrographer recommends that the shoreline depicted in the Final Feature File and survey soundings supersede and complement shoreline information compiled on the Composite Source File (CSF) and charts.

### **D.2.2 Prior Surveys**

Prior surveys exist for this survey, but were not investigated

### **D.2.3 Aids to Navigation**

Survey H12625 included two aids to navigation (ATONs). Positions were taken for each ATON and found to be on-station and serving its intended purpose.

### **D.2.4 Overhead Features**

No overhead features exist for this survey.

**D.2.5 Submarine Features**

No submarine features exist for this survey.

**D.2.6 Ferry Routes and Terminals**

There are no charted ferry routes within the limits of H12625.

**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**

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 11:03:05 -08'00'
LT Ryan A. Wartick	Field Operations Officer	01/21/2015	 Digitally signed by Ryan Wartick Date: 2015.01.22 08:45:51 -08'00'
LT Matthew M. Forney	Field Operations Officer	01/21/2015	 Matthew Forney 2015.01.22 09:20:11 -08'00'
HCST Douglas A. Bravo	Sheet Manager	01/21/2015	 2015.01.21 16:18:02 -08'00'

## F. Table of Acronyms

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



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



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



**UNITED STATES DEPARTMENT 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:** H12625

**LOCALITY:** Salmon Bank to Kanaka Bay, Strait of Juan De Fuca, WA  
**TIME PERIOD:** April 19 - 30, 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, H12625, during the time period between April 19 - 30, 2014.

Please use the zoning file N305FA2014CORP submitted with the project instructions for OPR-N305-FA-2014. Zones PS84, PS85, PS86, PS261, PS263, PS310, PS311, PS312 and PS313 are applicable zones for H12625.

**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).

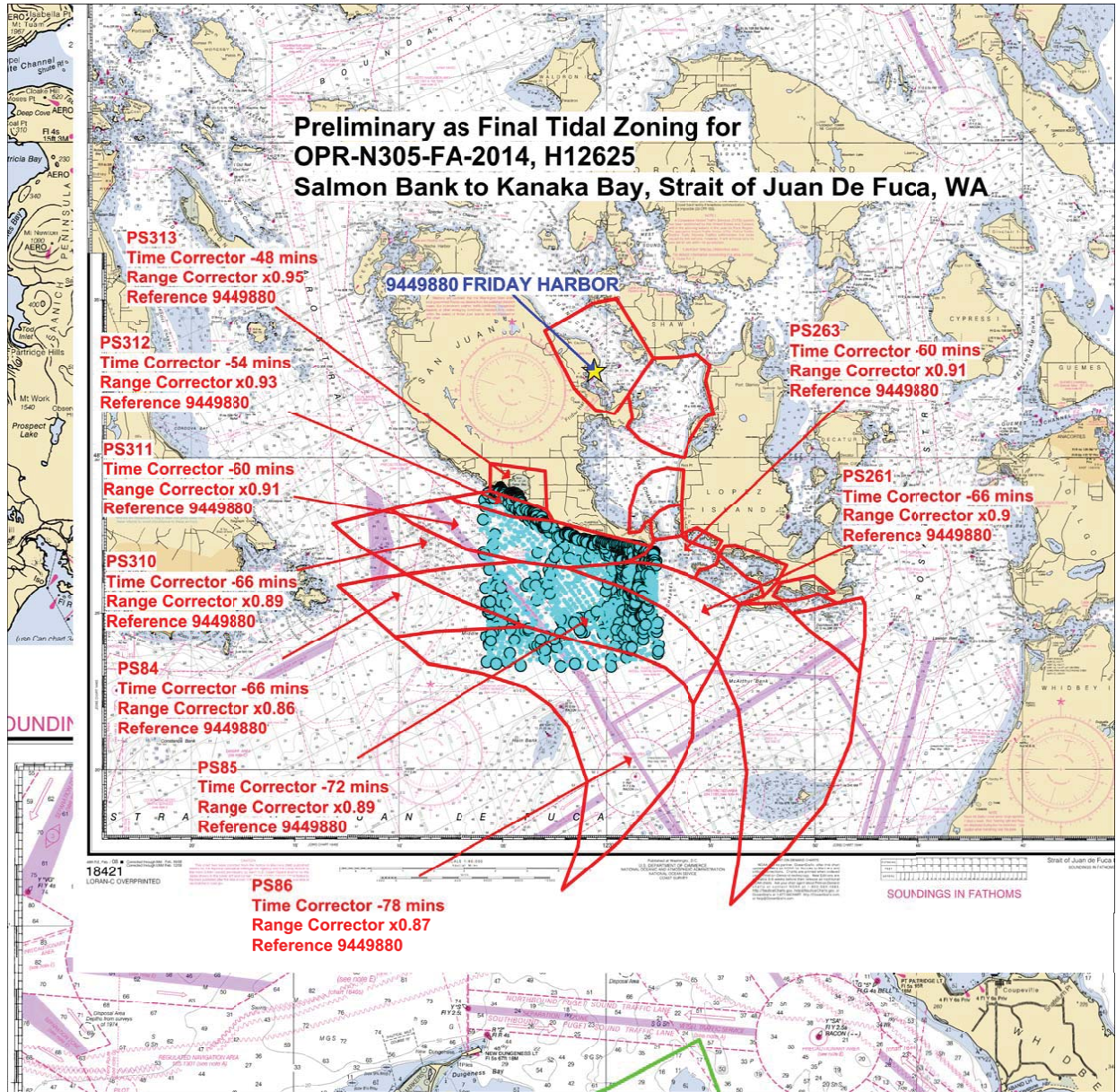
**HOVIS.GERALD.THOMAS.1365860250**  
Digitally signed by  
HOVIS.GERALD.THOMAS.1365860250  
DN: c=US, o=U.S. Government, ou=DoD,  
ou=PKI, ou=OTHER,  
cn=HOVIS.GERALD.THOMAS.1365860250  
Date: 2014.05.16 06:46:29 -04'00'

