H11856

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. H11856

LOCALITY

State Oregon

General Locality Columbia River

Sublocality Walker Island to Sandy Island

2008 - 2009

CHIEF OF PARTY

Jonathan L. Dasler, PE (OR), PLS (OR, CA)
David Evans and Associates, Inc.

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NOAA FORM 77-28 (11-72)

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

REGISTER NO.

H11856

HYDROGRAPHIC TITLE SHEET

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.

State: Oregon

General Locality: Columbia River

Sublocality: Walker Island to Sandy Island

Scale: 1:10,000

Date of Survey: October 2, 2008 - March 2, 2009

Instructions Dated: 4/1/2008

Project No.: OPR-N338-KR-08

Vessel: R/V Theory, R/V Preston

Chief of Party: Jonathan L. Dasler, PE (OR), PLS (OR, CA)

Surveyed by: David Evans and Associates, Inc.

Soundings taken by echo sounder: RESON 7125, RESON 8101

Graphic record scaled by: N/A

Graphic record checked by: N/A

Evaluation by: T. Faulkes

Automated plot by: N/A

Verification by: T. Faulkes, K. Reser

Soundings in: Feet at Columbia River Datum (CRD)

REMARKS: Time in UTC. UTM Projection Zone 10

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

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

All separates are filed with the hydrographic data.

Subconsultants: Zephyr Marine, P.O. Box 1575, Petersburg, AK 99833

John Oswald and Associates, 2000 E Dowling Road, Suite 10, Anchorage, AK 99507

Descriptive Report to Accompany Hydrographic Survey H11856
Project OPR-N338-KR-08
Columbia River, Oregon
Walker Island to Sandy Island
Scale 1:10,000
October 2008 – March 2009
David Evans and Associates, Inc.
Lead Hydrographers: Jonathan L. Dasler, Jason C. Creech

A. AREA SURVEYED

David Evans and Associates, Inc. (DEA) conducted hydrographic survey operations on the Columbia River, Oregon. The survey area (Figure 1) extends upriver from Walker Island to, approximately, Columbia River Mile (CRM) 74 just north of Sandy Island.

Survey H11856 was conducted in accordance with the *Statement of Work* for OPR-N338-KR-08; dated April 1, 2008 with the exception of tides and water levels requirements. Due to the Columbia River Datum (CRD), the project chart datum, being a non-tidal gradient datum and the complex hydrodynamics of the Columbia River, OPR-N338-KR-08 was approved as a pilot project for the use of Global Positioning System (GPS) water levels acquired directly at the survey vessel. This change was approved after the receipt of the Statement of Work.[1]

The project instructions required three categories of multibeam coverage: Complete, Object Detection, and Set Line Spacing. In water depths greater than four meters, complete multibeam coverage was required. Automated Wreck and Obstruction Information System (AWOIS) items and the main shipping channel were acquired to meet object detection coverage requirements. Twenty-five (25) meter set line spaced multibeam bathymetry was required from the four meter water depths to the "inshore limit of hydrography". The inshore limit of hydrography was defined as the seaward most extent of either the two meter contour or the equivalent to 0.8 millimeters at the scale of the largest scale nautical chart from the mean high water (MHW) line. Though not required by contract, multibeam side scan data was acquired but not processed.

Thirteen (13) bottom samples were acquired for H11856. One AWOIS item investigation was assigned to this survey.

Data acquisition was conducted from October 2, 2008 (DN276) to March 2, 2009 (DN061). Table 1 lists specific dates of acquisition.

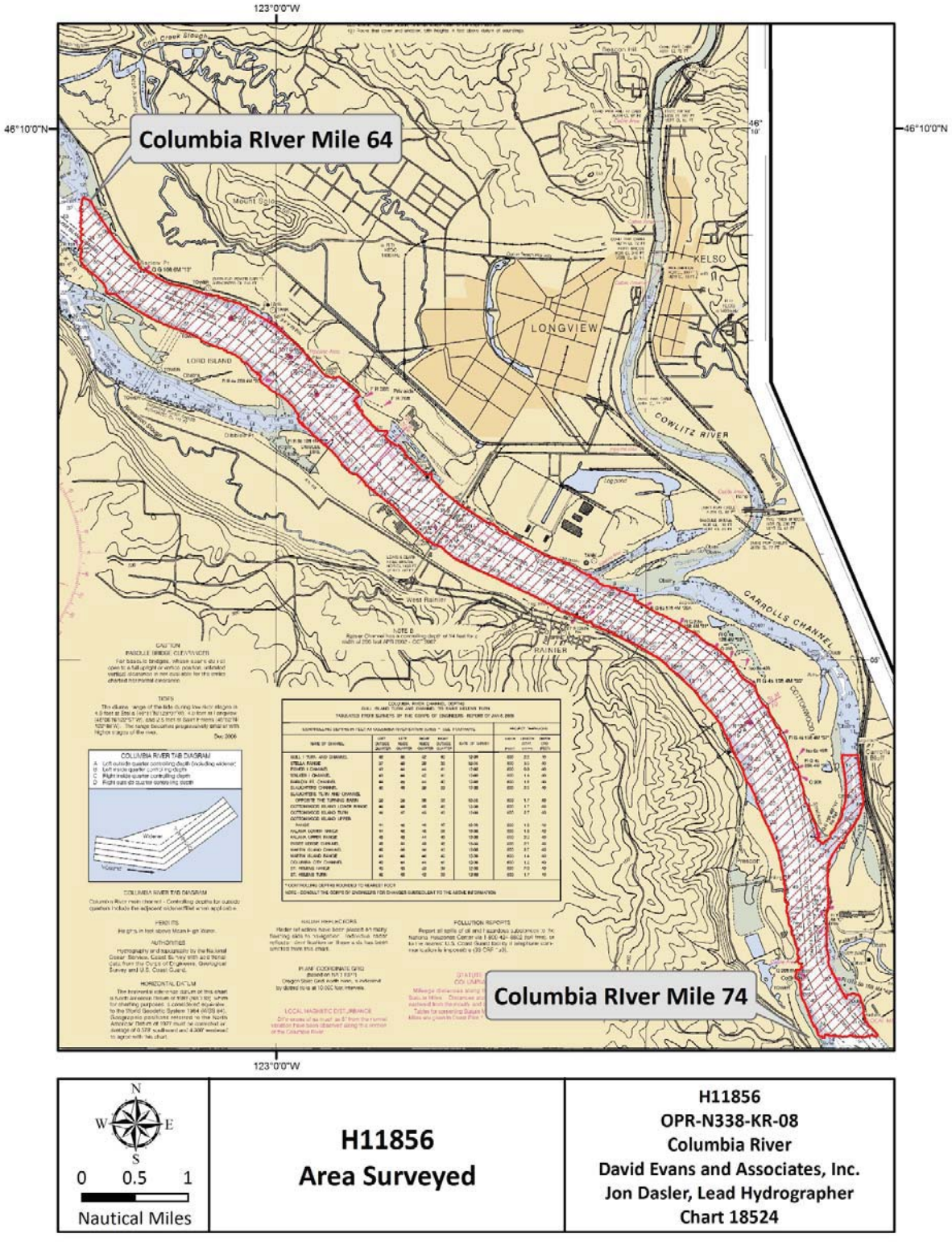


Figure 1. H11856 Survey area

Table 1. H11856 Days of Acquisition

Dates of Acquisition	
Month	**Dates**
October 2008	2-9, 11, 22, 23, 24
February 2009	23, 24, 26, 27
March 2009	2

Detailed survey statistics of H11856 are provided in Table 2.

Table 2. H11856 Survey Statistics

Survey Statistics	***Research Vessels (R/V) THEORY and PRESTON***
MBES (mainscheme nm)	341.21
Crosslines (MBES nm)	27.68
Developments (MBES nm)	1.24
Number of Item Investigations that required additional survey effort	22
Total number of square nautical miles	4.81

B. DATA ACQUISITION AND PROCESSING

B1. Equipment

Equipment and vessel used for data acquisition and survey operations during this survey are listed in Table 3 and 4.

Table 3. R/V Theory Equipment and Vessel Specifications

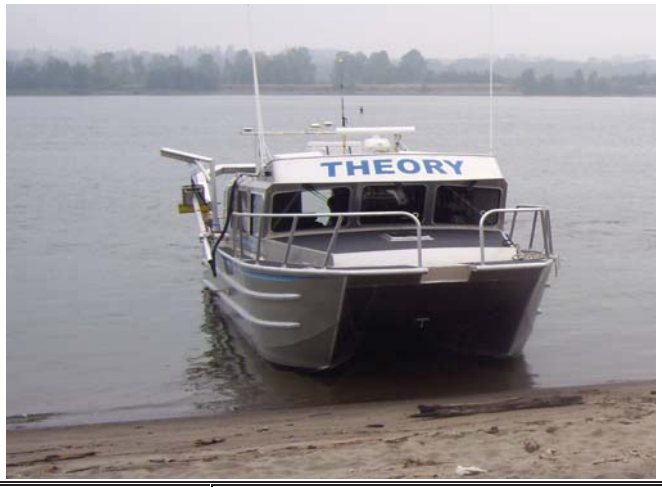
R/V THEORY	
	
Hull Registration Number	IAR34CATA808
Official Number (O/N)	1217549
Builder	Armstrong Marine
Design	Catamaran
Year Built	2008
Length Overall	36’
Beam	13’
Draft, Maximum	3’
Cruising Speed	26 knots
Max Survey Speed	9 knots
Primary Echosounder	RESON 7125-B
Sound Velocity Equipment	Brooke Ocean MVP-30 with AML Smart SV & P Reson SVP-70 Sea-Bird SEACAT SB-19 CTD Profiler
Positioning & Attitude	Applanix POS/MV 320 v4 RTK compatible

Table 4. R/V Preston Equipment and Vessel Specifications

R/V Preston	
	
Hull Registration Number	ABTJOHNB3090
Official Number (O/N)	WN0437NX
Builder	Action Boats Inc.
Design	Custom Monohull Jet
Year Built	1990
Length Overall	31’
Beam	8.5’
Draft, Maximum	16”
Cruising Speed	24 knots
Max Survey Speed	7 knots
Primary Echosounder	RESON 8101
Sound Velocity Equipment	Sea-Bird SEACAT SB-19 CTD Profiler AML SV Plus
Positioning & Attitude	Applanix POS/MV 320 v4 RTK compatible

There were no vessel or equipment configurations used during data acquisition that deviated from those described in the OPR-N338-KR-08 *Data Acquisition and Processing Report* (DAPR).[2]

B2. Quality Control

Quality control is discussed in detail in Section B of the DAPR. The results from the positioning system comparison and bar check comparison are included in Separate I *Acquisition and Processing Logs* and the sound velocity profile sensor weekly evaluation table can be found in Separate II *Sound Speed Data* section of this report.[3] Data were reviewed at multiple levels of data processing including CARIS Hydrographic Information Processing System (HIPS)

conversion, subset editing, and analysis of anomalies revealed in combined uncertainty and bathymetry estimator (CUBE) surfaces. Both baring and submerged significant features identified during survey were noted in the acquisition logs and saved to Hypack target files or Isis Cursor log files and then displayed during HIPS editing to aid in the interpretation of data and act as a check during feature compilation.

B2.a Crosslines

A total of 27.7 nautical miles of crosslines, or 8.08% of mainscheme lines, were run for analysis of survey accuracy. Crosslines were run in a direction perpendicular to mainscheme lines across the entire surveyed area providing a good representation for analysis of consistency.

Crossline analysis was performed using the Caris HIPS QC Report tool, which compares crossline data to a gridded surface and reports results by beam number. Crosslines were compared to a 50 centimeter CUBE surface that encompassed the entire survey area. This surface was not included with the deliverables due to its large file size. The QC Report tabular output and plots are included in Separate IV *Crossline Comparisons*.[4] The results of the analysis exceed the requirements as stated in the National Ocean Service (NOS) *Hydrographic Surveys Specifications and Deliverables* (April 2007).[5]

B2.b Uncertainty

The calculated uncertainty values of all nodes within the unfinalized CUBE surfaces range from 0.243 meters to 0.357 meters.

During HIPS processing, the "greater of the two" option was selected, where the calculated uncertainty from total propagated uncertainty (TPU) is compared to the standard deviation of the soundings influencing the node, and the greater value is assigned as the final uncertainty of the node. As a result, the uncertainty of the finalized surface and associated Bathymetric Attributed Grids (BAGs) increased for nodes, where the standard deviation of the node was greater than the calculated uncertainty. No area within the survey exceeds International Hydrographic Organization (IHO) Order 1 specifications for depth accuracy.[6]

B2.c Junctions

H11856 junctions with survey H11855 to the north and with survey H11857 to the south. Junctions were visually reviewed in Caris HIPS subset mode and a difference analysis was performed using Caris Bathy DataBASE.

In general, the depth differences between H11856 and H11855 are within 10 centimeters, with the greatest differences correlating to the natural migration of sand waves mid-channel of the river and along the steep south bank of the Columbia River just south of Light "12".[7] Due to the dynamic shifting of sand waves, data acquired significantly later than the majority of the mainscheme bathymetry, specifically fill from February 27, 2009 and March 2, 2009 (DN058 and DN061), were not used in the junction analysis.

In general, the depth differences between H11856 and H11857 are within 15 centimeters, with the largest differences correlating to the natural migration of sand waves mid-channel and along

the steep east bank of the Columbia River. Mid-channel data were collected for H11857 ten days prior to H11856.[8] Due to the dynamic shifting of sand waves, data acquired significantly later than the majority of the mainscheme bathymetry, specifically fill lines from February 23, 2009 and February 26, 2009 (DN054 and DN057), were not used in the junction analysis.

B2.d Unusual Conditions or Data Degradation

There is an error in the Reson 7125 bottom tracking algorithm that causes bottom detection (beams 86-115 and 140-168) to lock on to stronger sonar returns, bleeding over from more nadir returns. This may be related to the amplitude bottom detection used near nadir and the bottom detection locking on to the strong nadir return signal, rather than the actual bottom return for that designated beam area. These artifacts occur in two areas near nadir and are more prevalent on a hard bottom, when the amplitude of the nadir return is the strongest. The artifacts run along-track and can exceed 20 centimeters in the raw soundings, but are reduced to 5 to 10 centimeters in the CUBE surface.[9] Attempts to remove these artifacts during survey operations with changes in sonar settings were unsuccessful. Reson is aware of this issue and is working towards a resolution with a different bottom tracking algorithm.

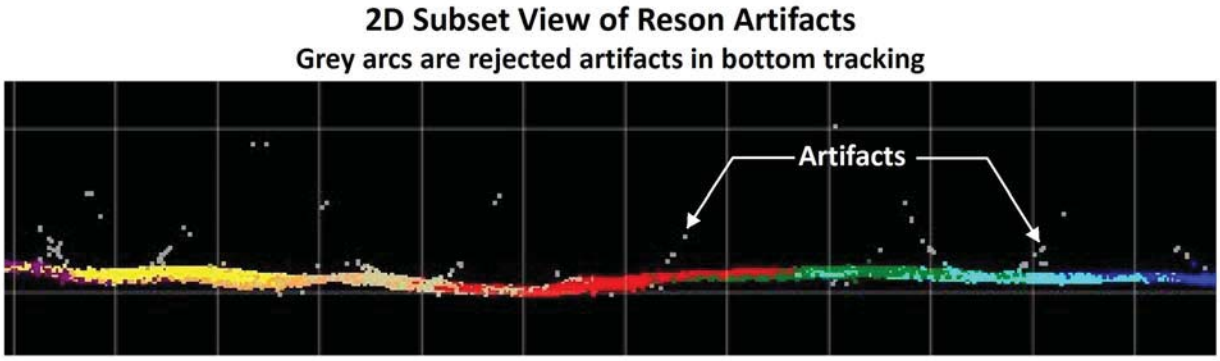


Figure 2. Artifacts in Reson 7125 bottom tracking algorithm

Snags and deadheads are common along the Columbia River. Any feature, submerged or baring that was determined to be seasonal or transient in nature was removed from the data.

