

H12362

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. H12362

### LOCALITY

State Alaska

General Locality Krenitzin Islands

Sublocality North of Akutan Bay

2011

### CHIEF OF PARTY

Dean Moyles

### LIBRARY & ARCHIVES

DATE

U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION  <b>HYDROGRAPHIC TITLE SHEET</b>		REGISTRY No  <b>H12362</b>
<b>INSTRUCTIONS</b> — 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 <u>Alaska</u>		
General Locality <u>Krenitzin Islands</u>		
Sub-Locality <u>North of Akutan Bay</u>		
Scale <u>1:40,000</u>		Date of Survey <u>07/25/2011 – 08/23/2011</u>
Instructions dated <u>July, 2011</u>		Project No. <u>OPR-Q191-KR-11</u>
Vessel <u>F/V PACIFIC STAR (556510)</u>		
Chief of party <u>Dean Moyles</u>		
Surveyed by <u>MOYLES, REYNOLDS, FARLEY, ROKYTA, LYDON, TIXIER, GOODALL, CHILDS</u>		
Soundings by <u>RESON SEABAT 7125 (PACIFIC STAR, HULL MOUNT)</u>		
SAR by <u>Martha Herzog</u>		Compilation by <u>Fernando Ortiz</u>
Soundings compiled in <u>Meters at MLLW</u>		
REMARKS: <u>All times are UTC. UTM Zone 3 N</u>		
<u>The purpose of this survey is to provide contemporary surveys to update National Ocean Service (NOS)</u>		
<u>nautical charts. All separates are filed with the hydrographic data. Revisions and end notes in red were</u>		
<u>generated during office processing. The processing branch concurs with all information and recommendations in</u>		
<u>the DR unless otherwise noted. Page numbering may be interrupted or non sequential.</u>		
<u>All pertinent records for this survey, including the Descriptive Report, are archived at the</u>		
<u>National Geophysical Data Center (NGDC) and can be retrieved via <a href="http://www.ngdc.noaa.gov/">http://www.ngdc.noaa.gov/</a>.</u>		

## A. Area Surveyed

H12362 is located to the north of Akutan Bay.

