

D00169

U.S. Department of Commerce
National Oceanic and Atmospheric Administration
National Ocean Survey

DESCRIPTIVE REPORT

Type of Survey: Navigable AreaHabitat Mapping

Registry Number: D00169

LOCALITY

State(s): Alaska

General Locality: Bristol Bay, Alaska

Sub-locality: Unimak Island

2012

CHIEF OF PARTY
CDR James M. Crocker, NOAA

LIBRARY & ARCHIVES

Date:

HYDROGRAPHIC TITLE SHEET

D00169

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

State(s): **Alaska**

General Locality: **Bristol Bay, Alaska**

Sub-Locality: **Unimak Island**

Scale: **40000**

Dates of Survey: **07/13/2012 to 07/28/2012**

Instructions Dated: **05/14/2012**

Project Number: **M-R908-FA-12**

Field Unit: **NOAA Ship *Fairweather***

Chief of Party: **CDR James M. Crocker, NOAA**

Soundings by: **Multibeam Echo Sounder**

Imagery by: **Multibeam Echo Sounder Backscatter**

Verification by: **Pacific Hydrographic Branch**

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

Remarks:

Horizontal Coordinate System: 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/>.

Table of Contents

A. Area Surveyed	1
A.1 Survey Limits	1
A.2 Survey Purpose	1
A.3 Survey Quality	2
A.4 Survey Coverage	2
A.5 Survey Statistics	3
B. Data Acquisition and Processing	4
B.1 Equipment and Vessels	4
B.1.1 Vessels	4
B.1.2 Equipment	5
B.2 Quality Control	5
B.2.1 Crosslines	5
B.2.2 Uncertainty	5
B.2.3 Junctions	6
B.2.4 Sonar QC Checks	6
B.2.5 Equipment Effectiveness	6
B.2.6 Factors Affecting Soundings	6
B.2.7 Sound Speed Methods	8
B.2.8 Coverage Equipment and Methods	8
B.2.9 IHO Uncertainty	8
B.2.10 Density	9
B.3 Echo Sounding Corrections	9
B.3.1 Corrections to Echo Soundings	9
B.3.2 Calibrations	9
B.4 Backscatter	9
B.5 Data Processing	9
B.5.1 Software Updates	9
B.5.2 Surfaces	10
B.5.3 Data Logs	11
B.5.4 Critical Soundings	11
B.5.5 Data Processing Deviations	11
C. Vertical and Horizontal Control	11
C.1 Vertical Control	11
C.2 Horizontal Control	12
C.3 Additional Horizontal or Vertical Control Issues	12
3.3.1 WAAS Correctors	12
D. Results and Recommendations	13
D.1 Chart Comparison	13
D.1.1 Raster Charts	13
D.1.2 Electronic Navigational Charts	14
D.1.3 AWOIS Items	14
D.1.4 Maritime Boundary Points	14
D.1.5 Charted Features	14

D.1.6 Uncharted Features.....	14
D.1.7 Dangers to Navigation.....	14
D.1.8 Shoal and Hazardous Features.....	14
D.1.9 Channels.....	15
D.1.10 Bottom Samples	15
D.2 Additional Results.....	15
D.2.1 Shoreline.....	15
D.2.2 Prior Surveys.....	15
D.2.3 Aids to Navigation.....	15
D.2.4 Overhead Features.....	15
D.2.5 Submarine Features.....	15
D.2.6 Ferry Routes and Terminals.....	15
D.2.7 Platforms.....	15
D.2.8 Significant Features.....	16
D.2.9 Construction and Dredging.....	16
E. Approval Sheet.....	17
F. Table of Acronyms.....	18

List of Tables

Table 1: Survey Limits.....	1
Table 2: Hydrographic Survey Statistics.....	3
Table 3: Dates of Hydrography.....	4
Table 4: Vessels Used.....	4
Table 5: Major Systems Used.....	5
Table 6: Survey Specific Tide TPU Values.....	5
Table 7: Survey Specific Sound Speed TPU Values.....	5
Table 8: Submitted Surfaces.....	10
Table 9: NWLON Tide Stations.....	11
Table 10: Water Level Files (.tid).....	12
Table 11: Tide Correctors (.zdf or .tc).....	12
Table 12: Largest Scale Raster Charts.....	13
Table 13: Largest Scale ENCs.....	14

List of Figures

Figure 1: M-R908-FA-12-D00169 Survey Outline.....	2
Figure 2: M-R908-FA-12 D00169 7111 Tide Offsets.....	7
Figure 3: M-R908-FA-12 D00169 Data Outside Tide Zoning.....	7
Figure 4: M-R908-FA-12 D00169 Data Outside Tide Zoning.....	8

Descriptive Report to Accompany Survey D00169

Project: M-R908-FA-12

Locality: Bristol Bay, Alaska

Sublocality: Unimak Island

Scale: 1:40000

July 2012 - July 2012

NOAA Ship *Fairweather*

Chief of Party: CDR James M. Crocker, NOAA

A. Area Surveyed

The survey area is located in Bristol Bay, AK, within the sublocality of Unimak Island.