B2.e Object Detection and Coverage Requirements

Survey speeds were maintained at less than 9 knots, so that object detection requirements were exceeded throughout the survey.[10]

High resolution, 50-centimeter CUBE surfaces were created over the entire survey area. The disambiguation method selected to create all 50-centimeter CUBE surfaces was "Shoal," which corresponds to the NOS *Hydrographic Surveys Specifications and Deliverables* (April 2007) Object Detection Coverage requirements. Survey coverage was reviewed to ensure that no data gaps (more than 3 connected open nodes) were present within AWOIS radii and maintained navigation channels.

Outside maintained navigation channels Complete Coverage requirements were demonstrated by creating one meter CUBE surfaces with "Deep" disambiguation method selected, which corresponds to the NOS *Hydrographic Surveys Specifications and Deliverables* (April 2007) Complete Coverage requirements. Survey coverage was reviewed to ensure that no data holidays (more than 3 connected open nodes) were present. In a telephone conversation on January 7, 2009 between the Pacific Hydrographic Branch (PHB) and DEA it was agreed that the one meter surfaces would be created and reviewed by DEA hydrographers, but not submitted with the delivered dataset in order to reduce data storage needs.

B3. Corrections to Echo Soundings

Data reduction procedures for survey H11856 are detailed in the OPR-N338-KR-08 DAPR, submitted under separate cover. The multibeam swath angle filter that was applied to each survey day varied depending on location, conditions, and sonar type. In general, Reson 7125 survey lines were unfiltered and used the entire 128-degree swath. Reson 8101 survey lines were filtered at a 60/60-degree angle from nadir for mainscheme hydrography and 60/90 or 60/75 for survey lines along the shoreline. For detailed information pertaining to applied filters please refer to the multibeam processing logs in Separate I *Acquisition and Processing Logs.*[11]

The survey area for H11856 contained numerous bearing features. The least depths of baring features were marked as "Examined" and the rest of the structure was flagged as "Rejected" to the mudline. The use of the examined sounding flag to track baring items aided hydrographers during the feature management compilation process. Baring features are not included in the finalized bathymetric sounding set. This was done to ensure that the generated surface represented the true river bottom and submerged features.

B3.a Deviations from DAPR

The post-survey calibration report for Applied Microsystems AML SV Plus (serial number 3591) has not yet been received from the manufacturer. The AML3591 was compared to another AML SV Plus (serial number 3592) as well as both AML Smart SV&Ps (serial numbers 5110 and 5111) as part of a weekly confidence check for sound speed determination. All comparisons passed within the National Oceanic and Atmospheric Administration (NOAA) specifications.[12]

Multibeam swath coverage images of sun illuminated depth and uncertainty layers have not been submitted as this requirement has been dropped from recent versions of NOS *Hydrographic Surveys Specifications and Deliverables.* These layers have been submitted in both BAG and CUBE format.[13]

There are no other deviations from the OPR-N338-KR-08 DAPR.

B3.b Additional Calibration Tests

The initial system calibration tests for the *R/V Theory* and *R/V Preston* were performed on August 15, 2008 (DN228) and August 29, 2008 (DN242), respectively. Additional tests were performed periodically to verify the adequacy of the known system biases and document changes

in alignment offsets due to sensor remounting and sonar strikes on submerged objects. Additional discussion on calibration tests can be found in the OPR-N338-KR-08 DAPR.

B4. Data Processing (Data Representation)

CUBE surface resolutions and depth ranges were set in accordance with the NOS *Hydrographic Surveys Specifications and Deliverables* (April 2007). Final CUBE surfaces were created at a 50-centimeter resolution to meet Object Detection requirements. Some data gaps exist in the 50-centimeter grids, however the grids still meet coverage requirements for the survey. Near shore coverage, in some areas less than 4 meters used, Set Line spacing and gaps are present between survey lines. Additionally, coverage outside of the maintained channel only required a one meter resolution and small data gaps may be visible in the 50-centimeter surfaces, but still meet requirements in these areas.[14] Complete Coverage requirements were met and all data gaps, three nodes or greater, were filled prior to ceasing survey operations.

In order to keep CUBE surfaces at a manageable size, the main survey area was broken up into six Field Sheets organized by corresponding Columbia River mile (H11856_CRM_61-63, etc.). When combined the Fields Sheets encompass the entire area of acquired multibeam bathymetry. A BAG was created for each finalized CUBE surface and both the CUBE and BAG surfaces have been included with the digital data.

C. HORIZONTAL AND VERTICAL CONTROL

Due to the CRD, the project chart datum, being a non-tidal gradient datum and the complex hydrodynamics of the Columbia River, the project chart datum, OPR-N338-KR-08 was approved as a pilot project for the use of GPS water levels acquired directly at the survey vessel. With the exception of tide reduction of baring features, traditional zoning from water level stations was not used for this project though zoning provided by Center for Operational Oceanographic Products and Services (CO-OPS) and verified water level files for the survey have been included with the digital deliverables

Prior to survey acquisition, three GPS base stations with a dual frequency (L1/L2) receiver were established in Washington at Kalama and Longview and in Oregon at the Beaver Army Terminal. The base stations logged raw dual frequency (L1/L2) GPS observables at one second epochs as well as broadcast real-time kinematic (RTK) corrections to the survey vessels. The base station closest to the area surveyed broadcast the RTK correctors. This base station was later used to post-process the navigation data. Base station positions relative to the North American Datum of 1983 (NAD83) (CORS96) (Epic 2002) were derived from the NGS (National Geodetic Survey) On-line Positioning User Service (OPUS) and were based on a 24-hour data file, with one second-epoch logging prior to commencement of survey operations.

A separation model of CRD relative to NAD83 was created and formatted to allow for direct integration with Hypack and Caris HIPS. The model input used a river profile of CRD relative to NAVD88 provided by the U.S. Army Corps of Engineers, Portland District (the designated stewards of CRD). GEOID 03 was used to transfer the NAVD88 to CRD relationship directly to the NAD83 ellipsoid, which allowed direct computation of GPS water levels from ellipsoid

heights recorded at the survey vessel. The model file (.bin) used to compute GPS water levels in HIPS, has been included with the digital deliverables.

RTK navigation was logged during acquisition and applied during preliminary data processing, but ultimately overwritten with a post-processed Inertially-Aided Kinematic Ambiguity Resolution (IAKAR) navigation solution. The HIPS Load Attitude and Navigation tool was used to load position, GPS height, and attitude data from a smoothed best estimate trajectory (SBET) file create from Applanix POSPac.

A complete description of horizontal and vertical control for survey H11856 can be found in the OPR-N338-KR-08 *Horizontal and Vertical Control Report*, submitted under separate cover.[15] A summary of horizontal and vertical control for this survey follows.

C1. Vertical Control

The vertical datum for this project is the CRD, an adopted low-water gradient datum relative to NAVD88. There are known problems in the NGS level lines between Oregon and Washington due to the long level runs without the ability to run tie lines across the Columbia River. GPS observations have documented large vertical differences in published bench mark elevations across the Columbia River. Whereas CO-OPS water level gauges are located in Oregon and Washington and are directly referenced to NGS published bench mark elevations, and the known issue with the level lines between Oregon and Washington, a decision was jointly made by the US Army Corps of Engineers and NOAA to use NGS OPUS solutions to establish vertical consistency in the relationship of CRD relative to NAVD88. The U. S. Army Corps of Engineers, Portland District (designated stewards of CRD) conducted surveys that established OPUS derived NAVD88 elevations on historic bench marks referencing CRD. A result of these surveys was a profile of Columbia River Datum relative to OPUS derived NAVD 88 elevations which were consistent across the Columbia River. The profile defined CRD relative to NAVD88 for each River Mile (RM) from RM 23 to RM 145 on the Columbia River and RM 0 to RM 26 on the Willamette River. This profile is used by the Portland District for hydrographic surveys and dredging operations to maintain the Federal Channel on the Columbia and Willamette rivers.

To improve vertical accuracy of this survey, soundings were reduced to CRD using GPS water levels measured at the survey vessel. Water levels were derived from post processed GPS heights and application of a separation model of the CRD to NAD83 ellipsoid relationship. Data reduction procedures, including detailed discussions of the CRD model generation and GPS water levels computations, for survey H11856 are detailed in the *OPR-N338-KR-08 Data Acquisition and Processing Report*.

To verify GPS water levels, a comparison was made by vessel static observations adjacent to the CO-OPS water level station 9440422 located in Longview, WA. . To obtain water levels relative to the CO-OPS defined CRD, the hydrographer selected Station Datum when downloading data from the CO-OPS web site. This is consistent with obtaining CRD values for any CO-OPS station on the Columbia River above river mile 23. Adjustments were required to correct CO-OPS water level data to CRD based on the updated USACE CRD profile used to maintain the Columbia and Willamette rivers. An additional adjustment was applied to correct local tidal

bench marks with orthometric heights based on NGS level lines to OPUS derived NAVD88 elevations to match the USACE profile and eliminate errors from distorted level lines. As a result of these comparisons, the hydrographer discovered a large deviation from the CO-OPS data reported from station 9440422 in Longview, WA. After running digital levels and recording a 1-hour series of water level observations with an optical level, it has been determined that the CO-OPS water level station in Longview, WA (9440422) is incorrectly reporting water levels relative to the station tidal bench marks and should be corrected by -0.071 meters to match CO-OPS tidal bench marks. CO-OPS is aware of this issue and is working toward resolving the problem. It should be noted that these adjustments were applied to CO-OPS water level data for comparison purposes of water level data relative to the revised USACE profile relative to OPUS derived NAVD88 elevations. This method was approved for project OPR-N388-KR-08 by the Office of Coast Survey, Hydrographic Surveys Division Chief as it is consistent with the USACE, Portland District, methods for maintaining the Federal Channel in the Columbia and Willamette rivers. Further, CO-OPS should adjust water level stations on Columbia River Datum and part of the Columbia PORTS® system to be consistent with the defined CRD profile by the Portland District. Table 5 lists corrections to be applied to CO-OPS data to be consistent with the Portland District CRD profile.

Table 5. Corrections Applied to 9440422 Longview, Washington

Description of Adjustment	Adjustment (m)
Revised CRD Value to 0.804m NAVD88 from CO-OPS 0.764m NAVD88	-0.040
Adjustment to OPUS elevation for Tidal Bench Mark SA 89 MON 4	-0.052
CO-OPS Gauge Correction Based on Optical Level Water Surface Observations	-0.071
Total Adjustment to CO-OPS Data in Longview, WA	**-0.163**

Water level observations, OPUS position results and gauge comparison data may be found in Appendix IV. No configurations used during data acquisition deviated from those described in the OPR-N338-KR-08 *Data Acquisition and Processing Report*.

C2. Discussion of GPS Tides

The coordinates of the GPS base stations used during acquisition and processing of H11856 are included in Table 6. The reference base stations used for both RTK and post processing are listed in the survey acquisition logs and POSPac processing logs included in Separate I *Acquisition and Processing Logs*.

Table 6. H11856 NAD83 Base Station Positions

RTK Base Station	Latitude (N)	Longitude (W)	Ellipsoid Height
KLMA	46/00/20.45579	122/50/50.13183	-11.153 m
PLVW	46/07/26.23898	122/58/49.89723	-11.143 m
BEVR	46/10/13.97257	123/09/26.40353	-15.766 m

As discussed in the OPR-N338-KR-08 DAPR, the use of GPS water levels eliminated large errors associated with discrete zoning and significantly reduced vertical uncertainty for this survey. Typical tide zoning artifacts for the survey area could exceed 30 centimeters, but as a result of using GPS water levels there are no visual tidal artifacts present in this survey.

C3. Horizontal Control

The horizontal datum for this project is the NAD83. Differential GPS (DGPS) and RTK positioning were used simultaneously throughout acquisition with DGPS positions only used for a real-time confidence check. DGPS corrections were received from the U.S. Coast Guard beacon at Fort Stevens, Washington (287 kHz) or from the secondary beacon at Appleton, Washington (300 kHz). Some DGPS outages from the primary beacon occurred during survey operations. The system was set up to automatically switch to the secondary beacon when the primary signal was lost, so all of the secondary navigation data were collected in DGPS mode.

Navigation and attitude data were post-processed using Applanix POSPac MMS software, which produced an IAKAR navigation solution relative to NAD83. The GPS reference station and position used during post-processing were identical to those used for RTK broadcast during acquisition.

The real-time navigation and attitude logged during acquisition was overwritten with post-processed data during HIPS processing. Post-processed navigation, attitude and GPS heights were applied to all HIPS data unless POSPac processing errors created data outages in the SBET files, which prevented application to some survey lines. These survey lines, which use real-time sensor data, including RTK navigation and GPS heights, are listed in Table 7. Quality checks of RTK navigation procedures and comparison to post processed data discussed in the OPR-N338-KR-08 DAPR *and* OPR-N338-KR-08 *Horizontal and Vertical Control Report* demonstrate that the use of RTK is also a reliable method to obtain GPS water levels. Survey lines using RTK have been thoroughly reviewed and exceed accuracy requirements for the survey.

Table 7. Survey Lines Using Real-time Sensor Data

Survey Vessel (R/V)	Day Number (DN)	Survey Line
Theory	278	2008TH2790058
Theory	280	2008TH2802021
Theory	283	2008TH2831933_XL
Preston	296	2008PR2962114

D. RESULTS AND RECOMMENDATIONS

D1. Chart Comparison

D1.a Survey Agreement with Chart

During the course of data acquisition and processing, H11856 was compared to the largest scale raster and electronic navigation charts (RNC and ENC). The results of these comparisons are described below, as well as in Sections D1.b through D1.f of this report.

Contours and soundings used during the chart comparison were generated from combined HIPS product surfaces. Soundings and contours were generated from a 5-meter HIPS product surface (1:10,000) of the entire survey area, which was compiled from all finalized CUBE surfaces for the survey. The product surfaces, contours, and soundings were created solely for quality assurance and chart comparison and have not been submitted as a final deliverable.

H11856 contours and soundings were compared in Caris HIPS to the depths and contours on the charts listed in Table 8.

