H12561

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

DESCRIPTIVE REPORT

Type of Survey:	Basic Hydrographic Survey
Registry Number:	H12561

LOCALITY

State(s):	Virginia
General Locality:	Coastal Virginia
Sub-locality:	17 NM East of Sand Shoal Inlet

2013

CHIEF OF PARTY
Jason M. Infantino

LIBRARY & ARCHIVES

Date:

U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION	REGISTRY NUMBER:
HYDROGRAPHIC TITLE SHEET	**H12561**

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):	**Virginia**
General Locality:	**Coastal Virginia**
Sub-Locality:	**17 NM East of Sand Shoal Inlet**
Scale:	**40000**
Dates of Survey:	**07/21/2013 to 10/01/2013**
Instructions Dated:	**04/06/2012**
Project Number:	**OPR-D302-KR-13**
Field Unit:	**Leidos (formerly SAIC)**
Chief of Party:	**Jason M. Infantino**
Soundings by:	**Multibeam Echo Sounder**
Imagery by:	**Side Scan Sonar Multibeam Echo Sounder Backscatter**
Verification by:	**Atlantic Hydrographic Branch**
Soundings Acquired in:	**meters at Mean Lower Low Water**

Remarks:

Contract: DG133C-08-CQ-0003.

Contractor: Leidos 221 Third Street, Newport, RI 02840 USA.

Subcontractors: Divemasters, Inc., 15 Pumpshire Road, Toms River, NJ 08753; Rotator Staffing Services, 25 Kennedy Blvd., East Brunswick NJ 08816.

Leidos Doc 14-TR-019.

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 H12561

Project: OPR-D302-KR-13

Locality: Coastal Virginia

Sublocality: 17 NM East of Sand Shoal Inlet

Scale: 1:40000

July 2013 - October 2013

Leidos (formerly SAIC)

Chief of Party: Jason M. Infantino

A. Area Surveyed

The area surveyed was a section of Coastal Virginia 17 NM East of Sand Shoal Inlet (Figure 1).

A.1 Survey Limits

Data were acquired within the following survey limits:

Northwest Limit	Southeast Limit
37° 25’ 14.04” N 075° 28’ 54.30” W	37° 14’ 52.04” N 075° 18’ 57.35” W

Table 1: Survey Limits

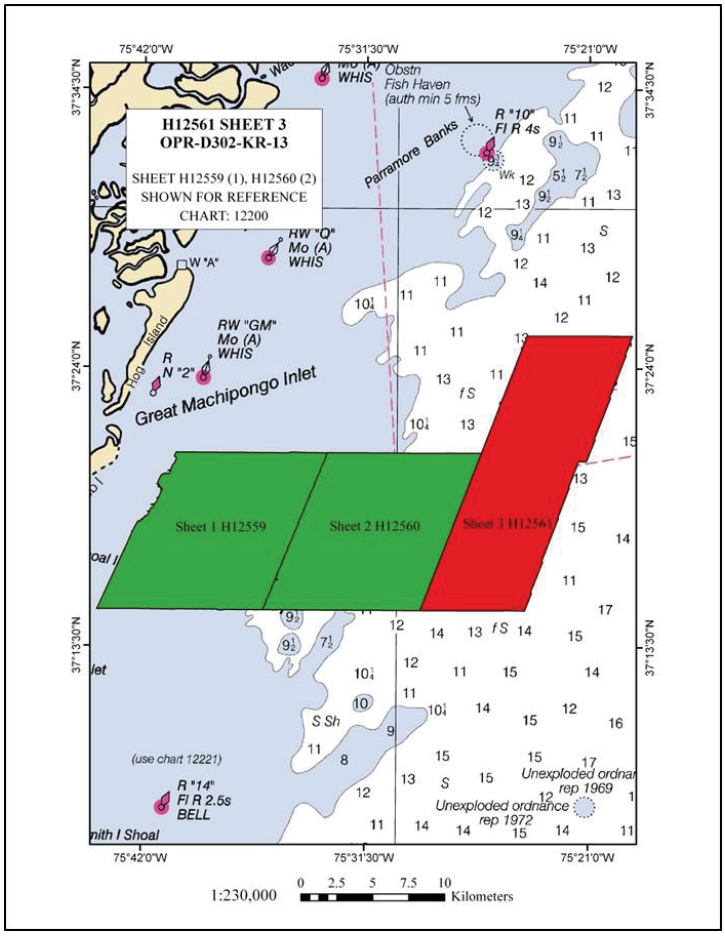

Figure 1: H12561 Survey Bounds

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

A.2 Survey Purpose

The purpose of this project is to provide contemporary surveys to update National Ocean Service (NOS) nautical charting products. This project will cover approximately 109 square nautical miles, of which approximately 87 square nautical miles are designated critical survey area, as designated in the NOAA Hydrographic Survey Priorities (NHSP), 2012 Edition.

A.3 Survey Quality

The entire survey is adequate to supersede previous data.

Leidos, formerly Science Applications International Corporation (SAIC), warrants only that the survey data acquired by Leidos and delivered to NOAA under Contract DG133C-08-CQ-0003 reflects the state of the sea floor in existence on the day and at the time the survey was conducted.

H12561 was surveyed in accordance with the following documents:
1. Project Instructions, OPR-D302-KR-13, dated 06 April 2012
2. Statement of Work, Hydrographic Survey Services, dated 11 April 2013
3. NOS Hydrographic Specifications and Deliverables, April 2013, released 18 April 2013 (HSSD)

A.4 Survey Coverage

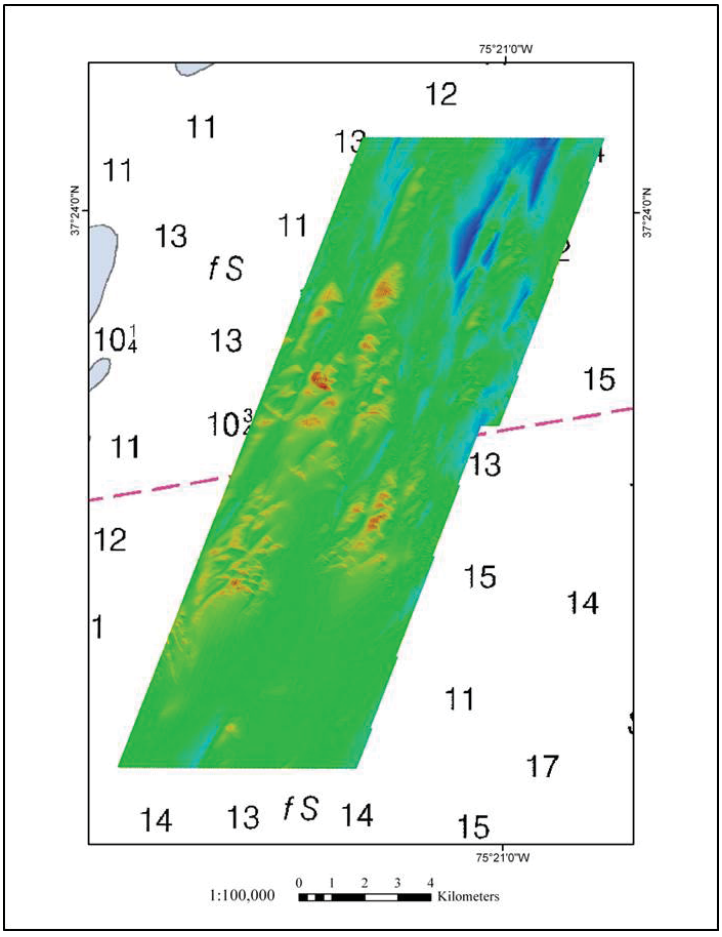

Figure 2: Final Bathymetry Coverage for H12561

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	*M/V Atlantic Surveyor*	*Total*
LNM	**SBES Mainscheme**	0	0
	MBES Mainscheme	0	0
	Lidar Mainscheme	0	0
	SSS Mainscheme	0	0
	SBES/MBES Combo Mainscheme	0	0
	SBES/SSS Combo Mainscheme	0	0
	MBES/SSS Combo Mainscheme	1188.88	1188.88
	SBES/MBES Combo Crosslines	103.63	103.63
	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			43.46

Table 2: Hydrographic Survey Statistics

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

Survey Dates	Julian Day Number
07/21/2013	202
07/22/2013	203
07/23/2013	204
07/24/2013	205
07/25/2013	206
07/26/2013	207
07/27/2013	208
07/28/2013	209
07/29/2013	210
07/30/2013	211
07/31/2013	212
08/01/2013	213
08/02/2013	214
08/03/2013	215
08/06/2013	218
09/30/2013	273
10/01/2013	274

Table 3: Dates of Hydrography

B. Data Acquisition and Processing

B.1 Equipment and Vessels

Leidos used their ISS-2000 software on a Windows XP platform to acquire these survey data. Survey planning and data analysis were conducted using the Leidos SABER software on Red Hat Enterprise 5 Linux platforms. L-3 Klein 3000 side scan data were collected on a Windows XP platform using L-3 Klein's SonarPro software. Subsequent processing and review of the side scan data, including the generation of coverage mosaics, were accomplished using SABER.

