

H11632

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-10-17-06

Registry No. H11632

LOCALITY

State Washington

General Locality The Straits of Georgia

Sublocality Alden Bank to Matia Island

2006

CHIEF OF PARTY

Commander Guy T. Noll, NOAA

LIBRARY & ARCHIVES

DATE

NOAA FORM 77-28 (11-72) <p style="text-align: center;">U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION</p> <p style="text-align: center;">HYDROGRAPHIC TITLE SHEET</p>	REGISTRY No H11632
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
<p>State <u>Washington</u></p> <hr/> <p>General Locality <u>The Straits of Georgia</u></p> <hr/> <p>Sub-Locality <u>Alden Bank to Matia Island</u></p> <hr/> <p>Scale <u>1:10,000</u> Date of Survey <u>September 12 to October 24, 2006</u></p> <hr/> <p>Instructions dated <u>8/15/2006</u> Project No. <u>OPR-N161-RA-06</u></p> <hr/> <p>Vessel <u>S-221, Launches 1103, 1021, 1016, 1015 and 1006</u></p> <hr/> <p>Chief of party <u>CAPT Guy T. Noll, NOAA</u></p> <hr/> <p>Surveyed by <u>Jacobson, Evans, Gendron</u></p> <hr/> <p>Soundings by echo sounder, hand lead, pole <u>Reson 8101 and 8125, Elac 1180 and 1050D, Knudsen 320M</u></p> <hr/> <p>Graphic record scaled by <u>N/A</u></p> <hr/> <p>Graphic record checked by <u>N/A</u> Automated Plot <u>N/A</u></p> <hr/> <p>SAR by <u>K. Reser</u> Compilation by <u>Kurt Brown</u></p> <hr/> <p>Soundings in <u>Fathoms at MLLW</u></p> <hr/>	
<p>REMARKS: <u>All times are UTC. UTM Projection Zone 10</u></p> <hr/> <p><u>The purpose of this survey is to provide contemporary surveys to update National Ocean Service (NOS) nautical charts. All separates are filed with the hydrographic data. Revisions and end notes in red were generated during office processing. Page numbering may be interrupted or non sequential.</u></p> <hr/> <hr/> <hr/>	

Descriptive Report to Accompany Hydrographic Survey H11632

Project OPR-N161-RA-06
The Straits of Georgia
Alden Bank to Matia Island
Scale 1:10,000
September to October, 2006
NOAA Ship RAINIER (s221)
Chief of Party: Commander Guy T. Noll, NOAA

A. AREA SURVEYED

This hydrographic survey was completed as specified by Hydrographic Survey Letter Instructions OPR-N161-RA-06 dated August 15, 2006, Change No. 1 to these instructions dated August 24, 2006, and all other applicable direction¹, with the exception of deviations noted in this report. The survey area is NW of the junction of the Strait of Georgia and Rosario Strait, in the vicinity of Alden Bank and Matia Island. This survey corresponds to sheet "F" in the sheet layout provided with the Letter Instructions. OPR-N161-RA-06 responds to a request from the Puget Sound Pilots Association to provide full-bottom multibeam coverage to address critical areas and inadequate chart data. Specifically, investigation of the south end of Alden Bank was requested by the Puget Sound Pilots Association to assess the suspected migration of the bank into the adjacent traffic lane.

The survey area was surveyed with a combination of 100% multibeam echosounder (MBES) and 200% side scan sonar (SSS) coverage, as described in Section B. The inshore survey limit was the Navigable Area Limit Line, as defined in Hydrographic Surveys Technical Directive 2006-1. In areas covered with 200% SSS, additional MBES coverage was obtained to acquire least depths over significant features or shoals, as appropriate for this survey. Except as noted below, vertical beam echo sounder (VBES) data were acquired in depths from 4 to 20 meters to define the navigable area limit, aid in the planning of MBES data acquisition, and provide inshore bathymetry in navigationally significant areas.

¹ Standing Instructions for Hydrographic Surveys (July 2006), NOS Hydrographic Surveys Specifications and Deliverables (June 2006), OCS Field Procedures Manual for Hydrographic Surveying (May 2006), and all Hydrographic Surveys Technical Directives issued through November 1, 2006.

Data Acquisition Type	S221	1103	1021	1016	1006	1015	Total
VBES (mainscheme)	-	8.57	-	-	-	-	8.57
MBES (mainscheme)	6.01	-	64.35	7.85	62.16	52.16	192.53
MBES + SSS (mainscheme)	-	-	-	-	-	66.43	66.43
XL (VBES+MBES)	-	-	-	-	11.79	1.35	13.14
DEV (VBES+MBES)	-	4.31	-	34.23	8.69	-	47.23
Shoreline	-	3.2	-	-	-	-	3.2
Bottom Sample	-	11	-	-	-	-	11
Square Nautical Miles	-	-	-	-	-	-	21.582
Features Investigated	-	-	-	-	-	-	0
Data Acquisition Dates	255	256, 279, 280	279, 280, 284	282, 284, 296	256, 280, 281, 283, 284, 296, 297	279, 280, 281	-

Table 1. Statistics for Survey H11632

Data acquisition was conducted from 12 September to 24 October 2006 (DN 255 to DN 297).

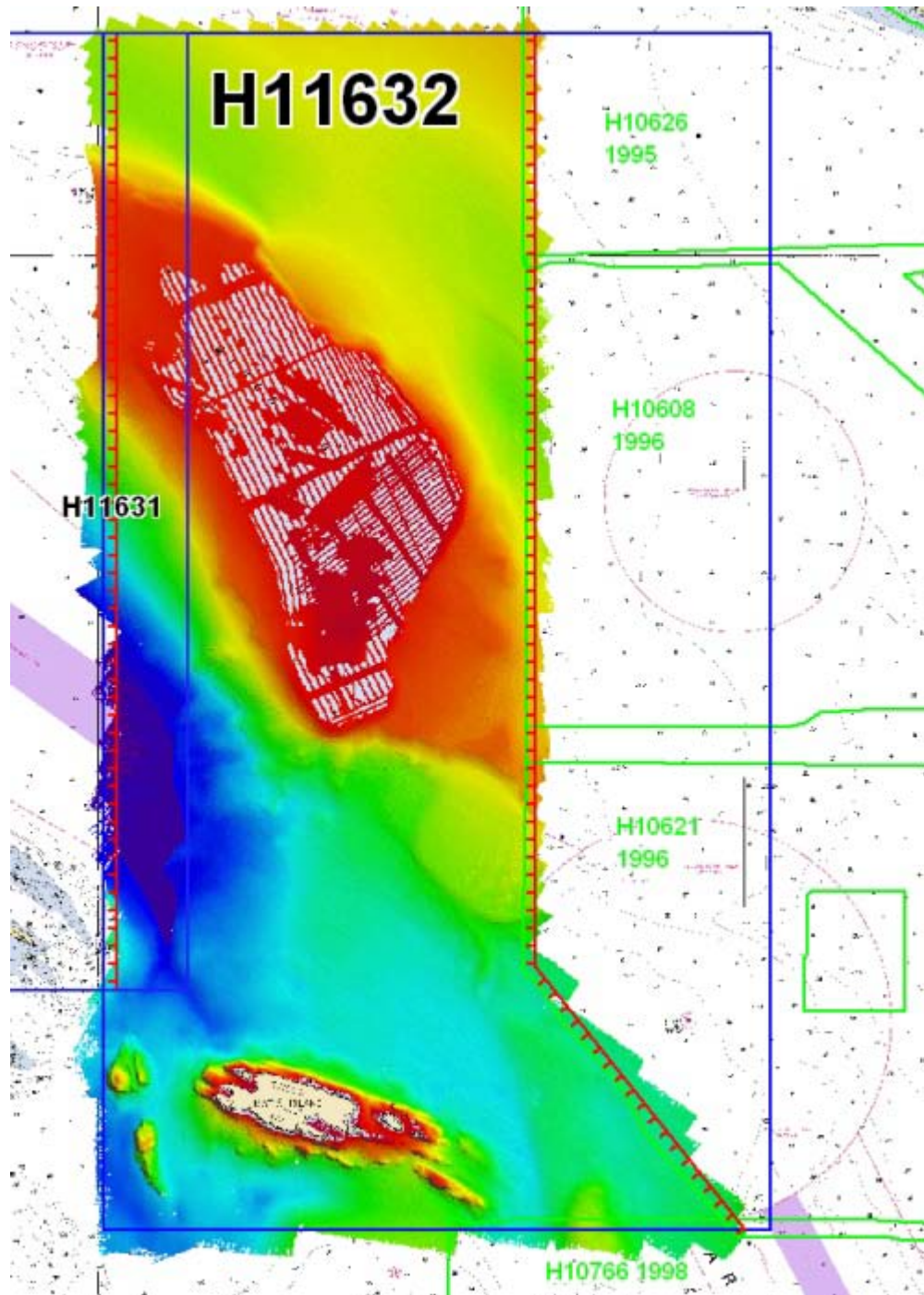


Figure 1. H11632 Survey limits with junction surveys (Chart 18431)

