H13200

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

DESCRIPTIVE REPORT

Type of Survey:	Navigable Area
Registry Number:	H13200

LOCALITY

State(s):	Louisiana
General Locality:	Louisiana Coast
Sub-locality:	15 Miles South of Diamond Reef

2018

CHIEF OF PARTY
George G. Reynolds

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

REGISTRY NUMBER:

HYDROGRAPHIC TITLE SHEET

H13200

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:	**Louisiana Coast**
Sub-Locality:	**15 Miles South of Diamond Reef**
Scale:	**40000**
Dates of Survey:	**05/28/2018 to 09/24/2018**
Instructions Dated:	**08/06/2018**
Project Number:	**OPR-K354-KR-18**
Field Unit:	**Ocean Surveys, Inc.**
Chief of Party:	**George G. Reynolds**
Soundings by:	**Multibeam Echosounder**
Imagery by:	**Side Scan Sonar Multibeam Echosounder Backscatter**
Verification by:	**Atlantic Hydrographic Branch**
Soundings Acquired in:	**meters at Mean Lower Low Water**

Remarks:

The purpose of this project is to provide contemporary surveys to update National Ocean Service (NOS) nautical charting products. All times are recorded in UTC. Data recorded and presented relative to UTM Zone 15 North. THE INFORMATION PRESENTED IN THIS REPORT AND THE ACCOMPANYING DIGITAL DATA REPRESENTS THE RESULTS OF SURVEYS PERFORMED BY OCEAN SURVEYS, INC. DURING THE PERIOD OF 28 MAY 2018 TO 24 SEPTEMBER 2018 AND CAN ONLY BE CONSIDERED AS INDICATING THE CONDITIONS EXISTING AT THAT TIME. REUSE OF THIS INFORMATION BY CLIENT OR OTHERS BEYOND THE SPECIFIC SCOPE OF WORK FOR WHICH IT WAS ACQUIRED SHALL BE AT THE SOLE RISK OF THE USER AND WITHOUT LIABILITY TO OSI.

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 H13200

Project: OPR-K354-KR-18

Locality: Louisiana Coast

Sublocality: 15 Miles South of Diamond Reef

Scale: 1:40000

May 2018 - September 2018

Ocean Surveys, Inc.

Chief of Party: George G. Reynolds

A. Area Surveyed

This survey provides hydrographic data for the Gulf of Mexico waters approaching the Louisiana Coast south of Vermilion Bay. The general locations of the survey limits are presented in Table 1.

A.1 Survey Limits

Data were acquired within the following survey limits:

Northwest Limit	Southeast Limit
29° 18' 34.3" N 92° 9' 1.05" W	29° 6' 50.35" N 91° 53' 5.35" W

Table 1: Survey Limits

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

A.2 Survey Purpose

As noted in the Hydrographic Title Sheet, the Project Instructions signature date was August 6, 2018. Before being superseded, the survey priorities from the original signed Project Instructions (March 23, 2018) were modified by a Change Request (July 9, 2018). The following text is copied verbatim from the latest Project Instructions' Purpose and Location Section.

"The Louisiana Coast project will provide contemporary surveys to update National Ocean Service (NOS) nautical charting products. It is in the vicinity of the Atchafalaya River Delta, and Port of Morgan City, Louisiana. The survey will provide updated bathymetry and feature data to address concerns of migrating shoals and exposed hazards, thus reducing the risk to navigation within the project area.

The Port of Morgan City is growing significantly and is working on programs to deepen and maintain the ship channel through the Gulf, bay, and up the Atchafalaya River to the Port of Morgan City where it intersects with the Gulf of Mexico Intracoastal Waterway.

The Port serves a number of industries, including the offshore oil, chemical and machinery industries, as well as shrimp and other seafood fisheries in the Gulf of Mexico. In addition to the port commerce, the Atchafalaya River delta has a rich ecosystem that supports both commercial fishing and recreational fishing communities. Updated charts from this project will support commerce and protect the environment by improving the safety of navigation for area traffic.

The project will cover approximately 300 square nautical miles of high priority survey area identified in the 2016 Hydrographic Health model. Modern surveys show significant shoaling and sediment transport; OPR-K354-KR-17 documented a shoal that had shifted a mile westward since the area was last surveyed in 1935. Adjacent surveys uncovered numerous exposed pipelines and hazards. Data from this project is intended to supersede all prior survey data, updating the local charting products."

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	Complete coverage (refer to HSSD Section 5.2.2.3). LNM no less than 10,592 LNM. Acquire backscatter data during all multibeam data acquisition (HSSD Section 6.2). Report significant shoaling via weekly progress report. COR may adjust surveying prioritization based on observed shoaling.

Table 2: Survey Coverage

Survey Coverage is in accordance with the requirements in the Hydrographic Survey Project Instructions and the Statement of Work (August 6, 2018), and the Hydrographic Surveys Specifications and Deliverables, [April, 2017 (HSSD)]. Where required, Complete Coverage was accomplished by acquiring one hundred percent (100%) side scan sonar (SSS) coverage with concurrent multibeam echosounder (MBES) with backscatter or Complete Coverage MBES with backscatter.

Additional SSS and MBES coverage was obtained as necessary to fill gaps in coverage, to provide a least depth for all significant SSS contacts, and to disprove charted features. Gaps in the 100% SSS coverage were addressed with SSS fill-in lines or covered with complete MBES data. Bathymetric "sounding stars" were also acquired to verify or disprove charted depths that fell between two MBES survey lines when the charted depth was shallower than the adjacent survey soundings.

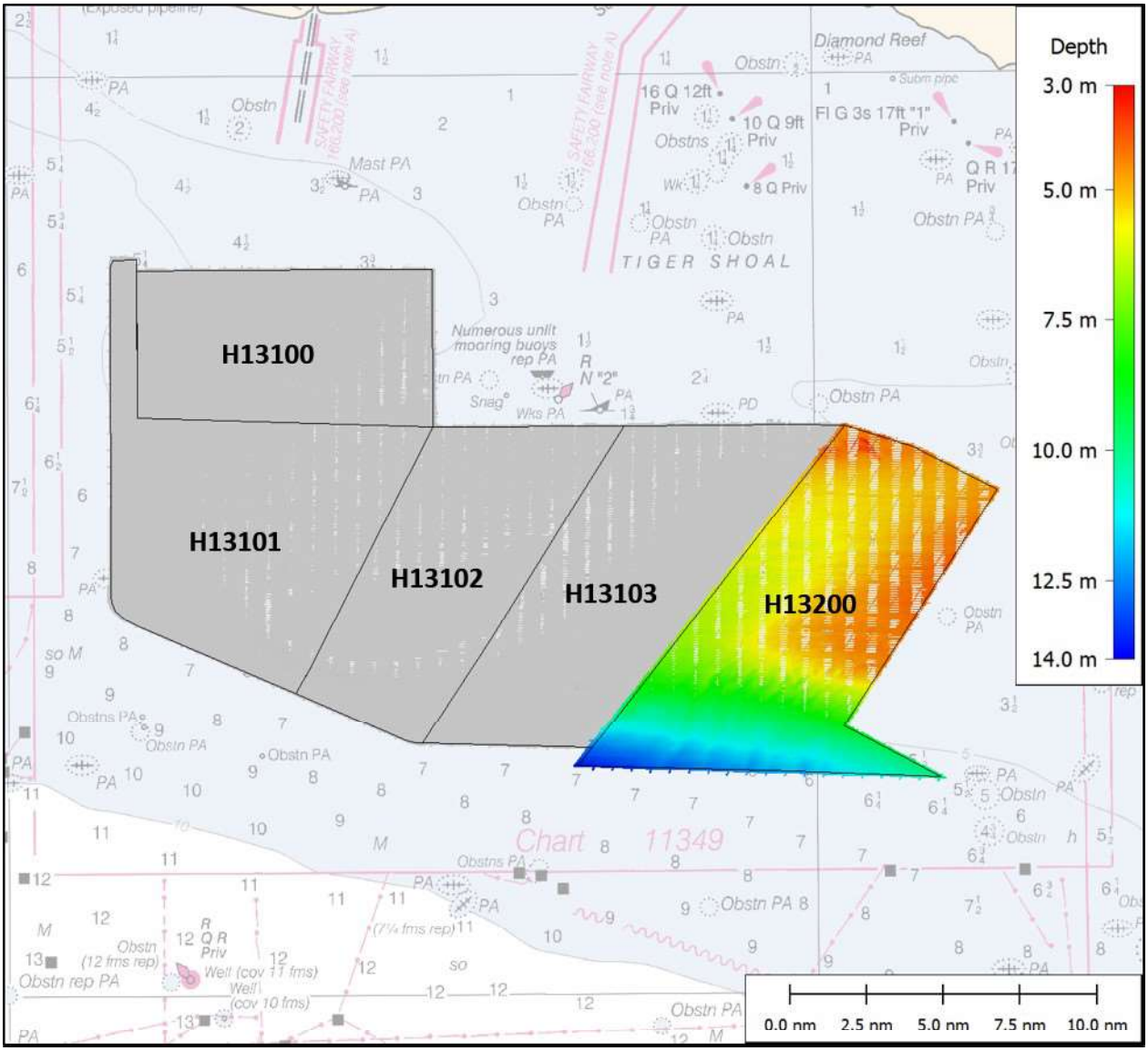


Figure 1: Survey H13200 MBES coverage overlaid on RNC 11340.

A.5 Survey Statistics

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

	HULL ID	*R/V Ocean Explorer*	*Total*
LNM	SBES Mainscheme	0	0
	MBES Mainscheme	400.59	400.59
	Lidar Mainscheme	0	0
	SSS Mainscheme	0	0
	SBES/SSS Mainscheme	0	0
	MBES/SSS Mainscheme	2095.68	2095.68
	SBES/MBES Crosslines	148.46	148.46
	Lidar Crosslines	0	0
Number of Bottom Samples			9
Number Maritime Boundary Points Investigated			0
Number of DPs			0
Number of Items Investigated by Dive Ops			0
Total SNM			79.89

Table 3: Hydrographic Survey Statistics

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

Survey Dates	Day of the Year
08/14/2018	226

Survey Dates	Day of the Year
08/15/2018	227
08/16/2018	228
08/17/2018	229
08/18/2018	230
08/19/2018	231
08/20/2018	232
08/21/2018	233
08/22/2018	234
08/23/2018	235
08/24/2018	236
08/25/2018	237
08/26/2018	238
08/27/2018	239
08/28/2018	240
08/29/2018	241
08/30/2018	242
08/31/2018	243
09/01/2018	244
09/02/2018	245
09/07/2018	250
09/08/2018	251
09/09/2018	252
09/10/2018	253
09/11/2018	254
09/18/2018	261
09/19/2018	262
09/20/2018	263
09/22/2018	265
09/23/2018	266

Table 4: Dates of Hydrography

The linear nautical miles (LNM) for MBES-only development and fill-in lines were included under the heading "Mainscheme MBES" in Table 3, Hydrographic Survey Statistics. There was no SSS-only mileage for this survey.

B. Data Acquisition and Processing

B.1 Equipment and Vessels

Refer to the Data Acquisition and Processing Report (DAPR) for a complete description of data acquisition and processing systems, survey vessels, quality control procedures and data processing methods. Additional information to supplement sounding and survey data, and any deviations from the DAPR are discussed in the following sections.

B.1.1 Vessels

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

Hull ID	***R/V Ocean Explorer***
LOA	18 meters
Draft	2 meters

Table 5: Vessels Used

B.1.2 Equipment

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

Manufacturer	Model	Type
EdgeTech	4125	SSS
Teledyne RESON	SeaBat 7125 SV2	MBES
Applanix	POS MV 320 v5	Positioning and Attitude System
Trimble	ProBeacon	Positioning System
Trimble	MS750	Positioning System
Trimble	NetR9	Positioning System
AML Oceanographic	Micro X	Sound Speed System
AML Oceanographic	Base X	Sound Speed System
ODIM Brooke Ocean	MVP30	Sound Speed System

Table 6: Major Systems Used

B.2 Quality Control

B.2.1 Crosslines

Multibeam/single beam echo sounder/side scan sonar crosslines acquired for this survey totaled 5.95% of mainscheme acquisition.

A total of 148.46 nm of crossline data was acquired on August 14-15 and September 18 (DNs 226-227 and 261). Crosslines were run northeast-southwest with mainscheme lines running east-west (Figure 2).

Soundings from mainscheme lines and crosslines were compared periodically throughout survey operations by reviewing preliminary MBES surfaces and using CARIS HIPS Subset Editor. Crossline comparisons provided confirmation that the system offsets and biases were entered correctly and verified the accuracy of sounding correctors (i.e. tide, sound speed, TrueHeave).

Statistical quality control information was compiled from a difference surface, generated in CARIS HIPS, between the depth layer of a 1.0m CUBE surface composed only of crossline data and the depth layer of a 1.0m CUBE surface composed only of mainscheme data. The crossline analysis results demonstrate very good agreement between crossline soundings and mainscheme soundings; the average difference is 0.007m and 99.99% of the 1.0m comparison cells have differences within +/- 0.25m.

Figure 3 is a histogram showing the distribution of depth differences for all comparison grid cells considered.

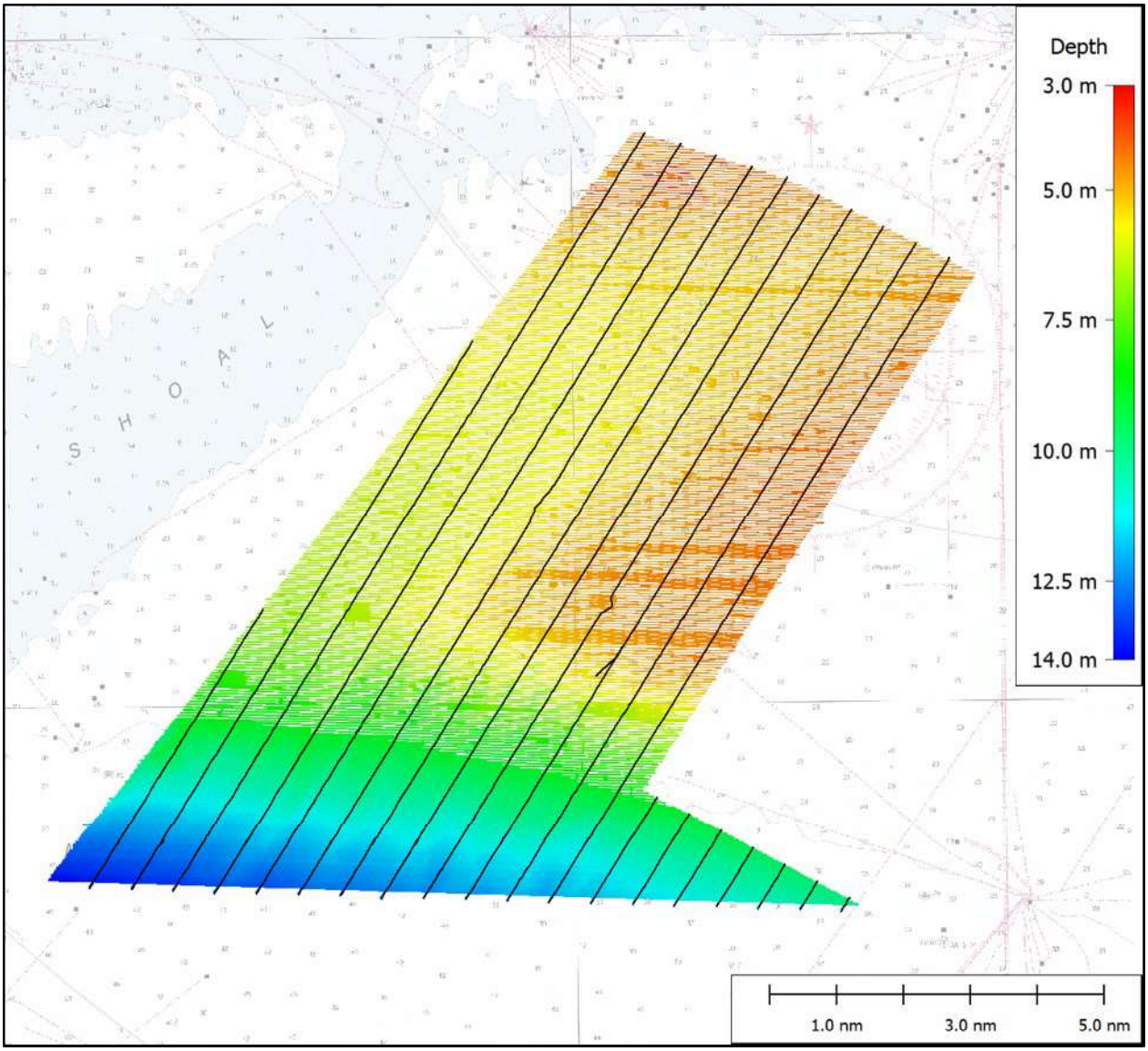


Figure 2: An overview of the crossline layout on a 1.0m surface created from mainscheme MBES data and colored by depth. RNC 11349 is visible in the background.

