H12053

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. H12053

LOCALITY

State Washington

General Locality Approaches to Puget Sound

Sublocality Cultus Bay

2009

CHIEF OF PARTY

Donald L. Brouillette

LIBRARY & ARCHIVES

DATE

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

HYDROGRAPHIC TITLE SHEET

REGISTRY No

H12053

INSTRUCTIONS – The Hydrographic Sheet should be accompanied by this form, filled in as completely as possible, when the sheet is forwarded to the Office.

FIELD No: N/A

State Washington

General Locality Approcaches to Puget Sound

Sub-Locality Cultus Bay

Scale 1:10,000 **Date of Survey** 09/19/09 - 10/06/09

Instructions dated 6/26/2009 **Project No.** OPR-N395-KR-09

Vessel M/V Defender IV (1154554), M/V Beaver (1054456)

Chief of party Donald L. Brouillette

Surveyed by B. Bunge, B. Heather, K. Fankhauser, C. Pinero, R. White, J. Deming, D. Moore, T. Jamison

Soundings by Reson SeaBat 8101, Kongsberg EM 3002

SAR by T. Faulkes **Compilation by** R. Davies

Soundings compiled in Fathoms

REMARKS: All times are UTC. UTM Zone 10

The purpose of this survey is to provide contemporary surveys to update National Ocean Service (NOS) nautical charts. All separates are filed with the hydrographic data. Revisions and end notes in red were generated during office processing. Page numbering may be interrupted or non sequential.

All pertinent records for this survey, including the Descriptive Report, are archived at the National Geophysical Data Center (NGDC) and can be retrieved via http://www.ngdc.noaa.gov/.

A. AREA SURVEYED

Williamson & Associates, Inc. conducted a hydrographic survey in the central section of Puget Sound just south of Whidbey Island, WA. The sub-locality of this survey is described as Cultus Bay (Fig. 1 Sheet D). The survey encompassed an area of approximately 13.5 square nautical miles and was assigned registry number H12053 and designated as Sheet "D". It is bound by the coordinates listed in Table 1. Project instructions required complete MBES coverage in areas greater than 4 meters, and bottom samples at a 1200 - 2000 meter grid spacing (depth dependent). The depth range encountered in this area was from -1.044 meters to 270.782 meters. Total cross-line length surveyed for task order OPR-N395-KR-09 was 36.15 nautical miles or 6.21 percent of the total main scheme nautical miles. Data acquisition was conducted from 19 September 2009 (Julian Day 262) to 6 October 2009 (Julian Day 279).

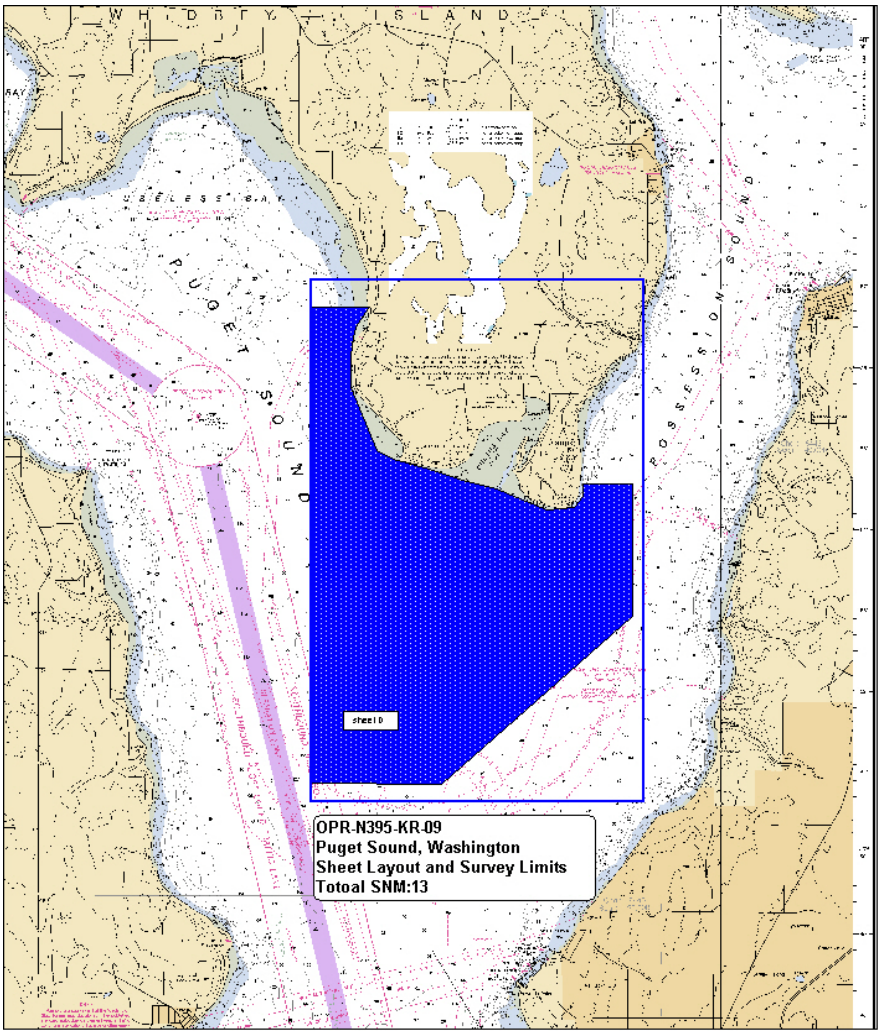


Figure 1: H12050 Sheet D

Table 1 – Sheet Bounds

Point	Latitude (North)	Longitude (West)
1	47° 57’ 5.2884”	122° 27’ 30.8124”
2	47° 50’ 36.7800”	122° 27’ 30.8124”
3	47° 50’ 36.7800”	122° 21’ 23.7708”
4	47° 57’ 592884”	122° 21’ 23.7708”
5	47° 57’ 5.2884”	122° 27’ 30.8124”

