H13489

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

DESCRIPTIVE REPORT

Type of Survey:	Navigable Area
Registry Number:	H13489

LOCALITY

State(s):	Alabama Mississippi
General Locality:	Approaches to Pascagoula, Louisiana, Mississippi, and Alabama
Sub-locality:	Dauphin Island

2021

CHIEF OF PARTY
Jonathan L. Dasler, PE, PLS, CH

LIBRARY & ARCHIVES

Date:

U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION	REGISTRY NUMBER:
HYDROGRAPHIC TITLE SHEET	**H13489**

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):	**Alabama Mississippi**
General Locality:	**Approaches to Pascagoula, Louisiana, Mississippi, and Alabama**
Sub-Locality:	**Dauphin Island**
Scale:	**20000**
Dates of Survey:	**08/14/2021 to 11/17/2021**
Instructions Dated:	**04/27/2021**
Project Number:	**OPR-J315-KR-21**
Field Unit:	**David Evans and Associates, Inc.**
Chief of Party:	**Jonathan L. Dasler, PE, PLS, CH**
Soundings by:	**Multibeam Echo Sounder**
Imagery by:	**Multibeam Echo Sounder Backscatter Side Scan Sonar**
Verification by:	**Atlantic Hydrographic Branch**
Soundings Acquired in:	**meters at Mean Lower Low Water**

Remarks: ***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 16N, 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 H13489

Project: OPR-J315-KR-21

Locality: Approaches to Pascagoula, Louisiana, Mississippi, and Alabama

Sublocality: Dauphin Island

Scale: 1:20000

August 2021 - November 2021

David Evans and Associates, Inc.

Chief of Party: Jonathan L. Dasler, PE, PLS, CH

A. Area Surveyed

David Evans and Associates, Inc. (DEA) conducted a hydrographic survey of the assigned area in the vicinity of Dauphin Island in Mississippi and Alabama. Survey H13489 was conducted in accordance with the Statement of Work and Hydrographic Survey Project Instructions dated April 27, 2021.

The Hydrographic Survey Project Instructions reference the National Ocean Service (NOS) Hydrographic Surveys Specifications and Deliverables Manual (HSSD) (April 2021) as the technical requirements for this project.

A.1 Survey Limits

Data were acquired within the following survey limits:

Northwest Limit	Southeast Limit
30° 17' 14.35" N 88° 23' 43.66" W	30° 10' 48.37" N 88° 2' 19.44" W

Table 1: Survey Limits

Survey limits were surveyed in accordance with the requirements in the Project Instructions and the HSSD. The assigned survey areas are outlined in Figure 1.

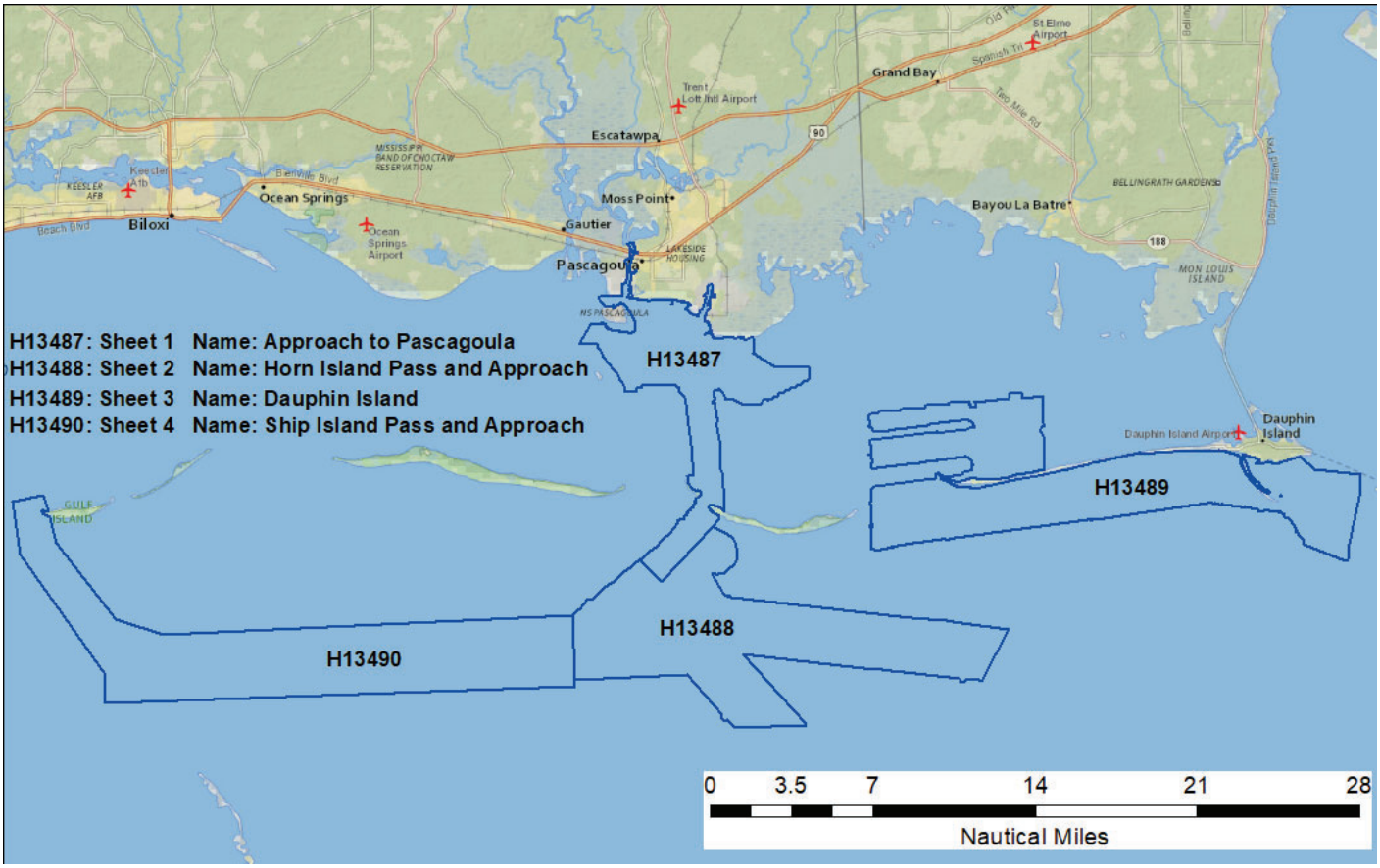


Figure 1: OPR-J315-KR-21 Assigned Survey Areas

A.2 Survey Purpose

The purpose of this survey, defined in the Project Instructions, is as follows: “The Port of Pascagoula, Mississippi is ranked as the 25th busiest by total tons of commerce in the US (1). This proposed survey area covers approximately 189 square nautical miles of the approaches to Pascagoula and Gulfport as well as sections of the Intercoastal Waterway (ICW) between Louisiana and Alabama. The region has been affected by several recent hurricanes so it is expected that modern hydrographic techniques will find significant changes to the seabed since the most recent surveys. Survey data from this project are intended to supersede all prior survey data in the common area."

(1) The U.S. Coastal and Inland Navigation System 2019 Transportation Facts & Information, Navigation and Civil Works Decision Support Center, USACE

A.3 Survey Quality

The entire survey is adequate to supersede previous data.

A.4 Survey Coverage

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

Water Depth	Coverage Required
All waters in survey area	Acquire backscatter data during all multibeam data acquisition (Refer to HSSD Section 6.2).
All waters in survey area	Complete Coverage (Refer to HSSD Section 5.2.2.3).

Table 2: Survey Coverage

Complete Coverage Option B was obtained over the entire survey area. Data were collected in depths greater than 3.5 meters relative to chart datum using 100% Side Scan Sonar (SSS) coverage with concurrent multibeam echosounder (MBES) and backscatter. This coverage type follows the Complete Coverage Option B requirement specified in Section 5.2.2.3 of the 2021 HSSD.

Figure 2 shows the H13489 survey outline in relation to the assigned survey area. The survey outline depicts coverage to the survey's Navigable Area Limit Line (NALL). In some areas, the survey's Complete Coverage requirement was met by filling holidays in the side scan sonar coverage with multibeam meeting the Complete Coverage Option A specification.

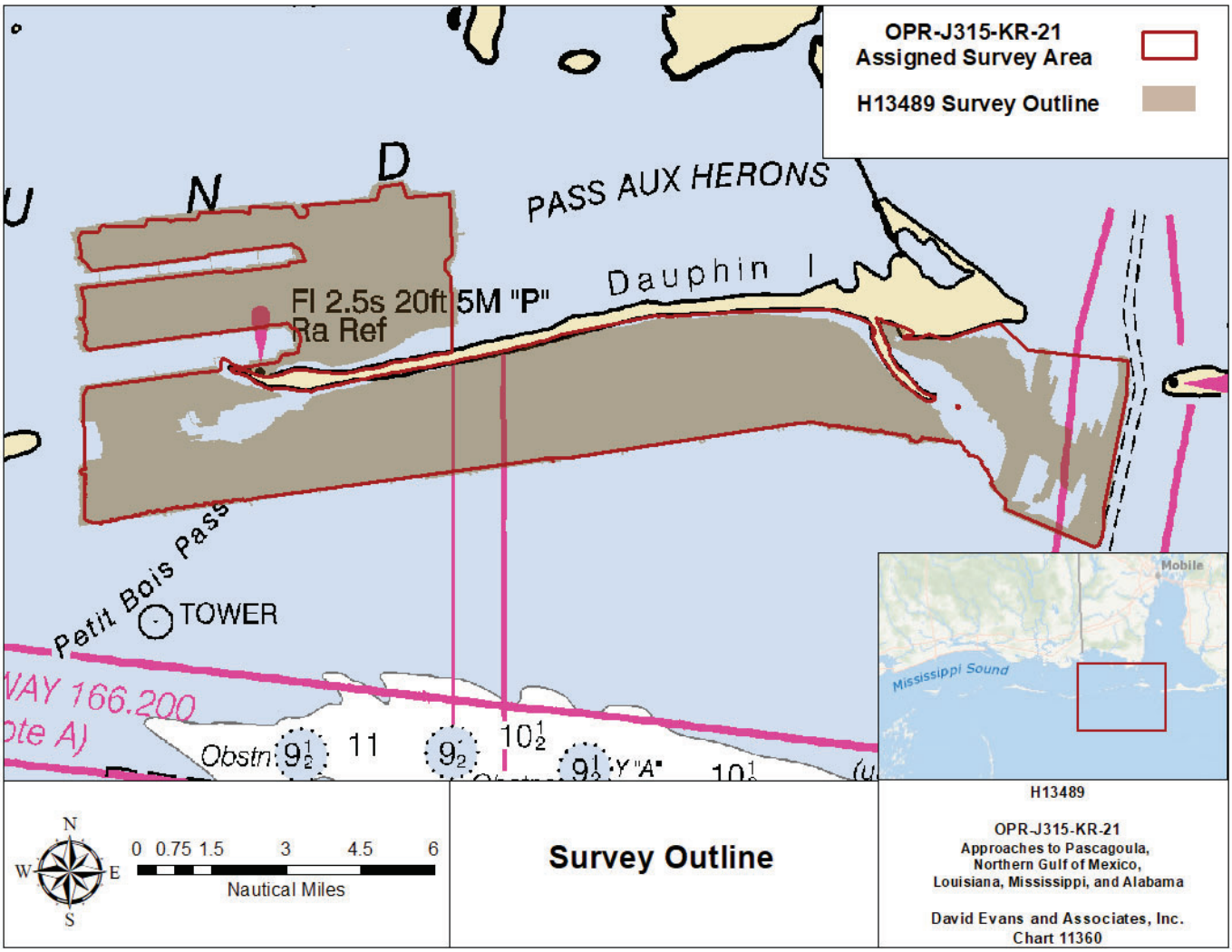


Figure 2: H13489 Survey Outline

A.6 Survey Statistics

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

	HULL ID	*S/V Blake*	*R/V Broughton*	*Total*
LNM	**SBES Mainscheme**	0	0	0
	MBES Mainscheme	3.87	50.27	54.14
	Lidar Mainscheme	0	0	0
	SSS Mainscheme	0	0	0
	SBES/SSS Mainscheme	0	0	0
	MBES/SSS Mainscheme	1254.05	407.81	1661.86
	SBES/MBES Crosslines	54.89	19.52	74.41
	Lidar Crosslines	0	0	0
Number of Bottom Samples				27
Number Maritime Boundary Points Investigated				0
Number of DPs				0
Number of Items Investigated by Dive Ops				0
Total SNM				49.7

