H13302

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

DESCRIPTIVE REPORT

Type of Survey:	Basic Hydrographic Survey
Registry Number:	H13302

LOCALITY

State(s):	Virginia
General Locality:	Southern Chesapeake Bay
Sub-locality:	3 NM West of Tail of the Horseshoe

2020

CHIEF OF PARTY
Paul L. Donaldson

LIBRARY & ARCHIVES

Date:

U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION	REGISTRY NUMBER:
HYDROGRAPHIC TITLE SHEET	**H13302**

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:	**Southern Chesapeake Bay**
Sub-Locality:	**3 NM West of Tail of the Horseshoe**
Scale:	**10000**
Dates of Survey:	**11/11/2019 to 06/27/2020**
Instructions Dated:	**08/27/2019**
Project Number:	**OPR-E350-KR-19**
Field Unit:	**Leidos**
Chief of Party:	**Paul L. Donaldson**
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: EA-133C-14-CQ-0033/TO-0006. Contractor: Leidos, 221 Third Street, Newport, RI 02840 USA. Subcontractors: Divemasters, Inc., 15 Pumpshire Road, Toms River, NJ 08753; OARS, 8705 Shoal Creek Blvd, Suite 109, Austin, TX 78757. Leidos Doc. 20-TR-022. All times were recorded in UTC. Final data are corrected to North American Datum of 1983 (NAD83) 2011 realization 2010, (NAD83(2011)2010.0), UTM Zone 18N.

Any revisions to the Descriptive Report (DR) applied during office processing are shown in red italic text. The DR is maintained as a field unit product, therefore all information and recommendations within this report are considered preliminary unless otherwise noted. The final disposition of survey data is represented in the NOAA nautical chart products. All pertinent records for this survey are archived at the National Centers for Environmental Information (NCEI) and can be retrieved via https://www.ncei.noaa.gov/. Products created during office processing were generated in NAD83 UTM 18N, MLLW. All references to other horizontal or vertical datums in this report are applicable to the processed hydrographic data provided by the field unit.

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Descriptive Report to Accompany Survey H13302

Project: OPR-E350-KR-19

Locality: Southern Chesapeake Bay

Sublocality: 3 NM West of Tail of the Horseshoe

Scale: 1:10000

November 2019 - June 2020

Leidos

Chief of Party: Paul L. Donaldson

A. Area Surveyed

The area surveyed was a section of the Southern Chesapeake Bay 3 NM West of Tail of the Horseshoe (Figure 1).

A.1 Survey Limits

Data were acquired within the following survey limits:

Northwest Limit	Southeast Limit
37° 09' 02.89" N 076° 13' 03.27" W	36° 58' 04.07" N 076° 07' 42.57" W

Table 1: Survey Limits

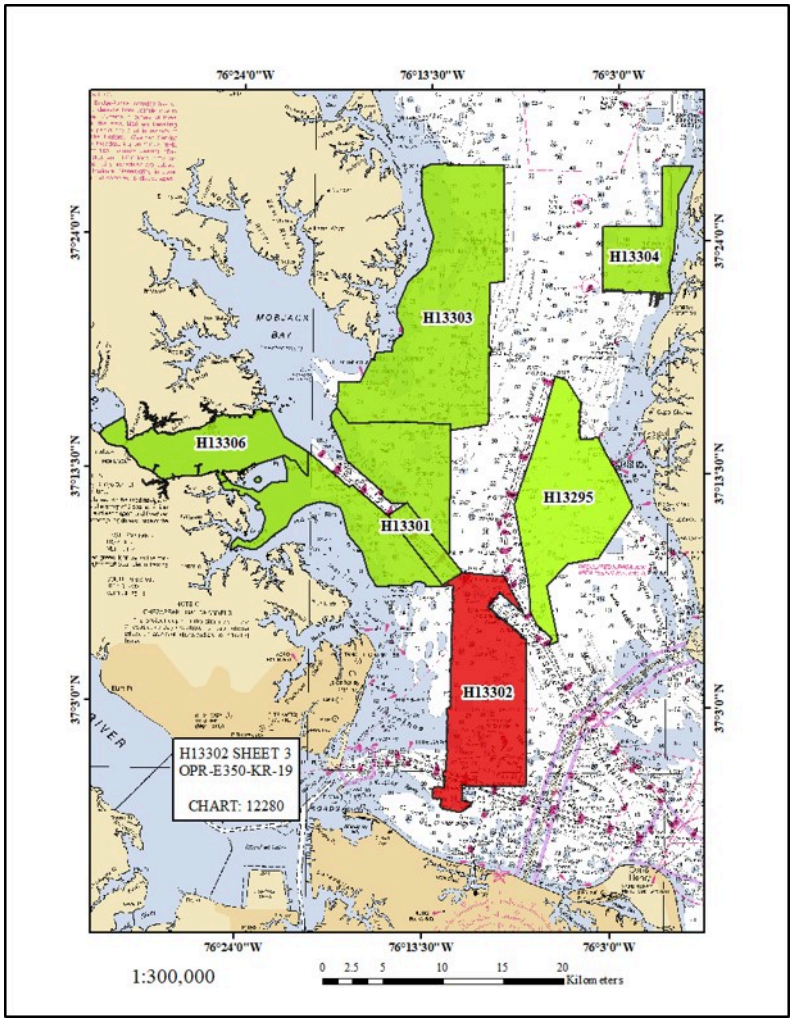

Figure 1: H13302 Survey Bounds

Survey limits were acquired in accordance with the requirements in the Project Instructions and the Hydrographic Surveys Specifications and Deliverables (HSSD), March 2019.

A.2 Survey Purpose

The purpose of this survey is to provide contemporary surveys to update National Ocean Service (NOS) nautical charting products. This project is located in the Chesapeake Bay in Virginia. The Chesapeake Bay is the largest of 130 estuaries in the United States. The Coast Guard is currently conducting a Waterways Assessment and Management Survey of the lower James River. This data will be used to assess if ATONs are correctly placed and help inform a comprehensive report regarding the location of shoals within the lower James River. Survey vintage in this area dates back to 1945. This project will provide critical data for the

updating of National Ocean Service (NOS) nautical charting products to increase maritime safety in the region. Survey data from this project is intended to supersede all prior survey data in the common area.

A.3 Survey Quality

The entire survey is adequate to supersede previous data.

Leidos warrants only that the survey data acquired by Leidos and delivered to NOAA under Contract EA-133C-14-CQ-0033 reflects the state of the sea floor in existence on the day and at the time the survey was conducted.

H13302 was surveyed in accordance with the following documents:
1. Project Instructions, OPR-E350-KR-19, dated 27 August 2019
2. Hydrographic Surveys Specifications and Deliverables (HSSD), March 2019
3. OPR-E350-KR-19 Statement of Work, dated 28 August 2019
4. Final_OPR-E350-KR-19_PRF.000, received 18 September 2019
5. Final_OPR-E350-KR-19_CSF.000, received 18 September 2019
6. OPR-E350-KR-19_Southern_Chesapeake_Bay_Questions.pdf, dated 05 November 2019
7. OPR-E350-KR-19_VERBAL AUTHORIZATION_ Southern OPR-E350-KR-19_Chesapeake Bay No-cost Extension - EA133C14CQ0033 1305M219FNCNJ0356, dated 08 May 2020

A.4 Survey Coverage

The following table lists the coverage requirements for this survey as assigned in the project instructions:

Water Depth	Coverage Required
H13302	Object Detection Coverage (Refer to HSSD Section 5.2.2.2)
8 meters water depth and shoaler	Sidescan may be acquired at an altitude of 6-20% of the range scale
All waters in survey area	Complete 5,553 LNM. Transit mileage, system calibration mileage and data which do not meet HSSD specifications shall not count towards the completion of the LNM requirement. Notify the Project Manager/COR upon nearing completion of LNM requirement. The final survey area shall be squared off and ensure the full investigation of any features within the surveyed extent.

Table 2: Survey Coverage

Leidos chose to achieve the coverage requirement using Object Detection Coverage, Option B (200% side scan sonar coverage with concurrent multibeam). Survey coverage achieved was in accordance with the requirements in the Project Instructions and the HSSD (Figure 2 through Figure 4).