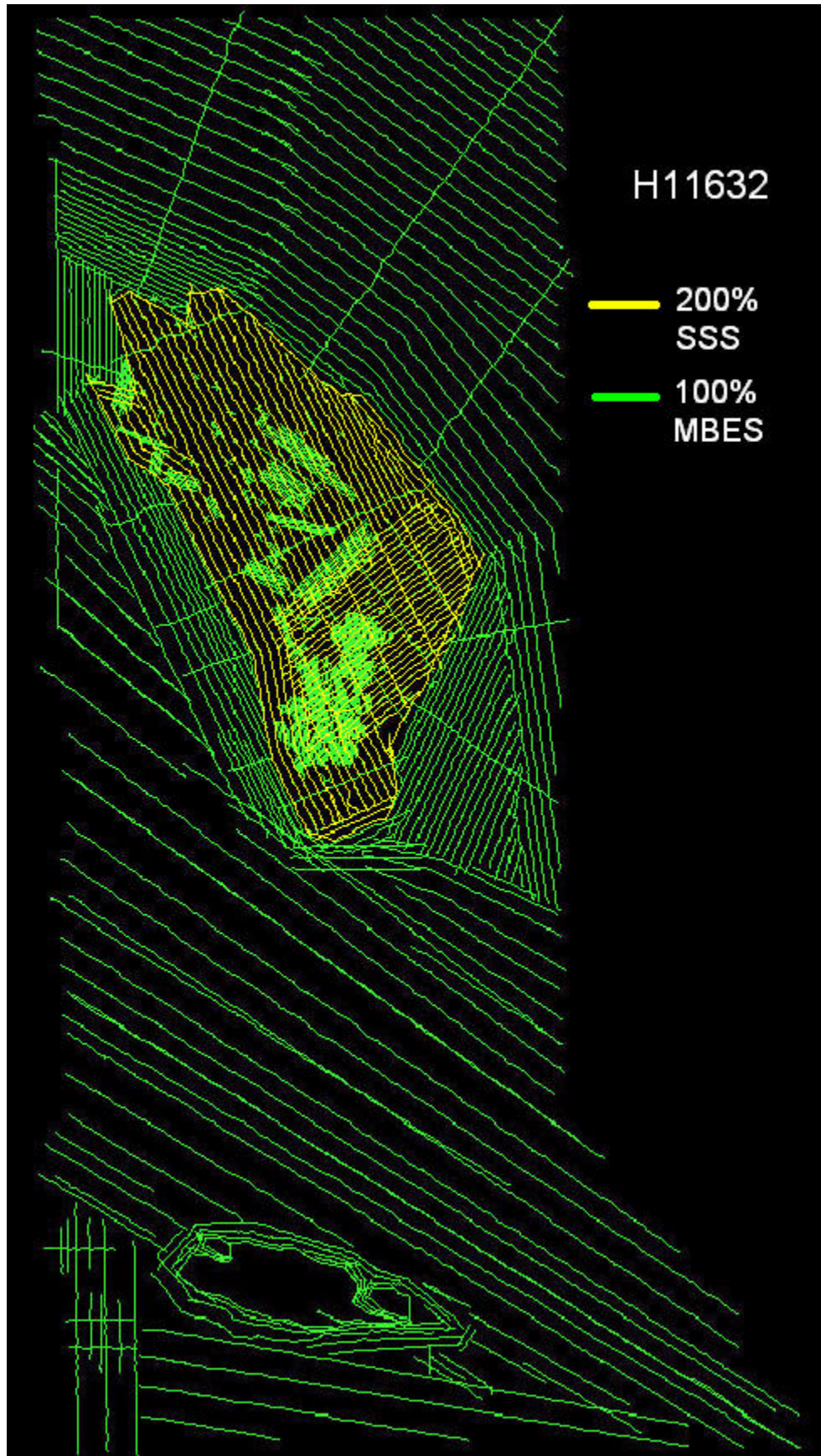


Figure 2. H11632 Survey acquisition lines

B. DATA ACQUISITION AND PROCESSING

RAINIER employed a mix of 200% side scan sonar and 100% multibeam echosounder coverage to most efficiently acquire 100% bottom coverage of the survey area, as shown in Figure 2. Two hundred percent SSS with “skunk stripe” MBES bathymetry was employed in depths shoaler than 20m on Alden Bank. Significant contacts were later developed by high resolution MBES. In all other areas, 100% MBES was acquired in all areas seaward of the NALL. A complete description of data acquisition and processing systems, survey vessels, quality control procedures and data processing methods can be found in the *OPR-N161-RA-06 Data Acquisition and Processing Report (DAPR)*,¹ submitted under separate cover. Items specific to this survey, and any deviations from the aforementioned report are discussed in the following sections.

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

B1. Equipment and Vessels

Data for this survey were acquired by the following vessels:

Hull Number	Name	Acquisition Type
s221	RAINIER	Multibeam Echosounder
1103	RA-2	Vertical beam Echosounder Detached Positions Bottom Samples
1021	RA-3	Multibeam Echosounder
1016	RA-4	Multibeam Echosounder
1006	RA-5	Multibeam Echosounder
1015	RA-6	Multibeam Echosounder Side Scan Sonar

Table 2. Data acquisition vessels used on H11632.

Sound speed profiles were measured with SEACAT SBE-19 and 19*plus* profilers in accordance with the Specifications and deliverables.

No unusual vessel configurations were used for data acquisition.

B2. Quality Control

Crosslines

Vertical Beam Echo Sounder (VBES) crosslines were not run on Survey H11632.

Multibeam Echosounder (MBES) crosslines totaled 13.2 nautical miles, comprising 6.1% of MBES hydrography. The mainscheme bathymetry was manually compared to the crossline nadir beams in CARIS subset mode and agreed very well with no discernable differences in depths less than 100m depths. In depths greater than 100m in the SW corner of the survey, differences between crossline and mainscheme soundings were 1 to 2 meters.²

A statistical Quality Control Report has been conducted on representative data acquired with each system used on this survey. Results of these tests are included in the updated 2006 Hydrographic System Readiness Review package³ submitted with this survey.

Junctions

The following contemporary survey junctions with H11632 (See Figure 1):

<u>Registry #</u>	<u>Scale</u>	<u>Date</u>	<u>Junction side</u>
H11631	1:10,000	2006	West
H10626	1:10,000	1995	Northeast
H10608	1:10,000	1995	East
H10621	1:10,000	1995	East-Southeast
H10766	1:10,000	1998	South-Southeast

Survey H11631 junctions well with this survey, a cursory comparison in Subset Editor indicates differences are generally within 0.2 meter.⁴

No data were supplied for comparison with the surveys completed in 1995 -1998.

Data Quality Factors

Coverage Gaps

The survey has several small gaps in coverage, as described below:

- 1) On Alden Bank, there are several areas where 200% SSS or 100% MBES was not completely achieved (see Figure 3). However, the regions missing the second coverage of side scan are free of features. The hydrographer recommends that the full bottom coverage be considered complete despite these gaps in 200% SSS, and that survey data supersede all charted and prior survey data in the common area.⁵

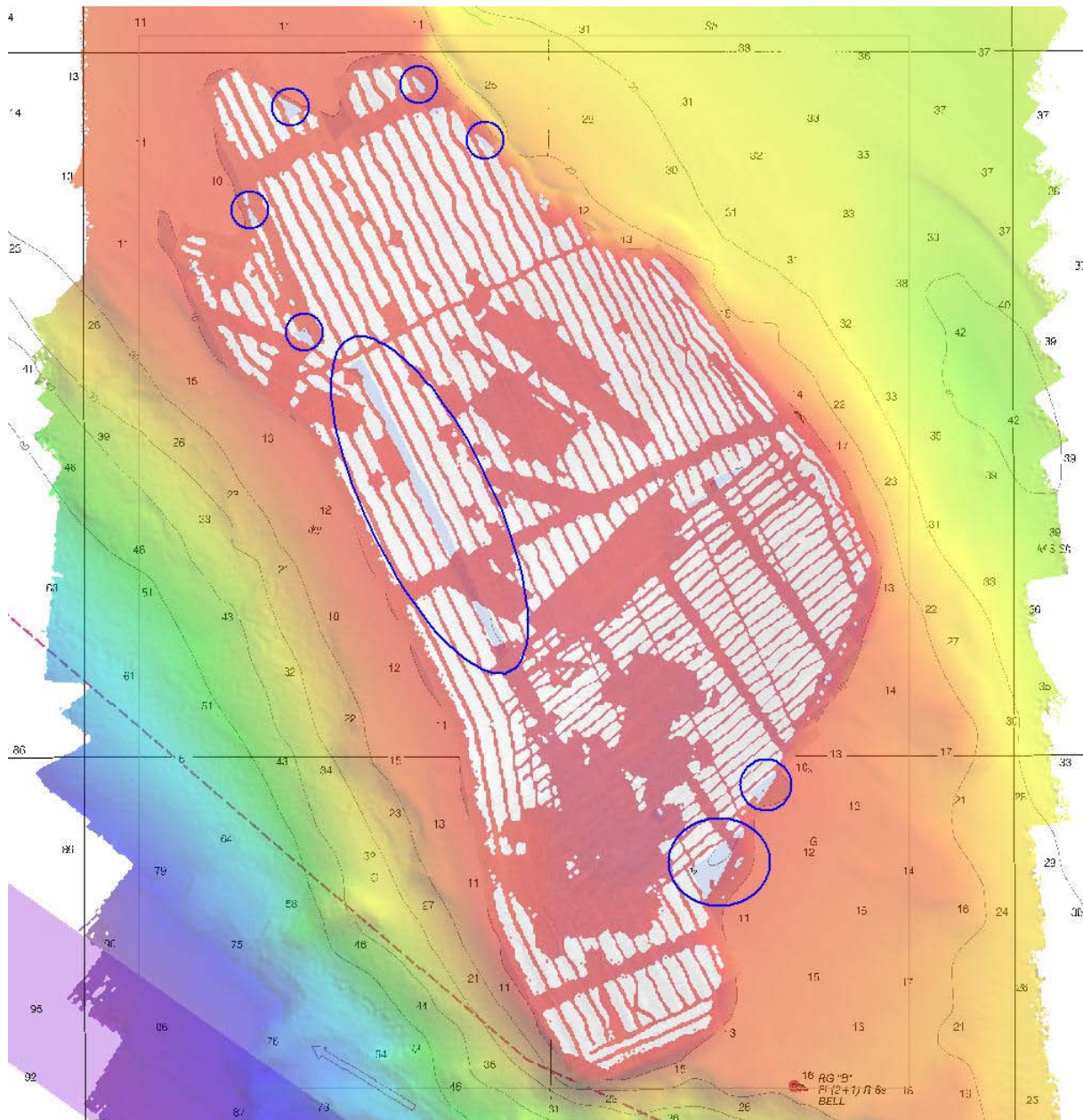


Figure 3. Holidays in 200% SSS and 100% MBES coverage on Alden Bank. All gaps were covered by first 100% SSS coverage layer, and are free of features.