Table 3: Hydrographic Survey Statistics

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

Survey Dates	Day of the Year
08/14/2021	226

Survey Dates	Day of the Year
08/15/2021	227
08/17/2021	229
08/18/2021	230
08/19/2021	231
08/20/2021	232
08/21/2021	233
08/22/2021	234
08/23/2021	235
08/24/2021	236
08/25/2021	237
08/26/2021	238
09/21/2021	264
09/22/2021	265
09/23/2021	266
09/24/2021	267
09/27/2021	270
09/28/2021	271
09/29/2021	272
09/30/2021	273
10/01/2021	274
10/03/2021	276
10/04/2021	277
10/05/2021	278
10/06/2021	279
10/07/2021	280
10/13/2021	286
10/26/2021	299
10/31/2021	304
11/01/2021	305
11/02/2021	306
11/03/2021	307
11/09/2021	313

Survey Dates	Day of the Year
11/10/2021	314
11/11/2021	315
11/16/2021	320
11/17/2021	321

Table 4: Dates of Hydrography

B. Data Acquisition and Processing

B.1 Equipment and Vessels

The OPR-J315-KR-21 Data Acquisition and Processing Report (DAPR), submitted with prior survey H13488, details equipment and vessel information as well as data acquisition and processing procedures. There were no vessel or equipment configurations used during data acquisition that deviated from those described in the DAPR.

The S/V Blake is an 82-foot aluminum catamaran with a 27-foot beam and a draft of 4.5 feet (Figure 3). The R/V Broughton is a 24-foot custom Duckworth offshore with an 8.5-foot beam and a draft of 2.75 feet (Figure 4).

B.1.1 Vessels

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

Hull ID	*S/V Blake*	*R/V Broughton*
LOA	82 feet	24 feet
Draft	4.5 feet	2.75 feet

Table 5: Vessels Used

Figure 3: S/V Blake

Figure 4: R/V Broughton

B.1.2 Equipment

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

Manufacturer	Model	Type
Teledyne RESON	SeaBat T50-R	MBES
EdgeTech	4200	SSS
Applanix	POS MV 320 v5	Positioning and Attitude System
AML Oceanographic	MicroX SV	Sound Speed System
AML Oceanographic	MVP30-350	Sound Speed System
AML Oceanographic	SmartX	Sound Speed System

Table 6: Major Systems Used

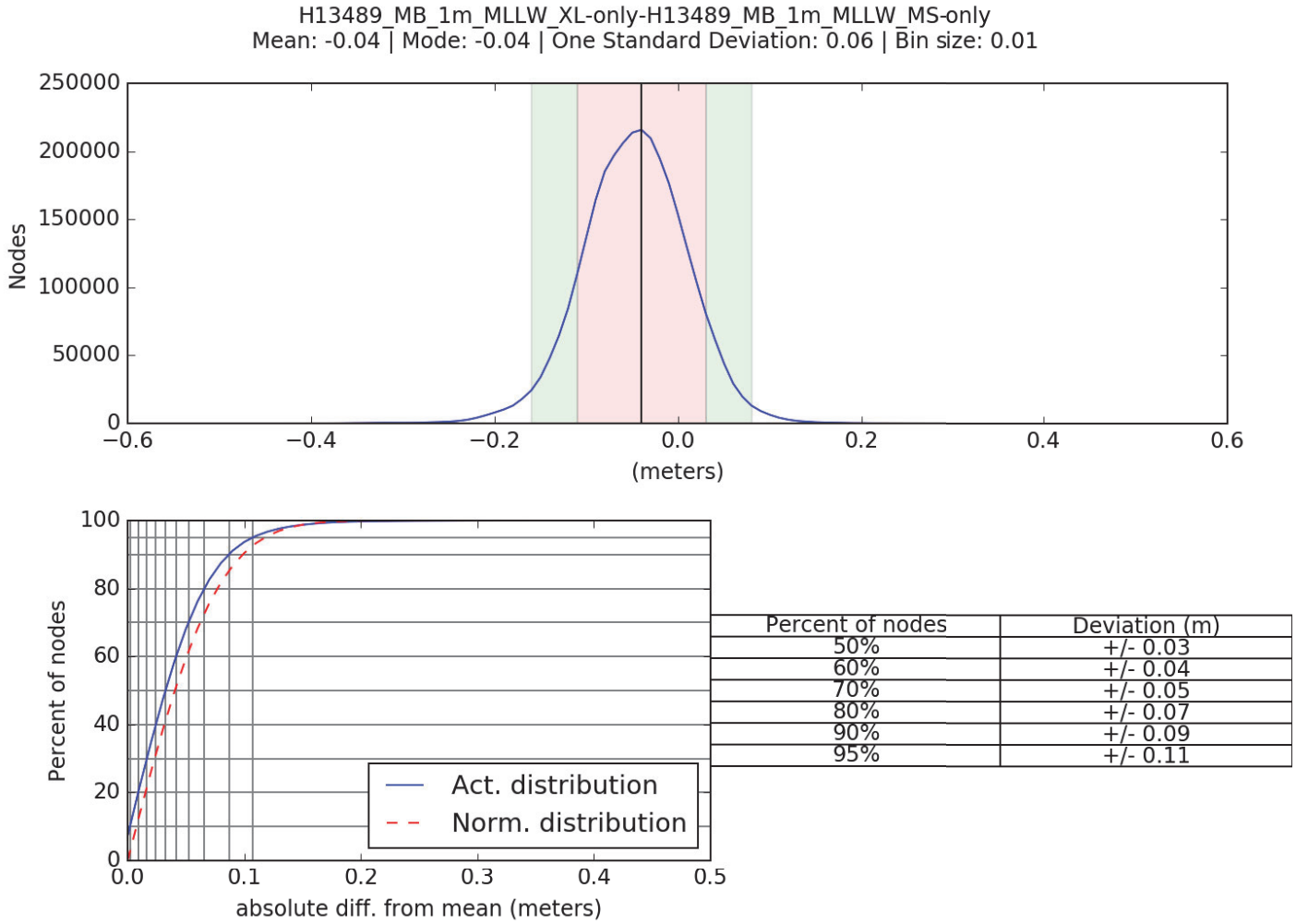
B.2 Quality Control

B.2.1 Crosslines

Multibeam crosslines were run across 4.34% of the entire survey area to provide a varied spatial and temporal distribution for analysis of internal consistency within the survey data.

Crossline analysis was performed using the CARIS Hydrographic Information Processing System (HIPS) Quality Control (QC) Report tool, which compares crossline data to a gridded surface and reports results by beam number. Crosslines were compared to a 1-meter Combined Uncertainty and Bathymetry Estimator (CUBE) surface encompassing mainscheme, fill, and investigation data for the entire survey area.

DEA performed an additional crossline analysis using the NOAA Pydro Compare Grids tool to analyze the differences between gridded mainscheme depths and gridded crossline depths. Input grids were 1-meter resolution CUBE surfaces of mainscheme and crossline depths. Results from the crossline to mainscheme difference analysis are depicted in Figure 5, with units represented in meters.



Percent of nodes	Deviation (m)
50%	+/- 0.03
60%	+/- 0.04
70%	+/- 0.05
80%	+/- 0.07
90%	+/- 0.09
95%	+/- 0.11

Figure 5: H13489 Crossline Difference

B.2.2 Uncertainty

The following survey specific parameters were used for this survey:

Method	Measured	Zoning
ERS via VDATUM	0.05 meters	0.152 meters

Table 7: Survey Specific Tide TPU Values.

Hull ID	Measured - CTD	Measured - MVP	Measured - XBT	Surface
S/V Blake	n/a meters/second	1.0 meters/second	n/a meters/second	0.5 meters/second
R/V Broughton	1.0 meters/second	n/a meters/second	n/a meters/second	0.5 meters/second

Table 8: Survey Specific Sound Speed TPU Values.

Additional discussion of these parameters is included in the DAPR. The S/V Blake used an AML MVP30-350 with integrated Micro SVP&T to acquire sound speed measurements. The R/V Broughton used an AML Smart X to acquire sound speed measurements. The measurement uncertainty for these sensors is listed in the Moving Vessel Profiler (MVP) and Conductivity Temperature and Depth (CTD) columns in Table 8.

During surface finalization in HIPS, the "Greater of the two values" option was selected, where the calculated uncertainty from Total Propagated Uncertainty (TPU) is compared to the standard deviation of the soundings influencing the node, and where the greater value is assigned as the final uncertainty of the node. The uncertainty of the finalized surface increased for nodes that had a standard deviation greater than TPU.

To determine if the surface grid nodes met International Hydrographic Organization (IHO) Order 1a specification, a ratio of the final node uncertainty to the allowable uncertainty at that depth was determined. As a percentage, this value represents the amount of error budget utilized by the Total Vertical Uncertainty (TVU) at each node. Values greater than 100% indicate nodes exceeding the allowable IHO uncertainty. The resulting calculated TVU values of all nodes in the submitted finalized surface is shown in Figure 6.

