

H11549

NOAA FORM 76-35A

U.S. DEPARTMENT OF COMMERCE  
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION  
NATIONAL OCEAN SERVICE

## DESCRIPTIVE REPORT

*Type of Survey* ..... HYDROGRAPHIC

*Field No.* ..... RA-10-02-06

*Registry No.* ..... H11549

### LOCALITY

*State* ..... Washington

*General Locality* ..... Colvos Passage and Vicinity

*Sublocality* ..... Northern Portion of Colvos Passage

2006

### CHIEF OF PARTY

..... Commander Guy T. Noll, NOAA

### LIBRARY & ARCHIVES

DATE .....

NOAA FORM 77-28 (11-72)	U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION	REGISTER NO.
<b>HYDROGRAPHIC TITLE SHEET</b>		H11549
INSTRUCTIONS · The hydrographic sheet should be accompanied by this form, filled in as completely as possible, when the sheet is forwarded to the office.		FIELD NO. RA-10-02-06
State <u>Washington</u>		
General Locality <u>Colvos Passage and Vicinity</u>		
Sublocality <u>Northern Portion of Colvos Passage</u>		
Scale <u>1:10,000</u>	Date of Survey <u>3/31/2006- 10/12/2006</u>	
Instructions Date <u>2/21/2006</u>	Project No. <u>OPR-N395-RA-06</u>	
Vessel <u>NOAA Ship Rainier launches 1006, 1016, 1015, 1021, 1101, 1103</u>		
Chief of Party <u>CDR Guy T. Noll, NOAA</u>		
Surveyed by <u>NOAA Ship Rainier Personnel</u>		
Soundings taken by echo sounder <u>Reson 8101 and 8125, Seabeam/Elac 1180, Knudsen 320M</u>		
Graphic record scaled by <u>NOAA Ship Rainier Personnel</u>		
Graphic record checked by <u>NOAA Ship Rainier Personnel</u>		
SAR by <u>Katie Reser</u>	Automated plot by _____	
Compilation by <u>Russ Davies</u>		
Soundings in <u>Fathoms and feet</u>	at	<u>MLLW</u>
REMARKS: <u>Time in UTC. UTM Projection Zone 10</u>		
Revisions and annotations appearing as endnotes were		
generated during office processing.		
All separates are filed with the hydrographic data.		
As a result, page numbering may be interrupted or non-sequential		

# Descriptive Report to Accompany Hydrographic Survey H11549

Project OPR-N395-RA-06  
Colvos Passage and Vicinity, Washington  
Northern Portion of Colvos Passage  
Scale 1:10,000  
March-April 2006, October 2006  
**NOAA Ship RAINIER (s221)**  
Chief of Party: Commander Guy T. Noll, NOAA

## A. AREA SURVEYED

This hydrographic survey was completed as specified by Hydrographic Survey Letter Instructions OPR-N395-RA-06 dated April 5, 2005, and all other applicable direction<sup>1</sup> with the exception of deviations noted in this report. The survey area is Puget Sound, Washington. This survey corresponds to sheet "B" in the sheet layout provided with the Letter Instructions. OPR-N395-RA-06 responds to a request from the Puget Sound Pilots, who use Colvos Passage as an alternate route for medium-sized vessels departing the Port of Tacoma.

One hundred percent multi-beam echosounder (MBES) coverage was obtained in the survey area in waters 8 meters and deeper, except as noted in section B2.<sup>1</sup> In depths less than 8 meters additional MBES coverage was obtained to acquire least depths over significant features or shoals, as appropriate for this survey. Vertical-beam echo sounder (VBES) data were acquired in depths from 4 to 20 meters to define the navigable area limit, aid in the planning of MBES data acquisition, and provide inshore bathymetry in navigationally significant areas.

Although not required by Letter Instructions, 100% side scan sonar (SSS) coverage was acquired parallel to the shoreline in approximately 4 meters of water along survey limits. This was done to improve detection of submerged hazards in the near shore areas.

Limited Shoreline Verification was performed for the survey area.

Data acquisition was conducted from March 31 to April 5, 2006 (DN090 to DN095) and on October 12, 2006 (DN285).

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<sup>1</sup> Standing Project Instructions (March 2004), NOS Hydrographic Specifications and Deliverables (March 2004), OCS Field Procedures Manual for Hydrographic Surveying (March 2005), and all Hydrographic Surveys Technical Directives issued through October 2006.

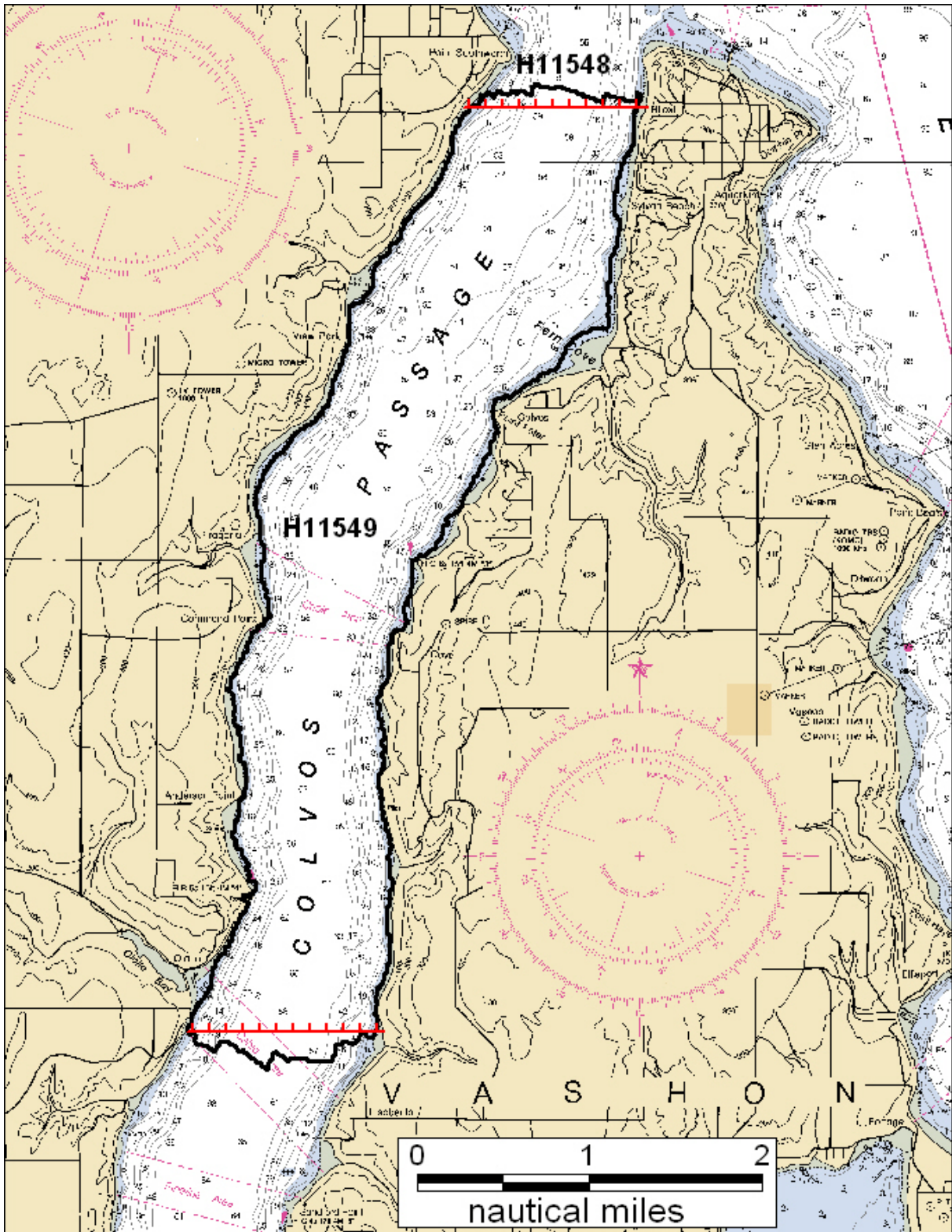


Figure 1: H11549 Survey Limits and junctions. (Chart 18474)

Data Acquisition Type	Hull Number						Total
	1101	1103	1021	1016	1006	1015	
Main scheme VBES (nm)	21.9	15.6					37.7
Main scheme MBES (nm)			38.09	41.18	23.59	62.03	148.17
Main scheme SSS (nm)						13.23	13.23
Crosslines (nm)	3.03	2.52			.59	4.49	10.63
Developments (nm)		4.57				0.65	
Shoreline (SSS, VBES nm)		12.8					12.87
Bottom Sample		9					9
Total Items Investigated		22					22
Total area surveyed (sq. nm)							5.7

Table 1. Statistics for survey H11549.

## B. DATA ACQUISITION AND PROCESSING

A complete description of data acquisition and processing systems, survey vessels, quality control procedures and data processing methods can be found in the *OPR-N395-RA-06 Data Acquisition and Processing Report (DAPR)*, submitted under separate cover.<sup>2</sup> Items specific to this survey, and any deviations from the aforementioned report are discussed in the following sections.

Final Approved Water Levels have been applied to survey H11549.<sup>3</sup> See Section C. for additional information.

### B1. Equipment and Vessels

Data for this survey were acquired by the following vessels:

Hull Number	Name	Acquisition Type
1101	RA-1	Vertical-Beam Echosounder Side Scan Sonar Detached Positions
1103	RA-2	Vertical-Beam Echosounder Detached Positions Bottom Samples
1021	RA-3	Multi-Beam Echosounder
1016	RA-4	Multi-Beam Echosounder
1006	RA-5	Multi-Beam Echosounder
1015	RA-6	Multi-Beam Echosounder Side Scan Sonar

Table 2. Data Acquisition Vessels for H11549.

Sound speed profiles were measured with SEACAT SBE-19+ profilers in accordance with the Specifications and Deliverables.

No unusual vessel configurations were used for data acquisition.

## B2. Quality Control

### Crosslines

Vertical Beam Echo Sounder (VBES) crosslines including buffer lines totaled 22.92 nautical miles, comprising 15.5% of main scheme hydrography. Crossline and Main Scheme bathymetry were manually compared in CARIS HIPS Subset Mode. Crosslines generally agreed within 1 meter of mainscheme hydrography. <sup>4</sup>

Multi-beam echosounder (MBES) crosslines totaled 5.08 nautical miles, comprising 3.4% of MBES hydrography. <sup>5</sup> The mainscheme bathymetry was manually compared to the XL nadir beams in CARIS subset mode and agreed well with differences averaging approximately .5m from 4 to 80m and within 1m in 80m and deeper. The only exception were Elac soundings from DN092, which exhibited discrepancies outside the acceptable IHO error limit. (See Data Quality Factors section below.)

A statistical Quality Control Report has been conducted on data representative data collected with each system used on this survey. Results are included in the updated 2006 RAINIER Hydrographic System Readiness Review package submitted with this survey.

