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.	**H12469**

LOCALITY

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

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:

HYDROGRAPHIC TITLE SHEET

H12469

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:	**Mississippi**
General Locality:	**Approaches to Mississippi Sound**
Sub-Locality:	**8nm S Petit Bois Island**
Scale:	**1:40,000**
Date of Survey:	**July 22, 2012 to November 4, 2012**
Instructions Dated:	**April 16, 2012**
Project Number:	**OPR-J348-KR-12**
Field Unit:	**R/V *Westerly***
Chief of Party:	**Jonathan L. Dasler, PE, PLS, CH**
Soundings by:	**RESON 7125**
Imagery by:	**EdgeTech 4200-FS**
Verification by:	***Atlantic Hydrographic Branch***
Soundings Acquired in:	**Meters at Mean Lower Low Water**

Remarks:

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.

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/.

TABLE OF CONTENTS

List of Figures

List of Tables

List of Appendices

Descriptive Report to Accompany Hydrographic Survey H12469
Project OPR-J348-KR-12
Locality: Approaches to Mississippi Sound, Mississippi
Sub-locality: 8nm S Petit Bois Island
Scale 1:40,000
July 2012 – November 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 Island. Survey H12469 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 H12469 survey limits are listed in Table 1.

Table 1. Survey Limits

Northeast Limit	Southwest Limit
30.123467 N	29.975934 N
88.380773 W	88.489736 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). Least depths of all significant side scan sonar contacts were determined with multibeam sonar investigations. The coverage area (Figure 1) totaled 36.2 square nautical miles using a combination of side scan and multibeam survey methods.

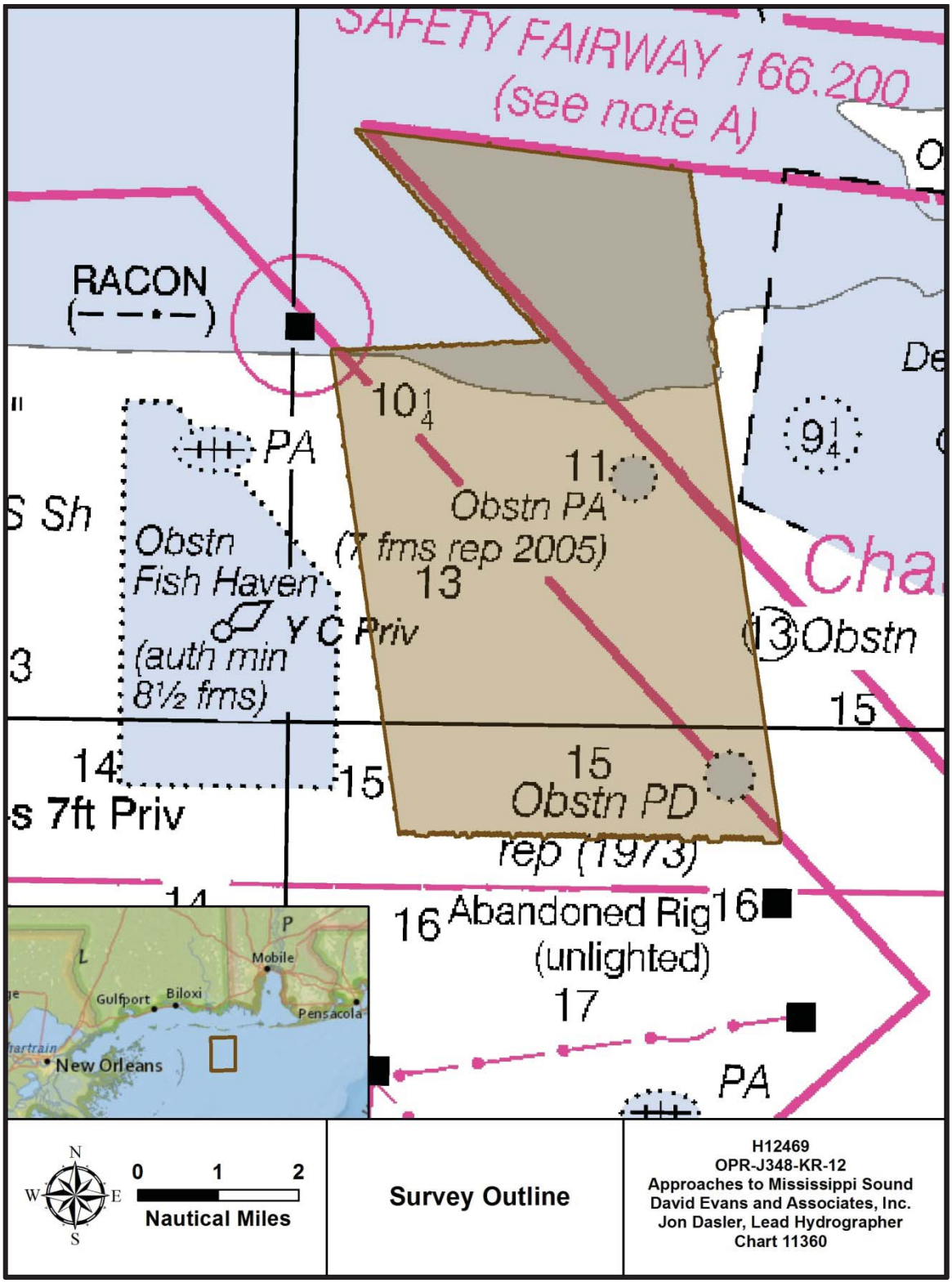


Figure 1. H12469 Survey Outline

A.5 Survey Statistics

Detailed survey statistics for H12469 are provided in Table 2.

