H12709

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

DESCRIPTIVE REPORT

Type of Survey:	Basic Hydrographic Survey
Registry Number:	H12709

LOCALITY

State(s):	Louisiana Mississippi
General Locality:	Western Vicinity of Lake Borgne
Sub-locality:	The Rigolets to Polecat Bend

2014

CHIEF OF PARTY
Jonathan L. Dasler, PE, PLS, CH

LIBRARY & ARCHIVES

Date:

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

U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION	REGISTRY NUMBER:
HYDROGRAPHIC TITLE SHEET	**H12709**

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

State(s):	**Louisiana Mississippi**
General Locality:	**Western Vicinity of Lake Borgne**
Sub-Locality:	**The Rigolets to Polecat Bend**
Scale:	**40000**
Dates of Survey:	**10/12/2014 to 11/16/2014**
Instructions Dated:	**08/29/2014**
Project Number:	**OPR-J311-KR-14**
Field Unit:	**David Evans & Associates, Inc.**
Chief of Party:	**Jonathan L. Dasler, PE, PLS, CH**
Soundings by:	**Reson 7125 SV2**
Imagery by:	
Verification by:	**Atlantic Hydrographic Branch**
Soundings Acquired in:	**meters at Mean Lower Low Water**

Remarks:

NAD83, 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.

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Descriptive Report to Accompany Survey H12709

Project: OPR-J311-KR-14

Locality: Western Vicinity of Lake Borgne

Sublocality: The Rigolets to Polecat Bend

Scale: 1:40000

October 2014 - November 2014

David Evans & 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 vicinity of The Rigolets and western Lake Borgne, Louisana. Survey H12709 was conducted in accordance with the Statement of Work (July 9, 2014) and Hydrographic Survey Project Instructions (August 29, 2014).

The Hydrographic Survey Project Instructions reference the National Ocean Service (NOS) Hydrographic Surveys Specifications and Deliverables Manual (HSSD), April 2014 as the technical requirements for this project.

A.1 Survey Limits

Data were acquired within the following survey limits:

Northwest Limit	Southeast Limit
30° 10' 42.8" N 89° 45' 17.28" W	30° 8' 7" N 89° 30' 11.38" W

Table 1: Survey Limits

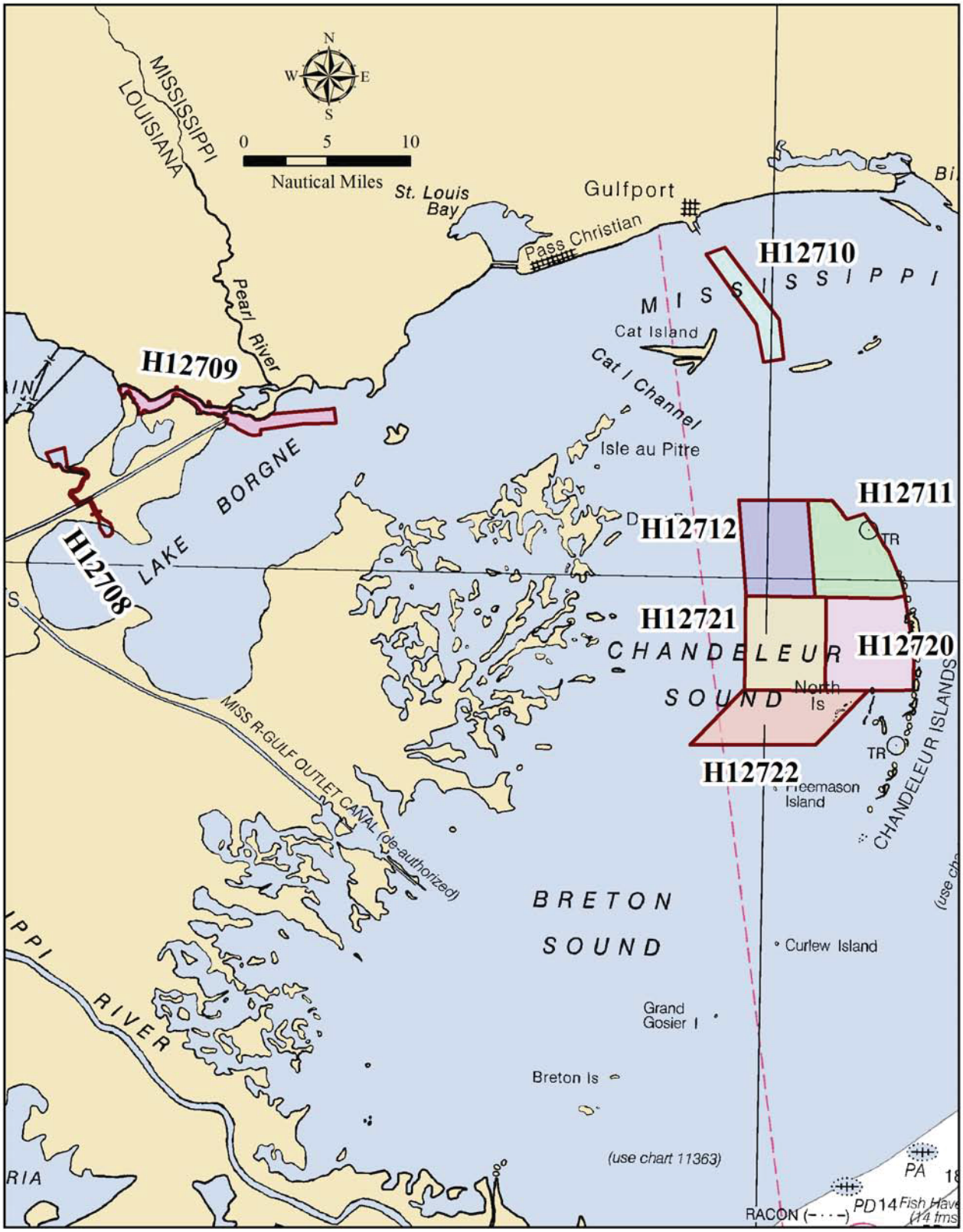


Figure 1: OPR-J311-KR-14 Assigned Survey Areas

Survey Limits were acquired in accordance with the requirements in the Project Instructions and the HSSD.

A.2 Survey Purpose

The purpose of this project is to provide contemporary surveys to update National Ocean Service (NOS) nautical charting products. This project is located in an area subject to the influence of hurricanes on an annual basis, thus producing a very dynamic environment requiring frequent re-surveying. In addition, the tug and tow industry will be re-routed to the west of the Chandeleur Islands due to a Gulf Intracoastal Waterway West (GIWW) closure in the Summer of 2015. A large portion of the proposed alternative route for the tug and tow industry lies within the southern portion of this project area. This project will cover approximately 129 SNM of emerging critical areas and 4.5 SNM of priority 2 areas as identified in the 2012 NOAA Hydrographic Survey Priorities (NHSP). The project area is located in the vicinity of Lake Borgne, the Gulfport Sound Channel, and west of the Chandeleur Islands.

A.3 Survey Quality

The entire survey is adequate to supersede previous data.

A.4 Survey Coverage

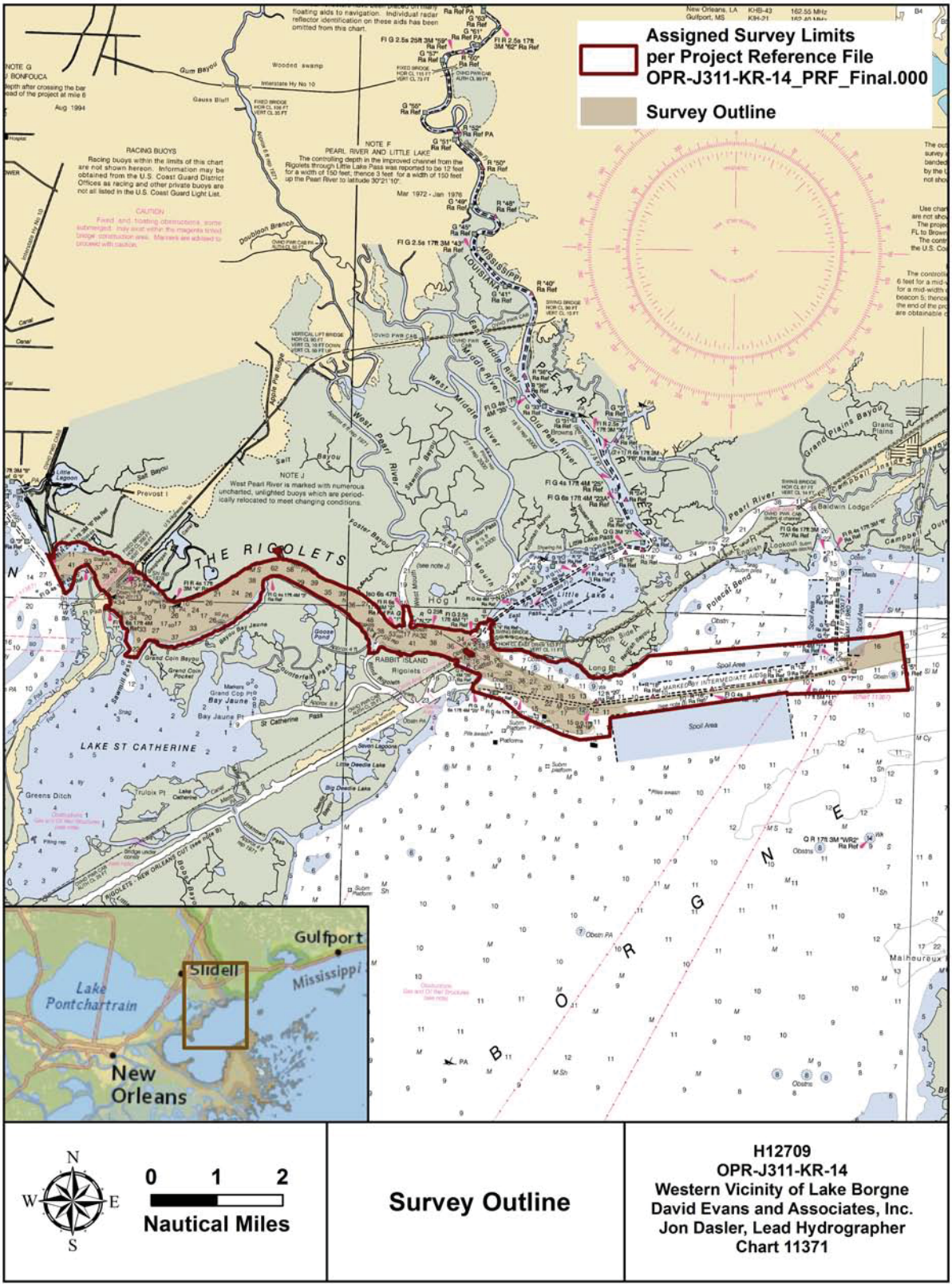


Figure 2: H12709 Survey Outline

The survey consisted of Object Detection MBES with Backscatter within the survey limits. This inshore limit of the survey was defined as the farthest offshore of either the surveyed 4-meter depth contour or the Navigable Area Limit Line (NALL) defined in the OPR-J311-KR-14 Project Reference File (PRF).

A.5 Survey Statistics

The following table lists the mainscheme and crossline acquisition mileage for this survey:

	HULL ID	*R/V Westerly*	*Total*
LNM	**SBES Mainscheme**	0	0
	MBES Mainscheme	838.17	838.17
	Lidar Mainscheme	0	0
	SSS Mainscheme	0	0
	SBES/SSS Mainscheme	0	0
	MBES/SSS Mainscheme	0	0
	SBES/MBES Crosslines	36.52	36.52
	Lidar Crosslines	0	0
Number of Bottom Samples			10
Number of AWOIS Items Investigated			0
Number Maritime Boundary Points Investigated			0
Number of DPs			0
Number of Items Investigated by Dive Ops			0
Total SNM			4.84

Table 2: Hydrographic Survey Statistics

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

Survey Dates	Day of the Year
10/12/2014	285
10/13/2014	286
10/14/2014	287
10/15/2014	288
10/16/2014	289
10/17/2014	290
10/18/2014	291
10/19/2014	292
10/20/2014	293
10/21/2014	294
10/22/2014	295
10/23/2014	296
10/24/2014	297
10/25/2014	298
10/26/2014	299
10/27/2014	300
10/28/2014	301
10/29/2014	302
10/30/2014	303
10/31/2014	304
11/02/2014	306
11/03/2014	307
11/04/2014	308
11/05/2014	309
11/16/2014	320

Table 3: Dates of Hydrography

B. Data Acquisition and Processing

B.1 Equipment and Vessels

The OPR-J311-KR-14 Data Acquisition and Processing Report (DAPR), previously submitted with survey H12708, 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 following vessels were used for data acquisition during this survey:

Hull ID	***R/V Westerly***
LOA	38 feet
Draft	3.5 feet

Table 4: Vessels Used

Figure 3: R/V Westerly

B.1.2 Equipment

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

Manufacturer	Model	Type
Reson	7125 SV2	MBES
Applanix	POS/MV 320 v4	Positioning & Attitude
Rolls Royce	MVP-30 with AML Micro SVPT	Primary Sound Speed Profiler
AML	AML Micro SV	Surface Sound Speed
Sea-Bird Electronics	SEACAT SBE-19 CTD Profiler	Secondary Sound Speed Profiler

Table 5: Major Systems Used

B.2 Quality Control

B.2.1 Crosslines

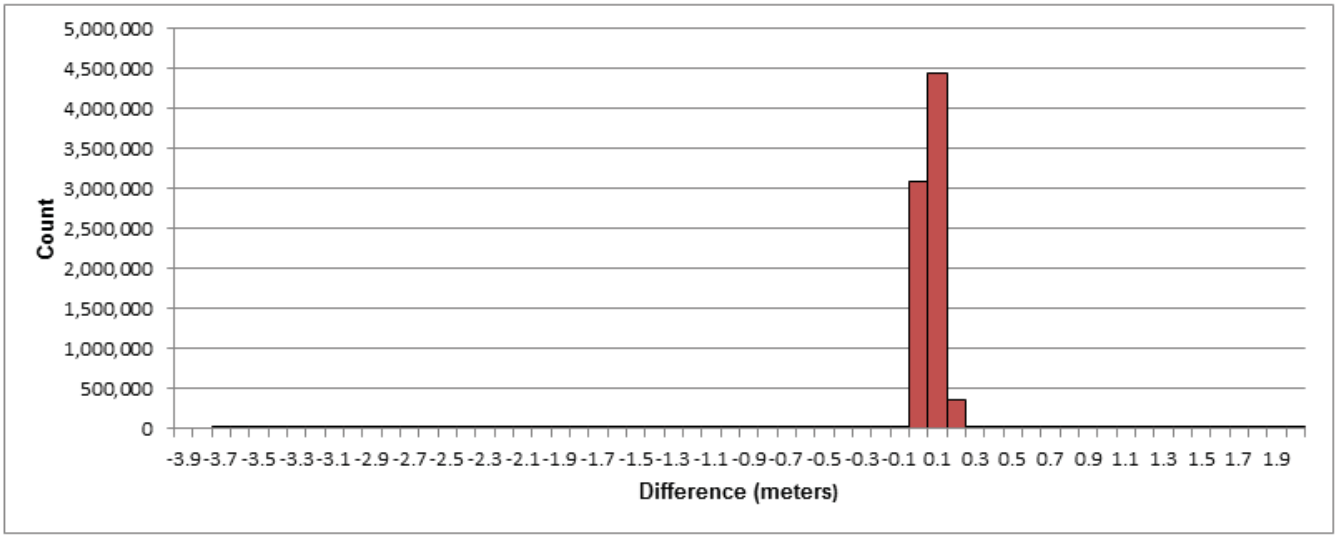
Crosslines acquired for this survey totaled 4% of mainscheme acquisition.

