H12790

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

DESCRIPTIVE REPORT

Type of Survey: Navigable Area

Registry Number: H12790

LOCALITY

State(s): Louisiana

General Locality: Approaches to Atchafalaya Bay, LA

Sub-locality: 20 NM SSW fo Point Au Fer

2015

CHIEF OF PARTY
Tara Levy

LIBRARY & ARCHIVES

Date:

U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION	REGISTRY NUMBER:
HYDROGRAPHIC TITLE SHEET	**H12790**

INSTRUCTIONS: The Hydrographic Sheet should be accompanied by this form, filled in as completely as possible, when the sheet is forwarded to the Office.

State(s):	**Louisiana**
General Locality:	**Approaches to Atchafalaya Bay, LA**
Sub-Locality:	**20 NM SSW fo Point Au Fer**
Scale:	**40000**
Dates of Survey:	**10/11/2015 to 02/18/2016**
Instructions Dated:	**10/11/2015**
Project Number:	**OPR-K379-KR-15**
Field Unit:	**C&C Technologies, An Oceaneering International Company**
Chief of Party:	**Tara Levy**
Soundings by:	**Multibeam Echosounder**
Imagery by:	**Side Scan Sonar**
Verification by:	**Atlantic Hydrographic Branch**
Soundings Acquired in:	**meters at Mean Lower Low Water (MLLW)**

Remarks:

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/.

Descriptive Report to Accompany Survey H12790

Project: OPR-K379-KR-15

Locality: Approaches to Atchafalaya Bay, LA

Sublocality: 20 NM SSW of Point Au Fer

Scale: 1:40000

October 11, 2015 – February 18, 2016

R/V *Sea Scout* & R/V *C-Ghost*

Chief of Party: Tara Levy

A. Area Surveyed

The survey area is located 20 NM SSW of Point Au Fer off the coast of Louisiana, USA.

A.1. Survey Limits

Data was acquired within the following survey limits:

Northwest Limit	Southeast Limit
29.098 N 91.598 W	28.002 N 91.497 W

Table 1: Survey Limits

Survey limits were designed as outlined in the Project Instructions and the HSSD.

A.2. Survey Purpose

The purpose of this survey is to provide a contemporary survey to update National Ocean Service (NOS) nautical charting products. Survey H12790 covers 24.29 square nautical miles (SNM) near the Atchafalaya River. The river is the only expanding river delta in North America and the Port of Morgan City has been working to deepen and maintain the channel. The project area potentially covers altered area where depth contours may have migrated.

A.3. Survey Quality

The entire survey is adequate to supersede previous data.

A.1. Survey Coverage

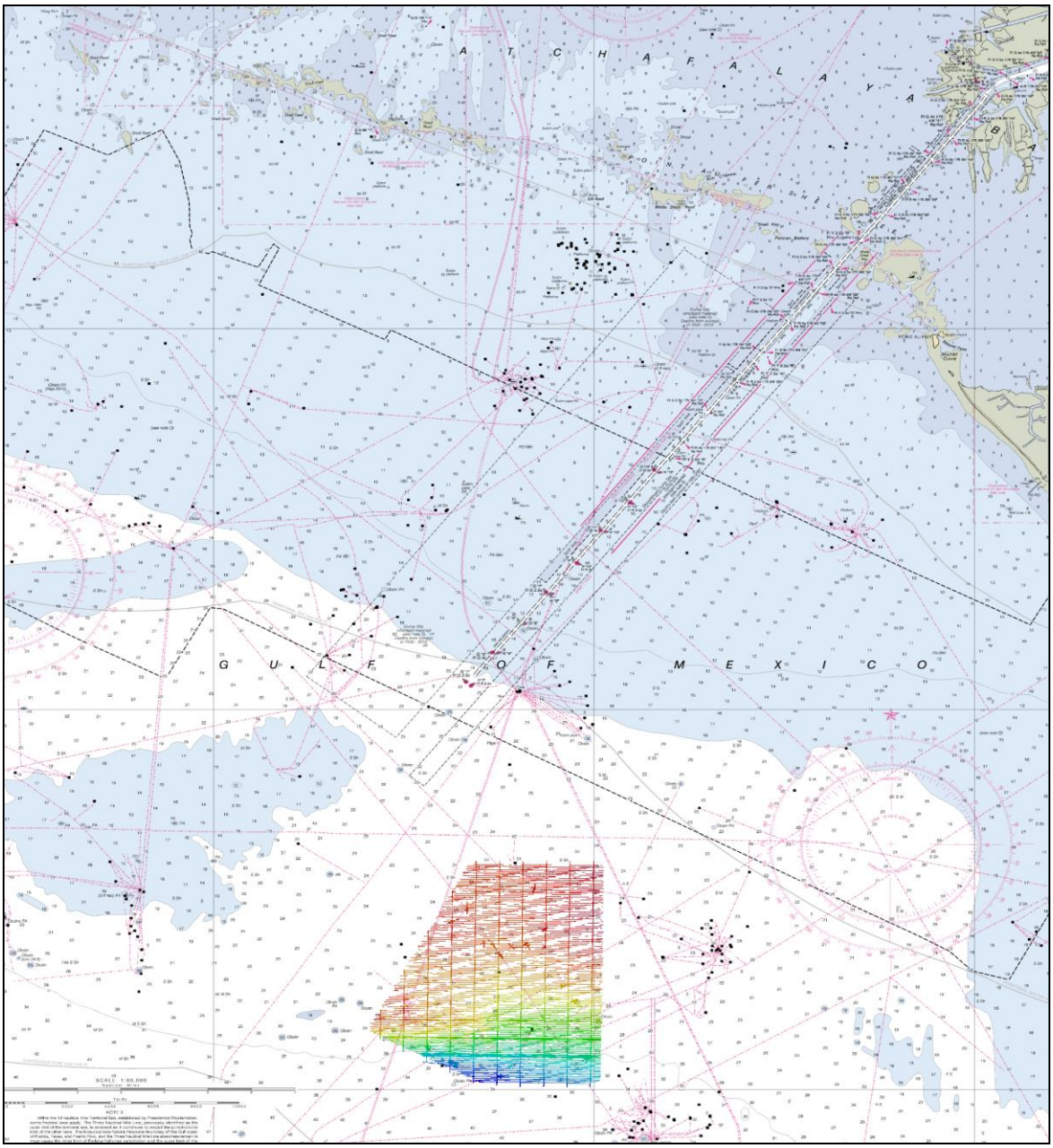


Figure 1. H12790 Survey Coverage

Survey coverage for H12790 (Figure 1) was collected in accordance with the requirements outlined in the Project Instructions and HSSD (2015). 100% side scan sonar (SSS) coverage was acquired with concurrent multibeam echosounder (MBES) data. A combination of complete MBES with backscatter and/or water column data and/or SSS data was collected for feature investigations.

A.2. Survey Statistics

The following table lists the mainscheme and crossline acquisition mileage for this survey. Note that these statistics exclude investigation, fill-in and feature disproval lines. Detached positions include position fixes associated with bottom samples, CTD's and leadlines.

	Hull ID	1237094	JQN00023E707	Total
LNM	**SBES Mainscheme**	0	0	0
	MBES Mainscheme	0	0	0
	SSS Mainscheme	0	0	0
	SBES/MBES Combo Mainscheme	0	0	0
	SBES/SSS Combo Mainscheme	0	0	0
	MBES/SSS Combo Mainscheme	594.29	0	594.29
	SBES/MBES Combo Crosslines	46.57	0	46.57
	Lidar Crosslines	0	0	0
Number of Bottom Samples		5	0	5
Number of DPs		31	1	32
Number of Items Investigated by Dive OPs		0	0	0
Total Number of SNM		24.29	0.00	24.29

Table 2: Hydrographic Survey Statistics

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

15/10/11
15/10/12
15/10/13
15/10/16
15/10/30
15/11/03
15/11/04
15/11/05
15/11/06
15/11/07
15/11/10
15/11/19
15/11/20
15/11/21
15/11/30
15/12/01
15/12/02
15/12/07
15/12/08
16/01/25
16/02/15
16/02/18

Table 3: Dates of Hydrography

A.3. Shoreline Verification

There is no Shoreline Verification for this survey.

A.4. Bottom Samples

Five (5) bottom samples were collected within the limits of H12790. Refer to the Final Feature File for additional information.

B. Data Acquisition and Processing

B.1. Equipment and Vessels

Refer to the OPR-K379-KR-15 Data Acquisition and Processing Report (DAPR) for additional information regarding survey systems as well as operational, processing and quality control procedures. A summary of the equipment and vessels used for this survey is provided below.

B.1.1. Vessels

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

Hull ID	1237094	JQN00023E707
LOA	40.84 meters	9.14 meters
Draft	1.98 meters	0.76 meters

Table 4: Vessels Used

B.1.2. Equipment

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

Manufacturer	**Model**	**Type**
Kongsberg	EM2040C	MBES
Kongsberg	EM3002	MBES
Klein	5000 V2	SSS
EdgeTech	4200 P	SSS
Coda Octopus	F180	Attitude and Positioning System
C-Nav	3050	Positioning System
AML	SV•Xchange	Sound Speed System
YSI Electronics	600R-BCR-C-T	Sound Speed System
Sea-Bird Electronics, Inc.	SBE 19 and SBE 19 Plus	Sound Speed System

Table 5: Major Systems Used

B.2. Quality Control

B.2.1. Crosslines

Crosslines were run perpendicular to mainscheme lines so that quality control statistics could be performed on the data after completion of mainscheme survey lines. The total crossline miles were 46.57 NM and the total mainline miles were 591.29 NM; investigation lines were not included in mainline totals. The crosslines comprise 7.9 percent of the total mainline miles.

Mainlines were compared to crosslines for which there was overlapping data using C & C's proprietary Hydromap software. The graphs generated from the comparison show the mean difference, RMS difference and confidence interval for each beam. Refer to the DAPR for additional information and Separates II Digital Data for sample graphical documentation.

The surface difference tool in CARIS HIPS was used to evaluate crossline and mainscheme line agreement; investigations were not included in the comparisons. The mainline BASE surface was used as Surface 1 and the crossline BASE surface as Surface 2. Statistical information about the difference surface was generated using the compute statistics tool (Figure 2). The analysis shows that greater than 99% of depth difference values are between -0.362 and 0.238 m. This is well within the maximum allowable TVU for the depths of the comparison area (7.52 – 11.64 m) which ranges from ±0.510 to ±0.522 m. All depth difference values between -0.751 m and -0.50 m are associated with a depression feature that is located at 29.074 N, 91.562 W; refer to section D.2.7 for additional information.

Statistical crossline information was also generated by comparing each of the crosslines to the depth layer of the 1-m BASE surface of the mainscheme survey lines using the CARIS QC report utility. In general, greater than 99% of crossline soundings fall within the selected Order 1a survey order, as outlined in the CARIS User Manual. Crossline comparisons generated with the CARIS QC report utility as well as the difference BASE surface are shown in the Separates II Digital Data\Checkpoint Summary & Crossline Comparisons folder.

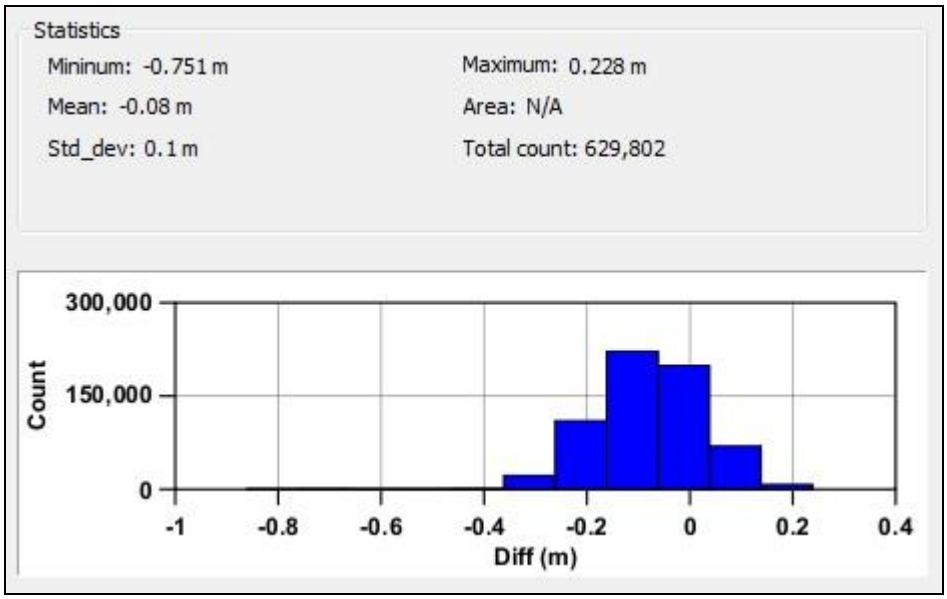


Figure 2. Crossline comparison statistical information and histogram output from CARIS compute statistics tool.

