

H11375

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. RA-10-02-05

Registry No. H11375

LOCALITY

State Washington

General Locality Approaches to Puget Sound

Sublocality Northwest coast of Whidbey Island

2005

CHIEF OF PARTY

CDR Guy T. Noll, NOAA

LIBRARY & ARCHIVES

DATE

HYDROGRAPHIC TITLE SHEET

H11375

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

FIELD NO.
RA-10-02-05

State Washington

General Locality Approaches to Puget Sound

Sublocality Northwest coast of Whidbey Island

Scale 1:10,000

Date of Survey 03/27/2005 - 07/13/2005

Instructions Date 3/11/2005

Project No. OPR-N372-RA-05

Vessel NOAA Ship Rainier launches 1006, 1015, 1016, 1121

Chief of Party Guy T. Noll, NOAA

Surveyed by NOAA Ship Rainier Personnel

Soundings taken by echo sounder Reson Seabat 8101 and Seabeam/Elac 1180

Graphic record scaled by NOAA Ship Rainier Personnel

Graphic record checked by NOAA Ship Rainier Personnel

Evaluation by Katie Reser, Russ. Davies Automated plot by _____

Verification by Russ Davies

Soundings in Fathoms at MLLW

REMARKS: Time in UTC. UTM Projection Zone 10

Revisions and annotations appearing as endnotes were

generated during office processing.

All separates are filed with the hydrographic data.

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

Descriptive Report to Accompany Hydrographic Survey H11375

Project OPR-N372-RA-05
Approaches to Puget Sound, Washington
Scale 1:10,000
March/July 2005
NOAA Ship RAINIER
Chief of Party: Commander Guy T. Noll, NOAA

A. AREA SURVEYED

This hydrographic survey was completed as specified by Hydrographic Survey Letter Instructions OPR-N372-RA-05, dated March 23, 2005, Standing Project Instructions dated March 23, 2004, and NOS Hydrographic Specifications and Deliverables dated May 5, 2003, with the exception of deviations noted in this report. The survey area is the Northwest Coast of Whidbey Island, Puget Sound, Washington, where the Puget Sound Pilots Association expressed concern about increased tug and barge traffic transiting the area east of the northbound traffic lanes. This survey corresponds to sheet “H” in the sheet layout provided with the Letter Instructions.

Inclement weather in Puget Sound during March and April caused the majority of this survey to be incomplete when RAINIER departed the project area in the spring. Due to the importance of the survey to the Puget Sound Pilots Association, two operational days were allocated to this survey in July 2005 after RAINIER’s summer inport in Seattle. Though survey coverage does not extend to the 4-meter contour, local Navigation Manager CDR David Neander, Hydrographic Surveys Division Operations Branch Chief LCDR Jon Swallow, and Chief of Pacific Hydrographic Branch CDR Donald Haines agreed that coverage is sufficient for submission to the Pacific Hydrographic Branch (see emails “H11375_Coverage_Email” in the Supplemental Correspondence folder).¹

Data acquisition was conducted from March 27 to April 4 (DN 086 to DN 094) and July 12-13, 2005 (DN 193 to DN 194).

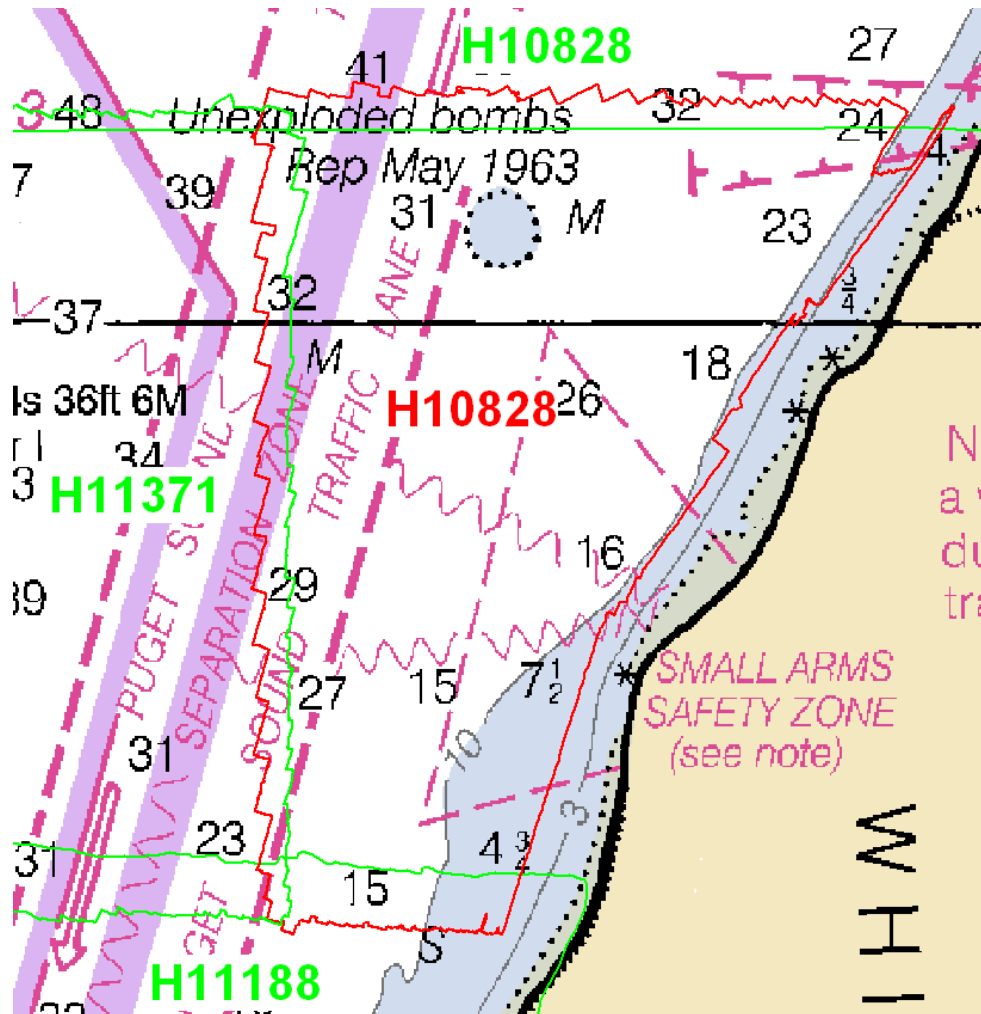


Figure 1. H11375 Survey Limits and Junctions.

B. DATA ACQUISITION AND PROCESSING

A complete description of data acquisition and processing systems, survey vessels, quality control procedures and data processing methods can be found in the *OPR-N372-RA-05 Data Acquisition and Processing Report (DAPR)*² and *Rainier 2005 Hydrographic Systems Certification Report*,³ submitted under separate cover. Items specific to this survey, and any deviations from the aforementioned reports are discussed in the following sections.

FINAL APPROVED WATER LEVELS HAVE BEEN APPLIED to these data. The BASE surface “H11375_Final” is the combined and final surface from which the Pydro PSS and MapInfo table “H11375_Depths” is created.⁴

B1. Equipment and Vessels

SWMB data and sound velocity profiles were acquired by RAINIER survey launches 1021 (Reson 8101), 1016 (Reson 8125), 1006 (Reson 8101), and 1015 (Elac 1180). Sound velocity profiles were measured with SEACAT SBE 19 Plus Profilers according the Specifications and

Deliverables. The sonar system selected for use in a given area was appropriate for the water depth as described in the DAPR.

Two unusual vessel configurations for 1006 and 1021 were applied to data acquired on DN 193 after post-collection inspection revealed that an inappropriate projector setting of “projector-fwd” was used. This problem is explained in the “Data Quality Factors” section below. The HIPS vessel files “1006_Reson8101_ProjFwd_HVF” and “1021_reson8101_ProjFwd_HVF” were applied to affected data.

B2. Quality Control

Crosslines

Shallow-water multibeam (SWMB) crosslines totaled 18.61 nautical miles, comprising 10.83% of SWMB hydrography. The mainscheme bathymetry was manually compared to the crossline nadir beams in CARIS subset mode and agreed with differences less than 0.2 meters. The largest disagreement is found in areas with sound velocity refraction artifacts, which are discussed in the “Data Quality Factors” section of this report. Figure 2 is one example of this in which the mainscheme lines cannot be adequately corrected for sound velocity.

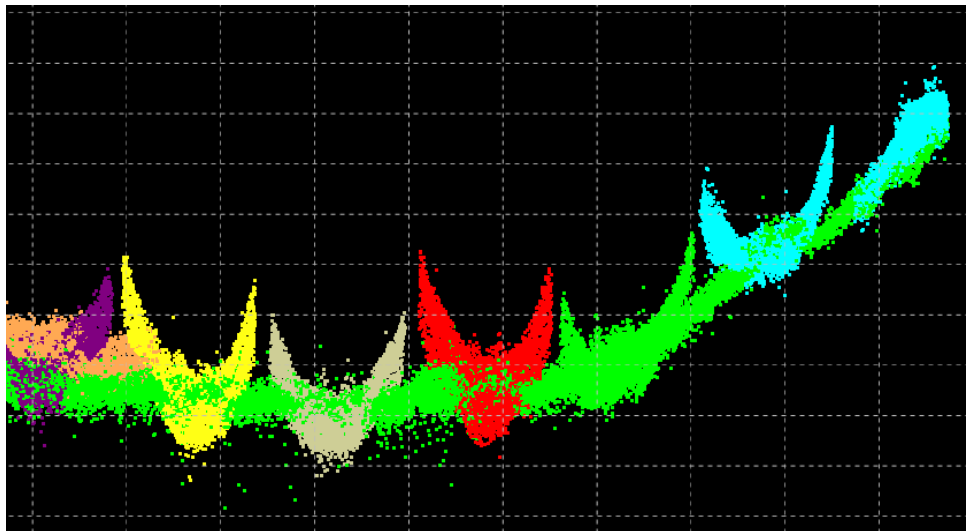


Figure 2. Crossline (green) compared to mainscheme lines with refraction errors, prior to further editing to remove “smile” artifacts.

Junctions

The following contemporary survey junctions with H11375 (see Figure 1):

Registry #	Scale	Date	Junction side
H11188	1:10,000	2002	South
H10828	1:10,000	1998	North
H11371	1:10,000	2005	West

At the time of this report, no junction bathymetry for H11188 and H10828 was available for comparison.⁵

Bathymetry from H11371 agreed with near-zero difference to bathymetry from H11375 in common areas save a 0.4-meter vertical discrepancy between the following lines in an area approximately 75 meters deep:

Line	Profile	Beam	Depth	Q	Status	Latitude	Longitude	Project	Vessel	Day
270_2137	82	44	74.636	3	Accept	48-21-03.03N	122-46-18.99W	H11371_B	1006_Reson8101_HVF	2004-310
100_1605	168	68	74.228	3	Accept	48-21-03.24N	122-46-19.16W	H11375	1021_reson8101_ProjFwd_HVF	2005-193

The discrepancy is most likely the result of uncompensated heave on line 270_2137.

Data Quality Factors⁶

The multitude of quality issues found in these data is discussed below.

Projector Forward/Aft Setting

A portion of SWMB data was acquired with the incorrect Reson 8101 setting of “Projector Forward” instead of the correct setting of “Projector Aft”. This setting caused the port and starboard beams to be switched, and the data to appear as if the sonar were mounted backward. This produces a characteristic “bow tie” when data is observed in Caris subset mode (see Figure 3). All data acquired by Launch 1006 and a portion of that acquired by 1021 on DN 193 were affected by this errant projector setting. On Launch 1021, the problem was identified and corrected halfway through DN 193 on line 902_2259.