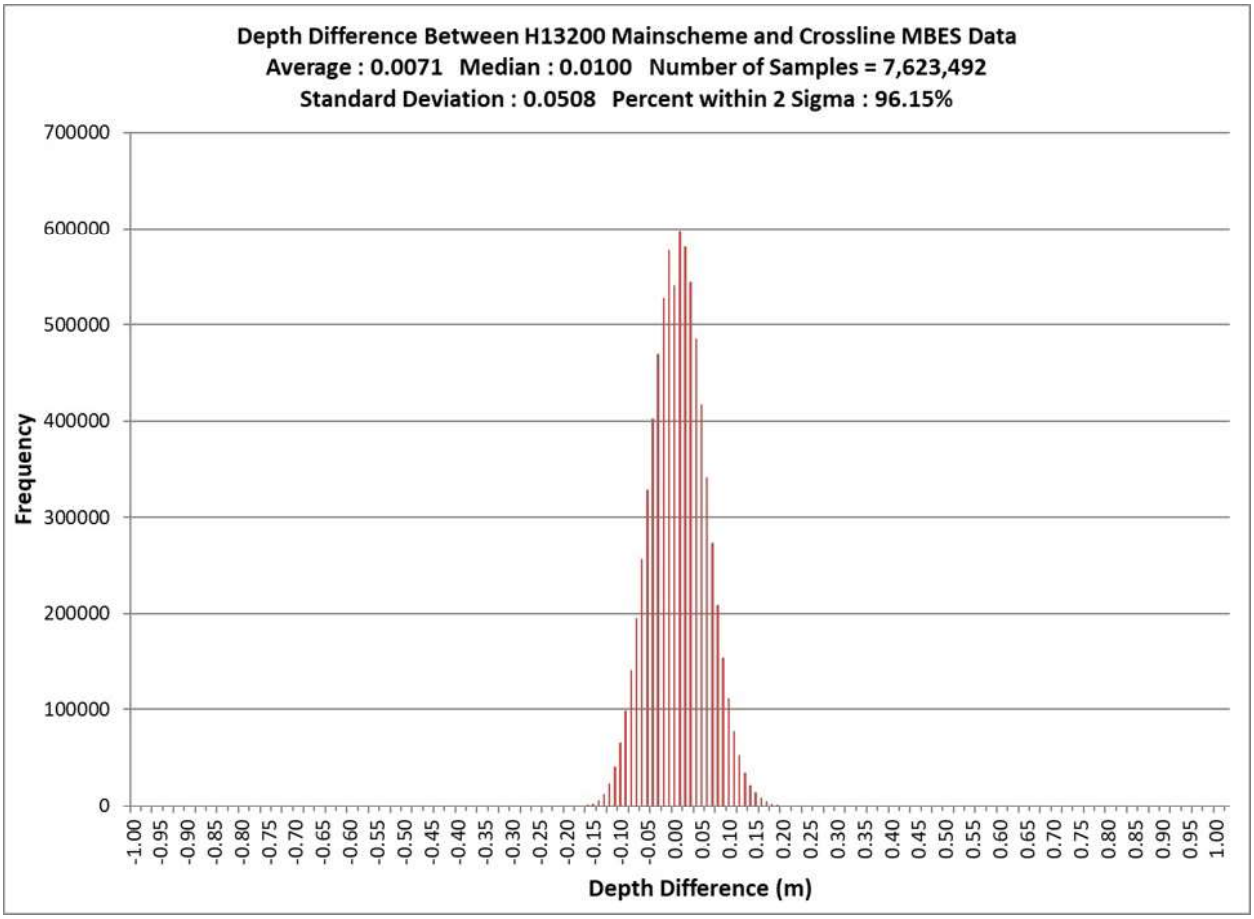


Figure 3: The graph shows a frequency distribution of the depth differences between the H13200 mainscheme data and the H13200 crossline MBES data. Statistics from the depth difference sample set are displayed above the graph.

B.2.2 Uncertainty

The following survey specific parameters were used for this survey:

Method	Measured	Zoning
ERS via VDATUM	0 meters	0.17166 meters

Table 7: Survey Specific Tide TPU Values

Hull ID	Measured - CTD	Measured - MVP	Surface
R/V Ocean Explorer	N/A meters/second	1 meters/second	2 meters/second

Table 8: Survey Specific Sound Speed TPU Values

The methods used to minimize the uncertainty in the corrections to echo soundings are described in detail in Section B, Processing and Quality Control, of the project DAPR. Survey H13200 did not deviate from the methods documented in the DAPR.

The Total Vertical Uncertainty Quality Check (TVU QC) "Ratio Method" was used to evaluate IHO uncertainty for the finalized surface, which was generated using the "greater of the two" option in the CARIS "Finalize Base Surface" utility. The TVU QC "Ratio Method" is described in the Chapter 4 Appendices of the NOAA OCS Field Procedures Manual (FPM) dated April 2014. Per the FPM TVU QC section, "The hydrographer should use the finalized surface because this surface will identify areas where either the uncertainty or the standard deviation exceeded the maximum allowable error and the greater of these two values is used in addition to having the uncertainty scaled to a 95% CI, whereas unfinalized surface uncertainties are reported at the 68% CI." The FPM TVU QC section also states that, "[ratio] values which do not require further examination are from -1 to 0 and the values which do require further examination are from -100 to -1".

Results from the TVU QC indicate that 99.99% of the nodes in this surface meet IHO Order 1 uncertainty specifications, i.e. the ratio values of nearly all the nodes are between 0 and -1. Of the 175 million nodes considered, only 27 had a ratio value below -1. Upon examination it was found that the nodes with ratio values below -1 were located over known seafloor disturbances and/or known discrete features, resulting in higher standard deviation values and finalized uncertainty values, which is to be expected.

B.2.3 Junctions

Three (3) prior surveys and 1 contemporary survey junction with Survey H13200. Figure 4 displays the location of the prior and contemporary junction surveys for Project OPR-K354-KR-28. The allowable TVU for the range of water depths within Survey H13200 is 0.51m to 0.53m. Therefore, according to the XMLDR Junction Area "maximum difference" threshold guidance equation (SQRT2 * TVU), the junction discrepancy action threshold = 0.72m.

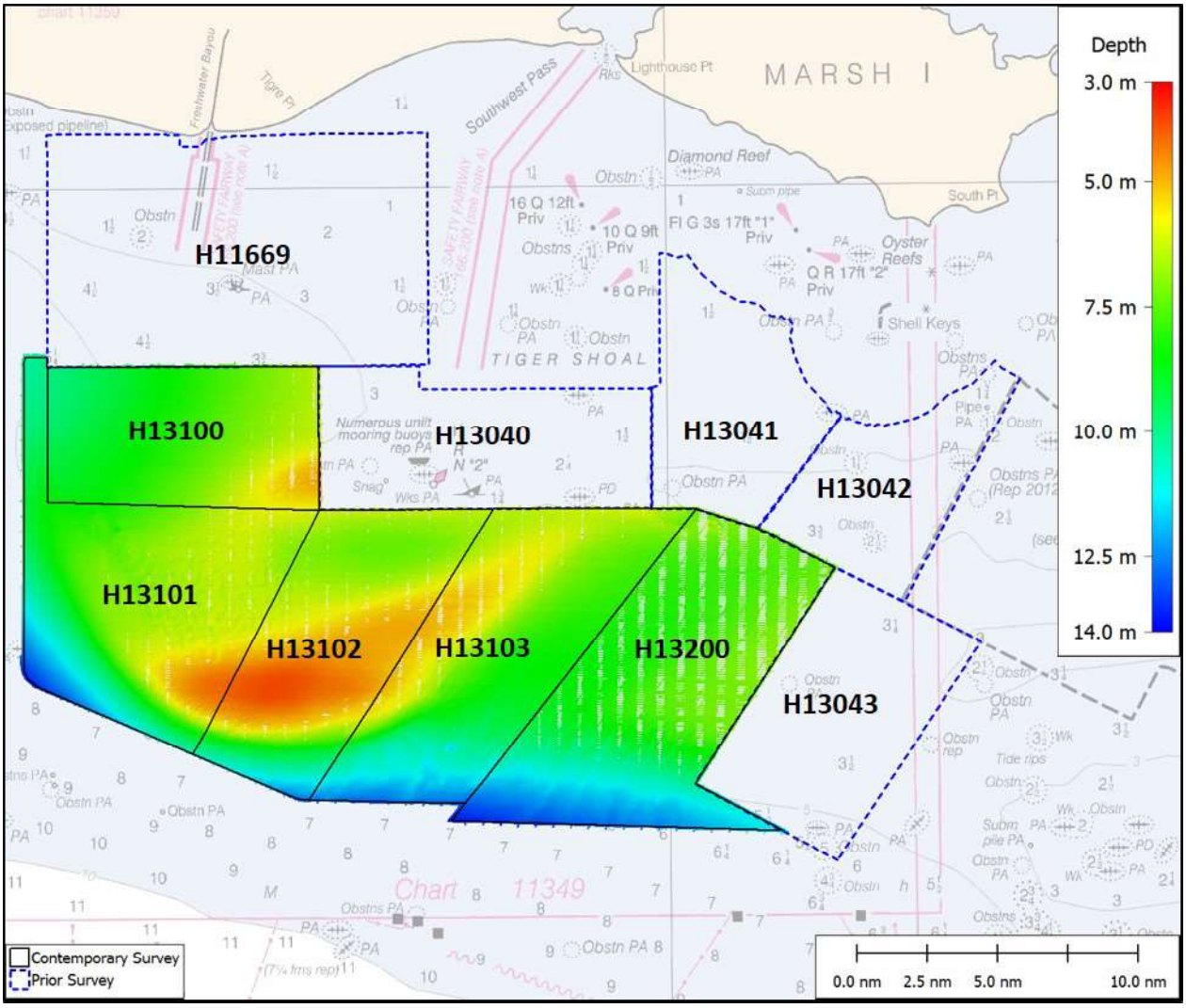


Figure 4: Survey junctions for Project OPR_K354-KR-18. RNC 11340 is displayed in the background.

The following junctions were made with this survey:

Registry Number	Scale	Year	Field Unit	Relative Location
H13041	1:40000	2017	Ocean Surveys, Inc.	N
H13042	1:40000	2017	Ocean Surveys, Inc.	N
H13043	1:40000	2017	Ocean Surveys, Inc.	E
H13103	1:40000	2018	Ocean Surveys, Inc.	W

Table 9: Junctioning Surveys

H13041

Survey H13041, a MBES/SSS survey conducted by Ocean Surveys, Inc. in 2017, overlaps the northern border of H13200. Depth data for Survey H13041 were taken from the dataset delivered to NOAA by Ocean Surveys, Inc. on February 6, 2018 in the form of a 1.0m resolution CARIS Spatial Archive (CSAR) raster "H13041_MB_1m_MLLW_Final.csar." To conduct the junction comparison the depths from the H13041 data were subtracted from the depths in the H13200 surface using the CARIS HIPS Difference Surface function. A histogram of the differences is shown in Figure 5.

Survey H13041 was run with the intention of achieving 100% SSS coverage, as was H13200 in the northern section where it junctions with H13041. Each survey's MBES coverage is "skunk stripe" coverage. The two surveys' mainscheme line plans meet at an angle, leading to a patchy junction area. The surveys share a common border of approximately 4600m, and the mainscheme lines and crosslines overlap by as much as 400m.

Depths from the H13041 survey show good agreement with depths from Survey H13200. The average difference between these surveys is 0.06m, and 99.97% of the 1.0m comparison cells have differences within +/- 0.25m. Differences were overall more variable on the crosslines than on the mainscheme lines; most mainscheme lines matched closely with few exceptions.

All (100%) junction comparison cells have a difference below the discrepancy action threshold of 0.72m.

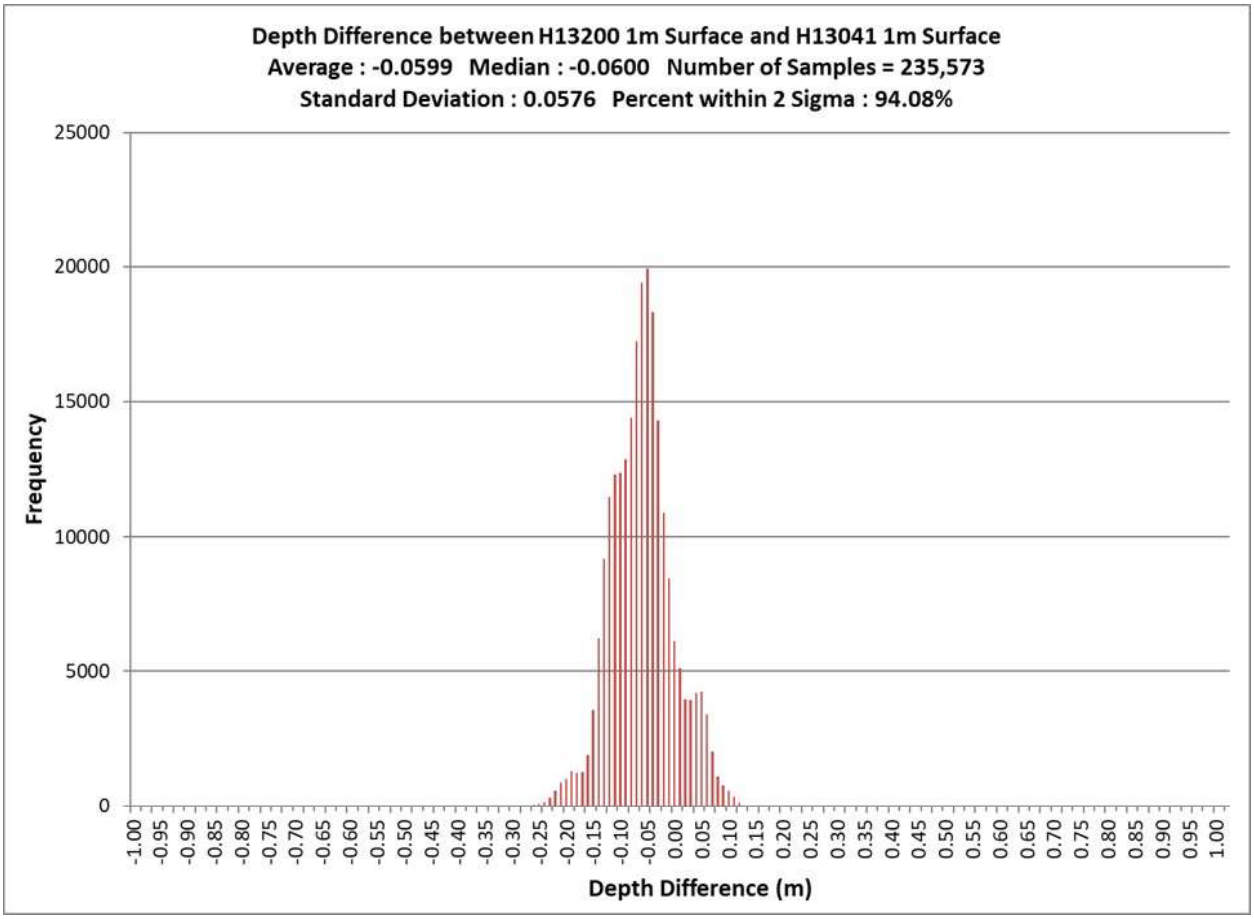


Figure 5: Surface-to-surface difference histogram comparing Survey H13200 to H13041.