Table 8. Charts compared to H11856

Chart	Scale	Edition	Edition Date	Issue Date	Latest LNM	Cleared Through Date
18524	1:40,000	36	12/01/2006	03/03/2009	09/09	04/21/2009
US5OR13M	---	33	---	04/28/2009	---	---

Survey H11856 depths were compared to the charted soundings on Charts 18524 and the corresponding ENC US5OR13M. In general there is good agreement between depths from survey H11856 and the chart. Based on the distribution of the differences, the hydrographer believes that the changes are the result of natural shoaling (Figure 3).[16]

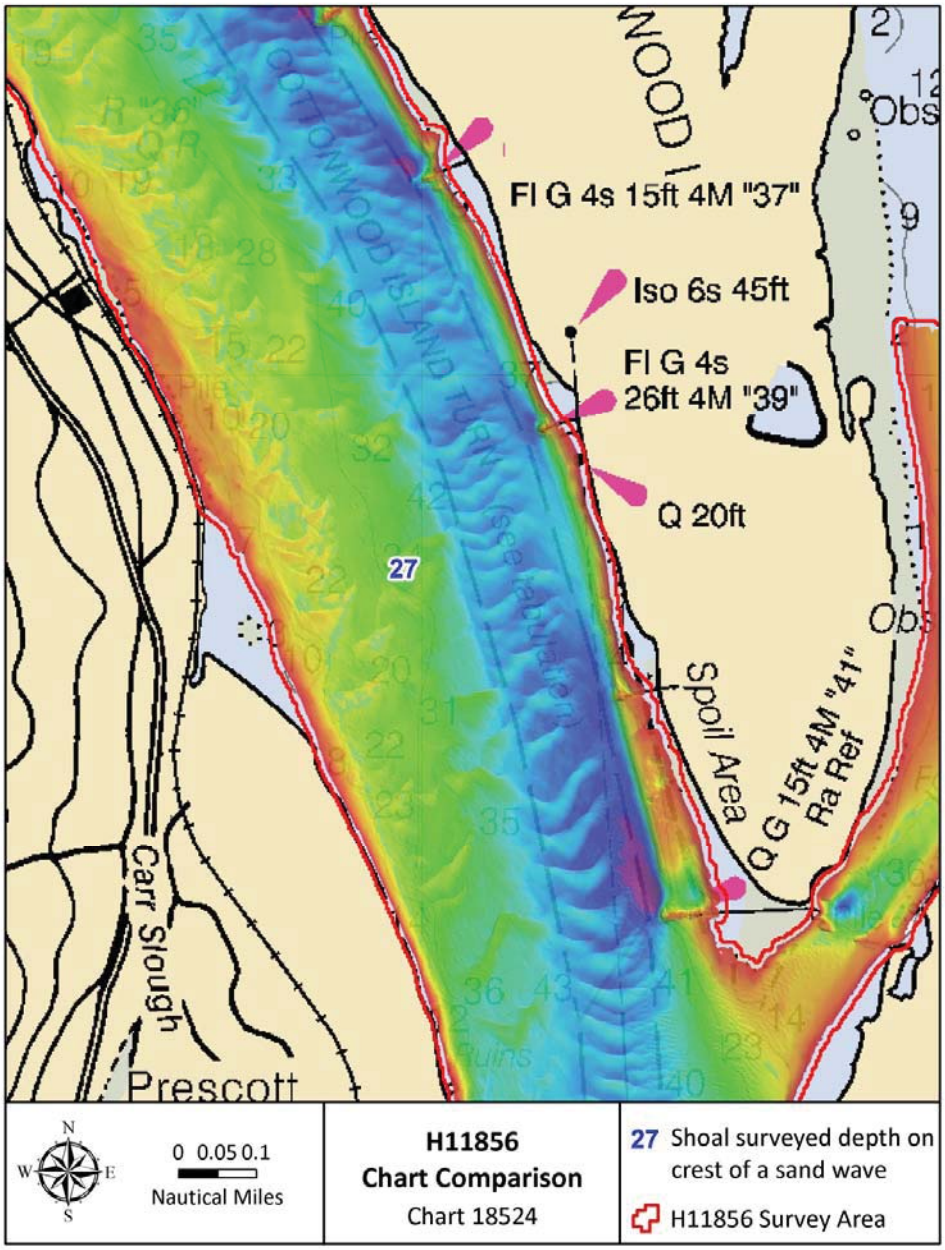


Figure 3. Surveyed 27-ft shoal on charted 34-ft sounding

The latest electronic and raster versions of the relevant charts were reviewed to ensure that all U.S. Coast Guard Local Notice to Mariners (LNM) issued during survey acquisition, impacting the survey area, were applied and addressed by this survey.

D1.b Comparison to Significant Shoals

The charted shoal in Carrolls Channel appears to have migrated north eastward (Figure 4, see 12 foot contour line).[17] Also, a new four-foot obstruction was reported as Danger to Navigation (DtoN) #3 in this area.[18] The Hydrographer recommends charting the area based on current hydrography.[19]

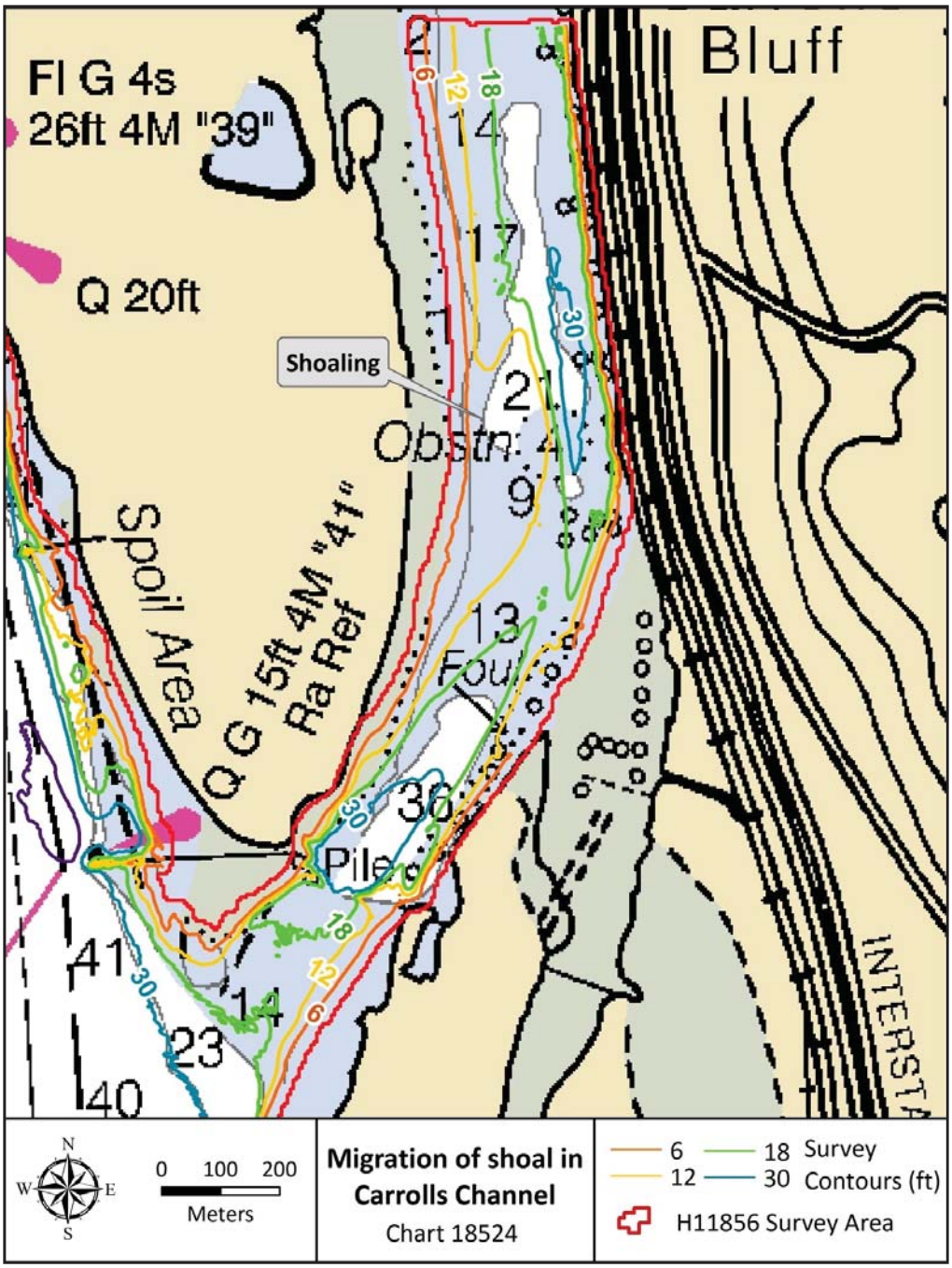


Figure 4. Migration of shoal in Carrolls Channel

The charted notation "Shoaling rep 2004" (between CRM 72 and 73) was not observed in MBES data Figure 5). The current survey's 18 foot contour agrees with the charted 18 foot contour in this area.[20]

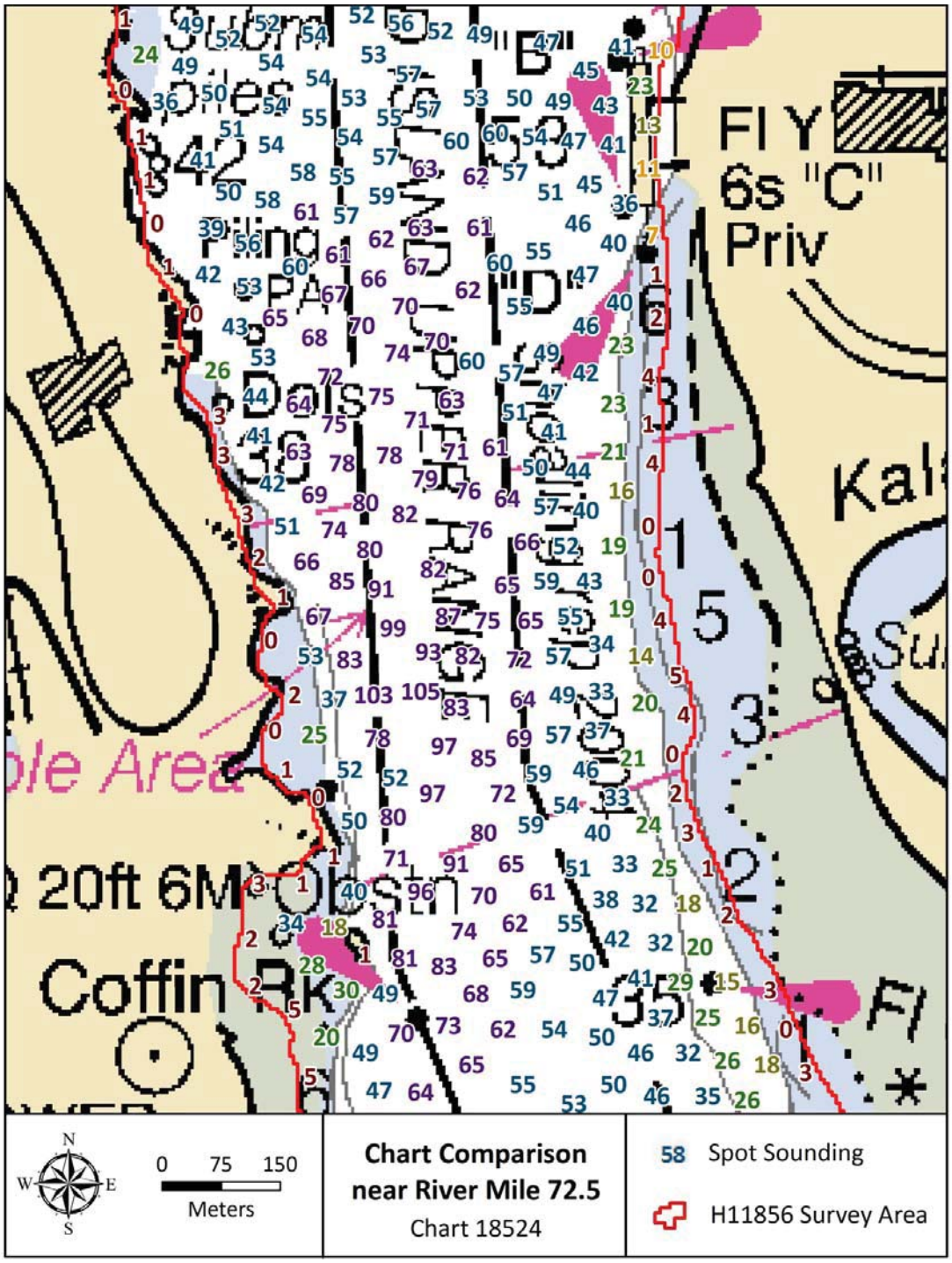


Figure 5. Chart comparison of charted shoaling

D1.c Comparison to Charted Features

One (1) AWOIS investigation was assigned within H11856 survey area (Figure 6).

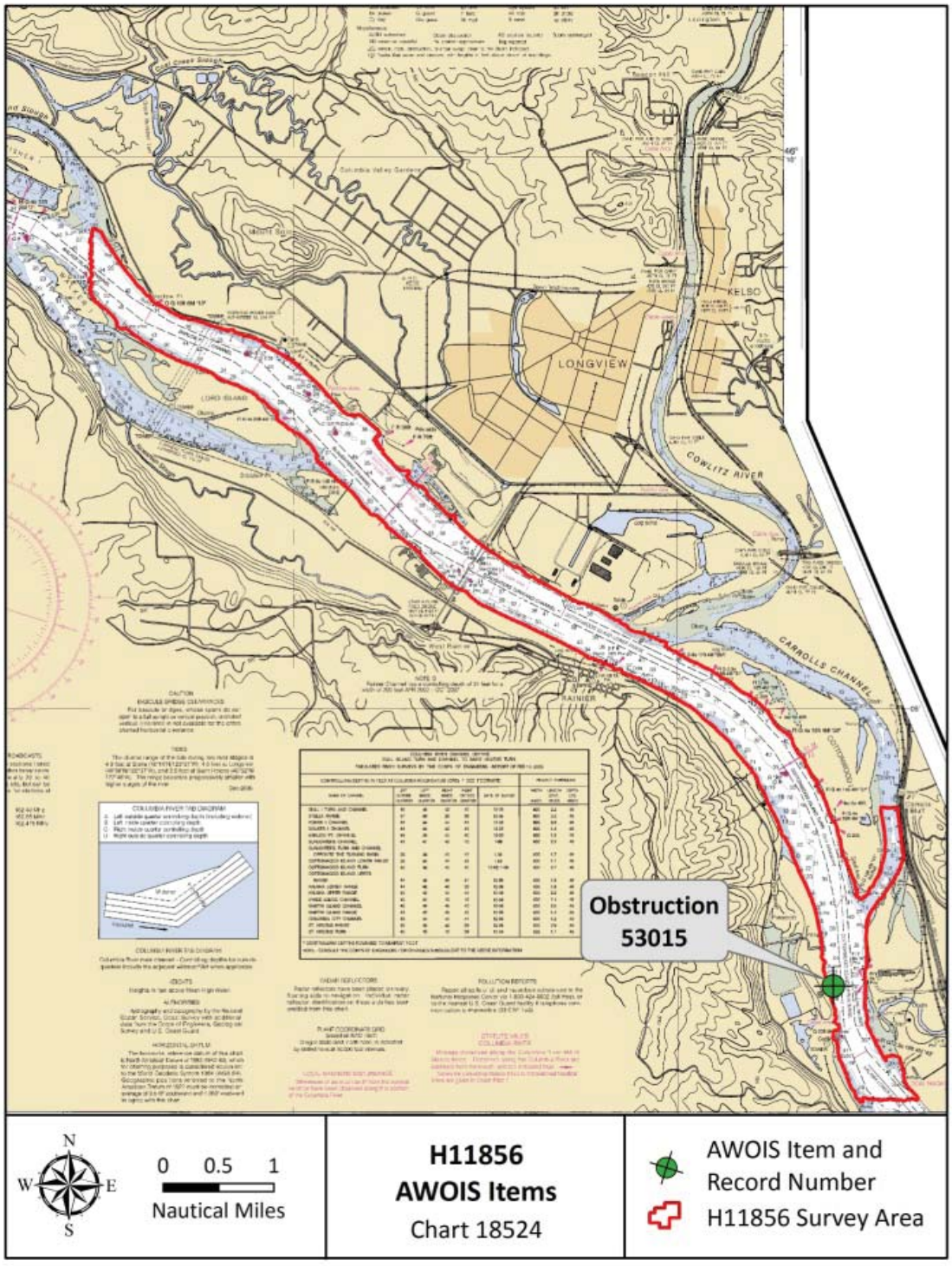


Figure 6. H11856 AWOIS investigations

The Piling PA (AWOIS 53015) charted at 46/02/30N, 122/52/54W was investigated with 100% multibeam coverage within the project limits. No large group of pilings was observed; however, there are small features in the Multibeam Echo Sounder (MBES) data that could possibly be pile ruins. A least depth of 39.3 feet (11.99 m) was found on an obstruction within the AWOIS radius.[21] The hydrographer recommends removing the Piling PA notation from applicable charts and updating the AWOIS database.[22] A complete description is available in Appendix 2 *Feature Reports*.

