H12733

NOAA FORM 76-35A

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

DESCRIPTIVE REPORT

Type of Survey:	Navigable Area
Project Number:	OPR-J377-KR-15
Registry Number:	H12733

LOCALITY

State(s):	Louisiana
General Locality:	Gulf of Mexico
Sub-locality:	Approaches to Breton Sound

2015

CHIEF OF PARTY
George G. Reynolds

LIBRARY & ARCHIVES

Date:

NOAA FORM 77-28

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

REGISTRY NUMBER:

HYDROGRAPHIC TITLE SHEET

H12733

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:	**Louisiana**
General Locality:	**Gulf of Mexico**
Sub-Locality:	**Approaches to Breton Sound**
Scale:	**1:20000**
Dates of Survey:	**Jun 18, 2015 to Jul 26, 2015**
Instructions Dated:	**Apr 23, 2015**
Project No.:	**OPR-J377-KR-15**
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 survey is to update existing NOS nautical charts in a high commercial traffic area. All times are recorded in UTC. Data recorded and presented relative to UTM Zone 16 North. THE INFORMATION PRESENTED IN THIS REPORT AND THE ACCOMPANYING BASE SURFACES REPRESENTS THE RESULTS OF SURVEYS PERFORMED BY OCEAN SURVEYS, INC. DURING THE PERIOD OF 18 JUNE TO 26 JULY 2015 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.

The purpose of this survey is to provide contemporary surveys to update National Ocean Service (NOS) nautical charts. All separates are filed with the hydrographic data. Any revisions to the Descriptive Report (DR) generated during office processing are shown in bold red italic text. The processing branch maintains the DR as a field unit product, therefore, all information and recommendations within the body of the DR are considered preliminary unless otherwise noted. The final disposition of surveyed features is represented in the OCS nautical chart update products. All pertinent records for this survey, including the DR, are archived at the National Centers for Environmental Information (NCEI) and can be retrieved via https://www.ncei.noaa.gov/.

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Descriptive Report to Accompany Survey H12733

Project: OPR-J377-KR-15

Locality: Gulf of Mexico

Sublocality: Approaches to Breton Sound

Scale: 1:20000

June 2015 - July 2015

Ocean Surveys, Inc.

Chief of Party: George G. Reynolds

A. Area Surveyed

This survey provides hydrographic data for the Gulf of Mexico waters approaching Breton Sound. 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° 26" 6.82' N 89° 15" 45.24' W	29° 17" 56.11' N 89° 2" 56.34' W

Table 1: Survey Limits

A.2 Survey Purpose

The purpose of this survey is to provide NOAA with accurate hydrographic data to update existing National Ocean Service (NOS) nautical charts in a high commercial traffic area located in the Gulf of Mexico east of the Mississippi River delta. The survey area includes multiple offshore platforms and pipelines.

A.3 Survey Quality

The entire survey is adequate to supersede previous data.

A.4 Survey Coverage

Survey Coverage is in accordance with the requirements in the Hydrographic Survey Project Instructions (April 23, 2015), the Statement of Work, 2015 (SOW), and the Hydrographic Specifications and Deliverables, April 2014 (HSSD). In all waters shallower than 20 meters, one hundred percent (100%) side scan sonar (SSS) coverage with concurrent multibeam echosounder (MBES) with backscatter coverage were collected with set line spacing. The entirety of Survey H12733 was in waters shallower than 20 meters. 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 for charted feature disprovals. Gaps in the 100% SSS coverage were addressed with SSS fill-in lines or covered with complete MBES data. The final survey area covers 34.01 square nautical miles (Figure 1).

At times, the towed EdgeTech 4200 and mounted EdgeTech 4125 SSS systems were operated simultaneously provided that the systems were not interfering with each other and the data quality was good. During data processing, the low frequency (600 kHz) 4125 data and the low frequency (300 kHz) 4200 data were converted, but only one of the simultaneous lines was used for SSS coverage and for contact selection and the secondary SSS line was removed from the final CARIS HDCS data set.

As described in Section B.2.2.2 of the Data Acquisition and Processing Report (DAPR), for a small portion of two survey lines acquired on July 2, 2015 (DN183), the vessel was operated above the maximum vessel speed of 9.72 knots required to obtain three (3) ensonifications of a 1-meter object at the pulse repetition rate of the fixed-mount 4125 SSS. For survey lines 20150702060537.jsf and 20150702070129.jsf, the secondary 4200 SSS data were converted and reviewed to verify that no significant features were absent from the 4125 data. The 4200 SSS operating in multi-pulse mode could be operated at a maximum vessel speed in excess of the 4125 SSS. Both the 4125 and 4200 SSS imagery was submitted for these trackline runs, with the 4125 imagery used to populate the coverage mosaic.

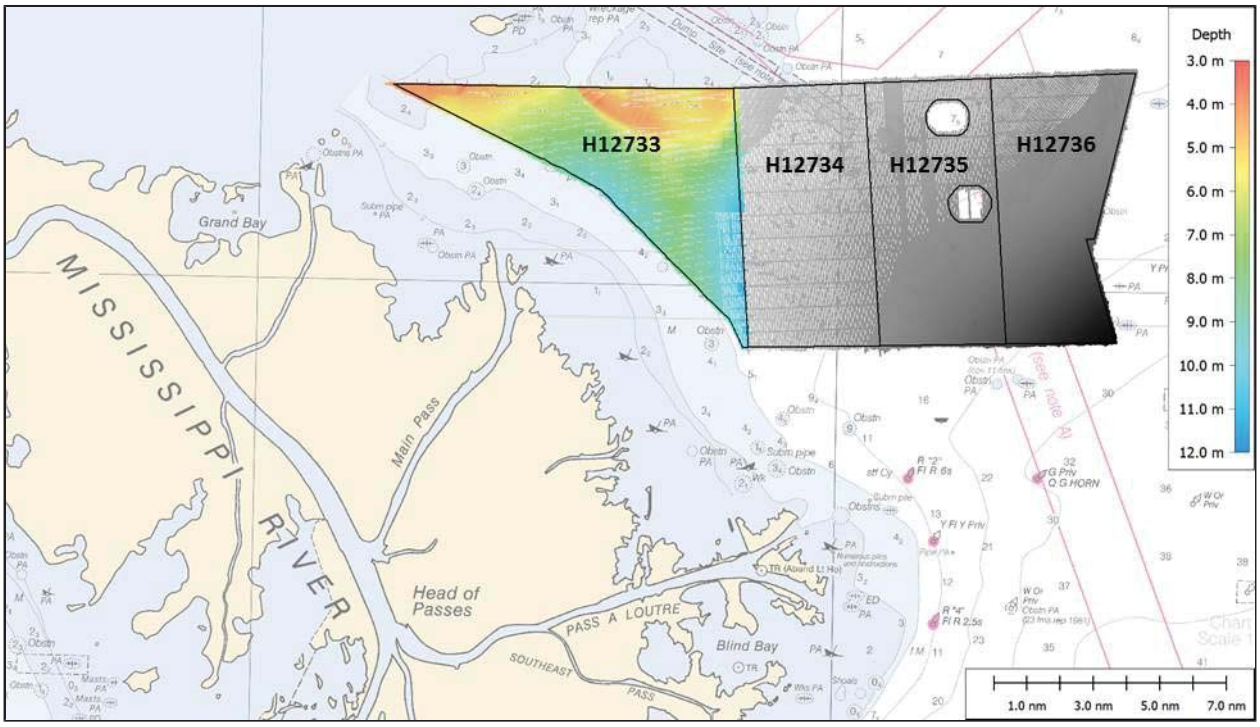


Figure 1: Survey H12733 MBES coverage overlaid on RNC 11366.

A.5 Survey Statistics

The following tables list the survey statistics (Table 2) and the dates of hydrography (Table 3).

	Hull ID	*R/V Ocean Explorer*	*Total*
LNM	SBES Mainscheme	0	0
	MBES Mainscheme	28.77	28.77
	Lidar Mainscheme	0	0
	SSS Mainscheme	0	0
	SBES/MBES Mainscheme	0	0
	SBES/SSS Mainscheme	0	0
	MBES/SSS Mainscheme	1184.07	1184.07
	SBES/MBES Cross Lines	97.40	97.40
	Lidar Cross Lines	0	0
Number of Bottom Samples			8
Number of AWOIS Items Investigated			0
Number of Maritime Boundary Points Investigated			0
Number of DPs			0
Number of Items Investigated by Dive Ops			0
Total Number of SNM			34.01

Table 2: Hydrographic Survey Statistics

Survey Dates	Julian Day Number
06/19/2015	170
06/20/2015	171
06/21/2015	172
06/28/2015	179
06/29/2015	180
06/30/2015	181
07/01/2015	182
07/02/2015	183
07/05/2015	186
07/06/2015	187
07/07/2015	188
07/08/2015	189
07/09/2015	190
07/10/2015	191
07/11/2015	192
07/12/2015	193
07/13/2015	194
07/14/2015	195
07/15/2015	196
07/16/2015	197
07/19/2015	200
07/20/2015	201
07/21/2015	202
07/23/2015	204
07/24/2015	205
07/25/2015	206
07/26/2015	207

Table 3: Dates of Hydrography

The lineal nautical miles (LNM) for MBES only development lines were included under the heading "Mainscheme MBES" in Table 2. Hydrographic Survey Statistics.

B. Data Acquisition and Processing

B.1 Equipment and Vessels

Refer to the OPR-J377-KR-15 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

Survey operations were conducted from the R/V Ocean Explorer. The R/V Ocean Explorer, O.N. 905425, is an 18-meter aluminum vessel, with a 5.1-meter beam and nominally 2-meter draft, powered by two 1,000 HP Iveco diesel engines.

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

Table 4: Vessel Used

B.1.2 Equipment

Table 5 summarizes the primary equipment used to acquire MBES and SSS data. All equipment was installed, calibrated and operated in accordance with the DAPR.

Manufacturer	Model	Type
Reson	7125	MBES
EdgeTech	4125	SSS
EdgeTech	4200	SSS
ODIM	MVP30 w/AML SVPT	Sound Speed System
AML	Micro-X	Sound Speed System
Applanix	POS MV 320 V.4	Positioning and Attitude System
Trimble	MS750	Positioning System
Trimble	ProBeacon	Positioning System

Table 5: Primary Survey Equipment

B.2 Quality Control

B.2.1 Cross Lines

A total of 97.40 nm of cross line data were acquired June 19 to June 21, 2015 (DN 170 - 172). Cross line mileage equaled 8.6% of the 1135.57 nm of mainscheme MBES lines. Cross lines were run nominally perpendicular to mainscheme lines (Figure 2).

Soundings from mainscheme lines and cross lines were compared periodically throughout survey operations reviewing preliminary MBES surfaces and using CARIS HIPS Subset Editor. Cross line 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 2-meter CUBE surface composed only of cross line data and the depth layer of a 2-meter CUBE surface composed only of mainscheme data. The cross line analysis results demonstrate excellent agreement between cross line soundings and mainscheme soundings, with the depth differences less than or equal to 0.29 meters. The allowable TVU for the range of water depths within Survey H12733 is greater than 0.50 meters.

Figure 3 is a histogram showing the distribution of depth differences for all comparison grid cells considered. The total number of 2-meter comparison cells equaled 573,473. Of 573,473 possible comparison cells, 573,058 or 99.93% of the cells include cross line and mainscheme soundings that match within +/- 20 centimeters.

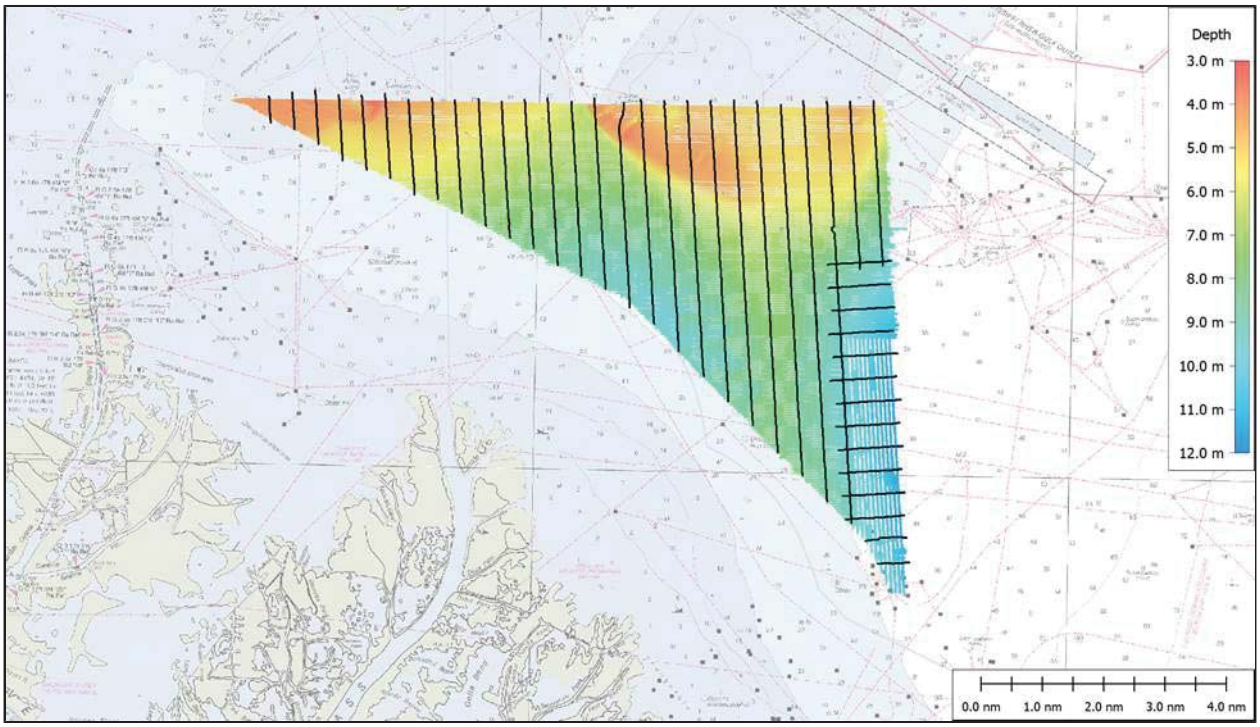


Figure 2: An overview of the cross line layout on a 2-meter surface created from mainscheme MBES data and colored by depth. RNCs 11363 and 11361 are visible in the background.

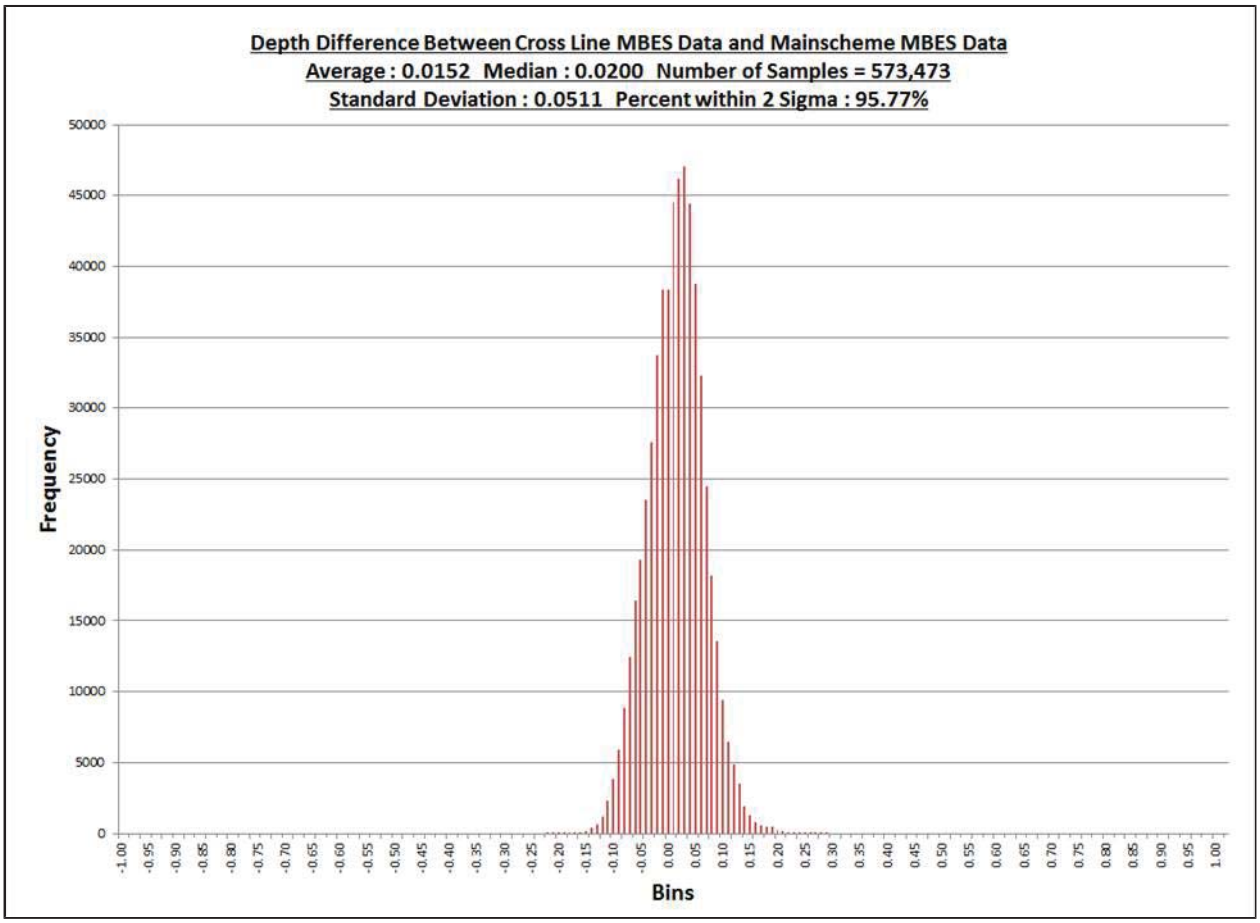


Figure 3: The graph shows a frequency distribution of the depth differences between the H12733 cross line data and the H12733 mainscheme MBES data. Statistics from the depth difference sample set are displayed above the graph.

B.2.2 Uncertainty

The following two tables list the tide and sound speed uncertainty parameters that were used to compute Total Propagated Uncertainty (TPU) for this survey.

Measured	Zoning
0.01 meters	0.14 meters

Table 6: Survey Specific Tide TPU Values

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

Table 7: 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 H12733 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 all finalized surfaces. 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." Finalized surfaces were used in this analysis. Surfaces were finalized using the “uncertainty” option as the basis for calculating “Final Uncertainty” in the CARIS “Finalize Base Surface” utility.

Seven (7) MBES CUBE (Combined Uncertainty and Bathymetric Estimator) surfaces were delivered along with Survey H12733 including "H12733_MB_4m_MLLW_Final" and six (6) 50-centimeter item investigation surfaces. The 4-meter surface is intended to satisfy coverage and sounding density requirements for a “Set Line Spacing” coverage area. The remaining 0.5-meter surfaces are intended to satisfy "Object Detection" coverage and sounding density requirements over significant features. Results from the TVU QC indicate that 100% of the nodes from all submitted surfaces meet IHO Order 1 uncertainty specifications, i.e. the ratio values of all nodes is less than -1. The maximum ratio range of all comparison cells from all submitted surfaces is -0.71 to -0.74.

B.2.3 Junctions

Four (4) prior surveys and one (1) contemporary survey junction with Survey H12733. Figure 4 displays the location of the prior and contemporary junction surveys for Project OPR-J337-KR-15.

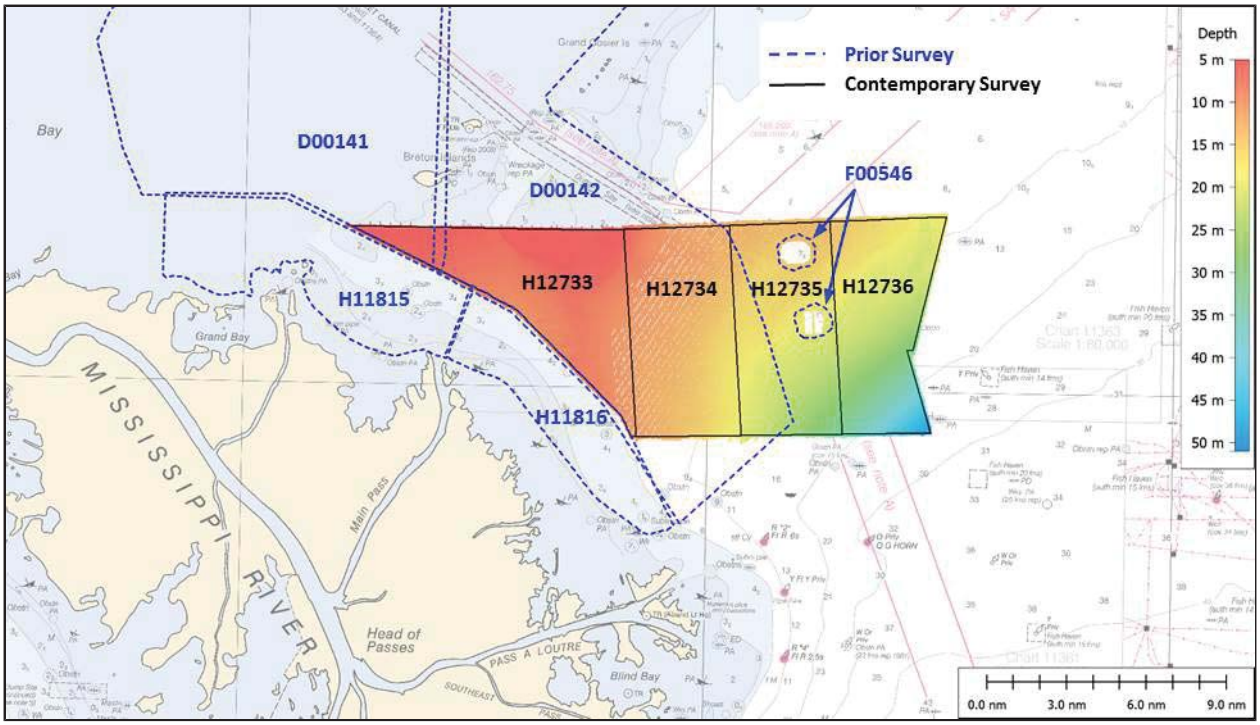


Figure 4: Survey junctions for Project OPR-J377-KR-15. RNC 11366 is displayed in the background.

Registry Number	Scale	Year	Field Unit	Relative Location
D00141	1:40000	2008	Terrasond, Ltd.	W
D00142	1:40000	2008	Terrasond, Ltd.	N
H11815	1:20000	2008	Terrasond, Ltd.	SW
H11816	1:20000	2008	Terrasond, Ltd.	SW
H12734	1:20000	2015	Ocean Surveys, Inc.	E

Table 8: Junctioning Surveys

<u>D00141</u>

Terrasond, Ltd.'s survey D00141, a reconnaissance survey conducted in 2008, overlapped the the northwest corner of H12733. Given that Survey D00141 was acquired with a Singlebeam Echosounder (SBES) and

Survey H12733 was Set Line Spacing coverage, the junction area between the two surveys was sparse. Depth data for Survey D00141 were downloaded from the National Geophysical Data Center (NGDC) website (http://www.ngdc.noaa.gov) in the form of a 4-meter resolution Bathymetric Attributed Grid (BAG), "D00141_4m_MLLW_1of1."

To conduct the junction comparison a finalized 4-meter CUBE surface was generated from the entire MBES data set for Survey H12733, "H12733_MB_4m_MLLW." In CARIS HIPS, depths from the "D00141_4m_MLLW_1of1" BAG were subtracted from the depths in the "H12733_MB_4m_MLLW" CUBE surface using the CARIS HIPS Difference Surface function. A histogram of the differences is shown in Figure 5. Depths from the H17233 survey show decent agreement with depths from the D00141 survey. Depth discrepancies generally equaled 70 centimeters or less with a mean difference of -43 centimeters. On average, Survey D00141 depths were deeper than H12733 depths, which may be due to sedimentation and/or sediment transport in the H12733 survey area since the 2008 Terrasond reconnaissance surveys were conducted.

The largest discrepancy between survey depths, -1.10 meters, is in the vicinity of a new shoal, where the 12-foot contour has migrated south of its charted location on RNC 11353 (Figure 6). H12733 depths over the new shoal were shallower than 12-feet (3.6 meters); depths from the D00141 survey that coincided with the new shoal averaged 15 to 16 feet (4.6 to 4.9 meters) accounting for the depth discrepancy between the two surveys.

Aside from new shoals identified in the H12733 survey data, additional factors that may account for the approximately 0 to 1 meter (0 to 3 feet) differences between the 2008 and 2015 surveys include the comparison of singlebeam and multibeam data, degraded horizontal accuracy associated with DGPS positioning (used for both surveys), slight misalignments between the surface grid nodes, and the use of different tide stations for tide correctors (multiple stations were used for D00141, including a supplemental gauge, Olga Compressor Station, LA, 876-0889).

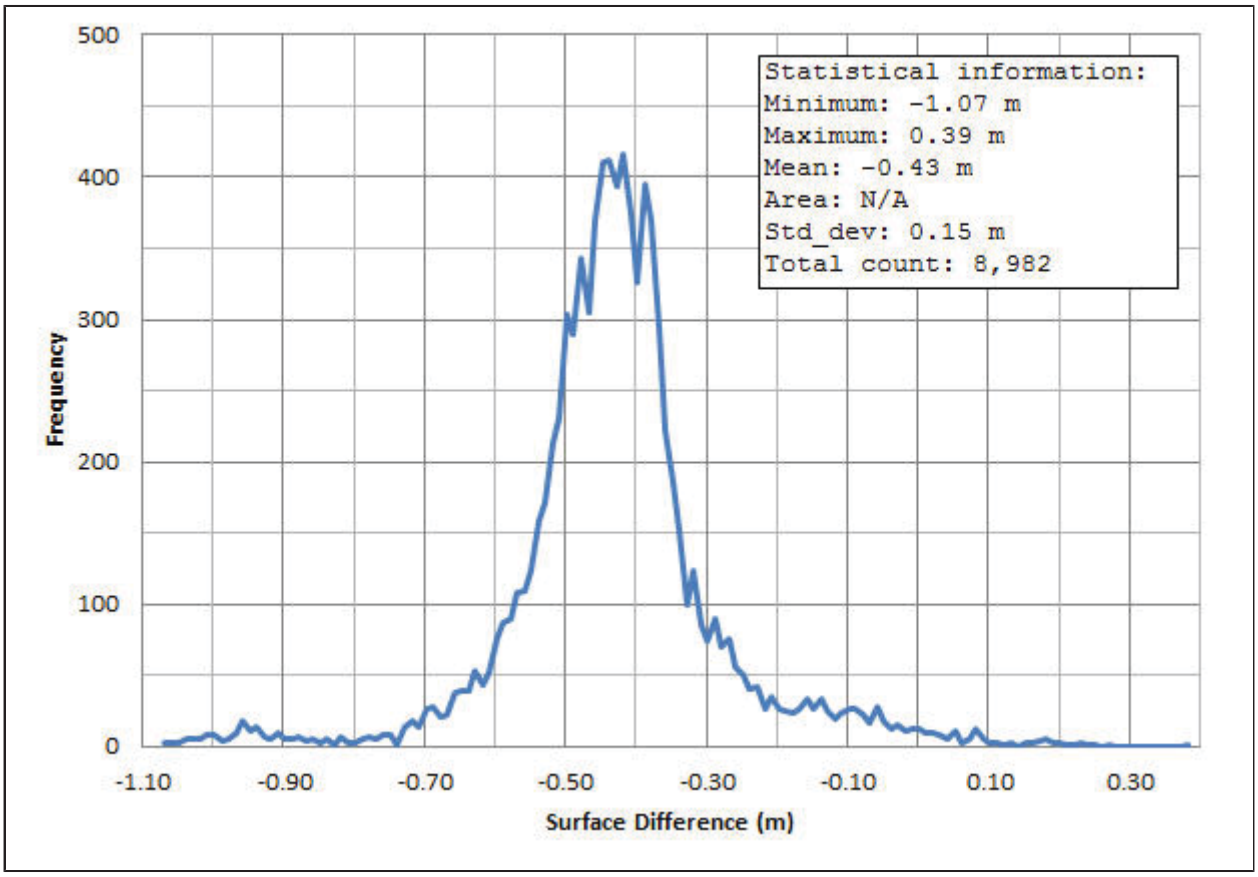


Figure 5: Surface-to-surface difference histogram comparing Survey H12733 to Survey D00141.

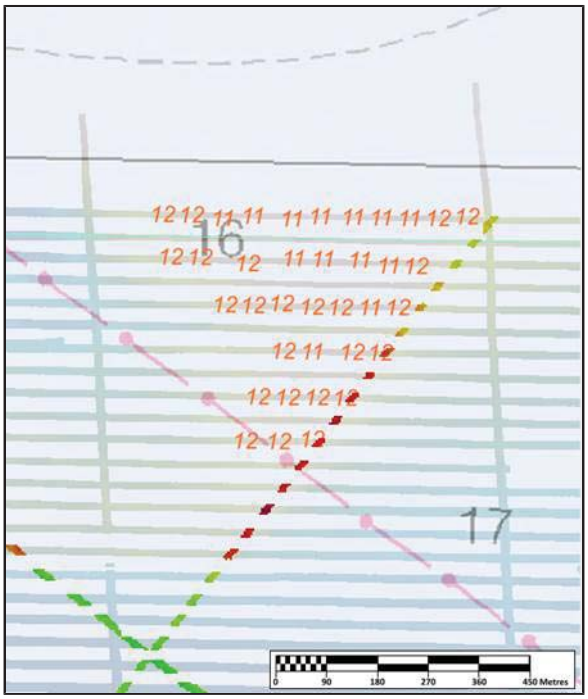


Figure 6: A new shoal identified by Survey H12733 accounts for the largest discrepancy in survey depths noted in the difference surface comparison between Surveys D00141 and H12733. Soundings 12 feet and shallower along with a shoal surface colored by depth from Survey H12733 were used to highlight the new shoal overlaid on RNC 11353. The difference surface generated from subtracting survey depths from D00141 from H12733 survey depths is displayed in comparison to the H12733 shoal. The red values in the difference surface represent depth differences greater than 90 centimeters.

D00142

Terrasond, Ltd.'s Survey D00142, a reconnaissance survey conducted in 2008, overlapped the majority of the H12734 survey area with the exception of the northeast corner which intersected with Survey D00141, as discussed above. Survey D00142 was acquired with a Singlebeam Echosounder (SBES) and Survey H12733 was Set Line Spacing coverage, so the junction area between the two surveys was patchy. Depth data for Survey D00142 were downloaded from the NGDC website in the form of a 5-meter resolution BAG, "D00142_5m_MLLW_1of1."

To conduct the junction comparison a finalized 5-meter CUBE surface was generated from the entire MBES data set for Survey H12733, "H12733_MB_5m_MLLW." In CARIS HIPS, depths from the "D00142_5m_MLLW_1of1" BAG were subtracted from the depths in the "H12733_MB_5m_MLLW" CUBE surface using the CARIS HIPS Difference Surface function. A histogram of the differences is shown in Figure 7. Depths from the H12733 survey show decent agreement with depths from the D00142 survey. Depth discrepancies generally equaled 80 centimeters or less with a mean difference of -30 centimeters. On average, Survey D00142 depths were deeper than H12733 depths, which may be due to sedimentation and/or sediment transport in the H12733 survey area since the 2008 Terrasond Reconnaissance Surveys were conducted.

Some of the largest discrepancies between survey depths, up to 1.05 meters, were located in the deeper southern waters of the H12733 survey area, where natural changes to the bathymetry and location of seafloor depressions and ridges have occurred between 2008 and 2015. Figure 8 highlights three of the areas where differences greater than +/- 60 centimeters were observed in the CARIS Difference Surface. These larger differences coincided with naturally occurring depressions in the seafloor, which would account for depths from H12733 being deeper than those surveyed in 2008.

