

H11931

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-10-17-08
Registry No. H11931

LOCALITY

State Alaska
General Locality Pavlof Island
Sublocality Outer Iliasik Island and Vicinity

2008

CHIEF OF PARTY

..... Captain Donald W. Haines, NOAA

LIBRARY & ARCHIVES

DATE

<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>	<p>REGISTRY No</p> <p style="text-align: center;">H11931</p>
<p>INSTRUCTIONS – The Hydrographic Sheet should be accompanied by this form, filled in as completely as possible, when the sheet is forwarded to the Office.</p>	<p>FIELD No:</p> <p style="text-align: center;">RA-10-17-08</p>
<p>State <u>Alaska</u></p> <hr/> <p>General Locality <u>Pavlof Island</u></p> <hr/> <p>Sub-Locality <u>Outer Iliasik Island and Vicinity</u></p> <hr/> <p>Scale <u>1:10,000</u> Date of Survey <u>July 18, 2008 - August 4, 2008</u></p> <hr/> <p>Instructions dated <u>6/4/2008</u> Project No. <u>OPR-P184-RA-08</u></p> <hr/> <p>Vessel(s) <u>RA6 (1015), RA3 (1021), RA1 (1101), RA2 (1103), RA4 (2801), RA5 (2802),</u> <u>RA9 (915), RAINIER (S221)</u></p> <hr/> <p>Chief of party <u>Captain Donald W. Haines, NOAA</u></p> <hr/> <p>Surveyed by <u>RAINIER Personnel</u></p> <hr/> <p>Soundings by <u>Reson SeaBat 8101, Tilted Reson SeaBat 8125, Reson SeaBat 7125, Seabeam/ELAC 1050D MKII, Knudsen 320M, Ceeducer</u></p> <hr/> <p>SAR by <u>Keith Toepfer</u> Compilation by <u>Katie Reser</u></p> <hr/> <p>Soundings compiled in <u>Fathoms</u></p>	
<p>REMARKS: <u>All times are UTC. UTM Zones 3N and 4N.</u></p> <hr/> <p><u>The purpose of this survey is to provide contemporary surveys to update</u> <u>National Ocean Service (NOS) nautical charts.</u></p> <hr/> <p><u>All separates are filed with the hydrographic data.</u></p> <hr/> <p><u>Revisions and end notes in red were generated during office processing.</u></p> <hr/> <p><u>Page numbering may be interrupted or non sequential.</u></p>	

Descriptive Report to Accompany Hydrographic Survey H11931

Project OPR-P184-RA-08

Pavlof Islands, Alaska

Outer Iliasik and Vicinity

Scale 1:10,000

July-August, 2008

NOAA Ship *Rainier* (s221)

Chief of Party: Commander Donald W. Haines, NOAA

A. AREA SURVEYED

This hydrographic survey was completed as specified by Hydrographic Survey Letter Instructions OPR-P184-RA-08 dated June 4, 2008 and all other applicable direction¹, with the exception of deviations noted in this report. The survey area is found at the southern extents of the Pavlof Islands, a cluster of islands found south of Pavlof Bay, AK. The Pavlof Islands area is a well-trafficked area offering shelter from the open water of the Gulf of Alaska. Iliasik Passage is the main route into the survey area, located between Inner and Outer Iliasik Islands. The area being surveyed begins south of Iliasik Channel, surrounds Outer Iliasik Island on three sides, and extends approximately 3.4 nautical miles south of the island. This survey corresponds to sheet "G" in the sheet layout provided with the Letter Instructions. OPR-P184-RA-08 responds to a request from the Southwestern Alaska Pilots. This is a critical survey area designated by the NOAA Hydrographic Survey Priorities, 2007 edition with much of the charted data dating back to before 1930. The Pavlof Islands area has seen increasing freighter and passenger traffic, prompting this survey.

Complete multibeam echosounder (MBES) coverage was achieved in the survey area in waters 8 meters and deeper. In depths less than 8 meters additional MBES coverage was acquired with 25 meter line spacing, and to identify least depths over significant features or shoals and junction with LIDAR data, as appropriate for this survey. Vertical beam echosounder (VBES) data were acquired over assigned LIDAR investigation areas. Total mileage acquired by each vessel and system is reference in Table 1.

¹NOS Hydrographic Surveys Specifications and Deliverables (April 2008), OCS Field Procedures Manual for Hydrographic Surveying (May 2008), and all Hydrographic Surveys Technical Directives issued through the dates of data acquisition.

Data Acquisition Type	Hull Number with Mileage (nm)						Total
	1101	1103	1015	1021	2801	2802	
VBES (mainscheme)	-	-	-	-	-	-	-
MBES (mainscheme)	12.42	-	103.53	217.86	143.05	143.79	620.65
SSS (mainscheme)	-	-	-	-	-	-	-
VBES + SSS (mainscheme)	-	-	-	-	-	-	-
Crosslines	-	-	-	-	-	27.94	27.94
Developments	-	-	-	-	-	-	-
Shoreline	-	7.83	-	-	-	-	7.83
Bottom Samples	-	-	-	-	-	-	20
Total Number of Items Investigated	-	1	-	-	-	-	1
Total Area Surveyed (sq. nm)	-	-	-	-	-	-	-

Table 1: Statistics for survey H11931.

Data acquisition was conducted from July 18 to August 4, 2008 (DN 200 to 217).

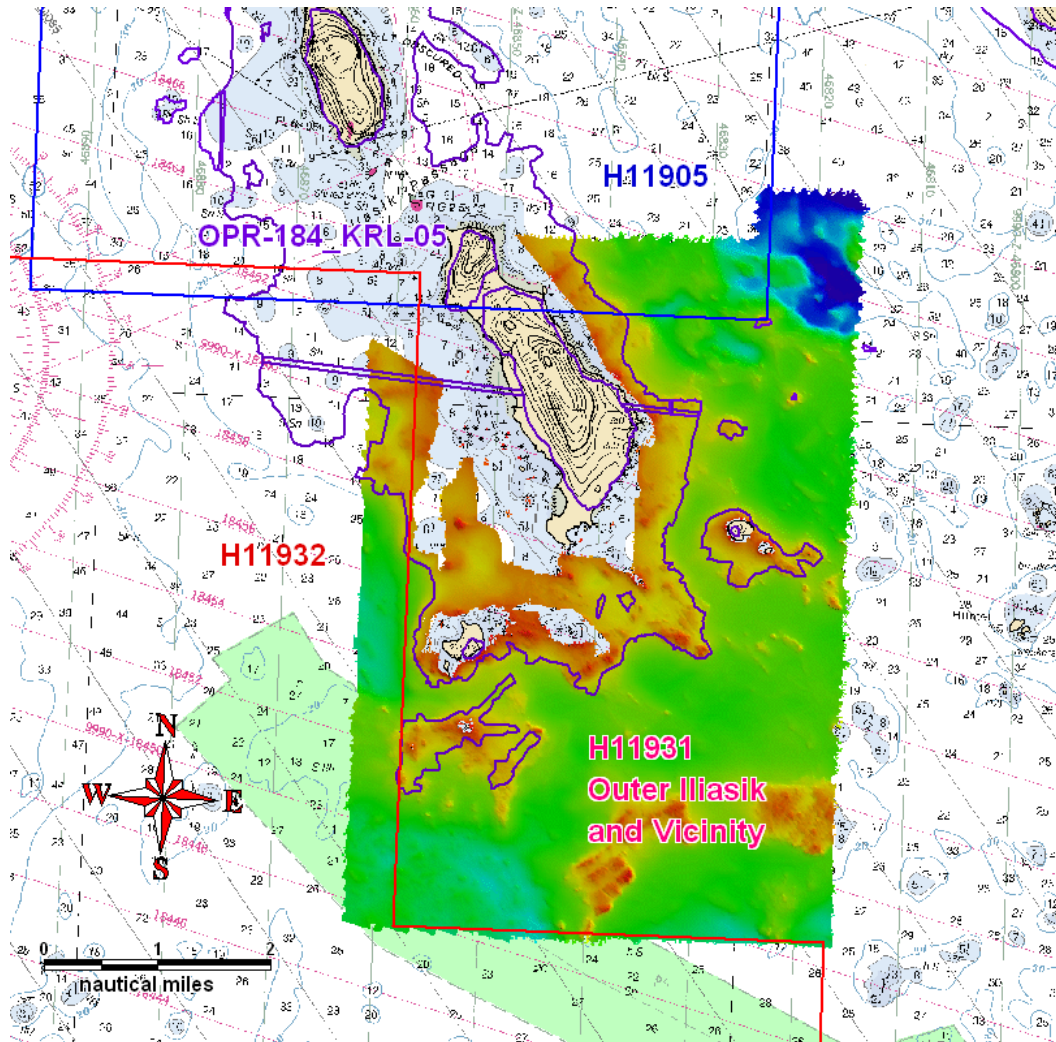


Figure 1. H11931 Survey Limits (Chart 16549). Contemporary Rainier survey junctions are in blue and red. LIDAR survey junction is displayed in purple.

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-08 Data Acquisition and Processing Report (DAPR)*¹, 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.

B1. Equipment and Vessels

Data for this survey were acquired by the following vessels:

Hull Number	Name	Acquisition Type
915	RA-9	Bottom Samples
1101	RA-1	Tilted Multibeam Echosounder
1103	RA-2	Vertical Beam Echosounder Detached Positions
1021	RA-3	Multibeam Echosounder
2801	RA-4	Multibeam Echosounder
2802	RA-5	Multibeam Echosounder
1015	RA-6	Multibeam Echosounder
S221	<i>Rainier</i>	Bottom Samples

Table 2. Data Acquisition Vessels for H11931.

Sound speed profiles were measured with SEACAT SBE-19+ profilers in accordance with the Specifications and Deliverables.

No unusual vessel configurations were used for data acquisition.

B2. Quality Control

Crosslines

Multibeam Echosounder (MBES) crosslines totaled 27.94 nautical miles, comprising 4.50% of main scheme MBES hydrography.² The mainscheme bathymetry was manually compared to the XL nadir beams in CARIS subset mode and agreed well with most differences within 0.2 meters, with the greatest differences equaling 0.35 meters in depths of 45 meters or greater.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 2008 *Rainier* Hydrographic System Readiness Review package submitted with this survey.

Junctions

The following contemporary surveys junctions with H11931⁴ (See Figure 1):

<u>Registry #</u>	<u>Scale</u>	<u>Date</u>	<u>Junction side</u>
H11439	1:10,000	2005	Shoreline (LIDAR)
H11488	1:10,000	2005	Shoreline (LIDAR)
H11905	1:10,000	2008	North
H11932	1:10,000	2008	South and West

2008 Junction Surveys

H11905 and H11932 were run concurrently within project OPR-P184-RA-08. Data was compared in CARIS subset mode and agreed well. Observed offsets ranged between 0.10 and 0.35 meters.⁵ The higher offset areas are due to sound velocity errors in the data and the intersection of outer beams where the errors are greatest.

