

H12359

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.* ..... N/A

*Registry No.* ..... H12359

### LOCALITY

*State* ..... Alaska

*General Locality* ..... Krenitzin Islands

*Sublocality* ..... Vicinity of Akun Bay

2011

### CHIEF OF PARTY

Dean Moyles

### LIBRARY & ARCHIVES

DATE .....

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

REGISTRY No

**HYDROGRAPHIC TITLE SHEET**

**H12359**

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

FIELD No: N/A

State Alaska

General Locality Krenitzin Islands

Sub-Locality Vicinity of Akun Bay

Scale 1:40,000

Date of Survey 07/25/2011 – 08/22/2011

Instructions dated 7/1/2011

Project No. OPR-Q191-KR-11

Vessel F/V PACIFIC STAR (556510), R/V R2 (623241)

Chief of party Dean Moyles

Surveyed by MOYLES, REYNOLDS, FARLEY, ROKYTA, LYDON, TIXIER, GOODALL, CHILDS, et.al

Soundings by RESON SEABAT 7125 (PACIFIC STAR), RESON SEABAT 7101 (R2 & D2)

SAR by Kurt Mueller

Compilation by Annie Raymond

Soundings compiled in Meters

**REMARKS:** All times are UTC. UTM Zone 3N

The purpose of this survey is to provide contemporary surveys to update National Ocean Service (NOS) nautical charts. All separates are filed with the hydrographic data. Revisions and end notes in red were generated during office processing. 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

H12359 is located in the Vicinity of Akun Bay.

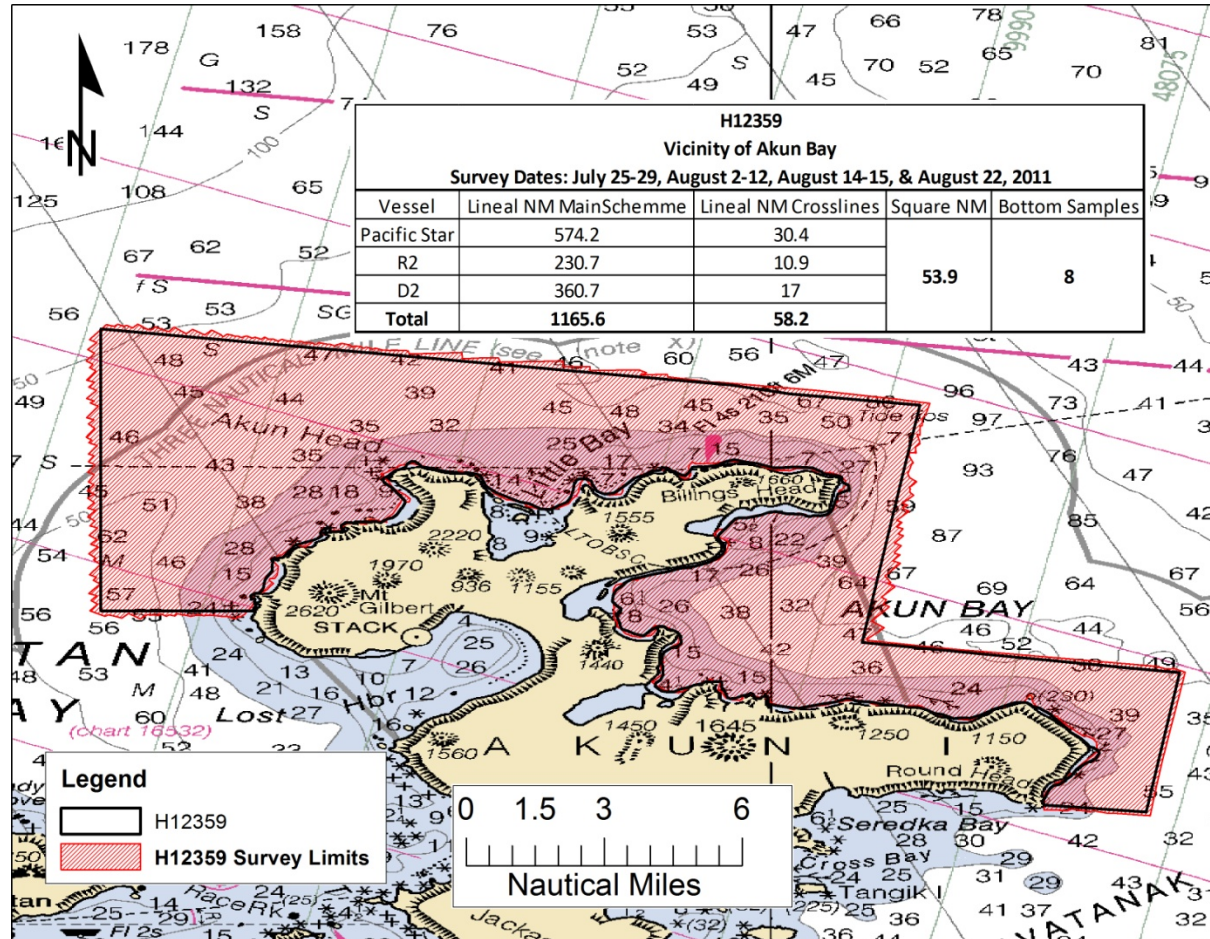


Figure 1 H12359 Area Surveyed

## **B. Data Acquisition and Processing**

Refer to the OPR-Q191-KR-11 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 H12359.

