H12544

NOAA Form 76-35A

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

DESCRIPTIVE REPORT

Type of Survey:	Basic Hydrographic Survey
Registry Number:	H12544

LOCALITY

State:	Alaska
General Locality:	Krenitzin Islands
Sub-locality:	South of Derbin Strait

2013

CHIEF OF PARTY
Dean Moyles

LIBRARY & ARCHIVES

Date:

NOAA FORM 77-28 (11-72)	U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION	REGISTRY NUMBER:
HYDROGRAPHIC TITLE SHEET		**H12544**

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:	**Alaska**
General Locality:	**Krenitzin Islands**
Sub-Locality:	**South of Derbin Strait**
Scale:	**40000**
Dates of Survey:	**06/27/2013 to 07/25/2013**
Instructions Dated:	**05/15/2013**
Project Number:	**OPR-Q191-KR-13**
Field Unit:	**Fugro Pelagos, Inc.**
Chief of Party:	**Dean Moyles**
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**
H-Cell Compilation Units:	***meters at Mean Lower Low Water***

Remarks:

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. Any revisions to the Descriptive Report (DR) generated during office processing are shown in bold red italic text. The processing branch maintains the DR as a field unit product, therefore, all information and recommendations within the body of the DR are considered preliminary unless otherwise noted. The final disposition of surveyed features is represented in the OCS nautical chart update products. All pertinent records for this survey, including the DR, are archived at the National Geophysical Data Center (NGDC) and can be retrieved via http://www.ngdc.noaa.gov/.

Table of Contents

List of Tables

List of Figures

Descriptive Report to Accompany Survey H12544

Project: OPR-Q191-KR-13

Locality: Krenitzin Islands

Sublocality: South of Derbin Strait

Scale: 1:40000

June 2013 - July 2013

Fugro Pelagos, Inc.

Chief of Party: Dean Moyles

A. Area Surveyed

H12544 is located South of Derbin Stait.

A.1 Survey Limits

Data was acquired within the following survey limits:

Northeast Limit	Southwest Limit
54.10917 N 165.08333 E	53.97528 N 165.34194 E

Table 1: Survey Limits

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

A.2 Survey Purpose

The purpose of this work is to provide NOAA with modern and accurate hydrographic survey data for the area South of Derbin Strait. The survey covered 28.90 square nautical miles of critical survey area as designated in the NOAA Hydrographic Survey Priorities, 2012 edition.

A.3 Survey Quality

The entire survey is adequate to supersede previous data.

A.4 Survey Coverage

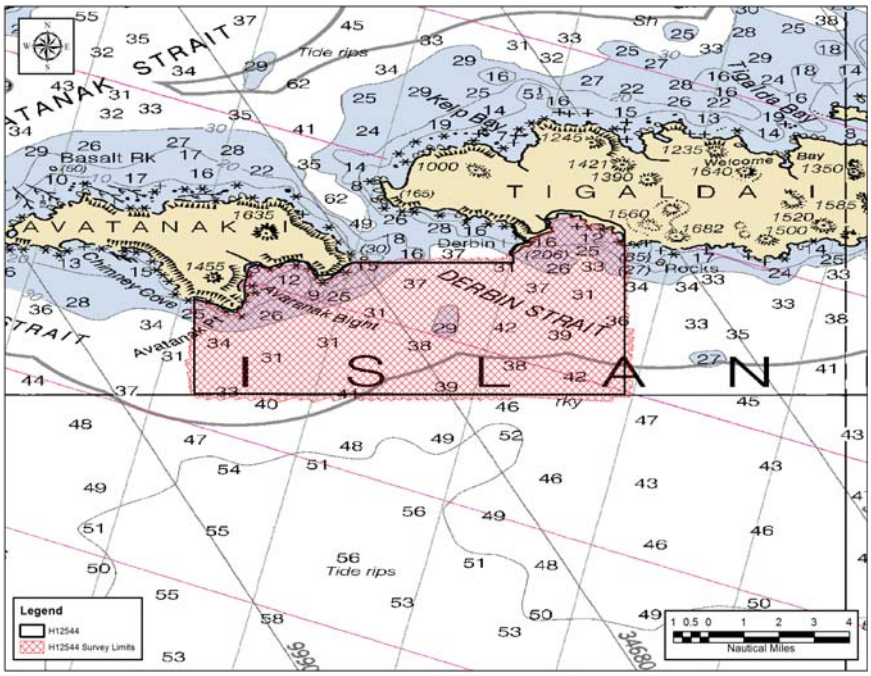

Figure 1: H12544 Survey Limits

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	*Ocean Pioneer*	*D2*	*R2*	*Total*
LNM	**SBES Mainscheme**	0	0	0	0
	MBES Mainscheme	272.49	159.08	33.83	465.4
	Lidar Mainscheme	0	0	0	0
	SSS Mainscheme	0	0	0	0
	SBES/MBES Combo Mainscheme	0	0	0	0
	SBES/SSS Combo Mainscheme	0	0	0	0
	MBES/SSS Combo Mainscheme	0	0	0	0
	SBES/MBES Combo Crosslines	23.27	8.88	0	32.15
	Lidar Crosslines	0	0	0	0
Number of Bottom Samples					6
Number of DPs					0
Number of Items Items Investigated by Dive Ops					0
Total Number of SNM					28.9

Table 2: Hydrographic Survey Statistics

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

Survey Dates
06/27/2013
06/28/2013
07/07/2013
07/09/2013
07/10/2013
07/12/2013
07/13/2013
07/14/2013
07/24/2013
07/25/2013

Table 3: Dates of Hydrography

There were 41 DP's for this survey.