2005 LIDAR Shoreline Junction Surveys

A CARIS BASE surface was provided by Pacific Hydrographic Branch for junction comparison with LIDAR surveys H11439 and H11488. The BASE surfaces were compared to H11931 CUBE surfaces in CARIS Notebook and were found to agree well. The multibeam soundings were generally shoaler than the LIDAR soundings. The differences between the surfaces were approximately 0.25 m, and did not exceed 0.4 m.⁶

Data Quality Factors

POS MV Heading Accuracy

During the course of data acquisition, survey personnel on RA-4 and RA-5 noted occasional instances when POS MV heading accuracy decreased from the normal level of ≤ 0.05 degrees to a maximum of 0.078 degrees. This phenomenon was seen almost daily, but was always self correcting after a period of approximately 15 to 20 minutes. The most likely cause of these incidents was less than optimal satellite geometry and narrower GPS antenna separation on these two new launches compared with older survey launches on *Rainier*.⁷

Roll Error Caused by Unstable Swing Arm Mount

Data acquired on Launch 1021 (RA-3) were found to have significant static roll offsets on DN202. The HVF for DN202 was adjusted to account for the roll error and all surfaces recomputed.⁸ See the DAPR for more details on this issue.

The roll offset seen on DN202 of acquisition can be attributed to the current mount of the Reson 8101: the sonar head is mounted on an extendable arm that is retracted and extended for use on each survey day. This configuration, although stable throughout a survey day, can change from day to day. The survey team onboard *Rainier* is working to create a new

standard so that positioning of the swing arm can become more constant and predictable. This survey launch was retired at the end of the 2008 field season and will not be used in future surveys.

Sound Speed Artifacts

Sound speed artifacts were frequently seen during survey H11931. After applying sound speed corrections in CARIS HIPS, some lines still exhibited the characteristic "smiles" and "frowns" indicative of inaccurate sound speed corrections (see Figure 2 below). During this project CTD sound velocity casts were taken more frequently than *Rainier's* standard 4-hour interval in order to capture accurate sound speed profiles. A sheet-wide concatenated SVP file applied using in nearest in distance with time was used in an effort to mitigate sound speed artifacts in the data. Despite the best efforts of the Hydrographer to conduct sufficient sound velocity casts distributed both spatially and temporally, and to correct for sound velocity errors in post processing as stated above, sound velocity errors were still noticeable in some regions. To compensate, the Hydrographer, where possible, rejected soundings obviously in error on the outer beams. The hydrographer feels that despite some remaining artifacts, the acquired data is within specification and is adequate to supersede charted depths.⁹

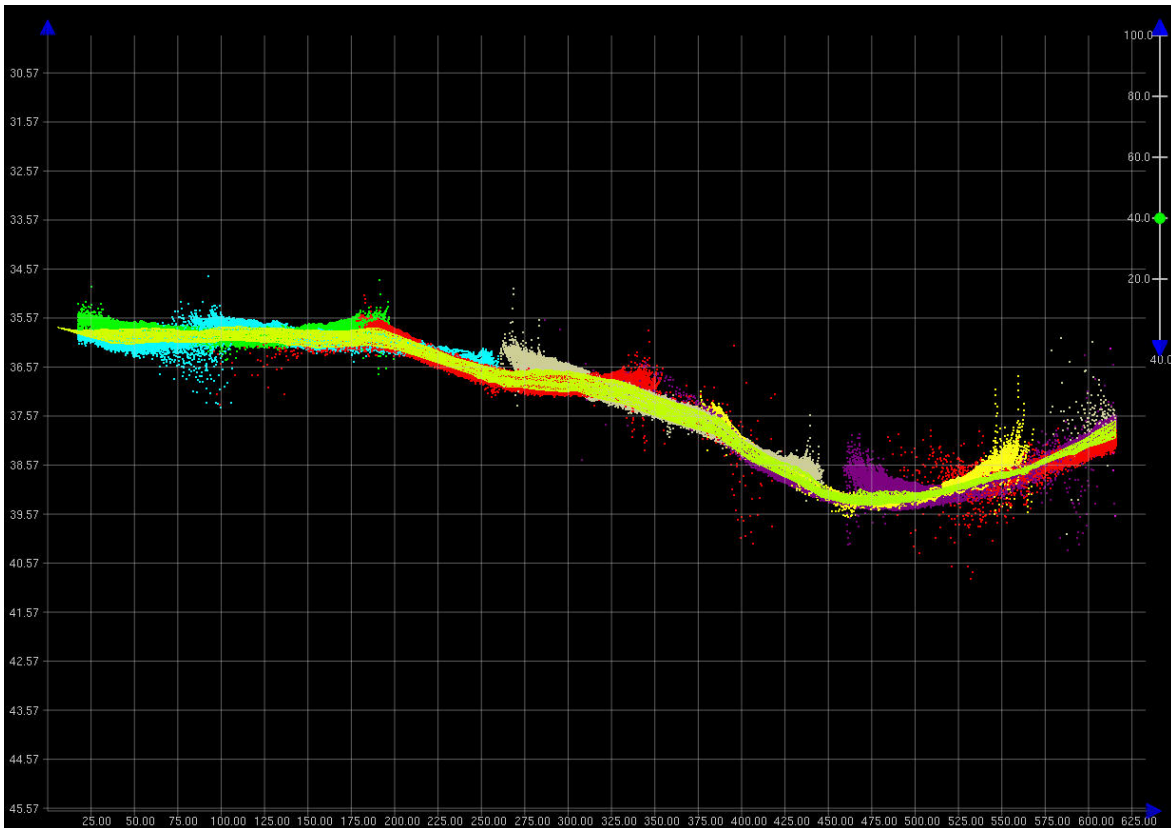


Figure 2. Example of sound speed error from H11931 data viewed in subset mode with wireframe CUBE reference surface displayed.

Horizontal Offsets

Horizontal offsets were seen in the steep slopes and rocky areas of the survey area. The vertical offsets resulting from horizontal offset of the lines' positions ranged from 0.2 to 0.5 meters. The variation in POS MV's stated horizontal accuracy (up to 2 meters) became apparent on the steep gradients found in the shoal areas with dynamic features. The BASE surface was not affected in these areas.¹⁰ See Figures 3 and 4 below.

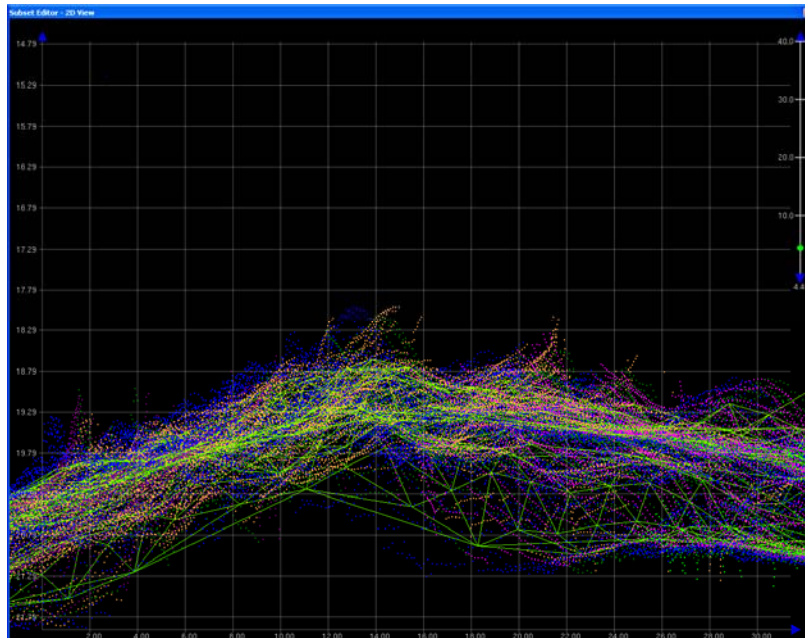


Figure 3. Example of horizontal offsets in H11931 data in a shoal, rocky area.

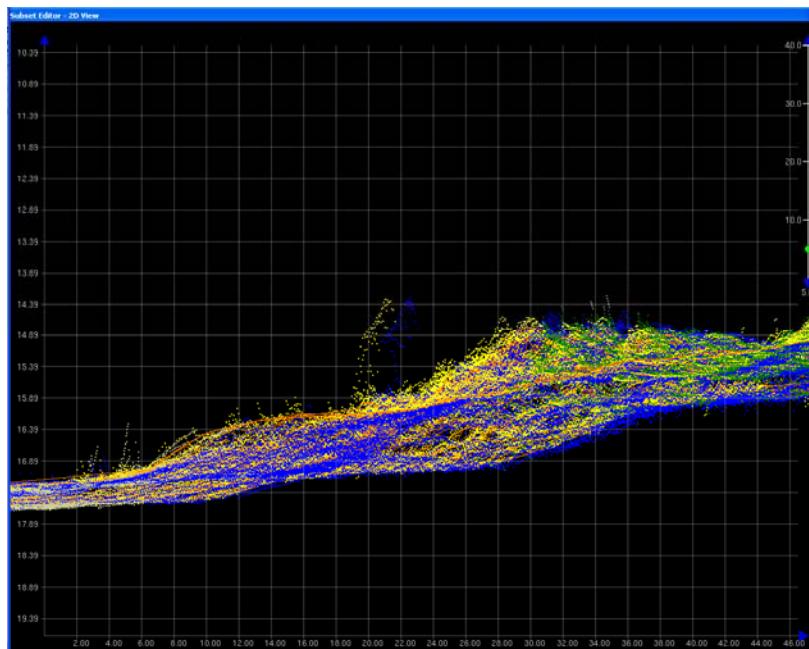


Figure 4. Another example of horizontal offsets present in H11931 data due to POS MV accuracy limits.

