

H11906

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.* H11906

### LOCALITY

*State* Alaska

*General Locality* Bering Sea

*Sublocality* Bristol Bay

2008

### CHIEF OF PARTY

Commander Douglas Baird, NOAA

### LIBRARY & ARCHIVES

DATE

<p style="text-align: center;">U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION</p> <p style="text-align: center;"><b>HYDROGRAPHIC TITLE SHEET</b></p>	<p>REGISTRY No</p> <p style="text-align: center;"><b>H11906</b></p>
<p><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.</p>	<p>FIELD No: N/A</p>
<p>State <u>Alaska</u></p> <hr/> <p>General Locality <u>Bering Sea</u></p> <hr/> <p>Sub-Locality <u>Bristol Bay</u></p> <hr/> <p>Scale <u>1:500,000</u> Date of Survey <u>8/8/2008 to 8/10/2008</u></p> <p>Instructions dated <u>7/23/2008</u> Project No. <u>M-R908-FA-08</u></p> <p>Vessels <u>Fairweather S220</u></p> <hr/> <p>Chief of party <u>Commander Douglas Baird, NOAA</u></p> <p>Surveyed by <u>Fairweather personnel</u></p> <p>Soundings by <u>Reson 8160, Reson 8111</u></p> <p>SAR by <u>Tyenne Faulkes</u></p> <p>Soundings compiled in _____</p>	
<p><b>REMARKS:</b> <u>All times are UTC. UTM Projection 04</u></p> <hr/> <p><u>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. Page numbering may be interrupted or non sequential.</u></p> <hr/> <p><u>All pertinent records for this survey, including the Descriptive Report, are archived at the National Geophysical Data Center (NGDC) and can be retrieved via <a href="http://www.ngdc.noaa.gov/">http://www.ngdc.noaa.gov/</a>.</u></p>	



**UNITED STATES DEPARTMENT OF COMMERCE**  
**National Oceanic and Atmospheric Administration**  
NATIONAL OCEAN SERVICE  
OFFICE OF COAST SURVEY  
Pacific Hydrographic Branch  
Seattle, Washington 98115-6349

March 7<sup>th</sup>, 2011

MEMORANDUM TO: CDR James M. Crocker  
Chief, Operations Branch

THROUGH: Gary C. Nelson, NOAA *Gary C. Nelson*  
Chief, Pacific Hydrographic Branch  
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email=gary.nelson@noaa.gov, c=US  
Date: 2011.03.21 13:44:25 -0700

FROM: Toshi Wozumi *Toshi Wozumi*  
Acting Hydrographic Team Lead, Pacific Hydrographic Branch  
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I am the author of this  
document  
2011.03.07 16:14:16 -08'00'

SUBJECT: Review of Hydrographic Survey H11906  
M-R908-FA-08  
Bristol Bay Habitat Mapping Project; Bristol Bay, AK

Survey H11906 has been reviewed for completeness of data package submission, survey field procedures, data processing and quality assurance methods, and overall data accuracy and data quality. For the following reasons the survey is not recommended to supersede charted data and should not proceed to HCell compilation.

- There were an insufficient amount of sound velocity casts taken during data acquisition which resulted in sound velocity artifacts that cause the data to be out of specification.
- During office review, differences between charted depths and surveyed depths were deemed negligible and not navigationally significant.
- Single swath of the multibeam is too narrow at chart scale (1:1,023,188) to add any meaningful depths to the chart.



# Descriptive Report to Accompany Hydrographic Survey H11906

Project M-R908-FA-08  
Bristol Bay Habitat Mapping Project  
Bristol Bay, AK  
Scale 1:500,000  
August 2008  
NOAA Ship *Fairweather* (S220)  
Chief of Party: Commander Doug D. Baird

## A. AREA SURVEYED

This survey was completed to acquire benthic habitat mapping data for the Resource Assessment and Conservation Engineering (RACE) Division of the Alaska Fisheries Science Center as part of NOAA's Integrated Ocean and Coastal Mapping (IOCM) initiative. As part of this IOCM initiative, bathymetric data acquired during this survey are also submitted to NOS to update nautical charts within the Eastern Bering Sea and to address the National Survey Backlog. Data are submitted as per Survey Project Instructions M-R908-FA-08 dated July 23, 2008 and all other applicable direction<sup>1</sup>, with the exception of deviations noted in this report.

Trackline coverage was obtained in the survey area using both a Reson 8111 and Reson 8160 sonar system hull-mounted on NOAA Ship *Fairweather*.

Data acquisition was conducted from August 8 through August 10 2008 (DN 221 through DN 223). Survey statistics were calculated for this survey (see *Table 1*).

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<sup>1</sup> NOS Hydrographic Surveys Specifications and Deliverables (April 2008), OCS Field Procedures Manual for Hydrographic Surveying (May 2008), and all Hydrographic Surveys Technical Directives issued through October 2008.

