H12255

NOAA FORM 76-35A
U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL OCEAN SERVICE

# DESCRIPTIVE REPORT

Type of Survey: Hydrographic Multibeam & 200% Sidescan

Project No. : OPR-K354-KR-10

Registry No. : H12255

## LOCALITY

State: Louisiana

General Locality: Gulf of Mexico

Sublocality: 7 NM S of West Ship Shoal

2012

CHIEFS OF PARTY
Scott Croft, Tara Levy

**LIBRARY & ARCHIVES**

DATE:

| NOAA FORM 77-28 (11-72) | U.S. DEPARTMENT OF COMMERCE<br>NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION | REGISTRY No: H12255 |
|---|---|---|
| | **HYDROGRAPHIC TITLE SHEET** | |
| | | **FIELD NUMBER:** Sheet 13 |

State: Louisiana

General Locality: Gulf of Mexico

Locality: 7 NM S of West Ship Shoal

Scale: 1:40,000 Date of Survey: October 2010 to December 2011

Instructions Dated: May 2010 Project Number: OPR-K354-KR-10

Vessels: *M/V Inez McCall*

Chiefs of Party: Scott Croft, Tara Levy

Surveyed by: C&C Technologies Personnel

Soundings taken by echosounder, hand lead line, or pole: Simrad EM3002 Multibeam Echo sounder

Verification by: *Atlantic Hydrographic Branch Personnel*

Soundings in: Feet: ~~X~~ Fathoms: _____ Meters: X at MLW: _____ MLLW: X

**Remarks:** Hydrographic Survey of Sheet 13 (H12255)
Data collection in meters, referenced to MLLW, later converted into feet
200% side scan sonar, with concurrent multibeam coverage
UTC time was used exclusively
Grab samples were not taken
Tidal Zones: CGM 716, 717, 718, 732, 733, WGM 266, 414, 415, 416
Tidal Station: 8762075 (Port Fourchon, LA) and 8763535 (Texas Gas Platform)

NOAA FORM 77-28 SUPERSEDES FORM C & GS - 537

***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. Revisions and Red notes were generated during office processing. The processing branch concurs with all information and recommendations in the DR unless otherwise noted. Page numbering may be interrupted or non-sequential. All pertinent records for this survey, including the Descriptive Report, are archived at the National Geophysical Data Center (NGDC) and can be retrieved via http://www.ngdc.noaa.gov/.***

## TABLE OF CONTENTS


INTRODUCTION ..... 5
A. AREA SURVEYED ..... 5
B. DATA ACQUISITION AND PROCESSING ..... 7
B.1 Equipment ..... 7
B.2 Quality Control ..... 7
**B.2.1 Survey Methods ..... 7**
**B.2.2 Crosslines ..... 8**
**B.2.3 Uncertainty ..... 10**
**B.2.4 Survey Junctions ..... 10**
**B.2.5 Sonar System Quality Control ..... 15**
**B.2.6 Unusual Conditions/Factors Affecting Soundings/Imagery ..... 16**
B.3 Corrections to Echo Soundings ..... 16
B.4 Data Processing ..... 18
**B.4.1 Coverage BASE Surfaces and Mosaics ..... 18**
**B.4.2 SSS Imagery and Contacts ..... 18**
C. VERTICAL AND HORIZONTAL CONTROL ..... 19
D. RESULTS AND RECOMMENDATIONS ..... 19
D.1 Chart Comparison ..... 19
**D.1.1 Charts and Notices to Mariners ..... 19**
**D.1.2 Charted Soundings ..... 19**
**D.1.3 Charted Features ..... 24**
D.1.3.1 AWOIS ..... 24
D.1.3.2 Investigation Items ..... 24
D.1.3.3 Danger to Navigation Reports ..... 24
D.1.3.4 Existing Infrastructure ..... 25
D.1.3.5 Feature Report ..... 25
D.2 Additional Results ..... 25
**D.2.1 Prior Surveys ..... 25**
**D.2.2 Aids to Navigation ..... 25**
**D.2.3 Additional Infrastructure ..... 25**
**D.2.4 Significant Scientific/Practical findings ..... 28**
E. APPROVAL SHEET ..... 29

## LIST OF FIGURES

Illustration No. 1. Large Scale Survey Coverage Graphic. ..... 5
Illustration No. 2: Small Scale Survey Coverage Graphic. ..... 6
Illustration No. 3. Color range map and histogram used to evaluate depth differences between mainlines and crosslines for Subarea 1. ..... 9
Illustration No. 4. Color range map and histogram used to evaluate depth differences between mainlines and crosslines for Subarea 2. ..... 9
Illustration No. 5. H12255 Survey Junctions. ..... 11
Illustration No. 6. Color range map and histogram used to evaluate depth differences between the junction of Subarea 1 of H12255 and Subarea 1 of H12253. ..... 12
Illustration No. 7. Color range map and histogram used to evaluate the more extreme depth differences between the junction of Subarea 1 of H12255 and Subarea 1 of H12253. .. 12
Illustration No. 8. Area of large depth differences between lines 13002-1 (red) and H12253-TIE-104-1 (blue); there is a depression evident in line 13002-1. ..... 13
Illustration No. 9. Color range map and histogram used to evaluate the depth differences between the junction of Subarea 2 of H12255 and Subarea 2 of H12253. ..... 13
Illustration No. 10. Color range map and histogram used to evaluate the depth differences between the junction of Subarea 2 of H12255 and Subarea 1 of H12254. ..... 14
Illustration No. 11. Isolated region of larger depth differences between Subarea 2 of H12255 and Subarea 1 of H12254; red indicates depth differences that exceed -0.5 m. ..... 14
Illustration No. 12. H12255 survey area with colored depth ranges shown in Illustration No. 13 ..... 20
Illustration No. 13. CARIS color range map (in meters) used for Illustration No. 12. ..... 20
Illustration No. 14. Region in the northwest corner of the survey area where charted depths (excluding the 23-ft charted depth), are 7 – 9 feet deeper than surveyed soundings. ..... 21
Illustration No. 15. Region in the southeast corner of the survey area where surveyed soundings are up to 5 feet deeper than charted depths (shown in the black circles). ..... 22
Illustration No. 16. Region in the vicinity of the isolated 30-ft contours where surveyed soundings are up to 6 feet deeper than charted depths; the most extreme are shown in black circles. ..... 22
Illustration No. 17. Comparison of charted 30-ft contour and surveyed soundings. Soundings of 0 to 9.144 m are in red and soundings greater than 9.144 m are in blue; 9.144 m represents ~30 ft. ..... 23
Illustration No. 18. Black circles show pipelines identified from the SSS; these are located on charted pipelines. Black boxes show pipelines that are also seen in the multibeam data; they are labeled 1 – 3 and shown in the following Illustrations 19 – 21. The red box shows a pipeline that has been investigated. ..... 26
Illustration No. 19. Pipeline (identified by black arrows) evident multibeam data; corresponds to box #1 in Illustration No. 18. Black circles show the location of SSS contacts that correspond to the pipeline. ..... 27
Illustration No. 20. Pipeline (identified by black arrow) evident in multibeam data; corresponds to box #2 in Illustration No. 18. Black circles show the location of SSS contacts that correspond to the pipeline. ..... 27

Illustration No. 21. Pipeline (identified by black arrow) evident in multibeam data; corresponds to box #3 in Illustration No. 18. Black circles show the location of SSS contacts that correspond to the pipeline. ..... 28
Illustration No. 22. Large scale hummocky bathymetry in CARIS 3D map window with high vertical exaggeration; view is looking northeast. ..... 28

## LIST OF TABLES

Table No. 1: Survey Statistics ..... 6
Table No. 2: Additional Survey Statistics ..... 6
Table No. 3: Acquisition Dates ..... 6
Table No. 4: Equipment List ..... 7
Table No. 5. H12255 Survey Junctions ..... 10
Table No. 6: Patch test results (June 7, 2010-south of Cameron, LA) ..... 15
Table No. 7: Patch test results (June 30, 2011 – south of Cameron, LA) ..... 15
Table No. 8: Patch test results (September 22, 2011 – south of Port Fourchon , LA) ..... 15
Table No. 9: Patch test results (November 11, 2011 – south of Port Fourchon , La) ..... 15
Table No. 10: Multibeam positional offsets (from CRP) ..... 17
Table No. 11: Multibeam angular offsets ..... 17
Table No. 12: Nautical Charts used for Comparison ..... 19
Table No. 13: Nautical Chart Correction Dates ..... 19
Table No. 14. AWOIS item assigned for full investigation. ..... 24
Table No. 15. Significant features that required further investigation. ..... 24
Table No. 16. Charted platform not present at time of survey. ..... 25

## APPENDICES

| | |
|---|---|
| Appendix I | Danger to Navigation Reports |
| Appendix II | Survey Feature Report |
| Appendix III | Reserved |
| Appendix IV | Tides and Water Levels |
| Appendix V | Supplemental Survey Records and Correspondence |

## SEPARATES

| | |
|---|---|
| Separates I | Acquisition and Processing Logs |
| Separates II | Sound Speed Data |
| Separates III | Hydrographic Survey Project Instructions and Statement of Work |
| Separates IV | Crossline Comparisons |
| Separates V | Side Scan Contact Listing and Images of Significant Contacts |

**DESCRIPTIVE REPORT TO ACCOMPANY**
**HYDROGRAPHIC SURVEY H12255**

## INTRODUCTION

The purpose of this survey is to provide accurate hydrographic data to NOAA in order to update existing nautical charts in a high commercial traffic area in the Gulf of Mexico near the Louisiana coast.

## A. AREA SURVEYED

The survey area is located 7 nautical miles south of West Ship Shoal in the Gulf of Mexico. Illustrations 1 and 2 show the layout of Sheet 13 (H12255) of Project OPR-K354-KR-10. Water depths in the survey area range from 20.4 feet to 48.4 feet Mean Lower Low Water. Survey statistics that includes the total survey line and crossline nautical miles, number of investigations, and data acquisition dates are shown in Tables No. 1 – 3.