Holidays and Coverage Deficiencies

Small holidays and sparse data exist in areas of steep slopes and rocky areas in survey H11931. In an effort to acquire a sufficient amount of data, extra lines were run over these areas, but down-sloping effects and shadows are still seen in the data in some areas. See Figures 5 and 6 below. Several areas in H11931 did not achieve coverage to completely junction with the LIDAR survey data because of thick kelp growth. The most notable areas are east of Sarana Island, shown below in Figure 7, and around Rona Island where kelp symbols exist in the Field Verified .hob file. The Hydrographer recommends charting these areas of kelp as added and/or revised in the Field Verified .hob layer in H11931's Notebook survey files.¹¹

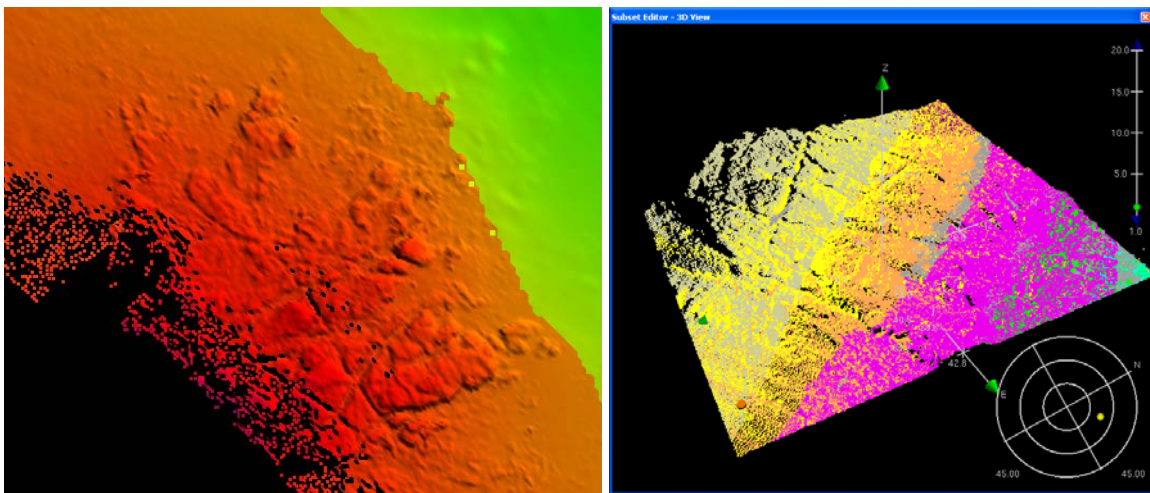


Figure 5. Rocky outcrop in the Northeast corner of sheet H11931 that has small data gaps due to the 'shadowing' effect of steep slopes. The CUBE surface is displayed to the left, while the 3-D subset image is displayed to the right, colored by line.

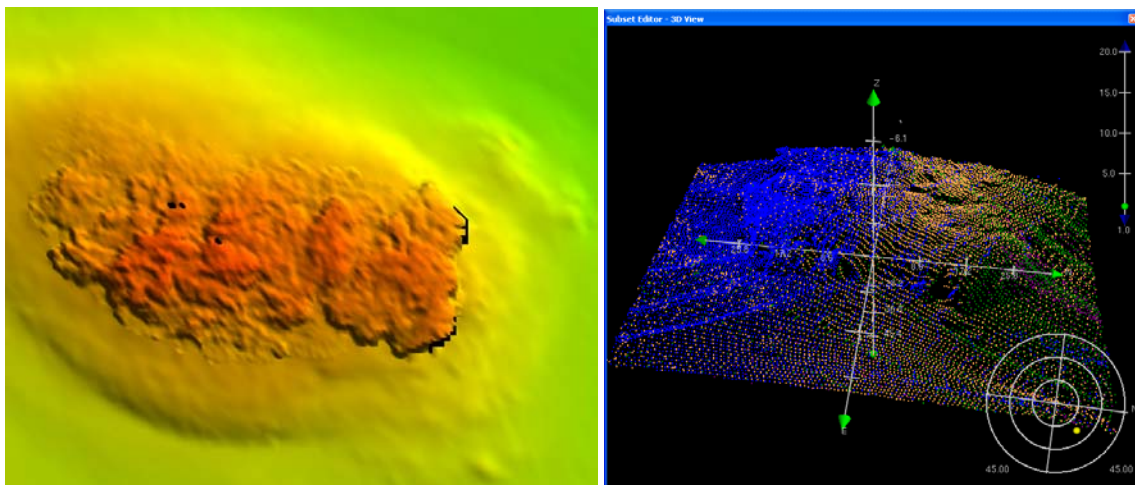


Figure 6. A second example of ‘shadows’ creating small gaps in data in the Southwestern corner of H11931. The left-hand image is the CUBE surface created in HIPS and SIPS, while the image to the right is the 3-D subset view of the same rocky outcrop, colored by line.

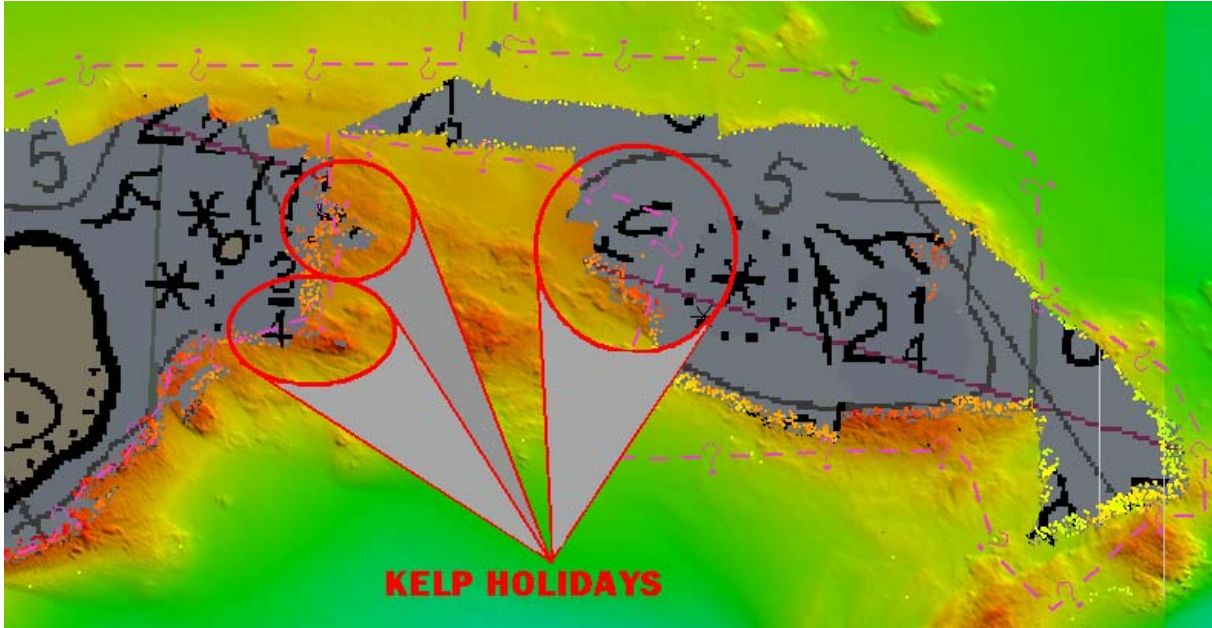


Figure 7. Holidays between Rainier and LIDAR coverage due to kelp east of Sarana Island.

B3. Data Reduction

Data reduction procedures for survey H11931 conform to those detailed in the *OPR-P184-RA-08 DAPR*.

B4. Data Representation

Many BASE surfaces were used in processing H11931. Final BASE surface resolutions and depth ranges were set in accordance with the Field Procedures Manual, with field sheets smaller than 25×10^6 nodes. The field sheet boundaries were created in multiples of 16 in an effort to reduce fliers in the surfaces created in overlapping areas of field sheets. The easting and northing values of the northwest and southeast corners of each field sheet were modified to be evenly divisible by 16, allowing nodes on multiple field sheets to have the same geographic positions and use the same hypotheses to compute their surfaces. CUBE surfaces processed at one meter resolution were computed using ‘shallow’ CUBE parameters; CUBE surfaces with resolutions of two and four meters were computed using ‘deep’ CUBE parameters. The submission Field Sheet and BASE Surface structure are shown in Figures 8 and 9 below. 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.

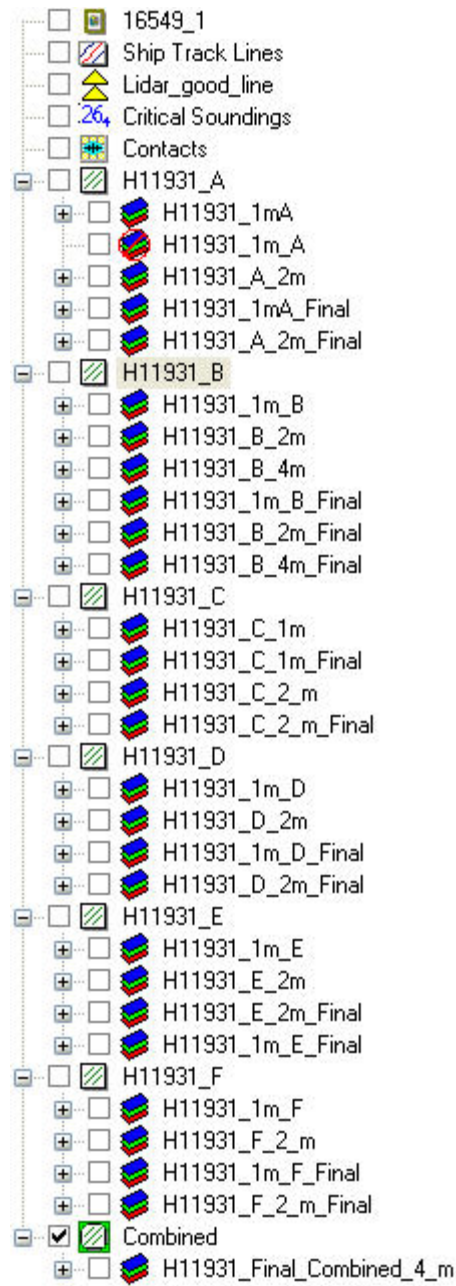


Figure 8. Field sheets and BASE surfaces submitted with H11931.