Aside from shoaling and deepening trends identified in the H12733 survey data, additional factors that may account for the approximately 0 to 1 meter (0 to 3 feet) differences between the 2008 and 2015 surveys include the comparison of singlebeam and multibeam data, degraded horizontal accuracy associated with DGPS positioning (used for both surveys), slight misalignments between the surface grid nodes, and the use of different tide stations for tide correctors (multiple stations were used for D00142, including a supplemental gauge, Olga Compressor Station, LA, 876-0889).

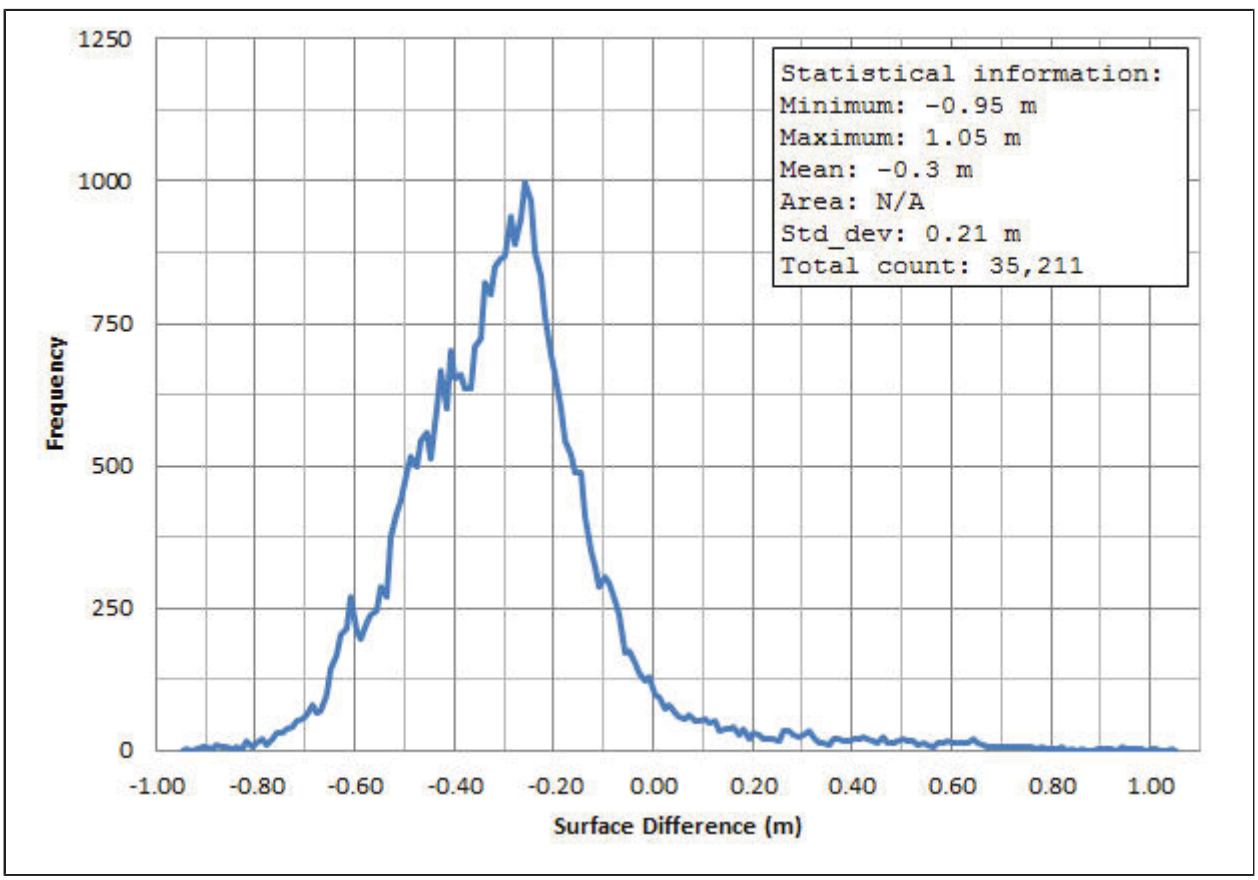


Figure 7: Surface-to-surface difference histogram comparing Survey H12733 to Survey D00142.

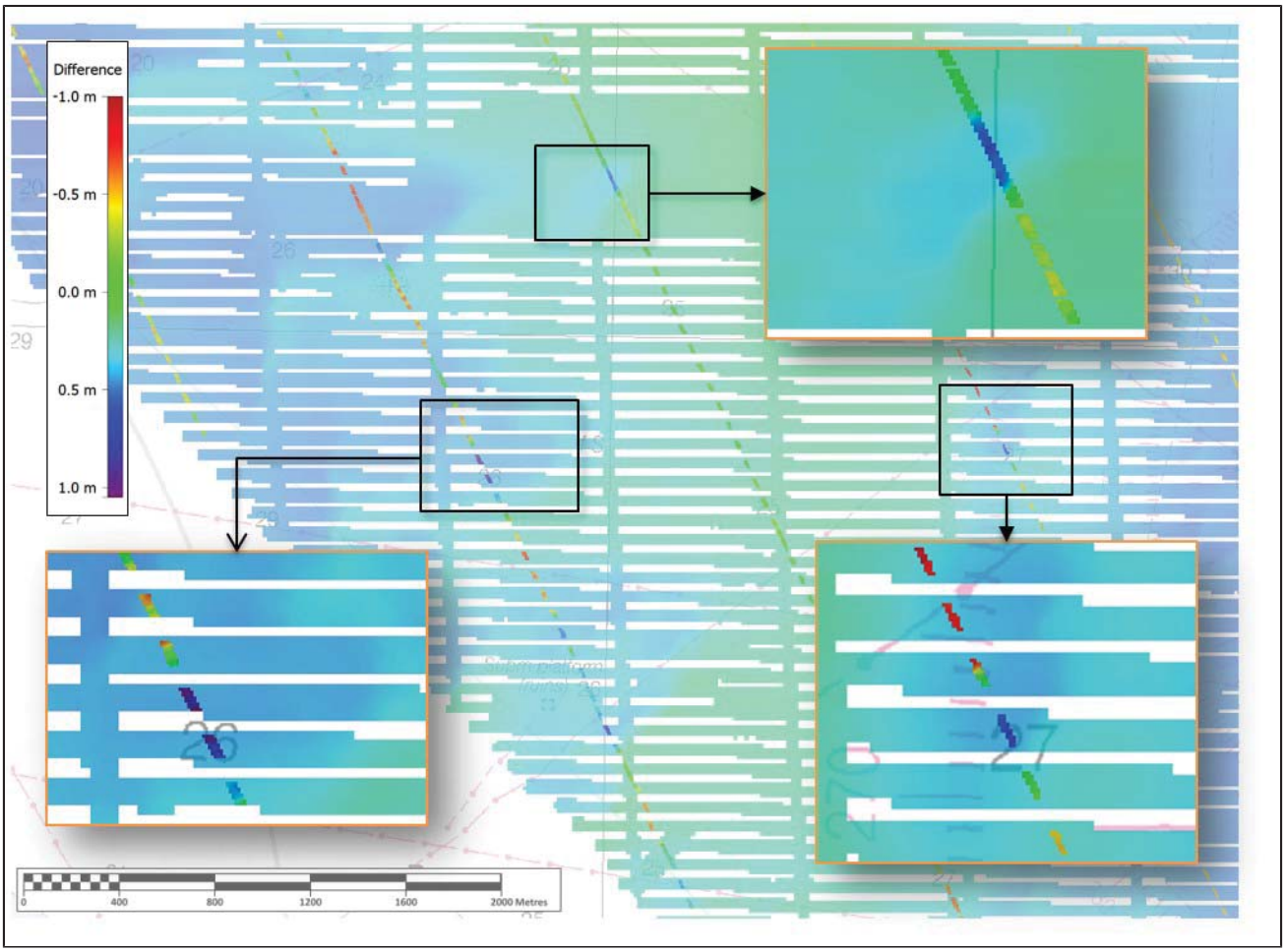


Figure 8: *The difference surface generated from subtracting survey depths from D00142 from H12733 survey depths is displayed in comparison to a H12733 5-meter CUBE surface colored by depth. Several sections of the difference surface are highlighted where depth discrepancies between the two surveys exceeded 70 centimeters, with blue representing a positive difference (deepening) and red representing a negative difference (shoaling). Changes in bathymetry, i.e. the position of depressions associated with seafloor topography, were responsible for the largest depth discrepancies between Surveys H12733 and D00142.*

H11815

Terrasond, Ltd.'s Survey H11815, a hydrographic survey conducted in 2008, overlapped the southwest border of H12733. Given that the mainscheme data for Survey H11815 was acquired with a Singlebeam Echosounder (SBES) and Survey H12733 was Set Line Spacing coverage, the junction area between the two surveys was sparse. Depth data for Survey H11815 were downloaded from the NGDC website in the form of a 5-meter resolution BAG, "H11815_MBVB_5m_MLLW_Combined."

To conduct the junction comparison a finalized 5-meter CUBE surface was generated from the entire MBES data set for Survey H12733, "H12733_MB_5m_MLLW." In CARIS HIPS, depths

from the "H11815_MBVB_5m_MLLW_Combined" BAG were subtracted from the depths in the "H12733_MB_5m_MLLW" CUBE surface using the CARIS HIPS Difference Surface function. A histogram of the differences is shown in Figure 9. Depths from the H12733 survey show decent agreement with depths from the H11815 survey. Depth discrepancies generally equaled 70 centimeters or less with a mean difference of -43 centimeters. On average, Survey H11815 depths were deeper than H12733 depths, which may be due to sedimentation and/or sediment transport in the H12733 survey area since the 2008 Terrasond surveys were conducted.

Additional factors that may account for the approximately 0 to 1 meter (0 to 3 feet) differences between the 2008 and 2015 surveys include the comparison of singlebeam and multibeam data, degraded horizontal accuracy associated with DGPS positioning (used for both surveys), slight misalignments between the surface grid nodes, and the use of different tide stations for tide correctors (multiple stations were used for H11815, including two supplemental gauges: Olga Compressor Station, LA, 876-0889, and Devon Energy Facility, LA, 876-0417).

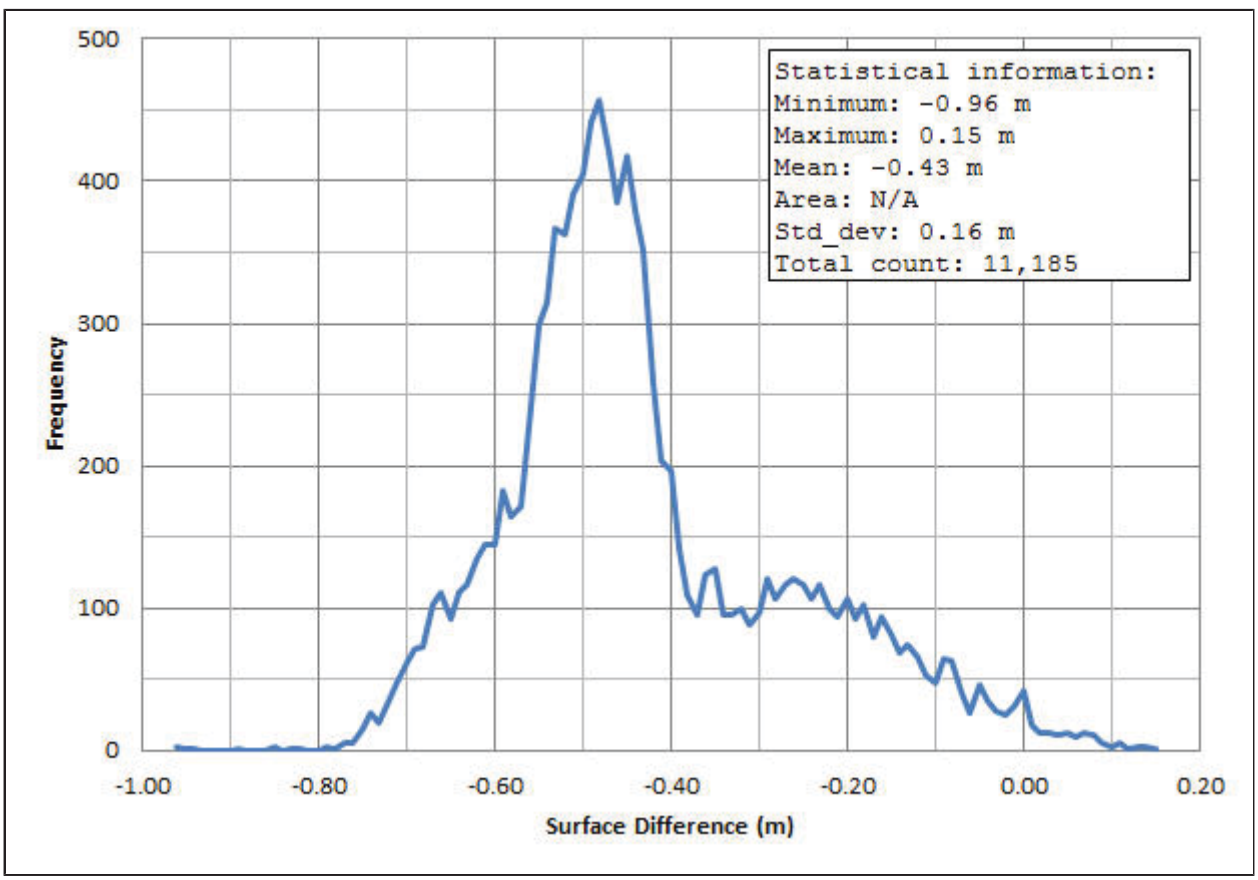


Figure 9: Surface-to-surface difference histogram comparing Survey H12733 to Survey H11815.

H11816

Terrasond, Ltd.'s Survey H11816, a hydrographic survey conducted in 2008, overlapped the southwest border of H12733. Given that the mainscheme data for Survey H11816 was acquired with a Singlebeam Echosounder (SBES) and Survey H12733 was Set Line Spacing coverage, the junction area between the two surveys was sparse. Depth data for Survey H11816 were downloaded from the NGDC website in the form of a 5-meter resolution BAG, "H11816_5m_MLLW_4of4."

To conduct the junction comparison a finalized 5-meter CUBE surface was generated from the entire MBES data set for Survey H12733, "H12733_MB_5m_MLLW." In CARIS HIPS, depths from the "H11816_5m_MLLW_4of4" BAG were subtracted from the depths in the "H12733_MB_5m_MLLW" CUBE surface using the CARIS HIPS Difference Surface function. A histogram of the differences is shown in Figure 10. Depths from the H17233 survey show decent agreement with depths from the H11816 survey. Depth discrepancies generally equaled 90 centimeters or less with a mean difference of -31 centimeters. On average, Survey H11816 depths were deeper than H12733 depths, which may be due to sedimentation and/or sediment transport in the H12733 survey area since the 2008 Terrasond surveys were conducted.

Some of the largest discrepancies between survey depths, up to -1.13 meters, were located in the deeper southwest waters of the H12733 survey area, where natural changes to the bathymetry and location of seafloor depressions and ridges have occurred between 2008 and 2015. Figure 11 highlights several of the areas where differences greater than +/- 60 centimeters were observed in the CARIS Difference Surface. These large differences coincided with naturally occurring depressions and ridges in the seafloor.

Additional factors that may account for the approximately 0 to 1 meter (0 to 3 feet) differences between the 2008 and 2015 surveys include the comparison of singlebeam and multibeam data, degraded horizontal accuracy associated with DGPS positioning (used for both surveys), slight misalignments between the surface grid nodes, and the use of different tide stations for tide correctors (multiple stations were used for H11816, including two supplemental gauges: Olga Compressor Station, LA, 876-0889, and Devon Energy Facility, LA, 876-0417).

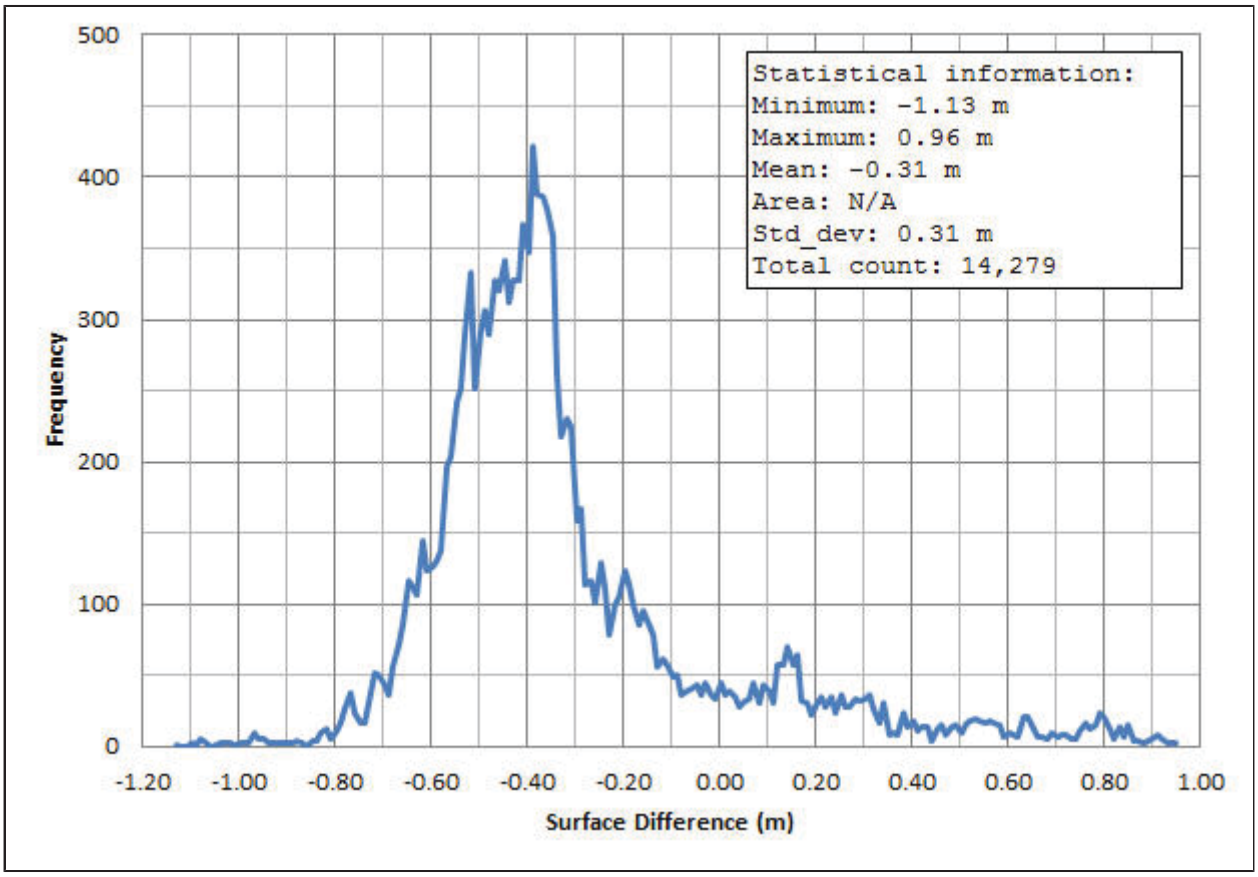


Figure 10: *Surface-to-surface difference histogram comparing Survey H12733 to Survey H11816.*

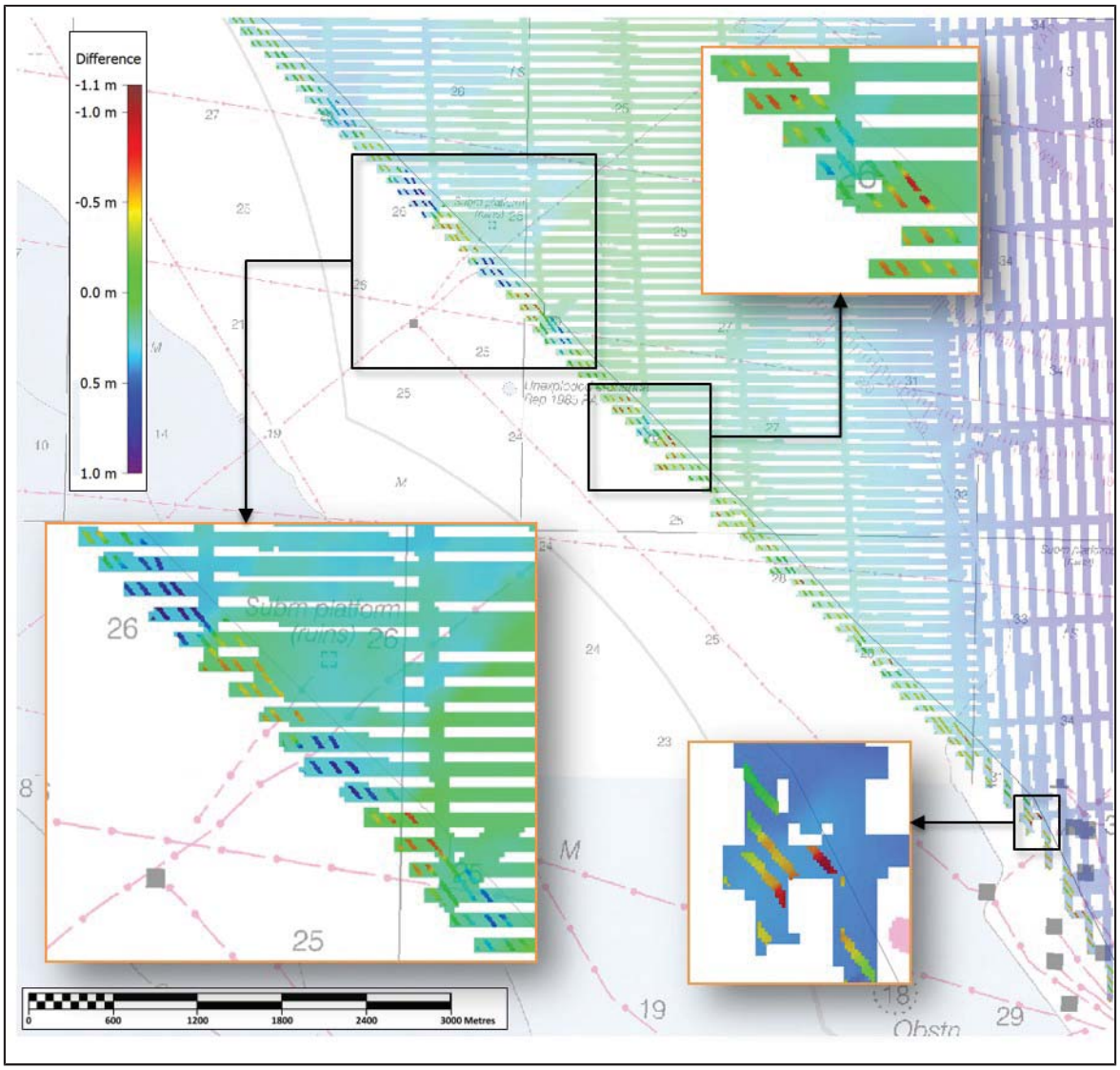


Figure 11: *The difference surface generated from subtracting survey depths from H11816 from H12733 survey depths is displayed in comparison to a H12733 5-meter CUBE surface colored by depth. Several sections of the difference surface are highlighted where depth discrepancies between the two surveys exceeded 80 centimeters, with blue representing a positive difference (deepening) and red representing a negative difference (shoaling). Changes in bathymetry, i.e. the position of depressions associated with seafloor topography, were responsible for the largest depth discrepancies between Surveys H12733 and H11816.*

H12734

The horizontal overlap between the bathymetric data from contemporary Surveys H12733 and H12734 varied between approximately 25 and 600 meters. Given that the overlap between the two surveys was in Set Line Spacing Coverage collection areas, the junction area between the two surveys was patchy. Depths from 2-meter BASE surfaces compiled from the MBES data from each survey, "H12733_MB_2m_MLLW" and

"H12734_MB_2m_MLLW," were compared using the CARIS HIPS Difference Surface function. A histogram of the differences is shown in Figure 12. Depths from the H12733 survey show good agreement with the depths from the H12734 survey. Depth discrepancies generally equaled 20 centimeters or less with a mean difference of -5 centimeters.

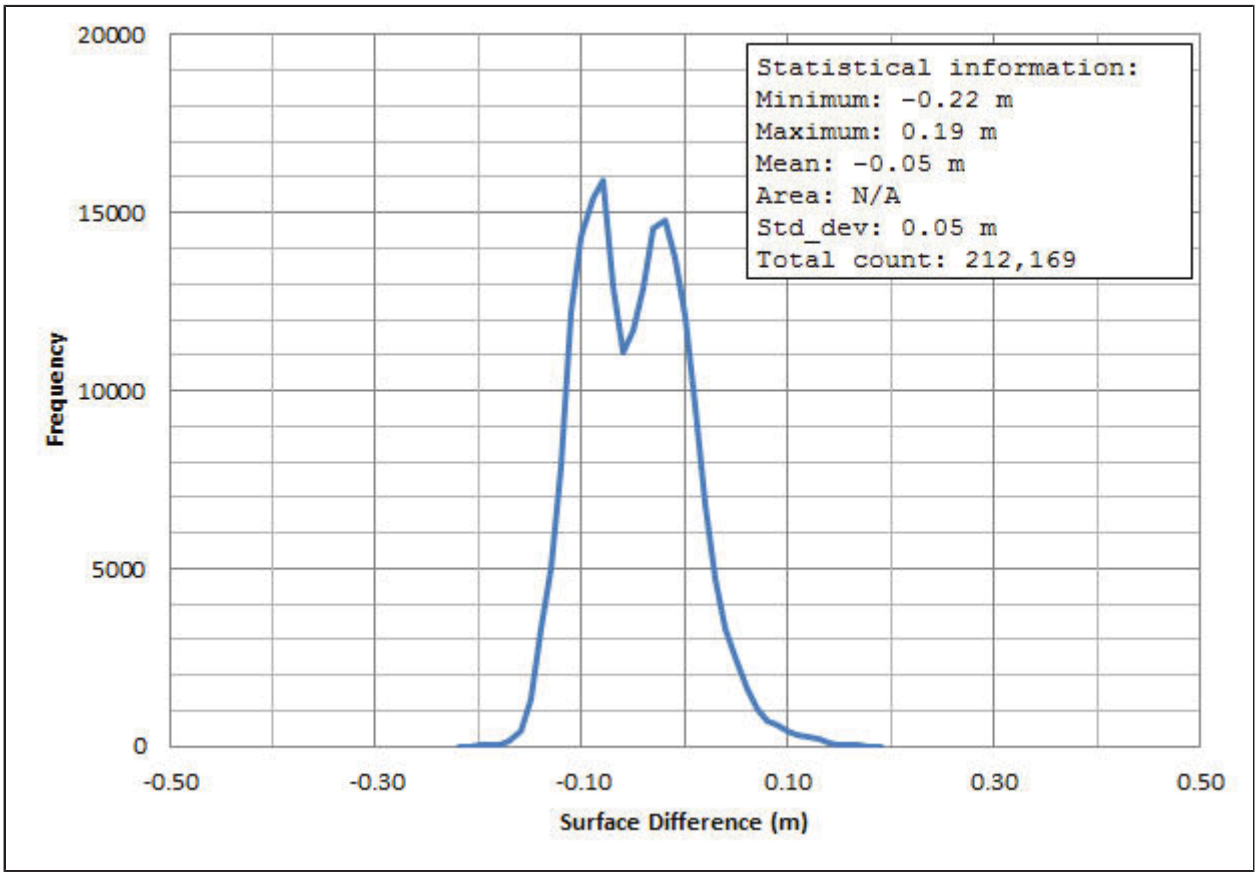


Figure 12: Surface-to-surface difference histogram comparing Survey H12733 to Survey H12734.

B.2.4 Sonar QC Checks

Sonar system quality control checks were conducted as detailed in the Quality Control section of the DAPR. Results from the weekly MBES bar checks are included in Appendix II of the DAPR.

B.2.5 Equipment Effectiveness

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 to reduce cavitation effects. The frequency of the noise bursts would typically increase as sea state worsened. Therefore, operations were suspended when the frequency or length of blowouts became too high. Accepted data effected by blowouts did not show any nadir gaps in coverage in excess of 3 nodes in the along-track direction.

Surface noise in port side of EdgeTech 4125 SSS

On some of the pole-mounted EdgeTech 4125 SSS lines, persistent refraction was noted beyond the 25-meter range on the port side of the SSS record while the starboard side of the record was unaffected (Figure 13), though the artifact was not constant across an entire collection day. Analysis of the data pattern led the hydrographers to conclude that data on the port side of the mounted SSS, the side closest to the vessel hull, were being affected by water turbulence across the hull and/or the mixing of the sharply stratified surface sound speed. The aforementioned cause and effect appeared to vary widely depending on vessel heading and current-induced crabbing. To mitigate this effect, the transducer pole was lowered to its maximum draft on July 4, 2015 (DN 185), as documented in the project DAPR. To ensure that 100% coverage of high quality SSS data was acquired, SSS fill-in lines were acquired over affected imagery areas as identified in the coverage mosaic. Lowering the draft for the 4125 SSS transducer reduced the impact of the water turbulence on the port side imagery.

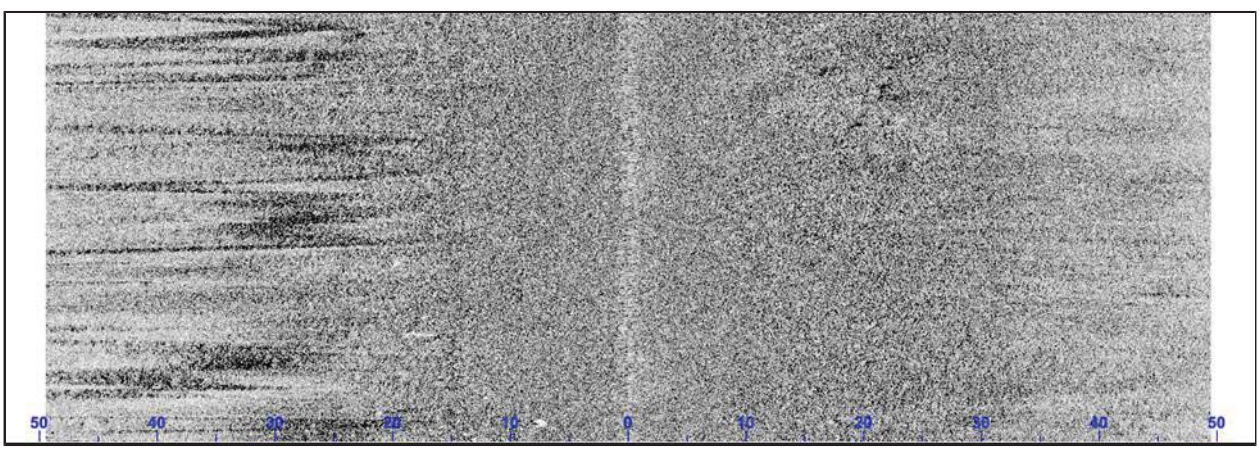


Figure 13: *Example of conditional port-side artifact in the pole-mounted EdgeTech 4125 SSS.*

B.2.6 Factors Affecting Soundings

Water Column and Surface Sound Speed Variability

The sound speed profiles measured throughout the limits of the survey area showed high variability, particularly near the surface (Figure 14). A drastic change in sound speed was often observed near the surface, where sound speed values would change by over 10 m/s in the top 5 meters of the water column. At times the high sound speed variability near the surface adversely affected the depth and positioning of outer beam soundings (Figure 15). Sound speed changes in the water column were time and space dependent and appear to be attributed to the influx of fresh water from the Mississippi River and the temperature changes throughout the day. To ensure that compromised data were not included in the final surface, outer range swath trimming was effected, as needed, on a case-by-case basis.