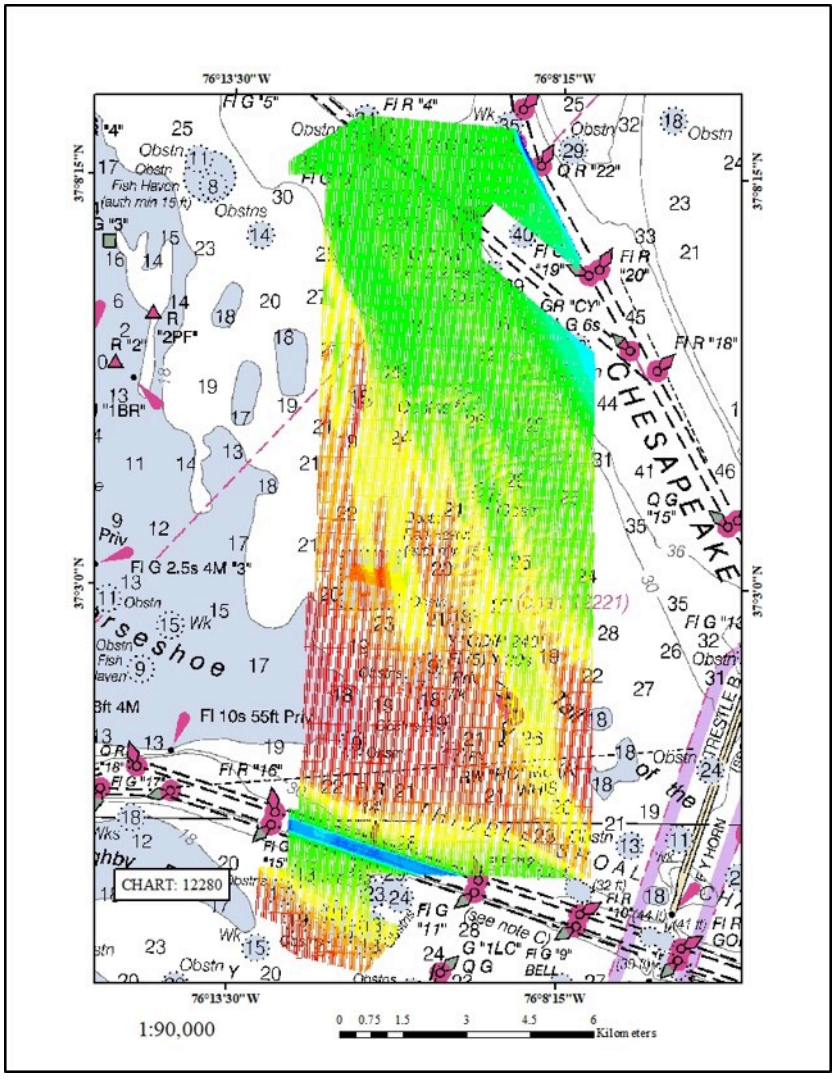

Figure 2: Final Bathymetry Coverage for H13302

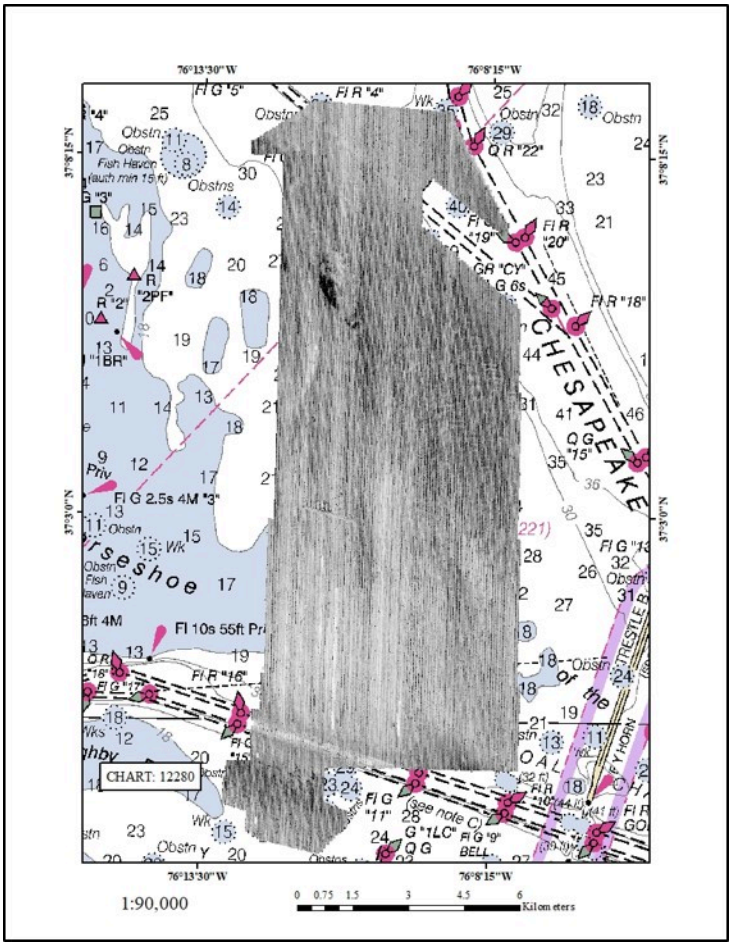

Figure 3: Final Side Scan Coverage for H13302 (First 100% coverage)

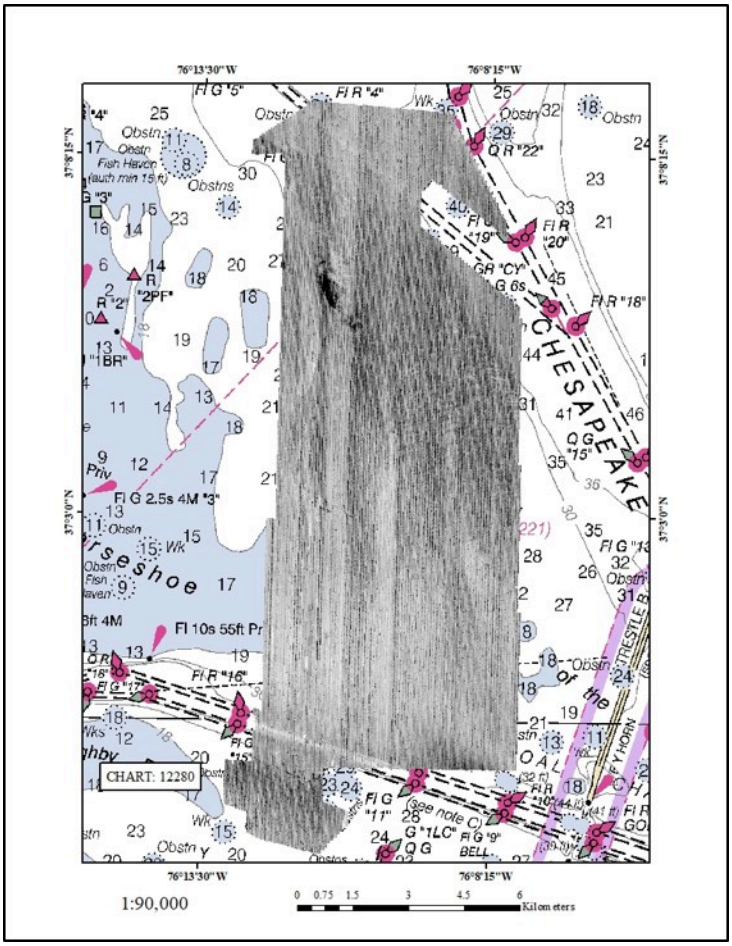

Figure 4: Final Side Scan Coverage for H13302 (Second 100% coverage)

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/SSS Mainscheme	0	0
	MBES/SSS Mainscheme	1699.74	1699.74
	SBES/MBES Crosslines	69.43	69.43
	Lidar Crosslines	0	0
Number of Bottom Samples			8
Number Maritime Boundary Points Investigated			0
Number of DPs			0
Number of Items Investigated by Dive Ops			0
Total SNM			34.51

Table 3: Hydrographic Survey Statistics

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

Survey Dates	Day of the Year
11/11/2019	315
11/12/2019	316
11/13/2019	317
11/14/2019	318
11/15/2019	319
11/18/2019	322
11/19/2019	323
11/20/2019	324
11/21/2019	325
11/22/2019	326
11/23/2019	327
11/24/2019	328
11/25/2019	329
12/03/2019	337
12/04/2019	338
12/05/2019	339
12/06/2019	340
12/07/2019	341
12/08/2019	342
12/09/2019	343
12/10/2019	344
06/26/2020	178
06/27/2020	179

Table 4: Dates of Hydrography

B. Data Acquisition and Processing

B.1 Equipment and Vessels

Leidos used their ISS-2000 software on a Windows 7 platform to acquire these survey data. Survey planning and data analysis were conducted using the Leidos SABER software on Red Hat Enterprise 7 Linux platforms. Klein 3000 side scan sonar (SSS) data were collected on a Windows 7 platform using Klein's SonarPro software. Subsequent processing and review of the SSS 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-E350-KR-19, delivered previously with H13295. 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 5: Vessels Used

Figure 5: M/V Atlantic Surveyor

The M/V Atlantic Surveyor (Figure 5) was used to collect multibeam echo sounder (MBES) (RESON SeaBat T50), side scan sonar (SSS) (Klein 3000), and sound speed data during twenty-four hours per day survey operations.

A detailed description of the vessel used is included in the DAPR.

B.1.2 Equipment

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

Manufacturer	Model	Type
Teledyne RESON (RESON)	SeaBat T50	MBES
Klein Marine Systems, Inc. (Klein)	3000	SSS
Applanix	POS/MV 320 V5	Positioning and Attitude System
AML Oceanographic	MVP30	Sound Speed System

Table 6: Major Systems Used

A detailed description of the equipment installed is included in the DAPR.

