

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

# DESCRIPTIVE REPORT

*Type of Survey* Hydrographic  
*Field No.* David Evans and Associates, Inc.  
*Registry No.* H12468

## LOCALITY

*State* Mississippi  
*General Locality* Approaches to Mississippi Sound  
*Sub-locality* 8nm S Petit Bois Pass

2012

CHIEF OF PARTY

Jonathan L. Dasler, David Evans and Associates, Inc.

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NOAA Form 77-28 (11 72)	U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION	REGISTRY NUMBER:
<b>HYDROGRAPHIC TITLE SHEET</b>		<b>H12468</b>
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:	<b>Mississippi</b>	
General Locality:	<b>Approaches to Mississippi Sound</b>	
Sub-Locality:	<b>8nm S Petit Bois Pass</b>	
Scale:	<b>1:40,000</b>	
Date of Survey:	<b>July 6, 2012 to October 5, 2012</b>	
Instructions Dated:	<b>April 16, 2012</b>	
Project Number:	<b>OPR-J348-KR-12</b>	
Field Unit:	<b>R/V <i>Westerly</i></b>	
Chief of Party:	<b>Jonathan L. Dasler, PE, PLS, CH</b>	
Soundings by:	<b>RESON 7125</b>	
Imagery by:	<b>EdgeTech 4200-FS</b>	
Verification by:	<b>Atlantic Hydrographic Branch</b>	
Soundings Acquired in:	<b>Meters at Mean Lower Low Water</b>	
Remarks:	<p><i>NAD 83, UTM Zone 16, Meters, Times are UTC. The purpose of this contract is to provide NOAA with modern, accurate hydrographic survey data with which to update nautical charts of the assigned area.</i></p>	

*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 Geophysical Data Center (NGDC) and can be retrieved via <http://www.ngdc.noaa.gov/>.*

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**Descriptive Report to Accompany Hydrographic Survey H12468**

Project OPR-J348-KR-12

Locality: Approaches to Mississippi Sound, Mississippi

Sub-locality: 8nm S Petit Bois Pass

Scale 1:40,000

July 2012 – October 2012

**David Evans and Associates, Inc.**

Chief of Party: Jonathan L. Dasler, PE, PLS, CH

**A. AREA SURVEYED**

David Evans and Associates, Inc (DEA) conducted hydrographic survey operations in the Approaches to Mississippi Sound, MS, 8nm S Petit Bois Pass. Survey H12468 was conducted in accordance with the *Statement of Work* (April 2, 2012) and *Hydrographic Survey Project Instructions* (April 16, 2012) for OPR-J348-KR-12.

**A.1 Survey Limits**

The extents of the H12468 survey limits are listed in Table 1.

**Table 1. Survey Limits**

<b>Northeast Limit</b>	<b>Southwest Limit</b>
30.131082 N	29.976341 N
88.300955 W	88.409169 W

**A.2 Survey Purpose**

The purpose of this survey is to provide National Oceanic Atmospheric Administration (NOAA) with modern, accurate hydrographic survey data with which to update nautical charts of the assigned area.

**A.3 Survey Quality**

The entire survey is adequate to supersede previous surveys.

**A.4 Survey Coverage**

The survey consisted of 200% side scan sonar coverage with concurrent multibeam. The survey polygon depicted in the Project Reference File (PRF) *OPR-J348-KR-12\_PRF.000*, which was included with the *Hydrographic Survey Project Instructions* (April 16, 2012), was used to define the limits for each survey. The survey was conducted over 180-meter set line spacing per 100% coverage (100-meter side scan sonar range). Automated Wreck and Obstruction Information System (AWOIS) items and significant side scan contact investigations were acquired to meet object detection coverage requirements for multibeam surveys. The coverage area (Figure 1) totaled 30.2 square nautical miles using a combination of side scan and multibeam survey methods.

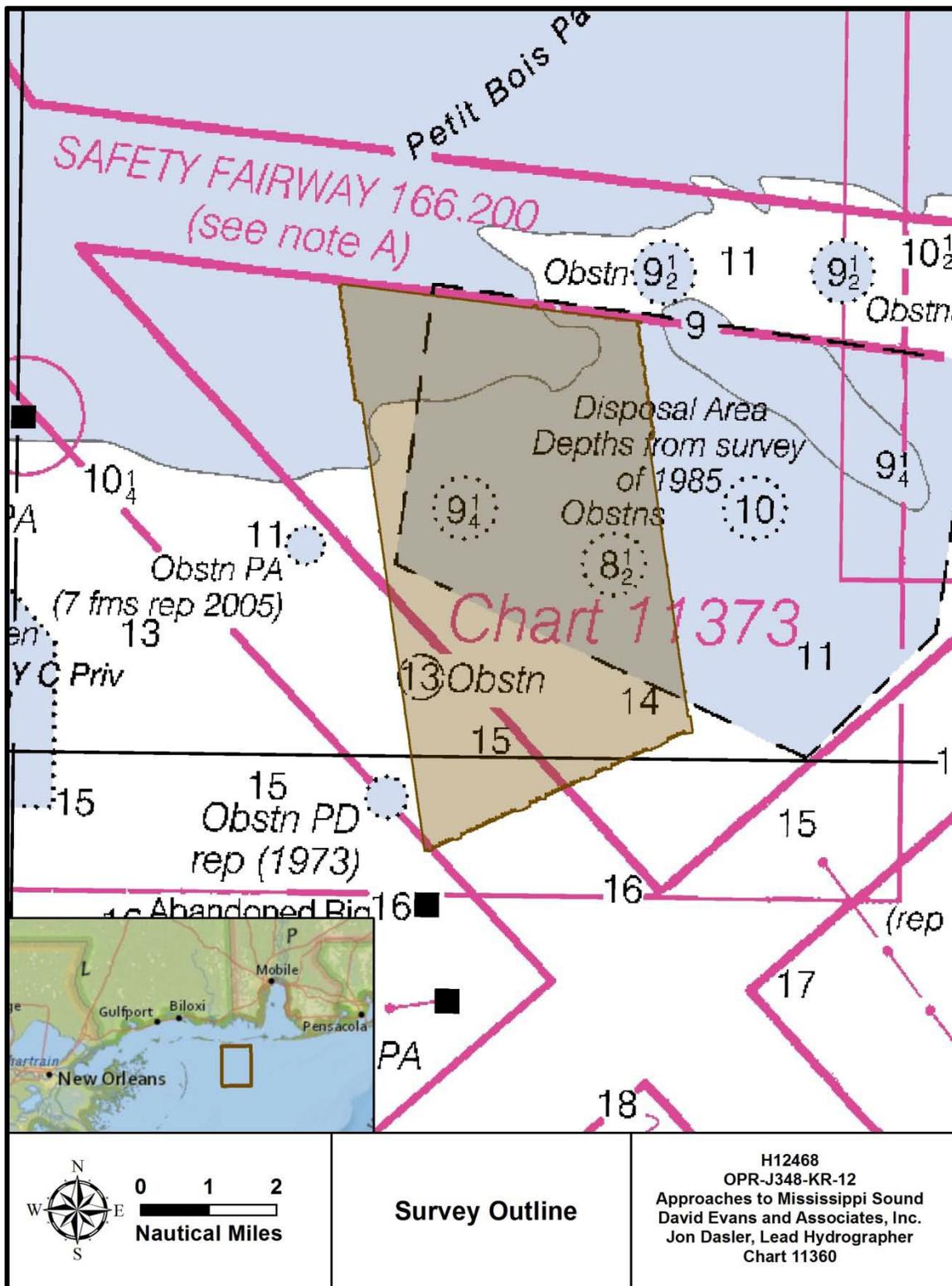


Figure 1. H12468 Survey Outline

### A.5 Survey Statistics

Detailed survey statistics for H12468 are provided in Table 2.

**Table 2. H12468 Hydrographic Survey Statistics**

Survey Statistics	Combination MBES/SSS Mainscheme
MBES/SSS main scheme (nm)	701.3
Crosslines (MBES nm)	59.8
Additional full coverage MBES (nm)	0
Additional full coverage MBES crosslines (nm)	0
Number of item investigations that required additional survey effort	0
Number of bottom samples	4
Total number of square nautical miles	30.2

Data acquisition was conducted from July 6, 2012 (DN 188) to October 5, 2012 (DN 279). Table 3 lists specific dates of survey and patch test data acquisition. Patch test data used to determine system biases in support of the survey are also included with the digital deliverable. Survey data was not collected on patch test days unless also listed under dates of acquisition.

**Table 3. H12468 Days of Acquisition**

Dates of Acquisition	
July	6,12-13,16-19, 25, 28-29
August	2-9,12-13
October	4-5
Dates of Patch Test Acquisition	
May	23
July	2, 16
August	16
September	29

### A.6 Shoreline

Shoreline investigation was not required for OPR-J348-KR-12.

### A.7 Bottom Samples

Four (4) bottom samples were acquired on July 24, 2012 (DN 206). Approximate sample locations were included in the file PRF provided by the Hydrographic Surveys Division (HSD). The final sampling plan primarily used the provided locations with some modification of position to better characterize changes in bottom type delineated in the side scan imagery and to avoid sampling in the vicinity of submerged infrastructure such as pipelines or platforms. One (1) of the samples taken was not included in the PRF. It was taken to characterize the bottom based on changes in bottom reflectance identified in the side scan imagery. Results are included in Appendix II *Supplemental Survey Records and Correspondence*.