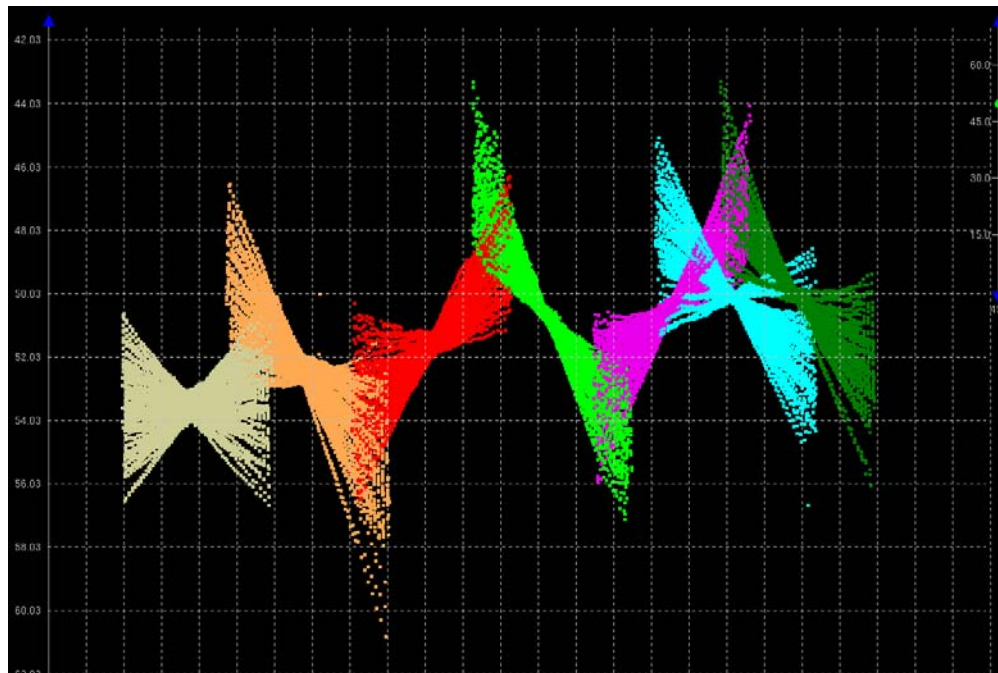


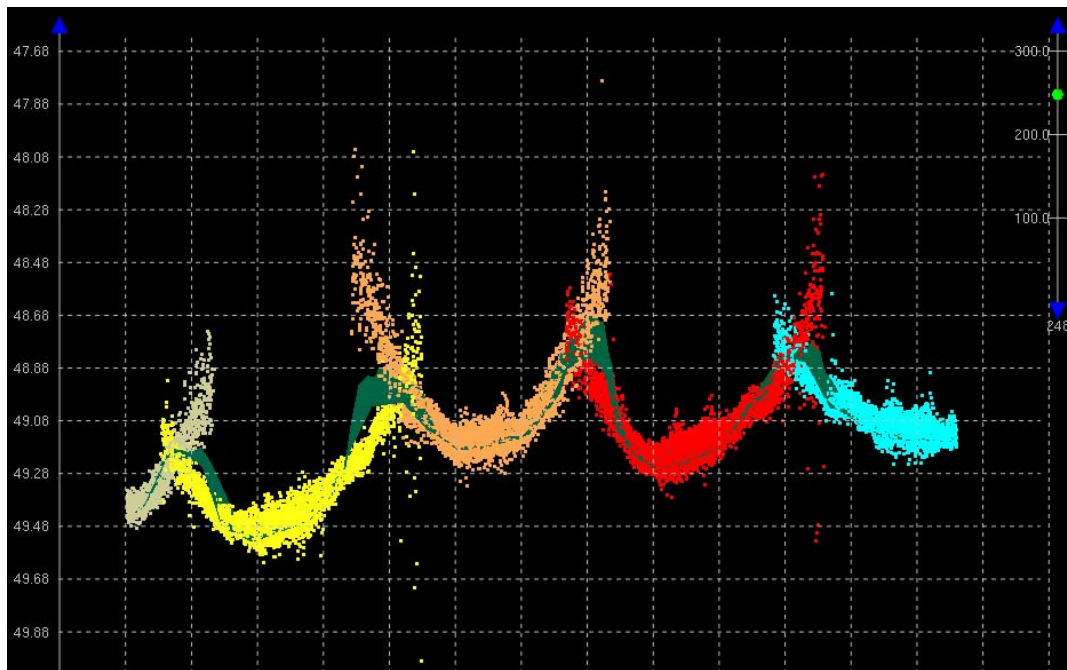
Figure 3: Data collected with an incorrect sonar projection setting,

“Projector Forward,” on RA5 (1006) on July 12, 2005 (DN 193), prior to re-conversion to correct the mounting problem.

To correct this projector setting problem, separate HVFs were created for each boat in which the SVP azimuth value was rotated 180 degrees (see email from LT Benjamin Evans and Jack Riley in the supplemental correspondence section of this report).⁷ To distinguish these reversed HVFs, the text “ProjFwd” was added to the HVF name. Problem data were then re-converted using these new HVFs, which had the effect of “flipping” the data back into the proper orientation. Line 902_2259 required special attention since the projector setting changed mid-line and no single HVF could correct the problem. This line was converted using both the normal and the rotated HVFs (1006_Reson8101_HVF and 1006_Reson8101_ProjFwd_HVF). The incorrectly projected segment of data from each line was then manually rejected in Caris Swath Editor.

Sound Velocity

Refraction artifacts appear in the data throughout the survey area. In general, data acquired in the spring (DN 086 to DN 094) are less affected than data acquired in the summer (DN 193 to DN 194). Data acquired on DN 193 by Launch 1006 (RA5) are most affected. Figure 4 depicts a cross section of Launch 1006 data in Caris HIPS subset mode, which exhibits this error.



*Figure 4: Refraction “smiles” exhibited by data acquired on DN 193 with Launch 1006 (RA5); approximately one meter vertical discrepancy prior to cleaning, **prior to filtering to remove “smile” artifacts.***

Weather and sea conditions during the spring were rougher than those experienced during the summer. The degree of refraction artifacts from the summer are most likely due to calmer

and warmer weather causing higher water surface temperatures and limited mixing of the water column.

After the individual sound velocity profile files were inspected for abnormalities (irregular profiles, incorrect file formatting, insufficient SVP data at surveyed depths, etc), the following attempts were made to correct the refraction errors:

1. Conventional concatenated launch sound velocity profile files were applied using CARIS HIPS options “Nearest in Distance” and “Nearest in time”.
2. One single sound velocity profile file, H11375_SVP.svp, was created using all of the sound velocity casts collected during the survey and applied using:
 - “Nearest in Distance, Nearest in Time (4hrs)”.
 - “Nearest in Distance”
 - “Nearest in Time”

None of the above attempts resolved the observed refraction error, so the data were re-corrected using the standard “Previous in Time” by boat SV correction. Thus, to minimize the effects of these refraction errors in the HDCS data on the final BASE surface, lines of data with refraction errors exceeding the maximum acceptable limit of 0.3 meters plus 0.5 percent of the water depth were edited using a swath angle filter. The filters were applied by Caris vessel-day projects in the following ways:

- 1006_Reson8101_ProjFwd_HVF: 2005-193: Filtered 45/45 degrees port/starboard
- 1015_Elac1180_HVF: 2005-087: Filtered 50/50 degrees port/starboard
- 1016_Reson8125_HVF: 2005-193: Filtered 55/55 degrees port/starboard
- 1021_Reson8101_ProjFwd_HVF: 2005-293: Filtered 50/50 degrees port/starboard

This procedure resulted in the creation of some holidays between sounding lines. These areas were inspected for features prior to filtering. No features were found in water depths significant to surface navigation. Where holidays remain in the final BASE surfaces, the seabed was found to be flat and devoid of significant features. The hydrographer recommends interpolation across these gaps to supersede charted depths in the common area.⁸

Water Level Corrections

Minor and intermittent tide correction errors can also be seen in these data (see Figure 5). None of the tide errors are greater than 0.1 meters, which is less than the allowable error for water levels, and are therefore not addressed further. Final approved water levels have been applied (see section C. VERTICAL AND HORIZONTAL CONTROL).

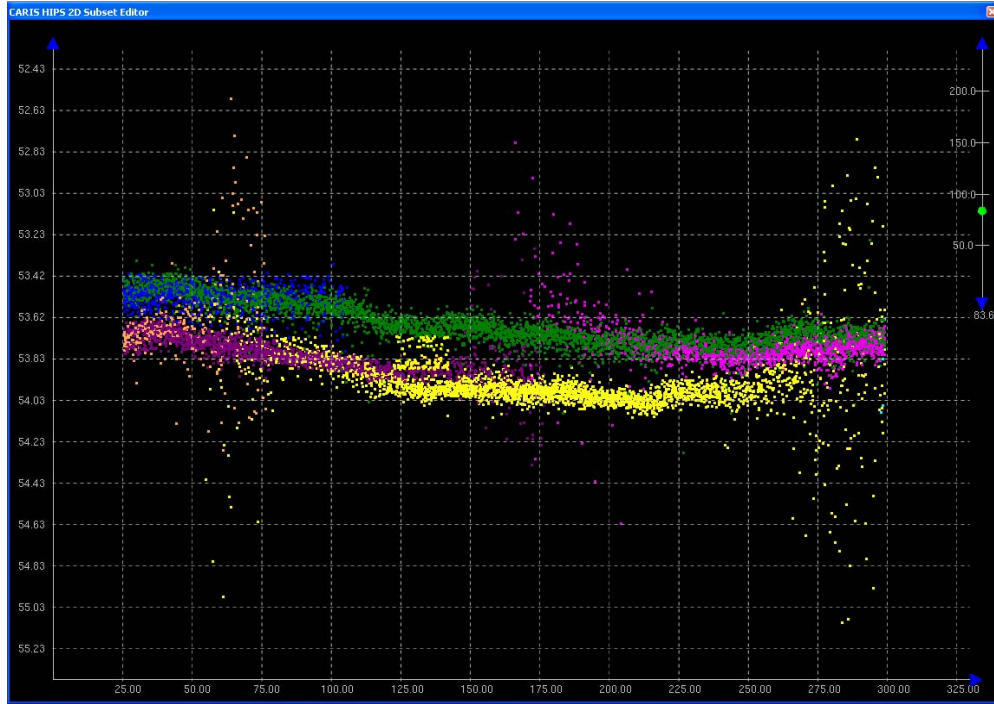


Figure 5: Vertical discrepancy between data collected on DN 094 with RA5 (1006) and DN 193 with RA3 (1021); approximately 0.08-meter vertical discrepancy.

Heave

Heave artifacts of up to a maximum of +/-0.5 meter in water 30 to 65 meters deep are present in the data acquired on DN 087 with the Elac1180 mounted on Launch 1015 (RA6). The issue was identified using a five-meter BASE surface, as seen in Figure 6.

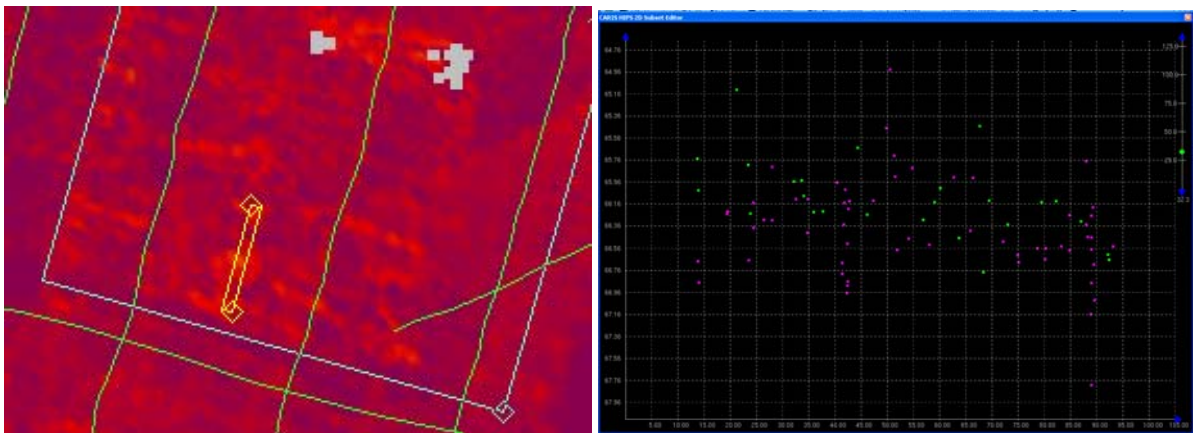


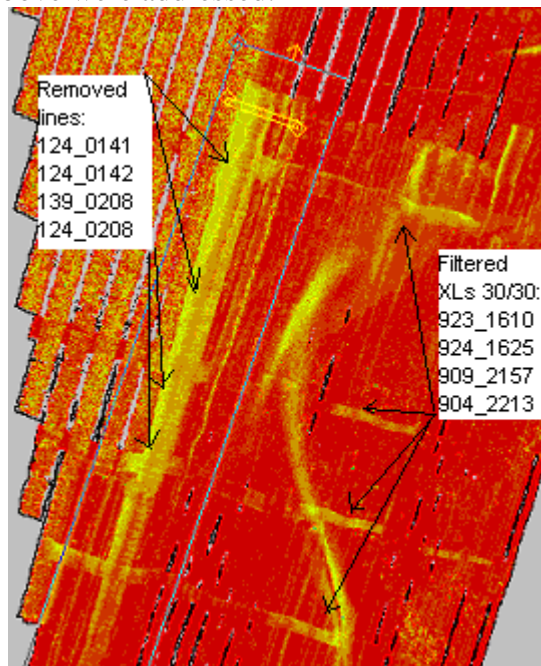
Figure 6: Heave artifacts in Elac data collected in the NW corner of the sheet on DN 097 with Launch 1015 (RA6).