A.1 Survey Limits

Data were acquired within the following survey limits:

Northwest Limit	Southeast Limit
58° 10" 9.3' N 157° 57" 7.29' W	54° 27" 43.9' N 166° 19" 36.4' W

Table 1: Survey Limits

Survey Limits were acquired in accordance with the requirements in the Project Instructions and the HSSD.

A.2 Survey Purpose

This project is a continuation of support of 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. RACE conducts fishery surveys to measure the distribution and abundance of commercially important fish and crab stocks in the eastern Bering Sea. Sonar data, video, and bottom samples will be combined with prior trawl surveys in an attempt to correlate habitat with fish stocks and to develop operational guidelines for fish habitat mapping. Multibeam data will be acquired primarily during transits using a Reson 7111 and Reson 8160 sonar systems for evaluation and comparison, which will also be submitted for charting purposes. Bathymetric data acquired during this project will be used to update nautical charts

within the Eastern Bering Sea and to address the National Survey Backlog.

A.3 Survey Quality

The entire survey is adequate to supersede previous data.

A.4 Survey Coverage

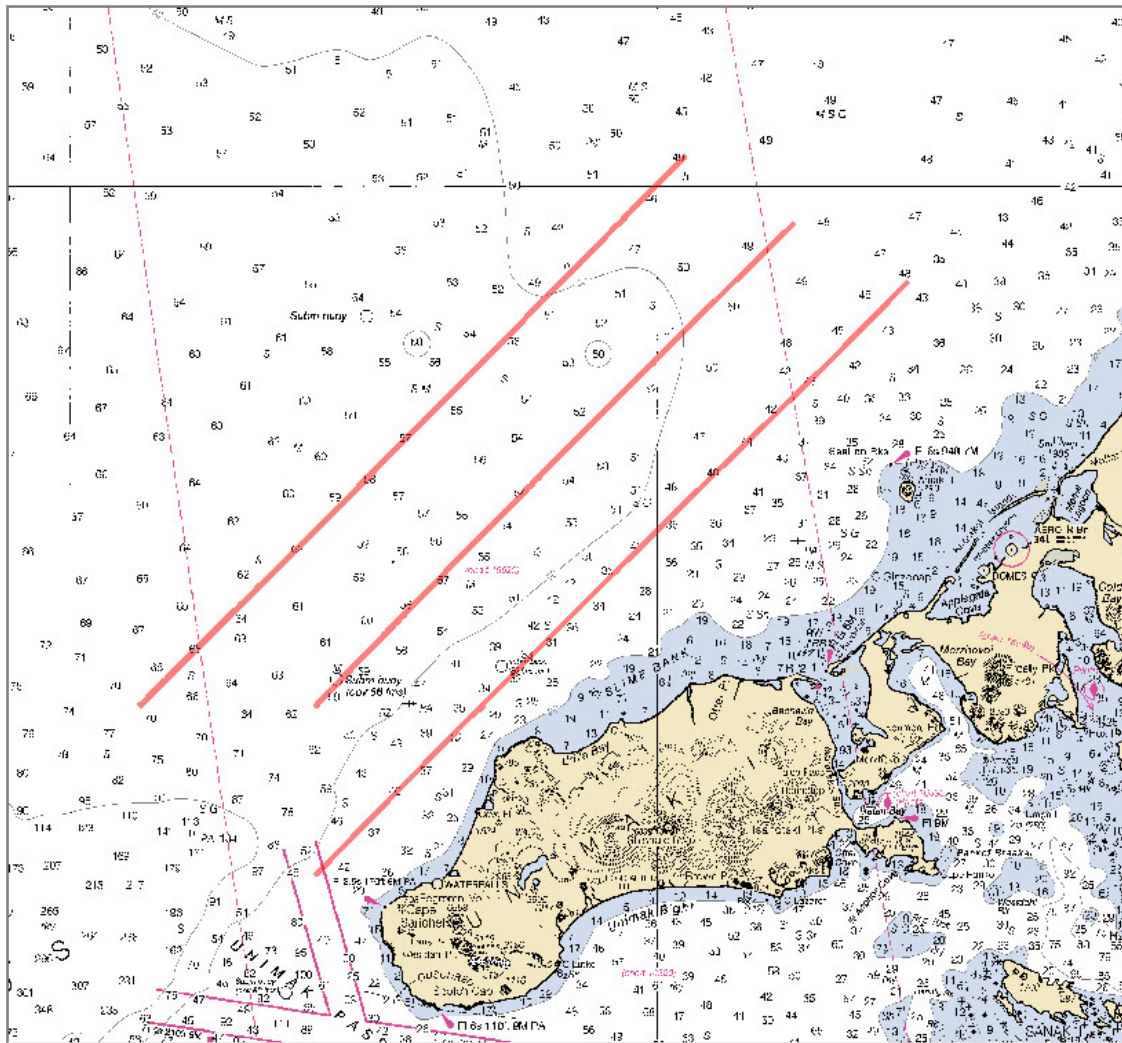


Figure 1: M-R908-FA-12-D00169 Survey Outline

Survey Coverage was in accordance with the requirements in the Project Instructions and the HSSD.