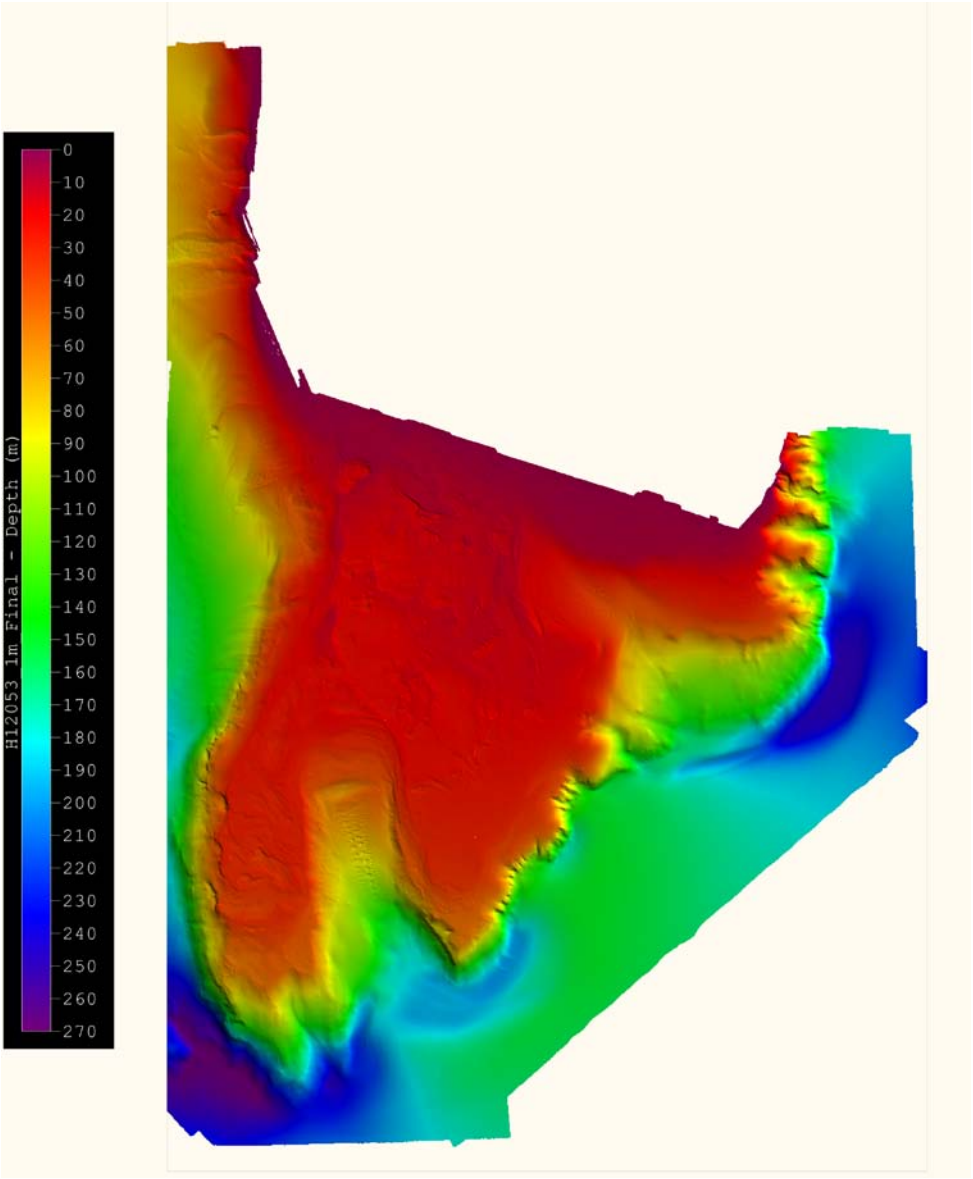


Figure 2: H12053 Surveyed Surface

B. DATA ACQUISITION AND PROCESSING

Refer to the OPR-N395-KR-09 Data Acquisition and Processing Report for a detailed description of all equipment, survey vessels, processing procedures and quality control features.

Items specific to this survey and any deviations from the Data Acquisition and Processing Report are discussed in the following sections.

B1. Equipment & Vessels

The marine vessels Defender IV and Beaver acquired all multibeam data for H12053.

The Defender IV is an aluminum catamaran built by Kvichak Marine Industries. It is 54 feet in length with a 20 foot beam. It has a large aft deck with an A-Frame and Davit. A Reson 8101 was pole mounted to the port side of the defender for this project.

The M/V beaver is a 30 foot vessel with a 10 foot beam. Powering the Beaver is a 300 HP Cummins 6BTA 5.9 Marine Diesel Engine. There is a large aft deck and room in the cabin for two sonar operators and the captain. The Beaver has a top speed of 26 kts and a service speed up to 22 Kts.

B2. Quality Control

B2.a Crosslines

Quality control cross-lines were planned so that most main scheme lines would intersect with at least one cross-line, were well distributed geographically, and that total cross-line nautical miles ran would total 5 % of the main scheme nautical miles.

Total cross-line length surveyed for task order OPR-N395-KR-09 was 36.15 nautical miles or 6.21 percent of the total main scheme nautical miles. All cross-lines were compared to the mainline BASE (CUBE Edited in IVS Fledermaus) surface, using the CARIS HIPS QC report routine and the vast majority of beams passed at 95 percent confidence level or better (*see below*). [1]

BASE Surface QC Report

Sheet: H12053
Error values from: Standard Deviation.
Number of nodes processed: 11,583,583
Number of nodes populated: 11,566,141 (99.8494248282246%)
S-44 Order 1:
Range: 0.0 to 100.0
Number of nodes considered: 6,748,156
Number of nodes within: 6,463,302 (**95.779%**)
Residual mean: -0.432157056438628

S-44 Order 2:
Range: 100.0 to 500.0
Number of nodes considered: 4,814,283
Number of nodes within: 4,777,725 (**99.241%**)
Residual mean: -3.28322693025421

Nadir to nadir comparisons were also completed to ensure accuracy. This process (comprised of select main scheme lines and cross-lines) aimed to calculate the standard deviations of the difference in depth and the overall offset in depth at each cross-line/main scheme line intersection (*see below*). See also DR Separate 4 for spreadsheet analysis.

Table 2:
Sheet: H12053

Overall Depth (m) Std Dev	Overall Depth (m) Offset Average
0.166	0.152

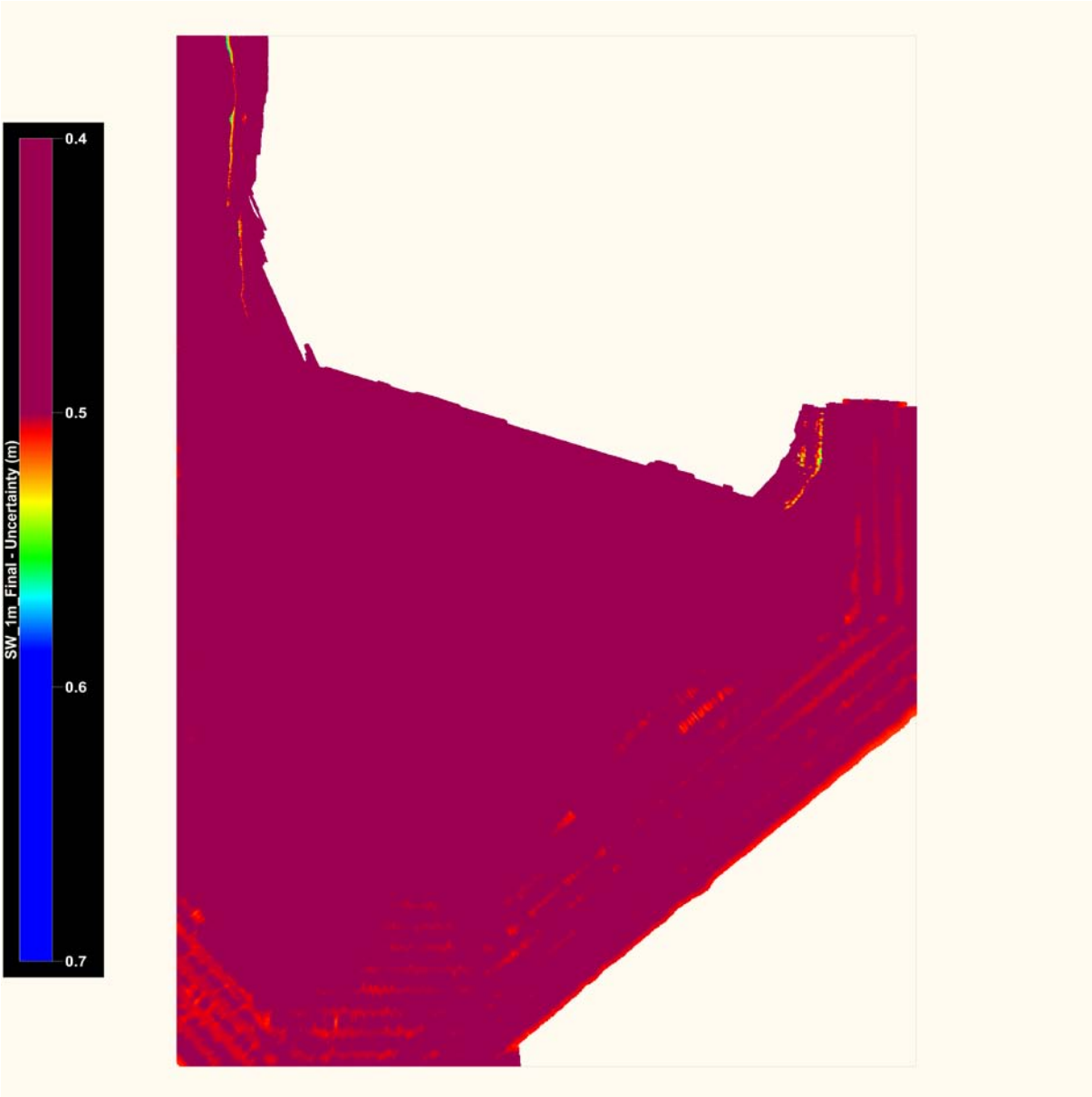
B2.b Uncertainty Values

The finalized BASE uncertainty surfaces were split into resolutions based on depth according to the National Ocean Surveys (NOS) *Hydrographic Surveys Specifications and Deliverables* or the HSSD (April 2008). The calculated uncertainty values of all nodes in the finalized Uncertainty BASE surfaces (using only soundings that have been CUBE filtered in Fledermaus within IHO order 1 specifications,[2] any max uncertainty measurements exceeding IHO Order 1 specifications are due to the tidal uncertainty values and are explained in section B.2., Unusual Conditions. The BASE surfaces are still within the 95% confidence level for IHO Order 1) are as follows:

Table 3:
Uncertainty Values for Sheet H12053

Depth Range (m)	Resolution (m)	Min Uncertainty (m)	Max Uncertainty (m)
0-23	1	0.458	0.516
20-52	2	0.469	0.602
46-115	4	0.476	0.586
103-350	8	0.481	0.526

Figure 3: Uncertainty Surface H12053



B2.c Junctions

Comparisons with prior surveys were not required under the task order OPR-N395-KR-09. [3]

B2.d Quality Control Checks

Positioning system confidence checks were conducted on a daily basis using QINSy's real time alert display. The alert display has numerous real-time displays that were monitored throughout the survey to ensure the positional accuracies, specified in the NOS Hydrographic Surveys

Specifications and Deliverables were achieved. The figure below shows a confidence check done during post processing. Two separate DGPS computations were used using the same GPS antenna to show that they were within 5 meters of each other.