A detailed description of the systems and vessel used to acquire and process these data is included in the Data Acquisition and Processing Report (DAPR) for OPR-D302-KR-13, previously delivered with the H12559 Descriptive Report (DR) on 16 May 2014. There were no variations from the equipment configuration described in the DAPR.

B.1.1 Vessels

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

Hull ID	*M/V Atlantic Surveyor*
LOA	110 feet
Draft	9 feet

Table 4: Vessels Used

The M/V Atlantic Surveyor was used to collect multibeam sonar (RESON 7125 SV), side scan sonar (L-3 Klein 3000), and sound speed data during twenty-four hours per day survey operations.

A detailed description of the vessel used is included in Section A of the Data Acquisition and Processing Report (DAPR).

B.1.2 Equipment

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

Manufacturer	Model	Type
Teledyne RESON	Seabat 7125 SV	MBES
L-3 Klein	3000	SSS
Applanix	POS/MV 320	Positioning and Attitude System
Trimble	Probeacon	Positioning System
Rolls Royce	MVP-30	Sound Speed System

Table 5: Major Systems Used

A detailed description of the equipment installed is included in Section A of the Data Acquisition and Processing Report (DAPR).

B.2 Quality Control

B.2.1 Crosslines

Crosslines, acquired for this survey, totalled 8.7% of mainscheme acquisition.

There were 103.63 linear nautical miles of crosslines and 1188.88 linear nautical miles of main scheme lines surveyed on H12561. This resulted in crossline mileage approximately 8.7% of the main scheme mileage which meets the requirement (Section 5.2.4.3 of the HSSD) to achieve at least eight percent for a multibeam survey using set line spacing. The main scheme lines were orientated 21°/201° and spaced 65 meters apart. Crosslines were oriented 90°/270° and spaced 750 meters apart. Refer to the "Multibeam Processing Log" section within Separates I for information on the delineation of main scheme and crossline data files.

In the field, hydrographers conducted daily comparisons of main scheme to near nadir crossline data to ensure that no systematic errors were introduced and to identify potential problems with the survey system. After the application of all correctors and completion of final processing in the office, separate two-meter CUBE PFM grids were built. One grid contained the full valid swath (±60° from nadir) of main scheme multibeam data and the other included only the near nadir swath (±5° from nadir) crossline data. A difference grid was then generated by subtracting CUBE depths in the main scheme PFM from CUBE depths in the crossline PFM.

The SABER Frequency Distribution Tool was used to analyze the difference grid. Comparisons of all final crossing data in H12561 showed that 98.80% were within 30 centimeters. These comparisons fall within the requirement defined in Section 5.2.4.3 of the HSSD, which states that at least 95% of the depth difference values are to be within the maximum allowable total vertical uncertainty (calculated to be between 0.545 and 0.651 meters for the water depths observed in H12561). See Separates II for a complete discussion of the analysis and tabular results.

B.2.2 Uncertainty

The Total Propagated Uncertainty (TPU) model that Leidos has adopted had its genesis at the Naval Oceanographic Office (NAVOCEANO), and is based on the work by Rob Hare and others ("Error Budget Analysis for NAVOCEANO Hydrographic Survey Systems, Task 2 FY 01", 2001, HSRC FY01 Task 2 Final Report). Once the TPU model is applied to the GSF bathymetry data, each beam is attributed with the horizontal uncertainty and the vertical uncertainty at the 95% confidence level. For specific details on the use and application of the SABER Total Propagated Uncertainty model, see Section B.1 in the DAPR.

The vertical and horizontal uncertainty values that were estimated by the TPU model for individual multibeam soundings varied little across the dataset, tending to be most affected by beam angle in the multibeam data. During application of horizontal and vertical uncertainties to the GSF files, individual beams where either the horizontal or vertical uncertainty exceeded the maximum allowable IHO S-44 5th edition Order 1a specifications were flagged as invalid. As a result, all individual soundings used in development of the final CUBE depth surface had modeled vertical and horizontal uncertainty values at or below the allowable IHO S-44 5th edition, Order 1a uncertainty.

During the creation of the CUBE surface, two separate vertical uncertainty surfaces are calculated by the SABER software. One surface contains the standard deviation of all soundings that are contributing to the CUBE hypothesis (Hyp. StdDev) and the other contains the average of the vertical uncertainty of all soundings contributing to the CUBE hypothesis (Hyp. AvgTPU). A third vertical uncertainty surface is generated from the larger value of these two uncertainties at each node and is referred to as the Hypothesis Final Uncertainty (Hyp. Final Uncertainty). For specific details on this process, see Section B.2 of the DAPR.

The final two-meter PFM CUBE surface contained final vertical uncertainties that ranged from 0.270 to 0.749 meters. The IHO Order 1a maximum allowable vertical uncertainty was calculated to range between 0.545 to 0.651 meters, based on the minimum CUBE depth (16.686 meters) and maximum CUBE depth (32.098 meters). The SABER Check PFM Uncertainty function was used to highlight all instances in the Hypothesis Final Uncertainty surface where a given node exceeded the IHO Order 1a allowable vertical uncertainty for the CUBE depth at that node. The final two-meter PFM CUBE surface contained 57 CUBE nodes with final vertical uncertainties that exceeded IHO Order 1a allowable vertical uncertainty. The nodes that exceed the IHO Order 1a allowable vertical uncertainty for the CUBE depth were located on steep slopes and around features where there is a high variability in the depth soundings.

The SABER Check PFM Uncertainty function was also run on each of the four half-meter feature PFM Hyp. Final Uncertainty surfaces. The results are listed in Figure 3. As expected, there are higher numbers of nodes that exceed uncertainty limits due to the smaller node resolution and the high variability of sounding depths around features.

The SABER Frequency Distribution Tool was also used to review the Hyp. Final Uncertainty surface within the two-meter grid and four half-meter resolution PFM grids. The results show that in the two-meter PFM, 97.90% of all nodes had final uncertainties less than or equal to 0.300 meters. In the four individual feature PFM grids, at least 97.99% of all grid nodes contained total vertical uncertainties of 0.300 meters or less as listed in Figure 3.

Feature Area	Feature Number	Number of Cube Nodes Exceeding IHO Order 1a	Percent of Nodes with TVU ≤ 0.300
1	1	1	99.69%
2	2	4	99.65%
3	3	171	97.99%
4	4	5	99.85%

Figure 3: Number of Nodes Exceeding the Allowable IHO Order 1a Uncertainty in the Feature BAG Files 1 of 4 through 4 of 4

B.2.3 Junctions

An analysis of H12561 junctions with contemporary surveys H12395, H12397, and H12560 was performed. Note that the Project Instructions stated that junctions should be performed on H12396 as well; however, there were no overlapping data from H12561 and H12396. Figure 4 shows the general locality of H12561 as it relates to the sheets for which junctions were performed. Details for H12395, H12397, and H12560 are listed in Table 6. See Separates II for a complete discussion of the junction results and tabular listings.