Table 2. H12469 Hydrographic Survey Statistics

Survey Statistics	Combination MBES/SSS Mainscheme
MBES/SSS main scheme (nm)	815.9
Crosslines (MBES nm)	69.2
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	3
Total number of square nautical miles	36.2

Data acquisition was conducted from July 22, 2012 (DN 204) to November 4, 2012 (DN 309). 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 were not collected on patch test days unless also listed under dates of acquisition.

Table 3. H12469 Days of Acquisition

Dates of Acquisition	
July	22-23
August	16-25
September	6-8,10-11,15-16
November	4
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

Three (3) bottom samples were acquired on October 10, 2012 (DN 284). 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. 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 *Westerly*	
	
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 69.2 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 893,102 node comparisons with an average difference of 0.01 meters and standard deviation of 0.06 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

Total Propagated Uncertainty Computation in CARIS HIPS*		
Tide Values	**Uncertainty* (m)**	**Day Number Range**
Tide Value Measured	0.000	-
Tide Value Zoning	0.079	-
Sound Speed Values	**Uncertainty* (m/s)**	
Sound Speed Measured (SN 5510)	2.000	200-224
Sound Speed Measured (SN 7710)	1.000	184-199 225-309
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 0.36 meters. The maximum uncertainty value is associated with a high standard deviation in the depth surface caused by gridding data over an irregular seafloor.

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

CUBE Finalized Uncertainty Statistics						
	Uncertainty (m)			**Allowable error utilized**		
	Average	**StdDev**	**Maximum**	**Average**	**StdDev**	**Maximum**
2m CUBE	0.20	0.006	0.328	37%	0.011	58%
4m CUBE	0.21	0.012	0.368	36%	0.020	63%

B.2.3 Junctions

Survey H12469 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 H12470 had not been completed. Junction analysis with this survey will be discussed in the H12470 Descriptive Report.

Table 8. H12469 Junction Surveys

Junction Survey Registry Number	Scale	Year	Field Unit	Junction Direction
H11546	1:20,000	2006	TerraSond, Ltd.	North, Northwest
H12466	1:40,000	2012	David Evans and Associates, Inc	Southeast
H12468	1:40,000	2012	David Evans and Associates, Inc.	East
H12470	1:40,000	2012	David Evans and Associates, Inc.	West

A 2-meter finalized H12469 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.

Table 9. H12469 Junction Analysis Results

Junction Survey Registry Number	Number of Nodes Compared	Minimum Difference (m)	Maximum Difference (m)	Mean Difference (m)	Standard Deviation (m)
H11546	159022	-0.49	-0.20	-0.16	0.07
H12466	2528	-0.19	0.21	0.04	0.12
H12468	469781	-0.32	0.42	0.00	0.06

<u>H11546</u>
Bathymetric Attributed Grids (BAG) for survey H11546 were downloaded from NOAA's National Geophysical Data Center (NGDC). The 2-meter finalized H12469 surface was compared to the prior survey using CARIS Bathy DataBASE. A qualitative review of the junctions showed no anomalous areas.

<u>H12466</u>
The 2-meter finalized surface from survey H12466 was compared to the H12469 surface using CARIS Bathy DataBASE. A qualitative review of the junction showed no anomalous areas in either junction.

H12468

The 2-meter finalized surface from survey H12468 was compared to the H12469 surface using CARIS Bathy DataBASE. A qualitative review of the junction showed no anomalous areas in either junction.

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.

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.

B.3 Echo Sounding Corrections

B.3.1 Corrections to Echo Soundings

Data reduction procedures for survey H12469 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 H12469 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. Designated soundings were added to depth surfaces as necessary in order to accurately represent the seafloor in accordance with NOS HSSD.

Table 10. H12469 Multibeam Surfaces

Surface Name	Resolution
H12469_2m_MLLW_1of2_Final	2.0m
H12469_4m_MLLW_2of2_Final	4.0m

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. H12469 Side Scan Mosaics

Mosaic Name	Resolution
H12469_100Percent	0.5m
H12469_200Percent	0.5m

C. VERTICAL AND HORIZONTAL CONTROL

A complete description of the horizontal and vertical control for survey H12469 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 be comparing H12469 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 H12469 using difference surface techniques. These RNCs are listed in Table 15.

Table 15. RNCs Compared to H12469

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

<u>11373</u>

Chart 11373 was compared to US4MS12M within the H12469 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.