A.6 Shoreline

Traditional shoreline verification was not a requirement in this task order, but positions were collected on a number of shoreline features. FPI's effort should not be considered complete feature verification (verify or disprove rocks, islets, shoreline, etc.), our intent was only to identify holes within our MBES coverage and to provide feedback on charted features within the survey limits.

A.7 Bottom Samples

Bottom Samples were acquired in accordance with the Project Instructions and the HSSD.

Five bottom samples were recommended for charting.

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	*Ocean Pioneer*	*R2*	*D2*
LOA	205 feet	29 feet	29 feet
Draft	14 feet	3 feet	3 feet

Table 4: Vessels Used

Due to an inoperable davit, production for vessel R2 was limited for the OPR-Q191-KLR-13 survey. The last day of survey for vessel R2 was JD 181.

B.1.2 Equipment

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

Manufacturer	Model	Type
Applanix	POS M/V v4	Positioning and Attitude System
Applied Micro-Systems	SV&P	Sound Speed System
OceanScience	UCTD	Conductivity, Temperature and Depth Sensor
Reson	7101	MBES
Reson	7125	MBES
Reson	SVP70	Sound Speed System

Table 5: Major Systems Used

WaterLOG H3611 (Radar Water Level Sensors) were installed on the port and starboard gunwales of M/V Ocean Pioneer 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 for the WaterLOG H3611 measurements when required.

B.2 Quality Control

B.2.1 Crosslines

Crosslines were planned and well distributed throughout the survey to ensure adequate quality control. Total crossline length surveyed was 32.15 nautical miles or 6.91 percent of the total mainscheme line length. Each crossline was compared to the entire mainscheme line plan through a 2m CUBE surface using the CARIS HIPS QC report routine. If the crossline covered an area with significantly rocky topography, the crossline was compared to a 1m CUBE surface of the entire mainscheme line plan.

The majority of the QC Reports fall well within the required accuracy specifications. However, several crosslines run by survey vessel D2 in the area South of Derbin Strait contain beams in the QC report that fall below the 95% confidence level due to significantly rocky topography as illustrated in the crossline profile from H12544. Good conformity was still seen between the mainscheme lines and the crosslines.

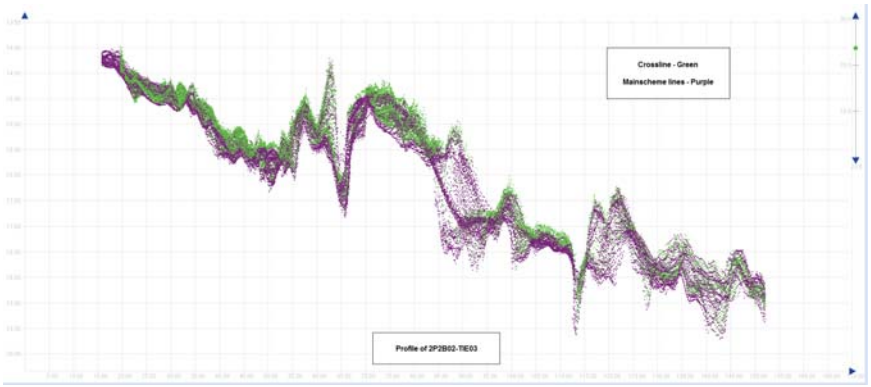

Figure 2: H12544 Crossline Profile

B.2.2 Uncertainty

The following survey specific parameters were used for this survey:

Measured	Zoning
0.1meters	0.2meters

Table 6: Survey Specific Tide TPU Values

Hull ID	Measured - CTD	Measured - MVP	Surface
Ocean Pioneer	1.987meters/second	0meters/second	0.250meters/second
R2	0meters/second	0.700meters/second	0.250meters/second
D2	0meters/second	1.645meters/second	0.250meters/second

Table 7: Survey Specific Sound Speed TPU Values

The majority of the data fell within IHO Order 1a accuracy specifications. Nodes that exceeded the allowable specifications were located in rough or rapidly changing topography or areas where the outer beams of the coverage boundaries were the single contributor to the surface. Despite these higher uncertainty values in these areas, agreement between adjacent lines and co-linearity between soundings was good.

Note: The percentage of nodes within IHO Oder 1a, were computed by CARIS using the Surface QC Report utility and are as follows:

CUBE Surface Uncertainty Report

Surface	Depth Range (m)	% of nodes within IHO Order 1a
H12544-1m_Final	0 - 20	93.34%
H12544-2m_Final	18 - 40	98.71%
H12544-4m_Final	36 - 80	99.99%
H12544-8m_Final	72 - 160	100.00%

As illustrated in the uncertainty errors graphic, the uncertainty is generally lowest near the sonar nadir beams and increases toward the outside of each swath. This is expected and primarily a result of the sonar's device model used within CARIS HIPS for TPU calculations. In general, total propagated uncertainty varies proportionally to water depth. Outer beams also have higher uncertainty values as a function of the bottom-detection algorithms within the sonar. Data met project specifications.

