

D00158

NOAA Form 76-35A

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

DESCRIPTIVE REPORT

Type of Survey: Navigable AreaSupport NMS

Registry Number: D00158

LOCALITY

State: FloridaGeorgiaNorth CarolinaSouth Carolina

General Locality: Florida to North Carolina

Sub-locality: Florida to North Carolina

2011

CHIEF OF PARTY
LCDR Benjamin K. Evans, NOAA

LIBRARY & ARCHIVES

Date:

NOAA FORM 77-28 (11-72)		U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION	REGISTRY NUMBER:
HYDROGRAPHIC TITLE SHEET			D00158
INSTRUCTIONS: The Hydrographic Sheet should be accompanied by this form, filled in as completely as possible, when the sheet is forwarded to the Office.			
State:	FloridaGeorgiaNorth CarolinaSouth Carolina		
General Locality:	Florida to North Carolina		
Sub-Locality:	Florida to North Carolina		
Scale:	40000		
Dates of Survey:	06/05/2011 to 06/08/2011		
Instructions Dated:	06/09/2011		
Project Number:	M-H712-FH11		
Field Unit:	NOAA Ship FERDINAND R. HASSLER (S-250)		
Chief of Party:	LCDR Benjamin K. Evans, NOAA		
Soundings by:	Multibeam Echo Sounder		
Imagery by:	Multibeam Echo Sounder Backscatter		
Verification by:	Pacific Hydrographic Branch		
Soundings Acquired in:	meters at Mean Lower Low Water		
H-Cell Compilation Units:	meters at Mean Lower Low Water		
Remarks: Horizontal Coordinate System: UTM Zones 17 and 18. The purpose of this survey is to provide contemporary survey to update National Ocean Service (NOS) charts. All separates are filed with the hydrographic data. Revisions and notes in red were generated during office processing. The processing branch concurs with all information and recommendations in the DR unless otherwise noted. Page numbering may be interrupted or non sequential. All pertinent records for this survey, including the Descriptive Report, are archived at the National Geophysical Data Center (NGDC) and can be retrievedHYPERLINK "http://www.ngdc.noaa.gov/" \h via http://www.ngdc.noaa.gov/.			

Table of Contents

A. Area Surveyed.....	1
A.1 Survey Limits.....	1
A.2 Survey Purpose.....	3
A.3 Survey Quality.....	4
A.4 Survey Coverage.....	5
A.5 Survey Statistics.....	6
A.6 Shoreline.....	7
A.7 Bottom Samples.....	7
B. Data Acquisition and Processing.....	7
B.1 Equipment and Vessels.....	7
B.1.1 Vessels.....	7
B.1.2 Equipment.....	7
B.2 Quality Control.....	8
B.2.1 Crosslines.....	8
B.2.2 Uncertainty.....	8
B.2.3 Junctions.....	9
B.2.4 Sonar QC Checks.....	9
B.2.5 Equipment Effectiveness.....	9
B.2.6 Factors Affecting Soundings.....	10
B.2.7 Sound Speed Methods.....	10
B.2.8 Coverage Equipment and Methods.....	11
B.3 Echo Sounding Corrections.....	11
B.3.1 Corrections to Echo Soundings.....	11
B.3.2 Calibrations.....	11
B.4 Backscatter.....	11
B.5 Data Processing.....	11
B.5.1 Software Updates.....	11
B.5.2 Surfaces.....	11
B.5.3 Noise to Portside.....	12
B.5.4 Filters Applied.....	13
B.5.5 Critical Soundings.....	13
C. Vertical and Horizontal Control.....	13
C.1 Vertical Control.....	13
C.2 Horizontal Control.....	13
D. Results and Recommendations.....	14
D.1 Chart Comparison.....	14
D.1.1 AWOIS Items.....	14
D.1.2 Charted Features.....	14
D.1.3 Uncharted Features.....	15
D.1.4 Dangers to Navigation.....	15
D.1.5 Shoal and Hazardous Features.....	15
D.1.6 Channels.....	15
D.2 Additional Results.....	15

D.2 Construction and Dredging.....	16
D.2.1 Shoreline.....	15
D.2.2 Prior Surveys.....	16
D.2.3 Aids to Navigation.....	16
D.2.4 Overhead Features.....	16
D.2.5 Submarine Features.....	16
D.2.6 Ferry Routes and Terminals.....	16
D.2.7 Platforms.....	16
D.2.8 Significant Features.....	16
E. Approval Sheet.....	17
F. Table of Acronyms.....	18

List of Tables

Table 1: Survey Limits.....	1
Table 2: Hydrographic Survey Statistics.....	6
Table 3: Dates of Hydrography.....	6
Table 4: Vessels Used.....	7
Table 5: Major Systems Used.....	7
Table 6: CARIS Surfaces.....	12
Table 7: USCG DGPS Stations.....	14

List of Figures

Figure 1: Florida to North Carolina Track Line way points.....	2
Figure 2: AWOIS position included in Project instructions.....	3
Figure 4: Track line and AWOIS acquired navigation data overlaid on applicable charts.....	5
Figure 3: Sunken ships 'USS NEW JERSEY' and 'USS VIRGINIA'.....	4
Figure 5: Total vertical uncertainty base surface for AWOIS items (8m).....	9
Figure 6: Track line data with evident gaps from software crashes.....	10
Figure 7: Track line data acquired from Reson 7111 in a snapshot from CARIS subset editor (rear view). Gray points are rejected soundings and are more pronounced on the port side (red).....	12
Figure 8: Charted (11555) feature partially outside the reference surface.....	15

Descriptive Report to Accompany Survey D00158

Project: M-H712-FH11

Locality: Florida to North Carolina

Sublocality: Florida to North Carolina

Scale: 1:40000

June 2011 - June 2011

NOAA Ship FERDINAND R. HASSLER (S-250)

Chief of Party: LCDR Benjamin K. Evans, NOAA

A. Area Surveyed

This survey consists of two separate sections. A track line survey was conducted en route from Key West, FL to offshore NC. The NOAA Hydrographic Surveys Division provided way points for the track line portion of this survey (Figure 1) in their project instructions. The leg from the Dry Tortuga to Key West, FL was omitted for time and traffic constraints. Figure 4 illustrates the actual track of data acquisition.