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 50-centimeter 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 2014 HSSD.

Additional crossline analysis was performed by computing a 50-centimeter CUBE surface from the crossline data. The surface was then differenced from a 50-centimeter 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.

Results from the crossline to mainscheme difference analysis are depicted in Figure 4. All outliers from the difference analysis were reviewed in HIPS subset editor and found to result from comparing gridded data over prominent features or steep slopes.



Mean:	0.02 m	Standard Deviation:	0.048 m
Minimum:	-3.95 m	Bin size:	0.1 m
Maximum:	4.163 m	Number of Nodes:	7,940,704

Figure 4: H12709 Crossline Differences

B.2.2 Uncertainty

The following survey specific parameters were used for this survey:

Measured	Zoning
0.000 meters	0.108 meters

Table 6: Survey Specific Tide TPU Values

Hull ID	Measured - CTD	Measured - MVP	Surface
R/V Westerly	n/a meters/second	1 meters/second	0.5 meters/second

Table 7: Survey Specific Sound Speed TPU Values

Additional discussion of these parameters is included in the DAPR.

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 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 surfaces increased for nodes where the standard deviation of the node was greater than the total propagated uncertainty. The resulting calculated uncertainty values of all nodes in the finalized 50-centimeter Object Detection multibeam surfaces range from 0.217 meters to 1.240 meters with a standard deviation of 0.005 meters.

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 greater than 100% indicate nodes exceeding the allowable IHO uncertainty.

For the 50-centimeter Object Detection multibeam surface the allowable uncertainty utilized ranges from 33% to 242%. The mean allowable uncertainty for the surface is 43% with a standard deviation of 0.013. In total 1,269 nodes out of 66,351,240 fail to meet specification.

Nodes that were reported out of specification were coincident with areas of high depth standard deviation such as steep terrain or prominent features. All uncertainty values were within allowable specification prior to surface finalization when standard deviation was incorporated into the solution when it was greater than the node uncertainty.

B.2.3 Junctions

Bathymetric Attributed Grids (BAGs) for the junction survey were downloaded from the NOAA National Geophysical Data Center (NGDC) website. The 50-centimeter finalized H12709 surface was compared to the junction survey by generating a difference surface with CARIS Base Editor. BAGs of identical resolution were combined in CARIS Base Editor before difference surfaces were created.

The following junctions were made with this survey:

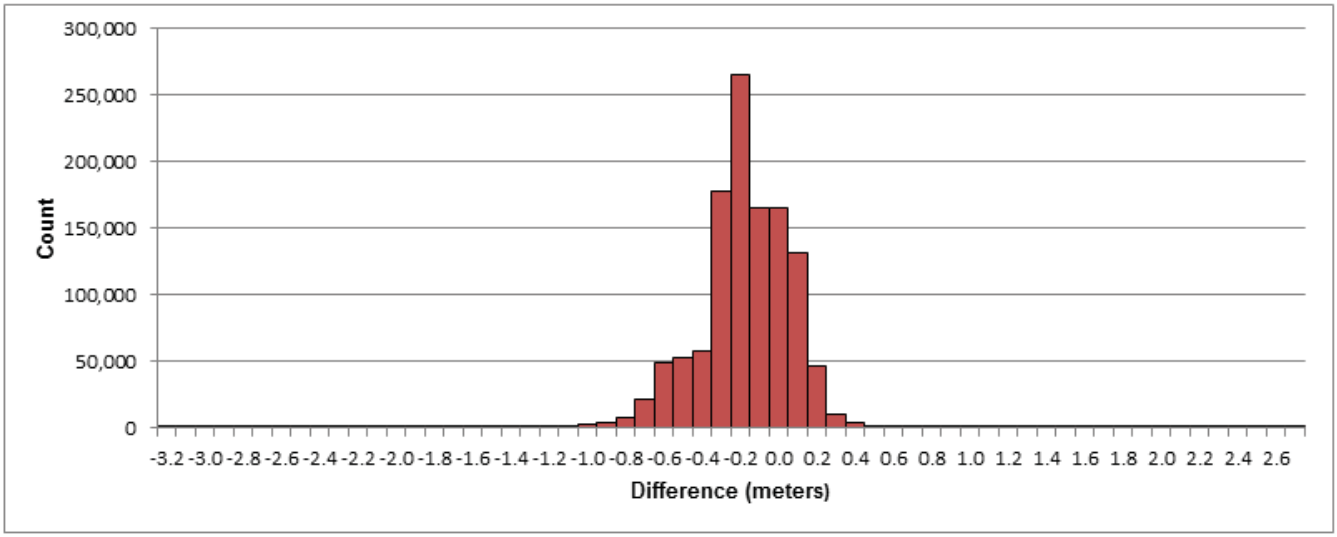
Registry Number	Scale	Year	Field Unit	Relative Location
H11612	1:20000	2007	Leidos	S
H11616	1:40000	2007	C & C Technologies, Inc.	E

Table 8: Junctioning Surveys

H11612

Survey H12709 junctions with prior survey H11612 from the CSX railroad bridge to the eastern boundary of H12709 in Lake Borgne. H12709 MBES data overlaps with both single beam and interferometric sonar

data collected with concurrent side scan acquisition during the H11612 survey. The minimum and maximum deviations occur within a large sediment wave field near the CSX railroad bridge and are likely associated with sediment migration. On average the H12709 data is approximately 19 centimeters shoaler than the prior survey from 2007. Results from this analysis are shown in Figure 5.

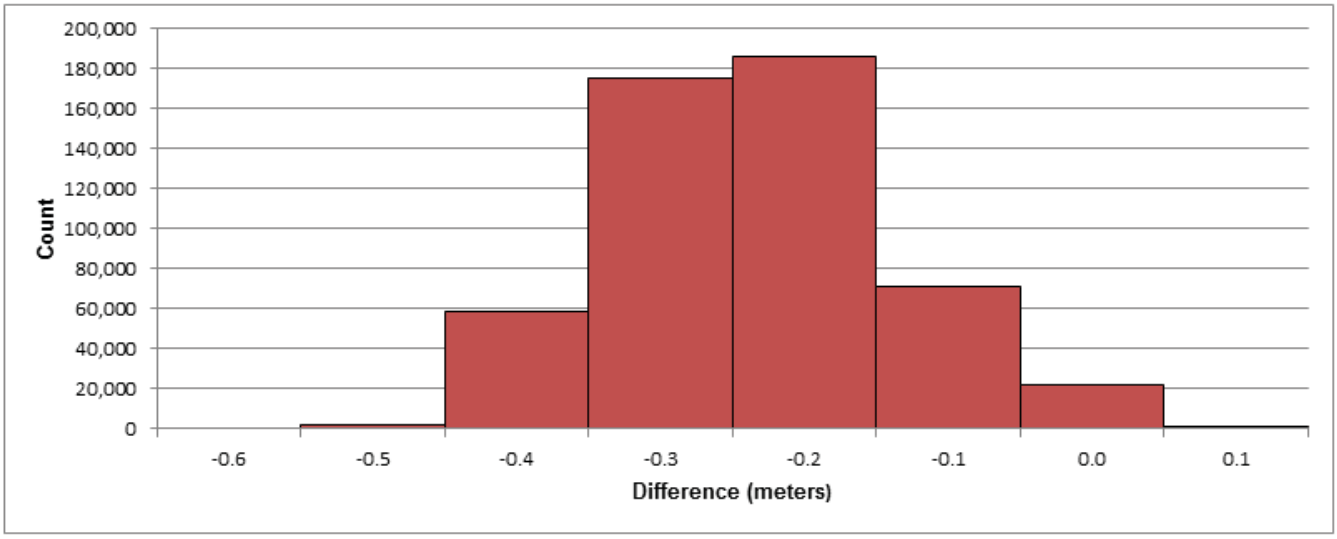


Mean:	-0.19 m	Standard Deviation:	0.272 m
Minimum:	-3.265 m	Bin size:	0.1 m
Maximum:	3.419 m	Number of Nodes:	1,181,021

Figure 5: Junction results between H12709 50-centimeter and H11612 1-meter bathy grids

H11616

Survey H12709 junctions with prior survey H11616 along the eastern extent of the H12709 survey area in Lake Borgne. H12709 MBES data overlaps with single beam sonar data collected with concurrent side scan acquisition during the H11616 survey. On average the H12709 data is approximately 23 centimeters shoaler than the prior survey from 2007. Results from this analysis are shown in Figure 6.



Mean:	-0.23 m	Standard Deviation:	0.096 m
Minimum:	-0.523 m	Bin size:	0.1 m
Maximum:	0.124 m	Number of Nodes:	515,928

Figure 6: Junction results between H12709 50-centimeter and H11616 5-meter bathy grids

B.2.4 Sonar QC Checks

Quality control is discussed in detail in Section B of the DAPR. Results from weekly position checks and weekly multibeam bar checks are included in Separate I Acquisition and Processing Logs of this report. The weekly sound speed checks can be found in Separate II Sound Speed Data Summary 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.

B.2.5 Equipment Effectiveness

Surface Sound Speed Data

Surface sound speed (SSP) logged to the Hypack HSX file flat lined at 1,499.99 meters per second during acquisition of survey line 2014WE2921305 which was collected on October 19, 2014 (DN 292). The SSP remained flat lined at 1,499.99 meters per second for all subsequent lines acquired during this day. SSP preceding the flat line showed little variation in SSP with an average value of 1,500 meters per second. The multibeam data for all impacted lines were thoroughly reviewed and no artifacts or offsets were observed in the data.

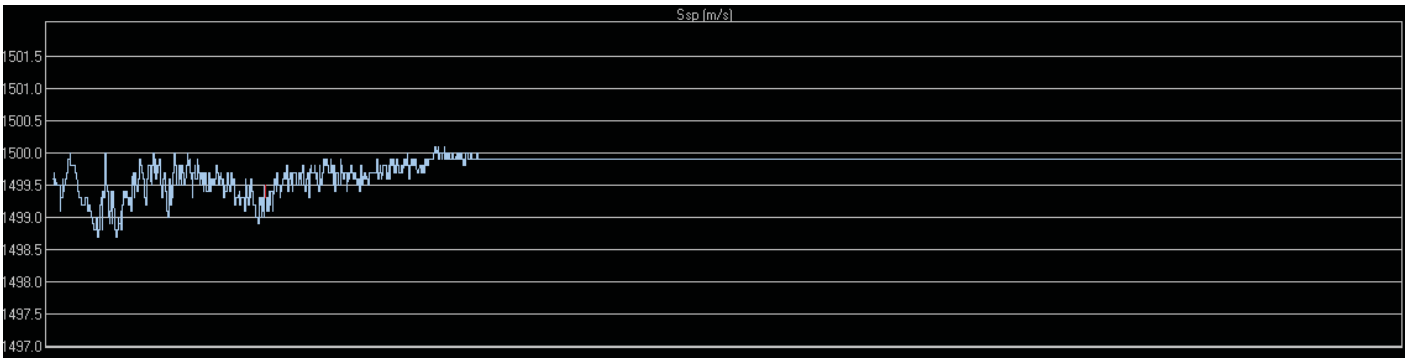


Figure 7: HIPS Attitude Editor View of 2014WE2921305 SSP

B.2.6 Factors Affecting Soundings

There were no other factors that affected corrections to soundings.

B.2.7 Sound Speed Methods

Sound Speed Cast Frequency: Approximately 15-minute intervals.

A Rolls Royce Moving Vessel Profiler (MVP) was the primary instrument used to acquire sound speed readings during multibeam operations. MVP sound speed readings were measured at approximately 15-minute intervals during survey operations. Additional discussion of sound speed methods can be found in the DAPR.

B.2.8 Coverage Equipment and Methods

Survey speeds were maintained to meet or exceed along-track density requirements. Investigation lines were acquired as needed in order to verify or acquire feature least depths. Fill lines were also run on an as needed basis in order to fill holidays or to increase node density.

B.2.9 Density

The sounding density requirement of 95% of all nodes, populated with at five 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 99.9% of all final CUBE surface nodes contained five or more soundings.

B.3 Echo Sounding Corrections

B.3.1 Corrections to Echo Soundings

Data reduction procedures for survey H12709 are detailed in the DAPR. A summary of the multibeam processing logs is 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 DAPR.

B.4 Backscatter

Multibeam backscatter was logged in Hypack 7K format and included with the H12709 digital deliverables. Data were processed periodically in CARIS HIPS to evaluate backscatter quality but the processed data is not included with the deliverables.

B.5 Data Processing

B.5.1 Software Updates

There were no software configuration changes after the DAPR was submitted.

The following Feature Object Catalog was used: 5.3.2

B.5.2 Surfaces

The following surfaces and/or BAGs were submitted to the Processing Branch:

Surface Name	Surface Type	Resolution	Depth Range	Surface Parameter	Purpose
H12709_MB_50cm_MLLW	CUBE	0.5 meters	1.52 meters - 33.98 meters	NOAA_0.5m	Object Detection Coverage
H12709_MB_50cm_MLLW_Final	CUBE	0.5 meters	1.52 meters - 33.98 meters	NOAA_0.5m	Finalized Object

Surface Name	Surface Type	Resolution	Depth Range	Surface Parameter	Purpose
					Detection Coverage

Table 9: Submitted Surfaces

Bathymetric grids were created relative to Mean Lower Low Water (MLLW) in CUBE format using Object Detection resolution requirements as described in the HSSD.

C. Vertical and Horizontal Control

A complete description of the horizontal and vertical control for survey H12709 can be found in the OPR-J311-KR-14 Horizontal and Vertical Control Report (HVCR), submitted under a separate cover. A summary of horizontal and vertical control for this survey follows.

