

H12441

NOAA FORM 76-35A

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

DESCRIPTIVE REPORT

Type of Survey Hydrographic Survey

Field No. OPR-Q191-KR-12

Registry No. H12441

LOCALITY

State Alaska

General Locality Krenitzin Islands

Sublocality North of Avatanak Island

2012

CHIEF OF PARTY

Dean Moyles, Fugro Pelagos, Inc.

LIBRARY & ARCHIVES

DATE

HYDROGRAPHIC TITLE SHEET

H12441

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

State: **Alaska**

General Locality: **Krenitzin Islands**

Sub-Locality: **North of Avatanak Island**

Scale: **1: 40,000**

Dates of Survey: **06/16/2012 to 07/7/2012**

Instructions Dated: **6/27/2012**

Project Number: **OPR-Q191-KR-12**

Field Unit: **F/V Pacific Star, R/V R2, R/V D2**

Chief of Party: **Dean Moyles, Fugro Pelagos, Inc.**

Soundings by: **Reson Seabat 7111 and 7101 Multibeam Echo Sounders**

Imagery by: **N/A**

Verification by: **Pacific Hydrographic Branch**

Soundings Acquired in: **meters at Mean Lower Low Water**

H-Cell Compilation Units: **meters at Mean Lower Low Water**

Remarks:

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. Notes in red were generated during office processing. The processing branch concurs with all information and recommendations in the DR unless otherwise noted. Page numbering may be interrupted or non-sequential. All pertinent records for this survey, including the Descriptive Report, are archived at the National Geophysical Data Center (NGDC) and can be retrieved via <http://www.ngdc.noaa.gov/>.

A. Area Surveyed

H12441 is located North of Avatanak Island. ¹

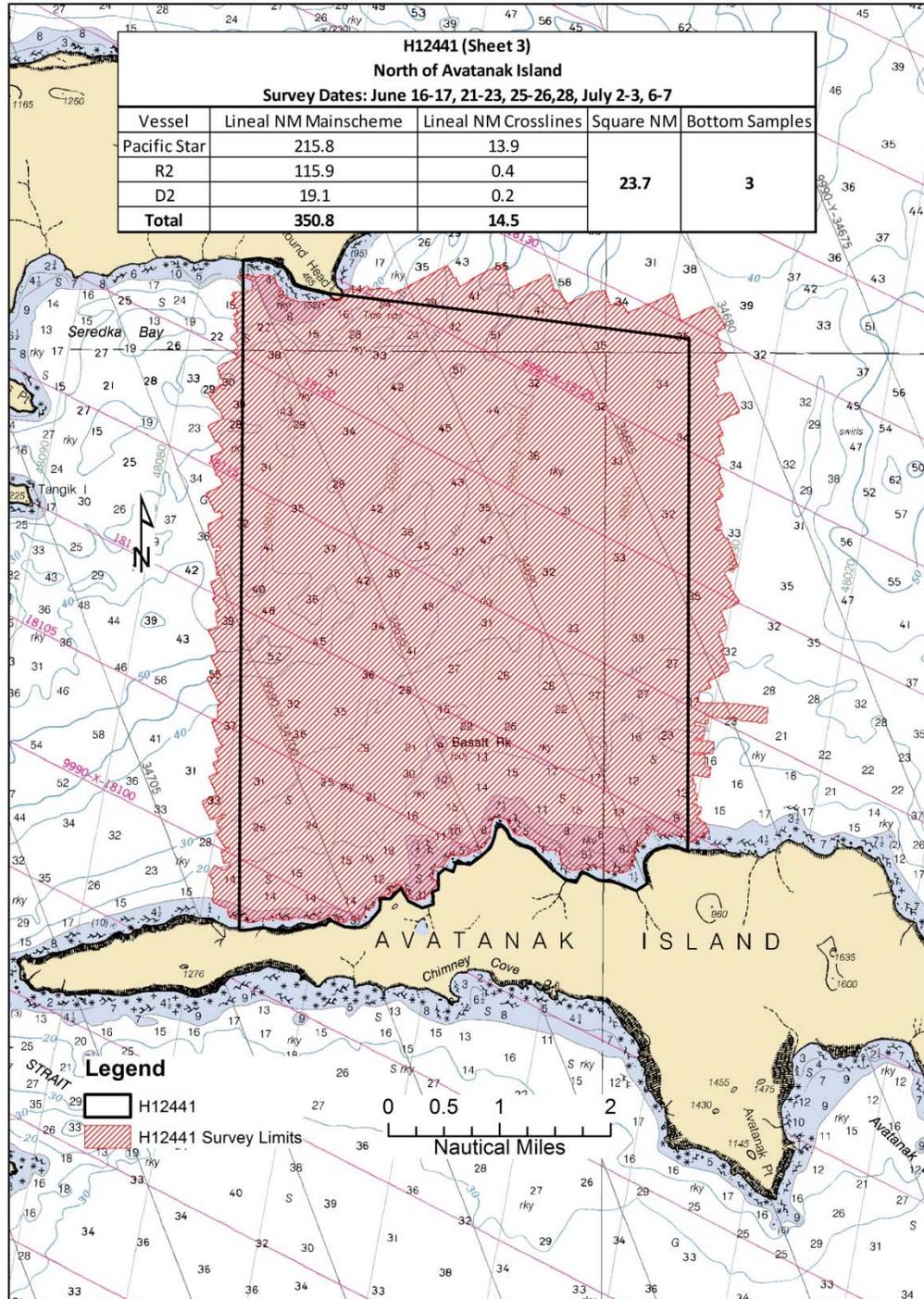


Figure 1 H12441 Area Surveyed

B. Data Acquisition and Processing

Refer to the OPR-Q191-KR-12 Data Acquisition and Processing Report for a detailed description of all equipment, survey vessels, processing procedures, and quality control features. Items specific to this survey and any deviations from the Data Acquisition and Processing Report are discussed in the following sections.

B.1 Equipment & Vessels

The F/V Pacific Star, the survey launch R/V R2, and the survey launch R/V D2 acquired all sounding data for H12441.

F/V Pacific Star, 162 feet in length with a draft of 16 feet, was equipped with a hull mounted Reson SeaBat 7111 multibeam echosounder system for the OPR-Q191-KR-12 project. The Reson 7111 system operates at a frequency of 100 kHz and forms 301 beams at a 1.5° spacing (across-track), with maximum swath coverage of 150°. Operating modes such as range scale, gain, power level, ping rates, etc. were a function of water depth and data quality and were noted on the survey line logs (see the Descriptive Report Separate 1). All 7111 multibeam data files were logged in the s7k format using WinFrog Multibeam v3.09.21. The vessel was equipped with an OCEANSCIENCE underway CTD (UCTD) deploying a Sea-Bird probe. Together, the system measures conductivity, temperature, and pressure to derive a sound velocity profile.

Vessel attitude and position were measured using an Applanix Position and Orientation System for Marine Vessels (POS MV) 320 V4. WaterLOG H3611 (Radar Water Level Sensors) were installed on the port and starboard gunwales of F/V Pacific Star to obtain a more precise static draft measurement. Samples were taken over a 10 minute period and averaged to determine the vessel's draft. Traditional static draft measurement techniques were also employed as a substitute to the WaterLOG H3611 measurements when required.

R/V R2, a Pacific Star launch, is 29 feet in length with a draft of 3 feet. For this survey, R2 was equipped with a hull mounted Reson SeaBat 7101 multibeam echosounder, fitted with a stick projector and operated at a frequency of 240 kHz. The system forms either 239 or 511 beams across a 150° swath width. All 7101 multibeam data files were logged in the s7k format using WinFrog Multibeam v3.09.21. R2 was equipped with two AML sound velocity and pressure sensors (SV&P) for sound velocity profiles. Vessel attitude and position were measured using an Applanix Position and Orientation System for Marine Vessels (POS MV) 320 V4.

R/V D2, a Pacific Star launch, is 29 feet in length with a draft of 3 feet. For this survey, D2 was equipped with a hull mounted Reson SeaBat 7101 multibeam echosounder, fitted with a stick projector and operated at a frequency of 240 kHz. The system forms either 239 or 511 beams across a 150° swath width. All 7101 multibeam data files were logged in the s7k format using WinFrog Multibeam v3.09.21. D2 was equipped with two AML sound velocity and pressure sensors (SV&P) for sound velocity profiles. Vessel attitude and position were measured using an Applanix Position and Orientation System for Marine Vessels (POS MV) 320 V4.

B.2 Quality Control

Crosslines

Crosslines were planned and well distributed throughout the survey to ensure adequate quality control. Total crossline length surveyed was 14.5 nautical miles or 4.1 percent of the total mainscheme line length. Each crossline was compared to the entire mainscheme line plan through a 2m CUBE surface using the CARIS HIPS QC report routine. If the crossline covered an area with significantly rocky topography, the crossline was compared to a 1m CUBE surface of the entire mainscheme line plan.

The majority of QC Reports fall well within the required accuracy specifications. However, a few crosslines run by the Pacific Star extending just north of Avatanak Island contain beams in the QC report that fall below the 95% confidence level due to significantly rocky topography, as illustrated in **Figure 2**. Good conformity was still seen between the mainscheme lines and crosslines. Mainscheme lines are shown in green and crosslines in purple. Quality Control Results are located in Separate II. ²

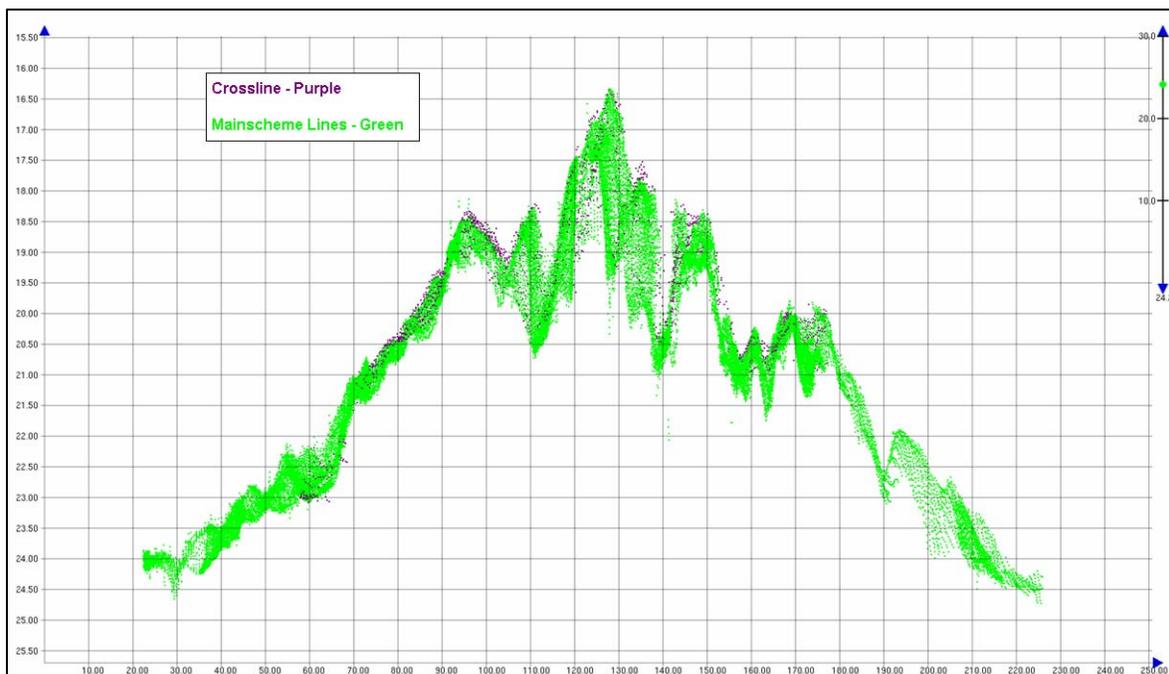


Figure 2 Profile of 1P302-TIE04

Note: The QC reports were generated based on the IHO Order 1a accuracy specification:

$$\pm\sqrt{a^2 + (b * d)^2}$$

Where, a=0.5 and b=0.013, d=depth

Uncertainty Values

The majority of the data fell within IHO Order 1a accuracy specifications (refer to **Table 1**). Nodes that exceeded the allowable specifications were located in rough or rapidly changing topography or in areas where the outer beams of the coverage boundaries were the single contributor to the surface (refer to **Figure 3** and **Figure 4**). Despite the higher uncertainty values in these areas, agreement between adjacent lines and colinearity between soundings was good.