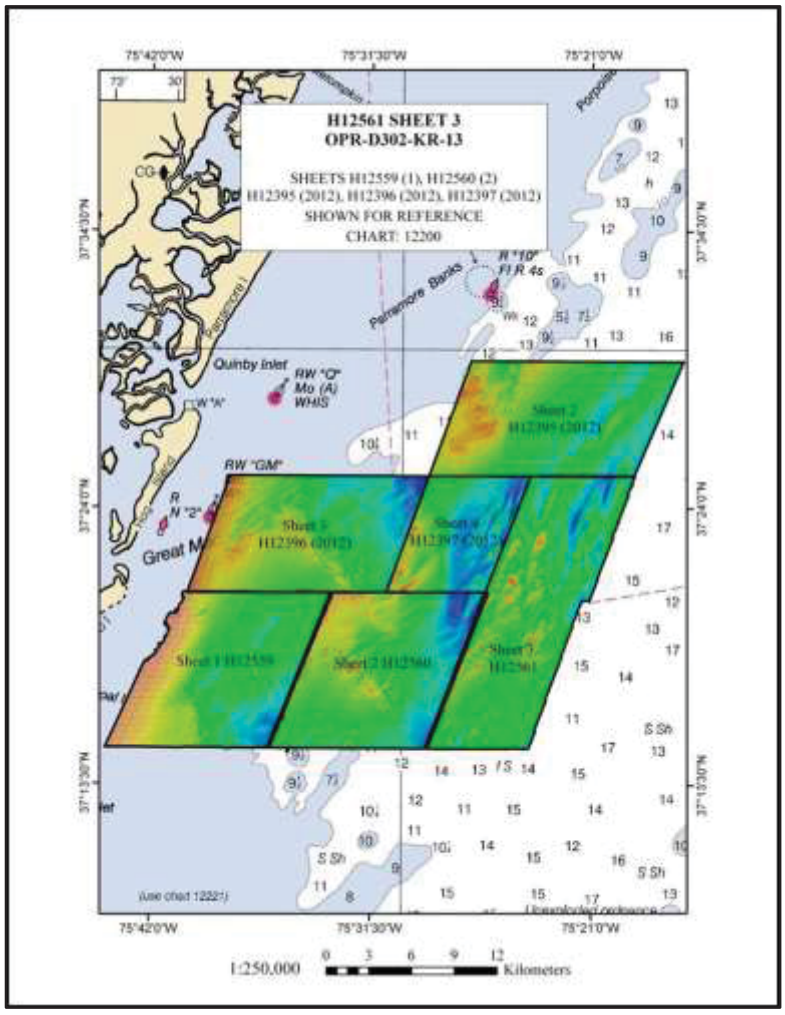

Figure 4: General Locality of H12561 with Contemporary Surveys

The following junctions were made with this survey:

Registry Number	Scale	Year	Field Unit	Relative Location
H12395	1:40000	2012	Leidos (formerly SAIC)	N
H12397	1:40000	2012	Leidos (formerly SAIC)	NW
H12560	1:40000	2013	Leidos (formerly SAIC)	SW

Table 6: Junctioning Surveys

H12395

H12561 junctions with H12395 to the north. 99.81% of the soundings differ by ±0.50 meters.

H12397

H12561 junctions with H12397 to the northwest. 97.33% of the soundings differ by ±0.50 meters.

H12560

H12561 junctions with H12560 to the southwest. 99.68% of the soundings differ by ±0.50 meters.

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

There were no other factors that affected corrections to soundings.

B.2.7 Sound Speed Methods

Sound Speed Cast Frequency: An MVP-30 was used to collect sound speed profile (SSP) data. SSP data were obtained at intervals frequent enough to meet depth accuracy requirements. Section 5.2.3.3 of the HSSD requires that if the sound speed measured at the sonar head differs by more than two meters/second from the commensurate profile data, then another cast shall be acquired. There were times when the sound speed values exceeded the two meters/second threshold due to the local temporal and tidal variability. During these times, several profiles were acquired and reapplied in an effort to reduce these effects. The product of this effort resulted in the final data bearing no significant artifacts due to sound speed differences.

Additional information can be found in Section A.8 of the DAPR.

A total of 490 sound speed profiles were applied to online data for H12561. All profiles that were applied for online bathymetry data collection were acquired within the bounds of the survey area. Please refer to the DAPR for specific details regarding acquisition (Section A.8) and application (Section C.1.3) of sound speed profiles.

Confidence checks of the sound speed profile casts were conducted periodically (approximately once per week) by comparing at least two consecutive casts taken with different SV and P Smart Sensors. Five sound speed confidence checks were conducted during H12561 and the results can be found in Separates II within the “Comparison Cast Log” section.

Sound speed profiles were obtained for four different survey purposes. The “Sound Speed Profile Log” section of Separates II is a cumulative report detailing each cast associated with H12561. The log is separated by the purpose of the applied cast; with individual tables for “Used for MB” (online bathymetry), “Used for Comparison”, “Used for Lead Line”, and “Used for Closing”. Additionally, in a separate folder on the delivery drive (H12561/Data/Processed/SVP/CARIS_SSP), there are four CARIS SSP files (.svp). These files contain concatenated SSP data that have been formatted for use in CARIS. The CARIS SSP files are designated based on the purpose of the cast and their filenames match the tables within the "Sound Speed Profile Log". All sound speed profile files delivered with the H12561 delivery data are broken out into sub-folders, which correspond to the purpose of each cast.

B.2.8 Coverage Equipment and Methods

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

B.2.9 Coverage Analysis

The Project Instructions specified coverage requirements in the survey area as “(1) 200% Side Scan Sonar (SSS) with concurrent Set Line Spacing Multibeam (MBES) and Backscatter, or (2) 200% SSS with concurrent Vertical Beam Echosounder (VBES), or (3) Object Detection MBES with Backscatter”. Leidos chose to meet the coverage requirements with 200% side scan with concurrent set line spacing using multibeam. To achieve this coverage the M/V Atlantic Surveyor used a towed L-3 Klein 3000 side scan sonar set to 75-meter range and multibeam main scheme line spacing at 65 meters. This survey scenario provided a consistent 100-meter side scan imagery swath and up to 20 meters of side scan overlap between adjacent lines within each 100% coverage.

The SABER Gapchecker routine was used to flag bathymetry data gaps exceeding the allowable limit of three contiguous nodes. Additionally, the entire surface was visually scanned for holidays at various points during the data processing effort. Additional survey lines were run to fill any holidays that were detected. A final review of the CUBE Depth surface in the two-meter grid showed that valid depths exist in 100% of the nodes and there were no areas where three or more nodes sharing adjacent sides lacked data.

All grids were examined for the number of soundings contributing to the chosen CUBE hypotheses for each node by running SABER’s Frequency Distribution Tool on the Hypothesis Number of Soundings (Hyp. # Soundings) surface of the PFM grid. The Hyp. # Soundings surface reports the number of soundings that were used to compute the chosen hypothesis. Analysis of the H12561 two-meter PFM grid revealed that 99.98% of all nodes contained three or more soundings; satisfying the requirements for set line spacing surveys, as specified in Section 5.2.2.3 of the HSSD.

Analysis of the four half-meter PFM grids showed that all had a minimum of 98.25% of all individual nodes contained five or more soundings to meet object detection coverage (HSSD Section 5.2.2.1).

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

In accordance with the April 2013 NOS HSSD and the Project Instructions, Leidos collected multibeam backscatter with all GSF data acquired by the RESON 7125 SV. The multibeam settings were checked to ensure acceptable quality standards were met and to avoid any acoustic saturation of the backscatter data. The multibeam backscatter data were written to the GSF in real-time by ISS-2000 and are delivered in the final GSF files for each sheet.

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
H12561_MB_2m_MLLW	BAG	2 meters	16.686 meters - 32.098 meters	N/A	MBES TracklineSBES Set Line Spacing

Surface Name	Surface Type	Resolution	Depth Range	Surface Parameter	Purpose
H12561_MB_50cm_MLLW_1of4	BAG	50 centimeters	22.397 meters - 26.630 meters	N/A	Object Detection
H12561_MB_50cm_MLLW_2of4	BAG	50 centimeters	22.878 meters - 25.255 meters	N/A	Object Detection
H12561_MB_50cm_MLLW_3of4	BAG	50 centimeters	24.684 meters - 27.223 meters	N/A	Object Detection
H12561_MB_50cm_MLLW_4of4	BAG	50 centimeters	24.352 meters - 25.731 meters	N/A	Object Detection
H12561_ss_1_100	SSS Mosaic	1 meters	-	N/A	100% SSS
H12561_ss_2_100	SSS Mosaic	1 meters	-	N/A	200% SSS

Table 7: Submitted Surfaces

A PFM CUBE Depth surface was used to assess and document multibeam survey coverage. The CUBE depth is populated with either the node's chosen hypothesis or the depth of a feature or designated sounding set by the hydrographer, which overrides the chosen hypothesis. The range of CUBE depths in H12561 was from 16.686 meters, 0.270-meter uncertainty (54 feet) to 32.098 meters, 0.300-meter uncertainty (105 feet). Section 5.2.2.3 of the HSSD requires a four-meter grid resolution for depths ranging from zero meters to 40 meters for set line spacing surveys. Due to the range of depths encountered on this project, Leidos requested and was granted permission to deliver all final grids at the higher two-meter node resolution. Therefore, final CUBE surfaces for H12561 were generated at two-meter grid node resolution. Over significant features, CUBE surfaces were generated at half-meter grid node resolution to meet the object detection specifications defined in Section 5.2.2.1 of the HSSD. Four significant features were identified in H12561 and four half-meter resolution PFM grids were generated to cover these features. Data within the half-meter resolution CUBE PFM grids also remain in the two-meter CUBE PFM grid.