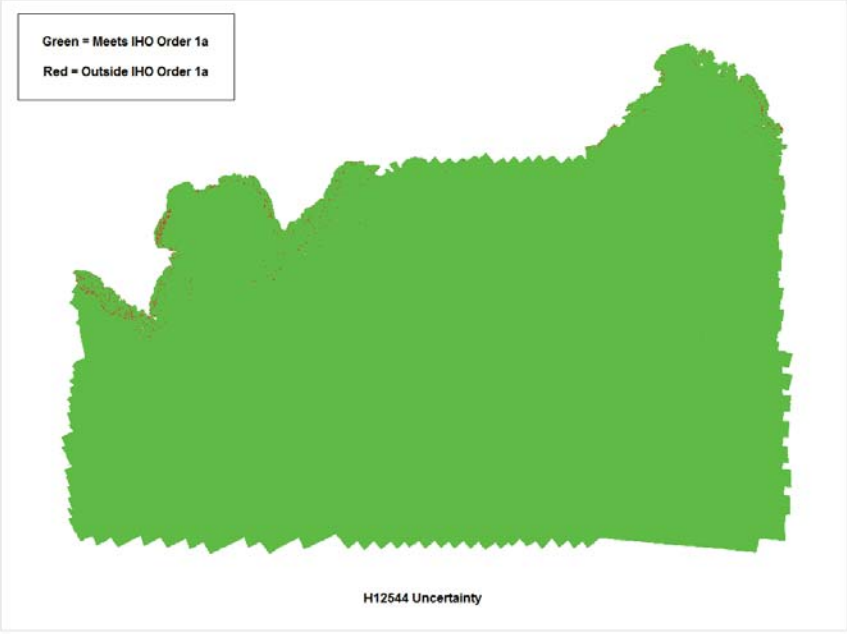

Figure 3: H12544 Uncertainty

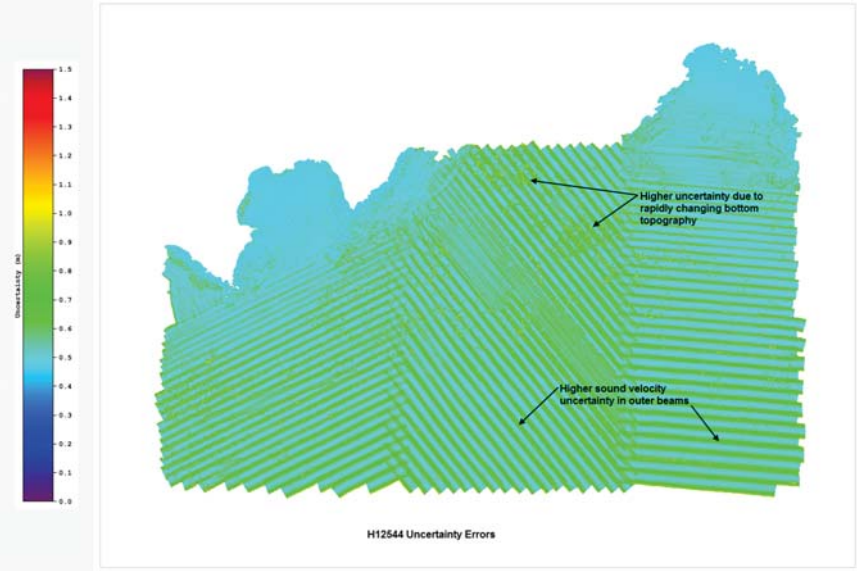

Figure 4: H12544 Uncertainty Errors

B.2.3 Junctions

The surveys are in agreement along their common borders. The conformity between H12544 and the bordering survey area (H12543) was inspected during processing, using CARIS HIPS' Subset Editor routine and finalized BASE Surfaces. Difference surfaces were also created at a 4-meter resolution between H12544, and the junction with survey area H12440 (2012) and the junction with survey area H12444 (2012). The data were well within the IHO Order 1a allowable error.

The following junctions were made with this survey:

Registry Number	Scale	Year	Field Unit	Relative Location
H12440	1:40000	2012	Fugro Pelagos, Inc.	N
H12444	1:40000	2012	Fugro Pelagos, Inc.	W

Table 8: Junctioning Surveys

H12440

A difference surface was also created at a 4-meter resolution between H12544, and the junction with survey area H12440 (2012), confirming that approximately 88.97% of the nodes agree to within +/-0.50m. The other 11.03% were in areas with irregular bottom topography or were on the outer edges of the swath at the coverage boundaries. The data were well within the IHO Order 1a allowable error.