A.5 Survey Statistics

The following table lists the mainscheme and crossline acquisition mileage for this survey:

	HULL ID	S220	Total
LNM	SBES Mainscheme	0	0
	MBES Mainscheme	661.11	661.11
	Lidar Mainscheme	0	0
	SSS Mainscheme	0	0
	SBES/MBES Combo Mainscheme	0	0
	SBES/SSS Combo Mainscheme	0	0
	MBES/SSS Combo Mainscheme	0	0
	SBES/MBES Combo Crosslines	0	0
	Lidar Crosslines	0	0
	Number of Bottom Samples		0
Number AWOIS Items Investigated		0	
Number Maritime Boundary Points Investigated		0	
Number of DPs		0	
Number of Items Items Investigated by Dive Ops		0	
Total Number of SNM		56.27	

Table 2: Hydrographic Survey Statistics

The following table lists the specific dates of data acquisition for this survey:

Survey Dates	Julian Day Number
07/13/2012	195
07/14/2012	196
07/15/2012	197
07/16/2012	198
07/17/2012	199
07/18/2012	200
07/19/2012	201
07/20/2012	202
07/21/2012	203
07/22/2012	204

Table 3: Dates of Hydrography

B. Data Acquisition and Processing

B.1 Equipment and Vessels

Refer to the Data Acquisition and Processing Report (DAPR) for a complete description of data acquisition and processing systems, survey vessels, quality control procedures and data processing methods. Additional information to supplement sounding and survey data, and any deviations from the DAPR are discussed in the following sections.

B.1.1 Vessels

The following vessels were used for data acquisition during this survey:

Hull ID	<i>S220</i>
LOA	70.4 meters
Draft	4.7 meters

Table 4: Vessels Used

B.1.2 Equipment

The following major systems were used for data acquisition during this survey:

Manufacturer	Model	Type
RESON	7111	MBES
RESON	8160	MBES
Applanix	POS/MV V4	Positioning System
Applanix	POS/MV V4	Vessel Attitude System
Brooke Ocean	MVP200	Sound Speed System
RESON	SV70	Sound Speed System
SeaBird	19+	Sound Speed System

Table 5: Major Systems Used

B.2 Quality Control

B.2.1 Crosslines

Crosslines, acquired for this survey, totalled 0% of mainscheme acquisition.

Crosslines were not collected per the HSSD, as this was a track line survey.

B.2.2 Uncertainty

The following survey specific parameters were used for this survey:

Measured	Zoning
0.01 meters	0.10 meters

Table 6: Survey Specific Tide TPU Values

Hull ID	Measured - CTD	Measured - MVP	Surface
S220	4 meters/second	1 meters/second	0.5 meters/second

Table 7: Survey Specific Sound Speed TPU Values

A measured uncertainty of 4m/s was applied while using the Free Fall Cone Penetrometer. An uncertainty of 1m/s was used for data collected when the Moving Vessel Profiler was being towed.

B.2.3 Junctions

There are no contemporary surveys that junction with this survey.

D00169 junctions with survey D00170. Depths disagree between -5.0 and +5.0 meters. The reviewer cannot adequately explain these discrepancies. Possibly a result of D00169 having zoned tidal correctors, where D00170 used a zero tide file.

B.2.4 Sonar QC Checks

Sonar system quality control checks were conducted as detailed in the quality control section of the DAPR.

B.2.5 Equipment Effectiveness

There were no conditions or deficiencies that affected equipment operational effectiveness.

B.2.6 Factors Affecting Soundings

Tides (vertical offsets)

There were vertical offsets in the data observed when comparing three separated survey line data acquired over the same location when the final tide zone correctors were applied to the data. Offsets up to 1 meter were observed. Even with the observed offset between tide corrected lines, the data are still within IHO Specification. The provided tide zone file did not cover the complete area where data was acquired. Where data was acquired outside the provided zoning zero tide correctors were applied (Fig. 3 & 4).