A second survey was conducted over two AWOIS items offshore of Cape Hatteras, NC. The two AWOIS items are less than a nautical mile apart and are notated by the red star in Figure 2. These AWOIS items are two US battleships intentionally sunk after World War One for aerial bombing experiments.

A.1 Survey Limits

Data was acquired within the following survey limits:

Northeast Limit	Southwest Limit
35.059143 N 75.215514 W	24.228407 N 83.217415 W

Table 1: Survey Limits

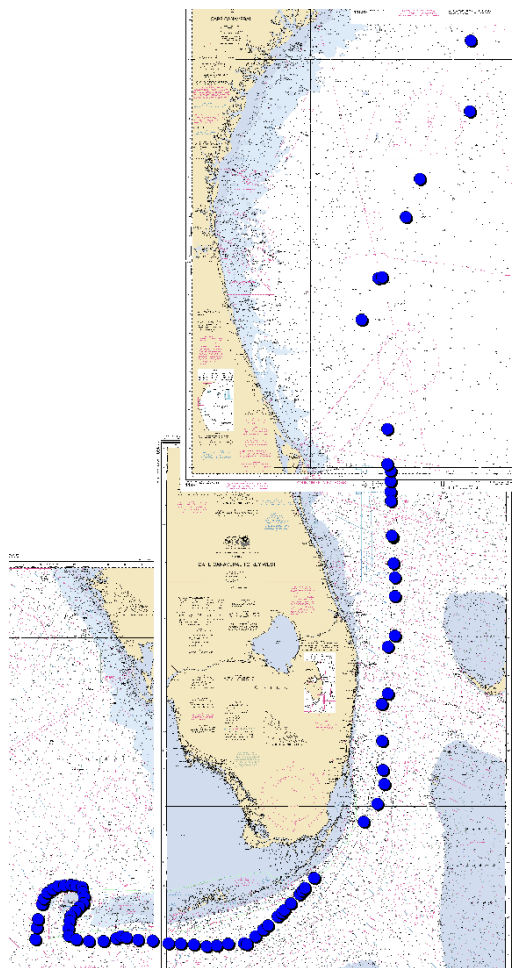


Figure 1: Florida to North Carolina Track Line way points.

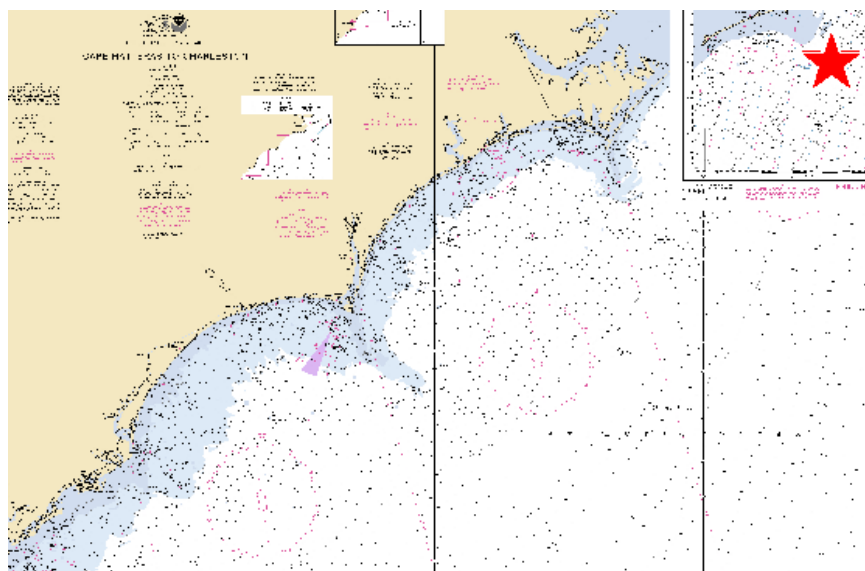


Figure 2: AWOIS position included in Project instructions.

The trackline portion of this survey did not meet Specification and was not compiled.

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

A.2 Survey Purpose

This survey was conducted as a preliminary test of NOAA Ship FERDINAND R. HASSLER's multibeam systems.

The track line segment of this survey was to provide bathymetry and backscatter data for fisheries science. This data is not intended for chart comparison or updates.

The second segment of this survey was to obtain modern multibeam sonar coverage over two known AWOIS items in support of the Monitor National Marine Sanctuary. These AWOIS objects are WWI vintage American Battleships, sunk during Billy Mitchell's aerial bombing experiments in 1923. This data could support ONMS efforts at expanding the Monitor NMS, as it is the first modern multibeam survey over these two wrecks.

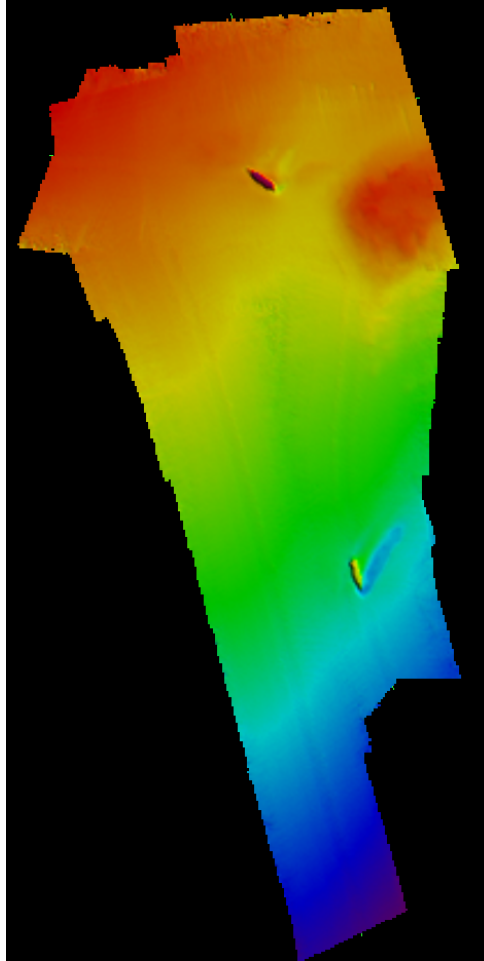


Figure 3: Sunken ships 'USS NEW JERSEY' and 'USS VIRGINIA'.