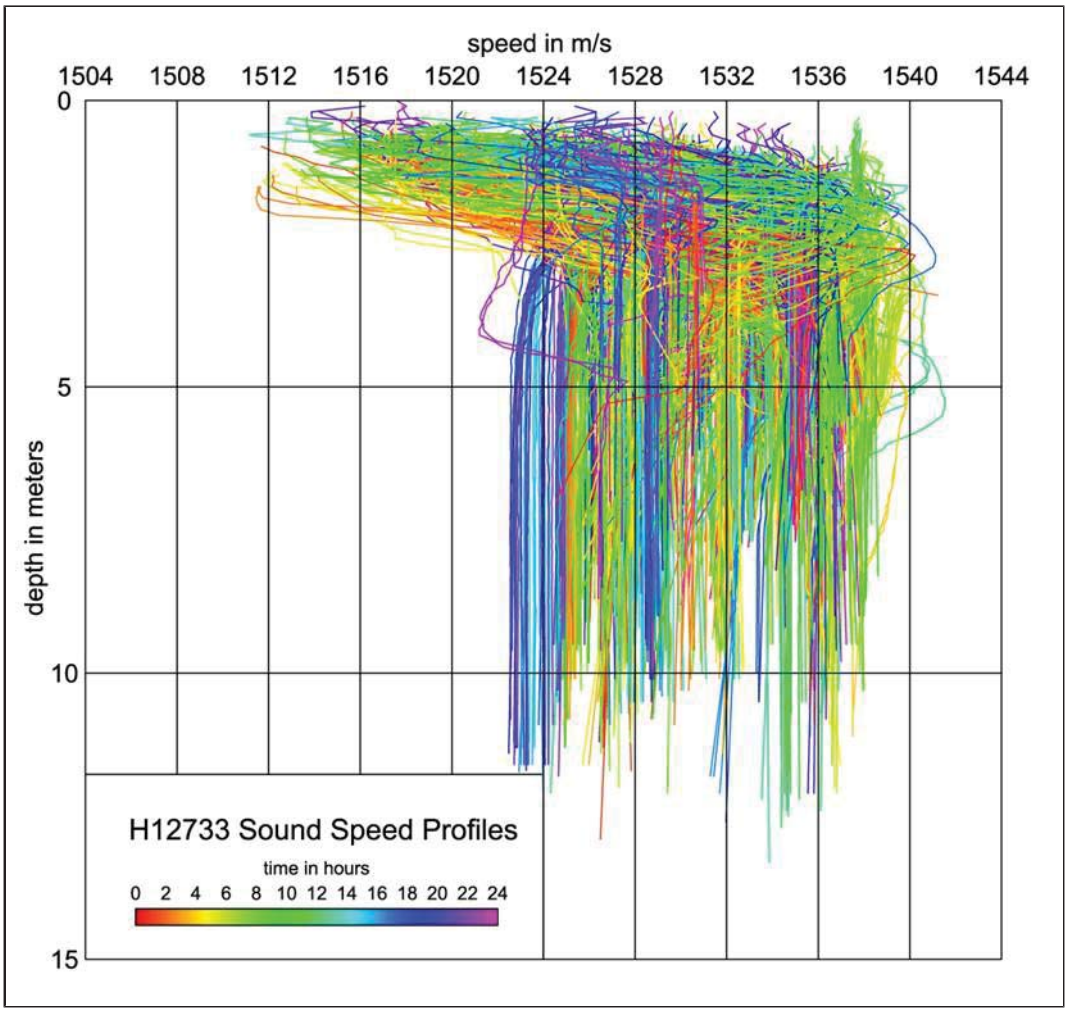


Figure 14: *The image above represents all H12733 sound speed profiles colored by cast time of day. The profiles showed high variability in sound speed measurements spatially and temporally, with the change most pronounced near the surface.*

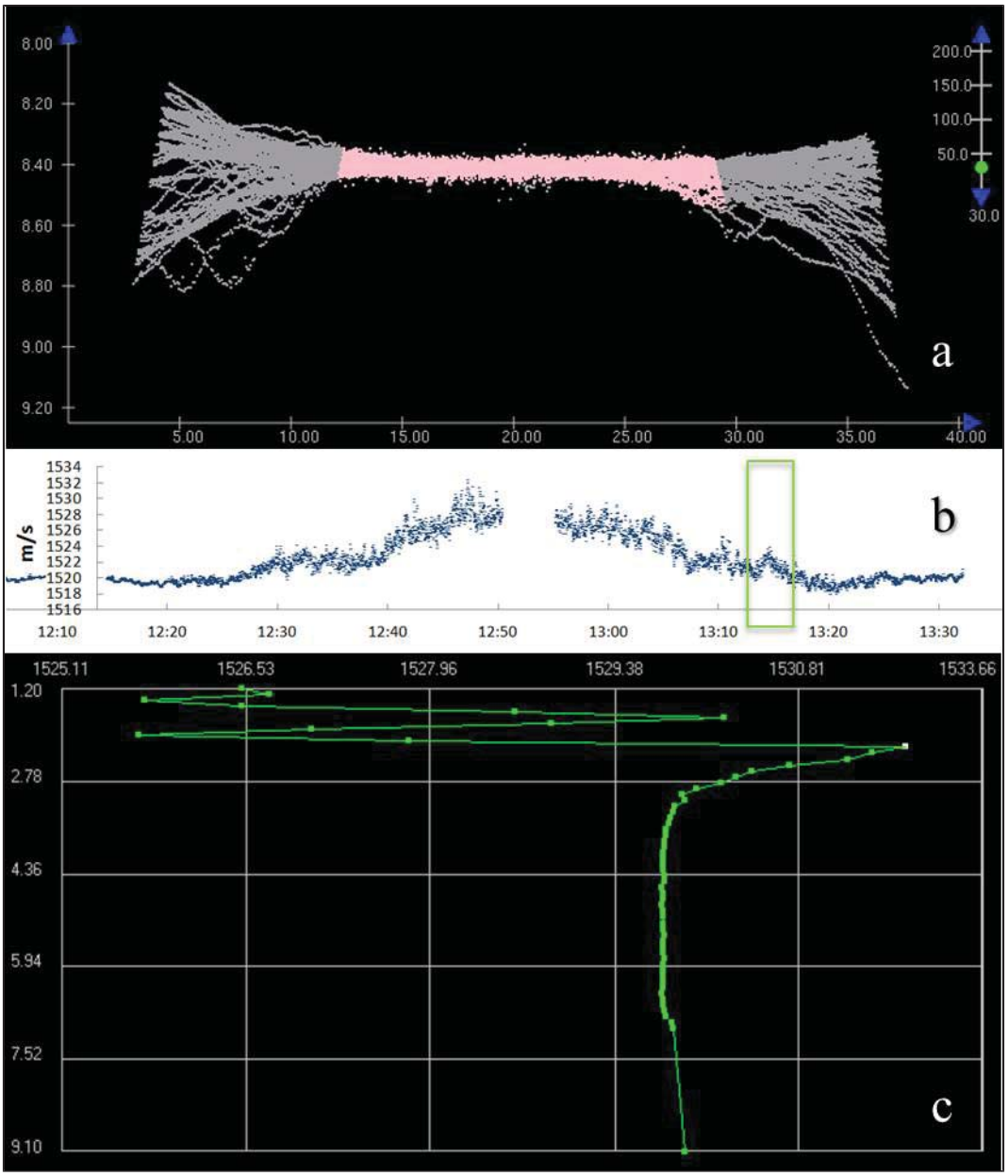


Figure 15: *Image (a) highlights a subset of a Reson 7125 line with the outerbeams showing a "thickening " indicative of a sound speed error; rejected soundings are colored grey. In image (b), a time series of the surface sound speed values for two of the lines collected on DN 180 is shown. The green box highlights the dynamic variation in surface speed of sound that correlates with the time of the soundings in the top image. The bottom image (c) shows a sound speed profile taken with the MVP on June 29, 2015 (DN 180). The sound speed value shows an overall increase of 6 m/s in the top 3 meters of water, with sharp fluctuations of +/- 4 m/s in the same interval. Depths and distances are in meters.*

SSS Refraction

The dynamic sound speed changes affected the SSS imagery at times, causing refraction in the outer ranges of the SSS swath (Figure 16). When practical, to lessen the impact of refraction in the towed SSS, the EdgeTech 4200 tow fish was flown below the refractive sound speed lens. To ensure that 100% coverage of high quality SSS data was acquired, SSS lines with excessive refraction were rejected or the portion of the line with severe refraction was re-run.

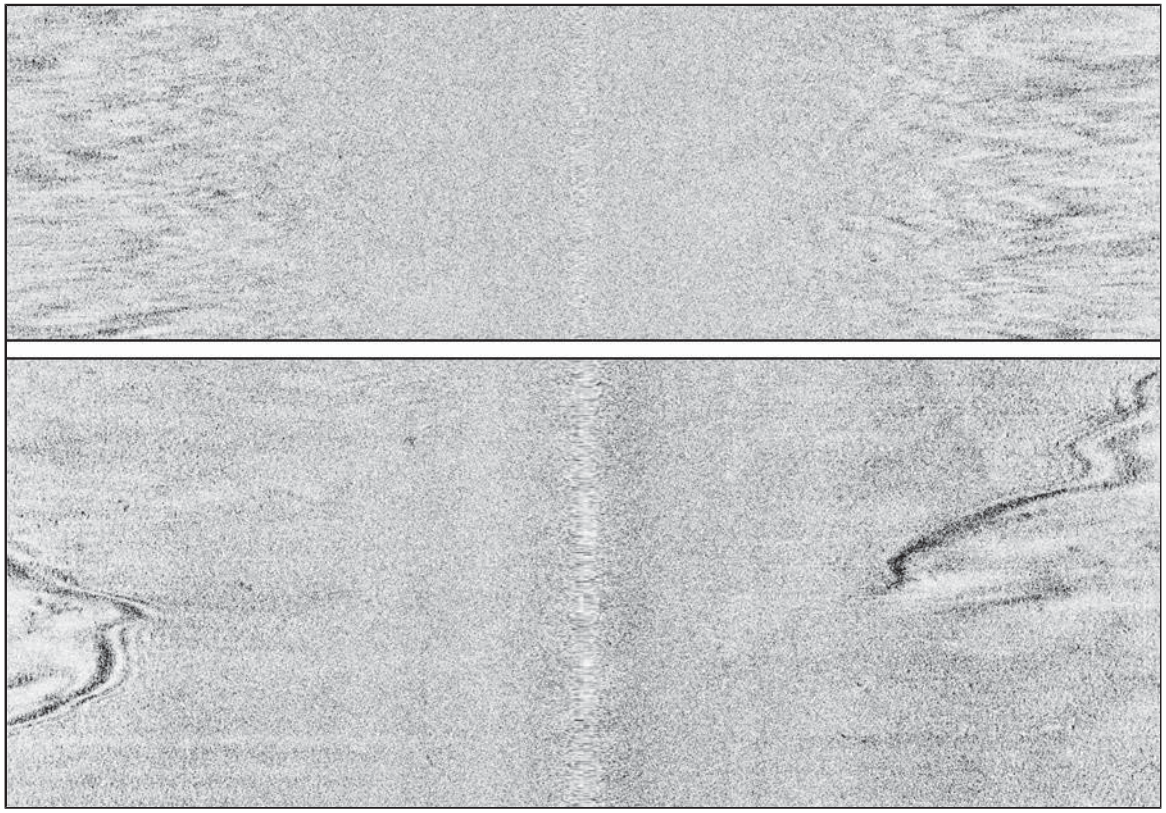


Figure 16: *The top image shows a subset of refraction as encountered with the fixed-mount 4125 SSS. The bottom image shows a subset of refraction as encountered with the towed 4200 SSS. Both screen grabs were taken from the CARIS SSS Editor Waterfall window.*

Tide Offset

Review of surface data indicated that there were a number of tide-related offsets between MBES data collected on different days scattered throughout Survey H12733. However, there were no noteworthy tide events that affected this survey. Overall, the tide correctors were modeled well for Survey H12733, showing good agreement between survey days. Tide offsets generally equaled 25 cm or less and are likely associated with local environmental effects, i.e. wind setup. Examples of two of the larger magnitude tide related offsets for Survey H12733 are presented in Figures 17 and 18.

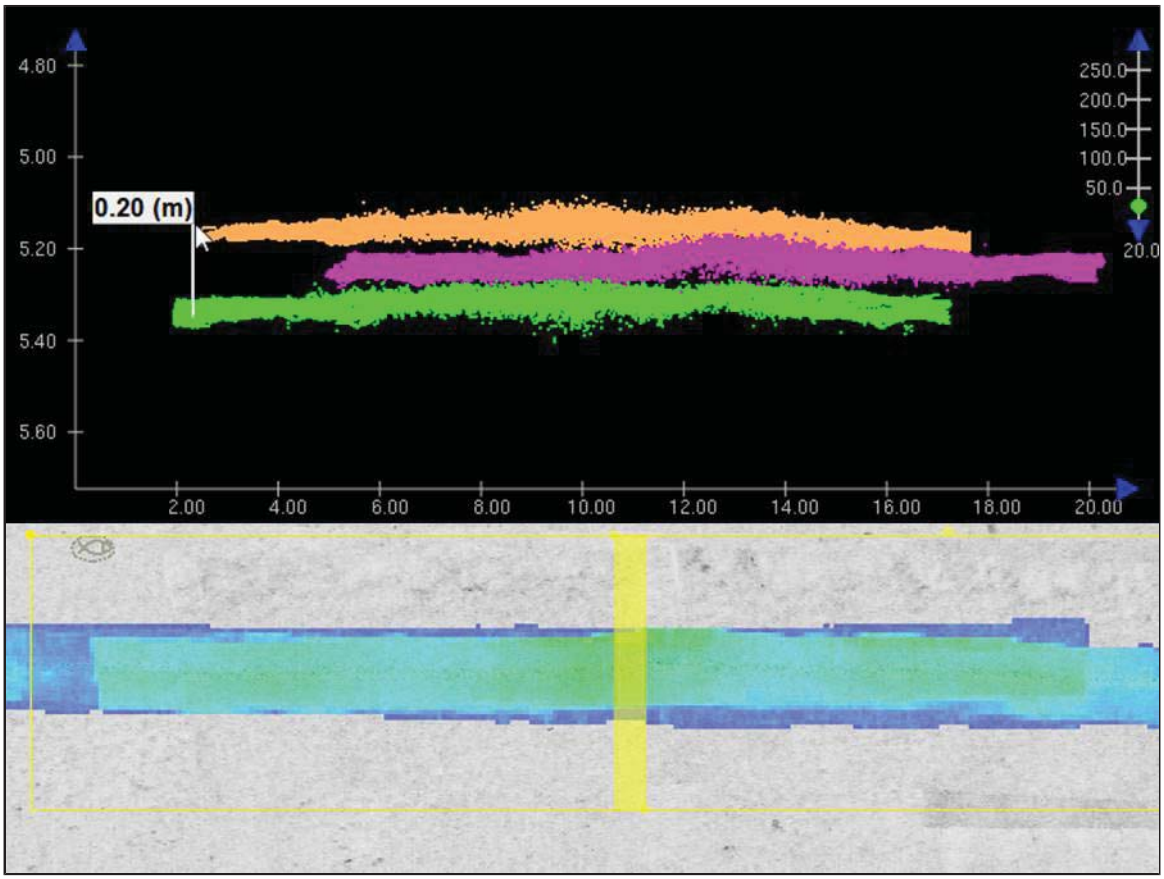


Figure 17: *The top image displays MBES data loaded into CARIS Subset Editor as an example of a tide-related vertical offset between mainscheme soundings collected on DN 186 (pink), DN 187 (green) and DN 196 (orange). The bottom image shows a subset window displayed over the Standard Deviation layer from the H12733 1-meter CUBE surface. The green and cyan colors indicate areas of higher standard deviation in the surface due to a minor tide offset. Depths and distances are in meters.*

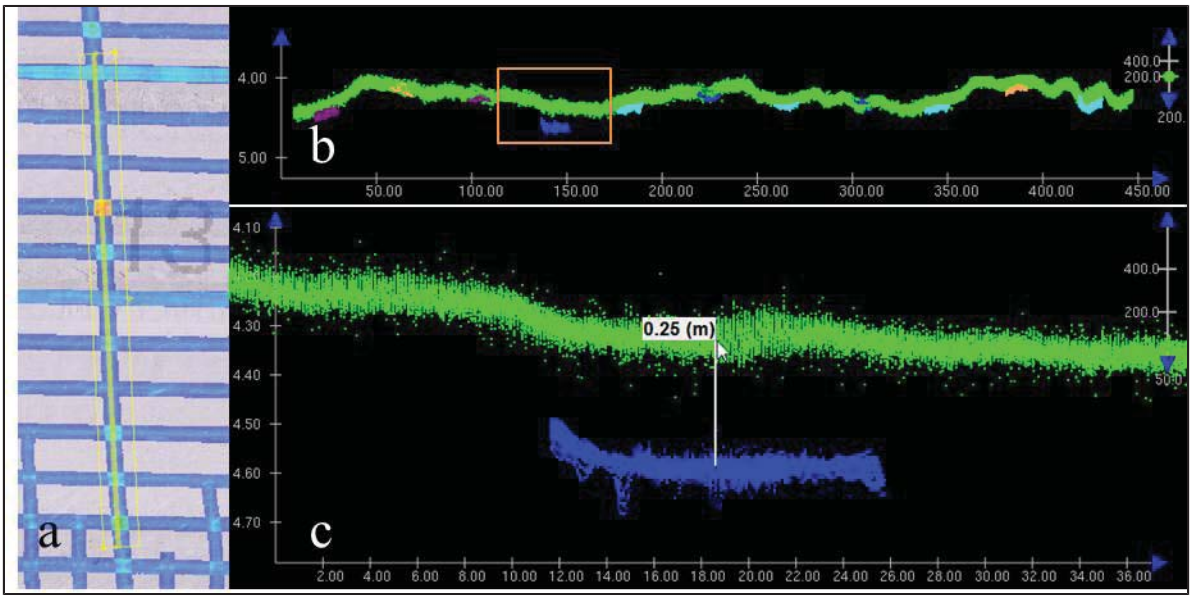


Figure 18: *Image (a) shows a subset window displayed over the Standard Deviation layer from a H12733 1-meter CUBE surface. The cyan, yellow, and red colors indicate areas of higher standard deviation in the surface due to a tide offset. Images (b) and (c) display MBES data loaded into CARIS Subset Editor as an example of a tide-related vertical offset between cross line soundings collected on DN 170 (green), and mainscheme soundings collected on DN 187 (cyan) and DN 201 (blue) shown in CARIS HIPS Subset Editor 2D View. Depths and distances are in meters.*

Vessel Wakes and Sea Surface Noise in SSS Imagery

There were occasional wakes recorded in the side scan imagery from vessel traffic associated with commercial fishing and oil field support vessels. The wakes were noted in the acquisition and processing logs. When a large wake was identified in the coverage mosaic, the coverage gap was filled with SSS or MBES development lines.

In addition to vessel wakes, the towed 4200 SSS occasionally recorded reflections off of large floating mats of seaweed and large balls of fish located above the tow fish in the water column. The surface noise appeared as shadowless dark spots in the SSS imagery (Figure 19). Lines that were affected by surface noise were carefully scrutinized to ensure all possible SSS contacts were selected.

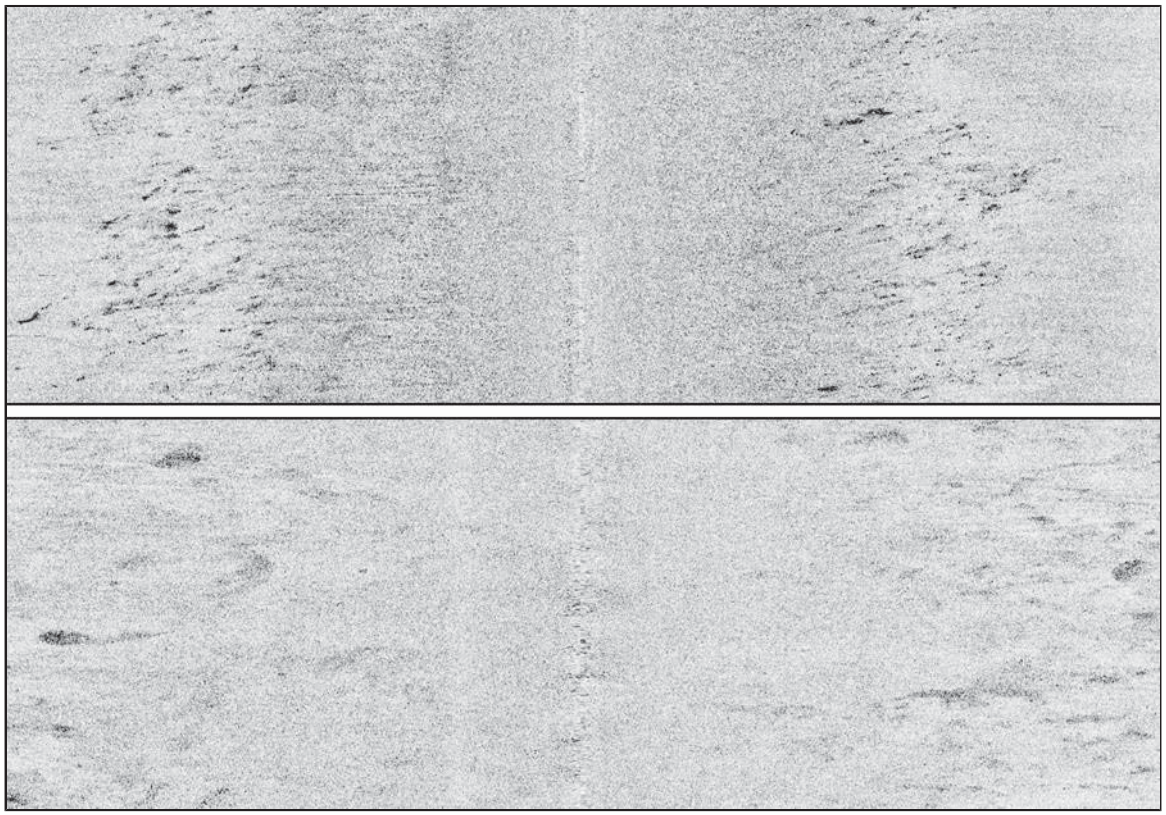


Figure 19: *An example of reflections off of the sea surface or fish in the water column above the towed SSS as it appears in the SSS imagery displayed in CARIS Side Scan Editor.*

Fish in SSS Imagery and MBES data

An abundance of fish and marine sea life were seen in the SSS and MBES data, either as lone swimmers or in schools (Figures 20 - 22). 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.

Dolphin pods were a persistent presence within the survey area, as well as large schools of fish, which at times created large shadows in the SSS imagery and gaps in the MBES data where fish and dolphins were rejected (Figure 23). To ensure that possible significant features were not located in these fish and dolphin shadows, these fish/dolphin related coverage gaps were developed with 200% SSS coverage or object detection MBES coverage.

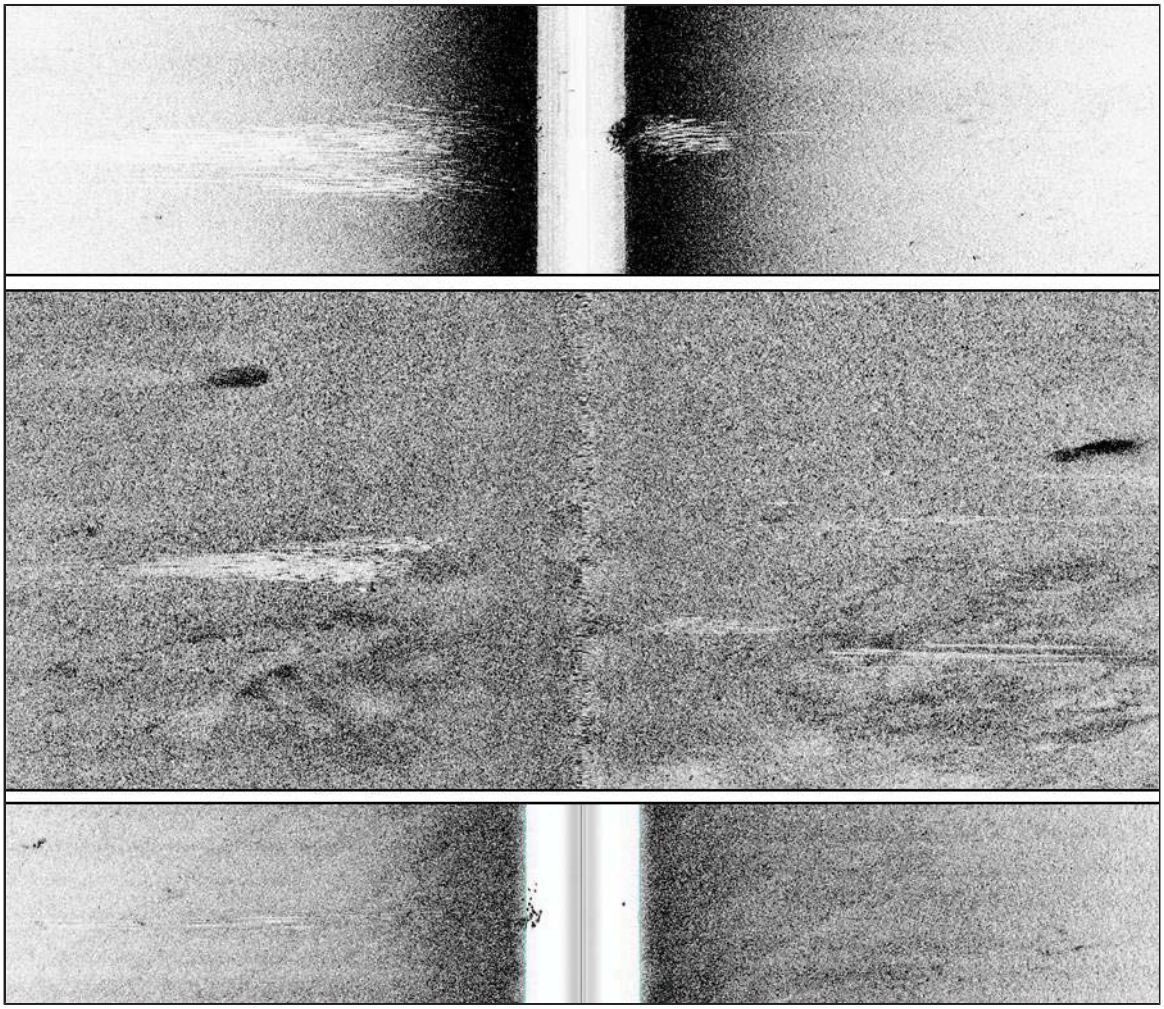


Figure 20: *Examples of fish schools and lone swimmers as they appear in the side scan imagery. The screen grabs on the top and bottom are of raw, un-slant range corrected imagery to show the fish returns in the water column. The middle screen grab is of a slant-range corrected and AVG corrected SSS line; therefore, the water column is not visible.*

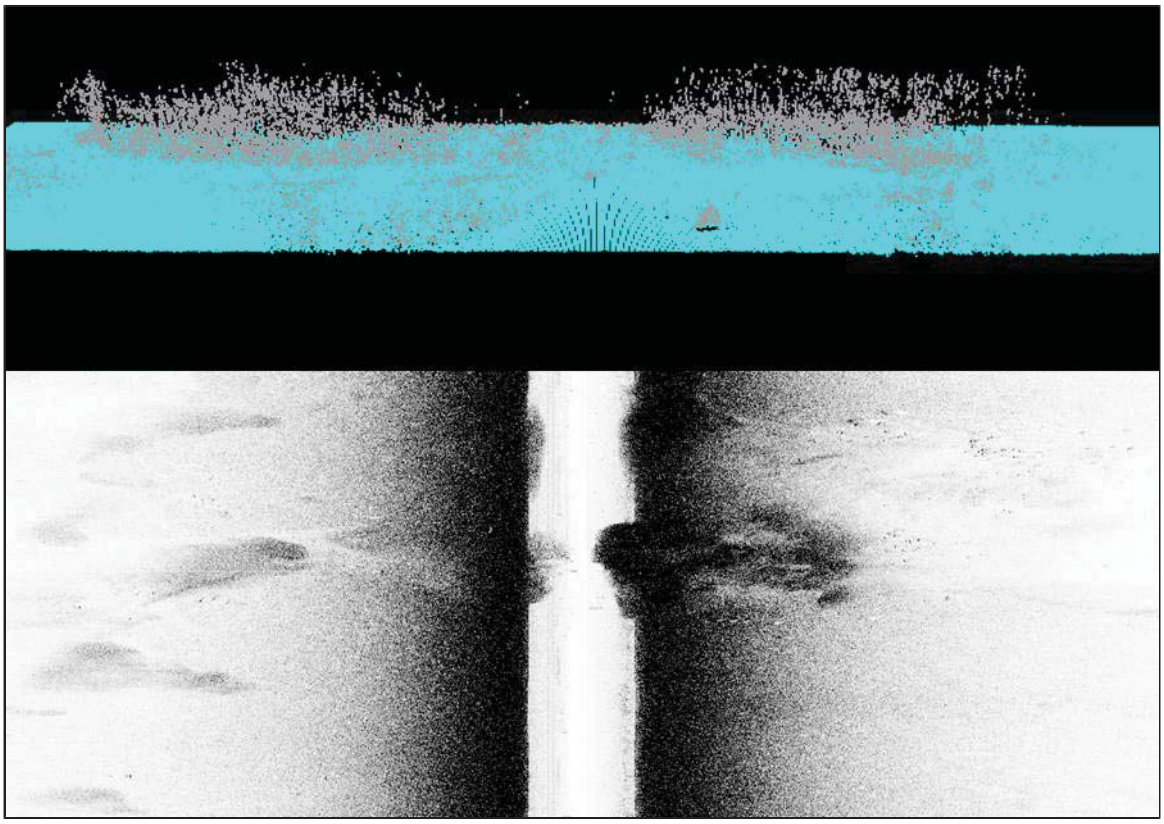


Figure 21: *The top image is a screen grab of MBES data loaded into the CARIS Subset Editor 3D window that shows a school of fish near the seafloor that has been rejected from the data (grey soundings). The bottom image shows the same school of fish as recorded in the pole-mounted 4125 SSS imagery, with portions of the fish schools visible in the water column.*

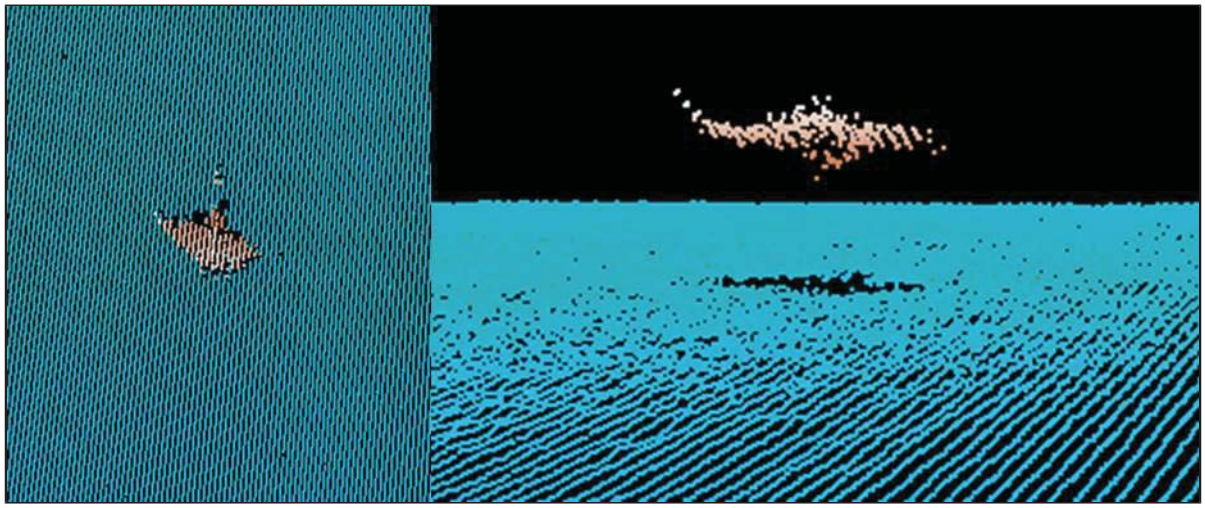


Figure 22: *A sea creature presumed to be a ray, represented here by the pink soundings, was ensonified with near nadir MBES soundings on survey line 2015OC1820344_1042.*