B.2 Quality Control

B.2.1 Crosslines

Multibeam/single beam echo sounder/side scan sonar crosslines acquired for this survey totaled 4.08% of mainscheme acquisition.

Refer to Separates II for details about how the crossing analyses were performed and a complete discussion of each analysis and tabular results. Figure 6 summarizes the crossline comparison results.

Difference Grid	Minimum and Maximum CUBE Depth (meters) of Crossline Grid	IHO Order 1A Maximum Allowable Uncertainty (meters) for the Range of Depths	Percentage of Depth Differences Less than IHO Order 1A Maximum Allowable Uncertainty
M/V Atlantic Surveyor Multibeam 50-centimeter Crossline (Class 1) to 50-centimeter Mainscheme	5.344 – 16.893	0.505 – 0.546	99.99

Figure 6: Summary of Crossing Analysis

B.2.2 Uncertainty

For specific details on the use and application of the SABER Total Propagated Uncertainty (TPU) model, refer to the DAPR. Once the TPU model was applied to the GSF bathymetry data, each beam was attributed with the horizontal uncertainty and the vertical uncertainty at the 95% confidence level. The vertical and horizontal uncertainty values, estimated by the TPU model for individual multibeam soundings, varied little across the dataset, tending to be most affected by beam angle. Individual soundings that had vertical and horizontal uncertainty values above IHO S-44 5th Edition, Order 1a were flagged as invalid during the uncertainty attribution.

As discussed in the DAPR, SABER generates two vertical uncertainty surfaces; the Hypothesis Standard Deviation (Hyp. StdDev) and the Hypothesis Average Total Propagated Uncertainty (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).

The final H13302 50-centimeter PFM CUBE surface contained final vertical uncertainties that ranged from 0.210 meters to 1.094 meters. The IHO Order 1a maximum allowable vertical uncertainty was calculated to range between 0.503 to 0.552 meters, based on the minimum CUBE depth (4.409 meters) and maximum CUBE depth (17.908 meters). Results from the SABER Check PFM Uncertainty function identified that there were 6,804 nodes in the final H13302 50-centimeter PFM CUBE surface with final vertical uncertainties that exceeded IHO Order 1a allowable vertical uncertainty. There were 6,339 nodes that exceeded the final uncertainties as result of a difference between two discrete areas in channels which were surveyed in the fall of 2019 and then had additional coverage in the summer of 2020. The data from 2020 had sand waves which were not present in the fall of 2019. SABER Check PFM Uncertainty function run prior to the addition of the 2020 data had 465 nodes in the H13302 50-centimeter PFM CUBE surface with final vertical uncertainties that exceeded IHO Order 1a allowable vertical uncertainty. These nodes were predominately associated with objects in the fish haven. The SABER Frequency Distribution Tool was also used to review the Hyp. Final Uncertainty surface within the final H13302 50-centimeter PFM grid. Results showed that 99.99% of all nodes had final uncertainties less than or equal to 0.480 meters. Again the Hyp. Final Uncertainty surface values were skewed due to the difference in bathymetry in the discrete area of channels between 2019 and 2020. Prior to the 2020 data 99.99% of the nodes were less than or equal to 0.300 meters with only 5 nodes exceeding the allowable uncertainties (Figure 7).

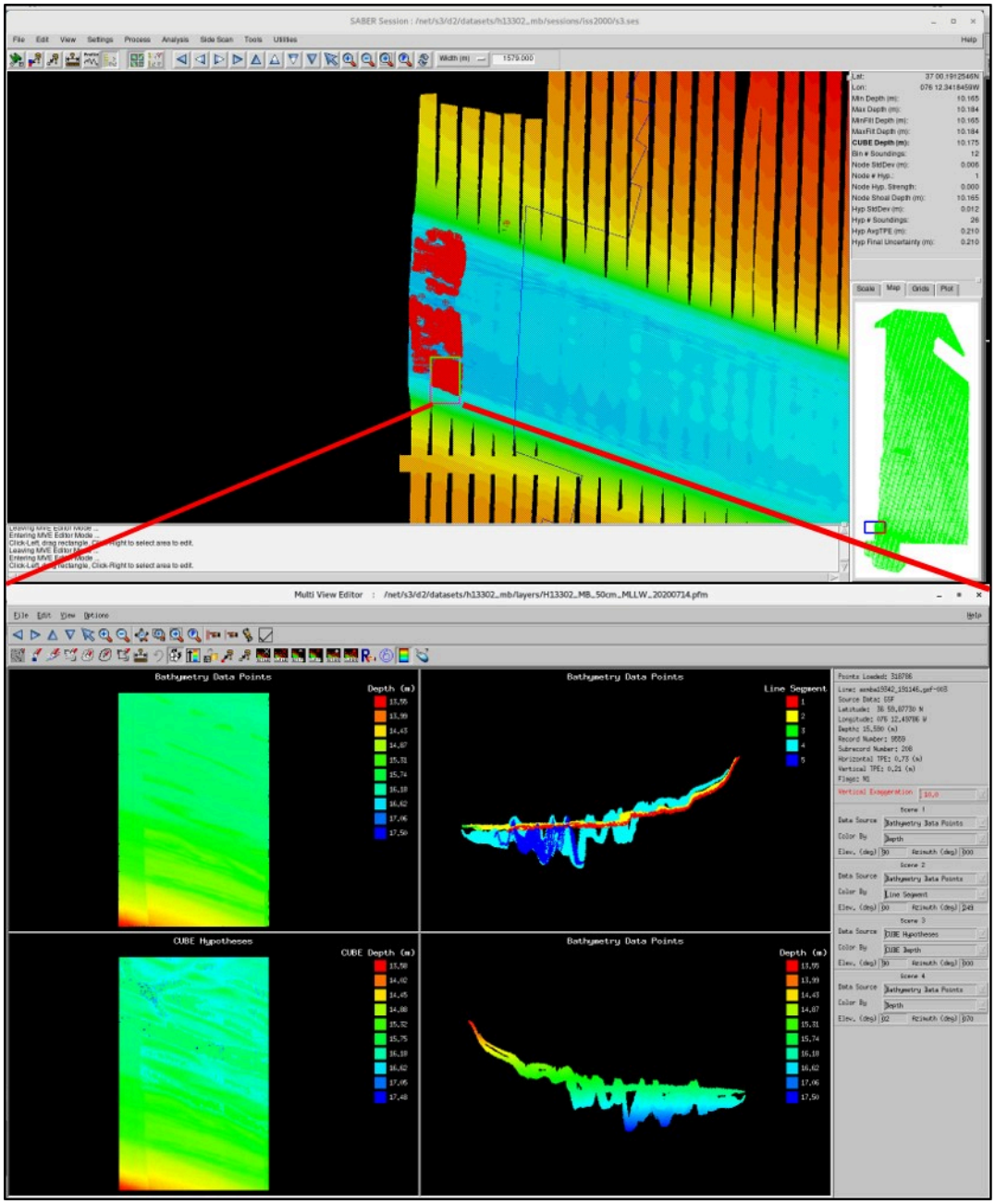

Figure 7: 2019 (Red and Yellow Lines) vs. 2020 (Blue Lines) Bathymetry Data Causing Elevated Uncertainties (Shown in Red)

B.2.3 Junctions

Per the Project Instructions, analyses of the H13302 junctions with adjacent surveys were performed between H13302 and the surveys listed in Table 7. Figure 8 shows the general locality of H13302 as it relates to the

sheets to which junctions were performed. Refer to Separates II for details about how junction analyses were performed and a complete discussion of each analysis and tabular results.