## B. DATA ACQUISITION AND PROCESSING

### B.1 Equipment and Vessels

The OPR-J348-KR-12 *Data Acquisition and Processing Report* (DAPR), submitted under separate cover, details equipment and vessel information as well as data acquisition and processing procedures used during this survey. There were no vessel or equipment configurations used during data acquisition that deviated from those described in the DAPR.

#### B.1.1 Vessels

The vessel used during this survey is listed in Table 4.

**Table 4. Vessel Specifications**

R/V <i>Westerly</i>	
	
IMO Number	1AR38CATK011
Official Number (O/N)	1231991
Builder	Armstrong Marine
Design	Catamaran
Year Built	2011
Weight	13 gross tons, 10 net tons
Length Overall	38'
Beam	16.5'
Draft, Maximum	4.6'
Cruising Speed	26 knots
Max Survey Speed	9 knots

## B.1.2 Equipment

Equipment systems used during data acquisition are listed in Table 5.

**Table 5. Equipment Used**

Type	Manufacturer	Model
Multibeam Echosounder	RESON	7125-SV2
Side Scan Sonar	Edgetech	4200-FS
Surface Sound Speed	AML	Micro X / SV Xchange
Primary Sound Speed Profiler	Brooke Ocean	MVP-30 with AML Micro SVPT
Secondary Sound Speed Profiler	Sea-Bird	SEACAT SBE-19 CTD Profiler
Positioning & Attitude	Applanix	POS/MV 320 v4

## B.2 Quality Control

Survey data show good internal consistency. As shown in Appendix II of the DAPR, the average weekly bar check difference was 0.004 meters with a standard deviation of 0.012 meters. Results from both crossline analysis and final Combined Uncertainty and Bathymetry Estimator (CUBE) surface uncertainty also indicate good internal consistency of the multibeam data.

### B.2.1 Crosslines

A total of 59.8 nautical miles of crosslines, or 8.5% of all survey lines, were run for analysis of survey accuracy. Crosslines were run in a direction perpendicular to main scheme lines across the entire surveyed area, providing a good representation for analysis of consistency. All crosslines were used for crossline comparisons.

Crossline analysis was performed using the CARIS Hydrographic Information Processing System (HIPS) Quality Control (QC) Report tool, which compares crossline data to a gridded surface and reports results by beam number. Crosslines were compared to a 2-meter CUBE surface encompassing mainscheme data for the entire survey area. The QC Report tabular output and plot are included in Separate II *Digital Data*. The results of the analysis meet the requirements as stated in the 2012 National Ocean Service (NOS) Hydrographic Surveys Specifications and Deliverables (HSSD).

Additional crossline analysis was performed by computing a 2-meter CUBE surface from the crossline data. The surface was then differenced from a 2-meter CUBE surface comprised of all mainscheme, fill, and investigation data. The resultant difference surface was exported using the Base Surface to ASCII function and statistics were compiled on the ASCII data. The crossline analysis included 770,658 node comparisons with an average difference of 0.01 meters and standard deviation of 0.07 meters.

### B.2.2 Uncertainty

Survey specific uncertainty parameters for tide and sound speed are included in Table 6. Additional discussion of these parameters is included in the DAPR.

**Table 6. TPU Values for Tide and Sound Speed**

<b>Total Propagated Uncertainty Computation in CARIS HIPS*</b>		
<b>Tide Values</b>	<b>Uncertainty* (m)</b>	<b>Day Number Range</b>
Tide Value Measured	0.000	-
Tide Value Zoning	0.079	-
<b>Sound Speed Values</b>	<b>Uncertainty* (m/s)</b>	
Sound Speed Measured (SN 5510)	2.000	200-224
Sound Speed Measured (SN 7710)	1.000	184-199 225-278
Surface Sound Speed	0.500	-

\*All uncertainty values listed at 1 sigma.

During surface finalization in HIPS, the "greater of the two" option was selected, where the calculated uncertainty from total propagated uncertainty (TPU) is compared to the standard deviation (StdDev) of the soundings influencing the node, and where the greater value is assigned as the final uncertainty of the node. The uncertainty of the finalized surface increased for nodes where the StdDev of the node was greater than the total propagated uncertainty. The resulting calculated uncertainty values of all nodes in the finalized surfaces range from 0.19 meters to 0.40 meters. The maximum uncertainty value is located over an exposed submarine cable with a high standard deviation in the depth surface caused by gridding data over the steeply sloping feature.

To determine if surface grid nodes met International Hydrographic Organization (IHO) Order 1 specification, a ratio of the final node uncertainty to the allowable uncertainty at that depth was determined. As a percentage, this value represents the amount of error budget utilized by the uncertainty value at each node. Values over 100% fail to meet specification.

As shown in Table 7, both uncertainty and the allowable error utilized have low average values and a tight StdDev. There were no nodes within the finalized surfaces that exceeded the allowable error.

**Table 7. CUBE Uncertainty**

<b>CUBE Finalized Uncertainty Statistics</b>						
	<b>Uncertainty (m)</b>			<b>Allowable error utilized</b>		
	<b>Average</b>	<b>StdDev</b>	<b>Maximum</b>	<b>Average</b>	<b>StdDev</b>	<b>Maximum</b>
<b>2m CUBE</b>	0.21	0.007	0.353	37%	0.013	65%
<b>4m CUBE</b>	0.21	0.011	0.402	36%	0.019	63%

### B.2.3 Junctions

Survey H12468 junctions with other surveys from project OPR-J348-KR-12 and with a prior NOAA survey. These junction surveys are listed in Table 8. At the time of writing, junction analysis with OPR-J348-KR-12 survey H12469 had not been completed. Junction analysis with this survey will be discussed in the H12469 Descriptive Report.

**Table 8. H12468 Junction Surveys**

Junction Survey Registry Number	Scale	Year	Field Unit	Junction Direction
H11546	1:20,000	2006	TerraSond, Ltd.	North, Northwest
H11547	1:20,000	2006	TerraSond, Ltd.	North, Northeast
H12466	1:40,000	2012	David Evans and Associates, Inc.	South
H12467	1:40,000	2012	David Evans and Associates, Inc.	East
H12469	1:40,000	2012	David Evans and Associates, Inc.	West

A 2-meter finalized H12468 surface, with no depth thresholds applied, was compared to the prior survey using CARIS Bathy DataBase. This surface was created for quality control purposes and has not been submitted. The resultant difference surfaces were exported to ASCII and statistics compiled for the ASCII data. Statistics of each junction comparison are listed in Table 9.

#### H11546 and H11547

Bathymetric Attributed Grids (BAG) for survey H11546 and H11547 were downloaded from NOAA’s National Geophysical Data Center (NGDC). BAGs for the each of the respective surveys were combined into 2-meter surfaces and compared to the H12468 surface using CARIS Bathy DataBase. A qualitative review of the junctions showed no anomalous areas.

#### H12466

The 4-meter finalized surface from survey H12466 was compared to the H12468 surface using CARIS Bathy DataBase. A qualitative review of the junction showed no anomalous areas in either junction.

#### H12467

The 2-meter finalized surface from survey H12467 was compared to the H12468 surface using CARIS Bathy DataBase. A qualitative review of the junction showed no anomalous areas in either junction.

**Table 9. H12468 Junction Analysis Results**

Junction Survey Registry Number	Number of Nodes Compared	Minimum Difference (m)	Maximum Difference (m)	Mean Difference (m)	Standard Deviation (m)
H11546	507	-0.27	-0.04	-0.16	0.04
H11547	1332	-0.16	0.10	0.01	0.05
H12466	87691	-0.24	0.22	0.02	0.05
H12467	254852	-0.21	0.28	0.01	0.06

### **B.2.4 Sonar QC Checks**

Quality control is discussed in detail in Section B of the DAPR. The results from the positioning system comparison and bar-to-multibeam comparison are included in Separate I *Acquisition and Processing Logs*. The sound velocity profile (SVP) sensor weekly evaluation table can be found in Separate II *Sound Speed Data* of this report.

Multibeam data were reviewed at multiple levels of data processing including: CARIS HIPS conversion, subset editing, and analysis of anomalies revealed in CUBE surfaces. Submerged significant features identified during survey operations were noted in the acquisition logs, saved to Isis cursor log files, and then displayed during HIPS editing to act as a check during feature compilation. In addition to the field interpretation of side scan contacts, two independent post-processing reviews of the side scan data were conducted, and all significant contacts or potentially significant contacts tracked in a custom database.

### **B.2.5 Equipment Effectiveness**

On July 24, 2012 (DN206) acquisition of periodic roll test lines resumed after motion artifacts were observed in the multibeam data. Roll artifacts were present when overlap between adjacent lines occurred and periodic heave-like artifacts occurred when the vessel experienced highly dynamic seas. Results from roll test lines collected on and after DN206 were added to the HIPS Vessel File (HVF) while the stability of the mount was assessed. A detailed inspection of the mount and its supports found no breaks or fractures. After the end of survey operations on August 13, 2012 (DN226) it was discovered that the R/V *Westerly's* multibeam mount had developed a failed weld at some point during the day's survey operations. The bottom of the multibeam mount has two aluminum tabs with predrilled holes that allow a multibeam system to be bolted on to the mount. A weld fracture was discovered on one of the tabs and a hairline crack was discovered on the second tab. This damage to the mount was not visible during previous inspection and was most likely a hairline fracture difficult to detect. The mount was repaired and reinforced on August 14, 2012 (DN227) and a new patch test was run on August 16, 2012 (DN229) prior to continuing survey operations. At this time the alterations to the mount's pitch which were added on May 23, 2012 (DN144) were removed.

