H11826

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.

Registry No. H11826

LOCALITY

State Washington

General Locality Colvos Passage and Vicinity

Sublocality Three Tree Point to Robinson Point

2008

CHIEF OF PARTY

Commander D. W. Haines, NOAA

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DATE

NOAA FORM 77-28 (11-72)

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

REGISTRY No

HYDROGRAPHIC TITLE SHEET

H11826

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 Washington

General Locality Colvos Passage and Vicinity

Sub-Locality Three Tree Point to Robinson Point

Scale 1:10,000 **Date of Survey** April 15 - April 30, 2008

Instructions dated 4/4/2008 **Project No.** OPR-N395-RA-08

Vessel RA1 (1101), RA3 (1021), RA4 (2801), RA5 (2802)

Chief of party CDR D.W. Hainies, NOAA

Surveyed by RAINIER Personnel

Soundings by echo sounder, hand lead, pole Reson SeaBat 8101, 7125 and Knudsen 320M

Graphic record scaled by N/A

Graphic record checked by N/A **Automated Plot** N/A

SAR by Annie Raymond **Compilation by** R. Davies

Soundings in Fathoms at MLLW

REMARKS: All times are UTC. UTM Projection zone # 10

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. Page numbering may be interrupted or non sequential.

NOAA FORM 77-28 SUPERSEDES FORM C&GS-537

Descriptive Report to Accompany Hydrographic Survey H11826

Project OPR-N395-RA-08
Colvos Passage and Vicinity, WA
Three Tree Point to Robinson Point
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 April 4, 2008 and all other applicable direction[1], with the exception of deviations noted in this report. The survey area is in the sublocality of Three Tree Point to Robinson Point within Puget Sound in the state of Washington. This survey corresponds to sheet "F" in the sheet layout provided with the Letter Instructions. OPR-N395-RA-08 responds to a request from the NOAA navigation manager based upon the volume of traffic, age of sounding data and seismic activity.

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

Limited Shoreline Verification was performed for the survey area.

Data Acquisition Type	Hull Number with Mileage (nm)				Total
	1101	1021	2801	2802	
MBES (mainscheme)	21.51	6.23	110.98	43.09	181.81
Crosslines	-	-	-	21.12	21.12
Developments	-	2.85	-	-	2.85
Shoreline	-	9.56	-	-	9.56
Bottom Samples	-	-	6	-	6
Total Number of Items Investigated	-	8	-	-	8
Total Area Surveyed (sq. nm)	-	-	-	-	13.37

Table 1: Statistics for survey H11826

Data acquisition was conducted from April 15 to April 30, 2008 (DN 106 to 121).

[1] Standing Instructions for Hydrographic Surveys (March 2004), NOS Hydrographic Surveys Specifications and Deliverables (May 2008), OCS Field Procedures Manual for Hydrographic Surveying (May 2008), and all Hydrographic Surveys Technical Directives issued through the dates of data acquisition.

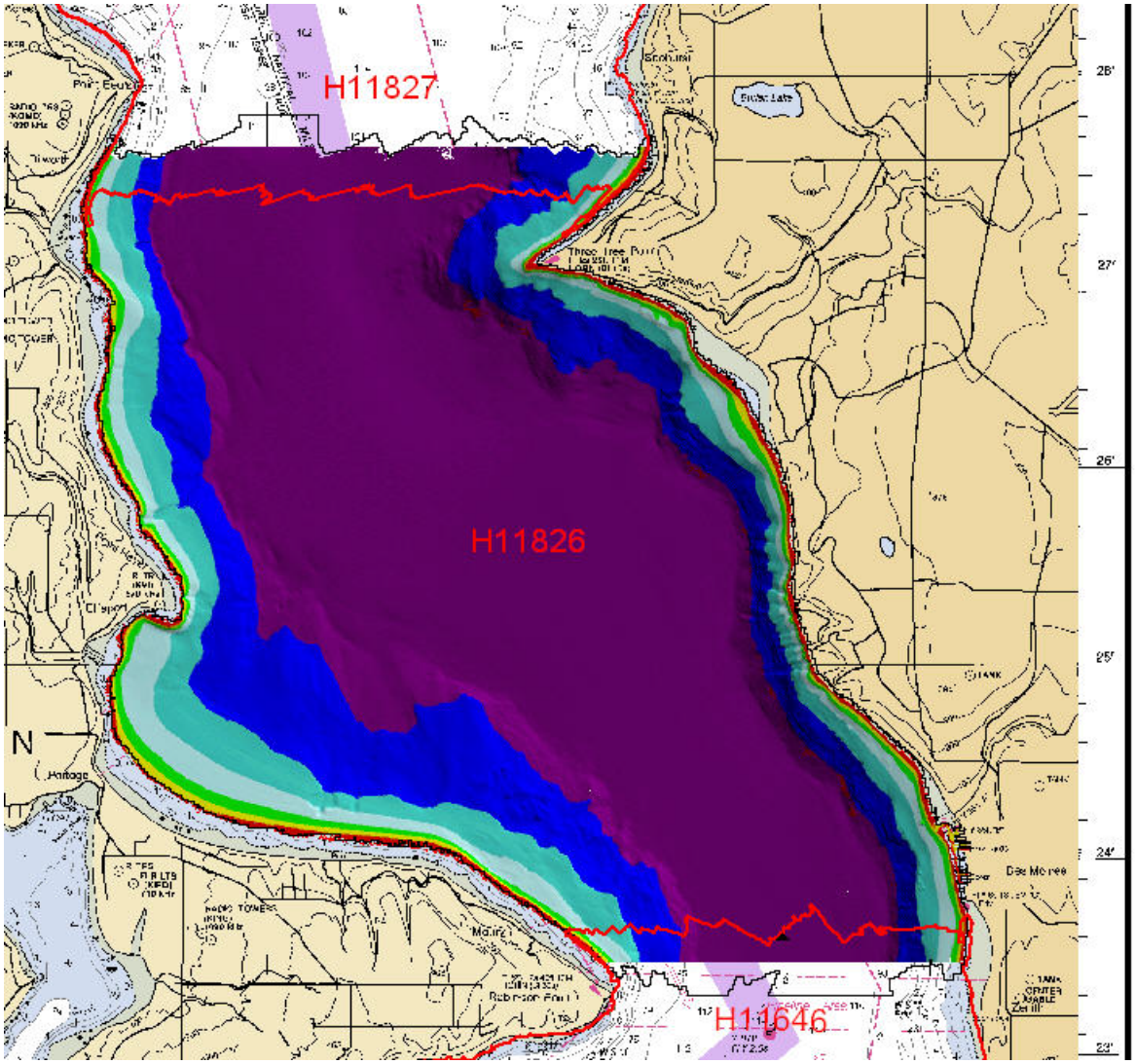


Figure 1: H11826 Survey Limits (Chart 18474).

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), submitted under separate cover.[1] 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. 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
1021	RA-3	Multibeam Echosounder Detached Positions
2801	RA-4	Multibeam Echosounder Bottom Samples
2802	RA-5	Multibeam Echosounder

Table 2: Data Acquisition Vessels for H11826.

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

No unusual vessel configurations were used for data acquisition.

B2. Quality Control

Crosslines

Multibeam echosounder (MBES) crosslines totaled 21.12 nautical miles, comprising 11.62% of main scheme MBES hydrography. The mainscheme bathymetry was manually compared to the XL nadir beams in CARIS subset mode and agreed well with differences less than 0.5m on both the slopes and flat areas. [2]

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 package submitted with this survey.

Junctions

The following contemporary surveys junction with H11826 (See Figure 1):

Registry #	Scale	Date	Junction side
H11827	1:10,000	2008	North
H11646	1:10,000	2008	South

Surveys H11827 and 11646 were completed concurrently with survey H11826 during project OPR-N395-RA-08. Survey data was compared in CARIS subset mode and agreed well with no discernable differences in the common area. See Figures 2 and 3. [3]

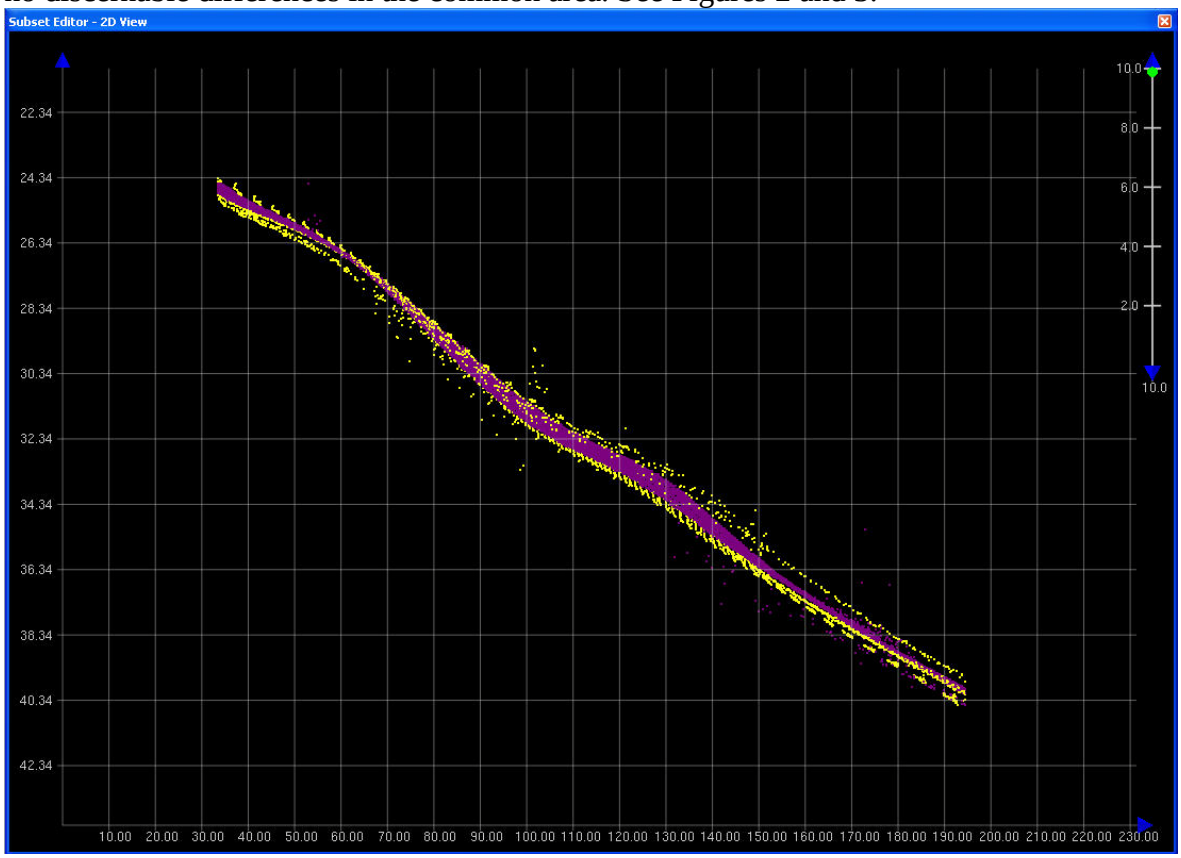


Figure 2: Junction comparison with 11827 as viewed in CARIS subset editor. Lines are colored by survey.

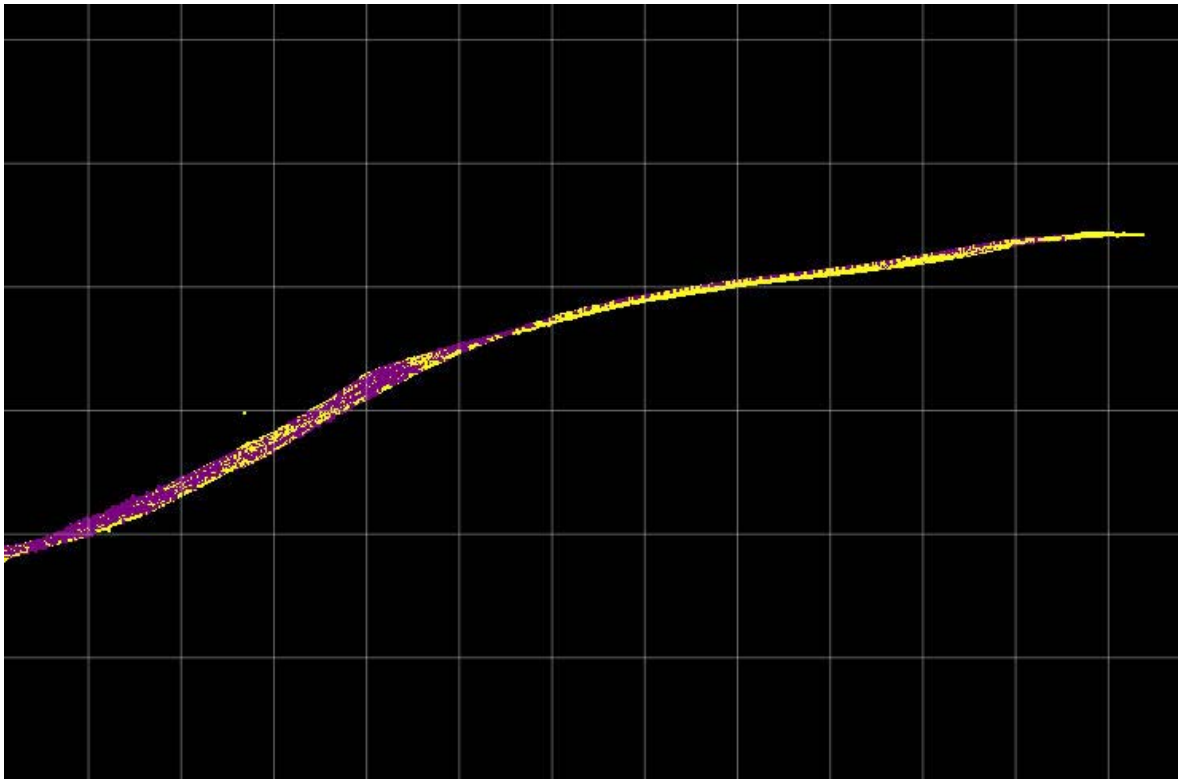


Figure 3: Junction comparison with 11646 as viewed in CARIS subset editor. Lines are colored by survey.