F/V Pacific Star, 162 feet in length with a draft of 16 feet, was equipped with a hull mounted Reson SeaBat 7125 dual-frequency multibeam echosounder system for the OPR-Q191-KR-11 project. The Reson 7125 operates at two user-selectable frequencies of 400 and 200 kHz. The 7125 forms 256 or 512 beams over 128° with a beam width of 0.5° (across-track) in the 400 kHz mode, and 256 beams over 128° with a beam width of 1° (across-track) in the 200 kHz mode. It allows the operator to select equi-angle or equi-distant beam spacing. For this project, both the 400 kHz and 200 kHz systems were configured for 256 equi-angle beams. The selection of these frequencies as well as range scale, gain, power levels, ping rates, etc. was a function of water depth and data quality and was noted on the survey line logs (see Separate 1). All 7125 multibeam data files were logged in the S7K format using WinFrog Multibeam v3.09.11. The vessel 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. WaterLOG H3611 (Radar Water Level Sensor) 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. The Reson 7101 on R2 was 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 v3.09.11. R2 was equipped with two AML sound velocity and pressure sensors (SV&P) for sound velocity profiles, and 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. The Reson 7101 on D2 was 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

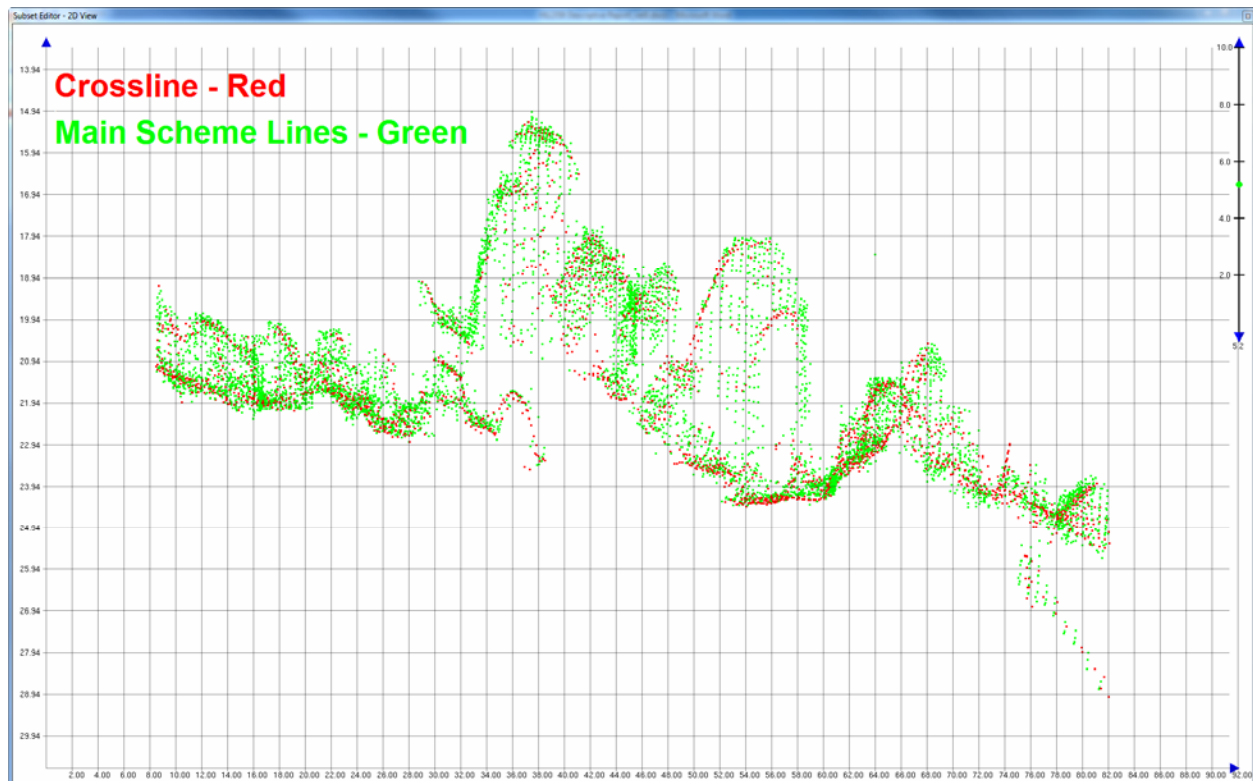
in the S7K format using WinFrog Multibeam v3.09.11. R2 was equipped with two AML sound velocity and pressure sensors (SV&P) for sound velocity profiles, and vessel attitude and position were measured using an Applanix Position and Orientation System for Marine Vessels (POS MV) 320 V4.

## B.2 Quality Control

### Crosslines

Crosslines were planned and well distributed throughout the survey to ensure adequate quality control. Total crossline length surveyed was 58.2 nautical miles or 5.0 percent of the total main scheme line length. Each crossline was compared to the entire main scheme line plan through a 1m or 2m CUBE surface, using the CARIS HIPS QC report routine.

The majority of QC Reports fall well within the required accuracy specifications. However, several crosslines run by R2 and D2 nearshore to Akun Island contain beams in the QC report that fall below the 95% confidence level due to a significantly rocky topography.<sup>1</sup> Good conformity was still seen between the main scheme lines and crosslines. Main scheme lines are shown in green and crosslines in red. Quality Control Results are located in Separate IV.