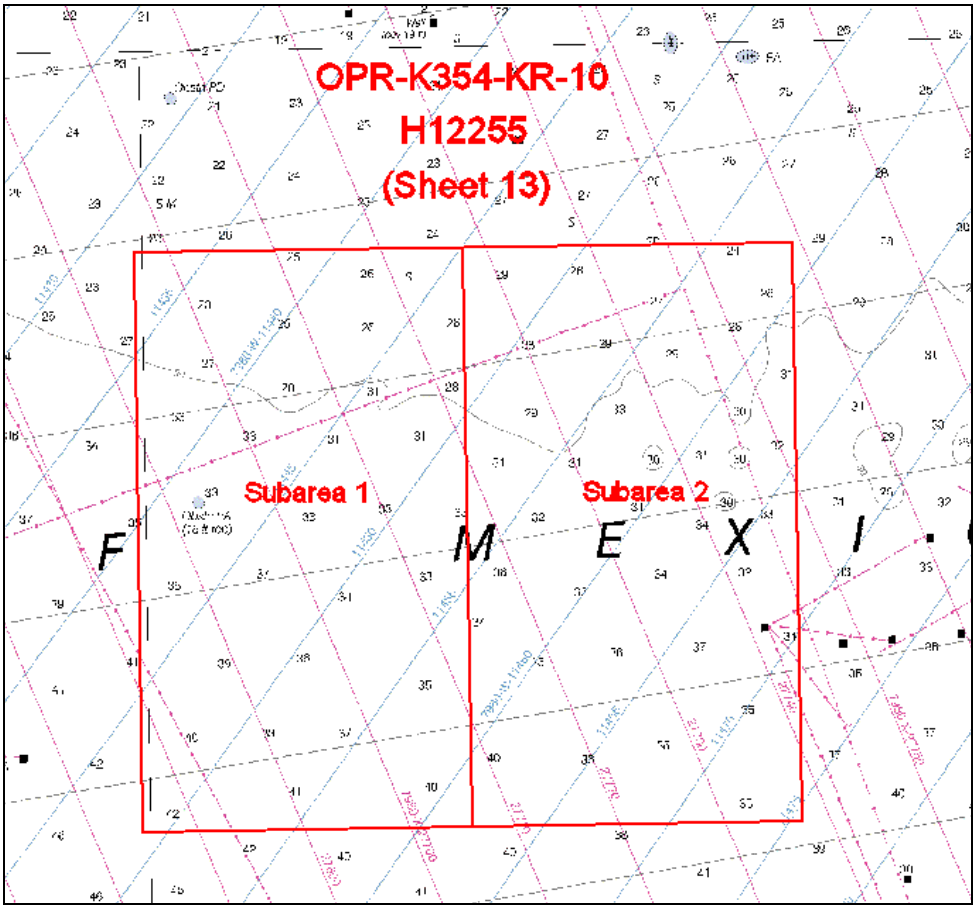



**Illustration No. 1. Large Scale Survey Coverage Graphic.**

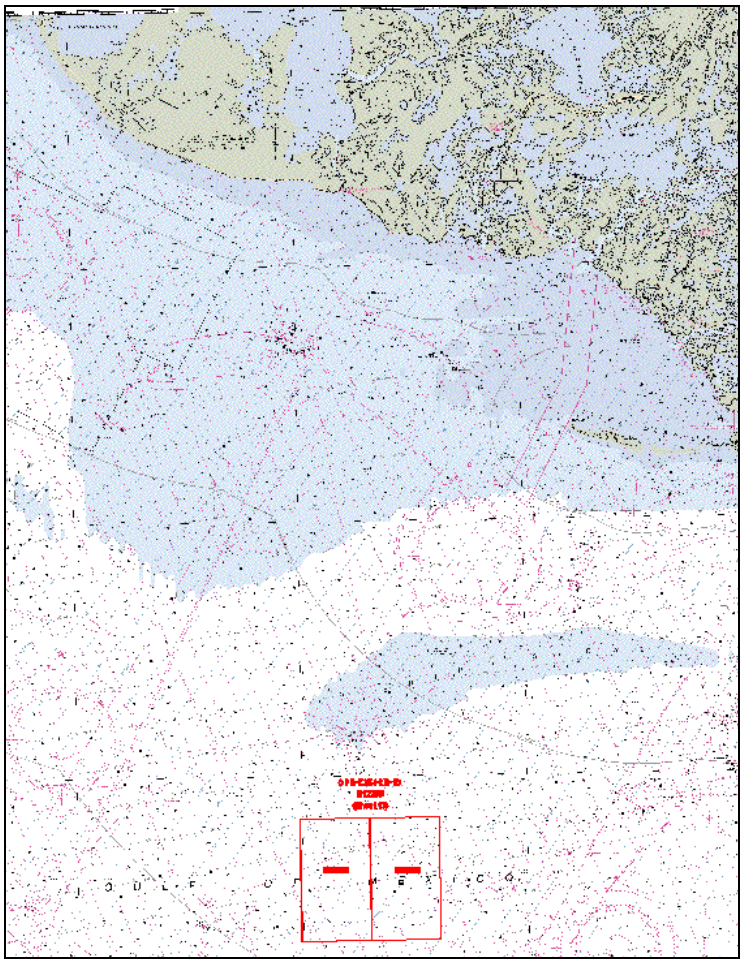


**Illustration No. 2: Small Scale Survey Coverage Graphic.**

**Table No. 1: Survey Statistics**

| | *Inez McCall* | Total |
|---|---|---|
| LNM Side Scan + Multibeam | 585.34 | 585.34 |
| LNM Crosslines | 30.62 | 30.62 |
| LNM Investigations | 0.63 | 0.63 |

**Table No. 2: Additional Survey Statistics**

| | |
|---|---|
| Number of items investigated | 1 |
| Total square nautical miles | 27.35 |

**Table No. 3: Acquisition Dates**

| Month | Day | Year |
|---|---|---|
| October | 22, 23, 30, 31 | 2010 |
| November | 1, 2, 8, 9, 10, 11 | 2010 |
| December | 2 | 2010 |
| November | 12,23 | 2011 |
| December | 30 | 2011 |

## B. DATA ACQUISITION AND PROCESSING

Refer to the OPR-K354-KR-10 Data Acquisition and Processing Report (DAPR) for additional information regarding survey systems, vessel diagrams, operational, processing and quality control procedures. Additional and supplemental information is included in this descriptive report.

### B.1 Equipment

Survey operations were conducted from the *M/V Inez McCall*. The vessel is 33.5 m long and 7.5 m wide with an approximate draft of 2.75 m. A central reference point was established prior to the survey from which all relevant offsets were measured. Primary systems and equipment utilized on the *M/V Inez McCall* are listed in Table No. 4.

**Table No. 4: Equipment List**

| System | Manufacturer | Model |
|---|---|---|
| Multibeam Echo Sounder | Simrad | EM3002 |
| Side Scan Sonar | Klein | 5000 |
| Single Beam Echo Sounder | ODOM | Echotrac DF3200 MK II |
| Motion Sensor | Applanix | POS MV-320 V.3 |
| Primary Positioning System | CNAV | 2050 |
| Secondary Positioning System | CNAV | 2050 |
| Tertiary Positioning System | Applanix | POS MV-320 V.3 |
| Sound Speed at Transducer | YSI Electronics | 600R |
| Sound Speed Profiler | Seabird | SBE19 |
| SSS collection | Chesapeake Technology Inc. | SonarWiz Map 4 |
| Multibeam collection | C&C Technologies | Hydromap |
| SSS Cable Payout Indicator | Subsea Systems, Inc. | PI-5600 |

### B.2 Quality Control

Side scan sonar and multibeam data were acquired in accordance with the coverage required for this survey. To ensure quality control, specific field procedures were conducted as well as a variety of data analyzing tools to validate the data. These methods are briefly outlined below. Refer to the DAPR for additional data acquisition, processing, and quality control procedures.

#### B.2.1 Survey Methods

The survey area was divided into two subareas (Illustration No. 1) and separate line-plans were created for each subarea in order to conduct efficient survey operations. The main survey lines were oriented east-west throughout both subareas. Two hundred percent (200%) side scan sonar (SSS) coverage and concurrent set line spacing multibeam echosounder (MBES) data were acquired in accordance with the coverage requirements as stated in the Project Instructions for this survey. Additional high-resolution multibeam developments were conducted over significant features (refer to section B.4.2 for more details).

The shallowest charted soundings determined the survey line spacing and the sidescan sonar range scale. Charted water depths in the survey area range from 23 to 42 feet, and a standard line spacing of 90 m was used for both subareas. The side scan sonar was operated with a range of 100 m per channel. The criteria of acquiring 200% SSS coverage for object detection was accomplished using the abovementioned parameters and Technique 2 as set forth in Section 6.1 of the HSSD (2010). The SSS tracklines used to generate 100% coverage mosaics were identified by an odd/even numbering system and ensured that sufficient coverage was obtained.

### B.2.2 Crosslines

Crosslines were run perpendicular to the mainscheme lines so that quality control statistics could be performed after each main line was completed. Based on pre-plot calculations, the total crossline miles were 30.62 nm, while the total main line miles were 585.34 nm. The cross lines comprised 5.2 percent of the total data set as compared to the mainscheme lines, compliant with set line spacing crossline requirements of Section 5.2.4.3 of the HSSD (2010), which states that lineal mileage of crosslines shall be at least 4% of main scheme mileage in areas surveyed with set line spacing coverage. Rerun miles are not included in these totals.

During data acquisition, each main line was also compared to all cross lines for which there was overlapping data. These graphs show the mean difference, RMS difference, and confidence interval for each beam. As can be seen in the sample statistics found in Separates IV, the main lines and cross lines depth values showed general agreement.

Crossline comparisons were also performed in CARIS HIPS/SIPS 7.1 using the Difference Surfaces tool. Separate 1-m BASE surfaces of mainlines and crosslines were created for each subarea and a difference BASE surface computed. The difference surface was examined with a user-defined color range map in 0.2 m increments from -0.6 m to 0.6 m.

The crosslines for Subarea 1 were cropped to 35º off of nadir on both the port and starboard sides because of large depth differences between mainline and outer-swath crossline data (Refer to section B.3). This difference was not seen in the crossline comparisons generated in Hydromap because only 5 º of nadir data from the crossline is used. This is done to reduce the error that is associated with the outer beams (Refer to section B.1.1.1 of the DAPR for more information). Cropping the crossline data ensures that the majority of the data is within IHO Order 1a specifications and that an accurate representation of the seafloor is provided. Crossline comparison within CARIS HIPS was conducted with the cropped data and shows that the majority of depth differences are between -0.4 and -0.2 m (Illustration No. 3). This is within the maximum allowable TVU (total vertical uncertainty), which ranges from ±0.51 to ±0.54 m for water depths of 6 to 15 m. However, the total depth differences range from -0.64 to 0.4 m, the extreme values of which exceed the maximum allowable TVU. An additional colormap, with increments of -0.7 to -0.5 m, -0.5 to 0.5 m and 0.5 to 0.7 m, was used to evaluate the extent and location of the larger depth differences. The depth differences that exceed the maximum allowable TVU are small and occur where the outer edges of the crossline swaths intersect mainline data.

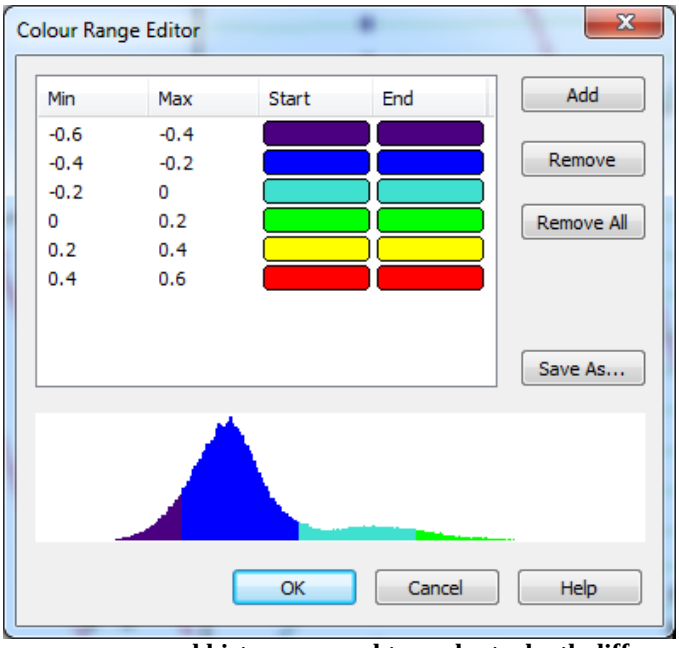



**Illustration No. 3. Color range map and histogram used to evaluate depth differences between mainlines and crosslines for Subarea 1.**

The depth differences between the mainlines and the crosslines in Subarea 2 range from -0.49 and 0.40 m, and the majority of the depth differences are between -0.2 and 0.2 m (Illustration No. 4). The depth values of Subarea 2 mainlines and crosslines do not differ by more than the maximum allowable TVU (total vertical uncertainty) for IHO Order 1a surveys for surveyed water depths of 8 to 14 m, which ranges from ±0.51 to ±0.53 m.

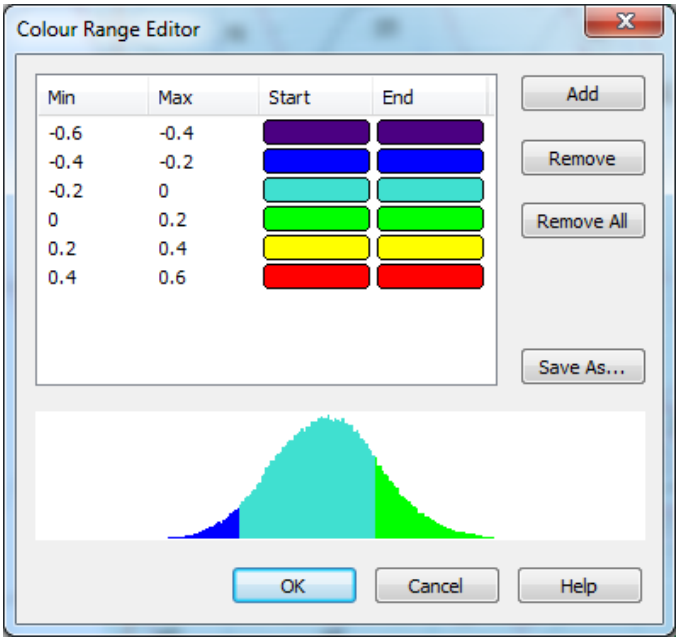



**Illustration No. 4. Color range map and histogram used to evaluate depth differences between mainlines and crosslines for Subarea 2.**

Statistical crossline information was also generated by comparing each of the crosslines to the depth layer of the 1-m BASE surface of the main survey lines. In Subarea 1, in general, >95% of crossline soundings were considered to meet IHO Order 1a standards. In Subarea 2, in general, >99% of crossline soundings were considered to meet IHO Order 1a standards. Crossline comparisons generated with the CARIS QC report utility are shown in Separate IV.