These artifacts are most likely due to an inadequate heave filter setting in the POS MV. Though the specific heave filter used on DN 087 is not retained in the digital record, RAINIER’s standing operating procedure during the time of acquisition was to leave the heave filter set to eight hertz. The weather and sea conditions during the spring of 2005 were notably worse than those in which RAINIER normally operates. The Multibeam Daily

Acquisition Log for RA-6 (1015) on DN 097 shows ten-knot winds and one to three-foot seas. Weather reports from the time period predicted southerly wind and swell. A setting of eight hertz was most probably insufficient to capture the complete period of swell experienced by the launch during data acquisition. The north-south azimuth with alternating intensity of heave artifact between lines supports the idea that the launch was probably traveling into the seas and experiencing shorter heave periods, then coming about on the adjacent line and traveling with the seas and experiencing longer heave periods. There is no remedy for these data post-acquisition, and so they are left as is. RAINIER's new standard operating procedure is to adjust the heave filter based on the survey conditions, as reported in the DAPR.

Miscellaneous

Several exceptions to the aforementioned data quality issues were dealt with on a line-by-line basis. Figure 7 is a portion of a preliminary finalized, combined BASE surface after the initial issues mentioned above were addressed.



*Figure 7: Standard deviation plot showing remaining miscellaneous data quality issues, heave and refraction, **prior to removal**.*

Lines 124_0141, 124_0142, 124_0208, and 139_0208 acquired on DN 094 by Launch 1006 (RA5) (projector fwd) were removed from the survey entirely because they exhibit a half-meter vertical offset (most likely associated with an improper heave filter setting) as seen in Figure 8 and are not necessary for adequate bottom coverage.

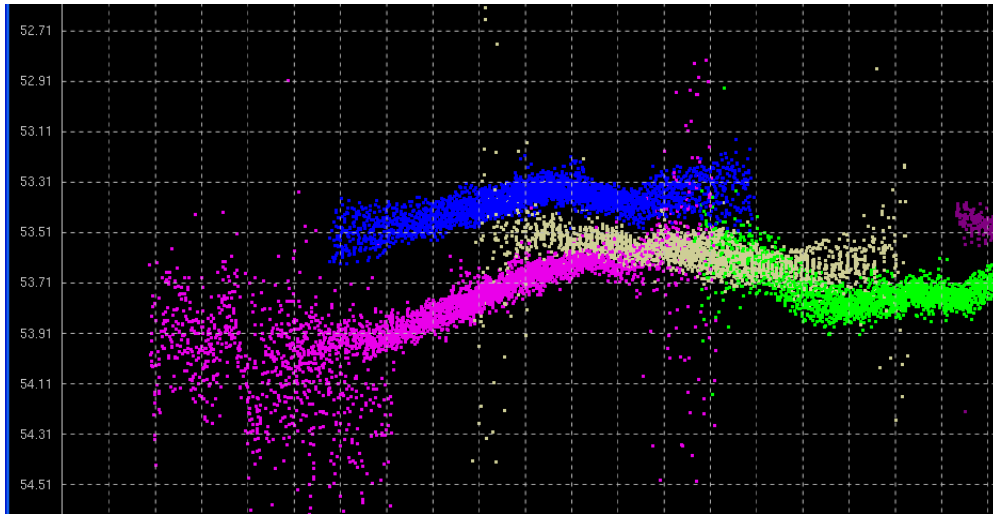


Figure 8: Approximate half-meter vertical offset in line 124_0141(RA-5, DN094).

A swath angle filter of 30-degrees on port and starboard was applied to six crosslines acquired with RA-3 (1021) on DN 193 because they presented refraction smiles (see Figure 7).

B3. Data Reduction

Data reduction procedures for survey H11375 conform to those detailed in the *OPR-N372-RA-05 DAPR* except where noted in this report.

B4. Data Representation

Though many BASE surfaces were used for the processing of H11375, the final submission is shown in Figures 9 and 10. The submission field sheets are smaller than 25×10^6 nodes.

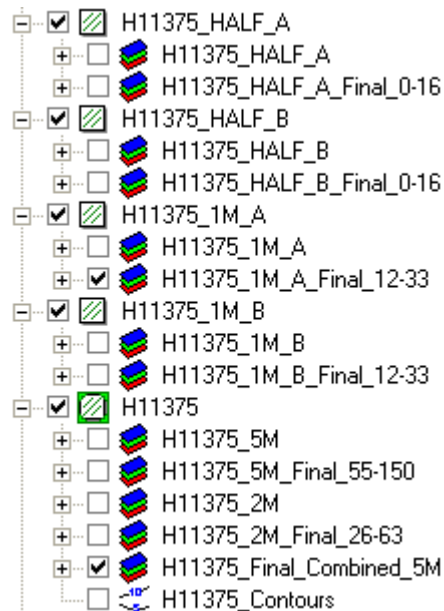


Figure 9: Screen grab of the field sheets and BASE surfaces submitted with H11375.

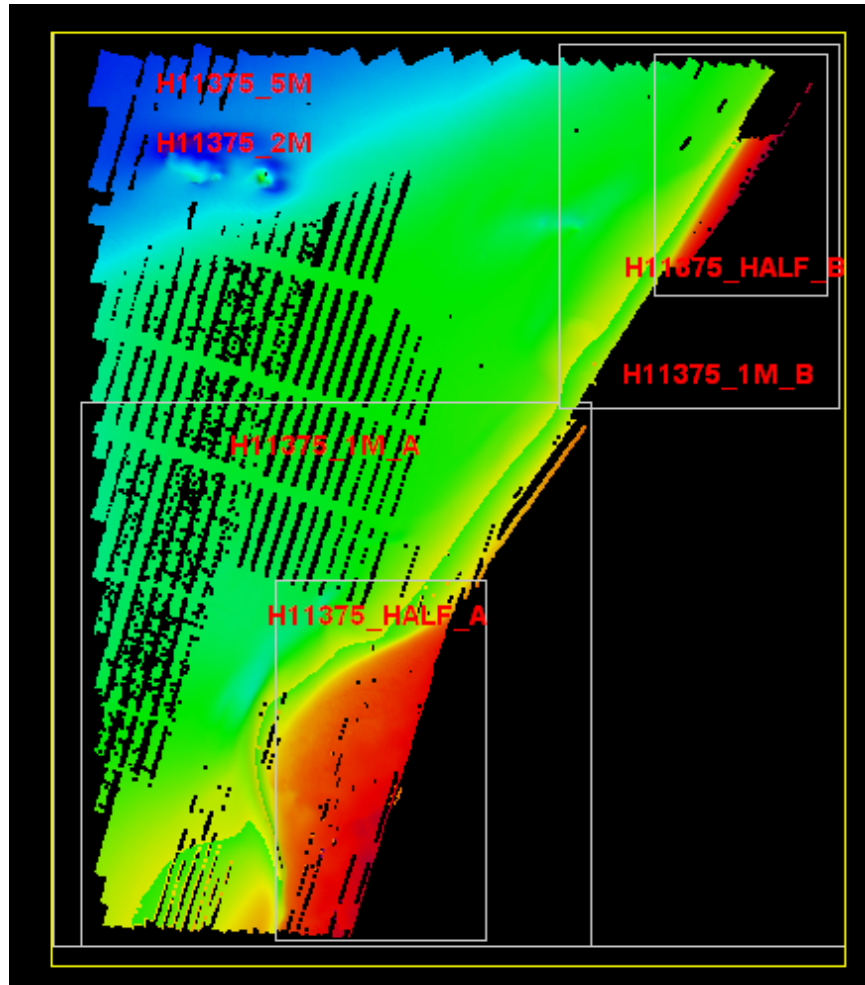


Figure 10: Screen grab of the field sheets and their resolutions for H11375.

C. VERTICAL AND HORIZONTAL CONTROL

Horizontal Control

The horizontal datum for this project is the North American Datum of 1983 (NAD83). Differential GPS (DGPS) was the sole method of positioning. Differential corrections from U.S. Coast Guard beacon at Whidbey Island (302 kHz) were utilized during this survey. Launch-to-launch DGPS performance checks were not performed during this survey.

Vertical Control

The vertical datum for this project is Mean Lower-Low Water (MLLW). The operating National Water Level Observation Network (NWLON) primary tide stations at Friday Harbor, WA (944-9880), and Port Townsend, WA (944-4900) served as control for datum determination and as the primary source for water level reducers for survey H11375.

No tertiary gauges were required.

All data were reduced to MLLW using **FINAL APPROVED WATER LEVELS** from station Friday Harbor, WA, and Port Townsend, WA, using the tide file 9449880.tid, 9444900.tid, and time and height correctors using the zone corrector file N372RA2004CORP_rev.zdf. See the memorandum located in the “Smooth Tides Request” section of this report dated August 3, 2005, from Cary R. Wong of the Requirements and Development Division notifying CDR Guy Noll, NOAA Ship RAINIER, that preliminary tidal zoning is accepted as the final tidal zoning for survey H11375.

D. RESULTS AND RECOMMENDATIONS

D.1. Chart Comparisons

D.1.a. Survey Agreement with Chart ⁹

Survey H11375 was compared with the following charts:

18429 (9th Ed; Dec 2002, 1:25,000), corrected through NTM 7/23/2005
18427 (21st Ed; Jun 2002, 1:25,000), corrected through NTM 7/23/2005
18440 (27th Ed; Nov 2003, 1:50,000), corrected through NTM 7/23/2005
18465 (35th Ed.; Dec. 2002, 1:80,000), corrected through NTM 7/23/2005
18441 (43rd Ed; Jul 2003, 1:80,000), corrected through NTM 7/23/2005
18423 (34th Ed; Dec 2003, 1:80,000), corrected through NTM 7/23/2005
18421 (46th Ed; Oct 2003, 1:80,000), corrected through NTM 7/23/2005
18400 (44th Ed; Aug 2003, 1:200,000), corrected through NTM 7/23/2005

All charted depths agree well with discrepancies no greater than two fathoms with two significant exceptions:

1. A charted 31-fathom depth in approximate position 48°20'36.38" N 122°45'09.41" W (varies by chart) was surveyed to 22 fathoms. Charts affected by this shoaler sounding are 18429, 18465, 18441, 18429, 18421, and 18400. This sounding is in the traffic separation scheme and is part of an unusual feature discussed below in the AWOIS section of this report. ¹⁰
2. A charted 35-42-fathom area in approximate position 48°20'35.82" N, 122°45'41.43" W (charted sounding and position varies slightly by chart) was surveyed to 31 fathoms. Charts affected by this shoaler depth are 18429. ¹¹

Charts 18427 and 18440 are not affected by either of these shoaler-than-charted depths.

In general, the charted contours are accurate and the bottom is relatively flat with gradual shoaling toward shore with the exception of the feature in the traffic lanes mentioned above. The shoaling in the southeast corner of the sheet extends at most one nautical mile off shore and contains many small rocks discussed below.

D.1.b. Dangers to Navigation

No dangers to navigation (DTONs) were found in survey H11375. ¹²

D.1.c. Other Features

The hydrographer recommends charting a “Rocky” notation in the southeast corner of the survey area and along the shore of Whidbey Island rather than a charted rock symbol for each designated feature in these regions. ¹³ The least depths on numerous rocks indicated in the bathymetry covering this area are not preserved in their respective BASE surfaces, and are “designated” in Caris and represented as rocks in the survey PSS (see H11375.pss and MapInfo table H11375_Features). See FPM section 4.2.4.3, “Directed Editing from Boat-day BASE Surface”, for additional information on RAINIER methodology for selecting “designated” soundings.

AWOIS item #52374 is a 1963 report of three unexploded bombs in approximate position. 48°20'30.0" N, 122°44'35.0" W. One hundred percent multibeam coverage was acquired over the reported area. No discernable bombs are visible in these data, though two large formations (approximately 500 by 200 meters and 300 by 200 meters) were found in the same position (see Figure 11). The shoaler-than-charted sounding described in section D.1.a. is part of this formation. The hydrographer recommends retaining the “unexploded bombs” note on the chart. ¹⁴

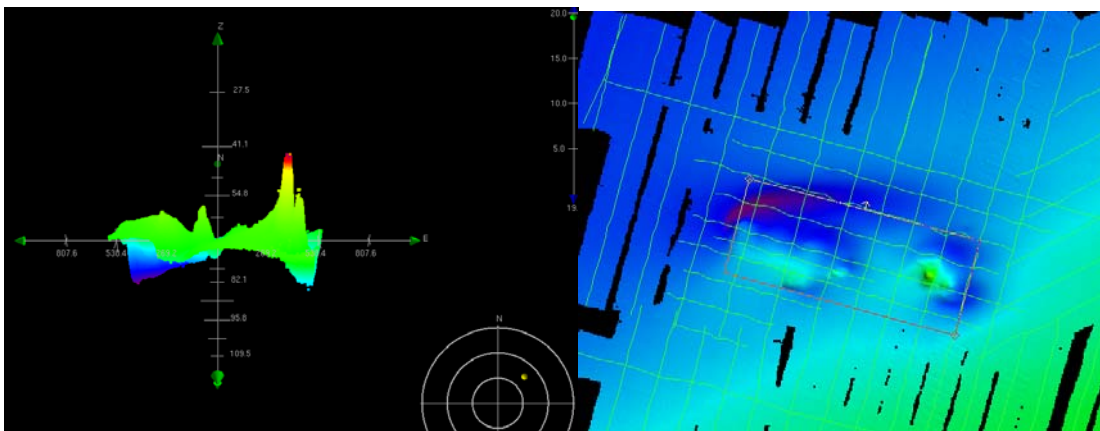


Figure 11: Screen grabs of two unusual features in the NW corner of the sheet near AWOIS item #52374.