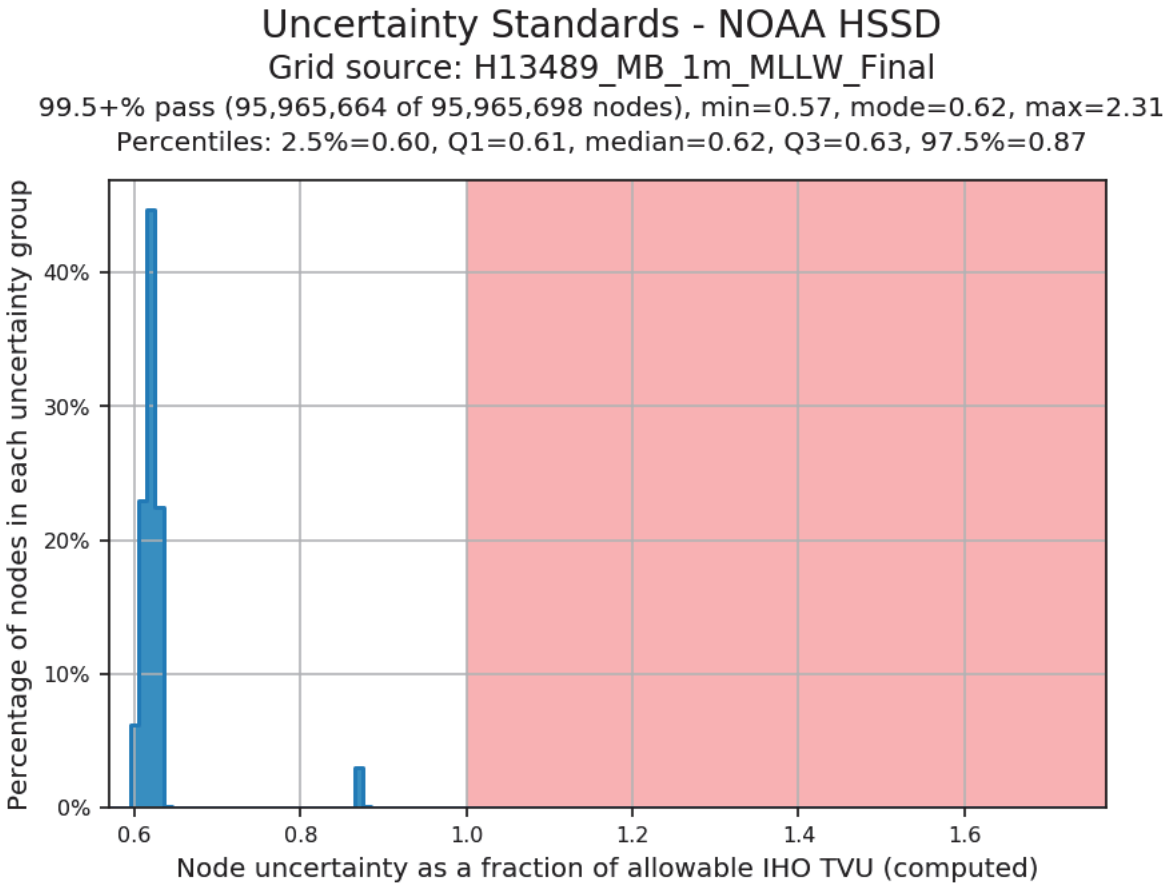


Figure 6: Node TVU Statistics - 1 meter, Finalized

B.2.3 Junctions

Survey H13489 junctions with prior contemporary surveys H12654, H12656, H13059, H13062, H13065, H13066, H13067, and H13068. Figure 7 depicts H13489 and the junctioning surveys.

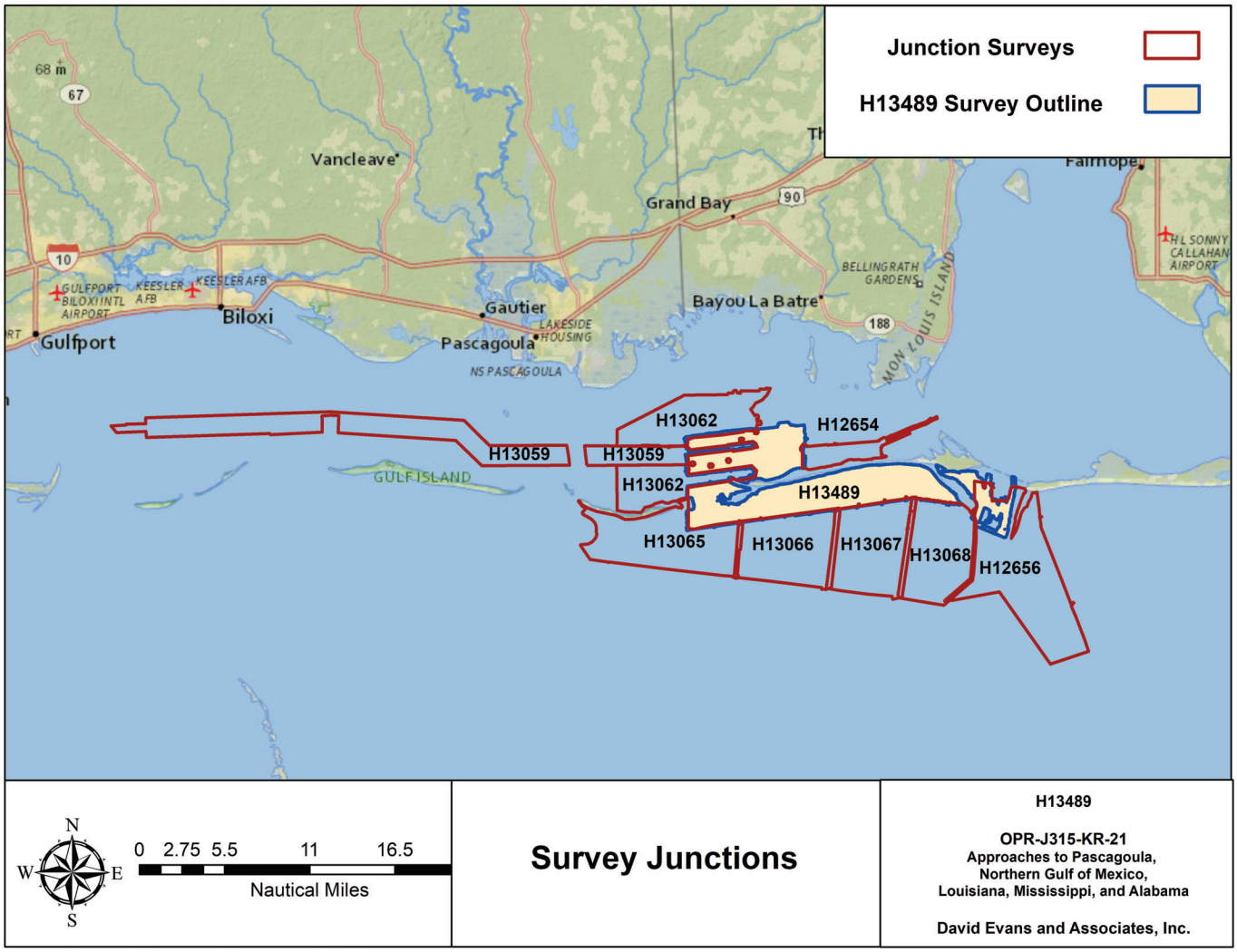


Figure 7: Survey Junctions with Registry Number H13489

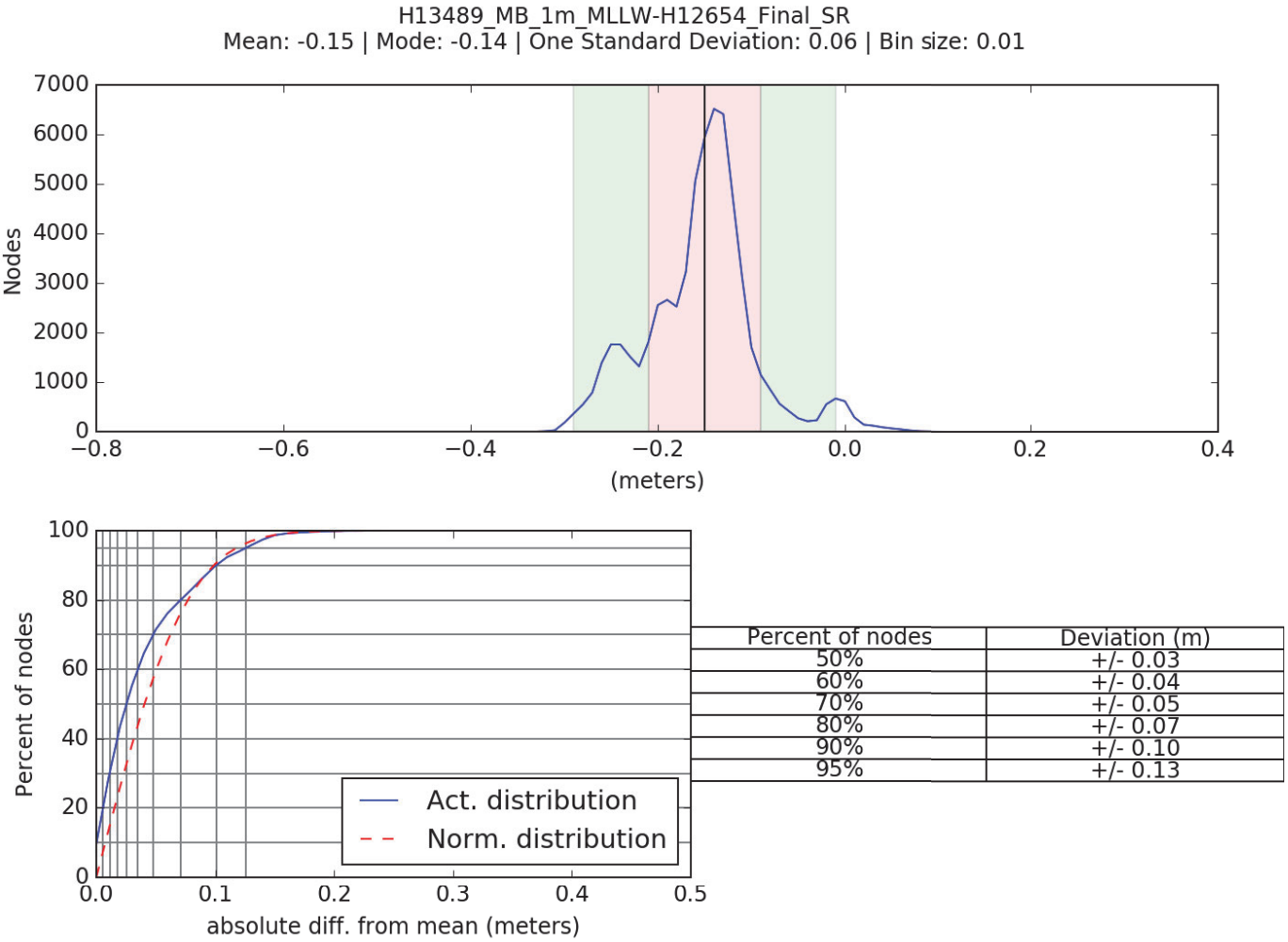
The following junctions were made with this survey:

Registry Number	Scale	Year	Field Unit	Relative Location
H12654	1:20000	2014	SAIC	NE
H12656	1:20000	2014	SAIC	SE
H13059	1:10000	2017	David Evans and Associates, Inc.	W
H13062	1:20000	2017	David Evans and Associates, Inc.	NW
H13065	1:20000	2017	David Evans and Associates, Inc.	SW
H13066	1:20000	2017	David Evans and Associates, Inc.	S
H13067	1:20000	2017	David Evans and Associates, Inc.	S
H13068	1:20000	2017	David Evans and Associates, Inc.	S

Table 9: Junctioning Surveys

H12654

The mean difference between H13489 and H12654 survey depths is 15 centimeters (H13489 deeper than H12654), shown in Figure 8. This area has been significantly impacted by recent hurricanes, as noted in the project instructions, which may account for some of the differences observed in the junction analysis. In addition, tide reduction methods differed between the surveys. Survey H12654 was reduced to Mean Lower Low Water (MLLW) using a tide zoning scheme relying on water levels from the NOAA National Water Level Observation Network (NWLON) stations at Dauphin Island, AL, (8735180) and Pascagoula NOAA Lab, MS (8741533). Survey H13489 used GPS Tides computed from post-processed navigation using Real Time Extended (RTX) methods and a VDatum-based separation model.

