

H11646

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. RA-10-03-08

Registry No. H11646

LOCALITY

State Washington

General Locality Colvos Passage and Vicinity

Sublocality Robinson Point to Dash Point

2008

CHIEF OF PARTY

Commander Donald W. Haines, NOAA

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DATE

HYDROGRAPHIC TITLE SHEET

H11646

INSTRUCTIONS - The hydrographic sheet should be accompanied by this form,
filled in as completely as possible, when the sheet is forwarded to the office.

FIELD NO.

RA-10-03-08

State WashingtonGeneral Locality Colvos Passage and VicinitySublocality Robinson Point to Dash PointScale 1:10,000Date of Survey 4/10/2008 - 4/30/2008Instructions Dated 4/4/2008Project No. OPR-N395-RA-08Vessel RA1(1101), RA3(1021), RA4(2801), RA5(2802)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/ASAR by K. Toepfer Automated plot by N/ACompilation by R. DaviesSoundings in Fathoms and Feet at MLLWREMARKS: Time in UTC. UTM Projection Zone 10Revisions and annotations appearing as endnotes weregenerated during office processing.As a result, page numbering may be interrupted or non-sequentialAll separates are filed with the hydrographic data.

Descriptive Report to Accompany Hydrographic Survey H11646

Project OPR-N395-RA-08
Colvos Passage and Vicinity, Washington
Robinson Point to Dash Point
Scale 1:10,000
April-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 and all other applicable direction¹, with the exception of deviations noted in this report. The survey area, Robinson Point to Dash Point, is a highly-trafficked area between West Seattle and Tacoma governed by a traffic separation scheme. Being the main route for deep-draft vessels and tug boats into Tacoma, with aging sounding data, and frequent seismic activity, this area has been designated an Emerging Critical Area. The southwestern corner of the survey area includes the precautionary zone marking the termination of the separation zone before reaching Commencement Bay and Tacoma harbor. This survey corresponds to sheet "E" in the sheet layout provided with the Letter Instructions. 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, except as noted in this report. Total mileage acquired by each vessel and system is referenced in Table 1.

Limited Shoreline Verification was performed for the survey area.

¹ 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 the dates of acquisition.

Data Acquisition Type	Hull Number with Mileage (nm)					Total
	1101	1103	1021	2801	2802	
MBES (mainscheme)	-	-	27.20	91.63	72.02	190.85
Crosslines	-	-	-	16.78	-	16.78
Developments	-	-	-	1.68	-	1.68
Shoreline	24.65	-	-	-	-	24.65
Bottom Samples	-	-	-	-	-	0
Total Number of Items Investigated	-	-	-	-	-	4
Total Area Surveyed (sq. nm)	-	-	-	-	-	16.28

Table 1: Statistics for survey H11646

Data acquisition was conducted from April 10 to April 30, 2008 (DN 101 to 121).

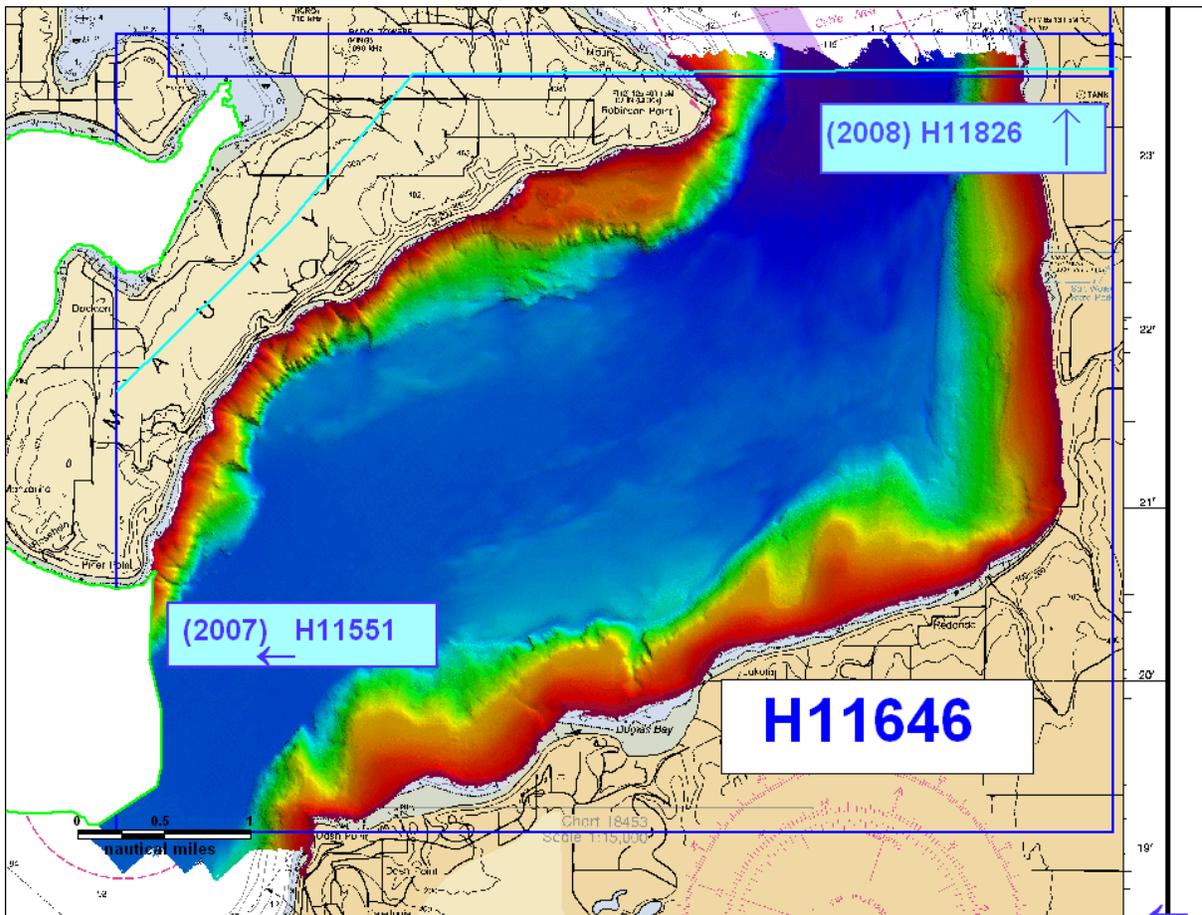


Figure 1. H11646 Survey Limits (Chart 18474).

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
2802	RA-5	Multibeam Echosounder

Table 2. Data Acquisition Vessels for H11646.

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

Multi-Beam Echosounder (MBES) crosslines totaled 16.78 nautical miles, comprising 7.16% 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 ranging between 0.0 and 0.25 meters. 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 survey junctions with H11646 (See Figure 1): ³

<u>Registry #</u>	<u>Scale</u>	<u>Date</u>	<u>Junction side</u>
H11551	1:10,000	2007	Southwest
H11826	1:10,000	2008	North

H11551

Survey H11551 was completed by RAINIER in 2007 and the resulting HDCS data were still archived onboard. The data were manually compared to survey H11646 in CARIS HIPS subset mode. The junction data agree well in shallow water, but greater offsets were seen with increasing depth. In shallow water where the greatest slopes and terrain were surveyed, the data agree within 0.25 meters. The maximum offsets were found to reach 1.5 meters in water depths of 180 meters in the outer beams of the ELAC multibeam echosounder used for the deep collection of H11551 survey data. This large offset should be attributed to differences between the quantity and quality of data acquired with the ELAC and Reson 7125.

H11826

Survey H11826 was conducted concurrently with H11646 so the HDCS data were available onboard. H11646 data were manually compared to survey H11826 in CARIS HIPS subset mode. The junction between these two surveys showed excellent agreement. At all depths and varying slopes of the bottom, differences were less than 0.1 meters.

Data Quality Factors

Horizontal Offsets

Horizontal offsets were seen in the steep slopes along the edges of the survey area. The vertical offsets resulting from horizontal offset of the lines' positions ranged from 0.2 to 0.5 meters. The variation in POS MV's stated horizontal accuracy (up to 2 meters) became apparent on the steep gradients found near the shore. The BASE surface was affected in these areas of steep slope; however, due to the slope, such offsets are cartographically insignificant.

⁴ See Figure 2 below.



Figure 2: Example of horizontal positioning offsets seen in sloping areas near the shore.

Reson 7125 High Frequency Slope Noise

There was considerable downslope noise seen in data from the Reson 7125 High Frequency system when surveying the steep slopes of the survey area. This noise was significantly cleaned to limit its affect on the BASE surface, but there are still some noticeable vertical 'strings' and offsets in the data. Correspondence with Reson indicates that this noise may be a flaw in the 7125 bottom detect algorithm. This issue is being researched at the time of this writing. The BASE surface deviations are cartographically insignificant due to the steep slope in the area. ⁵ See Figures 3 through 5.