Data Quality Factors

Inshore Holidays

There are small holidays between the 4m and 8m curves, most notably at the South end of Tramp Harbor. These holidays are areas where there is a lack of complete MBES coverage, but the coverage exceeds the requirement for 25m spaced VBES coverage. Additionally, the 1 meter surfaces in which these inshore holidays are most often seen were computed using a "shallow" CUBE parameter, which greatly reduces the capture distance for soundings used in surface creation, resulting in areas that are sparse in coverage. There were no indications of features in these areas and the Hydrographer recommends that acquired data be used to supersede charted depths. [4] The largest holiday can be seen in Figure 4.

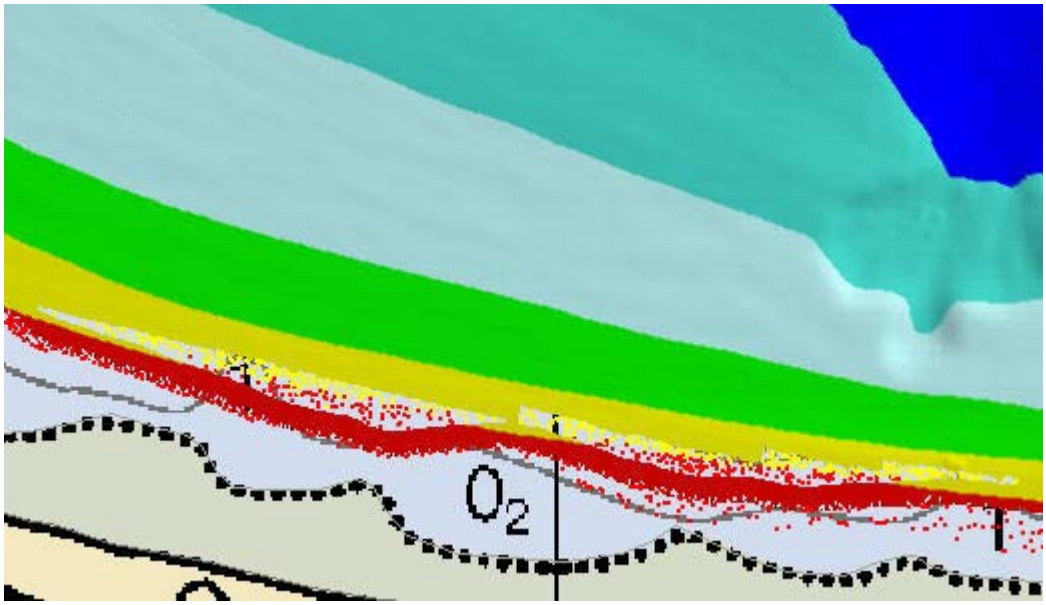


Figure 4: Holiday at the South end of Tramp Harbor on chart 18474. The red represents 4m or shoaler, and the yellow region is 4m-8m.

Tilted Multibeam

Vessel 1101 (RA-1) was fitted with a RESON 8125 tilted 30 degrees to starboard (see DAPR for additional information). This was used to acquire complete multibeam coverage to the 4m curve and often beyond while staying out in deeper water. The nature of the head tilt and the extended lengths the sonar is seeing inshore led to and increased number of sound speed artifacts. The 60 degree swath of the 8125, when tilted at 30 degrees, lead to the outer beams pointing at 30 degrees to port and 90 degrees to starboard. The horizontal beams would sometimes get lost with no return, and a large block of noise was common at the edge of the 8125 lines. Figure 5 shows both this block of noise and the sound velocity issue mentioned above. When possible, affected areas were rejected to more accurately represent the seafloor. This was the first project using the tilted sonar mount and RAINIER personnel are still learning the most effective techniques for acquiring and processing the data. RAINIER has moved on to taking increased sound speed casts and running at reduced speed to increase data density when running inshore buffer lines. The following section addresses the unexpectedly high TPE values associated with the tilted 8125 data.

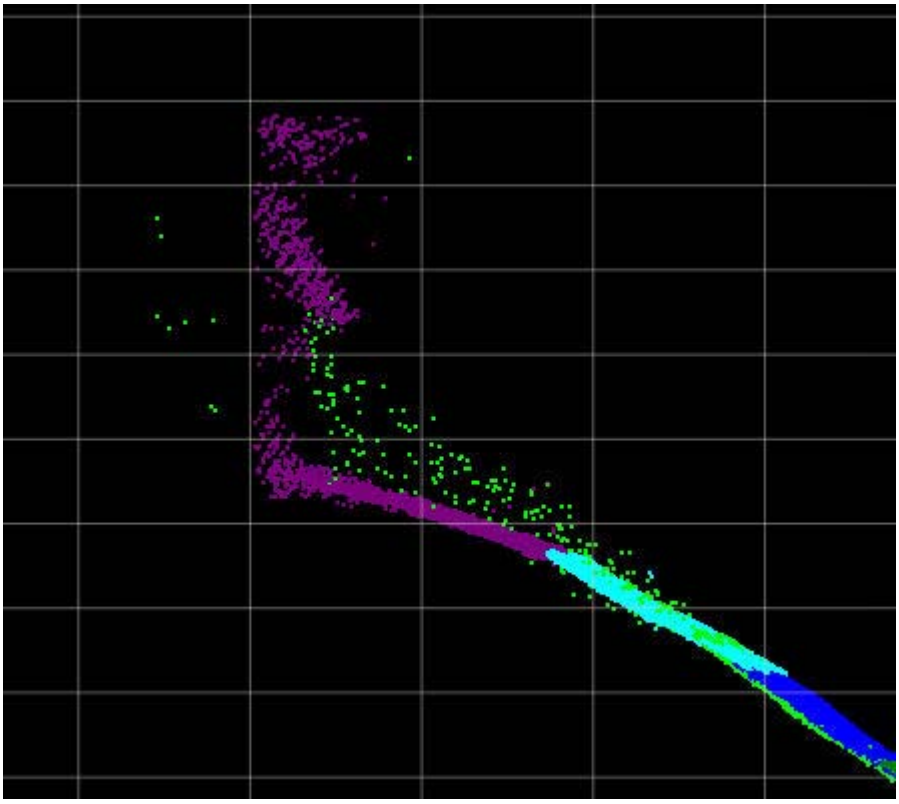


Figure 5: Example of sound speed error and outer beam noise seen in tilted 8125 data.

High Caris TPE Values from Tilted 8125 data

The outer beams on the starboard side of the tilted Reson 8125 swath have extremely high Total Propagated Error (TPE) values when calculated by Caris HIPS. Especially in beams 235-240, the TPE values have been observed to be from 2 to 10 m, typically in less than 8 m of water depth. Although the TPE is expected to be higher due to a more oblique angle and beam spreading, the TPE values as calculated by Caris far exceed the Hydrographer's expectations. Figure 6 shows an uncertainty model calculated by Dr. Brian Calder from UNH for a tilted Reson 8125 system at a variety of seafloor slopes. In RAINIER's standard use of the system, the slope is rarely less than 10 degrees; the figure demonstrates that the TPE values should not be nearly as high as are currently being reported. The Hydrographer feels that these high TPE values are due to Caris' model of TPE calculation and do not reflect the actual quality of these soundings. A Caris HelpDesk Ticket (00802013) has been opened to address this issue. Please note that all submitted surfaces with this survey have been finalized using the "Greater of the Two" of standard deviation and TPE as per the Field Procedures Manual section 4.2.6. Because the TPE of the soundings involved are so high, the resulting surface error values will also be high -- higher than would usually be acceptable. These data have been thoroughly reviewed by RAINIER personnel and the Hydrographer recommends using the near shore surfaces to update the charts irrespective of the surface error. [5]

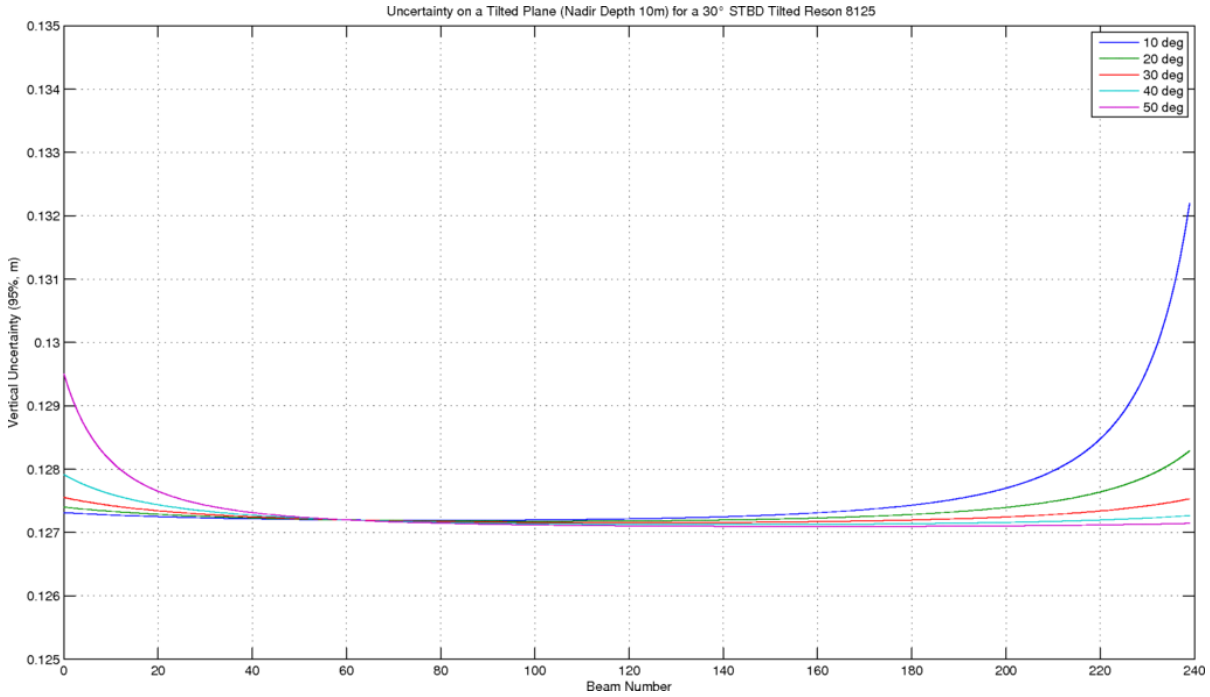


Figure 6: Dr. Calder's uncertainty model for a tilted 8125 at varying seafloor slopes.

Horizontal Offset

Horizontal offsets were seen in the steep slopes along the edges of East Passage, 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. Offsets observed were within the 2 meter accuracy of the POS in examined areas. The effect on the surface and appearance in subset editor are shown below in Figure 7. [6]

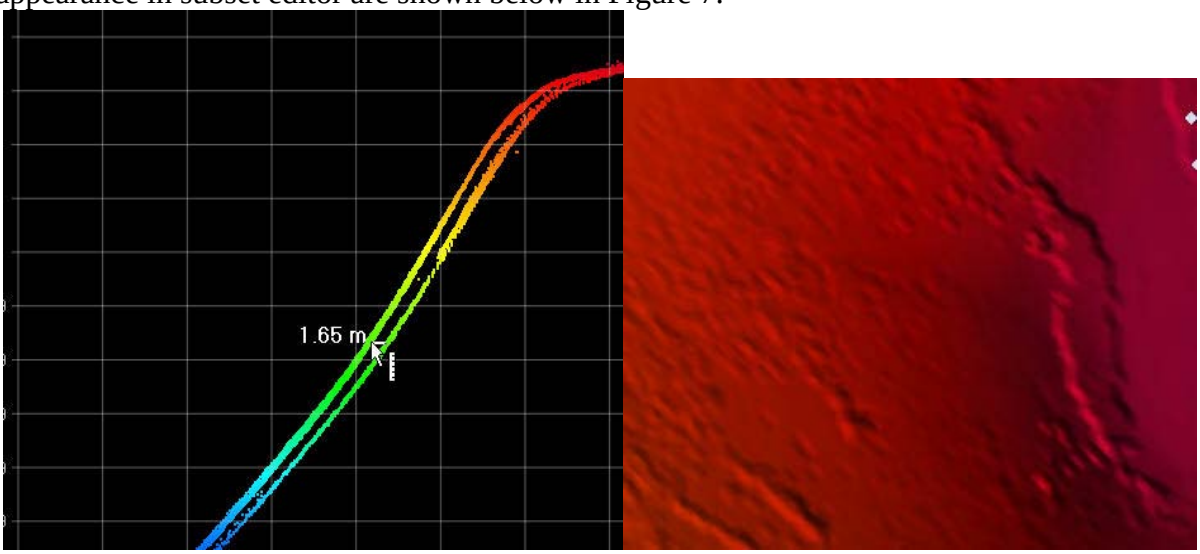


Figure 7: Horizontal Offset of 1.65m and the effect of the offset on the 1 meter surface.