Table 1 BASE Surface QC Report

BASE Surface QC Report		
Surface	Depth Range (m)	% of nodes within IHO Order 1a
H12441-1m	0 - 20	98.45%
H12441-2m	18 - 40	99.64%
H12441-4m	36 - 80	99.99%
H12441-8m	72 - 160	99.96%

Note: The percentage of nodes within IHO Order 1a were computed by CARIS using the Surface QC Report utility.

As seen in the uncertainty surface graphic (**Figure 4**), uncertainty is generally lowest near the sonar nadir beams and increases toward the outside of each swath. This is expected and primarily a result of the sonar’s device model used within CARIS HIPS for TPU calculations. In general, total propagated uncertainty varies proportionally to water depth. Outer beams also have higher uncertainty values as a function of the bottom-detection algorithms within the sonar.



Figure 3 Uncertainty DTM

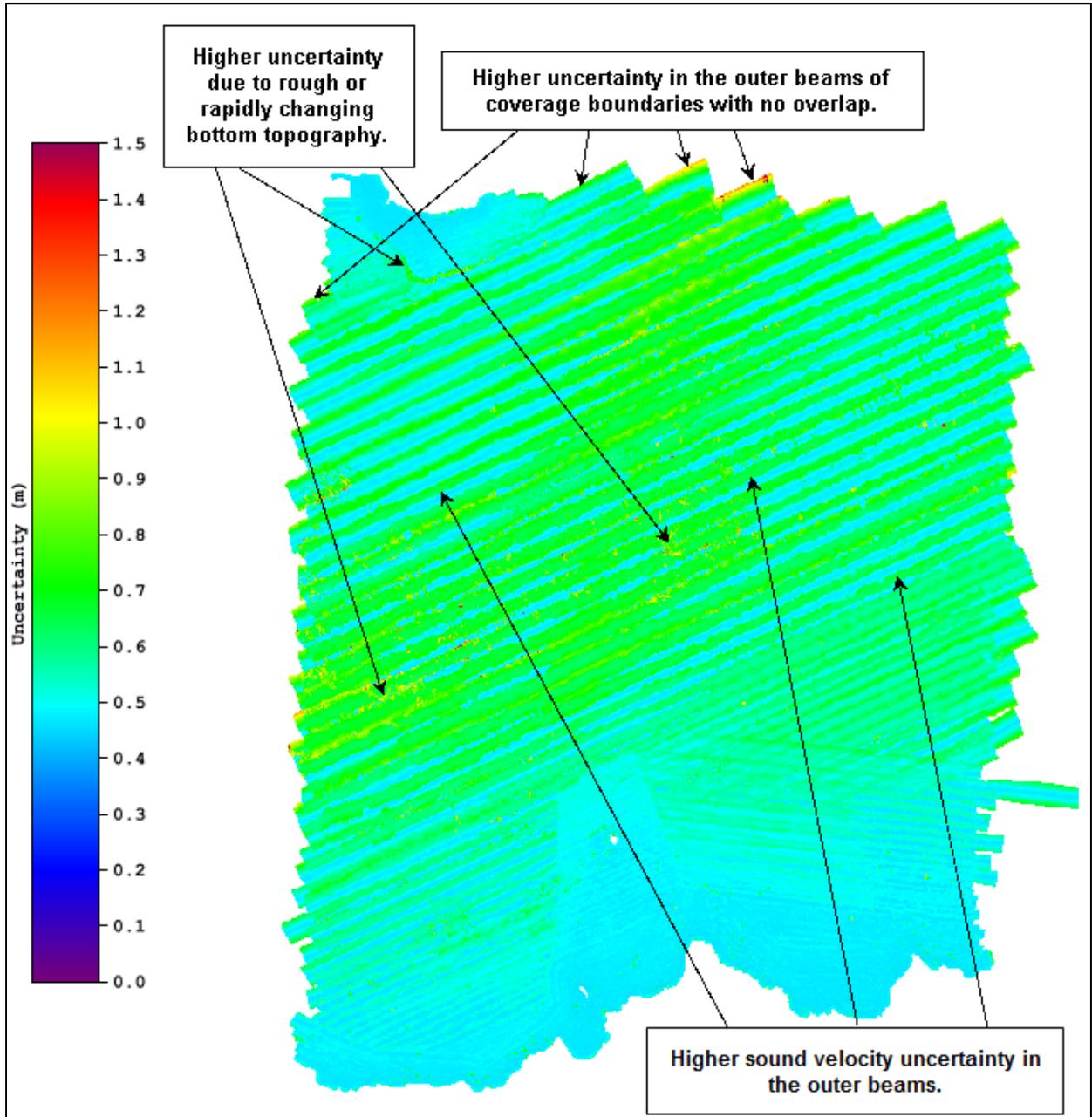


Figure 4 Uncertainty DTM

Data Density

The NOS Hydrographic Surveys Specifications and Deliverables, April 2011, require 95% of all nodes to be populated with at least five soundings. Survey H12441 met these project specifications (**Figure 5**).

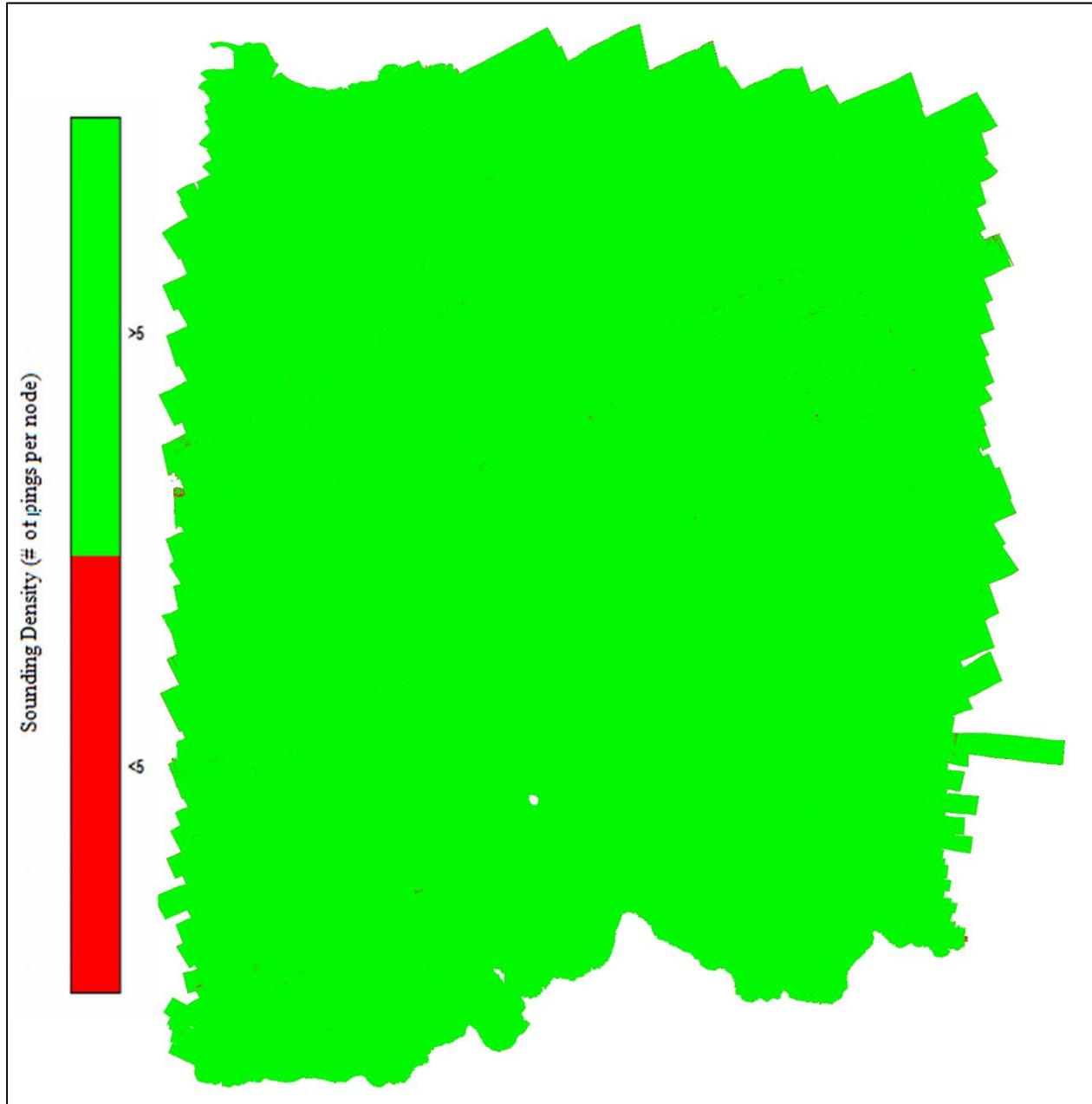


Figure 5 Density DTM

It should be noted however, that during routine processing in CARIS HIPS Swath Editor, survey lines from the F/V Pacific Star’s Reson 7111 were found that contained noise due to poor bottom tracking in areas of soft sediment. The bottom detect algorithm in the Reson 7111 may have been affected by the time spreading of the signal return due to sediment penetration close to nadir (**Figure 6**). To mitigate the effects of this sediment penetration, the sonar pulse length was kept low during data acquisition. However, as a result of this bottom detect issue and the rejection of some noisy data, data density dropped below the 5-pings-per-cell requirement in localized areas. Although some localized areas did not meet the 5 pings-per-cell requirement, the overall sheet did meet the 95% requirement for data density, and the CUBE BASE surfaces met IHO Order 1a specifications.

