H12078

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-40-06-09

Registry No. H12078

LOCALITY

State Alaska

General Locality Pavlof Islands

Sublocality North of Wosnesenski Island

2009

CHIEF OF PARTY
Captain Donald W. Haines, NOAA

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DATE

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

HYDROGRAPHIC TITLE SHEET

REGISTRY No

H12078

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-40-06-09

State: Alaska

General Locality: Pavlof Islands

Sub-Locality: North of Wosnesenski Island

Scale: 1:40,000 Date of Survey: June 19, 2009 - August 5, 2009

Instructions dated: 5/4/2009 Project No.: OPR-P184-RA-09

Vessel(s): RA1 (1101), RA2 (1103), RA4 (2801), RA5 (2802), RA3 (2803) RA6 (2804)

Chief of party: Captain Donald W. Haines, NOAA

Surveyed by: RAINIER Personnel

Soundings by: Reson SeaBat 7125, Tilted Reson SeaBat 8125, Knudsen 320M

SAR by: Anthony Lukach Compilation by: Katie Reser

Soundings compiled in: Fathoms

REMARKS: All times are UTC. UTM Zone 4N.

The purpose of this survey is to provide contemporary surveys to update National Ocean Service (NOS) nautical charts.

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/.

Descriptive Report to Accompany Hydrographic Survey H12078

Project OPR-P184-RA-09
Pavlof Islands, Alaska
North of Wosnesenski Island
Scale 1:40,000
June – August 2009
NOAA Ship *Rainier* (s221)
Chief of Party: Captain Donald W. Haines, NOAA

A. AREA SURVEYED

This hydrographic survey was completed as specified by Hydrographic Survey Project Instructions OPR-P184-RA-09 dated May 4, 2009 and all other applicable direction[1], with the exception of deviations noted in this report. The survey area is the area North of Wosnesenski Island in the Pavlof Islands, Alaska and corresponds to sheet "C" in the sheet layout provided with the Project Instructions. The purpose of this project is to provide contemporary surveys to update National Ocean Service (NOS) nautical charts.

Complete multibeam echosounder (MBES) coverage was not achieved in the survey area in waters 8 meters and deeper. In depths less than 8 meters additional MBES coverage was acquired to identify least depths over significant features or shoals, as appropriate for this survey. Additional multibeam coverage was achieved in water depths between 8 and 4 meters that meet or exceed the project instruction requirements. Two large areas on the east and west side of the survey comprising approximately 16% of the survey area (Figure 1) were left unsurveyed due to time limitations and adverse weather conditions. In the areas of survey coverage the data contains numerous holidays that were unable to be filled as a result of time constraints and weather conditions. The issues have been discussed with HSD and PHB with an agreement to submit the survey in its current state with polygons indicating areas of sparse or no coverage that need to be addressed.[1] Total mileage acquired by each vessel and system is reference in Table 1.

Data Acquisition Type	Hull Number with Mileage (nm)							Total
	1101	1103	2801	2802	2803	2804	S-221	
VBES (main scheme)	-	12.6	-	-	-	-	-	12.6
MBES (main scheme)	138.5	-	105.7	187.5	213.9	121.7	-	749.7
SSS (main scheme)	-	-	-	-	-	-	-	-
Crosslines	-	-	-	0.46	-	-	-	0.46
Developments	-	0.43	-	-	-	-	-	0.43
Shoreline	-	-	-	-	-	-	-	-
Bottom Samples	-	-	-	-	-	-	18	18
Total Number of Items Investigated	-	11	-	-	-	-	-	11
Total Area Surveyed (sq. nm)	-	-	-	-	-	-	-	46.89

Table 1: Statistics for survey H12078

[1] NOS Hydrographic Surveys Specifications and Deliverables (April 2009), OCS Field Procedures Manual for Hydrographic Surveying (April 2009), and all Hydrographic Surveys Technical Directives issued through the dates of data acquisition.

Limited Shoreline Verification was performed for the survey area seaward of the Navigable Area Limit Line (NALL) for H12078, as per section 3.5.5 of the Field Procedures Manual April 2009 (FPM). Shoreline features were given S-57 attribution and included for submission in Notebook HOB files.

Data acquisition was conducted from June 19 to August 5, 2009 (DN 170 to 217).

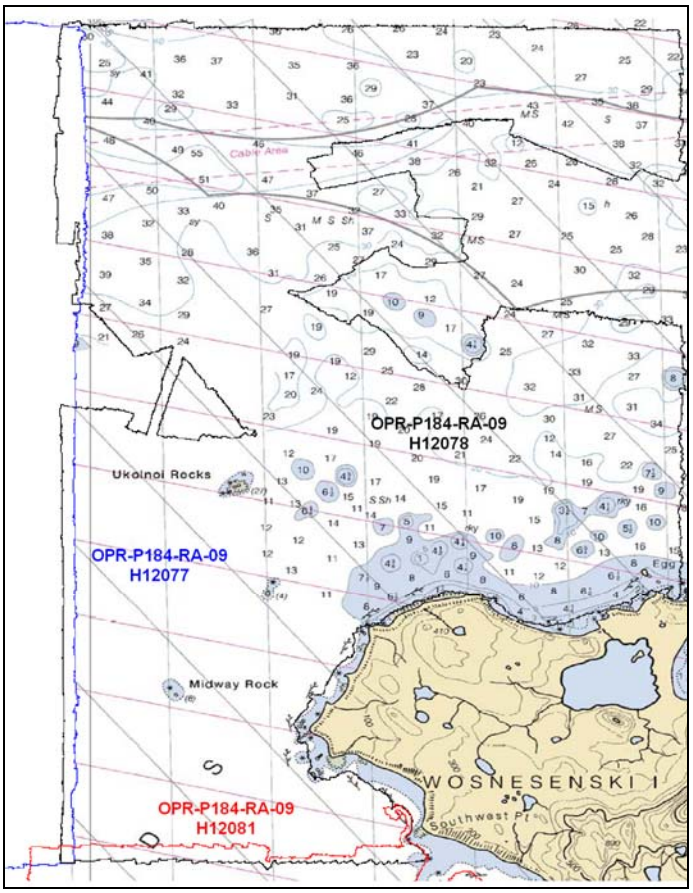


Figure 1: H12078 Survey Outline and Junctions overlaid on Chart 16551

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-P184-RA-09 Data Acquisition and Processing Report* (DAPR), submitted under separate cover. Items specific to this survey, and any deviations from the DAPR are discussed in the following sections.

Final Approved Water Levels have been applied to this survey. See Section C. for additional information.

B.1. Equipment and Vessels

Data for this survey were acquired by the following vessels:

Hull Number	Name	Length (ft)	Draft (ft)	Acquisition Type
S-221	*Rainier*	231	14	Bottom Samples
1101	RA-1	29	2	Reson 8125 Multibeam Echosounder
1103	RA-2	29	2	Knudsen 320M Vertical Beam Echosounder Detached Positions
2803	RA-3	29	3.5	Reson 7125 Multibeam Echosounder
2801	RA-4	29	3.5	Reson 7125 Multibeam Echosounder
2802	RA-5	29	3.5	Reson 7125 Multibeam Echosounder
2804	RA-6	29	3.5	Reson 7125 Multibeam Echosounder

Table 2: Data acquisition vessels and systems for H12078

Sound speed profiles were measured in accordance with the Specifications and Deliverables using SEACAT SBE-19 and 19+ profilers, as well as the Brooke Ocean Technology Moving Vessel Profiler.

Multibeam vessel navigation and attitude data were measured and recorded using Applanix POS/MV 320 systems, versions 4. Vertical Beam echosounder navigation and attitude data were measured using a Trimble DSM212L GPS receiver and a TSS MAHRS system.

A complete description of survey vessels, hardware, and software systems is included in the *OPR-P184-RA-09 DAPR.*

No unusual vessel configurations were used for data acquisition.

B.2. Quality Control

B.2.a. Crosslines

Due to time constraints only one crossline was performed for H12078, totaling 0.46 nautical miles and comprising 0.0006% of mainscheme MBES hydrography. The main scheme bathymetry was manually compared to the crossline nadir beams in CARIS subset mode and generally agreed within 0.15 meters.[2]

Due to the relatively low percentage of crosslines performed, lines that overlapped in their outer beams were compared to evaluate quality between different launches on different days. In general overlapping outer beams between lines agreed within 0 - 0.15 meters, exceeding this only in cases of sound speed errors or vertical offsets of the entire line.[3]

A statistical Quality Control Report has been conducted on representative data acquired with each system used on this survey. Results of these tests are included in the updated 2009 *Rainier* Hydrographic System Readiness Review package submitted with this survey.

B.2.b. Final Uncertainty

Uncertainty values of submitted, finalized grids are calculated in CARIS using the “Greater of the Two” of total propagated uncertainty and standard deviation (scaled to 95%). An IHO_1

"child" attribute layer was created for the H12078_Final_Combined surface in CARIS HIPS for analysis. The Uncertainty of 95% of finalized grids fall below the IHO levels as described in the NOS Specifications and Deliverables.[4] The exceptions to these results occurred in very sharp rocky areas and along very near-shore areas when using the tilted Reson 8125 sonar configuration, refer to OPR-P184-RA-09 Data Acquisition and Processing Report for specifics. In addition, data acquired by all boats on DN179, DN216, and DN217, and on DN201 by Vessel 2801exceeded IHO specifications in nodes located on outer beams. This deviation is caused due to 25-30 knot winds and 4-6 foot sea waves during acquisition, resulting in data quality issues and causing low data density after cleaning.[5]

B.2.c. Junctions

H12078 junctions with surveys H12077 and H12081, which are sheets B and F of the same project, respectively.[6] Table 3 lists all surveys that junction H12078. The sheet limits and area of overlap are shown in Figure 1.

Junction Survey	Survey Scale	Date of Survey	Survey Location
H12077	1:40,000	August, 2009	West
H12081	1:40,000	August, 2009	South

Table 3: Junction Surveys

Survey H12077 was completed concurrently with H12078 during project OPR-P184-RA-09. The area of overlap between the sheets was reviewed using BASE Surface comparison in CARIS HIPS& SIPS for consistency. Data were found to be in excellent agreement with a maximum discrepancy of 0.3 meter in 80 meters of water and average discrepancies within 0.2 meters.[7]

Survey H12081 was completed concurrently with H12078 during project OPR-P184-RA-09. The area of overlap between the sheets was reviewed using BASE Surface comparison in CARIS HIPS& SIPS for consistency. Data were found to be in excellent agreement with a maximum discrepancy of 0.2 meters in 40 meters of water and average discrepancies within 0.15 meters.[8]

B.2.d. Quality Control Checks

MBES quality control checks were conducted as discussed in the quality control section B of the DAPR.

B.2.e. Data Quality Factors

<u>Sound Speed Artifacts</u>
Despite the best efforts of the Hydrographer to conduct sufficient sound velocity casts distributed both spatially and temporally, sound velocity errors were still noticeable in several regions. Lines run on DN179 and DN190 by vessel 2803 (RA-3), and DN194 by 2802 (RA-5) exhibited the characteristic "smiles" indicative of inaccurate sound velocity corrections (Figure 2). In most cases the errors remained within IHO specifications. In the areas that

exceeded IHO standards, the Hydrographer rejected soundings from the outermost beams that exceeded the IHO specifications.[9]

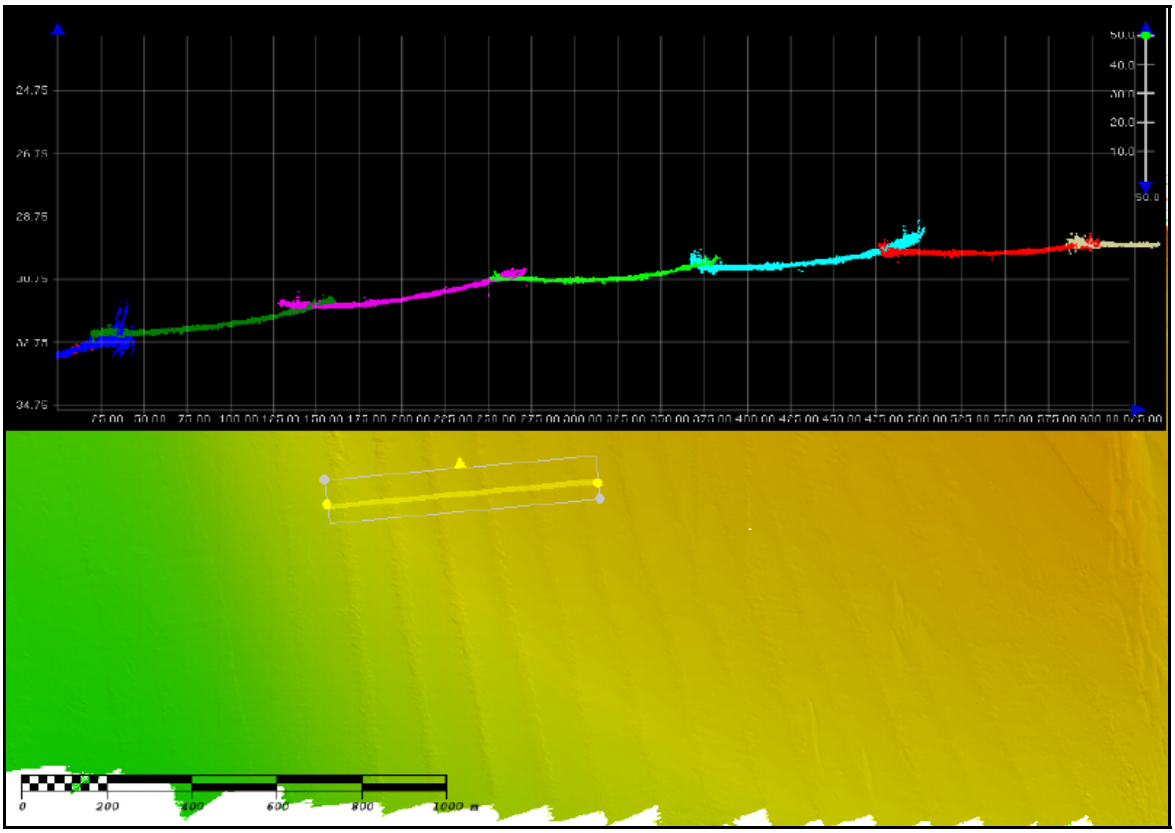


Figure 2: Sound Speed Artifacts From RA-3 on DN190

Sound Speed Blowouts

Data acquired by Launch 1101 (RA-1) on all days of survey exhibited significant sound velocity errors that occurred at random intervals during survey operations (Figure 3). These errors resulted from a failure of the Digibar surface sound velocimeter. Because this sonar uses surface sound speed input for beam forming, it was impossible to correct this data. The recurring failures were discovered during data acquisition of the project; however the intermittent Digibar sound speed error was not corrected until later in the field season through installation of a Reson SVP-71 Sound Velocimeter. In order to compensate, the Hydrographer has rejected soundings obviously in error.[10] Multibeam backscatter data was reviewed where these blowouts occurred and no navigationally significant items were evident; additionally, least depths where represented.[11]