B.2.2.Uncertainty

Uncertainty of all components of the sounding measurement are included in the CARIS vessel file and detailed in the DAPR.

The following survey specific parameters were used for this survey.

Measured	Zoning
0.037 m	0.075 m

Table 6: Survey specific TPU values for data collected in 2015 and processed with the tide zoning file and verified tides.

Measured	Zoning
0.1873 m	0.0 m

Table 7: Survey specific TPU values for data collected in 2016 and processed with ellipsoid-derived vertical correctors.

Hull ID	Measured – CTD	Measured – MVP	Surface
1237094	2.00 m/s	n/a	0.8 m/s
JQN00023E707	2.00 m/s	n/a	0.8 m/s

Table 8: Survey specific sound speed TPU values

CARIS HIPS was used to compute the Total Propagated Uncertainty (TPU) for each sounding. An Uncertainty layer child layer is generated during BASE surface creation that shows the uncertainty at each node of the surface. For additional review and quality control, two new layers were generated for each BASE surface that would become a finalized BASE surface. The two new layers were generated for the following surface: H12790_MB_1m_MLLW. The first layer was named <TVU_Maximum> and shows the maximum TVU at each node. The following formula was used during layer creation:

$$\sqrt{(0.5^2) + (0.013 * Depth)^2}$$

The second layer generated was named <Uncertainty_QC> and defined as the difference between the TVU_Maximum and Uncertainty layers. Positive values indicate that the uncertainty is less than the TVU_Maximum and that the data meet specifications, while negative values indicate that the uncertainty is greater than the TVU_Maximum and that the data do not meet specifications. The two layers could have been combined into one for the Uncertainty_QC, as shown below for the finalized surfaces, but the TVU_Maximum layer also aided in determining the designation or examination status of critical soundings.

The uncertainty for the H12790_MB_1m_MLLW BASE surface ranges from 0.20 – 0.40 meters. The Uncertainty_QC layer of the BASE surface shows all positive values, which demonstrates that all uncertainty values are less than the maximum TVU for each node.

An Uncertainty_QC_Final layer was also generated for all finalized surfaces, defined by the equation below:

$$\sqrt{(0.5^2) + (0.013 * Depth)^2} - Uncertainty$$

The uncertainty for the H12790_MB_1m_MLLW_Final surface ranges from 0.20 to 1.62 meters. A text file was exported from CARIS and run through a python script to determine the percentage of Uncertainty_QC_Final values that are less than zero, which indicates that the uncertainty values at those nodes exceed specifications.

Analysis of the Uncertainty_QC_Final layer for the H12790_MB_1m_MLLW_Final BASE surface indicates that less than 0.00003% of nodes have an uncertainty greater than the maximum allowable TVU.

It was observed that all uncertainty values are within specification for the un-finalized surfaces, but contain a small portion of values that are out of specification when finalized. The reason is due to the finalization parameter, where the uncertainty is defined as the greater of either the standard deviation or uncertainty for a particular node.

Note that when the surfaces are finalized, the TVU_Maximum and Uncertainty_QC layers are retained but Uncertainty_QC layer does not reflect the new Uncertainty values of the finalized surface. These layers can be removed, but if the finalized BASE surface is recomputed, it appears that these layers will be regenerated (after closing and re-opening the project). For this reason, the layers were not removed from the finalized surfaces

B.2.3. Junctions

Registry Number	Scale	Year	Field Unit	Relative Location
H12788	1:40,000	2015	C & C Technologies, Inc. An Oceaneering International Company	N
H12789	1:40,000	2015	C & C Technologies, Inc. An Oceaneering International Company	E
H11288	1:20,000	2005	NOAA Time Charter	W
H11475	1:20,000	2005	NOAA Time Charter	SW
H12557	1:40,000	2013	C & C Technologies, Inc.	S
H12556	1:40,000	2013	C & C Technologies, Inc.	SE

Table 9. Junctioning Surveys

The areas of overlap between Sheets (Figure 3) were evaluated using the CARIS Difference Tool to ensure general agreement of depths. Junction analyses were conducted using 1, 2, or 5 meter BASE surfaces and/or .bag files of all the Sheets. If necessary, data was further reviewed in Subset Editor.

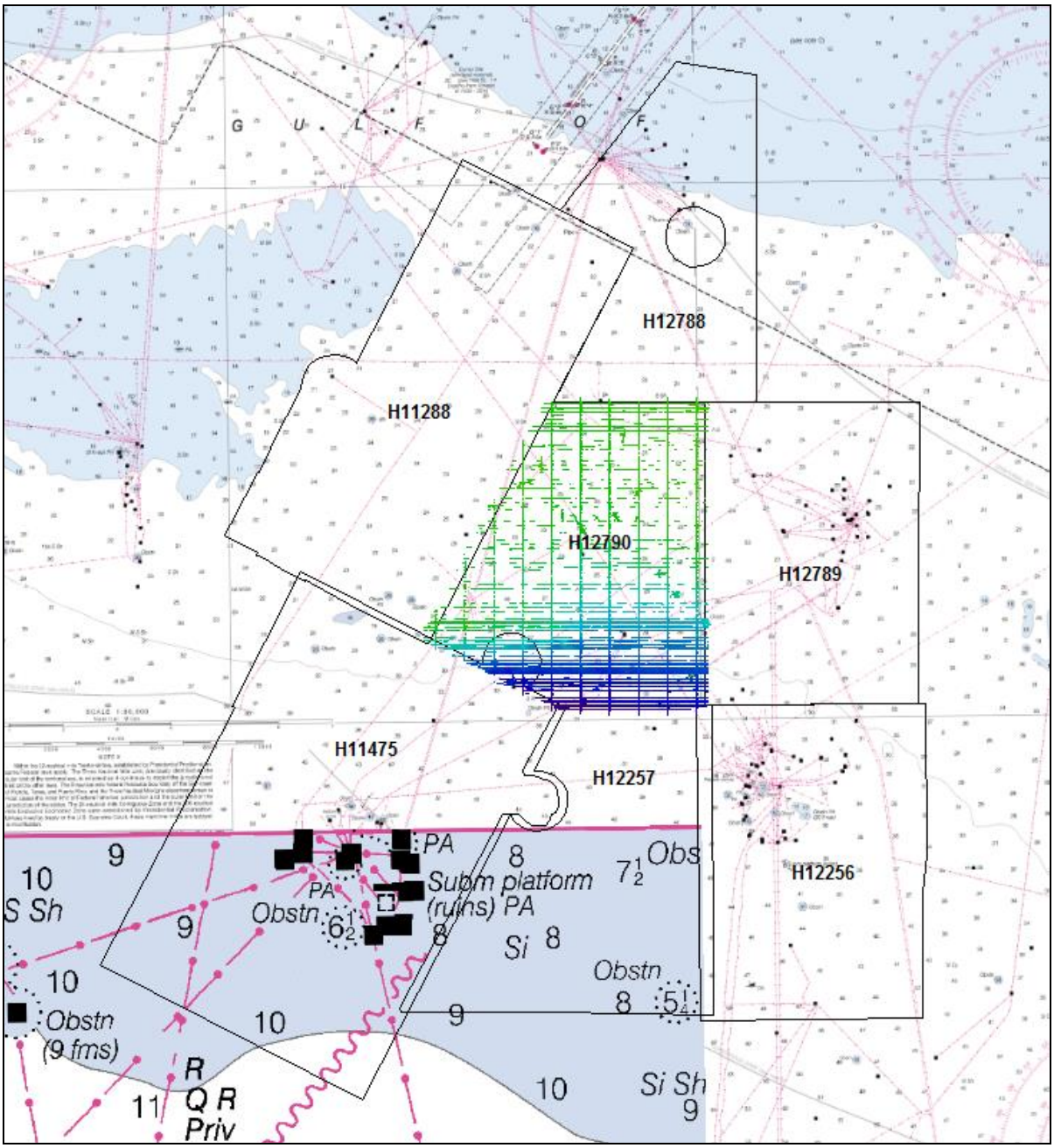


Figure 3. H12790 Junctions.

H12788

The southern margin of survey H12788 borders the northern margin of survey H12790. 1 meter BASE surfaces were used for comparison purposes. Figure 4 shows statistical information for the junction generated with the CARIS compute statistics tool. Depths from survey H12790 agree well with depths from survey H12788 with 100% of depth difference values between -0.281 and 0.234 m.

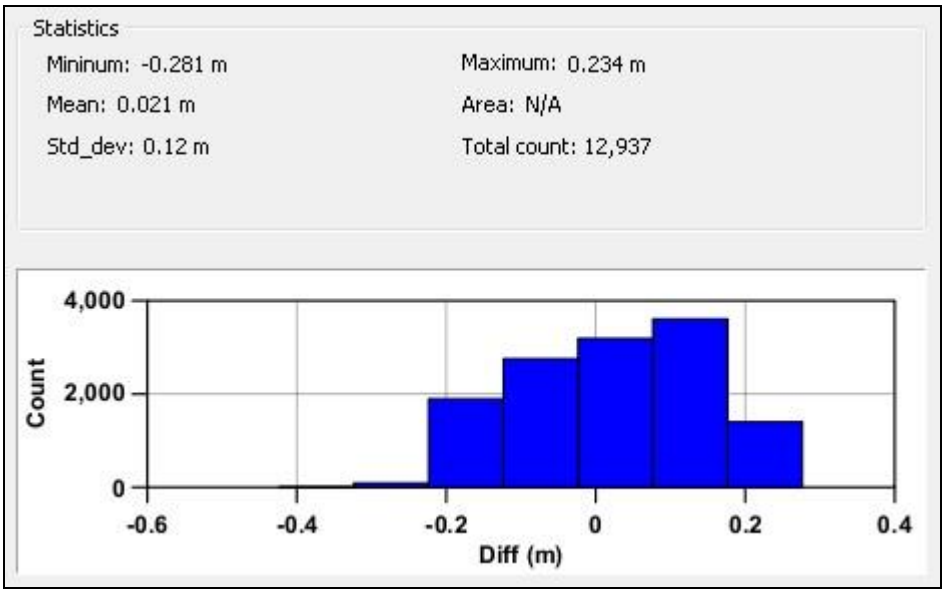


Figure 4. Statistical information and histogram output from CARIS Compute Statistics tool for the difference surface generated between H12790 and H12788 1-meter surfaces.

H12789

The western margin of survey H12789 borders the eastern margin of survey H12790. 1 meter BASE surfaces were used for comparison purposes. Figure 5 shows statistical information for the junction generated with the CARIS compute statistics tool. Depths between the two surveys agree well with 99% of depth difference values between -0.26 and 0.24 m. Note that this comparison is preliminary and the final comparison will be found in the H12789 Descriptive Report.

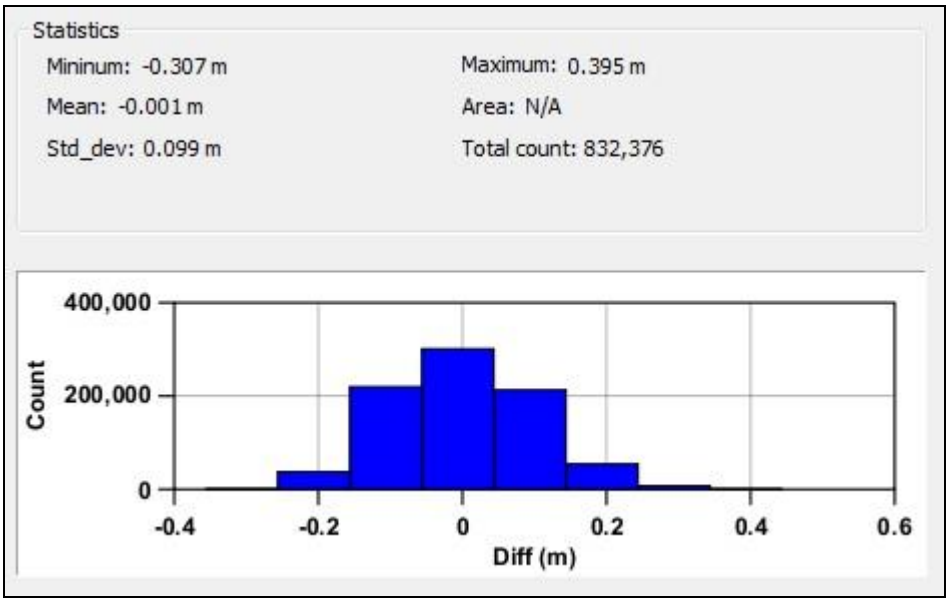


Figure 5. Statistical information and histogram output from CARIS Compute Statistics tool for the difference surface generated between H12790 and H12789 1-meter surfaces.

