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

DESCRIPTIVE REPORT

Type of Survey:	Hydrographic Survey
Project Number:	OPR-K339-KR-12
Registry Number:	H12427

LOCALITY

State:	Louisiana
General Locality:	Gulf of Mexico
Sub-locality:	9 NM S of Barataria Pass

2012

CHIEF OF PARTY

George G. Reynolds

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Date:

NOAA FORM 77-28 (11-72)	U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION	REGISTRY NUMBER:
HYDROGRAPHIC TITLE SHEET		**H12427**

State: **Louisiana**

General Locality: **Gulf of Mexico**

Sub-Locality: **9 NM S of Barataria Pass**

Scale: **1:40,000**

Date of Survey: **May 25, 2012 to July 09, 2012**

Instructions Dated: **March 30, 2012**

Project No.: **OPR-K339-KR-12**

Vessel: **R/V Ferrel - Official Number 1182802**

Chief of Party: **George G. Reynolds**

Surveyed By: **Ocean Surveys, Inc.**

Soundings by: **Multibeam Echosounder**

Imagery by: **Side Scan Sonar**

Verification by: **Atlantic Hydrographic Branch**

Soundings Acquired in: **Meters at MLLW**

H-Cell Compilation Units: *Meters at MLLW*

Remarks: The purpose of this survey is to update existing NOS nautical charts in a high commercial traffic area. All times are recorded in UTC. Data recorded and presented relative to UTM Zone 16 North.

Contractor: Ocean Surveys, Inc.
129 Mill Rock Rd E
Old Saybrook, CT 06475

THE INFORMATION PRESENTED IN THIS REPORT AND THE ACCOMPANYING BASE SURFACE REPRESENTS THE RESULTS OF A SURVEY PERFORMED BY OCEAN SURVEYS, INC. DURING THE PERIOD OF 25 MAY 2012 TO 09 JULY 2012 AND CAN ONLY BE CONSIDERED AS INDICATING THE CONDITIONS EXISTING AT THAT TIME. REUSE OF THIS INFORMATION BY CLIENT OR OTHERS BEYOND THE SPECIFIC SCOPE OF WORK FOR WHICH IT WAS ACQUIRED SHALL BE AT THE SOLE RISK OF THE USER AND WITHOUT LIABILITY TO OSI.

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 Survey H12427

Project: OPR-K339-KR-12
Locality: Gulf of Mexico
Sub-Locality: 9 NM S of Barataria Pass
Scale: 1:40000
May 2012 – June 2012
Ocean Surveys, Inc. – *R/V Ferrel*
Chief of Party: George G. Reynolds

A. AREA SURVEYED

A.1 Survey Limits

This survey provides hydrographic data for the Gulf of Mexico waters south of Barataria Pass. The general locations of the survey limits are presented in Table 1.

Table 1
General Location of Survey H12427

Northeast Limit	Southwest Limit
29-07-17 N 89-47-51 W	29-04-57 N 90-00-00 W

A.2 Survey Purpose

The purpose of this survey is to provide NOAA with accurate hydrographic data to update existing National Ocean Service (NOS) nautical charts in a high commercial traffic area located in the Gulf of Mexico, 9 nautical miles south of Barataria Pass, Louisiana. The survey area includes multiple offshore platforms and pipelines.

A.3 Survey Quality

The entire survey is adequate to supersede previous data.

A.4 Survey Coverage

Survey Coverage was in accordance with the requirements in the Hydrographic Survey Project Instructions (March 30, 2012), the Statement of Work (SOW), and the Hydrographic Survey Specifications and Deliverables Manual, April 2012 (HSSDM). Two hundred percent (200%) side scan sonar (SSS) coverage, with concurrent multibeam echosounder (MBES) coverage were collected with set line spacing to water depths of approximately 90 feet. Additional MBES coverage was obtained as necessary to provide a least depth for all significant features and assigned AWOIS investigation items. The final survey area covers 26.38 square nautical miles (Figure 1).

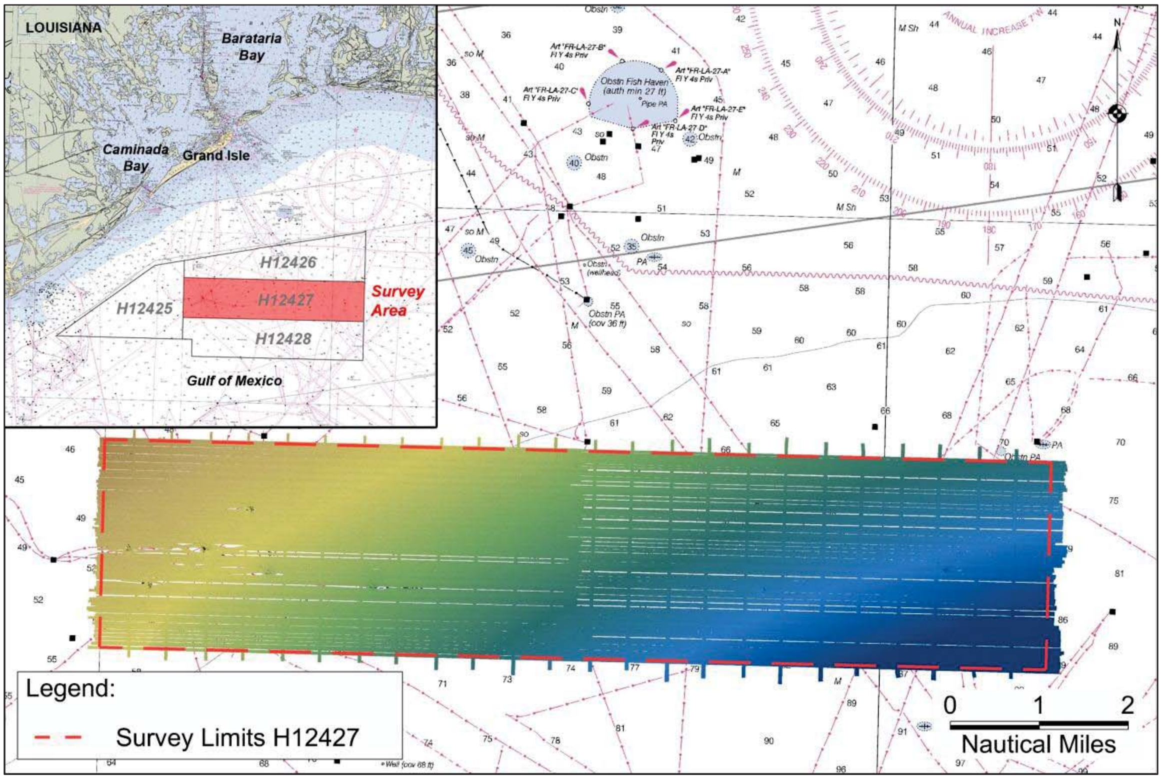


Figure 1. H12427 survey area overlain on RNC 11358.

SSS tracklines were separated by one-half the distance required for 100% coverage plus an allowance for overlap and trackline maintenance. Trackline offset and accompanying SSS range scale settings are presented in Table 2.

Table 2
H12427 Survey Line Spacing

Trackline Offset (meters)	SSS Range Scale (meters)
40	50
65	75
85	100

A.5 Survey Statistics

The following tables list the survey statistics (Table 3) and the dates of hydrography (Table 4).

Table 3
H12427 *R/V Ferrel* Survey Trackline Statistics

Concurrent MB/SSS Lineal NM	MBES Only Developments Lineal NM	SSS Only Developments Lineal NM	Cross Lines Lineal NM	Square Nautical Miles Covered	Bottom Samples Acquired	AWOIS Items Assigned	Number of Item Investigations
775.45	171.76	4.00	63.19	26.38	7	0	12

Table 4
Dates of Hydrography

Survey Date
5/28/2012
5/29/2012
5/30/2012
5/31/2012
6/1/2012
6/2/2012
6/3/2012
6/4/2012
6/5/2012
6/6/2012
6/11/2012
6/17/2012
6/18/2012
6/19/2012
6/20/2012
7/7/2012

A.6 Shoreline

No shoreline exists within the limits of H12427.

A.7 Bottom Samples

Seven (7) bottom samples were acquired to determine bottom characteristics. Bottom samples were assigned in the Project Reference File (PRF) provided with the Hydrographic Survey Project Instructions. A table listing the positions and descriptions of the bottom samples is included in Appendix II. A position and description of each sample are provided as attributed SBDARE objects in the S-57 Final Feature File (FFF). Digital images with identification reference numbers are submitted with the survey data and referenced in the NOAA extended attributes ‘images’ field.

B. DATA ACQUISITION AND PROCESSING

B.1 Equipment and Vessels

Refer to OPR-K339-KR-12 Data Acquisition and Processing Report (DAPR) for a complete description of data acquisition and processing systems, survey vessels, quality control procedures and data processing methods. Additional information to supplement sounding and survey data, and any deviations from the DAPR are included in this descriptive report.

B.1.1 Vessels

Survey operations were conducted from the *R/V Ferrel*. The *R/V Ferrel* R-492 is a 44.5-meter steel vessel, with a 9.8-meter beam and 1.8-meter draft and powered by two CAT D 353 diesel engines.

B.1.2 Equipment

Table 5 summarizes the primary equipment used to acquire MBES and SSS data. All equipment was installed, calibrated and operated in accordance with the DAPR.

Table 5
H12427 Primary Survey Equipment

Manufacturer	Mod el	Type
Reson	7101	Multibeam Echosounder
Reson	7125	Multibeam Echosounder
Klein	5000	Side Scan Sonar
ODIM	MVP30	Moving Vessel Profiler
Sea-Bird	SeaCAT SBE 19+	Sound Speed Profiler
Sea-Bird	MicroCAT SBE37	Sound Speed Sensor (Real-Time Surface Sound Speed)
Applanix/Trimble	POS MV 320 V.4	Primary Navigation DGPS
Applanix/Trimble	POS MV 320 V.4	Vessel Attitude and Heading

The Reson 7101 multibeam echosounder system was replaced with a Reson 7125 multibeam echosounder system on June 15, 2012 (DN 167).

B.2 Quality Control (QC)

B.2.1 Cross Lines

A total of 63.19 nm of cross line data were acquired May 28, 2012 (DN 149) with the Reson 7101. Cross line mileage equaled 8.34% of the 757.77 nm of mainscheme MBES lines.

Statistical quality control information was generated by comparing each of the cross lines to the final combined CARIS BASE (Bathymetry Associated with Statistical Error) surfaces. Cross line comparisons showed excellent agreement with the finalized BASE surfaces generated from the mainscheme survey lines. All cross line soundings considered in the analyses met IHO Order 1a uncertainty standards. Statistics from the cross line comparisons completed with the CARIS QC Report utility are presented in Separate II.

A difference surface was generated in CARIS HIPS to calculate the difference between the survey depths in a coverage surface composed of only mainscheme and development line data and the survey depths in a surface composed only of cross line data. The difference surface and its statistical information are presented in Figures 2 and 3. The outlier depth difference value of -0.84 meters was due to a designated sounding being present in the mainscheme and development line surface that was not represented in the cross line surface. Overall, there was good agreement between overlapping line and day-to-day sounding coverage as observed in the BASE surface depth and standard deviation layers.

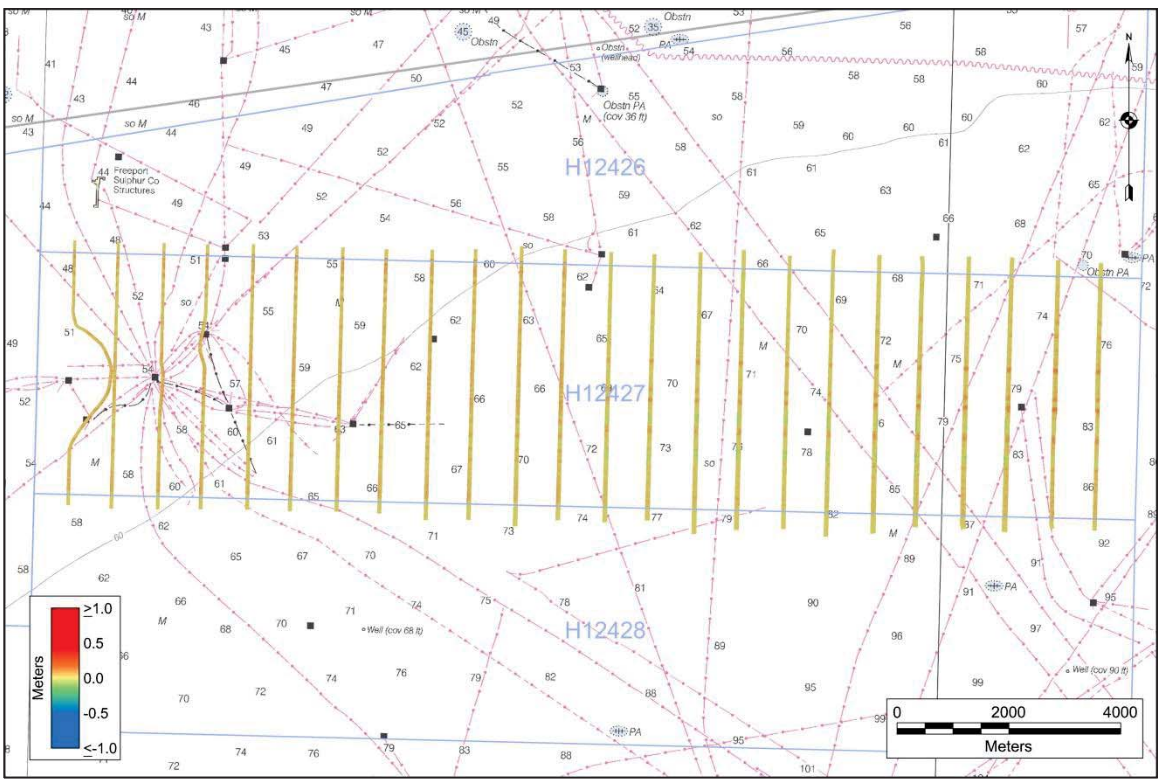


Figure 2. The difference surface calculated between the mainscheme/development line depth surface and the cross line depth surface. The surface is colored by depth difference with units in meters. Chart 11358 is visible in the background.

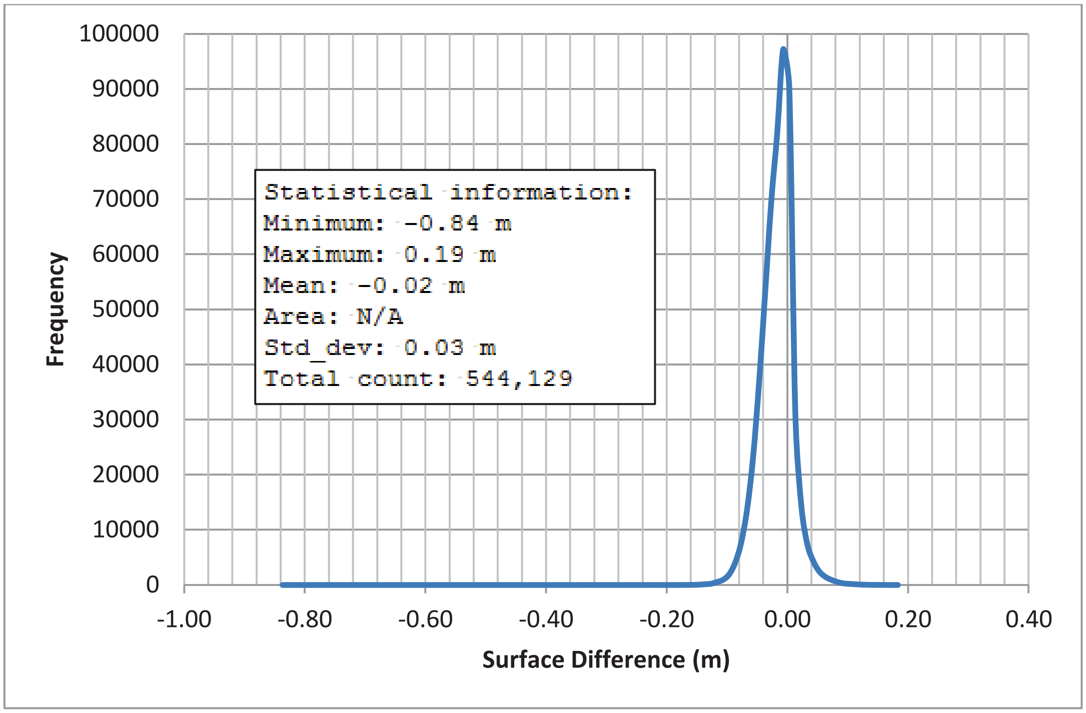


Figure 3. Statistical information from the depth difference surface between the cross line data and mainscheme/development line data.

B.2.2 Uncertainty

The methods used to minimize the uncertainty in the corrections to echo soundings are described in detail in Section *B. Processing and Quality Control* of the project DAPR. Survey H12427 did not deviate from the methods documented in the DAPR.

Tables 6 and 7 list the survey specific parameters used to compute Total Propagated Uncertainty (TPU).

Table 6
H12427 Tide TPU Values

Measured	Zoning
0.01 meters	0.1 meters

Table 7
H12427 Sound Speed TPU Values

Sound Speed Profile - MVP	Surface Sound Speed - SBE37
1 meter/second	1 meter/second

The CARIS QC BASE surface report utility was used to evaluate IHO uncertainty for all finalized surfaces. Results from the QC BASE surface report indicate that 100% of the nodes from the finalized 2-meter & 4-meter set line spacing surfaces meet IHO Order 1a uncertainty specifications. The QC BASE surface reports indicated that over 99% of the nodes from ten (10) out of the eleven (11) 0.5-meter object detection surfaces met the IHO Order 1a uncertainty specifications. For the surface titled Item-9_Inv_CUBE_0-5m_Final, 97.87% of the nodes met IHO Order 1a uncertainty specifications.

Since the finalized surface node uncertainty values were derived from the greater of either the node's Depth Uncertainty or Standard Deviation, the finalized object detection surface nodes that covered discrete features with high standard deviation values appeared to exceed the IHO Order 1a uncertainty budget. However, despite high standard deviation values over steep features, which are to be expected, the depth uncertainty values for all object detection and coverage surface nodes were below the depth dependent IHO Order 1a uncertainty threshold. QC BASE surface reports for all final surfaces are included in Separate II.

B.2.3 Survey Junctions

The following table lists the prior and contemporary surveys that junction with Survey H12427. Figure 4 displays the location of the prior and contemporary junction surveys for Project OPR-K339-KR-12.

Table 8
H12427 Survey Junctions

Registry Number	Scale	Year	Field Unit	Relative Location
H12425	1:20,000	2012	R/V Ferrel	West
H12426	1:40,000	2012	R/V Ferrel	North
H12428	1:40,000	2012	R/V Ferrel	South

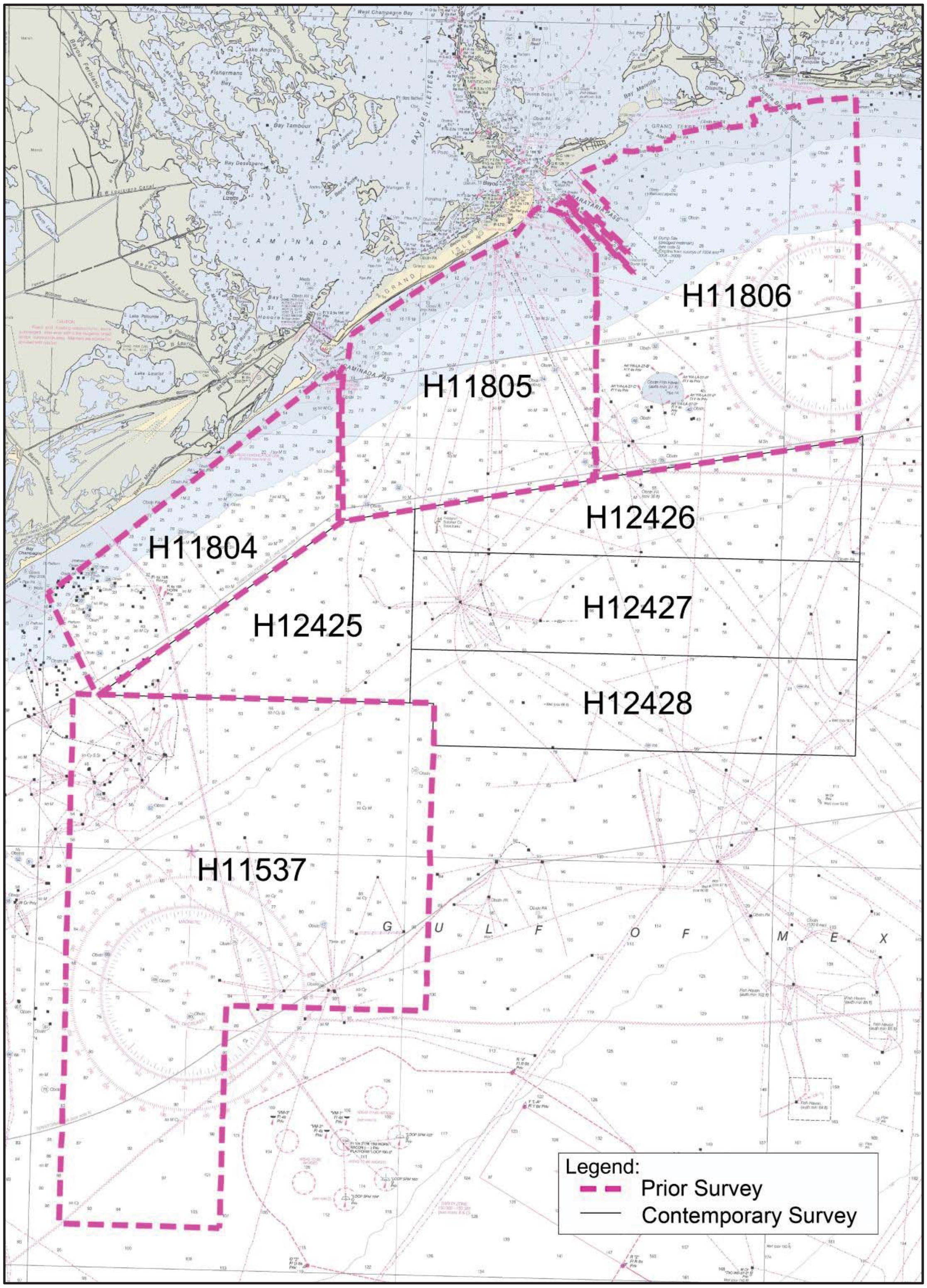


Figure 4. Survey junctions for Project OPR-K339-KR-12. RNC 11358 is displayed in the background.

<u>H12425</u>

There is an approximate overlap of 820-1200 feet (250-370 meters) between bathymetric data from Survey H12427 and Survey H12425, both acquired with the *R/V Ferrel*. The CARIS HIPS Difference Surface function was used to calculate the difference between depths from a 2-meter combined and finalized BASE surface from Survey H12425 and the depths from a 2-meter finalized BASE surface from Survey H12427. The resultant difference surface is shown in Figure 5 and a histogram of the depth differences is shown in Figure 6. Depths from the H12427 survey show good agreement with the depths from the H12425 survey. Depth discrepancies generally equaled 15 centimeters or less with a mean difference of 5 centimeters.

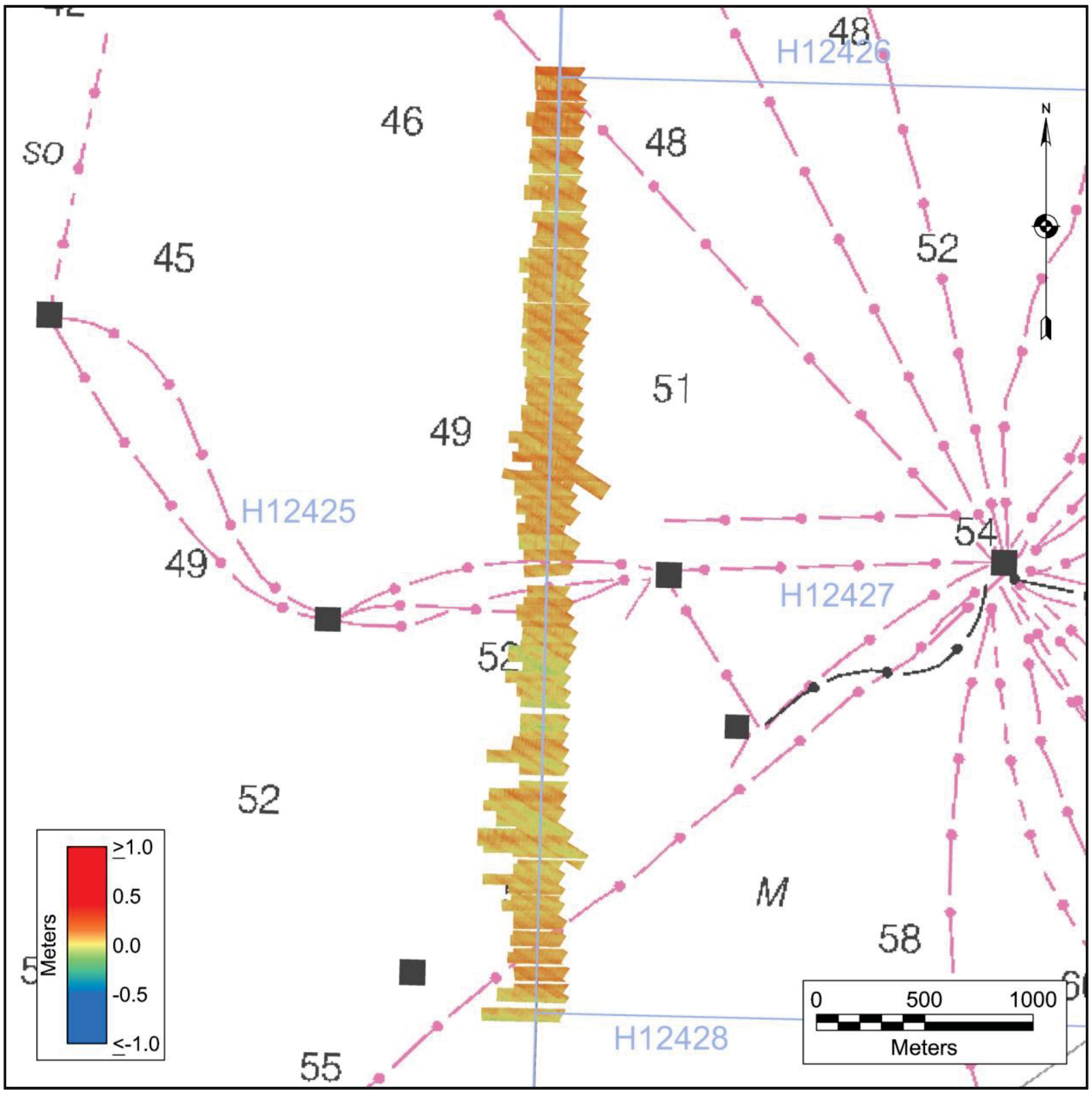


Figure 5. A difference surface calculated in CARIS HIPS using depth surfaces from junction Surveys H12425 and H12427. Difference units are in meters.