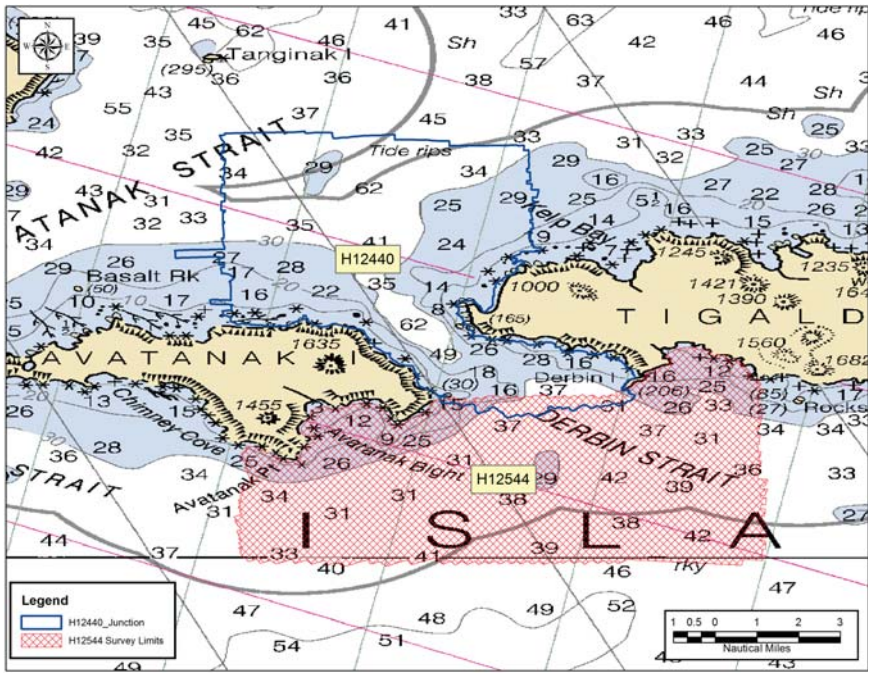

Figure 5: H12544 Junctions with H12440

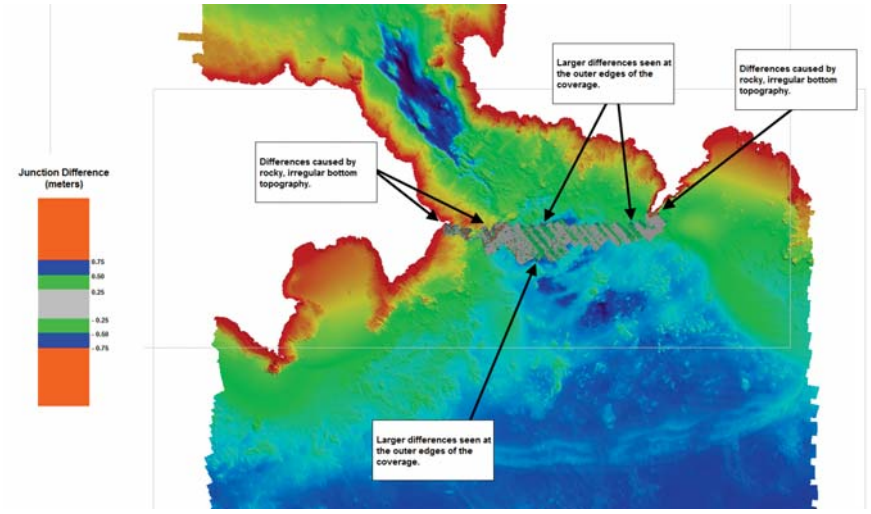

Figure 6: Difference Surface H12544 vs. H12440

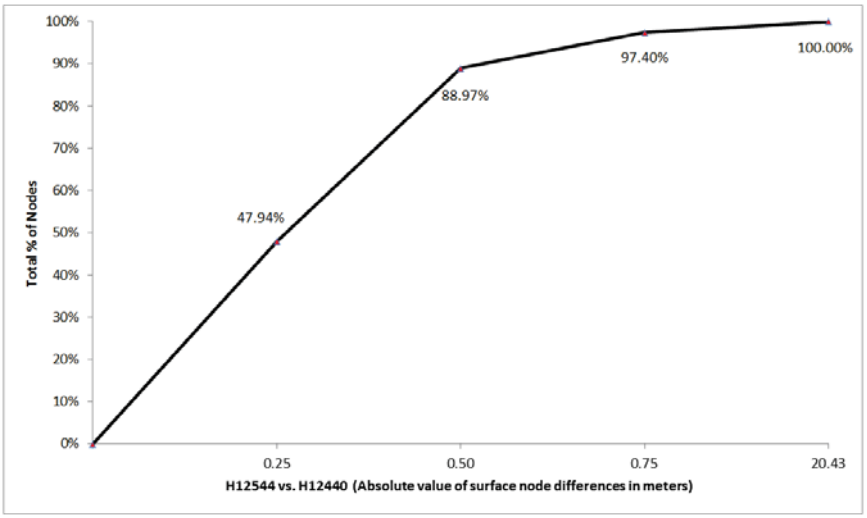

Figure 7: Difference Surface Statistics H12544 vs. H12440

H12444

A difference surface was created at a 4-meter resolution between H12544, and the junction with survey area H12444 (2012), confirming that approximately 96.55% of the nodes agree to within +/-0.50m. The other 3.45% were in areas with irregular bottom topography or were on the outer edges of the swath at the coverage boundaries. The data were well within the IHO Order 1a allowable error.