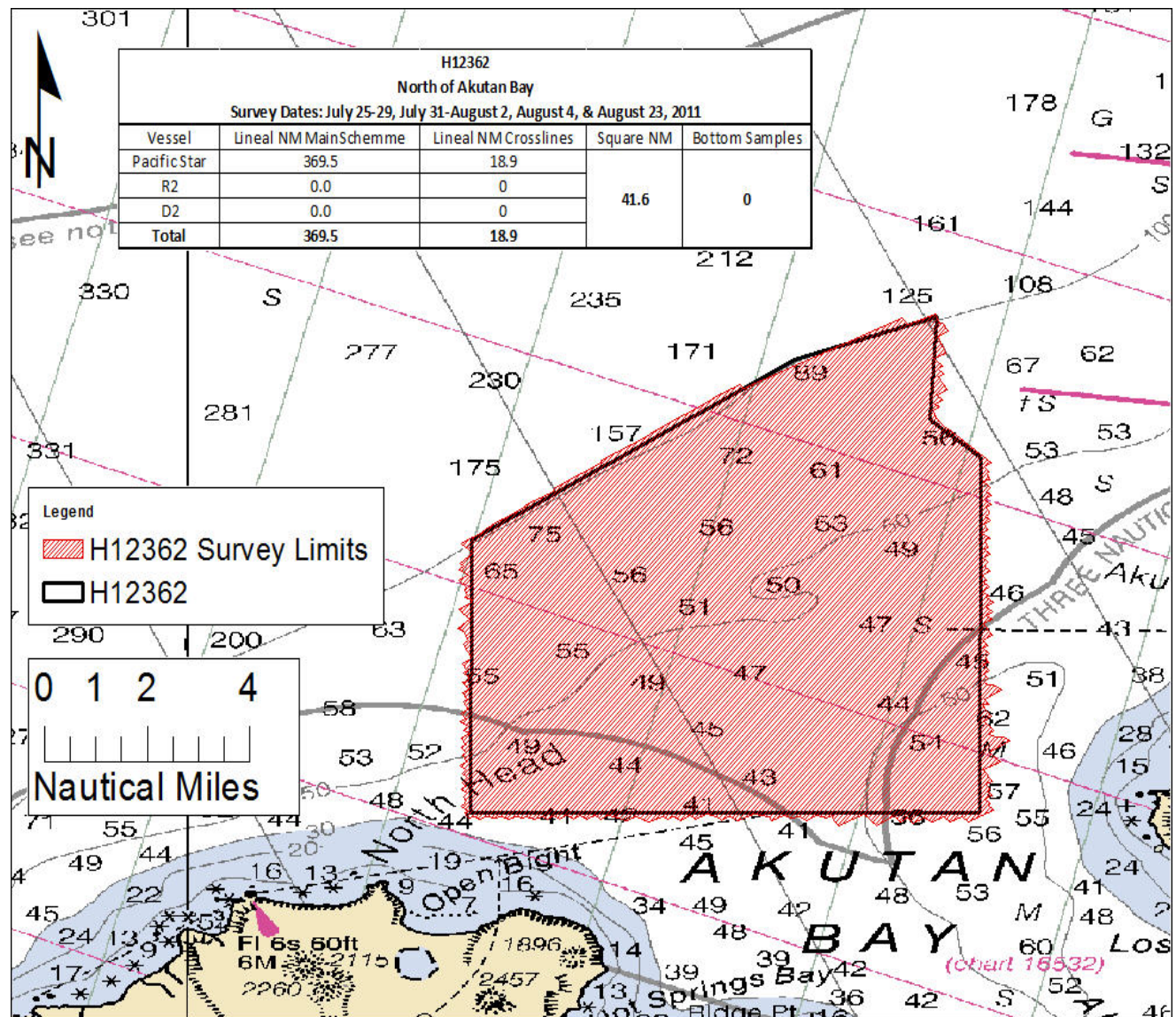


Figure 1 H12362 Area Surveyed

## 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 acquired all sounding data for H12362.

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.

### B.2 Quality Control

#### Crosslines

Crosslines were planned and well distributed throughout the survey to ensure adequate quality control. Total crossline length surveyed was 18.9 nautical miles or 5.1 percent of the total main scheme line length. Each crossline was compared to the entire main scheme line plan through 4m CUBE surface, using the CARIS HIPS QC report routine.

All of the QC Reports fall well within the required accuracy specifications with the exception of a few outer beams on two of the crosslines, which had increased uncertainty levels due sound speed errors and bottom detection algorithms in the outer beams. Good conformity was still seen between the main scheme lines and crosslines.<sup>1</sup>

Quality Control Results are located in Separate IV.