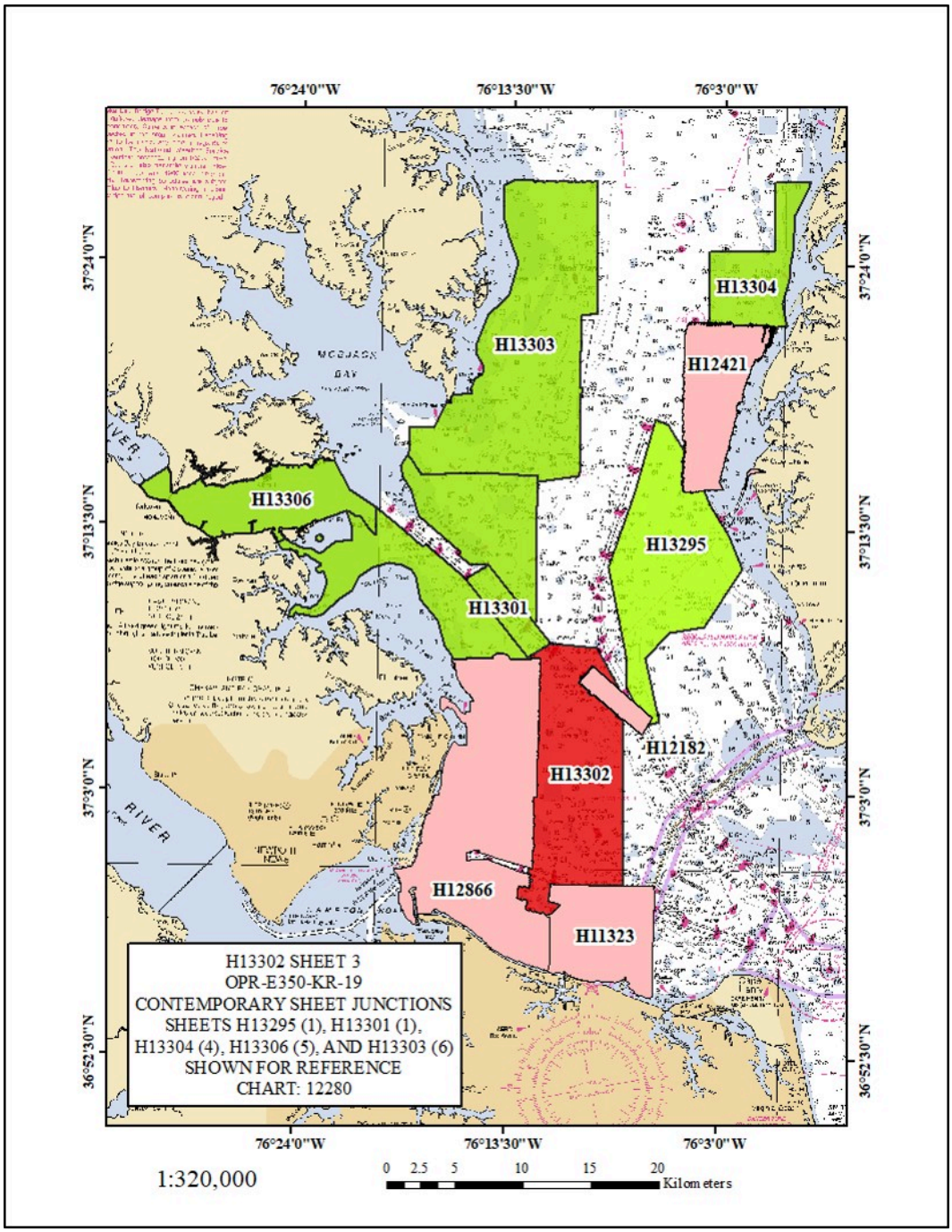

Figure 8: General Locality of H13302 with Junctioning Surveys

The following junctions were made with this survey:

Registry Number	Scale	Year	Field Unit	Relative Location
H12182	1:20000	2010	NOAA Ship Thomas Jefferson	NE
H11323	1:10000	2016	NOAA Ship Thomas Jefferson	S
H12866	1:10000	2016	NOAA Ship Thomas Jefferson	W

Table 7: Junctioning Surveys

H12182

H12182 junctions with H13302 to the northeast; 99.28% of the comparisons were within 0.540 meters with a calculated maximum allowable TVU of 0.534 meters.

H11323

H11323 junctions with H13302 to the south; 100% of the comparisons agreed within ±1.469 meters while 99.13% of the comparisons fell within 0.550 meters with a calculated maximum allowable TVU of 0.544 meters.

H12866

H12866 junctions with H13302 to the west; 100% of the comparisons agreed within ±0.593 meters while 99.99% of the comparison results fell within the calculated maximum allowable TVU of 0.530 meters.

B.2.4 Sonar QC Checks

Sonar system quality control checks were conducted as detailed in the DAPR; quality control checks conducted during H13302 are reported in Separates I.

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 factors which significantly impacted the soundings.

B.2.7 Sound Speed Methods

Sound Speed Cast Frequency: On the M/V Atlantic Surveyor, the MVP30 was the primary system used to collect sound speed profile (SSP) data, refer to the DAPR for additional details. 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.

All sound speed profiles applied for online bathymetry data collection were acquired within 500 meters of the bounds of the survey area as specified in Section 5.2.3.3 of the HSSD.

Confidence checks of the sound speed profile casts were conducted by comparing at least two consecutive casts taken with different SSP sensors. Six sound speed confidence checks were conducted during H13302 and the results can be found in Separates II within the “Comparison Cast Log” section.

All individual SSP files are delivered with the H13302 data and are broken out into sub-folders, which correspond to the purpose of each cast. Also, all individual SSP files for H13302 have been concatenated into four separate files based on the purpose of the cast, provided in CARIS format files (.svp), and delivered under (H13302/Processed/SVP/CARIS_SSP) on the delivery drive. In accordance with HSSD Section 8.3.6 H13302 data were collected over two years, the submission of the NCEI data is separated by calendar year. Refer to Separates II for additional details.

B.2.8 Coverage Equipment and Methods

All equipment and survey methods are detailed in the DAPR.

B.2.9 Multibeam Coverage Analysis

Leidos chose to achieve the coverage requirement using 200% side scan sonar coverage with concurrent multibeam bathymetry. To achieve this coverage, the M/V Atlantic Surveyor used a towed Klein 3000 SSS set to 50-meter range scale. Mainscheme line spacing was set to 40 meters, which ensured 200% SSS coverage.

The SABER Gapchecker program was used to flag MBES data gaps within the CUBE surface. 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 of the H13302 50-centimeter PFM showed that there were no holidays as defined for object detection coverage surveys in Section 5.2.2.2 of the HSSD. Within the final CUBE surface, there were instances where a three by one node gap exists, however, these were not considered holidays in the final multibeam CUBE surface as these instances generally resulted from either the holiday line data being slightly offset from the original line due to vessel line steering, or the swath width of the holiday lines being reduced compared to the original line due to water level differences. In addition node gaps existed within the fish haven associated with object shadows for which least depths were determined and were less than the authorized minimum clearance.

The final H13302 CUBE PFM was 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. The Hyp. # Soundings surface reports the number of soundings that were used to compute the chosen hypothesis. Analysis was conducted on the Hyp. # Soundings surface of the final PFM grid to ensure that the requirements for object detection coverage surveys, as specified in HSSD Section 5.2.2.2 were met. Within the final 50-centimeter PFM grid 99.01% of all nodes contained five or more soundings.

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. Multibeam files associated with calibration are provided within the H13302/Processed/Sonar_Data/H13302_MB/Calibration_Files/ directory.

B.4 Backscatter

Side Scan Sonar (SSS) Coverage Analysis: For all details regarding SSS data processing, see the DAPR. Leidos chose to adhere to the coverage requirements in the Project Instructions using Object Detection Coverage, Option B (200% side scan sonar coverage with concurrent multibeam). As referenced in Section A.4, the Project Instructions provided a waiver to HSSD Section 6.1.2.3 for towed side scan towfish height.

In waters less than 8 meters the towfish height above the bottom could be 6% of the range scale. Mosaics were analyzed for coverage at both 8% and 6% of range based on water depths greater or less than 8 meters.

Leidos generated two separate coverage mosaics at 1-meter cell size resolution as specified in Section 8.2.1 of the HSSD. The first 100% and second 100% coverage mosaics were independently reviewed using tools in SABER to verify data quality and swath coverage. The SABER Gapchecker routine was used to flag data gaps within each of the 100% SSS coverage mosaics. Additionally, the entirety of each SSS 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. Both coverage mosaics are determined to be complete and sufficient to meet the requirements contained within the Project Instructions and HSSD. Each 100 percent coverage mosaic is delivered as a single georeferenced raster file (datum of NAD83) in floating point GeoTIFF format, as specified in Sections 8.2.1 and 8.3.3 in the HSSD.

Multibeam Echo Sounder Seafloor Backscatter: Leidos collected MBES backscatter data with all GSF data acquired, in accordance with HSSD Section 6.2. The MBES settings used were checked to ensure acceptable quality standards were met and to mitigate acoustic saturation of the backscatter data. The MBES backscatter data acquired were written to the GSF in real-time by ISS-2000 and are delivered in the final GSF files for this sheet. Evaluation of backscatter data and processing were not required for OPR-E350-KR-19 and therefore no additional processing was performed by Leidos and no additional products were produced.

B.5 Data Processing

B.5.1 Primary Data Processing Software

The following software program was the primary program used for bathymetric data processing:

Manufacturer	Name	Version
Leidos	SABER	5.4.0.30.1

Table 8: Primary bathymetric data processing software

The following software program was the primary program used for imagery data processing:

Manufacturer	Name	Version
Leidos	SABER	5.4.0.30.1

Table 9: Primary imagery data processing software

The following Feature Object Catalog was used: NOAA Profile Version 2019.

The primary data processing software used for both bathymetry and imagery was SABER.