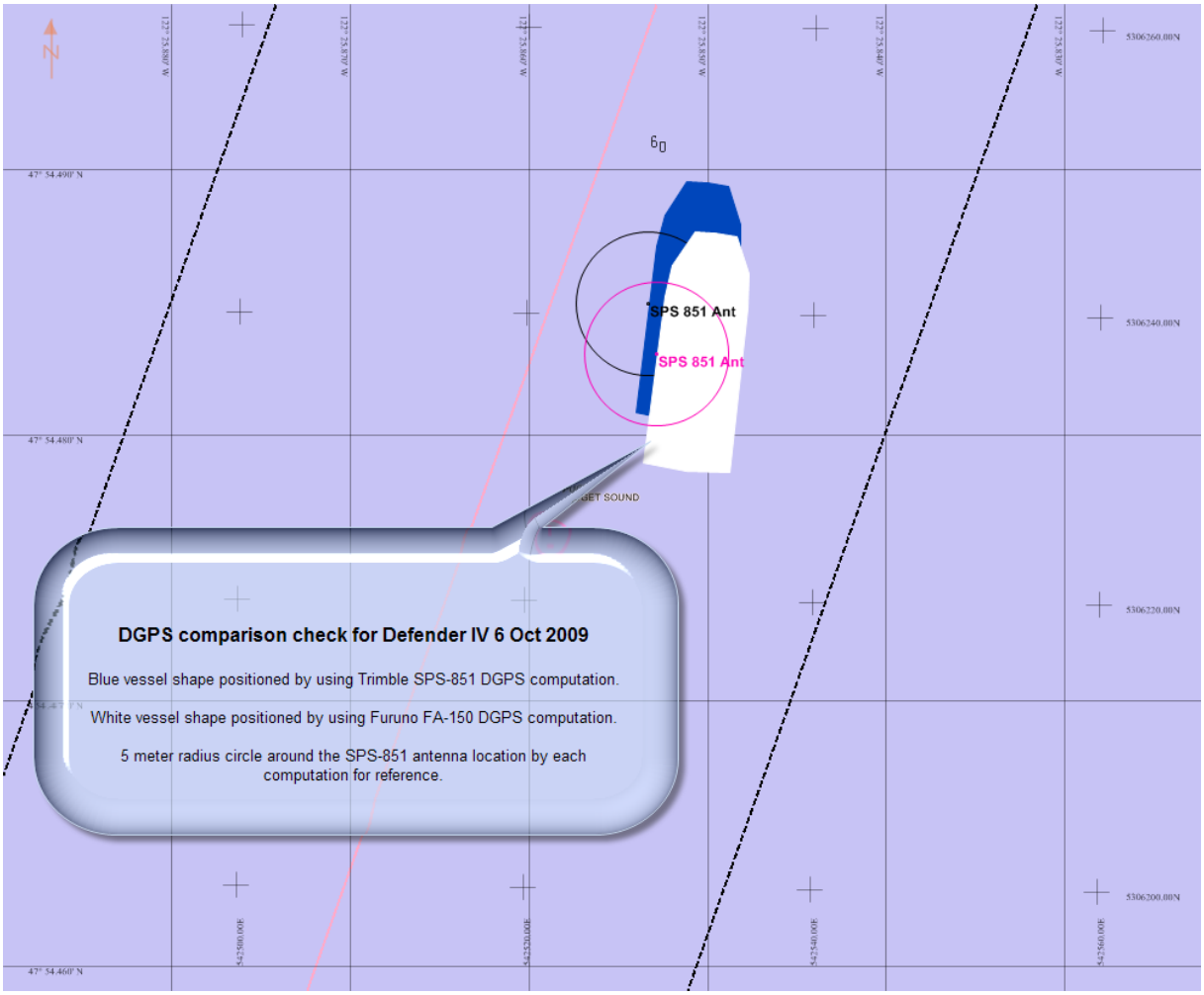


Figure 4: Position Check

B2.e Data Quality

In general, the multibeam data quality for H12053 was good. Notable problems follow:

Unusual conditions were observed in H12053 in the form of (1) current turbidity, (2) Sub-Aquatic Vegetation (SAV), and (3) numerous vessels with singlebeam echo sounders and fish finders.

1. Turbidity was visibly evident in many locations of the survey area. Problematic areas included the southernmost end of Whidbey Island and Cultus Bay. This area separates the currents flowing from the Puget Sound and the Admiralty Inlet from Possession Sound currents.

South Whidbey Island is more or less a wedge in the tidal current flow, especially considering the bathymetry of the area. The morphology in this survey area can easily produce tidal eddies and surges that are unquantifiable and resulted in vertical uncertainties ranging from 10-25 cm.

2. Sub-aquatic Vegetation (SAV) is present in all survey areas and is somewhat distinguishable from the benthic surface. [4] High precautions were taken not to edit out possible DTONs in these areas. Most of the SAV was left in the BASE and CUBE surfaces for coverage purposes and any DTONS present were assessed and reported according to the guidance set forth by the National Ocean Surveys (NOS) *Hydrographic Surveys Specifications and Deliverables* (April 2008).

3. On September 19th and 20th there was a fishing derby in Everett. The fishing derby brought an unusually large number of fish vessels into the survey area. The fishing vessel's echo sounders interfered slightly with the multibeam echo sounder creating flyers that needed to be edited out. The image below shows the number of vessels on the Defenders radar screen on the afternoon of the 19th. [5]

Figure 5: Radar Image of Surrounding Vessels

B2.f Object Detection

Shallow water multibeam data were acquired for least depth determination on significant contacts. Sounding designation was completed using 50 to 25 cm resolution depending on the presence of SAV. Designated sounding procedures followed those set forth by the National

Ocean Surveys (NOS) *Hydrographic Surveys Specifications and Deliverables* (April 2008).

B3. Corrections to Echo Soundings

Refer to the OPR-N360-KR-09 Data Acquisition and Processing Report for a detailed description of all corrections to echo soundings. No deviations from the report occurred.

B3.a Additional Calibration Tests

Post of the initial MB Calibration for the M/V Beaver (EM 3002), 4 extra calibrations were

performed. These calibrations are detailed in the OPR-N395-KR-09 DAPR, submitted under a separate cover.

Post of the initial MB Calibration for the M/V Defender IV(Reson 8101), daily calibration lines were run to determine the accuracy of the roll offset due to the Reson mounting pole configuration. These calibrations are detailed in the OPR-N395-KR-09 DAPR, submitted under a separate cover.

B4. Data Processing

Uncertainty BASE surfaces were built with sounding data that has been CUBE filtered to IHO Order 1 specifications. This was done in IVS Fledermaus 6.7. Finalized surfaces were built with the Data Range Resolutions set forth in the National Ocean Surveys (NOS) *Hydrographic Surveys Specifications and Deliverables* (April 2008). All BASE surfaces built from CUBE edited soundings have been included with the digital data. Details on CUBE editing procedures can be found in the OPR-N395-KR-09 DAPR, submitted under a separate cover.

The final S57 file for this project is called “H12053.000”. This file contains the object and metadata S57 objects as required in the Specifications and Deliverables. [6]

C. VERTICAL AND HORIZONTAL CONTROL

Refer to the OPR-N395-KR-09 Horizontal and Vertical Control Report for a detailed description of the horizontal and vertical control used on this survey. No deviations from the report occurred.

C1. Horizontal Control

The horizontal control datum for this survey was the North American Datum of 1983 (NAD83).

