NOAA FORM 76-35A

U.S. DEPARTMENT OF COMMERCE

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL OCEAN SERVICE

Descriptive Report

Type of Survey *Shallow Water Multibeam Hydrographic and Side Scan Sonar Survey*
Project No. *OPR-J364-KR-10-1*
Registry No. *H12236*

Locality

State *Florida*
General Locality *Gulf of Mexico*
Sub-locality *11 NM SW of Entrance to Choctawhatchee Bay*

2010

George G. Reynolds

CHIEF OF PARTY

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HYDROGRAPHIC TITLE SHEET

REGISTRY NO.

H12236

State	*Florida*
General Locality	*Gulf of Mexico*
Sub-Locality	*11 NM SW of Entrance to Choctawhatchee Bay*
Scale	1:40,000
Date of Survey	*April 5, 2010 – May 28, 2010*
Instructions Dated	*Preliminary, March 8, 2010, Final, June 8, 2010*
Project No.	*OPR-J364-KR-10-1*
Vessel	*R/V Ferrel – USCG Official Number 1182802*
Chief of Party	*George G. Reynolds*
Surveyed By	*Robert M. Wallace, John R. Bean, Joseph V. Tyler, Alexander G. Unrein, John R. Ayer, Bonnie L. Johnston*
Soundings by echo sounder	*Reson Seabat 7101*
Verification by	~~*Michael J. Engels*~~ ***Atlantic Hydrographic Branch***
Soundings in	*Meters (MLLW)*

HCell Compilation units in Feet (MLLW)

REMARKS: *All Times Recorded in UTC*

Data Recorded and Presented relative to UTM Zone 16 North

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

Red, bold, italic remarks made during office processing

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 5 APRIL 2010 TO 28 MAY 2010 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.

TABLE OF CONTENTS

Page

TABLE OF CONTENTS (Continued)

APPENDICES

SEPARATES

DESCRIPTIVE REPORT
TO ACCOMPANY
HYDROGRAPHIC SURVEY H12236

Project Number OPR-J364-KR-10-1
May 28, 2010
Ocean Surveys, Inc. – *R/V Ferrel*
Chief of Party: George G. Reynolds

INTRODUCTION

The purpose of this survey is to provide NOAA with modern, accurate hydrographic survey data to update the nautical charts of the Gulf of Mexico, in the Safety Fairway southwest of the entrance to Choctawhatchee Bay, Florida (Figure 1).

A. AREA SURVEYED

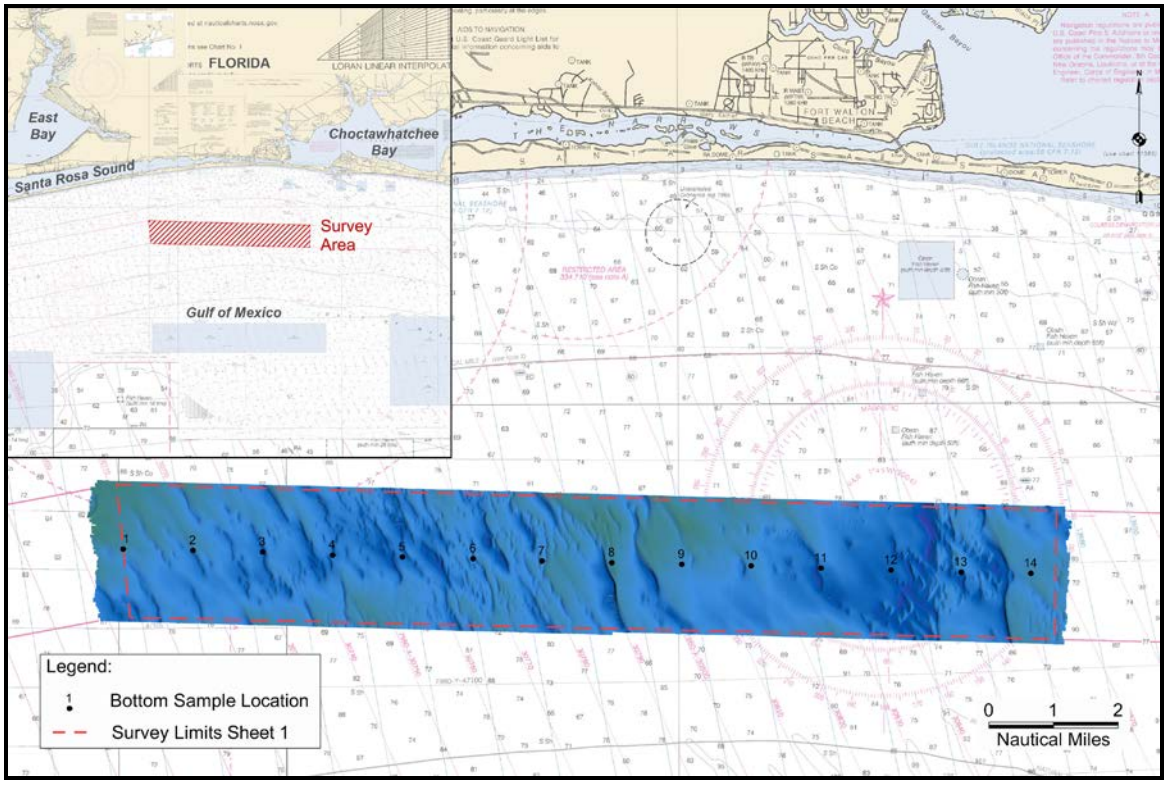

Figure 1. H12236 survey area overlain on RNC 11382 and RNC 11388. Multibeam colored by depth coverage image was developed from a 5-meter surface.

This survey provides hydrographic data for the Gulf of Mexico waters southwest of the entrance to Choctawhatchee Bay. This survey junctions with contemporary Survey H12237 to the east and Survey H12157 to the west. Survey H12157 was conducted under a separate task order assigned under Project No. OPR-J364-KR-09. Survey data were acquired to meet requirements specified in the contract Statement of Work (SOW, May 21, 2010), and NOS Hydrographic Surveys Specifications and Deliverables Manual, April 2010 (HSSD 2010). The survey limits are primarily bound by Safety Fairway limits as set forth in the Hydrographic Survey Project Instructions and Statement of Work. Two hundred percent (200%) side scan sonar (SSS) coverage, with concurrent shallow water multibeam echo sounder (SWMB) coverage were collected per "set line spacing" specifications to water depths of approximately 100 feet. Additional SWMB coverage was obtained as necessary to provide a least depth for all significant SSS contacts and assigned AWOIS investigation items. The final survey area covers 32.25 square nautical miles (Figure 1).

Table 1
General Location of Survey H12236

Northern Limit Latitude (N)	Southern Limit Latitude (N)	Western Limit Longitude (W)	Eastern Limit Longitude (W)
30-19-00	30-16-05	86-50-35	86-32-50

The mainscheme SSS/SWMB tracklines were run parallel to the safety fairway boundary lines (Figure 2). 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 indicated in Table 2. Survey statistics are presented in Table 3.

Initial onsite system calibration was performed on April 5, 2010 (DN 095). Fourteen (14) bottom samples were acquired on May 27, 2010 (DN 147). Mainscheme data, cross line data, additional calibration data and significant target development were acquired on the following dates: May 12-19 and 25-27, 2010 [Calendar Day Numbers (DN) 132-139 and 145-147 (2010)].

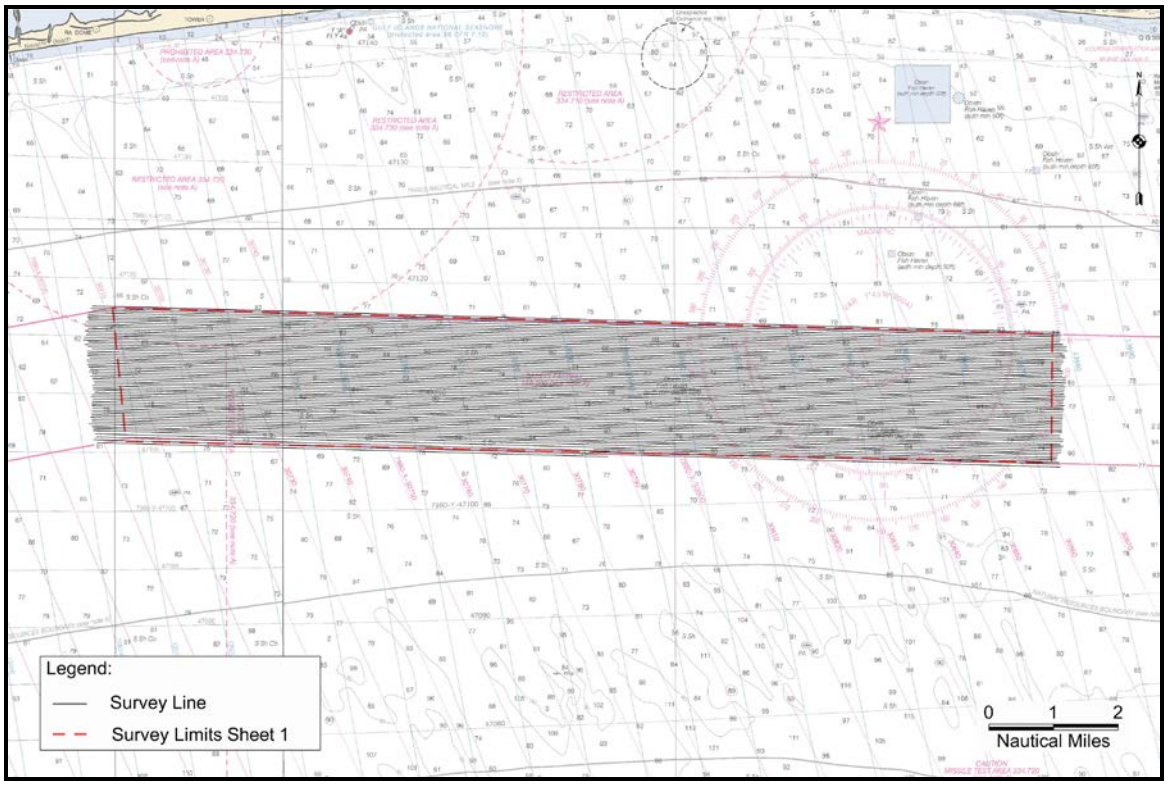

Figure 2. H12236 survey area with SSS/SWMB tracklines in black overlaid on RNC 11382 and RNC 11388.

Table 2
H12236 Survey Line Spacing

Water Depths (meters)	Trackline Offset (meters)	SSS Range Scale (meters)
18-32	65	75
20-30	65, 85	100

Table 3
H12236 *R/V Ferrel* Survey Trackline Statistics

Concurrent MB/SSS Lineal NM	Multibeam Only Lineal NM	SSS Only Lineal NM	Cross Lines Lineal NM	Square Nautical Miles Covered	Bottom Samples Acquired
934.4	9.4	36.2	43.5	32.25	14

B. DATA ACQUISITION AND PROCESSING

Refer to OPR-J364-KR-10 Data Acquisition and Processing Report (DAPR)* for a complete description of data acquisition and processing systems, survey vessel, 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.
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B.1 Equipment

Survey operations were conducted from Reservoir Geophysical's *R/V Ferrel*, 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. Table 4 summarizes the primary equipment used to acquire SWMB and SSS data. All equipment was installed, calibrated and operated in accordance with the DAPR*.
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Table 4
H12236 Primary Survey Equipment

System	Manufacturer	Model/Version No.
Multibeam Echo Sounder	Reson	7101
Side Scan Sonar	Klein	5000
Moving Vessel Profiler	ODIM	MVP30
Sound Speed Profiler	Sea-Bird	SeaCAT SBE 19+
Sound Speed Sensor (Real-Time Surface Sound Speed)	Sea-Bird	MicroCAT SBE37
Primary Navigation DGPS	Applanix/Trimble	POS MV 320 V.4
Secondary Navigation DGPS	Trimble	MS750
Vessel Attitude and Heading	Applanix/Trimble	POS MV 320 V.4
Multibeam acquisition, trackline control, position fixing	HYPACK, Inc.	Survey (V 9.0- 9.1.0.0) and Hysweep (V 9.0.26.0) 2009
SSS acquisition	Chesapeake Technology, Inc.	SonarWiz V4.04.0061
U.S.C.G. Differential Beacon Receivers (2)	Trimble	Probeacon
Survey GPS	Trimble	5700
Bar Check	OSI	Lead Disk
SSS Cable Payout Indicator	Hydrographic Consultants	SCC16"
Tide Gauge	Hazen	HTG5000

B.2 Quality Control (QC)

B.2.1 System Calibration

The initial SWMB system calibration for the *R/V Ferrel*, which included a patch test and performance surface evaluation, was performed on April 5, 2010 (DN 095) southeast of the entrance to Pensacola Bay. The latency and alignment values were updated in the CARIS vessel file, FERREL_7101_511_ED.hvf, prior to beginning acquisition for contemporary project OPR-J364-KR-09.

Data acquisition was begun on project OPR-J364-KR-10 immediately following completion of project OPR-J364-KR-09. No changes were made to the system configuration between projects. A patch test was performed on May 12 (DN 132) in the same location as the original test to verify the Reson 7101 alignment values before commencing survey operations for project OPR-J364-KR-10. It was found that the latency and attitude bias values calculated from the May 12 (DN 132) patch test were unchanged from the values calculated from the system calibration run on April 5 (DN 095). Two check lines acquired on May 12 (DN 132), processed with the verified bias values, were compared to a performance surface generated from SWMB data collected on April 5 (DN 095). The check lines showed excellent agreement with the performance surface. Therefore, the pitch, roll, and yaw values from April 5 (DN 095) were deemed adequate and were not modified in the Reson 7101 HVFs. A final post-survey patch test was performed on May 27, 2010 (DN 147), which, once again, verified the system alignment.

Transducer draft and echo sounder function were confirmed by means of bar checks and "spot checks" with a calibrated lead line performed prior to the start of survey operations and at weekly intervals during the course of the survey.

B.2.2 SWMB Cross Lines

A total of 43.5 lineal nautical miles of cross line data were acquired on May 12, 2010 (DN 132). The cross line mileage factor is 4.7% of the 934.4 nautical miles of mainscheme tracklines.

Statistical quality control information was generated by comparing each of the cross lines to the final combined 2-meter x 2-meter CARIS BASE (Bathymetry Associated with Statistical Error) surface. Cross line comparisons generated with the CARIS QC Report utility are presented in Separate IV***. ****Filed with original field records****

Cross line comparisons showed excellent agreement with the finalized BASE surface generated from the mainscheme survey lines. All cross line soundings considered in the analyses met IHO Order 1 uncertainty standards. 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.

B.2.3 Data Quality Review

B.2.3.1 CARIS BASE Surface Standard Deviation and Uncertainty

The standard deviation and uncertainty BASE surfaces were reviewed to direct sounding editing and evaluated to search for systematic errors, sporadic noise (fish, water column disturbances, etc.), and areas that warranted additional investigation (bathymetric features). In general, the final combined uncertainty BASE surfaces generated from the higher of the standard deviation or uncertainty values were appropriate for the bathymetric relief observed in the survey area. Highest standard deviation values were observed over wreck and obstruction features and steep slopes. The CARIS QC BASE surface report utility was used to evaluate IHO uncertainty for the final combined 2-meter BASE surface. Results from the QC BASE surface report indicate that 100% of the nodes from the final combined 2-meter surface meet IHO Order 1 uncertainty specifications. QC BASE surface reports for all final surfaces are included in Separate IV*. ***Filed with original field records***

B.2.3.2 SSS Imagery and Contacts

Contacts with approximately 1-meter heights and greater were identified in 2 x 100% coverage SSS imagery and attributed with feature classifications and descriptive remarks if applicable. A custom CARIS ContactFeatures.hcf was created for feature classification when positioning contacts and is submitted with the session data. Contacts were classified according to SSS shadow height and surrounding depths as specified in the SOW and HSSD 2010, Section 6.3.2 (Table 5). All contacts were correlated and evaluated in the CARIS HIPS/SIPS map window with respect to BASE surfaces, contours and charted information. Each significant contact was examined in the CARIS subset editor and a sounding was designated for the representative least depth of each contact (or Primary/Secondary contact pair). All significant contacts were developed with additional SWMB coverage to meet the object detection sounding density as specified in the HSSD 2010, Section 5.2.2.1. A tabulation of all side scan contacts, individual contact images, and supporting correlation tools (spreadsheet and database format) are presented in Separate V*. Isolated shoal features that were outstanding or navigationally significant with respect to the surrounding depths are represented and attributed in the S-57 feature file (i.e. OBSTRN, WRECKS).
Filed with original field records

Table 5
Significant Contact Selection Criteria

Surrounding Depth or Area (meters)	Significant Contact Height (meters)
≤ 20	≥ 1.0
> 20	10% of surrounding depth

B.2.4 Survey Junctions

Survey H12236 junctions with contemporary Survey H12157 (5/11/10, 1:10,000) to the west and Survey H12237 (1:40,000, 5/28/2010) to the east.

B.2.4.1 H12236-H12157 Junction

There is an approximate overlap of 0.5 kilometers between bathymetric data from Surveys H12236 and H12157. Depths from the combined final 2-meter BASE surfaces from Surveys H12236 and H12157 were compared in CARIS HIPS. Further analyses consisting of a surface-to-surface comparison (Figure 3) and statistical analysis (Figure 4) were performed using 10-meter by 10-meter surfaces. Depths from H12236 showed excellent agreement with depths from H12157. Depth discrepancies generally equaled 20 centimeters or less and the average difference between survey depths equaled approximately 0.025 meters.

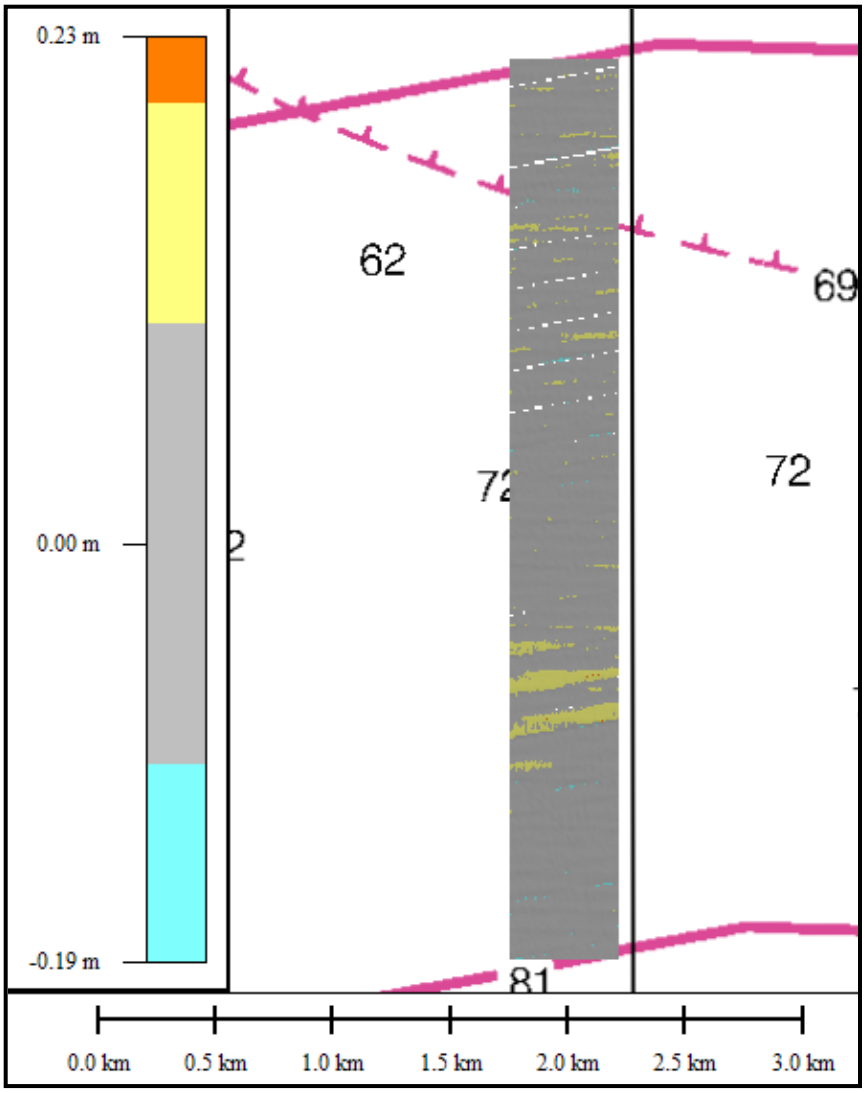

Figure 3. Surface-to-surface difference map comparing depths from Survey H12236 to depths from Survey H12157 overlaid on RNC 11382. Difference values are based on 10-meter by 10-meter data sampling. Grey areas represent depth differences of less than 0.10 meters. Maximum difference is 0.23 meters.

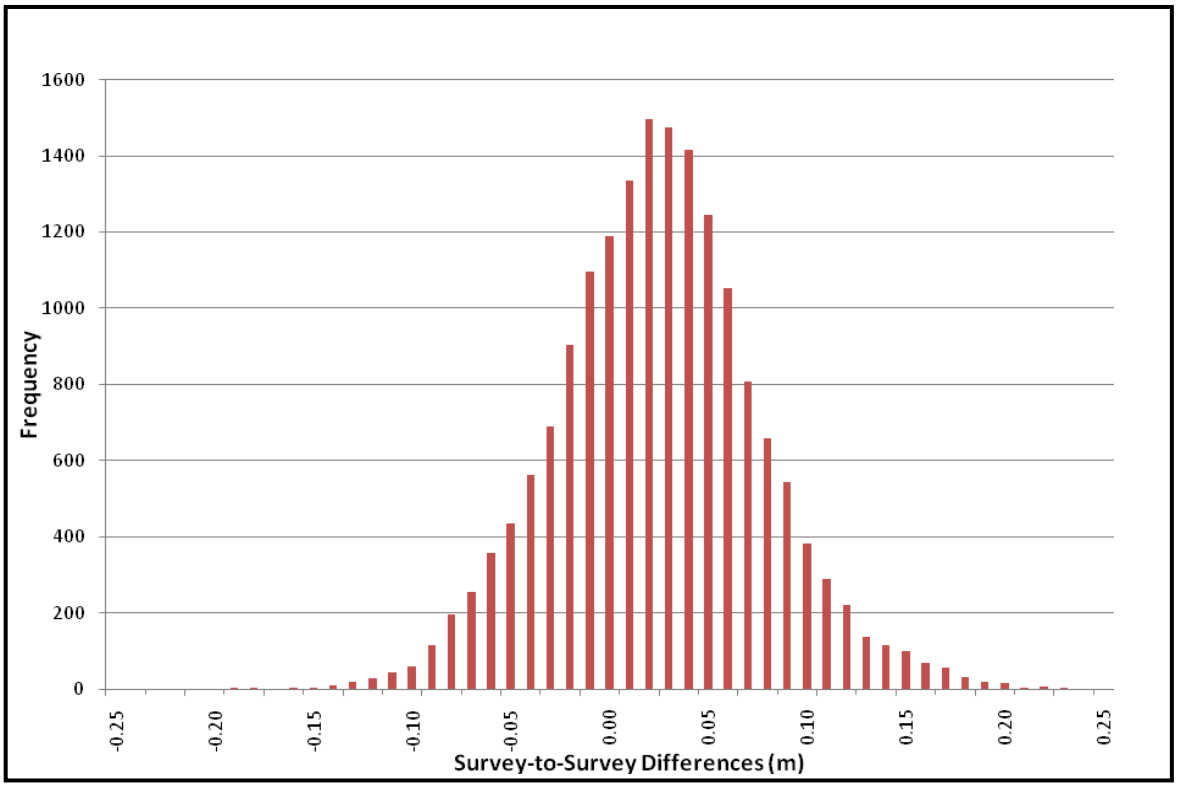

Figure 4. Surface-to-surface difference histogram comparing depths from Survey H12236 to depths from Survey H12157. Difference values are based on 10-meter by 10-meter data sampling. Average difference between surveys is 0.025 meters with a standard deviation of ±0.05 meters. Ninety-five (95) percent of the difference values were within 2 sigma of the mean.

B.2.4.2 H12236-H12237 Junction

There is an approximate overlap of 0.4 kilometers between bathymetric data from Surveys H12237 and H12236. Depths from the combined final 2-meter BASE surfaces from Surveys H12237 and H12236 were compared in CARIS HIPS. Further analyses consisting of a surface-to-surface comparison (Figure 5) and statistical analysis (Figure 6) were performed using 10-meter by 10-meter surfaces. Depths from H12237 showed excellent agreement with depths from H12236. Depth discrepancies equaled 20 centimeters or less and the mean difference between survey depths equaled 0.018 meters.