- 2) As described in the *OPR-N161-RA-06 DAPR*, the Elac 1180 and 1050D MBES systems produce data which is too sparse to meet NOAA coverage requirements. In survey H11632, this sparse coverage left numerous nodes unpopulated in the 5m resolution BASE surface between 100 and 150m. There is no evidence of features or shoaling in these areas, and the hydrographer recommends that the coverage be considered complete despite the gaps.⁶

B3. Data Reduction

Data reduction procedures for survey H11632 conform to those detailed in the *OPR-N161-RA-06 DAPR* and meet the requirements of NOS Specifications and Deliverables.

B4. Data Representation

Many BASE surfaces were used for the processing of H11632. The field sheet structure and CUBE surfaces submitted are shown in Figures 4 to 9. Final CUBE surface resolutions and depth ranges were set in accordance with the Field Procedures Manual. The submission field sheets have fewer than 25×10^6 nodes.

Side Scan Sonar data was split into two complete coverage mosaics to demonstrate areas covered by this technique. These mosaics were created at 2-meter resolution and named “H11632_SSS_100%” and “H11632_SSS_200%” and are shown below in Figures 10 and 11.















































-  H11632_10m
-  10m
-  10m_Final
-  H11632_Combined_10m
-  H11632_5m_A
-  5m_A
-  5m_A_Final
-  H11632_5m_B
-  5m_B
-  5m_B_Final
-  H11632_2m_A
-  2m_A
-  2m_A_Final
-  H11632_2m_B
-  2m_B
-  2m_B_Final
-  H11632_2m_C
-  2m_C
-  2m_C_Final
-  H11632_2m_D
-  2m_D
-  2m_D_Final
-  H11632_1m_A
-  1m_A
-  1m_A_Final
-  H11632_1m_B
-  1m_B
-  1m_B_Final
-  H11632_1m_C
-  1m_C
-  1m_C_Final
-  H11632_1m_D
-  1m_D
-  1m_D_Final
-  H11632_50cm_A
-  50cm_A
-  50cm_A_Final
-  H11632_50cm_B
-  50cm_B
-  50cm_B_Final
-  H11632_50cm_C
-  50cm_C
-  50cm_C_Final
-  H11632_50cm_D
-  50cm_D
-  50cm_D_Final

Figure 4. Field sheets and BASE surfaces submitted with H11632

- H11632_50cm_E
- 50cm_E
- 50cm_E_Final
- H11632_50cm_F
- 50cm_F
- 50cm_F_Final
- H11632_50cm_G
- 50cm_G
- 50cm_G_Final
- H11632_50cm_H
- 50cm_H
- 50cm_H_Final
- H11632_50cm_I
- 50cm_I
- 50cm_I_Final
- H11632_50cm_J
- 50cm_J
- 50cm_J_Final
- H11632_50cm_K
- 50cm_K
- 50cm_K_Final
- H11632_SSS_100%
- SSS_100%
- H11632_SSS_200%
- SSS_200%

Figure 5. Field sheets and BASE surfaces submitted with H11632

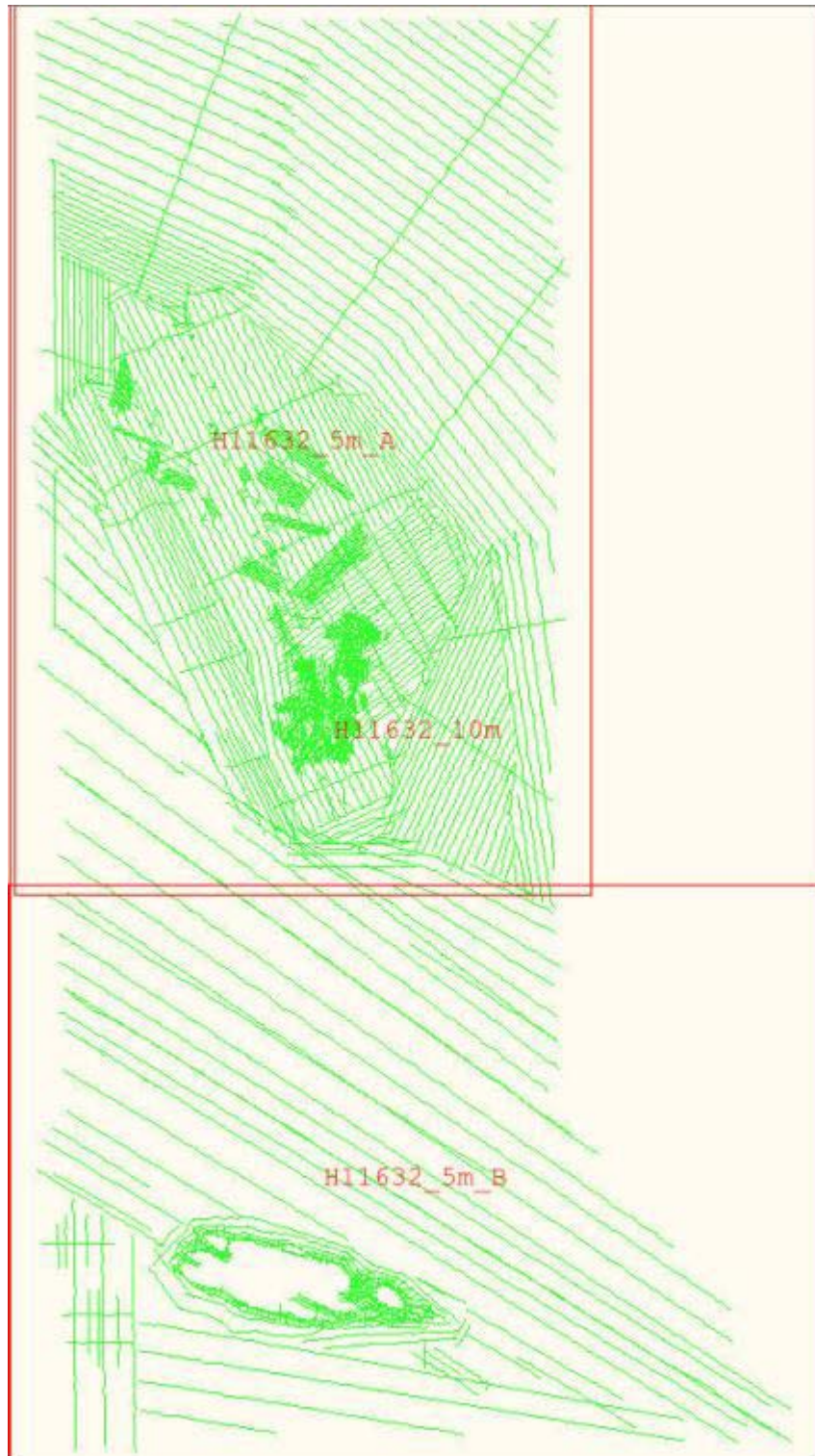


Figure 6. Layout of 10m – 5m resolution field sheets and BASE surfaces for H11632.

