H13646

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

DESCRIPTIVE REPORT

Type of Survey:	Navigable Area
Registry Number:	H13646

LOCALITY

State(s):	Louisiana
General Locality:	Approaches to Calcasieu
Sub-locality:	35 NM South of Cameron

2022

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

H13646

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):	**Louisiana**
General Locality:	**Approaches to Calcasieu**
Sub-Locality:	**35 NM South of Cameron**
Scale:	**10000**
Dates of Survey:	**07/19/2022 to 08/24/2022**
Instructions Dated:	**08/11/2022**
Project Number:	**OPR-K356-KR-22**
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**
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 15N, 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 H13646

Project: OPR-K356-KR-22

Locality: Approaches to Calcasieu

Sublocality: 35 NM South of Cameron

Scale: 1:10000

July 2022 - August 2022

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 Calcasieu Pass and Cameron, LA. Survey H13646 was conducted in accordance with the Statement of Work and Hydrographic Survey Project Instructions dated August 11, 2022.

The Hydrographic Survey Project Instructions reference the National Ocean Service (NOS) Hydrographic Survey Specifications and Deliverables Manual (HSSD) (March 2022) as the technical requirements for this project.

A.1 Survey Limits

Data were acquired within the following survey limits:

Northwest Limit	Southeast Limit
29° 20' 5.02" N 93° 17' 45.74" W	28° 59' 24.71" N 93° 8' 6.86" 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.

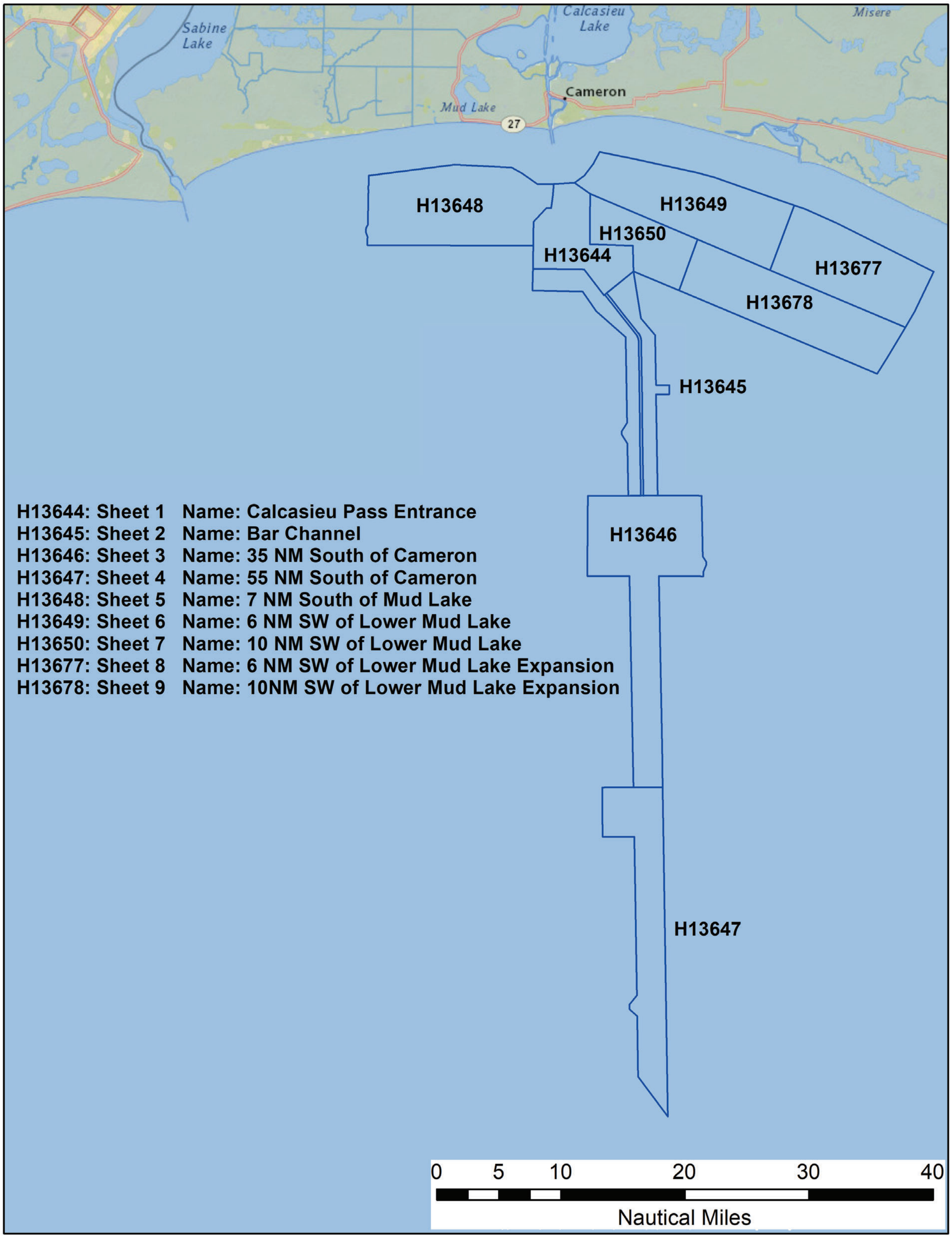


Figure 1: OPR-K356-KR-22 Assigned Survey Areas

A.2 Survey Purpose

The purpose of this survey, defined in the Project Instructions, is as follows: "Since 2020, the Louisiana Coast has been hit by six hurricanes and two named tropical storms, several of which caused serious damage to the Port of Lake Charles. The Port of Lake Charles is ranked in the top 15 US ports based on annual cargo Tonnage. This cargo includes petroleum products, rice, flour, other food products, as well as a variety of bulk cargoes utilized in manufacturing (1). The proposed survey area was identified in NOAA's Hydrographic Health Model as an area of significant need, and correspondence with the Lake Charles Pilot's Association revealed a critical need for updated hydrographic data and charting products in the approaches and anchorages to the Port of Lake Charles.

In addition to undiscovered hazards to navigation from hurricanes that still may exist in the survey area, new LNG terminals are proposed for the Port of Lake Charles which will benefit from updated charts of the channels and surrounding waters.

This survey will provide contemporary data to update National Ocean Service (NOS) nautical charting products and services, improving the safety of maritime traffic and services available to the Port of Lake Charles by reducing the current risk that is present due to outdated bathymetry. Survey data from this project is intended to supersede all prior survey data in the common area."

(1) https://www.bts.gov/content/tonnage-top-50-us-water-ports-ranked-total-tons

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 using 100% multibeam echosounder (MBES) coverage was obtained over the entire survey area. Backscatter was logged during all multibeam acquisition. This coverage type follows Option A of the Complete Coverage requirement specified in Section 5.2.2.3 of the 2022 HSSD. In all cases, the inshore limit of hydrography was the Navigable Area Limit Line (NALL) as defined in Section 1.3.2 of the

HSSD; however, for this survey, the inshore limit was not encountered and the full extent of the assigned boundary was met.

Survey coverage for feature disprovals followed disproval radii as depicted in the Project Reference File (PRF).

Figure 2 shows the H13646 survey outline in relation to the assigned survey area.