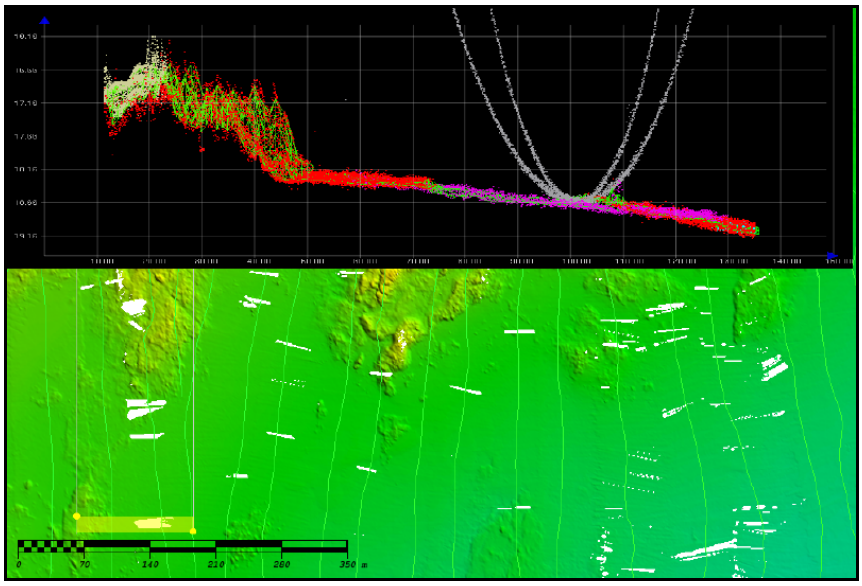


Figure 3: Sound Speed Blowouts

Water Column Noise

Data acquired on DN216 and DN217 by all vessels exhibited extensive noise (Figure 4). Survey operations during these days were severely hampered by inclement weather, mainly high winds and choppy sea state. As a result, numerous small holidays occur in these data, as well as significantly sparser density in soundings which caused CUBE to create "lumpy" surfaces. The Hydrographer manually rejected noisy data affecting the surface, which often resulted in holidays.[12]

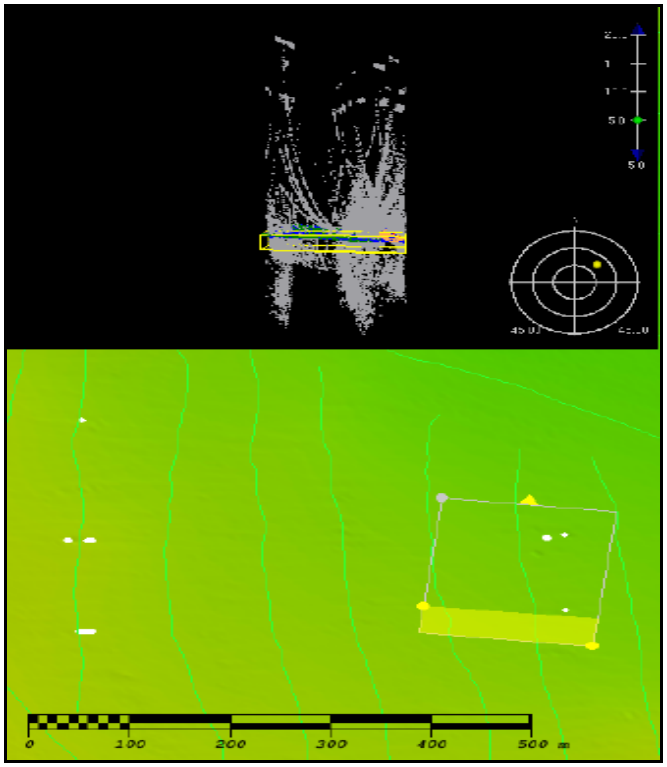


Figure 4: Water column noise from vessel 1101 (RA-1) on DN217

True Heave

Ten (10) lines logged after UTC midnight on vessel 2803 (RA-3) for DN192 and DN199 failed to load True Heave. Patching this data using FixTrueHeave utility did not resolve this error and therefore the lines have only real-time heave correctors applied. All lines were examined and no significant heave artifacts were present in the data.[13]

Vertical Offsets

Minor vertical offsets were present with data acquired on DN170 where it junctions with data acquired on other days (Figure 5). Generally agreement was 0.1 to 0.2 meters, with a maximum of 0.25 meters in 38 meters of depth, falling within IHO Order 1 specifications.[14]

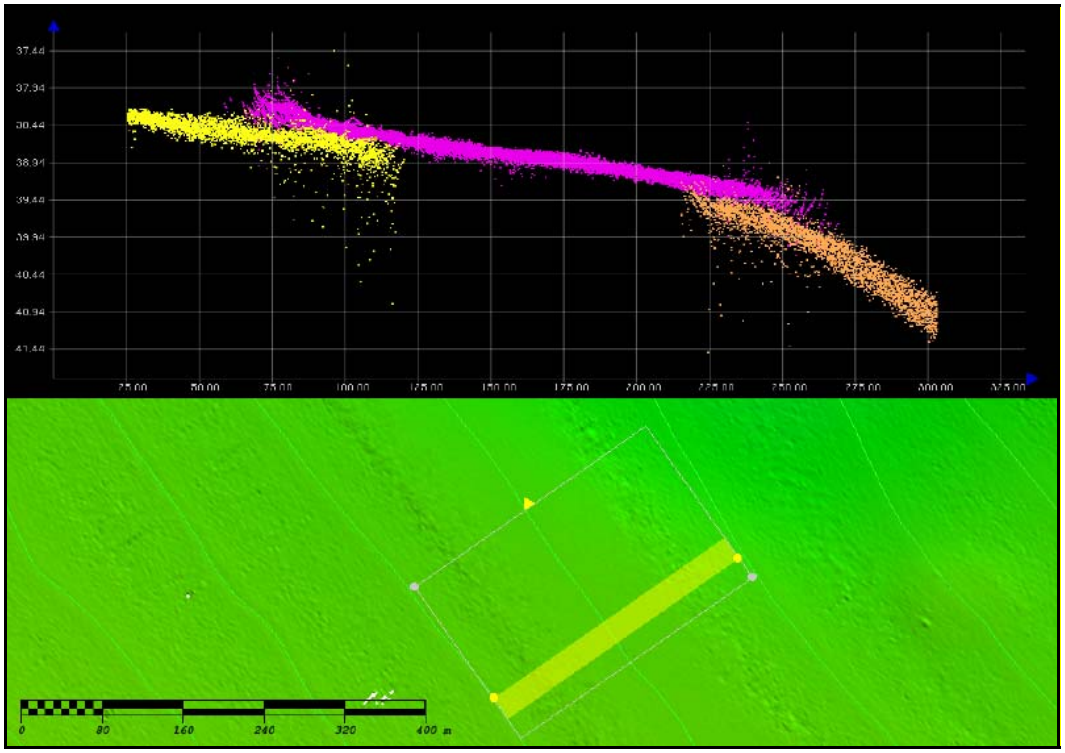


Figure 5: Vertical Offset from RA-5 on DN170

B.2.f. Object Detection and Coverage Assessment

Inshore Coverage

Coverage of H12078 often did not extend to the 8m curve due to heavy kelp around Wosnesenski Island and the surrounding islets. Survey operations were conducted as close inshore as safety would allow with a tilted 8125 Reson by vessel 1101 (RA-1). The Hydrographer created WEDKLP areas in the shoreline Final Feature File to indicate where the presence of kelp was heavy enough to create hazards for vessel traffic and prevent survey acquisition.[15]

Holidays

Holidays within H12078 were caused by three main factors; sound speed blowouts, foul weather, and time constraints. In accordance with the agreement involving Hydrographic Surveys Division (HSD) Operations and Pacific Hydro Branch (PHB), correspondence

attached in Appendix V[16], a holiday plan for the completion of work left unfinished for H12078 has been included with H12078 in the CARIS Notebook session H12078_NTBK.hsf.

Due to both time constraints and large areas of relatively shallow water, the decision was made to change the tilted Reson 8125 transducer to standard orientation. In this configuration waters from 8-35 meters were surveyed. Unfortunately, due to the failing Digibar surface sound velocimeter, as discussed in the data quality section, areas of sound speed blowouts are present in all data acquired by vessel 1101 (RA-1).[17] The areas affected by the Digibar are shown in Figure 6.

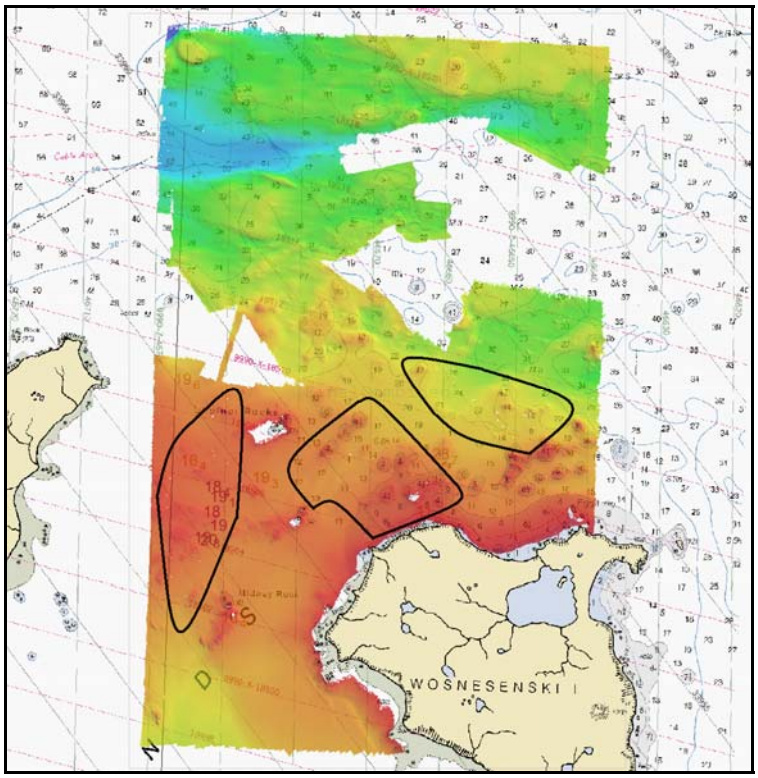


Figure 6: Areas with a high density of SV blowout holidays

Density

Data density for survey H12078 met the 5 sounding per node density requirement with 98.34% of nodes having greater than 5 contributing soundings.[18] It should be noted that, while significant holidays were present in many areas with sparse coverage evident, this did not have a major effect on the data density as these holiday nodes were not part of the surfaces and thus were not included in the overall density calculation.

B.2.g. Unusual Conditions

High winds and choppy seas severely hampered data acquisition nearing the conclusion of survey operations for H12078, specifically during the period of July 28 to August 6. In total, 3 days of operations were cancelled and 2 days had operations suspended after a few hours of acquisition. As a result, H12078 has many areas with small holidays and decreased density, resulting in CUBE having difficulty developing consistent hypotheses in these areas.[19]

B.3. Corrections to Echo soundings

Data reduction procedures for survey H12078 conform to those detailed in the *OPR-P184-RA-09 DAPR.*

B.4. Data Processing

Data processing procedures for survey H12078 conform to those detailed in the DAPR. Data were processed using CARIS HIPS & SIPS v6.1, Service Pack 2, and Hotfix 8. Additional processing details regarding Total Propagated Uncertainty (TPU/TPE) and CUBE Surfaces and Parameters utilized, along with any deviations from the processing procedures outlined in the DAPR are discussed below.

TPU Values:
The survey specific parameters used to compute TPU for H12078 are listed in Table 4.

Tide values:	Measured	0.01 m	Zoning	0.12 m
Sound Speed Values:	Measured	0.50 m/s	Surface	As per DAPR

Table 4: Survey Specific CARIS TPU Parameters

Many BASE surfaces were used in processing H12078. Final BASE surface resolutions and depth ranges were set according to Table 5 below, with field sheets smaller than 25 million nodes. CUBE surfaces were processed with a parameter set corresponding to each resolution as per HTD 2009-2. The CUBE parameter XML file is included with the data deliverables.

Within the bounds of H12078, there is only one 200 meter by 250 meter area that falls within the 8 meter depth range. In this area data density was enough to support a 4m surface. Therefore, the hydrographer extended the 4m depth range beyond the standard 46-115 meter range in order to increase the resolution of the final combined surface. The submission Field Sheet and BASE Surface structure are shown in figures 7 and 8.

Depth Range (m)	Resolution (m)
0-23	1
20-52	2
46-130	4

Table 5: Depth range and surface resolutions for H12078

Soundings and contours were generated in CARIS HIPS from the final combined BASE surface for field unit review purposes. They are included for reference only and are not intended as a deliverable.