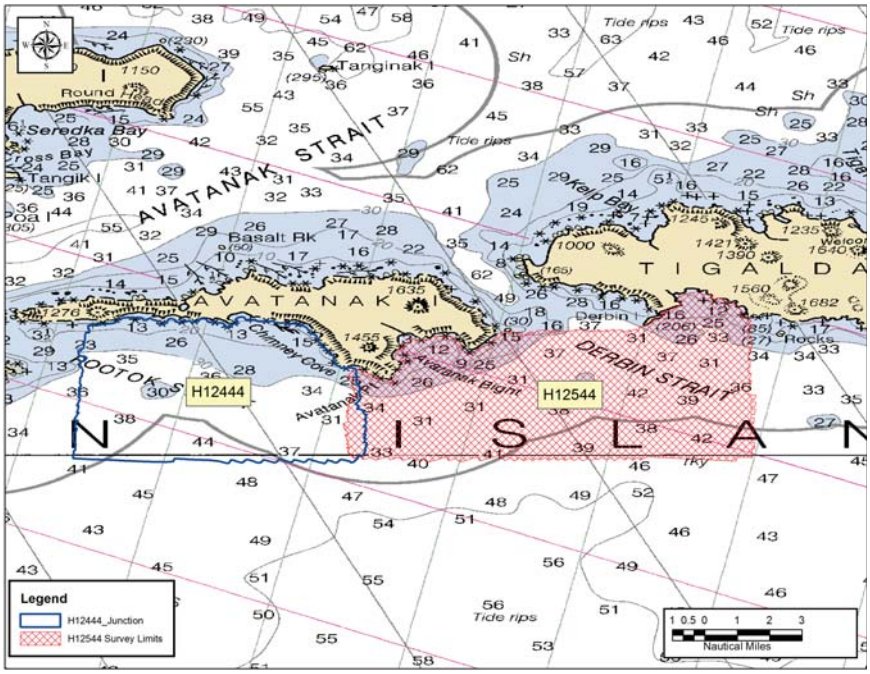

Figure 8: H12544 Junctions with H12444

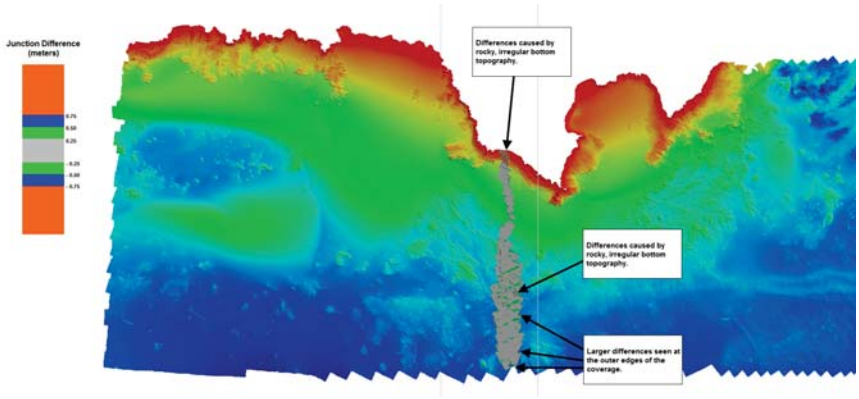

Figure 9: Difference Surface H12544 vs. H12444

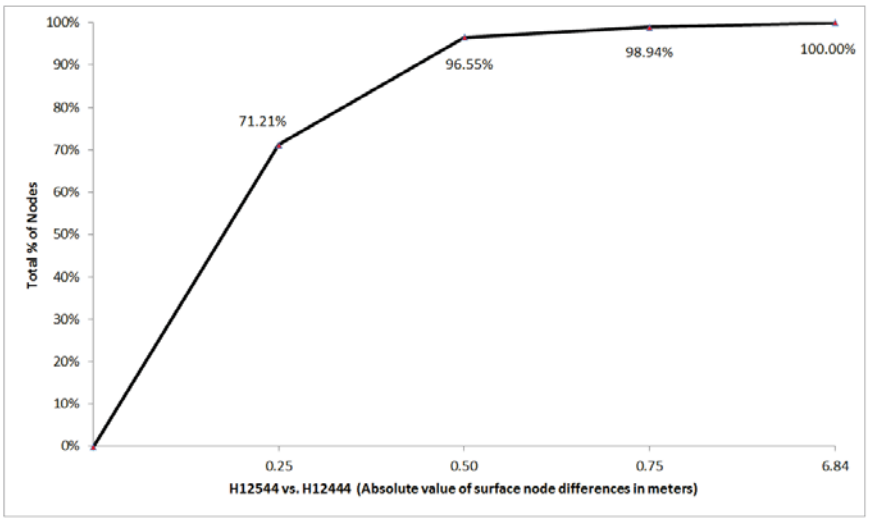

Figure 10: Difference Surface Statistics H12544 vs. H12444

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

B.2.5.1None Exist

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

B.2.6 Factors Affecting Soundings

B.2.6.1 Kelp

Along coastal regions of the survey, an abundance of kelp was observed during data acquisition. Due to data quality and safety issues, there may be some areas where survey operations were halted, thus not achieving the 4 fathom survey limit. In addition to this, during data processing every effort was made to flag the kelp as rejected data wherever the CUBE BASE surface included the kelp as part of the seafloor.

B.2.6.1 Sound Speed Refraction Errors

Sound speed refraction errors were seen in the outer beams of the swaths of survey lines that were run in deeper water. However, line overlap was sufficient, and the affected soundings were rejected in CARIS HIPS' Subset Editor routine to ensure the CUBE surface met IHO Order 1a specifications.

B.2.7 Sound Speed Methods

Sound Speed Cast Frequency: Sound speed measurements were conducted and applied as discussed in the Corrections to Echo Soundings section of the DAPR.

B.2.8 Coverage Equipment and Methods

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

B.2.9 Data Density

The NOS Hydrographic Surveys Specifications and Deliverables, April 2012, requires 95% of all nodes to be populated with at least five soundings. Survey H12544 met these project specifications.

Density requirements for H12544 were achieved with at least 99.50% of finalized surface nodes containing five or more soundings. Nodes that failed to meet the allowable specifications were located in rough or rapidly changing topography or areas where the outer beams of the coverage boundaries were the single contributor to the surface.

CUBE Surface Density Report

Surface	Depth Range (m)	% of nodes within HSSD 2012
H12544-1m_Final	0 - 20	99.51%
H12544-2m_Final	18 - 40	99.94%
H12544-4m_Final	36 - 80	99.96%
H12544-8m_Final	72 - 160	99.92%

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 and In-fills were run as necessary.

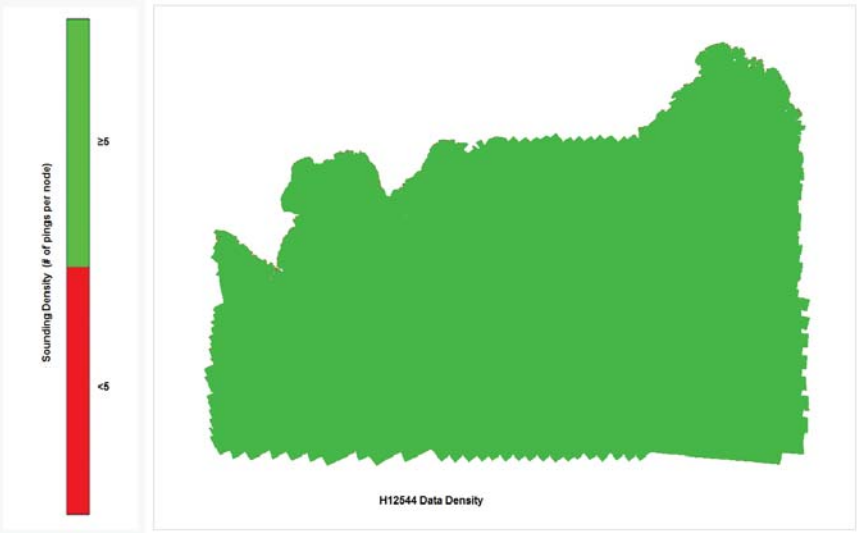

Figure 11: H12544 Data Density

B.3 Echo Sounding Corrections

B.3.1 Corrections to Echo Soundings

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

B.3.2 Calibrations

All sounding systems were calibrated as detailed in the DAPR.