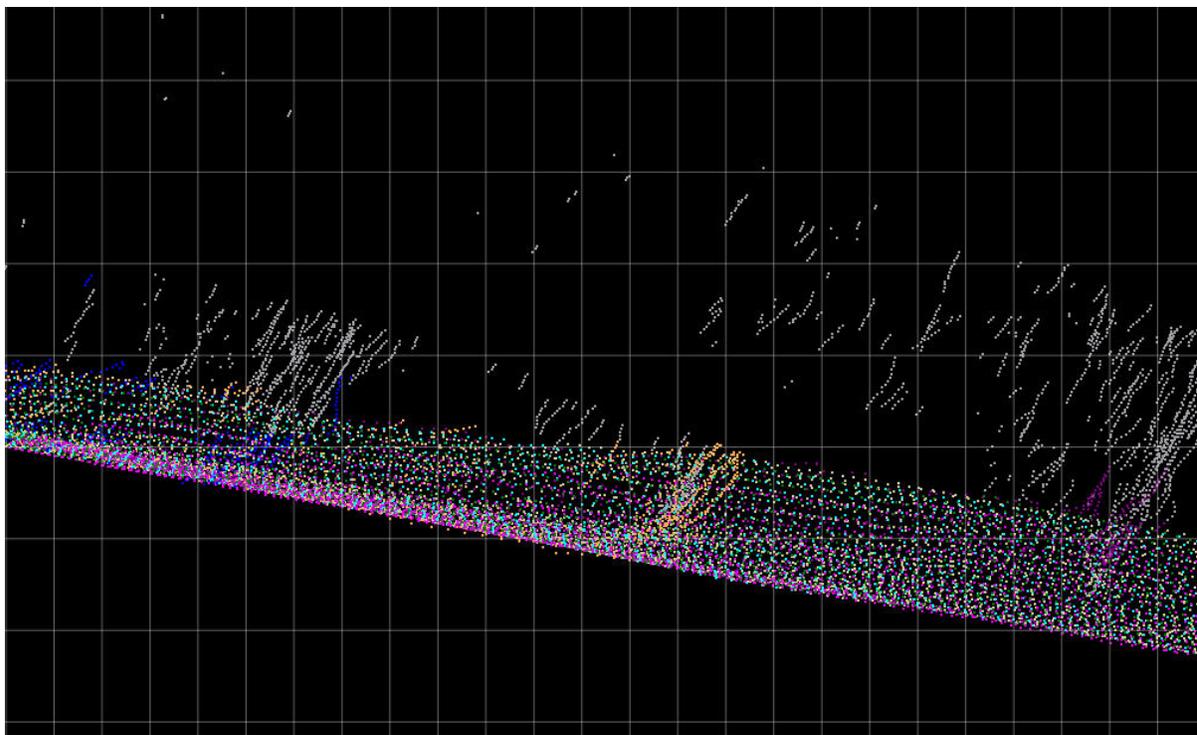


Figure 3: Example of Reson 7125 high frequency downslope noise with 'strings'.

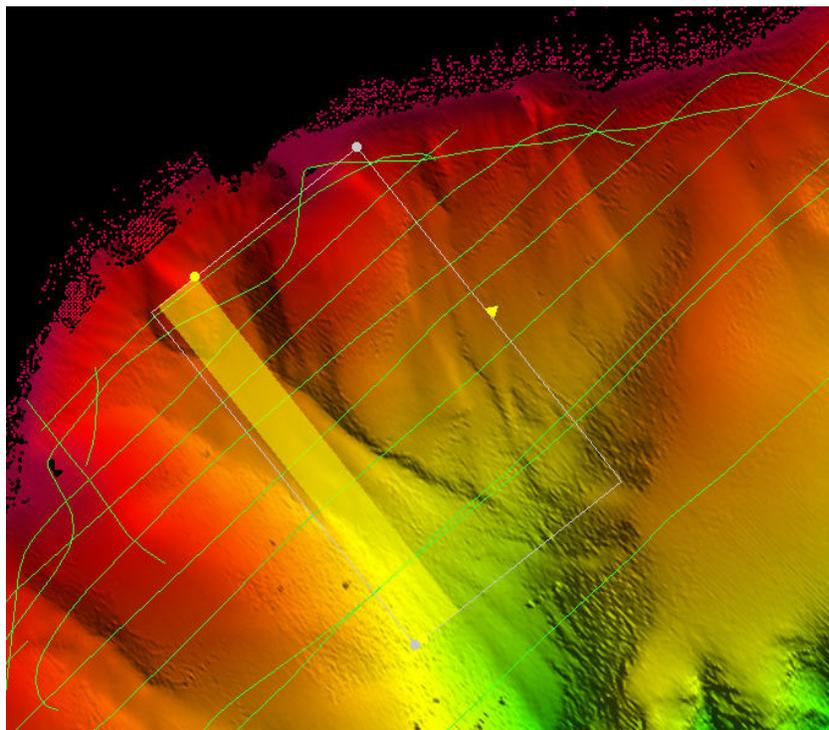


Figure 4: The 1m surface of the 'string' downslope noise from Figure 3 above in HIPS subset editor mode.



Figure 5: Another example of Reson 7125 downslope noise from outer beams.

High Caris TPE Values from Tilted 8125 data

Launch 1101's (RA-1) Reson 8125 sonar head is tilted 30 deg to starboard to allow for more efficient and more complete multibeam coverage in the near-shore area. See DAPR for more information on vessel configuration. The outer beams on the starboard side of the 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 from 2 to 10 m, typically in less than 8 m of water depth. Although expected to be higher due to a more oblique angle and beam spreading, the TPE values as calculated by Caris 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 m. The Hydrographer feels that these high TPE values are due to Caris' model of TPE calculation and do not reflect the 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 be 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. ⁶

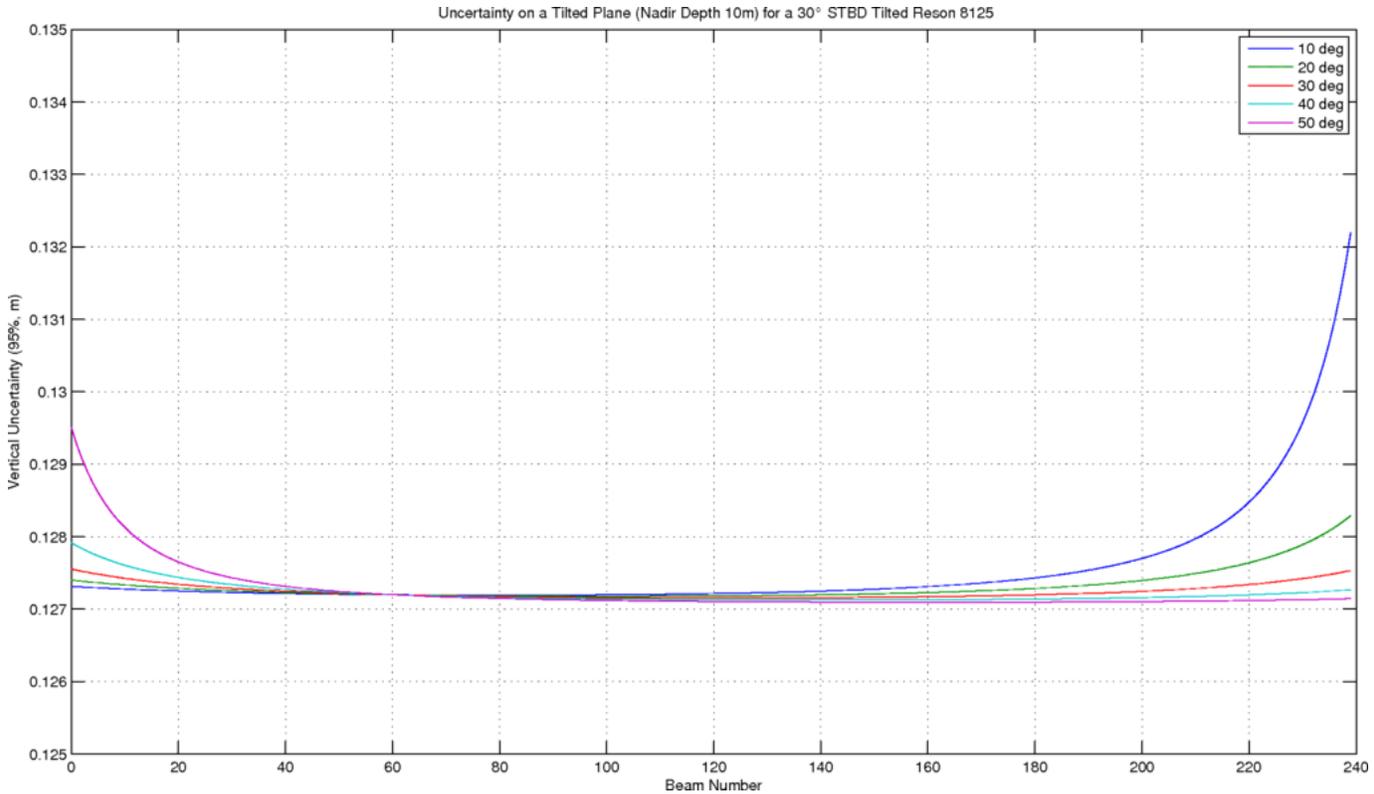


Figure 6: STBD-Tilted Reson 8125 vertical uncertainty on a tilted plane.

Roll Error Caused by Unstable Swing Arm Mount

Data acquired on Launch 1021 (RA-3) were found to have significant static roll offsets (see Figure 7). DN105 in particular had offsets that were causing errors in the BASE surface. Figure 8 shows the roll error at a 1 meter resolution, but at the appropriate resolution for the depth of the water (4 m) (Figure 9) the error is negligible. The HVF for DN105 was adjusted to account for the roll error and all surfaces recomputed. See the DAPR for more details on this issue.

The roll offset seen on DN 105 of acquisition can be attributed to the current mount of the Reson 8101: the sonar head is mounted on an extendable arm that is retracted and extended for use on each survey day. This configuration, although stable throughout a survey day, can change from day to day. The survey team onboard RAINIER is working to create a new standard so that positioning of the swing arm can become more constant and predictable.