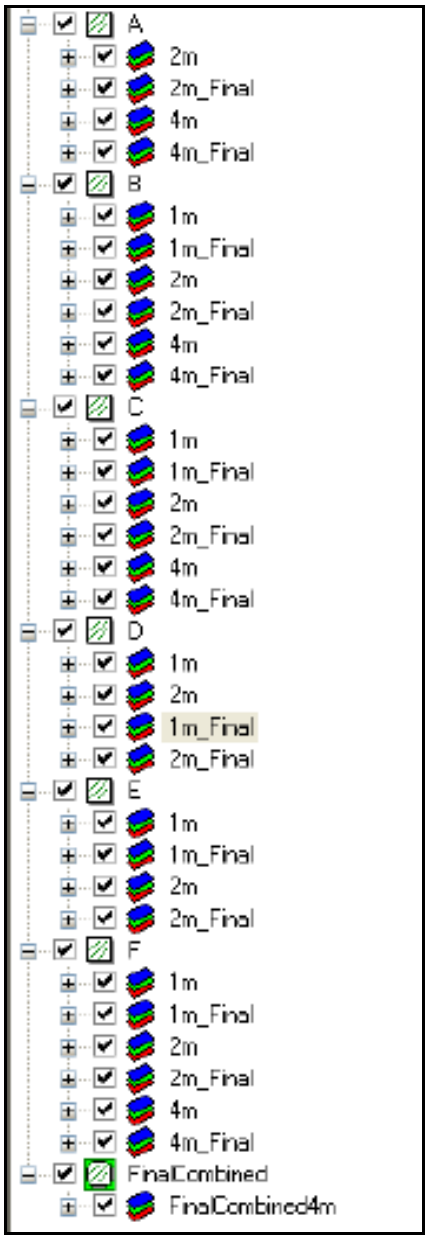


Figure 7: Field sheets and BASE surfaces submitted with H12078

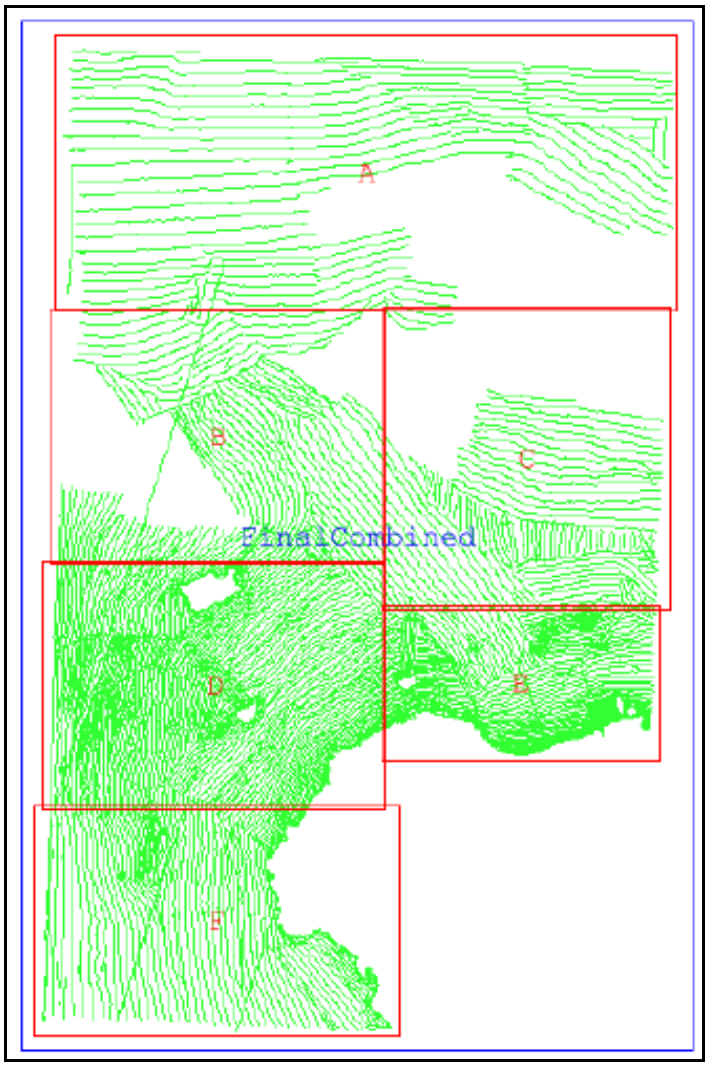


Figure 8: H12078 Field Sheet Layout (excluding VBES)

C. VERTICAL AND HORIZONTAL CONTROL

Project OPR-P184-RA-09 did not require static GPS observations or other horizontal control work, and all tide corrections were generated from CO-OPS maintained tide stations. Thus, no Horizontal and Vertical Control Report will be submitted.

C.1. Horizontal Control

The horizontal datum for this project is the North American Datum of 1983 (NAD83). Differential GPS (DGPS) was the sole method of positioning. The differential corrector beacons utilized for this survey are given in Table 6.

Location	Frequency	Operator	Priority
Cold Bay	313 kHz	USCG	Primary

Table 6: Differential Corrector Sources for H12078

C.2. Vertical Control

The vertical datum for this project is Mean Lower-Low Water (MLLW). The operating National Water Level Observation Network (NWLON) primary tide station at Sand Point, AK (945-9450) served as control for datum determination and as the primary source for water level reducers for survey H12078.

No tertiary gauges were required.

As per the Project Instructions, all data were reduced to MLLW using the final approved water levels from the Sand Point (945-9450) station by applying tide file 9459450.tid and time and height correctors through the zone corrector file P184RA2009CORP.zdf. **It will not be necessary for the Pacific Hydrographic Branch to reapply the final approved water levels to the survey data during final processing.**

The request for Final Approved Water Levels for H12078 was submitted to CO-OPS on August 13, 2009 in accordance with the Field Procedures Manual (FPM), dated April 2009. The Final Tide Note was received on Sept 11, 2009.[20] This documentation is included in Appendix IV.

D. RESULTS AND RECOMMENDATIONS

D.1. Chart Comparison

D.1.a. Survey Agreement with Chart

Chart comparison procedures were followed as outlined in section 4.5 of the FPM and section 8.1.3-D.1 of the HSSDM, utilizing CARIS HIPS & SIPS software program.

Survey H12078 was compared with the following charts:

Chart	Scale	Edition and Date	Local Notice to Mariners Applied Through
16549	1:80,000	15th Ed, July 2003	04/07/2009
16551	1:80,000	10st Ed; April 2008	04/11/2009

Table 7: Charts compared with H12078

Within the limits of survey H12078, soundings agreed with 87% of charted depths within 1 fathom.[21] In many instances, this survey found shoaler soundings between charted soundings even though agreement at the position of the charted depths was good. This can be attributed to achieving complete bottom coverage using MBES versus lead line survey methods.[22]

The northwest area of H12078 tended to be 2-3 fathoms shoaler than charted depths, with a maximum of 5 fathoms shoaler. The majority of which were located inside the cable area. This includes the shoalest soundings measured in the cable area, 22 fathoms, which were 3 fathoms shoaler than the shoalest charted depth of 25 fathoms.[23]

In general, contour lines on charts 16551 and 16549 were charted with reasonable accuracy. The only major change found was that the 20 fathom contour to the North of Wosnesenski Island has migrated considerably inshore, with only a few isolated shoal soundings remaining (Figure 9).[24]

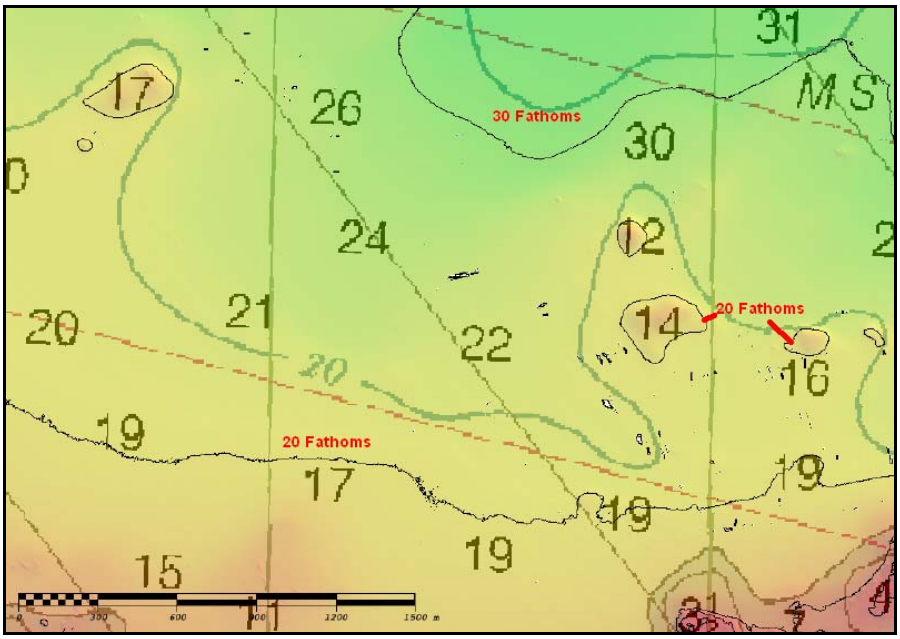


Figure 9: Shift in 20 fathom contour North of Wosnesenski Island

There were very few survey soundings in H12078 that were in excess of 1 fathom deeper than charted depths. In all areas where this was true, *Rainier* achieved complete multibeam coverage. In almost all cases depths were consistent with soundings in the area, but appear to be translated horizontally (Figure 10). This generally occurred to the North of Wosnesenski Island, where depths agreed with soundings within one fathom, but appeared to be shifted horizontally by 50 to 150 meters.[25]

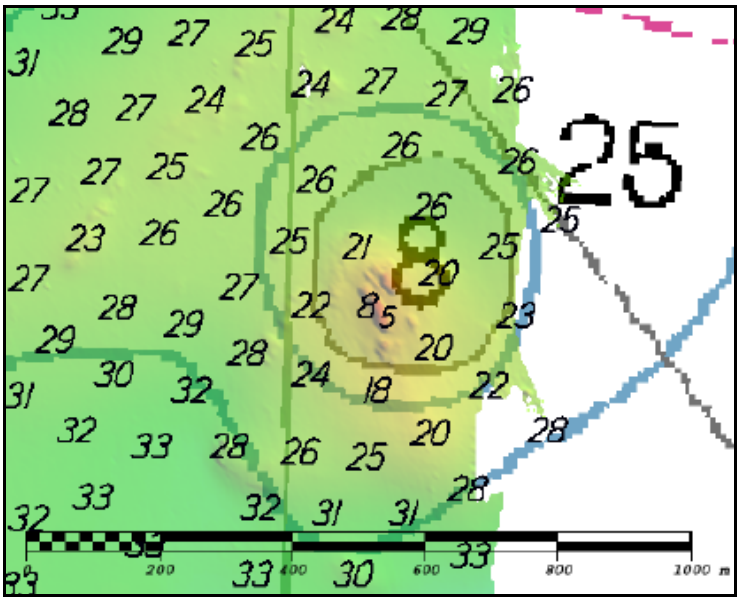


Figure 10: Mischarted shoals

Discrepancies between the charted shoreline of 16549 and 16551 were noticed as indicated in Figure 11. The shoreline depicted on chart 16551 agrees reasonably well with the composite source shoreline as provided with the project; and minor offsets are apparent between composite source and the shoreline of chart 16549. A more detailed high water line and additional rocks and ledges are also found on chart 16551 when compared to chart 16549. Even though both charts are of the same scale, the shoreline of chart 16551 appears to have been compiled at a higher resolution than that of chart 16549. The charted 16551 shoreline agrees much more closely with shoreline observed in the field in the near shore areas of Wosnesenski Islands.[26]

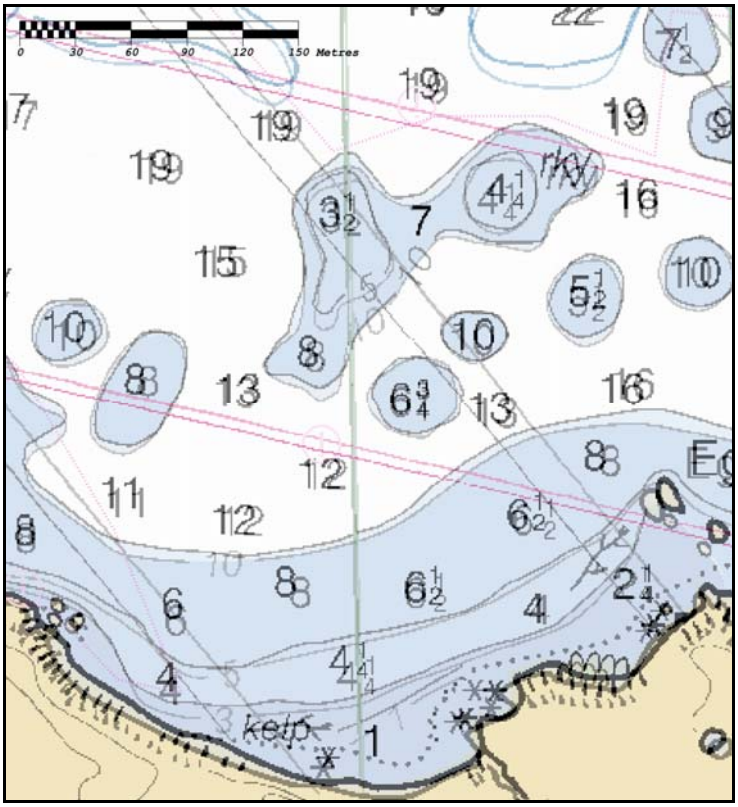


Figure 11: Shoreline and contour discrepancies between Charts 16551 and 16549 (Overlay)

The dotted danger line on chart 16549 is charted incorrectly. The area between danger line and mean high water (MHW) is tinted green, instead of blue. The contrast between charts 16549 and 16551 is shown below in Figure 12. The Hydrographer recommends adjusting the tint inshore of the charted danger lines on chart 16549 to blue.[27]

