

H11550

NOAA FORM 76-35A

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

## DESCRIPTIVE REPORT

*Type of Survey* ..... Hydrographic Survey

*Field No.* ..... N/A

*Registry No.* ..... H11550

### LOCALITY

*State* ..... Washington

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

*Sublocality* ..... Sothern Portion of Colvos Passage

2008

### CHIEF OF PARTY

..... Commander Donald W. Haines, NOAA

### LIBRARY & ARCHIVES

DATE .....

## HYDROGRAPHIC TITLE SHEET

H11550

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.

n/a

State WashingtonGeneral Locality Colvos Passage and VicinitySublocality Southern Portion of Colvos PassageScale 1:10,000Date of Survey 4/10/2008-4/28/2008Instructions Dated 4/4/2008Project No. OPR-N395-RA-08Vessel RA1(1101), RA2(1103), RA3(1021), RA4(2801), RA5(2802), RA6(1015\_C3D), RA9(1905\_Ceeducer)Chief of Party Commander Donald W. Haines, NOAASurveyed by RAINIER PersonnelSoundings taken by echo sounder Reson SeaBat 8101, Knudsen 320M, Ceeducer, Reson SeaBat 7125Graphic record scaled by N/AGraphic record checked by N/AEvaluation by Annie Raymond Automated plot by N/AVerification by Tyanne FaulkesSoundings in Fathoms and Feet at MLLWREMARKS: Time in UTC. UTM Projection Zone 10

Revisions and annotations appearing as endnotes were  
generated during office processing.

As a result, page numbering may be interrupted or non-sequential

All separates are filed with the hydrographic data.

# Descriptive Report to Accompany Hydrographic Survey H11550

Project OPR-N395-RA-08  
Colvos Passage and Vicinity, Washington  
Southern Portion of Colvos Passage  
Scale 1:10,000  
April 2008  
**NOAA Ship RAINIER (s221)**  
Chief of Party: Commander Donald W. Haines, NOAA

## A. AREA SURVEYED

This hydrographic survey was completed as specified by Hydrographic Survey Letter Instructions OPR-N395-RA-08 dated February 22, 2008<sup>1</sup> and all other applicable direction<sup>1</sup>, with the exception of deviations noted in this report. Southern Colvos Passage is part of an alternate route for medium-sized vessels departing Tacoma. Gig Harbor at the south end of the Passage is a popular small boat harbor used for recreation and mooring of small commercial and recreational vessels. This area has been recommended as Emerging Critical Area based on volume of traffic, age of sounding, and seismic activity. This survey corresponds to sheet "C" in the sheet layout provided with the Letter Instructions (See Figure 1). OPR-N395-RA-08 responds to a request from Puget Sound Pilots Association to provide contemporary hydrography with full-bottom coverage in the area.

Complete multibeam echosounder (MBES) coverage was achieved in the survey area in waters 4 meters and deeper.<sup>2</sup> Total mileage acquired by each vessel and system is referenced in Table 1.

Limited Shoreline Verification was performed for the survey area.

---

<sup>1</sup> NOS Hydrographic Surveys Specifications and Deliverables (April 2008), OCS Field Procedures Manual for Hydrographic Surveying (March 2007), and all Hydrographic Surveys Technical Directives issued through November 2006.

Data Acquisition Type	Hull Number with Mileage (nm)					Total
	1101	1103	1021	2801	2802	
MBES (mainscheme)	31.4	-	42.7	90	65	229.1
Crosslines	0.4	-	17.7	1.1	1.1	20.3
Shoreline	-	1.3	-	-	-	1.3
Bottom Samples	-	-	-	-	-	0
Total Number of Items Investigated	-	-	-	-	-	26
Total Area Surveyed (sq. nm)	-	-	-	-	-	12.7

*Table 1: Statistics for survey H11550*

Data acquisition was conducted from April 10 to April 28, 2008 (DN 101 to 119).

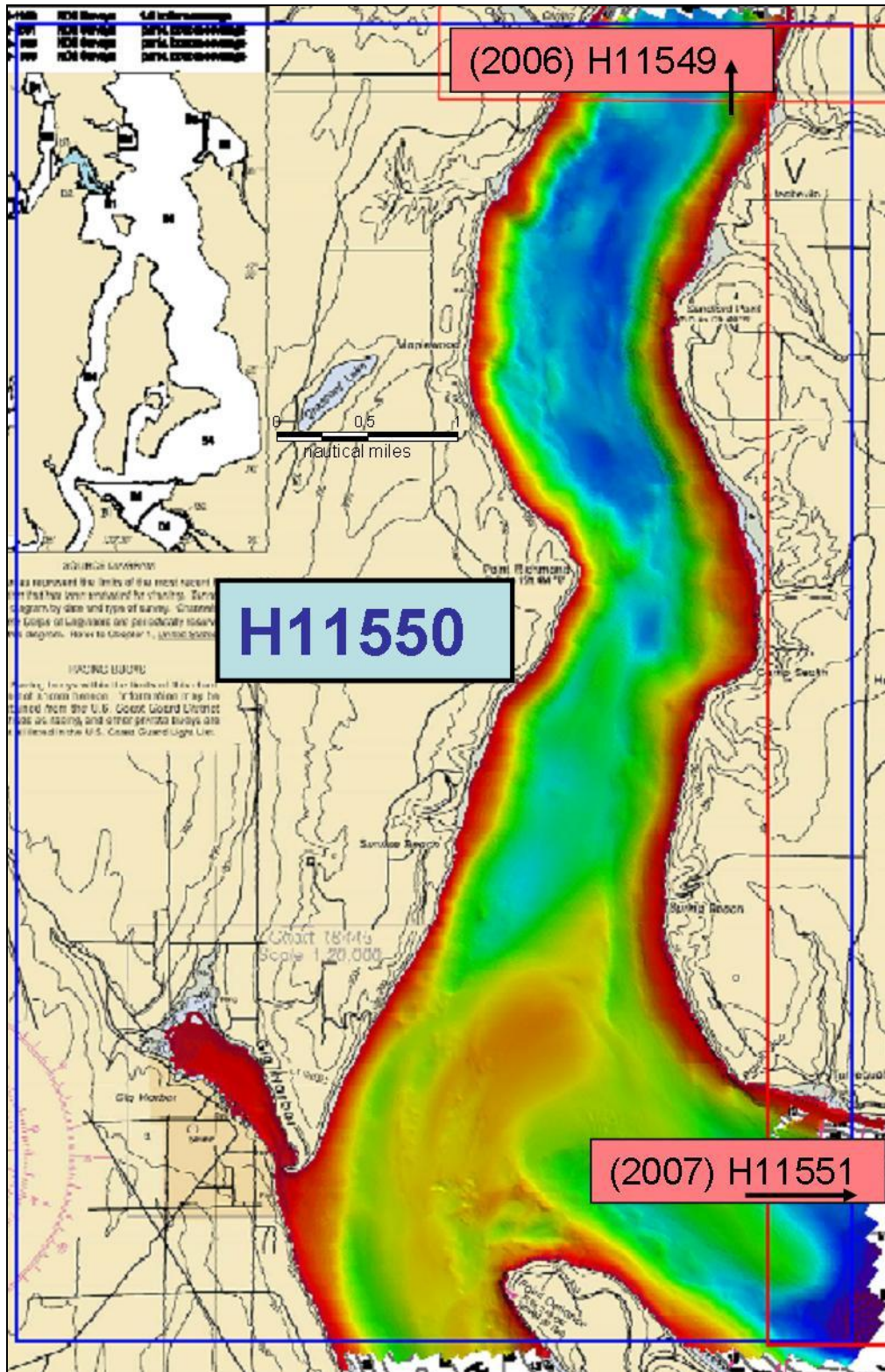


Figure 1: H11550 Survey Limits with 8m BASE surface overlaid on Chart 18474.

## 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-08 Data Acquisition and Processing Report (DAPR)*<sup>3</sup>, submitted under separate cover. Items specific to this survey, and any deviations from the DAPR are discussed in the following sections.

Final Approved Water Levels have been applied to this survey.<sup>4</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	Multibeam Echosounder
1103	RA-2	Vertical Beam Echosounder Detached Positions
1906	RA-9	Vertical Beam Echosounder Detached Positions
1021	RA-3	Multibeam Echosounder
2801	RA-4	Multibeam Echosounder
2802	RA-5	Multibeam Echosounder

*Table 2: Data Acquisition Vessels for H11550.*

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.<sup>5</sup>

### B2. Quality Control

#### Crosslines

Multi-Beam Echosounder (MBES) crosslines totaled 20.3 nautical miles, comprising 8.8% of mainscheme MBES hydrography. The mainscheme bathymetry was manually compared to the XL nadir beams in CARIS subset mode and agreed well with differences averaging less than 0.5 meter.<sup>6</sup>

A statistical Quality Control Report has been conducted on representative data acquired with each system used on this survey. Results of these tests are included in the updated 2008 RAINIER Hydrographic System Readiness Review<sup>7</sup> package submitted with this survey.