H11288 (2 meter surface)

The southeastern margin of survey H12188 borders the northwestern margin of survey H12790. The H11288_2m_MLLW_3of8 and H11288_2m_MLLW_4of8 .bag files were combined using CARIS HIPS for this analysis and compared to a 2 meter surface of H12790. Figure 6 shows statistical information for the junction generated with the CARIS compute statistics tool. The difference values demonstrate that in general, the depths from survey H12790 are deeper than those of survey H11288, with nearly 96% of the depth differences between -0.011 and 0.589 m.

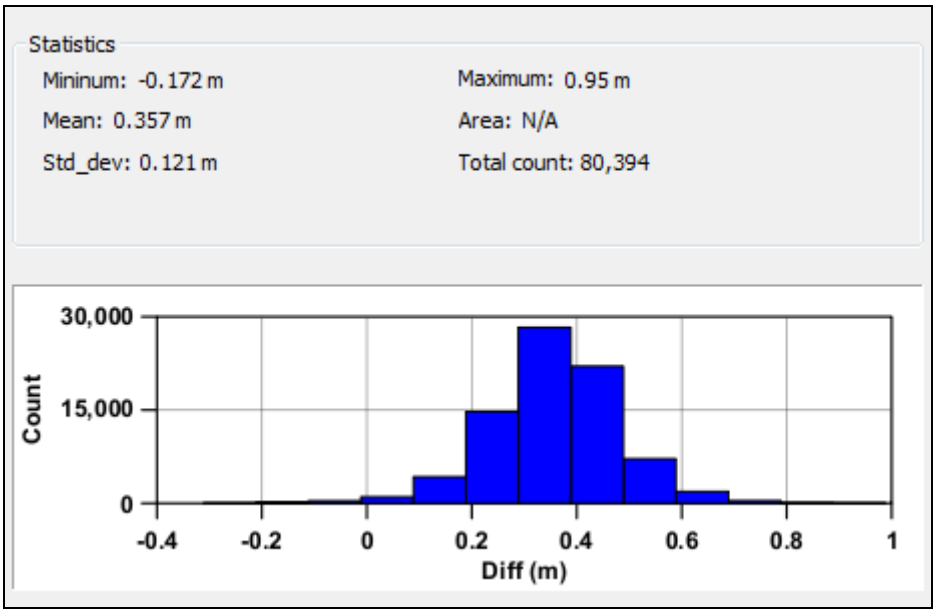


Figure 6. Statistical information and histogram output from CARIS Compute Statistics tool for the difference surface generated between H12790 and H11288 2-meter surfaces.

H11288 (5 meter surface)

The southeastern margin of survey H12188 borders the northwestern margin of survey H12790. The H11288_5m_MLLW_7of8 and H11288_5m_MLLW_8of8 .bag files were combined using CARIS HIPS for this analysis and compared to a 5 meter surface of H12790. Figure 7 shows statistical information for the junction generated with the CARIS compute statistics tool. The difference values demonstrate that in general, the depths from survey H12790 are deeper than those from survey H11288, with 94% of the depth differences between 0.067and 0.567 m.

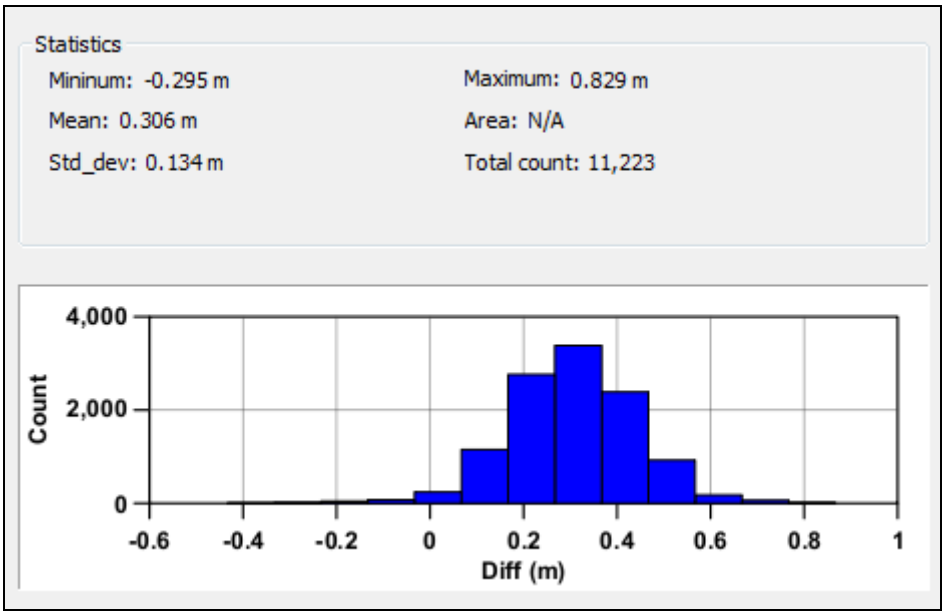


Figure 7. Statistical information and histogram output from CARIS Compute Statistics tool for the difference surface generated between H12790 and H11288 5-meter surfaces.

H11475

The northeast margin of survey H11475 borders the southwestern margin of survey H12790. An error occurred when attempting to combine the H11475 .bag surfaces that overlap H12790. The combine surface tool introduced an erroneous data point at 29-00-56.302N, 091-34-04.188W which shows a negative depth instead of a positive depth and therefore showed an erroneous depth difference value. For this reason, the H12790 2 meter surface was compared to the overlapping H11475 .bag surfaces (H11475_2m_MLLW_10of16, H11475_2m_MLLW_11of16, and H11475_2m_MLLW_12of16) separately. Figures 8 - 10 shows statistical information for the junctions generated with the CARIS compute statistics tool. The depth difference values demonstrate that the depths from survey H12790 are generally deeper than the depths from survey H11475.

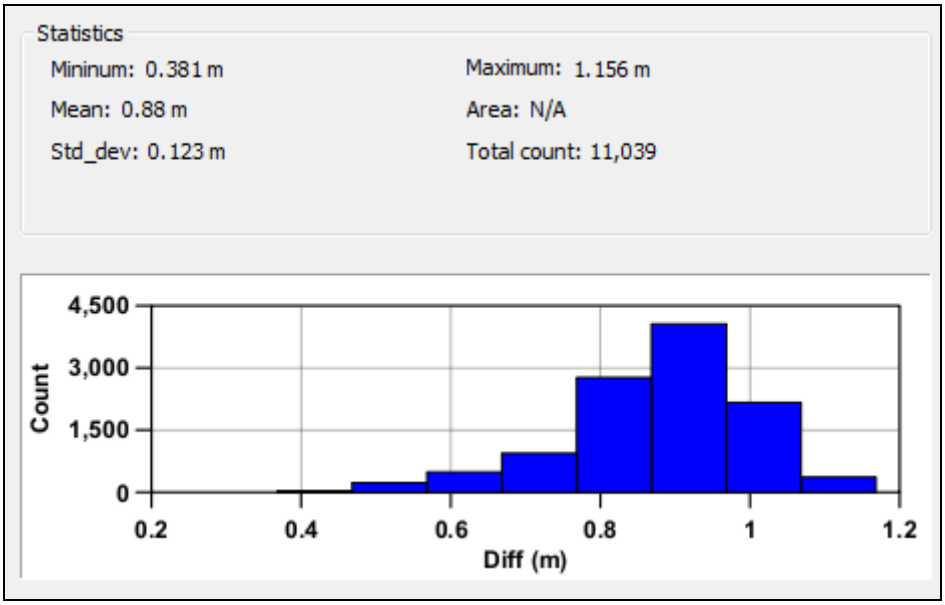


Figure 8. Statistical information and histogram output from CARIS Compute Statistics tool for the difference surface generated between H11475 (Bag 10of16) and H12790 2-meter surfaces.

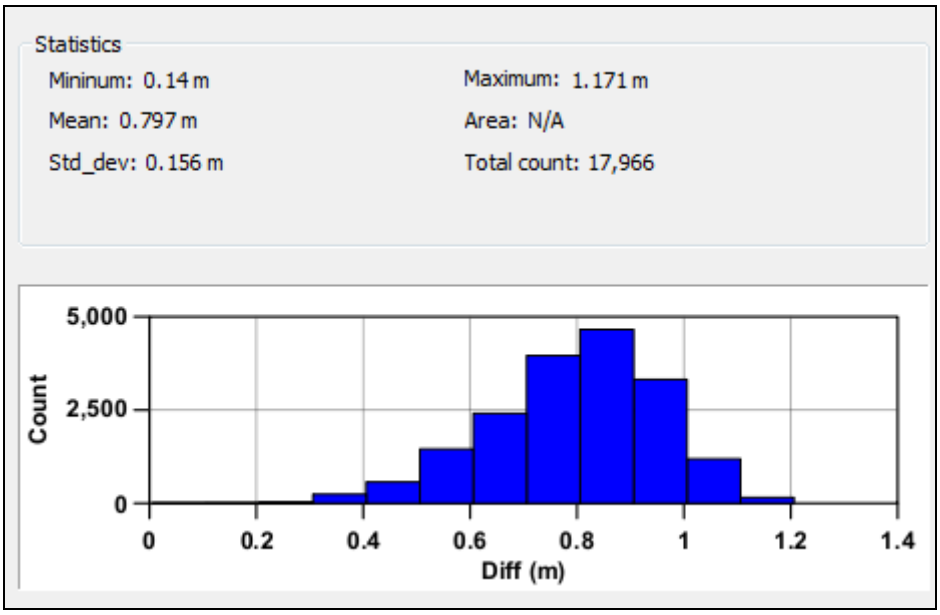


Figure 9. Statistical information and histogram output from CARIS Compute Statistics tool for the difference surface generated between H11475 (Bag 11of16) and H12790 2-meter surfaces.

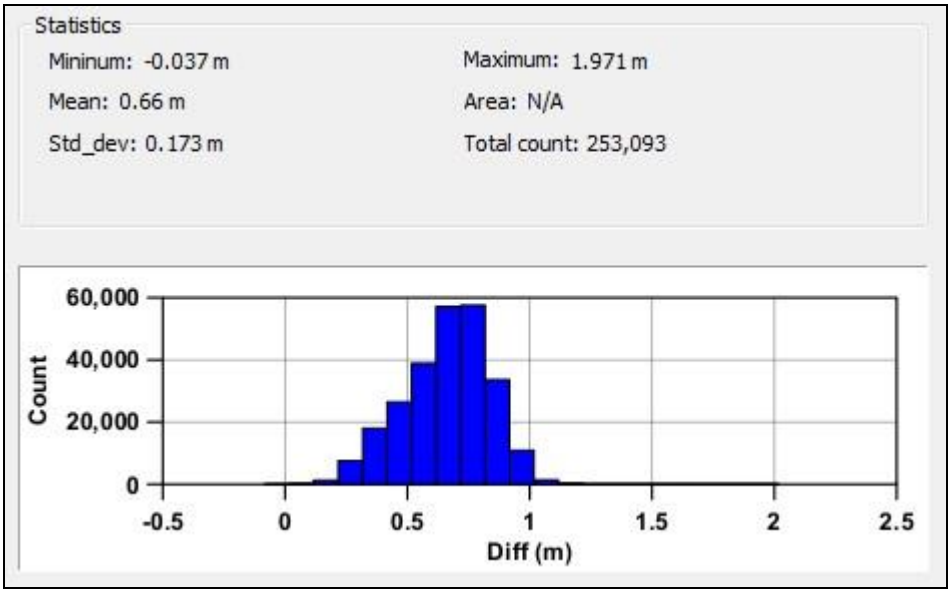


Figure 10. Statistical information and histogram output from CARIS Compute Statistics tool for the difference surface generated between H11475 (Bag 12of16) and H12790 2-meter surfaces.