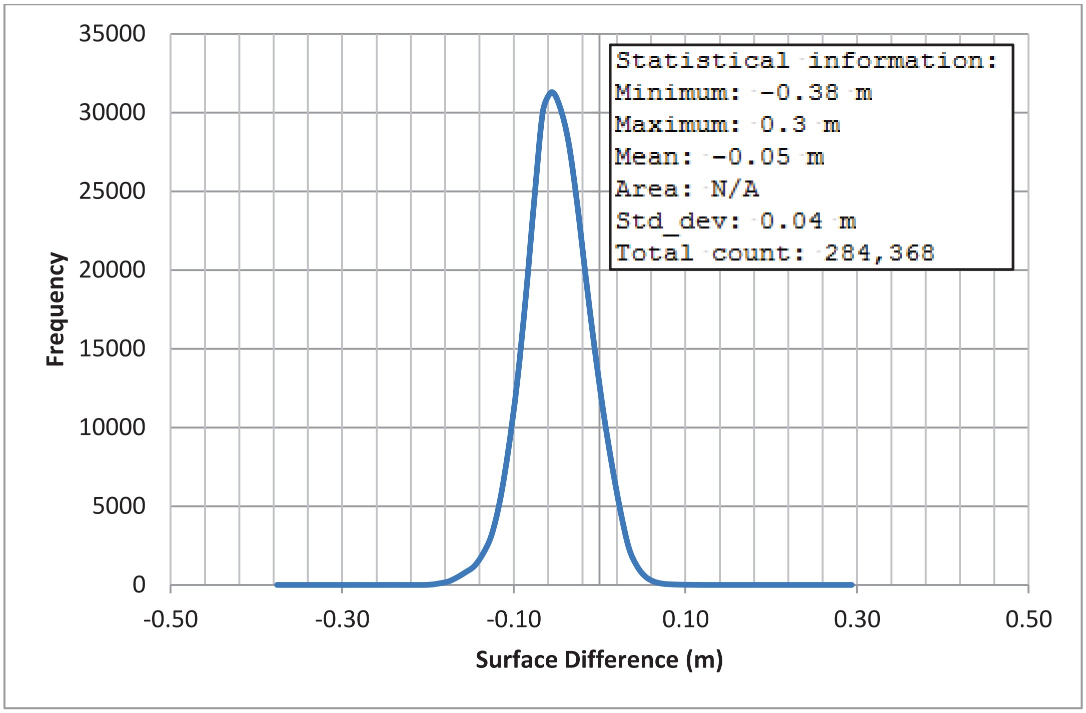


Figure 6. Depth difference histogram comparing Survey H12425 to Survey H12427.

<u>H12426</u>

There is an approximate overlap of 300-550 feet (90-170 meters) between bathymetric data from Survey H12426 and Survey H12427, both acquired with the *R/V Ferrel*. The CARIS HIPS Difference Surface function was used to calculate the difference between depths from a 4-meter combined and finalized BASE surface from Survey H12426 and the depths from a 4-meter combined and finalized BASE surface from Survey H12427. The resultant difference surface is shown in Figure 7 and a histogram of the depth differences is shown in Figure 8. Depths from the H12426 survey show good agreement with the depths from the H12427 survey. Depth discrepancies generally equaled 15 centimeters or less with a mean difference of 3 centimeters.

The outlier difference value of -0.56 m coincided with a feature located within the H12427 survey limits. Investigation lines were run over the feature for survey H12427, therefore, the obstruction was not developed with additional MBES in survey H12426. The feature least depth sounding in survey H12427 was selected from an investigation line, whereas the H12426 least depth sounding was selected from the outer beam of one MBES pass, accounting for the depth discrepancy.

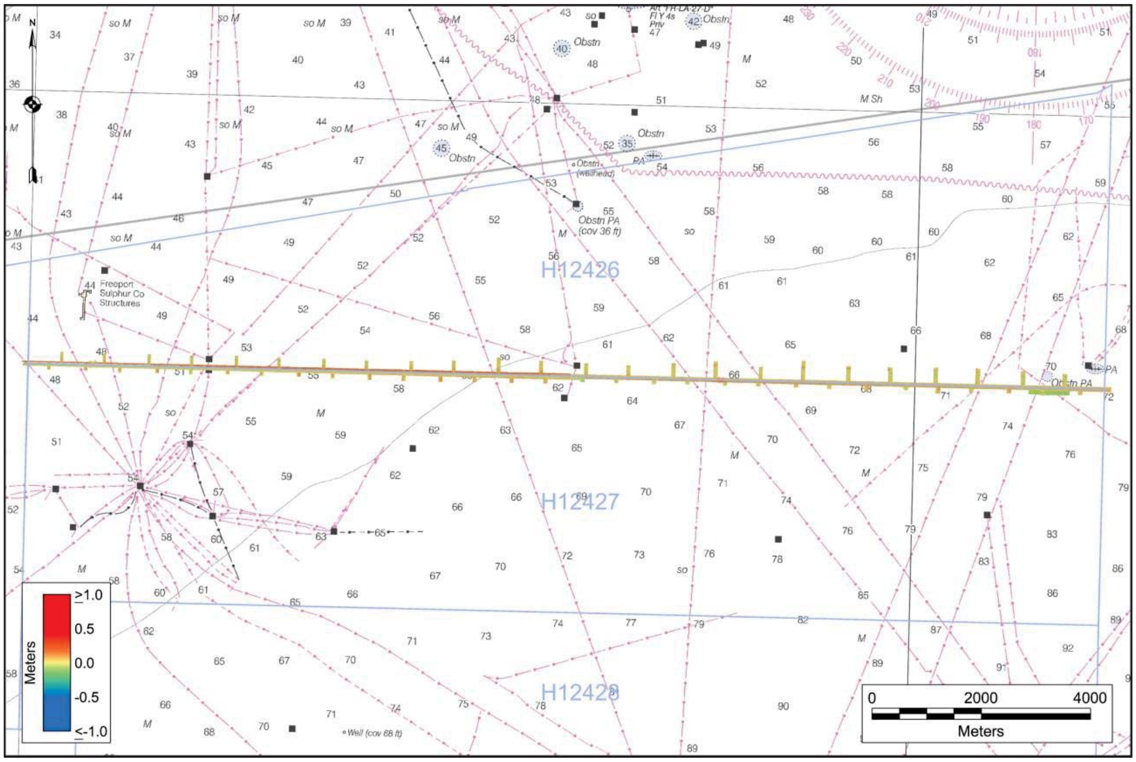


Figure 7. A difference surface calculated in CARIS HIPS using depth surfaces from junction Surveys H12426 and H12427. Difference units are in meters.

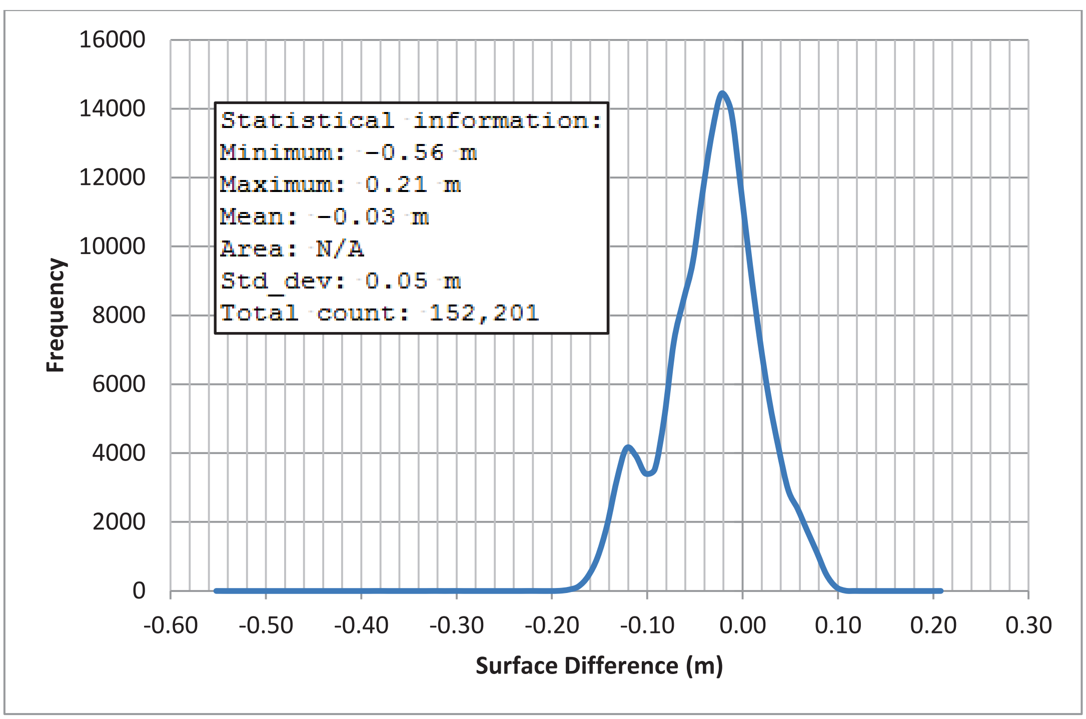


Figure 8. Depth difference histogram comparing Survey H12426 to Survey H12427.

H12428

There is an approximate overlap of 400 feet (120 meters) between bathymetric data from Survey H12427 and Survey H12428, both surveys acquired with the *R/V Ferrel*. The CARIS HIPS Difference Surface function was used to calculate the difference between depths from a 4-meter combined and finalized BASE surface from Survey H12428 and the depths from a 4-meter combined and finalized BASE surface from Survey H12427. The resultant difference surface is shown in Figure 9 and a histogram of the depth differences is shown in Figure 10. Depths from the H12427 survey show good agreement with the depths from the H12428 survey. Depth discrepancies generally equaled 15 centimeters or less with a mean difference of 2 centimeters.

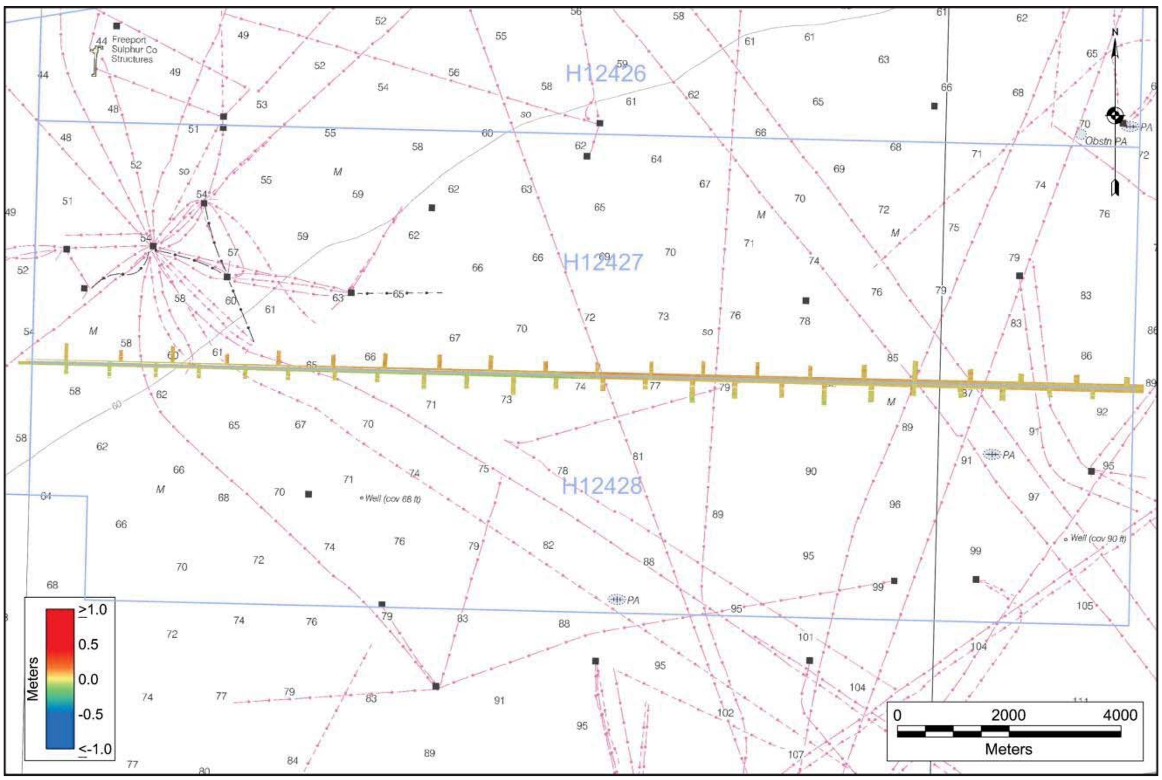


Figure 9. A difference surface calculated in CARIS HIPS using depth surfaces from junction Surveys H12428 and H12427.

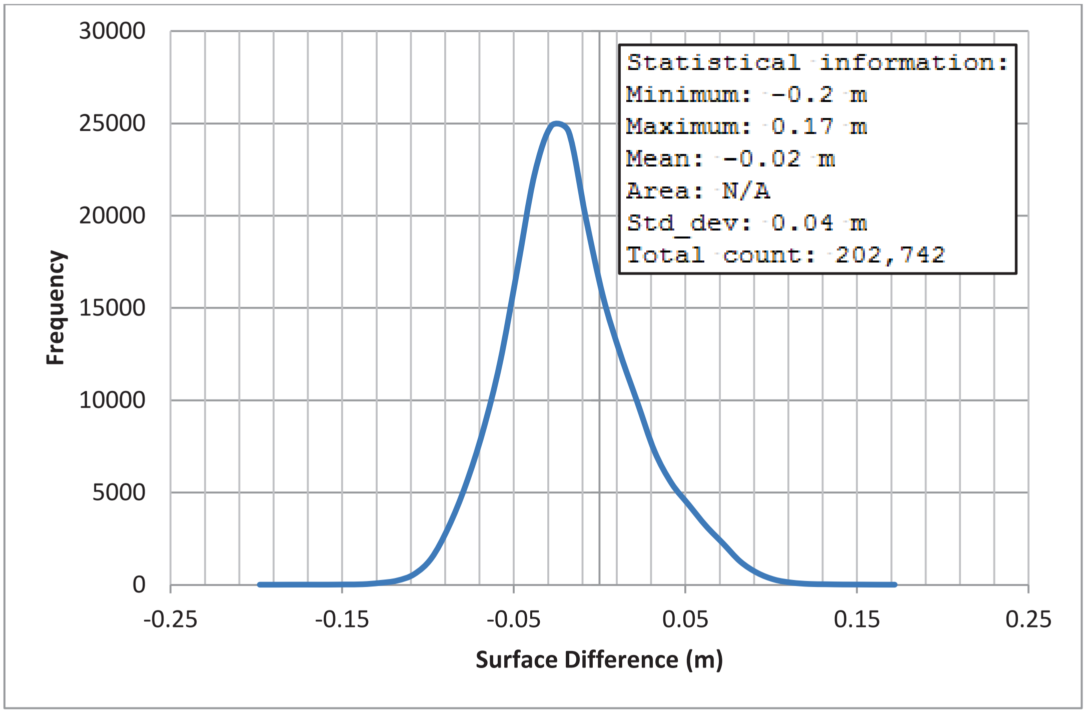


Figure 10. Depth difference histogram comparing Survey H12428 to Survey H12427.

B.2.4 Sonar QC Checks

Sonar system quality control checks were conducted as detailed in the *Quality Control* section of the DAPR. Results from the weekly MBES bar checks are included in Appendix II of the DAPR.

B.2.5 Equipment Effectiveness

During calibration of the Reson 7101 MBES, a constant systematic artifact was discovered on the port side of the swath (Figure 11). A constant depression was evident between roughly 45 degrees and 70 degrees on the port side. The “smile” shaped signature has a typical maximum downward deflection of about 10 centimeters at about 60 degrees before trending upward to a deflection of about 5 centimeters at 70 degrees. The presence of this approximate 10 centimeter artifact does not exceed the allowable Total Vertical Uncertainty (TVU) for this project but it does exceed the Reson reported vertical uncertainty of 5 centimeters for this system.

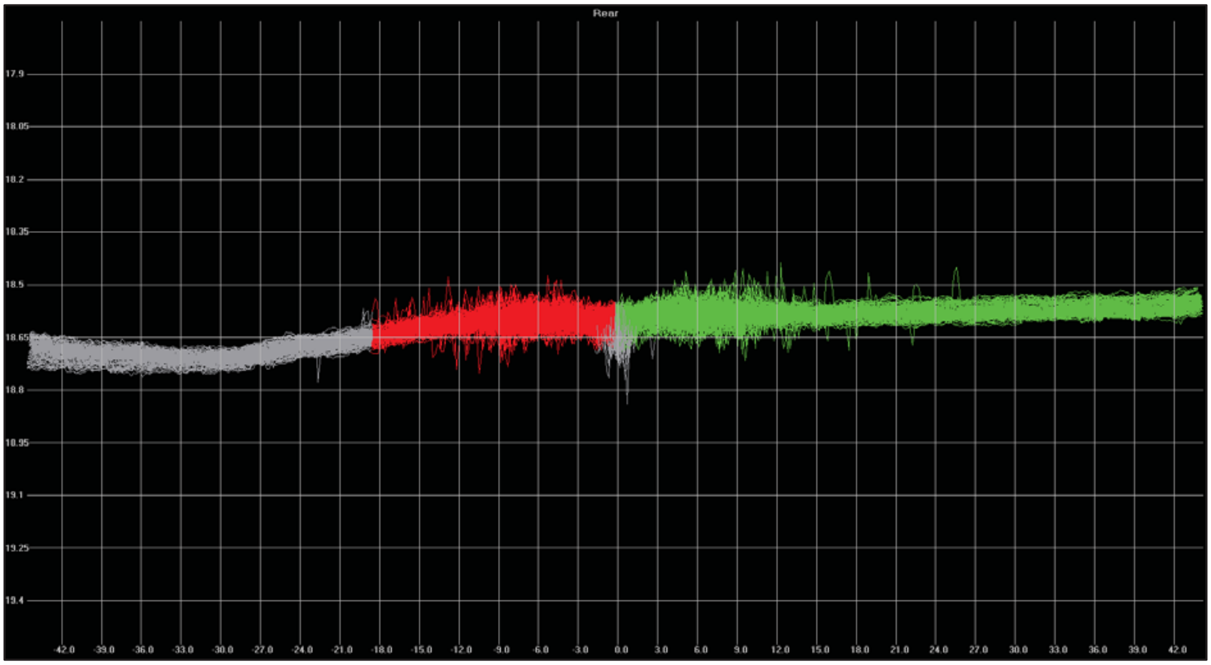


Figure 11. An example of the Reson 7101 port side swath artifact shown in CARIS Swath Editor with a 50x vertical exaggeration. The port side swaths are colored in red and the starboard swaths are colored green. The gray portion of the swath represents soundings rejected with a 45 degree swath beam filter.

Port side soundings were rejected beyond 45 degrees for all lines run with the Reson 7101 multibeam system per email correspondence from NOAA dated June 21, 2012 (see Appendix II). On June 15, 2012 (DN 167) the Reson 7101 multibeam system was replaced with a Reson 7125 MBES which was utilized for the remainder of survey operations.

The Reson 7101 and 7125 systems experienced periodic bursts of motion-induced noise or "blowouts," typically affecting between 1 and 4 sequential profiles. Efforts were made to reduce this noise during acquisition, including adjustments to system gain and power, in addition to the multibeam pole fairing that was installed to reduce cavitation effects. The frequency of the noise bursts would typically increase as sea state worsened. Therefore, operations were suspended when the frequency or length of blowouts became too high. The blowouts did not result in any nadir gaps in coverage in excess of 3 nodes in the along-track direction.

The Reson 7101 and 7125 systems displayed a trend in which the heights for features detected with the outer beams were greatly exaggerated. When a feature was detected with an outer beam, the soundings would seem to "ramp up" to an inflated height not supported by the correlating SSS contact heights from two or more side scan sonar passes (Figure 12). In these cases the outer beams were rejected in favor of soundings closer to nadir and the SSS contact heights were used to corroborate the feature's least depth.

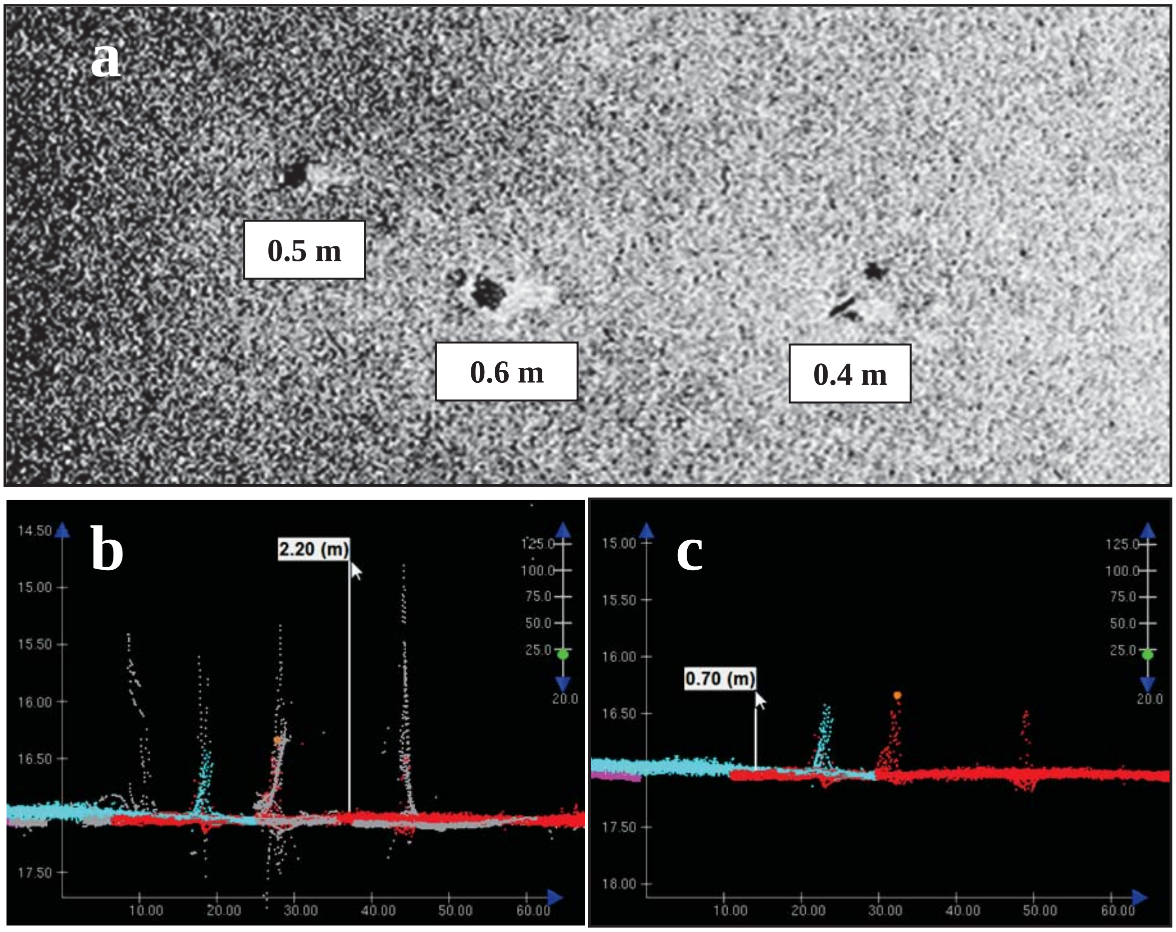


Figure 12. Example of Reson 7101 and 7125 outer beam detection issue where the system exaggerates the feature height. Three contacts with insignificant height were positioned in the side scan record with clear shadows measuring heights less than 70 centimeters, confirmed in both side scan coverages (a). The Reson 7101 outer beam soundings (colored in gray) greatly exaggerated the feature heights to over 2 meters tall (b). The outer beam data were rejected and soundings were selected from beams closer to nadir (colored in red and turquoise) which are more reflective of the SSS contact heights to ensure the true feature height would be represented in the finalized surfaces (c).