**Junctions**

The following contemporary surveys junctions with H11550 (See Figure 1):

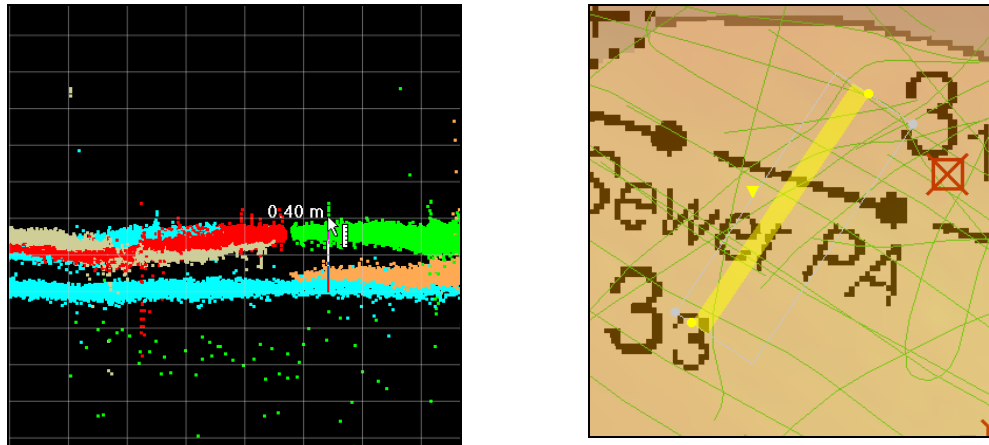
<u>Registry #</u>	<u>Scale</u>	<u>Date</u>	<u>Junction side</u>
H11549	1:10,000	2006	North
H11551	1:10,000	2007	Southeast

CARIS HDCS data for H11549 and H11551 were aboard RAINIER and used for junction comparison. HDCS data between H11550 and these two junction surveys were compared in CARIS subset editor. Agreement was excellent with no discernable offsets in the common area.<sup>8</sup>

**Data Quality Factors**

Gig Harbor

Survey data in Gig Harbor contains significant vertical offsets that appear to be tidal in nature. Differences ranged from 0.1 meters to 1 meter. The narrow entrance to this harbor and current velocity at the opening may contribute to a significant difference phase difference between Colvos Passage tides and Gig Harbor tides. The hydrographer recommends that a tide station be placed in Gig Harbor for future surveys.<sup>9</sup> An example of these offsets can be seen below in Figure 2.

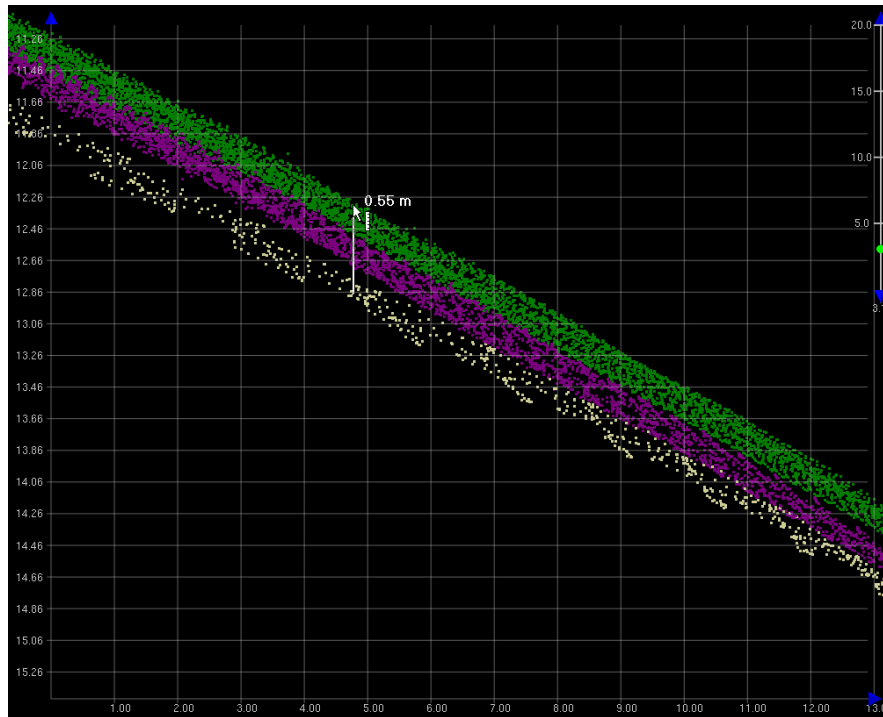


*Figure 2: Example of apparent tidal offsets within Gig Harbor. Overlaid on chart 18445\_2.*

Colvos Passage

Horizontal offsets were seen in the steep slopes along the edges of Colvos Passage. The offsets ranged from 0.1 meter to 0.6 meters in examined areas, and appeared to be an artifact

of horizontal positioning. The POS MV unit has a stated horizontal accuracy of 2 meters, and variations within this accuracy become apparent on a slope.<sup>10</sup> See Figure 3 below.



*Figure 3: Example of horizontal positioning offsets seen in sloping areas at the edges of Colvos Passage.*

#### Reson 7125 High Frequency Slope Noise

There was significant downslope noise seen in data from the Reson 7125 High Frequency system when surveying the steep areas of Colvos Passage. This noise was significantly cleaned to limit its affect on the BASE surface, but there are still some noticeable vertical ‘strings’ in the data and resultant bumps in the surface. The BASE surface does not deviate more than 0.6 meters from the prevailing data and is cartographically insignificant due to the steep slope in the area.<sup>11</sup> See Figure 4.

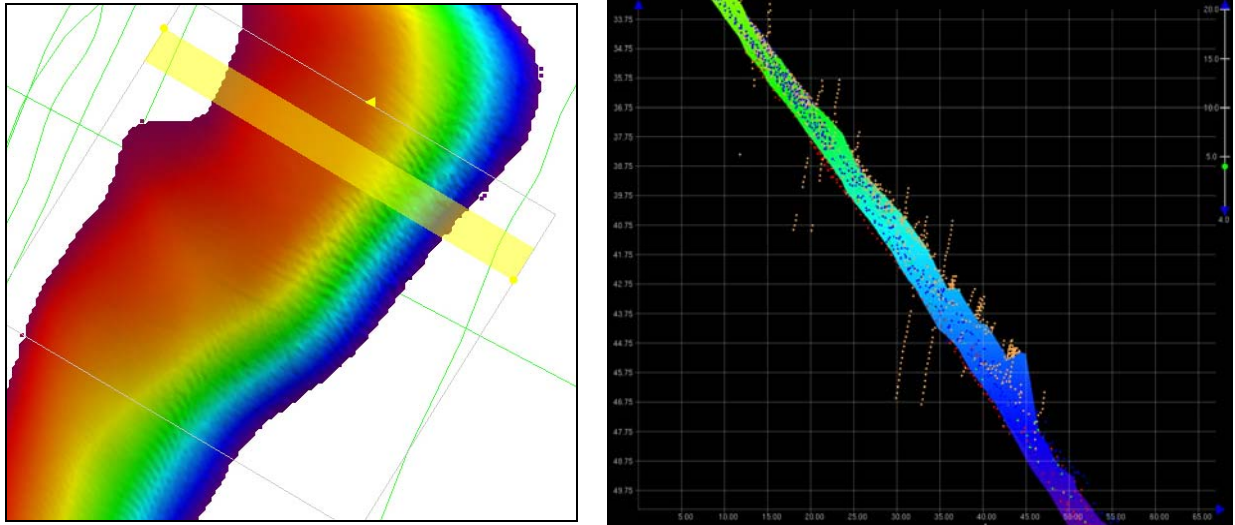


Figure 4: Surface and subset of 7125 high frequency downslope noise 'strings.'

### Reson 7125 Low Frequency Noise

There was significant noise seen in the data from the Reson 7125 Low Frequency system in all areas examined. This data was beam-filtered (beams 1-15 and 240-256 of a 256-beam system), swath edited, and subset cleaned to limit the noise effect on the BASE surface. Any remaining effects are less than 0.5 meters in deeper than 50 fathoms in all examined areas and are deemed navigationally insignificant by the Hydrographer.<sup>12</sup> See Figure 5.