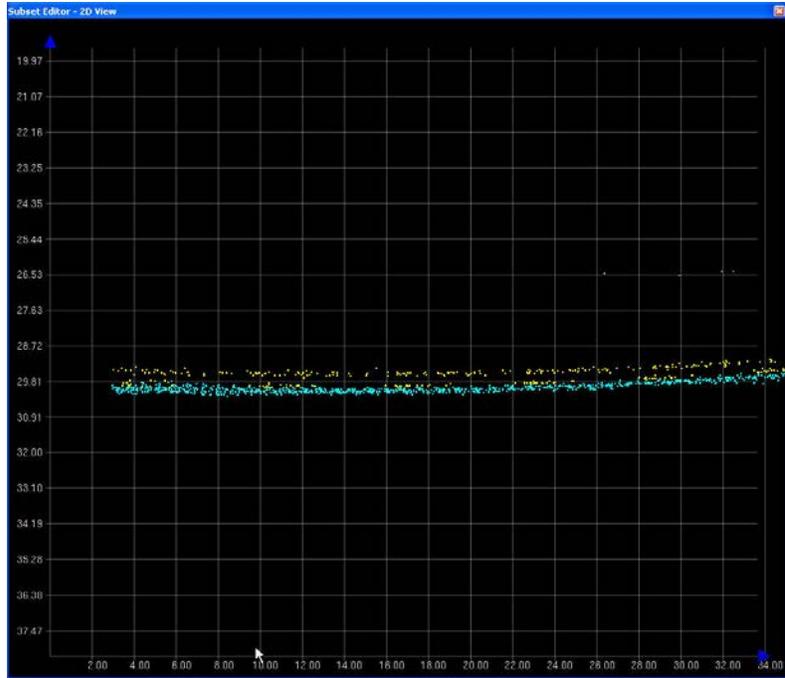


Figure 7: Roll error seen on DN105 from RA-3 swing arm.

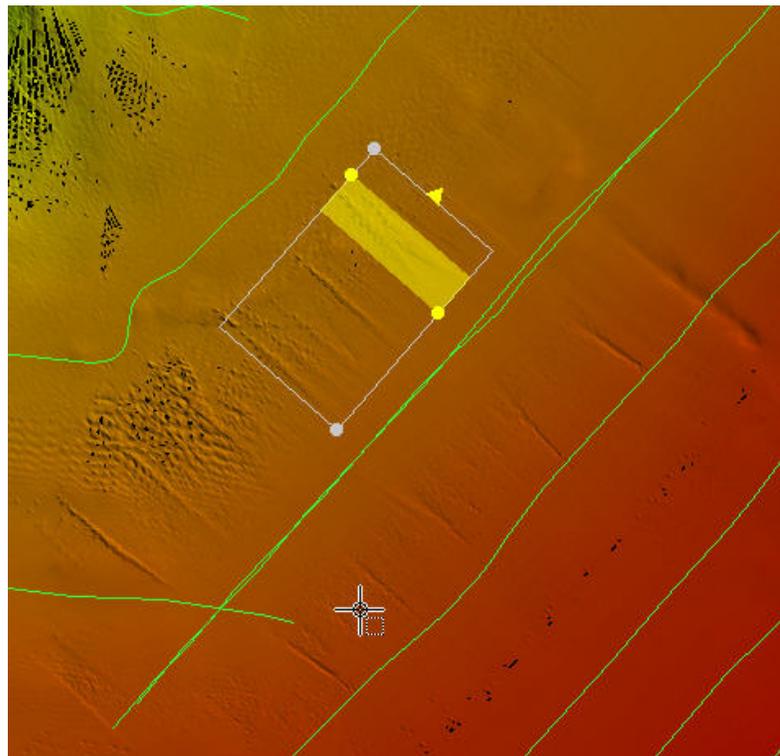


Figure 8: DN105 roll error viewed at a 1 meter resolution.

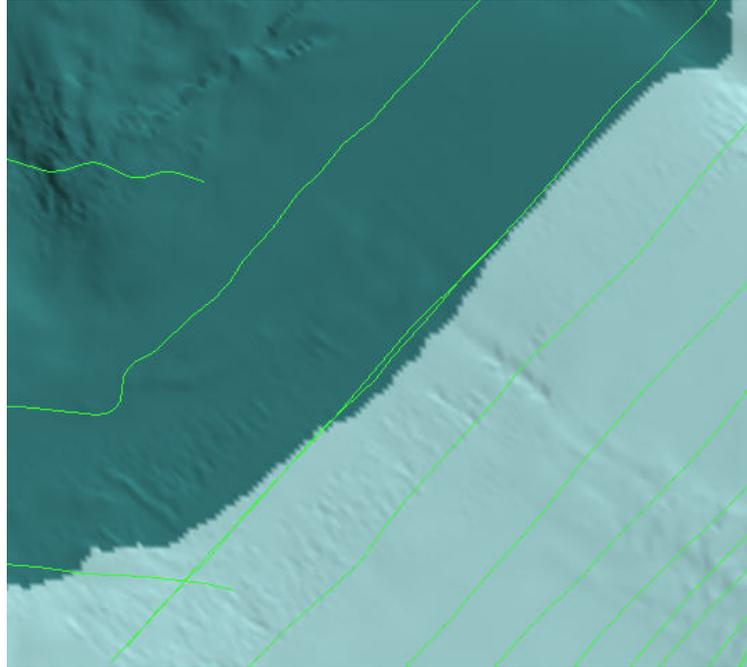


Figure 9: DN 105 roll error viewed in its appropriate resolution – 4 meters.

Holidays and Inshore Coverage Deficiencies

Small holidays and sparse data exist along the shore of survey H11646. Many areas had a number of the data quality factors mentioned above. Data that were significantly affecting the surfaces were rejected, leaving gaps in coverage. The sparse data are due to the increased beam spacing and range scale (and therefore, decreased ping rate) associated with the tilted Reson 8125 configuration. Although vessel speed was reduced to compensate for the decreased ping rate, data remain sparse. All sparse data fall into the 4-8m depth range where complete multibeam coverage is not required by the project instructions. Although the data is sparse, they are considerably more dense than would be achieved by 25 meter line spacing in the 4-8 meter depth regime.

Although some holidays in survey H11646 exceed specification of 3 nodes or less, there were no indications of features in the areas and the Hydrographer recommends that acquired data be used to supersede charted depths. See Figure 10 below. ⁷

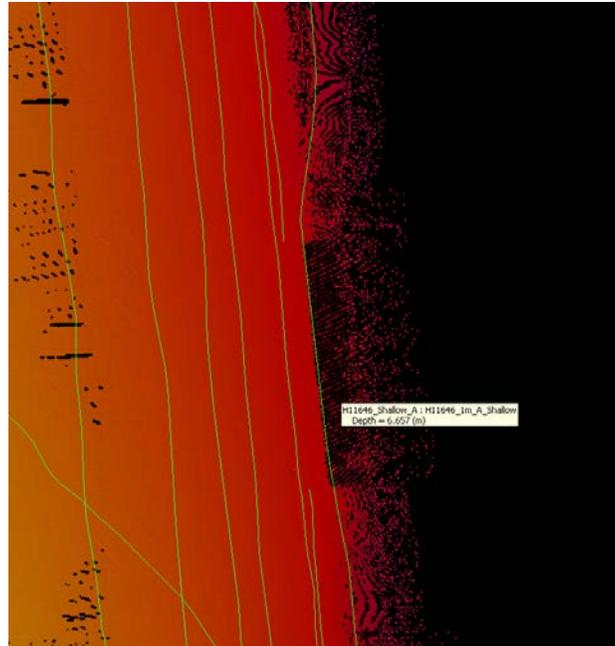


Figure 10: Sparse coverage in H11646 1m coverage.

B3. Data Reduction

Data reduction procedures for survey H11646 conform to those detailed in the *OPR-N395-RA-08 DAPR*.

B4. Data Representation

Many BASE surfaces were used in processing H11646. Final BASE surface resolutions and depth ranges were set to most accurately represent the seafloor with field sheets smaller than 25×10^6 nodes. In an effort to reduce fliers in the surfaces created in the overlapping areas of field sheets, the easting and northing values of the northwest and southeast corners of each field sheet were modified to be evenly divisible by 16. This modification allows the nodes on multiple field sheets to have the same geographic positions and use the same hypotheses to compute their surfaces, reducing the fliers at the junction of field sheets. The Hydrographer recommends using the same methodology for any further field sheet creation for computations with H11646's data.

CUBE surfaces processed at one meter resolution were computed using "Shallow" CUBE parameters. All other surfaces with resolutions from two to eight meters used "Deep" CUBE parameters. The submission Field Sheet and BASE Surface structure are shown in Figures 11, 12, and 13.

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.

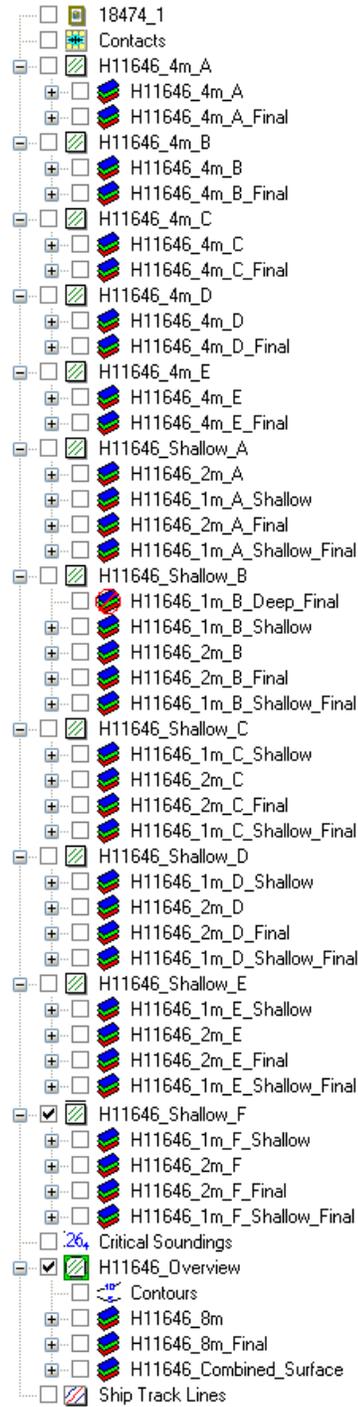


Figure 11: Field sheets and BASE surfaces submitted with H11646.