In order to remove roll artifacts present in data collected between June 16, 2012 (DN168) and July 23, 2012 (DN205) a daily roll correction was determined by analyzing crossings between mainscheme and crossline data. Roll corrections computed using this method deviated from the previous roll test collected on June 15, 2012 (DN167) with an average difference of 0.13 degrees (0.14-degree standard deviation) and maximum difference of 0.38 degrees.

After the mount was repaired and fully functional, daily roll test lines continued until the end of the project. Roll test results were included in the project vessel file.

### **B.2.6 Factors Affecting Soundings**

No other factors affected the sounding data.

## **B.2.7 Sound Speed Methods**

An ODOM Brooke Ocean Technologies' MVP30 and a SeaBird Electronics SEACAT SBE-19 CTD profiler were the primary instruments used to acquire sound speed readings during multibeam operations. Moving vessel profiler (MVP) sound speed readings were measured at approximately 20-minute intervals during survey operations. Additional discussion of sound speed methods can be found in the OPR-J348-KR-12 DAPR.

## **B.2.8 Coverage Equipment and Methods**

Survey speeds were maintained to meet or exceed along track coverage requirements throughout the survey.

Demonstration of 200% side scan sonar coverage was achieved by producing two separate 100% 50-centimeter resolution mosaics. Mosaics were thoroughly reviewed for holidays and areas of poor quality coverage due to biomass, vessel wakes, or other factors. A fill plan was created in order to acquire data where holidays and significant poor quality coverage existed.

Multibeam data were acquired in conjunction with side scan sonar collection. A fill plan was created for all holidays greater than three nodes long that extended across the entire multibeam track line.

Full water column data in Reson .s7k format were collected during some feature investigations on October 5, 2012 (DN 279) and have been included with the H12468 digital data.

## **B.2.9 Density**

The sounding density requirement of 95% of all nodes, populated with at least three soundings per node, was verified by exporting the density child layer of each CUBE surface to an ASCII text file and compiling statistics on the density values. More than 99.4% of all final CUBE surface nodes contained three or more soundings. Density statistics of individual item investigation surfaces using Object Detection requirements were reviewed and surpassed the 95% requirement.

## **B.3 Echo Sounding Corrections**

### **B.3.1 Corrections to Echo Soundings**

Data reduction procedures for survey H12468 are detailed in the DAPR. Multibeam processing logs are included Separate I *Acquisition and Processing Logs* of this report.

### **B.3.2 Calibrations**

No additional calibration tests were conducted beyond those discussed in the *OPR-J348-KR-12 DAPR*.

## **B.4 Backscatter**

Multibeam backscatter was logged in Hypack 7K format but was not processed or evaluated. This data was included with the H12468 digital deliverables.

## B.5 Data Processing

### B.5.1 Software Updates

No software updates occurred after submission of the *OPR-J348-KR-12 DAPR*.

### B.5.2 Surfaces

Bathymetric grids were created relative to Mean Lower Low Water (MLLW) in CUBE format using set line spacing and object detection resolution requirements as described in the NOS HSSD (April 2012).

Depth thresholds were applied during surface finalization as defined in the NOS HSSD (April 2012).

Table 10 lists the finalized CUBE surfaces submitted with this survey. The surface named “\_INV,” is a combined surface comprised of all investigation data at object detection resolution. In addition, field sheets and surfaces were submitted for all significant individual investigations. The name of the investigation field sheets corresponds to the primary side scan sonar contact name. Least depths for all significant contact investigations were added to the final surface with a designated sounding. Additional designated soundings were added to depth surfaces as necessary in order to accurately represent the seafloor in accordance with NOS HSSD.

**Table 10. H12468 Multibeam Surfaces**

Surface Name	Resolution
H12468_2m_MLLW_1of3_Final	2.0m
H12468_4m_MLLW_2of3_Final	4.0m
H12468_50cm_MLLW_INV_3of3_Final	0.5m

Side scan sonar mosaics were created for each 100% coverage at 50-centimeter resolution. Mosaics submitted with this survey are listed in Table 11.

**Table 11. H12468 Side Scan Mosaics**

Mosaic Name	Resolution
H12468_100Percent	0.5m
H12468_200Percent	0.5m

### C. VERTICAL AND HORIZONTAL CONTROL

A complete description of the horizontal and vertical control for survey H12468 can be found in the OPR-J348-KR-12 *Horizontal and Vertical Control Report (HVCR)*, submitted under separate cover. A summary of horizontal and vertical control for this survey follows.

#### C.1 Vertical Control

The vertical datum for this project is MLLW. Additional information related to tides and tide correctors is included in Tables 12, 13, and 14.

**Table 12. Tide Stations**

Station Name	Station ID
Pascagoula NOAA Lab, MS	874-1533

**Table 13. HIPS Water Level Files**

File Name	Status
8741533.tid	Verified

**Table 14. HIPS Zoning Files**

File Name	Status
REVISED_J348KR2012CORP.zdf	Revised Final Zoning

#### C.2 Horizontal Control

The horizontal datum for this project is North American Datum of 1983 (NAD83) projected in Universal Transverse Mercator (UTM) Zone 16. All of the real-time navigation data were collected in Differential GPS (DGPS) mode. DGPS corrections were received from the U.S. Coast Guard (USCG) beacon at English Turn, Louisiana (293 kHz) or from the secondary beacon at Eglin, Florida (295 kHz). During survey operations, some DGPS outages from the primary beacon occurred. The system was set up to automatically switch to the secondary beacon when the primary signal was lost.

## D. RESULTS AND RECOMMENDATIONS

### D.1 Chart Comparison

The majority of the chart comparison was performed by comparing H12468 depths to a digital surface generated from electronic navigational charts (ENCs) covering the survey area. ENCs at the same scale band were merged prior to surface creation in an attempt to build a continuous model over the survey area. A 50-meter product surface was then generated from a triangular irregular network (TIN) created from the soundings, depth contours, and depth features for each ENC scale. An additional 50-meter HIPS product surface of the entire survey area was generated from the finalized 4-meter CUBE surface. The chart comparison was conducted by creating and reviewing the resultant difference surface.

The electronic and raster versions of the relevant charts used during the comparison were reviewed to ensure that all USCG Local Notice to Mariners (LNM) issued during survey acquisition, impacting the survey area, were applied and addressed by this survey.

#### D.1.1 Raster Charts

The raster chart comparison was performed by comparing the raster navigational charts (RNCs) covering the survey area to the corresponding ENCs which were subsequently compared to H12468 using difference surface techniques. These RNCs are listed in Table 15.

**Table 15. RNCs Compared to H12468**

Chart	Scale	Edition Number	Edition Date	LNM Date	NM Date
11373	1:80,000	50	08/01/2012	10/30/2012	11/10/2012
11360	1:456,394	44	10/01/2010	10/16/2012	10/27/2012

#### 11373

Chart 11373 was compared to US4MS12M within the H12468 survey area. As depicted in Figure 2, multiple discrepancies were discovered during this comparison where ENC soundings were one foot shoaler than the corresponding RNC sounding. This appears to be an issue with implementation of NOAA sounding rounding rules (rounding at 0.75). When the ENC is set to display soundings in feet with default rounding (rounding at 0.5) the ENC and RNC soundings agree.

Charted differences determined by comparing surveyed depths to a digital surface of US4MS12M are discussed in Section D.1.2.