While RAINIER was operating in the area, the charted Small Arms Safety Zone and air station runway were observed in use.

D2. Additional Results

D.2.a. Prior Survey Comparison

Prior survey comparison with H11375 was not performed.

D.2.b. Shoreline Verification

Shoreline verification was not performed for survey H11375.

D.2.c. Aids to Navigation

There are no Aids to Navigation within survey H11375. ¹⁵

D.2.d. Overhead features (Cables, power lines, bridges)

There are no overhead features in survey H11375. ¹⁶

D.2.e. Submarine Cables and Pipelines

Several underwater “trenches” extend from the shore of Whidbey Island at varying azimuths (see Figure 12). All exist within the charted submarine cable areas. Charts 18645, 18429, 18423, and 18421 depict submarine cable areas while charts 18440 and 18400 depict submarine cable lines.

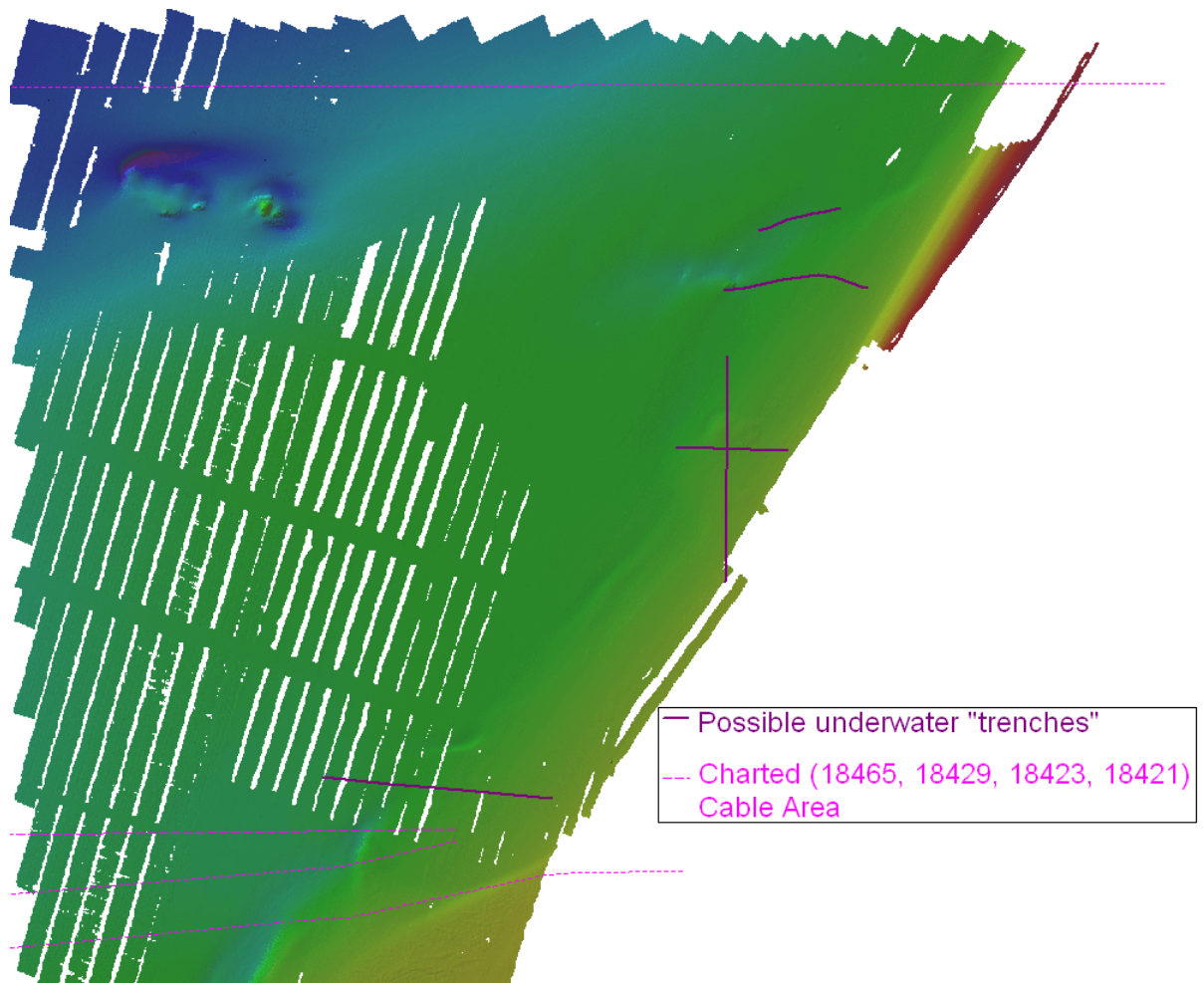


Figure 12: Possible underwater “trenches” in charted submarine cable areas.

D.2.f. Ferry Routes

There are no ferry routes on H11375.¹⁷

D.2.g. Bottom Samples

Bottom samples were not performed in survey H11375.¹⁸

D.2.h. Final Recommendations

Though multibeam data was not acquired to the four meter-curve in all areas as specified in the project instructions, the hydrographer DOES NOT deem further survey necessary to update charts affected by the survey area. Little to no variation was observed between surveyed and charted depths and contours in areas near shore. In addition, the majority of the area not surveyed to the four-meter contour exists within the Navy’s small arms safety zone, and should be avoided. Survey data are adequate to supersede charted data in their common areas except where noted in this report.

E. ADDITIONAL DOCUMENTATION

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

<u>Title</u>	<u>Date Sent</u>	<u>Office</u>
Data Acquisition and Processing Report for OPR-N372-RA-05	4/17/2006	N/CS34
Coast Pilot Report for OPR- N372-RA-05 [REDACTED]	2/14/2005	N/CS26

Revisions Compiled During Office Processing and Certification

¹ Filed in the survey folder, hydrographic records and attached to this report.

² Filed with the project records

³ Filed with the project records

⁴ Filed with the hydrographic records

⁵ The junction between survey H11375 and surveys H10828 and H11188 were not formally completed since these two surveys were processed previously. Soundings and depth curves are in good agreement within the common area.

⁶ The data for this survey is acceptable despite not meeting specifications given the depth of water. See the SAR which is attached to this report for more information and recommendations to accept this survey despite its problems.

⁷ Attached to this report.

⁸ Concur, based on the SAR for this survey. This survey should supersede existing data despite the holidays in the survey area.

⁹ Survey 11375 was compared with two largest scale charts, Chart 18429, scale 1:25,000, 8th Edition, Jan 1, 2007 and chart 18441, scale 80,000, 45th Edition April 1, 2006.

¹⁰ Chart 22 fathom sounding and rocky seabed area

¹¹ Chart 30 fathom sounding and rocky seabed area

¹² Concur

¹³ Do not concur, by reviewing the high resolution surfaces, these rocks mention by the hydrographer are isolated small boulders. It is recommended that these features be charted as shoal soundings because they do not raise much above the surrounding depths. Do not chart a rocky seabed area either.

¹⁴ Concur

¹⁵ Concur

¹⁶ Concur

¹⁷ Concur

¹⁸ Retain all bottom characteristics as charted.

H11375_ProjFwdAft_Email.txt

From FOO RAINIER <foo.rainier@noaa.gov>
Date Thursday, July 14, 2005 2:12 am
To _ OMAO MOP ChiefST RAINIER <ChiefST.Rainier@noaa.gov>, Gregory King
<Gregory.King@noaa.gov>, Matthew Foss <matthew.foss@ranems.pmc.noaa.gov>, Daniel Boles
<daniel.boles@ranems.pmc.noaa.gov>, Shelly Glenn <shelly.glenn@ranems.pmc.noaa.gov>,
robert.shepherd@ranems.pmc.noaa.gov, matt.boles@ranems.pmc.noaa.gov,
john.lomnicky@ranems.pmc.noaa.gov, michael.stevenson@ranems.pmc.noaa.gov, Briana Welton
<Briana.Welton@noaa.gov>, Brent Pounds <Brent.Pounds@noaa.gov>,
nicola.samuelson@noaa.gov, Andrew Halbach <Andrew.Halbach@noaa.gov>,
samuel.greenaway@noaa.gov, Olivia Hauser <olivia.hauser@noaa.gov>,
laurel.jennings@noaa.gov, jamie.wasser@noaa.gov, David Meyer
<david.meyer@ranems.pmc.noaa.gov>, Charles Doxley <charles.doxley@ranems.pmc.noaa.gov>,
"Lorraine Robidoux.atsea" <lorraine.robidoux.atsea@noaa.gov>
Cc CO RAINIER <co.rainier@noaa.gov>
Subject [Fwd: Re: ProjFwd Help!]
All,

For those of you who have been following the 8101 ProjFwd / ProjAft debacle over the last few days, the email below from Jack Riley describes how to fix that data from DN193 which was mistakenly acquired with the sonar in ProjFwd mode. I have created a duplicate of the current 1006 and 1021 HVFs with the SVP Azimuth value reversed to 180 degrees, which appears to correct the problem. We will use these VCFs for the affected data from DN193.

Anyone interested in a more detailed explanation, please see me.

Ben

----- Original Message ----- Subject: Re: ProjFwd Help!
Resent-Date: Wed, 13 Jul 2005 21:18:37 GMT
Resent-From: FOO.Rainier@noaa.gov
Date: Wed, 13 Jul 2005 17:18:32 -0400
From: Jack Riley <Jack.Riley@noaa.gov>
To: FOO RAINIER <foo.rainier@noaa.gov>
CC: 'Mark VanWaes' <Mark.Vanwaes@noaa.gov>
References: <42D49521.7090308@noaa.gov>

I don't remember a pre-convert, modify-XTF-data, utility being developed.

I just looked at the Reson 8101 ISD and the ProjFwd setting is not stored in the packet data; so, said utility would need to flip two arrays in each packet: the slant ranges array & the beam quality array. However, azimuth in the VCF/HVF's SVP sensor section is really a

H11375_ProjFwdAft_Email.txt

mounting flag--acceptable values being either 0.0 or 180.0.

The quickest solution would be to create two new timestamp entries in your affected VCF/HVF's SVP sensor section: one dated immediately prior to the date of ProjFwd setting and one dated immediately afterwards end-of-line time, with azimuth=180.0 and =0.0, resp. Be sure to (re)SVP Correct to generate the correct ObservedDepths (followed by (re)Merge).

That said, it would not be too difficult to write a utility in the form of a Pydro macro to do this (wrote one a few weeks ago to adjust date timestamp in XTF POS_RAW_NAVIGATION datagrams for FA)...ignoring a bunch of QC logic, like analyzing the veracity of (say) reported number of beams (to know how many bytes to read for aforementioned array data). If you *really* would like to avoid using the VCF/HVF solution I could probably have something for you sometime between tonight and next Thursday.

FOO RAINIER wrote:

> Jack,
>
> I've fallen victim to the infamous 8101 Projector Forward / Projector
> Aft bugaboo... To make a long story short, despite our best efforts
> to find and correct the problem, we've got a day's worth of data which
> was acquired with the 8101 set to "ProjFwd". I remember this biting
> other people before, and I seem to recall that you might have a canned
> solution to this problem- was there a utility written some time ago
> to renumber the beams in a .xtf to effectively reverse the projector
> mounting, prior to conversion to CARIS? You could also probably
> figure out a way to trick CARIS into converting it correctly by adding
> a 180 degree offset to the swath yaw bias, but if possible, I'd prefer
> to fix this prior to conversion. Any ideas?
>
> Thanks,
>
> Ben
>

--
LT Ben Evans, NOAA

H11375_ProjFwdAft_Email.txt

**Field Operations Officer
NOAA Ship RAINIER (s221)
NOAA Marine Operations Center, Pacific
1801 Fairview Ave. E
Seattle, WA 98102**

H11375_Coverage_Email2.txt

From "Dave Neander" <Dave.Neander@noaa.gov>
Date Friday, July 15, 2005 7:14 pm
To FOO RAINIER <foo.rainier@noaa.gov>
Cc don.haines@noaa.gov, CO RAINIER <co.rainier@noaa.gov>, Briana Welton
<Briana.Welton@noaa.gov>
Subject Re: H11375 complete
Attachments vCard(dave.neander) 1K

Thanks for the update Ben. Your coverage should be more than sufficient.