C.1 Vertical Control

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

C.2 Horizontal Control

The horizontal datum for this project is North American Datum of 1983 (NAD83).

The projection used for this project is NAD83 UTM Zone 16 North.

Data were acquired using the Louisiana State University C4GNet Real Time Network (RTN). RTN corrections were transmitted to the survey vessel via cellular network using the Network Transport of RTCM data over IP (NTRIP) protocol. The RTN corrected positions were compared to Differential Global Positioning System (DGPS) corrected positions from a secondary receiver during acquisition. DGPS corrections were obtained from United States Coast Guard (USCG) beacons at English Turn, Louisiana (293 kHz) or Eglin (AFB), Florida (295 kHz). Additional discussion on the use of the RTN is included in the DAPR.

D. Results and Recommendations

D.1 Chart Comparison

Sparsely charted soundings and incomplete or broken contours within The Rigolets prevented the creation of a digital surface of the electronic navigational charts (ENCs) needed to produce a difference surface between the charts and survey. The ENC chart comparison, which was still performed using GIS methods, involved computing zonal statistics between soundings charted on each ENC and all finalized grid nodes within a predefined radius around the charted soundings. The 1:40,000 scale comparison used at 60-meter radius and the 1:80,000 scale comparison used at 120-meter radius. The chart comparison also included a review of all assigned charted features within the survey area.

The raster navigational chart (RNC) comparison was performed by manually comparing the RNCs covering the survey area to the corresponding ENCs and identifying discrepancies between the two chart formats.

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

D.1.1 Raster Charts

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

Chart	Scale	Edition	Edition Date	LNM Date	NM Date
11367	1:40000	37	06/2014	04/25/2015	04/14/2015
11371	1:80000	40	03/2012	04/25/2015	04/14/2015
11369	1:80000	48	06/2012	04/25/2015	04/14/2015

Table 10: Largest Scale Raster Charts

11367

Small Craft Route Chart 11367 was compared to US5LA36M within the H12709 survey area. There are numerous discrepancies in sounding placement and value in the vicinity of the ICW in Lake Borgne with the most significant differences occurring between the eastern edge of the survey area and the marked ICW channel. There are also noticeable differences in the depiction of the ICW on the RNC and ENC. In some areas of Lake Borgne the ICW charted on US5LA36M is more than 60 meters north of the ICW charted on 11367. Adjacent to the survey area there are differences between the depictions of the mean high water shoreline (COALNE) and the zero contour lines (DEPCNT). It appears that feature updates included on the 37th Edition of Chart 11367 were not applied to US5LA36M.

11371

Coastal Chart 11371 was compared to US4MS10M within the H12709 survey area. Similar to the large scale chart comparison, there are numerous discrepancies in sounding placement and value in the vicinity of the ICW in Lake Borgne. In addition, a 33-foot sounding, a 19-foot obstruction (H12709 Danger to Navigation 3), and a 9-foot obstruction (H12709 Danger to Navigation 4) charted on US4MS10M adjacent to the U.S Highway 90 bridge are not depicted on 11371. It appears that these items were excluded from the RNC due to the inability to depict at the scale of the raster chart. No other differences between the RNC and ENC were observed within the survey extents. As with the 11367 comparison, there are noticeable differences between the depictions of the mean high water shoreline (COALNE) and the zero contour lines (DEPCNT) inshore of the survey limit. It appears that feature updates included on the 40th Edition of Chart 11371 were not applied to US4MS10M.

11369

Coastal Chart 11371 was compared to US4MS10M within the H12709 survey area. There are several minor inconsistencies in the placement of soundings charted between Lake Pontchartrain and the U.S. Highway 90 bridge. It appears that shoreline updates included on the 48th Edition of Chart 11369 were not applied to US4MS10M.

D.1.2 Electronic Navigational Charts

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

ENC	Scale	Edition	Update Application Date	Issue Date	Preliminary?
US5LA36M	1:40000	25	03/19/2015	03/19/2015	NO
US4MS10M	1:80000	15	03/19/2015	03/19/2015	NO

Table 11: Largest Scale ENCs

US5LA36M

In general, depths are between 5 feet shoaler to 5 feet deeper than charted though significant differences are present between the charts and the survey data.The source survey for the charts, which dates back to 1870, does not provide the sounding density to accurately depict the bathymetry of The Rigolets. In many cases there are surveyed soundings within 60 meters of a charted sounding that agree with the chart but the chart may not represent the shoalest surveyed sounding within the radius. There are also areas where RNC

11367_1 is missing contours necessary to identify the edge of the natural channel. When these contours are depicted they are often broken or sporadically placed.

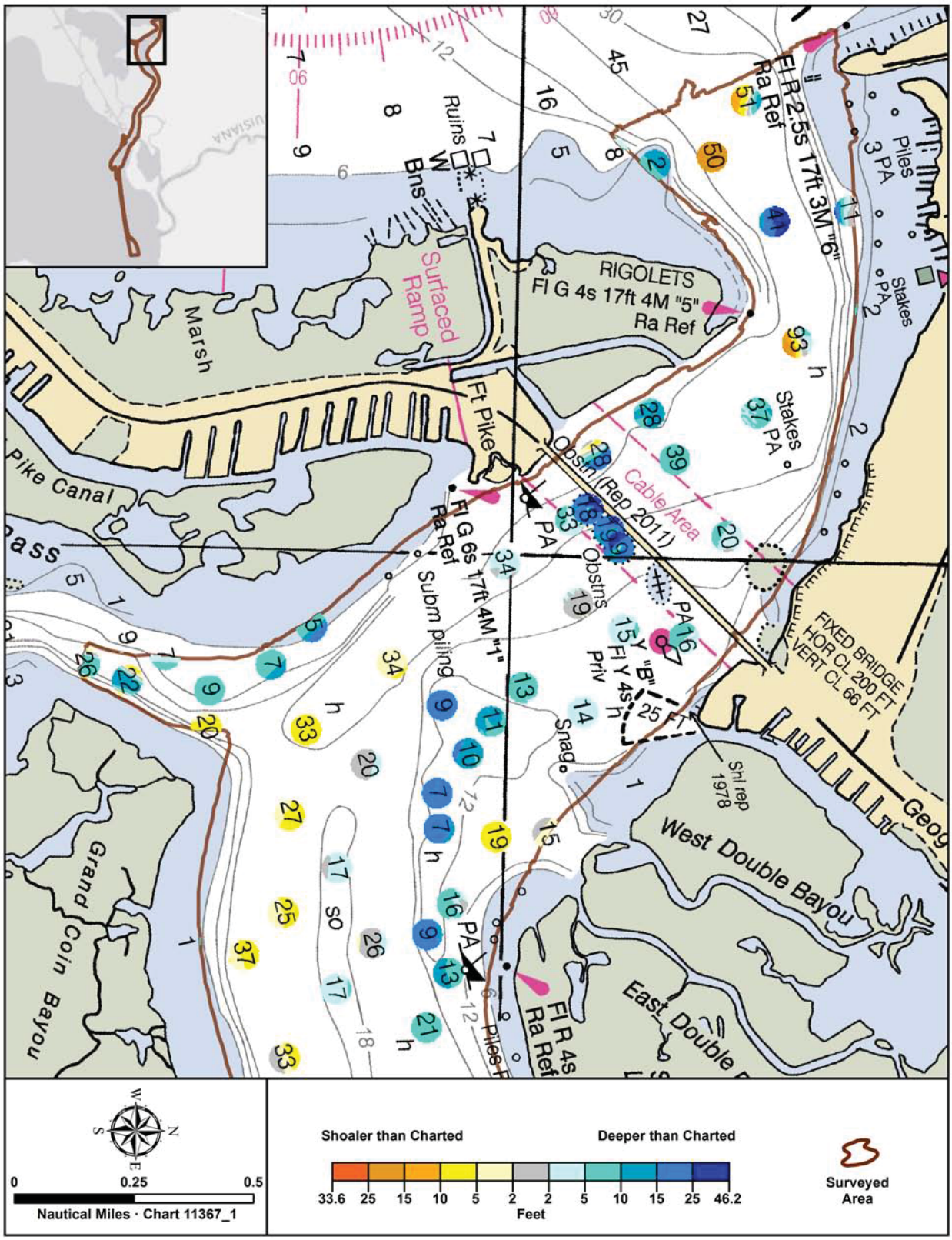


Figure 8: US5LA36M Charted Sounding Comparison (1 of 6)

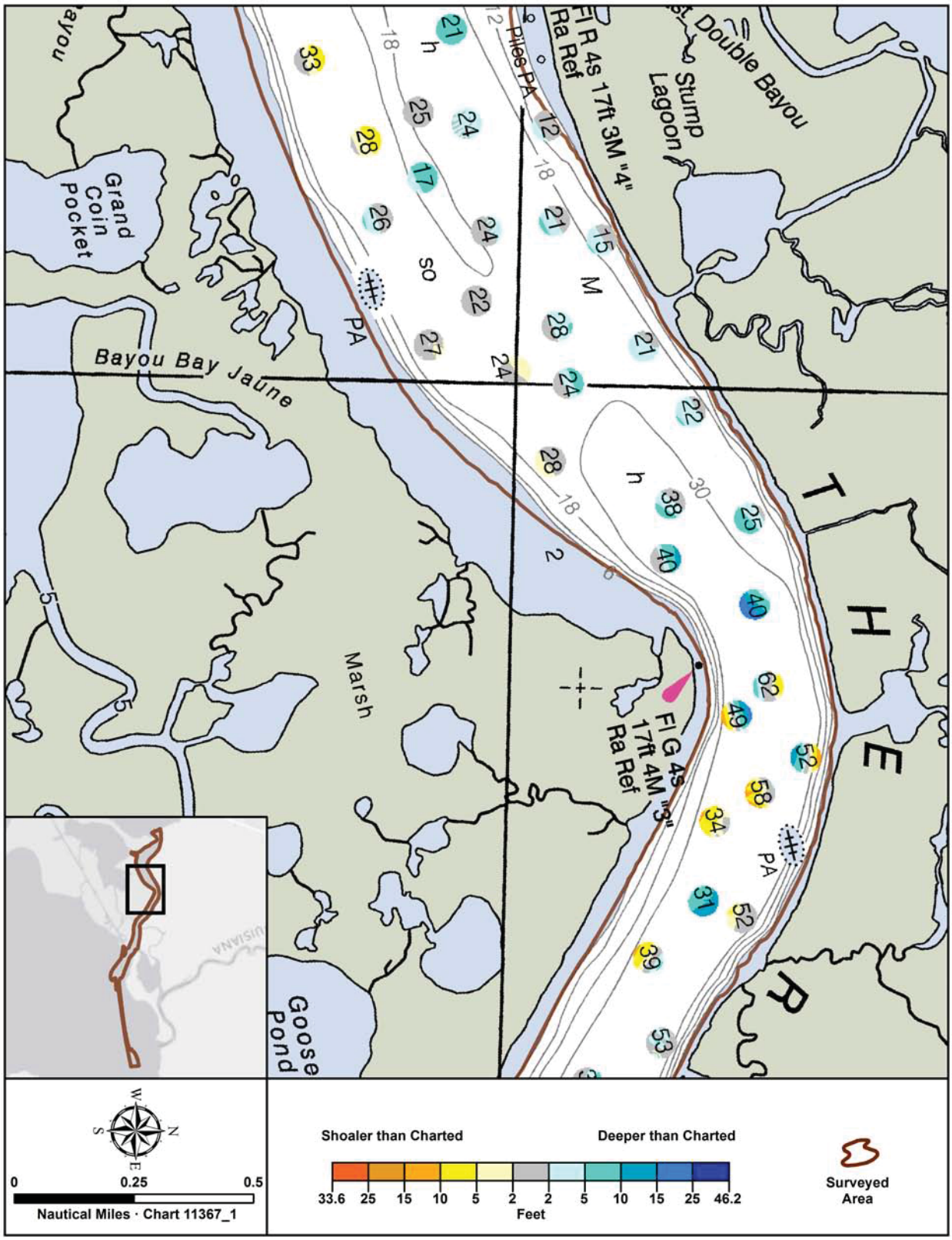


Figure 9: US5LA36M Charted Sounding Comparison (2 of 6)

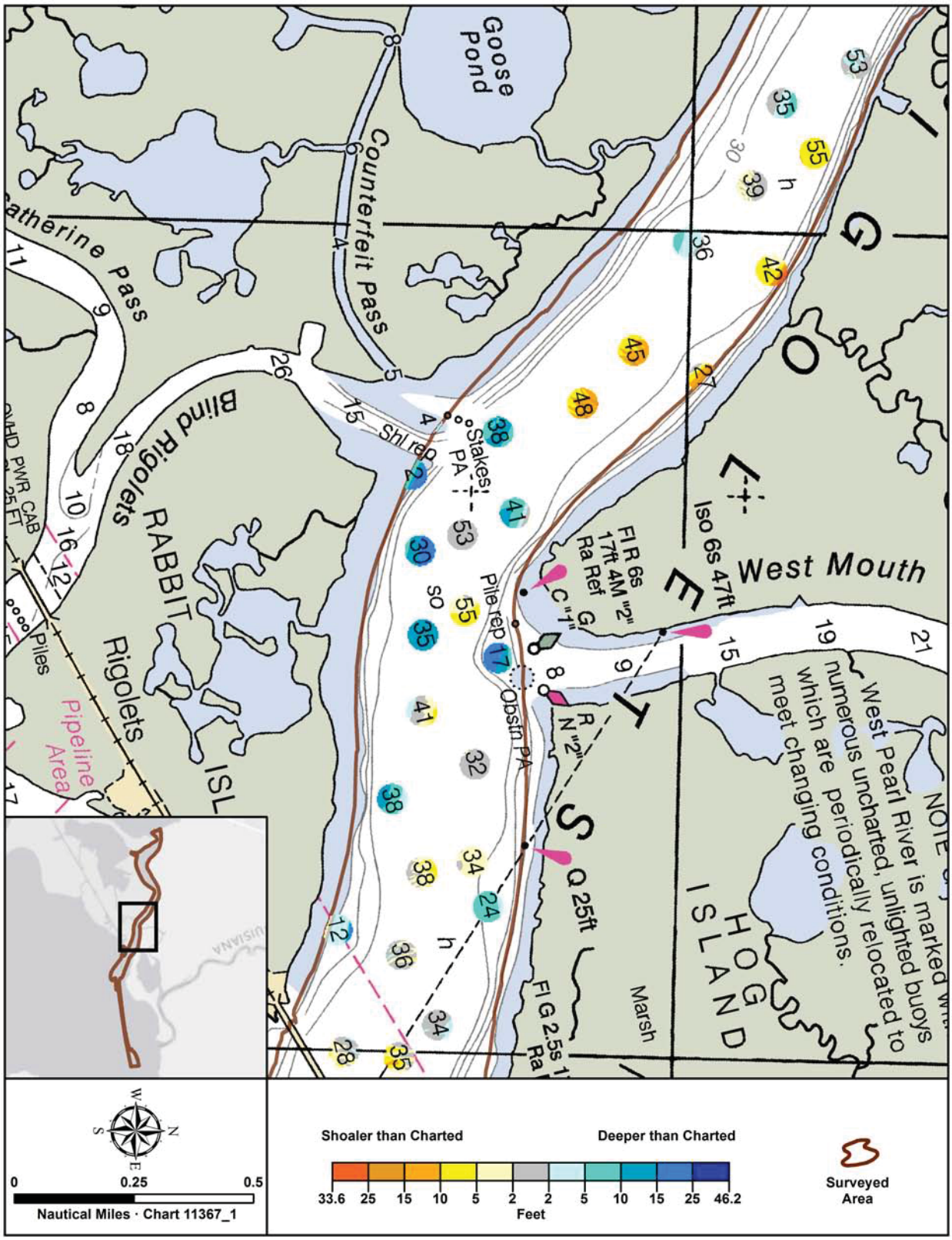


Figure 10: US5LA36M Charted Sounding Comparison (3 of 6)