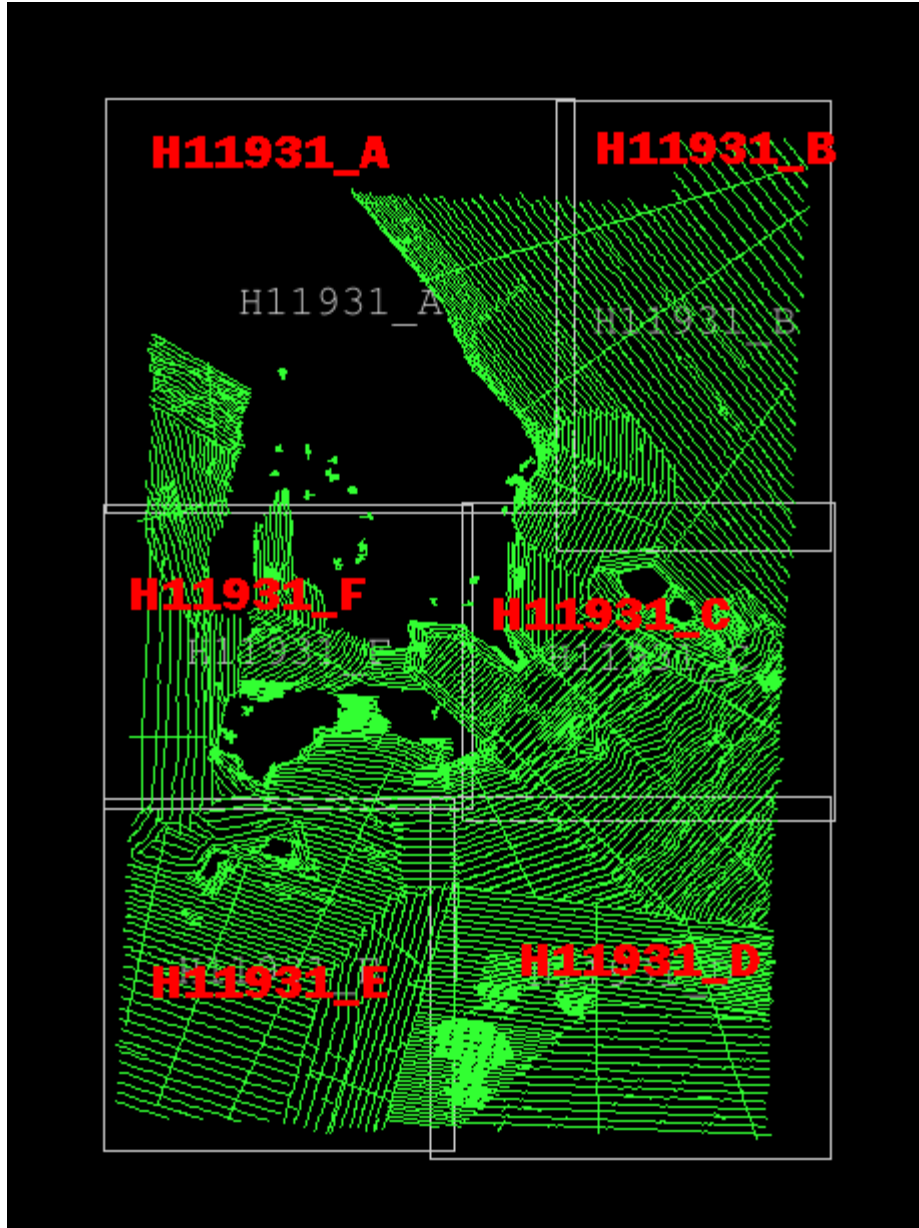


Figure 9. Layout of field sheet and BASE surfaces for H11931.

C. VERTICAL AND HORIZONTAL CONTROL

Project OPR-P184-08 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.

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	Operator	Distance	Priority
Cold Bay	289 kHz	USCG	250nm	Primary

Table 3: Differential Corrector Sources for H11931.

Vertical Control

The vertical datum for this project is Mean Lower-Low Water (MLLW). The operating National Water Level Observation Network (NWLON) primary tide stations at Sand Point, AK (945-9450) and King Cove, AK (945-9881) served as control for datum determination and as the primary source for water level reducers for survey H11931.

No tertiary gauges were required.

All data were reduced to MLLW using final approved water levels from station Sand Point, AK (945-9450) and King Cove, AK (945-9881) using the tide files 9459450.tid and 9459881.tid, respectively, and final time and height correctors using the zone corrector file P184RA2008CORP.zdf.

The request for Final Approved Water Levels for H11931 was submitted to CO-OPS on August 5, 2008 and the Final Tide Note was received on September 13, 2008. This documentation is included in Appendix IV.¹²

D. RESULTS AND RECOMMENDATIONS

D.1. Chart Comparison

D.1.a. Survey Agreement with Chart

Survey H11931 was compared with the following charts:

Chart	Scale	Edition and Date	Local Notice to Mariners Applied Through
16549	1:80,000	15 th Ed, Jul 2003	05/13/2008

Table 4: Charts compared with H11931.

With the exceptions noted in this report, depths from survey H11931 were generally one to two fathoms shoaler than charted depths on chart 16549. In shoaler water near the shore, the charted depths were occasionally found to be three to four fathoms deeper than survey depths with complete bottom coverage achieved. In many instances, this survey found shoaler soundings between charted depths even though agreement at the position of the charted depths was good. This can be attributed to increased bottom coverage using MBES methods.¹³

The depth contours on chart 16549 agreed within 100 meters with the contours from H11931, except for the following areas:

1. In the survey area 1.1 NM east of central Outer Iliasik Island the 20 meter depth contour was displaced up to 500 m east and north from the 20 meter surveyed depths.¹⁴ (See Figure 10 below)

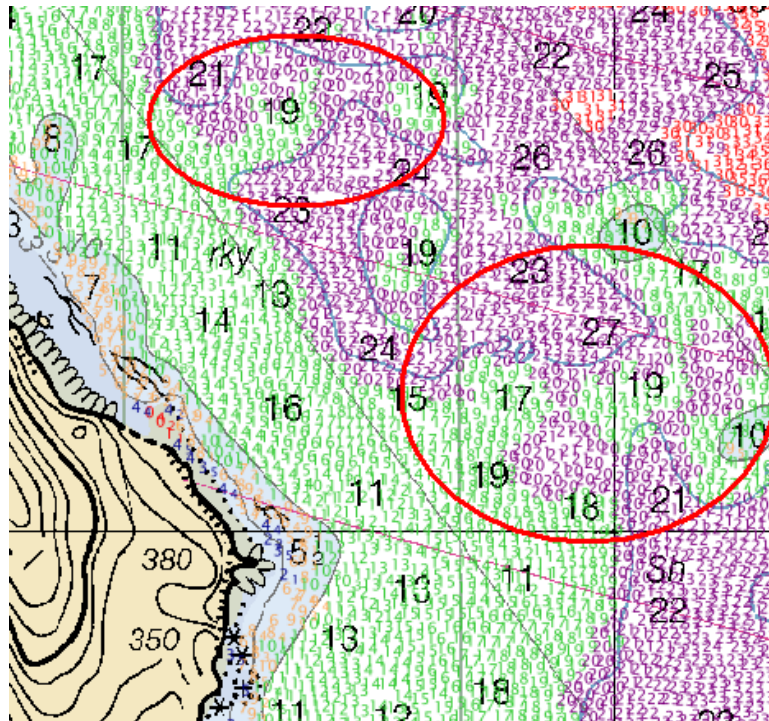


Figure 10: Areas of incorrectly charted depth contours, highlighted with red circles.

- 2. In the survey area 0.80 NM southeast of the Rona Islands, the 20 meter depth contour extends 500 meters closer toward shore than previously charted.¹⁵ (See Figure 11)

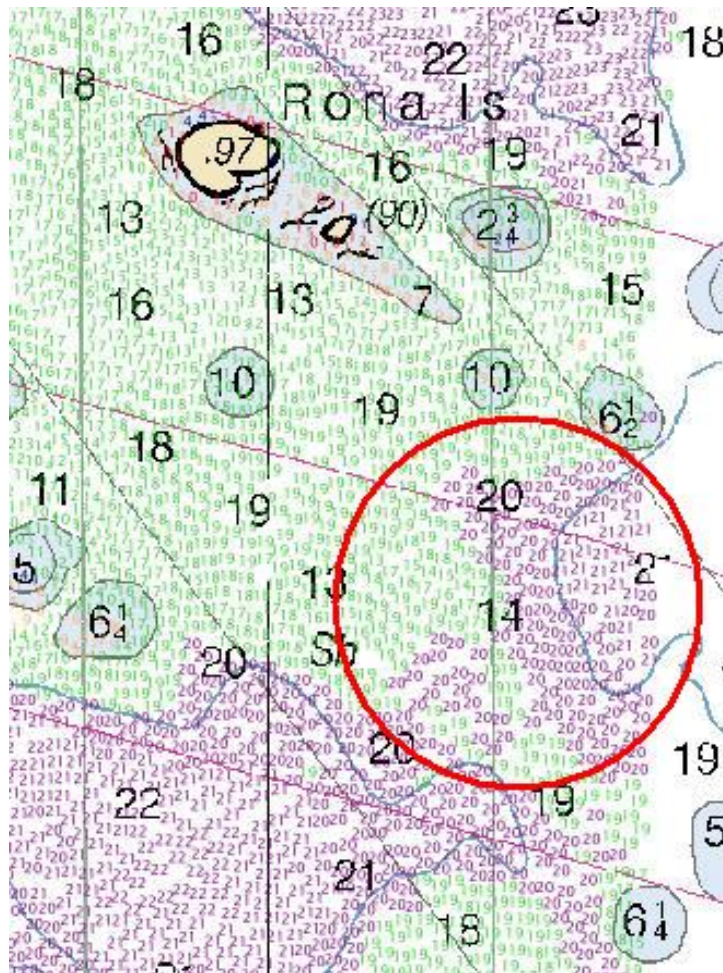


Figure 11: The red circle indicates an area of incorrectly-charted depth contours.

3. On the eastern shoreline of Outer Iliasik Island at approximate position $55^{\circ}00.3' N$, $161^{\circ}52.2' W$ the contours are charted incorrectly: the zero-meter contour intersects the three and five-meter contours in the area highlighted in Figure 12 below. Survey H11931 shows depths shoreward of the zero-meter curve. Multibeam and LIDAR coverage were achieved in the area. The Hydrographer recommends correcting the depth contours in this vicinity and charting depths as per digital data.¹⁶

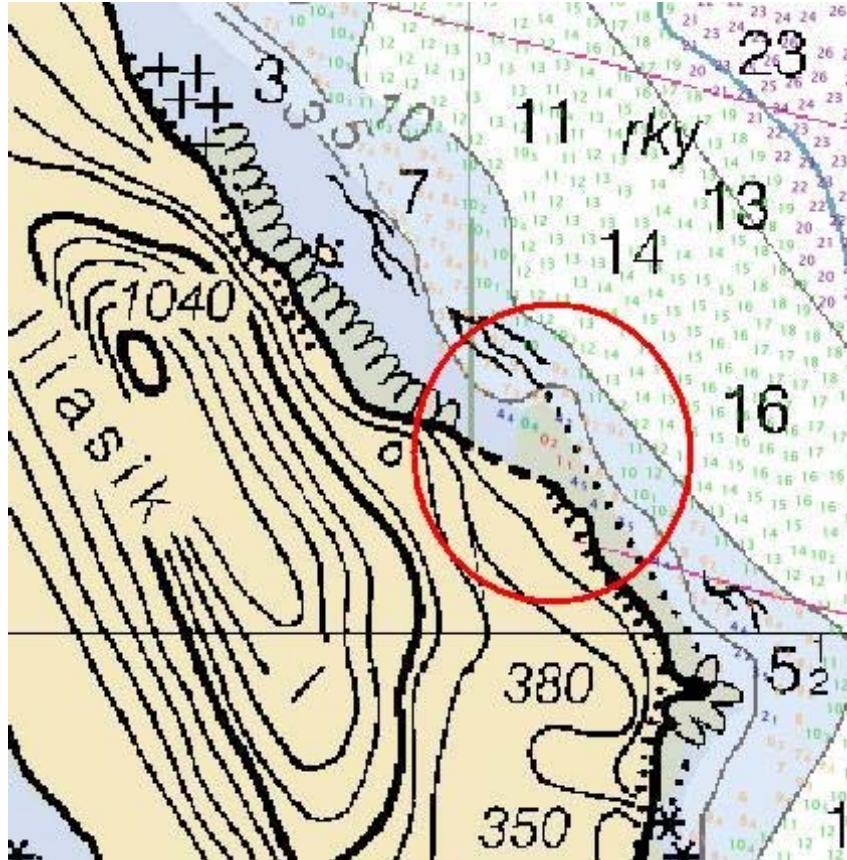


Figure 12: An area discovered with sounding values of less than one (1.0) fathom, highlighted by the red circle.