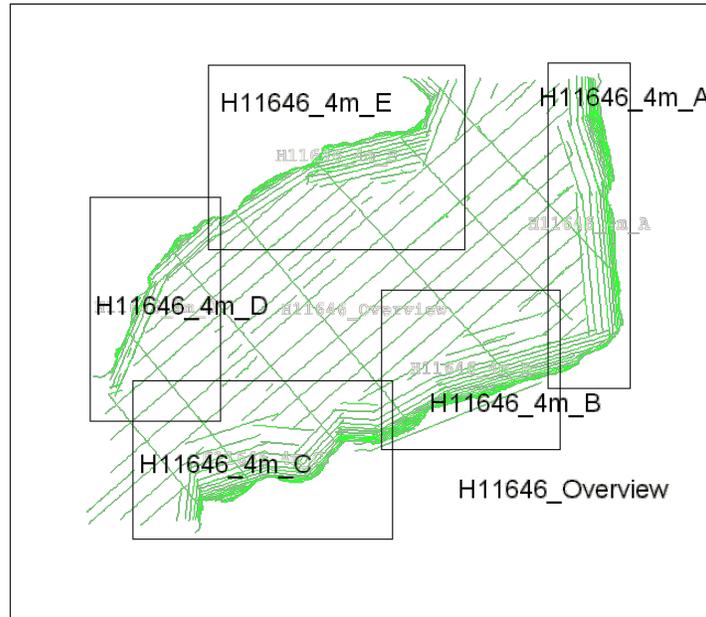


Figure 12: Representation of the 8 and 4 meter field sheets created for H11646.

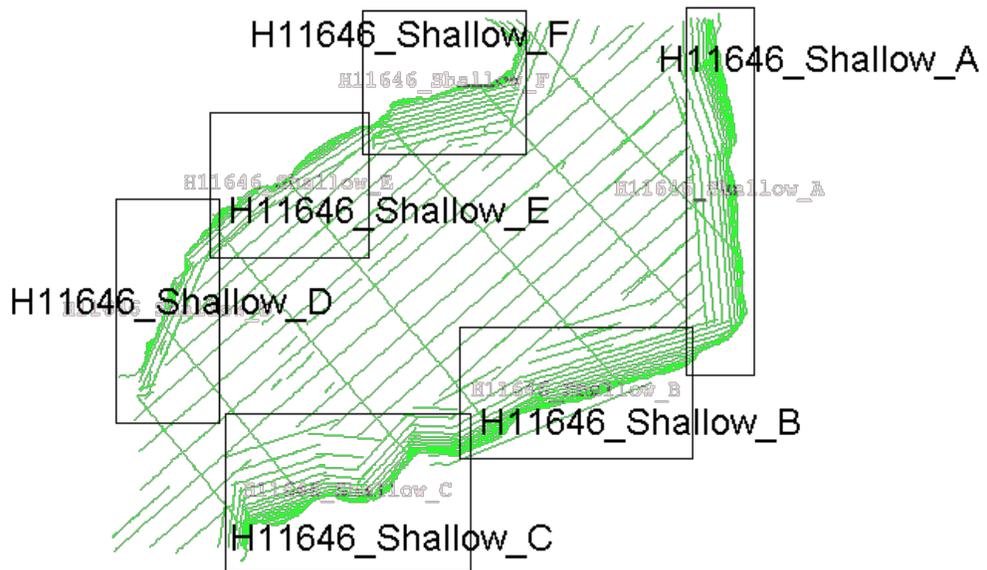


Figure 13: Representation of H11646's field sheets which contain the 1 and 2 meter surfaces.

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: H11646 Differential Corrector Source

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 Tacoma, WA (944-6484) and Seattle, WA (944-7130) served as control for datum determination and as the primary source for water level reducers for survey H11646. 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 H11646 was submitted to CO-OPS on 2 May 2008 and the Final Tide Note was received on 14 May 2008. This documentation is included in Appendix IV. ⁸

D. RESULTS AND RECOMMENDATIONS

D.1. Chart Comparison

D.1.a. Survey Agreement with Chart

Survey H11646 was compared with the following charts⁹:

Chart	Scale	Edition and Date	Local Notice to Mariners Applied Through
18474	1:10,000	8 th Ed, Oct 2003	03/08/2008

Table 4: Charts compared with H11646

Chart 18474

The bathymetry correlated well with the charted depths in the deeper, flat areas of the H11646 survey area. Most differences recorded in depths greater than 50 fathoms only differed by 1-2 fathoms. The two major exceptions were found at the southern end of the traffic separation scheme and near Robinson Point. At the southern end of the traffic separation scheme three depths are charted deeper than the bathymetry indicates. Around Robinson Point several charted depths were found to differ from survey soundings by greater than 2 fathoms.

In water less than 50 fathoms where the terrain is variable and slopes are steep, more differences in chart depths were found. Most changes were less than 2 fathoms, but several depths spread throughout the survey area showed greater differences. Overall, the area north of Poverty Bay was deeper than charted. East of Piner Point, the depths were found to be deeper than previously charted. Also, northeast of Dash Point there were numerous survey soundings that were shoaler than previous charted depths.

In the traffic separation scheme southbound, there were four survey soundings found to be more than two fathoms shoaler than charted; one of these had a difference of more than three fathoms. In the northbound lane, one survey sounding near Dash Point was found to be three fathoms shallower than the chart indicated. All survey soundings within the separation zone and precautionary area at the southern edge of the sheet were within two fathoms of chart depths. All discrepancies can be seen below in Figure 14.¹⁰

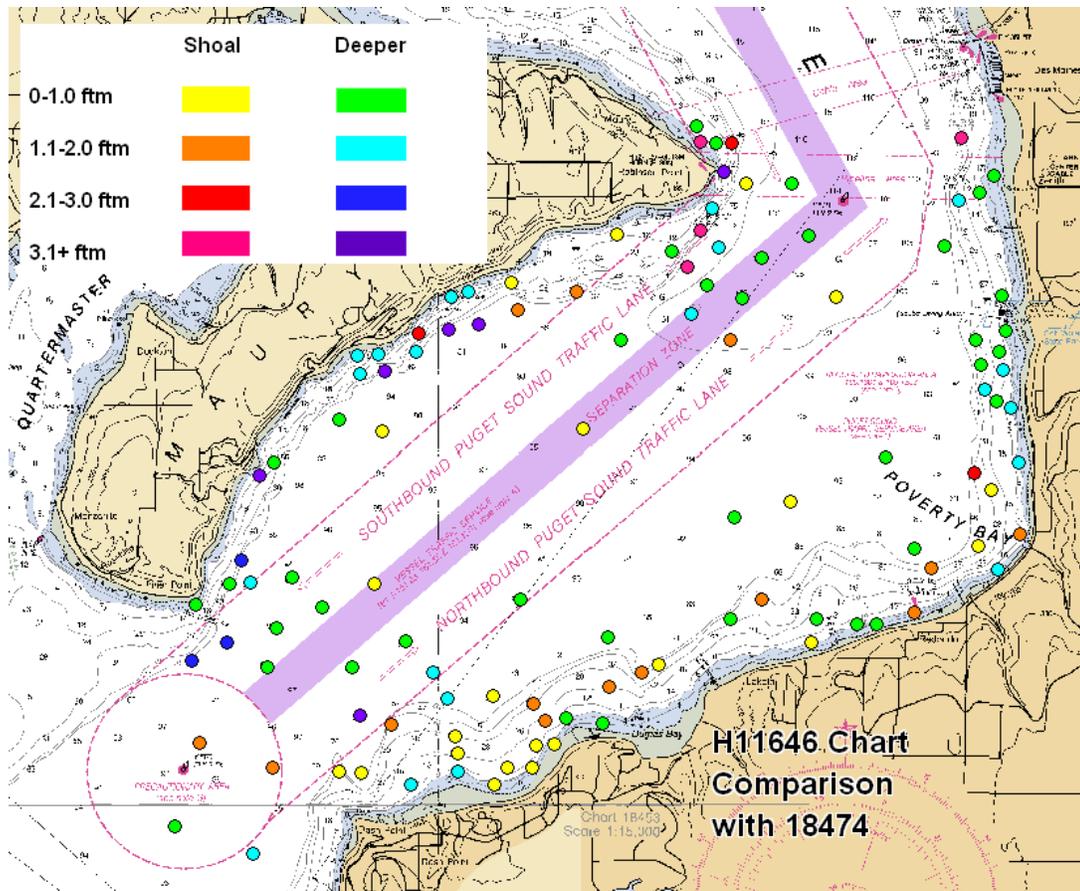


Figure 14: Comparison of charted soundings with bathymetry. The differences between the chart and survey data in fathoms are highlighted in different colors. Soundings with no change have been left blank.

Depth curves matched fairly well with acquired data. No major uncharted shoal areas were discovered. The shoals that do exist were charted more conservatively than was observed in the data. The greatest difference in depth curves was 50 fathoms, (conservatively charted) in an area of steep sides and varied terrain.