### B.2.3 Uncertainty

CARIS HIPS was used to compute the Total Propagated Uncertainty (TPU) for each sounding. The measured tide uncertainty parameter was set to 0.009 m and the zoning parameter set to 0.102 m. The measured sound speed parameter was set to 2 m/s and the surface sound speed parameter to 0.800 m/s. All BASE surfaces were created based upon the IHO Order 1a standards.

### B.2.4 Survey Junctions

Survey H12255 junctions with data collected from two other surveys in the OPR-K354-KR-10 project. Details of these surveys are shown in Table No. 5 and outlined in Illustration No. 5. Although continuous multibeam coverage is not obtained within a survey or between surveys due to the set line-spacing multibeam survey operations, a CARIS difference surface between the 1-m BASE surfaces of the junction surveys and the 1-m BASE surfaces of H12255 was computed to ensure general agreement of depths where overlap of sounding data occurred. Difference surfaces were created using the CARIS Difference Surfaces tool with H12255 as Surface 1 and the adjoining survey as Surface 2. The difference surfaces were initially evaluated with a user-defined color range map in 0.2 m increments from -0.6 to 0.6 m. A summary of each junction analysis follows.

**Table No. 5. H12255 Survey Junctions**

| Registry Number | Scale | Year | Sublocality |
|---|---|---|---|
| H12253 | 40000 | 2010 | Southwest Ship Shoal |
| H12254 | 40000 | 2010 | 8 NM S of Central Ship Shoal |

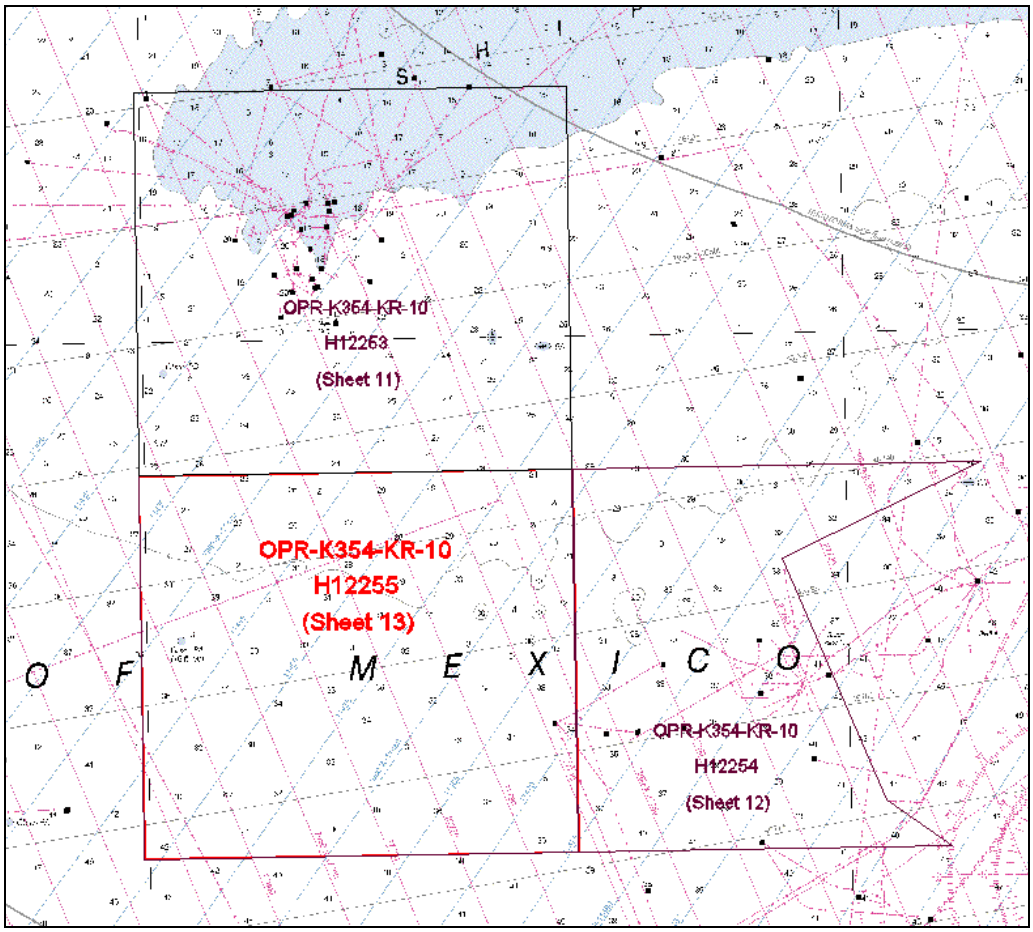



**Illustration No. 5. H12255 Survey Junctions.**

Junction with H12253

The northern margin of survey H12255 junctions with the southern margin of survey H12253. Preliminary 1-m BASE surfaces were created for each subarea of H12253 to which H12255 was compared. Any changes to this junction analysis will be addressed in the Descriptive Report of H12253. Subareas 1 and 2 of each survey overlap one another and crossline data of each survey overlaps mainline data of the adjoining survey.

Junction analysis for Subarea 1 of H12255 was conducted using the BASE surface with the cropped crosslines. H12255 data is consistently deeper than that of H12253 and the majority of depth differences are within 0.2 and 0.4 m (Illustration No. 6). However, there are some more extreme values greater than 0.6. In order to evaluate the extent and location of the more extreme values, an additional user defined colormap was used (Illustration No. 7). These values are located where crossline H12253-TIE-104-1 intersects mainlines 13001-1, 13002-1 and 13003-1. There appears to be a depression on line 13002-1 that is not present on H12253-TIE-104-1, which accounts for the largest depth differences (Illustration No. 8). Line 13002-1 was collected on October 22nd, 2010 while the tie line of H12253 was collected on December 10th, 2010; it is possible that the depression was filled in during this time period.

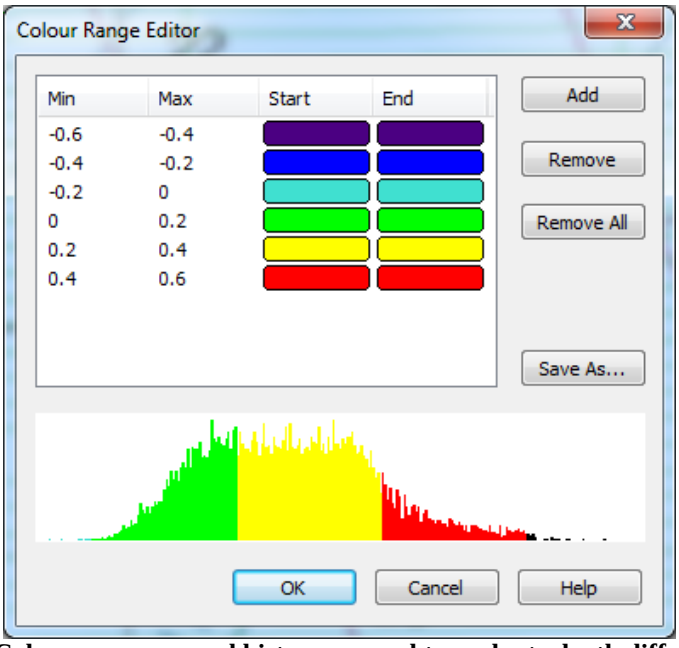



**Illustration No. 6. Color range map and histogram used to evaluate depth differences between the junction of Subarea 1 of H12255 and Subarea 1 of H12253.**

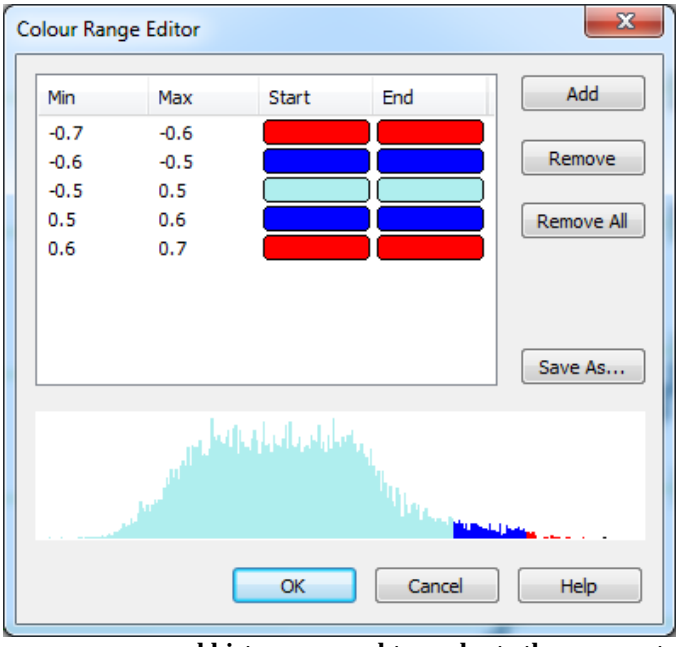



**Illustration No. 7. Color range map and histogram used to evaluate the more extreme depth differences between the junction of Subarea 1 of H12255 and Subarea 1 of H12253.**

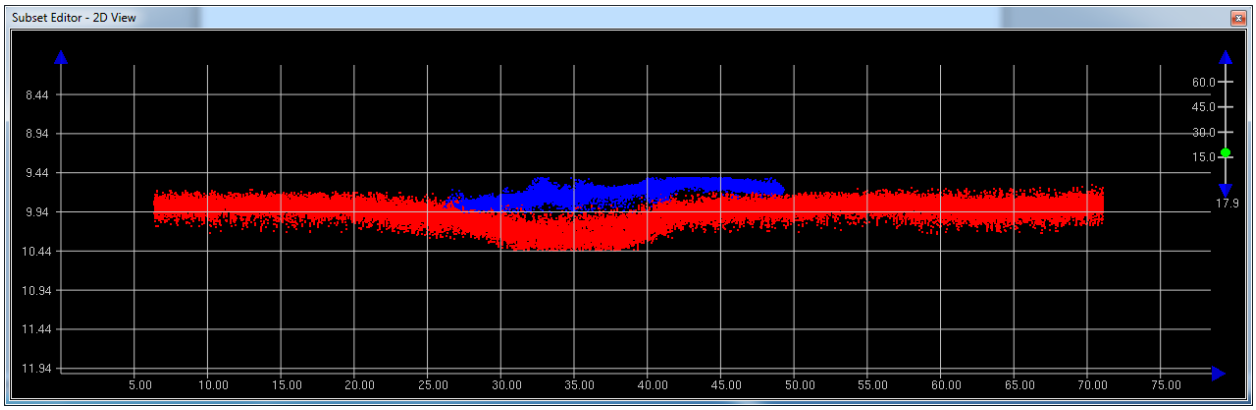



**Illustration No. 8. Area of large depth differences between lines 13002-1 (red) and H12253-TIE-104-1 (blue); there is a depression evident in line 13002-1.**

The depth differences between Subareas 2 of each survey range between -0.25 and 0.46 m, and the majority of depth differences are between 0.0 and 0.2 m (Illustration No. 9). Data from survey H12255 is generally slightly deeper than data from survey H12253.