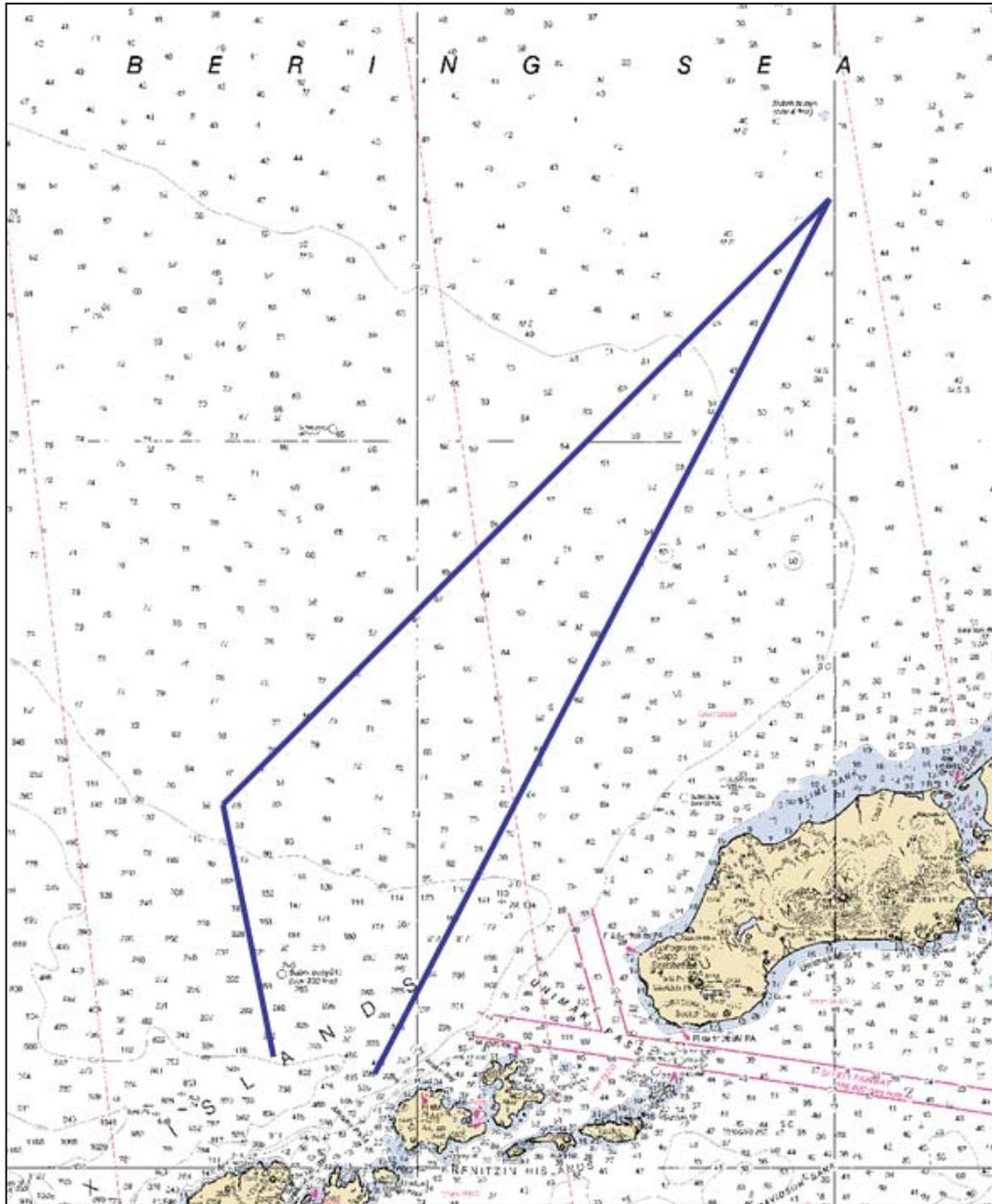


Figure 1: H11609 Survey coverage on chart 16011.

Data Acquisition Type	S220
MBES 8160 (lnm)	363.71
MBES 8111 (lnm)	348.16
Sq. Nautical Miles	114.97

Table 1: Vessel survey statistics for H11906. The 8111 and 8160 collected data simultaneously except for two deep areas near Dutch Harbor where the 8111 did not acquire data.

## B. DATA ACQUISITION AND PROCESSING

A complete description of data acquisition and processing systems, survey vessel, quality control procedures and data processing methods can be found in the *Data Acquisition and Processing Report* (DAPR), submitted under separate cover. Items specific to this survey and any deviations from the DAPR are discussed in the following sections.

**Final approved water levels** have been applied to this survey. See Section C for additional information.

### B1. Equipment and Vessels

Data for this survey were acquired by NOAA Ship *Fairweather*.

Sound speed profiles were measured with SEACAT SBE 19+ profilers and the Brooke-Ocean Freefall Cone Penetrometer (FFCPT) fitted with an Applied Microsystems (AML) Sound Velocity and Pressure (SVP) Smart Sensor.

Bottom samples were acquired using the SEABOSS sampling system.

Data were also acquired using a Klein 5410, Klein 7180, Towed Auto-Compensating Optical System (TACOS), and Seabed Observation and Sampling System (SEABOSS). These scientific data are archived at the Alaska Fisheries RACE Division but are not submitted with this survey due to the large volume of data they contain and the limited benefit they would offer for charting purposes.

#### Unusual Vessel Configurations

##### *Sonar Operation:*

Due to the habitat research aspect of this project, both Resons (8160 and 8111) were almost always operating and recording simultaneously. The acquisition set-up on *Fairweather* does not allow for simultaneous monitoring of both systems via the Reson controller. However, both systems could be monitored and controlled through Isis and the Seabat controller. Data quality factors were observed and noted below (see B2), but it is unclear if simultaneous operation played a role.

##### *Ultra-Short Baseline (USBL) pole-mounted transceiver:*

A Sonardyne USBL transceiver was pole-mounted to the portside hull of the *Fairweather* just aft of the Bridge. This transceiver is used to track and acoustically position towed equipment used for the fish habitat research project. While not utilized in any way for the hydrographic survey, this equipment operates along with its associated transponder beacons (which are attached to the towed equipment) at frequencies between 19 and 32 kHz. Although there are

data quality factors observed, they do not appear to be caused by this system since the pole and transceiver were removed mid-project and no change in the quality of soundings is apparent. There was, however, noise apparent in the backscatter caused by the transceiver. This effect was evidenced by changes in noise in the backscatter when the transceiver settings were changed.