H12557

The northern margin of survey H12557 borders the southern margin of survey H12790. 1 meter BASE surfaces were used for comparison purposes. Figure 11 shows statistical information for the junction generated with the CARIS compute statistics tool. The difference values demonstrate that the depths from H12790 are generally deeper than the depths from H12557, with over 99% of the depth differences between -0.280 and 0.418 m.

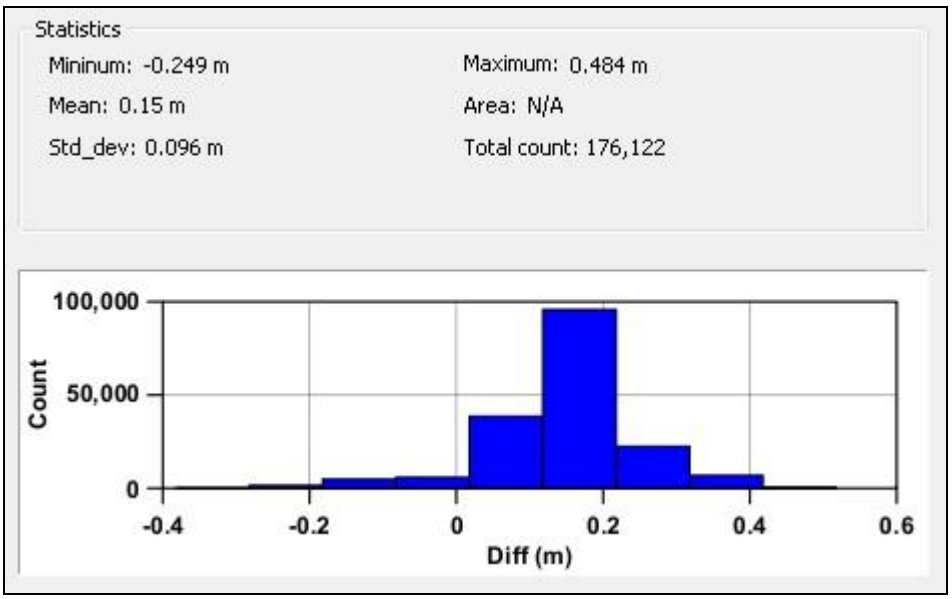


Figure 11. Statistical information and histogram output from CARIS Compute Statistics tool for the difference surface generated between H12557 and H12790 1-meter surfaces.

H12556

The northwestern margin of survey H12556 borders the southeastern margin of survey H12790. 1 meter BASE surfaces were used for comparison purposes. Figure 12 shows statistical information for the junction generated with the CARIS compute statistics tool. The difference values demonstrate that the depths from H12556 are generally deeper than the depths from H12790, with 99% of the depth differences between -0.352 and -0.052 m. However, there is very little overlap between the two surveys, so refer to the H12789 Descriptive Report for a more reliable comparison.

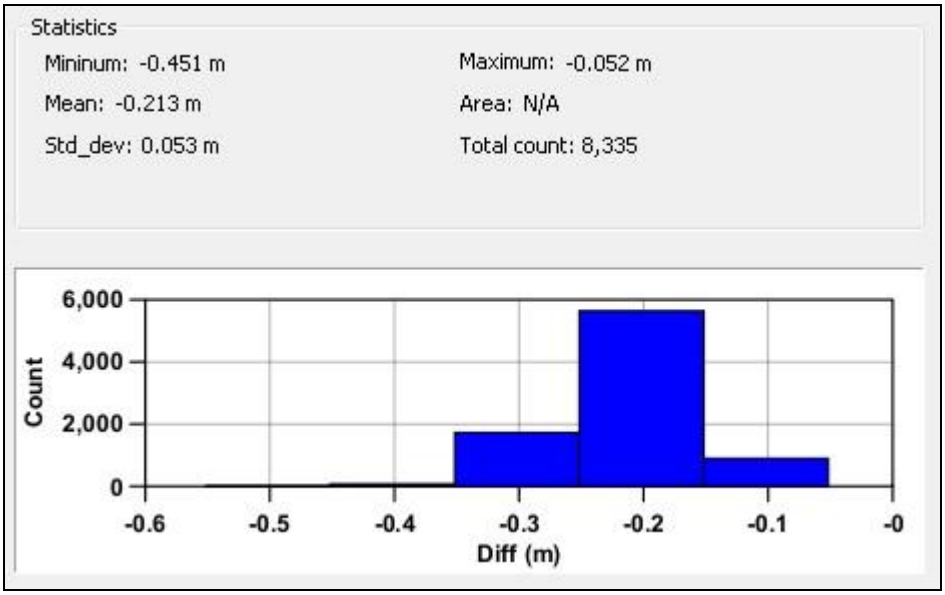


Figure 12. Statistical information and histogram output from CARIS Compute Statistics tool for the difference surface generated between H12556 and H12790 1-meter surfaces.

B.2.4. Sonar QC Checks

Odom single beam echosounders were continuously operated and monitored during the survey as an independent check on the multibeam bottom-detect. The R/V *Sea Scout* (Hull ID 1237094) is equipped with an Echotrac MK III, and the R/V *C-Ghost* (Hull ID JQN00023E707) is equipped with an ODOM Hydrotrac.

B.2.5. Equipment Effectiveness

If necessary, the angle of the multibeam sonars were modified in order to moderate the effects of factors such as increased sea state or to increase coverage; any changes are documented in the acquisition logs. Operation of the SSS at 50 m range with an 80 meter line spacing ensured 100% SSS coverage. When environmental factors limited the effective range of the side scan sonar, split lines were collected to ensure complete coverage.

B.2.6. Factors Affecting Soundings

Weather, sea state, water column sound speed, thermoclines, and fish/marine life were all temporary factors that affected the data periodically throughout the duration of the survey; these are noted in the acquisition and processing logs

B.2.7. Sound Speed Methods

Sea Bird Electronics SBE19 and SBE19plus CTDs were used for speed of sound measurements in the water column. Casts were conducted at least twice daily on board the R/V *Sea Scout*, at least once daily on board the R/V *C-Ghost* and more often as needed. The multibeam data was corrected for the water column sound speed in real-time using the SIS control software. To determine the sound speed at the transducers, an Endeco YSI sonde was used on board the R/V *C-Ghost*, and an AML SV•Xchange was used on board the R/V *Sea Scout*. The sound speed data and confidence checks are located in Separates II Digital Data\Sound Speed Data Summary.

B.2.8. Coverage Equipment and Methods

Complete Coverage, Option 2: SSS data and concurrent MBES data, as outlined in the HSSD (2015) was acquired in the survey area. 100% SSS coverage was acquired in accordance with the requirements stated in the project instructions for this survey. On board the R/V *Sea Scout*, MBES data was acquired with a Kongsberg EM2040C echosounder and on board the R/V *C-Ghost*, MBES data was acquired with a Kongsberg EM3002 echosounder. A Klein 5000 V2 side scan sonar was used aboard the R/V *Sea Scout* and an EdgeTech 4200P side scan sonar was used aboard the R/V *C-Ghost*. A combination of complete MBES with backscatter and/or water column data and/or SSS data was collected for feature investigations.

B.2.9. Density

According to section 5.2.2.2 of the HSSD (2015) at least 80% of all nodes on the surface shall be populated with at least 5 soundings for Complete Coverage Option 2 surveys. The Compute Statistics tool in CARIS HIPS was used to generate statistics about the density child layer for the following surface: H12790_MB_1m_MLLW_Final (Figure 13). A bin size of 1 was used and the data exported in ASCII format. The number of nodes in the first 4 bins were added together to determine the number of nodes that contain less than 5 soundings.

The H12790_MB_1m_MLLW_Final surface contains a total of 25,789,565 nodes and 25,681,127 nodes contain at least 5 soundings. Therefore, greater than 99.5% of all nodes on the surface contain at least 5 soundings.

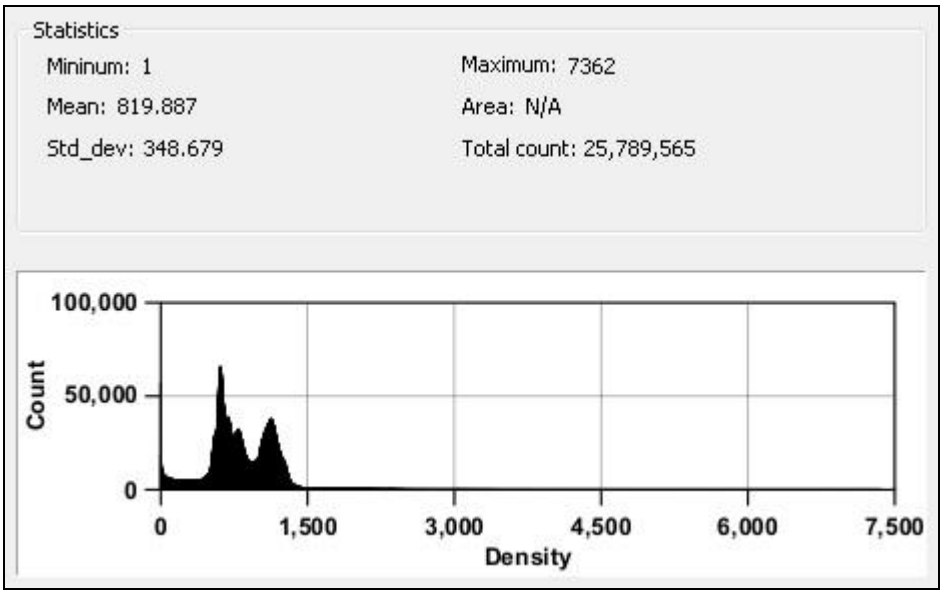


Figure 13. Statistical information about the density child layer of the H12790_MB_1m_MLLW_Final BASE surface, generated from the CARIS Compute Statistics tool.

B.3. Echo Sounding Corrections

B.3.1. Corrections to Echo Soundings

All corrections to echo sounding (instrument corrections, static and dynamic draft, speed of sound, and attitude corrections) follow the procedures outlined in the accompanying Data Acquisition and Processing Report (DAPR).

B.3.2. Calibrations

Prior to initiating survey operations, a standard patch test was performed for each vessel to determine correctors for pitch, roll, and heading (additional calibrations were performed as necessary). Squat and settlement tests were also conducted to determine the dynamic draft of the vessels. Refer to the Data Acquisition and Processing Report for additional information.

B.4. Backscatter

Backscatter was logged within each raw Kongsberg EM file. This data was imported during CARIS conversion and reviewed when necessary. Backscatter mosaics of the EM3002 data were able to be generated using CARIS. The EM2040C data was unable to be processed in CARIS; there is currently an open service request regarding this issue. All backscatter was imported and mosaics generated using FMGT version 7.5.1. Processing limitations necessitated the generation of several small mosaics instead of a mosaic of the entire area. Please note that errors were encountered with lines H90-c_4, H90-c_5, H90-c_5a and H90-c_6. Errors were also encountered in CARIS with these lines and the lines were removed from both the FMGT and CARIS projects.

B.5. Data Processing

B.5.1. Software updates

Software updates are detailed in the DAPR. No further software updates occurred after the submission of the DAPR.

The following Feature Object Catalog was used: NOAA Extended Attribute Files V5_3_2.

B.5.2. Surfaces

The following CARIS surfaces were submitted: A 1 meter surface (un-finalized and finalized) was generated to fulfill the Complete Coverage requirement for this survey. Both 2 and 5 meter surfaces were generated for the purpose of survey junction comparison. The extents of these surfaces were limited to the areas of junction overlap. A 1 meter BASE surface was generated for the crosslines and mainlines separately in order to conduct the crossline comparison analysis.

Surface Name	Surface Type	Resolution	Depth Range	Purpose
H12790_MB_1m_MLLW	Uncertainty	1 m	7.52 – 11.82 m	QC/Complete Coverage
H12790_MB_1m_MLLW_Final	Uncertainty	1 m	6.78 – 11.82 m	Complete Coverage
H12790_MB_2m_MLLW	Uncertainty	2 m	7.67 – 11.70 m	Survey Junctions
H12790_MB_5m_MLLW	Uncertainty	5 m	7.68 – 11.63 m	Survey Junctions
H12790_MB_Mainlines_1m_MLLW	Uncertainty	1 m	7.52 – 11.64 m	QC
H12790_MB_Crosslines_1m_MLLW	Uncertainty	1 m	7.70 – 11.61 m	QC

Table 10: CARIS surfaces

After initial data cleaning, the surfaces were reviewed a second time for fliers using the standard deviation layer and the 3D display window, when necessary. Higher standard deviation is generally associated with bathymetric features, contacts and/or areas of bathymetric change. Areas of noisy MBES data, although cleaned, can also show higher standard deviation. The highest standard deviation of 0.83 m is located at 29.013N, 91.566W and associated with a contact. This contact is within an area containing many contacts (refer to section D.2.7 and the Final Feature File for additional information) and is located between two (2) charted 28 foot obstructions.