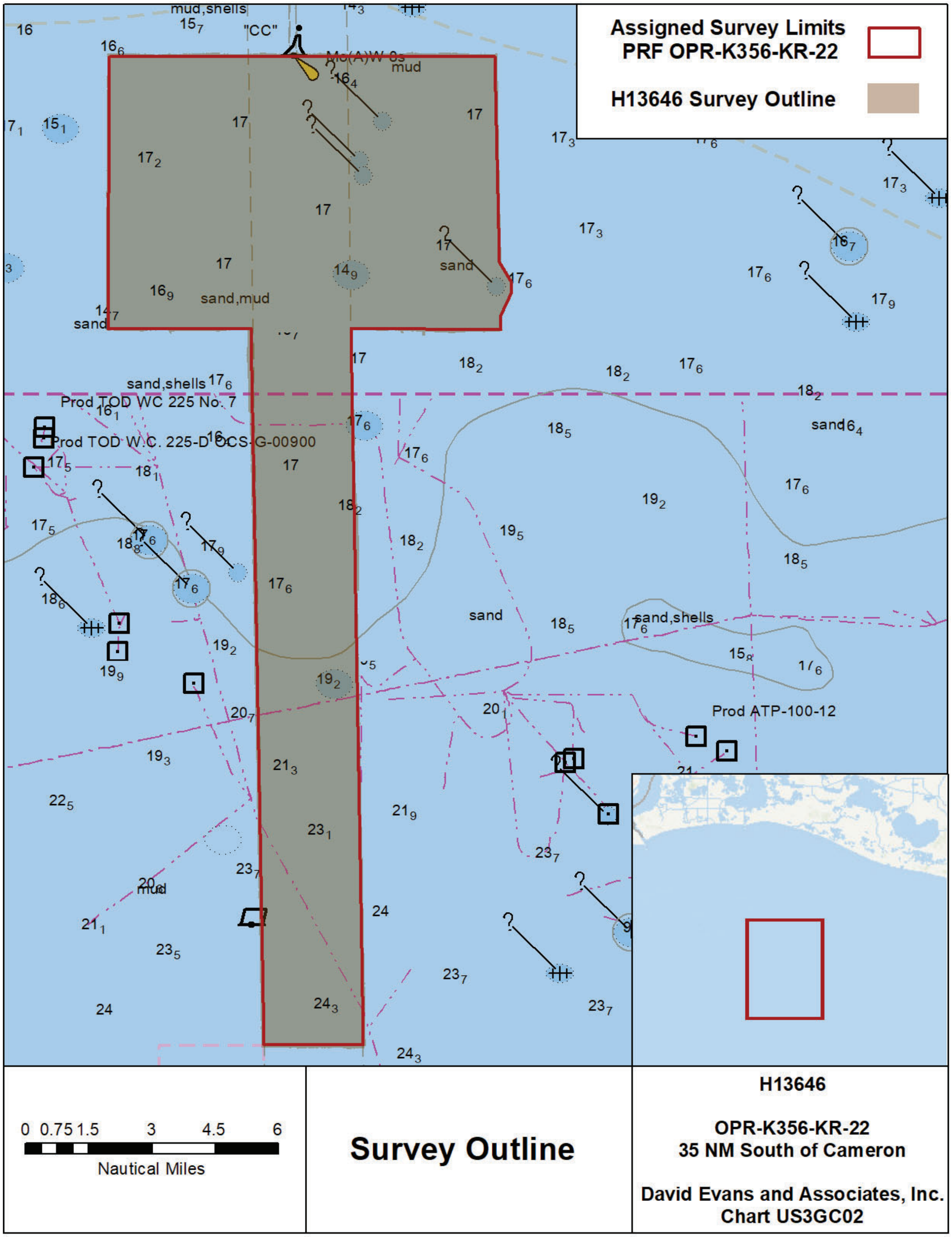


Figure 2: H13646 Survey Outline

A.6 Survey Statistics

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

	HULL ID	*S/V Blake*	*Total*
LNM	**SBES Mainscheme**	0.0	0.0
	MBES Mainscheme	2510.22	2510.22
	Lidar Mainscheme	0.0	0.0
	SSS Mainscheme	0.0	0.0
	SBES/SSS Mainscheme	0.0	0.0
	MBES/SSS Mainscheme	0.0	0.0
	SBES/MBES Crosslines	115.64	115.64
	Lidar Crosslines	0.0	0.0
Number of Bottom Samples			6
Number Maritime Boundary Points Investigated			0
Number of DPs			0
Number of Items Investigated by Dive Ops			0
Total SNM			79.29

Table 3: Hydrographic Survey Statistics

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

Survey Dates	Day of the Year
07/19/2022	200
07/22/2022	203
07/23/2022	204
07/24/2022	205
07/25/2022	206
07/26/2022	207
07/27/2022	208
07/28/2022	209
07/29/2022	210
07/30/2022	211
07/31/2022	212
08/01/2022	213
08/02/2022	214
08/03/2022	215
08/04/2022	216
08/05/2022	217
08/06/2022	218
08/07/2022	219
08/08/2022	220
08/09/2022	221
08/10/2022	222
08/11/2022	223
08/12/2022	224
08/13/2022	225
08/15/2022	227
08/24/2022	236

Table 4: Dates of Hydrography

B. Data Acquisition and Processing

B.1 Equipment and Vessels

The OPR-K356-KR-22 Data Acquisition and Processing Report (DAPR), submitted with survey H13644, 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).

B.1.1 Vessels

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

Hull ID	***S/V Blake***
LOA	82.0 feet
Draft	4.5 feet

Table 5: Vessels Used

Figure 3: S/V Blake

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
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

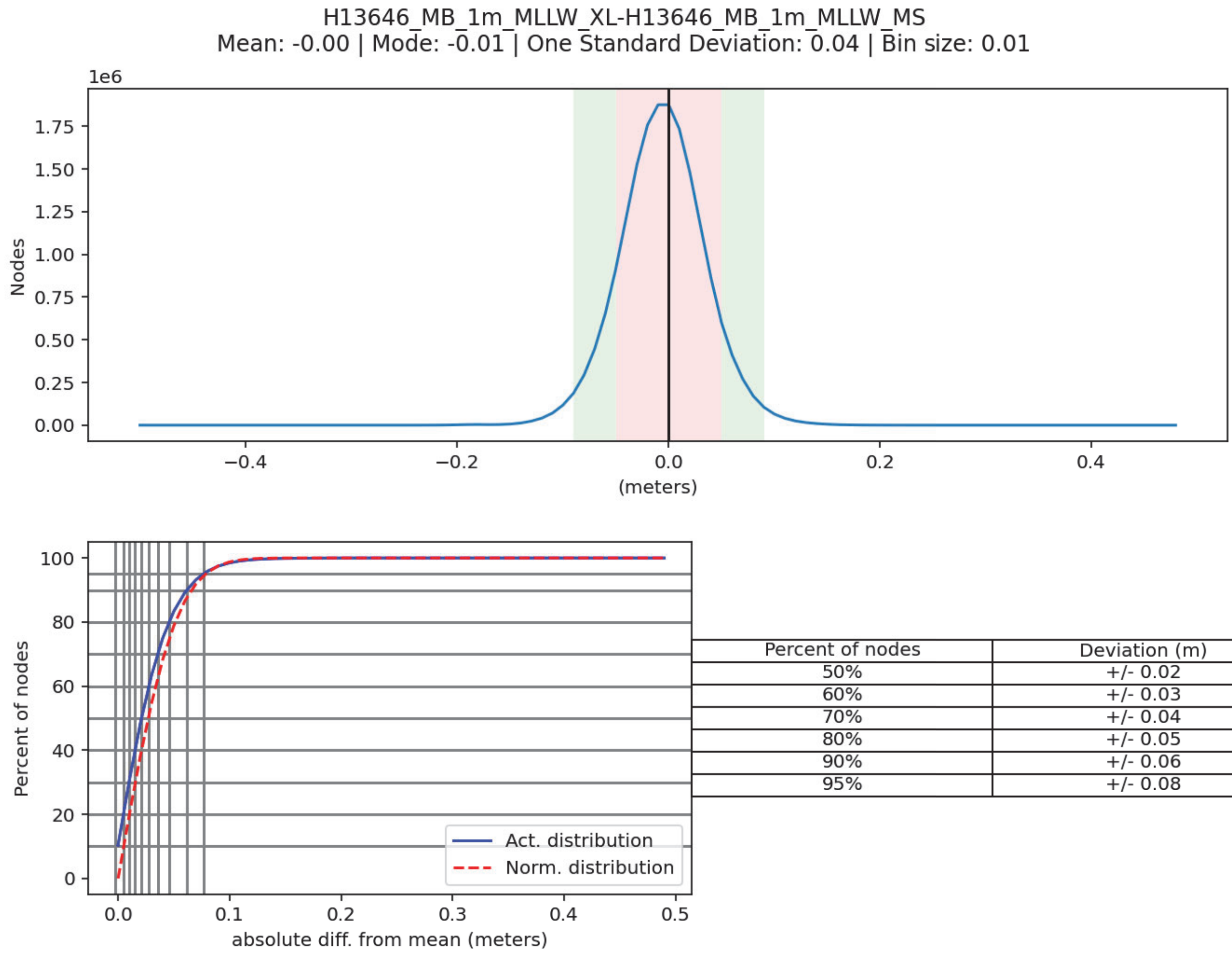
B.2 Quality Control

B.2.1 Crosslines

Multibeam crosslines were run across 4.61% 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 4, with units represented in meters.



Percent of nodes	Deviation (m)
50%	+/- 0.02
60%	+/- 0.03
70%	+/- 0.04
80%	+/- 0.05
90%	+/- 0.06
95%	+/- 0.08

Figure 4: H13646 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	0.13 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

Table 8: Survey Specific Sound Speed TPU Values.

The datum separation (Zoning) uncertainty value of 13.0 centimeters used to compute Total Propagated Uncertainty (TPU) listed in Table 7 corresponds to the value included in the original Project Instructions for the survey. Modifications to the task order issued after the start of survey operations, which expanded the survey area, included new Project Instructions listing a datum separation uncertainty of 12.0 centimeters. DEA received permission from the NOAA Hydrographic Surveys Division (HSD) Project Manager to continue to use the original value during processing for the survey. Related correspondence is included in Appendix II. The change in datum separation uncertainty resulted from a separation model revision issued during the survey and prior to the task order modification. The revised model resolved errors in the original model that were discovered by DEA and reported to NOAA. The OPR-K356-KR-22 DAPR includes more information on the model update.

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 measurement uncertainty for these sensors is listed in the Moving Vessel Profiler (MVP) column in Table 8.