Complete multibeam coverage to the 2-meter contour was obtained around Coffin Rock (CRM 73). This feature is correctly charted.[23]

D1.d Comparison of Soundings in Designated Anchorages and Along Channels

There is one Designated Anchorage (110.228) within survey H11856. Anchorage Area 110.228 is located at CRM 65 and the depths within this area generally agree with charted depths.[24]

There are eight named Columbia River Channel sections within survey H11856. The charted project depth is 40 feet for all eight channels. The depths on Survey H11856 are generally deeper. The most recent charted channel survey report was February 2009 at which time a minimum depth of 35 feet was found in the right outside quarter of the Kalama Lower Range channel. Table 9 lists the Columbia River channels affected by survey H11856.

Table 9. Columbia River Channels and Minimum Depths

Name of Channel	Project Depth (ft)	Controlling Depth (ft)	H11856 Minimum Survey Depth (ft)
Walker Island Channel (partial)	40	41	45
Barlow Point Channel	40	40	39
Slaughters Channel	40	40	36
Slaughters Turn and Channel	40	39	37
Cottonwood Island Lower Range	40	38	40
Cottonwood Island Turn	40	45	43
Cottonwood Island Upper Range	40	44	43
Kalama Lower Range (partial)	40	35	40

Three of the eight channels, though generally deeper than the project depth, had shoaler soundings than 40 feet.[25]

- Surveyed depth of 39.0 feet (11.89 m) was found in the right outside quarter of Barlow Point Channel at 46/08/04.825N and 123/00/36.591W.
- Surveyed depth of 36.7 feet (11.19 m) was found in the left outside quarter of Slaughters Channel at 46/07/34.682N and 122/59/39.980W.
- Surveyed depth of 36.8 feet (11.22 m) was found in the right outside quarter of Slaughters Turn and Channel at 46/06/01.310N and 122/57/03.977W.

In addition to the main Columbia River channels, there is an approach channel off Slaughters Channel leading to the Weyerhaeuser port facility at CRM 64. The most recent charted channel

survey was October 2006 with a controlling depth of 36 feet. Survey H11856 has found the minimum depth to be 34 feet.[26]

Rainier Channel is a side channel, roughly between CRM 66 and 67, and runs along the Oregon shore. The Rainier Channel was last surveyed October 2007 and has a charted controlling depth of 24 feet. Survey H11856 has found the minimum depth to be 25 feet.[27]

D1.e New Submerged Features

New submerged features are listed in tabular format in Appendix II *Survey Feature Report.*[28] Several new items of interest are discussed below.

An uncharted wreck was found 60 meters offshore of a charted wreck.[29] The charted wreck is attributed as showing mast/masts and always dry. No wreck was observed visually at the charted location. Multibeam coverage over the new submerged wreck is shown next to a pier in Figure 7. In the same area, multibeam data found what appears to be a pipe section 30 feet long and 6 feet in diameter, just off of the Rainier, OR pier facility. Additional information on all new features can be found in Appendix II *Survey Feature Report*.

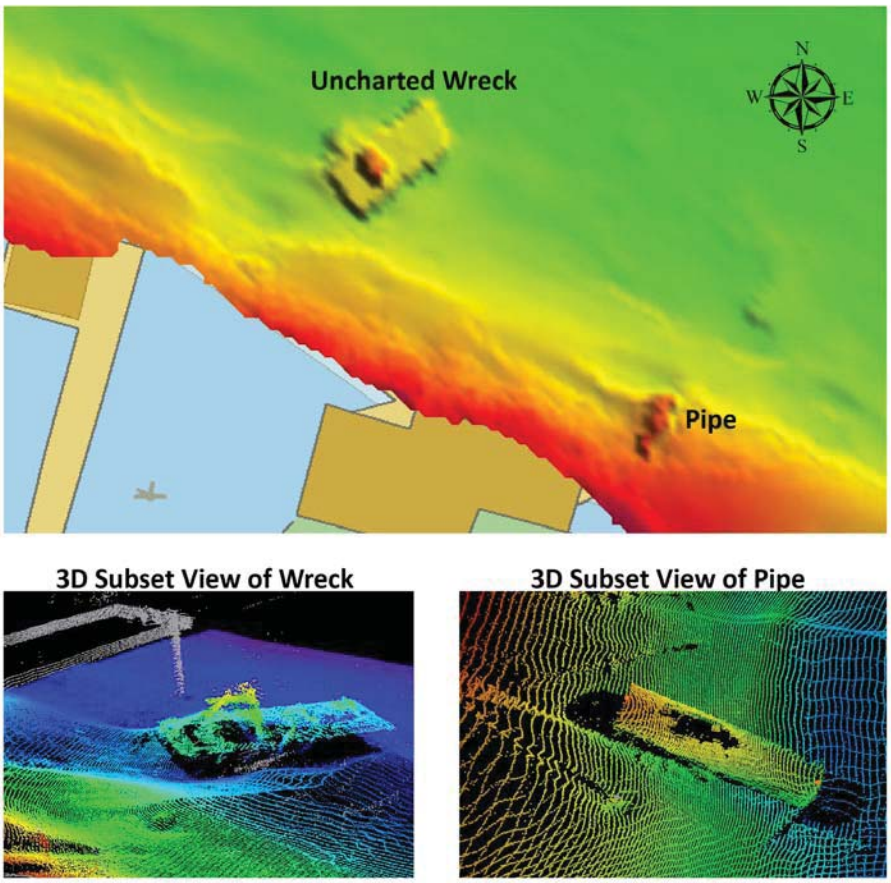


Figure 7. H11856 New submerged features

D1.f Dangers to Navigation (DtoN)

Three (3) DtoNs were located during survey H11856 and have been submitted to PHB. All DtoNs were reviewed by PHB and those deemed worthy of charting were forwarded on to the Marine Chart Division (MCD). Table 10 indicates charting status for each DtoN. Copies of the DEA DtoN submissions are included in Appendix I *Danger to Navigation Reports*.[30]

DtoN #1 was originally believed to be a submerged pile. The danger was forwarded to MCD and added to chart 18524_1 under LNM 51/08, issue date December 18, 2008. During an additional multibeam investigation the submerged pile was not located and is believed to be a transient deadhead. Numerous floating logs were observed in the area. The Hydrographer recommends removing this feature from the charts.[31] Additional information pertaining to this feature is included in Appendix I *Danger to Navigation Reports*.

DtoN #3 has been charted as a large obstruction which extends into the anchorage area. The Hydrographer recommends that this feature be charted as a single submerged pile.[32]

Table 10. DtoN Charting Status

DtoN	Feature	Applied to Raster Chart	Applied to ENC	PHB Submitted to MCD
DtoN 1	Obstruction	Yes	Yes	Yes
DtoN 2[33]	Obstruction	**No**	**No**	**No**
DtoN 3	Obstruction	Yes	Yes	Yes

D.2 Additional Results

D2.a Shoreline Investigations

Shoreline verification was not required for survey H11856. A new private pier and floating dock were observed on the north bank of the Columbia River at CRM 61. A new marina was observed on the south bank at CRM 67.1. The Hydrographer recommends that the charted shoreline and shoreline features be updated.[34]

D2.b Comparison with Prior Surveys

Comparison with prior surveys was not required under this task order.

D2.c Aids to Navigation (AtoN)

All U.S. Coast Guard aids to navigation (AtoN) within the survey limits were found to be correctly charted and serving their intended purpose.[35]

D2.d Overhead Clearance

Charted overhead power cables (between CRM 62 and 63) and the Lewis & Clark Fixed Bridge (CRM 66) impact overhead clearance in the survey area and appear to be charted correctly. Investigation of overhead clearance was not required under this task order.

D2.e Cables, Pipelines, and Offshore Structures

There are two charted pipeline areas located along the north bank of the Columbia River. One pipeline area is located between CRM 63-64 and the other is located between CRM 67-68. A pipeline is visible in the multibeam data at CRM 63-64 and is charted correctly. Three (3) additional pipelines were located during survey H11856. Two (2) of the pipelines are buried but visible in multibeam data. The third, which is located CRM 72 and 73 and approximately 220 meters downstream of a charted cable area, appears to be an elevated pipe secured to blocks on the river bottom (Figure 8). The pipelines are included in the S-57 feature file and additional information can be found in Appendix II *Survey Feature Report*.[36]

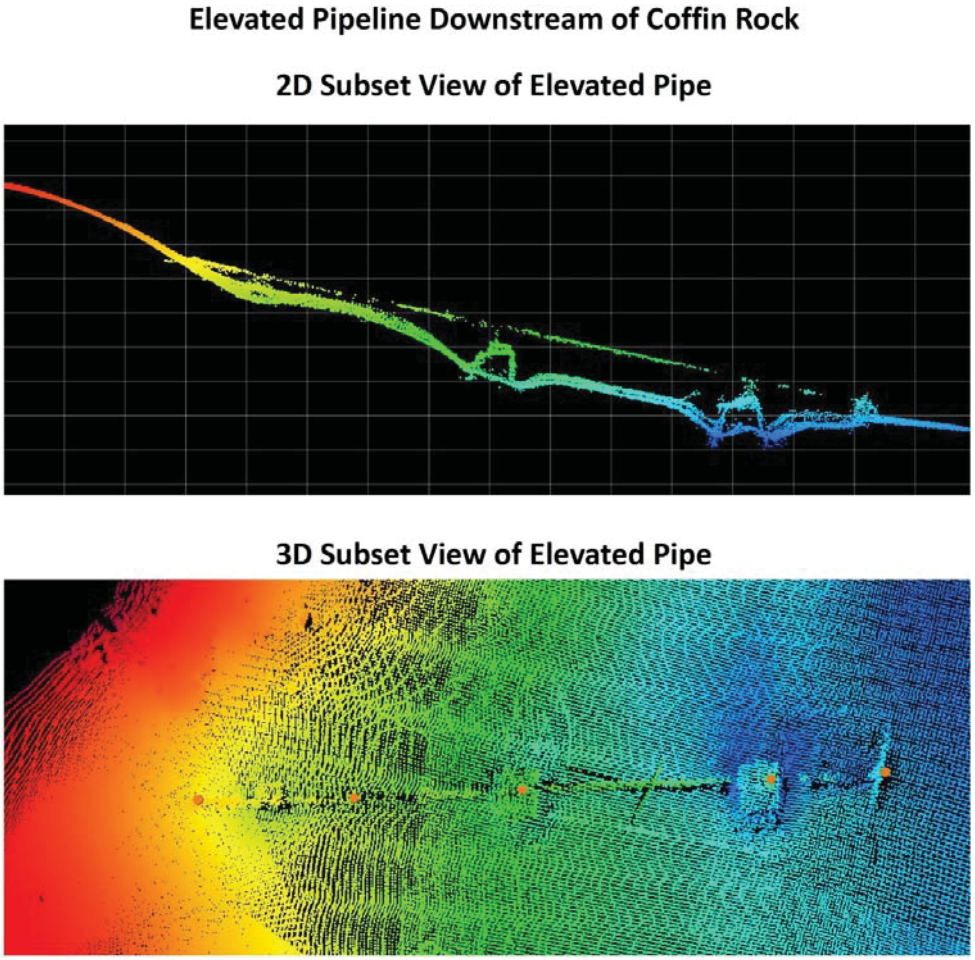


Figure 8. H11856 New elevated pipeline

Two (2) charted cable areas are located within the survey area and did not affect survey operations. No evidence of the cables was observed within the charted cable areas at CRM 67-68 or CRM 72-73.

D2.f Environmental Conditions Impacting the Quality of the Survey

Although the survey exceeds IHO Order 1 accuracy requirements, environmental conditions degraded the quality of the survey data. Due to the dynamic nature of the Columbia River with its heavy sediment transport, sand wave migration (up to one meter of downstream migration per day), has altered the river bottom over time, creating an offset between fill and mainscheme data.[37]

The difference in offset varies over the survey, depending upon the local sand wave formation and the time between fill and mainscheme data collection. Figure 9 shows an example of downstream sand wave migration impacting agreement between mainscheme and fill data.

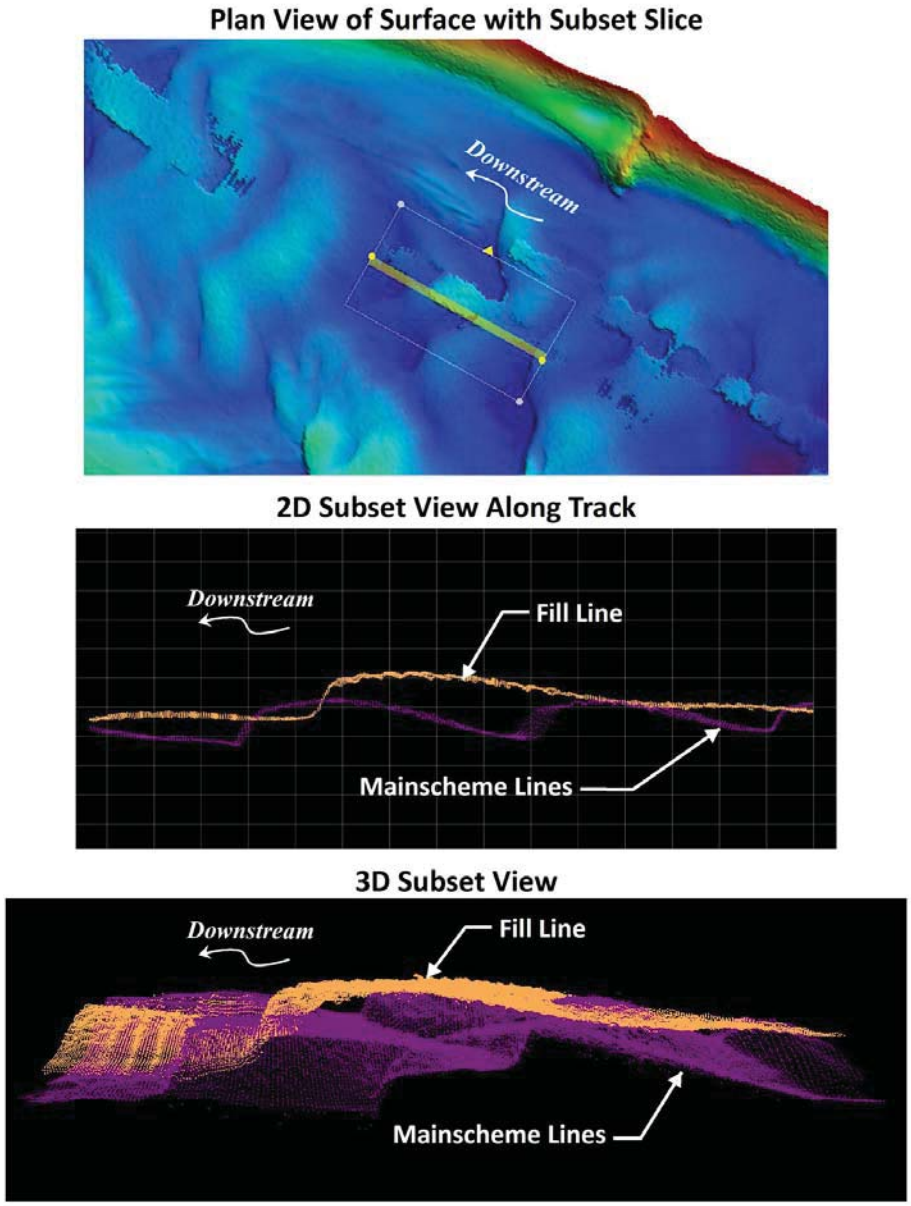


Figure 9. Sand wave migration

D2.g Construction Projects

Dredging activities were observed on October 6, 2008 and October 7, 2008 (DN280-281) during *R/V Preston* survey operations. The location of the dredge and pipes were noted to be just off the pier facilities for the City of Rainier, OR. Survey operations were not affected, but did impact fill agreement.