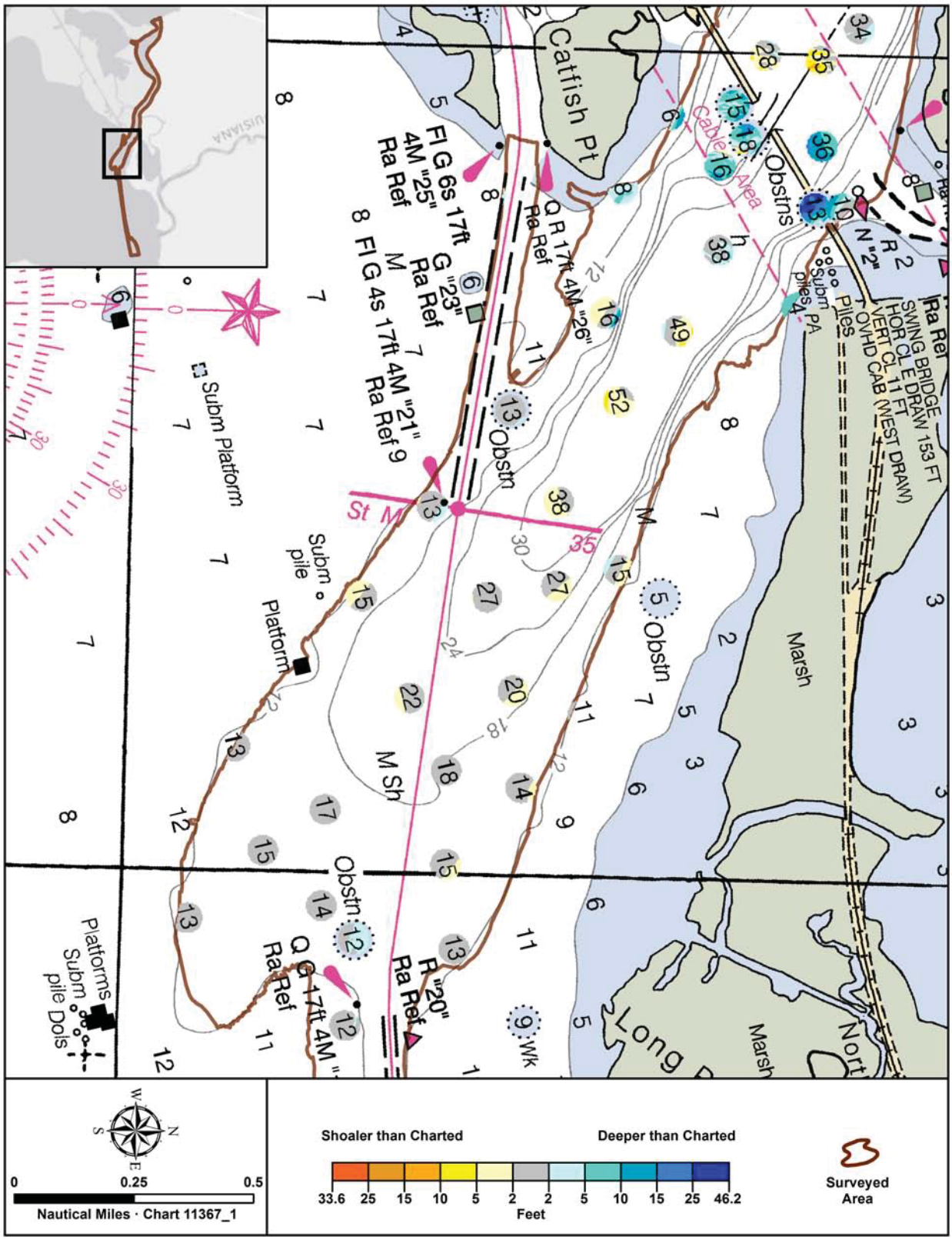


Figure 11: US5LA36M Charted Sounding Comparison (4 of 6)

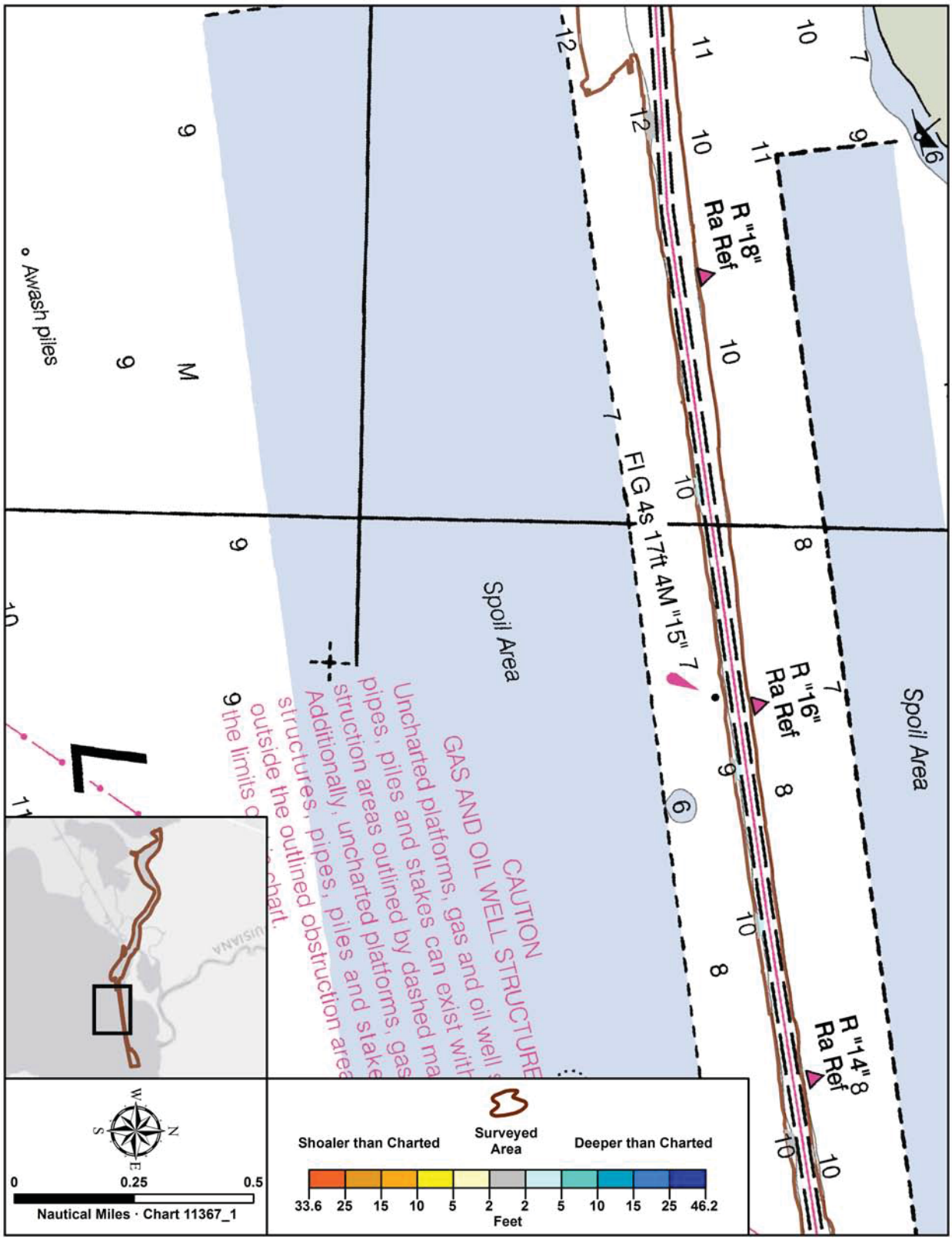


Figure 12: US5LA36M Charted Sounding Comparison (5 of 6)

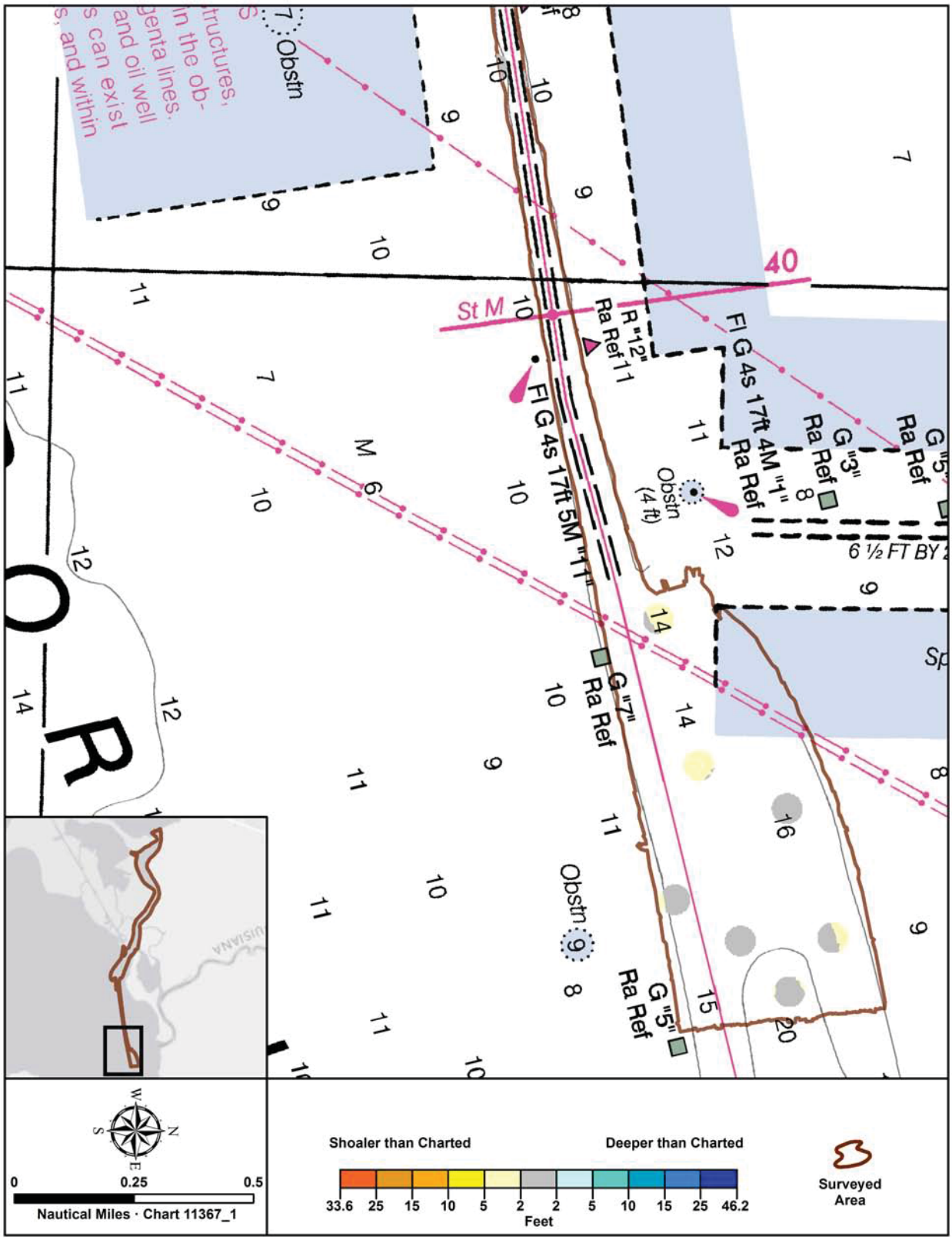


Figure 13: US5LA36M Charted Sounding Comparison (6 of 6)

US4MS10M

Chart comparison with US4MS10M shows similar results to the comparison with US5LA36M.