H13042

Survey H13042, a MBES/SSS survey conducted by Ocean Surveys, Inc. in 2017, overlaps the northeastern border of H13200. Depth data for Survey H13042 were taken from the dataset delivered to NOAA by Ocean Surveys, Inc. on February 6, 2018 in the form of a 1.0m resolution CSAR raster "H13042_MB_1m_MLLW_Final.csar." To conduct the junction comparison the depths from the H13042 data were subtracted from the depths in the H13200 surface using the CARIS HIPS Difference Surface function. A histogram of the differences is shown in Figure 6.

Survey H13042 was run with the intention of achieving 100% SSS coverage, as was H13200 in the northern section where it junctions with H13042; each survey's MBES coverage is "skunk stripe" coverage. The two surveys' mainscheme line plans are almost parallel to one another, but the slight offset in orientation leads to a junction area that varies from nearly complete mainscheme overlap to no overlap at all along the length of the common border, which is approximately 6100m. The mainscheme lines overlap by as much as 780m, and the crosslines overlap by up to 400m.

Overall agreement between the two surveys is very good. The average difference between these surveys is 0.02m, and 99.99% of the 1.0m comparison cells have differences within +/- 0.25m. However, there are

two distinct peaks in the histogram (Figure 6) that suggest some small biases are present in the data. Tidal differences are a likely cause of these depth discrepancies; the offset, when present, is noted across the full swath of coincident lines from the same survey day and the offset varies by survey day in H13042.

All (100%) junction comparison cells have a difference below the discrepancy action threshold of 0.72m.

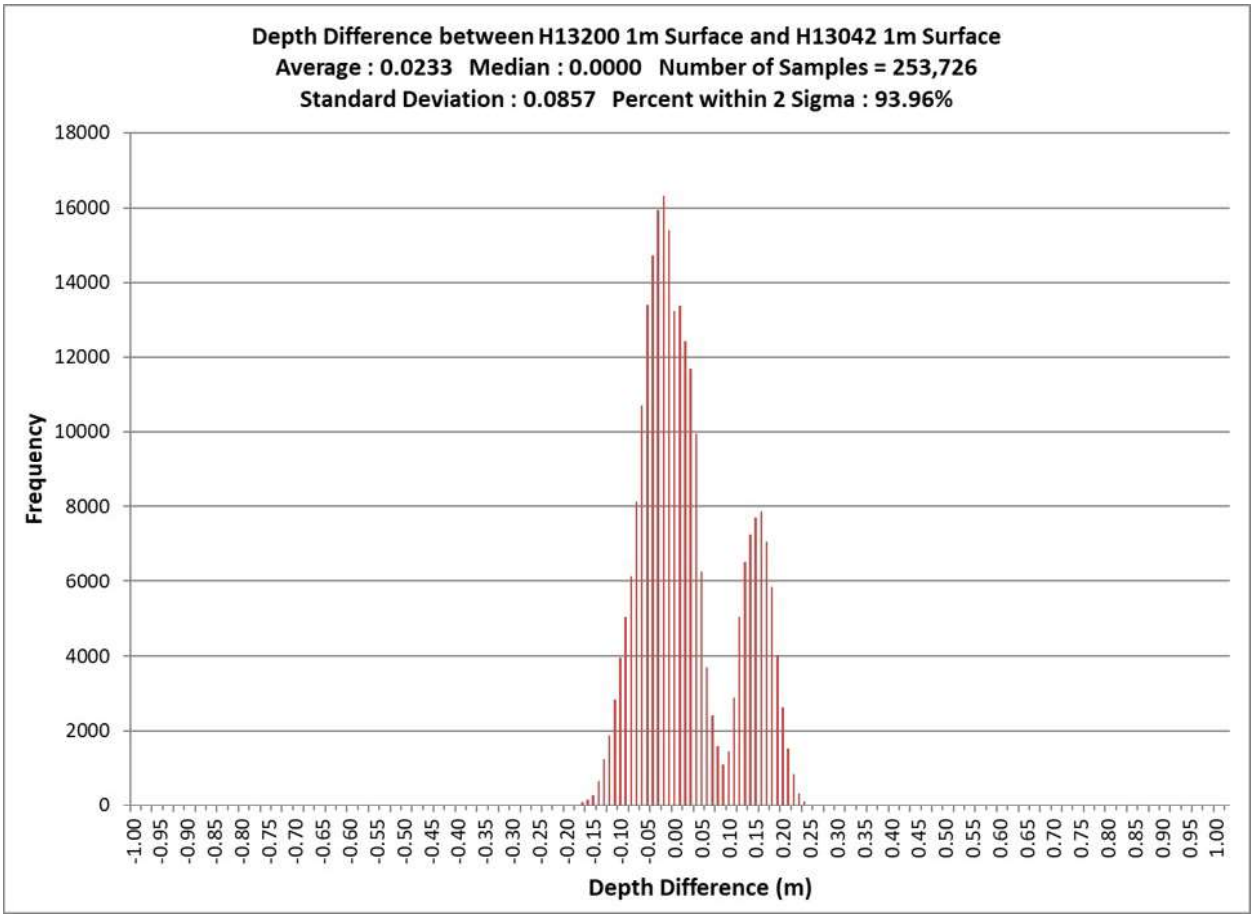


Figure 6: Surface-to-surface difference histogram comparing Survey H13200 to H13042.

H13043

Survey H13043, a MBES/SSS survey conducted by Ocean Surveys, Inc. in 2017, overlaps the eastern borders of H13200. Depth data for Survey H13043 were taken from the dataset delivered to NOAA by Ocean Surveys, Inc. on February 6, 2018 in the form of a 1.0m resolution CSAR raster "H13043_MB_1m_MLLW_Final.csar." To conduct the junction comparison the depths from the H13043 data were subtracted from the depths in the H13200 surface using the CARIS HIPS Difference Surface function. A histogram of the differences is shown in Figure 7.

Both Survey H13043 and Survey H13200 were run with the intention of achieving 100% SSS coverage in depths shoaler than 10.0m, and complete MBES coverage in the deeper waters in the southern portions of

both survey areas. Their junction area contains both "skunk stripe" coverage overlap for approximately 19,000m of their common border of 24,000m, and complete MBES overlap for the remaining common border of 5,000m at the south end of the junction. The mainscheme lines in the 100% SSS coverage area meet at an angle, giving a moderately dense junction area with a few patches of higher density in areas where mainscheme lines were run at 40m spacing rather than 80m spacing. Overlap of mainscheme lines in the complete coverage MBES area is approximately 260m, with crosslines overlapping by as much as 350m. Overlap in the 100% SSS coverage area is as much as 450m.

Depth agreement between the two surveys is very good. The average difference between these surveys is 0.05m and 99.64% of the 1.0m comparison cells have differences within +/- 0.25m.

All (100%) junction comparison cells have a difference below the discrepancy action threshold of 0.72m.

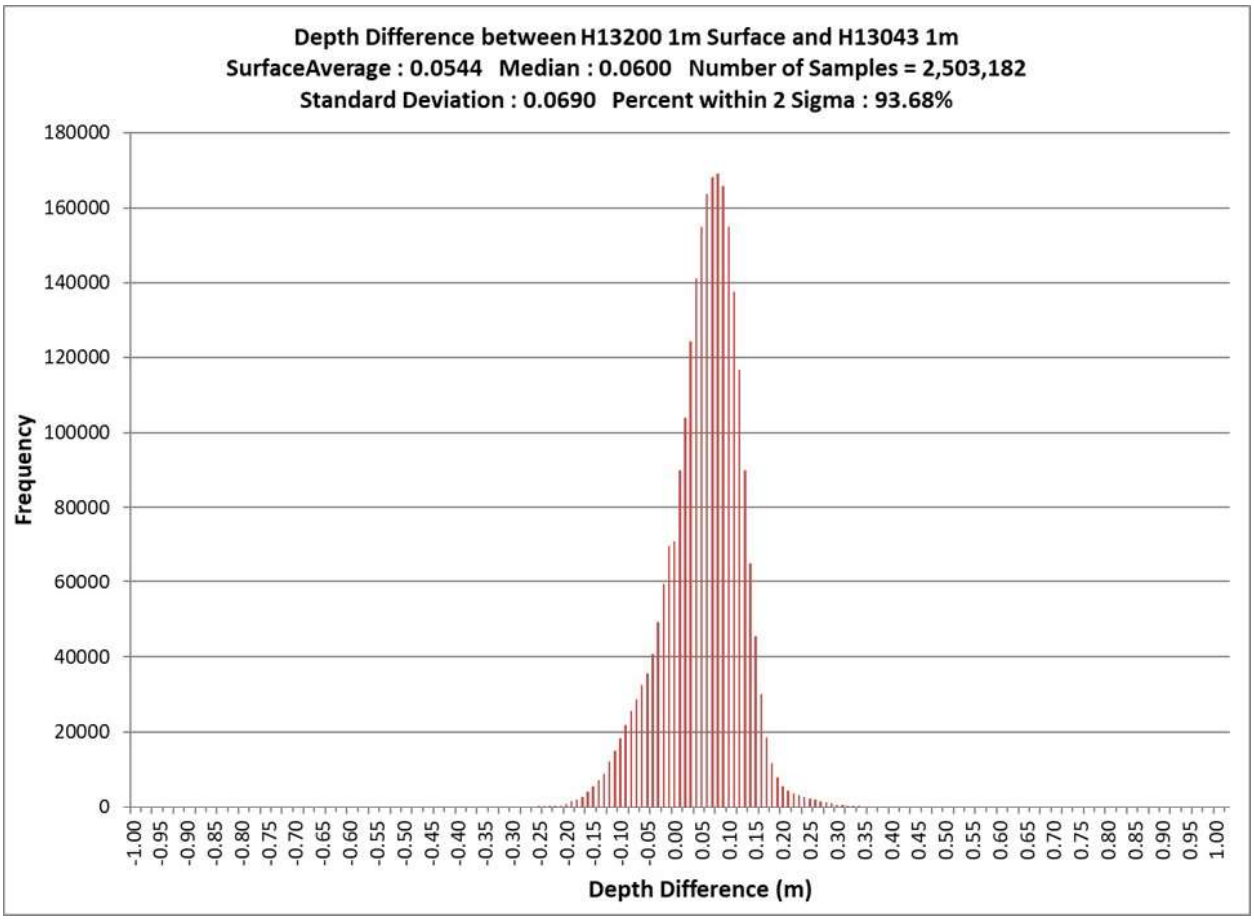


Figure 7: Surface-to-surface difference histogram comparing Survey H13200 to H13043.

H13103

Data from contemporary Surveys H13103 and H13200 overlap along a common border of approximately 25,000m. Both surveys were acquired to meet 100% SSS coverage for the majority of the area they cover

(approximately 20,600m of the common border), and complete coverage MBES in the southernmost areas of both surveys (approximately 4,400m of the common border). The mainscheme line plans of the two surveys are parallel and closely aligned; the "skunk stripe" coverage MBES data between the two surveys have nearly complete overlap, producing a dense junction area. The mainscheme lines overlap by as much as 670m, and there are two locations where the crosslines align between the two surveys; each crossline overlap has a length of approximately 2,100m within the junction area.

Depths from 1.0m CUBE surfaces compiled from the MBES data from each survey were compared using the CARIS HIPS Difference Surface function. A histogram of the differences is shown in Figure 8.

Depths from the two surveys show good agreement with one another. The average difference between these surveys is 0.02m, and 99.99% of the 1.0m comparison cells have differences within +/- 0.25m.

All (100%) junction comparison cells have a difference below the discrepancy action threshold of 0.72m.

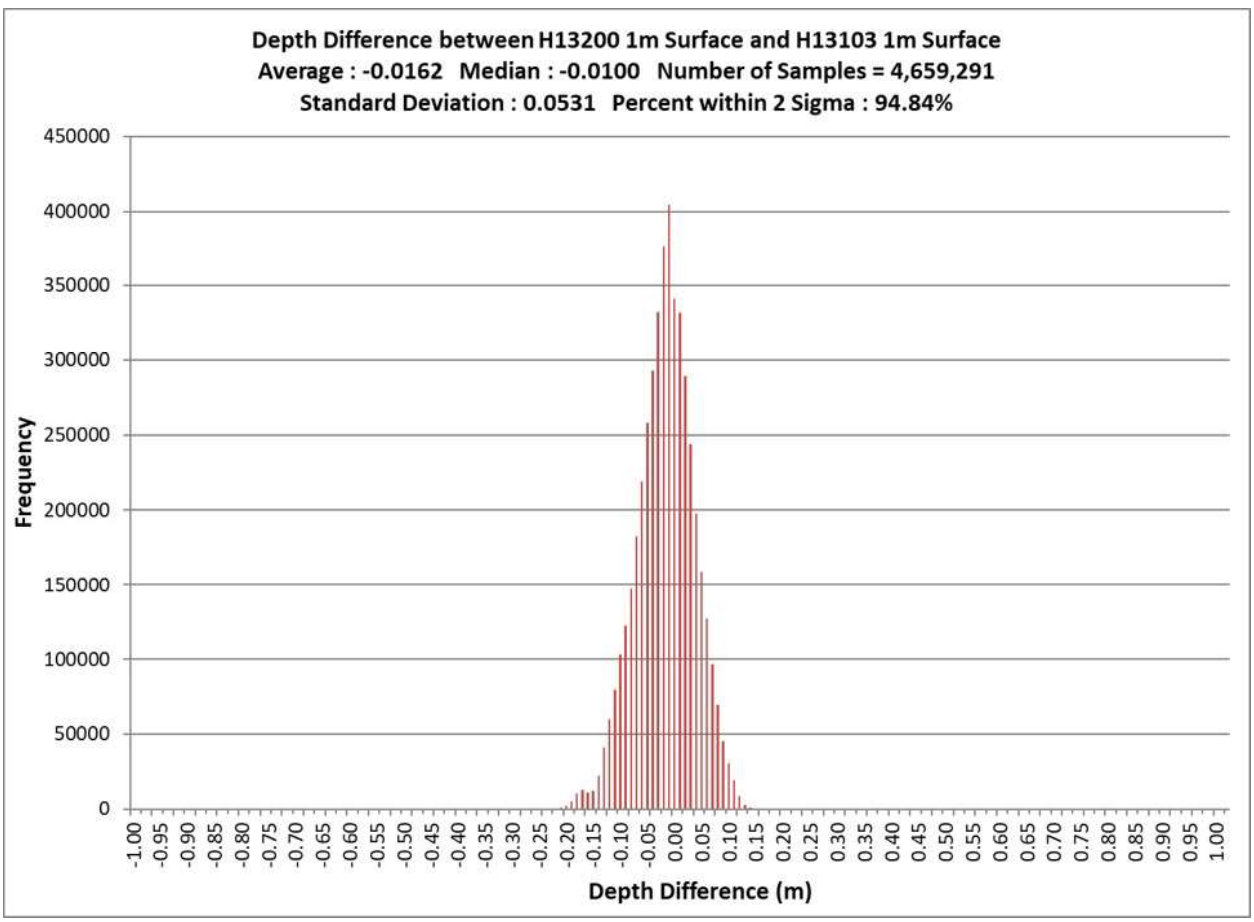


Figure 8: Surface-to-surface difference histogram comparing Survey H13200 to H13103.

B.2.4 Sonar QC Checks

Sonar system quality control checks were conducted as detailed in the quality control section of the DAPR.

B.2.5 Equipment Effectiveness

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

B.2.6 Factors Affecting Soundings

SSS Refraction

Dynamic sound speed changes affected the SSS imagery at times, causing refraction in the outer ranges of the SSS swath (Figure 9). To ensure that 100% coverage of high quality SSS data was acquired, when necessary, SSS lines with excessive refraction were rejected or the portion of the line with severe refraction was rerun. Due to the close line spacing employed in some locations, there were many instances of outer range refraction that did not trigger a re-run or rejection as high quality, 100% SSS coverage was achieved using only a portion of the imagery from a given line. For example, if refraction affected only the outer 20m of the 50m image range but the vessel was running on a 40m offset line plan, ample overlap was still achieved between adjacent tracklines resulting in greater than 100% SSS coverage of the area. In this scenario SSS imagery was not rejected.