In the vicinity of a charted $5 \frac{1}{4}$ -fathom sounding, the present survey revealed a least depth of 6.703 fathoms at approximately $54^{\circ}56.0' N$, $161^{\circ}55.1' W$, 0.85 nautical miles southwest of Sarana Island (see Figure 13 below). Full coverage was achieved over this feature; the Hydrographer recommends removing the charted depth and charting as per digital data.¹⁷

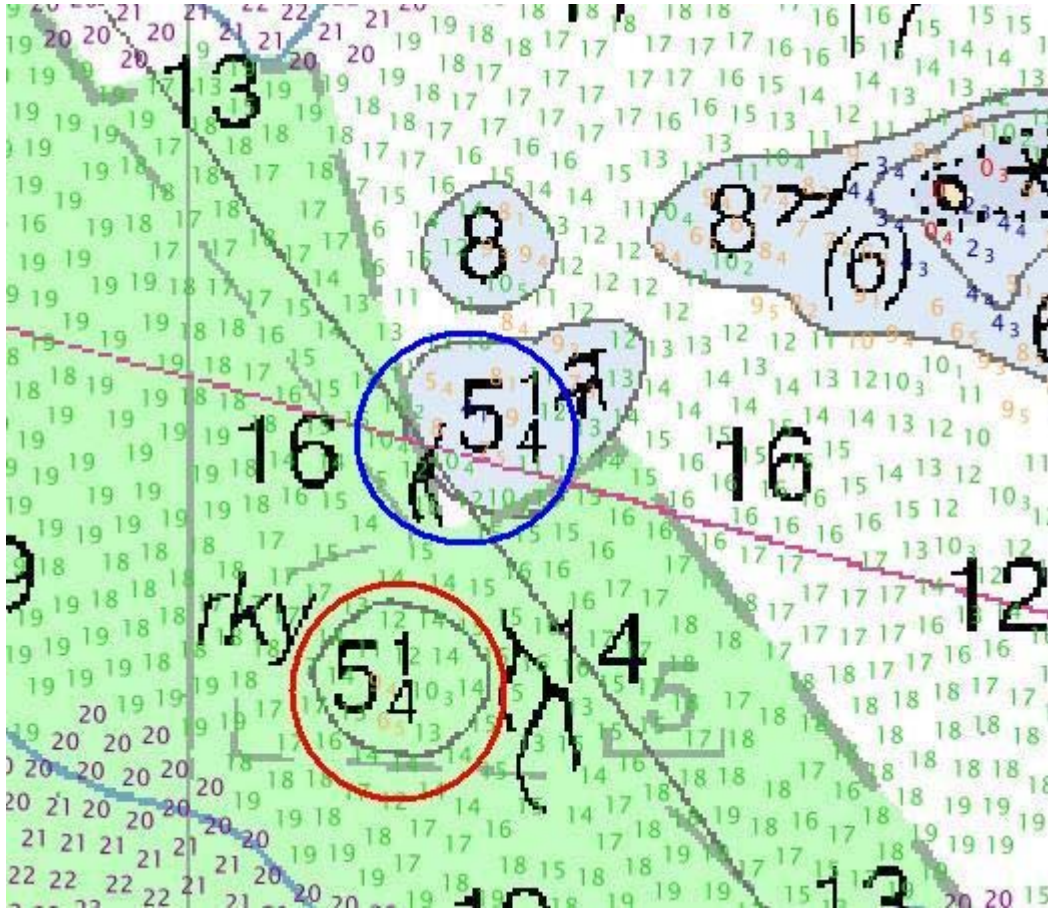


Figure 13: The $5\frac{1}{4}$ -fathom sounding highlighted by the red circle is charted approximately 1.25 fathoms shoaler than the depth that was discovered during survey H11931. The $5\frac{1}{4}$ -fathom sounding highlighted in blue is also charted approximately 0.4 meters too shoal.

Approximately 0.85 nautical miles southwest of Sarana Island another $5\frac{1}{4}$ -fathom charted sounding ($54^{\circ}57.0'N$, $161^{\circ}55.1'W$) is represented too shallow. The least depth detected by full-coverage LIDAR was 6.00 fathoms (10.97 m); the Hydrographer recommends removing the charted depth and charting as per digital data.¹⁸ See Figure 13 above.

Full multibeam coverage was achieved over the green-tinted wire drag area in the southwestern corner of the survey sheet. The Hydrographer recommends removing the green-tinted shading from the common area and charting as per digital data.¹⁹

The Hydrographer recommends that survey soundings supersede all prior survey and charted depths in the common area.²⁰

D.1.b. Dangers to Navigation

Two (2) Dangers to Navigation (DTONs) were found on survey H11931, and reported to the Marine Chart Division via email on 2 February, 2009.²¹ The original DTON submission package is included in Appendix IV. Descriptions of each DTON are included in the Survey Feature Report in Appendix I.²²

D.1.c. Other Features

Automated Wreck and Obstruction Information System (AWOIS) Investigations

One AWOIS item falls within the survey limits of H11931. The single item was assigned for a maritime boundary claim investigation.²³ The description of the AWOIS item investigation is included in the Survey Feature Report in Appendix II.²⁴

No additional charted items were investigated and no other features were located on survey H11931.

D.2. Additional Results

D.2.a. Prior Survey Comparison

Prior survey comparison was not performed.

D.2.b. Shoreline Verification

Shoreline Source

The Pacific Hydrographic Branch provided *Rainier* with a list of features from LIDAR survey H11439 and H11488 selected for further investigation.²⁵ These were provided as H11439_LI_Investigations.hob and H11488_LI_Investigations.hob.

In addition, a composite source file was provided using data from the latest ENC's as well as prior survey features. Photogrammetric survey project GC10645 has been adequately applied to ENC's used in the composite source file. This source shoreline was used for orientation purposes in Hypack and Notebook and on printed boat sheets utilized for investigation of the LIDAR items discussed above.

Shoreline Verification

Traditional "limited shoreline verification" was not required for this survey, since the near shore area was covered by junction LIDAR surveys H11439 and H11488 and thus outside the limits of H11931. The following field procedures were followed:

- H11931 LIDAR items selected for further investigation were addressed by visual, Detached Position (DP), VBES, or MBES techniques as appropriate and feasible, near predicted low water. Note that some of these features were located in areas unsafe to

approach and/or were considered insignificant to navigation, and were not further investigated.

- The composite source shoreline was used for orientation and navigation while transiting between assigned H11931 items.
- All new, charted, and AWOIS items within the limits of H11931 (i.e., offshore of the limits prescribed in the Letter Instructions and discussed in Section A.) were addressed.

In addition, annotations describing shoreline were recorded on hard copy plots of digital shoreline, and transferred to the “remrks” attribute on the corresponding features in Notebook. DP forms are included in the Detached Position directory of the *Separates to be Included with Survey Data*.

Investigation methods and recommendations are described in the Pydro “Remarks” and “Recommendations” tabs. Additional information can also be found in the Pydro Feature Report included in Appendix II.²⁶

All shoreline data is submitted in Caris Notebook .hob files. The session H11931_Notebook.wrk contains the following:

HOB File	Purpose and Contents
H11931_Composite_Source.hob	Original Source Data provided for project OPR-P184-RA-08 and filtered to the limits of survey H11931
H11931_Reference.hob	Survey outline and limit lines, and AWOIS item positions and radii.
H11931_Field_Verified.hob	Field verified source features and shoreline, including edits and updates not requiring DPs.
H11931_Deleted_Source.hob	Composite Source and LIDAR Investigation items that were deleted or disproved.
H11931_Field_VerifiedHOB.hob	Marker layer accompanying the H11931_Field_Verified.hob file.

Table 5. List and Description of Notebook HOB files.

One detached position (DP) was recorded in Caris Notebook and inserted into Pydro. This DP indicates revisions to a rock feature found on the verified shoreline. In addition, annotations describing shoreline were recorded on hard copy plots of digital shoreline, and transferred to the “remrks” attribute on the corresponding features in Notebook. DP forms are included in the Detached Position directory of the *Separates to be Included with Survey Data*.

Investigation methods and recommendations are described in the Pydro “Remarks” and “Recommendations” tabs. Details of investigations of H11488 LIDAR features and all new items are included in the Survey Feature Report in Appendix II. DP forms are included in the *Separates to be Included with Survey Data*.

Source Shoreline Changes and New Features

Items for survey H11931 that require further discussion and are associated with a detached position have been flagged “Report” in Pydro in H11931_PSS.pss. Investigation methods and recommendations are listed in the Remarks and Recommendations tabs. These features are included in the Survey Feature Report in Appendix I.

Recommendations

The Hydrographer recommends that the shoreline as depicted in the Notebook .HOB files supersede and complement shoreline information compiled on the GC, raster charts, and ENC's as described above.²⁷

D.2.c. Aids to Navigation

There are no Aids to Navigation within the limits of H11931.²⁸

D.2.d. Overhead Features

There are no overhead features charted within the survey limits of H11931, and none were seen during the survey.²⁹

D.2.e. Submarine Cables and Pipelines

There are no submarine cables or pipelines charted within the limits of H11931, and none were detected by the survey.³⁰

D.2.f. Ferry Routes

There are no ferry routes charted within the limits of survey H11931, and none were observed to be operating in the area.³¹

D.2.g. Bottom Samples

Twenty (20) bottom samples were collected during survey H11931.³² Distances between bottom samples followed the guidelines outlined in the April 2008 NOS Hydrographic Surveys Specifications and Deliverables where possible, and took into consideration the distances away from the junctioning surveys (H11905 and H11932) bottom sample locations. Of the twenty samples collected, twelve were sampled over areas with prior data. Five of these historic areas matched current samples, while seven did not. Eight samples were taken from areas without data collected from prior surveys. Bottom samples were collected with RA-9 and *Rainier* and logged directly into CARIS Notebook. The data is included in the submitted H11931_Field_Verified.hob layer.

D.2.h. Other Findings


There are no other findings to report for survey H11931.