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

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

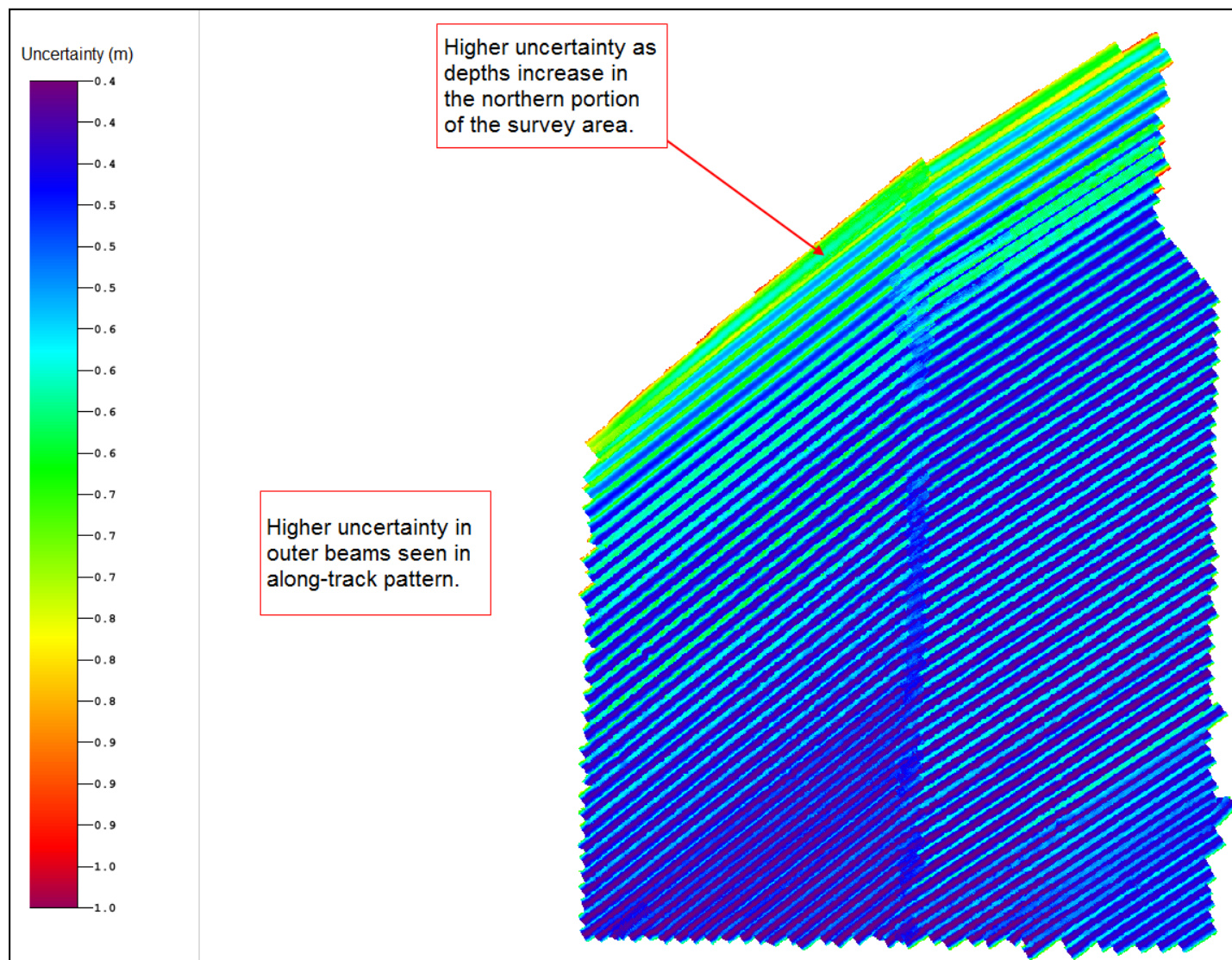
Where, a=0.5 and b=0.013, d=depth

### Uncertainty Values

The majority of H12362 had uncertainty values of 0.37m to 0.60m, which met project specifications (**Figure 2**).<sup>2</sup>

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.