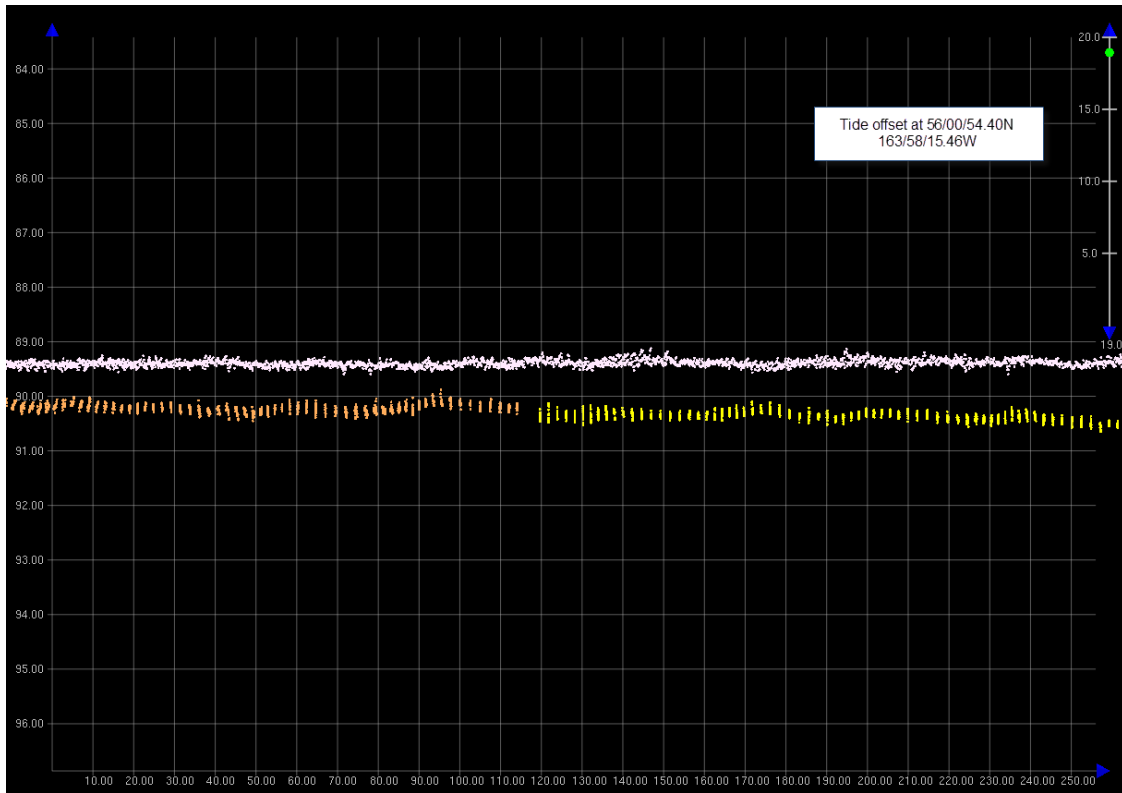


Figure 2: M-R908-FA-12 D00169 7111 Tide Offsets

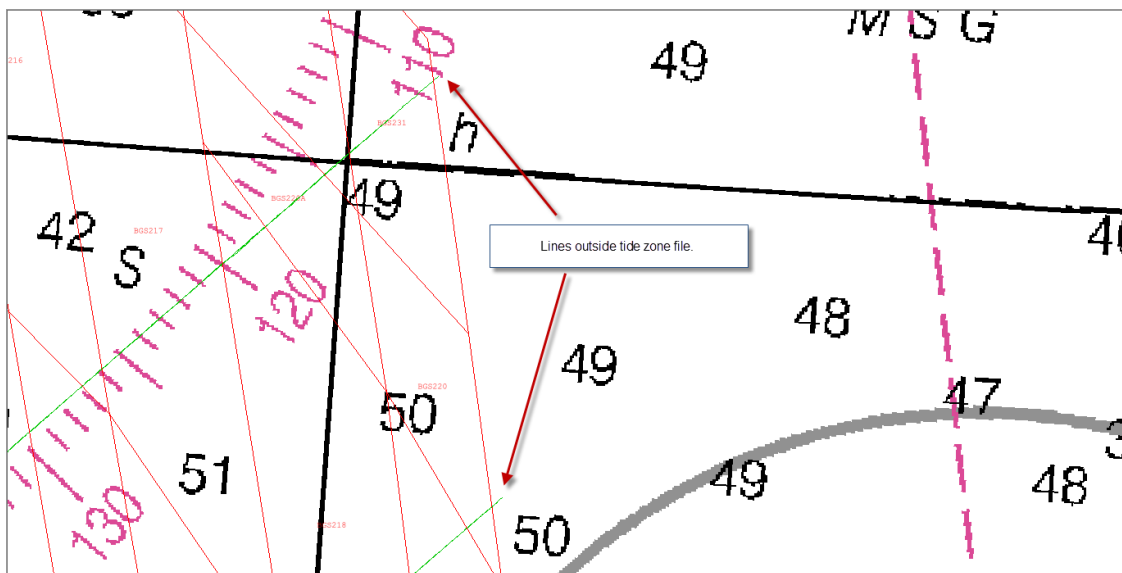


Figure 3: M-R908-FA-12 D00169 Data Outside Tide Zoning

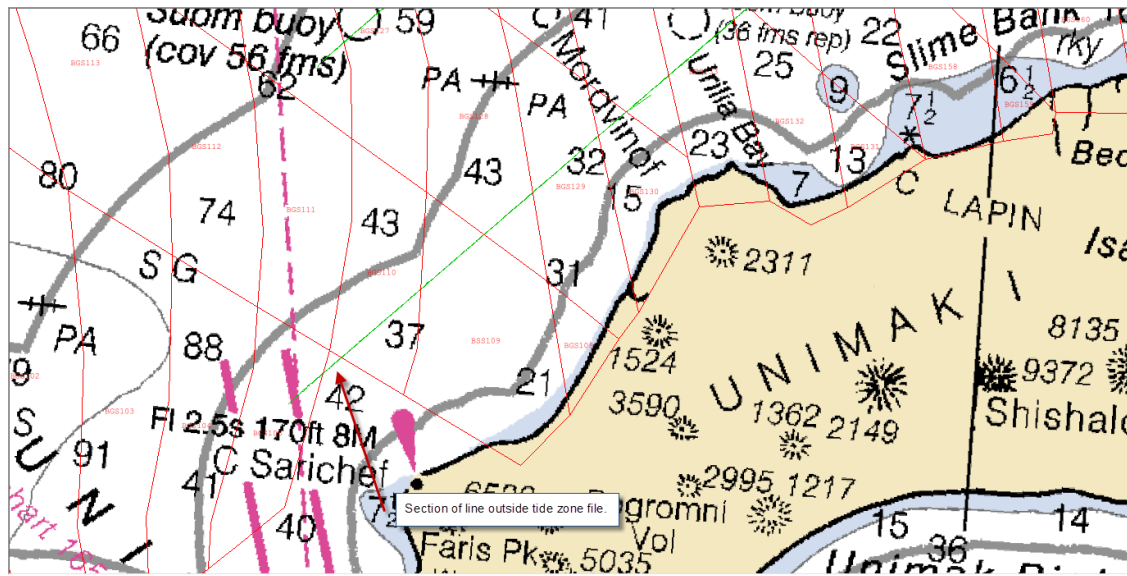


Figure 4: M-R908-FA-12 D00169 Data Outside Tide Zoning

B.2.7 Sound Speed Methods

Sound Speed Cast Frequency: Casts were conducted every 15 minutes while towing the Moving Vessel Profiler. When the Free Fall Cone Penetrometer was used, sound velocity casts were conducted every 4 hours.

Sound velocity profiles in D00169 - most likely logged with the FFCPT - are sometimes unable to adequately capture water column properties, and sometimes contain errors. See Figures 1 and 2 below. In these instances, SVP profiles should be removed. The reviewer examined surfaces and did not see any evidence of refraction artifacts in the data. The data is adequate to supersede charted soundings.

B.2.8 Coverage Equipment and Methods

All equipment and survey methods were used as detailed in the DAPR.

B.2.9 IHO Uncertainty

It was found that 100% of nodes in the 4 and 8 meter grid meet or exceed IHO Order 1 specifications for all depths of survey D00169, see Standards Compliance Review in Appendix V. To assess vertical accuracy standards, a child layer titled "IHO1" was created for each of the 4-meter, and 8-meter finalized surfaces using the equation as stated in section C. 2.1 of the DAPR.

B.2.10 Density

Density requirements for D00169 were achieved with at least 95% of finalized surface nodes containing five or more soundings, see Standards Compliance Review in Appendix V.

B.3 Echo Sounding Corrections

B.3.1 Corrections to Echo Soundings

All data reduction procedures conform to those detailed in the DAPR.

Raw bathymetric data has been converted into CARIS HDCS formatting with Delta Draft settings enabled, which corrects for draft based on the the Delta Draft values entered into the Hypack device model. This conversion setting trumps all subsequent draft correctors. Hypack does not contain any dynamic draft values, so the result is no draft correction. A review of the dynamic draft values from the HVF show that they provide, at most, a 0.09m vertical corrector. The reviewer established that this is an insignificant fraction of the total allowable vertical uncertainty and all data is adequate to supersede charted soundings.

B.3.2 Calibrations

All sounding systems were calibrated as detailed in the DAPR.