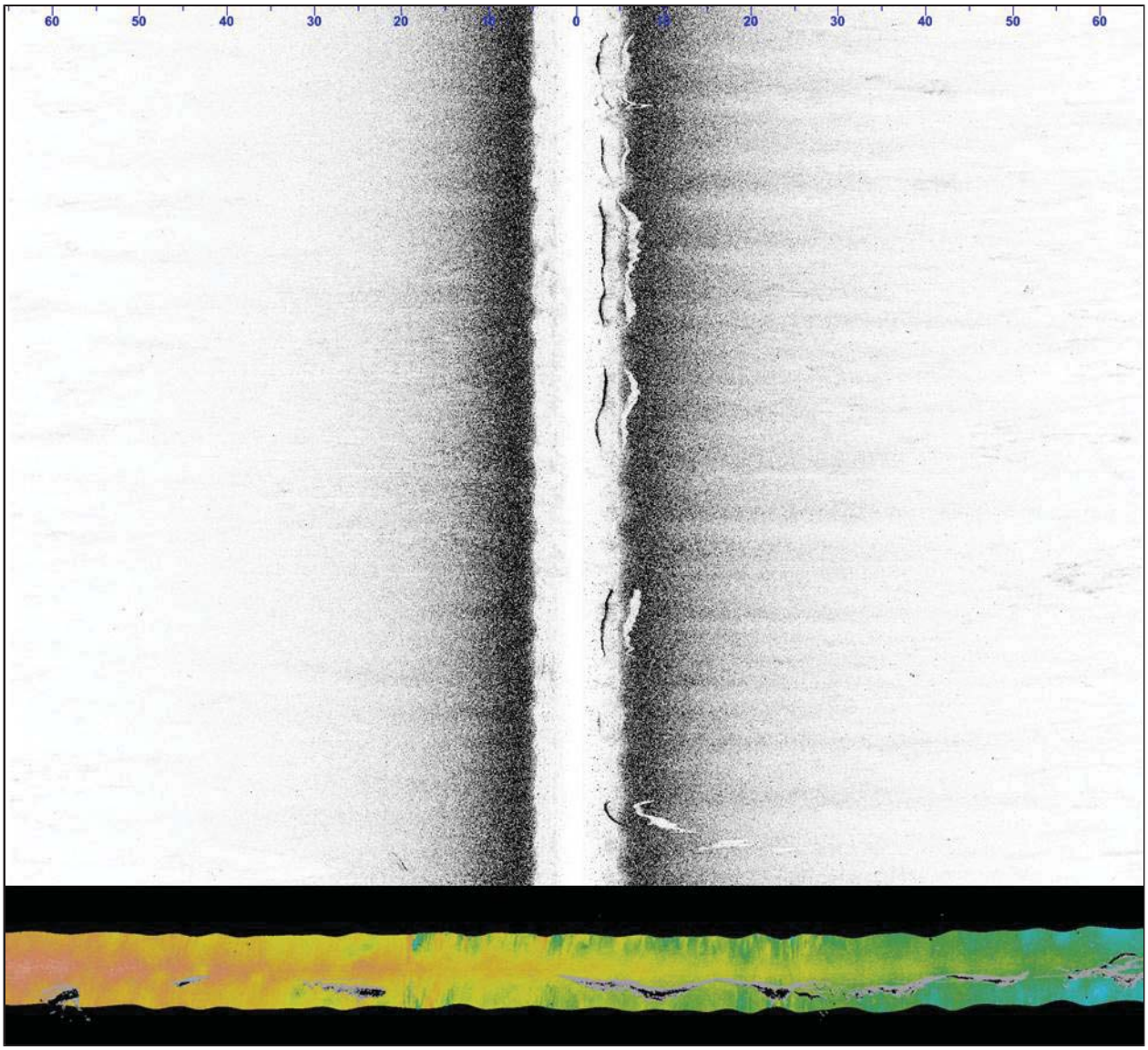


Figure 23: *A pod of dolphins as it was ensonified with the Reson 7125, on the bottom, and with the pole-mounted 4125 SSS, on the top. The dolphin produced shadows in both sonar coverages.*

Seaweed and Floating Debris catching on Pole Mount

Seaweed and other floating debris would often snag on the forward guy wire of the pole mount apparatus. The snagged weeds would present as a white/black line of brief duration across the 4125 SSS record and would be visible as noise near the surface in the Reson 7125 real-time acquisition waterfall display. The degree to which the snagged seaweed impacted the data was dependent on vessel heading and the amount of current-induced vessel crabbing. The field team mitigated the problem by occasionally raising the pole mount and clearing any weeds or other dangling debris from the wires. Figure 24 is an example of how the white line presented in the CARIS Side Scan Editor waterfall window; the line presented as black in the SSS acquisition display.

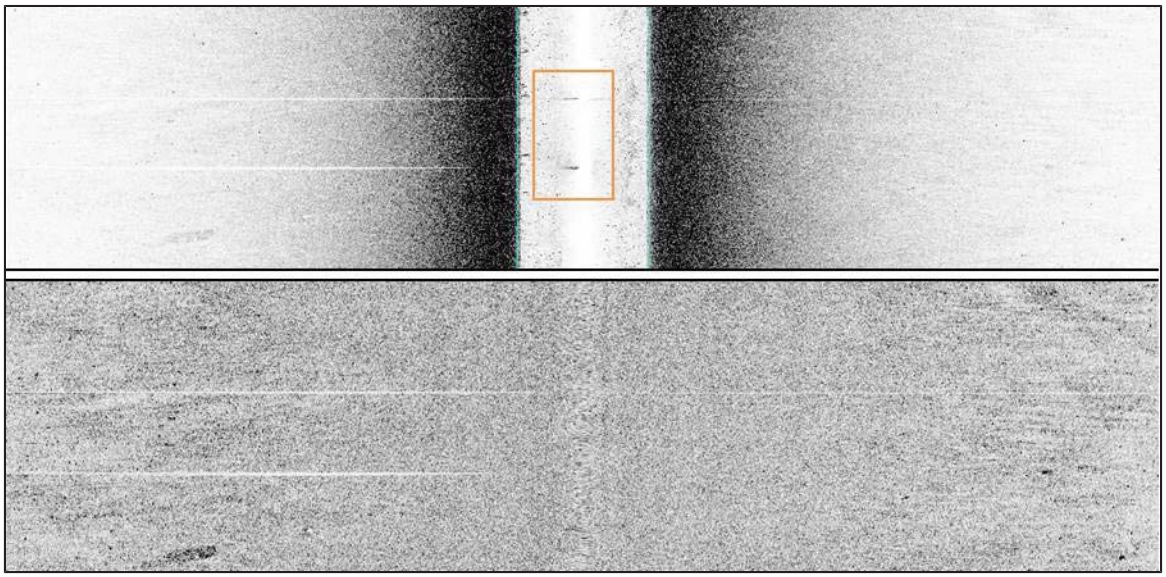


Figure 24: *An example of the sporadic white lines across the 4125 SSS imagery as displayed in CARIS Side Scan Editor. The top image shows the uncorrected imagery; black dots, most likely weeds, visible at the top of the water column are highlighted with the orange box and correspond with the white lines predominantly visible on the port side. The bottom image shows the white lines in the corrected SSS imagery.*

B.2.7 Sound Speed Methods

Sound speed measurements were acquired and processed as documented in the DAPR. All MBES lines were sound speed corrected using CARIS HIPS' "Nearest in Distance Within Time" method with the time set to two (2) hours.

B.2.8 Coverage Equipment and Methods

This survey was conducted to develop 100% SSS coverage along with concurrent MBES with backscatter to a depth of 20 meters, i.e. Set Line Spacing coverage as defined in Section 5.2.2.3 of the HSSD. All depths within Survey H12733 were shallower than 20 meters. Per the OPR-J377-KR-15 Project Instructions which stated "Gaps in SSS coverage should be treated as gaps in MBES coverage and addressed accordingly," gaps in SSS coverage and holidays caused by fish, dolphins, or boat wakes were developed with Complete Multibeam coverage. This methodology was confirmed with OSI's NOS Contracting Officer (COR) through an email correspondence dated July 21, 2015. Text from the emails discussing SSS holidays are included in the DR Appendix II, Supplemental Survey Records and Correspondence.

All potentially significant features located with mainscheme SSS or MBES were developed with high density multibeam sonar data to meet the HSSD requirement of Object Detection coverage.

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

B.2.9 Density

To confirm the HSSD coverage requirement that at least 95% of the surface nodes shall be populated with at least 5 soundings for Object Detection coverage surfaces and at least 3 soundings for Set Line Spacing coverage surfaces, the Compute Statistics tool was utilized within CARIS HIPS and SIPS to generate statistics for the Density layer for each finalized BASE surface. For the purpose of obtaining the most accurate surface density statistics, the surfaces used for the Density QC check were finalized with the "Apply Designated Soundings" box unchecked, as it was discovered that when this option was selected during surface finalization a density value of one (1) was assigned to all nodes containing a designated sounding, regardless of the node's sounding density value pre-finalization. That said, all MBES coverage surfaces included with the survey deliverables were re-finalized with the "Apply Designated Soundings" option selected.

The Compute Statistics tool generates an ASCII export containing two columns: 1) sounding density value and 2) the number of nodes that returned that value. This export was used to determine the percentage of nodes with a sounding density ≥ 5 for every object detection coverage CUBE surface and the percentage of nodes with a sounding density ≥ 3 for the set line spacing coverage CUBE surface.

The percentage of nodes with density greater than or equal to 3 soundings for the Set Line Spacing coverage surface was as follows: H12733_MB_4m_MLLW_Final = 99.89%.

Five (5) of the six (6) Object Detection surfaces had 100% of the nodes populated with a density greater than or equal to 5 soundings. The percentage of nodes with density greater than or equal to 5 soundings for surface H12733_MB_50cm_MLLW_A-068_Final was 99.96%.

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

The following calibrations were conducted after the initial system calibration discussed in the DAPR:

Calibration Type	Date	Reason
Reson 7125 Patch Test	2015-07-05	Change in transducer draft.

Table 9: Calibration following initial patch test.

System calibrations were performed as documented in Section C. of the DAPR. The initial MBES system calibration, or patch test, was performed on June 18, 2015 (DN 169). On July 5, 2015 (DN 186) the draft of the Reson 7125 transducer was deepened along with the pole-mounted 4125 SSS, in order to reduce the impact of water turbulence from the survey vessel's hull on the SSS imagery. A new calibration was performed after lowering the transducer draft.

B.4 Backscatter

Backscatter data were acquired concurrent with bathymetry data for Survey H12734. Per the Hydrographic Survey Project Instructions, MBES bathymetry was the priority on this project; therefore, the multibeam system settings were optimized for acquisition of bathymetry.

Backscatter data were recorded with HYSWEEP SURVEY in .7K format. These data were periodically reviewed to ensure function of the backscatter acquisition process. However, per the Project Instructions, OSI was not required to “process or create any additional backscatter products.” As such, these data are delivered in raw format in the “Backscatter” directory.

B.5 Data Processing

B.5.1 Software Updates

The following Feature Object Catalog was used: NOAA Extended Attribute object catalogue V 5.3.2.

Software versions described in Section A of the DAPR were used throughout acquisition and processing of data for Project OPR-J377-KR-15.

B.5.2 Surfaces

The following CUBE surfaces and mosaics were submitted to the Processing Branch:

Surface Name	Surface Type	Resolution	Depth Range	Surface Parameter	Purpose
H12733_MB_4m_MLLW_Final	CUBE	4 meters	3.03 meters - 12.19 meters	NOAA_4m	Set Line Spacing Coverage
H12733_MB_50cm_MLLW_A-008_Final	CUBE	0.5 meters	4.43 meters - 5.72 meters	NOAA_0.5m	Object Detection
H12733_MB_50cm_MLLW_A-036_Final	CUBE	0.5 meters	7.46 meters - 8.74 meters	NOAA_0.5m	Object Detection

Surface Name	Surface Type	Resolution	Depth Range	Surface Parameter	Purpose
H12733_MB_50cm_MLLW_A-068_Final	CUBE	0.5 meters	3.92 meters - 5.14 meters	NOAA_0.5m	Object Detection
H12733_MB_50cm_MLLW_A-069_Final	CUBE	0.5 meters	3.21 meters - 5.55 meters	NOAA_0.5m	Object Detection
H12733_MB_50cm_MLLW_A-072_Final	CUBE	0.5 meters	3.34 meters - 4.86 meters	NOAA_0.5m	Object Detection
H12733_MB_50cm_MLLW_A-080_Final	CUBE	0.5 meters	5.18 meters - 6.86 meters	NOAA_0.5m	Object Detection
H12733_SSS_100	SSS Mosaic GeoTiff	1 meters	-	N/A	100% SSS
H12733_SSS_200	SSS Mosaic GeoTiff	1 meters	-	N/A	200% SSS

Table 10: Submitted MBES and SSS Coverage Surfaces

Seven (7) MBES CUBE surfaces and two (2) SSS mosaics comprise the total surfaces delivered with Survey H12733. To demonstrate MBES coverage requirements were met for Set Line Spacing, a 4-meter CUBE surface was generated for the entire survey area. Six (6) small field sheets were generated over significant features and populated with 50-centimeter CUBE surfaces to demonstrate Object Detection coverage.

Two 1-meter SSS mosaics were submitted as GeoTIFFs to satisfy the SSS coverage requirements of 100% coverage and 200% coverage over charted feature disprovals. In addition, a higher resolution, 25-centimeter SSS mosaic image composed of all SSS lines was submitted in the ECW (Enhanced Compressed Wavelet) 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-J377-KR-15.

C.1 Vertical Control

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

Standard Vertical Control Methods Used: Discrete Zoning

The following National Water Level Observation Network (NWLON) station served as datum control for this survey:

Station Name	Station ID
Pilots Station East, SW Pass, LA	876-0922

Table 11: NWLON Tide Station

A final verified tide file was created from verified tide data obtained from the CO-OPS website upon completion of survey operations. As documented in the HVCR, with CO-OPS approval OSI removed numerous short period "data spikes" from the verified tide data via application of a fourth-order, zero-lag, Butterworth low-pass filter. The source of the abundant data spikes is suspected to be wakes from passing ships as they enter Southwest Pass.

Discrete zoning methods were utilized to apply tide correctors in CARIS HIPS and SIPS. The survey area is located within Zones CGM103, CGM102, CGM101, CGM100, CGM131, CGM125, and CGM123 as provided in the preliminary tidal zoning scheme included with the project SOW. Based on the results of cross line analysis, the time and range factors as provided in the preliminary zoning scheme were adequate. Preliminary zoning, provided by CO-OPS, was accepted as the final zoning for Project OPR-J337-KR-15.

File Name	Status
8760922.tid	Final Approved

Table 12: Water Level File

File Name	Status
J377KR2015RevCORP.zdf	Final

Table 13: Tide Corrector File

C.2 Horizontal Control

The horizontal datum for this project is North American Datum of 1983 (NAD83). The projection used for this project is UTM Zone 16 North.

All data products, except the S-57 Final Feature File (FFF) are referenced to Latitude/Longitude, UTM Zone 16 North. The S-57 Final Feature File, H12733.FFF.000, is referenced to the World Geodetic System Datum of 1984 (WGS 84) as specified in Section 8.2 S-57 Format Features Deliverables of the HSSD.

All MBES and SSS line and item investigation position data were acquired using an Applanix POS-MV operating in Differential GPS (DGPS) mode. The unit was configured to receive USCG Differential beacon correctors from the English Turn, LA station. Differential beacon correctors from the Eglin Air Force Base, FL station were used by the secondary navigation system (Trimble MS750) to facilitate real-time horizontal control confidence checks.

Prior to and during the course of the survey the accuracy of the primary positioning system was verified by means of a physical measurement to one of two horizontal control points established at the vessel's base of operation, the USCG Station in Venice, LA. Position confidence checks were accomplished, when possible, during fuel or weather stops. Refer to the DAPR and HVCR for additional details.

On July 7, 2015 (DN 188), the English Turn, LA DGPS station was scheduled for maintenance from 12:00 to 22:00 UTC per the USCG navigation center website (www.navcen.uscg.gov). The station's down time lasted approximately 5 hours, during which time the survey crew collected bottom samples.

The following DGPS stations were used for horizontal control:

DGPS Stations
English Turn, LA (primary), 293 kHz
Eglin Air Force Base, FL (secondary), 295 kHz

Table 14: USCG DGPS Stations used for Horizontal Control

D. Results and Recommendations

D.1 Chart Comparison

Chart comparisons were performed in CARIS HIPS/SIPS and Notebook using finalized BASE surfaces and contours and selected soundings. The latest editions of the NOAA NOS Raster Nautical Charts (RNC) and Electronic Nautical Charts (ENC) were downloaded from the NOAA Office of Coast Survey website (http://www.nauticalcharts.noaa.gov/) weekly during survey operations, and after the survey was completed for final comparisons. The RNCs and ENCs used for final comparisons were downloaded on September 11, 2015 and are submitted with the survey deliverables.

Local Notice to Mariners (LNM) and Notice to Mariners (NM) spanning the period beginning at the date of issuance of the Hydrographic Project Instructions (April 23, 2015) and ending on August 26, 2015 were consulted in conjunction with the foregoing chart comparison.

The following sections adhere to the Descriptive Report sounding rounding system as described in Section 5.1.2 of the HSSD. Specifically, features described below having "precision" depths are presented in the following manner:

ff feet (mm.mm meters, ±t.tt TPU) where ff = depth expressed in feet (chart units) having been rounded based on the precise meters expression of the depth using the 0.75 round value rule.

mm.mm = depth expressed in meters
±t.tt = Total Propagated Uncertainty (TPU) expressed in meters

An example of this notation follows: 80 feet (24.58 meters, ±0.24 TPU).

During the chart comparison it was found that the least depth soundings for charted regions were on obstruction features; however, 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 H12733 were addressed and attributed in the S-57 Final Feature File. For more information on the methodology that was used to build the FFF see Section B.2.5 Feature Verification in the DAPR.

An overview of the areas of change between charted depths and H12733 surveyed soundings is shown in Figure 25. The figure displays a difference surface made by subtracting a 10-meter resolution depth surface generated from the H12733 MBES data from a 250-meter resolution depth surface interpolated from the charted ENC soundings within the project area. Regions of shoaling are represented by positive depth differences and regions of deepening are represented by negative depth differences. The greatest areas of change were a deepening trend in the center of the survey area and migrating shoals along the northern survey limit. A detailed description of each chart comparison follows.

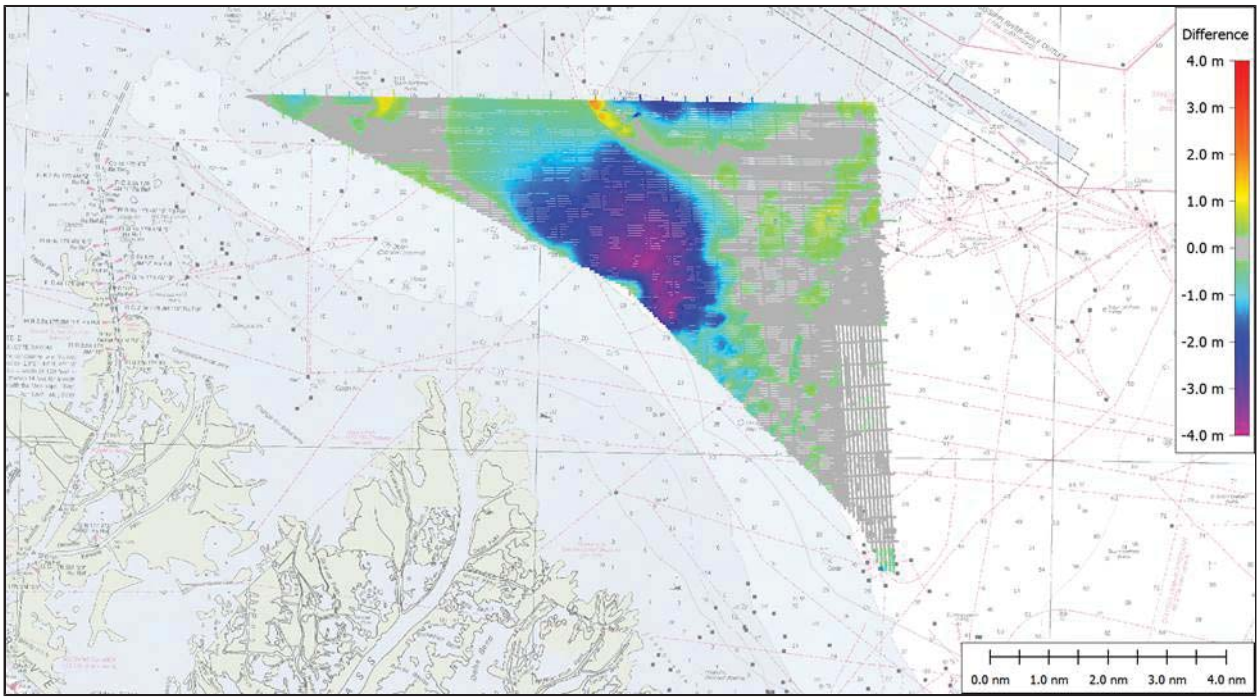


Figure 25: *A depth difference surface overlaid on RNCs 11363 and 11361 provides an overview of the areas of change between charted depths and H12733 surveyed soundings.*

D.1.1 Raster Charts

The following table summarizes pertinent epoch details about the largest scale RNCs assigned for the survey area.

Chart	Scale	Edition	Edition Date	LNM Date	NM Date
11353	1:40000	7	03/2014	08/04/2015	08/08/2015
11363	1:80000	44	02/2013	08/04/2015	08/08/2015
11361	1:80000	78	06/2015	08/04/2015	08/08/2015

Table 15: Largest Scale Raster Charts

<u>11353</u>

There is good agreement between the majority of surveyed and charted depths, with soundings differing by approximately 0 to 3 feet (0.9 meters). However, surveyed depths near the center of the survey are significantly deeper than charted depths, with surveyed depths measuring 5 to 12 feet (1.5 to 3.6 meters) deeper than charted depths (Figure 26).

A new shoal was identified in the vicinity of 29-25-49.22 N, 89-13-03.69 W, where the 12-foot contour has migrated south of its charted location and surveyed soundings are 5 feet (1.5 meters) shallower than the nearest charted depth of 16 feet (Figure 27). Significant shoaling was also observed in the vicinity of 29-25-50.65 N, 89-08-57.50 W, where 13 to 17-foot (4 to 5-meter) soundings were surveyed between charted 21 and 20 foot depths, on the deeper side of a charted 18-foot contour (Figure 28).

Large discrepancies were identified between the locations of the charted 12-foot, 18-foot, and 30-foot contours. The location of the charted 12-foot contour that crosses the survey at the approximate positions of 29-25-56.10 N, 89-08-36.05 W and 29-25-59.00 N, 89-05-47.70 W was disproved, with survey depths 2 to 5 feet deeper than the reported 12-foot contour depth (Figure 29).

The charted 18-foot contour that crosses the northwestern section of Survey H12733 has migrated up to 1.8 kilometers to the northwest (Figure 30). Survey depths are 1 to 4 feet (0.3 to 1.2 meters) deeper than the charted 18-foot contour. A portion of the northwestern 18-foot contour is delineated with a dashed line which, according to the NOAA publication U.S. Chart No. 1, indicates that it is an approximate depth contour.

The charted 18-foot contour that traverses the center of the survey area, has migrated over 3 kilometers northeast of its charted location, which is related to the deepening trend discussed above. A deep section of the seafloor demarcated with a 30-foot contour in the vicinity of 29-22-35.50 N, 89-08-04.7 W has expanded in size. The only charted contour that shows good agreement with the surveyed depths was the 30-foot contour that runs through the eastern side of the H12733 survey area. Portions of the charted 18-foot and 30-foot contours that intersect with Survey H12733 are charted as dashed lines indicating they are approximate depth contours. Figure 31 highlights the agreement and disagreement of H12733 survey soundings with the 18-foot and 30-foot charted contours located in the central and eastern portions of the survey area.

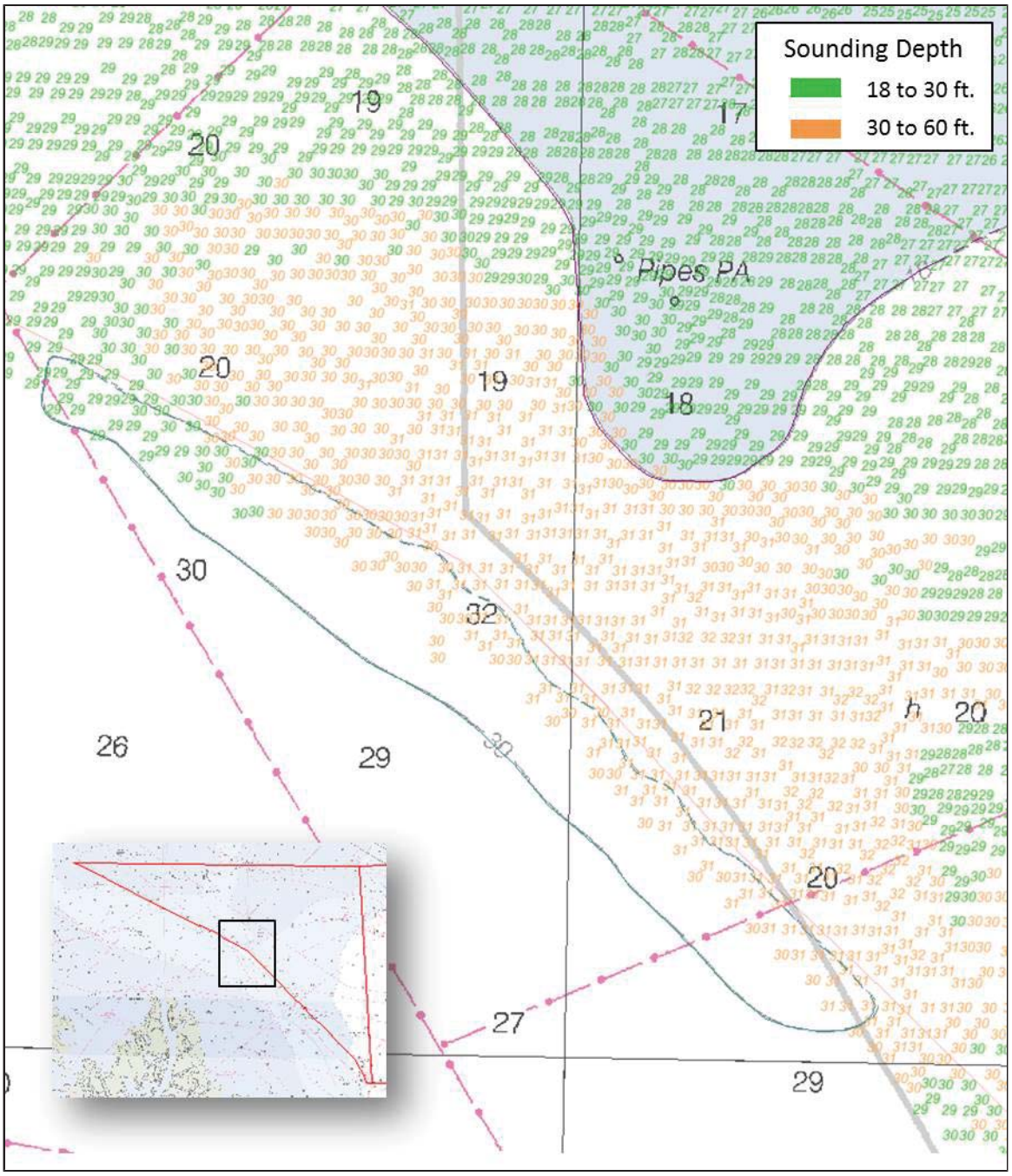


Figure 26: *Survey soundings colored by depth are overlaid on RNC 11353. Surveyed depths are consistently deeper than charted depths in the center of the survey area heading southeast. All depths are in feet.*

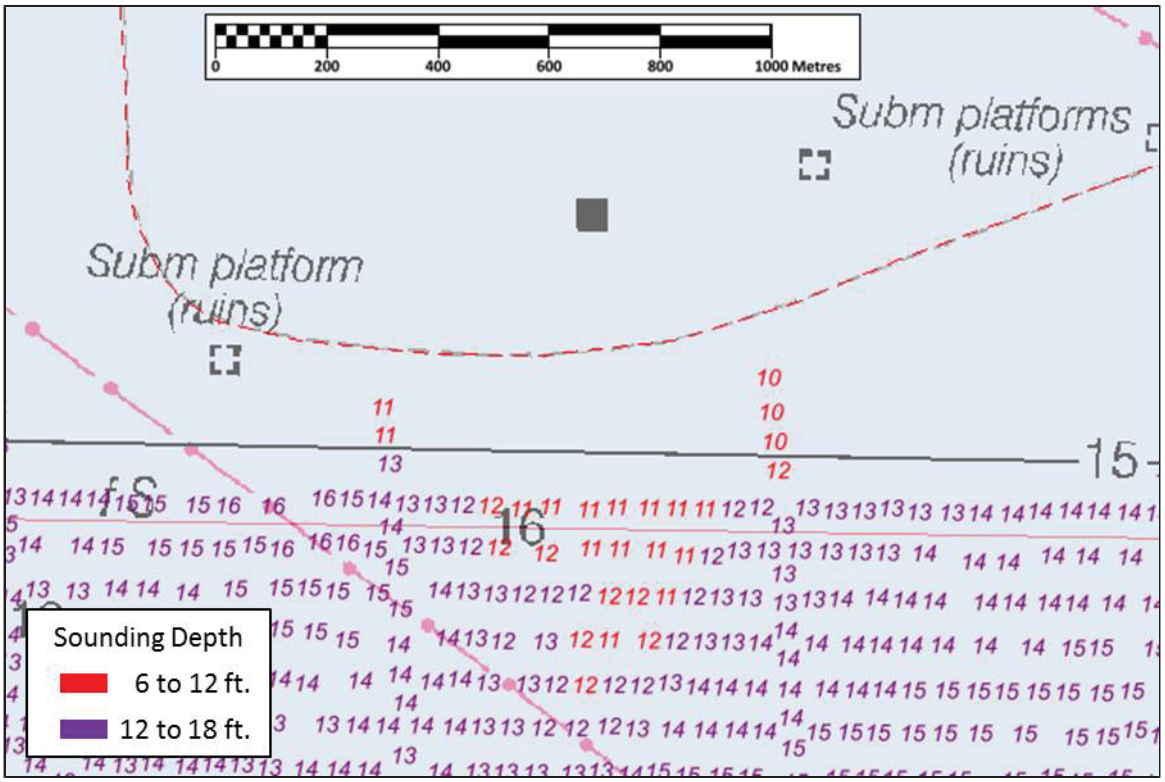


Figure 27: *Survey soundings colored by depth are overlaid on RNC 11353. A new shoal was identified with MBES coverage where the location of the 12-foot depth curve has migrated south. All depths are in feet.*