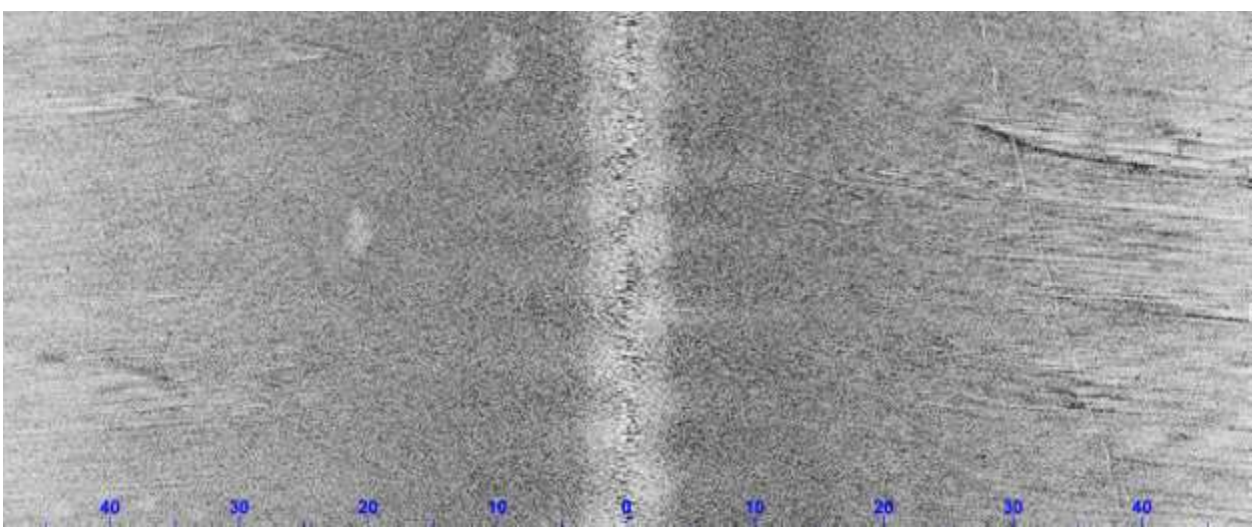


Figure 9: Refraction in the SSS imagery is visible in both channels of a survey line acquired with the fixed-mount 4125 SSS.

Sea State Induced White Streaks in SSS Imagery and MBES "Blowouts"

The Reson 7125 system experienced periodic bursts of motion-induced noise or “blowouts,” typically affecting between 1 and 4 sequential profiles. Efforts were made to reduce this noise during acquisition, including adjustments to system gain and power, in addition to the multibeam pole fairing that was installed on the R/V Ocean Explorer to reduce cavitation effects. The noise bursts were infrequent and were encountered when sea state worsened. Accepted data affected by blowouts did not show any coverage gaps in excess of 3 x 3 nodes in the 1.0m MBES coverage surface.

The fixed mount SSS data were also impacted by sea state conditions, such that when the wave frequency and height increased, more cavitation effects were observed near the transducer head with a dark return noted at the top of the water column in the raw SSS record. The cavitation noise at the transducer head resulted in intermittent black lines across the SSS record, which occasionally coincided with blowouts in the MBES data (Figure 10). The term "black line" is seen in the acquisition log to denote these types of events. The acquisition SSS waterfall was the opposite palette as the CARIS SSS palate. Therefore, a "black line" noted in the log coincides with a white line in CARIS. To ensure that 100% coverage was attained where the white streaks occurred, holiday fill-in lines were acquired over the location of the streaks with either MBES or SSS coverage as necessary.

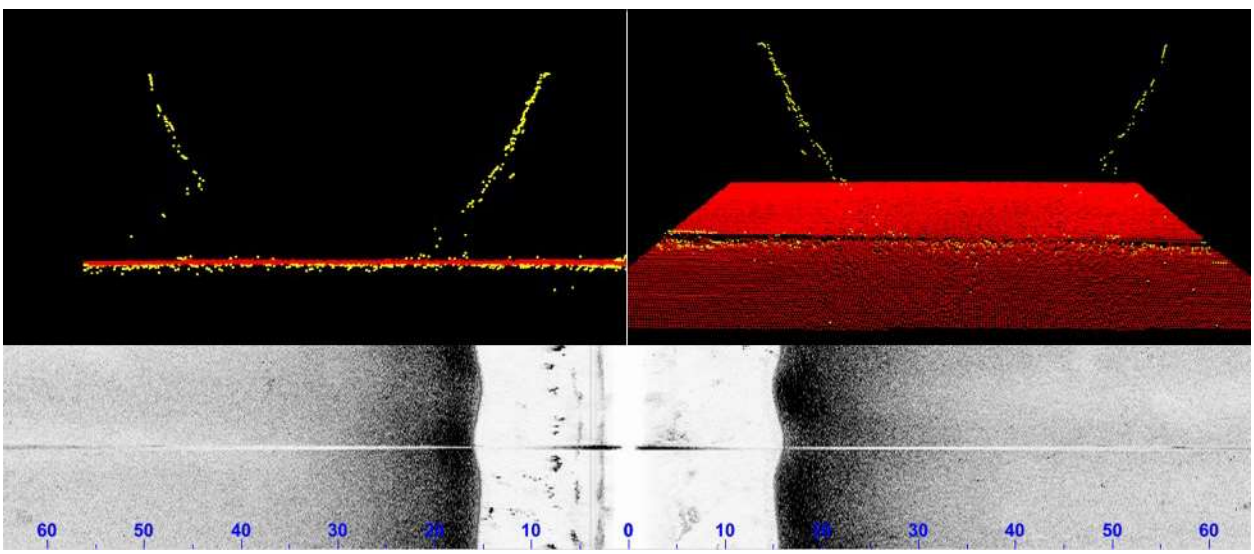


Figure 10: This figure shows how cavitation noise at the SSS and MBES transducer heads presented in the converted data. Noise at the 4125 TX head is visible as a dark return at the top of the water column with white streaking across the raw SSS imagery (bottom). In this instance, the SSS white streak coincided with an MBES blowout (top right and top left images).

Fish in SSS Imagery and MBES Data

An abundance of fish and marine life were observed in the SSS and MBES data, either as lone swimmers or in schools, which at times created large shadows in the SSS imagery and gaps in the MBES data (Figures 11

and 12). Fish and dolphins were noted in the acquisition log by the field team, and these areas were carefully reviewed during data processing. Shadows in the SSS, usually detached from a dark return, were typically associated with fish either in the water column or at a position closer to nadir. In the cases where a visible shadow was recorded in the SSS, the contact was designated as a fish, for two reasons: 1) the possibility that the assumed fish was actually a feature and 2) to assist processors in rejecting fish-related noise from the MBES data. Over 8,500 fish, fish school, dolphin, and other marine life contacts were identified in Survey H13200.

To ensure that possible significant features were not located in these fish and dolphin shadows, the fish/ dolphin related coverage gaps were rerun to achieve 100% SSS coverage or complete MBES coverage.

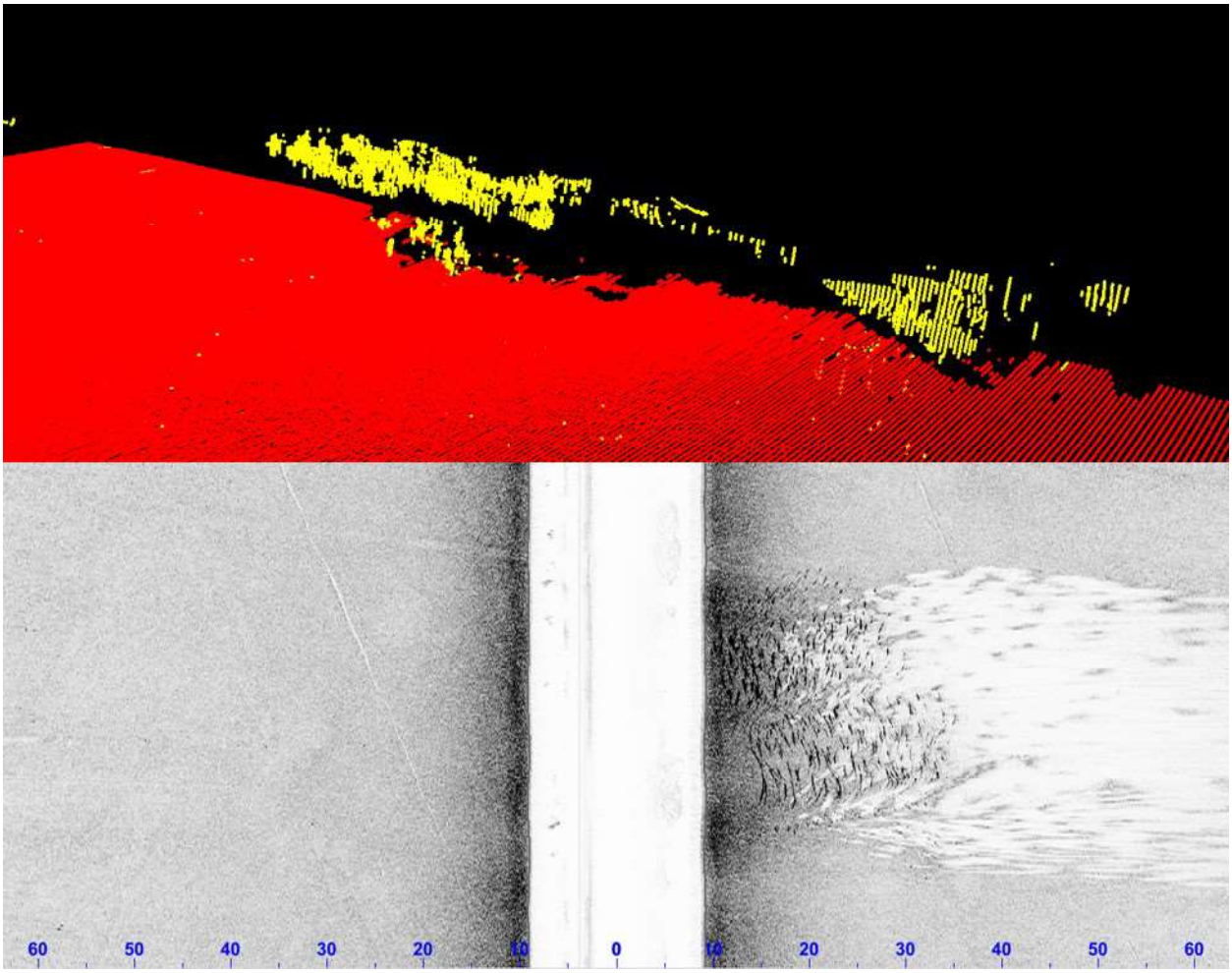


Figure 11: MBES and SSS images showing a school of fish visible in the water column and the acoustic shadow cast in each dataset. In the top panel the rejected MBES soundings are colored yellow.

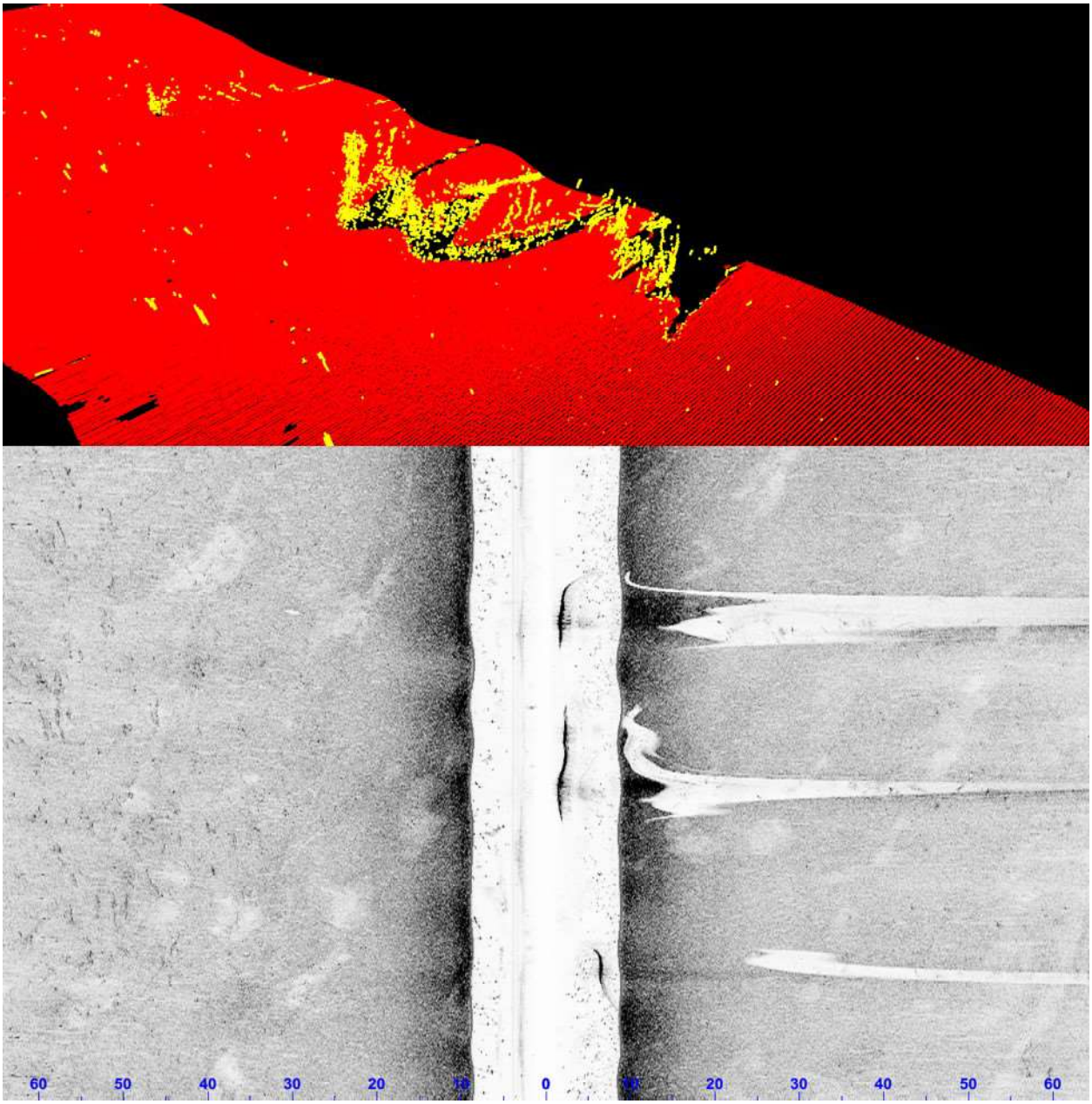


Figure 12: An example of a dolphin as it appears in the water column of the MBES and the SSS, and the acoustic shadow cast in each dataset. In the top panel the rejected MBES soundings are colored yellow.

B.2.7 Sound Speed Methods

Sound Speed Cast Frequency: Sound speed profile data were acquired with the ODIM MVP30 approximately every 15 minutes as documented in the DAPR.

All MBES lines were sound speed corrected using CARIS HIPS' "Nearest in Distance Within Time" method. The time interval used was 1 hour.

OSI submitted H13200 sound speed data in NetCDF format to the National Centers for Environmental Information (NCEI) on October 15, 2018 via the S2N tool. NCEI assigned the sound speed submission Accession Number 0177405. Correspondence regarding the NCEI data submission is included in Appendix II.

B.2.8 Coverage Equipment and Methods

This survey was conducted to develop 100% SSS coverage along with concurrent MBES with backscatter for all survey depths, i.e. Complete Coverage, Option B as defined in Section 5.2.2.3 of the HSSD 2017. For all disprovals either 200% SSS or Complete Coverage MBES was achieved. Per the HSSD which states "Gaps in 100% SSS coverage should be treated as gaps in coverage and addressed accordingly," gaps in SSS coverage and holidays caused by fish, dolphins, or white line noise were developed with Complete Multibeam or a second side scan coverage. All potentially significant features located with mainscheme SSS or MBES were developed with multibeam sonar data to meet HSSD 5.2.2.3 Complete Coverage requirements. All depths within Survey H13200 were shallower than 20m, for which HSSD 5.2.2.3 specifies a grid resolution of 1.0m.

The survey methods used to meet coverage requirements did not deviate from those described in the DAPR.

B.2.9 Density

The CARIS HIPS and SIPS Compute Statistics tool calculated that 99.74% of the 1.0m grid nodes have 5 soundings or more, which satisfies the density coverage requirements.