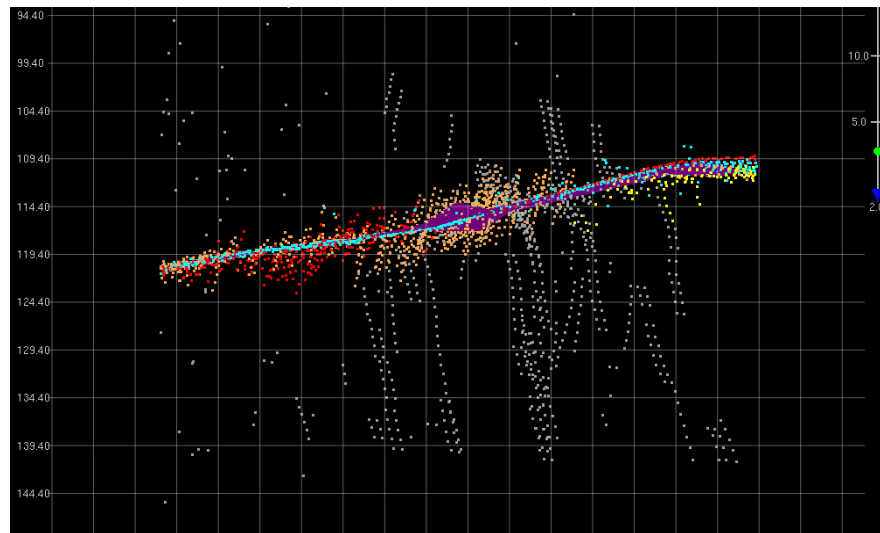


Figure 5: Low Frequency 7125 outer beam noise (rejected is turned on).

### **B3. Data Reduction**

Data reduction procedures for survey H11550 conform to those detailed in the *OPR-N395-RA-08 DAPR*.

Much of the MBES hydrography for this survey was run at high tide and/or with a tilted sonar head along the shore of Colvos Passage and Gig Harbor. This resulted in negative soundings and unnecessary MBES coverage of charted shoreline features. These data were processed as follows:

- Tide-corrected negative soundings were chopped by CARIS finalization methods.
- Charted shoreline features and new items that were DP'd with correlating but unintentional MBES coverage were rejected by the hydrographer and are only represented in Notebook and Pydro sessions as features (See Section D.2).
- Bathymetry was retained beneath shoreline features whenever possible (bathymetry beneath rejected charted pilings, etc).

If these soundings or features are needed, please see the original HDCS data.

Due to consistent noise in some of the deeper sonar data, beam filtering methods were used to enhance quality. This was only used for the deep sections of Colvos Passage to reject outer beam artifacts. This consisted of beam filtering for low-frequency Reson 7125 data to reject beams 1-15 and 240-256 (of 256 total beams) in deep areas where excessive noise effected the reference surface.

### **B4. Data Representation**

Many BASE surfaces were used in processing H11550. The submission Field Sheet and BASE Surface structure are shown in Figures 6 and 7.<sup>13</sup> Soundings and contours were generated in CARIS HIPS from the final combined BASE surface for field unit review purposes. They are included for reference only and are not intended as a deliverable.

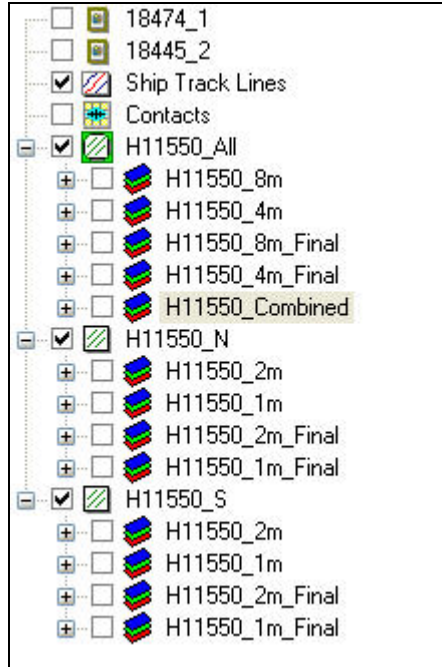


Figure 6: Field sheets and BASE surfaces submitted with H11550.



*Figure 7: Layout of field sheet and BASE surfaces for H11550.*

### C. VERTICAL AND HORIZONTAL CONTROL

Project OPR-N395-RA-08 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 3.

Location	Frequency	Operator	Distance	Priority
Robinson Point	323 kHz	USCG	6nm	Primary

*Table 3: Differential Corrector Source for H11550.*

#### 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, WA (944-6484) served as control for datum determination and as the primary source for water level reducers for survey H11550.

No tertiary gauges were required.

All data were reduced to MLLW using **final approved water levels** from stations at Seattle, WA (944-7130) and Tacoma, WA (944-6484) using the tide files 9446484\_Verified\_tru20080430.txt and 9447130\_verified\_thu20080430.txt, and **final** time and height correctors using the Tidal Constituent And Residual Interpolator (TCARI) corrector file N395RA2008-TCARI.tc.

The request for Final Approved Water Levels for H11550 was submitted to CO-OPS on May 1<sup>st</sup>, 2008 and the Final Tide Note was received on May 13<sup>th</sup>, 2008. This documentation is included in Appendix IV.<sup>15</sup>

## D. RESULTS AND RECOMMENDATIONS

### D.1. Chart Comparison

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

Survey H11550 was compared with the following charts:

Chart	Scale	Edition and Date	Local Notice to Mariners Applied Through
18474	1:40,000	8 <sup>th</sup> Ed, October 2003	03/08/2008
18445_2	1:20,000	32 <sup>nd</sup> Ed; August 2007	02/16/2008

*Table 4: Charts compared with H11550*

#### Chart 18474

Bathymetry within the main channel of southern Colvos Passage agreed within 2-fathoms of charted depths.<sup>16</sup> Colvos Passage is an area with many steep slopes and diverse bathymetry; differences between survey soundings and charted depths are attributed to increased horizontal positioning accuracy and increased coverage techniques. The Hydrographer recommends that survey soundings supersede all prior survey and charted depths in the common area.

#### Chart 18445\_2

Bathymetry within the main channel of southern Colvos Passage generally agreed within 1 fathom and never differed more than 2-fathoms from charted depths.<sup>17</sup> Bathymetry in Gig Harbor agreed within 0.5 fathom with the following exception of a shoaler sounding shown in Figure 8<sup>18</sup>:

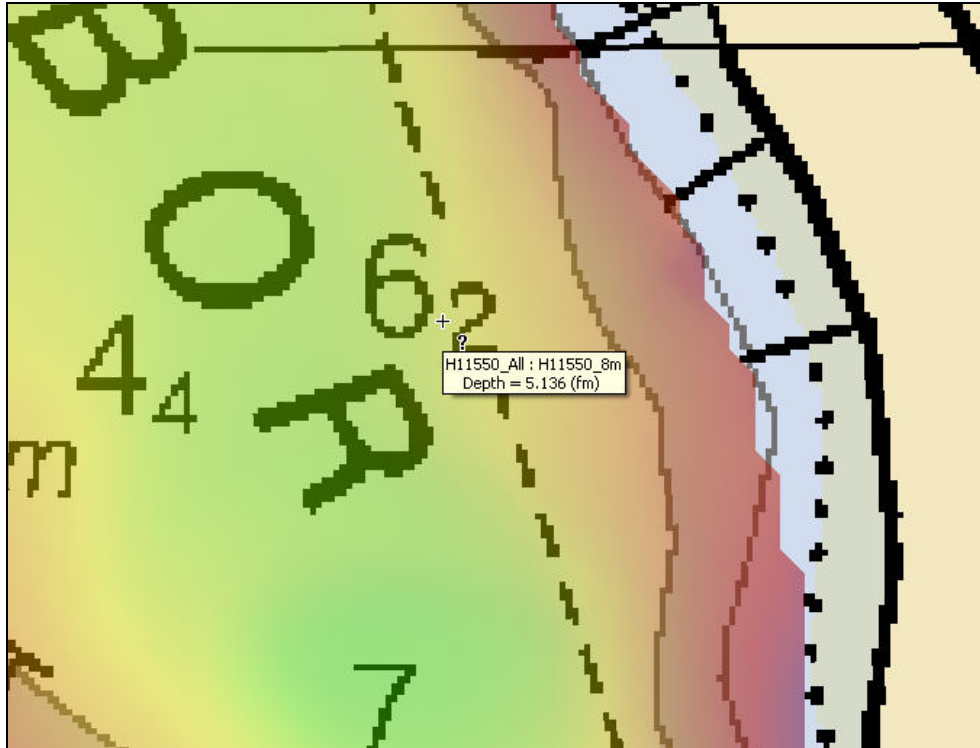


Figure 8: 5.1-fathom sounding over charted 6.3 fathom sounding (chart 18445\_2).

