

H11460

NOAA FORM 76-35A

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

## DESCRIPTIVE REPORT

*Type of Survey* ..... HYDROGRAPHIC

*Field No.* ..... N/A

*Registry No.* ..... H11460

### LOCALITY

*State* ..... Alaska

*General Locality* ..... Southwestern Alaskan Peninsula

*Sublocality* ..... Warner Bay

2005

### CHIEF OF PARTY

Dean Moyles

### LIBRARY & ARCHIVES

DATE .....

**HYDROGRAPHIC TITLE SHEET**

**H11460**

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 SW Alaska Peninsula

Sublocality Warner Bay

Scale 1:10,000

Date of Survey 7/20/2005 - 8/15/2005

Instructions Date 3/1/2005

Project No. OPR-P182-KR-05

Vessel R/V QUICKSILVER

Chief of Party Dean Moyles

Surveyed by Moyles, Orthmann, Reynolds, Gill, Mount, Stock, Busey, Briggs et al

Soundings taken by echo sounder, hand lead, pole Reson 8101 (Hull Mounted)

Graphic record scaled by N/A

Graphic record checked by N/A

Evaluation by G. Nelson

Automated plot by HP Designjet 1050C

Verification by G. Nelson

Soundings in Fathoms

at

MLLW

REMARKS: All times are recorded in UTC

**Revisions and annotations appearing as endnotes were**

**generated during office processing.**

**All seperates are filed with the hydrographic data**

**As a result, page numbering may be interrupted or non-sequential**

**A - Area Surveyed**

H11460 (Sheet AF) is bound by the coordinates listed below, which encompass Warner Bay.

Hydrographic data collection began on July 20, 2005 and ended on August 15, 2005.<sup>1</sup>

**Table 1 - H11460 Sheet Limits<sup>2</sup>**

<b>Sheet Limits</b> Task Order # 1 H11460 Sheet AF Scale 1:10,000		
Point #	Positions on NAD83	
	Degrees Latitude (N)	Degrees Longitude (W)
1	56°05'04.87" N	158°27'23.12" W
2	56°05'04.87" N	158°20'01.50" W
3	56°11'39.85" N	158°20'01.50" W
4	56°11'39.85" N	158°27'23.12" W

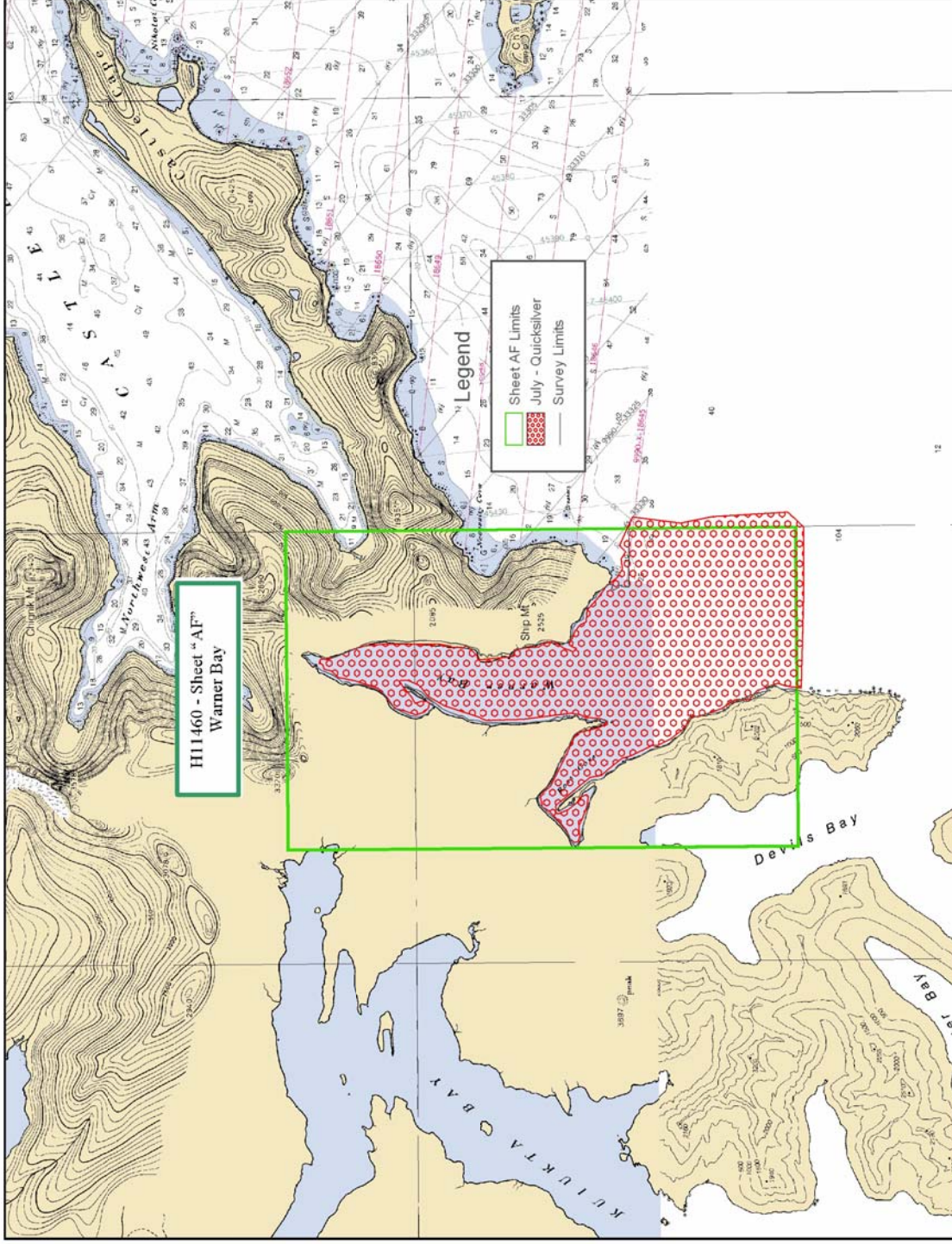


Figure 1 H11460 Area Surveyed



## **B – Data Acquisition & Processing**

Refer to the OPR-P182-KR-05 Data Acquisition and Processing Report<sup>3</sup> 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.