Dave

FOO RAINIER wrote:

> Dave, Don-
>
> We had two days of good weather and limited use of the NAS Whidbey
> Island small arms range, and were able to get a good chunk of H11375
> (OPR-N372-RA-05, Sheet H) completed. Please see that attached
> graphic, with the H11375 survey coverage outlined in red. While we
> did not achieve coverage all the way to the 8m isobath as called for
> in the LIs, I think we did cover the area of primary interest to the
> tug and barge traffic working east of the traffic lanes. Unless
> either of you see a need to push further inshore, I think we'll call
> this good and wrap it up.
>
> Ben
>
>
> -----
>

Thanks for the update Ben. Your coverage should be more than sufficient.

Dave

FOO RAINIER wrote:

Dave, Don-

H11375_Coverage_Email2.txt

We had two days of good weather and limited use of the NAS Whidbey Island small arms range, and were able to get a good chunk of H11375 (OPR-N372-RA-05, Sheet H) completed. Please see that attached graphic, with the H11375 survey coverage outlined in red. While we did not achieve coverage all the way to the 8m isobath as called for in the LIs, I think we did cover the area of primary interest to the tug and barge traffic working east of the traffic lanes. Unless either of you see a need to push further inshore, I think we'll call this good and wrap it up.

Ben

H11375_Coverage_Email1.txt

From FOO RAINIER <foo.rainier@noaa.gov>
Date Friday, July 29, 2005 6:10 pm
To Briana Welton <Briana.Welton@noaa.gov>
Subject [Fwd: Fwd: Re: Fwd: H11375 complete]
FYI.

----- Original Message ----- Subject: Fwd: Re: Fwd: H11375 complete
Date: Fri, 29 Jul 2005 10:01:13 -0800
From: CO RAINIER <co.rainier@noaa.gov>
Organization: NOAA Ship RAINIER
To: FOO RAINIER <foo.rainier@noaa.gov>
References: <42D5C5B7.3020305@noaa.gov> <opstvr0grwov797k@ra-co.rainier.nmao.ship>
<42EA24D7.B4F2B11F@noaa.gov>

now it's up to us to provide a good package to PHB for their approval.

----- Forwarded message -----
From: "Jon Swallow" <Jon.Swallow@noaa.gov>
To: "CO RAINIER" <co.rainier@noaa.gov>, "Don Haines"
<Don.Haines@noaa.gov>, "Dave Neander" <Dave.Neander@noaa.gov>
Cc: "Mike Gibson" <Mike.Gibson@noaa.gov>, "Michael Riddle"
<Michael.Riddle@noaa.gov>, "Kyle Ward" <Kyle.Ward@noaa.gov>
Subject: Re: Fwd: H11375 complete
Date: Fri, 29 Jul 2005 08:45:11 -0400

If Dave and Don are happy with the coverage, OPS is OK with calling this complete.

Jon

CO RAINIER wrote:

- >
- > Jon,
- > I reco we call this a completed survey, providing it meets PHB's
- > completion QA tests within the outlined area upon receipt. The Puget
- > Sound
- > Pilot discussion indicated that the primary usage of this area is tug and
- > barge traffic outside (east) of the main traffic lanes. Small boat
- > traffic
- > generally travels east of Whidbey Island and through Deception Passage to
- > then continue through Burrows Bay to the San Juans.
- > Guy
- >

H11375_Coverage_Email1.txt

> ----- Forwarded message -----
> From: "FOO RAINIER" <foo.rainier@noaa.gov>
> To: "Dave Neander" <Dave.Neander@noaa.gov>, don.haines@noaa.gov
> Cc: "CO RAINIER" <co.rainier@noaa.gov>, "Briana Welton"
> <Briana.Welton@noaa.gov>
> Subject: H11375 complete
> Date: Thu, 14 Jul 2005 02:53:59 +0100

>
> Dave, Don-

>
> We had two days of good weather and limited use of the NAS Whidbey
> Island small arms range, and were able to get a good chunk of H11375
> (OPR-N372-RA-05, Sheet H) completed. Please see that attached graphic,
> with the H11375 survey coverage outlined in red. While we did not
> achieve coverage all the way to the 8m isobath as called for in the LIs,
> I think we did cover the area of primary interest to the tug and barge
> traffic working east of the traffic lanes. Unless either of you see a
> need to push further inshore, I think we'll call this good and wrap it
> up.

> Ben

> --

> CO-RAINIER

> -----
> Name: H11375_outline.jpg
> H11375_outline.jpg Type: JPEG Image (image/jpeg)
> Encoding: Base64

--
CO-RAINIER

--
LT Ben Evans, NOAA
Field Operations Officer
NOAA Ship RAINIER (s221)
NOAA Marine Operations Center, Pacific
1801 Fairview Ave. E
Seattle, WA 98102



UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SERVICE
OFFICE OF COAST SURVEY
Pacific Hydrographic Branch
Seattle, Washington 98115-6349

January 8, 2007

MEMORANDUM TO:

Commander Donald W. Haines, NOAA
Chief, Pacific Hydrographic Branch

CDR Donald W. Haines,
NOAA
I have reviewed this
document
2007.01.12 15:32:00 -08'00'

FROM:

Katie Reser
Physical Scientist, Pacific Hydrographic Branch

Katie Reser
2007.01.08 13:51:38
-08'00'

SUBJECT:

Review of Hydrographic Survey H11375
OPR-N372-RA-05
Approaches to Puget Sound, Washington

I have reviewed hydrographic survey H11375 with regard to data integrity and completeness of the data submission package, survey field procedures, data processing and quality assurance methods, and overall data accuracy and data quality. Survey H11375 complies with specifications and requirements set forth in the NOS Hydrographic Surveys Specifications and Deliverables Manual, the Field Procedures Manual, and the Standing and Letter Project Instructions with the following exceptions:

- Heave artifacts with magnitudes up to 0.5m exist in 30-60m of water and are discussed in section B2 of the DR. The maximum allowable error for heave is 0.2m as specified in section 5.4.5 of the HSSDM. Given the depth of water, the data should be accepted despite not meeting spec.
- 100% coverage was not obtained during this survey due to filtering of sound velocity errors and is discussed in section B2 of the DR. The area was inspected by the field unit prior to filtering and was found to be relatively flat with no evidence of shoaling or significant features. This survey should supersede existing data despite the holidays.

I have performed the following additional processing of this survey in conjunction with this evaluation:

- Reviewed soundings flagged as “outstanding” using the backscatter imagery in Sidescan Editor. Where appropriate, the sounding flag was changed to “designated” and applied to the BASE surfaces.
- A flier was found on the east side of the survey area that pulled the BASE surfaces up 4.5m in 22m of water. The flier was removed in Subset Editor.
- Re-finalized and combined the BASE surfaces.



Special attention should be given to:

- During the survey, the charted Small Arms Safety Zone and air station runway were observed to be in use, as stated in section D1.c of the DR.
- The recommendation in section D.1.c of the DR that suggests charting a “Rocky” notation in the southeast corner of the survey instead of several individual rock symbols.
- The recommendation in section D.1.c of the DR that suggests retaining the “unexploded bombs” note on the chart in the area of the AWOIS investigation.
- The two shoaler-than-charted depths discovered during the chart comparison. One is a charted 31 fathom sounding surveyed to 22 fathoms and the other is a charted 35-42 fathom area surveyed to 31 fathoms. Positions and details about the depths are found in section D.1.a of the DR.
- There is a discrepancy between the name of the tide zone file applied to the data and the one specified in the tide note. Despite this naming issue, the applied tides are valid. Refer to email dated 06NOV06 in the Correspondence folder.

To improve the quality of future survey submissions the following recommendations are made:

- Ideally, soundings flagged “outstanding” should be reviewed and resolved in the field (see comment #5 in the checklist).

Final Recommendations:

- This survey should be accepted.
- This survey should fully supersede prior data.
- This survey should be given normal priority.

Reviewed and approved: _____



Kurt Brown
I am approving this document
2007.01.08 14:49:55 -08'00'

Date: _____

Kurt Brown
Physical Scientist, PHB

H11375 HCell Report
Russ Davies, Cartographer
Pacific Hydrographic Branch

Introduction

The primary purpose of the HCell is to directly update NOAA ENC's with new survey information in International Hydrographic Organization (IHO) format S-57. HCell compilation of survey H11375 utilized Office of Coast Survey HCell Specifications Version 3.0, May 2008. HCell H11375 will be used to update chart 18429, scale 1:25,000, 10th Ed.; Jan 1, 2007 and chart 18441, scale 1:80,000, 45th; April 1, 2006.

1. Compilation Scale

The density of soundings in the HCell is compiled as appropriate to emulate those soundings on Chart 18429. Position and density of non-bathymetric features included in the HCell have not been generalized from the scale of the hydrographic survey, 1:25,000.

2. Soundings

2.1 Source Data

A 5 meter resolution Combined BASE surface, **H11375_Final_combined_5m.hns**, surface was used as the basis for HCell production following Branch certification.

A survey-scale sounding (SOUNDG) feature object source layer was built from the **H11371_Final_Combined_5m** surface in CARIS BASE Editor. A shoal-biased selection was made at 1:10,000 survey scale using a radius table with values shown in **Table 1**.

Table 1

Upper limit (m)	Lower limit (m)	Radius (mm)
0	10	3
10	20	4
20	50	4.5
50	90	5

2.2 Sounding Feature Objects

In CARIS BASE Editor, soundings were manually selected from the high density sounding layer and imported into a new layer created to accommodate chart density depths. Manual selection was used to accomplish a density and distribution that more closely represents the seafloor morphology and that emulates density and distribution of soundings on chart 18429 than is possible using automated methods. See section 10.1, Data Processing Notes, for details about the use of manual sounding selection for

H11375. The sounding feature object source layer was exported from BASE Editor then imported into HOM.

3. Depth Areas

3.1 Source Data

Using the BASE surface **H11375_Final_Combined_5m** a single depth area was generated. No depth contours were delivered per OCS HCell Specifications ver.3.0 and Hcell User Guide ver. 1.2.

3.2 Depth Area Feature Objects

One all-encompassing depth range, 5.389 meters to 76.378 meters, was used for all depth area objects below MLLW. Upon conversion to NOAA charting units, this depth range is 2.468 fathoms to 46.199 fathoms.

4. Meta Areas

The following Meta object areas are included in HCell 11371:

M_QUAL
M_COVR
M_CSCL

Meta area objects were constructed on the basis of the perimeter lines delineating the survey limit. The perimeter was first used to create the Skin of The Earth (SOTE) layer, then duplicated to the Meta object layers and attributed per the HCell Specifications, version 3.0.

5. Survey Features

All features addressed for survey H11375 are fully documented with attribution and action taken during compilation. These features can be found in the Descriptive Report, under H11375_Features, attached.

There were no dangers to navigation reported during survey operations or office processing.

H11375 contained no federally maintained aids.

There was one AWOIS items located within the limits of H11375. See attached Features Report for the recommendation.

Bottom samples were retained as charted in the common area and area included in the .000 file..

6. Shoreline / Tide Delineation

No shoreline or intertidal areas were included in survey H11375.

7. Attribution

All S-57 feature objects have been attributed as fully as possible based on information provided by the Hydrographer and in accordance with OCS HCell Specifications, version 3.0.

8.1 CARIS S-57 Composer Scheme

All features to be included in the HCell were imported into a single HOB file, **H11375_cs.hob**, in BASE Editor. The HOB file was used as a template to create the S-57 Composer product file **H11375_CS**. Once the features were in S-57 Composer, they were managed by using the function create layer by “Unique Feature Acronyms”. The following are the feature acronyms included in the product file:

SOUNDG	Chart scale soundings
DEPARE	Group 1 object (Skin of the Earth)
SBDARE	Bottom samples and rocky seabed areas
M_COVR	Data coverage meta object
M_QUAL	Data quality meta object
M_CSCL	Compilation scale meta object
\$CSYMB	Blue notes
OBSTN	Obstruction on chart

8.2 Blue Notes

Notes regarding data sources are in S-57 Composer as a \$CSYMB feature with the blue note located in the INFORM field and the survey registry number, chart number, chart edition and edition date located in the TXTDSC field. The blue notes are included in the HCell when it is exported to .000.

9. Spatial Framework

9.1 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.

9.2 Horizontal and Vertical Units

During creation of sounding sets in CARIS BASE Editor, and creation of the HCell in CARIS S-57 Composer, units are maintained as metric with millimeter resolution.

NOAA rounding is applied at the same time that conversion to chart units is made to the metric HCell base cell file, at the end of the HCell compilation process.

A CARIS environment variable, `uslXsounding_round`, controls the depth at which rounding occurs. Setting this variable to NOAA feet displays all soundings as whole units.

In an ENC viewer feet display in whole feet. Soundings round to the deeper foot if the decimals of the foot are 0.75000 or greater.

Chart Unit Base Cell Units

Depth Units (DUNI):	Feet
Height Units (HUNI):	Feet
Positional Units (PUNI):	Meters

10. QA/QC

10.1 Data Processing Notes

Manual chart scale sounding selections were made for this survey.