During surface finalization in HIPS, the "Uncertainty" option was selected, where uncertainty values from the source surface are applied to the finalized surface uncertainty. This method, which incorporates grid uncertainties computed during the TPU process, was deemed to better reflect actual grid uncertainty when compared to the option to use standard deviation values scaled to 95% confidence interval.

To determine if the surface grid nodes met the International Hydrographic Organization (IHO) Order 1a specification, a ratio of the final node uncertainty to the allowable uncertainty at that depth was established. 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 surfaces are shown in Figure 5.

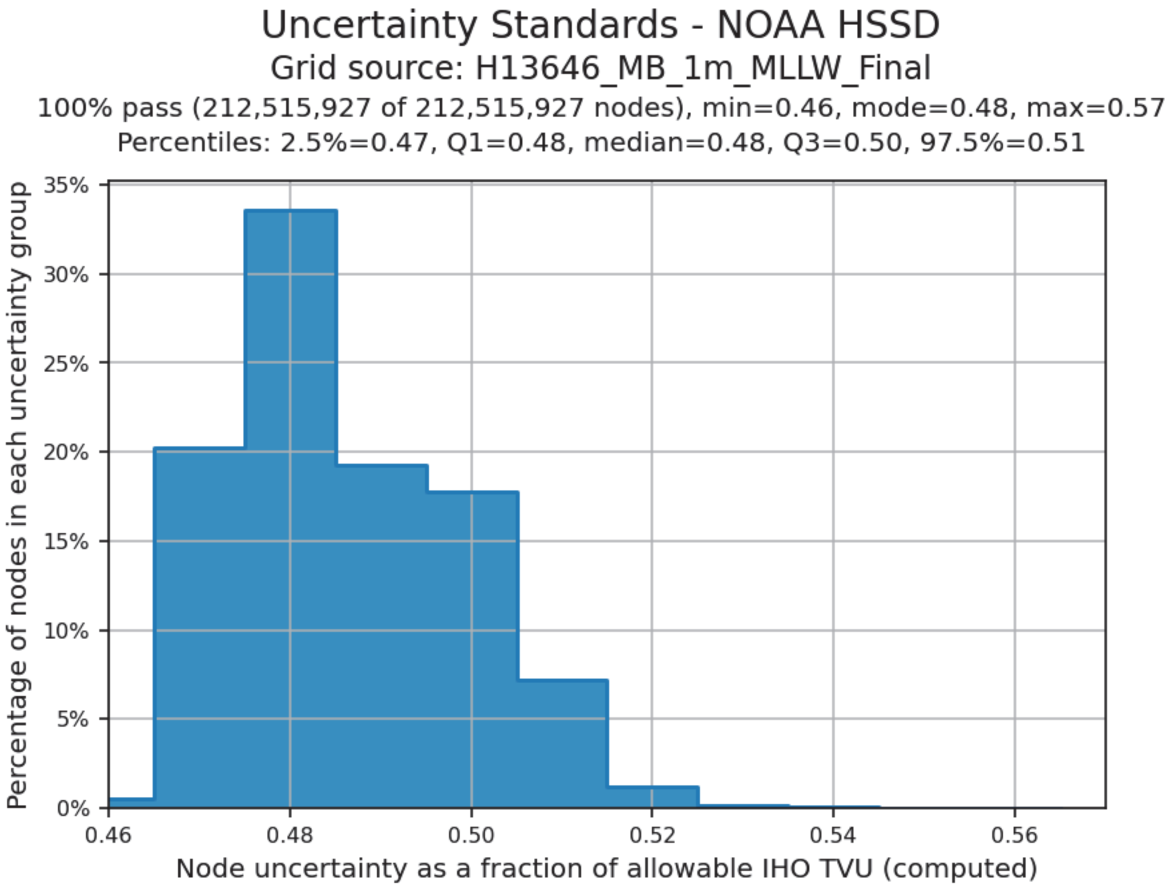


Figure 5: Node TVU Statistics - 1 meter, Finalized

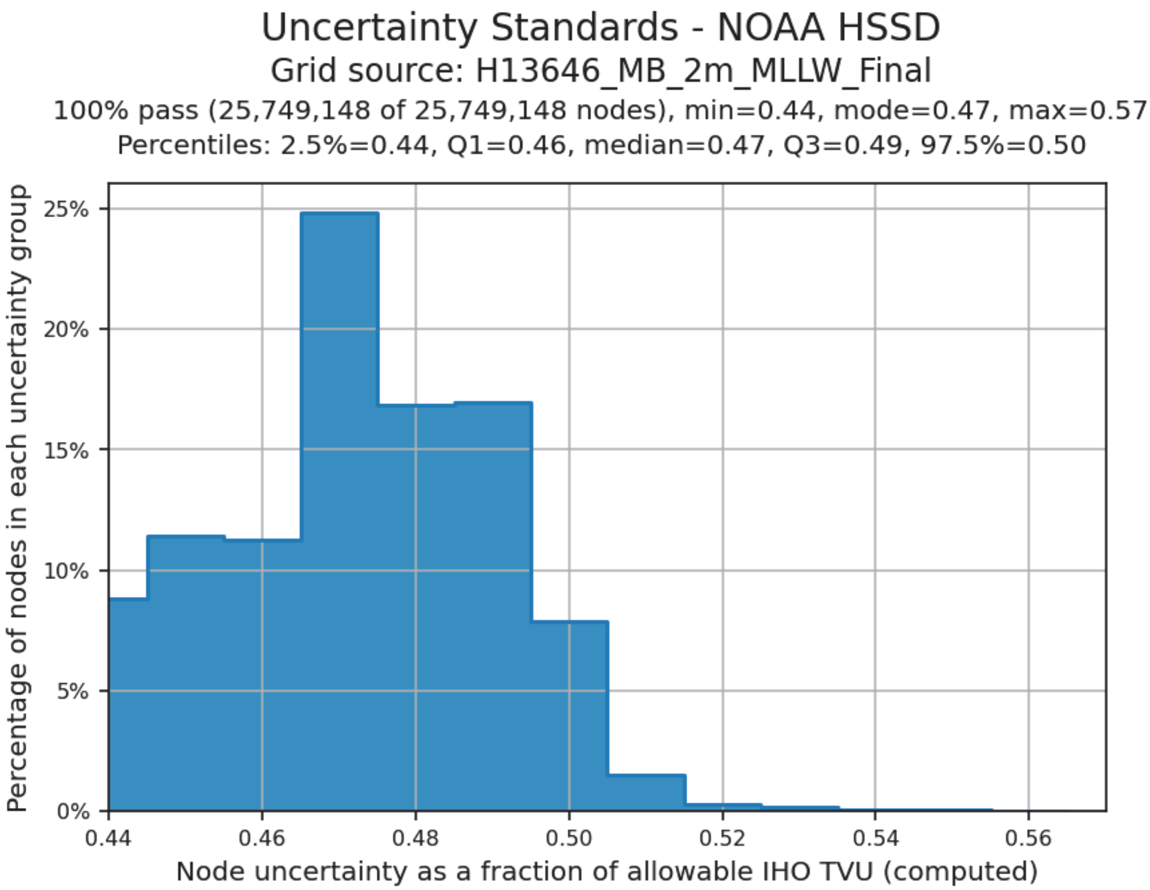


Figure 6: Node TVU Statistics - 2 meter, Finalized

B.2.3 Junctions

Survey H13646 junctions with current surveys H13645 and H13647, and prior surveys H12731, H12838, and H12877. Figure 7 depicts H13646 and the junctioning surveys.