Discrepancies between charted depths and survey soundings can be attributed to increased bottom coverage techniques and more accurate horizontal positioning since last surveyed.¹¹

The Hydrographer recommends that survey soundings supersede all prior survey and charted depths in the survey area of H11646.¹²

D.1.b. Dangers to Navigation

No dangers to navigation (DTONs) were found in survey H11646. ¹³

D.1.c. Other Features

Automated Wreck and Obstruction Information System (AWOIS) Investigations

Eight (8) AWOIS items fall the within the survey limits of H11646. All of these were assigned for full investigation. Descriptions of each AWOIS item investigation are included in the Survey Feature Report in Appendix II. ¹⁴

Additional Items

Two new non-hazardous wrecks were found on sheet H11646. The first wreck is located approximately two nautical miles southwest of Robinson Point (See Figure 15 below). The uncharted wreck is 14 meters in length with a least depth of 15.86 meters in 16.58 meters of water. The second wreck is located approximately two nautical miles north of Piner Point, near a charted pier (See Figures 16 and 17 below). The location of the pier was verified during shoreline acquisition. This second wreck is approximately 11 meters in length with a least depth of 12.32 meters in approximately 14 meters of water and is located approximately 8 meters from the support pilings of the pier. Due to the location of the feature and the depth, the Hydrographer recommends retaining the pier as charted and also charting the wreck with a least depth of 12.32 meters. See H11646 Feature Report for additional remarks and recommendations. ¹⁵

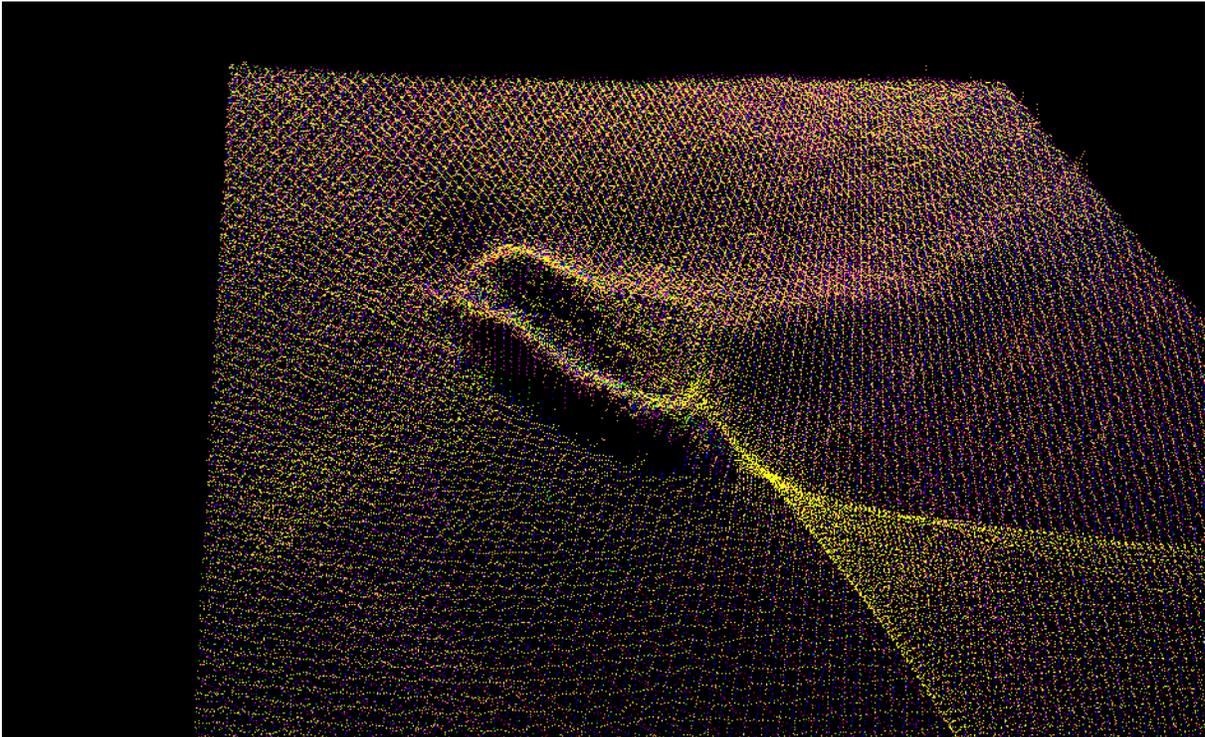


Figure 15: Image of wreck discovered approx. 2 nm south of Robinson Point.

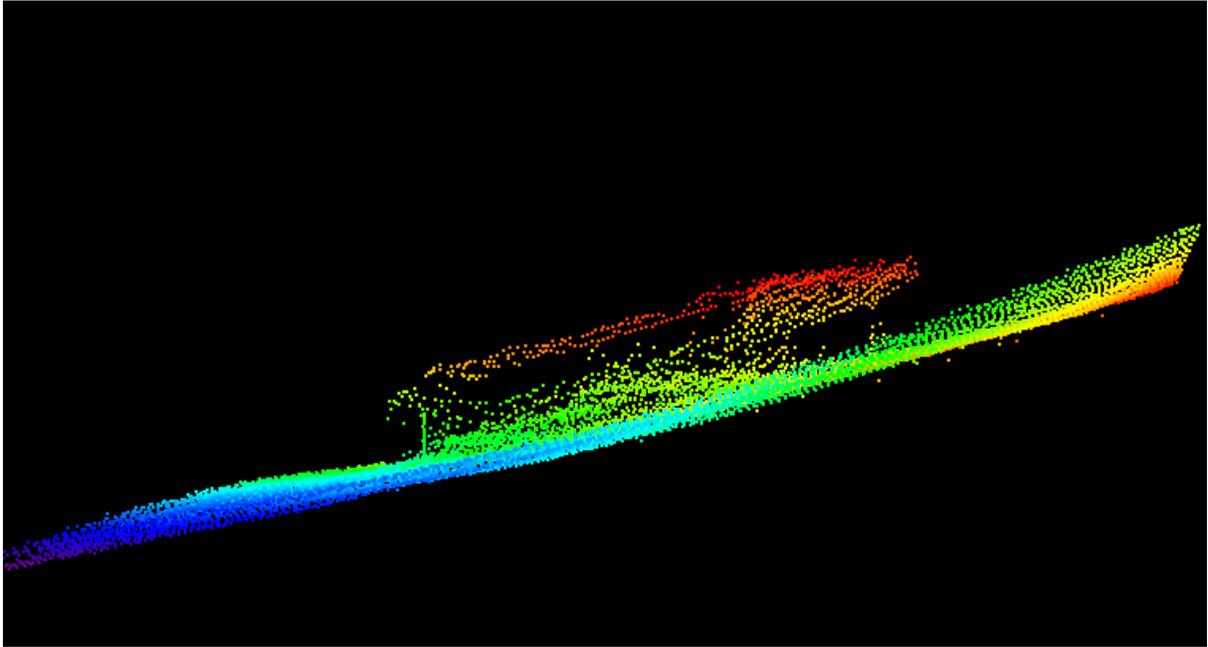


Figure 16: Profile view of southern wreck found approx. 2 nm north of Piner Point

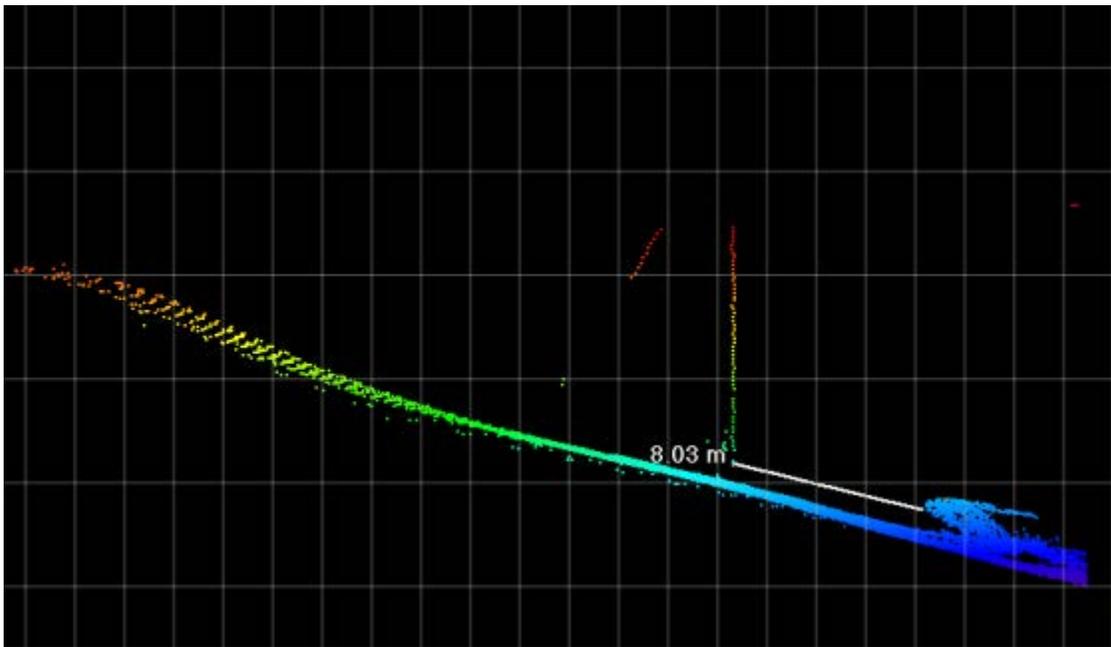


Figure 17: The southern wreck with distance from pier support pilings indicated.

Additional features investigated within the limits of H11646 are described in the Survey Feature Report in Appendix II. ¹⁶

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 predicted low water in accordance with the Specifications and Deliverables and FPM Section 3.4.6.1.2.

Detached positions (DPs) acquired during shoreline verification were recorded in HYPACK and on DP forms, processed in Pydro, and then translated into Caris Notebook. These indicate revisions to features and features not found on the verified shoreline. In addition, annotations describing shoreline were recorded on hard copy plots of digital shoreline, and transferred into the ‘remarks’ attribute on the corresponding features in Notebook. DP forms are included in the Detached Positions subdirectory Separates I. ¹⁷

All shoreline data is submitted in Caris Notebook .hob files. The session H11646_Notebook contains the following:

HOB File	Purpose and Contents
H11646_Comp_Source.hob	Original Source Data as filtered to the limits of survey H11646 from ENC cell US5WA18M and US5WA22M.
H11646_Reference.hob	Survey outline and limit lines, and AWOIS item positions and radii.
H11646_Field_Verified.hob	Field verified source features and shoreline, including Edits and updates not requiring DPs.
H11646_Deleted_Source.hob	Items removed from the field verified composite source requiring removal from chart.