## B2. Quality Control

### Crosslines

Crosslines were not acquired for H11906.

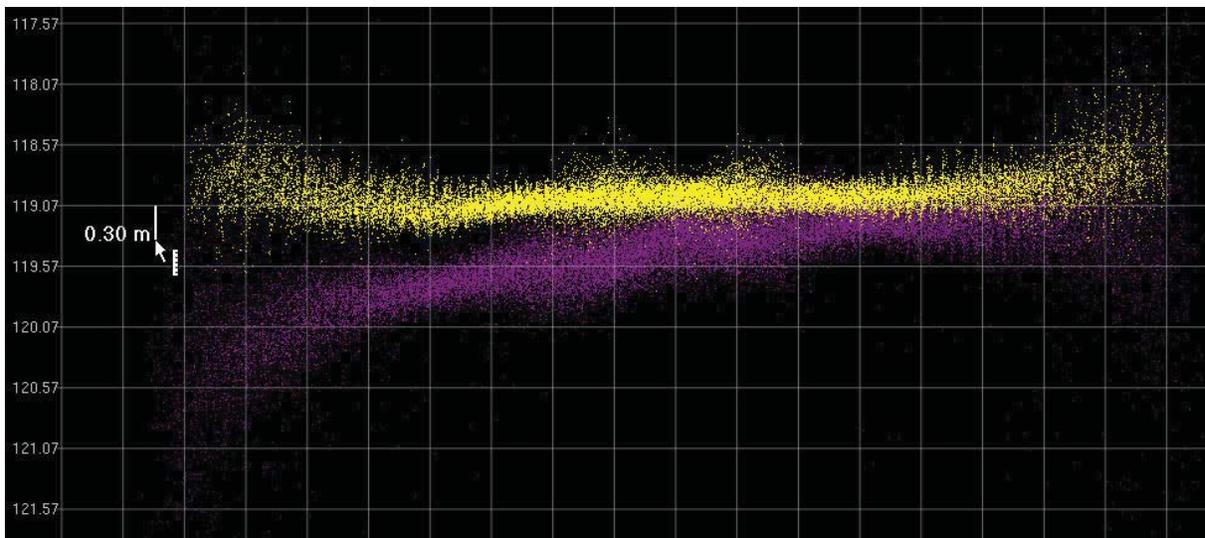
### Junctions

There were no contemporary survey junctions with H11906.

### Data Quality Factors

#### Sonar System Offset & Data Delivery

During post-processing of the data, an offset was noticed between the Reson 8111 and Reson 8160 data (See *Figure 3*). Most of the data submitted shows a 0.2-0.6 meter offset (with the 8111 consistently shoaler) and an exaggerated offset on the portside.



*Figure 3 shows 0.2-2.0 meter offset between 8111 (yellow) and 8160 (purple) systems.*

The offset is apparent in the majority of the survey area, which has a soft bottom type of mud and sand. The offset dissipates in the deeper, rockier area nearer to the shore at the southwest portion of the survey area. It is not clear whether this bottom type variability accounts for the entire offset, if there is a remaining problem with the 8160, or if it is a problem with *Fairweather's* thermosalinograph, which is needed to correctly beamsteer the 8160 during acquisition.

Since the majority of the survey area presents depths ideal for the 8111 system, this system alone was used for BASE surfaces containing the vast majority of the survey. A small, deeper area at the southwest corner of the survey nearest to Dutch Harbor was too deep for the 8111 system and therefore only the 8160 system was used to make a BASE surface. Data representation is more thoroughly addressed below in Section B4.

### Sound Velocity

Sound speed profiles for Line 5 (see *Figures 1* and *8* for trackline) were acquired in accordance with Specifications and Deliverables. Casts were initially taken at approximately two-hour intervals using the FFCPT alone or the FFCPT simultaneously with a CTD for comparison. After a failure of the MVP winch cable (after 15:24 on DN 221), casting occurred at four hour intervals using only the CTD. Sound velocity errors were seen in the data for Line 5. These errors were less than a meter in less than 100 meters of water and less than 2 meters in over 100 meters of water.

Sound speed profiles for Transit 1 (See *Figures 4* and *8* for trackline), transiting to the survey line, were only acquired at the beginning and end of the line due to a very limited survey schedule. These casts were more than four hours apart and did not meet guidelines in Specifications and Deliverables for cast timing or necessity.

A sound speed profile for Transit 2 (See *Figures 4* and *8* for trackline), transiting from the survey line to Dutch Harbor, was only acquired at the beginning of the line due to a very limited survey schedule. This casts was more than four hours from the end of the line and did not meet guidelines in Specifications and Deliverables for cast timing or necessity.