For real-time DGPS corrections, Hemisphere MBX-4 and GBX PRO units were used. They corrected positions acquired using a Trimble SPS-851 and DSM 232 respectively. These positions were later corrected for offsets to the MBES by CARIS HIPS in post processing.

C2. Vertical Control

All sounding data were initially reduced to MLLW using predicted tidal data from the Seattle tide station (9447130). Predicted tides were used only for preliminary data cleaning.

Final tidal corrections were generated using the final tides from the Seattle tide station along with zone definition files provided by NOAA.

D. RESULTS AND RECOMMENDATIONS

H12053 survey data was compared to:

RNC Number	Scale	Edition	Edition Date	Corrected Through
18473	1:40,000	8th	Sep. 2005	09/22/09

ENC Number	Edition	Update Application Date	Issue Date
US5WA17M	9th	11/09/09	11/09/09

D1. Comparison of Soundings

Charted soundings were compared with the surveyed data. In general, charted soundings in areas with little relief were very similar to the surveyed depths. Charted soundings on or very near slopes may be 10 or more fathoms off of the surveyed depths. These differences may be due to changes in surface since the last survey or less accurate positioning and measurements during the previous survey. The Hydrographer recommends all surveyed depths supersede previously charted soundings. [7]

2. AWOIS

AWOIS # 52914
REPORTED

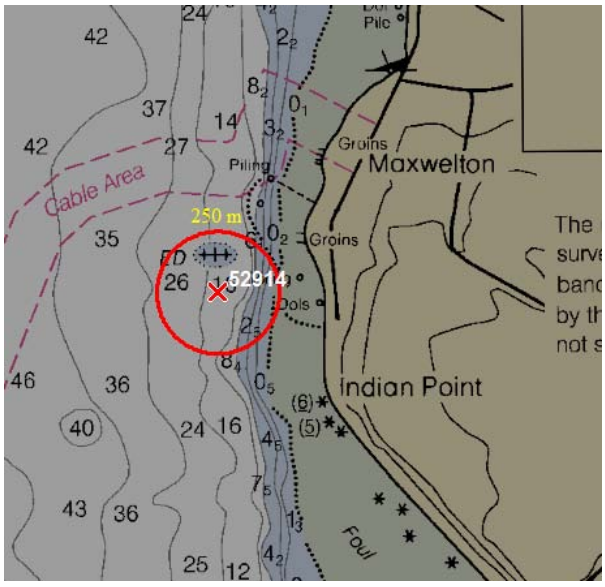
FEATURE	RADIUS	LATITUDE (N)	LONGITUDE (W)
AWOIS #52914	250m	47 55 59.34	122 27 4.51

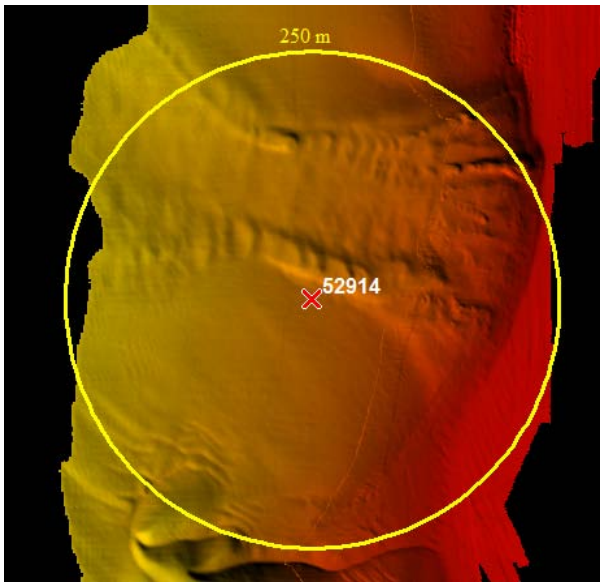
SURVEYED

FEATURE		LATITUDE (N)	LONGITUDE (W)
Located		47 56 4.444	122 27 5.4231

Remarks:
Charted submerged wreck. There is no evidence in the MBES dataset to indicate a wreck exists at the charted location. There is a scour or depression at the charted location of the wreck.

Hydrographer Recommendation:
The Hydrographer recommends removing the wreck annotation and symbol from all applicable charts and updating the AWOIS database. [8]





AWOIS # 52915

REPORTED

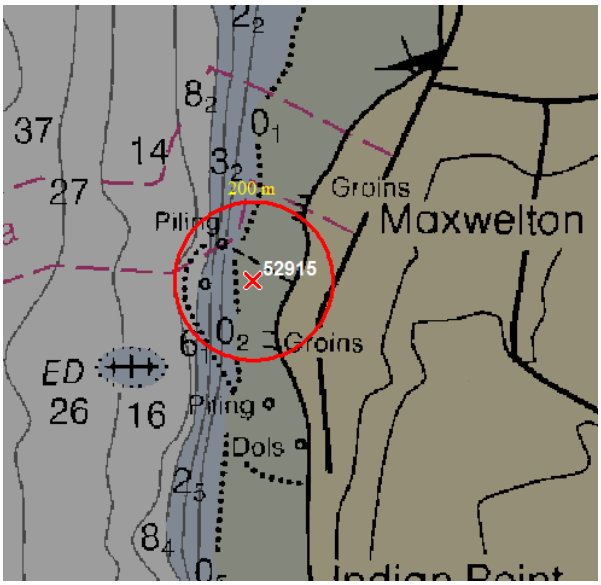
FEATURE	RADIUS	LATITUDE (N)	LONGITUDE (W)
AWOIS #52915	200m	47 56 11.34	122 26 50.11

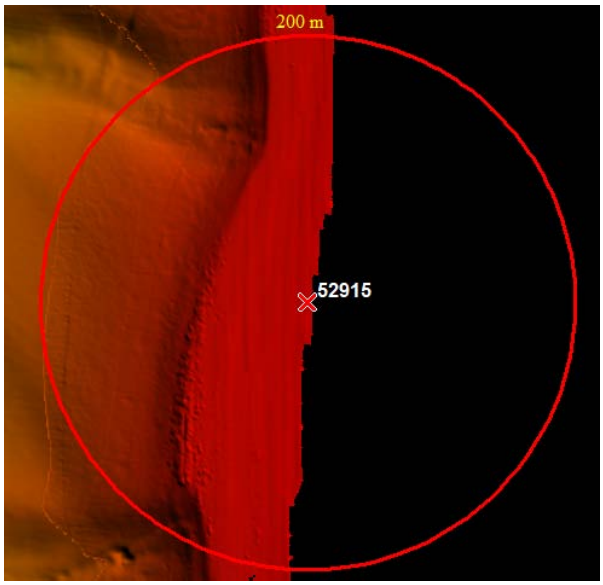
SURVEYED

FEATURE	LEAST DEPTH	LATITUDE (N)	LONGITUDE (W)
Located	7.3m	47 8 15.29	122 38 8.4 [9]

Remarks:
Charted dolphins and piles. The pier does not exist but several groups of piling and one dolphin were found at the area and located.

Hydrographer Recommendation:
Evidence of the charted pilings and dolphins are fairly inconclusive in the MBES dataset. There are targets that resemble submerged pilings within the radius of the AWOIS item. The Hydrographer recommends retaining the Pilings annotation and symbol on all applicable charts and updating the AWOIS database with the current position of the pilings. [10]





AWOIS # 53732

REPORTED

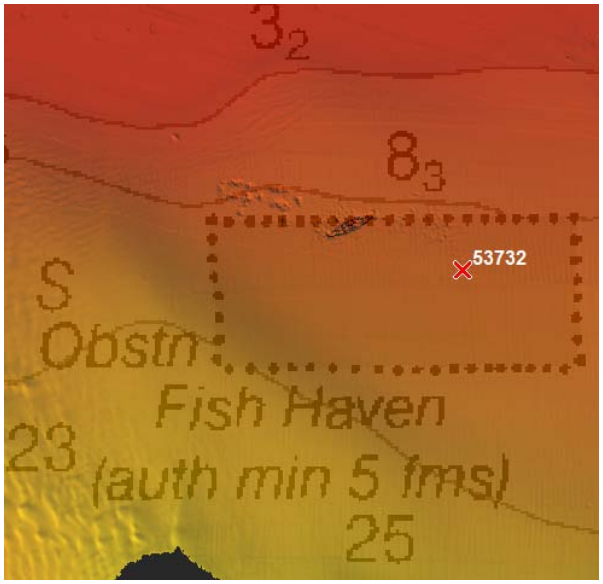
FEATURE	LATITUDE (N)	LONGITUDE (W)
AWOIS #53732	47 53 48	122 23 27