B.3 Echo Sounding Corrections

B.3.1 Corrections to Echo Soundings

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

B.3.2 Calibrations

All sounding systems were calibrated as detailed in the DAPR.

B.4 Backscatter

Backscatter data were acquired concurrent with bathymetry data for Survey H13200. Backscatter data were recorded with HYSWEEP SURVEY in .7K format, and these data were periodically reviewed to ensure functionality of the backscatter acquisition process.

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	10.4

Table 10: Primary bathymetric data processing software

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

Manufacturer	Name	Version
CARIS	SIPS	10.4

Table 11: Primary imagery data processing software

The following Feature Object Catalog was used: NOAA Extended Attribute Files V5_8.

Software versions described in Section A of the DAPR were used throughout acquisition and processing of data for Project OPR-K354-KR-18.

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
H13200_MB_1m_MLLW	CARIS Raster Surface (CUBE)	1 meters	6.12 meters - 13.95 meters	NOAA_1m	Complete Coverage (Option B)
H13200_SSS_1m_100	SSS Mosaic	1 meters	-	N/A	100% SSS
H13200_SSS_Disproval	SSS Mosaic	1 meters	-	N/A	200% SSS

Table 12: Submitted Surfaces

In addition to the above surfaces, a higher resolution, 0.25m SSS mosaic image composed of all SSS lines was submitted in Enhanced Compressed Wavelet (ECW) format to assist with the survey review.

C. Vertical and Horizontal Control

Additional information discussing the vertical or horizontal control for this survey can be found in the accompanying Horizontal and Vertical Control Report (HVCR) for Project OPR-K354-KR-18.

C.1 Vertical Control

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

ERS Methods Used:

ERS via VDATUM

Ellipsoid to Chart Datum Separation File:

OPR-K354-KR-2018_NAD83-MLLW_xGeoid17B.csar

C.2 Horizontal Control

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

The projection used for this project is UTM Zone 15 North.

The following PPK methods were used for horizontal control:

Smart Base

Application of the Applanix POSPac Smart Base process is described in detail in the project HVCR.

The following CORS Stations were used for horizontal control:

HVCR Site ID	Base Station ID
Calcasieu Pass	CALC
Eugene Island 337	DEV1
Abdalla Hall ULL	TONY
Franklin High Sch	FSHS
Amerada Pass	AMER
Lumcon	LMCN
Houma	HOUM

Table 13: CORS Base Stations

The following user installed stations were used for horizontal control:

HVCR Site ID	Base Station ID
OSI Freshwater Lock	OSFL

Table 14: User Installed Base Stations

Correctors from the U.S. Coast Guard Differential GPS (DGPS) station in English Turn, LA were utilized by the secondary GPS, a Trimble MS750, used as a "position integrity" alarm.

The following DGPS Stations were used for horizontal control:

DGPS Stations
English Turn, LA

Table 15: USCG DGPS Stations

D. Results and Recommendations

D.1 Chart Comparison

Chart comparisons were performed in CARIS HIPS/SIPS using finalized CUBE surfaces, contours and selected soundings. The latest edition of the NOAA NOS Electronic Nautical Chart (ENC) was downloaded from the NOAA Office of Coast Survey website (http://www.nauticalcharts.noaa.gov/) regularly during survey operations, and after the survey was completed for final comparisons. The ENC used for final

comparison was updated with Notice to Mariners data through December 20, 2018 and is submitted with the survey deliverables.

Local Notices to Mariners and Notices to Mariners from March 21, 2018 to December 20, 2018 were reviewed in conjunction with the chart comparison.

The chart comparisons documented below will discuss general seafloor changes, shoaling and deepening trends. All new or charted features identified, updated or disproved within Survey H13200 were addressed and attributed in the S-57 Final Feature File (FFF). For more information on the methodology that was used to build the FFF see Section B.2.5 Feature Verification in the DAPR.

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?
US4LA15M	1:80000	30	12/20/2018	12/12/2018	NO

Table 16: Largest Scale ENCs

US4LA15M

An overview of the areas of change between charted depths and H13200 surveyed soundings is shown in Figure 13. The figure displays a difference surface made by subtracting a 10m resolution depth surface generated from the H13200 MBES data from a depth surface interpolated from the charted ENC soundings within the project area. Regions of shoaling are represented by positive depth differences (warm colors) and regions of deepening are represented by negative depth differences (cool colors). As shown by the coloring in Figure 13 there has been a deepening trend throughout most of Survey H13200, with the areas of greatest change in the southern part of the sheet.

Figure 14 compares US4LA15M ENC contours to H13200 surveyed contours generated from the displayed generalized tinned surface. As shown, the 30-foot contour that runs across the southern part of Survey H13200 has shifted northwards along its entire length and should be redrawn based on recently surveyed soundings.

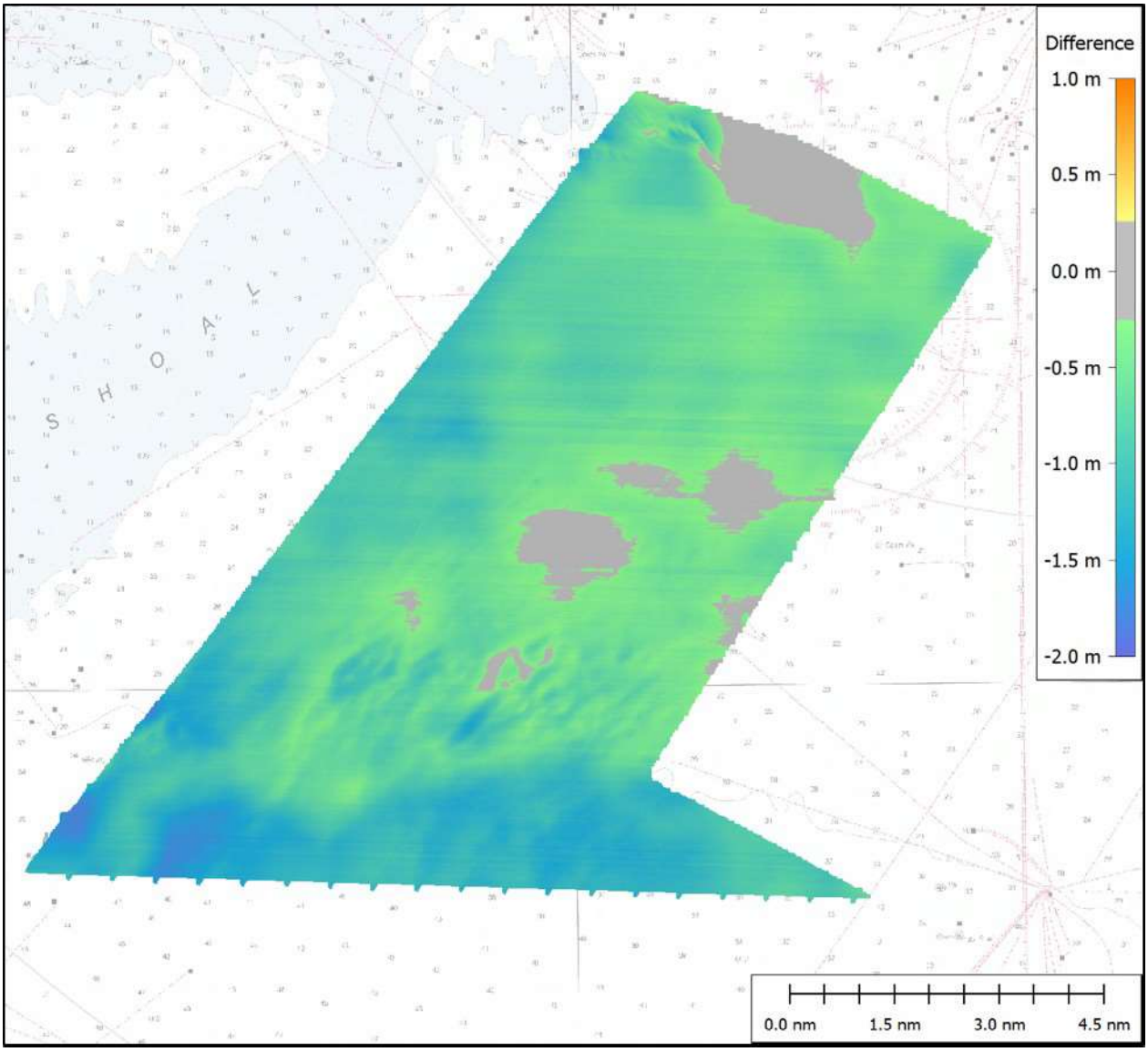


Figure 13: A depth difference surface overlaid on RNC 11349 provides an overview of the areas of change between charted depths and H13200 surveyed soundings.

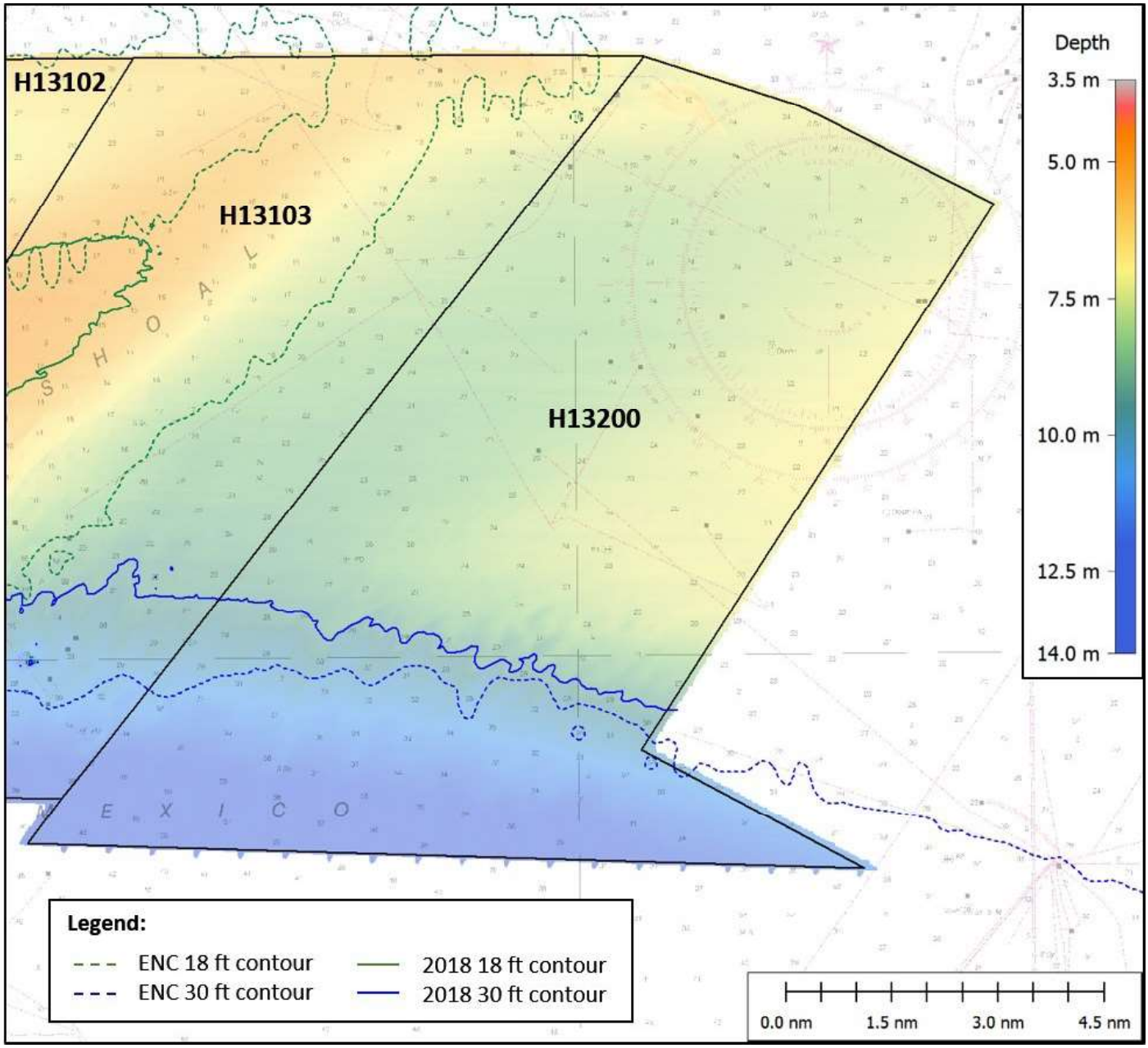


Figure 14: A colorized depth surface provides an overview of the change in contours from ENC US4LA15M to the surveyed data. RNC 11349 is displayed as an overlay.

D.1.2 Maritime Boundary Points

No Maritime Boundary Points were assigned for this survey.

D.1.3 Charted Features

The Project Instructions' guidance on Shoreline and Nearshore Features states, "Submit a Final Feature File in accordance with HSSD Section 7. Contact the COR if there are any questions regarding feature assignments and feature management. All features with attribute 'asgnmnt' populated with 'Assigned' shall be addressed in accordance with Chapter 7 of the HSSD. Investigation requirements for all assigned features will be provided in the investigation requirement attribute 'invreq.' For the purposes of disproval, charted features labeled with a "PA" will have a search radius of 160 meters, charted features labeled with a "PD" will have a search radius of 240 meters, and other features without a position qualifier will have a search radius of 80 meters. With respect to wellheads, reference HSSD Chapter 7.5.1." The disproval area for wellheads given in the referenced HSSD chapter is a 50m search radius.

Guidance on attribution of charted and CSF-assigned features varies between NOS-NOAA documents pertaining to this survey. For example, guidance on New/Delete vs. Update attribution is quite detailed in the HSSD Section 7.5.2 which lists numerous attribution change thresholds. In contrast, the CSF investigation requirements for platforms states, "If feature exists, include in FFF with descrp=retain. If feature is not visible, conduct a feature disproval (Section 7.3.4)." The addition of uncharted BSSE Wellheads in the CSF (which were often closer to a surveyed platform than the CSF-defined position of the platform) creates further uncertainty on how to attribute certain features. Given the ambiguity in directives, OSI consulted with the COR for clarification via e-mail on December 6, 2017. The COR's December 11, 2017 response follows: "Include both the significant wellheads and platform features in the FFF, and reposition any platform that deviates greater than 10 meters from the center point of the corresponding charted feature, based on the Page 97 of the HSSD. These are all delete/add for the charted platforms." A record of this correspondence is included in DR Appendix II.

Within the bounds of Survey H13200, 63 features were assigned for investigation within the CSF: 2 wrecks, 10 platforms, 17 pipeline sections, and 34 obstructions.

Of the 2 assigned wrecks, both were disproved with 200% SSS and partial MBES coverage within the feature-specific search radii.

See DR Section D.2.6 Platforms for information regarding the verification or disproval of the charted platforms.

Of the 34 obstructions assigned for investigation all but 1 are BSSE Wellheads. The non-BSSE Wellhead assigned obstruction is a non-specific obstruction and was not attributed with a known depth. This obstruction was disproved with 200% SSS and partial MBES coverage. All 33 BSSE Wellhead obstructions are recommended for deletion. One (1) BSSE Wellhead obstruction was coincident with a verified and charted platform, but no evidence of a wellhead aside from the verified platform was found within the disproval area. Each of the remaining 32 BSSE Wellhead obstructions were disproved with 200% SSS and partial MBES or with complete MBES coverage.

Seventeen (17) pipeline features were assigned for investigation in the CSF. Many of the pipelines, as packaged and assigned in the CSF, extend outside the bounds of the H13200 survey area and were not investigated beyond the survey limits. During preliminary data processing there were numerous pipeline or potential pipeline detections identified in Survey H13200. Many of these detections are duplicate detections

from a single feature imaged on one or more adjacent tracklines; discounting the duplicate detections leaves 9 unique potential pipeline features. A number of these potential detections were later deemed to be something other than an exposed pipeline, e.g. a water column dolphin or a low-relief escarpment. Two(2) pipeline features were confirmed. All pipeline detections are less than 1.0m above the seafloor, and therefore, are not deemed DTONs. The valid pipeline detections, as interpreted during late-stage processing, were forwarded to the COR via email on November 16, 2018 according to guidance in Section 1.7 of the HSSD regarding Non-DTON Seeps and Pipelines. No "seeps" were detected in Survey H13200.