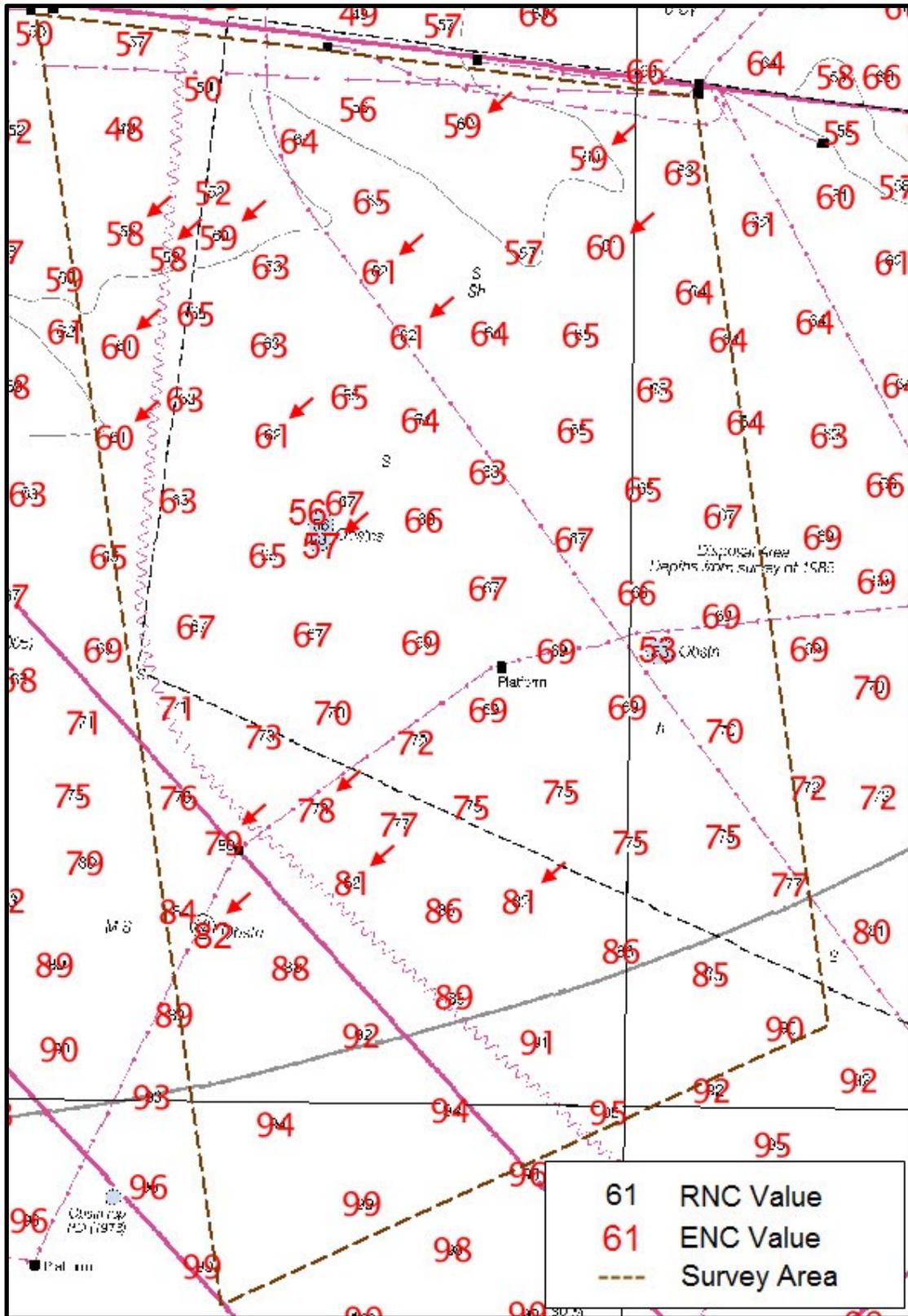


Figure 2. Sounding Discrepancies between 11373 and US4MS12M

11360

Chart 11360 corresponds to part of charts US3GC04M and US3GC05M within the H12468 survey area. As depicted in Figure 3, chart 11360 includes one sounding that is not portrayed on US3GC04M and is missing two soundings which are charted on US3GC04M. Chart 11360 agrees with US3GC05M within the survey area.

Charted differences in this area determined by comparing surveyed depths to a digital surface of US3GC04M and US3GC05M are discussed in Section D.1.2.

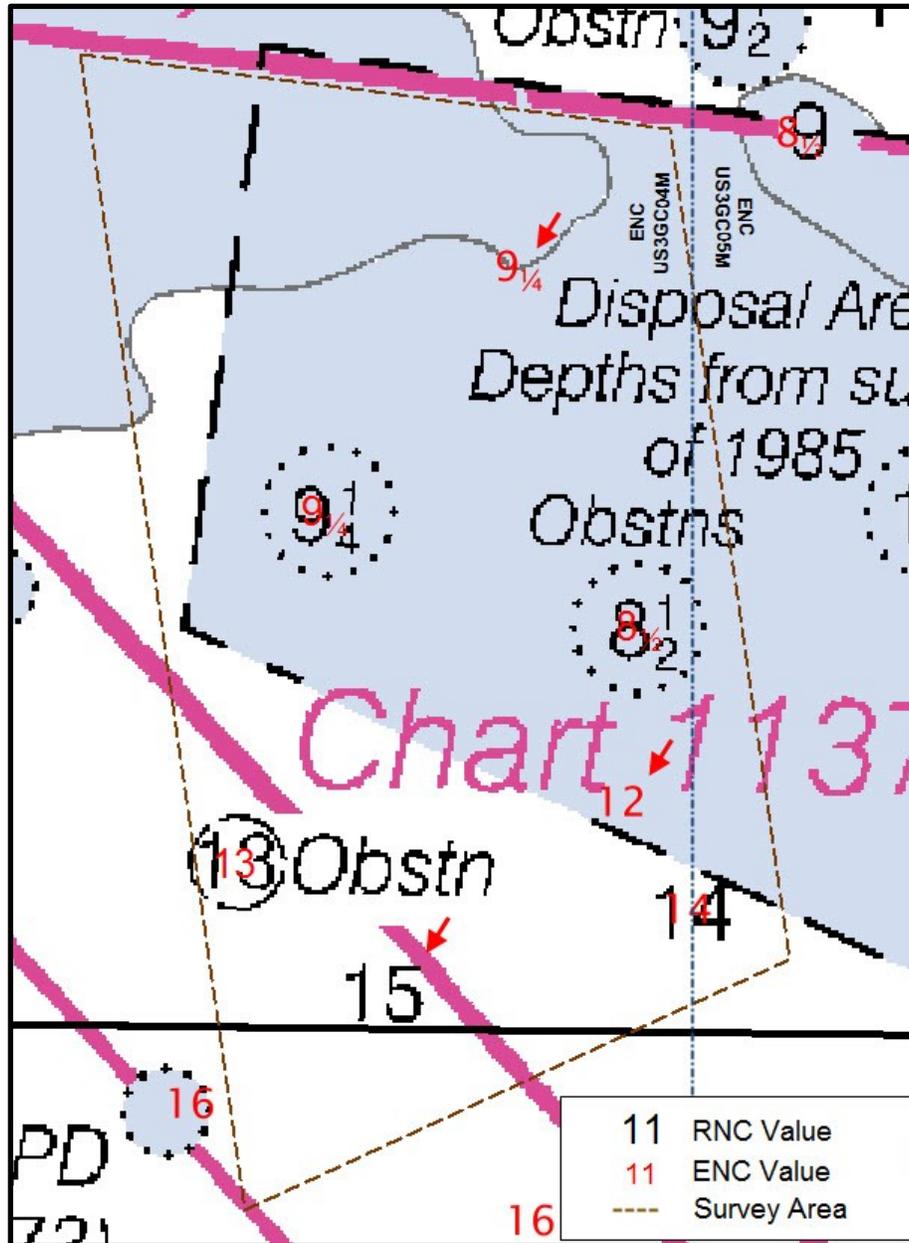


Figure 3. Sounding Discrepancies between 11360 and US3GC04M and US3GC05M

## D.1.2 Electronic Navigational Charts

Table 16 lists the ENC's compared to H12468.

**Table 16. ENC's Compared to H12468**

ENC Name	Scale	Edition Number	Update Application Date	Issue Date
US4MS12M	1:80,000	21	11/09/2012	11/09/2012
US3GC04M	1:250,000	48	11/06/2012	12/05/2012
US3GC05M	1:456,394	34	07/27/2011	09/24/2012

### US4MS12M

Surveyed depths from H12468 are generally 2 feet shoaler to 2 feet deeper than charted, though some areas are 2 feet to 5 feet shoaler than charted and 2 feet to 13 feet deeper than charted. The maximum difference of 13 feet deeper than charted corresponds to the disproval of a charted 53-foot obstruction (AWOIS item 7365) and is discussed in section D.1.3. ***Red Note: 53' obstruction was not disproved. Upon further investigation, obstruction (and AWOIS Item #7365) was determined to be a wreck and least known depth of this feature is approximately 12' deeper than existing charted obstruction sounding.*** The northern extent of the survey area is covered by sand, which appears to have migrated since the area was last surveyed. Figure 4 depicts the difference in feet between H12468 and ENC US4MS12M.

### US3GC04M and US3GC05M

The difference surface created from these small scale charts shows surveyed depths are generally zero to three fathoms deeper than charted (Figure 5) with the largest discrepancy at the disproved charted 8 1/2-fathom obstruction (AWOIS item 7365).