Reson 7125 High Frequency Noise

There was significant downslope noise seen in data from the Reson 7125 High Frequency system when surveying the steep areas of East Passage. The noise predominantly took two forms. The first, as seen in Figure 8, consists of large parallel bursts of noise. The second consists of small 'strings' or 'snakes' as seen in Figure 9. The snakes appeared to be more common when at the limit of high frequency range. 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. [7]

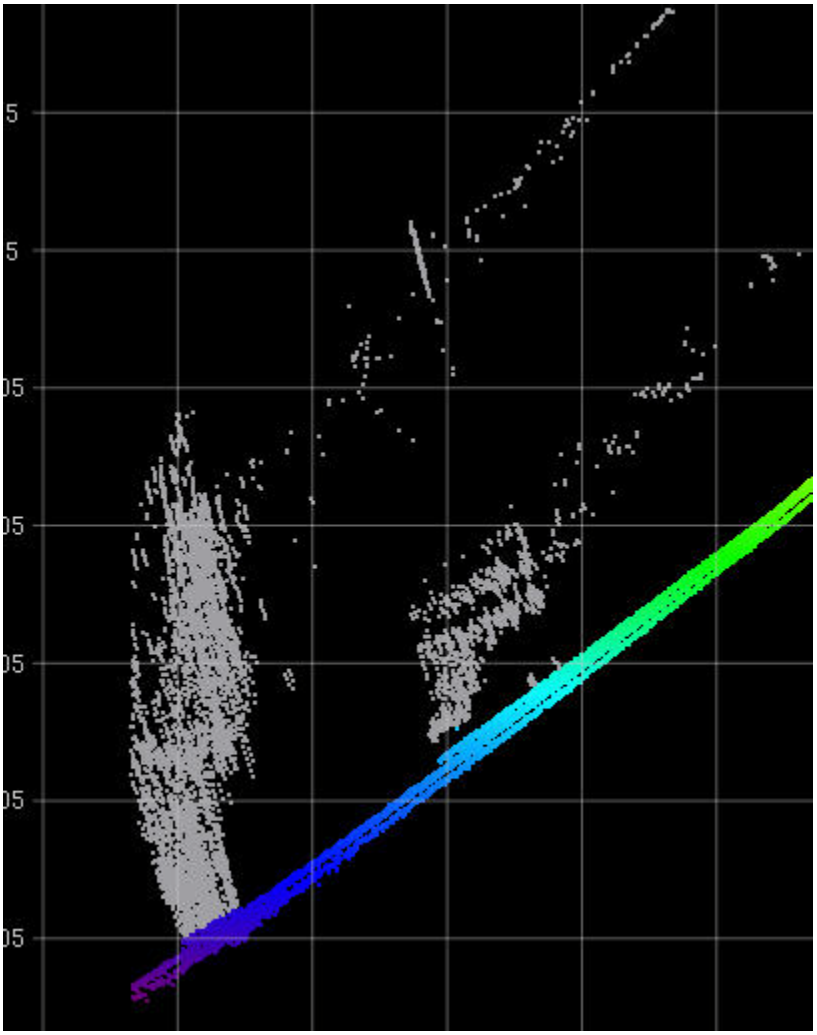


Figure 8: Large bursts of noise seen in 7125 data on slopes.

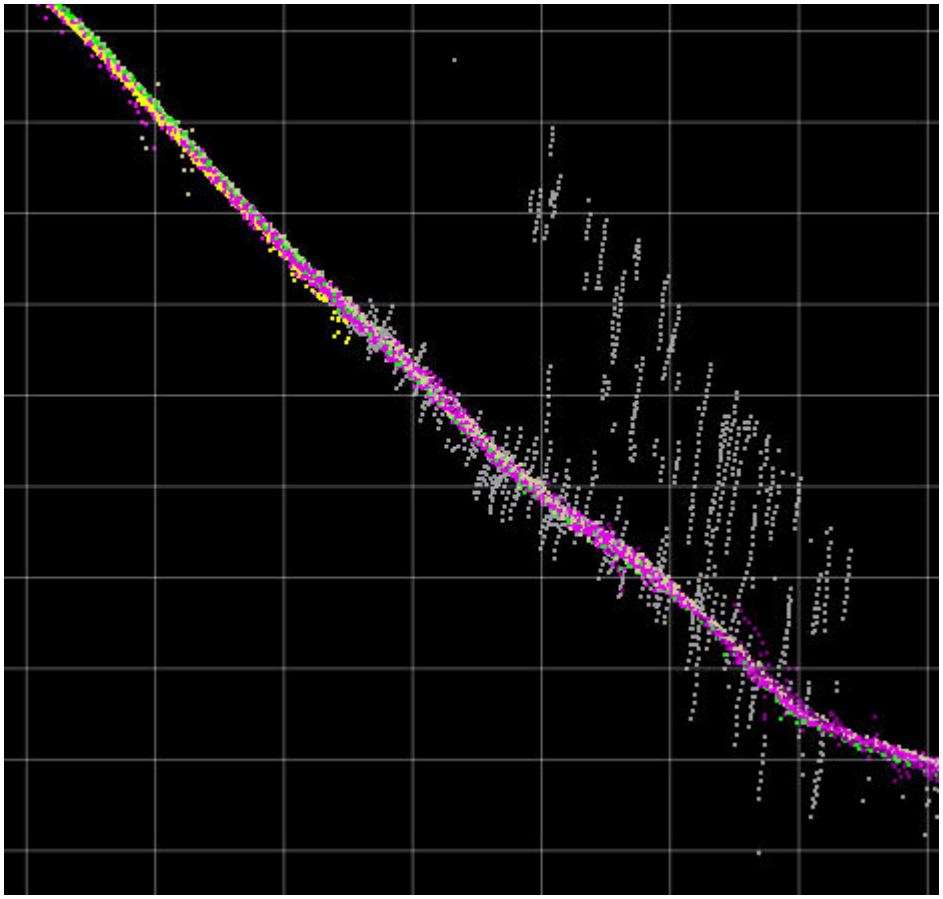


Figure 9: Example of 7125 high frequency downslope "strings."

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 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. [8] See Figure 10.

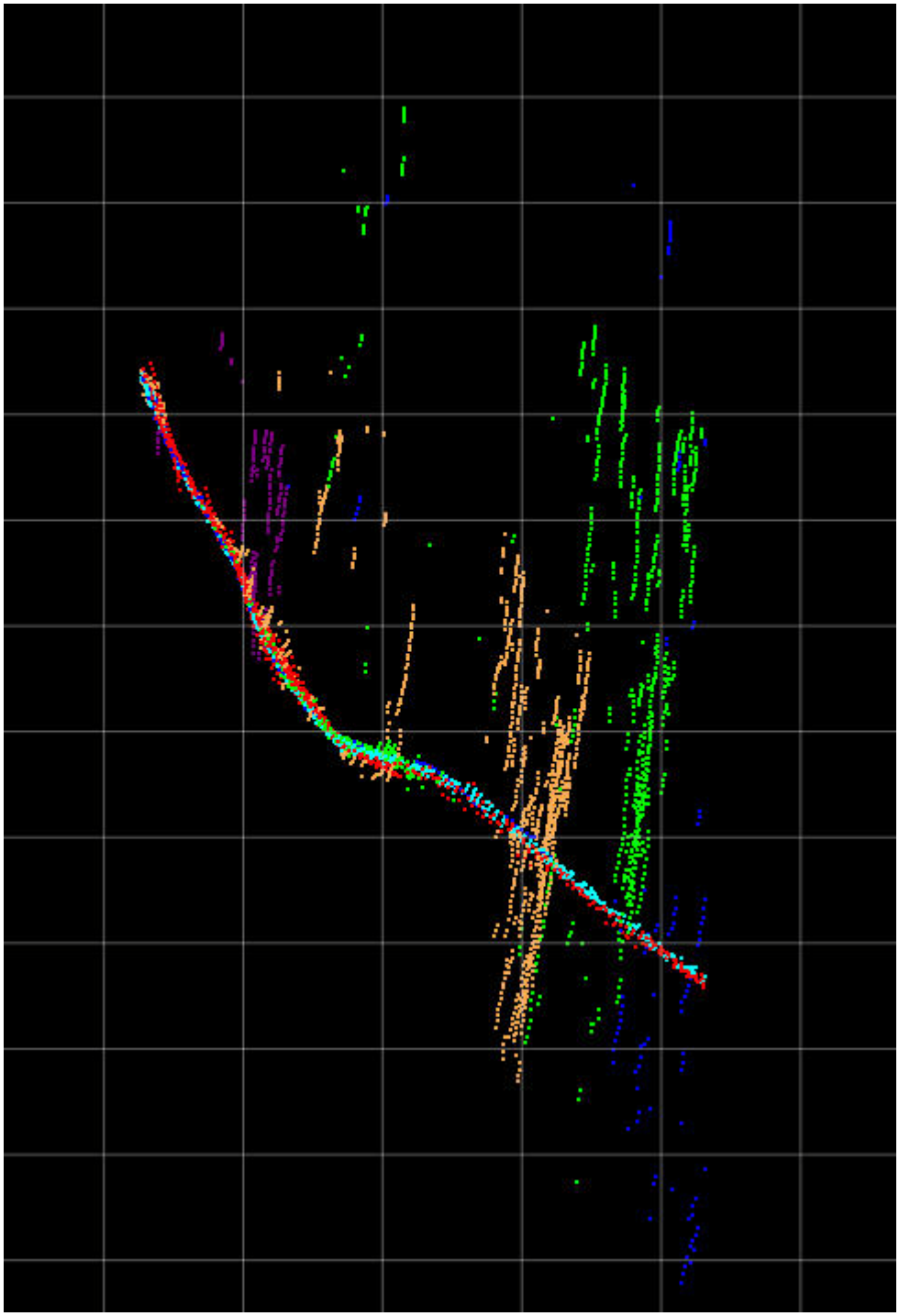


Figure 10: Low Frequency 7125 outer beam noise..

B3. Data Reduction

Data reduction procedures for survey H11826 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 East Passage. This resulted in negative soundings and MBES coverage of charted shoreline features. These data were processed as follows:

- Tide-corrected negative soundings are cut when creating the finalized surfaces due to the depth range selected on finalizing. (0-21.5m for the 1 meter finalized surface).
- 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.

B4. Data Representation

Many BASE surfaces were used in processing H11826. The submission Field Sheet and BASE Surface structure are shown in Figures 11 and 12. 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.

All field sheets were created as 16m x 16m grids, with the all eastings and northings a multiple of 16m from the point 5248750.00N, 541400.00E. For additional information on an individual field sheet's extents, see the associated .fsh file in the digital data.

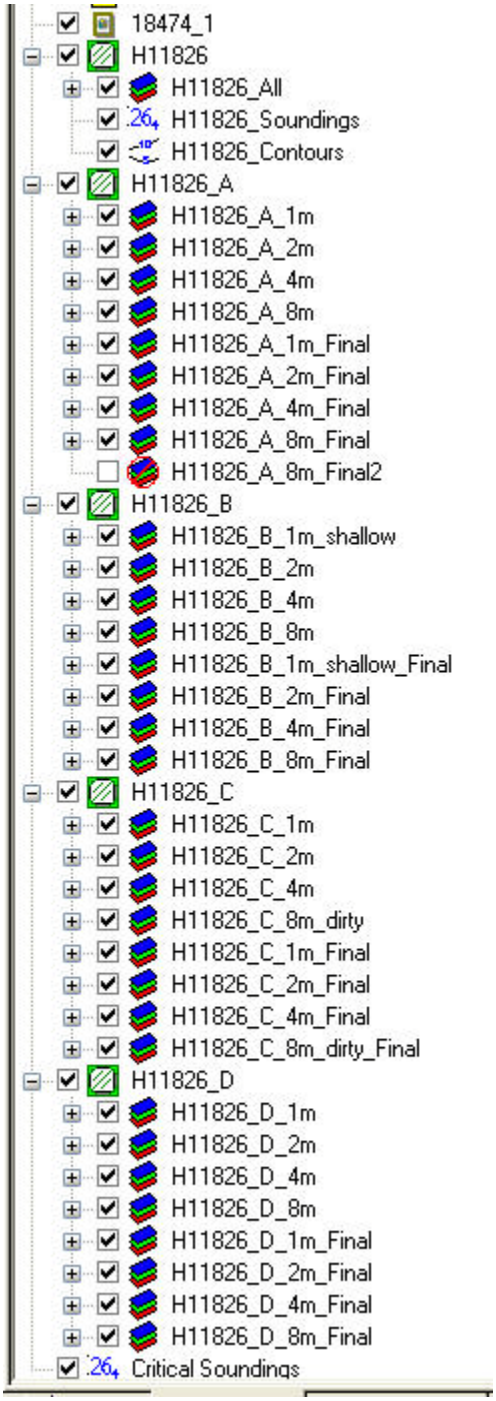


Figure 11: Field sheets and BASE surfaces submitted with H11826.

