H12323

NOAA Form 76-35A

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

DESCRIPTIVE REPORT

Type of Survey:	Navigable Area
Registry Number:	H12323

LOCALITY

State:	Washington
General Locality:	Strait of Georgia, WA
Sub-locality:	Patos Island to South of Pt. Roberts

2011

CHIEF OF PARTY
CAPT Donald W. Haines

LIBRARY & ARCHIVES

Date:

NOAA FORM 77-28 (11-72)	U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION	REGISTRY NUMBER:
HYDROGRAPHIC TITLE SHEET		**H12323**

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:	**Washington**
General Locality:	**Strait of Georgia, WA**
Sub-Locality:	**Patos Island to South of Pt. Roberts**
Scale:	**10000**
Dates of Survey:	**06/22/2011 to 08/04/2011**
Instructions Dated:	**04/07/2011**
Project Number:	**OPR-N161-RA-11**
Field Unit:	**NOAA Ship *Rainier***
Chief of Party:	**CAPT Donald W. Haines**
Soundings by:	**Multibeam Echo Sounder**
Imagery by:	
Verification by:	**Pacific Hydrographic Branch**
Soundings Acquired in:	**meters at Mean lower low water**
H-Cell Compilation Units:	***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. Revisions and end notes in red were generated during office processing. The processing branch concurs with all information and recommendations in the DR unless otherwise noted. Page numbering may be interrupted or non-sequential. All pertinent records for this survey, including the Descriptive Report, are archived at the National Geophysical Data Center (NGDC) and can be retrieved via http:// www.ngdc.noaa.gov/.xml dr is composed as follow:

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Descriptive Report to Accompany Survey H12323

Project: OPR-N161-RA-11

Locality: Strait of Georgia, WA

Sublocality: Patos Island to South of Pt. Roberts

Scale: 1:10000

June 2011 - August 2011

NOAA Ship *Rainier*

Chief of Party: CAPT Donald W. Haines

A. Area Surveyed

The survey area is Patos Island to South of Pt Roberts, at the southern end of the Strait of Georgia in Washington State. The western half of the sheet includes the main shipping channel for the Strait of Georgia, in addition to the international maritime boundary between the United States and Canada along its western limit. This survey corresponds to sheet #2 in the sheet layout provided with the Letter Instructions.

A.1 Survey Limits

Data was acquired within the following survey limits:

Northeast Limit	Southwest Limit
48.9332861111 N 122.953816667 W	48.7664055556 N 123.192683333 W

Table 1: Survey Limits

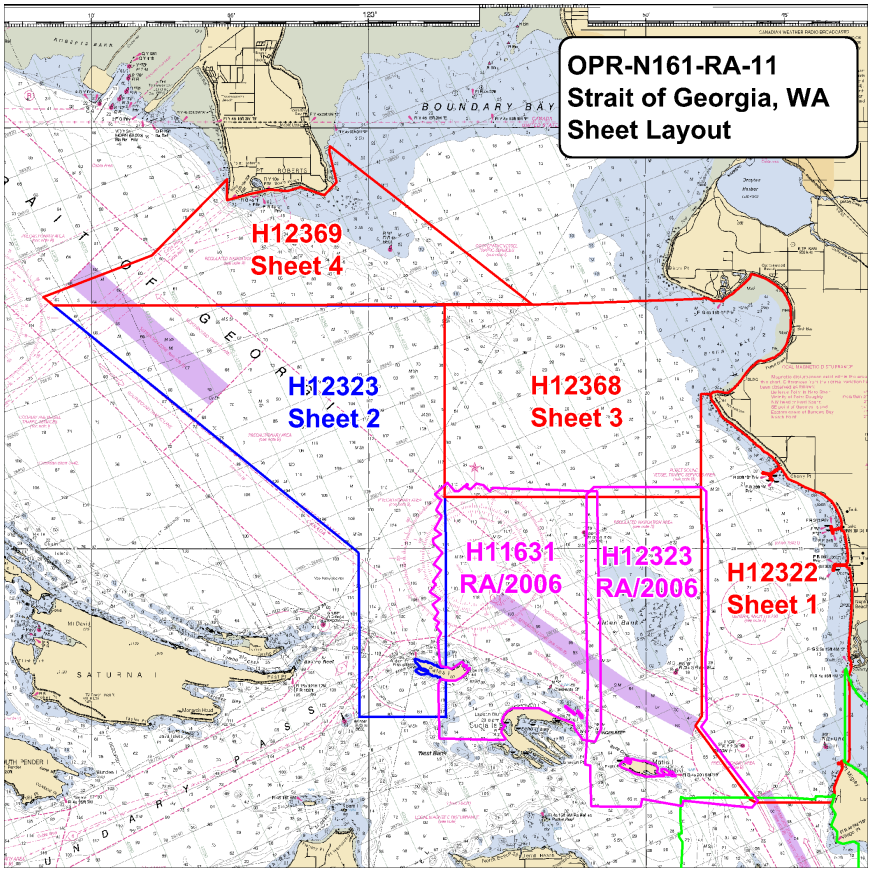

Figure 1: Overview of project OPR-N161-RA-11, including survey H12323.

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

A.2 Survey Purpose

The purpose of this survey is to provide contemporary hydrographic data to update National Ocean Service (NOS) nautical charts. The data will also address the concerns of the Puget Sound Pilots regarding shoals in the vicinity of Cherry Point/Ferndale, which is the largest oil tanker terminus in Washington. The area is very dynamic in nature and has seen changes in vessel traffic due to the recent doubling of capacity at Cherry Point.

A.3 Survey Quality

The entire survey is adequate to supersede previous data.

Data acquired on sheet H12323 met complete multibeam coverage requirements, including the 5 soundings per node data density requirements outlined in section 5.2.2.2 of the HSSD

A.4 Survey Coverage

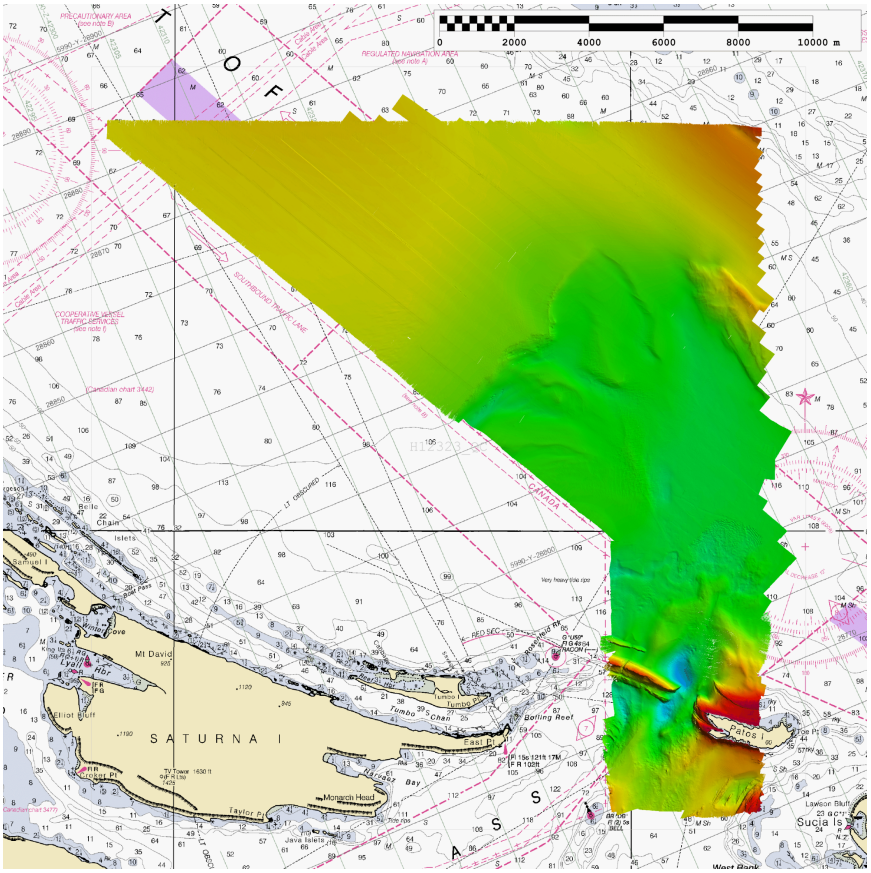

Figure 2: Overview of survey H12323 coverage area.

Rainier (S221) performed most of the data acquisition for the deep parts of the sheet. Survey launches were used to acquire data in the shoaler waters surrounding Patos Island in addition to shoreline verification.

Complete multibeam echosounder (MBES) coverage was achieved in the survey area in waters 4 meters and deeper, with a few exceptions shown below. Areas where the 4-meter curve was not achieved were either surveyed to the kelp line, or the Navigable Area Limit Line (NALL). In depths less than 4 meters, additional MBES coverage was acquired to identify least depths over significant features and areas of high vessel usage, as appropriate for this survey. No vertical beam echo sounder (VBES) data were acquired for this survey.

Holidays
Complete multibeam coverage was obtained in the survey area with a few small gaps in coverage found near Patos Island on steep slopes in non-navigationally significant areas resulting from down slope acoustic shadowing, as shown in Figure 3. Several data gaps exist on the west side of Patos Island inside Active Cove. Numerous vessels at anchor in the cove prevented complete multibeam coverage as seen in Figure 4.

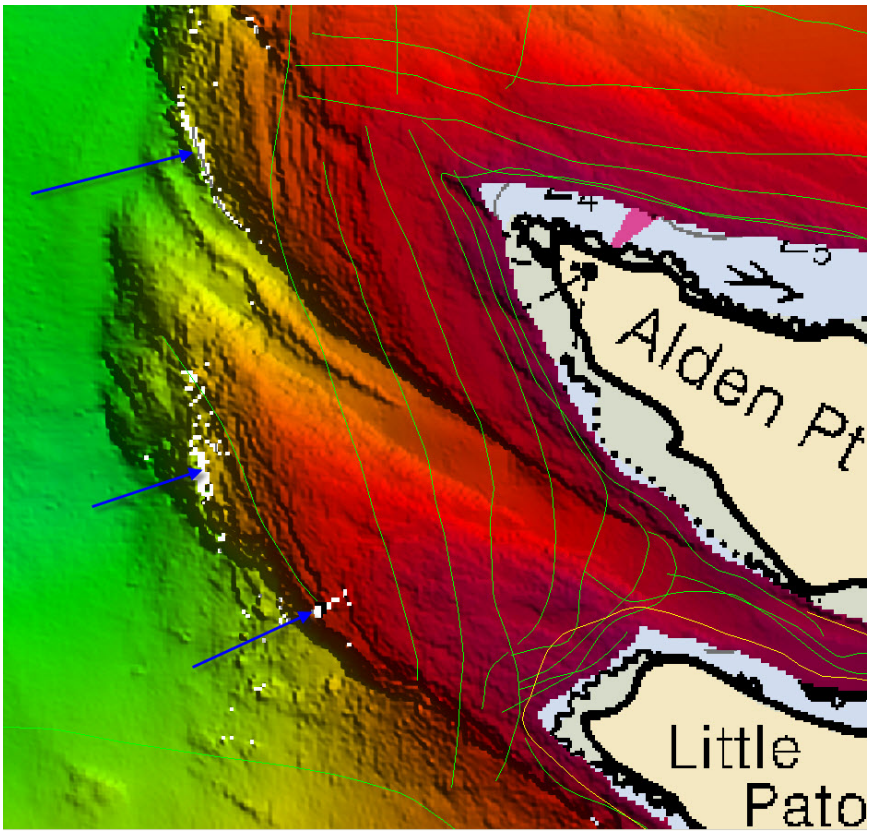

Figure 3: Holiday Shadows shown with blue arrows, located west of Patos Island.