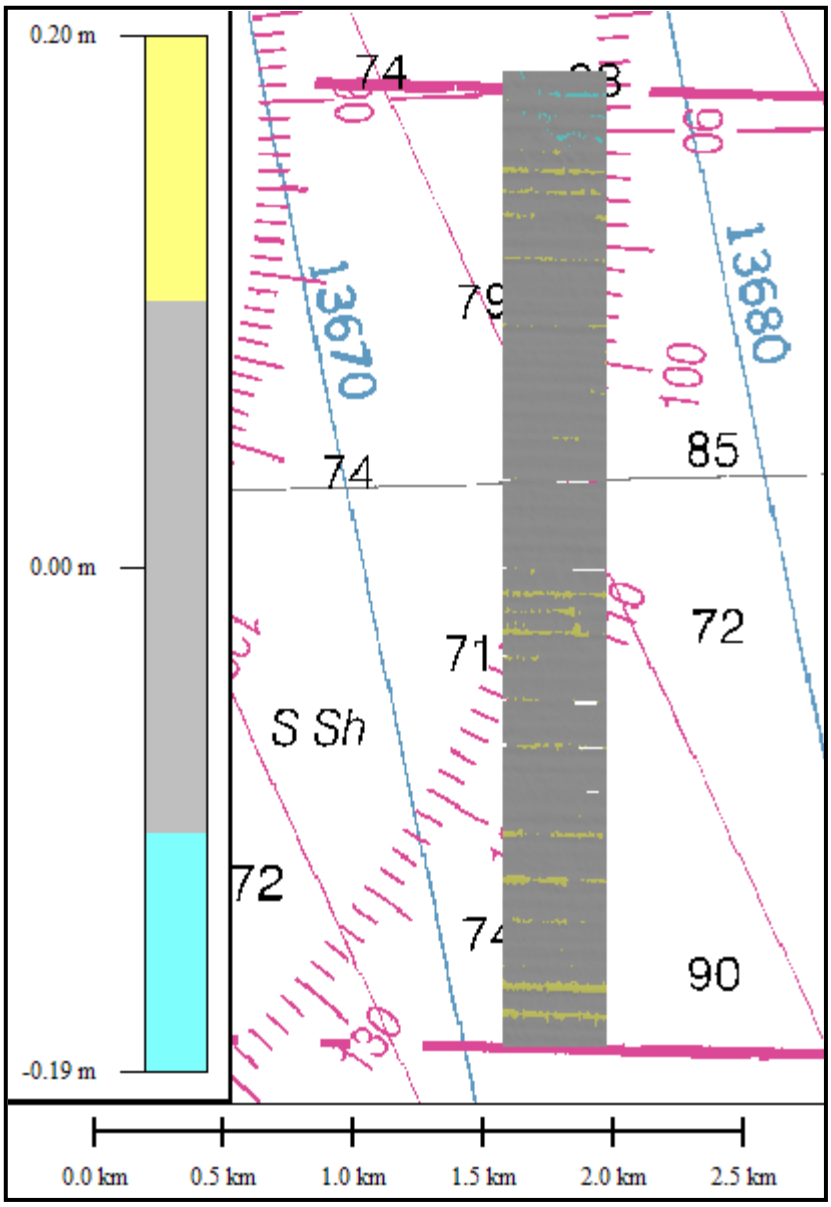

Figure 5. Surface-to-surface difference map comparing depths from Survey H12236 to depths from Survey H12237 overlaid on RNC 11388. Difference values are based on 10-meter by 10-meter data sampling. Grey areas represent depth differences of less than 0.10 meters. The maximum difference between surfaces is 0.20 meters.

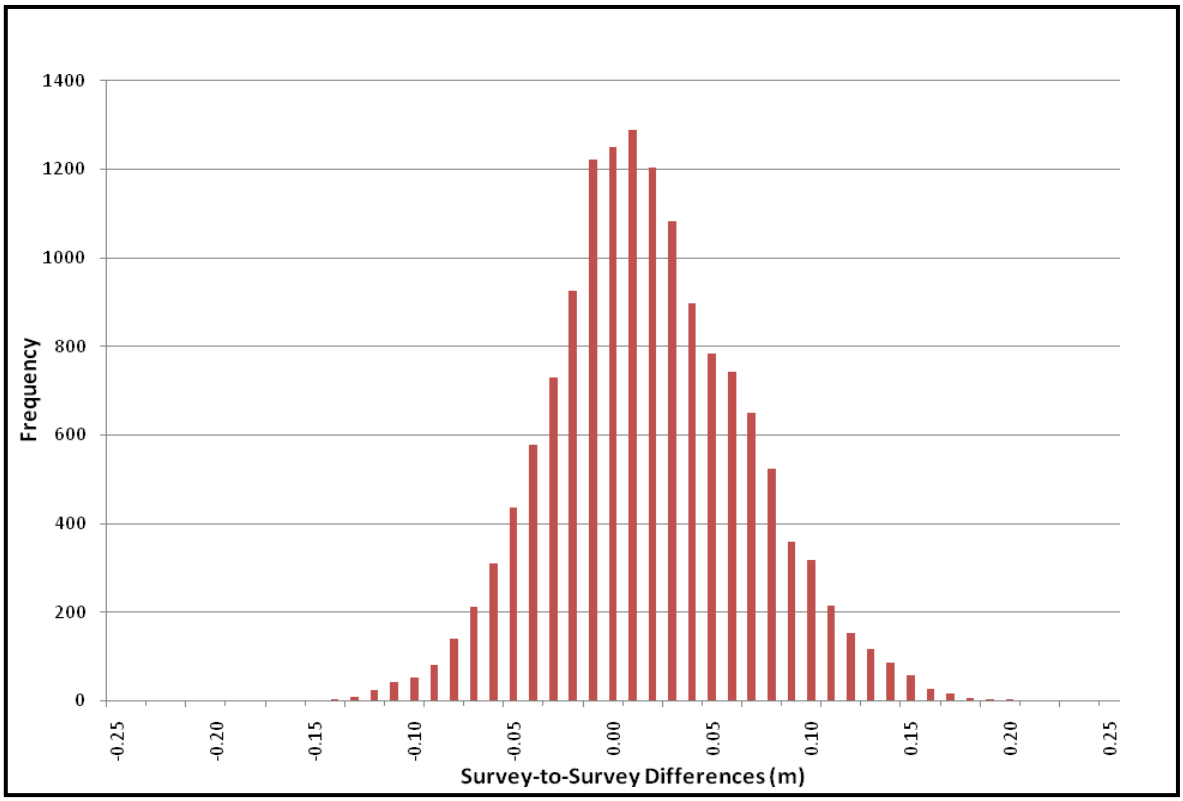

Figure 6. Surface-to-surface difference histogram comparing Survey H12236 to Survey H12237. Difference values are based on 10-meter by 10-meter data sampling. Average difference between surveys is 0.018 meters with a standard deviation of ±0.05 meters. Ninety-four (94) percent of the difference values were within 2 sigma of the mean.

B.2.5 Unusual Conditions/Factors Affecting Soundings/Imagery

The sound speed profiles measured throughout the limits of Survey H12236 showed high variability. The predominant trend observed in the MVP profiles was a rapid decrease in sound speed of up to 5 m/s between approximate depths of 10 to 20 meters. The depths at which abrupt changes in sound speed were observed often fell within the HSSD 2010-specified towfish altitude limits of 8 to 20 percent of the range scale being used. When using a range scale of 75 meters, the allowable towfish altitude is between 6 and 15 meters. This frequently placed the towfish at the same depth where sharp changes in sound speed were evident, increasing the incidence of refraction in the side scan imagery.

To ensure that this phenomenon did not compromise the quality of the final dataset, sound speed profiles were viewed during acquisition to assist in identifying the depths in the water column where refraction may be more severe due to rapid changes in sound speed. “Plateaus” in the profile served as indicators of depths prone to higher refraction and the SSS operator attempted to fly the towfish at depths below the refractive lens (Figure 7). In some areas, adjustments to towfish height did not help eliminate refraction in the side scan

imagery. In these instances, the SSS data were rejected from the line record and rerun at a later time.

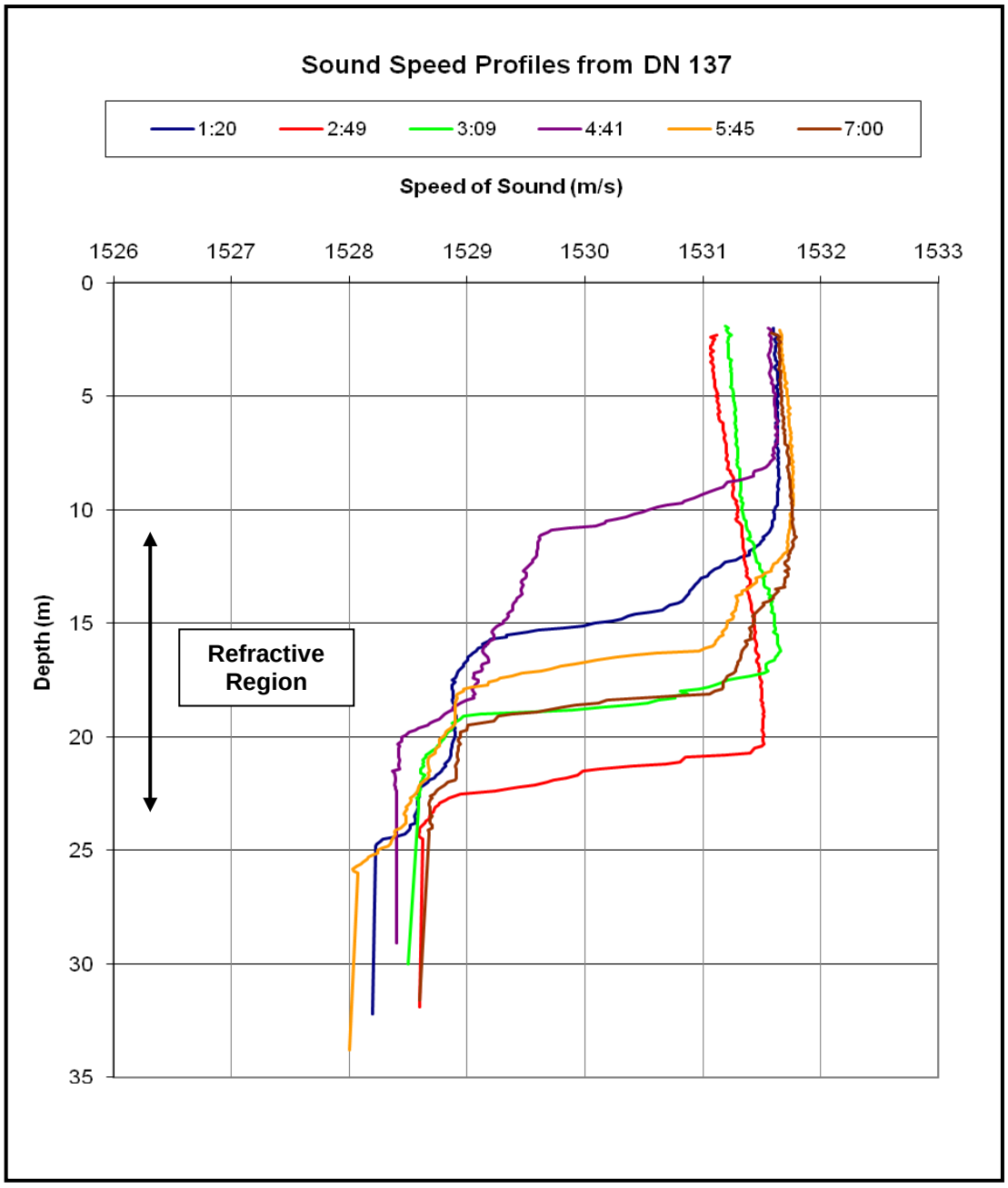

Figure 7. Sample sound speed profiles from May 17 (DN 137) demonstrate the rapid decrease in sound speed observed in the water column between approximate depths of 10-20 meters. Side scan operators reviewed profiles in real time to assist in determining an optimal height at which to fly the towfish in order to reduce refraction effects.

On May 13, 2010 (DN 133), the SSS range scale was reduced from 100 meters to 75 meters to avoid refraction effects in the outer swath. The line plan was adjusted accordingly to ensure full 200% SSS coverage was obtained. All changes in SSS range settings were recorded in the acquisition log found in Separate I*. ***Filed with original field records***

Sound speed variability also affected the SWMB data. To overcome this problem, the field team took frequent sound speed casts to accurately represent the sound speed conditions. The frequency of MVP casts typically ranged from 15 to 30 minutes. Surface sound speed values were displayed in the HYSWEEP survey window and recorded in the data file. The surface values were monitored throughout the survey for variations that indicated a new sound speed profile was needed.

Many of the MVP casts' extended Velocwin depth points did not appear to be projected correctly based on the trend of the sound speed profiles. The extended depth points were edited at the processor's discretion to better reflect the trend of the sound speed profile.

The method selected in CARIS HIPS to sound speed correct the multibeam data was determined based on the spatial and temporal changes observed in sound speed profiles over the course of the day. Geographic location appeared to influence sound speed variation to a greater extent than time of day. Samples of daily sound speed profiles were reviewed in groups with either time or space selected as a variable. Sound speed profiles that were acquired in close spatial proximity to each other (< 500 meters apart) over the span of many hours showed less variation between casts than profiles that were acquired within a short time span across a large spatial area (Figures 8 through 11). All of the SWMB lines were sound speed corrected using CARIS HIPS "Nearest in Distance Within Time" method.

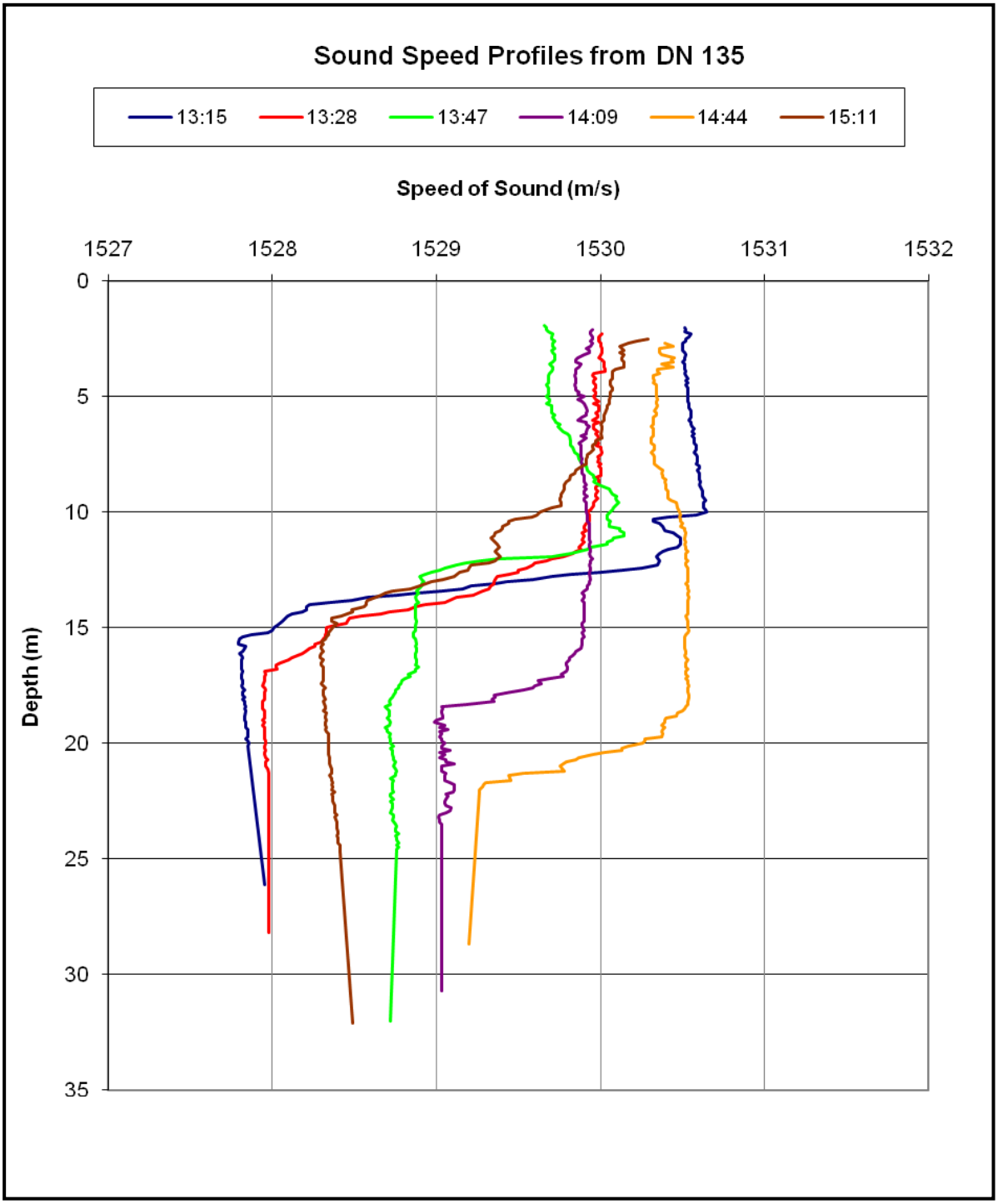

Figure 8. A sample of sound speed profiles collected on May 15 (DN 135) within a 2 hour time period. Profiles were collected along an east to west distance of 12 kilometers, with at least 1 kilometer between each cast.

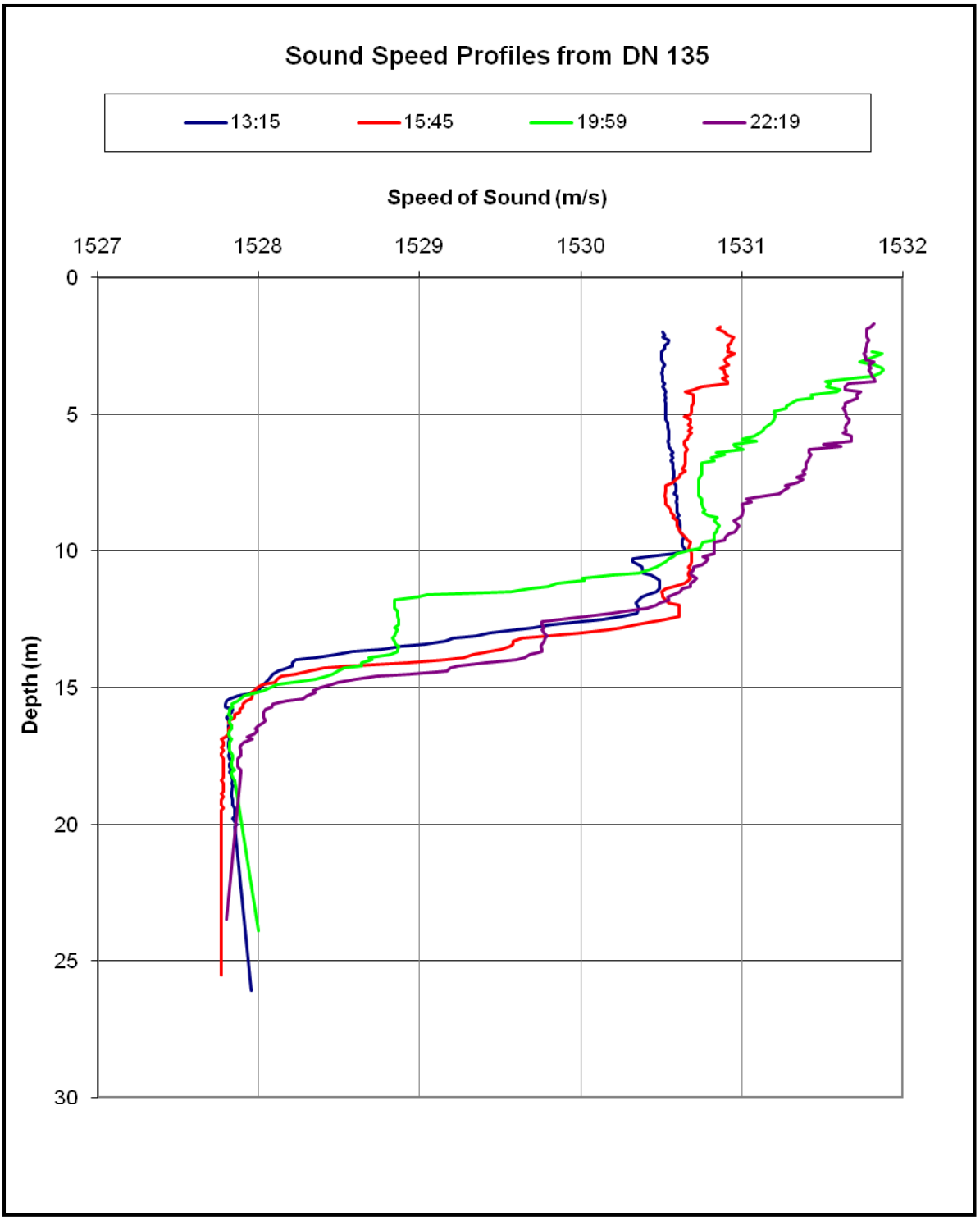

Figure 9. A sample of sound speed profiles collected on May 15 (DN 135) over the span of 9 hours within close spatial proximity of one another (less than 500 meters between cast position).

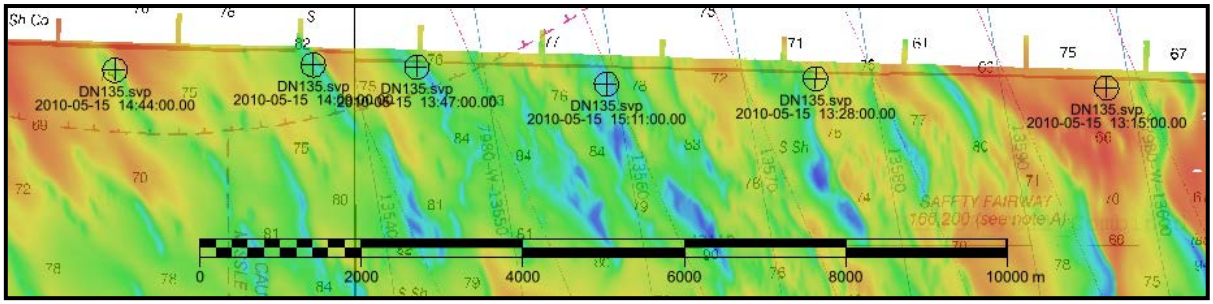

Figure 10. Positions of sound speed profiles from Figure 8 are represented by the black crosshairs overlain on RNC 11388 and a 2-meter BASE surface colored by depth.

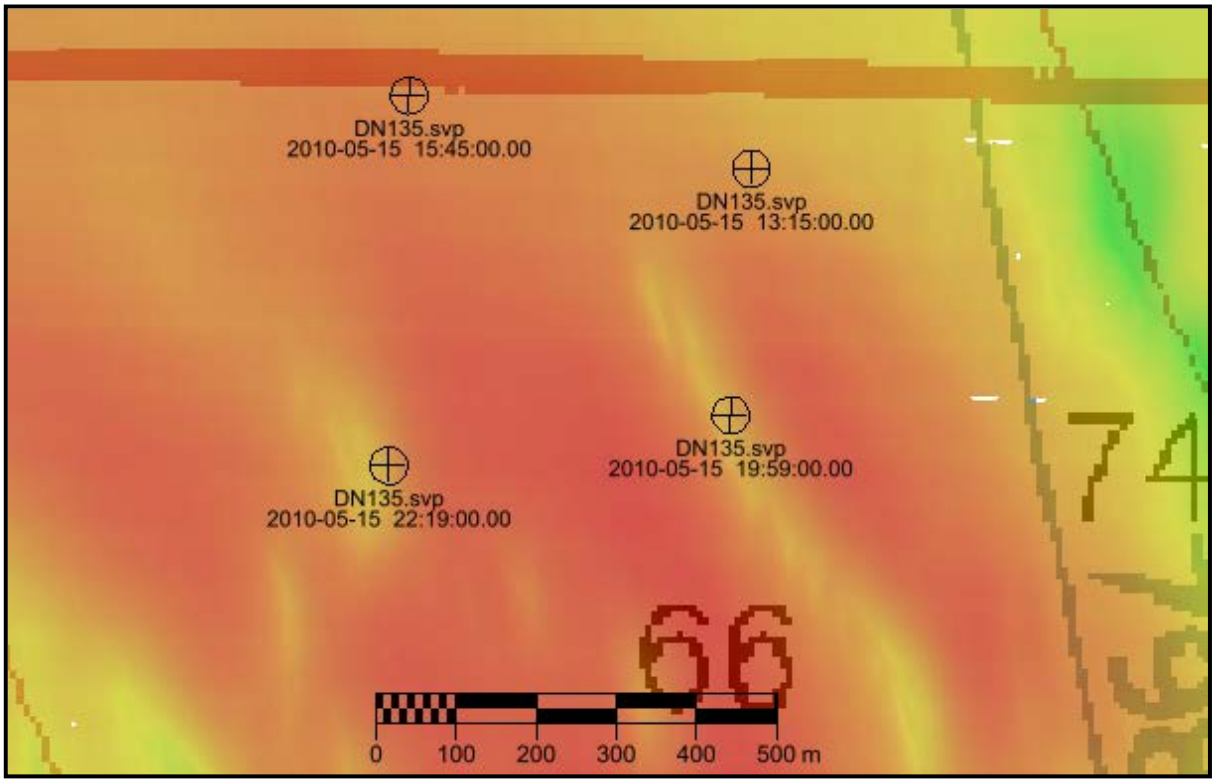

Figure 11. Positions of sound speed profiles from Figure 9 are represented by the black crosshairs overlain on RNC 11388 and a 2-meter BASE surface colored by depth.

Despite the efforts taken to reduce sound speed artifacts in the SWMB data, refraction effects were evident in the outer beams. Multibeam swaths for mainscheme survey lines were angle filtered by 55 to 60 degrees on port and starboard sides to reduce sound speed related uncertainty. Multibeam lines acquired for feature investigation were angle filtered to 45 degrees on port and starboard. The day-to-day or line-specific angle filter method is noted in the daily processing logs.

During SWMB acquisition, the Reson 7101 would experience periodic bursts of motion-induced noise or "blowouts" that typically affected between 2 to 4 sequential profiles, and in most cases required the entire swath to be rejected in processing. Efforts were made to reduce this noise, 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.

All multibeam data were closely reviewed by the processor in CARIS HIPS using both the Swath Editor and Subset Editor to identify and remove the noisy data. The coverage surfaces were then reviewed for any holidays that exceeded the coverage requirement that no gaps in surfaces be greater than 3 nodes (HSSD 2010). If holidays were found that exceeded the tolerances, additional SWMB fill-in lines were collected.