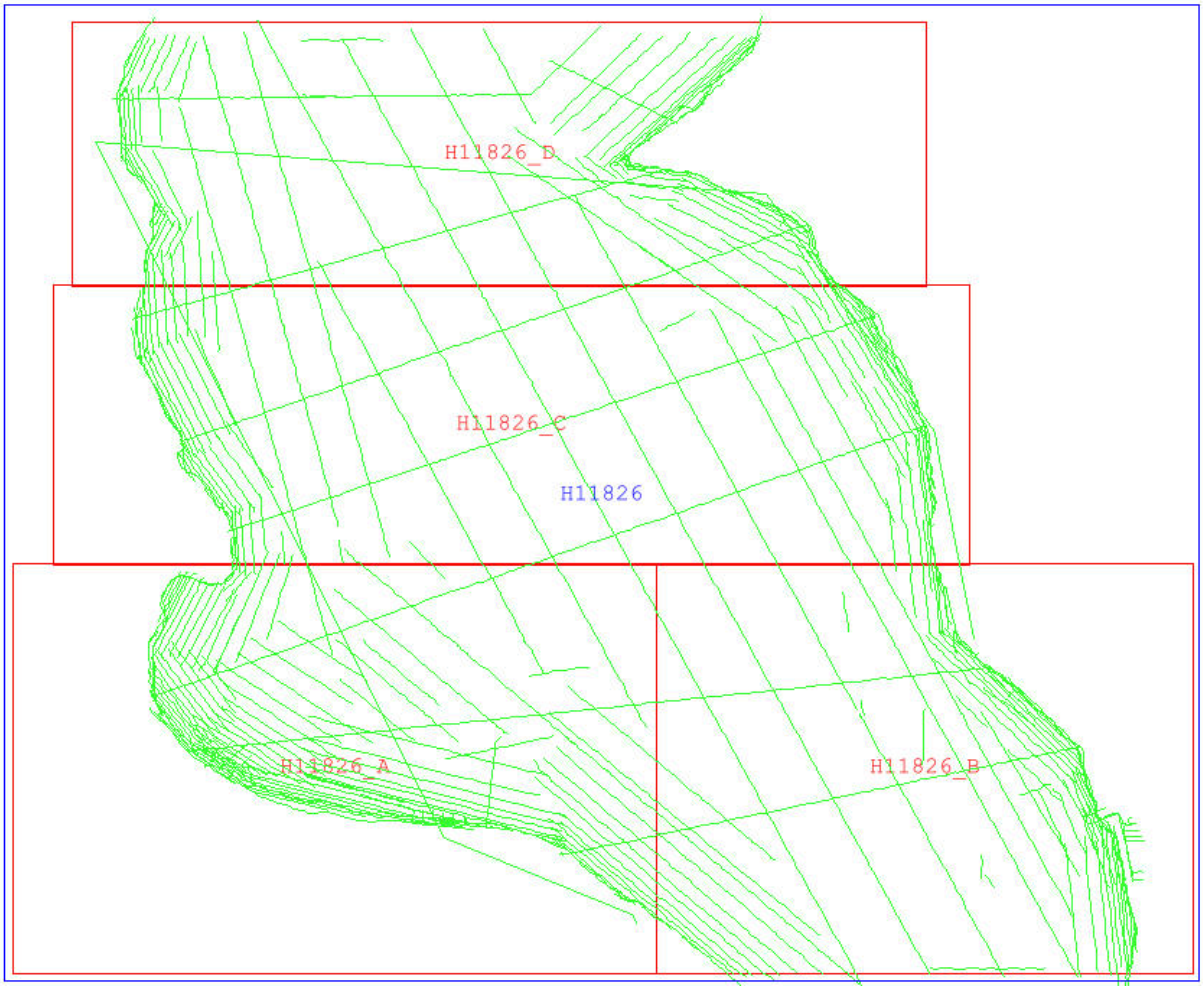


Figure 12: Layout of field sheet and BASE surfaces for H11826

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.

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 H11826.

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 H11826.

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 H11826 was submitted to CO-OPS on May 2nd, 2008 and the Final Tide Note was received on May 13th, 2008. This documentation is included in Appendix IV. [9]

D. RESULTS AND RECOMMENDATIONS

D.1. Chart Comparison

D.1.a. Survey Agreement with Chart

Survey H11826 was compared with the following charts:

Chart	Scale	Edition and Date	Local Notice to Mariners Applied Through
18474	1:40,000	8th Ed, October 2003	03/08/2008

Table 4: Charts compared with H11826

Chart 18474

Bathymetry within the main channel in East Passage agreed within 2 fathoms of the charted depths. East Passage is an area with many steep slopes and diverse bathymetry. Along these slopes, differences between the chart and observed soundings as great as 12 fathoms were observed. The current survey showed no trend of being deeper or shoaler than the chart. This could be attributed to increased positional accuracy, complete bottom coverage, and cartographic representation of soundings on an extremely steep slope. The Hydrographer recommends that survey soundings supersede all prior survey and charted depths in the common area. [10]

D.1.b. Dangers to Navigation

No dangers to navigation (DTONs) were found in survey H11826. [11]

D.1.c. Other Features

Automated Wreck and Obstruction Information System (AWOIS) Investigations
Five (5) AWOIS items fall the within the survey limits of H11826. Of these, all five were assigned for full investigation. Descriptions of each AWOIS item investigation are included in the AWOIS Report attached to this report.

Additional Items
There are multiple new wrecks and features associated with H11826. These additional features are described in the Features from Bathymetry Report attached to this report and can be viewed in the HIPS data and CARIS Notebook session (H11826.wrk). [12]

Numerous rocks were found in the bathymetry covering the southeast corner of the survey area along the shore near the Des Moines marina. The least depth of representative rocks that are not preserved in their respective BASE surfaces are designated in Caris and a rock SBDARE S57 area object was created in this location within the H11826_FieldVerified_Source.hob file and in the Notebook session H11826.wrk. The hydrographer recommends charting a "rocky" notation in this area rather than a charted rock symbol for each designated feature. [13]

There are two fish havens in Tramp Harbor. No obstructions were observed within either fish haven, although the bathymetry for both fish havens is sloped and, therefore, the northern fish haven has depths shoaler than the 5 fathom minimum displayed on the chart. The Hydrographer recommends cartographically displaying these shoaler soundings within the fish havens on the chart. [14]

North of Pt Heyer and east of the town of Vashon, a sand bar is forming. The tilted sonar was able to survey to, or close to, the 0m curve in that area, and it is recommended that the approximate 0m curve be moved seaward. Refer to the submitted grids for the 0m curve. [15]

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. DP forms are included in the Detached Positions subdirectory Separates I.

All shoreline data is submitted in Caris Notebook .hob files. The session H11826.wrk contains the following:

HOB File	**Purpose and Contents**
H11826_Reference	Contains the survey sheet limits.
H11826_CompSource	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.
H11826_FieldVerified_Source.hob	The Field verified layer contains the CompSource HOB with survey updates. Features contained in the FieldVerified_Source 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.
H11826_Deleted_Source.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 H11826 that require further discussion and are associated with a detached position, have been flagged "Report" in Pydro in H11826.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. Some features were added outside of Pydro and can only be viewed in Notebook. [16]

The charted pile in the SW corner of Tramp Harbor at Location 47° 24.16'N 122° 25.69'W was disproved by means of a visual search and complete tilted MBES. The four charted piles PA southeast of the southernmost measured mile marker at position 47° 26.86'N 122° 26.35'W were also disproved by means of a visual search and complete tilted MBES. [17]

Recommendations

The Hydrographer recommends that the shoreline as depicted in the Notebook .HOB files supersede and complement shoreline information compiled on the charts as described above.[18]

D.2.c. Aids to Navigation

All aids to navigation (ATONs) were found to be correctly charted and serve their intended purpose, with the exception of private aids located in the Des Moines Marina. The lights on the pier at the entrance to the marina have conflicting information in the Light List, raster chart, and Composite Source HOB file. While the lights were not positioned during the course of this survey, they were visually investigated and found to be located on the pier as charted on the raster chart. However, in the HOB file the lights and the pier are detached and the light positions fall off into the water. Review of the bathymetry shows that the HOB pier is properly placed, and the lights in the H11826_FieldVerified_Source.HOB file were moved to onto the HOB pier. Additionally, the yellow light at the south end of the marina breakwater has a Light List position that puts it well into the water, when it is in fact located at the tip of the breakwater as charted. The hydrographer recommends that the lights be charted as per the submitted H11826_FieldVerified_Source.HOB file and information updated accordingly. [19]

D.2.d. Overhead Features

There are no overhead features within the limits of survey H11826. [20]

D.2.e. Submarine Cables and Pipelines

Survey H11826 includes several charted cable and pipeline areas. Each area is discussed separately below.

- Maury-Des Moines Cable Area: A trench was located at the western end of the cable area extending between Des Moines and Maury at the southern end of the survey area. See Figure 13. The Hydrographer recommends retaining the cable area as charted. [21]

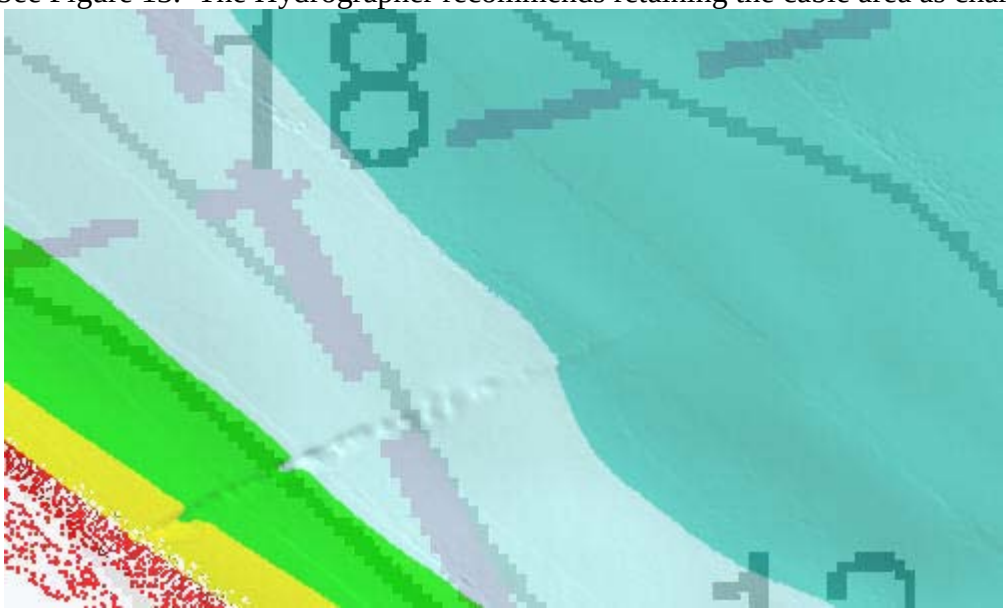


Figure 13: Maury-Des Moines Cable Trench in 1-meter resolution bathymetry overlaid on chart 18474

- Tramp Harbor-Three Tree Point Cable Area: No trench was observed in the bathymetry for this cable area. The Hydrographer recommends retaining the cable area as charted. [22]

- Des Moines Sewer: The hydrographer recommends modifying the sewer pipeline area on chart 18474 to follow the path of the sewer seen in H11826 bathymetry. A digitized pipeline was added by the hydrographer in H11826_FieldVerified_Source.hob in the Notebook session (H11826.wrk) and was properly attributed as a new feature. See Figure 14 below. [23]

Figure 14: Sewer pipeline in 1-meter resolution bathymetry overlaid on Chart 18474.