A.3 Survey Quality

The survey is partially adequate to supersede previous data.

The track line portion of this survey was conducted to test NOAA Ship FERDINAND R. HASSLER (S-250) systems and is not of chart quality. No water level or sound speed profile corrections have been applied, and the dataset does not meet sounding density requirements due to high vessel speed. The hydrographer recommends that the track line dataset be archived as-is, with no further processing or review for chart application.

The survey of the two AWOIS items meets applicable data quality requirements. However, water level corrections were not applied. IHO order 2 standards are met due to the relatively small tidal range (± 0.5 meters) and larger allowable uncertainty (approximately ± 2.5 meters). Therefore, there is no appreciable benefit to applying water level data.

The trackline portion of this survey did not meet Specification and was not compiled. The survey data of the AWOIS items is adequate to supersede charted data.

A.4 Survey Coverage

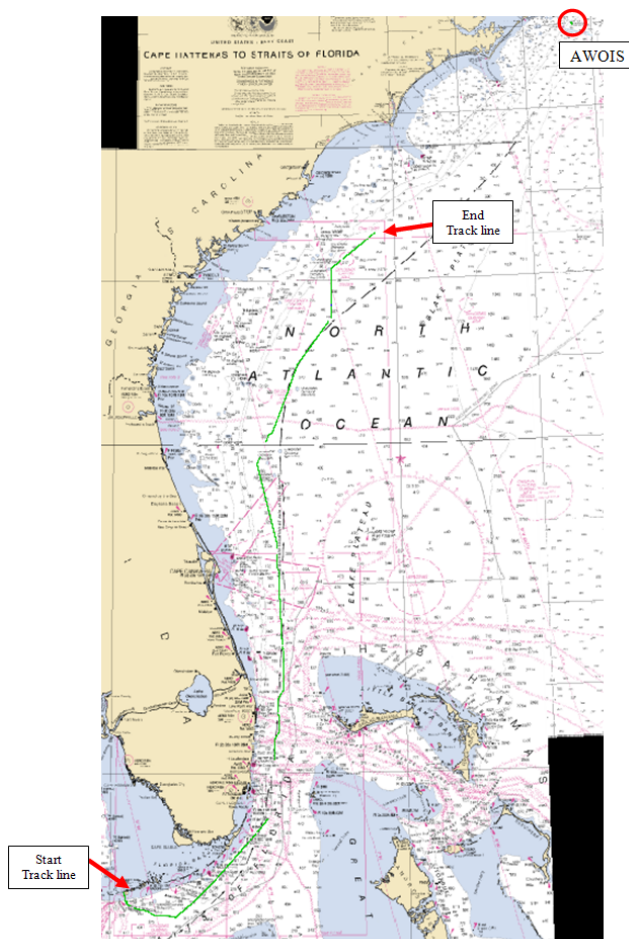


Figure 4: Track line and AWOIS acquired navigation data overlaid on applicable charts.

The track line was followed as closely as possible with cross track errors varying between 30-200 meters, yet sometimes it was necessary to deviate due to traffic. During periods after system crashes data were not recorded.

A.5 Survey Statistics

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

	HULL ID	<i>Total</i>
LNM	SBES Mainscheme	0
	MBES Mainscheme	548.46
	Lidar Mainscheme	0
	SSS Mainscheme	0
	SBES/MBES Combo Mainscheme	0
	SBES/SSS Combo Mainscheme	0
	MBES/SSS Combo Mainscheme	0
	SBES/MBES Combo Crosslines	0
	Lidar Crosslines	0
Number of Bottom Samples		0
Number of DPs		0
Number of Items Items Investigated by Dive Ops		0
Total Number of SNM		1.05

Table 2: Hydrographic Survey Statistics

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

<i>Survey Dates</i>
06/05/2011
06/06/2011
06/07/2011
06/08/2011

Table 3: Dates of Hydrography

A.6 Shoreline

Shoreline data was neither required nor acquired.

A.7 Bottom Samples

Bottom samples were neither required nor acquired.

B. Data Acquisition and Processing

B.1 Equipment and Vessels

Refer to the Data Acquisition and Processing Report (DAPR) for a complete description of data acquisition and processing systems, survey vessels, quality control procedures and data processing methods. Additional information to supplement sounding and survey data, and any deviations from the DAPR are discussed in the following sections.

B.1.1 Vessels

The following vessels were used for data acquisition during this survey:

Hull ID	<i>S-250</i>
LOA	37.7 meters
Draft	3.85 meters

Table 4: Vessels Used

B.1.2 Equipment

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

Manufacturer	Model	Type
Reson	7111	MBES
Sea-Bird	SeaCat 19	Sound Speed System
Applanix	POS/MV 320 V4	Positioning and Altitude
Hemisphere	MBX-4	Positioning System

Table 5: Major Systems Used

B.2 Quality Control

B.2.1 Crosslines

Crosslines were neither required nor performed for the track line segment of this survey.

All AWOIS investigation survey lines were conducted in a crossing pattern to meet the 4 percent crossline requirements. No significant discrepancies were identified.

B.2.2 Uncertainty

Track line data uncertainty has not been assessed.

The IHO recommends Order 2 for areas greater than 100m deep where a general depiction of the seabed is adequate and the likelihood of features affecting surface navigation is low. Since the sunken battleships are by far the most significant feature in this area, and are well represented in this data set, the hydrographer suggests that Order 2 is appropriate. Figure 5 illustrates the total vertical uncertainty analysis; green areas meet IHO Order 2 total vertical error requirements, red areas do not. Red sections result from outer beam data analysis on the sheet boundaries and are not directly over the AWOIS items.