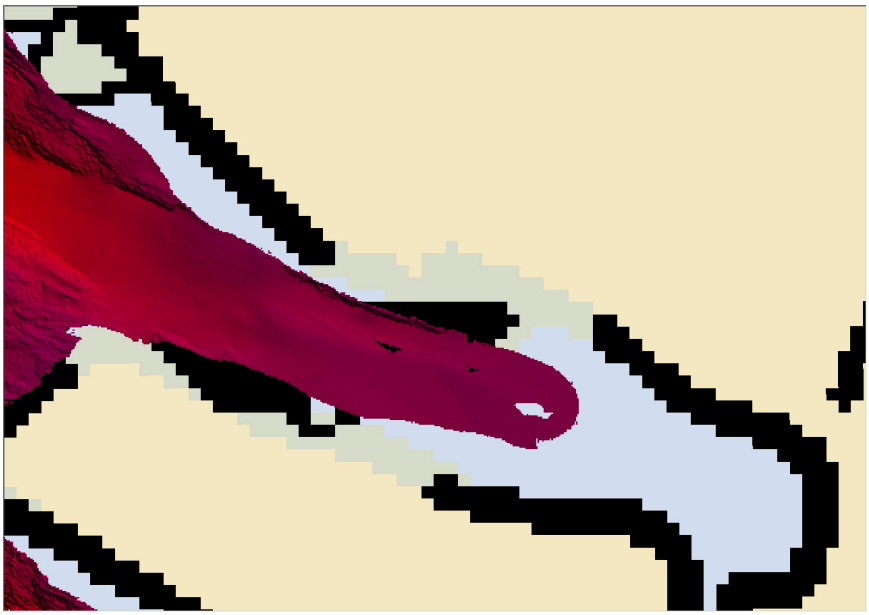

Figure 4: Data was reviewed using Side Scan editor in CARIS HIPS and SIPS and there was no evidence of significant features or shoaling in holidays.

Data is adequate and within specifications. Data was reviewed during office processing and there were no signs of shoaling in the vicinity of holidays.

A.5 Survey Statistics

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

	HULL ID	*S-221*	*2801*	*2804*	*Total*
LNM	**SBES Mainscheme**	0	0	0	0
	MBES Mainscheme	175.3	45.7	18.4	239.8
	Lidar Mainscheme	0	0	0	0
	SSS Mainscheme	0	0	0	0
	SBES/MBES Combo Mainscheme	0	0	0	0
	SBES/SSS Combo Mainscheme	0	0	0	0
	MBES/SSS Combo Mainscheme	0	0	0	0
	SBES/MBES Combo Crosslines	5.105	0	1.271	6.376
	Lidar Crosslines	0	0	0	0
Number of Bottom Samples					0
Number of DPs					2
Number of Items Items Investigated by Dive Ops					0
Total Number of SNM					45.57

Table 2: Hydrographic Survey Statistics

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

Survey Dates
06/23/2011
06/24/2011
07/19/2011
07/26/2011
08/04/2011

Table 3: Dates of Hydrography

A.6 Shoreline

Limited shoreline verification was performed for the survey area seaward of the Navigable Area Limit Line (NALL) for H12323, as per section 3.5.5.2 of the Field Procedures Manual May 2011 (FPM). Shoreline features were given NOAA and S-57 attribution and included for submission in the H12323_Final_Feature_File.hob file.

A.7 Bottom Samples

Per correspondence with Hydrographic Surveys Division, Operations Branch (HSD Ops), no bottom samples were acquired for sheet H12323 (see correspondence folder). Most of survey H12323 consist of deep areas in the traffic lanes, and areas around the island are not suitable for anchoring.

No bottom samples were acquired for this survey. The email is appended to this document.

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	*S-221*	*2801*	*2804*
LOA	70.4 meters	8.8 meters	8.8 meters
Draft	4.4 meters	1.2 meters	1.2 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
Kongsberg	EM 710	MBES
Applanix	POS/MV V4	Positioning and Orientation System
Seabird	SBE 19+	Sound Speed System
Reson	SV 70 and SV 71	Sound Speed System
Rolls Royce ODIM Brooke Ocean	MVP 200	Sound Speed System

Table 5: Major Systems Used

B.2 Quality Control

B.2.1 Crosslines

Multibeam Echosounder (MBES) crosslines totaled 6.37 nautical miles, comprising 4% of the main scheme MBES hydrography. The mainscheme bathymetry was compared to the crossline nadir beams in CARIS subset mode and agreed within 0.3 meters. The result of this comparison shows that the crosslines and the mainscheme lines are within the IHO requirements.

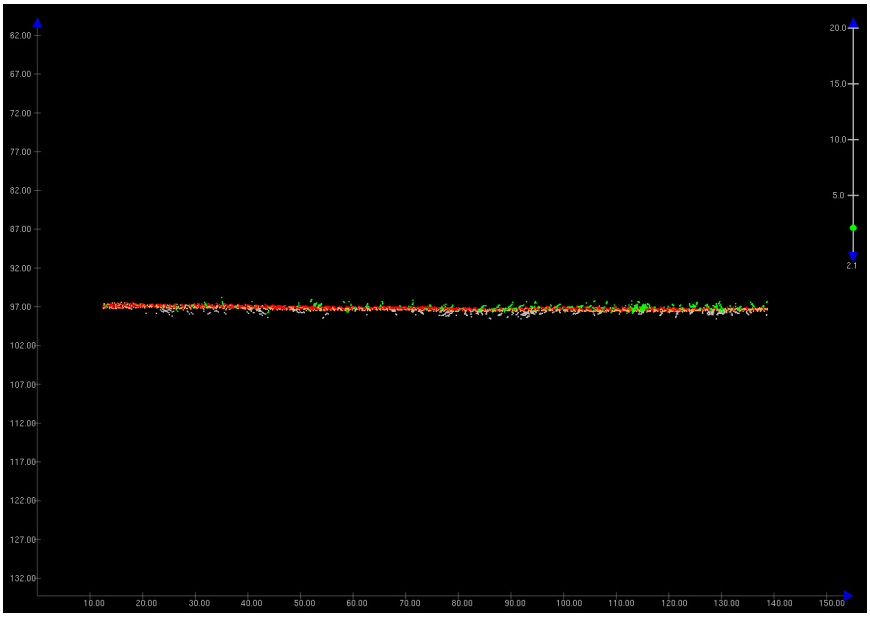

Figure 5: Crossline 006_2210 (red) in comparison with mainscheme line 000_1915 (khaki).

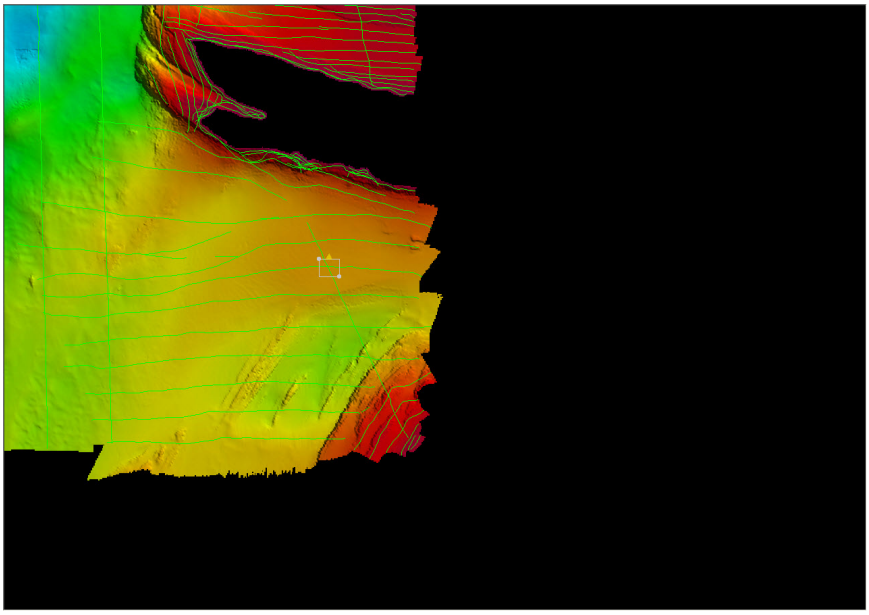

Figure 6: The location of the crossline comparison where crossline 006_2210 is compared with survey line 000_1915, south of Patos Island.

B.2.2 Uncertainty

The following survey specific parameters were used for this survey:

Measured	Zoning
0.0meters	0.075meters

Table 6: Survey Specific Tide TPU Values

Hull ID	Measured - CTD	Measured - MVP	Surface
S-221		3.0meters/second	0.15meters/second
2801	3.0meters/second		0.10meters/second
2804	3.0meters/second		0.10meters/second

Table 7: Survey Specific Sound Speed TPU Values

Uncertainty values of submitted, finalized grids are calculated in CARIS using the “Greater of the Two” of Total Propagated Uncertainty (TPU) and standard deviation (scaled to 95%). An Order 1 IHOness “child” attribute layer was created for the H12323_Final_Combined surface in CARIS HIPS for analysis. The uncertainty of 95% of the nodes in the finalized grids fall within the IHO 1 levels as described in the HSSD (see figure 7). The stripes of data that do not fall within IHO order 1 are in water deeper than 100 meters, and only require IHO order 2 uncertainty values. These data are sufficient to supersede the charted depths in that area.