The Hydrographer recommends that survey soundings supersede all prior survey and charted depths in the common area.<sup>19</sup>

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

Two (2) Dangers to Navigation (DTONs) were found on survey H11550 and were reported separately to the Marine Chart Division via email. The first report was submitted April 15, 2008 under the report named “H11550\_DTONT\_Report” and the second was submitted May 8, 2008 under report named “H11550\_DTONT\_Report\_DN129.” The original DTONT submission packages are included in Appendix IV.<sup>20</sup> Descriptions of each DTONT are included in the Survey Feature Report in Appendix I.

#### **D.1.c. Other Features**

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

Three (3) AWOIS items fall the within the survey limits of H11550 and were assigned for full investigation. Descriptions of each AWOIS item investigation are included in the Survey Feature Report in Appendix II as well as Notebook session H11550\_NTBK.<sup>21</sup>

## Additional Items

There are multiple new wrecks and features associated with H11550. These additional features are described in the Survey Feature Report in Appendix II and can be viewed in the HIPS data and CARIS Notebook session (H11550\_NTBK).<sup>22</sup>

### **D.2. Additional Results**

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

Prior survey comparison was not performed.

#### **D.2.b. Shoreline Verification**

##### Shoreline Source

A composite source shoreline file "0\_1FME01.000" was provided by Hydrographic Survey Division (HSD). This composite source was printed on paper "boat sheets" and displayed in Hypack for field verification.

##### Shoreline Verification

Limited shoreline verification was conducted at the lowest available stage of tide in accordance with FPM Section 3.4.6.1.2.

Detached positions (DPs) were recorded in HYPACK and logged on DP forms, processed in Pydro, and then translated into CARIS Notebook. These DPs 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, and transferred to the "remarks" attribute on the corresponding features in Notebook.<sup>23</sup> DP forms are included in the Detached Positions subdirectory Separates I.<sup>24</sup>

All shoreline data is submitted in Caris Notebook .hob files. The session H11550\_NTBK contains the following:

<b>HOB File</b>	<b>Purpose and Contents</b>
H11550_Reference	Contains the survey sheet limits.
H11550_Original_Comp_Source	The original composite HOB contains the features from the Composite source clipped to the limits of the survey sheet. This file remains unaltered through delivery to the processing branch.
H11550_Field_Verified.hob	The Field verified layer contains the Original_Comp_Source HOB with survey updates. Features contained in the Field_Verified HOB include: (a) new features (b) modification due to: attribution, geometry, feature object class, or position (c) Features from multiple sources (i.e. deconfliction). (d) Features Not Addressed remain in the Field Verified layer. This includes features inshore of the NALL and features from multiple sources which cannot be deconflicted.
H11550_Disprovals.hob	Features from Composite Source that have been disproved are in this layer. These include: (a) Features that no longer exist (b) Features that have been modified

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

Source Shoreline Changes and New Features

Items for survey H11550 that require further discussion and are associated with a detached position, have been flagged “Report” in Pydro in H11550.pss. Investigation methods and recommendations are listed in the Remarks and Recommendation tabs. These features are included in the Survey Feature Report in Appendix I.<sup>25</sup> Some features were added outside of Pydro and can only be viewed in Notebook.

Recommendations

The Hydrographer recommends that the shoreline as depicted in the Notebook .HOB files supersede and complement shoreline information compiled in the Composite Source and charted as described above.

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

Detached positions were taken on each ATON for check purposes only and were found to be correctly charted and serve their intended purpose. No GPS static surveys were conducted for Survey H11550.<sup>26</sup>

### D.2.d. Overhead Features

There are no overhead features within the limits of survey H11550.<sup>27</sup>

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

Survey H11550 includes several charted cable and pipeline areas. Each area is discussed separately below.

- Gig Harbor Sewer Pipeline: The hydrographer recommends modifying the sewer pipeline area on charts 18474 and 18445\_2 to follow the path of the sewer seen in H11550 bathymetry and removing the charted “PA” associated with this item. A digitized pipeline was added by the hydrographer in the H11550 Notebook session (H11550\_NTBK) and was properly attributed as a new feature. See Figure 9 below.<sup>28</sup>

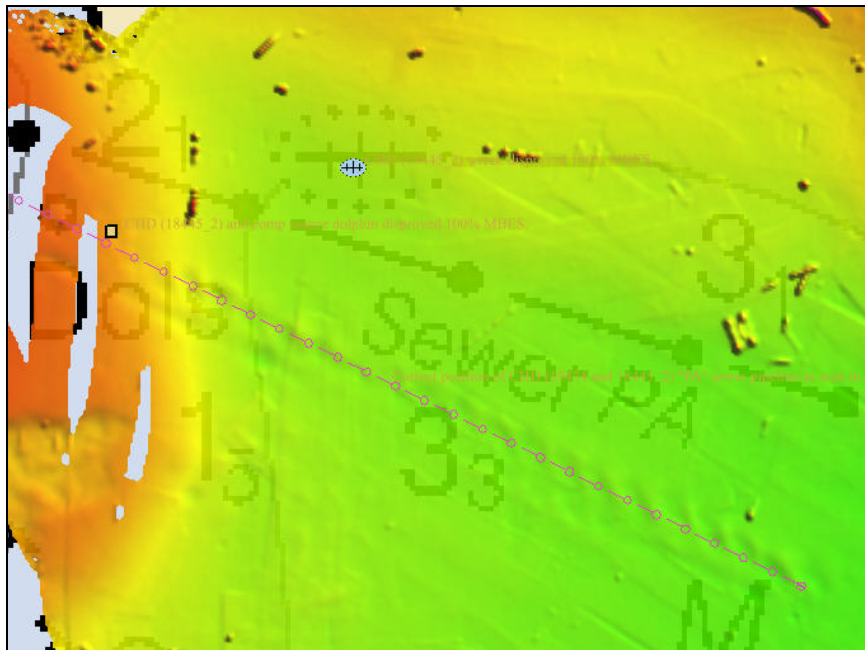


Figure 9: Sewer pipeline in 2-meter resolution bathymetry overlaid on Chart 18445\_2.



- Tahlequah: Partial coverage of cable area. Nothing seen in the bathymetry. The hydrographer recommends retaining charted cable area. See Figure 12 below.<sup>31</sup>

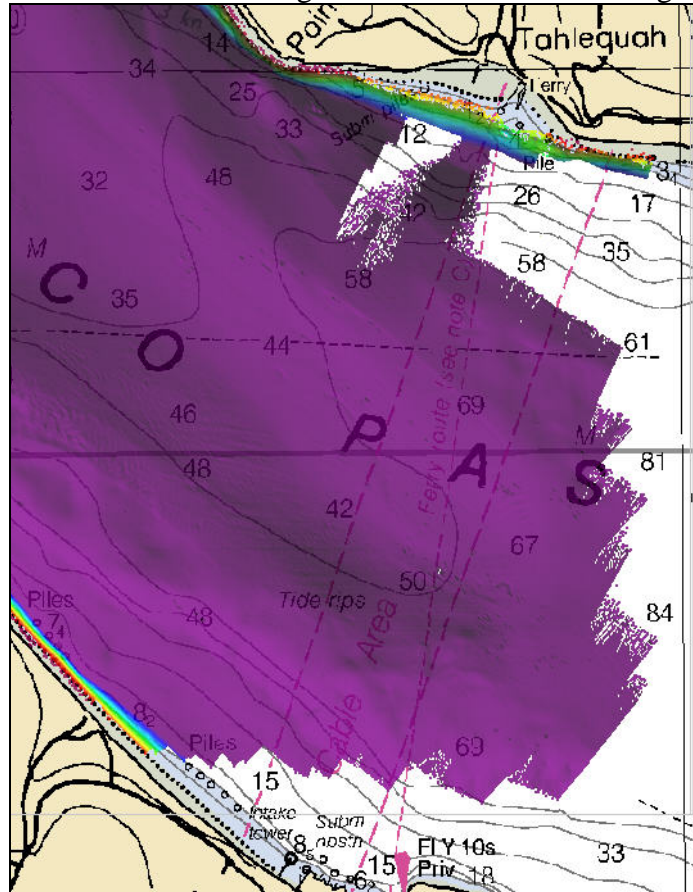


Figure 12: 2-meter resolution bathymetry over Tahlequah cable area on chart 18474.