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
H13302_MB_50cm_MLLW_Final_1_of_6	BAG	50 centimeters	4.686 meters - 16.614 meters	N/A	Object detection coverage, Option B (200% side scan sonar coverage with concurrent multibeam)
H13302_MB_50cm_MLLW_Final_2_of_6	BAG	50 centimeters	5.228 meters - 17.607 meters	N/A	Object detection coverage, Option B (200% side scan sonar coverage with concurrent multibeam)
H13302_MB_50cm_MLLW_Final_3_of_6	BAG	50 centimeters	4.409 meters - 10.208 meters	N/A	Object detection coverage, Option B (200% side scan sonar coverage with concurrent multibeam)
H13302_MB_50cm_MLLW_Final_4_of_6	BAG	50 centimeters	5.589 meters - 13.251 meters	N/A	Object detection coverage, Option B (200% side scan sonar coverage with

Surface Name	Surface Type	Resolution	Depth Range	Surface Parameter	Purpose
					concurrent multibeam)
H13302_MB_50cm_MLLW_Final_5_of_6	BAG	50 centimeters	5.776 meters - 15.905 meters	N/A	Object detection coverage, Option B (200% side scan sonar coverage with concurrent multibeam)
H13302_MB_50cm_MLLW_Final_6_of_6	BAG	50 centimeters	8.245 meters - 17.908 meters	N/A	Object detection coverage, Option B (200% side scan sonar coverage with concurrent multibeam)
H13302_SSSAB_1m_100kHz_1of2	SSS Mosaic (.tif)	1 meters	0 meters - 0 meters	N/A	First 100% SSS
H13302_SSSAB_1m_100kHz_2of2	SSS Mosaic (.tif)	1 meters	0 meters - 0 meters	N/A	Second 100% SSS

Table 10: Submitted Surfaces

Object Detection Coverage Section 5.2.2.2 of the HSSD requires 50-centimeter node resolution for depths ranging from zero meters to 20 meters. Leidos generated CUBE PFM grids for H13302 at 50-centimeter resolution.

SABER populates the CUBE depth 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 of the H13302 50-centimeter grid was from 4.409 meters (14.465 feet; 0.210 meters Total Vertical Uncertainty [TVU]) to 17.908 meters (58.753 feet; 0.210 meters TVU).

The final gridded bathymetry data are delivered as a Bathymetric Attributed Grid (BAG). The BAG files were exported from the CUBE PFM grid as detailed in the DAPR.

C. Vertical and Horizontal Control

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

C.1 Vertical Control

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

ERS Datum Transformation

The following ellipsoid-to-chart vertical datum transformation was used:

Method	Ellipsoid to Chart Datum Separation File
ERS via VDATUM	OPR-E350-KR-19_NAD83_VDatum_MLLW.cov

Table 11: ERS method and SEP file

Refer to the DAPR for details regarding the application of VDatum to the MBES data files. No final tide note was provided from NOAA Center for Operational Oceanographic Products and Services (CO-OPS). While a final tide note was not required, a final tide note has been provided by Leidos in Appendix I.

C.2 Horizontal Control

The horizontal datum for this project is North American Datum of 1983 (NAD 83).

The projection used for this project is Universal Transverse Mercator (UTM) Zone 18.

PPP

The vessel kinematic data (POS/MV files) were post-processed in Applanix POSPac software using the Applanix PP-RTX solution to generate the Smoothed Best Estimate of Trajectory (SBET) solutions which were applied through SABER to the multibeam data. Refer to the DAPR for additional information and for details regarding all antenna and transducer offsets. Any soundings with total horizontal uncertainties exceeding the maximum allowable IHO S-44 5th Edition Order 1a specifications were flagged as invalid and therefore were not used in the CUBE depth calculations.

D. Results and Recommendations

D.1 Chart Comparison

The chart comparisons were conducted using a combination of SABER and CARIS' HIPS and SIPS.

United States Coast Guard (USCG) District 5 Local Notice to Mariners (LNM) publications were reviewed for changes subsequent to the date of the Project Instructions and before the end of survey (as specified in Section 8.1.4 of the HSSD). The LNM reviewed were from week 42/19 (15 October 2019) until week 26/20 (30 June 2020).

H13302 data met data accuracy standards and bottom coverage requirements. Leidos recommends updating the common areas of all charts using data from this survey. Charting recommendations for new features, and updates to charted features, are documented in the H13302 S-57 FFF.

D.1.1 Electronic Navigational Charts

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

ENC	Scale	Edition	Update Application Date	Issue Date	Preliminary?
US5VA13M	1:40000	41	10/24/2019	06/23/2020	NO
US5VA20M	1:20000	19	07/27/2018	02/24/2020	NO
US5VA24M	1:40000	29	03/24/2020	05/01/2020	NO
US5VA14M	1:40000	33	06/12/2019	06/23/2020	NO

Table 12: Largest Scale ENCs

US5VA13M

ENC US5VA13M covers the H13302 survey area from 37° 01' 38.65"N northward to 37° 08' 30.60"N.

CUBE depths within H13302 agreed well with the charted depths across the contemporaneous survey area; observed depths were primarily within ±0.3 meters of charted depths (Figure 9). The depth contours on ENC US5VA13M generally agreed with depths that fell within the H13302 survey area (Figure 10).

Local notice to mariners 26/20 notes that on June 29, 2020, the Coast Guard is increasing the size of the existing Quarantine Anchorage Q. Anchorage area Q is contained within ENC US5VA13M and enters the

H13302 survey area in the Northeastern edge (Figure 11). This has been updated on the latest US5VA13M ENC.

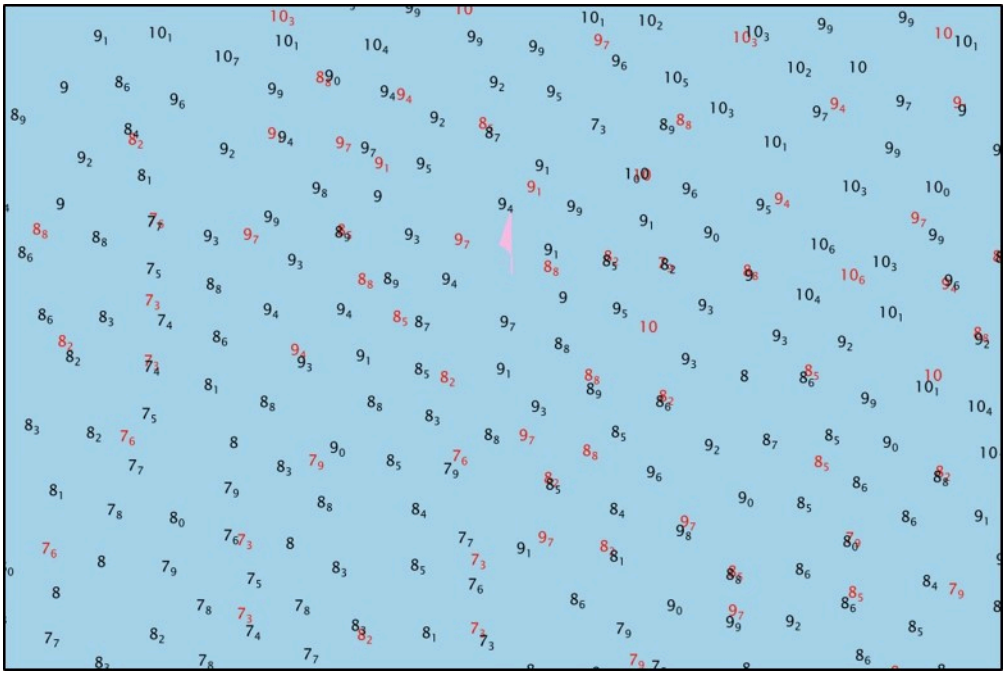

Figure 9: ENC US5VA13M Charted Soundings (red) with H13302 CUBE Depth Selected Soundings (black)

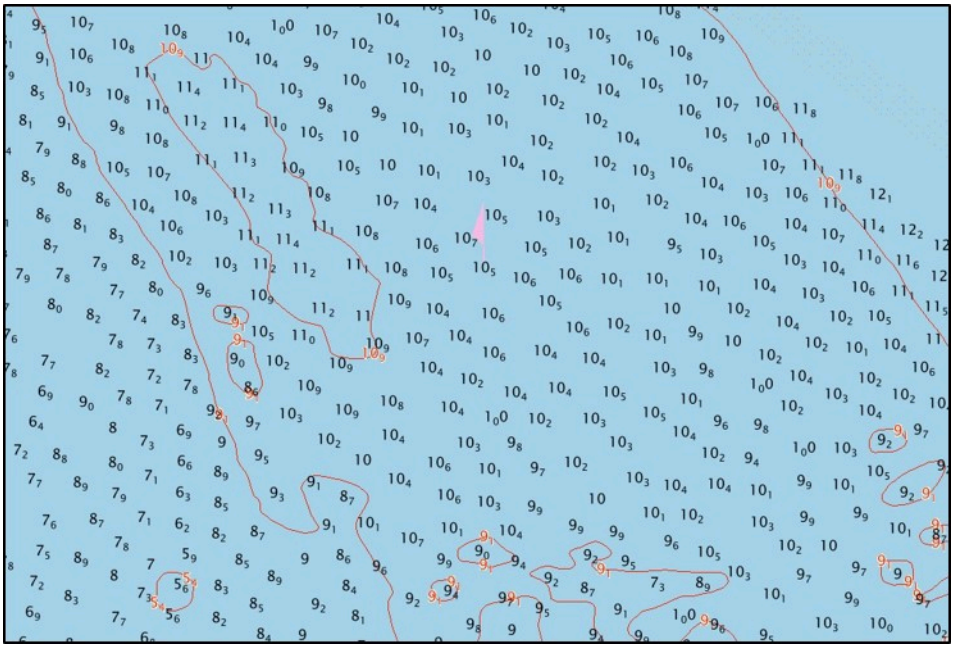

Figure 10: ENC US5VA13M with Charted Contours (red) with H13302 CUBE Depth Selected Soundings (black)