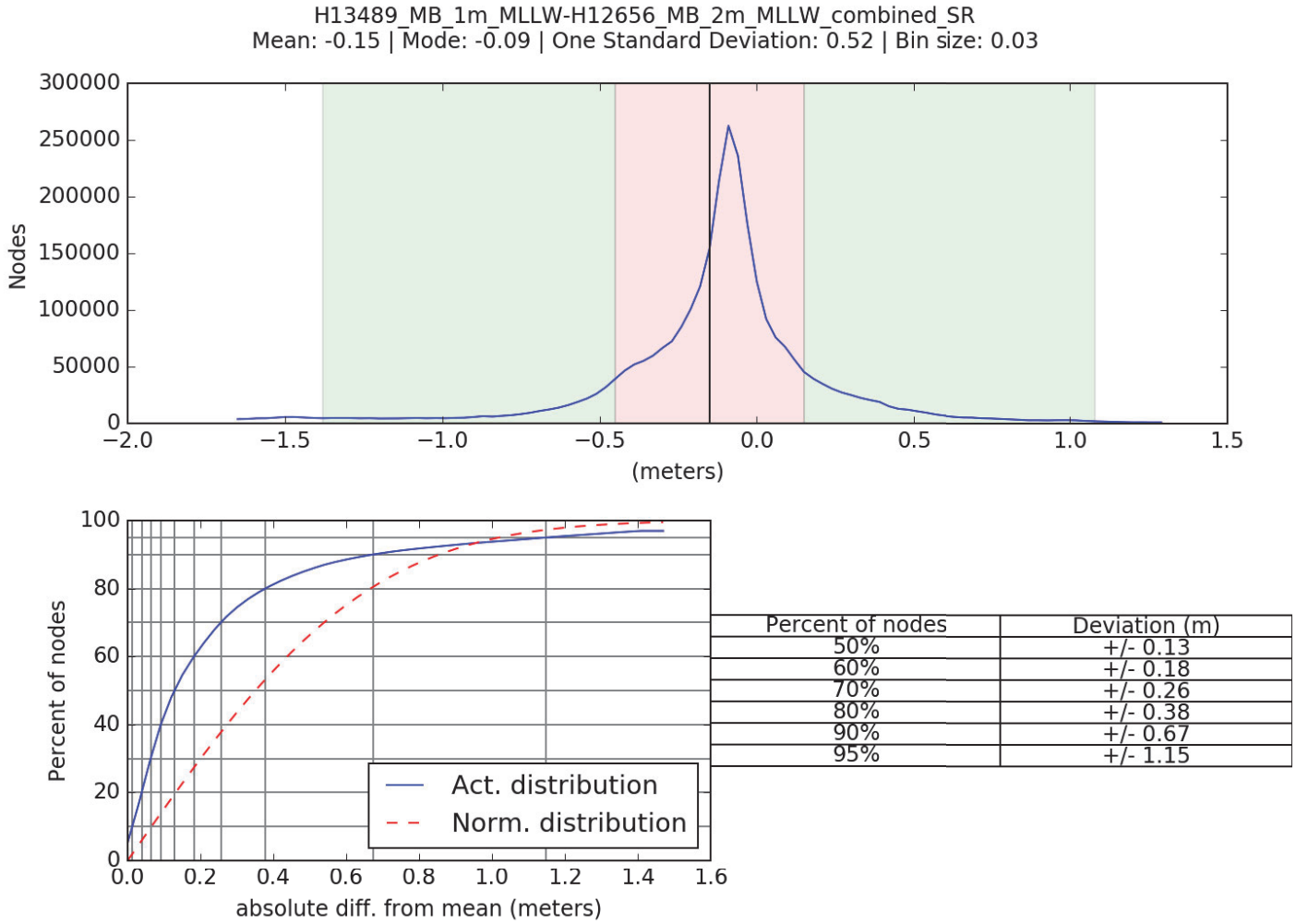


Percent of nodes	Deviation (m)
50%	+/- 0.03
60%	+/- 0.04
70%	+/- 0.05
80%	+/- 0.07
90%	+/- 0.10
95%	+/- 0.13

Figure 8: Distribution Summary Plot of Survey H13489 1-meter vs H12654 2-meter

H12656

The mean difference between H13489 and H12656 survey depths is 15 centimeters (H13489 deeper than H12656), shown in Figure 9. These differences may be a result of the impacts from recent hurricanes and variations in tide reduction methods. Survey H12656 was reduced to MLLW using the same tide zoning scheme used for survey H12654, while survey H13489 used Ellipsoidal Referenced Survey (ERS) methods.

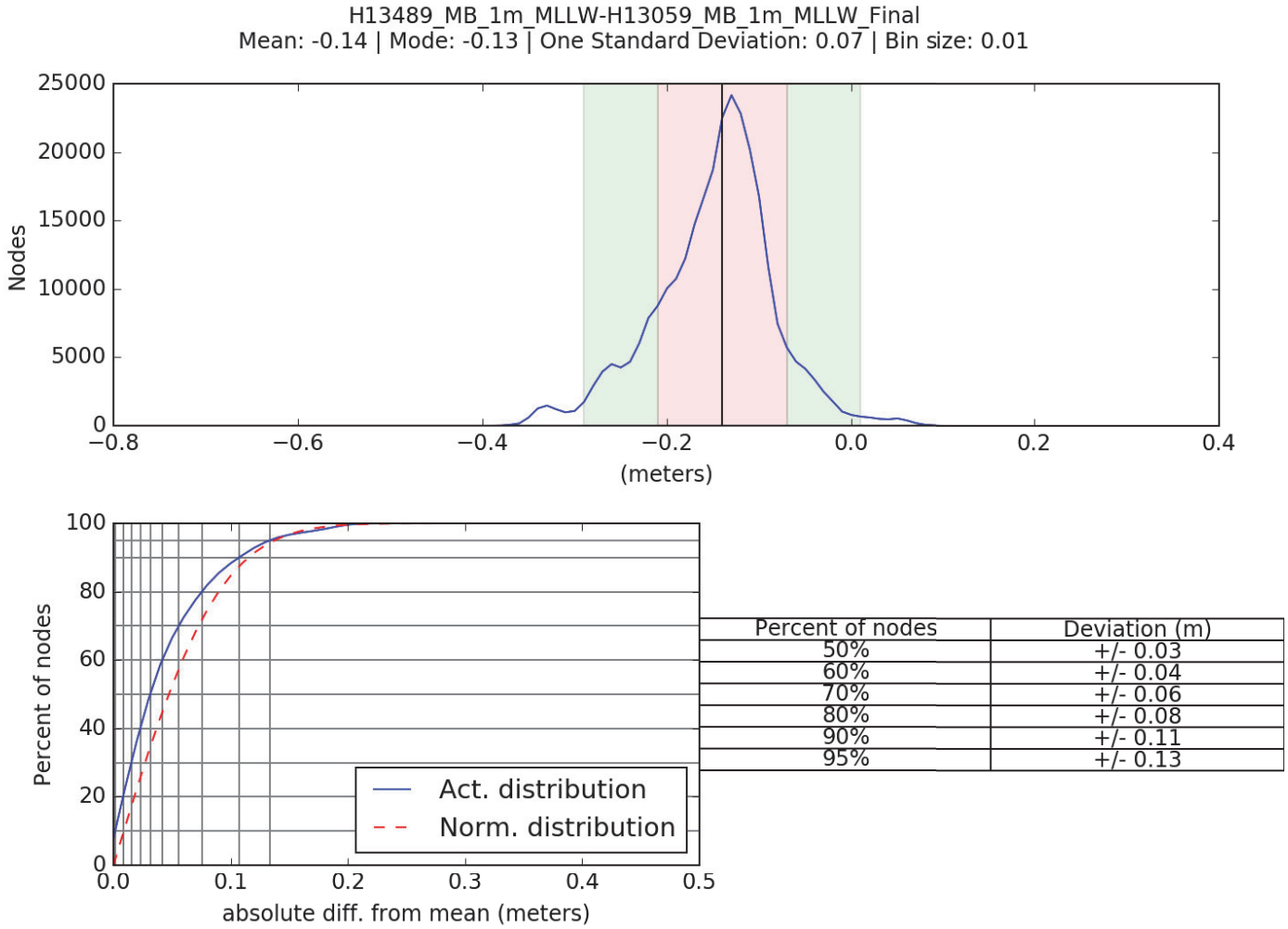


Percent of nodes	Deviation (m)
50%	+/- 0.13
60%	+/- 0.18
70%	+/- 0.26
80%	+/- 0.38
90%	+/- 0.67
95%	+/- 1.15

Figure 9: Distribution Summary Plot of Survey H13489 1-meter vs H12656 2-meter

H13059

The mean difference between H13489 and H13059 survey depths is 14 centimeters (H13489 deeper than H13059), shown in Figure 10. Survey H13059 was reduced to MLLW using Tidal Constituent and Residual Interpolation (TCARI) incorporating water levels from National Water Level Observation Network (NWLON) stations at Dauphin Island, Alabama (8735180), Pascagoula NOAA Lab, Mississippi (8741533), and Bay Waveland (8747437), where survey H13489 used ERS methods. The project area has also been impacted by recent hurricanes, which can result in changes to the seabed.

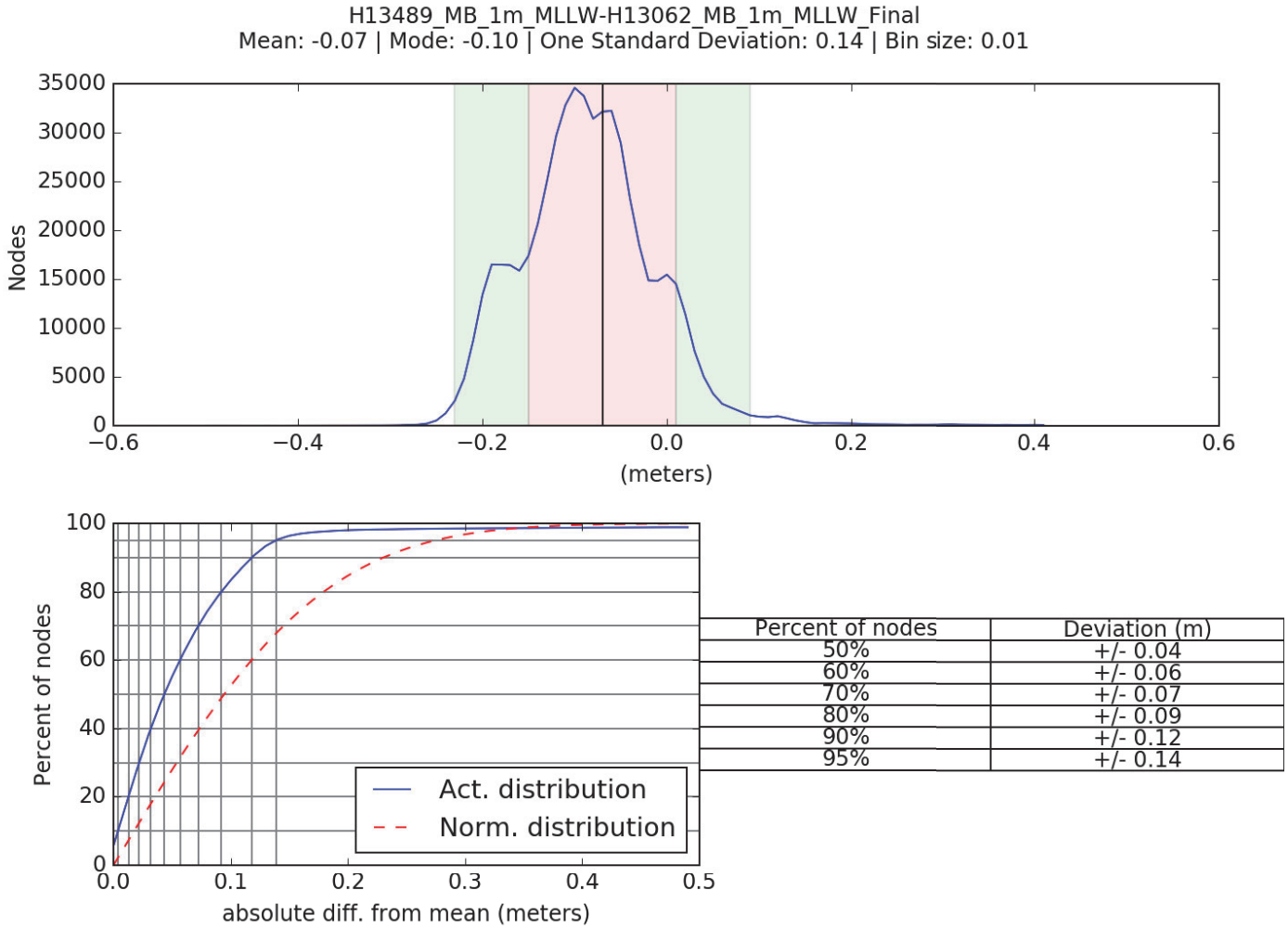


Percent of nodes	Deviation (m)
50%	+/- 0.03
60%	+/- 0.04
70%	+/- 0.06
80%	+/- 0.08
90%	+/- 0.11
95%	+/- 0.13

Figure 10: Distribution Summary Plot of Survey H13489 1-meter vs H13059 1-meter

H13062

The mean difference between H13489 and H13062 survey depths is 7 centimeters (H13489 deeper than H13062), shown in Figure 11. Like the junction with H13059, survey H13062 was reduced to MLLW using TCARI, while survey H13489 used ERS methods. The project area has also been impacted by recent hurricanes, which can result in changes to the seabed.