The final gridded bathymetry data are delivered as Bathymetric Attributed Grids (BAG). The BAG files were exported from CUBE PFM grids as detailed in Section B.2.4 of the DAPR.

As of the date of delivery of H12561, CARIS does not support version 1.5.1 BAGs with optional surfaces. Therefore, BAG version 1.1.0 files are delivered. Since the BAG version 1.1.0 files only contain two surfaces, the standard CUBE Depth and Hyp. Final Uncertainty, BAGs will be delivered with the additional surfaces delivered as supplemental non-standard BAG files. These additional BAG files were generated through the same process as the standard BAG files. The version 1.1.0 BAG format only allows for a Depth surface and an Uncertainty surface. Therefore, each of the non-standard BAG files were created with the

CUBE Depth values populating the Depth surface of the BAG and each of the additional group surfaces listed below populating the Uncertainty surface of the BAG.

Please note when reviewing these additional, non-standard version 1.1.0 BAG files the file name designates the layer that populates the Uncertainty layer of the BAG (Figure 5). Please also note that when displayed the two layers of the BAG remain named Depth and Uncertainty. These non-standard BAGs are provided for review purposes only and are not intended to be used as archival products. These additional surfaces are referred to as Elevation Solution Group surfaces and Node Group surfaces.

Note that by definition, BAG files contain elevations not depths however; many software packages display a BAG elevation surface as a depth (positive values indicating water depth).

The Elevation Solution Group is made up of the following three surfaces:

· shoal elevation - the elevation value of the least-depth measurement selected from the sub-set of measurements that contributed to the elevation solution.
· number of soundings - the number of elevation measurements selected from the sub-set of measurements that contributed to the elevation solution.
· stddev - the standard deviation computed from all elevation values which contributed to any hypothesis within the node. Note that the stddev value is computed from all measurements contributing to the node, whereas shoal elevation and number of soundings relate only to the chosen elevation solution.

The Node Group is made up of the following two surfaces:

· hypothesis strength - the CUBE computed strength of the chosen hypothesis.
· number of hypotheses - the CUBE computed number of hypotheses.

BAG Filename	Comments
H12561_MB_2m_MLLW_CUBE_Depth_Node_Std_Dev	Standard Deviation (Elevation Solution) of 2.0-meter BAG
H12561_MB_2m_MLLW_CUBE_Depth_Hyp_Nmbr_of_Sndgs	Number of Soundings (Elevation Solution) of 2.0-meter BAG
H12561_MB_2m_MLLW_CUBE_Depth_Node_Shoal_Depth	Shoal Depth (Elevation Solution) of 2.0-meter BAG
H12561_MB_2m_MLLW_CUBE_Depth_Node_Hyp_Str	Hypothesis Strength (Node Group) of 2.0-meter BAG
H12561_MB_2m_MLLW_CUBE_Depth_Node_Nmbr_of_Hyp	Number of Hypotheses (Node Group) of 2.0-meter BAG
H12561_MB_50cm_MLLW_CUBE_Depth_Node_Std_Dev_1of4	Standard Deviation (Elevation Solution) of 0.50-meter BAG
H12561_MB_50cm_MLLW_CUBE_Depth_Hyp_Nmbr_of_Sndgs_1of4	Number of Soundings (Elevation Solution) of 0.50-meter BAG
H12561_MB_50cm_MLLW_CUBE_Depth_Node_Shoal_Depth_1of4	Shoal Depth (Elevation Solution) of 0.50-meter BAG
H12561_MB_50cm_MLLW_CUBE_Depth_Node_Hyp_Str_1of4	Hypothesis Strength (Node Group) of 0.50-meter BAG
H12561_MB_50cm_MLLW_CUBE_Depth_Node_Nmbr_of_Hyp_1of4	Number of Hypotheses (Node Group) of 0.50-meter BAG
H12561_MB_50cm_MLLW_CUBE_Depth_Node_Std_Dev_2of4	Standard Deviation (Elevation Solution) of 0.50-meter BAG
H12561_MB_50cm_MLLW_CUBE_Depth_Hyp_Nmbr_of_Sndgs_2of4	Number of Soundings (Elevation Solution) of 0.50-meter BAG
H12561_MB_50cm_MLLW_CUBE_Depth_Node_Shoal_Depth_2of4	Shoal Depth (Elevation Solution) of 0.50-meter BAG
H12561_MB_50cm_MLLW_CUBE_Depth_Node_Hyp_Str_2of4	Hypothesis Strength (Node Group) of 0.50-meter BAG
H12561_MB_50cm_MLLW_CUBE_Depth_Node_Nmbr_of_Hyp_2of4	Number of Hypotheses (Node Group) of 0.50-meter BAG
H12561_MB_50cm_MLLW_CUBE_Depth_Node_Std_Dev_3of4	Standard Deviation (Elevation Solution) of 0.50-meter BAG
H12561_MB_50cm_MLLW_CUBE_Depth_Hyp_Nmbr_of_Sndgs_3of4	Number of Soundings (Elevation Solution) of 0.50-meter BAG
H12561_MB_50cm_MLLW_CUBE_Depth_Node_Shoal_Depth_3of4	Shoal Depth (Elevation Solution) of 0.50-meter BAG
H12561_MB_50cm_MLLW_CUBE_Depth_Node_Hyp_Str_3of4	Hypothesis Strength (Node Group) of 0.50-meter BAG
H12561_MB_50cm_MLLW_CUBE_Depth_Node_Nmbr_of_Hyp_3of4	Number of Hypotheses (Node Group) of 0.50-meter BAG
H12561_MB_50cm_MLLW_CUBE_Depth_Node_Std_Dev_4of4	Standard Deviation (Elevation Solution) of 0.50-meter BAG
H12561_MB_50cm_MLLW_CUBE_Depth_Hyp_Nmbr_of_Sndgs_4of4	Number of Soundings (Elevation Solution) of 0.50-meter BAG
H12561_MB_50cm_MLLW_CUBE_Depth_Node_Shoal_Depth_4of4	Shoal Depth (Elevation Solution) of 0.50-meter BAG
H12561_MB_50cm_MLLW_CUBE_Depth_Node_Hyp_Str_4of4	Hypothesis Strength (Node Group) of 0.50-meter BAG
H12561_MB_50cm_MLLW_CUBE_Depth_Node_Nmbr_of_Hyp_4of4	Number of Hypotheses (Node Group) of 0.50-meter BAG

Figure 5: Summary of Non-standard H12561 BAG Files

B.5.3 Side Scan Coverage Analysis

For all details regarding side scan data processing, see Section B.3 of the DAPR. As stated in Section B.2.9, Leidos used 200% side scan sonar with resulting multibeam to meet the coverage requirements specified in the Project Instructions. The 200% side scan coverage was verified by generating two separate 100% coverage mosaics at one-meter cell size resolution as specified in Section 8.3.1 of the HSSD. The first and second 100% coverage mosaics were independently reviewed using tools in SABER to verify data quality and swath coverage. Both coverage mosaics are determined to be complete and sufficient to meet the requirements contained within the Project Instructions. The mosaics are delivered as TIFF (.tif) images with accompanying world files (.tfw).

· H12561_ss_1_100_mosaic
· H12561_ss_2_100_mosaic

Side scan sonar contacts were investigated and confirmed using SABER Contact Review. All side scan sonar contacts and accompanying images are delivered in a Side Scan Sonar Contacts S-57 file.

C. Vertical and Horizontal Control

No vertical or horizontal controls were established, recovered, or occupied during data acquisition for OPR-D302-KR-13, which includes H12561. Therefore a Horizontal and Vertical Control Report was not required.

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
Duck, NC	8651370

Table 8: NWLON Tide Stations

File Name	Status
8651370_verified_07102013_10062013.tid	Verified Observed

Table 9: Water Level Files (.tid)

File Name	Status
D302KR2013CORP.zdf	Final

Table 10: Tide Correctors (.zdf or .tc)

No final tide note was provided by the NOAA Center for Operational Oceanographic Products and Services (CO-OPS). Leidos is not required to have a final tide note from CO-OPS for H12561 however, a final tide note has been provided by Leidos in Appendix I.