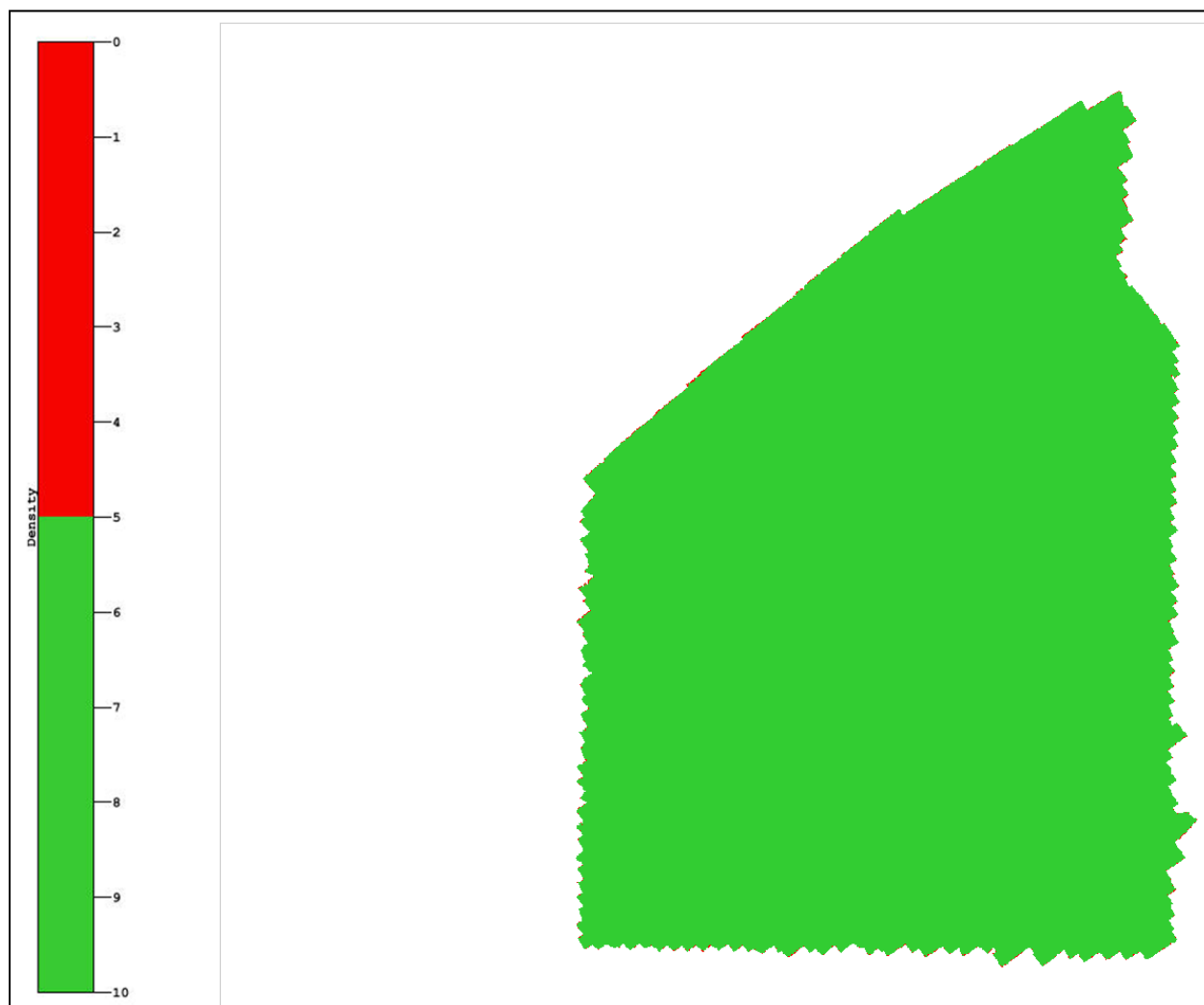




**Figure 2 Uncertainty DTM**

### 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 H12362 met these project specifications. **(Figure 3)**



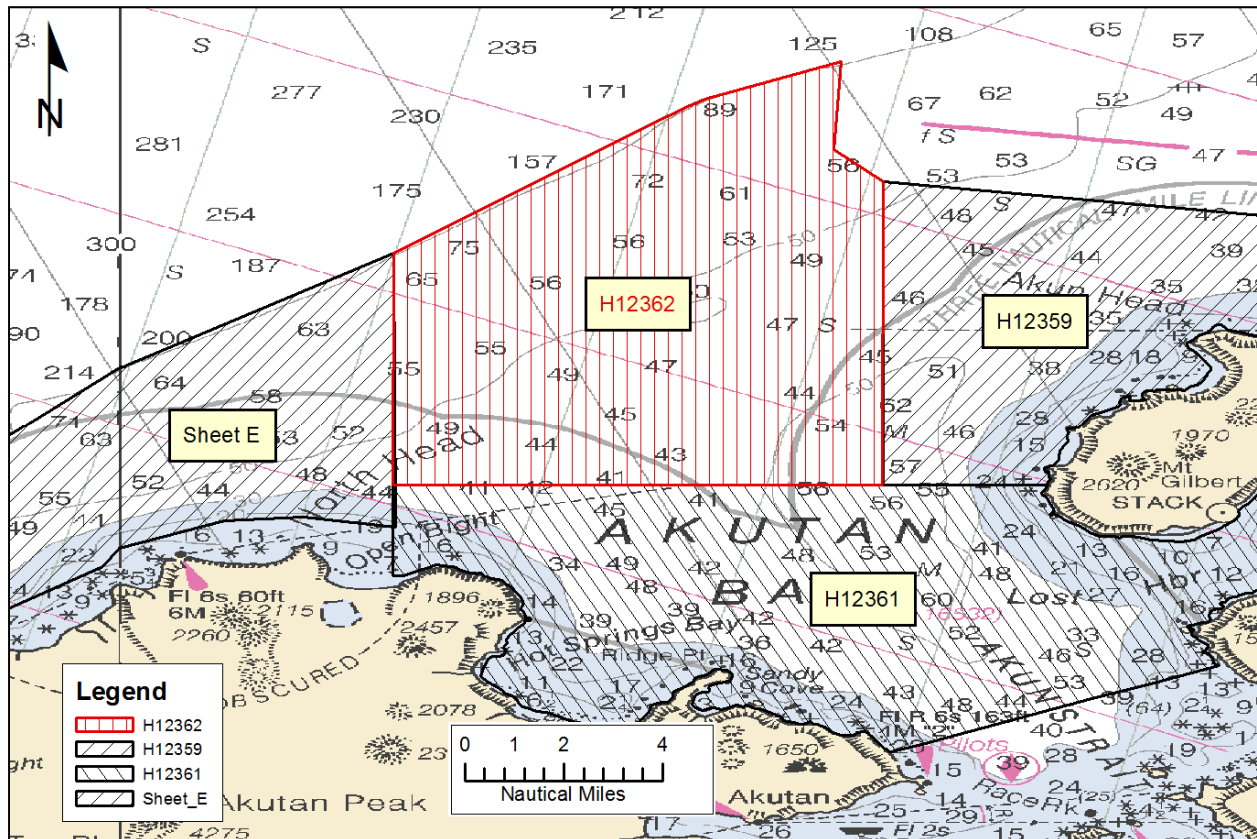
**Figure 3 Density DTM**

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

H12362 junctions with:

Registry #	Date	Junction Side
H11643 (Terrasond)	2007	East
H12359	2011	East
H12361	2011	South
Extra Area (Sheet E)	2011	West



**Figure 4 H12362 Survey Junctions**

The surveys are in agreement along their common borders. The agreement with H12359, H12361 and the extra area that Fugro Pelagos acquired (Sheet E) was noted in the field using the CUBE surfaces during subset cleaning. The conformity is also apparent in 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 H12362 was good. One notable problem follows:

1. Small tide busts, up to 30cm, exist within the survey area. All data met IHO Order 1a specifications.<sup>3</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 H12362 is called “H12362”, and it contains three BASE surfaces. The following parameters were used:<sup>4</sup>

- 36-80 meters: 4 m resolution, name “H12361\_4m\_Final”
- 72-160 meters: 8 m resolution, name “H12361\_8m\_Final”
- 144-320 meters: 16 m resolution, name “H12361\_16m\_Final”

Notes:

- Depth range was approximately 75m to 274m; therefore, resolutions finer than 4m or 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 “H12361\CARIS\Fieldsheets” directory.

The final S57 file for this project is called “H12362\_Field\_Features.hob”. 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