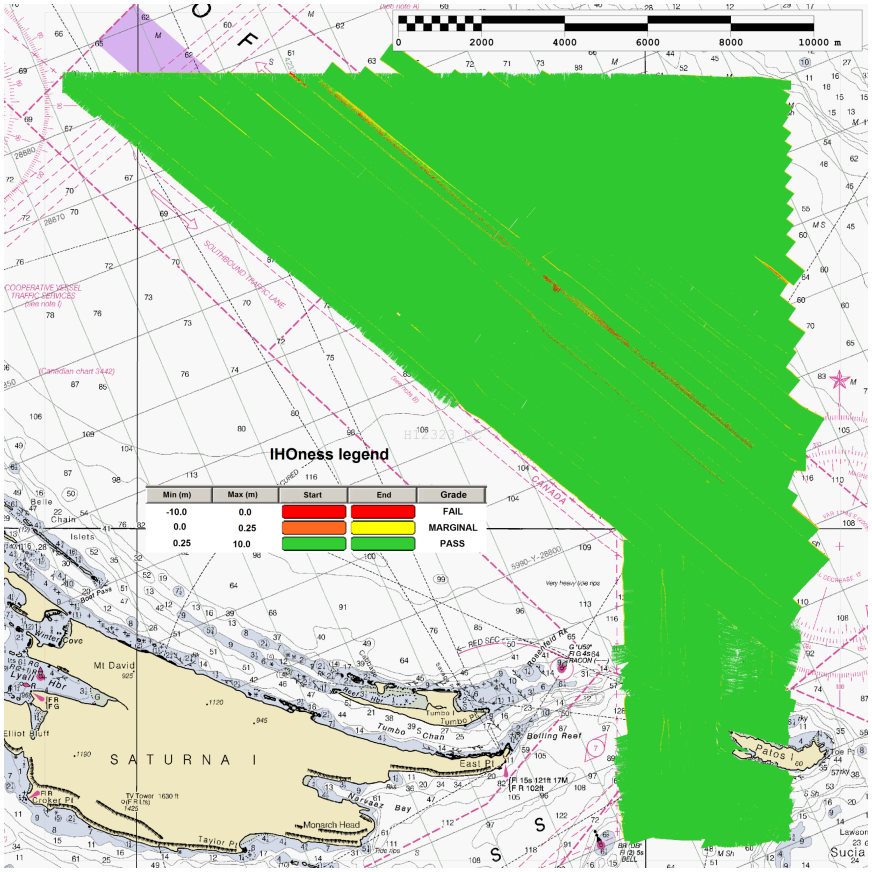

Figure 7: IHOness graphic, green means that the sounding meet IHO Order 1.

Data is adequate and within specifications despite the uncertanty values that are in water deeper than 100 meters. It is recommended that the data from H12323 supersede charted data in the common area.

B.2.3 Junctions

The following junctions were made with this survey:

Registry Number	Scale	Year	Field Unit	Relative Location
H11631	1:10000	2006	NOAA Ship RAINIER	SE
H12368	1:10000	2011	NOAA Ship RAINIER	E
H12369	1:10000	2011	NOAA Ship RAINIER	N

Table 8: Junctioning Surveys

H11631

Sheet H11631 was surveyed in 2006 and is located to the Southeast of H12323 (see Figure 8). The area of overlap was examined in CARIS subset editor and shows and shows agreement within 0.1 meters.

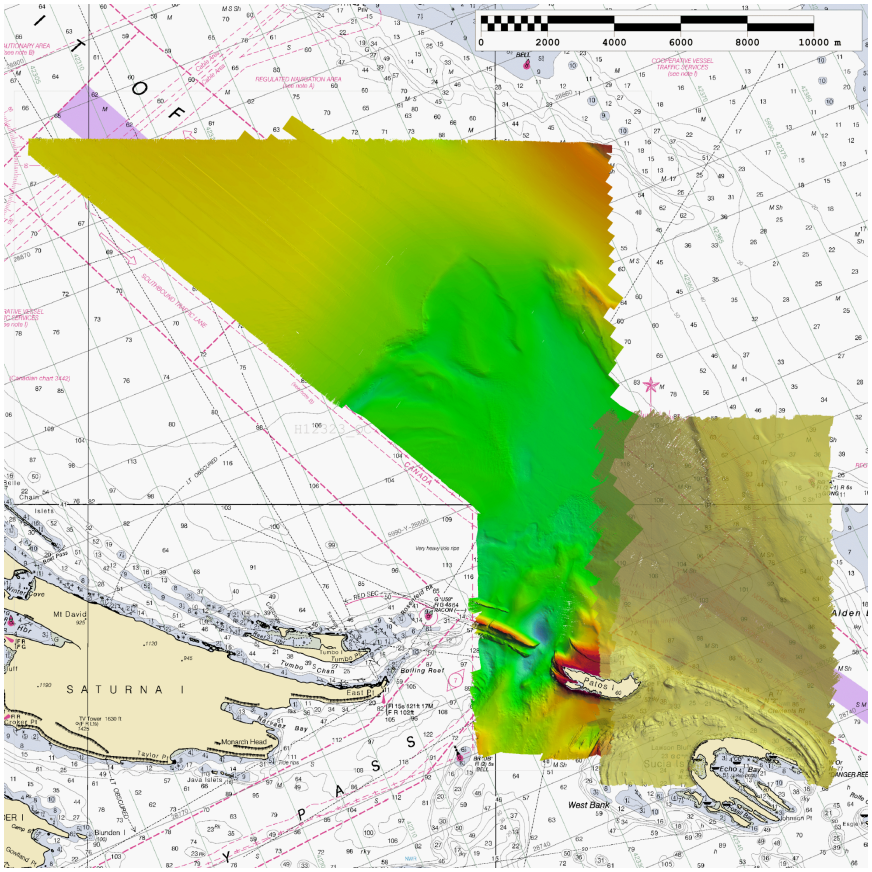

Figure 8: The junction between H12323 and H11631

H12323 junctions with survey H12369 to the North and survey H12368 to the East. A common junction was made with an adjoining portion of H12369 and H12368.

H12368

Sheet H12368 was surveyed in 2011 as part of OPR-N161-RA-11 and is located to the East of H12323 (see Figure 9). The area of overlap was examined in CARIS subset editor and shows agreement within 0.1 meters.

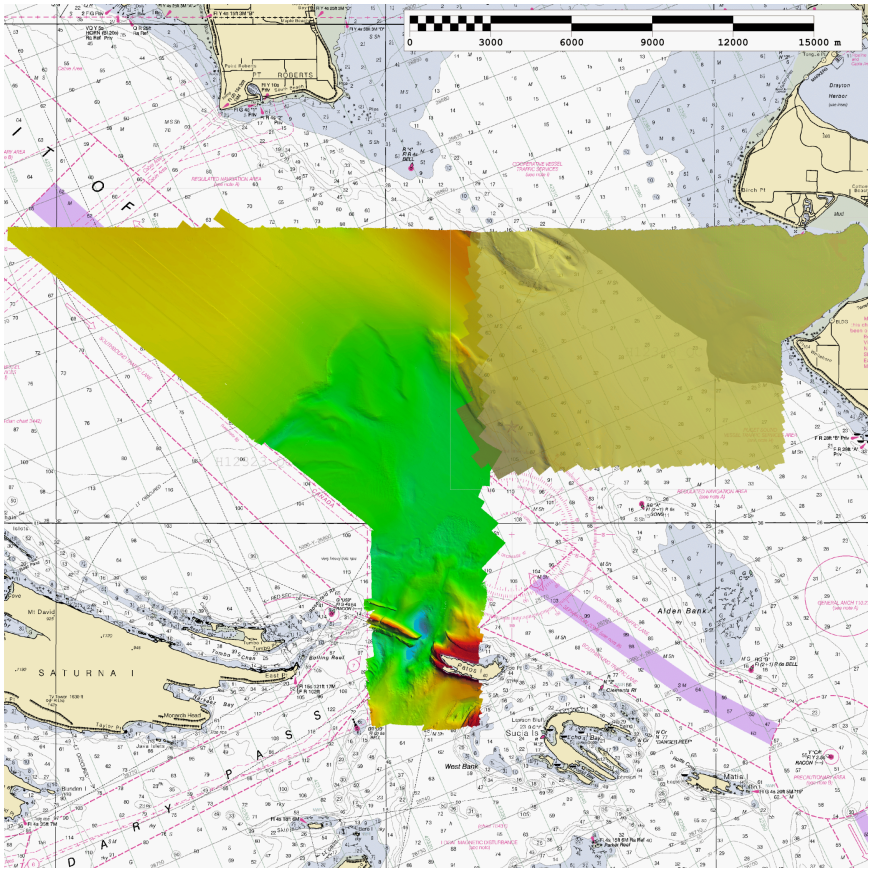

Figure 9: The junction between H12323 and H12368

H12369

Sheet H12369 was surveyed in 2011 as part of OPR-N161-RA-11 and is located to the North of H12323 (see Figure 10). The area of overlap was examined in CARIS subset editor and shows agreement within 0.1 meters.

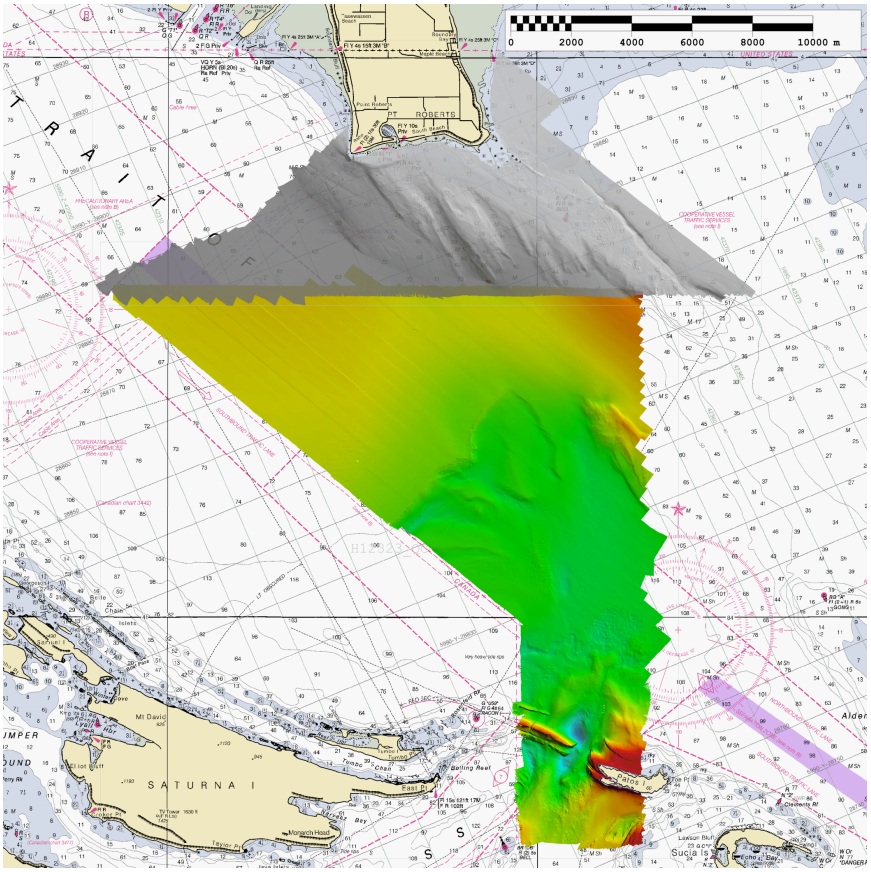

Figure 10: The junction between H12323 and H12369

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

B.2.5.1IMU

On day number 216, the IMU on survey launch 2804 (RA-6), serial number 334, experienced a complete failure. The unit was subsequently replaced with IMU serial number 355, and a new patch test was conducted; no multibeam data was effected. There were no other IMU issues during data acquisition.