### Equipment & Vessels

The R/V Quicksilver acquired all sounding data for H11460. The Quicksilver, which is 32 feet in length with a draft of 3 feet, was equipped with a Reson 8101 with option 033 (pseudo SideScan) for multibeam data acquisition. The vessel was also equipped with two AML sound velocity and pressure sensors for sound velocity profiles. Vessel attitude and position were measured using an Applanix Position and Orientation System for Marine Vessel (POS/MV) with XTF files logged in Triton ISIS V 6.9.

A 25 ft skiff, referred to as the DP Skiff, was used to perform item investigations and shoreline verification. The skiff was equipped with a CSI GBX-PRO DGPS receiver, WinFrog v3.4.0 data acquisition system (operated on a Panasonic laptop), laser range finder and a Sony digital camera. NOAA nautical charts & LIDAR Smooth Sheets were displayed as a layer in WINFROG for reference. All soundings on submerged features were collected by the Quicksilver. The DP skiff was utilized to mark locations of exposed rocks. A West Marine Single Beam Echosounder was used to aid the hydrographer on the skiff in locating the shoalest point of targets near the surf zone or areas of limited visibility,

Refer to OPR-P182-KR-05 Data Acquisition & Processing Report for a complete listing of equipment and vessel descriptions. No deviations from the report occurred.