#### D.2.f. Ferry Routes

The survey limits of H11550 includes one charted ferry route between Tahlequah and Point Defiance that was addressed in survey H11551 in 2007 and should be retained as charted.<sup>32</sup>

#### D.2.g. Bottom Samples

Bottom samples were not performed in survey H11550.<sup>33</sup>

#### D.2.h. Other Findings

There were no other findings within the limits of survey H11550.<sup>34</sup>

**E. APPROVAL**

As Chief of Party, Field operations for hydrographic survey H11550 were conducted under my direct supervision, with frequent personal checks of progress and adequacy. I have reviewed the attached survey data and reports. The survey data meets or exceeds requirements as set forth in the NOS Hydrographic Surveys and Specifications Deliverables Manual (April 2008 edition), Field Procedures Manual (March 2007 edition), Standing and Letter Instructions, and all HSD Technical Directives issued through May 2008. 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-08	May 23, 2008	N/CS34
Coast Pilot Report for OPR- N395-RA-08	TBD	N/CS26

Approved and Forwarded:



CDR/NOAA

Digitally signed by Donald W. Haines, CDR/NOAA  
 DN: cn=Donald W. Haines, CDR/NOAA, c=US, o=NOAA/NMAO/MOC-P, ou=NOAA Ship RAINIER, email=co.rainier@noaa.gov  
 Reason: I am approving this document  
 Date: 2008.05.21 15:43:03 -08'00'

Commander Donald W. Haines, NOAA  
 Commanding Officer

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

Survey Sheet Manager:



Digitally signed by Meghan McGovern  
 DN: cn=Meghan McGovern, c=US, o=NOAA, ou=NOAA Ship RAINIER, email=meghan.mcgovern@noaa.gov  
 Reason: I am the author of this document  
 Date: 2008.05.21 22:56:44 Z

Meghan E. McGovern  
 Lieutenant Junior Grade, NOAA

Chief Survey Technician:



I have reviewed this document  
 2008.05.21 22:58:38 Z

James B. Jacobson  
 Chief Survey Technician, NOAA Ship RAINIER

Field Operations Officer:



I have reviewed this document  
 2008.05.21 15:00:31 -08'00'

Lieutenant Charles J. Yoos III, NOAA  
 Field Operations Officer

- 
- <sup>1</sup> Project instructions were dated 4/4/2008.
- <sup>2</sup> Concur.
- <sup>3</sup> Filed with project records.
- <sup>4</sup> Concur.
- <sup>5</sup> Concur.
- <sup>6</sup> Concur.
- <sup>7</sup> Filed with project records.
- <sup>8</sup> Concur.
- <sup>9</sup> Concur.
- <sup>10</sup> Concur.
- <sup>11</sup> Concur.
- <sup>12</sup> Concur.
- <sup>13</sup> New fieldsheet and surfaces were created during office review. The 4-meter combined surface was used for compilation purposes.
- <sup>14</sup> Concur.
- <sup>15</sup> Report is appended to this document.
- <sup>16</sup> Concur.
- <sup>17</sup> Concur.
- <sup>18</sup> Concur.
- <sup>19</sup> Concur.
- <sup>20</sup> DTONs have been appended to this report. All DTONs submitted by the field and during office review have been updated on the charts. Chart as shown in HCell.
- <sup>21</sup> AWOIS report is appended to this document.
- <sup>22</sup> Items have been addressed as necessary in the HCell.
- <sup>23</sup> Concur.
- <sup>24</sup> Filed with hydrographic records.
- <sup>25</sup> The Survey Feature Report is filed with the hydrographic records. Note: The survey feature report does not include all features from H11550. Additional features were added, some removed and some modified in CARIS Notebook after the Feature Report was created in Pydro. All features included from H11550 have come directly from CARIS Notebook which is the official features deliverable for this survey. DTON report is appended to this document.
- <sup>26</sup> Use the latest ATONIS listing.
- <sup>27</sup> Concur.
- <sup>28</sup> Concur. Compiler used a \$LINES feature to identify the pipeline.
- <sup>29</sup> Concur.
- <sup>30</sup> Concur. Compiler used a \$AREAS feature to represent the new cable area.
- <sup>31</sup> Concur.
- <sup>32</sup> Concur.
- <sup>33</sup> Retain all bottom samples as charted.
- <sup>34</sup> Concur.

# H11550 Field DTONs AWOIS Report

**Registry Number:** H11550  
**State:** Washington  
**Locality:** Puget Sound  
**Sub-locality:** Southern Portion of Colvos Passage  
**Project Number:** OPR-N395-RA-08  
**Survey Dates:** 04/11/2008 - 04/28/2008

Two obstructions reported as DTONs and three disproved AWOIS items.

## Charts Affected

Number	Edition	Date	Scale (RNC)	RNC Correction(s)*
18445	31st	04/01/2006	1:80,000 (18445_8) 1:80,000 (18445_1) 1:20,000 (18445_2)	[L]NTM: ?
18474	8th	10/01/2003	1:40,000 (18474_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	Shoal	0.65 m	47° 21' 53.9" N	122° 32' 53.8" W	---
2.1	AWOIS	[no data]	[no data]	[no data]	---
2.2	AWOIS	[no data]	[no data]	[no data]	---
2.3	AWOIS	[no data]	[no data]	[no data]	---
3.1	Obstruction	-0.81 m	47° 24' 38.0" N	122° 31' 10.2" W	---
3.2	Obstruction	2.47 m	47° 20' 14.2" N	122° 35' 05.9" W	---

### **3 - Dangers to Navigation**

### 3.1) Profile/Beam - 3912/236 from h11550 / 1101\_reson8125\_hvf / 2008-102 / 008\_1637

## DANGER TO NAVIGATION

### Survey Summary

**Survey Position:** 47° 24' 38.0" N, 122° 31' 10.2" W  
**Least Depth:** -0.81 m (= -2.67 ft = -0.446 fm = 0 fm 3.33 ft)  
**TPU ( $\pm 1.96\sigma$ ):** THU (TPEh) [None] ; TVU (TPEv) [None]  
**Timestamp:** 2008-102.16:48:42.828 (04/11/2008)  
**Survey Line:** h11550 / 1101\_reson8125\_hvf / 2008-102 / 008\_1637  
**Profile/Beam:** 3912/236  
**Charts Affected:** 18474\_1, 18445\_1, 18445\_8, 18448\_1, 18440\_1, 18003\_1, 18007\_1, 501\_1, 530\_1, 50\_1

#### Remarks:

Designated sounding on new pile obstruction. DTON.

### Hydrographer Recommendations

DTON- Add obstruction to chart (18474).

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

0 ½fm (18448\_1, 18440\_1, 18003\_1, 18007\_1, 530\_1)

0fm 2ft (18474\_1, 18445\_1, 18445\_8)

-.8m (501\_1, 50\_1)

### Office Notes

Chart new obstruction.

### Feature Images

[Image file k:/projects/2008\_projects/opr-n395-ra-08/surveys/h11550\_c/pss/photos/1103\_102\_42b.jpg does not exist.]

[Image file K:/Projects/2008\_Projects/OPR-N395-RA-08/Surveys/H11550\_C/PSS/Photos/1103\_102\_42b.JPG does not exist.]

### 3.2) Profile/Beam - 1/1 from h11550 / dive / 2008-119 / dive#1

## DANGER TO NAVIGATION

### Survey Summary

**Survey Position:** 47° 20' 14.2" N, 122° 35' 05.9" W  
**Least Depth:** 2.47 m (= 8.12 ft = 1.353 fm = 1 fm 2.12 ft)  
**TPU ( $\pm 1.96\sigma$ ):** THU (TPEh) [None] ; TVU (TPEv) [None]  
**Timestamp:** 2008-119.22:10:40.000 (04/28/2008)  
**Survey Line:** h11550 / dive / 2008-119 / dive#1  
**Profile/Beam:** 1/1  
**Charts Affected:** 18445\_2, 18474\_1, 18445\_8, 18448\_1, 18440\_1, 18003\_1, 18007\_1, 501\_1, 530\_1, 50\_1

#### Remarks:

Obstruction found with MBES investigated by dive. LD 2.47 meters in CHD (18445\_2) 3 ftm

### Hydrographer Recommendations

DTON: Chart obstruction

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

1 ¼fm (18448\_1, 18440\_1, 18003\_1, 18007\_1, 530\_1)

1fm 2ft (18445\_2, 18474\_1, 18445\_8)

2.5m (501\_1, 50\_1)

### Office Notes

Chart new obstruction.