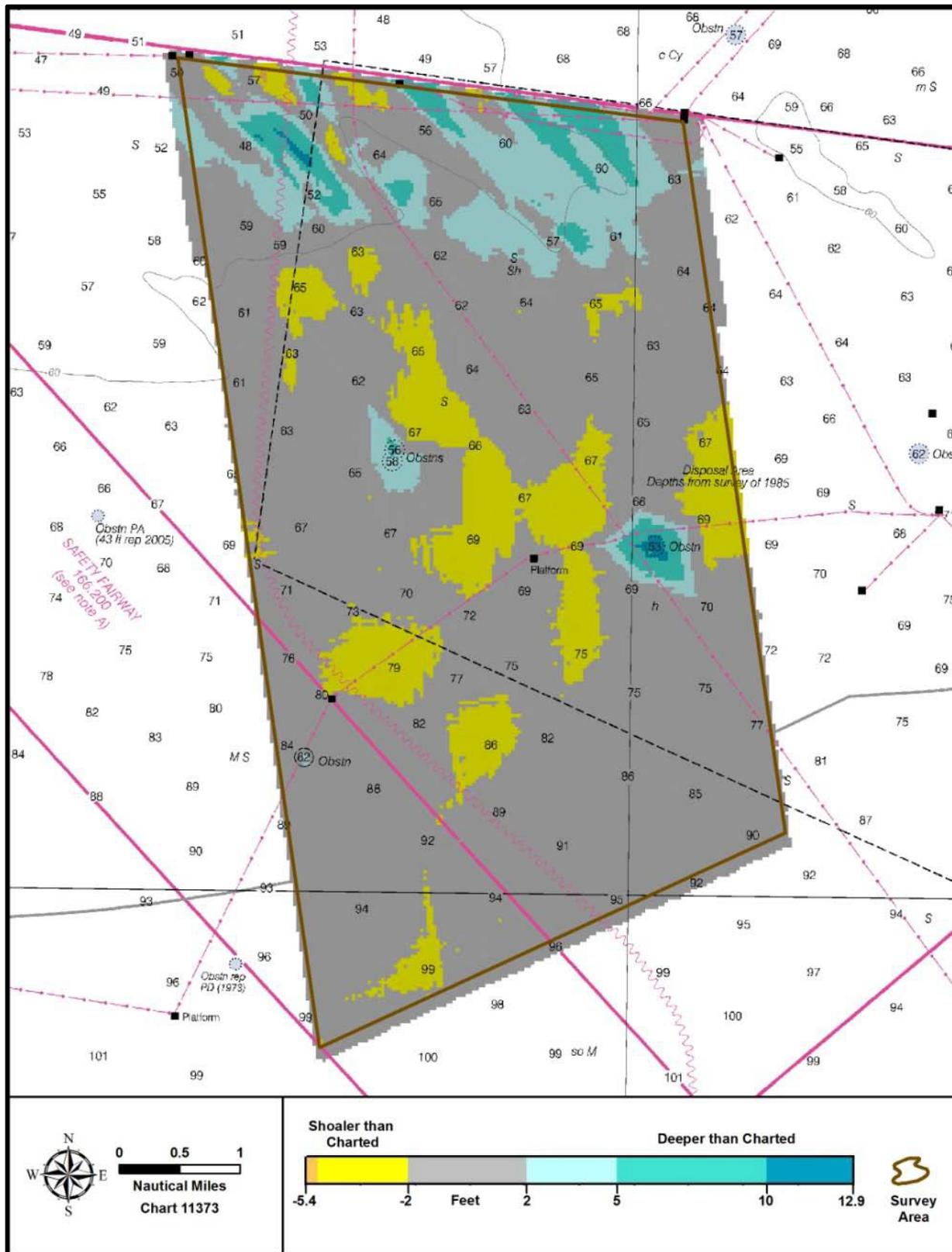


Figure 4. Depth Difference between H12468 and chart US4MS12M

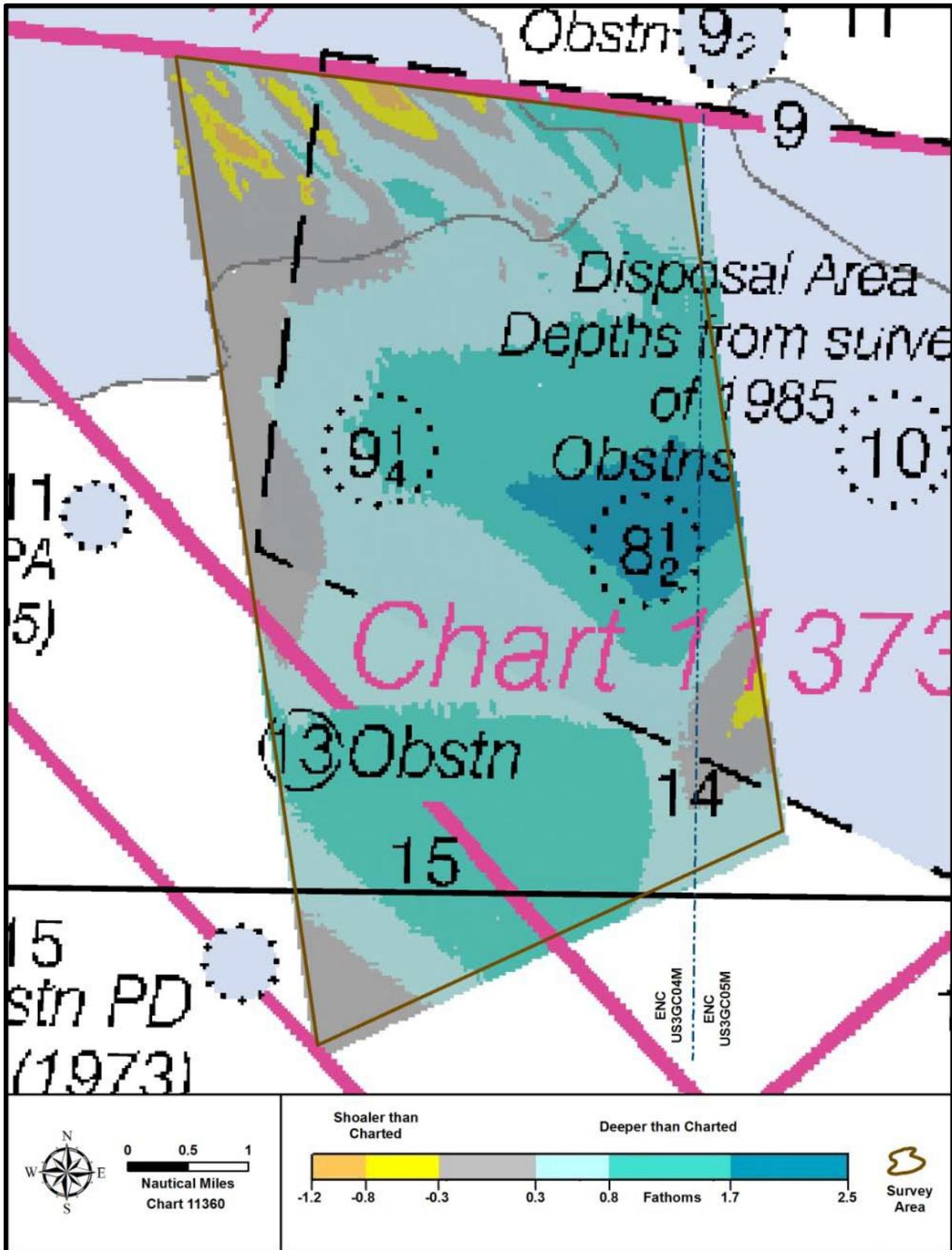


Figure 5. Depth Difference between H12468 and charts US3GC04M and US3GC05M

### **D.1.3 AWOIS Items**

Three (3) AWOIS items were assigned for full investigation within survey H12468.

#### 7362

The AWOIS database lists #7362 as an Obstruction from H10206/85-OPR-J217-MI-85 which was added during office processing. Survey H12468 has disproved this item with 200% side scan coverage. It is recommended that the obstruction be removed from the charts and the AWOIS database be updated with findings from the H12468 survey. The charted obstruction representing AWOIS #7362 as depicted in the Composite Source File (CSF) has been included in the Final Feature File with a description of 'Delete'.

#### 7364

The AWOIS database lists #7364 as an Obstruction from H10206/85-OPR-J217-MI-85 which was added during office processing. Survey H12468 has disproved this item with 200% side scan coverage. It is recommended that the obstruction be removed from the charts and the AWOIS database be updated with findings from the H12468 survey. The charted obstruction representing AWOIS #7364 as depicted in the CSF has been included in the Final Feature File with a description of 'Delete'.

#### 7365

The AWOIS database lists #7365 as an Obstruction from H10206/85-OPR-J217-MI-85 which was added during office processing. Survey H12468 has located this item with 200% side scan and multibeam coverage. It is recommended that the AWOIS database and chart be updated with findings from the H12468 survey. An Obstruction depicting AWOIS #7365 as surveyed has been included in the Final Feature File with a description of 'Update'.

### **D.1.4 Charted Features**

The survey contains no submerged charted features labeled as PD (Position Doubtful), ED (Existence Doubtful), PA (Position Approximate), or Reported. Charted features assigned in the CSF are included in the H12468 File Feature File and denoted with the Assignment Flag of 'Assigned'.

### **D.1.5 Uncharted Features**

The H12468 Final Feature File includes one uncharted obstruction denoted with the description of 'New'.

### **D.1.6 Dangers to Navigation**

No Dangers to Navigation (Dtons) were reported for this survey.

### **D.1.7 Shoal and Hazardous Features**

No shoals or potentially hazardous features were located within the H12468 survey area.

### **D.1.8 Channels**

The H12468 survey area does not contain any anchorage areas, maintained navigation channels or channel lines. The northern edge of H12468 borders charted safety fairway (33 CFR 166.200).

## **D.2 Additional Results**

### **D.2.1 Shoreline**

Shoreline investigation was not assigned in the *OPR-J348-KR-12 Hydrographic Survey Project Instructions or Statement of Work*.

### **D.2.2 Prior Surveys**

Aside from previously discussed comparison to junction surveys H11546 and H11547, no other comparisons with prior surveys were conducted.

### **D.2.3 Aids to Navigation**

No Aids to Navigation (AtoNs) were charted or located within the H12468 survey area.

### **D.2.4 Overhead Features**

There were no overhead bridges, cables, or other structures which would impact overhead clearance in the survey area.

### **D.2.5 Submarine Features**

The H12468 survey area contains one charted submarine cable and five charted pipelines. A section of cable was found to be uncovered and exposed on the seafloor. This issue was directed to the Central Gulf Coast Region Navigation Manager, the project Contract Officer's Technical Representative (COTR) and staff at the Atlantic Hydrographic Branch via email on September 27, 2012. Email correspondence related to this matter is included in *OPR-J348-KR-12 Project Correspondence*.