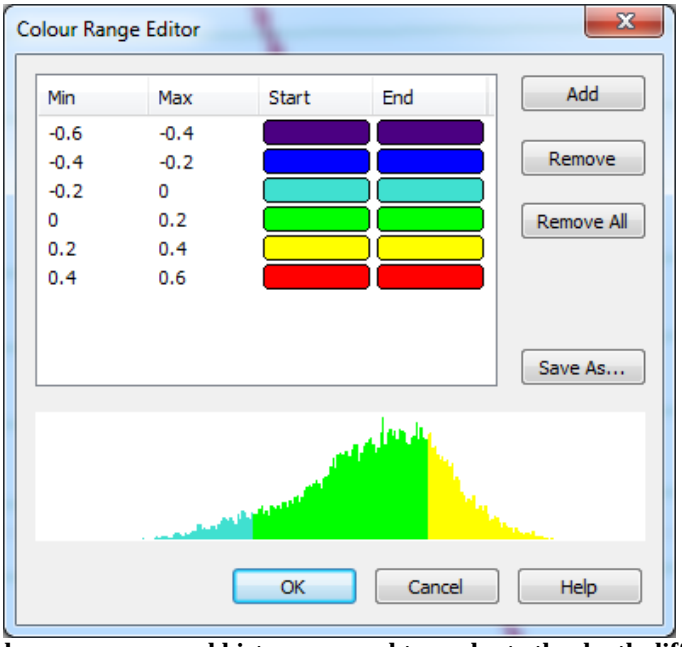



**Illustration No. 9. Color range map and histogram used to evaluate the depth differences between the junction of Subarea 2 of H12255 and Subarea 2 of H12253.**

Junction with H12254

The eastern margin of survey H12255 junctions with the western margin of survey H12254 and a preliminary 1-m BASE surface was created for Subarea 1 of H12254 to which data from H12255 was compared; any changes to this analysis will be noted in the descriptive report of H12254. Mainline data from Subarea 2 of H12255 overlaps mainline data from Subarea 1 of H12254. The maximum differences range from -0.57 to 0.42 m and the majority of the depth differences are between -0.4 and 0.2 m (Illustration No. 10). Depth differences

that exceed -0.5 m occur in one isolated region where the beginning of line 12046-1 intersects line 13145-1 (Illustration No. 11.)

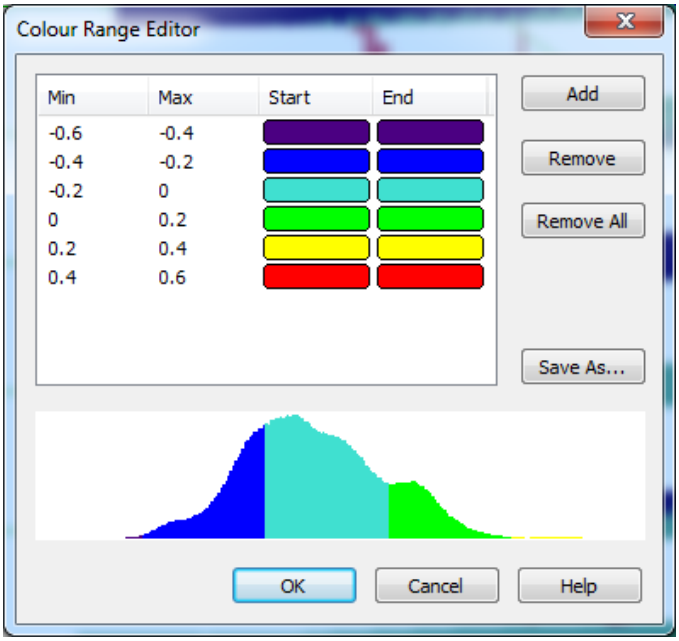



**Illustration No. 10. Color range map and histogram used to evaluate the depth differences between the junction of Subarea 2 of H12255 and Subarea 1 of H12254.**

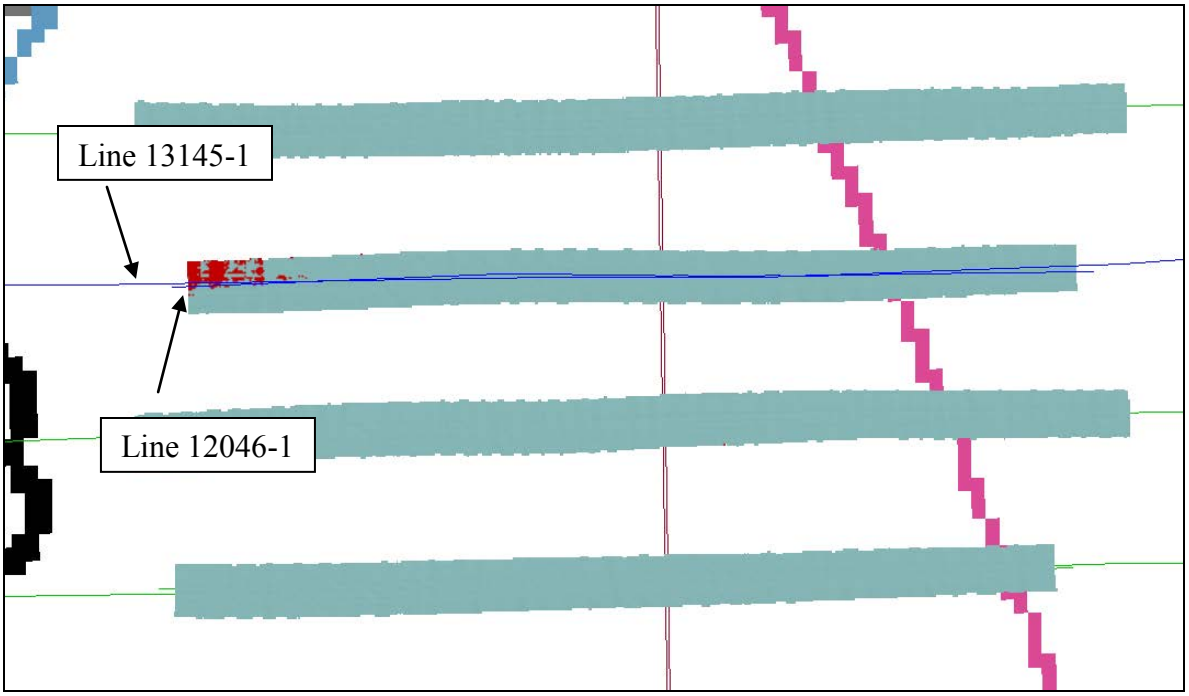



**Illustration No. 11. Isolated region of larger depth differences between Subarea 2 of H12255 and Subarea 1 of H12254; red indicates depth differences that exceed -0.5 m.**

### B.2.5 Sonar System Quality Control

A total of five patch tests were performed to calibrate the multibeam system. An initial patch test took place south of Cameron, LA on June 7th, 2010 (Table No. 6). Another four patch tests were performed; the first was outside of Port Fourchon, LA on the 14th of June 2011, the second was south of Cameron, LA on June 30th, 2011, a third outside Port Fourchon, LA on September 22th, 2011 and the fourth south of Port Fourchon, LA, on November 11, 2011.

On June 14th, 2011 a patch test was performed for the commencement of the 2011 NOAA project OPR-K354-KR-11. A second test was done as a check on the quality of the first calibration. The results from the June 30th patch tests were used as the final angular offsets. This was done because of concerns with the accuracy of the heading results. Results are shown in Table No. 7.

On September 22th, 2011, the EM3002 stopped working. After troubleshooting the topside and connections, it was determined that the problem was below the waterline, either with the cable or with the transducer. The boat was put into dry dock; the transducer and cable were replaced and a new patch test was performed. Results are shown in Table No. 8.

On November 11, 2011 another patch test was conducted after noticing misalignment in investigation multibeam data in CARIS. Results are shown in Table No. 9. The vessel file in CARIS was updated and correctors applied for data between September 22 and November 11, 2011.

**Table No. 6: Patch test results (June 7, 2010-south of Cameron, LA)**

| Roll | Pitch | Heading |
|---|---|---|
| -0.236° | 2.440° | 358.430° |

**Table No. 7: Patch test results (June 30, 2011 – south of Cameron, LA)**

| Roll | Pitch | Heading |
|---|---|---|
| -0.125° | 4.463° | -1.665° |

**Table No. 8: Patch test results (September 22, 2011 – south of Port Fourchon , LA)**

| Roll | Pitch | Heading |
|---|---|---|
| -0.117° | 4.755° | -1.569° |

**Table No. 9: Patch test results (November 11, 2011 – south of Port Fourchon , La)**

| Roll | Pitch | Heading |
|---|---|---|
| -0.17° | 3.72° | 2.521° |

The angular sector on the multibeam was set so that the criterion of two times water depth, as well as all accuracy, resolution, and detection criteria as set forth in Sections 5.2 and 5.3 of the "Specifications and Deliverables" document, were met.

Leadlines were conducted daily, when possible, to assess whether draft corrections needed to be applied in the multibeam collection software. The lead line logs are included in Separate I – Data Acquisition and Processing Logs.

An Odom Echotrac MKII single beam echosounder was used as an independent check on the multibeam system. Sound velocity was imported daily into the echo sounder.

Sound velocity casts were performed daily to measure the sound speed in the water column. Often casts were performed more than once to ensure accurate multibeam bottom detection. The water column sound speed was compared to the sound speed at the transducer, which was measured with an Endeco YSI sound speed profiler. Refer to the Data Acquisition and Processing Report for a description of sound speed corrections and to Separates II – Sound Speed Data for additional information.

In Subarea 1, several lines and portions of lines were re-run due to significant multibeam data gaps. Where only portions of lines were re-run, the new segments were added to the BASE surface. Evidence of the data gaps remains present in the final BASE surface and these regions also have high standard deviation. The fill-in lines are generally deeper than the original mainline multibeam data by 0.2 to 0.4 m. Two lines were completely re-run (13076-1 and 13077-1) and were removed from the project. They were replaced with lines 13076-2 and 13077-3.

In Subarea 2, two lines were partially re-run due to significant multibeam data gaps. 13123-2 was initially only a partial line and was replaced by 13123-3, while 13128-2 was added to the BASE surface. Similar to subarea 1, the fill-in lines are slightly deeper than the original mainline and regions of overlap with original data shows higher standard deviation.

### B.2.6 Unusual Conditions/Factors Affecting Soundings/Imagery

Fish and dolphins were noted in the acquisition logs and also noted when reviewing the side scan sonar data post-collection. Additional factors in the area that had the potential to impact the side scan imagery include shallow and warm water, the presence of thermoclines, and a soft bottom. The quality of the side scan sonar was monitored closely and the height of the fish manually adjusted to obtain the best possible data.

## B.3 Corrections to Echo Soundings

Positional and Angular Offsets

Prior to data collection on October 7th 2010, the computer for the EM3002 control software was swapped out due to a hardware failure. At this time, the positional and angular EM3002 mounting offsets in the control software (SIS) were also changed. No change should have been made to the offsets, and all future data was collected using these incorrect values.

To correct this error, the HIPS vessel file was updated with a second entry under Swath 1. This entry, beginning on October 7th (2010-280), uses the HVF correction values found in Tables No. 10 and No. 11 to adjust the data.

Due to the shallow water in the area, the angular, along track, and across track values went unnoticed. The vertical offset of nearly 0.4 meters was noticed right away when the lead line performed prior to data collection on 2010-280 was off by 0.4 meters. This error was corrected for in the multibeam control software as a subtraction to the waterline to CRP (draft) value. Because of this real-time correction, the 0.398-meter vertical offset is not entered in the HIPS vessel file.

To correct the angular offsets, the patch test results from June 30th, 2011 were used (Refer to Section B.2). This was done because after testing, the roll value from this patch test better corrected the data.

On November 11, 2011 another patch test was conducted after noticing misalignment in investigation multibeam data in CARIS. The vessel file in CARIS was updated and correctors applied for data between September 22 and November 11, 2011. In addition, the vessel file was also updated for data collected after November 11, 2011 with the correct heading value, which was not corrected for in SIS (Refer to DAPR for more details).

**Table No. 10: Multibeam positional offsets (from CRP)**

| | Y (Forward) | X (Starboard) | Z (Vertical) |
|---|---|---|---|
| Correct value (in SIS) | 14.518 m | 0.170 m | 3.048 m |
| Incorrect value (in SIS) | 14.80 m | 0.00 m | 2.65 m |
| HVF correction | -0.282 | 0.170 | 0.00 |

**Table No. 11: Multibeam angular offsets**

| | Roll (Positive starboard down) | Pitch (Positive bow up) | Heading (Positive clockwise) |
|---|---|---|---|
| Correct value (in SIS) | -0.125 | 4.463 | 358.335 (-1.665) |
| Incorrect value (in SIS) | 0.10 | 9.3 | 3.28 |
| HVF correction | -0.225 | -4.837 | -4.945 |

Tide Data

Between the dates of October 25, 2010 (JD 298) at 00:00 UTC and November 02, 2010 (JD 306) at 15:18 UTC, no verified tidal data is available from Port Fourchon, LA (Station 8762075). Multibeam data within this time period was processed with tidal data from station 8763535 (Texas Gas Platform), which was maintained by C&C Technologies for the duration of the OPR-K354-KR-10 survey. Tide data from station 8763535 was applied to data in Subarea 1 on survey days of October 30 and 31 and November 1, 2010 (JD 303, 304 and 305) and in Subarea 2 on survey days November 1 and 2, 2010 (JD 305 and 306).