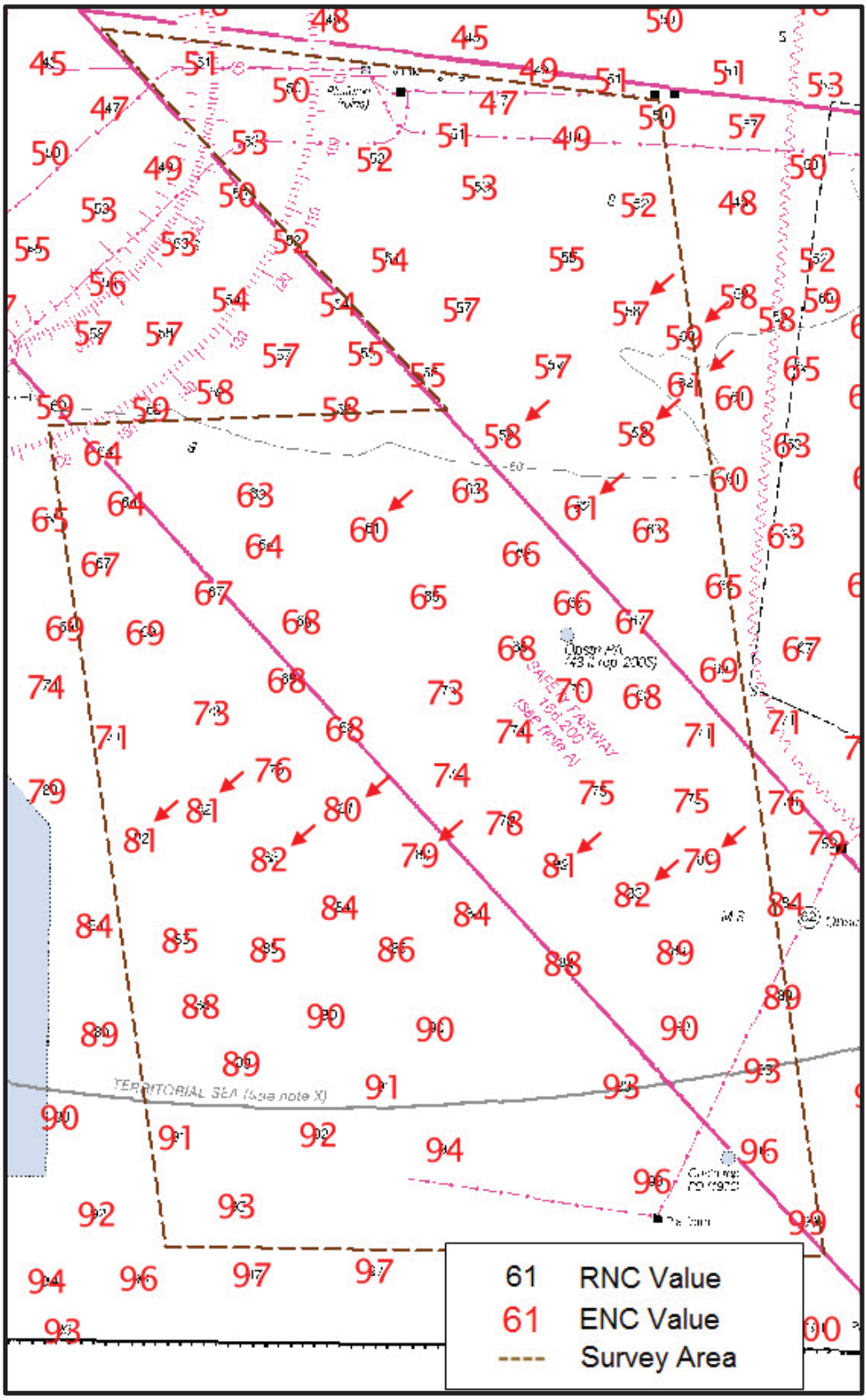


Figure 2. Sounding Discrepancies between 11373 and US4MS12M

11360

Chart 11360 corresponds to chart US3GC04M within the H12469 survey area. As depicted in Figure 3, there is no sounding agreement between the ENC and RNC within the H12469 survey area. Chart 11360 includes four soundings that are not portrayed on US3GC04M and is missing seven soundings which are charted on US3GC04M.