The section of the exposed cable was digitized and included in the Final Feature File in order to identify the area of exposure in the survey record. It is recommended that all charted pipelines and submarine cables within the survey area be retained as charted.

### **D.2.6 Ferry Routes and Terminals**

There were no ferry routes or terminals within the survey area.

### **D.2.7 Platforms**

The H12468 survey coverage encompassed five charted platforms. Four (4) of these platforms were disproved with either multibeam or side scan coverage and visual disproval by the survey party. They have been included in the Final Feature File with the recommendation to 'Delete'. The other platform was found to be charted incorrectly and is included in the feature file with the recommendation to 'Update'. An additional platform charted just outside of the northern boundary of the survey area was visually disproved by the survey party and has been included in the Final Feature File with the recommendation to 'Delete'.

### D.2.8 Significant Features

There was no additional information of scientific or practical value observed during the survey. No anomalous tidal or environmental conditions were observed during the survey that impacted the quality of the survey. However, from August 25, 2012 (DN 238) through September 5, 2012 (DN249) Hurricane Isaac impacted the survey area. When comparing mainscheme data collected before the storm and investigation data collected after the storm, a feature was found to have moved 38 meters (Figure 6). The feature at its pre-storm location was disproved by the investigation data and therefore rejected. A designated sounding was used in order to properly portray the feature in the depth surface at its post storm location

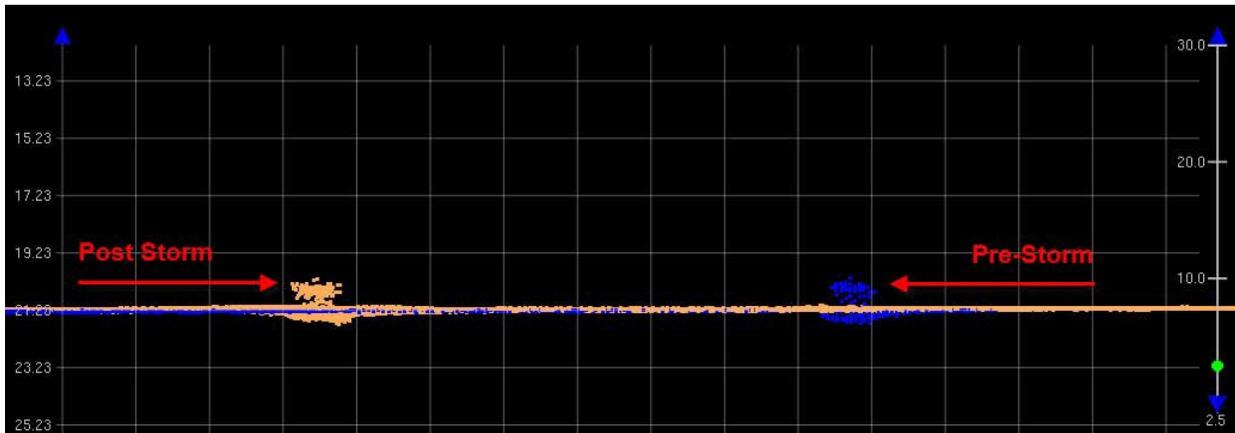


Figure 6. Pre (Blue) and Post (Salmon) Hurricane Isaac feature movement

### D.2.9 Construction and Dredging

There were no construction or dredging activities observed during survey operations.

## E. APPROVAL SHEET

The letter of approval for this report and accompanying data follows on the next page.



DAVID EVANS  
AND ASSOCIATES INC.

**LETTER OF APPROVAL**  
OPR-J348-KR-12  
REGISTRY NO. H12468

This report and the accompanying data are respectfully submitted.

Field operations contributing to the accomplishment of survey H12468 were conducted under my direct supervision with frequent personal checks of progress and adequacy. This report and associated data have been closely reviewed and are considered complete and adequate as per the OPR-J348-KR-12 *Statement of Work Statement* (April 2, 2012) and *Hydrographic Survey Project Instructions* dated April 16, 2012.

Digitally signed by Jon Dasler  
DN: cn=Jon Dasler, o=David Evans and  
Associates, Inc., ou=Marine Services Division,  
email=jld@deainc.com, c=US  
Date: 2013.01.31 10:38:26 -08'00'

---

Jonathan L. Dasler, PE, PLS, CH  
ACSM/THSOA Certified Hydrographer  
Chief of Party

Digitally signed by Jason Creech  
DN: cn=Jason Creech, o=David Evans and  
Associates, Inc., ou=Marine Services Division,  
email=jasc@deainc.com, c=US  
Date: 2013.01.31 10:33:18 -08'00'

---

Jason Creech  
Lead Hydrographer

David Evans and Associates, Inc.  
October 2012

## F. TABLE OF ACRONYMS

ACSM	American Congress of Surveying and Mapping
ASCII	American Standard Code for Information Interchange
AtoN	Aid to Navigation
AWOIS	Automated Wreck and Obstruction Information System
BAG	Bathymetric Attributed Grids
COTR	Contract Officer's Technical Representative
CTD	Conductivity, Temperature, and Depth
CUBE	Combined Uncertainty and Bathymetry Estimator
DAPR	Data Acquisition and Processing Report
DEA	David Evans and Associates, Inc
DGPS	Differential Global Positioning System
DN	Day Number
DtoN	Danger to Navigation
ED	Existence Doubtful
ENC	Electronic Navigational Charts
GPS	Global Positioning System
HIPS	Hydrographic Information Processing System
HSD	Hydrographic Surveys Division
HSSD	Hydrographic Surveys Specifications and Deliverables
HVCR	Horizontal and Vertical Control Report
HVF	HIPS Vessel File
IHO	International Hydrographic Organization
IMO	International Maritime Organization
LNM	Local Notice to Mariners
MBES	Multibeam
MLLW	Mean Lower Low Water
MVP	Moving Vessel Profiler
NAD83	North American Datum of 1983
nm	Nautical Mile
NOAA	National Oceanic Atmospheric Administration
NOS	National Ocean Service
PA	Position Approximate
PD	Position Doubtful
PE	Professional Engineer, Professional Engineer
PLS	Professional Land Surveyor
PRF	Project Reference File
QC	Quality Control
R/V	Research Vessel
RNC	Raster Navigational Chart
SSS	Side Scan Sonar
StdDev	Standard Deviation
SVP	Sound Velocity Profile
THSOA	The Hydrographic Society of America
TIN	Triangular Irregular Network
TPU	Total Propagated Uncertainty
USCG	US Coast Guard
UTM	Universal Transverse Mercator

APPENDIX I  
TIDES AND WATER LEVELS

**Project: OPR-J348-KR-12 Registry No: H12468**

**Contractor Name: David Evans and Associates, Inc.**

**Date: October 2012**

**Sheet Number: 3**

**Inclusive Dates: July 6, 2012 - October 05, 2012**

**Time (UTC)**

<b>Day Number</b>	<b>Date</b>	<b>Start Time</b>	<b>End Time</b>
188	07/06/2012	14:33:23	20:37:37
194	07/12/2012	18:38:47	20:46:08
195	07/13/2012	12:03:47	20:34:12
198	07/16/2012	12:27:09	20:26:01
199	07/17/2012	12:12:58	20:21:09
200	07/18/2012	13:42:49	20:23:25
201	07/19/2012	12:33:45	16:49:06
207	07/25/2012	13:11:19	20:57:48
210	07/28/2012	12:28:31	20:33:56
211	07/29/2012	12:19:41	21:14:51
215	08/02/2012	12:11:23	20:40:27
216	08/03/2012	12:05:53	18:45:34
217	08/04/2012	13:25:36	17:19:26
218	08/05/2012	18:51:50	20:44:11
219	08/06/2012	12:11:06	18:52:46
220	08/07/2012	12:16:37	20:51:11
221	08/08/2012	12:18:27	20:40:10
222	08/09/2012	13:34:29	13:47:25
225	08/12/2012	12:43:28	20:45:35
226	08/13/2012	12:16:39	15:14:22
278	10/04/2012	15:07:31	20:30:59
279	10/05/2012	13:10:45	19:45:00

**H12468**

**FINAL TIDE NOTE and FINAL TIDE ZONING CHART**

**DATE:** October 5, 2012

**HYDROGRAPHIC BRANCH:** Atlantic

**HYDROGRAPHIC PROJECT:** OPR-J348-KR-12

**HYDROGRAPHIC SHEET:** H12468

**LOCALITY** Approaches to Mississippi Sound, Mississippi

**SUB-LOCALITY:** 8nm S Petit Bois Pass

<b>TIME PERIOD:</b>	July	6,12,13,16-19,25,28-29
	August	2-9,12-13
	October	4-5

**TIDE STATIONS USED:** 8741533, Pascagoula NOAA Lab, MS  
Lat. 30° 22.0 N, Lon. 88° 33.7' W

**PLANE OF REFERENCE (MEAN LOWER LOW WATER):** 0.000 meters

**HEIGHT OF MEAN HIGH WATER (8741533) ABOVE PLANE OF REFERENCE:** 0.440 meters<sup>1</sup>

---

<sup>1</sup> MLLW            6.674m    Mean Lower-Low Water  
MHW            7.114m    Mean High Water

[http://tidesandcurrents.noaa.gov/data\\_menu.shtml?unit=0&format=Apply+Change&stn=8741533+Pascagoula+Noaa+Lab%2C+MS&type=Datums](http://tidesandcurrents.noaa.gov/data_menu.shtml?unit=0&format=Apply+Change&stn=8741533+Pascagoula+Noaa+Lab%2C+MS&type=Datums)

**FINAL TIDE ZONING  
H12468  
OPR-J348-KR-12**

<b>Zone</b>	<b>Time Corrector (Mins)</b>	<b>Range Ratio</b>	<b>Reference Station</b>
CGM38	-24	0.93	8741533
CGM38A	-18	0.93	8741533

**NOTE:** Final soundings were reduced to chart datum using a CO-OPS issued revision to the zoning scheme provided with the project instructions.