Table 5. List and Description of Notebook HOB files.

The *H11646_Field_Verified* layer depicts the shoreline as surveyed. This layer also includes a marker layer containing additional comments and information about features that were modified. The *H11646_Deleted_Source* layer is comprised of features that were disproved during shoreline investigation and MBES acquisition. These features should be removed from the chart.

Source Shoreline Changes and New Features

Items for survey H11646 that require further discussion and are associated with a detached position, have been flagged “Report” in Pydro in H11646_PSS.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. ¹⁸

Recommendations

The Hydrographer recommends that the shoreline as depicted in the Notebook .HOB files supersede and complement shoreline information compiled on the CFF and charts as described above. ¹⁹

D.2.c. Aids to Navigation

All aids to navigation (ATONs) were found to be correctly charted and serve their intended purpose. ²⁰

D.2.d. Overhead Features

There are no overhead features within the limits of survey H11646. ²¹

D.2.e. Submarine Cables and Pipelines

Survey H11646 includes several charted cable and pipeline areas, as shown in Figure 18. Each area is discussed separately below:

Lakota Sewer

A single pipeline was observed in the multibeam echosounder data approximately 390 meters northeast of the charted location of the sewer on the Lakota area shore. The bathymetry at the charted location of the sewer showed no evidence of the presence of a sewer or pipeline of any kind. The extent of the known location of the sewer line is the NALL line. The position of the pipeline inshore of the NALL line has been extrapolated by the Hydrographer based on the collected bathymetry. The point of entry was not noted during shoreline acquisition. The Hydrographer recommends modifying the charted sewer line to follow the path of the sewer located in survey H11646’s Notebook .hob files. ²²

Redondo Sewer

The sewer line located near Redondo was not seen in its charted location in the collected multibeam bathymetry. The sewer pipeline’s location was found approximately 150 meters northeast of the charted position with approximately the same offshore extents. The inshore limit of the known location of the sewer pipe is the NALL line. The position of the pipeline inshore of the NALL line has been extrapolated by the Hydrographer based on the bathymetry

acquired. The pipeline’s point of entry was not noted during shoreline acquisition. The Hydrographer recommends modifying the charted sewer line to follow the path of the sewer located in survey H11646’s Notebook .hob files. ²³

Zenith to Robinson Point Pipeline area

One trench was located in the bathymetry extending from the shore of the Zenith area towards Robinson Point within the charted cable area. The Hydrographer recommends retaining the cable area as charted. ²⁴

Saltwater State Park Sewer

The sewer line at Saltwater State Park was not seen in the bathymetry collected in the area. Multibeam coverage was collected to a depth of 3.5 meters in this area with the tilted multibeam echosounder. No other indications of a sewer or buried pipeline exist in the bathymetry, but the existence of this sewer was not disproved during shoreline investigation. Due to the limited information available on this feature, the Hydrographer recommends retaining the sewer as charted. ²⁵

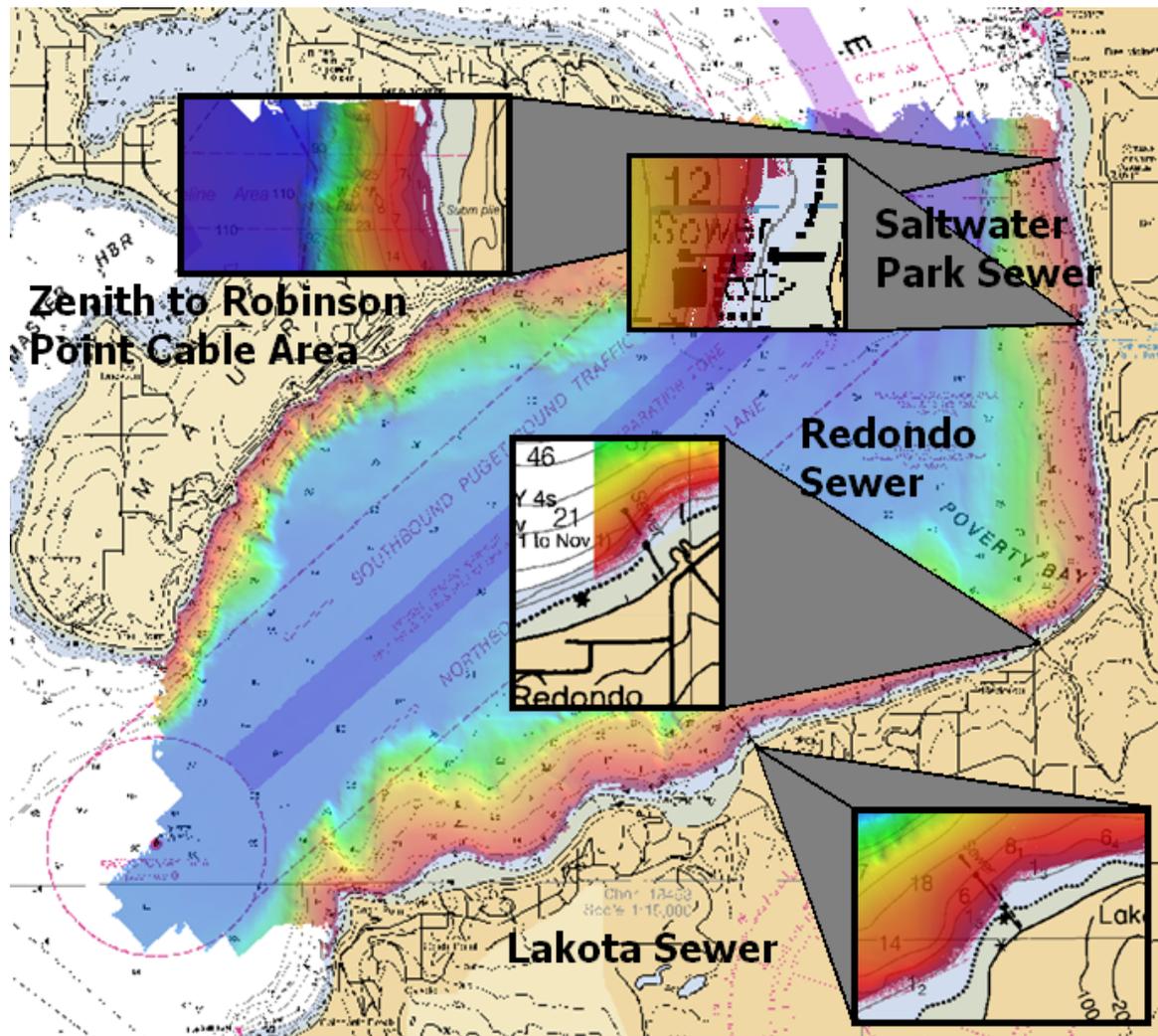


Figure 18: H11646 Cable area and Pipelines.

D.2.f. Ferry Routes

There are no ferry routes charted within the limits of survey H11646, and none were observed to be operating in the area. ²⁶

D.2.g. Bottom Samples

Bottom samples were not performed in survey H11646. ²⁷

D.2.h. Other Findings

There were no other findings within the survey limits of H11646.

E. APPROVAL

As Chief of Party, Field operations for hydrographic survey H11646 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 2007 edition), Field Procedures Manual (March 2008 Draft 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:

<u>Title</u>	<u>Date Sent</u>	<u>Office</u>
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: 2008.07.25 18:28:34 -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
 2008.07.25 16:32:40 -08'00'

Ensign Christine L. Schultz, NOAA
 Junior Officer

Chief Survey Technician:



James B Jacobson
 I have reviewed this document
 2008.07.25 16:04:40 -08'00'

James B. Jacobson
 Chief Survey Technician, NOAA Ship RAINIER

Field Operations Officer:



I have reviewed this document
 2008.07.25 16:58:21 -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 A common junction was made between surveys H11646, H11551 and H11826. See Hcell for H11646 for sounding selection.

⁴ Concur

⁵ Concur

⁶ Concur

⁷ Concur

⁸ Attached to this report

⁹ The southern portion of the survey also falls on chart 18453 (1:15,000, 25th Ed., 10/01 2007 NTM 02/14/2009).

¹⁰ Chart area as shown on the HCell.

¹¹ Concur

¹² Concur with clarification, except where mentioned in this report or with a blue note on the HCell.

¹³ Concur

¹⁴ Attached to this report

¹⁵ The hydrographer found two new wrecks during survey operations. They are included in this HCell. It is recommended that these features be added to the AWOIS data base. See attached report, Features from Bathymetry, following the AWOIS Report.

¹⁶ Note: the survey feature report does not include all features from H11646. 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 H11646 have come directly from CARIS Notebook, which is the official deliverable for this survey.

¹⁷ Filed with the hydrographic records

¹⁸ See endnote 12

¹⁹ Concur with clarification. Chart data as depicted in HCell.

²⁰ Use the latest ATONIS listing.

²¹ Concur

²² Chart as depicted on the HCell

²³ Chart as depicted on the HCell

²⁴ Concur

²⁵ Concur

²⁶ Concur

²⁷ Retain all charted bottom samples within the common area of this survey.