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

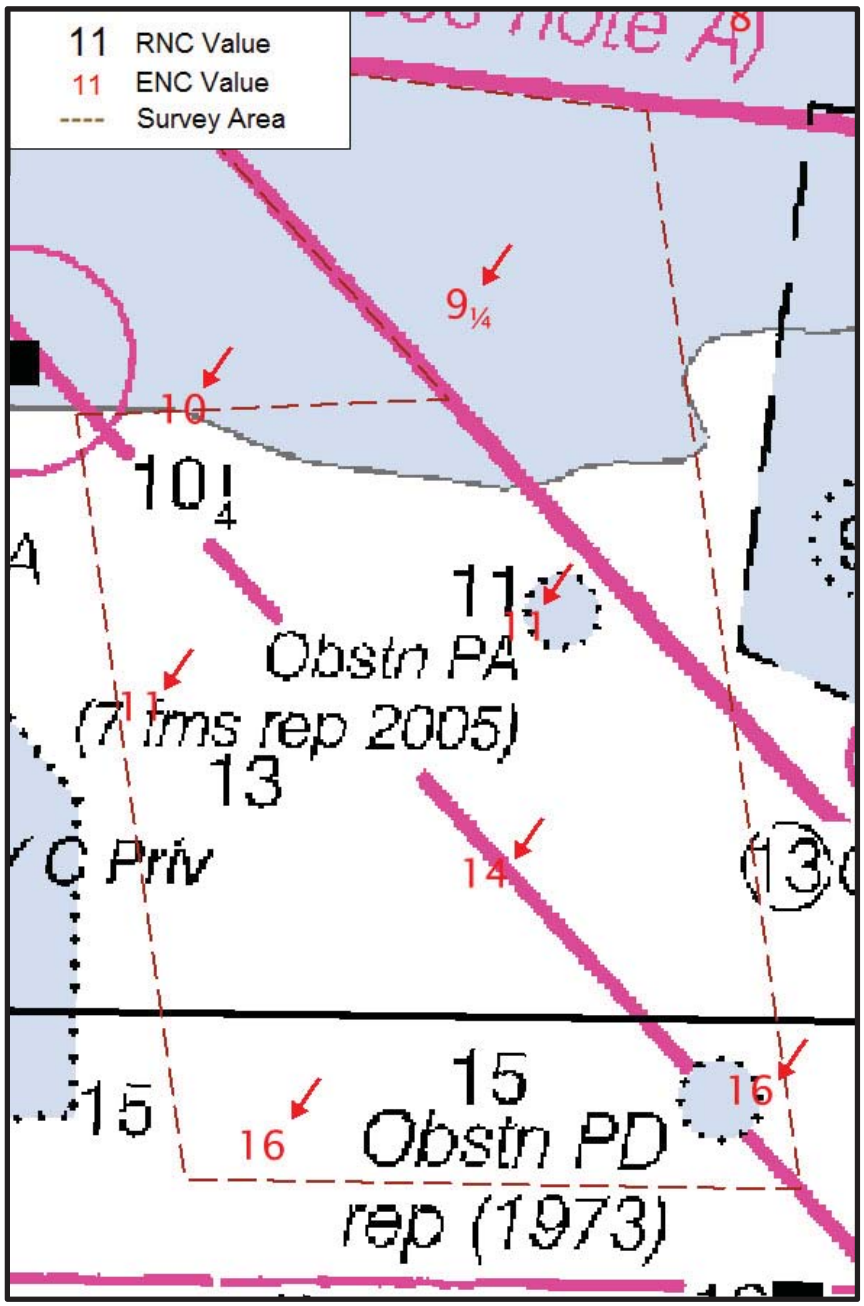


Figure 3. Sounding Discrepancies between 11360 and US3CG04M

D.1.2 Electronic Navigational Charts

Table 16 lists the ENCs compared to H12469.

Table 16. ENCs Compared to H12469

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

US4MS12M

Surveyed depths from H12469 are generally 2 feet shoaler to 2 feet deeper than charted with some areas 2 feet to 6 feet shoaler than charted. The maximum difference of 22 feet deeper than charted corresponds to the disproval of a charted 43-foot obstruction PA (AWOIS item 13392) and is discussed in section D.1.3. 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 H12469 and ENC US4MS12M.

US3GC04M

The difference surface created from this small scale chart shows surveyed depths are generally zero to three fathoms deeper than charted (Figure 5) with the largest discrepancy at the disproved charted 7-fathom obstruction (AWOIS item 13392).