E. APPROVAL

As Chief of Party, Field operations for hydrographic survey H11931 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 2008 edition), Field Procedures Manual (May 2008 edition), Standing and Letter Instructions, and all HSD Technical Directives issued through August 2008. These data are adequate to supersede charted data in their common areas. 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-P184-RA-08	11/25/2008	N/CS34
Coast Pilot Report for OPR- P184-RA-08	TBD	N/CS26

Approved and Forwarded:  CAPT/NOAA
 Captain Donald W. Haines, NOAA
 Commanding Officer
 CAPT Donald W. Haines, NOAA
 2009.02.24 13:04:58 -08'00'

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

Survey Sheet Manager: **Christine L. Schultz** 
Digitally signed by Christine L. Schultz
 DN: cn=Christine L. Schultz, c=US, o=NOAA, ou=NOAA
 Ship RAINIER, email=christine.schultz@noaa.gov
 Reason: I am the author of this document
 Date: 2009.02.17 07:34:38 -08'00'
 Ensign Christine L. Schultz, NOAA
 Junior Officer

Chief Survey Technician:  James B Jacobson
 I have reviewed this document
 2009.02.23 13:47:20 -08'00'
 James B. Jacobson
 Chief Survey Technician, NOAA Ship *Rainier*

Field Operations Officer:  LT/NOAA
 I have reviewed this document
 2009.02.23 11:00:35 -08'00'
 Lieutenant Charles Yoos, NOAA
 Field Operations Officer

Revisions and Corrections Compiled During Office Processing and Certification

¹ Filed with project records.

² The crossline percentage of mainscheme did not meet the 5% requirement as stated in the specifications, however, there were a sufficient number of crosslines for comparison purposes.

³ Concur.

⁴ H11932 has been compiled and a common junction was made with that survey. A junction with H11905 will be made when that survey is compiled. H11931 also junctions with LIDAR surveys H11439 and H11488, which were compiled with this survey.

⁵ Concur.

⁶ Concur.

⁷ The data meets specification and is adequate to supersede charted data despite the POS/MV heading accuracy degradation.

⁸ After the HVF was modified to account for the roll bias, the data from launch 1021 meets specifications.

⁹ Concur.

¹⁰ Concur. The data is adequate to supersede charted depths.

¹¹ Concur with clarification. In the areas of multibeam holidays, there was adequate coverage by LIDAR. Chart as depicted in the HCell.

¹² See attached Tide Note dated August 12, 2008.

¹³ Concur.

¹⁴ Concur. Update charted contours per survey depths.

¹⁵ Concur. Update charted contours per survey depths.

¹⁶ Concur with clarification. Chart intertidal areas defined by the zero contour as depicted in the HCell.

¹⁷ Concur.

¹⁸ Do not concur. LIDAR cannot be used to remove a shoaler charted depth. In this case, the least depth surveyed at this location was found to be 4fm 1ft. It is included in the HCell as a submerged rock.

¹⁹ Concur. The green-tint wire drag area has been blue noted to be removed.

²⁰ Concur.

²¹ Both reported DTONs have been applied to the charts and both are included in the HCell.

²² See DTON section in attached Feature Report.

²³ The charted rock assigned for investigation was disproved and a new submerged rock was identified at 54-58-57.485N, 161-54-25.970W with a depth of 0fm 4ft. The new rock is included in the HCell and the charted rock has been blue noted to be removed. Recommend the new rock be added to the AWOIS database.

²⁴ See attached Feature Report.

²⁵ Where there is overlap between a multibeam and LIDAR survey, the multibeam data supersedes the LIDAR data except when there are coincident soundings with shoaler depths from LIDAR.

²⁶ See attached Feature Report. Note: the survey feature report only includes the assigned AWOIS item, LIDAR investigations and DTONs reported from H11931. 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 H11931 have come directly from CARIS Notebook, which is the official features deliverable for this survey.

²⁷ Concur with clarification. The submitted hob files were used in the compilation of HCell H11931. During compilation, some modifications were made to accommodate chart scale. Chart features as depicted in the HCell.

²⁸ Concur.

²⁹ Concur.

³⁰ Concur.

³¹ Concur.

³² Ten bottom samples from H11931 are included in the HCell. The remaining ten bottom samples were not included because they conflicted with the delineated rocky seabed areas. All of the charted bottom samples within the survey area have been blue noted to be removed.

H11931 Survey Features Report

Registry Number: OPR-P184-RA-08
State: Alaska
Locality: Pavlof Island
Sub-locality: Outer Iliasik Island and Vicinity
Project Number: NOAA Ship RAINIER
Survey Dates: 07/18/2008 - 07/31/2008

Charts Affected

Number	Edition	Date	Scale (RNC)	RNC Correction(s)*
16549	15th	07/01/2003	1:80,000 (16549_1)	USCG LNM: 04/01/2008 (04/15/2008) NGA NTM: 01/21/2006 (04/19/2008)
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	[None]	54° 58' 59.8" N	161° 54' 25.0" W	---
1.2	Rock	-1.00 m	54° 58' 03.0" N	161° 52' 54.6" W	---
2.1	Rock	30.11 m	54° 57' 10.3" N	161° 55' 46.6" W	---
2.2	Rock	11.95 m	55° 01' 03.7" N	161° 53' 03.4" W	---
2.3	Rock	12.09 m	55° 00' 09.3" N	161° 51' 49.3" W	---
2.4	Rock	13.38 m	55° 00' 10.2" N	161° 51' 43.8" W	---
3.1	Rock	6.81 m	54° 57' 45.0" N	161° 52' 21.3" W	---
3.2	Rock	4.51 m	55° 00' 18.8" N	161° 54' 23.3" W	---

1 - Charted Features

1.1) GP No. - Other 1 from ChartGPs - ENC H11931_AWOIS_MBC

Survey Summary

Survey Position: 54° 58' 59.8" N, 161° 54' 25.0" W
Least Depth: [None]
TPU ($\pm 1.96\sigma$): **THU (TPEh)** [None] ; **TVU (TPEv)** [None]
Timestamp: [None]
GP Dataset: ChartGPs - ENC H11931_AWOIS_MBC
GP No.: Other 1
Charts Affected: 16549_1, 16540_1, 16011_1, 16006_1, 500_1, 513_1, 530_1, 50_1

Remarks:

[None]

Feature Correlation

Address	Feature	Range	Azimuth	Status
ChartGPs - ENC H11931_AWOIS_MBC	Other 1	0.00	000.0	Primary

Hydrographer Recommendations

[None]

S-57 Data

Geo object 1: Underwater rock / awash rock (UWTROC)
Attributes: SORDAT - 20080804
 SORIND - US,US,nsurf,H11931

1.2) GP No. - Danger 1 from ChartGPs - ENC H11931_Investigation_DP

Survey Summary

Survey Position: 54° 58' 03.0" N, 161° 52' 54.6" W
Least Depth: -1.00 m (= -3.28 ft = -0.547 fm = 0 fm 2.72 ft)
TPU ($\pm 1.96\sigma$): **THU (TPEh)** [None] ; **TVU (TPEv)** [None]
Timestamp: [None]
GP Dataset: ChartGPs - ENC H11931_Investigation_DP
GP No.: Danger 1
Charts Affected: 16549_1, 16540_1, 16011_1, 16006_1, 500_1, 513_1, 530_1, 50_1

Remarks:

Charted rock seen by LIDAR survey seen visually during shoreline investigation. Rock DP'd for height and position.

Feature Correlation

Address	Feature	Range	Azimuth	Status
ChartGPs - ENC H11931_Investigation_DP	Danger 1	0.00	000.0	Primary

Hydrographer Recommendations

Chart rock based on the depth, position, and S-57 attribution specified in this report.

Cartographically-Rounded Depth (Affected Charts):

0 ½fm (16549_1, 16540_1, 16011_1, 16006_1, 530_1)

-1.0m (500_1, 513_1, 50_1)

S-57 Data

Geo object 1: Underwater rock / awash rock (UWTROC)
Attributes: SORDAT - 20080804
 SORIND - US,US,nsurf,H11931
 VALSOU - -1.000 m
 VERDAT - 12:Mean lower low water
 WATLEV - 4:covers and uncovers

Feature Images



Figure 1.2.1

2 - New Features

2.1) Profile/Beam - 99/12 from h11931 / 2801_reson7125_hf_512beams / 2008-204 / 663_2311

Survey Summary

Survey Position: 54° 57' 10.3" N, 161° 55' 46.6" W
Least Depth: 30.11 m (= 98.78 ft = 16.464 fm = 16 fm 2.78 ft)
TPU ($\pm 1.96\sigma$): **THU (TPEh)** ± 2.024 m ; **TVU (TPEv)** ± 0.440 m
Timestamp: 2008-204.23:11:26.365 (07/22/2008)
Survey Line: h11931 / 2801_reson7125_hf_512beams / 2008-204 / 663_2311
Profile/Beam: 99/12
Charts Affected: 16549_1, 16540_1, 16011_1, 16006_1, 500_1, 513_1, 530_1, 50_1

Remarks:

3.52 m Rk found by MBES in 33.63 m surrounding depths.

Feature Correlation

Address	Feature	Range	Azimuth	Status
h11931/2801_reson7125_hf_512beams/2008-204/663_2311	99/12	0.00	000.0	Primary

Hydrographer Recommendations

Chart Rk based on the depth, position, and S-57 attribution specified in this report.

Cartographically-Rounded Depth (Affected Charts):

16fm (16549_1, 16540_1, 16011_1, 16006_1, 530_1)

30m (500_1, 513_1, 50_1)

S-57 Data

Geo object 1: Underwater rock / awash rock (UWTROC)
Attributes: SORDAT - 20080804
 SORIND - US,US,nsurf,H11931
 TECSOU - 3:found by multi-beam
 VALSOU - 30.109 m
 VERDAT - 12:Mean lower low water
 WATLEV - 3:always under water/submerged

2.2) Profile/Beam - 2112/222 from h11931 / 1101_reson8125_hvf / 2008-202 / 300_2126

Survey Summary

Survey Position: 55° 01' 03.7" N, 161° 53' 03.4" W
Least Depth: 11.95 m (= 39.20 ft = 6.533 fm = 6 fm 3.20 ft)
TPU ($\pm 1.96\sigma$): **THU (TPEh)** ± 2.071 m ; **TVU (TPEv)** ± 1.215 m
Timestamp: 2008-202.21:34:18.484 (07/20/2008)
Survey Line: h11931 / 1101_reson8125_hvf / 2008-202 / 300_2126
Profile/Beam: 2112/222
Charts Affected: 16549_1, 16540_1, 16011_1, 16006_1, 500_1, 513_1, 530_1, 50_1

Remarks:

3.96 m Rk found by MBES in 15.91 m surrounding depths.

Feature Correlation

Address	Feature	Range	Azimuth	Status
h11931/1101_reson8125_hvf/2008-202/300_2126	2112/222	0.00	000.0	Primary

Hydrographer Recommendations

Chart Rk based on the depth, position, and S-57 attribution specified in this report.