Fish were frequently seen in both the multibeam and SSS data (Figure 12). Fish were noted in the acquisition log by the field team, and these areas were carefully reviewed during data processing. If seen on only one side scan line, the contact was designated as fish. If the contact was visible in 200% side scan coverage and had a significant height, it was investigated with object detection multibeam coverage to verify or disprove the presence of a feature. In some instances, where the fish obscured a significant portion of the seafloor, SSS data were rejected from the SSS record and rerun at a later time.

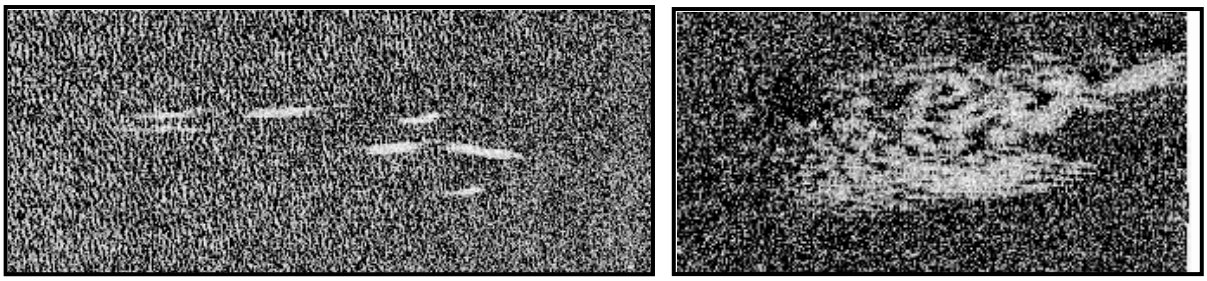

Figure 12. Examples of fish contacts encountered in the side scan imagery.

A vertical offset is apparent in the BASE surface standard deviation layers where SWMB data acquired on May 13 (DN 133) overlap SWMB data acquired on May 17 (DN 137) and where SWMB data acquired on May 25-26 (DNs 145-146) for fill-ins and contact investigations overlap mainscheme SWMB data (Figure 13). Multibeam data collected on May 13 (DN 133) were approximately 0.1-0.2 meters deeper than the overlapping data collected on May 17 (DN 137) (Figure 14). Multibeam data collected on May 25-26 (DNs 145-146) were approximately 0.1-0.2 meters deeper than the overlapping mainscheme data (Figure 15). The offset appears to be tidal and it did not exceed the allowable IHO Order 1 error budget at the survey depths of 20 meters (0.56 meters) to 100 meters (1.39 meters).

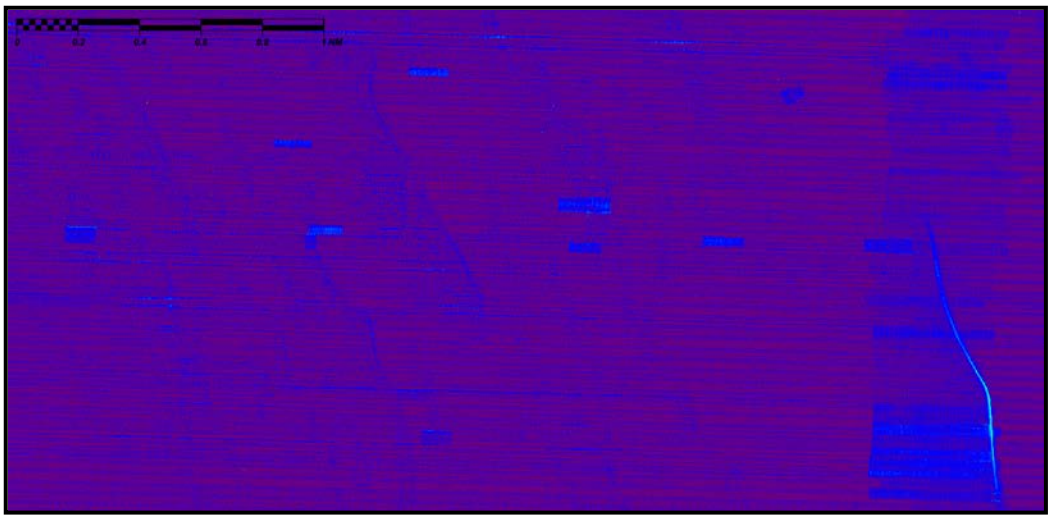

Figure 13. A subset of the standard deviation layer of the final combined BASE surface is displayed with the color range set between 0 and 0.5 meters to better isolate areas of higher standard deviation. Fill-in and contact investigation lines collected on May 25-26 (DNs 145-146) appear light blue among the mainscheme lines collected on May 12-19 (DNs 132-139). In the southeast corner of the image, higher standard deviation values indicate a tidal offset between SWMB lines collected on May 13 (DN 133) and May 17 (DN 137), which coincides with a seafloor ridge.

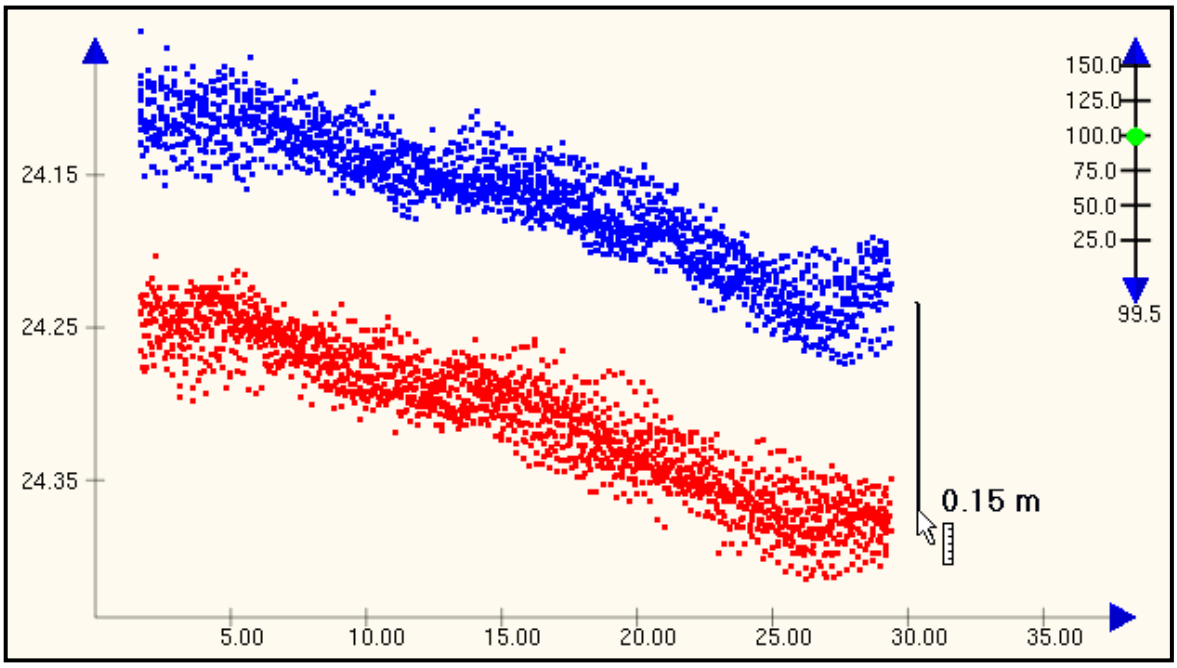

Figure 14. An example of the vertical offset between a mainscheme SWMB line collected on May 17 (DN 137) (blue) and a fill-in SWMB line collected on May 13 (DN 133) (red) displayed in CARIS HIPS Subset Editor. Depths and distances are in meters.

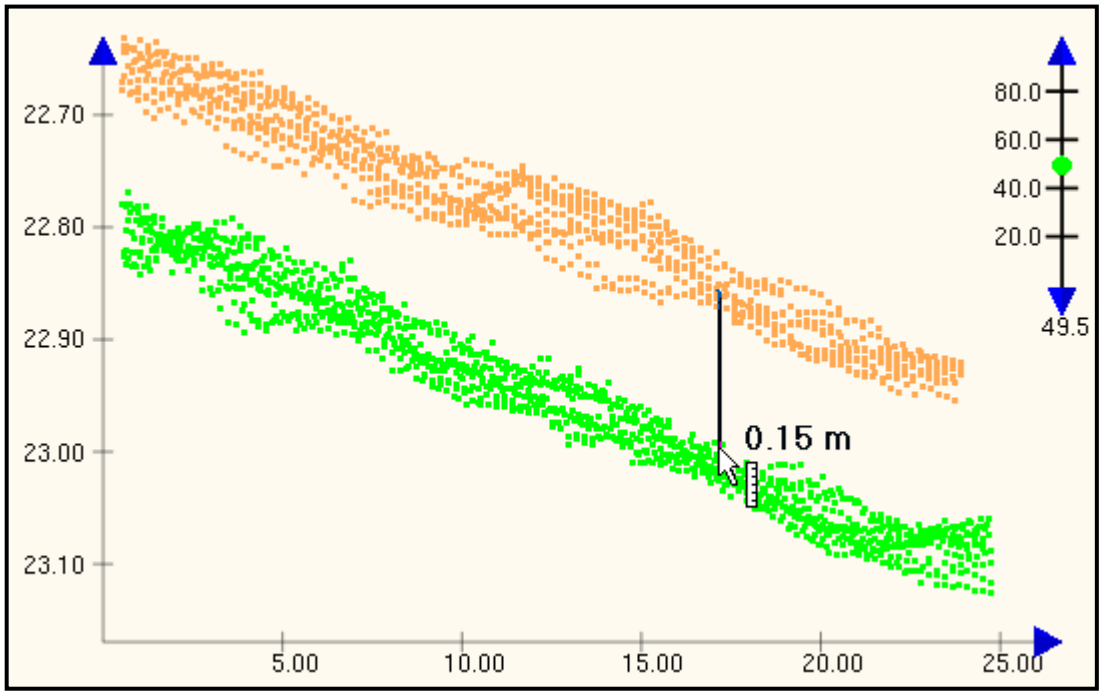

Figure 15. An example of a tidal offset between a mainscheme survey line collected on May 12 (DN 132) (orange) and a fill-in line collected on May 25 (DN 145) (green) displayed in CARIS HIPS Subset Editor. Depths and distances are in meters.

OSI undertook a brief water level analysis in an attempt to understand and validate the vertical offset depicted in Figure 13. Utilizing the Applanix POSPac MMS software, water level data at the location of the survey vessel were derived employing the Post-Processed Virtual Reference Station (PPVRS) technique. These water level data were compared to coincidental zone-corrected, verified water level data from the Panama City tide gauge. The analysis in fact demonstrated that the departure of the PPVRS-derived water level data from the zone-corrected, verified water levels is generally consistent in magnitude and direction with the offset displayed in Figures 14 and 15.

B.2.6 Sounding Coverage, Equipment and Methods

As noted in Table 4, a Reson Model 7101 multibeam echo sounder (MBES) was employed to acquire sounding data. The system was configured to operate using 511 equidistant beams. The range scale was closely monitored and adjusted for depth changes to optimize the swath coverage and system ping rate. A review of the raw data files of several MBES lines indicated that the ping rate oscillated around 8 pings per second. The combination of the high beam number and ping rate ensured the system had no trouble meeting mainscheme along track and grid node density requirements at typical survey speeds.

For contact developments requiring “Object Detection” coverage, the survey vessel was operated at a survey speed typically less than 6 knots. The Reson 7101 swath width was

narrowed to 120 degrees while maintaining the 511 beam setting. Multiple near-nadir passes were run for each contact development to make certain that extremely dense, high quality soundings were available for least depth determination.

B.3 Corrections to Echo Soundings

Preliminary patch test values were calculated in the field and final values were verified in CARIS HIPS.

Corrections to echo soundings were performed in accordance with the DAPR*. Alignment correctors for the *R/V Ferrel* remained unchanged for the duration of survey operations. Latency and attitude bias values calculated from the initial patch test were confirmed by a final patch test conducted after data acquisition was complete.

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Comparison casts taken with the CTD unit were not included with the SVP files used in sound speed correction of the multibeam data. Processing logs were updated indicating whether each MVP file was converted and appended to the current SVP file.

B.3.1 Static Draft Corrections

Static draft values were measured at the end of each survey day and recorded in the acquisition log. The static draft was also measured before and after each fueling. The CARIS vessel configuration file was updated with daily time tags and static draft values. Static draft values did not vary more than 0.05 meters between daily measurements, except for a larger difference in water level of 0.081 meters between measurements taken before and after fueling. Static draft correction values were applied during the CARIS HIPS merge process.

B.4 Data Processing

B.4.1 Survey Coverage

This survey was conducted to develop 200% SSS coverage within the survey limits along with concurrent SWMB, aka “skunk stripe” bathymetry. Full multibeam coverage of the survey area was not required. All potentially significant features located with mainscheme SSS or SWMB were developed with high density, near nadir multibeam sonar data to meet the HSSD 2010 requirement of “Object Detection Coverage.”

B.4.2 Coverage BASE Surfaces and Mosaics

It is stated in the HSSD 2010, Section “5.2.2.2 Complete Multibeam Coverage,” that a grid resolution of 1 meter shall be used in survey depths less than 22 meters and a 2-meter grid resolution be used in survey depths of 20-44 meters. Over 99 percent of the surveyed depths were 20 meters or deeper; therefore, Survey H12236 was divided into two field sheets, which were used to generate coverage BASE surfaces with 2-meter grid resolutions. However, a

number of shoals with depths less than or equal to 22 meters were developed throughout the survey area, necessitating the creation of six, sub-area field sheets that were used to generate BASE surfaces with 1-meter grid resolutions. Field sheet size was chosen to ensure the number of nodes per grid was less than 25 million, based on guidance from the Office of Coast Survey Field Procedures Manual (FPM, April 2009), "Section 4.2.3.8.1 Field Sheet and Grid Size Guidance."

A field sheet was also created over the wreck of the *Thomas Hayward* and a 0.5-meter BASE surface was generated to ensure the shape and high points of the wreck were represented in detail in the final surface. The layout for Survey H12236 field sheet deliverables is displayed in Figure 16 and the field sheet names with their BASE surface resolutions are provided in Table 6.

A field sheet titled "H12236_Full_Combined" is also included with the deliverables. This field sheet encompasses the entire survey area and includes a 2-meter x 2-meter Final Combined Surface that was generated from the finalized, sub-area BASE surfaces shown in Figure 16. All surfaces were generated in CARIS HIPS using the "Shallow Configuration" under the CUBE Parameters' Advanced settings menu. None of the multibeam coverage surfaces contained along-track holidays spanning over 3 nodes. A sounding layer was generated from the Final Combined Surface and was exported to a CARIS Notebook HOB file and used during chart comparison.

The 200% SSS coverage was attained by conducting vessel tracklines separated by one-half the distance required for 100-percent SSS coverage. Side scan mosaics with 1-meter resolution were created for each 100% SSS coverage. Each coverage mosaic was generated under its own field sheet, which encompassed the entire survey area.

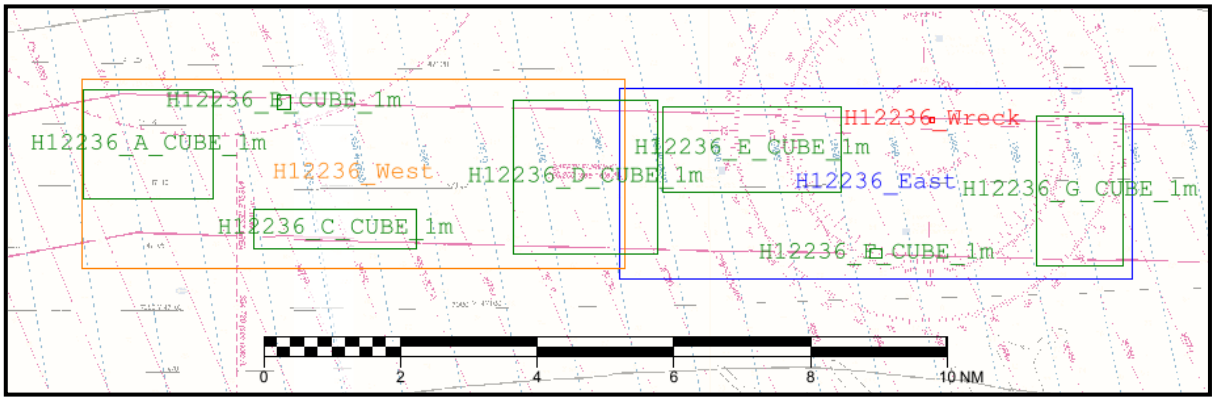


Figure 16. Layout of H12236 field sheet deliverables.

Table 6
H12236 Field Sheets

Field Sheet Name	Surface Resolution (meters)	Depth Range (meters)	Coverage Type
H12236_Wreck	0.5	21-27	SWMB
H12236_A_CUBE_1m	1	19-28	SWMB
H12236_B_CUBE_1m	1	21-28	SWMB
H12236_C_CUBE_1m	1	20-28	SWMB
H12236_D_CUBE_1m	1	19-30	SWMB
H12236_E_CUBE_1m	1	18-29	SWMB
H12236_F_CUBE_1m	1	21-23	SWMB
H12236_G_CUBE_1m	1	21-30	SWMB
H12236_East	2	20-32	SWMB
H12236_West	2	20-30	SWMB
H12236_Full_Combined	2	all	SWMB
H12236_SSS_100	1	all	SSS
H12236_SSS_200	1	all	SSS

C. VERTICAL AND HORIZONTAL CONTROL *See also HCell Report*

C.1 Vertical Control

The vertical datum for this project is Mean Lower Low Water (MLLW). The operating National Water Level Observation Network (NWLON) station at Panama City, FL (872-9108) serves as datum control for Survey H12236.

The survey area is located within Zone CGM8 as provided in the preliminary tidal zoning scheme included with the project SOW CD. Based on the results of cross line analysis, it appears that the time and range factors, as provided in the preliminary zoning scheme, are adequate.

C.2 Horizontal Control

The horizontal datum for this project is the North American Datum of 1983 (NAD83). All data products are referenced to Latitude/Longitude or Universal Transverse Mercator (UTM) Zone 16, meters. ***Concur***

All mainscheme line and item investigation position data were acquired using an Applanix POS MV operating in Differential GPS (DGPS) mode. This primary navigation system was supplied with USCG Differential beacon correctors from the Eglin Air Force Base, FL station. Differential beacon correctors from the U.S. Coast Guard station in Mobile Point, AL, were used by the secondary navigation system to facilitate real-time horizontal control

confidence checks. Due to degradation in the USCG Eglin AFB signal, the primary navigation system was temporarily supplied with correctors from the Mobile Point station. Degradation of the Eglin AFB signal occurred between 23:00 UTC on May 18 (DN 138) and 04:45 UTC on May 19 (DN 139). Initial dynamic draft and patch test calibration data were acquired with the POS MV operating in RTK GPS mode.

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. Position confidence checks were accomplished during fuel or weather stops for the *R/V Ferrel*. Refer to the DAPR* and Horizontal and Vertical Control Report (HVCR) * for additional details. ***Submitted with HCell Deliverable***

D. RESULTS AND RECOMMENDATIONS *See also HCell Report and Appendix II*

D.1 Chart Comparison

Chart comparisons were performed in CARIS HIPS/SIPS, Notebook and Easy View using surface models, contours and soundings that were generated from the 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 Coast Survey WWW site (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 7, were downloaded on August 31, 2010 and are submitted with the survey data.

The Local Notice to Mariners (LNM) and Notice to Mariners (NM) issued during the survey period (May 12, 2010 to May 28, 2010) were reviewed for significant updates. Coast Guard District 8 LNM 21/2010 (May 26, 2010) was the final notice reviewed for this project.

Table 7
H12236 Affected Charts

Chart Number	Scale	Edition	ENC
11382	1:80,000	41st, May/10	US4FL71M
11388	1:80,000	17th, Feb/04	US4FL74M

D.1.1 General Chart Comparison

In general, surveyed depths agreed with charted soundings within 3 feet (1 meter). Specific differences are discussed in the detailed chart comparisons below.

- The charted obstruction fish havens within the survey area were included as AWOIS investigation items and are discussed in detail under Appendix II*, Survey Feature Report. ***Appended to this report***

- In the western half of the survey area, it was a common trend that surveyed depths were significantly deeper than surrounding charted depths in the areas between the charted sounding positions (Figures 17 and 18). The surveyed depths in these basins were up to 25 feet (7.6 meters) deeper than surrounding charted depths.
- High-resolution data from this survey provide more detailed delineations of depth areas and individual features.

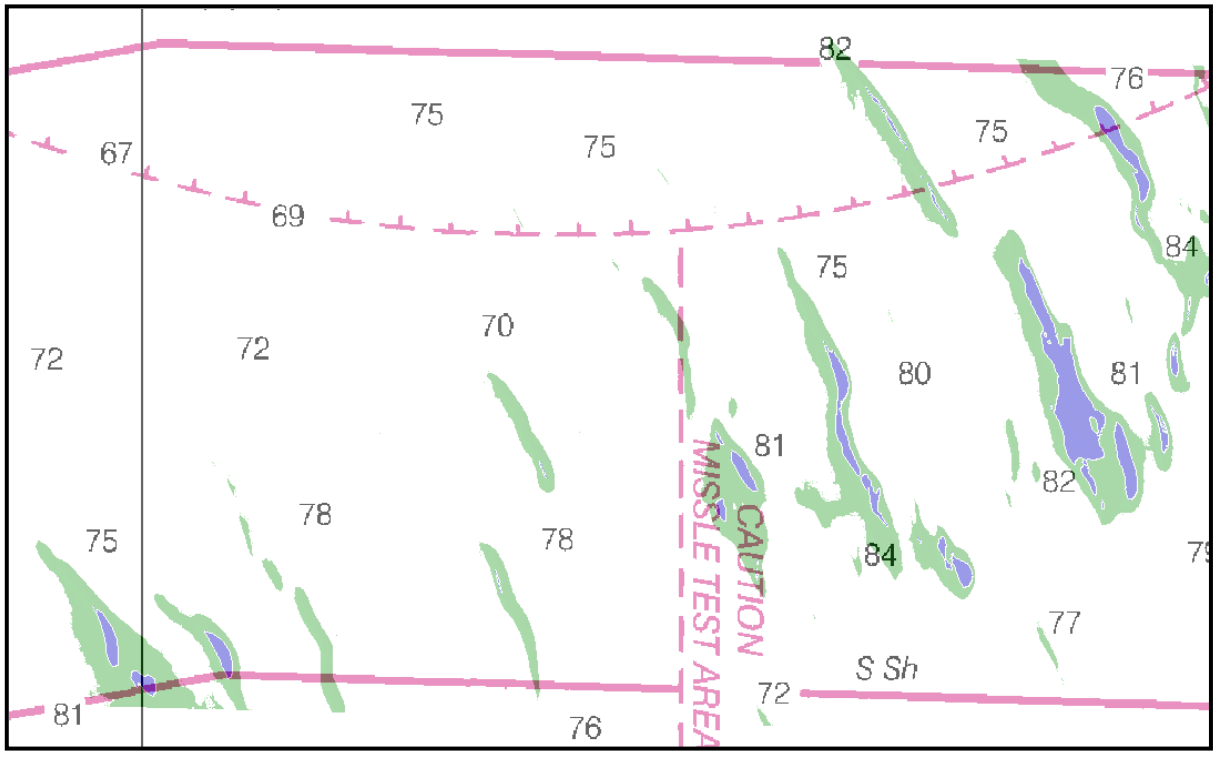


Figure 17. Deep areas surveyed between charted soundings on RNC 11382 are highlighted using CARIS BASE surfaces finalized by depth. Surveyed depths between 85 and 90 feet are colored in green and surveyed depths greater than 90 feet are colored in blue. Charted soundings are in feet.

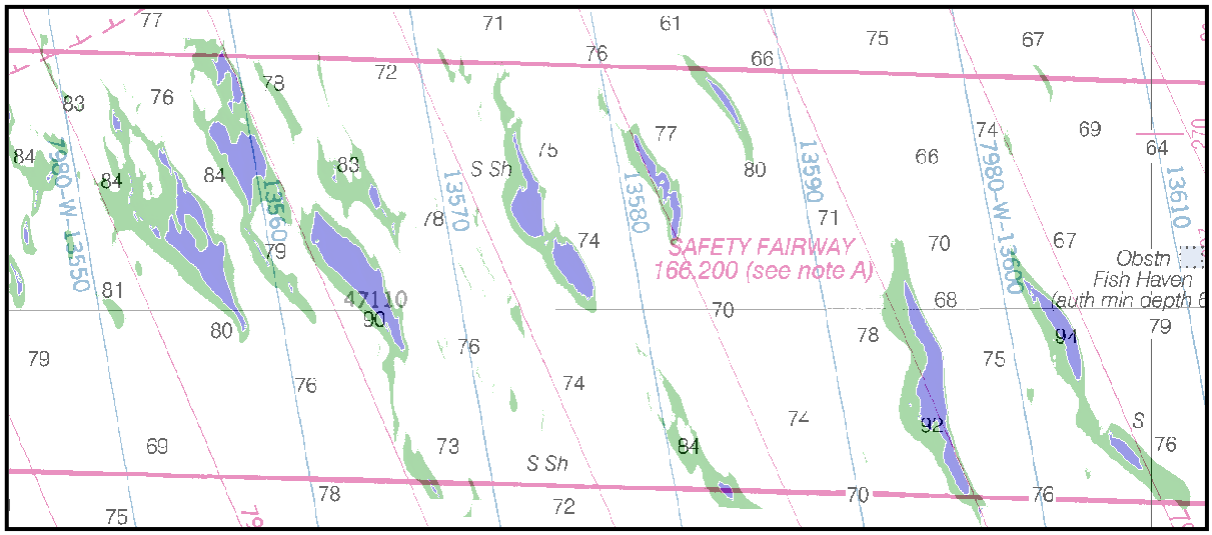


Figure 18. Deep areas surveyed between charted soundings on RNC 11388 are highlighted using CARIS BASE surfaces finalized by depth. Surveyed depths between 85 and 90 feet are colored in green and surveyed depths greater than 90 feet are colored in blue. Charted soundings are in feet.