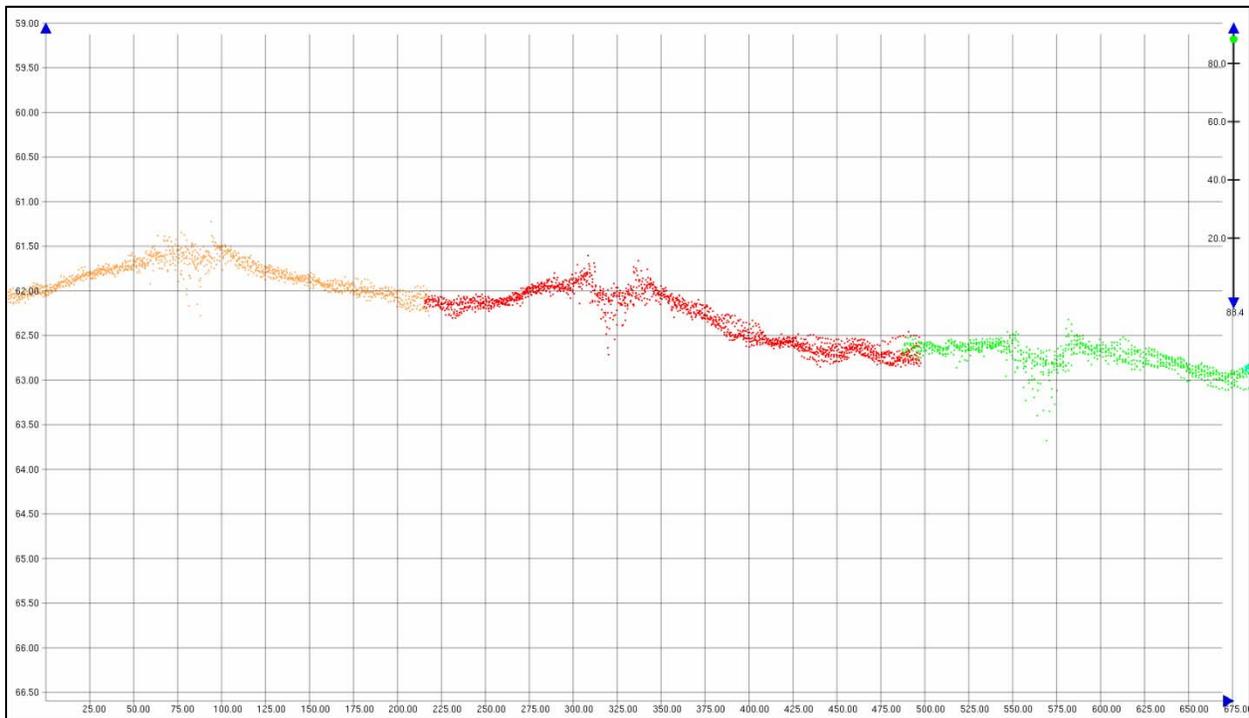


Figure 6 Bottom Detection Artifacts Near Nadir of Reson 7111

Detection requirements were met by minimizing vessel speed when necessary, using sonar range scales appropriate to the water depth to maximize ping rates, and maximizing swath overlap. These variables were adjusted in real-time by the online acquisition crew based on the WinFrog QC and coverage displays. The shipboard processing crew provided feedback after preliminary processing and coverage creation in CARIS HIPS. Infill lines were run as necessary.

Survey Junctions

H12441 junctions with:

Registry #	Date	Junction Side
H12263	2010	North
H12359	2011	North
H12440	2012	East
H12442	2012	West

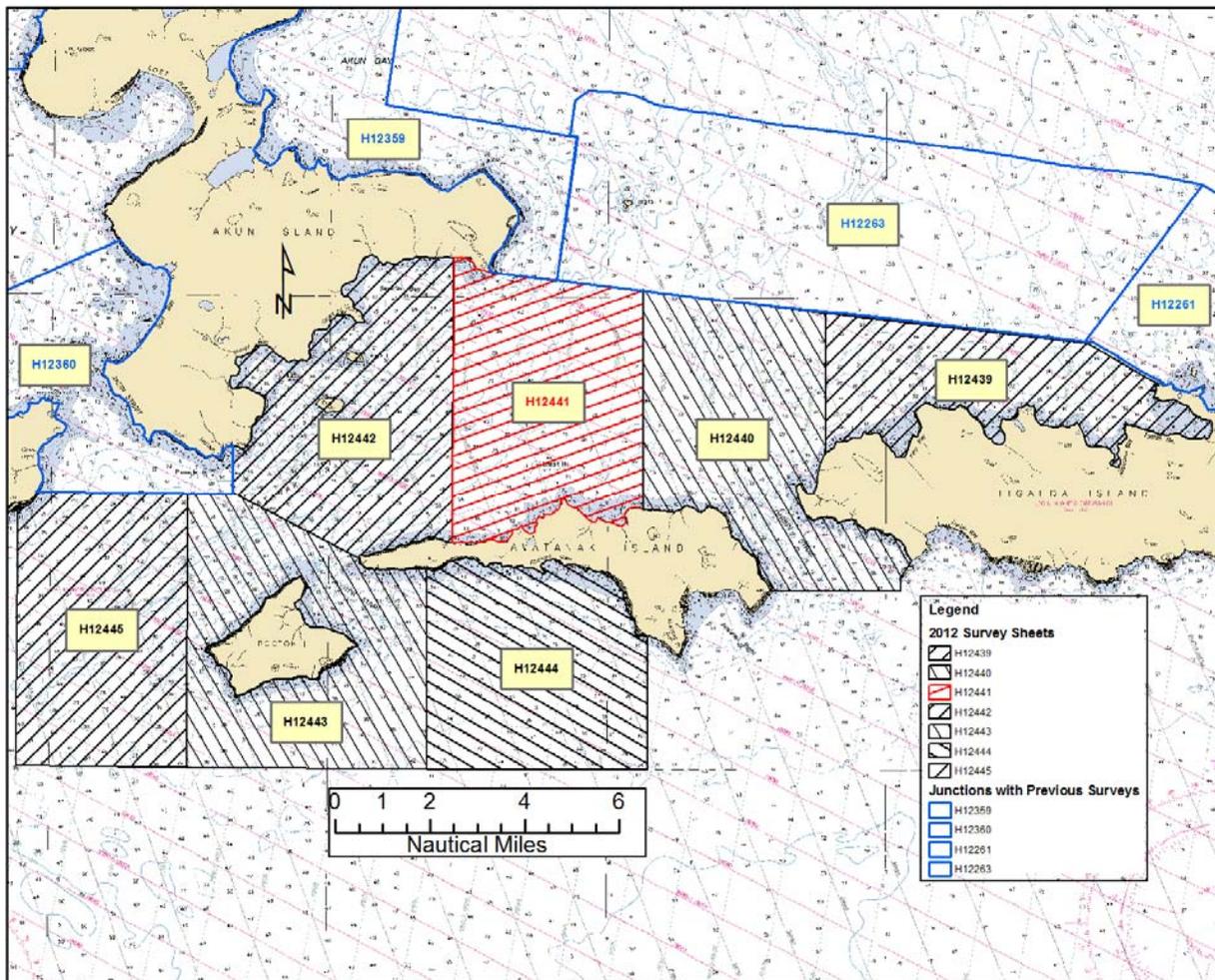


Figure 7 H12441 Survey Junction

The surveys are in agreement along their common borders. The conformity between H12441 and the bordering survey areas (H12440, H12442, H12263, and H12359) was inspected during processing using CARIS HIPS Subset Editor routine and the finalized BASE Surfaces. Difference surfaces were also created between H12441 and the bordering survey areas and

confirmed that more than 91.2% of the nodes agree to within 0.35m or less. The other 8.8%, which were in the deeper portions of the sheet, agree to within 0.4m to 0.65m. These differences were usually on the outer edges of the swath, and can be attributed to sound speed error. There is also a noticeable difference in areas with irregular bottom topography. These differences were usually on the nadir portion of the swath and can be attributed to the bottom detect issue with the Reson 7111. All data, however, were well within the IHO Order 1a allowable error.

Quality Control Checks

Positioning system confidence checks were conducted on a daily basis using the (POS MV) controller software. The controller software had numerous real-time displays that were monitored throughout the survey to ensure the positional accuracies specified in the NOS Hydrographic Surveys Specifications and Deliverables were achieved. These include, but are not limited to the following: GPS Status, Position Accuracy, Receiver Status (which included HDOP & PDOP), and Satellite Status. During periods of high HDOP and/or a low number of available satellites, survey operations were suspended.

Sonar system confidence checks were performed weekly by comparing post processed depth information collected by multiple vessels surveying over a common area. In addition, bar checks were performed to maintain a high confidence level. Sound Velocity Probe confidence checks were conducted weekly by producing comparable sound velocity data between all vessels. This check was carried out by having all sound velocity profiling equipment perform a cast in close proximity to each other in a near simultaneous time period.³

Data Quality

In general, the multibeam data quality for H12441 was good. Four notable problems follow:⁴

1. Along coastal regions of the survey, an abundance of kelp was observed during data acquisition. Due to data quality and safety issues, there may be some areas where survey operations were halted, thus not achieving the 4 fathom survey limit. In addition to this, during data processing every effort was made to flag the kelp as rejected data wherever the CUBE BASE surface included the kelp as part of the seafloor.⁵
2. The Reson SeaBat 7111 sonar system displayed bottom-detection artifacts near nadir of the multibeam swath. The bottom detection algorithm in the Reson 7111 may have been affected by the time spreading of the signal return due to sediment penetration close to nadir. To mitigate these effects, the sonar pulse length was kept at low settings during acquisition and the artifacts were monitored closely during data processing to ensure all data met IHO Order 1a specifications. See **Figure 6** above.

3. Sound speed refraction errors were seen in the outer beams of the swaths of survey lines that were run in deeper water. However, line overlap was sufficient, and the affected soundings were rejected in CARIS HIPS Subset Editor routine to ensure the CUBE surface met IHO Order 1a specifications.
4. A tide bust of 0.20 m to 0.30 m was observed at approximately 54° 05' 07"N, 165° 24' 45"W, north of the western half of Avatanak Island (**Figure 8**). The local complexity of the water levels in this area of Avatanak Strait, close to Avatanak Island, is beyond the ability of the discrete tidal zoning to describe.