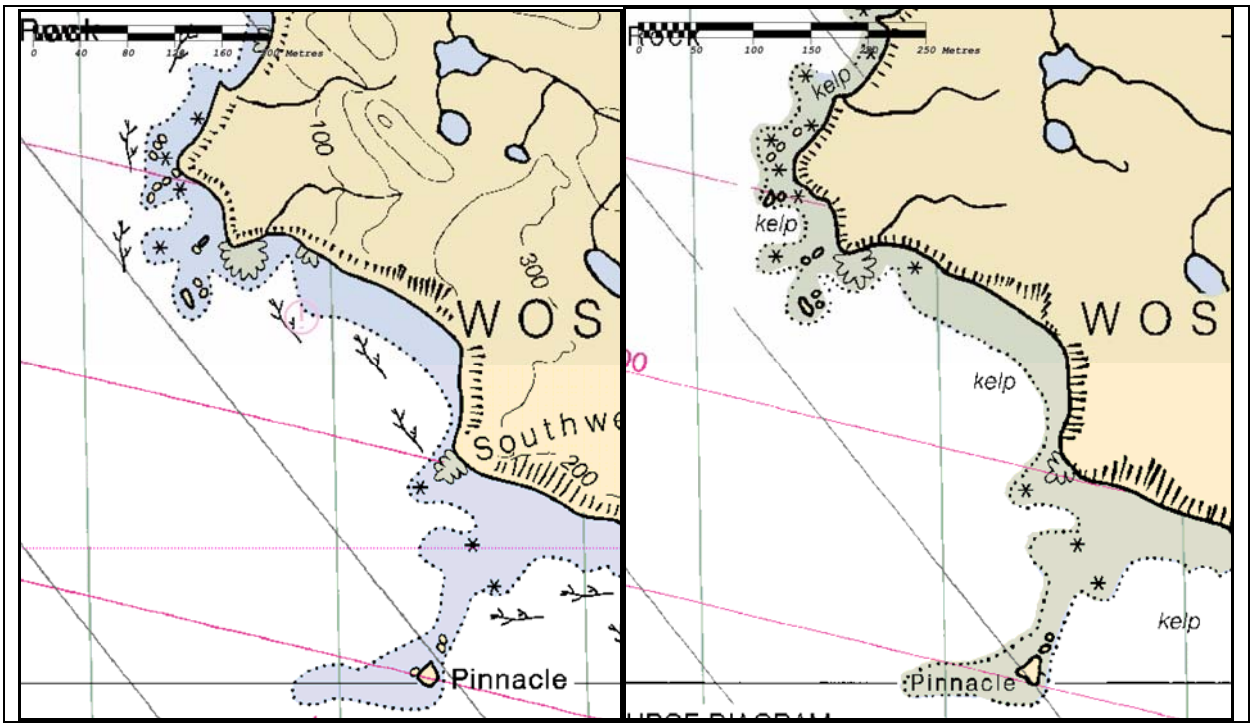


Figure 12: Danger area on Chart 16551 (Left) mischarted as a MLW line on Chart 16549 (Right)

The Hydrographer recommends that survey soundings supersede all prior survey and charted depths in the survey area.[28]

D.1.b. Automated Wreck and Obstruction Information System (AWOIS) Items

No AWOIS items where located within the survey limits of H12078.[29]

D.1.c. Other Investigated Features

<u>Additional Items</u>
A wrecked vessel was found in previously uncharted waters in 19 meters (10.4 fathoms) of depth at location 55° 15’ 04.24” N 161° 29’ 43.71” W (Figure 13). The wrecked vessel appears to be a crab boat laden with crab pots lying on her starboard side, measuring approx 30 meters in length and sitting 7 meters higher than the sea floor. The Hydrographer is confident that the least depth was acquired and recommends charting as a wreck as indicated in the Final Features File included in Caris Notebook digital data.[30]

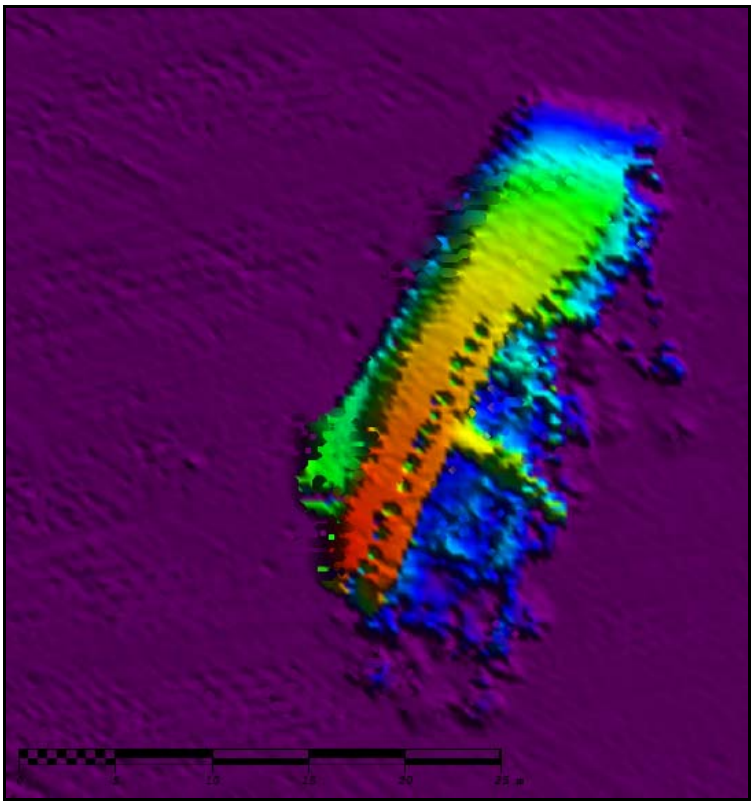


Figure 13: Uncharted wreck in H12078

D.1.d. Dangers to Navigation

Six Dangers to Navigation (DTONs) were found on survey H12078, and reported to the Marine Chart Division via email on February 17, 2010 and February 19, 2010.[31] The original DTON submission package is included in Appendix I.[32]

It was noted after submission that the DTON labeled "1.5" of report 2/17/2010 was incorrectly selected; a 10.5 fathom sounding was selected instead of the intended 3.5 fathom sounding.[33] The correct sounding was submitted as a DTON on February 19, 2010 under a separate report and is included in Appendix I.[34]

D.2. Additional Results

D.2.a. Shoreline Verification

<u>Shoreline Source</u>
Limited shoreline verification was accomplished using the composite source file (CSF) provided with the project instructions. The CSF has been created using the latest ENCs, most recent aerial photogrammetry, and prior hydrographic surveys. Prior survey features within the CSF are for reference. This composite source was printed on paper "boat sheets" and displayed in CARIS Notebook and/or Hypack for field verification.

Shoreline Verification

Limited shoreline verification was conducted near predicted low water in accordance with the Specifications and Deliverables section 8.2 and the Field Procedures Manual section 3.5 and 4.4. Detached positions (DPs) were recorded and S-57 attributed in CARIS Notebook. These DPs indicate revisions to features and features not found on the provided CSF. In addition, annotations describing shoreline were recorded on hard copy plots of the CSF as described above.

All shoreline data is submitted in CARIS Notebook HOB files. The session H12078_NTBK.hsf contains the following:

HOB File	Purpose and Contents
H12078_CSF.hob	Original Source Data as provided for project OPR-P184-RA-09 and filtered to the limits of survey H12078.
H12078_Reference.hob	Survey outline and limit lines.
H12078_FinalFeatureFile.hob	Composite source data modified by the field to best represent the shoreline at survey scale. This includes the addition of new features and modification of source features. This file retains all features neither verified nor disproved by this survey.
H12078_Disprovals.hob	Composite source items that were deleted or modified in position or geographic type.
H12078_HolidayPolygons.hob	Polygons indicating areas requiring additional survey coverage to meet minimum NOS specifications for submission and nautical charting purposes.

Table 8: List and Description of Notebook HOB files

Recommendations

The Hydrographer recommends that the shoreline as depicted in the Notebook HOB files supersede and complement shoreline information compiled on the composite source file and charts as described above.[35]

D.2.b. Prior Survey Comparison

Prior survey comparison was not performed.

D.2.c. Aids to Navigation

There are no Aids to Navigation located within the survey limits of H12078.[36]

D.2.d. Overhead Features

There are no overhead features located within the survey limits of H12078.[37]

D.2.e. Submarine Cables and Pipelines

Survey H12078 includes one charted cable areas, as shown in Figure 14. No indication of cables was present in the data, however due to time constraints full coverage was not acquired over the cable area located within the sheet limits. The Hydrographer recommends retaining the cable area as charted.[38]

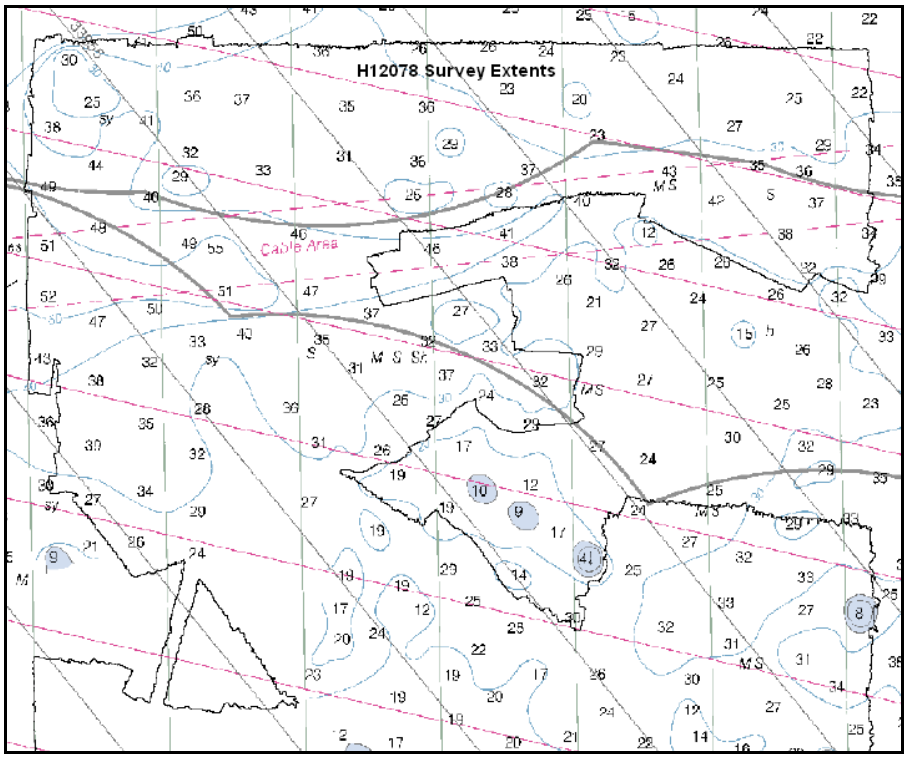


Figure 14: H12078 Cable Area

D.2.f. Ferry Routes

There are no ferry routes charted within the limits of survey H12078, and none were observed to be operating in the area.[39]

D.2.g. Bottom Samples

Fifteen (15) Bottom samples were collected for survey H12078.[40] Of the seven historic bottom samples collected, one did not agree with charted characteristics. The historic sample, recorded as a hard bottom, south of the cable area was surveyed to be a bottom type of sand with shells. All charted bottom characteristics located within H12078 were verified.

As outlined in 7.1 of the HSSD, the requirement of bottom sample collection every 2000 meters was not met due to time constraints.[41]

All bottom samples have been included in the H12078_FinalFeaturesFile.hob in the CARIS Notebook session and are described in the excel file H12078_BottomSamples.xlsx included in appendix V.

D.2.h. Other Findings

There are no other findings to report for this survey.

E. APPROVAL

As Chief of Party, field operations for hydrographic survey H12078 were conducted under my direct supervision, with frequent personal checks of progress and adequacy. I have reviewed the attached survey data and reports. The survey data meets or exceeds requirements as set forth in the NOS Hydrographic Surveys and Specifications Deliverables Manual (April 2009 edition), Field Procedures Manual (April 2009 edition), Standing and Project Instructions, and all HSD Technical Directives issued through August 2009. These data are adequate to supersede charted data in their common areas. This survey is complete and no additional work is required with the exception of deficiencies noted in the Descriptive Report. All data and reports are respectfully submitted to N/CS34, Pacific Hydrographic Branch.

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

Title	Date Sent	Office
Hydrographic Systems Readiness Review Package	*Under separate cover*	N/CS34
Data Acquisition and Processing Report for OPR-P184-RA-09	January 12, 2010	N/CS34
Coast Pilot Report for OPR- P184-RA-09	*To be submitted*	N/CS26
Tides and Water Levels Package for OPR-O184-RA-09	July 31, 2009	N/OPS1

Approved and Forwarded: Donald W. Haines, CAPT/NOAA
I am approving this document
2010.03.11 08:21:30 -08'00'

Captain Donald W. Haines, NOAA
Commanding Officer, NOAA Ship *Rainier*

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

Survey Sheet Manager: Adam Reed
I am the author of this document
2010.03.10 07:41:54 -08'00'

Ensign Adam R. Reed, NOAA
Junior Officer, NOAA Ship *Rainier*

Chief Survey Technician: James B Jacobson
I have reviewed this document
2010.03.09 16:16:52 Z

James B. Jacobson
Chief Survey Technician, NOAA Ship *Rainier*

Field Operations Officer: Brent Pounds
I have reviewed this document
2010.03.11 06:22:50 -09'00'

Lieutenant Brent J. Pounds, NOAA
Field Operations Officer, NOAA Ship *Rainier*

Revisions and Corrections Compiled During Office Processing and Certification

[1] The areas that were not surveyed are depicted in the coverage area for the HCell.
[2] The crossline percentage does not meet specification; however, the one crossline for this survey shows good agreement with mainscheme lines.
[3] Concur. The comparision is adequate to show that the data has good agreement with no significant offsets or systematic errors that can be attributed to a single vessel.
[4] Concur.
[5] After cleaning the outer beams, the data is adequate to supersede charted data in the common area.
[6] A common junction was made with H12077 which has already been compiled. A junction with H12081 will be made when that survey is compiled.
[7] Concur.
[8] Concur.
[9] After rejecting the outer beams on data exhibiting sound speed errors, the remaining data is adequate to supersede charted data in the common area.
[10] After rejecting the outer beams on data exhibiting sound speed errors, the remaining data is adequate to supersede charted data in the common area.
[11] Concur.
[12] After cleaning the noisy data, the remaining data is adequate to supersede charted data in the common area.
[13] Concur. The data is adequate to supersede charted data in the common area.
[14] Concur. The data is adequate to supersede charted data in the common area.
[15] Concur with clarification. Chart foul areas as depicted in the HCell.
[16] See attached correspondence.
[17] After rejecting the outer beams on data exhibiting sound speed errors, the remaining data is adequate to supersede charted data in the common area.
[18] Concur. The data is adequate to supersede charted data in the common area.
[19] In areas with very large holidays, the holidays are preserved in the coverage area for the HCell.
[20] See attached Tide Note dated September 4, 2009.
[21] Concur.
[22] Concur.
[23] Concur. Chart depths as depicted in the HCell.
[24] Update charted contours with new survey data.
[25] Concur. Chart depths as depicted in the HCell.
[26] Update depths and features as depicted in the HCell. Update charted coastline based on the latest available GC shoreline.
[27] Concur with clarification. Recommend that chart 16549 be updated based the appearance of 16551 and update foul areas as depicted in the HCell. Update charted coastline based on the latest available GC shoreline.
[28] Concur.
[29] Concur.
[30] Concur with clarification. The compiler recommends that the wreck be added to the AWOIS database.
[31] All six DTONs have been applied to the charts and all are included in the HCell.
[32] See attached DTON report.
[33] The 3.5 fathom sounding has been applied to the charts and is included in the HCell.
[34] See attached DTON report.
[35] Concur with clarification. The submitted hob files were used in the compilation of HCell H12078. During compilation, some modifications were made to accommodate chart scale. Chart features as depicted in the HCell.
[36] Concur.
[37] Concur.