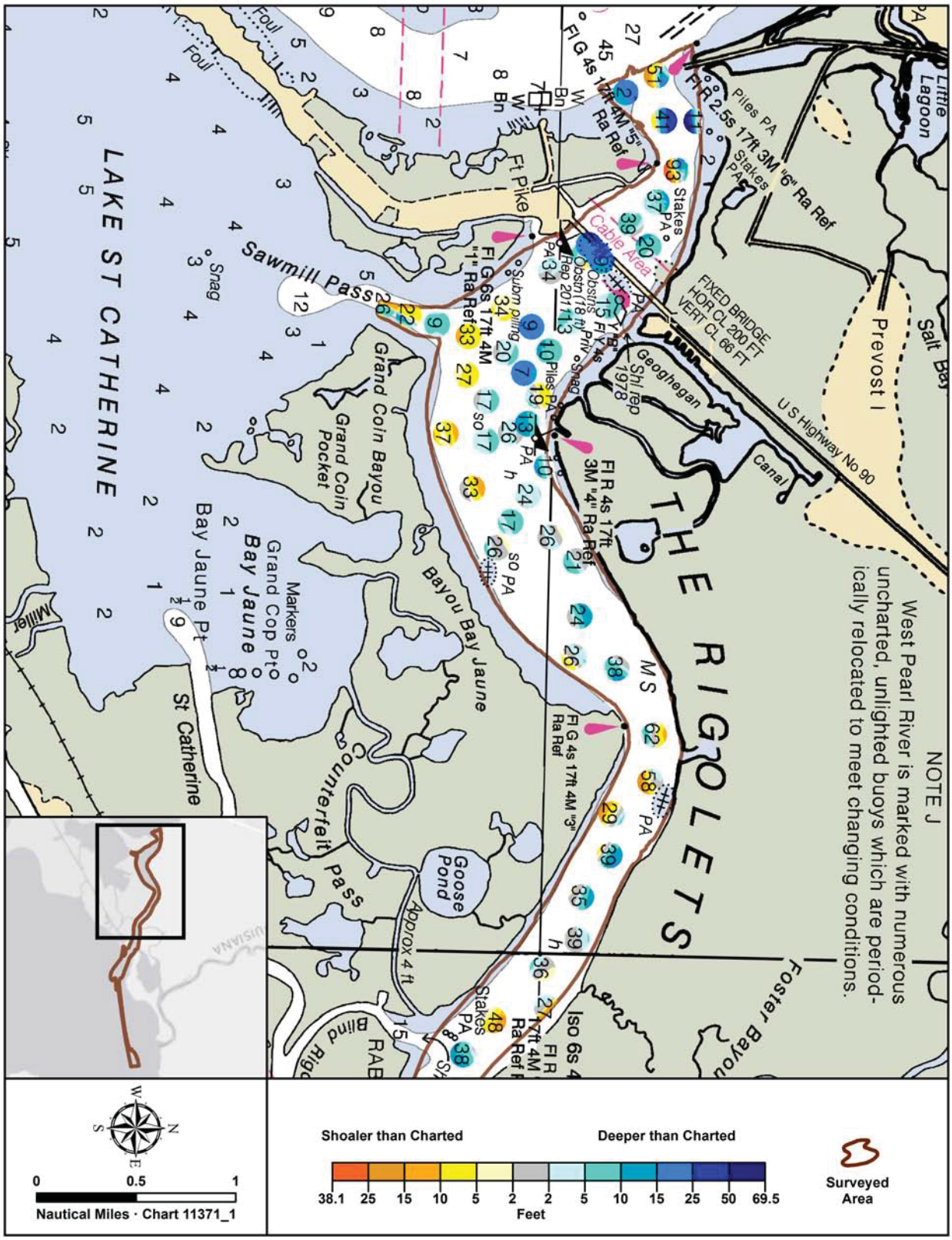


Figure 14: US4MS10M Charted Sounding Comparison (1 of 3)

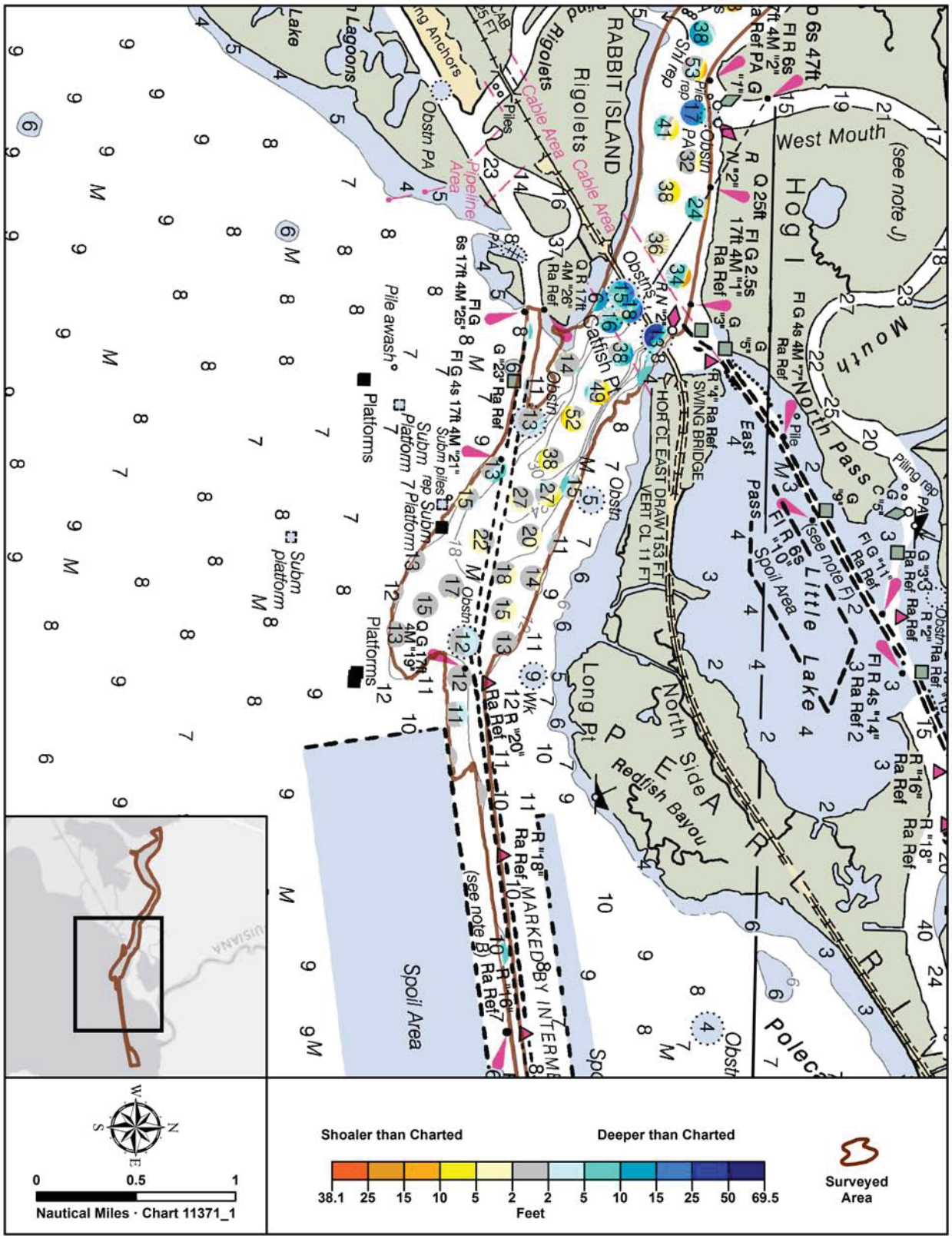


Figure 15: US4MS10M Charted Sounding Comparison (2 of 3)

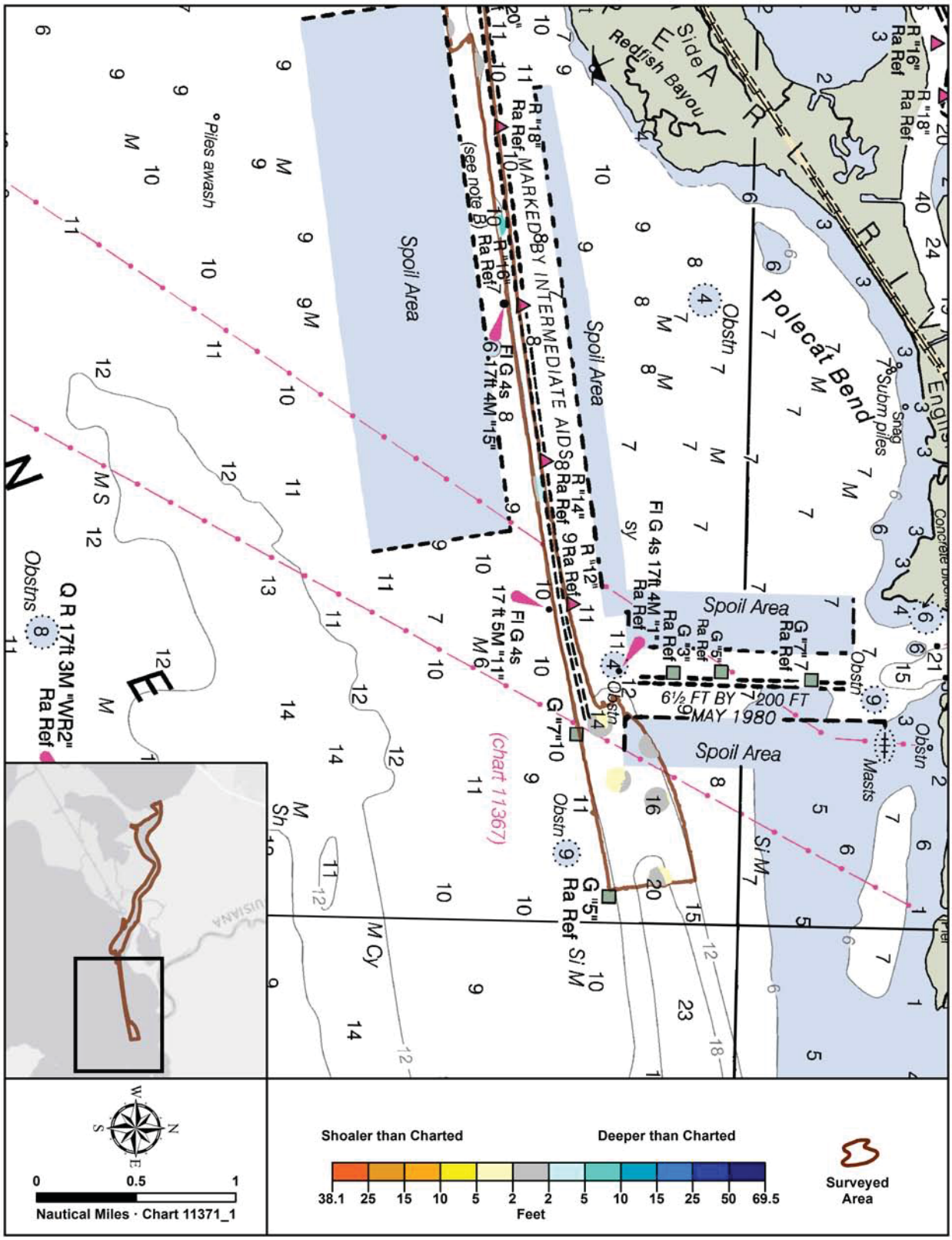


Figure 16: US4MS10M Charted Sounding Comparison (3 of 3)

D.1.3 AWOIS Items

No AWOIS Items were assigned for this survey.

D.1.4 Maritime Boundary Points

No Maritime Boundary Points were assigned for this survey.

D.1.5 Charted Features

The Stakes PA (Position Approximate) charted west of the U.S Highway 90 bridge have been disproved by the survey. The charted stake (pile) has been included in the Final Feature File (FFF) with a description of 'Delete'.

The 18-foot Obstruction reported 2011 at the U.S Highway 90 bridge was surveyed within 1 meter of its charted location with a new least depth of 19-feet. The charted has been included in the FFF with a description of 'Delete'. A wreck depicting the feature as surveyed is included in the FFF with a description of 'New'.

The Wreck PA depth unknown charted west of the U.S Highway 90 bridge has been disproved by the survey. The feature has been included in the FFF with a description of 'Delete'.

The Wreck showing hull or superstructure PA charted east of the U.S Highway 90 bridge has been disproved by the survey. The feature has been included in the FFF with a description of 'Delete'.

The Wreck PA showing hull or superstructure PA charted south of the The Rigolets Light 4 has been disproved by the survey. The feature has been included in the FFF with a description of 'Delete'.

The Wreck PA depth unknown charted in the vicinity of Bayou Bay Jaune has been disproved by the survey. The feature has been included in the FFF with a description of 'Delete'.

The Wreck PA depth unknown charted northeast of the The Rigolets Light 3 has been disproved by the survey. The feature has been included in the FFF with a description of 'Delete'.

The three stakes PA charted at the entrance to Blind Rigolets has been disproved by the survey. The features have been included in the FFF with a description of 'Delete'.

The Pile reported at the entrance to West Mouth has been disproved by the survey. The feature has been included in the FFF with a description of 'Delete'.

The Obstruction PA depth unknown at the entrance to West Mouth has been disproved by the survey. The feature has been included in the FFF with a description of 'Delete'.

D.1.6 Uncharted Features

All uncharted features are portrayed in the FFF as surveyed and attributed with the description of 'New'.

D.1.7 Dangers to Navigation

Four Dangers to Navigation (DtoNs) were reported for this survey using preliminary survey data, including preliminary water levels using Ellipsoidally-Referenced Survey (ERS) methods. GPS water levels were computed using RTK GPS height corrections from the Louisiana State University C4G Real-Time Network and a VDatum based separation model.

H12709 DtoN 1 reported three uncharted special purpose buoys west of the U.S. Highway 90 bridge. These are telemetry buoys used for the Spotted Seatrout Telemetry Project managed by Louisiana State University (LSU) and the Louisiana Department of Wildlife and Fisheries (LDWF). The buoys were not charted after DtoN submission.

H12709 DtoN 2 reported an uncharted obstruction located within The Rigoletes. During review at the Atlantic Hydrographic Branch (AHB) it was determined that this feature did not warrant submission to the Nautical Data Branch for charting. This feature was not charted.

H12709 DtoN 3 reported an uncharted obstruction located adjacent to U.S. Highway 90 bridge. This DtoN is currently charted based on preliminary data. Dton 3 is not charted RNC 11371.

H12709 DtoN 4 reported an uncharted obstruction located adjacent to U.S. Highway 90 bridge. The obstruction appears to be remnants of the old U.S. Highway 90 bridge swing span support. This DtoN is currently charted based on preliminary data. Piles which were charted in this location were disproved by the survey and removed from the chart when the obstruction was charted. Dton 4 is not charted on RNC 11371.

D.1.8 Shoal and Hazardous Features

All uncharted hazardous features were submitted as DtoNs and discussed in Section D.1.7. The source survey for the charts, which dates back to 1870, does not provide the sounding density to accurately depict the bathymetry of The Rigolets. Many areas of the largest scale chart (11367_1) are missing contours which would identify the edge of the natural channel. When these contours are depicted they are often broken or sporadically placed.

D.1.9 Channels

The survey area includes several sections of charted channels. These include the Intracoastal Waterway from Mile 34.1 to Mile 41.8, the entrance to the improved channel at East Pass Channel, and the entrance to Geoghegan Canal. The ICW and entrance channel at East Pass have charted project depths of 12 feet and the entrance to Geoghegan Canal has a charted project depth of 25 feet. All three channels contain surveyed soundings shoaler than the charted project depth. Figures 17 through 20 depict surveyed soundings and the

project depth for each channel. Inconsistences in the location of the ICW on the RNC and ENC versions of the chart are also apparent in these figures.