Prior to 2017, exposed pipes and seeps were handled as DTONs and therefore were appended to the FFF. The 2017 HSSD includes a new category of feature, "non-DTON seeps and pipes." However, the 2017 HSSD does not mention whether or not to include these non-DTON features in the FFF. The HSSD only addresses undetected charted pipelines and recommends that a non-detected pipeline should be attributed "Retain." In a December 11, 2017 e-mail to the COR, OSI inquired about how to treat exposed, non-DTON pipes and seeps in the FFF. The COR's December 12, 2017 response follows, "The current requirement of the "Non-DTON Seep and Pipeline Report" is a separate deliverable from the FFF. Your historic method of including the pipeline segments in the FFF is good. How you manage the other features is up to your discretion. The features that are not cartographically significant they will be ignored in the FFF." Given this latitude in how to treat the non-DTON seeps and pipes, OSI chose to include them in the FFF as discrete features.

D.1.4 Uncharted Features

In general there were very few new features surveyed in H13200. Of the relatively few SSS contacts chosen, most were either fish (chosen independently of the mass fish targeting scheme described in the DAPR) or features of insignificant height.

A 0.9m tall feature was surveyed approximately 125m to the east-southeast of an assigned BSSE Wellhead. The wellhead was disproved within a search area defined by a 50m radius. While this feature is not navigationally significant, it is possible that it is the assigned wellhead. For this reason, a designated sounding was created from the least depth of this feature (Figure 15).

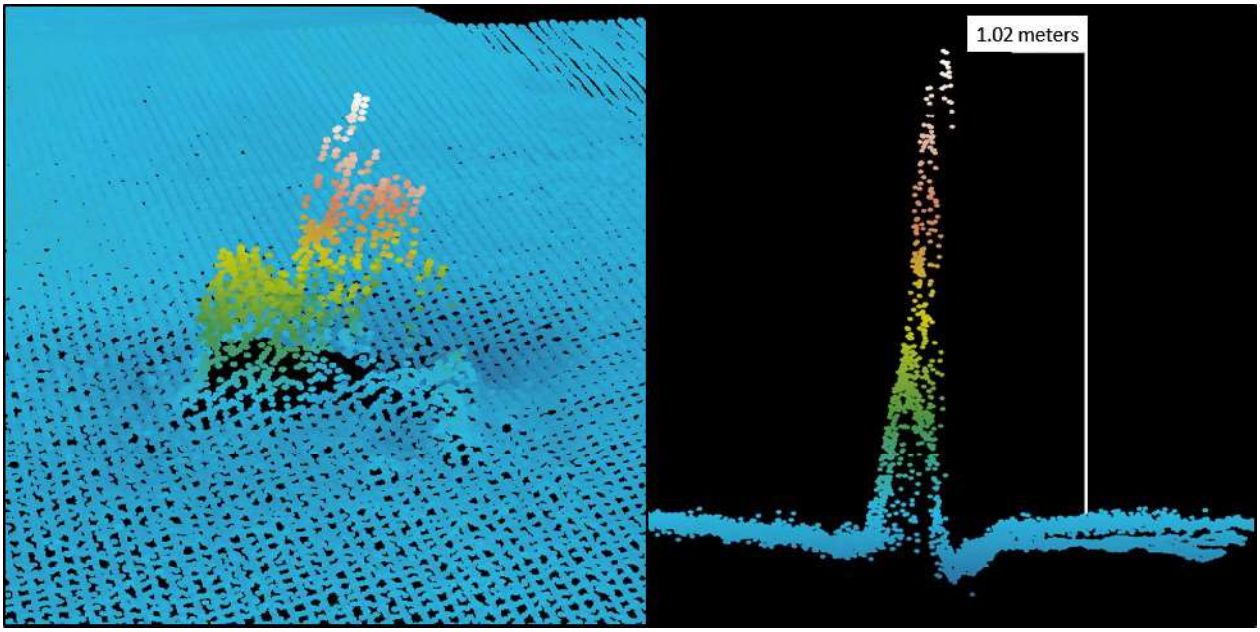


Figure 15: A 0.9m tall feature is represented in CARIS HIPS Subset Editor 3D with the soundings colored by depth.

D.1.5 Shoal and Hazardous Features

The methods employed in conducting the Shoal and Hazardous Features analysis are the same as described above for the Chart Comparison discussion.

In general there was more deepening than shoaling evident in Survey H13200, and no new discrete dangerous shoals were surveyed.

No DTONs were generated as a result of this survey.

D.1.6 Channels

No channels exist for this survey. There are no designated anchorages, precautionary areas, safety fairways, traffic separation schemes, pilot boarding areas, or channel and range lines within the survey limits.

D.1.7 Bottom Samples

Nine (9) bottom samples were acquired in close proximity to the recommended positions included in the PRF provided with the OPR-K354-KR-18 Project Instructions. A sediment sampler was deployed from a davit to acquire the requisite sample. Bottom sample locations were logged in a target file in HYPACK SURVEY. Once the sample was on deck, it was photographed and classified based on the criteria outlined in Appendix H, Bottom Classification, in the HSSD. Sediment within Survey H13200 was primarily found to be soft mud with fine sand, with some samples also containing stiff mud or broken shells.

D.2 Additional Results

D.2.1 Shoreline

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

D.2.2 Prior Surveys

Prior survey comparisons exist for this survey, but with the exception of the assigned junction surveys, prior data were not investigated.

D.2.3 Aids to Navigation

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

D.2.4 Overhead Features

No overhead features exist for this survey.

D.2.5 Submarine Features

As discussed above, 17 charted pipelines are located within Survey H13200. The majority of the charted pipelines were not visible in the SSS or MBES data.

In addition to the ENC and the CSF, pipeline data from the Bureau of Ocean Energy Management (BOEM) were reviewed prior to field operations to identify any potential uncharted BOEM pipelines in the survey area. Three (3) BOEM pipelines are not represented on the chart. All charted pipelines have a BOEM pipeline counterpart. Uncharted BOEM pipelines are displayed in Figure 15.

The BOEM pipeline data (last updated on December 3, 2018) were obtained as a shape file "ppl_arcs.shp" from the BOEM website (https://www.data.boem.gov/Main/Mapping.aspx) and re-projected as a .DXF file “BOEM_Pipelines_UTM_15N_NAD83_Meters.dxf.” These files are included with the digital deliverables for Survey H13200.

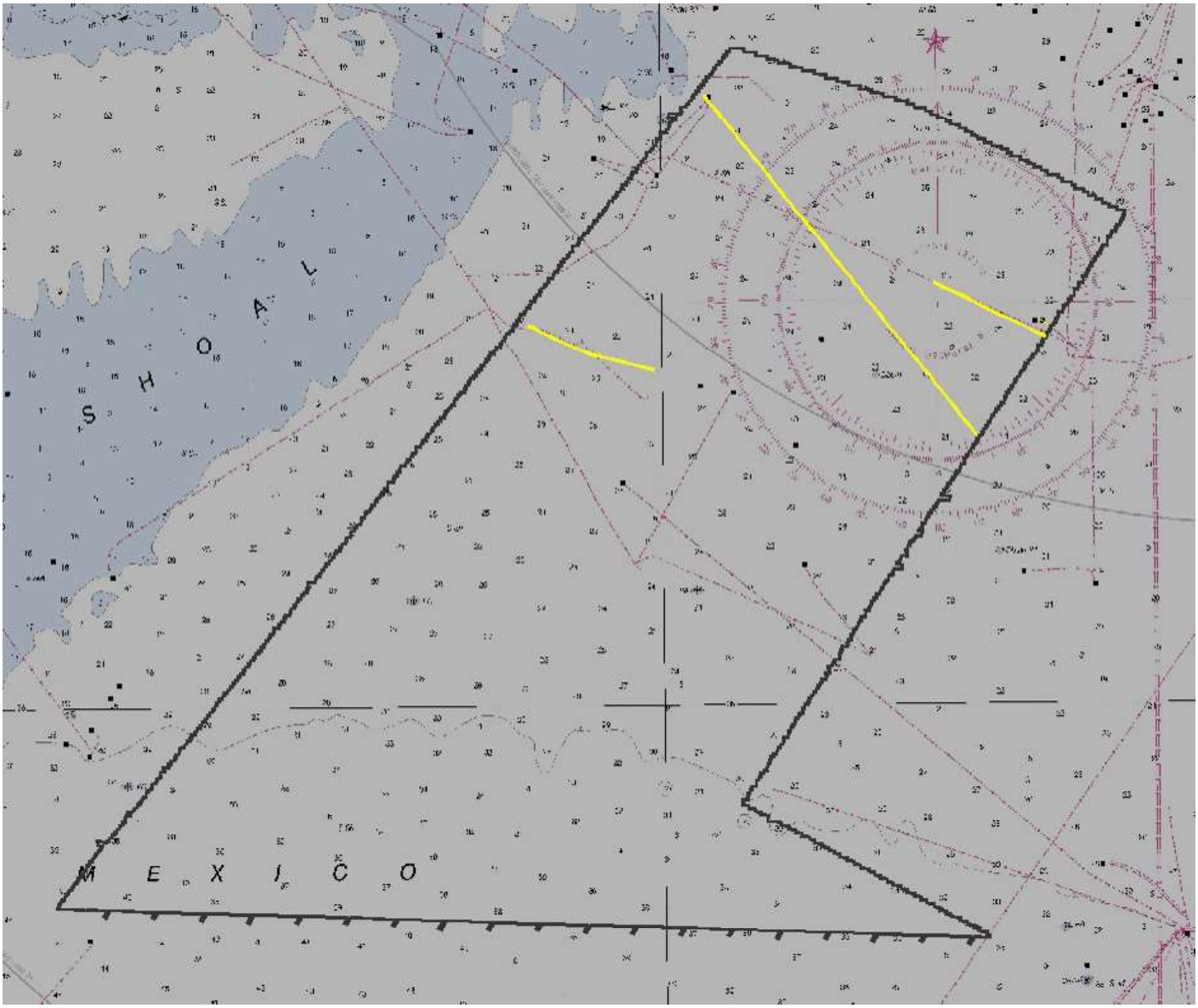


Figure 16: BOEM-defined pipelines that are not charted are highlighted in yellow. Survey H13200 survey boundary limits are shown in black.

D.2.6 Platforms

Of the 10 platforms assigned for investigation for Survey H13200, only 1 platform was found to be present. This platform is charted on the ENC and was assigned for investigation in the CSF; however, because its surveyed position was greater than 10m from the CSF position, it is recommended for deletion and a new platform is included in the FFF at the surveyed position. The remaining 9 platforms were disproved and are recommended for deletion.

In addition to the ENC and the CSF, BOEM platform data were reviewed prior to field operations to identify any potential uncharted BOEM platforms in the survey area. There were 17 BOEM platforms in the data

set. All BOEM platforms coincide with either an assigned BSSE Wellhead, a charted pipe/platform, or an uncharted BOEM-defined pipeline. 10 BOEM platforms coincide with charted, CSF platform positions (including the 1 platform that was found in the survey).

The BOEM platform data (last updated on December 3, 2018) were obtained as a shape file "platforms.shp" from the BOEM website (https://www.data.boem.gov/Main/Mapping.aspx) and re-projected as a .DXF file "BOEM_Platforms_UTM_15N_NAD83_Meters.dxf." These files are included with the digital deliverables for Survey H13200.

There were no platform related Local Notice to Mariners or Notice to Mariners notifications within Survey H13200 from March 21, 2018 to December 20, 2018.

D.2.7 Ferry Routes and Terminals

No ferry routes or terminals exist for this survey.

D.2.8 Abnormal Seafloor and/or Environmental Conditions

No abnormal seafloor and/or environmental conditions exist for this survey.

D.2.9 Construction and Dredging

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

D.2.10 New Survey Recommendation

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

D.2.11 Marine Mammal Observations

Per direction in Section 1.5 of the HSSD, all personnel aboard the survey vessel used during Project OPR-K354-KR-18 were trained as Marine Mammal Observers prior to commencement of the survey. Training consisted of each surveyor and vessel crew member watching the US Navy video referenced in the HSSD.

As noted multiple times in the survey acquisition log, large, mobile water column sonar targets (assumed to be dolphins) were ensonified by either the MBES or the SSS. The dolphin-assumption is based on both the size and behavior of the sonar targets. Often times these observations did not coincide with a visual (above water) sighting. Visual observations, when noted, were recorded on NOAA/NMFS,AFSC/NMML Form 11US (POP) which is included as Appendix L of the HSSD.

Completed digital 11US (POP) forms were compiled and transmitted along with the Project's digital marine mammal training record to pop.information@noaa.gov and ocs.ecc@noaa.gov with a CC to the Project's COR, Starla Robinson. These records are also included in Descriptive Report Appendix II.

D.2.12 Coast Pilot Review

In reference to the OPR-K354-KR-18 survey area the Coast Pilot Report, included with the April 4, 2018 Final Data Package, states that, "there is one paragraph in Coast Pilot 5, chapter 9, that describes Trinity Shoal (paragraph 301). There are no details on the surrounding area either. The paragraph appears to be accurate to Chart 11349 and does not need an update." The survey area considered in the Coast Pilot Report does not exactly match the area ultimately surveyed (the assigned survey area expanded after issue of the April 4, 2018 Final Data Package). However, the Report's "no updates needed" statement and the lack of other investigation requirements still applies to the area actually surveyed. The Hydrographic Survey Project Instructions contained only general guidance regarding the Coast Pilot. Therefore, in lieu of targeted responses to an assigned Coast Pilot Field Report, OSI conducted a general review of relevant Coast Pilot excerpts. Specifically, pertinent paragraphs from the following Coast Pilot section were considered: Coast Pilot 5 - 46th Edition, 2018 updated through 21-October-2018, Mississippi River to Sabine Pass.

Within the Coast Pilot Edition mentioned above there is only one specific, detailed, relevant entry concerning the assigned survey area. Most entries are of a general nature and are not refutable based on the observations of the OSI field team. Regarding “areas frequently transited and facilities utilized during in-ports” (as mentioned in the HSSD Section 8.1.3) Coast Pilot entries are somewhat more relevant. However, there are only a few Coast Pilot entries that this document will attempt to address as most entries are not relevant to the "areas frequently transited by the survey vessel and facilities utilized during in-ports."

OSI's Coast Pilot Review Report and the original Coast Pilot Report, mentioned above, were transmitted to ocs.nbd@noaa.gov and coast.pilot@noaa.gov with a CC to the Project's COR, Starla Robinson. These records are also included in Descriptive Report Appendix II.

D.2.13 Inset Recommendation

No new insets 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 Specifications and 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 with the exception of deficiencies noted in the Descriptive Report.

Report Name	Report Date Sent
Data Acquisition and Processing Report	2019-01-25
Horizontal and Vertical Control Report	2019-01-25
Coast Pilot Report	2018-11-15

Approver Name	Approver Title	Approval Date	Signature
George G. Reynolds	Chief of Party	01/25/2019	George G. Reynolds 2019.01.25 16:03:27 -05'00'
John R. Bean	Lead Hydrographer	01/25/2019	John R. Bean 2019.01.25 16:03:49 -05'00'
David T. Somers	Data Processing Manager	01/25/2019	David T. Somers 2019.01.25 16:04:15 -05'00'

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	Continually 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
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
HSSD	Hydrographic Survey Specifications and Deliverables

Acronym	Definition
HSTP	Hydrographic Systems Technology Programs
HSX	Hypack Hysweep File Format
HTD	Hydrographic Surveys Technical Directive
HVCR	Horizontal and Vertical Control Report
HVF	HIPS Vessel File
IHO	International Hydrographic Organization
IMU	Inertial Motion Unit
ITRF	International Terrestrial Reference Frame
LNM	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
NAIP	National Agriculture and Imagery Program
NALL	Navigable Area Limit Line
NM	Notice to Mariners
NMEA	National Marine Electronics Association
NOAA	National Oceanic and Atmospheric Administration
NOS	National Ocean Service
NRT	Navigation Response Team
NSD	Navigation Services Division
OCS	Office of Coast Survey
OMAO	Office of Marine and Aviation Operations (NOAA)
OPS	Operations Branch
MBES	Multibeam Echosounder
NWLON	National Water Level Observation Network
PDBS	Phase Differencing Bathymetric Sonar
PHB	Pacific Hydrographic Branch
POS/MV	Position and Orientation System for Marine Vessels
PPK	Post Processed Kinematic
PPP	Precise Point Positioning
PPS	Pulse per second

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

From: Starla Robinson - NOAA Federal <Starla.Robinson@noaa.gov>
Date: 11/15/18 17:30 (GMT-05:00)
To: "John R. Bean" <jrb@oceansurveys.com>
Subject: Re: NOAA Contract Hydrographic Survey Coast Pilot Review Report

Confirming receipt!