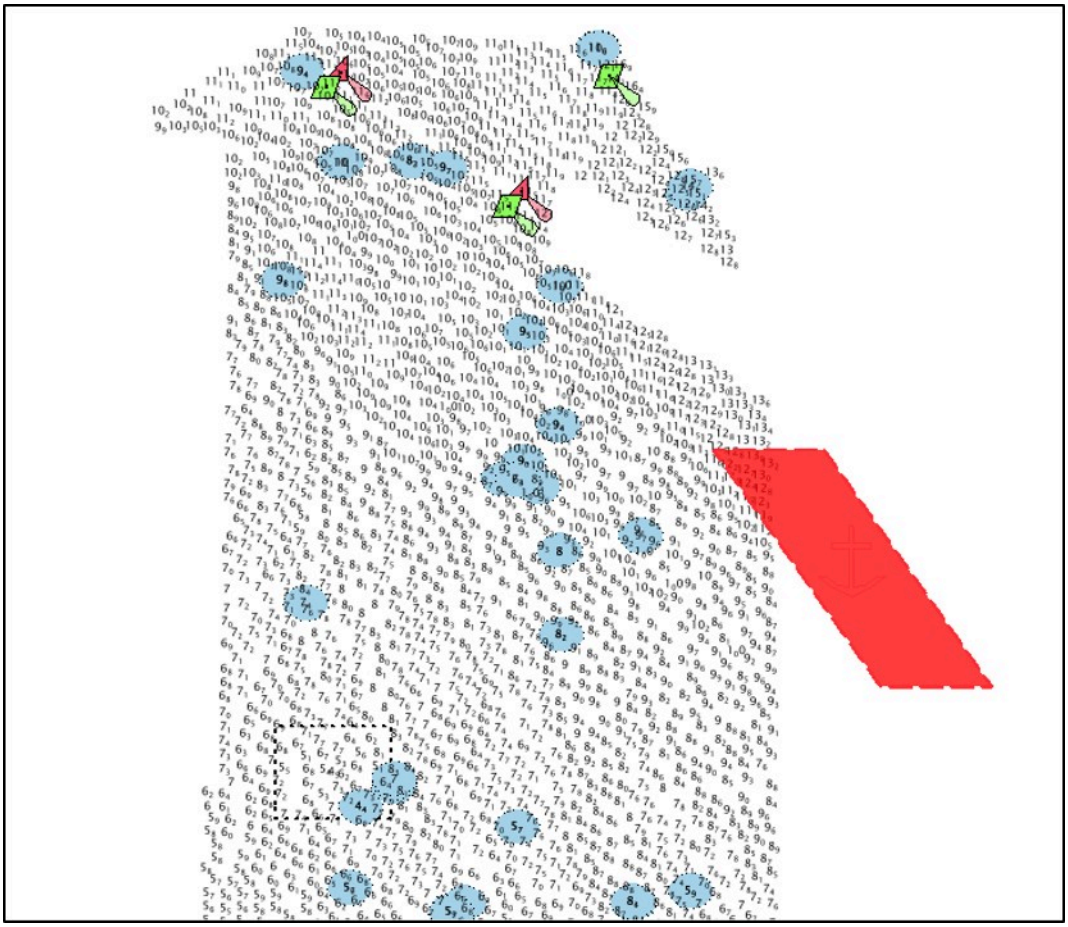

Figure 11: ENC US5VA13M with Survey Area and Anchorage Q (red)

US5VA20M

ENC US5VA20M covers the H13302 survey area from 37° 01’ 38.65”N southward.

CUBE depths within H13302 agreed well with the charted depths across the contemporaneous survey area; observed depths were primarily within ±0.3 meters of charted depths (Figure 12). The depth contours on ENC US5VA14M generally agreed with depths that fell within the H13302 survey area (Figure 13).

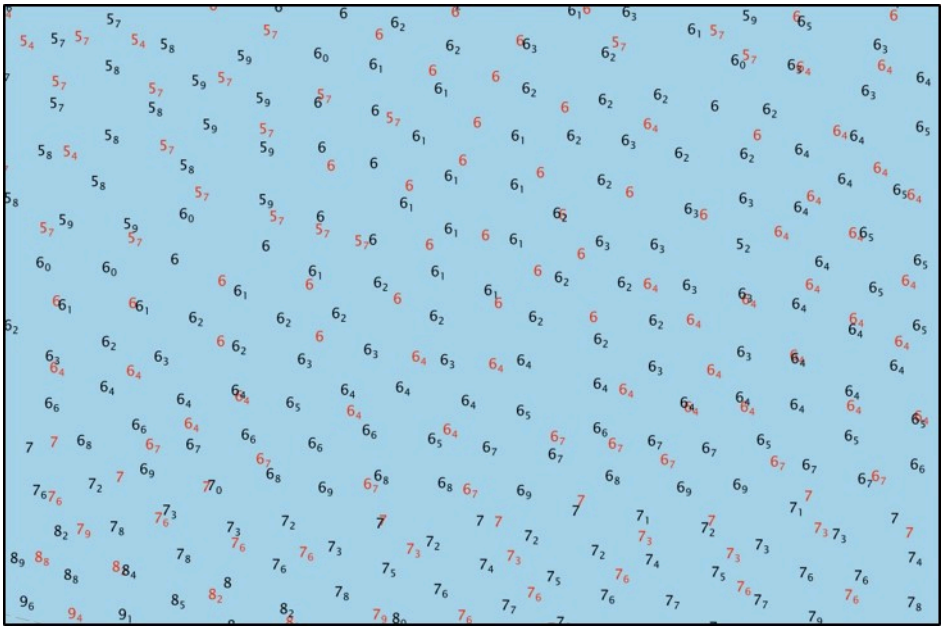

Figure 12: ENC US5VA20M Charted Soundings (red) with H13302 CUBE Depth Selected Soundings (black)

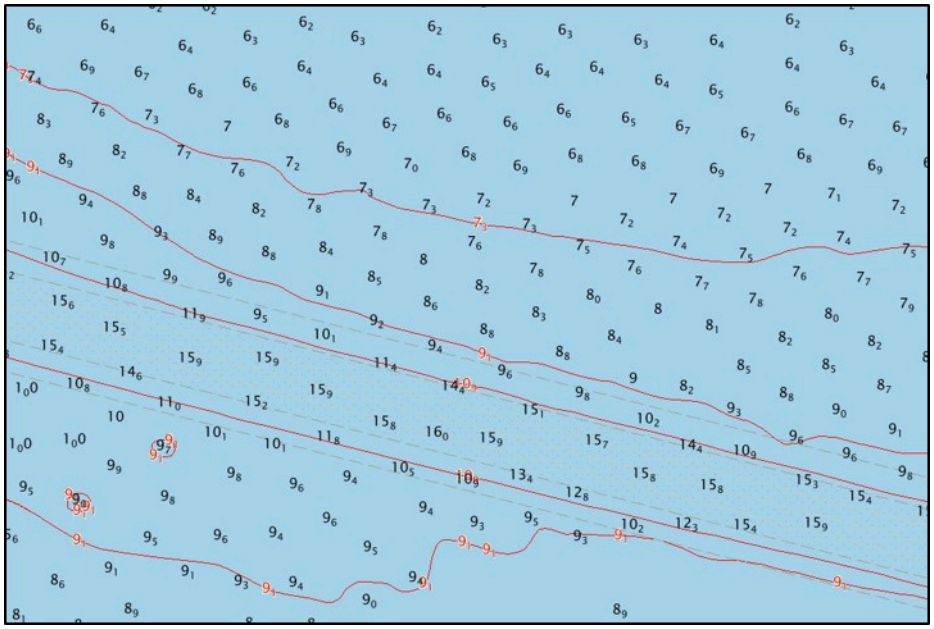

Figure 13: ENC US5VA20M Charted Contours (red) with H13302 CUBE Depth Selected Soundings (black)

US5VA24M

ENC US5VA24M covers the H13302 survey area from 37° 08’ 30.60”N northward and 076° 11’ 27.88”N westward.

CUBE depths within H13302 agreed well with the charted depths across the contemporaneous survey area; observed depths were primarily within ±0.2 meters of charted depths (Figure 14). The depth contours on ENC US5VA14M generally agreed with depths that fell within the H13302 survey area (Figure 15).