### Junctions

The following contemporary survey junctions with H11549 (See Figure 1):

<u>Registry #</u>	<u>Scale</u>	<u>Date</u>	<u>Junction side</u>
H11548	1:10,000	2006	North
H11550	1:10,000	2008	South

Surveys H11548 and H11550 junction well with this survey. Data from both surveys was manually compared in CARIS HIPS 6.1 using subset editor. No discrepancies were found. <sup>6</sup>

### Data Quality Factors

#### Unexplained vertical error

Elac 1180 data acquired with vessel 1015 on DN 092 exhibited a vertical offset from the surrounding data. Lines were investigated in Navigation Editor to examine the effects of excessive speed on the vessels dynamic draft, with negative results. When checked in Attitude Editor there was no indication of abnormal heave. Sound speed profiles were reapplied to the affected lines with no improvement. The tide corrector file was examined and found to have no gaps in data during time of acquisition. Processing and Acquisition logs were reviewed and indicate no problems with the POSMV and GAMS solution, a potential source of significant horizontal positioning error. To resolve this issue lines were removed from the CARIS Field sheets. See figure 2 and 3. This created some holidays in the combined finalized BASE surfaces in depths over 25m; however no navigationally significant features were detected in

the data set before removal. 1015 Elac DN092 HDCS lines still remain in the submitted H11549 HDCS data. <sup>7</sup>

Mainscheme MBES lines run on DN092 adjacent to the problematic 1015 Elac lines agreed well with data acquired in the area. Data acquired on different days did not contain this offset. See figure 4.

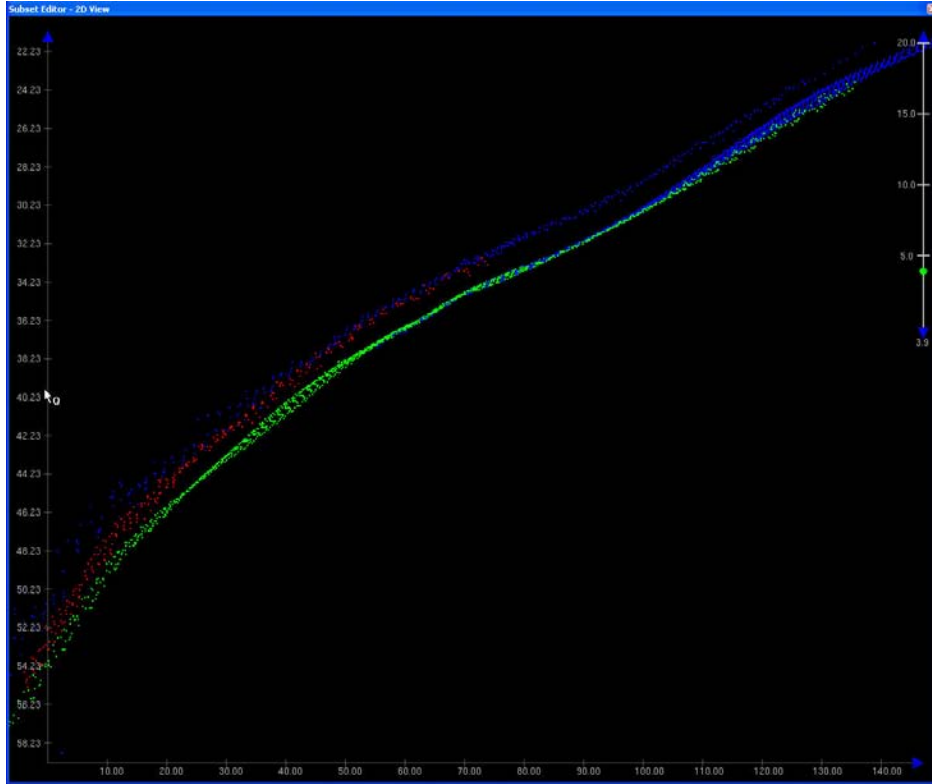


Figure 2: 1015 DN092 Elac crossline data (dark blue) is vertically offset up to 2m in 10m and deeper. Main-scheme Elac data (Red) from DN092 also exhibited a similar offset.

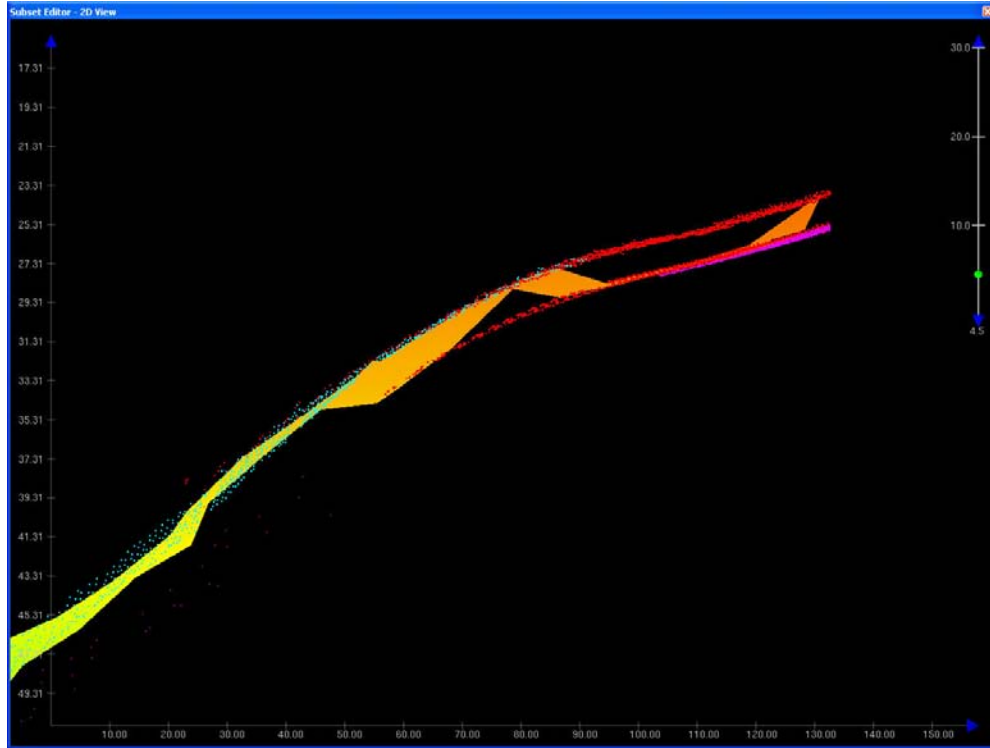


Figure 3: Effect of DN092 Elac bathymetry on finalized combined BASE surface (prior to removal from BASE surface).

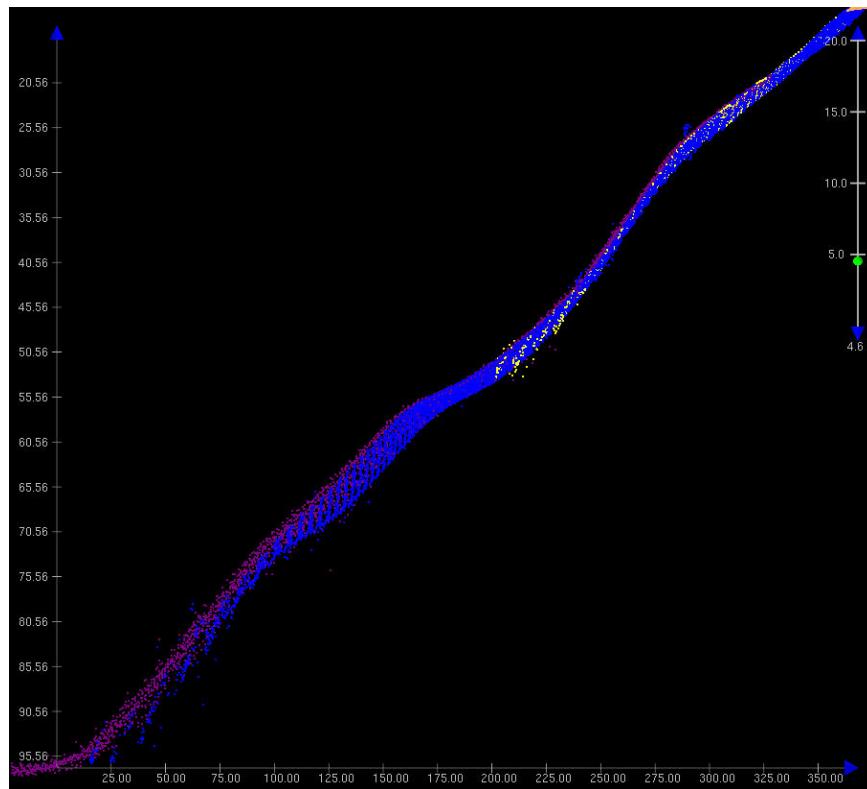


Figure 4: 1015 DN094 Elac crossline data (purple) agrees well with Reson 8101(yellow,blue) and 8125(orange).



True Heave Application Problems

True Heave was not applied to the following lines due to a problem with logging the POS MV true heave file across GPS week rollover (Sundays at 0000Z). Attempts to apply this corrupted file to HDCS data during merge HIPS produced data without Processed Depths files. The lines were reconverted without applying True Heave and were added to the relevant BASE surfaces. See figure 5.

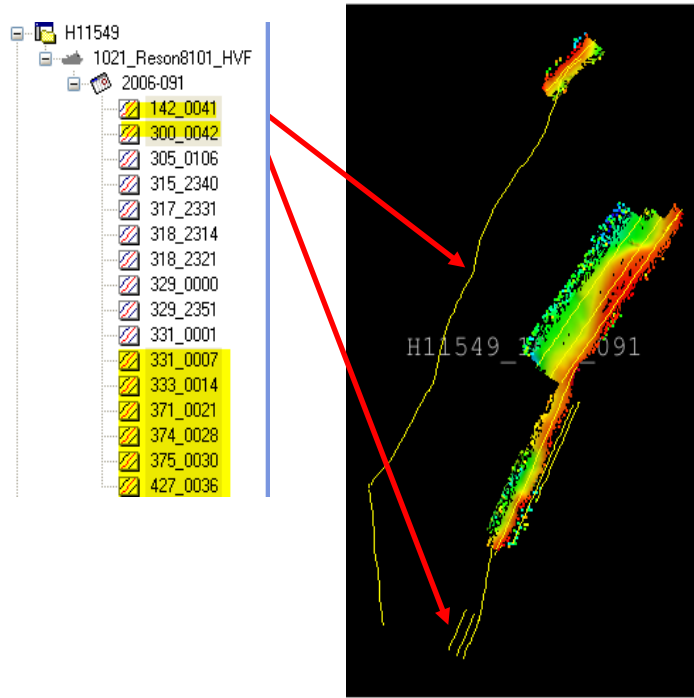


Figure 5: 1021 Reson lines with no True Heave applied.

Coverage

As mentioned above, Elac data from DN092 was excluded from the final field sheets for survey H11549. This resulted in offshore holidays. See figures 6 and 7.

In areas of some areas of steep nearshore bathymetry, 100% MBES coverage was not obtained to the 8m curve as required by the project instructions. However, in most cases, 100% SSS coverage was acquired over the resulting holidays, and indicated no significant features. <sup>8</sup> (See figures 8, 9, and 10.)