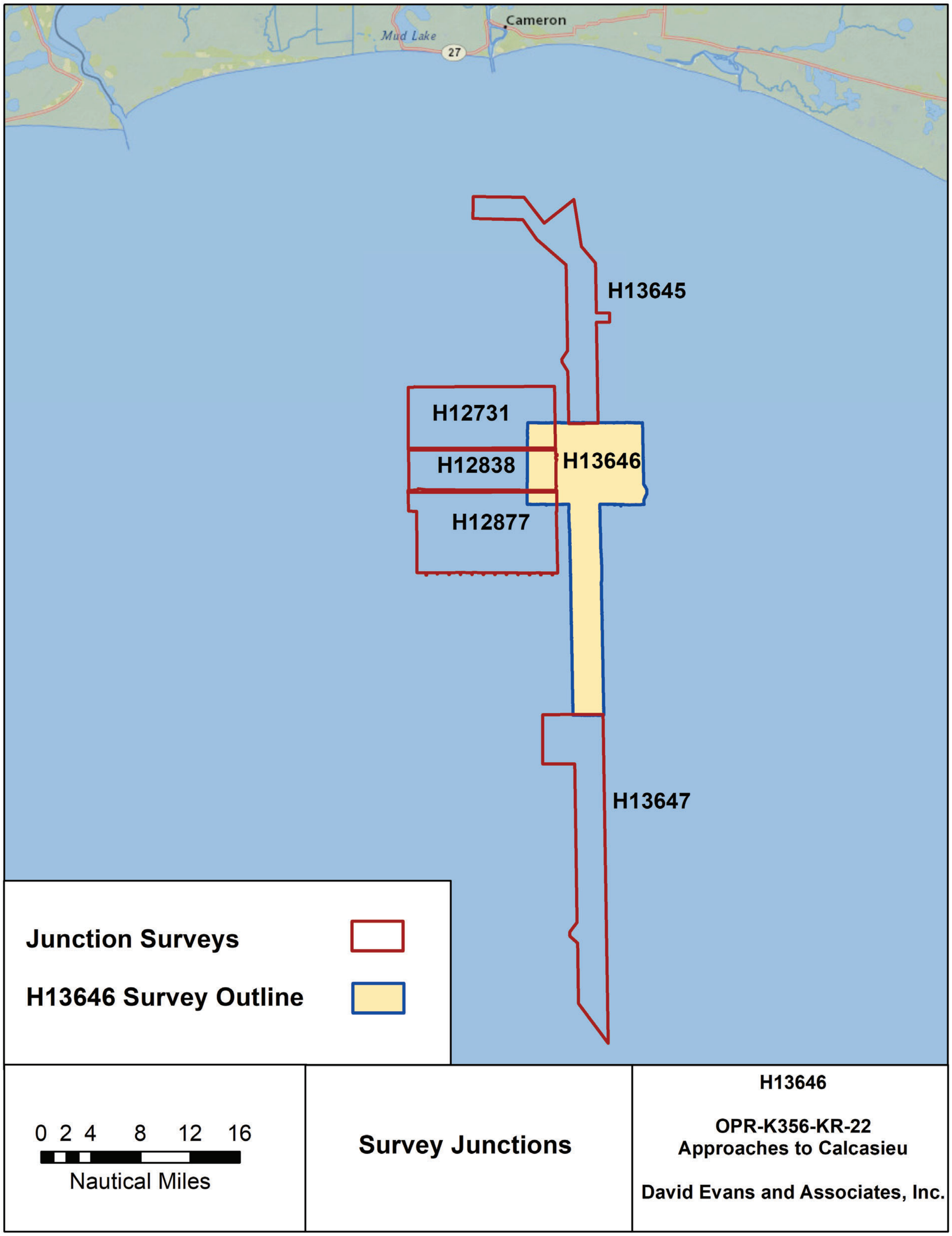


Figure 7: Survey Junctions with Registry Number H13646

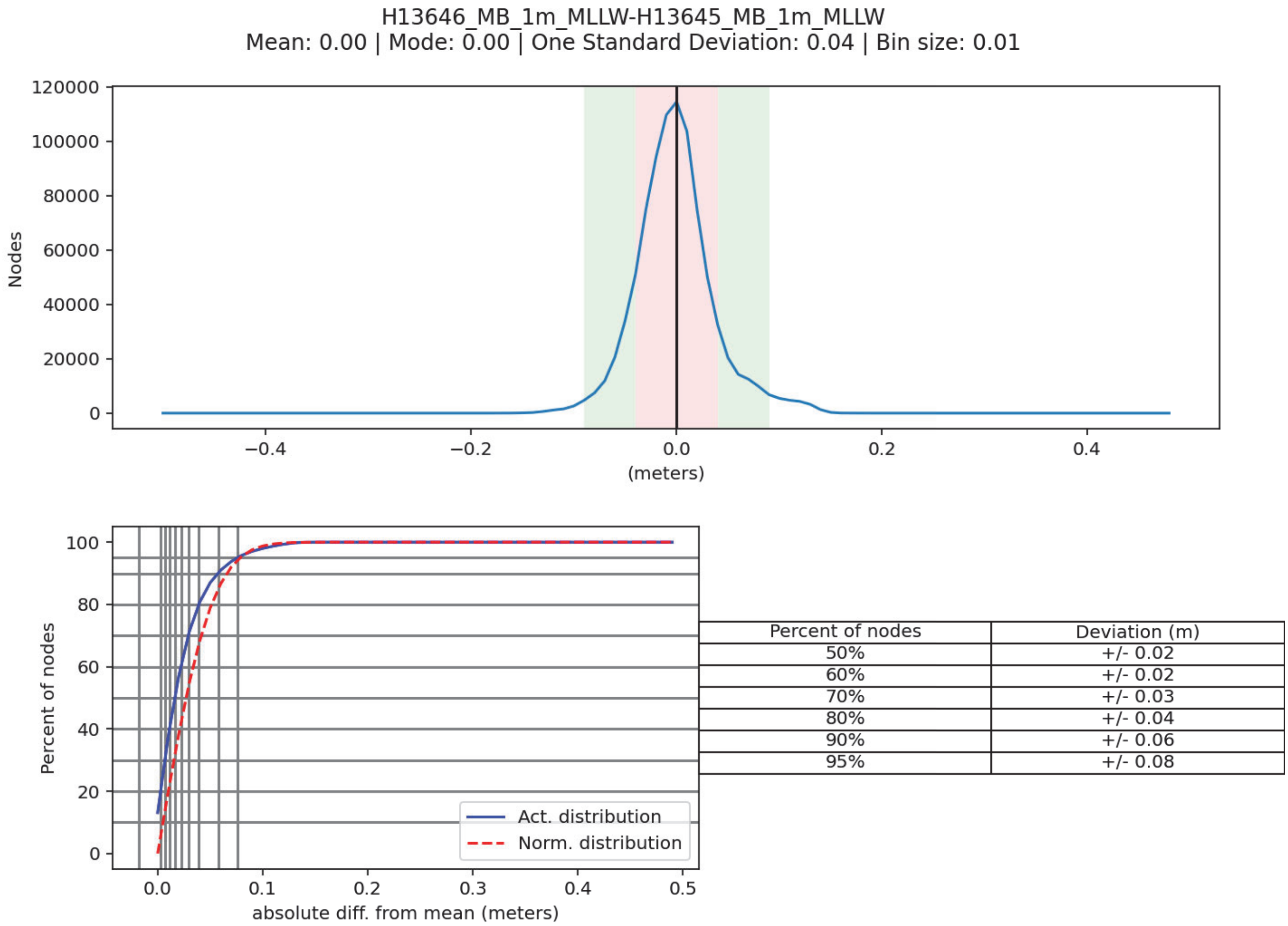
The following junctions were made with this survey:

Registry Number	Scale	Year	Field Unit	Relative Location
H13645	1:10000	2022	David Evans and Associates, Inc.	N
H13647	1:10000	2022	David Evans and Associates, Inc.	S
H12731	1:40000	2016	Leidos	W
H12838	1:40000	2016	Leidos	W
H12877	1:40000	2016	Leidos	W

Table 9: Junctioning Surveys

<u>H13645</u>

The mean difference between H13646 and H13645 is 0 centimeters, shown in Figure 8.



Percent of nodes	Deviation (m)
50%	+/- 0.02
60%	+/- 0.02
70%	+/- 0.03
80%	+/- 0.04
90%	+/- 0.06
95%	+/- 0.08

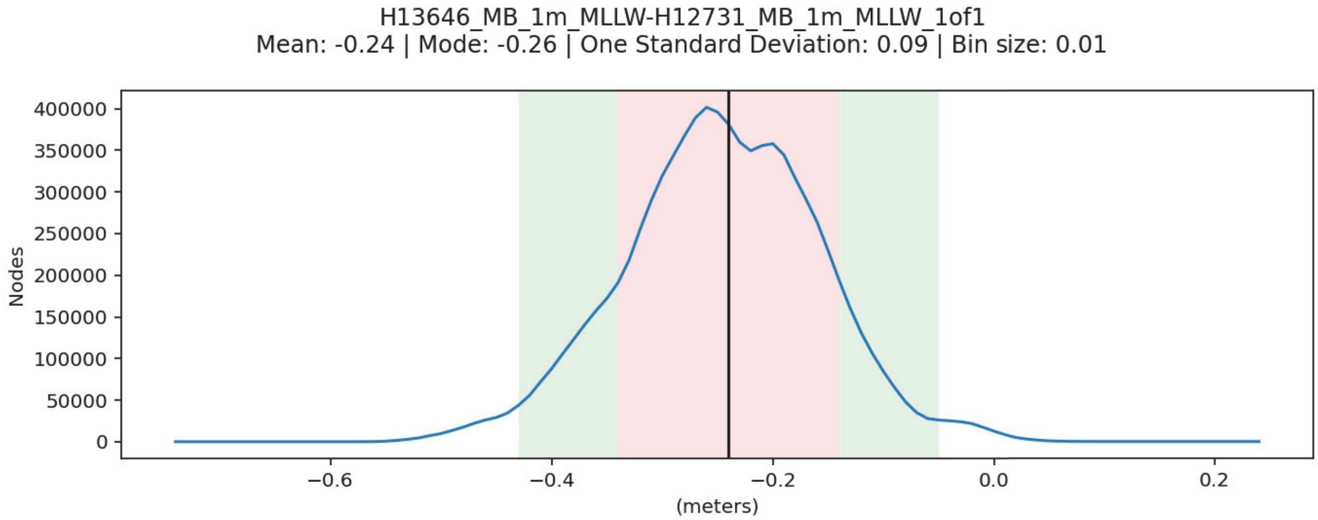
Figure 8: Distribution Summary Plot of Survey H13646 1-meter vs H13645 1-meter