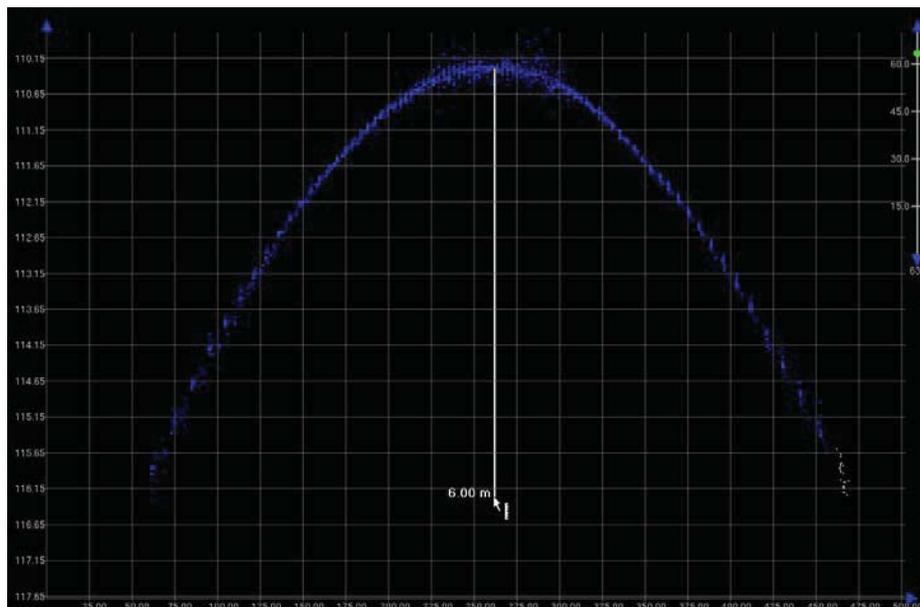


Figure 4 shows data set in 110 meters of water with 6.0 meter sound velocity error.

Consequently, lines for Transits 1 and 2 were filtered to limit the error seen in the surface, and to only allow sound velocity errors that were within the IHO limit for depth. Based on observation of the data throughout the wide depth range of the survey, filtering was completed as follows for Transits 1 and 2 only:

Water Depth (m)	Filtered Distance from Nadir (m)
70-101	60
101-215	100
215-300	150
300-2000+	250

Table 2 showing Nadir distance filtering for water depth values.

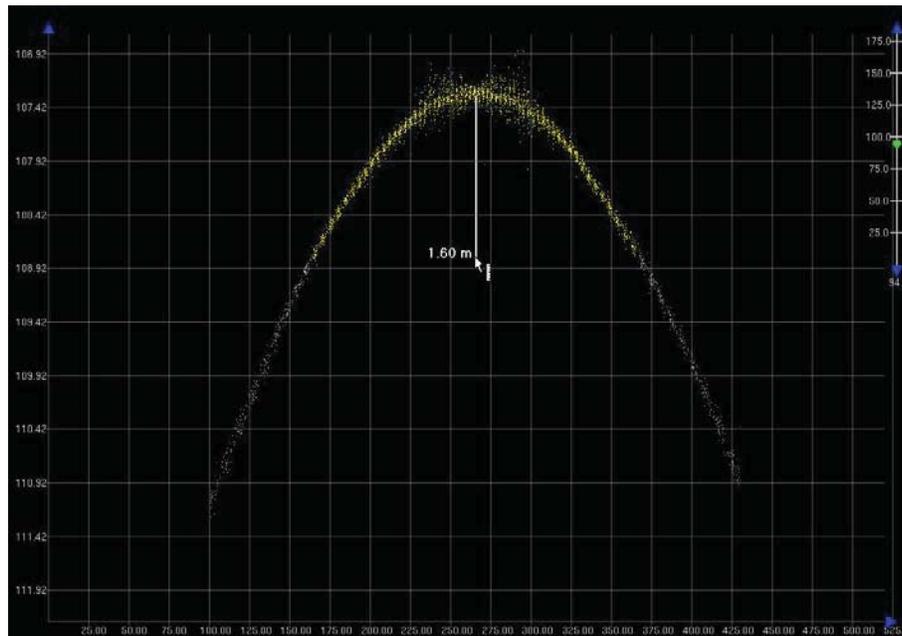


Figure 5 shows filtered data set in 107 meters of water with acceptable 1.6m error.

Coverage Gaps

There are several small coverage gaps apparent in the data for Transits 1 and 2 where the recording of lines was stopped and then started. (See Figure 6) These tend to be in areas where the vessel was traveling 8-12kts. Operator delay and software delay may contribute to this gap. These gaps are generally less than 50-meter wedges and do not significantly detract from the overall quality of the data due to the deep and featureless characteristic of the survey area. These gaps are not apparent in Line 5, where survey speeds were a slower 6-7kts.

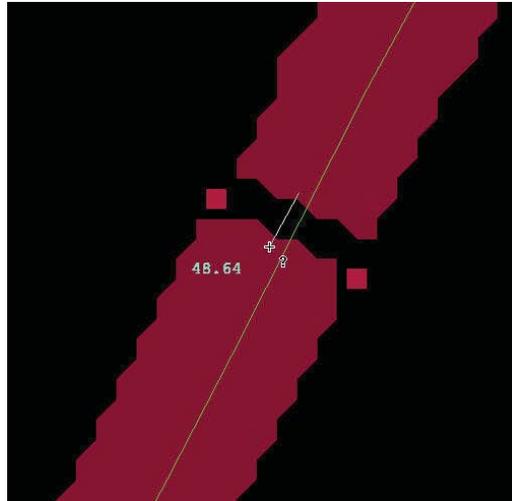


Figure 6 shows <50m holidays at line “stop/start”

**B3. Data Reduction**

Data reduction procedures for survey H11906 conform to those detailed in the *DAPR*.

**B4. Data Representation**

Several BASE surfaces were used in processing H11906. Final CUBE surface resolutions and depth ranges were set in accordance with the Field Procedures Manual and are listed below in Table 3.

Depth (m)	Finalized Resolution (m)
46-115	4
103-450	8
410+	16

Table 3: Finalized CUBE resolutions

As mentioned in Section B2, not all data submitted were used in the making of the finalized or combined surfaces. Since the 8111 system is the ideal system given the survey depths and since the 8160 offset is still apparent in the majority of the data (See *Figure 3*), only the 8111 system was used to make a final combined surface in the majority of the survey area.

However, in the deeper area at the southwest region of the survey (See *Figure 8*), the depths were too great to effectively use the 8111 system. In this area, the 8160 was used as the primary system. This combination of 8111 and 8160 data was used for the final combined surface.