D2.h Bottom Characteristics

Thirteen (13) bottom samples were obtained on September 29, 2008 (DN273) and are included in the S-57 attributed feature file in the *Supporting Data* folder.[38] A table listing the position and description of each bottom sample is included in Appendix V *Supplemental Survey Records and Correspondence*, along with photographs of each sample.[39]

E. LETTER OF APPROVAL

The letter of approval for this report and accompanying data follows on the next page.

DAVID EVANS AND ASSOCIATES INC.

LETTER OF APPROVAL

OPR-N338-KR-08
REGISTRY NO. H11856

This report and the accompanying data are respectfully submitted.

Field operations contributing to the accomplishment of survey H11856 were conducted under my direct supervision with frequent personal checks of progress and adequacy. This report and associated data have been closely reviewed and are considered complete and adequate as per the OPR-N338-KR-08 *Statement of Work*, dated April 1, 2008.

Digitally signed by Jon Dasler
DN: cn=Jon Dasler, email=jld@deainc.com, o=David Evans and Associates, Inc., c=US
Date: 2009.06.17 11:17:08 -07'00'

Jonathan L. Dasler, PE (OR), PLS (OR, CA)
ACSM/THSOA Certified Hydrographer
Chief of Party

Digitally signed by Jason Creech
DN: cn=Jason Creech, email=jasc@deainc.com, o=David Evans and Associates, Inc., c=US
Date: 2009.06.17 11:18:16 -07'00'

Jason Creech
Lead Hydrographer

David Evans and Associates, Inc.
March 2009

F. SUPPLEMENTAL REPORTS

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

Title	Submittal Date
OPR-N338-KR-08 Data Acquisition and Processing Report	June 17, 2009
OPR-N338-KR-08 Horizontal and Vertical Control Report	TBD[40]

Revisions and Corrections Compiled During Office Processing and Certification

[1] See the Horizontal and Vertical Control Report filed with project records.
[2] Filed with project records.
[3] Separates are filed with hydrographic records.
[4] Filed with hydrographic records.
[5] Concur.
[6] Concur. These data are adequate to supersede charted data in the common area.
[7] Concur. Compiler recommends a note be added to the charts stating that mariners use caution when navigating outside the maintained channels.
[8] Concur. Compiler recommends a note be added to the charts stating that mariners use caution when navigating outside the maintained channels.
[9] Despite the artifacts from the bottom tracking algorithm, the data meets specification.
[10] Concur.
[11] Filed with hydrographic records.
[12] Concur.
[13] Concur.
[14] Concur.
[15] Filed with project records.
[16] Concur. Updated soundings are included in HCell H11856
[17] Recommend charted contours be updated based on new survey data.
[18] The charts have been updated to reflect DTON #3 and the feature is included in HCell H11856.
[19] Concur.
[20] Concur. Recommend removing 'Shoaling rep 2004' notation and charting updated soundings included in HCell H11856.
[21] The obstruction is included in HCell H11856.
[22] Concur. Piling PA notation has been blue noted to be removed.
[23] Concur.
[24] Concur.
[25] The US Army Corps of Engineers Portland District has been contacted and have been made aware of the survey results. Given the fact that the Columbia River Channels are continually being dredged, it is recommended that the tabulated depths for each channel be updated with the latest survey information.
[26] Recommend updating controlling depth with the latest survey information. See endnote 25.
[27] Recommend updating controlling depth on Rainier Channel with the latest survey information. See endnote 25.
[28] See attached feature report.
[29] The new submerged wreck is included in the HCell. It is recommended that the new wreck located at 46-05-25.0152N, 122-55-51.5136W be added to the AWOIS database.
[30] See attached DTON report.
[31] Concur with clarification. The reported DTON has already been removed from the latest versions of the charts. No additional action is required.
[32] Concur. The DTON has been charted and is included in the HCell.
[33] DTON #2 was deemed insignificant and was not reported to MCD by the Pacific Hydrographic Branch.

[34] Do not concur. The new private pier and floating dock and the new marina facility were not included in the submitted feature file or the survey feature report. There is not enough information available to update the shoreline with these new features.
[35] Chart ATONs using latest ATONIS information.
[36] The three new pipeline features are included in the HCell as linear blue notes (cartographic lines objects) indicating the locations, lengths and orientations of the pipelines. It is recommended that the new pipeline features be charted.
[37] These data are adequate to supersede charted data in the common area despite the shifting nature of the sandwaves. Compiler recommends a note be added to the chart stating that mariners use caution when navigating outside the maintained channels.
[38] Thirteen bottom samples were collected during H11856 and all are included in the HCell. No charted bottom samples were retained.
[39] Filed with hydrographic records.
[40] The Horizontal and Vertical Control Report was submitted July 22, 2009.

APPENDIX I
DANGER TO NAVIGATION RECORDS

DANGER TO NAVIGATION 1

Disproved during MBES investigation

Jason Creech

From: Jason Creech
Sent: Monday, December 01, 2008 12:16 PM
To: 'gary.nelson@noaa.gov'
Cc: 'Dave.Neander@noaa.gov'; 'Crescent Moegling'; Jon Dasler
Subject: H11856_DTON_1 Submission
Attachments: H11856_DTON_1.doc

Gary,

Attached is a Danger to Navigation report for H11856_DTON_1. The attached file includes the danger report, standard chartlet, and supporting images. Please let me know if you have any questions or require any additional information on this danger to navigation.

Thanks,
Jason

Jason Creech
Lead Hydrographer
David Evans and Associates, Inc.
(804) 516-7829

Disproved during MBES investigation

Jason Creech

From: Gary Nelson [Gary.Nelson@noaa.gov]
Sent: Monday, December 01, 2008 12:39 PM
To: Jason Creech
Subject: Re: H11856_DTON_1 Submission

Follow Up Flag: Follow up
Flag Status: Red

Jason,

Both Dave Neander and I reviewed the DTON. We feel it does not need to be reported since it is so close to the row of pilings at chart scale.
It seems unlikely the traffic close to the pilings would have a deep enough draft that the piling would present a danger. Let me know if you disagree based on your experience in the area.

Regards,

Gary

> Gary,
>
>
>
> Attached is a Danger to Navigation report for H11856_DTON_1. The
> attached file includes the danger report, standard chartlet, and
> supporting images. Please let me know if you have any questions or
> require any additional information on this danger to navigation.
>
Disproved during MBES investigation
>
>
> Thanks,
>
> Jason
>
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>
>
>
> Jason Creech
>
> Lead Hydrographer
>
> David Evans and Associates, Inc.
>
> (804) 516-7829
>
>
>

Jason Creech

From: Gary Nelson [Gary.Nelson@noaa.gov]
Sent: Thursday, December 04, 2008 8:05 AM
To: Jason Creech
Subject: Re: H11856_DTON_1 Submission

Jason,

Thanks for the update. We will send it off today.

Regards,

Gary
> Gary,
>
> I discussed this with Jon who is familiar with this area.
>
> We feel that this submerged pile could easily be hit. MCD plotted a
> submerged pile that we discovered 4 ft off of a Day Beacon in Mobile
> Bay. This item is on the edge of an anchorage area and the charted
> depth is 33 ft. Further, the row of baring piles is used to secure log
> rafts or log barges so tugs are operating right up to the baring
> piles. The DtoN may be a log that fell off of a ship or barge and
> stuck in the bottom.
>
> It is our recommendation that this item be forwarded to MCD.
>
> Please let me know if you have any questions or comments.
>
> Thanks,
> Jason

Disproved during MBES investigation

>
>
> -----Original Message-----
> From: Gary Nelson [mailto:Gary.Nelson@noaa.gov]
> Sent: Monday, December 01, 2008 12:39 PM
> To: Jason Creech
> Subject: Re: H11856_DTON_1 Submission
>
> Jason,
>
> Both Dave Neander and I reviewed the DTON. We feel it does not need
> to be reported since it is so close to the row of pilings at chart scale.
> It seems unlikely the traffic close to the pilings would have a deep
> enough draft that the piling would present a danger. Let me know if
> you
>
> disagree based on your experience in the area.
>
> Regards,
>
> Gary
>
>> Gary,
>>
>>
>>
>> Attached is a Danger to Navigation report for H11856_DTON_1. The
>> attached file includes the danger report, standard chartlet, and
>> supporting images. Please let me know if you have any questions or
>> require any additional information on this danger to navigation.
>>

>>
>>
>> Thanks,
>>
>> Jason
>>
>>
>>
>>
>>
>> Jason Creech
>>
>> Lead Hydrographer
>>
>> David Evans and Associates, Inc.
>>
>> (804) 516-7829
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>>
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>

Disproved during MBES investigation

Danger to Navigation Report for Survey H11856

Registry Number: H11856

State: Oregon

Locality: Columbia River

Sub-locality: Walder Island to Sandy Island

Project Number: OPR-N338-KR-08

Survey Date: [None]

Charts Affected

Number	Edition	Date	Scale (RNC)	RNC Correction(s)*
18524	36th	12/01/2006	1:40,000 (18524_1)	USCG LNM: 10/14/2008 (11/18/2008) NGA NTM: None (11/29/2008)
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	32nd	06/01/2007	1:4,860,700 (530_1)	[L]NTM: ?
50	6th	06/01/2003	1:10,000,000 (50_1)	[L]NTM: ?

Disproved during MBES investigation

* Correction(s) - *source: last correction applied (last correction reviewed--"cleared date")*

Features

No.	Feature Type	Survey Depth	Survey Latitude	Survey Longitude
1.1	GP	4.57 m	46° 07' 03.9" N	122° 58' 32.2" W

1 - Danger To Navigation

Disproved during MBES investigation

1.1) GP No. - 1 from H11856_dtons.xls

DANGER TO NAVIGATION

Survey Summary

Survey Position: 46° 07' 03.9" N, 122° 58' 32.2" W

Least Depth: 4.57 m (= 14.99 ft = 2.499 fm = 2 fm 2.99 ft)

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

Timestamp: 2008-281.00:00:00.000 (10/07/2008)

GP Dataset: H11856_dtons.xls

GP No.: 1

Charts Affected: 18524_1, 18003_1, 18007_1, 501_1, 530_1, 50_1

Remarks:

Depths were acquired with multibeam sonar. Depths are corrected using RTK GPS tides and should be considered preliminary. Positions are referenced from contractor installed real-time kinematic GPS network and verified using the USCG DGPS beacon at Fort Stevens, Oregon. The obstruction appears to be a submerged piling which rises approximately 7.5m (24.6ft) above the natural bottom. It is located 30 meters from a row of charted piles.

Disproved during MBES investigation

Feature Correlation

Address	Feature	Range	Azimuth	Status
H11856_dtons.xls	1	0.00	000.0	Primary

Hydrographer Recommendations

PHB recommends charting an obstruction with a danger curve.

Cartographically-Rounded Depth (Affected Charts):

15ft (18524_1)

2 ½fm (18003_1, 18007_1, 530_1)

4.6m (501_1, 50_1)

S-57 Data

Geo object 1: Obstruction (OBSTRN)