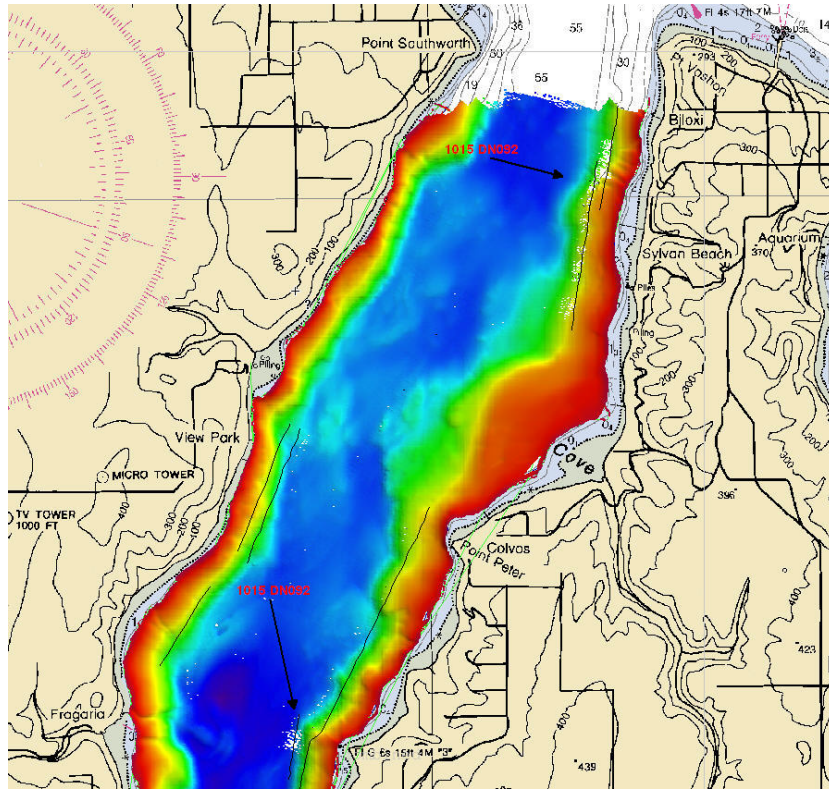


Figure 6: Northern holidays caused by omitting Elac data 1015 DN092.

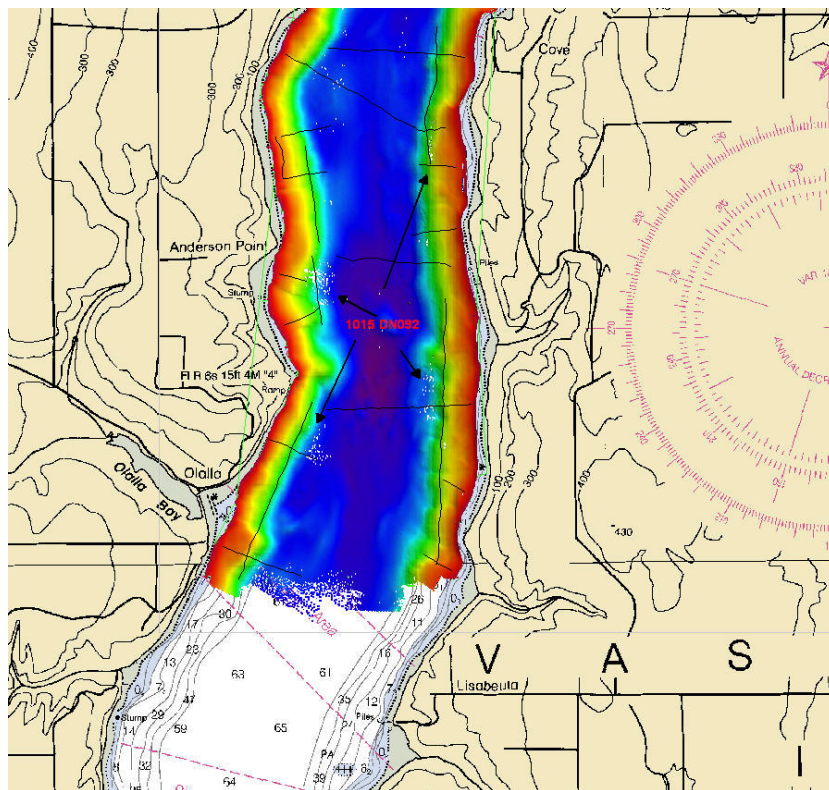


Figure 7: Southern holidays caused by omitting Elac data 1015 DN092.<sup>9</sup>

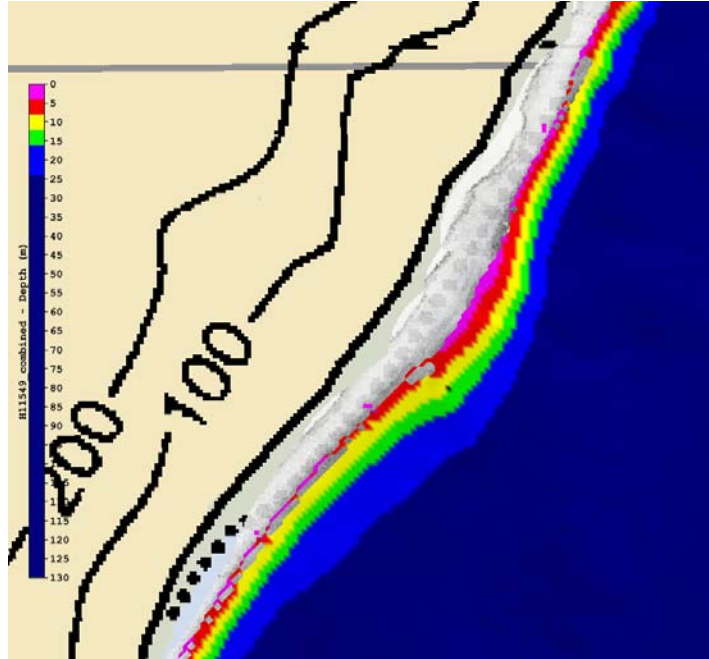


Figure 8: Due to the steep shoreline North of View Park 100% MBES coverage was not obtained to the 8m curve. However SSS coverage indicates no significant features in the area.<sup>10</sup>

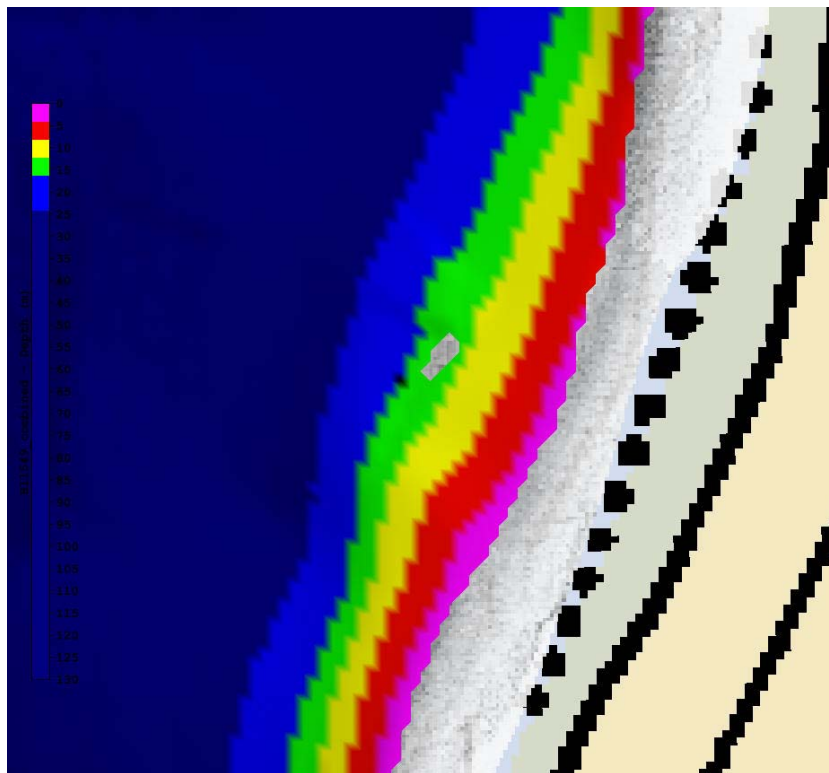


Figure 9: Holiday (25x10.5m North of Lisabeula (Vashon Island)). SSS indicates no significant features.<sup>11</sup>

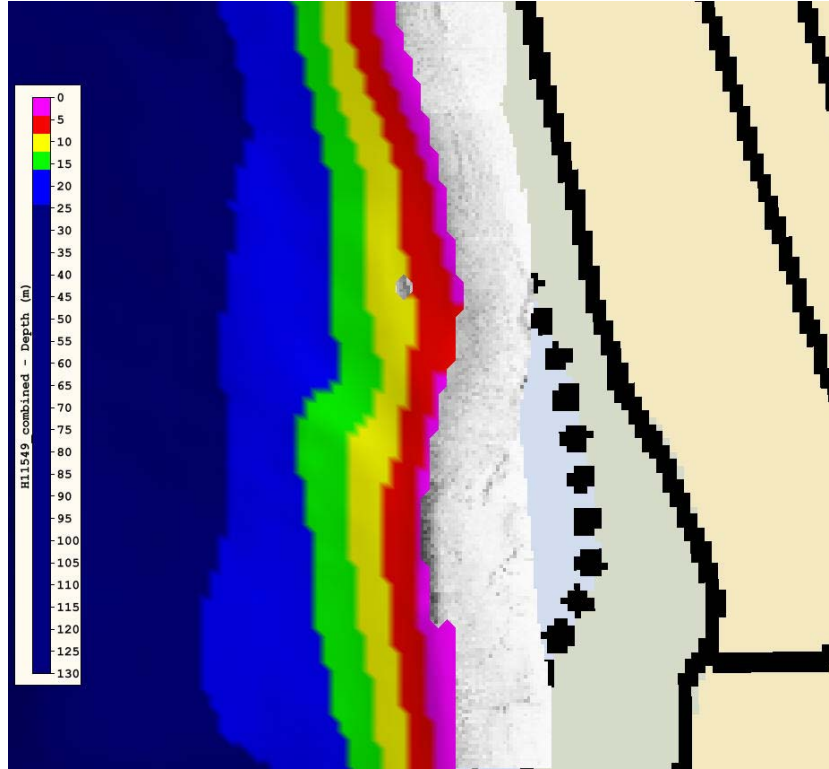


Figure 10: Holiday (9.85x13m ) North of charted pile on Vashon Island. SSS indicates no features in this area.<sup>12</sup>

The only exception to this was a MBES holiday which occurred over charted pier ruins along the steep nearshore bathymetry of Vashon Island. The pier ruins were detected by SSS, and found to be in their charted position (see Figure 11). As indicated in the shoreline feature data, the hydrographer recommends that these ruins be retained as charted.<sup>13</sup>