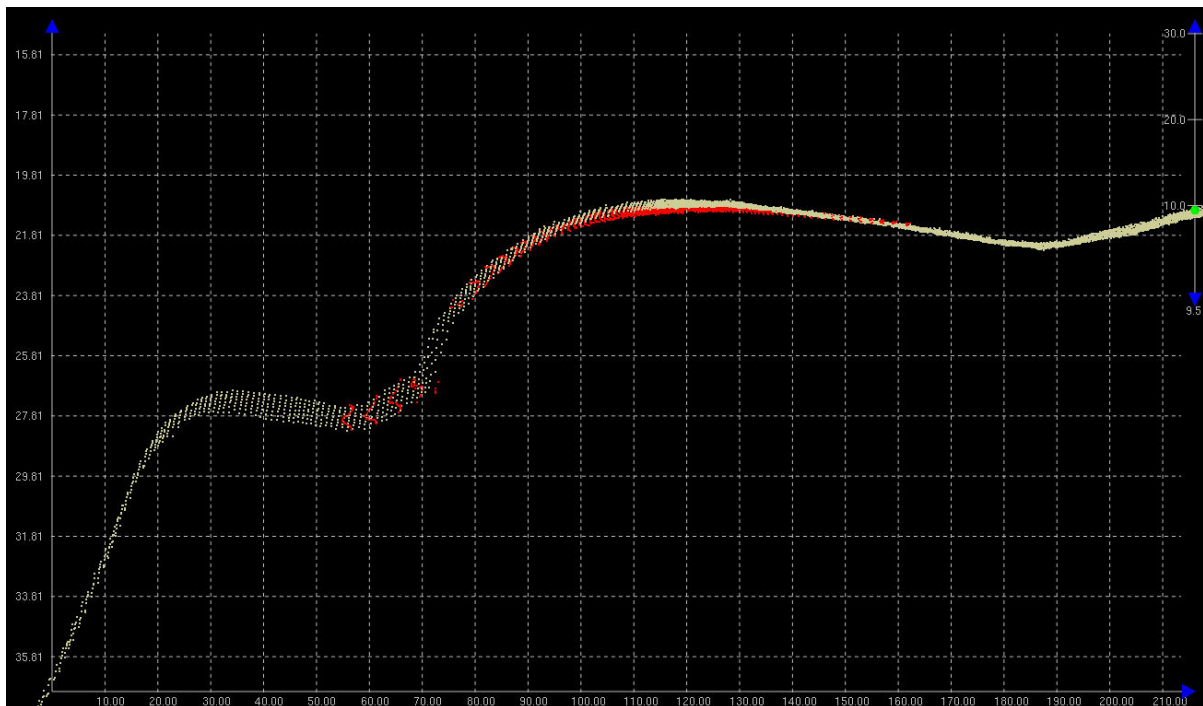
## Quality Control

### Crosslines

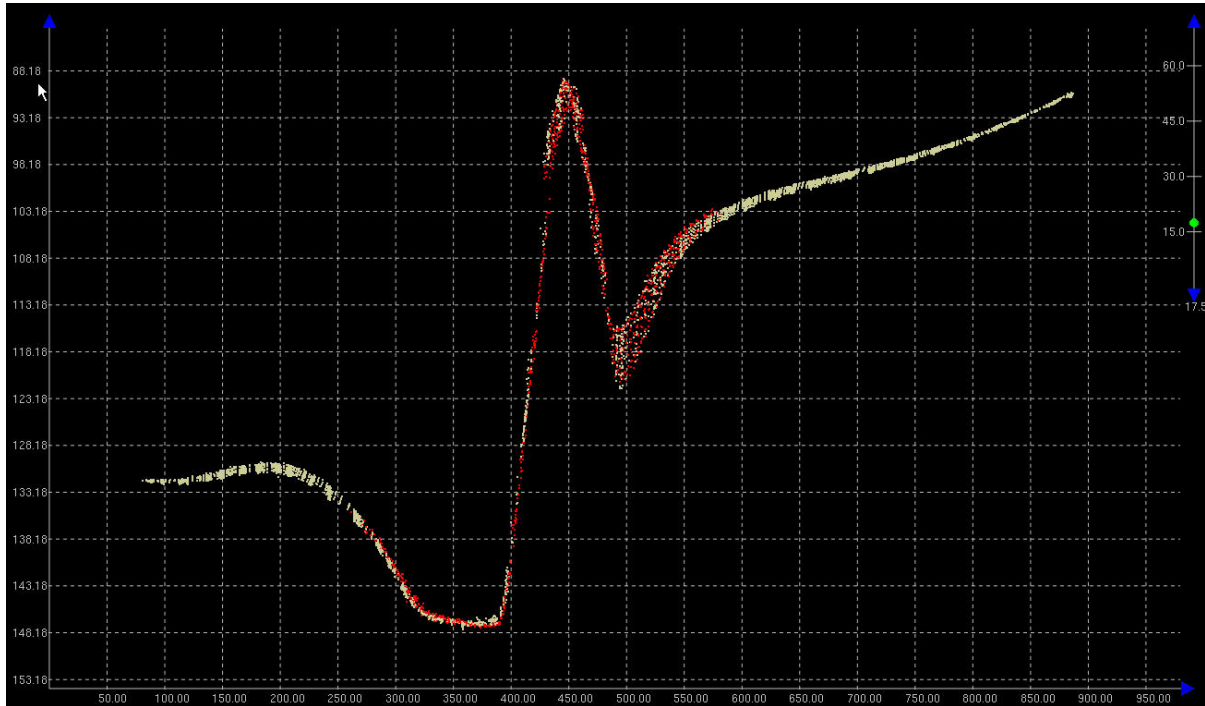
Quality control tielines were planned to total five percent of the main scheme line length. Total crossline length surveyed was 21.3 km (11.5 nautical miles) or 5.0 percent of the total main scheme kilometers. Collected tielines were well distributed throughout the sheet to insure adequate crossline quality control. A total of 31 tie line crossings were examined using the CARIS HIPS QC report routine.

The majority of QC Reports fall well within the required accuracy specifications. However, beams that fall below the 95 percent confidence level in the QC Report are associated with specific areas and conditions illustrated below. It should be noted that data at these locations are in agreement with the surrounding offset lines and are considered well within the required specifications.

The majority of beams that fell outside of the 95 percent confidence level were located in areas having extreme steep slopes and/or rocks. The figures below show two examples of this.



**Figure 2 Profile of AF02-QC008**



**Figure 3 Profile of AF04-QC011**

Note: The QC reports were generated based on the given accuracy specification of:

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

where,  $a = 0.5$ ,  $b = 0.013$  and  $d = \text{depth}$ .

However, since a variance of a difference, rather than a variance from a mean is being used, the  $a$  and  $b$  values defined in the `makehist.cla` file within CARIS will use:

$$a = 0.5 * \sqrt{2} = 0.707$$

$$b = 0.013 * \sqrt{2} = 0.018$$

### Data Quality

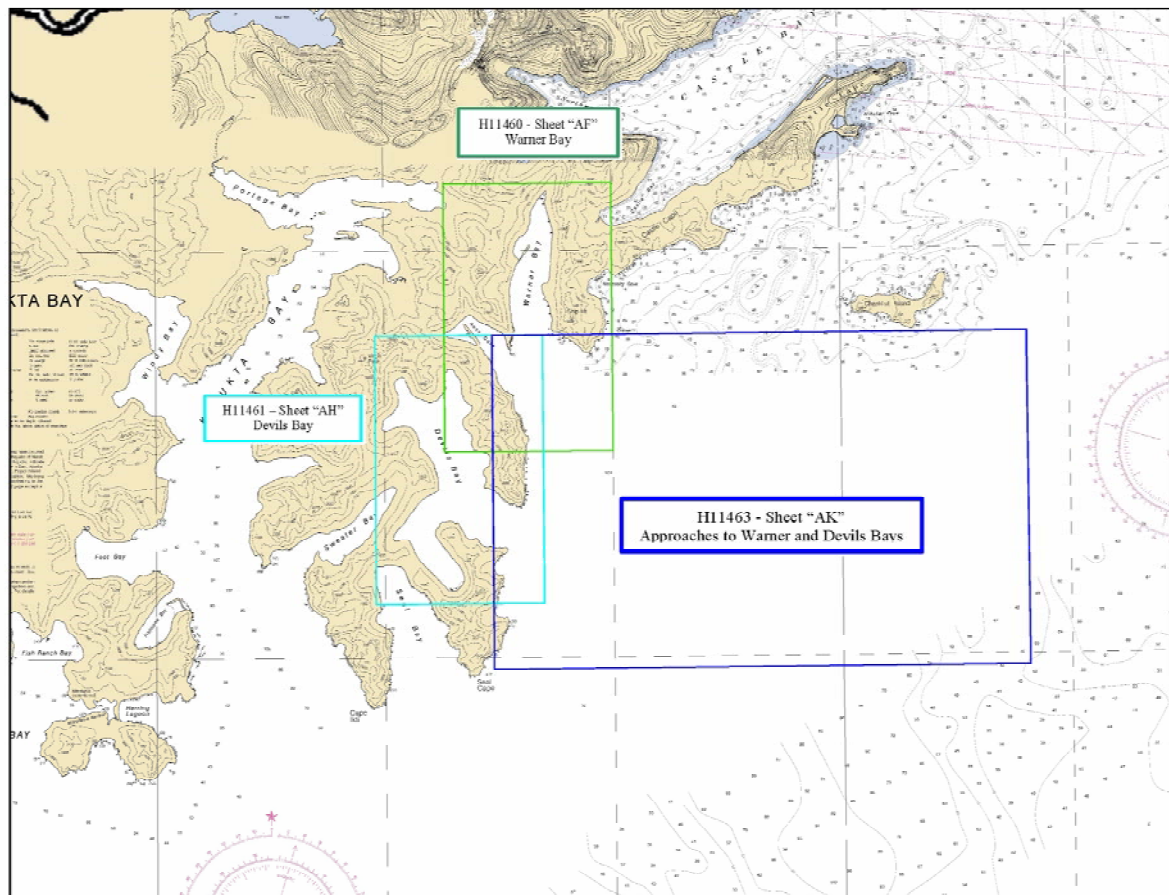
In general, the multibeam data quality for H11460 was excellent; there were no unusual conditions encountered.<sup>4</sup>