C. Vertical and Horizontal Control

A complete description of the horizontal and vertical control for the OPR-K379-KR-15 surveys is located within the accompanying Horizontal and Vertical Control Report (HVCR). A summary of the horizontal and vertical control is provided below.

C.1. Vertical Control

The vertical datum for this survey is Mean lower low water (MLLW).

Standard Vertical Control Methods Used:

Discrete Zoning

The following National Water Level Observation Network (NWLON) station(s) served as datum control of this survey.

Station Name	Station ID
LAWMA, Amerada Pass, LA	8764227

Table 11. Tide Stations

File Name	Status
8764227.tid	Verified

Table 12. Water Level Files (.tid)

File Name	Status
K379KR2015CORP.zdf	Final

Table 13: Tide Correctors (.zdf)

Preliminary zoning is accepted as the final zoning for project OPR-K379-KR-15 as outlined in the Tides and Water Levels Statement of Work section 1.5.1. This zoning was used for data collected in 2015 only. Data collected in 2016 was corrected using primary C-Nav GPS ellipsoid heights reduced to MLLW. The files used to correct the 2016 data are named in Tables 14 and 15. Refer to the DAPR for a detailed explanation.

File Name	Status
GPS_HAE_Reduction_to_MLLW_CGhost.tid	Final

Table 14. Water Level File (.tid) used to correct data collected by the R/V C-Ghost in 2016

File Name	Status
GPS_HAE_Reduction_to_MLLW_SeaScout.tid	Final

Table 15. Water Level File (.tid) used to correct data collected by the R/V Sea Scout in 2016

C.2. Horizontal Control

The horizontal datum for this project is the North American Datum of 1983 (NAD83). All survey products are referenced to the Universal Transverse Mercator (UTM) zone 15 N, meters, projection. The C-Nav GPS systems aboard the vessels receive corrections through the C-Nav Subscription Services. This is "a premier worldwide subscription service providing 5 cm or better positioning accuracy. GNSS corrections are broadcast via Inmarsat geostationary satellites, providing highly accurate and reliable positioning coverage from 72 degrees north to 72 degrees south latitude." (http://www.cnavgnss.com/products)

D. Results and Recommendations

D.1. Chart Comparison

D.1.1. Raster Charts

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

Chart	Scale	Edition	Edition Date	LNM Date	NM Date
11340	458596	79	02/2016	03/22/2016	03/26/2016
11351	80000	43	03/2012	03/22/2016	03/26/2016
11356	80000	41	07/2014	03/22/2016	03/26/2016

Table 16. Largest Scale Raster Charts

11340

Two (2) Local Notice to Mariners (LNM) were issued within the survey bounds subsequent to the date of the project instructions and before the end of the survey (LNM 06/16 9th Dist on 2/11/2016). These two previously uncharted features were observed during survey operations and submitted as H12790_DtoN_Submission1. More information regarding these obstructions can be found in the Final Feature File. The last Local Notice to Mariners reviewed was LNM 07/16 8th Dist - Chart: 11340, Current Edition: 79 Print Date: Feb. /2016, Mississippi River to Galveston.

Surveyed soundings range from 4.11 – 6.47 fathoms (7.52 – 11.82 meters). Depths increase from northwest to south-southeast within the survey area. User defined color range charts and a selected sounding layer were used to compare surveyed soundings to charted depths. The shoal biased selected sounding layer was generated with a single defined radius of 150 meters.

On chart 11340, the 5 fathom contour extends from west to east through the southern portion of the survey area. It is evident from survey data that the 5 fathom contour has shifted north of its current position, particularly in the eastern portion of the survey area (Figure 14).

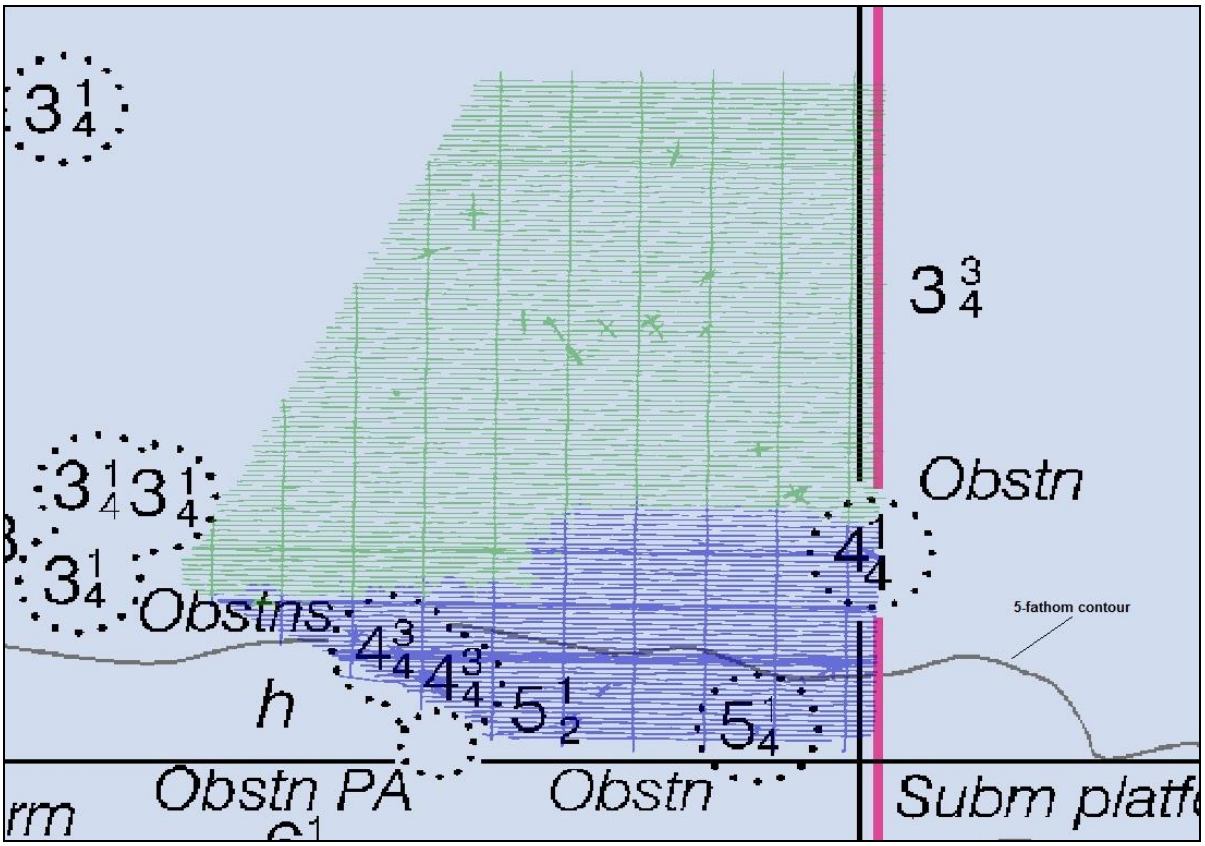


Figure 14. Comparison between surveyed soundings and charted 5 fathom contour. Blue represents area where surveyed soundings are greater than 5 fathoms (9.144 m) and green represents area where surveyed soundings are less than 5 fathoms.

11351

Four (4) Local Notices to Mariners (LNM) were issued within the survey bounds subsequent to the date of the project instructions and before the end of the survey. LMN 37/15 8th Dist issued on 9/24/2015 to 'Delete Platform (Fieldwood-103-20)'. This platform was removed before the start of H12790 survey operations, and was not present at the time of survey.

LNM 06/16 8th Dist issued on 2/4/2016 included addition of a 31-foot and a 28-foot obstruction, as well as removal of a 32-foot charted depth in the location of the new 28-foot obstruction. These notices correspond to H12790_DtoN_Submission1, and more information can be found in the Final Feature File.

The last Local Notice to Mariners reviewed was LNM 06/16 8th Dist - Chart: 11351, Current Edition: 43 Print Date: Mar. /2012, Point au Fer to Marsh Island.

Surveyed depths range from 24.67 to 38.81 feet (7.52 – 11.82 meters). In general, surveyed soundings are 1 – 3 feet deeper than charted depths throughout the survey area. In the southwest corner of the survey area, some surveyed soundings are up to 5 feet deeper than charted depths.

The charted 30 foot contour extends from west to east through the southern portion of the survey area. It is evident from the survey data that the contour has shifted north of its current position, particularly in the eastern portion of the survey area (Figure 15).

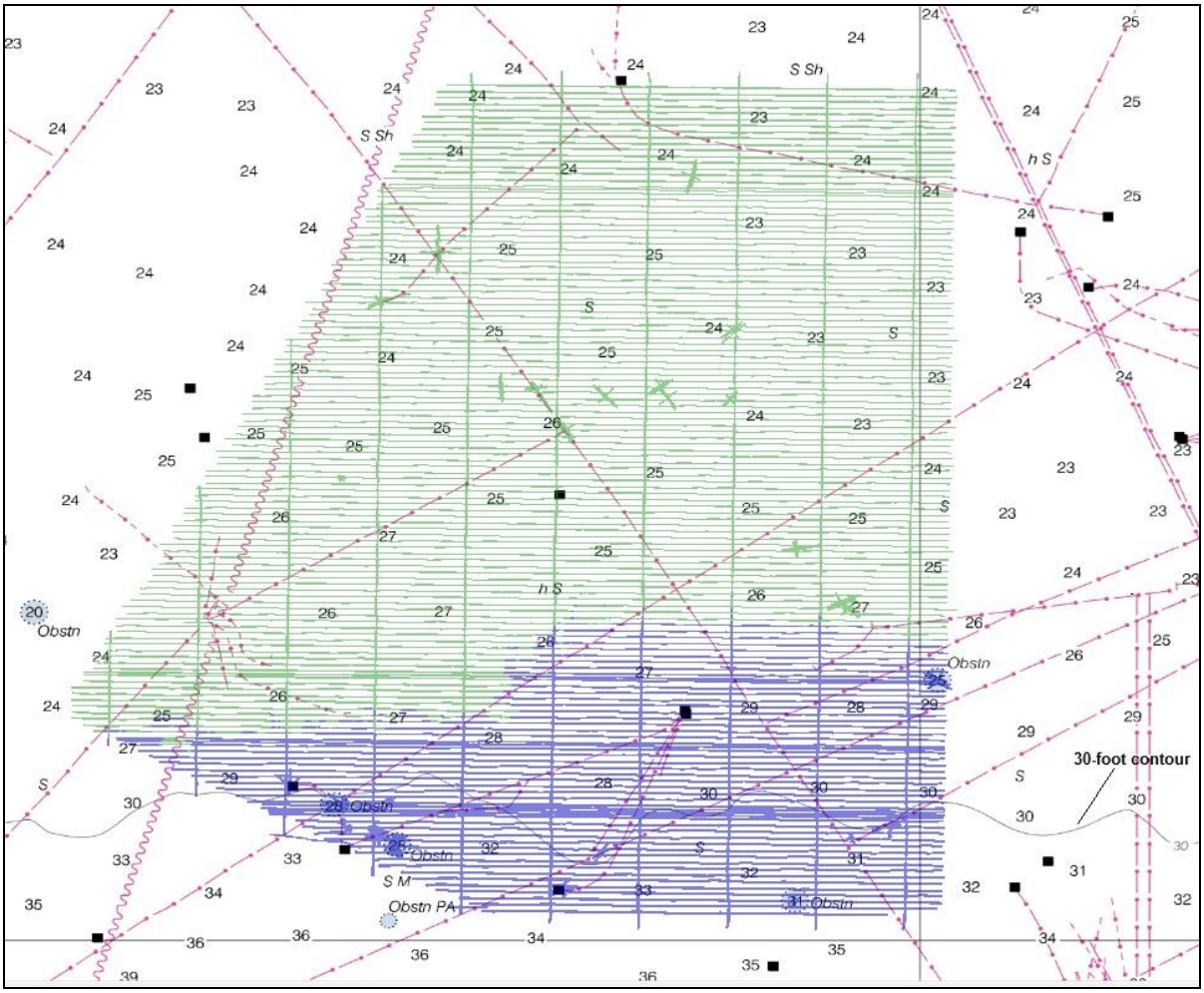


Figure 15. Comparison between surveyed soundings and the 30 foot contour of chart 11351. Green represents areas where surveyed soundings are less than 29.75 feet (9.143 m) in depth and blue represents areas where surveyed soundings are 29.75 feet (9.143 m) in depth and greater.