### Feature Images

[Image file K:/Projects/2008\_Projects/OPR-N395-RA-08/Surveys/H11550\_C/PSS/Photos/1\_1\_SC.png does not exist.]

[Image file K:/Projects/2008\_Projects/OPR-N395-RA-08/Surveys/H11550\_C/PSS/Photos/cage\_pss2.jpg does not exist.]

[Image file K:/Projects/2008\_Projects/OPR-N395-RA-08/Surveys/H11550\_C/PSS/Photos/cage\_pss1.jpg does not exist.]

# H11550 Office DTON

**Registry Number:** H11550  
**State:** Washington  
**Locality:** Puget Sound  
**Sub-locality:** Southern Portion of Colvos Passage  
**Project Number:** OPR-N395-RA-08  
**Survey Date:** 04/23/2008

Additional DTON reported during office review.

## Charts Affected

Number	Edition	Date	Scale (RNC)	RNC Correction(s)*
18445	32nd	08/01/2007	1:20,000 (18445_2)	USCG LNM: 04/07/1998 (06/03/2008) CHS NTM: None (05/30/2008) NGA NTM: None (06/07/2008)
18474	8th	10/01/2003	1:40,000 (18474_1)	USCG LNM: 04/29/2008 (06/03/2008) CHS NTM: None (05/30/2008) NGA NTM: 09/30/2006 (06/07/2008)
18445	31st	04/01/2006	1:80,000 (18445_8)	[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	Shoal	8.38 m	47° 19' 52.2" N	122° 34' 40.8" W	---

# **1 - Dangers to Navigation**

## 1.1) Profile/Beam - 2340/237 from h11550 / 2801\_reson7125\_hf\_512beams / 2008-114 / 321\_2022

### DANGER TO NAVIGATION

#### Survey Summary

**Survey Position:** 47° 19' 52.2" N, 122° 34' 40.8" W  
**Least Depth:** 8.38 m (= 27.51 ft = 4.585 fm = 4 fm 3.51 ft)  
**TPU ( $\pm 1.96\sigma$ ):** **THU (TPEh)**  $\pm 1.961$  m ; **TVU (TPEv)**  $\pm 0.248$  m  
**Timestamp:** 2008-114.20:25:06.590 (04/23/2008)  
**Survey Line:** h11550 / 2801\_reson7125\_hf\_512beams / 2008-114 / 321\_2022  
**Profile/Beam:** 2340/237  
**Charts Affected:** 18445\_2, 18474\_1, 18445\_8, 18448\_1, 18440\_1, 18003\_1, 18007\_1, 501\_1, 530\_1, 50\_1

#### Remarks:

Office noted DTON, shoalest sounding designated in CARIS from MBES data.

#### Feature Correlation

Address	Feature	Range	Azimuth	Status
h11550/2801_reson7125_hf_512beams/2008-114/321_2022	2340/237	0.00	000.0	Primary

#### Hydrographer Recommendations

Chart new shoal sounding

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

4 ½fm (18448\_1, 18440\_1, 18003\_1, 18007\_1, 530\_1)

4fm 3ft (18445\_2, 18474\_1, 18445\_8)

8.4m (501\_1, 50\_1)

#### S-57 Data

[None]

## Office Notes

Chart new shoal as sounding.