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CHIEF, PRODUCTS AND SERVICES BRANCH



**Preliminary as Final Tidal Zoning for  
OPR-N305-FA-2014, H12625  
Salmon Bank to Kanaka Bay, Strait of Juan De Fuca, WA**



# H12625 Danger to Navigation Report

**Registry Number:** H12625  
**State:** Washington  
**Locality:** Strait of Juan de Fuca, Washington  
**Sub-locality:** Salmon Bank to Kanaka Bay  
**Project Number:** OPR-N305-FA-14  
**Survey Dates:** April 19, 2014 - April 30, 2014

## Charts Affected

Number	Edition	Date	Scale (RNC)	RNC Correction(s)*
18434	7th	04/01/2008	1:25,000 (18434_1)	[L]NTM: ?
18465	38th	05/01/2008	1:80,000 (18465_1)	[L]NTM: ?
18423	36th	07/01/2007	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.	Feature Type	Survey Depth	Survey Latitude	Survey Longitude	AWOIS Item
1.1	Rock	1.49 m	48° 27' 53.6" N	123° 02' 58.4" W	---

## **1 - Dangers To Navigation**



**1.1) 199/2****DANGER TO NAVIGATION****Survey Summary**

**Survey Position:** 48° 27' 53.6" N, 123° 02' 58.4" W  
**Least Depth:** 1.49 m (= 4.90 ft = 0.816 fm = 0 fm 4.90 ft)  
**TPU ( $\pm 1.96\sigma$ ):** **THU (TPEh)**  $\pm 0.049$  m ; **TVU (TPEv)**  $\pm 0.339$  m  
**Timestamp:** 2014-115.19:08:03.173 (04/25/2014)  
**Survey Line:** h12625 / fa\_2806\_400khz\_7125\_512bms\_2014 / 2014-115 / 2014m\_1151907  
**Profile/Beam:** 199/2  
**Charts Affected:** 18434\_1, 18421\_1, 18423\_11, 18465\_1, 18400\_1, 18003\_1, 18007\_1, 501\_1, 530\_1, 50\_1

**Remarks:**

Rock approximately 5m high. Verified tides applied.