B.4 Backscatter

Towed Side Scan Sonar (SSS) operations were not required by this contract, but the backscatter and beam imagery snippet data from all multibeam systems were logged and are stored in the s7k files. All beam imagery snippet data was logged in the 7028 record of the s7k file for the project.

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: Version 5.3.2

B.5.2 Surfaces

The following CARIS surfaces were submitted to the Processing Branch:

Surface Name	Surface Type	Resolution	Depth Range	Surface Parameter	Purpose
H12544_1m	CUBE	1 meters	0 meters - 97 meters	NOAA_1m	Complete MBES
H12544_1m_Final	CUBE	1 meters	0 meters - 20 meters	NOAA_1m	Complete MBES
H12544_2m	CUBE	2 meters	0 meters - 97 meters	NOAA_2m	Complete MBES
H12544_2m_Final	CUBE	2 meters	18 meters - 40 meters	NOAA_2m	Complete MBES
H12544_4m	CUBE	4 meters	0 meters - 97 meters	NOAA_4m	Complete MBES
H12544_4m_Final	CUBE	4 meters	36 meters - 80 meters	NOAA_4m	Complete MBES
H12544_8m	CUBE	8 meters	0 meters - 97 meters	NOAA_8m	Complete MBES
H12544_8m_Final	CUBE	8 meters	72 meters - 160 meters	NOAA_8m	Complete MBES

Table 9: CARIS Surfaces

The surfaces have been reviewed where noisy data, or 'fliers' are incorporated into the gridded solution causing the surface to be shoaler than the true seafloor. Where these spurious soundings cause the gridded surface to be shoaler 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.

The NOAA CUBE parameters mandated in HSSD were used for the creation of all CUBE BASE surfaces in Survey H12544.

H12544_8m_Combined_office.csar created during office processing was used for compilation.

C. Vertical and Horizontal Control

Additional information discussing the vertical and horizontal control for this survey can be found in the accompanying HVCR.

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, Dutch Harbor	9462620
King Cove	9459881

Table 10: NWLON Tide Stations

The following subordinate water level stations were established for this survey:

Station Name	Station ID
Broad Bight	9462676
SE Tigalda Island	9462705
Green Bight	9462786

Table 11: Subordinate Tide Stations

File Name	Status
9462676.tid	Verified Observed
9462705.tid	Verified Observed
9462786.tid	Verified Observed

Table 12: Water Level Files (.tid)

File Name	Status
OPR-Q191-KR-13_Zoning_20131008.zfd tid	Preliminary

Table 13: Tide Correctors (.zdf or .tc)

A request for final approved tides was sent to N/OPS1 on 10/24/2013. The final tide note was received on 10/31/2013.

On October 08, 2013, John Oswald and Associates (JOA) issued verified tidal data and zoning for OPR-Q191-KR-13. All sounding data was then re-merged using CARIS HIPS and SIPS tide routine. JOA verified tidal data were used for all final Navigation BASE surfaces and S-57 Feature files. It should be noted that the tidal data applied to OPR-Q191-KR-13 is JOA verified and not CO-OPs verified. JOA are currently in the WALI verification process, which is pending, awaiting CO-OPs approval. Since the timeframe for CO-OPs verification is unknown, FPI were given approval, by our COTR, to submit the data with the JOA verified tides and zoning applied.

C.2 Horizontal Control

The horizontal datum for this project is NAD83.

The following PPK methods were used for horizontal control:

Single Base

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 generated. This position was logged concurrently with the bathymetry from WinFrog and the POS file using 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 MMS 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 to replace the real-time position records.

The following user installed stations were used for horizontal control:

HVCR Site ID	Base Station ID
Broad Bight	BB_E
SE Tigalda Island	TI_N

Table 14: User Installed Base Stations

The following DGPS Stations were used for horizontal control:

DGPS Stations
Cold Bay DGPS Station

Table 15: USCG DGPS Stations

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	LNM Date	NM Date
16531	1:80000	7	02/2002	10/01/2013	09/28/2013

Table 16: Largest Scale Raster Charts

16531

The Raster chart was downloaded from NOAA's Office of Coast Survey website on October 9, 2013.

Given that the survey area was ensonified with 100% multibeam coverage, discrepancies were discovered between the charted and surveyed depths.

Sounding agreement between surveyed soundings on sheet H12544 and spot soundings displayed on Raster chart 16531 varied between 1 and 3 fathoms. Generally, the surveyed data in the vicinity of the charted spot soundings from Raster chart 16531 agree to within 1 to 2 fathoms.

The Hydrographer recommends that soundings within the survey limits of H12544 supersede all prior survey and charted depths.