- Dilworth Sewer: The hydrographer recommends modifying the sewer pipeline area on chart 18474 to follow the path of the sewer seen in H11826 bathymetry. A digitized pipeline was added by the hydrographer in H11826_FieldVerified_Source.hob in the Notebook session (H11826.wrk) and was properly attributed as a new feature. See Figure 15 below. [24]

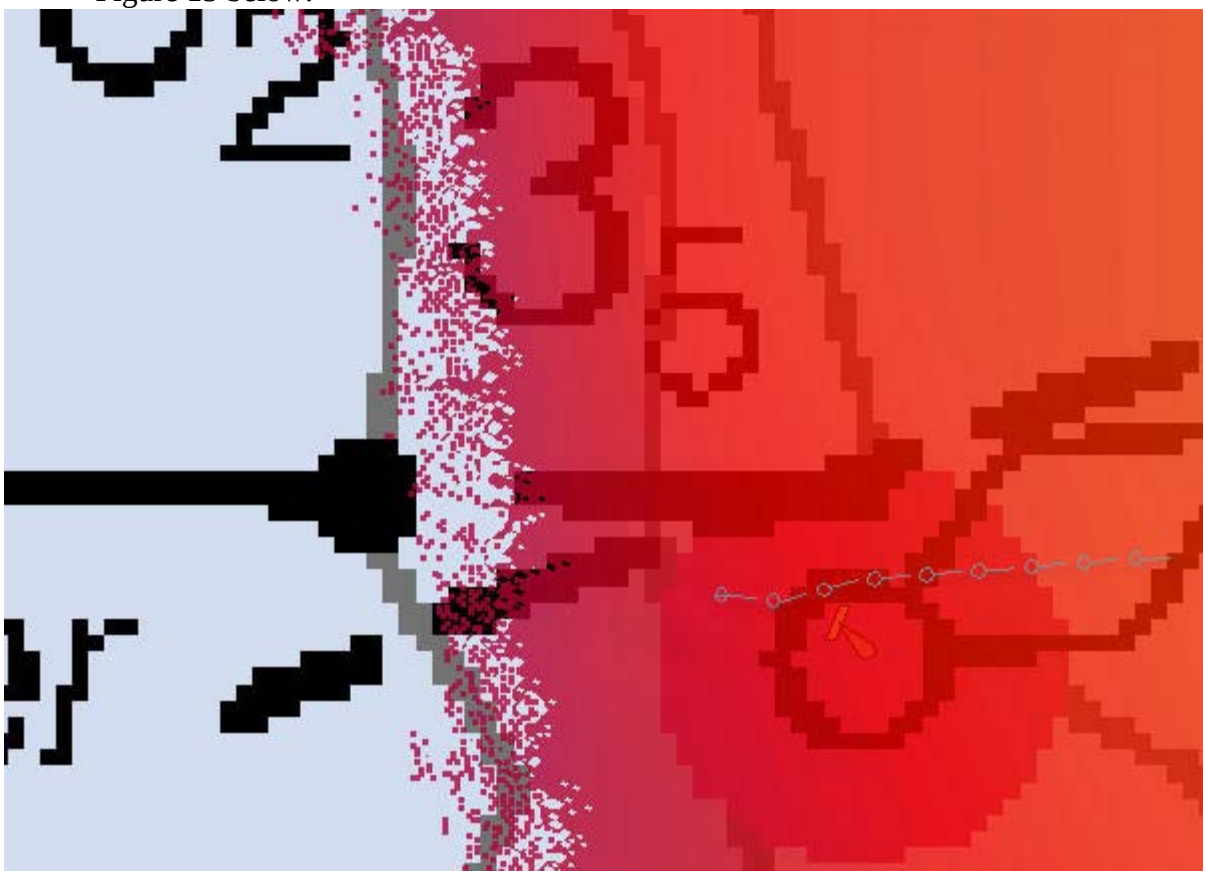


Figure 15: Sewer pipeline in 1-meter resolution bathymetry overlaid on Chart 18474.

- Three Tree Point: A pipe was observed in the bathymetry and confirmed with Side Scan Editor at position 47° 26.48'N 122° 21.86'W. A digitized pipeline was added by the hydrographer in H11826_FieldVerified_Source.hob in the Notebook session (H11826.wrk) and was properly attributed as a new feature. The hydrographer recommends adding to chart. [25] See figures 16 and 17.

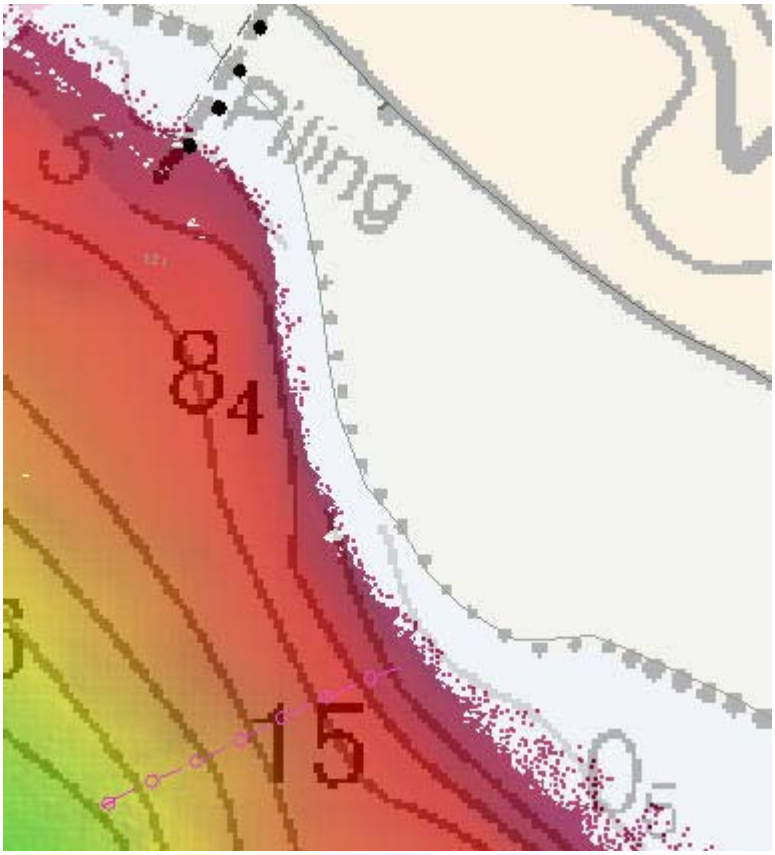


Figure 16: Pipeline in 1-meter resolution bathymetry overlaid on Chart 18474.

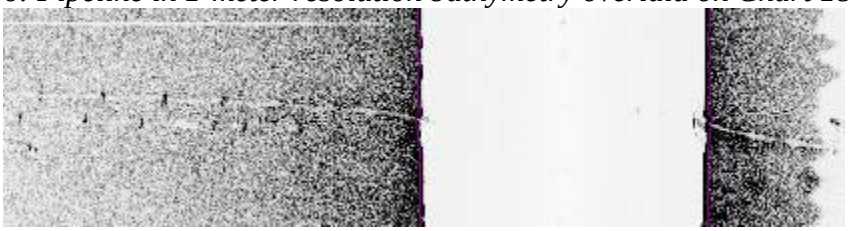


Figure 17: Pipeline in Side Scan Editor.

D.2.f. Ferry Routes

There are no ferry routes charted within the limits of survey H11826, and none were observed to be operating in the area. [26]

D.2.g. Bottom Samples

Six bottom samples were collected within Tramp Harbor in survey H11826. All samples produced fine grey sand, and were in 30m or less of water. The only charted bottom sample near Tramp Harbor indicated mud, but it was off the slope in 170m of water. All are included in the Survey Feature Report in Appendix II. [27]

D.2.h. Other Findings

There were no other findings within the limits of survey H11826.

E. APPROVAL

As Chief of Party, Field operations for hydrographic survey H11826 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 (May 2008 edition), Field Procedures Manual (May 2008 edition), Standing and Letter Instructions, and all HSD Technical Directives issued through April 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:

Title	Date Sent	Office
Data Acquisition and Processing Report for OPR-N395-RA-08	05/23/2008	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: 2008.07.20 12:25:56 -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:

I am the author of this document
2008.07.20 12:13:10 -08'00'

Russell A. Quintero
Ensign, NOAA

Chief Survey Technician: James B Jacobson

I have reviewed this document
2008.07.19 14:32:25 -08'00'

James B. Jacobson
Chief Survey Technician, NOAA Ship RAINIER

Field Operations Officer: LT/NOAA

I have reviewed this document
2008.07.19 14:59:40 -08'00'

Lieutenant Charles Yoos, NOAA
Field Operations Officer

Revisions Compiled During Office Processing and Certification:

[1] Filed with the project records
[2] Concur
[3] The junction with surveys H11827 and H11646 will be discussed in their Descriptive Reports. A common junction with these surveys will be made when they are compiled.
[4] Concur
[5] Concur
[6] Despite the horizontal offset, the data is adequate to supersede charted data.
[7] Concur
[8] Concur
[9] Attached to this report.
[10] Concur with clarification, except where mentioned in this report or with a blue note on the HCell
[11] Concur
[12] The hydrographer found six wrecks during survey operations. It is recommended that these features be added to the AWOIS data base. See attached report, Features *from Bathymetry*.
[13] Concur; see HCell for rocky seabed areas.
[14] Do not concur; retain charted limits of the two Fish Havens. Remove charted note, *auth min 5 fms* from the northern most one.
[15] See HCell for depiction of MLLW, zero depth curve.
[16] Note: the survey feature report does not include all features from H11826. Additional features were added, some removed, and some modified in CARIS Notebook after the features report was generated from Pydro. All features included in the compilation of H11826 have come directly from CARIS Notebook, which is the official deliverable for this survey.
[17] Concur
[18] Concur with clarification. Chart data as depicted in HCell.
[19] Use the latest ATONIS listing.
[20] Concur
[21] Concur
[22] Concur
[23] Chart as depicted on the HCell
[24] Chart as depicted on the HCell
[25] Chart as depicted on the HCell
[26] Concur
[27] Chart all bottom samples collected by the hydrographer and retain all charted bottom samples found in the common area.

H11826 AWOIS Report

Registry Number: H11826

State: Washington

Locality: Puget Sound

Sub-locality: Three Tree Point to Robinson Point

Project Number: OPR-N395-RA-08

Survey Dates: 20080415 - 20080430

Charts Affected

Number	Edition	Date	Scale (RNC)	RNC Correction(s)*
18474	8th	10/01/2003	1:40,000 (18474_1)	USCG LNM: 02/26/2008 (03/04/2008) NGA NTM: 09/30/2006 (03/08/2008)
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

Feature Type	Survey Depth	Survey Latitude	Survey Longitude
Shoal	-1.94 m	47° 24' 05.0" N	122° 24' 21.1" W
Shoal	-1.74 m	47° 24' 05.4" N	122° 24' 20.9" W
Wreck	9.09 m	47° 24' 39.2" N	122° 20' 34.5" W
Wreck	10.59 m	47° 26' 53.8" N	122° 22' 29.6" W
Wreck	12.79 m	47° 27' 12.7" N	122° 22' 41.9" W
Wreck	16.84 m	47° 25' 38.8" N	122° 21' 08.4" W
Wreck	19.61 m	47° 25' 43.4" N	122° 21' 09.0" W

Pile	-0.45 m	47° 23' 38.8" N	122° 23' 01.7" W
Rock	-0.43 m	47° 23' 41.6" N	122° 23' 03.9" W
Rock	-0.32 m	47° 24' 02.1" N	122° 24' 17.2" W
Shoal	-0.02 m	47° 27' 06.8" N	122° 26' 31.1" W
Pile	0.14 m	47° 26' 51.7" N	122° 22' 09.4" W
Rock	0.19 m	47° 25' 48.2" N	122° 21' 04.4" W
Wreck	0.20 m	47° 25' 41.2" N	122° 21' 03.0" W
Rock	0.21 m	47° 24' 53.9" N	122° 20' 50.3" W
Bottom Sample	[None]	47° 24' 35.0" N	122° 25' 40.4" W
Bottom Sample	[None]	47° 24' 54.3" N	122° 26' 10.2" W
Bottom Sample	[None]	47° 24' 15.8" N	122° 25' 26.3" W
Bottom Sample	[None]	47° 24' 20.9" N	122° 25' 06.9" W
Bottom Sample	[None]	47° 24' 08.6" N	122° 24' 26.5" W
Bottom Sample	[None]	47° 23' 52.5" N	122° 23' 19.8" W
AWOIS	[no data]	[no data]	[no data]
AWOIS	[no data]	[no data]	[no data]
AWOIS	[no data]	[no data]	[no data]
AWOIS	[no data]	[no data]	[no data]
AWOIS	[no data]	[no data]	[no data]

4 - AWOIS Database Items

4.1) AWOIS #53517 - OBSTRUCTION

No Primary Survey Feature for this AWOIS Item

Search Position:	47° 24' 23.9" N, 122° 25' 36.5" W
Historical Depth:	[None]
Search Radius:	0
Search Technique:	MB, SSS, VS
Technique Notes:	Conduct search to get accurate position and height of offshore pile. See MI table for search area.

History Notes:

Unknown source; Placed a fish haven in above location. See chart for extents of fish haven. (KRW 11/03/2006)

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:

Conducted visual search and 100% multibeam coverage. No pile observed. Recommend pile be disproved.

Hydrographer Recommendations

No offshore pile found in search, recommend removal from database. No pile is currently charted, no changes necessary. Fish havens are addressed seperately in the DR.

S-57 Data

[None]

Office Notes

Concur, retain fish haven as charted

4.2) AWOIS #53520 - OBSTRUCTION

No Primary Survey Feature for this AWOIS Item

Search Position:	47° 26' 48.2" N, 122° 26' 19.1" W
Historical Depth:	[None]
Search Radius:	100
Search Technique:	VS, MB, SSS
Technique Notes:	Investigate piles within the limits of the survey.

History Notes:

CL 1541/74, 1974; USCG Aux. investigation reports 3 Piles PA in the following locations:■Lat. 47° 26' 51.85 Lon. 122° 26' 17.44 ■Lat. 47° 26' 48.24 Lon. 122° 26' 19.06■Lat. 47° 26' 45.14 Lon. 122° 26' 19.70■The norther most pile is located 50m south of a charted pile in Lat. 47° 26' 51.85 Lon. 122° 26' 17.44 The source for this pile is H06101, 1935. (KRW 11/03/2006)

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:

Visual and 100% coverage MBES search was conducted and no piles were observed in the vicinity of AWOIS search radius.