The surface sound speed sensor failed due to a faulty cable on June 2, 2012 (DN154) affecting several MBES lines between 14:56 and 18:30 UTC. During this outage the field crew manually entered the sound speed measured with the MVP towfish in its near surface, docked position into the Sound Velocity field within the Reson Controller's Ocean Menu. Surface sound speed values were updated when a change of one (1) meter per second was observed.

On May 30, 2012 (DN 151) the pressure sensor on the Klein 5000 malfunctioned and began recording incorrect depth values. The field crew manually entered the tow fish depth into the Sensor Depth Source field located in the SonarWiz Sonar Layback Configuration Window until a new pressure sensor could be installed on June 8, 2012 (DN 160). The SonarWiz acquisition software adequately calculated tow fish layback using the manually entered fish depth as contacts selected from SSS data collected with the manually entered tow fish depths correlate well with MBES data and adjacent SSS data collected with the replacement pressure sensor. It was discovered upon SSS line conversion in CARIS HIPS and SIPS that Chesapeake was not logging the manually entered tow fish depth values in the XTF file; the faulty pressure gauge values were being converted into the SSS Sensor Depth field. The CARIS Attitude Editor displays the inaccurate SSS Sensor Depths recorded from the malfunctioning pressure sensor.

On June 19, 2012 (DN 171) there was a complete failure of the Klein 5000's starboard channel. Survey operations continued with bottom sample collection and MBES collection only. Replacement parts for the Klein 5000 were received and installed on June 21, 2012 (DN 173). Subsequent testing revealed side scan imagery quality was equivalent to that of the pre-failure imagery.

On rare occasions, a black and white line – an example of which can be seen in Figure 13 – would appear across one or both sides of the SSS imagery swath. These lines were an artifact of the Klein 5000 system, not the result of environmental influences. Contact selection was not affected due to this phenomenon and care was taken to ensure that in the incidence of this brief loss of imagery in one 100% SSS coverage, the second coverage was good.

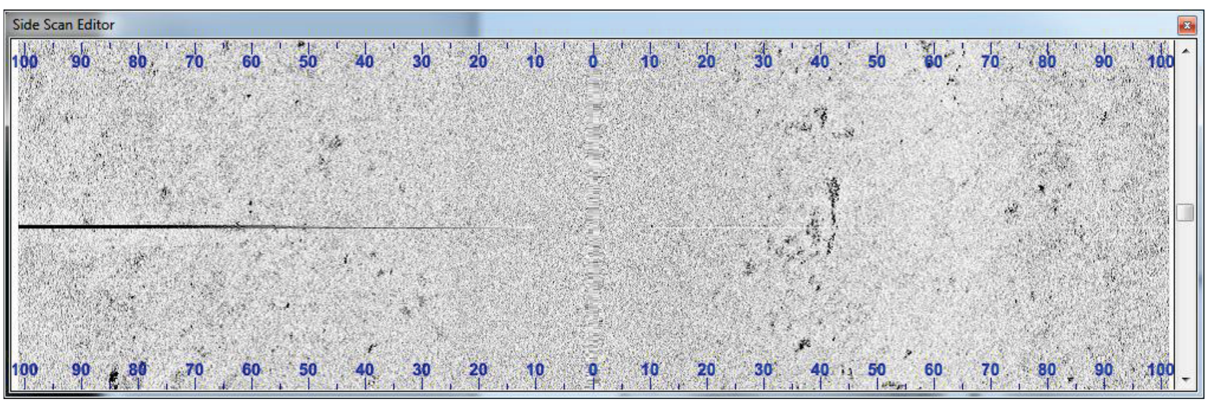


Figure 13. An example of the sporadic black and white line across the SSS imagery of Line 152-191521-4023, displayed in CARIS Side Scan Editor.

B.2.6 Factors Affecting Soundings

An artificial "trench" was observed in the near nadir beams in both the Reson 7101 and 7125 MBES systems in areas where soft mud was present. The nadir trench was first observed during calibration testing. Analysis of the data indicated a soft bottom was the culprit, such that the sound pulse from the nadir beams was penetrating the soft surface sediment and returning a false depth. All bottom samples collected within the project area confirmed that the seabed in the survey area was composed of soft mud (Figure 14). The Reson 7101 multibeam system, operating at a frequency of 240 kHz, exhibited near nadir penetration on the order of 10-30 cm while the Reson 7125 multibeam system, operating at a frequency of 400 kHz, exhibited near nadir penetration on the order of 5-15 cm. The subbottom penetration was not constant within the survey area; it was assumed to vary with sediment type. Near nadir soundings with a bottom signature below the apparent seafloor were rejected in an effort to provide BASE surfaces that are not biased by the subbottom penetration, per email correspondence from NOAA dated July 2, 2012 (see Appendix II).

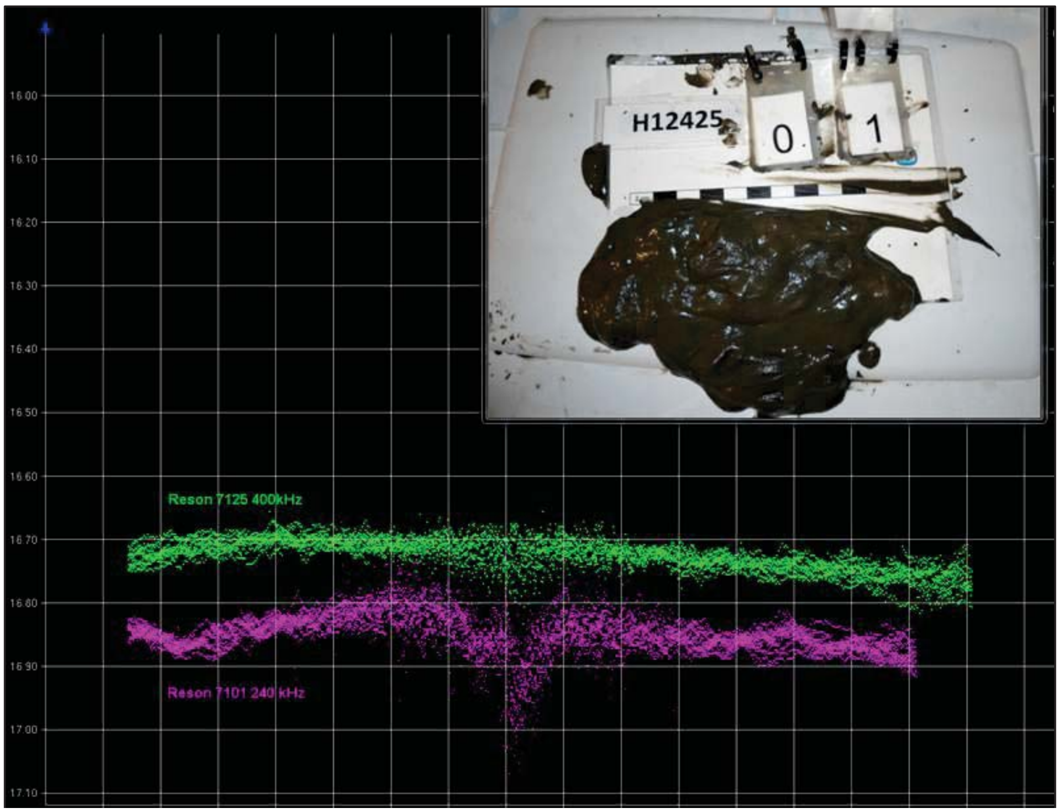


Figure 14. Example of Reson 7101 and 7125 near nadir subbottom penetration and a representative grab sample from Survey H12425. Portions of all surveys within Project OPR-K339-KR-12 were affected by this phenomenon.

The sound speed profiles measured throughout the limits of Survey H12427 showed high variability, particularly near the surface (Figure 15). This variability increased sound speed related error in the depth and positioning of outer beam soundings (Figure 16). Sound speed changes in the water column were time and space dependent and appear to be primarily attributed to the heating of the water surface and the influx of fresh water from the Mississippi River.

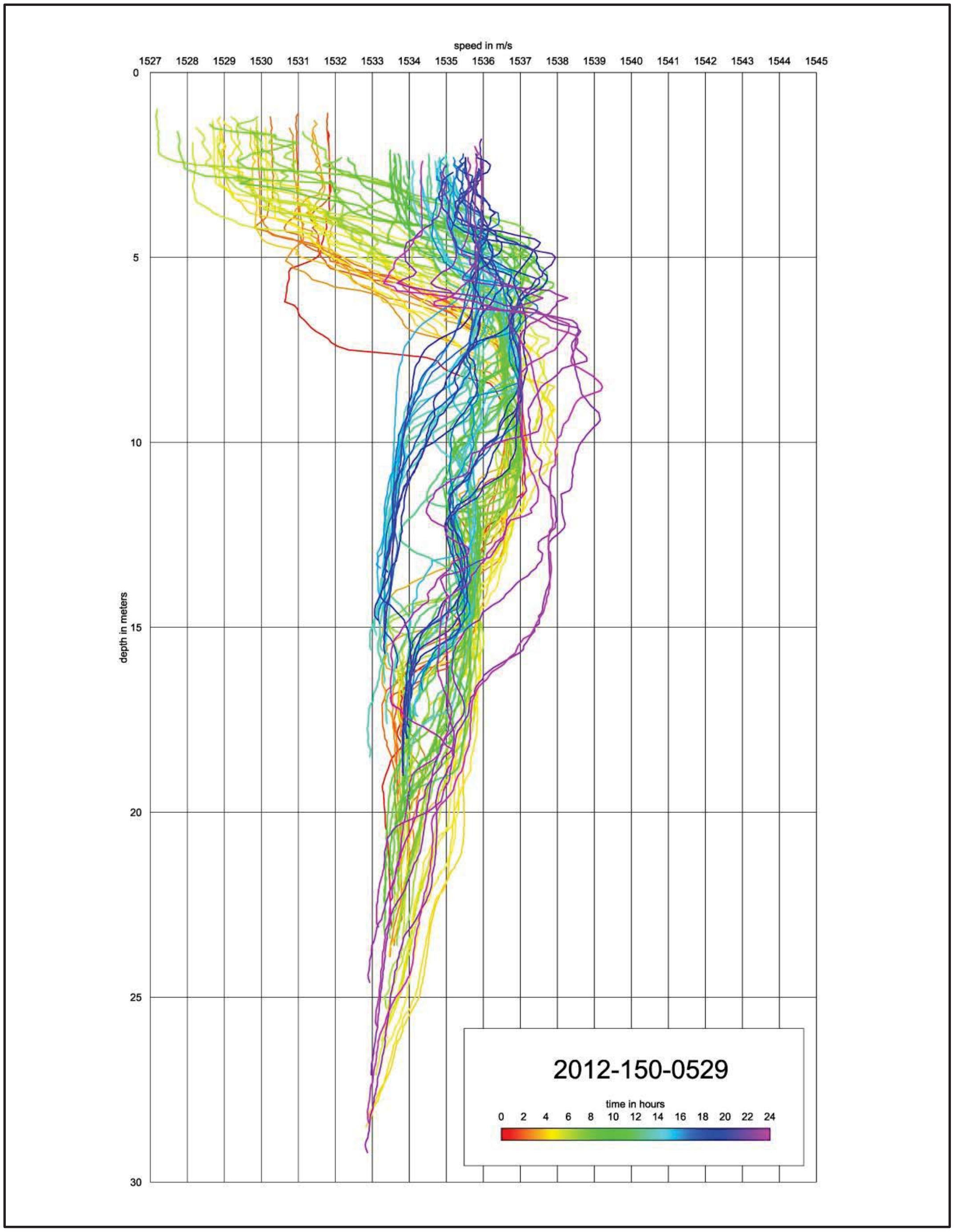


Figure 15. Sound speed profiles colored by cast time from May 29, 2012 (DN 150). The profiles showed high variability in sound speed measurements spatially and temporally, with the change most pronounced at the surface.

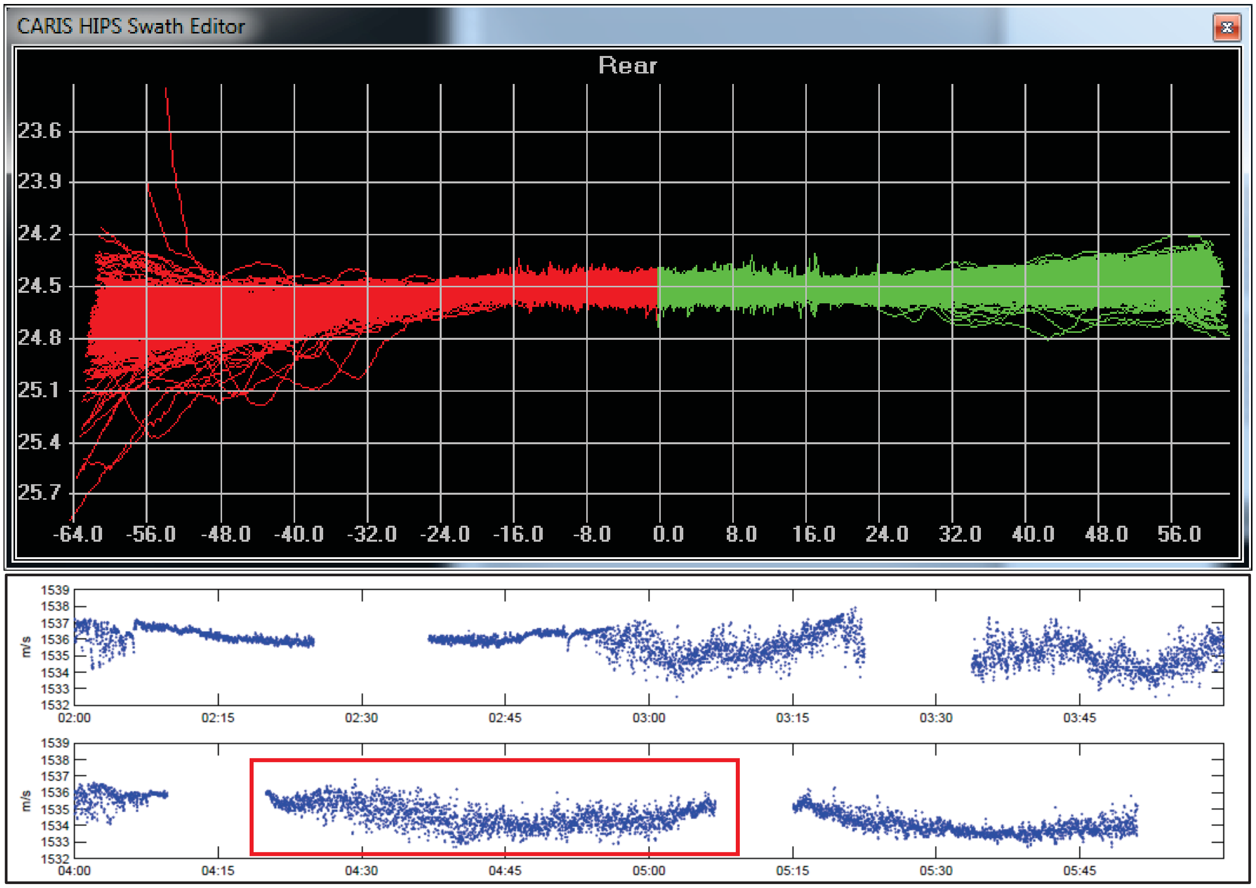


Figure 16. An example of the detrimental effect highly variable surface sound speed has on the positioning of outer beam soundings of the MBES swath. The upper image shows a selection of MBES swath profiles from Line 2012FE1540420_3807, port side in red and starboard side in green. The lower image shows a scatter plot of the surface sound speed over multiple lines from June 2, 2012 (DN154), with Line 2012FE1540420_3807 highlighted in the red box. Notice the variability in the surface sound speed, spatially and temporally, over this short time. Depths and distances are in meters. Speed is in meters per second.

The surface sound speed was plotted for all MBES lines. The plots were used to isolate MBES lines most likely to be susceptible to sound speed related error. Soundings beyond 60 degrees were rejected for lines where high variability in surface sound speed correlated with excessive depth and positioning error in the outer beam soundings.

The dynamic sound speed changes affected the SSS imagery at times, causing refraction in the outer ranges of the SSS swath. To lessen the impact of refraction, the tow fish was flown below the refractive sound speed lens or the SSS range scale was reduced. Changes in SSS range scale were recorded in the acquisition and processing logs and line spacing was modified to attain full coverage.

Overall, the tide correctors were modeled well for Survey H12427, showing good agreement between survey days. Still there were several areas where tide-related vertical offsets on the scale of 10 to 12 centimeters were noted between MBES data collected on different days. The tide-related vertical offset is most apparent when MBES data collected on June 18, 2012 (DN 170) intersect MBES lines collected on May 28, 2012 (DN 149) and May 30, 2012 (DN 151) (Figures 17 and 18). The survey dates June 18, 2012 and 20, 2012 (DNs 170 – 172) coincided with a spring tide and building seas associated with Tropical Storm Debby, evident in the large deviation between the predicted and verified tide data at the Port Fourchon, LA gauge from June 16, 2012 (DN 168) to June 28, 2012 (DN 180) (Figure 19). Survey operations for Project OPR-K339-KR-12 were suspended from June 22, 2012 (DN 174) through June 27, 2012 (DN 179) while Tropical Storm Debby passed.

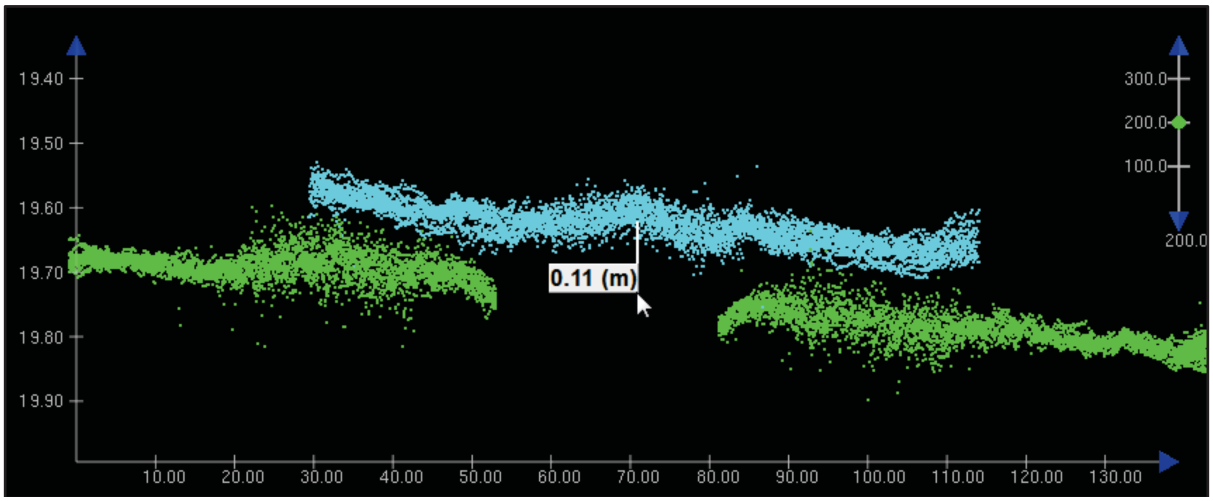


Figure 17. An example of the tide-related vertical offset between soundings collected on DN 170 (turquoise) and DN 151 (green) shown in CARIS HIPS Subset Editor. Depths and distances are in meters.

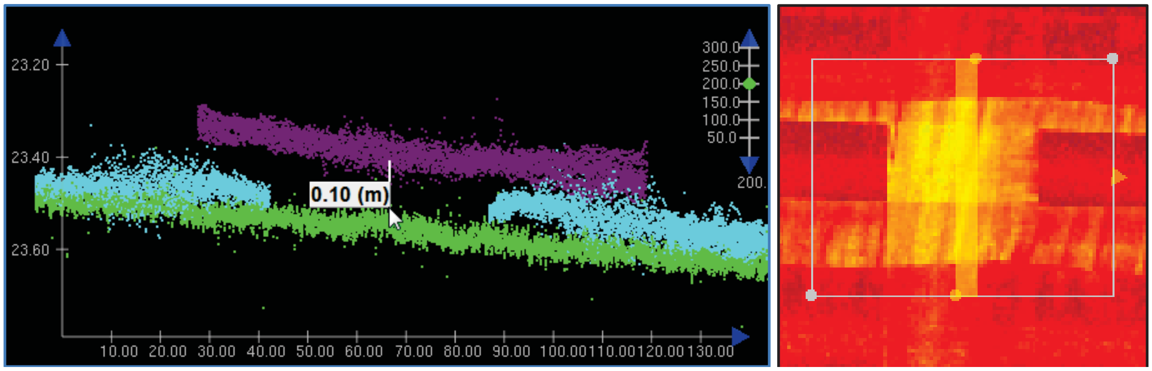


Figure 18. The left image is an example of the tide-related vertical offset between soundings collected on DN 149 (green), DN 170 (purple) and DN 153 (turquoise) shown in CARIS HIPS Subset Editor. Depths and distances are in meters. The right image shows the subset window displayed over the Standard Deviation layer from the H12427 2-meter CUBE surface. In this color map, areas with higher standard deviation are represented in yellow.

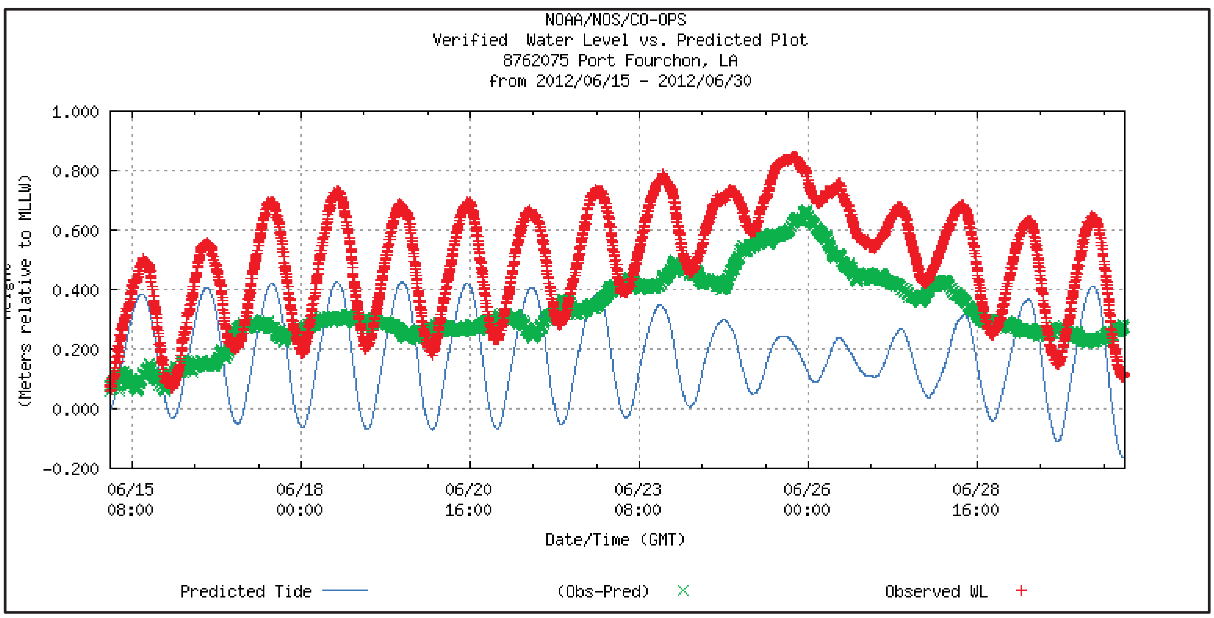


Figure 19. A verified tide versus predicted tide plot for the Port Fourchon, LA gauge downloaded from the NOS Tides and Currents website. A verified tide versus predicted tide plot for the Port Fourchon, LA gauge downloaded from the NOS Tides and Currents website. It appears that the spring tide coupled with tropical storm conditions had a relatively large influence on the Port Fourchon tide gauge starting on June 16, 2012 (DN 168), and then beginning to dissipate on June 26, 2012 (DN 178).

There was a large amount of vessel traffic within the project area, attributable to commercial and recreational fishing, and to vessels providing support to the numerous oil production platforms. It was a common occurrence to have vessel wakes recorded in the side scan imagery (Figure 20). The wakes were noted in the acquisition and processing logs. When a wake was identified in one of the 100% coverage mosaics, the second coverage mosaic was reviewed to ensure clean data were acquired on the second SSS pass of the seafloor.