**Figure 2 Profile of 2A06-TIE02**

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

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

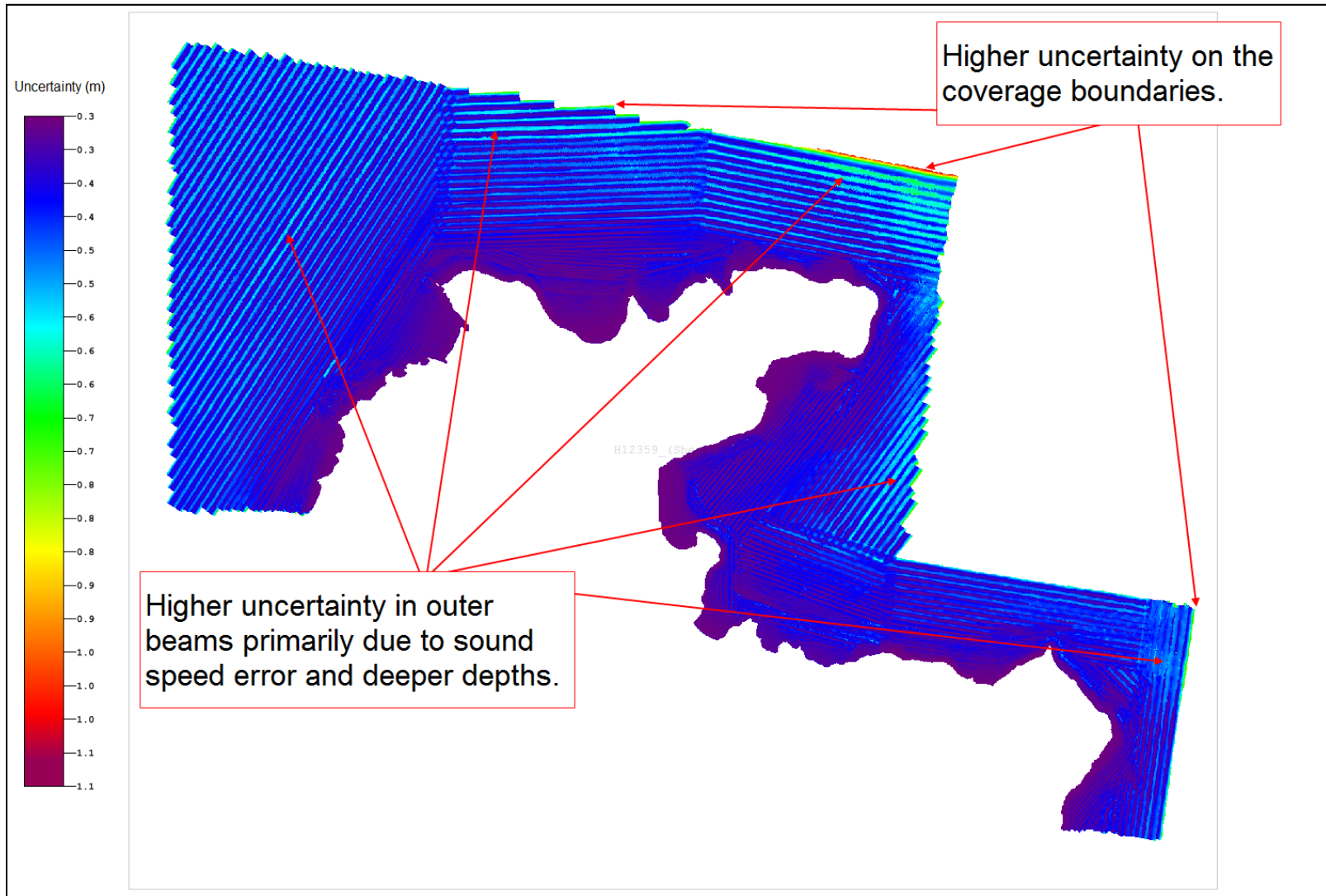
Where, a=0.5 and b=0.013, d=depth

### Uncertainty Values

The majority of H12359 had uncertainty values of 0.31m to 0.50m, which met project specifications (**Figure 3**).

As seen in the uncertainty surface graphic, uncertainty is generally lowest near the sonar nadir beams and increases toward the outside of each swath. Along-track uncertainty oscillations are due primarily to higher sound speed error in the outer beams, which varies proportionally to water depth. Additionally, outer beams also have higher uncertainty values due to bottom-detection algorithms within the sonar.

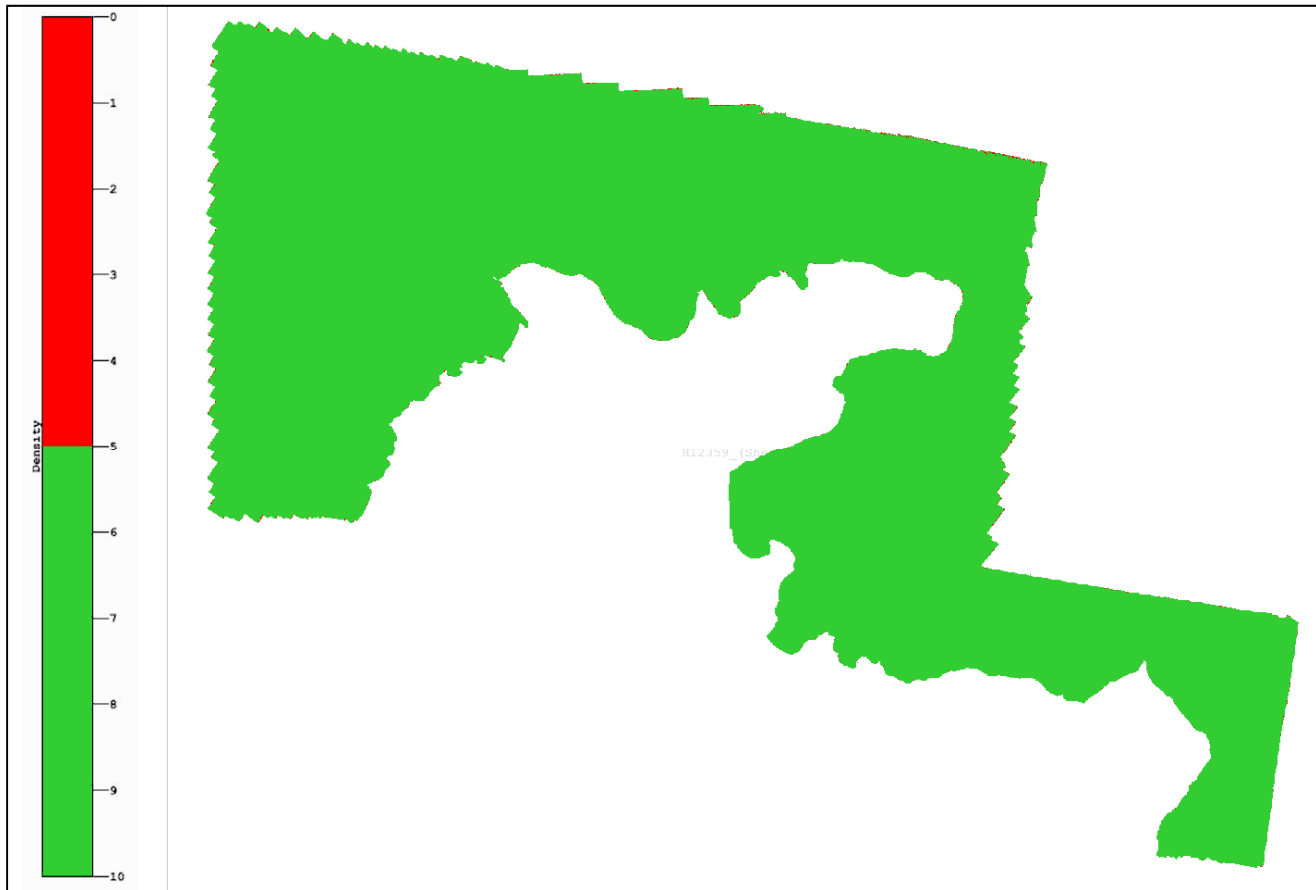




**Figure 3 Uncertainty DTM**

### Data Density

The NOS Hydrographic Surveys Specifications and Deliverables, April 2011, required 95% of all nodes to be populated with at least five soundings. Survey H12359 met these project specifications. **(Figure 4)**



**Figure 4 Density DTM**



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. In-fills were run as necessary.