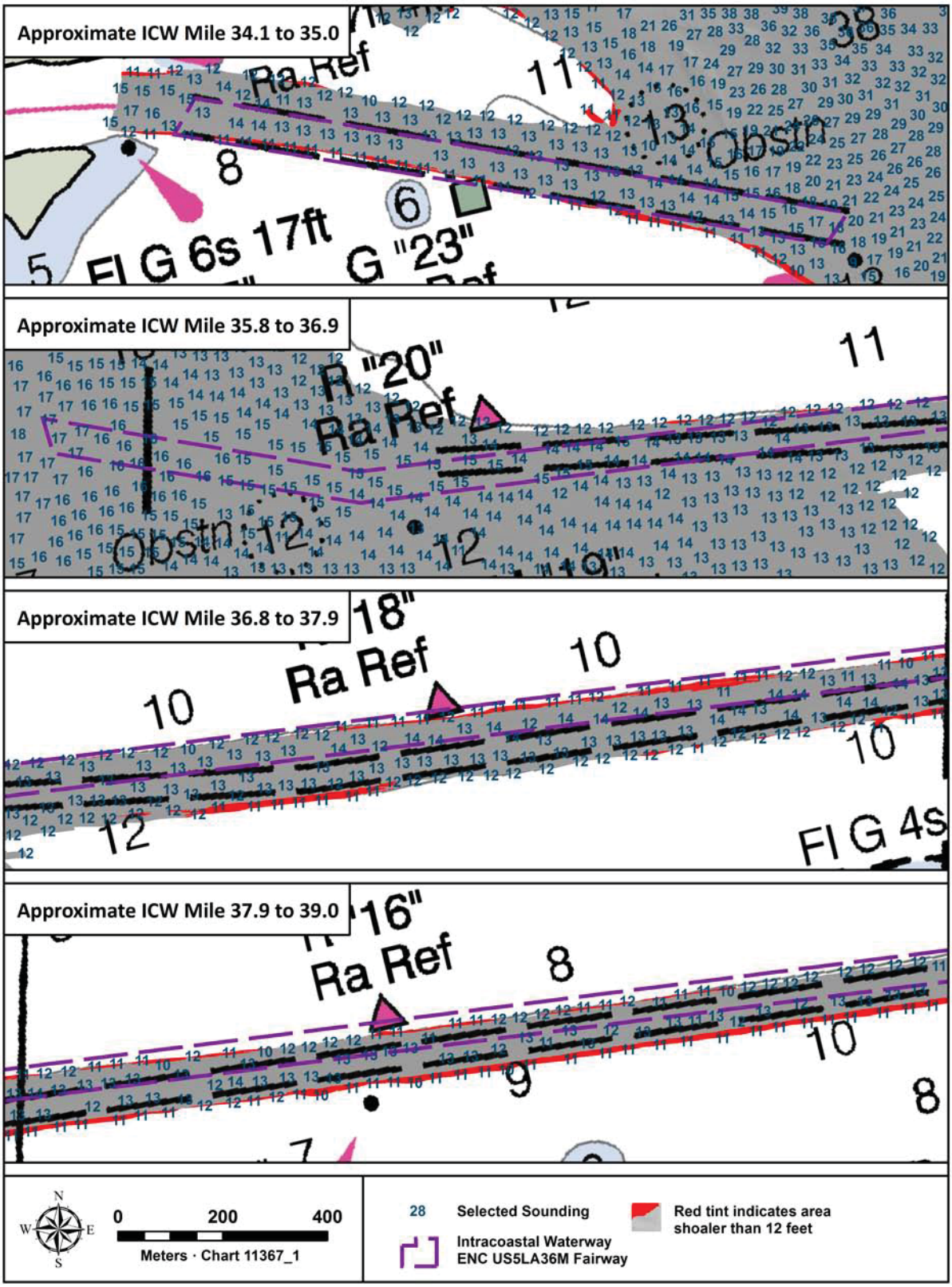


Figure 17: Surveyed Soundings in Intracoastal Waterway (1 of 2)

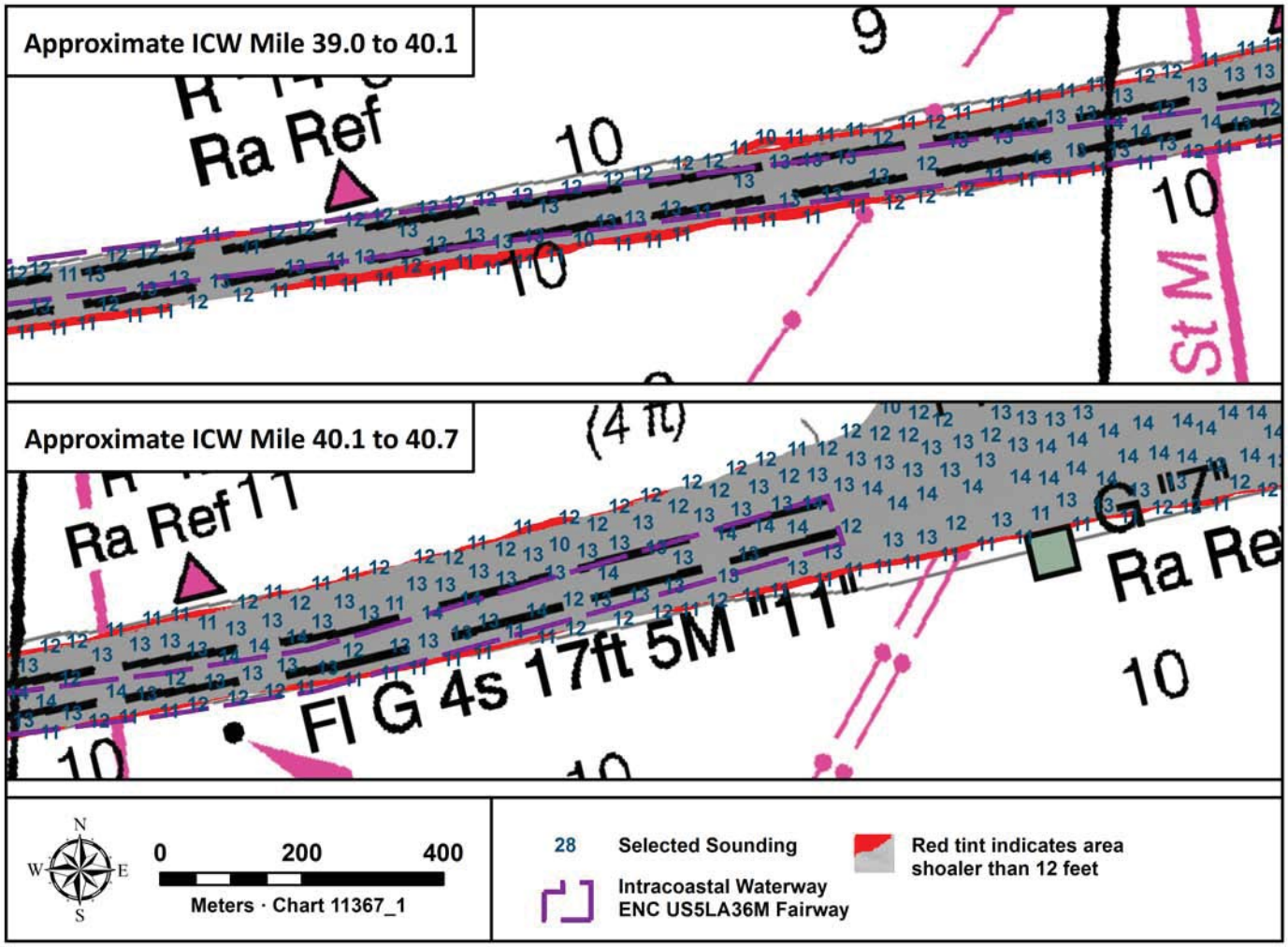


Figure 18: Surveyed Soundings in Intracoastal Waterway (2 of 2)

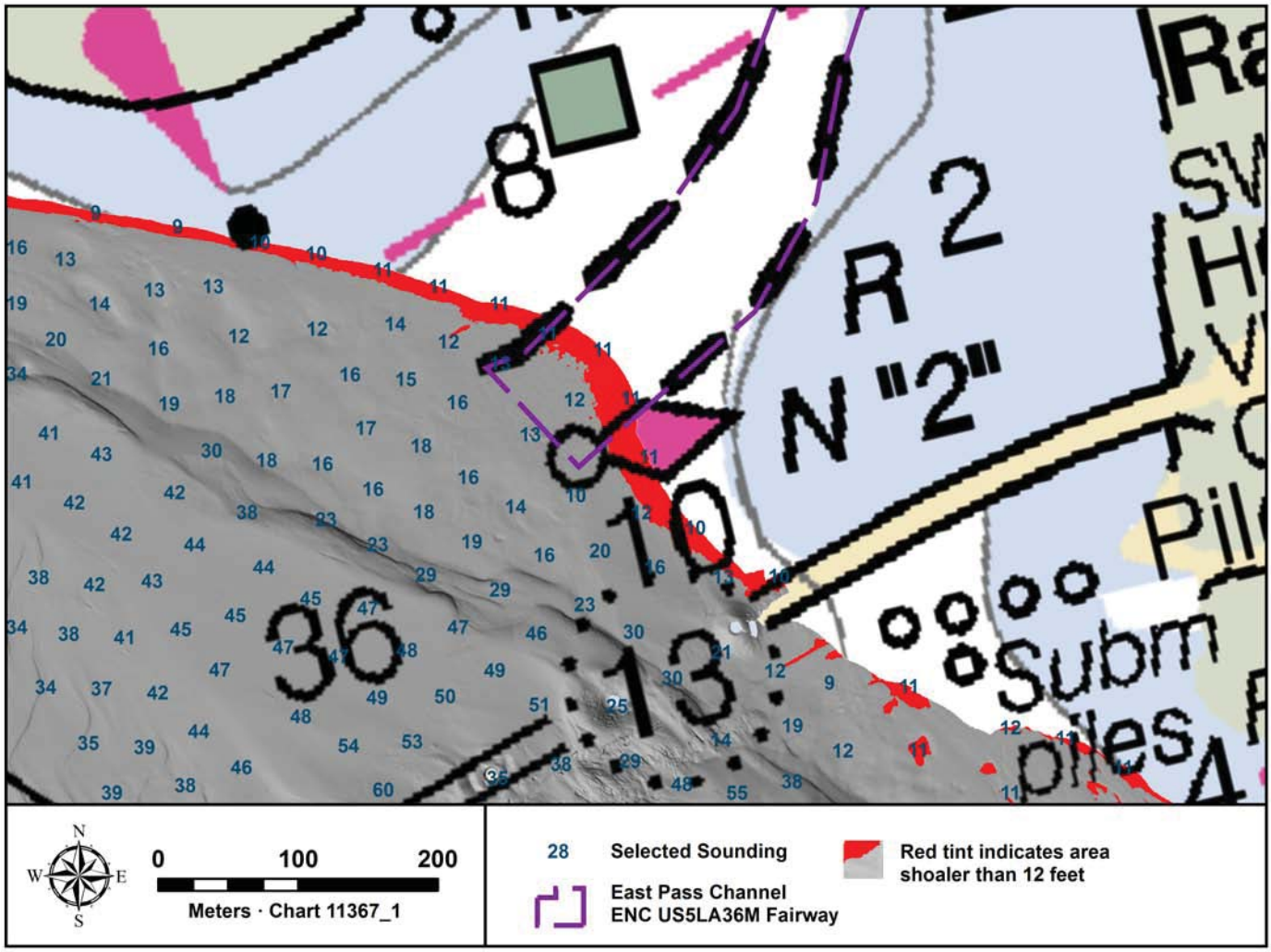


Figure 19: Surveyed Soundings in the entrance to East Pass Channel

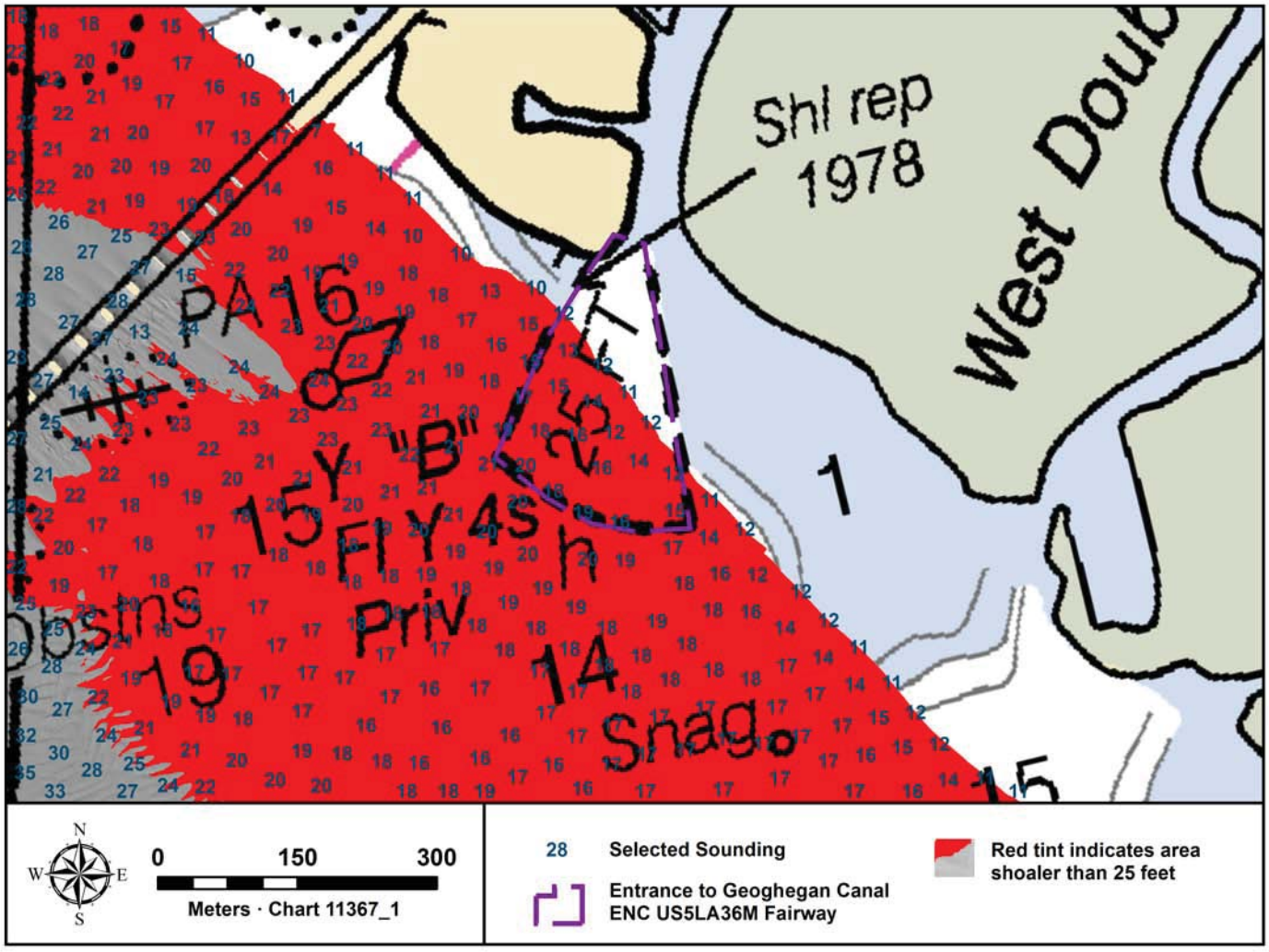


Figure 20: Surveyed Soundings in the entrance to Geoghegan Canal

D.1.10 Bottom Samples

Ten bottom samples were acquired on Novermber 3, 2014 (DN 307) and Novermber 5, 2014 (DN 309). The sampling plan followed suggested sample locations included in the PRF provided by the Hydrographic Surveys Division.