Multibeam Data

Because of extreme depth differences between the outer edges of the Subarea 1 crosslines and mainline data, the crossline data was cropped to 35 degrees off nadir on the port and starboard sides to remove the inaccuracies generally found in the outer beams. The cropped crossline data was used in all BASE surfaces and analyses to ensure that the majority of the data are within IHO Order 1a specifications (Refer to Section B.2.2) and that an accurate representation of the seafloor is provided.

The crosslines were collected on October 23 and match closely with mainline data collected on October 22 and 23, 2010. Directly after collecting the crossline data on October 23, 2010, the vessel transited to dock to wait out weather; survey operations commenced again on October 30, 2010. It was observed that most of the mainline-crossline depth discrepancy occurs with mainline data collected after the weather event on October 30 and 31 and November 1, 2010. These mainline data are generally shallower than the crosslines.

Line H55-II-A-1 of investigation H55-II-A had a missing range and angle datagram at the beginning of the file that caused the line to load improperly into CARIS HIPS. Since there was only one line with this problem, CARIS Development updated the .all file and removed the EM3000 datagram that referenced the missing Range and Angle datagram. There are 2 less pings in the converted data, which is the file that has been included with this project.

## B.4 Data Processing

### B.4.1 Coverage BASE Surfaces and Mosaics

Multibeam data processing was conducted using CARIS HIPS/SIPS 6.1 on the vessel and CARIS HIPS/SIPS 7.1.0 with Hot Fixes 1, 2 and 3 in the office. One BASE surface was created for each subarea at a scale of 1:40000 with a resolution of 1 meter, in accordance with Section 5.2.2.2 of the HSSD (2010), which states that a 1-m BASE surface will be created for 0 – 22 m water depths. One BASE surface was created for investigations at a scale of 1:40000 and a resolution of 0.5 m.

Side scan sonar data was processed using Chesapeake Technologies SonarWiz4 V.4.04.0118 software. All of the side-scan sonar data collected for this project has been layback corrected. 1-m resolution mosaics were created for even and odd lines in each subarea to check for 100% SSS coverage.

### B.4.2 SSS Imagery and Contacts

Side scan sonar data was evaluated twice and all contacts with a shadow identified on each 100% SSS coverage. These contacts were correlated and evaluated in either the CARIS HIPS/SIPS or CARIS Notebook map window with respect to BASE surfaces and charted information. In accordance with Section 6.3.2 of the HSSD (2010), in water depths of less than or equal to 20 m, contacts with heights computed from the shadow length of 1 m or more were considered significant. All significant contacts not fully developed with main scheme MBES coverage were investigated with additional MBES coverage. A sounding that represented the least depth of each investigated contact was designated using CARIS HIPS/SIPS. A list of all side scan sonar contacts is contained in Separate V and significant features are represented and attributed in the S-57 feature file. Refer to the Data Acquisition and Processing Report for details on the side scan sonar contact processing and correlation workflow.

## C. VERTICAL AND HORIZONTAL CONTROL

The vertical datum for the soundings is Mean Lower Low Water (MLLW). Tide and water level corrections were determined and applied in accordance with the CO-OPS Statement of Work. Data from Port Fourchon, LA (8762075) was used as the source of tides. Verified tides with final tide zoning were applied to the data. During times when no verified tidal data is available for the Port Fourchon station, tidal data from station 8763535 Texas Gas Platform was used (Refer to Section B.3 and Appendix IV).

The horizontal datum for the survey is the North American Datum of 1983 (NAD 83) and the projection is Universal Transverse Mercator (UTM) Zone 15 North.

## D. RESULTS AND RECOMMENDATIONS

### D.1 Chart Comparison

#### D.1.1 Charts and Notices to Mariners

Chart comparisons were performed in CARIS HIPS/SIPS 7.1 using the final BASE surfaces of main scheme and investigation lines, colored depth ranges, and sounding layers. The data was compared to the largest scale chart in this area, summarized in Tables No. 12 and 13.

**Table No. 12: Nautical Charts used for Comparison**

| Chart Number | Scale | Edition | Edition Date |
|---|---|---|---|
| 11356 | 1:80,000 | 38 | Jun 08 |

**Table No. 13: Nautical Chart Correction Dates**

| Chart Number | Corrected Through | |
|---|---|---|
| | NM | LNM |
| 11356 | Jun 14/08 | Jun 03/08 |

The Local Notice to Mariners (LNM) was reviewed for the duration of the survey for which the majority of the data was collected (between October 22 and December 02, 2010). The last Notice to Mariners reviewed was LNM 51/10 8$^{th}$ Dist on 12/18/2010. No Notice to Mariners was issued within the survey bounds during survey operations. In addition, because additional data was acquired in November and December of 2011, the Local Notice to Mariners was further evaluated; no Notice to Mariners was issued within the survey area between December 02, 2010 and December 30, 2011.

#### D.1.2 Charted Soundings

Charted soundings were compared to a sounding layer as well as color range maps. The sounding layers were generated from a 1-m BASE surface with a 350-ft single-defined radius for both subareas. (Refer to the Data Acquisition and Processing Report for sounding selection criteria). Water depths range from 20.4 to 48.4 feet and there is a general deepening

from north to south (Illustration No. 12). The shallowest surveyed soundings are located in the northwest corner while the deepest surveyed soundings are located in the southwest corner. Semi-linear extensions of depth ranges into adjacent depth ranges are oriented generally southwest-northeast, and represent large-scale-hummocky bathymetry that is present throughout the survey area (Refer to Section D.2.4 for details).

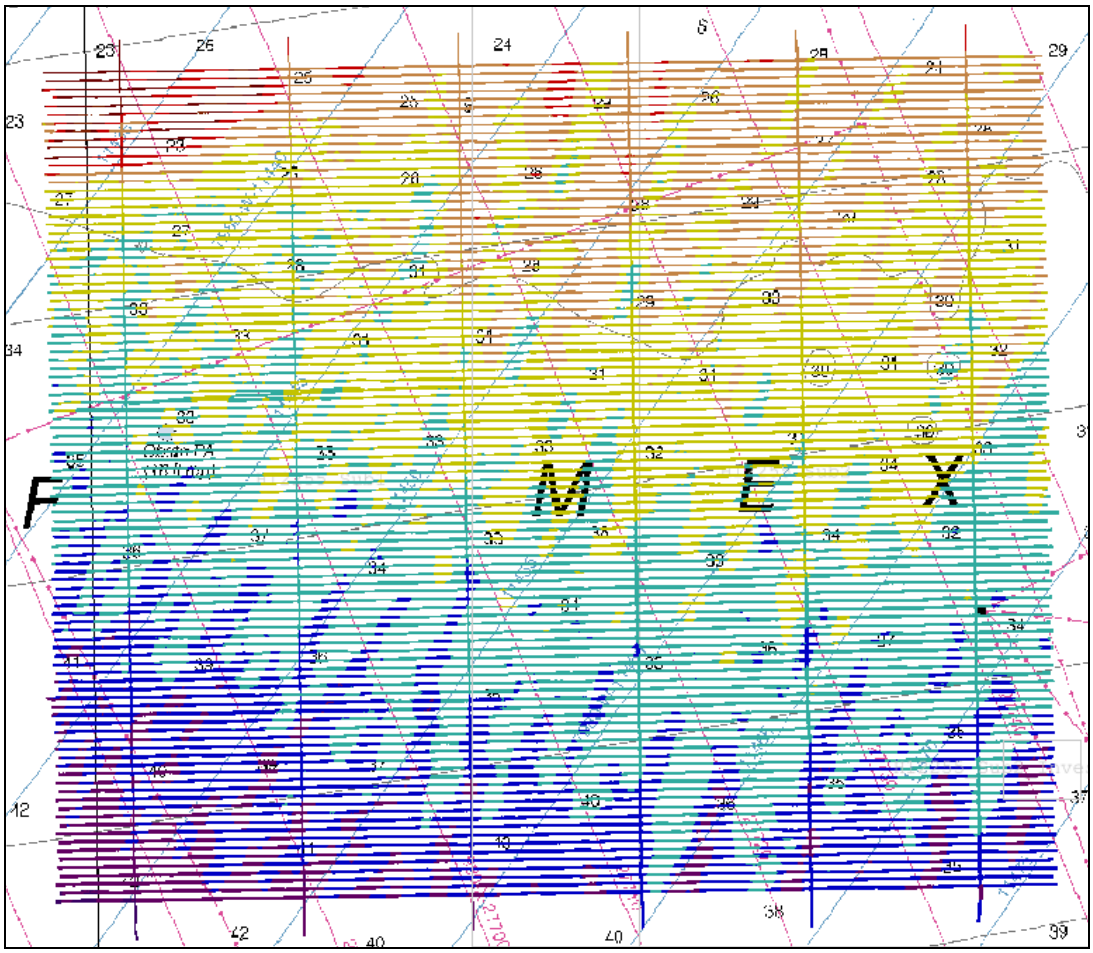



**Illustration No. 12. H12255 survey area with colored depth ranges shown in Illustration No. 13.**

| Min | Max | Start | End |
|---|---|---|---|
| 6 | 7 | | |
| 7 | 8 | | |
| 8 | 9 | | |
| 9 | 10 | | |
| 10 | 11 | | |
| 11 | 12 | | |
| 12 | 13 | | |
| 13 | 14 | | |
| 14 | 15 | | |

**Illustration No. 13. CARIS color range map (in meters) used for Illustration No. 12.**

Adjacent surveyed soundings can change fairly rapidly due to the large scale hummocky bathymetry, but surveyed soundings are consistently deeper than charted soundings. Surveyed soundings north of the charted 30-ft contour are generally at least 4 feet deeper than charted depths. The most extreme differences between surveyed soundings and charted depths occur just north of the charted 30-ft contour in the northwest corner of the survey area where surveyed soundings are 7 – 9 feet deeper than charted depths (Illustration No. 14). South of the charted 30-ft contour surveyed soundings are mainly 1 – 3 feet deeper than charted depths, although there are some areas where surveyed soundings are greater than 5 feet deeper than charted soundings. These occur in the southeast corner of the survey area (Illustration No. 15), and in the vicinity of the isolated 30-ft contours (Illustration No. 16).

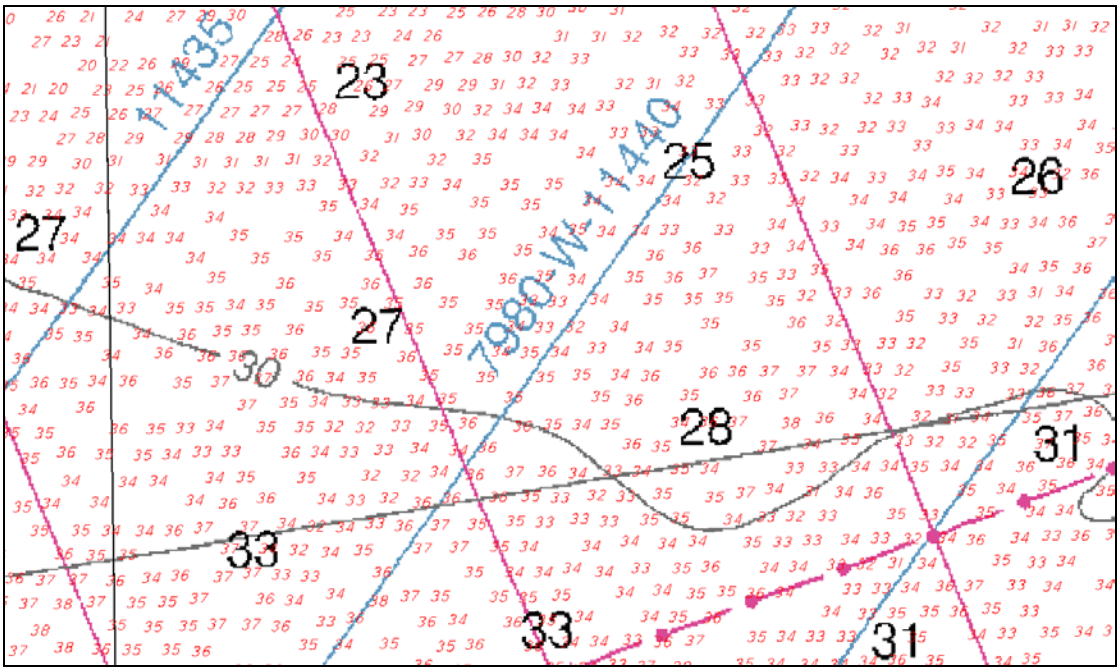



**Illustration No. 14. Region in the northwest corner of the survey area where charted depths (excluding the 23-ft charted depth), are 7 – 9 feet deeper than surveyed soundings.**