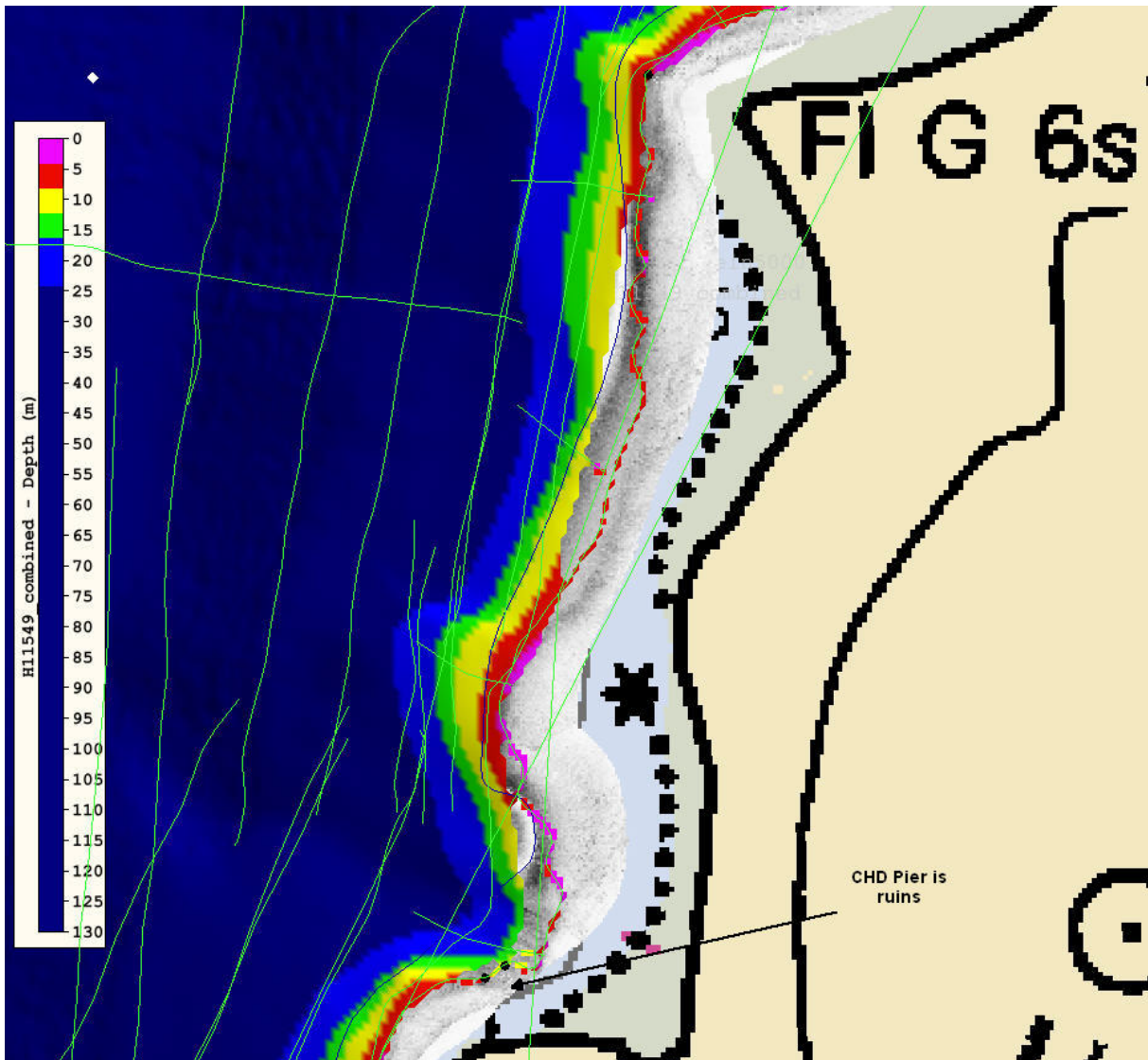


Figure 11: 100% SWMB coverage was not acquired to the 8m curve along charted pier leading North of Vashon Island due to steep shoreline. The ruined pier is captured in SSS imagery in charted location.

### B3. Data Reduction

Data reduction procedures for survey H11549 conform to those detailed in the *OPR-N395-RA-06 DAPR*. In addition, final processing of the survey was conducted using version 7.2.0 of Pydro.

### B4. Data Representation

Though many BASE surfaces were used for the processing of H11549, the final submission is shown in Figures 12 - 16. The submission field sheets have fewer than  $25 \times 10^6$  nodes. Final processing for survey H11549 was completed in CARIS HIPS 6.1, using RAINIER's 2006 CUBE parameters ("RAINIER HIPS 6.0" configuration in the "CUBEParams\_61.xml" file). "

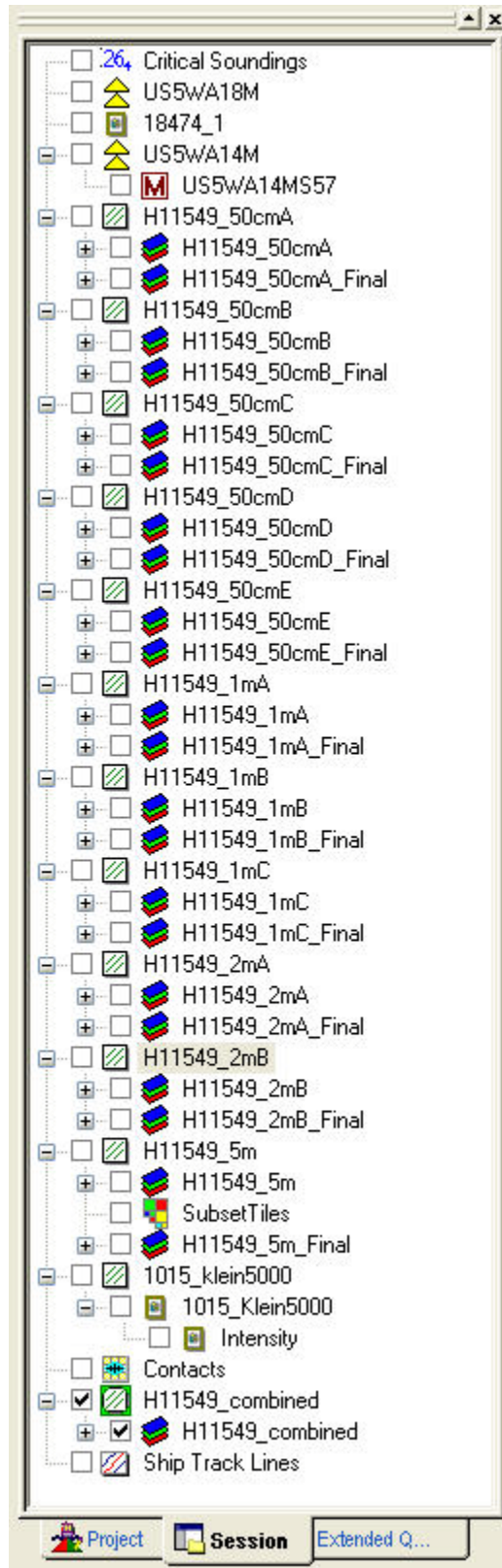


Figure 12: Field sheets and BASE surfaces submitted with H11549

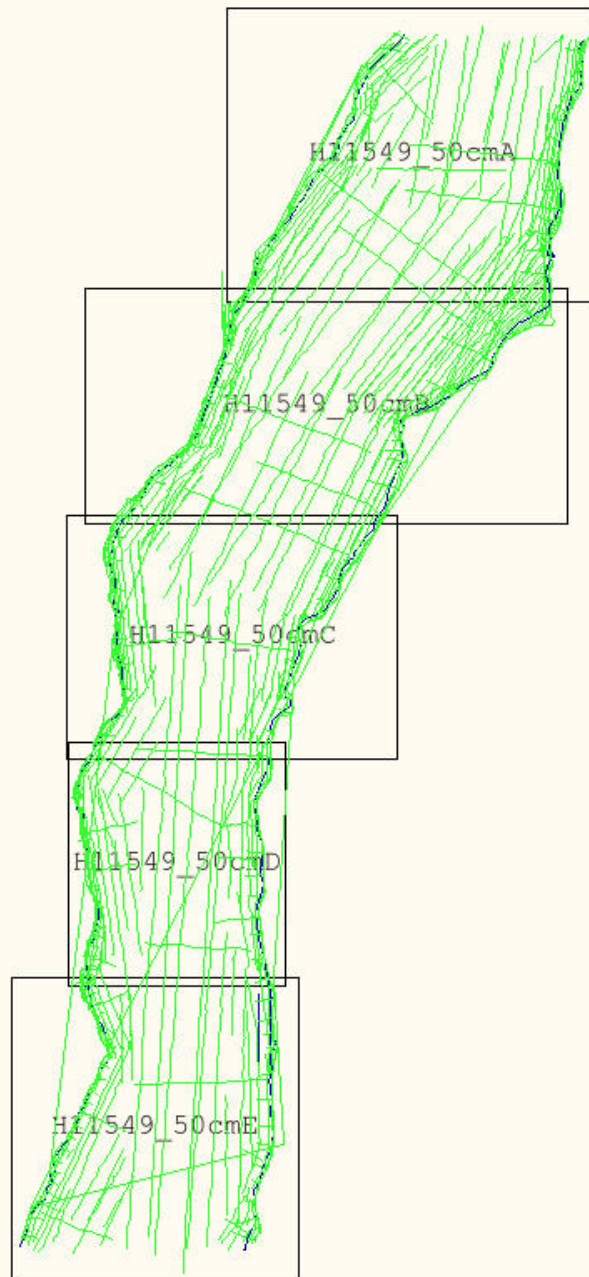
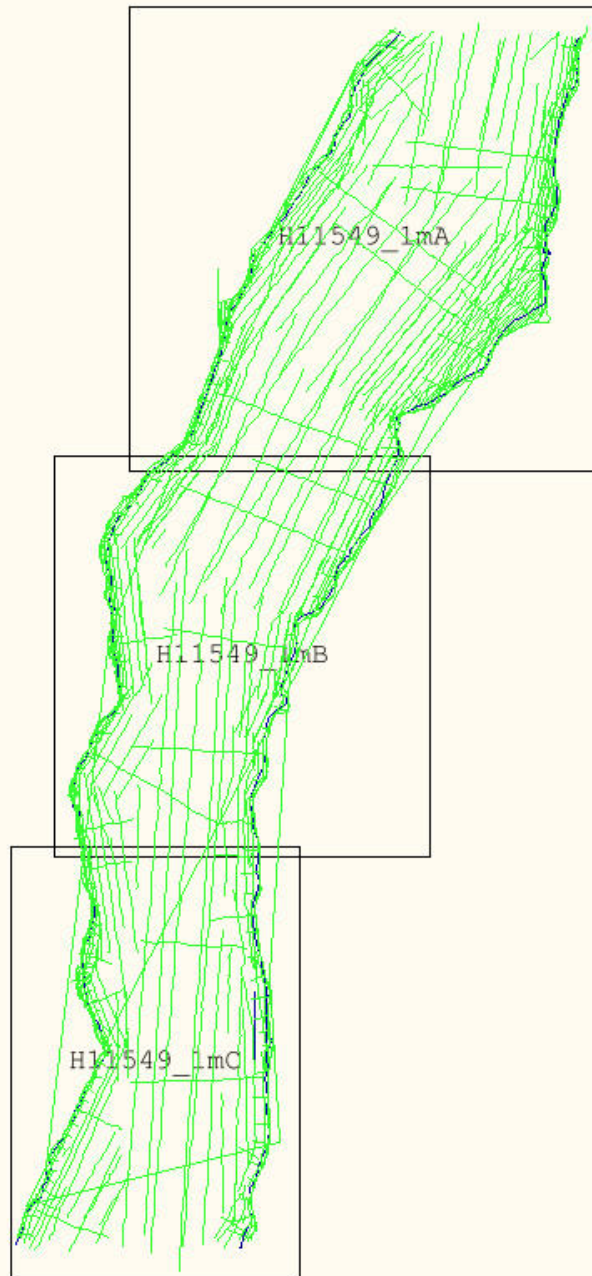
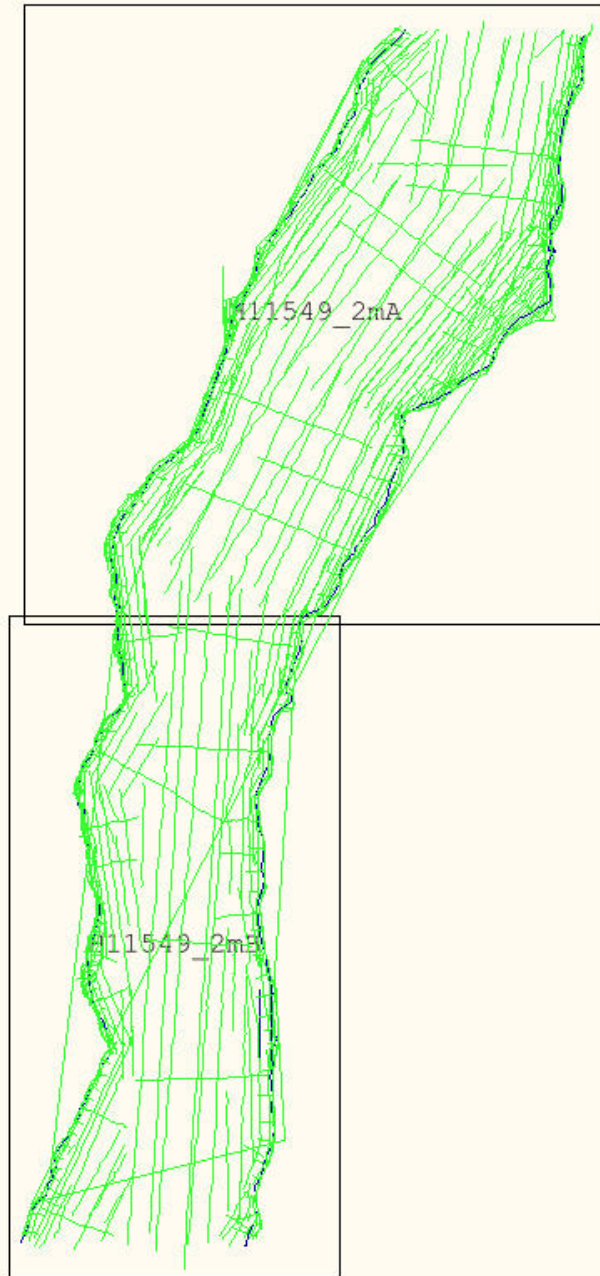