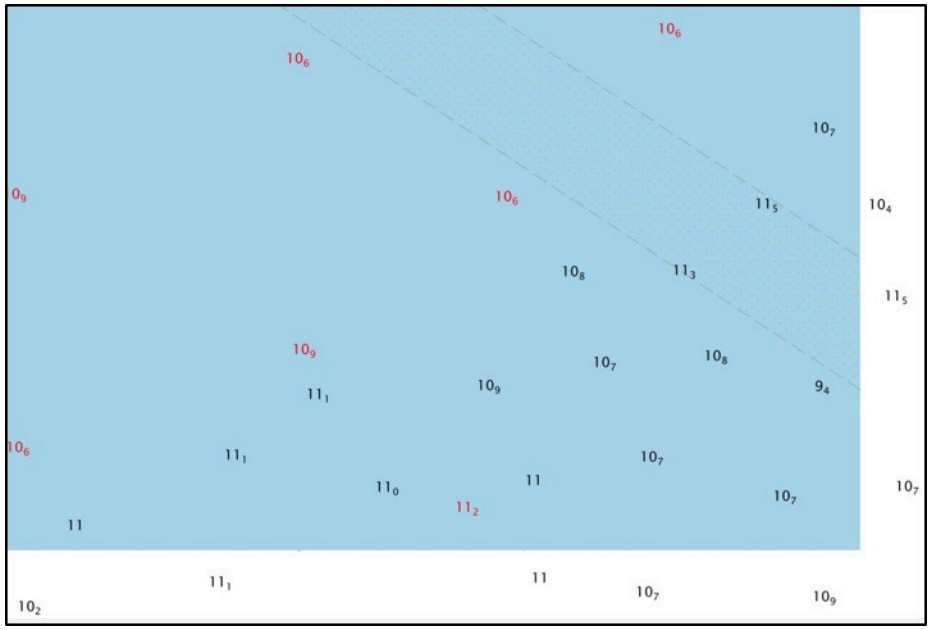

Figure 14: ENC US5VA24M Charted Soundings (red) with H13302 CUBE Depth Selected Soundings (black)

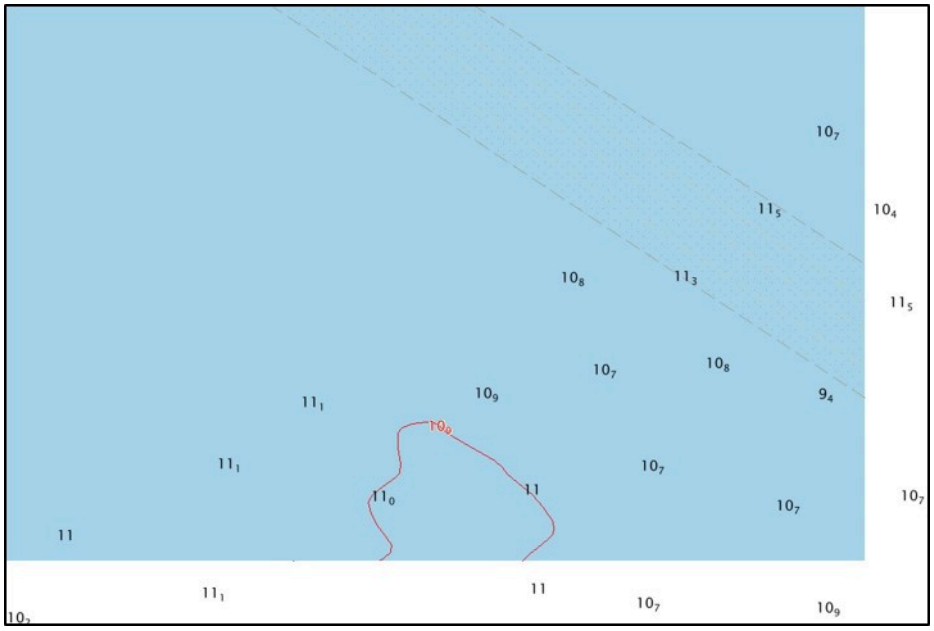

Figure 15: ENC US5VA24M Charted Contour (red) with H13302 CUBE Depth Selected Soundings (black)

US5VA14M

ENC US5VA14M covers the H13302 survey area from 37° 08’ 30.60”N northward and 076° 11’ 27.88”N eastward.

CUBE depths within H13302 agreed well with the charted depths across the contemporaneous survey area; observed depths were primarily within ±0.2 meters of charted depths (Figure 16). The depth contours on ENC US5VA14M generally agreed with depths that fell within the H13302 survey area (Figure 17).

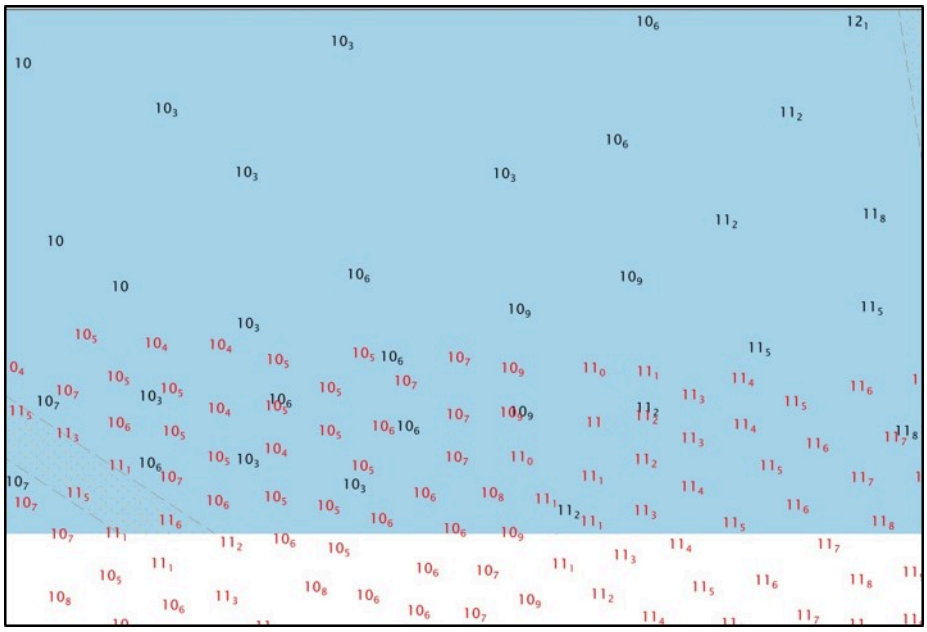

Figure 16: ENC US5VA14M Charted Soundings (black) with H13302 CUBE Depth Selected Soundings (red)

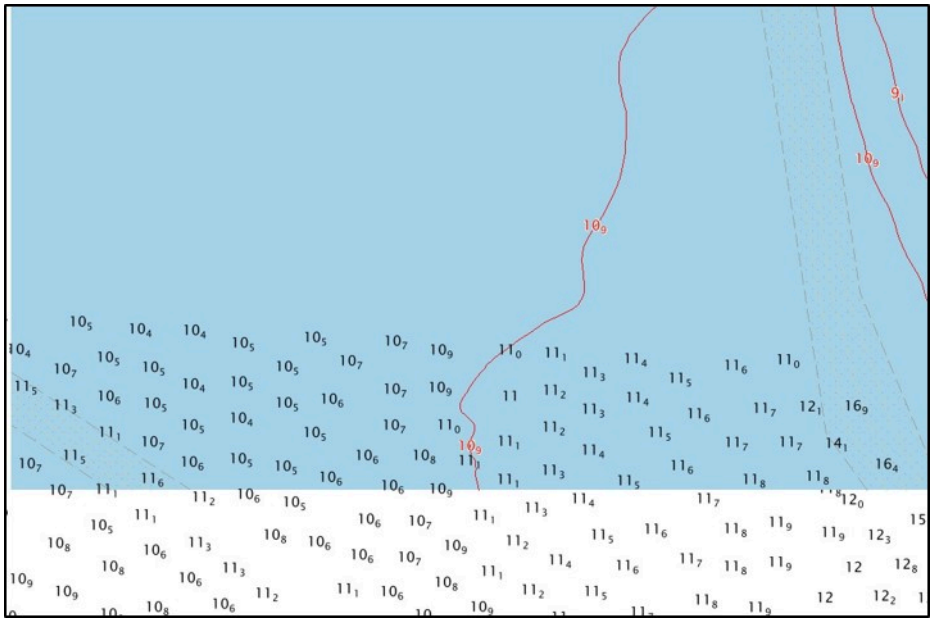

Figure 17: ENC US5VA14M Charted Contours (red) with H13302 CUBE Depth Selected Soundings (black)

D.1.2 Maritime Boundary Points

No Maritime Boundary Points were assigned for this survey.

D.1.3 Charted Features

There were 40 assigned charted features in the final CSF (Final_OPR-E350-KR-19_CSF.000) within the SOW of H13302; however none of these features contained the label PA, ED, PD, or Rep. Per HSSD Section 8.1.4, these charted features are not addressed in this section. In addition there was one unassigned obstruction, one unassigned buoy with light, and one unassigned wreck within the survey limits and are captured in the H13302 S-57 FFF. Refer the H13302 S-57 FFF for all the details and recommendations regarding these features.

D.1.4 Uncharted Features

See the H13302 S-57 FFF for all the details and recommendations regarding new uncharted features investigated.

D.1.5 Shoal and Hazardous Features

There were no significant shoals or hazardous features within the area covered by this survey other than those referenced in Section D.1.4.