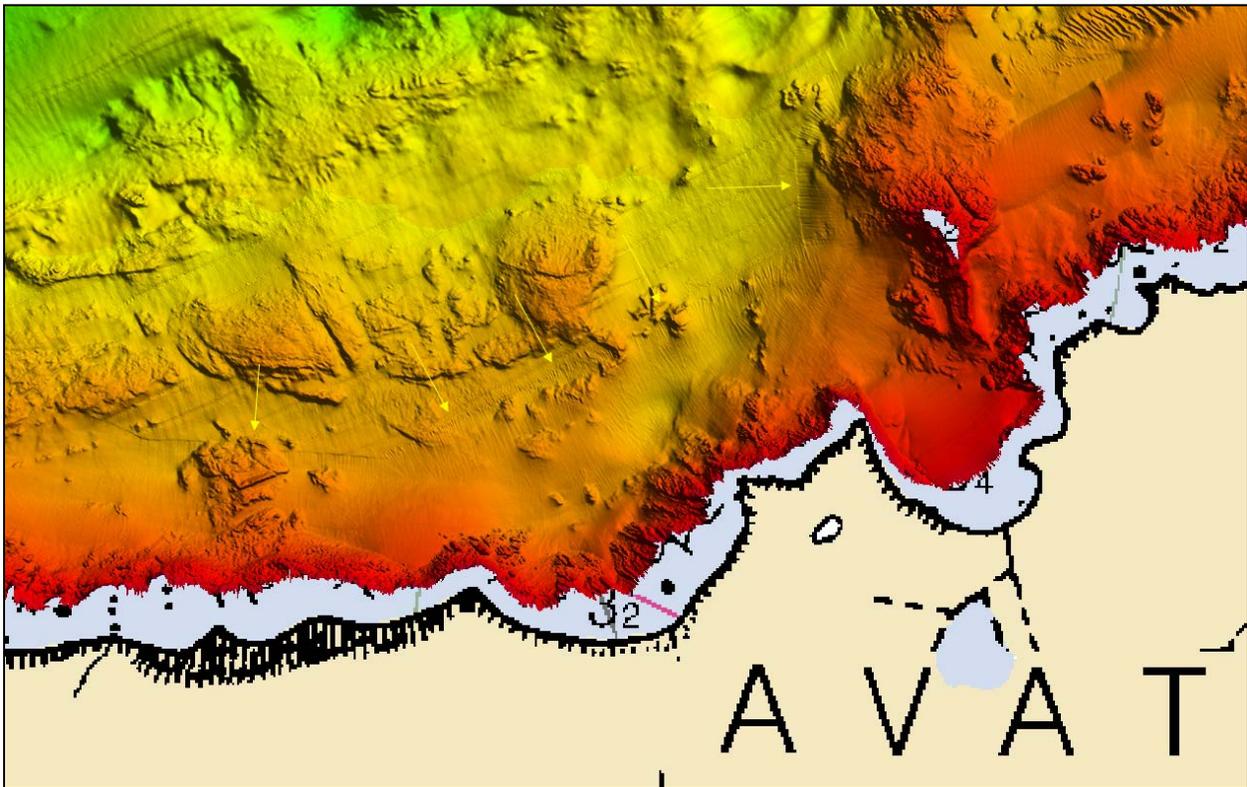


Figure 8 Tide Bust (Image at 10X Exaggeration)

Refer to the OPR-Q191-KR-12 Data Acquisition and Processing Report for a detailed description of the survey equipment and methodology used over the course of this survey.

B.3 Corrections to Echo Soundings

Refer to the OPR-Q191-KR-12 Data Acquisition and Processing Report for a detailed description of all corrections to echo soundings. No deviations from the report occurred.

B.4 Data Processing

Refer to the OPR-Q191-KR-12 Data Acquisition and Processing Report for a detailed description of the processing flow.

The final fieldsheet for H12441 is called “H12441”, and it contains eight CUBE surfaces. The following parameters were used:

Entire depth range: 1 m resolution, name “1m”
Entire depth range: 2 m resolution, name “2m”
Entire depth range: 4 m resolution, name “4m”
Entire depth range: 8 m resolution, name “8m”
0-20 meters: 1 m resolution, name “H12441_1m_Final”
18-40 meters: 2 m resolution, name “H12441_2m_Final”
36-80 meters: 4 m resolution, name “H12441_4m_Final”
72-160 meters: 8 m resolution, name “H12441_8m_Final”

Notes:

- Maximum depth was approximately 109m; therefore, resolutions coarser than 8m were not computed.
- Final CUBE surfaces were created with CARIS v 7.1 in the CARIS Spatial Archive (CSAR) format. These surfaces are located under the “H12441\CARIS\Fieldsheets” directory.⁶

The final S-57 file for this project is called “H12441_Field_Features.000”.⁷ This file contains the object and metadata S-57 objects as required in the Specifications and Deliverables.

C. Horizontal and Vertical Control

Refer to the OPR-Q191-KR-12 Horizontal and Vertical Control Report for a detailed description of the horizontal and vertical control used on this survey. No deviations from the report occurred. A summary of the project's horizontal and vertical control follows.

Horizontal Control

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

For real-time DGPS corrections, a CSI MBX-3 unit was tuned to the Cold Bay, Alaska USCG DGPS site. The unit output differentially corrected positions at 1 Hz to the (POS MV) 320 V4 where it was integrated with inertial data, and a position for the top-center of the IMU was generated. This position was logged concurrently with the bathymetry from WinFrog and the POS file using Fugro Pelagos PosMvLogger. It was later corrected for offsets to the multibeam echosounder (MBES) by CARIS HIPS in post processing.

Final positioning was done using post-processed kinematic (PPK) methods. Applanix POSPac MMS v5.4 software was used in conjunction with the POS files and local 1Hz base station data to generate a higher accuracy position, which was applied in processing to replace the real-time position records.

See OPR-Q191-KR-12 Horizontal and Vertical Control Report for a more detailed description of PPK positioning methods used.

Vertical Control

All sounding data were initially reduced to MLLW based on Preliminary Zoning provided by CO-OPS and modified by John Oswald and Associates (JOA) to use gauges located in Trident Bay, Rootok Island, and Tigalda Bay. Tidal data for a twenty-four hour period UTC, (Alaska Daylight Time to UTC was +8 hours) was assembled by JOA and uploaded to their ftp site at the end of every Julian Day. A cumulative file for the gauges was updated each day by appending the new data. It should be noted that these unverified tides were used in the field for preliminary processing only.

Between June and August, Sea-Bird pressure data was collected at two locations around Derbin Strait. The Sea-Bird data, along with PPK derived vessel altitude data, was used in developing final tide zones. The tidal zoning was modified by JOA, providing a more elaborate zoning scheme than the preliminary NOAA CO-OPS zones issued in the Statement of Work.

On October 13, 2012, JOA issued verified tidal data and final zoning for OPR-Q191-KR-12. All sounding data was then re-merged using CARIS HIPS and SIPS tide routine. Verified tidal data were used for all final Navigation BASE surfaces and S-57 Feature files.



For additional information, refer to the OPR-Q191-KR-12 Horizontal and Vertical Control Report.

Table 2 Tide Gauges

Gauge	Model	Gauge Type	Location	Latitude	Longitude	Operational
946-2721	H350XL/355	Digital Bubbler	Trident Bay, AK	54°08'20"N	165°31'34" W	June - Aug
946-2723	H350XL/355	Digital Bubbler	Rootok Island, AK	54°03'07"N	165°30'50" W	June - Aug
946-2782	H350XL/355	Digital Bubbler	Tigalda Bay, AK	54°07'05"N	164°58'35W	June - Aug

D. Results and Recommendations

D.1 Chart Comparison

H12441 survey was compared with charts shown in **Table 3**.

Table 3 Chart Comparisons

Chart Number	Type	Scale	Edition	Edition Date
16531	Raster	1:80,000	7	February-2002
US4AK6FM	ENC	n/a	8	October-2011

Comparison of Soundings

A comparison of soundings was accomplished by overlaying the latest edition of NOAA charts and ENC's onto the final BASE surfaces in CARIS HIPS and SIPS. The general agreement between the charted soundings and H12441 soundings is noted. A more detailed comparison was undertaken for any charted shoals or other dangerous features.

Agreement between the H12441 BASE surface depths and the charted soundings for all applicable ENC and Raster charts was within +/- 4 fathoms. Since the survey area was ensonified with 100% multibeam coverage, discrepancies between charted and surveyed depths were discovered and are summarized in **Table 4** and also presented in **Figure 9** and **Figure 10**. Special attention was given to soundings with greater than 2 fathoms difference.⁸

Table 4 Coordinates of Shoaler Soundings

Item Number	Nearest Charted Sounding (in fm)	Surveyed Sounding (in fm)	Latitude	Longitude
1	30	33.01	54°09'44.85" N	165°25'49.89" W
2	43	41.74	54°09'36.66" N	165°24'57.30" W
3	29	31.39	54°09'19.66" N	165°24'50.48" W
4	29	34.62	54°08'41.89" N	165°24'03.64" W
5	34	44.51	54°09'11.40" N	165°23'48.83" W
6	34	34.05	54°09'07.38" N	165°23'45.98" W
7	14	10.39	54°05'03.38" N	165°24'49.47" W
8	14	4.19	54°04'57.27" N	165°24'08.88" W
9	21	18.72	54°05'57.48" N	165°23'35.97" W
10	16	12.28	54°05'50.58" N	165°22'50.85" W



Item Number	Nearest Charted Sounding (in fm)	Surveyed Sounding (in fm)	Latitude	Longitude
11	7	4.77	54°05'20.50" N	165°22'53.69" W
12	7	3.38	54°05'14.18" N	165°22'42.85" W
13	10	12.92	54°06'08.07" N	165°22'25.42" W
14	10	8.83	54°05'41.91" N	165°22'13.73" W
15	15	7.4	54°06'05.50" N	165°21'34.70" W
16	8,6.25,5.5	4.93	54°05'30.17" N	165°10'56.47" W
17	23	18.86	54°06'31.10" N	165°18'51.43" W

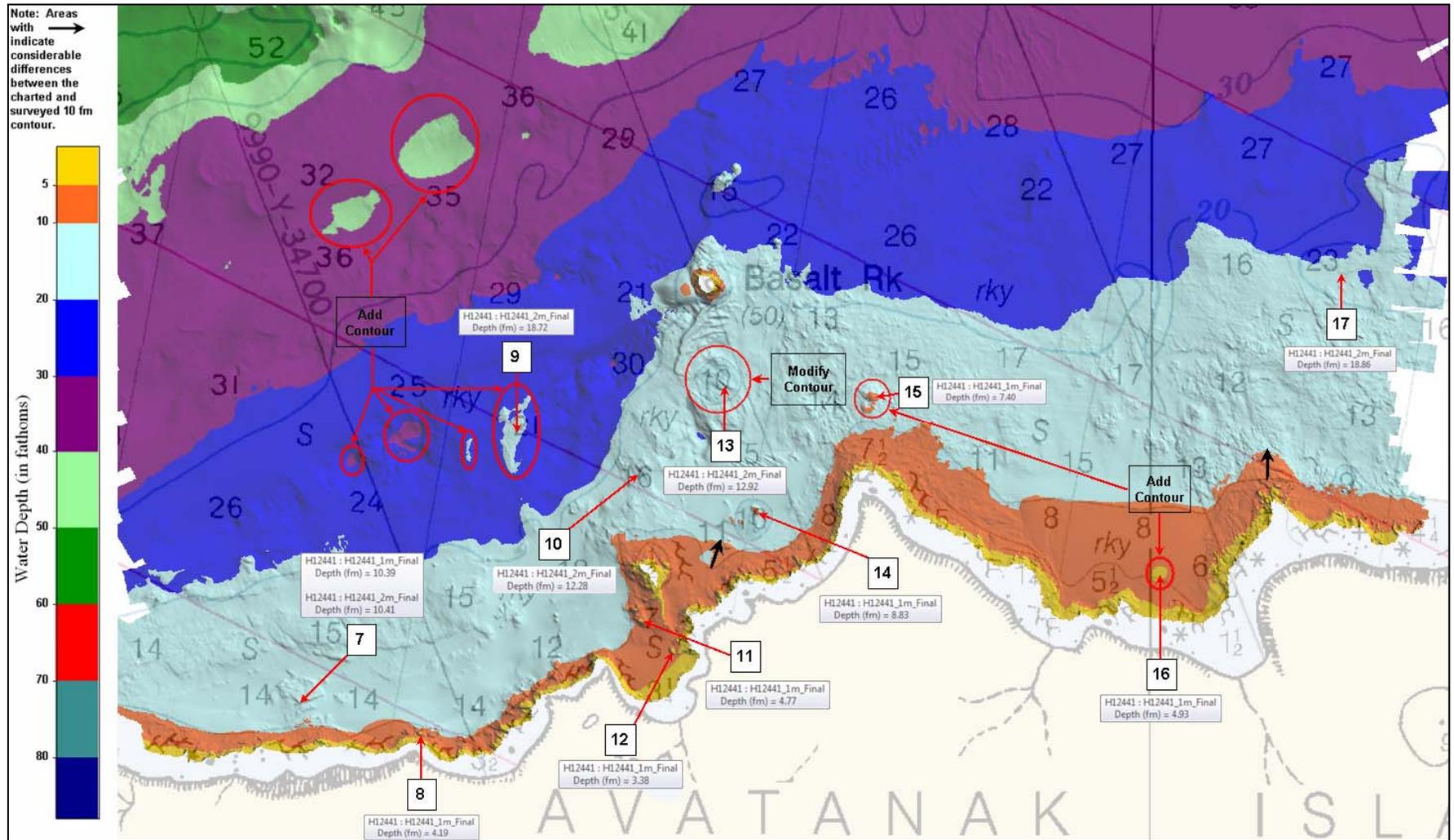


Figure 10 Contours and Charted Soundings to be Modified in the ENC and RNC

Contours in the area were adequate, but require revision from the high resolution data.⁹ In these areas, when necessary, the sounding was designated to ensure its inclusion in the finalized BASE surface. Exceptions follow:

1. Overall, the 100% multibeam coverage established discrepancies between charted and observed contours. Several new contours were discovered throughout the survey area and specifically around items 5, 9, 15, and 16. These new contours and their locations are identified with arrows stating “Add Contour,” as shown in **Figure 11**.¹⁰

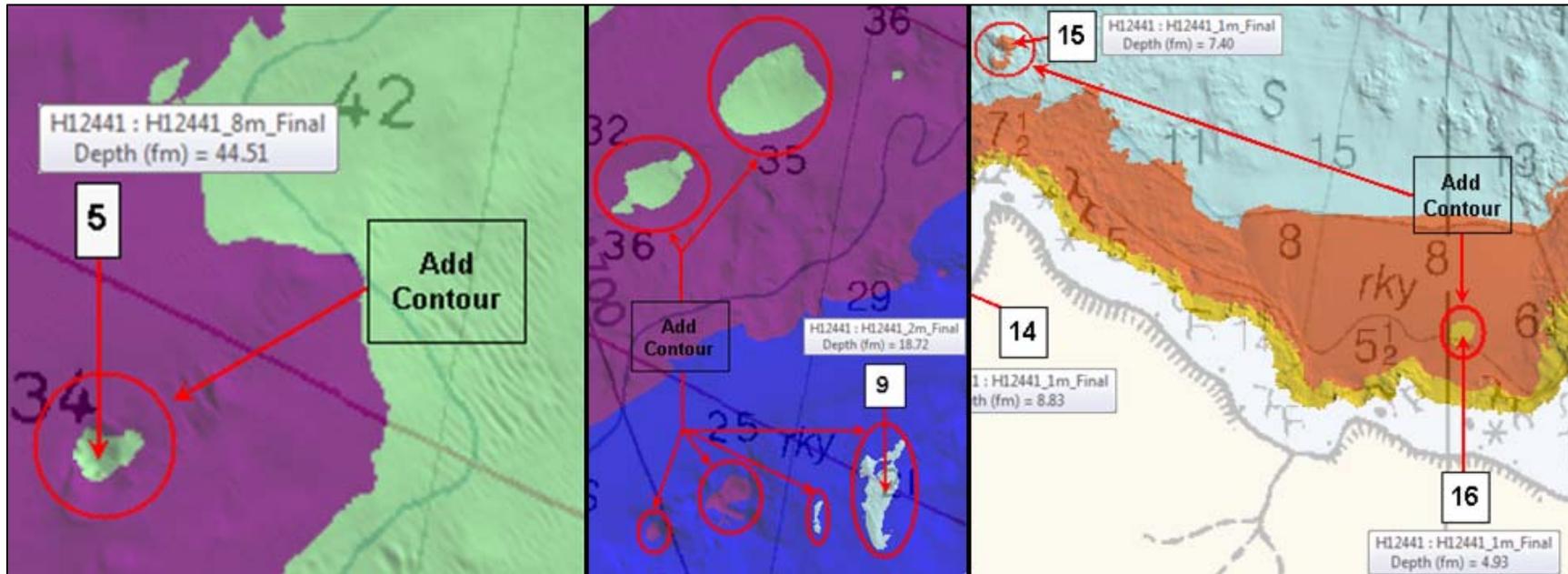


Figure 11 Proposed Modifications to Contours

One 10-fathom contour around item 13 and three 30-fathom contours around and between item 1 and 4 were found that no longer agree with surveyed depths in the area. These contours and their locations are identified with arrows stating “Modify Contour”, as shown in **Figure 12**.

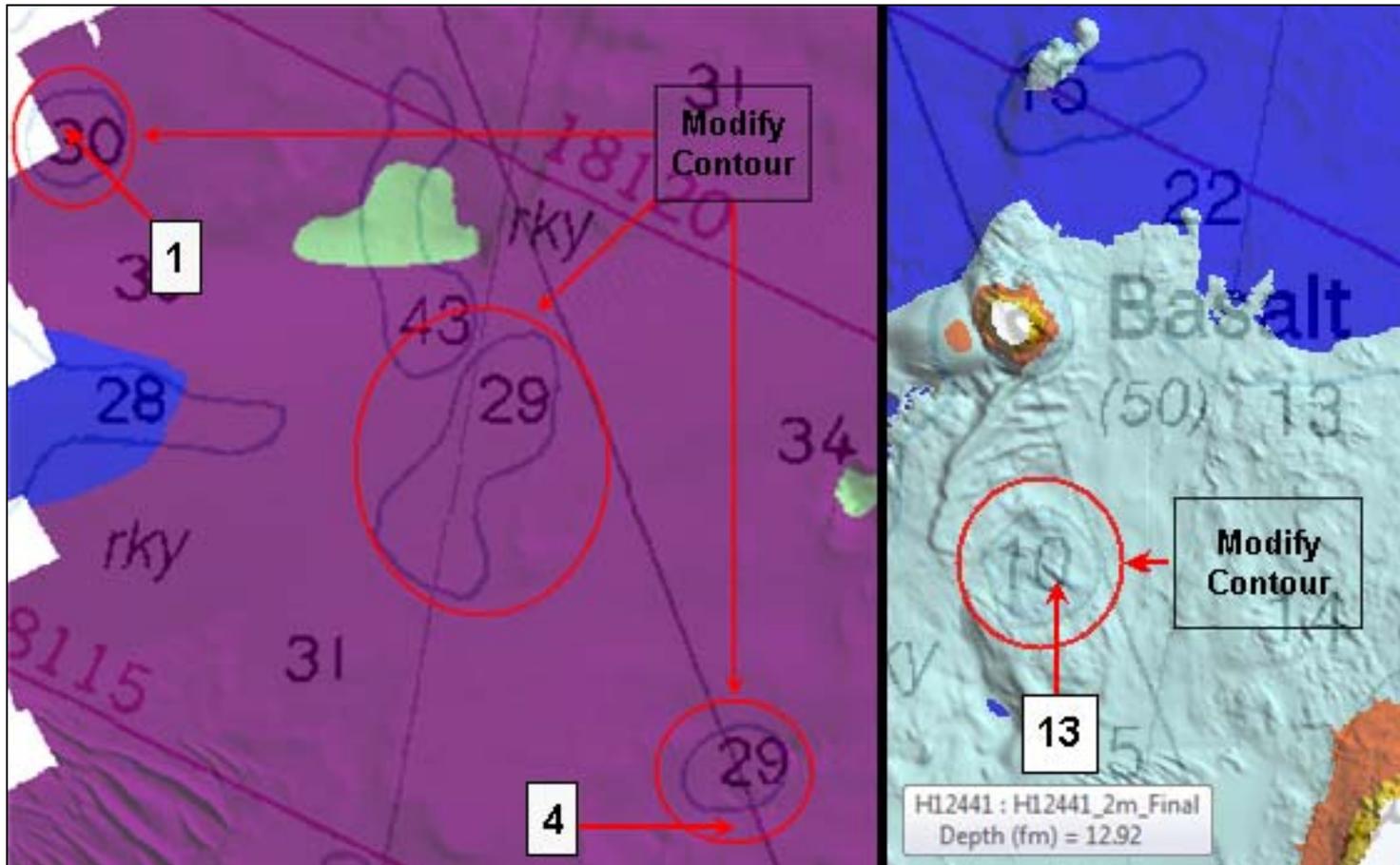


Figure 12 Proposed Modifications to Contours

Black arrows were positioned where the charted 10-fathom contour was considerably different from the surveyed depth. Specific locations are shown below in **Figure 13** and **Figure 14**.

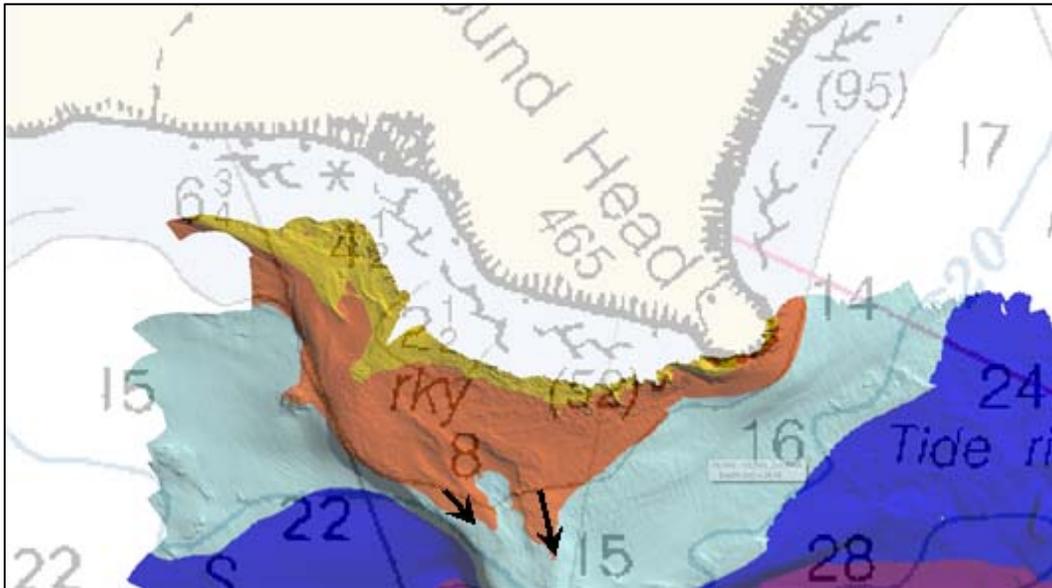


Figure 13 Change in the 10-fathom Contour (South of Round Head)

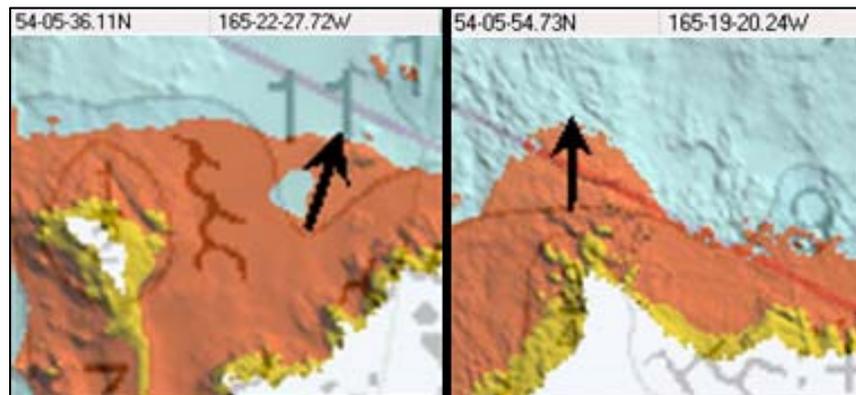


Figure 14 Change in the 10-fathom Contour

Within the survey area, there are considerable variances of the 30, 40, and 50-fathom charted contours from the surveyed depth. Hydrographer recommends contours and soundings be modified to agree with the H12441 survey.