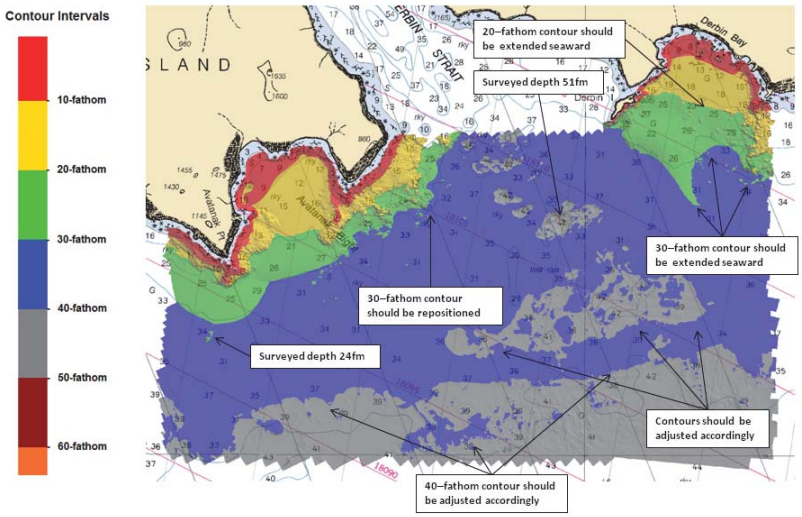

Figure 12: Chart Comparison H12544 vs. 16531

D.1.2 Electronic Navigational Charts

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

ENC	Scale	Edition	Update Application Date	Issue Date	Preliminary?
US3AK61M	1:300000	16	01/12/2011	06/24/2013	NO
US4AK6FM	1:80000	8	04/28/2011	05/02/2013	NO

Table 17: Largest Scale ENCs

US3AK61M

The ENCs were downloaded from NOAA's Office of Coast Survey website on October 9, 2013. Thus, the issue dates displayed are more recent than the dates in the Project Instructions.

Given that the survey area was ensonified with 100% multibeam coverage, discrepancies were discovered between the charted and surveyed depths.

Sounding agreement between surveyed soundings on sheet H12544 and spot soundings displayed on ENC US3AK61M varied between 1 meter and 8 meters. Generally, the surveyed data in the vicinity of the charted spot soundings from the ENC agreed to within 1 to 5 meters. However, the largest discrepancy found was 8 meters.

Although the ENC displays the spot soundings in meters, the contours are displayed in fathoms. The surveyed data for sheet H12544 shows contours that generally agree with the contour trends from ENC US3AK61M.

The Hydrographer recommends that soundings within the survey limits of H12544 supersede all prior survey and charted depths.

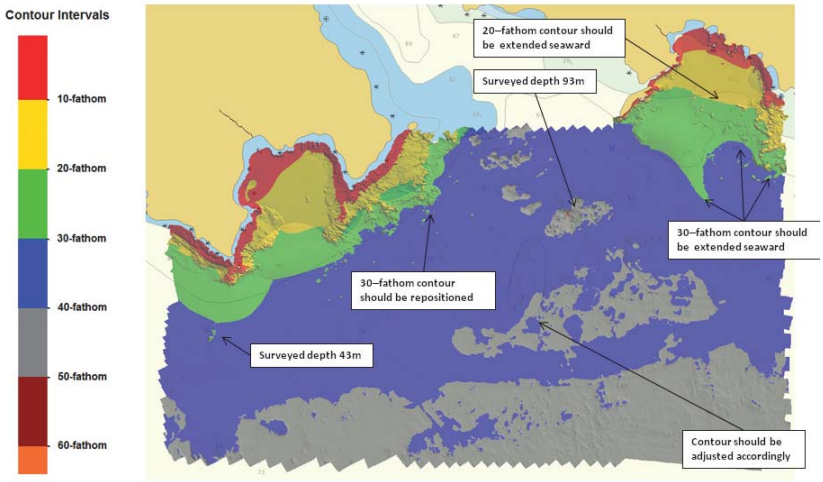

Figure 13: Chart Comparison H12544 vs. US3AK61M

US4AK6FM

Given that the survey area was ensonified with 100% multibeam coverage, discrepancies were discovered between the charted and surveyed depths.

Sounding agreement between surveyed soundings on sheet H12544 and spot soundings displayed on ENC US4AK6FM varied between 1 meter and 5 meters.

Although the ENC displays the spot soundings in meters, the contours are displayed in fathoms. The surveyed data for sheet H12544 shows contours that generally agree with the contour trends from ENC US4AK6FM.

The Hydrographer recommends that soundings within the survey limits of H12544 supersede all prior survey and charted depths.

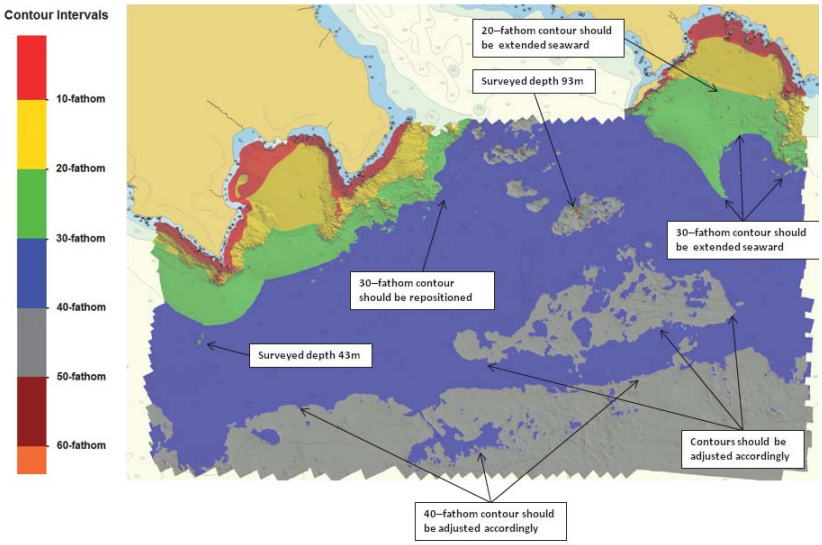

Figure 14: Chart Comparison H12544 vs. US4AK6FM

D.1.3 AWOIS Items

No AWOIS items exist for this survey.