The survey area was fully encompassed in fieldsheet “H11906\_8111” containing a 4m, 8m, and 16m surface using only 8111 data, and contains a smaller fieldsheet “H11906\_8160” with

8160 data at 16m resolution. The combined surface “H11906\_8111\_partial8160\_Combined” contains the finalized data in both fieldsheets (8111 and 8160) at proper resolutions. See *Figures 7-9* below.

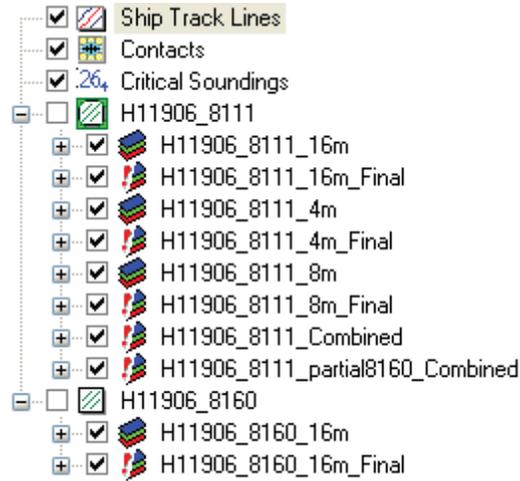


Figure 7: Field sheets and surfaces submitted for H11906.

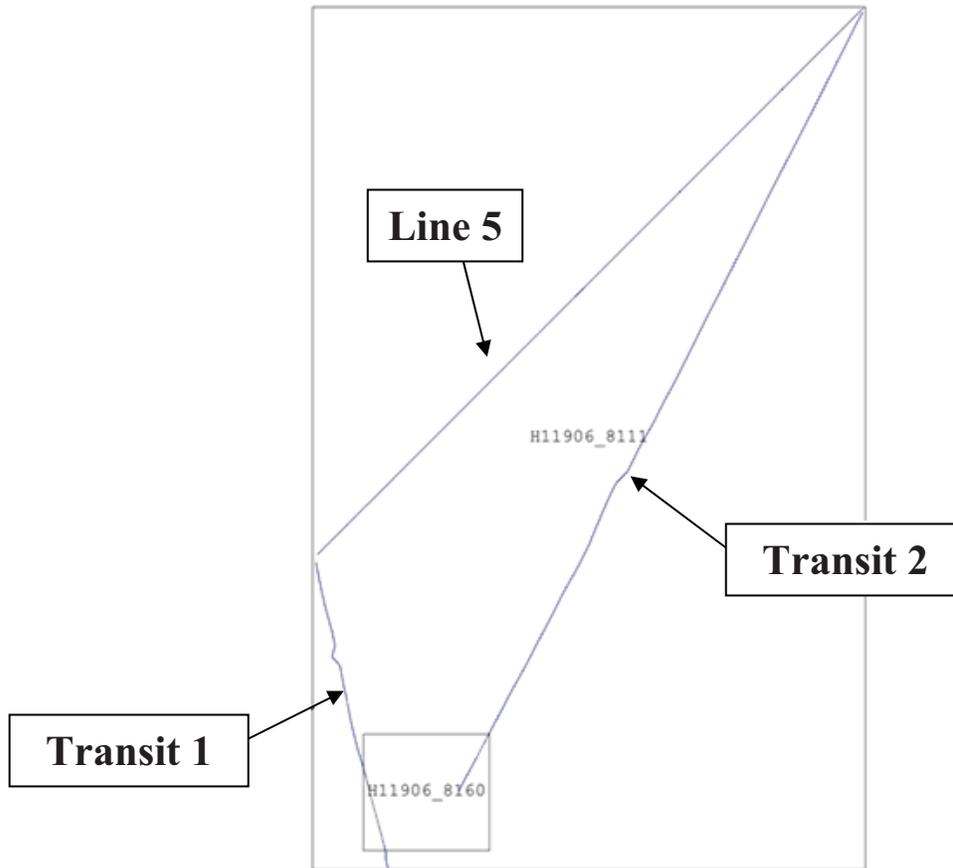


Figure 8: Field sheet layout for H11906 with trackline labels.