The Project Instructions specified NOAA tide station 8651370 Duck, NC as the source for water level correctors. A full explanation of the tide zone assessment is detailed in Section C.4 of the DAPR. For H12561, 8651370 Duck, NC was the source of all final verified water level heights for determining

correctors to soundings. All data for H12561 were contained within two tide zones (SA46 and SA55) which were provided from NOAA.

Leidos did not revise the delivered tide zones for tide station 8651370 Duck, NC. The water level zoning parameters in file D302KR2013CORP.zdf, provided by National Ocean Service (NOS), were deemed adequate for the application of observed verified water levels. As a result, they were accepted as final and applied to all H12561 bathymetry data.

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 Zone 18, North.

Please refer to the DAPR for details regarding all antenna and transducer offsets.

Horizontal positioning of the multibeam transducer by the POS/MV was verified by frequent comparison checks against an independent DGPS system. During survey data acquisition, the ISS-2000 real-time system provided a continuous view of the positioning comparison between the POS/MV and the Trimble DGPS. An alarm was triggered within ISS-2000 if the comparisons were not within an acceptable range. Any soundings with total horizontal uncertainties exceeding the maximum allowable IHO S-44 5th edition Order 1a specifications were flagged as invalid and therefore not used in the CUBE Depth calculations. Daily positioning confidence checks for H12561 were conducted several times throughout the day and a daily value is presented as a table within Separates I, “Daily Positioning Confidence Checks”. Daily positioning confidence checks for the M/V Atlantic Surveyor were within 0.77 meters.

The following DGPS Stations were used for horizontal control:

DGPS Stations
Driver, VA (289 kHz)
Annapolis, MD (301 kHz)
New Bern, NC (294 kHz)

Table 11: USCG DGPS Stations

D. Results and Recommendations

D.1 Chart Comparison

The chart comparisons were conducted using the Leidos SABER software to view the BSB raster charts with overlain data for H12561 such as the CUBE gridded surface, selected soundings, contacts, and features. Charting recommendations for depths follow Section 5.1.2 of the HSSD where depths and uncertainties are to be rounded by standard arithmetic rounding (round half up) and accompanying chart depth units are rounded using NOAA cartographic rounding (0.75 round up). All CUBE depths and uncertainty values are provided to millimeter precision.

For ENC comparisons, a combination of Jeppesen's dKart Inspector, SevenCs' SeeMyDENC, and CARIS' EasyView were used in conjunction with SABER.

United States Coast Guard (USCG) District 1 Local Notice to Mariners publications were reviewed for changes subsequent to the date of the Hydrographic Survey Project Instructions and before the end of survey (as specified in Section 8.1.4 of the HSSD). The Notice to Mariners reviewed were from week 27/13 (02 July 2013) until week 41/13 (08 October 2013).

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
12210	1:80000	39	07/2013	04/29/2014	04/26/2014
12200	1:419706	50	07/2011	04/29/2014	04/26/2014

Table 12: Largest Scale Raster Charts

12210

Chart 12210 covers the survey area north of 37° 20' 40.00"N.

There were no federally maintained channels within H12561 on this chart.

CUBE depths within H12561 were generally within ±3 feet of the charted depths.

The charted depth curves (60-foot and 90-foot) were in general agreement with the H12561 survey data.

There were no charted soundings or features not specifically assigned as an AWOIS item within H12561 on this chart.

AWOIS items are discussed in Section D.1.3.

All new uncharted features found, assigned AWOIS items, and charted feature updates are documented in the Final Feature File (S-57).

12200

Chart 12200 covers the entire H12561 survey area.

There were no federally maintained channels within H12561 on this chart.

CUBE depths within H12561 were generally within ±0.5 fathoms of the charted depths.

The charted 10-fathom depth curve was in general agreement with the H12561 survey data.

There were no charted soundings or features not specifically assigned as an AWOIS item within H12561 on this chart.

AWOIS items are discussed in Section D.1.3.

All new uncharted features found, assigned AWOIS items, and charted feature updates are documented in the Final Feature File (S-57).

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?
US4VA70M	1:80000	14	10/30/2013	10/30/2013	NO
US3DE01M	1:419706	14	04/24/2013	04/28/2014	NO

Table 13: Largest Scale ENCs

US4VA70M

Chart US4VA70M covers the survey area to north of 37° 20’ 42.47”N.

There were no federally maintained channels within H12561 on this chart.

CUBE depths within H12561 were generally within ±1 meter of the charted depths.

The charted depth curves (18.2-meter and 27.4-meter) were in general agreement with the H12561 survey data.

There were no charted soundings or features not specifically assigned as an AWOIS item within H12561 on this chart.

AWOIS items are discussed in Section D.1.3.

All new uncharted features found, assigned AWOIS items, and charted feature updates are documented in the Final Feature File (S-57).

US3DE01M

Chart US3DE01M covers the entire H12561 survey area.

There were no federally maintained channels within H12561 on this chart.

CUBE depths within H12561 were generally within ±1.8 meters of the charted depths.

The charted 18.2-meter depth curve was in general agreement with the H12561 survey data

There were no charted soundings or features not specifically assigned as an AWOIS item within H12561 on this chart.

AWOIS items are discussed in Section D.1.3.

All new uncharted features found, assigned AWOIS items, and charted feature updates are documented in the Final Feature File (S-57).

D.1.3 AWOIS Items

Seven AWOIS items were assigned for full investigation for this project. No AWOIS items were located within the H12561 survey limits.

D.1.4 Maritime Boundary Points

No Maritime Boundary Points were assigned for this survey.

D.1.5 Charted Features

No charted features exist for this survey.

D.1.6 Uncharted Features

See the S-57 Final Feature File for all the details and recommendations regarding new uncharted features investigated.

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

No bottom samples were required for this survey.

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

The junction analysis with the contemporary H12395 (2012), H12397 (2012), and H12560 (2013) surveys were conducted and the results are presented in section B.2.3 of this Report.

D.2.3 Aids to Navigation

No Aids to navigation (ATONs) exist for this survey.

D.2.4 Overhead Features

No overhead features exist for this survey.

D.2.5 Submarine Features

No submarine features 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

No present or planned construction or dredging exist within the survey limits.

D.2.10 Designated Soundings

Designated soundings were used to help better preserve the shallowest sounding relative to the computed depth surface. Separate flags exist in the Generic Sensor Format (version 3.04) for designated soundings and features. All depths flagged as features and designated soundings override the CUBE best estimate of the depth in the final BAG files. Both the designated soundings and features flags as defined within GSF are mapped to the same HDCS flag when ingested into CARIS (PD_DEPTH_DESIGNATED_MASK).

Two designated soundings were set for H12561 to preserve the least depth on non-significant objects. The difference between the least depth of these objects and the CUBE depth was more than one-half the maximum allowable total vertical uncertainty at that depth.

D.2.11 Final Feature S-57 File

Included with the H12561 delivery is the S-57 Final Feature File, H12561_FFF.000. Details on how this file was generated and quality controlled can be found in Section B.2.6 of the DAPR. The S-57 feature file delivered for H12561 contains millimeter precision for the value of sounding (VALSOU) attribute. As specified in Section 8.2 of the HSSD, the S-57 feature file is in the WGS84 datum and is unprojected with all depth units in meters. All of the features found in H12561 are retained within the S-57 Final Feature File.

Feature Correlator sheets were exported as image files (.jpg) and were included in the S-57 Final Feature File under the NOAA Extended Attribute field “images” where applicable.

D.2.12 Side Scan Sonar Contacts S-57 File

Included with the H12561 delivery is the Side Scan Sonar Contact S-57 File, H12561_SSCon.000. Details on how this file was generated and quality controlled can be found in Section B.2.6 of the DAPR. As specified in Section 8.2 of the HSSD, the S-57 feature file is in the WGS84 datum and is unprojected with all depth units in meters.