D.1.2 Detailed Chart Comparison and Charted Features

RNC 11382/ENC US4FL71M (Soundings in feet)

- H12236-1: A small portion of a Restricted Area south of Santa Rosa Island is located within the northwest corner of the survey limits. The Restricted Area is reserved for intermittent US Air Force test operations as stated in Chapter 2, Navigation Regulations, of Coast Pilot 5 (38th Edition, 2010). Surveyed depths agreed within 2 feet (0.6 meters) of the charted depths. Two contacts were developed with object detection coverage inside the Restricted Area. One was an obstruction with a least depth of 66.5 feet (20.3 meters) with a height of 6 feet (1.8 meters) at 30-18-15.66N, 86-49-15.29W in the vicinity of a charted 69-foot sounding. The second obstruction was a pair of objects with heights of 4.5 feet (1.4 meters). The least depth on the objects was 71.0 feet (21.6 meters) at 30-18-21.05N, 86-47-33.11W located between three charted 75-foot soundings (Figure 19). ***Concur***

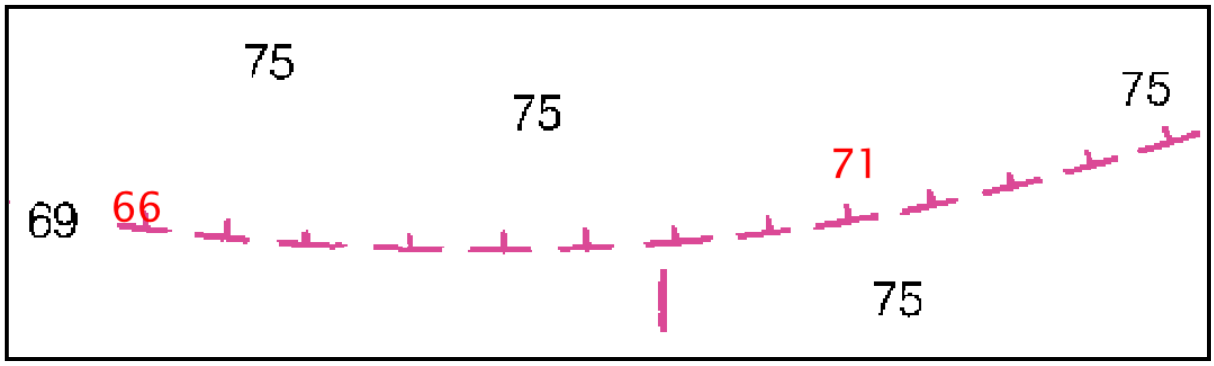


Figure 19. The least depth positions of two obstructions are shown in red in reference to the boundary limit of the charted Restricted Area represented by the dashed pink line. Soundings from RNC 11382 are in black. All depths are in feet.

- H12236-2: A new shoal was located between charted soundings of 80, 81, 82, and 84 feet (Figure 20). A least depth of 75.7 feet (23.1 meters) was developed over the shoal at 30-17-20.98N, 86-47-03.22W. ***Concur***

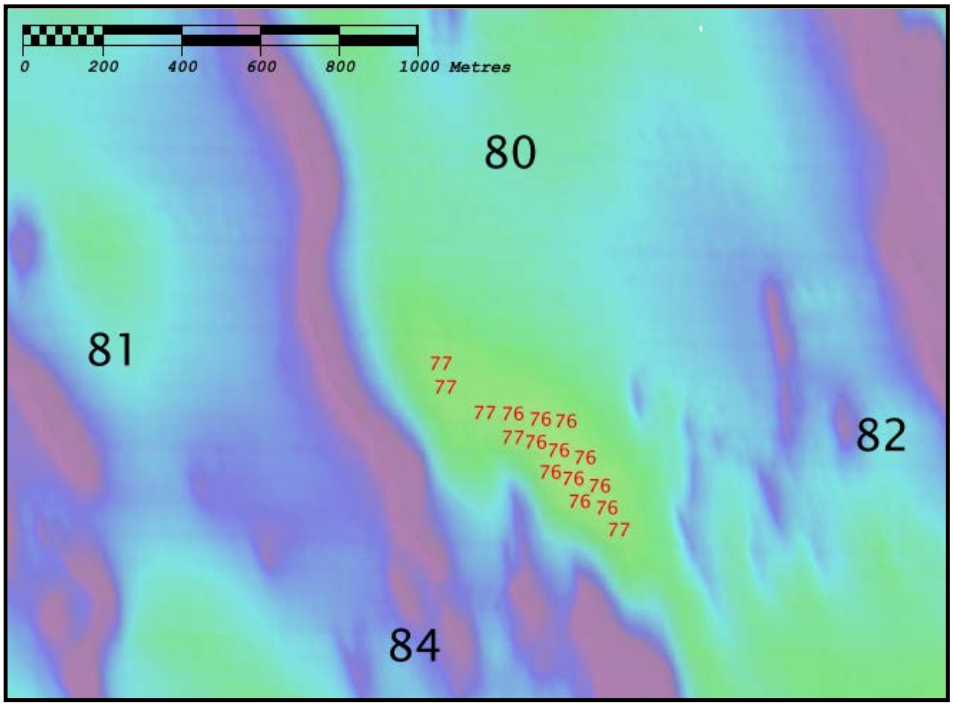


Figure 20. Surveyed depths over the new shoal are highlighted in red in reference to charted depths from ENCs US4FL74M and US4FL71M, which are shown in black. A 2-meter resolution BASE surface colored by depth is shown in the background. All depths are in feet.

RNC 11388/ENC US4FL74M (Soundings in feet)

- H12236-3: An Obstn Fish Haven (auth min depth 65 ft) centered at 30-17-40N, 86-39-47W was surveyed with 200% SSS and 100% SWMB. No obstructions were found within the fish haven. A least depth of 70.5 feet (21.5 meters) was developed at 30-17-42.20N, 86-39-42.84W. See AWOIS Item #14784 under Appendix II – Survey Feature Report for additional information. ***See Appendix II AWOIS #1.1, appended to this report***
- H12236-4: An Obstn Fish Haven (auth min depth 66 ft) centered at 30-16-45N, 86-36-40W was surveyed with 200% SSS and 100% SWMB. No obstructions were found within the fish haven. A least depth of 84.8 feet (25.8 meters) was developed at 30-16-42.05N, 86-36-39.56W. See AWOIS Item #14785 under Appendix II – Survey Feature Report for additional information. ***See Appendix II AWOIS #1.2, appended to this report***
- H12236-5: A 68-foot Wk was added to the chart following submission of the H12236 DTON Report (See Appendix I). The wreck is believed to be the Liberty Ship *Thomas Hayward*, a popular destination for recreational diving, which was sunk as an artificial reef in 1977. The wreck measures approximately 390 feet (120 meters) x 60 feet (18 meters) with a height of 13 feet (4 meters). A least depth of 67.9 feet (20.7 meters) was developed over the wreck at 30-18-23.02N, 86-36-13.10W (Figure 21). A WRECKS object is included in the S-57 feature file (H12236_S57_Features.000). ***See Appendix I, appended to this report***

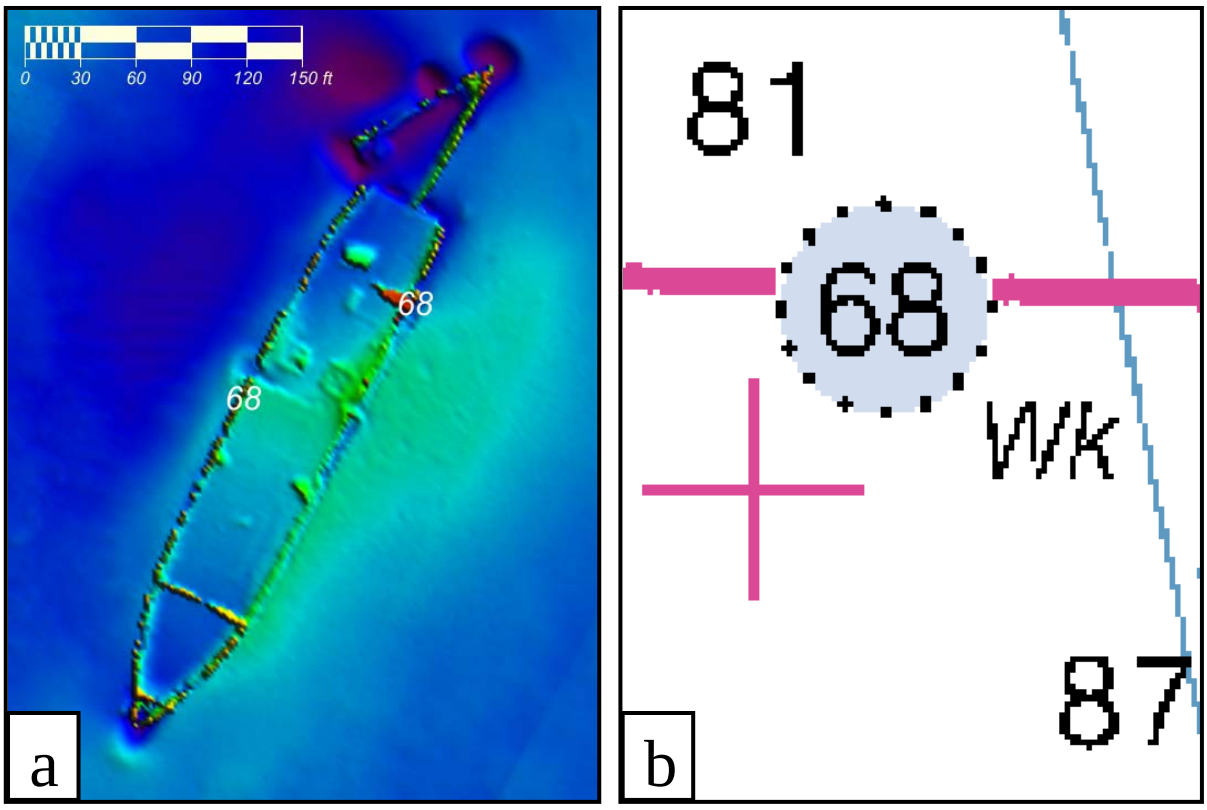


Figure 21. (a) The wreck of the *Thomas Hayward* as it appears in a 50-centimeter resolution BASE Surface colored by depth with the designated least depths shown in white. (b) The wreck position as charted on RNC 11388. All depths are in feet.

- H12236-6: There were four instances where significant shoaling was observed over charted soundings. These discrepancies are listed below.
  - Depths between 88 and 91 feet (26.8 to 27.7 meters) were surveyed over a charted 97-foot sounding located at 30-17-13.50N, 86-37-34.40W. ***Concur***
  - A new shoal with a least depth of 83.0 feet (25.3 meters) at 30-16-33.77N, 86-35-47.35W was developed over a charted 94-foot sounding. ***Concur***
  - A new shoal with a least depth of 78.8 feet (24.0 meters) at 30-17-13.63N, 86-34-34.34W was developed over a charted 91-foot sounding. ***Concur***
  - A new shoal with a least depth of 83.4 feet (25.4 meters) at 30-17-59.76N, 86-35-17.57W was developed over a charted 92-foot sounding. ***Concur***

- H12236-7: A triangular obstruction with an approximate height of 9 feet (2.7 meters) and a least depth of 65.7 feet (20.0 meters) was developed at 30-18-12.30N, 86-41-51.91W in the vicinity of a charted 80-foot sounding (Figure 22). The obstruction is included as an OBSTRN object in the S-57 feature file (H12236_S57_Features.000).

  Do not concur. Due to shoal depths nearby, obstruction is charted as a sounding in H12236_CS.000 file.

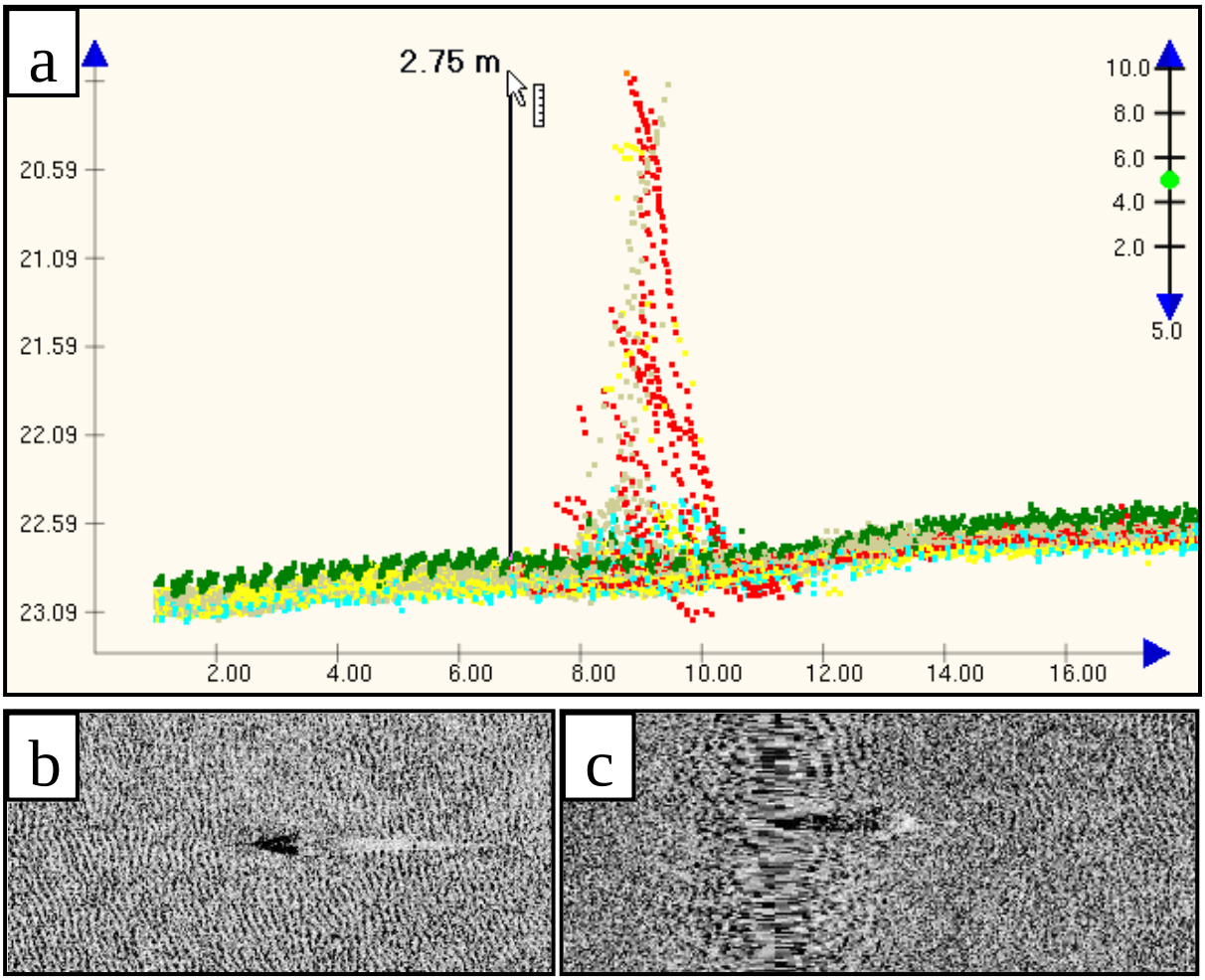
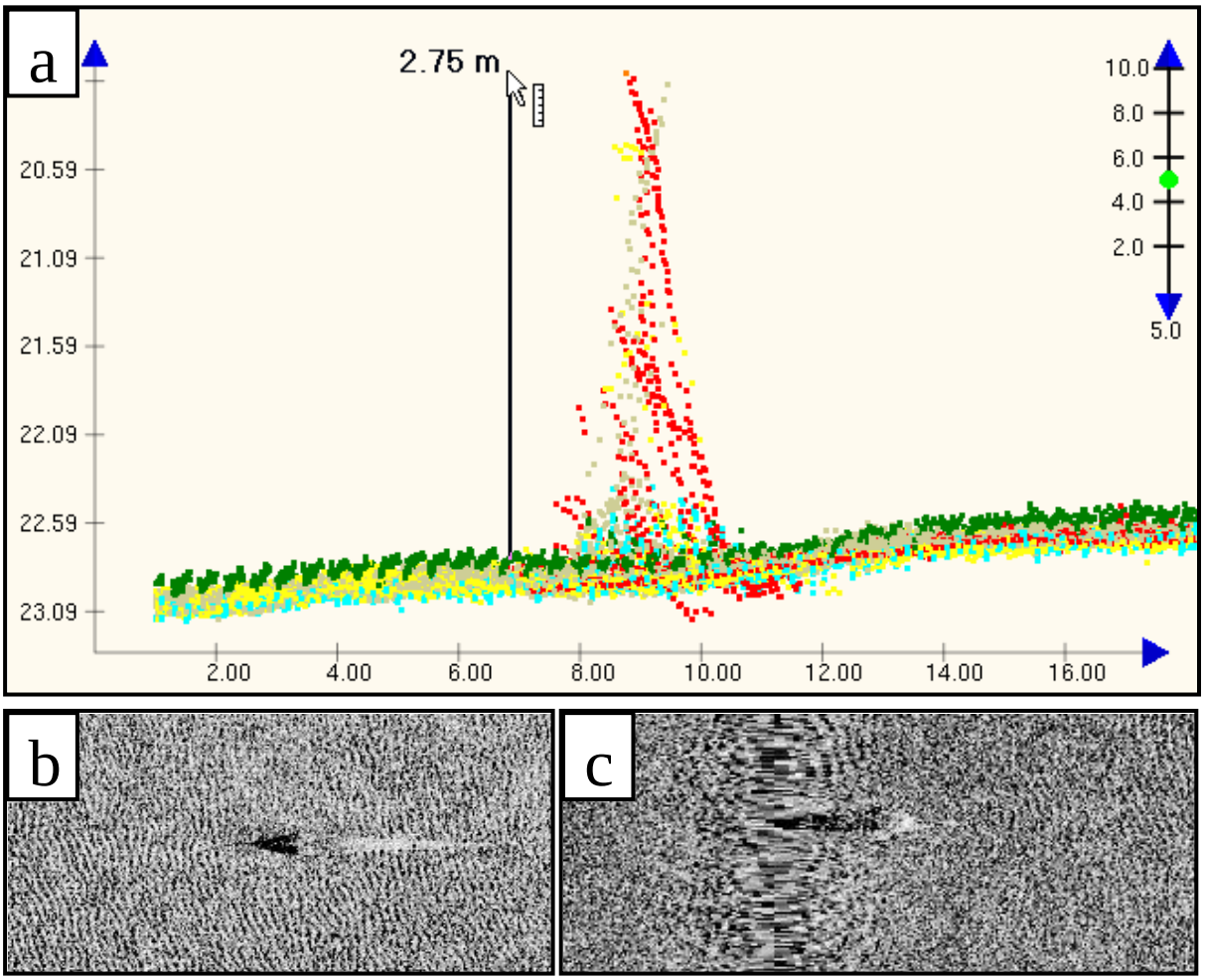


Figure 22. (a) The 65-foot obstruction displayed in CARIS HIPS Subset Editor with soundings colored by survey line; depth and distance units are in meters. (b, c) Side scan sonar imagery of the obstruction from two overlapping survey lines, Contacts 136-03260008 and 136-00240004, respectively.

- H12236-8: Five rectangular obstructions, no taller than six feet in height (1.8 meters) with a least depth of 81.5 feet (24.8 meters), were developed at 30-17-57.51N, 86-35-38.91W in the vicinity of charted 87-, 92-, and 93-foot soundings. The obstruction is included as potential AWOIS Item 14785 in Appendix II and an OBSTRN object in the S-57 feature file (H12236_S57_Features.000).

Do not concur. Due to shoal depths nearby and depth of obstruction, the field's submitted obstruction is charted as a sounding in H12236_CS.000 file.



- H12236-9: A shoaling trend was noted along the crest of a seafloor ridge, where depths as shallow as 69 feet (21.0 meters) were developed in the vicinity of 30-17-06.10N, 86-41-05.90W between charted soundings of 92 and 75 feet (Figure 23). ***Concur***

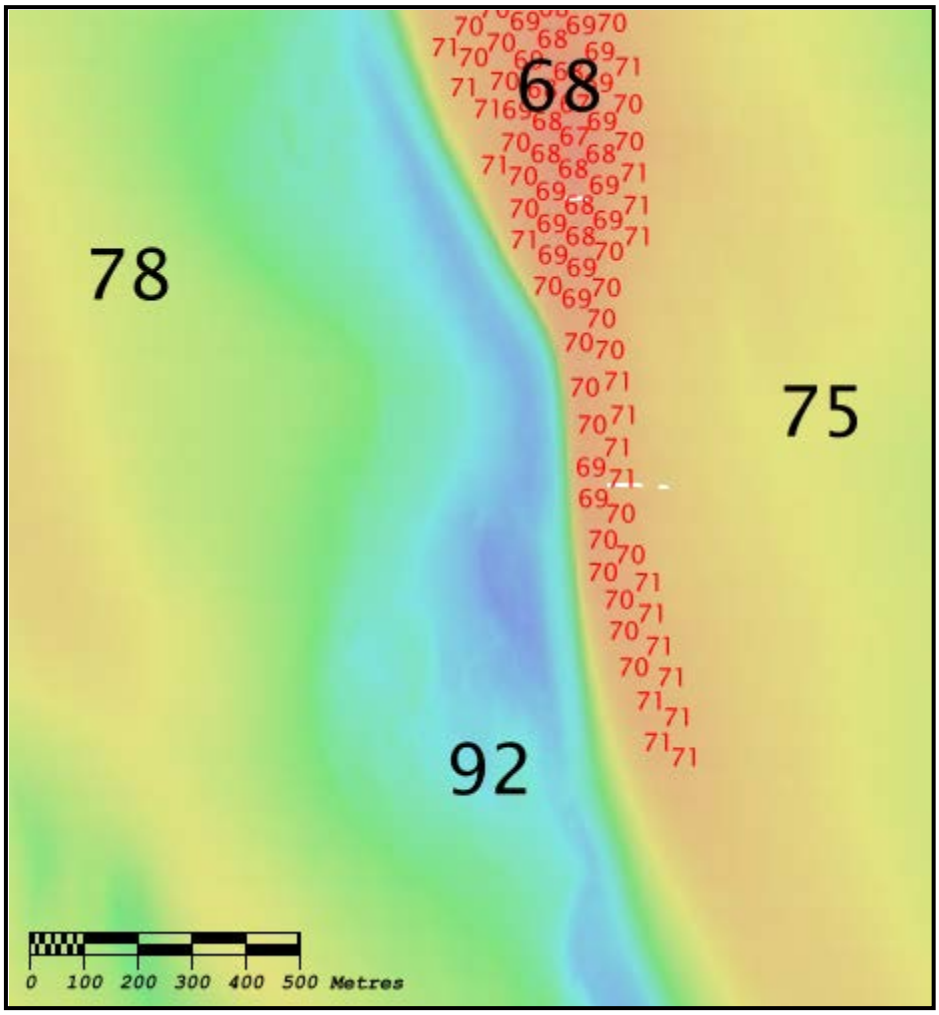


Figure 23. Surveyed depths less than or equal to 71 feet are highlighted in red in reference to the charted soundings from ENC US4FL74M, which are shown in black. A 2-meter resolution BASE surface colored by depth is shown in the background. All depths are in feet.

- H12236-10: A new shoal was surveyed approximately 500 feet (150 meters) west of a charted 77-foot sounding (Figure 24). A least depth of 72.5 feet (22.1 meters) was developed over the shoal at 30-17-36.58N, 86-35-00.44W. ***Concur***

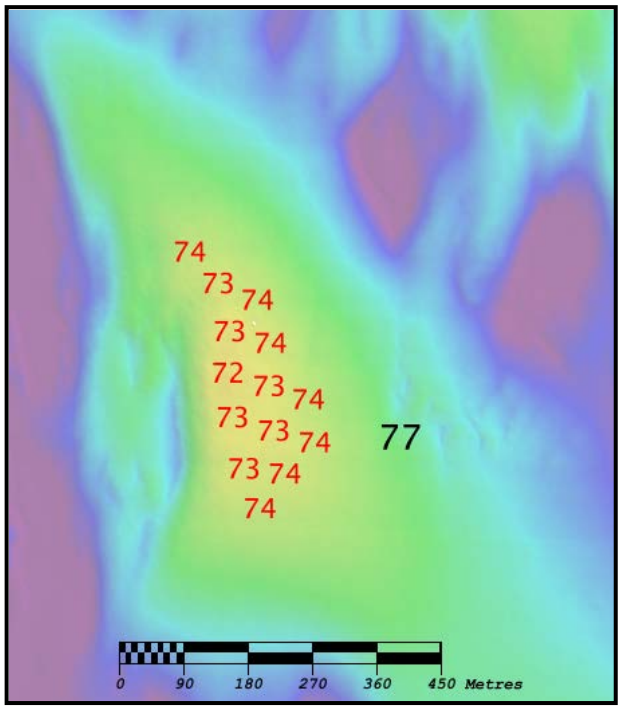


Figure 24. Surveyed depths over the new shoal are highlighted in red in reference to the charted 77-foot sounding from ENC US4FL74M, which are shown in black. A 2-meter resolution BASE surface colored by depth is shown in the background. All depths are in feet.