Hydrographer Recommendations

recommend removal of "Piles PA" from chart

S-57 Data

[None]

Office Notes

Concur

4.3) AWOIS #53518 - OBSTRUCTION

No Primary Survey Feature for this AWOIS Item

Search Position:	47° 25' 11.5" N, 122° 25' 30.5" W
Historical Depth:	[None]
Search Radius:	0
Search Technique:	MB, SSS, VS
Technique Notes:	Conduct search to get accurate position and height of fish haven. See MI table for search area.

History Notes:

CL 496/86 04/13/1988; Reports a permit obtained to construct a fish haven (min depth 5 fathoms) in above location. Fish haven has been constructed from fiberglass reinforced plastic modules manufactured for use as enhancement structures from Japan and large quarry rock. (KRW 11/03/2006)

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:

No structures observed in location of charted fish haven. Depths match surrounding contours, minimum depth 0m.

Hydrographer Recommendations

Retain

S-57 Data

[None]

Office Notes

Retain charted fish haven, remove note (auth min 5 fms)

4.4) AWOIS #53527 - OBSTRUCTION

No Primary Survey Feature for this AWOIS Item

Search Position:	47° 24' 53.2" N, 122° 26' 13.7" W
Historical Depth:	[None]
Search Radius:	100
Search Technique:	MB, SSS, DI, VS
Technique Notes:	Conduct search within the limits of hydrography

History Notes:

Source Unknown; Dolphin PA was placed on the chart in the late 1970's. See charted position above. (KRW 02/05/2007)

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:

Conducted visual and 100% multibeam search. No dolphin observed in vicinity. Observed two buoys, one orange and one white.

Hydrographer Recommendations

remove Dol PA from chart

S-57 Data

[None]

Office Notes

Concur

4.5) AWOIS #53549 - OBSTRUCTION

No Primary Survey Feature for this AWOIS Item

Search Position:	47° 24' 05.7" N, 122° 24' 15.7" W
Historical Depth:	[None]
Search Radius:	50
Search Technique:	SSS, MB, DI
Technique Notes:	Conduct search within the limits of hydrography

History Notes:

H06101, 1935; Smooth sheet located two piles: inshore pile at Lat.47/24/04.23 Lon. 122/24/20.45, offshore pile at 47/24/05.69 Lon. 122/24/15.69. Offshore pile is station Waw for the survey. Offshore pile currently charted as submerged. (KRW 11/03/2006)■■CL 117/76, 01/21/1976; USCG Aux. reports 2 Piles approx. 100 yds off shore. Inshore pile 6' above water level. Offshore pile submerged 1.5'. Piles are 25' apart perpendicular to the shore line. (KRW 11/03/2006)

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:

Piles not observed within search radius, however two piles matching the description of 100m offshore, perpendicular to shore, 10m apart were located to the W of the AWOIS search radius. Least depths were designated. They are just west of the easternmost charted pile.

Hydrographer Recommendations

Recommend moving charted subm pile to designated sounding.

S-57 Data

[None]

Office Notes

Concur with clarification, retain charted pile at latitude 47-24.060N, longitude 122-24.415W. Change the pile from a HW pile to a pile that is awash. Chart an obstruction (submerged pile) with a least depth of 1.295 fathoms at latitude 47-24.085N, longitude 122-24.350W

1 - Features from Bathymetry

1.1) Profile/Beam - 1994/447 from h11826 / 2801_reson7125_hf_512beams / 2008-116 / 321_2258

Survey Summary

Survey Position: 47° 24' 39.2" N, 122° 20' 34.5" W

Least Depth: 9.09 m (= 29.83 ft = 4.972 fm = 4 fm 5.83 ft)

TPU (±1.96σ): **THU (TPEh)** ±1.973 m ; **TVU (TPEv)** ±0.174 m

Timestamp: 2008-116.23:00:27.330 (04/25/2008)

Survey Line: h11826 / 2801_reson7125_hf_512beams / 2008-116 / 321_2258

Profile/Beam: 1994/447

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

Remarks:

Shoalest point on 17.25m long wreck. Shoalest point is 3m above seafloor in 12m of water.

Feature Correlation

Address	Feature	Range	Azimuth	Status
h11826/2801_reson7125_hf_512beams/2008-116/321_2258	1994/447	0.00	000.0	Primary

Hydrographer Recommendations

[None]

Cartographically-Rounded Depth (Affected Charts):

5fm (18448_1, 18440_1, 18003_1, 18007_1, 530_1)

3fm 0ft (18474_1, 18445_8)

9.1m (501_1, 50_1)

S-57 Data

Geo object 1: Wreck (WRECKS)

Attributes: CATWRK - 2:dangerous wreck

SORDAT - 20080430

SORIND - US,US,graph,survey H11826

VALSOU - 9.093 m

WATLEV - 3:always under water/submerged

Feature Images

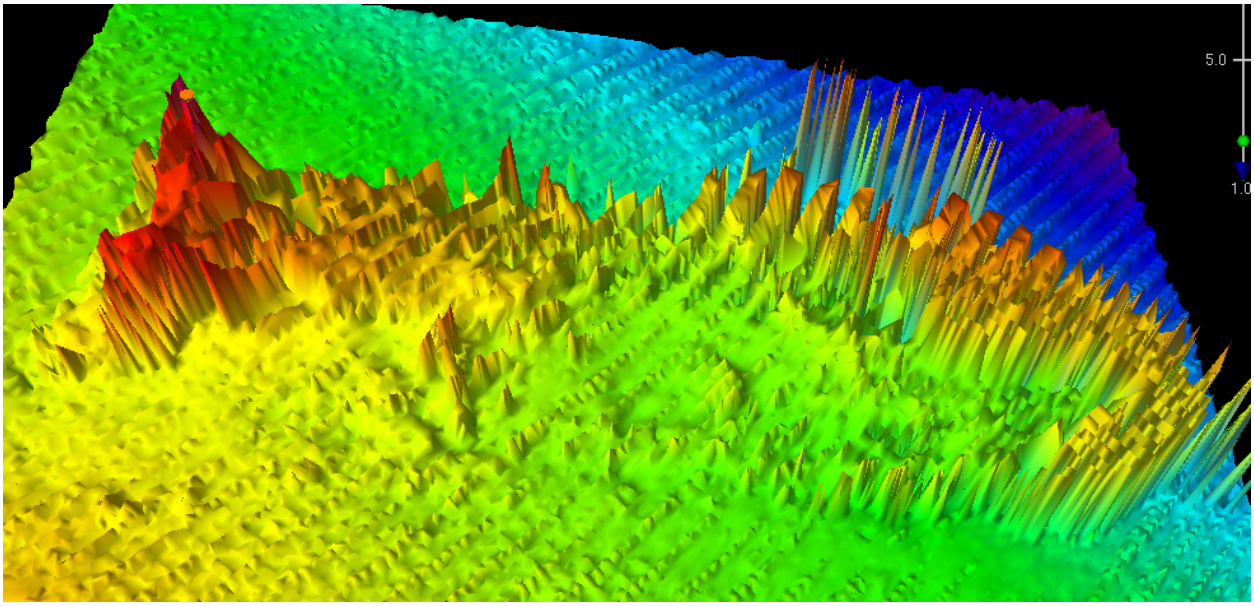


Figure 1.1.1

1.2) Profile/Beam - 350/112 from h11826 / 2801_reson7125_hf_512beams / 2008-120 / 408_2120

Survey Summary

Survey Position: 47° 26' 53.8" N, 122° 22' 29.6" W

Least Depth: 10.59 m (= 34.75 ft = 5.791 fm = 5 fm 4.75 ft)

TPU (±1.96σ): **THU (TPEh)** ±1.967 m ; **TVU (TPEv)** ±0.217 m

Timestamp: 2008-120.21:21:04.494 (04/29/2008)

Survey Line: h11826 / 2801_reson7125_hf_512beams / 2008-120 / 408_2120

Profile/Beam: 350/112

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

Remarks:

9m wreck in 13m of water, shoalest sounding 2m above seafloor.

Feature Correlation

Address	Feature	Range	Azimuth	Status
h11826/2801_reson7125_hf_512beams/2008-120/408_2120	350/112	0.00	000.0	Primary

Hydrographer Recommendations

[None]

Cartographically-Rounded Depth (Affected Charts):

5 ¾fm (18448_1, 18440_1, 18003_1, 18007_1, 530_1)

5fm 4ft (18474_1, 18445_1, 18445_8)

10.6m (501_1, 50_1)

S-57 Data

Geo object 1: Wreck (WRECKS)