H12362 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

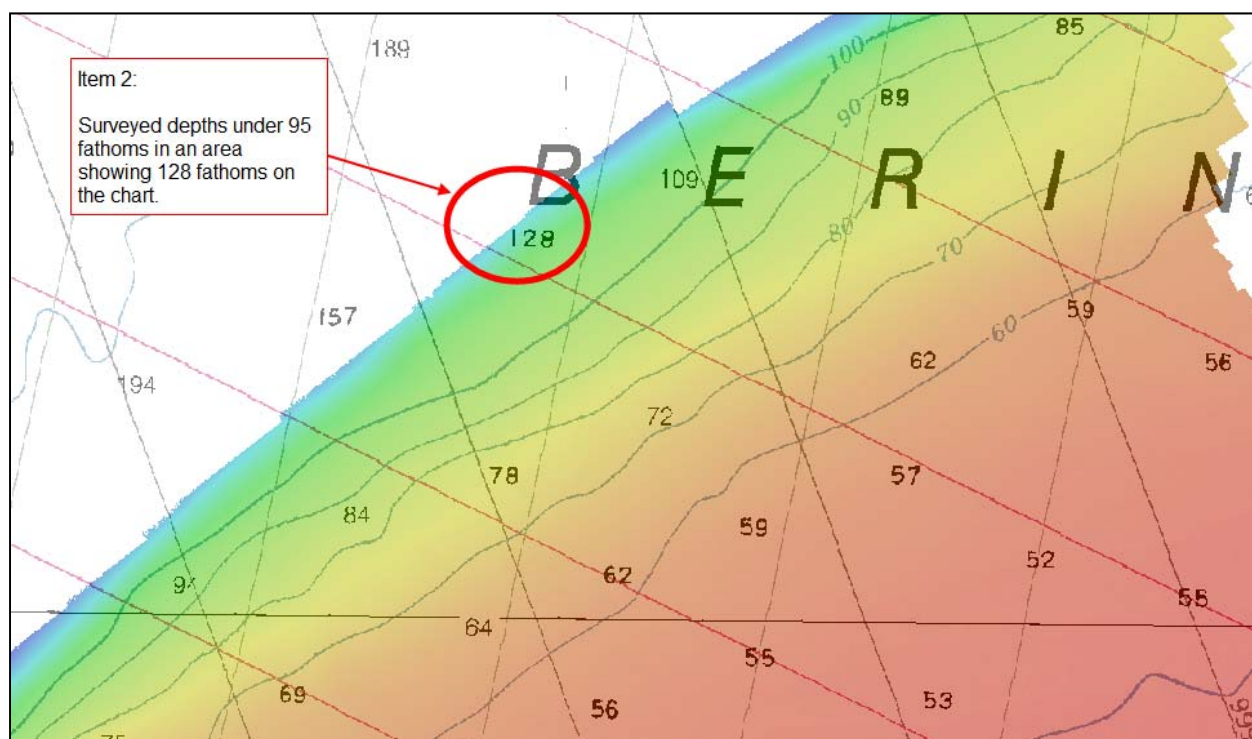
A comparison of soundings was accomplished by overlaying the latest edition of NOAA charts and ENC's onto the final BASE surfaces in CARIS HIPS & SIPS. The general agreement between the charted soundings and H12362 soundings is noted. A more detailed comparison was undertaken for any charted shoals or other dangerous features.

Agreement between the H12362 BASE surface depths and the charted soundings for all applicable ENC and Raster charts was within +/- 1 fathom for the majority of the charted soundings, especially in the southern (shoaler) portion of the survey area. As the water got deeper to the north, discrepancies began to increase, though most charted soundings and surveyed depths were in agreement 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. Exceptions follow:

1. Most charted contours were in general found to be adequate. Overall, the 100% multibeam coverage discovered discrepancies between charted and observed contours. The 90m and 100m contour had the largest discrepancies with surveyed depths. Hydrographer recommends contours and soundings be modified to agree with the H12362 survey.
2. In the northern portion of the survey area (approximately N54-21-33, W165-50-06), surveyed depths below 95 fathoms were found in an area displaying 128 fathoms on the ENC and 16531 RNC charts.
3. In the northern portion of the survey area (approximately N54-19-42, W165-53-53), surveyed depths below 120 fathoms were found in an area displaying 149 fathoms on the ENC and 16531 RNC charts.