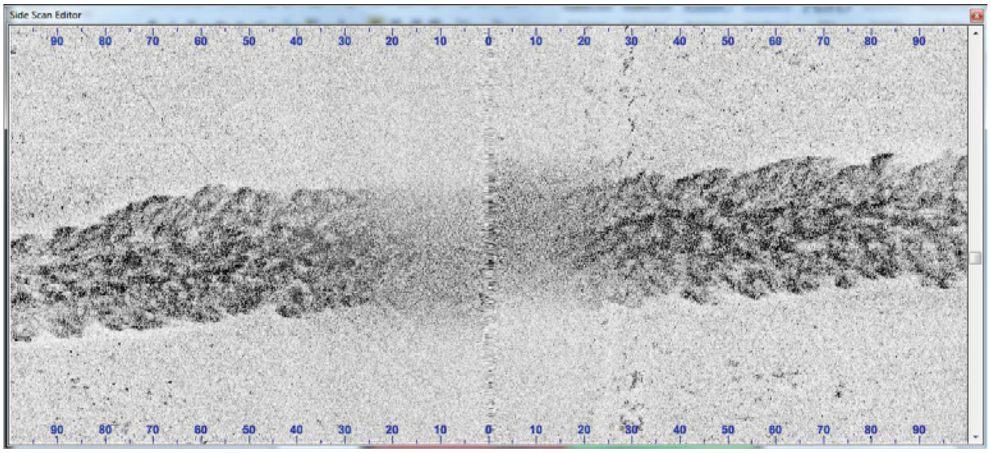


Figure 20. A vessel wake reflected from the surface as it appears in the SSS imagery.

In addition to vessel wakes, surface noise caused by a choppy sea state was observed in the side scan records (Figure 21). The surface noise appeared as shadow-less, dark spots in the SSS imagery. Occasionally, surface reflections off of large floating mats of seaweed were also recorded by the side scan sonar. In an effort to minimize the effect of surface noise on the SSS imagery, the SSS operator attempted to keep the tow fish height at eight (8) percent of the range scale in use. There were brief instances when the tow fish height fell slightly below the eight (8) percent threshold; however, this was quickly adjusted since a fish height alarm was activated in SonarWiz to alert the operator when the lower or upper fish height threshold was reached. In addition, planned lines had sufficient overlap to account for the occasional reduction of effective scanning range. Lines that were affected by surface noise were carefully scrutinized to ensure all possible SSS contacts were selected.

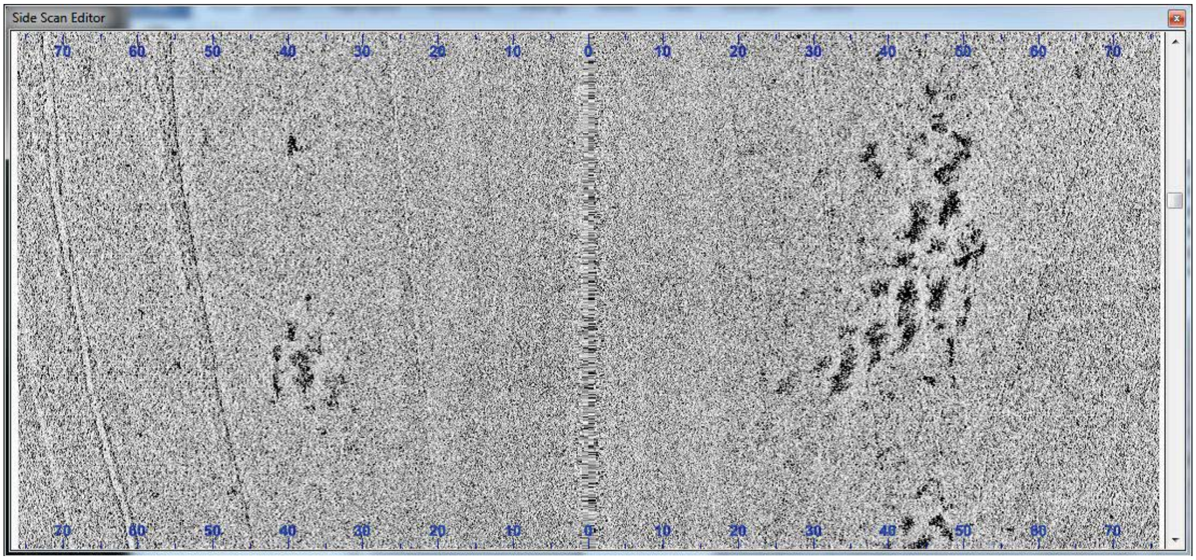


Figure 21. The reflection of surface noise from choppy seas appears as shadow-less, dark patches across the side scan record.

An abundance of fish and/or marine mammals were seen in the SSS data, either as lone swimmers or in schools (Figure 22). Fish and dolphins were noted in the acquisition log by the field team, and these areas were carefully reviewed during data processing. Shadows, usually detached from a dark return, were typically associated with fish either in the water column or at a position closer to nadir. In the cases where a visible shadow was recorded, the contact was designated as a fish, for two reasons: 1) the possibility that the assumed fish is actually a feature and 2) to assist processors in rejecting fish-related noise from the MBES data. The fish designation was confirmed if no correlating item was found in the second SSS coverage. If visible in both SSS coverages with a significant height, the contact was investigated with object detection MBES coverage to verify or disprove the presence of a feature.

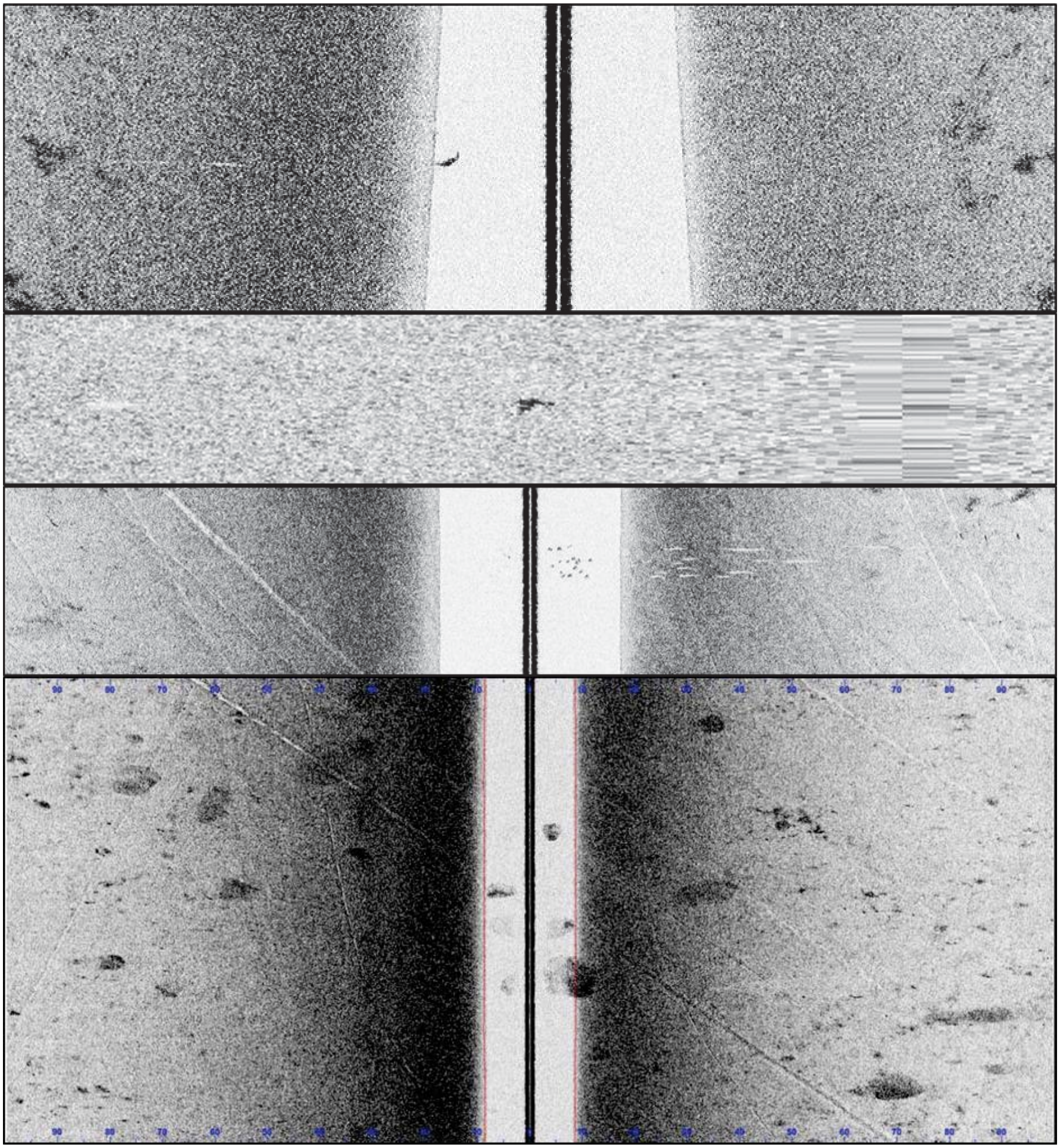


Figure 22. Examples of fish encountered in the side scan imagery.

The high volume of fish within the survey site resulted in MBES data afflicted with fish-related noise, which greatly increased the time spent manually rejecting soundings in CARIS HIPS Subset Editor. Balls of fish in the water column would give the appearance of rock-like features on the seafloor. Within areas of overlapping multibeam coverage these false features would be seen in one line of MBES data, but were not found in either the overlapping MBES coverage (Figure 23) or the double side scan coverage. The standard deviation layers from the 1-meter cleaning BASE surfaces were used to identify areas dense with fish features (Figure 24), and the MBES data were carefully edited in Subset Editor.

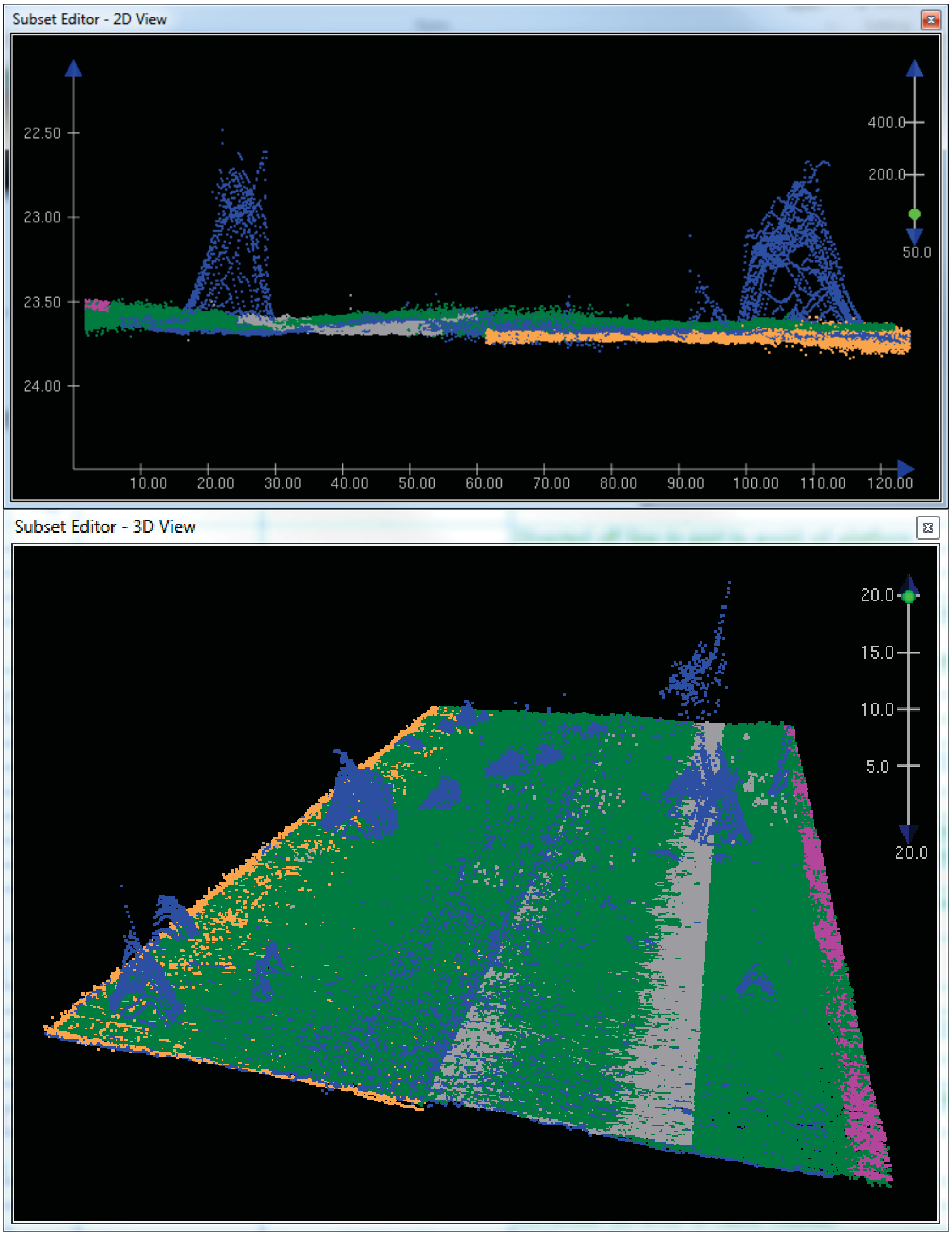


Figure 23. Balls of fish masquerading as features from MBES Line 151-103306-3206, colored in blue in CARIS Subset Editor's 2D View (top image) and 3D View (bottom image). Soundings from overlapping MBES lines are colored green, orange, and pink and rejected soundings are in gray. Depths and distance units are in meters.

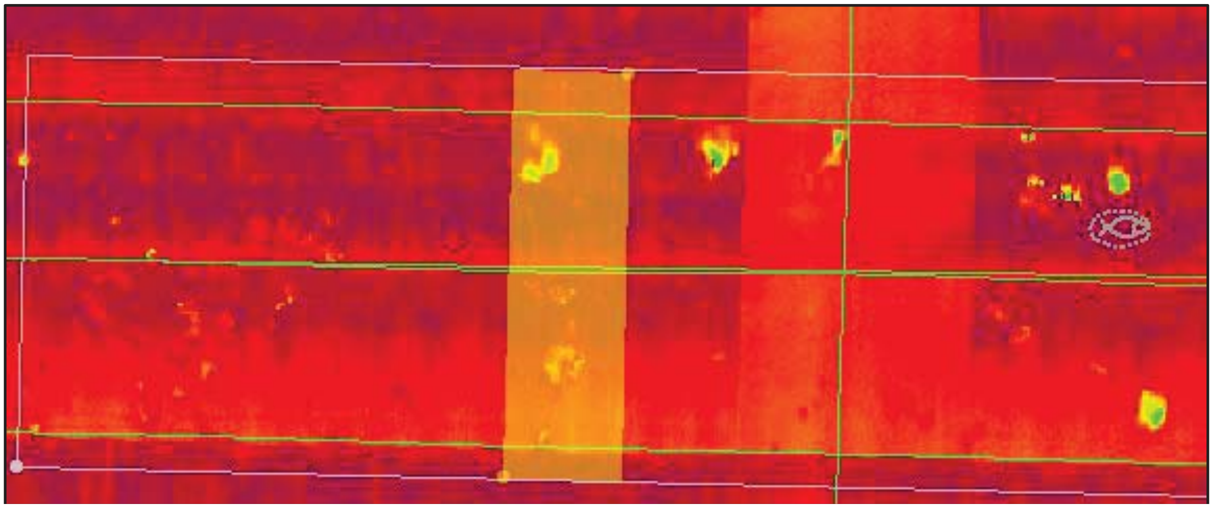


Figure 24. Fish noise as it appeared in the BASE surface standard deviation layer. The subset box used to edit the data in CARIS HIPS is visible in the image.

B.2.7 Sound Speed Methods

Sound speed measurements were acquired and processed as documented in the DAPR. All MBES lines were sound speed corrected using CARIS HIPS' "Nearest in Distance Within Time" method with the time set to one (1) hour.

B.2.8 Coverage Equipment and Methods

This survey was conducted to develop 200% SSS coverage within the survey limits along with concurrent MBES, referred to as "Set Line Spacing Coverage" in Section 5.2.2.3 of the HSSDM. There were no data gaps in either 100 percent side scan coverage mosaic within the survey limits for H12427. Full MBES coverage of the survey area was not required and was not attempted. There are visible gaps, or "skunk stripes" in the Set Line Spacing coverage surfaces, particularly where lines acquired with the Reson 7101 were run port-to-port. Although not a project requirement the Reson 7125 system was used to fill some of these gaps between mainscheme MB/SSS lines on days when the weather was too rough for side scan acquisition, but not too rough to acquire MBES development lines.

All potentially significant features located with mainscheme SSS or MBES were developed with high density, near nadir multibeam sonar data to meet the HSSDM requirement of "Object Detection Coverage." The survey methods used to meet coverage requirements did not deviate from those described in the DAPR.

B.2.9 Density

To confirm the HSSDM coverage requirement that at least 95% of the surface nodes shall be populated with at least 5 soundings for object detection coverage surfaces and at least 3 soundings for set line spacing coverage surfaces, the Compute Statistics tool was utilized within CARIS HIPS and SIPS to generate statistics for the Density layer for each pre-finalized BASE surface. The pre-finalized BASE surfaces were used for this test because it was discovered that once a surface is finalized a density value of one (1) is assigned to all nodes containing a designated sounding, regardless of the node's sounding density value pre-finalization.

The Compute Statistics tool generates an ASCII export containing two columns: 1) sounding density value and 2) the number of nodes that returned that value. This export was used to determine the percentage of nodes with a sounding density ≥ 5 for every object detection coverage CUBE surface and the percentage of nodes with a sounding density ≥ 3 for every set line spacing coverage CUBE surface. The results are presented in Table 9.

Table 9
Percentage of H12427 Nodes within Surface Density Requirement

BASE Surface Name	Percentage of nodes with Density ≥ 3 soundings	Percentage of nodes with Density ≥ 5 soundings
H12427_West_CUBE_2m	99.91 %	NA
H12427_West_CUBE_4m	99.94 %	NA
H12427_East_CUBE_2m	99.79 %	NA
H12427_East_CUBE_4m	99.91 %	NA
Item-1_Inv_CUBE_0-5m	NA	100 %
Item-2_Inv_CUBE_0-5m	NA	100 %
Item-3_Inv_CUBE_0-5m	NA	100 %
Item-4_Inv_CUBE_0-5m	NA	100 %
Item-5_Inv_CUBE_0-5m	NA	100 %
Item-6_Inv_CUBE_0-5m	NA	100 %
Item-7_Inv_CUBE_0-5m	NA	100 %
Item-8_Inv_CUBE_0-5m	NA	100 %
Item-9_Inv_CUBE_0-5m	NA	100 %
Item-10_Inv_CUBE_0-5m	NA	100 %
Item-11_Inv_CUBE_0-5m	NA	100 %
Item-12_Inv_CUBE_0-5m	NA	100 %

B.3 Echo Sounding Corrections

B.3.1 Corrections to Echo Soundings

Corrections to echo soundings were performed as documented in Section C. of the DAPR.

B.3.2 Calibrations

Preliminary patch test values were calculated in the field and final values were verified in CARIS HIPS. For Survey H12427, the offset values calculated for the pre-survey Reson 7101 and Reson 7125 system calibrations remained unchanged from those provided in the DAPR. The initial patch and performance test for the Reson 7101 MBES was completed on May 26, 2012 (DN 147) and the initial patch and performance test for the Reson 7125 MBES was completed on June 15, 2012 (DN 167) prior to beginning survey operations with the respective systems. Before each system was removed from the survey vessel, verification patch and performance tests were run to confirm the original calibration results.

B.4 Backscatter

Backscatter data were not acquired for H12427.

B.5 Data Processing

B 5.1 Software Updates

Table 10
H12427 Software Updates

Manufacturer	Name	Version	Service Pack	Hotfix	Installation Date	Use
CARIS	HIPS & SIPS	7.1	2	2	8/23/2012	Data Processing
CARIS	HIPS & SIPS	7.1	2	3	9/21/2012	Data Processing
CARIS	HIPS & SIPS	7.1	2	4	10/23/2012	Data Processing

The following Feature Object Catalog was used for NOAA extended attributes: Object catalog version 5.2.

B.5.2 Surfaces

Table 11 lists the CARIS coverage surfaces that were generated for Survey H12427.

Table 11
H12427 CARIS Surfaces

Final Surface Name	Surface Type	Resolution (m)	Depth Range (m)	Surface Parameter	Purpose
H12427_West_CUBE_2m_Final	CUBE	2	13.5-20.0	MBES	Set Line Spacing Coverage
H12427_West_CUBE_4m_Final	CUBE	4	16.0-23.2	MBES	Set Line Spacing Coverage
H12427_East_CUBE_2m_Final	CUBE	2	19.1-20.0	MBES	Set Line Spacing Coverage
H12427_East_CUBE_4m_Final	CUBE	4	18.8-27.9	MBES	Set Line Spacing Coverage
Item-1_Inv_CUBE_0-5m_Final	CUBE	0.5	15.0-17.7	MBES	Obj Det Coverage
Item-2_Inv_CUBE_0-5m_Final	CUBE	0.5	16.5-17.3	MBES	Obj Det Coverage
Item-3_Inv_CUBE_0-5m_Final	CUBE	0.5	16.7-17.5	MBES	Obj Det Coverage
Item-4_Inv_CUBE_0-5m_Final	CUBE	0.5	16.8-17.7	MBES	Obj Det Coverage
Item-5_Inv_CUBE_0-5m_Final	CUBE	0.5	16.7-19.0	MBES	Obj Det Coverage
Item-6_Inv_CUBE_0-5m_Final	CUBE	0.5	16.9-18.0	MBES	Obj Det Coverage
Item-7_Inv_CUBE_0-5m_Final	CUBE	0.5	16.3-19.3	MBES	Obj Det Coverage
Item-8_Inv_CUBE_0-5m_Final	CUBE	0.5	17.8-18.7	MBES	Obj Det Coverage
Item-9_Inv_CUBE_0-5m_Final	CUBE	0.5	1.27-20.0	MBES	Obj Det Coverage
Item-10_Inv_CUBE_0-5m_Final	CUBE	0.5	18.8-20.5	MBES	Obj Det Coverage
Item-11_Inv_CUBE_0-5m_Final	CUBE	1	22.0-24.9	MBES	Obj Det Coverage
H12427_SSS_Coverage_100	Mosaic	1	all	SSS	100 % SSS Coverage
H12427_SSS_Coverage_200	Mosaic	1	all	SSS	200 % SSS Coverage

Survey H12427 was divided into two (2) field sheets to generate the Set Line Spacing coverage surfaces (Figure 25 and Table 11) based upon the number of grid nodes (limited by CARIS HIPS) per field sheet (less than 25 million nodes). Soundings from all cross line, mainscheme, and development MBES lines were included in the final coverage surface generation. The grid resolutions selected to demonstrate Set Line Spacing coverage were 2 meters for depths between 0 and 20 meters and 4 meters for depths between 16 and 40 meters, per Section *5.2.2.3 Set Line Spacing* of the HSSDM.

In addition to the Set Line Spacing coverage surfaces, eleven (11) small field sheets were generated over features that required Object Detection Coverage. To demonstrate object detection coverage, CUBE BASE Surfaces were created with resolutions of 0.5 meters in depths between 0 and 20 meters and 1 meter in depths between 19 and 40 meters, per Section *5.2.2.1 Object Detection Coverage* of the HSSDM. In the event that no feature was located following item investigation with MBES development lines, an object detection surface was not generated over that investigation area.

The Set Line Spacing and Object Detection Coverage surfaces were generated in CARIS HIPS using the CubeParams_NOAA.xml template file for the CUBE gridding and disambiguation process. The selected CUBE parameters were dependent upon the surface resolution. See the DAPR for additional information regarding methods and parameters used for final surface generation.

A 1-meter resolution coverage mosaic field sheet was created for each 100% SSS coverage.

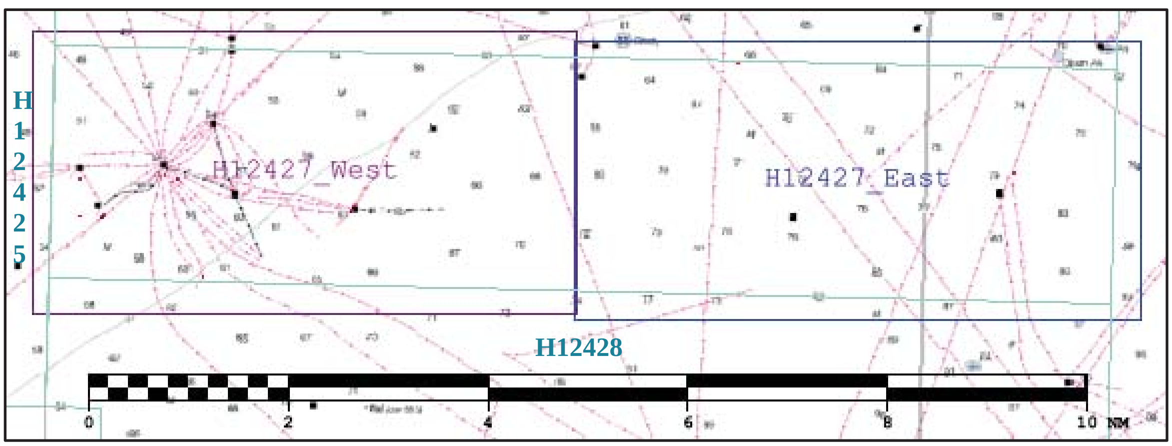


Figure 25. Final sub-area sounding field sheet layout for Survey H12427. RNC 11358 is in the background. The survey limits are colored in green.