2. Shoreline features on charts listed in **Table 3** need to be updated to agree with this survey and the Final Features File (FFF). The Hydrographer, during the S-57 compilation, inserted detailed remarks and recommendations in the extended attributes to aid in final chart compilation.

The Hydrographer recommends that soundings within the survey limits of H12441 supersede all prior survey and charted depths.



Automated Wreck and Observation Information System (AWOIS)

There were no AWOIS items assigned for investigation.

Charted Features

There were no charted features labeled ED, PD, PA, or Rep within the limits of H12441.

Dangers to Navigation

In addition to the chart comparison items noted in this report, two dangers to navigation were found and reported during this survey. ¹¹

Assigned Feature File

Charted features that fell inshore of the 4 fathom contour (NALL) were not investigated and have been noted with a “Not Addressed” comment in the “descrip” attribute of the final features file. Features that fell within the survey limits were addressed and attributed appropriately. This file contains the object and meta data with extended attributes as required in the Specifications and Deliverables (April 2012).

All features, including ones from the NOAA assigned feature file, that were within the geographical bounds of H12441 are included in the “H12441_Field_Features.000” file.

Note: Since CARIS Notebook and Bathy DataBase were unable to export to S-57 with the parameters outlined in section 8.2 of the HSSD 2012, an additional text file with the required meta information was sent to accompany the S-57 file. Refer to Appendix II for additional information.

D.2 Additional Results

Aids to Navigation

No aids to navigation exist on the charts (listed in **Table 3**) for the H12441.

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

Shoreline Features ¹²

Traditional shoreline verification was not a requirement in this task order, but positions were collected on a number of shoreline features. FPI's effort should not be considered a complete feature verification (verify or disprove rocks, islets, shoreline, etc), our intent was only to identify holes within our MBES coverage and to provide feedback on charted features within the survey limits.

Bottom Samples

The F/V Pacific Star was fitted to obtain bottom samples as specified in the Statement of Work. Three samples were obtained in survey H12441. ¹³

Samples were taken with a Van Veen grab sampler and positions were recorded with WinFrog Multibeam v3.09.21. Samples retrieved were analyzed and then encoded with the appropriate S-57 attributes. Positions and descriptions of bottom samples for survey H12441 are found in the "H12441_Field_Features.000" file.

Revisions and Corrections Performed During Office Processing and Certification

¹ Details typically incorporated into Section A, such as survey purpose, dates of acquisition, general and specific descriptions of the survey area, general overview of coverage, and shoreline verification, were not included in this section of this report. The information has been included in subsequent sections of the report.

² The effect of slope and rocky seafloor on confidence level are as expected. Resulting depths were used for updating the chart, but enclosed inside rocky area features as an added precaution.

³ Sound velocity profiles for the entire project were submitted with H12441.

⁴ There are holidays in the northern and southwestern part of the survey with no explanation in the Descriptive Report. The holidays on the southwestern side are covered by data from junctioning survey H12442.

⁵ For the chart update product, in areas in which bathymetric coverage to 4 m was not achieved due to the presence of kelp, the rocky nature of the seafloor is encoded and kelp features retained from the chart in order to convey an additional degree of danger to the mariner.

⁶ An 8-meter combined surface, H12440_Final_Combined_8m.csar, was created during office processing and was used as the basis for compilation of the chart update product.

⁷ The submitted feature file was used during compilation to update features with respect to the largest scale ENC. See Endnote 12.

⁸ All soundings listed in Table 4, *Coordinates of Shoaler Soundings*, with the exception of items 4 and 10, exist at or near the specified location in the survey scale soundings file, in many cases with a minor variance in sounding value. Not all of the listed soundings have been compiled to the chart update product. The red column added to Table 4, below, gives the charting disposition for each entry in the table:

Table 4 Coordinates of Shoaler Soundings

Item Number	Nearest Charted Sounding (in fm)	Surveyed Sounding (in fm)	Latitude	Longitude	Disposition to the Chart Update Product
1	30	33.01	54°09'44.85"N	165°25'49.89"W	No new surveyed sounding was compiled in this location.
2	43	41.74	54°09'36.66"N	165°24'57.30"W	No new surveyed sounding was compiled in this location.
3	29	31.39	54°09'19.66"N	165°24'50.48"W	A surveyed 31 fm sounding was compiled in place of the charted 29 fm sounding.



4	29	34.62	54°08'41.89"N	165°24'03.64"W	A 34 fm sounding was compiled at this location.
5	34	44.51	54°09'11.40"N	165°23'48.83"W	A 41 fm sounding was found at this location, but a surveyed 34 fm sounding was compiled nearby.
6	34	34.05	54°09'07.38"N	165°23'45.98"W	A 34 fm sounding was compiled nearby.
7	14	10.39	54°05'03.38"N	165°24'49.47"W	No new surveyed sounding was compiled in this location. The shoal is defined by a new 10 fm depth curve.
8	14	4.19	54°04'57.27"N	165°24'08.88"W	No new surveyed sounding was compiled in this location. The shoal is defined by a new 5 fm depth curve.
9	21	18.72	54°05'57.48"N	165°23'35.97"W	A 19 fm surveyed sounding was compiled at this location.
10	16	12.28	54°05'50.58"N	165°22'50.85"W	A 12 fm surveyed sounding was compiled near this location.
11	7	4.77	54°05'20.50"N	165°22'53.69"W	No new surveyed sounding was compiled in this location. The shoal is included in a new 5 fm depth curve.
12	7	3.38	54°05'14.18"N	165°22'42.85"W	No new surveyed sounding was compiled in this location. The shoal is included in a new 5 fm depth curve.
13	10	12.92	54°06'08.07"N	165°22'25.42"W	A 13 fm surveyed sounding was compiled in this location.
14	10	8.83	54°05'41.91"N	165°22'13.73"W	An 8 fm surveyed sounding was compiled in this location.



15	15	7.4	54°06'05.50"N	165°21'34.70W	A 7 fm 2 ft surveyed sounding was compiled in this location.
16	8,6.25,5.5	4.93	54°05'30.17"N	165°10'56.47W	The position given for this feature falls on land, on the west end of Tigalda Island. A surveyed 4 fm 5 ft sounding was found at Lat. 54°05'29.62"N, Long. 165°19'56.38"W, in the vicinity 8, 6-1/4, and 5-1/2 fm soundings, and has been compiled in this location.
17	23	18.86	54°06'31.10"N	165°18'51.43W	Surveyed 18 and 19 fm soundings were found in the vicinity of the charted 23 fm sounding, but no sounding was compiled at this location.

⁹ Depth curves included in the chart update product are based on contours generated from the Combined BASE Surface, generalized as suitable for compilation to the largest scale raster chart.

¹⁰ Contours for the chart update product are derived from the Combined BASE Surface. Final placement and complexity of depth curves are determined based on a number of factors, including soundings selected for compilation and the scale of the chart.

¹¹ The two DTONs submitted to PHB were not deemed significant for immediate compilation to the chart, and so were not forwarded to MCD. The proposed DTON at Lat. 54°06'05.50"N, Long. 165°21'34.70"W, was compiled to the HCell as a 7 fm 2 ft sounding. The proposed DTON at Lat. 54°10'04.21"N, Long. 165°24'34.45"W, a 10 fm 5 ft depth, is well defined by the new depth curve and was not compiled to the HCell.

¹² Shoreline applied to the October 2011 edition of ENC US4AK6FM is more up-to-date and more features intensive than the most recent equivalent scale raster chart, 16531. The resulting discrepancies between the ENC and RNC are mostly evident inshore of the 4-fathom curve, so would have had little effect on field data collection.

¹³ Two of the three bottom samples were applied to the chart update product. The bottom sample attributed NATSUR = rock was not compiled as it does not comply with specifications for compilation of bottom characteristic features to the chart update product.

E. Approval Sheet

Approval Sheet

For

H12441

Standard field surveying and processing procedures were followed in producing this survey in accordance with the following documents:

OPR-Q191-KR-12 Statement of Work
NOS Hydrographic Surveys Specifications and Deliverables, April 2011 Edition
Fugro Pelagos, Inc. Acquisition Procedures (2012-MBES_Acquisition_Procedures_April 2012 R0)
Fugro Pelagos, Inc. Processing Procedures (2012-MBES_Processing_Procedures_April 2012 R0)

The data were reviewed daily during acquisition and processing, and the survey is complete and adequate for its intended purpose.

This report has been reviewed and approved. All records are forwarded for final review and processing to the Chief, Pacific Hydrographic Branch.

Approved and forwarded,

Dean Moyles, (ACSM Cert. No. 226)
Senior Hydrographer
Fugro Pelagos, Inc.
February 1, 2013

X Dean
Moyles

Digitally signed by Dean Moyles
DN: cn=Dean Moyles, o=Fugro
Pelagos, Inc., ou,
email=dmoyles@fugro.com, c=US
Date: 2013.01.31 15:25:26 -08'00'

Dean Moyles
ACSM Cert. No. 226



APPENDIX I – TIDES AND WATER LEVELS

Abstract of Times of Hydrography for Smooth Tides

Project Number: OPR-Q191-KR-12 Registry Number: H12441

Contractor Name: Fugro Pelagos Inc. Date: February 1, 2013

Sheet Letter: n/a

Inclusive Dates: June 16-17, 21-23, 25-26, 28, July 2-3, 6-7, 2012.

Fieldwork is complete and Final Verified Zoned tides were applied for the production of the final combined BASE surfaces and S-57 feature file.

Table 5 Abstract of Times of Hydrography for F/V Pacific Star

YEAR	DAY	START TIME (UTC)	END TIME (UTC)
2012	174	2:55:54	12:59:22
2012	174	15:37:48	16:45:34
2012	175	2:57:44	7:57:05
2012	175	9:04:17	12:54:39
2012	175	15:07:07	22:15:10
2012	177	21:03:18	23:59:59
2012	178	0:00:00	0:26:45
2012	180	15:59:21	23:11:02
2012	185	22:45:07	23:58:02

Table 6 Abstract of Times of Hydrography for R/V R2

YEAR	DAY	START TIME (UTC)	END TIME (UTC)
2012	173	15:44:34	23:59:59
2012	174	0:00:00	1:37:25
2012	174	2:48:00	3:28:07
2012	174	5:29:35	4:16:01
2012	174	15:00:36	16:00:25
2012	175	14:57:58	22:49:47
2012	177	14:48:27	23:59:59
2012	178	0:00:00	1:32:39
2012	180	3:54:15	6:46:16
2012	189	16:47:07	18:25:22

Table 7 Abstract of Times of Hydrography for R/V D2

YEAR	DAY	START TIME (UTC)	END TIME (UTC)
2012	168	23:04:56	23:59:59
2012	169	0:00:00	2:03:57
2012	174	15:16:45	15:41:38
2012	184	19:13:39	20:00:23
2012	188	20:21:44	21:38:12



APPENDIX II – SUPPLEMENTAL SURVEY RECORDS AND CORRESPONDENCE

The following emails are included as they are recommendations or directives from NOAA that affected the survey.