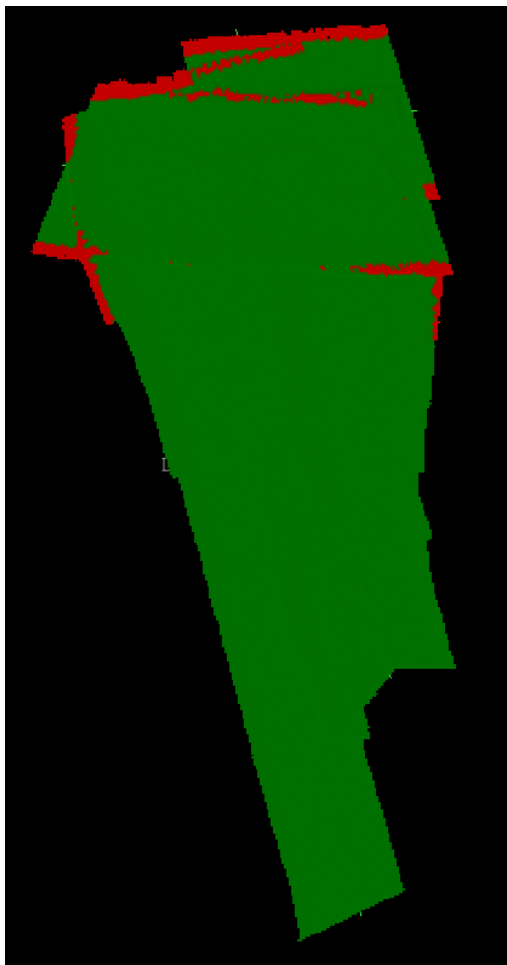


Figure 5: Total vertical uncertainty base surface for AWOIS items (8m).

The survey data of the AWOIS items is adequate to supersede charted data.

B.2.3 Junctions

There are no contemporary surveys that junction with this survey.

B.2.4 Sonar QC Checks

Sonar system quality control checks were conducted as detailed in the quality control section of the DAPR.

B.2.5 Equipment Effectiveness

B.2.5.1 Hysweep Crashes

Software crashes along the track line resulted in data gaps. This problem was not logged in any more detail.



Figure 6: Track line data with evident gaps from software crashes.

B.2.6 Factors Affecting Soundings

B.2.6.1 No Detected Factors

There were no other significant factors that affected corrections to soundings. Factors such as sea state and water column data were not recorded.

B.2.7 Sound Speed Methods

Sound Speed Cast Frequency: No sound speed profile was acquired for the trackline data. One CTD cast was taken on Dn159 for the AWOIS investigation.

According to the survey log, on Dn157 it was noted at 1746 that surface sound velocity input was missing. Upon investigation in Caris swath editor, surface sound speed artifacts are not evident.

The survey data of the AWOIS investigation is adequate to supersede charted data.

B.2.8 Coverage Equipment and Methods

All Equipment and survey methods were used as detailed in the DAPR.

B.3 Echo Sounding Corrections

B.3.1 Corrections to Echo Soundings

All data reduction procedures conform to those detailed in the DAPR.

B.3.2 Calibrations

All sounding systems were calibrated as detailed in the DAPR.

B.4 Backscatter

Water column backscatter was logged in the s7k files and submitted directly to NGDC, and is not included with the data submitted to the Branch. There is no plan to further process or investigate this data.

B.5 Data Processing

B.5.1 Software Updates

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

The following Feature Object Catalog was used: Version 5.2

B.5.2 Surfaces

The following CARIS surfaces were submitted to the Processing Branch:

Surface Name	Surface Type	Resolution	Depth Range	Surface Parameter	Purpose
D00158_8m (includes AWOIS items only)	CUBE	8 meters	89.51 meters - 134.56 meters	NOAA_8m	Complete MBES

Table 6: CARIS Surfaces

The one surface submitted includes only the AWOIS survey. All data fell within the depth range requiring 8m resolution. No surface was created for the track line data.

A 4 meter finalized surface (D00158_4m_Final) was created during office processing and used for compilation.

B.5.3 Noise to Portside

More noise was observed in the port-side of the data swath. As the Reson 7111 is mounted in the Starboard hull, we believe the outer beam data is bouncing off the port-side hull.

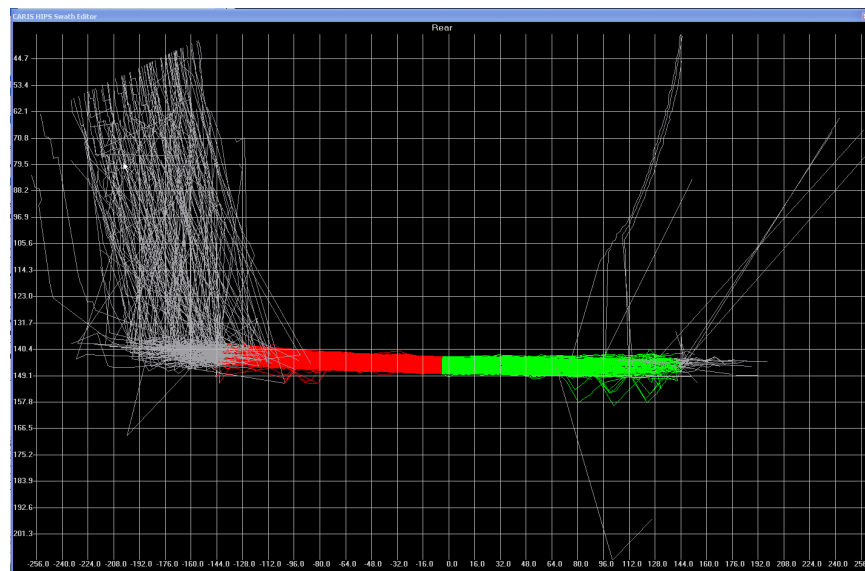


Figure 7: Track line data acquired from Reson 7111 in a snapshot from CARIS subset editor (rear view). Gray points are rejected soundings and are more pronounced on the port side (red).

B.5.4 Filters Applied

All track line data has 45 degree filters applied to port and starboard sides. AWOIS data was cleaned with Caris subset and swath editors without any filters applied.