[38] Concur. The cable area has been blue noted to be retained.
[39] Concur.
[40] Do not concur. There were 18 bottom samples submitted with H12078 and one bottom sample from H12077 that fell within the limits of H12078. All 19 bottom samples are included in the HCell and 3 charted bottom samples have been blue noted to be retained. Ten charted bottom samples have been blue noted to be removed because they will be updated with the bottom samples collected during H12078.
[41] The number of bottom samples collected is adequate given the scale of the chart.

H12078_DTON1

Registry Number: H12078

State: Alaska

Locality: Pavlof Islands

Sub-locality: North of Wosnesenski Island

Project Number: OPR-P184-RA-09

Survey Dates: 06/19/2009 - 08/05/2009

Charts Affected

Number	Edition	Date	Scale (RNC)	RNC Correction(s)*
16551	10th	04/01/2008	1:80,000 (16551_1)	NGA NTM: None (04/11/2009) USCG LNM: None (04/07/2009) CHS NTM: None (03/27/2009)
16549	15th	07/01/2003	1:80,000 (16549_1)	USCG LNM: 02/24/2009 (04/07/2009) CHS NTM: None (03/27/2009) NGA NTM: 01/21/2006 (04/11/2009)
16540	12th	01/01/2005	1:300,000 (16540_1)	[L]NTM: ?
16011	37th	11/01/2007	1:1,023,188 (16011_1)	[L]NTM: ?
16006	35th	04/01/2008	1:1,534,076 (16006_1)	[L]NTM: ?
513	7th	06/01/2004	1:3,500,000 (513_1)	[L]NTM: ?
500	8th	06/01/2003	1:3,500,000 (500_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	7.66 m	55° 13' 07.6" N	161° 29' 57.2" W	---
1.2	Rock	6.24 m	55° 11' 52.7" N	161° 28' 50.3" W	---
1.3	Rock	7.03 m	55° 13' 56.7" N	161° 29' 28.2" W	---
1.4	Rock	6.96 m	55° 13' 47.7" N	161° 30' 18.8" W	---
1.5	Rock	19.27 m	55° 14' 46.8" N	161° 29' 01.9" W	---
1.6	Rock	7.37 m	55° 13' 09.5" N	161° 27' 40.6" W	---

1 - Danger To Navigation

1.1) Profile/Beam - 7870/51 from h12078 / 2801_reson7125_lf_256 / 2009-170 / 916_1928

DANGER TO NAVIGATION

Survey Summary

Survey Position: 55° 13' 07.6" N, 161° 29' 57.2" W

Least Depth: 7.66 m (= 25.13 ft = 4.188 fm = 4 fm 1.13 ft)

TPU (±1.96σ): **THU (TPEh)** ±1.963 m ; **TVU (TPEv)** ±0.268 m

Timestamp: 2009-170.19:39:28.239 (06/19/2009)

Survey Line: h12078 / 2801_reson7125_lf_256 / 2009-170 / 916_1928

Profile/Beam: 7870/51

Charts Affected: 16549_1, 16551_1, 16540_1, 16011_1, 16006_1, 500_1, 513_1, 530_1, 50_1

Remarks:

4,1 Fathom Deep Rock in 6 Fathoms of water.

Feature Correlation

Address	Feature	Range	Azimuth	Status
h12078/2801_reson7125_lf_256/2009-170/916_1928	7870/51	0.00	000.0	Primary

Hydrographer Recommendations

[None]

Cartographically-Rounded Depth (Affected Charts):

4 ¼fm (16549_1, 16551_1, 16540_1, 16011_1, 16006_1, 530_1)

7.7m (500_1, 513_1, 50_1)

S-57 Data

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

Attributes: VALSOU - 7.659 m

Feature Images

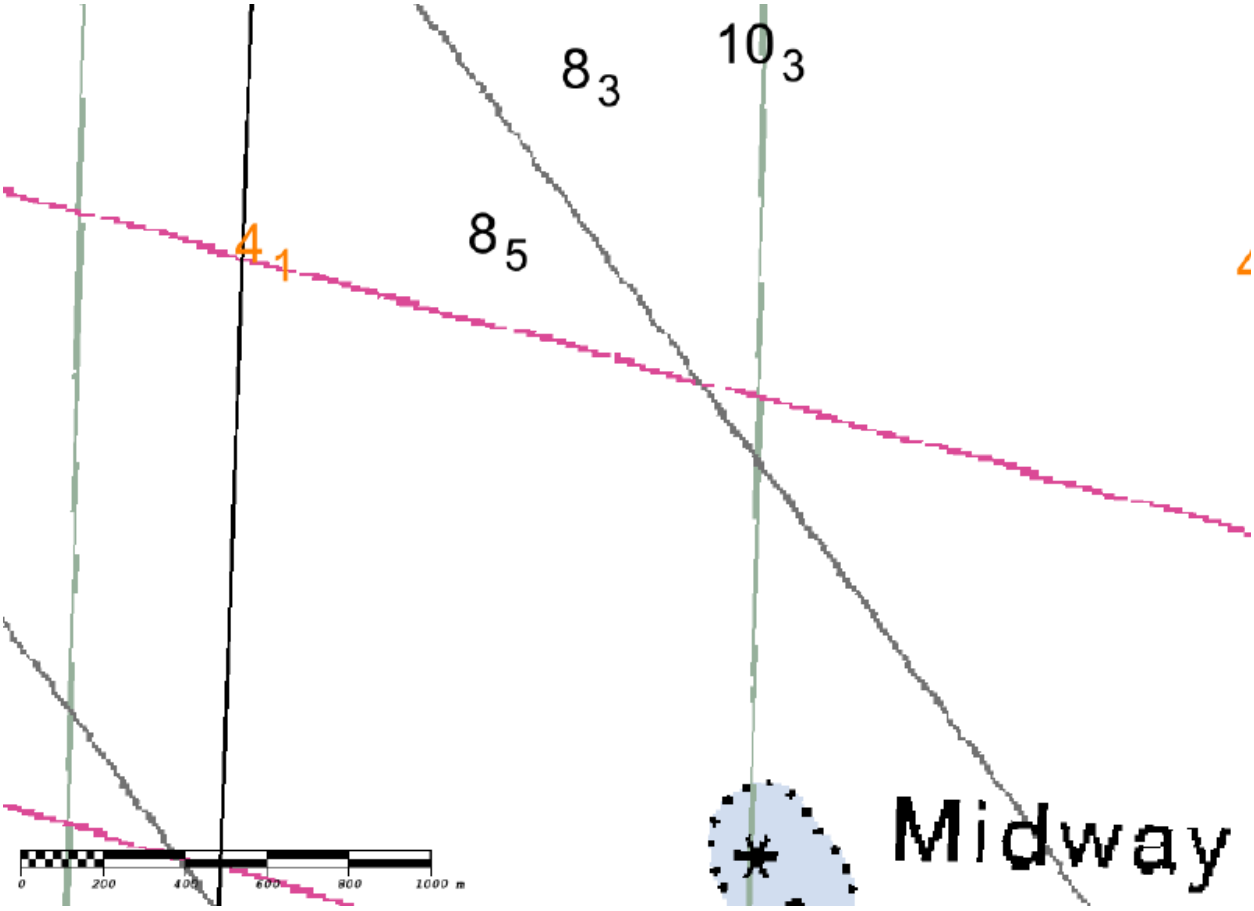


Figure 1.1.1

1.2) Profile/Beam - 2774/291 from h12078 / 2802_reson7125_hf_512 / 2009-191 / 000_2328

DANGER TO NAVIGATION

Survey Summary

Survey Position: 55° 11' 52.7" N, 161° 28' 50.3" W

Least Depth: 6.24 m (= 20.46 ft = 3.409 fm = 3 fm 2.46 ft)

TPU (±1.96σ): **THU (TPEh)** ±1.960 m ; **TVU (TPEv)** ±0.265 m

Timestamp: 2009-191.23:34:01.484 (07/10/2009)

Survey Line: h12078 / 2802_reson7125_hf_512 / 2009-191 / 000_2328

Profile/Beam: 2774/291

Charts Affected: 16549_1, 16551_1, 16540_1, 16011_1, 16006_1, 500_1, 513_1, 530_1, 50_1

Remarks:

3,2 fathom deep rock in 12 fathom deep water.

Feature Correlation

Address	Feature	Range	Azimuth	Status
h12078/2802_reson7125_hf_512/2009-191/000_2328	2774/291	0.00	000.0	Primary

Hydrographer Recommendations

[None]

Cartographically-Rounded Depth (Affected Charts):

3 ¼fm (16549_1, 16551_1, 16540_1, 16011_1, 16006_1, 530_1)

6.2m (500_1, 513_1, 50_1)

S-57 Data

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

Attributes: VALSOU - 6.235 m

Feature Images

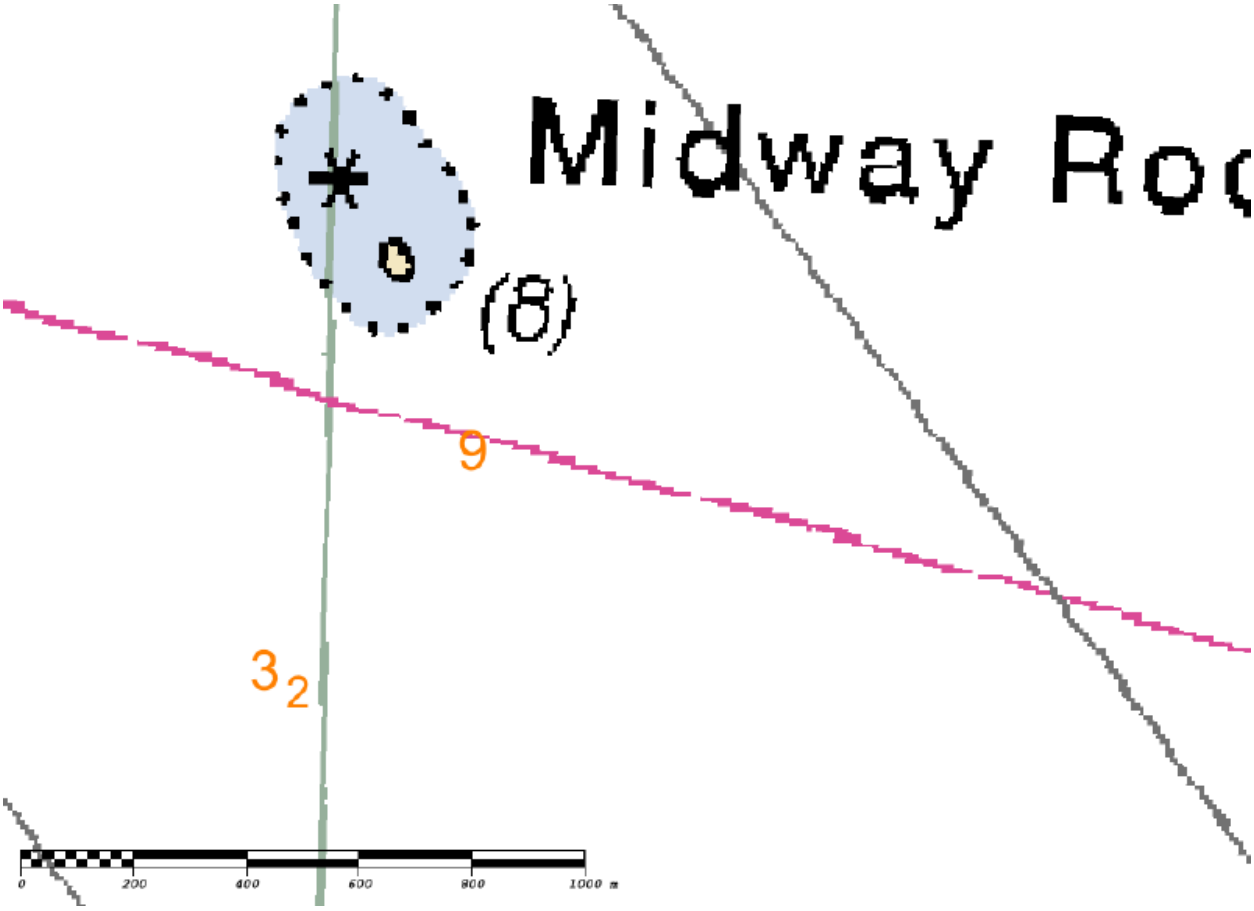


Figure 1.2.1

1.3) Profile/Beam - 288/157 from h12078 / 2802_reson7125_hf_512 / 2009-201 / 000_1903

DANGER TO NAVIGATION

Survey Summary

Survey Position: 55° 13' 56.7" N, 161° 29' 28.2" W

Least Depth: 7.03 m (= 23.06 ft = 3.844 fm = 3 fm 5.06 ft)

TPU (±1.96σ): **THU (TPEh)** ±1.961 m ; **TVU (TPEv)** ±0.265 m

Timestamp: 2009-201.19:03:49.738 (07/20/2009)