Figure 13: Layout of 50cm field sheets for H11549.

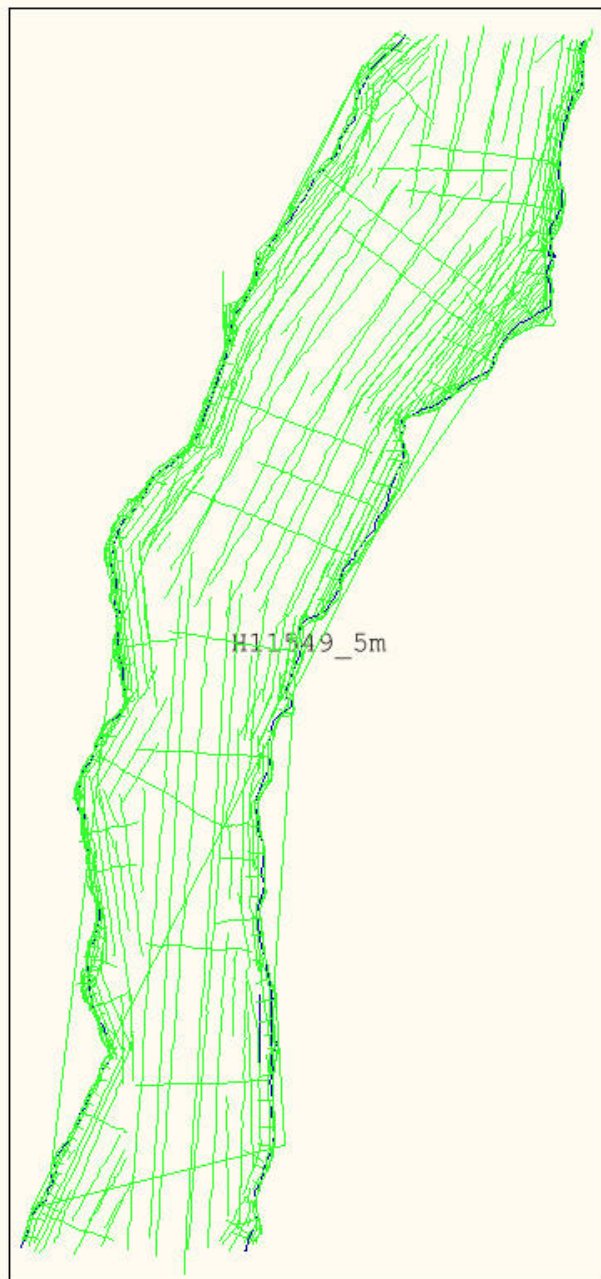




*Figure 14: Layout of 1m field sheets for H11549.*



*Figure 15: Layout of 2m field sheets for H11549.*



*Figure 16: Layout of 5m field sheets for H11549.*

### **C. VERTICAL AND HORIZONTAL CONTROL**

Project OPR-N395-RA-06 did not require static GPS observations or other horizontal control work, and all tide corrections were generated from CO-OPS maintained tide stations. Thus, no Horizontal and Vertical Control Report will be submitted. <sup>14</sup>

## Horizontal Control

The horizontal datum for this project is the North American Datum of 1983 (NAD83). Differential GPS (DGPS) was the sole method of positioning. The differential corrector beacons utilized for this survey are given in Table 2.

Location	Frequency	Custodian	Range	Priority
Robinson Point	323 kHz	USCG	7.5nm	Primary

*Table 3: Differential Corrector Sources for H11549.*

## Vertical Control

The vertical datum for this project is Mean Lower-Low Water (MLLW). The operating National Water Level Observation Network (NWLON) primary tide stations at Seattle, WA (944-7130) and Tacoma, Commencement Bay, WA (944-6484) served as control for datum determination and as the primary source for water level reducers for survey H11549

No tertiary gauges were required.

All data were reduced to MLLW using **Final Approved water levels** from stations Seattle WA (944-7130) and Tacoma, Commencement Bay, WA (944-6484) using the tide file 9447130.tid and 9446484.tid time and height correctors using the zone corrector file N395RA2006CORP.zdf.

The Request for Final Approved Water Levels was initially submitted to CO-OPS on April 10, 2006, and the Final Tide Note was received on September 27, 2006.<sup>15</sup> Additional bathymetric data were acquired on October 12, 2006 (DN285), and a second Request for Final Approved Water Levels was submitted on October 20, 2006.<sup>16</sup> The Final Approved Water Levels applied to this survey were received on October 25, 2006. All correspondence on this matter is included in Appendix IV.<sup>17</sup>

## D. RESULTS AND RECOMMENDATIONS

### D.1. Chart Comparison

#### D.1.a. Survey Agreement with Chart

RAINIER personnel compared H11549 survey data with the most recent editions of the paper, raster, and electronic nautical charts with coverage of the survey area during data acquisition and processing. The results of these comparisons are described below, as well as in Sections D.2.b. through D.2.f.

H11549 survey soundings were formally compared with depths on the following chart:

Chart	Scale	Edition and Date	Latest Notice to Mariners Applied
18449	1:25,000	18 <sup>th</sup> Ed, Feb 2004	10/04/2003
18474	1:40,000	8th Ed; Oct 2003	10/25/2003

Table 4: Charts compared with H11549

Soundings from survey H11549 agreed within 1 fathom with chart 18474 in depths of 15 fathoms and more. In water fewer than 15 fathoms, survey soundings were within 1/2 fathom of charted depths. Depths for chart 18449 agreed within 2 feet except as noted below. See figure 17. The hydrographer recommends that survey soundings supersede all charted depths in the common area. <sup>18</sup>