The survey data of the AWOIS items is adequate to supersede charted data.

B.5.5 Critical Soundings

Two critical sounding were identified (outstanding) for the purpose of feature creation by exporting to Pydro.

C. Vertical and Horizontal Control

Per project instructions, zero-tides and DGPS correctors were applied. Therefore, this data is not sufficient to supersede previous chart sounding data.

C.1 Vertical Control

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

C.2 Horizontal Control

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

USCG Differential GPS correctors were applied to all positioning data. No record was kept as to which station was used at given times and locations. The hydrographer assumes that the DGPS receiver was configured to auto track the strongest station. The DGPS stations and frequencies listed are located along the trackline route. New Bern was most likely the station used for AWOIS items.

The trackline portion of this survey did not meet Specifications and was not compiled. As explained in section A.3, the tidal range was small and only a portion of the allowable uncertainty for this offshore survey with a depth area of 90-135 meters. The survey data of the AWOIS items is adequate to supersede charted

The following DGPS Stations were used for horizontal control:

DGPS Stations
Key West (286 KHz)
Card Sound (314 KHz)
Cape Canaveral (289 KHz)
Kensington (292 KHz)
New Bern (294 KHz)
Driver (289 KHz)

Table 7: USCG DGPS Stations

D. Results and Recommendations

D.1 Chart Comparison

D.1.1 AWOIS Items

Number of AWOIS Items Addressed: 2

Number of AWOIS Items Not Addressed: 0

The two AWOIS items assigned for investigation are the known sunken battleships USS NEW JERSEY (#14918) and USS VIRGINIA (#14917) offshore Cape Hatteras, NC. Two wrecks were detected in the approximate investigation positions. One wreck is 105 meters southeast of the reported AWOIS position for USS NEW JERSEY, another wreck is 59 meters north-northwest of the reported position for AWOIS USS VIRGINIA.

Using Caris software, the most shoal sounding on each wreck was attributed as outstanding. These depths were imported to Pydro and exported into the final feature file.

Neither of these wrecks are charted on the largest scale chart (11555, 1:80,000) of this area. The hydrographer recommends charting both wrecks with position and depth from this survey. Due to the reconnaissance nature of this survey and scale of the chart, the hydrographer recommends retention of the surrounding charted depths.

The AWOIS Report is appended to this report.

D.1.2 Charted Features

An unexploded depth charge is charted in the vicinity of this survey, but was not investigated. The feature corresponded to informational AWOIS item #14919. The charted (11555) position of this unexploded depth

charge is partially contained within the survey area (Figure 8). No efforts were made to locate this depth charge nor would the equipment used in the survey be capable of detecting this feature. The hydrographer recommends retaining this feature as charted.



Figure 8: Charted (11555) feature partially outside the reference surface.

D.1.3 Uncharted Features

See section D.1.1. above, regarding AWOIS wrecks.

D.1.4 Dangers to Navigation

No Danger to Navigation Reports were submitted for this survey.

D.1.5 Shoal and Hazardous Features

No potentially hazardous features or shoals were investigated within the limits of D00158

D.1.6 Channels

This survey does not include investigation of channel depths, anchorages, precautionary areas safety fairways, traffic separation schemes, pilotage areas nor range lines.

D.2 Additional Results

D.2.1 Shoreline

In accordance with the Project Instructions and the HSSD, shoreline was not investigated.

D.2.2 Prior Surveys

This data was not compared to prior surveys.

D.2.3 Aids to Navigation

There are no ATONs assigned for this project and none were verified within the limits of D00158.

D.2.4 Overhead Features

No overhead features were investigated within D00158.

D.2.5 Submarine Features

No submarine features were investigated within D00158.

D.2.6 Ferry Routes and Terminals

No ferry routes nor terminals were investigated within D00158.

D.2.7 Platforms

No platforms were investigated within D00158.

D.2.8 Significant Features

No significant features, aside from noted AWOIS items, were identified.

D.2 Construction and Dredging


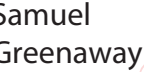
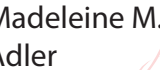
Offshore construction and dredging were not noted during this survey.

E. Approval Sheet

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

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

The survey data does not meet all requirements as set forth in the NOS Hydrographic Surveys and Specifications Deliverables Manual, Field Procedures Manual, Standing and Letter Instructions, and HSD Technical Directives. These track line sounding data are not adequate to supersede charted data in their common areas nor was this survey intended for that purpose. It is only recommended that charted positions and depths of AWOIS items #14917 and 14918 be updated. This survey is complete and no additional work is required.

Approver Name	Approver Title	Approval Date	Signature
LCDR Benjamin K. Evans, NOAA	Chief of Party	08/14/2012	 Benjamin K. Evans 2012.08.14 18:55:53 -04'00'
LT Samuel F. Greenaway, NOAA	Field Operations Officer	08/14/2012	 Samuel Greenaway Digitally signed by Samuel Greenaway DN: cn=Samuel Greenaway, o=NOAA Office of Marine and Aviation Operations, ou=Ferdinand R. Hassler, email=samuel.greenaway@noaa.gov, c=US Date: 2012.08.14 22:27:50 Z
LT Madeleine M. Adler, NOAA	Navigation Officer	08/14/2012	 Madeleine M. Adler Digitally signed by Madeleine M. Adler DN: cn=Madeleine M. Adler, o=NOAA Ship Ferdinand R. Hassler, ou=OMAO-MOCA, email=Madeleine.Adler@noaa.gov, c=US Date: 2012.08.14 22:47:00 Z

D00158 Feature Report

Registry Number: D00158
State:
Locality: Offshore Florida to North Carolina
Sub-locality: Florida to North Carolina
Project Number: M-H712-FH11
Survey Dates: 06/05/2011 - 06/08/2011

Charts Affected

Number	Edition	Date	Scale (RNC)	RNC Correction(s)*
11555	40th	04/01/2006	1:80,000 (11555_1)	[L]NTM: ?
12200	49th	06/01/2007	1:419,706 (12200_1)	[L]NTM: ?
11520	43rd	10/01/2008	1:432,720 (11520_1)	[L]NTM: ?
11009	38th	12/01/2006	1:1,200,000 (11009_1)	[L]NTM: ?
13003	49th	04/01/2007	1:1,200,000 (13003_1)	[L]NTM: ?