Attributes: SORDAT - 20081007

SORIND - US,US,nsurf,H11856

TECSOU - 3:found by multi-beam

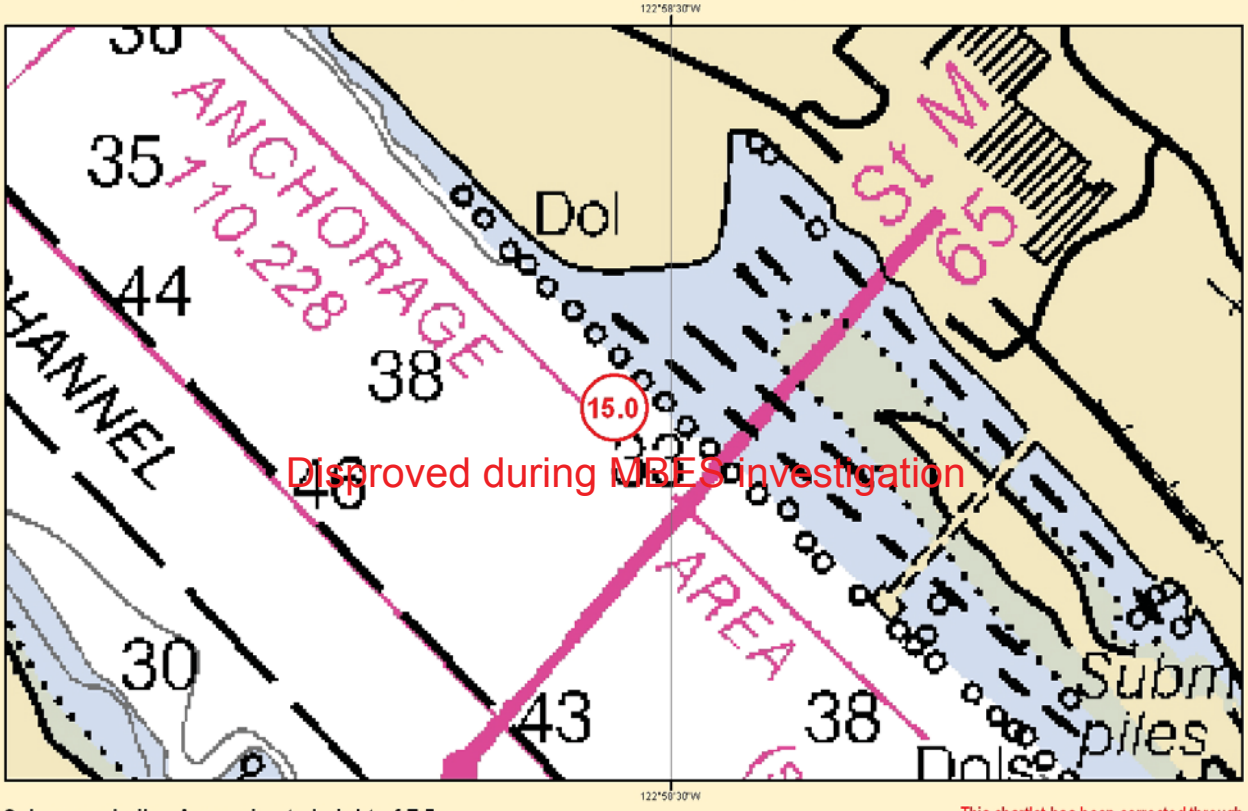
VALSOU - 4.57 m

VERDAT - 12:Mean lower low water

WATLEV - 3:always under water/submerged

Disproved during MBES investigation

DANGER TO NAVIGATION #1



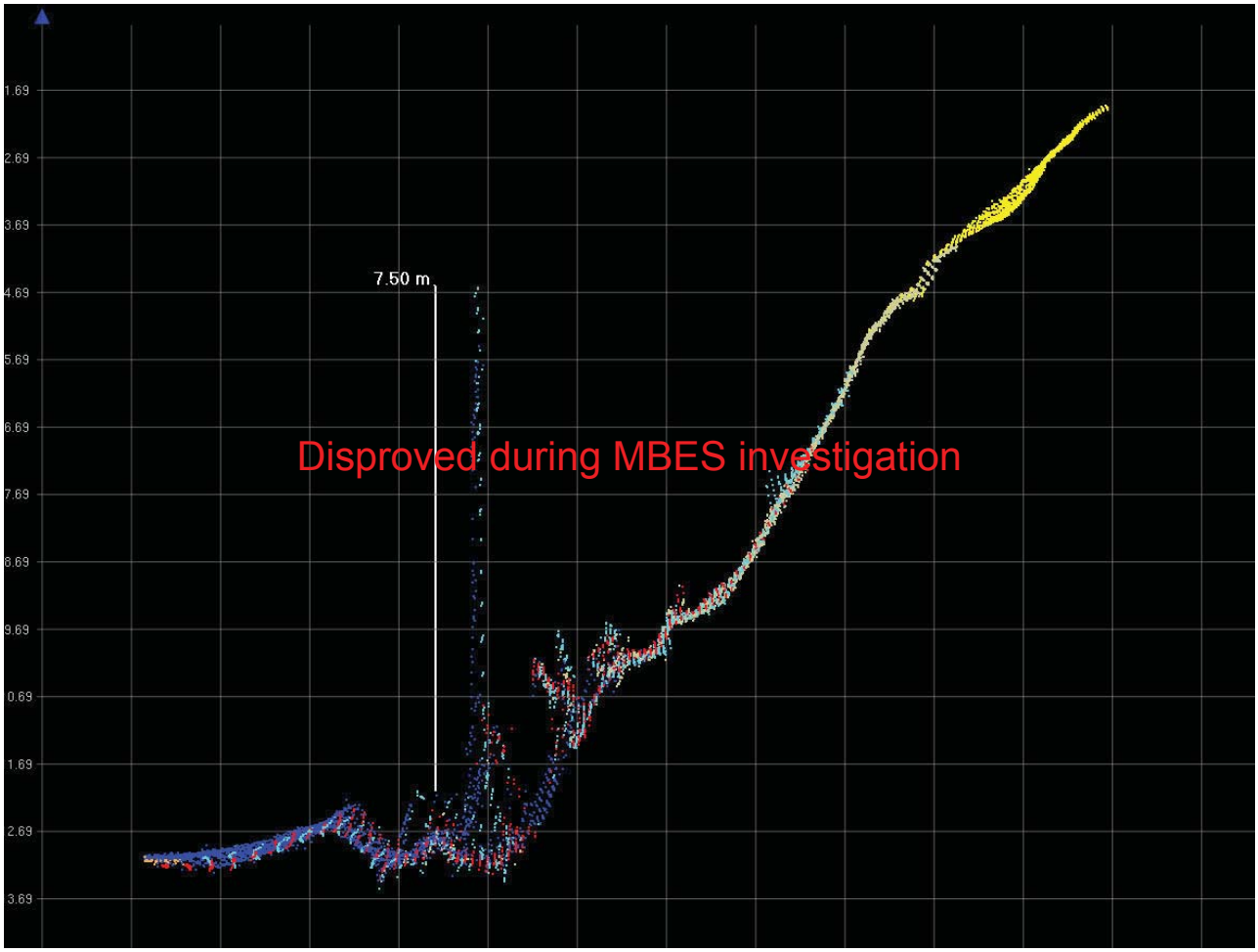
Submerged pile. Approximate height of 7.5m.

This chartlet has been corrected through Notice to Mariners dated November 8, 2008
NOT FOR NAVIGATION.

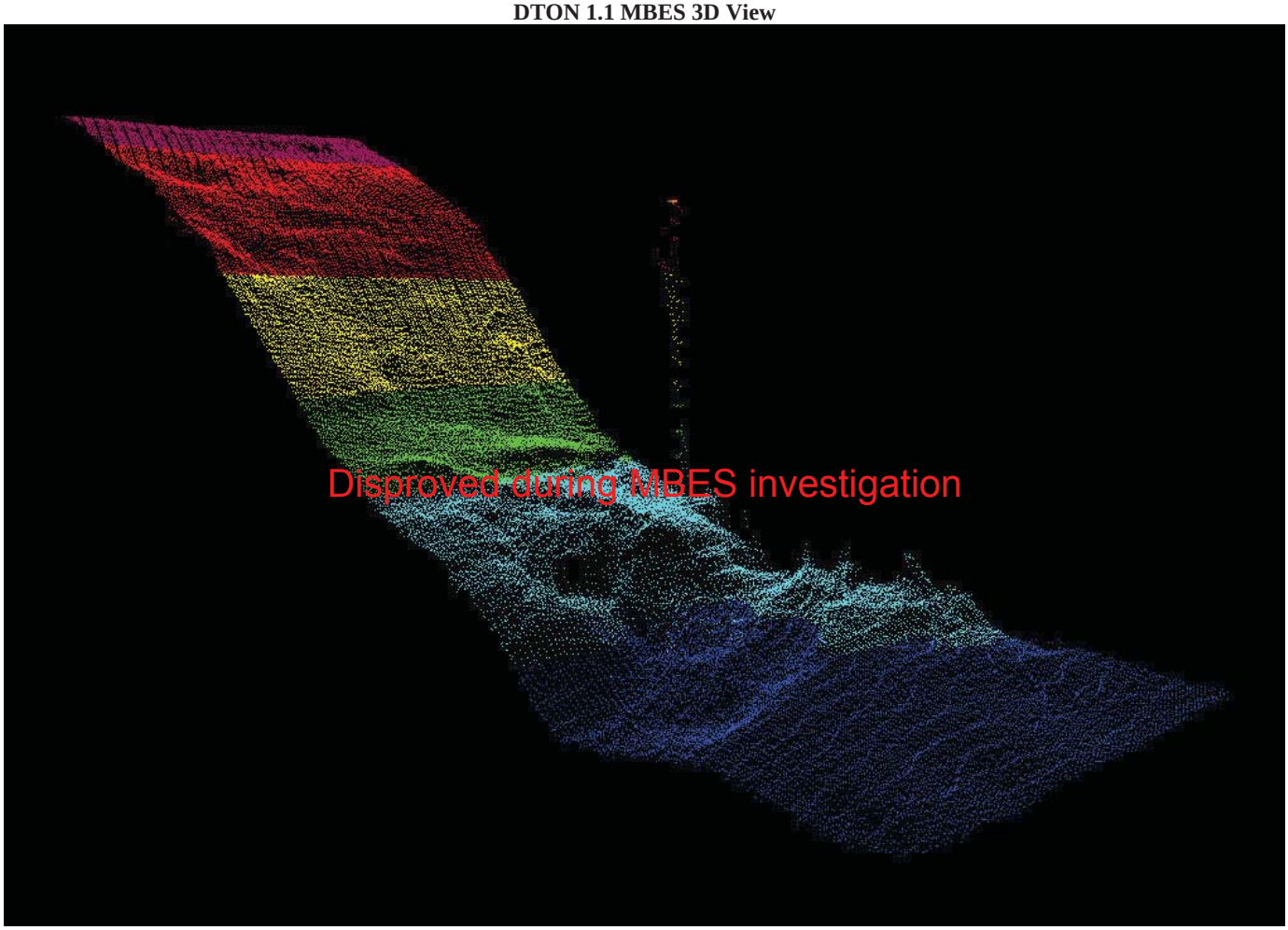
Chartlet 1 of 1

NOAA	NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION NATIONAL OCEAN SERVICE	Project: OPR-N388-KR-08 Survey: H11856 State: Oregon Locality: Columbia River Sub-Locality: Walker Island to Sandy Island Survey Scale: 1:10,000	Sounding Units: Feet Sounding Datum: Columbia River Horizontal Datum: NAD 83 Projection: UTM 10N Chart: 18524_1 Chart Edition: 36th Chart Scale: 1:40,000	David Evans and Associates, Inc. November 17, 2008

DTON 1.1 MBES 2D View



DTON 1.1 MBES 3D View



DANGER TO NAVIGATION 3

Jason Creech

From: Jason Creech
Sent: Thursday, February 26, 2009 7:17 AM
To: Gary Nelson
Cc: 'Dave.Neander@noaa.gov'; 'Crescent.Moegling@noaa.gov'; Jon Dasler
Subject: H11856_DTON_3 Submission
Attachments: H11856_DTON_3.doc

Gary,

Attached is a Danger to Navigation report for H11856_DTON_3. The attached file includes the danger report, standard chartlet, and supporting images. Please let me know if you have any questions or require any additional information on this danger to navigation.

Thanks,
Jason

Jason Creech
Lead Hydrographer

DAVID EVANS AND ASSOCIATES INC.

David Evans and Associates, Inc. | Marine Services Division
2801 SE Columbia Way, Ste. 130 | Vancouver, WA 98661
Office: 360.314.3200 | Direct: 804.516.7829 | Fax: 360.314.3250
jasc@deainc.com | www.deainc.com

H11856 DtoN

Registry Number: H11856
State: Oregon
Locality: Columbia River
Sub-locality: Walker Island to Sandy Island
Project Number: OPR-N338-KR-08
Survey Date: 02/23/2009

Contractor survey H11856 discovered the following DtoN on February 23rd, 2009.

Charts Affected

Number	Edition	Date	Scale (RNC)	RNC Correction(s)*
18524	36th	12/01/2006	1:40,000 (18524_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	32nd	06/01/2007	1:4,860,700 (530_1)	[L]NTM: ?
50	6th	06/01/2003	1:10,000,000 (50_1)	[L]NTM: ?

* Correction(s) - *source: last correction applied (last correction reviewed--"cleared date")*

Features

No.	Feature Type	Survey Depth	Survey Latitude	Survey Longitude	AWOIS Item
1.1	Obstruction	1.23 m	46° 03' 43.1" N	122° 52' 10.1" W	---

1 - Danger To Navigation

1.1) GP No. - 1 from H11856Dton.xls

DANGER TO NAVIGATION

Survey Summary

Survey Position: 46° 03' 43.1" N, 122° 52' 10.1" W

Least Depth: 1.23 m (= 4.04 ft = 0.673 fm = 0 fm 4.04 ft)

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

Timestamp: 2009-054.22:37:00.000 (02/23/2009)

GP Dataset: H11856Dton.xls

GP No.: 1

Charts Affected: 18524_1, 18003_1, 18007_1, 501_1, 530_1, 50_1

Remarks:

3-Obstrn

Depths were acquired with multibeam sonar. Depths are corrected using RTK GPS tides and should be considered preliminary. Positions are referenced from contractor installed real-time kinematic GPS network and verified using the USCG DGPS beacon at Fort Stevens, Oregon.

The obstruction appears to be a snag which rises approximately 2.8m (9.2ft) above the natural bottom. It is located in a charted depth of 21ft.

Feature Correlation

Address	Feature	Range	Azimuth	Status
H11856Dton.xls	1	0.00	000.0	Primary

Hydrographer Recommendations

Chart as surveyed.

Cartographically-Rounded Depth (Affected Charts):

4ft (18524_1)

0 ½fm (18003_1, 18007_1, 530_1)

1.2m (501_1, 50_1)

S-57 Data

Geo object 1: Obstruction (OBSTRN)

Attributes:

CATOBS - 1:snag / stump

QUASOU - 1:depth known

RECDAT - 20090223

SORDAT - 20090223

SORIND - US,US,survy,H11856

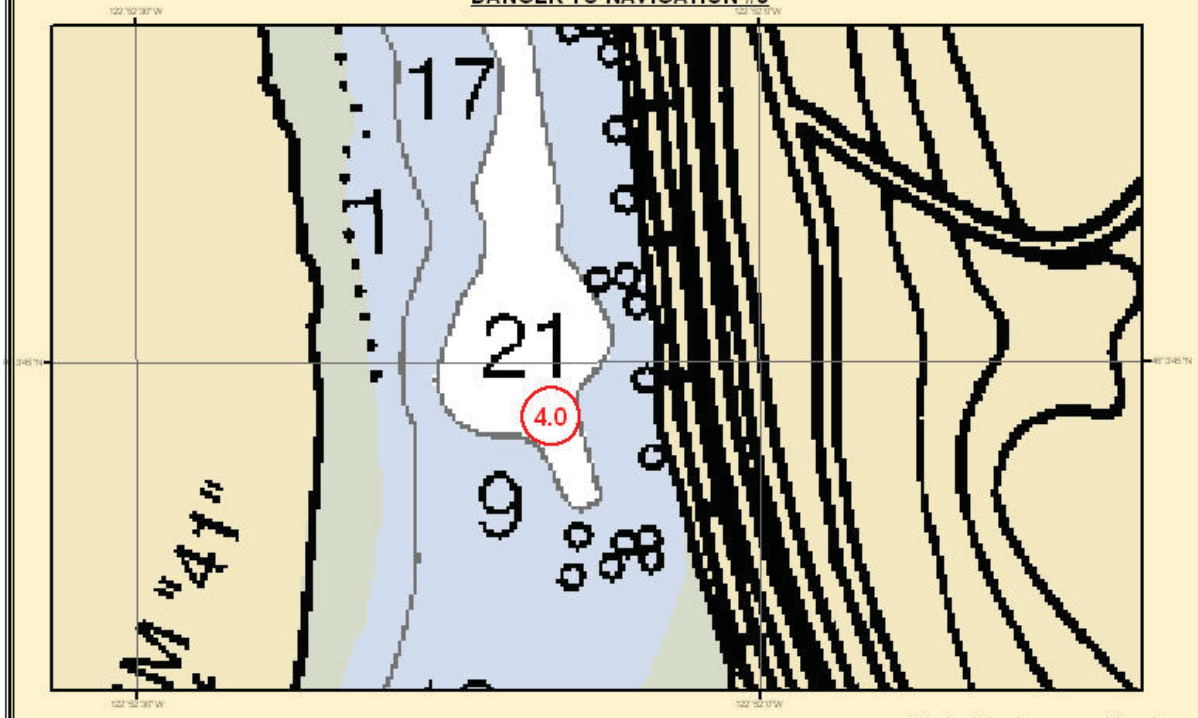
TECSOU - 3:found by multi-beam

VALSOU - 1.23 m

VERDAT - 12:Mean lower low water

WATLEV - 3:always under water/submerged

DANGER TO NAVIGATION #3



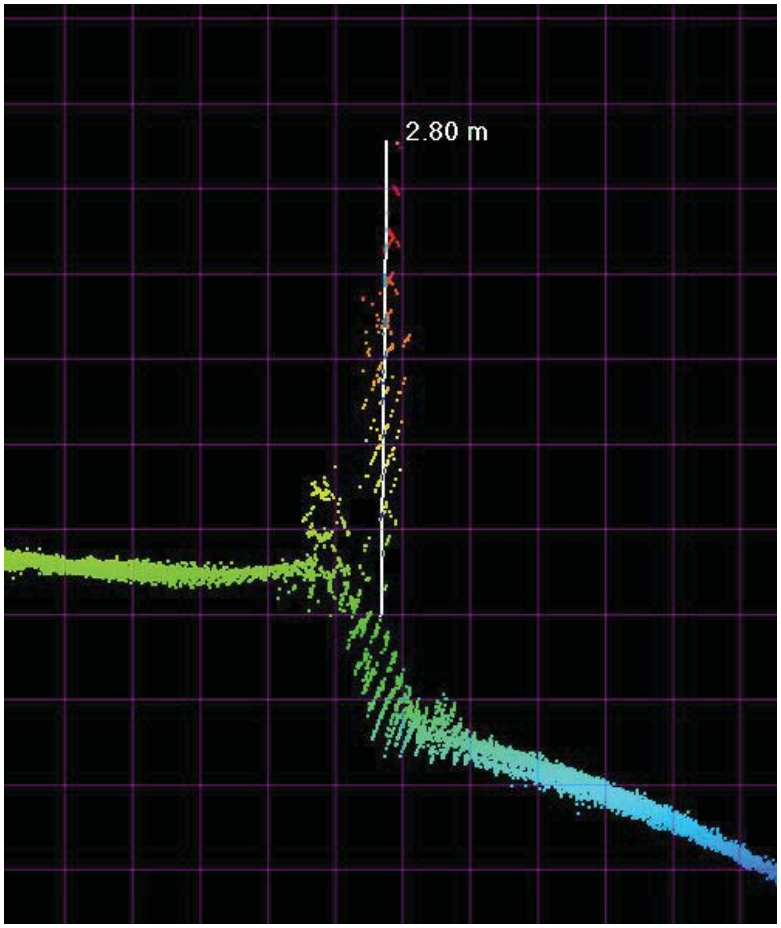
Snag. Approximate height of 2.8m.