- H12236-11: Significant shoaling was noted in the vicinity of charted soundings of 90 and 93 feet (Figure 25). A least depth of 80.4 feet (24.5 meters) was developed at 30-17-12.53N, 86-35-37.30W. ***Concur***

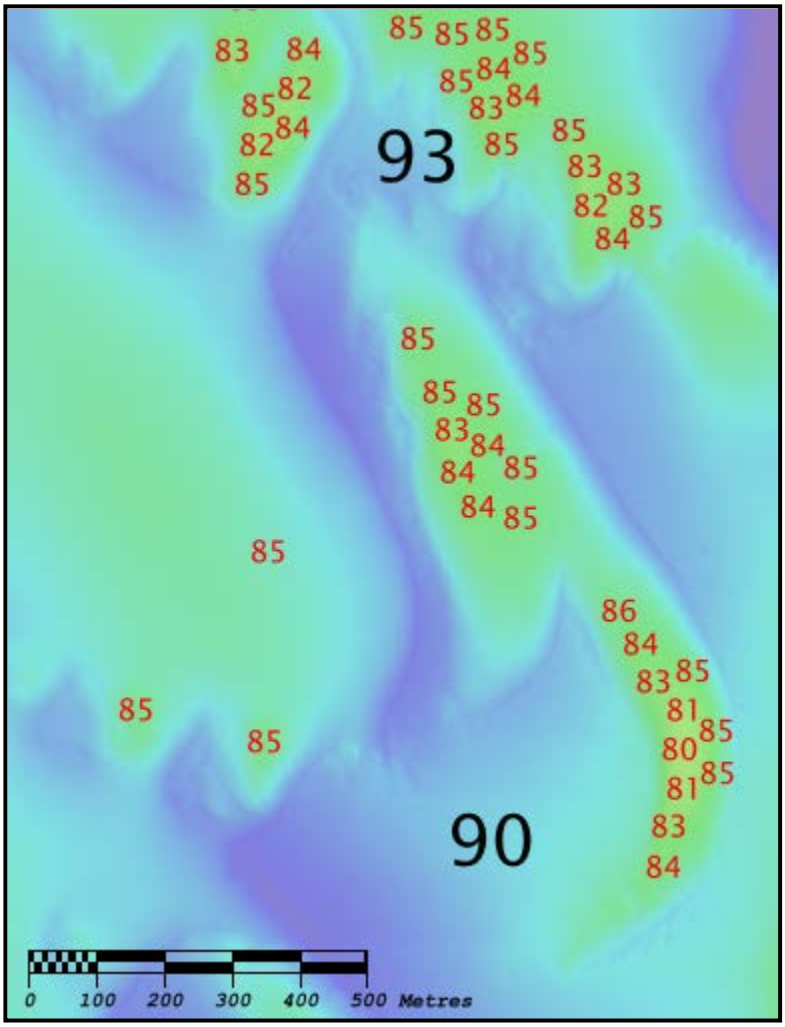


Figure 25. Surveyed depths less than or equal to 85 feet are highlighted in red in reference to the charted 90-foot and 93-foot soundings from ENC US4FL74M, which are shown in black. A 2-meter resolution BASE surface colored by depth is shown in the background. All depths are in feet.

- H12236-12: A group of 5 new shoals were located between charted soundings of 94, 90, 88 and 85 feet (Figure 26). Survey depths over the shoals ranged between 78 and 82 feet (23.8 and 25.0 meters) with the least depth of 78.0 feet (23.8 meters) developed at 30-16-49.18N, 86-35-50.65W. ***Concur***

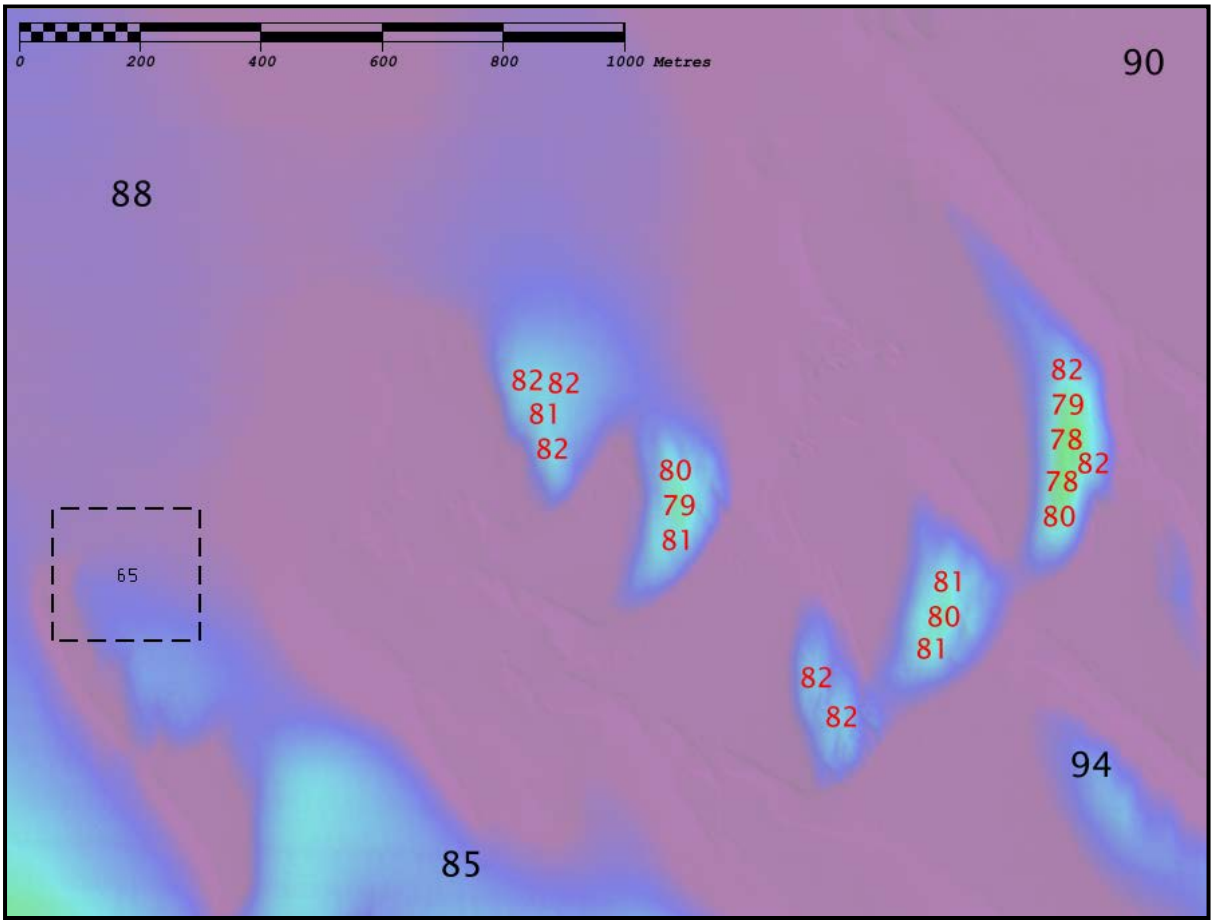


Figure 26. Surveyed depths over the new shoals are highlighted in red in reference to soundings from ENC US4FL74M, which are shown in black. A 2-meter resolution BASE surface colored by depth is shown in the background. All depths are in feet.

- H12236-13: There were two instances where surveyed depths were significantly deeper than charted soundings. These discrepancies are listed below.
    - Depths between 84 and 87 feet (25.6 and 26.5 meters) were surveyed over a charted 78-foot sounding located at 30-18-29N, 86-44-49W. ***Concur with clarification, there are also 76ft depths in the direct vicinity of the 78ft charted sounding***

- Depths between 76 and 78 feet (23.2 and 23.8 meters) were surveyed over a charted 70-foot sounding located at 30-16-31N, 86-41-36W. ***Concur***

D.1.3 Controlling and Tabulated Depths

Not applicable for this survey.

D.1.4 AWOIS Items

There were two (2) AWOIS item investigations assigned within the survey area (Table 8). All AWOIS items were investigated employing 200% SSS along with 100% multibeam coverage. Object detection coverage was obtained on all potentially significant SSS contacts located with the area defined by the AWOIS search radius.

Table 8
H12236 AWOIS Investigations

AWOIS Record	Latitude (N)	Longitude (W)	Description	Status
14784	30-17-40	86-39-47	14 Garbage Bins	Disproved
14785	30-16-45	86-36-40	12 Garbage Bins	Disproved

See Appendix II – Survey Feature Report, for complete reporting on AWOIS Item investigation. ***See Appendix II, appended to this report***

D.1.5 Dangers to Navigation (DTON)

One DTON report was generated for one (1) feature. A summary is presented in Table 9 and a copy of the report is included in Appendix I. ***See Appendix I, appended to this report***

Table 9
Dangers to Navigation

Item #	Feature	Depth Feet	Depth Meters	Latitude (N)	Longitude (W)	Description
1	Wreck	67.93	20.71	30-18-23.02	86-36-13.10	Uncharted Wreck in the Safety Fairway East of Pensacola Bay

D.2 Additional Results

D.2.1 Shoreline Verification

Shoreline verification was not required for this survey. ***Concur***

D.2.2 Comparison with Prior Surveys

A comparison with prior surveys was not required for this survey. ***Concur***

D.2.3 Aids to Navigation (ATON)

There were no Aids to Navigation within the survey area. ***Concur***

D.2.4 Restricted Data

Not applicable for this survey. ***Concur***

D.2.5 Other Data

D.2.5.1 Bottom Characteristics

Fourteen (14) bottom samples were acquired to determine bottom characteristics. Bottom samples were spaced at approximately 2000-meter intervals in accordance with the SOW. A table listing the positions and descriptions of the bottom samples is included in Appendix V***. A position and description of each sample is provided as attributed SBDARE objects in the S-57 feature file. Digital images with identification reference numbers are submitted with the survey data and referenced in the S-57 PICREP attribute. ****Appended to this report***

D.2.6 S-57 Feature File

D.2.6.1 S-57 Chart Features File

Several uncharted obstructions and one wreck were identified and delineated in the SSS data, SWMB data, and BASE surfaces. An S-57 feature file (H12236_S-57_Features.000/.hob) was created to emphasize the navigationally significant objects discovered during the survey, update charted objects and to provide information for these objects that could not be portrayed in the BASE surfaces. All S-57 features were attributed in accordance with guidance provided in the SOW and HSSD 2010 Section 8.2. Table 10 describes the attribute mapping for the S-57 feature file. ***See Appendix II for all feature discussions.***

Table 10
S-57 Chart Features Attribute Mapping

S-57 Attribute	Value
VALSOU	Corrected least depth
TECSOU	Technique used to develop VALSOU
INFORM	Unique Critical Sounding ID
SORDAT	Survey Date
SORIND	Survey reference – registry ID
PICREP	Contact image file name

userid*	Unique Contact ID
remrks*	Acquisition or processing remarks
recomd*	Charting recommendations

*These attributes are available in the CARIS Notebook HOB file format.

D.2.6.2 S-57 Contact File

All contacts are submitted in an S-57 attributed Notebook HOB file of $CSYMB objects. Table 11 describes the attribute mapping for the S-57 contact file.

Table 11
S-57 Contact Attribute Mapping

S-57 Attribute	Value
INFORM	Corrected least depth (m)
SORDAT	Survey Date
SORIND	Survey reference – registry ID
PICREP	Contact image file name
TXTDSC	Unique Critical Sounding ID (Line-beam-ping)
userid*	Unique Contact ID (Line-ping-offset)
remrks*	Acquisition or processing remarks
recomd*	Charting recommendations

*These attributes are available in the CARIS Notebook HOB file format.

D.2.6.3 S-57 Critical Sounding File

All critical soundings are submitted in an S-57 attributed Notebook HOB file of $CSYMB objects. Table 12 describes the attribute mapping for the S-57 critical soundings file.

Table 12
S-57 Critical Soundings Attribute Mapping

S-57 Attribute	Value
INFORM	Corrected least depth (m)
SORDAT	Survey Date
SORIND	Survey reference – registry ID
PICREP	Contact or feature image file name
TXTDSC	Unique Contact ID (Line-ping-offset)
userid*	Unique Critical Sounding ID (Line-beam-ping)
remrks*	Acquisition or processing remarks
recomd*	Charting recommendations

*These attributes are available in the CARIS Notebook HOB file format.

E. APPROVAL SHEET

LETTER OF APPROVAL

REGISTRY NO. H12236

This report and the accompanying data are respectfully submitted.

Field operations contributing to the accomplishment of Survey H12236 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.

George G. Reynolds
Ocean Surveys, Inc.
Chief of Party – H12236
December 23, 2010

Appendix I

Danger to Navigation Reports

From: George Reynolds [mailto:ggr@oceansurveys.com]
Sent: Wednesday, May 19, 2010 9:50 AM
To: 'ahb.dton@noaa.gov'; 'kathleen.jamison'
Subject: H12236 DTON Report #1

Hi Kathleen,

Attached is H12236 DTON Report #1.

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

Regards
George

George Reynolds
Ocean Surveys, Inc.
91 Sheffield St
Old Saybrook, CT
06475
860-388-4631 Ext 112
http://www.oceansurveys.com

H12236 DtoN

Registry Number:

State:

Locality:

Sub-locality:

Project Number:

Survey Date: 05/28/2010

Charts Affected

Number	Edition	Date	Scale (RNC)	RNC Correction(s)*
11388	17th	02/01/2004	1:80,000 (11388_1)	USCG LNM: 6/8/2010 (6/21/2011) NGA NTM: 11/18/2006 (7/2/2011)
1115A	43rd	11/01/2008	1:456,394 (1115A_1)	[L]NTM: ?
11360	43rd	11/01/2008	1:456,394 (11360_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	68ft WRECKS	Wreck	20.70 m	30° 18' 23.0" N	086° 36' 13.1" W	---

1 - Dangers To Navigation

1.1) 68ft WRECKS

DANGER TO NAVIGATION

Survey Summary

Survey Position:	30° 18' 23.0" N, 086° 36' 13.1" W
Least Depth:	20.70 m (= 67.93 ft = 11.322 fm = 11 fm 1.93 ft)
TPU (±1.96σ):	**THU (TPEh)** [None] ; **TVU (TPEv)** [None]
Timestamp:	2010-148.00:00:00.000 (05/28/2010)
GP Dataset:	AHB_H12236 / SAR / SAR AHB HOB Files / H12236_Pydro_Features.000
GP No.:	02260000BDAF0001
Charts Affected:	11388_1, 1115A_1, 11360_1, 11006_1, 411_1

Remarks:

WRECKS/remrks: Wreck of Liberty Ship Thomas Hayward; submitted as DTON

The uncharted wreck, believed to be the Liberty Ship Thomas Hayward, is approximately 120 meters x 18 meters and protrudes 4 meters from the surrounding bottom.

Feature Correlation

Address	Feature	Range	Azimuth	Status
AHB_H12236/SAR/SAR AHB HOB Files/H12236_Pydro_Features.000	02260000BDAF0001	0.00	000.0	Primary

Hydrographer Recommendations

Chart at least depth position

Cartographically-Rounded Depth (Affected Charts):

68ft (11388_1)

11fm (1115A_1, 11360_1, 11006_1, 411_1)

S-57 Data

Geo object 1:	Wreck (WRECKS)
Attributes:	CATWRK - 1:non-dangerous wreck
	NINFOM - Add WRECKS
	QUASOU - 6:least depth known

SORDAT - 20100528

SORIND - US,US,graph,H12236

TECSOU - 3,2:found by multi-beam,found by side scan sonar

VALSOU - 20.705 m

WATLEV - 3:always under water/submerged

Office Notes

SAR: WRECKS verified by 200% SSS and MB least depth. COMPILE: Wreck is shown on chart 11388 ed 17 and smaller scale charts as a wreck, least depth 68ft. Feature is shown on chart 11388 ed. 17, February 2004 and smaller scale charts as a non-dangerous wreck, least depth 68ft. Retain as charted.

Feature Images

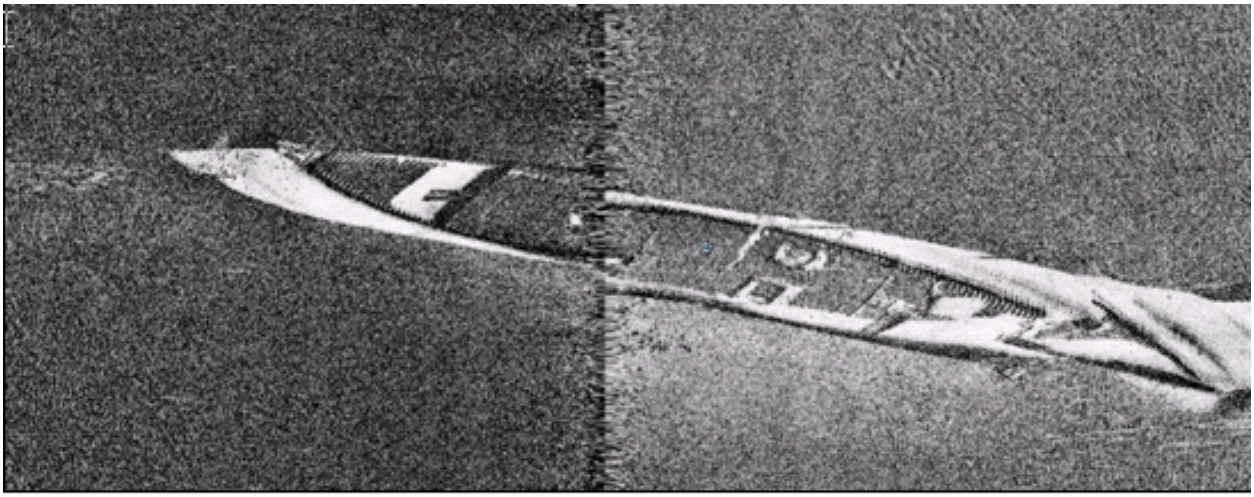


Figure 1.1.1

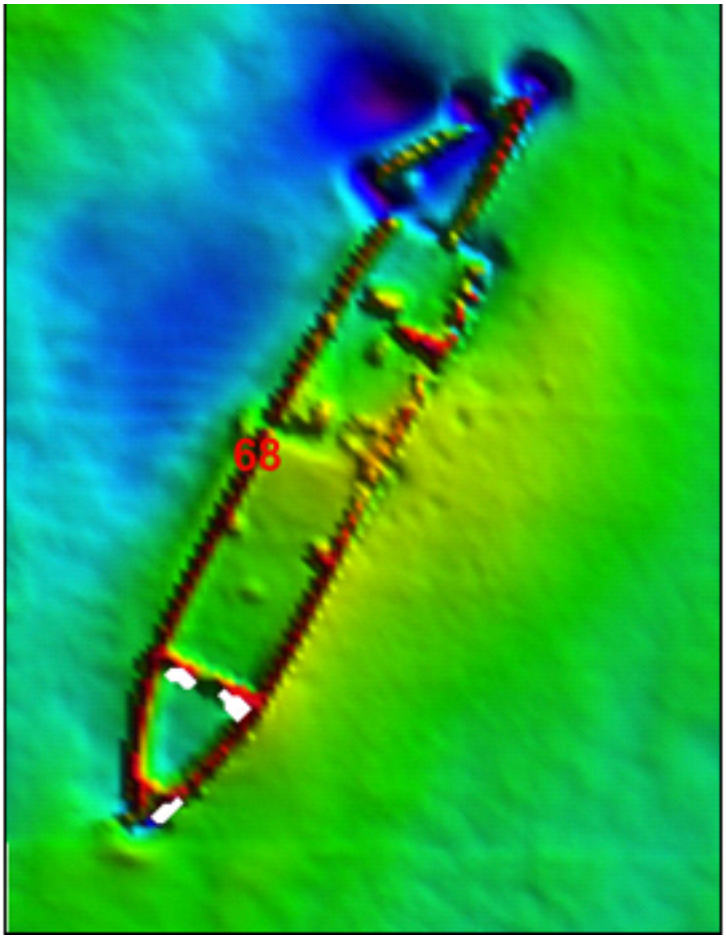


Figure 1.1.2

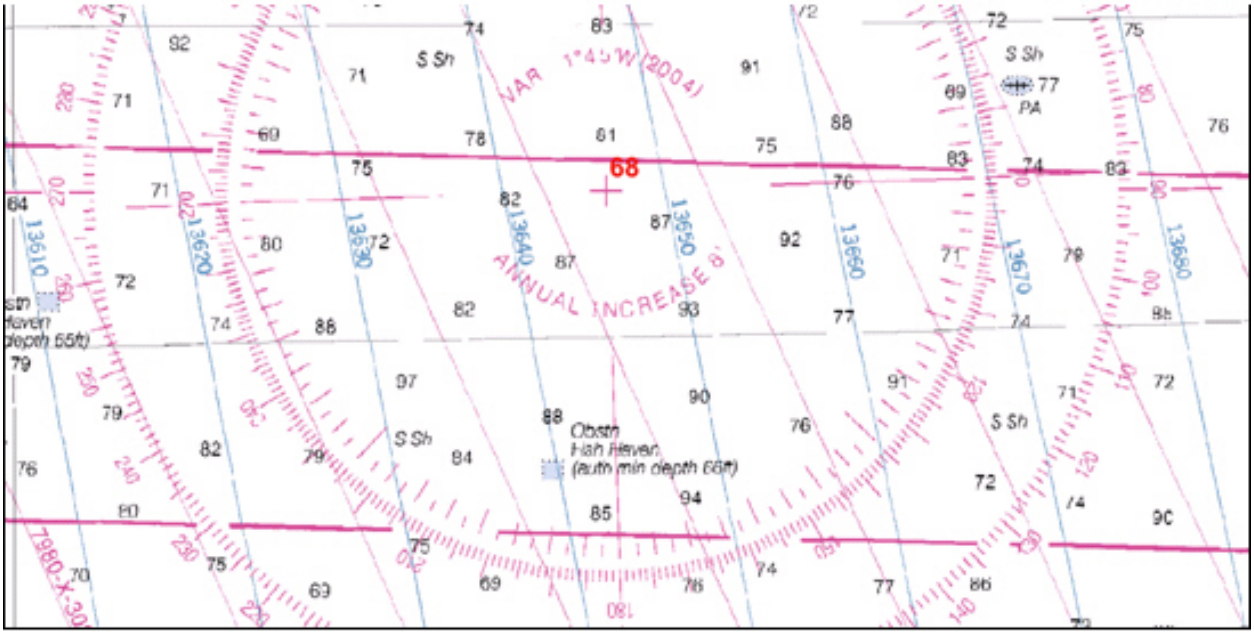


Figure 1.1.3

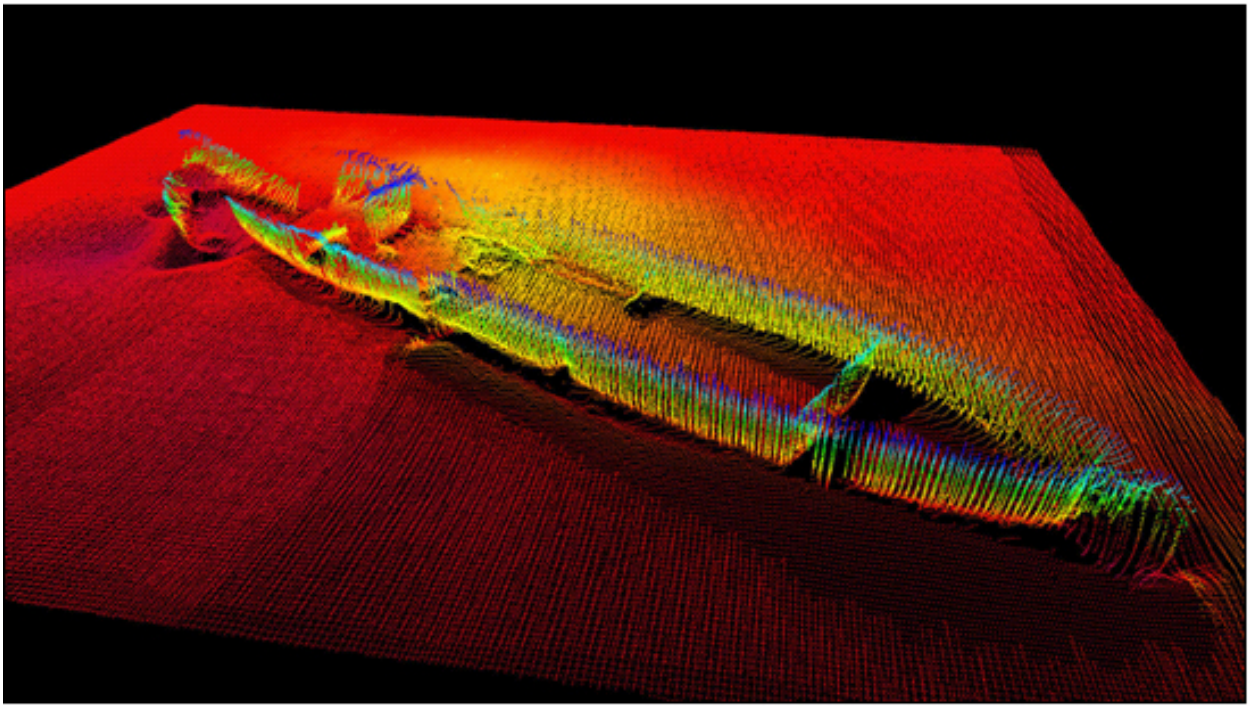


Figure 1.1.4

Appendix II

Survey Feature Report

Survey Feature Report

Uncharted obstructions, rocks and wrecks were identified in the SSS data, SWMB data, and BASE surfaces. An S-57 feature file (H12236_S57_Features.000) was created to emphasize navigationally significant objects discovered during the survey and to provide information for these objects that could not be portrayed in the BASE surfaces. Chart features with updated positions or least depths were also included in the S-57 feature file.