10.2 ENC Validation Checks

H11375 was subjected to QA and Validation checks in S-57 Composer prior to exporting the HCell base cell (000) file in chart units with NOAA rounding. dKart Inspector 5.0 (Service Pack 1) was then used to further check the data set for conformity using the S-58 ver. 2 standard (formerly Appendix B.1 Annex C of the S-57 standard). All tests were run and errors investigated and corrected where necessary.

11. Products

11.1 HSD, MCD and CGTP Deliverables

- H11375 Base Cell File, Chart Units, Soundings compiled to 1:25,000
- H11375 Base Cell File, Chart Units, Soundings compiled to 1:10,000
- H11375 Descriptive Report including end notes compiled during office processing and certification
- H11375 HCell Report

11.2 File Naming Conventions

S-57 Composer Product prefix: *H11375_CS.prd and H11375_SS.prd*

MCD Chart units base cell file: *US511375_CS.000*

MCD Chart units base cell file, survey scale soundings: *US511375_SS.000*

11.3 Software

BASE Editor 2.1:	Combination of Product Surfaces and initial creation of the S-57 bathymetry-derived features
HOM 3.3:	Assembly of the H-Cell, S-57 products unit conversion
S-57 Composer 2.0:	Assembly of the H-Cell, S-57 products export, QA
dKart Inspector 5.0:	Validation of the base cell file


12. Contacts

Inquiries regarding this HCell content or construction should be directed to:
Russ Davies, Cartographer, PHB, Seattle, WA; 206-526-6843;
Russ.Davies@noaa.gov.



UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
Office of Marine and Aviation Operations
Marine Operations Center
1801 Fairview Avenue East
Seattle, Washington 98102-3767

MEMORANDUM FOR: CDR Donald Haines, NOAA
Chief, Pacific Hydrographic Branch

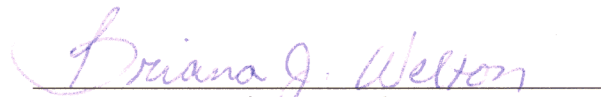
FROM: CDR Guy Noll, NOAA
Commanding Officer
NOAA Ship RAINIER 

DATE: December 8, 2005

TITLE: Approval of Hydrographic Survey H11375

Field operations for hydrographic survey H11375 were conducted under my direct supervision with frequent personal checks of progress and adequacy. I have reviewed the attached survey data and reports. The survey data meets or exceeds requirements as set forth in the NOS Hydrographic Surveys and Specifications Deliverables Manual, Field Procedures Manual, Standing and Letter Instructions, and HSD Technical Directives. These data are adequate to supersede charted data in their common areas with the exceptions noted in the Descriptive Report. This survey is complete and no additional work is required. Data and reports are respectfully submitted to N/CS34, Pacific Hydrographic Branch.

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



Briana J. Welton
Lieutenant (junior grade), NOAA
Survey Manager



Benjamin K. Evans
Lieutenant, NOAA
Field Operations Officer
NOAA Ship RAINIER



H11375_Features

Registry Number: H11375
State: WA
Locality: Puget Sound
Sub-locality: Northwest Coast of Whidbey Island
Project Number: OPR-N372-RA-05
Survey Dates: March 27, 2005 - July 13, 2005

Charts Affected

Number	Version	Date	Scale
18427	23rd Ed.	09/01/2006	1:25000
18429	9th Ed.	12/01/2002	1:25000
18421	48th Ed.	09/01/2006	1:80000
18423	35th Ed.	05/01/2005	1:80000
18441	45th Ed.	04/01/2006	1:80000
18465	37th Ed.	05/01/2005	1:80000
18440	28th Ed.	12/01/2005	1:150000
18400	47th Ed.	10/01/2006	1:200000
18003	20th Ed.	11/01/2006	1:736560
18007	32nd Ed.	07/01/2005	1:1200000
501	12th Ed.	11/01/2002	1:3500000
530	31st Ed.	06/01/2005	1:4860700
50	6th Ed.	06/01/2003	1:10000000

Features

No.	Feature Type	Survey Depth	Survey Latitude	Survey Longitude	AWOIS Item
1.1	Sounding	56.09 m	048° 20' 36.097" N	122° 45' 31.213" W	---
1.2	Sounding	17.65 m	048° 17' 34.483" N	122° 45' 00.582" W	---
1.3	Sounding	16.58 m	048° 17' 23.065" N	122° 44' 59.733" W	---
1.4	Sounding	41.35 m	048° 20' 35.751" N	122° 45' 10.867" W	---
1.5	Sounding	48.48 m	048° 20' 51.455" N	122° 42' 18.574" W	---
1.6	Sounding	49.01 m	048° 20' 42.228" N	122° 42' 25.599" W	---

1.7	Sounding	14.68 m	048° 17' 18.893" N	122° 44' 52.040" W	---
1.8	Sounding	13.18 m	048° 17' 42.510" N	122° 44' 35.030" W	---
1.9	Sounding	11.65 m	048° 17' 11.391" N	122° 44' 45.437" W	---
1.10	Sounding	13.41 m	048° 17' 22.820" N	122° 44' 45.895" W	---
1.11	Sounding	12.93 m	048° 17' 53.307" N	122° 44' 20.139" W	---
2.1	Sounding	56.03 m	048° 20' 29.821" N	122° 44' 35.130" W	52374

1 - New Features

1.1) Profile/Beam - 609/74 from h11375 / 1006_reson8101_hvf / 2005-094 / 191_0048

Survey Summary

Survey Position: 048° 20' 36.097" N, 122° 45' 31.213" W
Least Depth: 56.09 m
Timestamp: 2005-095.00:51:52.277 (04/05/2005)
Survey Line: h11375 / 1006_reson8101_hvf / 2005-094 / 191_0048
Profile/Beam: 609/74
Charts Affected: 18429_1, 18421_1, 18423_1, 18465_1, 18400_1, 18003_1, 18007_1, 501_1, 530_1, 50_1

Remarks:

SHOAL SOUNDING

SUBMERGED RK FOUND IN BATHY. LEAST DEPTH NOT PERSERVED IN BASE SURFACE.

Feature Correlation

Address	Feature	Range	Azimuth	Status
h11375/1006_reson8101_hvf/2005-094/191_0048	609/74	0.00	000.0	Primary

Hydrographer Recommendations

Cartographically-Rounded Depth (Affected Charts):

30fm (18421_1, 18465_1, 18400_1, 18003_1, 18007_1, 530_1)

30fm (18429_1, 18423_1)

56m (501_1, 50_1)

S-57 Data

Geo object 1: Sounding (SOUNDG)

Attributes: INFORM - SHOAL SOUNDING 56.09 M (30.67 FTM) SUBMERGED RK FOUND IN BATHY. LEAST DEPTH NOT PERSERVED IN BASE SURFACE.

QUASOU - 1:depth known

TECSOU - 3:found by multi-beam

Geo object 2: Underwater rock / awash rock (UWTROC)

Attributes: INFORM - SHOAL SOUNDING 56.09 M (30.67 FTM) SUBMERGED RK FOUND IN BATHY. LEAST DEPTH NOT PERSERVED IN BASE SURFACE.

QUASOU - 1:depth known

TECSOU - 3:found by multi-beam

VALSOU - 56.094 m

WATLEV - 3:always under water/submerged

Office Notes

Chart sounding and rocky seabed area.

1.2) Profile/Beam - 2531/12 from h11375 / 1006_reson8101_hvf / 2005-193 / 190_1750

Survey Summary

Survey Position: 048° 17' 34.483" N, 122° 45' 00.582" W
Least Depth: 17.65 m
Timestamp: 2005-193.17:56:02.704 (07/12/2005)
Survey Line: h11375 / 1006_reson8101_hvf / 2005-193 / 190_1750
Profile/Beam: 2531/12
Charts Affected: 18423_1, 18441_1, 18440_1, 18400_1, 18003_1, 18007_1, 501_1, 530_1, 50_1

Remarks:

SHOAL SOUNDING

SUBMERGED RK FOUND IN BATHY. LEAST DEPTH NOT PERSERVED IN BASE SURFACE.

Feature Correlation

Address	Feature	Range	Azimuth	Status
h11375/1006_reson8101_hvf/2005-193/190_1750	2531/12	0.00	000.0	Primary

Hydrographer Recommendations

RECOMMEND ROCKY NOTATION ON CHART INSTEAD OF INDIVIDUAL ROCK SYMBOLS.

Cartographically-Rounded Depth (Affected Charts):

9 ½fm (18441_1, 18440_1, 18400_1, 18003_1, 18007_1, 530_1)

9fm 4ft (18423_1)

17.6m (501_1, 50_1)

S-57 Data

Geo object 1: Sounding (SOUNDG)
Attributes: INFORM - SHOAL SOUNDING 17.65 M (9.65 FTM) SUBMERGED RK FOUND IN BATHY. LEAST DEPTH NOT PERSERVED IN BASE SURFACE.
 QUASOU - 1:depth known
 TECSOU - 3:found by multi-beam
Geo object 2: Underwater rock / awash rock (UWTROC)

Attributes: INFORM - SHOAL SOUNDING 17.65 M (9.65 FTM) SUBMERGED RK FOUND IN BATHY. LEAST DEPTH NOT PERSERVED IN BASE SURFACE.

QUASOU - 1:depth known

TECSOU - 3:found by multi-beam

VALSOU - 17.653 m

WATLEV - 3:always under water/submerged

Office Notes

Chart sounding

1.3) Profile/Beam - 3819/4 from h11375 / 1006_reson8101_hvf / 2005-193 / 193_1804

Survey Summary

Survey Position: 048° 17' 23.065" N, 122° 44' 59.733" W
Least Depth: 16.58 m
Timestamp: 2005-193.18:12:36.601 (07/12/2005)
Survey Line: h11375 / 1006_reson8101_hvf / 2005-193 / 193_1804
Profile/Beam: 3819/4
Charts Affected: 18423_1, 18441_1, 18440_1, 18400_1, 18003_1, 18007_1, 501_1, 530_1, 50_1

Remarks:

SHOAL SOUNDING

SUBMERGED RK FOUND IN BATHY. LEAST DEPTH NOT PRESERVED IN BASE SURFACE.

Feature Correlation

Address	Feature	Range	Azimuth	Status
h11375/1006_reson8101_hvf/2005-193/193_1804	3819/4	0.00	000.0	Primary

Hydrographer Recommendations

RECOMMEND ROCKY NOTATION ON CHART INSTEAD OF INDIVIDUAL ROCK SYMBOLS.

Cartographically-Rounded Depth (Affected Charts):

9fm (18441_1, 18440_1, 18400_1, 18003_1, 18007_1, 530_1)

9fm 0ft (18423_1)

16.6m (501_1, 50_1)

S-57 Data

Geo object 1: Sounding (SOUNDG)
Attributes: INFORM - SHOAL SOUNDING 16.58 M (9.07 FTM) SUBMERGED RK FOUND IN BATHY. LEAST DEPTH NOT PRESERVED IN BASE SURFACE.
 QUASOU - 1:depth known
 TECSOU - 3:found by multi-beam
Geo object 2: Underwater rock / awash rock (UWTROC)

Attributes: INFORM - SHOAL SOUNDING 16.58 M (9.07 FTM) SUBMERGED RK FOUND IN BATHY. LEAST DEPTH NOT PERSERVED IN BASE SURFACE.

QUASOU - 1:depth known

TECSOU - 3:found by multi-beam

VALSOU - 16.581 m

WATLEV - 3:always under water/submerged

Office Notes

Chart as sounding

1.4) Profile/Beam - 276/46 from h11375 / 1015_elac1180_hvf / 2005-087 / 20050328224402_017

Survey Summary

Survey Position: 048° 20' 35.751" N, 122° 45' 10.867" W
Least Depth: 41.35 m
Timestamp: 2005-087.22:49:06.270 (03/28/2005)
Survey Line: h11375 / 1015_elac1180_hvf / 2005-087 / 20050328224402_017
Profile/Beam: 276/46
Charts Affected: 18429_1, 18421_1, 18423_1, 18465_1, 18400_1, 18003_1, 18007_1, 501_1, 530_1, 50_1

Remarks:

SHOAL SOUNDING

SUBMERGED RK FOUND IN BATHY. LEAST DEPTH NOT PERSERVED IN BASE SURFACE.

Feature Correlation

Address	Feature	Range	Azimuth	Status
h11375/1015_elac1180_hvf/2005-087/20050328224402_017	276/46	0.00	000.0	Primary

Hydrographer Recommendations

[None]

Cartographically-Rounded Depth (Affected Charts):

22fm (18421_1, 18465_1, 18400_1, 18003_1, 18007_1, 530_1)

22fm (18429_1, 18423_1)

41m (501_1, 50_1)

S-57 Data

Geo object 1: Sounding (SOUNDG)
Attributes: INFORM - SHOAL SOUNDING 41.35 M (22.61 FTM) SUBMERGED RK FOUND IN BATHY. LEAST DEPTH NOT PERSERVED IN BASE SURFACE.
 QUASOU - 1:depth known
 TECSOU - 3:found by multi-beam
Geo object 2: Underwater rock / awash rock (UWTROC)

Attributes: INFORM - SHOAL SOUNDING 41.35 M (22.61 FTM) SUBMERGED RK FOUND IN BATHY. LEAST DEPTH NOT PERSERVED IN BASE SURFACE.