At Bois Pass

Highway 166.200  
(see note A)

Obstn: 9<sub>2</sub><sup>1</sup> 11 9<sub>2</sub><sup>1</sup> 10<sub>2</sub><sup>1</sup>  
Obstns 9

**CGM38A**  
Time Corrector -18 mins  
Range Corrector x0.93  
Reference 8741533

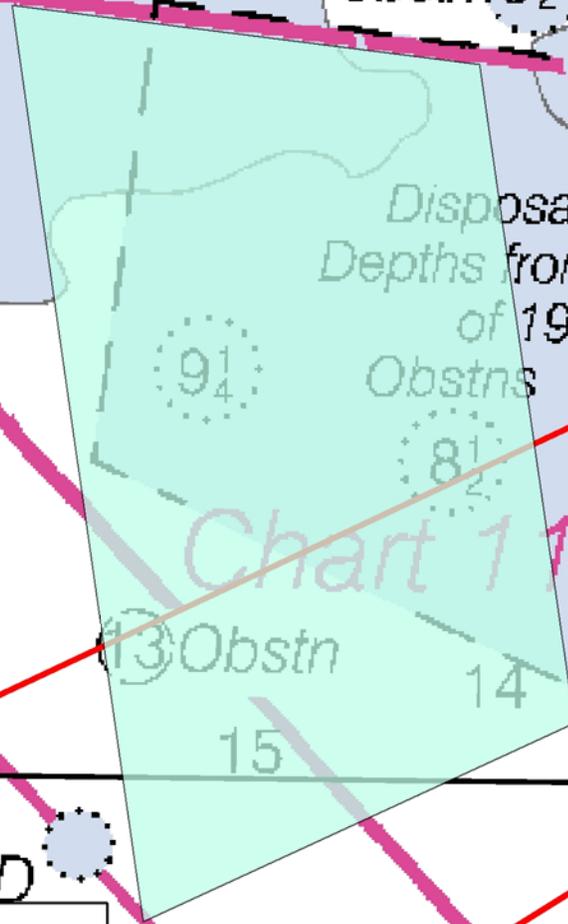
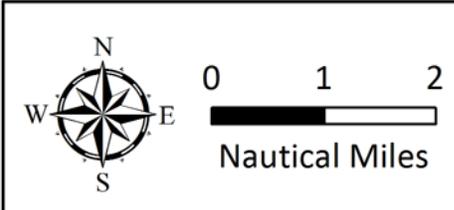


Chart 11373

11  
Obstn PA  
(7 fms rep 2005)

15  
Obstn PD

**CGM38**  
Time Corrector -24 mins  
Range Corrector x0.93  
Reference 8741533



**H12468**  
**Final Tide Zoning**

OPR-J348-KR-12  
Approaches to Mississippi Sound, MS  
David Evans and Associates, Inc.  
Jon Dasler, Lead Hydrographer  
Chart 11360

## APPENDIX II

# SUPPLEMENTAL SURVEY RECORDS AND CORRESPONDENCE



OPR,J348,KR,12

H12468 Bottom Samples

David Evans and Associates, Inc.  
2801 SE Columbia Way, Ste. 130  
Vancouver, WA 98661  
Phone: 360,314,3200  
Fax: 360,314,3250

Sample_ID	Target_Name	Time_(UTC)	Date	Longitude_(W)	Latitude_(N)	COLOUR	NATSUR	NATQUA
8	BS 8	12:41	7/24/2012	88/20/19.964	30/06/10.910	8,7	4,1	2,9
9	BS 9	13:04	7/24/2012	88/21/48.885	30/04/04.368	8	4	2
10	BS 10	13:19	7/24/2012	88/20/03.962	30/02/17.566	8,8	4,3	2,1
11	BS 11	13:33	7/24/2012	88/22/04.596	30/01/37.379	8	4,4	2,9

## APPENDIX III

### SURVEY FEATURES REPORT

- i. DTONS (0)
- ii. AWOIS (3)
- iii. WRECKS (0)
- iv. Maritime Boundary (0)

# Feature Report - AWOIS

**Registry Number:** H12468  
**State:** Mississippi  
**Locality:** Approaches to Mississippi Sound  
**Sub-locality:** 8nm S Petit Bois Pass  
**Project Number:** OPR-J348-KR-12  
**Survey Date:** 07/06/2012 - 10/05/2012

## Charts Affected

Number	Edition	Date	Scale (RNC)	RNC Correction(s)*
11373	47th	10/01/2008	1:80,000 (11373_1)	[L]NTM: ?
11366	11th	01/01/2008	1:250,000 (11366_1)	[L]NTM: ?
11360	43rd	11/01/2008	1:456,394 (11360_1)	[L]NTM: ?
1115A	43rd	11/01/2008	1:456,394 (1115A_1)	[L]NTM: ?
11006	32nd	08/01/2005	1:875,000 (11006_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 7365	Obstruction	19.71 m	30° 02' 53.5" N	088° 19' 45.3" W	7365
1.2	AWOIS 7364	AWOIS	[no data]	[no data]	[no data]	---
1.3	AWOIS 7362	AWOIS	[no data]	[no data]	[no data]	---

**1 - H12468 AWOIS Items**

## 1.1) AWOIS 7365

### Primary Feature for AWOIS Item #7365

**Search Position:** 30° 02' 53.1" N, 088° 19' 46.1" W  
**Historical Depth:** [None]  
**Search Radius:** 100  
**Search Technique:** MB  
**Technique Notes:** [None]

#### History Notes:

HISTORY

H10206/85--OPR-J217-MI-85; OBSTRUCTION ADDED DURING OFFICE PROCESSING IN  
LAT 30-02-52.35N, LONG 88-19-46.07W. ECHO SOUNDER DEPTH OF 53 FEET.

EVALUATOR RECOMMENDS CHARTING AN OBSTRUCTION AS SURVEYED AND INVESTIGATING  
AT AN OPPORTUNE TIME. (ENT 5/89 SJV)

### Survey Summary

**Survey Position:** 30° 02' 53.5" N, 088° 19' 45.3" W  
**Least Depth:** 19.71 m (= 64.66 ft = 10.776 fm = 10 fm 4.66 ft)  
**TPU ( $\pm 1.96\sigma$ ):** THU (TPEh) [None] ; TVU (TPEv) [None]  
**Timestamp:** 2012-279.00:00:00.000 (10/05/2012)  
**Dataset:** H12468\_AWOIS\_Items.000  
**FOID:** US 0000377791 00001(02260005C3BF0001)  
**Charts Affected:** 11373\_1, 11366\_1, 1115A\_1, 11360\_1, 11006\_1, 411\_1

#### Remarks:

OBSTRN/remrks: FS 217-152823-S. DEA CF #25. AWOIS 7365. Obstruction rising approximately 1.0m above the natural bottom.

### Feature Correlation

Source	Feature	Range	Azimuth	Status
H12468_AWOIS_Items.000	US 0000377791 00001	0.00	000.0	Primary
AWOIS_EXPORT	AWOIS # 7365	23.19	058.0	Secondary (grouped)

## Hydrographer Recommendations

Update charted position and depth (US,US,reprt,H-10206 / 19851209) to surveyed values.

### Cartographically-Rounded Depth (Affected Charts):

64ft (11373\_1)

10 ¾fm (1115A\_1, 11360\_1, 11006\_1, 411\_1)

10fm 4ft (11366\_1)

## S-57 Data

**Geo object 1:** Obstruction (OBSTRN)

**Attributes:** EXPSOU - 2:shoaler than range of depth of the surrounding depth area

QUASOU - 6:least depth known

SORDAT - 20121005

SORIND - US,US,graph,H12468

TECSOU - 3:found by multi-beam

VALSOU - 19.708 m

WATLEV - 3:always under water/submerged

## Office Notes

**SAR NOTE:** This feature was ensonified with set-line spacing MBES and 200% SSS. The feature was found in the surveyed location. The feature is located within a scour or depression in the sea floor. Data points interpreted as wreck like in appearance; feature shape confirmed and validated by the SS imagery. Defer final charting disposition to AHB Compiler.

**COMPILATION:** Concur. AWOIS #7365 feature observed in survey data appears to be a wreck with minimal relief. Recommend delete obstruction from chart. Add wreck with least depth of 64.659 ft. to chart.