11356

No Local Notices to Mariners were issued within the survey bounds subsequent to the date of the project instructions and before the end of the survey. The last Local Notice to Mariners reviewed was LNM 03/16 8th Dist - Chart: 11356, Current Edition: 41 Print Date: Jul. /2014, Isles Dernieres to Point au Fer.

Only the eastern edge of the survey area overlaps with chart 11356 and surveyed soundings in this area are 1 – 3 feet deeper than charted depths. This area of overlap is also covered by survey H12789; refer to the H12789 descriptive report for a detailed chart comparison.

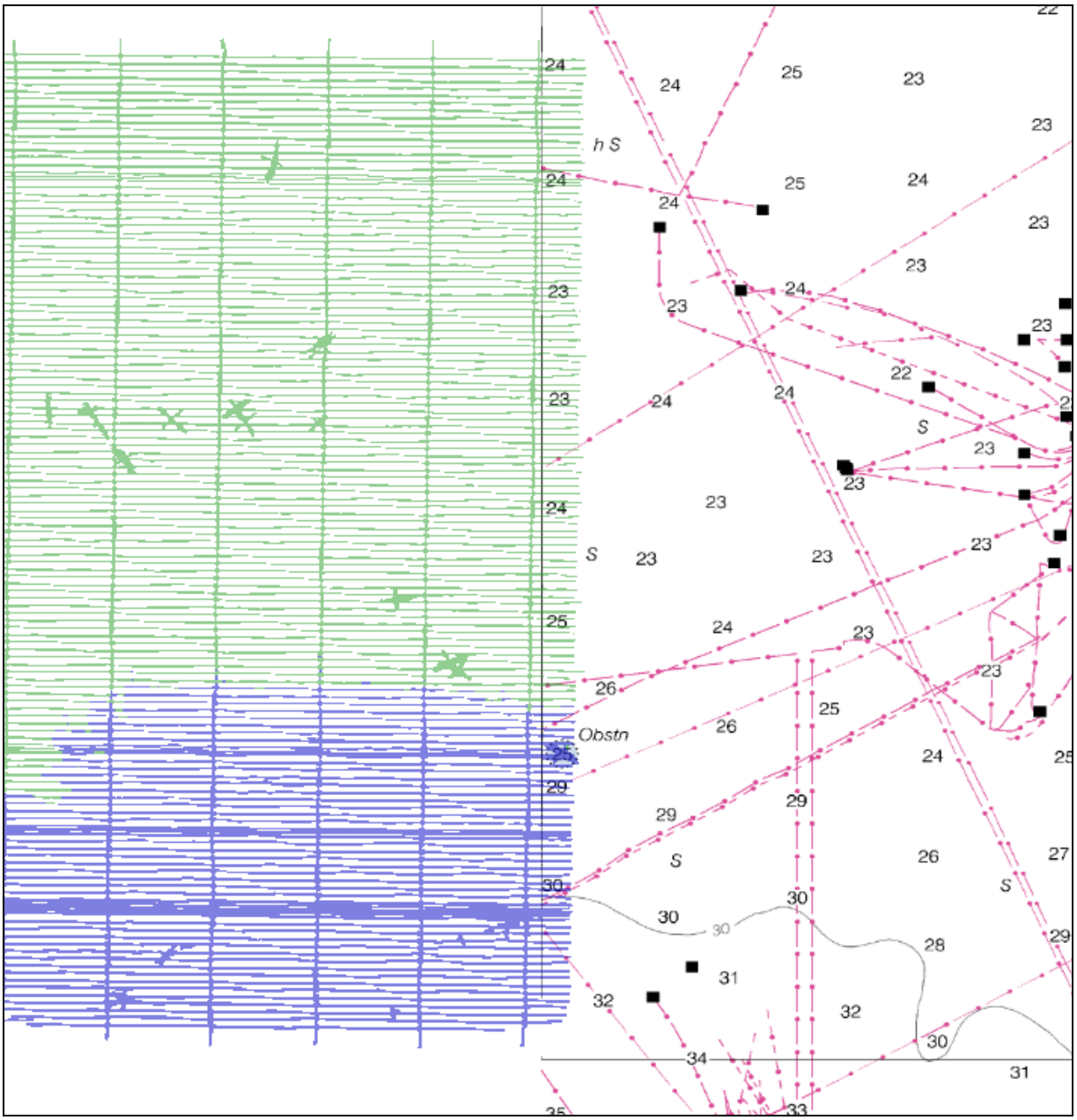


Figure 16. Comparison between surveyed soundings and 11356 charted depths, including the 30 foot contour. Green represents areas where surveyed soundings are less than 29.75 feet (9.143 m) in depth and blue represents areas where surveyed soundings are 29.75 feet (9.143 m) in depth and greater.

D.1.2. Electronic Navigational Charts

ENC Name	Scale	Edition	Update Application Date	Issue Date	Preliminary
US4LA21M	80000	27	2015-03-25	2016-02-02	NO

Table 17. Largest Scale ENCs

US4LA21M

Depths and contours on ENC US4LA21M generally match those of chart 11351. The observations made between surveyed soundings and depths on chart 11351 are valid for the ENC. The only observed differences in depths between the ENC and RNC 11351 exists in the southern region that is outside the survey bounds, but was covered with survey data. Surveyed soundings are up to 5 feet deeper than ENC depths (Figure 17).

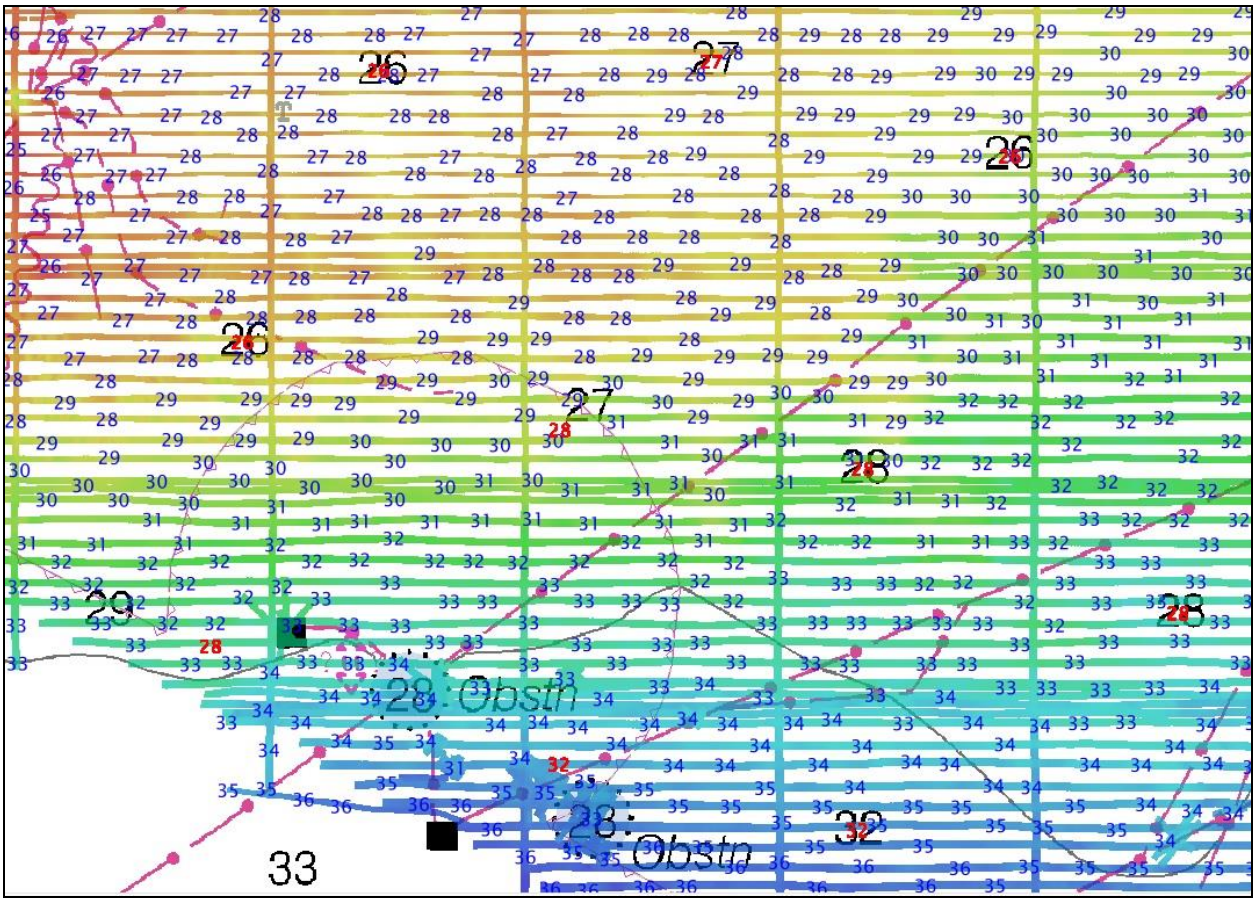


Figure 17. Comparison between charted depths of RNC 11351, charted depths of ENC US4LA21M (in red) and surveyed soundings (in blue).

D.1.3. AWOIS Items

AWOIS item investigations are not assigned for this project.

D.1.4. Maritime Boundary Points

No Maritime Boundary Points were assigned for investigation within H12790 survey bounds.

D.1.5. Charted Features

Chart 11340

There are two (2) charted obstructions within the survey area that correspond to DtoNs submitted for H12790. Two additional charted obstructions exist that are outside the survey bounds, but were covered with survey data. One (1) of these obstructions correlates to a DtoN submission for H12789 and is corroborated with survey data from H12790. The other obstruction, centered at 29.016N, 91.568W was not observed within survey data, though a portion of the charted 4 ¾ fathom obstruction area did not receive complete survey coverage. Refer to the Final Feature File for additional information.

Chart 11351

There are four (4) charted platforms and numerous charted pipelines within the survey area (refer to sections D.2.6 and D.2.4, respectively for additional information). There is also one (1) 31 foot obstruction and one (1) 28 foot obstruction charted within the survey area. One (1) 25 foot obstruction and one (1) 28 foot obstruction are charted outside survey bounds, but were covered with survey data; the 28 foot obstruction was not observed within survey data. Refer to the Final Feature File for additional information.

Chart 11356

No additional charted features than what was previously described for charts 11340 and 11351 exist on chart 11356. Previously described feature remarks are valid for chart 11356.

US4LA21M

The charted pipelines on ENC US4LA21M match those of RNC 11351. The four obstructions, and the four charted platforms on RNC 11351 are also present on the ENC USLA21M. Refer to the Final Feature File for additional information. No additional features are observed on the ENC that are not charted on the RNC.

D.1.6. Uncharted Features

Two (2) uncharted Dangers to Navigation were submitted and there are numerous contacts that required sounding designation in the CARIS project. Refer to the Final Feature File for additional information.

D.1.7. Dangers to Navigation

Two (2) Dangers to Navigation were submitted for survey H12790. Refer to the Final Feature File for additional information.

D.1.8. Shoal and Hazardous Features

No additional shoal or hazardous features were observed visually or within survey data that have not been discussed in sections D.1.6, D.1.7, D.2.4, D.2.6 or D.2.7.

D.1.9. Channels

No channels are currently charted within the survey limits, and none were observed during survey operations.

D.2. Additional Results

D.2.1. Prior Surveys

Prior survey data was not required to be evaluated for this survey.

D.2.2. Aids to Navigation

No Aids to Navigation are currently charted within the survey area, and none were observed either visually or within survey data.

D.2.3. Overhead Features

Overhead features do not exist for this survey.

D.2.4. Submarine Features

Numerous submarine pipelines are charted within the H12790 survey area. Several potential exposures were observed within survey data (SSS and/or MBES) and were further investigated. Refer to the Final Feature File for additional information. There is one submarine cable charted within the survey area but evidence of this cable was not observed within survey data.

D.2.5. Ferry Routes and Terminals

No ferry routes or terminals are currently charted within the survey limits, and none were observed during survey operations.

D.2.6. Platforms

There are four (4) platforms charted within the bounds of H12790. Two (2) of these platforms were observed visually and within survey data and are near currently charted platforms. Two (2) of these platforms were not observed visually or within survey data and the hydrographer recommends removal from the chart. There is one (1) additional platform in the CSF file but it is not currently charted. This platform was not observed visually or within survey data. One (1) charted platform outside the southwest survey bounds was covered with survey data and was observed visually and within survey data. Refer to the Final Feature File for additional information.