D.1.4 Charted Features

No charted features exist for this survey.

D.1.5 Uncharted Features

No uncharted features exist for this survey.

D.1.6 Dangers to Navigation

No Danger to Navigation Reports were submitted for this survey.

D.1.7 Shoal and Hazardous Features

No shoals or potentially hazardous features exist for this survey.

D.1.8 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.

Three anchorage symbols exist within the survey area. Although none of them were addressed by the survey, one anchorage symbol located on the west side of Avatanak Bight is located in an area with several charted rocks and kelp and is adjoining a rocky seabed area. It is recommended that this symbol be removed from the chart.

D.2 Additional Results

D.2.1 Shoreline

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

The Project Instructions state that Limited Shoreline Verification will be accomplished. A limited investigation was completed, see section D.2.9.1 below, however the requirement to investigate inshore assigned feature was waived.

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 Construction and Dredging

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

D.2.9.1 Final Feature File

Charted features that fell inshore of the 4-fathom contour (NALL) were not investigated and have been noted with a “Not Addressed” comment in the “descrp” attribute of the final features file. Features that fell within the survey limits were addressed and attributed appropriately. This file contains the object and metadata with extended attributes as required in the Specifications and Deliverables (April 2012).

All features, including ones from the NOAA assigned feature file, that were within the geographical bounds of H12544 are included in the “H12544_Field_Features.000” file.

Note: Since CARIS Notebook and Bathy DataBASE were unable to export to S-57 with the parameters outlined in section 8.2 of the HSSD 2012, an additional text file with the required meta information was sent to accompany the S-57 file.

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
Data Acquisition and Processing Report	2013-11-04
Horizontal and Vertical Control Report	2013-11-04
Tides and Water Levels Package	2013-11-04
MAR-P-001-R2 MBES Acquisition Procedures	2013-11-04
DAC-P-010-R3 MBES Processing Procedures	2013-11-04

Approver Name	Approver Title	Approval Date	Signature
Dean Moyles	Senior Hydrographer (ACSM Cert. No. 226)	11/04/2013	Dean Moyles Digitally signed by Dean Moyles DN: cn=Dean Moyles, o=Fugro Pelagos, Inc., ou, email=dmoyles@fugro.com, c=US Date: 2014.05.23 04:12:32 -07'00'

F. Table of Acronyms

Acronym	Definition
AFF	Assigned Features File
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 Staiton
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
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
HSSDM	Hydrographic Survey Specifications and Deliverables Manual

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 Porpagated Error
TPU	Topside Processing Unit
USACE	United States Army Corps of Engineers
USCG	United Stated Coast Guard
UTM	Universal Transverse Mercator
XO	Exectutive Officer
ZDA	Global Positiong System timing message
ZDF	Zone Definition File

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
Center for Operational Oceanographic Products and Services
Silver Spring, MD 20910

Date: January 30, 2014

TO: LCDR Michael Gonsalves
Chief, Operations Branch
Hydrographic Services Division
Office of Coast Survey

FROM: Gerald Hovis
Chief, Products and Services Branch
Oceanographic Division
CO-OPS

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: 2014.01.30 10:38:09 -05'00'

RE: Validation of Zoning supplied in support of OPR-Q191-KR-2013 Krenitzin Islands, AK

John Oswald & Associates (JOA) submitted discrete tidal zoning for validation by CO-OPS based on subordinate water level data collected at Broad Bight 9462676, Green Bight 9462705, and SE Tigalda Island 9462786. CO-OPS finds the water level data as well as discrete zoning submitted in support of OPR-Q191-KR-2013 to be valid and meet the requirements under NOS Specifications and Deliverables.

CO-OPS bases its validation of the contractor supplied zoning on the following reasons:

1. JOA's method to develop final zoning geometry and tide correctors is reasonable
2. The 2-sigma standard deviation of the difference between JOA's final tidal zoning and CO-OPS generated TCARI grid in the survey area are within 0.15 meters.
3. The 2-sigma standard deviation of the difference between JOA's final tidal zoning and provided zoning station water level data (BMPG) are within 0.11 meters.

CO-OPS offers the following recommendations:

1. When using mathematical interpolative methods to develop co-range and co-phase lines, only water level data from within relatively close proximity to a survey area should be used. Although unlikely in this particular instance, use of water level data for interpolation from as far away as the DART buoys and NWLON station at King Cove could introduce significant error because the mathematical interpolation does not account for oceanographic or hydrodynamic behaviors in the water levels.

CC:
Jeff Ferguson
Peter Stone
Michael Brown
LT Abigail Higgins
Castle "Gene" Parker
CDR David Zezula
Laura Rear McLaughlin
Corey Allen
Cristina Urizar

APPROVAL PAGE

H12544

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

- H12544_DR.pdf
- Collection of depth varied resolution BAGS
- Processed survey data and records
- H12544_GeoImage.pdf

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

Digitally signed by HOLMBERG.PETER.SCOTT.1365886101
DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=OTHER, cn=HOLMBERG.PETER.SCOTT.1365886101
Date: 2015.04.07 11:39:22 -07'00'

Approved:_____

Pete Holmberg
Cartographic Team Lead, Pacific Hydrographic Branch

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

Digitally signed by EVANS.BENJAMIN.K.1237217094
Reason: I am approving this document
Date: 2015.04.07 11:47:00 -07'00'

Approved:_____

CDR Ben Evans, NOAA
Chief, Pacific Hydrographic Branch