C. VERTICAL AND HORIZONTAL CONTROL

C.1 Vertical Control

Additional information concerning the vertical and horizontal control for this survey can be found in the accompanying Horizontal and Vertical Control Report (HVCR) for Project OPR-K339-KR-12.

The vertical datum for this project is Mean Lower Low Water (MLLW). The NOS/NOAA tide station at Port Fourchon, LA (8762075) serves as datum control for Survey H12427 (Table 12). A final verified tide file was created from verified tide data obtained from the CO-OPS website upon completion of survey operations (Table 13).

Table 12
H12427 NOS Tide Station used for Vertical Control

Station Name	Station ID
8762075	Port Fourchon

Table 13
H12427 Water Level File

File Name	Status
8762075.tid	Verified

Discrete zoning methods were utilized to apply tide correctors in CARIS HIPS and SIPS. The survey area is located within Zones CGM389, CGM390, CGM369, CGM372, and CGM370 as provided in the preliminary tidal zoning scheme included with the project SOW. Based on the results of cross line analysis, the time and range factors as provided in the preliminary zoning scheme were adequate. Preliminary zoning was accepted as the final zoning for Project OPR-K339-KR-12 (Table 14).

Table 14
H12427 Tide Correctors

Zoning Corrector File	Status
OPRK339KR12.zdf	Final

C.2 Horizontal Control

The horizontal datum for this project is the North American Datum of 1983 (NAD83). All data products, except the S57 Final Feature File are referenced to Latitude/Longitude, UTM Zone 16 North. The S-57 Final Feature File, H12427.FFF.000, is referenced to the World Geodetic System Datum of 1984 (WGS 84) as specified in Section *8.2 S-57 Soundings and Features Deliverables* of the HSSDM.

All mainscheme line and item investigation position data were acquired using an Applanix POS-MV operating in Differential GPS (DGPS) mode. The unit was configured to receive USCG Differential beacon correctors from English Turn, LA. Differential beacon correctors from Eglin Air Force Base were used by the secondary navigation system to facilitate real-time horizontal control confidence checks (Table 15).

Table 15
H12427 USCG DGPS Stations used for Horizontal Control

DGPS Station Frequency	Station ID
293 kHz	English Turn (Primary)
295 kHz	Eglin Air Force Base (Secondary)

Prior to and during the course of the survey the accuracy of the primary positioning system was verified by means of a physical measurement to a project horizontal control point established at the vessel's berth. The project horizontal control points were established using the National Geodetic Survey's Online Positioning Users Service (OPUS). Position confidence checks were accomplished at least bi-weekly, during fuel or weather stops. Refer to the DAPR and HVCR for additional details.

D. RESULTS AND RECOMMENDATIONS

D.1 Chart Comparison

Chart comparisons were performed in CARIS HIPS/SIPS and Notebook using finalized BASE surfaces and contours and soundings generated from a combined final BASE surface. The latest editions of the NOAA NOS Raster Nautical Charts (RNC) and Electronic Nautical Charts (ENC) were downloaded from the NOAA Office of Coast Survey website (http://www.nauticalcharts.noaa.gov/) weekly during survey operations, and when the survey was completed for final comparisons. The RNCs and ENCs used for final comparisons, summarized in Table 16 and Table 17, were downloaded on August 4, 2012 and are submitted with the survey deliverables.

The Local Notice to Mariners (LNM) and Notice to Mariners (NM) issued during the survey period (May 25, 2012 to July 9, 2012) were reviewed for significant updates. Coast Guard District 8 LNM 32/2012 (August 8, 2012) was the final notice reviewed for this project.

The following sections adhere to the Descriptive Report sounding rounding system as described in section *5.1.2* of the HSSDM. Specifically, features described below having "precision" depths are presented in the following manner: ff feet (mm.mm meters, ±t.tt TPU) where

- ff = depth expressed in feet (chart units) having been rounded based on the precise meters expression of the depth and rounded using the 0.75 round value rule.
- mm.mm = depth expressed in meters
- ±t.tt = TPUexpressed in meters

An example of this notation follows: 80 feet (24.58 meters, ±0.24 TPU)

D.1.1 Raster Charts

Table 16 lists the only RNC within the survey area.

Table 16
H12427 Affected RNCs

Chart	Scale	Edition	Edition Date	LNM Date	NM Date
11358	1:80,000	57	7/2012	6/26/2012	7/7/2012

<u>11358</u>

In general, surveyed depths agreed within 3 feet of the charted depths, with the majority of surveyed depths slightly deeper than charted. In particular, surveyed depths were most noticeably deeper than charted in the western end of the survey area, as evidenced by the migration of the 60-foot contour approximately 980 to 3600 feet (300 to 1100 meters) closer to shore (northwest) than its charted location (Figure 26).

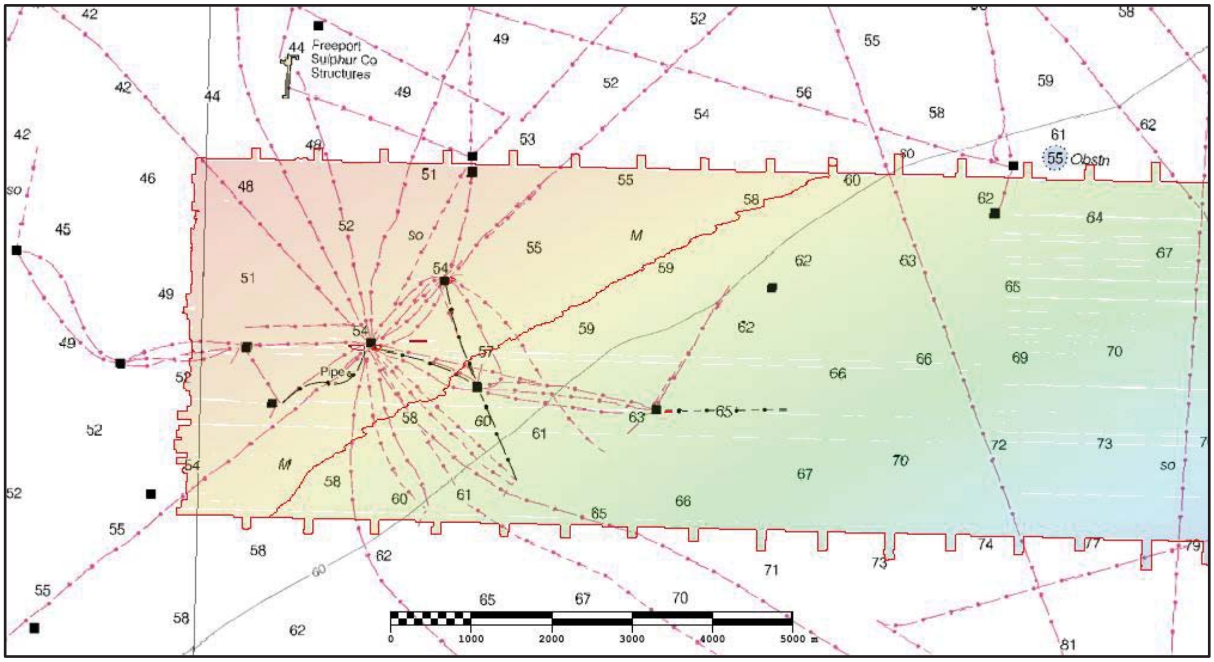


Figure 26. The surveyed 60-foot contour is displayed in red with the 2-meter BASE surface colored by depth overlain on RNC 11358. The charted 60-foot contour in grey is located approximately 980 to 3600 feet off shore from the surveyed location.

D.1.2 Electronic Navigational Charts

Table 17 lists the only ENC within the survey area.

Table 17
H12427 Affected ENCs

ENC	Scale	Edition	Update Application Date	Issue Date	Preliminary?
US4LA32M	1:80,000	29	7/2/2012	7/26/2012	No

US4LA32M

General chart comparison results for ENC US4LA32M were the same as discussed in the section above for RNC 11358, such that surveyed depths agreed within 3 feet of the charted depths and the same discrepancy in position between the surveyed and charted 60-foot contour was observed.

D.1.3 AWOIS Items

The southern portion of the investigation search area for AWOIS Item 14984 intersected with the H12427 survey area (Figure 27). The center of the AWOIS item search area fell within junction Survey H12426 at 29-07-24.00 N, 89-48-30.00 W where it was charted as an *Obstn PA*. The search area was investigated with 200% SSS coverage and 100% MBES coverage. No evidence of an obstruction was found with either sonar system. The AWOIS item's position, description and status are listed in Table 18.

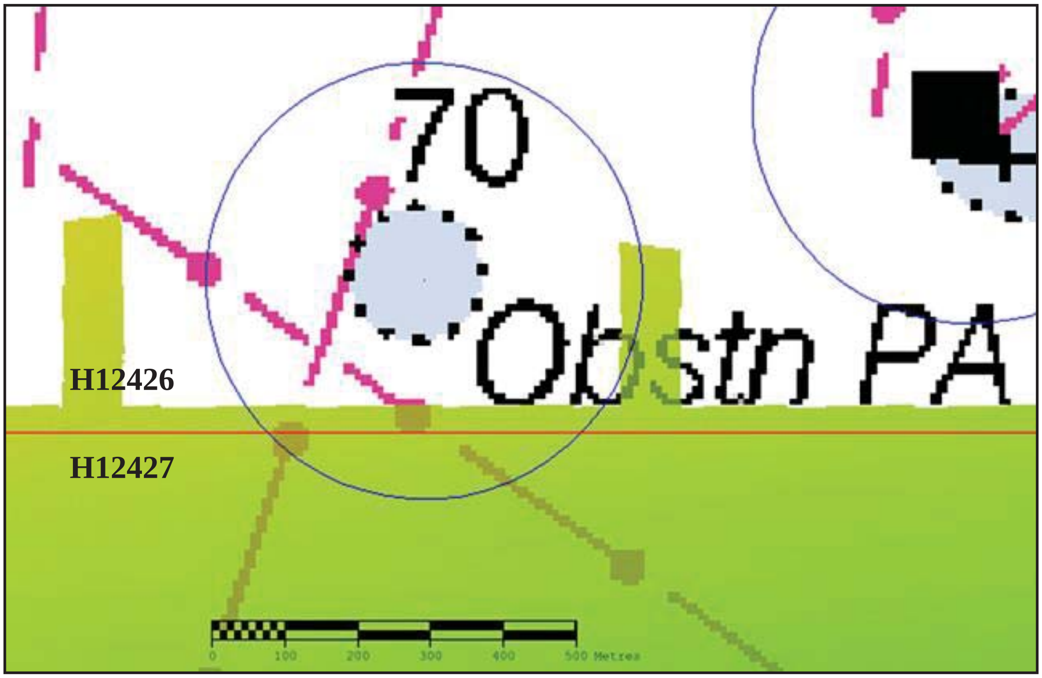


Figure 27. The southern portion of the search area for AWOIS Item 14984, represented by the blue circle, intersected with Survey H12427. In this image, a 4-meter coverage BASE surface colored by depth is overlain on RNC 11358. No evidence of an obstruction was found by SSS or MBES within the H12427 subset of the AWOIS search area.

Table 18
H12427 AWOIS Investigations

AWOIS Record	Latitude (N)	Longitude (W)	Description	Status
14984	29-07-24	89-48-30	LNM 50/84--8th CGD, 11/24/84; Submerged Object reported at 29 07 24 N 89 48 30 W (NAD 83).	Disproved in H12427

D.1.4 Charted Features

No charted features with the label *PA, ED, PD* or *Rep* were located within the survey limits of H12427. Charted platforms, pipelines and new features are discussed in the sections below.

D.1.5 Uncharted Features

An obstruction with a least depth of 49 feet (14.96 meters, ±0.26 TPU) was developed at 29-05-56.33 N, 89-59-40.62 W. The obstruction, possible pipe debris, is slightly over 5.9 feet (1.8 meters) tall (Figure 28). It is located approximately 490 feet (150 meters) south of a charted oil production platform, in the vicinity of charted pipelines, and offshore of charted depths of 51 and 52 feet (Figure 29). The obstruction is included in the S-57 Final Feature File.

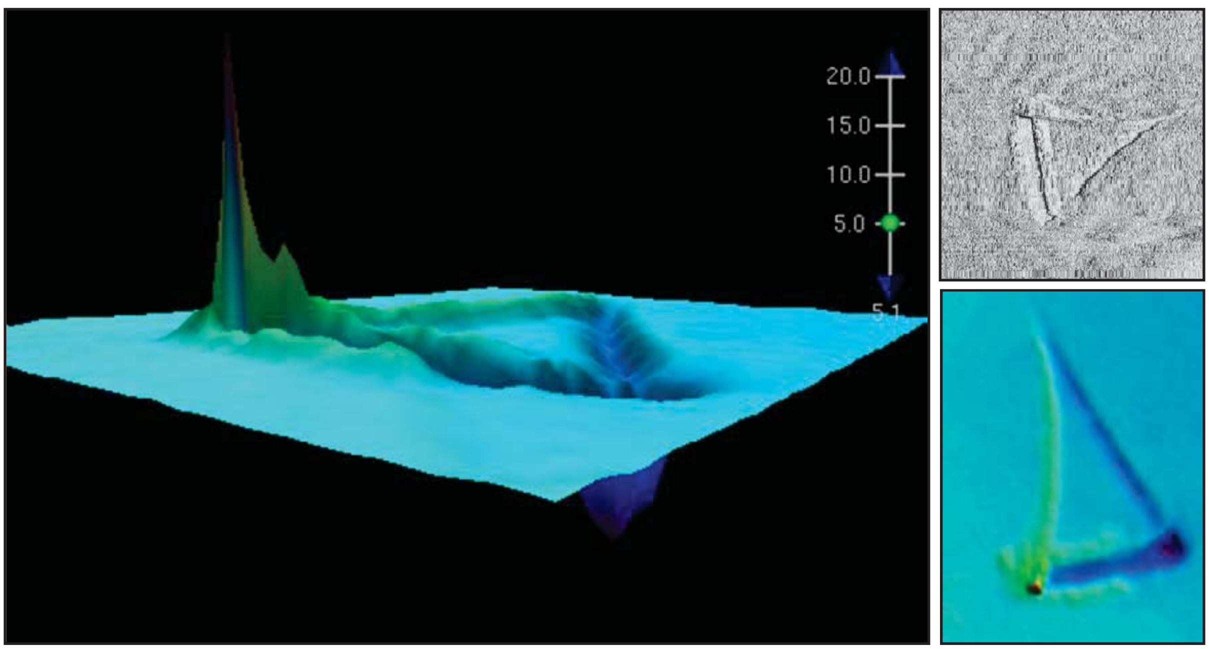


Figure 28. The triangular obstruction is displayed in multiple CARIS HIPS and SIPS editors in the 3 images above. The left image is a surface model of the soundings shown in Subset Editor 3D View. The top right image is the contact imagery taken from the Side Scan Editor waterfall window. The bottom right image shows the obstruction in the depth layer of a 50-cm resolution BASE surface.

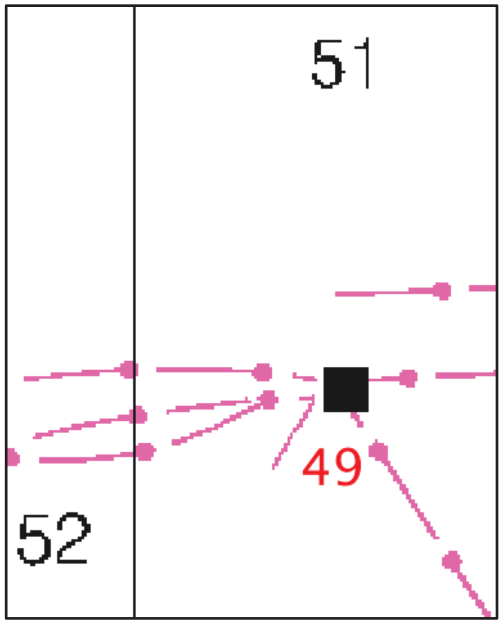


Figure 29. The position of the obstruction's least depth is highlighted in red shown relative to charted features and soundings from RNC 11358. Depths are in feet.

A 13.5-foot (4.1 meter) tall obstruction with a least depth of 44 feet (13.50 meters, ±0.24 TPU) was developed at 29-06-05.66 N, 89-58-43.97 W within the square footprint of a charted production platform and in the vicinity of a charted 54-foot depth (Figure 30). The obstruction appears to be a structure slightly detached from the base of the oil production platform. The platform base is located approximately 49 feet (15 meters) from the obstruction's least depth position (Figure 31). Due to the close proximity of the obstruction to a charted platform it was not submitted as a Danger to Navigation (DtoN). The obstruction is included in the S-57 Final Feature File.

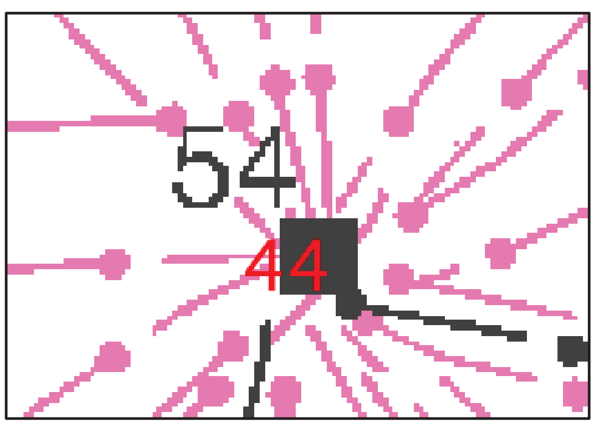


Figure 30. The position of the obstruction's least depth is highlighted in red shown relative to charted features and soundings from RNC 11358. Depths are in feet.

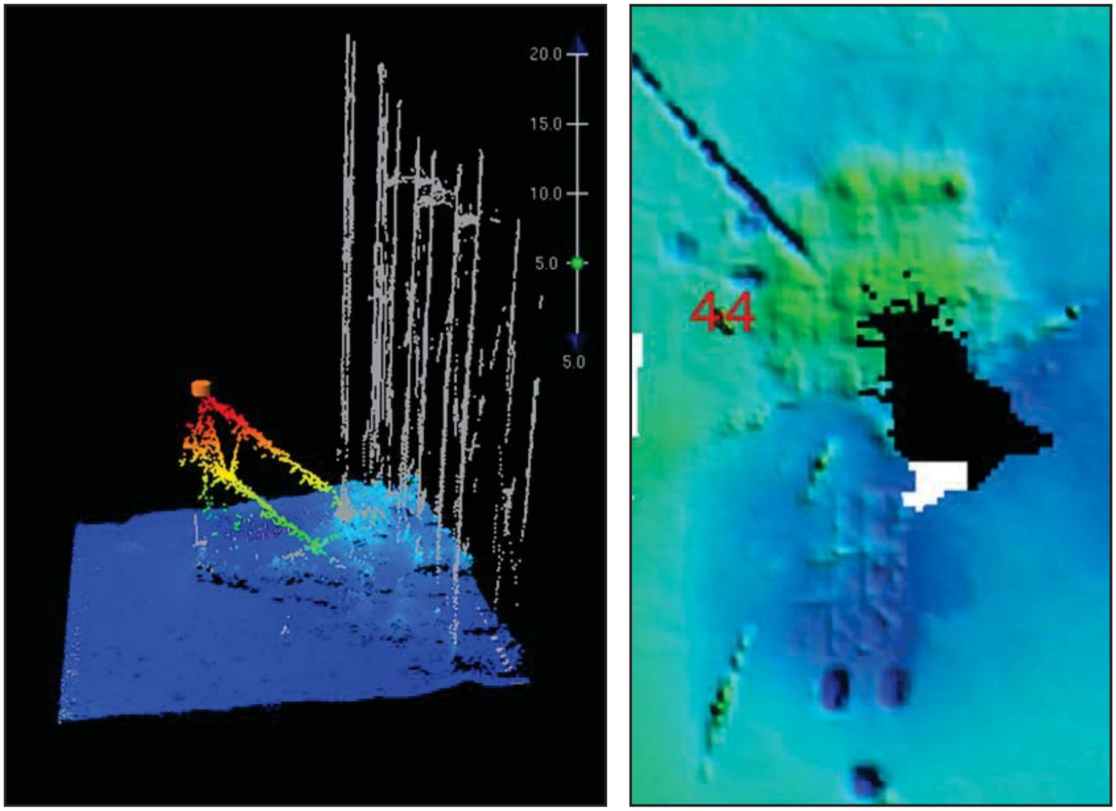


Figure 31. The left image taken in CARIS Subset Editor's 3D View shows the individual soundings colored by depth that comprise the obstruction and the surrounding seafloor with the base of the charted platform represented by the rejected soundings colored in grey. The right image shows the base of the charted platform in the depth layer of a 2-meter resolution surface with the obstruction's least depth highlighted in red. Depths are in feet.

A 5-foot (1.5 meter) tall obstruction with a least depth of 61 feet (18.78 meters, ±0.25 TPU) was located at 29-07-15.88 N, 89-52-11.58 W in the vicinity of a charted 66-foot depth (Figure 32). The obstruction is included in the S-57 Final Feature File.

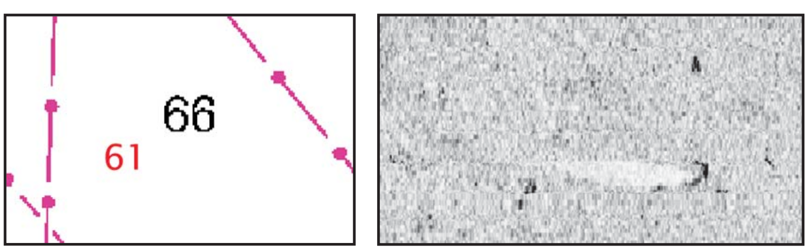


Figure 32. On the left, the position of the obstruction's least depth is highlighted in red shown relative to charted features and soundings from RNC 11358. Depths are in feet. On the right, is the contact SSS imagery from one side scan coverage.

Four narrow obstructions sticking out of the seafloor were located at 29-05-48.31 N, 89-57-53.64 W, the tallest of which was approximately 6.9 feet (2.1 meters) tall with a least depth of 55 feet (16.76 meters, ±0.26 TPU). The obstructions fall within the square footprint of a charted production platform and between charted depths of 57 and 60 feet (Figure 33). The obstruction with the shallowest least depth is included in the S-57 Final Feature File.

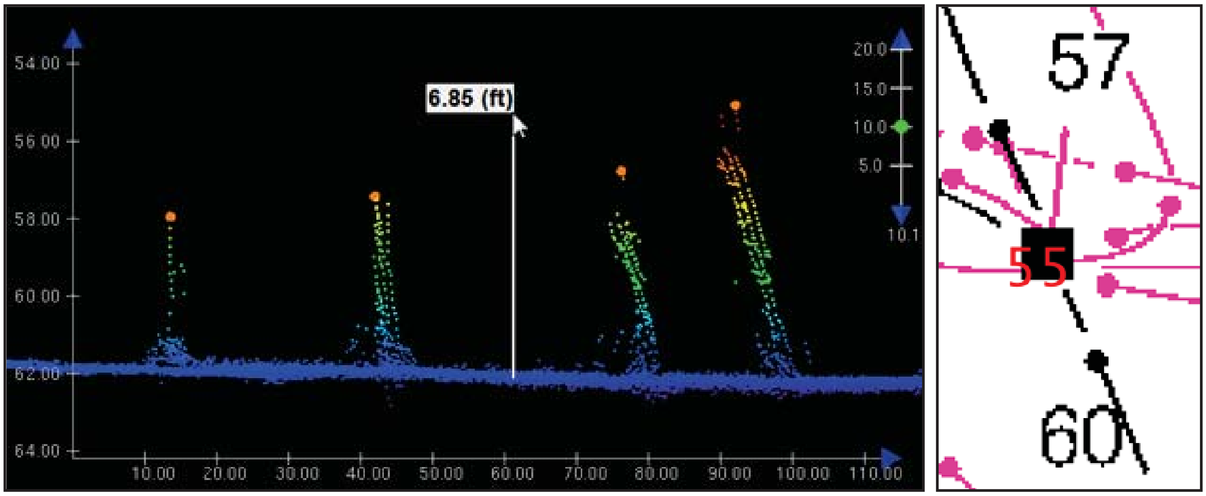


Figure 33. On the left, an image taken in CARIS Subset Editor 2D View shows the individual soundings colored by depth that comprise the four narrow obstructions. On the right, the position of the obstruction's least depth is highlighted in red shown relative to charted features and soundings from RNC 11358. Depths and distances are in feet.

A 7-foot (2.1 meter) tall obstruction with a least depth of 72 feet (22.03 meters, ±0.25 TPU) was located at 29-06-14.80 N, 89-49-00.65 W in the vicinity of a charted 79-foot depth (Figure 34). The obstruction is included in the S-57 Final Feature File.