From: David Scharff [david.scharff@noaa.gov] Sent: Wed 6/27/2012 6:15 AM
To: Dean Moyles
Cc:
Subject: Re: AWOIS

Message | OPR-Q191-KR-12 Project Instructions Final.pdf (733 KB)

Sorry for the delay I was out of the office. Attached are revised instructions dates 6/27/12 where the AWOIS investigation has been removed. This version has replaced PHB's copy of the PI for review purposes.

You had also requested a copy of the xml DR. to review. HSD is currently creating a revised version that should be approved shortly. I will send it to you once it is available.

On Thu, Jun 21, 2012 at 3:00 PM, Dean Moyles <dmoyles@fugro.com> wrote:
> You mentioned in Seattle that the AWOIS item was removed from the
> scope, can you confirm this?
>
>
> Dean Moyles
>
> Senior Hydrographer (ACSM certified)
>
> Fugro Pelagos, Inc.
>
> San Diego, CA 92123
>
> Phone (858) 292-8922
>
> Fax (858) 292-5308
>
> Cell (858) 945-6378
>
> www.fugro-pelagos.com
>
>
>
> This e-mail and any files transmitted with it are confidential and
> intended solely for the use of the addressee. This e-mail shall not be
> deemed binding unless confirmed in writing. If you have received it by
> mistake, please let us know by e-mail reply and delete it from your
> system; you may not copy this message or disclose its contents to
> anyone. Please note that any views or opinions presented in this
> e-mail are solely those of the author and do not necessarily represent
> those of the company. E-mail transmission cannot be guaranteed to be
> secure or error-free. The sender therefore does not accept liability
> for any errors or omissions in the contents of this message, which
> arise as a result of e-mail transmission.<SPAN style="FONT-SIZE



From: David Scharff [david.scharff@noaa.gov] Sent: Mon 6/18/2012 1:21 PM
To: Dean Moyles
Cc:
Subject: Re: UCTD Probes (Calibrations)

You may continue to use the two UCTD probes calibrated 7 months prior to deployment. As you mentioned below please calibrate these following completion of the project and note any discrepancies in the DR/DAPR.

On Mon, Jun 18, 2012 at 3:22 PM, Dean Moyles <dmoyles@fugro.com> wrote:
> I left you a voice mail, but I will follow up with this email; the two
> UCTD probes we have on board were calibrated 7 months prior to
> deployment (the
> 2011 spec & Deli specifies 6 months).

>
> They are performing excellent and compare very well with the other
> SV&P sensors on the two launches. The probes will be calibrated after
> the project and all calibration values will be compared with the last
> calibration, will this pose any problems?

>
>
> Dean Moyles
>
> Senior Hydrographer (ACSM certified)
>
> Fugro Pelagos, Inc.
>
> San Diego, CA 92123
>
> Phone (858) 292-8922
>
> Fax (858) 292-5308
>
> Cell (858) 945-6378
>
> www.fugro-pelagos.com

>
> This e-mail and any files transmitted with it are confidential and
> intended solely for the use of the addressee. This e-mail shall not be
> deemed binding unless confirmed in writing. If you have received it by
> mistake, please let us know by e-mail reply and delete it from your
> system; you may not copy this message or disclose its contents to
> anyone. Please note that any views or opinions presented in this
> e-mail are solely those of the author and do not necessarily represent
> those of the company. E-mail transmission cannot be guaranteed to be
> secure or error-free. The sender therefore does not accept liability
> for any errors or omissions in the contents of this message, which
> may be a result of a mail transmission. (SPAM style="font-size: 8pt; color: #000000; font-family: sans-serif;"></p></div>

From: David Scharff [david.scharff@noaa.gov] Sent: Fri 4/20/2012 11:41 AM
To: Dean Moyles
Cc:
Subject: Re: Permits

Lisa Rotterman
NMFS/AKR PROTECTED RESOURCES DIVISION
Steller Sea Lion Coordinator
907-271-1692
lisa.rotterman@noaa.gov

On Thu, Apr 19, 2012 at 3:53 PM, Dean Moyles <dmoyles@fugro.com> wrote:

Do you have a contact number for Lisa?

From: David Scharff [mailto:david.scharff@noaa.gov]
Sent: Thursday, April 19, 2012 10:59 AM
To: Dean Moyles
Subject: Fwd: Permits

Please see Kathleen's comments below. As she mentioned we are past the window for any kind of permit to be issued. We provided Lisa Rotterman with Fugro's operating procedures last year regarding operations in designated sea lion haul-out areas which were found to be consistent with NMFS recommendations regarding best practices. Let me know if you have any questions.



----- Forwarded message -----

From: **Kathleen Jamison** <kathleen.jamison@noaa.gov>
Date: Wed, Apr 18, 2012 at 3:53 PM
Subject: Re: Permits
To: David Scharff <david.scharff@noaa.gov>

Hey Dave,

The survey area is in a steller sea lion ESA-designated critical habitat area but not a sanctuary or wildlife refuge (the sea area, not land area - land area is separate and I think JOA is dealing with that). Which means that this survey is part of a larger ongoing programmatic consultation with NMFS' Office of Protected Resources on a national level; however, Fugro would not be seeking a permit in this instance. Instead, if they would like to consult with NMFS then they should contact Lisa Rotterman, who is based in Alaska's NMFS regional office and is a steller sea lion expert.

The information she would provide would probably be what we discussed last year. The area includes a couple rookeries and haulout areas for steller sea lions. The danger is if the vessel noise disturbs the gigantic male sea lions (while hauled out) such that they get scared and storm into the water, trampling the newborn pups along the way. The best mitigating measure is to observe the shoreline to see if there is a colony of sea lions. If not, go forth and survey at the usual slow survey speed. If there are hauled out sea lions on a given day, the field could survey the offshore areas while waiting for the nearshore areas to become free of sea lion hauled-out colonies. That was the advice we were given last year and it should still apply.

But please let Fugro know that the permit situation is precarious - JOA regularly has to obtain permits for installing gauges on land in wildlife refuges, sanctuaries, etc. But in the water, even if an area includes ESA-listed critical habitat, you won't be getting a permit, even if Fugro speaks with Lisa - there isn't enough time for the permit to come through in time to survey (there never is - contracts are awarded too late in the year). So it would just be an informal discussion with a sea lion expert on best practices (which I've outlined above).

-Kathleen

On Wed, Apr 18, 2012 at 12:40 PM, David Scharff <david.scharff@noaa.gov> wrote:

Hi Kathleen,

Is Viki the contact Fugro should use regarding permitting in Alaska, I was thinking it might be Lisa Rotterman?

Thanks,

Dave

----- Forwarded message -----

From: **Dean Moyles** <dmoyles@fugro.com>
Date: Tue, Apr 17, 2012 at 12:23 PM
Subject: Permits
To: David Scharff <david.scharff@noaa.gov>

David,

As per our conversation yesterday, I found this contact, would this be a good starting point or did you find out who we contacted last season?

Error! Filename not specified.

Dean Moyles

Senior Hydrographer (ACSM cert. No. 226)

Fugro Pelagos, Inc.

San Diego, CA 92123

Phone (858) 292-8922

Fax (858) 292-5308

Cell (858) 945-6378

www.fugro-pelagos.com

This e-mail and any files transmitted with it are confidential and intended solely for the use of the addressee. This e-mail shall not be deemed binding unless confirmed in writing. If you have received it by mistake, please let us know by e-mail reply and delete it from your system; you may not copy this message or disclose its contents to anyone. Please note that any views or opinions presented in this e-mail are solely those of the author and do not necessarily represent those of the company. E-mail transmission cannot be guaranteed to be secure or error-free. The sender therefore does not accept liability for any errors or omissions in the contents of this message, which arise as a result of e-mail transmission.



Dean Moyles

From: David Scharff - NOAA Federal [david.scharff@noaa.gov]
Sent: Monday, November 19, 2012 8:46 AM
To: Dean Moyles
Subject: Re: S-57 deliverables question

That is correct. I apologize for the confusion, the CSF/PRF for this project was created back in 2011 when details regarding the FFF were still being worked. Hopefully when I send the .000 file for your next project it will be less ambiguous. That's my goal anyway :).

On Thu, Nov 15, 2012 at 6:03 PM, Dean Moyles <dmoyles@fugro.com> wrote:

> To summarize our phone conversation a few days ago; I will remove the coastline and any other shoreline features that don't fall within the survey limits. I will also break down the FFF's into the individual surveys and only include the features that pertain to that survey.

>

> -----Original Message-----

> From: David Scharff [mailto:david.scharff@noaa.gov]

> Sent: Thursday, November 08, 2012 1:47 PM

> To: Dean Moyles

> Subject: Re: S-57 deliverables question

>

> My apologies for the delay Dean, your email got pushed to the second page of my inbox. You just popped back up on my radar...blame the 100 people that sent emails after you :).

>

> Did I "Assign" the coastline features in the CSF that was sent? If I did not you can create the FFF from the CSF you received.

>

>

> On Fri, Nov 2, 2012 at 11:48 AM, Dean Moyles <dmoyles@fugro.com> wrote:

>> Thanks, Megan stated below that we should have a FFF for each survey with only features that are within the survey limits. Can you provide us with those updated FFF's or do you want me to create them from the one that you sent?

>>

>> -----Original Message-----

>> From: David Scharff [mailto:david.scharff@noaa.gov]

>> Sent: Thursday, November 01, 2012 1:43 PM

>> To: Dean Moyles

>> Subject: Fwd: S-57 deliverables question

>>

>> Dean,

>>

>> Megan and I had a detailed discussion regarding your S-57 deliverables today. Below is her response to some of the questions you had asked. I will be back in the office Monday morning if you have any questions.