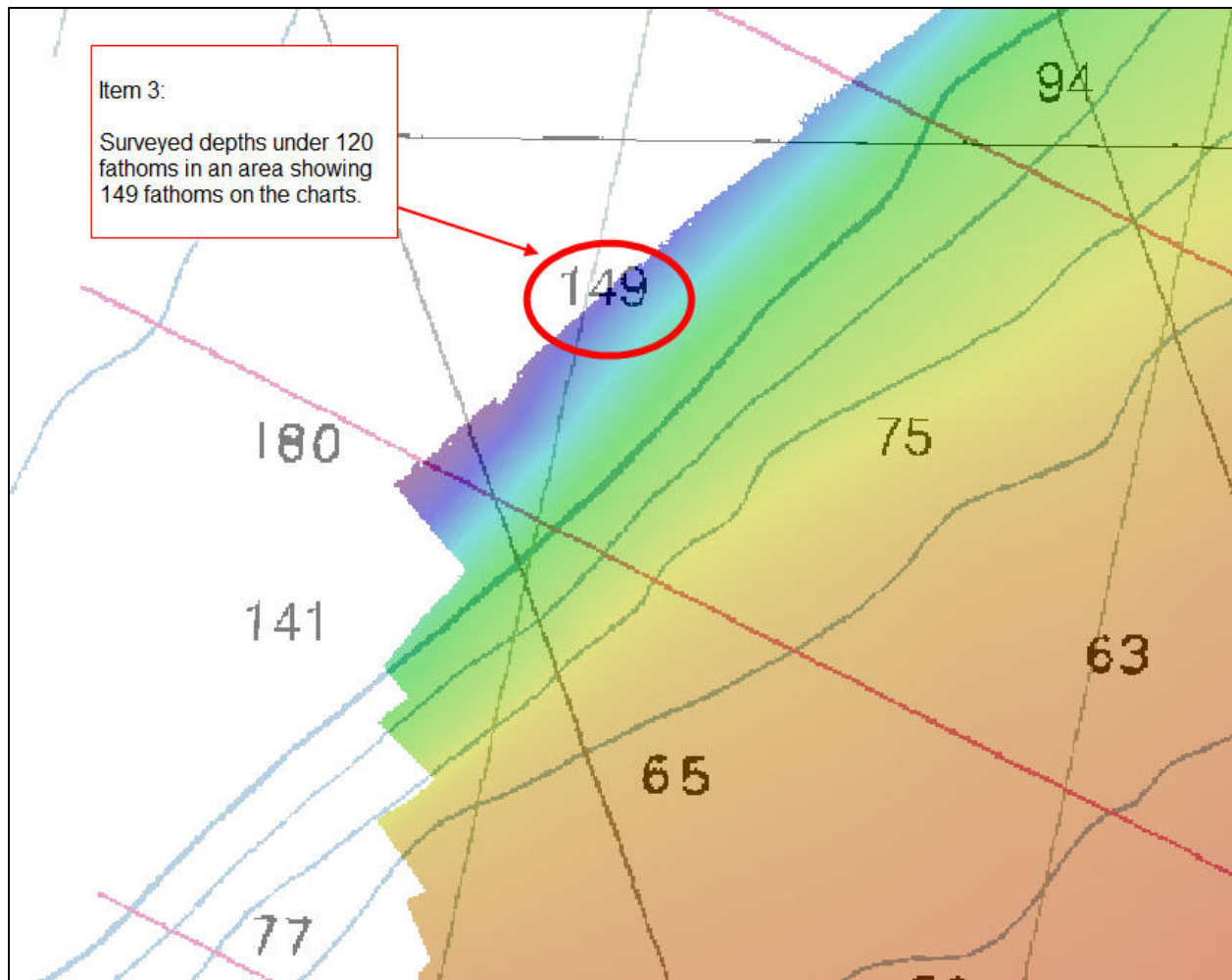
The Hydrographer recommends that soundings within the survey limits of H12362 supersede all

prior survey and charted depths.<sup>5</sup>



**Figure 5 Bathymetry Overlaid on Chart 16531**





**Figure 6 Bathymetry Overlaid on Chart 16531**

#### 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 H12362.

#### Dangers to Navigation



No Dangers to Navigation were found in the survey area H12362.

#### 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 "descr" 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 H12362 are included in the "H12362\_Field\_Features.hob" file.<sup>6</sup>

#### D.2 Additional Results

None to note.

#### Bottom Samples

No bottom samples were collected in the survey area H12362.

#### Aids to Navigation

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



## E. Approval Sheet

### Approval Sheet

For

**H12362**

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 14:20:24  
-08'00'



Revisions and Corrections performed during office processing and certification.

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<sup>1</sup> This data were rejected or not included in the surfaces because of the overlap between adjacent lines. Remaining data is adequate and within specification to supersede charted data in the common area.

<sup>2</sup> Data is adequate and within specifications despite the uncertainty values.

<sup>3</sup> Data is adequate and within specifications despite tide busts.

<sup>4</sup> During office processing and certification new base surfaces were created. A 16 meter base surface was created for compilation.

<sup>5</sup> Data is adequate and within specifications to supersede charted data in the common area.

<sup>6</sup> Concur with clarification. The submitted hob file contains 2 meta objects. M\_QUAL and M\_COVER. During office processing and certification a new file was created with new M\_QUAL coverage.

APPROVAL PAGE

H12362

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

- H12362\_DR.pdf
- Collection of depth varied resolution BAGS
- Processed survey data and records
- H12362\_GeoImage.pdf

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

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

**Peter 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: \_\_\_\_\_

**LCDR David. Zezula.**

**Chief, Pacific Hydrographic Branch**