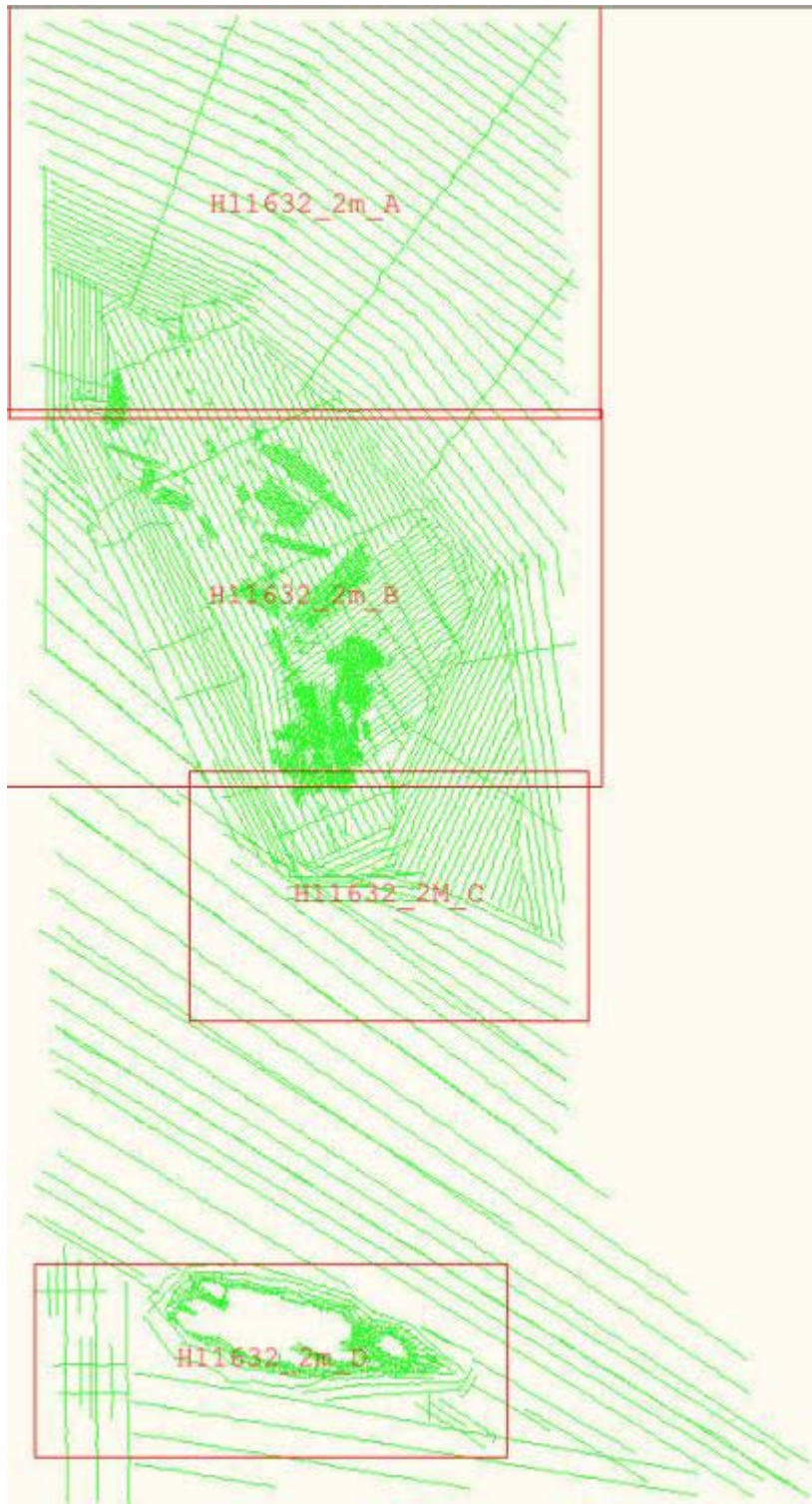


Figure 7. Layout of 2m resolution field sheets and BASE surfaces for H11632

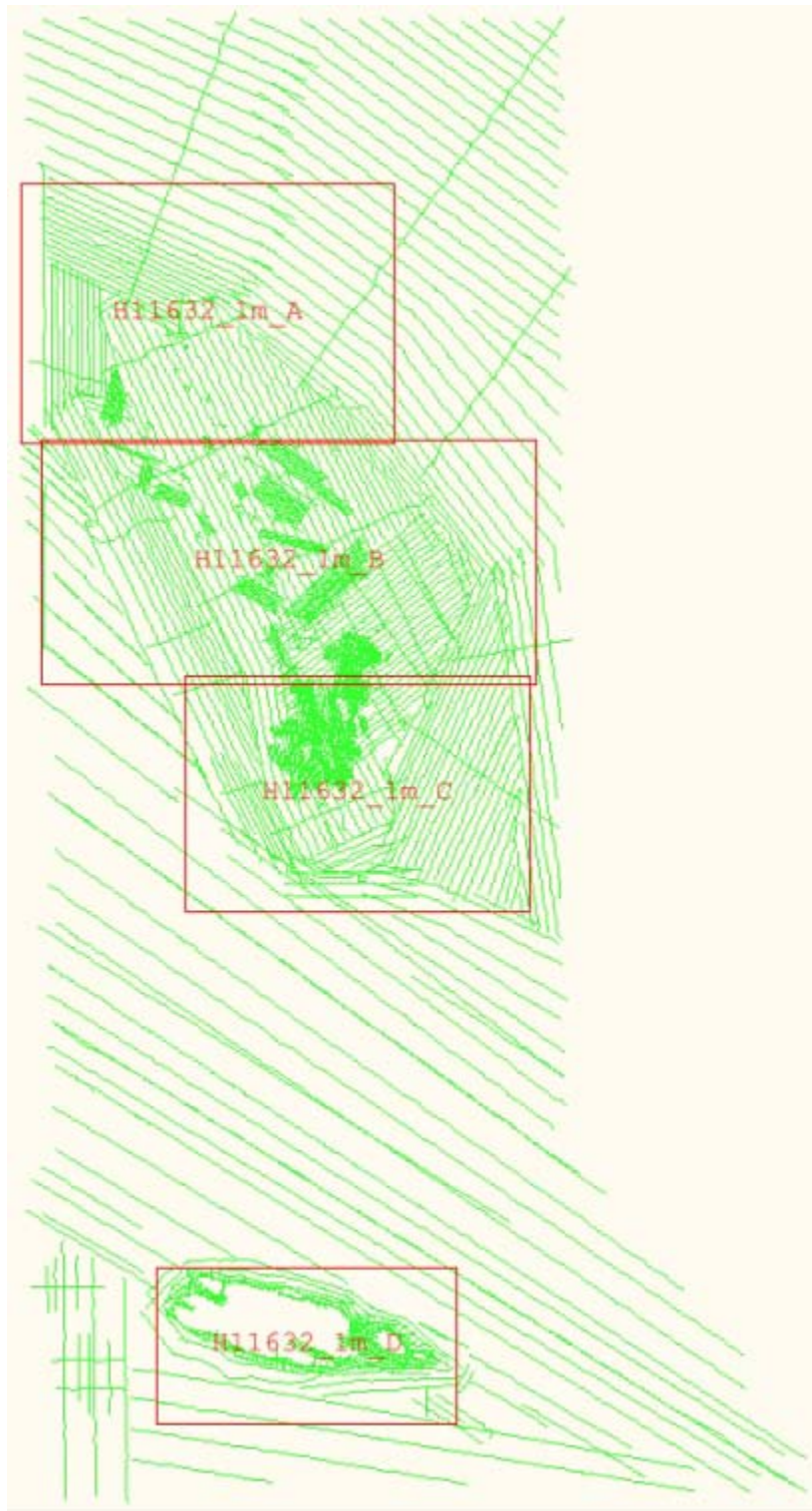


Figure 8. Layout of 1m resolution field sheets and BASE surfaces for H11632



Figure 9. Layout of 50cm field sheets and BASE surfaces for H11632

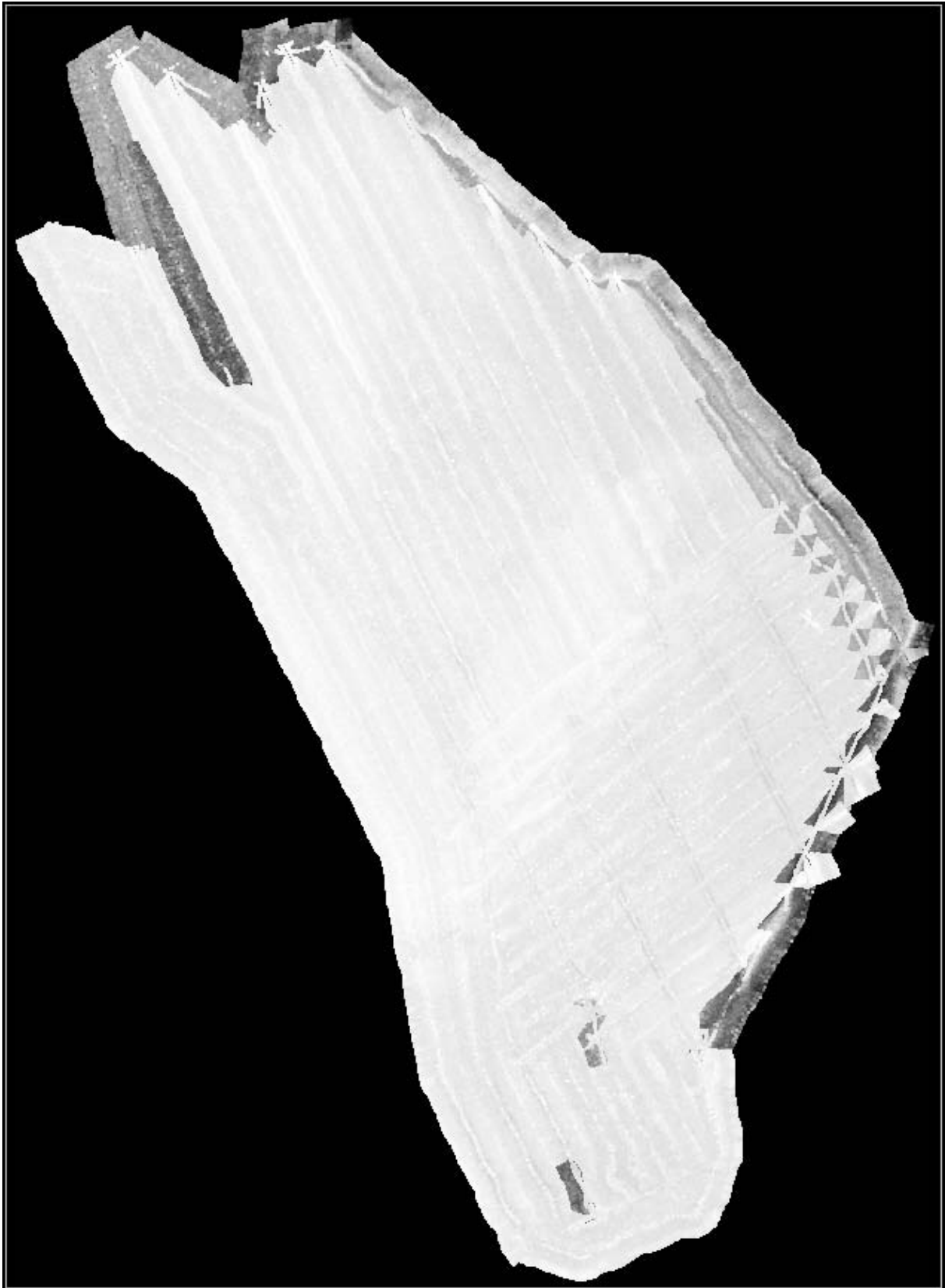


Figure 10. 100% side-scan mosaic over Alden Bank for H11632



Figure 11. 200% side-scan mosaic over Alden Bank for H11632

C. VERTICAL AND HORIZONTAL CONTROL

Project OPR-N161-RA-06 did not required either horizontal control work or subordinate tide station installation and thus no Horizontal and Vertical Control Report will be submitted.