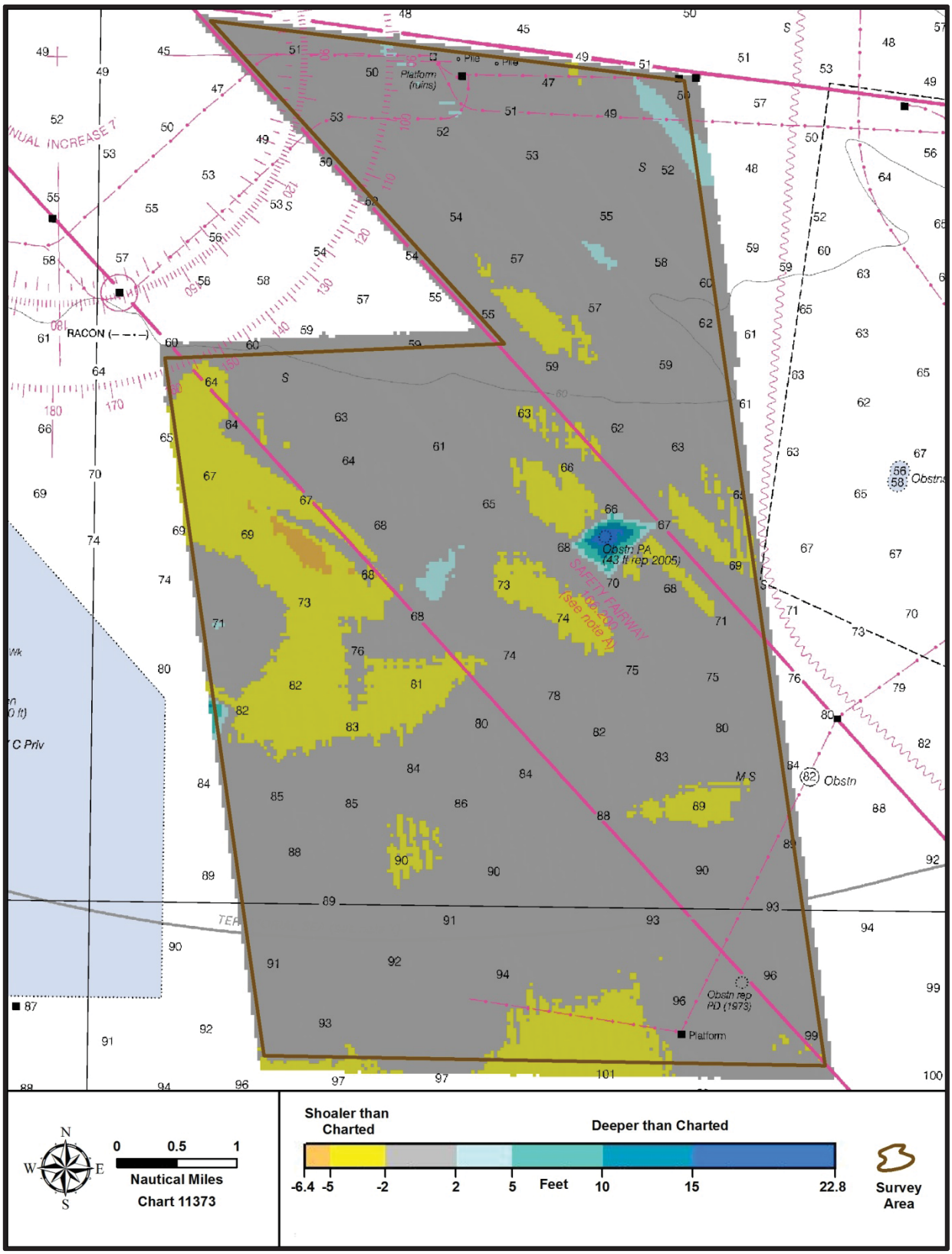


Figure 4. Depth Difference between H12469 and chart US4MS12M

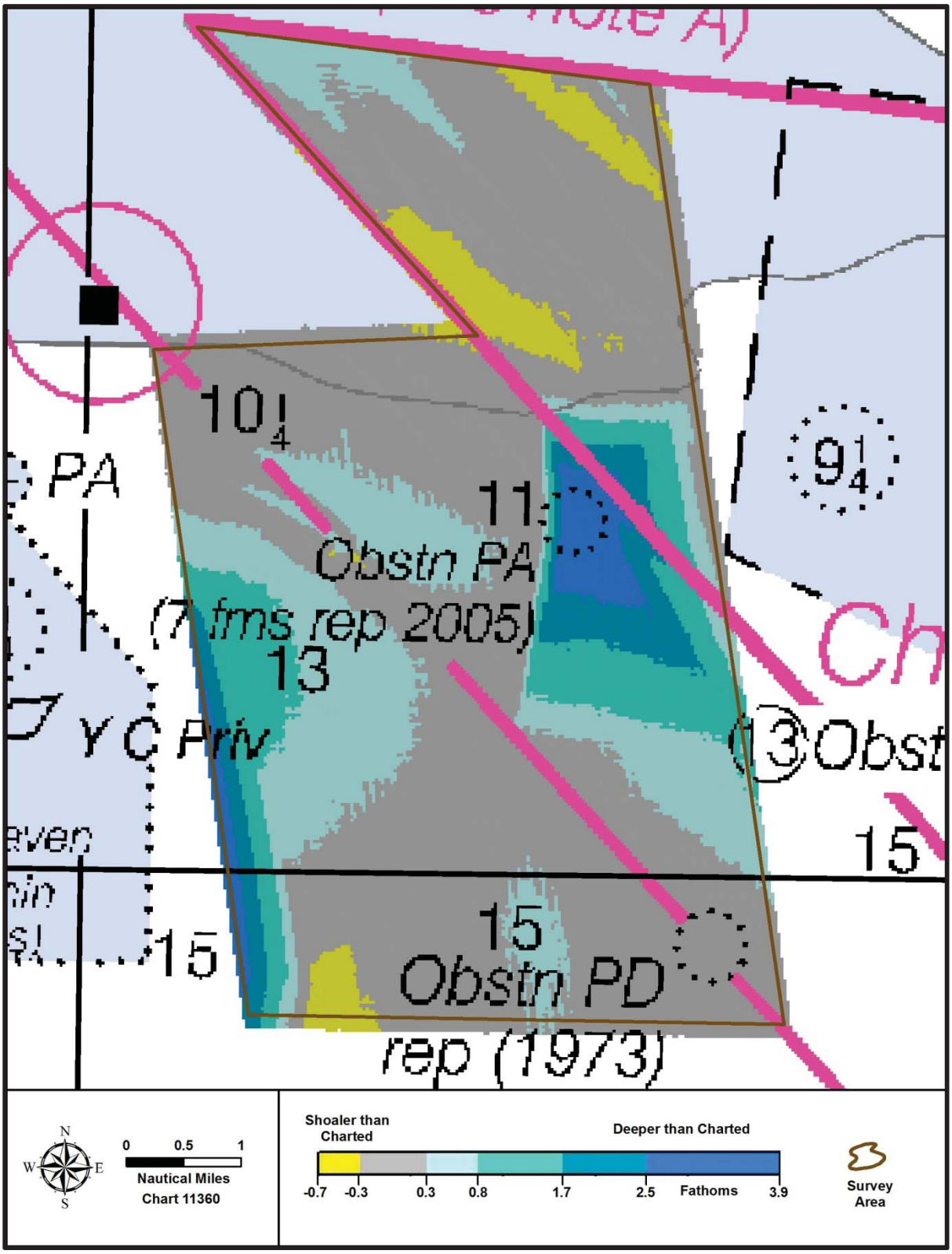


Figure 5. Depth Difference between H12469 and chart US3GC04M

D.1.3 AWOIS Items

Three (3) AWOIS items were assigned for full investigation within survey H12469.

3596

The AWOIS database lists #3596 as an Obstruction reported in 1973. It is charted as an Obstn PD (Position Doubtful) rep (Reported) (1973). Survey H12469 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 H12469 survey. The charted obstruction representing AWOIS #3596 as depicted in the Composite Source File (CSF) has been included in the Final Feature File with a description of 'Delete'.

7351

The AWOIS database lists #7351 as an Obstruction from H10206/85-OPR-J217-MI-85 which was added during office processing. This item is not currently charted and was not observed in the H12469 survey data. It is recommended that the AWOIS database be updated with findings from the H12469 survey. AWOIS #7351 has been included in the Final Feature File as a $CSYMB object with a description of 'Delete'.

13392

The AWOIS database lists #13396 as a 70-foot long submerged obstruction reported with an approximate position in the safety fairway. It is charted as an Obstn PA (Position Approximate) (43 ft rep 2005) on chart 11373. Survey H12469 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 H12469 survey. The charted obstruction representing AWOIS #13392 as depicted in the CSF has been included in the Final Feature File with a description of 'Delete'.

D.1.4 Charted Features

As previously discussed, the survey area contains one charted Obstn PD (AWOIS item 3596) and one charted Obstn PA (Position Approximate) (AWOIS item 13392). Both of these charted features have been disproved. The survey area does not contain any submerged charted features labeled as ED (Existence Doubtful). Charted features assigned in the CSF are included in the H12469 File Feature File and denoted with the Assignment Flag of 'Assigned'.

D.1.5 Uncharted Features

No uncharted features were located within the H12469 survey area.

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 H12469 survey area.

D.1.8 Channels

The H12469 survey area does not contain any anchorage areas, maintained navigation channels or channel lines. Safety fairway (33 CFR 166.200) runs through H12469 survey area. No new obstructions or dangers were located within the safety fairway in the survey area.