B.4 Backscatter

Backscatter was logged in 7k files and submitted directly to NGDC to be archived. The visiting scientist group will process the data for their needs.

B.5 Data Processing

B.5.1 Software Updates

There were no software configuration changes after the DAPR was submitted.

The following Feature Object Catalog was used: NOAA Extended Attribute Files V5_2

B.5.2 Surfaces

The following surfaces and/or BAGs were submitted to the Processing Branch:

Surface Name	Surface Type	Resolution	Depth Range	Surface Parameter	Purpose
D00169_7111_4m	CUBE	4 meters	0 meters - 0 meters	NOAA_4m	MBES TracklineSBES Set Line Spacing
D00169_7111_8m	CUBE	8 meters	0 meters - 0 meters	NOAA_8m	MBES TracklineSBES Set Line Spacing
D00169_7111_4m_Final_36to80	CUBE	4 meters	36 meters - 80 meters	NOAA_4m	MBES TracklineSBES Set Line Spacing
D00169_7111_8m_Final_72to160	CUBE	8 meters	72 meters - 160 meters	NOAA_8m	MBES TracklineSBES Set Line Spacing
D00169_7111_Combined_8m	CUBE	8 meters	36 meters - 160 meters	NOAA_8m	MBES TracklineSBES Set Line Spacing

Table 8: Submitted Surfaces

All field sheet extents were adjusted using the Base 16 Calculator tool to ensure coincident nodes among all bathymetric surfaces regardless of the field sheet in which they are contained given the standard surface resolutions of four and eight meters. The NOAA CUBE parameters mandated in HSSD were used for the creation of all CUBE BASE surfaces in Survey D00169. The surfaces have been reviewed where noisy data, or ‘fliers’ are incorporated into the gridded solution causing the surface to be shoaler or deeper than the true sea floor. Where these spurious soundings cause the gridded surface to be shoaler or deeper than the reliably measured seabed by greater than the maximum allowable TVU at that depth, the noisy data have been rejected and the surface recomputed. Both the RESON 8160 and 7111 data were collected for this project. However, only the RESON 7111 data has been analyzed to supersede the charted soundings and the 7111 data has only been used to make the submitted field sheets for this project. The RESON 8160 data has been submitted but for archive purposes only.

B.5.3 Data Logs

Data acquisition and processing notes are included in the acquisition and processing logs, and additional processing such as final tide and sound velocity application is noted in the D00169 Data Log spreadsheet. All data logs are submitted digitally in the Separates I folder.