2 - AWOIS Features

2.1) Profile/Beam - 1/1 from h11646 / 1021_nonechosounder_dp / 2008-114 / dp_1021_114

Primary Feature for AWOIS Item #53516

Search Position: 47° 19' 41.5" N, 122° 23' 32.6" W
Historical Depth: [None]
Search Radius: 50
Search Technique: VS, SWMB, SSS
Technique Notes: conduct search within the limits of hydrography

History Notes:

Source Unknown, Charted visible wreck was placed on the chart before 1968. (KRW 11/03/2006) ■■■CL 111/87, 1987; USCG Aux. investigation confirms visible wreck on beach in charted location. Wreck now only debris on beach. (KRW 11/03/2006)

Survey Summary

Survey Position: 47° 19' 43.1" N, 122° 23' 32.5" W
Least Depth: 0.07 m (= 0.24 ft = 0.040 fm = 0 fm 0.24 ft)
TPU ($\pm 1.96\sigma$): THU (TPEh) [None] ; TVU (TPEv) [None]
Timestamp: 2008-114.19:24:14.000 (04/23/2008)
DP Dataset: h11646 / 1021_nonechosounder_dp / 2008-114 / dp_1021_114
Profile/Beam: 1/1
Charts Affected: 18474_1, 18445_8, 18448_1, 18440_1, 18003_1, 18007_1, 501_1, 530_1, 50_1

Remarks:

BRG 170Mag, Rng 50m, charted wreck, Also marked by dolphin, photo 100-2041

Hydrographer Recommendations

Retain as charted.

Cartographically-Rounded Depth (Affected Charts):

0fm (18448_1, 18440_1, 18003_1, 18007_1, 530_1)
 0fm 0ft (18474_1, 18445_8)
 .1m (501_1, 50_1)

S-57 Data

Geo object 1: Wreck (WRECKS)
Attributes: CATWRK - 1:non-dangerous wreck
INFORM - DP #1
SORDAT - 20080423
SORIND - US,US,survey,H11646
VALSOU - 0.074 m
VERDAT - 12:Mean lower low water
WATLEV - 1:partly submerged at high water

Office Notes

Concur

Feature Images

[Image file K:/Projects/2008_Projects/OPR-N395-RA-08, Colvos/Surveys/H11646/PSS/Photos/IMGP2041.JPG does not exist.]

2.2) AWOIS #53515 - OBSTRUCTION

No Primary Survey Feature for this AWOIS Item

Search Position: 47° 22' 26.0" N, 122° 25' 03.6" W
Historical Depth: [None]
Search Radius: 50
Search Technique: VS, SWMB, SSS
Technique Notes: conduct search within the limits of hydrography

History Notes:

Source Unknown; Fish Haven authorized minimum depth 30' appeared on chart before 1984. Conduct search to obtain minimum depth. (KRW 11/03/2006)

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 #53515 Least depth determined as per digital data.

Hydrographer Recommendations

Chart as per digital data.

S-57 Data

[None]

Office Notes

The fish haven is not currently charted at the AWOIS position. It is recommended that this feature, Fish Haven, be remove from the AWOIS database.

2.3) AWOIS #53528 - UNKNOWN

No Primary Survey Feature for this AWOIS Item

Search Position: 47° 23' 03.6" N, 122° 22' 50.4" W
Historical Depth: [None]
Search Radius: 100
Search Technique: MB, SSS, DI, VS
Technique Notes: Conduct search within the limits of hydrography

History Notes:

CL 117(76),1976; USCG Aux. report indicates visible charted wreck in the above location is not visible. The report states a search approx 2000 yds of shore line from water line to 300' off shore. The bottom was visible. No sign of any wreckage. ■■■The original source for this wreck could not be found.

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 #53528 Wreck not seen in multibeam bathymetry in the area, but no data was recorded over the item in question because it was well inshore of the NALL. Visual investigation yielded no wreck.

Hydrographer Recommendations

Wreck not seen in multibeam bathymetry in the area, but no data was recorded over the item in question because it was well inshore of the NALL. Wreck was not seen during visual shoreline investigation. The Hydrographer recommends removal of AWOIS item #53528 from chart.

S-57 Data

[None]

Office Notes

Concur

2.4) AWOIS #53529 - OBSTRUCTION

No Primary Survey Feature for this AWOIS Item

Search Position: 47° 22' 34.7" N, 122° 24' 45.8" W
Historical Depth: [None]
Search Radius: 50
Search Technique: MB, SSS, DI, VS
Technique Notes: Conduct search within the limits of hydrography

History Notes:

H06101, 1935; locates signal "FEW" a piling in the above location. The charted location was offset to the southwest in Lat. 47/22/31 Lon. 122/24/44. ■■■CL117(75), 1975; USCG Aux. reported the pile in the charted position Lat. 47/22/31 Lon. 122/24/44 was not seen.

Survey Summary

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

Remarks:

Pile not seen during shoreline invesetigation at negative tide. Feature inshore of NALL and not seen in MBES data.

Hydrographer Recommendations

Pile not seen during shoreline invesetigation at negative tide. Feature inshore of NALL and not seen in MBES data. Hydrographer recommends removing AWOIS item #53529 from the chart.

S-57 Data

[None]

Office Notes

Concur

2.5) AWOIS #53530 - OBSTRUCTION

No Primary Survey Feature for this AWOIS Item

Search Position: 47° 22' 24.9" N, 122° 25' 04.5" W
Historical Depth: [None]
Search Radius: 50
Search Technique: MB, SSS, DI, VS
Technique Notes: Investigate piles within the limits of the survey.

History Notes:

CL 1541(74); Reports the charted pile in Lat. 47/22/24.92 Lon. 122/25/04.50 was submerged at high tide.

Survey Summary

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

Remarks:

Piling not seen by boat crew during shoreline investigation; does not appear in multibeam bathymetry.

Hydrographer Recommendations

Piling does not appear in multibeam bathymetry and was not seen during shoreline investigation with a negative tide. Hydrographer recommends removing piling from chart.

S-57 Data

[None]

Office Notes

Concur

2.6) AWOIS #53546 - OBSTRUCTION

No Primary Survey Feature for this AWOIS Item

Search Position: 47° 19' 14.8" N, 122° 25' 05.5" W
Historical Depth: [None]
Search Radius: 75
Search Technique: VS, MB, SSs
Technique Notes: Investigate piles within the limits of the survey.

History Notes:

CL 111(87); USPS investigation reports the existence of three piles surrounding Lat. 47/19/14.83 N, Lon. 122/25/05.52 W.(NAD83). (KRW 12/19/2006)

Survey Summary

Charts Affected: 18453_1, 18445_7, 18474_1, 18445_8, 18448_1, 18440_1, 18003_1, 18007_1, 501_1, 530_1, 50_1

Remarks:

Pilings located shoreward of the NALL and were not investigated.

Hydrographer Recommendations

Pilings located shoreward of the NALL and were not investigated. Hydrographer recommends retaining as charted.

S-57 Data

[None]

Office Notes

Concur

2.7) AWOIS #53547 - UNKNOWN

No Primary Survey Feature for this AWOIS Item

Search Position: 47° 19' 48.2" N, 122° 23' 29.3" W
Historical Depth: [None]
Search Radius: 75
Search Technique: VS, MB, SSS
Technique Notes: Investigate piles within the limits of the survey.

History Notes:

CL 111(87); USPS visual investigation found debris on the shore in Lat. 47/19/48.21 N, Lon. 122/23/29.31 W.(NAD83).(KRW 12/19/2006)■■■Note: On chart 18448 (1:80,000) the wreck is positioned 220 meters north northeast of the 18474 charted wreck. No investigation is necessary in the charted 18448 charted location. (KRW 12/19/2006)

Survey Summary

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

Remarks:

Position of wreck charted incorrectly on 18448. Multibeam bathymetry and visual inspection confirm that wreck is not located as charted on 18448 and is correctly charted on 18474.

Hydrographer Recommendations

Hydrographer recommends removal of AWOIS item #53547 from chart 18448 and charting the wreck as it is found on chart 18474.

S-57 Data

[None]

Office Notes

Concur

2.8) AWOIS #53318 - OBSTRUCTION

No Primary Survey Feature for this AWOIS Item

Search Position: 47° 20' 31.4" N, 122° 27' 26.4" W
Historical Depth: [None]
Search Radius: 100
Search Technique: VS, SWMB, S2
Technique Notes: [None]

History Notes:

CL-1304/86--USPS; ROCK COVERED WHEN HEIGHT OF TIDE IS 4.1FT ABOVE LLW LOCATED WITH COMPASS BEARINGS: FROM ROCK TO KMO RADIO TOWER 133DEG T, ROCK TO BROWNS PT LIGHTS 166DEG T, FROM ROCK TO STACK 216DEG T. ■ LNM 52/86; SUBM ROCK REP 1986 ADDED AT 47/20/32N 122/27/22W (ENTERED 01/17/06, SME)

Survey Summary

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

Remarks:

Charted rock seen by visual investigation, but further inshore from charted location. Bathymetry over charted location also confirms that rock is not currently located where it was charted. MBES data were acquired up to the NALL.

Hydrographer Recommendations

Charted rock seen by visual investigation, but further inshore from charted location. Bathymetry over charted location also confirms that rock is not currently located where it was charted. MBES data were acquired up to the NALL. The Hydrographer recommends moving the rock inshore of the NALL.

S-57 Data

[None]

Office Notes

Remove charted rock rep (1986) PA from the chart. Chart rock rep (2008) PA at latitude 47-20.545, longitude 122-27.436.