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, 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	2014-05-16
Descriptive Report, H12559	2014-05-16
Descriptive Report, H12560	2014-05-23

Approver Name	Approver Title	Approval Date	Signature
Jason M. Infantino	Lead Hydrographer	05/30/2014	Jason M. Infantino Digitally signed by Jason M. Infantino DN: cn=Jason M. Infantino, o=Marine Survey and Engineering Solutions, ou=Leidos, email=infantinoj@leidos.com, c=US Date: 2014.05.29 10:34:28 -04'00'

F. Table of Acronyms

Acronym	Definition
ACD	Automatic Contact Detection
AHB	Atlantic Hydrographic Branch
ATON	Aid to Navigation
AWOIS	Automated Wreck and Obstruction Information System
BAG	Bathymetric Attributed Grid
CO-OPS	Center for Operational Products and Services
CTD	Conductivity Temperature Depth
CSF	Composite Source File
CUBE	Combined Uncertainty and Bathymetry Estimator
DAPR	Data Acquisition and Processing Report
DGPS	Differential Global Positioning System
DP	Detached Position
DPC	Data Processing Center
DR	Descriptive Report
DTON	Danger to Navigation
ENC	Electronic Navigational Chart
EPF	Error Parameters File
FFF	Final Feature File
GAMS	GPS Azimuth Measurement Subsystem
GPS	Global Positioning System
GSF	Generic Sensor Format
HSD	Hydrographic Surveys Division
HSSD	Hydrographic Survey Specifications and Deliverables
HVCR	Horizontal and Vertical Control Report
IHO	International Hydrographic Organization
IMU	Inertial Measurement Unit
LNM	Local Notice to Mariners
LNM	Linear Nautical Miles
ISS-2000	Integrated Survey System 2000
ISSC	Integrated Survey System Computer
JD	Julian Day
MBES	Multibeam Echosounder
MCD	Marine Chart Division

Acronym	Definition
MHW	Mean High Water
MLLW	Mean Lower Low Water
MVE	Multi-View Editor
MVP	Moving Vessel Profiler
NAD 83	North American Datum of 1983
NM	Notice to Mariners
NOAA	National Oceanic and Atmospheric Administration
NOS	National Ocean Service
OCS	Office of Coast Survey
PFM	Pure File Magic
POS/MV	Position and Orientation System for Marine Vessels
PRF	Project Reference File
SABER	Survey Analysis and area Based EditoR
SBES	Singlebeam Echosounder
SNM	Square Nautical Miles
SSS	Side Scan Sonar
SSP	Sound Speed Profiler
TPU	Total Propagated Uncertainty
USCG	United Stated Coast Guard
UTM	Universal Transverse Mercator
ZDF	Zone Definition File

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	Executive Officer
ZDA	Global Positiong System timing message
ZDF	Zone Definition File

APPENDIX I

TIDES AND WATERLEVELS

APPENDIX I. TIDES AND WATER LEVELS

Field Tide Note

A field tide note was not required for H12561.

Final Tide Note

Observed verified water levels for the station in Duck, NC (8651370) were downloaded from the NOAA Tides and Currents web site. Water level correctors were prepared for each zone using the **SABER Create Water Level Files** software. The **SABER Apply Correctors** software applied the water level data to the multibeam data according to the zone containing the nadir beam of each ping.

Please refer to the H12561 Descriptive Report Section C.1 for details regarding final tides for H12561. The water level zoning correctors, based entirely on Duck, NC (8651370), were applied to all multibeam data for H12561.

No final tide note was provided by NOAA Center for Operational Oceanographic Products and Services (CO-OPS), Leidos is not required to have a final tide note from CO-OPS.

The on-line times for acquisition of valid hydrographic data are presented in the Abstract Times of Hydrography, H12561 (Table A-1).

Abstract Times of Hydrography

Project: OPR-D302-KR-13
Registry #: H12561
Contractor Name: Leidos
Date: 30 May 2014
Sheet Designation: 3
Inclusive Dates: 21 July 2013 – 01 October 2013
Field work is complete.

Begin Date	Begin Julian Day	Begin Time	End Date	End Julian Day	End Time
7/21/2013	202	01:59:13	7/25/2013	206	10:55:42
7/26/2013	207	22:22:43	7/29/2013	210	04:39:10
7/30/2013	211	17:53:37	8/03/2013	215	16:37:15
8/06/2013	218	01:18:25	8/06/2013	218	02:45:41
9/30/2013	273	21:13:36	10/01/2013	274	01:15:03

Table A-1: Abstract Times of Hydrography, H12561

Transmittal Letter to CO-OPS

A transmittal letter to CO-OPS was not required for H12561.

Other Correspondence Relating to Tides

There is no other correspondence relating to tides and/or water levels.

APPENDIX II

SUPPLEMENTAL SURVEY RECORDS AND COORESPONDENCE

APPENDIX II. SUPPLEMENTAL SURVEY RECORDS AND CORRESPONDENCE

This appendix contains copies of email exchanges between Leidos and NOAA concerning various aspects of the survey, data processing, and submittal topics. Note that there were no DTONs submitted for this sheet.

CORRESPONDENCE

From: Lucy Hick - NOAA Federal [mailto:lucy.hick@noaa.gov]
Sent: Thursday, December 06, 2012 3:57 PM
To: Evans, Rhodri E.
Cc: Mark Lathrop - NOAA Federal; Marc Moser - NOAA Federal; Melissa Sampson - NOAA Federal; Corey
Allen - NOAA Federal
Subject: Re: Draft Project Area & Instructions for OPR-D302-KR-13

Rod,

Yes. If you choose to use the 200% Side Scan Sonar (SSS) with concurrent Set Line Spacing Multibeam (MBES) and Backscatter method (Option #1), please use HSSD sections 5.2.2.3 and 6.0 (and subsections) to determine the requirements.

It is worthwhile to note that the use of sidescan sonar to meet object detection requirements does not alleviate the responsibility to investigate features or acquire splits. All significant shoals and features found in waters less than 30m deep shall be developed to the object detection standards described in HSSD 5.2.2.1.

Best Regards,
Lucy

On Thu, Dec 6, 2012 at 3:31 PM, Evans, Rhodri E. <RHODRI.E.EVANS@saic.com> wrote:
Lucy,

We looked at #6 below, and apologize for our error in mixing up the sheets/years. The junctioning you provide in the draft PI is correct.

We have a question on the coverage type and the node resolution we should be using for the "200% side scan sonar and set line spacing multibeam" option. If this option is employed, is section 5.2.2.3 Set Line Spacing the applicable Coverage and Resolution for multibeam grids? See table reproduced from page 90 in the Hydrographic Surveys Specifications and Deliverables (2012 Edition).

Depth Range (m)	Resolution (m)
0-20	2
16-40	4

Thanks Rod.

From: Evans, Rhodri E.
Sent: Thursday, December 06, 2012 2:50 PM
To: Lucy Hick - NOAA Federal

Cc: Mark Lathrop - NOAA Federal; Marc Moser - NOAA Federal; Melissa Sampson - NOAA Federal; Corey
Allen - NOAA Federal
Subject: RE: Draft Project Area & Instructions for OPR-D302-KR-13

Lucy,

Thanks for these very thorough answers. We will get back to you on #6.

Regards, Rod.

From: Lucy Hick - NOAA Federal [mailto:lucy.hick@noaa.gov]
Sent: Thursday, December 06, 2012 2:42 PM
To: Evans, Rhodri E.
Cc: Mark Lathrop - NOAA Federal; Marc Moser - NOAA Federal; Melissa Sampson - NOAA
Federal; Corey Allen - NOAA Federal
Subject: Re: Draft Project Area & Instructions for OPR-D302-KR-13

Dear Rod,

See replies in-line below and the attached revised draft Project Instructions. Please note that these Project Instructions are still subject to change based on budgetary or other requirements.

Let me know if you have any additional questions.

Best Regards,
Lucy

On Thu, Dec 6, 2012 at 11:04 AM, Evans, Rhodri E. <RHODRI.E.EVANS@saic.com> wrote:
Good morning Lucy,

Further to receipt and review of your draft PI for the 2013 Coastal Virginia project (OPR-D302-KR-13), SAIC has the following questions and requests for clarification:

1. The PI state under Purpose and Location: "…approximately 87 square nautical miles…", The details on page 2 add up to 109. Please confirm that the 3 sheets totaling 109 sq. nautical miles are the applicable survey;
The entire survey is 109 SNM, however only 87 SNM are designated critical by the 2012 NHSP document. For clarification, I will change the Purpose and Location text to read:

"The purpose of this project is to provide contemporary surveys to update National Ocean Service (NOS) nautical charting products. This project will cover

approximately 109 square nautical miles, of which approximately 87 square nautical miles are designated critical survey area, as designated in the NOAA Hydrographic Survey Priorities (NHSP), 2012 Edition."

2. Inshore Limit: "There is no inshore limit defined for this survey." Previous inshore limits were defined as "The inshore limit of hydrography will be the farthest offshore of the following: (1) the 24-foot depth contour or (2) the inshore limit depicted graphically." The northwest corner of Sheet 1 falls inshore of the 18-foot depth curve and extends almost to the 12-foot depth curve. Is SAIC required to survey to this limit as depicted graphically?