Survey Line: h12078 / 2802_reson7125_hf_512 / 2009-201 / 000_1903

Profile/Beam: 288/157

Charts Affected: 16549_1, 16551_1, 16540_1, 16011_1, 16006_1, 500_1, 513_1, 530_1, 50_1

Remarks:

3,5 Fathom sounding on a rock surrounded by 8 fathom depths

Feature Correlation

Address	Feature	Range	Azimuth	Status
h12078/2802_reson7125_hf_512/2009-201/000_1903	288/157	0.00	000.0	Primary

Hydrographer Recommendations

[None]

Cartographically-Rounded Depth (Affected Charts):

3 ¾fm (16549_1, 16551_1, 16540_1, 16011_1, 16006_1, 530_1)

7.0m (500_1, 513_1, 50_1)

S-57 Data

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

Attributes: VALSOU - 7.030 m

Feature Images

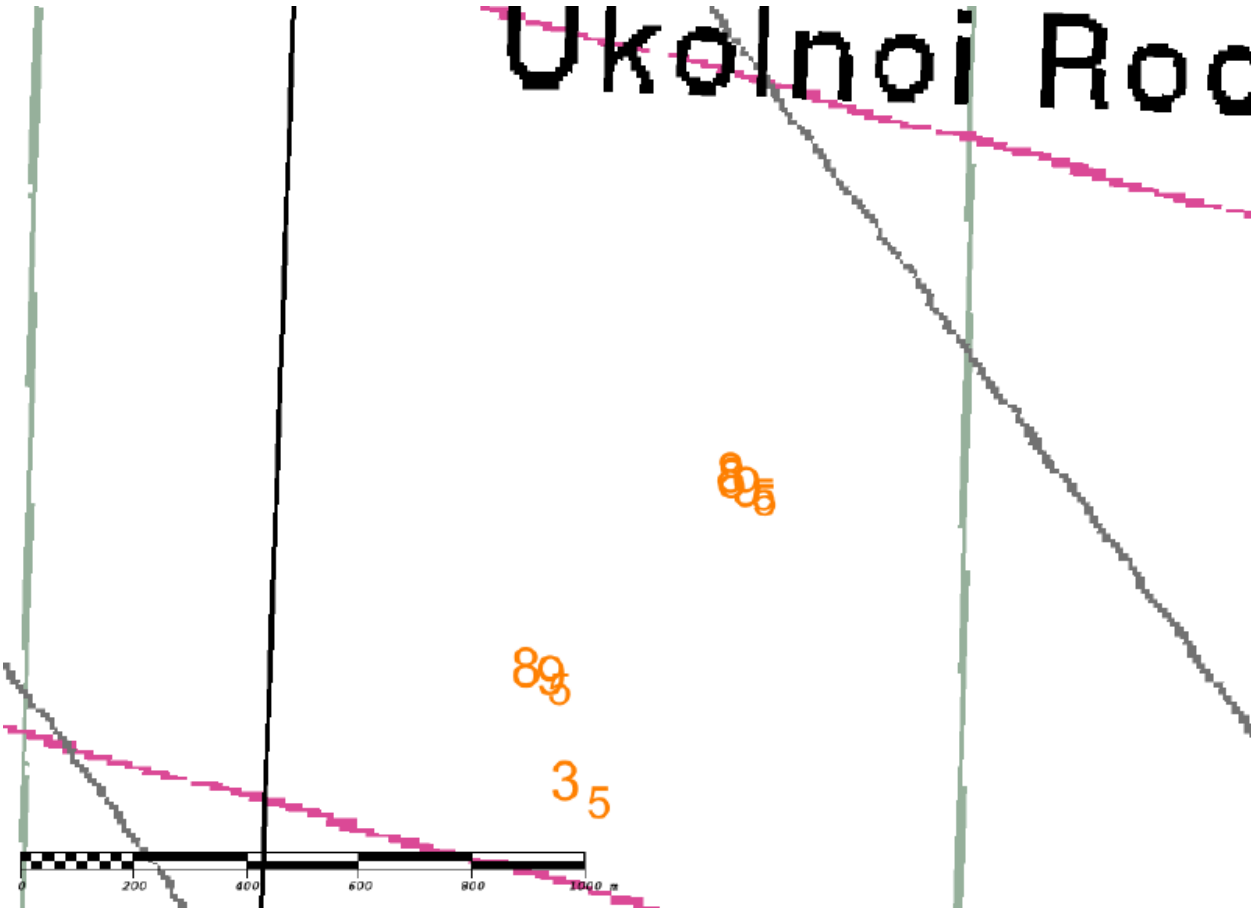


Figure 1.3.1

1.4) Profile/Beam - 603/242 from h12078 / 2803_reson7125_hf_512 / 2009-190 / 000_0045

DANGER TO NAVIGATION

Survey Summary

Survey Position: 55° 13' 47.7" N, 161° 30' 18.8" W

Least Depth: 6.96 m (= 22.82 ft = 3.804 fm = 3 fm 4.82 ft)

TPU (±1.96σ): **THU (TPEh)** ±1.962 m ; **TVU (TPEv)** ±0.265 m

Timestamp: 2009-191.00:46:26.906 (07/10/2009)

Survey Line: h12078 / 2803_reson7125_hf_512 / 2009-190 / 000_0045

Profile/Beam: 603/242

Charts Affected: 16549_1, 16551_1, 16540_1, 16011_1, 16006_1, 500_1, 513_1, 530_1, 50_1

Remarks:

3,5 Fathom deep Rock surrounded by 5,5 Fathom deep water.

Feature Correlation

Address	Feature	Range	Azimuth	Status
h12078/2803_reson7125_hf_512/2009-190/000_0045	603/242	0.00	000.0	Primary

Hydrographer Recommendations

[None]

Cartographically-Rounded Depth (Affected Charts):

3 ¾fm (16549_1, 16551_1, 16540_1, 16011_1, 16006_1, 530_1)

7.0m (500_1, 513_1, 50_1)

S-57 Data

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

Attributes: VALSOU - 6.956 m

Feature Images

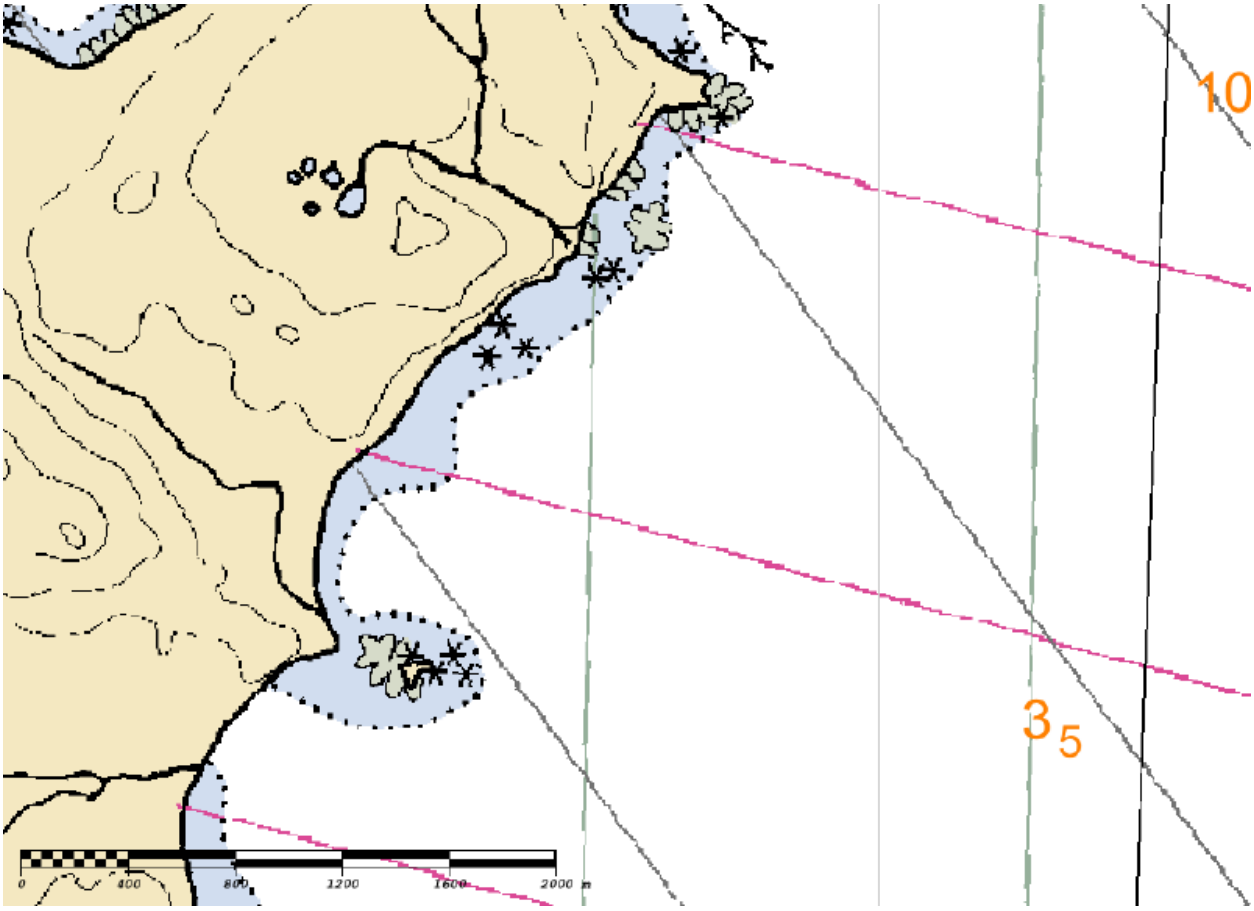


Figure 1.4.1

1.5) Profile/Beam - 3320/27 from h12078 / 2804_reson7125_hf_512 / 2009-216 / 000_2242

DANGER TO NAVIGATION

Survey Summary

Survey Position: 55° 14' 46.8" N, 161° 29' 01.9" W

Least Depth: 19.27 m (= 63.22 ft = 10.536 fm = 10 fm 3.22 ft)

TPU (±1.96σ): **THU (TPEh)** ±1.984 m ; **TVU (TPEv)** ±0.307 m

Timestamp: 2009-216.22:50:40.447 (08/04/2009)

Survey Line: h12078 / 2804_reson7125_hf_512 / 2009-216 / 000_2242

Profile/Beam: 3320/27

Charts Affected: 16549_1, 16551_1, 16540_1, 16011_1, 16006_1, 500_1, 513_1, 530_1, 50_1

Remarks:

3,4 fathom deep rock surrounded by 10 fathom deep water

Feature Correlation

Address	Feature	Range	Azimuth	Status
h12078/2804_reson7125_hf_512/2009-216/000_2242	3320/27	0.00	000.0	Primary

Hydrographer Recommendations

[None]

Cartographically-Rounded Depth (Affected Charts):

10 ½fm (16549_1, 16551_1, 16540_1, 16011_1, 16006_1, 530_1)

19.3m (500_1, 513_1, 50_1)

S-57 Data

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

Attributes: VALSOU - 19.269 m

Feature Images

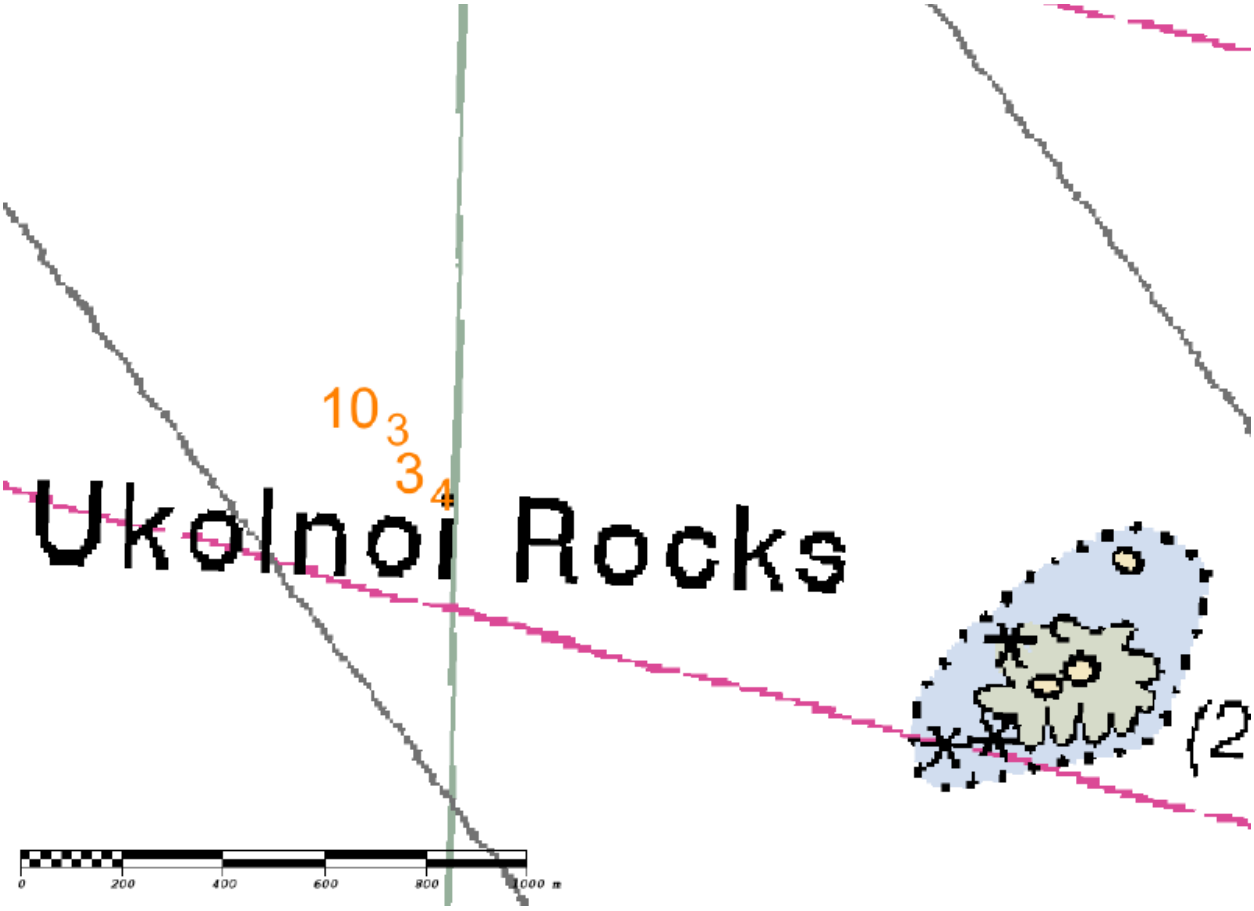


Figure 1.5.1

1.6) Profile/Beam - 171/501 from h12078 / 2803_reson7125_hf_512 / 2009-216 / 000_0041