Horizontal Control

The horizontal datum for this project is the North American Datum of 1983 (NAD83). Differential GPS (DGPS) was the sole method of positioning. The differential corrector beacons utilized for this survey are given in Table 3.

Location	Frequency	Custodian	Range	Priority
Whidbey Island, WA.	302kHz	USCG	28nm	Primary

Table 3. Differential Corrector Sources for H11632

Vertical Control

The vertical datum for this project is Mean Lower-Low Water (MLLW). The operating National Water Level Observation Network (NWLON) tide stations at Friday Harbor, WA. (944-9880) and Cherry Point, WA (944-9424) served as control for datum determination and sources for water level reducers for survey H11632.

No tertiary gauges were required.

Final Approved Water Levels for H11632 were requested from CO-OPS on November 2nd, 2006, and received on November 27th, 2006. This documentation is included in Appendix IV.

D. RESULTS AND RECOMMENDATIONS

D.1. Chart Comparison

D.1.a. Survey Agreement with Chart

RAINIER personnel compared H11632 survey data with the most recent editions of the paper, raster, and electronic nautical charts with coverage of the survey area during data acquisition and processing. The results of these comparisons are described below, as well as in Sections D.2.b. through D.2.f.

H11632 survey soundings were formally compared with depths on the following chart:⁷

Chart	Scale	Edition and Date	Notice to Mariners Applied Through
18430	1:25,000	8 th Ed Oct 2003	30 September 2003
18431	1:25,000	7 th Ed Apr 2005	26 April 2005

Table 4. Charts compared with H11632

Overall, H11632 survey soundings agreed with charted depths and contours to within one to two fathoms, except as noted below.⁸

Immediately north of Matia Island, survey contours were found to be slightly inshore of charted depth curves, and survey soundings were slightly deeper than charted depths. The hydrographer reasons that this may be due to cartographic generalization during chart compilation to avoid clutter near the charted shoreline.⁹

One of the primary areas of concern for H11632 was the Alden Bank area, particularly the southern tip which was suspected of migrating south into the Strait of Georgia traffic lane. A comparison to this chart does show a minor change in the shape of southern Alden Bank, but the effect on the traffic lane is negligible (see Figure 12).¹⁰ Comparison of the 10 and 20 fathom survey contours with charted depth curves indicates that the shoal has extended ~25m to the south and ~35-40m to the west. On the southeast corner of the shoal, the 10 fathom contour appears to have moved approximately 35m to the west. The 30-fathom curve appears to be largely unchanged.¹¹

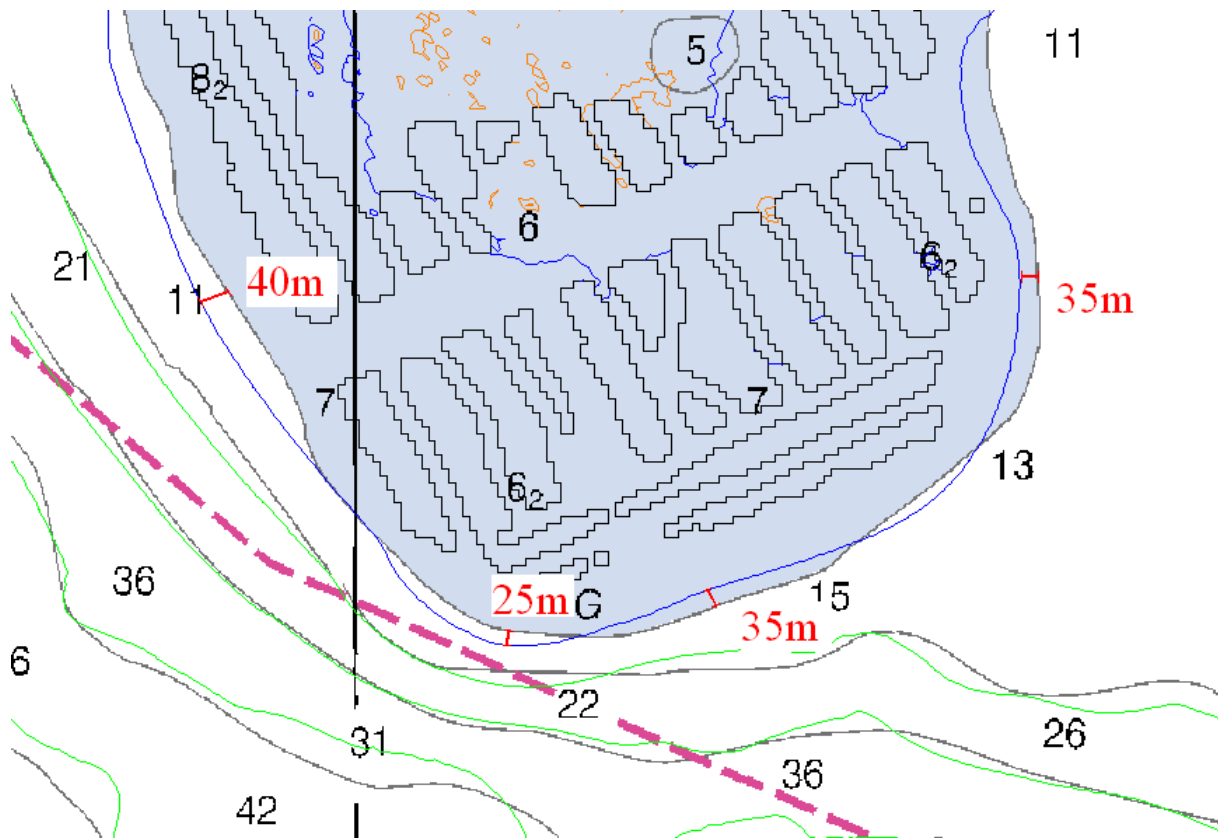


Figure 12. H11632 contours overlaid on southern Alden Bank (chart 18431)

D.1.b. Dangers to Navigation

No dangers to navigation (DTONs) were found in survey H11632.

D.1.c. Other Features

Two spots of scattered kelp are charted on southern Alden Bank. Although minor kelp was observed throughout the shoals of Alden Bank, the area of greatest concentration was found ~800 meters southwest of the charted positions. This kelp area was defined with a buffer-line and delineated in the H11632_Field_Verified_Composite_Source.hob file as a weed/kelp area.¹²

Numerous rocks were found in the SSS and bathymetry covering the Alden Bank area. Least depths not represented in the CUBE surfaces were flagged as designated soundings to be preserved in their respective CUBE surfaces. In order to ease the processing burden in Pydro, five (5) areas were delineated (see Figure 13) where one primary rock was selected to represent the entire area. All remaining features in that region were designated as secondary in the PSS. The hydrographer recommends charting a “rocky” notation on raster charts at each of these five “primary” representative rocks rather than a charted submerged rock symbol for each designated feature.¹³

For ENCs, these five regions were combined to create two (2) regions (see Figure 14) that were delineated in Notebook as rock seabed areas. The hydrographer recommends that “rocky seabed” is assigned these two areas on the ENC rather than a charted submerged rock symbol for each designated feature.¹⁴

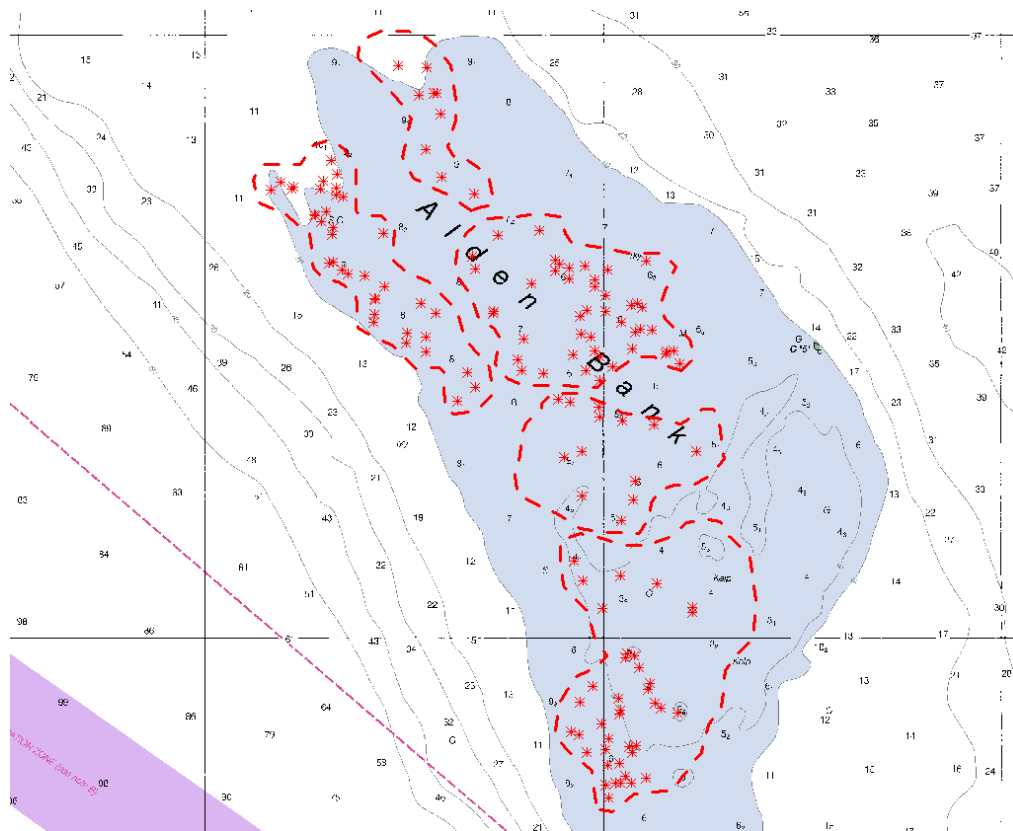


Figure 13. The five regions used in Pydro to assign secondary contacts to five “primary” representative rocks.