QUASOU - 1:depth known

VALSOU - 41.354 m

WATLEV - 3:always under water/submerged

Office Notes

Chart as sounding and rocky seabed area

1.5) Profile/Beam - 426/32 from h11375 / 1016_reson8125_hvf / 2005-193 / 122_1616

Survey Summary

Survey Position: 048° 20' 51.455" N, 122° 42' 18.574" W
Least Depth: 48.48 m
Timestamp: 2005-193.16:18:40.260 (07/12/2005)
Survey Line: h11375 / 1016_reson8125_hvf / 2005-193 / 122_1616
Profile/Beam: 426/32
Charts Affected: 18427_1, 18429_1, 18421_1, 18423_1, 18400_1, 18003_1, 18007_1, 501_1, 530_1, 50_1

Remarks:

SHOAL SOUNDING

SUBMERGED RK FOUND IN BATHY. LEAST DEPTH NOT PERSERVED IN BASE SURFACE.

Feature Correlation

Address	Feature	Range	Azimuth	Status
h11375/1016_reson8125_hvf/2005-193/122_1616	426/32	0.00	000.0	Primary

Hydrographer Recommendations

RECOMMEND ROCKY NOTATION ON CHART INSTEAD OF INDIVIDUAL ROCK SYMBOLS.

Cartographically-Rounded Depth (Affected Charts):

26fm (18427_1, 18421_1, 18400_1, 18003_1, 18007_1, 530_1)

26fm (18429_1, 18423_1)

48m (501_1, 50_1)

S-57 Data

Geo object 1: Sounding (SOUNDG)
Attributes: INFORM - SHOAL SOUNDING 48.48 M (26.51 FTM) SUBMERGED RK FOUND IN BATHY. LEAST DEPTH NOT PERSERVED IN BASE SURFACE.
 QUASOU - 1:depth known
 TECSOU - 3:found by multi-beam
Geo object 2: Underwater rock / awash rock (UWTROC)

Attributes: INFORM - SHOAL SOUNDING 48.48 M (26.51 FTM) SUBMERGED RK FOUND IN BATHY. LEAST DEPTH NOT PERSERVED IN BASE SURFACE.

QUASOU - 1:depth known

TECSOU - 3:found by multi-beam

VALSOU - 48.483 m

WATLEV - 3:always under water/submerged

Office Notes

Chart aas sounding

1.6) Profile/Beam - 644/10 from h11375 / 1016_reson8125_hvf / 2005-193 / 122_1616

Survey Summary

Survey Position: 048° 20' 42.228" N, 122° 42' 25.599" W
Least Depth: 49.01 m
Timestamp: 2005-193.16:19:53.010 (07/12/2005)
Survey Line: h11375 / 1016_reson8125_hvf / 2005-193 / 122_1616
Profile/Beam: 644/10
Charts Affected: 18427_1, 18429_1, 18421_1, 18423_1, 18400_1, 18003_1, 18007_1, 501_1, 530_1, 50_1

Remarks:

SHOAL SOUNDING

SUBMERGED RK FOUND IN BATHY. LEAST DEPTH NOT PERSERVED IN BASE SURFACE.

Feature Correlation

Address	Feature	Range	Azimuth	Status
h11375/1016_reson8125_hvf/2005-193/122_1616	644/10	0.00	000.0	Primary

Hydrographer Recommendations

RECOMMEND ROCKY NOTATION ON CHART INSTEAD OF INDIVIDUAL ROCK SYMBOLS.

Cartographically-Rounded Depth (Affected Charts):

27fm (18427_1, 18421_1, 18400_1, 18003_1, 18007_1, 530_1)

27fm (18429_1, 18423_1)

49m (501_1, 50_1)

S-57 Data

Geo object 1: Sounding (SOUNDG)
Attributes: INFORM - SHOAL SOUNDING 49.01 M (26.80 FTM) SUBMERGED RK FOUND IN BATHY. LEAST DEPTH NOT PERSERVED IN BASE SURFACE.
 QUASOU - 1:depth known
 TECSOU - 3:found by multi-beam
Geo object 2: Underwater rock / awash rock (UWTROC)

Attributes: INFORM - SHOAL SOUNDING 49.01 M (26.80 FTM) SUBMERGED RK FOUND IN BATHY. LEAST DEPTH NOT PERSERVED IN BASE SURFACE.

QUASOU - 1:depth known

TECSOU - 3:found by multi-beam

VALSOU - 49.007 m

WATLEV - 3:always under water/submerged

Office Notes

Chart as sounding

1.7) Profile/Beam - 1797/12 from h11375 / 1016_reson8125_hvf / 2005-193 / 187_2054

Survey Summary

Survey Position: 048° 17' 18.893" N, 122° 44' 52.040" W
Least Depth: 14.68 m
Timestamp: 2005-193.20:57:57.794 (07/12/2005)
Survey Line: h11375 / 1016_reson8125_hvf / 2005-193 / 187_2054
Profile/Beam: 1797/12
Charts Affected: 18423_1, 18441_1, 18440_1, 18400_1, 18003_1, 18007_1, 501_1, 530_1, 50_1

Remarks:

SHOAL SOUNDING

SUBMERGED RK FOUND IN BATHY. LEAST DEPTH NOT PERSERVED IN BASE SURFACE.

Feature Correlation

Address	Feature	Range	Azimuth	Status
h11375/1016_reson8125_hvf/2005-193/187_2054	1797/12	0.00	000.0	Primary

Hydrographer Recommendations

RECOMMEND ROCKY NOTATION ON CHART INSTEAD OF INDIVIDUAL ROCK SYMBOLS.

Cartographically-Rounded Depth (Affected Charts):

8fm (18441_1, 18440_1, 18400_1, 18003_1, 18007_1, 530_1)

8fm 0ft (18423_1)

14.7m (501_1, 50_1)

S-57 Data

Geo object 1: Sounding (SOUNDG)
Attributes: INFORM - SHOAL SOUNDING 14.68 M (8.03 FTM) SUBMERGED RK FOUND IN BATHY. LEAST DEPTH NOT PERSERVED IN BASE SURFACE.
 QUASOU - 1:depth known
 TECSOU - 3:found by multi-beam
Geo object 2: Underwater rock / awash rock (UWTROC)

Attributes: INFORM - SHOAL SOUNDING 14.68 M (8.03 FTM) SUBMERGED RK FOUND IN BATHY. LEAST DEPTH NOT PERSERVED IN BASE SURFACE.

QUASOU - 1:depth known

TECSOU - 3:found by multi-beam

VALSOU - 14.68 m

WATLEV - 3:always under water/submerged

Office Notes

Chart as sounding

1.8) Profile/Beam - 2605/122 from h11375 / 1016_reson8125_hvf / 2005-193 / 196_2017

Survey Summary

Survey Position: 048° 17' 42.510" N, 122° 44' 35.030" W
Least Depth: 13.18 m
Timestamp: 2005-193.20:22:33.193 (07/12/2005)
Survey Line: h11375 / 1016_reson8125_hvf / 2005-193 / 196_2017
Profile/Beam: 2605/122
Charts Affected: 18423_1, 18441_1, 18440_1, 18400_1, 18003_1, 18007_1, 501_1, 530_1, 50_1

Remarks:

SHOAL SOUNDING

SUBMERGED RK FOUND IN BATHY. LEAST DEPTH NOT PERSERVED IN BASE SURFACE.

Feature Correlation

Address	Feature	Range	Azimuth	Status
h11375/1016_reson8125_hvf/2005-193/196_2017	2605/122	0.00	000.0	Primary

Hydrographer Recommendations

RECOMMEND ROCKY NOTATION ON CHART INSTEAD OF INDIVIDUAL ROCK SYMBOLS.

Cartographically-Rounded Depth (Affected Charts):

7 ¼fm (18441_1, 18440_1, 18400_1, 18003_1, 18007_1, 530_1)

7fm 1ft (18423_1)

13.2m (501_1, 50_1)

S-57 Data

Geo object 1: Sounding (SOUNDG)
Attributes: INFORM - SHOAL SOUNDING 13.18 M (7.20 FTM) SUBMERGED RK FOUND IN BATHY. LEAST DEPTH NOT PERSERVED IN BASE SURFACE.
 QUASOU - 1:depth known
 TECSOU - 3:found by multi-beam

Office Notes

Chart as sounding

1.9) Profile/Beam - 5254/141 from h11375 / 1016_reson8125_hvf / 2005-193 / 199_1847

Survey Summary

Survey Position: 048° 17' 11.391" N, 122° 44' 45.437" W
Least Depth: 11.65 m
Timestamp: 2005-193.18:56:08.108 (07/12/2005)
Survey Line: h11375 / 1016_reson8125_hvf / 2005-193 / 199_1847
Profile/Beam: 5254/141
Charts Affected: 18423_1, 18441_1, 18440_1, 18400_1, 18003_1, 18007_1, 501_1, 530_1, 50_1

Remarks:

SHOAL SOUNDING

SUBMERGED RK FOUND IN BATHY. LEAST DEPTH NOT PERSERVED IN BASE SURFACE.

Feature Correlation

Address	Feature	Range	Azimuth	Status
h11375/1016_reson8125_hvf/2005-193/199_1847	5254/141	0.00	000.0	Primary

Hydrographer Recommendations

RECOMMEND ROCKY NOTATION ON CHART INSTEAD OF INDIVIDUAL ROCK SYMBOLS.

Cartographically-Rounded Depth (Affected Charts):

6 ¼fm (18441_1, 18440_1, 18400_1, 18003_1, 18007_1, 530_1)

6fm 2ft (18423_1)

11.6m (501_1, 50_1)

S-57 Data

Geo object 1: Sounding (SOUNDG)
Attributes: INFORM - SHOAL SOUNDING 11.65 M (6.37 FTM) SUBMERGED RK FOUND IN BATHY. LEAST DEPTH NOT PERSERVED IN BASE SURFACE.
 QUASOU - 1:depth known
 TECSOU - 3:found by multi-beam

Office Notes

Chart as a sounding

1.10) Profile/Beam - 2603/236 from h11375 / 1016_reson8125_hvf / 2005-193 / 220_2031

Survey Summary

Survey Position: 048° 17' 22.820" N, 122° 44' 45.895" W
Least Depth: 13.41 m
Timestamp: 2005-193.20:35:13.158 (07/12/2005)
Survey Line: h11375 / 1016_reson8125_hvf / 2005-193 / 220_2031
Profile/Beam: 2603/236
Charts Affected: 18423_1, 18441_1, 18440_1, 18400_1, 18003_1, 18007_1, 501_1, 530_1, 50_1

Remarks:

SHOAL SOUNDING

SUBMERGED RK FOUND IN BATHY. LEAST DEPTH NOT PERSERVED IN BASE SURFACE.

Feature Correlation

Address	Feature	Range	Azimuth	Status
h11375/1016_reson8125_hvf/2005-193/220_2031	2603/236	0.00	000.0	Primary

Hydrographer Recommendations

RECOMMEND ROCKY NOTATION ON CHART INSTEAD OF INDIVIDUAL ROCK SYMBOLS.

Cartographically-Rounded Depth (Affected Charts):

7 ¼fm (18441_1, 18440_1, 18400_1, 18003_1, 18007_1, 530_1)

7fm 2ft (18423_1)

13.4m (501_1, 50_1)

S-57 Data

Geo object 1: Sounding (SOUNDG)
Attributes: INFORM - SHOAL SOUNDING 13.41 M (7.33 FTM) SUBMERGED RK FOUND IN BATHY. LEAST DEPTH NOT PERSERVED IN BASE SURFACE.
 QUASOU - 1:depth known
 TECSOU - 3:found by multi-beam

Office Notes

Chart as a sounding

1.11) Profile/Beam - 2247/49 from h11375 / 1016_reson8125_hvf / 2005-193 / 224_2139

Survey Summary

Survey Position: 048° 17' 53.307" N, 122° 44' 20.139" W
Least Depth: 12.93 m
Timestamp: 2005-193.21:41:49.576 (07/12/2005)
Survey Line: h11375 / 1016_reson8125_hvf / 2005-193 / 224_2139
Profile/Beam: 2247/49
Charts Affected: 18421_1, 18423_1, 18441_1, 18440_1, 18400_1, 18003_1, 18007_1, 501_1, 530_1, 50_1

Remarks:

SHOAL SOUNDING

SUBMERGED RK FOUND IN BATHY. LEAST DEPTH NOT PERSERVED IN BASE SURFACE.