This chartlet has been corrected through Notice to Mariners dated November 8, 2008
NOT FOR NAVIGATION.

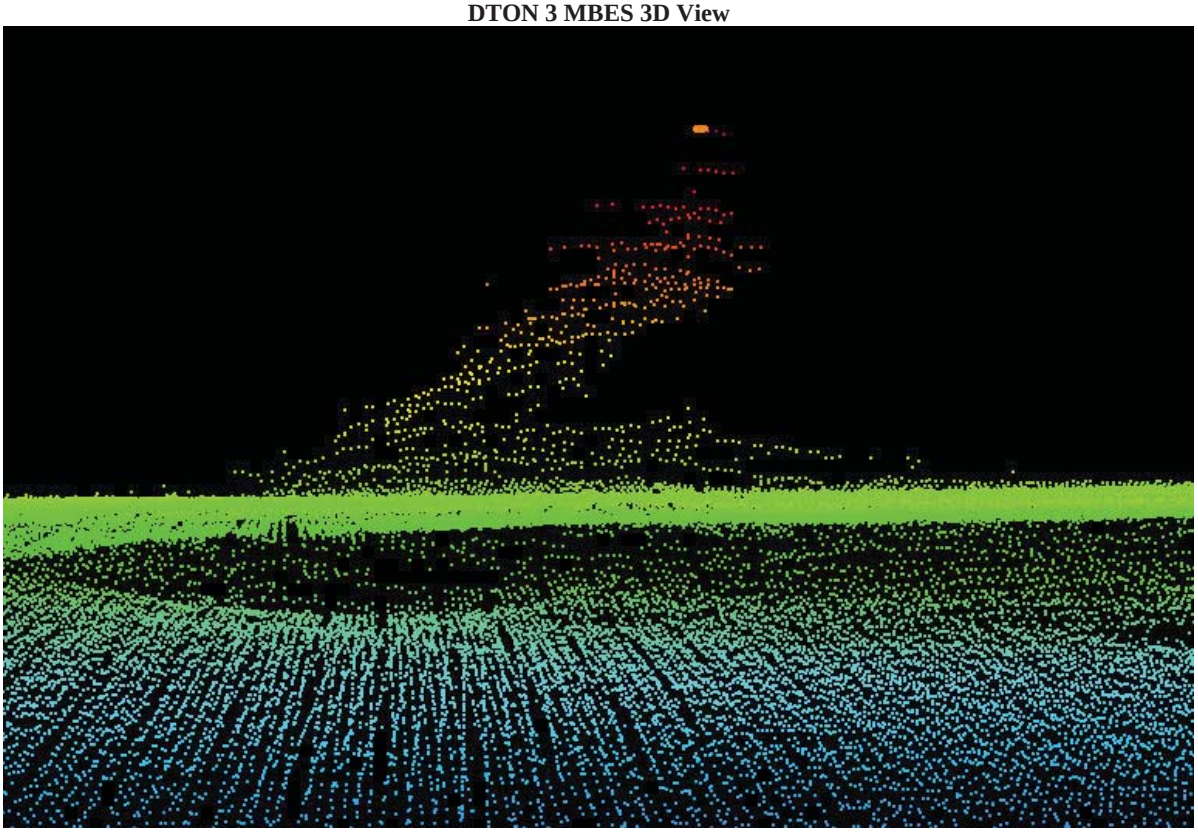
Chartlet 1 of 1

	NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION NATIONAL OCEAN SERVICE	Project: OPR-N388-KR-08 Survey: H11856 State: Oregon Locality: Columbia River Sub-Locality: Walker Island to Sandy Island Survey Scale: 1:10,000	Sounding Units: Feet Sounding Datum: Columbia River Horizontal Datum: NAD 83 Projection: UTM 10N Chart: 18524_1 Chart Edition: 36th Chart Scale: 1:40,000	David Evans and Associates, Inc. February 25, 2009

DTON 3 MBES 2D View



DTON 3 MBES 3D View



APPENDIX II
SURVEY FEATURE REPORT

Registry Number: H11856
State: Oregon
Locality: Columbia River
Sub-locality: Walker Island to Sandy Island
Project Number: OPR-N338- KR-08
Survey Date: October 2008 – March 2009

List of Features

List of Figures

AWOIS # 53015

REPORTED

FEATURE	RADIUS	LATITUDE (N)	LONGITUDE (W)
AWOIS #53015	150m	46-02-30	122-52-54

SURVEYED

FEATURE	LEAST DEPTH	LATITUDE (N)	LONGITUDE (W)
OBSTRN	11.99m	46-02-31.931N	122-53-00.398W

Remarks:
Charted Piling PA (AWOIS #53015) was investigated with 100% multibeam coverage within the project limits. No group of two baring pilings was observed; however, a new submerged feature was located in the vicinity. It is possible that this feature is pile ruins.

Hydrographer Recommendation:
The hydrographer recommends removing the Piling PA notation from applicable charts, charting new obstruction at the surveyed position, and updating the AWOIS database.

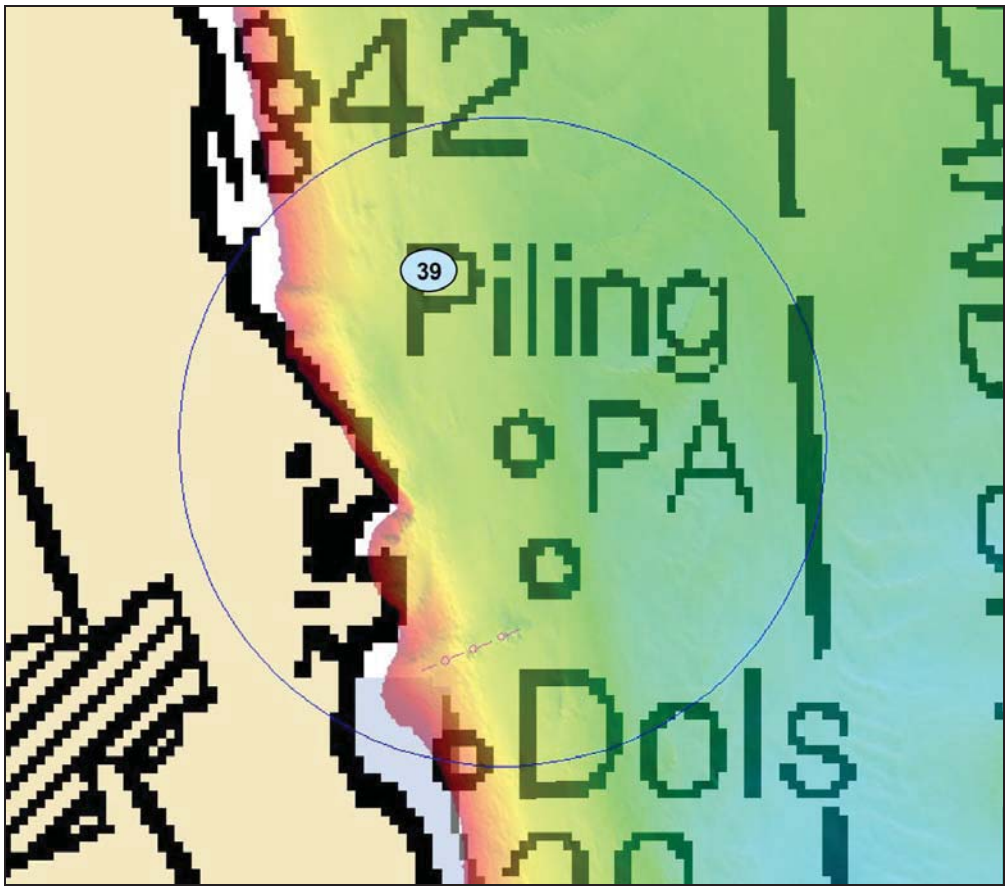


Figure 1: AWOIS search radius, chart 18524, MBES coverage, and ENC Features.

Appendix II
S-57 Features

OPR-N338-KR-08
H11856
Survey Features
MORFAC

Disproved:

ENC Latitude (N)	ENC Longitude (W)	Surveyed Latitude (N)	Surveyed Longitude (W)	Remarks
46-06-43.542	122-57-57.348	--	--	Charted incorrectly on ENC US5OR13M; RNC 18524 charted correctly
46-06-44.474	122-57-56.016	--	--	Charted incorrectly on RNC 18524 and ENC US5OR13M, feature is a offshore platform
46-08-03.403	122-59-55.162	--	--	disproved
46-06-24.679	122-58-17.546	--	--	disproved
46-03-19.044	122-52-28.998	--	--	disproved
46-06-43.542	122-57-58.899	--	--	disproved
46-06-44.447	122-58-00.350	--	--	disproved
46-06-45.172	122-58-01.791	--	--	disproved
46-06-46.097	122-58-03.094	--	--	disproved
46-06-47.002	122-58-04.609	--	--	disproved
46-06-48.865	122-58-07.688	--	--	disproved
46-06-48.050	122-58-06.311	--	--	disproved
46-06-50.644	122-58-10.376	--	--	disproved
46-06-51.731	122-58-12.013	--	--	disproved

New:

ENC Latitude (N)	ENC Longitude (W)	Surveyed Latitude (N)	Surveyed Longitude (W)	Remarks
--	--	46-06-53.345	122-58-14.376	Charted as PILPNT on RNC 18524 and ENC US5OR13M, feature is a dolphin
--	--	46-03-38.916	122-52-05.376	Charted as PILPNT on RNC 18524 and ENC US5OR13M, feature is a dolphin
--	--	46-04-04.422	122-52-09.458	Charted as PILPNT on RNC 18524 and ENC US5OR13M, feature is a dolphin.
--	--	46-06-52.801	122-58-13.519	Charted as PILPNT on RNC 18524 and ENC US5OR13M, feature is a dolphin.
--	--	46-03-47.416	122-52-07.734	Charted as PILPNT on RNC 18524 and ENC US5OR13M, feature is a dolphin.
--	--	46-03-31.961	122-52-08.746	Charted as PILPNT on RNC 18524 and ENC US5OR13M, feature is a dolphin.
--	--	46-04-03.497	122-52-08.818	Charted as PILPNT on RNC 18524 and ENC US5OR13M, feature is a dolphin.
--	--	46-03-41.548	122-52-05.174	Charted as PILPNT on RNC 18524 and ENC US5OR13M, feature is a dolphin.
--	--	46-06-56.333	122-58-19.114	Charted as PILPNT on RNC 18524 and ENC US5OR13M, feature is a dolphin.
--	--	46-03-55.912	122-52-09.192	Charted as PILPNT on RNC 18524 and ENC US5OR13M, feature is a dolphin.

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H11856
Survey Features
MORFAC

New:

ENC Latitude (N)	ENC Longitude (W)	Surveyed Latitude (N)	Surveyed Longitude (W)	Remarks
--	--	46-03-43.812	122-52-05.272	Charted as PILPNT on RNC 18524 and ENC US5OR13M, feature is a dolphin.
--	--	46-03-55.001	122-52-07.352	Charted as PILPNT on RNC 18524 and ENC US5OR13M, feature is a dolphin.
--	--	46-03-47.574	122-52-06.481	Charted as PILPNT on RNC 18524 and ENC US5OR13M, feature is a dolphin.
--	--	46-06-54.382	122-58-16.075	Charted as PILPNT on RNC 18524 and ENC US5OR13M, feature is a dolphin.
--	--	46-03-59.285	122-52-08.047	Charted as PILPNT on RNC 18524 and ENC US5OR13M, feature is a dolphin.
--	--	46-04-01.027	122-52-08.386	Charted as PILPNT on RNC 18524 and ENC US5OR13M, feature is a dolphin.
--	--	46-03-50.162	122-52-06.463	Charted as PILPNT on RNC 18524 and ENC US5OR13M, feature is a dolphin.
--	--	46-03-56.099	122-52-07.432	Charted as PILPNT on RNC 18524 and ENC US5OR13M, feature is a dolphin.
--	--	46-03-56.009	122-52-08.166	Charted as PILPNT on RNC 18524 and ENC US5OR13M, feature is a dolphin.
--	--	46-03-38.664	122-52-06.445	Charted as PILPNT on RNC 18524 and ENC US5OR13M, feature is a dolphin.
--	--	46-03-58.565	122-52-07.936	Charted as PILPNT on RNC 18524 and ENC US5OR13M, feature is a dolphin.
--	--	46-03-25.945	122-52-14.488	Charted as PILPNT on RNC 18524 and ENC US5OR13M, feature is a dolphin.
--	--	46-04-04.472	122-52-10.664	Charted as PILPNT on RNC 18524 and ENC US5OR13M, feature is a dolphin.
--	--	46-06-49.770	122-58-08.947	Charted correctly on RNC 18524, not on ENC US5OR13M.
--	--	46-01-43.334	122-52-06.910	Charted correctly on RNC 18524, not on ENC US5OR13M.
--	--	46-01-45.253	122-52-07.896	Charted correctly on RNC 18524, not on ENC US5OR13M.
--	--	46-06-50.004	122-58-09.455	Charted correctly on RNC 18524, not on ENC US5OR13M.
--	--	46-07-09.995	122-58-39.655	Charted correctly on RNC 18524, not on ENC US5OR13M.
--	--	46-06-57.024	122-58-20.255	New dolphin
--	--	46-05-57.289	122-57-32.231	New dolphin
--	--	46-05-53.934	122-57-21.845	New dolphin
--	--	46-05-54.326	122-57-23.062	New dolphin
--	--	46-05-56.828	122-57-30.798	New dolphin
--	--	46-03-49.262	122-52-06.254	New dolphin
--	--	46-03-57.611	122-52-07.727	New dolphin
--	--	46-06-55.372	122-58-17.641	New dolphin

OPR-N338-KR-08
H11856
Survey Features
OBSTRN

Disproved:

ENC Latitude (N)	ENC Longitude (W)	Surveyed Latitude (N)	Surveyed Longitude (W)	Remarks
46-05-15.440	122-54-26.849	--	--	disproved
46-05-17.417	122-54-32.897	--	--	disproved
46-07-48.150	122-59-30.926	--	--	disproved
46-07-03.900	122-58-32.200	--	--	DtoN #1; disproved

New:

ENC Latitude (N)	ENC Longitude (W)	Surveyed Latitude (N)	Surveyed Longitude (W)	Remarks
--	--	46-05-18.611	122-55-35.522	new awash pile
--	--	46-05-23.921	122-55-49.508	Possible section of pipe, approximately 1.8m (6ft) in diameter
--	--	46-05-23.647	122-55-49.728	Possible section of pipe, approximately 1.8m (6ft) in diameter
--	--	46-05-24.310	122-55-49.040	snag/stump
--	--	46-06-43.481	122-57-58.590	snag/stump
--	--	46-08-19.687	123-00-29.930	snag/stump
--	--	46-05-55.453	122-56-13.258	snag/stump
--	--	46-08-20.450	123-00-33.440	snag/stump
--	--	46-08-22.618	123-00-46.710	snag/stump
--	--	46-06-46.307	122-58-02.028	snag/stump
--	--	46-06-49.309	122-58-07.781	snag/stump
--	--	46-02-31.931	122-53-00.398	snag/stump
--	--	46-09-09.590	123-02-27.838	snag/stump
--	--	46-09-09.018	123-02-25.048	snag/stump
--	--	46-09-01.192	123-02-17.012	snag/stump
--	--	46-08-20.011	123-00-28.796	snag/stump
--	--	46-08-13.438	123-00-18.997	snag/stump
--	--	46-08-08.884	123-00-03.064	snag/stump
--	--	46-04-56.788	122-54-37.105	snag/stump
--	--	46-03-43.088	122-52-10.146	snag/stump
--	--	46-03-39.956	122-52-11.302	snag/stump