Attributes: CATWRK - 1:non-dangerous wreck

SORDAT - 20080430

SORIND - US,US,graph,survey H11826

VALSOU - 10.591 m

WATLEV - 3:always under water/submerged

Feature Images

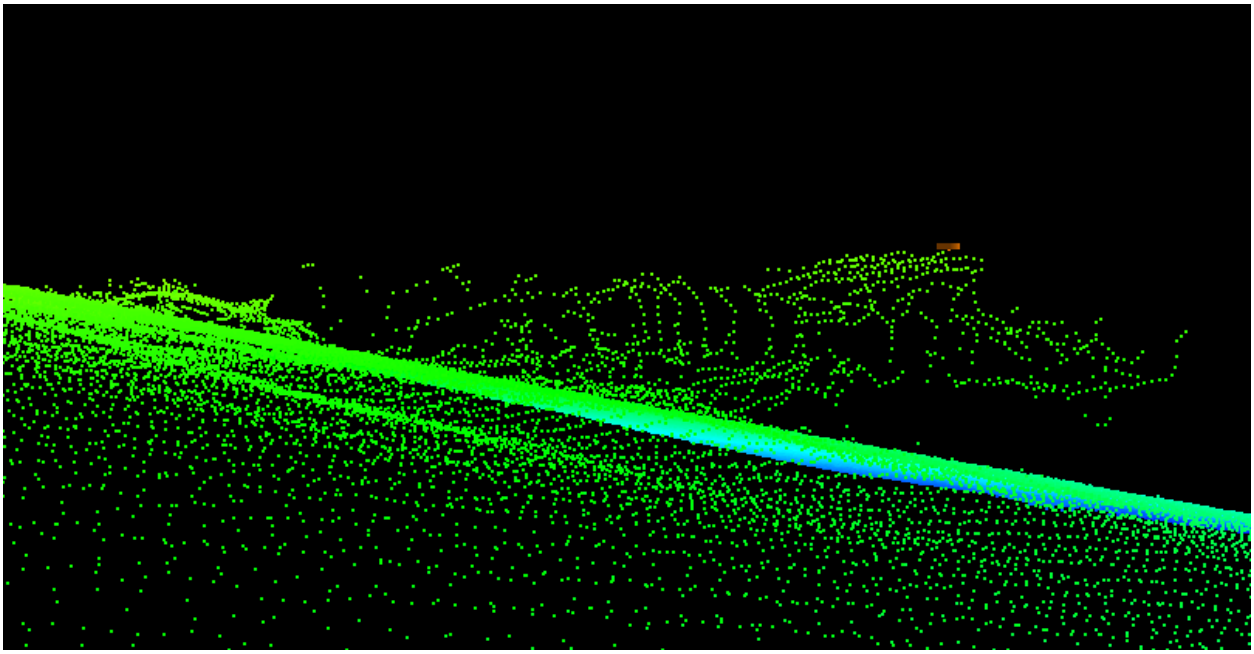


Figure 1.2.1

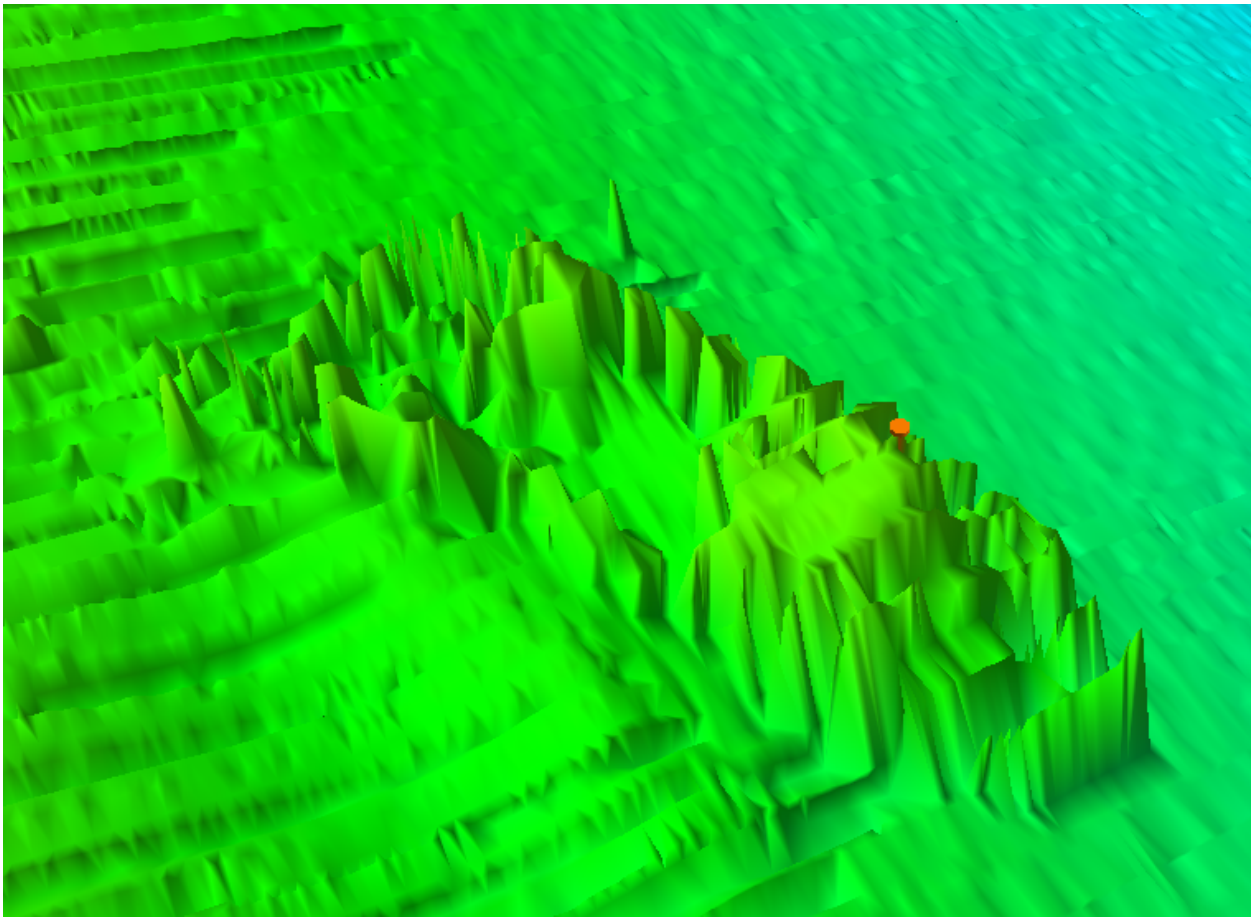


Figure 1.2.2

1.3) Profile/Beam - 121/47 from h11826 / 1101_reson8125_hvf / 2008-121 / 320_2059

Survey Summary

Survey Position: 47° 27' 12.7" N, 122° 22' 41.9" W

Least Depth: 12.79 m (= 41.96 ft = 6.994 fm = 6 fm 5.96 ft)

TPU (±1.96σ): **THU (TPEh)** ±1.962 m ; **TVU (TPEv)** ±0.120 m

Timestamp: 2008-121.21:00:00.502 (04/30/2008)

Survey Line: h11826 / 1101_reson8125_hvf / 2008-121 / 320_2059

Profile/Beam: 121/47

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

Remarks:

obstruction, possible small sunken boat, 4.5m long. Shoalest point is 1.2m above the seafloor. Not navigationally significant.

Feature Correlation

Address	Feature	Range	Azimuth	Status
h11826/1101_reson8125_hvf/2008-121/320_2059	121/47	0.00	000.0	Primary

Hydrographer Recommendations

[None]

Cartographically-Rounded Depth (Affected Charts):

7fm (18448_1, 18440_1, 18003_1, 18007_1, 530_1)

5fm 0ft (18474_1, 18445_1, 18445_8)

12.8m (501_1, 50_1)

S-57 Data

Geo object 1: Wreck (WRECKS)

Attributes: CATWRK - 1:non-dangerous wreck

CONVIS - 2:not visual conspicuous

SORDAT - 20080430

SORIND - US,US,graph,survey H11826

STATUS - 1:permanent

TECSOU - 3:found by multi-beam

VALSOU - 12.790 m

VERDAT - 12:Mean lower low water

WATLEV - 3:always under water/submerged

Feature Images

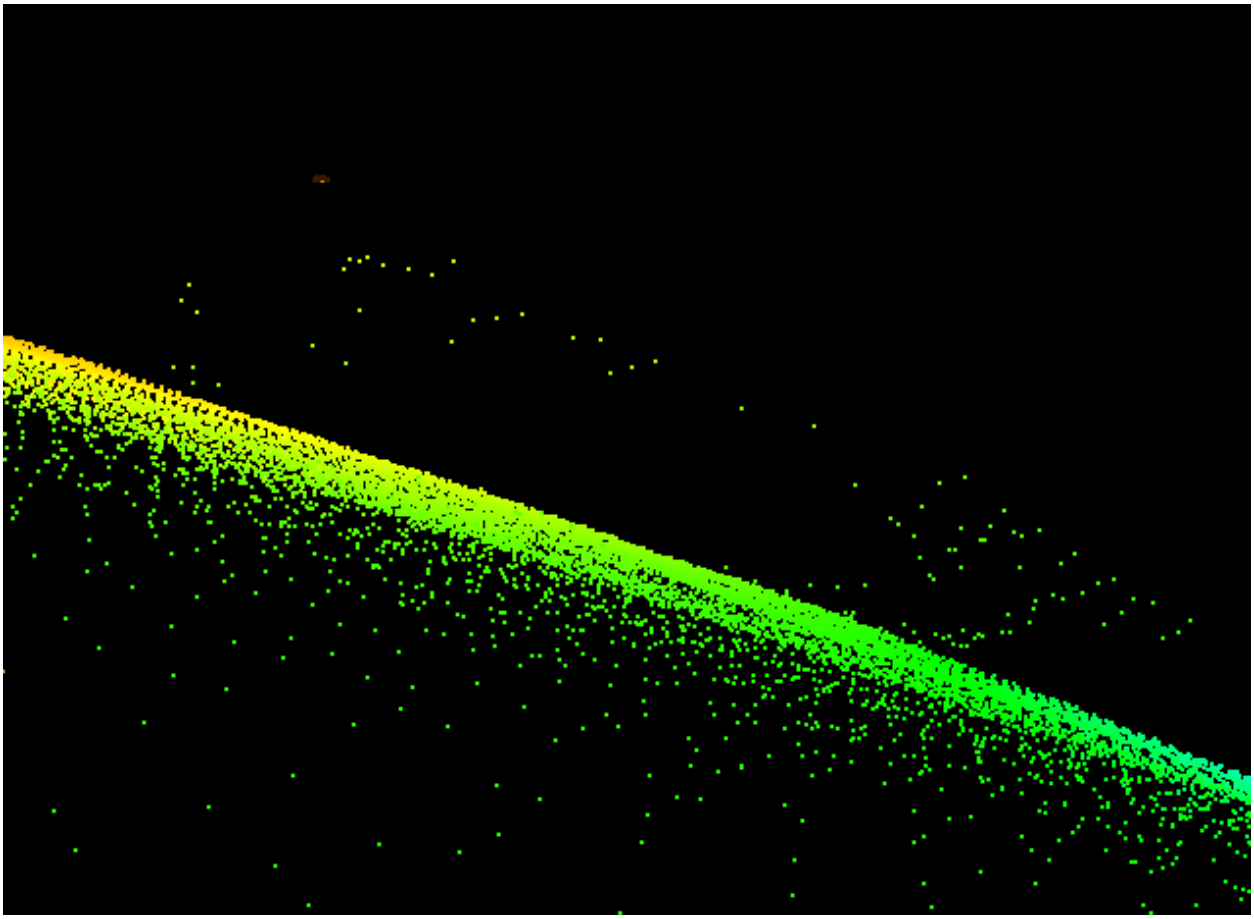


Figure 1.3.1

1.4) Profile/Beam - 1049/154 from h11826 / 2801_reson7125_hf_512beams / 2008-120 / 311_1812

Survey Summary

Survey Position: 47° 25' 38.8" N, 122° 21' 08.4" W

Least Depth: 16.84 m (= 55.26 ft = 9.210 fm = 9 fm 1.26 ft)

TPU (±1.96σ): **THU (TPEh)** ±1.966 m ; **TVU (TPEv)** ±0.234 m

Timestamp: 2008-120.18:14:31.028 (04/29/2008)

Survey Line: h11826 / 2801_reson7125_hf_512beams / 2008-120 / 311_1812

Profile/Beam: 1049/154

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

Remarks:

6m possible wreck rests in 18m of water with shoalest sounding .8m above seafloor.

Feature Correlation

Address	Feature	Range	Azimuth	Status
h11826/2801_reson7125_hf_512beams/2008-120/311_1812	1049/154	0.00	000.0	Primary

Hydrographer Recommendations

[None]

Cartographically-Rounded Depth (Affected Charts):

9 ¼fm (18448_1, 18440_1, 18003_1, 18007_1, 530_1)

9fm 1ft (18474_1, 18445_1, 18445_8)

16.8m (501_1, 50_1)

S-57 Data

Geo object 1: Wreck (WRECKS)

Attributes: CATWRK - 1:non-dangerous wreck

SORDAT - 20080430

SORIND - US,US,graph,survey H11826

VALSOU - 16.844 m

WATLEV - 3:always under water/submerged

Feature Images

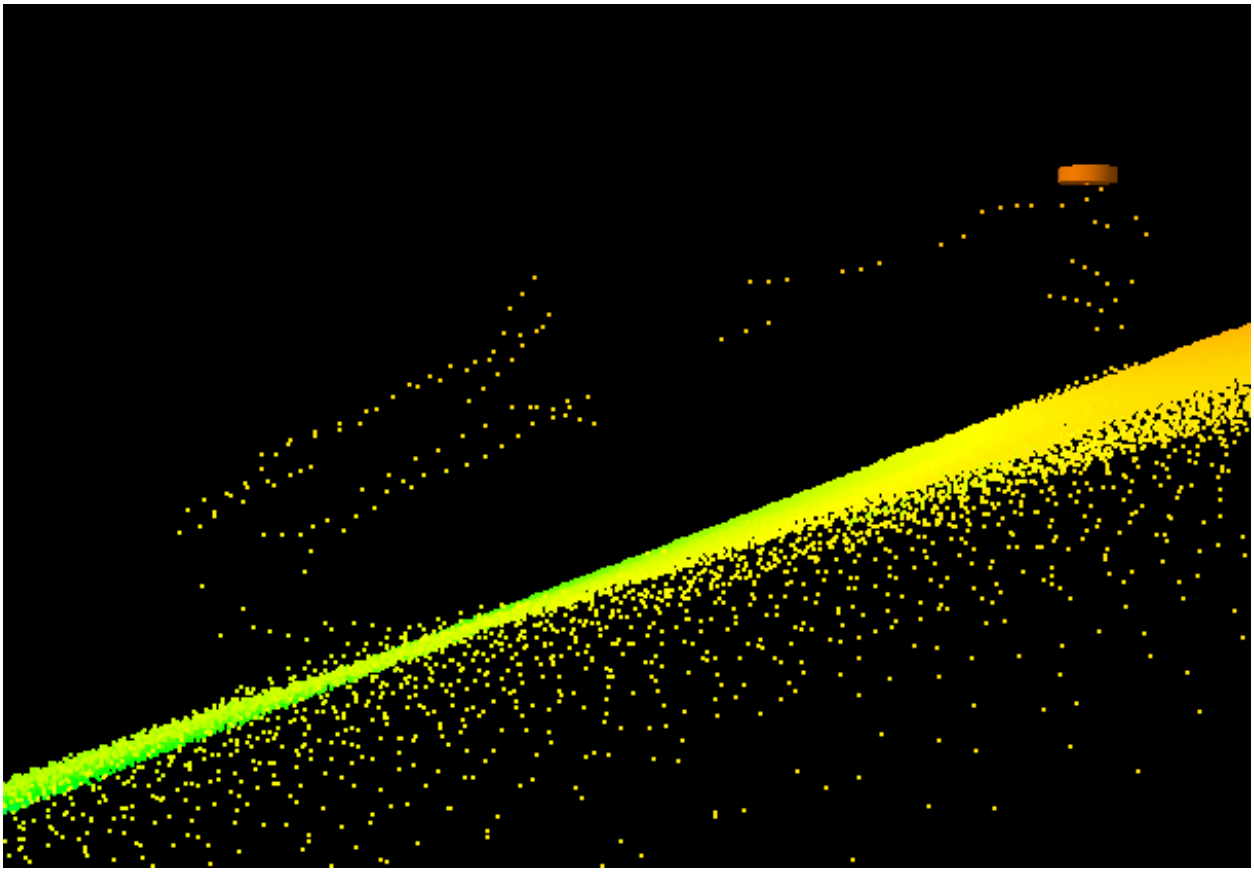


Figure 1.4.1

1.5) Profile/Beam - 1264/235 from h11826 / 2801_reson7125_hf_512beams / 2008-120 / 311_1812

Survey Summary

Survey Position: 47° 25' 43.4" N, 122° 21' 09.0" W

Least Depth: 19.61 m (= 64.33 ft = 10.722 fm = 10 fm 4.33 ft)

TPU (±1.96σ): **THU (TPEh)** ±1.964 m ; **TVU (TPEv)** ±0.250 m

Timestamp: 2008-120.18:15:09.753 (04/29/2008)

Survey Line: h11826 / 2801_reson7125_hf_512beams / 2008-120 / 311_1812

Profile/Beam: 1264/235

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

Remarks:

4.7m wreck in 20m of water. Shoalest sounding is 1m above seafloor.