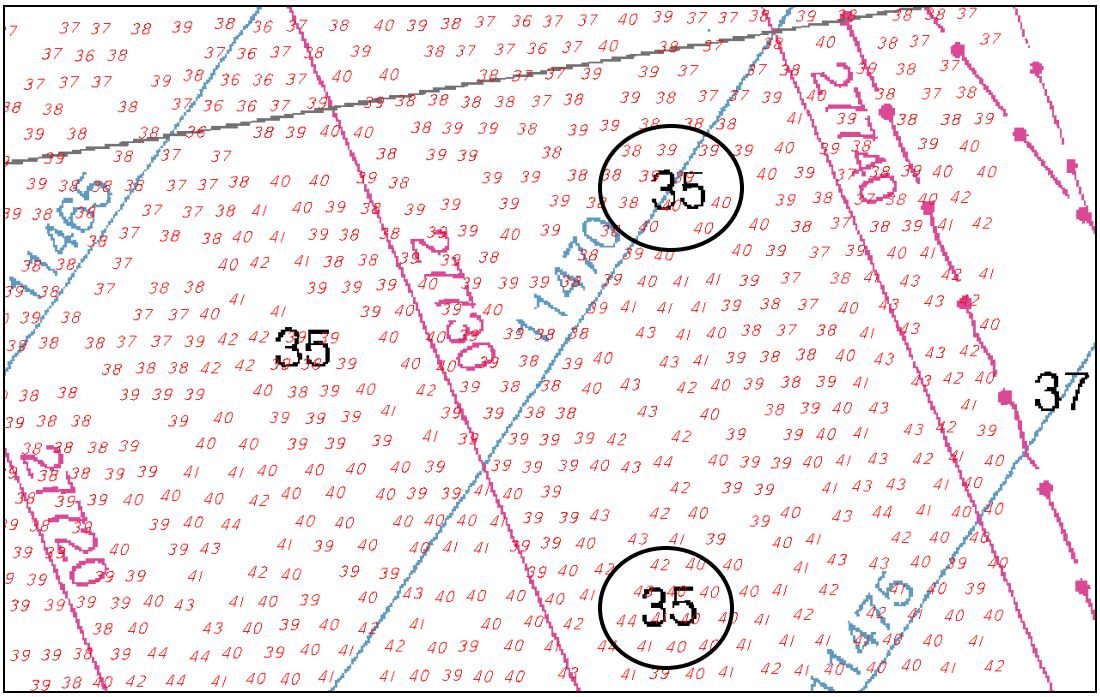



**Illustration No. 15. Region in the southeast corner of the survey area where surveyed soundings are up to 5 feet deeper than charted depths (shown in the black circles).**

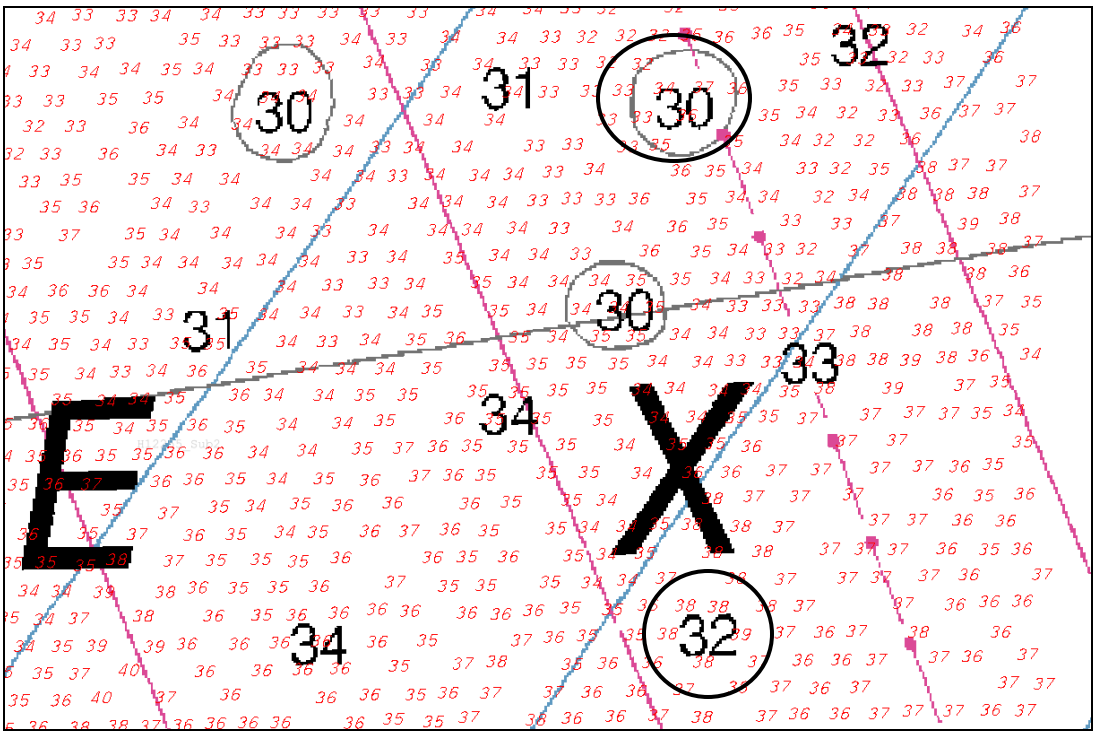



**Illustration No. 16. Region in the vicinity of the isolated 30-ft contours where surveyed soundings are up to 6 feet deeper than charted depths; the most extreme are shown in black circles.**

The 30-ft charted contour runs east-west through the northern portion of the survey area. In addition, there are 3 localized 30-ft contours south of the main contour in Subarea 2. In order to evaluate differences between the charted contour and surveyed soundings, a color range chart was created in CARIS with soundings of 0 – 9.144 m in red and soundings greater than 9.144 m in blue; 9.144 m represents ~30 ft. It is evident that the majority of the survey area is 30 feet deep or greater (Illustration No. 17) and examination of the user-generated sounding layer confirms this trend.

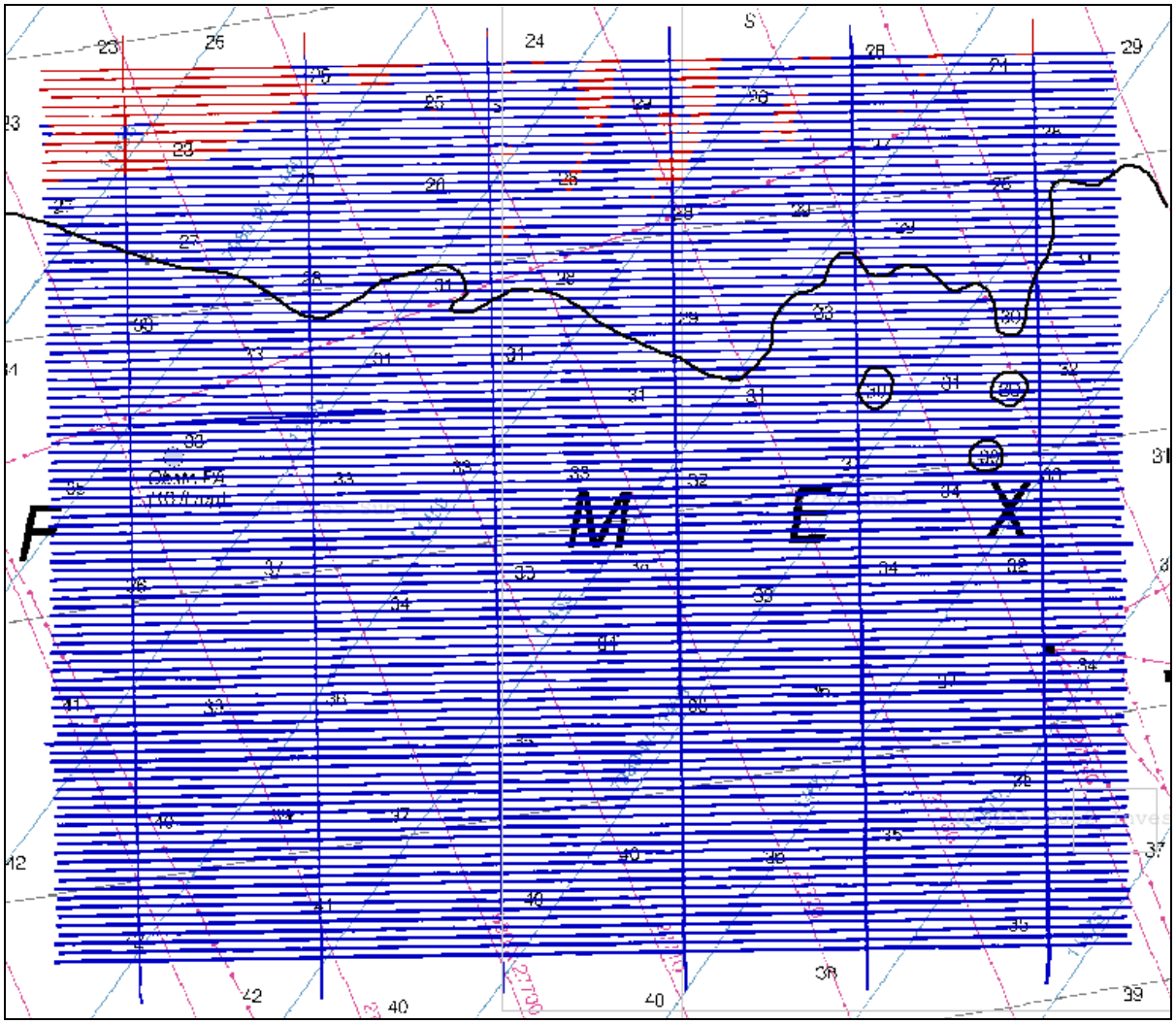



**Illustration No. 17. Comparison of charted 30-ft contour and surveyed soundings. Soundings of 0 to 9.144 m are in red and soundings greater than 9.144 m are in blue; 9.144 m represents ~30 ft.**

### D.1.3 Charted Features

#### D.1.3.1 AWOIS

One AWOIS item was assigned for full investigation within the H12255 survey area. No significant contact was found within the AWOIS radius and the Hydrographer recommends that the AWOIS item be removed from chart 11356. Refer to Appendix II: Survey Feature Report for details.

**Table No. 14. AWOIS item assigned for full investigation.**

| AWOIS Record | Chart Latitude | Chart Longitude | Chart Action/Comments |
|---|---|---|---|
| 12790 | 28°46'21.839" N | 91°09'30.352" W | Remove from Chart 11356 |

#### D.1.3.2 Investigation Items

One investigation was conducted (Table No. 15), although located slightly outside the eastern survey area boundaries. This item corresponds to primary SSS contact 306-045411S and is interpreted as an exposed pipeline. The feature was originally located in the side scan sonar on line 13185-1 between shotpoints 35 and 36, 20 m from nadir. Side scan sonar data indicated that the feature was at least 0.75 m in height. The feature was also evident in the mainscheme multibeam data of line 13185-1. In order to fully develop the contact, further multibeam data was collected on December 30, 2011. The feature has a least depth of 12.460 m in water depths of 13.6 to 13.8 m; the feature rises at least 1.14 m off the seafloor. However, because the feature is located on a charted pipeline, and does not rise above half the water column, the item was not submitted as a DTON.

In addition, because this contact is located slightly outside the survey bounds of H12255, the adjoining survey (H12254) was evaluated as well. This item corresponds to contact 337-205034P located in the side scan sonar data of survey H12254, but the feature was not investigated during data acquisition of H12254.

**Table No. 15. Significant features that required further investigation.**

| Primary SSS Contact Number | INV Name | Least Depth (m) | Survey Latitude | Survey Longitude | Remarks |
|---|---|---|---|---|---|
| 306-045411S | H55-II-A | 12.460 | 28°44'12.237"N | 91°03'16.664"W | Located on a charted pipeline |

#### D.1.3.3 Danger to Navigation Reports

No danger to navigation reports were issued for the H12255 survey area.

### D.1.3.4 Existing Infrastructure

The following structure is currently charted, but was not present at the time of survey.