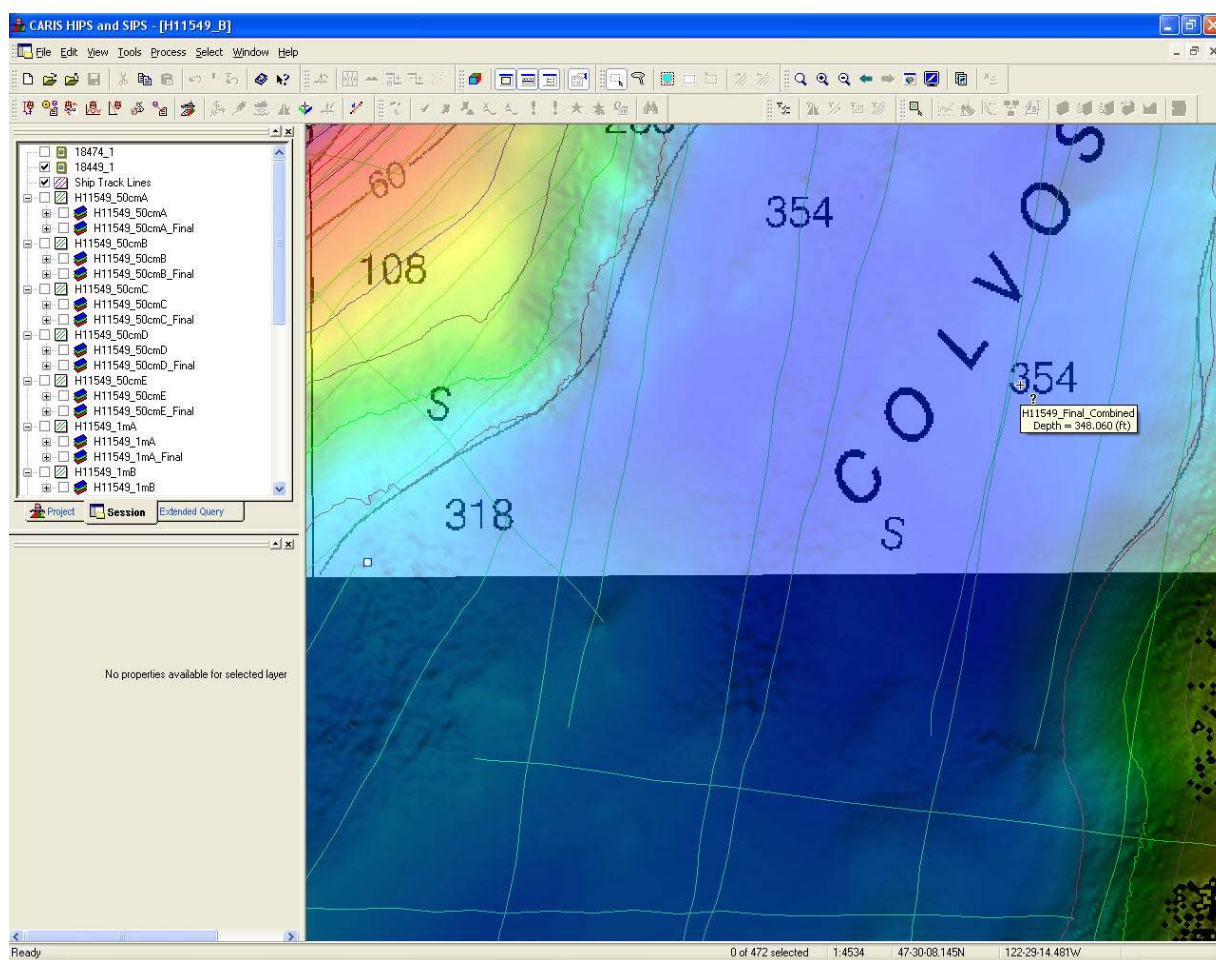


Figure 17: H11549 sounding is 6 feet shallower than charted (18449) depth 354 ft.

### D.1.b. Dangers to Navigation

There were no dangers to navigation (DTONs) found in survey H11549. <sup>19</sup>

### D.1.c. Other Features

#### Automated Wreck and Obstruction Information System (AWOIS) Investigations

Two (2) AWOIS items fall within the survey limits of H11549. Both of these were investigated and disproved. Descriptions of each AWOIS item investigation are included in the Survey Feature Report attached to this report.

#### Additional Items

Additional features investigated within the limits of H11549 are described in the Survey Feature Report in Appendix II. <sup>20</sup>

One additional feature was located on survey H11549. Figure 17 shows a large metal anchor buoy on the Western shore of Colvos Passage. This item appears to be partly submerged at high tide and a DP was taken in Hypack using a laser range finder. Due to the size and location of this feature, Hydrographer recommends this buoy to be placed on the chart as a visual aid. <sup>21</sup>



*Figure 18: Large metal anchor buoy ( DP1103\_090\_169) on western shore of Colvos Passage.*

## D.2. Additional Results

### D.2.a. Prior Survey Comparison

Prior survey comparison with H11549 was not performed.

### D.2.b. Shoreline Verification

#### Shoreline Source

ENCs USSWA14M and USSWA18M supplied by N/CS31 were converted into hydrographic object binary (HOB) files for use in CARIS Notebook 2.2. Features on charts 18449 and 18474 that were not shown on source shoreline files were digitized in Notebook by RAINIER personnel and added to the ENC features to create a composite source file. MapInfo table OPR-N395-RA-06-ChartedItems<sup>2</sup> contains charted items not attributed to prior sources. This table was added to the composite source file as well. This source data was printed on paper “boat sheets” and displayed in Hypack for field verification.

#### Shoreline Verification

Limited shoreline verification was conducted near predicted low water in accordance with the Standing Project Instructions and FPM sections 6.1 and 6.2. Detached positions (DPs) taken during shoreline verification were recorded in HYPACK and/or Trimble ProXRS DGPS receivers with TSCe data collectors, on DP forms, and processed in Pydro. These indicate revisions to features and features not found on the verified shoreline. In addition, annotations describing shoreline were recorded on hard copy plots of digital shoreline. DP forms are included in the *Separates to be Included with Survey Data*.<sup>22</sup>

All shoreline data is submitted in Caris Notebook .hob files. The session H11549\_B\_Notebook contains the following survey files:

<b>HOB File</b>	<b>Purpose and Contents</b>
H11549_Comp_Source.hob	Original Source Data as filtered from ENC cells USSWA14M and USSWA18M
H11549_Field_Verified.hob	Field verified source features and shoreline, including edits and updates not requiring DPs.
H11549_Pydro_Updates.hob	New or modified items processed through Pydro.
H11549_Pydro_Disprovals.hob	Deleted items processed through Pydro.

*Table 5. List and Description of Notebook HOB files.*

<sup>2</sup> See Change 1 to Project Instructions.

### Source Shoreline Changes and New Features

Items for survey H11549 that require further discussion and are associated with a detached position, have been flagged “Report” in Pydro in H11549.pss. Investigation methods and recommendations are listed in the Remarks and Recommendation tabs. These features are included in the Survey Feature Report in Appendix II. <sup>23</sup>

### Recommendations

The Hydrographer recommends that the shoreline as depicted Notebook .HOB file supersede and complement shoreline information depicted on the ENC and raster charts as noted. <sup>24</sup>

### **D.2.c. Aids to Navigation**

There were two Aids to Navigation within the limits of H11549. Each position was verified in the field against the ENC. The green lateral beacon #3 (USCG Light List 17105) South of Point Peter was found to be properly charted. The red lateral beacon #4 (USCG Light List 17110) North of Olalla Bay was found to be 50 meters offshore of its charted position. A detached position was acquired in the field and is included in the H11549\_pydro\_updates file. The position has been corrected on the current raster chart. Each ATON was found to serve its purpose. <sup>25</sup>

### **D.2.d. Overhead features**

There are no overhead features in survey H11549.

### **D.2.e. Submarine Cables and Pipelines**

Survey H11549 includes 2 charted cable areas, as shown in Figure 14. No trenches were located in the bathymetry extending from the shore in the vicinity of the charted cable area. Signs along the shore adequately mark the cable crossing areas. The Hydrographer recommends retaining the cable areas as charted. <sup>26</sup>



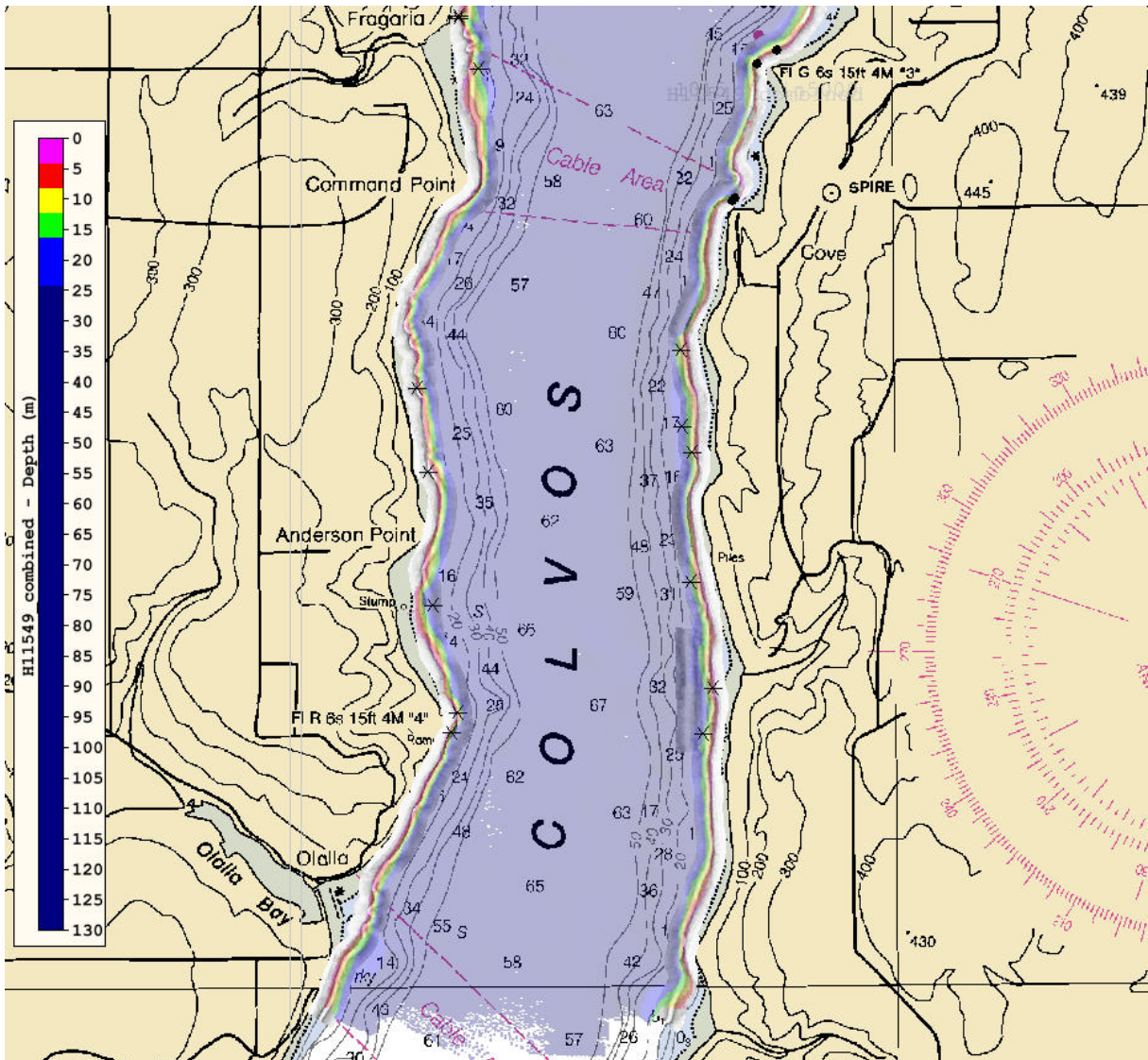


Figure 19: H11549 Cable area and Pipelines.

**D.2.f. Ferry Routes**

There are no ferry routes charted within the limits of H11549, and none were observed operating in the survey area.