Feature Correlation

Address	Feature	Range	Azimuth	Status
h11826/2801_reson7125_hf_512beams/2008-120/311_1812	1264/235	0.00	000.0	Primary

Hydrographer Recommendations

[None]

Cartographically-Rounded Depth (Affected Charts):

10 ¾fm (18448_1, 18440_1, 18003_1, 18007_1, 530_1)

10fm 4ft (18474_1, 18445_1, 18445_8)

19.6m (501_1, 50_1)

S-57 Data

Geo object 1: Wreck (WRECKS)

Attributes: CATWRK - 1:non-dangerous wreck

SORDAT - 20080430

SORIND - US,US,graph,survey H11826

VALSOU - 19.609 m

WATLEV - 3:always under water/submerged

Feature Images

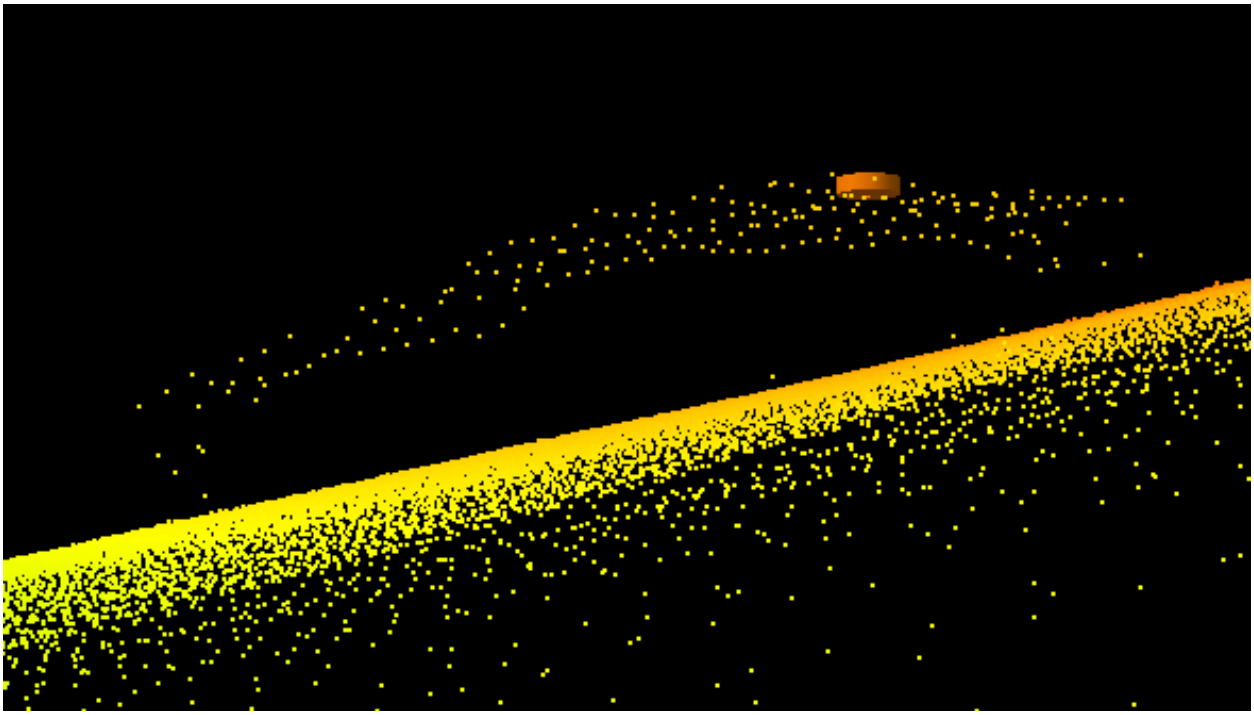


Figure 1.5.1

2.1) Profile/Beam - 2/1 from h11826 / 1021_nonechosounder_dp / 2008-114 / dp_1021_114

Survey Summary

Survey Position: 47° 25' 41.2" N, 122° 21' 03.0" W

Least Depth: 0.20 m (= 0.64 ft = 0.107 fm = 0 fm 0.64 ft)

TPU (±1.96σ): **THU (TPEh)** [None] ; **TVU (TPEv)** [None]

Timestamp: 2008-114.20:49:39.000 (04/23/2008)

DP Dataset: h11826 / 1021_nonechosounder_dp / 2008-114 / dp_1021_114

Profile/Beam: 2/1

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

Remarks:

sailboat, on shore, always dry

Feature Correlation

Address	Feature	Range	Azimuth	Status
h11826/1021_nonechosounder_dp/2008-114/dp_1021_114	2/1	0.00	000.0	Primary

Hydrographer Recommendations

wreck on shore, may be useful for navigation, recommend wreck added to chart

Cartographically-Rounded Depth (Affected Charts):

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

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

.2m (501_1, 50_1)

S-57 Data

Geo object 1: Wreck (WRECKS)

Attributes: CATWRK - 1:non-dangerous wreck

SORDAT - 2008421

SORIND - US,US,graph,survey H11826

STATUS - 1:permanent

VALSOU - 0.195 m

WATLEV - 2:always dry

Feature Images

Figure 2.1.1

UNITED STATES DEPARMENT 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: H11826

LOCALITY: Three Point to Robinson Point, Colvos Passage, WA
TIME PERIOD: April 15 - 30, 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

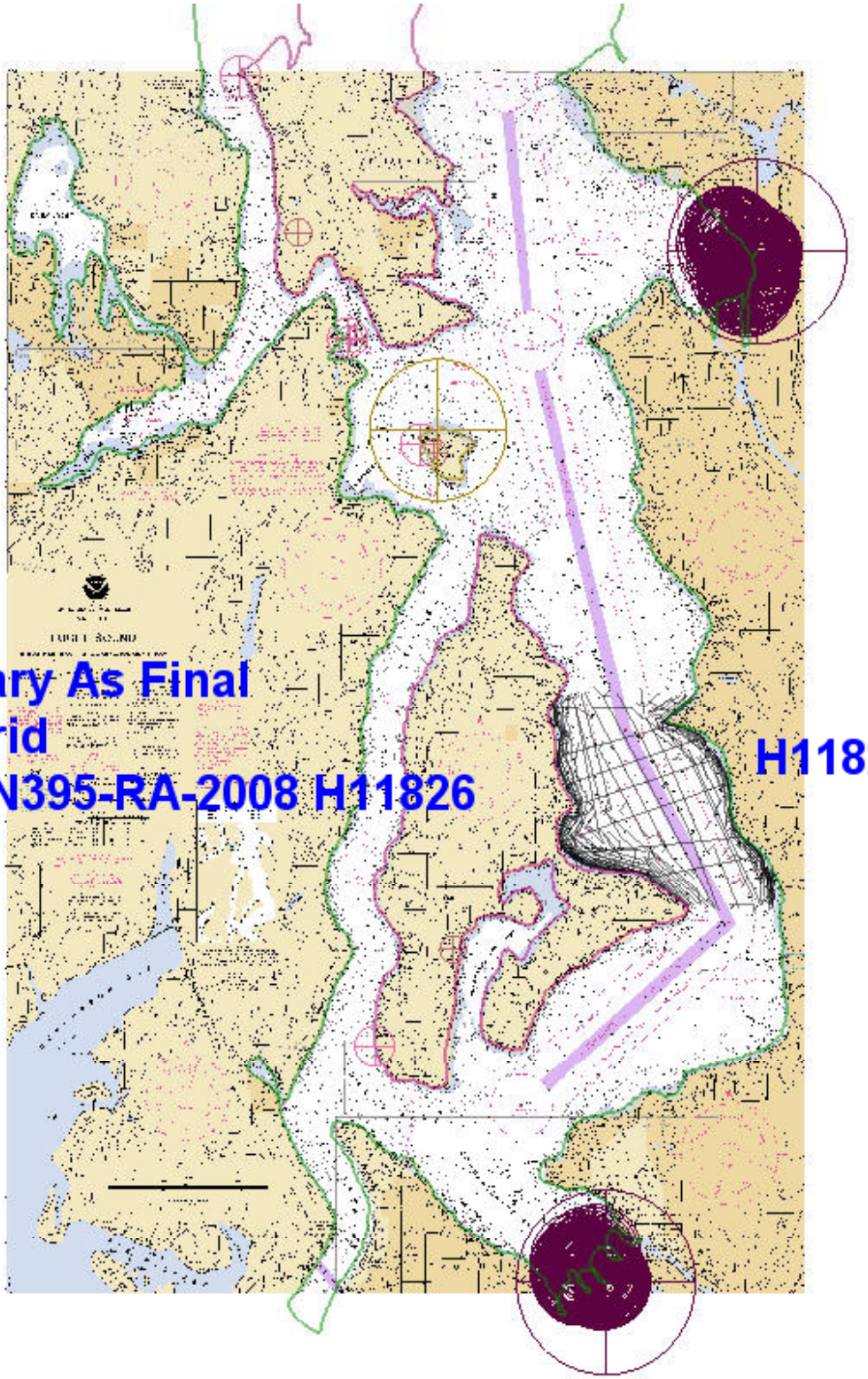
REMARKS: RECOMMENDED ZONING

Please use the TCARI grid "N395RA2008-TCARI.tc" submitted with the project instructions as the final grid for project OPR-N395-RA-2008, H11826, during the time period between April 15 - 30, 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).

_____
CHIEF, PRODUCTS AND SERVICES DIVISION



Preliminary As Final
TCARI Grid
for OPR-N395-RA-2008 H11826

H11826

H11826 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 ENCs and RNCs in the region: NOAA RNC, 18474 (1:40,000) and corresponding NOAA ENC, US5WA18M. (See section 4. Meta Areas.)

HCell compilation of survey H11826 utilized Office of Coast Survey DRAFT HCell Specifications Version 4.0. For additional information on the standards and protocols used for HCell Compilation, see the DRAFT A/PHB HCell Reference Guide, version 2.0, March 17th, 2010.

1. Compilation Scale

Depths for HCell H11826 were compiled to the largest scale charts in the region, 18474_1 (1:40,000). The density and distribution of soundings from H11826 were selected to emulate the distribution on these charts. Non-bathymetric features have been generalized to chart scale.

2. Soundings

A survey-scale sounding (SOUNDG) feature object layer was built from the H11826_Office_8m Combined Surface in CARIS BASE Editor. A shoal-biased selection was made at 1:10,000 survey scale using a Radius Table file with values shown in the table, below. The resultant sounding layer contains 17,990 depths ranging from 0 to 133 meters.

Shoal Limit (m)	Deep Limit (m)	Radius (mm)
-4.7	10	3
10	20	4
20	50	4.5
50	250	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 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 from Chart 18474	Metric Equivalent to Chart Fathoms, Arithmetically Rounded	Metric Equivalent of Chart Fathoms, with NOAA Rounding Applied	Fathoms with NOAA Rounding Applied	Fathoms with NOAA Rounding Removed for Display on H11826_SS.000
0	0	0.000	0.000	0
1	1.8288	2.0574	1.125	1
3	5.4864	5.715	3.125	3
5	9.144	0.144	5.125	5
10	18.288	18.517	10.125	10
20	36.576	37.9476	20.750	20
30	54.864	56.236	30.750	30
40	73.152	74.5236	40.750	40
50	91.44	92.812	50.750	50
100	182.88	184.2516	100.750	100

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 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 MLLW contour, to bring the MLLW into agreement with H11826 hydrography, necessitated inclusion of several “0” DEPCNT features in the HCell. These 0 value contours have been generalized per the chart above.

4. Meta Areas

The following Meta object areas are included in HCell H11826:

M_QUAL

The Meta area object was 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 have been 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 are 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 H11826 were delivered from the field in four 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 H11826 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.

6. S-57 Objects and Attributes

The *_CS HCell contains the following Objects:

$CSYMB	Blue Notes
M_QUAL	Data quality Meta object
OBSTRN	Obstructions
PILPNT	Piles
$LINES	Pipeline, sewer
SBDARE	Bottom samples and rocky seabed areas
SOUNDG	Soundings at the chart scale density
UWTROC	Rocks
WRECKS	Wrecks

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 and $LINES for linear bluenotes on new pipeline 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 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 H11826

H11826 junctions with H11827 to the north and H11646 to the south. A junction was not made because the two surveys have not been compiled. The junction will be discussed in the Descriptive Reports for survey H11827 and H11646.

10. QA/QC and ENC Validation Checks

H11826 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

H11826_CS.000	Base Cell File, Chart Units, Soundings and features compiled to 1:40,000
H11826_SS.000	Base Cell File, Chart Units, Soundings and Contours compiled to 1:10,000
H11826_DR.pdf	Descriptive Report including end notes compiled during office processing and certification, the HCell Report, and supplemental items
H11826_outline.gml H11826_outline.xsd	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 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.
Northport 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:

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Cartographer
Pacific Hydrographic Branch
Seattle, WA
206-526-6883
Russ.Davies @noaa.gov

APPROVAL SHEET
H11826

Initial Approvals:

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

Digitally signed by Russ Davies
Date: 2010.06.14 16:27:25 -07'00'

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.

Katie Reser
2010.06.15
08:11:31 -07'00'

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.

Gary C. Nelson
2010.06.15
09:11:24 -07'00'

Lucy Hick
AWOIS & SURF
Check Complete
2010.06.17 16:35:00 -04'00'