**Table No. 16. Charted platform not present at time of survey.**

| Charted Position | | |
|---|---|---|
| Latitude | Longitude | Chart Action |
| 28°45'08.481"N | 91°04'12.303"W | Delete |

### D.1.3.5 Feature Report

A Final Feature File for obstructions and infrastructure, has been submitted as a CARIS .hob file in a CARIS Notebook project.

## D.2 Additional Results

### D.2.1 Prior Surveys

Survey H12255 does not junction with surveys prior to 2010. Refer to Section B.2.4 for information on contemporary survey junctions and Section D.1 for comparison to nautical chart 11356.

### D.2.2 Aids to Navigation

No Aids to Navigation are charted within the survey area and none were found during survey operations.

### D.2.3 Additional Infrastructure

Along the eastern edge of the survey area there are several charted submarine pipelines, unburied sections of which were observed within the side scan sonar and/or multibeam survey data. The black circles in Illustration No. 18 show the location of the pipelines identified from the side scan sonar, all of which are located on charted pipelines. The black boxes show pipelines that are also evident in the multibeam data; these are labeled 1 – 3 and are shown in Illustrations No. 19 – 21. Least depths for these contacts have been examined in CARIS (evident in the Critical Soundings layer of the Final BASE surface) and can be found in the contact listing in Separates V. The pipeline in the red box was investigated and is described in Section D.1.3.2.

In addition, there are several possible uncharted pipeline exposures in Subarea 1 that were observed within the side scan sonar data. Information on all exposures can be found in the contact listing in Separates V.

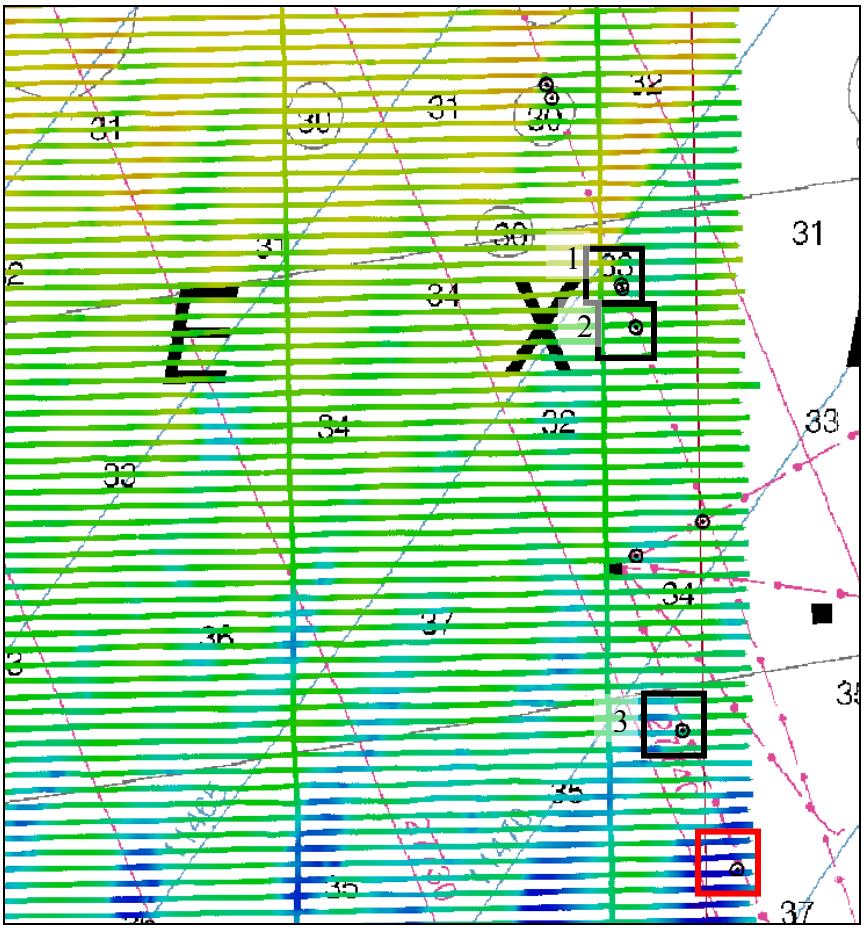



**Illustration No. 18. Black circles show pipelines identified from the SSS; these are located on charted pipelines. Black boxes show pipelines that are also seen in the multibeam data; they are labeled 1 – 3 and shown in the following Illustrations 19 – 21. The red box shows a pipeline that has been investigated.**

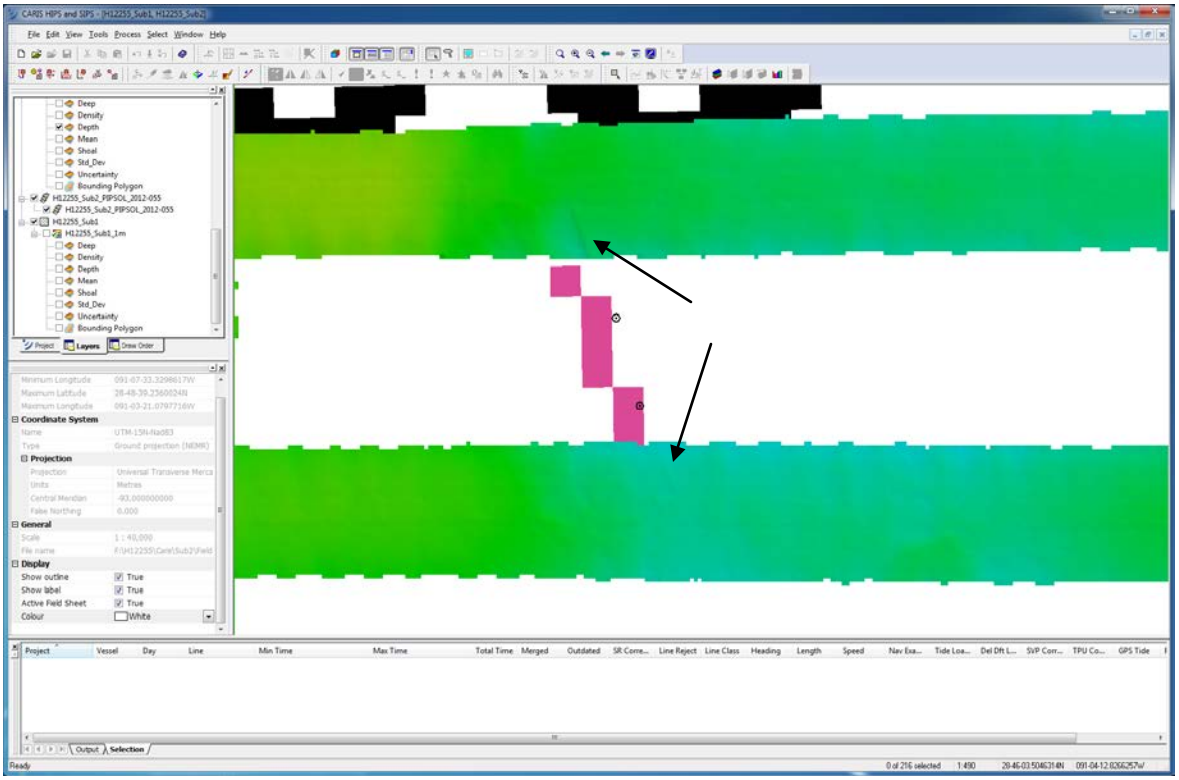


**Illustration No. 19. Pipeline (identified by black arrows) evident multibeam data; corresponds to box #1 in Illustration No. 18. Black circles show the location of SSS contacts that correspond to the pipeline.**

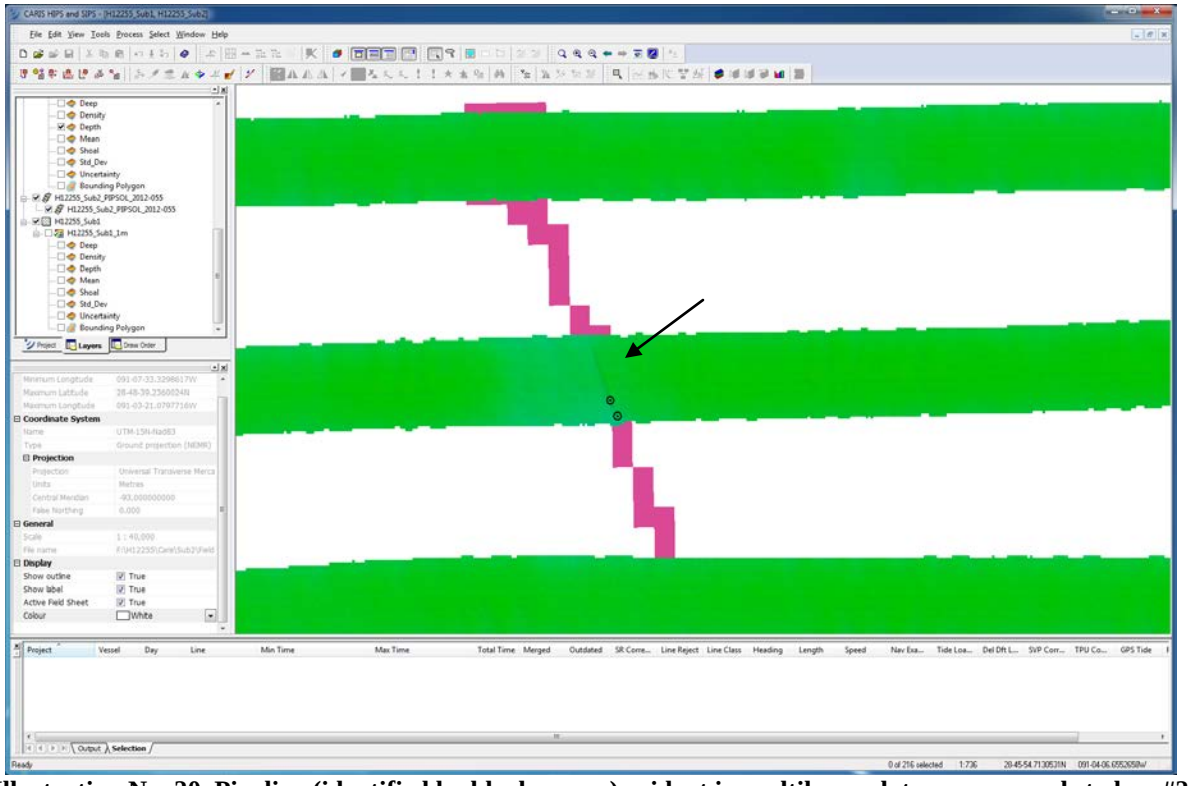


**Illustration No. 20. Pipeline (identified by black arrow) evident in multibeam data; corresponds to box #2 in Illustration No. 18. Black circles show the location of SSS contacts that correspond to the pipeline.**

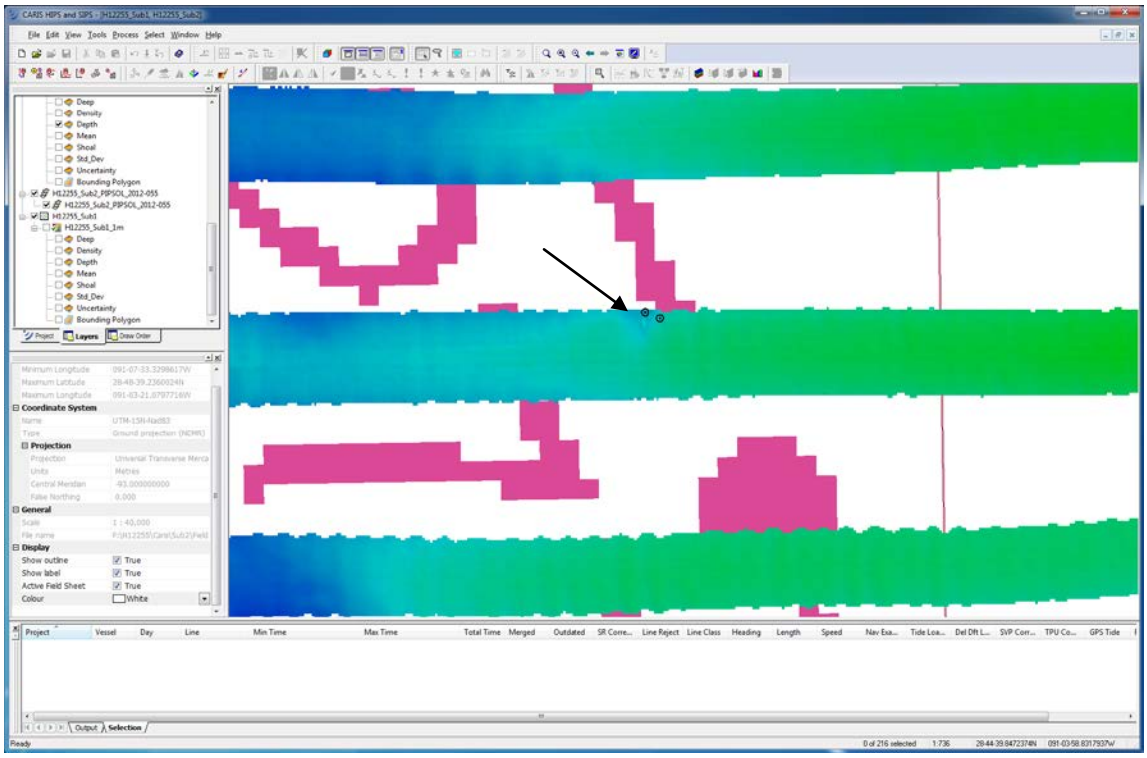


**Illustration No. 21. Pipeline (identified by black arrow) evident in multibeam data; corresponds to box #3 in Illustration No. 18. Black circles show the location of SSS contacts that correspond to the pipeline.**

### D.2.4 Significant Scientific/Practical findings

Large scale semi-linear hummocky bathymetry is evident throughout the survey area (Illustration No. 22). The features are generally oriented northeast-southwest.