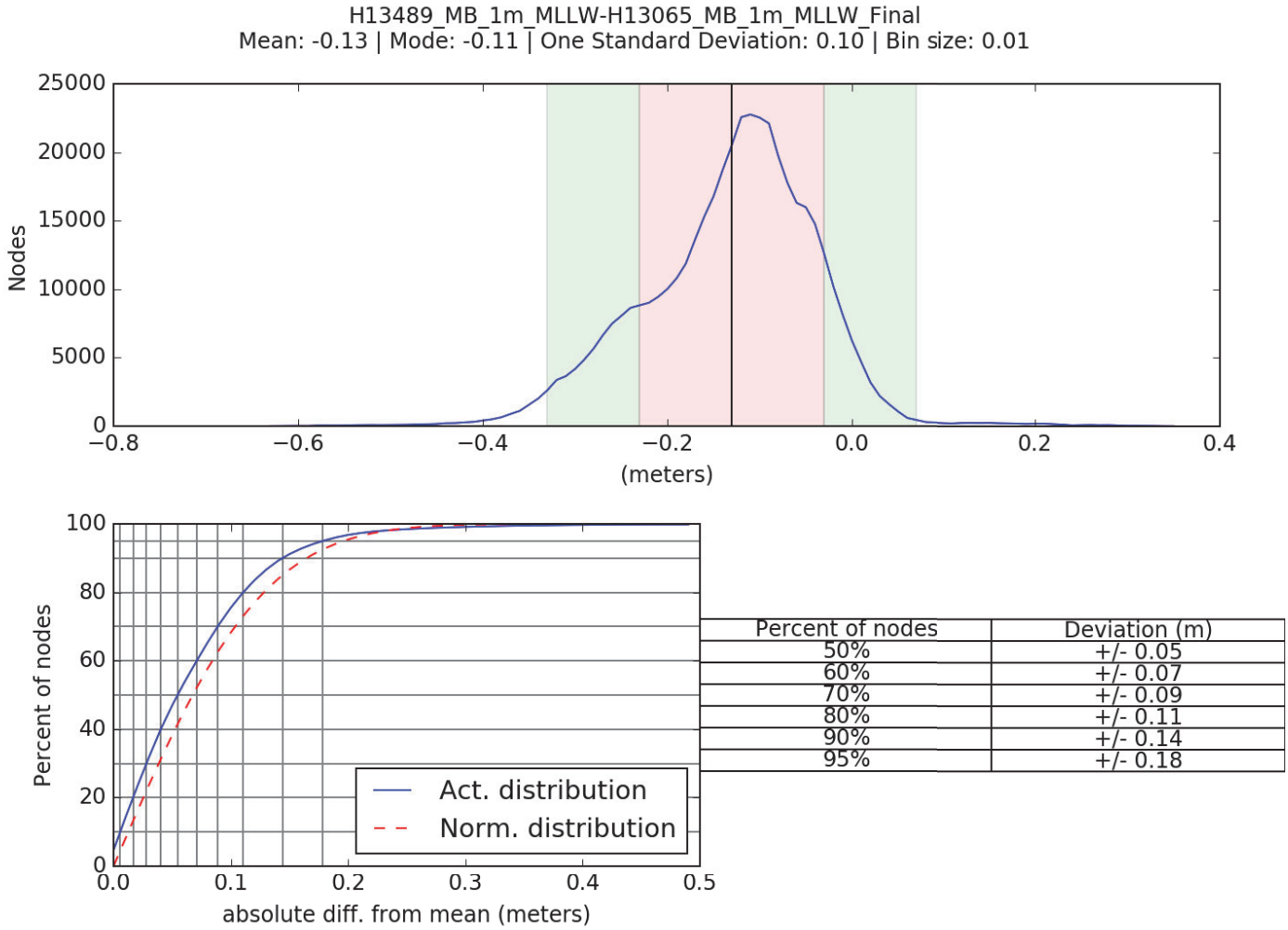


Percent of nodes	Deviation (m)
50%	+/- 0.04
60%	+/- 0.06
70%	+/- 0.07
80%	+/- 0.09
90%	+/- 0.12
95%	+/- 0.14

Figure 11: Distribution Summary Plot of Survey H13489 1-meter vs H13062 1-meter

H13065

The mean difference between H13489 and H13065 survey depths is 13 centimeters (H13489 deeper than H13065), shown in Figure 12. Like the junction with H13059, survey H13065 was reduced to MLLW using TCARI, while survey H13489 used ERS methods. The project area has also been impacted by recent hurricanes, which can result in changes to the seabed.

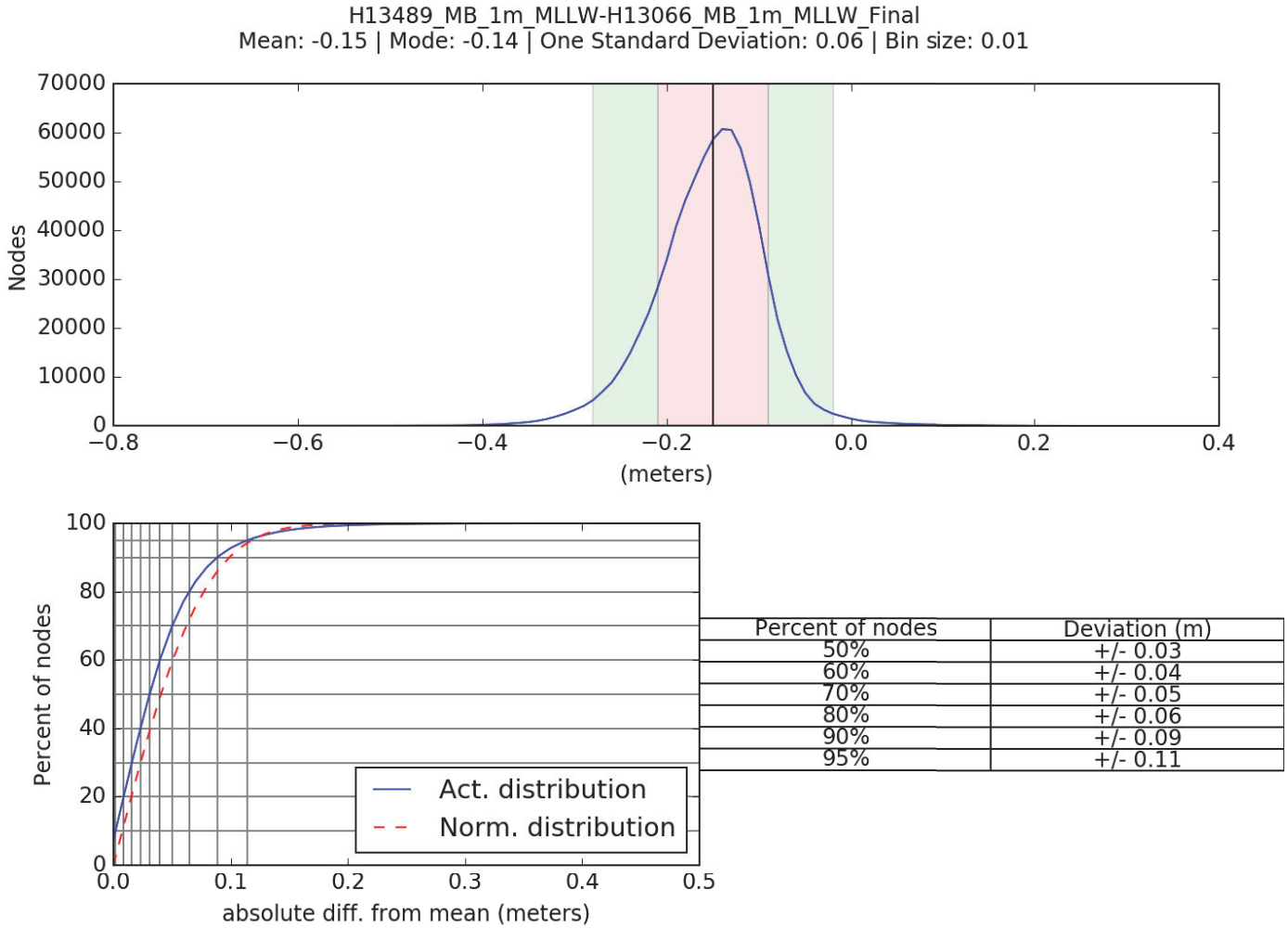


Percent of nodes	Deviation (m)
50%	+/- 0.05
60%	+/- 0.07
70%	+/- 0.09
80%	+/- 0.11
90%	+/- 0.14
95%	+/- 0.18

Figure 12: Distribution Summary Plot of Survey H13489 1-meter vs H13065 1-meter

H13066

The mean difference between H13489 and H13066 survey depths is 15 centimeters (H13489 deeper than H13066), shown in Figure 13. Like the junction with H13059, survey H13066 was reduced to MLLW using TCARI, while survey H13489 used ERS methods. The project area has also been impacted by recent hurricanes, which can result in changes to the seabed.