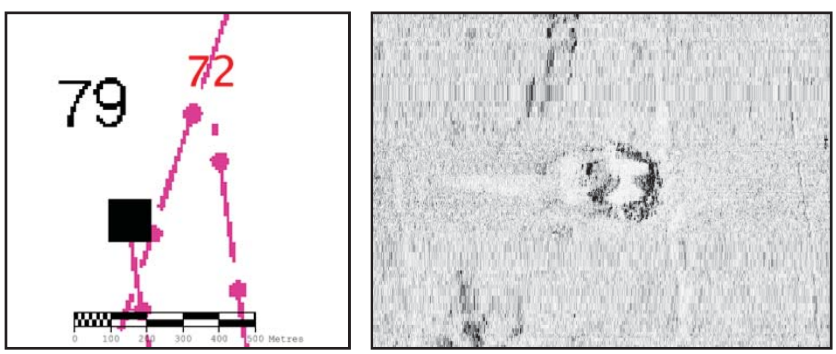


Figure 34. On the left, the position of the obstruction's least depth is highlighted in red shown relative to charted features and soundings from RNC 11358. Depths are in feet. The right image shows the contact as it appears in SSS imagery from one side scan sonar coverage.

A 9-foot (2.7-meter) tall obstruction with a least depth of 56 feet (17.16 meters, ±0.28 TPU) was developed at 29-05-42.16 N, 89-56-33.31 W, 40 feet (12 meters) west of a charted production platform and in the vicinity of a charted 63-foot depth (Figure 35). The obstruction appears to be a structure or a debris pile slightly detached from the base of the oil production platform. Due to the close proximity of the obstruction to a charted platform it was not submitted as a DtoN. The obstruction is included in the S-57 Final Feature File.

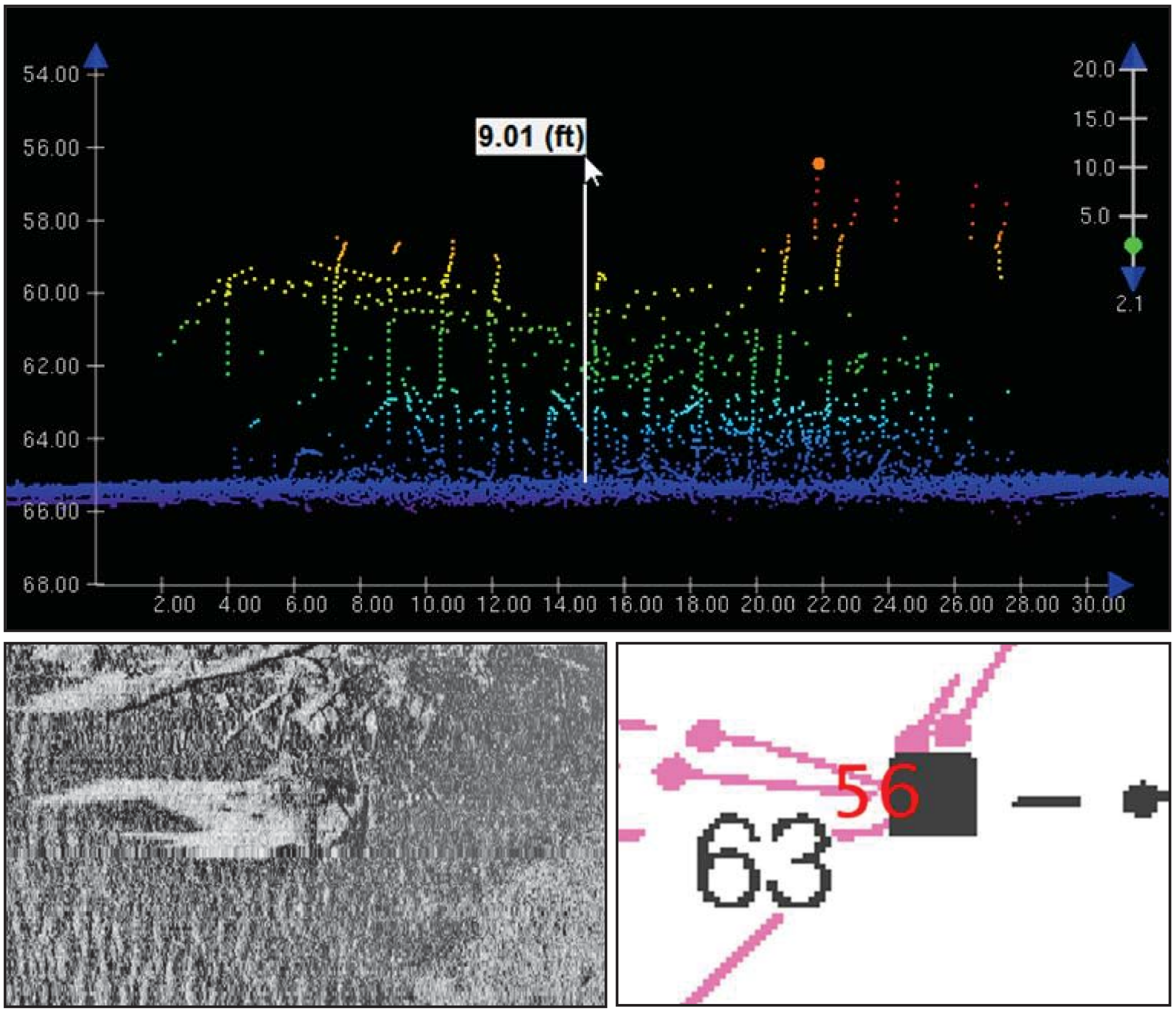


Figure 35. The top image taken in CARIS Subset Editor 2D View shows the individual soundings colored by depth that comprise the obstruction. The bottom left image shows SSS imagery of the feature from one side scan coverage. On the bottom right, the position of the obstruction's least depth is highlighted in red shown relative to charted features and soundings from RNC 11358. Depths and distances are in feet.

D.1.6 Dangers to Navigation

Two (2) DtoNs were submitted to the Atlantic Hydrographic Branch (AHB) on June 7, 2012, an obstruction and an uncharted flare stack. The coordinates and a brief description of the DtoNs are included in Table 19. During office processing, a new least depth of 53 feet (16.30 meters, ±0.25 TPU) was determined for an obstruction submitted as a DtoN (Figure 36), with a depth difference of 0.86 feet (0.26 meters) between the new and previously submitted least depth of 54 (16.56 meters ±0.24 TPU). Both DtoNs are included in the H12427 S-57 Final Feature File.

Table 19
H12427 Dangers to Navigation

S-57 Object Class	Latitude (N)	Longitude (W)	Least Depth [ft(m)]	Description	Status
OBSTRN	29-04-59.54	89-58-14.41	53 (16.30)	53-foot obstrn located seaward of chd (11358) 60-foot contour. In the vicinity of chd (11358) pipeline.	Not Added to Chart
LNDMRK	29-05-53.59	89-58-52.01	NA	Uncharted flare stack in the vicinity of mulitple oil production platforms.	Added to Chart as Pipe

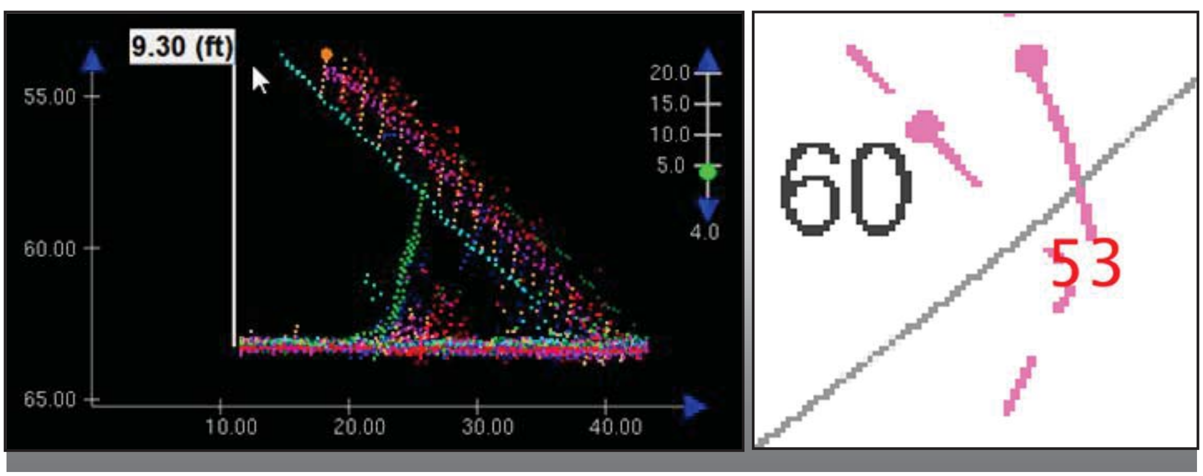


Figure 36. On the left, an image taken in CARIS Subset Editor 2D View shows the individual soundings colored by line that comprise the obstruction. On the right, the position of the obstruction's least depth is highlighted in red shown relative to charted features and soundings from RNC 11358. Depths and distances are in feet.

D.1.7 Shoal and Hazardous Features

No charted shoals were investigated for this survey.

D.1.8 Channels

No channels, anchorages, precautionary areas, safety fairways, traffic separation schemes, or pilot boarding areas exist for this survey.

D.2 Additional Results

D.2.1 Shoreline

No shoreline exists within this survey.

D.2.2 Prior Surveys

No Prior Survey Features were assigned for investigation.

D.2.3 Aids to Navigation

No Aids to Navigation were located within the survey area.

D.2.4 Overhead Features

Overhead features do not exist for this survey.

D.2.5 Submarine Features

A large number of charted pipelines, leading to and from offshore oil production platforms, were located within survey area H12427. There were two types of pipelines within the survey area, colored either magenta or black. Magenta pipelines are supply pipelines for oil, gas, chemicals, or water and the black coloration is indicative of outfall and intake pipelines, according to Chart No. 1: Nautical Chart Symbols, Abbreviations and Terms downloaded from the Office of Coast Survey (OCS) website (Figure 37). None of the charted pipelines had a buried depth value (BURDEP). That being said, the majority of the charted pipelines were not visible in the SSS or MBES data.

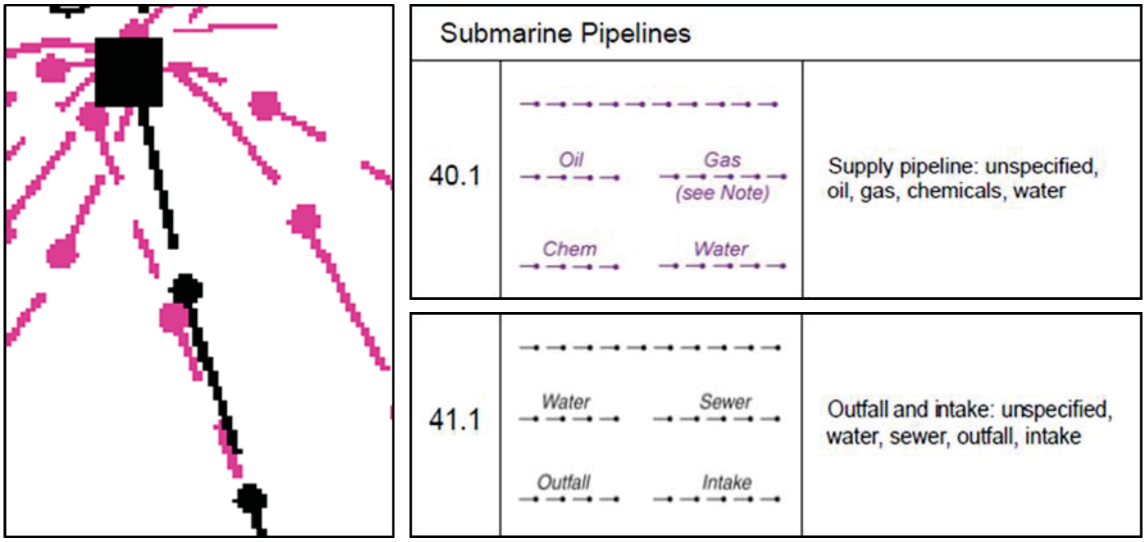


Figure 37. On the left, an example of charted pipelines from RNC 11358. On the right, a screen grab from Chart No. 1, Section L Offshore Installations, explains the NOAA chart symbols for the submarine pipelines encountered within Survey H12427.

Multiple linear contacts presumed to be exposed sections of charted pipelines were selected in the side scan records and confirmed with MBES coverage. Some sections of pipeline had a measurable height above the seafloor while others had little to no vertical relief. All pipelines visible in the SSS record, were digitized in CARIS SIPS Side Scan Editor as linear pipeline contacts whether buried in a trench or lying exposed on the surface. Table 20 lists the locations and a brief description of each section of exposed pipe. In situations where the exposed pipeline rose above the seafloor, a point contact was also selected at the location of the maximum height of the pipeline and used for contact correlation. Each pipeline section discussed below was digitized in CARIS Notebook and provided in the S-57 Final Feature File.

Table 20
H12427 Possible Exposed Pipelines

Start Latitude (N) Longitude (W)	End Latitude (N) Longitude (W)	Approximate Length [ft(m)]	Comments in reference to RNC 11358
29-06-31.87 089-58-13.49	29-06-31.84 089-58-12.69	70 (21.3)	The pipeline rises above the seafloor by approximately 4.4 feet (1.3 meters) and is located over a cluster of charted pipelines.

Start Latitude (N) Longitude (W)	End Latitude (N) Longitude (W)	Approximate Length [ft(m)]	Comments in reference to RNC 11358
29-06-30.29 089-58-09.22	29-06-30.77 089-58-09.05	50 (15.2)	The pipeline rises above the seafloor by approximately 5 feet (1.5 meters) and is located with the symbol footprint of a charted platform.
29-06-29.14 089-58-09.64	29-06-29.26 089-58-09.42	23 (7.0)	The pipeline rises above the seafloor by approximately 0.5 feet (0.15 meters) and is located over a charted pipeline.
29-06-28.55 089-58-08.36	29-06-29.06 089-58-08.46	51 (15.5)	The pipeline rises above the seafloor by approximately 1.3 feet (0.4 meters) and is located over a charted pipeline.
29-06-12.00 089-58-39.43	29-06-12.31 089-58-39.04	46 (14.0)	The pipeline rises above the seafloor by approximately 1.3 feet (0.4 meters) and is located 45 feet (13.7 meters) NW from a charted pipeline.
29-06-12.36 089-58-31.04	29-06-12.72 089-58-30.71	46 (14.0)	The pipeline rises above the seafloor by approximately 0.7 feet (0.2 meters) and is located between two charted pipelines.
29-06-10.16 089-58-33.90	29-06-10.54 089-58-33.49	60 (18.3)	The pipeline rises above the seafloor by approximately 0.75 feet (0.2 meters) and is located between two charted pipelines.
29-06-08.88 089-58-45.70	29-06-06.07 089-58-43.01	375 (114)	The pipeline trench is approximately 4 feet (1.2 meters) deep and is located 60 feet (18.3) NE from a charted pipeline extending from an oil production platform.
29-06-06.20 089-58-41.36	29-06-08.45 089-58-40.14	250 (76.2)	The pipeline rises above the seafloor by approximately 2.5 feet (0.76 meters) and is located between two charted pipelines extending from a charted oil production platform.

Start Latitude (N) Longitude (W)	End Latitude (N) Longitude (W)	Approximate Length [ft(m)]	Comments in reference to RNC 11358
29-06-06.75 089-58-40.98	29-06-07.50 089-58-40.19	110 (33.5)	The pipeline rises above the seafloor by approximately 0.75 feet (0.2 meters) and extends off of the pipeline listed in the previous row.
29-06-07.94 089-58-36.59	29-06-08.30 089-58-36.17	56 (17.0)	The pipeline rises above the seafloor by approximately 0.95 feet (0.3 meters) and is located over a charted pipeline.
29-06-05.35 089-58-40.73	29-06-05.81 089-58-39.95	84 (25.6)	The pipeline rises above the seafloor by approximately 4.3 feet (1.3 meters) and is located between two charted pipelines extending from a charted oil production platform.
29-06-05.65 089-58-39.70	29-06-05.69 089-58-39.47	20 (6.1)	The pipeline has less than 0.35 feet (0.1 meters) of vertical relief and is located between two charted pipelines extending from a charted oil production platform.
29-06-05.35 089-58-40.13	29-06-05.32 089-58-39.74	33 (10.1)	The pipeline has less than 0.35 feet (0.1 meters) of vertical relief and is located between two charted pipelines extending from a charted oil production platform.
29-06-04.42 089-58-37.40	29-06-04.44 089-58-36.68	65 (19.8)	The pipeline rises above the seafloor by approximately 0.7 feet (0.2 meters) and is located over a charted pipeline.
29-06-03.54 089-58-47.95	29-06-03.74 089-58-47.63	39 (11.9)	The pipeline is located 60 feet (18.3 meters) SE from a charted pipeline.
29-06-01.23 089-58-44.14	29-06-02.69 089-58-43.72	153 (46.6)	The pipeline rises above the seafloor by approximately 4.4 feet (1.34 meters) and is located between two charted pipelines extending from a charted oil production platform.

Start Latitude (N) Longitude (W)	End Latitude (N) Longitude (W)	Approximate Length [ft(m)]	Comments in reference to RNC 11358
29-05-58.56 089-58-33.80	29-05-58.36 089-58-33.28	48 (14.6)	The pipeline rises above the seafloor by approximately 3.15 feet (1.0 meter) and is located over a charted pipeline.
29-06-01.40 089-59-50.01	29-06-01.53 089-59-49.58	43 (13.1)	The pipeline has less than 0.35 feet (0.1 meters) of vertical relief and is located between two charted pipelines extending from a charted oil production platform.
29-06-03.16 089-59-42.14	29-06-03.31 089-59-41.06	97 (29.5)	The pipeline trench is approximately 1.3 feet (0.4 meters) deep and is located between two charted pipelines extending from a charted oil production platform.
29-06-02.73 089-59-42.08	29-06-02.97 089-59-40.97	111 (33.8)	The pipeline trench is approximately 1.85 feet (0.6 meters) deep and is located between two charted pipelines extending from a charted oil production platform.
29-06-01.13 089-59-41.57	29-06-01.89 089-59-40.81	101 (30.8)	The pipeline trench is approximately 0.7 feet (0.2 meters) deep and is located between two charted pipelines extending from a charted oil production platform.
29-05-59.84 089-59-40.69	29-06-00.35 089-59-40.57	60 (18.3)	The pipeline rises above the seafloor by approximately 4.3 feet (1.3 meters) and is located between two charted pipelines extending from a charted oil production platform.
29-05-59.26 089-59-40.06	29-05-59.34 089-59-39.57	46 (14.0)	The pipeline rises above the seafloor by approximately 0.1 feet (0.03 meters) and is located between two charted pipelines extending from a charted oil production platform.

Start Latitude (N) Longitude (W)	End Latitude (N) Longitude (W)	Approximate Length [ft(m)]	Comments in reference to RNC 11358
29-06-04.88 089-59-37.17	29-06-05.13 089-59-36.29	83 (25.3)	The pipeline rises above the seafloor by approximately 1 foot (0.3 meters) and is located 120 feet (36.6 meters) North of a charted pipeline extending from a charted oil production platform.
29-05-52.73 089-57-56.68	29-05-52.48 089-57-56.14	58 (17.7)	The pipeline rises above the seafloor by approximately 2.6 feet (0.8 meters) and is located over a charted pipeline.
29-05-49.81 089-57-52.14	29-05-49.84 089-57-51.08	94 (28.6)	The pipeline rises above the seafloor by approximately 3 feet (0.9 meters) and is located 120 feet (36.6 meters) North of a charted pipeline extending from a charted oil production platform.
29-05-49.21 089-57-52.11	29-05-48.94 089-57-51.37	70 (21.3)	The pipeline rises above the seafloor by approximately 2 feet (0.6 meters) and is located with the symbol footprint of a charted platform.
29-05-49.20 089-57-51.31	29-05-49.21 089-57-50.63	60 (18.3)	The pipeline rises above the seafloor by approximately 0.6 feet (0.2 meters) and is located 40 feet (12.2 meters) North of a charted pipeline extending from a charted oil production platform.
29-05-48.84 089-57-51.04	29-05-48.71 089-57-50.47	50 (15.2)	The pipeline is located over a charted pipeline with no vertical relief.
29-05-48.88 089-57-50.74	29-05-48.76 089-57-49.76	90 (27.4)	The pipeline rises above the seafloor by approximately 1.1 feet (0.3 meters) and is located over a charted pipeline.
29-05-47.32 089-57-46.03	29-05-47.02 089-57-44.88	113 (34.4)	The pipeline rises above the seafloor by approximately 0.5 feet (0.15 meters) and is located between two charted pipelines.

Start Latitude (N) Longitude (W)	End Latitude (N) Longitude (W)	Approximate Length [ft(m)]	Comments in reference to RNC 11358
29-05-48.46 089-57-44.08	29-05-47.85 089-57-42.44	160(48.7)	The pipeline is located over a charted pipeline with no vertical relief.
29-05-46.66 089-57-42.72	29-05-46.47 089-57-41.54	107 (32.6)	The pipeline is located between two charted pipelines extending from a charted oil production platform with no vertical relief.
29-05-35.39 089-56-40.88	29-05-35.65 089-56-40.70	34 (10.4)	The pipeline rises above the seafloor by approximately 0.95 feet (0.3 meters) and is located 100 feet (30.5 meters) NW of a charted pipeline extending from a charted oil production platform.
29-05-42.70 089-56-34.66	29-05-42.41 089-56-34.22	50 (15.2)	The pipeline is located over a charted pipeline with no vertical relief.
29-05-43.49 089-56-33.41	29-05-42.80 089-56-32.59	102 (31.1)	The pipeline rises above the seafloor by approximately 0.75 feet (0.2 meters) and is located between two charted pipelines extending from a charted oil production platform.
29-05-48.65 089-56-28.74	29-05-49.64 089-56-27.86	131 (39.9)	The pipeline trench is approximately 0.5 feet (0.15 meters) deep and is located over a charted pipeline.
29-06-03.48 089-59-29.05	29-06-03.48 089-59-28.55	44 (13.4)	The pipeline rises above the seafloor by approximately 3 feet (0.9 meters) and is located 80 feet (24.4 meters) south of a charted pipeline.
29-05-47.97 089-57-45.41	29-05-47.97 089-57-45.14	25 (7.6)	The pipeline rises above the seafloor by approximately 2.75 feet (0.8 meters) and is located 15 feet (4.5 meters) south of a charted pipeline.

D.2.6 Ferry Routes and Terminals

Ferry routes and terminals do not exist within this survey area.

D.2.7 Platforms

There were twelve (12) charted platforms assigned for investigation within Survey H12427, and of those platforms, three (3) were disproved with 200% SSS coverage and 100% MBES coverage. The assigned investigation positions, per the OCS provided Composite Source File (CSF), of two platforms (#487 and #478) are relatively close to one another (approximately 55 feet (16.7 meters)). As seen in Table 21, the updated survey position for each of these assigned investigations is equivalent as OSI has no knowledge of the history of either of the assigned platforms, i.e. which platform, if either, still exists. Updated positions for seven (7) of the nine (9) verified platforms were digitized from the center of the coverage surfaces in CARIS Notebook and were included in the S-57 Final Feature File. Assigned Platforms #487 and #478 were treated separately in this regard. Table 21 summarizes the results from the platform investigations.

Table 21
H12427 Charted Platform Investigation Results

Offshore Platform ID	Charted Position		Updated Survey Position		Distance between Charted and Surveyed Positions [ft(m)]	Chart Action
	Latitude (N)	Longitude (W)	Latitude (N)	Longitude (W)		
473	29-06-03.84	89-59-39.25	29-06-02.88	89-59-40.04	120.4 (36.7)	Update
483	29-05-40.84	89-59-26.25	29-05-40.65	89-59-23.21	272.0 (82.9)	Update
466	29-06-05.83	89-58-42.25	Same as Charted		NA	Retain
474	29-06-31.80	89-58-09.22	Same as Charted		NA	Retain
467	29-07-16.83	89-57-58.25	Disproved		NA	Remove

Offshore Platform ID	Charted Position		Updated Survey Position		Distance between Charted and Surveyed Positions [ft(m)]	Chart Action
	Latitude (N)	Longitude (W)	Latitude (N)	Longitude (W)		
493	29-05-49.83	89-57-53.25	29-05-49.37	89-57-52.95	54.8 (16.7)	Update
484	29-05-42.83	89-56-31.25	29-05-41.81	89-56-32.14	130.2 (39.7)	Update
475	29-06-32.83	89-55-38.25	Disproved		NA	Remove
486 VASTAR-GI-20-1	29-07-05.00	89-53-56.99	Disproved		NA	Remove
458 VASTAR-170-8	29-05-44.10	89-51-30.02	29-05-44.84	89-51-30.31	79.1 (24.1)	Update
487 EL PASO-113-5	29-06-01.60	89-49-09.09	29-06-02.15	89-49-09.63	66.9 (20.4)	Update (same updated survey position as #478)
478 SONAT-GOM-WD-39-1	29-06-01.50	89-49-09.70	29-06-02.15	89-49-09.63	72.8 (22.2)	Update (same updated survey position as #487)

A charted flare stack, with the S-57 categorization of LNDMRK (Landmark), at the assigned position of 29-07-16.83 N, 89-57-58.25 W, was disproved with 200% SSS coverage and 100% MBES coverage. The flare stack was associated with the charted platform ID 467 that was also disproved with full SSS and MBES coverage.