OPR-N338-KR-08
H11856
Survey Features
OFSPLF

New:

ENC Latitude (N)	ENC Longitude (W)	Surveyed Latitude (N)	Surveyed Longitude (W)	Remarks
--	--	46-06-44.388	122-57-56.020	Charted as dolphin, should be OFSPLF
--	--	46-06-43.470	122-57-57.427	Charted as dolphin, should be OFSPLF

OPR-N338-KR-08
H11856
Survey Features
PILPNT

Disproved:

ENC Latitude (N)	ENC Longitude (W)	Surveyed Latitude (N)	Surveyed Longitude (W)	Remarks
46-01-45.264	122-52-07.860	--	--	Charted as MORFAC on RNC 18524 and ENC US5OR13M, feature is a pile
46-06-50.022	122-58-09.480	--	--	Charted incorrectly on ENC US5OR13M; RNC 18524 charted correctly
46-06-49.792	122-58-08.940	--	--	Charted incorrectly on ENC US5OR13M; RNC 18524 charted correctly
46-07-09.977	122-58-39.612	--	--	Charted incorrectly on ENC US5OR13M; RNC 18524 charted correctly
46-03-25.981	122-52-14.484	--	--	Charted incorrectly on ENC US5OR13M; RNC 18524 charted correctly
46-03-31.968	122-52-08.724	--	--	Charted incorrectly on ENC US5OR13M; RNC 18524 charted correctly
46-03-38.657	122-52-06.420	--	--	Charted incorrectly on ENC US5OR13M; RNC 18524 charted correctly
46-03-38.876	122-52-05.376	--	--	Charted incorrectly on ENC US5OR13M; RNC 18524 charted correctly
46-03-41.609	122-52-05.196	--	--	Charted incorrectly on ENC US5OR13M; RNC 18524 charted correctly
46-03-47.498	122-52-07.716	--	--	Charted incorrectly on ENC US5OR13M; RNC 18524 charted correctly
46-03-47.581	122-52-06.492	--	--	Charted incorrectly on ENC US5OR13M; RNC 18524 charted correctly
46-03-50.137	122-52-06.456	--	--	Charted incorrectly on ENC US5OR13M; RNC 18524 charted correctly
46-03-55.904	122-52-09.084	--	--	Charted incorrectly on ENC US5OR13M; RNC 18524 charted correctly
46-03-55.026	122-52-07.284	--	--	Charted incorrectly on ENC US5OR13M; RNC 18524 charted correctly
46-03-56.027	122-52-08.148	--	--	Charted incorrectly on ENC US5OR13M; RNC 18524 charted correctly
46-03-58.608	122-52-07.932	--	--	Charted incorrectly on ENC US5OR13M; RNC 18524 charted correctly
46-04-01.027	122-52-08.364	--	--	Charted incorrectly on ENC US5OR13M; RNC 18524 charted correctly
46-04-04.447	122-52-10.596	--	--	Charted incorrectly on ENC US5OR13M; RNC 18524 charted correctly
46-04-03.486	122-52-08.832	--	--	Charted incorrectly on ENC US5OR13M; RNC 18524 charted correctly
46-04-04.433	122-52-09.444	--	--	Charted incorrectly on ENC US5OR13M; RNC 18524 charted correctly
46-03-56.095	122-52-07.392	--	--	Charted incorrectly on ENC US5OR13M; RNC 18524 charted correctly
46-01-43.737	122-52-06.945	--	--	disproved
46-06-57.276	122-58-20.712	--	--	disproved
46-06-55.724	122-58-18.804	--	--	disproved
46-06-57.028	122-58-20.856	--	--	disproved
46-06-52.866	122-58-14.376	--	--	disproved
46-06-53.579	122-58-15.456	--	--	disproved

OPR-N338-KR-08
H11856
Survey Features
PILPNT

Disproved:

ENC Latitude (N)	ENC Longitude (W)	Surveyed Latitude (N)	Surveyed Longitude (W)	Remarks
46-06-54.198	122-58-16.356	--	--	disproved
46-05-15.909	122-55-22.105	--	--	disproved
46-03-37.607	122-52-09.040	--	--	disproved
46-03-37.891	122-52-07.236	--	--	disproved
46-03-38.934	122-52-08.863	--	--	disproved
46-01-43.737	122-52-06.945	--	--	disproved
46-01-45.264	122-52-07.860	--	--	disproved
46-02-27.379	122-52-57.811	--	--	disproved
46-02-29.212	122-52-58.341	--	--	disproved
46-04-27.557	122-54-01.462	--	--	disproved
46-05-19.223	122-55-37.668	--	--	disproved
46-05-18.989	122-55-36.840	--	--	disproved
46-06-54.130	122-58-14.844	--	--	disproved
46-07-00.022	122-58-24.865	--	--	disproved
46-06-57.715	122-58-21.936	--	--	disproved
46-06-57.028	122-58-20.856	--	--	disproved
46-07-00.889	122-58-26.307	--	--	disproved
46-06-59.238	122-58-23.016	--	--	disproved
46-07-01.892	122-58-27.739	--	--	disproved
46-07-02.758	122-58-29.116	--	--	disproved
46-07-05.675	122-58-33.050	--	--	disproved
46-07-04.679	122-58-31.692	--	--	disproved
46-07-03.716	122-58-30.306	--	--	disproved
46-07-07.583	122-58-35.802	--	--	disproved
46-07-06.581	122-58-34.501	--	--	disproved
46-07-08.540	122-58-37.514	--	--	disproved
46-07-09.439	122-58-38.518	--	--	disproved

OPR-N338-KR-08
H11856
Survey Features
PILPNT

Disproved:

ENC Latitude (N)	ENC Longitude (W)	Surveyed Latitude (N)	Surveyed Longitude (W)	Remarks
46-07-12.272	122-58-42.369	--	--	disproved
46-07-11.367	122-58-41.123	--	--	disproved
46-03-06.451	122-53-10.680	--	--	disproved
46-05-18.863	122-55-36.228	--	--	disproved

New:

ENC Latitude (N)	ENC Longitude (W)	Surveyed Latitude (N)	Surveyed Longitude (W)	Remarks
--	--	46-08-42.896	123-01-52.669	Charted correctly on RNC 18524, not on ENC US5OR13M.
--	--	46-04-42.272	122-54-18.216	Seaward most extent of a group of 3 piles at CRM 69.5
--	--	46-04-20.075	122-53-55.896	new pile
--	--	46-04-20.132	122-53-56.184	new pile
--	--	46-05-24.356	122-55-49.688	new pile
--	--	46-04-20.255	122-53-55.378	new pile
--	--	46-04-19.877	122-53-55.406	new pile
--	--	46-04-42.870	122-54-19.044	new pile
--	--	46-04-19.823	122-53-55.507	new pile
--	--	46-04-19.747	122-53-55.392	new pile

OPR-N338-KR-08
H11856
Survey Features
PIPSOL

New:

Surveyed SOL Latitude (N)	Surveyed SOL Longitude (W)	Surveyed EOL Latitude (N)	Surveyed EOL Longitude (W)	Remarks
46-08-09.431	123-01-26.400	46-08-11.273	123-01-15.700	new pipeline; length 237m
46-05-51.600	122-56-01.453	46-05-47.861	122-56-03.036	new pipeline; length 120m
46-02-25.950	122-53-00.645	46-02-26.675	122-52-58.152	new pipeline; length 58m

OPR-N338-KR-08
H11856
Survey Features
UWTROC

Disproved:

ENC Latitude (N)	ENC Longitude (W)	Surveyed Latitude (N)	Surveyed Longitude (W)	Remarks
46-07-52.961	122-59-43.174	--	--	Disproved underwater/awash rock

OPR-N338-KR-08
H11856
Survey Features
WRECKS

New:

ENC Latitude (N)	ENC Longitude (W)	Surveyed Latitude (N)	Surveyed Longitude (W)	Remarks
--	--	46-05-25.015	122-55-51.514	Uncharted wreck located 60m offshore of a charted wreck.

H11856 HCell Report

Katie Reser, Physical Scientist
Pacific Hydrographic Branch

Introduction

The primary purpose of the HCell is to provide new survey information in International Hydrographic Organization (IHO) format S-57 to update the largest scale ENC and RNC in the region: NOAA ENC US5OR13M, and NOAA RNC 18524.

HCell compilation of survey H11856 used Pacific Hydrographic Branch HCell Reference Guide Version 2.0-Draft.

1. Compilation Scale

Depths for HCell H11856 were compiled to the largest scale chart in the region, 18524 (36th Ed., December 2006, 1:40,000). The density and distribution of soundings from H11856 were selected to emulate the distribution on the chart. Non-bathymetric features have been generalized to chart scale.

2. Soundings

A survey-scale sounding (SOUNDG) feature object layer was built from the 0.5-meter combined surface, **H11856_Combined_50cm**, in CARIS BASE Editor. A shoal-biased selection was made at 1:10,000 scale for the main chart area using a Radius Table file with values shown in the table, below.

Upper limit (m)	Lower limit (m)	Radius (mm)
0 10		3
10 20		4
20 50		4.5
50	500	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 and inset 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 generalized metric and feet equivalent contour values are shown in the table below.

Chart Contours in Feet	Metric Equivalent of Chart Contours	Metric Equivalent of Chart Contours NOAA Rounded	Actual Value of Chart Contours
0 0.00		NA	0.00
6 1.829		2.0574	6.75
12 3.658		3.8862	12.75
18 5.486		5.715	18.75
30 9.144		9.3726	30.75
60 18.288		18.5166	60.75

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

4. Meta Areas

The following Meta object areas are included in HCell 11856:

M_QUAL

Meta area objects were constructed on the basis of the limits of the hydrography. Due to the complexity of the extents generated during contour creation from the **H11856_Combined_50cm** surface, the limits of the coverage area were derived from a combination of auto-generating from the surface and extensive node filtering.

5. Features

Shoreline features for H11856 were delivered from the field in one S-57 file defining new features and modification to GC or charted features. The features included in the HCell were de-conflicted against the chart and hydrography during office processing.

There were three DTONs reported from survey H11856. The first DTON was reported to MCD by the Pacific Hydrographic Branch and applied to the charts, but was later disproved in a full multibeam investigation. The feature has since been removed from the charts and no further action is required.

Upon review, the second DTON was deemed insignificant and was not forwarded to MCD by the Pacific Hydrographic Branch.

The third DTON has been applied to the charts and is included in HCell H11856.

There are three AWOIS items in the limits of H11856 and one item was assigned to be investigated. The AWOIS item was found 91 meters to the northwest of the charted

position and is included in the HCell. The other two items in the survey limits were not investigated.

Thirteen bottom samples were collected during H11856 and all are included in the HCell. No charted bottom samples were retained.

The source of all features included in the H11856 HCell can be determined by the SORIND field.

6. S-57 Objects and Attributes

The *_CS HCell contains the following Objects:

SOUNDG	Chart scale soundings
UWTROC	Rock features
OBSTRN	Foul areas and obstructions
WRECKS	Wreck
PILPNT	Piles
MORFAC	Dolphins
OFSPLF	Offshore platforms
SBDARE Bottom	samples
M_QUAL	Data quality Meta object
$CSYMB	Blue notes
$LINES	Linear blue note features

The *_SS HCell contains the following Objects:

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

All S-57 Feature Objects in the *_CS HCell have been attributed as fully as possible based on information provided by the Hydrographer and in accordance with current guidance and the PHB HCell Reference Guide.

7. Blue Notes

Notes to the RNC and ENC chart compilers are included in the HCell as $CSYMB features with the blue note information and charting disposition located in the NINFOM field. In this HCell, linear blue notes were also submitted as $LINES to indicate areas where charted shoreline or linear features require modification based on new survey data. Blue note information and charting disposition for the linear features are also located in the NINFOM field.

8. Spatial Framework

8.1 Coordinate System

All spatial map and base cell file deliverables are in an LLDG geographic coordinate system, with WGS84 horizontal, MHW vertical, and CRD (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 CRD and heights on islets above MHW are typically measured with range finder, and therefore have lower precision. Units and precision are shown below.

BASE Editor and S-57 Composer Units:

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

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

Conversion to feet charting units with NOAA rounding ensures that:

- All depths display as whole feet.
- All height units (HUNI) which have been converted to charting units, and that are 2.0 feet above MHW and greater, are shown in feet.

9. Data Processing Notes

9.1 Junctions

H11856 junctions with surveys H11855 and H11857. H11855 has already been compiled and a junction was made between the surveys. A common junction will be made with survey H11857 when it is compiled.

9.2 Conflicts between Shoreline and Hydrography

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

10. QA/QC and ENC Validation Checks

H11856 was subjected to QA checks in S-57 Composer prior to exporting to the HCell base cell (000) file. The millimeter precision metric S-57 HCell was converted to a chart units and NOAA rounding applied. dKart Inspector was then used to further check the data set for conformity with the S-58 ver. 2 standard (formerly Appendix B.1 Annex C of the S-57 standard). All tests were run and warnings and errors investigated and corrected unless they have been approved by MCD as inherent to and acceptable for HCells.

11. Products

11.1 HSD, MCD and CGTP Deliverables

- H11856 Base Cell File, Chart Units, Soundings compiled to 1:40,000
- H11856 Base Cell File, Chart Units, Soundings compiled to 1:10,000
- H11856 Base Cell File, Metric Units, Features compiled to 1:10,000
- H11856 Descriptive Report including end notes compiled during office processing and certification, the HCell Report, and supplemental items
- H11856 Survey Outline to populate SURDEX

11.2 File Naming Conventions

- Chart units base cell file, chart scale soundings H11856_CS.000
- Chart units base cell file, survey scale soundings H11856_SS.000
- Metric base cell file, survey scale features H11856_Features.000
- Descriptive Report package H11856_DR.pdf
- Survey outline H11856_Outlin e.gml & *xsd

11.3 Software

CARIS HIPS Ver. 6.1	Inspection of Combined BASE Surfaces
CARIS BASE Editor Ver. 2.2	Creation of soundings and bathy-derived features, creation of the depth area, meta area objects, and Blue Notes; Survey evaluation and verification; Initial HCell assembly.
CARIS S-57 Composer Ver. 2.0	Final compilation of the HCell, correct

	geometry and build topology, apply final attributes, export the HCell, and QA.
CARIS GIS 4.4a	Setting the sounding rounding variable for conversion of the metric HCell to NOAA charting units with NOAA rounding.
CARIS HOM Ver. 3.3	Perform conversion of the metric HCell to NOAA charting units with NOAA rounding.
HydroService AS, dKart Inspector Ver. 5.1	Validation of the base cell file.
Newport Systems, Inc., Fugawi View ENC Ver.1.0.0.3	Independent inspection of final HCells using a COTS viewer.

12. Contacts

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

Katie Reser, Physical Scientist, PHB, Seattle, WA; 206-526-6864;
Katie.Reser@noaa.gov.

APPROVAL SHEET
H11856

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

Katie Reser
2010.05.04
09:23:41
-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.

Digitally signed by
Kurt Brown
Date: 2010.05.04
14:01:18 -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.

Digitally signed
by Russ Davies
Date:
2010.05.04
09:53:38 -07'00'