D.2 Additional Results

D.2.1 Shoreline

The OPR-J311-KR-14 Project Instructions required a limited shoreline verification using the composite source file (CSF). No assigned shoreline features were located within the H12709 survey extents.

D.2.2 Prior Surveys

No comparisons with prior surveys were conducted.

D.2.3 Aids to Navigation

One charted special purpose buoy (Louisiana State University Oceanographic Lighted Buoy B) has been included in the FFF with the description of 'Delete'. All charted public aids to navigation were found to be serving their intended purpose.

D.2.4 Overhead Features

Two bridges cross The Rigoletes within the survey area. The U.S. Highway 90 bridge is charted as a fixed bridge with horizontal clearance of 200 feet and vertical clearance of 66 feet. The CSX railroad bridge is charted as a swing bridge with horizontal clearance of 153 feet and vertical clearance of 11 feet. An overhead cable is charted over the west draw of the CSX railroad bridge. Cables were observed attached to the side of the bridge at an elevation higher than the underside of the bridge spans. The USCG District Eight Bridge Transportation Assistant provided information via email indicating that the U.S. Highway 90 bridge has a 200 foot horizontal clearance and 66.6 foot vertical clearance and the CSX railroad bridge has a 153 foot horizontal clearance and 11 foot vertical clearance. A copy of this email is included in Appendix II of this report.

The location and outline of the baring piers, support pylons, and fender systems of the U.S. Highway 90 bridge and the CSX railroad bridge are not accurately depicted on the charts. Multibeam data located on the baring bridge pylons and on or within the baring fender systems were rejected to the natural bottom. Shoreline construction features (SLCONS) which delineate these areas were added to the FFF. Multibeam soundings on submerged fender ruins were not rejected and are represented in the FFF and final grid. The Atlantic Hydrographic Branch (AHB) Hydro Team Lead provided guidance on how to properly handle this data.

D.2.5 Submarine Features

Charted cable areas encompass the U.S. Highway 90 and CSX railroad bridges. No signs denoting cable or pipeline crossings were observed onshore from the survey vessel. A linear feature indicative of a cable or pipeline is visible in the multibeam data within the charted cable area to the south of the CSX railroad bridge. This feature is depicted in the FFF with a submerged cable line feature.

D.2.6 Ferry Routes and Terminals

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

D.2.7 Platforms

The platform charted south of the ICW in Lake Borgne has been disproved by the survey. The feature has been included in the FFF as depicted in the CSF with a description of 'Delete'. No other platforms were charted or located within the survey area.

D.2.8 Significant Features

Several stretches of dynamic sediment wave fields are present between Lake Pontchartrain and the U.S. Highway 90 bridge. Evidence of sediment wave migration occurring between daily tide cycles is visible in the multibeam data.

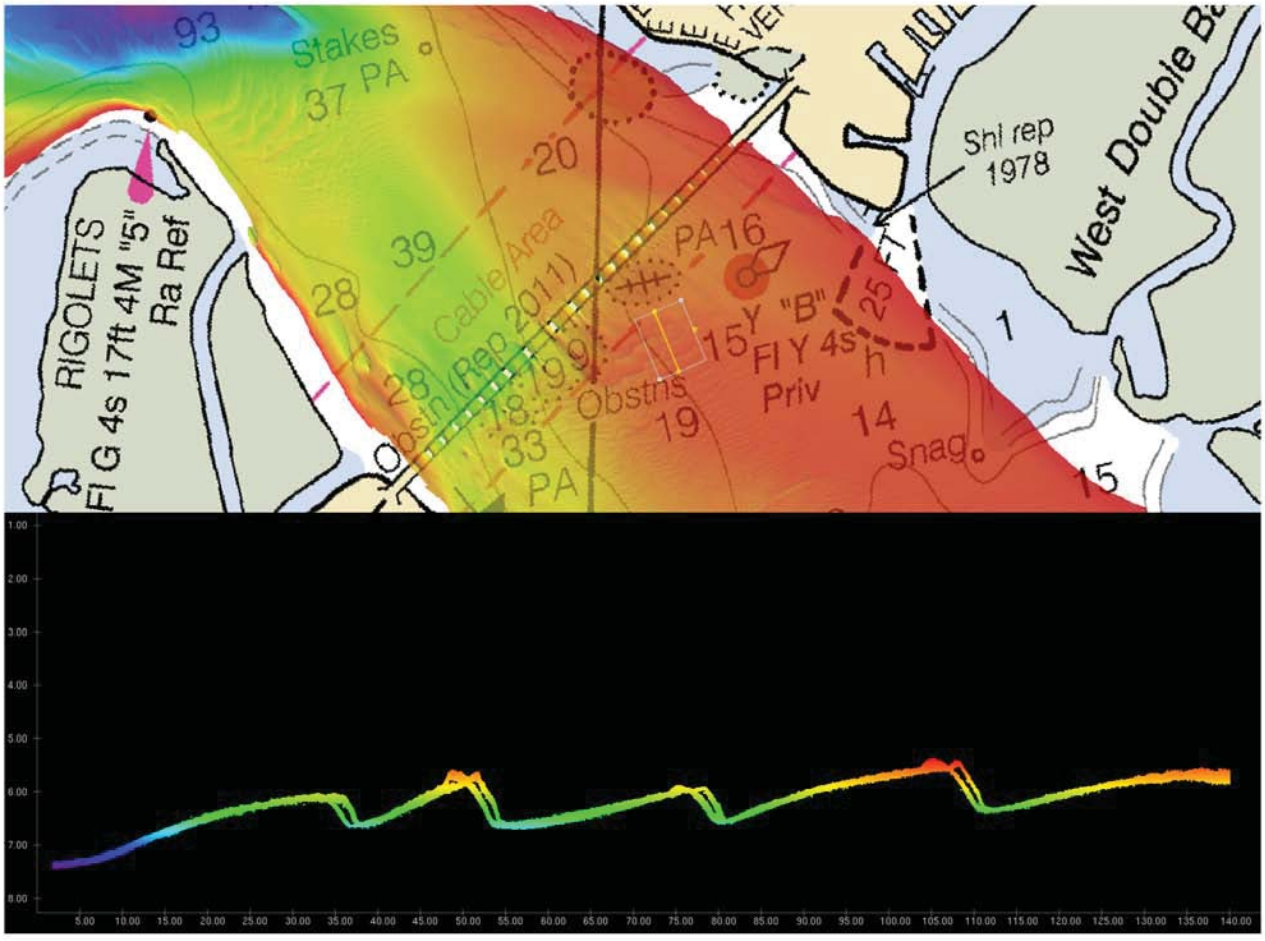


Figure 21: Example of sediment wave migration in The Rigolets

D.2.9 Construction and Dredging

No construction or dredging activities were observed during survey operations.

D.2.10 New Survey Recommendation

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

D.2.11 Inset Recommendation

No new insets are recommended for this area.

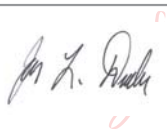
E. Approval Sheet

As Chief of Party, field operations for this hydrographic survey were conducted under my direct supervision, with frequent personal checks of progress and adequacy. I have reviewed the attached survey data and reports.

All field sheets, this Descriptive Report, and all accompanying records and data are approved. All records are forwarded for final review and processing to the Processing Branch.

The survey data meets or exceeds requirements as set forth in the NOS Hydrographic Surveys and Specifications Deliverables Manual, Statement of Work, and Hydrographic Survey Project Instructions. These data are adequate to supersede charted data in their common areas. This survey is complete and no additional work is required.

Report Name	Report Date Sent
Data Acquisition and Processing Report	2015-04-24

Approver Name	Approver Title	Approval Date	Signature
Jonathan L. Dasler, PE, PLS, CH	NSPS/THSOA Certified Hydrographer, Chief of Party	05/13/2015	 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: 2015.05.13 14:33:42 -07'00'
Jason Creech, CH	NSPS/THSOA Certified Hydrographer, Lead Hydrographer	05/13/2015	 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: 2015.05.13 14:34:07 -07'00'

F. Table of Acronyms

Acronym	Definition
AHB	Atlantic Hydrographic Branch
AST	Assistant Survey Technician
ATON	Aid to Navigation
AWOIS	Automated Wreck and Obstruction Information System
BAG	Bathymetric Attributed Grid
BASE	Bathymetry Associated with Statistical Error
CO	Commanding Officer
CO-OPS	Center for Operational Products and Services
CORS	Continually Operating Reference Staiton
CTD	Conductivity Temperature Depth
CEF	Chart Evaluation File
CSF	Composite Source File
CST	Chief Survey Technician
CUBE	Combined Uncertainty and Bathymetry Estimator
DAPR	Data Acquisition and Processing Report
DGPS	Differential Global Positioning System
DP	Detached Position
DR	Descriptive Report
DTON	Danger to Navigation
ENC	Electronic Navigational Chart
ERS	Ellipsoidal Referenced Survey
ERZT	Ellipsoidally Referenced Zoned Tides
FFF	Final Feature File
FOO	Field Operations Officer
FPM	Field Procedures Manual
GAMS	GPS Azimuth Measurement Subsystem
GC	Geographic Cell
GPS	Global Positioning System
HIPS	Hydrographic Information Processing System
HSD	Hydrographic Surveys Division
HSSD	Hydrographic Survey Specifications and Deliverables

Acronym	Definition
HSTP	Hydrographic Systems Technology Programs
HSX	Hypack Hysweep File Format
HTD	Hydrographic Surveys Technical Directive
HVCR	Horizontal and Vertical Control Report
HVF	HIPS Vessel File
IHO	International Hydrographic Organization
IMU	Inertial Motion Unit
ITRF	International Terrestrial Reference Frame
LNM	Local Notice to Mariners
LNM	Linear Nautical Miles
MCD	Marine Chart Division
MHW	Mean High Water
MLLW	Mean Lower Low Water
NAD 83	North American Datum of 1983
NAIP	National Agriculture and Imagery Program
NALL	Navigable Area Limit Line
NM	Notice to Mariners
NMEA	National Marine Electronics Association
NOAA	National Oceanic and Atmospheric Administration
NOS	National Ocean Service
NRT	Navigation Response Team
NSD	Navigation Services Division
OCS	Office of Coast Survey
OMAO	Office of Marine and Aviation Operations (NOAA)
OPS	Operations Branch
MBES	Multibeam Echosounder
NWLON	National Water Level Observation Network
PDBS	Phase Differencing Bathymetric Sonar
PHB	Pacific Hydrographic Branch
POS/MV	Position and Orientation System for Marine Vessels
PPK	Post Processed Kinematic
PPP	Precise Point Positioning
PPS	Pulse per second

Acronym	Definition
PRF	Project Reference File
PS	Physical Scientist
PST	Physical Science Technician
RNC	Raster Navigational Chart
RTK	Real Time Kinematic
SBES	Singlebeam Echosounder
SBET	Smooth Best Estimate and Trajectory
SNM	Square Nautical Miles
SSS	Side Scan Sonar
ST	Survey Technician
SVP	Sound Velocity Profiler
TCARI	Tidal Constituent And Residual Interpolation
TPU	Total Porpagated Error
TPU	Topside Processing Unit
USACE	United States Army Corps of Engineers
USCG	United Stated Coast Guard
UTM	Universal Transverse Mercator
XO	Executive Officer
ZDA	Global Positiong System timing message
ZDF	Zone Definition File

APPENDIX I

TIDES AND WATER LEVELS

H12709
TIMES OF HYDROGRAPHY

Project: OPR-J311-KR-14
Contractor Name: David Evans and Associates, Inc.
Date: November 16, 2014
Inclusive Dates: October 12, 2014 - November 16, 2014
Field work is complete
Time (UTC)

Day Number	Date	Start Time	End Time
285	10/12/2014	20:49:10	21:46:01
286	10/13/2014	12:42:00	22:55:57
287	10/14/2014	15:37:32	23:37:34
288	10/15/2014	13:44:06	23:31:33
289	10/16/2014	16:41:30	23:41:39
290	10/17/2014	12:38:42	19:49:37
291	10/18/2014	12:42:33	17:10:03
292	10/19/2014	12:30:12	22:56:52
293	10/20/2014	12:07:25	22:07:47
294	10/21/2014	16:34:30	23:16:23
295	10/22/2014	12:19:52	22:18:40
296	10/23/2014	12:18:30	22:34:54
297	10/24/2014	12:36:07	22:21:32
298	10/25/2014	12:32:02	22:16:33
299	10/26/2014	12:16:25	22:46:17
300	10/27/2014	12:56:20	22:34:29
301	10/28/2014	13:38:50	20:17:44
302	10/29/2014	14:39:09	22:30:47
303	10/30/2014	12:16:21	22:41:14
304	10/31/2014	12:23:45	21:51:37
306	11/02/2014	12:22:26	22:26:14
307	11/03/2014	13:15:04	15:06:57
308	11/04/2014	12:34:06	22:37:32
309	11/05/2014	12:55:53	20:35:48
320	11/16/2014	14:26:01	19:09:42

H12709
FINAL TIDE NOTE

DATE: November 16, 2014

HYDROGRAPHIC BRANCH: Atlantic Hydrographic Branch
HYDROGRAPHIC PROJECT: OPR-J311-KR-14
HYDROGRAPHIC SURVEY: H12709

LOCALITY: Western Vicinity of Lake Borgne, LA
SUB-LOCALITY: The Rigolets to Polecat Bend, LA

TIME PERIOD [1] : October 12, 2014 - November 16, 2014

TIDE STATIONS USED:

Station Name	Station ID	Type	Latitude	Longitude
The Rigolets, LA	8761402	Subordinate	30° 10.0' N	89° 44.2' W
New Canal Station, LA	8761927	Control	30° 01.6' N	90° 06.8' W
Shell Beach, LA	8761305	Control	29° 52.1' N	89° 40.4' W

PLANE OF REFERENCE (MEAN LOWER LOW WATER) :

8761402	0.000m
8761927	0.000m
8761305	0.000m

HEIGHT OF MEAN HIGH WATER ABOVE PLANE OF REFERENCE:

8761402	0.214m
8761927	0.152m
8761305	0.417m

REMARKS: RECOMMENDED ZONING

NOAA HSD approved use of the final zoning scheme on February 27, 2014. Correspondence related to zoning approval is included in this Appendix.