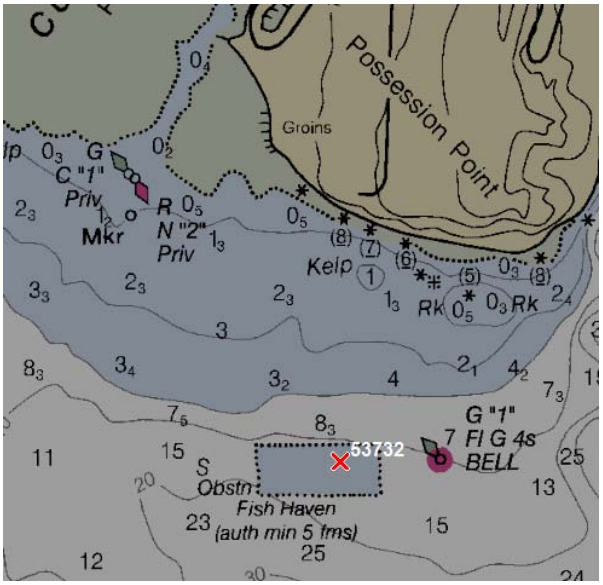
SURVEYED

FEATURE	LATITUDE (N)	LONGITUDE (W)
Located	47 53 50.7431	122 23 37.1901

Remarks:
Washington State Department of Fisheries artificial reef consisting of concrete, wood, quarry rock and fiberglass. The wreck of the WA state ferry Kehloken is adjacent to the fish haven.

Hydrographer Recommendation:
The Hydrographer recommends adjusting the obstruction annotation and symbol on all applicable charts and updating the AWOIS database with the current position of the wreck and obstruction bounds. [11]





D3. Charted Features

The wreck at 47-56-04.41621 N, 122-27-05.03503 W (RNC 18473, ENC US5WA17) was not found to exist. The Hydrographer recommends removing this item from the charts. [12]

D4. Dangers to Navigation

Five (5) dangers to navigation were found during the survey H12053. All dangers to navigation were reported to NOAA. [13] See attached DTON reports.

D5. Bottom Samples

Eight (8) bottom samples were obtained [14]and are included in the S-57 attributed feature file in the S-57 Feature File folder. A table listing the position and description of each bottom sample is included in Appendix III, along with photographs of each sample.

D6. Aids to Navigation

The following aids to navigation were examined during this survey: [15]

- Scatchet Head Buoy "1" at 47-54-29.9309 N, 122-26-18.3182 W (RNC 18473, ENC US5WA17) found to exist and to be serving its intended purpose

- Possession Point Buoy "1" at 47-53-48.3023 N, 122-23-08.5327 W (RNC 18473, ENC US5WA17) found to exist and to be serving its intended purpose

No uncharted aids to navigation were found in the survey area. [16]

E. Approval Sheet

REGISTRY NUMBER H12053

This report and the accompanying digital data are respectfully submitted.

Field operations contributing to the accomplishment of survey H12053 were conducted under my direct supervision with frequent personal checks of progress and adequacy. This report and smooth sheet have been closely reviewed and are considered complete and adequate as per the Statement of Work.

WILLIAMSON AND ASSOCIATES, INCORPORATED

Donald L. Brouillette

Digitally signed by Donald L. Brouillette
DN: cn=Donald L. Brouillette, o=WASSOC, ou=Survey, email=dbrouillette@wassoc.com, c=US
Date: 2010.01.22 13:29:45 -08'00'

Donald L. Brouillette

Hydrographer

Williamson & Associates, Incorporated

18 February 2010

Revisions Compiled During Office Processing and Certification:

[1] Concur
[2] Concur
[3] Concur
[4] See HCell for depiction of kelp area and blue notes for retaining of charted Kelp notations.
[5] Concur, data are adequate to supersede all charted data within the common area unless noted in this report or in the blue notes.
[6] Features from this file were compiled to the .000 file. Some features may not be shown in the HCell due to chart scale.
[7] Concur, data are adequate to supersede all charted data within the common area unless noted in this report or in the blue notes.
[8] Concur
[9] Position is outside survey area
[10] Concur with clarification, Remove charted piling note, chart pile in ruins at latitude 47/56/14.6N, longitude 122/26/53.95W. Retain charted piles in ruins at latitude 47/56/12.9N, longitude 122/26/49.41W. Retain charted dol at latitude 47/56/11.3N, longitude 122/26/56/11W.
[11] Concur, the wreck is located within the Fish Haven. It is recommended that the limits of the currently charted Fish Haven be changed to include several submerged features found by this survey. Chart the wreck and Obstrn, Fish Haven as shown on the HCell.
[12] Concur
[13] These DTONs are currently charted and are compiled to this HCell.
[14] Concur with clarification, the eight bottom samples were compiled to the HCell. In addition, two charted bottom samples were retained. See bluenotes in HCell
[15] Chart per latest ATONIS information
[16] Concur

H12053 Danger to Navigation Report

Registry Number: H12053

State: Washington

Locality: Puget Sound

Sub-locality: Cultus Bay

Project Number: OPR-N395-KR-09

Survey Dates: 09/30/2009 - 10/06/2009

Charts Affected

Number	Edition	Date	Scale (RNC)	RNC Correction(s)*
18473	8th	09/01/2005	1:40,000 (18473_1)	[L]NTM: ?
18445	32nd	08/01/2007	1:80,000 (18445_1)	[L]NTM: ?
18441	46th	12/01/2007	1:80,000 (18441_1)	[L]NTM: ?
18440	29th	09/01/2007	1:150,000 (18440_1)	[L]NTM: ?
18003	20th	11/01/2006	1:736,560 (18003_1)	[L]NTM: ?
18007	33rd	02/01/2009	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	Rock	4.82 m	47° 54' 00.7" N	122° 23' 17.6" W	---
1.2	Rock	1.50 m	47° 54' 08.6" N	122° 23' 12.0" W	---
1.3	Rock	6.09 m	47° 54' 15.4" N	122° 24' 42.3" W	---
1.4	Rock	8.73 m	47° 54' 17.5" N	122° 26' 08.1" W	---
1.5	Rock	10.47 m	47° 53' 54.8" N	122° 25' 27.1" W	---

1 - Danger To Navigation

1.1) GP No. - 1 from H12053_DTONs.xls

DANGER TO NAVIGATION

Survey Summary

Survey Position: 47° 54' 00.7" N, 122° 23' 17.6" W

Least Depth: 4.82 m (= 15.81 ft = 2.636 fm = 2 fm 3.81 ft)

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

Timestamp: 2009-275.33:35:10.000 (10/02/2009)

GP Dataset: H12053_DTONs.xls

GP No.: 1

Charts Affected: 18473_1, 18441_1, 18445_1, 18440_1, 18003_1, 18007_1, 501_1, 530_1, 50_1

Remarks:

Features are reduced to Mean Lower Low Water using verified tides and are positioned on NAD83.

Feature Correlation

Address	Feature	Range	Azimuth	Status
H12053_DTONs.xls	1	0.00	000.0	Primary

Hydrographer Recommendations

Recommend charting rock.