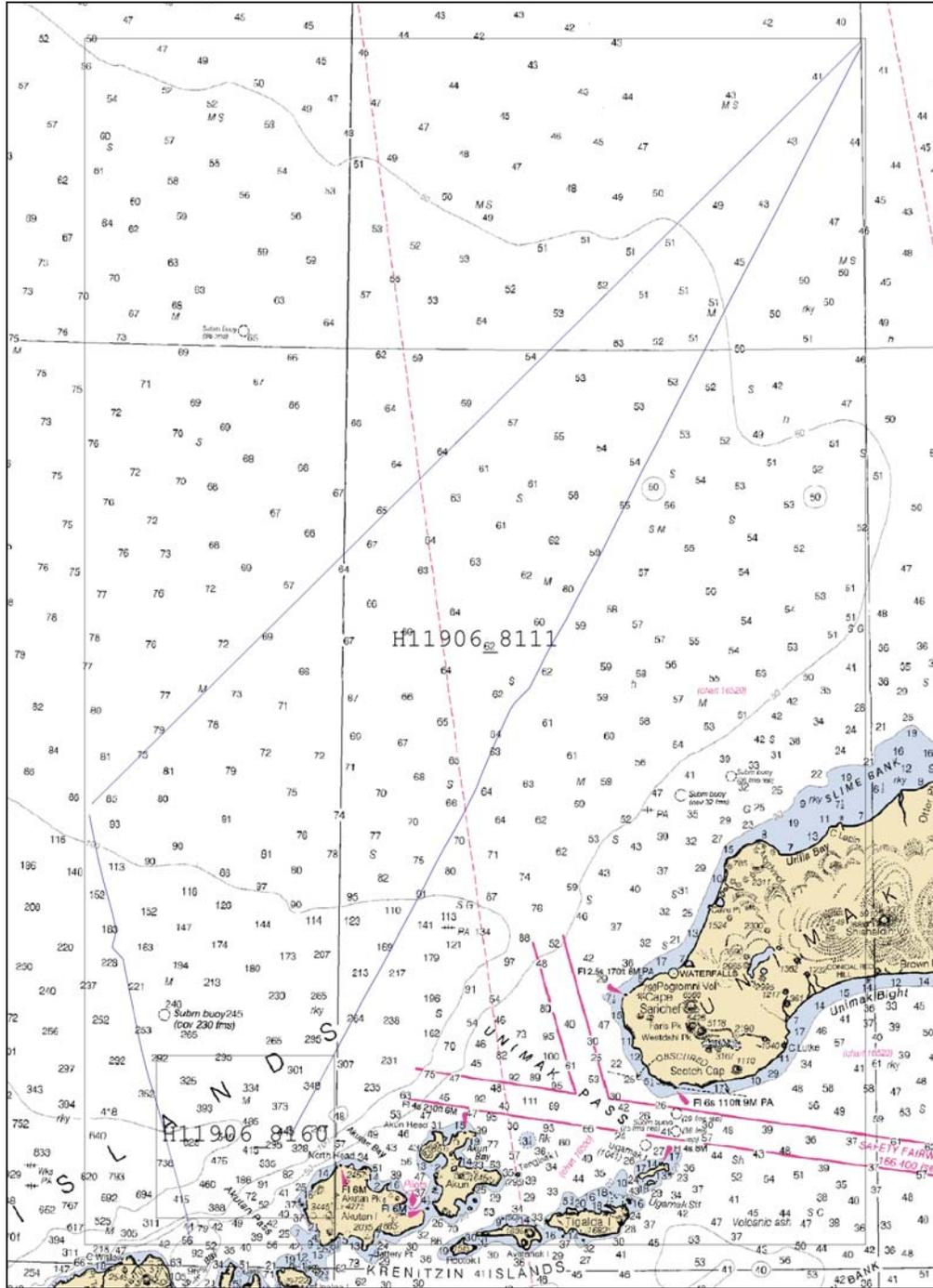


Figure 9 shows field sheet layout for H11906 overlaid on Chart 16011.

**C. VERTICAL AND HORIZONTAL CONTROL**

Project M-R908-FA-08 did not require static GPS observations or other horizontal control work, and all tide corrections were generated from a CO-OPS maintained tide station. Thus, no Horizontal and Vertical Control Report will be submitted. Refer to Section D2.h for recommendations on future vertical and horizontal control for this region.

**Horizontal Control**

The horizontal datum for this project is the North American Datum of 1983 (NAD83). Differential GPS (DGPS) was used for positioning when it was in range. There is a lack of DGPS stations in the Bristol Bay region and therefore much of the data were collected while out of range of DGPS. However, there are no apparent positional shifts between data collected with DGPS correctors and data collected without. Given the deep, flat, and featureless nature of the majority of this survey, the scale, and the absence of positional shifts, the hydrographer recommends that data without DGPS correctors be accepted along with the DGPS-corrected data. The differential corrector beacon utilized for this survey is shown in Table 3.

Location	Frequency	Operator	Distance	Priority
Cold Bay	289 kHz	USCG	80-150nm	Primary

*Table 3: Differential Corrector Source for H11906.*

**Vertical Control**

The vertical datum for this project is Mean Lower-Low Water (MLLW). The operating National Water Level Observation Network (NWLON) primary tide station at Unalaska, AK (946-2620) served as control for datum determination and as the primary source for water level reducers for survey H11906.

No other gauges were required.

All data were reduced to MLLW using **final approved water levels** from station Unalaska, AK (946-2620) using the tide file 9462620.tid. Final time and height correctors were applied to most of the data using the zone corrector file H11906CORF.zdf, however, several lines remained outside of the zone file and only applied the tide file, leaving a vertical shift in the data across this threshold (See *Figure 10*). Effected lines outside of the initial zoning are as follows:

<b>Reson 8160:</b>	<b>Reson 8111:</b>
222-0706	222-0813
222-0759	222-0847
222-0850	222-0705
222-0742	222-0739
222-0724	222-1102
222-0816	222-1136
222-0833	222-1027
222-1045	
222-1119	
222-1102	
222-1137	
222-1028	

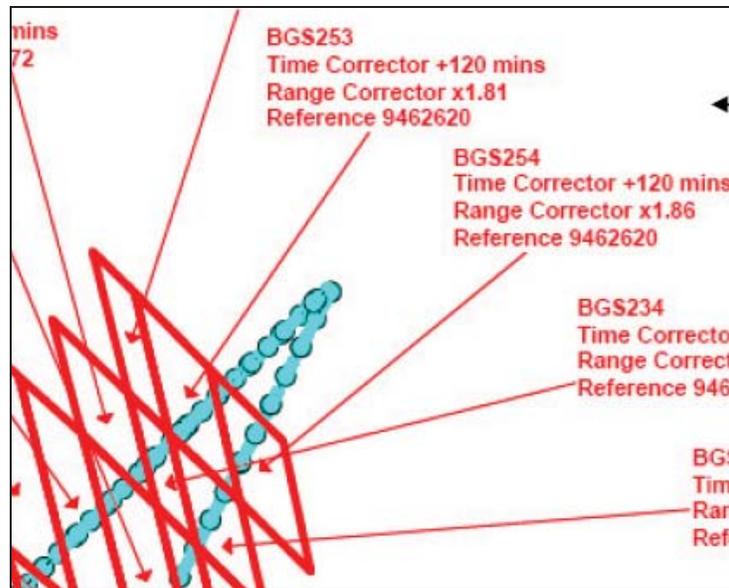


Figure 10 shows data outside approved zoning.