## Feature Images

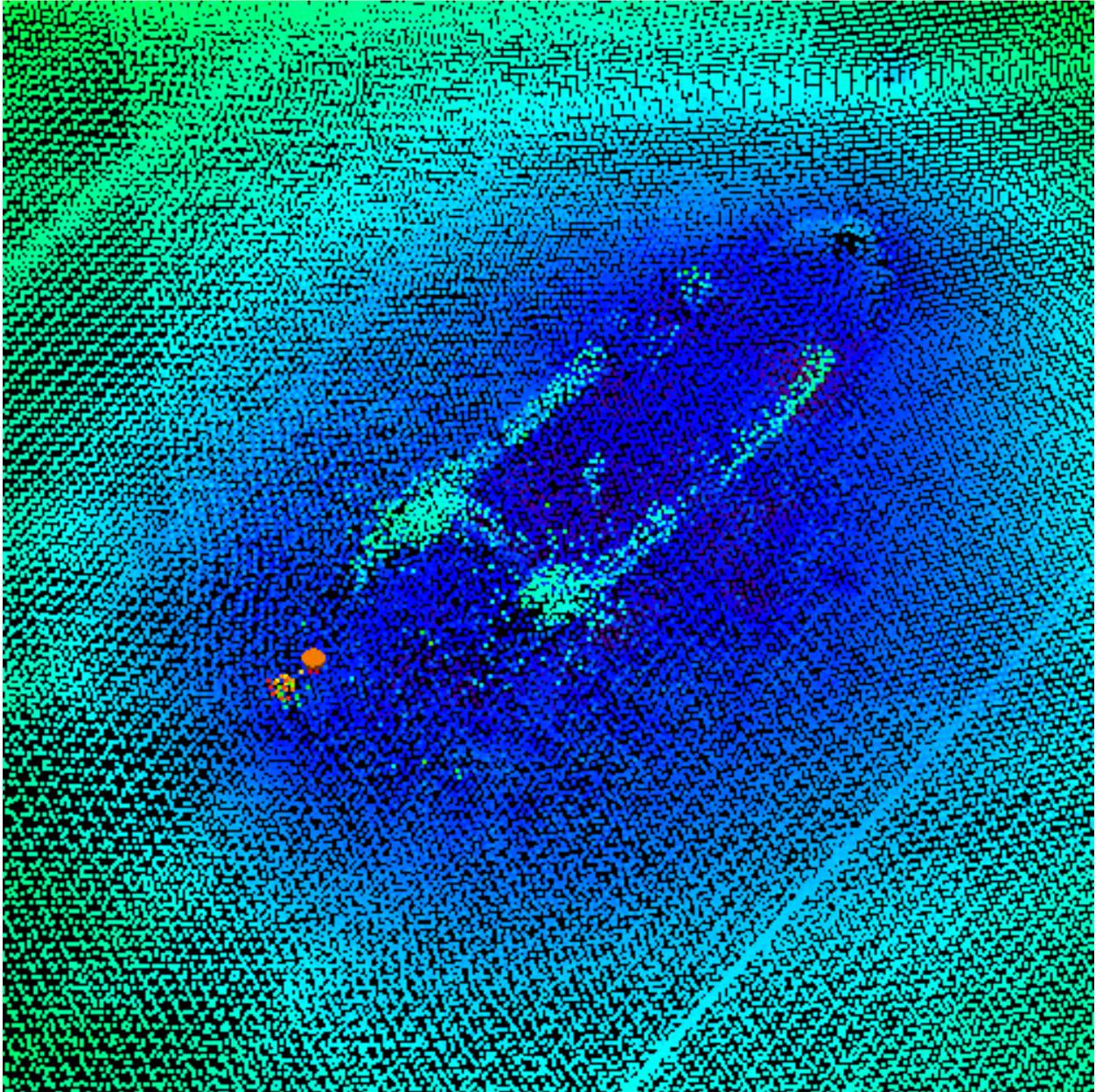


Figure 1.1.1

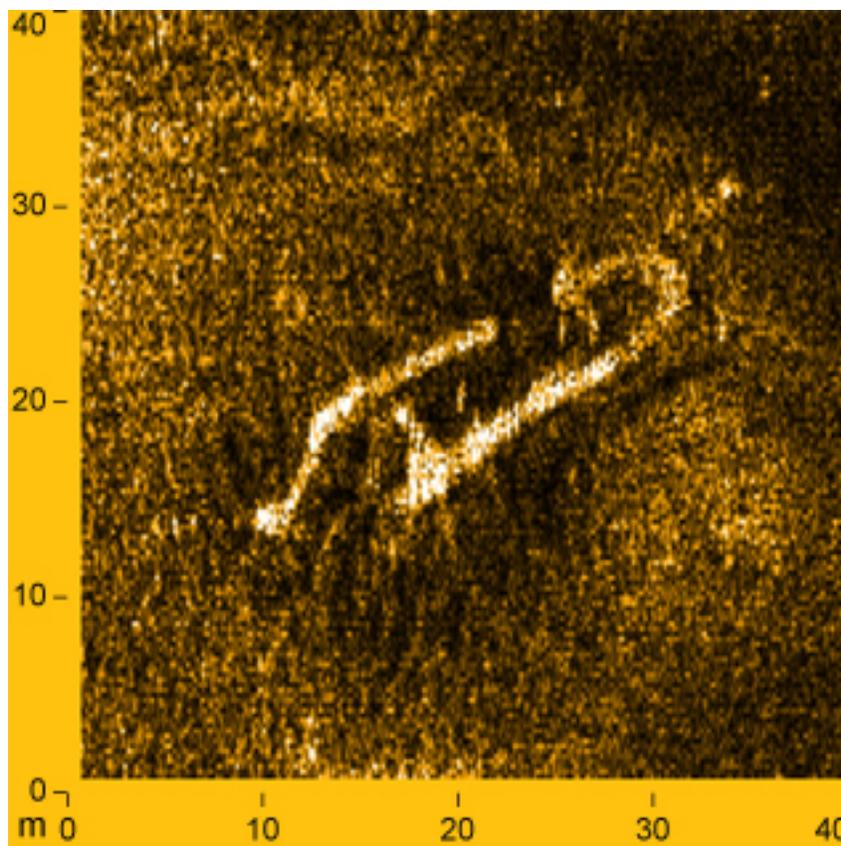


Figure 1.1.2

## 1.2) AWOIS #7364 - AWOIS 7364

### No Primary Survey Feature for this AWOIS Item

**Search Position:** 30° 03' 38.0" N, 088° 22' 16.6" W  
**Historical Depth:** [None]  
**Search Radius:** 100  
**Search Technique:** MB  
**Technique Notes:** [None]

#### History Notes:

HISTORY

H10206/85--OPR-J217-MI-85; OBSTRUCTION ADDED DURING OFFICE PROCESSING IN  
LAT 30-03-37.31N, LONG 88-22-16.56W. ECHO SOUNDER DEPTH OF 56 FEET.

EVALUATOR RECOMMENDS CHARTING AN OBSTRUCTION AS SURVEYED AND INVESTIGATING  
AT AN OPPORTUNE TIME. (ENT 5/89 SJV)

### Survey Summary

**Charts Affected:** 11373\_1, 11366\_1, 1115A\_1, 11360\_1, 11006\_1, 411\_1

#### Remarks:

[None]

### Feature Correlation

Source	Feature	Range	Azimuth	Status
AWOIS_EXPORT	AWOIS # 7364	0.00	000.0	Primary
H12468_AWOIS_Items.000	US 0000377792 00001	22.72	358.5	Secondary (grouped)

### Hydrographer Recommendations

[None]

### S-57 Data

[None]

## Office Notes

SAR NOTE: This feature was ensonified with set-line spacing MBES and 200% SSS. No evidence of this feature was found. This feature is considered disproved.

COMPILATION: Concur. Feature not observed in survey data. Considered disproved. Recommend delete obstruction/AWOIS #7364 from chart.

### 1.3) AWOIS #7362 - AWOIS 7362

#### No Primary Survey Feature for this AWOIS Item

**Search Position:** 30° 01' 07.9" N, 088° 23' 05.6" W  
**Historical Depth:** [None]  
**Search Radius:** 100  
**Search Technique:** MB  
**Technique Notes:** [None]

#### History Notes:

HISTORY

H10206/85--OPR-J217-MI-85; OBSTRUCTION ADDED DURING OFFICE PROCESSING IN  
LAT 29-58-56.57N, LONG 88-25-44.41W. ECHO SOUNDER DEPTH OF 82 FEET.

EVALUATOR RECOMMENDS CHARTING AN OBSTRUCTION AS SURVEYED AND INVESTIGATING  
AT AN OPPORTUNE TIME. (ENT 5/19/89 SJV)

#### Survey Summary

**Charts Affected:** 11373\_1, 11366\_1, 1115A\_1, 11360\_1, 11006\_1, 411\_1

#### Remarks:

[None]

#### Feature Correlation

Source	Feature	Range	Azimuth	Status
AWOIS_EXPORT	AWOIS # 7362	0.00	000.0	Primary
H12468_AWOIS_Items.000	US 0000377793 00001	22.61	358.5	Secondary (grouped)

#### Hydrographer Recommendations

[None]

#### S-57 Data

[None]

## Office Notes

SAR NOTE: This feature was ensonified with set-line spacing MBES and 200% SSS. No evidence of this feature was found. This feature is considered disproved.

COMPILATION: Concur. AWOIS #7362 is not observed in the survey data. Considered disproved. Recommend delete obstruction/AWOIS #7362 from chart.

APPROVAL PAGE

H12468

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

- H12468\_DR.pdf
- Collection of depth varied resolution BAGS
- Processed survey data and records
- H12468\_GeoImage.pdf

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

Approved: \_\_\_\_\_

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