### Survey Junctions

H12359 junctions with:

Registry #	Date	Junction Side
H11643 (Terrasond)	2007	North
H12263	2010	East
H12264	2010	East
H12361	2011	South
H12362	2011	West

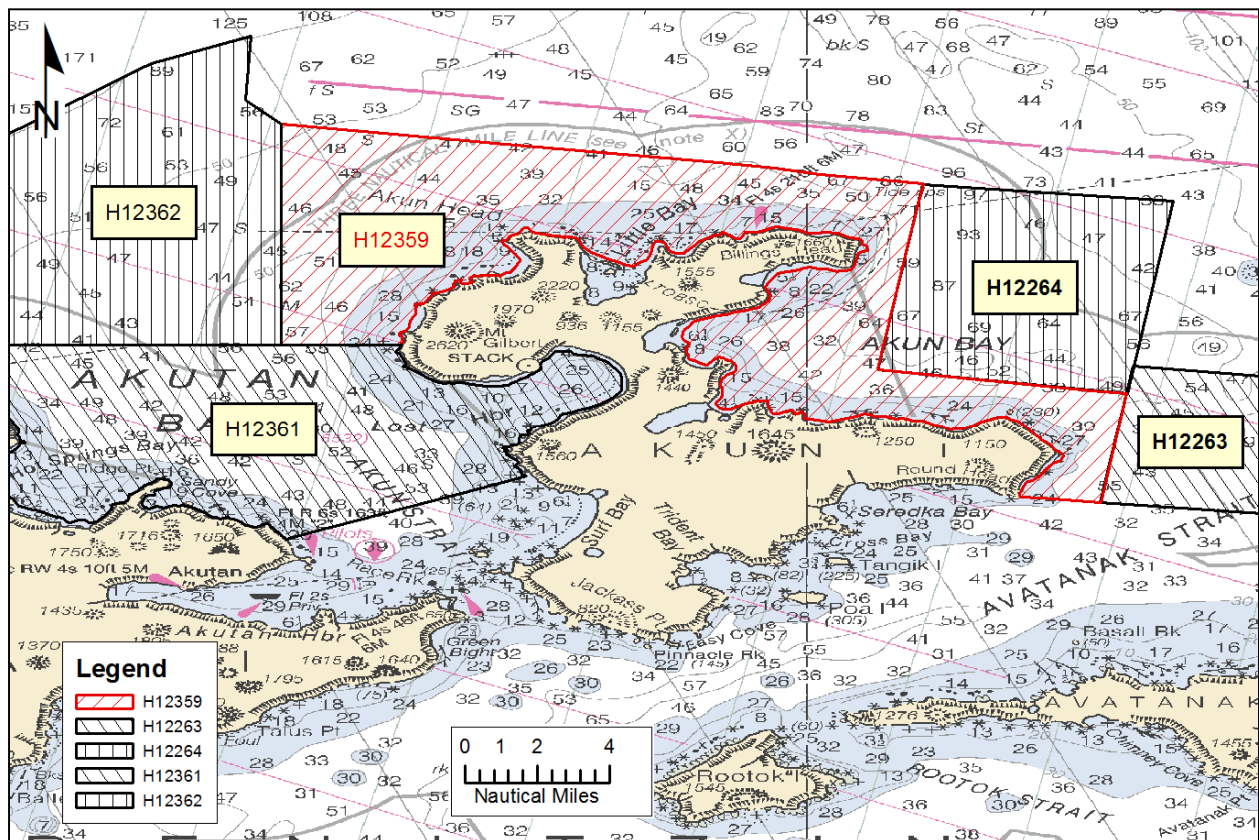


Figure 5 H12359 Survey Junctions

The surveys are in agreement along their common borders. The agreement with H12361 and H12362 was noted in the field using the CUBE surfaces during subset cleaning. The conformity is also apparent in the Finalized BASE Surfaces. The agreement with H12264 and H12263 was inspected during processing, using the finalized BASE Surfaces.

### 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), and Satellite Status. During periods of high HDOP and/or 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 was conducted by having all sound velocity profiling equipment perform a cast in close proximity to each other in a near simultaneous time period.

### Data Quality

In general, the multibeam data quality for H12359 was good. One notable problem follows:

1. Small tide busts, up to 30cm, exist within the survey area. All data met IHO Order 1a specification.<sup>2</sup>

Refer to the OPR-Q191-KR-11 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-11 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-11 Data Acquisition and Processing Report for a detailed description of the processing flow.

The final fieldsheet for H12359 is called “H12359”, and it contains five BASE surfaces. The following parameters were used:

- 0-20 meters: 1 m resolution, name “H12359\_1m\_Final”
- 18-40 meters: 2 m resolution, name “H12359\_2m\_Final”
- 36-80 meters: 4 m resolution, name “H12359\_4m\_Final”
- 72-160 meters: 8 m resolution, name “H12359\_8m\_Final”
- 144-320 meters: 16 m resolution, name “H12359\_16m\_Final”

#### Notes:

- Maximum depth was approximately 162m; therefore, resolutions coarser than 16m were not computed.
- Final CUBE BASE surfaces were created with CARIS v 7.1 in the CARIS Spatial Archive (CSAR) format. These surfaces are located under the “H12359\CARIS\Fieldsheets” directory.<sup>3</sup>

The final S57 file for this project is called “H12359\_Field\_Features.hob”.<sup>4</sup> This file contains the object and metadata S57 objects as required in the Specifications and Deliverables.