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 survey H11546 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 H12469 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 H12469 survey area contains six charted pipelines. It is recommended that all charted pipelines 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 H12469 survey coverage encompassed three charted platforms. Two (2) of these platforms were disproved with 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 correctly and is included in the feature file with recommendation to ‘Retain’.

D.2.8 Significant Features

No additional information of scientific or practical value was observed during the survey. No anomalous tidal or environmental conditions were observed during the survey that impacted the quality of the survey. Hurricane Isaac impacted the survey area from August 25, 2012 (DN 238) through September 5, 2012 (DN249), but no depth differences were observed in the multibeam data in areas of pre-storm and post storm overlap.

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. H12469

This report and the accompanying data are respectfully submitted.

Field operations contributing to the accomplishment of survey H12469 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: 2013.02.18 14:19:30 -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: 2013.02.18 14:20:14 -08'00'

Jason Creech
Lead Hydrographer

David Evans and Associates, Inc.
November 2012

F. TABLE OF ACRONYMS

ACSM	American Congress of Surveying and Mapping
ASCII	American Standard Code for Information Interchange
AtoN	Aid to Navigation
BAG	Bathymetric Attributed Grids
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
NOAA	National Oceanic Atmospheric Administration
NOS	National Ocean Service
PA	Position Approximate
PD	Position Doubtful
PE	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
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: H12469
Contractor Name: David Evans and Associates, Inc.
Date: November 2012
Sheet Number: 4
Inclusive Dates: July 22, 2012 - November 04, 2012

Time (UTC)

Day Number	Date	Start Time	End Time
204	07/22/2012	13:45:33	20:46:20
205	07/23/2012	12:48:18	17:50:20
229	08/16/2012	12:53:39	20:43:41
230	08/17/2012	12:26:19	20:41:44
231	08/18/2012	11:54:14	20:59:56
232	08/19/2012	12:25:26	20:50:42
233	08/20/2012	11:57:26	19:55:19
234	08/21/2012	12:06:44	20:47:18
235	08/22/2012	11:55:35	21:00:39
236	08/23/2012	11:44:14	20:43:48
237	08/24/2012	11:51:28	21:05:46
238	08/25/2012	12:01:34	16:28:23
250	09/06/2012	16:24:50	21:01:35
251	09/07/2012	12:17:48	21:11:54
252	09/08/2012	12:17:03	21:01:33
254	09/10/2012	12:14:03	21:05:41
255	09/11/2012	12:02:57	20:38:45
259	09/15/2012	12:53:12	21:09:47
260	09/16/2012	12:00:42	16:54:38
309	11/04/2012	13:10:26	17:02:55