B.2.6 Factors Affecting Soundings

B.2.6.1 Vertical offsets in outerbeams of EM710

There are some vertical differences/offsets in the Simrad EM 710 data at the northwestern portion of the survey area. There is approximately a 1.3 meter difference between line

"0014_20110623_121107_ShipName" and line "0009_20110623_1000057_ShipName", both acquired on DN 174. (See Figure 11). The vertical differences between lines seem to be due to sound speed errors in the outer beams of EM710 data. More frequent MVP casts might have eliminated these errors.

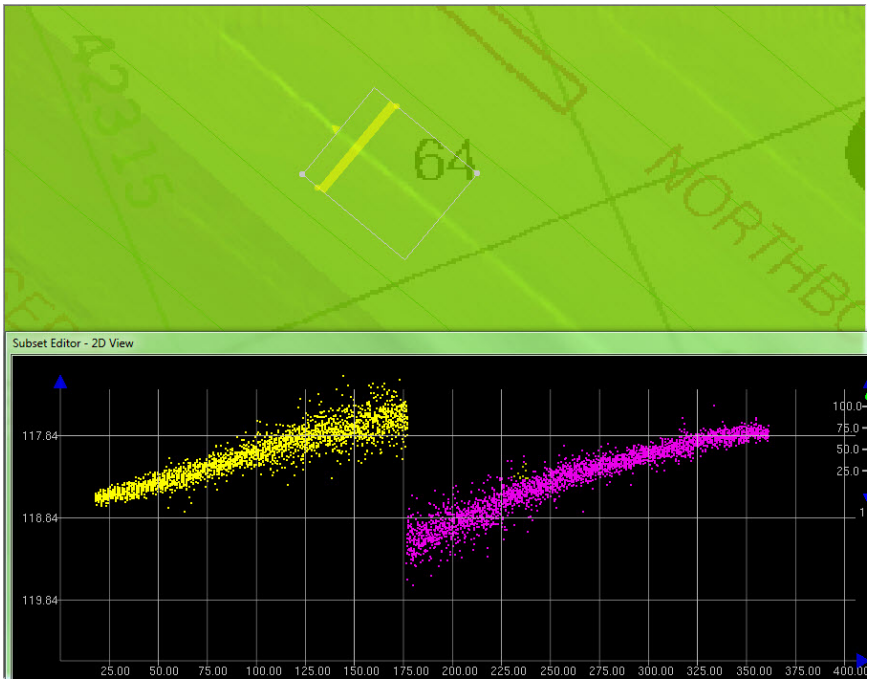

Figure 11: There is a 1 meter vertical differences/offsets in the Simrad EM 710 data at the northwestern part of Survey H12323, but still is within IHO Order 1.

Data is adequate and within specifications despite the outerbeam offsets in the SIMRAD EM 710 at the northwestern portion of the survey area.

B.2.7 Sound Speed Methods

Sound Speed Cast Frequency: Sound speed profiles were acquired in accordance with the HSSD using SeaBird Electronics SeaCat SBE19 and SBE 19Plus Conductivity, Temperature, and Depth (CTD) profilers; and the Rolls Royce ODIM Brooke Ocean Moving Vessel Profiler(MVP) 200 mounted aboard RAINIER. For ship data acquisition (EM710), casts were conducted every 30 minutes with the Rolls Royce ODIM Brooke Ocean Moving Vessel Profiler(MVP) 200 and applied in real-time. Sound velocity profiles were reapplied to EM710 data during multibeam processing in CARIS. For launch data acquisition, a minimum of one cast was taken every 4 hours with the SBE 19 and 19+ CTD's. Cast were often taken more frequently, based on location and changing water currents. These profiles were then concatenated and applied using the "nearest in distance" within time (4 hours) option in CARIS HIPS.

B.2.8 Coverage Equipment and Methods

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

B.3 Echo Sounding Corrections

B.3.1 Corrections to Echo Soundings

All Data reductions procedures conform to those detailed in the DAPR.

True heave was not applied to 5 lines from vessel 2804_Reson7125_LF_256 on DN 216 (002_2026, 003_2147, 004_2142_005_2154, 006_2210). This was not addressed in the DAPR. The lines were inspected and there are no errors or offsets associated with not applying true heave.

B.3.2 Calibrations

All sounding systems were calibrated as detailed in the DAPR.

B.4 Backscatter

Backscatter data was acquired, but was not formally processed by Rainier personnel. However, periodic spot checks were performed to ensure backscatter quality. This data was sent to NGDC for archival.

B.5 Data Processing

B.5.1 Software Updates

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

The following Feature Object Catalog was used: NOAAProfile.xml

B.5.2 Surfaces

The following CARIS surfaces were submitted to the Processing Branch:

Surface Name	Surface Type	Resolution	Depth Range	Surface Parameter	Purpose
H12323_1m	CUBE	1 meters	0 meters - 20 meters	NOAA_1m	Complete MBES
H12323_1m_Final	CUBE	1 meters	0 meters - 20 meters	NOAA_1m	Complete MBES
H12323_2m	CUBE	2 meters	18 meters - 40 meters	NOAA_2m	Complete MBES
H12323_2m_Final	CUBE	2 meters	18 meters - 40 meters	NOAA_2m	Complete MBES
H12323_4m	CUBE	4 meters	36 meters - 80 meters	NOAA_4m	Complete MBES
H12323_4m_Final	CUBE	4 meters	36 meters - 80 meters	NOAA_4m	Complete MBES
H12323_8m	CUBE	8 meters	72 meters - 160 meters	NOAA_8m	Complete MBES
H12323_8m_Final	CUBE	8 meters	72 meters - 160 meters	NOAA_8m	Complete MBES
H12323_16m	CUBE	16 meters	144 meters - 320 meters	NOAA_16m	Complete MBES
H12323_16m_Final	CUBE	16 meters	72 meters - 160 meters	NOAA_16m	Complete MBES
H12323_Final_Combined	CUBE	16 meters	0 meters - 320 meters	NOAA_16m	Complete MBES

Table 9: CARIS Surfaces

Data processing procedures for survey H12323 conform to those detailed in the DAPR. Data were processed using CARIS HIPS & SIPS v7.1 Hot Fix 2.

During office processing and certification, the reviewer created new surfaces. The depth thresholds used on these surfaces were derived from the 5.2.2.2 in the HSSD 2011 Spec.The DR also has a typo which refers to the wrong depth threshold for the 16m finalized surface. Rather than saying 72-160m it should say 144-320m.

C. Vertical and Horizontal Control

A complete description of vertical and horizontal control for survey H12323 can be found in the OPR-N161-RA-11 Horizontal and Vertical Control Report (HVCR), submitted under separate cover.

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
Cherry Point, WA	944-9424

Table 10: NWLON Tide Stations

File Name	Status
9449424.tid	Final Approved

Table 11: Water Level Files (.tid)

File Name	Status
N161RA2011.CORP.zdf	Final

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

A request for final approved tides was sent to N/OPS1 on 08/05/2011. The final tide note was received on 08/18/2011.

Tide Note is attached.

C.2 Horizontal Control

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

The following PPK methods were used for horizontal control:

Single Base

Rate 5 hertz

Vessel kinematic data were post-processed using Applanix POSPac processing software, POSGNSS processing software and Single Base processing methods described in the DAPR. Smoothed Best Estimate of Trajectory (SBET) and associated error (RMS) data were applied to all data.

The following user installed stations were used for horizontal control:

HVCR Site ID	Base Station ID
Cherry Point	n/a

Table 13: User Installed Base Stations

The following DGPS Stations were used for horizontal control:

DGPS Stations
Whidbey Island (302 kHz)

Table 14: USCG DGPS Stations

C.3 Additional Horizontal or Vertical Control Issues

3.3.1 Horizontal Control Offset.

Significant horizontal offset errors occurred on the north side of Patos Island and inside Active Cove during initial data acquisition for H12323. After applying SBETs the data showed good agreement, as shown in Figures 12 through 17. The offset took place on 2801 (RA-4), but on different days (DN 200 and DN 207).

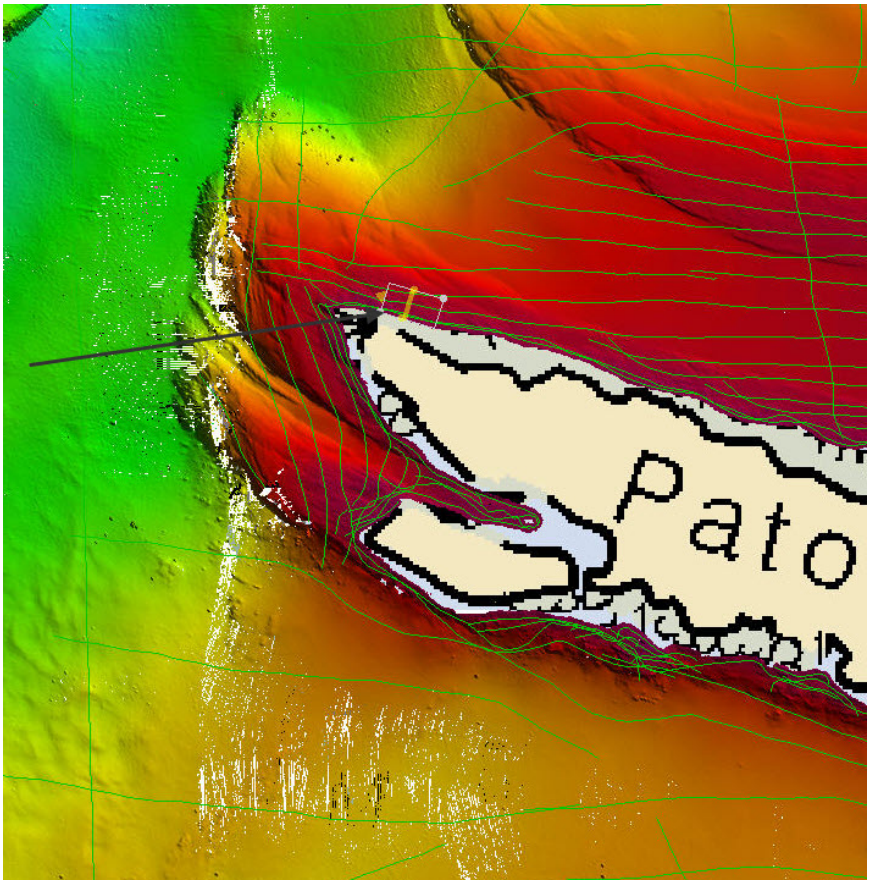

Figure 12: Horizontal Issue Location #1, Northwest part of Patos Island.