D.2.7. Significant Features

Along the southwest boundary of the survey area there is a high concentration of contacts that were either designated or marked as examined in the CARIS project. Due to the high concentration of contacts, some of the smaller features were not chosen as individual contacts from the SSS data. This has been represented as an area feature in the Final Feature File.

Two water column anomalies were discovered during the survey and submitted for information purposes. Data representative of the anomaly were rejected from the CARIS project. Both anomalies have been included in the Final Feature File. The water column anomaly located at 29.074N, 91.562W was covered with multibeam data on four (4) different occasions between October 12, 2015 and February 18, 2016. On October 12th, a 1.8-meter depression was evident. By February 18th the depression had filled in. Coverage on the 7th of November and the 25th of January show the gradual filling in of this depression. Though no longer present, this depression is represented as an area feature in the Final Feature File.

D.2.8. Construction and Dredging

No active dredging or construction was observed during survey operations.

D.3. Recommendations

D.3.1. New Survey Recommendations

No new surveys or investigations are recommended for this area.

D.3.2. Inset Recommendations

No new insets are recommended for this area.

E. Approval Sheet

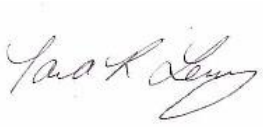
LETTER OF APPROVAL

REGISTRY NUMBER H12790

This report is respectfully submitted.

Field operations contributing to the accomplishment of the H12790 survey were conducted under my direct supervision with frequent personal checks of progress and adequacy. This report and CARIS project have been closely reviewed and are considered complete and adequate as per the Statement of Work.

This report is accompanied by the Data Acquisition and Processing Report for project OPR-K379-KR-15.



Tara Levy
Chief of Party
C & C Technologies
April 2016

Nicole Galloway
Geoscientist
C & C Technologies
April 2016

APPENDIX I

TIDES AND WATER LEVELS

FINAL TIDE NOTE and FINAL TIDE ZONING CHART

DATE: April 2016
HYDROGRAPHIC BRANCH: Atlantic
HYDROGRAPHIC PROJECT: OPR-K379-KR-15
HYDROGRAPHIC SHEET: H12790

LOCALITY: Approaches to Atchafalaya Bay

TIME PERIOD: October 11, 2015 – February 18, 2016
TIDE STATION USED: 8764227 LAWMA, LA
Lat. 29° 26.9' N Lon. 91° 20.3' W

PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.00 m
HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 1.53 m

REMARKS: RECOMMENDED ZONING
Use zones identified as: WGM279, WGM280

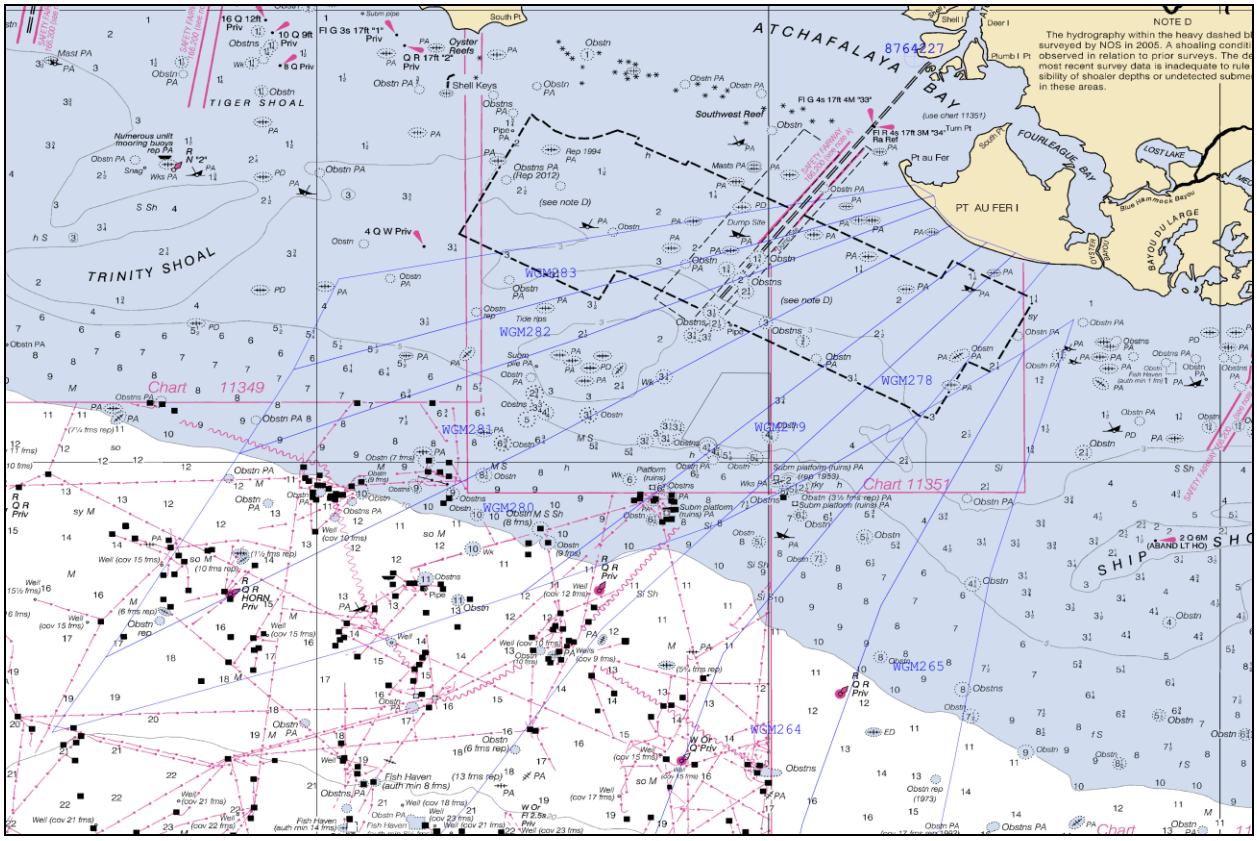
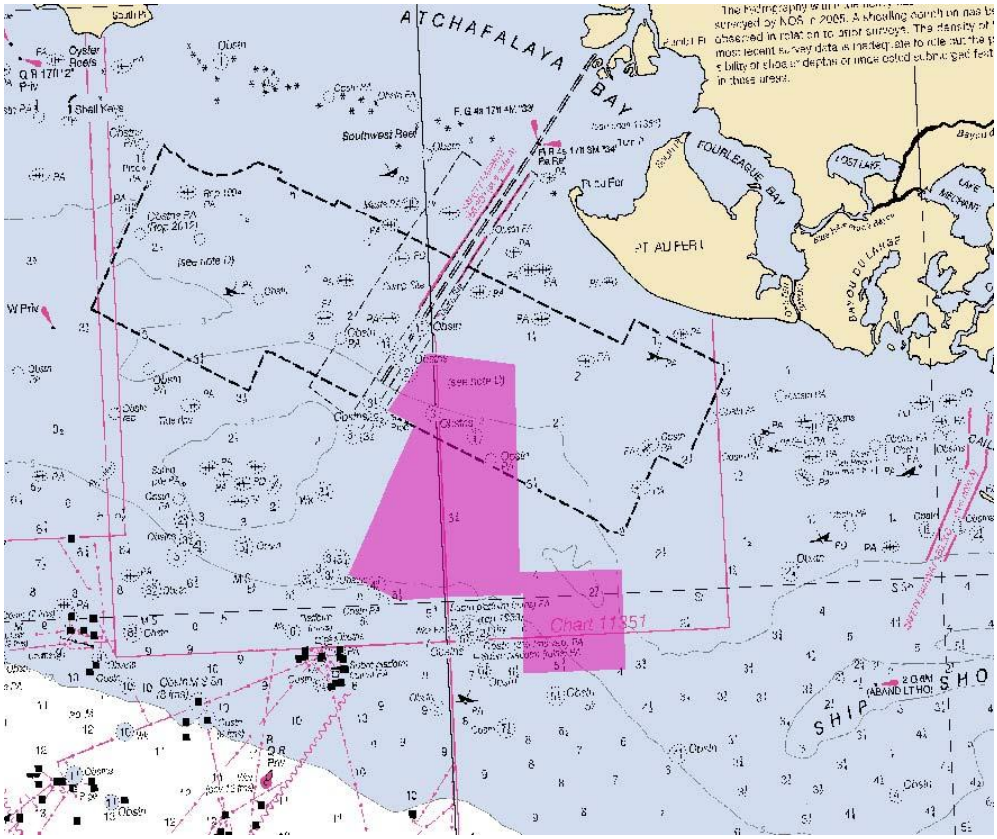


Figure 1. Final Tidal Zoning Chart

Note 1: Provided time series data are six minute time series data in meters, relative to MLLW and Greenwich Mean Time (GMT).
Note 2: For final processing of data collected in 2015, tidal zoning correctors were applied to verified observed data, acquired from the NOAA Tides and Currents website.
Note 3: For final processing of data collected in 2016, ellipsoid derived vertical correctors were applied

APPENDIX II

SUPPLEMENTAL SURVEY RECORDS AND CORRESPONDENCE



Coast Pilot Investigation Item for OPR-K379-TBA-15
Approach to Atchafalaya Bay, LA
42nd Edition of Coast Pilot 5 (08 February 2015)
Please verify the general depths described in the paragraph below:

Charts 11351, 11352, 11354

(213)
Atchafalaya Bay is a large indentation in the coast of Louisiana 112 miles W of Southwest Pass, Mississippi River. The bay is about 28 miles long in nearly an E-W direction, averages 7 miles in width, is full of shoals and oyster reefs, and has general depths ranging from 3 to 9 feet. A fringe of reefs partially separates the bay from the Gulf, the E end being known as Point au Fer Shell Reef. The bay is the approach to Lower Atchafalaya River and the Port of Morgan City, with depths of 25 feet or less extending 25 miles off the channel entrance.

Depths directly in front of the channel cannot be verified with data from OPR-K379-KR-15. Data from OPR-K379-KR-15 indicates depths of 25 feet or less abutting the channel and extending east while depths greater than 25 feet extend south and southwest (Figure 1).

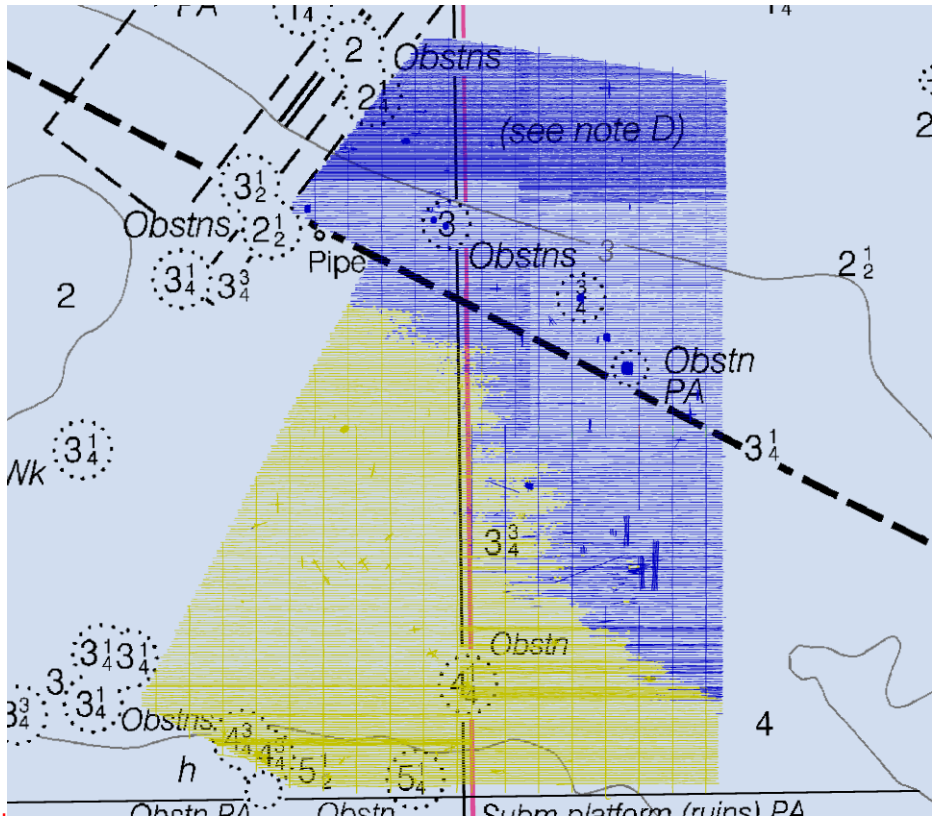


Figure 1. Sheets 1 – 4 of OPR-K379-KR-15 color coded by depth. Area in blue indicates area where surveyed soundings are less than 25 feet and the yellow area indicates area where surveyed soundings are greater than 25 feet.