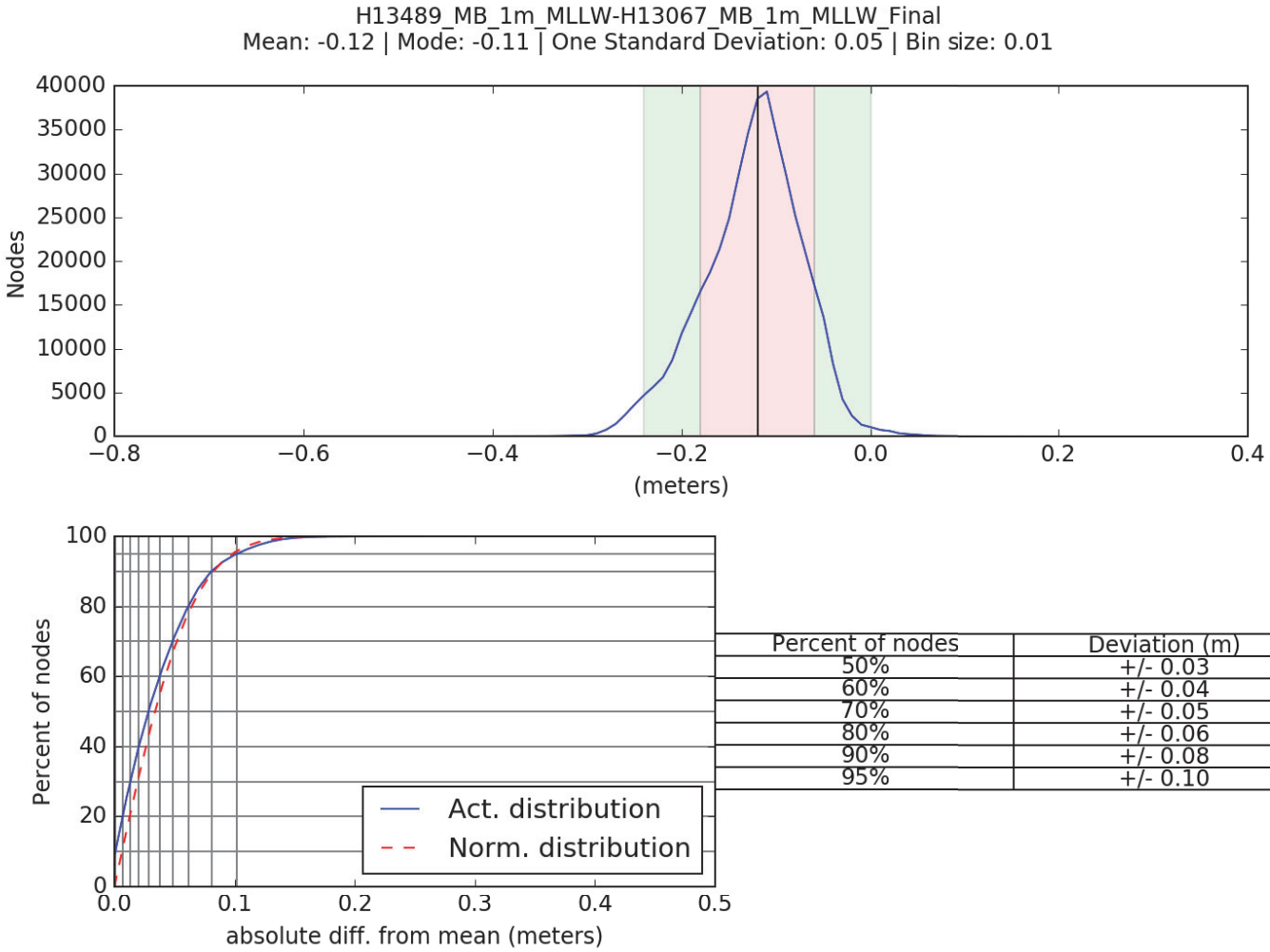


Percent of nodes	Deviation (m)
50%	+/- 0.03
60%	+/- 0.04
70%	+/- 0.05
80%	+/- 0.06
90%	+/- 0.09
95%	+/- 0.11

Figure 13: Distribution Summary Plot of Survey H13489 1-meter vs H13066 1-meter

H13067

The mean difference between H13489 and H13067 survey depths is 12 centimeters (H13489 deeper than H13067), shown in Figure 14. Like the junction with H13059, survey H13067 was reduced to MLLW using TCARI, while survey H13489 used ERS methods. The project area has also been impacted by recent hurricanes, which can result in changes to the seabed.

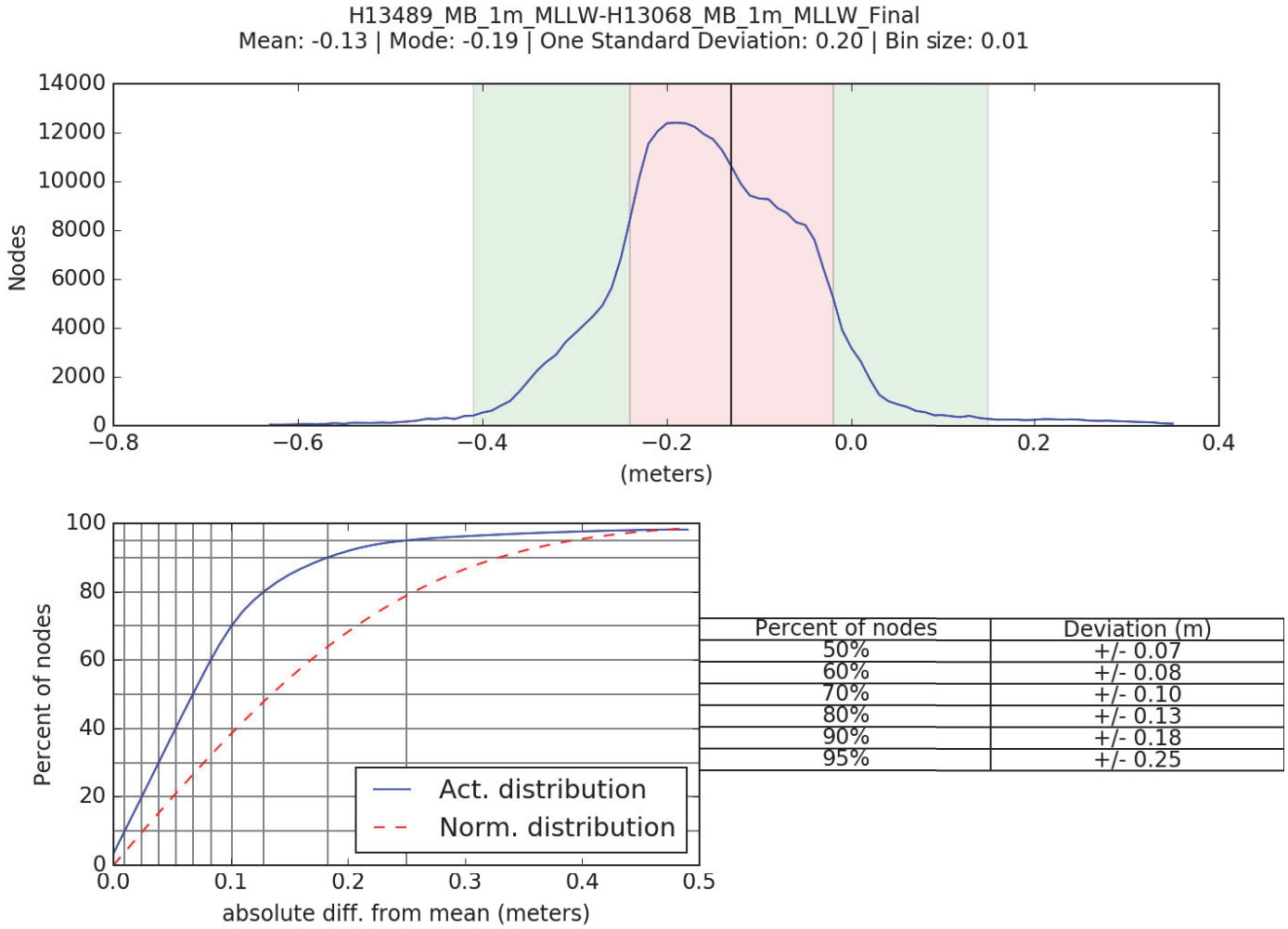


Percent of nodes	Deviation (m)
50%	+/- 0.03
60%	+/- 0.04
70%	+/- 0.05
80%	+/- 0.06
90%	+/- 0.08
95%	+/- 0.10

Figure 14: Distribution Summary Plot of Survey H13489 1-meter vs H13067 1-meter

H13068

The mean difference between H13489 and H13068 survey depths is 13 centimeters (H13489 deeper than H13068), shown in Figure 15. Like the junction with H13059, survey H13068 was reduced to MLLW using TCARI, while survey H13489 used ERS methods. The project area has also been impacted by recent hurricanes, which can result in changes to the seabed.



Percent of nodes	Deviation (m)
50%	+/- 0.07
60%	+/- 0.08
70%	+/- 0.10
80%	+/- 0.13
90%	+/- 0.18
95%	+/- 0.25

Figure 15: Distribution Summary Plot of Survey H13489 1-meter vs H13068 1-meter

B.2.4 Sonar QC Checks

Quality control is discussed in detail in Section B of the DAPR.

Multibeam data were reviewed at multiple levels of data processing, including CARIS HIPS conversion, subset editing, and analysis of anomalies revealed in CUBE surfaces.

Side scan data were reviewed at multiple levels of data processing, including during the initial SonarWiz import and preliminary stages of bottom-tracking, navigation review, and contact identification, as well as during the final stages of mosaic generation, data coverage and quality assessment, and contact correlation and attribution.

B.2.5 Equipment Effectiveness

Side Scan Sonar Timing Offset

Side scan files collected by the R/V Broughton on September 21, 2021, (DN264) and October 31, 2021, (DN304) in H13489 show a timing offset between the HYPACK navigation records and the side scan records in the HSX files. This occurred when timing from the Discover software was used in the HYPACK hardware configuration rather than the acquisition computer time, which was synced with the Position and Orientation System for Marine Vessels (POS MV).

This timing offset carried through to the processed SonarWiz data; however, SonarWiz software reads the time and ping information from the first side scan record in the HSX file upon import and positions it using the following position record in the file. Because of this, the positioning of side scan data is accurate and meets coverage and contact detection requirements, and it is only the ping times that are offset from the true time of acquisition.

The reviewer should be aware of potential issues that may arise if this data is processed using other side scan processing software (e.g., SIPS), as those software may read the time/position records in the HSX files differently than SonarWiz software and have issues properly displaying the data.

B.2.6 Factors Affecting Soundings

Bottom Changes During Survey Operations

Hurricane Ida, which made landfall near Port Fourchon, LA, on August 29, 2021, impacted the survey area. Misalignments exist between multibeam data acquired before and after the Category 4 hurricane. This issue is most evident along the western shore of Pelican Island where pre-hurricane survey lines acquired by the S/V Blake were extended farther inshore following the storm using the R/V Broughton. With guidance from the NOAA Operations Branch project manager, data were rejected (reject navigation and subset reject soundings) to remove the depth discrepancies when possible. An example of pre- and post-storm misalignment prior to rejecting data is presented in Figure 16.

Areas where bottom change is visible in the multibeam data (rejected and still present) have been noted in the H13489_Notes_for_Reviewer.hob file with the SNDWAV area feature class. This file is included with Appendix II of this report.

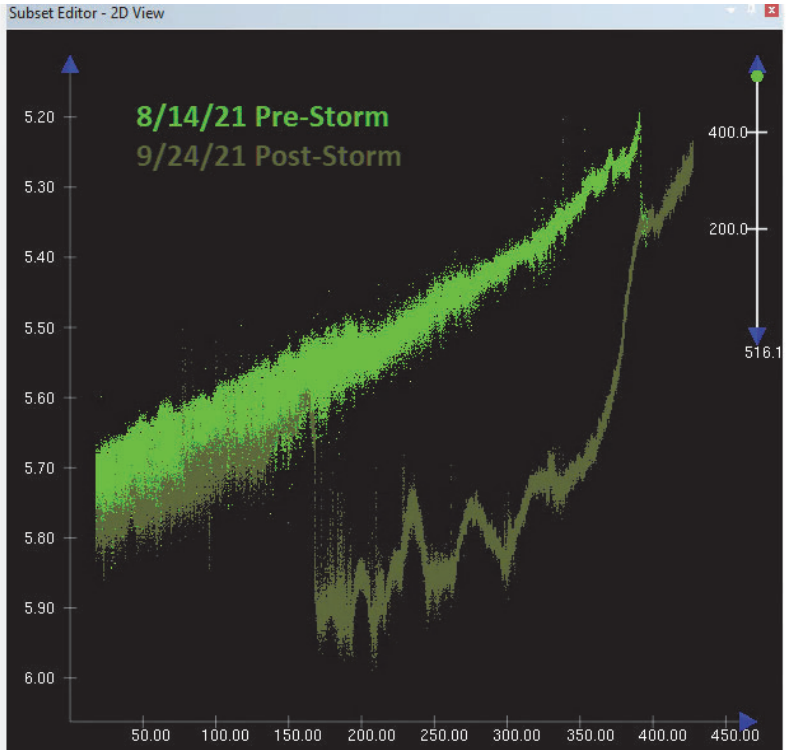


Figure 16: Sediment Movement Pre- and Post-Hurricane

B.2.7 Sound Speed Methods

Sound Speed Cast Frequency: Approximately 20-minute intervals

For H13489 survey operations, casts were distributed both temporally and spatially based on observed changes in sound speed profiles. Sound speed readings were applied in CARIS HIPS using the nearest in distance within a two-hour interval.