Thank you,
Starla

Starla D. Robinson, Physical Scientist
NOS - OCS - Hydrographic Survey Division - Operations Branch
National Oceanic Atmospheric Administration
Office: ***240-533-0034*** ***(Updated 6/13/17)***
Cell: 360-689-1431
Website Acquisition: HSD Planned Hydrographic Surveys
Website Planning: OCS Survey Plans

On Thu, Nov 15, 2018 at 3:07 PM John R. Bean <jrb@oceansurveys.com> wrote:

> All,
>
> OSI's Coast Pilot Review Report for contract survey OPR-K354-KR-18 "Louisiana Coast" is attached. Also attached for your convenience is the original Coast Pilot Report provided to OSI with the final data package for OPR-K354-KR-18. Please acknowledge receipt of this deliverable and should you have any questions or concerns, please don't hesitate to contact me.
>
> Sincerely,
>
> **John R. Bean, MS, CH**
>
> Manager-Hydrographic Surveys
>
> **OCEAN SURVEYS, INC.**
>
> 129 Mill Rock Road East, Old Saybrook, CT 06475
>
> **T** 860-388-4631 x148 **M** 860-710-8653 **F** 860-388-5879

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SERVICE
Hydrographic Survey Division
Silver Spring, Maryland 20910-3282

Date: 7/09/2018

PROJECT: OPR-J359-KR-18 Louisiana Coast
Contract # EA-133C-14-CQ-0035, Task Order: 04

SUBJECT: Change of Priority Survey Areas

The undersigned agree to the following plan for the remaining LNM from OPR-J359-KR-18:
1) First expand southward to delineate Trinity Shoal to the 10-meter (33 feet) contour.
2) If additional LNM remain, continue expansion survey eastward.

Environmental compliance has been completed for a one-mile buffer around the original project area. It appears that the contour will be achieved before that boundary will be crossed. Should it look like the boundary may be crossed please contact the COR for discussion on how to proceed.

Expansion southward will likely include the investigation one platform and 4 wellheads. This will not be a significant change from the previous planned area. An updated CSF and PRF will be provided to address the southward expansion.

This plan is within scope of project instructions and does not constitute a change of the contract and will incur no additional cost.

Justification

Trinity Shoal is the primary hazard to navigation in the 2018 Louisiana Coast Survey, and effects traffic in the area. OSI's preliminary data shows the shoal has moved 3 nautical miles west. Local traffic includes OSV's that can have drafts as deep as 27 feet. OSI, HSD, and the Navigation Manager agree that delineating the 10-meter (33 feet) contour will address a danger to navigation, and is the priority for the traffic patterns of this area.

Decision:
Please sign to confirm agreements and approve of the plan to proceed.

Hydrographic Surveys Division

Ocean Surveys, Inc.

-----Original Message-----
From: Alexandra.Grodsky@noaa.gov <Alexandra.Grodsky@noaa.gov>
Sent: Friday, October 19, 2018 4:45 PM
To: jjd@oceansurveys.com
Cc: Alexandra.Grodsky@noaa.gov
Subject: NCEI online publication confirmation of NCEI Accession 0177405

Dear Joseph DiPalma,

Thank you for sending your data and metadata files to be archived and published by the NOAA National Centers for Environmental Information (NCEI). NCEI received these data, SOUND VELOCITY collected from RV Ocean Explorer in Coastal Waters of Gulf of Mexico from 2018-05-29 to 2018-09-23, on 2018-10-15 19:53:12 via S2N.

Your data, identified as NCEI Accession Number 0177405, are now publicly accessible online via the NCEI Ocean Archive System at http://accession.nodc.noaa.gov/0177405. Use this link, http://accession.nodc.noaa.gov/0177405/data/0-data, to access the original data files in the NCEI archival information package.

These data will be discoverable via the NCEI Geoportal (http://data.nodc.noaa.gov/geoportal) and other online discovery tools, such as Data.gov about 24 hours after you receive this email.

If at any time you wish to update the content of NCEI Accession Number 0177405, please send an e-mail to NODC.DataOfficer@noaa.gov. Please remember to include the NCEI Accession Number.

Please let me know if you have any additional questions about NCEI archival activities or your archived data package. Thank you again for choosing to archive your data with the National Centers for Environmental Information (NCEI).

Regards,
Alexandra Grodsky
Alexandra.Grodsky@noaa.gov

Subject: [Send2NCEI] data submission confirmation for Reference ID: 281HAX
From: NODC.DataOfficer@noaa.gov
To: jjd@oceansurveys.com

Dear Joseph DiPalma,

Thank you for submitting your data collection, titled "SOUND VELOCITY

collected from RV Ocean Explorer in Coastal Waters of Gulf of Mexico from 2018-05-29 to 2018-09-23", to the NOAA National Centers for Environmental Information (NCEI). Your submission package has been assigned Reference ID: 281HAX. After reviewing your data and metadata, NCEI will update you about the archival status of your submission package.

You will be notified if NCEI creates an archival information package (accession) of your data, including the unique identifier for that archival information package (the NCEI Accession number). When your data are archived, NCEI keeps an exact copy of the data and metadata you sent and will develop necessary tracking and discovery metadata. In addition, NCEI may create additional versions to ensure your data are preserved for long-term access.

Upon completion of these archival ingest actions, NCEI will publish your data online (including a copy of your original files). You will receive another email once your submission package (Reference ID: 281HAX) is published for global access. In addition, NCEI may include all or part of your data into one or more product databases, such as the World Ocean Database.

If you have any questions about NCEI archival processes, please contact NODC.DataOfficer@noaa.gov. Also, if at any time you wish to update your submission package, please send an e-mail to NODC.DataOfficer@noaa.gov with your request. Please remember to include your submission package Reference ID.

Thank you again for choosing to archive your data with the National Centers for Environmental Information (NCEI).

NCEI Data Officer Team
NOAA National Centers for Environmental Information NOAA/NESDIS
1315 East-West Highway
Silver Spring, MD 20910
USA

-----Original Message-----
From: Alexandra.Grodsky@noaa.gov <Alexandra.Grodsky@noaa.gov>
Sent: Thursday, October 18, 2018 4:47 PM
To: jjd@oceansurveys.com
Cc: Alexandra.Grodsky@noaa.gov
Subject: NCEI acceptance confirmation for Reference ID: 281HAX

Dear Joseph DiPalma:

Thank you for sending your data and metadata files to the NOAA National Centers for Environmental Information (NCEI). NCEI received these data, SOUND VELOCITY collected from RV Ocean Explorer in Coastal Waters of Gulf of Mexico from 2018-05-29 to 2018-09-23, on 2018-10-15 19:53:12 via S2N.

After reviewing your submission package (metadata and data), I assigned your submission an NCEI Accession Number 0177405. This number is a tracking identifier for the NCEI Ocean Archive. Please reference this number when corresponding with NCEI about these data.

You can find information about these archived data at http://accession.nodc.noaa.gov/0177405.

After further reviewing your data, creating any additional representations of these data in a format that is more preservable in the NCEI Ocean Archive, and developing necessary tracking metadata, NCEI will publish these archived data online. You may access the archival copy of your original data via the link listed above.

In addition to creating an archival copy of these data, NCEI may include all or part of your data into one or more product databases, such as the World Ocean Database.

Please let me know if you have any questions or if you have additional data and documentation that you would like to archive with these data.

Thank you again for choosing to archive your data with the National Centers for Environmental Information (NCEI).

Regards,
Alexandra Grodsky
Alexandra.Grodsky@noaa.gov

Subject: [Send2NCEI] data submission confirmation for Reference ID: 281HAX
From: NODC.DataOfficer@noaa.gov
To: jjd@oceansurveys.com

Dear Joseph DiPalma,

Thank you for submitting your data collection, titled "SOUND VELOCITY collected from RV Ocean Explorer in Coastal Waters of Gulf of Mexico from 2018-05-29 to 2018-09-23", to the NOAA National Centers for Environmental Information (NCEI). Your submission package has been assigned Reference ID: 281HAX. After reviewing your data and metadata, NCEI will update you about the archival status of your submission package.

You will be notified if NCEI creates an archival information package (accession) of your data, including the unique identifier for that archival information package (the NCEI Accession number). When your data are archived, NCEI keeps an exact copy of the data and metadata you sent and will develop necessary tracking and discovery metadata. In addition, NCEI may create additional versions to ensure your data are preserved for long-term access.

Upon completion of these archival ingest actions, NCEI will publish your data online (including a copy of your original files). You will receive another email once your submission package (Reference ID: 281HAX) is published for global access. In addition, NCEI may include all or part of your data into one or more product databases, such as the World Ocean Database.

If you have any questions about NCEI archival processes, please contact NODC.DataOfficer@noaa.gov. Also, if at any time you wish to update your submission package, please send an e-mail to NODC.DataOfficer@noaa.gov with your request. Please remember to include your submission package Reference ID.

Thank you again for choosing to archive your data with the National Centers for Environmental Information (NCEI).

NCEI Data Officer Team
NOAA National Centers for Environmental Information NOAA/NESDIS
1315 East-West Highway
Silver Spring, MD 20910
USA

-----Original Message-----
From: NODC.DataOfficer@noaa.gov <NODC.DataOfficer@noaa.gov>
Sent: Monday, October 15, 2018 4:00 PM
To: jjd@oceansurveys.com
Subject: [Send2NCEI] data submission confirmation for Reference ID: 281HAX

Dear Joseph DiPalma,

Thank you for submitting your data collection, titled "SOUND VELOCITY collected from RV Ocean Explorer in Coastal Waters of Gulf of Mexico from 2018-05-29 to 2018-09-23", to the NOAA National Centers for Environmental Information (NCEI). Your submission package has been assigned Reference ID: 281HAX. After reviewing your data and metadata, NCEI will update you about the archival status of your submission package.

You will be notified if NCEI creates an archival information package (accession) of your data, including the unique identifier for that archival information package (the NCEI Accession number). When your data are archived, NCEI keeps an exact copy of the data and metadata you sent and will develop necessary tracking and discovery metadata. In addition, NCEI may create additional versions to ensure your data are preserved for long-term access.

Upon completion of these archival ingest actions, NCEI will publish your data online (including a copy of your original files). You will receive another email once your submission package (Reference ID: 281HAX) is published for global access. In addition, NCEI may include all or part of your data into one or more product databases, such as the World Ocean Database.

If you have any questions about NCEI archival processes, please contact NODC.DataOfficer@noaa.gov. Also, if at any time you wish to update your submission package, please send an e-mail to NODC.DataOfficer@noaa.gov with your request. Please remember to include your submission package Reference ID.

Thank you again for choosing to archive your data with the National Centers for Environmental Information (NCEI).

NCEI Data Officer Team
NOAA National Centers for Environmental Information NOAA/NESDIS
1315 East-West Highway
Silver Spring, MD 20910
USA

From: Blair Delean - NOAA Federal [mailto:blair.j.delean@noaa.gov]
Sent: Thursday, October 25, 2018 3:53 PM
To: rmw@oceansurveys.com
Cc: pop.information@noaa.gov; ocs.ecc@noaa.gov; Starla Robinson - NOAA Federal <starla.robinson@noaa.gov>; jrb@oceansurveys.com; dts@oceansurveys.com
Subject: Re: NOAA Contract Hydrographic Survey - MMO Observation Records - Project OPR-K354-KR-18

Excellent, thank you for your submission to the POP.

Very Respectfully,

LTJG Blair Delean, NOAA
Marine Mammal Laboratory
206.526.4048

From: Bob Wallace [mailto:rmw@oceansurveys.com]
Sent: Wednesday, October 24, 2018 4:27 PM
To: 'pop.information@noaa.gov' <pop.information@noaa.gov>; 'ocs.ecc@noaa.gov' <ocs.ecc@noaa.gov>
Cc: 'starla.robinson@noaa.gov' <starla.robinson@noaa.gov>; 'Robert M. Wallace Jr.' <rmw@oceansurveys.com>; John Bean (jrb@oceansurveys.com) <jrb@oceansurveys.com>; 'David Somers' <dts@oceansurveys.com>
Subject: NOAA Contract Hydrographic Survey - MMO Observation Records - Project OPR-K354-KR-18

All,

Attached is a .7z format zip file containing a tabulation of OSI's "trained observers" as well as 53 individual Marine Mammal Observation Logs. Observations were made during OSI's contract hydrographic survey entitled "Louisiana Coast", NOAA Project Number OPR-K354-KR-18. The period of the survey was May 28, 2018 through September 24, 2018.

Please don't hesitate to contact me if you have any questions or concerns.

Regards, Bob Wallace

Robert M. Wallace Jr.
Project Manager

OCEAN SURVEYS, INC.
129 Mill Rock Road East, Old Saybrook, CT 06475
T 860-388-4631 x129 **M** 860-227-3099 **F** 860-388-5879
rmw@oceansurveys.com | www.oceansurveys.com

From: Larisa Avens - NOAA Federal [mailto:larisa.avens@noaa.gov]
Sent: Thursday, October 25, 2018 11:59 AM
To: rmw@oceansurveys.com
Subject: Re: NOAA Contract Hydrographic Survey - Turtle Observation Records - Project OPR-K354-KR-18

Hi Bob,
Thank you for passing along the turtle sighting record.

Best,
Larisa

~~~~~~

Larisa Avens, Ph.D., Research Fishery Biologist
National Marine Fisheries Service, NOAA Beaufort Laboratory
101 Pivers Island Rd. Beaufort, NC 28516
Ph: 252-728-8747
http://www.sefsc.noaa.gov/labs/beaufort/

From: Bob Wallace [mailto:rmw@oceansurveys.com]
Sent: Wednesday, October 24, 2018 4:35 PM
To: 'larisa.avens@noaa.gov' <larisa.avens@noaa.gov>
Cc: 'ocs.ecc@noaa.gov' <ocs.ecc@noaa.gov>; 'starla.robinson@noaa.gov' <starla.robinson@noaa.gov>; 'Robert M. Wallace Jr.' <rmw@oceansurveys.com>; John Bean (jrb@oceansurveys.com) <jrb@oceansurveys.com>; 'David Somers' <dts@oceansurveys.com>
Subject: NOAA Contract Hydrographic Survey - Turtle Observation Records - Project OPR-K354-KR-18

All,

Attached is a .7z format zip file containing a tabulation of OSI's "trained observers" as well as one (1) Turtle Observation Log. The single observation was made during OSI's contract hydrographic survey entitled "Louisiana Coast", NOAA Project Number OPR-K354-KR-18. The period of the survey was May 28, 2018 through September 24, 2018.

Please don't hesitate to contact me if you have any questions or concerns.

Regards, Bob Wallace

Robert M. Wallace Jr.
Project Manager

OCEAN SURVEYS, INC.
129 Mill Rock Road East, Old Saybrook, CT 06475
T 860-388-4631 x129 **M** 860-227-3099 **F** 860-388-5879
rmw@oceansurveys.com | www.oceansurveys.com
~~~~~~

From: Starla Robinson - NOAA Federal <Starla.Robinson@noaa.gov>
Date: 12/8/18 11:08 (GMT-05:00)
To: "John R. Bean" <jrb@oceansurveys.com>
Cc: Tim Osborn - NOAA Federal <tim.osborn@noaa.gov>
Subject: Re: OPR-K354-KR-18 Non-DTON Pipes and Seeps

Got them, thank you.