---

[1] Please refer to the comprehensive list in attached Times of Hydrography.

http://tidesandcurrents.noaa.gov/benchmarks.html?id=8761402

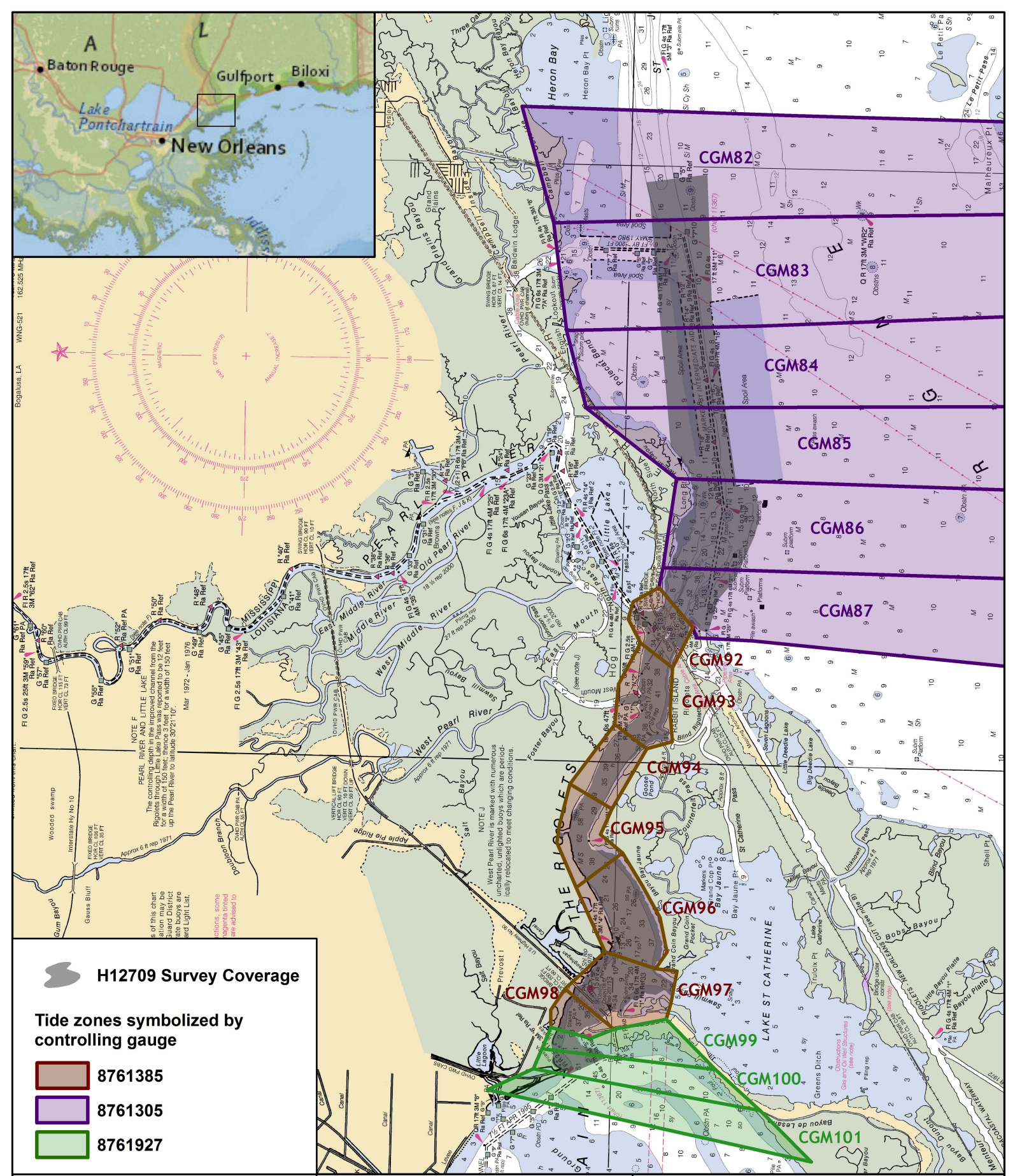
http://tidesandcurrents.noaa.gov/benchmarks.html?id=8761927

http://tidesandcurrents.noaa.gov/benchmarks.html?id=8761305

H12709
FINAL TIDE NOTE ZONING

Zone	Time Corrector (Mins)	Range Ratio	Reference Station
CGM100	-240	1.20	8761927
CGM101	-234	1.20	8761927
CGM82	-114	1.10	8761305
CGM83	-102	1.10	8761305
CGM84	-84	1.10	8761305
CGM85	-72	1.10	8761305
CGM86	-54	1.06	8761305
CGM87	-36	1.06	8761305
CGM92	-67	1.73	8761402
CGM93	-55	1.55	8761402
CGM94	-37	1.36	8761402
CGM95	-25	1.24	8761402
CGM96	-13	1.12	8761402
CGM97	0	1.00	8761402
CGM98	10	0.90	8761402
CGM99	-258	1.20	8761927

NOTE: Final soundings were reduced to chart datum using a revised version of the zoning scheme that was originally provided with the tides project instructions.



H12709
Final Tide Zoning Chartlet

OPR-J311-KR-14
Western Vicinity of Lake Borgne, LA
David Evans and Associates, Inc.
Chart 11371

From: Christina Fandel - NOAA Federal <christina.fandel@noaa.gov>
Sent: Friday, February 27, 2015 5:28 AM
To: Jason Creech
Cc: Lucy Hick - NOAA Federal; Corey Allen - NOAA Federal; Gerald Hovis - NOAA Federal; _NOS.CO-OPS.HPT
Subject: OPR-J311-KR-2014 preliminary evaluation of contractor zoning
Attachments: J311KR2014 Error Estimate Graphic.pdf

Jason,

HPT has completed preliminary estimates of the total propagated error in the Lake Pontchartrain to Lake Borgne section of OPR-J311-KR-15 and has determined that the TPE in all regions of this survey area falls below the 0.45 m threshold for OCS surveys using the supplied zoning scheme. I have attached a graphic showing the TPE between control stations and local water data.

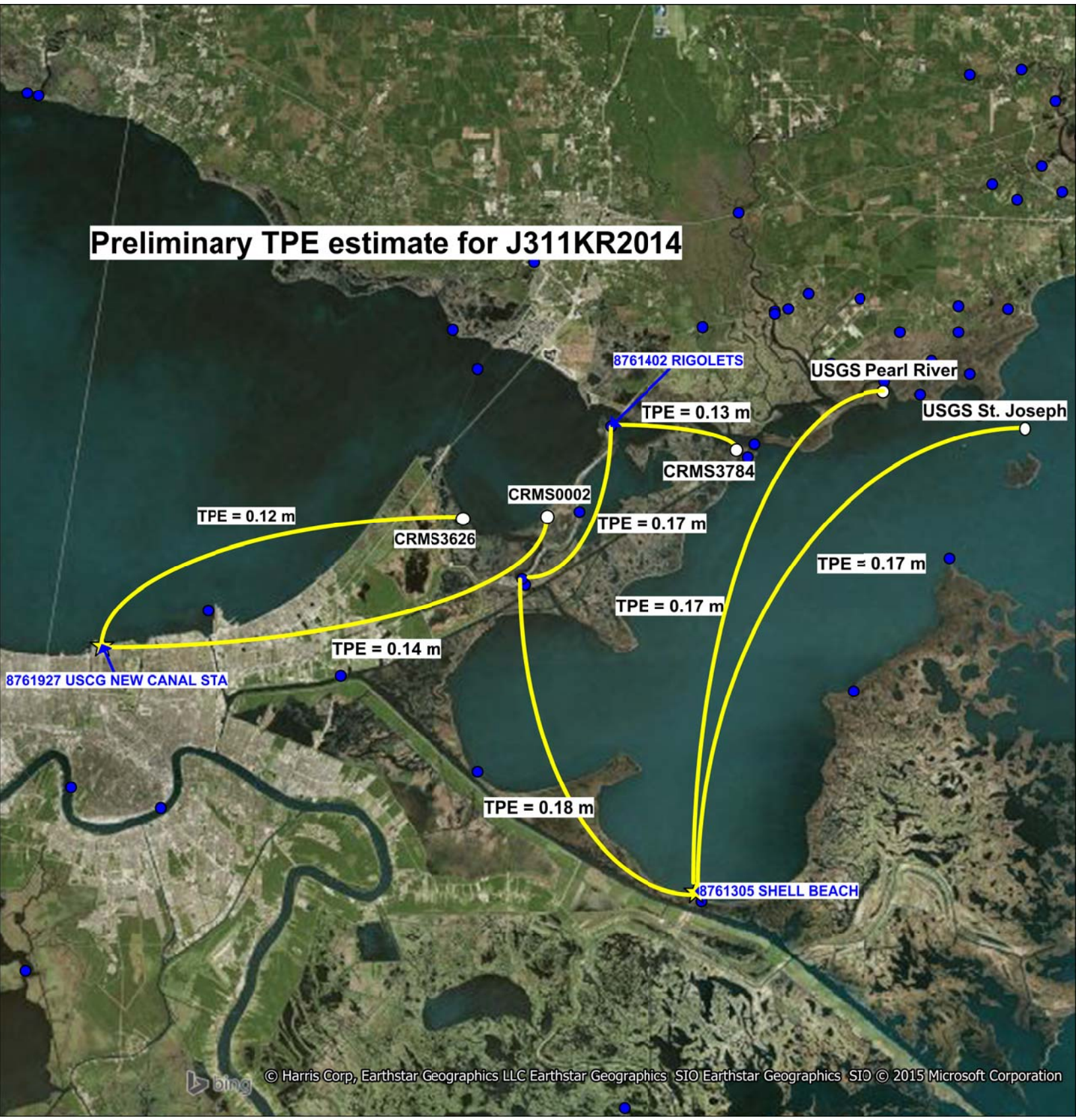
HPT requests clarification on the following item, but the outcome will not impact their decision; you may still proceed using your submitted zoning scheme.

HPT would like to request clarification on the development of the range correctors for zones located inside of Lake Pontchartrain. The correction applied to the preliminary zones of CGM 106-CGM 109 does not appear to the same correction applied to the preliminary zones of CGM 99- CGM 101.

Please let me know if you have any questions,

Christy

--
Christy Fandel
Physical Scientist
Hydrographic Survey Division
Office of Coast Survey, NOAA
Christina.Fandel@noaa.gov
(301) 713-2702 x178


Preliminary TPE estimate for J311KR2014
8761402 RIGOLETS
USGS Pearl River
USGS St. Joseph
TPE = 0.13 m
CRMS3784
CRMS0002
TPE = 0.12 m
CRMS3626
TPE = 0.17 m
TPE = 0.17 m
TPE = 0.17 m
TPE = 0.14 m
8761927 USCG NEW CANAL STA
TPE = 0.18 m
8761305 SHELL BEACH
bing
© Harris Corp, Earthstar Geographics LLC Earthstar Geographics SIO Earthstar Geographics SIO © 2015 Microsoft Corporation

APPENDIX II

SUPPLEMENTAL SURVEY RECORDS AND CORRESPONDENCE

SUPPLEMENTAL SURVEY RECORDS AND CORRESPONDENCE

From: Balthazar, Earl A CIV <Earl.A.Balthazar@uscg.mil>
Sent: Thursday, April 23, 2015 7:25 AM
To: Jason Creech
Cc: Frank, David M CIV
Subject: CTRL# 15-0154, Request for bridge clearance information

Good morning Mr. Creech,

This is all of the current information we have available.

Chef Menteur Pass -- 97.6 ft. Horizon; 11 ft. Vertical

Chef Menteur Pass RR -- 97.3 ft. Horizon; 11 ft. Vertical

Rigolets -- 200 ft. Horizon; 66.6 ft. Vertical

Rigolets RR -- 153 ft. Horizon; 11 ft. Vertical

Please contact me if you have additional questions/comments.

Respectfully,

Earl A. Balthazar Jr.
Bridge Transportation Assistant, USCG (dpb),
500 Poydras Street,
New Orleans, LA. 70130-3310
Office: 504-671-2132
FAX: 504-671-2133
d8dpball@uscg.mil

-----Original Message-----
From: Balthazar, Earl A CIV
Sent: Thursday, April 23, 2015 6:31 AM
To: 'Jasc@deainc.com'
Cc: Frank, David M CIV
Subject: RE: Request for bridge clearance information

Good morning Mr. Creech,

The United States Coast Guard does not provide information on the vertical and horizontal clearances of bridges.

The below link is to the public viewing site for NOAA Navigation Charts.

http://www.charts.noaa.gov/PDFs/PDFs.shtml

This information can also be found in the United States Coastal Plot #5 as published by NOAA.

This my assist you in finding the information you require.

Respectfully,

Earl A. Balthazar Jr.
Bridge Transportation Assistant, USCG (dpb),
500 Poydras Street,
New Orleans, LA. 70130-3310
Office: 504-671-2132
FAX: 504-671-2133
d8dpball@uscg.mil

-----Original Message-----
From: Frank, David M CIV
Sent: Wednesday, April 15, 2015 3:24 PM
To: Balthazar, Earl A CIV
Subject: FW: Request for bridge clearance information

Take for action

-----Original Message-----
From: Jason Creech [mailto:Jasc@deainc.com]
Sent: Wednesday, April 15, 2015 3:16 PM
To: d8dpall@uscg.mil
Cc: Tim.Osborn@noaa.gov; Frank, David M CIV
Subject: Request for bridge clearance information

Hello

My name is Jason Creech and I am a hydrographer with David Evans and Associates, Inc. We are currently under contract with NOAA Office of Coast Survey to perform hydrographic surveys of Chef Menteur Pass and The Rigolets.

I'd like to request the vertical and horizontal clearances of the US Highway 90 bridges and the CSX bridges crossing Chef Menteur Pass and The Rigolets in order to verify that this information is correctly charted.

I've cc'd Tim Osborn with NOAA OCS in case there any concerns with release of this information.

Please let me know if you have any questions.

Thanks in advance for your assistance.

Jason

Jason Creech, CH | Senior Associate, Nautical Charting Program Manager

David Evans and Associates, Inc. | Marine Services Division | www.deamarine.com <http://www.deamarine.com/>

t: 360.314.3200 | c: 804.516.7829 | jasc@deainc.com

APPROVAL PAGE

H12709

Data meet or exceed current specifications as certified by the OCS survey acceptance review process. Descriptive Report and survey data except where noted are adequate to supersede prior surveys and nautical charts in the common area.

The following products will be sent to NCEI for archive

- H12709_DR.pdf
- Collection of depth varied resolution BAGS
- Processed survey data and records
- H12709_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.

Digitally signed by Jasmine Cousins
DN: cn=Jasmine Cousins, o=NOAA, ou=Atlantic Hydrographic Branch, email=jasmine.cousins@noaa.gov, c=US
Date: 2016.06.27 12:17:30 -04'00'

Approved:_____

Lieutenant Commander Matthew Jaskoski, NOAA
Chief, Atlantic Hydrographic Branch