The first sound speed cast of the day acquired by the S/V Blake on September 29, 2021, (DN272) was located 600 meters outside of the survey area. This sound speed profile was deemed to be valid and used during multibeam processing. All other profiles were acquired within 500 meters of the survey limits.

During H13489 survey operations, the S/V Blake occasionally acquired the first cast of the day after starting multibeam data acquisition. In all cases, the first cast of the day was acquired within twenty-five minutes of the first sonar ping of the day. This issue occurred on the following days:

August 24, 2021 (DN236)
October 3, 2021 (DN276)

B.2.8 Coverage Equipment and Methods

Survey speeds were maintained to meet or exceed along-track sounding density requirements.

Multibeam data and side scan mosaics were thoroughly reviewed for holidays and areas of poor-quality coverage due to biomass, vessel wakes, or other factors. Side scan sonar contacts were developed with multibeam sonar to obtain a least depth of the contact using Complete Coverage requirements.

Complete Coverage multibeam was acquired inside the disproval radii for assigned charted features and over all new features. Additional discussion of coverage methods can be found in the DAPR.

B.2.9 Density

The sounding density requirement of 95% of all nodes, populated with at least five soundings per node, was verified by analyzing the density layer of the finalized surface. Individual surface results are stated in Figure 17.

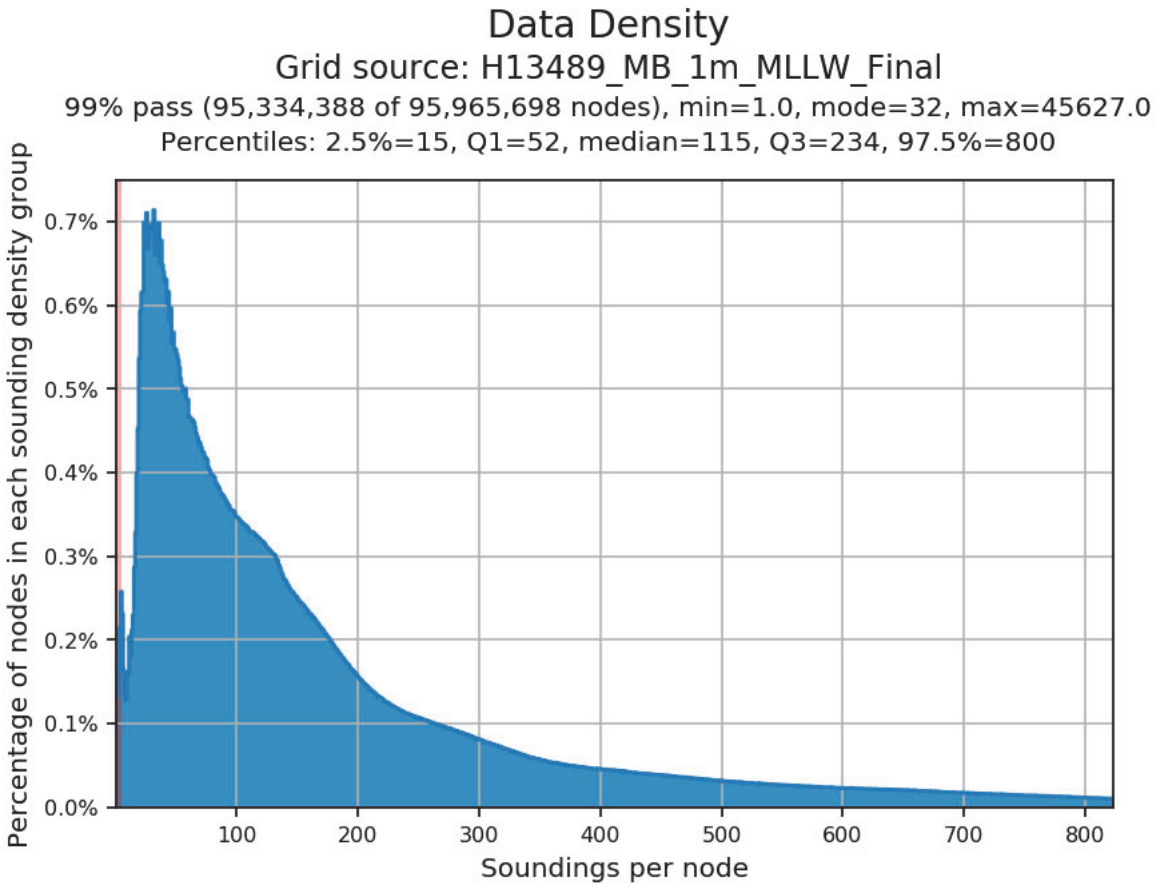


Figure 17: Node Density Statistics - 1 meter, Finalized

B.3 Echo Sounding Corrections

B.3.1 Corrections to Echo Soundings

Data reduction procedures for survey H13489 are detailed in the DAPR.

B.3.2 Calibrations

All sounding systems were calibrated as detailed in the DAPR.

B.4 Backscatter

Multibeam backscatter was logged in HYPACK 7K format and included with the H13489 digital deliverables. Data were processed periodically in CARIS HIPS to evaluate backscatter quality, but the processed data is not included with the deliverables. For data management purposes, the names of multibeam crosslines have been appended with the suffix _XL. This change was made to HIPS files only. The original file names of raw data files (HYPACK HSX and 7K) have been retained.

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
CARIS	HIPS/SIPS	11.3.8

Table 10: Primary bathymetric data processing software

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

Manufacturer	Name	Version
Chesapeake Technology, Inc.	SonarWiz	7.06.06 (64-bit)

Table 11: Primary imagery data processing software

The following Feature Object Catalog was used: NOAA Profile Version 2021.

A detailed listing of all data processing software is included in the OPR-J315-KR-21 DAPR.

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
H13489_MB_1m_MLLW.csar	CARIS Raster Surface (CUBE)	1 meters	1.336 meters - 19.398 meters	NOAA_1m	Complete MBES
H13489_MB_1m_MLLW_Final.csar	Finalized CARIS Raster Surface (CUBE)	1 meters	1.336 meters - 19.398 meters	NOAA_1m	Complete MBES
H13489_SSSAB_1m_600kHz_1of1	SSS Mosaic	1 meters	0 N/A - 0 N/A	N/A	100% SSS

Table 12: Submitted Surfaces

Bathymetric grids were created relative to MLLW in CUBE format using Complete Coverage resolution requirements as specified in the HSSD.

C. Vertical and Horizontal Control

A summary of the horizontal and vertical control for survey H13489 follows.

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-J315-KR-21_100m_NAD83_2011-MLLW.csar

Table 13: ERS method and SEP file

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 16.

The following PPK methods were used for horizontal control:

- RTX

The separation model listed in Table 12 was provided with the Project Instructions and used for sounding correction within the assigned survey area. Real-time navigation for all MBES survey lines were overwritten with post-processed navigation solutions in Smooth Best Estimate of Trajectory (SBET) format. Post-processed solutions were generated using Applanix POSPac MMS using the Trimble CenterPoint RTX option, which relies on precise satellite orbit and timing information to create centimeter-level positioning and elevation without the use of traditional local base stations. Information on survey control is detailed in the DAPR.

D. Results and Recommendations

D.1 Chart Comparison

The chart comparison was performed by comparing H13489 survey depths to a digital surface generated from the Band 4 and Band 5 electronic navigational charts (ENCs) covering the survey area. A 50-meter product surface was generated from a triangular irregular network (TIN) created from the ENC's soundings, depth contours, and depth features. An additional 50-meter HIPS product surface of the entire survey area was generated from the 1-meter CUBE surface. The chart comparison was conducted by creating and reviewing a difference surface using the ENC surface and survey surface as inputs. The chart comparison also included a review of all assigned charted features within the survey area. The results of the comparison are detailed below.

The relevant charts used during the comparison were reviewed to check that all United States Coast Guard (USCG) Local Notice to Mariners (LNMs) issued during survey acquisition, and impacting the survey area, were applied and addressed by this survey.

The ENCs used in the chart comparison are listed in Table 13. Figures 18 and 19 show the magnitude of differences along the comparison area.