The inshore limit was pushed to the west, in order to accommodate the full radius of two assigned AWOIS items. We do not intend for you to acquire data inshore of the 24-foot depth contour, with the expection of these two AWOIS items. I will re-instate the Inshore Limit requirement in the PIs as follows:

"The inshore limit of hydrography will be the farthest offshore of the following: (1) the 24-foot depth contour with the exception of the area covered by the search radius of any assigned AWOIS items or (2) the inshore limit depicted graphically."

3. Coverage Type: "Object Detection" This is contrary to the description of the Coverage Required which states "200% Side Scan Sonar (SSS) with concurrent Set Line Spacing Multibeam (MBES) and Backscatter, or 200% SSS with concurrent Vertical Beam Echosounder (VBES), or Object Detection MBES with Backscatter " which is Set Line Spacing coverage except for Object Detection coverage on significant features. Please clarify;

We require you to perform object detection coverage and provide you with three options for obtaining this coverage:

(1) 200% Side Scan Sonar (SSS) with concurrent Set Line Spacing Multibeam (MBES) and Backscatter, or
(2) 200% SSS with concurrent Vertical Beam Echosounder (VBES), or (3) Object Detection MBES with Backscatter

According to the HSSD section 6, "...the use of side scan sonar may be required for supplementing echo-sounding by searching the region between regular sounding lines for additional indications of dangers and bathymetric irregularities to meet object detection requirements." I understand that this may seem contrary to HSSD section 5.2.2, which states, "Object Setection Coverage...[is] attainable only with multibeam sonars."

However, the intention is that object detection coverage can be obtained by either 100% MBES, as described in HSSD section 5.2.2.1 or 200% SSS, as described in HSSD section 6 (and subsections).

I plan to propose some verbiage changes to the 2013 HSSD in order to clarify this. In the meantime, please note that for OPR-D302-KR-13, any of the above mentioned acquisition methods is valid for obtaining object detection coverage.

4. Please confirm that Backscatter data is required to be acquired. Further, is there a requirement to process any of the backscatter data and incorporate this into a deliverable product?;
We do indeed intend for you to acquire backscatter data for this project. There is no requirement to process the backscatter data. You will only be required to deliver the raw backscatter data. There is no requirement for incorporation into any other deliverable product. Please note that the collection of quality MBES bathymetry is a priority over the collection of MBES backscatter and shall not be compromised when acquiring MBES data.

5. Please confirm that no bottom samples are required.
We have used the criteria that for areas where prior surveys were conducted after 1970, no bottom samples will be required. In this case, the entire area was previously surveyed in 1981. Therefore, we will not be requiring bottom samples for this project.

6. Junctions: Please add Registry number H12337 (40000, 2011, SAIC, N) which junctions Sheet 3 to the north.
Our survey database does not show 12337 as junctioning with any sheets in this project. Instead, H12395 (40000, 2012, SAIC, N) junctions with Sheet 3 to the north. See graphic below. Please advise.

7. Please provide the project CSF, PRF, and AWOIS files as soon as they are ready.
I am still working on putting together the CSF and PRF. In the meantime, for your convenience, please find attached the AWOIS files in ESRI Shapefile format. Please note that these are subject to change, based on budgetary and other requirements.

8. Based on the 2012 tide zoning for Duck (8651370), we request additional Tide Zoning for the west side of Sheet 1.
We will provide you with updated tide zoning, which covers the complete assigned survey area for the 2013 project, as soon as it is ready.

Thanks in advance.

Regards, RE.
Rod Evans Ph.D | SAIC
Assistant Vice President
Acting Site Manager Newport/Mystic & Hydrographic Survey Services Manager
Marine Survey and Engineering Solutions
ph: 401.848.4783 | cell: 401.439.1037 | e: evansrh@saic.com

Science Applications International Corporation
221 Third Street, Building A
Newport, RI 02840 USA.
www.saic.com

From: Lucy Hick - NOAA Federal [mailto:lucy.hick@noaa.gov]
Sent: Thursday, November 29, 2012 11:18 AM
To: Evans, Rhodri E.
Cc: Marc Moser - NOAA Federal; Corey Allen - NOAA Federal; Mark Lathrop - NOAA Federal; Melissa
Sampson - NOAA Federal
Subject: Draft Project Area & Instructions for OPR-D302-KR-13

Dear Rod,

My name is Lucy Hick. I am a Physical Scientist with NOAA's Office of Coast Survey's (OCS) Hydrographic Surveys Division (HSD). While Mark Lathrop remains the COR for your contract, I will be acting as the primary point of contact for the 2013 Coastal Virginia project. Please direct all future communication to both Mark and me.

I am sending you both the proposed project area and the draft Project Instructions for the 2013 Coastal Virginia project (OPR-D302-KR-13). Please be away that these are both subject to change, as there may be further modifications due to budget or other requirements. However, I am providing this information for your convenience in order to help prepare for the upcoming negotiation process.

Please let me know if you have any questions regarding either the proposed survey area or the draft Project Instructions.

Best Regards,
Lucy

Lucy Hick
Physical Scientist / COR-In-Training
Hydrographic Surveys Division - Operations Branch
Office of Coast Survey
National Oceanic & Atmospheric Administration
(301) 713-2702 x125
Lucy.Hick@noaa.gov

From: Lucy Hick - NOAA Federal [mailto:lucy.hick@noaa.gov]
Sent: Wednesday, April 03, 2013 11:09 AM
To: Evans, Rhodri E.
Cc: Melissa Sampson - NOAA Federal; Mark Lathrop - NOAA Federal; Megan Greenaway - NOAA Federal; Karen Hart
Subject: Extended Attribute Files

Rod,
The following CARIS files customized and maintained by the Hydrographic Surveys Division are used by OCS during acquisition and processing:
Profiles_Pools_ProductInfo
* Atr_lut.txt
* Obj_lut.txt
* NOAA Profile Version #.#.#.xml
* NOAAunifiedPool.xml
* S57productinfo_NOAA.xml

Symbolization
* psymrefs.dic
* psymreft.dic

System_Files
* NOAA_cataloguecontrol.xml

When using the NOAA Customized Attribute files the following items should be noted:
* To install the customized files into the appropriate CARIS folders follow the Install_readme_v#_#_#.txt file.
* The BathyExtensionPool. xml and the notebookPool.xml are included in this package but they are managed by CARIS, not NOAA HSD. The Bathy pool and Notebook pool are referenced by NOAA's customized Catalogue Control file and therefore both of these pool files must reside in the \System\S57Config\system folders for all of the CARIS applications that utilize NOAA customized files. By default, CARIS installs the BathyExtensionPool.xml file into the CARIS\BDB\40\System\S57Config\system folder and the notebookPool.xml file into the CARIS\Notebook\31\System\S57Config\system folder.
* Ensure the CARIS Environment is set to point to the correct:
  - XML Catalogue Control File -> NOAA_cataloguecontrol.xml
  - Object Catalogue File -> NOAA Profile Version #.#.#.xml
  - S57 Product Info File -> S57productinfo_NOAA.xml

The latest version of NOAA's Customized Attribute files are contained in the attached zip file.

If you have questions regarding NOAA's customized files please contact Megan Greenaway in HSD Operations at megan.greenaway@noaa.gov 757-441-6746 x209.
For further information regarding CARIS pools, profiles, and catalogs contact Karen Hart in CARIS US at karen.hart@caris.com 703-299-9712 x12.
Best Regards,
Lucy

From: Lucy Hick - NOAA Federal [mailto:lucy.hick@noaa.gov]
Sent: Monday, April 29, 2013 4:36 PM
To: Evans, Rhodri E.
Cc: Quintal, Rebecca T.; Melissa Sampson - NOAA Federal; Mark Lathrop - NOAA Federal
Subject: Survey Outline Deliverables

Rod,

The Statement of Work, Section 6.6, has been revised to include the requirement to provide the survey outlines in a .000 format. You can reference the 2013 Hydrographic Specifications and Deliverable (HSSD), Section 8.1.2, for more detail. It is not a requirement to follow the 2013 HSSD other than this specific section.

I have attached 2013 HSSD and an updated version of the draft SOW for TO#8, which includes this change.
Please contact me if you have questions regarding this change.