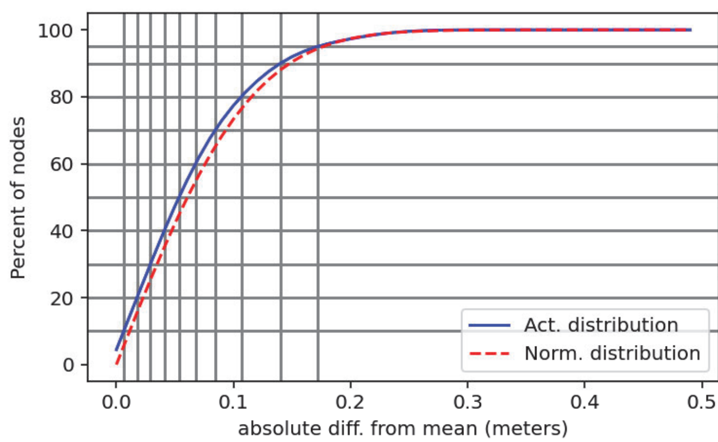
<u>H13647</u>

At the time of writing, data from survey H13647 was still being processed. The Descriptive Report (DR) for H13647 will include the junction analysis with H13646.

<u>H12731</u>

The mean difference between H13646 and H12731 is 24 centimeters (H13646 deeper than H12731), shown in Figure 9. Differences are likely caused by tide corrections methods for these surveys. Prior survey H12731 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) station at Calcasieu Pass (8768094). Survey H13646 used GPS Tides computed from post-processed navigation using Real Time Extended (RTX) methods and a VDatum-based separation model.



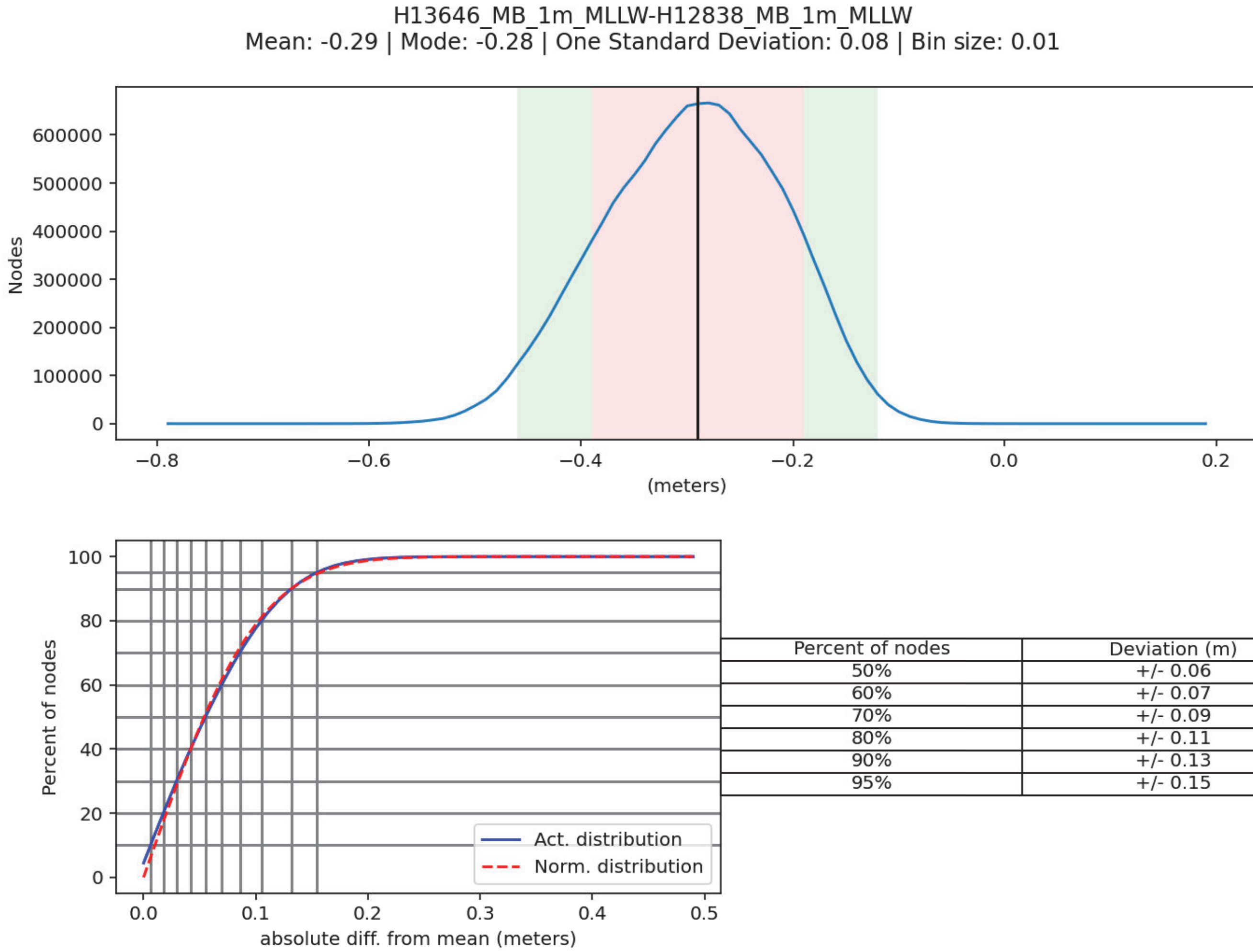


Percent of nodes	Deviation (m)
50%	+/- 0.05
60%	+/- 0.07
70%	+/- 0.08
80%	+/- 0.11
90%	+/- 0.14
95%	+/- 0.17

Figure 9: Distribution Summary Plot of Survey H13646 1-meter vs H12731 1-meter

H12838

The mean difference between H13646 and H12838 is 29 centimeters (H13646 deeper than H12838), shown in Figure 10. Differences are likely caused by tide corrections methods for these surveys. Prior survey H12838 was reduced to MLLW using a tide zoning scheme relying on water levels from the NOAA NWLON station at Calcasieu Pass (8768094). Survey H13646 used GPS Tides computed from post-processed navigation using Real Time Extended (RTX) methods and a VDatum-based separation model.

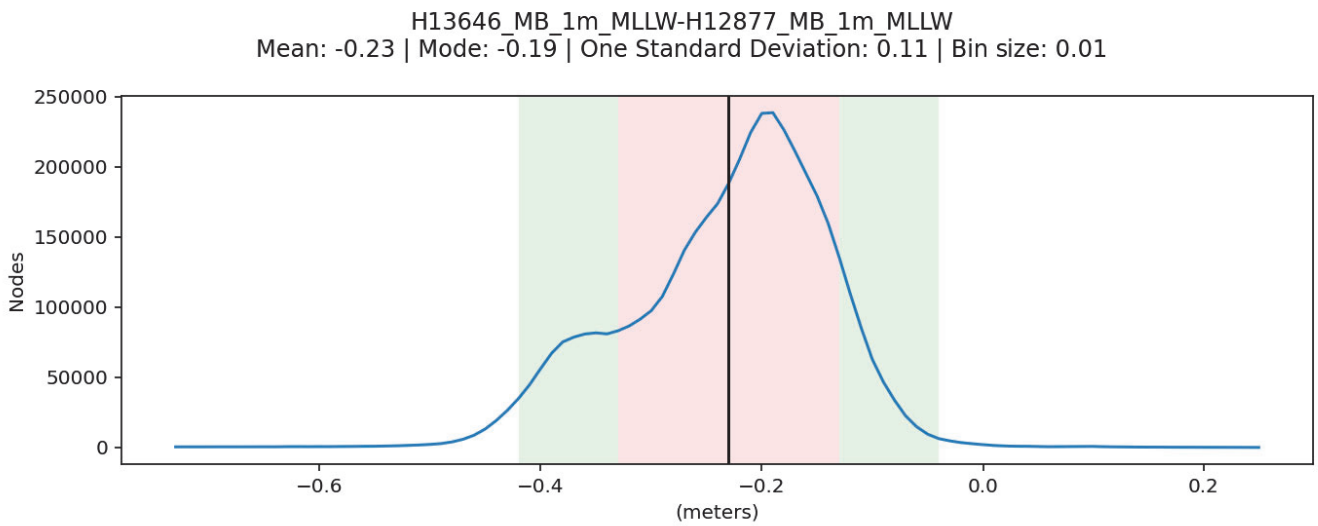


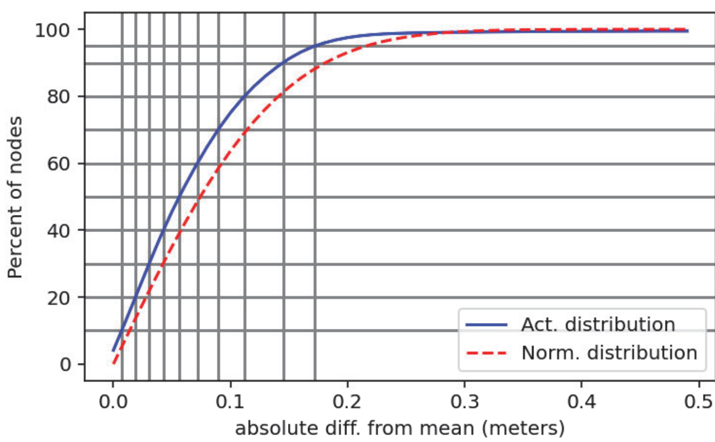
Percent of nodes	Deviation (m)
50%	+/- 0.06
60%	+/- 0.07
70%	+/- 0.09
80%	+/- 0.11
90%	+/- 0.13
95%	+/- 0.15