**Feature Correlation**

Source	Feature	Range	Azimuth	Status
2014m_1151907	199/2	0.00	000.0	Primary

**Hydrographer Recommendations**

Chart rock using surveyed soundings.

**Cartographically-Rounded Depth (Affected Charts):**

0  $\frac{3}{4}$ fm (18421\_1, 18465\_1, 18400\_1, 18003\_1, 18007\_1, 530\_1)

0fm 5ft (18434\_1, 18423\_11)

1.5m (501\_1, 50\_1)

**S-57 Data**

**Geo object 1:** Underwater rock / awash rock (UWTROC)

**Attributes:** VALSOU - 1.492 m

### Feature Images

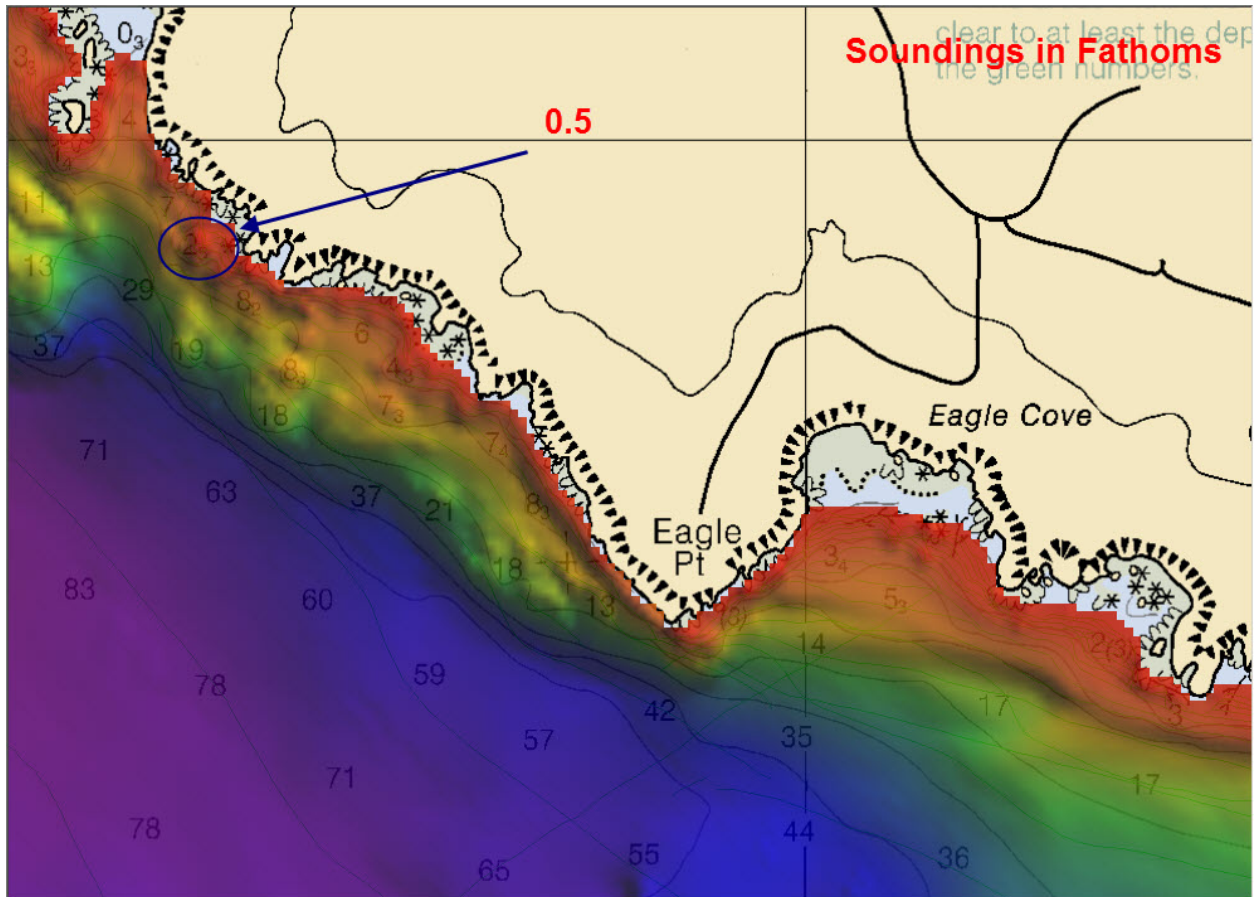


Figure 1.1.1

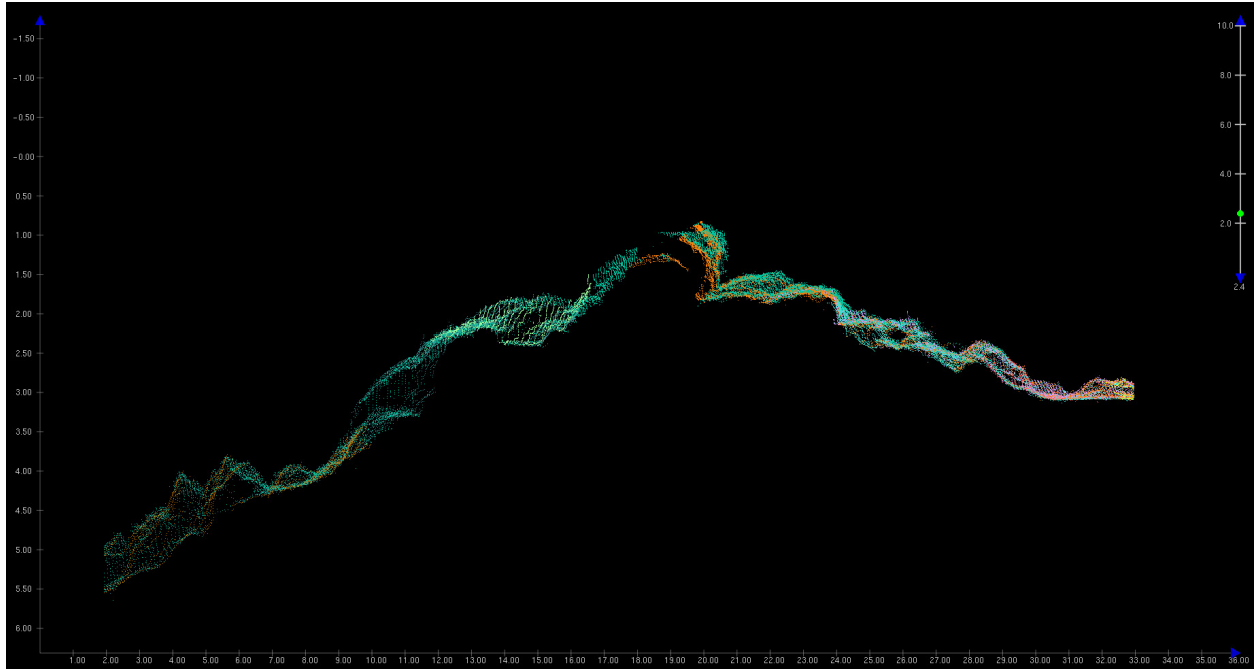


Figure 1.1.2

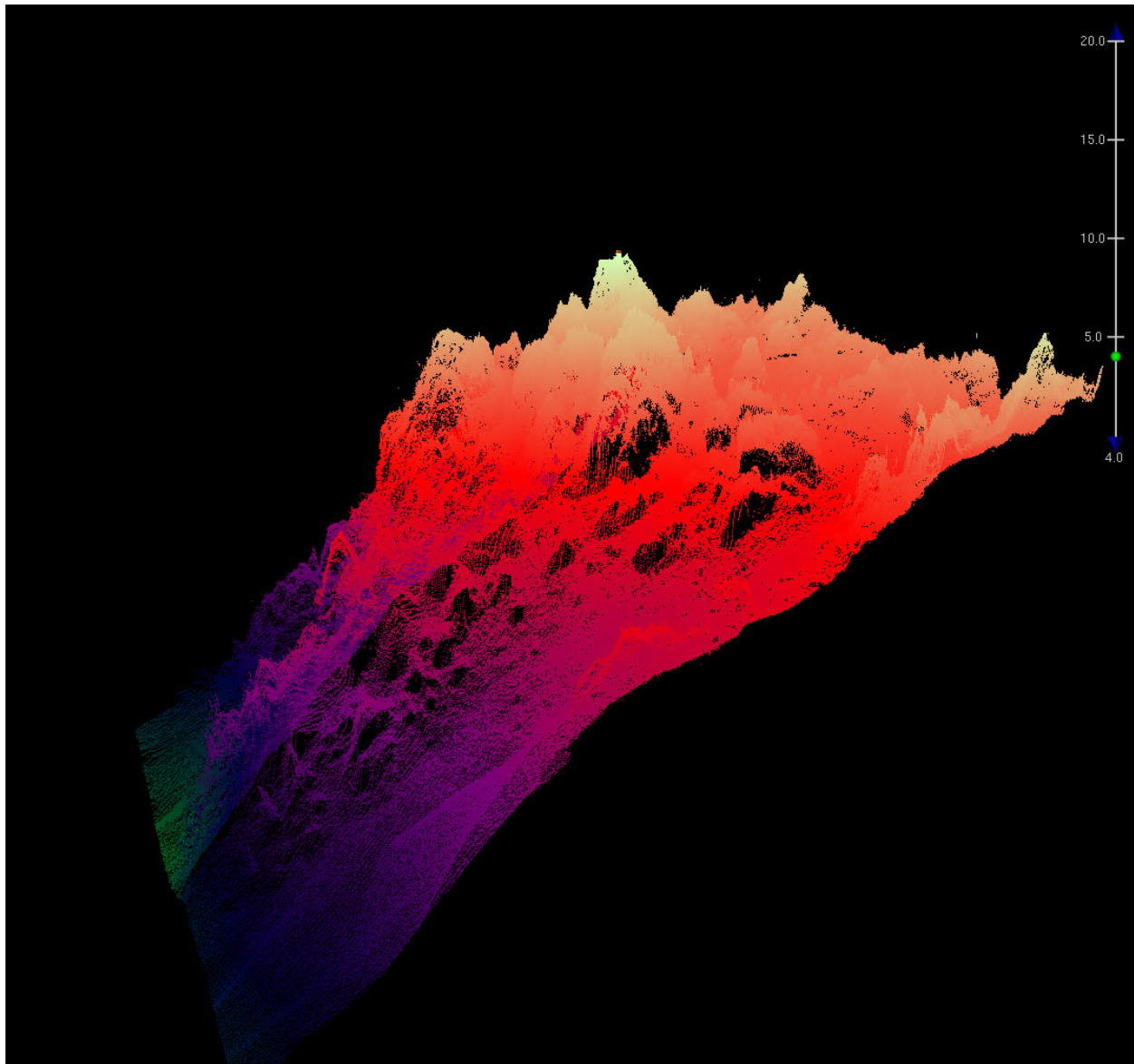


Figure 1.1.3

Office Notes:

The DTON was included in the chart update product with a depth of .74 (0 fathoms, 4 ft.) depth.

APPROVAL PAGE

H12625

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

- H12625\_DR.pdf
- Collection of depth varied resolution BAGS
- Processed survey data and records
- H12625\_GeoImage.pdf

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

Approved: \_\_\_\_\_

**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: \_\_\_\_\_

**CDR Benjamin K. Evans, NOAA**

Chief, Pacific Hydrographic Branch