B.5.4 Critical Soundings

No designated soundings were required.

B.5.5 Data Processing Deviations

All RESON 7111 data was filtered to 50 degrees off nadir on both port and starboard to remove poor quality data.

C. Vertical and Horizontal Control

No additional HVCR submitted with this project.

C.1 Vertical Control

The vertical datum for this project is Mean Lower Low Water.

Standard Vertical Control Methods Used:

Discrete Zoning

The following National Water Level Observation Network (NWLON) stations served as datum control for this survey:

Station Name	Station ID
Unalaska	9462620

Table 9: NWLON Tide Stations

File Name	Status
9462620.tid	Final Approved

Table 10: Water Level Files (.tid)

File Name	Status
R908FA2012CORP.zdf	Final

Table 11: Tide Correctors (.zdf or .tc)

A request for final approved tides was sent to N/OPS1 on 10/04/2012. The final tide note was received on 10/11/2012.

Preliminary zoning is accepted as the final zoning for project M-R908-FA-12 D00169. Some areas of survey D00169 remain outside the tide zoning and a zero tide was applied to the affected lines.

Tide file is appended to this report.

C.2 Horizontal Control

The horizontal datum for this project is North American Datum of 1983 (NAD83).

The projection used for this project is UTM 3N.

C.3 Additional Horizontal or Vertical Control Issues

3.3.1 WAAS Correctors

The Fairweather used an Integrated Differential GPS (DGPS) system offered within the POS MV 320 unit for real-time positioning of the ship for this project, which afford the option of using Satellite- Based Augmentation Systems (SBAS) - such as WAAS - for real-time decimeter level accuracy in position data. During this project there were minimal DGPS data gaps while using the Integrated DGPS causing almost no data quality issues. An adequate satellite constellation was maintained throughout the project. Navigation data was not post-processed for D00169. Please refer to the DAPR section 1.4.3 for more information.

D. Results and Recommendations

D.1 Chart Comparison

D.1.1 Raster Charts

The following are the largest scale raster charts, which cover the survey area:

Chart	Scale	Edition	Edition Date	LNМ Date	NM Date
16006	1:1534076	35	04/2008	04/24/2012	05/05/2012
16011	1:1023188	37	11/2007	04/24/2012	05/05/2012
16520	1:300000	23	08/2008	04/24/2012	05/05/2012

Table 12: Largest Scale Raster Charts

16006

Soundings from survey D00169 generally agreed within one to two fathoms with charted depths on chart 16006.

16011

Soundings from survey D00169 generally agreed within one to two fathoms with charted depths on chart 16011.

16520

Soundings from survey D00169 generally agreed within one to two fathoms with charted depths on chart 16520.

D.1.2 Electronic Navigational Charts

The following are the largest scale ENC's, which cover the survey area:

ENC	Scale	Edition	Update Application Date	Issue Date	Preliminary?
US2AK5FM	1:1023188	9	06/29/2011	12/08/2011	NO

Table 13: Largest Scale ENC's

US2AK5FM

See Raster charts above.

D.1.3 AWOIS Items

No AWOIS items exist for this survey.

D.1.4 Maritime Boundary Points

No Maritime Boundary Points were assigned for this survey.

D.1.5 Charted Features

Charted features exist for this survey, but were not investigated.

D.1.6 Uncharted Features

No uncharted features exist for this survey.

D.1.7 Dangers to Navigation

No Danger to Navigation Reports were submitted for this survey.

D.1.8 Shoal and Hazardous Features

No shoals or potentially hazardous features exist for this survey.

D.1.9 Channels

No channels exist for this survey. There are no designated anchorages, precautionary areas, safety fairways, traffic separation schemes, pilot boarding areas, or channel and range lines within the survey limits.

D.1.10 Bottom Samples

Bottom samples were assigned for this survey, but were not acquired.

D.2 Additional Results

D.2.1 Shoreline

Shoreline was not assigned in the Hydrographic Survey Project Instructions or Statement of Work.

D.2.2 Prior Surveys

No prior survey comparisons exist for this survey.

D.2.3 Aids to Navigation

Aids to navigation (ATONs) do not exist for this survey.

D.2.4 Overhead Features

Overhead features do not exist for this survey.

D.2.5 Submarine Features

Submarine features do not exist for this survey.

D.2.6 Ferry Routes and Terminals

No ferry routes or terminals exist for this survey.

D.2.7 Platforms

No platforms exist for this survey.

D.2.8 Significant Features

No significant features exist for this survey.

D.2.9 Construction and Dredging

There is no present or planned construction or dredging within the survey limits.





E. Approval Sheet

As Chief of Party, Field operations for this hydrographic survey were conducted under my direct supervision, with frequent personal checks of progress and adequacy. I have reviewed the attached survey data and reports.

All field sheets, this Descriptive Report, and all accompanying records and data are approved. All records are forwarded for final review and processing to the Processing Branch.

The survey data meets or exceeds requirements as set forth in the NOS Hydrographic Surveys and Specifications Deliverables Manual, Field Procedures Manual, Standing and Letter Instructions, and all HSD Technical Directives. These data are adequate to supersede charted data in their common areas. This survey is complete and no additional work is required with the exception of deficiencies noted in the Descriptive Report.