Cartographically-Rounded Depth (Affected Charts):

6 ½fm (16549_1, 16540_1, 16011_1, 16006_1, 530_1)

11.9m (500_1, 513_1, 50_1)

S-57 Data

Geo object 1: Underwater rock / awash rock (UWTROC)
Attributes: SORDAT - 20080804
 SORIND - US,US,nsurf,H11931
 VALSOU - 11.947 m
 WATLEV - 3:always under water/submerged

2.3) Profile/Beam - 6267/172 from h11931 / 1101_reson8125_hvf / 2008-202 / 300_2126

Survey Summary

Survey Position: 55° 00' 09.3" N, 161° 51' 49.3" W
Least Depth: 12.09 m (= 39.66 ft = 6.609 fm = 6 fm 3.66 ft)
TPU ($\pm 1.96\sigma$): **THU (TPEh)** ± 1.969 m ; **TVU (TPEv)** ± 0.285 m
Timestamp: 2008-202.21:48:41.641 (07/20/2008)
Survey Line: h11931 / 1101_reson8125_hvf / 2008-202 / 300_2126
Profile/Beam: 6267/172
Charts Affected: 16549_1, 16540_1, 16011_1, 16006_1, 500_1, 513_1, 530_1, 50_1

Remarks:

3.31 m rock found by MBES in 15.40 surrounding depths.

Feature Correlation

Address	Feature	Range	Azimuth	Status
h11931/1101_reson8125_hvf/2008-202/300_2126	6267/172	0.00	000.0	Primary

Hydrographer Recommendations

Chart Rk based on the depth, position, and S-57 attribution specified in this report.

Cartographically-Rounded Depth (Affected Charts):

6 ½fm (16549_1, 16540_1, 16011_1, 16006_1, 530_1)

12.1m (500_1, 513_1, 50_1)

S-57 Data

Geo object 1: Underwater rock / awash rock (UWTROC)
Attributes: SORDAT - 20080804
 SORIND - US,US,nsurf,H11931
 TECSOU - 3:found by multi-beam
 VALSOU - 12.087 m
 VERDAT - 12:Mean lower low water
 WATLEV - 3:always under water/submerged

2.4) Profile/Beam - 1710/470 from h11931 / 2801_reson7125_hf_512beams / 2008-200 / 313_2045

Survey Summary

Survey Position: 55° 00' 10.2" N, 161° 51' 43.8" W
Least Depth: 13.38 m (= 43.88 ft = 7.314 fm = 7 fm 1.88 ft)
TPU ($\pm 1.96\sigma$): **THU (TPEh)** ± 1.976 m ; **TVU (TPEv)** ± 0.318 m
Timestamp: 2008-200.20:48:39.641 (07/18/2008)
Survey Line: h11931 / 2801_reson7125_hf_512beams / 2008-200 / 313_2045
Profile/Beam: 1710/470
Charts Affected: 16549_1, 16540_1, 16011_1, 16006_1, 500_1, 513_1, 530_1, 50_1

Remarks:

4.0 m rock found by MBES in 17.38 m surrounding depths.

Feature Correlation

Address	Feature	Range	Azimuth	Status
h11931/2801_reson7125_hf_512beams/2008-200/313_2045	1710/470	0.00	000.0	Primary

Hydrographer Recommendations

Chart Rk based on the depth, position, and S-57 attribution specified in this report.

Cartographically-Rounded Depth (Affected Charts):

7 ¼fm (16549_1, 16540_1, 16011_1, 16006_1, 530_1)

13.4m (500_1, 513_1, 50_1)

S-57 Data

Geo object 1: Underwater rock / awash rock (UWTROC)
Attributes: SORDAT - 20080804
 SORIND - US,US,nsurf,H11931
 TECSOU - 3:found by multi-beam
 VALSOU - 13.376 m
 VERDAT - 12:Mean lower low water
 WATLEV - 3:always under water/submerged

3 - Dangers to Navigation

3.1) Profile/Beam - 1383/80 from h11931 / 1015_reson8101_hvf / 2008-204 / 360_0043

DANGER TO NAVIGATION

Survey Summary

Survey Position: 54° 57' 45.0" N, 161° 52' 21.3" W
Least Depth: 6.81 m (= 22.33 ft = 3.722 fm = 3 fm 4.33 ft)
TPU ($\pm 1.96\sigma$): **THU (TPEh)** ± 1.964 m ; **TVU (TPEv)** ± 0.271 m
Timestamp: 2008-205.00:46:33.762 (07/23/2008)
Survey Line: h11931 / 1015_reson8101_hvf / 2008-204 / 360_0043
Profile/Beam: 1383/80
Charts Affected: 16549_1, 16540_1, 16011_1, 16006_1, 500_1, 513_1, 530_1, 50_1

Remarks:

Dangerous rocky outcropping discovered east of Sarana Island. A shoal sounding was discovered under a 7 ftn charted sounding. Due to the location of the sounding, and the great misrepresentation of the shoal depths on the chart, this has been designated as a DtoN.

Feature Correlation

Address	Feature	Range	Azimuth	Status
h11931/1015_reson8101_hvf/2008-204/360_0043	1383/80	0.00	000.0	Primary

Hydrographer Recommendations

Chart dangerous 6.81 m rock based on depth, position, and S-57 attribution specified in this report.

Cartographically-Rounded Depth (Affected Charts):

3 $\frac{3}{4}$ fm (16549_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: SORDAT - 20080804
 SORIND - US,US,nsurf,H11931
 TECSOU - 3:found by multi-beam

VALSOU - 6.807 m

VERDAT - 13:Low water

WATLEV - 3:always under water/submerged

Feature Images

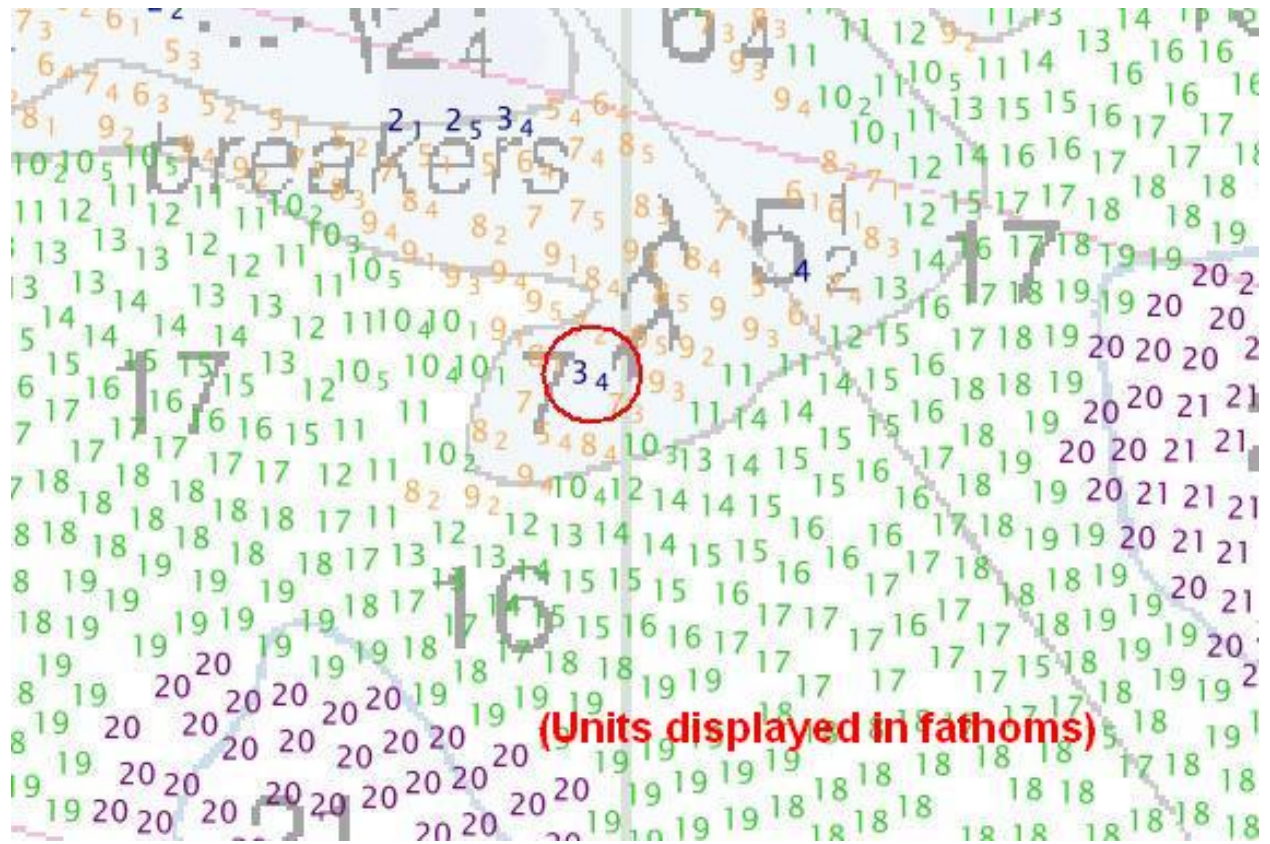


Figure 3.1.1

3.2) Profile/Beam - 1927/1 from h11931 / 1103_singlebeam_hvf / 2008-213 / 000_1837

DANGER TO NAVIGATION

Survey Summary

Survey Position: 55° 00' 18.8" N, 161° 54' 23.3" W
Least Depth: 4.51 m (= 14.78 ft = 2.464 fm = 2 fm 2.78 ft)
TPU ($\pm 1.96\sigma$): **THU (TPEh)** ± 3.927 m ; **TVU (TPEv)** ± 0.278 m
Timestamp: 2008-213.18:39:22.311 (07/31/2008)
Survey Line: h11931 / 1103_singlebeam_hvf / 2008-213 / 000_1837
Profile/Beam: 1927/1
Charts Affected: 16549_1, 16540_1, 16011_1, 16006_1, 500_1, 513_1, 530_1, 50_1

Remarks:

Dangerous rock discovered west of Outer Iliasik Island. A 4.51 m sounding was discovered outside of the 5-meter curve using a star pattern search method with VBES. Due to the location of the sounding, and the great misrepresentation of the shoal depths on the chart, this has been designated as a DtoN.

Feature Correlation

Address	Feature	Range	Azimuth	Status
h11931/1103_singlebeam_hvf/2008-213/000_1837	1927/1	0.00	000.0	Primary

Hydrographer Recommendations

Chart dangerous 4.51 m rock based on depth, position, and S-57 attribution specified in this report.