Feature Correlation

Address	Feature	Range	Azimuth	Status
h11375/1016_reson8125_hvf/2005-193/224_2139	2247/49	0.00	000.0	Primary

Hydrographer Recommendations

RECOMMEND ROCKY NOTATION ON CHART INSTEAD OF INDIVIDUAL ROCK SYMBOLS.

Cartographically-Rounded Depth (Affected Charts):

7fm (18421_1, 18441_1, 18440_1, 18400_1, 18003_1, 18007_1, 530_1)

7fm 0ft (18423_1)

12.9m (501_1, 50_1)

S-57 Data

Geo object 1: Sounding (SOUNDG)

Attributes: INFORM - SHOAL SOUNDING 12.93 M (7.07 FTM) SUBMERGED RK FOUND IN BATHY. LEAST DEPTH NOT PERSERVED IN BASE SURFACE.

QUASOU - 1:depth known

TECSOU - 3:found by multi-beam

Office Notes

Chart as a sounding

2 - AWOIS Features

2.1) Profile/Beam - 3763/76 from h11375 / 1006_reson8101_projfwd_hvf / 2005-193 / 129_2155

Primary Feature for AWOIS Item #52374

Search Position: 048° 20' 30.000" N, 122° 44' 35.000" W
Historical Depth: [None]
Search Radius: 0
Search Technique: S2
Technique Notes: CONDUCT SEARCH ONLY AS TIME PERMITS.

History Notes:

NOAA SHIP RAINIER CONDUCTED 100% SWMB OVER THE AREA. BOMBS WERE NOT IDENTIFIED IN THE BATHYMETRY. (ENTERED 11/05 BY BJW) NM 23/63, JUNE 1963; THREE 750 LBS. BOMBS HAVE BEEN DROPPED, UNEXPLODED, IN THE FOLLOWING INDICATED POSITIONS; DISTANCES AND BEARINGS FROM SMITH ISLAND LIGHT (48/19.1 N., 122/50.6 W APPROX.), A) TWO BOMBS ABOUT 8,600 YARDS 71 DEGREES. B) ONE BOMB ABOUT 10,300 YARDS 286 DEGREES. (ENTERED 02/04 BY KRW) LNM29/63--13th CGD; NOTED AS SOURCE FOR THESE UNEXPLODED BOMBS (REP MAY 1963). DOCUMENT NOT AVAILABLE. (ENTERED 4/97 BY MBH)

Survey Summary

Survey Position: 048° 20' 29.821" N, 122° 44' 35.130" W
Least Depth: 56.03 m
Timestamp: 2005-193.22:12:34.594 (07/12/2005)
Survey Line: h11375 / 1006_reson8101_projfwd_hvf / 2005-193 / 129_2155
Profile/Beam: 3763/76
Charts Affected: 18429_1, 18421_1, 18423_1, 18400_1, 18003_1, 18007_1, 501_1, 530_1, 50_1

Remarks:

100% SWMB AWOIS INVESTIGATION- NO BOMBS IDENTIFIED.
 An usual feature was identified, but is thought to be too large to be bombs.

Feature Correlation

Address	Feature	Range	Azimuth	Status
h11375/1006_reson8101_projfwd_hvf/2005-193/129_2155	3763/76	0.00	000.0	Primary
H11375_AWOIS	AWOIS # 52374	6.16	205.9	Secondary

Hydrographer Recommendations

[None]

S-57 Data

Geo object 1: Sounding (SOUNDG)

Attributes: INFORM - 100% SWMB AWOIS INVESTIGATION- NO BOMBS IDENTIFIED.

QUASOU - 1:depth known

TECSOU - 3:found by multi-beam

Office Notes

Retain as charted



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

TIDE NOTE FOR HYDROGRAPHIC SURVEY

DATE : August 3, 2005

HYDROGRAPHIC BRANCH: Pacific
HYDROGRAPHIC PROJECT: OPR-N372-RA-2005
HYDROGRAPHIC SHEET: H11375

LOCALITY: Puget Sound, Northwest Coast of Whidbey Island, WA
TIME PERIOD: March 28 - July 13, 2005

TIDE STATION USED: 944-9880 Friday Harbor
Lat. 48 32.8' N Long. 123 00.6' W
PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters
HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 2.167 meters

TIDE STATION USED: 944-4900 Port Townsend
Lat. 48 06.7' N Long. 122 45.5' W
PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters
HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 2.389 meters

REMARKS: RECOMMENDED ZONING

Preliminary zoning is accepted as the final zoning for project OPR-N372-RA-2005, H11375.

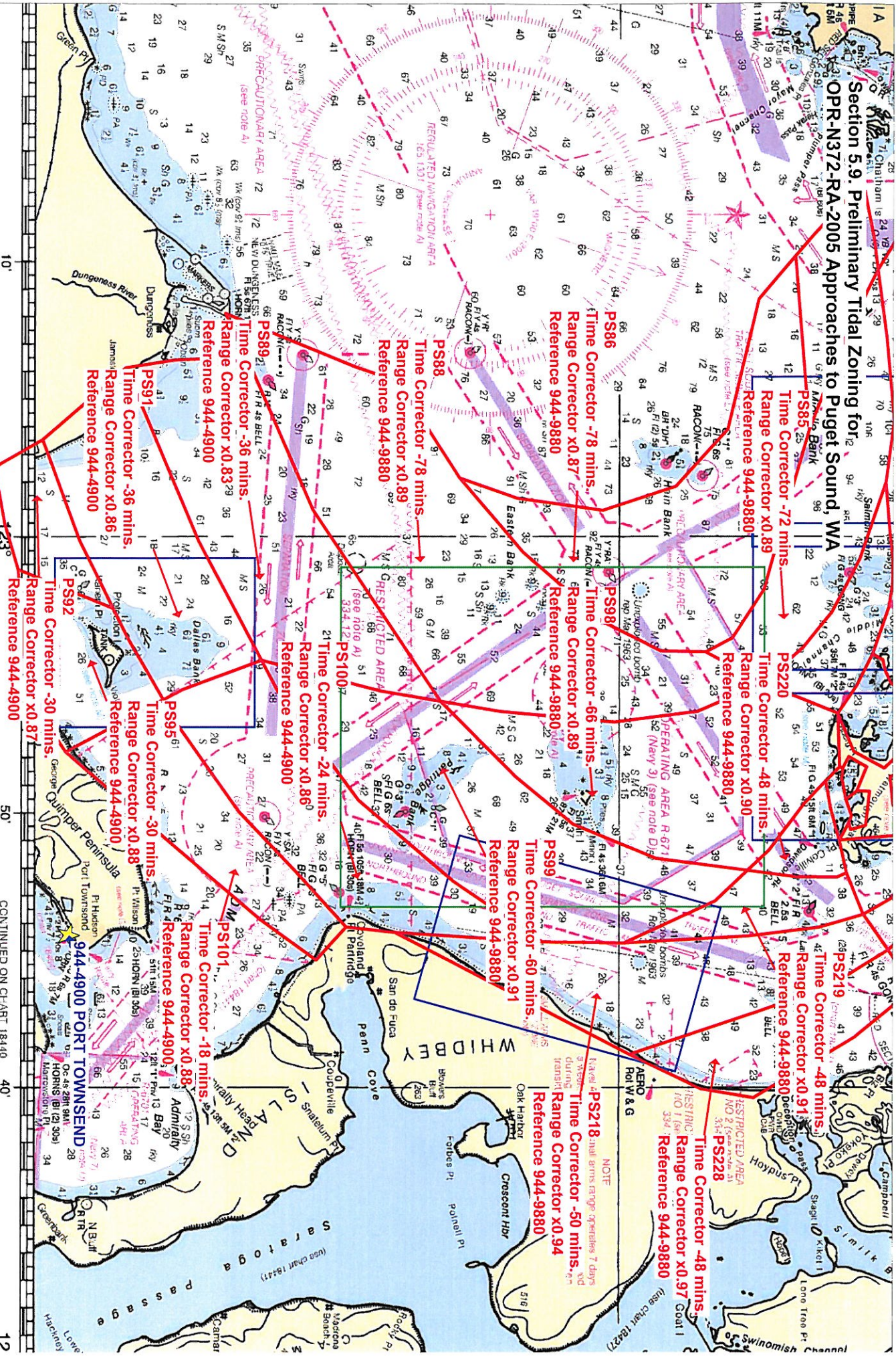
Zones PS99, PS100, PS218, PS219 & PS228 included in the preliminary zoning file "N372RA2005CORP" are the applicable zones for sheet H11375.

Note 1: Provided time series data are tabulated in metric units (meters), relative to MLLW and on Greenwich Mean Time on the 1983-2001 National Tidal Datum Epoch (NTDE).

Thomas V. Mero 12/6/05
CHIEF, REQUIREMENTS AND DEVELOPMENT DIVISION



Section 5.9. Preliminary Tidal Zoning for OPR-N372-RA-2005 Approaches to Puget Sound, WA



10' 123° 50' 40' 12

CONTINUED ON CHART 18440

NOTE
 Small arms targets operate 7 days a week during transit.

RESTRICTED AREA NO. 2 (see note A)
 PS228
 Time Corrector -48 mins.
 Reference 944-9880

RESTRICTED AREA NO. 2 (see note A)
 PS219
 Time Corrector -48 mins.
 Reference 944-9880

RESTRICTED AREA NO. 2 (see note A)
 PS220
 Time Corrector -48 mins.
 Reference 944-9880

RESTRICTED AREA NO. 2 (see note A)
 PS218
 Time Corrector -50 mins.
 Reference 944-9880

RESTRICTED AREA NO. 2 (see note A)
 PS228
 Time Corrector -48 mins.
 Reference 944-9880

RESTRICTED AREA NO. 2 (see note A)
 PS219
 Time Corrector -48 mins.
 Reference 944-9880

RESTRICTED AREA NO. 2 (see note A)
 PS220
 Time Corrector -48 mins.
 Reference 944-9880

RESTRICTED AREA NO. 2 (see note A)
 PS218
 Time Corrector -50 mins.
 Reference 944-9880

RESTRICTED AREA NO. 2 (see note A)
 PS228
 Time Corrector -48 mins.
 Reference 944-9880

RESTRICTED AREA NO. 2 (see note A)
 PS219
 Time Corrector -48 mins.
 Reference 944-9880

RESTRICTED AREA NO. 2 (see note A)
 PS220
 Time Corrector -48 mins.
 Reference 944-9880

RESTRICTED AREA NO. 2 (see note A)
 PS218
 Time Corrector -50 mins.
 Reference 944-9880

RESTRICTED AREA NO. 2 (see note A)
 PS228
 Time Corrector -48 mins.
 Reference 944-9880

RESTRICTED AREA NO. 2 (see note A)
 PS219
 Time Corrector -48 mins.
 Reference 944-9880

RESTRICTED AREA NO. 2 (see note A)
 PS220
 Time Corrector -48 mins.
 Reference 944-9880

RESTRICTED AREA NO. 2 (see note A)
 PS218
 Time Corrector -50 mins.
 Reference 944-9880

RESTRICTED AREA NO. 2 (see note A)
 PS228
 Time Corrector -48 mins.
 Reference 944-9880

RESTRICTED AREA NO. 2 (see note A)
 PS219
 Time Corrector -48 mins.
 Reference 944-9880

RESTRICTED AREA NO. 2 (see note A)
 PS220
 Time Corrector -48 mins.
 Reference 944-9880

RESTRICTED AREA NO. 2 (see note A)
 PS228
 Time Corrector -48 mins.
 Reference 944-9880

RESTRICTED AREA NO. 2 (see note A)
 PS219
 Time Corrector -48 mins.
 Reference 944-9880

RESTRICTED AREA NO. 2 (see note A)
 PS220
 Time Corrector -48 mins.
 Reference 944-9880

RESTRICTED AREA NO. 2 (see note A)
 PS228
 Time Corrector -48 mins.
 Reference 944-9880

RESTRICTED AREA NO. 2 (see note A)
 PS219
 Time Corrector -48 mins.
 Reference 944-9880

RESTRICTED AREA NO. 2 (see note A)
 PS220
 Time Corrector -48 mins.
 Reference 944-9880

RESTRICTED AREA NO. 2 (see note A)
 PS228
 Time Corrector -48 mins.
 Reference 944-9880

RESTRICTED AREA NO. 2 (see note A)
 PS219
 Time Corrector -48 mins.
 Reference 944-9880

RESTRICTED AREA NO. 2 (see note A)
 PS220
 Time Corrector -48 mins.
 Reference 944-9880

APPROVAL SHEET
H-11375

Initial Approvals:

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

The survey and associated records have been inspected with regard to survey coverage, development of critical depths, S-57 classification and attribution of soundings and features, cartographic characterization, and verification or disproof of charted data within the survey limits. The survey records and digital data comply with OCS requirements except where noted in the Descriptive Report and are adequate to supersede prior surveys and nautical charts in the common area.

I have reviewed the H-Cell, accompanying data, and reports. This survey and accompanying digital data meet or exceed OCS requirements and standards for products in support of nautical charting except where noted in the Descriptive Report.