## Survey Junctions

H11460 (Sheet AF) junctions with:

<u>Registry #</u>	<u>Scale</u>	<u>Date</u>	<u>Junction Side</u>
H11461	1:10,000	2005	North <sup>5</sup>
H11463	1:20,000	2005	West <sup>6</sup>



**Figure 4 H11460 Survey Junctions**

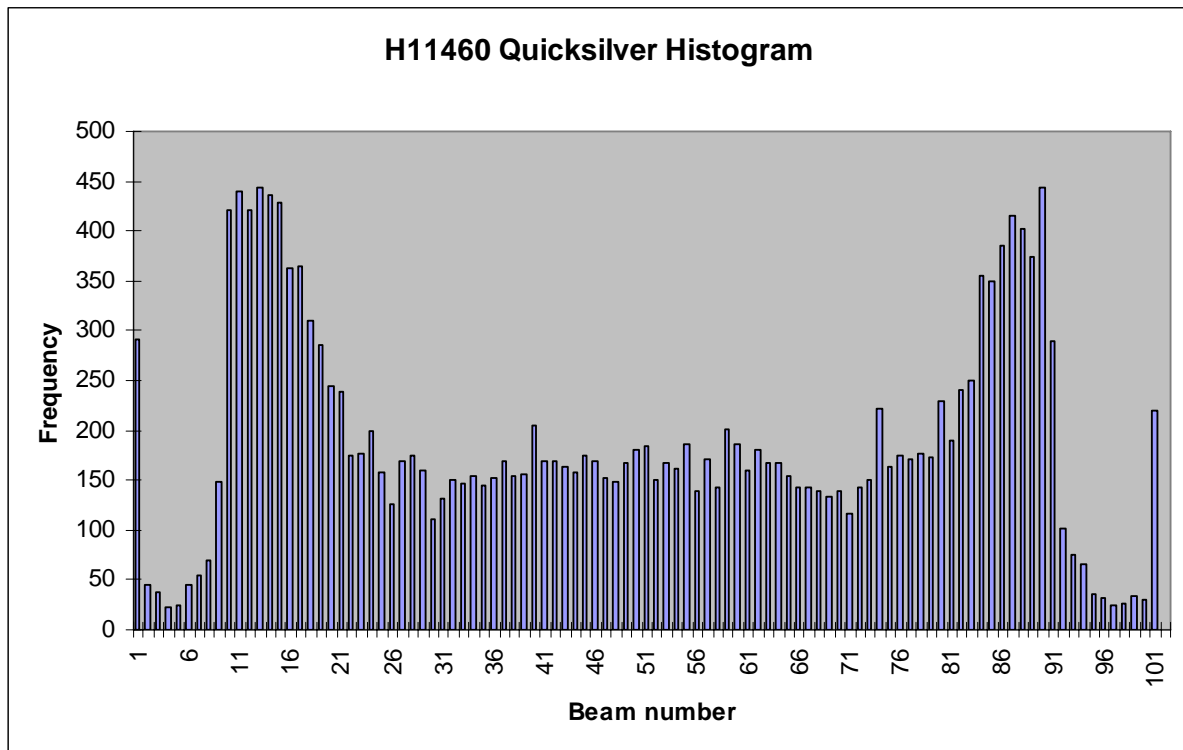
The surveys are in agreement along their common borders. The agreement was noted in the field using the 2 and 5 meter DTM's created for coverage verification. The conformity is also apparent in the preliminary smooth sheets.<sup>7</sup>



Smooth Sheet Histograms

The H11460 Quicksilver Histogram (Figure 5) illustrates the Reson 8101 data collected from July 20, 2005 to August 15, 2005 on the R/V Quicksilver. The histogram shows an increase of selected soundings from the outer beams (around beams 15 and 86). This is the result of surveying near the shoreline where the outer beams are mapping the shallowest areas. The majority of adjacent lines were run with port beams overlapped with port beams and starboard beams overlapped with starboard beams, which makes it possible to have higher density data per square meter on the outer edges, leading to a higher chance of sounding selection on the smooth sheet. The transition from phase to amplitude detection method of the sonar (around beams 36 and 71) is also apparent.

The decrease or lack of selected soundings on the outer beams is the result of deterioration of data quality on the outer beams. In most cases set filters were used to flag the outer beams as rejected, but in other cases, additional cleaning or filters were used on a line by line basis resulting in fewer selected soundings. It is also apparent from the histogram the increased number of selected sounding from beams number 1 & 101; this is also a direct result of surveying near the shoreline.



**Figure 5 Histogram for 8101 (Quicksilver)**



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## Quality Control Checks

During the hydrographic survey OPR-P182-KR-05 the R/Vs Quicksilver and Ocean Guardian conducted a number of confidence checks. This usually consisted of the vessels running two lines in the opposite direction over a reference surface (normally the patch test site). The data sets collected with the Reson 8101 and 8111 systems that were installed on the Quicksilver and Ocean Guardian respectively, compared within 5 to 10 centimeters.

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 (version March 2003) 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 stopped.