To address this, the hydrographer modified zone BGS254 to encompass the northeast corner of the trackline that was left out of the initial zoning (See *Figure 11*). This was done to avoid using a zero time offset from tide station Unalaska and to eliminate the apparently artificial ~2.0 meter vertical downward shift (in 80 meters of water) across the threshold. This new zone file was named H11906CORF\_new.zdf and was applied *only* to the lines listed above.

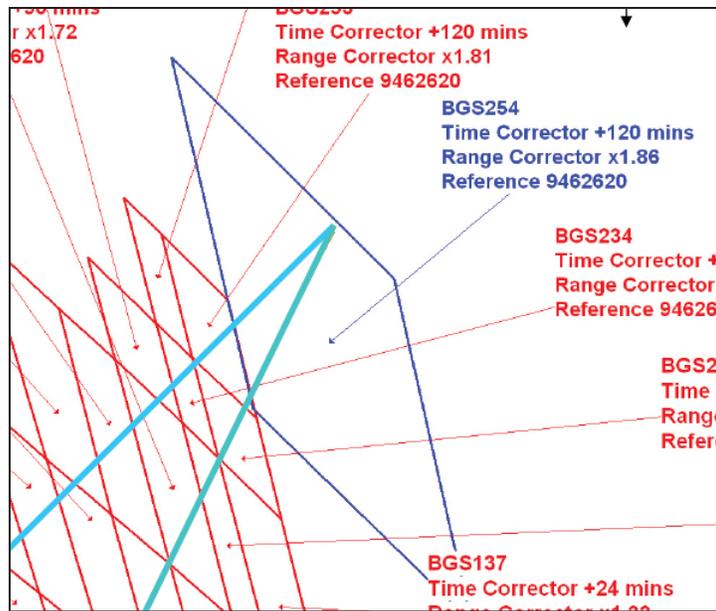


Figure 11 shows data within modified zone BGS254 with 120-minute corrector

This modification eliminated the vertical shift (See Figure 12) and the hydrographer recommends this modification be used and applied to the chart alongside the rest of the data.

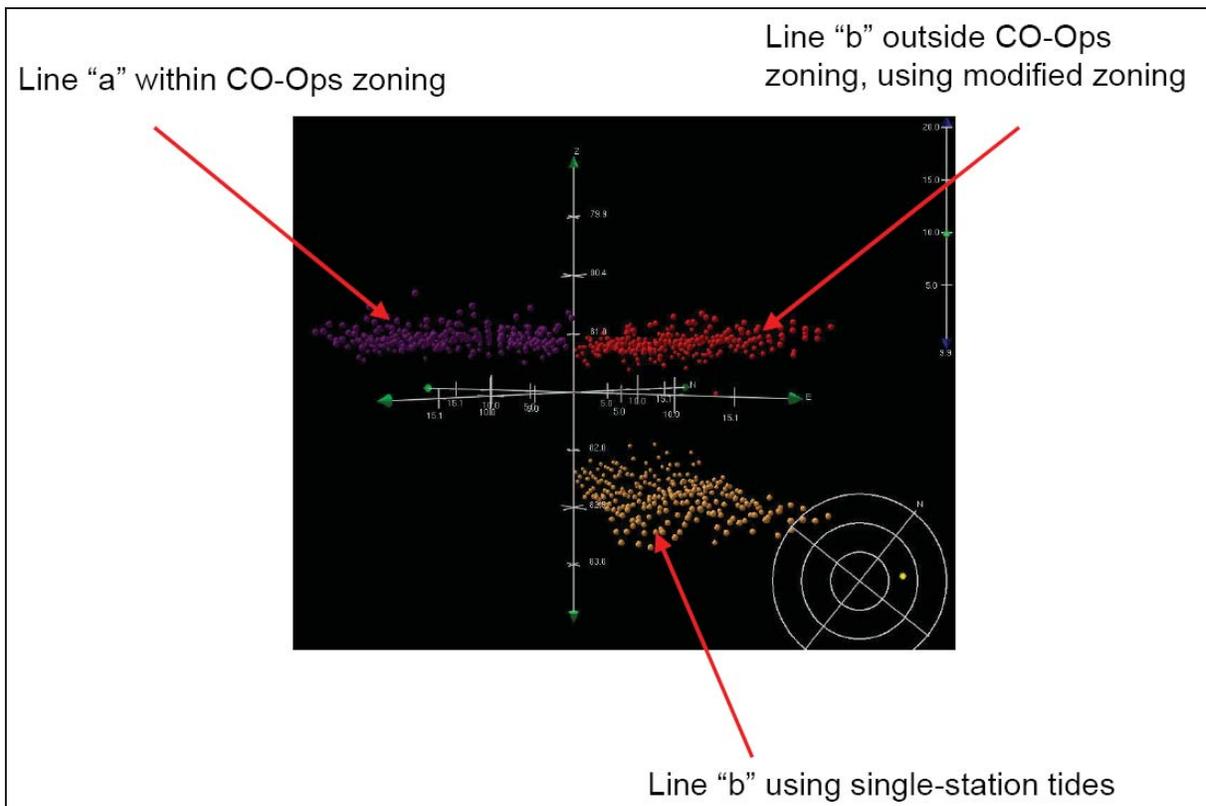


Figure 12 shows results of modified zoning (red) above original zoning (peach) at threshold with CO-Ops zoned data (purple). Offset is approximately 2.0 meters.