D.2.8 Significant Features

A seafloor seepage (assumed to be gas or liquid) was identified beyond the northern limits of Survey H12427 at 29-07-17.40 N, 89-59-16.87 W, overlapping with Survey H12426. Investigation MBES lines were acquired over the seepage location as it had initially been flagged as a significant contact. The seepage plume was surveyed as a dense cloud of bubbles detached from a depression in the seafloor that extended to the surface (Figure 38). All water column noise from the seepage was rejected from the sounding data set.

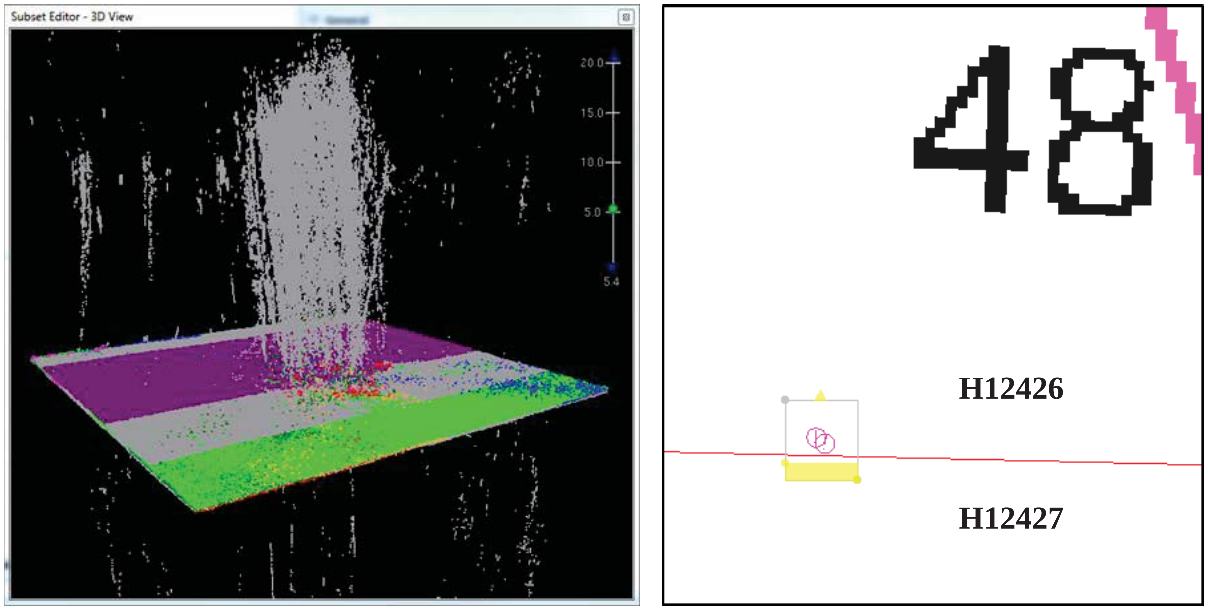


Figure 38. On the left, soundings acquired with a multibeam echosounder indicated gas or liquid in the water column emitted from a depression in the seafloor. On the right, the location of the seepage is denoted by two side scan contact symbols within a subset window with RNC 11358 in the background.

A depression in the seafloor less than a foot deep was located at 29-05-59.89N, 089-48-16.05W. The depression was created between the collection of MBES data on June 1, 2012 (DN 153) and the collection of MBES data on June 18, 2012 (DN 170). The irregular shape of the depression may indicate that it was created by a natural phenomenon (Figure 39). Perhaps it is a sinkhole.

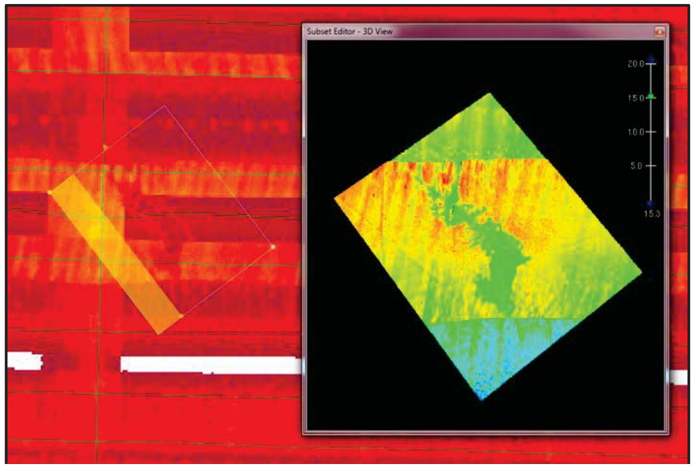


Figure 39. Possible sinkhole shown in the standard deviation layer of a 2-meter resolution BASE surface, and as soundings colored by depth in CARIS Subset Editor 3D View.

D.2.9 Construction and Dredging

Within the project area several temporary jack-up rigs were encountered on the surface during survey operations; the depressions left by their footprints were clearly evident on the seafloor. Examples of the impressions left by the jack-up rigs in the seafloor are shown in Figure 40.

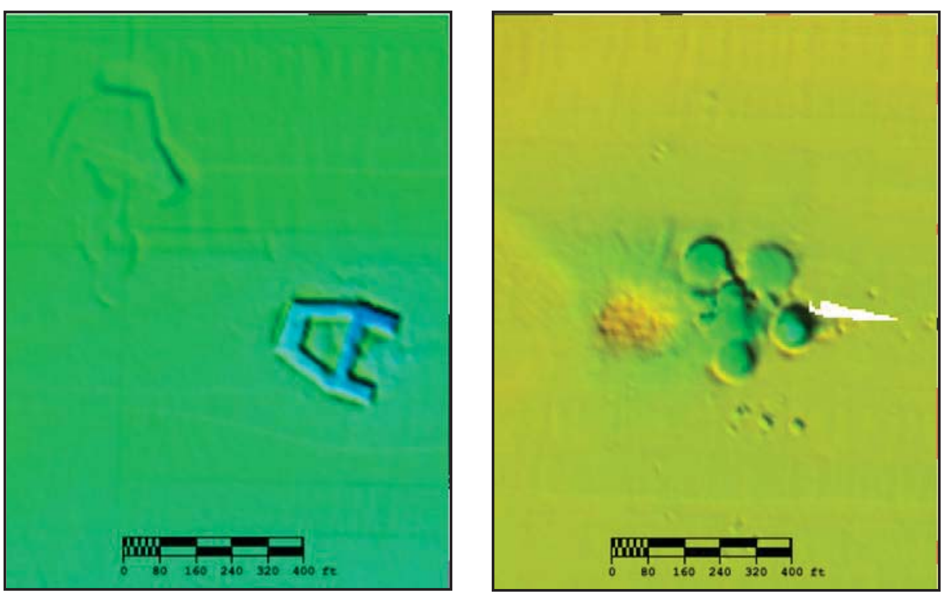


Figure 40. Examples of seafloor depressions left by temporary jack-up rigs shown in the depth layer of a 2-meter resolution BASE surface.

D.2.10 New Survey Recommendation

It is recommended that additional information be gathered to determine the type and source of the seafloor seepage documented in Section D.2.8.

E. APPROVAL SHEET

LETTER OF APPROVAL

REGISTRY NO. H12427

This report and the accompanying data are respectfully submitted.

Field operations contributing to the accomplishment of Survey H12427 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 Statement of Work.

Digitally signed by George G. Reynolds
DN: cn=George G. Reynolds, o=Ocean Surveys, Inc., ou, email=ggr@oceansurveys.com, c=US
Date: 2012.11.29 16:06:02 -05'00'

George G. Reynolds
Ocean Surveys, Inc.
Chief of Party – H12427
November 29, 2012

Project-wide reports, the Data Acquisition and Processing Report (DAPR) and the Horizontal and Vertical Control Report (HVCR), were submitted with contemporary survey H12425. They are named as follows:

Report Name	Date of Report
OPR-K339-KR-12_DAPR.pdf	November 27, 2012
OPR-K339-KR-12_HVCR.pdf	November 27, 2012

Appendix I

Tides and Water Levels

Abstract of Times of Hydrography

The following table, “Abstract of Times of Hydrography,” summarizes the days in which data were collected that contribute to the final accepted data set.

Date	Day Number	Min. Time UTC	Max. Time UTC
5/28/2012	149	10:02:21	20:45:54
5/29/2012	150	13:46:03	19:29:09
5/30/2012	151	03:43:29	23:46:09
5/31/2012	152	01:21:26	23:25:40
6/1/2012	153	01:38:18	21:51:47
6/2/2012	154	01:47:46	23:35:34
6/3/2012	155	00:41:23	23:48:24
6/4/2012	156	00:27:55	22:22:32
6/5/2012	157	00:53:40	23:43:41
6/6/2012	158	00:27:34	04:29:33
6/11/2012	163	18:44:42	21:26:44
6/17/2012	169	02:57:00	05:06:02
6/18/2012	170	13:23:02	23:53:01
6/19/2012	171	00:54:53	21:07:02
6/20/2012	172	12:48:55	21:41:22

Upon completion of field work and once available, verified tide data were downloaded from the CO-OPS website. Verified tides along with preliminary tidal zoning (provided with Tides SOW) were used to reduce soundings to chart datum (MLLW).

The COTR was notified via telephone communications that the OSI field team was ready to commence survey operations. The COTR subsequently instructed CO-OPS to begin providing OSI with verified tides. The COTR was notified via e-mail that field operations were completed. Email correspondence concerning tides follows.

From: Paul Turner [paul.turner@noaa.gov]
Sent: Tuesday, July 17, 2012 11:44 AM
To: George Reynolds
Subject: Re: OPR-K339-KR-12 Weekly Report July 13, 2012

Hi George-

Thank you for the update and I am glad to hear that the weather cooperated with you. Where you able to cover the entire area that was having the seismic testing?

Thanks,

Paul

On Mon, Jul 16, 2012 at 9:05 PM, George Reynolds <ggr@oceansurveys.com> wrote:

Hi Paul,

We had great weather after the storm passed through which allowed us to complete the field program. We have demobilized from the survey area and will turn our focus to data processing and reporting tasks.
We are looking forward to your visit this fall.

Please let me know if you have any questions or need additional information.

Thanks,
George

From: Kathleen Jamison [mailto:kathleen.jamison@noaa.gov]
Sent: Thursday, April 12, 2012 3:17 PM
To: George Reynolds
Subject: Re: Tide Component Error Estimate

It was indeed a typo (this highlights the advantage of xml forms!). Thanks for bringing this to our attention - we've made the correction. Attached is the revised SOW (just the one change you pointed out). We've saved the corrected version for our files as well.

On Thu, Apr 12, 2012 at 11:28 AM, George Reynolds <ggr@oceansurveys.com> wrote:

Hi Kathleen,

The quick response to the previous email was much appreciated. We have a follow-up question regarding the Tides SOW. A boiler plate error was located in Section 1.3.3. Tide Component Error Estimation, in which the value for the estimated tidal error contribution was referenced to Bar Harbor, ME not Barataria Bay. We wanted to confirm that the 0.11 meter error estimate is the correct value for the Barataria Bay zoning. Would it be better to address this question directly to Colleen Roche, the CO-OPS point of contact listed in the Tides SOW?

Thanks

George

--
Kathleen Jamison
Physical Scientist, Operations Branch
Hydrographic Surveys Division
Office of Coast Survey
NOAA National Ocean Service
Kathleen.Jamison@noaa.gov
301.713.2700 x126

STATEMENT OF WORK
OPR-K339-KR-2012 Approaches to Barataria Bay, LA
(02/27/2012 LH)

1.0. TIDES AND WATER LEVELS

1.1. Specifications

Tidal data acquisition, data processing, tidal datum computation and final tidal zoning shall be performed utilizing sound engineering and oceanographic practices as specified in National Ocean Service (NOS) Hydrographic Surveys Specifications and Deliverables (HSSD), dated April 2011.

1.2. Vertical Datums

The tidal datums for this project are Chart Datum, Mean Lower Low Water (MLLW) and Mean High Water (MHW). Soundings are referenced to MLLW and heights of overhead obstructions (bridges and cables) are referenced to MHW.

1.2.1. The Hydro Hot List (HHL)

Please contact CO-OPS' Hydrographic Planning Team (HPT) at nos.coops.hpt@noaa.gov and CO-OPS' Operational Engineering Team (OET) at nos.coops.oetteam@noaa.gov at least three business days before survey operations begin, and within 1 business day after survey operations are completed so that the appropriate CO-OPS National Water Level Observation Network (NWLON) control water level station(s), as well as any required subordinate station(s), is/are added to or removed from the CO-OPS Hydro Hotlist (HHL) (http://tidesandcurrents.noaa.gov/hydro). Include start and end survey dates, full project number (e.g. OPR-K339-KR-12), and control and subordinate station numbers. The notification must be sent to both teams as OET is responsible for configuring the station in the CO-OPS data base and HPT manages the addition and removal of stations from the HHL.

Station	Station ID	Control or Subordinate	Type (e.g. NWLON, PORTS©, etc)	Comment
Port Fourchon	8762075	Control	PORTS©	

Table 1: All stations that need to be added to the HHL in support of K339-KR-2012

It is important to know that the addition of a water level station to the HHL ensures the station is monitored by CORMS and any problems are reported daily. However, platforms should view the HHL each morning of active survey operations and click on the eyeball icon to double check that there are not problems with the required stations on that day. If a platform notices problems with data on their survey day of operation, please contact HPT at nos.coops.hpt@noaa.gov, CORMS at CORMS@noaa.gov, and their respective headquarters point of contact at HSD or NSD. Stations on the HHL are given priority for maintenance should a station cease normal operation during scheduled times of hydrography. CO-OPS will notify a field unit within 1 business day if a HHL water level station ceases operation during scheduled times of hydrography. This is in addition to the daily CORMS report that CORMS sends to NOAA field units, if the field unit's e-mail address is added to the CORM's daily e-mail list. To be added to the CORMS daily HHL report, the platform should contact CO-OPS' Data Monitoring and Analysis Team (DMAT) at nos.co-ops.dmat@noaa.gov and request to be added.

If the stations are listed on HHL, then weekly priority processing will occur and, for those water level stations, verified 6-minute water level data will be made available every week on Monday or Tuesday. If Monday happens to be a federal holiday, then the 6-minute verified water level data will be made available on the following Tuesday or Wednesday.

1.3. Tide Reducer Stations

The operating water level station at Port Fourchon, LA (8762075) will provide water level reducers for this project. Therefore it is critical that it remains in operation during the survey.

1.3.1. CO-OPS Long Term Water Level Station Operation and Maintenance

During periods of hydrography, CO-OPS is only responsible for the operation and maintenance of NWLON control stations and the contractor is responsible for the maintenance and operations of all contractor installed (tertiary) stations. The contractor is required to monitor the NWLON control water level data via the CO-OPS website at http://tidesandcurrents.noaa.gov/hydro.shtml or through regular communications with the OCS COTR or the OCS COTR's CO-OPS authorized point of contact (Colleen Roche at 301-713-2900 x 137 or via email: nos.coops.oetteam@noaa.gov) before and during operations. The OCS COTR or the COTR's CO-OPS authorized point of contact (Colleen Roche) will serve as liaison between the contractor and NOS/CO-OPS to confirm operation of this station and to ensure the acquisition of NWLON control water level data during periods of hydrography. Problems or concerns regarding the acquisition of valid water level data identified by the contractor shall be communicated with the OCS COTR or the COTR's CO-OPS authorized point of contact (Colleen Roche) to coordinate the appropriate course of action to be taken such as gauge repair and/or developing contingency plans for hydrographic survey operations.

1.3.2. Subordinate Station Requirements

No subordinate water level stations are required for this project, however, supplemental and/or back-up water level stations may be necessary depending on the complexity of the hydrodynamics and/or the severity of the environmental conditions of the project area. The installation and continuous operation of water level measurement systems (tide gauges) at subordinate station locations is left to the discretion of the contractor, subject to the approval of the COTR. If the contractor decides to install additional water level stations, then a 30-day minimum of continuous data acquisition is required. For all subordinate stations, data must be collected throughout the entire survey period for which they are applicable, and not less than 30 continuous days. This is necessary to facilitate the computation of an accurate datum reference as per NOS standards.

1.3.3. Tide Component Error Estimation

The estimated tidal error contribution to the total survey error budget in the vicinity of Barataria Bay, LA is 0.11 meters at the 95% confidence level, and includes the estimated gauge measurement error, tidal datum computation error, and tidal zoning error. Based on this result, no subordinate stations are required. It should be noted that the tidal error component can be significantly greater than stated if a substantial meteorological event or condition should occur during time of hydrography.

1.3.4. Water Level Records: If subordinate water level stations are installed, submit water level data, such as leveling records, field reports, and any other relevant data/reports, including the data downloaded onto diskette/CD as specified in the latest version of the NOS Specifications and Deliverables document.

1.3.4.1. Tidal records should be forwarded to the following address:

NOAA/National Ocean Service/CO-OPS
Chief, Engineering Division
N/OPS1 - SSMC4, Station 6531
1305 East-West Highway
Silver Spring, MD 20910

1.3.5. This section is not applicable to this project.

1.3.5.1. This section is not applicable to this project.

1.3.6. This section is not applicable to this project.

1.4. Zoning

1.4.1. The water level station at Port Fourchon, LA (8762075) is the reference station for predicted tides for hydrography Approaches to Barataria Bay, AL. The time and height correctors listed below for applicable zones should be applied to the predicted tides at the station indicated during the acquisition and preliminary processing phases of this project.
Predictions may be retrieved in one month increments over the Internet from CO-OPS SOAP web services at http://opendap.co-ops.nos.noaa.gov/axis/text.html. The contractor must notify the COTR or the COTR's authorized representative immediately of any problems concerning the predicted tides. Predictions are six-minute time series data relative to MLLW in metric units on Greenwich Mean Time. For the time corrections, a negative (-) time correction indicates that the time of tide in that zone is earlier than (before) the predicted tides at the reference station. A positive (+) time correction indicates that the time of tide in that zone is later than (after) the predicted tides at the reference station. For height corrections, the water level heights **relative to MLLW** at the reference station are multiplied by the range ratio to estimate the water level heights relative to MLLW in the applicable zone.

Zone	Time Corrector (min)	Range Ratio	Predicted Reference Station
CGM364	-12	x1.09	8762075
CGM369	-12	x1.09	8762075
CGM370	-24	x1.09	8762075
CGM372	-18	x1.09	8762075
CGM389	-6	x1.09	8762075
CGM390	-12	x1.09	8762075
CGM727	-18	x1.09	8762075

1.4.2. Polygon nodes and water level corrections referencing Port Fourchon, LA (8762075) are provided in ASCII format denoted by a *.zdf extension file name. Zoning diagrams, created in MapInfo, are provided in both digital and hard copy format to assist with the zoning. Longitude and latitude coordinates are in decimal degrees. Negative (-) longitude is a MapInfo representation of West longitude.

“Preliminary” data for the control water level station, Port Fourchon, LA (8762075), are available in near real-time and verified data will be available on a weekly basis for the previous week. **These water level data may be obtained from CO-OPS SOAP web services at http://opendap.co-ops.nos.noaa.gov/axis/text.html.**

1.4.3 Zoning Diagram(s)

Zoning diagrams, created in MapInfo® and Adobe PDF, are provided in digital format to assist with the zoning in section 1.4.1.

1.5. Final Zoning

1.5.1. For final processing, apply tidal zoning correctors to “verified” observed data of the NOS control station and/or the final processed data of the subordinate stations.

Appendix II

Supplemental Survey Records and Correspondence

Correspondence

E-mail correspondence between OSI and the COTR/NOAA personnel follows.

From: Kathleen Jamison [mailto:kathleen.jamison@noaa.gov]
Sent: Wednesday, April 11, 2012 9:10 AM
To: George Reynolds
Cc: J. Corey Allen; Marc Moser; Turner, Paul
Subject: Re: FW: Additional Project Files

Hi George,

I'll address your questions in order:

1) We are expecting the 2012 Specs & Deliverables to be released early next week. They are currently in final review by the Board of Hydrographers.

2) Tidal zone files and tides statement of work - attached

3) For the 2012 field season only, you have permission from NOAA/HSD Ops to use your current version of Velocwin that uses Wilson's equation for computing sound velocity from CTD casts. Please document this waiver in each DR for this project and note that you are using the CTD as a backup in case of an MVP failure.

4) XML DR Schemas - Corey Allen is finalizing the schemas and will deliver to you by April 20.

-Kathleen

On Tue, Apr 10, 2012 at 10:34 AM, George Reynolds <ggr@oceansurveys.com> wrote:
Hi Kathleen,

Thank you for the updated Project Instructions and the Composite Source files. We don't foresee any trouble in implementing the Extended Attributes into our workflow. Is there an expected release date for the 2012 Specs?

Tide zoning was not included with the project instructions zip file. Preliminary tidal zoning has been provided by CO-OPS for our prior NOAA projects, will the preliminary discrete tidal zones with uncertainty values be available for this project as well?

I also wanted to obtain clarification on the use of Velocwin for the processing of CTD casts. The 2011 specs state in section 5.2.3.3 "Sound Speed values derived from Conductivity, Temperature, and Depth measurements shall be calculated using the Chen-Millero equation. Use of Wilson's equation is no longer authorized." To our knowledge the latest version of Velocwin that we have (8.92) utilizes Wilson's equation for conversion of CTD casts taken with Seabird SBE 19 plus units. We intend to use the MVP's SV&P sensor to acquire all sound speed profiles that will be used for sounding correction; the SV&P sensor outputs sound speed versus depth directly. However, CTD units are used for comparison casts and would be our secondary method for sound speed profile acquisition should the MVP fail.

Can we use Velocwin to process CTD casts for use in DQA and in the event that the MVP fails to derive sound speed correctors from our Seabird 19 plus units for project OPR-K339-KR-12?

Lastly, we hope to deliver our DRs in the NOAA XML format. Is it possible to obtain the latest version of the XML schema, so that we can begin formating the DAPR?

Thanks for your assistance.

George

--

Kathleen Jamison
Physical Scientist, Operations Branch
Hydrographic Surveys Division
Office of Coast Survey
NOAA National Ocean Service
Kathleen.Jamison@noaa.gov
301.713.2700 x126

From: Paul Turner [mailto:paul.turner@noaa.gov]
Sent: Monday, June 04, 2012 2:47 PM
To: George Reynolds
Subject: Re: DTON question

Hi George,

I would recommend not submitting this as a DTON as it is only a temporary construction rig. I do recommend addressing this in the DR and noting if it prevent's the ship from surveying a portion of the assigned sheet(s), awois item(s), aton's,etc...

Thank you for bring this to my attention and please let me know if you have any additional questions.

Paul

On Mon, Jun 4, 2012 at 1:49 PM, George Reynolds <ggr@oceansurveys.com> wrote:

Hi Paul,

It is possible that we will encounter an uncharted jack up rig that is either involved with construction or drilling. The jack up installation may be temporary, i.e. servicing a pipe, or semi-permanent, i.e. drilling for months... The question is, should we consider a jack up rig a DTON if it is not charted or discussed in a notice to mariners?

Thanks
George

George Reynolds
Ocean Surveys, Inc.
129 Mill Rock Road East
Old Saybrook, CT 06475

860 388 4631 Ext 112
www.oceansurveys.com

From: Dinah Morris [mailto:dinah.morris@noaa.gov]
Sent: Thursday, June 07, 2012 3:50 PM
To: ggr@oceansurveys.com; dts@oceansurveys.com
Subject: H12427 DTONs

Good Day,
Please find attached a zip file for survey H12427 DtoN#1_FlarePipe.zip, which includes a Flare Pipe (Baring) feature for submission to Marine Chart Division (MCD). The contents of the attached WinZip file were generated at Atlantic Hydrographic Branch. The attached zip file contains a DtoN Letter (PDF) and a Pydro XML file.

If you have any questions, please direct them back to me; email me or call me at 757-441-6746
x103.

PLEASE NOTE: (1) A 54ft OBSTRN was submitted and after review has been recommended not to be added to the chart due to its location on a charted linear obstruction. AHB will not submit to Nautical Data Branch. (2) There was no acquisition time stamp submitted for this DtoN submission. In future submittals, please provide the time stamp.

Thank you for your assistance with this matter,

Dinah M. Oliver
****

On Thu, Jun 7, 2012 at 12:15 PM, George Reynolds <ggr@oceansurveys.com> wrote:

Hi Paul,

Attached are two DTON reports for H12427.

Please give me a call if you have any questions or need additional information.

Thanks
George

George Reynolds
Ocean Surveys, Inc.
129 Mill Rock Road East
Old Saybrook, CT 06475

860 388 4631 Ext 112
www.oceansurveys.com

From: George Reynolds [ggr@oceansurveys.com]
Sent: Thursday, June 21, 2012 2:36 PM
To: 'Paul Turner'
Cc: 'Castle E Parker'
Subject: RE: OPR-K339-KR-12 Weekly Report June 15, 2012

Hi Paul,

We have a MB topic that we would like discuss with you or Gene at the branch. If you are out this week should I try to contact Gene?