--
Starla D. Robinson, Physical Scientist
NOS - OCS - Hydrographic Survey Division - Operations Branch
National Oceanic Atmospheric Administration
Office: ***240-533-0034*** ***(Updated 6/13/17)***
Cell: 360-689-1431
Website Acquisition: HSD Planned Hydrographic Surveys
Website Planning: OCS Survey Plans

On Fri, Dec 7, 2018 at 3:23 PM John R. Bean <jrb@oceansurveys.com> wrote:

> Hi Starla,
>
> Following up on our Non-DTON Pipes and Seeps reports. I sent the reports in separately by sheet on 16 November and copied Tim Osborn. Could you please acknowledge receipt for all 5 sheets (H1300, H13101, H13102, H13103, and H13200) for our project correspondence folder.
>
> Thanks,
>
> **John R. Bean, MS, CH**
>
> Manager-Hydrographic Surveys
>
> **OCEAN SURVEYS, INC.**
>
> 129 Mill Rock Road East, Old Saybrook, CT 06475
>
> **T** 860-388-4631 x148 **M** 860-710-8653 **F** 860-388-5879
>
> jrb@oceansurveys.com | www.oceansurveys.com
>
> Follow us: LinkedIn | Twitter | Facebook

From: Starla Robinson - NOAA Federal <starla.robinson@noaa.gov>
Sent: Wednesday, September 12, 2018 11:26 PM
To: John R. Bean
Cc: George Reynolds; Martha Herzog - NOAA Federal; Corey Allen - NOAA Federal; David T. Somers
Subject: Re: Call Follow-up - Mileage Estimates 8/30
Attachments: Env Review - Atchafalaya 2018 Expansion.signed.pdf

I am excited that we were able to exceed the original project area!

Attached is the environmental compliance memo. The EC area exceeds the contracted area so we have a buffer to work in. I am required to clarify that the PRF and EC do not increase the scope of the firm-fixed-price. No additional funds will be provided. These files are providing the framework to complete the linear miles required in the contract.

Please add the EC memo and this email to your Project_Correspondence folder.

Thank you,
Starla

On Wed, Sep 12, 2018 at 8:45 AM, John R. Bean <jrb@oceansurveys.com> wrote:

> Thank you Starla.
>
> We'll apply the remaining mileage to the newest southern portion of H13200.
>
> Regards,
>
> John

From: Starla Robinson - NOAA Federal [mailto:starla.robinson@noaa.gov]
Sent: Tuesday, September 11, 2018 11:45 PM
To: John R. Bean <jrb@oceansurveys.com>; George Reynolds <ggr@oceansurveys.com>
Cc: Martha Herzog - NOAA Federal <martha.herzog@noaa.gov>; Corey Allen - NOAA Federal <corey.allen@noaa.gov>; David T. Somers <dts@oceansurveys.com>
Subject: Re: Call Follow-up - Mileage Estimates 8/30

Attached includes additional survey area and features for the 400 LNM. The priority is working the northern part of the H13200 southward. The expectation is to square off to the total of the contracted LNM. When acquisition is completed I will update the survey sheet extents to match yours and provide that to the hydro branch.

There should be no need to expand H13103, this area is included as a buffer in the unlikely event we require more area. The current separation model covers the area I expect us to need.

Does this sound good to OSI? Are there any questions or concerns?

Thank you,
Starla

On Mon, Sep 10, 2018 at 3:13 PM, John R. Bean <jrb@oceansurveys.com> wrote:

> Thanks Starla.
>
> We're looking forward to it. It's possible (though not certain yet) that the boat will be in a position to acquire the remaining mileage by as early as this coming weekend.
>
> Regards,
>
> John
>
> **From:** Starla Robinson - NOAA Federal <starla.robinson@noaa.gov>
> **Sent:** Saturday, September 8, 2018 4:27 AM
> **To:** jrb@oceansurveys.com
> **Cc:** George Reynolds <ggr@oceansurveys.com>; Martha Herzog - NOAA Federal <martha.herzog@noaa.gov>; Corey Allen - NOAA Federal <corey.allen@noaa.gov>; David T. Somers <dts@oceansurveys.com>
> **Subject:** Re: Call Follow-up - Mileage Estimates 8/30

Hello folk,
I just wanted do follow up that we are still planning on acquiring the last 400 miles south of H13200 and H13103. I will check in Tuesday with an update on the EC.

Thanks,

Starla

On Sun, Sep 2, 2018 at 11:44 AM, Starla Robinson - NOAA Federal <starla.robinson@noaa.gov> wrote:

> Thanks John! We shall get the EC expansion started! - Starla
>
> On Sun, Sep 2, 2018 at 10:31 AM, jrb@oceansurveys.com <jrb@oceansurveys.com> wrote:
>
> > Hi Starla,
> >
> > Our rough estimate of 400 LNM remaining means we expect to have that much mileage after all PI-Mod areas are surveyed. Those miles will have to go in an area not yet delineated. It sounds like you are suggesting they go on the south edge of H13200 after some environmental compliance work.
> >
> > We expect to be ready for those 400 miles in 2 weeks or less (barring weather).
> >
> > Regards,
> >
> > John R. Bean
> >
> > Ocean Surveys, Inc.
> >
> > 860-710-8653
>
> > Sent from mobile device.

From: Starla Robinson - NOAA Federal <starla.robinson@noaa.gov>
Sent: Saturday, September 01, 2018 4:51 PM
To: John R. Bean; George Reynolds
Cc: Martha Herzog - NOAA Federal; Corey Allen - NOAA Federal; David T. Somers
Subject: Call Follow-up - Mileage Estimates 8/30

Hello John,

I got your call regarding where to acquire the final 400 LNM after all of the delineated area. Is it 400 LNM beyond the bounds of after completing H13200 or the entire area including the expansion margin?

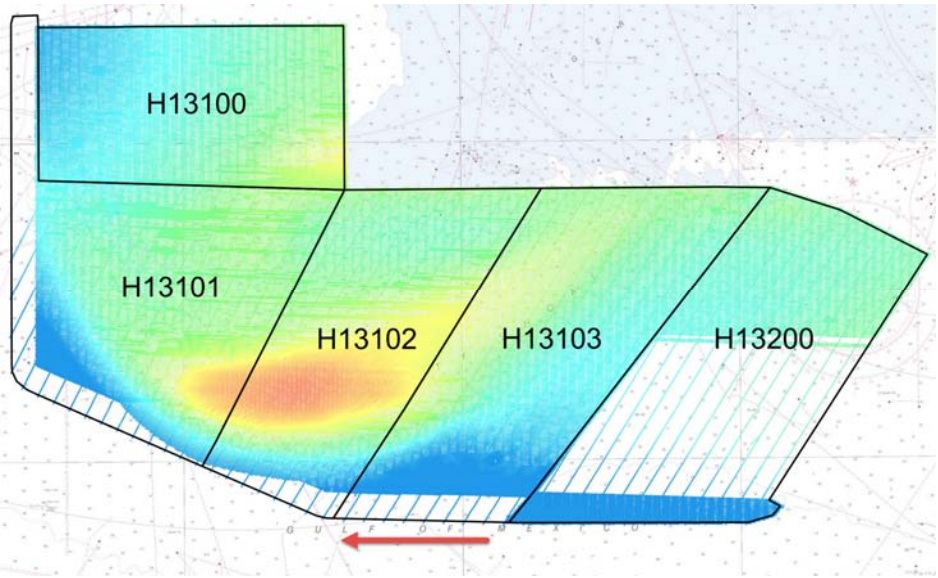
If it is in regards to completing H13200, I think expanding that sheet in the margin westward toward the shoal would be the easiest on this end and allow you to close the other sheets. If it is easier for you to role those LNM into H13103, we could also make that work.

If the full delineated area is including the margin, we can expand the project H13200 Southward. That will require some Environmental Compliance leg work to be done, but I am confident we can address it swiftly.

Please email to confirm, with an estimate of when you will run out of survey.

I will be easiest to contact via email for the next couple weeks. I will be on a night schedule so it may be hard to rendezvous via phone. Martha is my back up if there is a more urgent issue.

Thanks,
Starla



--
Starla D. Robinson, Physical Scientist
NOS - OCS - Hydrographic Survey Division - Operations Branch
National Oceanic Atmospheric Administration

Office: ***240-533-0034*** ***(Updated 6/13/17)***
Cell: 360-689-1431
Website Acquisition: HSD Planned Hydrographic Surveys
Website Planning: OCS Survey Plans

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
Office of Coast Survey
1315 East West Highway, SSMC3, Silver Spring, MD 20910

FROM: Jay Nunenkamp
Environmental Compliance Coordinator

TO: The Record

REFERENCE: Environmental Review of expanding the 2018 hydrographic survey of the Louisiana coast (Atchafalaya)

1.0 Background

Coast Survey planned a hydrographic survey of the Louisiana coast for the 2018 field season. This project would cover approximately 220 square nautical miles (snm) of the Louisiana coast near the Trinity shoal, off the coast of Marsh Island. In the course of project planning, Coast Survey performed the required analysis and coordination required under the applicable federal environmental laws. This analysis and coordination was documented in an environmental review memo dated March 9, 2018.

2.0 Proposed Survey Expansion

During project execution, Coast Survey determined that an additional 125 snm of the project vicinity, located to the south of the original study area, would also require surveying. The inclusion of this area would expand the total survey area to 345 snm. This memorandum reviews the environmental impacts of expanding this survey.

As with the originally-planned survey, one contractor vessel would operate high frequency (200 kilohertz or higher) echo sounders to map the riverbed. They would also operate a conductivity, temperature, and depth (CTD) instrument. Except for the expanded area, no changes to the survey are planned. The contractor would not collect bottom samples, deploy anchors, install tide gauges, benchmarks, or tide buoys, or do any other work that was not already outlined in the April 4 environmental review.

3.0 Environmental Compliance Requirements for the Proposed Survey Expansion

3.1 National Environmental Policy Act (NEPA)

Because the expanded survey (as well as the original survey) would take place in continental U.S. waters using platforms, equipment, and technology that was analyzed in the 2013 Programmatic Environmental Assessment (PEA) for Coast Survey Operations, Coast Survey has determined that this expansion would not have effects that were not already considered in that document and in its subsequent Finding of No Significant Impact (FONSI), dated May 29, 2013. Therefore, no additional NEPA review of this action is required.

3.2 Endangered Species Act

For ESA-listed species under the jurisdiction of the National Marine Fisheries Service (NMFS), Coast Survey completed a formal ESA section 7 consultation in 2013 for our survey operations, as documented in the April 30, 2013 Biological Opinion issued by NMFS. The Biological Opinion mandated the BMPs listed in Appendix B of this memorandum, which would be adhered to during the course of the expanded survey. This concludes the ESA process for those species administered by NMFS.

For ESA-listed species under the jurisdiction of the Fish and Wildlife Service (FWS), Coast Survey completed an informal ESA section 7 consultation for the original survey on March 9, 2018 that concluded there would be no effects from the survey on ESA-listed animals. For the expanded area, Coast Survey requested and received a revised ESA species list on September 5, 2018. The species in the September 2018 list were all included in the March 2018 consultation (West Indian Manatee, Loggerhead Sea Turtle, and Atlantic Sturgeon). As with the March 2018 determination, Coast Survey believes that the expanded survey would have no effect on these ESA-listed species.

3.3 Migratory Bird Treaty Act

Based on the nature of the proposed survey, no impacts to migratory birds are anticipated. No aspect of the proposed survey expansion (vessel operation, echo sounder use, or sound speed data collection) would attract, repel, or otherwise affect migratory birds in a manner that differs from other existing marine traffic (cargo ships, cruise ships, recreational boaters, etc.).

3.4 Marine Mammal Protection Act

OCS is currently preparing an application for a Letter of Authorization under the Marine Mammal Protection Act. As an interim measure, OCS is following the BMPs listed in Appendix B of this document, which are broadly protective of marine mammals.

3.5 Magnuson-Stevens Fishery Conservation and Management Act Section 305(b) (Essential Fish Habitat)

The Coast Survey PEA functions as an EFH assessment and consultation for all OCS surveys through 2018. No additional requirements apply to the proposed survey under Section 305(b) of the MSA.

3.6 National Historic Preservation Act

Based on the lack of significant interactions with the seafloor during the proposed expanded hydrographic survey, Coast Survey has determined that there is no potential for the expanded survey to affect historic properties. This concludes the NHPA process for this expanded survey.

3.7 Coastal Zone Management Act

The proposed expansion area is not located in the Louisiana coastal zone, and no effects to the coastal zone are expected from the expanded survey. This concludes the CZMA process for this expanded survey area.

The following table summarizes the days in which sounding data were collected that contribute to the final accepted data set.

Table 1
Abstract of Times of Hydrography

Date	Day Number	Min. Time UTC	Max. Time UTC
08/14/18	226	12:07:17	23:41:43
08/15/18	227	00:32:57	23:34:38
08/16/18	228	00:32:00	12:38:59
08/17/18	229	18:08:20	23:37:55
08/18/18	230	00:36:48	23:41:53
08/19/18	231	00:46:01	23:40:29
08/20/18	232	00:21:40	23:40:10
08/21/18	233	00:22:10	23:40:23
08/22/18	234	00:25:44	13:24:36
08/23/18	235	18:16:34	23:36:30
08/24/18	236	00:45:10	23:40:45
08/25/18	237	00:39:55	23:40:01
08/26/18	238	00:29:52	23:40:37
08/27/18	239	00:28:21	23:37:04
08/28/18	240	00:33:35	10:44:55
08/29/18	241	19:48:48	23:40:57
08/30/18	242	00:46:29	23:46:48
08/31/18	243	00:27:03	23:45:42
09/01/18	244	00:22:23	17:00:26
09/02/18	245	02:12:45	07:40:57
09/07/18	250	12:28:11	23:45:42
09/08/18	251	00:09:05	23:47:09
09/09/18	252	00:23:36	08:36:27
09/10/18	253	22:12:30	23:53:53
09/11/18	254	00:16:43	16:34:48
09/18/18	261	17:23:08	23:55:20
09/19/18	262	00:29:55	23:28:50
09/20/18	263	00:22:59	04:29:28
09/22/18	265	11:00:49	23:52:46
09/23/18	266	00:32:26	22:36:32

Tide/water levels for this project were derived exclusively via ERS techniques.

OSI's proposal for this survey suggested surveying to the ellipsoid using Fugro's Marinestar GNSS corrector service input to an Applanix POS MV. With the exception of certain calibrations, all field data were recorded utilizing Marinestar correctors. The manufacturer's stated horizontal and vertical accuracy using Marinestar correctors with an Applanix POS MV is 10 centimeters and 15 centimeters respectively. However, Marinestar-derived ellipsoid data (including Marinestar data processed using POSPac MMS) were found to be consistently inferior to Inertially Aided Post Processed Kinematic (IAPPK) ellipsoid data. Consequently, Applanix SmartBase (ASB)-derived ellipsoid records were used as the basis for development of MLLW tides. This change in approach, i.e. using ASB Smoothed Best Estimate of Trajectory (SBET) solutions instead of Marinestar-derived X, Y, Z data, was approved by the COR in an e-mail dated June 28, 2018. This e-mail as well as other tides-related correspondence is included in Descriptive Report Appendix II.

The QA/QC steps used in assessing ERS tide components and the processes employed in creating ERS tides are detailed in the Project Horizontal and Vertical Control Report (HVCR). In summary, once a "smoothed" IAPPK ellipsoid record was generated the CARIS "Compute GPS Tides" function was used in conjunction with the NOAA-provided SEP in creating MLLW tide correctors.

Qualitative and quantitative crossline analysis as well as junction analysis indicate that the final ERS correctors employed in reducing soundings to MLLW were adequate for their purpose. The results of crossline and junction analysis are presented in the Descriptive Report for this survey.

Coordinated Universal Time (UTC) was used to annotate the tide records and all other data obtained for this project.

APPROVAL PAGE

H13200

Data meet or exceed current specifications as certified by the OCS survey acceptance review process. Descriptive Report and survey data except where noted are adequate to supersede prior surveys and nautical charts in the common area.

The following products will be sent to NCEI for archive

- Descriptive Report
- Data Acquisition and Processing Report
- Collection of Bathymetric Attributed Grids (BAGs)
- Processed survey data and records
- Geospatial PDF of survey products
- Collection of backscatter mosaics

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

Approved: MCGOVERN.MEGHAN.ELIZABETH.1284020495 Digitally signed by MCGOVERN.MEGHAN.ELIZABETH.1284020495 Date: 2020.06.15 13:34:23 -04'00'

Commander Meghan McGovern, NOAA
Chief, Atlantic Hydrographic Branch