Thank you,
Lucy

Lucy Hick
Physical Scientist / COR Level 1
Hydrographic Surveys Division - Operations Branch
Office of Coast Survey
National Oceanic & Atmospheric Administration
(301) 713-2702 x125
Lucy.Hick@noaa.gov

From: Lucy Hick - NOAA Federal [mailto:lucy.hick@noaa.gov]
Sent: Thursday, May 30, 2013 4:56 PM
To: Evans, Rhodri E.
Cc: Mark Lathrop - NOAA Federal; Melissa Sampson - NOAA Federal; Marc Moser - NOAA Federal
Subject: Re: DG133C-08-0003, T008 (SAIC)

Rod,
I am pleased to hear that this Task Order has finally been awarded. Once you have an idea of your schedule, I'd like to discuss a convenient time to come down for a site visit. Also, for this Task Order, we will be using NOAA's Task Order Management & Information System (TOMIS). You have already been assigned as the SAIC POC in TOMIS.
One of the requirements for TOMIS is the establishment of a very high level Deliverable Schedule. We are asking you to define a set of major deliverables, as well as their

expected due date. Once these are established in TOMIS, you should receive automatic reminders when a deliverable is due.

I am attaching a blank Excel Deliverable Tracking Log spreadsheet. Please fill complete this Log for your major deliverables and return to me, so that I can enter the information into TOMIS. For your reference, I am also attaching an example spreadsheet with instructions.
Please let me know if you have any questions.
I am looking forward to working with you on this project.

Best Regards,
Lucy

Lucy Hick
Physical Scientist / COR Level 1
Hydrographic Surveys Division - Operations Branch
Office of Coast Survey
National Oceanic & Atmospheric Administration
(301) 713-2702 x125
Lucy.Hick@noaa.gov

Castle Parker - NOAA Federal

From: Lucy Hick - NOAA Federal
Sent: Wednesday, October 15, 2014 1:17 PM
To: Mark Lathrop - NOAA Federal
Cc: Castle Parker - NOAA Federal
Subject: Re: SAIC status report

Gene,

As Mark stated, the request for an extension was approved and I believe that the new due dates for delivery of the Surveys were as follows:

H12559 -- 5/16/2014
H12560 -- 5/23/2014
H12561 -- 5/30/2014

If I remember correctly, Leidos did submit their surveys by those due dates. If this is not the case, let me know and I can look into it further.

Lucy

On Wed, Oct 15, 2014 at 12:48 PM, Mark Lathrop - NOAA Federal <mark.t.lathrop@noaa.gov> wrote:
Gene,

Here is an e-mail string that includes the request for extension of D302-KR-13. The rationale was to concentrate on the Hurricane Sandy survey and subsequent processing due to the urgency of that project.

Mark

---------- Forwarded message ----------
From: **Evans, Rhodri E.** <RHODRI.E.EVANS@leidos.com>
Date: Wed, Nov 20, 2013 at 1:59 PM
Subject: RE: SAIC status report
To: Mark Lathrop - NOAA Federal <mark.t.lathrop@noaa.gov>
Cc: Lucy Hick - NOAA Federal <lucy.hick@noaa.gov>, "Quintal, Rebecca T." <REBECCA.T.QUINTAL@leidos.com>, "Lepore, Christine A." <CHRISTINE.A.LEPORE@leidos.com>

Thank you Mark. We'll stand by to hear more from you.

Regards, Rod.

From: Mark Lathrop - NOAA Federal [mailto:mark.t.lathrop@noaa.gov]
Sent: Wednesday, November 20, 2013 1:59 PM

To: Evans, Rhodri E.
Cc: Lucy Hick - NOAA Federal; Quintal, Rebecca T.; Lepore, Christine A.

Subject: Re: SAIC status report

Rod,

Lucy and I would like to discuss an extension to Task Order 8 with Jeff and Mike when they return to the office next week. That said, I don't foresee any difficulty in approving this extension.

Mark

On Wed, Nov 20, 2013 at 1:33 PM, Evans, Rhodri E. <RHODRI.E.EVANS@leidos.com> wrote:

Mark & Lucy,

Do you have an update on Lucy's potential visit to Newport?

The main reason that I ask is because we were planning to talk to you about a potential extension (a no-cost PoP adjustment of 3 or 4 months) on TO08. When the task order was awarded earlier this year I voiced some concern to Mark about the short PoP and particularly once TO09 was awarded shortly thereafter. Mark, you may recall that you advised we should request any PoP extension later this year (2013) if we deemed appropriate and necessary.

As you will have witnessed from the numerous Danger to Navigation reports from the NY-NJ Task Order 09, the data processing effort is very significant on TO09. We are trying to close out the survey acquisition and re-commencing this week, but it will extend into December before we are fully confident that all specifications are met and the survey can be completed. We are currently putting resource priority on TO09.

It would be tremendously beneficial for planning of staffing and execution of the task if we could extend the final deliveries of all TO08 deliverables through to the end of May 2014 versus the current PoP of January 31, 2014.

Please advise at your earliest convenience if you can accommodate this changed PoP request for TO08 (Virginia).

Regards, Rod.

Rod Evans Ph.D | Leidos

Branch Manager (Marine Survey and Engineering Solutions Branch)

Survey & Marine Operations Business Area Manager (Newport RI-San Diego CA)

Maritime Solutions Division | Maritime Systems Operation

phone: 401.848.4783

evansrh@leidos.com | leidos.com/natsec

From: Lucy Hick - NOAA Federal [mailto:lucy.hick@noaa.gov]

Sent: Monday, October 21, 2013 9:35 AM
To: Evans, Rhodri E.
Cc: Mark Lathrop - NOAA Federal; Quintal, Rebecca T.; Melissa Sampson - NOAA Federal
Subject: Re: SAIC status report

Hi Rod,

I am assuming that data acquisition for TA#8 is 100% complete?

I would like to discuss the possibility for a visit to your Newport office for a day to learn about your data processing methods and to address any issues/concerns that you may have. Would the sometime in the first half of November be a possibility?

Lucy

On Mon, Oct 21, 2013 at 9:23 AM, Evans, Rhodri E. <RHODRI.E.EVANS@leidos.com> wrote:

Mark,

Status Report via email reference:

- Task Order OMNI TO#8 Coastal Virginia Sheets 1-3
- Task Order OMNI TO#9 New York Harbor and Approaches Sheet 1-2

Task Order OMNI TO#8 Coastal Virginia, Sheets 1-3:

The demobilization of the survey vessel was completed on Saturday October 19, 2013 in the home port of Point Pleasant, NJ.

Data processing is ongoing in the Newport, RI data center.

Task Order OMNI TO#9 New York Harbor and Approaches, Sheet 1-2:

Both the Divemasters 30' R/V Oyster Bay and Alpine's 45' R/V Henry Hudson continue to survey on H12586 and some gap fills and item investigations on H12587. We experienced some weather downtime this past week.

We are currently ~79% complete on Sheet 1 (H12586), ~97% complete on Sheet 2 (H12587), and ~89% complete overall on this 2-sheet survey.

We will very probably demobilize the R/V Henry Hudson this week and continue to close-out the survey with the R/V Oyster Bay only.

The next status report will be on Monday, October 28, 2013.

Regards, Rod.

Rod Evans Ph.D | Leidos

Branch Manager (Marine Survey and Engineering Solutions Branch)

Survey & Marine Operations Business Area Manager (Newport RI-San Diego CA)

Maritime Solutions Division | Maritime Systems Operation

phone: 401.848.4783

evansrh@leidos.com | leidos.com/natsec

--

Lucy Hick
Physical Scientist / COR Level 1

Hydrographic Surveys Division - Operations Branch
Office of Coast Survey

National Oceanic & Atmospheric Administration
(301) 713-2702 x107
Lucy.Hick@noaa.gov

--

Lucy Hick
Acting Team Lead | COR-II
Operations Branch | Hydrographic Surveys Division
Office of Coast Survey | National Oceanic & Atmospheric Administration
(301) 713-2702 x107 | Lucy.Hick@noaa.gov

APPENDIX III

FEATURES REPORT
(No DTONS, AWOIS, WRECK or MARITIME BOUNDARIES)

APPROVAL PAGE

H12561

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

- H12561_DR.pdf
- Collection of depth varied resolution BAGS
- Processed survey data and records
- H12561_GeoImage.pdf

The survey evaluation and verification has been conducted according to current OCS Specifications, and the survey has been approved for dissemination and usage of updating NOAA's suite of nautical charts.

Approved: _____

Lieutenant CommanderMatthew Jaskoski, NOAA
Chief, Atlantic Hydrographic Branch