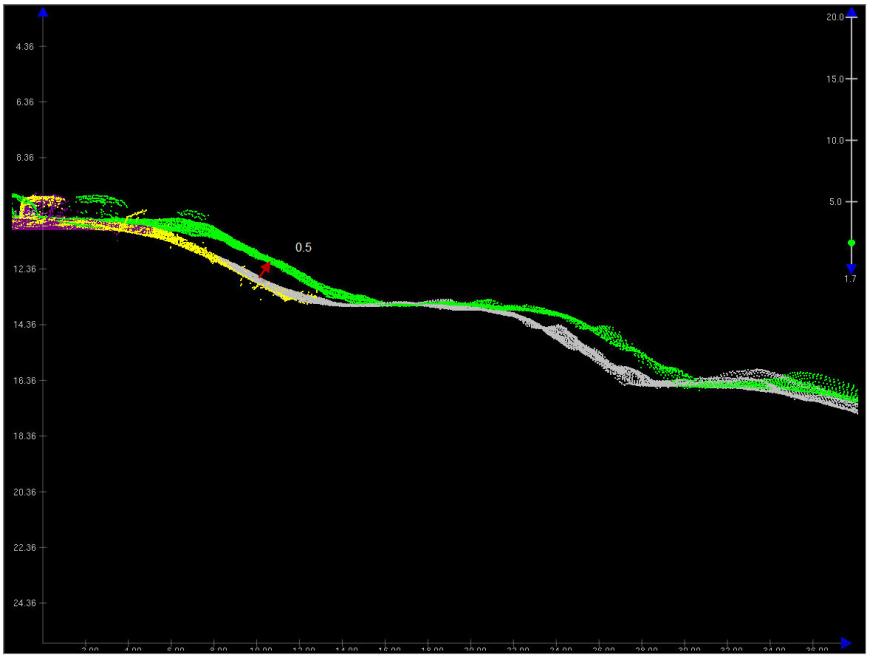

Figure 13: Horizontal Issue before applying SBET for Issue #1. Line 000_2009 (green) and line 00_1957 (grey).

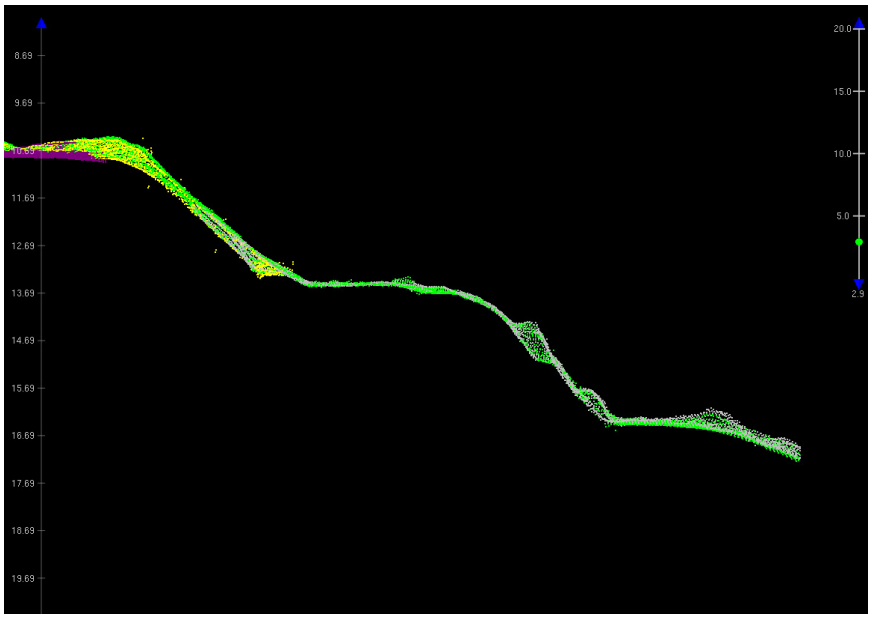

Figure 14: Horizontal Issue after applying SBET for Issue #1. Line 000_2009 (green) and line 00_1957 (grey)

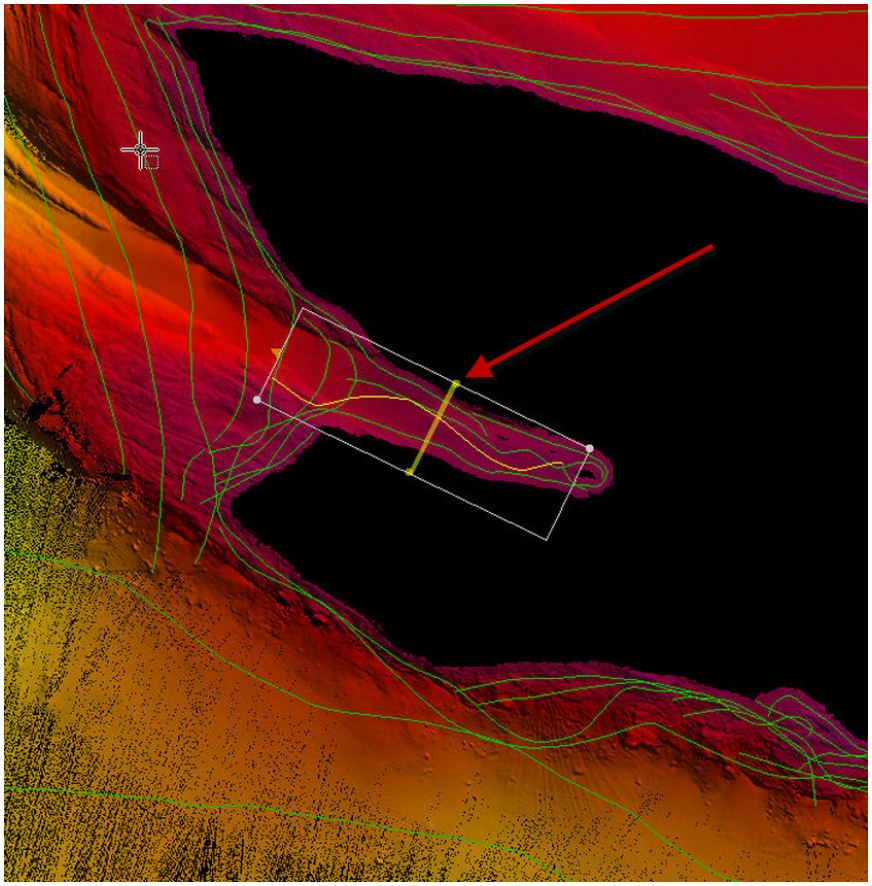

Figure 15: Horizontal Issue Location #2, inside Active Cove which is located in the West part of Patos Island.

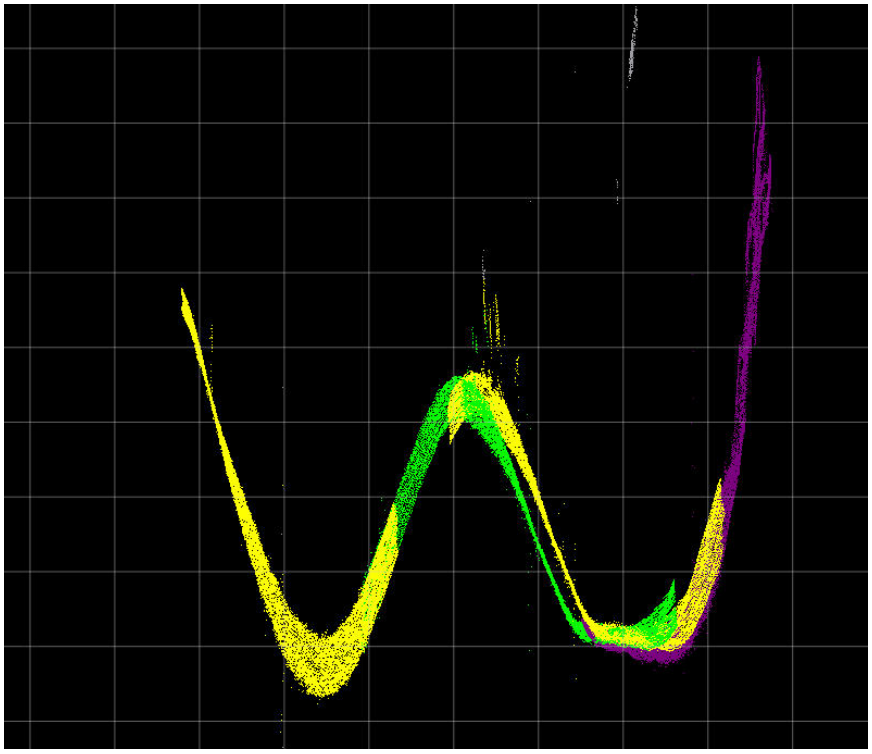

Figure 16: Horizontal Issue before applying SBET for Issue #2. Line 000_2128 (green) and line 000_1956 (yellow).

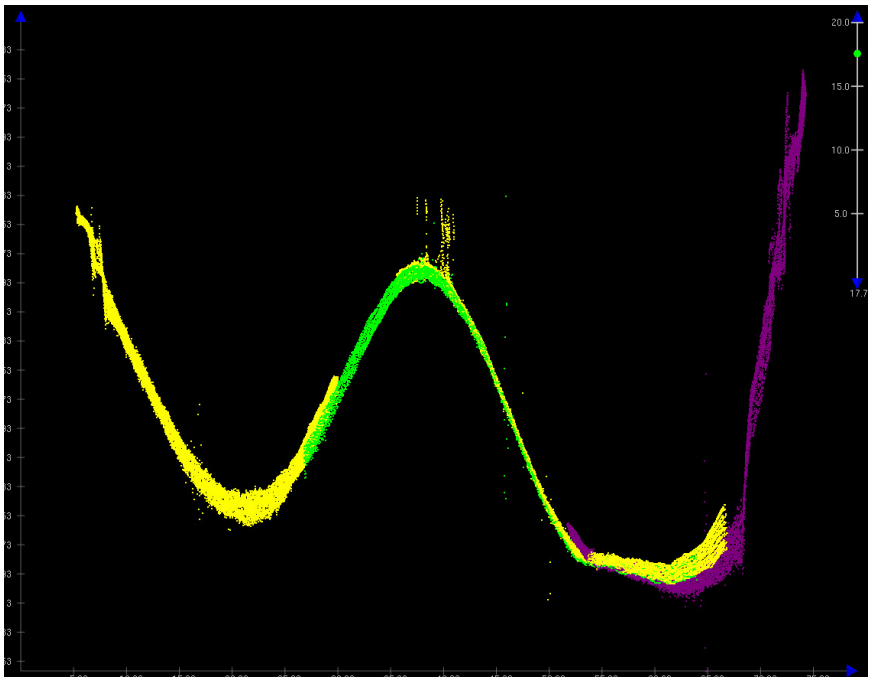

Figure 17: Horizontal Issue after applying SBET for Issue #2. Line 000_2128 (green) and line 000_1956 (yellow).

3.3.2 Applying Smoothed Best Estimate of Trajectory (SBET)

SBET files were applied to all the lines of survey H12323 acquired on day number 174 with the exception of line 2011_174_S221_185613 due to an unknown software error. This line was compared with adjacent lines and there were no significant difference between the lines. The usage of the SBET corrected horizontal offset errors in two locations in the vicinity of Patos Island which is discussed further in section 3.3.1. Vessel kinematic data were post-processed using Applanix POSPac processing software, POSGNSS processing software and Single Base processing methods described in the DAPR. SBET and associated error (RMS) data were applied to all data.