Figure 10: Distribution Summary Plot of Survey H13646 1-meter vs H12838 1-meter

H12877

The mean difference between H13646 and H12877 is 23 centimeters (H13646 deeper than H12877), shown in Figure 11. Differences are likely caused by tide corrections methods for these surveys. Prior survey H12877 was reduced to MLLW using a tide zoning scheme relying on water levels from the NOAA NWLON station at Calcasieu Pass (8768094). Survey H13646 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%	+/- 0.06
60%	+/- 0.07
70%	+/- 0.09
80%	+/- 0.11
90%	+/- 0.14
95%	+/- 0.17

Figure 11: Distribution Summary Plot of Survey H13646 1-meter vs H12877 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.

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: Approximately 20-minute intervals

For H13646 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 time" with a two-hour interval.

All sound speed profiles were acquired within 500 meters of the survey limits.

During H13646 survey operations, the S/V Blake acquired the first cast of the day after starting multibeam data acquisition on July 29, 2022 (DN210) and August 8, 2022 (DN220). In all cases, the first cast was acquired within 10 minutes of the first ping of the day.

B.2.8 Coverage Equipment and Methods

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

Multibeam data were thoroughly reviewed for holidays and areas of poor-quality coverage due to biomass, vessel wakes, or other factors. Feature investigations were performed with multibeam sonar to obtain a least depth, meeting the survey's coverage requirements. Survey coverage for feature disprovals was acquired inside disproval radii to meet the coverage requirement for the area. 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. Surface results are stated in Figures 12 and 13.

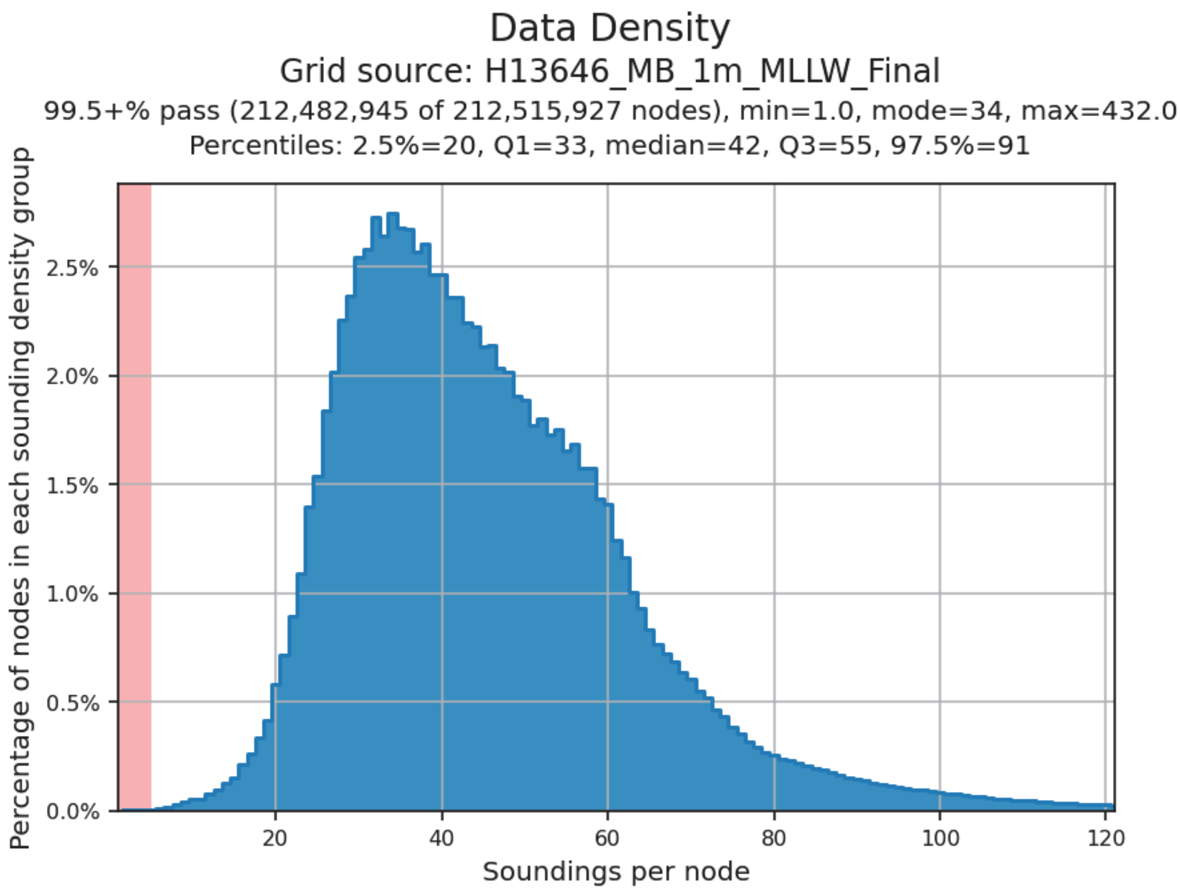


Figure 12: Node Density Statistics - 1 meter, Finalized

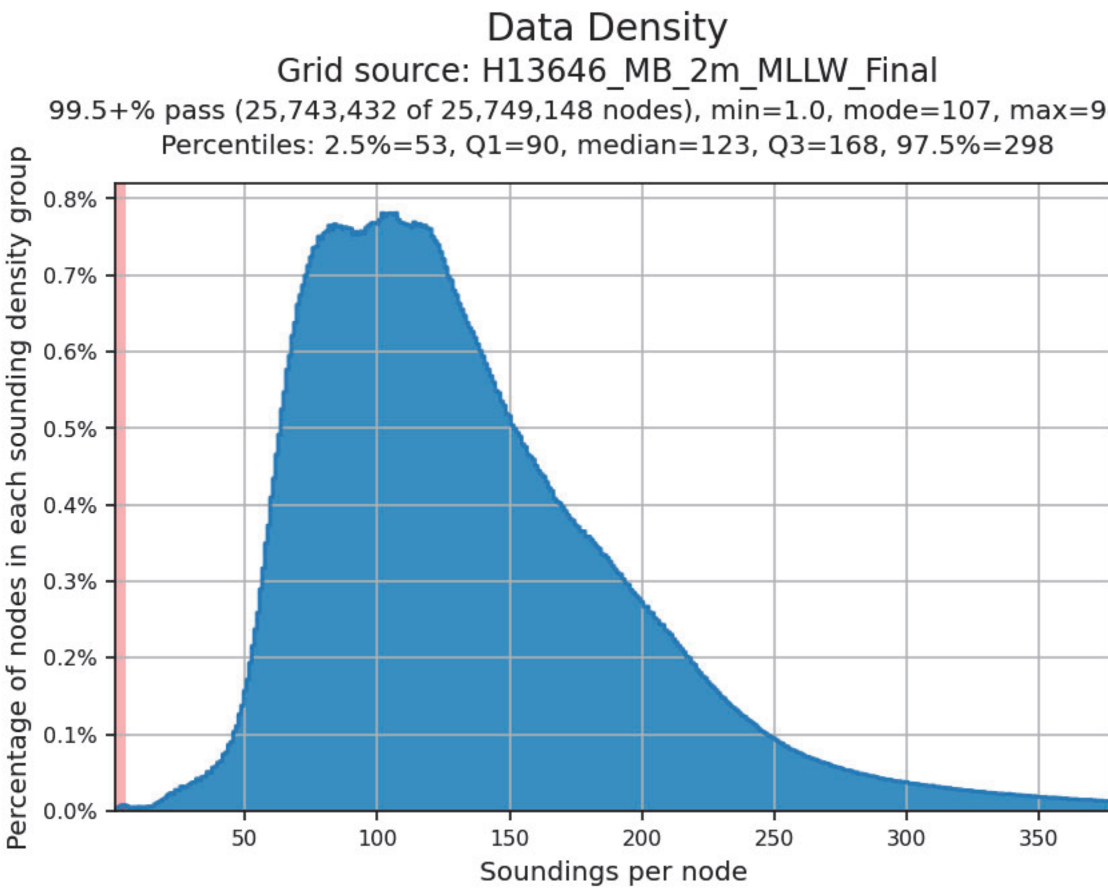


Figure 13: Node Density Statistics - 2 meter, Finalized

B.3 Echo Sounding Corrections

B.3.1 Corrections to Echo Soundings

Data reduction procedures for survey H13646 are detailed in the DAPR.