Leidos submitted five DTONs for H13302. Four DTONs were submitted in S-57 format to the Atlantic Hydrographic Branch (AHB) and one DTON was submitted to the Coast Guard.

• DTON 01 was submitted on 18 November 2019, for two uncharted wrecks as a single DTON based on distance criteria, and attributed and reported in the DTON submission in accordance to Section 1.6.1 of the HSSD. This DTON was submitted to Nautical Data Brach (NDB) and Marine Chart Division (MCD) on 19 November 2019.
• DTON 02 was submitted to the US Coast Guard on 10 December 2019, for an extinguished buoy light. The submission was made to the non-NOAA source authorities in accordance with Section 1.6.2 of the HSSD. As the light was present but extinguished and the sequence of the light was not identified as not serving its intended purpose, the FFF noted the deficiency however was captured as retain.
• DTON 03 was submitted on 13 December 2019, for an obstruction. This DTON was submitted to Nautical Data Brach (NDB) and Marine Chart Division (MCD) on 13 December 2019 but was submitted as DTON 02. This DTON is identified as DTON 3 in the FFF.
• DTON 04 and 05 were submitted on 17 February 2020, for two obstructions. The DTONs were submitted to Nautical Data Brach (NDB) and Marine Chart Division (MCD) on 18 February 2020.

Copies of the email correspondence for Leidos' submissions of H13302 DTON Report, as well as the DTON recommendation file, are included within Appendix II of this Descriptive Report. Figure 18 details the submitted DTON and the associated Feature number and object class in the S-57 FFF.

DTON Report Name	Date Submitted to USCG	Date Submitted to AHB	AHB Submitted to NDB and MCD	NDB Registration	Feature Number(s)	S-57 Object Class in the S-57 FFF
H13302_DTON_01.000	N/A	2019-11-18	2019-11-19	DD-31656	03	WRECKS
H13302_USCG_ATON_DTON_02.pdf	2019-12-10	N/A	N/A	N/A	56	LIGHTS
H13302_DTON_03.000	N/A	2019-12-13	2019-12-13	DD-31787	04	OBSTRN
H13302_DTON_04.000	N/A	2020-02-17	2020-02-18	DD-32070	38	OBSTRN
H13302_DTON_05.000	N/A	2020-02-17	2020-02-18	DD-32070	16	OBSTRN

Figure 18: DTON Reports

D.1.6 Channels

There were two channels within the area covered by this survey. York River Entrance Channel crosses the survey area to the north with controlling depth ranges of 11.0 to 11.3 meters. No depths were found to be shoaler than the controlling depths within the channel. In addition Thimble Shoal Channel was covered by this survey to the south with controlling ranges of 14.7 to 15.0m. No depths were found to be shoaler than the controlling depths within the channel. Quarantine Anchorage Area Q was expanded on June 29, 2020 (LNM 26/20) which established and anchorage area that enters H13302 survey area in the northeast

(See Section D.1.1). No significant features were identified within the coincident area. Per the investigation requirements from the CSF for the York River Entrance Channel and Thimble Shoal Channel, these features are not included in the H13302 FFF.

D.1.7 Bottom Samples

In accordance with both the Project Instructions and Section 7.2.3 of the HSSD, bottom characteristics were obtained for H13302. Bottom characteristics were acquired at the eight locations assigned in the PRF by NOAA. Leidos did not modify the bottom sample locations from the location proposed by NOAA in the PRF. Bottom characteristics collected during H13302 are included in the H13302 S-57 FFF, named H13302_FFF.000, within the Seabed Area (SBDARE) object, and are classified according to the requirements set forth in the HSSD. In addition, images of the sediment obtained for each bottom sample are referenced in the H13302_FFF.000 and are included on the delivery drive under the folder H13302/ Processed/Multimedia.

D.2 Additional Results

D.2.1 Shoreline

All features in the CSF within the assigned Survey Limits of H13302 were resolved. There were no assigned features inshore of the NALL.

D.2.2 Aids to Navigation

There were eight assigned aids to navigation (ATON) in the final CSF (Final_OPR-E350-KR-19_CSF.000) within the SOW of H13302. The eight ATONs were observed on station and serving their intended purpose. Per the investigation requirements from the CSF, as they were on station and serving intended purpose, they are included in the H13302 FFF with description of retain (Features 52-58, and 60). An unassigned buoy also fell within the survey limits of H13302 that was observed on station and serving its intended purpose and is included in the FFF (Feature 59).

D.2.3 Overhead Features

There were no overhead features within this survey area.

D.2.4 Submarine Features

There were no submarine features charted or identified within this survey area.

D.2.5 Platforms

There were no offshore platforms within this survey area.

D.2.6 Ferry Routes and Terminals

No ferry routes or terminals exist within this survey area.

D.2.7 Abnormal Seafloor and/or Environmental Conditions

No abnormal seafloor or environmental conditions, as defined in Section 8.1.4 of the HSSD, exist within this survey area.

D.2.8 Construction and Dredging

No construction or dredging exists for this survey area.

D.2.9 New Survey Recommendation

No new survey recommendations are made for the area surrounding this survey area.

D.2.10 Designated Soundings

As discussed in the DAPR within Generic Sensor Format (GSF) there are separate flags for a designated sounding of a feature. During data analysis, these flags are used to preserve the shoalest sounding relative to the computed depth surface. All depths flagged as a feature or designated sounding in GSF override the CUBE best estimate of the depth in the final BAG files. GSF feature flags were set on significant features within H13302, and all information is contained in the H13302 S-57 FFF.

D.2.11 Final Feature S-57 File

Included with the H13302 delivery is the S-57 FFF, H13302_FFF.000. Details on how this file was generated and quality controlled can be found in the DAPR. The S-57 FFF delivered for H13302 contains millimeter precision for the value of sounding (VALSOU) attribute. As specified in Section 2.2 of the HSSD, the S-57 FFF is in the WGS84 datum and is unprojected with all depth units in meters. Per HSSD Section 2.2 bathymetry data were positioned to NAD83. All significant and recommended for charting features found in H13302 are included within the S-57 FFF.

In accordance with the HSSD, Leidos addressed all assigned objects from the provided CSF S-57 file that fell within the bounds of H13302 in the S-57 FFF.

D.2.12 Side Scan Sonar Contacts S-57 File

Included with the H13302 delivery is the Side Scan Sonar Contact S-57 File, H13302_SSCon.000. Details on how this file was generated and quality controlled can be found in the DAPR. As specified in Section 2.2 of the HSSD, the S-57 file is in the WGS84 datum and is unprojected with all depth units in meters. Per HSSD Section 2.2 side scan data were positioned to NAD83.

Side scan sonar contacts were investigated and confirmed using SABER Contact Review. All side scan contacts are retained within the Side Scan Sonar Contact S-57 File. For each contact included in this S-57 file, a JPEG image of the side scan contact is included under the NOAA Extended Attribute field “images”.

D.2.13 Coast Pilot Review Report

In accordance with the Project Instructions and HSSD Section 8.1.3, a Coast Pilot Review was performed for OPR-E350-KR-19. Within the Coast Pilot Field Report (OPR-E350-KR-19CoastPilotReport.docx) provided by NOAA to Leidos on 28 October 2019, there were assigned investigation items and inquiries from the Nautical Publications Branch. During survey, Leidos reviewed and updated the assigned and additional Coast Pilot paragraphs as possible for the survey area, port of call, and areas frequently transited. Recommendations were documented using the text from the 53rd Edition (19 July 2020) and are marked following the HSSD Section 8.1.3. Leidos followed NOAA’s strategy for designating omitted paragraphs as provided in the delivered Coast Pilot Field Report (OPR-E350-KR-19CoastPilotReport.docx). Leidos submitted the Coast Pilot Field Report on 26 July 2020. The email correspondence for Leidos’ submission of the Coast Pilot Review Report is included within the Project Correspondence.

D.2.14 Inset Recommendation

No inset recommendations are made for the area covered by this survey.

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.

This Descriptive Report, all BAG files, 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 Hydrographic Surveys Specifications and Deliverables, Project Instructions, and Statement of Work. These data are adequate to supersede charted data in their common areas. This survey is complete and no additional work is required. Previously, or concurrently, submitted deliverables for OPR-E350-KR-19 are provided in the table below.

Report Name	Report Date Sent
OPR-E350-KR-19_Marine_Species_Awareness_Training_Record.pdf	2020-07-20
OPR-E350-KR-19_20200724.zip (NCEI Sound Speed Data 2019 data only)	2020-07-24
OPR-E350-KR-19_Coast Pilot Review Report.pdf	2020-07-26
OPR-E350-KR-19_DAPR.pdf	2020-07-29
H13295_DR.pdf	2020-07-29

Approver Name	Approver Title	Approval Date	Signature
Paul L. Donaldson	Chief Hydrographer	07/30/2020	Paul L Donaldson Digitally signed by: Paul L Donaldson DN: CN = Paul L Donaldson C = US O = Leidos OU = A01410D00000171EA2490940000B A8A Date: 2020.07.30 13:41:38 -04'00'