Cartographically-Rounded Depth (Affected Charts):

2 ½fm (18441_1, 18440_1, 18003_1, 18007_1, 530_1)

2fm 4ft (18473_1, 18445_1)

4.8m (501_1, 50_1)

S-57 Data

Geo object 1: Underwater rock / awash rock (UWTROC)

Attributes: SORDAT - 20091010

SORIND - US,US,survy,H12053

TECSOU - 3:found by multi-beam

VALSOU - 4.82 m

VERDAT - 12:Mean lower low water

WATLEV - 3:always under water/submerged

Feature Images

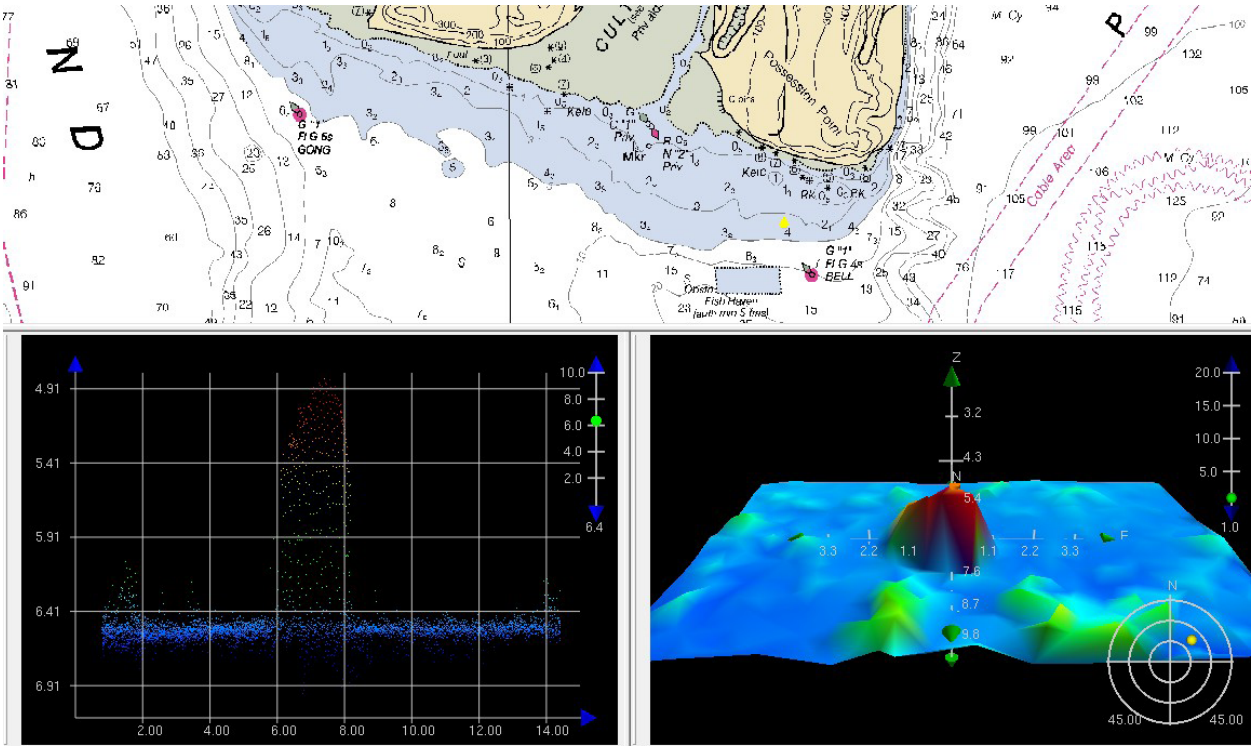


Figure 1.1.1

1.2) GP No. - 2 from H12053_DTONs.xls

DANGER TO NAVIGATION

Survey Summary

Survey Position: 47° 54' 08.6" N, 122° 23' 12.0" W

Least Depth: 1.50 m (= 4.92 ft = 0.820 fm = 0 fm 4.92 ft)

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

Timestamp: 2009-279.01:23:04.000 (10/06/2009)

GP Dataset: H12053_DTONs.xls

GP No.: 2

Charts Affected: 18473_1, 18441_1, 18445_1, 18440_1, 18003_1, 18007_1, 501_1, 530_1, 50_1

Remarks:

Features are reduced to Mean Lower Low Water using verified tides and are positioned on NAD83.

Feature Correlation

Address	Feature	Range	Azimuth	Status
H12053_DTONs.xls	2	0.00	000.0	Primary

Hydrographer Recommendations

Recommend charting rock.

Cartographically-Rounded Depth (Affected Charts):

0 ¾fm (18441_1, 18440_1, 18003_1, 18007_1, 530_1)

0fm 5ft (18473_1, 18445_1)

1.5m (501_1, 50_1)

S-57 Data

Geo object 1: Underwater rock / awash rock (UWTROC)

Attributes: SORDAT - 20091010

SORIND - US,US,survy,H12053

TECSOU - 3:found by multi-beam

VALSOU - 1.499 m

VERDAT - 12:Mean lower low water

WATLEV - 3:always under water/submerged

Feature Images

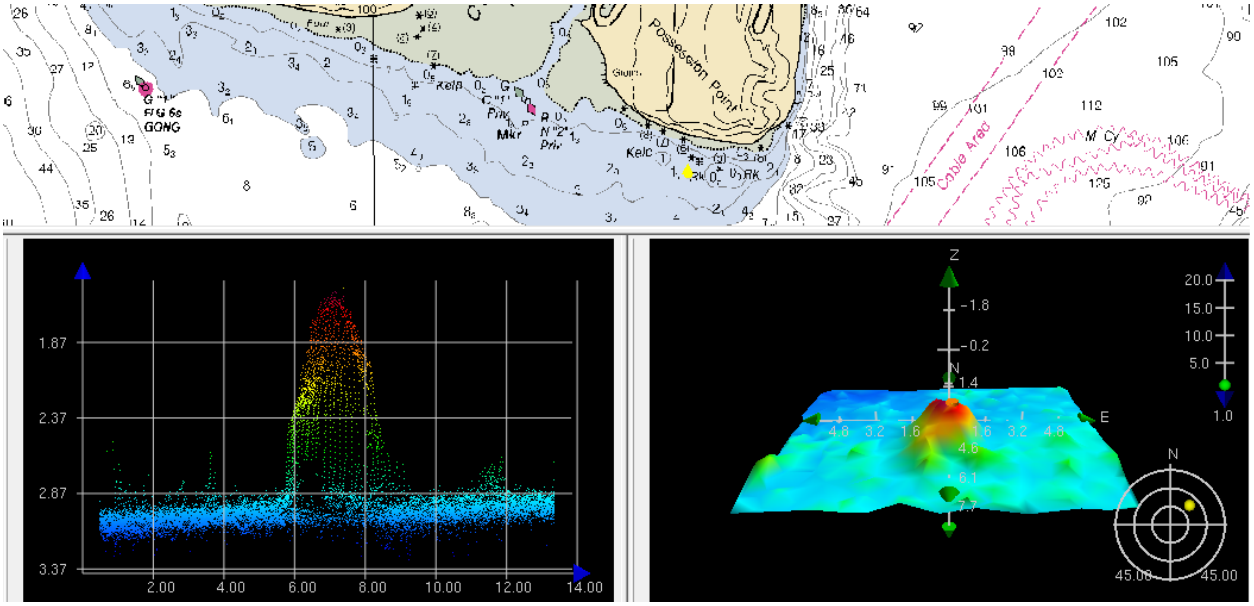


Figure 1.2.1

1.3) GP No. - 3 from H12053_DTONs.xls

DANGER TO NAVIGATION

Survey Summary

Survey Position: 47° 54' 15.4" N, 122° 24' 42.3" W

Least Depth: 6.09 m (= 20.00 ft = 3.333 fm = 3 fm 2.00 ft)

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

Timestamp: 2009-275.29:36:18.000 (10/02/2009)

GP Dataset: H12053_DTONs.xls

GP No.: 3

Charts Affected: 18473_1, 18441_1, 18445_1, 18440_1, 18003_1, 18007_1, 501_1, 530_1, 50_1

Remarks:

Features are reduced to Mean Lower Low Water using verified tides and are positioned on NAD83.

Feature Correlation

Address	Feature	Range	Azimuth	Status
H12053_DTONs.xls	3	0.00	000.0	Primary

Hydrographer Recommendations

Recommend charting rock.