Subject:
FW: Water column anomalies observed in H12790 of OPR-K379-KR-15
From:
Castle Parker - NOAA Federal <castle.e.parker@noaa.gov>
Date:
2/29/2016 12:59 PM
To:
Tim Osborn - NOAA Federal <tim.osborn@noaa.gov>
CC:
Nicole Galloway <ngalloway@oceaneering.com>, Tara Levy <tlevy@oceaneering.com>, "jdupl >> Duplechin, Jason" <jduplechin@oceaneering.com>, Starla Robinson - NOAA Federal <Starla.Robinson@noaa.gov>, Lucy Hick - NOAA Federal <lucy.hick@noaa.gov>, Christina Fandel - NOAA Federal <christina.fandel@noaa.gov>, Matthew Jaskoski - NOAA Federal <matthew.jaskoski@noaa.gov>, Michael Gonsalves - NOAA Federal <michael.gonsalves@noaa.gov>, Corey Allen - NOAA Federal <corey.allen@noaa.gov>

Good day Tim,

Oceaneering formerly known as C&C Technologies, Inc., a NOAA contract field unit submitted information regarding what appears to be gas seeps located at the end or near charted pipelines. AHB is forwarding this information for you to disseminate. The submission is related to survey H12790 and project OPR-K379-KR-15.   Please bear in mind these objects are not considered as chartable features and are considered as environmental issues.

The image below is an overall view with the Point Au Fer Island, LA in the upper right-hand corner. The two circles are the submitted seeps.

Regards,

Gene

Castle Eugene Parker

NOAA Office of Coast Survey

Atlantic Hydrographic Branch

Hydrographic Team Lead / Physical Scientist

castle.e.parker@noaa.gov

office (757) 441-6746 x115

From: Nicole Galloway [mailto:ngalloway@oceaneering.com]
Sent: Thursday, February 25, 2016 5:55 PM
To: Gene Parker; Starla Robinson - NOAA Federal; Lucy Hick - NOAA Federal; Christina Fandel - NOAA Federal
Cc: Tara Levy; jdupl >> Duplechin, Jason
Subject: Water column anomalies observed in H12790 of OPR-K379-KR-15

Good afternoon,

FW Water column anomalies observed in H12790 of OPR-K379-KR-15.txt

Two water column anomalies were observed within survey data from H12790 of project OPR-K379-KR-15. Attached is a zip file containing a .hob file, an S-57 file and associated images.
This data will be rejected in the project because it does not represent the seafloor, but a discussion will be added to the DR. Would you prefer this information to be also added to the Final Feature File?

Please note that additional tide information may be forthcoming and may affect the final depths of the data.

Let us know if there is any other information you require.
If there are any additional questions regarding infrastructure please contact Jason Duplechin (jduplechin@oceaneering.com).

Thank-you,
Nikki

--

Best regards,

Nicole Galloway

Geoscientist

Phone (+1) 337 210 0000 ext. 3519

Mobile (+1) 603 978 7211

ngalloway@oceaneering.com

730 E. Kaliste Saloom Road | Lafayette, LA | USA, Tel (+1) 337 210 0000 | oceaneering.com

Attachments:
H12790 Gas Seeps Report.pdf   2.1 MB

Castle Parker - NOAA Federal

From: OCS NDB - NOAA Service Account
Sent: Thursday, January 21, 2016 1:08 PM
To: Castle Parker - NOAA Federal
Cc: Matthew Jaskoski - NOAA Federal; Michael Gonsalves - NOAA Federal; Corey Allen - NOAA Federal; Christina Fandel - NOAA Federal; Starla Robinson - NOAA Federal; Tim Osborn - NOAA Federal; Emily Clark - NOAA Federal; Nicole Galloway; Tara Levy; NSD Coast Pilot; Benjamin K Evans - NOAA Federal; James Crocker - NOAA Federal; Matt Kroll - NOAA Federal; Nautical Data Branch; Tara Wallace - NOAA Federal; Pearce Hunt - NOAA Federal; _NOS OCS PBA Branch; _NOS OCS PBB Branch; _NOS OCS PBC Branch; _NOS OCS PBD Branch; _NOS OCS PBE Branch; _NOS OCS PBG Branch
Subject: Re: H12790 DtoN #1 Submission to NDB
Attachments: H12790 DtoN #1.zip

L-77/16 and DD-27147 have been registered by the Nautical Data Branch and directed to Products Branch G for processing.

The DtoNs reported are two submerged obstructions located in the Gulf of Mexico, 20 NM SSW of Point Au Fer, LA.

The following charts are affected:
11351 kapp 63

11340 kapp 49

The following ENCs are affected:
US4LA21M

US3GC03M

References:
H12790
OPR-K379-KR-15

This information was discovered by a NOAA Contractor and submitted by AHB.

Nautical Data Branch/Marine Chart Division/
Office of Coast Survey/National Ocean Service/
Contact: ocs.ndb@noaa.gov
NOAA NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

On Thu, Jan 21, 2016 at 11:38 AM, Castle Parker - NOAA Federal <castle.e.parker@noaa.gov> wrote:

Good Day,

Please find attached compressed file for survey H12790 DtoN report #1, containing a 28ft obstruction and 31ft obstruction for submission to Nautical Data Branch (NDB) and Marine Chart Division (MCD) for chart application.

The information originates from a NOAA contract field unit Oceaneering, formerly C&C Technologies Inc., and was submitted to the Atlantic Hydrographic Branch (AHB) for review and processing. The contents of the attached WinZip file were generated at AHB. The attached zip file contains a DtoN Letter (PDF), associated image files, and a Pydro XML file.

If any question arise, please direct them back to me via email or phone (757-441-6747 x115).

Thank you for your assistance with this matter.

Regards,

Gene Parker

Castle Eugene Parker

NOAA Office of Coast Survey

Atlantic Hydrographic Branch

Hydrographic Team Lead / Physical Scientist

castle.e.parker@noaa.gov

office (757) 441-6746 x115

Subject:
Re: H12790 DtoN #1 Submission to NDB
From:
OCS NDB - NOAA Service Account <ocs.ndb@noaa.gov>
Date:
1/21/2016 12:07 PM
To:
Castle Parker - NOAA Federal <castle.e.parker@noaa.gov>
CC:
Matthew Jaskoski - NOAA Federal <matthew.jaskoski@noaa.gov>, Michael Gonsalves - NOAA Federal <michael.gonsalves@noaa.gov>, Corey Allen - NOAA Federal <corey.allen@noaa.gov>, Christina Fandel - NOAA Federal <christina.fandel@noaa.gov>, Starla Robinson - NOAA Federal <Starla.Robinson@noaa.gov>, Tim Osborn - NOAA Federal <tim.osborn@noaa.gov>, Emily Clark - NOAA Federal <Emily.Clark@noaa.gov>, Nicole Galloway <ngalloway@oceaneering.com>, Tara Levy <tlevy@oceaneering.com>, NSD Coast Pilot <coast.pilot@noaa.gov>, Benjamin K Evans - NOAA Federal <Benjamin.K.Evans@noaa.gov>, James Crocker - NOAA Federal <James.M.Crocker@noaa.gov>, Matt Kroll - NOAA Federal <Matt.Kroll@noaa.gov>, Nautical Data Branch <OCS.NDB@noaa.gov>, Tara Wallace - NOAA Federal <Tara.Wallace@noaa.gov>, Pearce Hunt - NOAA Federal <Pearce.Hunt@noaa.gov>, _NOS OCS PBA Branch <ocs.pba@noaa.gov>, _NOS OCS PBB Branch <ocs.pbb@noaa.gov>, _NOS OCS PBC Branch <ocs.pbc@noaa.gov>, _NOS OCS PBD Branch <ocs.pbd@noaa.gov>, _NOS OCS PBE Branch <ocs.pbe@noaa.gov>, _NOS OCS PBG Branch <ocs.pbg@noaa.gov>

L-77/16 and DD-27147 have been registered by the Nautical Data Branch and directed to Products Branch G for processing.

The DtoNs reported are two submerged obstructions located in the Gulf of Mexico, 20 NM SSW of Point Au Fer, LA.

The following charts are affected:
11351 kapp 63

11340 kapp 49

The following ENCs are affected:
US4LA21M

US3GC03M

References:
H12790
OPR-K379-KR-15

This information was discovered by a NOAA Contractor and submitted by AHB.

Nautical Data Branch/Marine Chart Division/
Office of Coast Survey/National Ocean Service/
Contact: ocs.ndb@noaa.gov

On Thu, Jan 21, 2016 at 11:38 AM, Castle Parker - NOAA Federal <castle.e.parker@noaa.gov> wrote:

> Good Day,
>
> Please find attached compressed file for survey H12790 DtoN report #1, containing a 28ft obstruction and 31ft obstruction for submission to Nautical Data Branch (NDB) and Marine Chart Division (MCD) for chart application.

The information originates from a NOAA contract field unit Oceaneering, formerly C&C Technologies Inc., and was submitted to the Atlantic Hydrographic Branch (AHB) for review and processing. The contents of the attached WinZip file were generated at AHB. The attached zip file contains a DtoN Letter (PDF), associated image files, and a Pydro XML file.

If any question arise, please direct them back to me via email or phone (757-441-6747 x115).

Thank you for your assistance with this matter.

Regards,

Gene Parker

Castle Eugene Parker

NOAA Office of Coast Survey

Atlantic Hydrographic Branch

Hydrographic Team Lead / Physical Scientist

castle.e.parker@noaa.gov

office (757) 441-6746 x115

Attachments:
H12790 DtoN #1.zip 1.9 MB

Subject:
RE: Water column anomalies observed in H12790 of OPR-K379-KR-15
From:
Castle Parker - NOAA Federal <castle.e.parker@noaa.gov>
Date:
2/29/2016 12:28 PM
To:
ngalloway@oceaneering.com, Starla Robinson - NOAA Federal <Starla.Robinson@noaa.gov>, Lucy Hick - NOAA Federal <lucy.hick@noaa.gov>, Christina Fandel - NOAA Federal <christina.fandel@noaa.gov>
CC:
Tara Levy <tlevy@oceaneering.com>, "jdupl >> Duplechin, Jason" <jduplechin@oceaneering.com>

Good day Nikki,

If the DR is going to include a discussion, then I would add the two features as you submitted to the survey's feature file. I am going to generate a report and send to Tim Osborn to disseminate the information to the proper authorities. I will send you a copy of the report when completed.

Thanks!

Regards.

Gene

Castle Eugene Parker

NOAA Office of Coast Survey

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From: Nicole Galloway [mailto:ngalloway@oceaneering.com]
Sent: Thursday, February 25, 2016 5:55 PM
To: Gene Parker; Starla Robinson - NOAA Federal; Lucy Hick - NOAA Federal; Christina Fandel - NOAA Federal
Cc: Tara Levy; jdupl >> Duplechin, Jason
Subject: Water column anomalies observed in H12790 of OPR-K379-KR-15

Good afternoon,

Two water column anomalies were observed within survey data from H12790 of project OPR-K379-KR-15. Attached is a zip file containing a .hob file, an S-57 file and associated images.
This data will be rejected in the project because it does not represent the seafloor, but a discussion will be added to the DR. Would you prefer this information to be also added to the Final Feature File?

Please note that additional tide information may be forthcoming and may affect the final depths of the data.

Let us know if there is any other information you require.
If there are any additional questions regarding infrastructure please contact Jason Duplechin (jduplechin@oceaneering.com).

Thank-you,
Nikki

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Best regards,

Nicole Galloway

Geoscientist

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APPROVAL PAGE

H12790

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

- H12790_DR.pdf
- Collection of depth varied resolution BAGS
- Processed survey data and records
- H12790_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.

Approved: Briana Welton Hillstrom

Digitally signed by HILLSTROM.BRIANA.WELTON.1267667531
DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=NOAA, cn=HILLSTROM.BRIANA.WELTON.1267667531
Date: 2017.07.19 15:16:59 -04'00'

Lieutenant Commander Briana Welton Hillstrom, NOAA
Chief, Atlantic Hydrographic Branch