### Feature Images

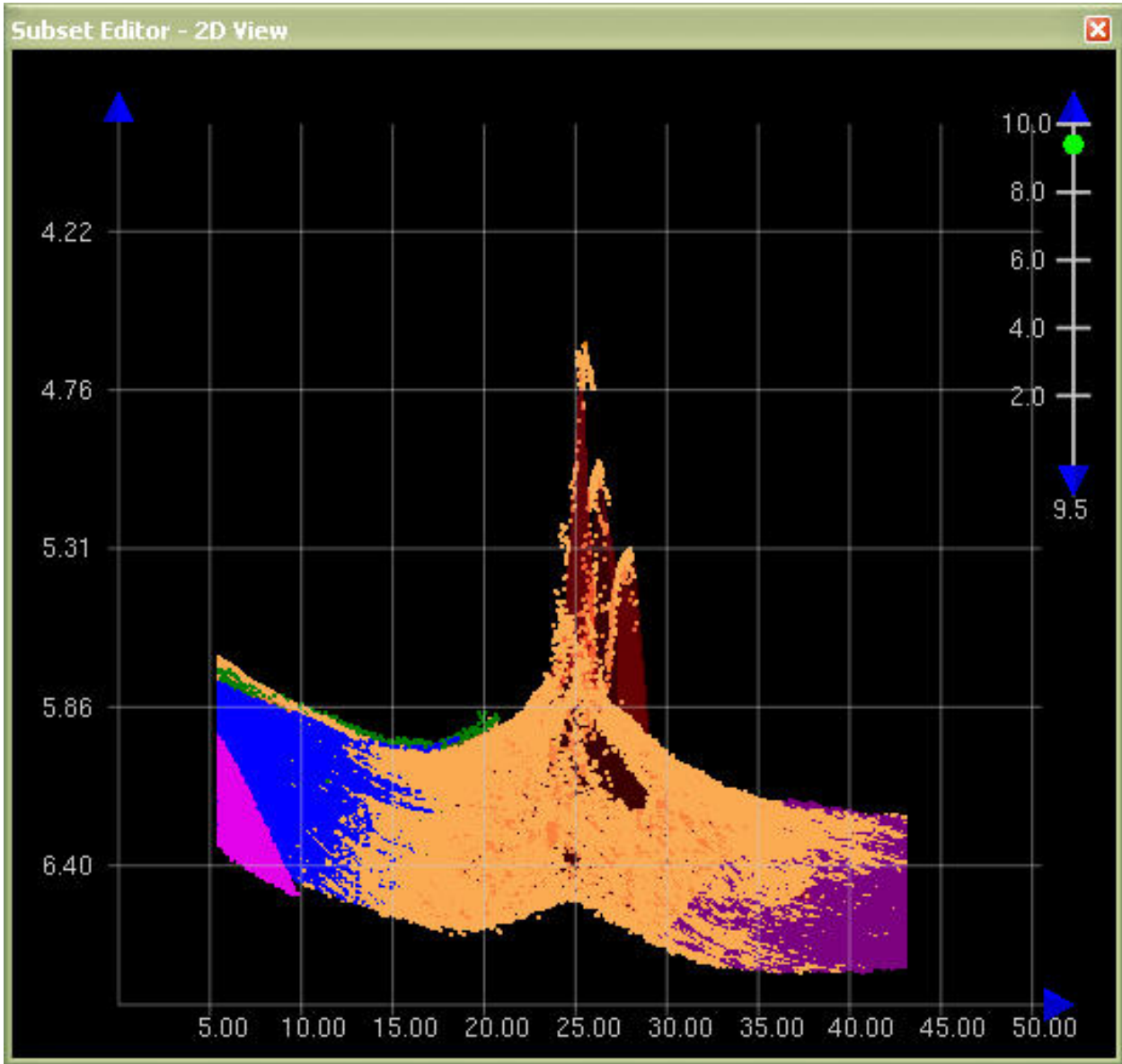


Figure 1.1.1

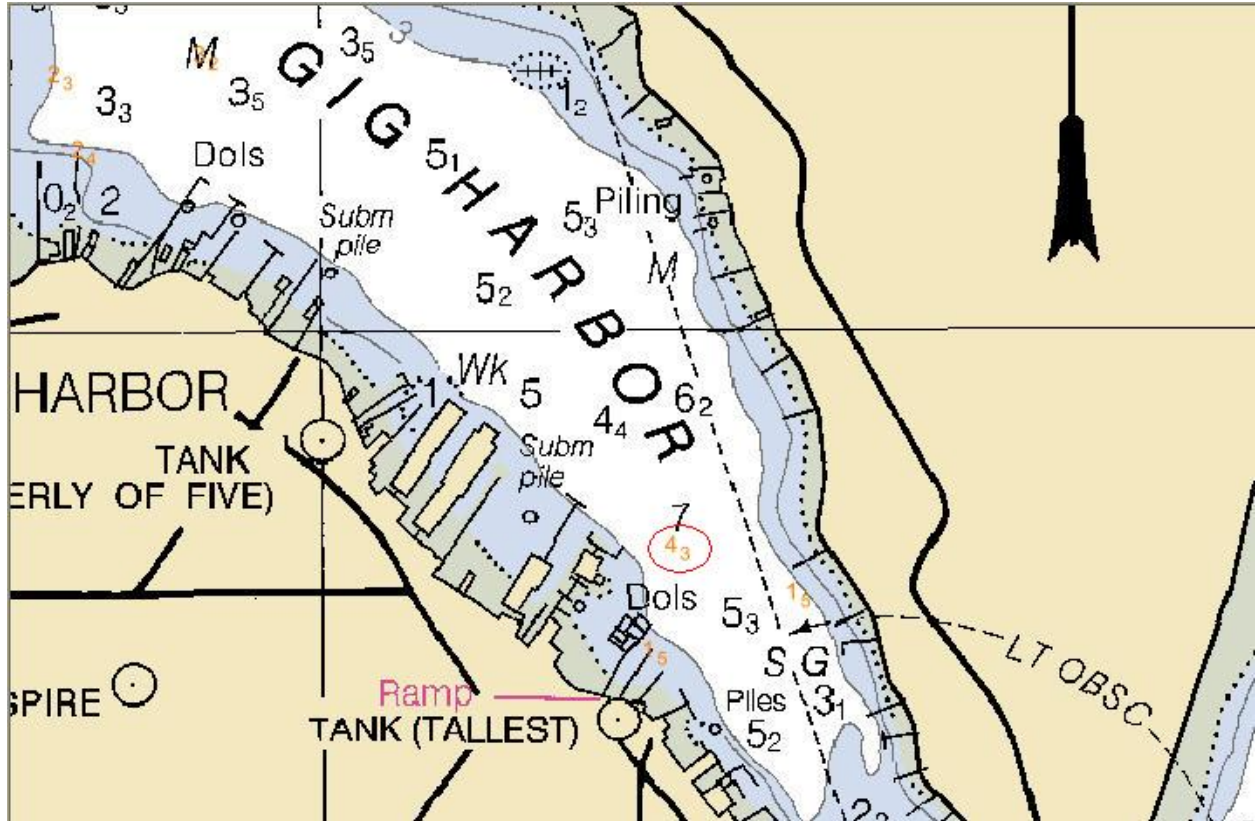


Figure 1.1.2

## **2 - AWOIS Features**

## 2.1) AWOIS #53299 - OBSTRUCTION

### No Primary Survey Feature for this AWOIS Item

**Search Position:** 47° 22' 04.2" N, 122° 31' 14.1" W  
**Historical Depth:** [None]  
**Search Radius:** 100  
**Search Technique:** S2, MB, VS  
**Technique Notes:** conduct search within the limits of hydrography

#### History Notes:

CL-2151/76; USPS REPORTS PILING AT POSITION 47/22.1N 122/31.2W (ENTERED 9/27/05, SME)

### Survey Summary

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

#### Remarks:

AWOIS item disproved with 100% MBES.

### Hydrographer Recommendations

Remove CHD (18474) pile.

### Office Notes

Remove charted pile

## 2.2) AWOIS #53300 - VIGILANT I

### No Primary Survey Feature for this AWOIS Item

**Search Position:** 47° 24' 09.3" N, 122° 31' 35.5" W  
**Historical Depth:** [None]  
**Search Radius:** 150  
**Search Technique:** S2, MB, SD  
**Technique Notes:** [None]

#### History Notes:

CL-331/71 -- OPR-412-FA; ON DAY OF INVESTIGATION WK WAS BEING SURFACED FOR REMOVAL, SUBSEQUENT CONTACT WITH SALVAGE GROUP REPORTED WK NOT YET REMOVED (ENTERED 9/27/05, 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 wreck disproved with 100% MBES coverage. New wreck located approximately 190 meters northeast of this location.

### Hydrographer Recommendations

Remove from chart (18474).

### Office Notes

Remove charted wreck.

## 2.3) AWOIS #53301 - OBSTRUCTION

### No Primary Survey Feature for this AWOIS Item

**Search Position:** 47° 24' 20.4" N, 122° 31' 23.7" W  
**Historical Depth:** [None]  
**Search Radius:** 100  
**Search Technique:** S2, MB, VS  
**Technique Notes:** INVESTIGATION NOT REQUIRED WITHIN 4M CURVE

#### History Notes:

CL-1580/81; USPS REPORTS SINGLE TALL PILE POSITION ESTIMATED AT 47/24.4N 122/31.5W  
(ENTERED 1/11/06, 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 piles disproved 100% MBES coverage

### Hydrographer Recommendations

Remove piles from chart (18474)

### Office Notes

Remove charted piles.



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

**TIDE NOTE FOR HYDROGRAPHIC SURVEY**

**DATE :** May 13, 2008

**HYDROGRAPHIC BRANCH:** Pacific Hydrographic Branch

**HYDROGRAPHIC PROJECT:** OPR-N395-RA-2008

**HYDROGRAPHIC SHEET:** H11550

**LOCALITY:** Southern Portion of Colvos Passage, WA

**TIME PERIOD:** April 10 - 28, 2008

**TIDE STATION USED:** Seattle, WA 944-7130

Lat. 47° 36.2' N Long. 122° 20.4' W

**PLANE OF REFERENCE (MEAN LOWER LOW WATER):** 0.000 meters

**HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE:** 3.199 meters

**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**

Please use the TCARI grid "N395RA2008-TCARI.tc" submitted with the project instructions as the final grid for project OPR-N395-RA-2008, H11550, during the time period between April 10 - 28, 2008.

**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).

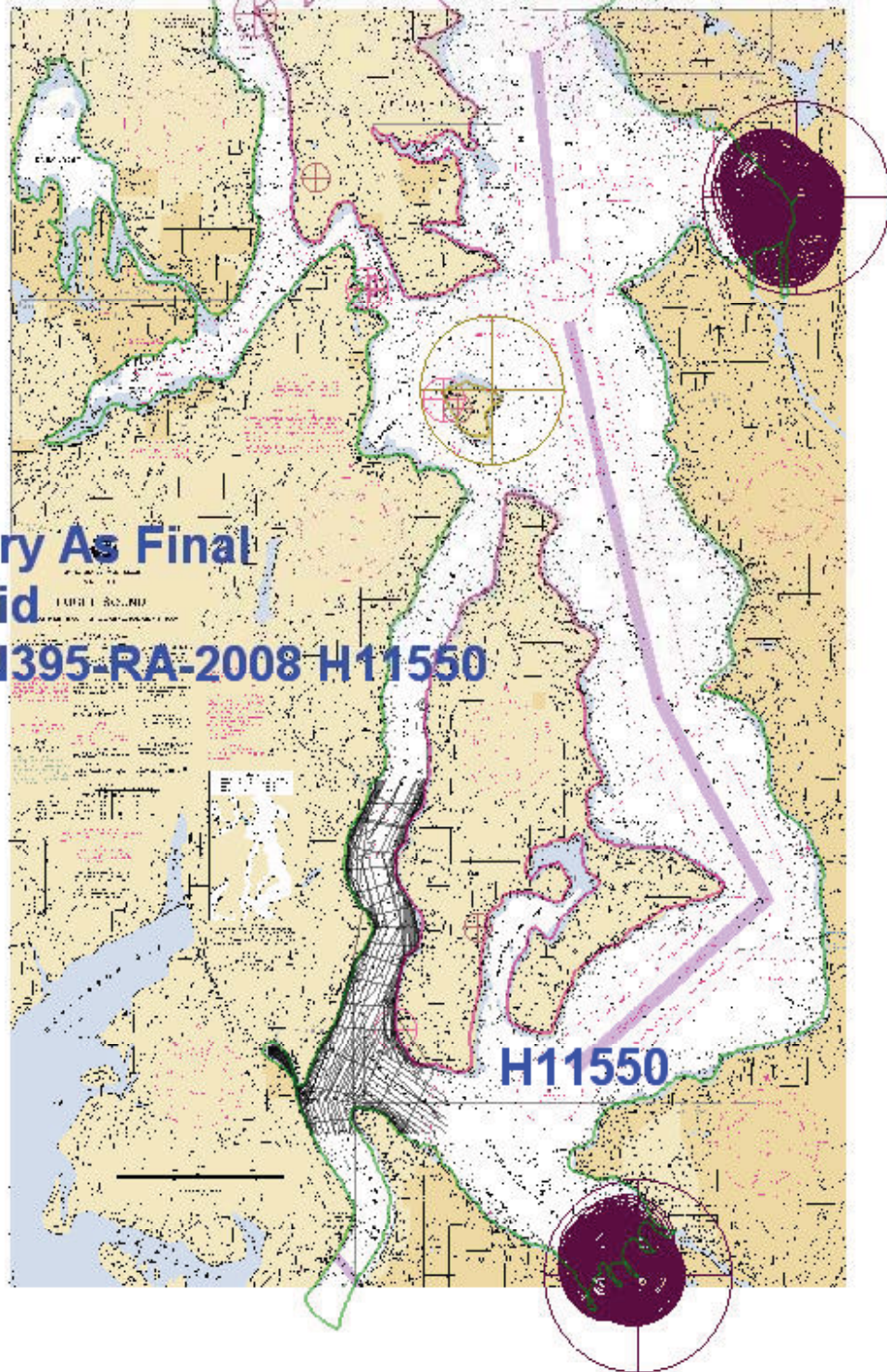
**Peter J.  
Stone**

Digitally signed by Peter J. Stone  
DN: cn=Peter J. Stone, o=CO-OPS,  
ou=NOAA/NOS, email=peter.  
stone@noaa.gov, c=US  
Date: 2008.05.14 14:23:05 -04'00'