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

Features

No.	Name	Feature Type	Survey Depth	Survey Latitude	Survey Longitude	AWOIS Item
1.1	AWOIS #14918 (246/128)	Wreck	88.83 m	35° 01' 54.1" N	075° 17' 21.9" W	---
1.2	AWOIS # 14917 (278/154)	Wreck	102.79 m	35° 01' 11.2" N	075° 17' 10.2" W	---

1 - AWOIS Features

1.1) AWOIS #14918 (246/128)

Survey Summary

Survey Position: 35° 01' 54.1" N, 075° 17' 21.9" W
Least Depth: 88.83 m (= 291.43 ft = 48.571 fm = 48 fm 3.43 ft)
TPU ($\pm 1.96\sigma$): THU (TPEh) [None] ; TVU (TPEv) [None]
Timestamp: 2011-159.00:00:00.000 (06/08/2011)
Dataset: D00158_Final_Feature_File.000
FOID: US 0000000002 02387(0226000000020953)
Charts Affected: 11555_1, 12200_1, 11520_1, 11009_1, 13003_1

Remarks:

WRECKS/remrks: AWOIS 14918 - Uncharted wreck, USS NEW JERSEY, found by 100% MBES coverage.

Feature Correlation

Source	Feature	Range	Azimuth	Status
D00158_Final_Feature_File.000	US 0000000002 02387	0.00	000.0	Primary

Hydrographer Recommendations

Chart wreck at surveyed (D00158) position.

Reposition charted (11520) wreck to surveyed (D00158) position.

S-57 Data

Geo object 1: Wreck (WRECKS)
Attributes: CATWRK - 1:non-dangerous wreck
 QUASOU - 2:depth unknown
 SORDAT - 20110608
 SORIND - US,US,graph,D00158
 TECSOU - 3:found by multi-beam
 VALSOU - 88.827 m
 WATLEV - 3:always under water/submerged

Office Note: Clarification, no wrecks are charted in the vicinity of survey D00158 on chart 11555 (1:80,000), the largest scale chart of the area. A wreck is charted near this AWOIS feature on chart 11520 (1:432,720).