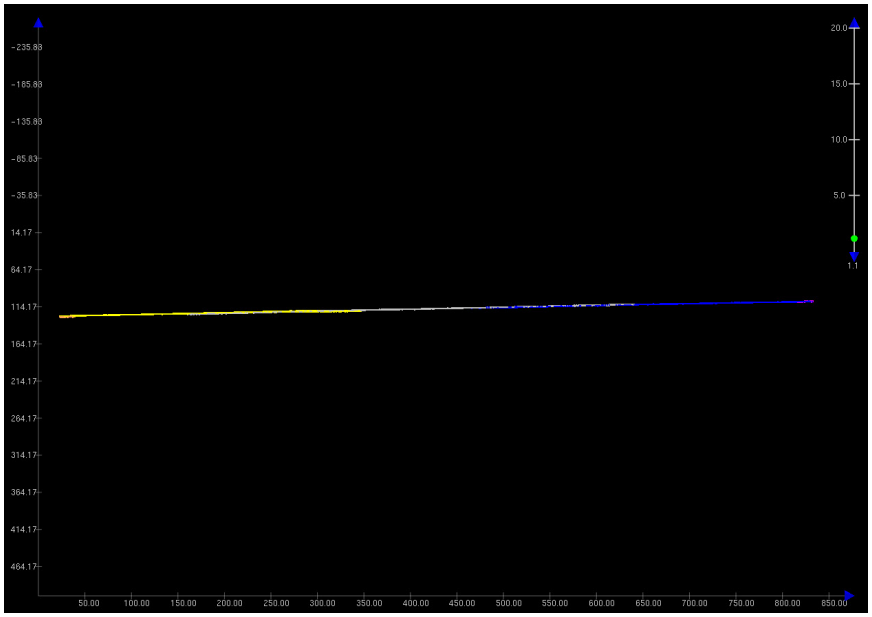

Figure 18: Line 2011_174_S221_185613 (gray), comparison with adjacent lines (blue and yellow). The scale on the x-axis goes from 50.00m - 850.00m. The y-axis 464.17m to -235.83m.

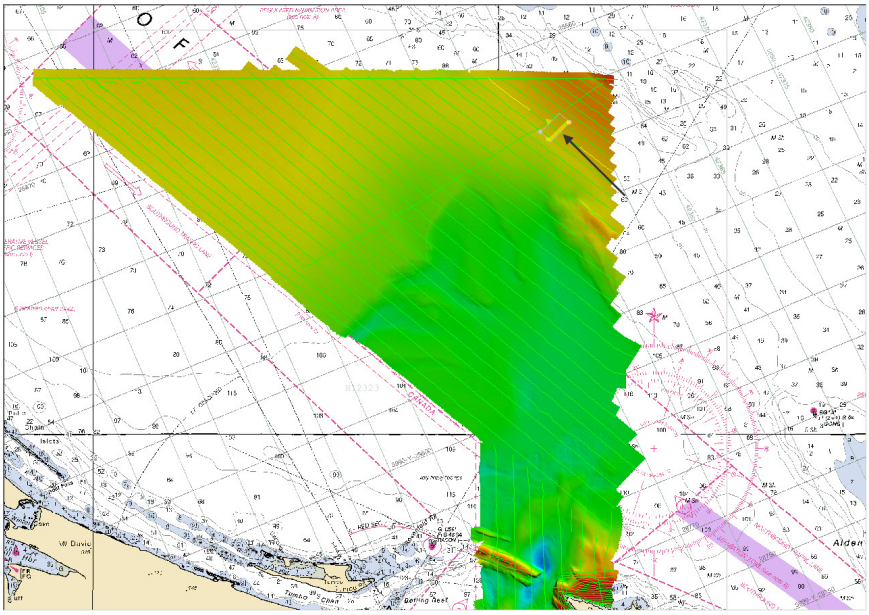

Figure 19: Line 2011_174_S221_185613 comparison with adjacent survey lines 0027_20110623_174136.ShipName and 0033_20110623_194732_ShipName.

D. Results and Recommendations

D.1 Chart Comparison

D.1.1 Raster Charts

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

Chart	Scale	Edition	Edition Date	LNM Date	NM Date
18431	1:25000	8	09/2011	09/20/2011	10/01/2011
18421	1:80000	50	04/2011	07/26/2011	08/06/2011

Table 15: Largest Scale Raster Charts

18431

Chart 18431 only overlays the southeastern quarter of Survey H12323. Depths as surveyed in this area agree with chart 18431.

Survey soundings between 1 and 2 fathoms were found between the charted 3 and 5 fathom contours on the west end of Patos Island off Alder Point. The Hydrographer recommends adjusting the charted contours to encompass shoal depths as surveyed. (see Figure 20)

The charted 53 fathom depth southwest of Patos Island was not shown to exist in this survey. Depth surrounding this sounding were 100 fathoms or deeper. There was no indication of shoaling in the acquired data set. The Hydrographer recommends adjusting the sounding to the newly surveyed depth. (see Figure 21)

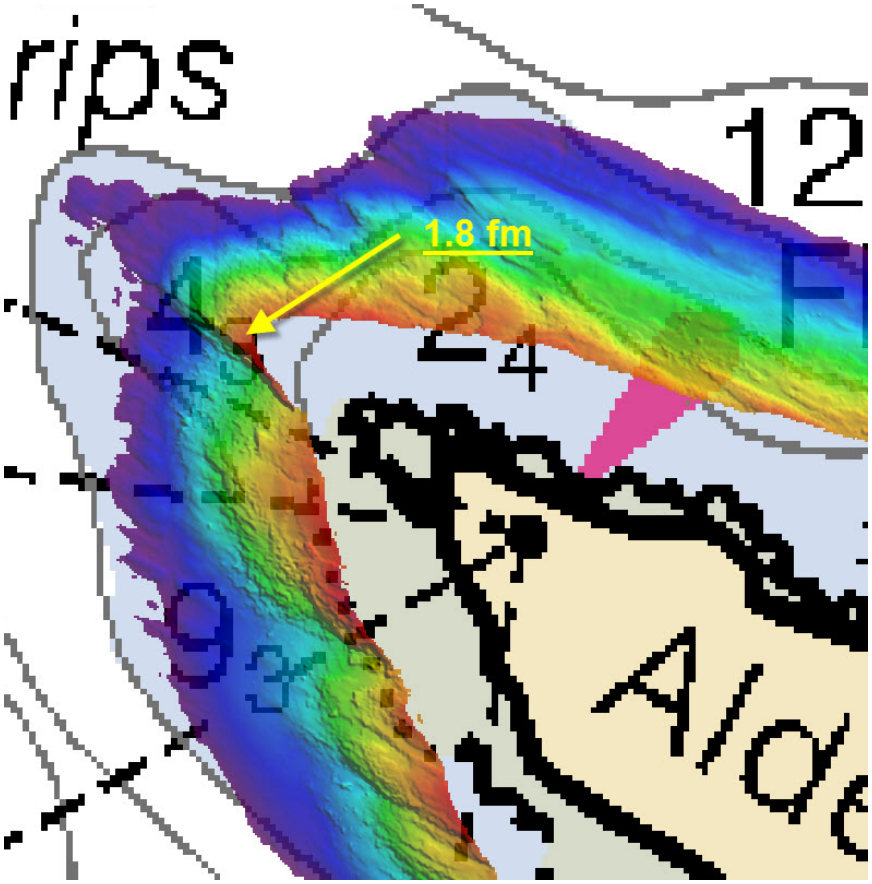

Figure 20: On chart 18431, northwest of Alder Point a 1.8 fathom sounding was acquired over a 4 fathom depth.

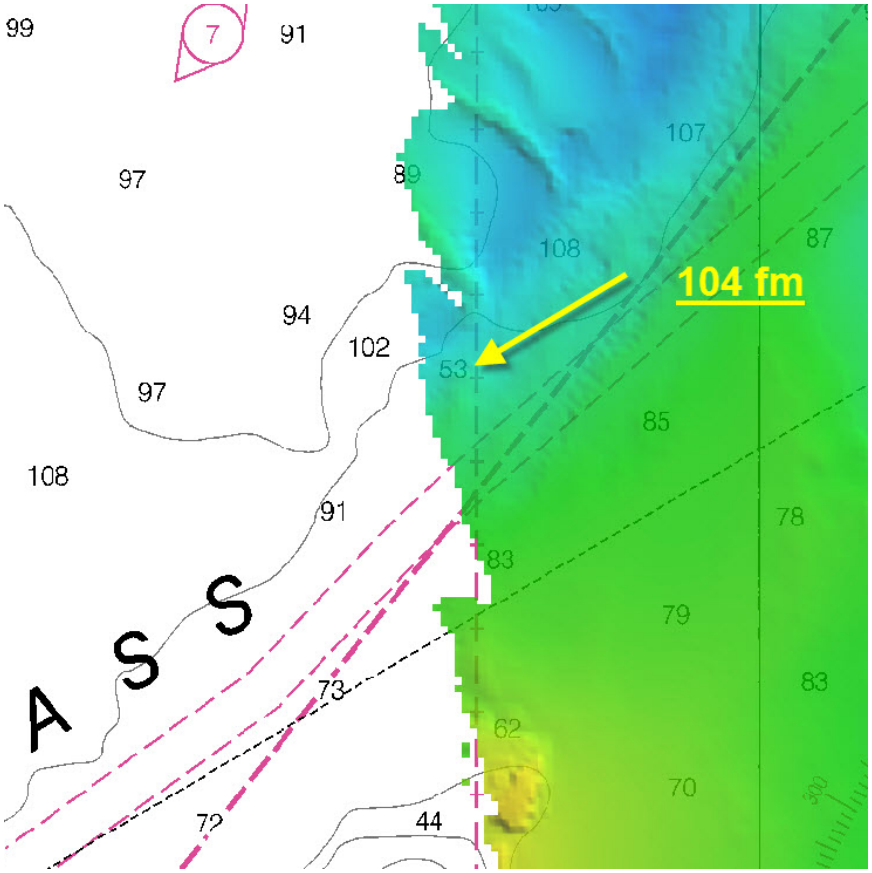

Figure 21: On chart 18431, northeast of Boundary Pass a 104 fathom sounding was acquired over a charted 53 fathom depth.

Concur with the hydrographer's recommendations and chart comparison described in this section unless otherwise noted by figure number. Figure 20. A 1.20 fathoms was obtained during office processing.

18421

Charted depths on Chart 18421 agree within 2 fathoms of survey soundings with the following exception:

A 29 fathom sounding was found in the vicinity of a charted 20 fathom depth northwest of Alden Point. (see Figure 22).

The charted 53 fathom depth that was discussed above in southwest of Patos Island was charted as 63 fathoms on Chart 18421. Depth surrounding this sounding were 100 fathoms or deeper. There was no indication of shoaling in the acquired data set. The Hydrographer recommends adjusting the sounding to the newly surveyed depth.

The Hydrographer recommends that the survey soundings supersede all prior survey and charted depths in their common area.