**D.2.g. Bottom Samples**

Nine bottom samples were performed in survey H11549. Current bottom samples for this survey agreed with historic bottom samples.<sup>27</sup>

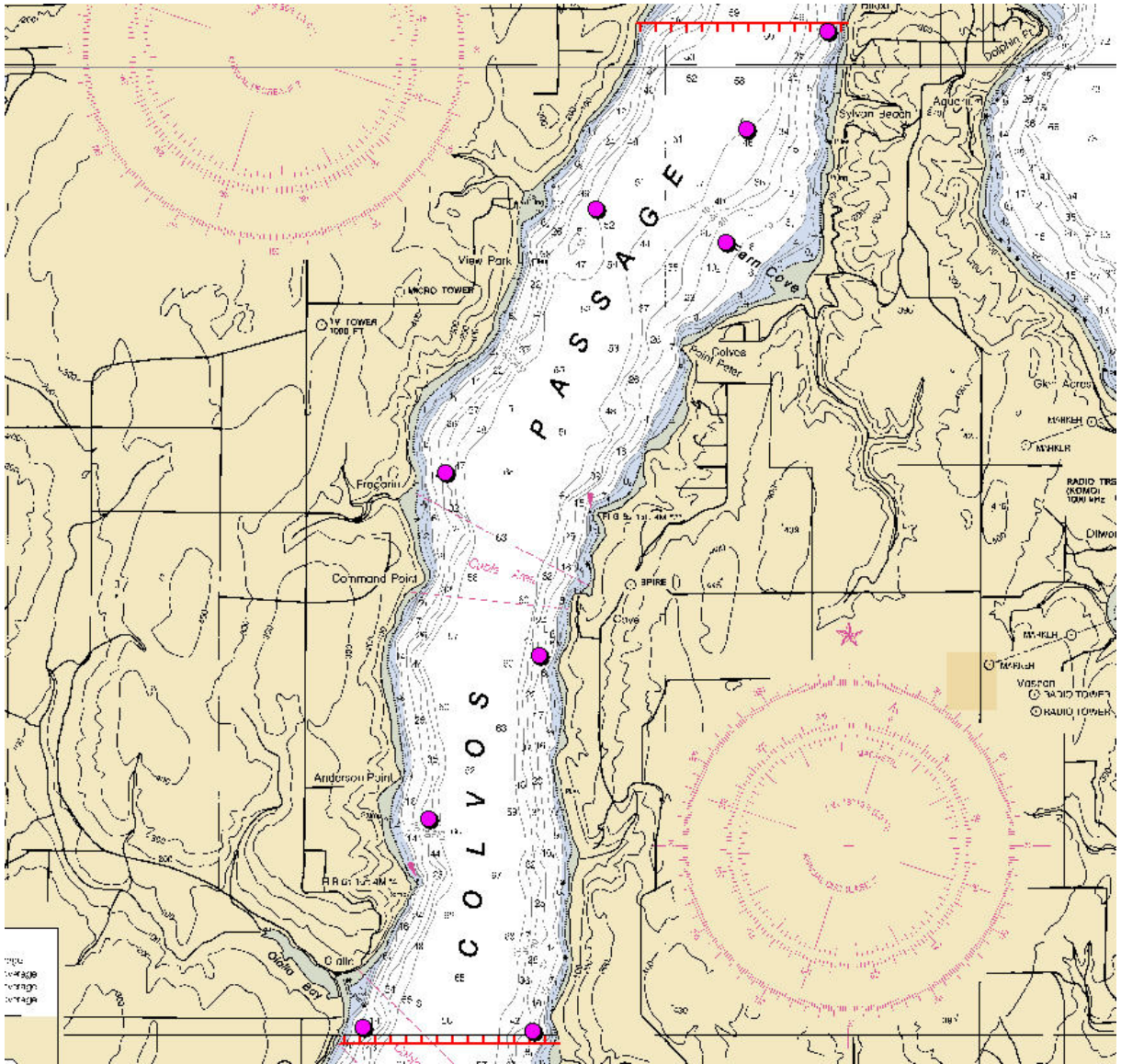


Figure 20 Bottom samples for H11549.

**D.2.h Miscellaneous**


None.

**E. APPROVAL**

As Chief of Party, field operations for hydrographic survey H11549 were conducted under my direct supervision, with frequent personal checks of progress and adequacy. I have reviewed the attached survey data and reports. This survey meets or exceeds requirements as set forth in the NOS Hydrographic Surveys and Specifications Deliverables Manual (March 2004), Field Procedures Manual (March 2005), Standing and Letter Instructions, and all HSD Technical Directives issued through October, 2006. These data are adequate to supersede charted data in their common areas. This survey is complete and no additional work is required. All data and reports are respectfully submitted to N/CS34, Pacific Hydrographic Branch.

Listed below are supplemental reports submitted separately that contain additional information relevant to this survey:


<u>Title</u>	<u>Date Sent</u>	<u>Office</u>
Data Acquisition and Processing Report for OPR-N395-RA-06	12 March 2007	N/CS34
Coast Pilot Report for OPR- N395-RA-06	10 January 2007	N/CS26

  
 Guy T. Noll  
 Commander, NOAA  
 Commanding Officer


Guy Noll  
 I am approving this document  
 2007.03.21 17:35:16 -07'00'

Approved and Forwarded:


In addition, the following individuals were also responsible for overseeing data acquisition and processing of this survey:

Survey Sheet Manager:   
 Matthew Z. Boles  
 Survey Technician, NOAA Ship RAINIER

Matthew Boles  
 cn=Matthew Boles, o=US, ou=NOAA, ou=RAINIER,  
 email=matt.boles@noaa.gov  
 I am the author of this document  
 2007.03.27 20:18:03 Z

Chief Survey Technician:   
 James B. Jacobson  
 Chief Survey Technician, NOAA Ship RAINIER

James B Jacobson  
 I have reviewed this document  
 2007.03.29 16:11:26 Z

Field Operations Officer:   
 Benjamin K. Evans  
 Lieutenant, NOAA

LT Benjamin K. Evans, NOAA  
 I have reviewed this document  
 2007.03.28 23:44:46 Z

## **Revisions Compiled During Office Processing and Certification**

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<sup>1</sup> Concur

<sup>2</sup> Filed with project records

<sup>3</sup> Concur

<sup>4</sup> Concur

<sup>5</sup> Did not meet the 5% requirement but was sufficient for quality control.

<sup>6</sup> Concur

<sup>7</sup> Concur

<sup>8</sup> Concur

<sup>9</sup> No holidays exist in the southern portion of this survey because of the overlapping junction with survey

H11550.

<sup>10</sup> Concur

<sup>11</sup> Concur

<sup>12</sup> Concur

<sup>13</sup> Concur

<sup>14</sup> Concur

<sup>15</sup> See attached Tide Note.

<sup>16</sup> See attached Tide Note.

<sup>17</sup> Filed with the hydrographic records.

<sup>18</sup> Concur

<sup>19</sup> Concur

<sup>20</sup> The Survey Feature Report is filed with the hydrographic records. Note: the survey feature report does not include all features from H11549. Additional features were added, some removed, and some modified in CARIS Notebook after the feature report was generated from Pydro. All features included in the compilation of H11549 have come directly from CARIS Notebook, which is the official features deliverable for this survey.

<sup>21</sup> Concur with clarification, chart feature as an obstruction. See HCell for description and location.

<sup>22</sup> Filed with the hydrographic records.

<sup>23</sup> Filed with the hydrographic records.

<sup>24</sup> Concur

<sup>25</sup> Use the latest ATONIS information for the description and location of the aids in the survey area.

<sup>26</sup> Concur

<sup>27</sup> All bottom samples are included in HCell H11549

# H11549\_AWOIS

**Registry Number:** H11549  
**State:** Washington  
**Locality:** Puget Sound  
**Sub-locality:** Northern Portion of Colvos Passage  
**Project Number:** OPR-N395-RA-06  
**Survey Dates:** 3/31/2006 - 4/05/2006

## Charts Affected

Number	Edition	Date	Scale (RNC)	RNC Correction(s)*
18474	8th	10/01/2003	1:40,000 (18474_1)	[L]NTM: ?
18445	31st	04/01/2006	1:80,000 (18445_8) 1:80,000 (18445_1)	[L]NTM: ?
18448	34th	07/01/2006	1:80,000 (18448_1)	[L]NTM: ?
18440	28th	12/01/2005	1:150,000 (18440_1)	[L]NTM: ?
18003	20th	11/01/2006	1:736,560 (18003_1)	[L]NTM: ?
18007	32nd	07/01/2005	1:1,200,000 (18007_1)	[L]NTM: ?
501	12th	11/01/2002	1:3,500,000 (501_1)	[L]NTM: ?
530	31st	06/01/2005	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	AWOIS	[no data]	[no data]	[no data]	---
1.2	AWOIS	[no data]	[no data]	[no data]	---

## 1.1) AWOIS #53302 - OBSTRUCTION

### No Primary Survey Feature for this AWOIS Item

**Search Position:** 47° 28' 59.4" N, 122° 30' 58.5" W  
**Historical Depth:** [None]  
**Search Radius:** 200  
**Search Technique:** S2, SWMB, VS  
**Technique Notes:** INVESTIGATION NOT REQUIRED WITHIN 4M CURVE

**History Notes:**

CL-2151/76; UPSP REPORTS SEVEN PILINGS APPROX 30' FROM SHORE AT POSITION 47/29.0N 122/30.9W (ENTERED 9/27/05, SME)

### Survey Summary

**Charts Affected:** 18474\_1, 18445\_1, 18448\_1, 18440\_1, 18003\_1, 18007\_1, 501\_1, 530\_1, 50\_1

**Remarks:**

piles not seen in side scan/MB; correlating chd pier is ruins inside NALL

### Feature Correlation

Address	Feature	Range	Azimuth	Status
OPR-N395-RA-06_Awois	AWOIS # 53302	0.00	000.0	Primary

### Hydrographer Recommendations

Remove from chart

### S-57 Data

**Geo object 1:** Shoreline Construction (SLCONS)

### Office Notes

Concur

## 1.2) AWOIS #53312 - OBSTRUCTION

### No Primary Survey Feature for this AWOIS Item

**Search Position:** 47° 25' 53.3" N, 122° 30' 46.5" W  
**Historical Depth:** [None]  
**Search Radius:** 200  
**Search Technique:** S2, MB, VS  
**Technique Notes:** INVESTIGATION NOT REQUIRED WITHIN 4M CURVE

**History Notes:**

CL-2110/77; USPS REPORTS 5 PILINGS AT 47/25.9N 122/30.7W (ENTERED 01/11/06, SME)

### Survey Summary

**Charts Affected:** 18474\_1, 18445\_1, 18445\_8, 18448\_1, 18440\_1, 18003\_1, 18007\_1, 501\_1, 530\_1, 50\_1

**Remarks:**

AWOIS pilings not seen in SSS/MB

### Feature Correlation

Address	Feature	Range	Azimuth	Status
OPR-N395-RA-06_Awois	AWOIS # 53312	0.00	000.0	Primary

### Hydrographer Recommendations

AWOIS Item disproved.

### S-57 Data

**Geo object 1:** Pile (PILPNT)

### Office Notes

Concur



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

**TIDE NOTE FOR HYDROGRAPHIC SURVEY**

**DATE :** April 27, 2006

**HYDROGRAPHIC BRANCH:** Pacific  
**HYDROGRAPHIC PROJECT:** OPR-N395-RA-2006  
**HYDROGRAPHIC SHEET:** H11549

**LOCALITY:** Northern Portion of Colvos Passage, WA  
**TIME PERIOD:** March 31 - April 5, 2006

**TIDE STATION USED:** Seattle, WA 944-7130  
Lat. 47 36.2' N Long. 122 20.3' W  
**PLANE OF REFERENCE (MEAN LOWER LOW WATER):** 0.000 meters  
**HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE:** 3.199 meters

**TIDE STATION USED:** Tacoma, WA 944-6484  
Lat. 47 16.0' N Long. 122 24.7' W  
**PLANE OF REFERENCE (MEAN LOWER LOW WATER):** 0.000 meters  
**HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE:** 3.336 meters

**REMARKS:** RECOMMENDED ZONING  
Use zone(s) identified as: PS166 & PS181

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).