Feature Images

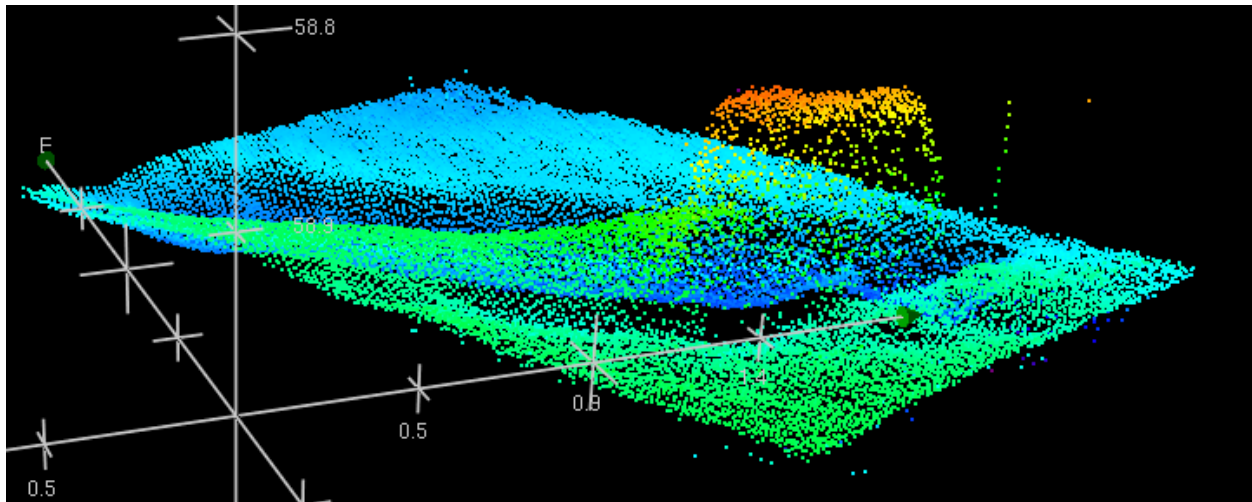


Figure 1.1.1

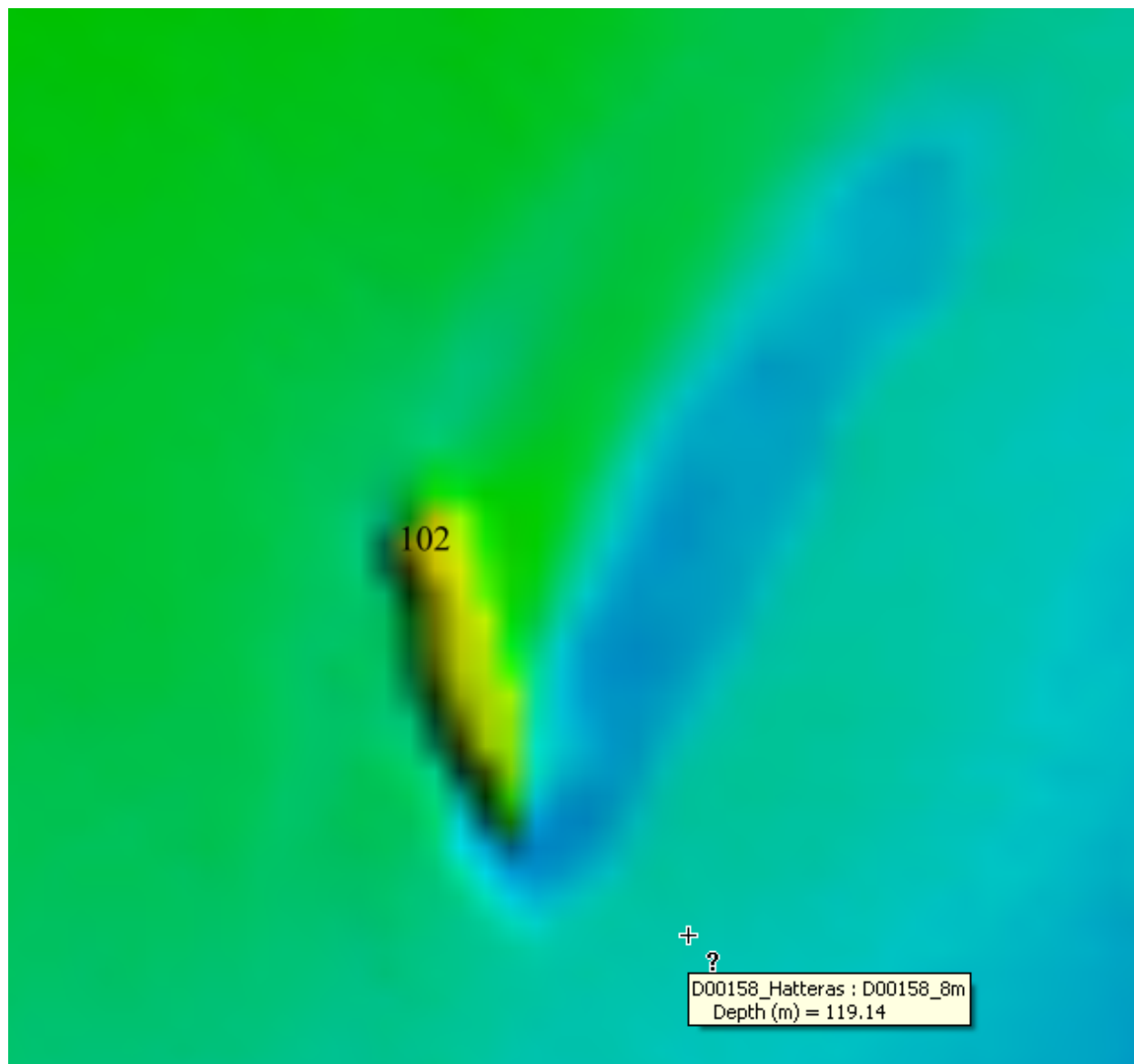


Figure 1.1.2

1.2) AWOIS # 14917 (278/154)

Survey Summary

Survey Position: 35° 01' 11.2" N, 075° 17' 10.2" W
Least Depth: 102.79 m (= 337.24 ft = 56.207 fm = 56 fm 1.24 ft)
TPU ($\pm 1.96\sigma$): THU (TPEh) [None] ; TVU (TPEv) [None]
Timestamp: 2011-159.00:00:00.000 (06/08/2011)
Dataset: D00158_Final_Feature_File.000
FOID: US 0000000001 02387(0226000000010953)
Charts Affected: 11555_1, 12200_1, 11520_1, 11009_1, 13003_1

Remarks:

WRECKS/remrks: AWOIS 14917 - Uncharted wreck, USS VIRGINIA, found by 100% MBES coverage.

Feature Correlation

Source	Feature	Range	Azimuth	Status
D00158_Final_Feature_File.000	US 0000000001 02387	0.00	000.0	Primary

Hydrographer Recommendations

Chart wreck at surveyed (D00158) position.

S-57 Data

Geo object 1: Wreck (WRECKS)
Attributes: CATWRK - 1:non-dangerous wreck
 QUASOU - 2:depth unknown
 SORDAT - 20110608
 SORIND - US,US,graph,D00158
 TECSOU - 3:found by multi-beam
 VALSOU - 102.791 m
 WATLEV - 3:always under water/submerged

Office Note: Concur.