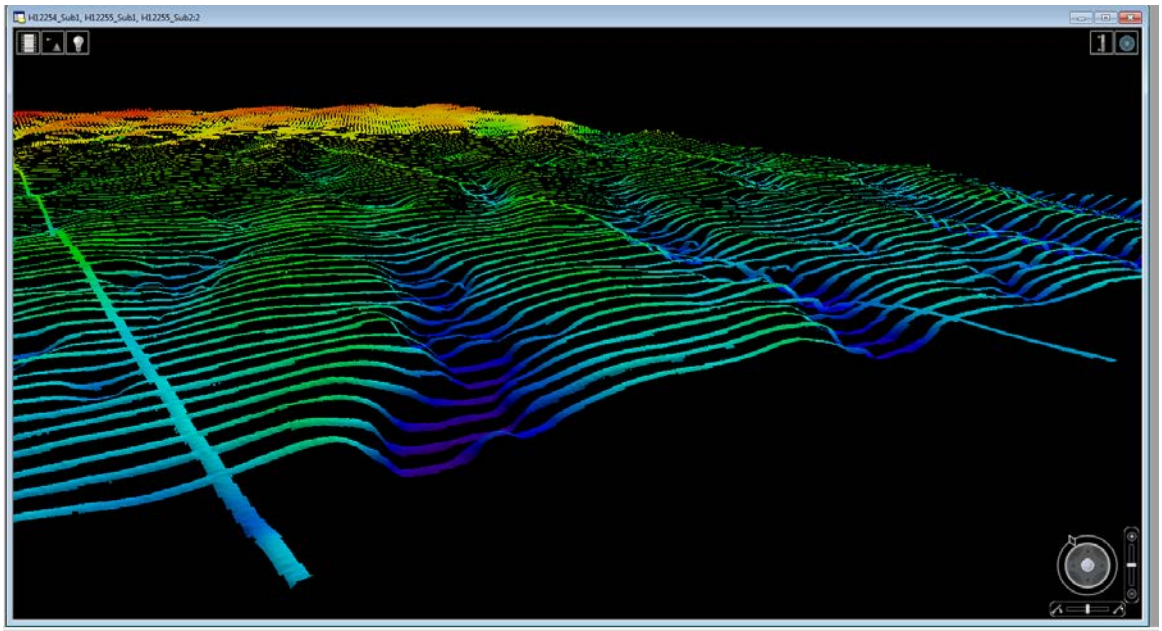


**Illustration No. 22. Large scale hummocky bathymetry in CARIS 3D map window with high vertical exaggeration; view is looking northeast.**

## E. APPROVAL SHEET

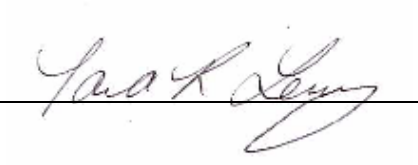
LETTER OF APPROVAL

REGISTRY NUMBER H12255

This report and the accompanying smooth sheet are respectfully submitted.

Field operations contributing to the accomplishment of the survey H12255 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-K354-KR-10.



Tara Levy
Chief of Party
C&C Technologies
March 2012

# APPENDIX I

# TIDES AND WATER LEVELS

Generally, verified tidal data from Port Fourchon, LA (Station 8762075) was downloaded from the website shown below and applied to the multibeam data with final tidal zoning.

http://tidesandcurrents.noaa.gov/station_retrieve.shtml?type=Historic%20Tide%20Data&state=Louisiana&id1=876

However, between the dates of October 25, 2010 at 00:00 UTC and November 02, 2010 at 15:18 UTC, no verified tidal data is available from Port Fourchon, LA (Station 8762075). Multibeam data within this time period was processed with tidal data from station 8763535 (Texas Gas Platform), which was operated and maintained by C&C Technologies for the duration of the OPR-KR354- KR-10 survey. Tide data from station 8763535 with final tidal zoning (Table No. 3) was applied to data on survey days October 30 and 31 and November 1, and 2, 2010 (JD 303 – 306).

For the 876353 (Texas Gas Platform) tide data, the contractor from JOA used the following parameters to convert the data to MLLW: STND height – MLLW = STND height + -6.702. The data was smoothed with 3 hour, 3$^{rd}$ degree polynomial. As with Fourchon, the time zone in UTC and the units are meters.

**Table No. 3. Tide zones and corrector for Station 873535 (Texas Gas Platform).**

| Tide Zone | Reference Station | Primary/Secondary | Time Corrector | Range Ratio |
|---|---|---|---|---|
| CGM716 | 8763535 | PRIM | -12 | 0.870 |
| CGM717 | 8763535 | PRIM | -6 | 0.900 |
| CGM718 | 8763535 | PRIM | -6 | 0.900 |
| CGM732 | 8763535 | PRIM | 0 | 0.900 |
| CGM733 | 8763535 | PRIM | 0 | 0.970 |
| WGM266 | 8763535 | PRIM | -12 | 1.000 |
| WGM414 | 8763535 | PRIM | -6 | 1.000 |
| WGM415 | 8763535 | PRIM | 0 | 1.000 |
| WGM416 | 8763535 | PRIM | 0 | 1.000 |

## ABSTRACT OF TIMES OF HYDROGRAPHY

Project: OPR-K354-KR-10
Contractor Name: C & C Technologies, Inc.
Inclusive Dates: October 22, 2010 - December 30, 2011
Registry No.: H12255 (Sheet 13)
Date: March 2012
Sheet Number: 13
Field Work is Complete
Time (UTC)

| Date | Julian Day | Start | End | Year |
|---|---|---|---|---|
| 10/22/2010 | 295 | 1801 | 2400 | 2010 |
| 10/23/2010 | 296 | 0000 | 1016 | 2010 |
| 10/30/2010 | 303 | 0937 | 2400 | 2010 |
| 10/31/2010 | 304 | 0000 | 1008 | 2010 |
| 10/31/2010 | 304 | 1031 | 2400 | 2010 |
| 11/1/2010 | 305 | 0000 | 0938 | 2010 |
| 11/1/2010 | 305 | 1002 | 1918 | 2010 |
| 11/1/2010 | 305 | 1950 | 2400 | 2010 |
| 11/2/2010 | 306 | 0000 | 1008 | 2010 |
| 11/2/2010 | 306 | 1051 | 1243 | 2010 |
| 11/8/2010 | 312 | 0443 | 1707 | 2010 |
| 11/8/2010 | 312 | 1817 | 2400 | 2010 |
| 11/9/2010 | 313 | 0000 | 1812 | 2010 |
| 11/9/2010 | 313 | 1917 | 2001 | 2010 |
| 11/9/2010 | 313 | 2108 | 2400 | 2010 |
| 11/10/2010 | 314 | 0000 | 0554 | 2010 |
| 11/11/2010 | 315 | 0404 | 0610 | 2010 |
| 11/11/2010 | 315 | 0717 | 1313 | 2010 |
| 11/11/2010 | 315 | 1419 | 1631 | 2010 |
| 12/2/2010 | 336 | 1033 | 1551 | 2010 |
| 11/12/2011 | 316 | 1122 | 1513 | 2011 |
| 11/23/2011 | 327 | 1120 | 1151 | 2011 |
| 12/30/2011 | 364 | 2337 | 2400 | 2011 |

# APPENDIX II

# SUPPLEMENTAL SURVEY RECORDS AND CORRESPONDENCE

No supplemental records or correspondence

# APPENDIX III SURVEY

# FEATURES REPORT

## No DTONs, Maritime Boundaries or Wrecks

# H12255_AWOIS Items

**Registry Number: H12255**

**State: Louisiana**

**Locality: Gulf of Mexico**

**Sub-locality: 7 NM S of West Ship Shoal**

**Project Number: OPR-K354-KR-10**

**Survey Date: 22 OCT 2010 – 30 DEC 2011**

## Charts Affected

| Number | Edition | Date | Scale (RNC) | RNC Correction(s)* |
|---|---|---|---|---|
| 11356 | 38th | 06/01/2008 | 1:80,000 (11356_1) | [L]NTM: ? |
| 11340 | 73rd | 08/01/2008 | 1:458,596 (11340_1) | [L]NTM: ? |
| 1116A | 73rd | 08/01/2008 | 1:458,596 (1116A_1) | [L]NTM: ? |
| 411 | 52nd | 09/01/2007 | 1:2,160,000 (411_1) | [L]NTM: ? |

* Correction(s) - *source: last correction applied (last correction reviewed--"cleared date")*

## Features

| No. | Name | Feature Type | Survey Depth | Survey Latitude | Survey Longitude | AWOIS Item |
|---|---|---|---|---|---|---|
| 1.1 | AWOIS 12790 - Charted dangerous obstruction, PA, (16 ft rep) | AWOIS | [no data] | [no data] | [no data] | --- |

## 1.1) AWOIS #12790 - AWOIS 12790 - Charted dangerous obstruction, PA, (16 ft rep)

### No Primary Survey Feature for this AWOIS Item

**Search Position:** 28° 46' 21.8" N, 091° 09' 30.4" W

**Historical Depth:** 4.88 m

**Search Radius:** 1000

**Search Technique:** S2, MB

**Technique Notes:** [None]

**History Notes:**

CGD8, LNM 4/76; REPORTS A SUBMERGED UNMARKED OBSTRUCTION HAS BEEN REPORTED IN POSITION LAT. 28/46/12N., LON. 091/09/30 W.(NAD 27) A MAXIMUM DEPTH OF 16 FEET IS REPORTED OVER OBSTRUCTION.

### Survey Summary

**Charts Affected:** 11356_1, 1116A_1, 11340_1, 411_1

**Remarks:**

CGD8, LNM 4/76; REPORTS A SUBMERGED UNMARKED OBSTRUCTION HAS BEEN REPORTED IN POSITION LAT. 28/46/12N., LON. 091/09/30 W.(NAD 27) A MAXIMUM DEPTH OF 16 FEET IS REPORTED OVER OBSTRUCTION.

### Feature Correlation

| Source | Feature | Range | Azimuth | Status |
|---|---|---|---|---|
| AWOIS_EXPORT | AWOIS # 12790 | 0.00 | 000.0 | Primary |

### Hydrographer Recommendations

Not observed during survey operations, etiher visually or within survey data; AWOIS 12790

Remove from chart

### S-57 Data

[None]

# Office Notes

SAR Note - no Obstn is present in the MB or SSS data.

COMPILATION: Concur. No indicaiton of obstruction found during present survey operations. Delete charted dangerous obstruction, PA, (16 ft rep). Update chart with present survey depths.

APPROVAL PAGE

H12255

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 NGDC for archive

- H12255_DR.pdf
- Collection of depth varied resolution BAGS
- Processed survey data and records
- H12255_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: 
Digitally signed by Abigail Higgins
DN: cn=Abigail Higgins, o=NOAA, ou=Office of Coast Survey, email=abigail.higgins@noaa.gov, c=US
Date: 2012.08.31 16:38:27 -04'00'

**LT Abigail Higgins**
Chief, Atlantic Hydrographic Branch