## Corrections to Echo Soundings

Refer to the OPR-P182-KR-05 Data Acquisition and Processing Report for a detailed description of all corrections to echo soundings and lead line measurements. No deviations from the report occurred.

## **C – Horizontal & Vertical Control**

Refer to the OPR-P182-KR-05 Horizontal and Vertical Control Report<sup>8</sup> for a detailed description of the horizontal and vertical control used on this survey. A summary of the project's horizontal and vertical control follows. No deviations from the report occurred.

### Horizontal Control

The horizontal control datum for this survey was the North American Datum of 1983 (NAD83). All raw positions were originally collected in WGS84 and transformed to NAD83 during the post-processed kinematic GPS (KGPS) routine.

It was necessary to acquire dual frequency GPS data at known locations on the ground so that a KGPS solution could be used for final positioning. John Oswald & Associates, LLC (JOA) established two local control points: station "849E" was located on the tidal bench mark 8849 E 2001, and station "Arm", was located nearby on a piece of pipe extending off of station 849E.

Vessel position was determined in real time using a Trimble Zephyr L1/L2 GPS antenna, which was connected to a Trimble BD950 L1/L2 GPS card residing in the POS/MV. The POS/MV was setup via the Com 2 to accept USCG and/or Fugro Pelagos differential corrections, which were output from a CSI MBX-3S Coast Guard beacon receiver and/or the Fugro Pelagos L1 base station. Note: since the pseudorange corrections received by the POS/MV are based on the NAD 83 position of the reference station antenna position, all



DGPS-based final positions are NAD 83. However, nearly all final positions were determined using a post-processed KGPS solution using the POSPac 4.2 processing software, which also output a final solution in NAD 83. (Refer to the “2005-NOAAProcessingProcedures” document for KGPS processing procedure).

### Vertical Control

All sounding data were initially reduced to mean lower low water (MLLW) using unverified tidal data from one tide station located on Chankliut Island, AK. A sub-contractor, John Oswald & Associates LLC (JOA), operated the gauge.

**Table 2 - Tide Gauges**

Gauge	Model	Gauge Type	Location	Latitude	Longitude	Operational
9458849	H350/355	Digital Bubbler	Chankliut Island, AK	56°08'40"N	158°06'47" W	05/26/05–08/25/05

**Table 3 - Final Tide Zones**

Zone	Primary			
	Site	Number	Time	Range Ratio
JOA001	Chankliut Island, AK	9458849	0	1.00
JOA002	Chankliut Island, AK	9458849	0	0.95
JOA003	Chankliut Island, AK	9458849	-6	0.95
JOA004	Chankliut Island, AK	9458849	-6	1.00
JOA005	Chankliut Island, AK	9458849	-6	1.06
JOA006	Chankliut Island, AK	9458849	-12	1.06
JOA007	Chankliut Island, AK	9458849	-12	1.00

JOA assembled tidal data for a twenty-four hour period UTC (Alaska Standard Time to UTC was +8 hours) and e-mailed these data to the R/V Ocean Guardian at the end of every Julian Day. A cumulative file for the gauge was updated each day by appending the new data.

On October 10, 2005, JOA issued verified tidal data and final zoning for OPR-P182-KR-05. The tidal zoning was modified by JOA, providing a simpler zoning scheme from those issued in the Statement of Work (for additional information refer to JOA’s Final Technical Report). From October 10, 2005 to November 5, 2005 all sounding data were re-merged using CARIS HIPS and SIPS tide routine. Verified tidal data were used for the Preliminary Smooth Sheet. Refer to the Vertical and Horizontal Control Report for additional tidal information and station descriptions.



## D – Results and Recommendations

### Chart Comparison<sup>9</sup>

H11460 survey was compared with charts:

Chart Number	Scale	Edition	Edition Date as of April 2005
OPR-P182-KR-05			
16006	1:1,534,076	33 <sup>rd</sup>	Dec. 2000
16011	1:1,023,188	36 <sup>th</sup>	Aug. 2004
16013	1:969,761	29 <sup>th</sup>	Nov. 2003
16561	1:80,000	2 <sup>nd</sup>	Mar. 2005
16566	1:77,477	10 <sup>th</sup>	Feb. 1999

### Comparison of Soundings & Contours

The soundings and contours, in general, compare well with the existing charts, but since the existing charts have little to no hydrographic data overlapping within the survey limits of H11460, the comparison of soundings and contours could only be performed on the outer northeast portion of the sheet.<sup>10</sup>

### Automated Wreck and Observation Information System

There were no AWOIS items assigned to H11460.<sup>11</sup>

### Charted Features

There were no charted features labeled PA, ED, PD, or Rep within the limits of H11460.<sup>12</sup>

### Dangers to Navigation

Three dangers to navigation were located during the hydrographic survey of H11460. Refer to Appendix A for Submitted Report.<sup>13</sup>



## Additional Results

### Additional Item Investigations

None were assigned for this sheet.<sup>14</sup>

### LIDAR Investigations

None were assigned for this sheet.<sup>15</sup>

### RSD Shoreline

Remote Sensing Division (RSD) provided the shoreline detail for this sheet. Since the RSD shoreline was the official shoreline source provided by NOAA, primary focus was given to its verification during this survey. Visual inspection during shoreline verification deemed the RSD shoreline very accurate and the Hydrographer recommends that it supersede the TENIX LADS (H11260) shoreline if any discrepancies occur.<sup>16</sup>

During MHW verification, no significant errors were found in the RSD MHW.<sup>17</sup>

### Changes to Charted Features

Charted rock (chart 16561) at 56° 11' 16.11" N, 158° 22' 59.34" W was not found during this survey. Visual search in clear water near low tide, along with singlebeam search did not reveal rock. However, area was noted as foul with multiple rocks nearby. Recommend removal of rock symbol and addition of foul area. DP form JD223\_AB.<sup>18</sup>