Cartographically-Rounded Depth (Affected Charts):

2 ½fm (16549_1, 16540_1, 16011_1, 16006_1, 530_1)

4.5m (500_1, 513_1, 50_1)

S-57 Data

Geo object 1: Underwater rock / awash rock (UWTROC)
Attributes: SORDAT - 20080804
 SORIND - US,US,nsurf,H11931
 VALSOU - 4.506 m

VERDAT - 12:Mean lower low water

WATLEV - 3:always under water/submerged

Feature Images

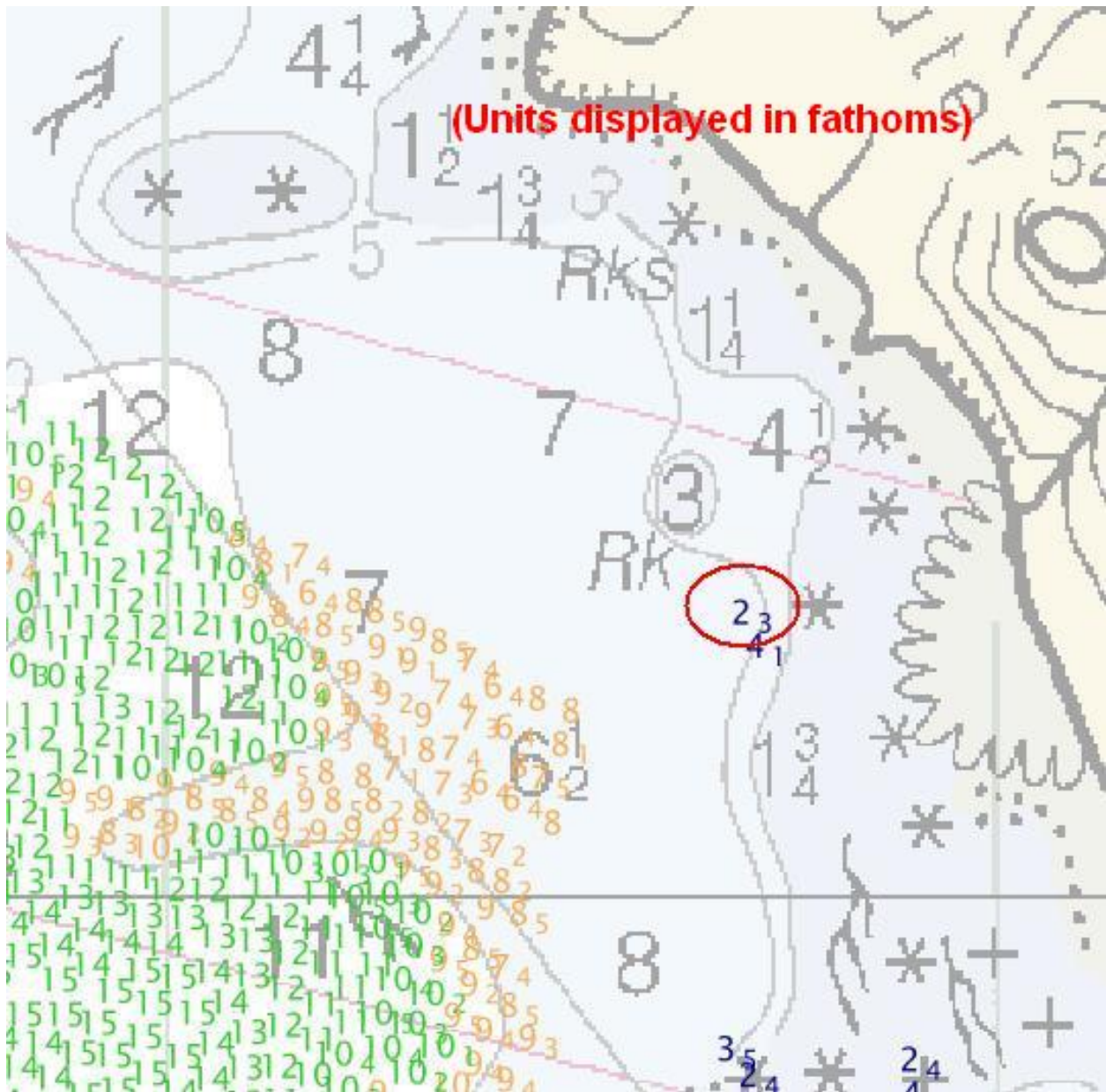


Figure 3.2.1



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

TIDE NOTE FOR HYDROGRAPHIC SURVEY

DATE : August 12, 2008

HYDROGRAPHIC BRANCH: Pacific
HYDROGRAPHIC PROJECT: OPR-P184-RA-2008
HYDROGRAPHIC SHEET: H11931

LOCALITY: Outer Iliasik Island and Vicinity, Pavlof Islands, AK
TIME PERIOD: July 18 - August 3, 2008

TIDE STATION USED: 945-9881 King Cove, AK
Lat. 55° 03.6'N Long. 162° 19.6' W

PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters
HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 1.876 meters

REMARKS: RECOMMENDED ZONING

Preliminary zoning is accepted as the final zoning for project OPR-P184-RA-2008, H11931, during the time period between July 18 and August 3, 2008.

Please use the zoning file "P184RA2008CORP" submitted with the project instructions for Pavlof Islands, AK. Zone SWA218 is the applicable zone for H11931.

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).

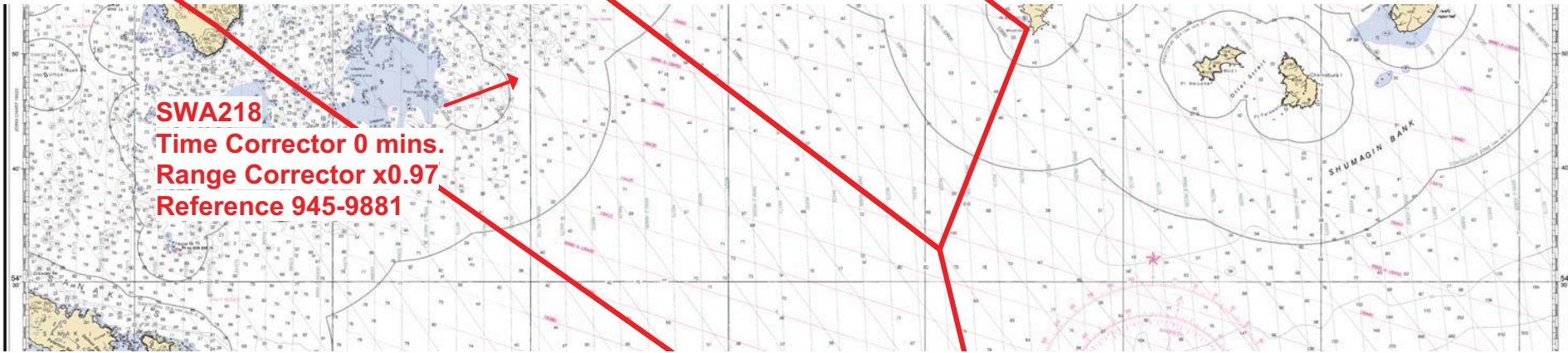
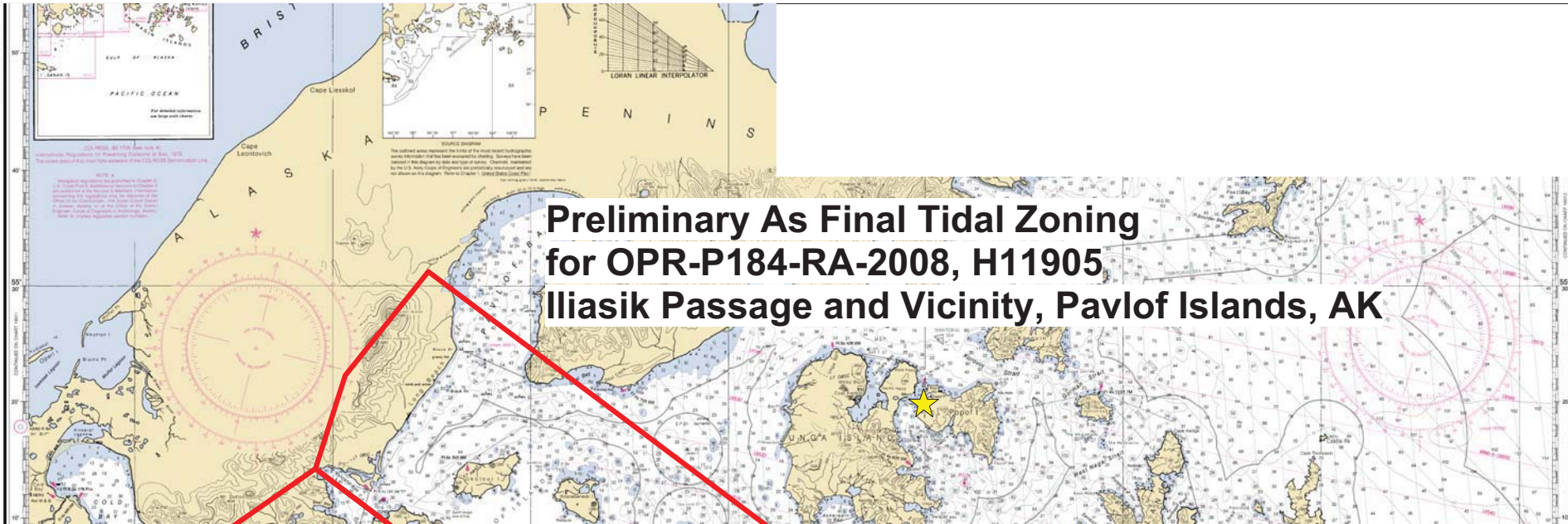
Peter J. Stone

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: 2008.08.19 17:50:34 -04'00'

CHIEF, PRODUCT AND SERVICES DIVISION



N-C OVERPRINTED



H11931 HCell Report
Katie Reser, Physical Scientist
Pacific Hydrographic Branch

1. Specifications, Standards and Guidance Used in HCell Compilation

HCell compilation of survey H11931 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 H11931 were compiled to the largest scale raster charts shown below:

Chart	Scale	Edition	Edition Date	NTM Date
16549	1:80,000	16 th	03/01/2010	05/22/2010

The following ENC's were also used during compilation:

Chart	Scale
US4AK55M	1:80,000

3. Soundings

A survey-scale sounding (SOUNDG) feature object layer was built from a 4-meter multibeam combined surface from H11931 and 3-meter LIDAR surfaces from H11439 and H11488 in CARIS BASE Editor. A shoal-biased selection was made at 1:20,000 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 H11931_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
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 H11931:

M_QUAL

The Meta area objects were constructed on the basis of the limits of the hydrography. H11931 contains several M_QUAL objects: One large area depicting the data sourced from the H11931 main survey area, several smaller areas depicting H11931 singlebeam investigations, one area depicting data from a portion of LIDAR survey H11439 and one area depicting data from a portion of LIDAR survey H11488.

Due to the numerous number of M_QUALs included in this survey it was requested from MCD that a single area object depicting the full extents of the survey area be created. A single \$AREAS object has been included to fulfill that request.

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:

\$AREAS	Single area object depicting total coverage
\$CSYMB	Blue notes
COALNE	GC coastline
DEPCNT	LIDAR zero contours
LNDARE	Islands and islets
LNDELV	Heights on islands and islets
M_QUAL	Data quality meta object
SBDARE	Rocky seabed areas, ledges, reefs and bottom samples
SOUNDG	Soundings at the chart scale density
UWTROC	Rocks
WEDKLP	Kelp

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

H11931 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

H11931_CS.000	Base Cell File, Chart Units, Soundings and features compiled to 1:80,000
H11931_SS.000	Base Cell File, Chart Units, Soundings and Contours compiled to 1:20,000
H11931_DR.pdf	Descriptive Report including end notes compiled during office processing and certification, the HCell Report, and supplemental items
H11931_Outline.gml	Survey outline
H11931_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:

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APPROVAL SHEET
H11931

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