## **C. Vertical and Horizontal Control**

Refer to the OPR-Q191-KR-11 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 with 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 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, replacing the real-time position records.

See OPR-Q191-KR-11 Horizontal and Vertical Control Report for a more detailed description of PPK positioning methods used.

### Vertical Control

All sounding data was reduced to MLLW initially using observed tidal data from three John Oswald and Associates (JOA) tide stations located in Akun Bay, Surf Bay and Trident Bay, AK, and one NOAA COOPS tide station located in Unalaska, AK. 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. The NOAA supplied tidal zoning was modified by JOA, providing a more elaborate zoning scheme than those zones issued in the Statement of Work.

On November 14, 2011, JOA issued verified tidal data and final zoning for OPR-Q191-KR-11. 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 S57 Feature files.



For additional information, refer to the OPR-Q191-KR-11 Horizontal and Vertical Control Report.

**Table 1 Tide Gauges**

<b>Gauge</b>	<b>Model</b>	<b>Gauge Type</b>	<b>Location</b>	<b>Latitude</b>	<b>Longitude</b>	<b>Operational</b>
946-2711	H350XL/355	Digital Bubbler	Surf Bay, AK	54°08'58"N	165°36'58" W	July - Sep
946-2719	H350XL/355	Digital Bubbler	Akun Cove, AK	54°14'20"N	165°32'28" W	July - Sep
946-2721	H350XL/355	Digital Bubbler	Trident Bay, AK	54°08'20"N	165°31'34" W	July - Sep
946-2620	NOAA CO-OPS Gauge	Aqua Trak	Unalaska, AK	53°52'48"N	165°32'12" W	July 1989 - Present

## D. Results and Recommendations

### D.1 Chart Comparison

H12359 survey was compared with charts shown in **Table 2**.

**Table 2 Chart Comparisons**

Chart Number	Type	Scale	Edition	Edition Date
16531	Raster	1:80,000	7	February-2002
16532	Raster	1:20,000	6	June-2000
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 ENCs onto the final BASE surfaces in CARIS HIPS & SIPS. The general agreement between the charted soundings and H12359 soundings is noted. A more detailed comparison was undertaken for any charted shoals or other dangerous features.

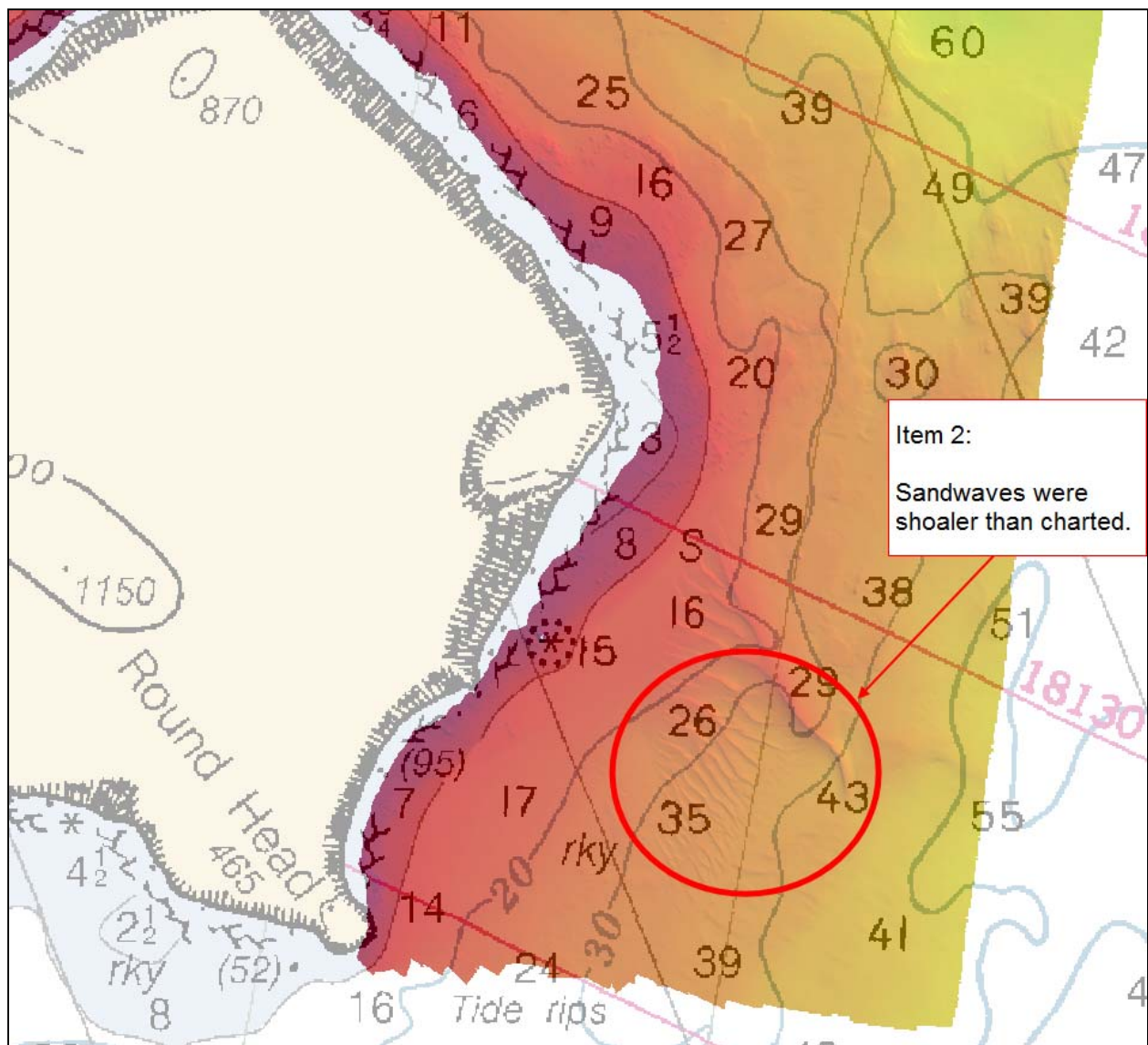
Agreement between the H12359 BASE surface depths and the charted soundings for all applicable ENC and Raster charts was within +/- 3 fathoms. Since the survey area was ensonified with 100% multibeam coverage, shoaler depths were discovered between the charted soundings. Additionally, contours in the area were adequate, but require revision from the high resolution data. In these areas, when necessary, the sounding was designated to ensure its inclusion in the finalized BASE surface. Exceptions follow:

1. Most charted contours were in general found to be adequate, though the 5-fathom contour did not agree well with the H12359 survey soundings. Overall, the 100% multibeam coverage discovered discrepancies between charted and observed contours. Hydrographer recommends contours and soundings be modified to agree with the H12359 survey.
2. The sandwaves located 1.5 to 2 km northeast of Round Head (approximately N54-11-01, W165-22-31) were found to be shoaler than charted on both RNCs and ENC. Hydrographer recommends contours and soundings be modified to agree with the H12359 survey.
3. An underwater rock, located 2 km east of Helianthus Cove (approximately N54-14-16.8, W165-30-24.6), was not represented on the RNCs or ENC, creating a 5-fm discrepancy between the charted depth and the H12359 surveyed depth. The surveyed least depth of the rock is 25.8 fathoms.



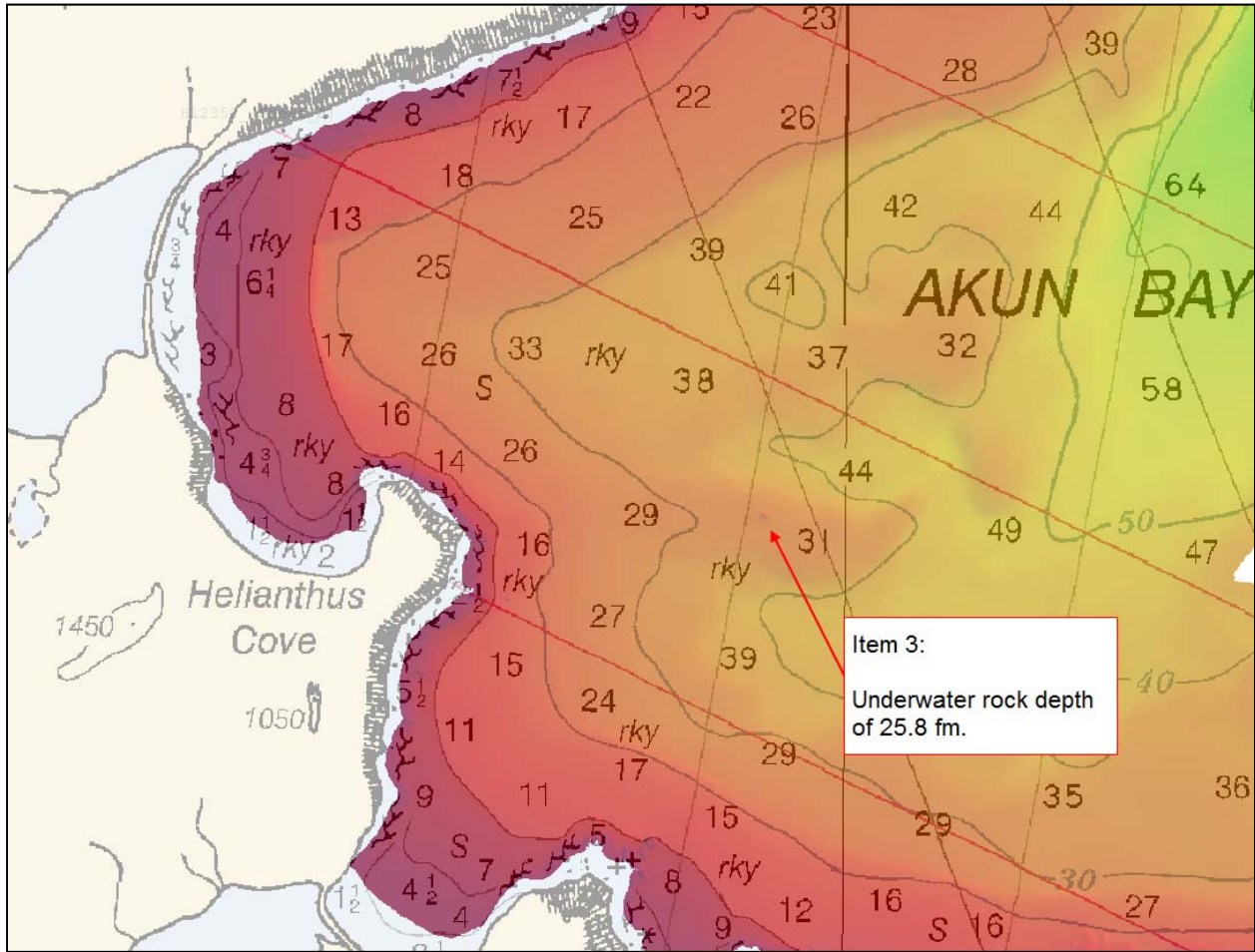
4. A rocky outcropping, located at the northeast edge of Little Bay (approximately N54-17-48.3, W165-34-07.9), has surveyed depths less than 10 fathoms, though it extends beyond the RNC's and ENC's charted 10-fathom contour.
5. Shoreline features on charts listed in **Table 2** need to be updated to agree with this survey and the Final Features File (FFF). The ENC has numerous erroneous and incorrectly positioned islets and rocks.<sup>5</sup>

The Hydrographer recommends that soundings within the survey limits of H12359 supersede all prior survey and charted depths.