**Note 2:** Use tide data from the appropriate station with applicable zoning correctors for each zone according to the order in which they are listed in the Tidezone corrector file (\*.ZDF). For example, tide station one (TS1) would be the first choice for an applicable zone followed by TS2, etc. when data are not available.

*For [Signature]*  
\_\_\_\_\_  
CHIEF, PRODUCTS AND SERVICES DIVISION





**Final tide zone node point locations for OPR-N395-RA-2006, H11549**

Format:                   Tide Station (in recommended order of use)  
                               Average Time Correction (in minutes)  
                               Range Correction  
                               Longitude in decimal degrees (negative value denotes Longitude West),  
                               Latitude in decimal degrees

	Tide Station Order	AVG Time Correction	Range Correction
PS166	944-7130	0	x1.01
-122.385315 47.594109			
-122.414475 47.59963			
-122.454132 47.611852			
-122.493204 47.634317			
-122.495538 47.625254			
-122.500206 47.610671			
-122.499041 47.599633			
-122.49671 47.588986			
-122.539476 47.5659			
-122.560992 47.540933			
-122.541374 47.467087			
-122.495278 47.458593			
-122.45129 47.4477			
-122.381302 47.450472			
-122.33877 47.466953			
-122.385315 47.594109			
PS181	944-6484	0	x0.99
-122.541374 47.467087			
-122.57024 47.420319			
-122.548689 47.378796			
-122.514862 47.385533			
-122.497948 47.427117			
-122.495278 47.458593			
-122.541374 47.467087			



**H11549 HCell Report**  
Russ Davies, Cartographer  
Pacific Hydrographic Branch

**Introduction**

The primary purpose of the HCell is to provide new survey information in International Hydrographic Organization (IHO) format S-57 to update the largest scale ENC and RNC in the region: NOAA ENC US5WA14M, US5WA18M, NOAA RNC 18449 and 18474.

HCell compilation of survey H11549 used Office of Coast Survey HCell Specifications Version 4.0 and HCell Reference Guide Version 2.0.

**1. Compilation Scale**

Depths for HCell H11549 were compiled to the largest scale chart in the region, 18449, 1:25,000. The density and distribution of soundings from H11549 were selected to emulate the distribution on the chart. Non-bathymetric features have been generalized to chart scale.

**2. Soundings**

A survey-scale sounding (SOUNDG) feature object layer was built from the 10-meter combined surface, **H11549\_Combined**, in CARIS BASE Editor. A shoal-biased selection was made at 1:10,000 scale for the main chart area using a Radius Table file with values shown in the table, below.

Upper limit (m)	Lower limit (m)	Radius (mm)
0	10	3
10	20	4
20	50	4.5
50	300	5

In CARIS BASE Editor soundings were manually selected from the high density sounding layers and imported into a new layer created to accommodate chart density depths. Manual selection was used to accomplish a density and distribution that closely represents the seafloor morphology.

**3. Depth Areas and Depth Contours**

**3.1 Depth Areas**

Depth contours at the intervals on the largest scale chart are included in the \*\_SS HCell for MCD raster charting division to use for guidance in creating chart contours. The metric and fathom equivalent contour values are shown in the table below.

One depth range, from 0.218 to 126.397 meters, was used for the depth area objects. Upon conversion to NOAA charting units, the depth range is 0.715 to 414.687 feet.

### 3.2 Depth Contours

Depth contours at the intervals on the largest scale chart are included in the \*\_SS HCell for MCD raster charting division to use for guidance in creating chart contours. The generalized metric and fathom equivalent contour values are shown in the table below.

Chart Contours in Feet	Metric Equivalent of Chart Contours	Metric Equivalent of Chart Contours NOAA Rounded	Actual Value of Chart Contours
0	0.00	0.0	0.0
6	1.8288	2.0574	6.75
12	3.6576	3.8862	12.75
18	5.4864	5.715	18.75
30	9.144	9.3726	30.75
60	18.288	18.5166	60.75
300	91.44	91.6686	300.75

Contours delivered in the \*\_SS file have not been deconflicted against shoreline features, soundings and hydrography as all other features in the \*\_CS file and soundings in the \*\_SS have been. This results in conflicts between the \*\_SS file contours and HCell features at or near the survey limits. Conflicts with M\_QUAL should be expected. HCell features should be honored over \*\_SS.000 file contours in all cases where conflicts are found.

### 4. Meta Areas

The following Meta object areas are included in HCell 11549:

M\_QUAL  
M\_CSCL

Meta area objects were constructed on the basis of the limits of the hydrography. (See 3.1 *Depth Areas*.)

### 5. Features

Shoreline features for H11549 were delivered from the field in three HOB files defining new features and modification to GC or charted features. The features included in the HCell were de-conflicted against GC shoreline, the chart and hydrography during office processing.

Feature generalization to emulate chart scale is accomplished primarily through reduction in the number of features included in the HCell, and in some cases generalizing area features to point objects. Some instances of reduction of area features to point objects is

entrusted to the RNC division, for example rocky seabed areas that will display as point features on the RNC. Where line and area objects are included in the HCell, complexity of the lines and edges comprising the features have been smoothed to commensurate with chart scale.

There were no DTONs reported from survey H11549.

There were two AWOIS items in the limits of H11549.

Six bottom samples were collected during H11549 and are included in the HCell.

The source of all features included in the H11549 HCell can be determined by the SORIND field.

### **6. S-57 Objects and Attributes**

The H11549\_CS HCell contains the following Objects:

\$CSYMB	Blue notes
M_QUAL	Data quality Meta object
M_CSCL	Compilation scale meta object
OBSTRN	Foul areas
PILPNT	To be updated or added to chart
SBDARE	Bottom samples.
SLCONS	GC Pier to be retained with new information
SOUNDG	Chart scale soundings
UWTROC	Rock features

The H11549\_SS HCell contains the following Objects:

SOUNDG	Soundings at the survey scale density
DEPCNT	NOAA rounded contours at chart scale intervals

All S-57 Feature Objects in the H11549\_CS HCell have been attributed as fully as possible based on information provided by the Hydrographer and in accordance with current guidance and the OCS HCell Specifications.

### **7. Blue Notes**

Notes to the RNC and ENC chart compilers are included in the HCell as \$CSYMB features. By agreement with MCD, the NINFOM field is populated with an abbreviated version of the Blue Note (30 characters or less), describing the chart disposition, to be used by MCD in generating their Chart History spreadsheet.

## **8. Spatial Framework**

### **8.1 Coordinate System**

All spatial map and base cell file deliverables are in an LLDG geographic coordinate system, with WGS84 horizontal, MHW vertical, and MLLW (1983-2001 NTDE) sounding datum.

### **8.2 Horizontal and Vertical Units**

DUNI, HUNI and PUNI are used to define units for depth, height and horizontal position in the chart units HCell, as shown below.

Chart Unit Base Cell Units:

Depth Units (DUNI):	Feet
Height Units (HUNI):	Feet
Positional Units (PUNI):	Meters

During creation of the HCell in CARIS BASE Editor and CARIS S-57 Composer, all soundings and features are maintained in metric units with as high precision as possible. Depth units for soundings measured with sonar maintain millimeter precision. Depths on rocks above MLLW and heights on islets above MHW are typically measured with range finder, and therefore have lower precision. Units and precision are shown below.

BASE Editor and S-57 Composer Units:

Sounding Units:	Meters rounded to the nearest millimeter
Spot Height Units:	Meters rounded to the nearest decimeter

Conversion to charting units and application of NOAA rounding is completed in the same step, at the end of the HCell compilation process.

Conversion to feet charting units with NOAA rounding ensures that in an ENC viewer feet display in whole feet. Soundings round to the deeper foot if the decimals of the foot are 0.75000 or greater.

## **9. Data Processing Notes**

### **9.1 Junctions**

H11549 junctions with surveys H10548 and H11550 have been made.

## **9.2 Conflicts between Shoreline and Hydrography**

There are instances of GC shoreline in conflict with hydrography. These were examined using the highest resolution Surfaces. Conflicts were given a blue note with a recommendation to adjust the GC shoreline using the new survey data.

## **10. QA/QC and ENC Validation Checks**

H11549 was subjected to QA checks in S-57 Composer prior to exporting to the HCell base cell (000) file. The millimeter precision metric S-57 HCell was converted to a chart units and NOAA rounding applied. dKart Inspector was then used to further check the data set for conformity with the S-58 ver. 2 standard (formerly Appendix B.1 Annex C of the S-57 standard). All tests were run and warnings and errors investigated and corrected unless they have been approved by MCD as inherent to and acceptable for HCells.

## **11. Products**

### **11.1 HSD, MCD and CGTP Deliverables**

- H11549 Base Cell File, Chart Units, Soundings compiled to 1:25,000
- H11549 Base Cell File, Chart Units, Soundings compiled to 1:10,000
- H11549 Descriptive Report including end notes compiled during office processing and certification, the HCell Report, and supplemental items
- H11549 Survey Outline to populate SURDEX

### **11.2 File Naming Conventions**

- Chart units base cell file, chart scale soundings H11549\_CS.000
- Chart units base cell file, survey scale soundings H11549\_SS.000
- Metric base cell file, survey scale features H11549\_Features.000
- Descriptive Report package H11549\_DR.pdf
- Survey outline H11549\_Outline.gml & \*xsd

### 11.3 Software

CARIS BASE Editor Ver. 2.3	Creation of soundings and bathy-derived features, creation of the depth area, meta area objects, and Blue Notes; Survey evaluation and verification; Initial HCell assembly.
CARIS S-57 Composer Ver. 2.1	Final compilation of the HCell, correct geometry and build topology, apply final attributes, export the HCell, and QA.
CARIS GIS 4.4a	Setting the sounding rounding variable for conversion of the metric HCell to NOAA charting units with NOAA rounding.
CARIS HOM Ver. 3.3	Perform conversion of the metric HCell to NOAA charting units with NOAA rounding.
HydroService AS, dKart Inspector Ver. 5.1	Validation of the base cell file.
Newport Systems, Inc., Fugawi View ENC Ver.1.0.0.3	Independent inspection of final HCells using a COTS viewer.

### 12. Contacts

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

Russ Davies, Cartographer, PHB, Seattle, WA; 206-526-6871; [Russ.Davies@noaa.gov](mailto:Russ.Davies@noaa.gov)



APPROVAL SHEET  
H11549

The survey evaluation and verification has been conducted according to branch processing procedures and the HCell compiled per the latest OCS HCell Specifications.

The survey and associated records have been inspected with regard to survey coverage, delineation of the depth curves, development of critical depths, S-57 classification and attribution of soundings and features, cartographic characterization, and verification or disproval of charted data within the survey limits. The survey records and digital data comply with OCS requirements except where noted in the Descriptive Report and are adequate to supersede prior surveys and nautical charts in the common area.

I have reviewed the HCell, accompanying data, and reports. This survey and accompanying digital data meet or exceed OCS requirements and standards for products in support of nautical charting except where noted in the Descriptive Report.