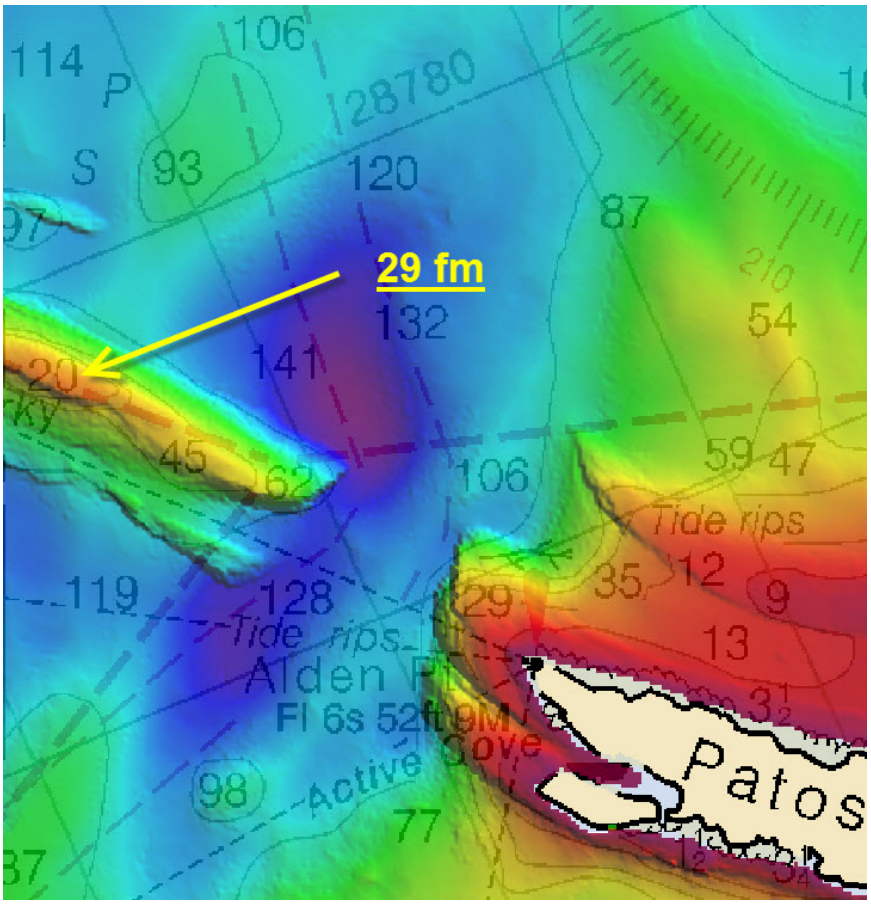

Figure 22: On chart 18421, a 29 fathom sounding was acquired over a 20 fathom depth.

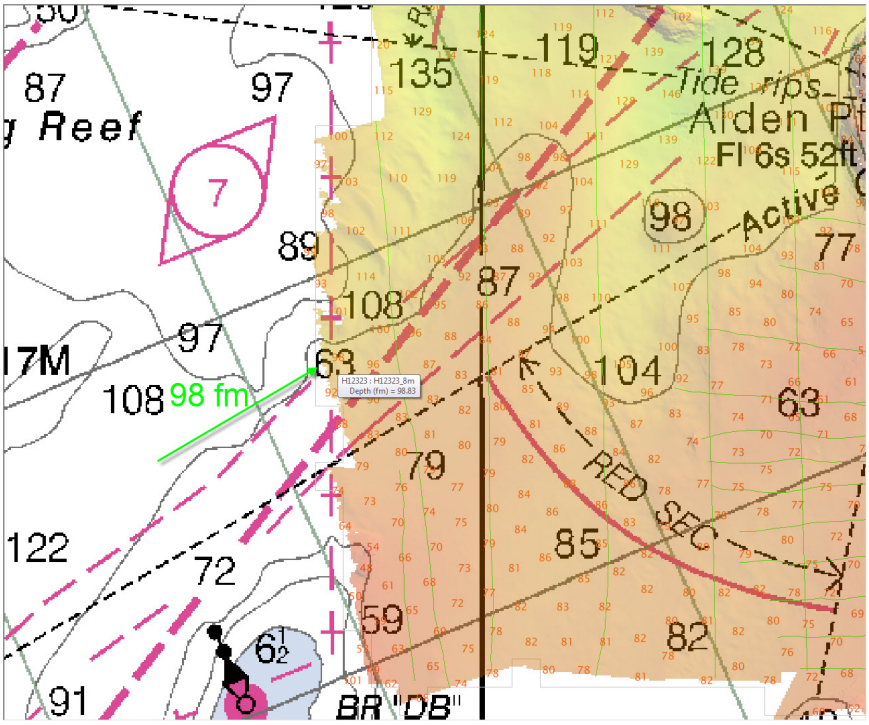

Figure 23: On chart 18421, a 98 fathom sounding was acquired over a 63 fathom depth.

D.1.2 AWOIS Items

No AWOIS items were located within the bounds of survey H12323.

D.1.3 Charted Features

No charted features were addressed for survey H12323.

D.1.4 Uncharted Features

There were no uncharted features in survey H12323.

D.1.5 Dangers to Navigation

No Danger to Navigation Reports were submitted for this survey.

D.1.6 Shoal and Hazardous Features

There were no shoal and hazardous features within the bounds of survey H12323.

D.1.7 Channels

A traffic separation scheme is correctly depicted on charts 18421 and 18431. Vessel use of the charted northbound and southbound Puget Sound traffic lane as well as the separation zone were observed by the hydrographer. The soundings within these areas are within 1 fathom of charted depths. No revisions are recommended to these areas. There are no maintained channels within the limits of survey H12323.

D.2 Additional Results

D.2.1 Shoreline

Limited shoreline verification had accomplished using the composite source file (CSF) provided with the project instructions. The CSF has been created using the latest ENCs, most recent aerial photogrammetry, and prior hydrographic surveys. Prior survey features within the CSF were for reference.

Limited shoreline verification was conducted near predicted low water in accordance with the HSSD and FPM section 3.5. Detached Positions (DPs) acquired during shoreline verification were recorded and S-57 attributed in CARIS Notebook. All shoreline data has been submitted in the CARIS Notebook HOB file "H12323_Final_Feature_File.hob".

The Hydrographer recommends that the shoreline as depicted in the Notebook HOB file supersede and complement shoreline information compiled in the CSF and charts as described above.

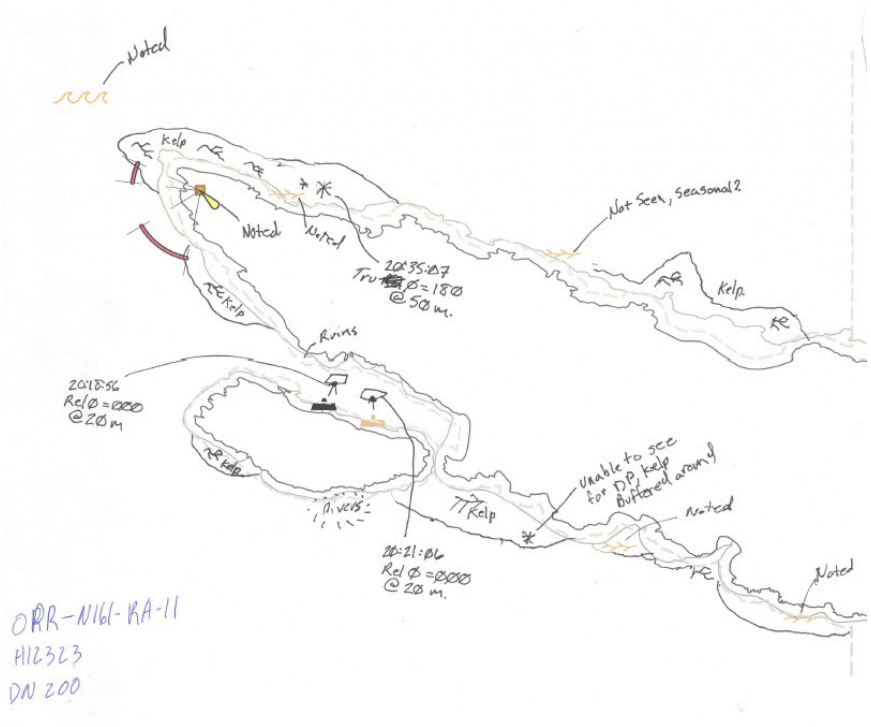

Figure 24: Investigation of the charted kelp line in the supplied composite source file for H12323.

D.2.2 Prior Surveys

No prior surveys were provided for the area covered by survey H12323.

D.2.3 Aids to Navigation

Survey H12323 included one aid to navigation (ATON) Patos Island Light (Light List 19825). The ATON's position was visually checked in the field against the digital raster chart and found to serve its intended purpose. This ATON is included in the H12323_Final_Features_File.hob.

Figure 25: USCG Light Station Patos Island referenced in features file.

Chart ATONs per latest ATONIS information

D.2.4 Overhead Features

There are no overhead features on survey H12323.

D.2.5 Submarine Features

There is a charted cable area on survey H12323 but it was not evident in the multibeam data. The hydrographer recommends to retaining the cable area as charted.

D.2.6 Ferry Routes and Terminals

There are no ferry routes or terminals charted on survey H12323, and none were observed to be operating in the area.

D.2.7 Platforms

There are no platforms within the bounds of survey H12323.

D.2.8 Significant Features

There were no significant features within the bounds of survey H12323.

D.2 Construction and Dredging

There was no construction or dredging observed within the limits of survey H12323.

D.2.9.1 Interim Deliverables

OPR-N161-RA-11 project instructions included an appendix of two interim deliverables related to waterline measurements. The first, recommendation on VDatum ERS vs. TCARI Non-ERS vertical transformation technique using crossline data was not performed by the field due to a lack of experienced personnel. The field did not accomplish this portion of the survey at the time of the survey acceptance review therefore traditional tides were used in this survey. Correspondence between the field and the branch can be found in Appendix V. The second requirement, to compare VDatum derived MLLW surface versus ERZT derived MLLW surface was not addressed as the ERZT functionality does not exist at this time. The waiver of the second interim deliverable can be found in Appendix V.

Email correspondence is appended to this document.