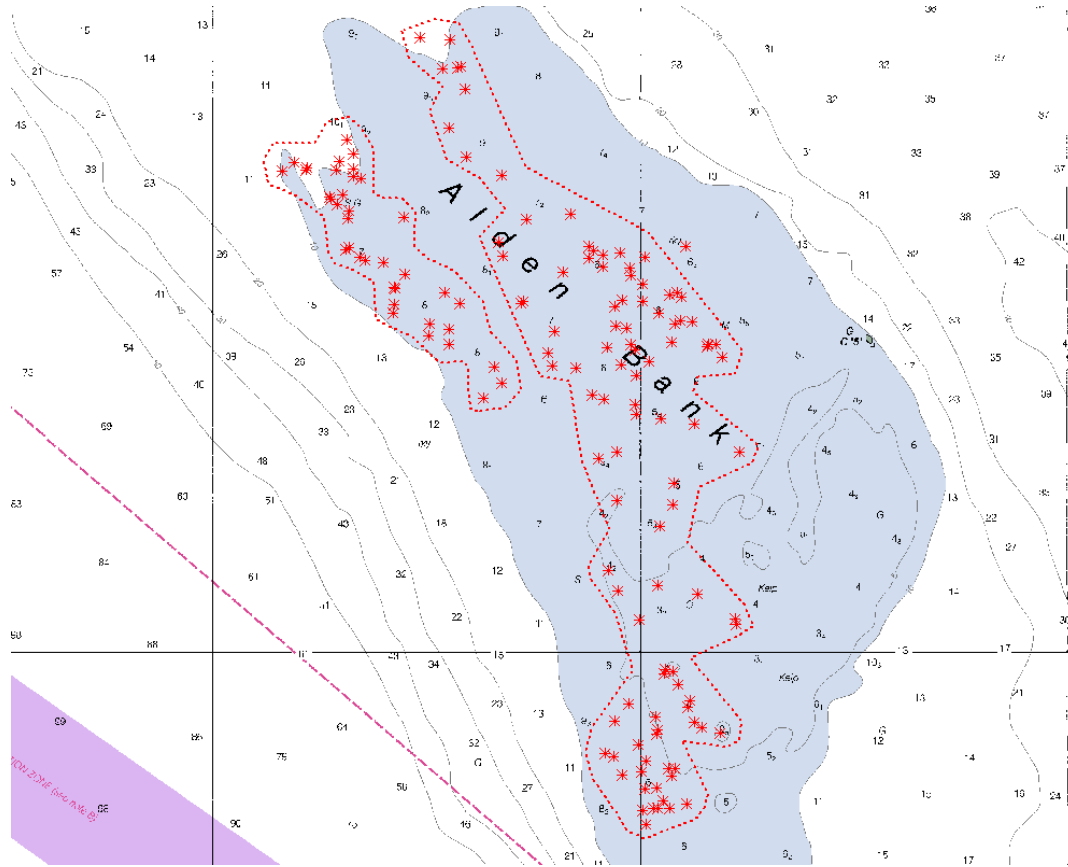


Figure 14. Two areas on Alden Bank recommended to be designated as 'rocky' seabed areas

The mooring buoy west of Rolfe Cove on Matia Island was not found at its charted location (see Figure 15). Two public mooring buoys were found in inner Rolfe Cove, and are included in the Notebook H11632_Pydro_Updates.hob file (see Section D.2.b below)¹⁵

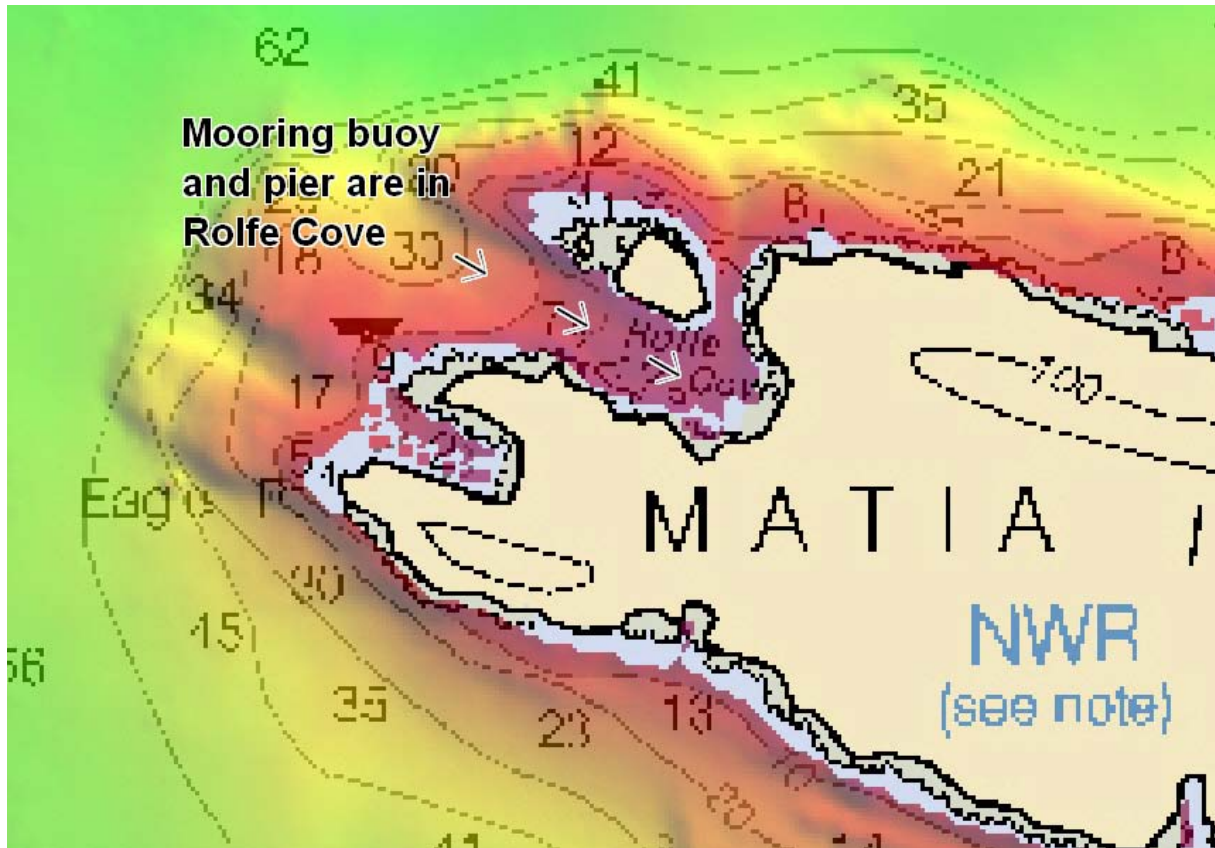


Figure 15. Location of mooring buoy and pier (Chart 18430)

D.2. Additional Results

D.2.a. Prior Survey Comparison

Prior survey comparison with H11632 was not performed.

D.2.b. Shoreline Verification

Shoreline Source

Features shown on the current edition of chart 18431 that were not depicted on the shoreline source document were digitized in MapInfo by RAINIER personnel and displayed in Hypack for field verification.

Shoreline Verification

A zero or negative tide window did not occur during daylight hours while RAINIER was in the OPR-N161-RA-06 project area. Shoreline verification was performed during the lowest available daylight tides. See table below for tidal heights of shoreline verification.

Day Number	Date	Times of acquisition (UTC)	Highest Tide (m)	Lowest Tide (m)
280	October 7th, 2006	17:01:15 – 17:41:54	0.89	0.79

Table 5. Dates, times, and tidal heights of shoreline verification acquired on H11632

Detached positions (DPs) taken during shoreline verification were recorded in HYPACK, logged on DP forms, and processed in Pydro. These indicate revisions to features and features not found on the verified shoreline. In addition, annotations describing shoreline were recorded on hard copy plots of digital shoreline. DP forms are included in the *Separates to be Included with Survey Data*.