DANGER TO NAVIGATION

Survey Summary

Survey Position: 55° 13' 09.5" N, 161° 27' 40.6" W

Least Depth: 7.37 m (= 24.19 ft = 4.032 fm = 4 fm 0.19 ft)

TPU (±1.96σ): **THU (TPEh)** ±1.965 m ; **TVU (TPEv)** ±0.272 m

Timestamp: 2009-217.00:41:58.314 (08/05/2009)

Survey Line: h12078 / 2803_reson7125_hf_512 / 2009-216 / 000_0041

Profile/Beam: 171/501

Charts Affected: 16549_1, 16551_1, 16540_1, 16011_1, 16006_1, 500_1, 513_1, 530_1, 50_1

Remarks:

4 fathom deep rock surrounded by 10 fathom deep water

Feature Correlation

Address	Feature	Range	Azimuth	Status
h12078/2803_reson7125_hf_512/2009-216/000_0041	171/501	0.00	000.0	Primary

Hydrographer Recommendations

[None]

Cartographically-Rounded Depth (Affected Charts):

4fm (16549_1, 16551_1, 16540_1, 16011_1, 16006_1, 530_1)

7.4m (500_1, 513_1, 50_1)

S-57 Data

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

Attributes: VALSOU - 7.374 m

Feature Images

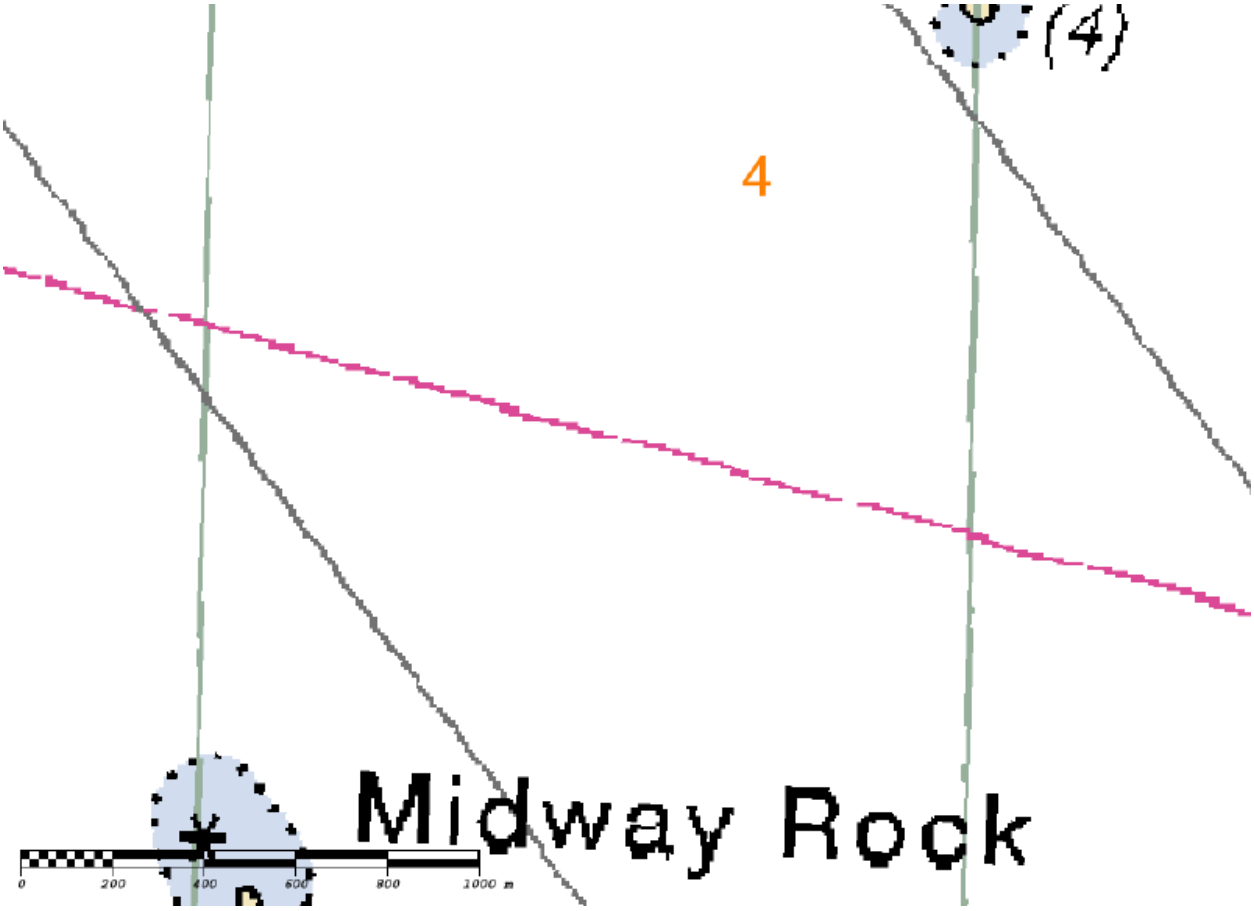


Figure 1.6.1

H12078_DTON1

Registry Number: H12078

State: Alaska

Locality: Pavlof Islands

Sub-locality: North of Wosnesenski Island

Project Number: OPR-P184-RA-09

Survey Date: 08/04/2009

Charts Affected

Number	Edition	Date	Scale (RNC)	RNC Correction(s)*
16551	10th	04/01/2008	1:80,000 (16551_1)	NGA NTM: None (04/11/2009) USCG LNM: None (04/07/2009) CHS NTM: None (03/27/2009)
16549	15th	07/01/2003	1:80,000 (16549_1)	USCG LNM: 02/24/2009 (04/07/2009) CHS NTM: None (03/27/2009) NGA NTM: 01/21/2006 (04/11/2009)
16540	12th	01/01/2005	1:300,000 (16540_1)	[L]NTM: ?
16011	37th	11/01/2007	1:1,023,188 (16011_1)	[L]NTM: ?
16006	35th	04/01/2008	1:1,534,076 (16006_1)	[L]NTM: ?
513	7th	06/01/2004	1:3,500,000 (513_1)	[L]NTM: ?
500	8th	06/01/2003	1:3,500,000 (500_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	6.79 m	55° 14' 42.8" N	161° 28' 55.1" W	---

1 - Danger To Navigation

1.1) Profile/Beam - 3420/208 from h12078 / 2804_reson7125_hf_512 / 2009-216 / 000_2309

DANGER TO NAVIGATION

Survey Summary

Survey Position: 55° 14' 42.8" N, 161° 28' 55.1" W

Least Depth: 6.79 m (= 22.29 ft = 3.716 fm = 3 fm 4.29 ft)

TPU (±1.96σ): **THU (TPEh)** ±1.961 m ; **TVU (TPEv)** ±0.265 m

Timestamp: 2009-216.23:17:04.780 (08/04/2009)

Survey Line: h12078 / 2804_reson7125_hf_512 / 2009-216 / 000_2309

Profile/Beam: 3420/208

Charts Affected: 16549_1, 16551_1, 16540_1, 16011_1, 16006_1, 500_1, 513_1, 530_1, 50_1

Remarks:

3,4 fathom deep rock surrounded by 10 fathom deep water

Feature Correlation

Address	Feature	Range	Azimuth	Status
h12078/2804_reson7125_hf_512/2009-216/000_2309	3420/208	0.00	000.0	Primary

Hydrographer Recommendations

[None]

Cartographically-Rounded Depth (Affected Charts):

3 ¾fm (16549_1, 16551_1, 16540_1, 16011_1, 16006_1, 530_1)

6.8m (500_1, 513_1, 50_1)

S-57 Data

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

Attributes: VALSOU - 6.795 m

Feature Images

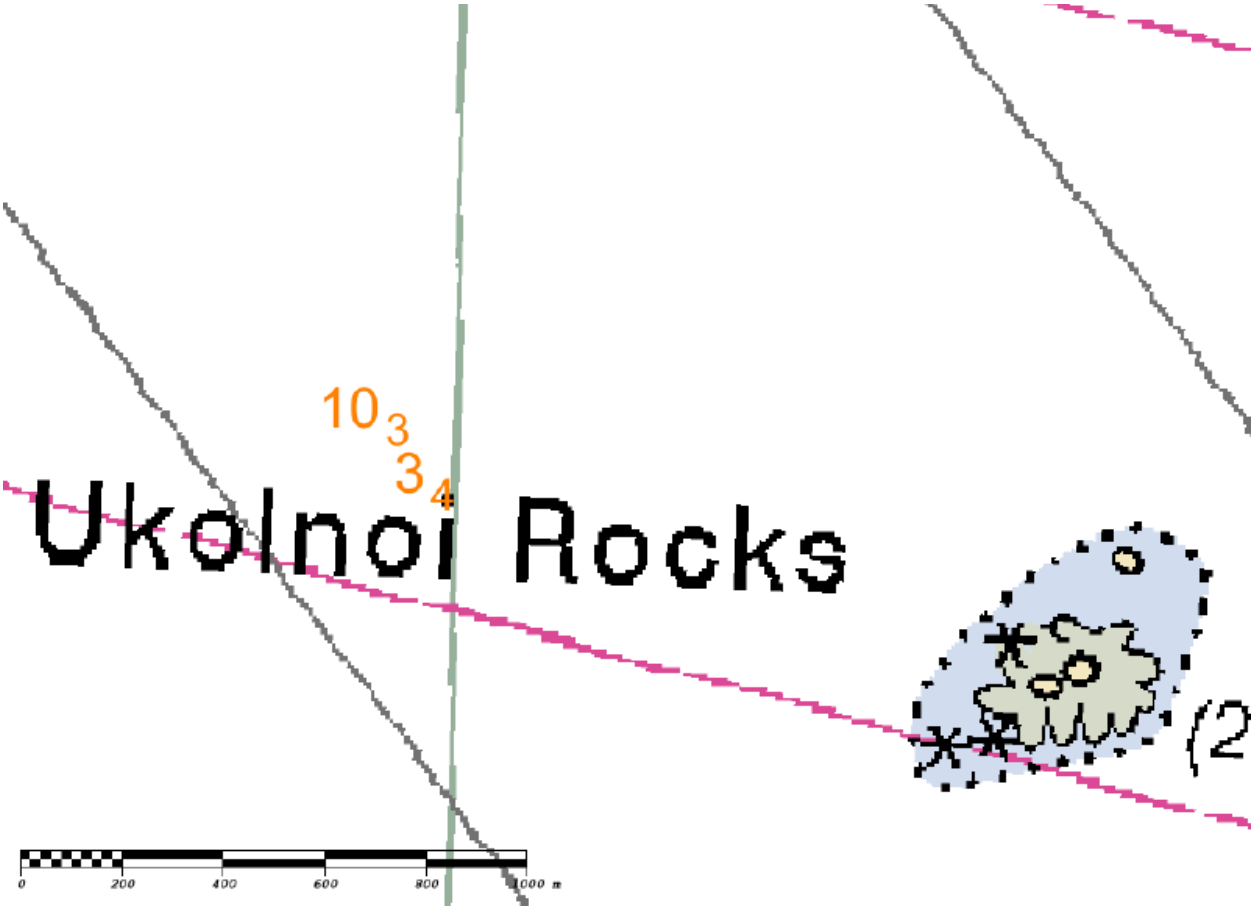


Figure 1.1.1

From "foo.rainier" <foo.rainier@noaa.gov>
Date Wed, 12 Aug 2009 15:59:00 -0800
To "james.m.crocker" <James.M.Crocker@noaa.gov>
Subject Re: OPR-P184-RA-09, Pavlof Islands Operations Completed