Cartographically-Rounded Depth (Affected Charts):

3 ¼fm (18441_1, 18440_1, 18003_1, 18007_1, 530_1)

3fm 2ft (18473_1, 18445_1)

6.1m (501_1, 50_1)

S-57 Data

Geo object 1: Underwater rock / awash rock (UWTROC)

Attributes: SORDAT - 20091010

SORIND - US,US,survy,H12053

TECSOU - 3:found by multi-beam

VALSOU - 6.095 m

VERDAT - 12:Mean lower low water

WATLEV - 3:always under water/submerged

Feature Images

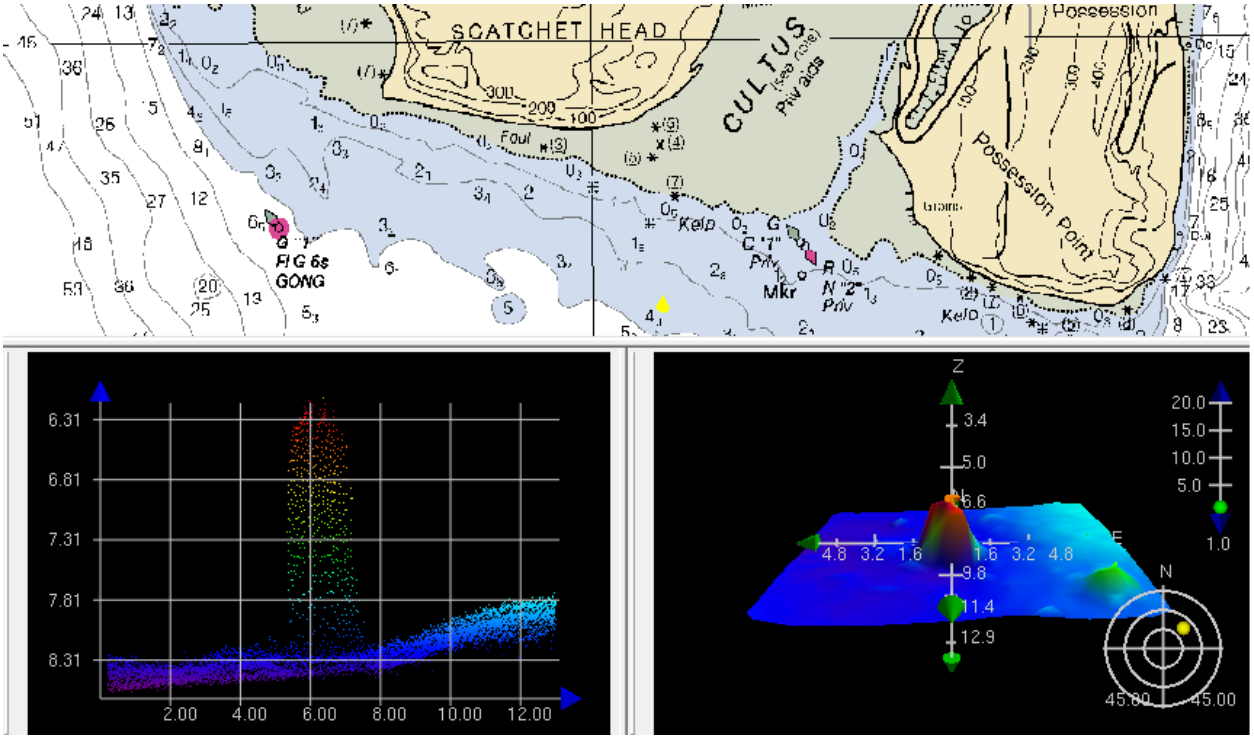


Figure 1.3.1

1.4) GP No. - 4 from H12053_DTONs.xls

DANGER TO NAVIGATION

Survey Summary

Survey Position: 47° 54' 17.5" N, 122° 26' 08.1" W

Least Depth: 8.73 m (= 28.65 ft = 4.775 fm = 4 fm 4.65 ft)

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

Timestamp: 2009-275.31:42:44.000 (10/02/2009)

GP Dataset: H12053_DTONs.xls

GP No.: 4

Charts Affected: 18473_1, 18441_1, 18445_1, 18440_1, 18003_1, 18007_1, 501_1, 530_1, 50_1

Remarks:

Features are reduced to Mean Lower Low Water using verified tides and are positioned on NAD83.

Feature Correlation

Address	Feature	Range	Azimuth	Status
H12053_DTONs.xls	4	0.00	000.0	Primary

Hydrographer Recommendations

Recommend charting rock.

Cartographically-Rounded Depth (Affected Charts):

4 ¾fm (18441_1, 18440_1, 18003_1, 18007_1, 530_1)

4fm 4ft (18473_1, 18445_1)

8.7m (501_1, 50_1)

S-57 Data

Geo object 1: Underwater rock / awash rock (UWTROC)

Attributes: SORDAT - 20091010

SORIND - US,US,survy,H12053

TECSOU - 3:found by multi-beam

VALSOU - 8.732 m

VERDAT - 12:Mean lower low water

WATLEV - 3:always under water/submerged

Feature Images

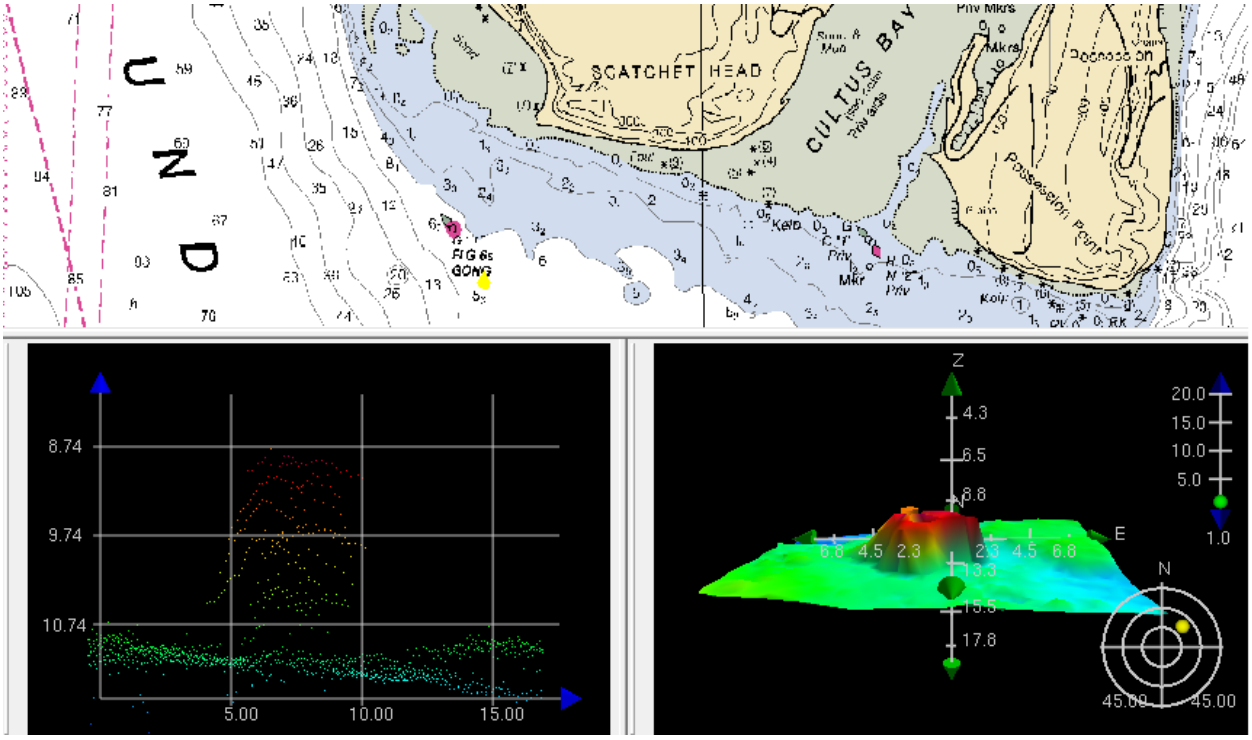


Figure 1.4.1

1.5) GP No. - 5 from H12053_DTONs.xls

DANGER TO NAVIGATION

Survey Summary

Survey Position: 47° 53' 54.8" N, 122° 25' 27.1" W

Least Depth: 10.47 m (= 34.36 ft = 5.727 fm = 5 fm 4.36 ft)

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

Timestamp: 2009-273.30:39:28.000 (09/30/2009)

GP Dataset: H12053_DTONs.xls

GP No.: 5

Charts Affected: 18473_1, 18441_1, 18445_1, 18440_1, 18003_1, 18007_1, 501_1, 530_1, 50_1

Remarks:

Features are reduced to Mean Lower Low Water using verified tides and are positioned on NAD83.

Feature Correlation

Address	Feature	Range	Azimuth	Status
H12053_DTONs.xls	5	0.00	000.0	Primary

Hydrographer Recommendations

Recommend charting rock.