All shoreline data is submitted in Caris Notebook .hob files. The session H11632_Notebook contains the following:¹⁶

HOB File	Purpose and Contents
H11632_Composite_Source.hob	Original Source data as filtered from ENC cell US5WA41M
H11632_Reference.hob	Survey outline and limit lines, and AWOIS item position and radius
H11632_Field_Verified_Composite_Source.hob	Field verified source features and shoreline, including edits and updates not requiring DPs
H11632_PydroUpdates.hob	New or modified items processed through Pydro, including DPs and Bottom Samples

Table 6. H11632 Notebook .hob files

Source Shoreline Changes and New Features

Items for survey H11632 that require further discussion and are associated with a detached position, have been flagged “Report” in Pydro in H11632.pss. Investigation methods and recommendations are listed in the Remarks and Recommendation tabs. These features are included in the Survey Feature Report in Appendix II.¹⁷

Recommendations

The hydrographer recommends that the shoreline as depicted in the Notebook .HOB files supersede and complement shoreline information compiled on charts as described above.¹⁸

D.2.c. Aids to Navigation

Survey H11632 included four aids to navigation (ATONs). Each ATON’s position was visually checked in the field against the digital raster chart, verified by detached position. All ATONs were found to be serving their intended purpose.¹⁹

Detached positions were taken on each ATON for check purposes only. No GPS static observations were conducted for survey H11632.

D.2.d. Overhead features

There are no overhead features in survey H11632.²⁰

D.2.e. Submarine Cables and Pipelines

There are no submarine cables or pipelines charted within the limits of H11631, and none were detected by the survey.²¹

D.2.f. Ferry Routes

There are no charted ferry routes within the limits of H11632. The Alaska Marine Highway System operates ferry service between Bellingham and ports in southeast Alaska which crosses the H11632 survey area within the traffic separation scheme.²²

D.2.g. Bottom Samples

Eleven (11) bottom samples were collected in survey H11632 in accordance with the Field Procedures Manual guidance for depth, spacing, and location. Seven of the samples were collected from areas with charted bottom characteristics. Five of these samples agreed well with previously charted bottom types. The two samples that exhibited change were both located in the vicinity of Alden Bank and previously charted as “rky”. Four additional samples were obtained in coves and a shoal area near Matia Island in potential anchorage areas without currently charted bottom characteristics. Details of bottom characteristics from obtained samples can be found in the Survey Feature Report in Appendix II.²³

D.2.h Miscellaneous


Almost the entire area of Alden Bank is heavily fished for Dungeness crab. Heavy concentrations of crab pots and buoys are present over all of Alden Bank, particularly the shoaler southern half. All the crab pots and marker buoys could be a potential hazard to pleasure boaters.

E. APPROVAL

As Chief of Party, Field operations for hydrographic survey H11632 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 (June 2006 edition), Field Procedures Manual (May 2006 edition), Standing and Letter Instructions, and all HSD Technical Directives issued through October 2006. These data are adequate to supersede charted data in their common. This survey is complete and no additional work is required. All data and reports are respectfully submitted to N/CS34, Pacific Hydrographic Branch.


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

<u>Title</u>	<u>Date Sent</u>	<u>Office</u>
Data Acquisition and Processing Report for OPR-N161-RA-06	2/2/2007	N/CS34
Coast Pilot Report for OPR- N161-RA-06	12/12/2006	N/CS26


Approved and Forwarded:  2007.05.11 11:02:45 -08'00'

Guy T. Noll
 Commander, NOAA
 Commanding Officer

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

Survey Sheet Manager:  Shawn Gendron
 I am the author of this document
 2007.05.11 18:49:37 Z

D. Shawn Gendron
 Assistant Survey Technician, NOAA

Chief Survey Technician:  James B. Jacobson
 I have reviewed this document
 2007.05.11 18:32:21 Z

James B. Jacobson
 Chief Survey Technician, NOAA Ship RAINIER

Field Operations Officer:  LT Benjamin K. Evans, NOAA
 I have reviewed this document
 2007.05.11 19:10:31 Z

Benjamin K. Evans
 Lieutenant, NOAA

Revisions Compiled During Office Processing and Certification

¹ Filed with project records

² Concur

³ Filed with project records

⁴ Concur

⁵ Concur

⁶ Concur

⁷ H11632 was compared to charts 18430, 8th Edition, October 2003 and 18431, 7th Edition, April 2005.

⁸ Concur

⁹ Concur

¹⁰ Concur

¹¹ Concur

¹² Concur. Represented in HCell.

¹³ Concur with clarification. Compiler delineated two rocky seabed areas and charted UWTRCOCs at the locations where soundings were designated on the most significant rocks in the area. Rky point features will be added to the raster by MCD raster chart division at appropriated spacing to represent the rocky seabed areas. UWTRCOCs were also designated in the southern part of the rocky seabed area on several soundings shoaler than 3 fathoms.

¹⁴ Concur. Compiler delineated two rocky seabed areas in the locations recommended.

¹⁵ Concur. Two new mooring buoys inside Rolfe Cove (shown below) are included in the HCell.



¹⁶ The explanation for the delivered .hob file structure in the DR made reference to a file that was not submitted. H11632_Reference.hob was mentioned in the DR and was supposed to contain AWOIS features and radii. Since there were no AWOIS items assigned within the limits of this survey, it is likely this file does not exist and the DR references the file in error.

¹⁷ The Survey Feature Report is filed with the hydrographic records. Note: the survey feature report does not include all features from H11632. Additional features were added, some removed, and some modified in CARIS Notebook after the feature report was generated from Pydro. All features included in the compilation of H11632 have come directly from CARIS Notebook.

¹⁸ Concur

¹⁹ Chart according to latest ATONIS information.

²⁰ Concur

²¹ Concur

²² Concur

²³ 9 of the 11 bottom samples from survey H11632 were included in the HCell and 28 were bluenoted to be retained 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 : November 29, 2007

HYDROGRAPHIC BRANCH: Pacific
HYDROGRAPHIC PROJECT: OPR-N161-RA-2006
HYDROGRAPHIC SHEET: H11632

LOCALITY: Alden Bank, Matia Island, WA
TIME PERIOD: September 12 - October 24, 2006

TIDE STATION USED: 944-9880 Friday Harbor, WA
Lat. 48° 32.8'N Long. 123° 0.6' W

PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters
HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 2.167 meters

REMARKS: RECOMMENDED ZONING

Use zone(s) identified as: PS256, PS257, PS258, PS302, PS303, PS305 &
PS306

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/
NCS, email=peter.stone@noaa.gov, c=US
Date: 2010.03.22 16:46:33 -0400

CHIEF, PRODUCTS AND SERVICES DIVISION



Final Zoning
OPR-N161-RA-2006, H11632
Alden Bank, Matia Island, WA

PS305
Time Corrector +30 mins
Range Corrector x1.17
Reference 944-9880

PS306
Time Corrector +36 mins
Range Corrector x1.15
Reference 944-9880

PS302
Time Corrector +30 mins
Range Corrector x1.12
Reference 944-9880

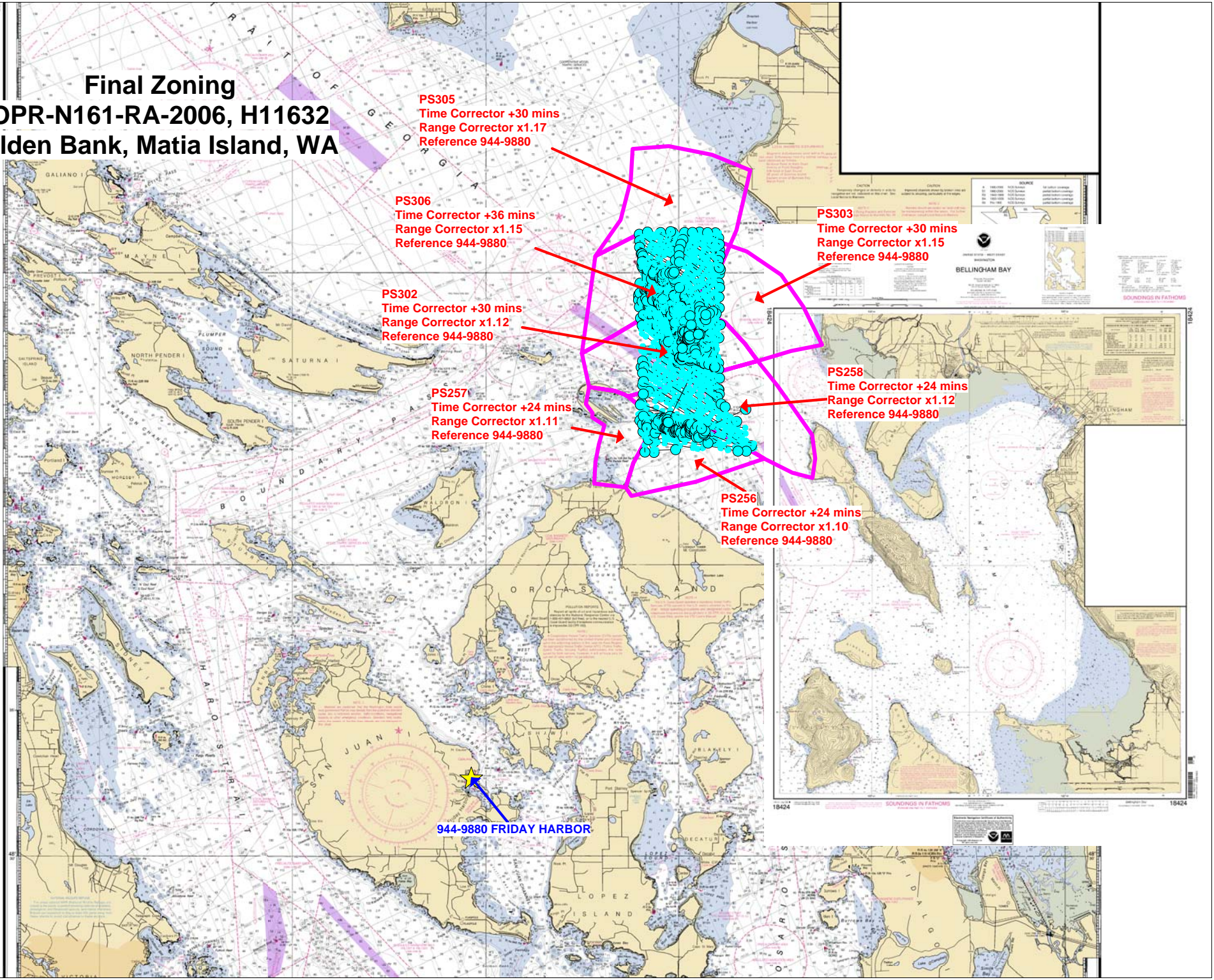
PS257
Time Corrector +24 mins
Range Corrector x1.11
Reference 944-9880