Charted rock (chart 16561) at 56° 08' 26.97" N, 158° 22' 43.25" W was not observed during this survey. However, multiple rocks were nearby and the area was noted as foul. Recommend removal of rock symbol and addition of foul with kelp. DP form JD223\_AA.<sup>19</sup>

Charted rock (chart 16561) at 56° 10' 42.98" N, 158° 22' 43.37" W was not observed during this survey. However, multiple rocks were nearby and the area was noted as foul. Recommend removal of rock symbol and addition of foul. DP form JD223\_08.<sup>20</sup>

Charted islet (chart 16561) at 56° 06' 33.17" N, 158° 24' 34.07" W was found to be a rock (10 ft MLLW). Recommend removal of islet and charting of a rock. DP form JD227\_08.<sup>21</sup>

Charted islet (chart 16561) at 56° 05' 34.89" N, 158° 23' 47.87" W was found to be a rock (6 ft MLLW). Recommend removal of islet and charting of a rock. DP form JD227\_10.<sup>22</sup>



### Tidal Range

JOA established the tidal range for OPR-P182-KR-05 to be 2.351 meters (7.713 feet or 1.286 fathoms). This value was used in determining height above mean high water (MHW).

### Bottom Samples

On August 13, 2005 the R/V Quicksilver was fitted to obtain bottom samples as specified in the Statement of Work. The purpose of this was to characterize the bottom for possible anchorages.

Bottom samples were conducted in areas that appeared suitable for anchorage. Samples were taken with a grab sampler and the position recorded with WinFrog V3.5.0. Sediment retrieved from the sampler was analyzed and categorized as specified in Appendix 2 (Table A-4) of the NOS Hydrographic Surveys Specifications and Deliverables (March, 2003). Positions and descriptions of all samples are found in Appendix G and a graphical plot in Separate 6.<sup>23</sup>

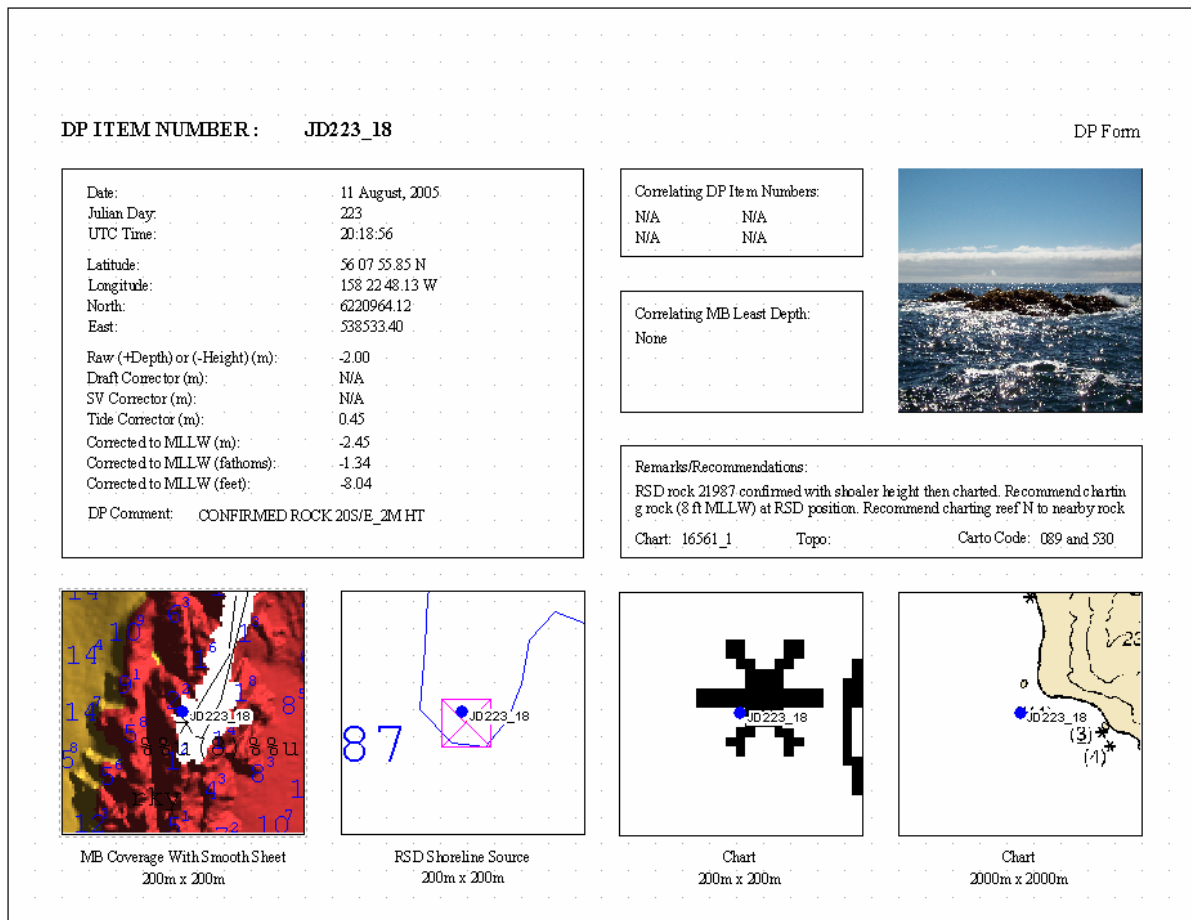
### Aids to Navigation

There were no charted aids to navigation in the survey area. No uncharted aids to navigation were found in the survey area.<sup>24</sup>