## D. RESULTS AND RECOMMENDATIONS

### D.1. Chart Comparison

#### D.1.a. Survey Agreement with Chart

Survey data from H11906 were compared with the most recent editions of the raster nautical charts with coverage of the survey area during data acquisition and processing. The results of these comparisons are described below, as well as in Sections D.2.b. through D.2.f.

H11906 survey soundings were formally compared with depths on the following charts:

Chart	Scale	Edition and Date	Latest Notice to Mariners Applied
16011	1:1,023,188	37 <sup>th</sup> Ed, Nov 2007	11/15/2008
16006	1:1,534,076	35 <sup>th</sup> Ed, Apr 2008	11/15/2008
500	1:2,152,520	8 <sup>th</sup> Ed, Jun 2003	11/15/2008
513	1:3,500,000	7 <sup>th</sup> Ed, Jun 2004	11/15/2008
530	1:4,860,700	32 <sup>nd</sup> Ed, Jun 2007	11/15/2008

*Table 5: Charts compared with H11906*

The seafloor within the limits of this survey is generally featureless with depths from 70 to 2000 meters. Since the data acquired form a narrow trackline, there are only several occasions where data overlap a charted sounding.

In all but one case (see *Figure 13*), data shoaler than 200 meters matched charted soundings to within 5 meters. The majority of data shoaler than 200 meters matched to within 0.1 meters. Data deeper than 200 meters varied inconsistently between zero and 56 meters from charted soundings. In *Figure 13*, a charted (16011) sounding of 75 fathoms was surveyed as 79 fathoms. This sounding is the first sounding overlapped by survey data near the beginning of Line 5 in position 55-05-16.17N 166-59-03.13W. The hydrographer recommends that the shoaler charted (16011) sounding be retained.

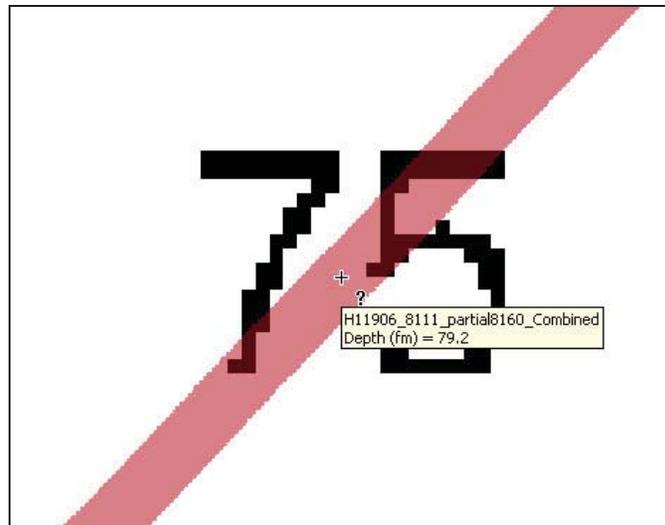


Figure 13 shows the one sounding shoaler than 200 meters that has a difference of more than 5 meters. Overlaid on Chart 16011 with soundings in fathoms.

#### Recommendations:

The hydrographer recommends that survey data and soundings be charted where there is an absence of historical data or where modern data is shoaler, but that the data quality of the survey as a whole is insufficient to disprove any charted shoaler soundings.

#### **D.1.b. Dangers to Navigation**

No dangers to navigation (DTONs) were found in survey H11906.

#### **D.1.c. Other Features**

##### Automated Wreck and Obstruction Information System (AWOIS) Investigations

Two (2) AWOIS items were assigned for full investigation but were not investigated due to time constraint.

##### Additional Items

No additional charted items were investigated in H11906.

#### **D.2. Additional Results**

##### **D.2.a. Prior Survey Comparison**

Prior survey comparison was not performed for H11906.

##### **D.2.b. Shoreline Verification**

No shoreline verification was performed for H11906.

#### **D.2.c. Aids to Navigation**

No Aids to Navigation were within the limits of H11906.

#### **D.2.d. Overhead features**

There were no overhead features in survey H11906.

#### **D.2.e. Submarine Cables and Pipelines**

There were no submarine cables or pipelines charted within the limits of H11906, and none were detected by the survey.

#### **D.2.f. Ferry Routes**

There were no ferry routes charted within the limits of survey H11906, and none were observed to be operating in the area.

#### **D.2.g. Bottom Samples**

Three (3) bottom samples were collected during survey H11906. The areas selected for bottom sampling were driven solely by FISHPAC project operations and thus do not meet the criteria given in the FPM May 2008 edition. Positions and characteristics for these samples were then manually entered into Notebook (H11906\_BS.hob). None of the samples taken were at the position of currently charted bottom characteristics, and varied slightly from characteristics in the same region.

#### **D.2.h Miscellaneous**

##### POSMV

POSPac data was recorded for the duration of this survey and is submitted for review, archiving, and possible future use.

##### Additional Recommendations:

Due to the limited modern tidal information in the region of Bristol Bay, the hydrographer recommends that tide stations be installed in the area of Bristol Bay for future survey work.

<u>Title</u>	<u>Date Sent</u>	<u>Office</u>
Data Acquisition and Processing Report for M-R908-FA-08	14 Nov 2008	N/CS34
Coast Pilot Report for M-R908-FA-08	18 Sep 2008	N/CS26

Survey Sheet Manager:



Digitally signed by Meghan McGovern  
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gov, c=US  
Date: 2009.02.17 10:37:30 -08'00'

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Meghan McGovern  
Lieutenant (junior grade), NOAA