All S-57 features were attributed in accordance with guidance provided in the SOW and HSSD using the following conventions:

- INFORM was used for survey descriptive information to aid in chart application. SBDARE bottom sample object INFORM attributes contain the original field descriptions of the sediment samples.
- SORDAT was attributed with the final date of the survey.
- SORIND was attributed with the country codes and survey registry (e.g. US, US, survey, H12236).

H12236 AWOIS

Registry Number:

State:

Locality:

Sub-locality:

Project Number:

Survey Date: 02/01/2004

Charts Affected

Number	Edition	Date	Scale (RNC)	RNC Correction(s)*
11388	17th	02/01/2004	1:80,000 (11388_1)	USCG LNM: 6/8/2010 (6/21/2011) NGA NTM: 11/18/2006 (7/2/2011)
1115A	43rd	11/01/2008	1:456,394 (1115A_1)	[L]NTM: ?
11360	43rd	11/01/2008	1:456,394 (11360_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	Charted Fish Haven-AWOIS 14784	Obstruction	19.80 m	30° 17' 36.6" N	086° 39' 50.9" W	---
1.2	Charted Fish Haven-AWOIS 14785	Obstruction	20.10 m	30° 16' 41.9" N	086° 36' 44.5" W	---

1.1) Charted Fish Haven-AWOIS 14784

Survey Summary

Survey Position:	30° 17' 36.6" N, 086° 39' 50.9" W
Least Depth:	19.80 m (= 64.96 ft = 10.827 fm = 10 fm 4.96 ft)
TPU (±1.96σ):	**THU (TPEh)** [None] ; **TVU (TPEv)** [None]
Timestamp:	2004-032.00:00:00.000 (02/01/2004)
GP Dataset:	AHB_H12236 / SAR / SAR AHB HOB Files / H12236_Pydro_Features.000
GP No.:	02260000BDAC0001
Charts Affected:	11388_1, 1115A_1, 11360_1, 11006_1, 411_1

Remarks:

Lat/Long: 30-17-40N, 86-39-47W

ENC US4FL74M OBSTRN area

SORIND: US,US,graph,Chart 11388

CATOBS: Fish Haven

QUASOU: least depth unknown, safe clearance at value shown

VALSOU: 65 usft

AWOIS History: CL 939/89, 9/18/1989; USACE -- DISTRICT RECEIVED APPLICATION FROM CITY OF DESTIN, FL FOR DEPT OF ARMY PERMIT FOR PLACEMENT OF CLEANED GARBAGE BINS FOR ARTIFICIAL REEFS. SITE "6" CONSISTS OF 10 SMALL, 2 MEDIUM, AND 2 LARGE BINS WITH A MINIMUM LEAST DEPTH OF 65'. CHARTED AS OBSTN FISH HAVEN (AUTH MIN DEPTH 65'). POSITION DOCUMENTED AS LORAN "C" 13611.3/47111.7 AND CHARTED AT 30 17 40 / 86 39 47. (KSJ 5/3/2010)

Status: AWOIS Item #14784 is charted as an “Obstn Fish Haven (auth min depth 65ft).” The search area defined by a 600-meter radius was centered on the small fish haven and was covered with 200% SSS and 100% SWMB. The history for AWOIS Item #14784 states that 14 garbage bins of various sizes were placed in the fish haven; however, it does not provide the dimensions of the bins. It was assumed by the hydrographer that the garbage bins were of a rectangular shape. No obstructions, small or large, were located within the 200-meter x 200-meter limits of the charted obstruction area. However, three (3) rectangular objects were located within the search area and one (1) rectangular object was located 60 meters north of the search area. In addition, a number of solitary, rectangular objects were identified in the side scan imagery at distances of up to 1600 meters outside the search area (Figure 1). The obstructions generally had approximate heights of 5 feet (1.5 meters).

Two of the obstructions had least depths less than the fish haven’s authorized minimum depth of 65 feet. Least depths of 61.87 feet (18.86 meters) and 63.03 feet (19.21 meters) were developed at 30-18-01.52N, 86-39-47.38W and 30-17-56.36N, 86-39-43.34W, respectively, and were located over 500 meters north of the charted fish haven position. -3- DR – Appendix II

Figure 2 displays the 62-foot obstruction that is located 60 meters north of the AWOIS search area as it appears in the CARIS HIPS Subset Editor.

Feature Correlation

Address	Feature	Range	Azimuth	Status
AHB_H12236/SAR/SAR AHB HOB Files/H12236_Pydro_Features.000	02260000BDAC0001	0.00	000.0	Primary

Hydrographer Recommendations

The charted Obstn Fish Haven was disproved. It is speculated that the garbage bins were deposited haphazardly within the Safety Fairway, not within the reported fish haven position. A list of the position and least depth of the obstructions that were found in relative proximity to the AWOIS search area is provided in Table 1, accompanied by an image of the object captured from a side scan line file. None of the obstruction heights were considered significant relative to the surrounding survey depths, as all of the computed target heights were less than ten percent of the surrounding depth, per Section “6.3.2 Significant Contacts” of the HSSD 2010. It is recommended that the Obstn Fish Haven be removed from the chart.

Cartographically-Rounded Depth (Affected Charts):

65ft (11388_1)

10 ¾fm (1115A_1, 11360_1, 11006_1, 411_1)

S-57 Data

Geo object 1: Obstruction (OBSTRN)

Attributes:

CATOBS - 5:fish haven

NINFOM - Retain OBSTRN

SORDAT - 20040200

SORIND - US,US,graph,Chart 11388

VALSOU - 19.800 m

WATLEV - 3:always under water/submerged

Office Notes

SAR: No depths less than auth min depth of 65ft. Compile: Do not concur. Corps of Engineers permitted area, retain OBSTRN (fish haven) as charted.

Feature Images

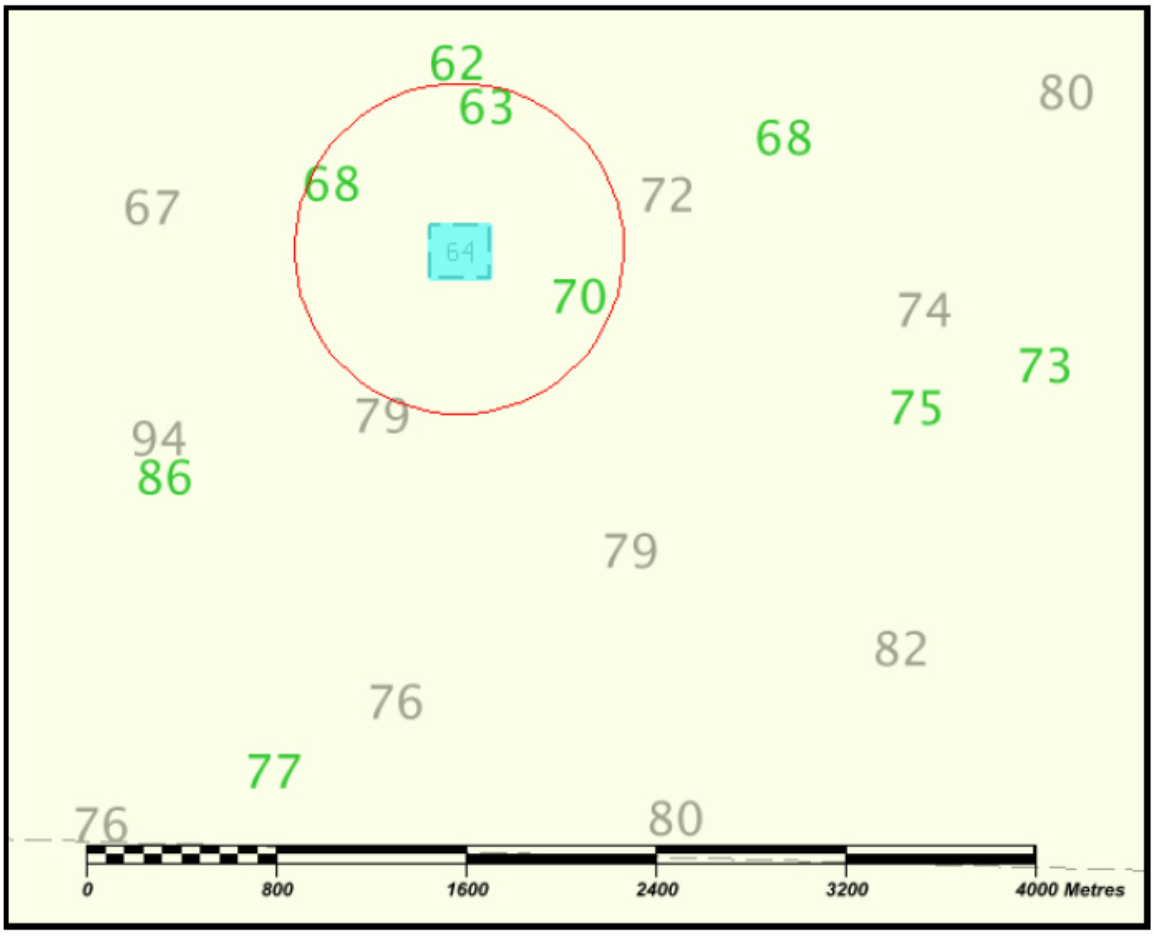


Figure 1. The least depth positions of nine rectangular obstructions are shown in green relative to the charted position of AWOIS Item #14784 on ENC US4FL74M. The AWOIS search area is represented by the red circle and the Obstn Fish Haven is highlighted in cyan. All depths are in feet.

Figure 1.1.1

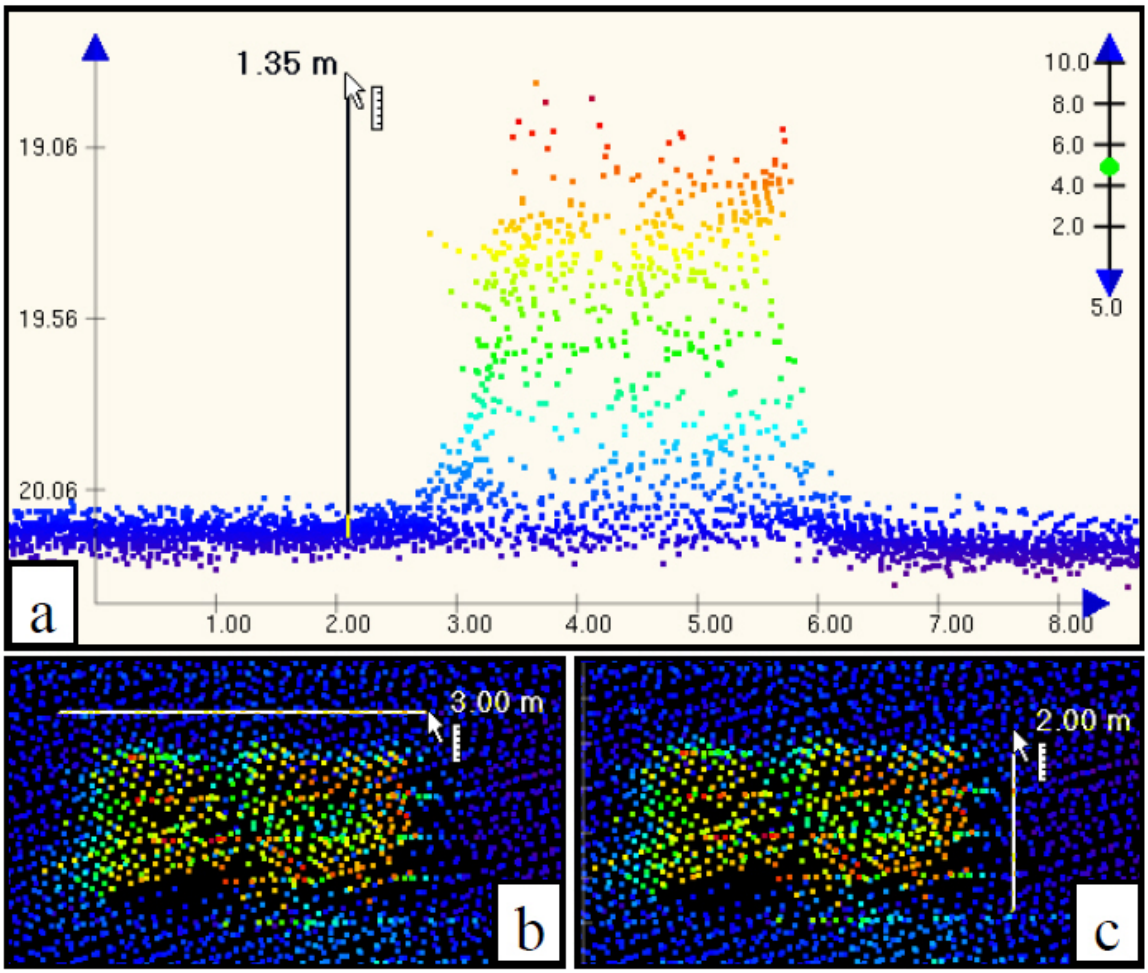


Figure 2. (a) A rectangular obstruction located 60 meters north of the AWOIS search area as it appears in the CARIS HIPS Subset Editor. Soundings are colored by depth. (b, c) The length and width of the 62-foot obstruction is measured in Subset Editor Plan View. All depths and units are in meters.

Figure 1.1.2

Table 1

Obstructions Found in Relative Proximity to AWOIS Item #14784

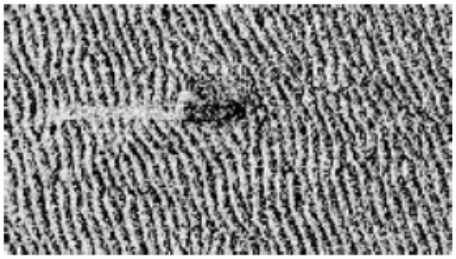
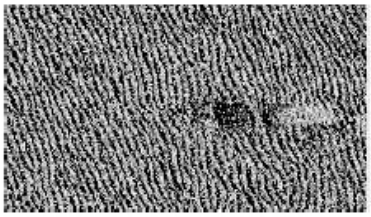
Obstruction Least Depth	Latitude	Longitude	Side Scan Image
61.87 feet	30-18-01.52N	86-39-47.38W	 138-17250001
63.03 feet	30-17-56.36N	86-39-43.34W	 138-15400002

Figure 1.1.3

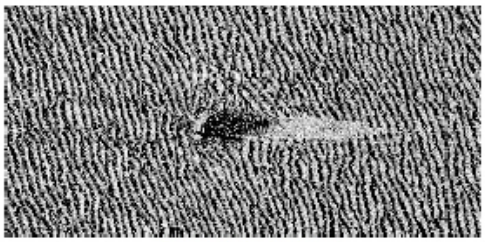
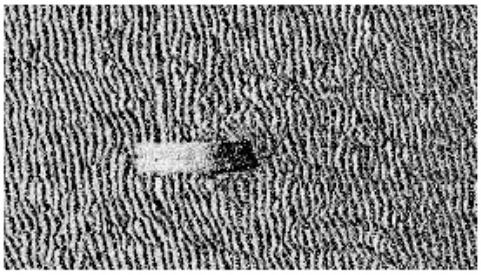
70.44 feet	30-17-34.01N	86-39-30.60W	 138-04410002
67.91 feet	30-17-47.29N	86-40-04.39W	 138-10400002

Figure 1.1.4

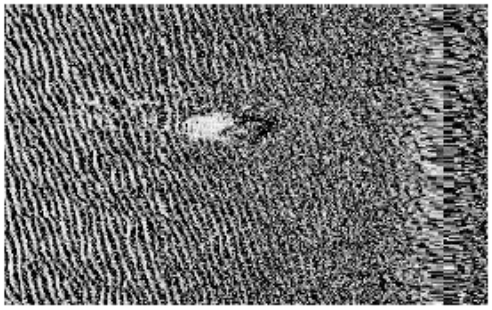
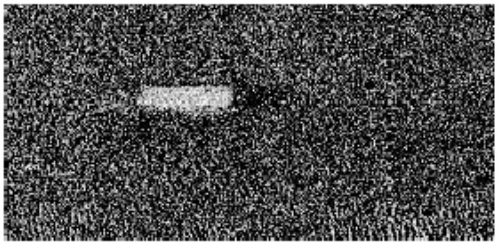
Obstruction Least Depth	Latitude	Longitude	Side Scan Image
67.75 feet	30-17-52.73N	86-39-02.76W	 138-11410004
85.73 feet	30-17-12.67N	86-40-27.13W	 137-14370007

Figure 1.1.5

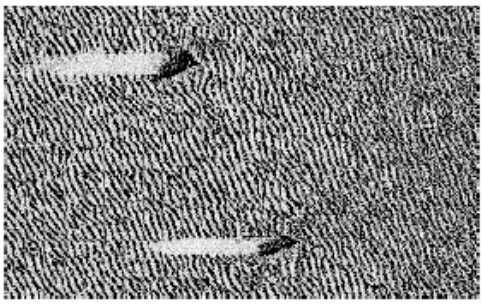
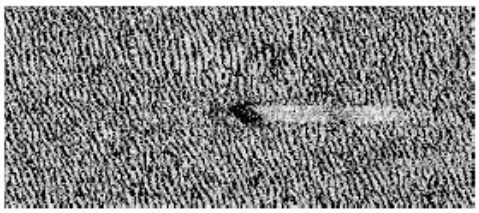
73.10 feet	30-17-25.86N	86-38-27.21W	 137-21320004
74.93 feet	30-17-20.85N	86-38-44.74W	 137-19350004

Figure 1.1.6

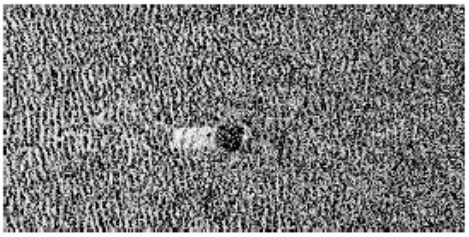
Obstruction Least Depth	Latitude	Longitude	Side Scan Image
77.13 feet	30-16-38.00N	86-40-12.20W	 136-18500003

Figure 1.1.7

1.2) Charted Fish Haven-AWOIS 14785

Survey Summary

Survey Position:	30° 16' 41.9" N, 086° 36' 44.5" W
Least Depth:	20.10 m (= 65.94 ft = 10.991 fm = 10 fm 5.94 ft)
TPU (±1.96σ):	**THU (TPEh)** [None] ; **TVU (TPEv)** [None]
Timestamp:	2004-032.00:00:00.000 (02/01/2004)
GP Dataset:	AHB_H12236 / SAR / SAR AHB HOB Files / H12236_Pydro_Features.000
GP No.:	02260000BDAD0001
Charts Affected:	11388_1, 1115A_1, 11360_1, 11006_1, 411_1

Remarks:

Lat/Long: 30-16-45N, 86-36-40W

ENC US4FL74M OBSTRN area

SORIND: US,US,graph,Chart 11388

CATOBS: Fish Haven

QUASOU: least depth unknown, safe clearance at value shown

VALSOU: 66 usft

AWOIS History: CL 939/89, 9/18/1989; USACE -- DISTRICT RECEIVED APPLICATION FROM CITY OF DESTIN, FL FOR DEPT OF ARMY PERMIT FOR PLACEMENT OF CLEANED GARBAGE BINS FOR ARTIFICIAL REEFS. SITE "3" CONSISTS OF 2 SMALL AND 10 LARGE BINS WITH A MINIMUM LEAST DEPTH OF 66'. CHARTED AS OBSTN FISH HAVEN (AUTH MIN DEPTH 66'). POSITION DOCUMENTED AS LORAN "C" 13639.6/47105.7 AND CHARTED AT 30 16 45 / 86 36 40. (KSJ 5/3/2010)

Status: AWOIS Item #14785 is charted as an “Obstn Fish Haven (auth min depth 66ft).” The search area defined by a 600-meter radius was covered with 200% SSS and 100% SWMB. The history for AWOIS Item #14785 states that 12 garbage bins of the large and small variety were placed in the fish haven; however, it does not provide the dimensions of the bins. It was assumed by the hydrographer that the garbage bins were of a rectangular shape. No obstructions were located within the 200-meter x 200-meter limits of the charted obstruction area. However, two (2) rectangular objects were located within the AWOIS search area and one (1) rectangular object was located approximately 40 meters northeast of the search area. In addition, a cluster of five (5) rectangular objects were identified in the side scan imagery and developed with object detection coverage approximately 2 kilometers northeast of the AWOIS search area. Figure 3 shows the least depth positions of the obstructions relative to the AWOIS search area.

Feature Correlation

Address	Feature	Range	Azimuth	Status
AHB_H12236/SAR/SAR AHB HOB Files/H12236_Pydro_Features.000	02260000BDAD0001	0.00	000.0	Primary

Hydrographer Recommendations

The charted Obstn Fish Haven was disproved. It is speculated that the garbage bins were deposited haphazardly within the Safety Fairway, not within the reported fish haven position. A list of the positions and least depths of the obstructions that were found in relative proximity to the AWOIS search area is provided in Table 2, accompanied by an image of the object captured from a side scan line file. None of the obstruction heights were considered significant relative to the surrounding survey depths, as all of the computed target heights were less than ten percent of the surrounding depth, per Section “6.3.2 Significant Contacts” of the HSSD 2010.

It is recommended that the Obstn Fish Haven be removed from the chart. The fish haven could be repositioned over the cluster of obstructions located at 30-17-57.51N, 86-35-38.91W. The largest of the obstructions was approximately 6 feet (1.8 meters) tall with a least depth of 81.6 feet (24.9 meters). This group of obstructions, shown in Figure 4, bears the closest resemblance to the description provided in the AWOIS History, despite being located over 2 kilometers northeast of the charted location of the Obstn Fish Haven.

Cartographically-Rounded Depth (Affected Charts):

66ft (11388_1)

11fm (1115A_1, 11360_1, 11006_1, 411_1)

S-57 Data

Geo object 1:	Obstruction (OBSTRN)
Attributes:	CATOBS - 5:fish haven
	NINFOM - Retain OBSTRN
	SORDAT - 20040200
	SORIND - US,US,graph,Chart 11388
	VALSOU - 20.100 m
	WATLEV - 3:always under water/submerged

Office Notes

SAR: No depths less than auth min depth of 66ft. Compile: Do not concur. Corps of Engineers permitted area, retain OBSTRN (fish haven) as charted.

Feature Images

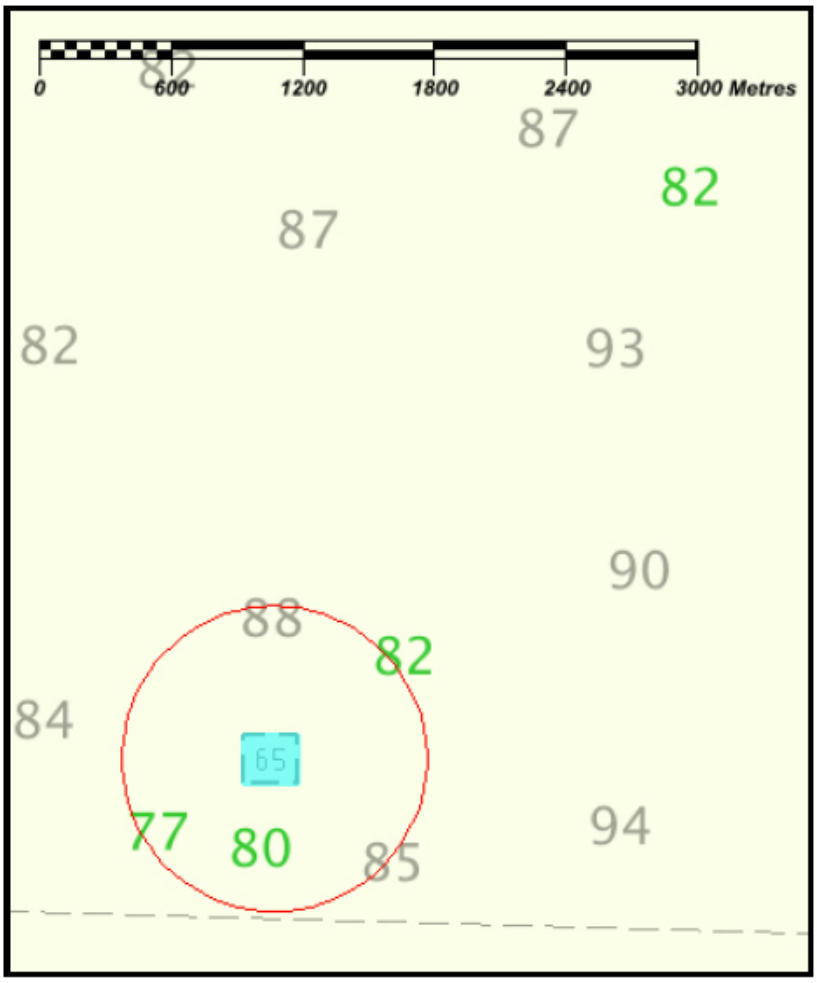


Figure 3. The least depth positions of four obstructions are shown in green relative to the charted position of AWOIS Item #14785 on ENC US4FL74M. The AWOIS search area is represented by the red circle and the Obstn Fish Haven is highlighted in cyan. All depths are in feet.