Shoreline Correlator Sheet

ArcMap v9.0 with the Shoreline Correlator add-on, written by the Fugro Pelagos Inc. GIS department, aided in the processing of the investigation results. The Correlator utilized the WinFrog Log files to create an individual DP form for all acquired DP's. The Correlator was mapped to the Log, Tide, Photos, NOAA Chart (largest scale available), LIDAR Data, Smooth Sheet Soundings and Multibeam Coverage files to calculate and display the desired information for each DP. Figure 9 shows an example of a DP form produced from the Correlator. The DP forms and the raw field notes can be found in Appendix F.<sup>25</sup>



**Figure 6 DP Correlator Sheet**



**E – Approval Sheet**

**Approval Sheet**

For

**H11460**

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

OPR-P182-KR-05 statement of work and hydrographic manual;  
Fugro Pelagos, Inc. Acquisition Procedures (2005- NOAAAcquisitionProcedures);  
Fugro Pelagos, Inc. Processing Procedures (2005-NOAAProcessingProcedures);  
Technical Report for Tides, Chankliut Island Tide Station Report

The data were reviewed daily during acquisition and processing.

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,

A handwritten signature in dark ink, appearing to read "Dean Moyles", written over a horizontal line.

Dean Moyles, Fugro Pelagos, Inc.  
Lead Hydrographer  
Fugro Pelagos, Inc. Survey Party



## Revisions Compiled During Office Processing and Certification

<sup>1</sup> The month was shown incorrectly as “June” on the smooth sheet. The month was changed by hand in ink to July on the smooth sheet.

<sup>2</sup> Revise sheet limits to the following:

56/11/28N, 158/27/22W
56/04/54N, 158/27/22W
56/04/54N, 158/19/35W
56/11/28N, 158/19/35W

The survey area encompasses Warner Bay and Ross Cove. The revised survey limits listed above delineate the physical layout of the smooth sheet and not the specific limits of hydrography. The evaluator recommends using the survey index (SURDEX) to evaluate hydrographic coverage.

<sup>3</sup> Filed with the project records.

<sup>4</sup> Concur. Survey is adequate to supercede prior surveys and charted miscellaneous source data within the common area.

<sup>5</sup> Strike “North” and insert South.

<sup>6</sup> Strike “West” and insert East.

<sup>7</sup> Concur with the hydrographer’s comments above.

<sup>8</sup> Filed with the project records.

<sup>9</sup> Comparisons with charts 16561 and 16566 (same editions as listed below) were conducted during office processing.

<sup>10</sup> Concur with the hydrographer’s comments above.

<sup>11</sup> Concur.

<sup>12</sup> Concur.

<sup>13</sup> Concur with clarification. Three dangers to navigation were submitted. All three items were listed as soundings. The second item a 6 fm 0 ft sounding (56/07/15.70N, 158/24/15.68W) was adjusted for tides and shown as a 6.4 fm Rk on the smooth sheet. The third item, a 3 fathom 3 ft sounding (56/07/20.57N, 158/24/23.57W) is shown as a 3.6 fm Rk on the smooth sheet. Not all DTON’s may be shown on the Hdrawing due to scale and shoaler soundings in the vicinity.

<sup>14</sup> Concur.

<sup>15</sup> Concur.

<sup>16</sup> Do not concur. There was no LIDAR shoreline available within the common area of this survey.

<sup>17</sup> Concur.

<sup>18</sup> Concur. Chart the area as shown on the Hdrawing.

<sup>19</sup> Concur. Chart the area as shown on the Hdrawing.

<sup>20</sup> Concur. Chart the area as shown on the Hdrawing.

<sup>21</sup> Concur. Chart as shown on the Hdrawing.

<sup>22</sup> Concur. Chart as shown on the Hdrawing.

<sup>23</sup> Filed with the hydrographic records. Bottom characteristics are portrayed on the smooth sheet and compiled to the Hdrawing based on charting specifications. Bottom sample descriptions were not fully shown on the smooth sheet in all cases as described in App. G.

<sup>24</sup> Concur.

<sup>25</sup> Filed with the hydrographic records.



## **Appendix A - Danger to Navigation**

Three dangers to navigation were located during the hydrographic survey of H11460 and were submitted throughout the course of the project.

Hydrographic Survey Registry Number: H11460

Survey Title:           State:                ALASKA  
                          Locality:           Southwestern Alaska Peninsula  
                          Sub-locality:       Warner Bay

Project Number: OPR-P182-KR-05

Survey Dates:     June – August, 2005

Depths are reduced to Mean Lower Low Water using unverified tides.

Positions are based on the NAD83 horizontal datum.

**Charts Affected:**

Chart Number	Scale	Edition	Edition Date as of April 2005
OPR-P182-KR-05			
16006	1:1,534,076	33 <sup>rd</sup>	Dec. 2000
16011	1:1,023,188	36 <sup>th</sup>	Aug. 2004
16013	1:969,761	29 <sup>th</sup>	Nov. 2003
16561	1:80,000	2 <sup>nd</sup>	Mar. 2005
16566	1:77,477	10 <sup>th</sup>	Feb. 1999

**DANGER TO NAVIGATION:**

<u>Feature</u>	<u>Depth (fms ft)</u>	<u>Latitude</u>	<u>Longitude</u>
Shoal area that extends off from the northern coast as you enter Ross cove.			
Sounding	10 fms 2 ft	56-06-59.59N	158-24-04.34W
Sounding	6 fms 0 ft	56-07-15.70N	158-24-15.68W
Sounding	3 fms 3 ft	56-07-20.57N	158-24-23.57W

**COMMENTS:**

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





## **Appendix B - List of Geographic Names**

No new geographic names in the survey were discovered.





## Appendix C – Progress Sheet

**Appendix D - Tides and Water Levels**

Abstract of Times of Hydrography for Smooth Tides

Project Number: OPR-P182-KR-05

Registry Number: H11460

Contractor Name: Fugro Pelagos Inc.