1 - Features from Bathymetry

1.6) Profile/Beam - 480/205 from h11646 / 2801_reson7125_hf_512beams / 2008-108 / 384_2134

Survey Summary

Survey Position: 47° 21' 46.3" N, 122° 26' 23.3" W
Least Depth: 12.32 m (= 40.40 ft = 6.734 fm = 6 fm 4.40 ft)
TPU ($\pm 1.96\sigma$): THU (TPEh) ± 1.964 m ; TVU (TPEv) ± 0.235 m
Timestamp: 2008-108.21:35:49.855 (04/17/2008)
Survey Line: h11646 / 2801_reson7125_hf_512beams / 2008-108 / 384_2134
Profile/Beam: 480/205
Charts Affected: 18474_1, 18445_8, 18448_1, 18440_1, 18003_1, 18007_1, 501_1, 530_1, 50_1

Remarks:

Uncharted non-hazardous wreck extending 1.5m above seafloor discovered with location beneath charted pier. Wreck extends 11m horizontally and is only 8m from one of the pilings holding up the pier structure.

Discovered with MBES Reson 7125.

Hydrographer Recommendations

Uncharted wreck located during H11646 survey operations. Item found with Reson 7125 MBES. Wreck determined to have a least depth of 12.32 m and a surrounding depth approx. 17 m. This wreck does not pose a hazard to navigation. All soundings were adjusted to MLLW using approved water levels. This wreck's location is currently underneath a charted pier; the hydrographer recommends keeping the pier as charted and the new wreck with least depth of 12.32 meters.

Cartographically-Rounded Depth (Affected Charts):

6 $\frac{3}{4}$ fm (18448_1, 18440_1, 18003_1, 18007_1, 530_1)

6fm 4ft (18474_1, 18445_8)

12.3m (501_1, 50_1)

S-57 Data

Geo object 1: Wreck (WRECKS)
Attributes: CATWRK - 1:non-dangerous wreck
 SORDAT - 20080417
 SORIND - US,US,survey,H11646
 TECSOU - 3:found by multi-beam
 VALSOU - 12.315 m

WATLEV - 3:always under water/submerged

Office Notes

Chart submerged wreck. It is recommended that this wreck be added to the AWOIS database.

1.9) Profile/Beam - 106/475 from h11646 / 2801_reson7125_hf_512beams / 2008-108 / 367_1733

Survey Summary

Survey Position: 47° 22' 38.9" N, 122° 24' 16.7" W
Least Depth: 15.86 m (= 52.03 ft = 8.672 fm = 8 fm 4.03 ft)
TPU ($\pm 1.96\sigma$): THU (TPEh) ± 1.984 m ; TVU (TPEv) ± 0.199 m
Timestamp: 2008-108.17:33:52.290 (04/17/2008)
Survey Line: h11646 / 2801_reson7125_hf_512beams / 2008-108 / 367_1733
Profile/Beam: 106/475
Charts Affected: 18474_1, 18445_8, 18448_1, 18440_1, 18003_1, 18007_1, 501_1, 530_1, 50_1

Remarks:

wreck, 15.86m in 16.58m of water discovered with MBES, Reson 8125; investigated with Reson 7125 MBES

Hydrographer Recommendations

Uncharted wreck located during H11646 survey operations. Item found with Reson 8125 MBES and further investigated with Reson 7125 MBES. Wreck determined to have a least depth of 15.86 m and a surrounding depth of 16.56 m. This wreck does not pose a hazard to navigation. All soundings were adjusted to MLLW using approved water levels.

Cartographically-Rounded Depth (Affected Charts):

8 ½fm (18448_1, 18440_1, 18003_1, 18007_1, 530_1)

8fm 4ft (18474_1, 18445_8)

15.9m (501_1, 50_1)

S-57 Data

Geo object 1: Wreck (WRECKS)
Attributes: CATWRK - 1:non-dangerous wreck
 HEIGHT - 15.86 m
 SORDAT - 20080417
 SORIND - US,US,survey,H11646
 TECSOU - 3:found by multi-beam
 VALSOU - 15.860 m
 VERDAT - 12:Mean lower low water

WATLEV - 3:always under water/submerged

Office Notes

Chart submerged wreck. It is recommended that this wreck be added to the AWOIS database.

Feature Images

[Image file K:/Projects/2008_Projects/OPR-N395-RA-08, Colvos/Surveys/H11646/PSS/Photos/367_1733_106-475.bmp does not exist.]



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: H11646

LOCALITY: Robinson Point to Dash Point, Colvos Passage, WA

TIME PERIOD: April 12 - 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, H11646, during the time period between April 12 - 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).

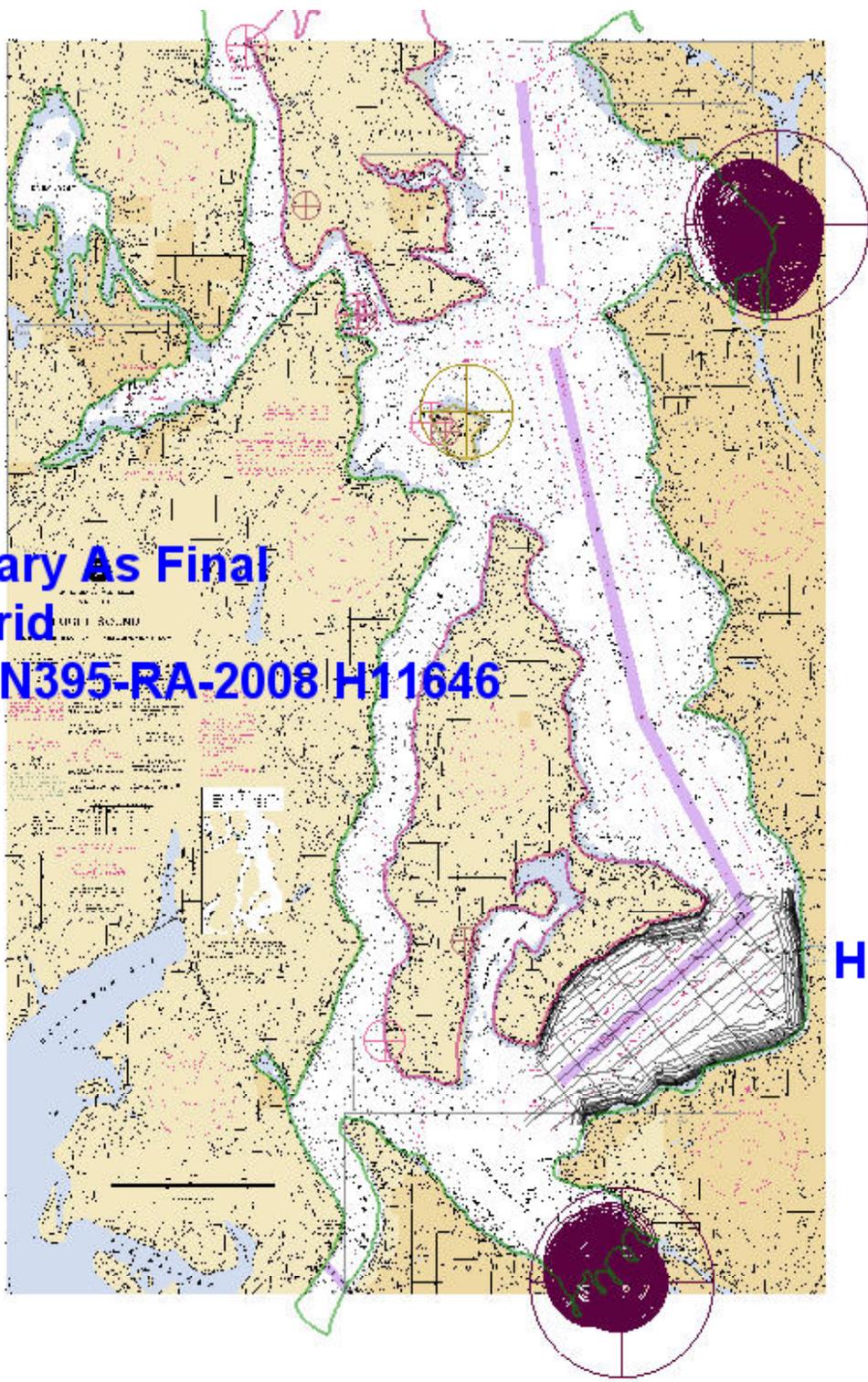
**Peter J.
Stone**

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 14:18:47 -04'00'

CHIEF, PRODUCTS AND SERVICES DIVISION



**Preliminary As Final
TCARI grid
for OPR-N395-RA-2008 H11646**



H11646

H11646 HCell Report
Russ Davies, Cartographer
Pacific Hydrographic Branch

Introduction

The primary purpose of the HCell is to provide new survey information in International Hydrographic Organization (IHO) format S-57 to update the largest scale ENC's and RNC's in the region: NOAA RNC, 18474 (1:40,000) and corresponding NOAA ENC, US5WA18M and US5WA22M (See section 4. Meta Areas.)

HCell compilation of survey H11646 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 H11646 were compiled to the largest scale charts in the region, 18474_1 (1:40,000). The density and distribution of soundings from H11646 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 H11646 _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 20,982 depths ranging from 0 to 215.664 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 H11646 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 H11646:

M_QUAL
M_CSCL

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 has 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 H11646 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 H11646 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
M_CSCL	Area of smaller scale compilation
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
MORFAC	Dolphin

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): 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 feet charting units with NOAA rounding ensures that:

- All depths display as whole feet.
- 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.

9. Data Processing Notes

9.1 Junction with H11646

H11646 junctions with H11826 to the north and H11551 to the south. A junction was made between these surveys.

10. QA/QC and ENC Validation Checks

H11646 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

H11646_CS.000	Base Cell File, Chart Units, Soundings and features compiled to 1:40,000
H11646_SS.000	Base Cell File, Chart Units, Soundings and Contours compiled to 1:10,000
H11646_DR.pdf	Descriptive Report including end notes compiled during office processing and certification, the HCell Report, and supplemental items
H11646_outline.gml H11646_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:

Russ Davies
 Cartographer
 Pacific Hydrographic Branch
 Seattle, WA
 206-526-6883
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APPROVAL SHEET
H11646

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 disproof 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.