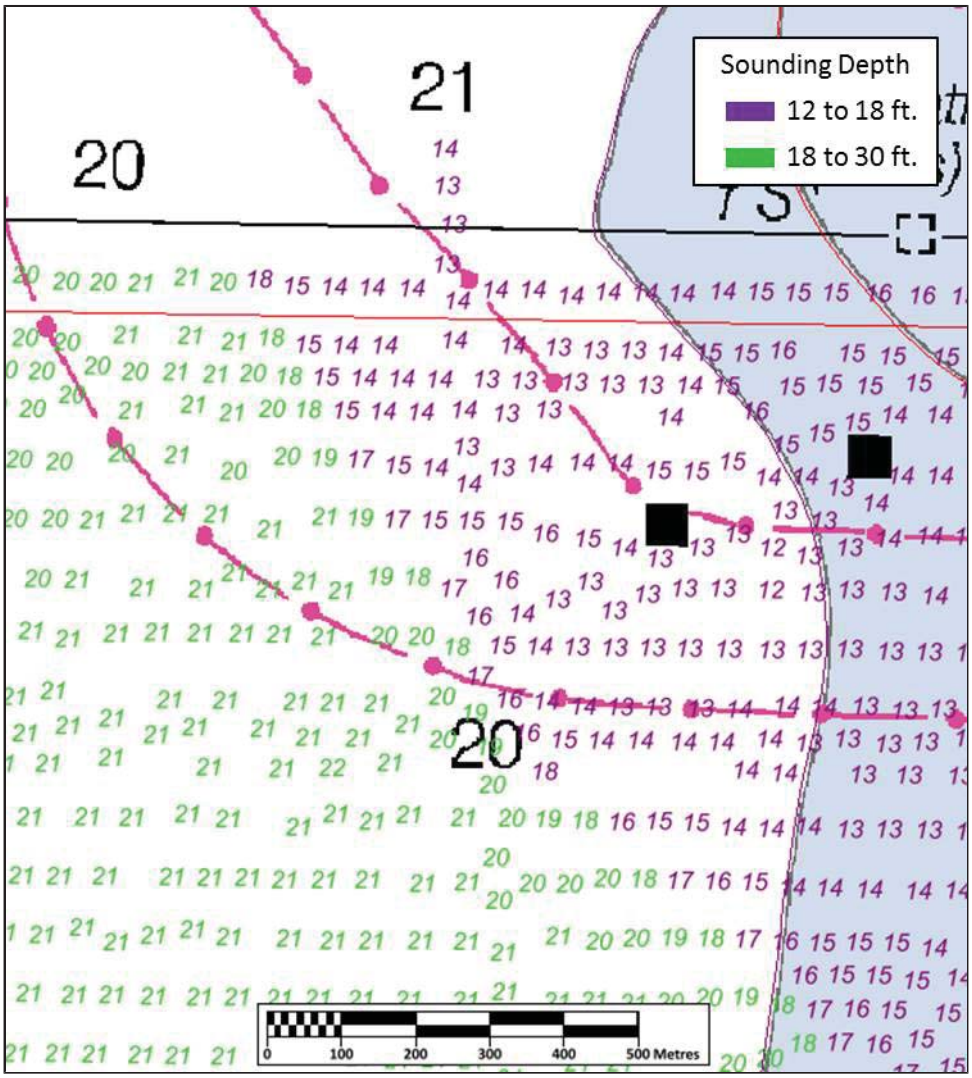


Figure 28: *Survey soundings colored by depth are overlaid on RNC 11353. A new shoal was identified with MBES coverage where the location of the 18-foot depth curve has migrated west. All depths are in feet.*

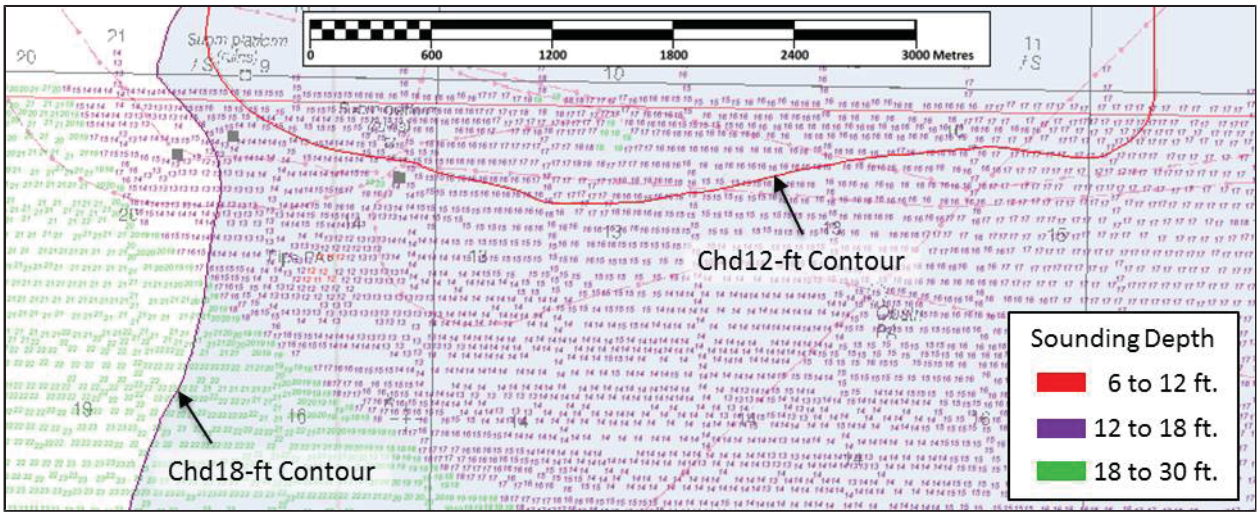


Figure 29: *Surveyed soundings colored by depth are overlaid on RNC 11353. The location of the 12-foot contour in the northeastern portion of the survey area was disproved. All depths are in feet.*

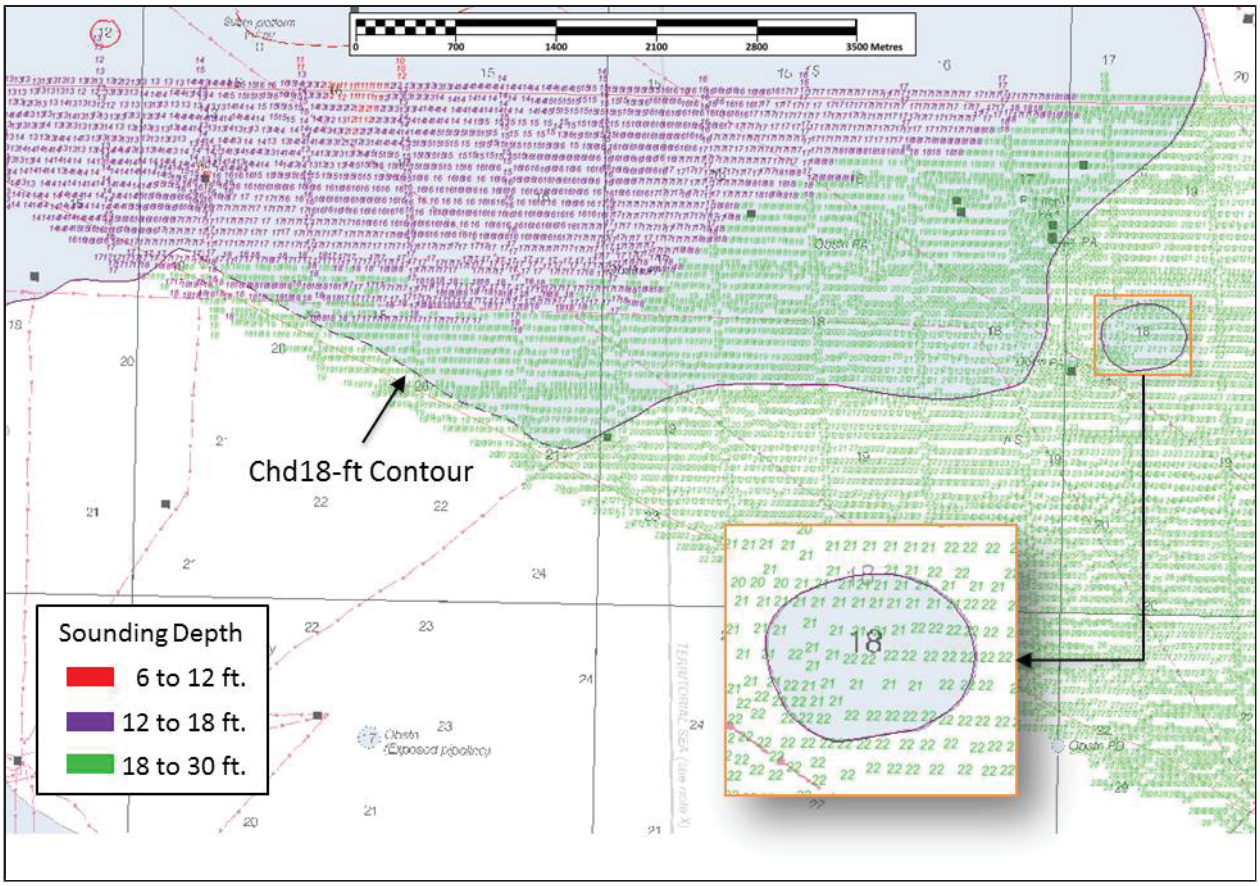


Figure 30: *The charted 18-foot contour in the northwestern portion of the survey area has migrated northwest of its charted location. Survey soundings colored by depth are overlaid on RNC 11353. All depths are in feet.*

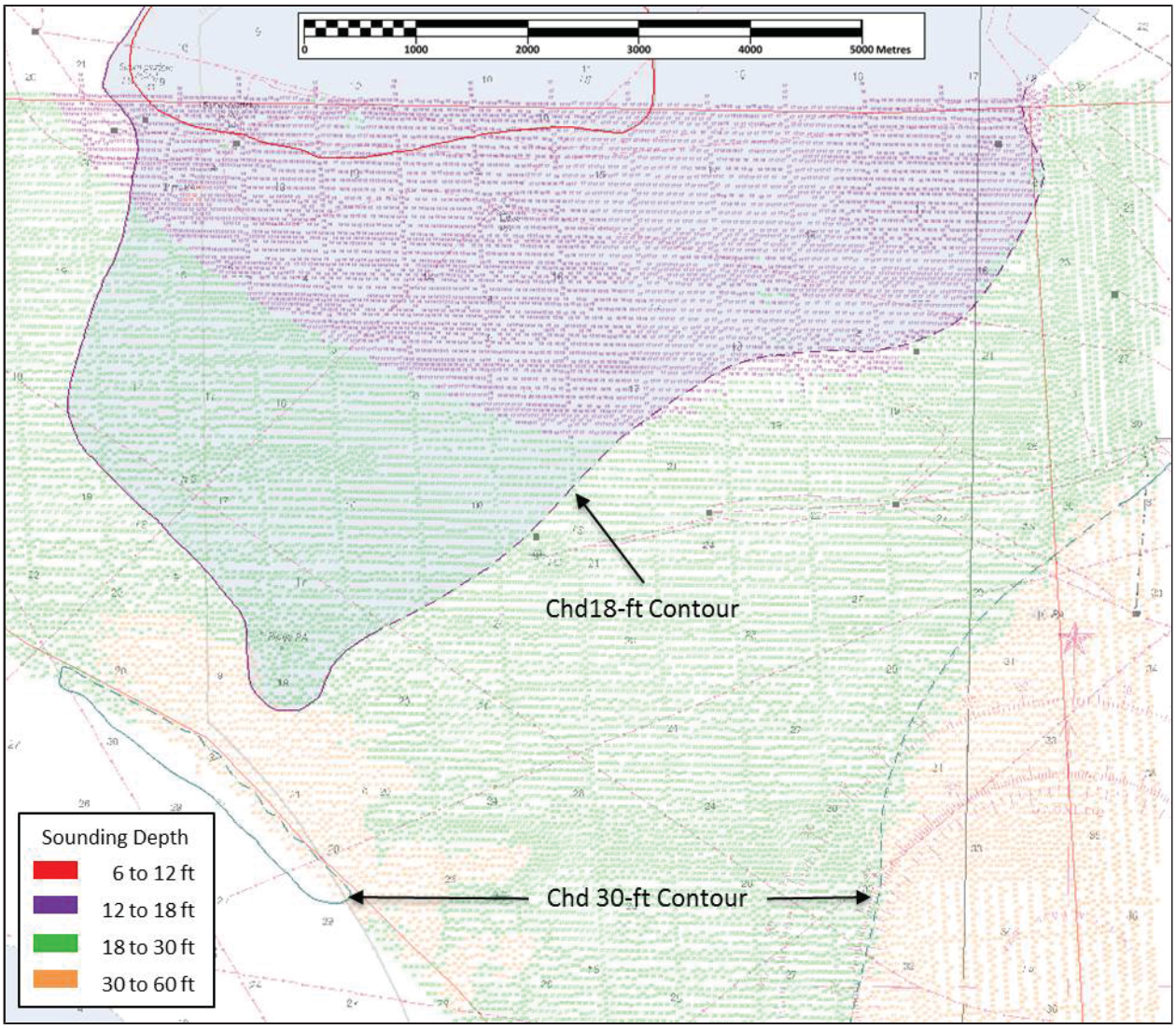


Figure 31: *This figure highlights the areas of good and poor agreement between H12733 survey soundings and the charted 18-foot and 30-foot contours. Survey soundings colored by depth are overlaid on RNC 11353. Most notably, the southern section of the 18-foot contour has migrated over 3 kilometers northeast of its charted location. All depths are in feet.*

11363

All the charted depths and contours on RNC 11363 located within the H12733 survey area coincided with depths from the larger scale chart RNC 11353; therefore, the results from the chart comparison for RNC 11363 are nearly identical to those of RNC 11353. The aspect in which the chart comparisons differ involves a mismatch in the value of the sounding charted at the approximate position of 29-24-28.40 N, 89-04-24.50 W. The sounding value is charted as 32 feet on RNC 11363 in comparison to 19 feet on RNC 11353. Surveyed depths verify the 19-foot depth on RNC 11353 (Figure 32). It is recommended that the 32-foot sounding on RNC 11363 be updated to 19 feet.

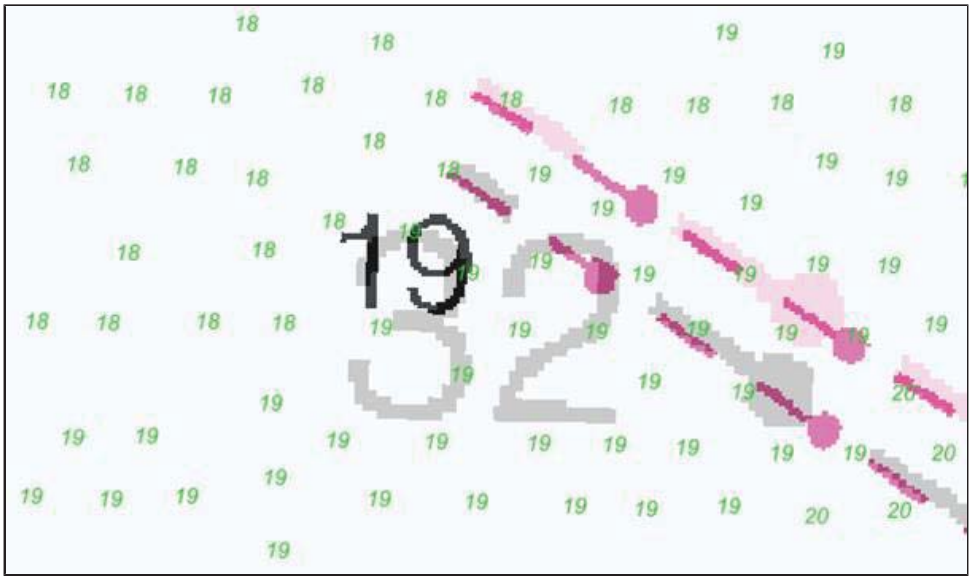


Figure 32: *Surveyed depths are colored in green overlaid on RNCs 11353 and 11363. There is a discrepancy between the sounding value as charted on RNC 11353 (19 feet) and RNC 11363 (32 feet). All depths are in feet.*

<u>11361</u>

There is good agreement between the surveyed depths and the depths charted on RNC 11361, with soundings differing by 0 to 1 foot (0.3 meters). Surveyed depths also agree well with the RNC 11361 30-foot contour, an approximate depth contour.

D.1.2 Electronic Navigational Charts

The following table summarizes pertinent epoch details about the largest scale ENCs assigned for the survey area.

ENC	Scale	Edition	Update Application Date	Issue Date	Preliminary?
US5LA24M	1:40000	39	09/19/2014	09/09/2015	YES
US4LA33M	1:80000	27	08/21/2013	09/09/2015	YES
US4LA34M	1:80000	29	01/06/2015	09/16/2015	YES

Table 16: Largest Scale Electronic Charts

US5LA24M

RNC 11353 is the source for ENC US5LA24M; therefore, the positions and values of the soundings and contours included in ENC US5LA24M are identical to those charted on RNC 11353. All chart comparison notes entered under the RNC 11353 apply to US5LA24M.

US4LA33M

RNC 11361 is the source for ENC US4LA33M; therefore, the positions and values of the soundings included in ENC US4LA33M that coincide with H12733 are identical to those charted on RNC 11361. There is good agreement between the surveyed depths and the soundings from ENC US4LA33M, with soundings differing by 0 to 1 foot (0.3 meters). Surveyed depths also agree well with the ENC US4LA33M 30-foot contour, an approximate depth contour.

US4LA34M

RNC 11363 is the source for ENC US4LA34M; therefore, the positions and values of the soundings included in ENC US5LA24M that coincide with H12734 are identical to those charted on RNC 11363. All chart comparison notes entered under RNC 11363 apply to US4LA34M, including the instance of the mis-matched sounding. The same difference in sounding value is noted between ENCs US5LA24M and US4LA34M, with the 19-foot depth charted on US5LA24M verified by H12733 survey depths (Figure 33). It is recommended that the 32-foot sounding on ENC US4LA34M be updated to 19 feet.

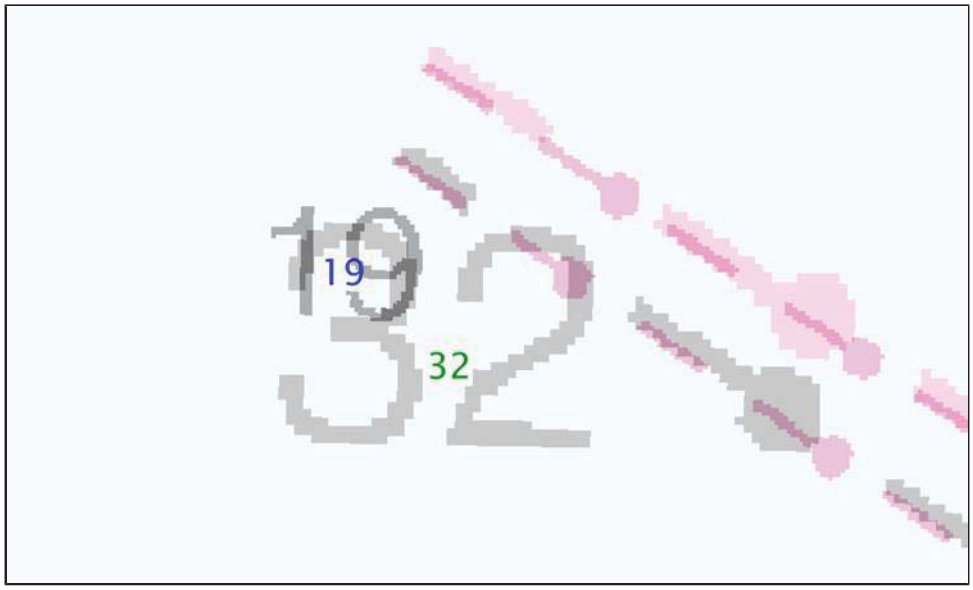


Figure 33: A sounding from ENC US5LA24M colored in blue is compared with a sounding from ENC US4LA34M colored in green, overlaid on partially transparent RNCs 11353 and 11363. All depths are in feet.

D.1.3 AWOIS Items

No AWOIS items were assigned for this survey.

D.1.4 Maritime Boundary Points

No Maritime Boundary Points were assigned for this survey.

D.1.5 Charted Features

Thirteen (13) charted features were assigned for investigation within the Composite Source File (CSF) provided with the OPR-J377-KR-15 Project Instructions: eight (8) OBSTRN/obstructions, one (1) PILPNT/Piling, and four (4) WRECKS/wrecks. Of the thirteen (13) investigated charted features, ten (10) were disproved and three (3) were updated. A description of the result of each feature investigation follows.

A charted "Well" obstruction was located at 29-25-36.45 N, 89-13-43.14 W. The charted Well was found to be a small offshore platform, visible above water. Per the CARIS S-57 Object Catalogue, a wellhead as defined under the CATOBS (category of obstruction) attribute is "a submarine structure projecting some distance above the seabed and capping a temporarily abandoned or suspended oil or gas well." Given that the structure was not submerged, it is recommended that the obstruction symbol be replaced with an offshore platform symbol (OFSPLF). Mounds indicative of a disturbed seafloor were identified at the base of the updated well/platform feature.

An Obstn PA located at 29-25-19.23 N, 89-11-52.82 W was disproved with 200% SSS and Complete MBES coverage. No evidence of an obstruction was found within the area defined by a 100-meter search radius. It is recommended that the Obstn PA be removed from the chart.

A small feature less than 1.5 feet (0.5 meters) tall was identified at position 29-25-22.35 N, 89-10-49.31 W over a charted Obstn PA, alongside a small mound (Figure 34). The insignificant feature's least depth of 18 feet (5.42 meters, ±0.37 TPU) was not shallower than surrounding charted depths and did not pose a danger to navigation. An area defined by a 100-meter search radius centered on the obstruction position was investigated with 200% SSS and partial MBES. No features of significance were identified within the search area. It is recommended that the Obstn PA be removed from the chart.

A charted "Pile (rep) PA" positioned at 29-25-30.94 N, 89-10-02.70 W and a nearby Wreck PA positioned at 29-25-24.09 N, 89-10-01.13 W were disproved with 200% SSS and partial MBES coverage. No evidence of a piling or a wreck were identified within the search areas defined by 100-meter radii centered on each feature. It is recommended that the Pile PA and the Wreck PA be removed from the chart.

The position of an Obstn PA located at 29-24-56.91 N, 89-09-58.30 W was verified with 200% SSS and MBES coverage (Figure 35). Due to a combination of factors including the relatively shallow water surrounding the obstruction (22 feet/ 6.7 meters), the estimated height of the obstruction being over 13 feet (4 meters) tall, and the transducer draft being 4.5 feet/1.4 meters, the survey vessel could not safely "see" over the top of the obstruction with the 7125 MBES. A depth of 9 feet (2.80 meters) was derived for the obstruction by subtracting

the averaged contact height measured in CARIS SSS editor from an average surrounding depth obtained with MBES. A lighted green buoy marked the approximate location of the obstruction.

Publishing the as-surveyed/as-estimated depth of the obstruction may have the effect of causing "deep draft" vessels to steer further clear of the obstruction. This may be especially important in the event that the privately maintained AtoN, the green lighted buoy, is lost or destroyed. It is recommended that the obstruction be updated with the H12733 survey depth and position and the PA be removed. It is also recommended that the privately maintained green buoy is charted at position 29-24-56.87 N, 89-09-57.48 W which is the as-surveyed position of the buoy's clump weight.

A charted "Pipe PA" obstruction located at 29-25-31.00 N, 89-08-19.18 W was disproved with 200% SSS and partial MBES coverage. No evidence of a pipe was found within the area defined by a 100-meter search radius. It is recommended that the Pipe PA symbol be removed from the chart.

A charted Obstn PA position was verified at 29-25-27.13 N, 89-06-38.49 W. The obstruction was developed with object detection MBES coverage and was found to be a bridged crossing of two pipelines where both pipelines were exposed (Figure 36). It is recommended that the obstruction be updated with the surveyed least depth and the PA be removed.

A Wreck PD positioned at the western terminus of a charted pipeline at 29-23-46.02 N, 89-06-24.12 W was disproved with 200% SSS and partial MBES coverage. No evidence of a wreck was found within the area defined by a 150-meter search radius. It is recommended that the wreck PD be removed from all charts.

Two charted "Pipes PA" obstructions were disproved with 200% SSS and partial MBES coverage at their charted locations of 29-23-21.74 N, 89-07-55.40 W and 29-23-17.56 N, 89-07-48.83 W. No evidence of pipes were identified within the search areas defined by 100-meter radii centered on each feature. Several small obstructions of insignificant height were positioned with SSS and MBES coverage approximately 100 to 200 meters east/northeast of the charted pipe obstructions (Figure 37). The features are not navigationally significant; in fact the least depths on the objects are 10 feet deeper than the surrounding charted depths. The AWOIS history for the pipes states: "Numerous pipes and obstructions reported. CG reports that a "responsible dredge removed all pipes and obstns." It appears that the dredge may have missed a few small ones. Due to the insignificance of the new features that were identified, it is recommended that the Pipes PA be removed from all charts.

A Wreck PA positioned at 29-23-31.06 N, 89-03-37.10 W was disproved with 200% SSS and partial MBES coverage. No evidence of a wreck was found within the area defined by a 100-meter search radius. It is recommended that the wreck PA be removed from all charts.

Lastly, a charted Wreck without the distinction of a PA or PD annotation, was disproved at 29-22-06.46 N, 89-06-34.67 W with 200% SSS and complete MBES coverage. No evidence of a wreck was found within the area defined by a 50-meter search radius; however, a linear feature with the appearance of an arched pipeline was developed in the vicinity of the charted wreck. It is recommended that the wreck be removed from all charts.

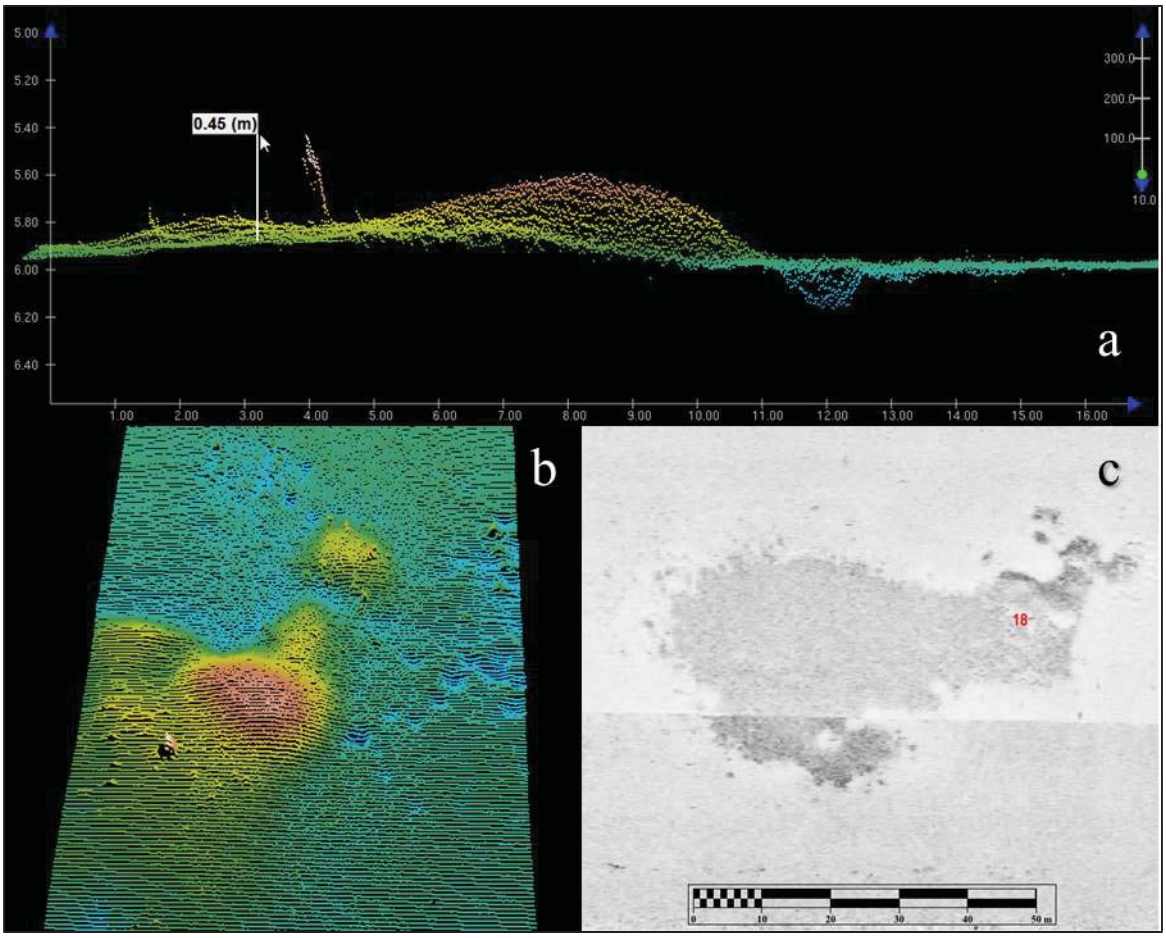


Figure 34: *An insignificant feature alongside a small mound was positioned over a charted Obstn PA. The features are shown in the CARIS Subset Editor 2D window (a) and 3D window (b). A pronounced difference in the seafloor's reflective properties was visible in the SSS imagery surrounding the charted Obstn PA symbol, suggestive of a change in bottom type.*

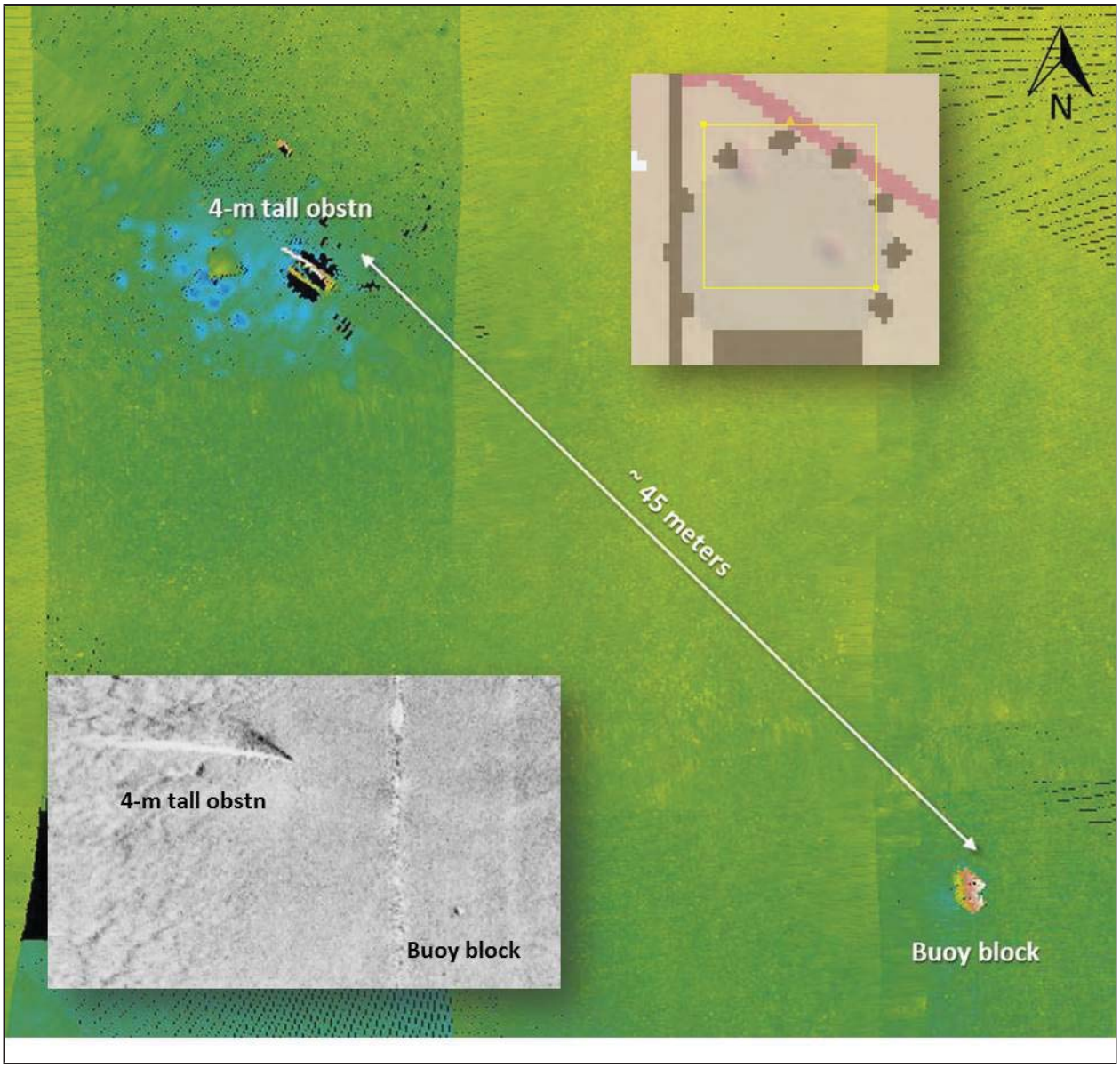


Figure 35: *The verified obstruction is shown in CARIS Subset Editor 3D in reference to the block for a new lighted buoy. The inset in the lower left corner presents both features as they appear in the SSS imagery.*

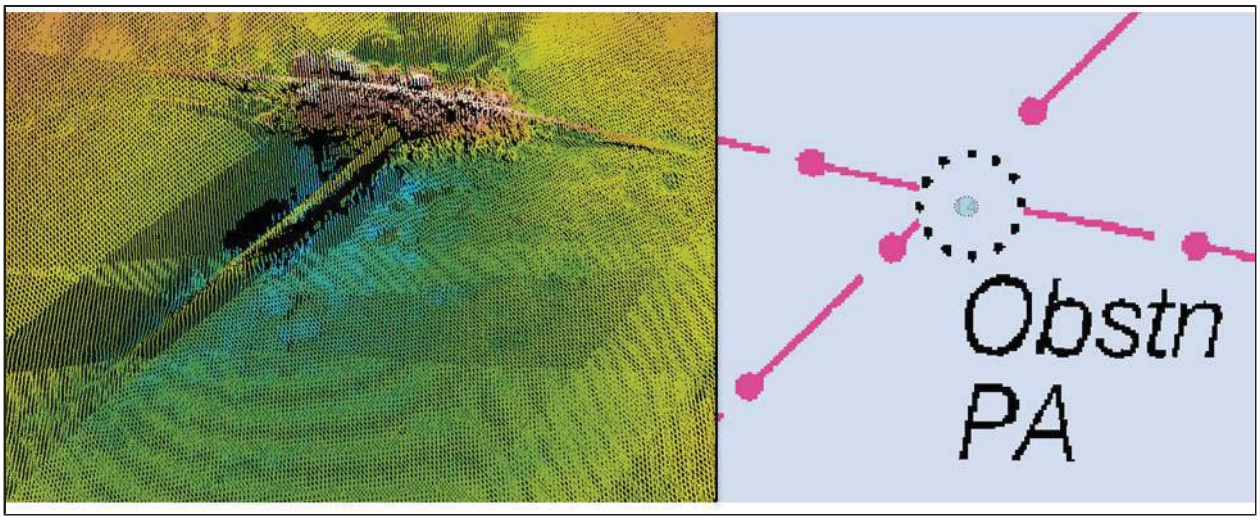


Figure 36: *An obstruction PA was verified and found to be a crossing of two exposed, charted pipes.*

Figure 37: *On the left, the locations of two insignificant features (blue 28 and 27 foot objects) are shown relative to the charted Pipes PA obstructions. The right image is a screen grab of the pipes in CARIS Subset Editor with the soundings colored by depth.*

D.1.6 Uncharted Features

No uncharted features from miscellaneous sources were provided for investigation for Survey H12733. However, multiple new, uncharted features were identified and are included in the S-57 Final Feature File.