H12469

FINAL TIDE NOTE and FINAL TIDE ZONING CHART

DATE: November 4, 2012

HYDROGRAPHIC BRANCH: Atlantic

HYDROGRAPHIC PROJECT: OPR-J348-KR-12

HYDROGRAPHIC SHEET: H12469

LOCALITY Approaches to Mississippi Sound, Mississippi

SUB-LOCALITY: 8nm S Petit Bois Island

TIME PERIOD:		
	July	22-23
	August	16-25
	September	6-8,10-11,15-16
	November	4

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 [1]

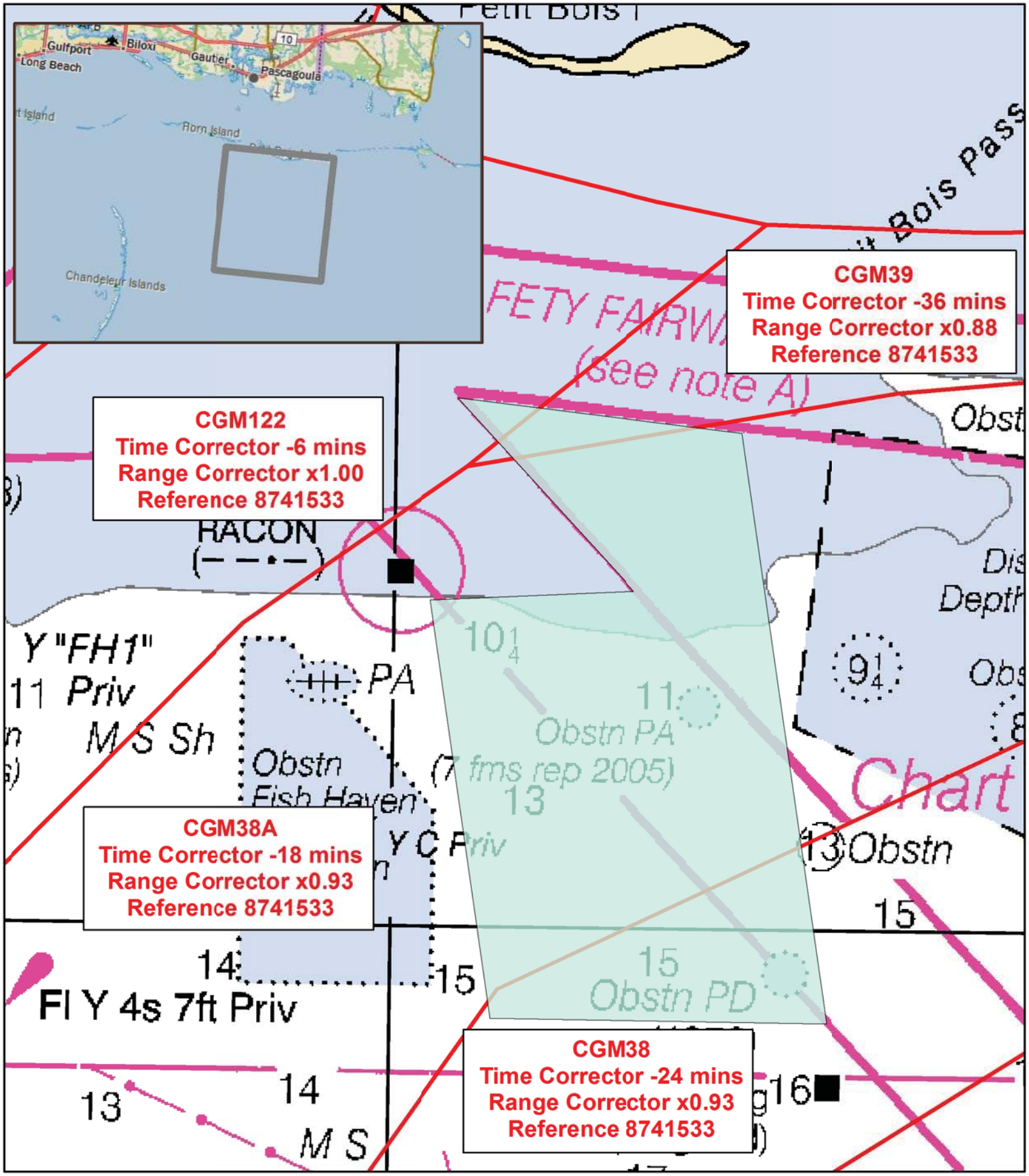
[1] MLLW 6.674m Mean Lower-Low Water
MHW 7.114m Mean High Water