Cartographically-Rounded Depth (Affected Charts):

5 ¾fm (18441_1, 18440_1, 18003_1, 18007_1, 530_1)

5fm 4ft (18473_1, 18445_1)

10.5m (501_1, 50_1)

S-57 Data

Geo object 1: Underwater rock / awash rock (UWTROC)

Attributes: SORDAT - 20091010

SORIND - US,US,survy,H12053

TECSOU - 3:found by multi-beam

VALSOU - 10.473 m

VERDAT - 12:Mean lower low water

WATLEV - 3:always under water/submerged

Feature Images

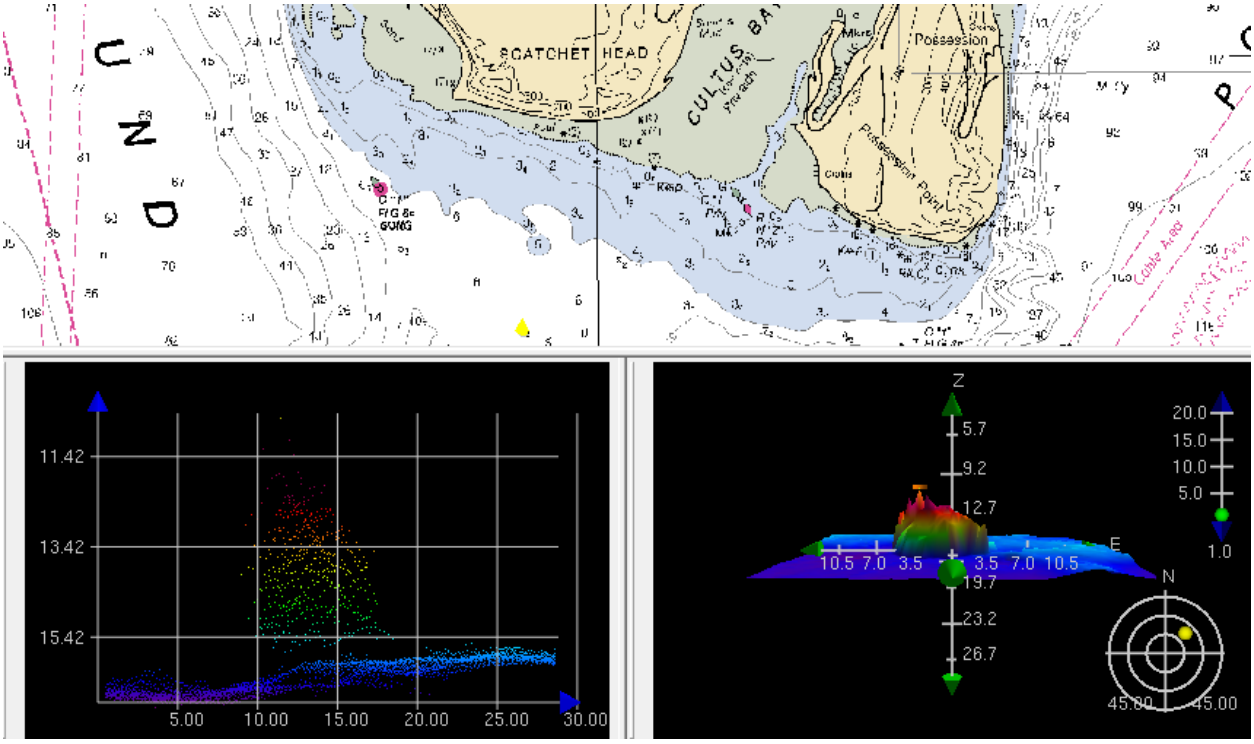


Figure 1.5.1

H12053 HCell Report

Russ Davies Cartographer
Pacific Hydrographic Branch

1. Specifications, Standards and Guidance Used in HCell Compilation

HCell compilation of survey H12053 used:

Office of Coast Survey HCell Specifications: Draft, Version: 4.0, 17 March, 2010.
HCell Reference Guide: Version 2.0, 22 February, 2010.

2. Compilation Scale

Depths and features for HCell H12053 were compiled to the largest scale raster charts shown below:

Chart	Scale	Edition	Edition Date	NTM Date
18473	1:40,000	8th	9/2005	10/30/2010

The following ENCs were also used during compilation:

Chart	Scale
US5WA17M	1:40,000

3. Soundings

A survey-scale sounding (SOUNDG) feature object layer was built from the 12-meter 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.

Shoal Limit (m)	Deep Limit (m)	Radius (mm)
0	10	3
10	20	4
20	50	4.5
50	300	5

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

4. 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 18473	Metric Equivalent to Chart Fathoms Arithmetically Rounded	Metric Equivalent of Chart Fathoms, with NOAA Rounding Applied	Fathoms with NOAA Rounding Applied	Feet with NOAA Rounding Removed for Display on H12053_SS.000
0	0	0.2286	0	0
1	1.8288	2.0574	1.125	1
3	5.4864	5.715	3.125	3
5	9.144	9.3726	5.125	5
10	18.288	18.517	10.125	10
20	36.576	37.9476	20.750	20
30	54.864	56.2356	30.750	30
40	73.152	74.5236	40.750	40
50	91.44	92.8116	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, COALNE and SBDARE objects, and with DEPCNT objects representing MLLW, should be expected. HCell features should be honored over *_SS.000 file contours in all cases where conflicts are found.

5. Meta Areas

The following Meta object areas are included in HCell H12053:

M_QUAL

The Meta area objects were constructed on the basis of the limits of the hydrography.

6. Features

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 may be modified to emulate chart scale per the HCell Reference Guide on compiling features to the chart scale HCell.

7. S-57 Objects and Attributes

The *_CS HCell contains the following Objects:

$CSYMB	Blue Notes-Notes to the MCD chart Compiler
DEPCNT	Modified GC MLLW
M_QUAL	Data quality Meta object
OBSTRN	Obstruction area object
SBDARE	Modified GC ledges and reefs, bottom samples, and rocky seabed areas
SOUNDG	Soundings at the chart scale density
UWTROC	Rock features
$LINES	Pipelines, outfalls or sewer lines
MORFAC	Dolphins, mooring buoys

The *_SS HCell contains the following Objects:

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

8. Spatial Framework

8.1 Coordinate System

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

8.2 Horizontal and Vertical Units

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

Chart Unit Base Cell Units:

Depth Units (DUNI):	Fathoms
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

See the HCell Reference Guide for details of conversion from metric to charting units, and application of NOAA rounding.

9. Data Processing Notes

There were no significant deviations from the standards and protocols given in the HCell Specification and HCell Reference Guide.

9.1 Junction with H12053

Survey H12053 does not junction with any contemporary surveys.

10. QA/QC and ENC Validation Checks

H12052 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

H12053_CS.000	Base Cell File, Chart Units, Soundings and features compiled to 1:15,000 and 1:40,000
H12053 _SS.000	Base Cell File, Chart Units, Soundings and Contours compiled to 1:10,000
H12053_DR.pdf	Descriptive Report including end notes compiled during office processing and certification, the HCell Report, and supplemental items
H12053 _outline.gml	Survey outline
H12053 _outline.xsd	Survey outline

11.2 Software

CARIS HIPS Ver. 6.1	Inspection of Combined BASE Surfaces
CARIS BASE Editor Ver. 2.3	Creation of soundings and bathy-derived features, creation of the depth area, meta area objects, and Blue Notes; Survey evaluation and verification; Initial HCell assembly.
CARIS S-57 Composer Ver. 2.1	Final compilation of the HCell, correct geometry and build topology, apply final attributes, export the HCell, and QA.
CARIS GIS 4.4a	Setting the sounding rounding variable for conversion of the metric HCell to NOAA charting units with NOAA rounding.
CARIS HOM Ver. 3.3	Perform conversion of the metric HCell to NOAA charting units with NOAA rounding.
HydroService AS, dKart Inspector Ver. 5.1, SP 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
206-526-6841
Russ.Davies@NOAA.GOV

APPROVAL SHEET
H12053

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.

Digitally signed
by Russ Davies
Date: 2011.01.10
14:51:53 -08'00'

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: 2011.01.10
15:24:31 -08'00'

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.

Digitally signed by Gary C.
Nelson
DN: cn=Gary C. Nelson,
o=NOAA, ou=Pacific
Hydrographic Branch,
email=gary.nelson@noaa.gov,
c=US
Date: 2011.01.10 15:05:22 -08'00'

Digitally signed by Lori Knell
DN: cn=Lori Knell, o=NOAA,
ou=NOAA HSD,
email=lori.knell@noaa.gov, c=US
Reason: AWOIS/Surf Check
Date: 2011.01.18 14:13:33 -05'00'