Report Name	Report Date Sent
HSRR Memo	2012-05-01
Data Acquisition and Processing Report	2012-12-07
Coast Pilot Report	2012-12-07

Approver Name	Approver Title	Approval Date	Signature
CDR James M. Crocker, NOAA	Chief of Party	12/05/2012	 James M Crocker c=James M Crocker, o=NOAA Ship Fairweather, ou, email=james.m.crocker@noaa.gov, c=US 2012.12.05 22:36:47 -08'00'
HAST Clinton R. Marcus	Sheet Manager	12/05/2012	 Digitally signed by Clinton Marcus Date: 2012.12.06 07:11:30 -08'00'
CST Tami M. Beduhn	Chief Survey Technician	12/05/2012	Tami Beduhn '00'08- 21:33:03 2012.12.05 
LT Caryn M. Zacharias, NOAA	Field Operations Officer	12/05/2012	 Caryn M. Zacharias 2012.12.05 18:47:31 -08'00'

F. Table of Acronyms

Acronym	Definition
AHB	Atlantic Hydrographic Branch
AST	Assistant Survey Technician
ATON	Aid to Navigation
AWOIS	Automated Wreck and Obstruction Information System
BAG	Bathymetric Attributed Grid
BASE	Bathymetry Associated with Statistical Error
CO	Commanding Officer
CO-OPS	Center for Operational Products and Services
CORS	Continually Operating Reference Station
CTD	Conductivity Temperature Depth
CEF	Chart Evaluation File
CSF	Composite Source File
CST	Chief Survey Technician
CUBE	Combined Uncertainty and Bathymetry Estimator
DAPR	Data Acquisition and Processing Report
DGPS	Differential Global Positioning System
DP	Detached Position
DR	Descriptive Report
DTON	Danger to Navigation
ENC	Electronic Navigational Chart
ERS	Ellipsoidal Referenced Survey
ERZT	Ellipsoidally Referenced Zoned Tides
FFF	Final Feature File
FOO	Field Operations Officer
FPM	Field Procedures Manual
GAMS	GPS Azimuth Measurement Subsystem
GC	Geographic Cell
GPS	Global Positioning System
HIPS	Hydrographic Information Processing System
HSD	Hydrographic Surveys Division
HSSD	Hydrographic Survey Specifications and Deliverables

Acronym	Definition
HSTP	Hydrographic Systems Technology Programs
HSX	Hypack Hysweep File Format
HTD	Hydrographic Surveys Technical Directive
HVCR	Horizontal and Vertical Control Report
HVF	HIPS Vessel File
IHO	International Hydrographic Organization
IMU	Inertial Motion Unit
ITRF	International Terrestrial Reference Frame
LNM	Local Notice to Mariners
LNM	Linear Nautical Miles
MCD	Marine Chart Division
MHW	Mean High Water
MLLW	Mean Lower Low Water
NAD 83	North American Datum of 1983
NAIP	National Agriculture and Imagery Program
NALL	Navigable Area Limit Line
NM	Notice to Mariners
NMEA	National Marine Electronics Association
NOAA	National Oceanic and Atmospheric Administration
NOS	National Ocean Service
NRT	Navigation Response Team
NSD	Navigation Services Division
OCS	Office of Coast Survey
OMAO	Office of Marine and Aviation Operations (NOAA)
OPS	Operations Branch
MBES	Multibeam Echosounder
NWLON	National Water Level Observation Network
PDBS	Phase Differencing Bathymetric Sonar
PHB	Pacific Hydrographic Branch
POS/MV	Position and Orientation System for Marine Vessels
PPK	Post Processed Kinematic
PPP	Precise Point Positioning
PPS	Pulse per second

Acronym	Definition
PRF	Project Reference File
PS	Physical Scientist
PST	Physical Science Technician
RNC	Raster Navigational Chart
RTK	Real Time Kinematic
SBES	Singlebeam Echosounder
SBET	Smooth Best Estimate and Trajectory
SNM	Square Nautical Miles
SSS	Side Scan Sonar
ST	Survey Technician
SVP	Sound Velocity Profiler
TCARI	Tidal Constituent And Residual Interpolation
TPU	Total Propagated Error
TPU	Topside Processing Unit
USACE	United States Army Corps of Engineers
USCG	United States Coast Guard
UTM	Universal Transverse Mercator
XO	Executive Officer
ZDA	Global Positioning System timing message
ZDF	Zone Definition File



UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Ocean Service
Silver Spring, Maryland 20910

TIDE NOTE FOR HYDROGRAPHIC SURVEY

DATE : October 10, 2012

HYDROGRAPHIC BRANCH: Pacific
HYDROGRAPHIC PROJECT: M-R908-FA-2012
HYDROGRAPHIC SHEET: D00169

LOCALITY: Bristol Bay, Unimak Island, AK
TIME PERIOD: July 13 - 22, 2012

TIDE STATION USED: 946-2620 Unalaska, AK
Lat. 53° 52.8'N Long. 166° 32.2' W
PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters
HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 1.011 meters

REMARKS: RECOMMENDED ZONING

Preliminary zoning is accepted as the final zoning for project M-R908-FA-2012, D00169, during the time period between July 13 - 22, 2012.