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

FINAL TIDE ZONING
H12469
OPR-J348-KR-12

Zone	Time Corrector (Mins)	Range Ratio	Reference Station
CGM38	-24	0.93	8741533
CGM38A	-18	0.93	8741533
CGM39	-36	0.88	8741533
CGM122	-6	1.00	8741533

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



N
W E
S

0 1 2
Nautical Miles

H12469
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
No Supplemental Survey Records or Correspondence

APPENDIX III
Feature Report
AWOIS: three
DtoN: none
Maritime Boundary: none
Wrecks: none

H12469 AWOIS

Registry Number: H12469
State: Mississippi
Locality: Approaches to Mississippi Sound
Sub-locality: 8 NM South of Petit Bois Island
Project Number: OPR-J348-KR-12
Survey Date: 07/22/2012 - 11/04/2012

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	OBSTRUCTION	AWOIS	[no data]	[no data]	[no data]	---
1.2	OBSTRUCTION	AWOIS	[no data]	[no data]	[no data]	---
1.3	OBSTRUCTION	AWOIS	[no data]	[no data]	[no data]	---

1 - AWOIS

1.1) AWOIS #13392 - OBSTRUCTION

No Primary Survey Feature for this AWOIS Item

Search Position: 30° 03' 06.0" N, 088° 25' 06.0" W

Historical Depth: 13.11 m

Search Radius: 200

Search Technique: S2, MB

Technique Notes: [None]

History Notes:

LNM 41/05, CGD08 -- A 70-foot long submerged obstruction has been reported in a safety fairway in the Gulf of Mexico in approximate position 30-03-06.0N 088-25-06.0W. The obstruction is reported to be covered by approximately 43 feet of water and is not marked. Mariners are urged to use extreme caution in this area. UPDATED 10/18/2005 JCM.

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 # 13392	0.00	000.0	Primary

Hydrographer Recommendations

[None]

S-57 Data

[None]

Office Notes

SAR: AWOIS 13392 disproved within search radius by SSS and MBES.

COMPILE: Delete obstruction at charted position.

1.2) AWOIS #3596 - OBSTRUCTION

No Primary Survey Feature for this AWOIS Item

Search Position: 29° 59' 21.5" N, 088° 23' 42.9" W
Historical Depth: [None]
Search Radius: 200
Search Technique: MB, S2
Technique Notes: [None]

History Notes:

HISTORY
CL1394/73--NMFS; OBSTR. REPORTED 1973, IN LAT.29-59-20.78N, LONG.88-23-42.89W (ENTERED 9/84 RWD)
NM45/73--OBSTRUCTION REPORTED IN APPROX. POS. LAT. 29-59-21N, LONG. 88-23-43W.
FE309WD/74--OPR-479-RU/HE-74; UNASSIGNED ITEM; CLEARED BY 92 FEET IN ONE DIRECTION ONLY; SLIGHTLY LESS THAN .5 MILE RADIUS AROUND OBSTRUCTION. INSUFFICIENT FOR DISPROVAL, HOWEVER EVALUATOR RECOMMENDS ADDING "PD" TO CHARTED OBSTRUCTION.
H9420WD/74--OPR-479; CLEARED BY 91 FEET. (PROCESSING INCOMPLETE)
H10206/85--OPR-J217-MI-85; INFORMATION ITEM. MAINSCHEME HYDRO NEGATIVE. EVALUATOR RECOMMENDS RETAIN AS CHARTED. (UP 5/12/89 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 # 3596	0.00	000.0	Primary

Hydrographer Recommendations

[None]

S-57 Data

[None]

Office Notes

SAR: AWOIS 3596 considered disproved within search radius by SSS and MBES.

COMPILE: Delete AWOIS 3596 at charted position.

1.3) AWOIS #7351 - OBSTRUCTION

No Primary Survey Feature for this AWOIS Item

Search Position: 29° 58' 57.3" N, 088° 25' 44.4" W
Historical Depth: [None]
Search Radius: 200
Search Technique: MB
Technique Notes: [None]

History Notes:

HISTORY
H10206/85--OPR-J217-MI-85; OBSTRUCTION ADDED DURING OFFICE ì
PROCESSING IN LAT. 29-58-56.57N, LONG. 88-25-44.41W. ECHO SOUNDER ì
DEPTH OF 93 FEET. EVALUATOR RECOMMENDS CHARTING AN OBSTRUCTION AS ì
SURVEYED AND INVESTIGATING AT AN OPPORTUNE TIME. (ENT 5/19/89, ì
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 # 7351	0.00	000.0	Primary

Hydrographer Recommendations

[None]

S-57 Data

[None]

Office Notes

COMPILE: Obstruction disproved by field unit. Obstruction is not currently charted.

APPROVAL PAGE

H12469

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

- H12469_DR.pdf
- Collection of depth varied resolution BAGS
- Processed survey data and records
- H12469_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 HIGGINS.ABIGAIL.SARAH.1267671750
DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=NOAA, cn=HIGGINS.ABIGAIL.SARAH.1267671750
Date: 2013.09.30 14:24:39 -04'00'

LT Abigail Higgins, NOAA
Chief, Atlantic Hydrographic Branch