D.1.7 Dangers to Navigation

The following DTON reports were submitted to the processing branch:

DTON Report Name	Date Submitted
H12733_DtoN_1.000	2015-07-24
H12733_DtoN_2.000	2015-09-11

Table 17: DTON Reports

Two (2) Danger to Navigation (DtoN) S-57 files (.000) were submitted to the Atlantic Hydrographic Branch (AHB) for Survey H12733. The DtoN #1 submission included position and depth updates for a charted Obstn PA and reported the new lighted buoy that marked the 13-foot (4-meter) tall obstruction. AHB decided not to forward the obstruction and buoy on to the Marine Chart Division (MCD) because the obstruction's new position was located inside the charted Obstn PA symbol and it was well marked with a lighted navigation aid. This information was shared with OSI in an email pertaining to DtoN #1 dated July 24, 2015.

Included in H12733 DtoN #2 were a total of fourteen (14) possible exposed pipeline features that were submitted as DtoNs following guidance found in Section 8.1.3 of the 2014 HSSD which states that "Dangers to Navigation shall be recommended for," among other things, "Exposed or leaking submerged pipelines." AHB chose not to submit the pipeline DtoNs to the MCD. AHB's reasoning, shared with OSI in an email pertaining to contemporary Survey H12734 DtoN #1 and sent on July 29, 2015, holds true for all pipeline features within the project area. The email states, "AHB will not be submitting these features to Nautical Data Branch and Marine Chart Division based upon the fact it does appear to be elevated pipelines and the location is on and/or near charted pipelines. The charted pipelines are linear obstructions and the chart includes a note to exercise caution in pipeline areas." AHB submitted the reported features to NOAA's Central Gulf Coast Navigation Manager Tim Osborn such that the information could be relayed to the proper authorities.

The DtoNs are included in the H12733 S-57 Final Feature File, H12733.FFF.000. Danger to Navigation Reports as well as correspondence regarding the DtoN submissions are included in Appendix II of this report.

D.1.8 Shoal and Hazardous Features

A Caution Area (CTNARE) encompasses all the affected charts within the OPR-J377-KR-15 project area. The CTNARE's Information field states: "Uncharted platforms, gas and oil well structures, pipes, piles and stakes can exist within the limits of this chart." A number of exposed pipe features and obstructions were identified with the MBES and SSS data within the H12733 survey area, which corroborates the caution area statement.

D.1.9 Channels

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

D.1.10 Bottom Samples

Eight (8) bottom samples were acquired to determine bottom characteristics. Bottom samples were assigned in the PRF provided with the Hydrographic Survey Project Instructions. There were no deviations from the assigned bottom sampling plan. A position and description of each sample are provided as attributed SBDARE objects in the FFF. Digital images with identification reference numbers are submitted with the survey data and referenced in the NOAA extended attributes 'images' field.

D.2 Additional Results

D.2.1 Shoreline

No shoreline exists within this survey.

D.2.2 Prior Surveys

Prior survey data exists for this survey area. However, with the exception of the assigned junction surveys, prior data were not investigated.

D.2.3 Aids to Navigation

Several temporary white buoys were located in the vicinity of 29-25-46.80 N, 89-12-10.80 W over what appears to be an excavation area. Scrape marks that appear to have been caused by a dredge bucket were located west of an approximately 100-meter long dredged trench (Figure38). At least seven small white buoys were visible on the surface above the disturbed seafloor (Figure 39).

An uncharted navigation aid, a lighted, green buoy, was positioned with MBES coverage over a charted obstruction symbol (Figure 40). The buoy is presumed to be private as it is marked "Century Corporation Hazard," with the purpose of the buoy to identify a navigational hazard. The navigation aid was included in the DtoN #1 submission and it appears to be permanent; therefore, it was included in the H12733 FFF.

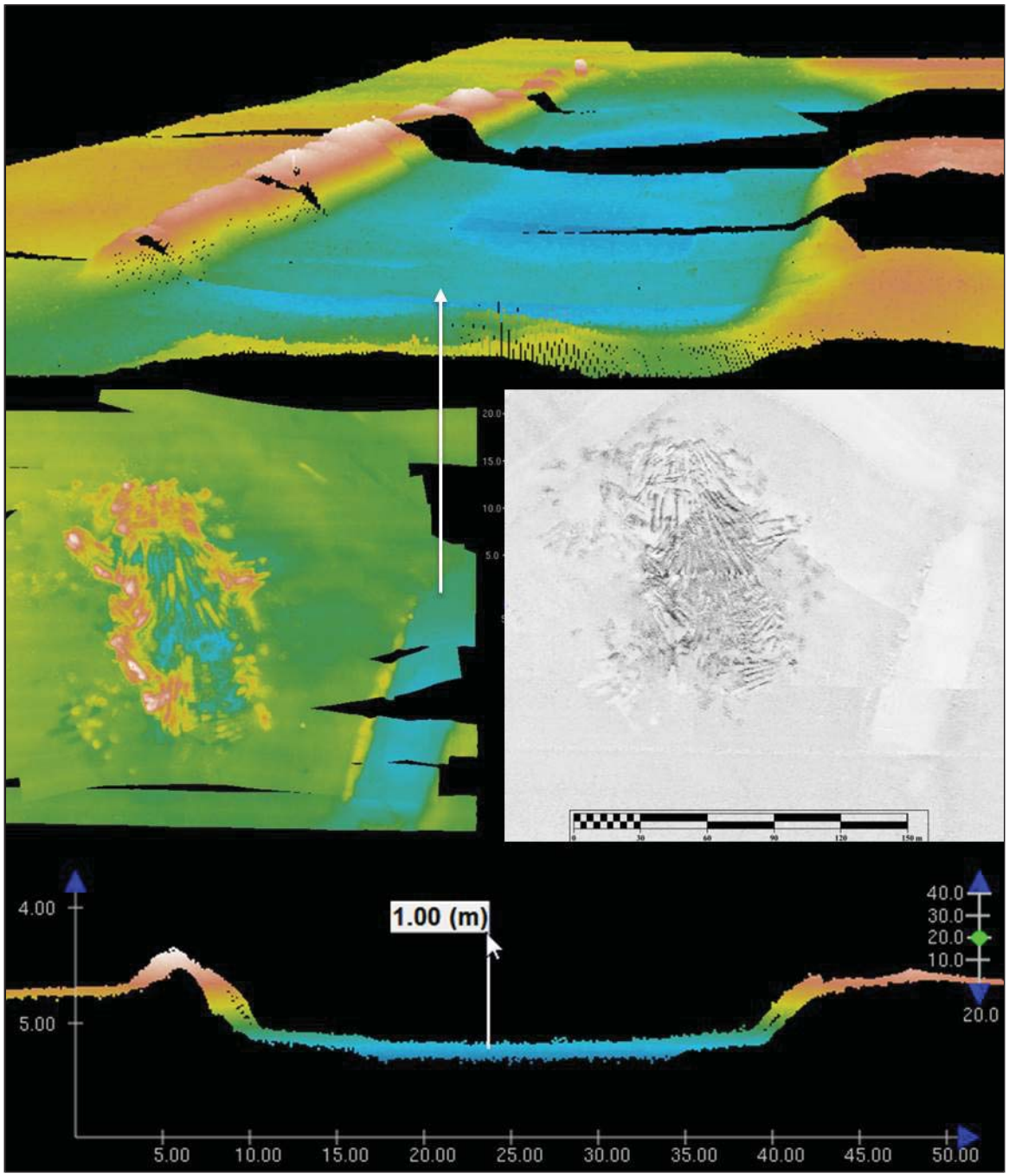


Figure 38: *Dredge/excavation area marked by the temporary buoys as displayed in CARIS Subset Editor and Sidescan Editor.*

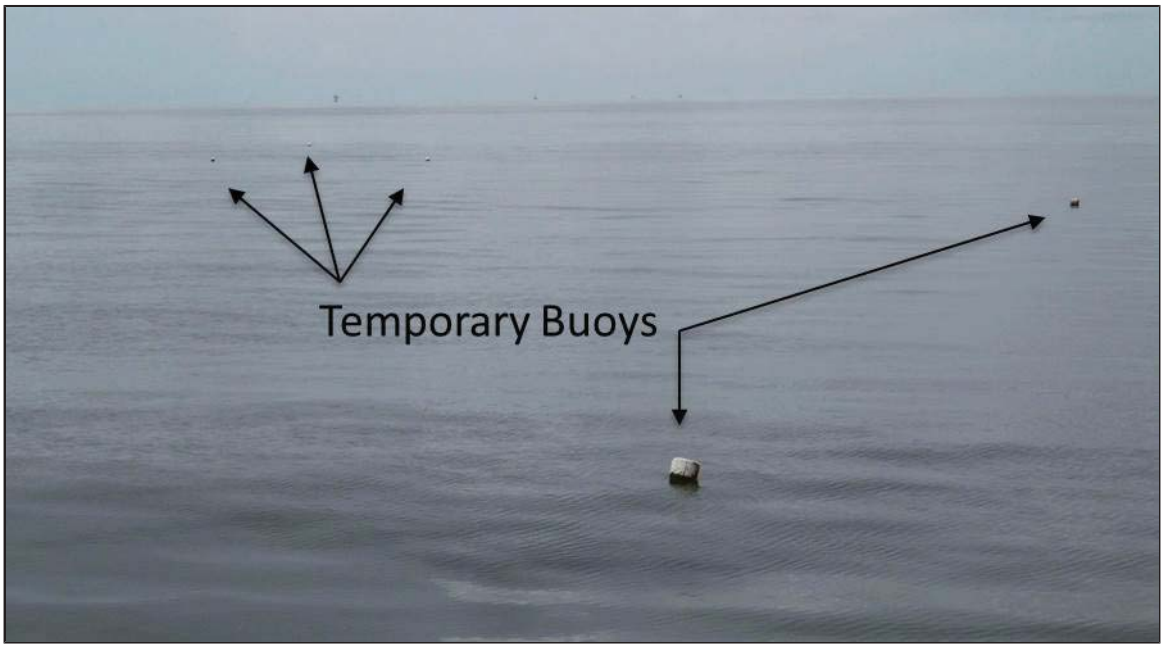


Figure 39: *Multiple small white buoys were positioned over a dredge/excavation area. The buoys are not permanent aids to navigation.*

Figure 40: *An uncharted lighted buoy marked "Century Corporation Hazard " was positioned in the vicinity of a dangerous charted obstruction.*

D.2.4 Overhead Features

Overhead features do not exist for this survey.

D.2.5 Submarine Features

An abundance of charted pipelines are located within Survey H12733. Pipes colored magenta represent supply pipelines for oil, gas, chemicals, or water, according to Chart No. 1: Nautical Chart Symbols, Abbreviations and Terms downloaded from the Office of Coast Survey (OCS) website (Figure 41).

None of the charted pipelines have a buried depth value (BURDEP). That being said, the majority of the charted pipelines were not visible in the SSS or MBES data.

Multiple linear contacts presumed to be exposed sections of charted pipelines were selected in the side scan records. Most were confirmed with MBES coverage. Some sections of pipeline had a measurable height above the seafloor while others had little to no vertical relief. All pipelines visible in the SSS record, were digitized in CARIS SIPS Side Scan Editor as linear pipeline contacts whether buried in a trench or lying exposed on the surface. As mentioned in the DtoN section of this report, fourteen (14) exposed pipeline sections were presented with the DtoN #2 submission for this survey. The exposed pipeline sections and relevant attribution are included in the H12733 S-57 Final Feature File.

Review of information contained in a shape file (.SHP) downloaded from the Bureau of Ocean Energy Management (BOEM) on October 3, 2014 suggests that there may be several uncharted pipelines within Survey H12733. The BOEM pipeline shape file that intersects with the OPR-J337-KR-15 project area was reprojected to UTM Zone 16N, NAD83 and saved as a .DXF file. The BOEM pipeline DXF file was then visually compared to the charted pipelines within the project area to identify any uncharted BOEM pipelines. Figure 42 provides an overview of the disparity between charted and BOEM-defined pipelines within Survey H12733.

The shape file, “ppl_arcs.shp” and re-projected .DXF file, “Pipelines_UTM_16N_NAD83_Meters.dxf” are included with the digital deliverables along with the RNC/ENC charts considered in the chart comparison. BOEM pipeline data were obtained at the following web address: http://www.data.boem.gov/homepg/data_center/mapping/geographic_mapping.asp.

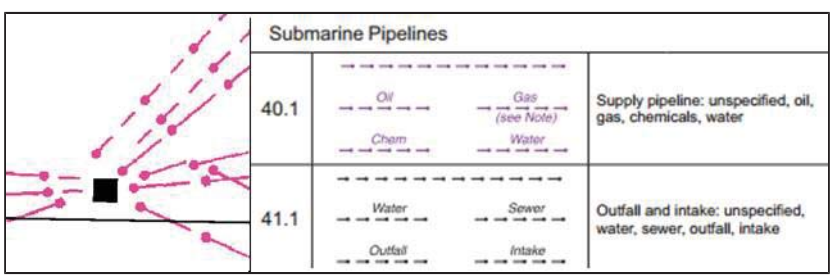


Figure 41: *On the left, an example of charted pipelines from RNC 11353. On the right, a screen grab from Chart No. 1, Section L Offshore Installations, explain the NOAA chart symbols for the submarine pipelines encountered within OPR-J377-KR-15.*

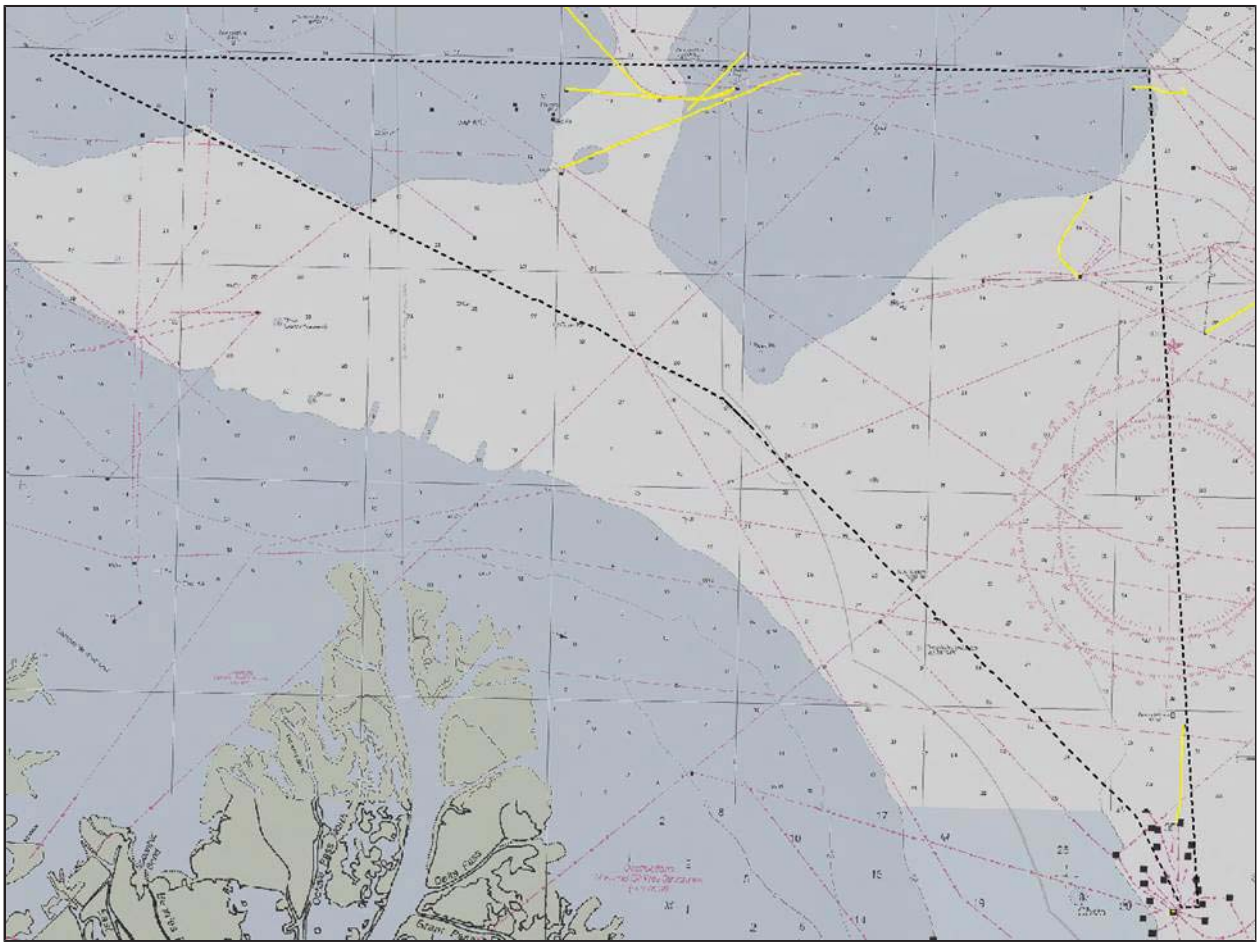


Figure 42: *The yellow lines represent BOEM-defined pipelines that are not depicted on RNCs 11353 and 11361.*

D.2.6 Ferry Routes and Terminals

No ferry routes or terminals are located within the survey.

D.2.7 Platforms

Thirty-two (32) "assigned" platforms were included in the Composite Source File (CSF). Fourteen (14) of the platforms were verified visually on the surface at their CSF-described locations and positioned with SSS and/or MBES coverage. New positions are recommended for five (5) of the charted platforms, where the difference between the platform's surveyed position and its charted position was greater than 2mm at the scale of the survey (e.g. 40m for 1:20,000). Two of the five platforms with updated positions were composed of expansive, multi-towered constructions; the extents of these multi-platform features were not well represented by a single platform point symbol. Therefore, it is recommended that the platforms charted at 29-25-47.20 N, 89-08-47.60

W and 29-25-44.08 N, 89-08-06.65 W be deleted and replaced with one or more point platform symbols at the new positions of the individual platform towers, as represented in the FFF (Figures 43 and 44).

During a pre-survey chart review, an additional charted platform was identified on RNC 11361 and ENC US4LA33M at position 29-18-53.16 N, 89-03-29.71 W that was not assigned in the project CSF. The un-assigned platform's RNC symbol was directly adjacent to a second charted platform to its west that was assigned in the CSF. The assigned charted platform was positioned at 29-18-54.17 N, 89-03-33.29 W. Both the unassigned and assigned platforms' were investigated by the field team; a single platform was positioned with SSS and MBES data at 29-18-54.08 N, 89-03-30.07 W. It is recommended that both charted platform symbols be removed from RNC 11361 and ENC US4LA33M, and a single platform symbol be added at the H12733 surveyed position.

Thirteen (13) platforms were disproved with 200% SSS and partial/complete MBES coverage, including all five (5) of the charted submerged platforms. One of the submerged platforms, Century-109-6, located at 29-25-43.00 N, 89-07-25.90 W has already been deleted from RNC 11353 and 11363 per LNM 32/15 with the changes posted on August 27, 2015. As of September 11, 2015, the date the charts were downloaded to complete the H12733 chart comparison, the submerged platform was still included on ENCs US5LA24M and US4LA34M.

For specific information regarding each verified, updated, or deleted platform see the S-57 final feature file. Existing platform pictures are included under the NOAA Extended Attribute "images."

Figure 43: *On the left, the surveyed positions of the three-towered platform visible in a SSS mosaic are shown in respect to the charted platform position on RNC 11353, with the recommended new platform positions shown in black. The right image captures the platform's surface presence.*

Figure 44: *On the right, the surveyed positions of the three-towered platform visible in a SSS mosaic are shown in respect to the charted platform position on RNC 11353, with the recommended new platform positions shown in black. The left image captures the platform's surface presence.*

D.2.8 Significant Features

Many small circular depressions are visible in the MBES data throughout the survey area (Figure 45). The holes are randomly spaced, less than 50 centimeters deep, and do not appear to be associated with industrial activity. They are more likely related to a natural phenomenon, possibly ground fish-created habitat, as some species in the Gulf of Mexico (i.e. red grouper) are known to excavate depressions in flat, sandy bottoms (See Wall, Carrie C., et al. "Spatial and temporal variability of red grouper holes within Steamboat Lumps Marine Reserve, Gulf of Mexico." Marine Ecology Progress Series (Impact Factor: 2.62). 2011. 431:243-254.)

A large, oval mound, possibly a sediment cap, was developed with MBES coverage at the location of a disproved charted platform located at 29-25-25.33 N, 89-10-04.21 W. The mound measures approximately 150 meters by 80 meters, with a height of 2 feet (60 centimeters). The presumed sediment cap area has a stronger acoustic return than the surrounding seafloor, indicating the mound is composed of a coarser sediment than the natural seafloor (Figure 46).

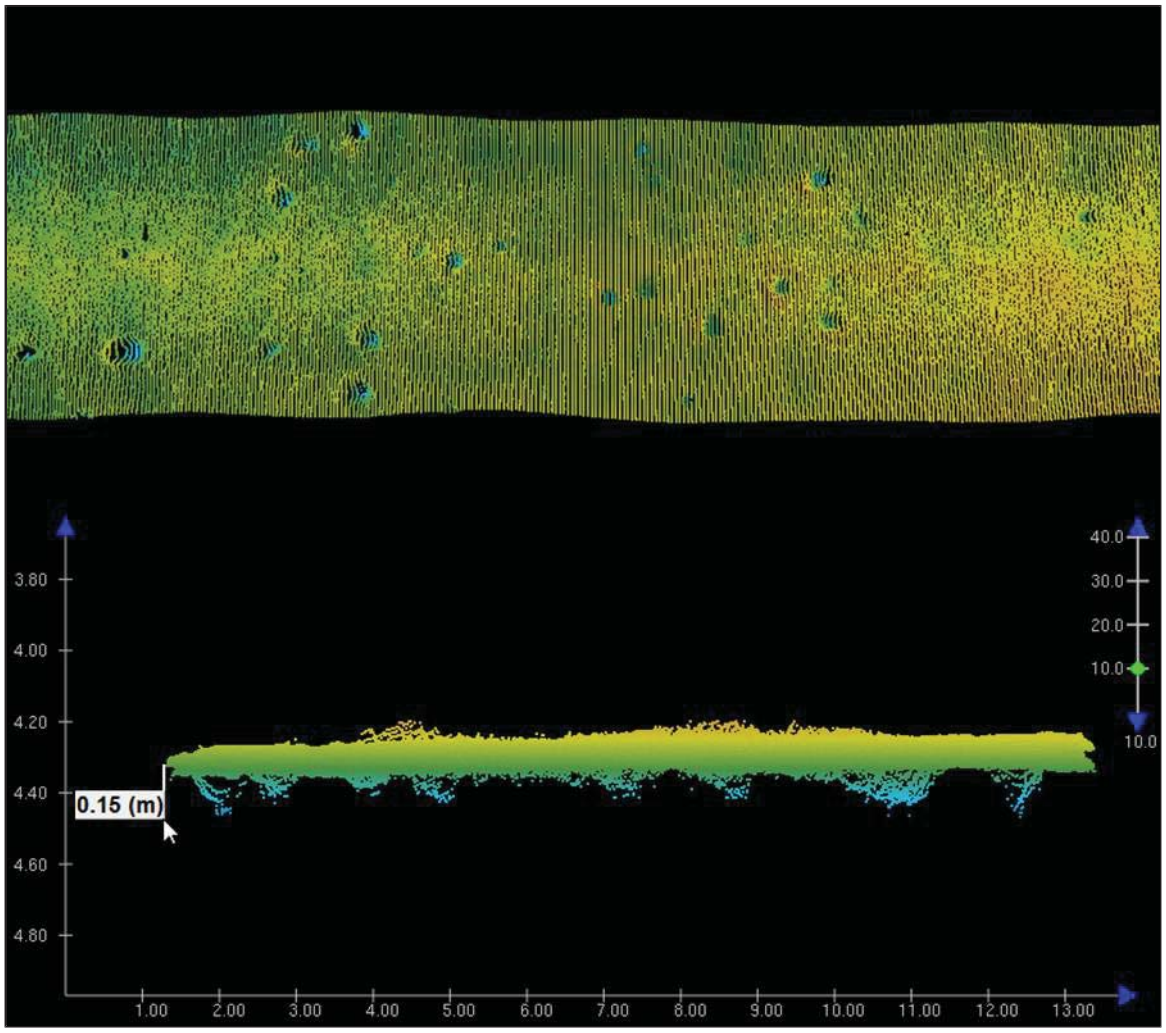


Figure 45: *Possible ground fish habitat holes as they appeared in the MBES data, displayed in CARIS Subset Editor 3D and 2D windows with the soundings colored by depth.*

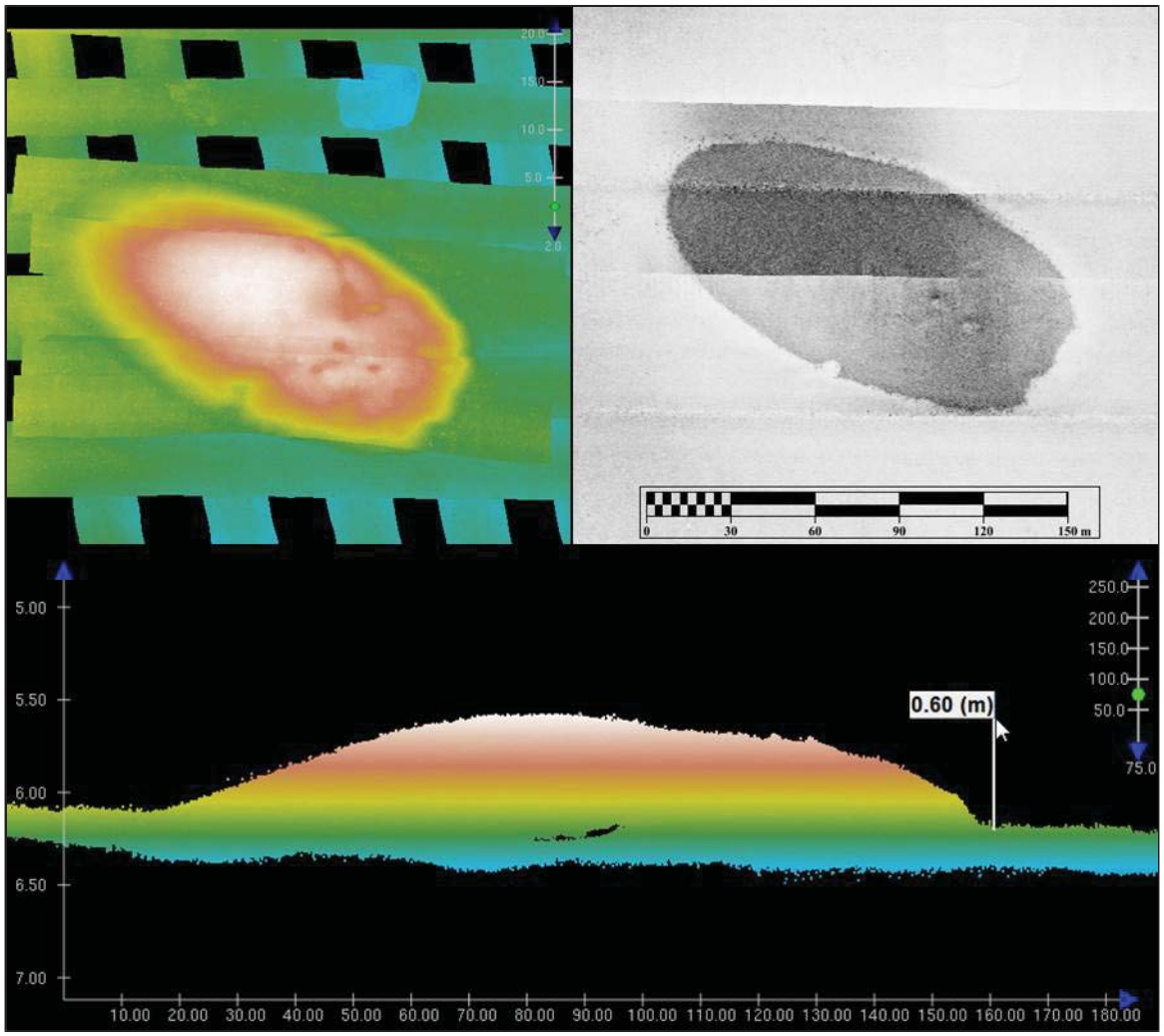


Figure 46: *Possible sediment cap as it appeared in the MBES data as displayed in CARIS Subset Editor 3D and 2D windows with the soundings colored by depth (top left and bottom), and as it appeared in the SSS coverage mosaic (top right).*

D.2.9 Construction and Dredging

Evidence of prior dredging and trench laying was identified in survey data at several locations within the survey area. In the southeastern corner of the H12733 survey area, several trenches and multiple depressions left by temporary jack-up rigs are visible in the SSS imagery and the MBES data in the vicinity of platforms charted at 29-18-52.91 N, 89-03-29.33 W and 29-18-43.71 N, 89-03-30.21 W (Figure 47).