Date: December 15, 2005

Sheet Letter: AF

Inclusive Dates: July 20, 2005 to August 15, 2005

Fieldwork is complete and verified tides were applied for the production of the smooth sheet.

Refer to JOA's final verified tides report for additional information.

**Table 4 - Abstract of Times of Hydrography for R/V Quicksilver**

<b>YEAR</b>	<b>DAY</b>	<b>START TIME (UTC)</b>	<b>END TIME (UTC)</b>	<b>COMMENTS</b>
2005	201	15:57:58	23:49:46	
2005	202	0:16:16	0:45:18	
2005	202	15:50:52	23:51:11	
2005	203	0:27:23	2:17:02	
2005	203	16:21:37	21:38:23	
2005	204	17:54:05	18:48:03	
2005	206	16:00:22	18:52:02	
2005	207	1:15:50	1:27:06	
2005	207	15:42:39	23:57:39	
2005	208	0:11:19	2:12:52	
2005	208	15:38:04	23:41:26	
2005	211	0:22:45	2:34:23	
2005	211	16:36:03	23:49:42	Also worked in Sheet AH
2005	212	0:06:35	1:56:51	Also worked in Sheet AH
2005	212	15:46:33	21:14:56	Also worked in Sheet AJ
2005	222	16:03:06	23:47:43	
2005	223	0:02:16	2:20:55	
2005	223	15:39:34	23:53:48	
2005	224	0:18:01	1:58:49	
2005	227	15:47:44	18:23:23	



## **Appendix E - AWOIS**

No AWOIS items were assigned for H11460.



## Appendix F – DP forms and the raw field notes



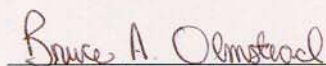
**Appendix G – Grab Sample Positions and Descriptions**

Grab Sample ID	Date	Time	Latitude	Longitude	Northing	Eastng	Approximate Depth (m)	Description
JD223_01_AF	11-Aug-05	16:56:36	N56 09.9233	W158 24.1168	6224648.17	537139.54	22	Gritty Black Sand (S-gty-bk) with Shells (Sh)
JD223_02_AF	11-Aug-05	17:32:45	N56 10.4837	W158 23.5463	6225692.73	537720.85	26	Black Silty Sand (S-Silt-bk) with Shells (Sh)
JD223_03_AF	11-Aug-05	17:56:33	N56 10.9890	W158 23.1568	6226633.68	538115.54	37	Rocky (rky)
JD223_04_AF	11-Aug-05	18:14:48	N56 10.3952	W158 22.7350	6225536.04	538561.86	37	Black Silty Sand (S-Silt-bk) with Shells (Sh)
JD223_05_AF	11-Aug-05	18:26:21	N56 09.5417	W158 22.8142	6223952.10	538494.16	30	Rocky (rky) with Shells (Sh)
JD223_06_AF	11-Aug-05	19:15:16	N56 08.9557	W158 23.0540	6222862.86	538255.60	36	Coral (Co)
JD223_07_AF	11-Aug-05	19:26:10	N56 08.2695	W158 22.9342	6221591.16	538391.07	22	Black Gritty Sand (S-gty-bk) with Shells (Sh)
JD223_08_AF	11-Aug-05	20:28:34	N56 07.7005	W158 22.3425	6220541.23	539013.49	27	Shells (Sh)
JD223_09_AF	11-Aug-05	22:00:27	N56 07.6617	W158 24.2257	6220451.89	537063.16	40	Course Gray Sand (S-gy-br) with Shells (Sh)
JD223_10_AF	11-Aug-05	22:11:17	N56 08.3242	W158 24.2450	6221680.63	537032.52	36	Course Gray Sand (S-gy-crs) with Shells (Sh)
JD223_11_AF	11-Aug-05	22:21:25	N56 08.9698	W158 24.2450	6222878.31	537022.17	38	Course Brown Sand (S-crs-br) with Shells (Sh)
JD223_12_AF	11-Aug-05	22:46:23	N56 07.9067	W158 24.9387	6220900.04	536320.63	37	Shells (Sh)
JD223_13_AF	11-Aug-05	22:56:10	N56 08.2568	W158 26.1093	6221539.48	535102.62	35	Brown Silty Sand (S-Silt-br) with Shells (Sh)
JD223_14_AF	11-Aug-05	23:04:23	N56 08.0303	W158 26.6268	622114.98	534570.01	36	Brown Silty Clay (Cl)
JD227_15_AF	15-Aug-05	17:09:01	N56 07.5972	W158 25.5848	6220320.31	535656.04	14	Black Course Sand (S-crs-bk) with Shells (Sh)
JD227_16_AF	15-Aug-05	18:40:43	N56 06.7240	W158 24.6158	6218709.09	536673.81	29	Black Course Sand (S-crs-bk) with Shells (Sh)
JD227_17_AF	15-Aug-05	18:54:25	N56 05.8070	W158 23.7208	6217016.13	537616.31	27	Gravel (G)

APPROVAL SHEET  
H11460

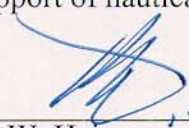
Initial Approvals:

The survey and associated records have been inspected with regard to survey coverage, delineation of the depth curves, development of critical depths, cartographic symbolization, and verification or disproof of charted data. The survey records and digital data comply with NOS requirements except where noted in the Descriptive Report and are adequate to supersede prior surveys and nautical charts in the common area.

  
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Bruce Olmstead  
Cartographic Team  
Pacific Hydrographic Branch

Date: 4/6/2006

I have reviewed the smooth sheet, accompanying data, and reports. This survey and accompanying digital data meet or exceed NOS requirements and standards for products in support of nautical charting except where noted in the Descriptive Report.

  
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Donald W. Haines  
CDR, NOAA  
Chief, Pacific Hydrographic Branch

Date: 7 April 2006