PS303
Time Corrector +30 mins
Range Corrector x1.15
Reference 944-9880

PS258
Time Corrector +24 mins
Range Corrector x1.12
Reference 944-9880

PS256
Time Corrector +24 mins
Range Corrector x1.10
Reference 944-9880

944-9880 FRIDAY HARBOR



H11632 HCell Report
Kurt Brown, Physical Scientist
Pacific Hydrographic Branch

Introduction

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

ENC US5WA40M
ENC US5WA41M
RNC18430 (1:25,000)
RNC18431 (1:25,000)

HCell compilation of survey H11632 used Office of Coast Survey DRAFT HCell Specifications Version 4.0. For additional information on the standards and protocols used for HCell Compilation, see the DRAFT A/PHB HCell Reference Guide, version 2.0, 22 February, 2010.

1. Compilation Scale

Depths for HCell H11632 were compiled to the largest scale chart in the region, 18431, 1:25,000. The survey also falls on the northernmost part of overlapping chart 18431, also 1:25,000.

2. Soundings

A survey-scale sounding feature layer, H11632_SS, was built in CARIS BASE Editor using the following BASE surface from survey H11632:

H11632_Combined_10m

A shoal-biased selection was made at 1:10,000. The resultant sounding layer contains depths ranging from 0 to 171.907 meters.

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

3. Depth Contours

Depth contours at the intervals on the largest scale chart are included in the H11632_SS HCell for MCD raster charting division to use for guidance in creating chart contours. The generalized metric and feet equivalent contour values are shown in the table below.

Chart Contour Intervals in Fathoms from Chart 17404	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 H11632_SS.000
1	2.0574	1.8288	1.125	1
2	3.8862	3.6576	2.125	2
3	5.4864	5.715	3.125	3
5	9.144	9.372	9.125	5
10	18.288	18.517	10.125	10
20	36.576	37.948	20.125	20
30	56.864	56.236	30.125	30
40	73.152	74.524	40.125	40
50	91.44	92.812	50.750	50

Contours delivered in the H11632_SS file have not been deconflicted against shoreline features, soundings and hydrography as all other features in the H11632_CS file and soundings in the H11632_SS have been. This results in conflicts between the H11632_SS file contours and HCell features at or near the survey limits. Conflicts with M_QUAL and SBDARE objects, and with DEPCNT objects representing MLLW, should be expected. HCell features should be honored over H11632_SS.000 file contours in all cases where conflicts are found.

4. Meta Areas

The following Meta object area is included in HCell 11632:

M_QUAL

The meta area object was constructed on the basis of the limits of the hydrographic data.

5. Features

5.1 Generalization of Features to Chart Scale

Features addressed by the field units are delivered to PHB where they are deconflicted against the hydrography and the largest scale chart. These features, as well as features to be retained from the chart and features digitized from the Base surface are included in the HCell. The geometry of these features is modified to emulate chart scale.

Feature generalization to emulate chart scale is accomplished primarily through reduction in the number of features included in the HCell, and in some cases generalizing area features to point objects. Some instances of reduction of area features to point objects is

entrusted to the RNC division, for example rocky seabed areas that will display as point features on the RNC. Where line and area objects are included in the HCell, complexity of the lines and edges comprising the features have been smoothed to commensurate with chart scale.

5.2 Compilation of Features to the HCell

Shoreline features for H11632 were delivered from the field in several .hob files described in the DR. The files contained new features, modification to GC or charted features, and disprovals. These were deconflicted against GC shoreline, the chart and hydrography during office processing.

During office processing 2 rocky seabed areas were digitized from the high resolution BASE surfaces. Several new UWTROCS and kelp areas were also included in the HCell.

; 'bottom samples were imported from the survey into the HCell.

There were no DTONs reported from survey H11632

There were no AWOIS items were included in survey H11632.

The source of all features included in the H11632 HCell can be determined by the SORDAT and SORIND fields.

5.3 Mean High Water Used for HCells

For the purposes of determining the height at which a rock becomes an islet, the CO-OPS *“Tide Note for Hydrographic Survey”*, *“Height of High Water Above the Plane of Reference”* is used.

6. S-57 Objects and Attributes

The H11632_CS HCell contains the following Objects:

SOUNDG	Chart scale soundings
UWTROC	Rock features
SBDARE	Bottom samples, rocky seabed areas and ledges
M_QUAL	Data quality Meta object
\$CSYMB	Blue notes
WEDKLP	Kelp areas
BOYSPP	Private mooring buoys

The H11632_SS HCell contains the following Objects:

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

All S-57 Feature Objects in the H11632_CS HCell have been attributed as fully as possible based on information provided by the Hydrographer and in accordance with current guidance and the OCS HCell Specifications.

7. Blue Notes

Notes to the RNC and ENC chart compilers are included in the HCell as \$CSYMB features. By agreement with MCD, the NINFOM field is populated with an abbreviated version of the Blue Note (30 characters or less), describing the chart disposition, to be used by MCD in generating their Chart History spreadsheet.

8. Spatial Framework

8.1 Coordinate System

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

8.2 Horizontal and Vertical Units

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

Chart Unit Base Cell Units:

Depth Units (DUNI):	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

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

Conversion to fathoms and feet charting units with NOAA rounding ensures that:

- All depths deeper or equal to 11 fathoms display as whole fathoms.

- All depth units between 0 fathoms (MLLW) and 11 fathoms display as fathoms and whole feet.
- All depth units above 0 fathoms (MLLW) to 2.0 feet above MHW display in feet for values that round to 5 feet or less, and in fathoms and feet above that. (This is a deviation from the traditional 'fathoms and feet' charting rule that requires that all depths above MLLW will be shown in feet. The display in fathoms and feet for depths between MLLW and 2 feet above MHW accommodates S-57 rules that require the same charting units to be used for all depth units (DUNI) in an ENC.)
- All height units (HUNI) which have been converted to charting units, and that are 2.00 feet above MHW and greater, are shown in feet.

In an ENC viewer fathoms and feet depth units (DUNI) display in the format X.YZZZ, where X is fathoms, Y is feet, and ZZZ is decimals of the foot. In an ENC viewer, heights (HUNI) display as whole feet.

9. Data Processing Notes

9.1 Junctions

H11632 junctions to the west with survey H11631 which is being compiled concurrently.

10. QA/QC and ENC Validation Checks

H11632 was subjected to QA checks in S-57 Composer prior to exporting to the HCell base cell (000) file. The millimeter precision metric S-57 HCell was converted to a chart units and NOAA rounding applied. dKart Inspector was then used to further check the data set for conformity with the S-58 ver. 2 standard (formerly Appendix B.1 Annex C of the S-57 standard). All tests were run and warnings and errors investigated and corrected unless they have been approved by MCD as inherent to and acceptable for HCells.

11. Products

11.1 HSD, MCD and CGTP Deliverables

- H11632 Base Cell File, Chart Units, Soundings and Features compiled to 1:25,000
- H11632 Base Cell File, Chart Units, Soundings compiled to 1:10,000
- H11632 Descriptive Report including end notes compiled during office processing and certification, the HCell Report, and supplemental items
- H11632 Survey Outline to populate SURDEX

11.2 File Naming Conventions

- | | |
|--|----------------------------|
| • Chart units base cell file, chart scale soundings | H11632_CS.000 |
| • Chart units base cell file, survey scale soundings | H11632_SS.000 |
| • Descriptive Report package | H11632_DR.pdf |
| • Survey outline | H11632_Outline.gml & *.xsd |

11.3 Software

CARIS HIPS Ver. 6.1	Inspection of Combined BASE Surfaces
CARIS BASE Editor Ver. 2.3	Creation of soundings and bathy-derived features, creation of the depth area, meta area objects, and Blue Notes; Survey evaluation and verification; Initial HCell assembly.
CARIS S-57 Composer Ver. 2.1	Final compilation of the HCell, correct geometry and build topology, apply final attributes, export the HCell, and QA.
CARIS GIS 4.4a	Setting the sounding rounding variable for conversion of the metric HCell to NOAA charting units with NOAA rounding.
CARIS HOM Ver. 3.3	Perform conversion of the metric HCell to NOAA charting units with NOAA rounding.
HydroService AS, dKart Inspector Ver. 5.1	Validation of the base cell file.
Newport Systems, Inc., Fugawi View ENC Ver.1.0.0.3	Independent inspection of final HCells using a COTS viewer.

12. Contacts

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

Kurt Brown, Physical Scientist, PHB, Seattle, WA; 206-526-6839;
Kurt.Brown@noaa.gov.

APPROVAL SHEET
H11632

Initial Approvals:

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

The survey and associated records have been inspected with regard to survey coverage, delineation of the depth curves, development of critical depths, S-57 classification and attribution of soundings and features, cartographic characterization, and verification or 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.

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.