Figure 1.2.1

Table 2
Obstructions Found in Relative Proximity to AWOIS Item #14785

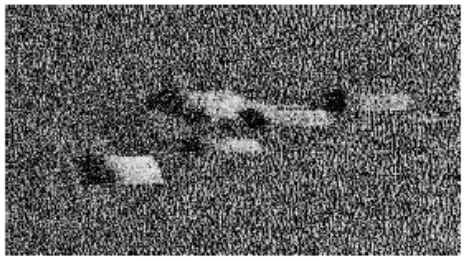
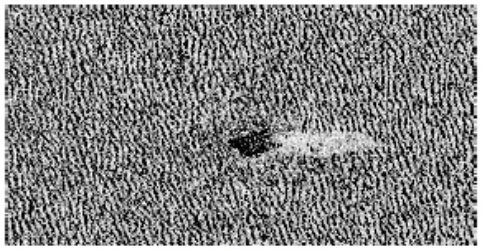
Obstruction Least Depth	Latitude	Longitude	Side Scan Image
81.55 feet	30-17-57.51N	86-35-38.91W	 138-16390003
76.61 feet	30-16-35.28N	86-36-57.06W	 136-22130003

Figure 1.2.2

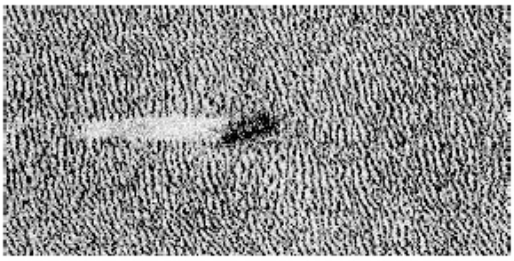
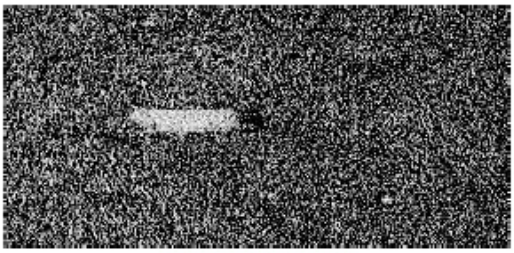
80.45 feet	30-16-33.18N	86-36-41.98W	 136-18500002
81.76 feet	30-16-57.68N	86-36-21.02W	 137-12380004

Figure 1.2.3

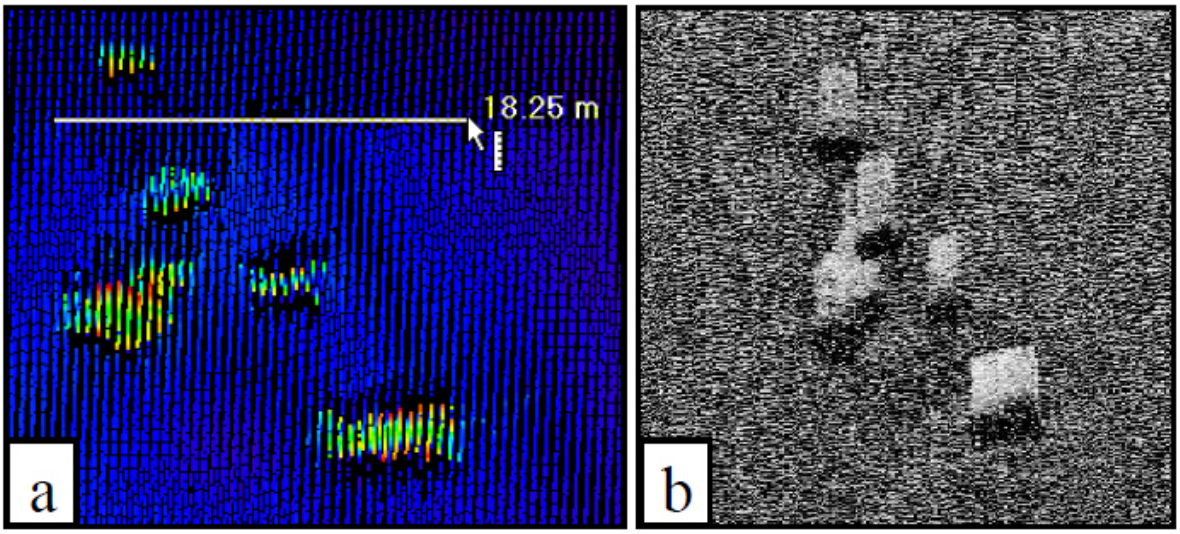


Figure 4. (a) The cluster of 5 rectangular obstructions as they appear in CARIS HIPS Subset Editor. Soundings are colored by depth. (b) The same 5 obstructions as they appear in side scan imagery.

Figure 1.2.4

H12236 Uncharted

Registry Number:

State:

Locality:

Sub-locality:

Project Number:

Survey Date: 05/28/2010

Charts Affected

Number	Edition	Date	Scale (RNC)	RNC Correction(s)*
11382	41st	05/01/2010	1:80,000 (11382_1)	USCG LNM: 3/29/2011 (6/21/2011) NGA NTM: 11/19/2005 (6/25/2011)
1115A	43rd	11/01/2008	1:456,394 (1115A_1)	[L]NTM: ?
11360	43rd	11/01/2008	1:456,394 (11360_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	79ft WRECKS	Wreck	24.29 m	30° 17' 42.0" N	086° 49' 02.1" W	---

1 - DR_UnCharted

1.1) 79ft WRECKS

Survey Summary

Survey Position: 30° 17' 42.0" N, 086° 49' 02.1" W

Least Depth: 24.29 m (= 79.69 ft = 13.282 fm = 13 fm 1.69 ft)

TPU (±1.96σ): **THU (TPEh)** [None] ; **TVU (TPEv)** [None]

Timestamp: 2010-148.00:00:00.000 (05/28/2010)

GP Dataset: AHB_H12236 / SAR / SAR AHB HOB Files / H12236_Pydro_Features.000

GP No.: 02260000BDAE0001

Charts Affected: 11382_1, 1115A_1, 11360_1, 11006_1, 411_1

Remarks:

WRECKS/remrks: Small barge w/Insignif Ht at survey depth covered with 200% SSS and 100% SWMB

Feature Correlation

Address	Feature	Range	Azimuth	Status
AHB_H12236/SAR/SAR AHB HOB Files/H12236_Pydro_Features.000	02260000BDAE0001	0.00	000.0	Primary

Hydrographer Recommendations

[None]

Cartographically-Rounded Depth (Affected Charts):

79ft (11382_1)

13fm (1115A_1, 11360_1, 11006_1, 411_1)

S-57 Data

Geo object 1: Wreck (WRECKS)

Attributes:

CATWRK - 1:non-dangerous wreck

NINFOM - Add WRECKS

QUASOU - 6:least depth known

SORDAT - 20100528

SORIND - US,US,graph,H12236

TECSOU - 3,2:found by multi-beam,found by side scan sonar

VALSOU - 24.290 m

WATLEV - 3:always under water/submerged

Office Notes

SAR: WRECKS confirmed with 200% SSS and MB least depth. COMPILE: Chart non-dangerous wreck, least depth 79ft at the present survey position.

Feature Images

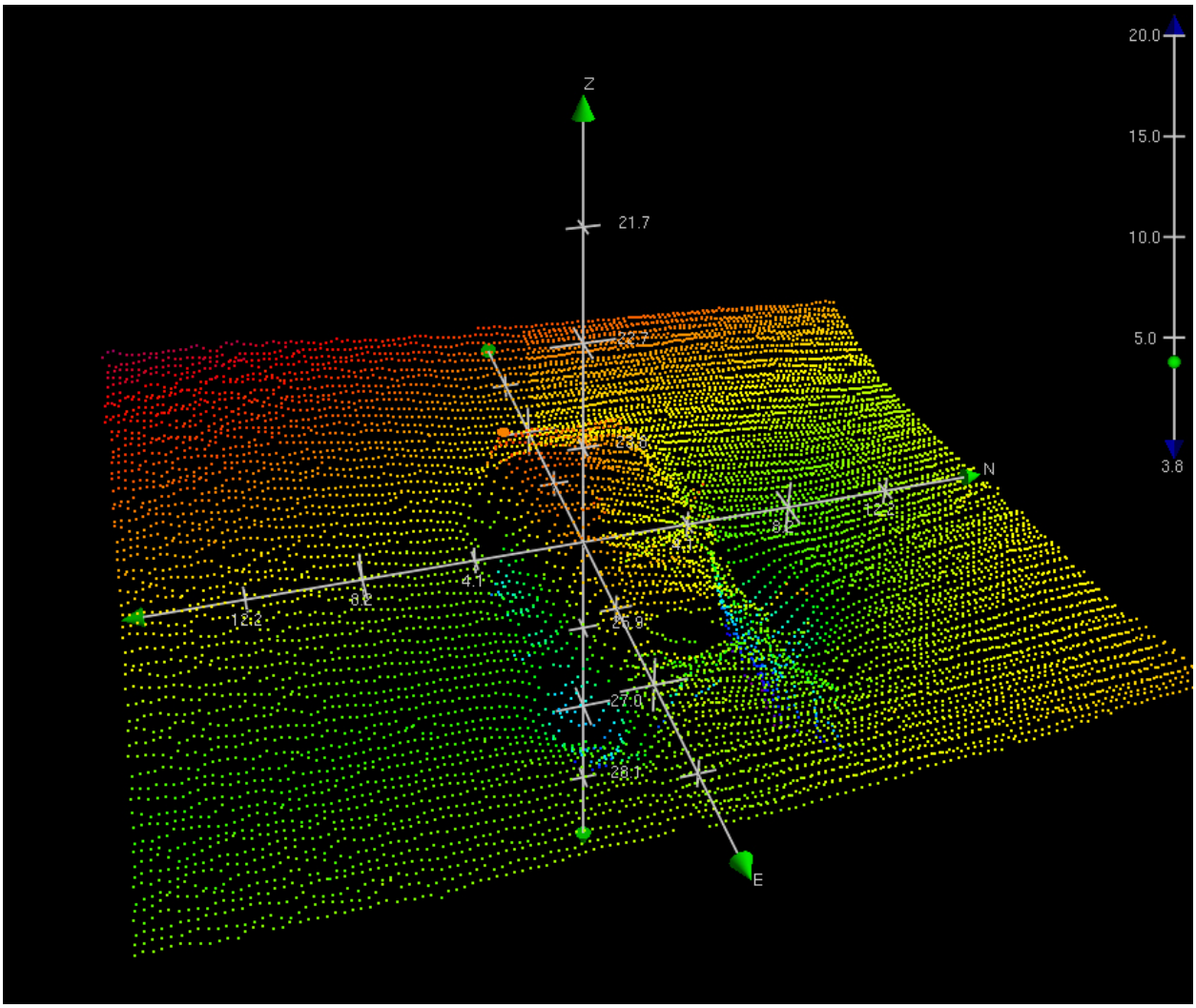


Figure 1.1.1

Figure 1.1.2

H12236 Bottom Samples

Registry Number:

State:

Locality:

Sub-locality:

Project Number:

Survey Date: 05/28/2010

Charts Affected

Number	Edition	Date	Scale (RNC)	RNC Correction(s)*
11382	41st	05/01/2010	1:80,000 (11382_1)	USCG LNM: 3/29/2011 (6/21/2011) NGA NTM: 11/19/2005 (6/25/2011)
11388	17th	02/01/2004	1:80,000 (11388_1)	USCG LNM: 6/8/2010 (6/21/2011) NGA NTM: 11/18/2006 (7/2/2011)
11360	43rd	11/01/2008	1:456,394 (11360_1)	[L]NTM: ?
1115A	43rd	11/01/2008	1:456,394 (1115A_1)	[L]NTM: ?
11006	32nd	08/01/2005	1:875,000 (11006_1)	[L]NTM: ?
411	52nd	09/01/2007	1:2,160,000 (411_1)	[L]NTM: ?

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

Features

No.	Name	Feature Type	Survey Depth	Survey Latitude	Survey Longitude	AWOIS Item
1.1	Sand	GP	[None]	30° 17' 46.5" N	086° 49' 54.7" W	---
1.2	Sand	GP	[None]	30° 17' 40.8" N	086° 46' 10.3" W	---
1.3	Sand	GP	[None]	30° 17' 34.7" N	086° 42' 25.8" W	---
1.4	Sand	GP	[None]	30° 17' 29.7" N	086° 38' 41.7" W	---
1.5	Sand	GP	[None]	30° 17' 23.1" N	086° 34' 56.7" W	---

1.1) Sand

Survey Summary

Survey Position: 30° 17' 46.5" N, 086° 49' 54.7" W

Least Depth: [None]

TPU (±1.96σ): **THU (TPEh)** [None] ; **TVU (TPEv)** [None]

Timestamp: 2010-148.00:00:00.000 (05/28/2010)

GP Dataset: COMPILE / Working / HOB's / SBDARE.000

GP No.: 0226000077590001

Charts Affected: 11382_1, 1115A_1, 11360_1, 11006_1, 411_1

Remarks:

SBDARE/remrks: 1-01 Medium grey and tan sand

Feature Correlation

Address	Feature	Range	Azimuth	Status
COMPILE/Working/HOB's/SBDARE.000	0226000077590001	0.00	000.0	Primary

Hydrographer Recommendations

[None]

S-57 Data

Geo object 1: Seabed area (SBDARE)

Attributes: NATQUA - 2:medium
NATSUR - 4:sand
NINFOM - Add SBDARE
OBJNAM - Sand
SORDAT - 20100528
SORIND - US,US,graph,H12236

Office Notes

Chart SBDARE

1.2) Sand

Survey Summary

Survey Position: 30° 17' 40.8" N, 086° 46' 10.3" W

Least Depth: [None]

TPU (±1.96σ): **THU (TPEh)** [None] ; **TVU (TPEv)** [None]

Timestamp: 2010-148.00:00:00.000 (05/28/2010)

GP Dataset: COMPILE / Working / HOB's / SBDARE.000

GP No.: 02260000775C0001

Charts Affected: 11382_1, 11388_1, 1115A_1, 11360_1, 11006_1, 411_1

Remarks:

SBDARE/remrks: 1-04 Medium to coarse grey sand

Feature Correlation

Address	Feature	Range	Azimuth	Status
COMPILE/Working/HOB's/SBDARE.000	02260000775C0001	0.00	000.0	Primary

Hydrographer Recommendations

[None]

S-57 Data

Geo object 1: Seabed area (SBDARE)

Attributes: NATQUA - 2:medium
NATSUR - 4:sand
NINFOM - Add SBDARE
OBJNAM - Sand
SORDAT - 20100528
SORIND - US,US,graph,H12236

Office Notes

Chart SBDARE

1.3) Sand

Survey Summary

Survey Position: 30° 17' 34.7" N, 086° 42' 25.8" W

Least Depth: [None]

TPU (±1.96σ): **THU (TPEh)** [None] ; **TVU (TPEv)** [None]

Timestamp: 2010-148.00:00:00.000 (05/28/2010)

GP Dataset: COMPILE / Working / HOB's / SBDARE.000

GP No.: 02260000775B0001

Charts Affected: 11388_1, 1115A_1, 11360_1, 11006_1, 411_1

Remarks:

SBDARE/remrks: 1-07 Medium to coarse light grey-tan sand

Feature Correlation

Address	Feature	Range	Azimuth	Status
COMPILE/Working/HOB's/SBDARE.000	02260000775B0001	0.00	000.0	Primary

Hydrographer Recommendations

[None]

S-57 Data

Geo object 1: Seabed area (SBDARE)

Attributes: NATQUA - 2:medium
NATSUR - 4:sand
NINFOM - Add SBDARE
OBJNAM - Sand
SORDAT - 20100528
SORIND - US,US,graph,H12236

Office Notes

Chart SBDARE

1.4) Sand

Survey Summary

Survey Position: 30° 17' 29.7" N, 086° 38' 41.7" W

Least Depth: [None]

TPU (±1.96σ): **THU (TPEh)** [None] ; **TVU (TPEv)** [None]

Timestamp: 2010-148.00:00:00.000 (05/28/2010)

GP Dataset: COMPILE / Working / HOB's / SBDARE.000

GP No.: 02260000775A0001

Charts Affected: 11388_1, 1115A_1, 11360_1, 11006_1, 411_1

Remarks:

SBDARE/remrks: 1-10 Coarse light grey sand with some shell hash

Feature Correlation

Address	Feature	Range	Azimuth	Status
COMPILE/Working/HOB's/SBDARE.000	02260000775A0001	0.00	000.0	Primary

Hydrographer Recommendations

[None]

S-57 Data

Geo object 1: Seabed area (SBDARE)

Attributes:

NATQUA - 3:coarse

NATSUR - 4:sand

NINFOM - Add SBDARE

OBJNAM - Sand

SORDAT - 20100528

SORIND - US,US,graph,H12236

Office Notes

Chart SBDARE

1.5) Sand

Survey Summary

Survey Position: 30° 17' 23.1" N, 086° 34' 56.7" W

Least Depth: [None]

TPU (±1.96σ): **THU (TPEh)** [None] ; **TVU (TPEv)** [None]

Timestamp: 2010-148.00:00:00.000 (05/28/2010)

GP Dataset: COMPILE / Working / HOB's / SBDARE.000

GP No.: 0226000077580001

Charts Affected: 11388_1, 1115A_1, 11360_1, 11006_1, 411_1

Remarks:

SBDARE/remrks: 1-13 Medium to fine grey sand with some shell hash

Feature Correlation

Address	Feature	Range	Azimuth	Status
COMPILE/Working/HOB's/SBDARE.000	0226000077580001	0.00	000.0	Primary

Hydrographer Recommendations

[None]

S-57 Data

Geo object 1: Seabed area (SBDARE)

Attributes: NATQUA - 2:medium
NATSUR - 4:sand
NINFOM - Add SBDARE
OBJNAM - Sand
SORDAT - 20100528
SORIND - US,US,graph,H12236

Office Notes

Chart SBDARE

Appendix III

Final Progress Spreadsheet

And

Survey Outline

Ocean Surveys, Inc.

May Survey Progress Estimate

FY 2010 Task Order Number 5

OPS			FIELD		
Project Number and Name	**Sheet Identifier**	**Registry Number**	**Date Field Work Began**	**Date Field Work Completed**	**May Cumulative % Complete**
OPR-J364-KR-10 Florida Safety Fairways, Florida	1	H12236	5/12/10	5/28/10	100%
	2	H12237	5/19/09	5/28/10	100%

Figure 1. Final Progress Spreadsheet, Table 1.

Ocean Surveys, Inc.

May Project Statistics

FY 2010 Task Order Number 5

Project	Location	Month/ Year	LNM MB		LNM SSS		LNM Combo		Combo Type	
			Ship	Launch	Ship	Launch	Ship	Launch	Ship	Launch
OPR-J364-KR-10	Florida Safety Fairways, Florida	May-10	1915		1776		1776			MB/SSS
		TOTAL	1915	0	1776	0	1776	0	n/a	n/a

Project	Location	Month/ Year	Items Investigated	Tide Gauges Installed / Removed	Bottom Samples	Days at Sea (Operating Days)	Days Lost Due to Weather	Days Lost Due to Equipment or Other
OPR-J364-KR-10	Florida Safety Fairways, Florida	May-10	7	0	28	17	0	0
		TOTAL	7	0	28	17	0	0

Figure 1. Final Progress Spreadsheet, Table 2.

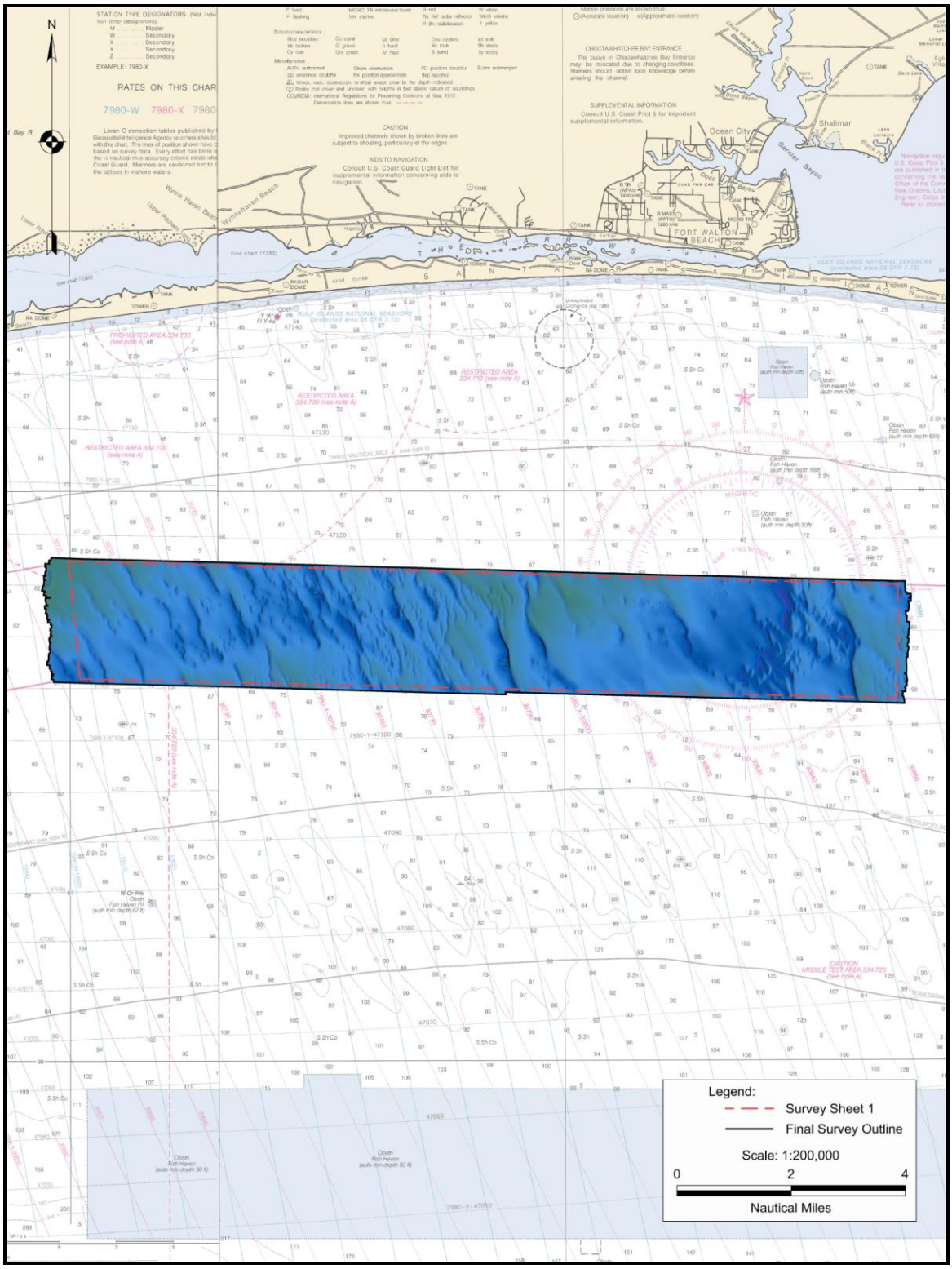


Figure 2. Final Survey Outline.

Appendix IV

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
5/12/2010	132	05:50:00	23:05:42
5/13/2010	133	01:22:02	23:35:14
5/14/2010	134	00:27:30	06:26:59
5/15/2010	135	00:34:12	23:41:48
5/16/2010	136	00:24:13	23:37:45
5/17/2010	137	00:26:51	23:37:52
5/18/2010	138	00:49:33	23:34:53
5/19/2010	139	00:23:09	05:00:45
5/25/2010	145	04:35:47	23:44:04
5/26/2010	146	00:26:32	07:42:29
5/27/2010	147	12:50:47	16:15:24

The COTR was notified via e-mail and 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. Email correspondence concerning the tide gauge follows.

From: George Reynolds [mailto:ggr@oceansurveys.com]
Sent: Friday, May 14, 2010 10:24 AM
To: 'OET OET'; 'Thomas.Landon'
Cc: 'kathleen.jamison'
Subject: OPR-J364-KR-10 - Add Panama City Station to Hydro Hot List

Hi Tom:

OSI has moved operations to OPR-J364-KR-10 (see attached sketch). To support this survey we request that the National Water Level Observation Network station at Panama City, FL (872-9108) be placed on the hydro hot list. Survey operations started in this area on May 11, 2010.

Please let me know if you need any additional information.

Thanks for your help

Regards

George

George Reynolds

Ocean Surveys, Inc.

91 Sheffield St

Old Saybrook, CT

06475

860-388-4631 Ext 112

http://www.oceansurveys.com

From: George Reynolds [mailto:ggr@oceansurveys.com]
Sent: Tuesday, June 08, 2010 5:14 PM
To: 'OET OET'; 'Thomas.Landon'
Cc: 'kathleen.jamison'
Subject: RE: OPR-J364-KR-10 - Add Panama City Station to Hydro Hot List

Hi Tom,

We have completed OPR-J364-KR-10 survey operations and no longer need data from the Panama City, FL (872-9108) gauge. The Panama City gauge can be removed from the Hydro Hot List.

Thanks for your help.