>>

>> Dave

>>

>>

>> ----- Forwarded message -----

>> From: Megan Greenaway <megan.greenaway@noaa.gov>

>> Date: Thu, Nov 1, 2012 at 12:14 PM

>> Subject: RE: shoreline deliverables question

>> To: David Scharff <david.scharff@noaa.gov>

>>



```
>>
>> Dave,
>>
>> Yes, they should be delivering a .000 S-57 feature file again this year.
>>
>> No they should not include the shoreline in the Final Feature File (FFF). Only the
>> "Assigned" features (and new features) should be included in the FFF. Reference pages 132-133
>> of HSSD. I've highlighted a couple sentences below. Make sure you did not "Assign" the
>> coastline features in the CSF you sent to them with the project instructions. To do this
>> check "assignment" attribute in CSF.000 file.
>>
>> "All "Assigned" CSF features shall be delivered in a Final Feature
>> File (FFF) in S-57 .000
>>
>> format. Each FFF shall be broken down according to surveys. Only
>> the features within the
>>
>> survey limits shall reside in each survey deliverable (i.e.
>> HXXXXX.FFF.000, not the entire
>>
>> project feature data). The FFF shall contain attributed information
>> on specific objects that
>>
>> cannot be portrayed in a simple depth grid. Features to include in the FFF include; all
>> "Assigned"
>>
>> features from the Composite Source File (CSF) and any new fea- tures
>> found within the survey
>>
>> area. The FFF shall be in the WGS84 datum, unprojected and have the
>> following parameters set;
>>
>> * Producing Agency = US Office of Coast Survey
>>
>> * Navigational Purpose = 1 thru 5 according to chart compilation
>> scale
>>
>> * Individual Cell Code = H number of survey, H12345 becomes '12345'
>>
>> * Horizontal Datum = WGS84 (datum of S-57 file)
>>
>> * Vertical Datum (for heights) = MHW
>>
>> * Sounding Datum = MLLW
>>
>> * Units = metric
>>
>> * Compilation Scale = survey
>>
>> The FFF shall include shoreline data only if the hydrographer
>> conducted shoreline ver-
>>
>> ification. New features and changes to the source shoreline shall
>> be portrayed in the
>>
>> FFF and be as fully attributed as possible using S-57 encoding rules.
>>
```



>> U.S. Coast Guard maintained aids to navigation shall NOT be
>> included in the FFF. The
>>
>> hydrographer shall investigate all aids to navigation and report
>> results as required in section
>>
>> 7.2. Privately maintained aids and/or mooring buoys shall be
>> included in the FFF, unless they
>>
>> are temporary in nature or are repositioned frequently.
>>
>> General soundings, contours and depth areas will NOT be included
>> in the FFF since these
>>
>> objects will be derived from Caris surfaces or final BAGs during
>> chart compilation. In rare
>>
>> cases, an isolated sounding may be part of the FFF if it is a
>> navigational
>>
>> significant shoal and/or needs additional attribution.
>>
>> Megan
>>
>> -----Original Message-----
>> From: David Scharff [mailto:david.scharff@noaa.gov]
>> Sent: Thursday, November 01, 2012 10:27 AM
>> To: Megan Greenaway
>> Subject: shoreline deliverables question
>>
>> Hi Megan,
>>
>> Last year Fugro delivered an S-57 files which included all the "Assigned" (and possibly
>> non-Assigned") shoreline features within Q191-11's limits along with bottom samples, meta
>> data, etc. I assume these deliverable requirements are the same for this year?
>>
>> The CSF/PRF I provided Fugro included the coastline, which they said
>> may be difficult to break up according to specific sheet limits. If
>> the inshore limit cuts off at the null (or 4 fathoms I believe for
>> this
>> project) do they need to submit the shoreline? They also asked if we knew how split the
>> shoreline file along the sheet limits. I actually don't know exactly how to perform this
>> myself, but this doesn't seem to be something that should be too difficult. Do we have a
>> procedure for this?
>>
>> Thanks,
>> Dave



Dean Moyles

From: Crescent Moegling - NOAA Federal [crescent.moegling@noaa.gov]
Sent: Thursday, December 13, 2012 1:49 PM
To: Dean Moyles
Subject: Re: H12439 Feature File

Dean,
I wasn't able to figure out a way from Notebook or BDB to export to .000 and include this metadata. I'm suggesting you submit a separate text file for each survey which includes this information.
Crescent

On Thu, Dec 13, 2012 at 1:23 PM, Dean Moyles <dmoyles@fugro.com> wrote:

I have one final question for you, when I go to export to an S-57 in notebook I don't get the options that are outlined in the HSSD 2012 on pages 132 and 133 would you know why?

From: Crescent Moegling - NOAA Federal [mailto:crescent.moegling@noaa.gov]
Sent: Tuesday, December 11, 2012 3:02 PM
To: Dean Moyles
Subject: RE: H12439 Feature File

Dean,

See attached feature HOB file with comments in the "office notes" section. One general comment: "All real world features in the Final Feature File shall be '1-Primary'" See page 166 in Specs.

Crescent Moegling

Hydrographic Team Lead

Northwest Navigation Manager

Pacific Hydrographic Branch

[206.526.6840](tel:206.526.6840)

From: Dean Moyles [mailto:dmoyles@fugro.com]
Sent: Tuesday, December 11, 2012 9:47 AM
To: Crescent Moegling (Crescent.Moegling@noaa.gov)
Subject: H12439 Feature File



Here is the feature file for Priority 1 (H12439) for you to review, I'm still working on the DR, but I should be done by lunch.

Dean Moyles

Project Manager/Senior Hydrographer (ACSM cert. No. 226)

Fugro Pelagos, Inc.

3574 Ruffin Road

San Diego, CA 92123

Phone [\(858\) 292-8922](tel:(858)292-8922)

Fax [\(858\) 292-5308](tel:(858)292-5308)

Cell [\(858\) 945-6378](tel:(858)945-6378)

www.fugro-pelagos.com

This e-mail and any files transmitted with it are confidential and intended solely for the use of the addressee. This e-mail shall not be deemed binding unless confirmed in writing. If you have received it by mistake, please let us know by e-mail reply and delete it from your system; you may not copy this message or disclose its contents to anyone. Please note that any views or opinions presented in this e-mail are solely those of the author and do not necessarily represent those of the company. E-mail transmission cannot be guaranteed to be secure or error-free. The sender therefore does not accept liability for any errors or omissions in the contents of this message, which arise as a result of e-mail transmission.

--
Crescent Moegling
Hydrographic Team Lead
Northwest Navigation Manager
Pacific Hydrographic Branch
206.526.6840



REPORT OF DANGERS TO NAVIGATION

Hydrographic Survey Registry Number: H12441

Survey Title: **State:** Alaska

Locality: Krenitzin Islands

Sub-locality: North of Avatanak Island

Project Number: OPR-Q191-KRL-12

Survey Dates: June 16, 2012 – N/A

Survey Danger Acquisition Date and Time: See feature.

Features are reduced to Mean Lower Low Water with observed tidal data provided by John Oswald & Associates (JOA).

Affected Raster Charts:

Chart Number	Scale	Edition	Edition Date
16531	1:80,000	7	02/2002

Affected ENC's:

ENC Name	Scale	Edition	Issue Date
US4AK6FM	80000	8	10/28/2011

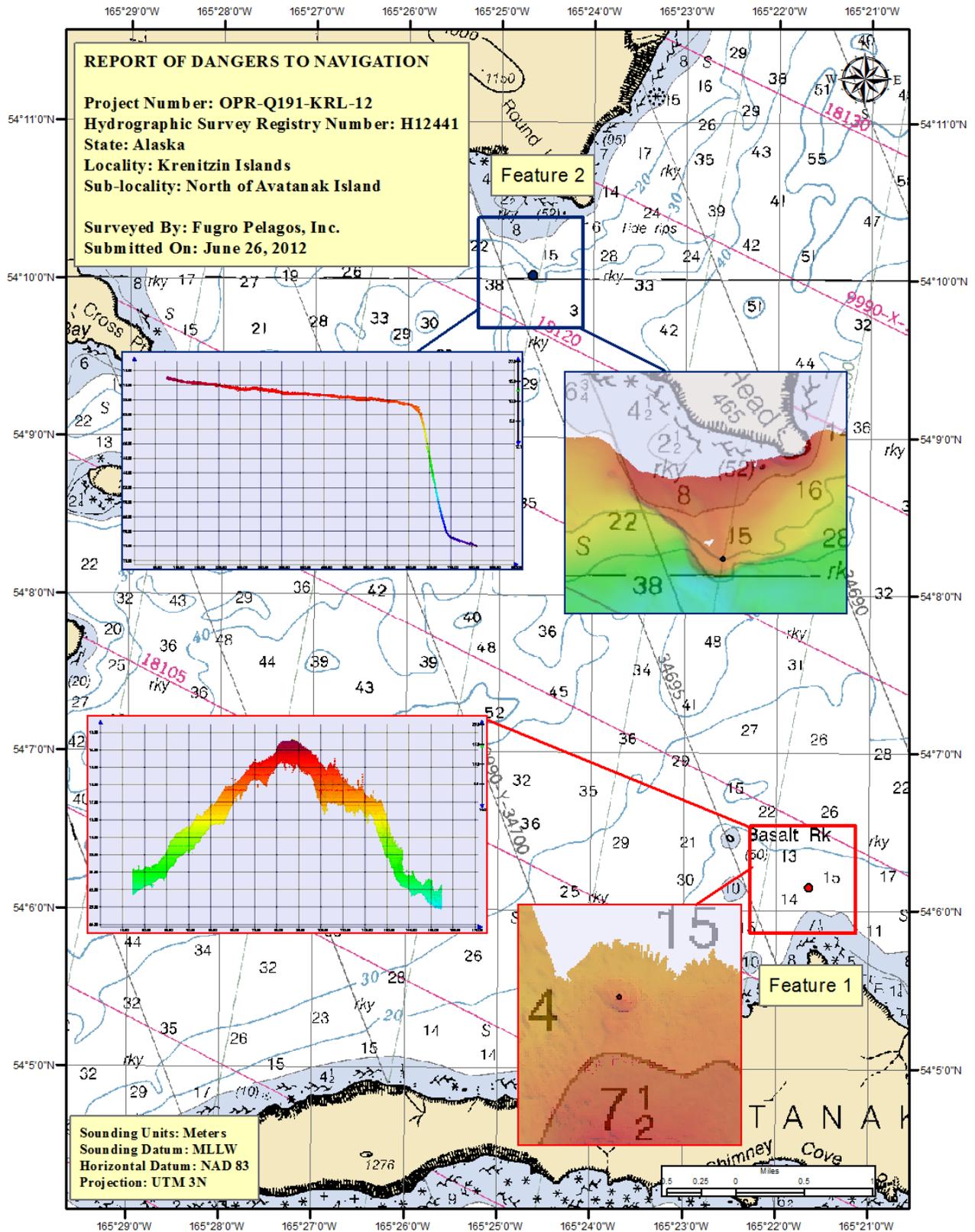
DANGER:

Feature	Depth	Latitude	Longitude	Time (UTC)
1. Sounding	7.3 fathoms	54-06-05.50N	165-21-34.70W	2012-06-26 01:11:38.976
2. Sounding	10.9 fathoms	54-10-04.21N	165-24-34.45W	2012-06-23 22:03:08.293

COMMENTS:

Questions concerning this report should be directed to the Chief, Pacific Hydrographic Branch (N/CS34), at (206) 526-6835.

These two Dangers to Navigation were not submitted to Marine Chart Division for immediate compilation to the chart, but are reflected in the chart update product. DTON #1 was compiled to the chart update product as a 7fm 2ft sounding. The shoal given for DTON #2 is represented by a new 10fm depth curve.



APPROVAL PAGE

H12441

Data meet or exceed current specifications as certified by the OCS survey acceptance review process. Descriptive Report and survey data except where noted are adequate to supersede prior surveys and nautical charts in the common area.

The following products will be sent to NGDC for archive

- H12441_DR.pdf
- Collection of depth varied resolution BAGS
- Processed survey data and records
- H12441_GeoImage.pdf

The survey evaluation and verification has been conducted according current OCS Specifications.

Approved: _____

Kurt Brown

Physical Scientist, Pacific Hydrographic Branch

The survey has been approved for dissemination and usage of updating NOAA's suite of nautical charts.

Approved: _____

LCDR Benjamin K. Evans

Chief, Pacific Hydrographic Branch