B.3.2 Calibrations

All sounding systems were calibrated as detailed in the DAPR.

B.4 Backscatter

Multibeam time series backscatter data (RESON 7058 normalized backscatter datagram) were logged in HYPACK 7K format and are included with the H13646 raw digital deliverables. Backscatter data were referenced to processed multibeam bathymetric data and processed in QPS FMGT. A 2-meter backscatter mosaic is included with the H13646 processed 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. A GSF export containing the final bathymetry and backscatter with edits retains the original file names of the raw data files but with the postfix "_merged."

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	11.4.8, After DN192: 11.4.13, GSF export only: 11.4.16 beta

Table 10: Primary bathymetric data processing software

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

Manufacturer	Name	Version
QPS	FMGT	7.10.1

Table 11: Primary imagery data processing software

The following Feature Object Catalog was used: NOAA Profile Version 2022.

A detailed listing of all data processing software is included in the OPR-K356-KR-22 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
H13646_MB_1m_MLLW.csar	CARIS Raster Surface (CUBE)	1 meters	14.209 meters - 25.12 meters	NOAA_1m	Complete MBES
H13646_MB_1m_MLLW_Final.csar	Finalized CARIS Raster Surface (CUBE)	1 meters	14.209 meters - 20.0 meters	NOAA_1m	Complete MBES
H13646_MB_2m_MLLW.csar	CARIS Raster Surface (CUBE)	2 meters	14.212 meters - 24.982 meters	NOAA_2m	Complete MBES
H13646_MB_2m_MLLW_Final.csar	Finalized CARIS Raster Surface (CUBE)	2 meters	18.0 meters - 24.982 meters	NOAA_2m	Complete MBES
H13646_MBAB_2m_BL_350kHz_1of1.tif	MB Backscatter Mosaic	2 meters	0.0 meters - 0.0 meters	N/A	Complete MBES

Table 12: Submitted Surfaces

Bathymetric grids were created relative to MLLW in CUBE format using Complete Coverage resolution requirements as specified in the HSSD. Grid resolution for the backscatter mosaic was determined by the HSSD frequency-dependent resolution requirement.

C. Vertical and Horizontal Control

A summary of the horizontal and vertical control for survey H13646 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-K356_KR-22_VDatum +_NAD83(2011)-MLLW_Geoid09.csar

Table 13: ERS method and SEP file

C.2 Horizontal Control

The horizontal datum for this project is North American Datum 1983 (2011).

The projection used for this project is Universal Transverse Mercator (UTM) Zone 15.

The following PPK methods were used for horizontal control:

- RTX

The separation model listed in Table 13 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 SBET format. Additional discussion on post-processing methods and survey control is included in the DAPR.

D. Results and Recommendations

D.1 Chart Comparison

The chart comparison was performed by comparing H13646 survey depths to digital surfaces generated from Band 3, Band 4, and Band 5 electronic navigational charts (ENCs) covering the survey area. A 5-meter product surface was generated from a triangular irregular network (TIN) created from the ENC's soundings, depth contours, and depth features. An additional 5-meter HIPS product surface was generated from the 1-meter and 2-meter CUBE surfaces. 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 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 14. Figures 14 through 16 show the magnitude of differences along the comparison area.