Regards

George

Appendix V

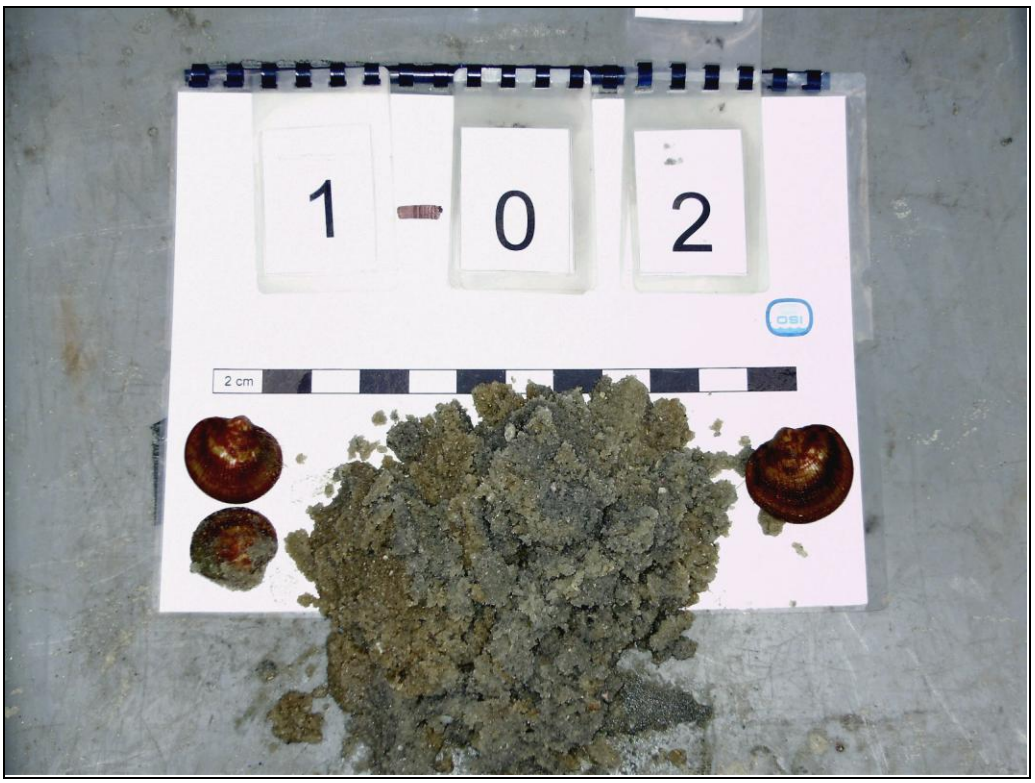
Supplemental Survey Records and Correspondence

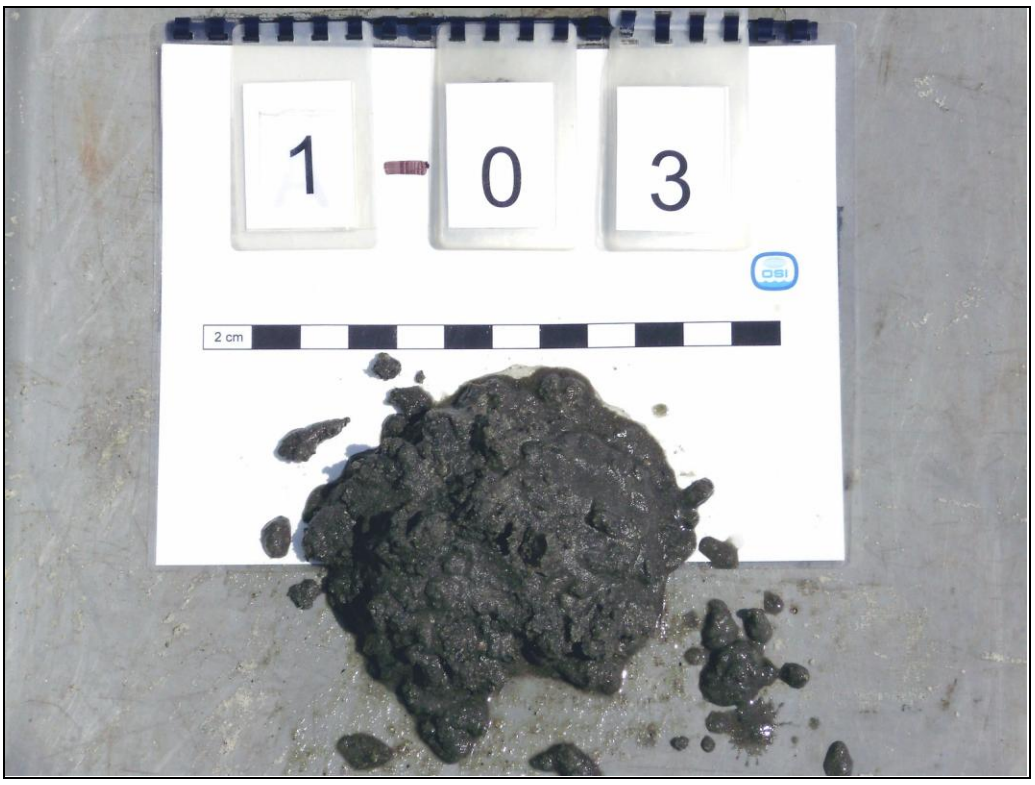
Bottom Samples

Bottom samples were obtained at approximate 2000-meter intervals across the site. Sediment grab locations are included in the S-57 feature file (H12236_S57_Features.hob).

OSI Bottom Sample Designation	Latitude, N (NAD83)	Longitude, W (NAD83)	Depth (meters)	Description
1-01	30-17-46.50	86-49-54.69	22.0	Medium grey and tan sand
1-02	30-17-45.19	86-48-39.95	24.2	Fine grey and tan sand with some shell hash
1-03	30-17-43.62	86-47-25.27	27.7	Fine grey sand with shell hash
1-04	30-17-40.76	86-46-10.31	25.7	Medium to coarse grey sand
1-05	30-17-38.78	86-44-55.57	25.8	Medium to coarse grey sand
1-06	30-17-37.06	86-43-39.67	25.1	Fine to medium, grey with streaks of brown sand
1-07	30-17-34.72	86-42-25.84	22.3	Medium to coarse light grey-tan sand
1-08	30-17-32.97	86-41-10.97	21.3	Medium to coarse light grey-tan sand
1-09	30-17-31.24	86-39-56.10	22.6	Coarse light grey-tan sand
1-10	30-17-29.75	86-38-41.75	22.8	Coarse light grey sand with some shell hash
1-11	30-17-27.27	86-37-26.70	25.6	Coarse light grey sand
1-12	30-17-25.31	86-36-11.77	27.3	Coarse light grey sand
1-13	30-17-23.05	86-34-56.69	26.9	Medium to fine grey sand with some shell hash
1-14	30-17-21.72	86-33-41.80	22.0	Medium light-grey sand


1 - 0 1
2 cm


1 - 0 2
2 cm


1 - 0 3
2 cm


1 - 0 4
2 cm


1 - 0 5
2 cm


1 - 0 6
2 cm


1 - 0 7
2 cm


1 - 0 8
2 cm


1 - 0 9
2 cm


1 - 1 0
2 cm


1 - 1 1
2 cm


1 - 1 2
2 cm


1 - 1 3
2 cm


1 - 1 4
2 cm

Correspondence

E-mail correspondence between OSI and the COTR follows.

From: kathleen.jamison
Sent: Friday, April 30, 2010 5:31 PM
To: George Reynolds
Subject: Re: Answers

As per our phone discussion:

1) The "exceptions" we have given for the FY09 work does not apply to the FY10 survey work. If adjustments need to be made to the FY10 project requirements that conflict with the 2010 Specs & Deliverables, that will be done on a case-by-case basis.

2) We concur with each of your statements below (#1-4).

3) #4 is the only topic that also applies to the 2010 survey sheets - you do not need to add cross lines just to reach the 4% if you are doing re-runs or fill-ins to the original line spacing. If your cross lines do not meet the 4% requirement, please explain this in the DR briefly - you can cite this email as documented permission from your COTR (that goes for any variation from the specs that is discussed and approved by your COTR - just document it!).

Have a great weekend - tell your crew to stay safe and listen to the Coast Guard - I'll be keeping my eye on what's happening to Pensacola regarding the spill, but please let me know if you hear of any useful information from the scene.

Regards,
Kathleen

George Reynolds wrote:
Hi Kathleen,

Thanks for following up on our discussion topics.

For your reference, the following is a copy of our notes from the meeting aboard the Ferrel.

1. In water depths of greater than 20 meters, occasional SSS refraction is not a concern assuming that line spacing results in "Complete multibeam coverage".

2. In water depths of 20m, refraction is acceptable only if, by means of confidence checks along the line, we are able to determine that we can see features across the entire record. This will not apply in the event that the refraction is sporadic as we

will not have a "standard" by which to judge the effects of refraction. "Complete multibeam coverage" will not suffice to replace the object detection capabilities of the SSS in 20m. Only "object detection multibeam coverage" would serve in place of SSS.

3. During skunk stripe SSS/MB surveying the multibeam density requirement in water depths 20M and less is 5 soundings/1m cell with cell size increasing to 5% of water depth after 20m per "complete multibeam coverage" standards. Due to our "exception", we are required to populate cells with three soundings (<20m water = 2m cell, >20m water =4m cell). Per "complete multibeam coverage" standards, holidays may span no more than 3 nodes cells). Therefore, with the exception of the cases presented below, we are allowed 6m of along track holiday in <20m and 12m of along track holiday in >20m before we have to go back and fill-in the holiday. NOAA suggested that "common sense" should also be one of the tools that we use when making decisions on this subject.

Larger holidays than described above may be acceptable if:

Exception 1: We have overlapping coverage from adjacent swaths that populate some of the cells that would have been populated by the swath that experienced the blowout.

Exception 2: We have partial coverage within the blowout area and are able to confidently retain some of the soundings within the blowout.

Again, common sense should prevail.

4. Tie line percentage requirement applies to the planned or proposed line plan, not the actual line plan implemented. In other words, if we plan on line spacing for 100M SSS and end up having to do in-fills to meet coverage requirements due to site conditions (i.e refraction), no additional tie lines are required to reach the 4% lineal nautical miles run for the additional trackline miles.

If you have any questions on the above please let me know.

Looking forward to talking with you later today.

Regards
George

-----Original Message-----
From: kathleen.jamison [mailto:Kathleen.Jamison@noaa.gov]
Sent: Friday, April 30, 2010 9:15 AM
To: George Reynolds
Subject: Answers

Hi George,

I will give you a call shortly to follow up on this email. Now that you have worked out the degraded imagery issues in Sheet A (to where contacts can be reliably observed in the imagery), I'd like to clarify which questions you still would like official answers on.

For now, I can confirm two issues that we discussed last week and/or on our site visit:

1) Modification to Project Instructions permitting substitution of "Complete" multibeam echosounder coverage for 200% side scan sonar with concurrent "Set Line Spacing" multibeam in depths greater than 20 m.

2) Task award for OPR-J364-KR-10. The official word from the contracting office is "on or before May 22," although I have emphasized to them that this area is a priority, and to award the task order as soon as possible, so I'm hoping for something closer to May 15, although of course I cannot say for sure.

Will you be suspending operations or making modifications in the spill aftermath? I had thought there wouldn't be much worry in Pensacola, at least in the near term while the oil will hit land in Louisiana and doesn't seem to be moving north east, but then I read that Pensacola is constructing a boom for the bay. Needless to say, the spill is causing quite the stir around here as we scramble to make our resources available to the Coast Guard!

--
Kathleen Jamison
Physical Scientist, Data Acquisition Control Branch
Hydrographic Surveys Division
NOAA
Kathleen.Jamison@noaa.gov
301.713.2700 x109

From: kathleen.jamison [mailto:Kathleen.Jamison@noaa.gov]
Sent: Friday, May 14, 2010 3:19 PM
To: George Reynolds
Subject: VelociWin

George,

As per our conversation, you may continue to use VelociWin and the Wilson equation until the new VelociWin software is ready, as long as you continue to meet the standard of a sound speed profile with an error less than 2 meters per second, as explained in 5.2.3.3 of the Specs & Deliverables.

--
Kathleen Jamison
Physical Scientist, Data Acquisition Control Branch
Hydrographic Surveys Division
NOAA
Kathleen.Jamison@noaa.gov
301.713.2700 x109

From: Catherine Perren <Catherine.A.Perren@noaa.gov>
Date: Tue, 01 Jun 2010 11:57:24
To: 'George Reynolds'<ggr@oceansurveys.com>;
'kathleen.jamison'<Kathleen.Jamison@noaa.gov>
Cc: 'Ben Evans'<Benjamin.K.Evans@noaa.gov>
Subject: OSI, DG133C08CQ0007T005, Re: NCNJ3000-10-10497

Attached is a copy of the above referenced task order. If you have any questions, feel free to contact me.

Catherine Perren
Contract Specialist
National Capital Aquisition Division
1305 East-West Hwy.
SSMC4, Rm. 7608
Silver Spring, MD 20910
301-713-0820 x126
fax (301) 713-0808

From: kathleen.jamison
Sent: Tuesday, June 08, 2010 5:13 PM
To: George Reynolds
Subject: Project Instructions for OPR-J364-KR-10

Hi George,

Here are the official and final project instructions for OPR-J364-KR-10. I know that you have all the information contained in the document, but this way you've got the official PI for your records.

--
Kathleen Jamison
Physical Scientist, Data Acquisition Control Branch Hydrographic Surveys Division NOAA Kathleen.Jamison@noaa.gov 301.713.2700 x109

From: George Reynolds [mailto:ggr@oceansurveys.com]
Sent: Friday, June 11, 2010 10:34 AM
To: LCDR Richard Brennan
Cc: kathleen Jamison
Subject: OPR-J364-KR-10 Raw MBES and SSS directory size info

LCDR Brennan,

The following are the raw data directory sizes for OPR-J364-KR-10, Florida and Alabama Safety Fairways, Sheets 1 & 2.

H12236 (Sheet 1)
R/V Ferrel
MBES Raw directory raw/hsx - 51 GB
SSS Raw directory xtf - 78 GB

H12237 (Sheet 2)
R/V Ferrel
MBES Raw directory raw/hsx - 42 GB
SSS Raw directory xtf - 80 GB

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

Regards
George

George Reynolds
Ocean Surveys, Inc.
91 Sheffield St
Old Saybrook, CT
06475
860-388-4631 Ext 112
http://www.oceansurveys.com

AHB COMPILATION LOG

General Survey Information	
REGISTRY No.	H12236
PROJECT No.	OPR-J364-KR-10
FIELD UNIT	OSI
DATE OF SURVEY	20100405-20100528
LARGEST SCALE CHART	***11382_1, edition 41, May 2010, 1:80,000*** ***11388_1, edition 17, Feb 2004, 1:80,000***
SOUNDING UNITS	**FEET**
COMPILER	Katrina Wyllie

Source Grids	**File Name** V:\SAR_Queue\H12236_J364_OSI\AHB_H12236\SAR Final Products\GRIDS
	H12236_4m_Combined.csar **H12236_A_CUBE_1m_Final.csar** **H12236_B_CUBE_1m_Final.csar** **H12236_C_CUBE_1m_Final.csar** **H12236_D_CUBE_1m_Final.csar** **H12236_E_CUBE_1m_Final.csar** **H12236_F_CUBE_1m_Final.csar** **H12236_G_CUBE_1m_Final.csar** **H12236_East_CUBE_2m_Final.csar** **H12236_West_CUBE_2m_Final.csar** **H12236_Wreck_CUBE_50cm_Final.csar**
Surfaces	**File Name** V:\SAR_Queue\H12236_J364_OSI\AHB_H12236\COMPILE\Working
Interpolated TIN	\Interpolated TIN\ **H12236_12m_InterpTIN.csar**
Shifted Interpolated TIN	\Shifted Surface\ **H12236_12m_InterpTIN_Shifted.csar**
Final HOBs	**File Name** V:\SAR_Queue\H12236_J364_OSI\AHB_H12236\COMPILE\Final_Hobs
Survey Scale Soundings	**H12236_SS_Soundings.hob**
Chart Scale Soundings	**H12236_CS_Soundings.hob**
Contour Layer	**H12236_Contours.hob**
Feature Layer	**H12236_Features.hob**
Meta-Objects Layer	**H12236_MetaObjects.hob**
Blue Notes	**H12236_BlueNotes.hob**

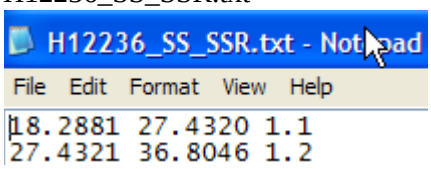
Meta-Objects Attribution	
Acronym	**Value**
M_COVR	
CATCOV	1 – coverage available
SORDAT	20100528
SORIND	US,US,graph,H12236
M_QUAL	
CATZOC	Zone of confidence A1
INFORM	R/V Ferrel
POSACC	5m
SORDAT	20100528
SORIND	US,US,graph,H12236
SUREND	20100528

SURSTA	20100405
DEPARE	
DRVALV 1	60 ft
DRVALV2	102 ft
SORDAT	20100528
SORIND	US,US,graph,H12236

SPECIFICATIONS:

I. COMBINED SURFACE:
- a. Number of SAR Final Grids: 10 (and one 4m combined)
- b. Resolution of Combined (m): 4 m

II. SURVEY SCALE SOUNDINGS (SS):
- a. Attribute Name: Depth
- b. Selection criteria: Radius, Shoal bias
- c. Radius value is: mm at map scale
  Radius table file: H12236_SS_SSR.txt



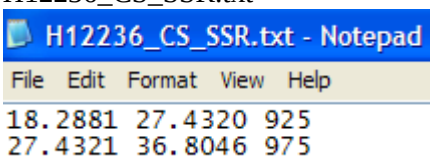
- d. Queried Depth of All Soundings
  - i. Minimum: 61.8668ft
  - ii. Maximum: 101.3760ft

III. INTERPOLATED TIN SURFACE:
- a. Resolution (m): 12 m
- b. Interpolation method: Natural Neighbor
- c. Shift value: -0.75 ft

IV. CONTOURS:
- a. Attribute Name: Depth
- b. Use a Depth List: H12236_depth_contours.txt
- c. Output Options: Create contour lines
  - i. Line Object: DEPCNT
  - ii. Value Attribute: VALDCO

V. FEATURES:
- a. Number of Chart Features: 2 OBSTRN, 2 WRECKS, 5 SBDARE
- b. Number of Non-Chart Features: 9 SBDARE

VI. CHART SURVEY SOUNDINGS (CS):
- a. Number of ENC CS Soundings: 112
- b. Number of HCell CS Soundings: 113
- c. Attribute Name: Depth
- d. Selection criteria: Radius, Shoal bias
- e. Radius value is: Distance on the ground (m)
  Radius table file: H12236_CS_SSR.txt



ATLANTIC HYDROGRAPHIC BRANCH
H-CELL REPORT to ACCOMPANY
SURVEY H12236 (2010)

This H-Cell Report has been written to supplement and/or clarify the original Descriptive Report (DR) and pass critical compilation information to the cartographers in the Marine Chart Division. Sections in this report refer to the corresponding sections of the Descriptive Report.

B. DATA ACQUISITION AND PROCESSING

B.2 QUALITY CONTROL

The AHB source depth grids for the survey's nautical chart update were one 50cm, seven 1m, and two 2m resolution BASE surfaces (*.CSAR), which were combined at 4m resolution. The survey scale soundings were created from the combined surface using a sounding spacing range (SSR) file (reference the AHB Compilation Log section of this Descriptive Report) at the largest scale chart covering the respective area of the survey (Chart 11382_1 1:80,000; Chart 11388_1 1:80,000). The survey scale soundings were imported into a "point cloud" grid. The chart scale soundings were derived directly from the survey scale soundings point cloud grid to preserve absolute continuity between the charted depths, the survey scale soundings, and the original source grid. The chart scale soundings were selected using a SSR file. The chart scale soundings are a subset of the survey scale soundings. The surface model was referenced when selecting the chart scale soundings, to ensure that the selected soundings portray the bathymetry within the common area.

A UTM projected TIN surface was created from the survey scale soundings point cloud grid, from which an interpolated surface of 12m resolution was generated. The interpolated TIN surface of 12m resolution was shifted by the NOAA sounding rounding value of -0.75 feet. The shifted interpolated TIN was used to generate 90 foot depth contours. The depth contours are forwarded to MCD for reference only. The contours were utilized during chart scale sounding selection and quality assurance efforts at AHB. The depth contours are incorporated into the SS H-Cell product as per 2010 H-Cell Specifications.

The compilation products (Final *.HOB files) for this survey are detailed in the H12236 AHB Compilation Log contained within this document. The Final HOB files include depth areas (DEPARE), depth contours (DEPCNT), soundings (SOUNDG), meta-objects (M_COVR, M_QUAL), cartographic Blue Notes ($CSYMB), and features (OBSTRN, WRECKS, SBDARE).

As dictated by Hydrographic Technical Directive 2008-8, the Final HOB files were combined into two separate H-Cell files in S-57 format. Both S-57 files were exported from CARIS S-57 Composer in feet. Quality assurance and topology checks were conducted using CARIS S-57 Composer and DKART Inspector validation tests.

The final H-Cell products are two S-57 files, in Lat/Long NAD-83. The contents of these two H-Cell deliverables are listed in the table below:

TABLE 1 - Contents of H-Cell Files

H12236_CS.000			**Scale 1:80,000**
Object Class Types	**Geographic**	**Cartographic**	**Meta**
S-57 Object Acronyms	DEPARE	$CSYMB	M_COVR
	OBSTRN		M_QUAL
	SBDARE		
	SOUNDG		
H12236_SS.000			**Scale 1:40,000**
Object Class Types	**Geographic**		
S-57 Object Acronyms	DEPCNT		
	SOUNDG		

B.2.4 Junctions and Prior Surveys

Survey H12236 (2010) junctions with survey H12157 (2010) to the west and H12237 (2010) to the east. Most present survey depths compare within 1 foot of junctioning survey depths to the west and east. Most present survey depths compare within 1 foot of the charted hydrography to the north and south.

B.4 DATA PROCESSING

The following software was used to process data at the Atlantic Hydrographic Branch:

CARIS Bathy DataBASE version 3.2/HF2
CARIS HIPS/SIPS version 7.1/HF2
CARIS S-57 Composer version 2.2/SP1/HF4
DKART Inspector version 5.1
HSTP Pydro version 11.8 (r3585)

C. HORIZONTAL AND VERTICAL CONTROL

The hydrographer makes adequate mention of horizontal and vertical control used for this survey in section C of the DR. The sounding datum for this survey is Mean Lower Low Water (MLLW), and the vertical datum is Mean High Water (MHW). Horizontal control used for this survey during data acquisition is based upon the North American Datum of 1983 (NAD83), UTM projection zone 16 North.

D. RESULTS AND RECOMMENDATIONS

D.1 CHART COMPARISON

11388 (17th Edition, FEB/04)
Choctawhatchee Bay
Corrected through NM 08/27/2011
Corrected through LNM 08/16/2011
Scale 1:80,000

11382 (41st Edition, MAY/10)
Pensacola Bay and approaches
Corrected through NM 08/27/2011
Corrected through LNM 08/19/2011
Scale 1:80,000

ENC COMPARISON

US4FL74M
Choctawhatchee Bay
Edition 4
Application Date 20100526
Issue Date 20100604
Chart 11388

US4FL71M
Pensacola Bay and approaches
Edition 7
Application Date 20100405
Issue Date 20100706
Chart 11382

D.2 ADDITIONAL RESULTS

The charted hydrography originates with prior surveys and requires no further consideration. The hydrographer makes adequate chart comparisons in section D and Appendix I and II of the DR. The hydrographer recommends that any charted features not specifically addressed either in the H-Cell files or the Blue Notes should be retained as charted. The following exceptions are noted:

a. The field unit collected a total of 14 bottom samples. All seven charted seabed characteristics are recommended to be deleted and only five of the fourteen field unit seabed areas are recommended for chart application in order to reduce chart clutter.
b. The 90 ft depth curve for isolated deeps is not utilized in the fairway section of the chart coincident with the survey area. However 91+ soundings are charted and unsupported by depth curves. This was obviously done to reduce chart clutter in the fairway area and this practice was mimicked during the CS HCell compilation. Therefore, sounding selection was completed without the use of the 90 foot contour or consideration to the display of the 90 foot depth curve on the nautical chart for this area. Additionally, the 90 foot contour has been included in the SS HCell for reference purposes.

D.6 MISCELLANEOUS

Chart compilation was completed by Atlantic Hydrographic Branch personnel in Norfolk, Virginia. Compilation data will be forwarded to the Marine Chart Division in Silver Spring, Maryland. See section D.1 of this report for a list of the Raster Charts and Electronic Navigation Charts (ENC) used for compiling the present survey.

D.7 ADEQUACY OF SURVEY

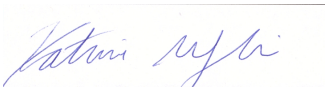
The present survey is adequate to supersede the charted bathymetry within the common area. Any features not specifically addressed either in the H-Cell files or the Blue Notes should be retained as charted. Refer to section D and Appendix I and II of the DR for further recommendations by the hydrographer.

APPROVAL SHEET
H12236

Initial Approvals:

The completed survey has been inspected with regard to survey coverage, delineation of depth contours, disposition of critical depths, cartographic symbolization, and verification or disproval of charted data. All revisions and additions made to the H-Cell files during survey processing have been entered in the digital data for this survey. The survey records and digital data comply with National Ocean Service and Office of Coast Survey requirements except where noted in the Descriptive Report and the H-Cell Report.

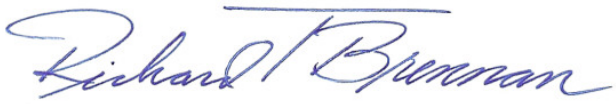
All final products have undergone a comprehensive review per the Hydrographic Surveys Division Office Processing Manual and are verified to be accurate and complete except where noted.



Digitally signed by
Katrina Wyllie
Date: 2011.09.09
16:49:52 -04'00'

Katrina Wyllie
Physical Scientist
Atlantic Hydrographic Branch

I have reviewed the H-Cell files, accompanying data, and reports. This survey and accompanying Marine Chart Division deliverables meet National Ocean Service requirements and standards for products in support of nautical charting except where noted.



Richard T. Brennan
2011.09.15 14:07:35 -04'00'

Approved: _____

CDR Richard T. Brennan, NOAA
Chief, Atlantic Hydrographic Branch