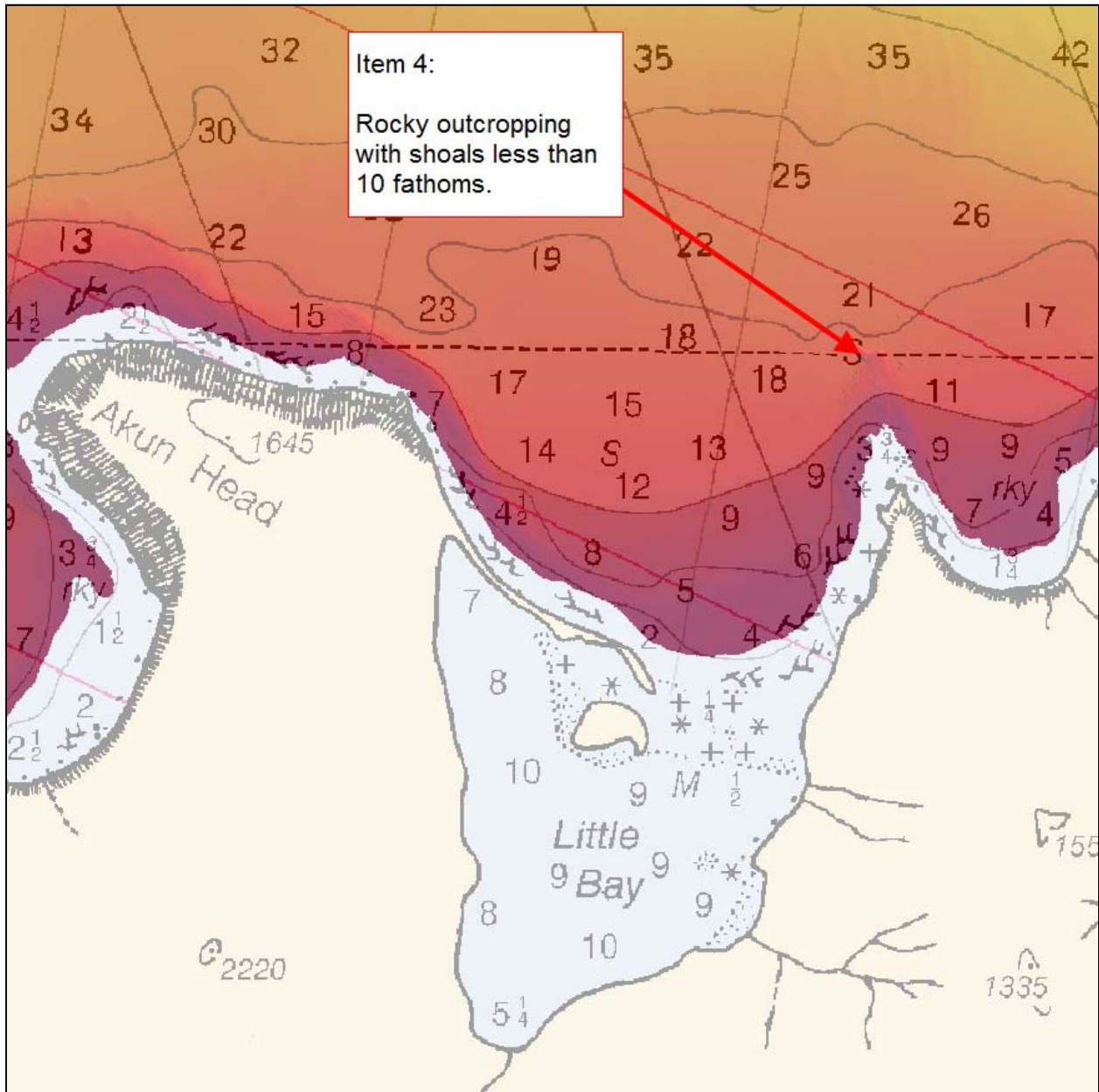


**Figure 6 Bathymetry Overlaid on Chart 16531 - Sandwaves**





**Figure 7 Bathymetry Overlaid on Chart 16531 – Underwater Rock**



**Figure 8 Bathymetry Overlaid on Chart 16531 – Rocky Outcropping**

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, or PA within the limits of H12359.

### 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. Refer to Appendix I (Danger to Navigation Reports) for details.<sup>6</sup>

### Assigned Feature File

Charted features that fell inside the 4 fathom contour were not investigated and have been noted with a “Not Addressed” comment in the “descrp” 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 2011).

All features, including ones from the NOAA assigned feature file, that were within the geographical bounds of H12359 are included in the “H12359\_Field\_Features.hob” file.<sup>7</sup>

### D.2 Additional Results

None to note.

### Bottom Samples

The F/V Pacific Star was fitted to obtain bottom samples as specified in the Statement of Work. Eight samples were obtained in survey H12359.

Samples were taken with a Van Veen grab sampler and positions were recorded with WinFrog Multibeam v 3.09.11. Samples retrieved were analyzed and then encoded with the appropriate S57 attributes. Positions and descriptions of samples are found in the “OPR-Q191-KR-11\_FFF.hob” feature file.<sup>8</sup>

### Aids to Navigation

One aid to navigation exists on the charts (listed in **Table 2**) for the H12359.

The charted aid to navigation was found to be serving its intended purpose:

1. FI 4s 210ft 6M at N54-17-48, W165-31-28

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

### Shoreline Features

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.

### Revisions and Corrections performed during office processing and certification.

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<sup>1</sup> Data is adequate for charting.

<sup>2</sup> Data is adequate for charting.

<sup>3</sup> A 16m combined surface H12359\_16m\_Combined\_Office, created during office processing, was used as the basis for compilation.

<sup>4</sup> The submitted feature file was used during office processing to update features with respect to the largest scale chart.

<sup>5</sup> The ENC has numerous "islet" features that appear to be erroneously collected from dotted curved lines on the raster chart. It is recommended that a more thorough evaluation into the source of these features be conducted by the Marine Chart Division so that any discrepancy between the ENC and raster be resolved.

<sup>6</sup> All the DTONs were applied to the chart by MCD. See attached DTON report. The compiler changed the 4.8fm sounding at 54-16-21.98N, 165-40-25.18W to a UWTROC of the same depth in the chart update product.

<sup>7</sup> The submitted feature file was used during office processing to update features with respect to the largest scale chart.

<sup>8</sup> The bottom samples were recommended for charting and included in the chart update product.