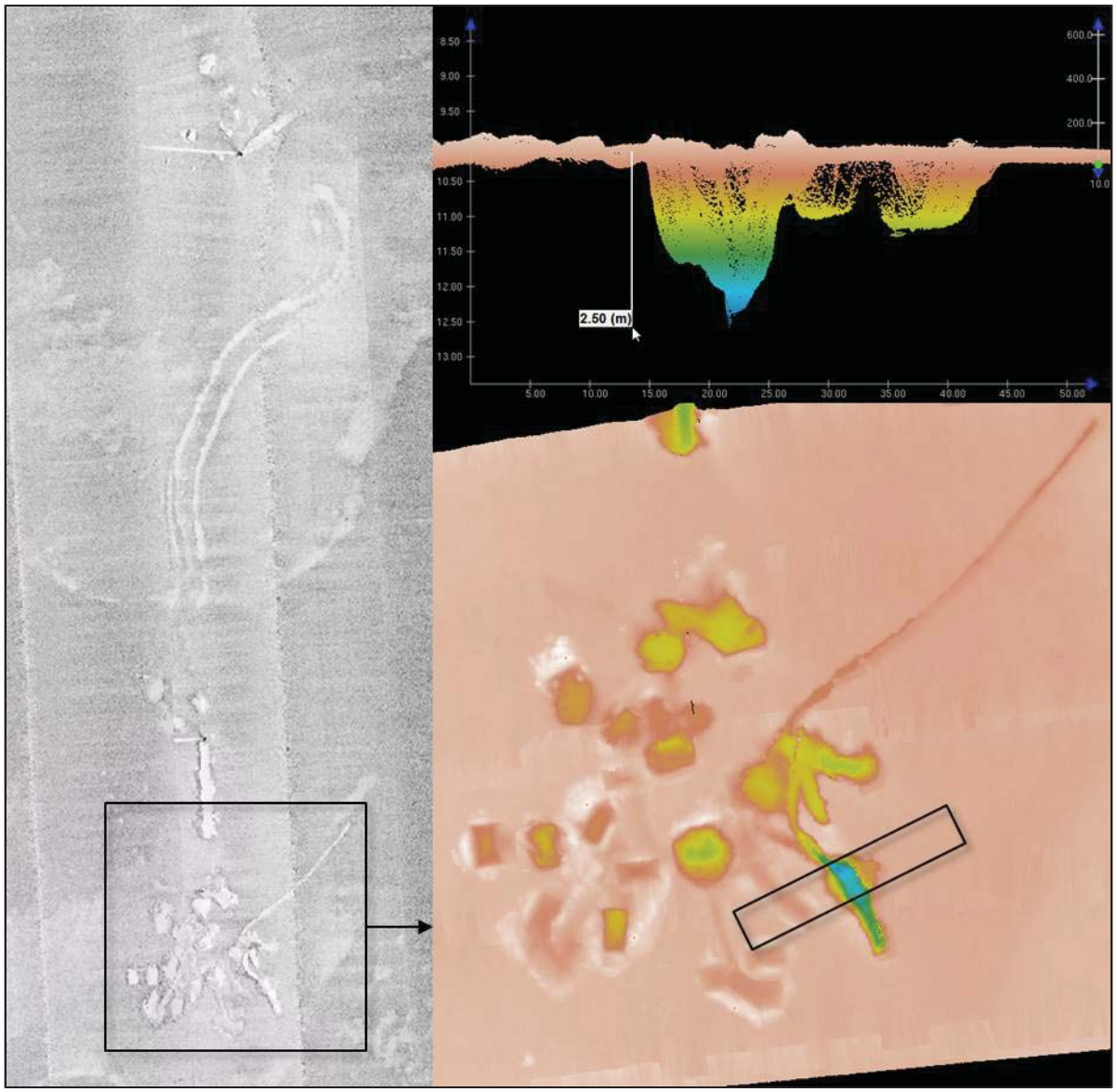


Figure 47: *On the left, drag marks, trenches, and depressions surrounding two platforms are shown in the SSS coverage mosaic. The images on the right are screen grabs from CARIS Subset Editor displaying the trenching and seafloor depressions surrounding the southern platform.*

D.2.10 New Survey Recommendation

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

D.2.11 New 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 and Specifications Deliverables Manual, Field Procedures Manual, Letter Instructions, and all HSD Technical Directives. These data are adequate to supersede charted data in their common areas. This survey is complete and no additional work is required with the exception of deficiencies noted in the Descriptive Report.

Report Name	Report Date Sent
Data Acquisition and Processing Report	2015-11-19
Horizontal and Vertical Control Report	2015-11-19

Approver Name	Approver Title	Approval Date	Signature
George G. Reynolds	Chief of Party	11/19/2015	

Digitally signed by George G. Reynolds
Date: 2015.11.17 17:46:29 -05'00'

APPENDIX I

TIDES AND WATER LEVELS

The following table summarizes the days in which 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
06/19/2015	170	18:25:49	21:42:00
06/20/2015	171	20:14:54	23:46:21
06/21/2015	172	00:40:37	18:29:55
06/28/2015	179	22:29:44	23:53:04
06/29/2015	180	00:43:43	23:52:57
06/30/2015	181	00:28:58	23:52:59
07/01/2015	182	00:30:47	23:48:50
07/02/2015	183	00:33:57	11:09:06
07/05/2015	186	19:14:21	23:52:34
07/06/2015	187	04:45:31	23:56:17
07/07/2015	188	00:42:09	17:08:30
07/08/2015	189	00:23:12	23:55:18
07/09/2015	190	00:35:53	23:56:55
07/10/2015	191	00:30:15	22:06:48
07/11/2015	192	15:03:20	16:20:22
07/12/2015	193	11:38:15	12:02:42
07/13/2015	194	20:24:41	23:51:17
07/14/2015	195	00:18:48	22:53:38
07/15/2015	196	00:48:07	07:28:40
07/16/2015	197	02:02:11	12:02:02
07/19/2015	200	02:07:00	23:54:41
07/20/2015	201	00:29:38	23:53:17
07/21/2015	202	00:16:09	02:14:19
07/23/2015	204	11:55:36	13:22:16
07/24/2015	205	00:58:05	23:53:29
07/25/2015	206	00:33:02	23:49:40
07/26/2015	207	00:20:37	01:13:44

Water level data from NOS-NOAA tide station 876-0922, Pilots Station East, SW Pass, LA was used for vertical control. Predicted tide files were used during preliminary processing. Preliminary tides from the Pilots Station East station were downloaded and reviewed for data gaps. Verified tides were downloaded and reviewed when available.

The Verified tide curve contains numerous short period "data spikes" of relatively large magnitude, e.g. some spikes were over 50% of the total range of tide on a given day. While the true cause of the data spikes is not know it is suspected that wakes caused by passing ships are to blame. With CO-OPS approval OSI removed the spurious tide data via application of a fourth-order, zero-lag, Butterworth low-pass filter using a sampling frequency of 120 with a cut-off frequency of 5. The e-mail chain regarding verified tide data filtering is included below and also in DR Appendix II along with other key project correspondence.

Final project data are delivered with filtered, verified tides applied using the zoning file "J377KR2015RevCORP.zdf" provided by CO-OPS and verified by OSI.

Based on the results of cross line analysis, it appears that the time and range factors as provided in the preliminary zoning scheme are adequate in light of the tide error budget for this project which is defined in the Tides SOW as 0.30 meters.

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

Table 2
Tide Zones Associated with Project OPR-J377-KR-15

Zone	Time Correction	Range Correction
CGM228	+12	1.01
CGM115	+24	1.01
CGM116	+24	1.05
CGM119	+36	1.01
CGM120	+36	1.09
CGM119a	+30	0.97
CGM123	+48	1.01
CGM124	+48	1.09
CGM125	+60	1.01
CGM131	+66	1.01
CGM100	+78	1.05
CGM101	+90	1.05
CGM102	+102	1.09
CGM103	+114	1.09

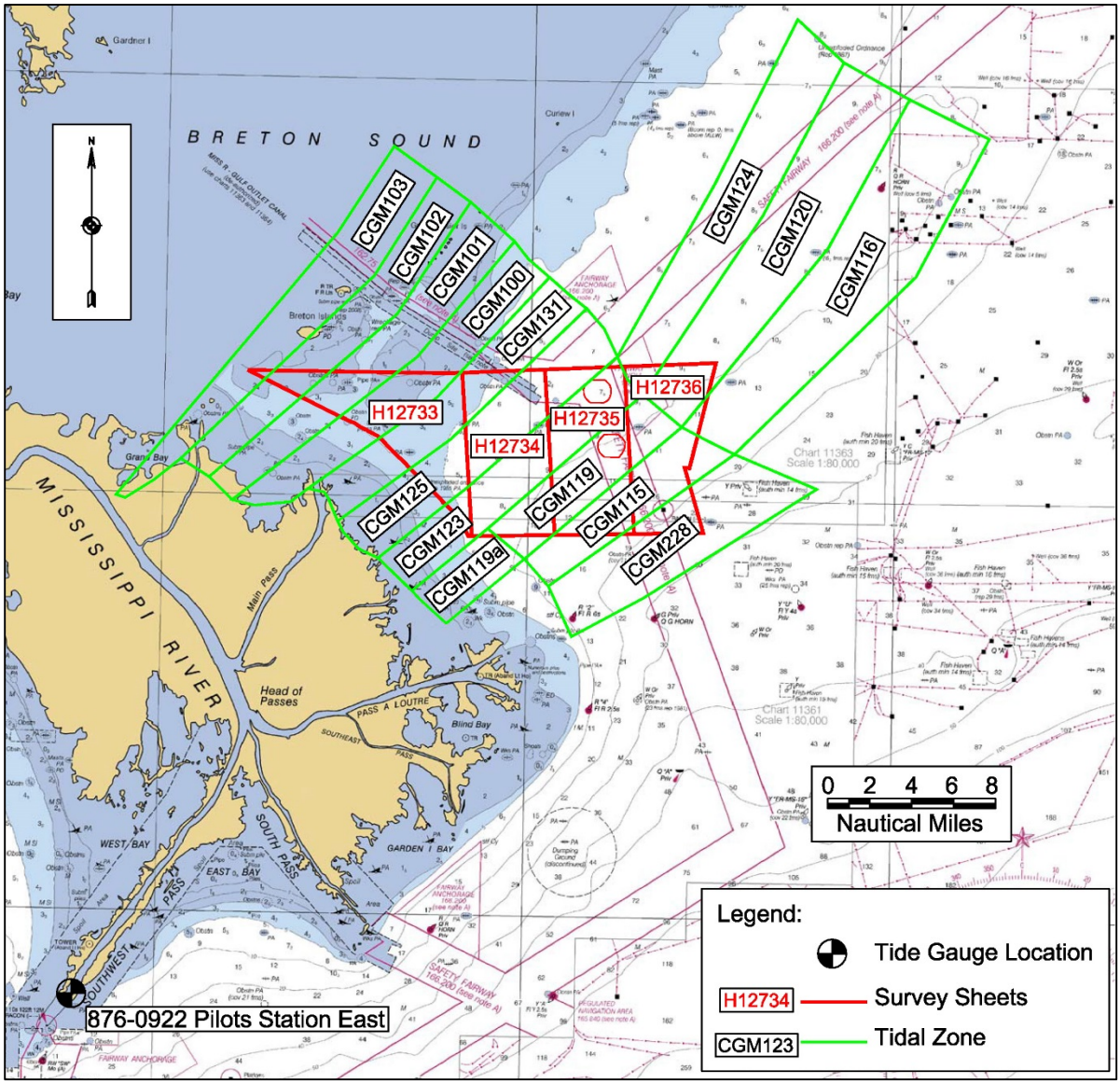


Figure 1. Project survey boundaries (red lines), tidal zone boundaries (green lines), and the Pilots Station East, LA tide station location.

E-mail Chain Regarding Verified Tide Data Filtering

From: Paul Turner - NOAA Federal <paul.turner@noaa.gov>
Date: 09/03/2015 10:39 AM (GMT-05:00)
To: David Somers <dts@oceansurveys.com>, George Reynolds <ggr@oceansurveys.com>
Cc: Katrina Wyllie - NOAA Federal <Katrina.Wyllie@noaa.gov>, Michael Gonsalves - NOAA Federal <michael.gonsalves@noaa.gov>
Subject: Re: Pilots Station gauge data

Hi Dave-

I've received a feed-back from CO-OPS regarding your tides questions and have copied it below:

'OSI may proceed with using the filtered data set for Pilots Station East. The filtered data

captures the tide signal well' Please let me know if you have any other questions.

Paul

From: Paul Turner - NOAA Federal <paul.turner@noaa.gov>
To: David Somers <dts@oceansurveys.com>
Cc: "Katrina.Wyllie@noaa.gov" <Katrina.Wyllie@noaa.gov>; George G. Reynolds <ggr@oceansurveys.com>
Sent: Tuesday, September 1, 2015 1:42 PM

Subject: Re: Pilots Station gauge data

HI Dave-

I forwarded you request over to CO-OPS last week and will follow-up with them to check on this.

I will forward the response to you as soon I hear back from them.

Paul

On Tue, Sep 1, 2015 at 9:18 AM, David Somers <dts@oceansurveys.com> wrote: Hi Paul,

Has CO-OPs had a chance to review our smoothed tides? We'd like to apply final tides as soon as possible.

Thanks,
Dave

From: David Somers <dts@oceansurveys.com>
To: "paul.turner@noaa.gov" <paul.turner@noaa.gov>; "Katrina.Wyllie@noaa.gov" <Katrina.Wyllie@noaa.gov>
Cc: George G. Reynolds <ggr@oceansurveys.com>; Bonnie Johnston <blj@oceansurveys.com>
Sent: Friday, August 21, 2015 12:12 PM
Subject: Re: Pilots Station gauge data

Hi Paul,

OSI would like CO-OPS to review our application of a low pass filter to the Pilots Station East (8760922) data.

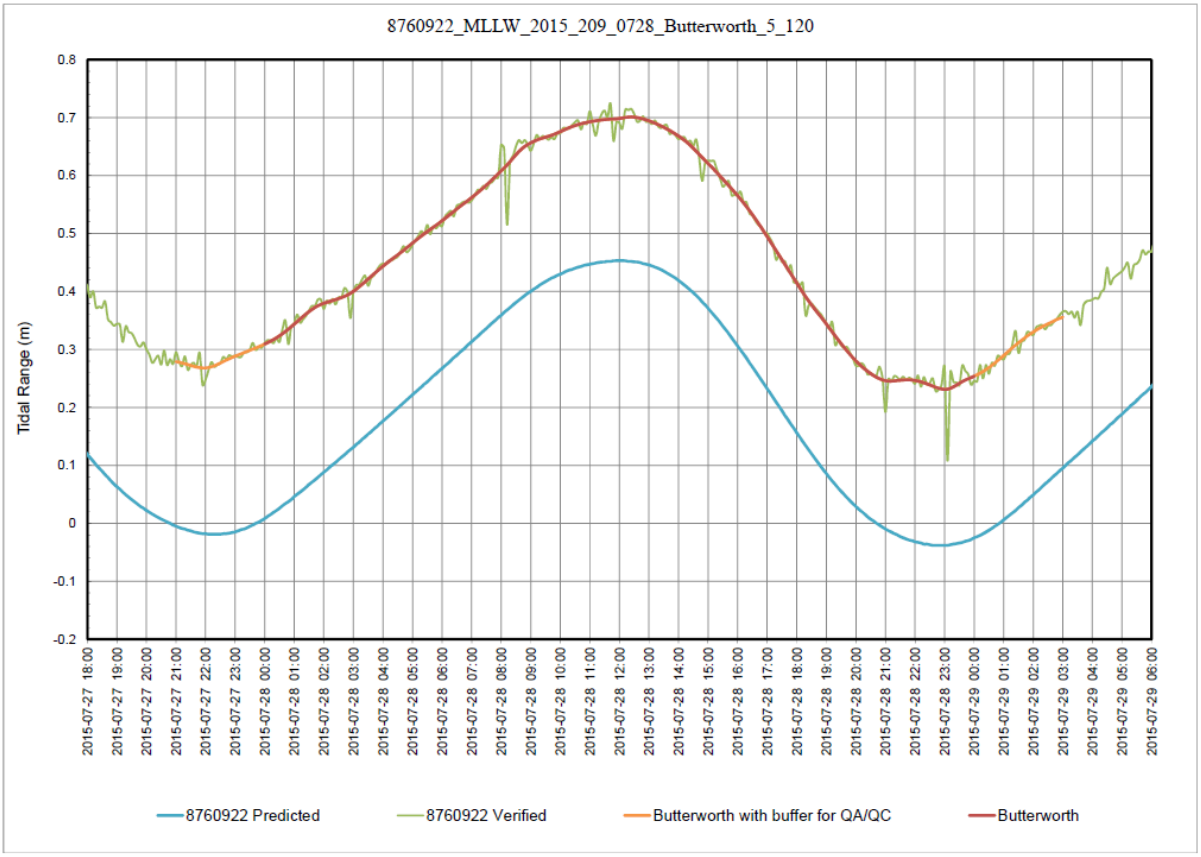
We applied a fourth-order zero-lag Butterworth low-pass filter on the Pilots Station East, LA (8760922) verified 6-minute MLLW water level data using a sampling frequency of 120 with a cut-off frequency of 5 to produce final processed data. It is our intent to use the filtered data in conjunction
with the project tidal zoning scheme provided by CO-OPS.

Attached is a PDF with daily tide graphs for the duration of our survey and a zip file containing unfiltered and filtered 6 min ASCII data in *.tid format.

Please let me know if you need anything else or have questions.

Thanks,
Dave

Example of daily tide graph included in this e-mail chain.



-----Original Message-----
From: Paul Turner - NOAA Federal [mailto:paul.turner@noaa.gov] Sent:
Tuesday, May 5, 2015 1:56 PM
To: George Reynolds <ggr@oceansurveys.com>
Cc: Katrina Wyllie - NOAA Federal <Katrina.Wyllie@noaa.gov>; Michael Gonsalves
- NOAA Federal <michael.gonsalves@noaa.gov>
Subject: Pilots Station gauge

Hi George-

Do you have a few minutes to talk about the Tides question you had for the Brenton Sound project. We heard back from CO-OPS regarding your proposed approach of applying a low pass filter through the data for the Pilots
Station gauge which is acceptable.

Let me know what you'd like to do and I can be reached at 301-713-2777 ext 153 if you'd like to discuss this.

Paul
--
Paul Turner Program
Analyst

Tides Statement of Work

STATEMENT OF WORK
OPR-J377-KR-2015 Vicinity of Breton Sound, LA (Revised)
(12/09/2014 HY)

1.0. TIDES AND WATER LEVELS

1.1. Specifications

Tidal data acquisition, data processing, tidal datum computation and final tidal zoning shall be performed utilizing sound engineering and oceanographic practices as specified in National Ocean Service (NOS) Hydrographic Surveys Specifications and Deliverables (HSSD), dated April 2014.

1.2. Vertical Datums

The tidal datums for this project are Chart Datum, Mean Lower Low Water (MLLW) and Mean High Water (MHW). Soundings are referenced to MLLW and heights of overhead obstructions (bridges and cables) are referenced to MHW.

1.2.1. The Hydro Hot List (HHL)

Please contact CO-OPS' Hydrographic Planning Team (HPT) at nos.coops.hpt@noaa.gov and CO-OPS' Operational Engineering Team (OET) at nos.coops.oetteam@noaa.gov at least three business days before survey operations begin, and within 1 business day after survey operations are completed so that the appropriate CO-OPS National Water Level Observation Network (NWLON) control water level station(s) is/are added to or removed from the CO-OPS Hydro Hotlist (HHL) (http://tidesandcurrents.noaa.gov/hydro). Include start and end survey dates, full project number (e.g. OPR-H355-TJ-10), and control and subordinate station numbers. The notification must be sent to both teams.

Station	Station ID	Control or Subordinate	Type (e.g. NWLON, PORTS©, etc)	Comment
Pilots Station East, LA	8760922	Control	NWLON	

Table 1: All stations that need to be added to the HHL in support of OPR-J377-KR-2015 (Revised)

It is important to know that the addition of a water level station to the HHL ensures the station is monitored by CORMS and any problems are reported daily. However, platforms should view the HHL each morning of active survey operations and click on the “Plot” to double check that there are not problems with the required stations on that day. If a platform notices problems with data on their survey day of operation, please contact HPT at nos.coops.hpt@noaa.gov, CORMS at CORMS@noaa.gov, and their respective headquarters point of contact at HSD or NSD. Stations on the HHL are given priority for maintenance should a station cease normal operation during scheduled times of hydrography. CO-OPS will notify a field unit within 1 business day if a HHL water level station ceases operation during scheduled times of hydrography. This is in addition to the daily CORMS report that CORMS sends to NOAA field units, if the field unit's e-mail address is added to

the CORM's daily e-mail list. To be added to the CORMS daily HHL report, the platform should contact CO-OPS' Data Monitoring and Analysis Team (DMAT) at nos.co-ops.dmat@noaa.gov and request to be added.

If the stations are listed on HHL, then weekly priority processing will occur and, for those water level stations, verified 6-minute water level data will be made available every week on Monday or Tuesday. If Monday happens to be a federal holiday, then the 6-minute verified water level data will be made available on the following Tuesday or Wednesday. In order to ensure that verified data is correctly downloaded please **select a date that is more than 7 days prior to the day of interest** in the 'From' field on the CO-OPS website.

1.3. Tide Reducer Stations

The operating water level station at Pilots Station East, LA (8760922) will provide water level reducers for this project. Therefore it is critical that it remains in operation during the survey.

1.3.1. CO-OPS Long Term Water Level Station Operation and Maintenance

During periods of hydrography, CO-OPS is only responsible for the operation and maintenance of NWLON control stations and the contractor is responsible for the maintenance and operations of all contractor installed (tertiary) stations. The contractor is required to monitor the NWLON control water level data via the CO-OPS website at http://tidesandcurrents.noaa.gov/hydro.shtml or through regular communications with the OCS COTR or the OCS COTR's CO-OPS authorized point of contact (Colleen Fanelli at 301-713-2877 ext. 167 or via email: nos.coops.hpt@noaa.gov) before and during operations. The OCS COTR or the COTR's CO-OPS authorized point of contact (Colleen Fanelli) will serve as liaison between the contractor and NOS/CO-OPS to confirm operation of this station and to ensure the acquisition of NWLON control water level data during periods of hydrography. Problems or concerns regarding the acquisition of valid water level data identified by the contractor shall be communicated with the OCS COTR or the COTR's CO-OPS authorized point of contact (Colleen Fanelli) to coordinate the appropriate course of action to be taken such as gauge repair and/or developing contingency plans for hydrographic survey operations.

1.3.2. Subordinate Station Requirements

No subordinate water level stations are required for this project; however, supplemental and/or back-up water level stations may be necessary depending on the complexity of the hydrodynamics and/or the severity of the environmental conditions of the project area. The installation and continuous operation of water level measurement systems (tide gauges) at subordinate station locations are left to the discretion of the contractor, subject to the approval of the COTR. If the contractor decides to install additional water level stations, then a 30-day minimum of continuous data acquisition is required. For all subordinate stations, data must be collected throughout the entire survey period for which they are applicable, and not less than 30 continuous days. This is necessary to facilitate the computation of an accurate datum reference as per NOS standards.

1.3.3. Tide Component Error Estimation

The estimated tidal error contribution to the survey area is 0.30 meters at the 95% confidence level, and includes the estimated gauge measurement error, tidal datum computation error, and tidal zoning error. Based on this analysis no subordinate stations will be required. It should be noted that the tidal

error component can be significantly greater than stated if a substantial meteorological event or condition should occur during time of hydrography.

1.3.4. Water Level Records: If subordinate water level stations are installed, submit water level data, such as leveling records, field reports, and any other relevant data/reports, including the data downloaded onto diskette/CD as specified in the latest version of the NOS Specifications and Deliverables document.

1.3.4.1. Water level records should be forwarded to the following address:

NOAA/National Ocean Service/CO-OPS
Chief, Engineering Division
N/OPS1 - SSMC4, Station 6531
1305 East-West Highway
Silver Spring, MD 20910

1.3.5. This section is not applicable to this project.

1.3.5.1. This section is not applicable to this project.

1.3.6. This section is not applicable to this project.

1.4. Zoning

1.4.1. The water level station at Pilots Station East, LA (8760922) is the reference station for predicted tides for hydrography in the vicinity of Breton Sound, LA. The time and height correctors listed below for applicable zones should be applied to the predicted tides at the station indicated during the acquisition and preliminary processing phases of this project.
Preliminary data may be retrieved in one month increments over the Internet from CO-OPS SOAP web services at http://opendap.co-ops.nos.noaa.gov/axis/text.html. The contractor must notify the COTR or the COTR's authorized representative immediately of any problems concerning the predicted tides. Preliminary data are six-minute time series data relative to MLLW in metric units on Greenwich Mean Time. For the time corrections, a negative (-) time correction indicates that the time of tide in that zone is earlier than (before) the predicted tides at the reference station. A positive (+) time correction indicates that the time of tide in that zone is later than (after) the predicted tides at the reference station. For height corrections, the water level heights **relative to MLLW** at the reference station are multiplied by the range ratio to estimate the water level heights relative to MLLW in the applicable zone.

Zone	Time Corrector (min)	Range Ratio	Predicted Reference Station
CGM100	+78	x1.05	8760922
CGM101	+90	x1.05	8760922
CGM102	+102	x1.09	8760922
CGM103	+114	x1.09	8760922
CGM115	+24	x1.01	8760922
CGM116	+24	x1.05	8760922
CGM119	+36	x1.01	8760922
CGM119a	+30	x0.97	8760922

CGM120	+36	x1.09	8760922
CGM123	+48	x1.01	8760922
CGM124	+48	x1.09	8760922
CGM125	+60	x1.01	8760922
CGM131	+66	x1.01	8760922
CGM228	+12	x1.01	8760922

1.4.2. Polygon nodes and water level corrections referencing Pilots Station East, LA (8760922) are provided in ASCII format denoted by a *.zdf extension file name. Zoning diagrams, created in MapInfo, are provided in both digital and hard copy format to assist with the zoning. Longitude and latitude coordinates are in decimal degrees. Negative (-) longitude is a MapInfo representation of West longitude.

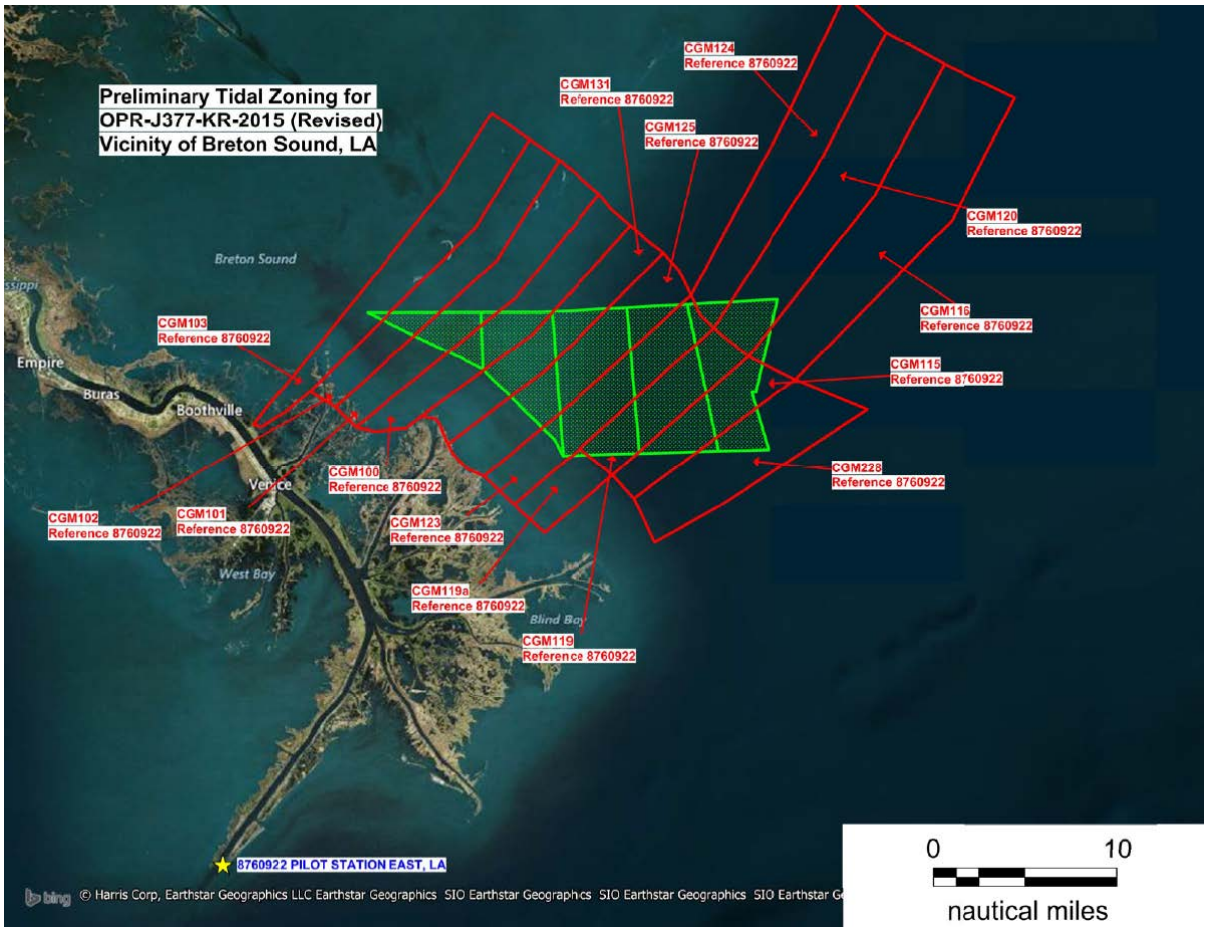
"Preliminary" data for the control water level station, Pilots Station East, LA (8760922), are available in near real-time and verified data will be available on a weekly basis for the previous week. **These water level data may be obtained from CO-OPS SOAP web services at http://opendap.co-ops.nos.noaa.gov/axis/text.html.**

1.4.3 Zoning Diagram(s)

Zoning diagrams, created in MapInfo® and Adobe PDF, are provided in digital format to assist with the zoning in section 1.4.1.

1.5. Final Zoning

1.5.1. For final processing, apply tidal zoning correctors to "verified" observed data of the NOS control station and/or the final processed data of the subordinate stations.