CHIEF, PRODUCTS AND SERVICES DIVISION



**Preliminary As Final  
TCARI Grid  
for OPR-N395-RA-2008 H11550**



**H11550 HCell Report**  
Tyanne Faulkes, ERT Associate  
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's and RNC's in the region: NOAA RNC's, 18445 (1:20,000) and 18474 (1:40,000) compiled in place, and corresponding NOAA ENC's, US5WA18M and US5WA22M. (See section 4. Meta Areas.)

HCell compilation of survey H11550 utilized Office of Coast Survey HCell Specifications Version 3.1, with approved modifications to better align with PHB's HCell process and to meet MCD needs.

**1. Compilation Scale**

Depths and features for HCell H11550 were compiled to the largest scale chart in the region, 18445, 1:20,000, with additional scales compiled using the M\_CSCL meta area object. (See section 4. Meta Areas.)

**2. Soundings**

A survey-scale sounding (SOUNDG) feature object layer was built from the 4-meter Combined Surface in CARIS HIPS/SIPS. A shoal-biased selection was made at 1:7,000 and 1:15,000 survey scale using a Radius Table file with values shown in the table, below. The resultant sounding layer contains 17,758 depths ranging from 0 to 155.477 meters.

Shoal Limit (m)	Deep Limit (m)	Radius (mm)
-4.7	10	3
10	20	4
20	50	4.5
50	200	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**

The extents of the highest resolution BASE Surface together with the extents of the soundings layer were used to digitize the hydrographic extents, which were then used to create the single, all encompassing depth area (DEPARE). This extent was then modified as needed to accommodate nearshore area features.

### 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 metric and fathom equivalent contour values are shown in the table below.

Chart Contour Intervals in Fathoms	Metric Equivalent to Chart Fathoms, Arithmetically Rounded	Metric Equivalent of Chart Fathoms, with NOAA Rounding Applied	Fathoms with NOAA Rounding Applied
0	0	0.2286	0.229
1	1.8288	2.0574	2.057
3	5.4864	5.715	5.715
10	18.288	18.5166	18.517
20	36.576	37.9476	37.948
30	54.864	56.2356	36.236
40	73.152	74.5236	74.524
50	91.44	92.8116	92.812

With the exception of the zero contours included in the \*\_CS file, contours 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 may result in conflicts between the \*\_SS file contours and HCell features at or near the survey limits. Conflicts with M\_QUAL, DEPARE, COALNE and SBDARE objects, and with DEPCNT objects representing MLLW, should be expected. HCell features should be honored over \*\_SS.000 file contours in all cases where conflicts are found.

Some modifications made to GC shoreline MLLW contours, to bring the GC shoreline into agreement with H11550 hydrography, necessitated inclusion of several “0” DEPCNT features in the HCell. These 0 value contours have been generalized per the chart above. See 9.2 *Conflicts between Shoreline and Hydrography*.

### 4. Meta Areas

The following Meta object areas are included in HCell H11550:

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

#### 5.1 Generalization of Features to Chart Scale

Features addressed by the field units are delivered to PHB where they are deconflicted against the hydrography and the largest scale chart. These features, as well as features to be retained from the chart and features digitized from the Base surface are included in the HCell. The geometry of these features is modified to emulate chart scale.

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.

## 5.2 Compilation of Features to the HCell

Shoreline features for H11550 were delivered from the field in nine different hob files defining new features, modification to GC or charted features, and disprovals. These were deconflicted against GC shoreline, the chart and hydrography during office processing.

The source of all features included in the H11550 HCell can be determined by the SORIND field.

## 5.2 Mean High Water Used for HCells

For the purposes of determining the height at which a rock becomes an islet, the CO-OPS “*Tide Note for Hydrographic Survey*”, “*Height of High Water Above the Plane of Reference*” is used.

For the purpose of compilation of intertidal depth areas, a MHW (-h) value is used for defining the DRVAL1 (Depth Range Value) attribute field for the DEPARE component of the feature, where DRVAL2 is always 0.0. The MHW value from US5WA18M was used for H11550.

## 6.S-57 Objects and Attributes

The \*\_CS HCell contains the following Objects:

\$AREAS	Delineates new extents of cable area
\$CSYMB	Blue Notes
\$LINES	Delineates new position of sewer pipeline
BOYSSP	Buoy
DEPARE	The all-encompassing depth area
DEPCNT	Zero contour
FLODOC	Floating dock
MORFAC	Dock
M_CSCL	Compilation scale meta area to define an inset, and for
M_QUAL	Data quality Meta object
OBSTRN	Obstruction area and point objects
PILPNT	Pilings
PONTON	Floating dock
SBDARE	Bottom samples
SLCONS	Shoreline construction
SOUNDG	Soundings at the chart scale density
UWTROC	Rock features
WATTUR	Tide rips
WRECKS	A wreck area

The \*\_SS HCell contains the following Objects:

DEPCNT	Generalized contours at chart scale intervals
SOUNDG	Soundings at the survey scale density

All S-57 Feature Objects in the \*\_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 with the Blue Note information located in the NINFOM field.

## 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 datums.

### 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):	Fathoms and 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, so precision is less. 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 fathoms and feet charting units with NOAA rounding ensures that:

- All depths deeper or equal to 11 fathoms display as whole fathoms.
- All depth units between 0 fathoms (MLLW) and 11 fathoms display as fathoms and whole feet.

- All depth units above 0 fathoms (MLLW) to 2.0 feet above MHW display in feet for values that round to 5 feet or less, and in fathoms and feet above that. (This is a deviation from the traditional 'fathoms and feet' charting rule that requires that all depths above MLLW will be shown in feet. The display in fathoms and feet for depths between MLLW and 2 feet above MHW accommodates S-57 rules that require the same charting units to be used for all depth units (DUNI) in an ENC.)
- All height units (HUNI) which have been converted to charting units, and that are 2.00 feet above MHW and greater, are shown in feet.

In an ENC viewer fathoms and feet depth units (DUNI) display in the format X.YZZZ, where X is fathoms, Y is feet, and ZZZ is decimals of the foot. In an ENC viewer, heights (HUNI) display as whole feet.

## 9. Data Processing Notes

### 9.1 Junction with H11508

H11550 junctions with H11549 and H11551, submitted in April 2007 and December 2007 respectfully. These surveys have not been compiled so junctions were not performed.

## 10. QA/QC and ENC Validation Checks

H11550 was subjected to QA checks in S-57 Composer prior to exporting to the metric HCell base cell (000) file. The millimeter precision metric S-57 HCell was converted to 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 are MCD approved as inherent to and acceptable for HCells.

## 11. Products

### 11.1 HSD, MCD and CGTP Deliverables

H11550_CS.000	Base Cell File, Chart Units, Soundings and features compiled to 1:20,000
H11550_SS.000	Base Cell File, Chart Units, Soundings and Contours compiled to 1:7,000 and 1:15,000
H11550_DR.pdf	Descriptive Report including end notes compiled during office processing and certification, the HCell Report, and supplemental items
H11550_outline.gml	Survey outline to populate SURDEX

### 11.3 Software

CARIS HIPS Ver. 6.1	Inspection of Combined BASE Surfaces
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:

Tyanne Faulkes, ERT Associate  
Pacific Hydrographic Branch  
Seattle, WA  
206.526.6883  
Tyanne.Faulkes@noaa.gov

APPROVAL SHEET  
H11550

Initial Approvals:

The survey evaluation and verification has been conducted according to branch processing procedures and the H-Cell compiled per the latest OCS H-Cell 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 H-Cell, 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.