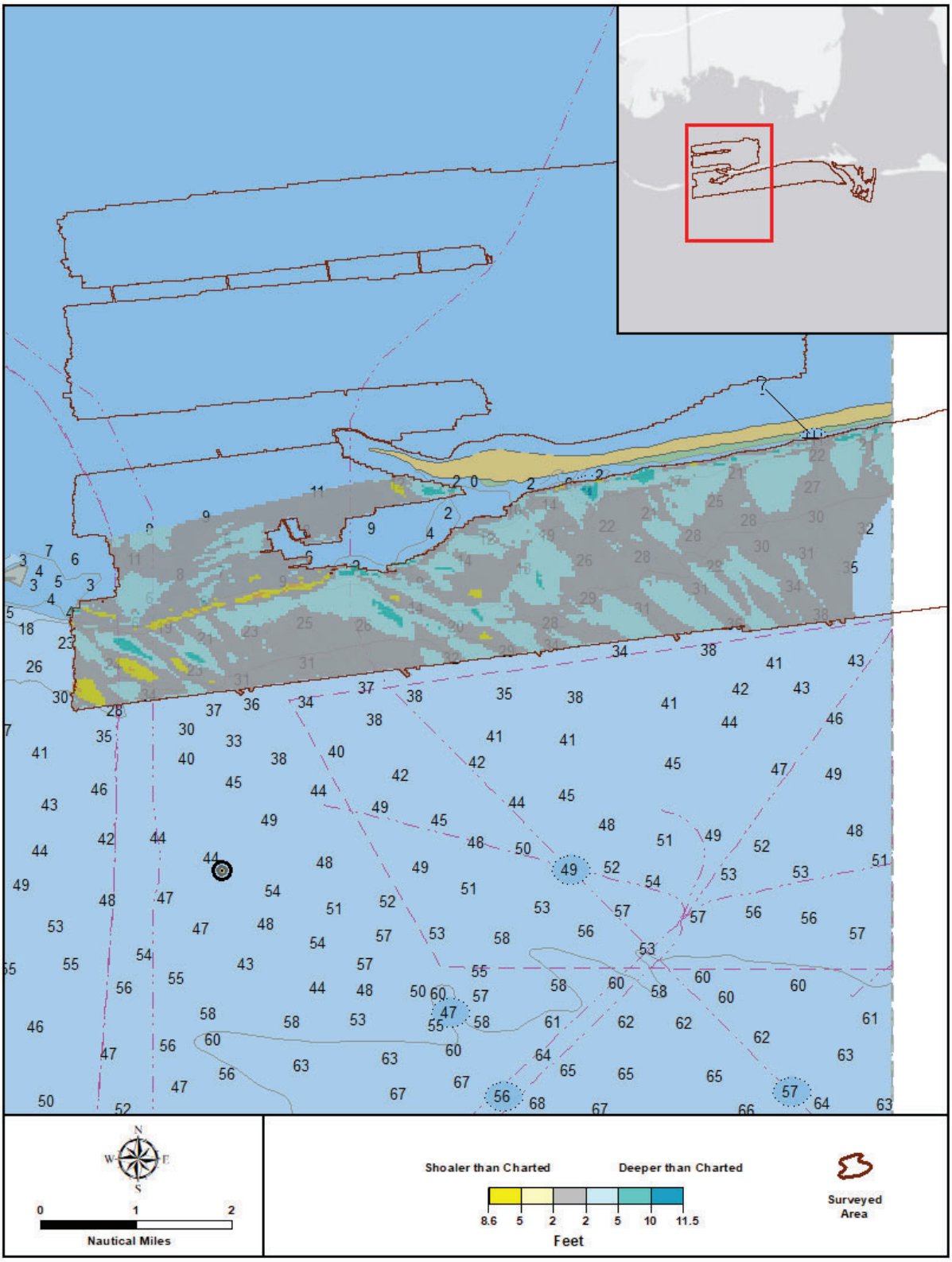


Figure 18: Depth Difference Between H13489 and US4MS12M

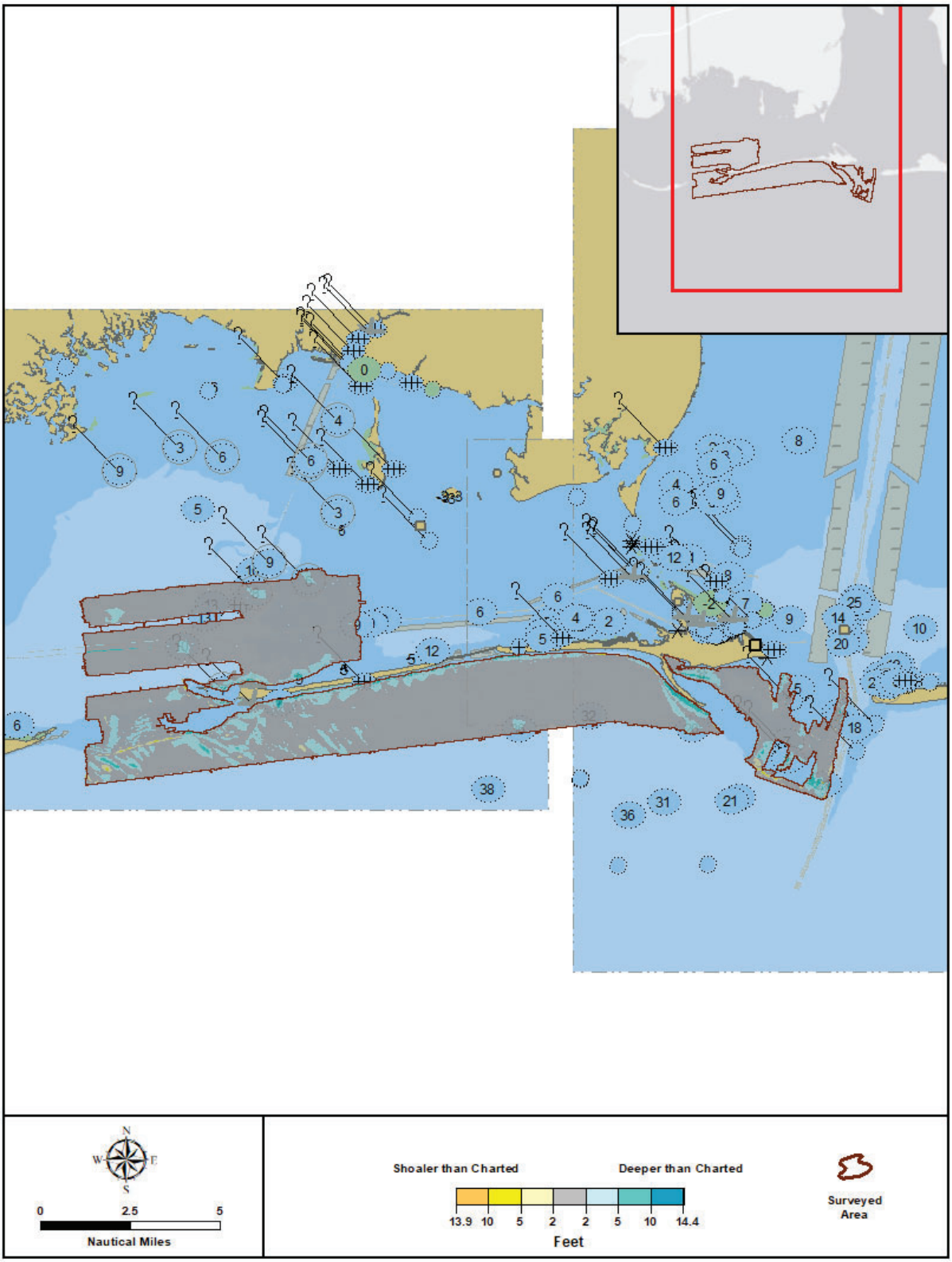


Figure 19: Depth Difference Between H13489 and Band 5 ENCs

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
US4MS12M	1:80000	45	10/14/2020	11/30/2021
US5MS11M	1:40000	61	09/07/2021	11/24/2021
US5MS21M	1:40000	48	01/05/2022	01/05/2022
US5AL12M	1:40000	41	10/08/2021	11/01/2021

Table 14: Largest Scale ENCs ***ENC US5MS11M is not in the survey area.***

Two ENCs cover the survey area but were not evaluated by the field unit - US4AL11M and US5AL13M.

US4AL11M - scale 1:80000 - Edition 67 - Update Application Date 01/12/2022 - Issue Date 03/17/2022

US5AL13M - scale 1:40000 - Edition 60 - Update Application Date 10/08/2021 - Issue Date 01/20/2022

D.1.2 Shoal and Hazardous Features

No shoals or potentially hazardous features exist for this survey.

D.1.3 Charted Features

All assigned features included in the project Composite Source File (CSF) found seaward of the NALL have been addressed by the survey and are included in the Final Feature File (FFF).

All disproved features have been included in the FFF with a description of "Delete." All new features have been included in the FFF with the surveyed feature depicted and a description of "New."

There are three charted fish havens in the survey area, which are maintained by the Alabama Marine Resources Division (AMRD). These include the Bernie Heggeman Memorial Reef, Mississippi Sound #1 Reef, and CCA Alabama Pelican Bay Reef. Obstruction features were not created for items within the fish havens unless the item’s least depth was less than the charted authorized minimum depth for the fish haven. The FFF includes four new point obstructions within the CCA Alabama Pelican Bay Reef.

In one instance, two surveyed features that were positioned 20 meters apart (closer than 2mm at survey scale, refer to HSSD 7.4b) were added to the FFF. A surveyed obstruction (possible submerged beacon pile) was the shoalest feature in the area. A second wreck feature 20 meters away was also added to the FFF as it addressed an assigned "Unverified Charted Feature."

Contact heights included in the side scan contact .000 file have been sourced from the shadow height measurement obtained from SonarWiz. Due to limitations in computing accurate heights from side scan shadow lengths, contact heights may not match heights from correlating contacts or feature heights measured

from multibeam data included in the Final Feature File. The height field for contacts created on baring features observed in side scan data have been intentionally left blank.

D.1.4 Uncharted Features

All uncharted features are portrayed in the FFF as surveyed and attributed with the description of "New." Refer to the FFF for additional information.

D.1.5 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.2 Additional Results

D.2.1 Aids to Navigation

Aids to Navigation (AtoNs) were investigated using bathymetric data and visual observations. Six AtoN discrepancies were reported to USCG using the Navigation Center's Online ATON Discrepancy Report Form on September 10, 2021, October 21, 2021, November 11, 2021, and January 11, 2022. Copies of the online submittals are included in Appendix II. AtoNs have been included in the FFF with appropriate comments and recommendations.

D.2.2 Maritime Boundary Points

No Maritime Boundary Points were assigned for this survey.

D.2.3 Bottom Samples

Twenty-seven bottom samples were acquired on October 7, 2021, (DN280) and October 13, 2021 (DN286). The bottom sampling plan followed suggested sample locations included in the provided Project Reference File (PRF). Minor adjustments were made to the recommended sampling locations with approval from the Contracting Officer's Representative (COR). Correspondence is included in Appendix II of this report.

D.2.4 Overhead Features

No overhead features exist for this survey.

D.2.5 Submarine Features

There are 26 submerged pipelines and two submerged cables charted in the survey area. Four sections of potentially exposed pipeline were reported following HSSD 1.7.1 and 1.7.3. Correspondence related to this reporting is included in Appendix II.

D.2.6 Platforms

There are five platforms charted within the survey area. See the H13489 FFF for more details.

D.2.7 Ferry Routes and Terminals

No ferry routes or terminals exist for this survey.

D.2.8 Abnormal Seafloor or Environmental Conditions

The project CSF included two assigned water turbulence features (WATTUR – Breakers) in the planned H13489 survey area. One in the vicinity of Pelican Bay and the other along the shoreline of Dauphin Island. While both features fell inshore of the NALL, breakers were visually observed in these areas during survey operations. These features are included in the FFF with description “Retain.” A new WATTUR area feature was added to the FFF depicting breakers observed inshore of the NALL in the vicinity of Petit Bois Pass.

D.2.9 Construction and Dredging

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

D.2.10 New Survey Recommendations

No new surveys or further investigations are recommended for this area.

D.2.11 ENC Scale Recommendations

According to the National Charting Plan, the ENCs covering the survey area are slated to be reschemed to include new Band 2 through Band 5 cells based on a gridded production scheme. The hydrographer has no ENC scale recommendations for the area.

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, 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.

Report Name	Report Date Sent
Data Acquisition and Processing Report	2021-12-09

Approver Name	Approver Title	Approval Date	Signature
Jonathan L. Dasler, PE, PLS, CH	NSPS-THSOA Certified Hydrographer, Chief of Party	01/21/2022	Digitally signed by Jonathan L. Dasler, PE, PLS, CH Date: 2022.01.21 13:51:43 -08'00'
Jason Creech, CH	NSPS-THSOA Certified Hydrographer, Charting Manager / Project Manager	01/21/2022	Digitally signed by Jason Creech Date: 2022.01.21 14:00:15 -08'00'
James Guilford	IHO Cat-A Hydrographer, Lead Hydrographer	01/21/2022	Digitally signed by James Guilford Date: 2022.01.21 14:10:12 -08'00'
Michael Redmayne	IHO Cat-A Hydrographer, Lead Hydrographer	01/21/2022	Digitally signed by Michael Redmayne Date: 2022.01.21 14:19:54 -08'00'
Jason Dorfman	Lead Hydrographer	01/21/2022	Digitally signed by Jason Dorfman Date: 2022.01.21 14:37:24 -08'00'

F. Table of Acronyms

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

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

Acronym	Definition
PRF	Project Reference File
PS	Physical Scientist
RNC	Raster Navigational Chart
RTK	Real Time Kinematic
RTX	Real Time Extended
SBES	Singlebeam Echosounder
SBET	Smooth Best Estimate and Trajectory
SNM	Square Nautical Miles
SSS	Side Scan Sonar
SSSAB	Side Scan Sonar Acoustic Backscatter
ST	Survey Technician
SVP	Sound Velocity Profiler
TCARI	Tidal Constituent And Residual Interpolation
TPU	Total Propagated Uncertainty
USACE	United States Army Corps of Engineers
USCG	United States Coast Guard
UTM	Universal Transverse Mercator
XO	Executive Officer
ZDF	Zone Definition File