## E. Approval Sheet

### Approval Sheet

For

**H12359**

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

OPR-Q191-KR-11 Statement of Work  
NOS Hydrographic Surveys Specifications and Deliverables, April 2011 Edition  
Fugro Pelagos, Inc. Acquisition Procedures (2011-MBES\_Acquisition\_Procedures\_R0)  
Fugro Pelagos, Inc. Processing Procedures (2011-MBES\_Processing\_Procedures\_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.  
March 5, 2012

**Dean  
Moyles**

Digitally signed by Dean  
Moyles  
DN: cn=Dean Moyles,  
o=FPI, ou=Marine,  
email=dmoyles@fugro.co  
m, c=US  
Date: 2012.03.03 13:59:28  
-08'00'

# REPORT OF DANGERS TO NAVIGATION

**Hydrographic Survey Registry Number:** H12359

**Survey Title:**      **State:**       Alaska  
                          **Locality:**    Pacific Ocean/Bering Sea  
                          **Sub-locality:** Vicinity of Akun Bay

**Project Number:**    OPR-Q191-KR-11

**Survey Dates:**     July 25, 2011 – 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
16532	1:20,000	6	06/2000
16531	1:80,000	7	02/2002

## Affected ENC's:

ENC Name	Scale	Edition	Issue Date
US4AK6FM	80000	4	06/15/2007

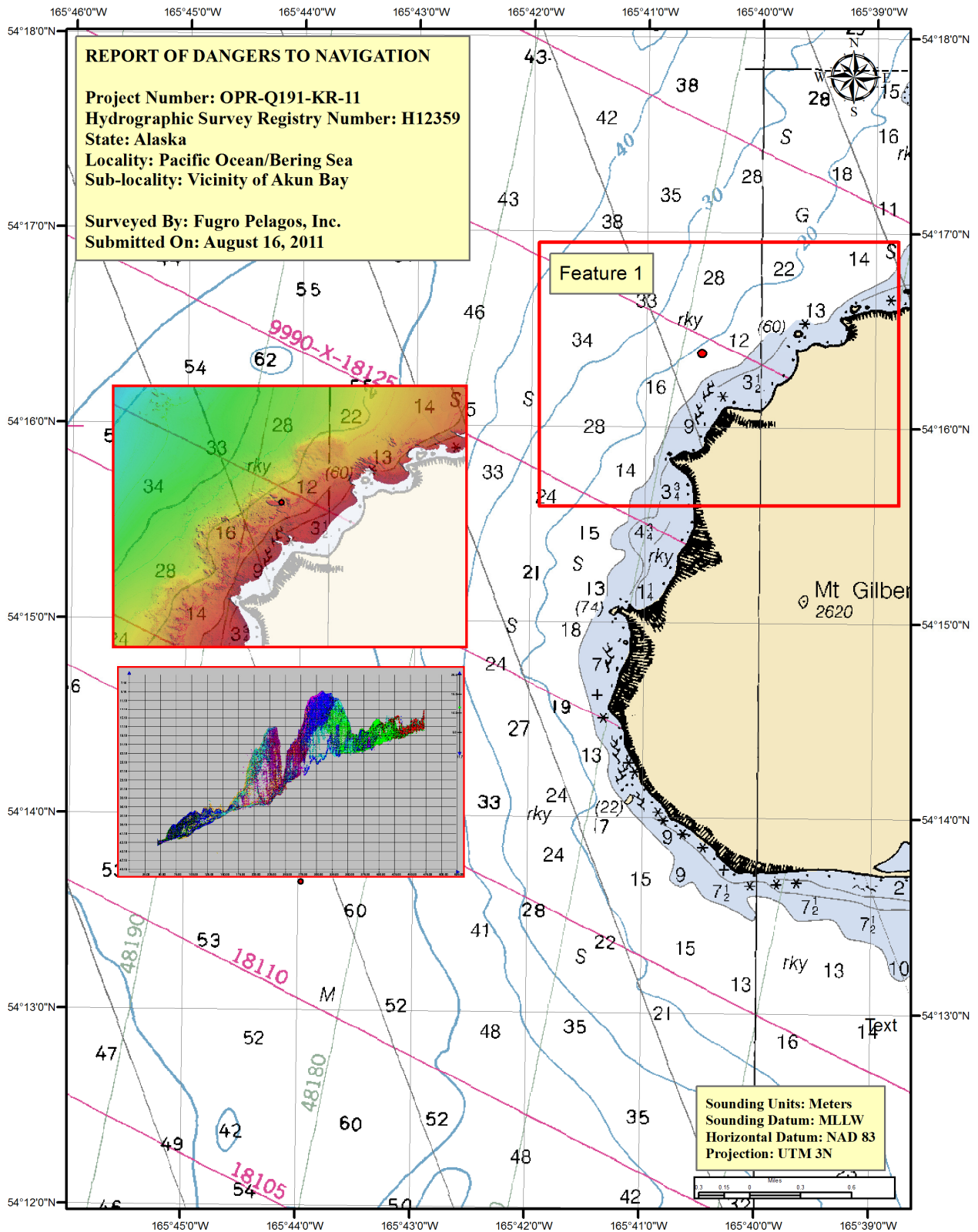
## DANGER:

Feature	Depth	Latitude	Longitude	Time (UTC)
1. Sounding	4.8 fathoms	54-16-21.98N	165-40-25.18W	2011-08-14 16:26:57.765

## COMMENTS:

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





# REPORT OF DANGERS TO NAVIGATION

**Hydrographic Survey Registry Number:** H12359

**Survey Title:**      **State:**       Alaska  
                          **Locality:**    Pacific Ocean/Bering Sea  
                          **Sub-locality:** Vicinity of Akun Bay

**Project Number:**    OPR-Q191-KR-11

**Survey Dates:**     July 25, 2011 – 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
16532	1:20,000	6	06/2000
16531	1:80,000	7	02/2002

## Affected ENC's:

ENC Name	Scale	Edition	Issue Date
US4AK6FM	80000	4	06/15/2007

## DANGER:

Feature	Depth	Latitude	Longitude	Time (UTC)
1. Sounding	8.0 fathoms	54-16-13.20N	165-30-21.47W	2011-08-03 00:44:22.859

## COMMENTS:

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



APPROVAL PAGE

H12359

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

- H12359\_DR.pdf
- Collection of depth varied resolution BAGS
- Processed survey data and records
- H12359\_GeoImage.pdf

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

Approved: \_\_\_\_\_

**Pete Holmberg**

Cartographic Team Lead, Pacific Hydrographic Branch

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

Approved: \_\_\_\_\_

**CDR David J. Zezula, NOAA**

Chief, Pacific Hydrographic Branch