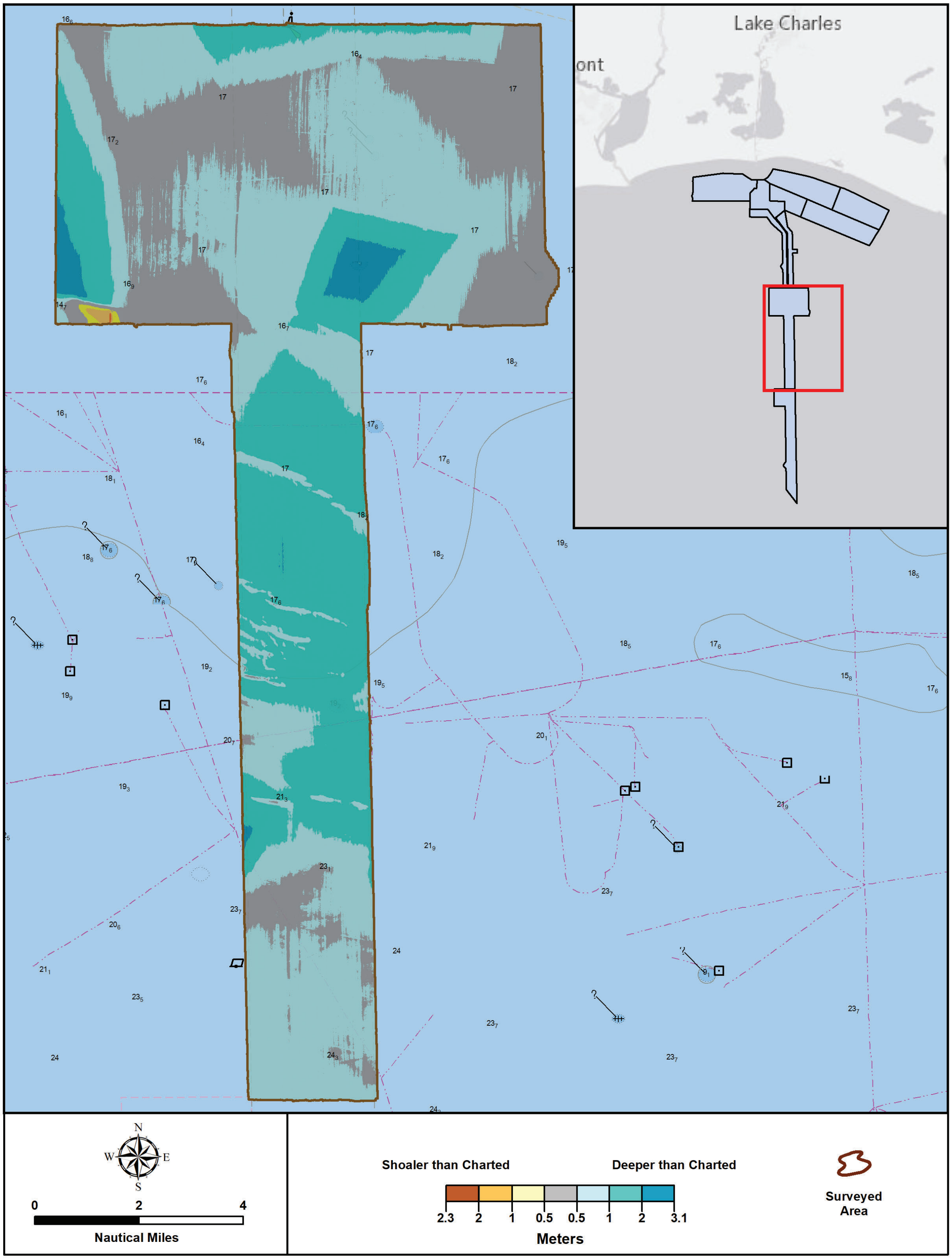


Figure 14: Depth Difference Between H13646 and US3GC02M

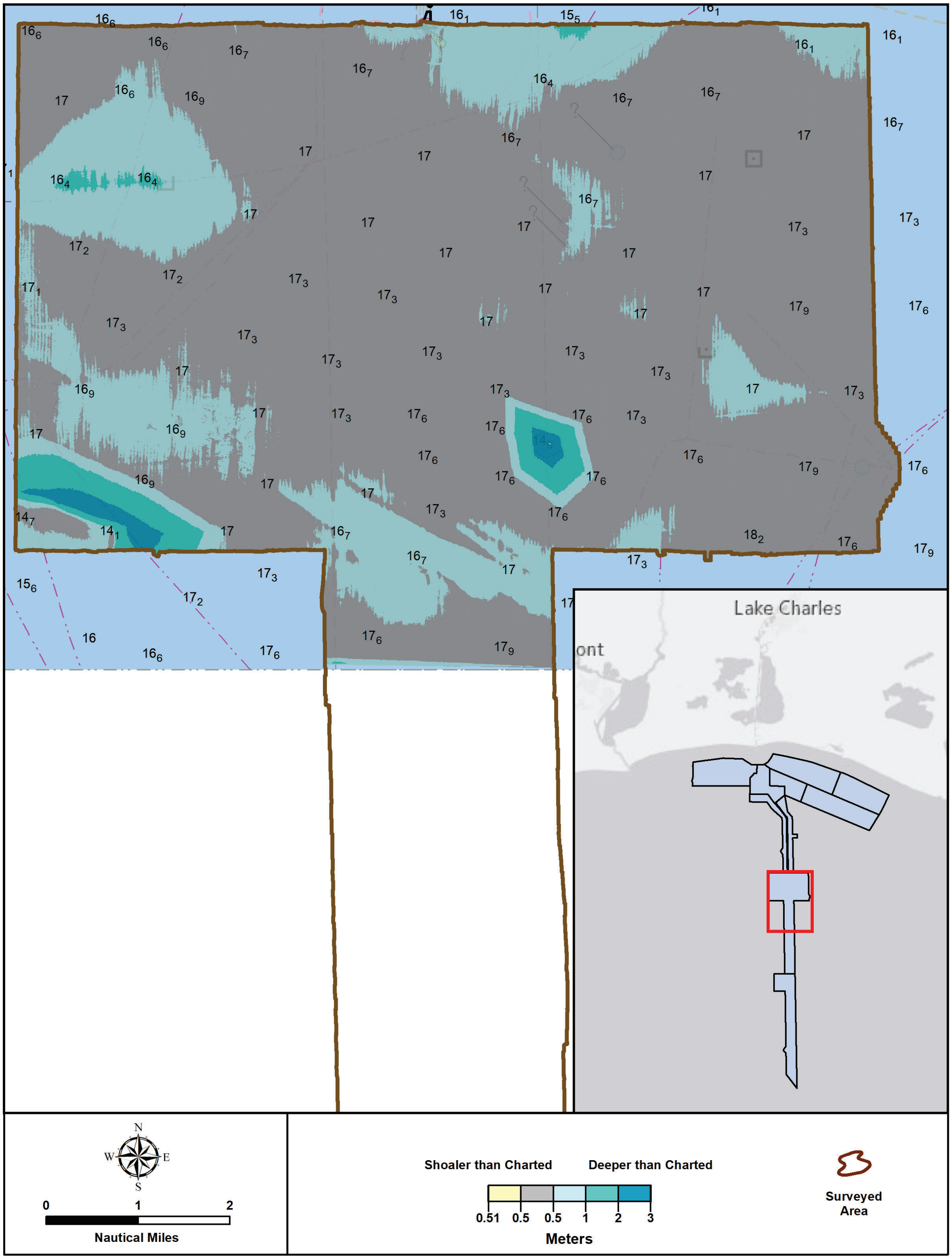


Figure 15: Depth Difference Between H13646 and US4LA14M

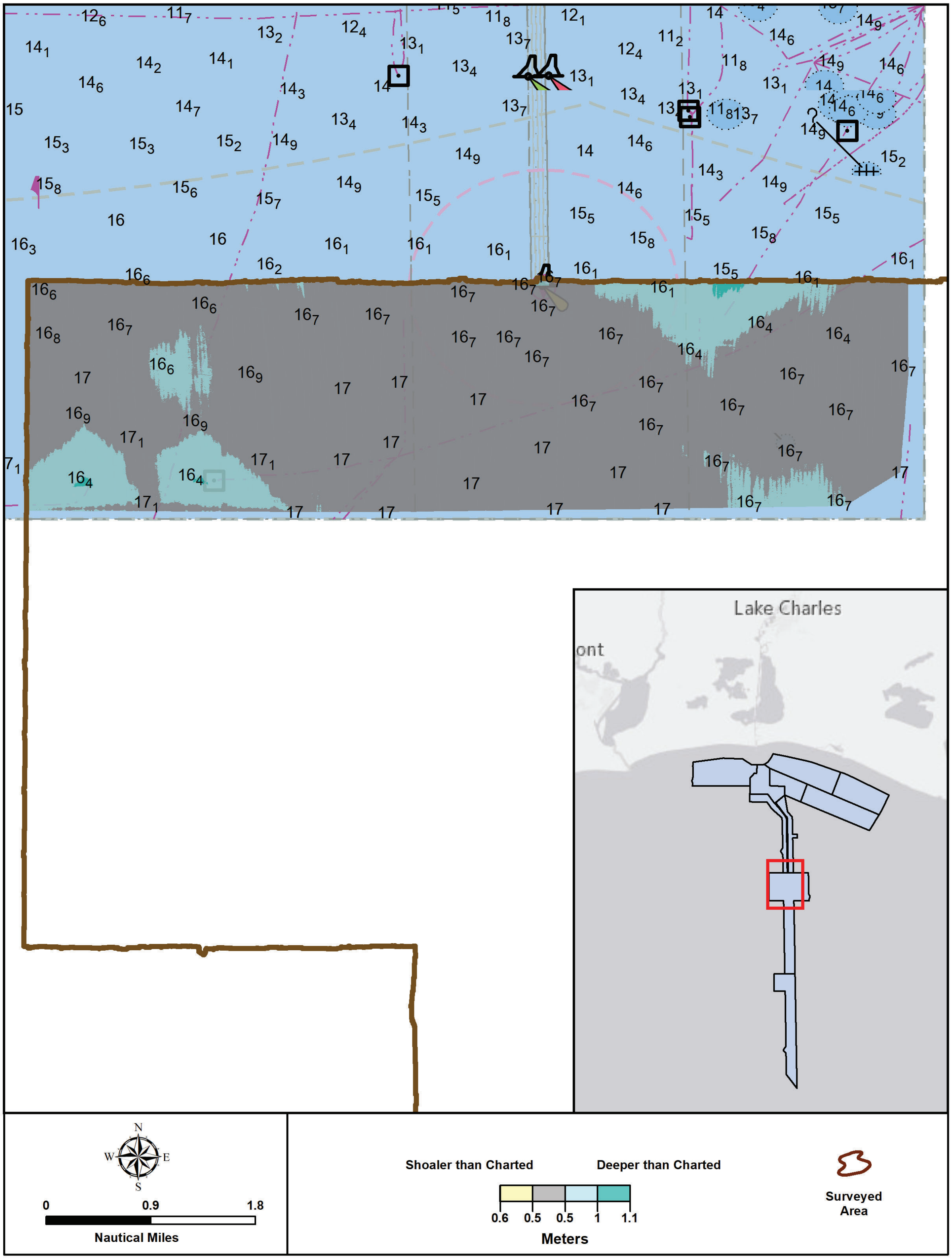


Figure 16: Depth Difference Between H13646 and US5LA16M

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
US3GC02M	1:250000	45	05/12/2022	05/24/2022
US4LA14M	1:80000	32	01/10/2022	07/05/2022
US5LA16M	1:50000	19	05/09/2022	07/01/2022

Table 14: Largest Scale ENCs

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) 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."

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

The survey area encompasses portions of the Calcasieu Pass Safety Fairway (33 CFR 166.200). The hydrographer recommends encoding the name of safety fairways in the ENCs. Safety fairways are included in the Code of Federal Regulations (CFR).

D.2 Additional Results

D.2.1 Aids to Navigation

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

D.2.2 Maritime Boundary Points

No Maritime Boundary Points were assigned for this survey.

D.2.3 Bottom Samples

Six bottom samples were acquired on August 24, 2022 (DN236). The bottom sampling plan followed suggested sample locations included in the provided PRF. Minor adjustments were made to the recommended sampling locations with approval from the NOAA HSD Project Manager. 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

Assigned submerged pipelines that are within the survey area are included in the FFF. One section of exposed pipeline was reported to the Bureau of Safety and Environmental Enforcement (BSEE) on September 28, 2022. Correspondence related to this reporting is included in Appendix II.

D.2.6 Platforms

Three offshore platforms are charted within the survey area. These features are addressed in the FFF.

D.2.7 Ferry Routes and Terminals

No ferry routes or terminals exist for this survey.

D.2.8 Abnormal Seafloor or Environmental Conditions

No abnormal seafloor or environmental conditions exist for this survey.

D.2.9 Construction and Dredging

No construction or dredging activities were observed during survey operations.

D.2.10 New Survey Recommendations

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

D.2.11 ENC Scale Recommendations

No new ENC scales are recommended for this 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	2022-11-18

Approver Name	Approver Title	Approval Date	Signature
Jonathan L. Dasler, PE, PLS, CH	NSPS-THSOA Certified Hydrographer, Chief of Party	02/01/2023	Digitally signed by Jonathan L. Dasler, PE, PLS, CH Date: 2023.02.01 08:32:23 -08'00'
Jason Creech, CH	NSPS-THSOA Certified Hydrographer, Charting Manager / Project Manager	02/01/2023	Digitally signed by Jason Creech Date: 2023.02.01 08:34:51 -08'00'
James Guilford	IHO Cat-A Hydrographer, Lead Hydrographer	02/01/2023	Digitally signed by James Guilford Date: 2023.02.01 08:53:08 -08'00'
Jason Dorfman	Lead Hydrographer	02/01/2023	Digitally signed by Jason Dorfman Date: 2023.02.01 09:00:12 -08'00'
Sam Werner	Data Processing Manager	02/01/2023	Digitally signed by Sam Werner Date: 2023.02.01 09:02:18 -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