Please use the zoning file R908FACORP submitted with the project instructions for M-R908-FA-2012.

Refer to attachments for zoning information.

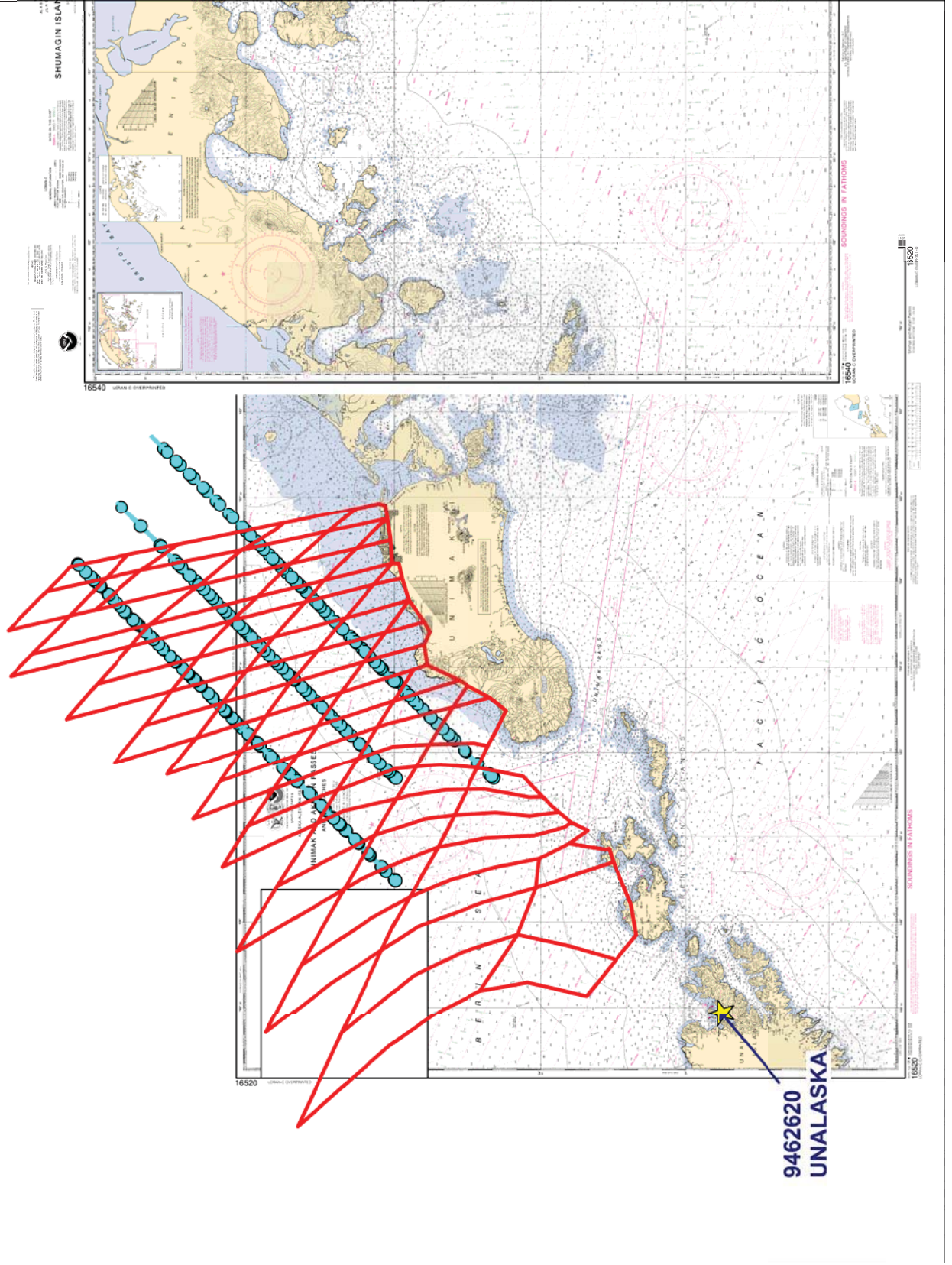
Note 1: Provided time series data are tabulated in metric units (meters), relative to MLLW and on Greenwich Mean Time on the 1983-2001 National Tidal Datum Epoch (NTDE).

HOVIS.GERALD.THOMAS.1365860250
Digitally signed by
HOVIS.GERALD.THOMAS.1365860250
DN: c=US, o=U.S. Government, ou=DoD,
ou=PKI, ou=OTHER,
cn=HOVIS.GERALD.THOMAS.1365860250
Date: 2012.10.11 13:58:06 -04'00'

CHIEF, PRODUCTS AND SERVICES BRANCH



**Preliminary as Final Tidal Zoning for
M-R908-FA-2012, D00169
Bristol Bay, Unimak Island, AK**



APPROVAL PAGE

D00169

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

- D00169_DR.pdf
- Collection of depth varied resolution BAGS
- Processed survey data and records
- D00169_GeoImage.pdf

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

Approved: _____

Peter Holmberg
Acting Chief, Pacific Hydrographic Branch

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

Approved: _____

Kurt Brown
Physical Scientist, Pacific Hydrographic Branch