Preliminary Tidal Zoning for
OPR-J377-KR-2015 (Revised)
Vicinity of Breton Sound, LA
CGM124
Reference 8760922
CGM131
Reference 8760922
CGM125
Reference 8760922
CGM120
Reference 8760922
CGM116
Reference 8760922
CGM115
Reference 8760922
CGM228
Reference 8760922
CGM103
Reference 8760922
CGM100
Reference 8760922
CGM102
Reference 8760922
CGM101
Reference 8760922
CGM123
Reference 8760922
CGM119a
Reference 8760922
CGM119
Reference 8760922
Breton Sound
Empire
Buras
Boothville
Venice
West Bay
Blind Bay
8760922 PILOT STATION EAST, LA
© Harris Corp, Earthstar Geographics LLC Earthstar Geographics SIO Earthstar Geographics SIO Earthstar Geographics SIO Earthstar G
0
10
nautical miles

APPENDIX II

SUPPLEMENTAL SURVEY RECORDS AND CORRESPONDENCE

-----Original Message-----
From: Paul Turner - NOAA Federal [mailto:paul.turner@noaa.gov]
Sent: Tuesday, July 21, 2015 4:09 PM
To: George Reynolds <ggr@oceansurveys.com>
Cc: Castle Parker - NOAA Federal <castle.e.parker@noaa.gov>; Michael Gonsalves - NOAA Federal <michael.gonsalves@noaa.gov>; Bob Wallace <rmw@oceansurveys.com>; David Somers <dts@oceansurveys.com>; Bonnie Johnston <blj@oceansurveys.com>
Subject: Re: SSS Fill-ins for fish, dolphins, wakes, platform shadows for Breton Sound, OPR-J377_KR-15

Hi George-

Just following up to our conversation this afternoon regarding filling in SSS gaps & holidays with MB data. This is acceptable so long as you adhere to the standard HSSD MB acquisition specs.

Please let me know if you have any other follow-up questions.

Paul

From: George Reynolds [mailto:ggr@oceansurveys.com]
Sent: Tuesday, July 21, 2015 10:18 AM
To: 'Paul Turner - NOAA Federal' <paul.turner@noaa.gov>; 'Castle Parker - NOAA Federal' <castle.e.parker@noaa.gov>; Michael Gonsalves - NOAA Federal <michael.gonsalves@noaa.gov>
Cc: 'Bob Wallace' <rmw@oceansurveys.com>; 'David Somers' <dts@oceansurveys.com>; Bonnie Johnston <blj@oceansurveys.com>
Subject: RE: SSS Fill-ins for fish, dolphins, wakes, platform shadows for Breton Sound, OPR-J377_KR-15

Hi Paul,

I received your email in response to my phone call. The call was in regard to the questions in the following emails.

We interpret the project instructions and the 2014 Specs & Deliverables to indicate that complete MB data can be used to fill SSS holidays caused by fish, dolphins, boat wakes or gaps in 100%SSS coverage. Based on this interpretation we have been filling in SSS holidays with MB only data for the past couple of weeks.

Please confirm that our interpretation is correct and that this is an acceptable method to fill SSS holidays.

Thanks

George

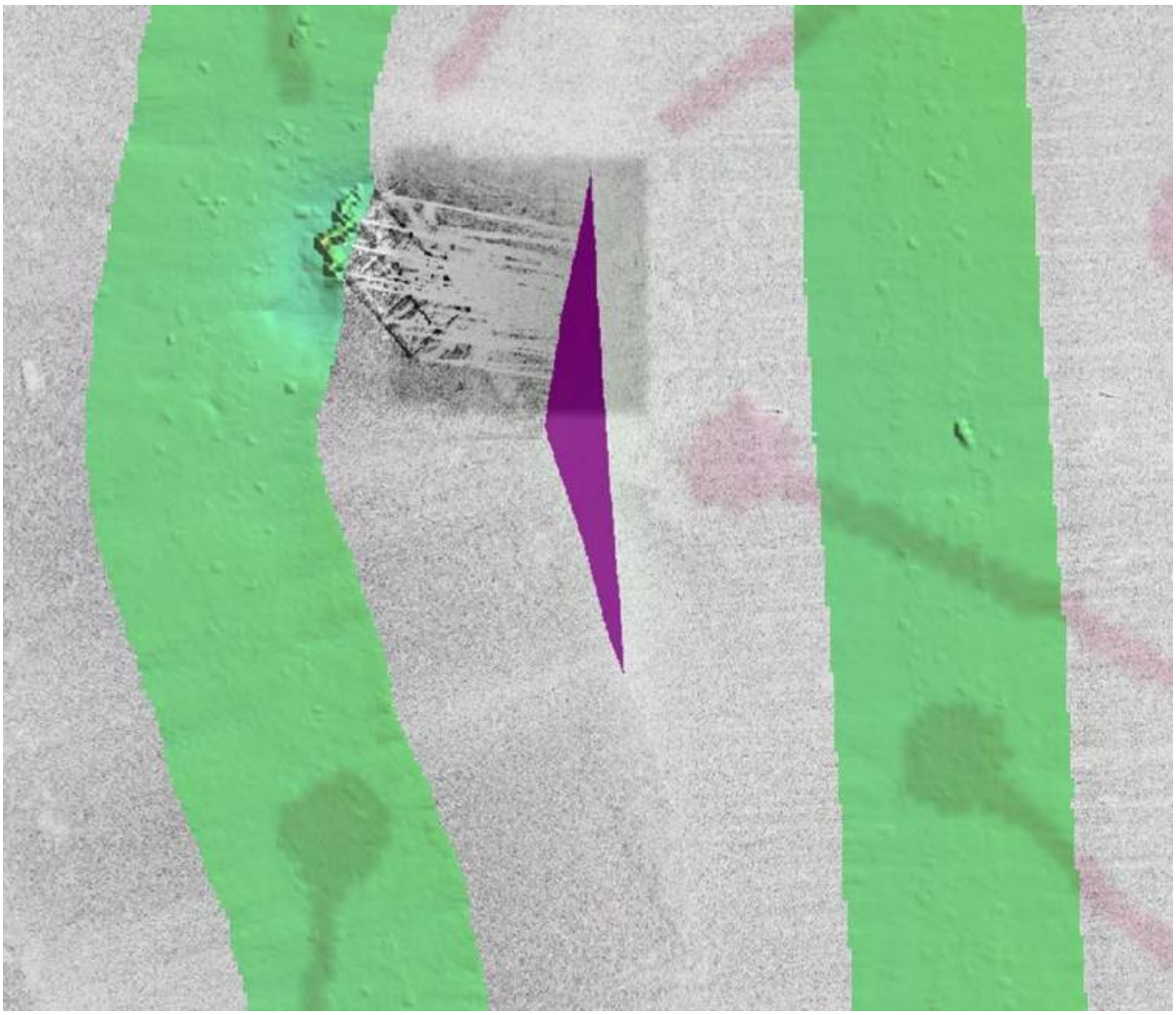
From: George Reynolds [mailto:ggr@oceansurveys.com]
Sent: Wednesday, July 15, 2015 10:39 AM
To: 'Paul Turner - NOAA Federal'; 'Castle Parker - NOAA Federal'
Cc: 'Bob Wallace'; 'David Somers'; Bonnie Johnston
Subject: RE: SSS Fill-ins for fish, dolphins, wakes, platform shadows for Breton Sound, OPR-J377_KR-15

Hi Paul,

In addition to the SSS fill in questions below, the following is an example of a SSS coverage gap holiday. Is it acceptable to fill in SSS coverage holidays with MB data only?

Thanks

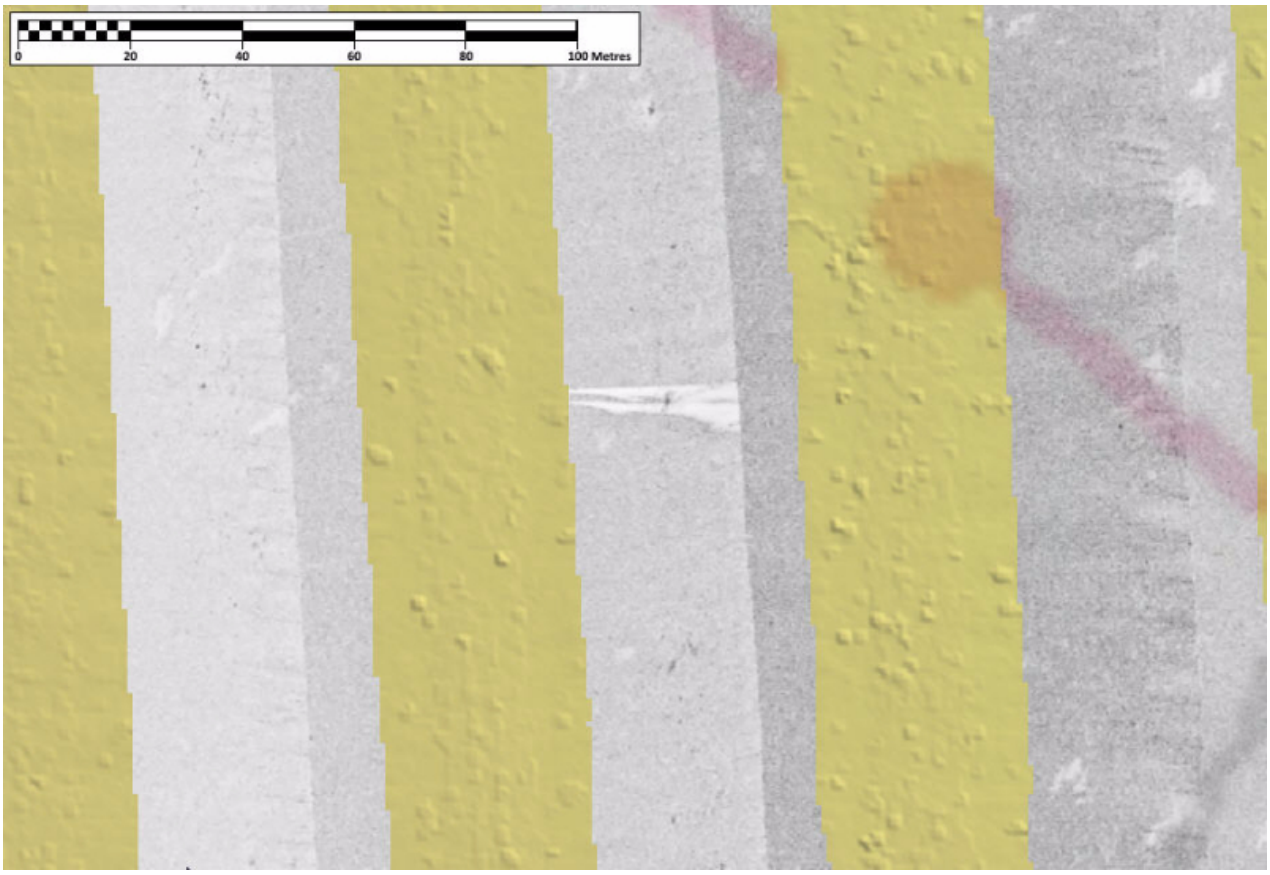
George



From: Bonnie Johnston [mailto:blj@oceansurveys.com]
Sent: Friday, July 10, 2015 4:47 PM
To: Paul Turner - NOAA Federal; Castle Parker - NOAA Federal
Cc: George Reynolds; Bob Wallace; David Somers
Subject: SSS Fillins for fish, dolphins, wakes, platform shadows for Breton Sound, OPR-J377_KR-15

Good afternoon,

We're currently reviewing the 100% SSS coverage for project OPR-J377-KR-15, Approaches to Breton Sound. We have a question regarding holiday fill-ins in the mosaic where fish, dolphins, boat wakes, or large platforms have created large shadows in the SSS record. Where these shadows/holidays occur does OSI need to obtain 200% SSS coverage or will 100% MBES over the shadow also meet coverage requirements? We attached a screen grab as an example of the SSS coverage fill-ins in question.



Thank you,

Bonnie

Hydrographer & Data Analyst

OCEAN SURVEYS, INC.
129 Mill Rock Road East, Old Saybrook, CT 06475
860.388.4631

From: Paul Turner - NOAA Federal [mailto:paul.turner@noaa.gov]
Sent: Monday, March 30, 2015 2:09 PM
To: George Reynolds
Cc: Tiffany Squyres - NOAA Federal; Robin Resweber - NOAA Federal; Katrina Wyllie - NOAA Federal; David T. Somers; Michael Gonsalves - NOAA Federal
Subject: Re: OSI Proposal -- Task Order 1, OPR-J377-KR-15, Approaches to Breton Sound, LA, Sheets 1-4

Hi George-

Below, please find in-line response's in blue to the questions regarding new optional coverage requirement.

1. If complete MBES is sufficient to determine least depth, is there a case where object detection standards are required? Features? Shoals?

In accordance with section 5.2.2.2 Complete Multibeam Coverage of the 2014 HSSD, "All significant shoals or features found in waters less than 30m deep shall be developed to Object Detection standards or have designated soundings from a beam within 30 degrees of nadir unless multiple passes were made over the feature."

The key word with this spec is *'significant shoals or features*' which would be a new shoal/feature in a high traffic area/route that would pose a threat to surface navigation. Not necessarily every feature or shoal.

2. Can gaps in SSS coverage be covered with additional SSS?

Yes, please re-run any SSS coverage gaps (holidays, line-breaks, bad SSS data, etc...) with additional SSS.

3. Is 200% SSS sufficient to disprove a feature?

Yes, 200% SSS coverage is sufficient to disprove a feature so long as basis of the disapproval is from quality SSS data (little or no refraction, appropriate range scale, etc...)

If you would to discuss this more in-depth please let me know and we can set-up a call.

Thanks,

Paul

On Mon, Mar 30, 2015 at 12:33 PM, George Reynolds <ggr@oceansurveys.com> wrote:

Hi Paul,

After reviewing the revised Project Instructions (PI) we have a few questions regarding coverage requirements. Below are the PI requirements followed by our questions.

I can give you call to discuss if that works for you.

Thanks

George

Project Instructions

OPR-J377-KR-15 Coverage Requirements in waters less than 20 meters:

A) Complete MBES with backscatter

OR

B) 100% SSS with concurrent set line spacing MBES with backscatter

Notes:

- Complete MBES is sufficient for both determination of least depth identified with SSS and for disproving a feature
- 100% SSS is insufficient to disprove a feature.
- Gaps in SSS coverage should be treated as gaps in MBES coverage and addressed accordingly

Questions:

1. If complete MBES is sufficient to determine least depth, is there a case where object detection standards are required? Features? Shoals?

2. Can gaps in SSS coverage be covered with additional SSS?

3. Is 200% SSS sufficient to disprove a feature?

From: Tiffany Squyres - NOAA Federal [mailto:tiffany.squyres@noaa.gov]
Sent: Thursday, March 26, 2015 12:57 PM
To: Lori Falvey
Cc: Paul Turner - NOAA Federal; George Reynolds; Robin Resweber - NOAA Federal; Katrina Wyllie - NOAA Federal
Subject: Re: OSI Proposal -- Task Order 1, OPR-J377-KR-15, Approaches to Breton Sound, LA, Sheets 1-4

Good afternoon Lori,

We have revised the project instructions associated with this task.

The change can be found on page 2 under the 'Limits and Coverage'

section which updates the coverage requirements from 200% Side Scan Sonar to 100% Side Scan Sonar and reduces the Coverage Type from "object detection" to "complete coverage". This is an adjustment to the coverage requirements only.

Please review the attached and submit a revised approach and pricing to everyone included in this email by 3:00 pm ET on April 3.

v/r,

Tiffany

757-605-7405

From: Castle Parker - NOAA Federal <castle.e.parker@noaa.gov>
To: blj@oceansurveys.com; Paul Turner - NOAA Federal <paul.turner@noaa.gov>
Cc: Matthew Jaskoski - NOAA Federal <matthew.jaskoski@noaa.gov>; Corey Allen - NOAA Federal <corey.allen@noaa.gov>; George Reynolds <ggr@oceansurveys.com>
Sent: Thursday, September 17, 2015 9:46 AM
Subject: RE: How to address least depths on significant pipeline features in the Final Feature File

Good day,
I will attempt to answer and then we'll see if the recommendation is appropriate and generally accepted…

For the elevated pipeline sections that are located on or very close in proximity to a charted pipeline, use a PIPSOL linear object and attribute the least depth and height above the sea floor in the remarks attribute.

For the elevated pipeline section that are not near or in close proximity to a charted pipeline, create a linear obstruction feature object. The extended attributes includes VALSOU for the linear obstruction and describe the obstruction with the remarks attribute.

Sound good?
Regards,
Gene

From: blj@oceansurveys.com [mailto:blj@oceansurveys.com]
Sent: Thursday, September 17, 2015 9:29 AM
To: Paul Turner - NOAA Federal; Castle Parker - NOAA Federal
Subject: How to address least depths on significant pipeline features in the Final Feature File

Good morning,

We are in the process of compiling the Final Feature File for the Breton Sound project and have a question about how AHB would like the least depth reported on arched pipeline features with significant heights (>/= 1 m). For the Barataria Bay project OSI submitted the significant pipeline features as both linear (PIPSOL) and point (OBSTRN) S-57 features, primarily because the PIPSOL class does not have a "value of sounding" (VALSOU) field.

OSI could continue using this method or as an alternative option enter the pipeline feature's least depth value in the NOAA extended attribute "observed depth" (obsdpt) field.

What method would best assist AHB in feature compilation?

Thank you and regards,
Bonnie

Bonnie Johnston
Hydrographer and Data Analyst

OCEAN SURVEYS, INC.
129 Mill Rock Road East, Old Saybrook, CT 06475
T 860-388-4631 x158 **F** 860-388-5879
blj@oceansurveys.com | www.oceansurveys.com
Follow us: LinkedIn | Twitter | Facebook

-----Original Message-----
From: George Reynolds [mailto:ggr@oceansurveys.com]
Sent: Tuesday, February 10, 2015 5:22 PM
To: 'Paul Turner - NOAA Federal'; 'Katrina Wyllie - NOAA Federal'; 'Michael Gonsalves - NOAA Federal'
Subject: RE: FW: Revised OPR-J377-KR-15 sheet limits

Hi Paul,

Thanks for you quick response, we will proceed accordingly.

Regards
George

-----Original Message-----
From: Paul Turner - NOAA Federal [mailto:paul.turner@noaa.gov]
Sent: Tuesday, February 10, 2015 5:12 PM
To: George Reynolds; Katrina Wyllie - NOAA Federal; Michael Gonsalves - NOAA Federal
Subject: Re: FW: Revised OPR-J377-KR-15 sheet limits

Hi George-

That adjustment is fine, please move forward planning your cost proposal based on the adjusted sheet limits that you provided me. I will update the project files to reflect this revision.

Thanks,

Paul

On Tue, Feb 10, 2015 at 5:01 PM, George Reynolds <ggr@oceansurveys.com> wrote:
Hi Paul,

In reviewing the sheet layout we noticed that the North South sheet limits are not parallel to one another. We believe the project can be run with greater efficacy if the sheet limit lines were adjusted slightly. Attached is shape file and PDF with adjusted internal sheet limits for OPR-J377-KR-15. The sheet to sheet boundaries (1-2, 2-3, & 3-4) were made parallel to support a more efficient survey line layout.

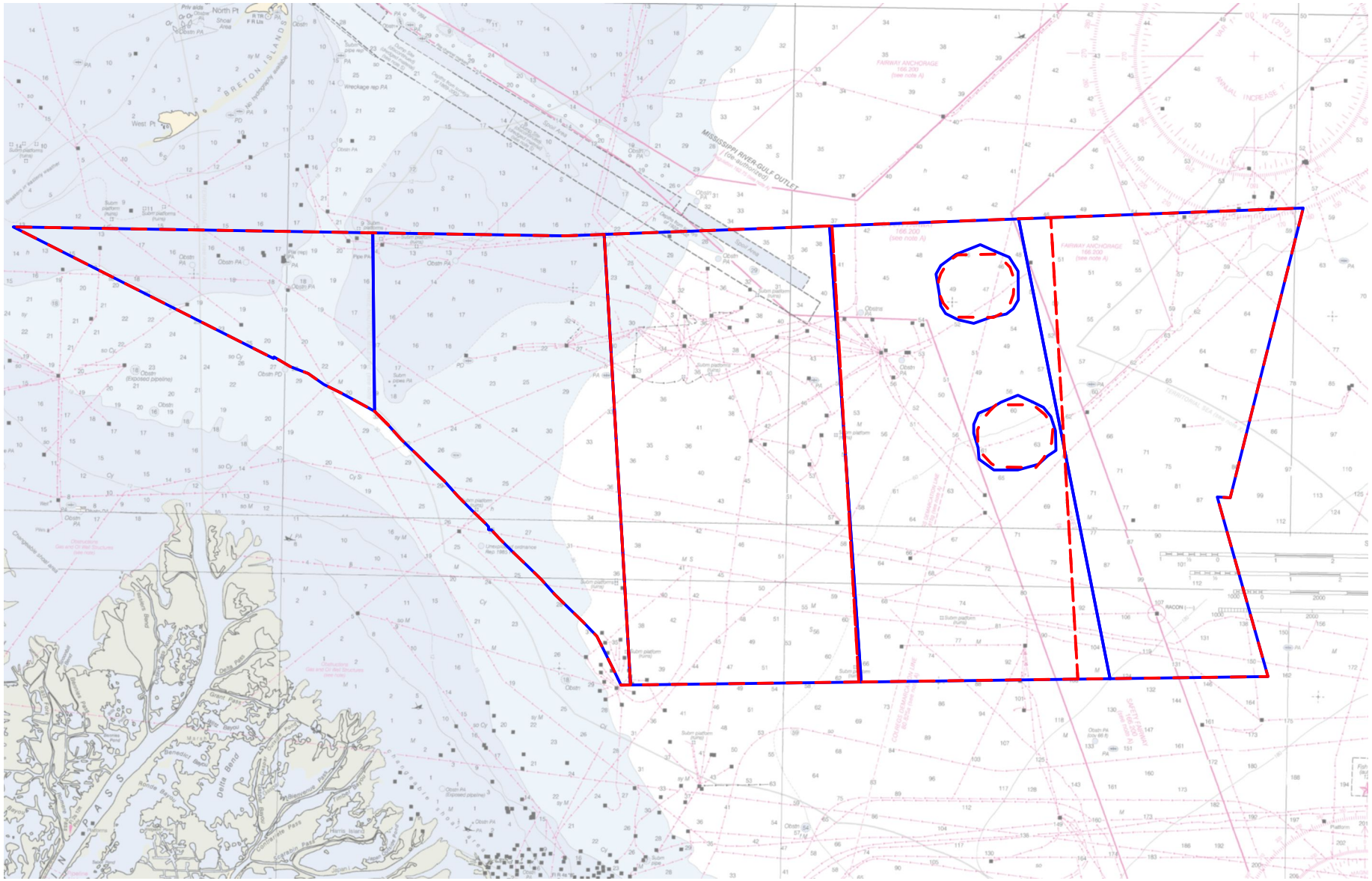
Please let me know if this new layout is acceptable.

Thanks

George

--
Paul Turner
Physical Scientist
NOAA - Office of Coast Survey

301-713-2700 *106
Paul.Turner@noaa.gov


BRETON ISLAND
MISSISSIPPI RIVER-GULF OUTLET
(Not authorized)
FAIRWAY ANCHORAGE
166.200
(see note A)
Delta Band
Pass a Loutre
Southwest Pass
Southeast Pass
Loop Pass
Cabinet Pass
Scrapping Pass
Harris Island
Bayou Lafourche
Bayou Terrebonne
Bayou Grand Caillou
Bayou Dularge
Bayou Petite Caillou
Bayou Cocodrie
Bayou Chauvin
Bayou Pelton
Bayou Blue
Bayou Gauche
Bayou Boeuf
Bayou Sale Cypre
Bayou Sale Cypre
Bayou Terre Aux Boeufs
Bayou Lamoque
Bayou Mazant
Bayou Petite Caillou
Bayou Cocodrie
Bayou Chauvin
Bayou Pelton
Bayou Blue
Bayou Gauche
Bayou Boeuf

From: Paul Turner - NOAA Federal <paul.turner@noaa.gov>
Date: 09/03/2015 10:39 AM (GMT-05:00)
To: David Somers <dts@oceansurveys.com>, George Reynolds <ggr@oceansurveys.com>
Cc: Katrina Wyllie - NOAA Federal <Katrina.Wyllie@noaa.gov>, Michael Gonsalves - NOAA Federal <michael.gonsalves@noaa.gov>
Subject: Re: Pilots Station gauge data

Hi Dave-

I've received a feed-back from CO-OPS regarding your tides questions and have copied it below:

'OSI may proceed with using the filtered data set for Pilots Station East. The filtered data captures the tide signal well'

Please let me know if you have any other questions.

Paul

From: Paul Turner - NOAA Federal <paul.turner@noaa.gov>
To: David Somers <dts@oceansurveys.com>
Cc: "Katrina.Wyllie@noaa.gov" <Katrina.Wyllie@noaa.gov>; George G. Reynolds <ggr@oceansurveys.com>
Sent: Tuesday, September 1, 2015 1:42 PM

Subject: Re: Pilots Station gauge data

HI Dave-

I forwarded you request over to CO-OPS last week and will follow-up with them to check on this.

I will forward the response to you as soon I hear back from them.

Paul

On Tue, Sep 1, 2015 at 9:18 AM, David Somers <dts@oceansurveys.com> wrote:
Hi Paul,

Has CO-OPs had a chance to review our smoothed tides? We'd like to apply final tides as soon as possible.

Thanks,
Dave

From: David Somers <dts@oceansurveys.com>
To: "paul.turner@noaa.gov" <paul.turner@noaa.gov>; "Katrina.Wyllie@noaa.gov" <Katrina.Wyllie@noaa.gov>
Cc: George G. Reynolds <ggr@oceansurveys.com>; Bonnie Johnston <blj@oceansurveys.com>
Sent: Friday, August 21, 2015 12:12 PM
Subject: Re: Pilots Station gauge data

Hi Paul,

OSI would like CO-OPS to review our application of a low pass filter to the Pilots Station East (8760922) data.

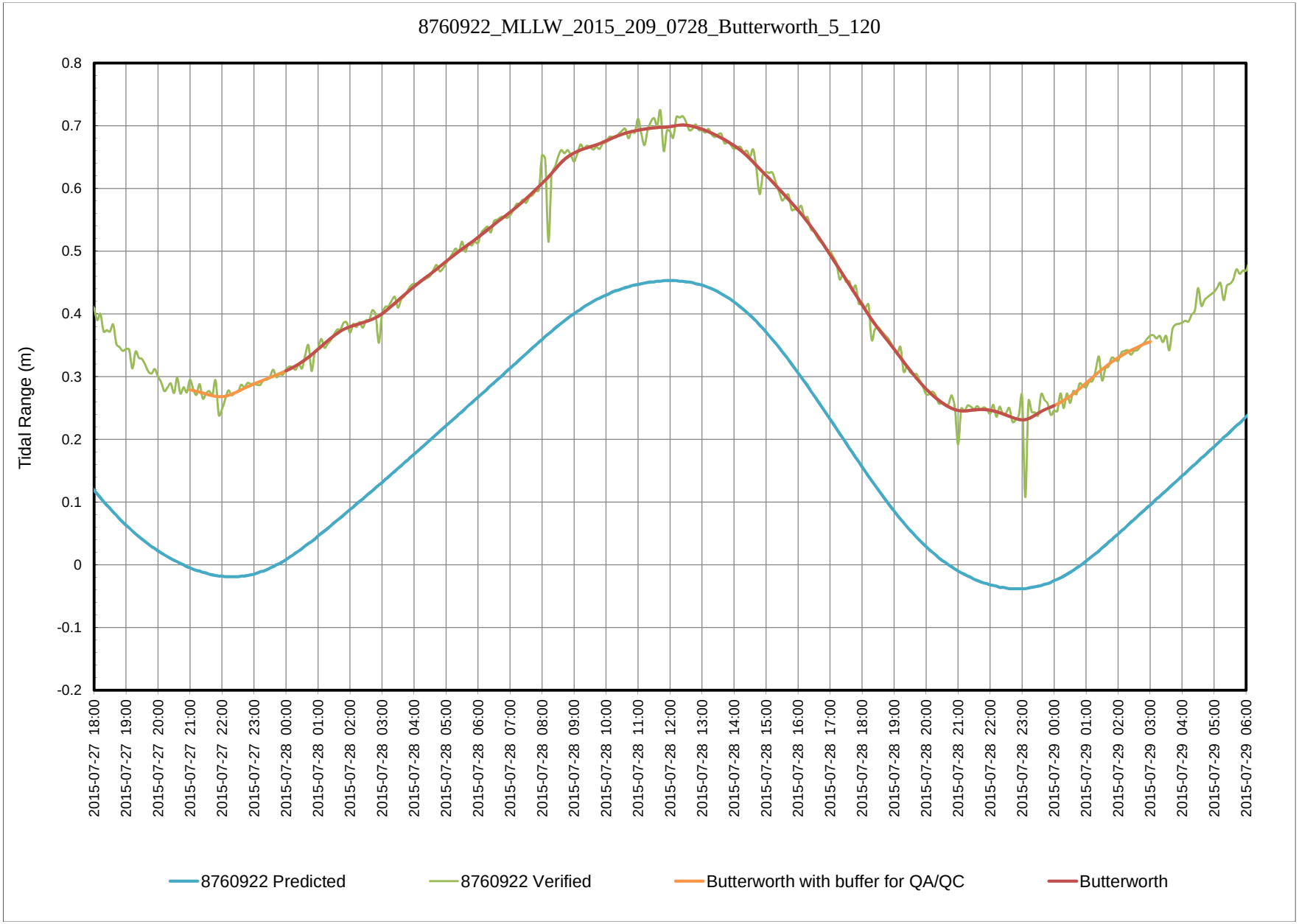
We applied a fourth-order zero-lag Butterworth low-pass filter on the Pilots Station East, LA (8760922) verified 6-minute MLLW water level data using a sampling frequency of 120 with a cut-off frequency of 5 to produce final processed data. It is our intent to use the filtered data in conjunction with the project tidal zoning scheme provided by CO-OPS.

Attached is a PDF with daily tide graphs for the duration of our survey and a zip file containing unfiltered and filtered 6 min ASCII data in *.tid format.

Please let me know if you need anything else or have questions.

Thanks,
Dave

Example of daily tide graph included in this e-mail chain.



-----Original Message-----
From: Paul Turner - NOAA Federal [mailto:paul.turner@noaa.gov]
Sent: Tuesday, May 5, 2015 1:56 PM
To: George Reynolds <ggr@oceansurveys.com>
Cc: Katrina Wyllie - NOAA Federal <Katrina.Wyllie@noaa.gov>; Michael Gonsalves - NOAA Federal <michael.gonsalves@noaa.gov>
Subject: Pilots Station gauge

Hi George-

Do you have a few minutes to talk about the Tides question you had for the Brenton Sound project. We heard back from CO-OPS regarding your proposed approach of applying a low pass filter through the data for the Pilots Station gauge which is acceptable.

Let me know what you'd like to do and I can be reached at 301-713-2777 ext 153 if you'd like to discuss this.

Paul
--
Paul Turner
Program Analyst
NOAA's National Ocean Service
Office of Coast Survey

301-713-2777 ext 153
Paul.Turner@noaa.gov

APPROVAL PAGE

H12733

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

- H12733_DR.pdf
- Collection of depth varied resolution BAGS
- Processed survey data and records
- H12733_H12734_H12735_H12736_GeoImage.pdf

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

Briana J. Welton

Digitally signed by WELTON.BRIANA.JANE.1267667531
DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=NOAA, cn=WELTON.BRIANA.JANE.1267667531
Date: 2017.03.10 09:47:10 -05'00'

Approved:_____

Lieutenant Commander Briana Welton, NOAA
Chief, Atlantic Hydrographic Branch