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, Project 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	2011-12-16
Horizontal and Vertical Control Report	2011-12-16
Tides and Water Levels Package	2011-07-01
Coast Pilot Report	2011-12-16

Approver Name	Approver Title	Approval Date	Signature
Donald W. Haines, CAPT/NOAA	Commanding Officer	12/16/2011	Donald W. Haines, CAPT/ NOAA 2011.12.16 11:24:10 -08'00'
Olivia Hauser, LT/NOAA	Field Operations Officer	12/16/2011	2011.12.16 11:23:10 -08'00'
James Jacobson	Hydrographic Chief Survey Technician	12/16/2011	Digitally signed by James B Jacobson Reason: I have reviewed this document Date: 2011.12.16 11:28:17 -08'00'
Manuel Cruz	Hydrographic Survey Technician / Sheet Manager	12/16/2011	Digitally signed by Manuel.Cruz DN: cn=Manuel.Cruz, o=NOAA, ou=OMAO, email=manuel.cruz@noaa.gov, c=US Date: 2011.12.16 14:21:56 -08'00'

F. Table of Acronyms

Acronym	Definition
AFF	Assigned Features File
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
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
HSSDM	Hydrographic Survey Specifications and Deliverables Manual

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

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

Return-path	<Kathleen.Jamison@noaa.gov>
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Date	Fri, 05 Aug 2011 10:27:36 -0400
From	"Kathleen.Jamison" <Kathleen.Jamison@noaa.gov>
Subject	Re: Bottom Samples for H12323 and H12322
In-reply-to	<30482fdf.2fdf3048@noaa.gov>
To	OPS.Rainier@noaa.gov
Cc	James.M.Crocker@noaa.gov, Manuel.Cruz@noaa.gov, Todd.Walsh@noaa.gov, chiefst.rainier@noaa.noaa.gov, CO.Rainier@noaa.gov, Michael.Gonsalves@noaa.gov
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X-Barracuda-Spam-Report	Code version 3.2, rules version 3.2.2.70983 Rule breakdown below pts rule name description ---- ---------- ---------- ---------- - 0.01 BSF_SC0_SA_TO_FROM_DOMAIN_MATCH Sender Domain Matches Recipient Domain
References	<30482fdf.2fdf3048@noaa.gov>
Original-recipient	rfc822;todd.walsh@noaa.gov

Olivia,

Sorry to just get back to you - I somehow forgot to respond yesterday.
I concur with your decision not to collect bottom samples for H12323 for
the reasons you gave - deep, traffic lanes, and steep shoreline.

-Kathleen

On 8/3/2011 5:31 PM, OPS.Rainier@noaa.gov wrote:
> Kathleen,
>
> I was looking over the PRF for Sheets H12323 and H12322 on the current
> project (OPR-N161-RA-11) and see there are no proposed bottom sample
> sites were provided.
> We went ahead and acquired 17 bottom samples on H12322 (see image
> attached) and have concluded that no bottom samples are required on
> H12323. Please let me know if the samples on H12322 meet HSD's
> approval.
>
> H12323 is mostly very deep, in the traffic lanes, or on a steep
> shoreline. Reviewing the data and the location, we concluded we need
> no bottom samples are needed. Please email us with your concurrance or
> with suggestions on where to sample if you think otherwise. Thank you.
>
> Sincerely,
>
> Olivia

--
Kathleen Jamison
Physical Scientist, Operations Branch

Hydrographic Surveys Division
Office of Coast Survey
NOAA National Ocean Service
Kathleen.Jamison@noaa.gov
301.713.2700

On 11/16/2011 1:18 AM, Olivia Hauser wrote (including in line responses from Corey Allen):

Hauser:

A couple things. First, I assume that the method for applying a VDatum transformation to Caris data is still the same as that outlined in pages 149-153 of the ERS SOP, correct?

Allen:

Yes, that's a valid method for getting VDatum GPS Tides in HIPS--one that requires TCARI grid data. That said, I thought HSD was providing the VDatum grid, a priori, in the PI data.

Hauser:

Also, I am writing to see if any additional tools are available for calculating the SEP for the ellipsoidally referenced zoned tides (EZRT), mentioned in page 153 of the ERS SOP provided with appendix 4 of this year's FPM.

Allen:

If there's an ERZT evaluation component in (any of) your PI this year, you should have gotten word that the ERZT deliverable is changed from complete analysis to submission of data adequate for analysis. Apart from the other relevant data pieces not already present in the stock deliverables (POS data, etc.), ERZT requires CSAR surfaces referenced to ellipsoid. Can we proceed with your desired ERZT study(s) by you sending HSTP the required data:

SBETs, SBET error files, POS *.000 files, HVFs for all vessels, tide (zone or TCARI) files, and all CSAR surfaces.

Hauser:

PS. Doroba, the SOP I talked to you on the phone about is the one mentioned below. I am sure the TJ must have a copy of the document on board. Take good notes so you can apply all of this to the data we acquired in Strait of Georgia. We have a comparison to complete as part of our project instructions.

Reply Reply to all Forward

Reply |J. Corey Allen Corey.Allen@noaa.gov to me, Jack, Glen, Michael, John, Steve

show details 11/17/11

Olivia,

Please use this email as official correspondence in the DR. The ERZT component of the ERS interim deliverables is waived as a requirement. At the time of project instruction compilation we anticipated the ERZT toolset to be fully implemented by the time the RA would be performing this analysis, but since we haven't yet tested or approved this methodology you are not required to submit these deliverables. Please refer to the ERS SOP, Chapter 4 Appendix of 2011 FPM, when performing ERS. The RA should still perform the "Compare Time Series" analysis as indicated in Appendix I of the project instructions, an SOP on this procedure can be found in your Pydro installation folder C:\Program Files\Pydro\Lib\site-packages\HSTP\Pydro\PostAcqTools_CompareTSeries.docx.

If you have any additional questions please contact the ERS team (Jack, Steve, or myself).

Cheers, Corey

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

TIDE NOTE FOR HYDROGRAPHIC SURVEY

DATE : August 12, 2011

HYDROGRAPHIC BRANCH: Pacific
HYDROGRAPHIC PROJECT: OPR-N161-RA-2011
HYDROGRAPHIC SHEET: H12323

LOCALITY: Patos Is. to Point Roberts, WA
TIME PERIOD: June 23 - August 4, 2011

TIDE STATION USED: 944-9424 Cherry Point, WA
Lat. 48° 51.8'N Long. 122° 45.5' W
PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters
HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 2.535 meters

REMARKS: RECOMMENDED ZONING

Preliminary zoning is accepted as the final zoning for project OPR-N161-RA-2011, H12323, during the time period between June 23 to August 4, 2011.

Please use the zoning file "N161RA2011CORP" submitted with the project instructions for Strait of Georgia, WA. Zones PS301, PS304, PS305, PS306, PS307 and PS308 are the applicable zones for H12323.

Refer to attachments for zoning information.

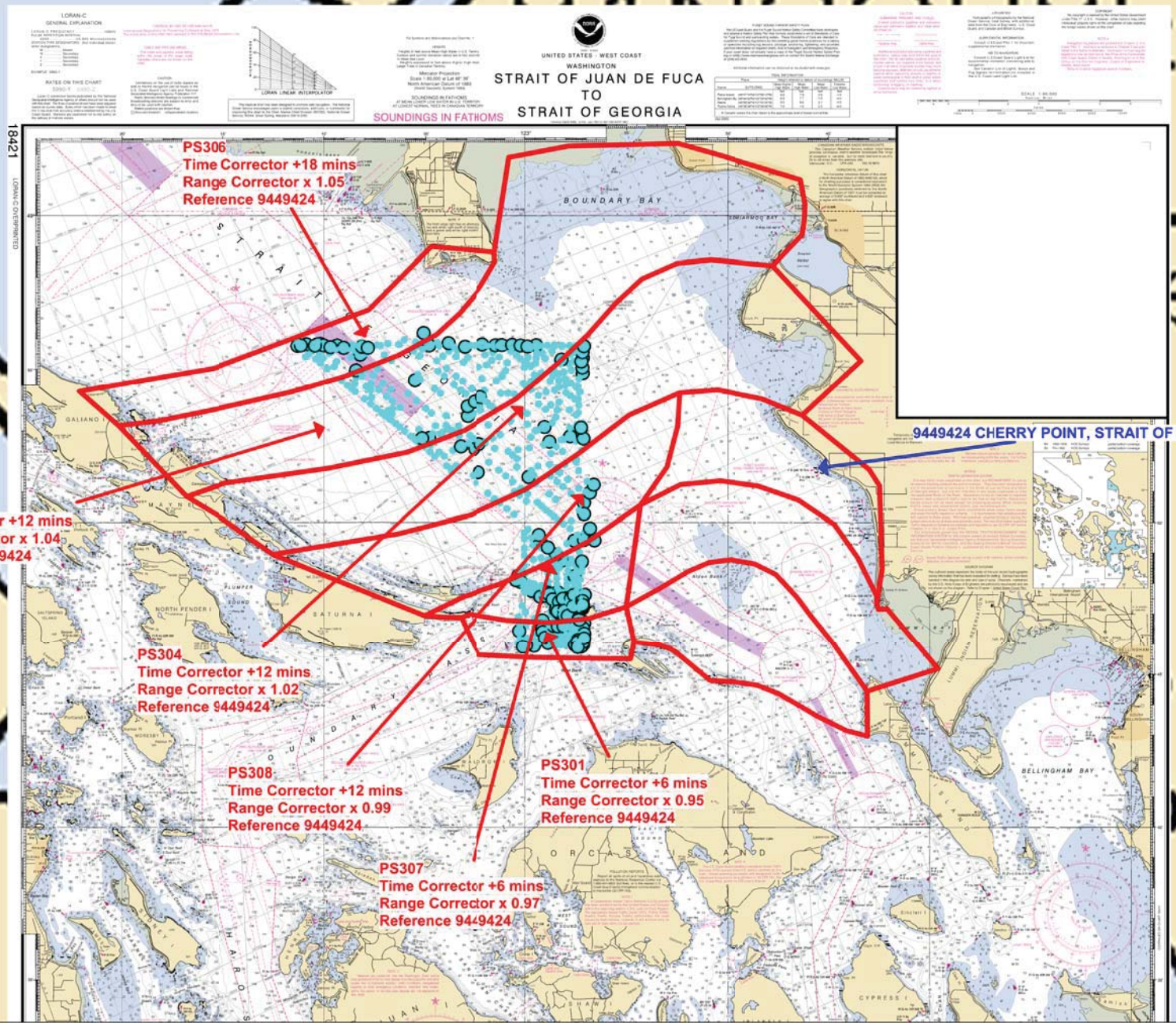
Note 1: Provided time series data are tabulated in metric units (meters), relative to MLLW and on Greenwich Mean Time on the 1983-2001 National Tidal Datum Epoch (NTDE).

Peter J. Stone

Digitally signed by Peter J. Stone
DN: cn=Peter J. Stone, o=NOAA/NOS/CO-OPS, ou=Oceanographic Division, email=peter.stone@noaa.gov, c=US
Date: 2011.08.15 17:13:44 -04'00'

CHIEF, OCEANOGRAPHIC DIVISION

Preliminary as Final Tidal Zoning for
OPR-N161-RA-2011, H12323
Strait of Georgia, WA



APPROVAL PAGE

H12323

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

- H12323_DR.pdf
- Collection of depth varied resolution BAGS
- Processed survey data and records
- H12323_GeoImage.pdf

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

Digitally signed by Peter S. Holmberg
DN: cn=Peter S. Holmberg, o, ou, email=peter.holmberg@noaa.gov, c=US
Date: 2012.07.31 10:11:33 -07'00'

Approved:_____

Peter Holmberg
Cartographic Team Lead, Pacific Hydrographic Branch

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

David Zezula
2012.07.31 10:22:55 -07'00'

Approved:_____

LCDR David J. Zezula, NOAA
Chief, Pacific Hydrographic Branch