Feature Images

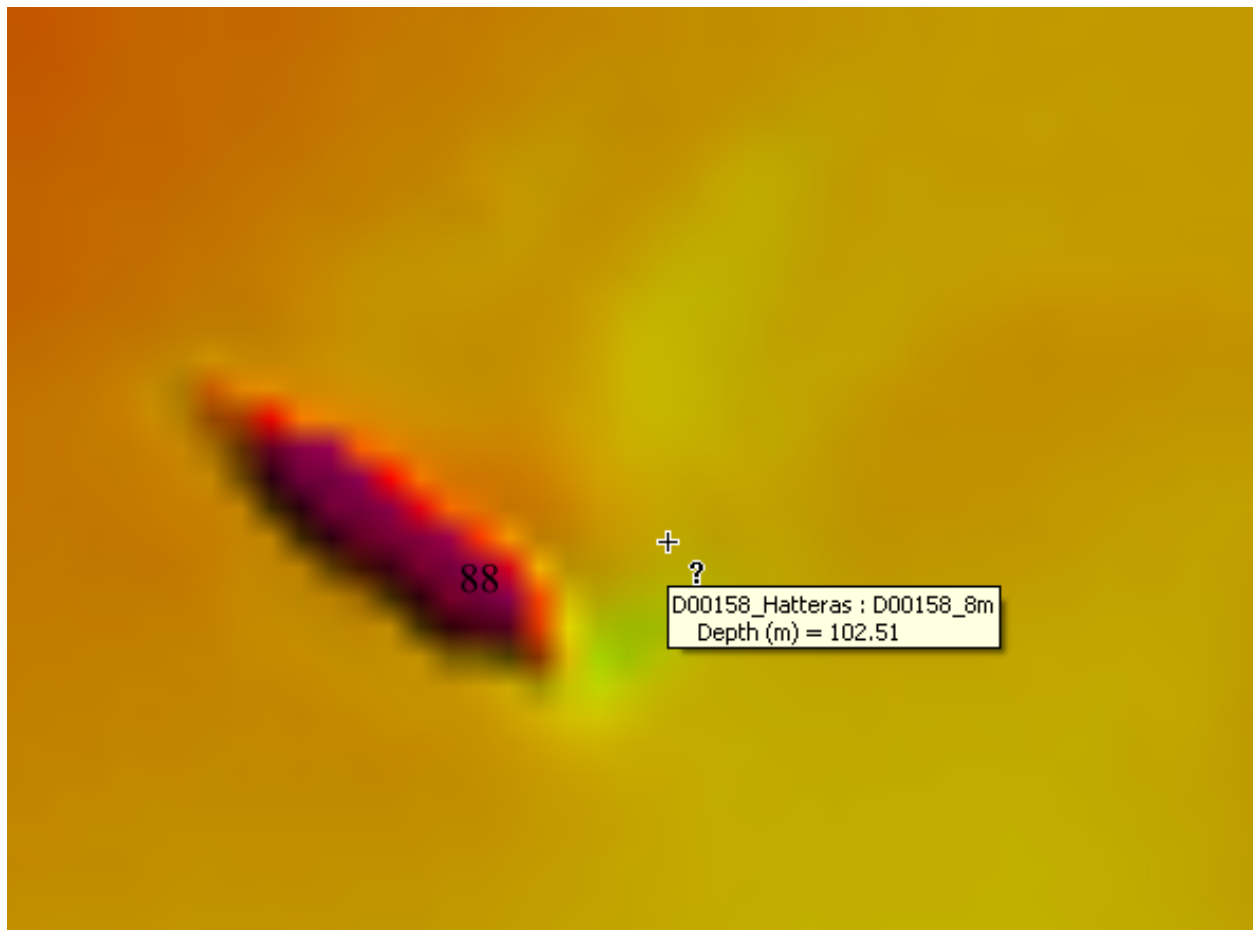


Figure 1.2.1

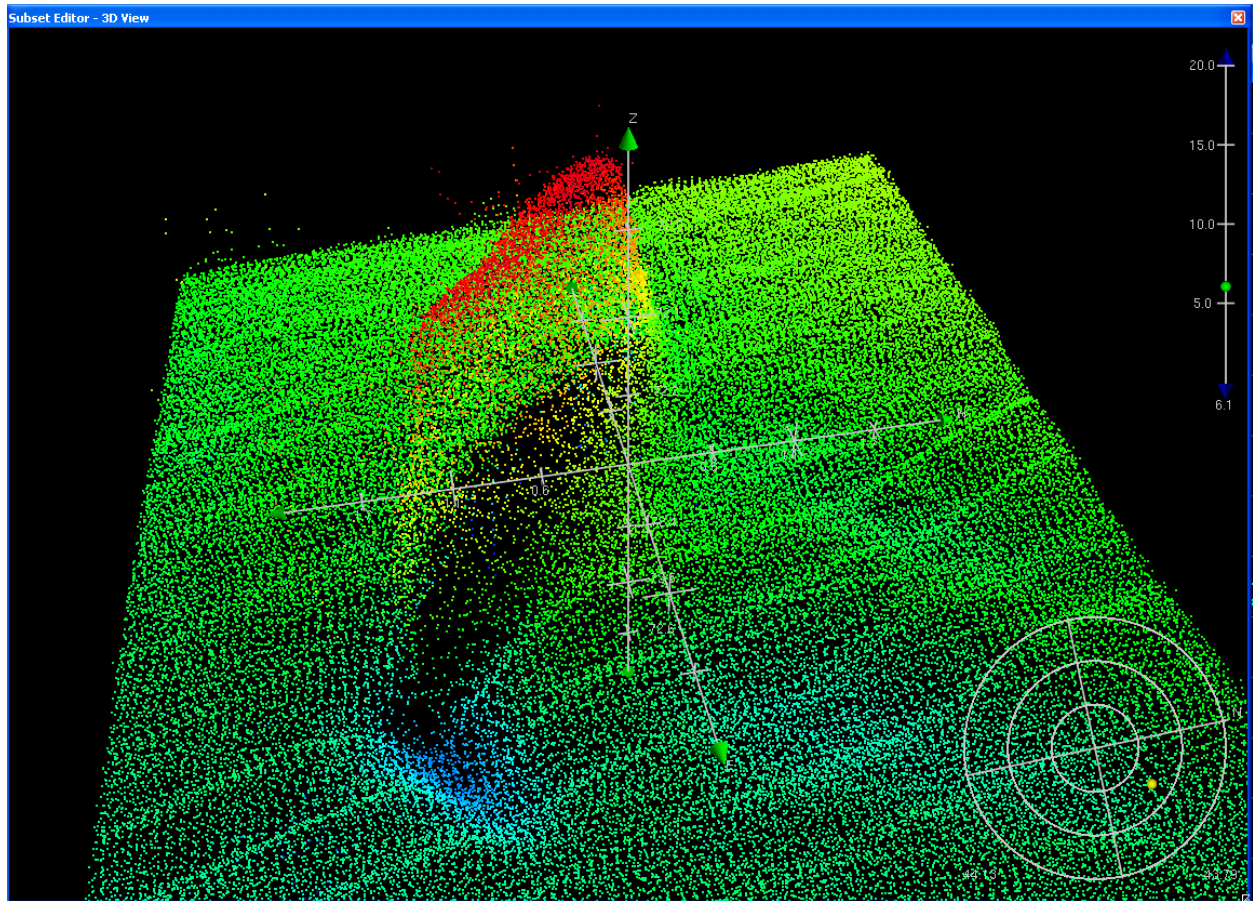


Figure 1.2.2

APPROVAL PAGE

D00158

Data partially meet current specifications as certified by the OCS survey acceptance review process. Descriptive Report and survey data except where noted are adequate to supersede prior surveys and nautical charts in specific areas as delineated during office processing.

The following products will be sent to NGDC for archive:

- D00158_DR.pdf
- One BAG, D00158_MB_4m_MLLW_1of1.bag
- Processed survey data and records
- D00158_GeoImage.pdf

The survey evaluation and verification has been conducted according current OCS Specifications.

Approved: _____
Pete Holmberg
Cartographic Team Lead, Pacific Hydrographic Branch

The survey has been approved for dissemination and limited usage of updating NOAA's suite of nautical charts.

Approved: _____
CDR David Zezula, NOAA
Chief, Pacific Hydrographic Branch