CDR Crocker,

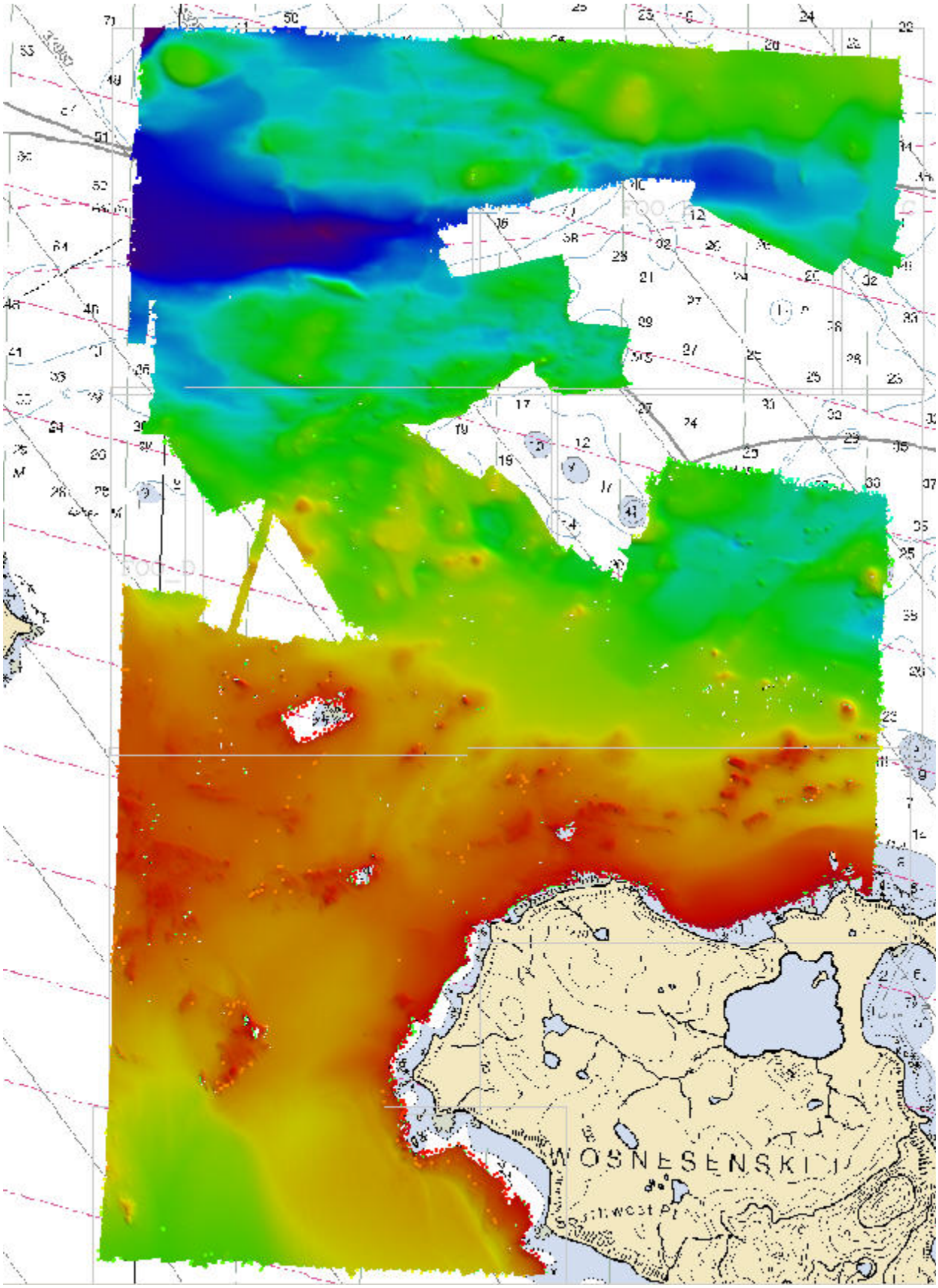
You are correct, /Rainier/ will not be returning to the Pavlof project area this season. Unfortunately Sheet C (H12078) has significant areas without coverage and could not be blocked off well due to adverse weather conditions on the last leg. In addition, much of the data acquired in the last days of the leg on this sheet is of poor quality and has significant holidays due to rough weather conditions. In initial discussions with CAPT Neander, who was the acting CO during this final leg, it was decided that /Rainier/ should not submit this survey at this time, with the hopes that OPS could direct either /Rainier/ or /Fairweather/ to the area in following seasons to complete the necessary acquisition.

However, in light of your discussion with CAPT Neander, the survey will be submitted as is with the understanding that further data acquisition will not be able to be complete and inadequacies in data will be addressed in the DR. Attached is a jpeg of the DTM for this sheet showing the areas of missing or sparse coverage. /Rainier/ will submit holiday line plans and uncompleted polygon areas after data cleaning is complete for future assignment as an FE.

V/R,
-Brent

james.m.crocker wrote:
> Brent,
>
> Would you please define what you mean in regards to submitting sheet C
> (H12078) until further acquisition is completed? My understanding is
> the ship will not return to Pavlof this year.
>
> Regards,
> Jim
>
>
>
> FOO Rainier wrote:
>> Good day,
>>

>> This email is to inform you that /Rainier/ has completed data
>> acquisition on OPR-P184-RA-09, Pavlof Islands. We were able to
>> complete sheets A, B, D, E, and F (H12076, H12077, H12079, H12080,
>> and H12081, respectively) and approximately 75 percent of sheet C
>> (H12078). We were unable to complete sheet C (H12078) due to adverse
>> weather conditions and this survey will not be submitted until
>> further acquisition is completed. All survey outlines for completed
>> surveys will be submitted shortly.
>>
>> /Rainier/ is currently underway, bound for our inport in Kodiak,
>> after which, we will begin operations on OPR-P357-RA-09, Kachemak
>> Bay. We anticipate surveying 5 sheets there and will begin with the
>> tide gauge installation at Bear Cove, AK. We will commence survey
>> operations, as the weather allows, in order of assigned priority.
>>
>> Very Respectfully,
>> LT Brent Pounds, NOAA
>> Field Operations Officer
>> NOAA Ship /Rainier/



File: H12078.jpg

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

TIDE NOTE FOR HYDROGRAPHIC SURVEY

DATE : September 4, 2009

HYDROGRAPHIC BRANCH: Pacific
HYDROGRAPHIC PROJECT: OPR-P184-RA-2009
HYDROGRAPHIC SHEET: H12078

LOCALITY: North of Wosnesenski Island, AK
TIME PERIOD: July 19 - August 5, 2009

TIDE STATION USED: 945-9450 Sand Point, AK
Lat. 55° 19.9'N Long. 160° 30.3' W
PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters
HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 1.988 meters

REMARKS: RECOMMENDED ZONING
Use zone(s) identified as: SWA205

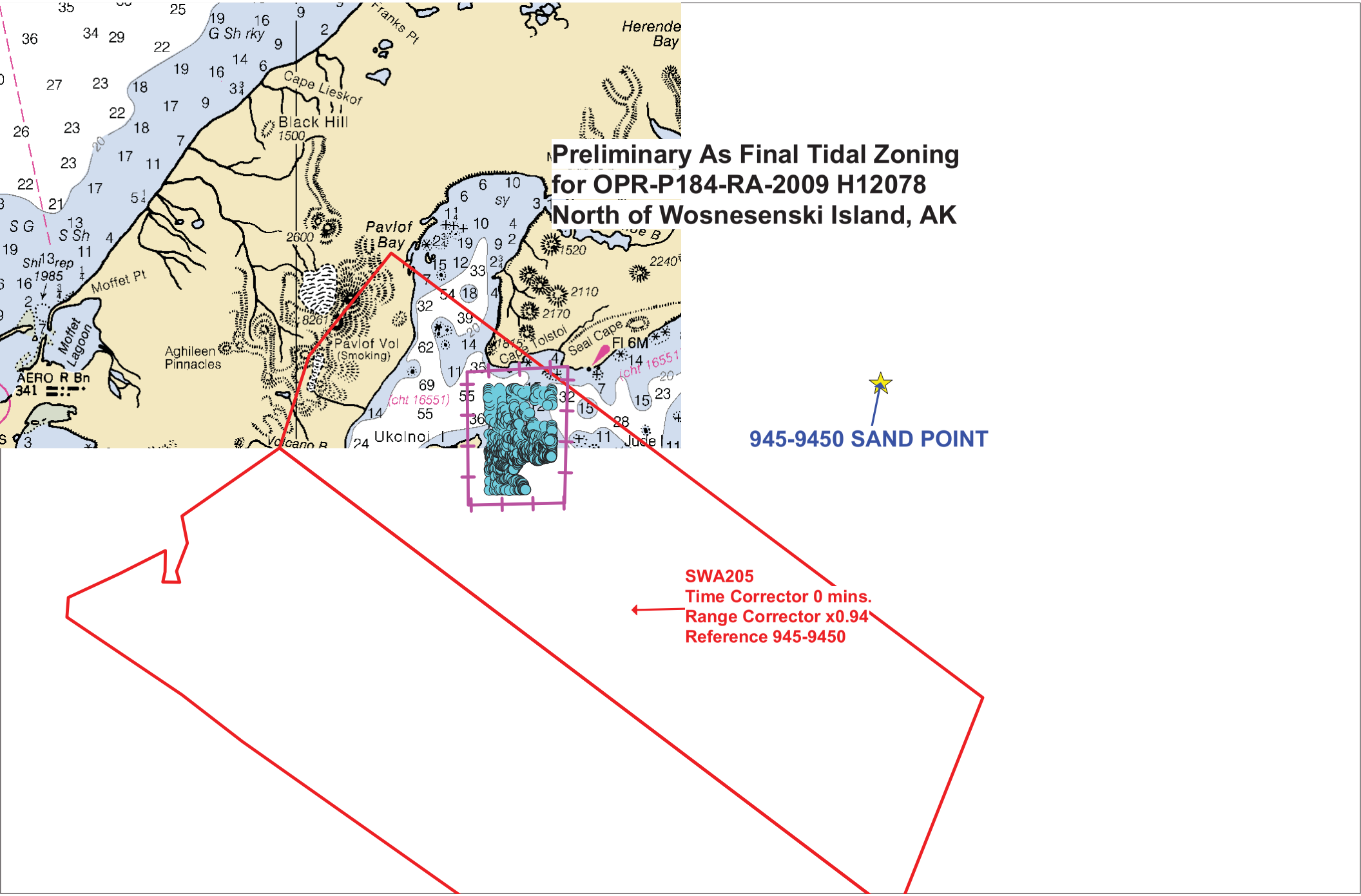
Refer to attachments for zoning information.

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

Peter J. Stone

Digitally signed by Peter J. Stone
DN: cn=Peter J. Stone, o=CO-OPS, ou=NOAA/NOS, email=peter.stone@noaa.gov, c=US
Date: 2009.09.11 15:38:39 -04'00'

CHIEF, OCEANOGRAPHIC DIVISION


Preliminary As Final Tidal Zoning
for OPR-P184-RA-2009 H12078
North of Wosnesenski Island, AK
945-9450 SAND POINT
SWA205
Time Corrector 0 mins.
Range Corrector x0.94
Reference 945-9450
Cape Lieskof
Black Hill
Pavlof Bay
Moffet Pt
Moffet Lagoon
Aghileen Pinnacles
Pavlof Vol (Smoking)
Ukolnoi
Franks Pt
Herende Bay
Seal Cape
Fl 6M
AERO R Bn 341

H12078 HCell Report

Katie Reser, Physical Scientist
Pacific Hydrographic Branch

1. Specifications, Standards and Guidance Used in HCell Compilation

HCell compilation of survey H12078 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 H12078 were compiled to the largest scale raster charts shown below:

Chart	Scale	Edition	Edition Date	NTM Date
16549	1:80,000	16th	03/01/2010	05/22/2010
16551	1:80,000	10th	04/01/2008	09/11/2010

The following ENCs were also used during compilation:

Chart	Scale
US4AK55M	1:80,000

3. Soundings

A survey-scale sounding (SOUNDG) feature object layer was built from 4-meter multibeam combined surface in CARIS BASE Editor. A shoal-biased selection was made at 1:15,000 survey scale using a Radius Table file with values shown in the table, below.

Shoal Limit (m)	Deep Limit (m)	Radius (mm)
-5	10	3
10	20	4
20	50	4.5
50	500	5

In CARIS BASE Editor soundings were manually selected from the high density sounding layers (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	Metric Equivalent to Chart Fathoms, Arithmetically Rounded	Metric Equivalent of Chart Fathoms, with NOAA Rounding Applied	Fathoms with NOAA Rounding Applied	Fathoms with NOAA Rounding Removed for Display on H12078_SS.000
0	0.0000	0.2286	0.125	0
3	5.4864	5.715	3.125	3
5	9.144	9.373	5.125	5
10	18.288	18.517	10.125	10
20	36.576	37.948	20.750	20
30	54.864	56.2356	30.750	30
40	73.152	74.5236	40.750	40
50	91.44	92.812	50.750	50

With the exception of zero contours included in the *_CS file, contours have not been de-conflicted against shoreline features, soundings and hydrography, as all other features in the *_CS file and soundings in the *_SS have been. This may result in conflicts between the *_SS file contours and HCell features at or near the survey limits. Conflicts with M_QUAL, COALNE, DEPCNT and SBDARE objects 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 H12078:

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 de-conflicted 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
COALNE	GC coastline
DEPCNT	Zero contours
M_QUAL	Data quality meta object
OBSTRN	Obstruction areas
SBDARE	Ledge, reef, rocky seabed areas and bottom samples
SOUNDG	Soundings at the chart scale density
UWTROC	Rocks
WEDKLP	Kelp
WRECKS	Wreck

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 and feet
Height Units (HUNI):	Feet
Positional Units (PUNI):	Meters

During creation of the HCell in CARIS BASE Editor and CARIS S-57 Composer, all soundings and features are maintained in metric units with as high precision as possible. Depth units for soundings measured with sonar maintain millimeter precision. Depths on rocks above MLLW and heights on islets above MHW are typically measured with range finder, so precision is less. Units and precision are shown below.

BASE Editor and S-57 Composer Units:

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

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.

10. QA/QC and ENC Validation Checks

H12078 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

H12078_CS.000	Base Cell File, Chart Units, Soundings and features compiled to 1:80,000
H12078 _SS.000	Base Cell File, Chart Units, Soundings and Contours compiled to 1:15,000
H12078 _DR.pdf	Descriptive Report including end notes compiled during office processing and certification, the HCell Report, and supplemental items
H12078 _Outline.gml	Survey outline
H12078 _Outline.xsd	Survey outline

11.2 Software

CARIS HIPS Ver. 6.1	Inspection of Combined BASE Surfaces
CARIS BASE Editor Ver. 2.2	Creation of soundings and bathy-derived features, meta area objects, and blue notes; Survey evaluation and verification; Initial HCell assembly.
CARIS S-57 Composer Ver. 2.0	Final compilation of the HCell, correct geometry and build topology, apply final attributes, export the HCell, and QA.
CARIS GIS 4.4a	Setting the sounding rounding variable for conversion of the metric HCell to NOAA charting units with NOAA rounding.
CARIS HOM Ver. 3.3	Perform conversion of the metric HCell to NOAA charting units with NOAA rounding.
HydroService AS, dKart Inspector Ver. 5.1	Validation of the base cell file.
Northport Systems, Inc., Fugawi Marine ENC Ver.3.1.0.435	Independent inspection of final HCells using a COTS viewer.

12. Contacts

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

Katie Reser
Physical Scientist
Pacific Hydrographic Branch
Seattle, WA
206-526-6864
katie.reser@noaa.gov

APPROVAL SHEET
H12078

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

Katie Reser
2010.10.19
13:06:08 -07'00'

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

Digitally signed by
Russ Davies
Date: 2010.10.19
13:50:07 -07'00'

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

Digitally signed by Gary C. Nelson
DN: cn=Gary C. Nelson, o=NOAA, ou=Pacific Hydrographic Branch, email=gary.nelson@noaa.gov, c=US
Date: 2010.10.19 13:54:58 -07'00'

Rachel Medley
AWOIS and SURF
Check Complete
2010.10.22 11:59:14
-04'00'