Thanks
George

From: Paul Turner [mailto:paul.turner@noaa.gov]
Sent: Thursday, June 21, 2012 9:44 AM
To: George Reynolds
Subject: Re: OPR-K339-KR-12 Weekly Report June 15, 2012

Hi George,

Thank you for the project update. I am currently out of the office and will be unavailable until this coming Monday (6/25/12) but would be happy to speak with you any time next week.

Are you available Monday at 2:00 (you are on Central time - correct).

Paul

On Wed, Jun 20, 2012 at 6:40 PM, George Reynolds <ggr@oceansurveys.com> wrote:

Hi Paul,

We have completed about 70 % of the H12428 main scheme lines and have developed several contacts. Weather conditions this week continue to cause SSS surface noise issues in the shallow water portions of H12425 and H12426. We will continue survey operations in deeper water of H12428 until weather conditions subside.

We discovered an issue with our Reson 7101 this week. The 7101 was removed from the vessel and a Reson 7125 was installed. We plan to employ the 7125 for the remainder of the survey.

I would like to discuss a few items with you when you have chance. Please let me know what time works for you.

Please let me know if you have any questions or need additional information.

Thanks,
George

From: Castle Parker [mailto:castle.e.parker@noaa.gov]
Sent: Thursday, June 21, 2012 12:29 PM
To: George Reynolds; Paul Turner
Subject: RE: OPR-K339-KR-12 MB artifact

George,
It looks like you are still getting a swath width of approximately 50m on the starboard side with ~22m on the port with combined swath width of ~ 70m or greater; that's good. I think that what you recommend with rejecting the outer swath regions ~45° to 70° is the way to handle the artifact from the Reson 7101 data. That way, you don't have to re-run and only filter the off angle and still get good usable data.

If you left the 40-70° in the bathy data, the fact that it dips down is less of a source for sounding selections. However, the grid would get pulled down as well and creating a grid artifact. Bearing in mind there is not sounding spacing interval spec, I concur with filtering the port outer beams and keep the good data.

If you wanted to decrease the MB gaps between the different lines would be to decrease line spacing but that would provide more SS overlap. Since this is an SS survey for Object Detection, and considering your sea state issue, I suggest to continue letting the SS range scale be the guide for the line spacing. Hey, even with the outer port beams filtered, you're still getting 70m+ MB swath width.

Thanks for your input and the opportunity for discussion.
Regards,

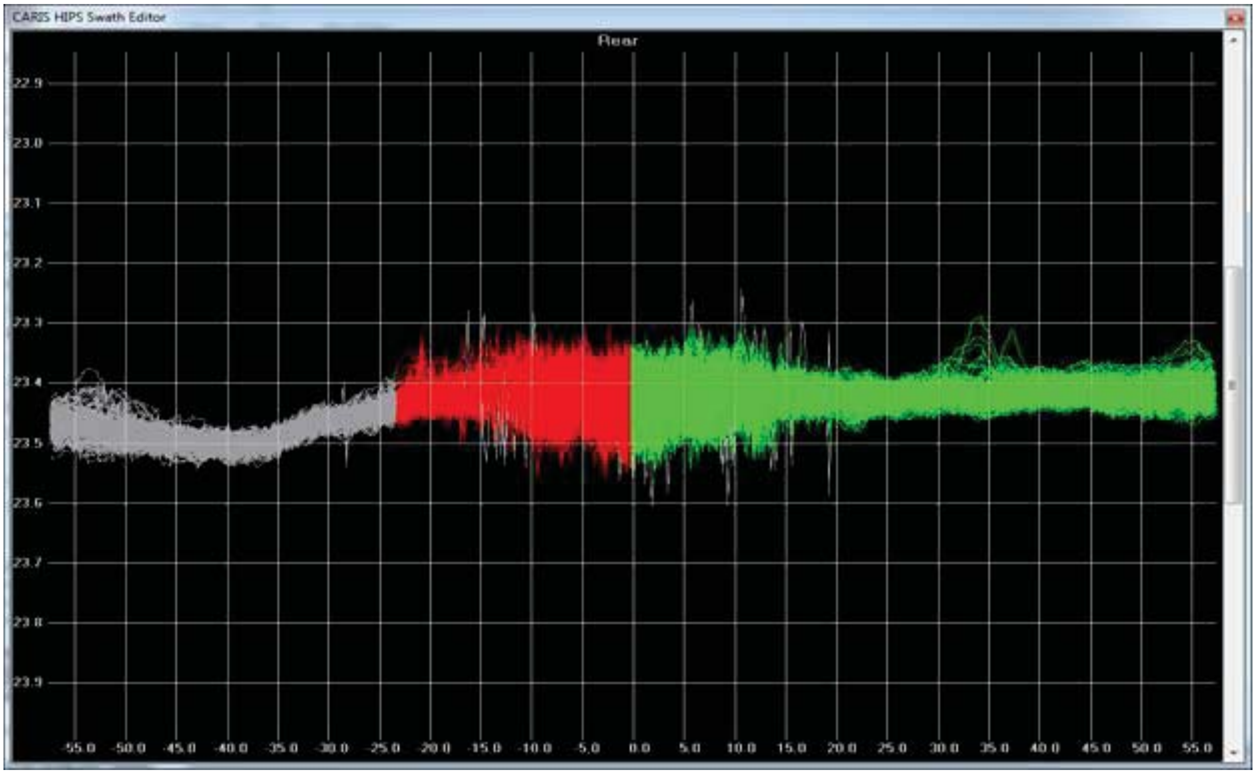
Gene

From: George Reynolds [mailto:ggr@oceansurveys.com]
Sent: Thursday, June 21, 2012 12:08 PM
To: 'Castle E Parker'; 'Paul Turner'
Subject: OPR-K339-KR-12 MB artifact

Hi Gene,
The following summarizes the Reson 7101 issue we discussed. Note: we have replaced this system with a Reson 7125 which we plan to use for the remainder of the survey. On review of the multibeam data acquired during the first leg of this survey, a constant systematic artifact was discovered. This feature is evident between roughly 45 degrees and 70 degrees on the port side. The "smile" shaped signature has a typical maximum downward deflection of about 10cm at about 60 degrees before trending upward to a deflection of 5cm at 70 degrees. The presence of this ? 10cm artifact exceeds the Reson stated vertical uncertainty of 5cm for this system.

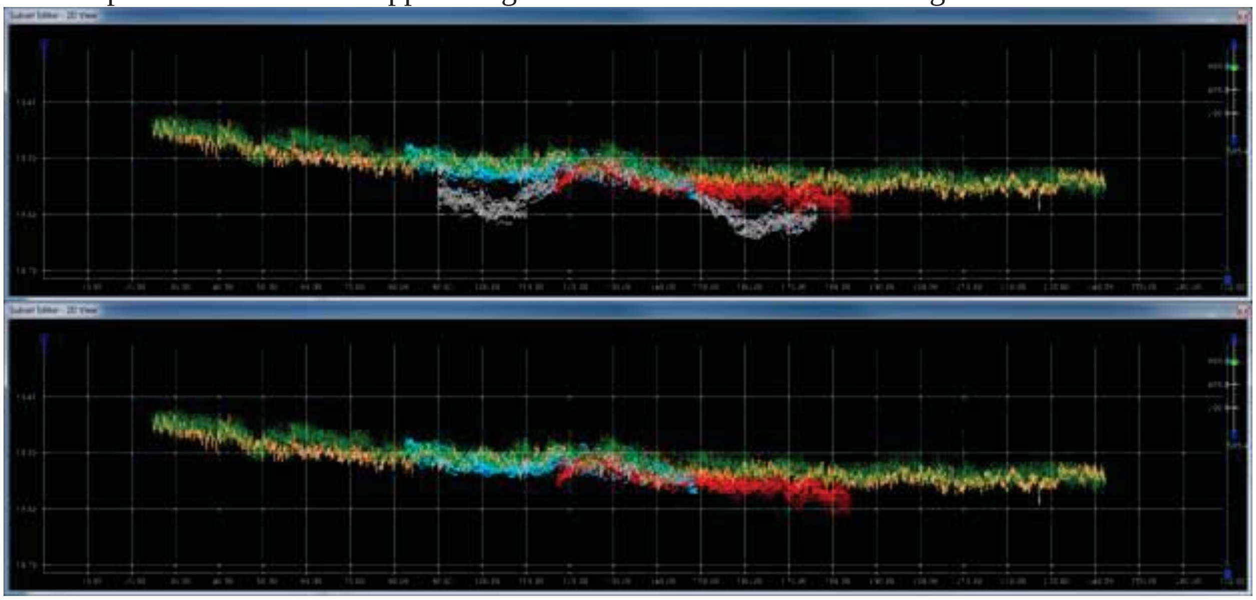
Preliminary data processing results indicate that the suspect data will still be within the TVU for this survey. However, it is our opinion that soundings obtained within the suspect portion of the swath be rejected and only used when necessary to support contact identification/verification

(i.e. not object detection).
The following examples are presented for reference. Caris files are available on our website should you wish to examine these data more closely. Example of the "smile" artifact in grey (50x vertical exaggeration)

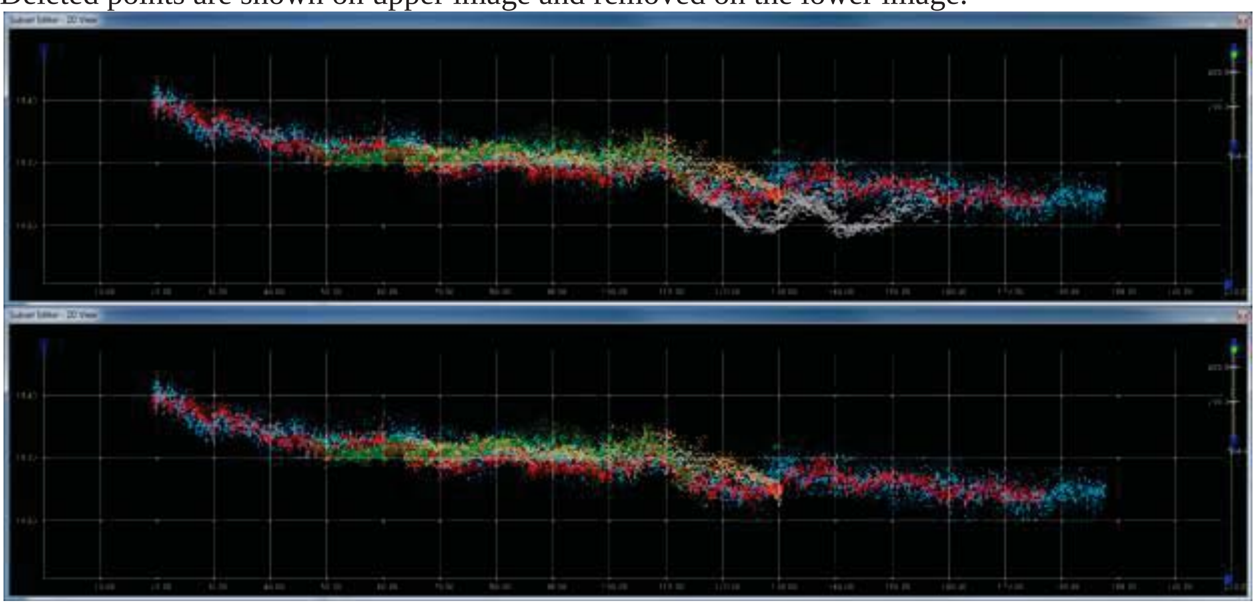


Below are figures showing four lines with two lines run perpendicular to the other two lines. Data have been filtered to 45 degrees on the port side; starboard side was not filtered and extends to 70 degrees.

Deleted points are shown on upper image and removed on the lower image.



Deleted points are shown on upper image and removed on the lower image.



Please contact me if you have any questions or need additional information.
Thanks
George

From: Castle Parker [mailto:castle.e.parker@noaa.gov]
Sent: Monday, July 02, 2012 7:16 AM
To: George Reynolds; Paul Turner
Cc: Abigail Higgins
Subject: RE: H12425 Multibeam Sub bottom Penetration

Good day George,
I would have to agree with you. What else can you do? If you kept the nadir regions, the selected depths would be coming from the shoaler areas within the grid swath. By rejecting the nadir regions, and depending on the grid resolution, only quality data would be supporting the grid. This is simply a situation that one can't avoid. The GOM is great for this type of thing.

I concur.

Gene

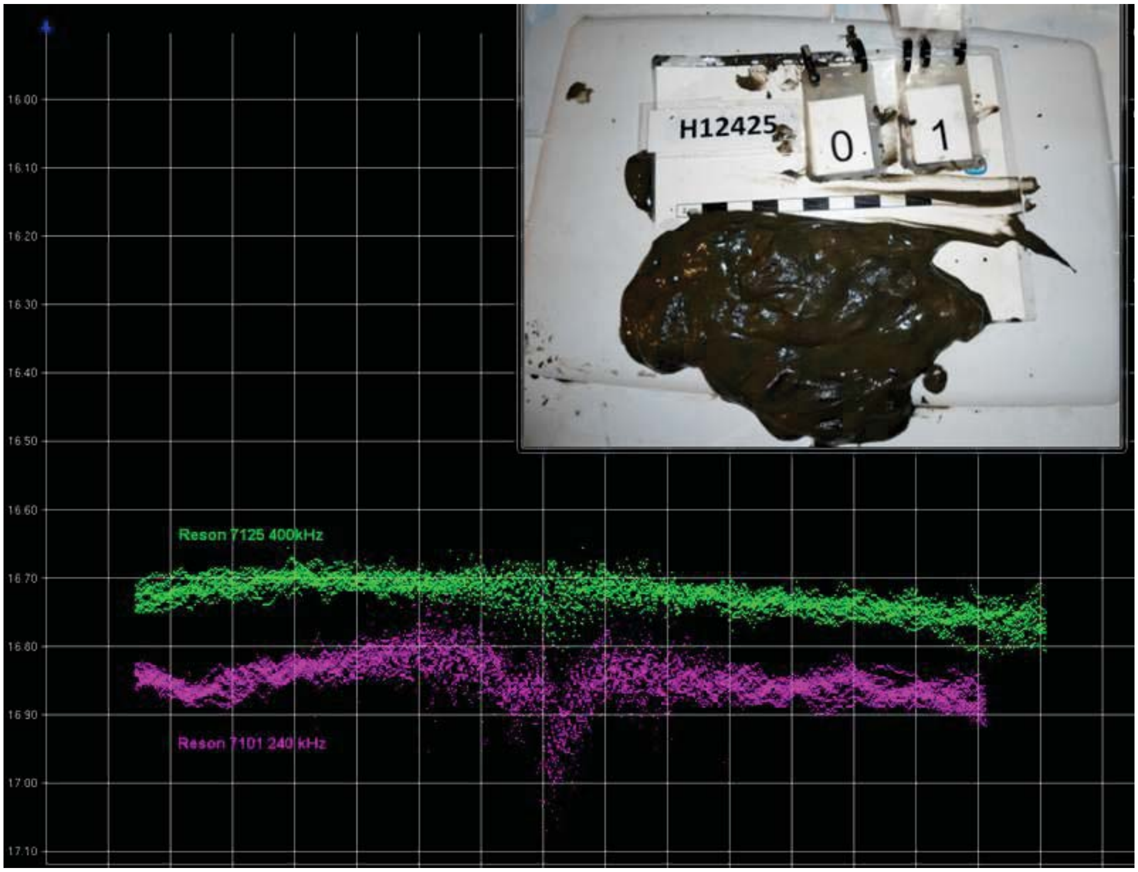
From: George Reynolds [mailto:ggr@oceansurveys.com]
Sent: Friday, June 29, 2012 4:29 PM
To: 'Castle Parker'; 'Paul Turner'
Subject: H12425 Multibeam Sub bottom Penetration

Hi Gene,

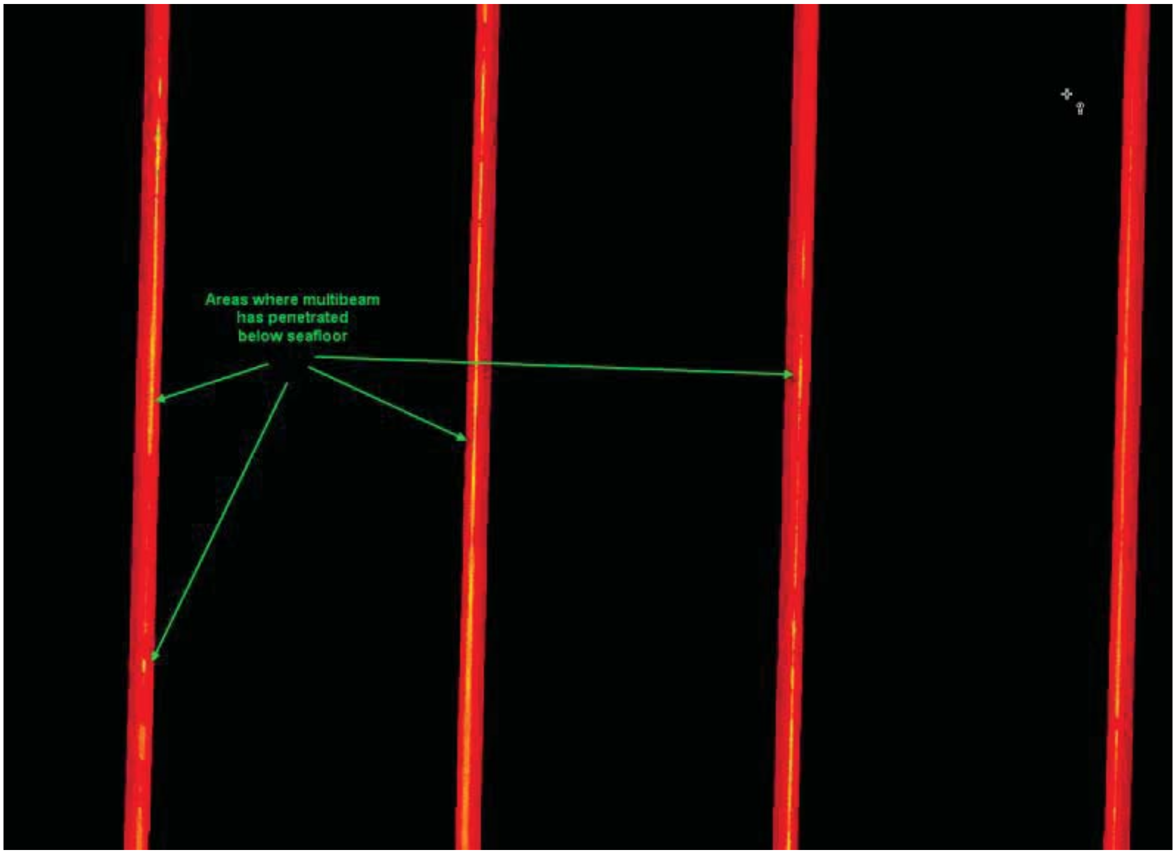
Following up on our phone conversation, we have encountered areas within H12425 where the Reson 7101 and 7125 multibeam systems have difficulty detecting a consistent bottom in the near nadir portion of the swath. The seabed in these areas is likely composed of very soft mud (see photo of a representative grab sample below). As shown on the following multibeam screen grab, near nadir energy appears to slightly penetrate the seabed. As you would expect, the penetration depth varies with frequency, 240kHz Reson 7101 signal penetrates on the order of 10-30cm, while Reson 7125 400kHz energy penetrates on the order of 5-15cm in the same areas.

In an effort to provide base surfaces that are not biased by this phenomenon, OSI recommends that near nadir soundings with a bottom signature below the apparent seafloor be rejected.

* Example of Reson 7101 and 7125 ”soft” bottom data and a representative grab sample.



* Example of seabed penetration observed on neighboring lines.



From: Paul Turner [mailto:paul.turner@noaa.gov]
Sent: Tuesday, July 03, 2012 2:11 PM
To: ggr@oceansurveys.com
Subject: Fwd: Visit / Required cross line miles

Hi George-

In response to our conversation regarding cross-line coverage (in the email string below), it will be acceptable for you to run your cross-lines on the original 100 m. range SSS line plans so long as the cross-lines are in agreement and within spec where they inter-sect with the main-scheme lines. If your cross-line coverage is under the 4% required coverage, you will need to explain this in the DR and describe the circumstances behind the deficiency. Please feel free to cite this email as documented permission from your COR in the DR.

I will be out of the office for the remainder of the day and be back in the office on Thursday. Please let me know if you have any additional questions.

Thank you,

Paul Turner

---------- Forwarded message ----------
From: George Reynolds <ggr@oceansurveys.com>
Date: Mon, Jul 2, 2012 at 2:46 PM
Subject: Visit / Required cross line miles
To: Paul Turner <paul.turner@noaa.gov>
Hi Paul,

Good talking with you today.

We are looking forward to your visit on the 26th of this month. There are a couple of crew boat companies that we can hire to take you out to the survey ship. Once we finalize the arrangements I will forward the meeting location and time. This info should be available on or about the 22nd of the month.

As we discussed, due to sea conditions and refraction issues we had to reduce the SSS range from the planned 100 meters to the 50-meter range for a significant portion of the deep water areas surveyed to date. The densified line plan associated with the reduced SSS range has resulted in doubling the planned line miles in portions of the study area. Regarding the cross line requirement, is it acceptable to compute the cross line mile percentage based only on the planned line miles or do we need to base the calculation on the actual main scheme miles run?

For your reference, the following is email correspondence with Kathleen regarding a similar issue that was raised during the Pensacola Survey.

Thanks
George

From: Paul Turner [paul.turner@noaa.gov]
Sent: Tuesday, July 17, 2012 11:44 AM
To: George Reynolds
Subject: Re: OPR-K339-KR-12 Weekly Report July 13, 2012

Hi George-

Thank you for the update and I am glad to hear that the weather cooperated with you. Where you able to cover the entire area that was having the seismic testing?

Thanks,

Paul

On Mon, Jul 16, 2012 at 9:05 PM, George Reynolds <ggr@oceansurveys.com> wrote:

Hi Paul,

We had great weather after the storm passed through which allowed us to complete the field program. We have demobilized from the survey area and will turn our focus to data processing and reporting tasks.
We are looking forward to your visit this fall.

Please let me know if you have any questions or need additional information.

Thanks,
George

From: George Reynolds [ggr@oceansurveys.com]
Sent: Monday, July 30, 2012 12:23 AM
To: 'Paul Turner'
Subject: OPR-K339-KR-12 Update

Hi Paul,
Just a quick note to let you know that all of our equipment is back in the office and we are processing data.

Please let me know if you have any questions or need additional information.

Thanks,
George

Appendix III

Feature Report

AWOIS: 0

DtoN: 1

Maritime Boundry: 0

Wrecks: 0

H12427 DtoN

Registry Number: H12427

State: Louisiana

Locality: Gulf of Mexico

Sub-locality: 9 NM S of Barataria Pass

Project Number: OPR-K339-KR-12

Survey Dates: 20120525 - 20120709

Charts Affected

Number	Edition	Date	Scale (RNC)	RNC Correction(s)*
11358	54th	02/01/2007	1:80,000 (11358_1)	[L]NTM: ?
11352	40th	05/01/2008	1:175,000 (11352_1)	[L]NTM: ?
11366	11th	01/01/2008	1:250,000 (11366_1)	[L]NTM: ?
11340	73rd	08/01/2008	1:458,596 (11340_1)	[L]NTM: ?
1116A	73rd	08/01/2008	1:458,596 (1116A_1)	[L]NTM: ?
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	Flare Stack	GP	[None]	29° 05' 53.6" N	089° 58' 52.0" W	---

Generated by Pydro v12.9(r3782) on Wed Jun 19 20:26:08 2013 [UTC]

1.1) Flare Stack

DANGER TO NAVIGATION

Survey Summary

Survey Position:	29° 05' 53.6" N, 089° 58' 52.0" W
Least Depth:	[None]
TPU (±1.96σ):	**THU (TPEh)** [None] ; **TVU (TPEv)** [None]
Timestamp:	2012-191.00:00:00.000 (07/09/2012)
Dataset:	dton_feature.000
FOID:	US 0000368147 00001(022600059E130001)
Charts Affected:	11358_1, 11352_1, 11366_1, 1116A_1, 11340_1, 11006_1, 411_1

Remarks:

LNDMRK/remrks: Uncharted flare stack in the vicinity of multiple oil production platforms.

Feature Correlation

Source	Feature	Range	Azimuth	Status
dton_feature.000	US 0000368147 00001	0.00	000.0	Primary

Hydrographer Recommendations

Chart new flare stack.

S-57 Data

Geo object 1:	Landmark (LNDMRK)
Attributes:	CATLMK - 6:flare stack
	CONVIS - 1:visual conspicuous
	NINFOM - Add landmark (flare stack)
	SORDAT - 20120709
	SORIND - US,US,graph,H12427

Office Notes

SAR: MCD has charted this as a pipe. Compile: Delete pipe, add landmark

Feature Images

Figure 1.1.1

APPROVAL PAGE

H12427

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

- H12427_DR.pdf
- Collection of depth varied resolution BAGS
- Processed survey data and records
- H12427_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.

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: 2013.06.28 17:04:14 -04'00'

Approved: ______________________________

LT Abigail Higgins, NOAA
Chief, Atlantic Hydrographic Branch